

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,  
PRINCIPAL BENCH AT NEW DELHI  
ORIGINAL APPLICATION NO. 164 / 2018

IN THE MATTER OF:

Ashwani Kumar Dubey

...APPLICANT

VERSUS

Union of India and Ors.

...RESPONDENTS

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THROUGH:

  
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PLACE: NEW DELHI  
DATE: 8-7-24

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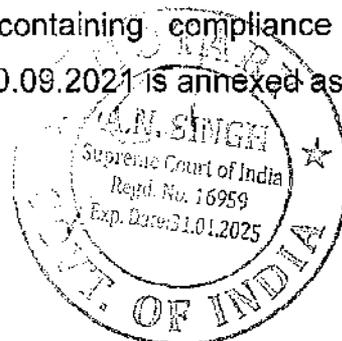
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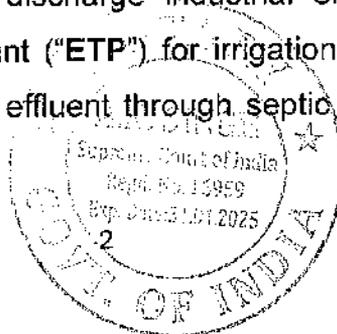
OBJECTIONS TO THE JOINT COMMITTEE REPORT DATED 11.01.2022  
(CONTAINING COMPLIANCE STATUS FOR QUARTER – 5 I.E., AS ON 31.10.2021)  
BY WAY OF THE PRESENT AFFIDAVIT ON BEHALF OF HINDALCO INDUSTRIES  
LIMITED, RENUKOOT PLANT (RESPONDENT NO. 21)

I, Sumita Singh, D/o Late Professor B. D. Singh aged about 50 years and presently working as the Deputy General Manager with the Respondent No. 21, at Aditya Birla Group, 8<sup>th</sup> Floor, Parvanath Capital Tower, Bhai Vir Singh Marg, Gol Market, New Delhi – 110 001 do hereby solemnly affirm and state as under:

1. That I am duly authorized to represent Respondent No. 21 in the present proceedings. I am aware of the facts and circumstances of the present case. As such, I am authorized and competent to swear the present Affidavit on behalf of Respondent No. 21.
2. That I have gone through the records of the present case and at the outset it is stated that the Joint Committee did not conduct any field visit of Respondent No. 21's plant during 16<sup>th</sup> to 21<sup>st</sup> October 2021, despite claiming to have done so. The premises of Respondent No. 21 were last inspected in August 2021 and the same is evident from Letter dated 10.09.2021 addressed by UPPCB, enclosing Joint Committee Report containing compliance status as on 31.07.2021. Copy of the Letter dated 10.09.2021 is annexed as ANNEXURE – R21/1.



3. Further, from a perusal of the recommendations contained in the Joint Committee Report dated 11.01.2022 ("**Joint Committee Report**") it is clear that the same are reproductions of the recommendations contained in its earlier report dated 31.08.2021 without recording any observations made during the purported inspection period 16.10.2021 to 21.10.2021. On this ground alone the recommendations contained in the Joint Committee Report be set aside.
4. In any event, the Objections to the recommendations contained in the Joint Committee Report in relation to Hindalco Industries Limited Renukoot Plant ("**Hindalco**" or "**Respondent No. 21**") are now set-out hereinbelow. That the Respondent No. 21, states as follows:
5. **Objection and Response to the recommendation of imposition of environmental compensation on Respondent No. 21 as contained in the Joint Committee Report:** The Joint Committee recommended imposition of Environmental Compensation (EC) of Rs. 1,36,80,000/- for not achieving the prescribed ZLD conditions and discharging untreated sewage into the environment. The objections to the said recommendations are as under:
- a. It is hereby specifically stated that Respondent No. 21 has not discharged untreated industrial effluent or sewage outside its premises including the natural drain adjoining its the Renukoot Plant. Further, the Joint Committee's observations are not supported by any material evidence collected from the site and hence it can't be accepted.
- b. Respondent No. 21 received Consent to Operate dated 15.05.2020 from Uttar Pradesh Pollution Control Board ("**UPPCB**") and the said consent is valid for a period of five years from (01.01.2020 to 31.12.2024) ("**CTO dated 15.05.2020**"). As per the CTO dated 15.05.2020, Respondent No. 21 is authorized to discharge industrial effluent generated through effluent treatment plant ("**ETP**") for irrigation / river through drain and disposal of domestic effluent through septic tank / soak pit subject to

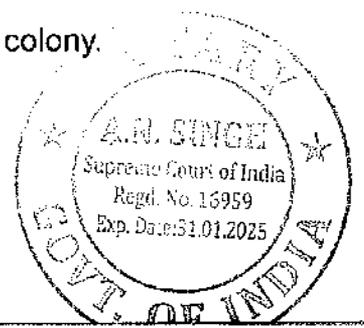


general and specific conditions mentioned therein. Copy of the CTO dated 15.05.2020 is annexed as ANNEXURE – R21/2.

- c. The CTO dated 15.05.2020 stipulates that the Respondent No. 21 should ensure ZLD at the Renukoot Plant, however, in the event the Respondent No. 21 discharges outside the premises, such discharge is required to be treated in terms of the parameters laid down in the CTO. As such, the Joint Committee failed to appreciate that the CTO in its general condition permits the discharge of treated effluent, if any, and the same cannot be considered to be a violation.
- d. As per the conditions of CTO dated 15.05.2020, Respondent No. 21 was required to achieve ZLD as per the following maximum daily discharge limit:

Effluent Discharge Details			
S. No.	Kind of Effluent	Maximum daily discharge, KL/day	Treatment facility and discharge point
1	Industrial	ZLD (8100 KLD treated effluent shall be 100% recycled in the process, cooling and horticulture etc.)	ETP
2	Domestic	12200 KLD treated effluent shall be reused in flushing, dust suppression and irrigation and other purposes.	STP

- e. In response to the query raised by UPPCB, Respondent No. 21 vide letter dated 05.05.2020 submitted the ZLD compliance status. In the said Letter dated 05.05.2020 the following was stated:
- i. for the purpose of being a ZLD compliant plant, the water consumption and associated wastewater generation in the factory for purposes such as processing, cooling, drinking, toilets etc. is considered and not the water used and associated waste-water generation due to use of water in the residential colony.



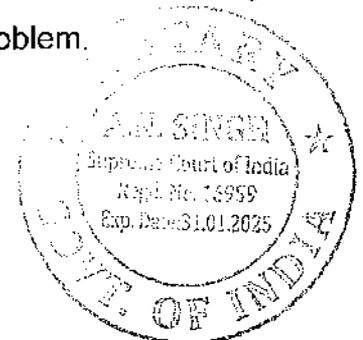
- ii. 90% of total ETP treated water, i.e., 7204 m<sup>3</sup>/d is being recycled and reused for various purposes such as in process, for gardening, toilet flushing. That approx. 896 m<sup>3</sup>/day of treated effluent is being discharged at ETP outlet.
- iii. For the remaining 896 m<sup>3</sup>/day of treated effluent, establishment of Process Water Recycling Plant (PWRP) is in process and the same would ensure 100% recycling of treated effluent.
- iv. 100% of treated sewage generated from use of water for domestic purposes is reused. Quantity recycled is 4250 m<sup>3</sup>/day.
- v. Detailed action plan [Short Term and Long Term] for meeting ZLD for the residual quantity and shifting of movement of sewage from natural drain to closed and dedicated sewerage network system along with target dates was also provided. The plans were submitted on the assumption that there will not be any restriction on movement of transportation and personnel due to Covid-19 pandemic.

Thus, the Respondent No. 21, was already 90% compliant of the ZLD condition as stipulated in the CTO dated 15.05.2020 and for the rest 10%, informed UPPCB that it was in process of establishing PWRP which was on the assumption that there are no restrictions due to Covid-19 pandemic. The Respondent No. 21 had also submitted a detailed long term as well as short action plan. Copy of the Letter dated 05.05.2020 is annexed as ANNEXURE – R21/3.

- f. Further vide Respondent No. 21's Letter dated 17.12.2020, UPPCB was informed that:

ZLD in plant:

- i. PWRP is commissioned and is in operation. But despite best efforts consistent results are not being achieved, probably on account of teething problems and unforeseen fluctuation in manufacturing process. It was informed that the R&D team of M/s. Ion Exchange is working extensively to overcome teething problem.



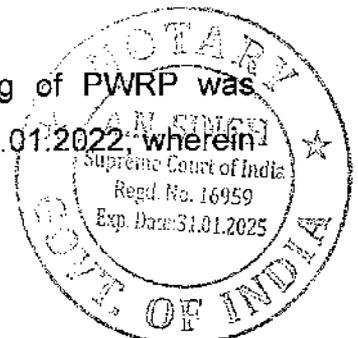
- ii. Progress to achieve ZLD is being halted due to Covid-19 pandemic. Some of the balancing equipment has arrived and is being erected and commissioned.

**ZLD in colony:**

- i. Total quantity of sewage generated in the residential colony is treated in the already installed STP of 24000 KLD. The quality of treated sewage is within the limits prescribed by UPPCB. Partial recycling of treated sewage for toilet flushing and gardening is achieved. Remaining treated quantity of sewage is discharged.
- ii. Conversion is being undertaken of all open nallah domestic drain into a close drainage system through installation of hume piping network was commenced to isolate STP from any shock load during rainy season and ensure consistent quality of treated sewage on all round basis.
- iii. Drain survey, contour mapping and topography study of the colony along with detailed study on identification and separation of the stream that falls in the natural drain has been done for making closed loop of all sewage generated from household.
- iv. Considering the large size of the colony with high population density, an expert organization like CSIR-NEERI is required to study and identify sustainable solutions and this will help in achieving 100% recycling of treated sewage as on a sustainable basis.
- v. In view of the above, UPPCB was requested to extend the due date of achieving ZLD in residential colony of Respondent No. 21.
- vi. Since the statute is silent on mandating any requirement of ZLD for colony but as a commitment to achieve global best practices in sustainability and environment conservation, compliance of all existing laws and notifications have been achieved.

Copy of the Letter dated 17.12.2020 is annexed as **ANNEXURE – R21/4**.

- g. The updated status with respect to commissioning of PWRP was captured in the Oversight Committee Report dated 14.01.2022, wherein

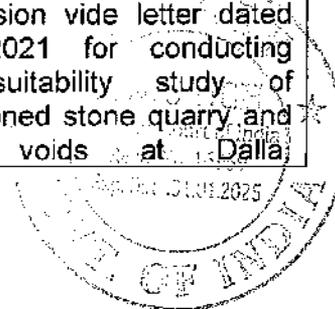


it is stated that Respondent No. 21 has commissioned Process Water Recycling Plant (PWRP) on 23.11.2021 in order to achieve ZLD. Treated waste-water from STP is being used in horticulture, other miscellaneous works and the rest is discharged into Murdhawa Nala (i.e., natural drain). Copy of the Letter dated 23.11.2021 is annexed as **ANNEXURE – R21/5**. Copy of the Oversight Committee Report dated 14.01.2022 is annexed as **ANNEXURE – R21/6**.

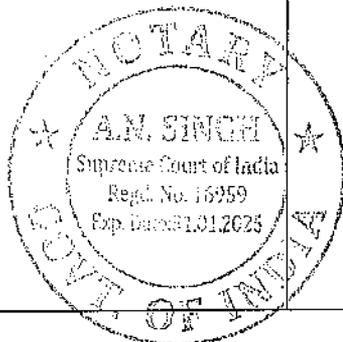
- h. In light of the aforesaid, it is submitted that the Joint Committee failed to take note of the situation on account of Covid-19 pandemic that was beyond the control of Respondent No. 21. The Joint Committee also failed to take note that a detailed action plan with target dates was already submitted by Respondent No. 21 vide its letter dated 05.05.2020 and that the achievement of the same was on the assumption that there will not be any restrictions imposed on account of Covid-19 pandemic. Disregarding the same and the progress made by Respondent No. 21 in achieving ZLD status despite restrictions on account of Covid-19 pandemic, imposition of EC was recommended.
- i. The ZLD status of Respondent No. 21 stands achieved and is also acknowledged/mentioned/captured in the Minutes of the meeting of Fly Ash Management and Utilization Mission held on 24.11.2022. In light of the aforesaid compliances the recommendation by the Joint Committee are unsustainable and not tenable. Copy of the Minutes of the meeting of Fly Ash Management and Utilization Mission held on 24.11.2022 is annexed as **ANNEXURE – R21/7**.
6. **Additionally, the compliance status and response to the action points identified in the orders passed by this Hon'ble Tribunal and additional issues identified by earlier oversight committee are mentioned in the table below:**

**TABLE – A**

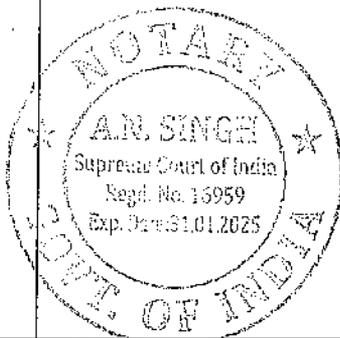
S NO.	ISSUES IDENTIFIED IN THE HON'BLE NGT ORDER	COMPLIANCE STATUS (AS ON 31.10.2021)	RESPONSE
a)	<p>Industry shall achieve emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of all baking furnaces. The emission from boilers shall be reduced to the level of 50 mg/Nm<sup>3</sup> from the exiting Norms of 150 mg/Nm<sup>3</sup> by December 31, 2019 retrofitting of existing ESPs and also meet emission limit of SO<sub>2</sub> &amp; Nox notified for industrial boilers.</p>	<ul style="list-style-type: none"> <li>The unit has filed application at Hon'ble Supreme Court (CIVIL APPEAL Diary No(s). 44191/2019) for waiving off the stringent emission standards imposed on them.</li> <li>The committee asked the unit to furnish the details of SMS generated through OCEMS during the last two quarters along with clarifications.</li> </ul>	<p>a. Civil Appeal D. No. 44191/2020 (Civil Appeal No. 15-16 of 2020) on behalf of the Respondent No. 21 was allowed vide Order dated 04.07.2023 and CPCB was directed to re-examine the feasibility of altering the standards of applicable emission norms having regard to all relevant factors. Copy of the Order dated 04.07.2023 is annexed as <b><u>ANNEXURE – R21/8.</u></b></p> <p>b. The Respondent No. 21's plant has installed OCEMS and ESP in 04 boilers which are connected with the CPCB server. During the period from July to September 2021, 27 alerts were generated.</p> <p>c. Unit has achieved an emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of all baking furnaces. Copy of the Progress Report mentioning about achieving the above emission norm is annexed as <b><u>ANNEXURE – R21/9.</u></b></p>
b)	<p>Industry shall ensure that no red mud is leached out to ground water during monsoon and post monsoon period. Piezometers / monitoring wells should be installed in and around the red mud disposal sites in consultation with the CGWB / concerned SGWB. Regular monitoring of the leach gate should be carried out as per the sampling and analysis plan as proposed by the concerned SPCB.</p>	<ul style="list-style-type: none"> <li>Around 95 % red mud utilization has been reported by the unit. It has been informed that during April 2021 to October 2021, approx. 579233 MT Red mud has been supplied to various cement manufacturers by rail/road.</li> <li>The unit is in process to develop greenery on the closed red mud site.</li> <li>It has been informed that the</li> </ul>	<p>a. 95% of Red Mud has been utilized and the remaining red mud is disposed in dumpsites / landfills.</p> <p>b. For disposal Dalla, Sonebhadra abandoned stone quarry was identified and it was observed that Dalla abandoned stone quarry is partially filled with water and is available for disposal.</p> <p>c. DFO, Obra has granted permission vide letter dated 10.05.2021 for conducting site suitability study of abandoned stone quarry and mine voids at Dalla.</p>



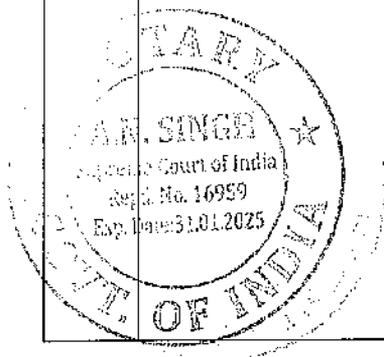
	<p>Besides, industry shall facilitate utilization of Red mud in nearby cement industries, including those located in MP. The industry shall also explore the possibility of extraction of titanium and other heavy metals from the red mud.</p>	<p>district administration has allotted two voids of total 61 Acre area in Dalla region for filling of red mud mixed with ash in abandoned stone quarries. The unit has awarded feasibility study to the MNIT, Prayagraj for the same.</p> <ul style="list-style-type: none"> <li>• Total four Piezometers have been installed for groundwater monitoring around the Red mud area. The locations were finalized with approval from CGWB. The Committee asked the unit to submit the Groundwater quality monitoring report for further analysis.</li> <li>• It has been informed that the study was conducted in collaboration with M/S Neptune for precious metal recovery including TiO<sub>2</sub> from red mud. However, due to process complexities TiO<sub>2</sub> recovery was not successful as it is present in the form of minerals like rutile or anatase or coexist with other minerals.</li> </ul>	<p>Sonebhadra and to fill and rehabilitate the same by filling of red mud / fly ash. Copy of the approval dated 10.05.2021 is annexed as <b><u>ANNEXURE – R21/10.</u></b></p> <p>d. 04 piezo wells have been installed.</p> <p>e. MoEF&amp;CC vide Office Memorandum dated 15.03.2023 conveyed its approval for undertaking the pilot study for backfilling of mine voids involving area of 0.55 Ha. Copy of the approval dated 15.03.2023 granted by MoEF to undertake pilot study for backfilling of abandoned mine is annexed as <b><u>ANNEXURE – R21/11.</u></b></p> <p>f. Signing of MoU between DFO, UP, Aluminium Association of India and IIFM is under process for backfilling of Dalla abandoned stone quarry with fly ash and red mud. Northern Coalfields Limited is also requested to allot one pit of Gorbi mine for filling it with red mud and fly ash. Copy of the Minutes of the meeting of Fly Ash Management and Utilization Mission held on 01.05.2023 is annexed as <b><u>ANNEXURE – R21/12.</u></b></p> <p>g. On 07.06.2023 members of the working committee and other experts visited the proposed site for backfilling of abandoned mine voids/ stone quarries at Dalla with red mud and bottom ash/ fly ash for afforestation at Dalla. During the meeting the modalities for dewatering and conducting geophysical and geotectonic studies were discussed and decided. Copy of the minutes of meeting dated 07.06.2023 of the working committee and</p>
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			<p>other experts on backfilling of abandoned mine is annexed as <b><u>ANNEUXRE – R21/13</u></b>.</p> <p>h. Thereafter DFO, Obra-Sonebhadra vide letter dated 17.06.2023 granted approval for dewatering the proposed mine voids at Dalla. The approval was communicated vide IIFM, Bhopal's Letter dated 17.06.2023. Copy of the approval dated 17.06.2023 granted by DFO, Obra-Sonebhadra to IIFM for dewatering is annexed as <b><u>ANNEXURE – R21/14</u></b>. Copy of the Letter dated 17.06.2023 addressed by IIFM is annexed as <b><u>ANNEXURE – R21/15</u></b>.</p> <p>i. De-watering at Dalla and grouting work is completed except, surface leakages are yet to be arrested due to lack of hard surface for grouting.</p> <p>j. Formulation of SOP by Aluminium Association of India and IIFM, Bhopal is also under process for conducting pilot study on mixing of red mud with fly ash for backfilling of Dala abandoned stone quarry. Copy of the Minutes of the meeting of Fly Ash Management and Utilization Mission held on 04.07.2023 is annexed as <b><u>ANNEXURE – R21/16</u></b>.</p> <p>k. A team of experts under the chairmanship of Director IIFM has been formed by involving IIT BHU, MNIT Allahabad, CGWB, IIFM, CPCB and DFO.</p> <p>l. Greenery has been done on the closed red mud site as per CPCB norms.</p> <p>m. A consolidated CTO dated 07.12.2023 along with terms and conditions mentioned</p>
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			<p>therein was also granted by the UPPCB to the Pilot Study (for the period 07.12.2023 to 31.12.2027) for filling of abandoned mine with red mud and fly ash. Copy of the CTO dated 17.12.2023 issued by UPPCB for Pilot Study is annexed as <b><u>ANNEXURE – R21/17</u></b>. Copy of the report mentioning the compliance status of consolidated CTO dated 07.12.2023 is annexed as <b><u>ANNEXURE – R21/18</u></b>.</p>
c)	To achieve ZLD in ETP and STP.	<ul style="list-style-type: none"> <li>• The Unit is recycling the treated industrial effluent.</li> <li>• The unit has installed STP for the treatment of 24 MLD sewage generated from the residential colony. However only 12 MLD sewage is being treated and partial quantity is being recycled.</li> <li>• The unit is directly letting out some of the sewage without any treatment in the natural drain.</li> <li>• As prescribed in the consent condition issued by UPPCB, the unit was instructed to achieve ZLD for industrial effluent and reuse of domestic effluent. In no case, the unit is allowed to discharge effluent outside the premises.</li> <li>• Similarly, the ZLD condition has also been imposed through the environmental clearance issued by MoEF&amp;CC on 02.12.2011.</li> </ul>	<p>a. Respondent No. 21 has commissioned Process Water Recycling Plant (PWRP) on 23.11.2021 in order to achieve ZLD. Treated wastewater from STP is being used in horticulture, other miscellaneous works and the rest is discharged into Murdhawa Nala (i.e., natural drain).</p> <p>b. ZLD status is achieved.</p> <p>c. On an ongoing basis non-biodegradable waste that is collected is segregated for further disposal through re-processors / recyclers. Biodegradable waste is converted into vermicompost for inhouse utilization in horticulture activities.</p>

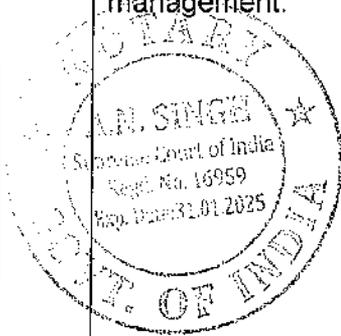


	<ul style="list-style-type: none"> <li>• Thus, the unit is violating the condition of ZLD imposed through environmental clearance since 2011.</li> <li>• The unit representative had informed during the previous visit, that it is technically feasible to achieve zero freshwater intake for the industrial process. However, the unit has not submitted any timebound action as desired by the committee.</li> </ul>	
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7. **Compliance status and Response to the other identified issues in the Joint Committee Report:**

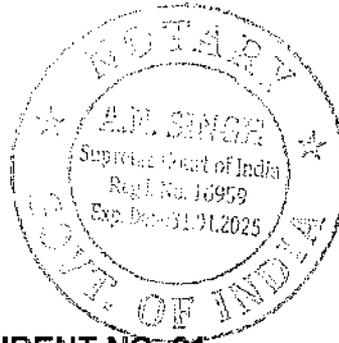
**TABLE – B**

S NO.	ISSUES IDENTIFIED IN THE HON'BLE NGT ORDER	COMPLIANCE STATUS (AS ON 31.10.2021)	RESPONSE
a)	Control of air pollution during coal storage, handling and transportation.	The transportation of coal is mainly done through the road. During the visit, very high fugitive emission has been observed in the in CHP area and the measures taken by the unit are not adequate to control the fugitive emission in effective manner.	<p>a. Approx 80% coal is being transported through rail and 20% is being transported through tarpaulin covered trucks.</p> <p>b. For dust suppression, permanent water sprinkler system is installed at the main ash storage area.</p>
b)	Fly ash and bottom ash management.	<ul style="list-style-type: none"> <li>• A very big heap of bottom ash has been found inside the plant premises. The said bottom ash has been stored on the land in a haphazard manner since several years.</li> </ul> <p>The details regarding the year-wise generation of bottom</p>	<p>a. All the ash is being disposed in environment friendly manner and only temporary ash storage area is in the plant. The said area is of earthen construction using well-compacted soil which is structurally sound and stable. Since, the ash is in dry form there is no seepage of water out of the storage area.</p>

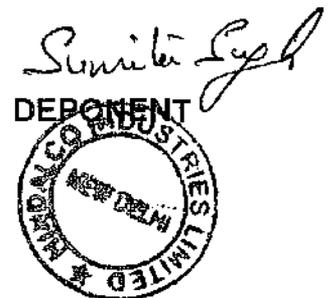


		<p>ash and its storage on the open land are not provided by the unit.</p> <ul style="list-style-type: none"> <li>It has been informed that some of the legacy bottom ash has been sent for utilization in the road construction.</li> </ul>	<p>b. Entire fly ash is handled by dry ash system. Ash is being loaded into bulkers from ash silos and bottom ash is also being sent to various users routed through intermediate settling ponds in dry form.</p>
c)	Treatment and Disposal of MSW generated from residential area.	<ul style="list-style-type: none"> <li>As per information, approx. 25 – 30 Ton of waste is generated per day from the residential colony.</li> <li>The generated MSW has been dumped without any treatment in low lying area near the closed red mud site.</li> <li>Though the unit had installed a waste segregation unit but it is non-functional from its day of installation.</li> </ul>	<p>On an ongoing basis non-biodegradable waste that is collected is segregated for further disposal through re-processors / recyclers. Biodegradable waste is converted into vermicompost for inhouse utilization in horticulture activities. Procurement of equipment for segregation of collected waste category wise is in progress. Installation of new machines and requisite civil and electrical job is in progress</p>

8. That in light of the aforesaid objections and the compliances by Respondent No. 21 the recommendations of the Joint Committee Report be set aside and Respondent No. 21 be discharged from the present proceedings.
9. That the Respondent No. 21 is filing the present Objections by way of an Affidavit to the recommendations contained in the Joint Committee Report dated 11.01.2022 and reserves its right to file further / additional affidavit if so advised or as directed.



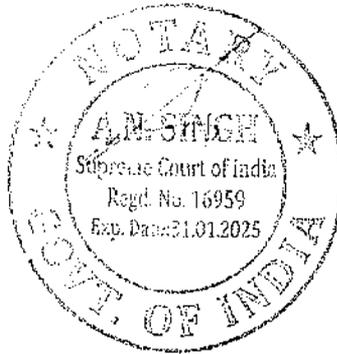
COUNSEL FOR RESPONDENT NO. 21



**VERIFICATION**

Verified on this 08 day of July 2024 at New Delhi that the contents of the aforesaid affidavit are true and correct to my knowledge and belief and based on records maintained by the answering Respondent No. 21. No part of the affidavit is false and nothing material has been concealed therefrom.

I identify the deponent who has Signed/put T.I. in my presence



**ATTESTED**

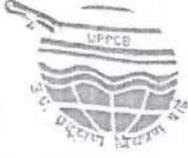
A.N. Singh, Adv.  
Notary Public  
Govt. of India, New Delhi

~~08 JUL 2024~~

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5585



ANSWER R/श/र  
क्षेत्रीय कार्यालय

REGIONAL OFFICE  
उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड  
U.P. POLLUTION CONTROL BOARD  
सोनभद्र  
SONBHADRA

संदर्भ संख्या  
Ref No. 67000650/OA No - 164/2024

दिनांक  
Date 10/09/2024

To,  
M/s Hindalco Industries Ltd,  
Renukoot, Sonbhadra.

Subject:- Regarding Quarterly Status report from Feb-2021 to April-2021 & May-2021 to July-2021 of Committee constituted by Hon'ble NGT in matter of O.A. No.164 of 2018 in case of Ashwini Kumar Dubey vs Union of India and other's.

Sir,  
As Per Hon'ble NGT order the Quarterly Status report from Feb-2021 to April-2021 & May-2021 to July- 2021 is being forwarded for information and further necessary action.

Encl:- As above

(Dr. T.N. Singh)  
Regional officer

Copy To:-

1. Ceo2, Uttar Pradesh Pollution Control Board, Lucknow for kind information and further necessary action.
2. Shri Rajendra D. Patil, Scientist D, CPCB Regional Directorate, Lucknow for kind information.

Regional officer

कार्यालय : मकान संख्या 162, उत्तर मोहाल (निकट चण्डी होटल)  
राबर्ट्सगंज, सोनभद्र-231216  
ई-मेल : rosonbhadra@uppcb.com

Office : House no. 162, Uttar Mohal (Near Chandi Hotel)  
Robertsganj, Sonbhadra-231216  
E-mail : rosonbhadra@uppcb.com

## Quarterly Status Report

February 2021 – April 2021 and May 2021 – July 2021

Report of Committee constituted by Hon'ble NGT in The Matter of No. 164 Of  
2018 in Case of Ashwani Kumar Dubey Vs. Union of India and Others

### INTRODUCTION

Hon'ble NGT in the matter vide its order dated 14.07.2020, directed the following regarding the Oversight Committee,

*".....Since the term of the Committee has expired, further oversight work may be undertaken by a joint Committee (OC) of the CPCB with respective State PCB and the District Magistrates. The State PCBs will be the nodal agency for the respective States.*

*The newly constituted OC may furnish its reports quarterly by email at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF. First such report may be furnished giving status as on 31.10.2020 by 15.11.2020 with copies to concerned stake holders for their response if any by 30.11.2020."*

Accordingly, the following members have been nominated by the concerned departments for the said committee,

- Shri Rajendra D. Patil, Scientist D, CPCB Regional Directorate, Lucknow
- Shri Radhey Shyam, Regional Officer, UPPCB, Sonbhadra
- Shri Ramesh Kumar, SDM-Duddhi, Sonbhadra

Earlier, the said nominated committee had submitted two reports to the Hon'ble NGT for the quarter ended 30.10.2020 and 31.01.2021. Whereas the field visits for the period of February 2021 - April 2021 could not be done due to adverse conditions due to the COVID pandemic. However, virtual meetings with the concerned stakeholders have been conducted during June 07-14, 2021.

The nominated committee members have conducted the field visits during 02-09 August 2021 to review the compliance status for the quarter May 2021-July 2021.

The compliance status of the concerned stakeholders verified during the above meetings and visits is given below.

*lll*

SDM

*RSP*

UPPCB

*Rat*

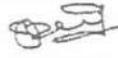
CPCB

## 3. Aluminum Smelter: M/s HINDALCO Industries Ltd, Renukoot, Sonbhadra

## 3.1. Compliance status of action points identified in Hon'ble NGT orders and additional issues identified by earlier oversight committee.

S. No.	Issues identified in Hon'ble NGT order	Compliance Status (As on 31.07.2021)
a)	Industry shall achieve emission limit of 50 mg/Nm <sup>3</sup> for particulate matter in respect of all Baking furnaces. The emission from boilers shall be reduced to the level of 50 mg/Nm <sup>3</sup> from the exiting Norms of 150 mg/Nm <sup>3</sup> by December 31, 2019 retrofitting of existing ESPs and also meet emission limit of SO <sub>2</sub> & NO <sub>x</sub> notified for industrial boilers.	<ul style="list-style-type: none"> <li>It has been informed that the unit has filed application at Hon'ble Supreme Court (CIVIL APPEAL Diary No(s). 44191/2019) for waiving of the stringent emission standards imposed on them.</li> <li>The committee asked the unit to furnish the details of SMS generated through OCEMS during the last two quarters along with clarifications.</li> </ul>
b)	Industry shall ensure that no red mud is leached out to ground water during monsoon and post monsoon period. Piezometers/monitoring wells should be installed in and around the red mud disposal sites in consultation with the CGWB/concerned SGWB. Regular monitoring of the leachate should be carried out as per the sampling and analysis plan as proposed by the concerned SPCB. Besides, industry shall facilitate utilization of Red mud in nearby cement industries, including those located in MP. The industry shall also explore the possibility of extraction of titanium and other heavy metals from the red mud.	<ul style="list-style-type: none"> <li>It has been informed that 98% of generated red mud is utilized during FY 2020 - 21.</li> <li>The unit has issued purchase order to TERI institute for habitation of closed red mud dump.</li> <li>It has been reported that the district administration has allotted 61 (55 + 6) Acre area in Dala region for filling of red mud mixed with ash in abandoned stone queries. The unit has awarded study to the MNIT, Prayagraj for the same.</li> <li>Total 04 Piezometers have been installed for groundwater monitoring around the Red mud area. The locations were finalized with approval from CGWB. The Committee asked the unit to submit the Groundwater quality monitoring report for further analysis.</li> </ul>
c)	To achieve ZLD	<ul style="list-style-type: none"> <li>At present, the treated industrial effluent is being partially utilized and the remaining is discharged outside the plant premises.</li> </ul>

  
SDM

  
UPPCB

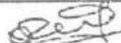
  
CPCB

S. No.	Issues identified in Hon'ble NGT order	Compliance Status (As on 31.07.2021)
		<ul style="list-style-type: none"> <li>• Though the unit has installed STP and treating and reusing the sewage generated from the residential colony, during the visit committee found that the unit was directly letting out some of the sewage generated from their residential colony without any treatment in the surrounding environment.</li> <li>• As prescribed in the consent condition issued by UPPCB, the unit was instructed to achieve ZLD for industrial effluent and reuse of domestic effluent. In no case, the unit is allowed to discharge effluent outside the premises.</li> <li>• Similarly, the ZLD condition has also been imposed through the environmental clearance issued by MoEF&amp;CC on 02.12.2011.</li> <li>• Thus, the unit is violating the condition of ZLD imposed through environmental clearance since 2011.</li> <li>• During the discussion, the unit representative informed that it is technically feasible to achieve zero freshwater intake for the industrial process. The committee asked to submit the timebound action plan for the same.</li> </ul>

## 3.2. Status of other identified issues

S. No.	Issues identified	Compliance Status (As on 31.07.2021)
a)	Control of air pollution during coal storage, handling and transportation.	<ul style="list-style-type: none"> <li>• It is informed that transportation of coal is mainly done through road and necessary precautions are been taken to control emissions during coal transportation, storage, and handling.</li> <li>• The committee asked to submit the CCTV footage of the random dates to</li> </ul>

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SDM

  
UPPCB

  
CPCB

S. No.	Issues identified	Compliance Status (As on 31.07.2021)
		verify the status of the emission in the coal storage areas.
b)	Fly ash and bottom ash management	<ul style="list-style-type: none"> <li>A very big heap of bottom ash is found inside the plant premises. The said bottom ash is stored on land in a haphazard manner for several years. The details regarding the year-wise generation of bottom ash and its storage on the open land are still awaited.</li> <li>It has been informed that they have sent 1576 MT stores ash for utilization. However, still huge quantity is left at site.</li> </ul>

### 3.3. Calculation for environmental compensation

The unit is violating the condition of ZLD since last 10 years i.e. from 2011. However, as the present committee is reviewing the matter for the period starting from 01.08.2020 and hence this date is considered as reference for calculation of period of non-compliance. However, additional environmental compensation can be imposed on the unit for non-compliance of ZLD condition since last 10 years.

The environmental compensation calculated based on 'Polluters Pay Principle' is as demonstrated below

- $$EC = PI \times N \times R \times S \times LF$$

$$= 80 \times 364 \times 250 \times 1.5 \times 1$$

$$= 1,09,20,000/-$$
- Where,
  - PI = Pollution Index of Industrial sector  
(Taken as '80' considering 'Red Category')
  - N = number of days of violation took place  
(From 01.08.2020 to 31.07.2021 i.e., 364 days)
  - R = A factor in Rupees (taken as '250')
  - S = Factor for scale of operation  
(('1.5' considering scale of operation being 'Large')
  - LF = location factor  
(('1.0' considering population of area being < 1 million)

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SDM

  
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CPCB

#### 3.4. Recommendations of the Committee

- The unit should immediately take corrective measures to achieve the ZLD. In no case, they should discharge treated or untreated effluent in the surrounding environment.
- The unit should immediately ensure environment friendly disposal for the huge quantity of bottom ash stored in open inside the plant premises.
- UPPCB can initiate stringent action against the unit for storing a huge quantity of bottom ash in open and also impose the appropriate applicable environmental compensation for the same.

Further, the committee recommends for imposing environmental compensation (EC) of Rs. 1,09,20,000/- for not achieving the prescribed ZLD condition and discharging untreated sewage into the environment. Though the unit is not complying the said condition for last 10 years the calculated environmental compensation is only for the limited period of violation ( i.e. from 01.08.2020 to 31.07.2021)



  
SDM

UPPCB

CPCB

# 5591

Annexure R21/2



U.P. Pollution Control Board

## CONSENT ORDER

20

Ref No. -  
62829/UPPCB/Sonebhadra(UPPCBRO)/CTO/water/SONBHADRA/2019

Dated : 15/05/2020

To ,

Shri KAILESH NATH BHANDARI  
M/s HINDALCO INDUSTRIES LIMITED RENUKOOT  
Hindalco Industries Limited,Renukoot,SONBHADRA,231217  
SONBHADRA

Sub : Consent under Section 25/26 of The Water (Prevention and control of Pollution) Act, 1974 (as amended) for discharge of effluent to M/s. HINDALCO INDUSTRIES LIMITED RENUKOOT

Reference Application No :5678420

Dated :15/05/2020

1. For disposal of effluent into water body or drain or land under The Water (Prevention and control of Pollution) Act,1974 as amended (here in after referred as the act ) M/s. HINDALCO INDUSTRIES LIMITED RENUKOOT is hereby authorized by the board for discharge of their industrial effluent generated through ETP for irrigation/river through drain and disposal of domestic effluent through septic tank/soak pit subject to general and special conditions mentioned in the annexure ,in reference to their foresaid application .
2. This consent is valid for the period from 01/01/2020 to 31/12/2024 .
3. In spite of the conditions and provisions mentioned in this consent order UP Pollution Control Board reserves its right and powers to reconsider/amend any or all conditions under section 27(2) of the Water (Prevention and Control of Pollution) Act, 1974 as amended .

This consent is being issued with the permission of competent authority .

**For and on behalf of U.P. Pollution Control Board**

Pramod Kumar Agarwal Digitally signed by Pramod Kumar Agarwal  
Date: 2020.05.15 11:51:43 +05'30'

**Chief Environmental Officer (circle-2)**

**Enclosed : As above  
(condition of consent):**

Copy to: Regional Officer, U.P. Pollution Control Board, Sonbhadra with the direction to send the compliance report of consent conditions on quarterly basis.

Pramod Kumar Agarwal Digitally signed by Pramod Kumar  
Agarwal  
Date: 2020.05.15 11:51:57 +05'30'

**Chief Environmental Officer (circle-2)**

## Annexure to Consent issued to M/s.HINDALCO INDUSTRIES LIMITED RENUKOOT vide

Consent Order No. 5678420/ Water

Dated : 15/05/2020

**CONDITIONS OF CONSENT**

- This consent is valid only for the approved production capacity of Aluminium Metal- 4,20,000 MT/Annum (max. 35,672 MT/Month) (Extruded Product-3750 MT/Month, Flat Rolled Product-10000 MT/Month, Wire Rod-8500 MT/Month), using Bauxite as main raw material and Alumina (7,20,000 MTPA) as intermediate product and CPC Consumption -1,40,047 MTPA, imported Calcined Pet Coke (CPC) – 50,000 MTPA (Approx 137 MT/day) as raw material for anode making and Co-Gen Power-84 MW..
- The quantity of maximum daily effluent discharge should not be more than the following :

<b>Effluent Discharge Details</b>			
<b>S.No</b>	<b>Kind of Effluent</b>	<b>Maximum daily discharge, KL/day</b>	<b>Treatment facility and discharge point</b>
1	Industrial	ZLD (8100 KLD treated effluent shall be 100% recycled in the process, cooling and horticulture etc)	ETP
2	Domestic	12200 KLD treated effluent shall be reused in flushing, dust suppression and irrigation and other purposes.	STP

- Arrangement should be made for collection of water used in process and domestic effluent separately in closed water supply system. The treated domestic and industrial effluent if discharged outside the premises, if meets at the end of final discharge point, arrangement should be made for measurement of effluent and for collecting its sample. Except the effluent informed in the application for consent no other effluent should enter in the said arrangements for collection of effluent. It should also be ensured that domestic effluent should not be discharged in storm water drain .
- 4(a) The domestic effluent should be treated in treatment plant so that the should be in conformity with the following norms dated treated effluent .

<b>Domestic Effluent</b>		
<b>S.No</b>	<b>Parameter</b>	<b>Standard</b>
1	BOD	30 mg/l
2	COD	250 mg/l
3	Total Suspended Solids	100 mg/l
4	Oil & Grease	10 mg/l

- 4(b). The industrial effluent should be treated in treatment plant so that the treated effluent should be in conformity with the following norms. .

Industrial Effluent		
S.No	Parameter	Standard
1	BOD	30 mg/l
2	COD	250 mg/l
3	Total Suspended Solids	100 mg/l
4	Oil & Grease	10 mg/l
5	Quantity of Discharge	Fluoride as F-2.0 mg/l
6	Quantity of Discharge	Sulphide as S-2.0 mg/l
7	Quantity of Discharge	pH- 6.5 to 9.0

5. Effluent generated in all the processes, bleed water, cooling effluent and the effluent generated from washing of floor and equipments etc should be treated before its disposal with treated industrial effluent so that it should be according to the norms prescribed under The Environment (Protection) Act,1986 or otherwise mandatory .
6. The other pollutant for which norms have not been prescribed, the same should not be more than the norms prescribed for the water used in manufacturing process of the industry .
7. The method for collecting industrial and domestic effluent and its analysis should be as per legal Indian standards and its subsequent amendments/standards prescribed under The Environment (Protection) Act, 1986.
8. The treated domestic and industrial effluent be mixed (as per the provisions of Condition No. 2) and disposed of on one disposal point. This common effluent disposal point should have arrangement for flow meter/V Notch for measuring effluent and its log book be maintained .

**Specific Conditions:**

1. The Show cause notice issued under section 33-A of Water (Prevention and Control of Pollution) Act 1974 by the Board vide letter no. H26513/C-2/Jal/41/Ka.ba.no./17 dated 27-19-2018 is hereby revoked with the approval of competent authority.
2. This consent is valid for production of Aluminium Metal- 4,20,000 MT/Annum (max. 35,672 MT/Month) (Extruded Product-3750 MT/Month, Flat Rolled Product-10000 MT/Month, Wire Rod-8500 MT/Month), using Bauxite as main raw material and Alumina (7,20,000 MTPA) as intermediate product and CPC Consumption -1,40,047 MTPA, imported Calcined Pet Coke (CPC) – 50,000 MTPA (Approx 137 MT/day) as raw material for anode making and Co-Gen Power-84 MW.
3. Industry shall comply with the provisions of MoEF&CC Office Memorandum No. Q-18011/54/2018-CPA, September 10, 2018.
4. Industry shall treat industrial effluent to achieve the standards prescribed under Environment (Protection) Rules, 1986. Industrial effluent after treatment shall be 100% recycled in the process, cooling and horticulture etc.
5. Domestic effluent shall be treated through STP and treated domestic effluent shall be reused in flushing, dust suppression and irrigation of green belt and other purposes. Industry shall install STP for treatment of domestic effluent generated from the residential colony and guest house located nearby Plant-2 and shall achieve ZLD for domestic effluent upto 31.12.2020 in a time bound manner and its quarterly progress report shall be submitted to the Board.
6. Industry shall immediately remove bypass system at the outlet of STP.
7. Industry shall install PTZ camera at ETP, STP and PWRP within 15 days and their URLs shall be submitted to the Board.
8. Industry shall submit the ETP and STP treated effluent analysis report of NABL accredited laboratory on quarterly basis to the Board.
9. In compliance of Core committee, Red mud shall be stored in such manner such that no red mud leached out to ground water during monsoon and post monsoon period. Industry shall facilitate utilization of red mud and safe disposal.
10. Industry shall operate and maintain installed OCEMS facility effectively and transmit data to CPCB and UPPCB server. Industry shall also calibrate installed OCEMS from recognized agency on six monthly basis.
11. Solid waste shall be disposed in such manner so that no air, water and soil pollution takes place.
12. Industry shall comply with the provisions of Hazardous and Other waste (Management & Trans boundary Movement) Rules 2016 and shall submit details of Hazardous waste disposal in Form-10.
13. Industry shall develop and maintain green belt as per the guidelines issued by the Board vide office order dated 16/02/2018, which is available on Board's Website- www.uppcb.com."
14. Industry shall submit environmental statement in prescribed format as per rule 14 of Environment (Protection) Act, 1986.
15. Industry shall abide by directions given by Hon'ble Court, MoEF&CC, Central Pollution Control Board and UPPCB for protection and safe guard of environment from time to time.
16. Industry shall comply with the directions issued under Singrauli Action Plan in time bound manner.
17. Industry shall comply with the recommendations of Core Committee constituted by Hon'ble NGT and submit the compliance report to the Board on quarterly basis.
18. Consent fees if revised, shall be payable by industry from the date of its applicability.
19. Industry shall ensure the compliance of directions given by Hon'ble Oversight committee from time to time.
20. Industry shall comply with the relevant provisions of Environmental Laws.
21. If closure order is issued by CPCB or UPPCB against the unit, then CTO issued earlier will remain suspended during the closure period and after ensuring the compliance and after revocation of closure order, the CTO will automatically be effective with additional conditions mentioned in the closure revocation order.
22. Industry shall submit the Bank Guarantee of Rupees Ten Lakh only, having validity of 05 years for compliance of aforesaid specific condition with in fifteen days, otherwise this CTO will be automatically revoked. In case of non compliance the Bank Guarantee will be forfeited and action will be taken as per law.

Issued with the permission of competent authority .

For and on behalf of U.P. Pollution Control Board .

Pramod Kumar Agarwal  
Digitally signed by Pramod Kumar  
Agarwal  
Date: 2020.05.15 11:52:33 +05'30'  
Chief Environmental Officer (circle-2)



Amend R21/3  
24

May 5, 2020

To,  
The Member Secretary  
U.P. Pollution Control Board,  
T.C. 12 V, Vibhuti Khand,  
Gomtinagar, Lucknow.

**Subject: - Reply on Query raised by UPPCB on April 28,2020.**

Sir,

Please find attached current status of ZLD incompliance of Core Committee Recommendation for your kind perusal.

### Current Water and Wastewater Management at Hindalco

At HINDALCO, water for industrial and domestic purpose is taken from the downstream of the Rihand Dam from Renu River. River pumping station is at a distance of 3 km from Hindalco works. After primary treatment water is pumped to Water Treatment Plant. The water treatment plant is located near the factory at an elevation of 1159 feet. Water is treated to make it suitable for use in domestic and industrial purposes. From here the water is supplied to various colonies and plant by gravity.

We have ETP in which all effluent from entire plant viz. alumina, reduction, fabrication and various other utilities are treated which is being recycled in the plant for process use. For treatment of sewage generated from our premises, a STP has been in operational, treated STP water is being recycled for cooling purpose, horticulture use, spraying and process.

### Defining ZLD

For the purpose of being a Zero Liquid Discharge (ZLD) factory, in all our past submissions, we have considered the water consumption and associated wastewater generation in the factory for various purposes such as process, cooling, drinking, toilets, etc. We have not considered the water used and associated sewage generation due to use of water in our colony.

