BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN BENCH ZONE
AT
CHENNAI

APPEAL NO. 15 OF 2020

IN THE MATTER OF:
THE CONSERVATION ACTION TRUST,
5, Sahakar Bhavan, 1st Floor, LBS Road,
Narayan Nagar, Ghatkoper (W),
Mumbai-400 086
Represented by its Executive Trustee,
Mr. Debi Goenka&1 Others.

...APPELLANT.

VERSUS

UNION OF INDIA,
Ministry of Environment and Forests & Climate Change,
Through it's Secretary
Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi- 110 003 and 3 others

...RESPONDENTS.

COUNTER AFFIDAVIT FILED ON BEHALF OF THE 4th RESPONDENT

ADVOCATES FOR THE 4th RESPONDENT
J. RAMACHANDRA RAO, Additional Advocate General, Telangana State.
Y. RAMA RAO,
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550-C, Road No.91, Jubilee Hills, Hyderabad-500 033, Telangana.
Mob: 7667967963, 9849012022

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THROUGH

ADVOCATES FOR THE 4th RESPONDENT

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Mob: 7667967963, 9849012022

Place: Chennai.

Date: 13-11-2020.

YRP

Counsel for 4th Respondent

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I, Shri. A. AJAY, S/O. A. CHANDAPPA, Aged about 56 years, Occupation: the then EXECUTIVE DIRECTOR/CIVIL/THERMAL, TSGENCO, Hyderabad – 500 082, Currently working as DIRECTOR (CIVIL), TSGENCO, Hyderabad – 500 082 do hereby solemnly affirm and sincerely swear on oath as follows:-

1. It is humbly submitted that I, in my official capacity as EXECUTIVE DIRECTOR/CIVIL/THERMAL, in the Office of the TSGENCO, VIDYUT SOUDHA, HYDERABAD, the answering 4th Respondent in the above-mentioned matter, am well conversant with the facts and circumstances of

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the case on the basis of the official records. Further, I am authorized and competent to swear to the contents of the Instant Counter – Affidavit.

2. It is respectfully submitted that I have gone through the contents of the Appeal filed by the Appellants, and I have understood the same. I am well conversant with the facts and circumstances of the instant Appeal and thereby seek leave of this Hon'ble Tribunal.

3. It is respectfully submitted that the contents which arespecifically and categorically not admitted by the answering Respondent herein all the other averments / contentions / allegations as made in the Appeal preferred by the Appellants, are deemed to be denied and disputed by the answering Respondent herein, and further the Appellants herein may be put to strict proof of the same.

4. In reply to para 1 of the appeal it is respectfully submitted that, it is the description of the appellant and the same may be put a strict proof.

5. In reply to para 2 of the appeal it is respectfully submitted that they are general in nature and hence need not be traversed.

6. In reply to :

A. Para 3(A), it is respectfully submitted that it is general information about the project.

B. Para 3(B), it is respectfully submitted that it is general information about the project.

C. Para 3(C), it is to submit that, initially, TSGENCO has proposed to establish 5200 MW Coal based thermal power station at Veerlapalem (V), Dameracherla (M), Nalgonda Dist. Accordingly, the Govt of Telangana, I & CAD department has accorded the permission for drawl of 208 Cuses (6.60

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TMC throughout the year) from the river Krishna vide G.O. Ms. No. 13, dated. 30.01.2015.

For operation and maintenance of 4000 MW coal based thermal power station, the maximum requirement of water is 3.714 TMC @ 3.00 cum per hour as per new standards fixed by MoEF& CC, GoI vide Gazettnotification dated. 16.10.2017.

As such TSGENCO will utilize only 3.714 TMC of water per year from the above allocation of 6.60 TMC per annum. The surplus water allocation will be utilized for expansion projects by obtaining necessary statutory approvals

D. Para 3(D), it is submitted that, *According to Revised EIA Report, a budget of Rs 5597 crores (capital) and Rs 430 Crores/ annum (recurring) has been earmarked. It is pertinent to note that the record of the Public Hearing notes this figure as Rs 2410 Crore wherein the FGD system was not considered.*

It is to further submit that this has been done to comply with the new emission norms. Additionally, the Flue gas de-sulphurisation (FGD) system, Nox Control equipment and High efficiency ESP are part of this additional control equipment.

E. Para 3(E), it is respectfully submitted that,

i) The MoEF& CC, GoI has accorded Stage – II clearance for diversion of 1892.35 Ha of forest land under Veerlapalem forest block, Dameracherla (M), Nalgonda Dist in favour of TSGENCO for establishing 6800 MW coal based thermal power plant vide letter F. No. 8-07/2015-FC, dated. 07.07.2015.

ii) No forest land was diverted for establishing 2400 MW coal based thermal power plant under Dilawarpur forest block as the diverted forest land to an extent of 1892.35 Ha under Veerlapalem forest block

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is sufficient for establishing total 6800 MW thermal power plant (4400 MW + 2400 MW).

iii) The TSGENCO has handed over an equivalent Non-forest land to an extent of Ac. 1892.35 Ha (Ac. 4676.00) under old Nalgonda Dist to the Forest department for raising compensatory afforestation by the Forest department. An amount of Rs. 80.13053 Crores was deposited with Forest department on 02.05.2015 for the above purpose.

iv) The MoEF& CC, GoI has diverted 1892.35 Ha of forest land under Veerlapalem forest block for establishing 6800 MW thermal power plant (4400 MW + 2400 MW) but not for 4400 MW.

F. Para 3(F), it is respectfully submitted that the procedure for railway corridor is as follows:

i) A consultant empaneled by the Railways has to be nominated. They shall prepare the Feasibility Study Report (FSR). A conceptual plan has to be prepared which is presented to the Railways. An In-Principle clearance or Rail Traffic Clearance has to be obtained. A DPR shall be prepared and Engineering Scale Plans are to be submitted for approval of the Railways. The construction of the same is started after receiving the above approvals. Currently TSGENCO has completed the following activities pertaining to the Railway line.

1. The TSGENCO has appointed the consultants i.e. M/s. RITES Limited, Secunderabad for preparation of Feasibility Study for the proposed Railway siding from Vishnupuram to project site including marshalling yard vide P.O. No. CC-0055/CE/Civil/Th/SE/TCD-I/YTPS/F. RITES. Dameracherla/D, No. 254/2015, dated. 22.08.2015.

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2. Subsequently, M/s. RITES Limited, Secunderabad have furnished the Feasibility study report including conceptual plan to M/s. South Central Railways on 05.01.2018.
3. M/s. South Central Railways have accorded the In-Principle approval to the Feasibility Study report on 25.09.2019, vide Lr. No. T.143/GNT/496, dated. 25.09.2019 after various reviews.
4. DPR was submitted to South Central Railways by M/s. RITES Limited, Secunderabad on 10.01.2020 and the approval to the DPR from the SC railways is awaited.

ii) After finalizing the railway line alignment and approval of M/s. South Central Railways only, the land acquisition for laying the connecting railway line for a length of 10.66 km from Vishnupuram Railway Station to project site will be taken up. Now as the alignment of railway line is finalized and M/s. South Central Railways has also communicated its In-principle approval vide letter dated. 25.09.2019, the requisition was filed with the District Collector for acquisition of required land.

iii) Indian Railways will not build the required connecting railway line. TSGENCO has to take up the same after obtaining the necessary approvals of the Railways.

G. In reply to Para 3(G), it is submitted that the environmental and ecological impact of the transmission lines have not been included in the scope of the EIA or the standard TOR. However, all statutory clearances will be obtained by the Agency appointed by TSGENCO/ TSTRANSCO for the transmission lines.

H. Para 3(H), it is respectfully submitted that the matter in EIA is again reproduced by the appellant.

7. In reply to para 4, it is to submit that

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(i) The forest land diverted in favour of TSGENCO for establishing Yadadri Thermal Power plant under Veerlapalem forest block, Dameracherla (M), Nalgonda District is a highly degraded forest land. As per the report given by the Additional PCCF, MoEF& CC, Regional Office, Chennai vide Lr. No. 13.3 (9)/INS/ ROSEZ/ 2014/26, dated. 20.02.2015, there are no endangered/ rare/ unique species of Flora and Fauna present in the above forest. Also there is no protected archaeological/heritage/ defence or any other important monuments in the area. The area is not having wildlife sanctuary or national park. Nearest protected area is Amrabad Tiger reserve at about 10 km distance from the above diverted forest land.

(ii) There were about 1200 encroachers and also 1194 pattedars provided with RoFR, UDAFA, Assignment, D-Form patta in the above diverted forest land, which clearly shows that the above land is completely degraded forest land.

(iii) Further, the Sub Committee of EAC (T&C), MoEF& CC, GoI, New Delhi has visited the proposed project site on 05.12.2015 and inspected the entire proposed project area and after thorough inspection & satisfying with the site conditions, recommended for issue of ToR to TSGENCO for setting up of 5X800 MW coal fired Super critical thermal power plant at Veerlapelm (V), Dameracherla (M), Nalgonda duly including their recommendation in the ToR besides other generic ToR vide their report. (Copy Enclosed- **Annexure -1)**.

It is further submitted that the allegations made by the appellant are not correct.The impacts of Yadadri Thermal Power plant on all the aspects i.e. river Krishna, Tungapahad vagu, Wildlife, Transportation and storage of coal, railway lines, etc were already discussed in the Revised EIA report. The EAC was satisfied with the information provided in the Revised EIA report by TSGENCO and recommended the Environmental clearance for the project.

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8. In reply to:

a. Para 5(a), it is respectfully submitted that the mere non-availability of a document on the website of MoEF&CC is not a relevant fact.

b. Para 5(b), 5(c), 5(d) and 5(e), it is respectfully submitted that the appellant is stating the background for the proposal of Yadadri TPS.

c. Para 5(f), 5(g), 5(h), 5(I), it is submitted that the EIA/EMP report prepared by M/s. Bhagavathi Ana Labs Pvt. Ltd, Hyderabad was not satisfactory and also the same was pointed out by EAC, MoEF& CC during the 63rd EAC meeting held on 29th – 30th August, 2016.In furtherance to that, the TSGENCO has changed the consultants and appointed M/s. B.S. Envi-Tech Pvt. Ltd, Hyderabad for revising the EIA/EMP report based on the comments and observations given by the EAC. Accordingly, revised EIA/EMP report was prepared by M/s. B.S. Envi-Tech Pvt. Ltd, Hyderabad and the same was uploaded in the TSPCB website on 01.02.2017 for seeking the comments of the public within 3 weeks. This was after complying to the MoEF&CC minutes of the 63rd EAC meeting. Finally, after satisfying with the revised EIA/EMP report submitted by TSGENCO and presentation given before 5th EAC meeting held on 26.04.2017, EAC has recommended for grant of environmental clearance for the above project.

9. In reply to Para 6, it is submitted that,

(i) As per the directions of Govt of Telangana, TSGENCO has proposed to establish 6800 MW Thermal Power plant under Veerlapalem and Dilawarpur forest blocks, Dameracherla (M), Nalgonda Dist and filed application with MoEF& CC, GoI for diversion of forest land to an extent of 4334.01 Ha on 07.01.2015.

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(ii) The MoEF&CC,GoI, New Delhi after thorough verification of the application and site visit, had restricted the extent of land from 4334.01 Ha to 1892.35 Ha based on the norms prescribed by CEA in the extent of lands to be considered for establishing coal based thermal power plants. Accordingly, MoEF& CC, GoIhas accorded Stage – II clearance vide F. No. 8-07/2015-FC (FC section), Dt. 07.07.2015 for the land to an extent of 1892.35 Ha (i.e. 4676 acres)only under Veerlapalem forest block instead of Veerlapalem and Dilawarpur forest blocks for establishment of above thermal power plants.

The forest land is degraded forest land. The sub-committee of the EAC (Thermal) visited the site and after touring and review of the topography of the site including the Forest land areas, Tungapahad vagu etc had approved the site with specific conditions which is reflected as Additional TOR for the project including the shifting of Ash Pond area and non-disturbance of Tungapahad stream etc. The statement that no details are given is frivoloussince the appellant quotes the land requirement table from Form A, Part-I of the Forest Clearance application. It may be noted that at the time of submission of the Application of Forest Clearance dated. 07.01.2015, the planning was to establish 6800 MW thermal power plants at different stages keeping in view of the future requirements and the request of NTPC to implement a power plant as part of reorganization of the two states namely Andhra Pradesh and Telangana was done. However, later the project was reconfigured to implement 5x800 MW by TSGENCO on priority basis. Any project configuration will be finalized based on the final techno-economic feasibility/ Detailed Project Report.

The "siting guidelines" give a framework for selection of land for the power plant or any industry. Avoidance of agricultural land / Reserve Forest land is

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required to be complied. It may be seen that the identified land though it is denoted as Reserve Forest land is a **degraded land**. Hence this land was identified. The same was authenticated by the Report of the Sub-committee of the EAC of MoEF&CC which visited the site and got convinced of the site conditions before recommending additional TORs for the project

It is pertinent to note that the Hon'ble NGT has advised MoEF to revise the siting guidelines in line with the current scenarios since the guidelines were promulgated "wayback" in 1987 (2640 MW coal based thermal power plant of M/s Nagarjuna Construction Company Ltd., Srikakulam in the year 2012). Hence, saying that the site selection guidelines have not been followed is not correct.

10. In reply to Para 7, it is to submit that the details of the Forest Clearance were submitted to the Ministry and EAC. The Forest Clearance was restricted to 1892.35 Ha only. There are no details available for the expansion other than reserving space for future expansion. Hence, the total capacity of 6800 MW was not considered which is the normal standard practice. Anyhow as and when any expansion of plant capacity is planned, TSGENCO will approach MOEF&CC and obtain the necessary clearances as per statutory guidelines.

11. In reply to Para 8, it is submitted that the allegation made by the appellant is false, baseless and frivolous and is specifically denied by this answering respondent. The photograph displayed in Annexure 13 was the inauguration pylon which was under construction. The pylon was inaugurated by the Hon'ble Chief Minister of Telangana State on 08.06.2015 for the proposed 5X800 MW thermal power plant. The project construction works were commenced by M/s. BHEL on 17.10.2017 as per the Letter of Intent issued by TSGENCO, only

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after according the stage –II clearance on 07.07.2015 and Environmental clearance on 29.06.2017 by MoEF& CC, GoI.

Further, M/s. BHEL has awarded the site leveling and grading works to the following agencies vide LoIsnoted against each and they have commenced the works on 13.05.2018. The copies of the LoIs are enclosed as **Annexure -2&3.**

S. No.	Name of the Agency	LOI issued by M/s. BHEL.	Date of commencement of work
1	M/s. RK Infracorp Pvt Limited, Hyderabad	Lr. No. BHEL:PSSR: SCT:1699-Package – 1/2018/363, dt.18.04.2018.	13.05.2018.
2	M/s. Sri Raja Rajeswari Constructions India Pvt Limited Hyderabad	Lr. No. BHEL:PSSR:SCT:1699-Package – 2/2018/395, dt.24.04.2018.	13.05.2018.

As already seen from the above, it is further submitted that the allegations made by the above appellant that site leveling, and grading works started before issue of EC is not correct and the averments are specifically denied by this answering respondent.

12. In reply to Para 9, it is submitted that that the Forest Department has declared that the forest in Nalgonda Distis highly degraded as part of the site report submitted by the Addl. PCCF (Central), MoEF& CC, Regional Office, Chennai vide his letter dated. 20.02.2015. Subsequently the Sub-committee of EAC of MoEF&CC has visited the site and upon verification recommended the grant of TOR with specific conditions.

13.In reply to Para 10, it is respectfully submitted that it is just a repetition of the the EIA report.

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14. In reply to Para 11, it is respectfully submitted that it is just a repetition of the the EIA report.

15.In reply to Para 12, it is submitted that the proposals of obtaining the EC for establishment of both (4X270 MW) Bhadradri Thermal Power Station at Manuguru, Khammam Dist and (5X800 MW) Yadadri Thermal Power Station at Veerlapalem (V), Dameracherla (M), Nalgonda Dist were taken up in the year 2015 and ason that date the only available potential sites (Site -1 : Punulachilka (V), Kothagudem (M), Khammam Dist and Site - 2: Karukonda&Kunaram villages, Kothagudem (M), Khammam Dist) in Telangana state based on the site selection criteria of thermal power plants, were considered in the proposals.

16. In reply to Para 13, it is to submit that as there was a deficiency of 2700 MW to 3000 MW electrical power as on the date of formation of Telangana State, TSGENCO has proposed to establish coal based thermal power station with a capacity of 4400 MW at Veerlapalem (V) and 2400 MW at Dilawarpur (V), Dameracherla (M), Nalgonda Dist to meet the power demand of Industrial, domestic and agriculture sectors, etc of Telangana state.

Accordingly, the site selection team comprising officials from TSGENCO, and Revenue officials from State Govt visited the potential sites in Telangana state identifying the most suitable and viable site for setting up of supercritical thermal power projects in the state. Out of three prospective sites identified in Telangana state, the selection committee has finalized the present site located in villages of Veerlapalem, Dilawarpur and Gangadevi Gutta of Damerachela (M) in Nalgonda Dist which is having good rail/road accessibility, availability of water and the least R&R issues.

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After finalizing the above site by the selection committee, the Hon'ble Chief minister, Telangana state has also visited the same site and satisfied the site selection and given his approval for setting up of the above thermal power plant.

17. In reply to Para 14, it is to submit that the Hon'ble NGT has already directed MoEF&CC to revise the Siting Guidelines (**Annexure- 4**). The learned counsels are well aware about it and is being unnecessarily brought out.

18.In reply to Para 15, it is submitted that the same is clear from the statement that sub-committee of EAC of MoEF&CC which has experienced people with sound professional knowledge was convinced that the Project Proponent has not taken valleys which are fertile and having extensive cultivation. They have infact thoroughly visited the site and opined intheir report that "the area proposed for the project is flat, nearly barren with grassy patches having herbaceous legumes such asCotalariaand few other lateritic plateau species". How does the appellants conclude and castigate that the MoEF&CC has not applied mind etc.

19. In reply to Para 16, it is respectfully submitted that:

i. There will be no impact on the Tiger Reserve since the Project is implementing the FGD and Nox control unit which will control the outlet emission to exceptionally low values (i.e 98% of the emission is controlled). The impact on the ambient air quality has been evaluated and presented in the Revised EIA

ii. The site visit report specifically mentions that the Amrabad Tiger Reserve at about 10 km whereas the EC mentions that the Yadadri TPS is at a distance of 14.03 km from the Nagarjuna Sagar Tiger Reserve based on the Survey of

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India Toposheet. The exact aerial distance was furnished in the Revised EIA report.

There is no discrepancy. The PCCF&Chief Wildlife Warden,Govt. of Telangana has categorically stated the following:

"*1. The Amarabad Tiger Reserve does not fall within the 10km of the boundary of the proposed Yadadri Thermal Power Station at Veerlapalem village*

2. No Wild animal migratory path or Wild animal corridor is located within 10 kms of the boundary of the proposed Yadadri Themal Power Station (Annexure 2A of the revised EIA report"

iii. The revised EIA showcased the Landuse pattern of the site using latest satellite imagery. The site is Reserved forest land but it is degraded. The change in land use have been clearly mentioned along with proposed development of greenbelt, non-diversion of Tungapahad vagu, strengthening the banks of the vagu etc as per the recommendations of the sub-committee report.

iv. The revised EIA report clearly showed the plant layout on the Survey of India Toposheet with latitude and longitude Fig 2.5, Pg17. The land categorization was furnished in the Table on Pg 18 of the Rev EIA Report. Photographs of the site were furnished as Fig 2.4 regarding the degraded nature of Forest land. The Sub-Committee Report has categorically stated "*Point 2.4 – Within the project area, agriculture is confined to valleys,,"*

v. This statement of the Appellant is not correct. The Sub-Committee Report clearly mentions "*Point 2.2 – The Vagu runs from NE to SE after taking several meanders. In valleys it has narrow flood plains but in plateaus it*

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runs through deepgorges. Within the project area, it is flood plain ranging from 10m to 100m wide in the "U" shaped meandering zone."

20. In reply to Para 17, it is submitted that:

i. The contention of the appellants is totally out of context. The letter of Sri. Y. Chennakesava Reddy as mentioned suggests not to establish the project due to loss of 2095 acres of forest land. However, the Forest land is a degraded land as confirmed by the Addl. PCCF (Central), MoEF & CC, Regional Office, Chennai and the Sub- committee Report. Further, after going through the details of the site conditions, they have recommended for diversion of forest land and issue of ToR respectively. This is a concoction of the Appellant. The RS imagery clearly gives the factual position of the status of agricultural lands. The category of lands acquired for the project are given in the revised EIA at Para 2.51 at Pg 18 of the Revised EIA.

ii. There are no agricultural activities carried out at the site since it is degraded forest land. Whatever the agriculture is being carried out is in the valley zones. The RS imagery clearly shows where the agriculture is being carried out.

21. In reply to Para 18, it is to submit that the allegation is blatantly false. It is a pre-requisite that the status of Forest land along with forest clearance has to be submitted to MoEF&CC while filing the application for Environmental Clearance. The Forest department evaluated the proposal and issued the Stage II clearance since the identified land is degraded land. The sub-committee visit was mainly to ascertain the ground situation and the information submitted. The sub-committee also recommended the site for the project.

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22. In reply to Para 19, it is to submit that the averments made by the appellants are totally false and baseless. The first public hearing for the project was conducted on31.05.2016. The validity of the Public hearing is for three years as per Office Memorandum dated. 29th August 2017 **(Annexure-5) of** MoEF&CC.

Subsequently, the project proponent requested the Ministry to exempt from conducting the second public hearing. The Ministry however asked the Project Proponent to publish the Revised EIA/EMP report on the website of TSPCB and also issue the public notice in two newspapers one in vernacular language of the locality concerned and another one in English newspapers to seek the public comments. TSPCB has uploaded the revised EIA/EMP report submitted by TSGENCO on the website of TSPCB on 01.02.2017 and also published the public notices on 02.02.2017 in Namaste Telangana & Hindu newspapers.

Public comments were received from three persons namely, Sri. Y. Chenna Keshava Reddy, Dr. K. Babu Rao and Sri. N. Harindar and they were suitably replied in the Revised EIA/EMP report at Annexure – 11.

23. In reply to Para 20, it is submitted that the EAC pointed out to the various shortcomings of the original EIA report and asked for a revision of the EIA report incorporating the information like use of FGD technology, water withdrawal & availability, use of ACC technology, etc. The same was carried out by the Project Proponent and submitted to the EAC for consideration.

24.In reply to Para 21, it is respectfully submitted that the Project Proponent has requested MoEF&CC to exempt from conducting the Public Hearing for the second time considering the following facts:

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a) Public hearing for the project was already conducted on 31.05.2016. The same is validated as per Office Memorandum dated 29th August 2017 (**Annexure-5**)of MoEF & CC.

b) There is no change in location or capacity of the project or change in the survey numbers of the land to be acquired.

c) The EAC is an advisory Committee, but the Committee was convinced about the request of the Project Proponent and recommended to MoEF&CC to exempt the Project from Public Hearing. However, it asked the Project Proponent to upload the Revised EIA report on TSPCB website and giving a public notice in two Newspapers for seeking the comments from the public within a period of 21 days.

25. In reply to Para 22, it is submitted that the EAC has very diligently applied the mind and evaluated the request of the Project Proponent and did not take decisions in a haste.

26. In reply to Para 23, it is submitted that allegations made by the Appellant are absolutely baseless, frivolous and false. The entire risk assessment has been carried out and provided with figures in Chapter 7 of the Revised EIA Report. Similarly, Chapter 10 deals with the Environmental Management Cell and its functioning.

27. In reply to Para 24, is to submit that the Appellant is simply harping on the fact that the Sub-Committee report mentions as 10km is the distance of Nagarjunsagar Tiger Reserve (Amrabad Tiger Reserve) whereas the aerial distance is 14.03 km as per the SOI Toposheet July 2015. If there was any discrepancy, the Forest Department would have brought out the same at the time of issuance of wildlife clearance. The Principal Chief Conservator of Forest and Chief Wildlife Warden, Govt. of Telangana has issued the letter attached as Annexure-2A in the Revised

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EIA. The Survey of India map certified by DFO, Wildlife Management, Nagarjunasagar was also submitted.

It is to further submit that the appellant is unnecessarily indicating other sanctuaries which are about 100 km away from the project site.

Collection of baseline data

The MOEF&CC has issued guidelines for Consultants wherein when a new Consultant takes over the project, the new consultant has to validate the baseline data. Please refer to clarifications to Version 3 of the Scheme dated October 3, 2017 (**Annexure-6**) for EIA consultants. Considering the above, the new consultant M/s. BS Envi-tech Pvt Ltd. has followed the same and collected one-month baseline date to validate the data of Bhagavathi Ana Labs Pvt Limited. The Project proponent will collect the baseline date for other seasons as part of the compliance monitoring and submit it as Six-monthly reports to MoEF&CC and TSPCB.

28. In reply to para 25, it is submitted that the Allegation of the appellant that the source and analysis of coal is not given in the revised EIA report is not correct and false. The source of coal and its analysis is clearly given in the Page No. 20 & 21 of revised EIA report and the same are reproduced below:

The project will use blend coal having ratio of 50 % Indigenous and 50 % Imported coal or 100 % Imported coal with LDO as startup fuel and Heavy Fuel Oil (HFO) for flame stabilization. The following are the characteristics of the coal proposed for use in the power project.

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COAL ANALYSIS

Descreption	Unit	Indian Coal (based on SCCL data)	Imported Coal (based on MSTC's Imported Coal)	Blended Coal (50% Indian Coal & 50 %Imported Coal)
Proximate Analysis				
Fixed Carbon	%	33.0	42.94	37.97
Volatile Matter		27.00	28.92	27.96
Moisture		10.00	13.14	11.57
Ash		30.00	15.00	22.50
Calorific Value	**Kcal/kg**	4530	5700	5115
Total				
Ultimate Analysis				
Carbon	%	49.41	57.75	53.58
Hydrogen		2.83	3.53	3.18
Sulphur		0.42	0.80	0.61
Nitrogen		0.85	1.08	0.97
Oxygen (difference)		6.49	8.70	7.59
Moisture		10.00	13.14	11.57
Ash		30.00	15.00	22.50

Coal analysis considered by BHEL for design of Power Plant and Radio activity and heavy metal content of coal are already given as **Annexure – 2C** and **Annexure – 2D**respectively in the revised EIA report.

ANNUAL COAL REQUIREMENT

The estimated coal requirement is given below

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Fuel		5x800 MW (4000 MW)
Blend Coal (50% Indigenous Coal and 50% Imported Coal) (@GCV of 5115 kcal/kg)	TPH	1650
	TPD	39600
	MTPA	12.28 @ 85 % PLF
Or		
Imported Coal (100%) (@GCV of 5700 kcal/kg)	TPH	1480
	TPD	35520
	MTPA	11.02 @ 85 % PLF
MTPA – million tonnes per annum, TPH -Tonnes Per Hour, TPD-Tons per day *PLF-Plant Load Factor*		

COAL SOURCE AND LINKAGE

The MOU with M/s SCCL for supply of Indigenous coal and the commitment letter for supply of coal as per the MOUare already enclosed in revised EIA as **Annexure - 2E (I) and Annexure - 2E (II)**. Also, MoU entered with M/s. MSTC for supply of imported coal is revised as directed by the EAC during the 63rd meeting is enclosed as **Annexure - 2E (III)**in revised EIA report.

The same are herewith enclosed as **Annexures7,8 and 9** respectively.

COAL TRANSPORTATION

Indigenous coal received will be transported from SCCL Mines using the Rail network. Imported coal will be received by ships at Krishnapatnam/Kakinada/Visakhapatnam ports. From the Ports, coal will be transported by Indian Railways to the plant site.

29. In reply to Para 26, it is submitted that there is no contravention of the MoEF&CC direction. Being a Government of Telangana Project, the Government has decided to source the coal from SCCL Mines by following due procedures laid

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out for Coal linkages. The MOU entered with M/s SCCL along with the commitment letter for supply of Indigenous coal is also furnished in the EIA report as Annexure - 2E (I)& 2E(II). Similarly, TSGENCO entered an MOU with MSTC Ltd (A Govt. of India Enterprise) to arrange for procuring imported coal as per the quality specifications. Hence, the water and fuel linkages have been firmed up and the documentation regarding the same has been furnished.

Allocation of Water:

Telangana State Government has accorded permission for drawl of 208 Cusecs (i.e. 6.60 TMC per year) throughout the year from the nearest and feasible location of river Krishna to meet the requirement of water for the above power plant vide G. O. Ms. No. 13, dated. 30.01.2015. The water allocation order is also enclosed in the revised EIA report as (Annexure – 2(F)).

As such the allegations of the appellant that there is no coal linkage and water allocation before issue of EC is not correct and baseless.

30. In reply to Para 27, it is submitted that the Ministry of Coal (MoC) Govt. of India has taken a decision in 2015 that, fresh applications for grant of coal linkages shall be kept in abeyance, till a new policy is formulated for grant of coal linkages. As such, the Ministry of Coal allocation for valid linkage for the project is not available during submission of EIA. However, TSGENCO has entered Memorandum of Understanding (MOU) with M/s. Singareni Collieries Company Limited (A Government Company) for supply of 7.0 Million Tonnes of coal per annum to YTPS. As per the MOU "the Seller shall supply 7.00 Million Tonnes per Annum (7.0 MMTPA) of G9 & above grades coal/WG-G9 grade for operation of Yadadri Thermal Power Station (5 X 800 MW) subject to the obtaining linkage from Standing Linkage Committee (LT) of Ministry of Coal, Govt. of India for such supplies as per NCDP 2007 and cost plus policy guidelines 2008". The copy of MOU was furnished in revised EIA.(Annexure 2E(I)).

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Subsequently, MOC, GoI has introduced SHAKTI POLICY-2017 (Scheme for Harnessing and Allocating Koyala (Coal) Transparently in India) for allocation of coal linkage to the Power Sector.

As per the conditions stipulated in the MOU with M/s. SCCL, TSGENCO has applied to MOC, GoI for allocation of Long-Term Coal Linkage for YTPS (5X800 MW) under SHAKTI POLICY-2017.

Ministry of Coal, Govt. of India has granted Long Term linkage of G9 grade coal from M/s. SCCL to YTPS during February 2018. As such, TSGENCO has fulfilled the MOU conditions with M/s. SCCL.

31.In reply to Para 28, it is to submit that the averments made by the appellants are totally incorrect and false. The analysis of both domestic as well as imported coal carried out by M/s. BHEL has been furnished in the Revised EIA report. The air pollution modelling has been carried out considering the fuel analysis. Here it is to be noted that the project is implementing FGD system to capture 98% of the pollutants in compliance to the MoEF&CC order dated. 07.12.2015 at an estimated cost of Rs. 4150.00 Crores. The Appellant is misleading the Hon'ble NGT by not mentioning the same. The Appellant himself says that "the composition and the concentration of elements in coal vary widely and will have very different pollution impacts depending on the source". Hence, TSGENCO has taken the help of BHEL who the manufacturers of Super Critical boilers are to arrive at the technically feasible fuel mix.

32. In reply to Para 29, it is submitted that the appellants are just reiterating the office Memorandum dated 13th November 2009, issued by the Ministry of Power and this answering respondent has already submitted that the project is based only on Supercritical technology.

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33. In reply to Para 30, it is respectfully submitted that it is important to mention that BHEL which is a leading Navratna Public Sector company having considerable experience in various boiler technologies including Super critical technology is the EPC contractor of the Project. BHEL has already commissioned power plants based on super critical technologies based on use of indigenous coal or blend coal and imported coal. Hence BHEL is having considerable experiencing of implementing Super critical technology in the country and continuously monitoring the performance of the same is in a much better position to make suitable design changes for achieving high efficiencies. TSGENCO has proposed to utilize the higher grade G9 coal of GCV 4601 K.Cal/Kg to 4900 K.Cal/Kg with ash content less than 34% and imported coal of GCV greater than 5700 K.Cal/kg with ash content 15% in blend to achieve Super critical boiler efficiencies. Hence it is premature on the part of Appellant to state that "it may not be possible to consistently achieve super critical boiler efficiencies over the long run at Yadadri TPS plant".

34. In reply to Para 31, it is submitted that this answering respondent is surprised by the misleading statement of the appellants as "burning of domestic coal in boilers that have been designed to burn imported low ash coal and achieve super-critical levels of thermal efficiency will likely result in damage to the boiler and other equipment". It is to submit that any boiler manufacturer will evaluate the coal specifications, source of coal and design the boiler based on a range comprising minimum coal quality to maximum coal quality without effecting the steam generation capacity. The submission given in the EIA report is based on the BHEL's specification who are designing the Equipment manufacturer.

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i. In reply to Para 31(i), it is to submit that this point is not relevant and this answering respondent brings to the notice of the Hon'ble NGT regarding MoEF&CC revoking the same vide dated MAY 21, 2020 (**Annexure-10**).

ii.In reply to Para 31(ii), it is to submit that the appellant's Statement on utilization of lower grade coal for Yadadri Thermal Power Station (YTPS) is not correct. The appellant wrongly assumed that, TSGENCO has chosen for utilization of lower grade coal ('G' grade) and considered the quality parameters viz., Ash, GCV & UHV of 'G' grade coal under Useful Heat Value (UHV) based coal gradation system.

It is to submit that, consequent to the Directives of Ministry of Coal (MOC), Govt. of India (GoI) vide notification dt:30.12.2011, the coal gradation has been shifted from UHV ('A' to 'G' grades) to GCV system (G1 grade to G17 grade) w.e.f. 01.01.2012 as tabulated below.

GCV GRADE	GCV RANGE (Kcal/Kg)
G1	Above 7000
G2	6701-7000
G3	6401-6700
G4	6101-6400
G5	5801-6100
G6	5501-5800
G7	5201-5500
G8	4901-5200
G9	4601-4900
G10	4301-4600
G11	4001-4300
G12	3701-4000
G13	3401-3700
G14	3101-3400
G15	2801-3100
G16	2501-2800
G17	2201-2500

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TSGENCO has proposed for utilization of higher grade G9 coal of GCV 4601 Kcal/Kg to 4900 Kcal/Kg with ash content less than 34% in compliance with the MOEF Notification dt:07.10.2008 for YTPS to achieve super critical boiler efficiencies.

iii. The Research study mentioned here is not relevant to the present categorization of coal grade as consequent to the Directives of Ministry of Coal (MOC), Govt. of India (GoI) vide notification dt:30.12.2011, the coal gradation has been shifted from UHV ('A' to 'G' grades) to GCV system (G1 grade to G17 grade) w.e.f. 01.01.2012.

iv. TSGENCO has proposed to utilize the higher grade G9 coal of GCV 4601 K.cal/Kg to 4900 K.Cal/Kg with ash content less than 34% and imported coal of GCV greater than 5700 K.Cal with ash content 15% in blend to achieve Super critical boiler efficiencies. The same is given in the revised EIA report at Para 2.5.2, Page. 20.

35. In reply to Para 32, it is respectfully submitted that with respect to the above-mentioned power plant, TSGENCO has proposed dry stack with gas reheat system (gas to gas heater) is used. Hence, the problem of re-entrainment of condensed liquid is prevented. It is also to inform that High efficiency Mist eliminators are provided. The chimney is being provided with Borosilicate liner.

36. In reply to Para 33, it is to submit that there is no false claim as the test reports of coal sample of SCCL were made available and the same was incorporated in the revised EIA report as (**Annexure – 2D**). As per the report of M/s. Vimta labs, Mercury content in the coal samples of SCCL mines is less than 0.1 mg/Kg.

It is a fact that Mercury and trace elements will be present in the coal, based on the geological formations. A recent study of TERI has highlighted the following which is significant in the present project. (**Annexure-11**)

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"The mercury content in Indian coal ranges between 0.01 ppm and 1.1 ppm (Rai, Raman, Choudhary 2013). As mercury boils at low temperatures, thermal power plant emits 90% of its mercury into air and 10% to land. Mercury abatement from the emission can be achieved as co-benefit of reduction of Nox, Sox and dust. A higher degree of focus as of now, therefore is towards the reduction of Sox and Nox emissions which will automatically reduce mercury emission"[1]

The above study has brought the important aspect that "Mercury abatement from the emission can be achieved as co-benefit of reduction ofNox, Sox and dust" which is what the Project Proponent is implementing.

37. In reply to Para 34, it is submitted that in the revised EIA report, no where it was mentioned that no mercury content present in the coal from SCCL mines. The test reports of coal sample of SCCL done by M/s. Vimta Labs shows that Mercury content is less than 0.1 mg/Kg which was incorporated in the revised EIA report as Annexure – 2D.

38. In reply to Para 35, it is submitted that as per the condition stipulated in the Environmental Clearance granted for the above project, the analysis of the mercury in the coal has been redone through IICT, Hyderabad. Regular sampling and analysis will be carried out during the operation phase.

39. In reply to Para 36, it is submitted that the allegation made by the appellant is without any scientific basis. The Appellant himself concedes and states "*However, the Revised EIA is silent on the amount of Mercury or other heavy metals that will be released every year on account of the Yadadri TPS. This will again depend on the concentration of these toxic substances in the coal that will be burnt at the project site*". Hence the emissions modelling will be realistic based on the coal that

1 Pachouri, R. and A. K. Saxena. 2020. *Emissions Control in Thermal Power Stations – Issues, Challenges, and the Way Forward.* New Delhi: The Energy and Resources Institute

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will be burnt at the project site. However, use of FGD, Nox and ESP will substantially reduce the Mercury emissions. Please refer TERI Paper **(Annexure-11).** This amply demonstrates that the Project Proponent will achieve the emission norms as stipulated in the Notification S.O. 3305E dated 7th December 2015. Even, the USEPA – Mercury and Air Toxics Standard (MATS) specifies the following control technologies for reducing Mercury and other toxics:

Widely-available control technologies that reduce mercury and other air toxics

Pollutant Addressed	**Existing Control Technologies to Address Toxic Pollutants**
Mercury	Selective Catalytic Reduction (SCR)with Flue-gas Desulfurization (FGD), Activated Carbon Injection (ACI), ACI with Fabric Filter (FF) or Electrostatic Precipitators (ESP)
Non-mercury metals	FF, ESP
Dioxins & furans	Work Practice Standard (inspection, adjustment, and/or maintenance and repairs to ensure optimal combustion)
Acid gases	FGD, Dry Sorbent Injection (DSI), DSI with FF or ESP
Sulfur dioxide	FGD, DSI

Source: https://www.epa.gov/mats/cleaner-power-plants

40. In reply to Para 37, it is to submit that this is another baseless allegation, which confirms the Appellants confusion. Any independent study or assessment has to be done by the Regulatory or the Research Agencies. This can be taken up once the power plants are fitted with the Pollution control equipment like FGD, Nox control and ESP. It is important that data pertaining to burning of coal, the RegulatorMoEF&CC has prescribed the standard based on the international practices. Indian coals and the related emissions especially Mercury have to be

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studied. Hence it is a good practice to review international research studies undertaken from pioneering agencies like USEPA and introduce the emission standard in the country. Subsequently based on the Indian experience, the standards can be modified to suit Indian conditions. All these aspects are not in the scope of the Project Proponent. There is no question of deliberately misleading the Regulator (MoEF&CC) by the Project Proponent. The MoEF&CC had definitely applied mind and appreciated the fact that the Project is implementing Super critical technology with Pollution control technologies to achieve the new emission standards. Similar is the case with the other studies like impacts of the emissions on the health of local communities etc can only be done once the power plant is commissioned. But with the implementation of the Pollution control equipment like FGD, Nox control and ESP, the impacts on emissions will not be significant. This was amply demonstrated in Chapter 4 of the Revised EIA report.

41. In reply to Para 38, it is submitted that the allegation made by the appellants is totally false and is denied. The Revised EIA had accounted for Particulate Emissions from Limestone crusher area, Coal storage area and emissions due to wind erosion and given clearly at Page 214 of the revised EIA Report.

a. This allegation is totally false. The dry fly ash will be conveyed by pneumatic system which is a closed system. Hence there will be no fugitive dust generation. The silos are provided with bag filter which is the standard engineering practice.

b.This allegation is totally false. The fly ash will be loaded in bulkers which are closed trucks and dispatched to cement plants or other users. Thus there is no fugitive emission. Hence there is no question of modeling of fugitive emission.

c. The unutilized ash will be disposed to ash pond in wet mode. Minimum water column will be maintained so that there is no drying of the ash and impact due to

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wind blow. Continuous sprinkling of water will be done to control the fugitive emissions. It is a regular practice being adopted by every thermal power plant.

d. Care will be taken during the loading and transportation of gypsum to control the fugitive emissions.

42. In reply to Para 39, it is to submit that the allegation framed by the appellant is false. The project proponent has evaluated the dust emissions from the storage of coal and limestone storage, etc as fugitive emissions. (Table 4.2 of REIA report Page 214). The standard operation practice of ash ponds will be that a minimum water column will be maintained so that there is no drying of the ash and impact due to wind blow. The details of Gypsum handling were given on Page 213 of revised EIA/EMP report wherein it is clearly mentioned that gypsum will be dewatered and the cake generated will be sent to a gypsum storage shed through a belt conveyor.

43. In reply to Para 40, it is to submit that the allegation is false and misleading. The Revised EIA report clearly mentioned that three ports namely Krishnapatnam, Vishakhapatnam, Kakinada Ports have been approached for receiving the imported coal being procured through MSTC. An MoU has been signed with MSTC for importing the Coal. The Port Authorities have given consent letters stating that they have adequate facilities like coal berths, railway sidings etc. to import coal and supply the same as per the requirement of Yadadri TPS. The railway route for the same is shown in Fig 2.10 in the revised EIA report. Railways are already implementing the doubling of the track to cater to the cement industries in the area. ToRs 45, 46 has asked for the details of transportation which have been provided and the EAC was convince about the feasibility of the same. The Appellant statement "these agreements fail miserably to provide the information required by Standard TORs 45 and 46" is mischievous and misleading.

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44. In reply to Para 41, it is submitted that this is again a blatant allegation of the Appellant. It is proposed to transport entire requirement of coal to Yadadri Thermal Power Station by Rail mode only. No Road transportation is proposed. The indigenous coal will be transported from SCCL mines and imported coal will be transported from the ports by Railways to the plant site via., Vishnupuram Railway Station on Bibinagar Nadikudi main Railway line of South Central Railways. A Railway line is proposed from Vishnupuram Railway Station to the plant site.

The details of coal transportation was furnished under clause No. 2.10.1 of revised EIA. The proposed Rail route is also shown in figure 2.10 of revised EIA.

45. In reply to Para 42, it is submitted that the allegation made by the appellant regarding the failure in assessing the impact of train and road transportation of coal on ambient air quality is frivolous, baseless and false. The port operations where loading and unloading of coal is done is under the purview of the concerned Port Operator and the Operator has to comply with the conditions stipulated in their respective ECs and Consents issued by MoEF&CC and State Pollution Control Board. The current practice by the Railways is to wet the coal at the loading point and cover it with tarpaulins since there is shortage of closed wagons. These are proven methods being followed.

46. In reply to Para 43, it is submitted that the Appellant is confusing and misleading this Hon'ble Tribunal by bringing out references of the earlier EIA. The revised EIA has addressed the shortcomings of the earlier EIA.

47. In reply to Para 44, it is respectfully submitted that this another instance were the appellant is trying to mislead this Hon'ble Tribunal. The Revised EIA has sufficiently addressed regarding the source of coal (both domestic and imported), transportation logistics etc.

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48. In reply to Para 45, it is submitted that the source of domestic coal is from SCCL which will be among the "basket of mines of Kothagudem area". The MoU signed between Project Proponent and SCCL clearly states in Para 3.0 (Annexure 2E(I) that SCCL will open new cost plus mines for this power plant by the time the Power Plant is commissioned and in case there is delay then SCCL will supply coal from other sources on weighted E-auction prices. It is important to understand that to open a mine, SCCL has to obtain the necessary permissions from various statutory agencies which takes considerable time. It is also important to note that SCCL has agreed to set up dedicated washery along with basket of mines identified to supply washed coal to the Yadadri TPS. The Revised EIA has assessed the potential air quality impacts based on the typical coal quality as per the Equipment manufacturer – BHEL which has extensive experience in using Indian and imported coals. The important aspect is that the Project Proponent has committed to comply with the new emission norms of MoEF&CC and is implementing the FGD, DeNox and High Efficiency ESP. This will significantly reduce the emissions which was clearly presented in Para 4.2.1.5, Page 231 of the Revised EIA report. The impacts on ground water, surface water and amount of ash generation have all been furnished in the Revised EIA report. It is strange that at one point the Appellant says the exact coal specification which is proposed to be burnt in the power plant is not given and hence the EC should be cancelled (Para 44) whereas here he is questioning that potential impacts cannot be rationally assessed by EAC. The Revised EIA has provided adequate information based on valid data provided by the Equipment Manufacturer who has considerable experience in implementing power plants including super-critical power plants which are currently in operation in India. The EAC had clearly gone through all the documentation and was convinced about the same before issuing the EC.

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49. In reply to Para 46, it is submitted that the Appellant is continuously trying to mislead this Hon'ble Tribunal. The appellant state that under RTI it has obtained information from MoEF&CC and CPCB and both of them stated that they are not aware of any such study being carried out in India for any project. Regarding the same it is to submit that any radioactive studies needs to be done by Bhaba Atomic Research Centre (BARC). The Appellant herein is misleading by saying that "impact of radioactivity has not been addressed in the Revised Report" and mentions selectively about the NGT Appeal No 7 of 2011. A perusal of the Judgement of the Hon'ble NGT along with conclusion is given at **(Annexure-12).**

The important aspect of the Judgement of the Hon'ble NGT (Annexure-12) is that it had directed MoEF& CC to constitute a comprehensive study and develop standards. Nowhere it has stated that the project proponents to undertake detailed studies before clearance is given by the Ministry. The Appellant is wrongly quoting the Judgement of the Hon'ble NGT and misleading.

It is humbly submitted that this answering respondent did mention the typical radioactivity as measured by BARC as Annexure – 2D in the revised EIA report. The coal mines when are operational can provide the requisite samples for analysis.

50. In reply to Para 47, it humbly submitted that this answering respondent gave the details of the Ash Pond which were mentioned in 2.10.3, Page 39 of the Revised EIA report.

51. In reply to Para 48, it is submitted that the allegation made by the appellant is false. The Project Proponent has stated that the detail design of the Ash Pond can be done during the Detailed Engineering stage and based on the geo-technical investigation. Any physical investigation on the site can be done only upon receipt of EC. The fact is that the TSGENCO engineers have considerable experience in

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commissioning and operation of Ash Ponds which is a fact. Hence, it is not merely stated here.

52. In reply to Para 49, it is submitted that the Appellant is suddenly quoting USEPA standards with respect to the Ash Pond liner. The USEPA standard cannot be made applicable for an Indian Project and it cannot be taken as a document as a basis for information. The following is the typical protocol to be followed for designing an Ash Pond. CEA also has issued guidelines to be followed in designing of Balance of Plant Equipment including Ash dyke etc for power plants of 500 MW and above capacity which will be followed by designers,

a) Topographical survey, land use map, drainage pattern, hydrological studies, geotechnical investigations

b) Detailed laboratory tests are to be conducted to establish, physical, chemical and engineering properties of soil and analysis of sub soil water.

c) Based on the properties of founding soil and fill material, the stability and seepage analysis is carried out.

d) Subsequently the Dyke is designed as per best engineering practice including IS and studies by reputed institutions. The design is done for the ultimate height and unutilized ash to be stored.

Source: *Management of Ash Disposal by Naresh, D.N, Indian Geotechnical Conference-2010, GEOtrendz, Indian Geotechnical Conference.*

Hence the issue of not giving design details is not correct.

53. In reply to Para 50 and Para 51, it is submitted that the issue of HDPE thickness, use of clay liner etc are related to design criteria of the Ash Pond design. As enunciated in the above paragraph, the detailed engineering will take care of the

design of Ash Pond based on site specific geo-technical studies and not as per USEPA norms published for a USA.

54. In reply to Para 52, it is submitted that the use of software can be done only when the site-specific parameters are made available only after conducting the geotechnical investigations. The Appellant's allegation that "studies on landfill and pond leakage overwhelmingly show that all such units leak eventually" is baseless and frivolous. Even if that is the case, there is no relevant information provided by the appellant herein. A sound engineering design of the ash pond based on detailed site-specific studies will ensure that the Ash pond functions effectively.

55. In reply to Para 53, it is submitted that the detailed water balance and waste water balance has been furnished in the Revised EIA Report. (Para 2.10.3) and Fig. 2.11 on Page 44 which clearly shows the Ash water recovery system which will ensure the ash pond overflow is treated in a AHP Clarifier and reused into the Ash handling system. It is further submitted that the appellant is trying to mislead the Hon'ble Tribunal.

56.In reply to Para 54, it is to submit that the allegation is blatantly false. The details of Storm water management and Rain water harvesting has been furnished in Para 4.2.3.14, Page 265 of the Revised EIA report. The Table 4.13 provides the estimates of Rain water harvesting potential which is the title of the Table. They are not the average annual flow rates as alleged by the Appellant. The storm water design and design of garland drains, etc will be done during the detailed engineering phase of the project. Hence, it is not correct on the part of Appellant to castigate the Project Proponent that no calculations have been provided. All structures will be designed as per good engineering practices and conforming to BIS standards.

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57. In reply to Para 55, it is submitted that there is no discharge of wastewater recharge to ground water. The statement "ZLD analyses do not account for recharge of contaminated water to the underlying aquifer either throughout the plant area or through the ash pond liner" A ZLD system will not discharge any contaminated water to water body or ground water. The statement "Assuming one-third of the rainfall in the plant area infiltrates to the groundwater table, the average recharge of contaminated water due to precipitation will be more than 1000 m3/hr during monsoon season..." is totally false and confusing and is only stated to mislead the Hon'ble NGT. This answering respondent submits that the rainfall cannot infiltrate to the groundwater table and recharge contaminated water due to precipitation.

58. In reply to 56, it is submitted that as stated in the earlier paragraphs, a detailed design of the ash pond as per BIS and CEA guidelines will be carried out. This can only be done during the detailed engineering stage since the process involves conducting geo-technical investigations. Hence the allegation of the Appellant stating "the ash pond spillway is lacking in critical details" is not correct.

59. In reply to Para 57, it is submitted that one cannot undertake any activity till the Environmental Clearance is issued for the project. Subsequently only the Project Proponent can initiate field level studies to obtain site specific engineering data for designing of the foundations and structures and finalizing the same in terms of design basis reports for starting the construction activities. All these will be done as per the current BIS standards and CEA guidelines for Power Plants. Conducting geotechnical investigations prior to the completion of the EIA will result in contravening the EIA notification which clearly prohibits any activity on site without prior environmental clearance.

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60.In reply to Para 58, it is submitted that the allegation made by the appellant is false. The sub-committee of the MoEF&CC which visited the site and toured extensively had recommend the following "*As agreed by the PP, the area for ash pond shall be minimized by shifting it towards North. Further a minimum distance of 500m buffer shall be maintained between the proposed ash pond and Tungapadu vagu. The buffer shall be developed into thick green belt/natural forest*". The Appellant had enclosed the Sub-Committee report as Annexure-16 in his appeal and he is well aware why the Ash Pond has been shifted. But still the Appellant simply wants to beat around the bush with his statements and confuse the Hon'ble Tribunal.

61. In reply to Para 59 and 60, it is submitted that the allegation of the Appellant is false. The Details of Fly Ash Utilisation Plan as per MoEF&CC guideline was given in Table 4.19, pg 285 of the Revised EIA Report. Annexure-4E of the Revised EIA Report gave the letters from various cement plants within 50 km radius which is big advantage for the proposed Yadadri Thermal Power Station since Fly Ash can be directly used by Cement Plants in manufacturing cement. The TOR 19 condition had been complied. It is a general practice that the Cement Manufacturers will initially give *Willingness letters* for lifting the fly ash and will enter into detailed agreements when the power plant is due for commissioning.

62.In reply to Para 61, it is to submit that the allegation made by the appellant is baseless. There are about 8 cement plants within 50 km radius and they gave the willingness to lift fly ash from the power plant once it is commissioned. How this can be termed as "unrealistic". Quoting the CEA report of 2014-15 regarding KTPS which has achieved less than 60% fly ash utilization is irrelevant in the present case. Every thermal power plant is doing its best in increasing the fly ash utilization which is borne in the CEA Report.

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63.In reply to Para 62, it is submitted that the allegations are baseless, frivolous and false. No cement plant or any other organization will enter into firm agreement with a power plant which is under construction. The project proponent will enter into an agreement with cement plants before commissioning the plant which is the standard practice.

64. In reply to Para 63, it is to submit that the appellant is continuously making allegations which are baseless, frivolous and false. The Revised EIA had submitted the willingness letters from cement plants within 50 km radius. The cement plants can consume about 0.864 MTPA of fly ash. Based on this a detailed Fly ash utilization table has been presented in Table 4.20 of the Revised EIA report. This shows that about 3.30 MTPA needs to be accommodated in the Ash Pond and also the unutilized bottom ash totaling to 13.75 MTPA for 25years of power plant operation (i.e) about 17.05 MTPA of ash has to be stored. The Appellant is misguiding by saying that 55MTPA of fly ash will be generated without considering the amount of ash which will be consumed by the neighboring cement plants. Based on such erroneous calculation, the Appellant is extrapolating the height of the ash pond will be 45 m which is a figment of imagination.

65. In reply to Para 64, it is submitted that the salient aspects of the Hydrogeological study done by M/s Hydro-Geosurvey Consultants Pvt ltd was incorporated in the Revised EIA report at Para 3.4.3 of Page 101. The sub-committee has advised not to disturb the Tungapahad vagu, create a buffer of 100 m on either side and strengthen the Vagu. The ash pond to be shifted 500m away from the vagu. The details of diversion of the stream lets at the revised Ash pond location were also furnished. There is no ground water extraction for the project. The ash pond will be provided with an impervious liner based on detailed engineering studies was also mentioned.

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66. In reply to Para 65, it is submitted that the details were presented in the Revised EIA report and the EAC was convinced about the mitigation measures suggested.

67. In reply to Para 66, it is submitted that the Appellant takes the liberty of quoting the Revised EIA and states that no information is provided. The statement *" ..the revised EIA provided a wide range of depths pre-monsoon (14-35 meter below ground level) and post monsoon (8-26 meters below ground level)" is preceded by this statement "The Project Proponent has not specified the depth of groundwater during either the pre-monsoon or post-monsoon periods)* itself shows the misguiding and confusing mentality of the Appellant at Para 3.4.3.1.1 provides the details of the movement of ground water. Proper and detailed analysis including photographs of the site, hydrogeological map of the study area, details of ground water movement etc was provided in the Revised EIA report. It is un-charitable on the part of the Appellant to say " *it is submitted that without a proper and detailed analysis, the ground water levels provided are speculative and not factual and the ability to predict impacts to groundwater is wholly absent*"

68.In reply to Para 67 and 68, it is to submit that the allegation is baseless and misleading. The Pollution control equipment will be installed and operated. The CPCB has already implemented the Project, wherein all the Continuous emission monitoring station of stacks and ambient air quality are connected to the respective State Pollution Control Board server which is in turn connected to the Server of the Central Pollution Control Board. A real time monitoring is now in place. The calibration of these equipment's have also been made online. The data is generated on real time basis. Already based on Hon'ble NGT's orders, the CPCB and MoEF&CC are levying the Stiff penalties on Project Proponents for non-compliance of EC conditions. (Refer- **Annexure-13)**

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69.In reply to Para 69, it is submitted that the allegation is baseless as an entire chapter, i.e., chapter 6 deals with Environmental Monitoring program which details the location, sampling parameters, frequency of measurement etc. A detailed budget for monitoring program also has been given in Table 6.8, Page 318. This clearly portrays that the appellant simply wants to mislead the process of adjudication by selectively raising issues without checking the facts. It is also pertinent to note that the appellant silent on facts and figures mentioned in the Revised EIA Report.

70. In reply to Para 70, it is respectfully submitted that the same has been enunciated in the paragraph mentioned above, i.e., the reply to Para 69, where an elaborate monitoring scheme covering Air quality, stacks, ground water, surface water (Tungapahad vagu), wastewater monitoring, noise environment, soil quality with the parameters to be monitored, frequency etc was given in Chapter 6. The Project Proponent will comply with these monitoring protocol and hence the EAC was convinced before issuing the EC.

71. In reply to Para 71, it is respectfully submitted that these points were already answered in the reply to Para 70 as mentioned above. We need not compare with USEPA standards when Indian standards are available. We do not know why the Appellant wants to compare with USEPA Standards all the time.

72. In reply to Para 72, it is to submit that the allegation is false and baseless. About 299 TMC is the portion allocated to Telangana from the 811 TMC of water. Out of this the average utilization of Krishna water in Telangana region is 256 TMC and hence the Irrigation and CAD department has allocated 3.154 TMC of water to the Project. ICAD gave a letter to this effect and the same was submitted as Annexure 4C of the Revised EIA report. How the Appellant can state "*the claim that the said project will be allowed to withdraw water from the River Krishna can*

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be considered to be preliminary at best, and cannot be considered to be a certainty" What proof other than a Government sanction can satisfy the Appellant is beyond anybody's understanding. This only shows the ulterior motive of the Appellant in questioning everything on earth and ensure delaying the project which will increase the overall project cost. One would have appreciated if the Appellant would have brought out valid suggestions.

73. In reply to Para 73, it is submitted that the Revised EIA did mention about the impact of drawl of water from River Krishna. (Para 4.2.3.8, Pg258). There is no discharge of treated wastewater either into the Tungapahad vagu or the River Krishna. The ICAD has given assurance (Annexure-4c) the Department will release minimum flows from the Upstream reservoir (Pedda Cheruvu) which will ensure sustenance of the downstream ecology of the vagu and River Krishna.

74. In reply to Para 74, it is to submit that the Central Water Commission monitors all the rivers with the help of gauging stations and generates adequate data which is used for distributing the water for each of the states through which the River passes. Similarly, the Krishna Water Dispute Tribunal has been setup to adjudicate any disputes between the concerned states regarding water drawl and usage. It is submitted that we need not depend on an external agency report to take care of our needs. The allegation that " *off the cuff statements not rooted in science or facts should not find place in EIAs*" is without any reason since the appellant herein is not acknowledging the letter issued by ICAD department.

75. In reply to Para 75, it is submitted that there are projects located in Karnataka and Andhra Pradesh and all these projects are receiving water based on the allocation to the respective States. As already mentioned, that Telangana has been allotted about 299 TMC of water out of which about 256 TMC is the average

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utilization. Hence the ICAD has opined that allotment of 3.154 TMC to the Project Proponent.

76. In reply to Para 76, it is submitted that the Project Proponent stands by the reply submitted to Dr.K.Babu Rao. It is also pertinent to mention that monitoring of upstream/downstream monitoring of water quality of Tungapahad and River Krishna have been given in Table 6.3 at Page no. 313 of the Revised EIA report.

77. In reply to Para 77, it is submitted that the Project Proponent had accepted the observations and the EAC and accordingly shifted the ash pond and provided the buffer zone of 100 m on either side of the vagu. The vagu has not been disturbed. The minimum flow during the lean season has been assured by the ICAD department.

78. In reply to Para 78, it is submitted that the Project Proponent had accepted all the observations and assured the EAC as well as MoEF&CC that it will implement the same. It is pertinent to mention that the Appellant is misleading by stating "*It had the following recommendations with respect to the River*" while the recommendations of the Sub-Committee is for the Tungapahad vagu. It is submit that the word/ term "Vagu" in Telugu language means a stream and not a river.

79. In reply to Para 79, it is to submit that the allegation is false and incorrect as Para 3.3.4.1 has extensively dealt with the Hydrology of the site, the catchment of Tungapahad vagu, surface water flow regime, and the project site drainage pattern. Based on these analyses and the direction of the Sub-committee to shift the Ash Pond beyond 500m from the Tungapahad vagu, the diversion of the two streams and also the same pictorially in Fig4.21A and Fig 4.21B of the revised EIA report. Hence the statement " *It is respectfully submitted that it is not clear where and how the project proponent intends to build these drains...* " is totally false.

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80. In reply to Para 80, it is submitted that the Project Proponent is installing the FGD system, De-Nox and ESP systems to comply with the emission guidelines of the MoEF&CC. A recent study of TERI has highlighted the following which is significant in the present project.

> "*The mercury content in Indian coal ranges between 0.01 ppm and 1.1 ppm (Rai, Raman, Choudhary 2013). As mercury boils at low temperatures, thermal power plant emits 90% of its mercury into air and 10% to land. Mercury abatement from the emission can be achieved as co-benefit of reduction of Nox, Sox and dust. A higher degree of focus as of now, therefore is towards the reduction of Sox and Nox emissions which will automatically reduce mercury emission*"

Pachouri, R. and A. K. Saxena. 2020. *Emissions Control in Thermal Power Stations -- Issues, Challenges, and the Way Forward.* New Delhi: The Energy and Resources Institute

The ash pond will be lined with an impervious liner based on the detailed engineering study comprising geotechnical studies etc. Regular monitoring of the ground water quality using piezometers is planned for the ash pond area. These measures have been mentioned in the Revised EIA report which negates the statement of the Appellant " *the Revised EIA Report is silent on the impacts and mitigation measures adopted for the same*"

81. In reply to Para 81, it is to submit that the ash pond has been shifted based on the Sub-Committee's recommendation to the EAC which has been accepted by the Project Proponent. The Appellant has reproduced the recommendation of the Sub-Committee's observations (Point 78). One would have appreciated if constructive suggestions were given by the Appellant instead of saying "*the Project Proponent cannot be allowed to go ahead with the construction of the ash pond when the impugned clearance for the same is based on such vague details.*"

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82. In reply to Para 82 and 83, it is submitted that the ash pond will be constructed with an impervious liner (HDPE). However, the detailed engineering of the ash pond will decide on the thickness of the components etc.

83. In reply to Para 84, it is respectfully submitted that the Project Proponent will undertake detailed engineering studies including geo-technical investigations to design the ash pond, as explained earlier. The thickness of liner both HDPE and clay will be finalized based on these studies. It is further submitted that the appellant always refers to USEPA (40 CFR Part 257.) which is not applicable to the project at hand as already stated in the above paragraphs.

84. In reply to Para 85, it is submitted that the points raised by Shri.N.Harinder were answered. It is further submitted that the Sub-committee has asked Project Proponent to shift the ash pond beyond 500m from the Tungapahad vagu.

85.In reply to Para 86, it is respectfully submitted that this issue has already been explained in reply to Para 84 of the appeal. The Project Proponent will conduct a detailed engineering study before finalizing the design of the ash pond including detailed geo-technical studies which is a pre-requisite. The design will be based on BIS standards and good engineering practice. Based on the study, the liner thickness of HDPE and requirement of a clay liner will be finalized and implemented.

a. The very purpose of a liner is to prevent any leaching of the ash pond and arrest the movement of any contaminated water. The development of greenbelt of 100 m width on either side will prevent soil erosion and also act as a buffer to absorb the surface runoff during monsoon apart from controlling dust pollution.

b. The shifting of the ash pond has been done in compliance with the recommendations of the Sub-Committee and MoEF&CC. A close perusal of

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the revised layout (Fig2.8, Pg 26 of the Revised EIA) shows that the entire plant has been accommodated on the northern side of the village road. The ash pond only is in the southern side. A 50m barrier on either side of the road is proposed. Similarly a 100 m width green belt is provided. The impervious liner will prevent any migration of ash pond leachate.

c. As already discussed, the issue of liner both HDPE and Clay liner will be finalized based on the detailed engineering design. Hence it is premature at this point of time to draw conclusions.

d. The design of the liner will be done based on detailed engineering comprising geo-technical studies and complies with Indian Standards and guidelines

e. We are surprised the Appellant is passing judgement on the condition of the ashpond liner. In other points he recommends a clay liner below the HDPE liner and now he declares " *The single HDPE liner will not be "impervious" over the life span of the ash pond and therefore will not prevent release of toxic chemicals and wastewater from the ash pond*" and at some point he recommends the guideline of USEPA.

86. In reply to Para 87, it is respectfully submitted that the appellant is misleading this Hon'ble Tribunal with respect to the facts. The Sub-committee of the EAC has visited the site and recommended for shifting of the Ash Pond by 500 m from the Tungapahad vagu. Also it recommended for providing 100m width greenbelt as a buffer on either side of the vagu passing through the site. The Project Proponent has complied with this recommendation. The answering respondent is unable to understand how this condition of the ToR is violated when the Additional TOR conditions – Sl.No. (i) of Lr.No J-13012/18/2015-IA.I(T)dated 16-02-2016 states

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that "The Tungaphaad vagu should not be diverted but it should be preserved, protected and enhanced it's flow".

87.In reply to Para 88, it is respectfully submitted that the Project Proponent has confirmed that an impervious liner based on detailed engineering of the ash pond design will be done which will protect the release of any leachate to the groundwater and hence protect the Tungaphad vagu.

88. In reply to Para 89, it is submitted that this allegation is baseless. The diversion of streams has been described in detail at Para 4.2.3.13 on Pg 263 of the Revised EIA. The Report mentions that the Stream in the Project area will be disturbed. However, the design of the storm water drains will be done in the project area and the same will be connected to the Tungaphad vagu to ensure the rain water from the project flows to the Tungapahad vagu. The location and presence of streams are not inconsistent and is based on the Survey of India toposheet.

89. In reply to Para 90, it is to submit that the allegation is baseless. The presence of streams has been shown in the Map and the plan for diversion of the same near the ash pond also has been shown. The Appellant is misleading with respect to ToR point 21. ToR 21 states " *It shall also be ensured that a minimum distance of 500 m distance of plant boundary is kept from the HFL of river system/streams etc., and the boundary of site should also be located 500 m away from railway track and national highways". The Project Proponent had complied with all the conditions of the ToR 21. 500 m has left between the ash pond and the Tungaphad vagu. 500 m has been left from the HFL of the River Krishna and the project boundary. The details have been shown in Fig 4.20, Pg 262 of the Revised REIA report.*

90. In reply to Para 91, it is to submit that the Project Proponent has already submitted that there will be no discharge of treated waste water from the project

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since the project is designed on "zero liquid discharge" system. The water balance has been drawn keeping in mind the new norms of MoEF&CC which advises to minimize the water consumption to 2.5 m3/MWh. The reasons why there will be no significant impact on aquatic ecology have been furnished in Para 4.2.3.9, Pg 260 of the Revised EIA report. A detailed water balance and waste water balance has been submitted in Para 4.2.3, Pg 246 and Para 4.2.3.5, Pg 253 of the Revised EIA report. Hence the statement of the Appellant that "the project proponent has not provided an accurate accounting of wastewater flows at the plant and ash pond" is totally false and baseless. The estimate on surface runoff in the catchment areas and the recharge to ground water has been furnished in Para 3.4.3.1, Pg102 of the Revised EIA report.

91.In reply to Para 92, it is submitted that the appellant is framing baseless, incorrect and frivolous allegations. The very fact that the location of the plant gives a good benefit in terms of utilizing the two major solid wastes namely Fly ash and the FGD gypsum is not appreciated by the Appellant. The cement companies have given their consent to lift the fly ash when the plant is commissioned. The Appellant is questioning the letters issued by the Cement manufacturers. Whereas he is now questioning why there are no firm agreements, MoUs or even letter of intent from concrete manufacturers to accept any amount of FGD sludge. The following extract from the study by Centre for Science and Environment nails the allegation. (**Annexure-14)**

"*With the implementation of FGD systems, India will produce around 12–17 million tonnes of FGD gypsum annually. Around 10 million tones of gypsum was consumed by the industrial sector in 2015–16, of which almost half was imported. The cement industry needs a large amount of gypsum(16–20million tones of gypsum based on 330million tones of*

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cement produced in 2018–19) in its manufacturing and it is facing a gypsum shortage. Apart from imports, the sector is using inferior quality synthetic gypsum from the fertilizer industry. FGD gypsum can thus fulfill this short fall both in quantity and quality"

*Source:*Sunita Narainand Vinay Trivedi 2020, *Flue Gas Desulphurization : Limestone Availability and Gypsum Use*, Centre for Science and Environment, New Delhi.

92. In reply to Para 93, it is humbly submitted that the disposal of FGD sludge does not pose a problem as discussed in the reply to Para 92. The Appellant is unnecessarily raising these allegations repeatedly.

93. In reply to Para 94, it is submitted that the revised EIA has given the basic requirement of Ash pond. The design of ash pond will be done during the detailed engineering stage after ascertaining the geo-technical studies etc. The designer will provide the construction, operation and maintenance of the ash pond. The Project Proponent also has considerable experience in operation and maintenance of ash ponds which will be leveraged for this project. The entire Ash pond design, construction and operation is very much summarized by Shri D Nagaraj, AGM, NTPC, in a paper titled "Management of Ash Disposal" (**Annexure-15**).

94. In reply to Para 95, it is respectfully submitted that the detailed engineering design of the ash pond has to be carried out after the completion of geo-technical studies and hence the details were not given. The design will incorporate the safety features both in design as well as construction and operation of the ash pond. It may also be mentioned that BHEL is the EPC Contractor for the project and is well qualified to design the ash pond with all safety features. The on-site and off-site plan will be prepared and approved by the respective statutory authorities before

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commissioning of the Power Plant. The process of design, construction, operation of the ash pond is well enunciated in the material papers.

95. In reply to Para 96, it is submitted that the allegation is totally false. A detailed Focused Group Discussion (FGD) was conducted and based on the analysis of the same, the Community Development Plan as part of Corporate Social Responsibility was developed and presented. Chapter 7 of the Revised EIA does not only deal with rehabilitation and resettlement of project affected families. Table 7.29, Pg403 clearly gives the budget for the following

* Establishment of R&R center
* Community Development Plan and CSR Budget
* Conducting health camps once in 6 months
* Traffic management at Veerappagudem

An amount of Rs158.52 crores has been provisioned for this purpose. A Tribal welfare fund of Rs 100 lakhs has been provisioned.

The statement of the Appellant is false and misleading.

96. In reply to Para 97, it is submitted that the appellant is confusing Occupational Health and Safety with Public health impacts. The Public health impacts have been addressed and the same were submitted as responses to Dr.K.Babu Rao's question. Regarding the Hon'ble Supreme Court Judgement of 31st January 2014, it has asked the National Institute of Occupational Health and Safety, Ahmedabad to prepare a comprehensive report.

NIOSH submitted the Report to Hon'ble Court which directed that respective High Courts of States as follows and disposed the case.

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" *Report of National Institute of Occupational Health (NIOH) titled Environment, Health and Safety Issues in Coal Fired Thermal Power Plants of the year 2011 may also be made available by the Secretary General of the Supreme Court to the Registrar Generals of the High Courts of the aforesaid States. We make it clear that the Report is not at all comprehensive in certain aspects and the respective High Courts can examine the issues projected in this Judgment independently after calling for the reports about the CFTPPs functioning in their respective States. The Registrar Generals of High Courts of the aforesaid States should place this Judgment before the Chief Justices of the respective States so as to initiate suo moto proceedings in the larger interest of the workers working in CFTPPs in the respective States.*

The Writ Petition is accordingly disposed of.....

J.(K.S. Radhakrishnan) .....

J.(A.K. Sikri) New Delhi, January 31, 2014."

The Project Proponent will implement a comprehensive Occupational Health and Safety plan in the Yadadri Power Plant.

97. In reply to Para 98, it is respectfully submitted that the Project Proponent has mentioned about the proposed colony for accommodating the Staff. The cumulative impacts of the power plant including the Operating and Proposed industries within 15 km radius (Table 4.3, Pg214) was carried out and presented in the Revised EIA report.

98. In reply to Para 99 to 104, it is respectfully submitted that the Project Proponent has clearly mentioned in its Vision Document – (Annexure 1E,) of the Rev EIA report that as per 18th EPS the installed capacity required by 2018-19 would be 17041 MW to meet the peak demand of 13108 MW. The Government of Telangana has planned development of Urban Centres in Warangal, Karimnagar

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and Nizamabad, Hyderabad Metro Rail, Hyderabad ITIR region, Lift Irrigation Projects and Water Grid Project.

99. It is humbly submitted that the total cost of project is about Rs. 29965.48 Crores and as per the schedule the project zero date will be commenced with effect from 17-10-2017. As per the scheduled program for the completion of the project, the Unit-1 and 2 has to be completed on 16-10-2020 and the Units 3,4 and 5 shall be completed by 16-10-2021 and the same shall be commissioned with effect from the said dates. In pursuance of the said schedule the works have been commenced and 30% of the civil works in respect of the boiler, mills, ESP, civil construction, power house foundations, power house building fabrications, etc have been completed. The reputed organization like BHEL has been awarded the contract and the letter of intent for an amount of Rs. 20379 Crores issued to the BHEL. It is further submitted that this answering respondent has spent about Rs. 8174.61 Crores till date, which is almost equivalent to one-third of the total project cost.

100. In reply to the grounds stated in this appeal it is submitted that they are all formulated in general and no specific violation of any statutory provisions, rules, notifications and statutory duties have been specifically raised. On the contrary, the general grounds in respect of the principles of the Administrative Act has been raised.

101. In this connection, it is submitted that the appellant itself is under misconception of law in respect of the Environmental Laws. The Statutory authorities have taken all precautions between the sustainable development as well as impact on the Environment. Therefore, a specific enquiry has been conducted in respect of the environment and the report was also taken into consideration. In addition to it during the public hearing all objections that were raised have been considered and thereafter EC has been granted.

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102. It is humbly submitted that the entire material placed before this Hon'ble Tribunal will clearly disclose the application of mind of the authorities by following the principles laid down by various judicial pronouncements and statutory provisions including the mandatory procedure laid down therein and reasons therefore have been specifically submitted.

103. It is strongly asserted that the grant of Environmental Clearance is in conformity with the requirements of the EIA Notification. EAC has not only considered the E1A report but also has taken into consideration the proceedings of the public hearing and the objections that were raised by the public to the project and thereafter the Environmental Clearance has been granted.

104. It is humbly submitted that EAC has not blindly accepted the word of the project proponent. Their decision is based upon proper specific documentation and findings. The answering Respondent herein strongly asserts that every crucial aspects of E1A studies have been completed before initiation of the construction work.

105. It is humbly submitted that the E1A is not violative of Article 21 and Article 14 of the Constitution of India. [N.D. Dayal and another versus Union of India – the right to development encompasses much more than economic well-being, and includes within its definition the guarantee of fundamental human rights. Therefore, the adherence of sustainable development principle is a 'sine qua non' for the maintenance of symbiotic balance between the rights to environment and development. The right to environment is a fundamental right on the other hand the right to development is also one. Here the right to 'sustainable development'

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cannot be singled out. Therefore, the concept of sustainable development is to be treated as integral part of "life under Article 21']].

106. It is humbly submitted that the EAC has conducted independent verification of all issues relating to the construction of the proposed project and the said contention is also hereby denied.

107. It is humbly submitted that the site selection of the proposed project was not decided in violation of the siting criteria guidelines prescribed for the Thermal Power Plants.

108. It is humbly submitted that the EAC had not dealt with the issue in a casual and lackadaisical manner.

109. It is humbly submitted that the Environmental Clearance has been rightly given for the proposed project and the same has been granted not in violation of the EIA Notification, 2006, Air [prevention and Control of Pollution] Act, 1981, Water (Prevention and Control of Pollution) Act, 1974, Environmental Protection Act, 1986, and the principles of Precaution and Sustainable Development.

110. It is humbly submitted that the contention of the appellant that there is a violation of statutory provisions as well as procedure by not recording the reasons are not correct. Therefore, the grounds raised therein are liable to be dismissed in limini with exemplary costs.

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111. That under the facts and circumstances stated above, it is most humbly prayed that this Hon'ble Tribunal may be pleased to-

i. Dismiss the interim relief sought by the appellant herein and this appeal may be dismissed in limini in the interest justice and equity.

ii. Dismiss and reject the instant Appeal filed by the Appellants with exemplary cost herein; and

iii. The Hon'ble Court may also pass any further Order or Orders as may seem fit and proper.

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Solemnly affirm and signed
At Hyderabad, on this the 13th day
of November, 2020.

Before me
A. Naresh
[A. Naresh Anand]
Advocate, Hyderabad

Attestation:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN BENCH ZONE
AT CHENNAI

APPEAL NO. 15 OF 2020

IN THE MATTER OF:

THE CONSERVATION ACTION TRUST,
5, Sahakar Bhavan, 1st Floor, LBS Road,
Narayan Nagar, Ghatkoper (W),
Mumbai-400 086
Represented by its Executive Trustee,
Mr. Debi Goenka & 1 Others.

...APPELLANT.

VERSUS

UNION OF INDIA,
Ministry of Environment and Forests & Climate Change,
Through it's Secretary
Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi- 110 003 and 3 others

...RESPONDENTS.

AFFIDAVIT

I, Shri. A. AJAY, S/O. A. CHANDAPPA, Aged about 56 years, R/o. Hyderabad, do hereby solemnly affirm and state as under:

That, I was the then EXECUTIVE DIRECTOR/CIVIL/THERMAL, TSGENCO and currently, I am working as DIRECTOR (CIVIL), TSGENCO, in RESPONDENT No.4 Corporation in the main appeal and I am conversant with the facts and circumstances stated in the reply and as such, I am competent to swear this affidavit.

That the contents of the accompanying reply from paragraph No.1 to 111 are true and correct and have been drafted under my instructions.

4TH RESPONDENT

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VERIFICATION

Verified on this 13th day of November, 2020 that the contents of the above-mentioned affidavit are true to the best of my knowledge and based on legal advice and that have not suppressed any material fact.