The total treated water to be reused for achieving ZLD is 12350 m<sup>3</sup>/d, the details are as below:

Wastewater stream	Quantity (m <sup>3</sup> /d)	ZLD status
Total wastewater generated from industrial use and treated in factory's ETP	8100	90% of total ETP treated water, i.e. 7204 m <sup>3</sup> /d is being recycled and reused for various purposes such as in process, for gardening, toilet flushing. The rest ~896 m <sup>3</sup> /d of treated effluent is being discharged at the ETP outlet.
Total sewage generated from use of water for domestic purposes in factory and treated in STP	4250	Currently at Hindalco, we are using 7305 m <sup>3</sup> /d of treated sewage from the outlet of Sewage Treatment Plant (STP). Sewage from plant and colony are treated in our STP.

HINDALCO INDUSTRIES LIMITED  
Renukot Works  
P O Renukot - 231217  
Distt Sonbhadra (U.P.)  
Telephone +91 5446 252077-79 / 254791-96  
Fax +91 5446 252107 / 252427

REGISTERED OFFICE  
Ahura Centre, 1<sup>st</sup> Floor, B-Wing  
Mahakall Cavez Road,  
Andheri(East), Mumbai 400 030  
Telephone +91 22 6691 7000  
Fax +91 226691 7001

Website [www.hindalco.com](http://www.hindalco.com)

E mail [hindalco@adityabirla.com](mailto:hindalco@adityabirla.com)

Corporate Identity No. L27020MH1956PLC01123B



The details of water consumption and associated wastewater at Hindalco Industries Limited, Renukoot- industrial effluent or sewage are presented in sections below.

### 1.2 Water consumption

Three types of water are used in the plant for process, domestic use, gardening, etc., namely fresh water from downstream of Rihand dam from Renu River, recycled water from ETP outlet; and recycled water from STP outlet. These details are presented in the table below:

Water by source	Quantity (m <sup>3</sup> /d)	Remarks
Fresh water from Renu River	27733	Metered and treated in water treatment plant
Recycled from ETP	7204	90% of total
Recycled from STP	7305	170% of sewage generated by Hindalco from factory and 20 % of total sewage treated in STP
<b>Total</b>	<b>42242</b>	

### 1.3 Water consumption by end use

The details are presented in the table below:

Details	Quantity (m <sup>3</sup> /d)	Remarks
<b>Total Water consumption for process use =</b>	<b>15631</b>	
Fresh water	5734	Metered
Recycled STP treated	6808	Metered
Recycled ETP treated	3089	Metered
<b>Total Water consumption for domestic use in plant =</b>	<b>5242</b>	
Fresh for drinking	3942	Metered
recycled ETP treated for toilet flushing	1300	Metered
<b>Total Water consumption for domestic use in colonies</b>	<b>15278</b>	
Fresh for drinking in plant 1 colony	13322	Metered
Fresh for drinking in plant 2 colony	1956	Metered
<b>Total Water consumption for gardening, green belt</b>	<b>3311</b>	No wastewater, evaporates
Recycled STP treated for gardening in admin colony	496	
Recycled ETP water for spraying & Green Belt Development	2815	
Public taps & utilities	2726	Routed to STP through the Nallah
Dairy farm	53	
<b>Total usage</b>	<b>42242</b>	

HINDALCO INDUSTRIES LIMITED  
Renukoot Works  
P.O. Renukoot - 231217  
Dist. Sonbhadra (U.P.)  
Telephone +91 5448 252077-79 / 254761-68  
Fax +91 5448 252107 / 252427

REGISTERED OFFICE  
Ahura Centre, 1<sup>st</sup> Floor, B-Wing  
MahaKali Caves Road,  
Andheri(East), Mumbai 400 033  
Telephone +91 22 2661 7000  
Fax +91 226551 7001

Website www.hindalco.com  
E mail hindalco@adityabirla.com  
Corporate Identity No. L27026MH1958PLC011238



#### 1.4 Wastewater generation due to water use by Hindalco in factory and colony

This is being divided 2 types -- industrial wastewater and domestic sewage. These details are presented in the table below.

Details	Quantity (m <sup>3</sup> /d)	Remarks
Process wastewater	8100	Treated in ETP
Sewage from factory	4250	Estimated based on ratio of 80% sewage generation from water consumption
<b>From factory</b>	<b>12350</b>	
Sewage from two colonies	12200	Sewage from plant 1 colony is treated in STP and part of that from plant 2 colony is treated in soak pits. Estimated based on ratio of 80% sewage generation from water consumption
<b>From colonies</b>	<b>12200</b>	

#### 1.5 Sewage collection

The sewage from the plant and colonies is routed through natural open drains of Renukool township and then lifted near the inlet of STP for treatment. In these open drains in addition to the sewage generated by Hindalco, there is discharge from a large number of other establishments like households, shops, market, Auto Garages, Khatala, etc.

#### 1.6 Sewage Treatment

Presently Company is having 24 MLD capacity Sewage Treatment Plant (STP) which is running efficiently delivering 10.9 to 12.5 MLD treated sewage water with the quality meeting prescribed norms of UPPCB.

To make the system exclusive for collection, transportation and treatment of sewages from our colony only and to achieve ZLD of domestic treated sewages from our Colony, we are proposing the following action plan.

#### 2.0 Suggested Action Plan

There are two key sets of actions that we are proposing:

- Short-term – meeting ZLD for residual 806 m<sup>3</sup>/d of treated effluent that is currently being discharged at the ETP outlet. For this, we are in the process of establishing PWRP (Process Water Recycling Plant) that would ensure 100% recycling of this treated effluent.
- Long-term – for collection of sewage move from use to natural drains to closed and dedicated sewerage network system for collection of Sewage Effluent.

The detailed action plan is presented in the table below:

HINDALCO INDUSTRIES LIMITED  
Renukool Works  
P.O. Renukool - 211217  
Dist. Gopabandha (B.P.)  
Telephone: +91 5446 252977-79 / 254791-99  
Fax: +91 5446 252107 / 252427

HINDALCO LIMITED  
Aditya Centre, 1<sup>st</sup> Floor, B Wing  
Mahakali Caves Road,  
Andheri (East), Mumbai 400 050  
Telephone: +91 22 4591 7060  
Fax: +91 22 0691 7091

Website: [www.hindalco.com](http://www.hindalco.com)

E-mail: [hindalco@adityabirla.com](mailto:hindalco@adityabirla.com)

Corporate Identity No. 127029MH195BP/C011239



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Sl No	Activities	Time	Target Date
1	Selection of suitable vendor for Drain survey , Contour mapping and topography study , study of Sewages effluent load from each area and building blocks, Identification and separation of the streams which falls in natural drain for making close loop of all sewages and transporting it to existing STP for treatment	3	08-06-2020
2	Finalising the contract with selected vendor (Invite offers from different vendors, Review of techno commercial offer, negotiations and vendor finalization)	3	30-06-2020
3	Study by selected vendor and submitting their report	10	15-09-2020
4	Conceptualization and designing the schemes as per study report for segregation, collection and transportation of domestic effluents from different colony location to Existing STP through closed pipe network.	4	15-10-2020
5	Budgeting and approvals	2	31-10-2020
6	Ordering and erection of piping and various pump stations as per above designed scheme	30	15-06-2021
7	Commissioning of the above scheme	2	30-06-2021
	Total Number of Weeks for completion of project	54	

Note : - Above Finish dates have been given assuming there will not be any transportation and personal movement restriction due to Covid 19 pandemic after 15th May' 2020.

We hope you will find above in order.

Thanking you,

Yours faithfully  
FOR HINDALCO INDUSTRIES LIMITED

(Mukesh Mittal)  
V.P (Safety & Environment)

Cc. Regional Officer, UP Pollution Control Board

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Corporate Identity No. L27020MH1958PLC011238



December 17, 2020

To,  
The Member Secretary  
U.P. Pollution Control Board,  
T.C. 12 V, Vibhuti Khand,  
Gomtinagar, Lucknow.

**Subject: Zero Liquid Discharge (ZLD) in Domestic Effluent from Colony, Hindalco, Renukoot**

Reference: (i) Our Letter dated 05 May 2020 on ZLD at Renukoot  
(ii) Consent to Operate ref. 62829/UPPCB/Sonebhadra (UPPCBRO) / CTO/water/SONBHADRA/2019 dated 15 May, 2020  
(iii) CTO Condition - Status Report dated 9 October 2020

Sir,

With reference to the above, we would like to submit the following for your kind consideration:

**ZLD in the plant**

**Treated Effluent**

- We have commissioned **Process Water Recycling Plant (PWRP)** to establish ZLD in the plant. This is in operation and we are able to reuse 90 % of treated ETP Water for various purposes such as., in process, gardening and toilet flushing. **The rest 10 % i.e. 896 m3/day of treated effluent is being discharged at the ETP Outlet.**
- Sir, in spite of our best efforts, we are not getting consistent result of desired treated water quality. This is, probably, due to **teething problem in PWRP** & unforeseen fluctuation in manufacturing process. Presently, R&D team of M/s Ion Exchange is working extensively to establish 100% ZLD concept by overcoming teething problem to take of remaining quantum of effluent by suitably modifying the process.
- Initially, it was targeted to establish this process by June 20. However, due to COVID-19 Pandemic Issue in the Country, progress in this direction have been halted.
- Now, in November 2020, some of the balancing equipment have already been arrived in the Plant. Same is being erected & commissioned.
- With completion of this, we do hope that we will be able to achieve and sustain the ZLD in the plant by February 2021.
- Progress made in this regard is attached as **Annexure I** - current photographs.

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### Treated Sewage

- Sir, as mentioned in our letter of 05 May 2020, in the Plant, we reuse 100 % of treated sewage generated from use of water for domestic purpose. Quantity recycled is 4250 m<sup>3</sup>/day.

Hence, as mentioned, in the Plant, we would be able to achieve ZLD on consistent basis by February 2021.

### ZLD in the Colony

Sir, with respect to ZLD in the colony, we would like highlight the following points:

#### Close Looping System

- We have one Sewage Treatment Plant (STP) of 24000 KLD and running efficiently. At present hydraulic load is to the tune of 12000 – 16000 KLD. We treat total quantity of sewages, generated in our colony in this STP. Quality of treated sewage is within the limits prescribed by UPPCB. At present, we are able to recycle treated sewage partially (6331 m<sup>3</sup>/day) for toilet flushing and gardening. Remaining quantity (5381 m<sup>3</sup>/day) is being discharged.
- We have started converting all our open nallah domestic drain into a close drainage system through installation of hume piping network. This is being done to isolate the STP from any shock load during rainy season and to ensure consistent quality of treated sewage on 24x7 basis.
- We have also completed the drain survey, contour mapping and topography study of our colony area through our Project Department Team. A detailed study on identification and separation of the stream which falls into the natural drain has been done for making closed loop of all sewages generated from households. The estimate cost of the project is approx. Rs. 4.8 Crore. We have already placed PO with different agencies and the jobs are under process. The tentative timeline for implementation of project will be approx. 3 months from now. Please refer to **Annexure II**, PO copy and photograph of job under progress.

#### Study by NEERI to identify sustainable solution for use of treated colony sewage

- Further, we have engaged CSIR – NEERI Nagpur 2020 to conduct a study for sustainable solution towards reduction of domestic water consumption and effective utilization of treated sewage to achieve ZLD. Cost of this Study would be of Rs. 15 Lakh.
- NEERI team will do assessment of
  - domestic water supply
  - consumption pattern
  - sewage generation from township & manufacturing complex

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- Characterization of domestic water supply and treated sewage.

We are expecting the final report in the month of Feb. '21. Copy of Purchase Order to CSIR – NEERI Nagpur and Scope of work is attached as **Annexure III**.

Sir, looking at the very large size of our colony with high population density, we need expert organization like M/s CSIR - NEERI to study and identify sustainable solutions (Techno-economic consideration and consistent compliance) for reuse of treated sewage. This will help us in taking necessary steps towards achieving 100% recycling of treated sewage as stipulated in the recent Consent to Operate on a sustainable basis.

**Once we receive report from CSIR-NEERI, we shall prepare action plan with time target based on their recommendation and submit the same to the Board**

### Submission

Sir, considering the actions initiated by us, we humbly request you to kindly consider our request for extension of due date of achieving ZLD in our colony domestic effluent. Proposed new date is December 2021. This extension will help us implement the recommendations made by M/S NEERI based on their study. As mentioned earlier, CSIR-NEERI report is expected in February 2021. The proposed date of extension shall also bring us clarity on our compliance liability towards achieving ZLD in our colony. Since, the statute is silent on mandating any such requirement of ZLD for colony. In our commitment to achieving global best practices in sustainability and environment conservation; we assure you that we have achieved compliance with all existing laws and notifications issued by your esteemed office and shall continue to do so as responsible stakeholders.

In case of any clarification or further inputs. Please do contact us. We will provide all necessary additional information including Technical presentation to the UPPC Board on this.

Thanking you,

Yours faithfully,

For **HINDALCO INDUSTRIES LIMITED**

Mukesh Mittal  
V.P. (Safety & Environment)

CC: The Regional Officer,  
UPPCB, House No.162  
Uttar Mohal, Sonbhadra

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Approved R21/S  
o/c 31

November 23, 2021

To  
The Regional Officer,  
U.P. Pollution, Control Board,  
H.No. 162, Uttar Mohal  
Sonebhadra, U.P

**Sub: Achieving Zero Liquid Discharge (ZLD) at Hindalco Renukoot Plant.**

Dear Sir,

We write to confirm that the Process Water Recycling Plant (PWRP) installed in April, 2019 in our Renukoot Plant, as per the CTO conditions, has been commissioned. This would enable us to meet our commitment of Zero Liquid Discharge in our Plant.

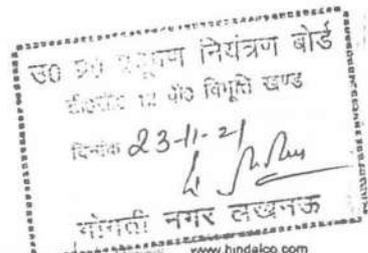
We are pleased with the outcome particularly given certain technical challenges and delays owing to Covid-19 lockdown and inaccessibility of the experts from M/s. Ion Exchange. After consistent efforts this milestone has been possible in our Renukoot Plant.

Thanking You,

Yours faithfully,  
FOR HINDALCO INDUSTRIES LIMITED

(Mukesh Kumar Mittal)  
V.P (Environment)

Cc: Member Secretary, UPPCB, Lucknow



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Answer R 21/16  
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**REPORT OF THE OVERSIGHT COMMITTEE, NGT, U.P, LUCKNOW**

**IN THE MATTER OF:-**

**ORIGINAL APPLICATION NO. 164/2018**

**IN RE: ASHWANI KUMAR DUBEY**

**VERSUS**

**UNION OF INDIA & ORS.**

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**UPDATED PROGRESS REPORT OF THE OVERSIGHT COMMITTEE DATED 14.01.2022 REGARDING O.A. NO. 164/2018 (EARLIER O. A. NO. 276/2013) IN RE: ASHWANI KUMAR DUBEY VS. UNION OF INDIA & ORS.**

**I. BACKGROUND**

The Hon'ble NGT in the matter of OA No. 164/2018 (earlier O.A. No. 276/2013) in re: *Ashwani Kumar Dubey Vs. Union of India & Ors.* has dealt with the issue of pollution being caused by Thermal Power Plants in District Sonbhadra of Uttar Pradesh and District Singrauli of Madhya Pradesh on account of their activities resulting in the continued destruction of the environment. The industries are discharging mercury beyond prescribed norms affecting the nervous system causing disorders and other ailments to inhabitants. The mentioned areas are critically polluted as per the '**Comprehensive Environmental Pollution Index Report**'. According to the studies, fly ash created and stored by the industries and crushers are main sources of high level of pollution in this area. Transportation of coal by trucks from the coal companies also contribute to pollution.

**II. DIRECTIONS OF THE HON'BLE NGT**

1. Vide order dated 14.07.2020, the Hon'ble NGT reiterated the following directions issued on 12.02.2020 in OA No.117/2014, *Shantanu Sharma vs. Union of India & Ors.* for compliance by the concerned TPPs:

*"a. The TPPs may take prompt steps for scientific disposal of fly ash in accordance with the statutory notification issued by the MoEF&CC under the provisions of the EP Act requiring 100% utilization and disposal of fly ash.*

*b. For the non-compliant TPPs, environmental compensation needs to be determined w.e.f. the cut-off date of 31.12.2017 as stipulated in the Notification dated 27.01.2016.*

*c. CPCB may accordingly compute and levy Environmental Compensation in accordance with the formula referred to above w.r.t. individual TPPs in accordance with law and submit compliance report to this Tribunal before the next date.*

*d. 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 may be complied.*

*e. Task Force of Ministry of Power and Ministry of Coal may recommend list of abandoned mines/quarries for mine back filling purposes to the CPCB. CPCB may notify the same accordingly for use by the TPPs as per applicable guidelines and permission from State PCBs/PCCs.*

*f. A Committee comprising of CPCB and IIT Roorkee may assess the environmental damage with regard to the breach sites at Vidhyanchal TPP an Essar TPP in Singrauli area and submit*

*its recommendation within three months. CPCB shall be at liberty to engage any other technical expert for this purpose.*

*g. The Committee comprising of Collector, CPCB and Member Secretary of MP State Pollution Control Board may assess the damage with regard to the breach sites at Vindhyachal TPP and Essar TPP in Singrauli area to the crop and agricultural productivity and ensure effective restoration/remediation of affective sites within three months.*

*h. CPCB may ensure implementation of action plans approved by it in accordance with timeline as provided in the statute.*

*i. A joint Committee comprising of MoEF&CC, CPCB, IIT Roorkee and any other member considered necessary may submit quarterly progress report on recommendations of Expert Committee of Niti Aayog for enhanced utilization of fly ash in various sectors: mines, roads, cement, industries and bricks etc., along with its implementation status.*

*j. The present order is subject to proceedings pending before the Hon'ble Supreme Court and where stay is operative, this order will not operate till stay continues and thereafter abide by orders of Hon'ble Supreme Court."*

**2. Vide the same order dated 14.07.2020** following additional directions were also issued:

*i. Fly ash disposal may be undertaken as per the directions in the order of this Tribunal dated 12.02.2020.*

*ii. Fly ash disposal in mounds and backfilling of ash in abandoned mines may be undertaken as per the CPCB guidelines, if necessary, Indian Bureau of Mines, Dhanbad may also be consulted so that latest technology is utilized and all necessary safeguards are adopted.*

*iii. Report of CPCB regarding Cost apportionment for desilting/restoration of Rihand Reservoir is accepted and further steps, including further study be undertaken as recommended by CPCB. The U.P. Irrigation Department may coordinate such study.*

*iv. Anpara TPS and Lanco-Anpara power plants may stop ash pond overflow discharge into Rihand Reservoir to the extent the work remains unexecuted.*

*v. NTPC, Vindhyachal may deposit amount of Rs. 10 Crores as recommended by the Oversight Committee with the State PCB towards interim compensation, deducting the amount already deposited. The plant may also develop RCC wall around the plant in the matter recommended.*

*vi. The liability for environmental compensation in respect of UPVUN, Anpara and NTPC Vindhyachal may be assessed by joint Committee of CPCB and State PCB within two months. The nodal agency will be the State PCB for coordination and compliance.*

vii. The transportation measures may be adopted as per suggestions of the Committee and directions of the Hon'ble Supreme Court.

### III. PROGRESS REPORT

The Oversight Committee had submitted its report in this regard on 01.03.2021 for the consideration of the Hon'ble NGT. The report could not be considered as the hearing was adjourned. The updated progress report in this matter has been divided into major four parts which are as under:

- A. Thermal Power Plants & Industries
- B. Coal Mines of M/s Northern Coalfields Limited (NCL)
- C. Stone Crushers
- D. UPPCB, CPCB and MOEF&CC

#### A. Thermal Power Plants (TPPs) & Industries

S. No.	Issues/ Directions by the Hon'ble NGT	Compliance Status	Updated Progress			
1.	100% Utilization and Disposal of Flyash	Partially Complied	Except M/s Hindalco industries, Renuagar and Renukoot, ash utilization is abysmally low in all the units. Even these two units have not met the norm in Financial Year 2019-20 & 2020-21 and 2020-21 & 2021-22 respectively. The unit wise utilization details are given in the following table:			
<b>Table</b>						
TPPs/Industries	Year	Total Ash Generated (in Lac MT)	Total Ash Utilized (in Lac MT)	Disposal in ash pond (in Lac MT)	Ash Utilization (in %)	
M/s UPRVNL Anpara	2019-20	36.24	1.41	34.83	3.69%	
	2020-21	33.61	9.19	24.42	27.34%	
	2021-22 (Upto Sep., 2021)	17.61	0.70	16.46	3.97%	
M/s Obra Thermal Power Plants	2019-20	11.14	0.86	10.28	7.71%	
	2020-21	14.09	0.80	13.28	5.73%	
	2021-22 (Upto Sep., 2021)	7.13	0.36	6.77	5.04%	
M/s Lanco Anpara Power Ltd., Anpara	2019-20	15.77	3.58	12.19	22.71%	
	2020-21	17.49	2.95	14.54	16.88%	
	2021-22 (Upto Sep., 2021)	8.57	1.09	7.48	12.70%	
M/s NTPC Rihand	2019-20	39.01	16.84	22.17	43.18%	
	2020-21	39.21	20.39	18.82	52.02%	
	2021-22	20.54	9.49	11.05	46.21%	

		(Upto Sep., 2021)				
NTPC Shaktinagar		2019-20	32.06	12.58	19.48	39.24%
		2020-21	29.84	9.97	19.87	33.41%
		2021-22	14.80	3.34	11.46	22.55%
		(Upto Sep., 2021)				
M/s Hindalco Industries Ltd., Renusagar		2019-20	16.01	9.82	6.19	61.33%
		2020-21	15.04	11.17	3.87	74.26%
		2021-22	6.71	7.40	-	110.28%
		(upto Sep., 2021)				
M/s Hindalco Industries Ltd. Renukoot		2019-20	2.98	2.98	-	100%
		2020-21	1.54	1.24	0.30	80.51%
		2021-22	0.99	0.91	0.08	91.91%
		(upto Sep., 2021)				
2.	Imposition and Realization of EC on the non-compliance by the TPPs	Partially Complied	EC of total Rs. 23,14,80,000/- was imposed on these industrial units for the period 2019-2020. However, the amount has been realized only from M/s Lanco, Anpara and not from others as a stay has been granted to all of them by the Hon'ble Supreme Court.			
3.	Utilization/Disposal of Fly Ash	Partially Complied	<p><b>M/s Anpara TPS</b></p> <ol style="list-style-type: none"> <li>1. After getting consent from the UPPCB, Anpara TPS has filled up ash (about 3.19 lac MT) in a low-lying area (village- Dibulganj) in Feb,2021. No further filling of ash is possible in it. Now, soil cover is being provided for plantation to be done in June/July-2022 in coordination with the Forest Department, U.P.</li> <li>2. It has requested the District Administration to allot 07 abandoned stone mines/quarries in Billi Markundi area (8.4 acre) for fly ash disposal. The District Administration has assured to allot these mines. Out of the 07 mines, 04 mines (approx. 4 Lac MT capacity) are undisputed while 03 mines (approx. 3.0 Lac MT capacity) have ownership dispute between Revenue and Forest Department. After the dispute resolution, these mines would be made available to UPRVUNL.</li> <li>3. A feasibility study for developing an Eco Park on the old mounds of fly ash, has been done by the IIT-BHU. Work for preparation of design/drawing/ estimate of Eco-Park has been completed and a comparative study with the existing NTPC Eco- Park work is being done. These efforts will take care of how much quantity of ash has not been revealed to the Committee.</li> <li>4. Fly ash generated from the 07 units of Anpara is also utilized by issuing it free of cost to cement industries and ash brick industries. The quantity of ash being utilized in this manner has not been revealed.</li> </ol>			

		<p><b>Partially Complied</b></p>	<p><b><u>M/s Obra TPS:</u></b></p> <ol style="list-style-type: none"> <li>1. After obtaining Consent to Establish (CTE) from the UPPCB, the unit has done the following for backfilling of ash in-             <ol style="list-style-type: none"> <li>a. Bid Part-I of Tender for disposal of 2.4 Lac CuM ash in Obra Sector- 2 &amp; 3 in the first phase was opened but the bidders did not qualify the Pre-Qualification Criteria, therefore fresh bid has been invited. Subsequently, about 5-10 Lac CuM ash is also proposed to be disposed here in the second phase.</li> <li>b. Bid Part-I of Tender for disposal of 3.0 Lac CuM in abandoned stone quarries has been opened and is under process for opening the financial bid.</li> <li>c. Approval for inviting tenders from the Headquarter regarding ash filling (1.8 Lac CuM) in low-lying area near Lodhi Toll Plaza is awaited.</li> </ol> </li> <li>2. Agreement with M/s ACC Ltd. for lifting 1.35 Lac MT/month of fly ash is in the final stage. After the agreement, ash lifting will be done from Obra B as well as Obra C.</li> <li>3. M/s Zaak Technologies, Germany has agreed for taking minimum 1.0 Lac MT/month of fly ash for manufacturing Grade Sand.</li> <li>4. Flyash generated from the unit is partly utilized by issuing fly ash free of cost to cement and ash brick industries. The quantity of ash being utilized in this manner has not been revealed. The remaining quantity is discharged in the form of ash slurry to ash dyke.</li> </ol>
		<p><b>Partially Complied</b></p>	<p><b><u>M/s Lanco Anpara Power Ltd., Anpara</u></b></p> <ol style="list-style-type: none"> <li>1. Several request letters dated 18.11.2015, 24.02.2016, 16.05.2016, 20.11.2018, 01.07.2020 and 23.07.2021 have been sent to NCL for allotment of abandoned mines. Response is still awaited.</li> <li>2. A request letter dated 13.11.2019 have been sent to DM, Sonbhadra for allotment of abandoned mines. Response is still awaited.</li> <li>3. Agreement/MOU signed with M/s J.S Enterprises, Renusagar on 20.01.2021 (duration 23.01.2021 to 22.1.2022) to coordinate with cement industries for utilization of approx. 60000 MT/month of fly ash generated. In the FY 2021-2022 (till Sep., 2021), 108885 MT ash has been lifted.</li> <li>4. Agreements have been signed with the following brick manufacturing units for supply of fly ash:</li> </ol>

			<p>a. M/s Jai Bricks, Pipri, Anpara (20.11.2018) to take upto 200 MT/month of flyash.</p> <p>b. M/s Birendra Singh Inta Bhatta, Auri More, Anpara (20.11.2018) to take upto 200 MT/month of flyash.</p> <p>c. M/s HIBA Infratech, Auraiya (18.08.2021) to take upto 200 MT/month of fly ash for the period 01.09.2021 to 31.8.2022.</p> <p>d. M/s KS Enterprises, Lalganj, Mirzapur (20.09.2021) to take upto 5000 MT/month of fly ash for the period 20.09.2021 to 19.09.2022.</p> <p>However, no ash has been lifted by the above first three units till Sep., 2021.</p> <p>5. Letters dated 07.02.2019 and 08.07.2021 were sent to the Regional office, NHAI, Varanasi for entering into an MoU to take fly ash for road construction projects. Response is still awaited.</p> <p><b>Partially Complied</b></p> <p><b><u>M/s NTPC Rihand</u></b></p> <p>1. It is presently manufacturing ash bricks through 02 fully automatic ash brick plants. Approx. 1206 MT flyash has been used to manufacture 5.32 Lacs bricks/month. These bricks are utilized in the Plant, townships and ash dykes.</p> <p>2. To promote the offtake of dry fly ash, the Plant has procured 03 Bogey Tank for Alumina Powder (BTAP) rakes for transportation of fly ash. Till 30.09.2021, approx. 81,000 MT of fly ash has been transported to the cement plants.</p> <p>3. It has given permission to M/s ACC Ltd. for transportation of fly ash in 10 rakes of tarpaulin covered BOXN wagon. Out of 10 rakes, 5 rakes have been dispatched to different cement plants of ACC Ltd. Similarly, 2 rakes have been sent to Dalmia Cement Plant, Nagoan, Assam.</p> <p>4. 03 MoUs have been signed with NHAI- Varanasi for the supply of approx. 06 Lac CuM of pond ash (NH-56, NH-29 and bypass road project Varanasi). Approx. 4.22 Lac MT of pond ash was lifted by NHAI during 26.06.2020 to 30.09.2021.</p> <p>5. It has requested NCL authorities on 05.08.2020 for allocation of mines for backfilling of abandoned coal mines but no mines have been allocated to it till now.</p> <p><b>Partially Complied</b></p> <p><b><u>M/s NTPC Shaktinagar</u></b></p> <p>1. Ash filling in abandoned stone quarries having 60 Hectare area located at Billi, Markundi has been offered on lease basis and the NTPC is the getting the feasibility assessment done.</p>
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		<p><b>Partially Complied</b></p>	<p>2. It has installed 05 semi-automatic fly ash brick plants and 02 old brick machines have been replaced with new brick machines. Presently 4.5 lac/month bricks are being manufactured.</p> <p>3. It has signed a contract with NHAI for the supply of 11.75 Lac MT Pond ash for road projects. (Supply started on 27.06.2020). Steps are also being taken for finalization of contract for additional supply of 5.2 lac MT of pond ash for Varanasi Ring Road project.</p> <p><b><u>M/s Hindalco Industries Ltd., Renusagar</u></b></p> <p>1. Approx. 34800 MT/month of fly ash &amp; 84000 MT/month of pond ash is being transported through rail rakes and bulkers on continuous basis for its utilization by the following cement &amp; cement sheet making companies-</p> <ol style="list-style-type: none"> <li>M/s Hyderabad Industries Ltd., Jaunpur (3000 MT/month of fly ash, for the period of 01.05.2020 to 30.04.2025)</li> <li>M/s Prism Cement, Satna (13500 MT/month of fly ash, for the period of 01.05.2019 to 30.04.2024)</li> <li>NU Vista Ltd., Bihar (7800 MT/month of fly ash, for the period of 01.09.2019 to 31.08.2022)</li> <li>M/s Kanodia Infratech Ltd., Bihar (10500 MT/month of fly ash, for the period of 01.12.2019 to 30.11.2024)</li> <li>M/s ACC Ltd. Tikariya Sultanpur (U.P.) (4000-8000 MT/month of pond ash, for the period of 01.08.2021 to 01.08.2022)</li> <li>M/s Shree Cement, Bihar (60000 to 80000 MT/month of pond ash, for the period of 01.08.2021 to 31.07.2022)</li> <li>Fly Ash Movers Ltd., Satna (4000 to 8000 MT/month of pond ash, for the period of 01.09.2021 to 31.08.2022)</li> </ol> <p>2. Approx. 4030 MT/month of flyash is used for bricks manufacturing at their own Brick making plant at Renusagar and for supply to other brick-making units viz. M/s Bharat Hume &amp; Pipe, Karhiya Sonbhadra &amp; M/s Puja Industries Bhairwa Sonbhadra.</p> <p>3. Approx. 19786 MT/month of ash is supplied for road projects of Varanasi.</p>
		<p><b>Partially Complied</b></p>	<p><b><u>M/s Hindalco Industries Ltd., Renukoot</u></b></p> <p>1. The preliminary assessment of site suitability study of an abandoned quarry in Dalla region by M/s Genstru, Pune has been completed. The final</p>

			<p>report is awaited.</p> <p>2. Approx. 9930.02 MT/month of fly ash is being transported through bulkers on a continuous basis for its utilization by the following cement-making companies-</p> <ol style="list-style-type: none"> <li>M/s Tabsio Infratech- 79.03 MT/month</li> <li>M/s Eco Cement - 747.00 MT/month</li> <li>M/s Diamond Industries- 280.65 MT/month</li> <li>Himalaya Height C. Pvt. Ltd., Durgawat- 787.64 MT/month</li> <li>M/s F. S. Fertilizers- 74.78 MT/month</li> <li>M/s Kanodia Infratech Ltd., Bhabhua- 433.81 MT/month</li> <li>M/s Abhinav Road Carrier/ Brij Cement- 988.64 MT/month</li> <li>M/s J. P. Chunar- 4400.65 MT/month</li> <li>M/s Alakhnanda, Ramnagar- 92.52 MT/month</li> <li>M/s Emami Cement, Durgawati- 1100.35 MT/month</li> <li>Bharat Infra Cement Ltd, Chandauli- 981.78 MT/month</li> <li>M/s Amba Cement, Bhadoi-164.46 MT/month</li> <li>Ultratech Cement, Dala- 37.29 MT/month</li> <li>R.L.J. Infra Cement, Chunar- 323.04 MT/month</li> <li>M/s Trinani Cement- 93.27 MT/month</li> <li>M/s Laxmi Cement- 55.11 MT/month</li> </ol> <p>3. Approx. 643.33 MT/month of dry ash is utilized for Varanasi National Highway.</p> <p>4. Approx. 4015 MT/month of bottom ash is utilized for Varanasi &amp; Garhwa road projects.</p> <p><b><u>M/s Grasim Industries Ltd. (Chemical Division), Renukoot</u></b></p> <ol style="list-style-type: none"> <li>Reclamation activity has been started from Aug, 2021 by tree plantations in low-lying areas within the plant premises. Plantation activity is expected to be completed by the end of monsoon season, 2022.</li> <li>For intermittent storage in adverse scenario, the industry is in process of obtaining abandoned mines in Obra region. The Pre-feasibility Study for the same has been completed by M/s Genstru Consultant Pvt. Ltd.</li> <li>The industry has received the Permission to carry out site suitability study of abandoned stone quarry/mine voids at Dalla, Sonbhadra (UP) to fill &amp; rehabilitate the same by fly ash &amp; bottom Ash.</li> </ol>
4.	Ash dyke management of TPS	Partially Complied	<p><b><u>Anpara TPS:</u></b></p> <p>Ash dyke's height is being raised to the extent of 5 meters for disposal of wet ash. The ash pond has been divided into two lagoons each having a</p>

		<p><b>Partially Complied</b></p>	<p>decantation well. On completion of work, one lagoon has been made operational since 02.06.2021. The work of 2<sup>nd</sup> lagoon was expected to be complete by Dec., 2021.</p> <p><b><u>Obra TPS:</u></b></p> <ol style="list-style-type: none"> <li>1. It has got the design and drawing of raising of ash dyke prepared by IIT-Roorkee. The first raising work of ash dyke has been completed and the 2<sup>nd</sup> raising work has been started from October, 2021. As per the report of IIT-Roorkee, the ash dyke is structurally safe, sound and sustainable and there is no chance of breach.</li> <li>2. In order to maintain zero discharge from ash dyke, all the systems i.e., ash slurry pump, seepage of the ash dyke and Ash Water Recirculation System (AWRS) are functioning properly and its regular maintenance work is being done. AWRS also facilitates recirculation of ash pond water.</li> <li>3. The unit is yet to install flow meters to measure the quantity of ash slurry disposed in the ash dyke and the amount of water recycled from the ash pond.</li> </ol>
		<p><b>Partially Complied</b></p>	<p><b><u>M/s Lanco Anpara Power Ltd.</u></b></p> <ol style="list-style-type: none"> <li>1. The AWRS is fully functional and flow meters in all three lines have been installed on 05.12.2021.</li> <li>2. Regular monitoring is being done to keep ash dykes in proper condition to avoid any overflow.</li> </ol>
		<p><b>Partially Complied</b></p>	<p><b><u>NTPC Rihand</u></b></p> <ol style="list-style-type: none"> <li>1. Ash dyke has been constructed with approved engineering design provided by the Corporate Centre. Third party assessment of ash dyke is being done by IIT-Roorkee.</li> <li>2. It has awarded the ash dyke stability study to IIT-Hyderabad for the year 2021. Two visits of experts (in Feb.,2021 &amp; July, 2021) for dyke stability assessment have been done and their report is still awaited.</li> <li>3. Flow meters are installed. During April, 2021 to Sept., 2021, approx. 17016721 KL of ash slurry has been discharged and out of that 15388800 KL water has been recycled through the AWRS.</li> </ol>
		<p><b>Partially Complied</b></p>	<p><b><u>M/s NTPC Shaktinagar</u></b></p> <ol style="list-style-type: none"> <li>1. Regular monitoring is being done to keep ash dykes in proper condition to avoid any overflow.</li> </ol>

			<p>2. It has awarded the ash dyke stability study to IIT-Hyderabad. Two visits (in Feb.,2021 &amp; July, 2021) of experts of IIT- Hyderabad for dyke stability assessment has been done and their report is awaited.</p> <p>3. The unit has installed flow meters. The unit discharged 7724990 KL ash slurry and recycled 6257242 KL water during the quarter July, 2021 to Sep., 2021.</p> <p>4. In order to increase the offtake of dry fly ash, installation of Dry Ash Extraction System (DAES) in all units of Stage- I is in progress with a plan to discard old DAES in 02 units. In Stage-II, U#6 DAES has been commissioned and U#7 commissioning is in progress.</p> <p><b>Partially Complied</b></p> <p><b><u>M/s Hindalco Industries, Renusagar</u></b></p> <p>1. Ash Dyke at Bichari is around 8 kms from Renusagar Power Plant which was constructed in the year 2004 as per the approved design of the CBRI, Roorkee and is maintained strictly as per the standard operating procedure with round the clock monitoring.</p> <p>2. The stability assessment of the ash dyke is being conducted by reputed agencies i.e., CBRI, Roorkee/ IIT BHU/ MIT Moradabad.</p> <p>3. The unit has installed flow meters to measure quantity of ash slurry disposed in the ash dyke and the amount of water recycled from the ash pond. During April, 2021 to July, 2021, a total of 1048824 KL ash slurry was discharged and 883682 KL water was recycled.</p> <p>4. It has also initiated the process for getting 48.55 hectare of forest land for making new ash dyke.</p> <p><b>Partially Complied</b></p> <p><b><u>M/s Hindalco Industries, Renukoot:</u></b></p> <p>Entire fly ash (which is 80% of the total ash generated) is handled by dry ash system. Ash is being loaded into bulkers from ash silos and bottom ash is also being sent to various users routed through intermediate settling ponds in dry form. All the ash is being disposed in environment friendly manner; only temporary ash storage area is in place. This area is of earthen construction using well-compacted soil which is structurally sound and stable. Since, the ash is in dry form there is no seepage of water out of the storage area.</p>
5.	Measures for transportation, storage & handling of coal by TPPs	Complied	<p><b>M/s Anpara TPP (Unit-A, B &amp; D)-</b> Entire coal transportation is being done by railway wagon (MGR system). It has never transported coal through road. There is no fugitive emission in the Coal Handling Plant (CHP). Sprinkling of water is done to control</p>

		<p>the coal- dust near the crushers.</p> <p><b>M/s Obra TPP (Unit-B)-</b> Coal transportation is being done by railway wagon and covered shed is provided for unloading. No transportation of coal being done through road. The unit has installed water sprinklers in coal storage area and dust suppression system at loading- unloading points.</p> <p><b>M/s Lanco Anpara Power Ltd.-</b> About 70% of coal is transported through railway rakes and the rest 30% is transported through tarpaulin covered trucks. Sprinkling of water on the road is also being done. The unit has installed water sprinklers in coal storage area and dust suppression system at loading-unloading points.</p> <p><b>M/s NTPC Rihand-</b></p> <ol style="list-style-type: none"> <li>1. It is transporting 100% coal from the linked mines of Northern Coalfield Ltd. (NCL) through Merry-Go-Round (MGR) railway system and a covered shed is provided for unloading of coal.</li> <li>2. Water sprinklers, dust and dry fog dust suppression systems have also been installed and the same are operational in the CHP.</li> <li>3. Installation of cold fog dust suppression system is proposed in Stage-I system. Notice Inviting Tender has been issued for the same and the system is expected to be commissioned by Dec., 2022.</li> </ol> <p><b>M/s NTPC Shaktinagar:</b></p> <ol style="list-style-type: none"> <li>1. It is transporting 100% coal from the linked mines of NCL through MGR railway system and unloading takes place in a covered shed.</li> <li>2. Water sprinklers in the coal storage areas and dust suppression systems have also been installed and the same are operational.</li> <li>3. The fugitive emission is in the range of prescribed norms. The unit is in process to further improvise the condition by installing a fog system.</li> </ol> <p><b>M/s Hindalco Industries Ltd., Renusagar:</b></p> <ol style="list-style-type: none"> <li>1. The industry is transporting approximately 80% of coal through BPC and the balance of 20% is transported through tarpaulin-covered trucks.</li> <li>2. It has installed a belt pipe conveyor (BPC) system (4.65 km) from the Krishnashila coal mine for coal transportation.</li> <li>3. Fugitive emission of dust is being controlled by the Dust Extraction System installed at the coal</li> </ol>
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			<p>discharge point and conveyors. Rain guns are installed in the yard periphery and are operational for controlling dust in the coal storage area. Stacker mouths discharge are mounted with water sprinklers in all the crushers in the CHP area.</p> <p><b>M/s Hindalco Industries Ltd., Renukoot:</b></p> <ol style="list-style-type: none"> <li>1. Approx. 80% coal is being transported through rail and 20% is being transported through tarpaulin covered trucks.</li> <li>2. For dust suppression, permanent water sprinkler system is installed at the main ash storage area.</li> </ol> <p><b>M/s Grasim Industries (Chemical Division):</b> Transportation of coal is mainly done through road and tarpaulin cover is maintained during transit. Sprinklers are installed in coal loading, shifting and storage areas to prevent fugitive emissions.</p>
6.	Achieving Zero Liquid Discharge (ZLD) in ETP & STP	Partially Complied	<p><b>Anpara TPS:</b></p> <ol style="list-style-type: none"> <li>1. A &amp; B-Plants: Work for installing ETP is under tender process at HQ- Lucknow. Part-II of the bid has been opened and is in process of approval to award the work. The scheduled completion time is Dec., 2023.</li> <li>2. D- Plant: Plant-ETP is receiving process water and stormwater. STP treated water is separately used for horticulture works and it is not mixed with ETP and stormwater.</li> <li>3. Plant area ETP &amp; STP effluent is not being discharged outside the premise. It is recycled and used for sprinkling in the CHP, making ash slurry etc.</li> <li>4. The work for joining of CISF complex (which is inside the plant area) to the existing STP is in progress. This work also includes recirculation of treated water through the pipeline from the existing STP to the Ash Slurry pump for its reuse. The work was affected due to Covid-19-Pandemic. Now, about 90% work is complete.</li> </ol> <p><b>Obra TPS:</b></p> <ol style="list-style-type: none"> <li>1. ETP of this plant is functional but it is yet to achieve ZLD.</li> <li>2. STP has been commissioned on 31.03.2021 and connecting work of residences is in progress which is almost 70% complete.</li> <li>3. At present, effluent of sector- 10 colony area is mixed with power house effluent which ultimately goes to ETP for treatment. Therefore, for segregation of colony area effluent a new pump house is being constructed which is in the</li> </ol>
		Partially Complied	

			<p>final stage. After completion of pump house, the pumps which already have an ETP will be transferred to new pump house and effluent from power house will be taken into pump and same will be discharged into the ETP for treatment and re-circulation.</p>
		<b>Complied</b>	<p><b><u>M/s Lanco Anpara Power Ltd.</u></b> The unit is achieving ZLD. All treated waste water is being used in horticulture and in the ash plant. It has also installed a flow meter on 05.12.2021 at inlet and at recycling point.</p>
		<b>Complied</b>	<p><b><u>NTPC Rihand</u></b> It has installed 03 ETPs and 02 STPs. Treated water is fully recycled and reused. ZLD is being maintained. Flow meters are installed to measure the amount of waste water received and treated through ETP.</p>
		<b>Complied</b>	<p><b><u>NTPC Shaktinagar</u></b> The unit is recycling the treated waste water from ETP and has also installed a flow meter to measure the amount of waste water received through ETP. ZLD is being achieved.</p>
		<b>Partially Complied</b>	<p><b><u>M/s Hindalco Industries, Ltd., Renuagar:</u></b> The industry has developed a road map and timeline for creating the sludge drying bed/filter press to be installed at ETP. The process to select a vendor for this purpose has been initiated in Dec., 2021.</p>
		<b>Partially Complied</b>	<p><b><u>M/s Hindalco Industries Ltd., Renukoot:</u></b> The industry has commissioned Process Water Recycling Plant (PWRP) on 23.11.2021 in order to achieve ZLD. Treated waste water from STP is being used in horticulture, other miscellaneous works and the rest is discharged into Murdhawa Nala (i.e. natural drain).</p>
		<b>Complied</b>	<p><b><u>M/s Grasim Industries Ltd. (Chemical Division), Renukoot:</u></b> ZLD condition fully complied for plant ETP &amp; STP (w.e.f. 17.11.2017) and residential colony STP (w.e.f. 24.11.2019). For further utilization of treated sewage, the industry has installed a 1000 m<sup>3</sup> ultrafiltration (UF) system which is operational since 10.03.2021. The treated STP water from the UF system is utilized in plant cooling towers.</p>
7.	Installation of Flue-Gas Desulfurization	<b>Partially Complied</b>	<p><b><u>M/s Anpara TPS</u></b> 1. A &amp; B-Plant: Central Electricity Authority vide its letter dated 23.10.2021 has rejected the tender of</p>

	(FGD) for control of gaseous emission		<p>M/s Beijing SPC. The notice for re-tendering has been issued.</p> <p>2. D-Plant: LOA dated 04.07.2019 was issued to M/s Beijing SPC Environment Protection Tech Co, China for installation of FGD. 40% of civil work has been completed.</p> <p><b>Obra TPS:</b> Retendering for Part- I will be done on 27.01.2022. Installation of FGD is expected to be complete by June, 2023.</p> <p><b>M/s Lanco Anpara Power Ltd.</b> The unit is in the process to install FGD system for achieving standards notified for gaseous emissions before specified timeline.</p> <p><b>NTPC Rihand</b> Bids received for the installation of FGD are under technical evaluation. The work of the installation of FGD in Stage- II &amp; Stage- III units is in progress and will be completed by December and September, 2023 respectively.</p> <p><b>NTPC Shaktinagar</b> Work of chimney construction, absorber and associated work is in progress. Efforts are being made to complete FGD installation within the revised timeline i.e., 31.12.2024.</p> <p><b>M/s Hindalco Industries, Ltd., Renuagar:</b> The technology has been finalized for FGD installation in one boiler unit. In July, 2021, the industry has placed LOI to the vendor. It will take about 17.5 months to receive the material. The work is expected to be complete by April, 2023. On the basis of successful working of FGD system in one boiler, it shall be replicated in other nine boilers.</p>
8.	Maintenance of the capacity and quality of the water of Rihand Reservoir along with its preservation	<p><b>Partially Complied</b></p> <p><b>Complied</b></p> <p><b>Partially Complied</b></p>	<p><b>Anpara TPS:</b> The spillway is being raised to minimize the chances of overflow by the Mocha nala into the Rihand reservoir. After raising of spillway, there will be no overflow into the reservoir. The timeline for completing this work has not been revealed by the unit.</p> <p><b>NTPC Rihand and Shaktinagar</b> are not discharging any pollutants into the Rihand Reservoir.</p> <p><b>M/s Lanco Anpara Power Ltd.:</b> The unit has entered into facility &amp; Service Agreement with UPRUVNL Anpara on 12.11.2006 for the use of ash dyke as one of the common facilities.</p>