4th RESPONDENT

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Place: Hyderabad
Date: 13-11-2020

ANNEXURES

ANNEXURE - 1

VISIT REPORT ON THE SITE FOR 5×800 MW COAL FIRED SUPER CRITICAL THERMAL POWER PLANT AT DAMARACHERLA, DISTRICT NALGONDA, TELANGANA OF TELANGANA STATE POWER GENERATION CORPORATION LTD. (TSGENCO)

Submitted by

Sub-Committee of EAC (T&C)

Ministry of Environment, Forest & Climate Change

Government of India

New Delhi

December, 2015

VISIT REPORT ON THE SITE FOR 5×800 MW COAL FIRED SUPER CRITICAL THERMAL POWER PLANT AT DAMARACHERLA, DISTRICT NALGONDA, TELANGANA OF TELANGANA STATE POWER GENERATION CORPORATION LTD. (TSGENCO)

1.0 Background

Telangana State Power Generation Corporation Ltd. (TSGENCO) applied to MoEF&CC for TOR for 5 × 800 MW Coal fired Supercritical TPP at Damaracherla, District Nalgonda, Telangana. The Project Proponent (PP) presented the proposal at 45th EAC (T&C) meeting held on 29th-30th October, 2015 at MoEF&CC, New Delhi. The PP explained the relative merits and demerits of the three sites selected, and based on the availability of degraded forest land and water source (Krishna River) closer to the site, the PP selected the site located at Veerlapalem Village, Dameracherla Mandal of Nalgonda District, Telangana. The Committee observed that a stream/rivulet known as Tungapadu Vagu, a tributary of Krishna River passes through the site and the site selected is a degraded forest land. The Committee, after detailed discussion about the suitability of the site for setting up of the 5 × 800 MW TPP, decided that a Sub-Committee should visit the site for assessing the status of forest, River Krishna & its tributary and the topography and ecology of the site with respect to the riparian ecosystems. The PP also requested for the site visit [vide, minutes of 45th meeting of EAC (T&C)].

The Sub-Committee consisting of Professor C. R. Babu, Shri T. K. Dhar, Shri A. K. Bansal, Shri B.B. Barman and Dr. M. Ramesh visited the site on 05-12-2015. During the visit, the officials of TSGENCO, State Pollution Control Board, Irrigation & Flood Control Department, Revenue Officials and the DFO accompanied the Sub-Committee (list of officials from TSGENCO and Government of Telangana State is annexed). The entire team walked about 10 km covering cross section of the landscape of the project area including the Tungapadu Vagu and its flood plains along some segments of its course, and its confluence with the River Krishna. The different landscape features were recorded. The Sub-Committee interacted with local MLA and elected representatives of tribal villages and large number of villagers, who also accompanied the Committee during the visit.

2.0 Observations

The documents submitted by PP indicates that Forest Clearance (FC) was issued for total forest land of 1, 892. 35 ha (4,334.01 ha proposed originally) to TSGENCO for the establishment of Coal based Thermal Power Station of capacity 4,400 MW at Veerlapalem Village and 2,400 MW at DilawarpurVillage of Dameracherla Mandal of Nalgonda District in the State of Telangana subject to some conditions (vide, F.No. 8-07/2015-FC; **Annexure I**; **Figure 1**). The forest area allocated includes enclosures (encroachments and dis-reserved area for settlements for persons displaced for Nagarjuna Sagar dam). The PP proposed to set up 5 × 800 MW capacity TPP over an area of 1,133.12 ha (2,800 acres) located at Veerapalem village, Dameracherla Mandal of Nalgonda District (**Figure 2**). The land use of the core area is given in **Annexure II**. There are four waterbodies on the North-East side of the project; two of them are close to the boundary of the project; and all the four waterbodies are inter-connected and discharge their overflows into Tungapadu Vagu (**Figure 3**).

There are also primary and secondary surface channels originating from the project area and join the Tungapadu Vagu which has numerous meanders within and outside the project area and also all along its course; it also passes through deep gorges, particularly before it joins the River Krishna (**Figure 3**).

2.1 Landscape Ecology

The reserve forest area, including the area earmarked for the project has undulating low hill ranges with extensive plateaus. These hill ranges enclose shallow valleys and the maximum height is about 100 m from the valley base (**Figure 4**). The slopes and plateaus are rocky with thin layer of soil or no soil. The valleys composed of thick soil layer and the soil is lateritic in nature. The valleys are fertile and extensively cultivated. The major crops are Cotton, Chillies, Paddy, *Cajanus* and other pulses (green gram and black gram) and groundnut; orchards of oranges, lemon, banana and coconut are also cultivated. There are human settlements. Most of the low lying areas are converted into Paddy fields (**Figure 5**). *Borassus* palm is dotted along the paddy and other crop fields. *Phoenix* palm is common along the bank of Tungapadu Vagu.

The plateaus and gentle slopes are either nearly barren or with scattered bushes of *Acacia* and *Grewia* (**Figure 6**). The invasive species *Prosopis juliflora,* is also scattered. In deep depressions and along drainage channels, old relict thorny scrub forest consisting of

Randia, *Flacourtia* and *Acacia* species exists (**Figure 7**). The area proposed for the project is flat, nearly barren with grassy patches having herbaceous legumes such as *Crotalaria* and few other lateritic plateau species (**Figure 8**). The rainfall pattern over a period of 5 years (2009-2013) in the District is given in the **Annexure III**. The Tungapadu Vagu passes through the project area (**Figure 9**).

2.2 Tungapadu Vagu

As per the Engineer-in-Chief (Irrigation & CAD Department, Government of Telangana), Tungapadu Vagu is the main course in Group VIII of (K-7) lower Krishna Sub-basin in Krishna Basin and has catchment area of 694 sq. km (262.72 miles) with a yield of about 1,234 Mc ft (1.234 TMC) and the total length is about 87 km. The sub-basin group VIII is further divided in 3 subgroups i.e. (i) the Udayasamudrum Tank reservoir subgroup basin (subgroup VIII-I) which has catchment of 50.20 sq miles and yield of 284.73 Mc ft and irrigates 2511.38 acres (ayacut); (ii) the Pedda Cheruvu reservoir subgroup basin having 124.56 sq miles that yield 124.56 Mc ft and ayacut of 3653.80 acres; (iii) VIII-3 subgroup basin lies in Nagarjuna Sagar Left Canal (NSLC) command encircled between Mukundapuram Major canal & Venkatadripalem Major canal of NSLC. The catchment is about 92.96 sq miles (241 sq km) and the yield is 328.98 Mc ft mostly in the form of return flow as regenerated flow of the ayacut areas (balance yield of 328.98 Mcft) below NSLC which is used for irrigation. For Devulapalli balancing reservoir of Nagarjuna sagar left canal, there is no yield except the flash floods during heavy rainfall that enter into the Devulapalli reservoir. In other words, the regenerated flow from NSP ayacut is drained into the Vagu. During dry days the Vagu can be used for releasing Krishna waters from Nagarjuna Sagar reservoir and thereafter from Devulapalli reservoir which is a balancing reservoir. Actual discharges from the reservoirs during the last 5 years are not available.

The Tungapadu Vagu enters the project area from North-West and leaves the project area at the South and runs further south to join the River Krishna (**Figure 11**) which is about 5 km South-East of the project. The Vagu originates from Padakaparthy Village of Chityal Mandal, Nalgonda District and joins Krishna River below Nagarjuna Sagar dam near Veerapalem Village. The Vagu has a catchment area of 267 sq. miles (694 sq. kms) including the NSLC command area and yields 1,234 Mc ft. (1.234 TMC) including 328. 98 Mc ft. as regenerated flow from the ayacut. Along its course, three major reservoirs are created. The upper most reservoir is Udayasamudram Tank at Panagal Village in Nalgonda District; the

middle reservoir is Peddacheruvu (Thipparthy Vagu project at Ganganapalem Village of Thipparthy Mandal in Nalgonda District and the lowermost reservoir is at Devulapathy Village of Tripuraram Mandal in Nalgonda District and receives the regenerated flow from NSLC and also overflow from NSLC (**Figure 3**). The Vagu crosses Miryalguda – Nagarjuna Sagar road at Tungaphad Village and flow beside Veerapalem and finally joins Krishna River near Danda Pahad (**Figure 3**).

The Vagu runs from North-East to South-East after taking several meanders (**Figure 7**). In valleys it has narrow flood plains but in plateaus it runs through deep gorges (**Figure 10**). Within the project area it has a flood plain ranging from 10 m to 100 m wide in the 'U' shaped meandering Zone (**Figure 8**). *Ecologically, the Vagu not only drains the entire catchment but also take the drainage from the ayacut of NSLC and overflows from waterbodies which are inter-linked, but also provides water for irrigation.*

2.3 Status of Forests within and Outside the Project Areas

The Nagarjuna Sagar Tiger Reserve is about 40 km from the project site. The left out intact patch Reserve Forest is highly degraded and can be restored to original forest ecosystems – tropical thorn forest and grasslands. The ridges within the project area harbour degraded tropical thorn forest. The dominant species is *Acacia sundara* and other associates such as *Grewia rotundifolia*, *Albezia amarea, Randia*, *Flacourtia* and others.

2.4 Status of Agriculture within and outside the Project Areas

Within the project area, agriculture is confined to valleys. Paddy cultivation is common. The area is irrigated by Borewells and also from the regenerated flow below Devulapalli reservoir using pumps.

Outside the project area, crops such as pulses, chillies, cotton and others are also cultivated in uplands as a rainfed crop. Orchards of oranges and lemon are also common.

2.5 Stakeholder's Views

During discussion with local MLA and elected representatives of tribal villages and tribals (**Figure 12 A, B, C**), it was evident that the local communities welcome the project and already several Gramsabhas of tribal villages agreed to give their lands for the project. However, they expressed that the project proponent should implement the best R&R package for land losers, higher compensation for the land than what is offered presently and CSR

activities that would benefit the tribal communities. They also suggested that the compensation for land losers, irrespective of the ownership status, should be equal and high.

3.0 Summary and Recommendations

Based on the observations made during Site Visit, discussions held with all the stakeholders including Project Proponent, and critical evaluation of documents submitted, the Sub-Committee recommends the following:

(i) The Tungapadu Vagu is a perennial natural rivulet and is the lifeline for the local communities by providing water not only for irrigation, and recharging groundwater but also for draining the area into Krishna River.

a) *The Tungapadu Vagu should not be diverted but it should be preserved and protected, and enhanced its flows.*

b) *The PP should leave a minimum of 100 m buffer on either side of its banks and this buffer should be developed into native forest.*

c) *No effluent should be discharged into the rivulet or Krishna River.*

d) *In areas where the banks are breached, the breaches should be plugged and strengthened.*

e) *In areas where the riverbed is silted/partial blocked due to landslides, the blocks and silt should be removed in a way that the original gradient is maintained.*

f) *No water from the stream is extracted.*

g) *To sustain the downstream ecology of the Tungapadu Vagu, the Irrigation Department should release minimum ecological flows from the reservoirs constructed in the upstream.*

(ii) The Project area is above the high flood line as evident from the level of flood plains with respect to the project site and level of water course, and *as such the project site, which is a plateau, is not prone to floods.* In fact, the plateau is cut deeply by the rivulet and forms a deep gorge.

(iii) The plateaus and their slopes within the project area, which are not used for the project purpose, are highly degraded. *These should be restored to their original natural forest*

ecosystem and should be used for the conservation of rare and endemic plants and animals found in the plateaus of project area. These forests not only serve as green belt to mitigate fugitive emissions, CO_2 and other pollutants, but also serve as a conservation area.

(iv) The reserve forest that demarcates the project boundary on the south is also highly degraded. *This intact patch should be restored to its original forest ecosystem and should be connected to the forest ecosystem of the project area and other reserve forest in the area.* This would not only serve as buffer for the project but also acts as a corridor for wildlife and enhance stream flow. *For this purpose the PP should provide grants to the State Forest Department and work should start within a reasonable time of 1-2 years after preparing a detailed site specific action plan.*

(v) The tribal communities of the area and local MLA welcomed the project. However, they expressed higher compensation for land acquired, the best R&R package available and implementation of social welfare schemes and healthcare system for local communities. *The PP should create a permanent corpus fund for tribal welfare and also provide adequate compensation for the land loosers irrespective of their status besides best possible R&R package and extending social welfare schemes and healthcare system for local communities.*

(vi) Cumulative impact assessment of air, water, soil and socio-economics should be carried out in view of a number of cement plants already established/operating in the vicinity of the proposed plant.

(vii) As agreed by the PP, the area for ash pond shall be minimized by shifting it towards North. Further, a minimum distance of 500 m buffer shall be maintained between the proposed ash pond and Tungapadu Vagu. The buffer shall be developed into thick green belt/natural forest.

(viii) Issue of ToR to TSGENCO for setting up of 5x800 MW coal-fired supercritical TPP at Veerlapalem village of Dameracherla Mandal in Nalgonda District of Telangana State may be considered by including the above recommendations as ToRs besides other generic ToRs.

4.0 Acknowledgement

The Sub-Committee acknowledges the assistance provided to them by the officials of TSGENCO, the State Government and the local representatives during their Site Visit.

(Prof. C. R. Babu)
Member (EAC)

(T. K. Dhar)
Member (EAC)

(A. K. Bansal)
Member(EAC)

(B. B. Barman)
Member Secretary (EAC) & Director, MoEF&CC

(Dr. M. Ramesh)
Joint Director, MoEF&CC

List of officials from TSGENCO and Government of Telangana State present during the Site Visit on 05.12.2015

I. TSGENCO:

1. Sri. C. Radha Krishna, Director/Projects
2. Sri. A. Ajay, Chief Engineer/Civil/Thermal
3. Smt. V. Arudhra, Superintending Engineer/Civil
4. Sri. E. Hanuman, Superintending Engineer/Tech. to the CMD/TSGENCO
5. Sri. K. Ramakrishna Reddy, Executive Engineer/Civil
6. Sri. Srinivasa Rao, OSD, Security, TSGENCO
7. Sri. K. Karunakar, SI, TSGENCO
8. Sri. D. Gangaramulu, Asst. Executive Engineer/Civil

II. Irrigation and CAD Department:

1. Sri. Ch. Purushotham Raju, Chief Engineer/Irrigation/Nagarjuna Sagar Project
2. Sri. K. Dharma, Superintending Engineer/Irrigation//Nagarjuna Sagar Project

III. Revenue Department:

1. Sri. Sreenivas Reddy, Revenue Divisional Officer (I/C), Miryalaguda, Nalgonda Dist.
2. Smt. Ramadevi, MRO, Dameracherla Mandal, Nalgonda Dist.

IV. Forest Department:

1. Sri. S. Satyanaraya, Divisional Forest Officer, Nalgonda

V. Telangana State Pollution Control Board:

1. Sri. L. Vishweshwar Goud, Environmental Engineer, Regional Office, Nalgonda
2. Sri. V. Ravi Shankar, Asst. Environmental Engineer, Regional Office, Nalgonda

VI. Police Department:

1. Sri. Gone Sandeep, DSP, Miryalaguda, Nalgonda Dist
2. Sri. Partha Saradhi, CI, Halia, Nalgonda Dist.
3. Sri. Veera Raghavulu, SI, Dameracherla, Nalgonda Dist ,
4. Sri. Ravindar, Rural CI, Miryalaguda, Nalgonda Dist.
5. Sri. Sardar Singh, Rural SI, Miryalaguda, Nalgonda
6. Sri. Yaladri, SI, Tripuraram, Nalgonda Dist.
7. Sri. Vijayakumar, SI, Vemulapally, Nalgonda Dist.

VII. Public Representatives:

1. Sri. N. Bhaskar Rao, MLA, Miryalaguda, Nalgonda Dist.
2. Sri. Shankar Nayak, ZPTC, Dameracherla, Nalagonda Dist.

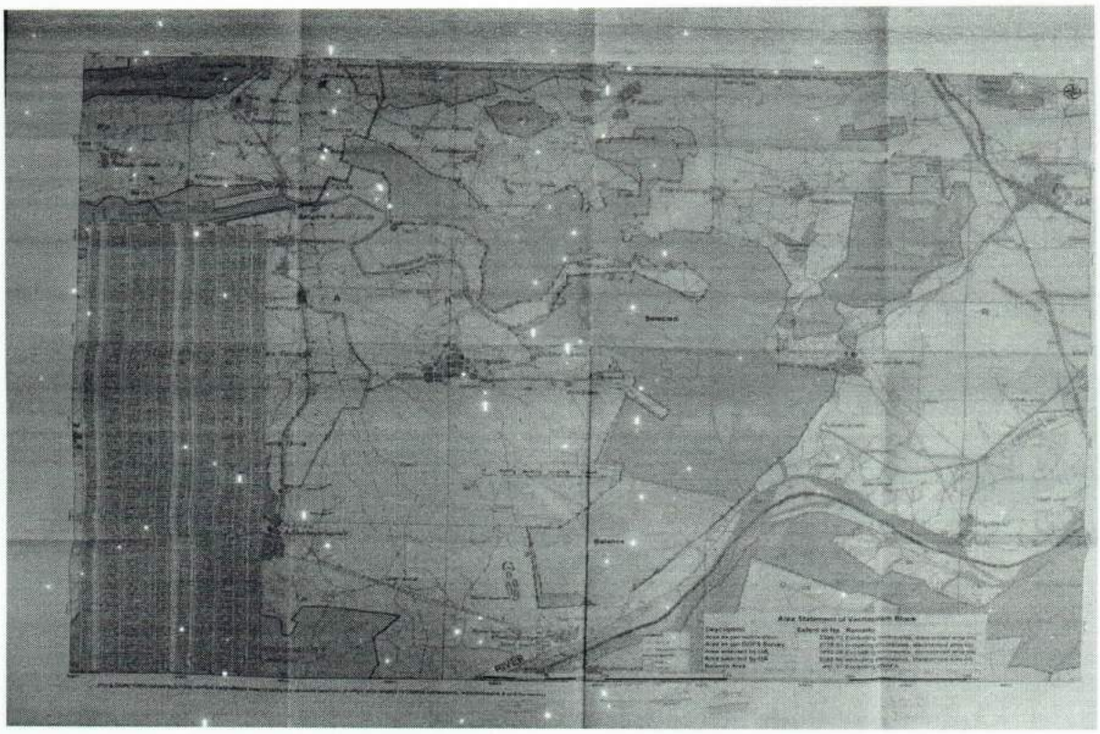

Figure 1: Map showing the forest area granted to the TSGENCO and the reserve forest patch at the southern end not granted to the project

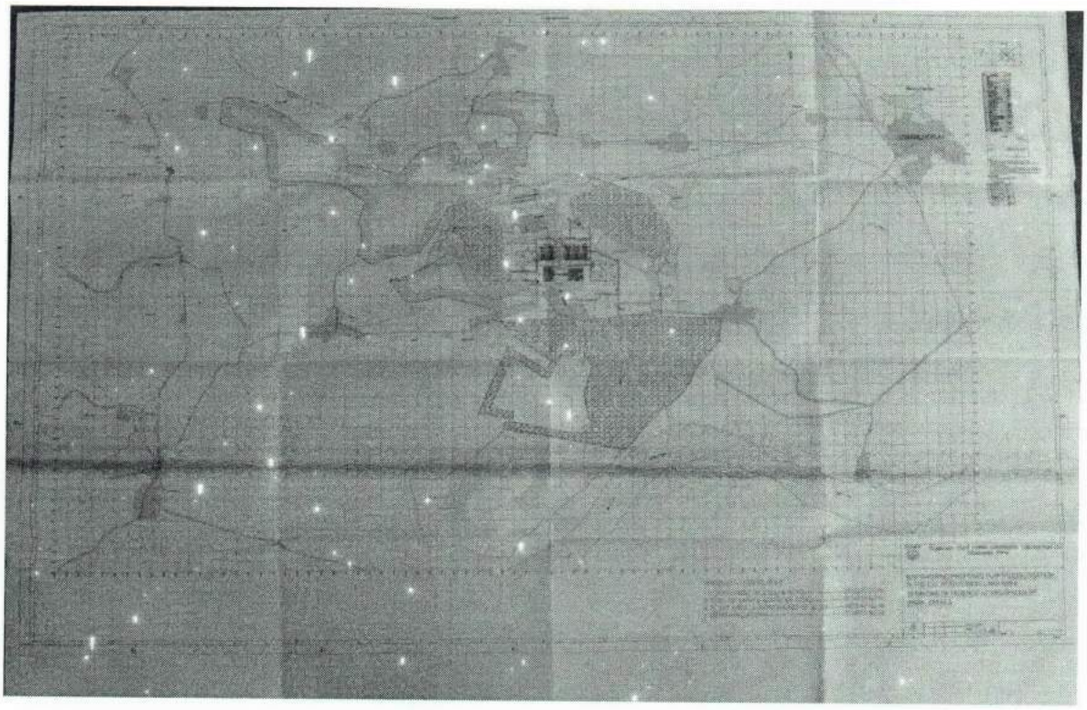

Figure 2: Map showing the boundary of the area allocated and the project layout.

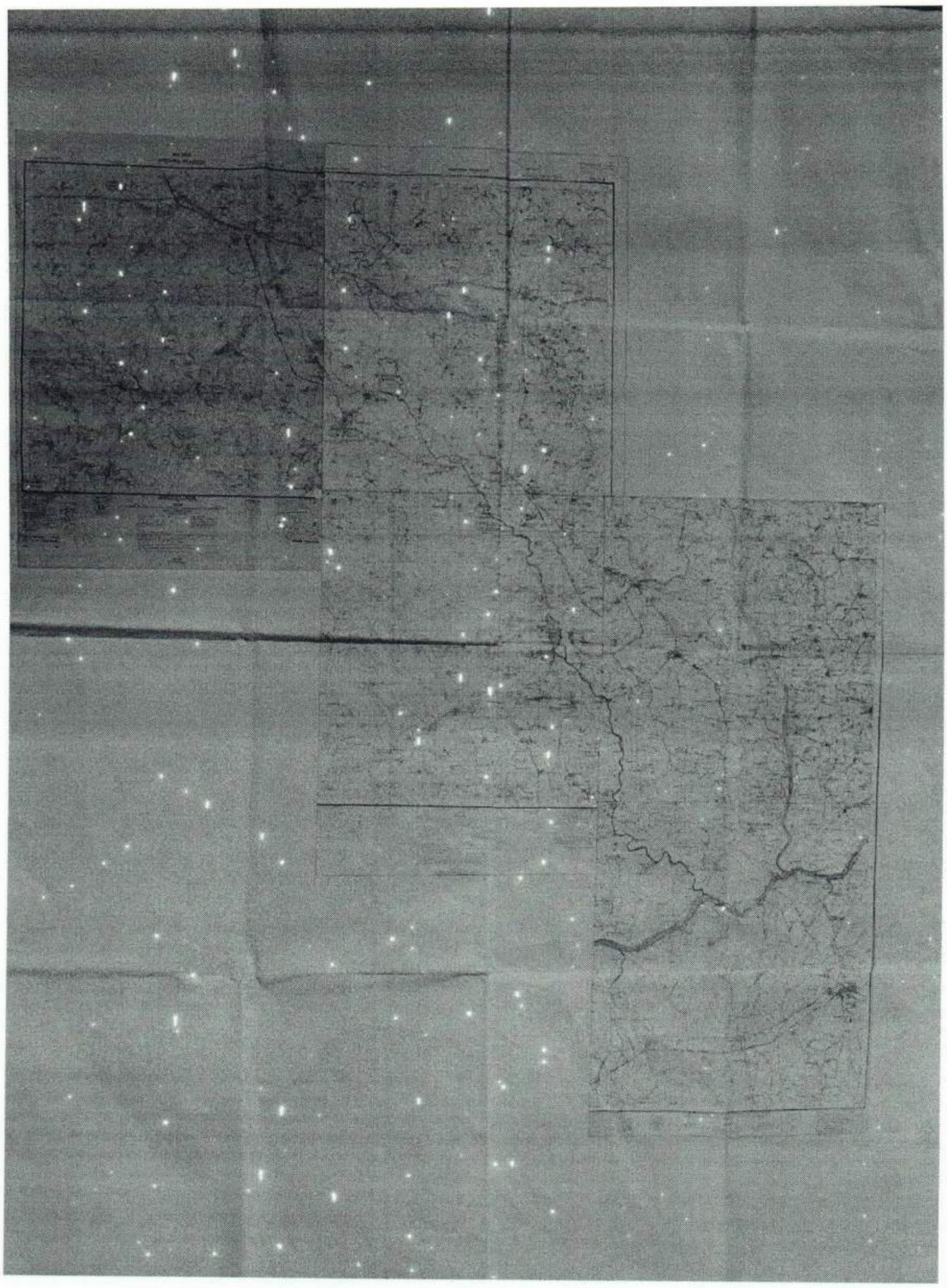

Figure 3: Toposheet showing the course of Tungapadu Vagu and Krishna river

Figure 4: Landscape of the project area and its surroundings including Tungapadu Vagu, plateau, and low-lying hills

Figure 5: Paddy Cultivation along Tungapadu Vagu

Figure 6: Degraded thorny scrub of plateau

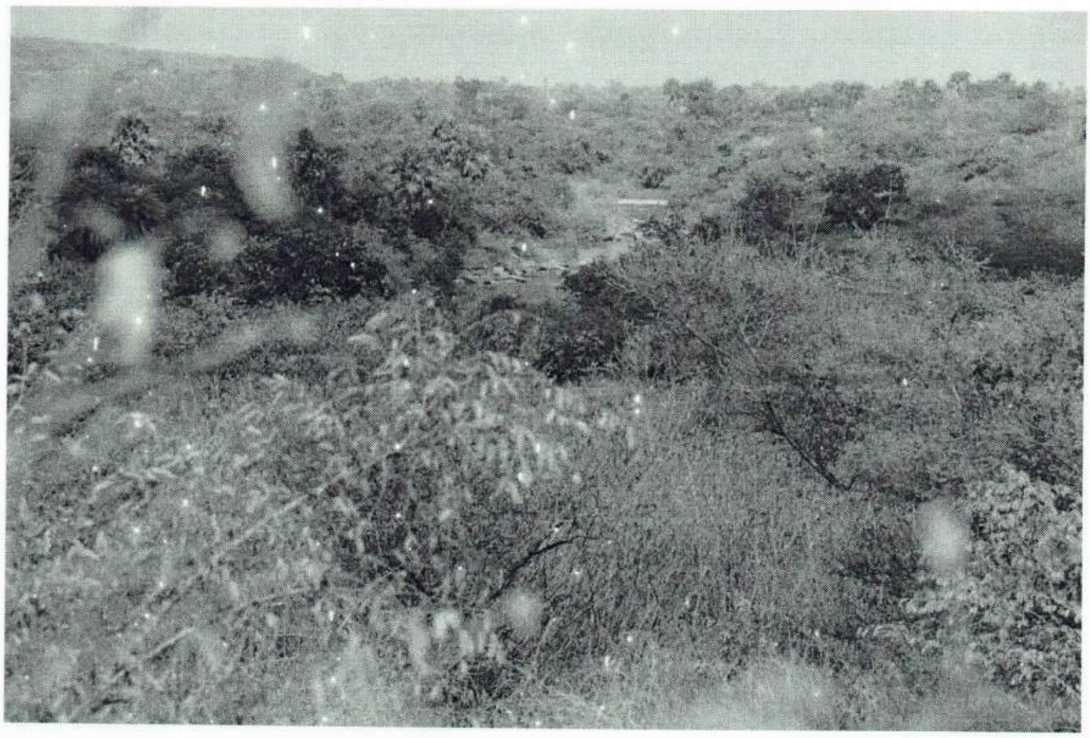

Figure 7: Meandering of the Tungapadu Vagu before it joins Krishna river and dense scrub forest in depressions

Figure 8: Nearly barren (degraded forest) area of the project

Figure 9: Tungapadu Vagu passing through the project area and please note the flood plain

Figure 10: Tungapadu Vagu passing through deep Gorge

Figure 11: The confluence point of Tungapadu Vagu with the river Krishna

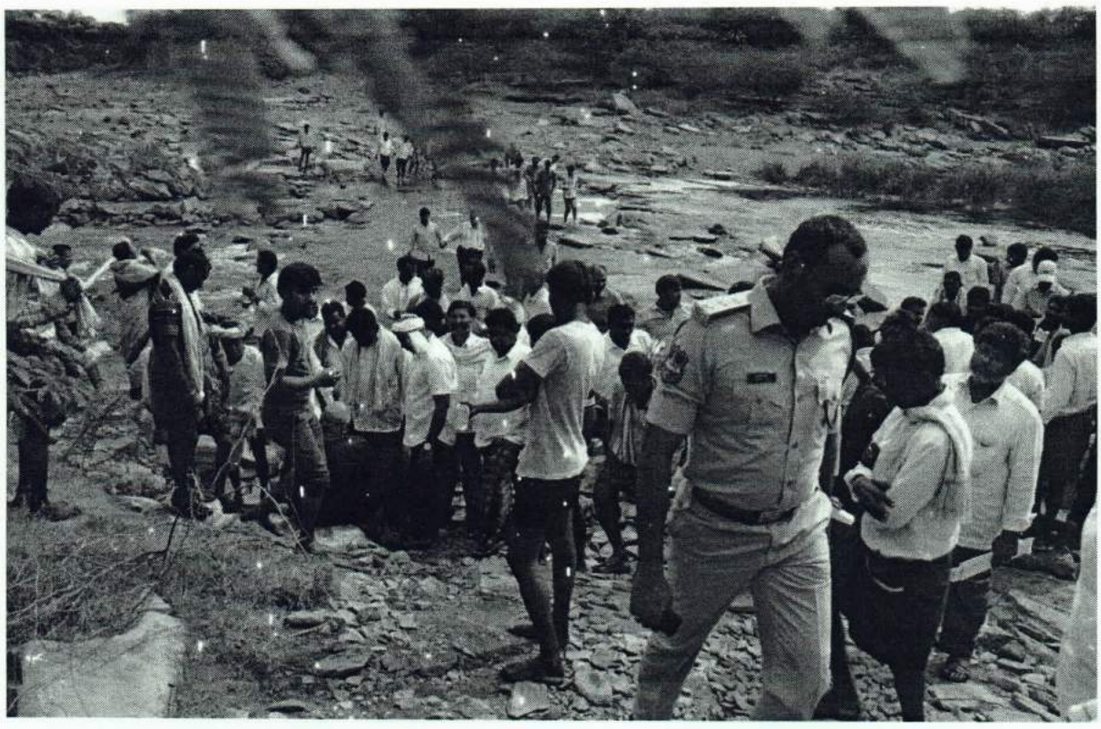

Figure 12 A: Villagers gathered near Vagu for interaction with members of the subgroup

Figure 12 B: Villagers of different age groups interacting with the members of subgroup

Figure 12 C: Interaction of the group with stakeholders including local MLA and elected representatives of tribal villages

Annexure 1

FOREST CLEARANCE

F. No. 8-07/2015-FC
Government of India
Ministry of Environment, Forests & Climate Change
(FC Section)
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Indira Paryavaran Bhawan
Aliganj, Jor Bagh Road
New Delhi 110003
Dated: 7th July, 2015

To

The Principal Secretary (Forest)
Government of Telangana,
Hyderabad.

Sub: Diversion of 1,892.35 ha (4334.01 ha proposed originally) of forest land in favour of TSGENCO for the establishment of Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V) and 2400 MW at Dilawarpur (V) of Dameracherla (M), in Nalgonda District in the State of Telangana.

Sir,

I am directed to refer to the State Government of Telangana's 0063/FOR.I (1)/2014-1 dated 29th January, 2015 on the subject mentioned above seeking prior approval of the Central Government under section-2 of the Forest (Conservation) Act, 1980 and letter no. 0063/FOR.I (1)/2014-2 dated 16.04.2015 forwarding additional information as sought by the Ministry vide its letter of even number dated 9.04.02015. After careful consideration of the proposal by the Forest Advisory Committee constituted by the Central Government under section 3 of the said Act, 'in-principle' approval to the proposal was granted vide this Ministry's letter of even number dated 27th April 2015 subject to fulfillment of certain conditions prescribed therein. The State Government has furnished compliance report in respect of the conditions stipulated in the in-principle approval and has requested the Central Government to grant final approval.

In this connection, I am directed to say that on the basis of the compliance report furnished by the State Government of Telangana vide their letter no. 63/FOR.I (1)/2015 dated 21.05.2015 and letter no. 63/For.I(1)/2015-4 dated 20.06.2015, final approval of the Central Government is hereby granted for diversion of 1,892.35 ha (4334.01 ha proposed originally) of forest land in favour of TSGENCO for the establishment of Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V) and 2400 MW at Dilawarpur (V) of Dameracherla (M), in Nalgonda District in the State of Telangana subject to fulfillment of the following conditions:

(i) Legal status of the diverted forest land shall remain unchanged;

(ii) Compensatory afforestation over the non-forest land, equal in extent to the forest land being diverted, shall be raised and maintained by the State Forest Department from the funds already provided by the User Agency;

(iii) The non-forest land transferred and mutated in favour of the State Forest Department shall be notified by the State Government as RF under Section-4 or PF under Section-29 of the Indian Forest Act, 1927 or under the relevant section(s) of the local Forest Act, latest within a period of six months from the date of issue of Stage--II approval. The Nodal Officer shall report compliance in this regard along with a copy of the original notification declaring the non-forest land under Section 4 or Section 29 of the Indian Forest Act, 1927, as the case may be, within the stipulated period to the Central Government for information and record;

(iv) The User Agency shall pay the additional amount of NPV, if so determined, as per the final decision of the Hon'ble Supreme Court of India;

(v) The User Agency shall obtain the Environment Clearance as per the provisions of the Environmental (Protection) Act, 1986, if required;

(vi) The User Agency shall ensure that ash disposal is carried out as per the detailed plan prepared for the purpose, and in accordance with all environmental safeguards.

(vii) Following activities shall be undertaken by the user agency under the supervision of the State Forest Department at the project cost:

a. Mitigative measures to minimize the soil erosion and choking of streams, as per approved plan, shall be implemented.
b. Planting of adequate drought hardy plant species and sowing of seeds to arrest soil erosion.
c. Construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour.

(viii) Wherever possible and technically feasible, the User Agency shall undertake by involving local community, the afforestation measures in the blanks within the project area being diverted under this approval, in consultation with the State Forest Department at the project cost.

(ix) The user agency shall take all measures to prevent pollution by effluents, particulate matters etc at the project cost.

(x) The user agency shall develop a green belt along the power station and also along the water pipe line/channel.

(xi) The forest clearance to the project is accorded without any guarantee on coal linkages.

(xii) No residential area shall be built on forest land diverted.

(xiii) No labour camp shall be established on the forest land;

(xiv) The User Agency shall provide fuels, preferably alternate fuels, to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;

(xv) The boundary of the diverted forest land shall be demarcated on ground at the project cost, by erecting four feet high reinforced cement concrete pillars, each inscribed with its serial number, forward and back bearing and distance from pillar to pillar;

(xvi) The layout plan of the proposal shall not be changed without the prior approval of the Central Government;

(xvii) The forest area to be diverted may not be used for any other purpose than the power plant proposed;

(xviii) The forest land shall not be used for any purpose other than that specified in the proposal;

(xix) The forest land proposed to be diverted shall under no circumstances be transferred to any other agency, department or person without prior approval of the Central Government;

(xx) No damage to the flora and fauna of the adjoining area shall be caused;

7/7/15

(xxi) Any tree felling shall be done only when it is unavoidable and that too under strict supervision of the State Forest Department;

(xxii) The user agency in consultation with the State Government shall create and maintain alternate habitat/home for the avifauna, whose nesting trees are to be cleared in this project. Bird's nests artificially made out of eco-friendly material shall be used in the area, including forest area and human settlements, adjoining the forest area being diverted for the project;

(xxiii) The user agency shall submit the annual self compliance report in respect of the above conditions to the State Government and to the concerned Regional Office of the Ministry regularly.

(xxiv) Any other condition that the concerned Regional Office of this Ministry may stipulate, from time to time, in the interest of conservation, protection and development of forests & wildlife; and

(xxv) The User Agency and the State Government shall ensure strict compliance of all conditions for which undertakings have been obtained from the User Agency and also compliance to provisions of the all Acts, Rules, Regulations and Guidelines, for the time being in force, as applicable to the project.

Yours

(Rajagopal Prashant)
Assistant Inspector General of Forest (FC)

Copy to:

1. The Principal Chief Conservator of Forests, Government of Telangana, Hyderabad.
2. The Addl. PCCF (Central), Regional Office, Chennai.
3. The Nodal Officer (FCA), O/o the PCCF, Government of Telangana, Hyderabad.
4. User Agency for Information.
5. Monitoring Cell, FC Division, MOEF&CC, New Delhi.
6. Guard File

(Rajagopal Prashant)
Assistant Inspector General of Forest (FC)

Annexure II

Land use in the project area (Source: Project Proponent):

S. No.	Details	Area in Acres	Area in Hectares
1	Main Plant Area	250.00	101.17
2	BOP Area	350.00	141.64
3	Raw Water Reservoir	100.00	40.46
4	Coal Handling Plant	250.00	101.17
5	Ash Dyke Area	700.00	283.28
6	Green Belt Area	1000.00	404.68
7	Housing Colony	100.00	40.46
8	Additional Pipeline and Railway Corridor	50.00	20.23
	Total	**2800.00**	**1133.12**

Annexure III

RAINFALL PATTERN IN THE DISTRICT

HYDROMET DIVISION, NEW DELHI
INDIA METEOROLOGICAL DEPARTMENT
DISTRICT RAINFALL (mm) FOR LAST FIVE YEARS

District : NALGONDA

Note : (1) The District Rainfall in millimeters (R/F) shown below are the arithmatic averages of Rainfall of Stations under the District.
(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.
(3) Blank Spaces show non-availability of Data.

YEAR	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.	R/F	%DEP.
2009	0.0	-100	0.0	-100	10.7	4	11.7	-26	7.7	-69	52.8	-49	29.4	-80	123.5	-13	137.0	-10	80.9	-19	35.4	8	0.0	-100
2010	17.4	480	0.4	-92	3.1	-70	4.5	-72	53.5	113	94.2	-10	256.5	72	170.0	20	207.7	37	92.5	-8	71.5	117	44.7	671
2011	0.0	-100	38.6	798	0.0	-100	29.0	92	16.3	-43	60.9	-41	180.2	16	187.1	27	35.5	-76	10.2	-90	0.9	-97	0.0	-100
2012	23.1	463	0.0	-100	0.0	-100	13.6	-10	6.5	-77	82.4	-20	143.9	-7	121.6	-17	130.7	-13	86.0	-19	66.1	107	0.0	-100
2013	12.0	193	48.3	1023	0.0	-100	21.4	42	12.9	-55	116.1	13	177.6	15	212.8	45	152.4	2	363.4	243	29.4	-8	0.0	-100

ANNEXURE - 2

भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)
Power Sector – Southern Region,
Periyar EVR Building, 690, Anna Salai,
Nandanam, Chennai – 600 035.