			<p><b>Comments by UPPCB</b></p> <p>As per the information furnished by the UPPCB, the Ministry of Water Resources River Development and Ganga Rejuvenation Central Water &amp; Power Research has assessed the cost of Hydrographic/capacity survey of Rihand Reservoir to be Rs. 69.09 lac. Accordingly, payment of this amount has been made to the Central Water and Power Research Station (CWPRS) Khadakwasla, Pune, Maharashtra, which has been engaged by the Irrigation Department, UP for this study. Study work has been reported to be delayed due to COVID-19. Further information in this regard is awaited from Executive Engineer Rihand Dam, Civil Division, Pipari.</p>																						
9.	<b>Ambient Air quality around Anpara TPS</b>	<b>Partially Complied</b>	<p>Anpara TPS has installed 03 CAAQMS for ambient air quality monitoring at 03 different locations. All are working properly and are linked with the CPCB server. The status of the Ambient Air Quality at these locations is as follows:</p> <ol style="list-style-type: none"> <li>The concentration of PM10 exceeded the standard limit of 100 <math>\mu\text{g}/\text{Nm}^3</math> in the month of January to June, 2021 and Nov., 2021 for Anpara Colony near Auri More.</li> <li>The limit was exceeded in Anpara Admin Building near Bajrang Nagar for the months of January to May, 2021 and Nov., 2021.</li> <li>At Anpara DTPS Admin Building near Coal Handling Plant (CHP), the concentration of PM10 was high in the months of January, March, April, May, September and November, 2021. (Refer Appendix- I)</li> </ol>																						
10.	<b>CAAQMS installed by TPPs in Sonbhadra</b>	<b>Complied</b>	<table border="1"> <thead> <tr> <th>Name of Industry</th> <th>No. of CAAQMS installed</th> </tr> </thead> <tbody> <tr> <td>M/s UPRVUNL Anpara</td> <td>01</td> </tr> <tr> <td>M/s UPRVUNL Opra</td> <td>03</td> </tr> <tr> <td>M/s NTPC Rihand</td> <td>03</td> </tr> <tr> <td>M/s NTPC Shaktinagar</td> <td>02</td> </tr> <tr> <td>M/s NCL Khadia</td> <td>01</td> </tr> <tr> <td>M/s NCL Bina</td> <td>01</td> </tr> <tr> <td>M/s NCL Kakri</td> <td>01</td> </tr> <tr> <td>Hindalco Industries Ltd., Renusagar</td> <td>01</td> </tr> <tr> <td>Hindalco Industries Ltd., Renukoot</td> <td>01</td> </tr> <tr> <td>M/s Lanco- Anpara Power Ltd.</td> <td>01</td> </tr> </tbody> </table> <p>All the CAAQMS are using four parameters viz.</p>	Name of Industry	No. of CAAQMS installed	M/s UPRVUNL Anpara	01	M/s UPRVUNL Opra	03	M/s NTPC Rihand	03	M/s NTPC Shaktinagar	02	M/s NCL Khadia	01	M/s NCL Bina	01	M/s NCL Kakri	01	Hindalco Industries Ltd., Renusagar	01	Hindalco Industries Ltd., Renukoot	01	M/s Lanco- Anpara Power Ltd.	01
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			SO <sub>2</sub> , NO <sub>x</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> to assess the air quality. The details of the Air Quality for Sep., 2021 regarding the above mentioned TPPs/industries are enclosed as Appendix- II.
11.	<b>Continuous operation of ESPs and installation of OCEMS connected with the CPCB/SPCB server</b>	<b>Complied</b>	<b><u>M/s Anpara TPS</u></b> 1. During the period from July to Sep., 2021, 11 SMS alerts were generated. 2. Stack Emission: Due to shut down of units, ESPs went out of order, changes in the ESP field and coal mills, soot blowing, load variation etc. occurred. Immediate action was taken to normalize the plant and to lower down the PM-value of Unit No 1, 2, 3, 4, 5 below 100 mg/Nm <sup>3</sup> & 6, 7 below 50 mg/Nm <sup>3</sup> .
		<b>Complied</b>	<b><u>M/s Obra TPS</u></b> Electronic Precipitators (ESPs) have been upgraded and their effective functioning is being ensured. OCEMS is installed in all the operational stacks and connected with the CPCB server for online monitoring of data. During the period from July to Sep., 2021, 39 SMS alerts were generated. PM level is being maintained within the prescribed limit of 100 mg/NM <sub>3</sub>
		<b>Complied</b>	<b><u>M/s Lanco Anpara Power Ltd.</u></b> Effective operations of ESPs are ensured. OCEMS is installed in all the operational stacks and connected with the CPCB server. During the period from July to Sep., 2021, no SMS alerts were generated. The unit has stated that PM level is within the prescribed limit of 50 mg/NM <sub>3</sub> .
		<b>Complied</b>	<b><u>NTPC Rihand</u></b> 1. It has installed 06 ESPs (one for each unit) and OCEMS in all stacks and these are connected with the CPCB server. 2. During the period from July to Sep., 2021, 119 SMS alerts were generated. 3. The alerts appeared on few occasions in EQMS due to technical problems in the sensors of the monitoring equipment. It has been reported by the unit that the actual quality of the treated effluent was always well below the prescribed limits. 4. The PM alerts mainly appeared in the OCEMS during unit light-up after shut down and its stabilization. The alerts appeared intermittently for a very short period and not for a long duration.
		<b>Complied</b>	<b><u>NTPC Shaktinagar</u></b> Effective operations of ESPs are ensured. OCEMS

			<p>was installed in all the operational stacks and connected with the CPCB server. During the period from July to Sep., 2021, 242 SMS alerts were generated.</p> <p><b>Complied</b> <u>M/s Hindalco Industries Ltd., Renusagar</u>  1. OCEMS has been installed on Sep., 2015 in all the boilers/Stacks &amp; ETP. The emission level is well within prescribed limit of 100 mg/NM<sup>3</sup>.  2. During the period from July to Sep., 2021, 27 SMS alerts were generated for which the industry has replied to the CPCB.</p> <p><b>Complied</b> <u>M/s Hindalco Industries Ltd., Renukoot</u>  1. The unit has installed OCEMS and ESP in 04 boilers which are connected with the CPCB server. During the period from July to Sep., 2021, 27 SMS alerts were generated.  2. Industry has achieved an emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of all baking furnaces.</p> <p><b>Complied</b> <u>M/s Grasim Industries Ltd. (Chemical Division), Renukoot:</u> The unit has installed OCEMS. During the period from July to Sep., 2021, 26 SMS alerts were generated for which the industry has replied to the CPCB.</p> <p>The details regarding the SMS alerts generated on OCEMS installed in TPPs/industries for monitoring of emission during the period from July to Sep., 2021 is enclosed as Appendix- III.</p>
12.	Utilization of Bauxite Residue (BR) (Red Mud)/ Flyash in Hindalco Industries Ltd., Renukoot	Partially Complied	<p><u>M/s Hindalco Industries Ltd., Renukoot</u>  1. Approx. 487196 MT Red mud which is 93% of the total red mud generated has been supplied to various cement manufacturers by rail/road during April, 2021 to September, 2021 while the remaining 7% is disposed in dumpsites/landfills.  2. DFO, Obra has granted permission vide letter dated 10.05.2021 for conducting site suitability study for filling of red mud in 6-7 hectare of void stone quarry. M/s Genstru, Pune has completed the study and the final report is awaited.  3. No leachate has been established.  4. 04 Piezo wells have been installed.</p>
13.	Installation of RO Plant and their actual operationalization	Complied	<p>Anpara TPS has installed 08 RO plants and all are operational. Each has capacity of 1000 litre/hr and supplying drinking water from Jan., 2015 onwards to Auri More (Anpara Colony), Kashi More, Lal Tower, Belwadah near pipeline, Belwadah near Semritat and Kunda Bharti- 1, 2 &amp; 3 villages.</p>

	<b>Complied</b>	<b>Obra TPS</b> has installed 11 RO Plants to provide pure drinking water in nearby areas and all are functioning properly. It is also supplying drinking water through tankers to nearby residents whenever required. No information has been given about the villages.
	<b>Complied</b>	<b>M/s Lanco Anpara Power Ltd.</b> has installed 07 RO plants and all are operational. Each has capacity of 1000 litre/hr and supplying drinking water since Oct., 2020 to Dibulganj, Auri, Anpara, Pipri-1, Pipri-2, Sonwani-1 and Sonwani-2 villages.
	<b>Complied</b>	<b>NTPC Rihand:</b> 04 RO Plants have been installed near the plant area and it is also supplying water in nearby areas through water tankers. No information has been given about the villages.
	<b>Complied</b>	<b>NTPC Shaktinagar:</b> 06 RO Plants have been installed near the plant area and it is also supplying drinking water in steel tankers in village Paraswar Raja.
	<b>Not Complied</b>	<b>M/s Hindalco Industries Ltd., Renusagar:</b> No RO plant has been installed. Drinking water is supplied through pipeline from Renusagar to Garbandha & Partaliya villages.
	<b>Complied</b>	<b>M/s Hindalco Industries Ltd., Renukoot:</b> It has installed 13 RO Plants in Kushma & Kirvani villages and is providing pure drinking water since Jan., 2015. It is also supplying drinking water through stainless steel tankers to the villages.
	<b>Complied</b>	<b>M/s Grasim Industry, Renukoot:</b> It has installed 04 RO Plants of 5000 litre/hr capacity in Khairahi- 1 & 2, Gambhirpur, Kushmaha- 2 villages and all are operational.

**B. Coal Mines of M/s Northern Coalfields Limited (NCL)**

S.No.	Issues/ Directions by the Hon'ble NGT	Compliance Status	Updated Progress
1.	Backfilling of active mines situated within 50 km from a power plant by using at least 25% fly ash	Not Complied Due to technical difficulty	Mixing fly ash with coal mine overburden has serious safety implications which were deliberated in the 44 <sup>th</sup> meeting of the Standing Committee on Safety in coal mines held on 12.02.2020. As per its decision, a work order has been issued on 10.07.2021 to the IIT-BHU for carrying out a scientific study of the stability of overburden (OB)

			dumps mixed with fly ash in running/active mines of NCL Bina, Dudhichuwa and Khadia. The outcome of the study is awaited.
2.	Bringing down ash content to equal to or below 34% by the NCL	Partially Complied	As per the information received about all the mines of the NCLs (except NCL Kakri Project) from RO, Sonbhadra, the ash content in the coal dispatched from all the units is below 34%, thus, coal beneficiation is not required.
3.	Control of Air Pollution during coal storage, handling and transportation	Partially Complied	<p><b><u>NCL Krishnashila Project</u></b></p> <ol style="list-style-type: none"> <li>1. Till Sep,2021 40% of coal is transported through rail; 44% through Belt Piped Conveyor (BPC) and the remaining 16% through tarpaulin-covered trucks.</li> <li>2. The 4 MT/annum Coal Handling Plant (CHP) is operational. It is equipped with a silo for the rapid loading of coal onto railway wagons. Throughout the length of the CHP, a cold fog dust suppression system has been provided. The road from coal yard to weighbridge is sprayed with a permanent sprinkling system, while the remaining area is sprayed with 10 mobile water sprinklers (4 with total volumetric capacity of 28 KL and 06 with capacity of 12 KL) and 01 truck-mounted mist gun.</li> <li>3. Dust survey is conducted on regular basis. 18 CCTVs have been put throughout the mine to monitor the operations, dust suppression systems and sprinkling frequency.</li> </ol> <p><b><u>NCL Khadia Project:</u></b></p> <ol style="list-style-type: none"> <li>1. Till Sep,2021,70.70 % of coal has been transported through rail and 29.30 % through tarpaulin-covered trucks.</li> <li>2. It has installed 02 CHP having capacity of 4 MT/annum and 6 MT/annum through which coal is being transported through Merry-Go-Round (MGR) (rail transport). For further increment in the dispatch capacity through rail mode, a wharf wall (railway siding) of 4 MT/annum was expected to be made operational by Dec, 2021.</li> <li>3. Mobile water sprinklers are deployed on haul roads.</li> <li>4. Dust extraction system is operational in the Coal Handling Plant (CHP-Phase-1).</li> <li>5. Fixed sprinklers around coal yard-1.</li> <li>6. Drills are provided with dust extractors.</li> <li>7. Approach road to mines is covered with blacktopping.</li> <li>8. Wetting of Run-of-mine (ROM) coal before</li> </ol>

		<p>crushing in the CHP is done through automatic water sprinklers installed at the receiving pit.</p> <ol style="list-style-type: none"> <li>9. Routine maintenance and periodic overhauling of Heavy Earth Moving Machinery (HEMM) is being done.</li> <li>10. Thick green belts around the mine and colony are maintained.</li> <li>11. Vegetative covers provided on the non-active OB dump.</li> <li>12. For continuous monitoring of particulate matter (PM) levels in the air, it has established one Continuous Ambient Air Quality Monitoring Station (CAAQMS) linked with the CPCB server.</li> <li>13. Truck-mounted mist spray machine and road sweeping machine has been installed (date not revealed).</li> <li>14. Water sprinklers and dust extraction system at the CHP receiving Pit Phase- I has been renovated.</li> <li>15. Approx. 2 km WBM haul road for prevention of fugitive dust emission has been constructed.</li> <li>16. Fixed fogging machine near the coal yard to control dust emission has been installed.</li> <li>17. Biological reclamation through the plantation on 20 hectares dump slope and grassing on the area beside it has been done.</li> </ol> <p><b><u>NCL Kakri Project</u></b></p> <ol style="list-style-type: none"> <li>1. Till Sep., 2021, 57.66% of coal is transported through rail and 42.34% is transported through tarpaulin-covered trucks.</li> <li>2. Dust Suppression system is installed in coal loading silo area, loading and unloading point at the CHP. Coal Stockyard is sprinkled through a firefighting truck. Water sprinkling on haul roads is being done through water tankers.</li> </ol> <p><b><u>NCL Dudhichuwa Project</u></b></p> <ol style="list-style-type: none"> <li>1. Till Sep, 2021, 86.28% of coal is transported through rail and 13.72% through road. Pipe Conveyor transportation is used for internal transportation from CHP to Silo loading of railway wagon.</li> <li>2. 06 tankers with total volumetric capacity of 70KL, 03 tankers of 28 KL &amp; 04 tankers of 22KL are deployed for dust suppression in haul road and coal yard.</li> <li>3. 02 road sweeping machines are deployed for sweeping the colony and industrial road.</li> <li>4. 02 truck-mounted fogging machines are deployed in the mine and colony for</li> </ol>
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			<p>suppression of dust.</p> <p>5. Installation of 01 fixed fogging guns at Warf Wall Siding is in progress.</p> <p><b><u>NCL Bina Project</u></b></p> <p>1. Approx. 85.22% of coal is transported through rail and the remaining 14.78% of coal is transported through road by tarpaulin-covered trucks.</p> <p>2. Fixed sprinklers were fitted at the CHP in August, 2021.</p> <p>3. 02 fixed fog canon machines with a throw of approx. 100 m were commissioned in September, 2021.</p> <p>4. Fixed sprinklers were installed on transportation road of 1.5 km length.</p> <p>5. 02 truck-mounted fogging machines are operational.</p> <p>6. 01 truck-mounted road sweeping machine is operational.</p> <p>7. Mist spraying arrangements in the CHP, crusher &amp; all transfer points have been made.</p> <p>8. 17500 saplings planted within the premises in the year 2020-21.</p> <p>9. 15 mobile water sprinklers are working.</p> <p>10. All drill machines are provided with cyclone dust separator &amp; dust guards.</p> <p>11. One surface miner has been procured to control dust due to drilling &amp; blasting.</p>
4.	Installation of CCTV cameras at strategic locations in the coal mines	Complied	It has been reported that in all the mines of the NCL, cameras have been installed at the exit. No information has been furnished about installation of cameras at other strategic locations.
5.	Management of waste water generated from different processes and achieving ZLD.	Complied	<b>NCL Krishnashila Project:</b> An ETP of 0.4 MLD is operational. It is provided with a collection tank, oil & grease trap, primary settling tank, flash mixer, clariflocculator, sludge tank and drying beds etc. The treated water is reused for sprinkling and horticulture purposes. No water is discharged outside the mine premises. ZLD is being maintained.
		Complied	<b>NCL Khadia Project</b> has installed ETP of 38 MLD capacity. The treated effluent is being reused in dust suppression, firefighting etc. and ZLD is being maintained.
		Partially Complied	<b>NCL Kakri Project</b> has installed an ETP of 27.6 MLD capacity to treat the waste water generated from different sources. The treated effluent from the ETP is used for sprinkling on haul roads and the CHP, washing of dumpers, dozers and light

		<p>vehicles, firefighting and in other service buildings. The remaining water is partly stored at the siltation pond and partly dissipated in the low-lying areas around the mine. No information has been revealed about the quantity and quality of water being discharged outside.</p> <p>It has re-invited bids on GeM Portal for the hiring of a 'Truck Mounted fog canon sprinkler system' to further enhance its water utilization capacity.</p> <p><b>Partially Complied</b></p> <p><b>NCL Dudhichuwa Project</b> has installed an ETP of 30 MLD. Flow meters have been installed at the inlet and outlet of the ETP. Effluent from the CHP and workshop is taken into the collection tank and is pumped to the ETP for treatment and then utilized for dust suppression on haul road using mobile tankers.</p> <p>A proposal for relocation of ETP to avoid flooding during the rainy season has been sent to the civil department. No information has been revealed about achieving ZLD.</p> <p><b>Complied</b></p> <p><b>NCL Bina Project:</b> Waste water generated from different processes after treatment at ETP (i.e., 31.2 MLD capacity) is being re-used for different purposes viz., dust suppression, firefighting, CHP, HEMM etc. ZLD is being maintained.</p>
6.	Fire due to coal overburden/ reject	<p><b>Complied</b></p> <p><b>NCL Krishnashila Project:</b> It has been informed that there has never been an incidence of fire due to coal overburden. The coal yard has sufficient number of fire hydrants to meet any such eventuality. The stock of coal (presently approx. 9000 Ton) is also kept at low height for better air circulation.</p> <p><b>NCL Bina Project:</b> Fire in the coal reject storage generated from Deshaling plant has been extinguished completely.</p>

### C. Stone Crushers

S.No.	Issues/ Directions by the Hon'ble NGT	Compliance Status	Updated Progress
1.	All stone crushers in the Singrauli area have not taken adequate pollution control measures as the level of air pollution in the vicinity of the stone	<b>Partially Complied</b>	In the operational 279 stone crushers, closed metal sheet enclosures have been installed at all the dust emitting points and water sprinkling systems are also installed for dust suppression. As per information given by the RO, Sonbhadra, the environment is very dusty and hazy in the area where stone crushers are situated. This indicates that the several stone crushers are not

	crusher is high and causes a health hazard. Relocation of stone crushers may also be explored.		operating the water sprinkling system and air pollution control systems effectively.  No information has been submitted regarding the air quality either by the industries or by the UPPCB.										
2.	Status of 384 stone crusher units established in Sonbhadra	Partially Complied	<table border="1"> <tr> <td>Total no. of Stone Crusher Units identified</td> <td>384</td> </tr> <tr> <td>Total no. of Stone Crusher Units has installed proper APCS &amp; have CTO from UPPCB</td> <td>269</td> </tr> <tr> <td>Total no. of Stone Crusher Units Applied for CTO</td> <td>01</td> </tr> <tr> <td>Total no. of Stone Crusher Units which have not installed proper APCS &amp; are sealed</td> <td>76</td> </tr> <tr> <td>Total no. of Stone Crusher Units is not in working condition/not applied for CTO/Self- closed/ Dismantled</td> <td>38</td> </tr> </table>	Total no. of Stone Crusher Units identified	384	Total no. of Stone Crusher Units has installed proper APCS & have CTO from UPPCB	269	Total no. of Stone Crusher Units Applied for CTO	01	Total no. of Stone Crusher Units which have not installed proper APCS & are sealed	76	Total no. of Stone Crusher Units is not in working condition/not applied for CTO/Self- closed/ Dismantled	38
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Total no. of Stone Crusher Units is not in working condition/not applied for CTO/Self- closed/ Dismantled	38												

#### D. UPPCB, CPCB & MOEF&CC

S.No.	Issues/ Directions by the Hon'ble NGT	Compliance Status	Updated Progress
1.	The regional carrying capacity of the entire Singrauli region is to be assessed before any expansion scheme concerning the existing industries.	Not Complied	No new expansion of any project/ industries is being allowed in Singrauli (U.P.) region. Assessment of regional carrying capacity of the Singrauli region is yet to be started.
2.	At least three continuous monitoring systems for mercury (Hg) monitoring in the ambient air should be installed at suitable locations in Singrauli area by the industries on Polluters Pay Principle. Besides this, mercury in the surface and groundwater should also be monitored manually once in three months.	Partially Complied	1. Mercury monitoring in the ambient air, soil & groundwater in the area is being done by the NEERI, Nagpur. 2. The assessment of mercury bearing sludge, ground water and soil around the secured landfill (SLF) sites of Chemical Division, Grasim Industries Ltd., Renukoot, Sonbhadra done by the NEERI, Nagpur in the year 2019 revealed that mercury was not leaching from the SLF and not contaminating the groundwater. (Refer Appendix- IV)
3.	Notification of abandoned mines/quarries	-	No information has been furnished about it.

4.	A Joint Committee comprising of MOEF&CC, CPCB, IIT Roorkee and any other member considered necessary may submit a quarterly progress report on recommendation of Expert Committee of NITI Aayog for enhanced utilization of fly ash in various sectors	-	No information has been furnished about it.
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### Recommendations

1. Majority of the Thermal Power Plants (TPPs)/industries located in Sonbhadra district of UP are not utilizing/ disposing 100% fly ash as per the CPCB guidelines. From the aforementioned progress report, it appears that these TPPs/industries have taken certain measures but their adequacy for 100 % utilization/ disposal of fly ash cannot be ascertained for want of relevant information not forthcoming from these TPPs/industries in spite of repeated reminders. The TPPs/industries may be directed to submit its action plan along with quarterly progress report to the Oversight Committee for purposeful and objective monitoring and rendering effective assistance to the Hon'ble NGT.
2. As per the direction of the Hon'ble NGT, the CPCB was required to notify the list of abandoned mines/quarries for being used by the TPPs/industries but from the information received from these TPPs/industries, it appears that no such list has been notified by the CPCB as yet. The CPCB may be directed to notify the same at the earliest.
3. The filling of abandoned coal mines and stone quarries is a key avenue for ash disposal, but there is a substantial delay in processing the requests of the TPPs/industries owing to the necessary conditions of repeated inspections, studies and approvals by different authorities which take a very long time. There is an urgent need to simplify this procedure. For this purpose, a Committee may be constituted under the Chairpersonship of the District Magistrates and all the district level officers of concerned departments as well as Heads of the stakeholder units as members, who should deliberate on this issue and submit its report to the respective departmental heads in the State and the Central Government for revision of the procedure. All the guidelines should be oriented towards giving single-window clearance in a time-bound manner from the district level.
4. The quarterly progress report of the Joint Committee comprising of the MOEF&CC, CPCB, IIT Roorkee and any other member considered necessary for enhanced utilization of fly ash in various sectors viz., mines, roads, cement, industries and bricks etc. along with its

implementation status may be shared with the State and District Level Committees and all stakeholders as well as the Oversight Committee for increasing awareness about the possible alternative uses of flyash.

5. The UPPCB had imposed Environmental Compensation (EC) on the TPPs/industries erring in achieving 100% fly ash utilization for the year 2019-2020. But no information has been provided about any such action being taken by the UPPCB against the continued violation of the Environment Protection (EP) Act and related rules/guidelines by the TPPs/industries. It is pertinent to mention that the Hon'ble Supreme Court has stayed the realization of EC but not granted them immunity from continued violation of the law. Therefore, the UPPCB may be directed to discharge their statutory responsibility in its letter and spirit until these TPPs/industries fully comply with the Environmental Laws in respect of 100% utilization/disposal of fly ash.
6. The TPPs/industries may be directed to share their action plan for protecting the environment as approved by the CPCB to the Oversight Committee along with the quarterly progress report for ensuring timely implementation of the same with a view to save the environment from further deterioration and provide a dignified healthy living to the local people.
7. Online Continuous Emission Monitoring System (OCEMS) and Continuous Ambient Air Quality Monitoring Stations (CAAQMS) have been installed and linked with the CPCB server by all the TPPs/industries for continuous online data transmission to determine the source emissions and effluent discharge. The UPPCB may be directed to submit a monthly analysis report of the air and water quality to the Oversight Committee to facilitate monitoring of the action plan as well as their correlation with the impact on the environment.
8. It was noticed earlier that a natural drain (Morcha Nala) is discharging a huge amount of water into the ash pond at Anpara TPP, which was directed by the Hon'ble NGT to be diverted by the Irrigation Department, UP. After a meeting held under the chairmanship of the Additional Chief Secretary, Department of Irrigation and Water Resource, Govt of UP, a decision has been taken not to divert the Nala but to up-grade the ash dyke. Accordingly, steps have been reported to be taken by the Anpara TPP. In this regard, the UPPCB may be directed to monitor the situation on the ground and send a report to this Committee within three months.
9. As per the compliance report received from the TPPs/industries, Anpara, Obra and Hindalco Industries (Renukoot and Renusagar) are not maintaining Zero Liquid Discharge (ZLD). The UPPCB may be directed to levy EC on them till they achieve ZLD.
10. There is a cluster of 350 stone crusher units in Sonbhadra out of which 279 are operational. In operational stone crushers, closed metal sheet enclosures are installed at all dust emitting

points and a water sprinkling system is also installed for dust suppression. However, it is observed that the environment is very dusty and hazy in the area where stone crushers are situated. This indicates that several stone crushers are not operating the water sprinkling system and air pollution control systems effectively. The District Level Committee may be directed to take note of the prevailing situation and take effective remedial steps within the ambit of environment laws.

11. The Hydrographic/capacity survey and stability study of the Rihand reservoir, which is a source of water including drinking water to the entire area, is pending for a very long time. As a result, the restoration work has not begun as yet. The Additional Chief Secretary, Irrigation Department, Govt. of UP may be directed to expedite the study by making it a regular agenda point in his monthly meeting relating to environmental issues.

The Member Secretary, UPPCB is directed to send this report to the Registrar General, National Green Tribunal, Principal Bench, New Delhi for placing the same before the Hon'ble Tribunal with a copy to the Chief Secretary, Government of Uttar Pradesh for necessary action. The report also be uploaded on the website of the Committee.

14-Jan-22

14-Jan-22

**X** Anant Kumar Singh

Anant Kumar Singh  
Member, Oversight Committee  
Signed by: ANANT KUMAR SINGH

**X** SVS Rathore

Justice SVS Rathore  
Chairman, Oversight Committee  
Signed by: SURENDRA VIKRAM SINGH RATHORE

Jan 14, 2022

*Appendix- I: Ambient Air quality around Anpara TPS*

*Appendix- II: Details of the Ambient Air Quality for the month of Sep., 2021 of some mentioned TPPs/industries*

*Appendix- III: Details regarding the SMS alerts generated on OCEMS installed in TPPs/industries for monitoring of emission during the period from July to Sep., 2021*

*Appendix- IV: Assessment Report of mercury bearing sludge, ground water and soil around the secured landfill (SLF) sites of Chemical Division, Grasim Industries Ltd., Renukoot, Sonbhadra*

Please visit our website: [osngt.upsdc.gov.in](http://osngt.upsdc.gov.in) for more information.

Appendix- I

## Ambient Air quality around Anpara TPS:

S.N.	Month	Anpara Colony near Auri more	Anpara Admin Building near Bajrang Ngar	Anpara DTSPS Admin Building Coal Handling Plant
		PM 10 ( $\mu\text{g}/\text{Nm}^3$ ) (100 $\mu\text{g}/\text{Nm}^3$ )		
1	January, 2021	142.0	227	117.98
2	February, 2021	138.6	182	93.45
3	March, 2021	160.0	144.5	114.7
4	April, 2021	172	214.20	136
5	May, 2021	159.4	188	112
6	June, 2021	183	68.6	46.7
7	July, 2021	58.0	27.1	45.2
8	August, 2021	86	24.4	69.3
9	September, 2021	43	38.2	103
10	October, 2021	76.28	88.2	91.3
11	November, 2021	131.0	158.9	112.3

5631

60

Monthly Average Ambient Air Quality Data of Month September-2021

INDUSTRY NAME	NTPC SHAKTINAGAR								NTPC RIHAND NAGAR											
	Near Vidyut Vihar colony				Near C.W. Pump House				MGR				PUNRVAS				SHIV MANDIR			
CAAQMS STATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Parameter Name	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Permissible Limit	80	80	100	60	80	80	100	µg/m <sup>3</sup>	80	80	100	60	80	80	100	60	80	80	100	60
Monthly Average																				
Sep-21	16.9	18.0	26.9	14.0	17.7	16.7	31.3	19.2	25.7	70.9	45.9	13.4	17.7	32.3	27.1	19.0	13.5	37.2	30.5	18.7

(1)

Monthly Average Ambient Air Quality Data of Month September-2021

INDUSTRY NAME	NORTHERN COALFIELDS LIMITED Bina Project, Bina, Sonbhadra				NORTHERN COALFIELDS LIMITED Kakri Project, Kakri, Sonbhadra				NORTHERN COALFIELDS LIMITED Khadia Project, Khadia, Sonbhadra			
CAAQMS STATION	Bina Project CAAQMS_1_Bina_Radhakrishn,				Kakri Project CAAQMS_1_VTC_Kari_Project				Khadia Project CAAQMS_1_Chaitany_Khadia			
Parameter Name	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Permissible Limit	80	80	100	60	80	80	100	60	80	80	100	60
Monthly Average												
Sep-21	22.88	12.87	24.11	8.36	11.20	36.19	59.91	39.94	9.16	15.4	55.78	27.61

INDUSTRY NAME	Jaypee Chark Industrial Complex (A Unit of Jaiprakash Associates Limited)								Chunar Cement Factory (A Unit of Jaiprakash Associates Limited)											
CAAQMS STATION	Near Main Gate				Near Store				CPP DM Plant				Near Water Storage Tank				TownShip(Near Guest House)			
Parameter Name	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Permissible Limit	80	80	100	60	80	80	100	60	80	80	100	60	80	80	100	60	80	80	100	60
Monthly Average																				
Sep-21	12.63	10.93	56.60	28.46	12.90	10.23	58.95	27.96	15.46	18.41	46.63	24.34	15.6	18.65	44.04	17.51	10.95	14.43	42.11	16.09

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Monthly Average Ambient Air Quality Data of Month September-2021

INDUSTRY NAME	Hindalco Ind. Ltd. (Aluminium Division)				UPRVUNL Obra, Thermal Power Plant											
CAAQMS STATION	Renukoot				AAQMS 1				AAQMS 2				AAQMS 3			
Parameter Name	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Permissible Limit	80	80	100	60	80	80	100	60	80	80	100	60	80	80	100	60
Monthly Average																
Sep-21					40.50	4.26	125.80	28.93	20.87	31.89	185.50	133.17	19.39	17.96	116.46	188.99

INDUSTRY NAME	Hindalco Ind. Ltd. (Power division)				Inanco Anpara Power Ltd. Anpara				UPRVUNL, Anpara, Sonbhadra			
CAAQMS STATION	Renuagar				central store				AAQMS-1			
Parameter Name	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>x</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Permissible Limit	80	80	100	60	80	80	100	60	80	80	100	60
Monthly Average												
Sep-21	20.79	3.18	25.97	16.45	17.74	10.94	36.85	10.18	12.56	12	17.3	7.56

Note\*: Hindalco Renukoot Ltd.(Aluminium Division)-CAAQMS Details will be send tomorrow



सन्दर्भ संख्या

Ref No. ....

To,

Oversight Committee.  
 NGT, Uttar Pradesh,  
 Lucknow.

दिनांक

Date .....

**Subject:** Regarding SMS alerts generated on OCEMS (Online Continuous Emission Monitoring System) installed in Industries for Monitoring of Emissions during period July -2021to September-2021.

Sir,

Please refer the subject cited above. In this context, the SMS alerts received towards OCEMS installed in respective industries is listed below:-

S.No.	Name of Industries	No. of SMS Alert Received Between July-2021 to September-2021	Cause of SMS Alerts
01	M/s NTPC Shaktinagar, Sonbhadar	242	
02	M/s Grasim Industries Ltd, Power Plant Division, Renukoot, Sonbhadra	26	Comment have been done on dated:17 July 2021 i.e Malfunctioning of Hopper level Switch caused tripping of ESP field # 1 & 20 Sep 2021, hence emission has crossed above Permissible limit & Dated: 20.09.2021 i.e Emission crossed because of Standby of ID Fan Charge-Over
03	M/s NTPC Rihand, Rihandnagar, Sonbhadra	119	Comment have been done on Dated: 18.08.2021, i.e Alert have been appeared during light up after shut down and synchronization, dated:17.08.2021 i.e. Alert have been appeared due to unit tripping on BCP problem, Dated:06.08.2021 i.e. Alert have been appeared during light up after shut down and synchronization, 04.08.2021 i.e. Alert received bec. Unit was under Shut Down and sensor was in maintenance, dated:30.7.2021 i.e Alert appeared due to maintenance of CEMS, dated:13.07.2021 05.07.2021 i.e. Alert have been appeared during light up after shut down and synchronization.
04	M/s Hindalco Industries Ltd., Renukoot, Sonbhadra	27	In July 2021- 10 Nos of alerts generated during preventive maintenance In Boiler #2. In August 2021 In -06 Nos. of alert generated due to ID Tripped in Baking Furnace #6. In September 2021-02 Nos. of alerts generated due Plant was tripped and due to ESP

कार्यालय : मकान संख्या 162, उत्तर मोहाल (निकट चण्डी होटल)  
 रावर्टसगंज, सोनभद्र-231216  
 ई-मेल : rosonbhadra@uppcb.com

Office : House no. 162, Uttar Mohal (Near Chandi Hotel)  
 Robertsganj, Sonbhadra-231216  
 E-mail : rosonbhadra@uppcb.com

			transformers of FCB Calciner tripped in Calciner #2 and 03 Nos. of Alets generated because of power fluctuation and low air pressure in Baking Furnace #4.
05	M/s Lanco Anpara Thermal Power Plant, Anpara, Sonbhadra.	00	No SMS alert had been received between July-2021 to September-2021
06	M/s Jaypee Churk Industrial Complex, Churk, Sonbhadra	00	No SMS alert had been received between July-2021 to September-2021
09	M/s Hindalco Industries Limited, Renuagar, Sonbhadra	27	In July 2021 No SMS alert had been received. In Aug-2021 -10 Nos. of SMS alerts received. Due to disturbance in ash conveying line. In September 2021-17 Nos. of SMS alert received, due to Boiler #9 was taken shut down as a result emission accumulated.
10	M/s Birla Carbon, Renukoot, Sonbhadra	00	No SMS alert had been received during July-2021 to September-2021.
11	M/s Chunar Cement Factory (A Unit of Jai Prakash Associates Ltd.)	00	No SMS alert had been received between July-2021 to September-2021.
12	M/s UPRVUNL, Anpara, Sonbhadra	11	Probable cause of exceedence of PM value had been mailed to CPCB & Service Provider.
13	M/s UPRVUNL, Anpara, Sonbhadra	39	In July 2021-02 No. of SMS alerts received in Unit 11 & 09. In August 2021-35 No. of SMS alert received in Aug-2021. In September 2021-02 No. of SMS alerts received in Unit 10 & 11. Probable cause of exceedence of PM value had been mailed to CPCB & Service Provider.
14	M/s Ultratech Cement Limited Unit Dalla Cement, Dalla, Sonbhadra	00	No SMS alert had been received regarding exceeding of PM between July-2021 to September-2021.

Regards,

(Dr. T.N. Singh)  
Regional officer

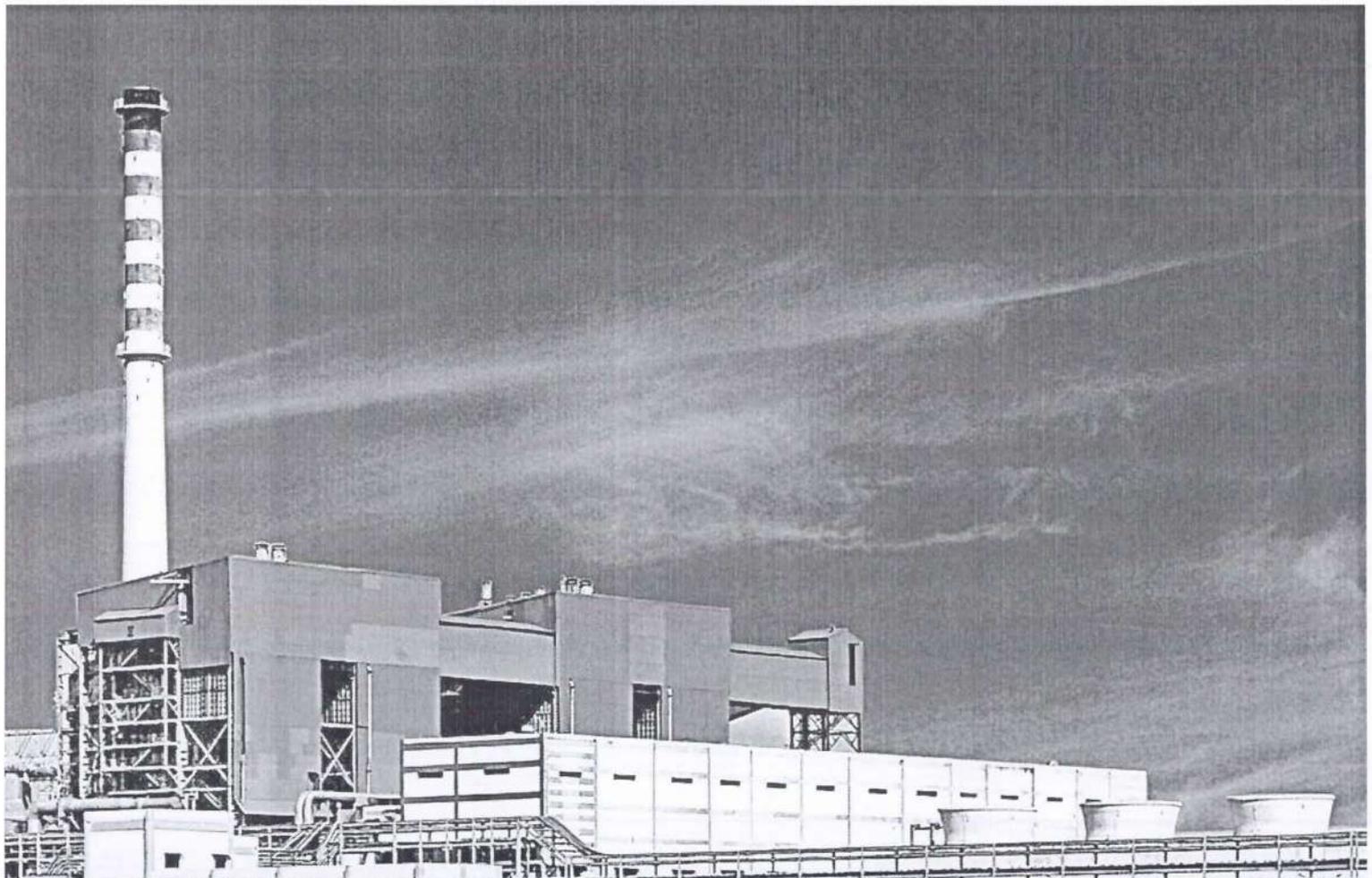
Copy To:

1. CEO 2, Uttar Pradesh Pollution Control Board, Lucknow for Kind information.

Regional officer

# ASSESSMENT OF THE MERCURY BEARING SLUDGE, GROUNDWATER AND SOIL AROUND THE SECURED LANDFILL SITES OF CHEMICAL DIVISION, GRASIM INDUSTRIES LTD, RENUKOOT, SONEBHADRA DIST., UP

Sponsor  
Chemical Division, Grasim Industries Ltd.  
Renukoot



CSIR-NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE  
HYDERABAD ZONAL CENTRE  
UPPAL ROAD, HYDERABAD-500007

# PROJECT PERSONNEL

CSIR- NEERI, HYDERABAD ZONAL CENTER

DR. T.V.B.P.S. RAMA KRISHNA

DR. MEGANATHAN. P. R

MR. S. HARIRAMA KUMAR

MR. SHAIK FAREED

MS. P. PRIYANKA

MR. MADHU

MS. AKANKSHA

MR. S. RAHUL

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MR. K. YADAGIRI

MR. M. SURESH

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MS. YASHASWITHA

MS. YESHWITHA

MS ANJANI MAMIDALA

MR. MOHAMMED IBRAHIM ALI

## PROJECT LEADER(S)

MRS. MORAMI KALITA

MS. RAMYA SANAM

DR SHAIK BASHA

## PROJECT COORDINATOR

DR. S.CHANDRASEKHAR

DIRECTOR, CSIR-NEERI, NAGPUR

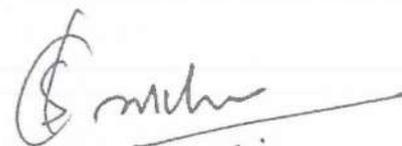
**FOREWORD**

Grasim Renukoot Chemical Division (GRCD), a unit of M/s Grasim Industries Ltd. is situated in Renukoot, District, Sonbhadra (U.P.) about 160 km from Varanasi. The mercury brine sludge was produced during the manufacturing of caustic soda and the same was disposed in a secured landfill within their premises. From May 2011 onwards Caustic soda production by mercury cell was stopped, as per the directives of Govt. of India. The Industry has three capped secured landfill sites (SLFs) which have been closed as per the CPCB guidelines.

UPPCB has issued the letter no. H52509 dated 02.09.2020 stating the NGT case that directed GRCD, Renukoot to undertake the study for assessing the chemicals of concern with general parameters and heavy metals in mercury containing sludge, groundwater and soil surrounding the SLFs. In this regard, M/s GRCD, Renukoot retained CSIR-National Environmental Engineering Research Institute (NEERI) to undertake the study for assessment of the parameters of concern, heavy metals in mercury containing sludge, groundwater and soil surrounding the SLFs.

CSIR-NEERI had carried out the survey of the landfill site, groundwater and soil in the study area covering 3 km buffer around Grasim Industries during October 2020. The analysis results stated that the values for mercury were within the limits of BIS for all the samples around the landfill site. It was also inferred from the leaching tests that mercury does not leach from the landfill site of Grasim Industries, Renukoot.

The help and cooperation extended by officials of Grasim, Renukoot and the people in and around the villages is gratefully acknowledged.



**(S. Chandrasekhar)**

**Director**

April 2021



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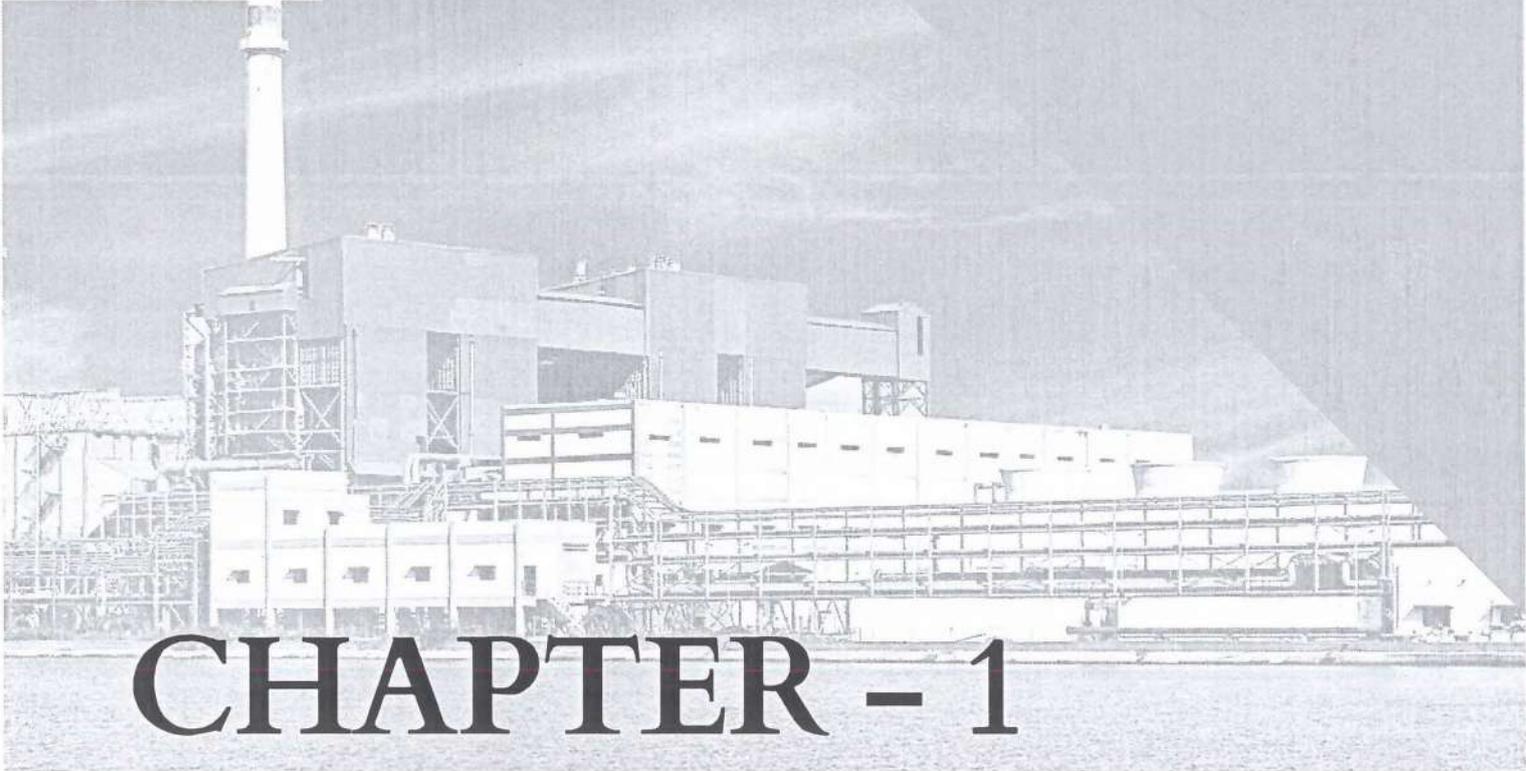


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# CHAPTER - 1

# INTRODUCTION

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## 1.0 PREAMBLE

Grasim Renukoot Chemical Division (GRCD), a unit of M/s Grasim Industries Ltd. is situated in Renukoot, District – Sonbhadra (U.P.), about 160 km from Varanasi. This plant was previously operated by M/s Kanoria Chemicals & Industries Ltd. (KCIL). Later the plant was acquired by Aditya Birla Group. Grasim is the largest Caustic Soda producer in India. The mercury brine sludge was produced during the manufacturing of caustic soda and the same was disposed in a secured landfill within their premises. From May 2011 onwards Caustic soda production by mercury cell was stopped, as per the directives of Govt. of India.

The Industry has three capped secured landfill sites (SLFs). Three SLFs were capped and closed as per the CPCB guidelines. The three closed SLFs were filled with the sludges containing Mercury (Hg), which was generated then in the mercury cell, also known as Castner-Kellner process.

UPPCB has issued the letter no. H52509 dated 02.09.2020 referring to the NGT case and directed GRCD, Renukoot to undertake the study for assessing the chemicals of concern, general parameters and heavy metals in mercury containing sludge, groundwater and soil surrounding the SLFs. In this regard, M/s GRCD, Renukoot has requested CSIR-NEERI HZC to undertake the study for assessment of the parameters of concern, heavy metals in mercury containing sludge, groundwater and soil surrounding the SLFs. Accordingly, the objectives and scope of work of the study were proposed as follows:

## 1.1 Objectives

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- To assess the general parameters, heavy metals of the mercury containing sludge in the SLFs
- To understand the leaching characteristics of the mercury containing sludge by conducting TCLP tests
- To assess the groundwater quality around the landfill sites of GRCD To assess the soil quality around the SLFs
- Identification of potential impacts due to the existing SLF on the major environmental components viz., groundwater, soil etc
- To delineate environmental management measures

## 1.2 Scope of Work and Methodology

- Delineation of the study area on the Survey of India Toposheet (1:50,000 scale) demarcating the secured landfill (SLF) site
- Establishment of the well network for groundwater level measurement and groundwater quality assessment around the SLF site
- Collection of the sludge from the landfill site of GIL
- Assessment of the leaching characteristics of sludge of landfill site by TCLP (Toxicity Characteristic Leaching Procedure) procedure to assess the hazardous nature of the sludge
- Leaching experiments were set up at the laboratory level to understand the leaching characteristics of sludge in terms of heavy metals
- Collection and analysis of groundwater samples in and around the landfill site for groundwater quality parameters (Physico-chemical and Heavy metals) as per standard protocols (APHA protocol) for major cations, anions (pH, EC, TDS, Total alkalinity, Ca, Mg, Na, K, Cl, SO<sub>4</sub>, PO<sub>4</sub>, NO<sub>3</sub>), oil and grease and heavy metals (Al, B, Cd, Co, Cr, Fe, Mn, Ni, Pb, Zn, Hg and As).
- The soil samples in the study area were collected from the identified locations. Soil samples were analyzed for umber grid pH, Conductivity, Soil permeability, Texture, Particle Density, Bulk density, Porosity, Water holding capacity, Soluble Cations and anions, organic carbon, Exchangeable Sodium percentage, Exchangeable cations, CEC, available N, P, K and heavy metals specifically mercury to understand the soil quality.
- A detailed assessment of Soil quality and Groundwater level and quality status was carried out and reported for the study area to assess the leaching characteristics of landfill site
- The remedial measures for groundwater and soil contamination shall be recommended, if necessary

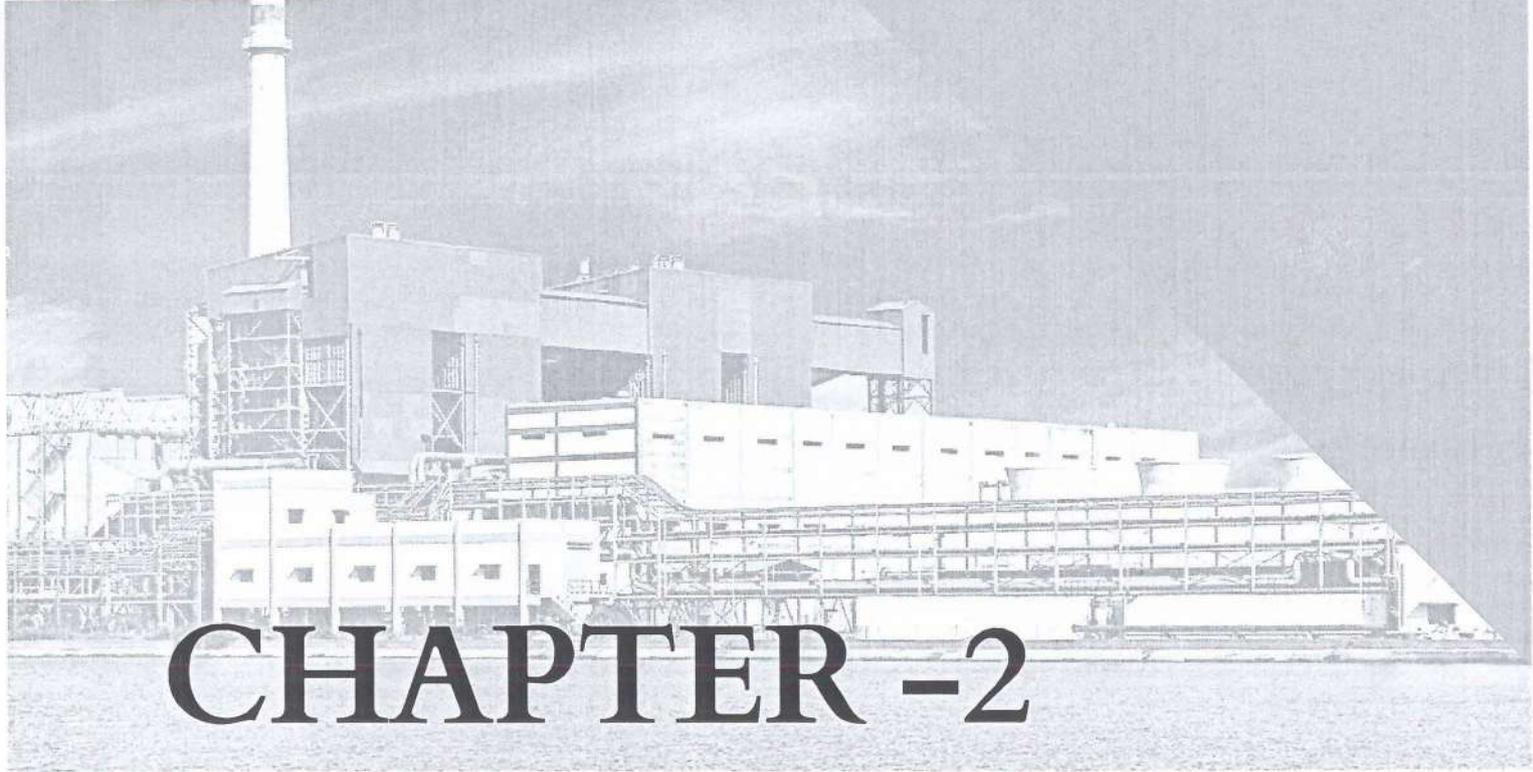
## 1.3 Layout of the report

The report is presented in the following structure:

- Chapter 1: Introduction (this chapter)
- Chapter 2: Project Description
- Chapter 3: Description of Study Area
- Chapter 4: Environmental Quality Status around the Secured Landfill Site
- Chapter 5: Conclusion and Recommendations



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# CHAPTER -2

# PROJECT DESCRIPTION

## 2.0 Introduction

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### 2.1 Caustic Soda

The installed production capacity for caustic soda is 353 TPD. The main raw materials for the caustic soda manufacture are power and common salt. The power is received by GRCD through 132 KV transmission line directly from Rihand Power Station and also from our 2 x 25 MW CPP and salt is procured from Salt works in Gujarat. The solution of salt in water is prepared and is purified by addition of sodium carbonate, barium carbonate, caustic soda etc. The calcium and magnesium impurities are precipitated and removed by settling and filtration from the process fluid. The clarified brine is made ultrapure by passing through polish brine filter and Ion exchange column before being fed to the electrolyzers which consists of anode segment and cathode segment separated by a high-performance membrane. DC current coming from Rectifier then flows from anode to Cathode and after electrolysis of Ultrapure brine, it decomposes into sodium and chlorine ions. Sodium ions pass through the membrane and goes to cathode side and combine with water to form Caustic soda (NaOH) and Hydrogen is liberated. The chloride ions which remain in the anode side combine to form chlorine gas which is then sent out for drying and liquefaction. The installed production capacity of the plant for different products is shown in Table 2.1. The reaction is shown below:



Table 2.1: Production capacities - GIL, Renukoot

Sr. No.	Product	UOM	Consent Capacity
1	Caustic Soda Lye	TPM	10950
2	Liquid Chlorine	TPM	8630
3	Hydrochloric acid	TPM	2107
4	Stable Bleaching Powder	TPM	5400
5	Aluminium Chloride	TPM	1500
6	Poly Aluminium Chloride	TPM	6000
7	Chlorinated paraffin	TPM	1800
8	Hydrogen	TPM	275

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The hydrogen so produced is used as fuel in Hydrogen fired boiler, caustic concentration plant, in the synthesis of Hydrochloric acid, and bottling in cylinders. Hydrogen is highly inflammable; therefore, proper care is taken to keep it away from the fire. No other chemical reactions of dangerous nature occur during caustic soda manufacture. The depleted brine from the electrolyzers is saturated again by dissolution of common salt. The product caustic soda is collected in production tank and then transferred to main storage tank.

## 2.2 Liquid Chlorine

The chlorine is a by-product of caustic soda plant. After its dissociation from common salt in the electrolyser it is taken to the liquefaction section where it is first scrubbed with water to remove impurities of Sodium Chloride in scrubbing towers. So washed chlorine gas, which is saturated with water vapours, is dried by contact with sulphuric acid in drying towers. In the liquefaction operation of chlorine no chemical reaction takes place as such, but care is taken to ensure that chlorine is absolutely dry after the drying operation. This is being done by constant monitoring of the concentration of sulphuric acid in the drying towers and the chlorine compressors, which are checked at every two hour interval and proper operating record is maintained.

After compressing the gas to  $3 \text{ kg/cm}^2$  pressure, it is liquefied in refrigeration system by cooling it to about minus  $10^\circ\text{C}$ . The liquefied product is taken to the main storage tank. Grasim is having capacity of storing 500 MT of liquid chlorine in five number storage tanks, with 100 MT capacity of each which are properly insulated and dyked. The flow diagram of Chlorine plant is depicted in Figure 2.1. All rules regulations of department of Explosive are followed for safe storage of Liquid Chlorine.

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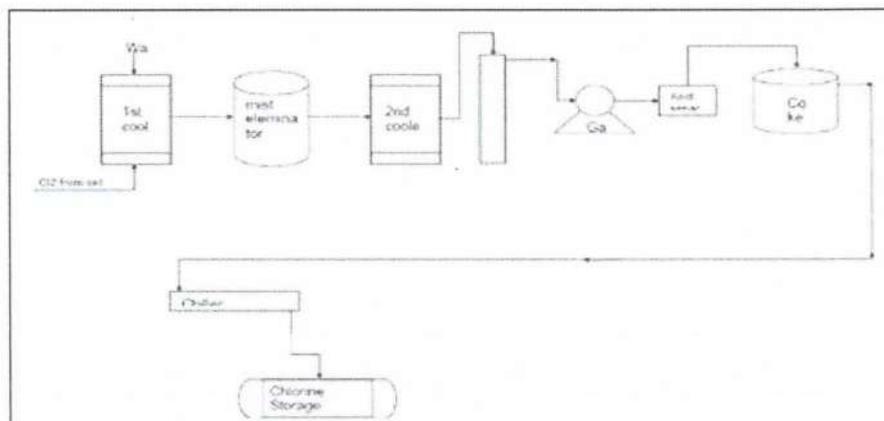


Figure 2.1: Flow Diagram - Chlorine Plant

### Hydrochloric Acid

Hydrochloric acid is also a by-product of caustic soda manufacturing plant. The scrubbed chlorine from scrubbing tower is contacted at high temperature with hydrogen which is also a by-product of caustic soda unit, to form hydrochloric acid vapours which after absorbing in water make 33% (w/w) of Hydrochloric Acid. Hydrochloric Acid so produced is stored in storage tanks. Hydrochloric acid is also produced as a by-product in the CPW plant where unreacted chlorine is absorbed in a graphite absorber where water is circulated to form HCl. The process flow diagram of Hydrochloric Acid plant is depicted in Figure 2.2.

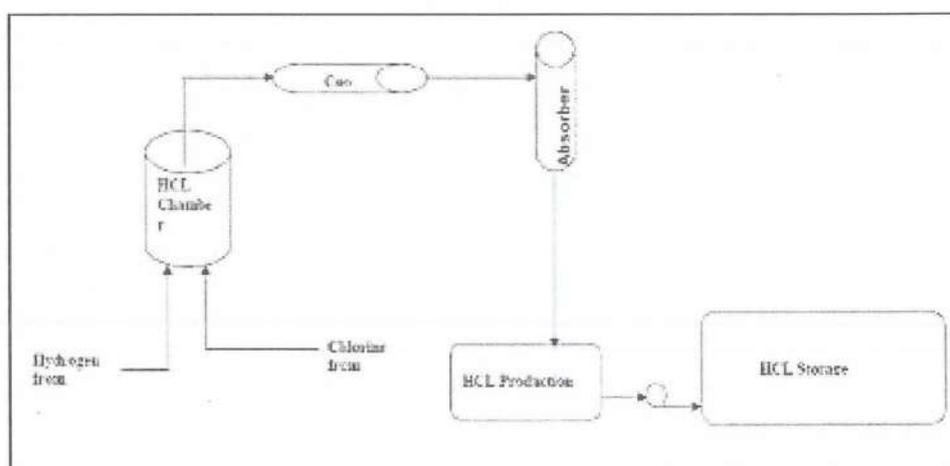


Figure 2.2: Flow Diagram - Hydrochloric Acid

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### 2.3 Caustic Soda Flakes

Caustic Soda produced in caustic soda unit has concentration of 50% (w/w) only and is in solution form. The 50% water is evaporated by application of heat by burning of hydrogen gas along with furnace oil. After concentrating the lye to about 99% it is cooled by indirect method with water to make its flakes, which are packed in HDPE bags.

### 2.4 Stable Bleaching Plant (SBP)

The main basic materials used for bleaching powder production are quick lime, liquid chlorine. About 95% pure chemical lime is purchased which is slacked with water to make calcium hydroxide with 1% moisture. Slacked lime is allowed to mature for some time and classified for bigger particles in an air classifier. The  $\text{Ca(OH)}_2$  so produced is reacted with liquid chlorine in chlorine drums under vacuum so that the reaction water is removed simultaneously. The reaction is as follows:



After complete chlorination of hydrated lime, the product is packed in HDPE bags/Airtight containers. The process flow diagram of Stable Bleaching plant is presented in Figure 2.3.

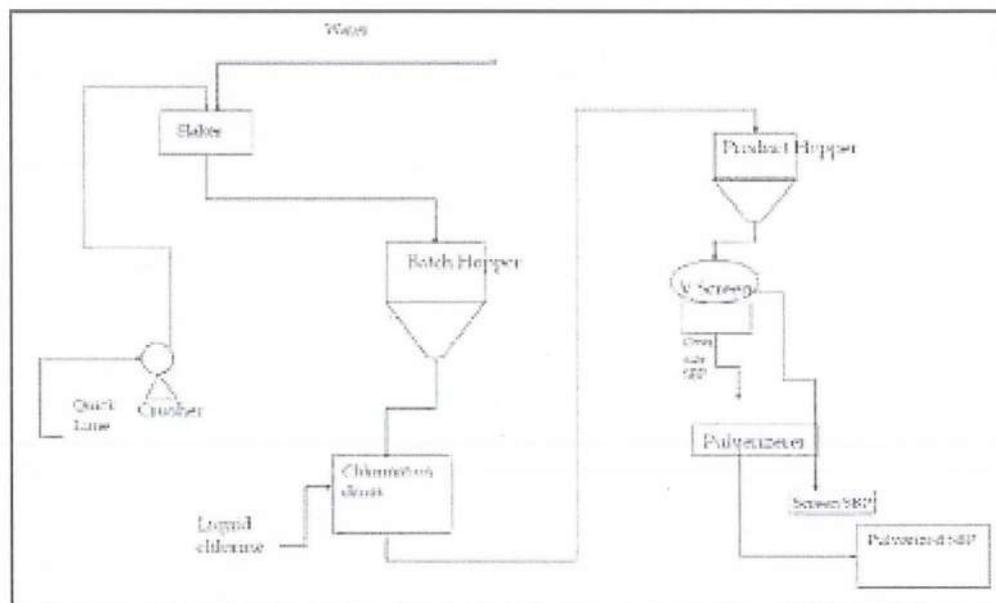


Figure 2.3: Flow Diagram - Stable Bleaching Powder

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## 2.5 Aluminum Chloride

Aluminium Chloride is manufactured by passing Chlorine Gas over molten Aluminium metal. Aluminium ingots are charged in brick lined MS vessel, called reactor and melted by means of gas or any other heat source. Chlorine gas is then passed over it. Aluminium Chloride vapours come out and condense in M.S. hollow chamber called condenser. It is discharged from the condenser at a regular interval in a specially made container and transferred to the main silo. The reaction being exothermic, initially metal is heated but later on reaction is auto thermal and melting of aluminium ingot is self-sustaining. Excess heat is removed by means of cooling water spread over the reactor. Suction blowers continuously suck un-reacted Chlorine through series of scrubbing towers having water, lime and caustic solutions.

The product is then crushed and screened and packed in PVC lined HDPE bags and/or 200 Litres open mouth M.S. Drums. The process flow diagram of Aluminium Chloride plant is depicted in Figure 2.4.

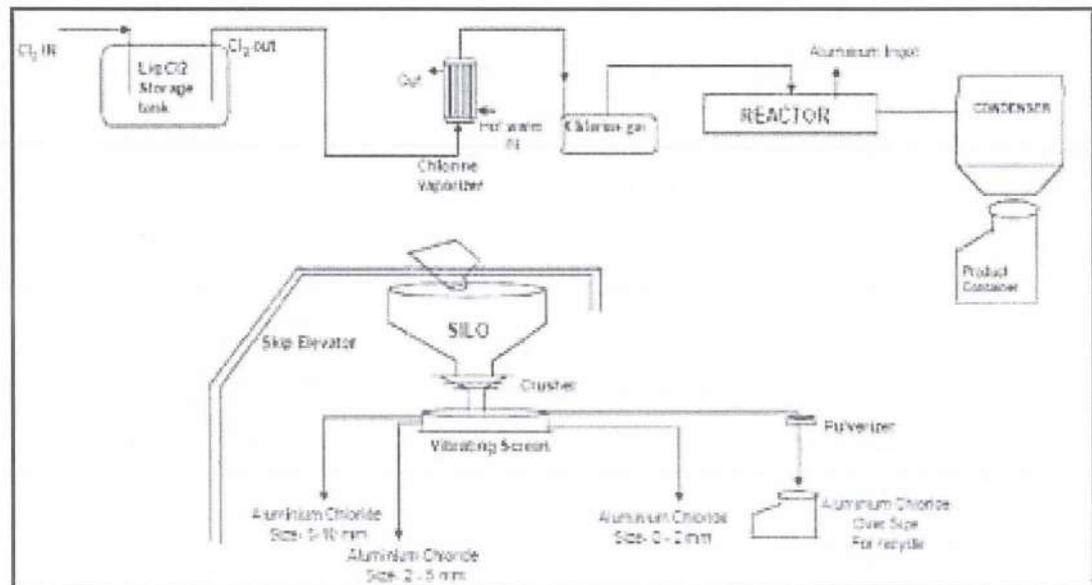


Figure 2.4: Flow Diagram - Aluminium Chloride

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## 2.6 Hydrogen Bottling

The hydrogen purified by cooling and filtration is fed to hydrogen bottling plant. The before bottling it, is further purified to make it Caustic soda free by using water spray. The hydrogen, so purified is compressed in hydrogen compressors to about 150 Kg/cm pressure and bottled in hydrogen bottles approved by CCE.

## 2.7 Poly – Aluminum Chloride

Poly-aluminium Chloride is produced by high temperature (160°C) and high pressure (5 to 6 bar) reaction between Hydrochloric Acid (32% (w/w) approx) and Hydrated Alumina (62% (w/w)  $Al_2O_3$  approx) as shown below:



HCl is charged in a glass-lined reactor at room temperature and then hydrated Alumina is charged in the reactor. Reactor is then closed and contents of the reactor are heated by steam to initiate the reaction. Reaction is exothermic and reactor temperature is maintained at 160°C for 4 to 6 hours, depending on acid strength and active alumina content in reactor feed material, to form Poly-Aluminium Chloride (PAC) slurry. PAC slurry is cooled to 110°C and is discharged from the reactor and cooled to nearly 70°C in a heat exchanger. PAC slurry is filtered through a filter press at a temperature not less than 50°C for easier filtration to obtain PAC product. The process flow diagram of Poly Aluminium Chloride plant is depicted in Figure 2.5.

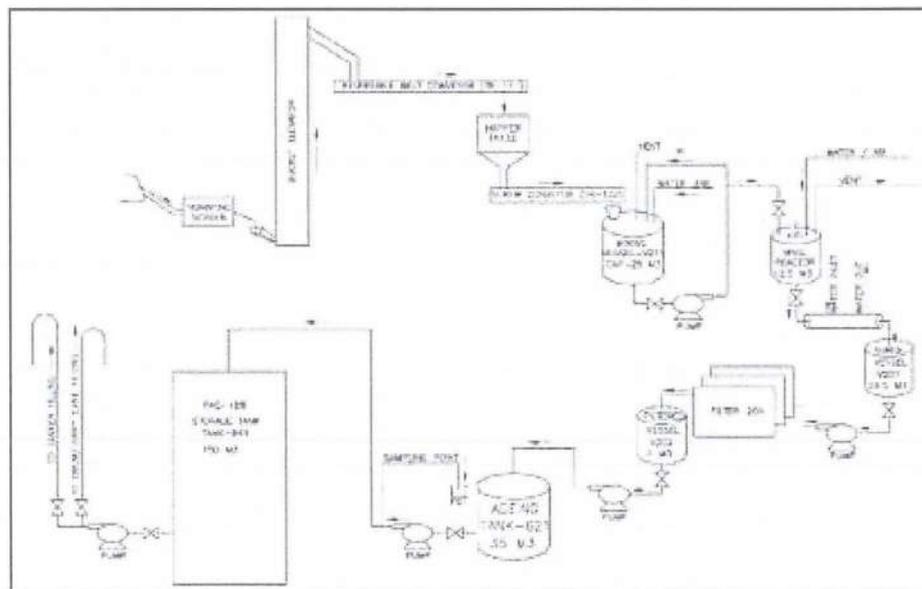


Figure 2.5: Flow Diagram – Poly Aluminium Chloride

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## 2.8 Chlorinated Paraffin Wax

Chlorinated Paraffin wax is produced by chlorination of liquid paraffin wax. The chlorination is carried out in a lead lined reactor where chlorine is passed through a sparger at the bottom of the reactor. HCl is produced as a by-product. During reaction un-reacted chlorine is led to graphite absorber where water is circulated to form HCl.

## 2.9 Electricity Generation

Thermal Power is generated by burning coal in IRCFC boiler generating high pressure steam and passing through the turbo generator of 2 x 25 MW capacities. The generated electricity is at 11 KV where from it is distributed to our Chemical plant for various uses. The process flow diagram of power generation plant and steam generation plant is depicted in Figures 2.6 & 2.7.

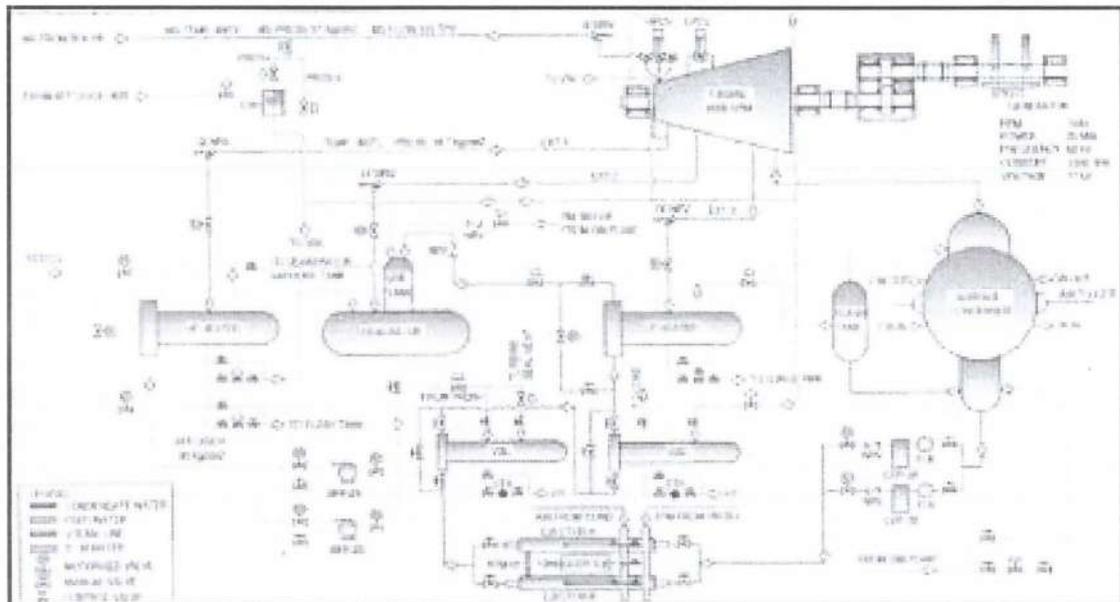


Figure 2.6: Flow Diagram - Thermal Power Plant

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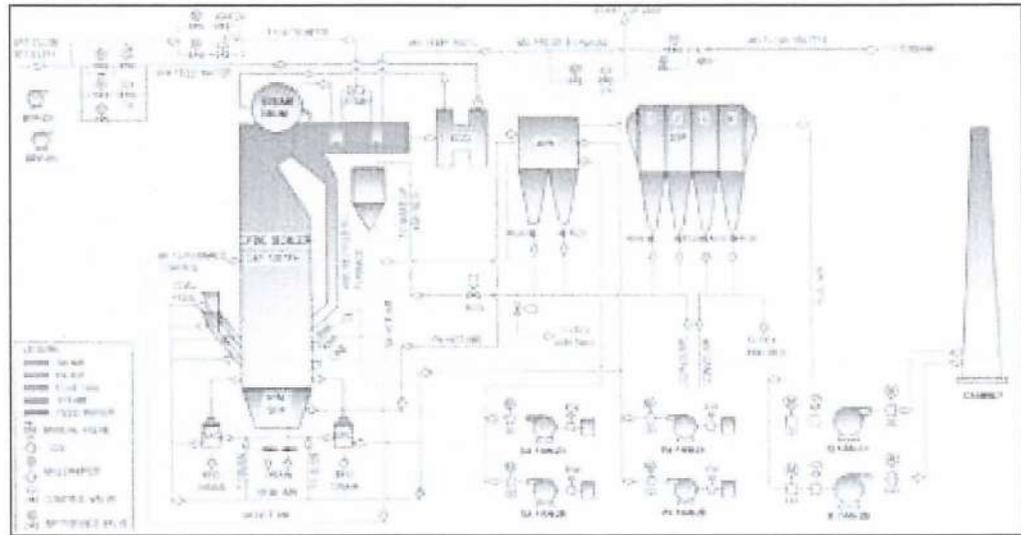


Figure 2.7: Flow Diagram – Steam Generation (Boiler) Plant

### 2.10 Existing Waste Management Practices

Each section of the plant has a dedicated effluent collection pit in the section. Maximum reduction, reuse and recycle of effluent is done in the section itself. The unused effluent from the sections is sent to effluent treatment plant for treatment (Figure 2.8). The effluent from various sections is collected in effluent collection pit where it is collected for equalization. The pH of the effluent after equalization is maintained in the desired range with alkali or acid, whatever may be the requirement. The neutralized effluent is then passed through pipe flocculator into flocculation tank where dosing of polyelectrolyte is done using flash mixer. Effluent dosed with polyelectrolyte then goes to lamella clarifier where sufficient retention time is given for settling and clarification. By gravity, suspended solids settle down and are removed as sludge from the bottom. The sludge is then dewatered in filter press. The water from filter press is again recycled back in collection tank. The filter cake is filled in bags and stored for disposal in TSDF.

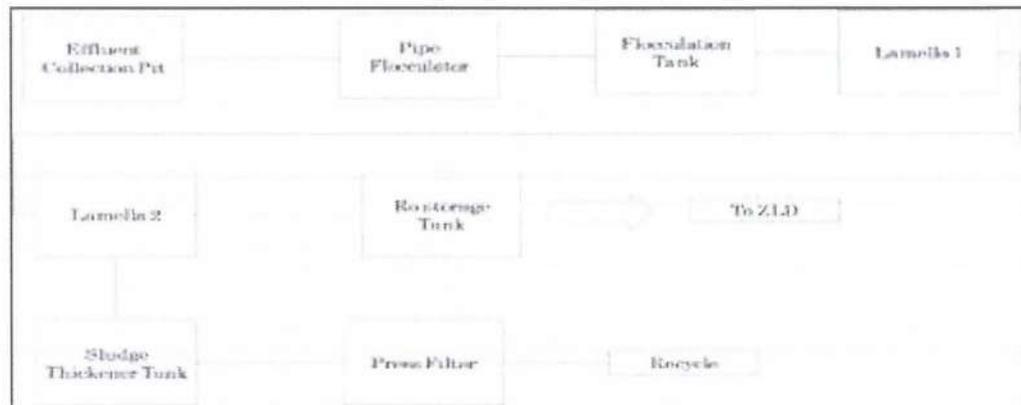


Figure 2.8: Schematic Flow Diagram of ETP

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Clarifier overflow is stored in treated water tank and then passed through multi-grade filter (MGF) followed by ACF. The filtered water is stored in ultra-filter tank. Then it is pumped through bag filter into UF unit. UF permeate is fed to RO unit. RO unit is installed in 2 stages. RO-1 which is Brackish water RO to treat effluent with TDS 2500 ppm. Reject from BW RO is fed to Sea Water RO which treats effluent upto TDS 10000 ppm. Reject of SW RO goes to MEE feed tank. The permeate of RO stages is used for cooling tower make up. The Schematic diagram is presented in Figure 2.9.

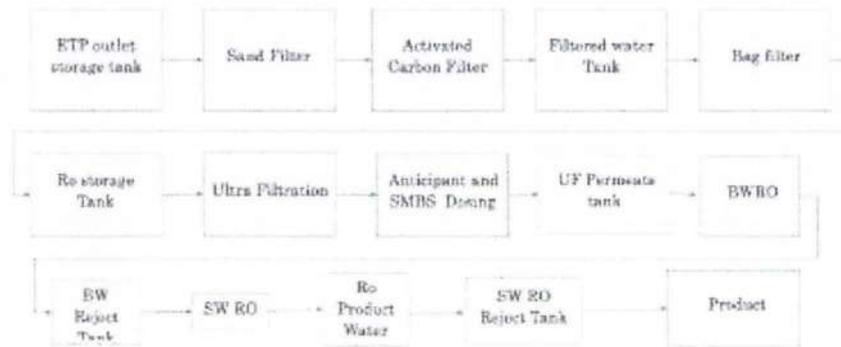
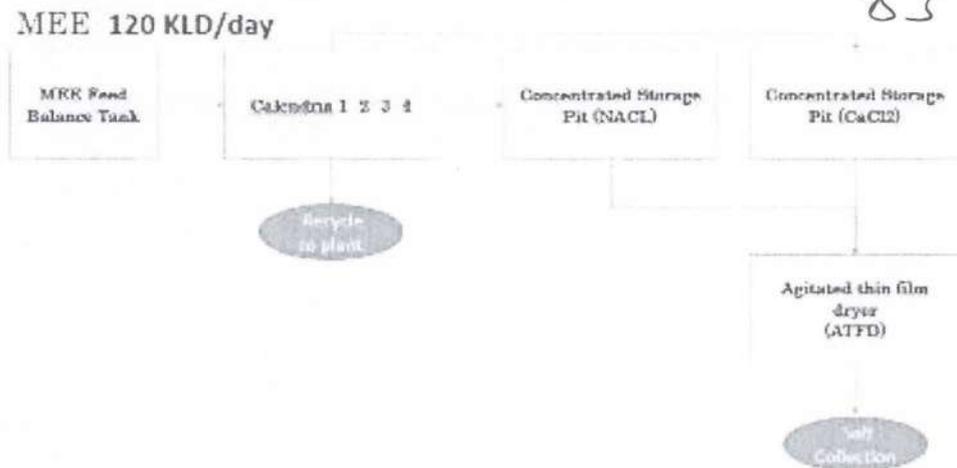


Figure 2.9: Flow Diagram - Filters

Multiple Effective Evaporator (MEE) permeate is used for cooling tower make and the reject is sent to ATFD (Agitated Thin Film Drier). Semi solid salt is generated at this stage. Condensate is sent to ETP collection tank. The salt is collected in bags, stored and finally disposed in TSDf. No water is left for discharge. Hence, completing the ZLD process requirement. The schematic diagram is presented hereunder in Figure 2.10.



**Figure 2.10: Flow Diagram – MEE**

Waste details which are generated from process and disposal practice of units:

- **Brine Sludge** – Generated from the brine purification process is non-hazardous. Brine sludge in semi solid brine mud cake form is stored in HDPE lines secured landfill within plant premises and disposed to TSDF of M/s. Ramky and Bharat Oil & Waste Management, Kanpur.
- **MEE & ATFD Salts/ETP Sludge** – The salt sludge is generated from the ATFD section of ETP and ETP sludge is generated filter press. Both the sludge is stored in separate bags at an isolated location in plant and disposed to authorized TSDF.

**E-Waste:** Generated from various sections of the plant consists of electronic and instrument obsolete equipments. The waste generated is collected and is sent to Authorized Recycler

**Acid-Battery Waste:** Used battery is sent to Authorized Recycler or buyback agreement is done with the supplier. Used battery is disposed within 6months.

**Bio-Medical waste** is sent to common disposal facility (Incineration), The waste is stored in colored coding bags/container.

**Used Oil** is collected in adequate storage facilities such as barrels, drums and kept at an isolated location in the plant maintained under lock and key with all safety and environment protection measures. Used oil stored is then sold off to authorized recycler.

**Fly Ash & Bed Ash** It is non-hazardous waste and is utilized 100% for ash-based product (bricks and other building materials-Cement), road construction

**Plastic Waste** is sold off to Authorized Recycler for new product or raw material

**Other wastes** – Such as spent resin, exhausted activated carbon, used activated carbon, glass wool, asbestos etc is sent to authorized vendor. Interim storages are developed for all other wastes and are being transferred to TSDF.

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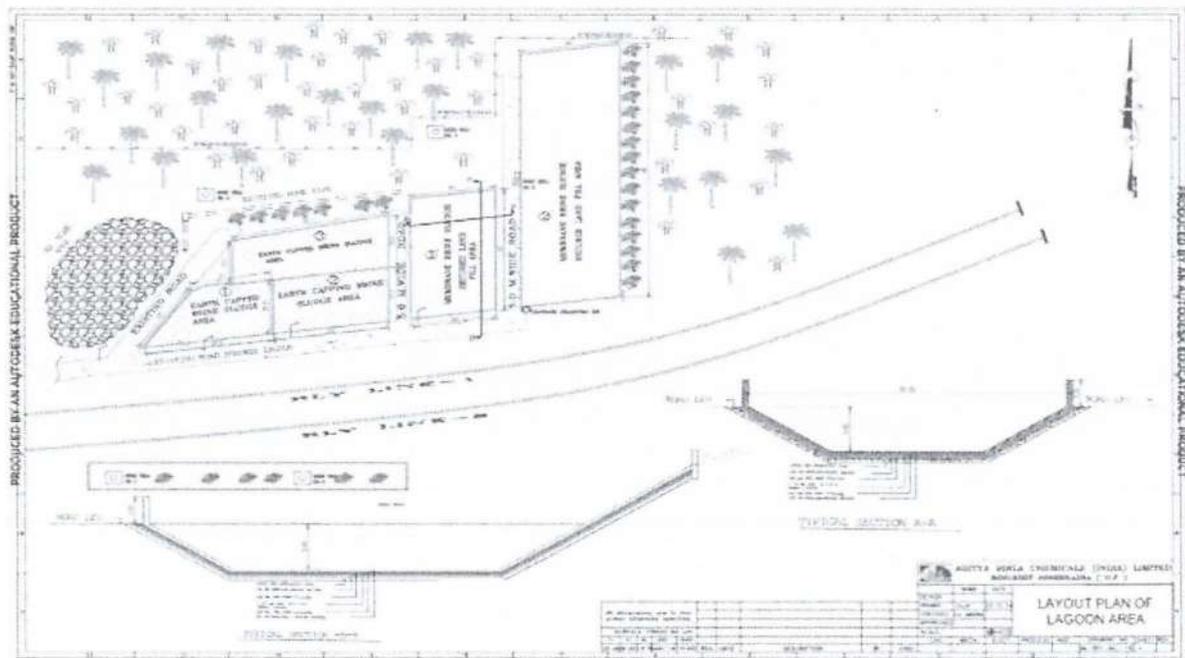
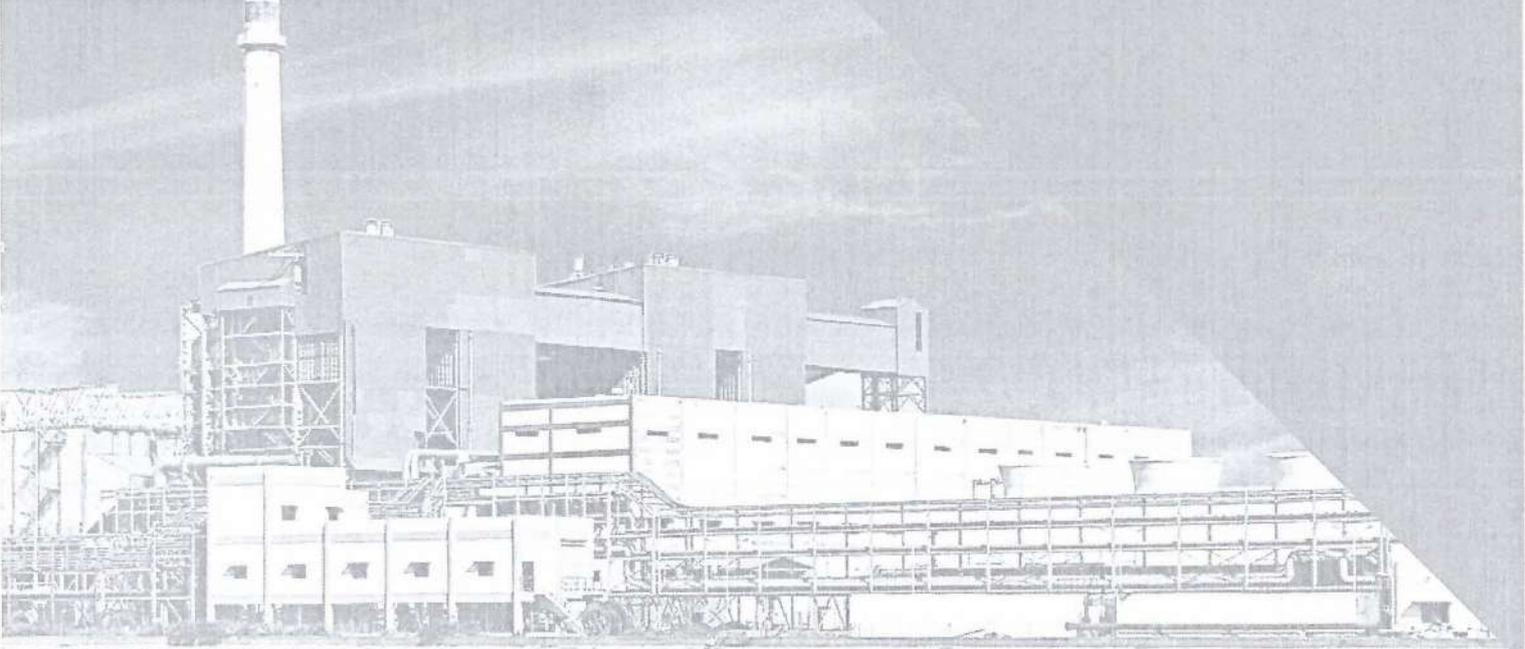


Figure 2.11: Layout of Secured Landfill Site at Chlor-Alkali Plant, Renukoot, Sonbhadra (U.P)



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## CHAPTER -3

# DESCRIPTION OF THE STUDY AREA

*(Source: Central Groundwater Board (CGWB) Report)*

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### 3.0 Introduction

The study area falls in the Survey of India Toposheet No 63P/4. The study area lies in between the latitudes N 24° 09' 30" to N 24° 15' 00" and longitudes E 83° 00' 00" to E 83° 06' 00". A 5 km radius buffer has been prepared around GRCD, Renukoot. The study area location is shown in the Figure 3.1.

#### 3.1. Climate and Rainfall

The annual rainfall on an average is 1115mm. The temperature rises in February and the highest temperatures are recorded in May with average maximum temperature of 45.5°C and average minimum temperature of 2.5°C. Temperature on an average varied from 16.15 to 39.80°C.

#### 3.2 Physiography and Drainage

The study -region is drained by the River Son, which itself forms a part of the Ganga River System. It forms a dendritic pattern of drainage. The main tributaries of the river Son are the Kanhar, Rihand, Pandu and Bijul. The slope varies from place to place largely due to the erosion of the Rihand and the Kanhar, the two important tributaries of the Son. On the basis of the variations in drainage pattern and water divides, there are five well marked drainage sub-systems (i) The southern Son (ii) The Bijul (iii) The Rihand (iv) The Kanhar and (v) The Pandu. The southern valley plain of the Son valley is associated with a Perennial Nadi called the Charkighaghiya and a narrow-elongated flood plain of the river Son. The Rihand River has one left bank tributary i.e. the Deohar and two right bank tributaries namely, Ajhir and Laira. The river Rihand divides the Rihand valley into the eastern and the western parts. The eastern part is wider than the western part. The notable left bank tributaries of the Kanhar are Pangan, Thema, Louwa and the Hathinala. The important right bank tributaries are Malia and Goitha. Almost parallel East-West lines of hillocks are identified in its valley. Before passing through the gorge, the Kanhar forms two typical basins namely, the Singrauli and Dudhi which are agriculturally most fertile. Tributaries of these major rivers follow the direction of maximum gradient, east or west, the Pandu flowing in easterly direction forms a dissected saucer shaped depression in the northeastern part of the region.

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### 3.3 Geology

Geologically the study area including Grasim Industries Limited, Renukoot is located in the southern part of Sonebhadra District; U.P. Geologically the study area is comprised of Precambrian rocks of central India belonging to Mahakoshal Group and Chotanagpur Granite Gneiss Complex (CGGC). The Mahakoshal Group is represented chiefly by slate and phyllites while the CGGC is formed of granites and gneisses with subordinated schists.

The Sonebhadra District area shows very little structural variation excepting some folding contortion and local warping. Folding is tighter in southern part of the Vindhyan formation. The lower Vindhyan in the Son valley presents crumpling and it is probably due to eroded bed of the upper Vindhyan. The folds are seen south of Billi station along the railway line and along the road to Obra, give resemblance of local folding of simple type. Faulting has been reported previously by different authors but there is no authentic evidence on the surface with which it may be said to be present in the area under investigation. But adjacent to the present area, the following fault zone has been accounted in the Vindhyan i.e. (i) Rajkhar - Singrauli fault zone and (ii) The Son valley fault zone. Both indicates rather the weak zones between the Archaeans and the Bijawar and between the Bijawar and Vindhyan. It provides evidence that the northern block has been the down thrown side.

The Singrauli Rajkhar fault may be much older than the Son valley fault. In the Son valley the two fault lines tending East-West may be accounted as (i) the Jamul-Markundi fault and (ii) Billi - Kajarhat -Hardi fault. These two have guided the Son River and are reserved in nature with Bijawar being thrust over the Vindhyan. It is a normal vertical type of fault that has caused the abrupt truncation in the rocks of Rohatas and lower Kaimur stage. These are also noted as the 'boundary fault'. Apart from these two major faults, the Son valley is also traversed by cross faults such as (i) Agori -Ghathila fault (ii) Mangeshar fault, and (iii) Reverse fault in Kheinjua, which are observed near the Kota, Khatrai, Mangeshar hill and East of Deora respectively. These faults have brought out remarkable changes in the surface of the area in the general. The Jamul Markundi fault along with Mangeshar fault may be responsible for the fault scarp of western Agari uplands, Markundi scarp, the great gorge of Mangeshar as well as the diversion of the river Ghaghar to join the Son. The relative horizontal displacements have also probably changed the confluence of the River Ghaghar and Rihand with the Son and formation of the Soucer shaped depression opposite to Chopan in the Son valley. The Billi-Hardi alignment has assisted the consequent undercutting of the Kaimur and consequent slip-off slope of the river Son which has resulted further steepening of the scarp the limestone shows different joint pattern but generally most of these are vertical. The dolomitic limestone and parcellanite also show more or less the same pattern of joints. The strike of different rock formation generally tends in east -west direction and the rock beds show variable dips in different directions.