Ref. BHEL: PSSR: SCT: 1699- Package 1/2018/363 Date: 18.04.2018

To,
M/s RK Infracorp Pvt Ltd.,
Flat No. 207, Lumbini Enclave,
Opp: NIMS, Panjagutta,
Hyderabad- 500 082
Ph: 040- 23300156, 755 rkinfracorp@gmail.com

Sub: Letter of Intent (LOI) for Package 1 of Levelling and Grading Works for 5x 800 MW Yadadri Thermal Power Station at Veerlapalem village, Dameracherla Mandal, Nalgonda district, Telangana state

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Ref:

1) Our Tender Spec No. BHEL: PSSR: SCT: 1699 dated 23.11.2017 floated through E-Procurement Portal https://bheleps.buyjunction.in, containing
   - Volume – I, Book – I - Notice Inviting Tender (NIT) & Volume IA Technical conditions of contract (TCC);
   - Volume– I, Book – II - Volume IB Special conditions of contract (SCC); Volume IC General Conditions of contract (GCC); Volume ID- Forms & procedures;
   - Volume II- Price Bid
2) Corrigendum 01 dated 04.12.2017
3) Corrigendum 02 dated 06.12.2017
4) Corrigendum 03 dated 13.12.2017
5) Corrigendum 04 dated 21.12.2017
6) Your offer ref. BHEL PSSR SCT 1699 dated 07.12.2017 submitted through E-Procurement Portal

---

Dear Sir,

Kindly refer to your Offer & other correspondence cited above against our Tender Specification no BHEL PSSR SCT 1699. We are pleased to award this letter of intent for above said work.

1.0 Scope of Work
The scope of work under this LOI shall be in line with the tender specification no. SCT 1699.

2.0 Contract Price
The contract price for the subject work will be Rs. 45,18,44,000/- (Rupees Forty Five Crores Eighteen Lakhs Forty Four Thousand Only) approximately for the quantity indicated in the tender.

3.0 Security Deposit
Based on the above contract price, the total amount of security deposit works out to Rs. 2,25,92,200/- (Rupees Two Crores Twenty Five Lakhs Ninety Two Thousand Two Hundred Only). The same is to be submitted by you towards security deposit in line with Sl. No. 5 - Security Deposit of Volume-IA Part II Chapter-1 of Technical Conditions of Contract (Volume 1A).

BHEL PSSR CONTRACTS DEPATT CHENNAI-35.

TUV NORD ISO 9001

3.1 Additional Security Deposit
Based on the contract price mentioned in clause 2.0, Additional Security Deposit (ASD) for the work will be Rs. 1,14,46,800/- (Rupees One Crore Fourteen Lakhs Forty Six Thousand Eight Hundred only) in line with Clause 1.15.13 Additional Security Deposit (ASD) of Volume-IC Book II Chapter-1 of General Conditions of Contract.

4.0 Contract Period
7 (seven) months from the date of commencement of work at site as indicated in the Tender.

5.0 Date of Commencement of Work
The date of commencement of work under the LOI shall be the date mutually agreed between you and BHEL Site in-charge / 5 x 800 MW Yadadri TPS. You may please communicate the actual date of commencement of work after discussing with BHEL Site in-charge / 5 x 800 MW Yadadri TPS (Sri. E. R. Harikrishnan / GM (Projects VII), Nalgonda; Contact No: 9052117810).

6.0 Plan & Progress Monitoring
Compliance of Form-14 (Refer Book II Volume 1D – Forms & Procedures) to be ensured every month, as per Clause.no.2.9 of GCC.

7.0 General
The work shall be executed by you strictly complying with the following requirements and as per conditions stipulated in the tender specification.

7.1 Adequate mobilization of resources like manpower, T&P, etc., through your own sources to avoid interruption / delay in the progress & also ensuring safety aspects.

7.2 Timely payment to workmen to avoid any industrial relation problems leading to stoppage of work, labour unrest, etc.

7.3 Compliance with all statutory regulations.

7.4 Execution of Contract Agreement as per GCC 1.14.

You are requested to communicate your unqualified acceptance to this LOI.
Detailed Letter of Intent (DLOI) shall be issued upon receipt of your unqualified acceptance to this LOI.

Thanking you,

BHEL - PSSR CONTRACTS DEPATT CHENNAI-35.

Yours faithfully
for BHARAT HEAVY ELECTRICALS LTD

18/04/2018

Additional General Manager / SCT & Purchase

संदीपन बिस्वास
SANDIPAN BISWAS
अपर महाप्रबंधक / उप संविदा
Addl. General Manager / Sub Contracting
बी.एच.ई.एल.-पी.एस.एस.आर / BHEL - P.S.S.R.
पेरियार ई.वी.आर.बिल्डिंग, / Periyar EVR Building
690, अन्ना सालई, नन्दनम, चेन्नई – 600 035.
690, Anna Salai, Nandanam, Chennai - 35.

Cc: Site Incharge, BHEL, 5 x 800MW Yadadri TPS
Site Finance, BHEL, 5 x 800MW Yadadri TPS
GM / Projects – VII, Nalgonda
GM / Projects – I
GM / Projects-V
AGM / Finance

LOI Control No. (For BHEL's internal use only)- SR/ 02436/ 18-04-2018

ANNEXURE - 3

भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

Bharat Heavy Electricals Limited

(A Govt. of India Undertaking)
Power Sector – Southern Region,
Periyar EVR Building, 690, Anna Salai,
Nandanam, Chennai – 600 035.

Ref. BHEL: PSSR: SCT: 1699- Package 2 /2018/395 Date: 24.04.2018

To,
M/s Sri Raja Rajeswari Constructions India Pvt Ltd.,
#8-2-268/ R/ 5, Ground Floor,
Sri Laxminarsimha Sai Building,
Sagar Society Road, Banjara Hills
Road No. 2, Hyderabad- 500 034
Ph: 040- 40064689 vtsrgopal@srrcipl.com, rajkumar@srrcipl.com

Sub: Letter of Intent (LOI) for Package 2 of Levelling and Grading Works for 5x 800 MW Yadadri Thermal Power Station at Veerlapalem village, Dameracherla Mandal, Nalgonda district, Telangana state

Ref:

1) Our Tender Spec No. BHEL: PSSR: SCT: 1699 dated 23.11.2017 floated through E-Procurement Portal https://bheleps.buyjunction.in, containing
   - Volume – I, Book – I - Notice Inviting Tender (NIT) & Volume IA Technical conditions of contract (TCC);
   - Volume– I, Book – II - Volume IB Special conditions of contract (SCC); Volume IC General Conditions of contract (GCC); Volume ID- Forms & procedures;
   - Volume II- Price Bid
2) Corrigendum 01 dated 04.12.2017
3) Corrigendum 02 dated 06.12.2017
4) Corrigendum 03 dated 13.12.2017
5) Corrigendum 04 dated 21.12.2017
6) Your offer ref. BHEL/ YTPS/ TS/ Pkg- 1 & 2/ 2017-18 dated 11.12.2017 submitted through E-Procurement Portal
7) Our letter ref. BHEL: PSSR: SCT: 1699 Package-2/ 2018/ 366 dated 20.04.2018
8) Your letter ref. BHEL:PSSR:SCT:1699:Pkg No.2/ 2018-19 dated 20.04.2018

Dear Sir,

Kindly refer to your Offer & other correspondence cited above against our Tender Specification no BHEL PSSR SCT 1699. We are pleased to award this letter of intent for above said work.

1.0 Scope of Work
The scope of work under this LOI shall be in line with the tender specification no. SCT 1699.

2.0 Contract Price
The contract price for the subject work will be Rs. 45,18,44,000/- (Rupees Forty Five Crores Eighteen Lakhs Forty Four Thousand Only) approximately for the quantity indicated in the tender.

3.0 Security Deposit
Based on the above contract price, the total amount of security deposit works out to Rs. 2,25,92,200/- (Rupees Two Crores Twenty Five Lakhs Ninety Two Thousand Two Hundred Only). The same is to be

BHEL - PSS CONTRACTS DEPATT CHENNAI-35.

submitted by you towards security deposit in line with Sl. No. 5 - Security Deposit of Volume-IA Part II Chapter-1 of Technical Conditions of Contract (Volume 1A).

3.1 Additional Security Deposit

Based on the contract price mentioned in clause 2.0, Additional Security Deposit (ASD) for the work will be Rs. 1,14,46,800/- (Rupees One Crore Fourteen Lakhs Forty Six Thousand Eight Hundred only) in line with Clause 1.15.13 Additional Security Deposit (ASD) of Volume-IC Book II Chapter-1 of General Conditions of Contract.

4.0 Contract Period

7 (seven) months from the date of commencement of work at site as indicated in the Tender.

5.0 Date of Commencement of Work

The date of commencement of work under the LOI shall be the date mutually agreed between you and BHEL Site in-charge / 5 x 800 MW Yadadri TPS. You may please communicate the actual date of commencement of work after discussing with BHEL Site in-charge / 5 x 800 MW Yadadri TPS (Sri. E. R. Harikrishnan / GM (Projects VII), Nalgonda; Contact No: 9052117810).

6.0 Plan & Progress Monitoring

Compliance of Form-14 (Refer Book II Volume 1D – Forms & Procedures) to be ensured every month, as per Clause.no.2.9 of GCC.

7.0 General

The work shall be executed by you strictly complying with the following requirements and as per conditions stipulated in the tender specification.

7.1 Adequate mobilization of resources like manpower, T&P, etc., through your own sources to avoid interruption / delay in the progress & also ensuring safety aspects.

7.2 Timely payment to workmen to avoid any industrial relation problems leading to stoppage of work, labour unrest, etc.

7.3 Compliance with all statutory regulations.

7.4 Execution of Contract Agreement as per GCC 1.14.

You are requested to communicate your unqualified acceptance to this LOI.
Detailed Letter of Intent (DLOI) shall be issued upon receipt of your unqualified acceptance to this LOI.

Thanking you,

BHEL - PSSR CONTRACTS DEPATT CHENNAI-35.

Yours faithfully
for BHARAT HEAVY ELECTRICALS LTD

24/04/2018

Additional General Manager / SCT & Purchase

संदीपन बिस्वास
SANDIPAN BISWAS
अपर महाप्रबंधक / उप संविदा
Addl. General Manager / Sub Contracting
बी.एच.ई.एल.–पी.एस.एस.आर / BHEL - P.S.S.R.
पेरियार ई.वी.आर.बिल्डिंग, / Periyar EVR Building
690, अन्ना सालई, नन्दनम, चेन्नई – 600 035.
690, Anna Salai, Nandanam, Chennai - 35.

Cc: Site Incharge, BHEL, 5 x 800MW Yadadri TPS
Site Finance, BHEL, 5 x 800MW Yadadri TPS
GM / Projects – VII, Nalgonda
GM / Projects – I
GM / Projects-V
AGM / Finance

LOI Control No. (For BHEL's internal use only)- SR/02443 / 24-04-2018

ANNEXURE - 4.

ANNEXURE-

4

NGT ORDER TO MOEF FOR REVISING SITING GUIDELINES - THERMAL POWER PLANTS

Revise thermal power plants guidelines: Green Tribunal to MoEF

SECTIONS

Revise thermal power plants guidelines: Green Tribunal to MoEF

PTILast Updated: May 27, 2012, 09:19 AM IST

Synopsis

National Green Tribunal has directed the Ministry of Environment and Forests to revise guidelines for setting up of thermal power projects.

NEW DELHI: The **National Green Tribunal** has directed the **Ministry of Environment and Forests** (MoEF) to revise guidelines for setting up of thermal power projects by clearly demarcating the areas not conducive for projects.

The MoEF was asked to submit the revised guidelines, which should clearly indicate 'Go' as the area for a project and 'No go' as the place where a project cannot be undertaken, within three months.

The order came along with the tribunal's decision that environment clearance to **Nagarjuna Construction Company Ltd** for first phase of proposed 2,640 MW coal-based thermal power plant in Andhra Pradesh's Srikakulam district, shall remain suspended and the MoEF shall revisit the nod.

The Rs 14,000-crore **thermal power project** (TPP) was caught in controversy after protests by locals that led to death of three persons in police firing in July, 2010.

A bench of Tribunal headed by its Acting Chairperson A S Naidu said the guidelines relating to TPPs followed by MoEF were formulated "way back" in 1987 and should be updated.

"The changed scenario, scientific developments and change in technology mandates that the siting criteria as well as guidelines for setting up TPPs should be revised to bring it on a par with modern techniques to suit present environmental condition and to protect the ecologically sensitive areas.

"We, therefore, direct the MoEF to take cognisance of the present-day scenario and revise the siting criteria, guidelines for setting up of TPPs to match with the present day requirements as early as possible so as to avoid future controversies," the bench, also comprising Dr G K Pandey as an expert member, said.

The Tribunal said the updated guidelines would avoid "unnecessary litigation" and would go a long way in providing proper selection of environmentally compatible sites.

ANNEXURE - 5 (200)

No. J-11013/41/2006-IA-II (I) (Part)
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj
New Delhi-110003

Dated: 29th August, 2017.

OFFICE MEMORANDUM

Subject: Terms of Reference for EIA/EMP studies for the projects/activities requiring Environmental Clearance under the EIA Notification, 2006 - Extension of validity period - regarding.

In order to streamline the process and provide greater clarity in issuing Terms of Reference (ToRs) for undertaking EIA/EMP studies for the projects/activities requiring Environmental Clearance under the EIA Notification, 2006, the following decisions have been taken with immediate effect:

(i) The validity of ToRs for projects/activities (except for River Valley and HEP Projects), for submission of EIA/EMP reports shall be three years.

(ii) The validity of ToRs for River Valley and HEP Projects, for submission of EIA/EMP report shall be four years.

(iii) The above validity period can be extended by the concerned Regulatory Authority for a maximum period of one year without referring the proposal to the EAC/SEAC concerned, provided an application is made by the applicant before expiry of the validity period, together with an updated Form-1 and proper justification and there is no change in terms and conditions of the ToRs. After the lapse of validity, such extension will need EAC/SEAC consideration.

(iv) Thus, an outer limit of validity of ToRs shall be 4 years for all the projects/activities and 5 years for River Valley and HEP Projects.

(v) The ToRs will specifically mention the date of expiry of validity.

(vi) Extension of validity of ToRs beyond the outer limit of four years for all projects/activities, and five years for River Valley and HEP projects, shall not be allowed/considered by the Regulatory Authority.

(vii) The baseline data used for preparation of EIA/EMP reports may be collected at any stage, irrespective of the request for ToR or the issue thereof. However, such a baseline data and the public consultation should not be older than 3 years, at the time of submission of the proposal, for grant of Environmental Clearance, as per ToRs prescribed.

(viii) Public consultation shall be conducted during the validity of the ToRs. The public consultation conducted after the expiry of ToRs shall not be accepted by the Regulating Authority.

(ix) In case the proposal for Environmental Clearance along with EIA/EMP reports based on the ToRs prescribed, is not submitted within the validity period of ToRs, and/or not complying with the above conditions, the process shall be started *de novo*. The already collected baseline data may be re-used, provided it is not more than 3 years old and duly recommended by EAC/SEAC in their due diligence.

(x) In case, any proposal for ToR is delisted for want of additional information within the time period, as stipulated by the Ministry, the same can be listed again after the requisite information is submitted.

2. This Office Memorandum is issued in supersession of the earlier OMs of this Ministry as under:

i) No. J-11013/ 41/2006-IA-II (I) dated 22.03.2010;
ii) No. Z-11012/1/2013-IA-I (Part) dated 19.11.2013;
iii) No. Z-11012/1/2013-IA-I (part) dated 12.12.2013;
iv) No. J-11013/ 41/2006-IA-II (I) dated 22.08.2014;
v) No. J-11013/ 41/2006-IA.II (I) dated 08.10.2014;
vi) No.J-11013/41/2006-IA.II(I) dated 07.11.2014; and
vii) No. J-11015/109/2013-IA.II(M) dated 12.01.2017

3. This issues with the approval of the competent authority.

29/8/17

(Sharath Kumar Pallerla)
Scientist 'F'

Copy to:

1. All the officers of IA Division
2. Chairperson/Member Secretaries of all the SEIAAs/SEACs
3. Chairman of all the Expert Appraisal Committees
4. Chairman, CPCB
5. Chairpersons/Member Secretaries of all SPCBs/UTPCCs

Copy for information:

1. PS to Minister for Environment, Forest and Climate Change
2. PPS to Secretary(EF&CC)
3. PPS to AS(AKJ) / AS (AKM)
4. PPS to JS(GB) / JS(JT)
5. Website, MoEF&CC
6. Guard file

ANNEXURE - 6

Clarifications to Version 3 of the Scheme
October 3, 2017

Accreditation Scheme for EIA Consultant Organisations – Version 3: Clarifications -

Further to Clarifications issued on Dec 27, 2016, the following additional clarifications to the Scheme will become effective immediately:

Sl. No.	Clarifications
1.	**Functional Area requirements (Ref Annexure – IIA page 117) of the Scheme) –** a. **Functional Area – Noise and Vibration (NV):** It is proposed that the Functional Area Vibration will be required only for vibration intensive Sectors namely; Sector 1 - Mines (involving blasting), Sector 29 – Airports and Sector 34 – Highways. This can be filled by In-house or Empanelled experts. b. **Functional Area Solid and Hazardous Waste Management (SHW):** In accordance with MoEF&CC Notifications on Waste Management in 2016, the Functional Area SHW will now comprise - i. Hazardous Waste (HW) including Plastic waste, E-waste, ISW (Industrial Solid Waste) ii. Solid Waste (SW) including Construction and Demolition (C & D) Waste iii. Bio-medical Waste (BMW) Functional area ISW is now a part of HW. Since out of HW, ISW is the main concern for Group 2 (Power, Cement, Glass and Ceramic), a FAE (In-house or Empanelled) knowledgeable in ISW would be adequate for these Sectors. c. **Functional Area Air Quality (AQ):** Requirement of AQ is Core FA requirement for Group 1 & 2 as per the Scheme. Now other than Sectors 4 (Power) and 9 (Cement), the FA-AQ can be covered by either In-house or Empanelled experts.
2.	**Fulfilling the requirements of Functional areas (Ref Annexure – IIA page 117 of the Scheme) –** To address non-fulfilment or partial fulfilment of FAE requirements as per Annexure IIA by some AO/ACOs, Item 2 of 'Clarifications to Version 3 of the Scheme, dt. Dec 27, 2016' is replaced by – a. After the office assessment, NABET assessors will inform the AO/ACO of shortfalls, if any, in respect of core and significant functional areas, as applicable. The assessors will also inform the AO/ACO about non-compliance in QMS to Version 3, if any. b. When FAE requirements of none of the Sectors applied/ approved is fulfilled: i. If an AO/ACO does not meet the requirement of FAEs of any of the Sectors, it will be given 3 month's time to fulfil the same. For ACOs, the earlier approved Sectors (if applied) will continue to be reflected against its name in the NABET list of ACOs. In case the AO/ACO is not able to fulfil the requirements even after 3 months, it may be given another 3 months

	provided there is justifiable rationale based on the efforts put in by it. During this period for ACO, the Sectors approved earlier (if applied) will continue to be reflected in the NABET list of ACOs. In both the above cases, a noting that 'FAE requirement fulfilling is in process' will be mentioned. ii. In case the AO/ACO does not fulfil the FAE requirements of any of the Sectors after 6 months of the office assessment, the same shall expire. The application of the AO will be closed and the ACO will lose its accreditation. Should they wish to get accredited, they will need to apply afresh as per IA norms. c. When FAE requirement of some of the Sectors applied/ approved is fulfilled: i. If an AO/ACO meets the core and significant FA requirements of some of the Sectors applied/approved after office assessment and AC meeting, such Sectors will be approved. The balance earlier approved Sectors of the ACO (if applied) shall be retained in the NABET list of ACOs against its scope of accreditation for next 3 months from the date of communication by NABET secretariat with a noting that 'FAE requirement fulfilling is in process'. After the expiry of this period, the Sectors for which FAE requirements are still not fulfilled, will be deleted from the list. ii. For AO/ACO falling in above category (c.- i.), the balance Sectors may be approved as and when they fulfil all requirements of FAEs. The AO/ACO needs to give an undertaking to NABET that all relevant FAEs are available. d. The Accreditation cycle for the AO/ACO will be guided by the date of Initial accreditation irrespective of above procedures.
3.	**Accreditation Fees (Ref. Appendix D page 81 of the Scheme) -** The following will be applicable: a. Expansion in scope of accreditation – Rs. 30,000/- b. Document Assessment (Stage I) - Half man day charge
4.	**Time cycle of accreditation (Ref. Section 10.2 sub clause 10.2.1, page 24 of the Scheme) –** As per accreditation mechanism, maintaining the time cycle of accreditation is a fundamental requirement. The accreditation cycle for an organisation starts with its entry to the Scheme i.e. from the last date of office assessment based on which the Initial Accreditation (IA) was granted. In view of the above, **Section 10.2.1** (Page 24) may be read in conjunction with **Section C 1.0 (**Page 60 Para 3) – 'RA comes 18 months after SA i.e., on completion of 3 years after IA'.
5.	**An ACO losing a Sector or Category A status in a Sector due to leaving of the lone EC in that Sector and the EIA is due for public hearing or presentation in EAC/SEAC -** In such cases, the following will be applicable - 1. On request from the ACO, NABET will permit the ACO to complete the work in-hand taking due diligence. However, the ACO must refrain from taking up further projects in that Sector till the deficiency is made good by the ACO. 2. The EIA prepared may be presented by another ACO accredited for the relevant Sector and the category provided the second ACO owns up the report after due validation (vide **Annexure 1**).

Annexure 1

GUIDELINES FOR COMPLETING/VALIDATING EIA REPORTS

Sometimes due to specific reasons explained hereunder, a project proponent (PP) may change the QCI-NABET Accredited EIA Consultant Organisation (ACO) before the EIA could be finalised or presented to the concerned EAC/SEAC. The reasons for changing a NABET ACO could be any of the following -

i. The concerned EC leaves the ACO midway and the ACO does not have another EC for the said Sector, resulting in ACO losing the Sector for which the EIA was prepared or being prepared.

ii. Due to dispute between the ACO and the PP.

iii. The ACO does not want to continue in the EIA business and unable to complete/ present the EIA to EAC/SEAC.

iv. The EIA work was awarded by the PP to a Consultant organisation not accredited by QCI-NABET or the accreditation does not cover the relevant Sector. Since, MoEF&CC Notification dated March 3, 2016 requires only accredited consultants for preparing and presenting EIAs, the PP wants to award the EIA to an ACO.

In case of **point (i, ii, iii)** above, the balance work for the EIA can be awarded to an ACO or the completed EIA can be presented to the EAC/SEAC by another ACO, who meets the requirements mentioned below/ performs necessary due diligence including the following:

1. EIA Report not yet completed (under progress) –

a. The new ACO shall review the TOR and the contract document of the EIA that is being re-awarded.
b. All the required FAEs and EC (of relevant Category) as per the requirements of NABET shall be available with the new ACO.
c. The existing report shall be studied by all concerned FAEs and the EC and a detailed status report shall be prepared of incompleteness/inadequacies and activities to be undertaken to complete/supplement the report satisfactorily.
d. Excerpts or sections from the existing report should be adopted only after the same are reviewed thoroughly by the concerned FAE/EC. Balance part of the EIA to be prepared developed as per NABET Scheme Version 3.
e. A site visit of EC and all required FAEs shall be mandatory and adequate field notes shall be maintained for verification by NABET.
f. In case the baseline monitoring jobs were completed by the earlier consultant, the same shall be assessed for their completeness as per TOR.
g. Such baseline data shall be cross checked with existing secondary data from reputed sources.
h. New ACO shall clearly mention the source of each set of secondary data and ensure that due credit to previously engaged organisation is given in the reference.
i. In case there are no secondary data available for cross checking the existing data then some limited monitoring should be carried out as follows :
   - Ambient air quality - limited monitoring shall be undertaken for **at least one fortnight** at 10% of the previously monitored locations (at least at one location) preferably during the season when the original monitoring was done.
   - Water, soil, noise - **at least 10%** (minimum one station) of water, soil and noise data

shall be repeated.

j. In case the season of original baseline monitoring and that of validation differ, an analysis will be done by the new ACO about appropriateness of the existing results taking in account the relevant factors and the same will be reported in the EIA report.

k. In case the baseline monitoring was not completed by the previous consultant organisation, the data shall be generated freshly by the new ACO as per TOR (the old incomplete baseline data will not be used).

2. **EIA Report completed but not presented to EAC/SEAC (for validation of completed EIA for presentation) –**
   a. To follow points 1 (a, b & c) above.
   b. EC with concerned FAEs must visit the site to familiarise with site conditions and assess if TOR points have been covered in the EIA adequately.
   c. Cross check the important base line data with secondary sources.
   d. If suitable secondary sources are not available, follow point 1 (i) above
   e. An addendum on how the report was validated for its correctness and completeness to be prepared. Supplementary information, if necessary, may be included on this Addendum.

3. The ownership and responsibility of EIA shall be with Project Proponent (PP) and the ACO who have completed/ validated/ updated it. The earlier organisation shall not be able to claim it as their experience under the NABET Scheme.

In case of **point (iv),** it is likely that the EIA was done under the supervision of unapproved experts and therefore cannot be considered for re-award to new accredited consultant. It needs a fresh EIA under NABET approved ECs and FAEs.

Abbreviations:

ACO:	Accredited Consultant Organization
AO:	Applicant Organisation
AQ:	Meteorology, air quality modelling and prediction
BMW:	Bio-medical Waste
C&D:	Construction and Demolition Waste
EAC:	Expert Appraisal Committee
EC:	EIA Coordinator
EIA:	Environmental Impact Assessment
FA:	Functional Area
FAE:	Functional Area Expert
HW:	Hazardous Waste
IA:	Initial Accreditation
ISW:	Industrial Solid Waste
MoEF&CC:	Ministry of Environment Forest & Climate Change
NABET:	National Accreditation Board for Education and Training

NV:	Noise and Vibration
PP:	Project Proponent
QCI:	Quality Council of India
QMS:	Quality Management System
RA:	Re-accreditation
SA:	Surveillance Assessment
SEAC:	State Level Expert Appraisal Committee
SHW:	Solid and Hazardous Waste
SW:	Solid Waste
TOR:	Term of Reference

******

ANNEXURE – 7

~~ANNEXURE – 2E (I)~~

తెలంగాణ तेलंगाना TELANGANA A 580450

Date:27/04/2016, 03:36 PM Serial No: 5.044 Denomination: 100

Purchased By:
K.VENKATESHWARLU
S/O K.R.L.SHARMA
R/O HYD

For Whom
TSGENCO,VIDYUT SOUDHA ,HYD

Sub Registrar
Ex. Officio Stamp Vendor
SRO: S.R.Nagar

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made on this 27th day of April 2016 (the "MOU") at Hyderabad.

BETWEEN

A. **The Singareni Collieries Company Limited,** an existing company under the Companies Act, 2013, having its registered office at Kothagudem Collieries (PO) 507 101, Khammam District, Telangana (hereinafter referred to as the **"Seller"** which expression shall, unless the context otherwise specifies mean and include its successors and permitted assigns) of the FIRST PART

AND

G.M. (Mktg.)
SCCL, Hyderabad

B. **The Telangana State Power Generation Corporation Limited (TSGENCO),** a Company registered under the Companies Act, 2013 and having its Registered Office at Vidyut Soudha, Hyderabad, Telangana and herein after called the PURCHASER (which expression shall unless repugnant to the context shall include its legal representatives and successors) on the OTHER PART.

(The Seller and the Purchaser are hereinafter collectively referred to as the **"Parties").**

Whereas the Seller is a Government Company engaged in mining and sale of coal including coal exploration, design, construction, project management development, operations and allied consultancy services.

Whereas the Purchaser is in requirement of **G9 grade coal** for their proposed Yadadri Thermal Power Station (4000 MW), Damaracherla, Nalgonda (dt) and requested the Seller to supply coal to meet the generation requirement of this unit.

And whereas the Seller have agreed in principle to supply coal to the Purchaser from **cost plus mines after necessary approvals and guidelines as per the Ministry of Coal, Govt. of India, applicable for long term linkage/LoA/cost plus mines.**

NOW THEREFORE, in consideration of the premises and mutual covenants herein contained, the Parties hereto agree as follows:

1.0 The Seller shall supply 7.00 Million Tonnes per Annum (7 MMTPA) of G9 & above grades coal / WG-G9 grade for operation of Yadadri Thermal Power Station (5x800 MW) subject to the obtaining linkage from SLC (LT) of Ministry of Coal, Govt. of India for such supplies as per NCDP 2007 and cost plus policy guidelines 2008.

2.0 The Seller shall issue LoA after approval of application by SLC (LT), MOC, GoI, on successfully achieving the milestones stipulated in LoA, SCCL would execute Fuel Supply Agreement (FSA) with the TSGENCO covering commercial arrangement for supply of coal which shall include price and other details on mutually agreed terms and conditions.

G.M. (Mktg.)
SCCL, Hyderaba

Chief Engineer
(Coal & Commercial)
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.

3.0 SCCL shall open new cost plus mines for this power plant and the schedule of opening of such mine shall link to the commissioning of TSGENCO Power Plant which is expected to be commissioned by March 2019 and also Washeries to wash the raw coal as per the requirement of Yadadri TPS. The supply of coal shall commence from January 2019 tentatively. Upon delay in commissioning of the cost plus mines and washery, due to force majeure reasons, coal shall be supplied from other sources on weighted average e-auction prices, on best effort basis.

4.0 The Purchaser shall intimate exact date of commissioning of the plant to Seller in advance (i.e 3 months) so that SCCL shall initiate proposal for entering into FSA which shall indicate the modalities for supply of coal.

5.0 The Purchaser shall furnish year wise requirement of coal to Seller sufficiently in advance to supply of coal.

6.0 **Settlement of Disputes:** In the event of any dispute or difference touching the MOU between the parties shall be settled in accordance with the following guidelines.

ARBITRATION: In the event of any difference or dispute between the parties thereto, such dispute or difference shall be resolved amicable by mutual consultation. Any difference or dispute arising between the parties under this agreement shall be settled through Arbitration in accordance with the provisions of the Arbitration and Conciliation Act 1996. In such event the Tribunal shall consist of three Arbitrators, one each to be nominated by the Seller and Purchaser and the Third Arbitrator shall be nominated by the two Arbitrators nominated by the Purchaser and the Seller. The venue of Arbitration shall be decided mutually between the parties.

7.0 Severability and Renegotiation: In the event any part or provision of this Agreement becomes, for any reason, unenforceable or is declared invalid by a Competent Court of Law or Tribunal the rest of this agreement shall remain in full force and effect as if the unenforceable or invalid portions had not been part of this agreement and in such eventuality the parties agree to negotiate with a view to amend or modify this agreement for achieving the original intent of the parties.

G.M. (Mktg.)
SCCL, Hyderabad

8.0 Termination of MOU: The MOU shall stand terminated after payment of consequential damages liable to Seller or Purchaser, as the case may be. Such consequential damages shall be as per the decision of competent authority of Seller / Purchaser as the case may be.

9.0 Effective Date: This MOU will be effective from the date of signing and can be amended/ supplemented or replaced by another document signed by the Parties.

IN WITNESS WHEREOF THE PARTIES THORUGH THEIR AUTHORISED REPRSENTATIVES HAVE SET THEIR HANDS ON THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.

For and on behalf of Seller
(SCCL)

(J.NAGAIAH)
G.M. (Marketing)

G.M. (Mktg.)
SCCL, Hyderabad

GENERAL MANAGER (MKTG) * S.C.C.L. HYDERABAD *

Witness:

(N.V.K. SRINIVAS)
DGM (Marketing)

For and on behalf of Purchaser
(TSGENCO)

Telangana State Power Generation Corporation Ltd. * Vidyut Soudha, Hyd-82.

(K.VENKAESWARLU)
CE (Coal & Commercial)

Chief Engineer
(Coal & Commercial)
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.

Witness:

(G. Srinivasa Rao)
Secy.

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ANNEXURE-8.

~~ANNEXURE-2E (II)~~

The Singareni Collieries Company Limited
(A Government Company)

Regd Office :
Kothagudem Collieries - 507 101
Bhadradri Kothagudem District,
Telangana State, India.

Singareni Bhavan, Red Hills,
P.B. No. 18, Khairatabad (P.O.),
Hyderabad-500 004, Telangana State
CIN : U10102TG1920SGC000571

CMD/PS/H/144 2-374 Dt.09.12.2016

To
The Chairman & Managing Director
TSGENCO,
Vidyut Soudha, Khairatabad
HYDERABAD – 500 082
Fax: 040-23499166

Sir,

Dir (Fin) CE/Coal

Sub: Supply of coal to Yadadri Thermal Power Station - Reg.
Ref: Your Lr.No. CMD/CE(C&C)/SE(C&C)/F.IC/D.NO.530/2016, Dt. 8.12.2016.

Kindly refer to the above cited letter. It is to inform that SCCL is committed to supply 7.00 Million Tonnes/annum coal to Yadadri TPS as per MoU dt. 27.4.2016 signed between SCCL & TSGENCO. The above supplies will be as per the commercial terms and conditions between SCCL & TSGENCO.

Office of the Chief Engineer
(Coal & Commercial)
TSGENCO, V.S. Hyd-82.
Inward No: 1512
09 DEC 2016
SE/Commercial & Coal
DE/Commercial & Coal
SE/Planning
Chief Engineer
(Coal & Commercial)

Def cee Coal

Yours faithfully,

Chairman & Managing Director

ANNEXURE – 9.

~~ANNEXURE – 2E (III)~~

తెలంగాణ तेलंगाना TELANGANA 23 NOV 2016

F 171269

MD. ABDUL KHAI
STAMP VENDOR
L.No. 16-07-047/2013, R.L.No. 16-07-
5-9-20/A, Hotel Anmol Continen
Opp. Secretariat, Hyd. Ph : 9295

Sl.No. 8267 Dated 23/11/16 Rs. 100..
Sold to....K. Anandam.....
S/o W/o: K. Pachaiah.....R/o. Hyd.
For Whom: .....Self.....

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (hereinafter referred to as "the **MOU**") entered into on this 09th Day of December 2016 at Hyderabad by and between :

MSTC Limited, a Government of India Enterprise having its office at 225C, A.J.C. Bose Road, Kolkata-700020, (hereinafter referred to as 'MSTC") of the **First Part**

and

TELANGANA STATE POWER GENERATION CORPORATION LIMITED, a Govt Company incorporated under Companies Act, 2013, having its office at Vidyut Soudha, Khairthabad, Hyderabad. – 500 082, (hereinafter called as "TSGENCO") of the **Second Part.**

WHEREAS:

a) TSGENCO has proposed to establish Yadadri Thermal Power Station of 5x800 MW coal based thermal power project (hereinafter referred to as "the **Project**") at Veerlapalem Village, Nalgonda District,

Telangana to improve the power supply situation in Telangana and the project is scheduled to be commissioned in the year 2018-19.

b) TSGENCO proposes to operate and run the Project plant by using imported coal in blend with indigenous coal.

c) MSTC, a Govt. of India Enterprise, is having wide experience in supplying of imported coal to various thermal Plants in India;

d) MSTC has agreed to supply such imported coal of about 7 Million tonnes per annum (7.0 MTPA) for the above proposed project at the request of TSGENCO.

e) Whereas it is necessary to record the preliminary intentions aforesaid of the parties by way of and as a memorandum being these presents subject however to further agreement/s as may be entered into by them.

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING (MOU) WITNESSTH AS FOLLOWS:

1. <u>INDENT/S :</u>

a) MSTC shall supply upon placement of the indent/s by TSGENCO imported coal on Long term basis for operation of the Yadadri Thermal Power Station (5x800 MW). Such imported coal shall be non- coking coal(steaming) as per the following characteristics :

i)	GCV (ADB)	: 5700-6000 Kcal/Kg.
ii)	Total Moisture (ARB)	: 15-25%
iii)	Ash Content (ADB)	: 15%
iv)	Sulphur	: < 0.8%
v)	Volatile matter	: 25 -45
vi)	HGI	: 45-60
vii)	Size of coal	: 0-50mm

b) <u>Quantity:</u>

The quantity of imported coal shall be 7.00 MTPA, more or less if the power plant is operated with blended coal of 50% indigenous and 50% imported coal.

c) MSTC shall source imported coal from Indonesia/Australia/South Africa and supply as per the specifications to be stipulated..

09/12/16

d) TSGENCO shall intimate exact date of commissioning of the Project to MSTC in advance (i.e. three months) so that MSTC shall arrange necessary logistics.

e) The imported coal shall be supplied from Kakinada/Krishnapatnam port/ any other nearest ports in India.

f) MSTC and TSGENCO shall mutually discuss and agree upon the price of coal to be supplied and other commercial terms at the time of supply of imported coal.

g) The quantity of imported coal to be supplied may vary depending on the Plant load factor of the power plant of TSGENCO as well as the allocation of indigenous coal based on the long term coal linkage, if any, granted by the Ministry of Coal. TSGENCO shall not responsible for any variation in the quantity of imported coal that may be imported.

2. REPRESENTATION AND WARRANTIES:

Neither party shall have the right or power to bind the other party to any agreement without the prior written consent of the other party. Unless specifically agreed in writing, no party is authorized to make commitments, representations, and warranties to agreements on behalf of the other party and each party agrees that it will not hold itself out as having such authority. If any party acts in violation of the foregoing, the said party agrees to indemnify, defend and hold the other parties harmless from and against any and all claims, demands, losses, damages, liabilities, law suits and other proceedings, judgments and awards, the reasonable cost and expenses, (including but not limited to reasonable attorneys fee) arising directly or indirectly in whole or in part, out of the breach of this article by such party whether committed by the indemnifying party, its employees, agents, successors or assigns.

3. LIMITATION OF LIABILITY:

Neither party shall be liable to each other for any financial liability or any consequential loss incurred by the party individually in respect of this MOU. Notwithstanding anything stated in these presents to the contrary, the parties hereto agree that pursuant to the preliminary understanding of the parties hereto as recorded in these presents , the parties shall enter into agreement/s, on the broad terms recorded herein, to give effect to such understanding and intention of the parties hereto.

09/12/16

4. **ASSIGNMENT:**

The assignment by any party of all its rights and obligations under this MOU to a third party shall be subject to the written consent of the other party provided that such assignee shall also specifically agree in writing to be bound by the terms of this MOU and further terms as may be agreed by the parties hereto.

5. **NOTICE:**

Any notice to be given under this MOU shall be in writing and shall be deemed to have been duly and properly served upon the Parties hereto if delivered against acknowledgement or by registered mail with acknowledgement or by registered mail with acknowledgement due, addressed to the Parties herein at the following addresses or such changed addresses as will be duly notified by the Parties from time to time.

Attention	**Address**
MSTC Limited,	represented by A. Rajamanickam BM
Attention	
TSGENCO	represented by K Anandam, Chief Engineer (coal & comml)

6. **CONFIDENTIALITY:**

a. Both the parties, to the extent of their respective rights and obligations to do so, shall exchange or disclose such technical information and data as is reasonably required of each party to perform its responsibilities under this MOU and/or laws. Each party agrees to keep in confidence and to use the same degree of care as it uses with respect to its own proprietary data to prevent the disclosure to third parties of all technical information, data and confidential business information (hereinafter referred to as "Data").

b. Exchange, use and maintenance of confidential data shall be mutually discussed and agreed to by the parties.

c. The preceding provisions of confidentially and restriction on use of data shall not apply to by the Parties.

- Information in the public domain of information, which subsequently enter into private domain without committing breach of this clause.
- Information in possession of the party at the time of disclosure and was not acquired, directly or indirectly, from the other party.

- Information which a party is required to disclose under law, rules or regulations to any judicial or other authorities.
- Consultants / advisors provided they, in turn, sign undertaking of confidentially.

7. EFFECTIVE DATE:

This MOU shall come into force as soon as it is signed but shall remain in force for the period as mentioned hereunder at Clause No. 8 , subject to termination as provided for hereinbefore by either party without any recourse or any liability on account of such termination.

8. VALIDITY & TERMINATION:

The validity of this MoU shall be deemed to be in force till formal agreement for supply of Coal is executed between the parties hereto or till 16.05.2018 whichever is earlier.

This MoU may be terminated in the event of failure of any party to fulfill the terms and conditions of the MoU substantially vitiating the intents and purpose thereof, by giving three months notice in writing but only after one year of signing of this MoU. Further, during this period the MoU can be terminated by mutual consent of the Parties if it is jointly agreed that due to certain insurmountable reasons it is not possible to proceed further with the Project. Any notice for termination of the MOU may be delivered by hand or sent by first class airmail delivery/courier at the address specified above for each party and if posted shall be deemed to have been served within seven days after posting. During this one year period from the date of signing of this MoU, any one of the Parties shall not enter into negotiations with any other private or public entity without the written consent of the other Party relating to the construction, ownership and operation of the Project at the said Site.

9. Non-Liability of Govt. of India

It is clearly understood by the parties hereto that Government of India is not a party in any way with regard to execution or otherwise of this MOU and as such Government of India has no liability, any way, arising out of this MoU.

10. INTERGRITY PACT

This MoU between the parties shall be also governed by the Integrity Pact as available in the Supplier's Website www.mstcindia.co.in and the parties hereto hereby accept the same.

11. SETTLEMNT OF DISPUTES:

Any dispute or difference, whatsoever arising between the parties hereto out of or relating to the construction, meaning, scope, operation or effect of this non-binding MOU or the validity or the breach thereof shall be amicably settled by the parties hereto.

IN WITNESS WHEREOF, the parties hereto have signed this Memorandum of Understanding at Hyderabad on the date first mentioned above in the presence of witnesses as mentioned hereunder.

For and behalf of MSTC Limited

09/12/16

A. RAJAMANICKAM, DGM/BM.

For and behalf of Telangana State Power Generation Corporation Limited

Chief Engineer
(Coal & Commercial)
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.

WITNESSES:

1. G. Srinivasulu SO/plg/TSGENCO

MSTC LIMITED
D.No: 6-3-635 & 639, 2nd Floor, Akash Ganga Complex, Khairatabad, Hyderabad-4.
Govt. of India Enterprise

2. Jamil Akhtar
Manager – MSTC Ltd.

ANNEXURE-10.

रजिस्ट्री सं. डी.एल.- 33004/99 REGD. No. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

सी.जी.-डी.एल.-अ.-21052020-219495
CG-DL-E-21052020-219495

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 1400] नई दिल्ली, बृहस्पतिवार, मई 21, 2020/वैशाख 31 , 1942
No. 1400] NEW DELHI, THURSDAY, MAY 21, 2020/VAISAKHA 31, 1942

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 21 मई, 2020

का.आ. 1561(अ).—जबकि केन्द्रीय सरकार ने पर्यावरण (संरक्षण) नियमावली, 1986 के नियम 5 के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 3, धारा 6 और धारा 25 के तहत अपनी शक्तियों का प्रयोग करते हुए, ऐश सामग्री (ऐश कंटेंट) को 34% तक की सीमा सहित कोयले का उपयोग करने के लिए ताप विद्युत संयंत्रों की कतिपय श्रेणियों को अधिदेशित करते हुए भारत के राजपत्र, असाधारण में सा.का.नि. 02 (अ), तारीख 2 जनवरी, 2014 द्वारा पर्यावरण (संरक्षण) नियमावली, 1986 के नियम 3 के उपनियम 8 का संशोधन प्रकाशित किया।

और जबकि सा.का.नि. 02 (अ), तारीख 2 जनवरी, 2014 द्वारा उक्त अधिसूचना द्वारा निम्नलिखित समय-सीमा तक कच्चे अथवा मिश्रित अथवा लाभकारी कोयले (बेनिफिसिएटिड कोल), जिसमें ऐश सामग्री चौंतीस प्रतिशत (34%) से अधिक ना हो, का उपयोग करने के लिए त्रैमासिक आधार पर कोयला आधारित ताप विद्युत संयंत्रों को अधिदेशित किया गया है :

क्रम सं.	विद्युत संयंत्र की श्रेणी	गर्तमुख(पिट-हैड)/कोयला खान से ताप विद्युत संयंत्र के अवस्थान की दूरी	समय-सीमा
(क)	एकल ताप विद्युत संयंत्र (किसी भी क्षमता के) और कैटिप्व ताप विद्युत संयंत्र (100 मेगावाट और अधिक क्षमता सहित)	गर्तमुख विद्युत संयंत्रों को छोड़कर गर्तमुख से दूरी पर ध्यान दिए बिना शहरी क्षेत्रों,या परिस्थितिकीय रूप से संवेदनशील क्षेत्रों या अत्यधिक प्रदूषित क्षेत्रों में अवस्थित	2 जून, 2014 से प्रभावी।
(ख)		1000 किमी से अधिक दूर	2 जून, 2014 से प्रभावी।
(ग)		750-1000 किमी के बीच	1 जनवरी, 2015 से प्रभावी।
(घ)		500-749 किमी के बीच	5 जून, 2016 से प्रभावी।

और जबकि, केंद्रीय सरकार ने पर्यावरण (संरक्षण) नियमावली के नियम 5 के उप-नियम (3) के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 6 और धारा 25 के अधीन अपनी शक्तियों का प्रयोग करते हुए भारत के राजपत्र, असाधारण में स.का.आ. 3305 (अ), तारीख 7 दिसंबर, 2015 और सा.का.नि.593 (अ), तारीख 28 जून, 2018 द्वारा विद्युत उत्पादन की क्षमता और विद्युत संयंत्र की संस्थापना की तारीख और समय-बद्ध रीति से प्राप्त किए जाने के आधार पर ताप विद्युत संयंत्रों की विभिन्न श्रेणियों के लिए उत्सर्जन मानकों और विनिर्दिष्ट जल उपभोग को प्रकाशित किया था।

और जबकि, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय ने विद्युत मंत्रालय द्वारा दिनांक 13 अक्तूबर, 2017 को प्रस्तुत की गई यथा संशोधित योजना के अनुसार विभिन्न ताप विद्युत संयंत्रों को वर्ष 2022 तक प्रदूषण नियंत्रण उपकरण संस्थापित करने के लिए पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 5 के तहत निर्देश जारी करने के लिए केंद्रीय प्रदूषण नियंत्रण बोर्ड को दिनांक 7 दिसंबर, 2017 के फा.सं. क्यू-15017/40/2007-सीपीडब्ल्यू द्वारा निदेश दिए।

और जबकि, विद्युत मंत्रालय ने अन्य बातों के साथ-साथ यह अभ्यावेदन किया है कि प्रदूषण नियंत्रण प्रौद्योगिकियों के उन्नत होने के साथ ही ताप विद्युत संयंत्र दहन प्रक्रिया से उत्पन्न फ्लाई-ऐश का पता लगाने में बेहतर उपकरणों से सुसज्जित हुए हैं और बिना धुला कोयला अधिक कुशलता और मितव्ययता से प्रयोग किया जा सकता है; ताप विद्युत संयंत्रों को राख अवयवों की विभिन्न किस्मों के साथ कोयले के लिए डिजाइन किया गया है और इनमें सूखी राख (ड्राई ऐश) निकालने, उसका रखरखाव करने और राख के उपयोग के लिए आपूर्ति प्रणालियों को उपलब्ध कराया गया है; धुले कोयले के उपयोग से बिजली उत्पादन महंगा हो जाता है; ताप विद्युत संयंत्रों में उत्पन्न फ्लाई-ऐश सीमेंट निर्माण, ईंटें बनाने, सड़क बिछाने, खनन के उपरांत रिक्त हुए स्थलों और निचले क्षेत्रों को भरने के लिए बैक-फिल सामग्री जैसे कई लाभकारी उपयोगों के लिए प्रयोग की जा रही है; औसतन ऐश की मात्रा 34% तक बनाए रखने की आवश्यकता उद्योगों को कोयले का आयात करने के लिए प्रेरित करती है जिससे विदेशी मुद्रा इत्यादि का बहिर्वाह (आऊटफ्लो) होता है।

और जबकि, कोयला मंत्रालय ने अन्य बातों के साथ-साथ अभ्यावेदन किया है कि कोयला खानें वर्षों से कच्चे कोयले की गुणवत्ता, आकार और बाहरी सामग्री में सुधार के लिए निरंतर कड़े प्रयास कर रही हैं जिससे सभी संबंधित उपकरणों की टूट-फूट में उल्लेखनीय कमी आई है, कोयला धुलाई प्रक्रिया में कई प्रकार का रखरखाव होता है और कोयला खानों से धुलाई-स्थलों (वाशरीज़) तक कोयले की बड़ी मात्रा को सड़क द्वारा ले जाने और फिर आगे

विद्युत संयंत्रों तक ले जाने के लिए रेल साइडिंग्ज़ तक ले जाने से बचना; धुलाई की प्रक्रिया केवल कोयले को धुले हुए कोयले और वाशरी अवशिष्ट में बॉटती है जबकि खनित कोयले की राख की मात्रा वही रहती है; निम्न श्रेणी कोयला वाशरी अवशिष्ट कई छोटे उपयोगकर्ता उद्योगों में, अधिक प्रदूषण आदि सृजित करते हैं।

और जबकि, कोयला मंत्रालय और विद्युत मंत्रालय ने इसलिए अनुरोध किया है कि दिनांक 2 जनवरी, 2014 की अधिसूचना पर पुन: विचार द्वारा, विद्युत संयंत्रों को धुले हुए कोयले के प्रयोग के लिए अधिदेशित करने पर गौर किया जाना अपेक्षित है जिससे पर्यावरण पर प्रतिकूल प्रभाव डाले बिना कोयले की लंबी दूरी की ढुलाई के लिए बिजली के उत्पादन में आसानी होगी।

और जबकि, नीति आयोग ने अपनी रिपोर्ट में वाशरीज़, कोयला खनन, परिवहन और विद्युत संयंत्रों में कोयले की खपत की दृष्टि से इस विषय का विश्लेषण करने के बाद अन्य बातों के साथ-साथ संक्षिप्त में यह अभ्यावेदन किया है कि समीपवर्ती उद्योगों में वाशरी अवशिष्ट का इस्तेमाल अधिक प्रदूषण पैदा करता है; चूंकि वाशरी अवशिष्ट अनेक छोटे उद्योगों में वितरित होते हैं, इसलिए विद्युत संयंत्र पर उत्पन्न प्रदूषण की तुलना में अनेक स्थलों पर उत्पन्न प्रदूषण को नियंत्रित करना अधिक काठेन होता है; धुलाई प्रक्रिया में उत्पन्न राख (ऐश) कोयला कणों के साथ-साथ पानी को भी प्रदूषित करती है और इसका लाभकारी उपयोग नहीं किया जा सकता, कोयला धुलाई प्रक्रिया में पानी का अधिक प्रयोग होता है, अपशिष्ट सृजन होता है; वाशरी अवशिष्ट के निपटान का पर्यावरण पर प्रतिकूल प्रभाव होता है क्योंकि इसमें बड़ी मात्रा में निम्न श्रेणी कोयला अवशिष्ट, तरल अपशिष्ट प्रवाह, कोयला भण्डारण, कोयला मिट्टी का रखरखाव, अपवाह और उड़ने वाली धूल का रखरखाव और निपटान करना होता है, कोयला धुलाई का स्थलाकृति, जल निकास स्वरूप और गुणवत्ता, जल निकायों, बड़े पैमाने पर प्रतिवेशी वायु गुणवत्ता पर भी प्रतिकूल प्रभाव पड़ता है; धुलाई प्रक्रिया से विद्युत उत्पादन की लागत में भी वृद्धि होती है जिसका कोई पर्यावरणीय लाभ इत्यादि भी नहीं होता।

और जबकि, नीति आयोग ने इसलिए सिफारिश की है कि पर्यावरणीय और प्रदूषण मानकों का निर्धारण करना और उन्हें लागू करना विवेकपूर्ण होगा, जिन्हें कोयले में ऐश की मात्रा प्रतिबंधित किए जाने के बजाए, परिवहन दूरी के आधार पर विद्युत उत्पादकों के साथ जोड़ा जाना चाहिए।

और जबकि, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय ऊर्जा मंत्रालय, कोयला मंत्रालय के अभ्यावेदनों, नीति आयोग और कई हितधारकों की रिपोर्ट पर विवेचन करने तथा सावधानीपूर्वक विचार करने के बाद एवं जनहित में निम्नलिखित निष्कर्ष पर पहुंचा है—

i) खनित कोयले में ऐश सामग्री की मात्रा समान रहती है। वाशरी से ऐश सामग्री दो स्थानों (वाशरी और विद्युत संयंत्र) में विभाजित हो जाती है जबकि बिना धुला कोयला विद्युत संयंत्र में प्रयोग किया जाता है, ऐश सामग्री का निपटान केवल एक स्थान अर्थात विद्युत संयंत्र में किया जाता है;

ii) ताप विद्युत संयंत्र प्रदूषण नियंत्रण, ऐश प्रबंधन के लिए तकनीकी रूप से सुसज्जित होते हैं क्योंकि उनमें फ्लाई-ऐश का निराकरण करने के लिए उच्च क्षमता वाले उपकरण होते हैं, ड्राई ऐश निष्क्रमण और हैंडलिंग सिस्टम, ऐश उपयोग के लिए सप्लाई सिस्टम और फ्लू गैसों को तितर-बितर करने के लिए बड़े टाल (स्टैक) होते हैं;

iii) पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय ने उत्सर्जन मानक अधिसूचित किए हैं जिनमें क्रमश: ताप विद्युत संयंत्रों को समयबद्ध रीति से इन मानकों का पालन करने के लिए अधिदेशित किया गया है;

और जबकि, फ्लाई ऐश प्रबंधन और विभिन्न स्तरों पर बिना धुले कोयले के संसाधन के दौरान उत्पन्न अन्य संबंधित पर्यावरणीय पहलुओं सहित बिना धुले कोयले की हैंडलिंग के लिए यथासंभव उत्कृष्ट कार्यढांचे को अपनाना समयोचित है।

और जबकि, कोयला मंत्रालय ने अभ्यावेदन किया है कि मौजूदा अप्रत्याशित कोविड-19 महामारी और इसके फलस्वरूप देश में ऊर्जा उत्पादन के लिए कोयला क्षेत्र की मांग को प्रोत्साहित कर घरेलू कोयले के उपयोग की तत्काल आवश्यकता को देखते हुए यह वांछनीय है कि तत्काल अधिसूचना जारी की जाए।

अब, इसलिए, केंद्रीय सरकार पर्यावरण (संरक्षण) नियमावली, 1986 के नियम 5 के उपनियम (4) के साथ पठित पर्यावरण संरक्षण अधिनियम, 1986 (1986 का 29) की धारा 3, धारा 6 और धारा 25 के तहत अपनी शक्तियों का प्रयोग करते हुए, उक्त नियमावती के नियम 5 के उपनियम (3) के भाग (अ) के तहत सूचना देने की अनिवार्यता को हटा देने के उपरांत जनहित में पर्यावरण (संरक्षण) नियमावली, 1986 को आगे संशोधित करते हुए एतद्वारा निम्नलिखित नियम बनाती है, अर्थात्:

1. (1) इन नियमों को पर्यावरण (संरक्षण) संशोधन नियमावली, 2020 कहा जाएगा।

(2) ये सरकारी गज़ट में प्रकाशित होने की तारीख से लागू होंगे।

2. पर्यावरण (संरक्षण) नियमावली, 1986 में, नियम 3 में, उपनियम (8) के लिए निम्नलिखित उपनियम प्रतिस्थापित होगा, अर्थात् :-

"(8) ताप विद्युत संयंत्रों को, ऐश सामग्री अथवा दूरी संबंधी अनुबंधों के बिना, निम्नलिखित शर्तों के अध्याधीन कोयले के प्रयोग की अनुमति होगी:

(1) उत्सर्जन मानदण्डों के लिए प्रौद्योगिकीय समाधान निर्धारित करना:

i. वर्तमान अधिसूचनाओं और केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा समय-समय पर जारी अनुदेशों के अनुसार विविक्त सामग्री के लिए विनिर्दिष्ट मानदंडों का अनुपालन करना।

ii. वाशरी के मामले में मिडलिंग और अवशिष्टों का एफबीसी(तरलीकृत तल दहन) प्रौद्योगिकी आधारित विद्युत संयंत्रों में उपयोग किया जाए। एफबीसी संयंत्रों में मिडलिंग और अवशिष्टों के लिए वाशरी में संयोजन (लिंकेज) होना चाहिए।

2. ऐश पॉन्ड का प्रबंधन:

i. ताप विद्युत संयंत्र धुले हुए कोयले से बिना धुले हुए कोयले पर स्विच करने के कारण फ्लाई-ऐश पॉन्ड(मौजूदा विद्युत उत्पादन क्षमता) की अतिरिक्त क्षमता की पात्रता प्राप्त किए बिना, समय-समय पर जारी की गई अधिसूचनाओं में यथा-अधिसूचित शर्तों का पालन करें।

ii. ऐश प्रबंधन के लिए जल की खपत को अनुकूल करने हेतु समुचित प्रौद्योगिकी समाधान लागू हों;

iii. यदि आवश्यक हो तो फ्लाई-ऐश का अधिकतम उपयोग सुनिश्चित करने के लिए स्थल विशिष्ट स्थितियों के आधार पर ऐश का पृथक्करण इलैक्ट्रो-स्टेटिक अवक्षेपक (प्रेसीपिटेटर) स्तर पर किया जाए।

iv. ताप विद्युत संयंत्र उपर्युक्त 2(i) के अध्याधीन, छोड़ी हुई अथवा चालू खानों (वर्किंग माइन्स) में (खान मालिकों द्वारा सुविधाजनक बनाया जाए) पर्यावरणीय सुरक्षा उपायों के साथ फ्लाई-ऐश का निपटान करें।

3. परिवहन:

i. ढके हुए रेलवे वैगन (तिरपाल अथवा किसी अन्य माध्यम से ढके हुए रेलवे वैगन) और/अथवा खान-क्षेत्र से परे ढके हुए वाहक (कन्वेयर) द्वारा ही कोयले का परिवहन किया जाए। तथापि, जब तक रेल परिवहन/वाहक इन्फ्रास्ट्रक्चर उपलब्ध नहीं हो जाता, सड़क परिवहन ट्रकों द्वारा किया जाए जो तिरपाल अथवा किसी अन्य माध्यम से ढके हुए हों।

ii. ताप विद्युत संयंत्र द्वारा सुनिश्चित किया जाए कि

(क) रेल अथवा कन्वेयर द्वारा परिवहन के लिए विद्युत संयंत्र में अथवा इसके समीप रेल साइडिंग सुविधा अथवा कन्वेयर सुविधा स्थापित हो; और

(ख) यदि रेल अथवा कन्वेयर सुविधा की अनुपलब्धता के कारण परिवहन न हो पाए, तो यह सुनिश्चित किया जाए कि संबंधित खान के डिलीवरी स्थान से कोयले का परिवहन ढके हुए ट्रकों (तिरपाल अथवा किसी अन्य माध्यम द्वारा), अथवा किसी अन्य यंत्रीकृत बंद ट्रक से सड़क द्वारा हो।

(4) इसे वित्तीय वर्ष 2020-21 और उसके बाद के लिए संबंधित परियोजनाओं हेतु संगत पर्यावरणीय स्वीकृति की अतिरिक्त शर्तें भी समझा जाएगा। मौजूदा पर्यावरणीय स्वीकृतियों को संशोधित किया जाएगा ताकि संगत क्षेत्रों के लिए उपरोक्त शर्तों को प्रवर्तनशील बनाया जा सके। तदनुसार संबंधित राज्य प्रदूषण नियंत्रण बोर्ड द्वारा प्रचालन की अनुमति जारी की जाएगी।

[फा.सं. 13014/01/2020–आईए-I(टी)]

गीता मेनन, संयुक्त सचिव

टिप्पण—मूल नियम भारत के राजपत्र में सं.का.आ. 844(अ), तारीख 19 नवंबर 1986 द्वारा प्रकाशित किए गए थे और पश्चातवर्ती संशोधन सं.का.आ. 82(अ), तारीख 16 फरवरी, 1987; का.आ. 64(अ), तारीख 18 जनवरी, 1988; सा.का.नि. 931(अ), तारीख 27 अक्तूबर,1989; का.आ. 23(अ), तारीख 16 जनवरी, 1991; सा.का.नि. 95(अ), तारीख 12 फरवरी, 1992; सा.का.नि. 329(अ), तारीख 13 मार्च, 1992; सा.का.नि. 562(अ), तारीख 27 मई, 1992; सा.का.नि. 884(अ), तारीख 20 नवंबर, 1992; सा.का.नि. 386 (अ), तारीख 22 अप्रैल, 1993; सा.का.नि. 422 (अ), तारीख 19 मई, 1993; सा.का.नि. 801 (अ), तारीख 31 दिसंबर, 1993; सा.का.नि. 320 (अ), तारीख 16 मार्च, 1994; सा.का.नि. 560 (अ), तारीख 19 सितंबर, 1997; सा.का.नि. 378 (अ), तारीख 30 जून, 1998; सा.का.नि. 07 (अ), तारीख 22 दिसंबर, 1998; सा.का.नि. 407 (अ), तारीख 31 मई, 2001; सा.का.नि. 826 (अ), तारीख 16 नवंबर, 2009; सा.का.नि. 513 (अ), तारीख 28 जून, 2012; सा.का.नि. 02 (अ), तारीख 02 जनवरी, 2014; का.आ. 3305 (अ), तारीख 07 दिसंबर, 2015; सा.का.नि. 593 (अ), तारीख 28 जून, 2018; और का.आ. 236 (अ), तारीख 16 जनवरी, 2020 द्वारा किए गए।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 21st May, 2020

S.O. 1561(E).—Whereas the Central Government had, in exercise of its powers under Section 3, Section 6 and Section 25 of Environment (Protection) Act, 1986 (29 of 1986) read with rule 5 of Environment (Protection) Rules, 1986, published draft rules further to amend sub-rule (8) of rule 3 of Environment (Protection) Rules, 1986, in the Gazette of India, Extraordinary, *vide* number G.S.R. 02(E), dated the

2nd January, 2014 mandating certain categories of thermal power plants to use coal with ash content restricted to 34%.

And whereas, the said Notification *vide* number G.S.R. 02(E) dated the 2nd January, 2014, mandated coal based thermal power plants to use raw or blended or beneficiated coal with ash content not exceeding thirty-four percent (34%), on quarterly basis, by the time lines given below:

Sl. No.	Category of Power Plant	Distance of location of Thermal Power Plant from pit-head/coal mine	Time lines
(a)	Stand-alone Thermal Power Plants (any capacity), and Captive Thermal Power Plants (with capacity of 100 MW and above)	Located in urban areas, or ecologically sensitive areas or critically polluted areas, irrespective of distance from pit-head, except pit-head power plants.	With effect from 2nd June, 2014.
(b)		beyond 1000 km	With effect from 2nd June, 2014.
(c)		between 750-1000 km	With effect from 1st January, 2015.
(d)		between 500-749 km	With effect from 5th June, 2016.

And whereas, the Central Government had, in exercise of its powers under sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, in the Gazette of India, Extraordinary, *vide* number S.O. 3305 (E), dated the 7th December, 2015 and G.S.R. 593 (E), dated the 28th June, 2018 published the emission standards and specific water consumption for various category of thermal power plants, based on capacity of power generation and date of installation of power plant and to be achieved in time bound manner.

And whereas, the Ministry of Environment, Forest and Climate Change directed the Central Pollution Control Board vide F.No.Q-15017/40/2007-CPW dated the 7th December, 2017 to issue Directions under Section 5 of Environment (Protection) Act, 1986, to various Thermal Power Plants to install pollution control equipment as per the revised plan submitted by the Ministry of Power dated the 13th October, 2017 by 2022.

And whereas, the Ministry of Power has, *inter alia*, represented that with advancement in pollution control technologies, thermal power plants are better equipped to capture fly-ash generated in combustion process and unwashed coal can be used more efficiently and economically; thermal power plants are designed for coal with wide variety of ash content and are equipped with dry ash evacuation, handling and supply systems for ash utilisation; using washed coal makes power generation costlier; fly ash generated in thermal power plants is being used in several beneficial uses like cement manufacturing, brick making, road laying, back-fill material for reclamation of mine voids and low lying areas; requirement of maintaining average ash content to 34% prompts industries to undertake import of coal, resulting in outflow of foreign exchange etc.

And Whereas, the Ministry of Coal has, *inter alia*, represented that the coal mines are constantly striving to improve raw coal in terms of quality, size and extraneous material over the years which has considerably reduced wear and tear of all related equipment, coal washing process involves multiple handling and avoidable road transportation of huge quantities of coal from coal mines to washeries and then to rail sidings for onward transport to power plants; the washing process only divides the coal into washed coal and washery rejects while the ash content of mined coal remains the same; use of low grade coal washery rejects, in the multiple small user industries, generates more pollution etc.

And Whereas, the Ministry of Coal and Ministry of Power have, therefore, represented that the mandating power plants to use washed coal requires to be revisited by reconsidering the notification dated the 2nd January, 2014 which will help ease power generation for long distance haulage of coal without adverse impact on the environment.

And Whereas, the **NITI Aayog**, in its report after analysing the issue from the perspective of washeries, Coal mining, transportation and consumption of coal at power plants has, *inter alia*, summed up that use of washery rejects in nearby industries generates more pollution; since washery rejects are distributed in number of smaller industries, the pollution control at numerous points is more difficult than controlling the

pollution at power plant end; Ash generated in the washing process pollutes water along with coal particles and cannot be gainfully utilised; Coal washing process involves increased water use, effluent generation; Disposal of washery rejects has negative environmental impact as it has to handle and dispose huge quantity of low grade coal washery rejects, liquid effluent streams, coal storage, handling coal dust, runoff and fugitive dust; Coal washing also adversely impacts topography, water drainage pattern and quality, water bodies, surrounding air quality at large scale; Washing process increases the cost of power generation with no commensurate environmental advantages etc.

And Whereas, NITI Aayog has, therefore, recommended that it may be prudent to determine and enforce the environmental and pollution norms, to be complied with by the power generators, rather than restricting the ash content in coal, based on distance of transportation.

And Whereas, the Ministry of Environment, Forest and Climate Change, after deliberating the representations from Ministry of Power, Ministry of Coal, report of NITI Aayog and various stakeholders and after careful considerations & in larger public interest, arrived at the following:

(i) The extent of ash content in mined coal remains the same. With washeries, the ash content gets divided at two places (washeries and the power plant), whereas if unwashed coal is used in power plant, the ash content is handled at only one place viz. the power plant;

(ii) Thermal power plants are technologically equipped to address pollution control, ash management as they have high efficiency equipment to capture fly ash, dry ash evacuation and handling systems, ash supply systems for ash utilisation and tall stacks for wider dispersal of flue gases;

(iii) The Ministry of Environment, Forest and Climate Change has notified emission norms, mandating respective thermal power plants to adhere to such norms in a time bound manner;

And Whereas, it is expedient to adopt best possible framework towards handling of unwashed coal including management of fly ash and other associated environmental aspects arising out of processing of unwashed coal at different stages.

And Whereas, the Ministry of Coal has represented that in view of the existing unprecedented COVID-19 pandemic and the resultant immediate requirement of utilization of domestic coal by stimulating coal sector demand for power generation in the country, it is desirable to issue the notification at the earliest.

Now, therefore, in exercise of the powers conferred by Section 3, Section 6 and Section 25 of the Environment Protection Act, 1986 (29 of 1986) read with sub-rule (4) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government, after having dispensed with the requirement of notice under clause (a) of sub-rule (3) of rule 5 of the said rules, in public interest, hereby makes the following rules to further amend the Environment (Protection) Rules, 1986, namely :-

1. (1) These rules may be called the Environment (Protection) Amendment Rules, 2020

   (2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in rule 3, for sub-rule (8), the following sub-rule shall be substituted, namely :-

"(8) Use of coal by Thermal Power Plants, without stipulations as regards ash content or distance, shall be permitted subject to following conditions:

(1) **Setting Up Technology Solution for emission norms:**

(i) Compliance of specified emission norms for Particulate Matter, as per extant notifications and instructions of Central Pollution Control Board, issued from time to time.

(ii) In case of washeries, Middling and rejects to be utilized in FBC (Fluidised Bed Combustion) technology based thermal power plants. Washery to have linkage for middling and rejects in Fluidised Bed Combustion plants.

(2) **Management of Ash Ponds:**

(i) The thermal powers plants shall comply with conditions, as notified in the Fly Ash notification issued from time to time, without being entitled to additional capacity of fly ash pond (for existing power generation capacity) on ground of switching from washed coal to unwashed coal.

(ii) Appropriate Technology solutions shall be applied to optimise water consumption for Ash management;

(iii) The segregation of ash may be done at the Electro-Static Precipitator stage, if required, based on site specific conditions, to ensure maximum utilization of fly ash;

(iv) Subject to 2(i) above, the thermal power plants to dispose flyash in abandoned or working mines (to be facilitated by mine owner) with environmental safeguards.

(3) **Transportation:**

(i) Coal transportation may be undertaken by covered Railway wagon (railway wagons covered by tarpaulin or other means) and/or covered conveyer beyond the mine area. However, till such time enabling Rail transport/conveyer infrastructure is not available, road transportation may be undertaken in trucks, covered by tarpaulin or other means.

(ii) It shall be ensured by the thermal power plant that

a. Rail siding facility or conveyor facility is set up at or near the power plant, for transportation by rail or conveyor; and

b. If transportation by rail or conveyor facility is not available, ensure that the coal is transported out from the Delivery Point of the respective mine in covered trucks (by tarpaulin or other means), or any mechanized closed trucks by road.

(4) This shall also be deemed to be additional conditions of the relevant Environmental Clearances for respective projects for financial year 2020-21 and onwards. The existing Environmental Clearances shall stand modified so as to make the above conditions operative for relevant sectors. The Consent to Operate shall be issued by respective State Pollution Control Boards accordingly."

[F.No.13014/01/2020-IA.I(T)]

GEETA MENON, Jt. Secy.

Note:-The principal rules were published in the Gazette of India *vide* number S.O. 844(E), dated the 19th November,1986 and subsequently amended *vide* numbers S.O. 82(E), dated 16th February, 1987; S.O. 64(E), dated18th January, 1988; G.S.R. 931(E), dated 27th October, 1989; S.O. 23(E), dated 16th January, 1991; G.S.R. 95(E), dated 12th February, 1992; G.S.R.329(E), dated 13th March, 1992; G.S.R. 562(E), dated 27th May, 1992; G.S.R. 884(E), dated 20th November, 1992; G.S.R. 386(E), dated 22nd April, 1993; G.S.R. 422(E), dated 19th May, 1993; G.S.R. 801(E), dated 31st December, 1993; G.S.R. 320(E), dated 16th March, 1994; G.S.R. 560(E), dated 19th September, 1997; G.S.R. 378(E), dated 30th June, 1998;G.S.R. 7(E), dated 22nd December, 1998; G.S.R. 407(E), dated 31st May, 2001; G.S.R. 826(E), dated 16th November, 2009; G.S.R. 513(E), dated 28th June, 2012; G.S.R. 02(E) dated 2nd January, 2014; S.O. 3305 (E), dated 7th December, 2015; G.S.R. 593(E), dated 28th June, 2018 and S.O. 236 (E), dated 16th January, 2020.

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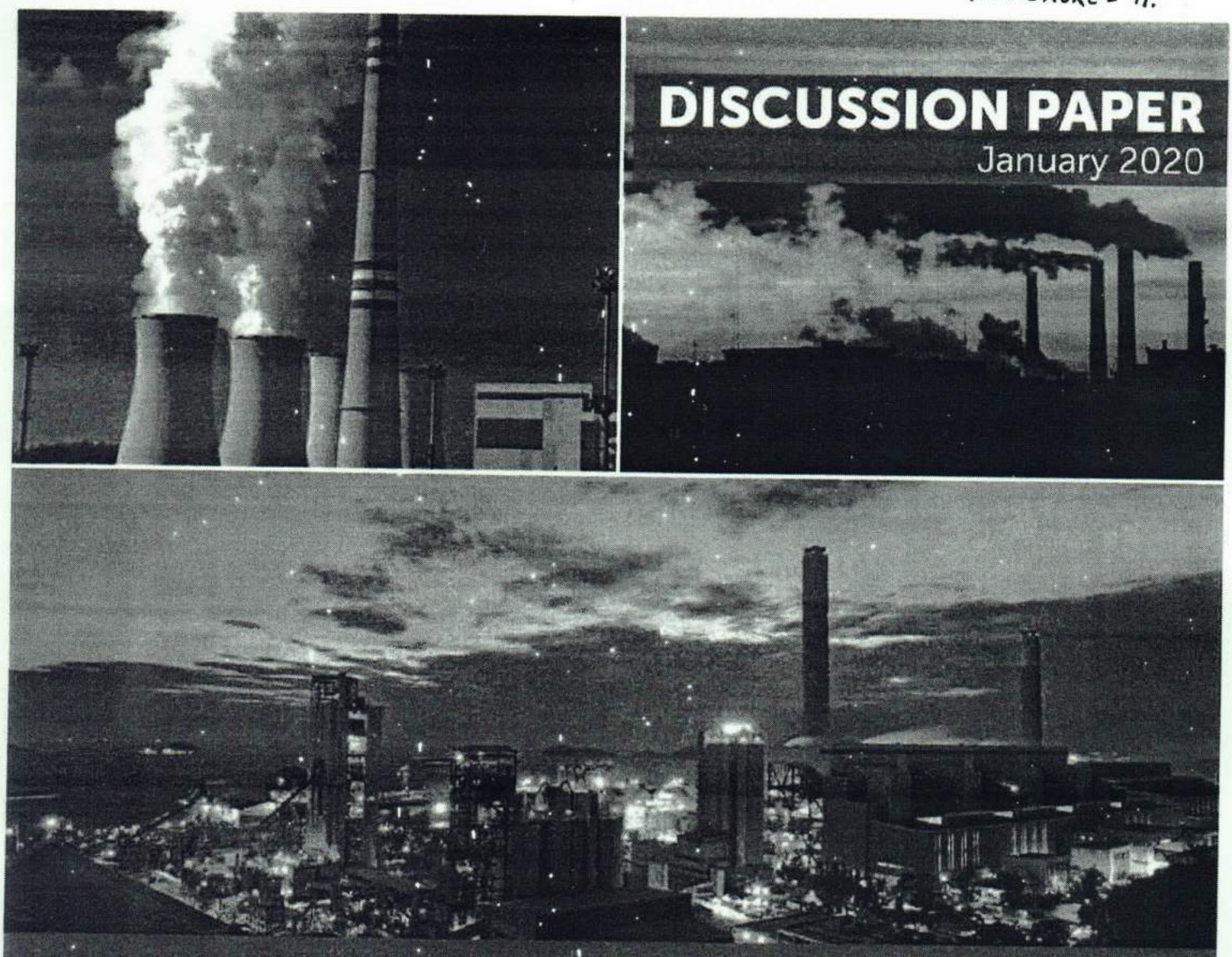
ANNEXURE - II.



DISCUSSION PAPER
January 2020

Emissions Control in Thermal Power Stations: Issues, Challenges, and the Way Forward

THE ENERGY AND RESOURCES INSTITUTE
Creating Innovative Solutions for a Sustainable Future

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CONTENTS

AT A GLANCE

- As per TERI analysis, of the total environmental pollution in 2016, power sector reportedly accounted for 51% of SO_2, 43% of carbon dioxide (CO_2), 20% of oxides of nitrogen (NOx), and 7% of $PM_{2.5}$ emissions.
- Ministry of Environment, Forest and Climate Change (MoEFCC) revised the emission norms for thermal power stations (TPSs) on 7 December, 2015 requiring an implementation of the emission control systems (ECSs) within 2 years from the date of notification. The deadline had to be pushed to December 2022 for all the power stations in the country in view of the sheer volume of work, implementation issues and challenges as well as the critical need for maintaining supply of electricity. Power stations in national capital region were however required to comply with the revised norms by December, 2019.
- Implementation of these measures in NCR stations brings out that the measures for control of $PM_{2.5}$ are on a better footing as compared to the same for control of NOx and SOx. The same holds true for other plants in the country. An action plan giving top most priority to the remaining work in NCR stations is an emergent requirement.
- Coordinated and concerted efforts are required for meeting the time-lines for control of all the pollutants in all the power stations, more importantly in the state and private sector plants, which are lagging behind considerably.
- This paper brings out the overview of new environmental norms, present status of their implementation, issues, challenges, and the way forward.

INTRODUCTION

Air pollution is a growing concern in many countries including India. Air pollution in the form of particulate matter (PM), SOx, NOx, mercury, etc., comes from various sources such as industries, thermal power stations, construction and demolition work. Out of 10 most polluted cities in regard to $PM_{2.5}$ level in world, 9 cities are in India. The Indian cities which find a place in the list are Kanpur, Faridabad, Gaya, Delhi, Gurugram, Varanasi, Agra, Lucknow and Patna.

Ambient air pollution is widely known to have severe negative impacts on human health. When emitted into the atmosphere, SOx, NOx, and mercury undergo chemical reactions to form compounds that can travel long distances. These fine particles compounds contribute to death and serious respiratory illness (e.g., asthma, chronic bronchitis). Exposure to particulate matter leads to various diseases that have short and long term health effects. Short term effects include severity of asthma and lower respiratory infections (LRI) in children and adults. Long term exposure leads to increased likelihood of suffering chronic illness including chronic obstructive pulmonary disease (COPD), ischemic heart disease (IHD), lung cancer (LC) and systemic oxidative stress, among others. The Indian Council for Medical Research (ICMR) reported India's ambient air pollution-related premature mortality at 0.67 million in 2017. A recent assessment at TERI on the health impacts of air pollution reveal that total mortality due to ambient air pollution will be 0.76 million in 2020.