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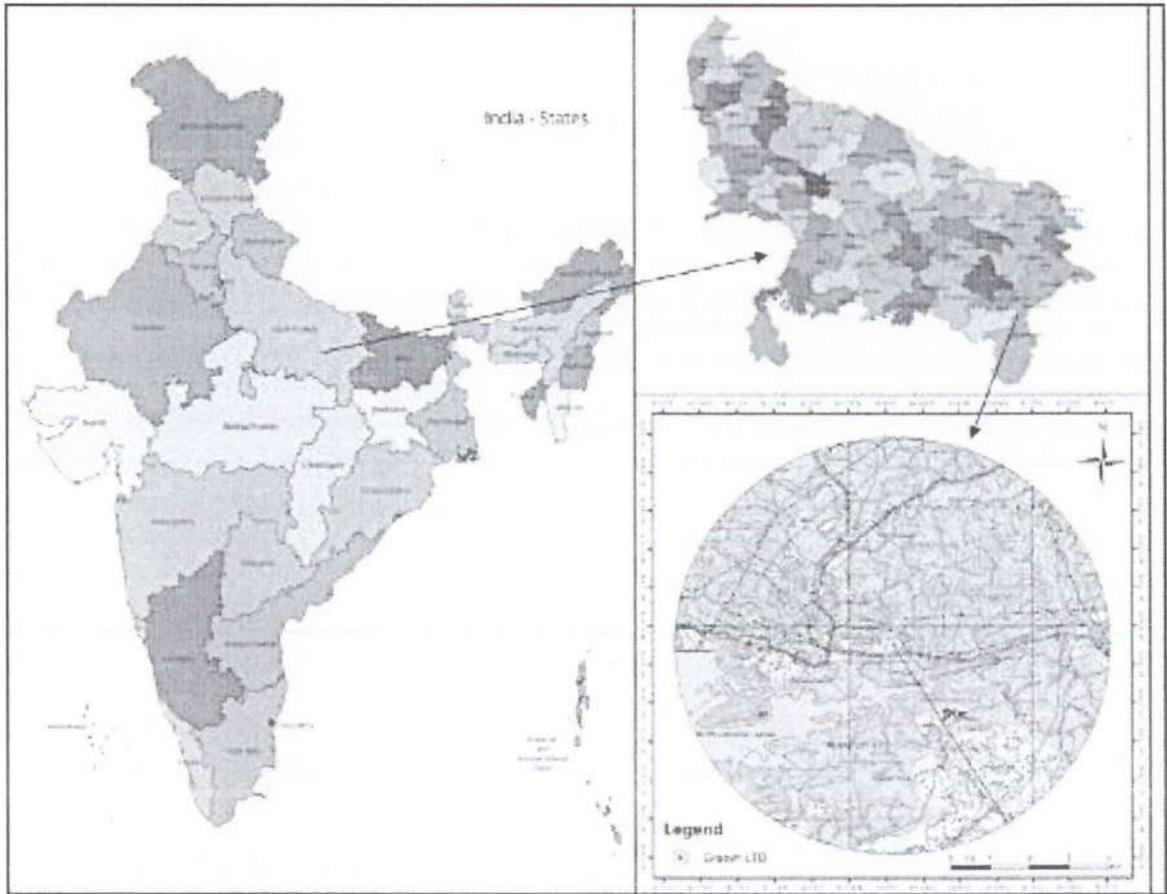
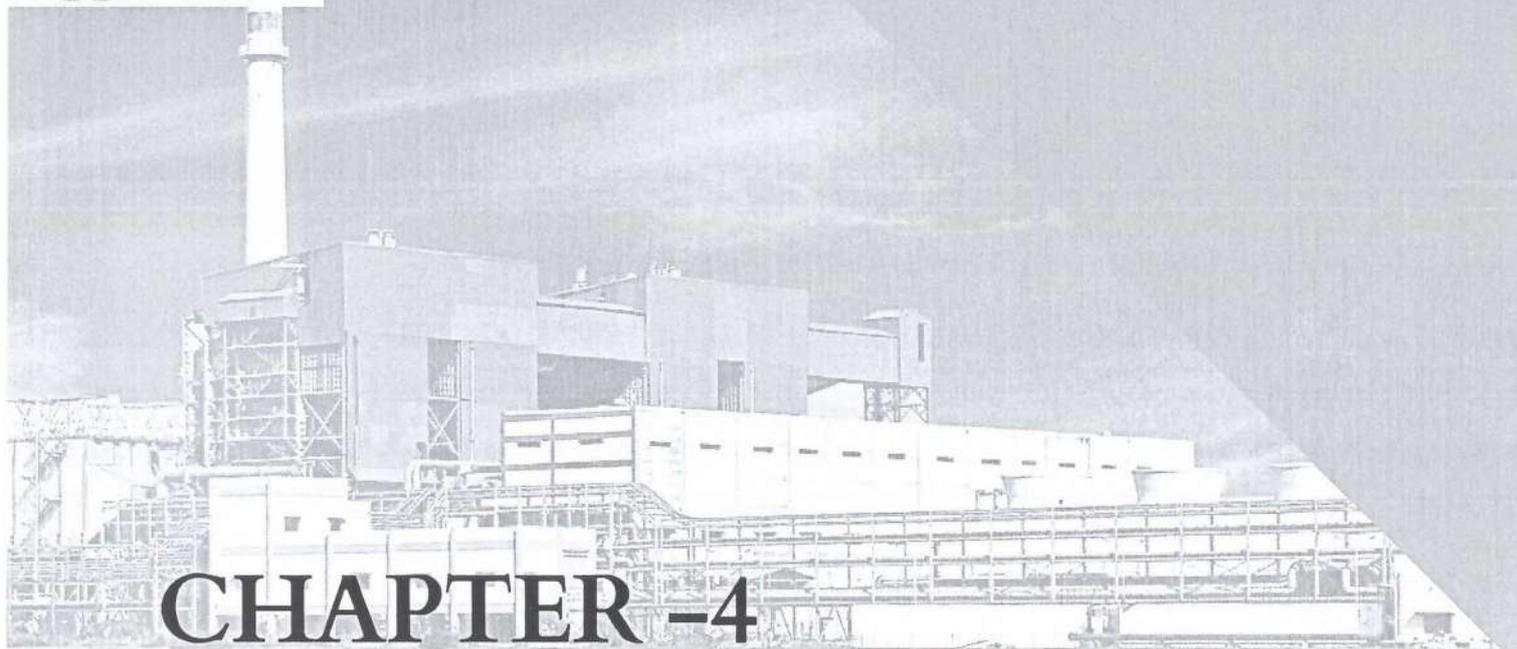


Fig. 3.1 Study area location



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**CHAPTER -4**

**ENVIRONMENTAL  
QUALITY STATUS  
AROUND THE SECURED  
LANDFILL SITE**

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## 4.0 Introduction

M/s Grasim Chloro-alkali Plant at Renukoot, Sonbhadra District, in U.P the mercury bearing brine sludge was produced during the manufacturing of caustic soda and the same was disposed in a secured landfill within their premises. From 2011 onwards, the production of Caustic soda by mercury cell route was discontinued as per the directives of Govt. of India. The mercury brine sludge has been stored in the secured landfill was capped and closed according to the then existing Hazardous Waste Rules 2008 as also the Hazardous Rules 2016 and compliance with the directions received from UPPCB/CPCB.

Disposal of mercury-containing waste creates many pathways by which mercury may be released into the environment. Mercury is a persistent, mobile and bioaccumulative element in the environment and retained in organisms. Usually, mercury found in the environment is inorganic since mercury is never broken down into other chemical and harmless form. Once, it enters into the environment, mercury permanently exists in the environment by changing its chemical forms depending on the environment. The possible behavior of mercury in the environment is depicted in Figure 4.1.1.

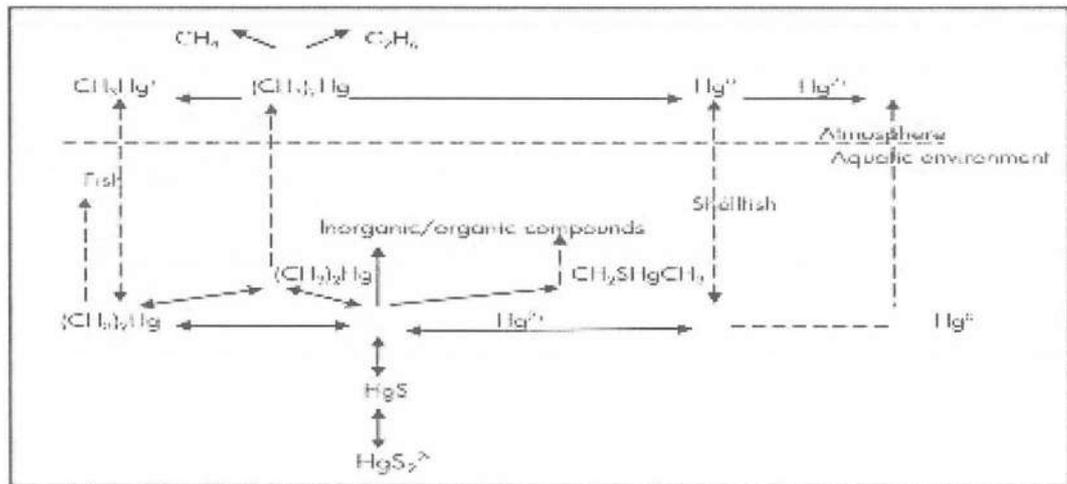


Fig. 4.1.1 : Pathways of mercury

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#### 4.1 Details of the Secured Landfill Site

There are five landfill sites existing in the Chloro-alkali Grasim Industrial premises and detailed layout of these is presented in Chapter 2. There are three secured landfill sites are closed by capping as per the CPCB guidelines. The details of these secured landfills are mentioned in Table 4.1.1. Two more secured landfills are in operation to dispose the brine sludge (non-hazardous) generated presently in the process plant. The total area of the plant premises is 323 Acres and the details of the Capped Secured Landfill site are as below:

**Table 4.1.1 : Details of hazardous landfill site**

Landfill Site	Area (sq.m)	Quantity (MT)
Site -1	856	6134
Site -2	1071	7808
Site -3	950	5883
<b>Total</b>	<b>2877</b>	<b>19825</b>

CSIR-NEERI team had visited the site on October 14-24, 2020. The team has visited the secured landfill site along with the PCB officials. CSIR-NEERI team had collected the sludge and ash samples in the presence of PCB officials. The site has been properly capped after the collection of sludge and ash samples from the landfill site area. The cross section of the landfill site is as given in Fig. 4.1.2. The sludge and ash layer collected from the landfill site have been characterized and the results are presented in following sections.

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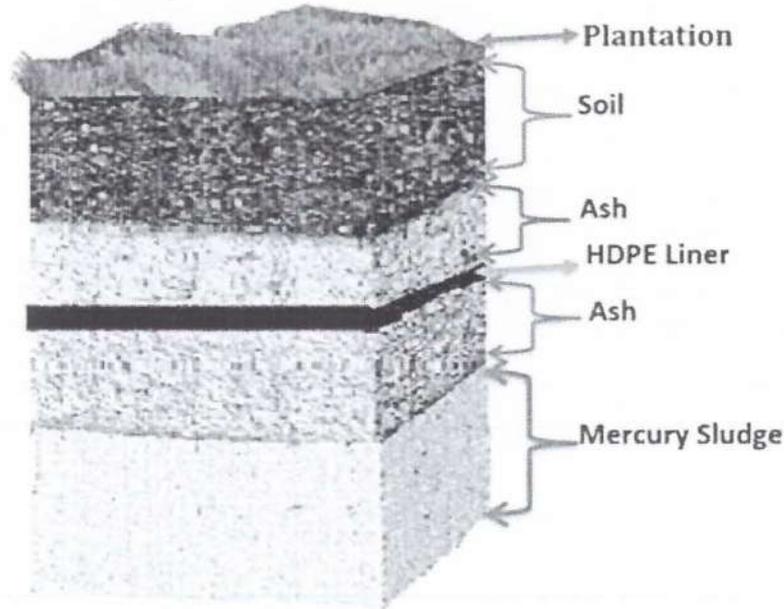


Fig. 4.1.2: Cross section of the landfill site area

## 4.2 Mercury Bearing Sludge & Ash Characterization

The Mercury bearing sludge, Top soil and Ash samples were collected from secured landfill site. Sampling Locations are presented in Table 4.2.1 and Fig. 4.8.3 A&B. Collected samples were air dried, Sieved and analyzed for various physico chemical parameters and heavy metals including mercury.

### 4.2.1 Physical Characteristics

Physical characteristics of sludge, ash and top soil samples are described through specific parameters, viz., particle size distribution, bulk density, porosity etc. Particle size distribution is a major factor which influences water holding capacity, bulk density, moisture availability. Particle size in between 0.05 to 0.25mm is predominant in the sludge and ash samples, whereas size between 0.002 to 0.05 mm size is more in top soil samples (Table 4.2.2).

Bulk density is the mass of bulk solid that occupies a unit volume of a bed, including the volume of all interparticle voids. The bulk density and particle density of sludge samples are 0.98 g/cm<sup>3</sup> and 3.33 g/cm<sup>3</sup>, respectively. Ash layer and top soil was observed with Bulk density of 1.04 to 1.39 g/cm<sup>3</sup> (Table 4.2.3).

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#### 4.2.2 Chemical Characteristics

The collected sludge, ash samples and top soil were analysed for parameters, viz. pH, electrical conductivity, soluble cations and anions (Tables 4.2.4). pH is the parameter that helps us to ascertain the alkaline or acidic nature of the particle. Top soil, Ash and Sludge samples are strongly alkaline in nature with pH variation from 8.48 to 10.26.

Soluble salts were estimated from water saturated extract (1:2). The soluble salts in sludge samples are indicated in terms of electrical conductivity (EC) and Electrical Conductivity of Sludge and Ash layer have been observed to be 20.6 to 25mS/cm, whereas EC of top soil and Ash layer HDPE is observed to be in the range of 3.17 to 4.26 respectively. Therefore, Sludge, Ash Layer and top soil samples were observed to be saline in nature. Calcium and Magnesium are observed in the range of 0.01 to 0.05 meq/100gm and 0.14 to 0.87 meq/100g, Sodium and Potassium are in the ranges of 3.59 to 44.57 meq/100 gm and 0.001 to 0.097 meq/100g, respectively. Chlorides ranged from 5.60 to 60.0 meq/100gm and sulphates content ranged from 4.06 to 36.1 meq/100gm. Sodium, chloride and sulphate content is high in sludge and HDPE Ash layer.

#### 4.2.3 Heavy Metals

The sludge, Ash and top soil were investigated for Heavy metals viz., Arsenic (BDL to 1.3mg/kg), Boron (21.7 to 46.1 mg/kg), Cadmium (0.7 to 3.9 mg/kg), Chromium (9.9 to 72.8 mg/kg), Cobalt (2.1 to 11.4 mg/kg), Copper (20.1 to 64.58 mg/kg), Iron (4921 to 20056 mg/kg), Mercury (10.07 to 40 mg/kg), Manganese (125 to 363 mg/kg), Nickel 28.4 to 184.7 mg/kg, Lead (6.0 to 36.8 mg/kg) and Zinc (41.6 to 172.2 mg/kg). The observed concentrations are presented in Table 4.2.5. Concentration of Mercury in the sludge and HDPE Ash layer samples were found to be high (40 mg/kg) as compared to Top soil (10.07 mg/kg) and Ash layer (29.19 mg/kg). Heavy metal concentrations were more in HDPE Ash layer samples as compared to others.

#### 4.2.4 Toxicity Characteristic Leaching Procedure (TCLP)

Toxicity Characteristic Leaching Procedure is process which is used to determine the presence of hazardous elements in the waste. Accordingly, TCLP analysis was carried out following USEPA hazardous waste test method SW 846 (1311) to determine inorganic analytes in the leachate using Hazardous waste filtration assembly. The solid phase is separated with extraction fluid quantity equivalent to 20 times the solid phase weight. The extraction fluid used depends on the alkalinity of the solid phase waste. After the extraction, the liquid is separated from the solid phase by passing through glass fibre filter of 0.7  $\mu$ m size. The heavy metals results of the TCLP leachate are shown in Table 4.2.6. It was observed that heavy metals are below TCLP concentration Limit (Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 (Annexure III)). Therefore possibility of leaching of metals including mercury from the mercury bearing sludge and ash layers from the secured land fill is minimal.

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Table 4.2.1 : Sampling Location details

1.	Samples	GPS Location	Type
2.	Sludge	24°12'18.00"N 83° 3'17.00"E	Sludge sample
3.	RMS-Top Soil	24°12'18.00"N 83° 3'17.00"E	Top Soil
4.	RMS-Ash Layer	24°12'18.00"N 83° 3'17.00"E	Ash
5.	RMS-Ash Layer HDPE	24°12'18.00"N 83° 3'17.00"E	Ash

Table 4.2.2 : Particle size distribution

S.No	Sample Code	Particle Size Distribution (%)			
		0.25 to 2.00 mm (Coarse sand)	0.05 to 0.25 mm (Fine sand)	0.002 -0.05 mm (Silt)	<0.002 mm (Clay)
1	Sludge	25.98	45.13	21.18	7.71
2	RMS-Top Soil	0.53	23.96	60.66	14.85
3	RMS-Ash Layer	1.40	77.45	4.46	16.69
4	RMS-Ash Layer HDPE	12.67	41.52	37.77	8.05

Table 4.2.3 Physical Properties of Sludge samples

S.No	Sample Code	Bulk Density (g/cc)	Porosity (%)	Water Holding Capacity (%)
1	Sludge	0.98	70.58	75.00
2	RMS-Top Soil	1.39	44.32	46.30
3	RMS-Ash Layer	1.16	61.56	63.80
4	RMS-Ash Layer HDPE	1.04	61.45	67.02

Table 4.2.4 : Chemical Properties (water soluble extract) of Sludge samples

S.No	Sample Code	pH	EC (mS/cm)	Ca <sup>++</sup>	Mg <sup>++</sup>	Na <sup>+</sup>	K <sup>+</sup>	SO <sub>4</sub> <sup>-</sup>	Cl <sup>-</sup>
				----- (meq/100gm) -----					
1.	Sludge	10.25	25.00	0.05	0.35	36.3	0.090	36.1	60.0
2.	RMS-Top Soil	8.93	4.26	0.06	0.76	3.59	0.001	5.88	15.4
3.	RMS-Ash Layer	10.26	20.60	0.05	0.87	5.11	0.004	4.06	5.60
4.	RMS-Ash Layer HDPE	8.48	3.17	0.01	0.14	44.57	0.097	31.0	40.2

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 Table 4.2.5 : Heavy Metals in Sludge Samples

S.No.	Sample Code	As	B	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Zn
		mg/kg											
1.	Sludge	BDL	39.8	0.7	2.1	9.9	90.1	4921	40	125	41.4	6.0	41.6
2.	Top Soil	1.3	43.9	2.6	11.4	38.8	20.1	20056	10.07	363	36.6	8.0	56.8
3.	Ash Layer	BDL	21.7	1.4	10.8	37.0	32.4	11417	29.19	310	28.4	10.2	59.9
4.	Ash Layer HDPE	BDL	46.1	3.9	9.1	72.8	645.8	16776	40	302	184	36.8	172

Table 4.2.6 : Heavy Metals in TCLP Leachate

S. No.	Sample Code	As	B	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Zn
		(mg/L)											
1.	Sludge	BDL	0.02	BDL	BDL	0.0002	0.0001	BDL	0.05	BDL	BDL	BDL	BDL
2.	Top Soil	BDL	0.005	BDL	0.00001	BDL	0.0001	BDL	0.003	0.01	BDL	0.0001	0.01
3.	Ash Layer	0.00001	0.002	BDL	0.0001	BDL	0.0001	BDL	0.003	0.02	BDL	0.0001	0.005
4.	Ash Layer HDPE	BDL	0.02	BDL	BDL	0.0001	0.0001	BDL	0.065	0.001	0.001	0.0001	BDL
*TCLP leachable Concentration Limit (mg/L)		5.0	-	1.00	80	5.00	25	-	0.2	10.00	20	5.00	250

\*Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

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### 4.3 Groundwater Quality around SLF site

Groundwater chemistry is primarily controlled by the weathering of source rock and atmospheric deposition. In addition, characteristics of soil, climatic conditions, types of rocks, topography, intrusion of sea water and anthropogenic activities have significant effect on the chemistry of groundwater. The human activities such as urbanization, ever-increasing population and deforestation have interrupted the natural hydrological cycle. Geochemical processes that are taking place within the groundwater system due to the reaction with the aquifer material have profound effect on water quality. Groundwater quality is of utmost importance in assessing the usage for drinking, irrigation, domestic and industrial purposes. Therefore, protection and management of quality of groundwater is emerging as a matter of concern in India and the World.

The prevailing environmental data is useful for identification of significant environmental concerns in the area. Groundwater samples were collected around the landfill site to assess the groundwater quality due to impact of capped landfill site. The quality of water in the study area serves as the prevailing status for assessing the impacts on environment.

#### 4.3.1 Groundwater Quality

##### 4.3.1.1 Field Survey

The study area is a buffer zone of 5 km radius surrounding secured landfill site of GRCD, Renukoot. Field studies were undertaken to understand the background of the area, collection of preliminary information, groundwater and surface water sample collection, and groundwater level. Suitable sites were identified and sampled considering the drainage pattern of the study area. The water samples were collected from the available groundwater sources (dug wells, hand pumps etc) present within the 5km radius buffer zone. Subsequently, groundwater level was also measured along with sample collection. Majority of the villages in study area utilize groundwater for agricultural and domestic uses. The map showing the sampling locations is shown in Figure 4.3.1. The samples were collected at representative locations so that they are uniformly distributed in the study area. A total of 22 nos. samples were collected around the Industry, out of which 14 nos. are monitoring wells and 8 nos. are groundwater samples around the Industry. The details of the groundwater samples are presented in Table 4.3.1.

##### 4.3.1.2 Groundwater Quality

The impact on water environment due to development and operations of industry on surrounding groundwater environment will be in two ways, one is in the form of stress through withdrawal of water resources and the other is discharge of effluents from the industry into surrounding environment causing impacts on water quality. To address these issues, it is important to consider available water resource information along with collection of data of water quality of the area. The data collected is the prevailing status of water environment as part of assessment study. The conventional water quality parameters such as physical, inorganic, nutrient, demand, and metals having health, aesthetic significance are determined to understand the prevailing status of the quality of water. The standard methods prescribed for sampling of groundwater and surface water, analysis of individual parameters were followed in this study.

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Samples of groundwater were collected and stored in 1 litre and 100 ml Poly Propylene bottles which were cleaned thoroughly and cleansed with distilled water before collection of the sample. The collected samples were labelled properly as per the project area. The samples collected in 1litre bottles are analyzed for physico-chemical parameters while 100 ml PP bottles for heavy metal analysis. The 100 ml bottles are then acidified with conc. HNO<sub>3</sub> to retain the metals present in groundwater and surface water samples.

The analysis of physico-chemical parameters was carried out by adopting standard protocols given by APHA, 2012. The temperature was measured by using thermometer in the field. The pH and conductivity were measured with respective meters. TDS was calculated by using the gravimetric method. The chemical parameters like Total hardness, Chloride, Calcium Hardness, Alkalinity were determined titrimetrically. Magnesium Hardness (Mg) was calculated by taking the deducting Calcium Hardness from Total Hardness. Potassium and Sodium were determined by Flame Photometer. Sulphate was determined by turbidity method using visible Spectrophotometer. Heavy metals like Arsenic (As), Chromium (Cr), Copper (Cu), Boron (B), Cadmium (Cd), Nickel (Ni), Lead (Pb) and Zinc (Zn), Cobalt (Co), Iron (Fe), Manganese (Mn) were determined using ICP-MS.

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#### 4.3.1.3 Physico-chemical characteristics

Monitoring and analysis of groundwater quality is one of the major objectives of the study. The analysis of major cations, anions and heavy metals (Tables 4.3.2 to 4.3.6) of the groundwater samples which were taken into consideration brings out the following findings about the key parameters of groundwater quality during the study period. Groundwater quality analysis for all the 18 groundwater locations was carried out. The physico-chemical parameters were analyzed and compared with the Bureau of Indian Standards (BIS 10500:2012) of drinking water and presented below.

#### A. Groundwater quality of the monitoring Wells

**pH:** The pH of the monitoring wells varied from 6.5 to 8.5. The groundwater samples collected from all monitoring wells were observed to be within the permissible limit (6.5 – 8.5) of BIS standards.

**Total Dissolved Solids (TDS):** TDS of monitoring wells varied from 224 to 5920mg/l. High TDS was observed at eight locations in the monitoring wells which may be attributed to high sodium and high chloride contents. High TDS levels also attributed to the leaching of major cations/anions from the underlying rocks in the study area which consequently increases the TDS. The underlying rocks consist of granites and gneiss of the Mahakoshal and Chotanagpur granite gneiss group. They fall under the hard rock areas which increase the TDS of the groundwater samples.

**Alkalinity:** It signifies the acid neutralising ability of the water. The primary sources of alkalinity in groundwater are rocks, which contain carbonate, bicarbonate, hydroxide compounds and phosphates. Alkalinity is directly related to hardness and pH. The value of alkalinity in monitoring wells ranged from 44 to 250mg/l. The values of all the groundwater samples had total alkalinity within the permissible limit of BIS.

**Sodium (Na):** The sodium concentration varied from 16 to 2587mg/l. High levels of sodium in groundwater is due to the underlying hard rocks in the area.

**Chloride (Cl):** Chloride values ranged from 78 - 3177mg/l. It was observed that chloride content was above the BIS limit of 1000mg/l at eight monitoring wells. The high chloride concentration may be attributed to the underlying rocks such as granite and gneiss group which consists of chlorite, quartzites, limestone etc. Excess chloride content in water could lead to laxative effect and unsuitable for irrigation purpose.

**Sulphate (SO<sub>4</sub><sup>2-</sup>):** Sulphate ions exists naturally in water and no major health implications are recorded till date due to their presence in groundwater. However, elevated levels of sulphate in water lead to increase in pH causing acidosis. The sulphate concentration varied from 25 to 161mg/l. All the monitoring well samples showed sulphate content within the permissible limit i.e., 400mg/l of BIS.

**Nitrate (NO<sub>3</sub><sup>-</sup>):** The nitrate content of groundwater samples ranged from 1.04 to 17.10mg/l. All samples had nitrate concentration within BIS limits.

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**Fluoride ( $F^-$ ):** The values of fluoride varied from 0.57 to 1.32mg/l in all monitoring wells. All the samples showed fluoride content within BIS limits.

**Heavy Metals:** Heavy metals concentrations in monitoring wells suggest that all metals were within the BIS limits except for the Iron, Manganese, Nickel and lead

- Iron, Manganese, Nickel concentrations at some of the locations were found to be higher than the permissible limits. The high levels of these metals may be attributed to the underlying geological rocks that include quartzites, alumina, magnetite, alluvium etc. All these rocks contain the heavy metals like iron, manganese etc which contribute to the elevated levels in groundwater samples. Both Fe and Mn are the most abundant metallic elements in natural water.  $Mn^{2+}$  salts have high solubility but under aeration conditions, they are oxidized precipitating oxyhydroxides.

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**B. Water quality of the groundwater samples around the SLF**

**pH:** pH of the groundwater samples ranged from 7.1 to 8.0. The groundwater samples collected from all samples were observed to be within the permissible limit (6.5 – 8.5) of BIS.

**Total Dissolved Solids (TDS):** TDS concentration varied in between 323 – 681mg/l in the area. All monitored samples had TDS within the BIS limit of 2000mg/l.

**Alkalinity:** The value of alkalinity in groundwater ranged from 88 to 172mg/l. The total alkalinity of all the samples were within the permissible limit of BIS.

**Sodium (Na):** The sodium concentration was found to be in the range of 24 to 101mg/l. No BIS standards exist for sodium.

**Chloride (Cl):** Chloride concentration ranged from 32 to 199mg/l. It was observed that chloride content was within 1000 mg/l as per BIS limit.

**Sulphate (SO<sub>4</sub><sup>2-</sup>):** Sulphate concentration varied from 11 to 91mg/l. Sulphate content was within the permissible limit i.e. 400mg/l of BIS for all the samples.

**Nitrate (NO<sub>3</sub><sup>-</sup>):** The nitrate content varied from 0.2 to 18mg/l in the study area and concentrations for all the samples were within the desirable limits of BIS.

**Fluoride (F<sup>-</sup>):** The fluoride concentration ranged in between 0.57 to 1.40mg/l in the area. All the samples showed fluoride content below the BIS limits.

**Heavy Metals:** Heavy metals concentrations in groundwater reveal all the heavy metals were within the BIS limits except for the iron, manganese, nickel and lead. Mercury was not detected at any location.

Table 4.3.1 Groundwater Locations

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S.No	Sample Code	Sample Location	GPS Locations	Water Level (m)	Elevation (m)	Source Type	Remarks
<b>Monitoring Wells</b>							
1.	RMS-1	Piezometer sample inside the industry	24°12'16.00"N 83°03'16.00"E	05.07	310	Piezometer	Piezometer sample beside the power plant. Piezometer used only for recording water level and temperature
2.	RMS-8	Monitoring well beside SLF	24°12'18.61"N 83°03'16.09"E	05.19	327	Monitoring well	The well beside SLF
3.	RMS-10	NEERI-EISD drilled site	24°12'15.79"N 83°03'16.64"E	05.37	314	Monitoring well	Adjacent Rly track near capacitive power plant. Near SLF site adjacent to Grasim online piezometer
4.	RMS-11	Monitoring well near SLF	24°12'16.06"N 83°03'16.92"E	05.18	308	Monitoring well	Grasim monitoring well no. 1 as per Grasim. Near railway track adjacent to EISD-NEERI drilled point
5.	RMS-12	Grasim Monitoring well 4	24°12'19.96"N 83°03'19.04"E	03.13	311	Monitoring well	Near SLF area adjacent to leachate collection tank of SLF
6.	RMS-13	Grasim Monitoring well 3	24°12'19.86"N 83°03'17.85"E	04.17	320	Monitoring well	Near SLF area-towards hill side-adjacent to monitoring well 2
7.	RMS-14	SLF leachate	24°12'19.05"N 83°03'19.65"E	--	316	Leachate sample	Leachate pump, leachate near SLF, adjacent to railway track near and
8.	RMS-15	Monitoring well	24°12'09.61"N 83°03'06.32"E	09.61	322	Monitoring well	DM plant area near cooling towers adjacent to membrane cell ETP tank
9.	RMS-16	Grasim Monitoring well 10	24°12'10.93"N 83°03'00.25"E	10.41	312	Monitoring well	Near STP area, adjacent to toilet backside of Lindone building
10.	RMS-17	Monitoring well adjacent to SLF	24°12'17.51"N 83°03'17.39"E	03.49	334	Monitoring well	Grasim monitoring well 5, adjacent to the wall of SLF
11.	RMS-18	Monitoring well adjacent to SLF	24°12'16.52"N 83°03'16.01"E	02.77	318	Monitoring well	Grasim Monitoring well no. 6
12.	RMS-19	Grasim Monitoring well 8	24°12'09.90"N 83°03'22.79"E	15.30	319	Monitoring well	Near brick manufacturing plant
13.	RMS-20	Monitoring well near truck parking area	24°12'25.37"N 83°03'11.98"E	18.57	340	Monitoring well	Monitoring well inside truck parking area opposite to small shop
14.	RMS-21	Monitoring well- Lal bungalow	24°12'32.76"N 83°03'08.76"E	12.57	333	Monitoring well	Lal Bungalow area - monitoring well of Grasim
<b>Groundwater samples around Industry</b>							
15.	RMS-2	Near Renukoot police chowki and railway station	24°12'14.39"N 83°02'21.47"E	23.22	322	Hand Pump with Bore well	Water is used for drinking and cooking
16.	RMS-3	Renukoot	24°11'54.38"N 83°02'28.44"E	24.15	300	Hand Pump with Bore well	Katel No.1, Dongiya Nala, used for drinking and cooking
17.	RMS-4	Near mahanaya mandir, Lanke colony	24°11'56.67"N 83°01'39.63"E	08.50	284	Hand Pump	Water used for drinking when RO water is not supplied
18.	RMS-5	Infront of government inter college GIC	24°12'04.13"N 83°01'20.64"E	03.52	281	Hand Pump	Renukoot
19.	RMS-6	Infront of Rihand	24°12'32.40"N 83°00'22.50"E	16.67	212	Hand Pump	Sometimes the water is used for drinking and used for domestic purposes
20.	RMS-7	Besides shivmandir, Muligedi	24°12'27.70"N 83°01'21.37"E	11.52	293	Hand Pump	--
21.	RMS-25	Old Shiv park area near shiv mandir gate	24°13'12.35"N 83°02'07.73"E	18.12	302	Hand Pump	Sardar Patel nagar-old shiv park area adjacent to adharsh Garments shop
22.	RMS-26	Grasim-Hitech carbon colony	24°14'02.80"N 83°03'20.55"E	--	293	Tube Well	Near children park

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Table 4.3.2 Groundwater Quality - Physical Parameters

Sr. No	Sample Code	pH	Temp (°C)	Turbidity (NTU)	TSS (mg/l)	TDS (mg/l)	Conductivity (µS/cm)
<b>Monitoring Wells</b>							
1.	RMS-1	8.5	28.5	1.0	69	4660	7770
2.	RMS-8	7.2	27.5	0.5	5.2	224	408
3.	RMS-10	6.9	28.2	0.1	59.8	5920	10070
4.	RMS-11	7.6	27.8	0.5	11.8	3850	6417
5.	RMS-12	7.9	26.9	0.4	29.4	531	921
6.	RMS-13	7.5	26.2	1.0	20.6	252	414
7.	RMS-14	7.4	27.0	1.2	16.2	3760	7470
8.	RMS-15	8.4	36.1	1.0	98.2	3627	6045
9.	RMS-16	7.0	28.8	0.1	19.2	1950	3650
10.	RMS-17	7.9	28.6	0.2	43.6	4790	11060
11.	RMS-18	7.8	28.7	1.0	53	3466	6250
12.	RMS-19	6.5	31.8	0.1	38.2	3764	6273
13.	RMS-20	7.7	30.2	0.1	6.8	568	1114
14.	RMS-21	7.1	29.6	0.2	29.6	822	1703
<b>Groundwater Samples around the SLF</b>							
15.	RMS-2	7.1	28.3	0.1	10	380	600
16.	RMS-3	7.1	27.5	0.1	0.4	393	656
17.	RMS-4	7.1	27.5	0.3	11.4	401	671
18.	RMS-5	7.4	28.0	0.1	17.8	276	483
19.	RMS-6	7.3	26.9	0.1	3.2	460	768
20.	RMS-7	7.7	27.2	1.1	26.6	259	472
21.	RMS-25	8.0	28.0	0.2	2.2	505	887
22.	RMS-26	7.5	27.6	0.1	0.4	681	1215
	<b>Desirable</b>	<b>6.5 – 8.5</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>500</b>	<b>-</b>
	<b>Permissible</b>	<b>NR</b>	<b>-</b>	<b>5</b>	<b>-</b>	<b>2000</b>	<b>-</b>

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Table 4.3.3 Groundwater Quality- Inorganic Parameters

Sr. No	Sample Code	Total Hardness (as CaCO <sub>3</sub> )	Calcium (as Ca)	Magnesium (as Mg)	Sodium (as Na)	Potassium (as K)
		mg/l				
<b>Monitoring wells</b>						
1.	RMS-1	546	123	57	1423	6.0
2.	RMS-8	148	34	15	18	1.0
3.	RMS-10	860	171	104	1730	7.0
4.	RMS-11	320	85	456	1125	8.0
5.	RMS-12	189	50	15	106	2.0
6.	RMS-13	192	38	23	16	1.0
7.	RMS-14	356	80	37	1840	7.0
8.	RMS-15	133	336	148	1770	6.0
9.	RMS-16	1280	296	130	380	4.0
10.	RMS-17	404	106	34	2587	17.0
11.	RMS-18	672	158	66	940	5.0
12.	RMS-19	1500	194	155	320	6.0
13.	RMS-20	368	85	37	80	1.0
14.	RMS-21	450	96	63	82	2.0
<b>Groundwater samples around the industry</b>						
15.	RMS-2	180	45	16	69	1.0
16.	RMS-3	192	43	20	79	2.0
17.	RMS-4	192	46	18	70	1.0
18.	RMS-5	240	46	30	24	1.0
19.	RMS-6	280	42	42	68	2.0
20.	RMS-7	172	44	15	70	2.0
21.	RMS-25	196	42	22	99	1.0
22.	RMS-26	344	84	32	101	1.0
<b>Desirable</b>		<b>200</b>	<b>75</b>	<b>30</b>	-	-
<b>Permissible</b>		<b>600</b>	<b>200</b>	<b>100</b>	-	-

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Table 4.3.4 Groundwater Quality- Inorganic Parameters

Sr. No	Sample Code	Total Alkalinity (as CaCO <sub>3</sub> )	Sulphate (as SO <sub>4</sub> )	Chloride (as Cl)	Salinity	Fluoride (as F)
		mg/l			‰	mg/l
<b>Monitoring Wells</b>						
1.	RMS-1	172	91	2432	4.3	1.32
2.	RMS-8	44	27	79	0.14	0.94
3.	RMS-10	64	157	3177	5.74	0.79
4.	RMS-11	250	65	1520	2.12	1.9
5.	RMS-12	80	28	232	0.42	0.77
6.	RMS-13	60	35	78	0.14	1.06
7.	RMS-14	100	64	3044	5.50	1.10
8.	RMS-15	121	148	1069	0.48	1.4
9.	RMS-16	72	133	1420	2.56	1.32
10.	RMS-17	100	200	4085	7.38	1.05
11.	RMS-18	96	204	1710	3.10	1.23
12.	RMS-19	175	165	1445	1.24	1.16
13.	RMS-20	72	45	290	0.52	0.60
14.	RMS-21	58	25	822	0.91	0.57
<b>Groundwater samples around the industry</b>						
15.	RMS-2	172	91	32	0.06	0.57
16.	RMS-3	88	53	162	0.29	1.06
17.	RMS-4	164	30	93	0.17	0.99
18.	RMS-5	172	11	79	0.14	0.89
19.	RMS-6	176	50	120	0.22	1.40
20.	RMS-7	108	24	125	0.23	1.23
21.	RMS-25	136	54	144	0.26	1.02
22.	RMS-26	168	91	199	0.36	0.81
<b>Desirable</b>		<b>200</b>	<b>200</b>	<b>250</b>	<b>-</b>	<b>1.0</b>
<b>Permissible</b>		<b>600</b>	<b>400</b>	<b>1000</b>	<b>-</b>	<b>1.5</b>

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Table 4.3.5 Groundwater Quality – Nutrient Parameters

Sr. No.	Sample Code	Nitrate (as NO <sub>3</sub> )	Total Phosphorus (as P-PO <sub>4</sub> )	Available Phosphorus (as P-PO <sub>4</sub> )	O&G
		mg/l			
<b>Monitoring Wells</b>					
1.	RMS-1	5.22	0.317	0.162	BDL
2.	RMS-8	3.26	0.057	0.031	BDL
3.	RMS-10	6.04	0.016	0.004	BDL
4.	RMS-11	9.45	0.121	0.099	BDL
5.	RMS-12	1.04	0.034	0.020	BDL
6.	RMS-13	2.48	0.088	0.044	BDL
7.	RMS-14	4.65	0.028	0.002	BDL
8.	RMS-15	14.47	0.816	0.297	BDL
9.	RMS-16	14.7	0.013	BDL	BDL
10.	RMS-17	1.06	0.020	0.002	BDL
11.	RMS-18	10.02	0.022	0.001	BDL
12.	RMS-19	18.19	0.256	0.204	BDL
13.	RMS-20	17.10	0.011	0.001	BDL
14.	RMS-21	15.13	0.108	0.050	BDL
<b>Groundwater samples around the Industry</b>					
15.	RMS-2	14.58	0.025	0.014	BDL
16.	RMS-3	18.0	0.031	0.020	BDL
17.	RMS-4	7.22	0.185	0.016	BDL
18.	RMS-5	0.20	0.019	0.005	BDL
19.	RMS-6	13.79	0.016	0.005	BDL
20.	RMS-7	0.20	0.031	0.001	BDL
21.	RMS-25	16.56	0.008	BDL	BDL
22.	RMS-26	10.44	0.038	0.007	BDL
<b>Desirable</b>		<b>45</b>	-	-	-
<b>Permissible</b>		<b>NR</b>	-	-	-

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Table 4.3.6 Groundwater Quality –Heavy Metals

Sr. No	Sample Code	As	B	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn	Hg
		mg/l											
<b>Monitoring Wells</b>													
1.	RMS-1	BDL	BDL	BDL	0.001	0.052	0.013	1.342	BDL	0.032	0.532	BDL	<0.001
2.	RMS-8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.230	0.003	0.043	BDL	<0.001
3.	RMS-10	BDL	BDL	0.003	0.007	BDL	0.005	2.585	0.454	0.028	0.131	BDL	<0.001
4.	RMS-11	BDL	BDL	BDL	0.001	0.032	0.005	0.050	BDL	0.022	BDL	BDL	<0.001
5.	RMS-12	BDL	0.044	BDL	BDL	BDL	BDL	0.937	0.042	BDL	0.543	0.080	<0.001
6.	RMS-13	BDL	BDL	BDL	BDL	BDL	BDL	0.570	0.153	BDL	0.033	0.069	<0.001
7.	RMS-14	BDL	0.078	BDL	BDL	BDL	BDL	0.660	0.049	BDL	0.006	0.105	<0.001
8.	RMS-15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001	BDL	0.001
9.	RMS-16	BDL	0.269	BDL	0.014	0.013	BDL	0.715	0.938	BDL	0.060	0.130	0.001
10.	RMS-17	BDL	0.105	BDL	0.025	0.005	BDL	4.786	1.622	BDL	0.216	0.134	<0.001
11.	RMS-18	BDL	0.197	BDL	0.001	0.002	BDL	1.706	0.260	BDL	0.093	0.177	<0.001
12.	RMS-19	BDL	0.178	BDL	0.005	BDL	BDL	0.392	2.766	BDL	0.059	0.065	<0.001
13.	RMS-20	BDL	BDL	BDL	0.001	BDL	BDL	0.468	0.019	BDL	0.017	0.090	<0.001
14.	RMS-21	BDL	0.009	BDL	0.016	0.002	BDL	0.520	0.302	BDL	0.038	0.085	<0.001
<b>Groundwater samples around the Industry</b>													
15.	RMS-2	BDL	BDL	BDL	BDL	BDL	BDL	0.075	BDL	BDL	BDL	BDL	<0.001
16.	RMS-3	BDL	BDL	BDL	BDL	BDL	0.003	BDL	BDL	BDL	BDL	BDL	<0.001
17.	RMS-4	BDL	BDL	0.005	0.001	BDL	0.009	7.551	0.572	0.004	0.006	1.126	<0.001
18.	RMS-5	BDL	BDL	BDL	BDL	BDL	0.002	8.022	0.874	0.022	0.004	BDL	<0.001
19.	RMS-6	BDL	BDL	BDL	BDL	BDL	0.002	2.307	BDL	BDL	BDL	BDL	<0.001
20.	RMS-7	BDL	0.029	BDL	0.004	0.002	0.029	3.796	BDL	0.019	0.029	BDL	<0.001
21.	RMS-25	BDL	0.039	BDL	BDL	BDL	0.013	2.359	0.009	BDL	0.005	0.111	<0.001
22.	RMS-26	BDL	0.022	0.004	0.002	0.004	0.015	0.146	0.086	0.002	0.033	0.141	<0.001
<b>Desirable</b>		<b>0.01</b>	<b>0.5</b>	<b>0.003</b>	<b>-</b>	<b>0.05</b>	<b>0.05</b>	<b>0.3</b>	<b>0.1</b>	<b>0.02</b>	<b>0.01</b>	<b>5</b>	<b>0.001</b>
<b>Permissible</b>		<b>0.05</b>	<b>1.0</b>	<b>NR</b>	<b>-</b>	<b>NR</b>	<b>1.5</b>	<b>NR</b>	<b>0.3</b>	<b>NR</b>	<b>NR</b>	<b>15</b>	<b>NR</b>

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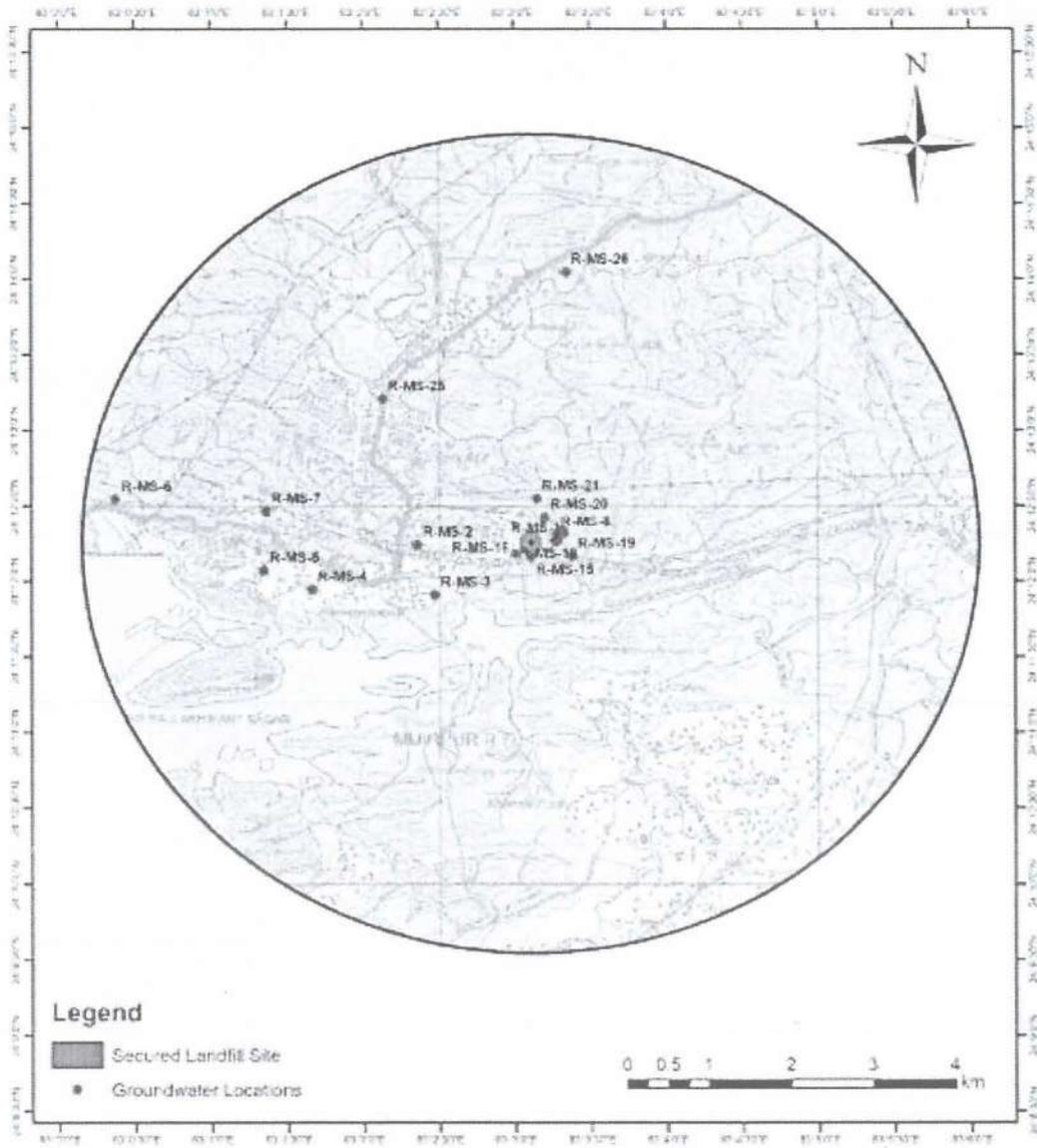


Fig. 4.3.1A Groundwater and surface water sampling locations around GRCD, Renukoot

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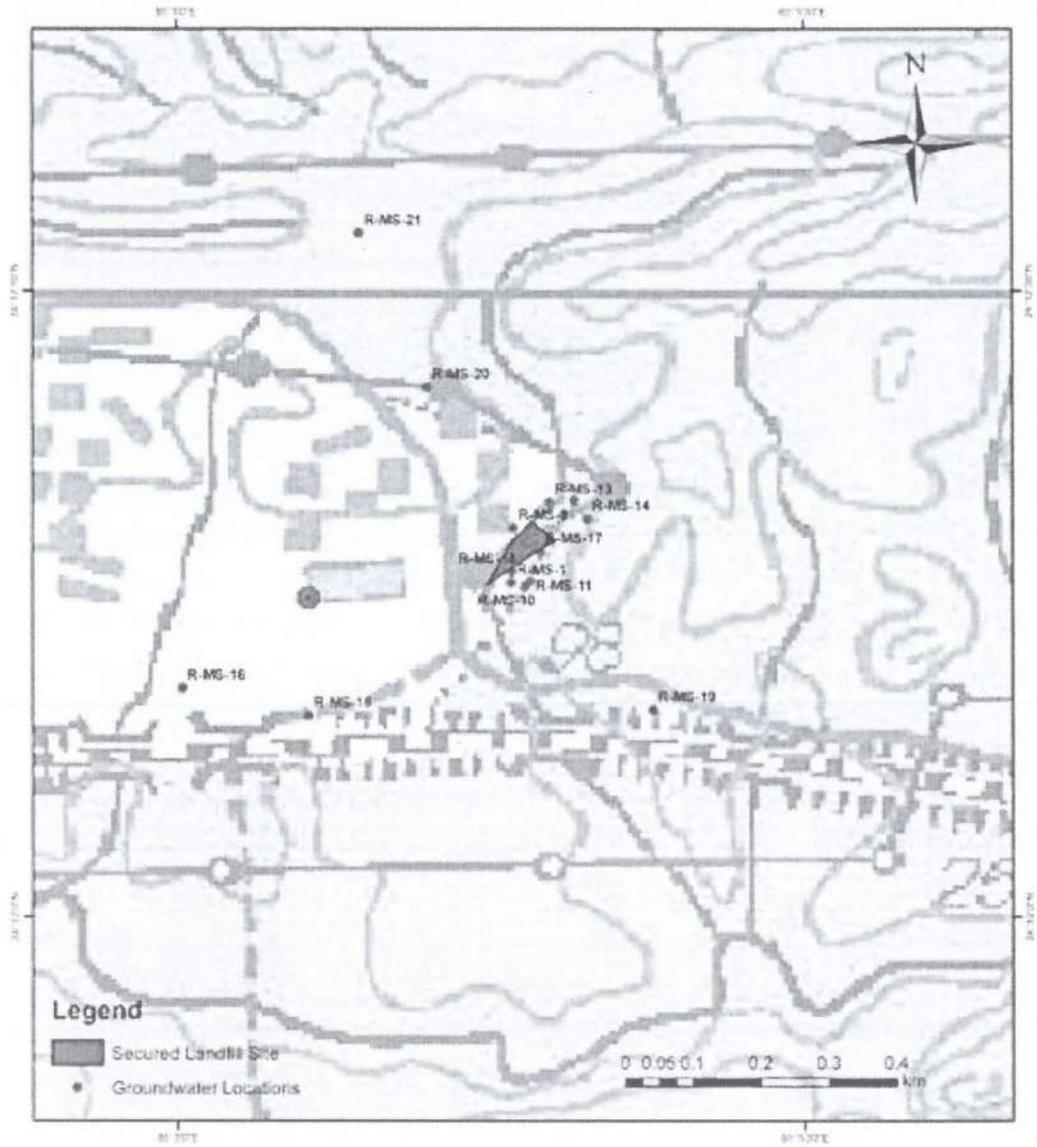


Fig. 4.3.1B Secured Landfill Site of GRCD, Renukoot

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## 4.4 Hydrogeochemistry

The groundwater parameter analysis reveals the various concentrations of parameters present in groundwater. A more robust presentation of the groundwater quality has been done by the hydrochemical diagrams viz., Piper Plot, Gibbs Plot and Wilcox Diagram. The details of the plot with respect to the groundwater quality have been explained in detail below:

### 4.4.1 Piper Plot

Hydrogeochemistry of groundwater are greatly depend on lithology, groundwater flow pattern, and resident time. Based on chemical composition, groundwater is usually grouped into three main categories such as bicarbonate, sulfate, and chloride types. Piper diagram is a useful tool to identify different hydrochemical facies by plotting the content of cations and major anions in groundwater indicating the origin, source of dissolved salts and processes that affect the characteristics of groundwater. Arthur M Piper in 1944 proposed the piper plot which is an useful procedure in presenting the chemistry data to help in understanding the sources of the dissolved constituents in water. It is based on the fact that cations and anions are in equilibrium in water.