Exposure to ambient $PM_{2.5}$ concentrations is linked with cardiovascular and respiratory diseases, and cancers. Among various pollutants, $PM_{2.5}$ has been found to have one of the strongest associations with mortality and morbidity (Pope, Burnett, Turner, et al. 2011). Since these particles are extremely small, they tend to get into human organs thereby affecting them over time. As per recent estimates by the World Health Organisation (WHO), in cities and rural areas, exposure to ambient $PM_{2.5}$ concentrations were estimated to cause 4.2 million premature deaths worldwide per year (WHO 2018).

The coal-fired power generation is considered as one of the major source of environmental pollution in India. Of the total environmental pollution in 2016, power sector reportedly accounted for 51% of SO_2, 43% of carbon dioxide (CO_2), 20% of oxides of nitrogen (NOx), and 7% of $PM_{2.5}$ emissions (TERI Analysis). Coal based power plants have dominated the power supply mix since 1980s. As of 31 March 2019, around 56% of India's total installed capacity, 365 GW, was coal based and these thermal power stations (TPSs) accounted for 75% of the total electricity generation in the country.

Over the years, Government of India has been taking necessary action to contain environmental pollution from various sources including thermal power stations. Norms for control of emissions from thermal power stations, first notified by Ministry of Environment, Forest & Climate Change (MoEFCC) in 1984, have undergone change from time to time. On 7 December, 2015, the prevailing norms in respect of $PM_{2.5}$ and were revised and norms in respect of SOx, NOx and mercury were introduced.

The norms currently in vogue were notified on 7th December, 2015. Environmental concerns having become more pronounced, MoEFCC notified "Environment (Protection) Amendment Rules, 2015" for thermal power stations.

This paper aims to present an overview of new environmental norms, their implementation status, factors coming in way of their implementation, as well as suggested measures, wherever possible.

ENVIRONMENTAL POLLUTION FROM THERMAL POWER STATIONS

"Environment (Protection) Amendment Rules, 2015" for thermal power stations notified by MoEFCC on 7th December, 2015 specify limits in respect of four pollutants as well as specific water consumption as given in Table1.

The existing stations as well as new stations including upcoming stations were required to comply with the new standards within 2 years of issue of notification i.e. by 7 December 2017. implementation of pollution control measures in order to comply with new standards in coal based capacity which stood at about 173 GW as on 31 December, 2015 and also in the new capacity to be commissioned within the next 2 years without impacting continuity and reliability of power supply, seemed to be a challenging task. The issues and challenges were discussed in a number of meetings. On 8 June 2016, in a meeting chaired by the MoEFCC and MoP, it was decided that a committee comprising representatives from MoEFCC, MoP, Ministry of Coal, CEA and CPCB may be constituted to look into all the issues related to the implementation of norms. In the meeting it was inter-alia decided that MOP/CEA shall submit by December, 2016 (a) plan for phasing out of power plants commissioned up to December, 2003 and (b) implementation plan in respect of units commissioned during January, 2004 to December, 2016. On 21 September 2016, Ministry of Power constituted a committee under chairmanship of Chairman, CEA to prepare an action plan. On 30 June 2017, MoP communicated to MoEFCC concerns of various thermal power plants with regard to compliance of new emission norms, particularly w.r.t. particulate matter, SOx and NOx Along with CEA report outlining plan of action for implementation of new norms keeping in mind the techno-economic feasibility and ensuring availability of power to all at affordable cost without any disruption.

To review the issues arising out of new environmental norms, a meeting was held on 1 September, 2017 in MoEFCC with CEA, CPCB and NTPC. In the meeting, it was decided that the action plan submitted by MoP to MoEFCC extending up to 2024 should commence from 2018 and the same be implemented by 2022 with respect to all pollutants. A revised plan accordingly prepared by CEA was submitted by Ministry of Power to MOEFCC on 13 October 2017. Taking into consideration the technical challenges and time required for installation of Flue Gas Desulphurisers (FGD) and other technologies to meet the new emission limits, MoEFCC gave concurrence to the revised implementation plan on 7 December 2017. Taking note of a study by IIT, Kanpur on Air Pollution and Green House Gases (GHGs) in Delhi (January, 2016) bringing out that 13 power plants in the radius of 300 km of Delhi are expected to contribute to secondary particles, the target date for environmental compliance in respect of the plants located in national capital region (NCR) was decided as December, 2019.

Table 1 New environmental norms for thermal power stations (MoEFCC 2015)

Emission Parameter	TPSs (Units) Installed		
	Before 31.12.03	After 31.12.03 to 31.12.16	From 01.01.17
Particulate Matter (PM)	100 mg/Nm³	50/Nm³	30 mg/Nm³
SO_2	600 mg/Nm³ (For < 500 MW Unit)	200 mg/Nm³ (For => 500 MW Unit)	100 mg/Nm³
NOx	600 mg/Nm³	300 mg/Nm³	100 mg/Nm³
Mercury (Hg)	NIL (< 500 MW Unit) 0.03 mg/Nm³ (=>500 MW Unit)	0.03 mg/Nm³	0.03 mg/Nm³
Water	1. All plants with once through cooling (OTC) shall install cooling tower and achieve specific water consumption (SWC) up to maximum of 3.5 m³/MWh within a period of 2 years from the date of publication of the notification. 2. All CT-based plants reduce SWC up to maximum of 3.5 m³/MWh within a period of 2 years from the date of publication of the notification. 3. New plants to be installed after 1 January 2017 shall have to meet SWC up to maximum of 2.5 m³/MWh and achieve zero waste water discharge.		

EMISSION CONTROL SYSTEMS AND THE CURRENT STATUS OF IMPLEMENTATION

Emission control systems (ECSs) in the form of Flue Gas Desulphurisation (FGD), Selective Catalytic Reduction (SCR)/ Selective Non-Catalytic Reduction (SNCR) need to be implemented and measures such as combustion modification and retrofit of Electro-Static Precipitator (ESP) are required to be taken wherever necessary for control of SOx, NOx, PM and mercury within the limits specified by MoEFCC. Phased implementation plan for the emission control systems for controlling SOx and PM is at Annexure 1.

The mercury content in Indian coal ranges between 0.01 ppm and 1.1 ppm (Rai, Raman, and, Choudhary 2013). As mercury boils at low temperatures, thermal power plant emits 90 % of its mercury in to air and 10% to land. Mercury abatement from the emission can be achieved as co-benefit of reduction of NOx, SOx and dust. A higher degree of focus as of now, therefore is towards the reduction of SOx and NOx emissions which will automatically reduce mercury emission.

Control of Sulphur Dioxide Emission

To curtail SO_x emission from power plants, various types of Flue Gas Desulphurisers (FGDs) are being installed before the inlet of power plant stack. FGD removes SOx content from flue gas using various chemical processes. For a typical coal-fired power station, flue-gas desulfurization may remove more than 90% of the SO2 in the flue gases (Compositech Filters nd). Various types of FGD technologies such as wet type FGD (which use limestone, ammonia and sea water as raw material), semi-dry type FGD and dry sorbent injection (DSI) FGD are available. Wet type FGD technology, using lime stone as raw material, is prominent world-wide mainly on account of lower capital and operating expenditure.

FGD implementation status in the country:

The Central Electricity Authority prepared a detailed plan in consultation with the utilities that includes FGD implementation programme, shutdown planning, etc. Table-2 gives the overall sector-wise picture in regard to the stage at which how much plant capacity stands with respect to implementation of FGD, as of September, 2019.

The latest available status shows that against the proposed plan of implementation of FGD in generating units aggregating ~166 GW, it has been installed only in ~1.3 GW (hardly 1%), feasibility study has been started in units aggregating ~162 GW and it has been completed in ~141 GW. However, bids have been awarded only for ~35 GW capacity. This is extremely low as compared to the phased implementation plan requiring implementation in plants with aggregate capacity of 5.44 GW (see Exhibit 2) by 2019 and 31.77 GW by 2020. The current status of progress in regard to FGD deployment makes it abundantly clear that majority of power plants would face a challenge in installing FGD system by the respective planned cut-off dates. Cumulative capacity planned for FGD implementation from 2018 to 2022 as shown in Exhibit-I portrays the magnitude of such a challenge.

While there seems to be some action on the part of central sector plants, the ones in private and state sector are lagging behind significantly. The situation in state sector is alarming where FGD is to be installed in units

Table 2 FGD implementation status of TPSs (September 2019) (Capacity in MW)

S. No	Sector	FGD Planned	Feasibility Study Completed	NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	53 350	53 350	51 510	32 840	0
2	State Sector	51 885	43 965	18 625	1000	0
3	Private Sector	61 237	44 080	29 060	1320	1320
	Total	166 472	141 395	99 195	35 160	1320

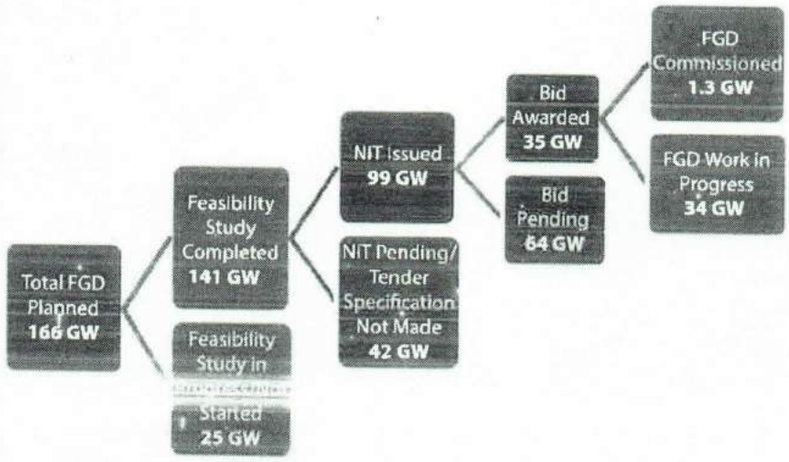

Exhibit 1 Status of FGD implementation in the country up to September 2019

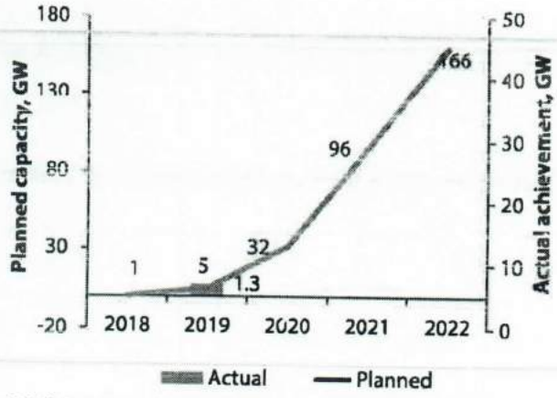

Exhibit 2 Cumulative phase implementation plan for FGD

with a total capacity of 52 GW but only 1 GW capacity had been awarded up to September, 2019.

Status of FGD installation in NCR

In December 2017, the Central Pollution Control Board (CPCB) issued directions under Section 5 of Environment Protection Act to all coal-based power plants, affirming timelines for compliance mostly as per CEA's phasing plan, i.e. December, 2022. CPCB's directions, however, made two changes to the CEA's schedule: FGD installation was accelerated till December 2019 for plants based within a radius of 300 km of Delhi; timelines for upgrading Electro-Static Precipitators (ESP), which were not detailed in CEA's plan, were also specified. Table-3 presents an overview of the FGD installation plan and progress in the thermal power stations located in NCR.

Power Plant wise implementation status in NCR may be seen at Annexure-2. It is noted that out of a total capacity of ~12.8 GW, feasibility study has been completed for all the stations, contracts have been awarded for ~4.6 GW, and FGD has been installed only in one plant of 1.3 GW.

Control of Particulate Matter Emission

Electro-Static Precipitators (ESPs) are deployed for control of particulate matter (PM) in thermal power stations. The power stations commissioned recently comply with the new environment norm (50 mg/Nm^3) for PM. Out of a total of 197 GW of plant capacity as in December, 2017, PM non-compliant capacity was noted as 73 GW (37%), out of which 66 GW capacity has been considered for ESP implementation/up-gradation implementation plan for 65 GW (99%) is already in place.

A review of implementation status of pollution control measures for control of particulate matter in thermal power stations in NCR as of 30 September, 2019 shows that out of a total capacity of 12,790 MW, statutory limits were already complied by plants with capacity of 9,450 MW, and orders for ESP had been placed for 2420 MW. Status of ESP implementation is shown in Exhibit 3.

The progress of implementation of PM emission control equipments in TPSs in the country in general and in the TPSs in the NCR region in particular therefore seems to be on track.

Table 3 FGD implementation status of TPSs situated in NCR region (September 2019) (Capacity in MW)

S. No	Sector	FGD Planned	Tender Specifications Made and NIT Issued	Bids Awarded	FGD Commissioned
1	Central Sector	3320	3320	3320	0
2	State Sector	4770	4770	0	0
3	Private Sector	4700	4700	1320	1320
	Total	12 790	12 790	4640	1320

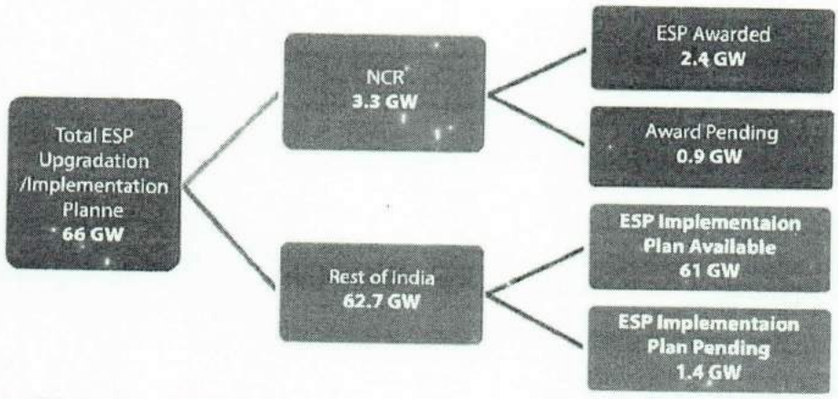

Exhibit 3 Status of ESP implementation in the country up to September 2019

Control of Nitrogen Dioxide/ Nitrogen Oxide Emission

As per the revised plan submitted by the MoP on December 2017, it was suggested that pre combustion modification such as in-situ modification in boiler, installation of Low NOx burners and over-fired air (OFA) shall be adopted besides installation of SCR/SNCR systems by 2022. An affidavit dated 20 August, 2018 (SCI 2019), was filed by CEA with respect to NOx, requesting for change of norm of 300 mg/Nm^3 and 100 mg/Nm^3 for thermal units installed after 31 December, 2003 to 450 mg/Nm^3 which is practically achievable with the combustion modification. With the help of Secondary over Fired Air (SOFA) provided in boiler, NOx level can be maintained at 450 mg/Nm^3.

Furthermore, a meeting was held on 17 May, 2019 having participation from MoEFCC, Environment Pollution Prevention and Control Authority (EPCA), Ministry of Power (MoP), CPCB, CEA, and NTPC (India Environment Portal 2019). During the meeting it was decided that to assess NOx emissions, a joint sampling by CEA and CPCB would be carried out at TPSs having Combustion Modification by design and CPCB shall submit Report to MoEFCC. Subsequently the joint monitoring was carried out in 7 units of 4 thermal power stations by joint team of CPCB and CEA from 13 February, 2019 to 2 April, 2019. Out of 7 monitored units, only 5 units were found complying with the NOx emission standards of 300 mg/Nm^3 at full load only. So, it was agreed in-principle to revise the NOx norms from 300 to 450 mg/Nm^3 for thermal power plants installed between 1 January, 2004 to 31 December, 2016 and same would be presented for a final decision to Secretary MoEFCC and Secretary MoP. Revision specifying relief for NOx emission is awaited.

Under the guidance of MoP, NTPC set out to test SCR/ SNCR technologies in some of the NTPC units on pilot basis to assess viability of these technologies for Indian coal, which contains high amount of ash. Installation of SCR on these units has reportedly been completed. The results of these pilot tests, once available, will bring clarity in regard to way forward for implementation of NOx control systems.

ISSUES AND CHALLENGES

A number of factors have impeded implementation of pollution control measures in the thermal power stations; the key inhibiting factors are presented in the following paragraphs.

A planned shutdown for implementation of emission control systems which could cause non-availability of supply and revenue loss to DISCOMs appears to be primary concern of DISCOMs and state governments in view of a number of state, private and central sector power plants supplying power to a DISCOM likely to be under shutdown at any point of time for implementation of emission control systems. Alternate power, if available, could be costly, which would add to their financial woes.

Generating companies - mostly the ones supplying power to a single State – seem to be concerned about recovery of full additional capital expenditure through tariff due to lack of clarity in regard to regulatory treatment. The power stations which plan to go ahead with requisite measures for emission control, find downgrading of the stations in the merit order despatch due to increase in marginal cost, to be an important concern. The resultant reduction in plant load factor and higher fixed charges per unit of electricity generation is another operational challenge for such plants till the time all the plants implement emission control systems to comply with the revised emission norms. This makes the lenders also wary of funding additional capital expenditure (Adcap) requirements for this purpose.

Lack of bidders for supply of FGD is coming in the way of meeting the target for implementation in time. FGD manufacturers/suppliers do not seem to be keen to increase their manufacturing capacity as they reckon it as one-time opportunity rather than a recurring one, this translates into high lead time for supply of equipment.

Suppliers are facing an issue on the availability of 'working front' for facilities, materials, batching plant, etc., and delay in approval of drawings is leading to delay in implementation in many of the projects under execution.

Further, add on scope such as wet stack, water treatment plant, lime handling system, etc., not being the core competence of bidders for the main equipment, lead to an increase in cost and overall implementation schedule.

Delays in decision making for placement of order by generating companies occurring at times, as well as requirement of compressed time schedule matching with phased implementation plan present difficulties for the manufacturers/supplier, particularly in the case of FGD which requires time period of the order of 30 months from placement of order to commissioning.

Lenders already being conscious in funding new generation projects in view of many of the new power stations having turned into stranded assets, are not keen to finance emission control systems to power stations having power purchase agreements (PPAs) for partial capacity. Uncertainties in regard to time frame in which payment will be received from DISCOMs, which has been a challenge for the private sector generating companies in maintaining desired cash flow, are perceived to be increasing significantly. These are some of the demotivating factors for independent power producers (IPPs) to put equity component of additional capital investment requirement.

POLICY AND REGULATORY DEVELOPMENTS

A number of positive developments which have been there in the last few years have bought clarity and certainty in regard to consideration of marginal cost due to implementation of ECS in merit order dispatch, approval of additional capital and operational expenditure, etc. Key developments are listed below:

- Ministry of Power issued directions under section 107 of the Act to CERC to address the Merit Order Dispatch issue as under:

  "The Phasing of the implementation of the new environmental norms has been reviewed. Accordingly, it is directed that the impact of operating costs incurred in the implementation of new Environmental Norms shall not be considered for Merit Order Despatch of Coal Based Thermal Power Stations till 31.12.2022. For this purpose, CERC shall advise a methodology of supplementary tariff determination separately from normal tariff so that installation of FGD/other ECS (emission control system) has no bearing on the merit order dispatch till 31.12.2022".

- Central Electricity Regulatory Commission (CERC) Tariff Regulations, 2019 specify the modalities for submission of additional capital expenditure on account of revised emission standards, factors to be considered by the Commission for approval of the same and the admitted expenditure on this account forming the basis of tariff determination (Section 29, CERC Tariff Regulation, 2019).

- Central Electricity Regulatory Commission has also allowed the cost claimed by the petitioner in the event of the same having been discovered through competitive bidding. Certain costs claimed by the petitioner have also been allowed by CERC subject to truing up wherever they are required to meet statutory requirements and safe operation of plant.

- Central Electricity Regulatory Commission regulations also provide for consideration of additional capitalisation and additional operation and maintenance expenses on account of implementation of revised emission standards in existing or new generating stations in their tariff [Regulation 14(2) and 29(4)].

- Central Pollution Control Board is strictly monitoring the air pollution status of 102 most polluted cities in India. National Green Tribunal (NGT) has given power to CPCB to impose penalties on industries deviating from norms. CPCB has issued notice under Section-5 of Environment (Protection) Act, 1986, to all the thermal power stations in NCR.

WAY FORWARD

Thermal power stations are reported to be amongst the major contributors in regard to some of the pollutants. New environmental norms notified by MoEFCC in December, 2015 are intended to reduce emission of SO2, CO2, particulate matter and mercury from thermal power stations. Despite deferment of timelines for compliance of the new norms from December, 2017 to (a) December 2022 for all thermal power stations and (b) December, 2019 for the power stations located in NCR, pace of implementation of emission control systems in the power stations is far from satisfactory.

While, power stations seem to be on better footing in regard to retrofitting/up-gradation of Electro-static Precipitators for control of $PM_{2.5}$, implementation of measures for control of SOx and NOx within specified limits calls for meticulous planning and coordination, as well as hand holding and guidance by the early movers. Concerted efforts need to be made by all concerned on various fronts for timely implementation of emission control systems.

Following measures are suggested for timely implementation of remedial measures for compliance of revised emission norms:

- Phased implementation plan having been made by CEA giving due consideration to various requirements, CEA, in consultation with states, could carry out an assessment of likely shortage of power on account of shutdown of power plants in state & private sector as well as inter-state generating stations planned on account of retrofitting/implementation of emission control systems This would help the DISCOMs/ State Governments in assessment of difficulties in maintaining power supply to consumers. In case there is difficulty in certain DISCOMs/States for certain months, their allocation from unallocated power of central generating stations may be enhanced appropriately, which can also have attendant advantage addressing their concerns regarding purchase of costly power. In case this does not suffice for certain period of time for a DISCOM, it may procure power through power exchanges. The linking of installation of FGD with capital maintenance/annual overhaul of generating units can ease the problem. Opportunity cost towards shutdown period has already been agreed in-principle by the CERC.
- Issues such as slow pace of implementation of emission control systems to meet new environmental norms and in-principle approval of additional capital expenditure on the lines on which CERC has already opined, may be taken up in the Forum of Regulators for facilitating action on the part of concerned State Electricity Regulatory Commission (SERC).
- In order to expedite in-principle approval of additional capital expenditure, the state governments may consider, wherever required, issuing directions under Section 108 of the Act to the respective SERC to do so with the caveat that in the event of a unit not complying with the new norms by the due date would be shutdown till it complies with the new norms.
- Technology options in respect of FGD may be examined by CEA and the findings may be brought to the notice of all concerned - generating companies, power utilities, SERCs as well as CERC so as to facilitate proper and timely decision making on the part of generating companies to place orders.
- CEA may consider periodic review of base costs, for various technologies and guidelines regarding additional costs which may vary depending on specific set of condition, depending on price discovery in competitive bidding.
- Ministry of Power may consider advising PFC and/or REC to lend money to needy generating companies who approach them for loan for this purpose with safeguards towards recovery of the same as per agreed schedule.
- SERCs may expeditiously make appropriate provisions in tariff regulations necessitated on account of revised emission standards for thermal power stations.
- A proper retirement plan for old and inefficient units, causing more emission due to poor operational heat

Revised/New Emissions Norms for Thermal Power Stations: Issues and the Road Ahead

	Issues/Concerns	Measures in Place/Suggested Measures/The Way Forward
DISCOMs	Maintaining continuity of electricity supply	Allocation of unallocated power of central generating station; Procurement of power through power exchanges; In-principle concurrence of CERC to opportunity cost towards shut down during ECS installation
	High cost of alternate power during the shutdown period	
Developers/ Gencos	1. Full recovery of Additional Capital Expenditure (Adcap) and operational expenditure* 2. Lack of promoters interest in putting equity	In- principle approval of new emission norms as Change in Law by SERCs
		In- principle approval of Adcap by SERCs
		Appropriate provisions by SERCs in the Tariff Regulations necessitated on account of new emission standards.
	Time being taken to place orders	General guidelines for technology selection by CEA to facilitate decision making in regard to technology. Alternative technologies, if found appropriate by CEA, can widen the sources of supply, thereby helping meeting the time-lines. Results of pilots for NOx control once available can accelerate action.
	Time taken in processing of petitions*	Periodic review of base cost of technology options and guidelines regarding additional costs which may vary depending on a specific set of conditions.
	Downgrading in merit order despatch*	CERC Tariff Regulations 2019 made explicit provision in regard to the steps to be followed taking the additional operating costs out of merit order despatch
	Lack of bidders	Widening technology options;
Manufactures/ Suppliers	Increase in overall implementation time due to add-on scope	Option of exclusion of balance of system from main package.
	Working front availability at power stations	Facilitation by the generating stations to the suppliers to the extent possible.
Funders	Plants with untied capacity bringing down Funders' comfort	Phasing out old and inefficient power stations; Emission based dispatch

* Concerns for funders as well

rate, is required to be formulated rather than extending PPA for such units in view of their zero/marginal fixed cost liability. PPAs should rather be signed by DISCOMs with new and efficient thermal power plants.

- Prioritisation of Thermal Power Stations for implementation of emission control equipments based on proximity to city, specially the stations near large / metro cities as well as plants along Ganges belt would go a long way in addressing air pollution in and around such cities.
- An interim mortality assessment due to emission from coal fired power plants at TERI has pegged total premature deaths at 77000 for 2020. The associated health cost due to mortality and morbidity is Rs 723 billion for 2020. The assessment of impact on tariff due to installation of ECS, as well as health cost on account

of emissions could help all concerned in shaping the way forward.

- Emission based dispatch of generating units should start engaging the attention of policy makers and Regulators despite the fact that it may bring certain stations with higher marginal cost into operation.
- Options of excluding auxiliaries like wet stack, water treatment plant, lime handling system, etc., can be provided in the tenders in order to optimize scope and overall implementation schedule. Parallel contracting of aforementioned to separate vendors needs to be considered by the generating companies so that pace of implementation can be increased.
- Particulate Matter limits permitted for old TPS (100mg/Nm3) may also be reduced to 50 mg/Nm3, the level specified for thermal power stations commissioned between year 2003 and 2016 in a bid to mitigate air pollution arising from all the thermal power stations.
- An inter-ministerial steering-cum-monitoring committee comprising representative of MOEFCC, MOP, CEA, CPCB, NTPC, etc., may be constituted to meet the target date for implementation of emission control system as per phased implementation plan ending in December, 2022.

ANNEXURE

Annexure 1: Phasing Plan of Emission Control Equipments

	S.N.	Description	Capacity (GW)
FGD	A	Present thermal coal-based power plant as on Dec 2016	187
	a	Plant identified for retirement	8
	b	Capacity already have FGD/CFBC boilers	13
	c	**Balance plant for new environment compliance**	166
	c.1	*Identified capacity proposed to comply in phased manner of 7 years, by 2024**	149
	c.2	*Plants to be scrapped due to various constraints such as lack of space, etc.*	17

*MoP changed the timeline to year 2022

	S.N.	Description	No. of Units
FGD	A	Total no. of units in coal power plant capacity in India	650
	a	Either complying with new emission norms or planned to phasing out or have not submitted plan for FGD (35 GW)	235
	b	FGD to be installed in	415
	B	Phasing plan of FGD installation	
	I	No. of unit by 2018	1
	ii	No. of unit by 2019	8
	iii	No. of unit by 2020	53
	iv	No. of unit by 2021	174
	v	No. of unit by 2022	178

	S.N.	Description	No. of Units
ESP	A	Total no. of units in coal power plant capacity in India	650
	a	ESP already installed in 115 GW capacity units	
	b	Either complying with new emission norms or planned to phasing out or have not submitted plan for ESP (14 GW)	9
	C	ESP to be installed in 64 GW	220
	B	Phasing plan of ESP installation	
	i	No. of unit by 2018	01
	ii	No. of unit by 2019	02
	iii	No. of unit by 2020	27
	iv	No. of unit by 2021	97
	v	No. of unit by 2022	93

Source CEA, Quarterly Review Report Renovation & Modernisation of TPSs, September 2019

Annexure 1: Status of Emission Control Systems in TPSs, NCR

State	Station	Status	Capacity, (MW)
Uttar Pradesh	Dadri Thermal Power Plant, Gautam Buddh Nagar	**FGD**: Awarded on 26 October 2018 and on 1 February 2018. Work in progress **DE-NOx**: Combustion modification implemented in Unit 5 and scheduled for November 2019 for Unit 6 **ESP:** Statutory limits being complied	1820
	Harduaganj Thermal Power Plant, Aligarh	**FGD:** NIT Issued **ESP:** Order has been placed to M/s NTPC on 29.11.18 for pre-award services **De-NOx:** NIT floated on 08.03.2019	500
Haryana	Mahatma Gandhi TPS, Haryana CLP	**FGD**: Operation of FGD started **ESP**: Statutory limits being complied **DE-NOx**: Combustion modification completed	1320
	Panipat Thermal Power Plant, Panipat, Haryana	**FGD:** NIT Issued **ESP:** SPM values are within limits **De-NOx:** Combustion modification planned	710
	Rajiv Gandhi Thermal Power Plant, Hisar, Haryana	**FGD:** NIT Issued **ESP:** Repair of ESP fields will be carried out in the forthcoming overhauling scheduled in October–November 2019 **De-NOx:** Combustion modification planned	1200
	Indira Gandhi Thermal Power Plant, Jhajjar	**FGD**: Bid Awarded **DE-NOx:** Awarded on 29 October 2018 **ESP**: Statutory limits being complied	1500
	Deenbandhu Chhotu Ram Thermal Power Station, Yamuna Nagar	**FGD**: NIT Issued **ESP**: Repair of ESP fields will be carried out in the forthcoming overhauling scheduled in October–November 2019 **De-NOx**: Preliminary pilot study is being carried out by NTPC	600
Punjab	Guru Gobind Singh Super Thermal Power Plant, Ropar	**FGD:** NIT issued **ESP**: Already installed in Units 3 and 4, and to be installed in Units 5 and 6 in 2019–20. **De-NOx:** NOx values are below specified limits	840
	Guru Hargobind Thermal Plant, Lehra Mohabbat	**FGD**: NIT issued **ESP:** Matter being taken up with BHEL **De-NOx:** Matter being taken up with BHEL	920
	Talwandi Sabo Power Ltd, Mansa, Punjab	**FGD:** Technical bids opened **ESP:** SPM are within the limits. Need to be certified by state government **De-NOx:** NIT issued. For combustion modification	1980
	Nabha Power Ltd, Rajpura, GMR	**FGD:** Bid awarded **ESP**: Statutory limits being complied **De-NOx:** Low NOx burner installed	1,400
	Total		12,790

Source CEA, Quarterly Review Report Renovation & Modernisation of TPSs, September 2019

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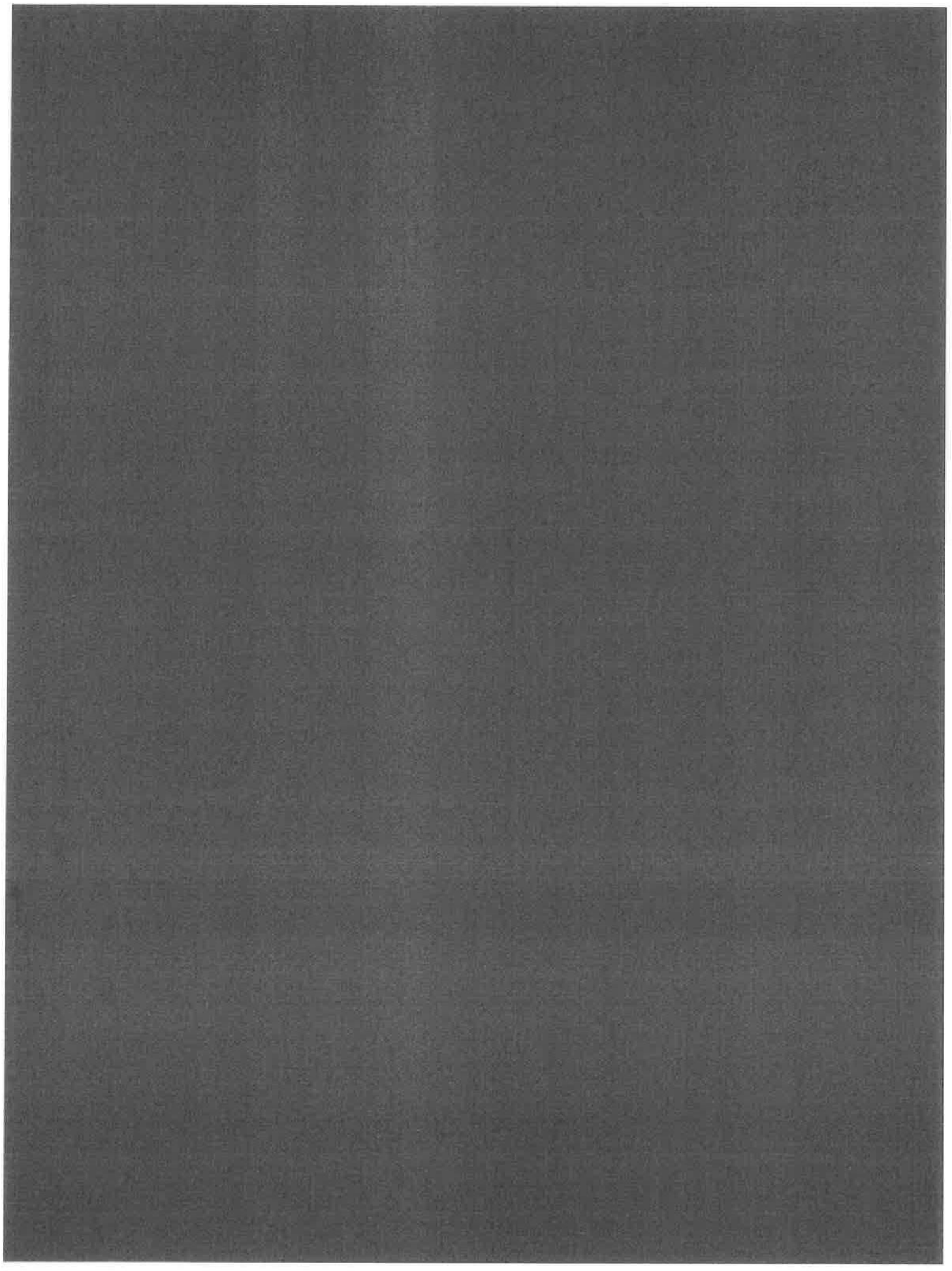

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ANNEXURE-12.

Krishi Vigyan Arogya Sanstha & Ors Vs Ministry of Environment & Forests & Ors.

Title

Krishi Vigyan Arogya Sanstha & Ors Vs Ministry of Environment & Forests & Ors.

Party

India

Type of document

National - higher court

Date of text

September 20, 2011

Data source

InforMEA

Court name

National Green Tribunal

Seat of court

New Delhi

Justice(s)

Kumar Agrawal, D.

Venkata Ramulu, C.

Glossary term(s)

environmental impact assessment

emission

energy

radioactive contamination

environmental standard

ECOLEX Subject(s)

Energy

Environment gen.

Abstract

The directions were issued by the NGT Bench on hearing the appeal [Appeal No. 7/2011(T)] filed by the residents of the Koradi village against the 'Environment Clearance granted to the Maharashtra State Power Generation Co. Ltd for expansion of 3x660 MW coal based thermal power plant at Koradi in Nagpur district of Maharashtra.
The Tribunal observed that while granting environment clearance to the project, the following aspects were not considered by the Expert Appraisal Committee/Ministry of Environment and

Forests: Impact of nuclear radiation caused by thermal power plant on human habitation and ecology of the areaIII: The Tribunal relied on various research publications on Radioactivity submitted by the appellants, which highlighted the fact that the waste produced by the coal plants is more radioactive than that generated by the nuclear power plants which can result into severe environment and human health problems. Cumulative impact of various existing and proposed thermal power plants in and around the project area: The Tribunal observed that the issue with regard to effect of nuclear radiation on human population and ecology in and around the area was raised in the public hearing but the same was neither examined nor incorporated in the final Environment Impact Assessment report.

The Tribunal issued the following directions to the Ministry of Environment & Forests and disposed of the appeal with liberty to the Appellants to take appropriate steps if the same are not complied with. To conduct a long term study of the impacts caused by nuclear radiation from the thermal power projects by involving Bhabha Atomic Research Agency or any such other recognized institution dealing with nuclear radiation with reference to the coal ash generated by the thermal power project particularly the cumulative effect of a number of thermal power projects located in the area on human habitation, environment and ecology and to also consider the health profile of the residents within the area in which the pollutants are expected to spread from the thermal power project. To include in the Terms of Reference of all the future projects asking the proponent to furnish details of possible nuclear radioactivity levels of the coal proposed to be used for the thermal power plant. To get the national standards prescribed from the Department of Atomic Energy, Govt. of India within a period of one year from the date of receipt of this order, as to the permissible levels of nuclear radiation in residential, industrial and ecologically sensitive areas of the country. Considering the above, the Tribunal also took note that the grant of Environment Clearance is basically a procedural law and any procedural lapses such as collection and evaluation of basic data which may lead to threat to the environment, ecology and conservation of natural resources, shall have to be taken seriously by the Tribunal while dealing with the disputes coming before it. It further stated that the Expert Appraisal Committee/ Ministry of Environment and Forests should consider even small deficiencies in the Environment Impact Assessment report which should be rectified by the project proponent.