Piper plot is constructed in AQUACHEM software to understand the hydrochemical evolution of groundwater in the study area (Figure 4.4.1). It can be observed from the Piper plot that most of the samples are concentrated in the chloride side of the anion triangle and sodium forms the major cation part of the cation triangle. This indicates that the major ion types are chloride in the anions and sodium in the cations part. The high concentration of sodium and chloride indicates the interaction of rock with water in the area. The superior water types are in the order of mixed Na-Cl > Na-Mg-Ca-Cl > Na-Ca-Cl. The majority of samples are mixed Na-Ca-Cl, Na-Mg-Ca-Cl, Na-Ca-Cl types of water that indicate mineral dissolution, rock-water interaction. The piper plot indicates that the high values of the groundwater quality parameters is mainly from the interactions between rock and water which is the main reason elevated values of TDS and other parameters.

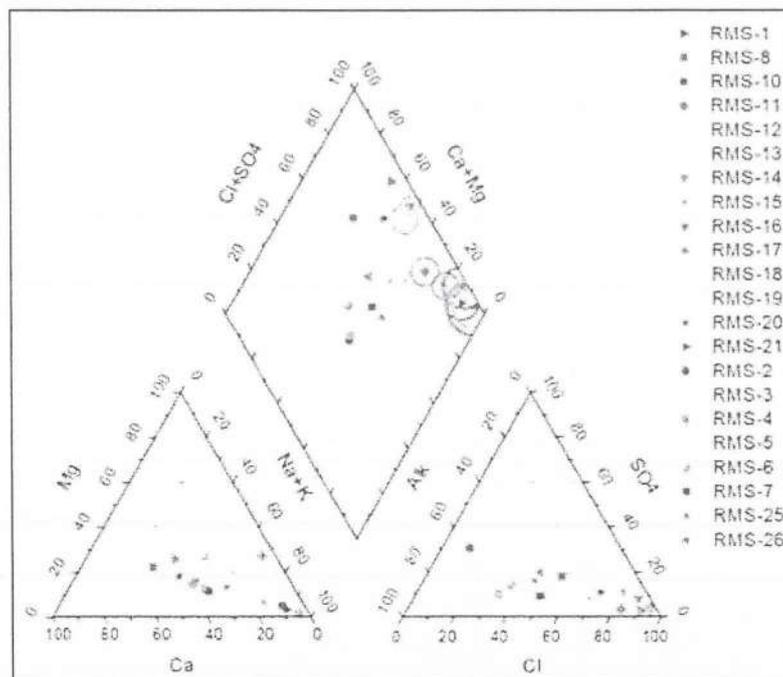


Fig. 4.4.1 Piper plot of the samples of the study area

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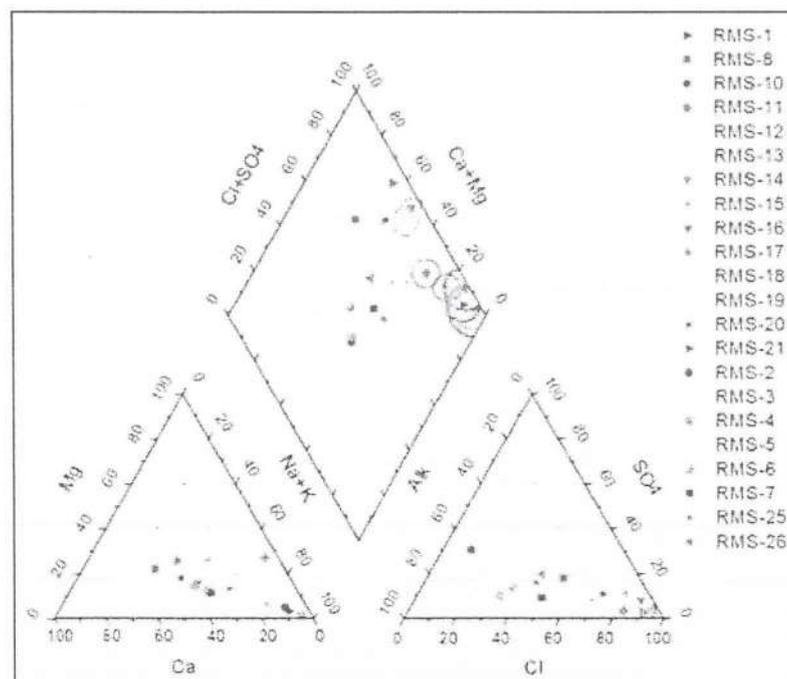


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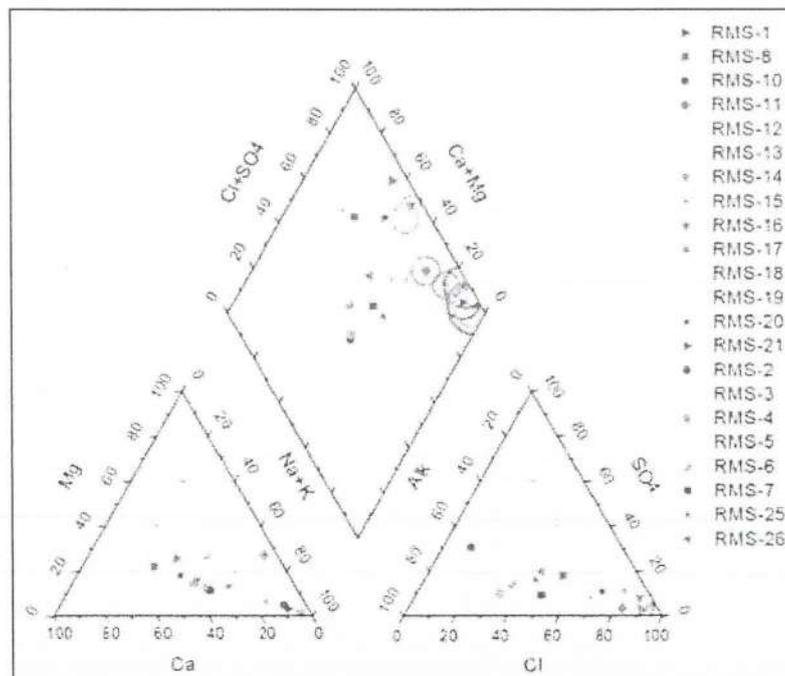


Fig. 4.4.1 Piper plot of the samples of the study area

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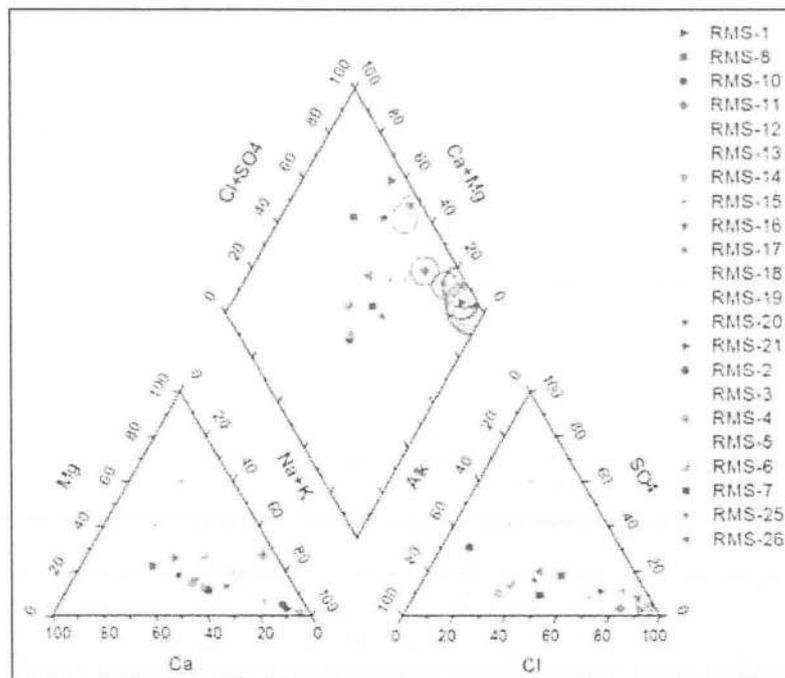


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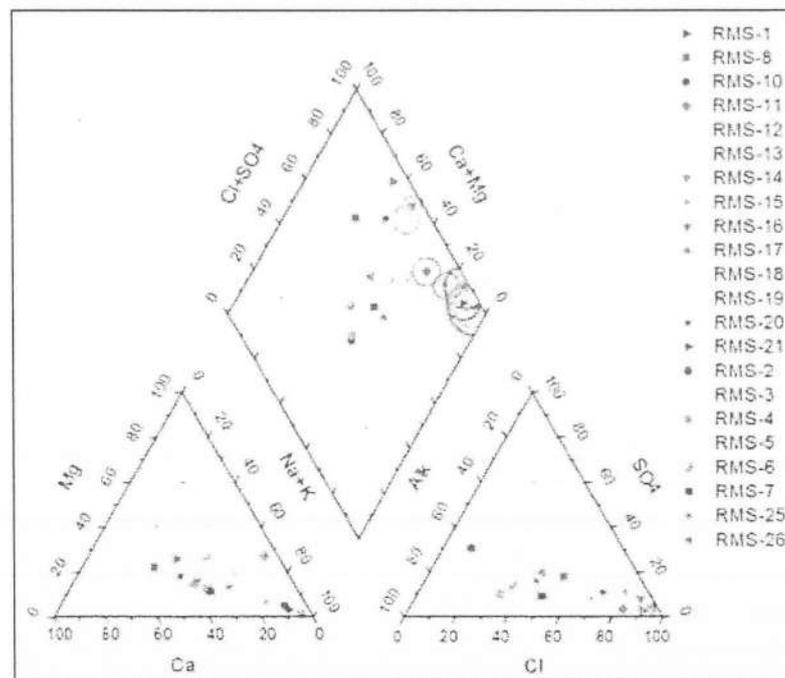


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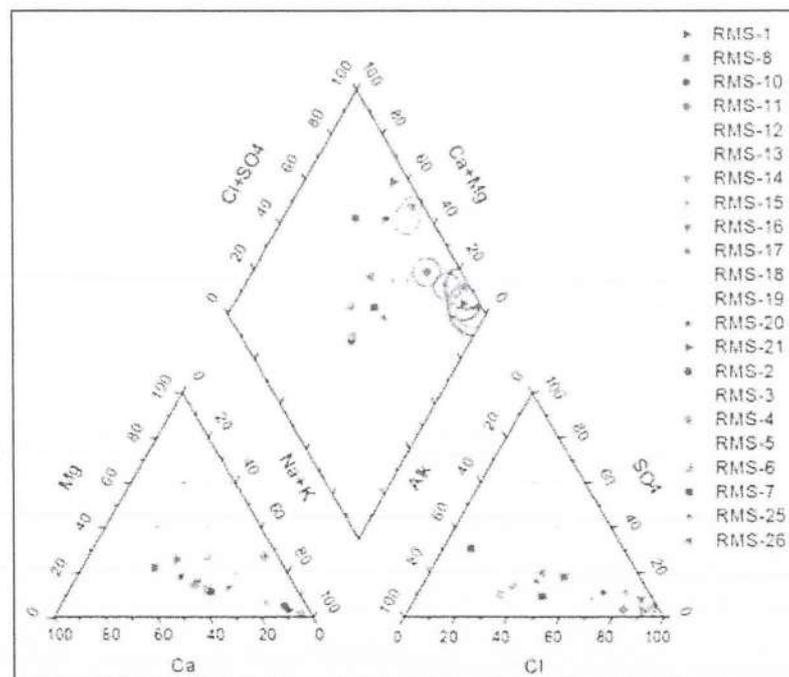


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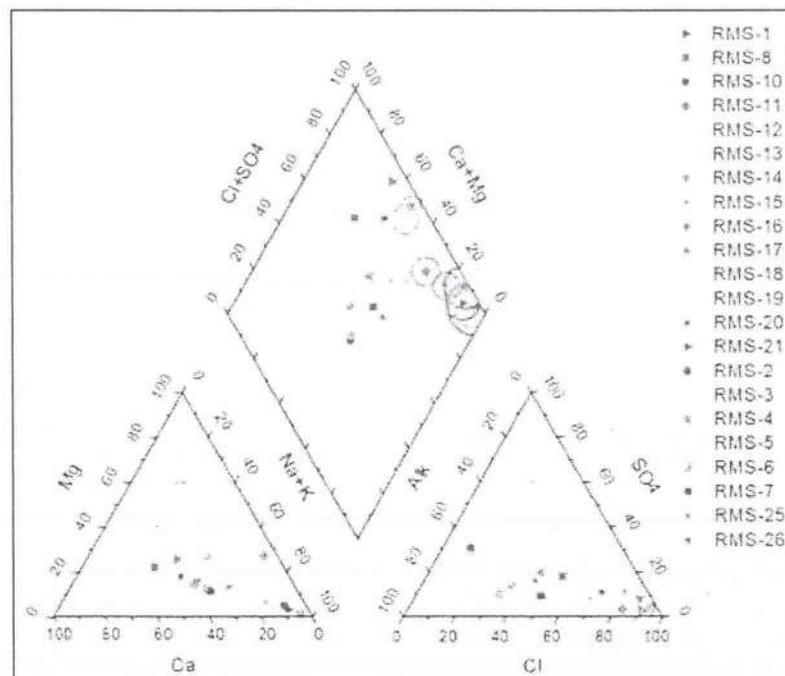


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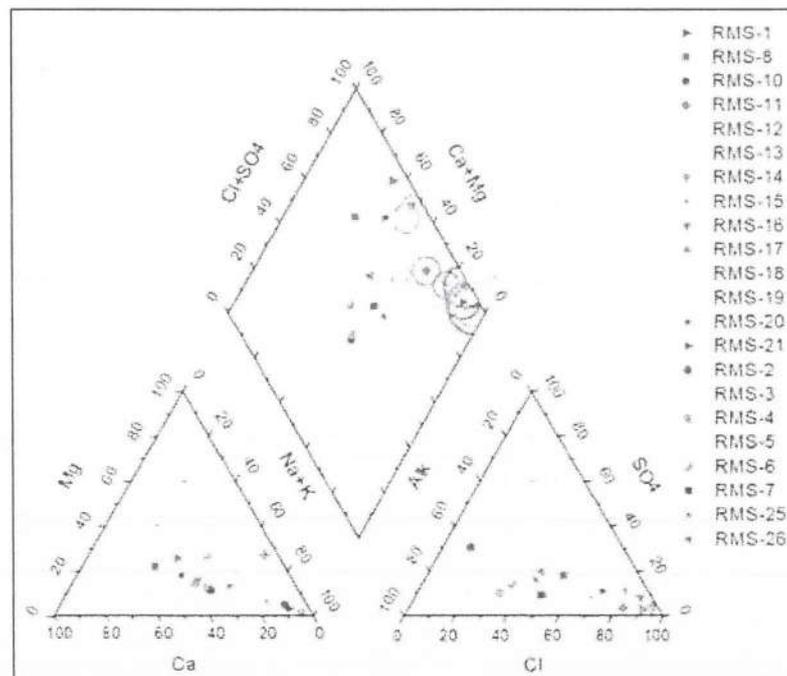


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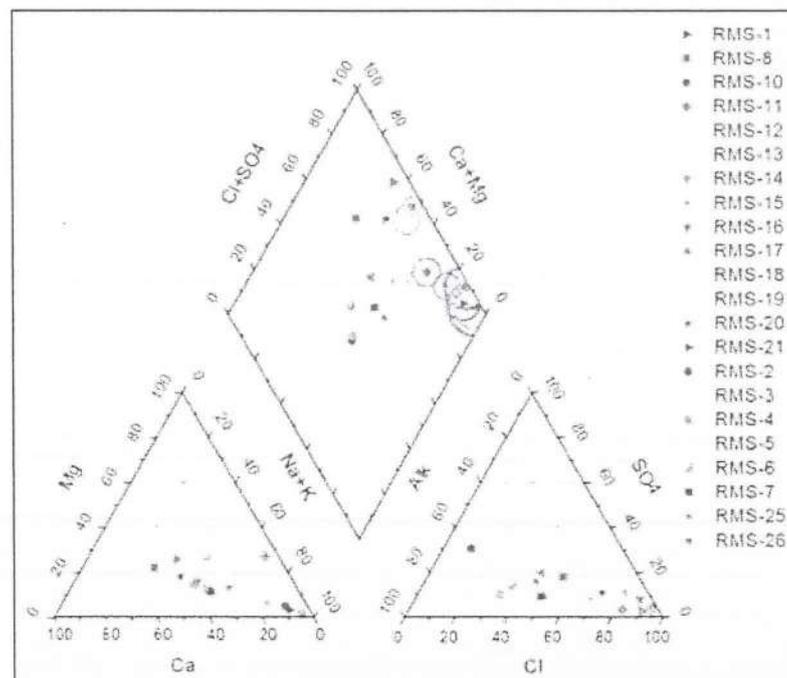


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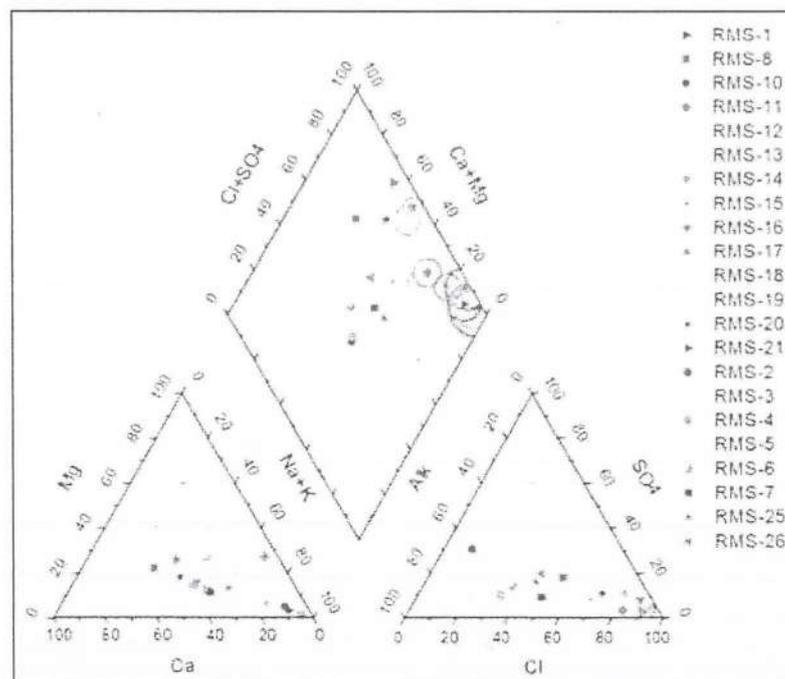


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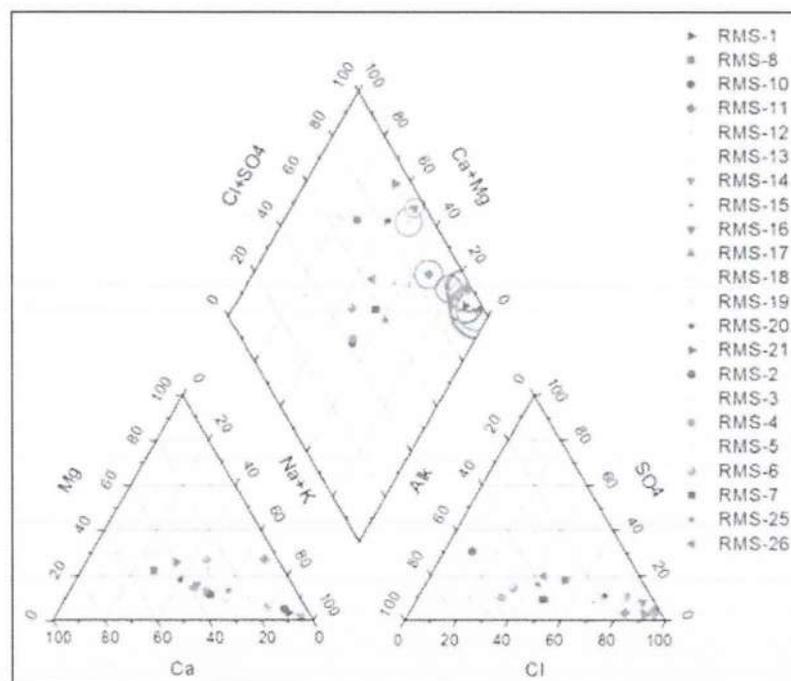


Fig. 4.4.1 Piper plot of the samples of the study area

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#### 4.4.2 Gibbs plot

The relation between aquifer characteristics and water composition such as rock-water interaction, rainfall dominance (chemistry of the rain water) and evaporation dominance (rate at which the evaporation takes place) is obtained by plotting the Gibbs plot. The Gibbs plot is shown in Figure 4.4.2. The cation plot shows that all the samples fall in the rock dominance. Majority of samples that fall in the rock dominance indicate the weathering of rock forming minerals that influence the groundwater quality by dissolution of rocks in groundwater.

The anion Gibbs plot show that all the samples fall in the rock dominance. As mentioned before the rock weathering process greatly influences the groundwater quality. The anion plot indicates the primary mechanism the rock weathering process. The concentration of ions is greatly influenced by rock weathering processes. This increases the sodium and chloride content in groundwater which in turn increases the TDS value of groundwater samples.

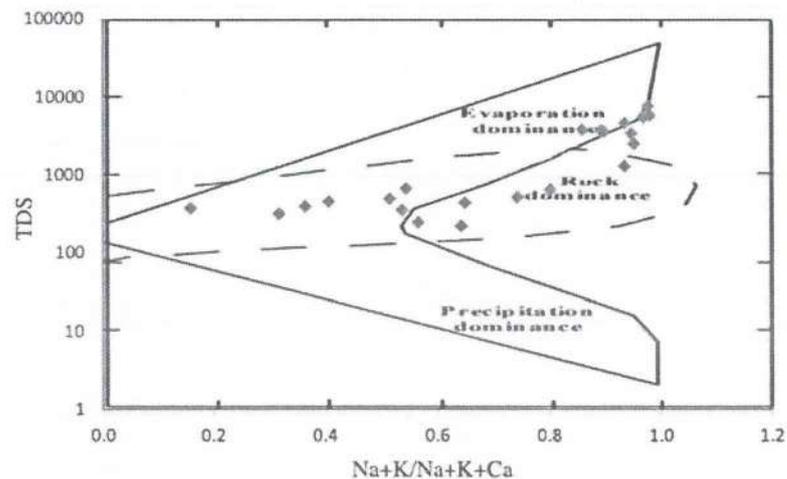


Fig. 4.4.2A Cations plot of the study area

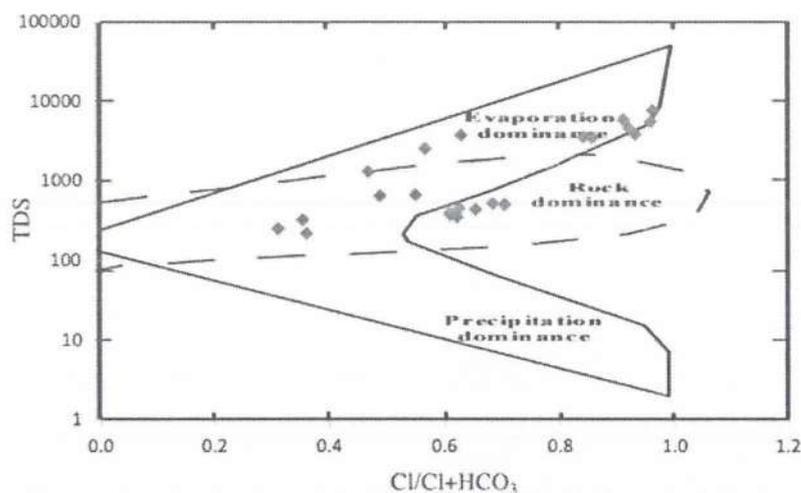


Fig. 4.4.2B Anions of the study area

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The groundwater chemistry is usually controlled by chemical composition of the rock, evaporation rate, the and the rainwater. The hydrochemical diagrams displayed the mechanisms that control the chemistry of groundwater from the relationship of chemical components with their respective lithologies in the aquifer, representing the water–rock interaction and evaporation.

#### 4.5 Groundwater Quality Index

Many studies have assessed the water quality based on the calculation of water quality index. Groundwater Quality Index gives an indication of quality of groundwater.

##### 4.5.1 Calculation of groundwater quality index

Groundwater Quality Index is one of the useful tools for the groundwater quality evaluation and management. This method is used in the present work for evaluation of water quality index that was developed by Brown et al. (1970). The water quality index was prepared using the measured values of the groundwater quality. The parameters were determined based on their importance in the groundwater quality. The standard values of drinking water of BIS were used in the study and the step by step procedure for water quality index calculation are presented below:

- A weight is assigned to each parameter ( $w_i$ ) based on their importance in groundwater. The highest value is assigned to parameters having major effects on the groundwater quality and the lowest value is assigned to parameters not considered harmful.
- Each parameter relative weight is calculated as per the following equation:

$$W_i = \frac{w_i}{\sum_{i=1}^n w_i}$$

where,  $W_i$  is the relative weight of the parameter and  $w_i$  is the weight of each parameter

- The quality rating scale for every parameter is computed by dividing the value in each groundwater sample by its respective standard according to BIS standards and the result was multiplied by 100

$$qi = \left( \frac{Ci}{Si} \right) \times 100$$

where,  $qi$  is the quality rating for each parameter,  $C_i$  is the concentration of each parameter and  $S_i$  is the BIS norm for each parameter

- For computing the WQI, the water quality sub index ( $Sli$ ) for each parameter is first determined and then the following equation is used to calculate the WQI of the groundwater sample

$$Sli = Wiqi$$

$$WQI = \sum_{i=1}^n Sli$$

where,  $Sli$  is the sub index of the  $i$ th parameter

The WQI index values are classified as per the following table water quality scale table:

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S.No.	WQI	Water Quality Status	Usage
1.	0 – 25	Excellent	Drinking, irrigation and industrial
2.	26 – 50	Good	Domestic, irrigation and industrial
3.	51 – 75	Poor	Irrigation
4.	76 – 100	Very poor	Restricted use for irrigation
5.	> 100	Unsuitable for drinking	Proper treatment before use

Based on the above calculation, the groundwater samples have been classified based on the WQI of the groundwater sample (Table 4.5.1).

The weighted arithmetic average method used in the present work considers the maximum permissible limits of BIS. However, it has certain limitations, such as that it is not possible to evaluate all the risks present in the water, and the weighting required for each parameter according to its importance could become subjective.

The results obtained in the study area ranged from 15 to 145 (Table 4.5.1), observing water of excellent to very poor. One groundwater sample has excellent water quality which can be used for drinking, irrigation and industrial purpose, 14 samples have good water quality that can be used for domestic, irrigation and industrial purpose, 02 samples have poor water quality that can be used only for irrigation and one groundwater sample has very poor quality that can be used for irrigation but restricted.

**Table 4.5.1 Water Quality Index values of the groundwater samples**

S.No	Code	WQI	Usage
1	RMS-1	109	Proper treatment before use
2	RMS-2	16	Drinking, irrigation and industrial
3	RMS-3	21	Drinking, irrigation and industrial
4	RMS-4	18	Drinking, irrigation and industrial
5	RMS-5	20	Drinking, irrigation and industrial
6	RMS-6	27	Domestic, irrigation and industrial
7	RMS-7	23	Drinking, irrigation and industrial
8	RMS-8	15	Drinking, irrigation and industrial
9	RMS-10	121	Proper treatment before use
10	RMS-11	116	Proper treatment before use
11	RMS-12	25	Drinking, irrigation and industrial
12	RMS-13	20	Drinking, irrigation and industrial
13	RMS-14	107	Proper treatment before use
14	RMS-15	88	Restricted use for irrigation
15	RMS-16	84	Restricted use for irrigation
16	RMS-17	145	Proper treatment before use
17	RMS-18	87	Restricted use for irrigation
18	RMS-19	94	Restricted use for irrigation
19	RMS-20	30	Domestic, irrigation and industrial
20	RMS-21	41	Domestic, irrigation and industrial
21	RMS-25	28	Domestic, irrigation and industrial
22	RMS-26	29	Domestic, irrigation and industrial

**Table 4.5.2 Summary of the GWQI values**

Water Quality Status	Usage	No. of samples
Excellent	Drinking, irrigation and industrial	08
Good	Domestic, irrigation and industrial	05
Poor	Irrigation	00
Very poor	Restricted use for irrigation	04
Unsuitable for drinking	Proper treatment before use	05
<b>Total no. of samples</b>		<b>22</b>

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From the groundwater quality index values, following conclusions can be made:

- All the above values calculated are empirical in nature. Eight samples fall in the “Excellent” water quality status which means the possible usage of those wells can be for drinking, irrigation and industrial purposes. However, the well water must be properly treated before using for drinking purpose.
- Five samples fall in the “Good” water quality status which means the possible usage of those wells can be for domestic, irrigation and industrial purposes.
- Four samples fall in the “Very Poor” water quality status which means the possible usage of those wells can be irrigation purposes with restriction.
- Eight samples fall in the “Unsuitable for drinking” water quality status which means the water of those wells if used for any other purposes should properly be treated before any usage

#### 4.6 Surface Water Quality

Four surface water samples have been collected in the area. The surface water locations details are given in the Tables 4.6.1 to 4.6.7. The samples have been analysed for physico chemical and heavy metals. The results of the surface water samples reveal the following:

- pH varied from 8.3 to 8.5 in the surface water samples
- TDS of the samples varied from 113 - 2515mg/l. The high value of TDS in Dongiya Nallah due to the sewage flow from the adjoining villages
- Chloride ranged from 39 - 977mg/l in the surface water samples. Oil and Grease was BDL in all the water samples
- COD was in the range of 40-76mg/l, BOD varied from 0.9 to 1.5mg/l

Table 4.6.1 : Surface Water Sampling Locations

S. No	Sample Code	Sample Location	GPS Location	Remarks
1.	RMS-9	Dongiya Nala Sample	24°11'56.32"N 83°02'35.97"E	Sewage from hiteer colony and others flow through this Nallah and meets Rihand dam
2.	RMS-10	Rihand dam-near Grasim-intake well	24°11'41.11"N 83°03'04.04"E	Near Grasim - intake well pump house Rihand dam
3.	RMS-11	Near Dongia Nallah confluence point	24°11'54.74"N 83°02'37.85"E	Sample collected near dongia nallah after confluence point river
4.	RMS-12	Downstream after dongia nallah	24°11'31.86"N 83°02'33.50"E	Surface water sample collected after Dongia nallah confluence point downstream

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Table 4.6.2 : Surface water Quality – Physical Parameters

Sr. No	Sample Code	pH	Temp (°C)	Turbidity (NTU)	TSS (mg/l)	TDS (mg/l)	Conductivity (µS/cm)
1.	RMS-9	8.3	32.1	0.7	14.6	2515	4190
2.	RMS-10	8.5	32.0	0.2	5.3	113	192
3.	RMS-11	8.5	31.7	0.1	3.0	122	201
4.	RMS-12	8.5	31.5	0.2	2.2	121	198

Table 4.6.3 : Surface water Quality- Inorganic Parameters

Sr. No	Sample Code	Total Hardness	Calcium	Magnesium	Sodium	Potassium
		mg/l				
1.	RMS-9	568	114	68	483	6.0
2.	RMS-10	64	16	6.0	11	3.0
3.	RMS-11	56	13	6.0	18	2.0
4.	RMS-12	80	19	8.0	10	2.0

Table 4.6.4 : Surface water Quality- Inorganic Parameters

Sr. No	Sample Code	Total Alkalinity	Sulphate	Chloride	Salinity	Fluoride
		mg/l			‰	mg/l
1.	RMS-9	52	82	977	1.78	0.79
2.	RMS-10	24	11	42	0.08	0.66
3.	RMS-11	16	12	51	0.09	0.74
4.	RMS-12	28	15	39	0.07	0.44

Table 4.6.5: Surface water Quality – Nutrient Parameters

Sr. No.	Sample Code	Nitrate (as NO <sub>3</sub> )	Total Phosphorus (as P-PO <sub>4</sub> )	Available Phosphorus (as P-PO <sub>4</sub> )	O&G
		mg/l			
1.	RMS-9	7.49	0.112	0.078	BDL
2.	RMS-10	0.74	0.011	0.004	BDL
3.	RMS-11	0.20	0.025	0.005	BDL
4.	RMS-12	0.74	0.026	0.014	BDL

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Table 4.6.6 : Surface water Quality- Nutrient Parameters

Sr. No	Sample Code	Available N	Nitrites	TKN	O&G	COD	DO	BOD	TC	FC	TVC
		mg/l							CFU/100ml	CFU/ml	
1.	RMS-9	2.5	0.070	2.8	BDL	40	7.0	1.0	-	-	-
2.	RMS-10	0.7	BDL	1.4	BDL	64	7.0	1.5	TNC	ND	11×10 <sup>5</sup>
3.	RMS-11	BDL	0.010	0.56	BDL	40	6.5	0.9	TNC	ND	300×10 <sup>5</sup>
4.	RMS-12	0.69	BDL	0.84	BDL	76	6.7	1.1	TNC	100	240×10 <sup>5</sup>

Table 4.6.7 : Groundwater Quality –Heavy Metals

Sr. No	Sample Code	As	B	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn	Hg
		mg/l											
1.	RMS-9	BDL	BDL	BDL	0.001	BDL	0.004	BDL	BDL	BDL	BDL	BDL	<0.001
2.	RMS-10	BDL	0.003	BDL	BDL	BDL	BDL	0.240	BDL	BDL	0.008	0.027	<0.001
3.	RMS-11	BDL	0.018	BDL	BDL	BDL	0.002	BDL	BDL	BDL	0.001	0.012	<0.001
4.	RMS-12	BDL	0.063	0.001	BDL	BDL	0.007	BDL	BDL	BDL	0.004	BDL	<0.001

## 4.7 Sediment Quality

### 4.7.1 Sediment Characterization

Suspended matter may be divided into different categories that generally are divided as organic and inorganic suspended matter. Organic suspended matter contains mainly phytoplankton. Inorganic part contains mainly sediments that are suspended by currents and waves, or taken to the water column by human activities like dredging and dumping.

Sediment of Dongiya nala was collected as per the standard procedure using Van Veen Grab Sampler to assess the prevailing status of sediment quality. The location of Dongia Nala (R-MS-3) identified within project area are given in Table 4.7.1 & Fig. 4.8.3 A&B. The analysis of sediment samples have been carried out as per the standard methods. Sediment quality have been determined viz., texture, distribution of particle size, Total Organic carbon and Heavy Metals.

The sediment texture is observed to be predominantly sandy as coarse and fine sand are dominant with a value of 80.62% and 14.55% as compared to clay and silt content (2.31% and 2.52%) in the sediment sample. TOC content of Dongiya Nala sediment was observed to be 1.12%. Sediment quality is furnished in Tables 4.7.1 to 4.7.2.

### 4.7.2 Heavy Metals

Sediment sample was analyzed for heavy metals such as Arsenic (BDL), Chromium (14.6 mg/kg), Boron (48.2 mg/kg), Zinc (81.5 mg/kg), Lead (12.3mg/kg), Nickel (28.0 mg/kg), Cadmium (3.0 mg/kg), Iron (22194 mg/kg), Manganese (911 mg/kg), Copper (15.6 mg/kg), Cobalt (15.0mg/kg), Mercury (0.23 mg/kg) (Table 4.7.3). Results were compared with the sediment quality guidelines of USEPA (1999) National recommended water quality criteria-correction-United State Environmental Protection Agency EPA 822-Z-99-001 and Consensus based sediment quality Guidelines, Recommendations for use and application, December 2003, Wiscosin, Dept of Natural Sources (ANNEXURE IV).

The heavy metal concentrations in the sample was below the Threshold Effect concentration limit as per above mentioned sediment quality guidelines (Annexure IV).

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Table 4.7.1 Particle Size Distribution

S.No.	Sample Code	Particle Size Distribution (%)				Soil Texture
		Coarse Sand	Fine Sand	Silt	Clay	
1.	R-MS-3	80.62	14.55	2.52	2.31	Sand (S)

Table 4.7.2 Nutrient Parameters

S.No	Sample Code	Parameters		
		Total Nitrogen (%)	Total Phosphorus (%)	TOC (%)
1.	R-MS-3	0.07	0.05	1.12

Table 4.7.3 Heavy Metals in Sediment Sample

(unit : mg/kg)

S. No.	Sampling Locations	As	B	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Zn
1.	R-MS-3	BDL	48.2	3.0	15.0	14.6	15.6	22194	1.03	911	28.0	12.3	81.5

## 4.8 Soil Quality Assessment

The area under study is situated at Renukoot, Sonbhadra (U.P.). Sonbhadra district represents broadly 3 major soil groups: alfisols, ultisols, and vertisols. The alfisols and ultisols are formed in the northern and central part of Sonbhadra district. The ultisols type of soils are developed in the southern part of Sonbhadra District, with Dudhi complex granite gneissic parent rock. The chemical weathering of granite gneiss releases important nutrients like potassium, sodium, calcium, aluminium, iron, magnesium and silica, all important for agriculture.

These granitic parent rocks have undergone intense weathering under hot and humid climate to the extent that they have developed laterites. The soil taxonomic units encountered in the study area are Lithic Ustorthents and Typic Ustorthents. Lithic Ustorthents are associated with Hills/Ridges/Rock outcrops and occur in recently exposed or as thin regolith over hard rocks. Typic Ustorthents soils are not so extensive and are found in association with colluvial plain areas. Soil Map of Sonbhadra district is presented in Fig. 4.8.1

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The major crops of the district are Paddy, Wheat, Arhar, Gram, Lentil, Linseed, Sesamum, Pea and Vegetables like Tomato, Brinjal, Chilli, Cucurbits and broad beans. The lack of irrigation facilities is one of the major factors affecting production and productivity of crops in this district. Major source of irrigation is canal supplying water from the reservoirs after storing rain water. Management of red, black soils with shallow depth and rocky nature located in undulated terrain is another problem of the district. Land use and land cover map of Sonbhadra district is presented in Fig. 4.8.2 (Source : Chopra Narayan, Land use planning of southern part of Sonbhadra District, U.P., using Remote Sensing Techniques, International Journal of Geomatics And Geosciences Vol. 2, No 4 2012).

#### 4.8.1 Soil Characteristics

Field survey was undertaken to assess the soil quality in and around the secure land fill (SLF) site of Grasim, Renukoot. Locations are identified in and around SLF site for subsoil investigation. Thirteen The samples of soil from six locations were collected in and around the secured land filled sites (SLFs). The soil sample details are given in Table 4.8.1 and their respective locations are depicted in Fig. 4.8.3A&B. Representative soil samples were collected from depths of 0-15 cm, 15-30 cm and 30-45 cm at each of the identified locations near SLF and from 15-30 cm depth from locations of surrounding area for the analysis of physico-chemical characteristics including soil fertility parameters and heavy metals.

#### 4.8.2 Methodology

The standard methods have been followed for the analysis. The international pipette method (Black, 1965 and Piper 1966) was adopted for determination of particle size analysis. The textural diagram was derived using "SEE soil class 2.0 version based on the United States Department of Agriculture (USDA) classification of soils. Physical parameters such as bulk density, porosity and water holding capacity were determined by KR Box method (Keen and Raczkowski, 1921). Soil permeability was determined by Constant Head method (ASTM D 2434).

The chemical characteristics of soil and Soluble cations & anions were measured by preparing soil extract in distilled water in ratio 1:2 (Jackson, 1967). Exchangeable cations and CEC were determined by Centrifuge / Sodium saturation method (EPA 9081, C A Black 1965). Organic carbon was determined by Walkey and Black method (1979). Fertility status of soil in terms of available nitrogen was determined by Kjeldhal method and available phosphorus by chlorostannous reduced molybdophosphorous blue colour method (Olsen method, 1954). Potassium was determined by flame photometric method (Jackson ML 1967). Heavy metals in soil were determined by extracting soil with conc. H<sub>2</sub>SO<sub>4</sub> and conc. HNO<sub>3</sub> followed by analysis on Inductively Coupled Plasma Spectrometer (ICP) (APHA, 2017). Mercury was analyzed in Direct Mercury Analyzer 80 (DMA) (USEPA, Method 7473).

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### 4.8.3 Physical Characteristics

Physical characteristics of soil samples are described through specific parameters, such as particle size distribution, texture, bulk density, porosity and water holding capacity and soil permeability. (Tables 4.8.2 to 4.8.3). The particle size distribution in terms of total sand, silt and clay is furnished in Table 4.8.2.

**Particle size distribution:** It is also known as gradation, refers to the proportions by dry mass of a soil distributed over specified particle-size ranges. Soil particles vary in size and are classified into sand, silt, and clay. Starting with the finest, clay particles are smaller than 0.002 mm in diameter. Particle size distribution is a major factor as it influences water holding capacity, bulk density, Soil moisture availability, and nutrient content. Fine sand content (14.55 to 78.16%) and Coarse Sand (1.49 to 80.62%) of the soil samples collected from the study area are found to be higher as compared to silt and clay content.

**Soil Texture:** Texture indicates the relative content of particles of various sizes, such as sand, silt and clay in the soil. Soil texture is a classification of soil based on its physical texture and characteristics, particularly the size of the particles that make up the soil. The predominant texture of soil in study area is sandy loam followed by Sand and loamy sand (Fig. 4.8.4). The coarser the soil texture, the smaller the active surface area of the soil particles, and the smaller is the resistance of the soil to erosion.

**Soil density:** Soil bulk density is the mass of dry soil per unit of bulk volume, including the air space while particle density is volumetric mass of solid soil. The bulk density and particle density of soils in the region are in the range of 1.17 to 1.45 g/cm<sup>3</sup> and 2.00 to 2.94 g/cm<sup>3</sup> (Table 4.8.3).

**Soil Porosity:** Soil porosity is a measure of air-filled pore spaces and gives information about movement of gases, inherent moisture, and development of root system and strength of soil. It is mainly controlled by the soil texture and the soil organic matter content. The porosity of soil samples in study area are found in the range of 38.56 to 55.72%, as the soils of the study area are mostly sandy loam in texture.

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**Water holding capacity:** Water holding capacity is the ability of a certain soil texture to physically hold water against the force of gravity. It is primarily controlled by the texture and the organic matter content of soil. Water holding capacity of the samples ranged from 36.36 to 52.41% (Table 4.8.3).

**Soil Permeability:** Soil permeability, also called as hydraulic conductivity, is the rate of the flow of water through soil materials. It is an important parameter in estimating the rate at which a fluid will actually flow through a particular type of soil. Soil permeability of the soil samples were found to be moderately slow to moderate (0.36 cm/hr to 2.16 cm/hr as per soil permeability Class (Annexure SI).

#### 4.8.4 Chemical Characteristics

The soil samples were analysed for various chemical parameters, viz. pH, electrical conductivity, soluble cations and anions, Sodium Adsorption Ration (SAR), nutrients and organic carbon content and presented in Tables 4.8.4 to 4.8.6.

**Soil pH:** It is an key parameter to indicate the alkaline or acidic nature of the soil. It also affects the microbial population, solubility of metal ions and regulates nutrient availability. Variation in pH of soil within the study area is presented in Table 4.8.4. The majority of the soil samples are moderately alkaline to strongly alkaline in nature with pH variation from 7.71 to 9.6.

**Electrical conductivity:** The soluble salts were determined from soil saturated extract (1:2). The soluble salts in soil samples are expressed in terms of electrical conductivity (EC) and have been observed in the range: 0.04 to 1.00 mS/cm, which fall in the salt free category (<2 mS/cm) (Annexure SII).

**Soluble Cations & Anions:** Soluble cations and anions in soils were determined in water and soil extract of 2:1 ratio. Soluble cations (in solution) can be removed by leaching or can be precipitate when soil is dried. Amongst the soluble cations, Ca and Mg are found in the range of 0.01 to 0.06 and 0.03 to 1.11meq/100g and Na and K are in the ranges of 0.01 to 0.94 and 0.001 to 0.007meq/100g of soil extract, respectively (Table 4.8.4). The most important anions present in soluble state in the soil are chlorides and sulphates. Chlorides ranged from 0.16 to 1.04 meq/100g and sulphates content ranged from 0.08 to 0.42 meq/100g. Many samples from the study area are found to be in Non-Salinized range with respect to Chloride except RMS S4 samples which are weakly salinized.

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**Sodium Adsorption ratio:** Sodium adsorption ratio (SAR), along with pH, characterizes salt-affected soils. It is an easily measured property that gives information on the comparative concentrations of  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$  in soil solutions. SAR of most of the soil samples of the study area ranged from 0.10 to 0.69 except in samples near SLF -RMS S4 (11.03 to 14.46).

Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced aeration, and a general degradation of soil structure (NRSC,USDA 2017).

**Exchangeable Cations and CEC:** The CEC of a soil together with exchangeable bases, provides a measure for evaluating the fertility status of soil. Amongst the exchangeable cation, the concentration of calcium and magnesium vary from 0.4 to 3.08meq/100g and 3.39 to 10.61meq/100g, respectively. Whereas sodium and potassium are in the range of 0.95to 2.81 meq/100g and 0.128 to 0.64meq/100g of soil, respectively. CEC of soil samples varied from 8.5 to 16.12 cmol (p+) kg . Soil pH is important for CEC because as pH increases (becomes less acid), the number of negative charges on the colloids increase, thereby increasing CEC. Exchangeable sodium percentage (ESP) is varied from 10.32 to 26.82 (Table 4.8.5). The presence of sodium in exchangeable form may have deleterious effect on the chemical and physical properties of soil. ESP of soil is below 5% can be considered as normal in respective alkalinity level. Soils of the study area are more alkaline with respect to exchangeable sodium percentage which is above 15.

**Organic Carbon & Available N, P, K:** Organic carbon in soil samples varied in the range 1.0 to 2.9% which is in the fertile range. Available Nitrogen (N) in soil refers to the fraction of the total N which is converted in to forms accessible to the plant. In the soil samples of the study area, available nitrogen levels are poor (87.8 to 201 kg/ha) as per soil fertility ratings. Available phosphorus (P) refers to the inorganic form, occurring in the soil solution that may be available to plants. Available potassium (K) are water soluble and exchangeable K which are potentially available or fixed. Available K levels are found to be in the range of poor to medium (40.3 to 148 kg/ha) and Available P levels are in fertile range (39.45 to 99.85 kg/ha) as per Soil fertility ratings as per ICAR listed in Annexure II. The results show that the soil in study area is poor in Available nitrogen and Potassium level and fertile w.r.t organic carbon and available phosphorous. The fertility status of soil is presented in Table 4.8.6.

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**Heavy Metals:** Trace levels of metals in soil are very important for the quality of soil and environment, however, excessive levels can cause toxicity in plants, foods and ultimately in animals and humans that feed upon them. All soils naturally contain trace levels of metals (Clain et al., 2007). The presence of metals in soil is not indicative of contamination as soils contain heavy metals naturally. Depending on the local geology, the concentration of metals in a soil may exceed the ranges (from literature) listed in Annexure-VI.

Soil samples were analyzed for heavy metals such as Arsenic (BDL to 12.2 mg/L), Boron (21.47 to 79.84 mg/kg) Cadmium (1.32 to 4.63 mg/kg), Chromium (3.09 to 39.36 mg/kg), Cobalt (6.62 to 28.03 mg/kg), Copper (10.42 to 39.79 mg/kg), Iron (11375 to 29722 mg/kg), Manganese (204 to 1094 mg/kg), Nickel (12.9 to 37.12 mg/kg), Lead (3.68 to 49.3 mg/kg) and Zinc (39.5 to 93.06 mg/kg). The observed levels of heavy metals are presented in Table 4.6.7. The heavy metal concentrations in the study area are below the screening level for Industrial area as per MoEF & CC Guidelines for contaminated sites in India (Annexure SIV) and concentration of Heavy metals in the sample of Location RMS-S7 (far way from SLF) are found to be below the screening levels for Residential and Agricultural area.

The mercury concentration in the soil samples collected adjacent to the SLF site are in the range of 0.1 to 40.0 mg/kg. The maximum concentration of mercury was found in the soils collected nearby the SLF site (RMS S2). However, mercury levels of all the soil samples were found to below the screening level for Industrial area as per MoEF & CC Guidance document for assessment and remediation of contaminated sites in India, 2015.

([https://cpcb.nic.in/uploads/hwmd/MoEFCC\\_guidelines\\_contaminatedsites.pdf](https://cpcb.nic.in/uploads/hwmd/MoEFCC_guidelines_contaminatedsites.pdf)).

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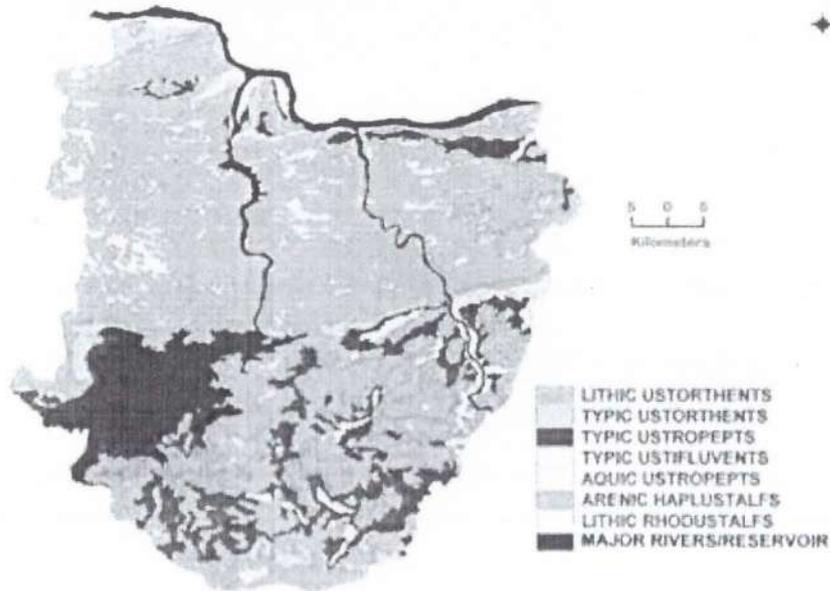


Fig. 4.8.1: Soil map

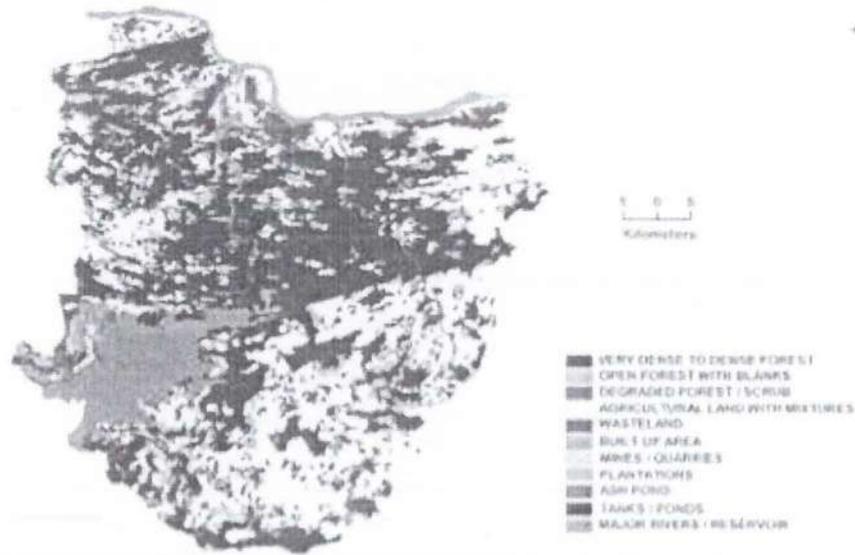


Fig. 4.8.2: Landuse/ Land cover map

Source: Chopra Narayan, Land use planning of southern part of Sonbhadra District, U.P., using Remote Sensing Techniques, International Journal of Geomatics And Geosciences Vol. 2, No 4 (2012)

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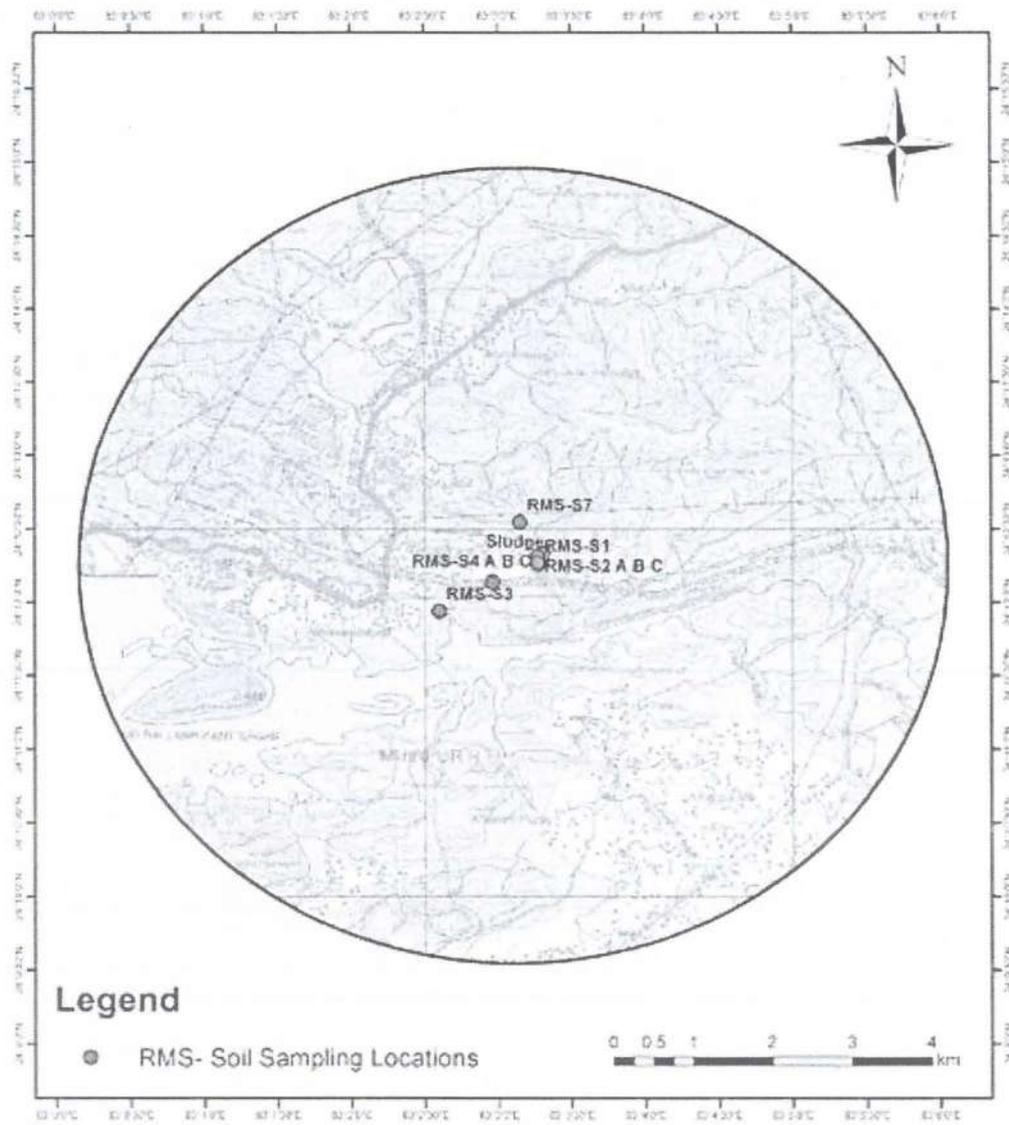


Fig. 4.8.3A : Soil sampling locations (3km radius)

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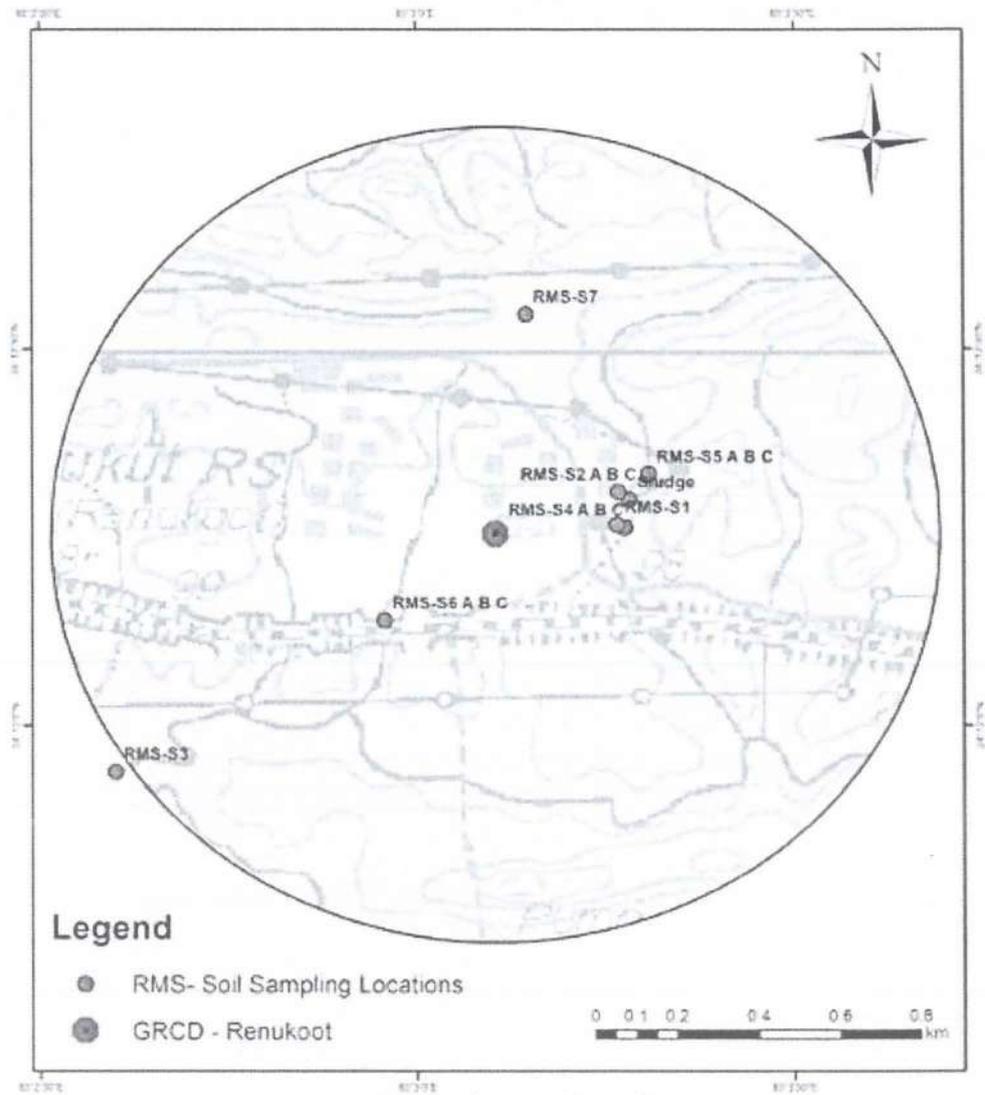


Fig. 4.8.3 B : Soil sampling locations

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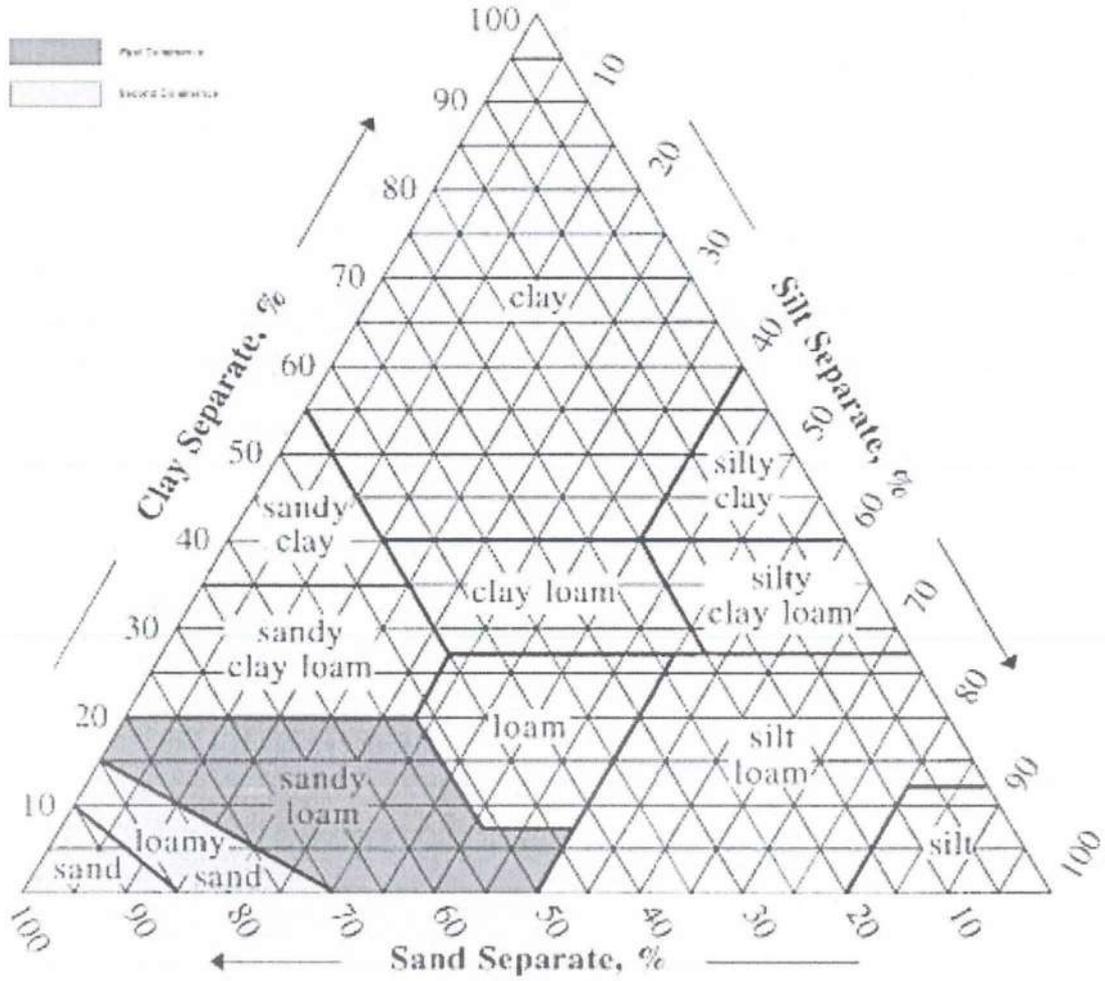


Fig. 4.8.4 : Predominant Soil Texture in Study Area

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Table 4.8.1 Soil &amp; Sediment Sampling Locations

S.No	Sample Code	Sample Location	GPS Location	Sample Type	Remarks
6.	RMS-S1	Near Peizometer inside the industry	24°12'16.00"N 83°03'16.00"E	Soil	-
7.	RMS-S2 A	Beside SLF	24°12'18.61"N 83°03'16.09"E	Soil (0-15cm)	-
8.	RMS-S2 B	Beside SLF	24°12'18.61"N 83°03'16.09"E	Soil (15-30 cm)	-
9.	RMS-S2 C	Beside SLF	24°12'18.61"N 83°03'16.09"E	Soil (30-45 cm)	-
10.	RMS-S3	Dongiya nala	24°11'56.32"N 83°02'35.97"E	Sediment	Sediment Sample
11.	RMS-S4 A	Near SLF	24°12'15.79"N 83°03'16.64"E	Soil (0-15cm)	Between Ely track and power plant
12.	RMS-S4 B		24°12'15.79"N 83°03'16.64"E	Soil (15-30 cm)	
13.	RMS-S4 C		24°12'15.79"N 83°03'16.64"E	Soil (30-45 cm)	
14.	RMS-S5 A	Near SLF	24°12'20.05"N 83°03'18.53"E	Soil (0-15cm)	Soil sample collected adjacent to SLF near hill side
15.	RMS-S5 B		24°12'20.05"N 83°03'18.53"E	Soil (15-30 cm)	
16.	RMS-S5 C		24°12'20.05"N 83°03'18.53"E	Soil (30-45 cm)	
17.	RMS-S6 A	Near boundary wall of STP/ETP discharge point	24°12'08.37"N 83°02'57.43"E	Soil (0-15cm)	Adjacent to Railway track.
18.	RMS-S6 B		24°12'08.37"N 83°02'57.43"E	Soil (15-30 cm)	
19.	RMS-S6 C		24°12'08.37"N 83°02'57.43"E	Soil (30-45 cm)	
20.	RMS-S7	Lal Bungalow Area	24°12'32.76"N 83°03'08.76"E	Soil (0-15 cm)	Opposite to Buildings adjacent to banyan tree

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Table 4.8.2 Soil - Particle size distribution

Sr. No.	Sampling Locations	Particle Size Distribution (%)				Soil Texture
		Coarse sand	Fine sand	Silt	Clay	
1.	RMS-S1	29.18	56.06	3.08	11.69	loamy sand (LS)
2.	RMS-S2 A	33.52	46.74	14.62	5.12	loamy sand (LS)
3.	RMS-S2 B	10.66	61.22	20.51	7.61	sandy loam (SL)
4.	RMS-S2 C	14.30	73.16	10.97	1.57	sand (S)
5.	RMS-S4 A	80.62	14.55	2.52	2.31	sand (s)
6.	RMS-S4 B	23.61	26.17	39.58	10.64	loam (L)
7.	RMS-S4 C	28.81	41.13	13.54	16.53	sandy loam (SL)
8.	RMS-S5 A	2.55	63.62	30.88	2.96	sandy loam (SL)
9.	RMS-S5 B	32.66	38.06	15.49	13.79	sandy loam (SL)
10.	RMS-S5 C	11.18	78.16	2.05	8.61	sand (S)
11.	RMS-S6 A	1.49	74.00	18.49	6.02	sandy loam (SL)
12.	RMS-S6 B	27.62	44.32	15.92	12.14	sandy loam (SL)
13.	RMS-S6 C	26.57	45.26	15.80	12.37	sandy loam (SL)
14.	RMS-S7	31.25	31.07	21.54	16.14	sandy loam (SL)

Table 4.8.3 : Physical Properties of soil

Sr. No.	Sampling locations	Density(g/cc)		Porosity Percent (%)	Water Holding Capacity (%)	Permeability (cm/sec)
		Bulk	particle			
1.	RMS-S1	1.45	2.50	42.10	36.36	0.36
2.	RMS-S2 A	1.41	2.70	47.82	40.25	0.72
3.	RMS-S2 B	1.38	2.27	39.20	38.80	
4.	RMS-S2 C	1.36	2.50	45.71	45.41	
5.	RMS-S4 A	1.17	2.63	55.72	52.00	1.08
6.	RMS-S4 B	1.22	2.00	38.96	52.32	
7.	RMS-S4 C	1.24	2.56	51.78	42.57	
8.	RMS-S5 A	1.37	2.94	53.53	52.41	2.16
9.	RMS-S5 B	1.33	2.22	40.14	48.02	
10.	RMS-S5 C	1.34	2.86	53.07	48.56	
11.	RMS-S6 A	1.25	2.04	38.56	47.48	0.36
12.	RMS-S6 B	1.25	2.27	44.81	41.07	
13.	RMS-S6 C	1.22	2.56	52.44	47.52	
14.	RMS-S7	1.14	2.50	54.35	51.44	0.72

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Table 4.8.4 Chemical Properties of Soil Extract (water soluble)

Sr. No.	Sampling Locations	pH	EC mS/cm	Ca <sup>++</sup>	Mg <sup>++</sup>	Na <sup>+</sup>	K <sup>+</sup>	SO <sub>4</sub> <sup>-</sup>	Cl <sup>-</sup>	SAR (meq/l)
				←-----(meq/100gm)-----→						
1.	RMS-S1	7.92	0.09	0.01	0.07	0.04	0.004	0.16	0.24	0.69
2.	RMS-S2 A	8.91	0.13	0.03	0.35	0.03	0.001	0.22	0.16	0.24
3.	RMS-S2 B	9.58	0.12	0.02	0.10	0.04	0.001	0.27	0.20	0.54
4.	RMS-S2 C	9.32	0.14	0.02	0.17	0.04	0.001	0.23	0.20	0.46
5.	RMS-S4 A	9.33	1.02	0.01	0.14	0.94	0.002	0.19	1.00	11.03
6.	RMS-S4 B	9.6	1.00	0.01	0.03	0.64	0.001	0.33	1.04	14.46
7.	RMS-S4 C	9.09	0.84	0.01	0.03	0.91	0.002	0.42	1.12	11.13
8.	RMS-S5 A	8.04	0.07	0.01	1.18	0.03	0.002	0.16	0.24	0.12
9.	RMS-S5 B	7.99	0.09	0.01	1.04	0.04	0.001	0.19	0.24	0.15
10.	RMS-S5 C	8.26	0.05	0.01	1.11	0.03	0.001	0.20	0.24	0.13
11.	RMS-S6 A	8.37	0.04	0.03	0.35	0.01	0.005	0.29	0.20	0.10
12.	RMS-S6 B	8.43	0.04	0.01	0.07	0.03	0.006	0.08	0.16	0.25
13.	RMS-S6 C	8.1	0.05	0.01	0.03	0.04	0.007	0.09	0.28	0.45
14.	RMS-S7	7.71	0.27	0.06	0.21	0.02	0.002	0.39	0.32	0.14

Table 4.8.5: Exchangeable Cations

S. No	Sampling Locations	Ca <sup>++</sup>	Mg <sup>++</sup>	Na <sup>+</sup>	K <sup>+</sup>	CEC	ESP%
		←-----(meq/100gm)-----→					
1.	RMS-S1	2.44	4.86	1.37	0.164	12.53	15.50
2.	RMS-S2 A	1.04	6.94	0.95	0.264	11.24	10.32
3.	RMS-S2 B	1.16	6.25	1.24	0.164	9.82	14.09
4.	RMS-S2 C	2.64	4.39	2.01	0.128	10.46	21.89
5.	RMS-S4 A	0.64	6.83	2.81	0.192	8.54	26.82
6.	RMS-S4 B	0.40	9.03	2.67	0.192	16.12	21.72
7.	RMS-S4 C	0.69	10.61	2.34	0.154	13.79	16.97
8.	RMS-S5 A	0.68	9.03	1.96	0.128	8.50	16.64
9.	RMS-S5 B	1.03	7.22	1.78	0.128	12.04	17.50
10.	RMS-S5 C	1.72	3.39	1.23	0.164	9.41	18.91
11.	RMS-S6 A	2.02	4.39	1.26	0.321	11.74	15.81
12.	RMS-S6 B	1.50	6.81	1.33	0.640	13.41	12.96
13.	RMS-S6 C	1.98	8.81	1.83	0.192	10.27	14.32
14.	RMS-S7	3.08	4.08	1.81	0.264	10.17	19.56

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Table 4.8.6 : Soil Fertility Status

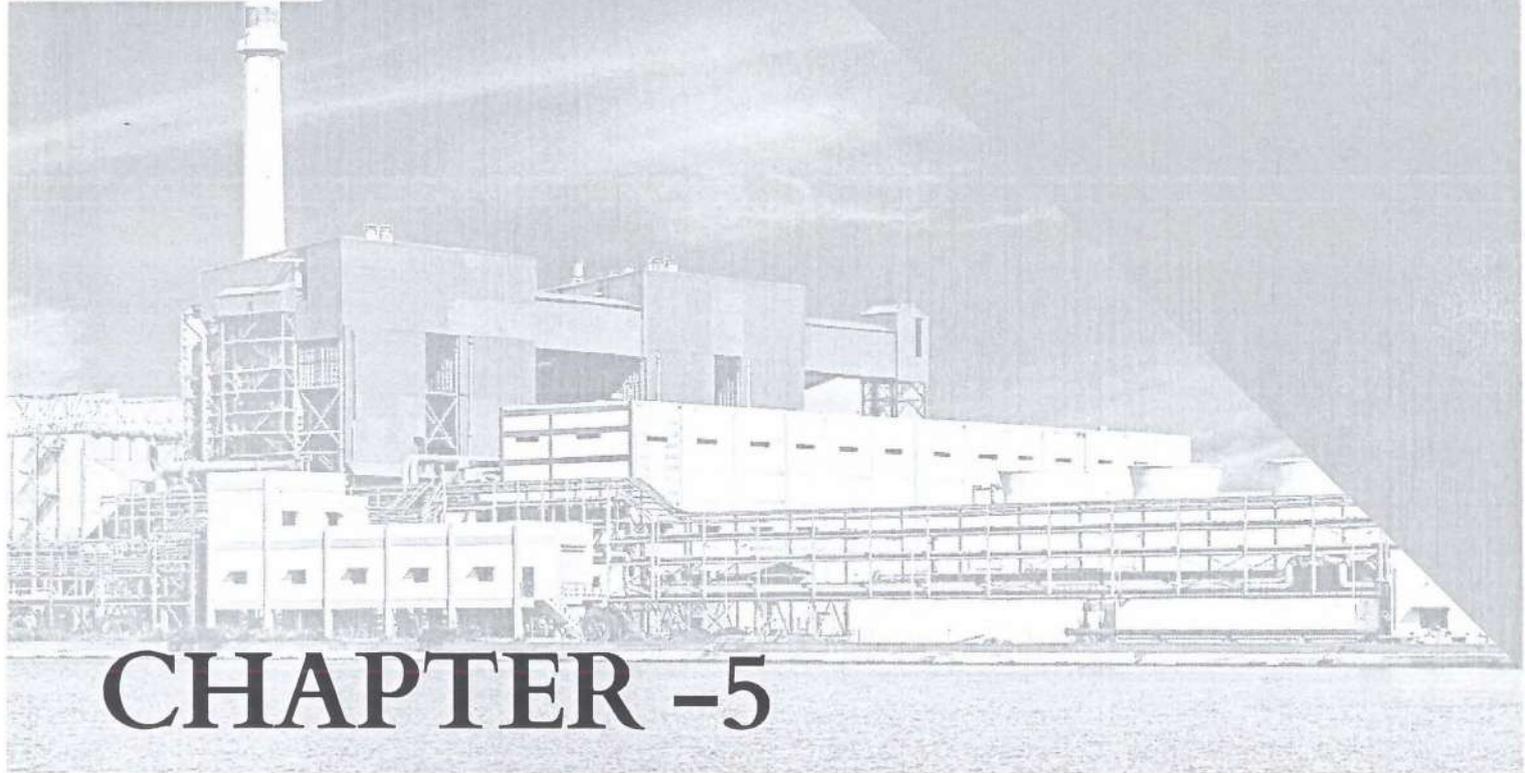
S. No.	Sample Code	Organic Carbon (%)	Available		
			N	P	K
			Kg/ha		
1.	RMS-S1	0.68	125	98.94	55.2
2.	RMS-S2 A	1.42	100	99.24	40.3
3.	RMS-S2 B	0.80	138	99.85	37.3
4.	RMS-S2 C	0.60	113	70.11	44.8
5.	RMS-S4 A	1.68	151	77.39	43.7
6.	RMS-S4 B	1.21	125	67.07	41.7
7.	RMS-S4 C	1.07	138	83.46	54.9
8.	RMS-S5 A	0.82	87.8	57.97	48.6
9.	RMS-S5 B	0.78	201	64.34	56.3
10.	RMS-S5 C	0.76	100	39.45	54.9
11.	RMS-S6 A	1.21	201	67.07	141
12.	RMS-S6 B	0.96	251	87.10	148
13.	RMS-S6 C	1.11	138	72.84	116
14.	RMS-S7	0.51	176	77.39	105
<b>Poor soil</b>		<b>&lt; 0.5</b>	<b>&lt; 280</b>	<b>&lt;10</b>	<b>&lt;108</b>
<b>Medium soil</b>		<b>0.5-0.75</b>	<b>280-560</b>	<b>10-24.6</b>	<b>108-280</b>
<b>Fertile soil</b>		<b>&gt;0.75</b>	<b>&gt; 560.0</b>	<b>&gt; 24.6</b>	<b>&gt;280</b>

*Nutrient status Classification: Source: Soil Testing in India, Dept. of Agri. And Cooperation, Ministry of Agriculture, Govt. of India, 2011*

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Table 4.8.7 Heavy metal content of the Soil

S.No	Sample Code	As	B	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Zn
		mg/kg											
1.	RMS-S1	0.20	40.0	2.6	6.9	12.1	20.5	18404	0.10	283	13.0	7.0	65.7
2.	RMS-S2 A	10.2	41.5	2.3	10.8	3.1	24.9	18263	27.0	363	33.0	49.4	76.3
3.	RMS-S2 B	11.1	35.2	2.0	11.8	5.3	27.2	17961	40.0	355	25.7	18.0	68.6
4.	RMS-S2 C	12.2	50.9	3.0	14.3	22.0	36.7	22629	35.8	466	29.3	26.1	93.1
5.	RMS-S4 A	8.10	30.6	1.7	6.6	13.9	10.4	16381	2.82	204	13.8	3.7	39.5
6.	RMS-S4 B	7.7	42.0	2.3	8.4	27.0	14.2	18705	4.35	263	19.0	9.6	61.9
7.	RMS-S4 C	9.4	33.1	1.9	8.8	15.6	15.7	16244	9.74	306	16.8	8.6	59.0
8.	RMS-S5 A	11.2	79.8	4.6	28.0	39.4	39.8	29722	0.48	1094	37.1	9.6	69.0
9.	RMS-S5 B	10.4	63.7	3.7	24.3	27.6	30.8	25657	0.36	1078	33.3	9.1	60.2
10.	RMS-S5 C	8.90	48.8	2.8	17.6	17.8	24.1	22478	0.34	680	20.7	4.0	44.9
11.	RMS-S6 A	0.10	48.0	2.8	12.0	22.5	18.6	21301	0.23	390	21.3	19.2	78.8
12.	RMS-S6 B	6.80	43.9	2.5	10.6	7.3	20.2	19829	0.37	336	19.2	15.8	71.4
13.	RMS-S6 C	0.30	52.3	3.4	11.3	20.0	20.9	22501	0.24	381	22.2	19.7	92.4
14.	RMS-S7	BDL	21.5	1.3	6.7	11.0	16.9	11376	3.04	224	17.5	6.4	54.3



# CHAPTER -5

# CONCLUSIONS & RECOMMENDATIONS

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## 5.0 Summary & Conclusions

A systematic study on assessment of groundwater and sludge/soil quality in and around secured land fill sites of Grasim Renukoot Chemical Division, Renukoot was conducted through monitoring of piezometers/bore wells/hand pumps/open wells as well as mercury bearing sludge and soils within 5km radius of the SLF site. The field work was conducted in the study area for collecting the groundwater samples from monitoring wells (13 nos.), piezometer (1 no.), wells (8 nos. of bore wells/tube wells) and soil/sludge samples (13 nos.) and collected samples were analyzed for assessing the impacts of SLF site on groundwater and soil quality.

The pH of water samples was normal and varied from 6.5 to 8.5. Groundwater temperatures were recorded more than 25°C in all the samples of groundwater and this may be attributed to climatic conditions prevailing in that area. TDS values varied from 224 - 4790mg/l in the study area. High TDS levels in the groundwater attributed to high sodium and high chloride contents. High levels of EC in monitoring wells indicate corrosive nature of water. The alkalinity values in study area are ranged from 44 to 250mg/l. The sodium concentration varied from 16 to 2587mg/l.

Chloride concentration in groundwater varied in the range of 32 to 4085mg/l. High chloride values (>1000mg/l) is due to the underlying rocks such as Precambrian belonging to Mahakoshal Group and Chotanagpur Granite Gneiss Complex (CGGC). The sulphate concentration varied from 11 to 204mg/l in the area. Fluoride concentration ranged from 0.57 to 1.32 mg/l and is within permissible limits as per BIS.

Iron, Manganese, Nickel and lead concentrations at some of the locations were found to be higher than the permissible limits. The high levels of these metals may be attributed to the underlying geological rocks. These rocks contain the heavy metals like chromium, iron, manganese etc which contribute to the elevated levels in groundwater samples. Both Fe and Mn are the rich metallic elements in natural water. Mn present in igneous and metamorphic rocks as a minor constituent.  $Mn^{2+}$  salts have high solubility but under aeration conditions, they are oxidized precipitating oxyhydroxides.

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Groundwater parameter analysis has been performed by the hydrochemical diagrams viz., Piper Plot, Gibbs Plot and Wilcox using AQUACHEM software for assessing the dissolved constituents sources in water. Piper plot revealed that most of the samples are mixed Na-Ca-Cl dominant fluids, suggest mineral dissolution. The cation and anion Gibbs plot indicates that the samples lie in rock dominance. Thus, the hydrochemical diagrams revealed that the chemistry of groundwater is influenced by the relation of parameters with their respective lithologies in the aquifer, representing the rock-water interaction. Plots indicate that the high values of groundwater quality are due to the interactions between the rock and water.

The weighted arithmetic average method is applied for the calculation of water quality index considering maximum permissible limits of BIS. The groundwater quality index values ranged between 15 - 145, revealing water of excellent to poor quality. Any well water in case to be used for drinking purposes should possibly be treated before drinking.

Thirteen samples of soil were collected from six locations to assess soil quality in and around secure land fill (SLF) site of Grasim, Renukoot. Samples were collected from various depths of 0-15 cm, 15-30 cm and 30-45 cm at each of the identified locations near SLF and from 15-30 cm depth from locations of surrounding area. Fine sand (14.55 to 78.16%) and coarse sand (1.49 to 80.62%) of the soil samples are found to be higher as compared to silt and clay content. The porosity of soil samples in study area are found in the range of 38.56 to 55.72%, as the soils are mostly sandy loam in texture. Soil permeability were found to be moderately slow to moderate (0.36 to 2.16cm/hr as per soil permeability Class). Most of the soil samples are moderately alkaline to strongly alkaline with pH variation from 7.71 to 9.6. Soils in the study area are found to be in Non-Salinized range with respect to Chloride. Soils are poor in available nitrogen and potassium level and fertile w.r.t organic carbon and available phosphorous. The heavy metal concentrations in the soils are below the screening level for Industrial area as per MoEF&CC Guidelines for contaminated sites in India. The mercury concentration in the soil samples were found to below the screening level for Industrial area as per MoEF&CC Guidance document.

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The mercury bearing sludge, top soil and ash samples were collected from secured land fill site and analyzed for various physico chemical parameters and heavy metals including mercury. Top soil, ash and sludge samples are strongly alkaline in nature with pH variation from 8.48 to 10.26. EC of sludge and ash layer have been observed to be 20.6 to 25mS/cm, whereas EC of top soil and ash layer HDPE is observed to be in the range of 3.17 to 4.26, respectively. Sludge and ash layer were observed to be highly saline and top soil samples are moderately saline in nature. Concentration of mercury in the sludge and HDPE Ash layer samples were found to be high (40 mg/kg) as compared to Top soil (10.07 mg/kg) and Ash layer (29.19 mg/kg). TCLP analysis was carried out following USEPA hazardous waste test method to determine inorganic analytes in the leachate and observed that heavy metals are below TCLP concentration Limit (Management & Transboundary Movement Rules, 2016). Therefore, possibility of leaching of metals including mercury from the mercury bearing sludge and ash layers from the secured land fill is minimal.

As per the study conducted by CSIR-NEERI during 2019, it was observed that mercury was not leaching from the SLF and also not contaminating the groundwater. In view of this, it was not recommended to decommission the stabilised SLF for shifting the mercury contaminated sludge. The report recommended the construction of storm water drainage (leachate collection system) around the SLF and treating this in the existing ETP.

During the current study, it was observed that GRCD has installed leachate collection system and the leachate is being treated in the existing ETP. The system is shown in Annexure – A.

To summarise, the study has revealed that the mercury sludge in SLF is stabilized and there is no considerable evidence for leaching of mercury from SLF. Geologically, the study area is comprised of Precambrian rocks, which is very hard rock and have no permeability.

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## References

APHA (2012). Standard methods for analysis of the water and waste water analysis, 22nd editions.

BIS (2012). Indian standard specification for drinking water. IS: 10500.

Groundwater Broacher of Sonebhadra District, Uttar Pradesh, By Dr.H.K.Pandey, Scientist C, 2012-2013, Central Groundwater Board, Government of India



Leachate Collection System

## Year Wise Disposal Details of Waste From April 2019 to February 2021

YEAR WISE DISPOSAL DETAILS OF WASTE FROM APR'19 TO FEB'21

Sl No	Material Description	Unit	Despatched Qty	
			FY_2019-20	FY_2020-21 (Up to Feb'21)
1	FRP Waste	MT	0.00	12.46
2	MEE Salt Sludge	MT	910.97	306.09
3	ETP Sludge	MT	60.35	31.90
4	E-Waste	MT	2.78	0.41
5	Waste Oil	Drum (210 Ltr )	31.00	19.00
6	Brine Sludge (Membrane cell process)	MT	6294.03	13525.16
7	Lead Acid Batteries	NOS	0.00	4.00
8	Bio Medical Waste	KG	100.50	88.47
9	Plastic Waste	MT	195.18	114.28

Annexure-B  
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Ref. No : 13583/UPPCB/Sonebhadra(UPPCBRO)/HWM/SONBHADRA/2020

Dated :02/03/2021

To,

M/s GRASIM INDUSTRIES LIMITED CHEMICAL DIVISION RENUKOOT

GRASIM INDUSTRIES LIMITED CHEMICAL DIVISION RENUKOOT  
,SONBHADRA,231217

Tehsil :Duddhi

District :SONBHADRA

Sub :- Authorisation issued under the provisions of Hazardous and Other Wastes  
(Management and Transboundary Movement) Rules, 2016

1.Number of authorization and date of issue 13583 and02/03/2021 .

2.Reference of application (No. and date) 10586194 and31/12/2020 .

3.Mr SHRIDHARA SASTRY of M/s GRASIM INDUSTRIES LIMITED  
CHEMICAL DIVISION RENUKOOT is hereby granted an authorization based on  
the enclosed signedinspection report for generation, collection, utilization, storage and disposal or any other  
use of hazardous or other wastes or both on the premises situated at GRASIM  
INDUSTRIES LIMITED CHEMICAL DIVISION .

Details of Authorisation

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S No.	Category of Hazardous Waste as per the Schedules I,II and III of these rules	Authorised mode of disposal or recycling or utilization or co-processing, etc.	Quantity(ton/annum)
1	Spent ion exchange resin containing toxic metals (Sch-1, S.No. 35.2)	Through TSDF	50 Ton/Annum
2	Spent Carbon or filter medium (Sch.-1, S.No.-36.2)	Through TSDF	20 Ton/Annum
3	Used or spent oil (Sch.-1, S.No.-5.1)	Authorized Recyclers	50 Ton/Annum
4	Wastes or residues containing oil (Sch.-1, Cat.-5.2)	Through TSDF	5 Ton/Annum
5	Brine Sludge (Sch.I, S.No. 16.3)	Through TSDF	10000 Ton/Annum
6	Residue or sludges and filter cakes (Sch-1, S.No. 16.2)	Through TSDF	6 Ton/Annum
7	Asbestos (Sch-II, B21)	Through TSDF	100 Ton/Annum
8	Spent Carbon or filter medium (Sch.-1, Cat.-36.2)	Through TSDF	5 ton/annum
9	Empty barrels/ containers/liners contaminated with hazardous chemicals /wastes (Sch.-1, Cat.-33.1)	Through TSDF	100 Ton/Annum
10	Rubber Wastes (Sch-III, B3040)	Through TSDF	5 Ton/Annum
11	Ferro Silicate and alloys (Sch-II, B28)	Through TSDF	1 Ton/Annum
12	Chemical sludge from waste water treatment (Sch.-1, Cat.-35.3)	Through TSDF	150 Ton/Annum
13	Chemical sludge from waste water treatment (Sch.-1, Cat.-35.3)	Through TSDF	2800 Ton/Annum
14	Drosses and Waste from treatment of salt sludge (Schedule-1 S.No. 11.5)	Through TSDF	100 Ton/Annum
15	Exhaust Air or Gas cleaning residue (Sch-I, S.No. 35.1)	Through TSDF	10 ton/annum
16	Halogen- containing compounds which produce acidic vapours on contact with humid air or water e.g. silicon tetrachloride, aluminum chloride, titanium tetrachloride (Sch-II, B30)	Through TSDF	120 Ton/Annum
17	Halogen- containing compounds which produce acidic vapours on contact with humid air or water e.g. silicon tetrachloride, aluminum chloride, titanium tetrachloride (Sch-II, B30)	Through TSDF	800 Ton/Annum

1. The authorization shall be valid for a period of 02/03/2026 from the date of issue of this letter.
2. The authorization is subject to the following general and specific conditions (please specify any conditions that need to be imposed over and above general conditions, if any).

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### A General Conditions of Authorization -

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under .
2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Board .
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization .
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorisation .
5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time .
6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and penalty .
7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility .
8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation .
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained .
10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorisation .
11. The importer or exporter shall bear the cost of Import or export and mitigation of damages if any
12. An application for the renewal of an authorisation shall be made as laid down under these Rules .
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Changes or Central Pollution Control Board from time to time .
14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year .
15. The Unit will file the renewal application at least 2 months prior to the expiry of this Order.