ANNEXURE-13

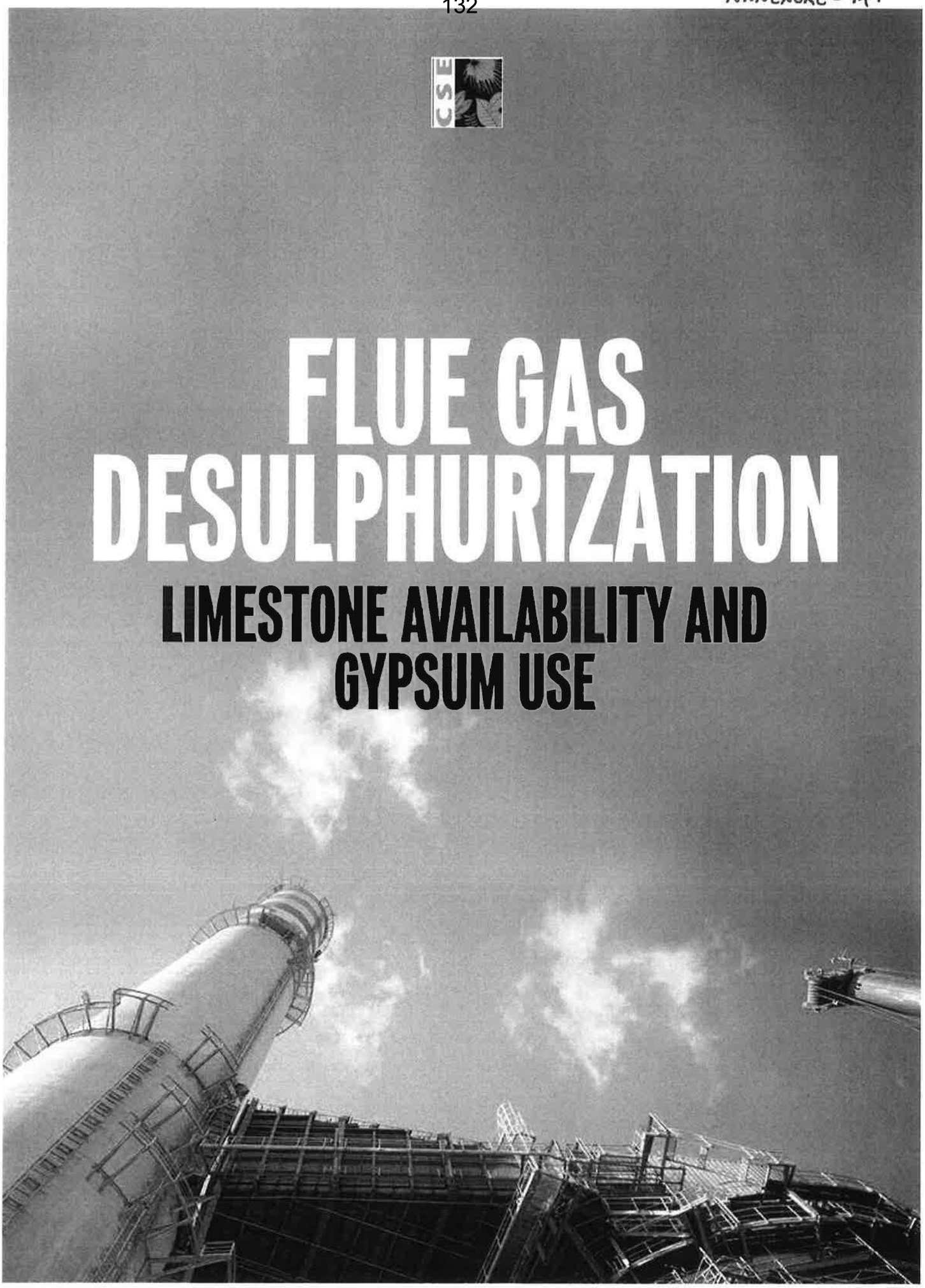
Order of the National Green Tribunal regarding management of fly ash, 12/02/2020

- *12/02/2020*

Order of the National Green Tribunal in the matter of Shantanu Sharma Versus Union of India & Others dated 12/02/2020 regarding management of fly ash generated by the thermal power plants (TPPs).

The NGT directed the TPPS to 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. CPCB has been asked to compute and levy environmental compensation and the CPCB guidelines of May 2019 for utilization/disposal of fly ash for reclamation of low lying areas and in stowing/back filling of abandoned mines/quarries should be complied with.

ANNEXURE – 14.



FLUE GAS DESULPHURIZATION

LIMESTONE AVAILABILITY AND GYPSUM USE

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FLUE GAS DESULPHURIZATION

LIMESTONE AVAILABILITY AND GYPSUM USE

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CONTENTS

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1. EXECUTIVE SUMMARY

A large number of India's coal-based thermal power plants are set to install flue gas desulphurisation (FGD) systems by 2022 in order to meet new emission norms announced by the government in 2015. Limestone is a key raw material in most FGD systems installed to control sulphur dioxide (SO_2) emissions. This report attempts to address the availability of limestone for FGD and also the use of its by-product, FGD gypsum.

Limestone is an abundant resource in India with total reserves of 200 billion tonnes. India's limestone production has been growing steadily and it is among the world's largest producers with 338 million tonnes of limestone produced in 2017–18. The cement industry consumes a major share of limestone, followed by the steel and chemical industries. CSE estimates that the coal-based power sector would require only seven to ten million tonnes of limestone annually for operating FGD systems. This is less than three per cent of India's present limestone consumption. Moreover, regional distribution of limestone reserves shows that access will not be a problem as a majority of power plants are located within 200 km of a limestone mine.

For FGD, high quality limestone ($CaCO_3$ > 90 per cent) with minimum impurities is desirable. High quality limestone is already being produced for use by the steel and chemical industries. Industry experts believe that producing additional high quality limestone would not be a challenge given our large reserves. As per CSE's estimation, the cost of limestone will not be significant. A 500 MW plant will require about 32,000–40,000 tonnes of limestone annually, costing around three to four crore rupees with an impact of less than one paisa per unit of electricity. Ensuring the use of high quality limestone will offer multiple benefits: high removal rates of SO_2, generation of valuable gypsum that can be used by the cement and other industries, and eliminating the need for dumping gypsum thus attenuating related environmental impacts. Additionally, a power plant can offset the cost of limestone by selling FGD gypsum.

Gypsum is a scarce resource in India. India's gypsum consumption in 2014–15 was around ten million tonnes, out of which it only produced 2.5 million tonnes while importing the rest.[1] The quality of FGD gypsum is at par or even better than mineral gypsum and it has become a substitute for mineral gypsum across the world. China is able to utilize more than 70 per cent of its FGD gypsum, largely in cement and construction. In India as well, gypsum is an integral component of cement production and the sector has to rely on costly imports or poor quality synthetic gypsum. By adopting FGD, India's power plants would produce around 12–17 million tonnes of gypsum which can thus meet domestic shortfall and reduce the import burden.

A number of steps need to be taken to ensure limestone availability and gypsum utilization. The Ministry of Environment, Forest and Climate Change (MoEF & CC) should release guidelines for appropriate safeguards in handling, storage and transport of limestone and gypsum. Captive limestone miners should be allowed to sell high quality limestone to their nearest power plant.

In the long term, power plants should be directed to utilize all the FGD gypsum produced; however, for the short term disposal guidelines can be issued. While the use of FGD gypsum in the cement industry should be encouraged, it is also necessary to provide incentives to the manufacturers of high-end gypsum products like wall boards and plaster boards. The agriculture sector can also become a valuable consumer of FGD gypsum; however, certain quality checks and field trials are essential to ensure its use in agriculture is safe.

2. BACKGROUND

In December 2015, the standards set by the MoEF & CC for coal-based thermal power plants came into force.[2] The new standards aim to drastically cut emissions of particulate matter (PM), SO_2, mercury and oxides of nitrogen (NO_x) (see *Table 1: New emission norms for thermal power stations*). To arrest pollution and to meet the norms, power plants will need to upgrade their electrostatic precipitators (ESP), install FGD systems, and fine-tune boiler operations.

Table 1: New emission norms for thermal power stations

Emission norms for plants installed after 1 January 2017 are very stringent

Pollutant (mg/Nm³)	Unit size	Installed before 31 December 2003	Installed between 2004 and 2016	Installed 1 January 2017 onwards
PM	All	100	50	30
SO_2	<500 MW	600	600	100
	>=500 MW	200	200	100
NO_x	All	600	300	100
Hg	All	0.03 (>500 MW)	0.03	0.03

Source: MoEF&CC, 2015

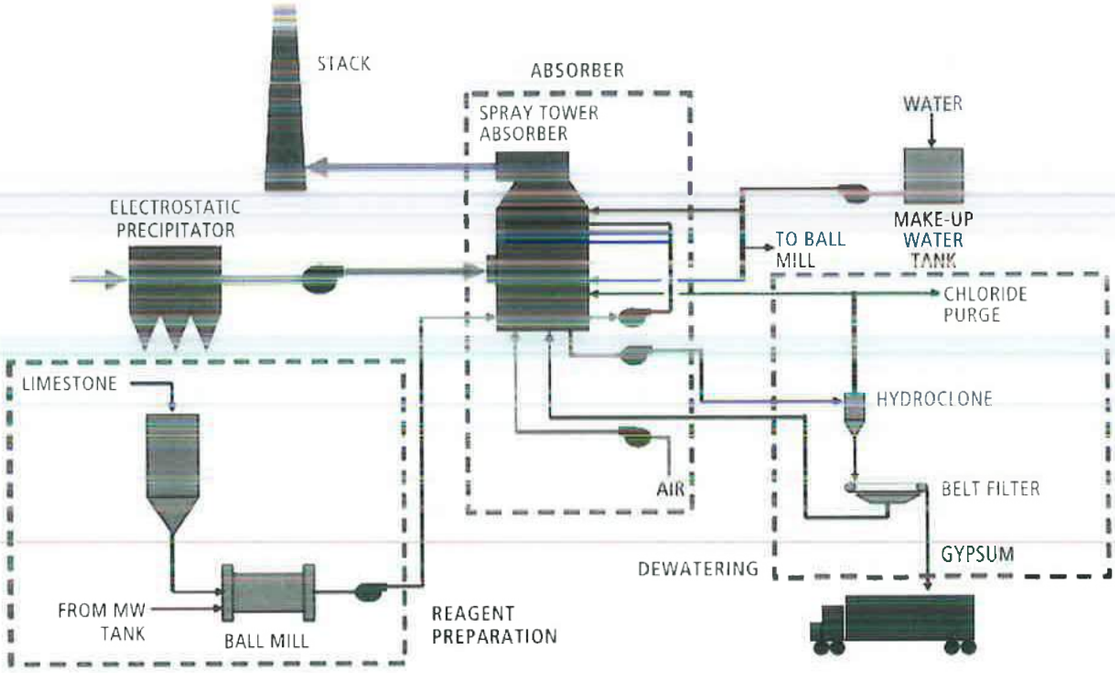
Of all the thermal power plant emissions, SO_2 is a particularly harmful pollutant. Epidemiological studies have reported links between exposure to SO_2 and health problems such as chronic obstructive pulmonary disease (COPD)[3], asthma and respiratory disease, and increased mortality.[4] Another study plotted a 0.34 per cent increase in non-accidental mortality for every one part per billion (ppb) increase in SO_2.[5] Sulphur dioxide also behaves as a secondary pollutant since it reacts with compounds in the atmosphere to form small particles, increasing particulate matter concentration. Small particles penetrate deeply into the lungs and contribute to health problems.[6] Acid rain, leading to damage of soil, vegetation and property, is another serious hazard.

India is the largest emitter of SO_2 in the world, contributing more than 15 per cent of global anthropogenic emissions.[7] Controlling these emissions would require the installation of FGD systems in power stations.[8] Until recently, the industry claimed that FGD systems were not appropriate for Indian plants for a number of reasons: technology was not proven for Indian coal which has high ash content; many plants claimed to have insufficient space to install FGD systems; controlling SO_2 would result in a significant increase in power tariff. Over the last two years, CSE published a series of reports that addressed these issues/myths. This report addresses two remaining persistent queries from power plants and regulators: availability of sufficient quantity of limestone for plants that are scattered across India and the use of gypsum, the main by-product of FGD.

3. FLUE GAS DESULPHURIZATION (FGD) SYSTEMS

FGD systems are installed in power plants to remove SO_2 from flue gas[9] (see *Figure 1: Schematics of a wet FGD system*).[10] Flue gas is sprayed with a reagent (wet limestone is commonly used), which reacts with the SO_2 in the flue gas producing calcium sulphate di-hydrate [$CaSO_4 \cdot 2H_2O$], also known as gypsum. The process limits the amount of SO_2 that can escape into the atmosphere.

Figure 1: Schematics of a wet FGD system
Wet limestone reacts with the SO_2 in flue gas to produce gypsum

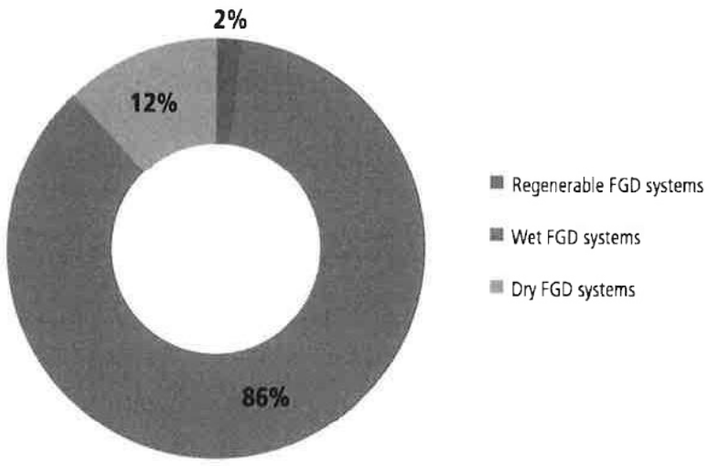


Source: Northeast States for Coordinated Air Use Management, 2011

FGD systems are categorized according to the reagent and the quantum of water used in the process. Commonly used reagents include lime, limestone, sodium hydroxide, ammonia, seawater, magnesium oxide and magnesium hydroxide. Limestone-based wet FGD systems which can remove 90–99 per cent of SO_2 are the dominant choice for thermal power stations globally[11] (see *Graph 1: FGD technology global population*).

While no survey on FGD installations has been carried out in recent years, Transparent Technologies Pvt. Ltd, a domestic supplier of FGD systems, estimates wet FGD systems still have a dominant share of the global market. In China and Germany, wet FGD systems have over 90 per cent share of the installed base.[12] Approximately 85 per cent of the FGDs installed in the US are wet systems, 12 per cent are spray dry and three per cent are dry systems.[13] India's FGD installation is expected to follow the same trend.

Graph 1: FGD technology—global population
Wet FGD technology dominates the global market



Source: USEPA, 2003

Another popular FGD system is the seawater-based FGD system which is favoured in coastal areas. The natural alkalinity of seawater can remove up to 99 per cent of SO_2, thus eliminating the cost of the reagent.[14] In the case of the dry scrubbing process, atomized lime slurry is sprayed into the flue gas in the absorber vessel. The resulting calcium sulphate is collected downstream. The removal efficiency of dry scrubbers is up to 60 per cent.[15] Since smaller units need to meet looser norms, these systems may be suitable for them. A variant of this, known as dry sorbent injection (DSI) system, is a relatively inexpensive process—scrubbing material in DSI is usually trona or sodium bicarbonate.

3.1 FGD SYSTEMS IN INDIA

So far only seven gigawatt of coal-power capacity goes through FGD systems in India (see *Annexure 1: FGD footprint in India*). Till 2015, there were no national regulatory standards for SO_2 emissions in the thermal power sector. Certain states such as Gujarat had enacted state-wide norms for SO_2 emissions but they were not enforced.

In December 2015, MoEF & CC announced new norms for emissions from coal-based power plants. The original notification required the plants to meet the new norms by December 2017. However, the Central Pollution Control Board (CPCB) extended the timelines to meet SO_2 norms over the 2017–22 time period. As per Central Electricity Authority's (CEA) FGD implementation plan, out of 196 GW of total capacity FGD installation is feasible in about 170 GW. Out of this, FGD has been planned for 161 GW of capacity (see *Table 2: Plan for FGD implementation in India*).

Table 2: Plan for FGD implementation in India
Almost 90 per cent of capacity in India would install FGD

S.No.	Description	Capacity (MW)	Units (No.)
1	Total capacity considered	196,667	650
2	Capacity retired/identified for retirement	8,967	82
3	Capacity already having FGD	6,130	15
4	Capacity with CFBC boilers	5,524	48
5	Capacity claims to SOx complaint	5,115	23
6	Balance capacity	170,931	482
7	Capacity where FGD has been planned	161,552	415
8	FGD possibility being explored	690	
9	Space not available	8,689	

Source: CEA, 2019

A significant share of India's thermal power capacity is likely to opt for wet limestone FGD due to its well proven operational and technological track record across the world. Accordingly, India's power plants will also require limestone for the operation of their FGD systems. Our estimates show the country's reserves and production capacity will easily be able to meet this incremental demand for limestone.

Table 3: Capacity vs Age distribution of the plant
Only 108–130 GW of the capacity out of 195 GW should ideally opt for wet limestone FGD

Capacity	Age distribution			
	0–15	16–25	26–35	>35
=>500 MW and above	101.74	7.2	7	0.5
250–500 MW	16.15	0.6	0	0
Upto 250 MW	21.42	12.26	17.23	10.84

We believe that units which are 500 MW or larger and less than 25 years old should opt for wet limestone FGD. Units between 250–500 MW but less than 15 years old may also consider wet limestone FGD depending on their emissions and especially if they are located in polluted or densely populated areas. The plants that are situated near the coast may be better off installing seawater-based FGD.

Units that are smaller than 250 MW and are less than 25 years old should opt for a combination of DSI, coal washing, fuel switching or other inexpensive measures. Many of the units that are more than 25 years old should be phased out within a short time frame.

4. LIMESTONE

A large number of coal-based power plants will need relatively high quality limestone to operate their FGD systems. This makes it necessary to assess the quantity and quality of limestone available for this purpose.

4.1 LIMESTONE RESERVES AND PRODUCTION IN INDIA

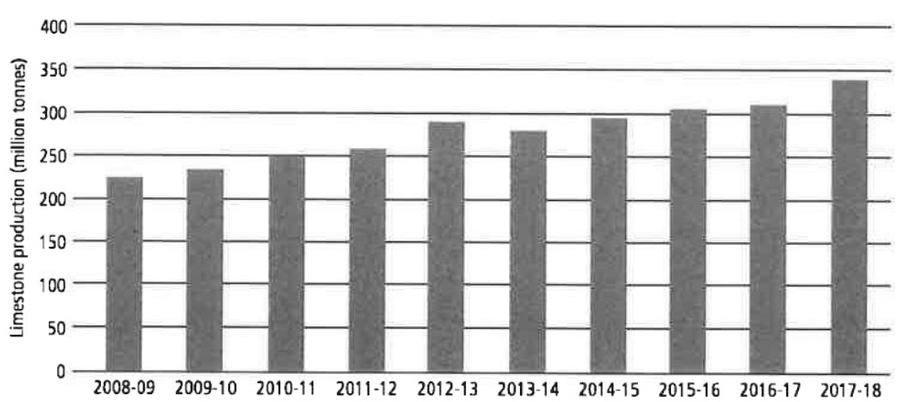
Limestone is a sedimentary rock composed mainly of calcium carbonate ($CaCO_3$) in the form of the mineral calcite. According to the estimates of the Indian Bureau of Mines (IBM), the total reserves/resources of limestone of all categories and grades stands at over 200 billion tonnes, of which 16 billion tonnes (eight per cent) are placed under the Reserves category and 184 billion tonnes (92 per cent) under Remaining Resources category. Of the Reserves category, proved reserves are around 9.4 billion tonnes and the rest is included under Probable Reserves.[16]

Limestone is available across different states (see *Figure 2: Limestone reserves in India*). Karnataka is the leading state with 27 per cent of the total resources followed by Andhra Pradesh and Rajasthan (12 per cent each), Gujarat (ten per cent), Meghalaya (nine per cent), Telangana (eight per cent), and Chhattisgarh and Madhya Pradesh (five per cent each).[17] Since the cement industry is the main consumer of limestone, most of the mines are owned directly by the cement companies.

In 2017–18, 338 million tonnes of limestone was produced. Limestone production has steadily increased in India in the past decade (see *Graph 2: Production of limestone*). It is being produced across most states of India, with Rajasthan being the leading producer accounting for 22 per cent of total production, followed by Madhya Pradesh (13 per cent), Andhra Pradesh and Chhattisgarh (11 per cent each), Karnataka (nine per cent), Telangana (eight per cent), Gujarat (seven per cent) and Tamil Nadu (six per cent). Cement is the largest limestone consuming industry accounting for 94 per cent share followed by Iron and Steel (four per cent), and Chemicals (two per cent). [18]

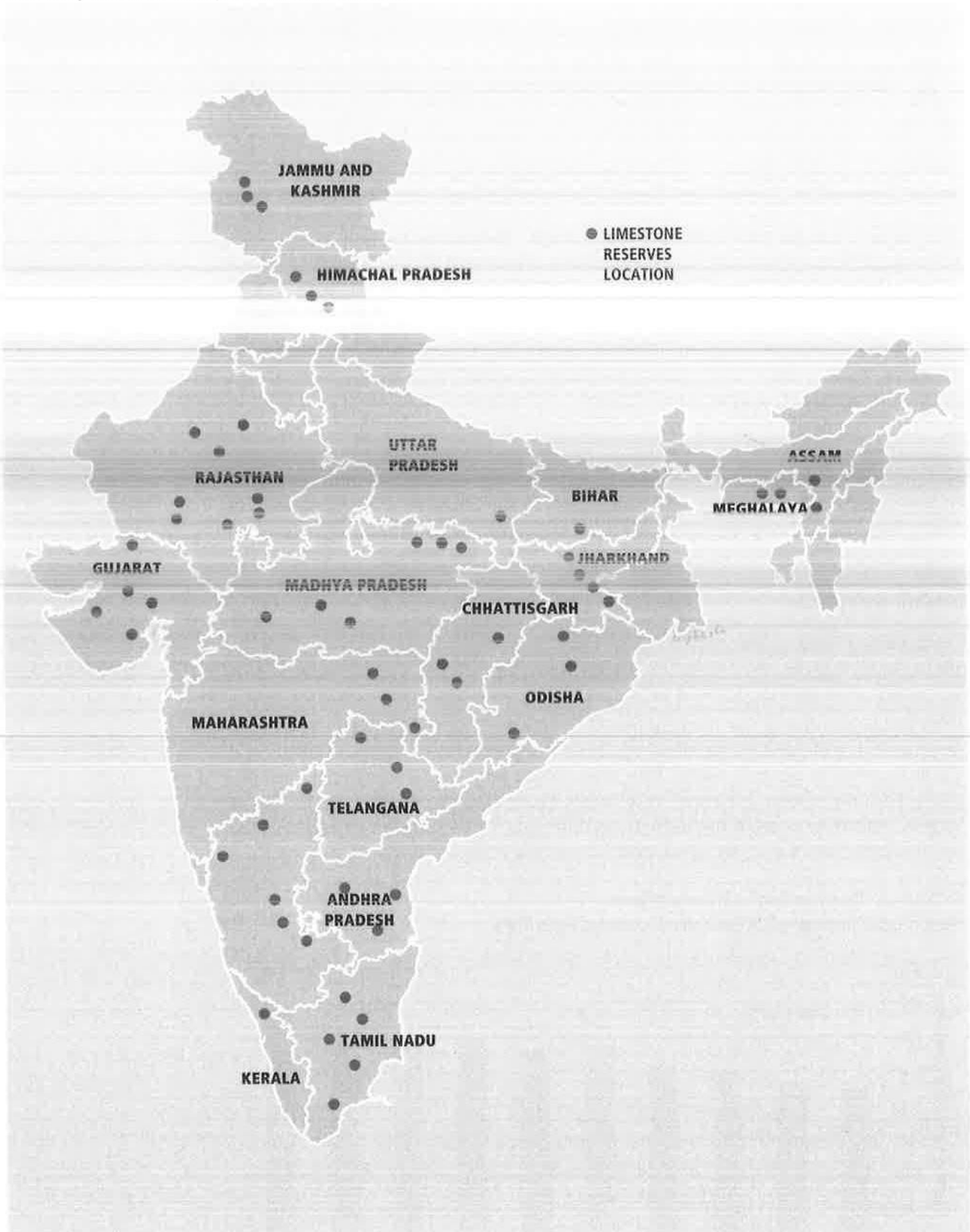
Graph 2: Production of limestone

Production of limestone has been steadily increasing in India



Source: India Mineral Yearbook, 2018

Figure 2: Limestone reserves in India
Availability of limestone is spread across the country



Source: Indian Bureau of Mines, 2018

4.2 LIMESTONE REQUIREMENT FOR FGD

As per CEA's National Electricity Plan, 2018, coal-based thermal power plants will generate 1,018 billion units in 2021–22 and 1,246 billion units in 2026–27. Based on the projected electricity generation and general coal quality (in terms of sulphur content), we have estimated potential SO_2 generation if no emission controls are put in place. SO_2 reduction potential is calculated based on the following parameters: potential fleet distribution (in terms of unit size and age), relevant norms, and emissions in line with norms. Although plants will use a range of reagents or alternative measures such as DSI, we have assumed that the cumulative SO_2 reduction will be achieved using only limestone—this assumption will therefore give us the upper limit of limestone needed by India's coal-based power sector. Under this scenario, 9–10 million tonnes of limestone will be needed annually by 2026–27, which is only about three per cent of the current limestone consumption.

Table 5: Limestone requirement of coal-based power plant
Thermal power plants will require 7–10 million tonnes of limestone by 2026–27

Year	Capacity (GW)	Electricity Generation (billion units)	Category	SO_2 (million tonnes)	SO_2 reduction (million tonnes)	Limestone requirement (million tonnes)
2015	188	895	Uncontrolled	4.30		
2022	248	1018	Uncontrolled	4.75		7–8
			With abatement	1.02	3.73	
2027	248	1246	Uncontrolled	5.81		9–10
			With abatement	1.25	4.56	

Source: CSE estimations based on CEA coal generation projection (see Annexure 2: Assumptions for SO_2 estimations)

While the limestone requirement for FGD is a small fraction of overall supply, an important factor is the distance of the source of limestone from the power station. Given the weight of limestone, transportation adds significantly to costs. To assess the ease of access to limestone, we identified large power generation clusters across the country totalling 134 GW. Next, we identified the limestone-mining areas that are nearest to these power-generating clusters (see *Annexure 5: Key power station/clusters and nearby limestone deposits*).

The results have been summarized (see *Table 6: Proximity of power generation capacity to limestone mining districts*) and they show that almost 60 per cent of the power generation capacity (~80 GW) falls within 200 km of a limestone-mining district. Another 20 per cent lies between 200–300 km of the mining district. Many states house both power plants as well as limestone mining regions (Madhya Pradesh and Rajasthan). In certain cases, power stations are close to limestone-mining districts in the neighbouring states—power stations in Punjab and Haryana are close to limestone deposits in Himachal Pradesh and Rajasthan.

Table 6: Proximity of power generation capacity to limestone mining districts

Most plants are located within 200 km of a limestone mining district

Distance (Km)	Capacity (MW)
0–100	30,170
101–200	49,174
201–300	27,760
301–400	15,230
>400	14,170

Source: CSE, 2019

Thermal power plants will have to make arrangements for procurement and transportation of limestone and its storage within the plant premises. Limestone storage yards with a capacity of at least two to three months would be typically needed by power stations to ensure that FGD operations run uninterrupted. NTPC's Vindhyachal power station in Madhya Pradesh (MP) commissioned FGD systems recently. It procures limestone from the Katni district in MP, about 200 km away, instead of sourcing it from the nearby Sonbhadra district of Uttar Pradesh. The limestone, in the form of boulders, is transported by trucks and stored within the plant premises close to the FGD unit. The storage facility can accommodate stock for two to three months. A crusher has been installed with a cyclone precipitator for converting the boulders to powder or slurry. Similarly, CLP India Pvt. Ltd procures limestone from Rajasthan and has a storage capacity of five to six months in the plant premises. Limestone needs of two to three days are stored near the FGD system for processing.

Wet FGD systems use limestone as an absorbent. The SO_2 in flue gas reacts with $CaCO_3$ and produces calcium sulphate ($CaSO_4$) and a small amount of $CaSO_3$ in a certain temperature and humidity. Magnesium Oxide (MgO) in the limestone can also produce a desulphurization effect. Other chemicals present in natural limestone such as SiO_2, Al_2O_3, Fe_2O_3 can't produce a desulphurization effect and are hence considered as impurities in limestone.

Typically, the content of $CaCO_3$ in limestone should be higher than 90 per cent (CaO > 45–50 per cent) for good performance of wet FGD.[1920] Poor quality limestone increases requirement of limestone. Impurities also have an impact on the stable operation of wet FGD systems as well as on their efficiency in reducing SO_2 concentration in flue gas. Furthermore, they can affect the quality of gypsum produced.[21] Apart from quality, mechanical factors such as grind size (grindability index) and chemical factors such as SO_2 loading also affect the FGD's SO_2 removal efficiency.

Bureau of Indian Standards (BIS) has detailed broad requirements for different industries. For example, cement can use limestone of a wide variety (CaO varying from 44–52 per cent) while steel and glass require very high quality limestone ($CaCO_3$ > 90 per cent) for some processes (see *Annexure 3: Grades of Limestone*). Secondly, while some industries (building, cement, iron and steel) can accommodate materials such as iron, alumina and silica in limestone, others (glass and chemical) require limestone to be as free from impurities as possible.[22] Similarly, BIS may also need to specify requirements of limestone being used in FGDs to ensure good quality FGD gypsum.

4.3 COST OF LIMESTONE

The quality of limestone determines its selling price. Depending on the grade of limestone the price varies between ₹273–1007 per tonne. Industry experts told CSE that the average selling price for limestone for FGDs would be around ₹500–600 per tonne. However, NTPC has procured limestone at ₹900 per tonne for the Vindhyachal power station's FGD system—possibly, this is a higher quality limestone (see *Table 7: Limestone prices in India*).

Table 7: Limestone prices in India

Price varies with quality of limestone. The best quality limestone goes to the steel industry

	User industry	Price range (in ₹)	Average selling price (in ₹)
1	LD (steel process)	473–863	737
2	Steel Melting Shop (SMS)	289	289
3	Blast Furnace (BF)	300–1007	524
4	Chemical	273	419
5	Cement	427–630	427

Source: IBM, Average Sale Price of Limestone for the month of January 2016

To develop some understanding of the cost of limestone for FGD in one power plant, we take the case of a 500 MW unit:

Table 8: Annual limestone requirement and cost for a 500 MW plant

The per unit cost of limestone is very low

Total coal consumption (million tonnes)	SO_2 generated (tonnes)	Limestone requirement (tonnes)	Per unit (₹/Kwh)
2.25	18,049	32,000	0.00859

Note: High quality limestone delivery price at plant is taken as ₹900/tonne.
Assumptions: Plant operates at plant load factor (PLF) of 85 per cent; sulphur content in coal (0.4 per cent); removal efficiency (90 per cent)
Source: CSE estimations

Based on our analysis, a 500 MW plant will require 32,000–40,000 tonnes of limestone annually. The annual cost of limestone will be in the range of ₹3–4 crore. The cost of limestone can be more than offset by selling gypsum, which sells for over ₹1,000 per tonne, produced from the process.

Limestone requirement for coal-based power plants is miniscule compared to the present demand and consumption of limestone. However, it is essential that good quality limestone be allocated to power plants. Most power plants do have a mine near them from which limestone can be sourced but the problem is that many of those mines are captive mines. Captive mines are those mines which are not allowed to sell limestone to any company other than the one that owns them. It is essential that these mines be opened up for use by the power plants in order to facilitate the availability of good quality limestone for FGD. This will ensure that there is enough supply of good quality limestone at low cost. Further, MoEF & CC should release guidelines for handling and storage of limestone and gypsum in power plants. Proper transportation, handling and storage practices need to be put in place to avoid fugitive emission like fly ash.

5. GYPSUM

Gypsum ($CaSO_4.2H_2O$) is a hydrated calcium sulphate used widely in industries due to its property of losing three-quarters of its water when moderately heated/calcined. This calcined gypsum can be moulded in various shapes during cooling. Gypsum is classified into three major categories based on its production method: a) natural, also called mineral gypsum; b) synthetic gypsum, a by-product of industrial processes; and c) marine gypsum.

Natural or mineral gypsum is extracted through mining. Marine gypsum is recovered from salt pans during the production of common salt. Synthetic gypsum is a by-product obtained through chemical process such as production of fertilizers. FGD gypsum is a unique synthetic by-product derived from FGD systems.

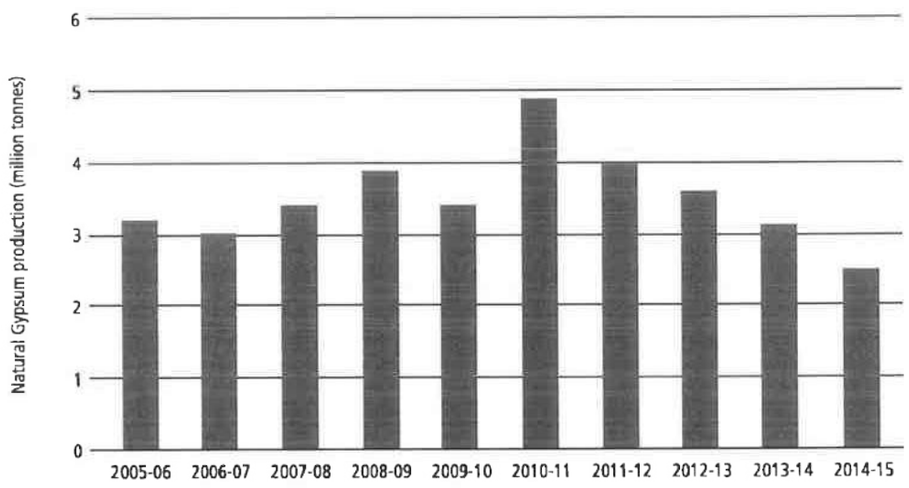
The cement industry is the dominant consumer of both mineral and synthetic gypsum. The chemical composition of the three categories of gypsum varies slightly, which in turn determines its use in various sectors (see *Annexure 4: Gypsum classification standards*).

5.1 PRODUCTION AND CONSUMPTION OF GYPSUM

The total global production of mineral gypsum in 2015 was about 268 million tonnes. China, the global leader, produced half of the world's gypsum (129 million tonnes). Most of the other major producers had shares of less than six per cent each. India's gypsum production in 2014–15 was 2.5 million tonnes, which was less than one per cent of the global total.[23]

Graph 3: India's gypsum production

Gypsum production has been decreasing, a worrying trend for the cement industry



Note: As per Government of India Notification S.O. 423 (E), dated 10 February 2015, 'gypsum' has been declared as 'Minor Mineral', hence the producers report the production data directly to the respective states and not to IBM.
Source: IBM, 2017

India is among the largest importers of gypsum in the world with annual imports of 3–5 million tonnes. Gypsum is mainly imported from Oman, Pakistan, Iran and Thailand. The other major sources to meet the demand include domestic mines, and synthetic and marine gypsum.

Rajasthan accounts for 82 per cent of the national gypsum deposit and Jammu and Kashmir accounts for 14 per cent; the rest is distributed among Tamil Nadu, Gujarat, Himachal Pradesh, Karnataka, Uttarakhand, Andhra Pradesh and Madhya Pradesh.[24] Rajasthan is the leading producer, contributing about 99 per cent of the total output. The remaining one per cent is contributed by Jammu and Kashmir.

IBM tracks only industrial sector consumption of gypsum. Hence, data is available only for that segment. About 10.3 million tonnes of gypsum in all forms was consumed in the organised sector in 2014–15. The respective share of natural gypsum, by-product gypsum and marine gypsum in total consumption during 2015–16 was about 58 per cent, 37 per cent, and five per cent. The cement industry was the largest consumer (99 per cent), using nearly all of the mineral gypsum and reported by-product gypsum. The balance was consumed by a variety of industries such as plaster of Paris, asbestos products, ceramics, fertilizers, refractories, textile, pharmaceutical, paint and chemicals. A portion of by-product gypsum generated from chemical industries is used by the agricultural sector but this consumption is not tracked by the IBM.

Table 9: Break-up of gypsum consumption in India
Cement sector is the dominant consumer of gypsum

Type of gypsum	Quantity (million tonnes)	Source	Consumed in
Mineral gypsum	5.9	From Rajasthan mines, imported from Oman, Pakistan, Iran and Thailand	Largely in cement and some in steel sector
Synthetic gypsum or by-product gypsum	3.8	From chemical plants such as fertilizer	Largely cement
Marine gypsum	0.5	Salt pans of Gujarat and Tamil Nadu	Largely cement
Total	10.31		99 per cent is consumed in cement sector

Note: Nearly 3–4 million tonnes of gypsum is imported. However, it is not clear whether it is mineral gypsum or synthetic gypsum.
Source: IBM, 2015

5.2 FGD GYPSUM

FGD gypsum is a by-product of the wet limestone FGD system, a result of the reaction of limestone with SO_2 in flue gases. It is important to note that the chemical composition of natural and FGD gypsum is quite similar (see *Table 10: Comparison of mineral gypsum vs FGD gypsum*). In fact, FGD gypsum has an even higher content of $CaSO_4.2H_2O$ than natural gypsum, particularly if higher quality limestone is used and the process parameters are maintained. Its quality makes FGD gypsum a valuable substitute of natural gypsum with large scale uses. Production of FGD gypsum can therefore reduce the need for mining gypsum and its related environmental impact.

Table 10: Comparison of mineral gypsum vs FGD gypsum
Due to comparable quality, FGD gypsum is substituting mineral gypsum across the world[24]

Parameter	Natural gypsum	FGD gypsum
Colour	White or colourless transparent	Yellow, nearly white or greyish black
Size	~140 um	30–60 um
Impurities	Clay, sand	Ash, calcium, carbonate, calcium sulphate and Mg, K, Na, Al etc.
SiO_2	1.34	1.5~6
Al_2O_3	0.14	0.1~2.2
Fe_2O_3	0.18	0.1~1.2
MgO	0.98	0.2~0
H_2O	19.69	15~21
$CaSO_4.2H_2O$	82.56	>=90

Source: Wang and Deng, 2015

With the implementation of FGD systems, India will produce around 12–17 million tonnes of FGD gypsum annually. Around 10 million tonnes of gypsum was consumed by the industrial sector in 2015–16, of which almost half was imported. The cement industry needs a large amount of gypsum (16–20 million tonnes of gypsum based on 330 million tonnes of cement produced in 2018–19) in its manufacturing and it is actually facing a gypsum shortage. Apart from imports, the sector is using inferior quality synthetic gypsum from the fertilizer industry. FGD gypsum can thus fulfil this shortfall both in quantity and quality.

Utilization of gypsum

Cement gypsum: Gypsum plays a crucial role in cement. It makes mortar or concrete more workable by keeping the cement in a plastic state at early stages of hydration. Gypsum also contributes to strength acceleration in early stages of hydration.[25] Synthetic gypsum has gained popularity in cement production across the world. China is utilizing a significant portion of its FGD gypsum in the cement and construction sectors.

Agricultural gypsum: Gypsum is a soluble source of essential plant nutrients like calcium and sulphur and can improve overall plant growth. Gypsum amendments improve the physical properties of some soils (especially heavy clay soils). It helps reduce erosion losses of soils and nutrients, and the concentrations of soluble phosphorus in surface water runoff.[26] FGD gypsum is being used in agriculture in US and China.

Gypsum boards: Gypsum board or drywall is essentially a board with a gypsum core and a paper facing. Being fire resistant, it is used as building material for wall, ceiling and partition systems in residential, institutional and commercial structures. Manufacturers are globally shifting towards FGD gypsum as an effective alternative to natural gypsum ore.

Utilization of FGD gypsum has been increasing across the world. It has replaced the use of mineral gypsum in many applications and comprises a significant share of total gypsum consumption. FGD gypsum's share is over 50 per cent in the US, where it is mainly utilized in wall board manufacturing. In China, FGD gypsum is mainly used by the cement sector and to improve alkaline soils. The growth of FGD gypsum generation and utilization has been extraordinary in China. China is able to utilize more than 70 per cent of its FGD gypsum.

5.3 REVENUE GENERATION FROM FGD GYPSUM

The revenue generated from FGD gypsum is dependent on the price of gypsum. Since a large quantity of domestic gypsum supply remains under the government, it also controls its pricing. Rajasthan State Minerals and Mines Limited (RSMML), a public sector enterprise of the state of Rajasthan, fixes prices regularly and these prices usually become the market price drivers. Prices of gypsum have remained stagnant over the years, ranging from ₹450–1,100 per metric tonne (see *Table 11: Basic sale price of gypsum to various industries from India's lone producer*).

Table 11: Basic sale price of gypsum to various industries from India's lone producer

RSMML largely controls the domestic mineral gypsum prices as it contributes 99 per cent of total production

From all mines/dispatch points	Basic sale price (₹)
Gypsum RoM for cement industry	515
Gypsum RoM for PoP industry	715
Gypsum RoM for gypsum board manufacturing industries	1,065
Gypsum board (loose)	775
Gypsum power (packed)	1,075

Source: RSMML, 2019

Since the supply of gypsum from RSMML is quite limited, the cement industry located across the country has to rely on other sources. Import pricing depends on the source of gypsum and the port of arrival; however, that is also aligned with RSMML selling price. Plants located near the sea can economically import gypsum. For plants located far away from the port transport costs can be high, which is why some cement plants use somewhat inferior quality chemical gypsum (phosphogypsum) from nearby fertilizer plants. As coal-based power plants are located across the country, transportation costs for FGD gypsum to the cement plants can be significantly lower if sourced from the nearest power plant.

Only a handful of units in India are currently operating limestone-based wet FGD. Therefore, FGD gypsum prices are not well established. However, one can safely assume that they would be in line with RSMML's mineral gypsum prices. Another proxy is the price of synthetic gypsum—various vendors are selling phosphogypsum online at ₹500–1,000 per tonne, based on the quality. Gypsum of 99 per cent purity is being sold at 1800/MT and Gypsum of 55–60 per cent purity is being sold at 750/MT.

Table 12: Annual revenue from gypsum sale for 500 MW unit

FGD gypsum can give significant revenue if proper market linkages are set up beforehand

	Limestone consumed (tonnes p.a.)	Gypsum generated (tonnes p.a.)	Sold to cement	Sold for gypsum board manufacturing	Sold to other industries / agriculture	Disposal (25 per cent)	Revenues (₹)
Conservative estimates*	32,000	54,400	(40 per cent of total) 21,760	(20 per cent of the total) 10,880	8,160 (15 per cent of the total)	136,000	2.61 cr.
Optimistic estimates**	32,000	54,400		(100 per cent) 544,000			5.44 cr.

**Based on price from RSMML mines*

*** Considering 100 per cent is sold to wall board and plaster board manufacturers*

Source: CSE, 2019

Based on the domestic demand scenarios and international end uses, we can estimate the potential revenue from the sale of FGD gypsum. We start from the analysis presented above (see *Table 8: Annual limestone requirement and cost for a 500 MW plant*) which estimated a 500 MW unit would use 32,000 tonnes of limestone annually. Under this scenario, the unit would produce 54–60,000 tonnes of gypsum per annum (see *Table 12: Annual revenue from gypsum sale for 500 MW unit*). This revenue model is based on China's experience of FGD gypsum utilization, which is around 75 per cent of their total FGD gypsum generation.

As per the IBM Working Group report, 'augmentation of infrastructural activities will engender growth of the cement industry, which will raise the consumption of gypsum and thereby its demand leading to increased dependence on imports and synthetic gypsum. FGD gypsum can play a crucial role in reducing imports.' Accordingly, we have projected that a major share of FGD gypsum will be sold to the cement industry.

Gypsum board manufacturing industry, which is presently in its nascent stage, could grow with appropriate encouragement, similar to its growth in developed countries. Gypsum is an excellent partition material because of its light weight and other characteristics and is a useful construction material for high-rise buildings. Gypsum is sold for wall board/plaster board manufacturing at much higher prices compared to the cement industry. Thus, earning can be much higher if those industries grow as projected in optimistic estimates (see *Table 11: Basic Sale price of gypsum to various industries from India's lone producer*).

Our analysis shows that a 500 MW coal-based generating unit could earn around ₹2–5 crore annually by selling FGD gypsum. This earning can offset the cost of limestone incurred in operating the FGD. Looking at wide applications and scarcity in India, full utilization of FGD gypsum can be achieved with proper market linkages. This will also eliminate environmental impact of gypsum disposal. Thus, MoEF & CC should direct power plants to utilize 100 per cent of FGD gypsum. Disposal guidelines may be given only for a short period of time.

6. RECOMMENDATIONS

Apart from providing cleaner air for all of us to breathe, FGD installations in India can be beneficial in other significant ways as well. Gypsum is a scare resource in India. India's mineral gypsum production has been decreasing and the country's reliance on imported gypsum has increased. FGD gypsum can significantly reduce this import burden. However, the following issues need to be addressed to achieve this:

1. BIS has specified broad specification guidelines for gypsum being used in the cement sector. In turn, BIS may also need to specify the quality of limestone being used in FGDs to ensure good quality FGD gypsum.

2. MoEF & CC should release guidelines for handling and storage of limestone and gypsum in power plants. Proper transportation, handling and storage practices need to put in place to avoid fugitive emission like fly ash.

3. MoEF & CC should direct power plants to utilize 100 per cent of FGD gypsum. Disposal guidelines should be given only for a short period of time.

4. The agriculture sector can also be a potential consumer of FGD gypsum in India. Gypsum is commonly used in non-nitrogen-based fertilizers. FGD gypsum has been determined safe for agricultural use through many studies. However, it is always prudent to set strict quality standards. Agricultural research organisations such as Indian Council of Agricultural Research should carry out field testing to ensure applicability of gypsum produced from Indian power plants.

ANNEXURES

ANNEXURE 1: FGD footprint in India

Power station	Capacity of the plant connected to FGD (MW)	Type of FGD	Technology supplier	Area of construction (sq. m)	Water consumption (cu. m/year)	Auxiliary power consumption (per cent)	Reagent used	Reagent consumption (kg/hr)
Tata Trombay	750	Seawater	Alstom	7,200	147,73,000	1–1.5	Seawater	–
Reliance Dahanu	500	Seawater	Ducon	Data not available	87,600,000–105,120,000	1.25	Seawater	
Udupi TPP	1,200	Seawater	Ducon	10,000	306,600–350,400	0.5	Limestone	–
Adani Mundra	1,980	Seawater	Alstom	1,500	125,000–140,000	1.5	Seawater	–
JSW Ratnagiri	1,200	Seawater	Alstom	1,500 (scrubber alone)	Data not available	Data not available	Seawater	–
NTPC Vindhyachal stage V	500	Limestone	Alstom	10,000–20,000	613,200–876,000	1.1	Limestone	6,250
CLP India	1,200	Limestone	GE-Alstom				Limestone	
IL&FS Cuddalore	1,200	Limestone	Datong		36,500,000	1.9	Limestone	3,800
NTPC Bongaigaon	750	Limestone	BHEL/ Ducon	Data not available	Data not available	3.1	Limestone	Data not available

**FGD systems have been installed in NTPC's Bongaigaon unit in Assam and the IL&FS power station in Cuddalore, Tamil Nadu, however, they are yet to be commissioned and stabilized*

Source: Centre for Science and Environment, 2019

ANNEXURE 2: Assumptions for SO_2 estimations

Sulphur dioxide emissions were calculated based on vintage, size, coal consumption and sulphur content in the coal. Final emission were calculated based on units which will meet their respective standards by installing SO_2 control technology based on the reduction required. Ten per cent sulphur assumed to be trapped in ash based on CSE findings.

ANNEXURE 3: Grades of Limestone

Industry/grade	Standards
Cement	CaO (42 per cent) minimum, Phosphorous (<1 per cent) max, MgO (4 per cent) max.
Blast Furnace	CaO (44–46 per cent), MgO (4–8 per cent), SiO_2 (5–7 per cent) max.
Steel melting shop (SMS)	CaO (48–53 per cent), MgO (4 per cent) max.
Chemical	CaO (95 per cent)/ (50 per cent) min,
Sugar	CaO (80 per cent)
Glass	$CaCO_3$ (94.4 per cent), Total $CaCO_3$+$MgCO_3$ (97.5 per cent), SiO_2 (2.5 per cent)
Fertilizer	$CaCO_3$+$MgCO_3$ (85 per cent), SiO_2 (5 per cent)
Building	CaO (40 per cent) max, SiO_2 (10–20 per cent) min.

Source: http://geologydata.info/non_mettalic/limestone.htm

ANNEXURE 4: Gypsum classification standards

Characteristic	Type I	Type II	Type III	Type IV
Free water (maximum per cent)	1.0	-	1.0	-
Carbon dioxide (max mass per cent)	1.0	-	3.0	-
Silica, insoluble matter (max. mass per cent)	0.7	6.0	6.0	-
Iron and aluminium (max. mass per cent)	0.1	1.5	1.0	-
Magnesium oxide (max mass per cent)	0.5	1.0	1.5	3.0
Calcium sulphate dihydrate (mass per cent)	96.0 (min)	85.0–90.0	85.0 (min)	70.0–75.0
Chlorides (max. mass per cent)	0.01	0.003	0.1	0.5
Industry usage	Surgical plaster	Fertilizers	Pottery, building	Cement

Source: BIS, 2003

ANNEXURE 5: Key power station/clusters and nearby limestone deposits

Major limestone deposit	Limestone production (MTPA) (2014–15)	Nearest power station/cluster	Limestone state	Power station/ cluster state	Distance (km)	Capacity of thermal power (MW)
Sonebhadra	2.95	Singrauli	Uttar Pradesh	Madhya Pradesh	125	6,680
Katni	5.58	Anuppur	Madhya Pradesh	Madhya Pradesh	168	1,410
Satna	17.89	Sidhi			163	3,960
Katni	5.58	Umaria			98	1,340
		Betul			410	1,330
		Seoni			110	600
Neemuch	4.53	Khandwa			413	1,200
Renukut (Sonebhadra)	2.95	Sonebhadra	Uttar Pradesh	Uttar Pradesh	39	9,680
Chandrapur	9.25	Chandrapur	Maharashtra	Maharashtra	15	5,380
		Amravati			248	1,350
		Gondia			228	3,300
		Jalgaon			472	1,420
		Nagpur			171	7,376
		Nashik			686	1,170
Bilaspur	19.82	Korba	Chhattisgarh	Chhattisgarh	99	6,975
		Janjgir Champa			169	4,120
		Raigarh			169	4,363
		Raipur			113	1,370

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Major limestone deposit	Limestone production (MTPA) (2014–15)	Nearest power station/cluster	Limestone state	Power station/ cluster state	Distance (km)	Capacity of thermal power (MW)
Bilaspur	3.57	Bathinda	Himachal Pradesh	Punjab	296	1,360
		Tarn Taran			248	
		Rupnagar			85	1,260
		Mansa			294	1,980
		Patiala			160	1,400
		Hisar		Haryana	304	1,200
		Panipat			294	920
		Jhajjar			405	2,820
		Yamunanagar			225	600
Gulbarga	20.1	Raichur	Karnataka	Karnataka	173	3,320
		Bellary			302	2,560
Bagalkot	3.53	Mangaluru			474	1,200
Kutchh	8.67	Kutchh	Gujarat	Gujarat		9,160
		Jamnagar			324	1,940
		Sabarmati			415	
Amreli	5.57	Sabarmati			252	1,770
		Bhavnagar			118	500
		Kheda			238	1,470
Junagadh	7.24	Bhavnagar			209	
		Jamnagar			157	1,940
		Surat			550	600
		Tapi			575	1,350
Nalgonda	14.79	Warangal	Telangana	Telangana	144	750
		Paloncha			223	1,200
		Karimnagar			216	1,760
		Khammam			133	3,040
		Mancheriyal			297	1,050
		Vijaywada		Andhra Pradesh	213	3,820
		Vizag			557	1,320
Cudappah	10.28	Cuddapah	Andhra Pradesh	Andhra Pradesh		2,370
		Nellore	Andhra Pradesh	Andhra Pradesh	178	3,500
		Krishnapatnam	Andhra Pradesh	Andhra Pradesh	187	1,440
Ariyalur	10.94	Cuddalore	Tamil Nadu	Tamil Nadu	126	2,070
		Tiruvallur			298	3,550
		Salem			207	1,080
		Neyveli			90	2,320
		Tuticorin			360	1,200

Contd...

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Major limestone deposit	Limestone production (MTPA) (2014–15)	Nearest power station/cluster	Limestone state	Power station/ cluster state	Distance (km)	Capacity of thermal power (MW)
Sirohi	12.02	Barmer	Rajasthan	Rajasthan	250	1,240
Chittorgarh	18.06	Baran			267	1,500
		Jhalawar			222	750
		Kota			164	1,200
Pali	17.75	Ganganagar			543	1–760
		Bikaner			300	250

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Thermal power stations must control sulphur dioxide pollution to comply with the 2015 environmental norms stipulated for them.

The discussion, however, has so far been restricted on the question of selection of suitable technology. Issues related to operations—particularly the suitability of specific technology options—sourcing of raw material, and the utilization of suitable by-products of the process have not been considered so far.

This publication attempts to address this gap by showing that procurement of limestone for wet flue gas desulphurization (FGD) will not be a major problem. It also highlights the utility of the by-product emanating from the process, called FGD gypsum, and its potential uptake in India.

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ANNEXURE – 15.

Indian Geotechnical Conference – 2010, GEO*trendz*
December 16–18, 2010
IGS Mumbai Chapter & IIT Bombay

Management of Ash Disposal

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ABSTRACT

Management of Ash Disposal of coal based Thermal Power plant has to comply with the stipulations of the MoEF. The environmental aspects are to be considered during planning and design stage of ash dyke it self. The main environmental aspect which requires attention for ash dyke are mainly air pollution, surface contamination & ground water contamination. To minimize the impact of ash disposal on the environment it is essential to manage safe environment of ash dyke during construction, while disposing , while raising the dyke and also on abandoned dyke. For this purpose the dyke needs to be continuously monitored ,inspected and maintained. This paper presents some of the key issues associated with planning safe dyke, management of ash disposal for coal based thermal power project.

1. INTRODUCTION

One of the major and important part of any coal based Thermal Power plant is combustion of coal. The by product of combustion i.e. ash mainly consists of two types of ash .viz Furnace bottom ash which is collected at the bottom of the boiler units and pulverized fuel ash which is collected in electrostatic precipitators and economizer hoppers. In NTPC plants it is found that about 20% of the total ash is bottom ash and the balance 80% is fly ash. Generally Indian coal contains about 30 to 45% ash. In typical thermal project of 2000MW capacity, the daily ash production will be about 2200 tonnes of bottom ash and about 11000 tonnes of fly ash. The MoEF (Ministry of Environment & Forest, Govt of India) stipulates various conditions to be implemented while issuing environmental clearance to the power utility. Some of the main stipulations related to ash disposal are

(a) 100% fly ash utilization to be achieved in 4 years for new projects. (MoEF 2009)
(b) Effluents to meet the prescribed standards
(c) Safe ash dyke design
(d) Prevent ground water contamination
(e) Control of fugitive dust.
(f) Area limitation for Ash disposal.

For utilizing and disposing the ash, the facilities to be provided for ash utilization and disposal management is planned at the conceptual stage. The design, planning of disposal system and ash utilization shall fulfill the requirement of plant and comply with the MoEF norms. The factors affecting the environment are land for ash disposal, pollution on Ground water and surface water bodies, fugitive dust emission and failure/breach of ash dyke.

One of the major challenge in management in ash disposal is to protect the environment with safe disposal. For this purpose it is necessary to have a well planned design, construction, continuous monitoring and safe ash disposal management in place. Some of the aspects related to ash disposal and management like design ,construction, monitoring, inspection, training, factors to be considered, emergency preparedness are briefly presented in this paper. A suggested check list which may help the operating stations are mentioned in the paper.

2. PLANNING, DESIGN & CONSTRUCTION

Planning and Design

The disposal system has to be planned in advance keeping in view the requirements of the MoEF stipulations and keeping the dyke ready for discharge as per the predetermined schedule. In exigencies/emergency, alternate arrangement is desirable to divert the discharge instead of taking the risk by continuing the discharge. The other aspects to be considered are the distance to the ash dyke, properties of coal, topographical conditions ,geological locations ,metrological conditions etc.. The volume of ash generated during the design life of the plant is worked out based on the characteristics of coal. The volume of ash to be disposed is worked out at the conceptual stage on the basis of ash utilization stipulated by MoEF.The unutilized ash is disposed to an identified area contained within dyke

generally referred as tailings.To protect the environment due to ash disposal various site specific studies like topographical survey, earlier land use map, drainage pattern, environmental impact assessment, archives, meteorological data, hydrological studies , geotechnical investigations are carried out at the proposed site.

A detailed laboratory tests are conducted to establish the physical, chemical and engineering properties of soil and analysis of subsoil water. Typical properties of pond ash are presented in Table-1. Based on the properties of founding soil and fill material, the stability and seepage analysis is carried out. Dyke is designed as per best engineering practice including IS and studies by reputed institutions. The design is done for the ultimate height and the unutilized ash to be stored .

Table 1: Typical Properties of Ash

Engineering Properties	*Ranges*	
	Bottom Ash	Fly Ash
Grain size, %		
-Clay	0	0
-Silt	15-40	60-90
-Sand	50-80	05-20
-Gravel	0	0
Specific Gravity	1.85	1.84
Maximum Dry Density (gm/cc)	1.004	1.037
Optimum Moisture Content, %	39.4	40.6
Effective Cohesion, (kg/cm^2)	0	0
Effective angle of shearing resistance, degree	42	33
Coefficient of Permeability, (cm/sec)	10^{-2} to 10^{-4}	10^{-5} to 10^{-8}

Chemical Constituents	*Range (%)*	
	Bottom Ash	*Fly Ash*
Silica (SiO_2)	70.0	73.2
Alumina(Al_2O_3	24.4	21.3
Iron Oxide (Fe_2O_3)	2.50	2.56
Calcium Oxide (CaO)	0.50	0.60
Magnesium Oxide (MgO)	1.1	1.0
Sulphur Oxide (SO_3)	0.5	0.5

Soft wares like Geo slope, Plaxis, visual FEA etc. are also used to aid in the design.

A typical case of seepage and stability analysis is presented in fig.1 and 2. Based on the seepage analysis the internal drainage and exit gradient are arrived.

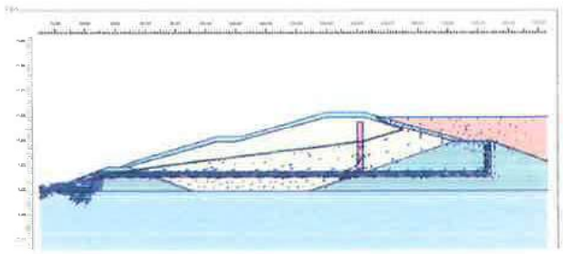


Fig. 1: Seepage Analysis

The stability anaysis for a typical case is presented in fig. 2. Based on the analysis for static and seismic cases stable slopes are arrived.

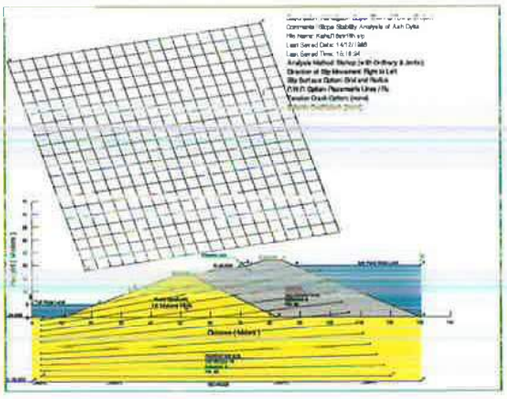
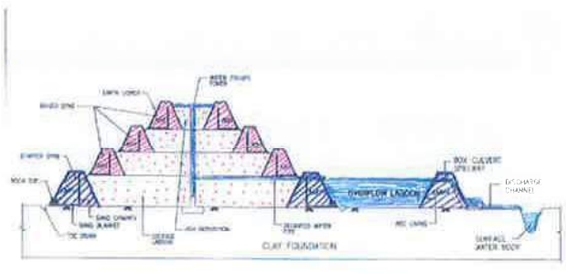


Fig. 2: Slope Stability Analysis

Construction

Construction is a critical phase in achieving a safe dyke. Modern construction equipment permits to achieve speed with quality. Generally a starter dyke is constructed and subsequent raising is done by either upstream / inward raising or down stream/ outward raising. Refer 3 and 4 respectively. In d/s method the volume of ash to be handled is more. This may add to ash utilization. Depending upon the seismic zone the method of construction may be finalized. In seismic zone V d/s method appears to be better option than u/s construction.



WET ASH DISPOSAL-CROSS SECTION (TYPICAL)

Fig. 3: Upstream Construction Method

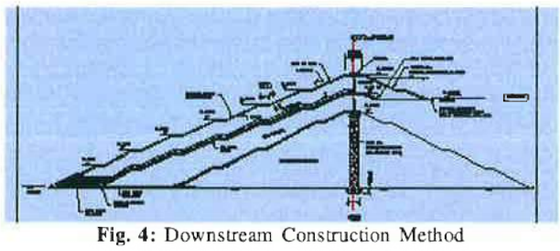


Fig. 4: Downstream Construction Method

Ash Disposal

Ash disposal system needs to be planned at the conceptual stage of the project The ash is disposed either in wet disposal or dry disposal system. For use in manufacture of cement dry fly ash is preferred.

Dry Ash Disposal

In order to make available the dry ash without mixing water, dry extraction system is adopted. In dry ash extraction system, ash collected in the ESP hoppers is removed in dry form by using either a vacuum system or a pressure system and is conveyed to a buffer hopper located adjacent to ESP. From this hopper, a part of the ash can be transported in dry form by pneumatic conveying to the storage site for further use. Fig.5

Ash is transported in a conditioned form through conveyors and placed in predetermined manner.

Fig, 5: Ash Disposed Thru Conveyor at Disposal Site

The ash is deposited and compacted in this disposal. To avoid erosion soil cover is placed. As there is no water used in disposal the leachate is minimal. To control fugitive dust plantation is done Fig. 6 .

Fig. 6: Ash .Mound at 45 m Height with Plantation to Control Fugitive Dust

The selection of system to a certain extent depends on the climate conditions and distance from plant to disposal site. The main limitation is that the system is capital intensive and expensive when compared to wet disposal system.

Wet Disposal

In Wet Disposal the ash is mixed with water and the ash slurry is transported to the disposal area. In wet disposal system there are two methods, lean concentration slurry disposal (LCSD) and high concentrated slurry disposal(HCSD). Based on the technology scanning and discussion with experts and visit to some of the power plants the recent revolution in the area in wet disposal is HCSD with reduced water content The mixture behaves like semi solid and a Non Newtonian fluid. The disposal of this highly viscous and non-Newtonian fluid requires special type pumps.Following are the few merits of HCSD over LCSD which is attracting the more use of HCSD system.

1. Water consumption is reduced due to high concentration in HCSD (60-70%) in comparison with LCSD (15-25%)
2. HCSD is highly impermeable, leaching, erosion & wear tendency is very less.
3. Specific energy consumption is reduced.
4. Fugitive dust is minimal as compared to LCSD. Because of less water, there will be no breach of the dyke. This is major relief in the safe disposal of ash.

HCSD is environment friendly. According to Paterson it is important to maintain the density and rheology of the thickner under flow within a narrow range. As per limited information, the limitation in the system, is capital intensive and transportation of HCSD is generally up to 10-12Km.

For the first time in NTPC, considering the site specific aspects at one of the projects, the fly ash is planned to dispose through HCSD by placing in layers one over the other in cells. Bottom ash is disposed off in LCSD. Separate lagooning arrangement is made for HCSD and BA. Refer fig7.a

For disposing HCSD literature suggests that a slope of 1 in 20 may be maintained . To maintain such a slope during monsoon and flushing of pipes the top ash is likely to spill over including erosion which may have a negative impact on the environment. India being tropical climate, to avoid erosion in HCSD and negative impact on environment containment dyke is required and the same is provided which is shown in fig-7 (b) It is seen from figure that due to catchment area and to exit the surface rain run off

spillways at suitable locations around the dyke is provided. Internal drainage arrangement and toe drain around the dyke is also provided.

The top sub soil comprise of sandy Silt/Clayey Silt which is semi impervious . The ground water table at the time of investigation in 2006 is about 13 – 18m below ground level. However to prevent ground water contamination if any and to conform to the stipulations, liner is provided in following manner.

(a) The OFL and lagoon 1A is provided with bentonite blended soil.

(b) Lagoon 1B and 1B a layer of HCSD of about 300mm thick is envisaged to be spread as the mix is highly impervious and act as barrier or as liner to prevent pollution of ground water if any.

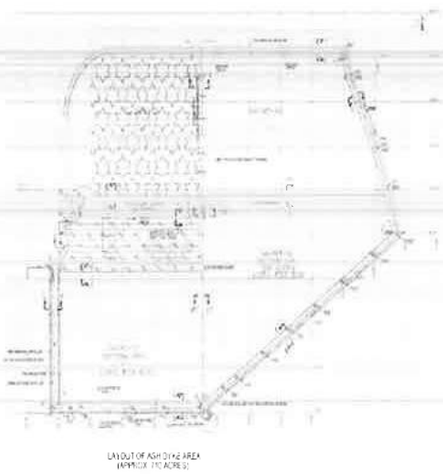


Fig. 7: (a) Plan for Disposal of Fly ash by HCSD and BA by LCSD

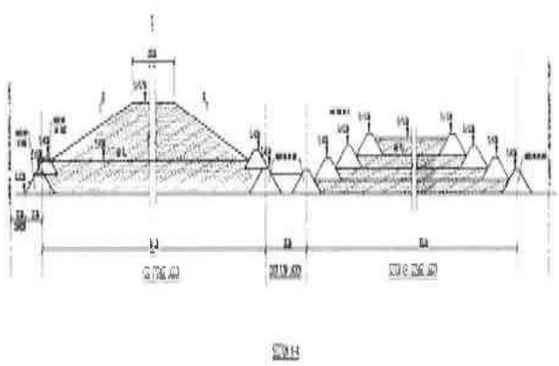


Fig. 7: (b) Scheme Developed for Disposal of Fly ash by HCSD and BA by LCSD

3. MANAGEMENT OF ASH DISPOAL

Management of safe ash disposal thru wet disposal involves lagooning arrangement within the allotted land, method of disposal, continuous inspection, monitoring and maintenance ,commitment for safe disposal. In order to minimize the risk of failure, preventive measures are accorded top priority. Instrumentation of dyke is necessary and shall form an integral part of monitoring mechanism.

In order to achieve

(i) more or less uniform ash filling within the lagoon

(ii) completely utilize the available storage capacity

(iii) maintain water cover throughout to avoid island formation within the lagoon leading to dust problem

Multi point discharge may be adopted.

Preventive measures, recirculation of ash water, operation and maintenance, emergency action plan and preparedness, control of fugitive dust, control of pollution of ground water etc. some of them are briefly described here in this paper.

Land Requirement

Some of the factors affecting land requirement are ash utilization, PLF (Plant load factor), height of dyke, shape and topography of land, substrata, land use pattern, seismic zone, coal parameters etc.

MoEF has given the stipulation of land requirement for emergency fly ash storage for thermal power plant an area upto 50 hectares (equal to 125 acres) for a 500MW unit . For storing ash a dyke is to be built which occupies certain land. Land is also required for overflow lagoon, garlanding of pipes, inspection road, toe drain etc. Typically for storing ash in 125 acres the land occupied by dyke is about 33 acres ,by garland pipes, inspection road ,toe drain and pump house is about 12 acres, over flow lagoon is about 25 acres. i.e about 70 acres for 500MW unit and about 100 acres for 2 X500MW units. The land for 2X500 MW shall be 2X125 + 100 = 350 acres or 0.35 acre/MW.

To maintain the effluents like TSS within permissible limits the ash slurry needs to be decanted, for this purpose settling area may also be estimated from Stoke"s Law .

Lagooning Arrangement

In case wet disposal the planning of discharge, type of dyke, method of construction and dyke construction shall be such that at no point the generation is to be affected for want of discharge area. This is one of the challenges in ash disposal management. For this purpose and for optimum use of land there is need for multi lagooning arrangement. A typical arrangement with over flow lagoon and garland pipes around the dyke is shown in fig8(a) and the land for auxilaries are shown in fig8(b). The planning of raisings

are done as per the utilization and discharge requirement. For this purpose, a continuous monitoring of the discharge becomes essential component of management.

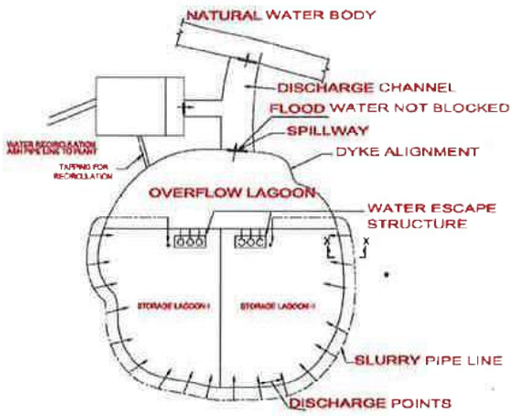


Fig. 8: (a) Typical Lagooning Arrangement

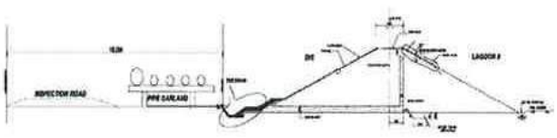


Fig. 8: (b) Land Required for Auxiliaries

Land for dyke (500mw) 35 acres*

Land for garland pipe and inspection road 10 acres

Land for over flow lagoon 25 acres

* - As the perimeter increases dyke encroachment also increases.

To avoid ground water pollution, MoEF stipulates liner for the ash disposal area. The liner may be natural or synthetic depending upon the substrata encountered and the permeability of soil. To avoid the contamination of nearby fields, toe drain is provided all around the periphery of outer dyke which will collect the seepage water from storage lagoon which is either lead to the nearest natural drain or channel or pumped back to the OFL for recirculation. Water escape structure for decantation, method of discharge and recirculation of decanted water are provided as per requirement.

Table 2: Suggestive Checklist

1. Whether there is any signs of sinking/caving-in/ boiling on the
   (a) Upstream
   (b) Downstream
   (c) Foundation very near to the d/s toe.
2. Whether any wet spots/areas are observed on
   (a) D/s slope
   (b) Foundation very near to the d/s toe.
3. Whether any seepage is observed on
   (a) u/s and d/s slopes
   (b) Foundation very near to the d/s toe.
4. Whether any longitudinal and transverse cracks are observed
   (a) On the top of dyke
   (b) u/s slope and d/s toe.
5. Whether there is any damage to the turfing protection
6. Whether any stone pitching/ brick lining is dislodged or caved in
7. Whether any rat holes are present on the top of dyke. u/s & d/s slope.
8. Whether the rock toe is maintaining its design shape.
9. Whether the toe is in good condition.
10. Whether the toe drain is shifted/slided from its original position and is clean with no obstruction for flow of water.
11. Whether there is any erosion on the u/s slope due to wave action or draw down in the lagoon.
12. Whether the filters placed to guide seepage water is not shifting from its original location.

This is only suggestive and may be modified as per actual requirements

Preventive Measures for Safety of Dyke

Adequate free board shall be maintained to prevent overtopping. Overtopping leads to breach.

The slopes shall be maintained as per the drawings. Upstream slopes shall be protected to prevent erosion due to wave action.

Periodical inspection of ash dykes shall be done to detect weakness signs, if any

Piping and seepage is one of the main cause for excessive settlement or instability of the dyke.There may be several reasons and the measures to prevent shall be arrived at. Cracks, rain cuts, rat holes, sink holes, , water boils, settlement etc. shall be attended immediately.

Prompt remedial measures to correct the weakness.

Shallow rooted vegetation cover like grass shall be grown on the dyke top and slopes.Big shrubs and trees will affect dyke stability and also prevent visibility during inspection.

Protect downstream slopes to prevent erosion due to rain cuts and also from /wave action if tail water is likely to build up.

Provisde slope drains to guide the rain water falling on dyke top to the toe drains.

Provide internal drainage system to control the phreatic

line to prevent slip and piping failures.

Regular maintenance of the dyke with turfing will prevent the possibility of rain cuts. Gullies if any shall be back filled with earth and covered with grass turfing.

Stagnation of seepage water in the drains is not desirable. All toe drains and surface drains shall be cleaned periodically to remove silt or vegetation for smooth flow.

Water logging at the d/s side shall be avoided to prevent subsidence/instability of the dyke. In case of water boils placing of reverse filter is found to be effective in arresting sand boils.

In case of water stagnation on the downstream side the provision of relief wells is found to be effective.

Other suitable methods like artificial drainage through reverse filter/sand wicks/relief wells/sand blanket/surface loading etc may be undertaken. Intermittent pumping can also be considered on case to case basis.

Operation and Maintenance of Ash Pond

Local management instruction shall be prepared by the generating station for operation and maintenance of ash disposal. The instructions cover the function and procedures to follow to ensure safety of the dyke. Periodic inspection by cross functional team will enable the management to monitor and plan safe disposal. Awareness of the safety of dyke shall be part of monitoring system. It is experienced that preventive measures and timely repair of dykes thus prevent avoidable damage to dyke and environment.

Monitoring

Monitoring dykes and reacting quickly to inadequate performance or to danger signals is a continuing critical aspect for dyke safety. Awful monitoring and quick response can prevent failure to a large extent. It is very important to constantly inspect the dyke and carry out necessary remedial measures Instrumentation data will fore tell of any abnormal behavior and quick response to any abnormal behavior can prevent failures in many cases.

Inspection

The purpose of inspection is to verify throughout operating life of the project with structural integrity of the dyke and appurtenant structures, assure protection to human life and property around the area. Periodic inspection will disclose conditions which may disrupt operation or threaten safety. Inspection frequency shall be outlined by the local unit.

Training

The personnel connected with operation, inspection, maintenance of the dyke, management may be provided adequate training on regular basis which will increase the awareness and commitment to the safety.Rotation of training programmes at different sites will enable to share the experience of different site specific problems.

4. EMERGENCY ACTION PLAN AND RESPONSE PREPAREDNESS

In order to mitigate the risk of failure, preventive measures shall be accorded top priority. Preplanning is required to identify condition which could lead to failure.A suggestive emergency plan and response preparedness is included in this paper which shall be reworked as per local management instructions to minimize the effects of failures if any.

Emergency Preparedness & Response Procedure

Source of hazard	:	
Area & location	:	
Cause of emergency	:	Breach of Ash Dyke
Emergency Response	:	
Procedure to tackle	:	Inform to the Shift-in-Charge Engineer & Fire Station and higher authority about the incident. - Ask for help Personal Safety -First -Aid Kit available
Ambulance & Hospital	:	Round the clock medical aid available in township
Mitigation	:	plug the breach portion by dumping sand/ash filled bags and restore the section. -Shift the discharge to other lagoon. Attend to the distressed area immediately - plug the breach.
Requirement	:	Round the clock inspection. Actual occurrence report to be available with respective deptt. And the cause may be looked into and arrive at long term remedial measures.

5. CONTROL OF POLLUTION OF WATER BODIES (SURFACE & GROUND WATER)

The disposal of ash whether a landfill or in a pond, can have significant effects on nearby surface waters if sufficient precautions are not taken. One of the control measures of pond effluent is to monitor effluent during discharge to maintain the prescribed TSS. This is maintained by providing adequate length of escape weir and recirculation of the effluent into OFL. Leachates may be prevented to contaminate ground water supplies by providing liner. To control pollution of water bodies MoEF stipulates the need for liner.

6. CONTROL OF FUGITIVE DUST EMISSION

Dry fly ash is readily lifted up by wind due to less cohesive

force in the fine solid particles. One of the conditions stipulated by MoEF is to control fugitive dust emission. The fugitive dust emission could be either from ash pond from a) operating lagoon, b) non operating lagoon and c) abandoned ash pond. Some of the measures on abandoned pond only are briefly described in this paper.

Fig. 9: (a) Safe Disposal for Control of Fugitive Dust. With Uniform Discharge and Free Board

Fig. 9: (b) Safe Disposal for Control of Fugitive Dust. With Sheet of Water

Fig. 9: (c) Safe Disposal for Control of Fugitive Dust. With Sprinkler

By maintaining the designed free board, uniform ash filling, judicious use of sprinklers and compaction of the exposed ash surface wherever feasible, vegetation growth etc. the fugitive dust emission from the operative and non operative lagoon, can be controlled. Refer fig 10 a to c

Abandoned Ash Pond

At one of the station the ash pond has been raised upto the ultimate height. Once the ash is filled upto the final height, to control the dust emission the final ash surface has been covered with 300mm thick soil. This cover also assisted in the growth of vegetation over the abandoned ash pond which also controlled fugitive dust emission.

Fig. 10: (a) Abandoned Dyke - Reclaimed

Fig. 10: (b) Abandoned Dyke–Vegetation

7. CONCLUDING REMARKS

One of the major challenges in ash disposal is to protect the environment. To manage safe disposal and conform to the stipulations of MoEF it is necessary to have proper

planning ,studies/ investigations , method of disposal at design stage , implementation stage, and management of safe disposal during operating and non operating stage. MoEF (2009) has stipulated the land for emergency storage of ash.

Based on the technology scan and visits/discussions with experts/utilities/manufacturers it is gathered that HCSD has several advantages compared to other disposal methods .

To contain the material within the boundary there is need for containment dyke. The design shall ensure necessary drainage arrangements and free board to accomi surface and rain run off. HCSD helps to mitigate the pollution of water bodies. Risk of breach will be minimum . The cake like formation on drying fugitive dust emission is minimal compared to other disposal methods.

The system despite being capital intensive is environmental friendly. The present limitation is in the pumping distance and size of the particles.

Monitoring and Periodic inspection and preventive measures enable a safe ash disposal. Tendency to overfill will avoid overtopping and this will minimize the risk of breach. Preventive measures shall be accorded top priority. Instrumentation of the dyke is a useful tool in maintaining the dyke.

Training to increase the awareness for reducing water and natural resource consumption, responsibility towards pollution prevention measures shall form a part of management in ash disposal which will help in a long way in protecting the environment.

Thus the challenge arising out of ash disposal in pond can be mitigated through response management and adequate resources.

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BEFORE THE HON'BLE
NATIONAL GREEN TRIBUNAL,
SOUTHERN ZONE AT CHENNAI

Appeal No: 15 of 2020

COUNTER AFFIDAVIT FILED ON
BEHALF OF THE
4th RESPONDENT

M/s. J. RAMACHANDRA RAO,
M/s. Y. RAMA RAO,
M/s. B.LAKSHMINARASIMHAN
ADVOCATES FOR THE 4th RESPONDENT