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## B Specific Conditions of Authorization

1. The wastes must be safely collected in leak proof containers and shall be duly marked in a manner suitable for handling, storage and transport and the packaging shall be easily visible and be able to withstand physical conditions and climatic factors. All hazardous waste containers / bags shall be provided with a general label. The storage area should be at an isolated spot in the premises and must be fenced, covered and duly marked.
2. The authorized person/agency shall ensure that no adverse impact on the air, soil and water including groundwater takes place due to activities for which authorization has been requested. Comprehensive safety measures must be followed in handling of wastes and the staff must be properly trained.
3. The authorized person shall not receive, collect, or store any hazardous waste from any unauthorized occupier or generator of hazardous wastes. In case any hazardous wastes is sold to any other reprocessing unit it must be ensured that such unit is fully complying with environmental requirements and has a valid authorization of the Board.
4. In no case any hazardous wastes shall be disposed off on land, in any drain or stream. All spillages of hazardous chemicals, used containers, of hazardous chemicals such as flammable corrosive, explosive and toxic nature must be safely collected and stored. Non-compatible wastes must be suitably and safely handled.
5. It is within the powers and functions of the U.P. Pollution Control Board to modify / revoke the terms and conditions of the authorization issued under the Rule – 7 of Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
6. You are directed to display board outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including waste water and air emission and solid hazardous waste generated within the factory premises. Necessary compliance should be sent within 15 days of receipt of this letter.
7. It is the mandatory duty of the authorized person to comply with the guidelines for transportation of hazardous waste in accordance with rule 18 of Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.
8. It should be ensured that hazardous wastes shall be properly collected and packed in HDPE bags and then temporarily stored in a lined RCC tank/pit with suitable shed.
9. An ETP sludge/salt test report of a laboratory approved under E.P. Act shall be submitted along with compliance of this letter of this office.
10. Used oil shall be sold only to recyclers registered with U.P. Pollution Control Board. The record shall be maintained.
11. The occupier, transporter and operator of a facility shall be liable for damages caused to the environment resulting due to improper handling and disposal of hazardous waste listed in schedule 1,2, and 3 and shall be liable to pay a fine as levied by the State Pollution Control Board under the rules.
12. You shall have the valid membership of any common TSDF for S.L.F. (M/S U.P. Waste Management Project Kumbhi Kanpur Dehat or M/s Bharat Oil and Waste Management Ltd., Kumbhi, Akbarpur, Kanpur Dehat. permitted by U.P.P.C.B.), and start sending the stored hazardous wastes for final disposal to the TSDF and report back to U.P.P.C.B. with the required manifesto (document of proof) within three month of this letter. The authorized incinerator is with M/s Bharat Oil Company, Sahibabad, Ghaziabad for oily waste and paint sludge only.
13. You are required to store the hazardous waste safely and send it to TSDF/incinerator within stipulated time period.
14. This authorization is valid till the industry is having valid consent as per the provisions of Air (Prevention and Control of Pollution) Act 1981 and Water (Prevention and Control of Pollution) Act, 1974.

( Authorized Signatory )

**Ajay Kumar**

Digitally signed by Ajay  
Kumar Sharma  
Date: 2021.03.05 10:47:10

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**UTTAR PRADESH POLLUTION CONTROL BOARD**

Copy to: To the Regional Officer, U.P. Pollution Control Board,  
Sonbhadra for information and  
necessary action .

**Ajay Kumar Sharma**  
CEO/EE, I/C Circle

Digitally signed by Ajay  
Kumar Sharma  
Date: 2021.03.05 10:47:10

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Annexure-I

## Specifications for Drinking Water - (IS 10500: 2012)

S. No.	Substance or characteristic	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Remarks
<b>Essential Characteristics</b>				
1.	Colour Hazen Units, max	5	15	Extended to 15 only if toxic substances are not suspected in absence of alternate sources
2.	Odour	Agreeable	Agreeable	a. test cold and when heated b. test after several dilutions
3.	Taste	Agreeable	Agreeable	Test to be conducted only after safety has been established
4.	Turbidity (NTU) Max	1	5	-
5.	pH value	6.5 to 8.5	No relaxation	-
6.	Total hardness (mg/l, CaCO <sub>3</sub> ) Max.	200	600	-
7.	Iron (mg/l, Fe) Max	0.3	No relaxation	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
8.	Chlorides (as Cl) mg/l Max	250	1000	-
9.	Free residual chlorine (mg/l), Min	0.2	1	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/L
<b>Desirable Characteristics</b>				
10.	Total dissolved solids, mg/l, max	500	2000	-
11.	Calcium (mg/l, Ca) Max.	75	200	-
12.	Magnesium (mg/l, Mg) Max.	30	100	-
13.	Copper (mg/l, Cu) Max.	0.05	1.5	-
14.	Manganese (mg/l, Mn) Max.	0.1	0.3	Total concentration of manganese (as Mn) and iron(as Fe) shall not exceed 0.3 mg/l
15.	Sulphate (mg/l, SO <sub>4</sub> ) Max.	200	400	May be extended upto 400 provided Magnesium (as Mg) does not exceed 30
16.	Nitrate(mg/l, NO <sub>3</sub> ) Max.	45	No relaxation	-
17.	Fluoride(mg/l, F) Max.	1.0	1.5	-

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S. No.	Substance or characteristic	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Remarks
18.	Phenolic compounds (mg/l C <sub>6</sub> H <sub>5</sub> OH) Max.	0.001	0.002	-
19.	Mercury (mg/l, Hg) Max	0.001	No Relaxation	-
20.	Cadium (mg/l, Cd) Max.	0.003	No Relaxation	-
21.	Selenium (mg/l, Se) Max.	0.01	No Relaxation	-
22.	Total Arsenic (mg/l, As) Max.	0.01	0.05	-
23.	Cyanide(mg/l, CN) Max.	0.05	No Relaxation	-
24.	Lead (mg/l, Pb) Max.	0.01	No Relaxation	-
25.	Zinc(mg/l, Zn) Max.	5	15	-
26.	Anionic detergents (mg/l, MBAS) Max	0.2	1.0	-
27.	Total Chromium(mg/l),Max.	0.05	No relaxation	-
28.	Polynuclear aromatic hydrocarbons (mg/l, PAH) Max.	0.0001	No relaxation	-
29.	Mineral oil (mg/l) Max.	0.05	No relaxation	-
30.	Pesticides (mg/l) Max.	-	No relaxation	-
<b>Radioactive materials</b>				
31.	Alpha emitters (Bq/l) Max.	0.1	No relaxation	-
32.	Beta emitters (pci/l) Max.	1.0	No relaxation	-
33.	Alkalinity (mg/l) Max.	200	600	-
34.	Aluminium (mg/l, Al) Max.	0.03	0.2	-
35.	Boron(mg/l) Max.	0.5	1.0	-

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## Annexure-II

## Methods for Preservation and Analysis of Water Samples

S. No.	Parameter	Units of Expression	Preservative and Storage Condition	Reference: APHA 21 <sup>st</sup> Edition Methods
<b>Physical Parameters</b>				
1.	Temperature	°C	Analyze immediately	2550 - B: (Thermometer)
2.	pH	--	Analyze immediately	4500-H <sup>+</sup> - B: (Electrode)
3.	Conductivity	µs/ms	Refrigeration at 4°C	2510 - B: (Conductivity meter)
4.	Total dissolved solids	mg/l	Refrigeration at 4°C	2540 - C: (dried at 180°C & gravimetric)
5.	Total suspended solids	mg/l	Refrigeration at 4°C	2540 - D: (dried at 103°C-105°C & gravimetric)
6.	Turbidity	NTU	Refrigerate and Analyze immediately	2130 - B: (Nephelometric)
<b>Inorganic Parameters</b>				
7.	Total alkalinity	as CaCO <sub>3</sub> mg/l	Refrigerate and Analyze immediately	2320 - B: (Titration)
8.	Hardness	as CaCO <sub>3</sub> mg/l	Add HNO <sub>3</sub> to pH < 2 and refrigerate	2340 - C: (EDTA Titrimetric)
9.	Chloride	mg/l	Not Required	4500-Cl <sup>-</sup> - B: (Argentometric)
10.	Sulphate	mg/l	Refrigeration at 4°C	4500-SO <sub>4</sub> <sup>-</sup> - E: (Turbidimetric)
11.	Fluoride	mg/l	Not Required	4500-F - D: (SPADNS)
12.	Sodium and potassium	mg/l	Not Required	3500- K, Na-B: (Flame Photometric)
<b>Nutrient and Demand Parameter</b>				
13.	Nitrate	as NO <sub>3</sub> <sup>-</sup> - N mg/l	Refrigerate and analyze immediately	4500-NO <sub>3</sub> B: (UV spectrophotometric)
14.	Total Phosphate	mg/l	Refrigeration at 4°C	4500-P-D: (Stannous Chloride)
15.	Dissolved Oxygen [DO]	mg/l	Analyze immediately	4500-O-C: (Azide modification)
16.	COD	mg/l	Add H <sub>2</sub> SO <sub>4</sub> at pH < 2 refrigerate & analyze immediately	5220-B: (Open Reflux)
17.	BOD	mg/l	Refrigeration at 4°C & analyze immediately	5210-B: (BOD Test at 27 °C)
18.	Total Kjeldhal Nitrogen	mg/l	Refrigerate and Add H <sub>2</sub> SO <sub>4</sub> to pH < 2	4500- N <sub>DKJ</sub> -B: (Macro-kjeldhal)
19.	Oil and grease	mg/l	Add H <sub>2</sub> SO <sub>4</sub> at pH < 2 refrigerate	5220 -B: (Liquid-Liquid Partition Gravimetric)
<b>Heavy Metals</b>				
20.	Heavy metals	mg/l	Add HNO <sub>3</sub> to pH < 2	3030 -E, 3125 - B: (ICP- MS)

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## Annexure III

## SCHEDULE II

[See rule 3 (1) (17) (ii)]

List of waste constituents with concentration limits

Class A: Based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]

Class	Constituents	Concentration in mg/l
(1)	(2)	(3)
A1	Arsenic	5.0
A3	Cadmium	1.0
A4/A 64	Chromium	5.0
A5	Lead	5.0
A6	Manganese	10.0
A7	Mercury	0.2
A65	Cobalt	80.0
A66	Copper	25.0
A68	Nickel	20.0
A71	Zinc	250

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## Annexure SI

## Soil permeability classes for agriculture and conservation

Soil permeability classes	Permeability rates	
	cm/hour	cm/day
Very slow	Less than 0.13	Less than 3
Slow	0.13 - 0.3	3 - 12
Moderately slow	0.5 - 2.0	12 - 48
Moderate	2.0 - 6.3	48 - 151
Moderately rapid	6.3 - 12.7	151 - 305
Rapid	12.7 - 25	305 - 600
Very rapid	More than 25	More than 600

[http://www.fao.org/tempref/FI/CDrom/FAO\\_Training/FAO\\_Training/General/x6706e/x6706e09.htm](http://www.fao.org/tempref/FI/CDrom/FAO_Training/FAO_Training/General/x6706e/x6706e09.htm)

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## Annexure SII

## Soil Fertility Ratings

S.No.	Soil Nutrients	Soil Fertility Ratings		
		Low	Medium	High
1	Organic carbon as a measure of available Nitrogen (%)	<0.5	0.5-0.75	>0.75
2	Available N as per alkaline permanganate method (kg/ha)	<280	280-560	>560
3	Available P by Olsen's method (kg/ha) in Alkaline soil	<10	10-24.6	>24.6
4	Available K by Neutral N, ammonia acetate method (kg/ha)	<108	108-280	>280

pH Range	Soil Reaction Rating
<4.6	Extremely acid
4.6-5.5	Strongly acid
5.6-6.5	Moderately acid
6.6-6.9	Slightly acid
7.0	Neutral
7.1-8.5	Moderately alkaline
>8.5	Strongly alkaline

## General interpretation of EC values

S. No.	Soil	EC (mS/cm)	Total salt content (%)	Crop reaction
1.	Salt free	0-2	<0.15	Salinity effect negligible, except for more sensitive crops
2.	Slightly saline	4-8	0.15-0.35	Yield of many crops restricted
3.	Moderately saline	8-15	0.35-0.65	Only tolerant crops yield satisfactorily
4.	Highly saline	>15	>0.65	Only very tolerant crops yield satisfactorily

(Source : Methods Manual, Soil Testing in India, Dept. of Agri. and Cooperation, Ministry of Agriculture, Govt. of India, 2011)

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## Annexure-III

## Metals Concentrations Typically Found in Unpolluted Soil and Soil Clean Up Standards

Metal (Symbol)	Typical Concentrations in Natural Soils
	(mg/kg)
Aluminium (Al)	10000 - 300000*
Antimony (Sb)	< 1 - 8.8
Arsenic (As)	< 0.1 - 73
Barium (Ba)	10-1500
Beryllium (Be)	<1 - 7
Cadmium (Cd)	<0.010 - 2
Chromium (Cr)	1-1000
Cobalt (Co)	< 0.3 - 70
Copper (Cu)	< 0.6-495
Iron (Fe)	7000 - >550000*
Lead (Pb)	2 - 200*
Magnesium (Mg)	50 - 50000
Manganese (Mn)	< 2 - 7000
Mercury (Hg)	3.40
Molybdenum (Mo)	0.2 - 5*
Nickel (Ni)	5 - 500*
Potassium (K)	50 - 37000
Selenium (Se)	< 0.1 - 3.9
Silver (Ag)	0.01 - 8
Strontium (Sr)	50 - 1000*
Thallium (Tl)	0.1 - 0.8
Tin (Sn)	2 - 200*
Titanium (Ti)	1000 - 10000
Zinc (Zn)	< 3.0 - 264
Zirconium (Zr)	60 - 2000 *

(Source : Frink, Charles R., 1996. "A Perspective of Metals in Soils", Journal of Soil Contamination, 5(4):329- 359. Table A8: Most Likely Concentrations of EPA Target Analytes in Uncontaminated Soils of the Northeast (mg/kg [ppm] dry weight. www.newhallinfo.org)\* Lindsay, W. 1979. Chemical Equilibrium in Soils. New York: John Wiley and Sons. (in: US EPA, 1987. A Compendium of Superfund Field Operations Methods. Exhibit 16-2. "The Content of Various Elements in Soils." www.epa.gov, # Criteria are 100 mg/kg for hexavalent chromium and 3900 mg/kg for trivalent chromium

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## Annexures IV

Soil (Screening and Response levels)							
S.No	Chemical Name	Chemical Group	Response levels	Screening Levels			
				Agril.	Residential /- parkland	Commercial	Industrial
				mg/kg			
1.	Arsenic	Metal	50	12	12	12	12
2.	Boron	inorganic	-	2	-	-	-
3.	Cadmium	Metal	13	1.4	10	22	22
4.	Chromium	Metal	-	64	64	87	87
5.	Cobalt	Inorganic	190	40	50	300	300
6.	Copper	Metal	190	63	63	91	91
7.	Iron	Inorganic	-	-	-	-	-
8.	Mercury	Metal	36	6.6	6.6	24	50
9.	Manganese	Inorganic	-	-	-	-	-
10.	Nickle	Metal	-	-	-	-	-
11.	Lead	Metal	530	70	140	260	600
12.	Zinc	Metal	720	200	200	360	360

Guidance document for assessment and remediation of contaminated sites in India : volume II-2.1-b  
 Screening and Response levels, 1st Edition, December 2015, by MoEF&CC, GoI  
[https://cpcb.nic.in/uploads/hwmd/MoEFCC\\_guidelines\\_contaminatedsites.pdf](https://cpcb.nic.in/uploads/hwmd/MoEFCC_guidelines_contaminatedsites.pdf)

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भारतीय मानक  
पीने का पानी — विशिष्टि  
(दूसरा पुनरीक्षण)

*Indian Standard*  
DRINKING WATER — SPECIFICATION  
( *Second Revision* )

ICS 13.060.20

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

May 2012

Price Group 6

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**AMENDMENT NO. 1 JUNE 2015  
TO  
IS 10500 : 2012 DRINKING WATER — SPECIFICATION**

*(Second Revision)*

[Page 2, Table 2, Sl No. xii), col 3] — Substitute '1.0' for '0.3'.

[Page 3, Table 3, Sl No. x), col 4] — Substitute 'No relaxation' for '0.05'.

(FAD 14)

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Publication Unit, BIS, New Delhi, India

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Drinking Water Sectional Committee, FAD 25

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Drinking Water Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was originally published in 1983. A report prepared by the World Health Organization in cooperation with the World Bank showed that in 1975, some 1 230 million people were without safe water supplies. These appalling facts were central to the United Nations decision to declare an International Drinking Water Supply and Sanitation decade, beginning in 1981. Further, the VI Five-Year Plan of India had made a special provision for availability of safe drinking water for the masses. Therefore, the standard was formulated with the objective of assessing the quality of water resources, and to check the effectiveness of water treatment and supply by the concerned authorities.

The first revision was undertaken to take into account the up-to-date information available about the nature and effect of various contaminants as also the new techniques for identifying and determining their concentration. Based on experience gained additional requirements for alkalinity; aluminium and boron were incorporated and the permissible limits for dissolved solids, nitrate and pesticides residues modified.

As per the eleventh five year plan document of India (2007-12), there are about 2.17 lakh quality affected habitations in the country with more than half affected with excess iron, followed by fluoride, salinity, nitrate and arsenic in that order. Further, approximately, 10 million cases of diarrhoea, more than 7.2 lakh typhoid cases and 1.5 lakh viral hepatitis cases occur every year a majority of which are contributed by unclean water supply and poor sanitation. The eleventh five year plan document of India (2007-2012) recognizes dealing with the issue of water quality as a major challenge and aims at addressing water quality problems in all quality affected habitations with emphasis on community participation and awareness campaigns as well as on top most priority to water quality surveillance and monitoring by setting up of water quality testing laboratories strengthened with qualified manpower, equipments and chemicals.

The second revision was undertaken to upgrade the requirements of the standard and align with the internationally available specifications on drinking water. In this revision assistance has been derived from the following:

- a) EU Directives relating to the quality of water intended for human consumption (80/778/EEC) and Council Directive 98/83/EC.
- b) USEPA standard — National Primary Drinking Water Standard, EPA 816-F-02-013 dated July, 2002.
- c) WHO Guidelines for Drinking Water Quality, 3rd Edition Vol. I Recommendations, 2008.
- d) Manual on Water Supply and Treatment, third edition — revised and updated May 1999, Ministry of Urban Development, New Delhi.

This standard specifies the acceptable limits and the permissible limits in the absence of alternate source. It is recommended that the acceptable limit is to be implemented as values in excess of those mentioned under 'Acceptable' render the water not suitable. Such a value may, however, be tolerated in the absence of an alternative source. However, if the value exceeds the limits indicated under 'permissible limit in the absence of alternate source' in col 4 of Tables 1 to 4, the sources will have to be rejected.

Pesticide residues limits and test methods given in Table 5 are based on consumption pattern, persistence and available manufacturing data. The limits have been specified based on WHO guidelines, wherever available. In cases where WHO guidelines are not available, the standards available from other countries have been examined and incorporated, taking in view the Indian conditions.

In this revision, additional requirements for ammonia, chloramines, barium, molybdenum, silver, sulphide, nickel, polychlorinated biphenyls and trihalomethanes have been incorporated while the requirements for colour, turbidity, total hardness, free residual chlorine, iron, magnesium, mineral oil, boron, cadmium, total arsenic, lead, polynuclear aromatic hydrocarbons, pesticides and bacteriological requirements have been modified.

In this revision, requirement and test method for virological examination have been included. Further, requirements and test methods for cryptosporidium and giardia have also been specified.

Routine surveillance of drinking water supplies should be carried out by the relevant authorities to understand the risk of specific pathogens and to define proper control procedures. The WHO Guidelines for Drinking Water Quality, 3rd Edition, Vol. I may be referred for specific recommendations on using a water safety approach incorporating risk identification. Precautions/Care should be taken to prevent contamination of drinking water from chlorine resistant parasites such as cryptosporidium species and giardia.

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*Indian Standard*  
**DRINKING WATER — SPECIFICATION**  
*( Second Revision )*

**1 SCOPE**

This standard prescribes the requirements and the methods of sampling and test for drinking water.

**2 REFERENCES**

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

**3 TERMINOLOGY**

For the purpose of this standard the following definition shall apply.

**3.1 Drinking Water** — Drinking water is water intended for human consumption for drinking and cooking purposes from any source. It includes water (treated or untreated) supplied by any means for human consumption.

**4 REQUIREMENTS**

Drinking water shall comply with the requirements given in Tables 1 to 4. The analysis of pesticide residues given in Table 3 shall be conducted by a recognized laboratory using internationally established test method meeting the residue limits as given in Table 5.

Drinking water shall also comply with bacteriological requirements (*see 4.1*), virological requirements (*see 4.2*) and biological requirements (*see 4.3*).

**4.1 Bacteriological Requirements****4.1.1 Water in Distribution System**

Ideally, all samples taken from the distribution system including consumers' premises, should be free from coliform organisms and the following bacteriological quality of drinking water collected in the distribution system, as given in Table 6 is, therefore specified when tested in accordance with IS 1622.

**4.2 Virological Requirements**

**4.2.1** Ideally, all samples taken from the distribution

**Table 1 Organoleptic and Physical Parameters**  
*(Foreword and Clause 4)*

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, <i>Max</i>	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	pH value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, <i>Max</i>	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, <i>Max</i>	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

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**Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts**  
 (Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, <i>Max</i>	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, <i>Max</i>	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MBAS) mg/l, <i>Max</i>	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, <i>Max</i>	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, <i>Max</i>	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, <i>Max</i>	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl <sub>2</sub> ), mg/l, <i>Max</i>	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, <i>Max</i>	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, <i>Max</i>	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, <i>Max</i>	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, <i>Min</i>	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, <i>Max</i>	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, <i>Max</i>	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, <i>Max</i>	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, <i>Max</i>	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO <sub>3</sub> ), mg/l, <i>Max</i>	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH), mg/l, <i>Max</i>	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, <i>Max</i>	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO <sub>4</sub> ) mg/l, <i>Max</i>	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H <sub>2</sub> S), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, <i>Max</i>	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as CaCO <sub>3</sub> ), mg/l, <i>Max</i>	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, <i>Max</i>	5	15	IS 3025 (Part 49)	—

## NOTES

1 In case of dispute, the method indicated by \* shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

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**Table 3 Parameters Concerning Toxic Substances**  
 (Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Cadmium (as Cd), mg/l, <i>Max</i>	0.003	No relaxation	IS 3025 (Part 41)	—
ii)	Cyanide (as CN), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 27)	—
iii)	Lead (as Pb), mg/l, <i>Max</i>	0.01	No relaxation	IS 3025 (Part 47)	—
iv)	Mercury (as Hg), mg/l, <i>Max</i>	0.001	No relaxation	IS 3025 (Part 48)/ Mercury analyser	—
v)	Molybdenum (as Mo), mg/l, <i>Max</i>	0.07	No relaxation	IS 3025 (Part 2)	—
vi)	Nickel (as Ni), mg/l, <i>Max</i>	0.02	No relaxation	IS 3025 (Part 54)	—
vii)	Pesticides, µg/l, <i>Max</i>	See Table 5	No relaxation	See Table 5	—
viii)	Polychlorinated biphenyls, mg/l, <i>Max</i>	0.000 5	No relaxation	ASTM 5175*	—
ix)	Polynuclear aromatic hydrocarbons (as PAH), mg/l, <i>Max</i>	0.000 1	No relaxation	APHA 6440	or APHA 6630
x)	Total arsenic (as As), mg/l, <i>Max</i>	0.01	0.05	IS 3025 (Part 37)	—
xi)	Total chromium (as Cr), mg/l, <i>Max</i>	0.05	No relaxation	IS 3025 (Part 52)	—
xii)	Trihalomethanes:				
a)	Bromoform, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
b)	Dibromochloromethane, mg/l, <i>Max</i>	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
c)	Bromodichloromethane, mg/l, <i>Max</i>	0.06	No relaxation	ASTM D 3973-85* or APHA 6232	—
d)	Chloroform, mg/l, <i>Max</i>	0.2	No relaxation	ASTM D 3973-85* or APHA 6232	—

## NOTES

1 In case of dispute, the method indicated by "\*" shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

**Table 4 Parameters Concerning Radioactive Substances**  
 (Foreword and Clause 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 14194	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Radioactive materials:				
a)	Alpha emitters Bq/l, <i>Max</i>	0.1	No relaxation	Part 2	—
b)	Beta emitters Bq/l, <i>Max</i>	1.0	No relaxation	Part 1	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

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**Table 5 Pesticide Residues Limits and Test Method**  
(Foreword and Table 3)

Sl No.	Pesticide	Limit µg/l	Method of Test, Ref to	
			USEPA (4)	AOAC/ ISO (5)
(1)	(2)	(3)		
i)	Alachlor	20	525.2, 507	—
ii)	Atrazine	2	525.2, 8141 A	—
iii)	Aldrin/ Dieldrin	0.03	508	—
iv)	Alpha HCH	0.01	508	—
v)	Beta HCH	0.04	508	—
vi)	Butachlor	125	525.2, 8141 A	—
vii)	Chlorpyrifos	30	525.2, 8141 A	—
viii)	Delta HCH	0.04	508	—
ix)	2,4- Dichlorophenoxyacetic acid	30	515.1	—
x)	DDT ( <i>o, p</i> and <i>p, p</i> - Isomers of DDT, DDE and DDD)	1	508	AOAC 990.06
xi)	Endosulfan (alpha, beta, and sulphate)	0.4	508	AOAC 990.06
xii)	Ethion	3	1657 A	—
xiii)	Gamma — HCH (Lindane)	2	508	AOAC 990.06
xiv)	Isoproturon	9	532	—
xv)	Malathion	190	8141 A	—
xvi)	Methyl parathion	0.3	8141 A	ISO 10695
xvii)	Monocrotophos	1	8141 A	—
xviii)	Phorate	2	8141 A	—

NOTE — Test methods are for guidance and reference for testing laboratory. In case of two methods, USEPA method shall be the reference method.

**Table 6 Bacteriological Quality of Drinking Water<sup>1)</sup>**  
(Clause 4.1.1)

Sl No.	Organisms	Requirements
(1)	(2)	(3)
i)	All water intended for drinking:	
a)	<i>E. coli</i> or thermotolerant coliform bacteria <sup>2a, b)</sup>	Shall not be detectable in any 100 ml sample
ii)	Treated water entering the distribution system:	
a)	<i>E. coli</i> or thermotolerant coliform bacteria <sup>2)</sup>	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample
iii)	Treated water in the distribution system:	
a)	<i>E. coli</i> or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample
b)	Total coliform bacteria	Shall not be detectable in any 100 ml sample

<sup>1)</sup>Immediate investigative action shall be taken if either *E. coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause shall be determined by immediate further investigation.

<sup>2)</sup>Although, *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests shall be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

<sup>3)</sup>It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for progressive improvement of water supplies.

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system including consumers' premises, should be free from virus.

**4.2.2** None of the generally accepted sewage treatment methods yield virus-free effluent. Although a number of investigators have found activated sludge treatment to be superior to trickling filters from this point of view, it seems possible that chemical precipitation methods will prove to be the most effective.

**4.2.3** Virus can be isolated from raw water and from springs, enterovirus, reovirus, and adenovirus have been found in water, the first named being the most resistant to chlorination. If enterovirus are absent from chlorinated water, it can be assumed that the water is safe to drink. Some uncertainty still remains about the virus of infectious hepatitis, since it has not so far been isolated but in view of the morphology and resistance of enterovirus it is likely that, if they have been inactivated hepatitis virus will have been inactivated also.

**4.2.4** An exponential relationship exists between the rate of virus inactivation and the redox potential. A redox potential of 650 mV (measured between platinum and calomel electrodes) will cause almost instantaneous inactivation of even high concentrations of virus. Such a potential can be obtained with even a low concentration of free chlorine, but only with an extremely high concentration of combined chlorine. This oxidative inactivation may be achieved with a number of other oxidants also, for example, iodine, ozone and potassium permanganate, but the effect of the oxidants will always be counteracted, if reducing components, which are mainly organic, are present. As a consequence, the sensitivity of virus towards disinfectants will depend on the *milieu* just as much as on the particular disinfectant used.

**4.2.5** Viruses are generally resistant to disinfectants as well as get protected on account of presence of particulate and organic matter in water. Because the difference between the resistance of coliform organisms and of virus to disinfection by oxidants increases with increasing concentration of reducing components, for example, organic matter, it cannot be assumed that the absence of available coliform organisms implies freedom from active virus under circumstances where a free chlorine residual cannot be maintained. Sedimentation and slow sand filtration in themselves may contribute to the removal of virus from water.

**4.2.6** In practice, >0.5 mg/l of free chlorine for 1 h is sufficient to inactivate virus, even in water that was originally polluted provided the water is free from particulates and organic matter.

**4.2.7** MS2 phage are indicator of viral contamination in drinking water. MS2 phage shall be absent in 1 litre of water when tested in accordance with USEPA method 1602. If MS2 phage are detected in the drinking water, virological examination shall be done by the Polymerase Chain Reaction (PCR) method for virological examination as given in Annex B. USEPA method in Manual of Method for Virology Chapter 16, June 2001 shall be the alternate method. If viruses are detected, the cause shall be determined by immediate further investigation.

#### 4.3 Biological Requirements

**4.3.1** Ideally, all samples taken including consumers premises should be free from biological organisms. Biological examination is of value in determining the causes of objectionable tastes and odours in water and controlling remedial treatments, in helping to interpret the results of various chemical analysis, and in explaining the causes of clogging in distribution pipes and filters. In some instances, it may be of use in demonstrating that water from one source has been mixed with that from another.

**4.3.2** The biological qualities of water are of greater importance when the supply has not undergone the conventional flocculation and filtration processes, since increased growth of methane-utilizing bacteria on biological slimes in pipes may then be expected, and the development of bryozoal growths such as *Plumatella* may cause operational difficulties.

**4.3.3** Some of the animalcules found in water mains may be free-living in the water, but others such as *Dreissena* and *Asellus* are more or less firmly attached to the inside of the mains. Although these animalcules are not themselves pathogenic, they may harbour pathogenic organisms or virus in their intestines, thus protecting these pathogens from destruction by chlorine.

**4.3.4** Chlorination, at the dosages normally employed in waterworks, is ineffective against certain parasites, including amoebic cysts; they can be excluded only by effective filtration or by higher chlorine doses than can be tolerated without subsequent dechlorination. *Amoebiasis* can be conveyed by water completely free from enteric bacteria; microscopic examination after concentration is, therefore, the only safe method of identification.

**4.3.5** Strict precautions against back-syphonage and cross-connections are required, if amoebic cysts are found in a distribution system containing tested water.

**4.3.6** The *cercariae* of *schistosomiasis* can be detected by similar microscopic examination, but there is, in

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any case, no evidence to suggest that this disease is normally spread through piped water supplies.

**4.3.7** The cyclops vector of the embryos of *Dracunculus medinensis* which causes dracontiasis or Guinea-worm disease can be found in open wells in a number of tropical areas. They are identifiable by microscopic examination. Such well supplies are frequently used untreated, but the parasite can be relatively easily excluded by simple physical improvements in the form of curbs, drainage, and apron surrounds and other measures which prevent physical contact with the water source.

**4.3.8** Cryptosporidium shall be absent in 10 liter of water when tested in accordance with USEPA method 1622 or USEPA method 1623\* or ISO 15553 : 2006.

**4.3.9** Giardia shall be absent in 10 liter of water when tested in accordance with USEPA method 1623\* or ISO 15553 : 2006.

**4.3.10** The drinking water shall be free from microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms. An illustrative (and not exhaustive) list is given in Annex C for guidance.

NOTE — In case of dispute, the method indicated by '\*' in 4.3.8 and 4.3.9 shall be referee method.

## 5 SAMPLING

Representative samples of water shall be drawn as prescribed in IS 1622 and IS 3025 (Part 1).

ANNEX A  
(Clause 2)

## LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
1622 : 1981	Methods of sampling and microbiological examination of water ( <i>first revision</i> )	(Part 41) : 1992	Cadmium ( <i>first revision</i> )
3025	Methods of sampling and test (physical and chemical) for water and waste water:	(Part 42) : 1992	Copper ( <i>first revision</i> )
(Part 1) : 1987	Sampling ( <i>first revision</i> )	(Part 43) : 1992	Phenols ( <i>first revision</i> )
(Part 2) : 2002	Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy	(Part 46) : 1994	Magnesium
(Part 4) : 1983	Colour ( <i>first revision</i> )	(Part 47) : 1994	Lead
(Part 5) : 1983	Odour ( <i>first revision</i> )	(Part 48) : 1994	Mercury
(Part 7) : 1984	Taste threshold ( <i>first revision</i> )	(Part 49) : 1994	Zinc
(Part 8) : 1984	Tasting rate ( <i>first revision</i> )	(Part 52) : 2003	Chromium
(Part 10) : 1984	Turbidity ( <i>first revision</i> )	(Part 53) : 2003	Iron
(Part 11) : 1983	pH value ( <i>first revision</i> )	(Part 54) : 2003	Nickel
(Part 16) : 1984	Filterable residue (total dissolved solids) ( <i>first revision</i> )	(Part 55) : 2003	Aluminium
(Part 21) : 1983	Total hardness ( <i>first revision</i> )	(Part 56) : 2003	Selenium
(Part 23) : 1983	Alkalinity ( <i>first revision</i> )	(Part 57) : 2005	Boron
(Part 24) : 1986	Sulphates ( <i>first revision</i> )	(Part 59) : 2006	Manganese
(Part 26) : 1986	Chlorine residual ( <i>first revision</i> )	(Part 60) : 2008	Fluoride
(Part 27) : 1986	Cyanide ( <i>first revision</i> )	13428 : 2003	Packaged natural mineral water — Specification ( <i>first revision</i> )
(Part 29) : 1986	Sulphide ( <i>first revision</i> )	14194	Radionuclides in environmental samples — Method of estimation:
(Part 32) : 1988	Chloride ( <i>first revision</i> )	(Part 1) : 1994	Gross beta activity measurement
(Part 34) : 1988	Nitrogen ( <i>first revision</i> )	(Part 2) : 1994	Gross alpha activity measurement
(Part 37) : 1988	Arsenic ( <i>first revision</i> )	15302 : 2002	Determination of aluminium and barium in water by direct nitrous oxide-acetylene flame atomic absorption spectrometry
(Part 39) : 1989	Oil and grease	15303 : 2002	Determination of antimony, iron and selenium in water by electrothermal atomic absorption spectrometry
(Part 40) : 1991	Calcium		

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## ANNEX B (Clause 4.2.7)

### POLYMERASE CHAIN REACTION (PCR) METHOD

#### B-1 GENERAL

The method involves the concentration of viruses from 100 litre of drinking water to 1 ml by membrane filter technique. The concentrate is subjected to amplification using polymerase chain reaction (PCR) and primers based on highly conserved regions of viral genomes. This method can detect as low as 10 genome copies. Stringent precautions are needed to avoid contamination with amplified DNA products leading to false positive reactions. Detection of hepatitis A virus (HAV) RNA and enterovirus (EV) RNA is considered as an indication of presence of viruses in water. Steps involved include concentration of water, RNA extraction, complementary DNA (cDNA) synthesis and PCR.

#### B-2 CONCENTRATION OF DRINKING WATER

##### B-2.1 Apparatus

###### B-2.1.1 Pressure Pump

B-2.1.2 Membrane Filter Assembly with 144 mm Diameter with Tripod Stand

B-2.1.3 Pressure Vessel (50 litre capacity) with Pressure Gauge

B-2.1.4 Inter-connecting Pressure Tubes

##### B-2.2 Reagents

Autoclaved double distilled water shall be used for the preparation of reagents/buffers in this study.

B-2.2.1 Aluminium Chloride

B-2.2.2 HCl/NaOH Urea (Extra Pure)

B-2.2.3 Disodium Hydrogen Phosphate ( $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ ) — 0.2 M, filter sterilized.

B-2.2.4 Sodium Dihydrogen Phosphate ( $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ ) — 0.2 M, filter sterilized.

B-2.2.5 Citric Acid — 0.1 M, filter sterilized.

B-2.2.6 L-Arginine — 0.5 M, filter sterilized.

B-2.2.7 Urea-Arginine Phosphate Buffer (U-APB) — Mix 4.5 g of urea with 2 ml of 0.2 M  $\text{NaH}_2\text{PO}_4$  and 2 ml of 0.5 M L-Arginine and make up the volume to 50 ml with sterile distilled water. The pH of the eluent shall be 9.0.

B-2.2.8 Magnesium Chloride ( $\text{MgCl}_2$ ) — 1 M.

B-2.2.9 McIl Vaines Buffer (pH 5.0) — Mix 9.7 ml of

0.1 M citric acid with 10.3 ml of 0.2 M  $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$  under sterile conditions.

##### B-2.3 Procedure

Filter 100 litre of drinking water sample through membrane filter assembly using either positively charged membrane of 144 mm diameter or 0.22 micron diameter pore size nitrocellulose membrane. For positively charged membrane the test water pH need not be adjusted. But for the 0.22 micron nitrocellulose membrane adjust the pH to 3.5 after adding the aluminium chloride as a coagulant to a final concentration of 0.0005 M.

At lower pH pass the water through the membrane. The flow rate shall be 40 litre/h approximately. After the completion of the filtration, elute the adsorbed particles using 100 ml of urea-arginine phosphate buffer (U-APB). Precipitate the suspended particles using 1 ml of magnesium chloride (1 M). Dissolve the resultant precipitate centrifuged out of the sample in 800-1.0 ml of McIl Vaines buffer. The processed sample can be stored at refrigerator until required.

#### B-3 RNA EXTRACTION

##### B-3.1 Apparatus

B-3.1.1 Cooling Centrifuge

B-3.1.2 Deep Freezer ( $-20^\circ\text{C}$ )

B-3.1.3 Vortex Mixer

B-3.1.4 Pipette Man

##### B-3.2 Reagents

B-3.2.1 Cetyl Trimethyl Ammonium Bromide (CTAB) Buffer

CTAB	: 1 percent
Sodium Dodecyl Sulphate (SDS)	: 1 percent
EDTA	: 20 mM
Sodium Chloride	: 1 M

B-3.2.2 Phenol, Chloroform and Isoamylalcohol in the ratio of 25:24:1 (PCI)

B-3.2.3 Ethanol

B-3.2.4 TE Buffer (pH 8.0)

Tris base	: 1 M
EDTA	: 0.5 M

B-3.2.5 Sodium Acetate — 3 M.

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**B-3.3 Procedure**

Treat 300 µl of concentrated water sample with equal volume of CTAB and 1/10th volume of PCI. Vortex and centrifuge at 5 000 × g for 30 min at 4°C. Add 1/10th volume of 3 M sodium acetate and double the volume of cold ethanol to the aqueous layer. Keep the mixture at either at -20°C for overnight or in liquid nitrogen for 2-5 min. Centrifuge at 10 000 × g, for 30 min at 4°C. Discard the supernatant and air dry the pellet and dissolve it in 20 µl TE buffer.

**B-4 COMPLEMENTARY DNA (cDNA) SYNTHESIS****B-4.1 Apparatus****B-4.1.1 PCR Machine****B-4.1.2 Deep Freezer (-20°C)****B-4.2 Reagents****B-4.2.1 cDNA Synthesis Kit****B-4.3 Procedure**

Suspend the extracted RNA in 20 µl of cDNA reaction mixture, which consists of 4 µl of 5X reverse transcriptase reaction buffer [250 mM TRIS-HCl (pH 8.5), 40 mM KCl, 150 mM MgCl<sub>2</sub>, 5 mM dithiothreitol (DTT)], 0.5 µl of 10 mM deoxynucleotide phosphate (dNTP), 2 µl of hexa nucleotide mixture, 1 µl of 25 U of Maloney Murine Leukaemia Virus (M-MuLV) reverse transcriptase, 0.5 µl of 20 U of human placental RNase inhibitor. Heat the reaction mixture to 95°C for 5 min and rapidly chill on ice, this is followed by the addition of 1 µl (25 U/µl) of M-MuLV reverse transcriptase. Incubate the reaction mixture as given by the manufacturer of the kit and quickly chill the reaction tube on ice.

**B-5 PCR AMPLIFICATION****B-5.1 Apparatus****B-5.1.1 PCR Machine****B-5.1.2 Deep Freezer (-20°C)****B-5.1.3 Micropipette****B-5.2 Reagents****B-5.2.1 Primers for EV and HAV**

EV sense primer, 5' — TCC TCC GGC CCC TGA ATG CG — 3'  
 antisense primer, 5' — ATT GTC ACC ATA AGC AGC CA — 3'

HAV sense primer, 5' — GTTTT GCTCC TCTTT ATCAT GCTAT G-3'

antisense primer, 5' — GGAAA TGCTC CAGGT ACTTT CTTTG-3'

**B-5.2.2 PCR Master Mix****B-5.2.3 Mineral Oil****B-5.3 Procedure****B-5.3.1 PCR Amplification for Hepatitis A Virus (HAV)**

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS-HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl<sub>2</sub>, 0.01 percent gelatin (1× PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of HAV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min	} 35 cycles
Denaturation for 1.0 min at 94°C	
Annealing for 1.0 min at 57°C	
Extension for 1.3 min at 72°C	
Final extension at 72°C for 7 min.	

**B-5.3.2 PCR Amplification for Enterovirus (EV)**

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS-HCl (pH 8.3), 50 mM KCl, 2.5 mM MgCl<sub>2</sub>, 0.01 percent gelatin (1X PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of EV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min	} 35 cycles
Denaturation for 1.0 min at 94°C	
Annealing for 1.0 min at 42°C	
Extension for 2.0 min at 72°C	
Final extension at 72°C for 7 min.	

**B-6 AGAROSE GEL ELECTROPHORESIS****B-6.1 Apparatus****B-6.1.1 Micropipette****B-6.1.2 Electrophoresis Apparatus****B-6.1.3 Gel Documentation System****B-6.2 Reagents****B-6.2.1 Running Buffer — 50X TAE buffer**

Tris base/Tris buffer : 121.00 g

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Glacial acetic acid : 28.55 ml  
 0.5 M EDTA : 50.00 ml  
 Distilled water : 300.45 ml  
 (autoclaved)

Make the final volume upto 1 000 ml with deionised distilled water, sterilize and store at 4°C. The final concentration for the preparation of agarose gel and to run the gel shall be 1X.

**B-6.2.2 Tracking Dye** — 6X bromophenol blue.

**B-6.2.3 Ethidium Bromide** — 0.5 µg/ml.

#### B-6.3 Procedure

Run the PCR amplified product of EV and HAV on 1.5 percent agarose gel using 1X TAE buffer. Load 10 µl of amplified product after mixing it with 1 µl 10X loading dye. Run the molecular weight marker along with the samples. Run the electrophoresis at 100 V for 30 min. Stain the gel with ethidium bromide (0.5 µl/ml) for 20 min. Wash it with distilled water and view under UV transilluminator and photograph the gel to analyse the band pattern. EV gives the band as 155 base pair and the HAV gives band as 225 base pair.

### ANNEX C (Clause 4.3.10)

#### ILLUSTRATIVE LIST OF MICROSCOPIC ORGANISMS PRESENT IN WATER

Sl No.	Classification of Microscopic Organism	Group and Name of the Organism	Habitat	Effect of the Organisms and Significance
(1)	(2)	(3)	(4)	(5)
i)	Algae	a) Chlorophyceae:		
		1) <i>Species of</i> Coelastrum, Gomphosperium, Micractinium, Mougeotia, Oocystis, Euastrum, Scenedesmus, Actinastrum, Gonium, Eudorina Pandorina, Pediasstrum, Zygnema, Chlamydomonas, Careteria, Chlorella, Chroococcus, Spirogyra, Tetradron, Chlorogonium, Stigeoclonium	Polluted water, impounded sources	Impart colouration
		2) <i>Species of</i> Pandorina, Volvox, Gomphosperium, Staurastrum, Hydrodictyon, Nitella	Polluted waters	Produce taste and odour
		3) <i>Species of</i> Rhizoclonium, Cladotrix, Ankistrodesmus, Ulothrix, Micrasterias, Chromulina	Clean water	Indicate clean condition
		4) <i>Species of</i> Chlorella, Tribonema, Clostrium, Spirogyra, Palmella	Polluted waters, impounded sources	Clog filters and create impounded difficulties
		b) Cyanophyceae:		
		1) <i>Species of</i> Anacystis and Cyndrospermum	Polluted waters	Cause water bloom and impart colour
		2) <i>Species of</i> Anabena, Phormidium, Lyngbya, Arthrospira, Oscillatoria	Polluted waters	Impart colour
		3) <i>Species of</i> Anabena, Anacystis, Aphanizomenon	Polluted waters, impounded sources	Produce taste and odour
		4) <i>Species of</i> Anacystis, Coelosperium, Aphanizomenon, Anabena, Cleotrichina,	Polluted waters	Toxin producing
		5) <i>Species of</i> Anacystis, Rivularia, Oscillatoria, Anabena	Polluted waters	Clog filters

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Sl No.	Classification of Microscopic Organism	Group and Name of the Organism	Habitat	Effect of the Organisms and Significance
(1)	(2)	(3)	(4)	(5)
		6) <i>Species of Rivularia</i>	Calcareous waters and also rocks	Bores rocks and calcareous strata and causes matted growth
		7) <i>Species of Agmenellum, Microcoleus, Lemanea</i>	Clean waters	Indicators of purification
		c) Diatoms (Bacillarcophyceae):		
		1) <i>Species of Fragillaria, Stauroneis</i>	Stephanodiscus, —	Cause discoloration
		2) <i>Species of Asterionella, Tabellaria</i>	Hill streams high altitude, torrential and temperate waters	Taste and odour producing clog filters
		3) <i>Species of Synedra and Fragillavia</i>	Polluted waters	Taste and odour producing
		4) <i>Species of Nitzschia, Gomphonema</i>	Moderately polluted waters	Cause discoloration
		5) <i>Species of Cymbella, Synedra, Melosira, Navicula, Cyclotella, Fragillaria, Diatoma, Pleurosigma</i>	Rivers and streams impounded sources	Clog filters and cause operational difficulties
		6) <i>Species of Pinnularia, Cyclotella, Meridion, Cocconeis</i>	Surinella, Clean waters	Indicators of purification
		d) Xanthophyceae:		
		<i>Species of Botryococcus</i>	Hill streams, high altitude and temperate waters	Produces coloration
ii)	Zooplankton	a) Protozoa:		
		1) <i>Amoeba, Giardia, Lamblia, Arcella</i>	Polluted waters	Pollution indicators
		2) <i>Endamoeba, Histolytica</i>	Sewage and activated sludge	Parasitic and pathogenic
		b) Ciliates:		
		<i>Paramoecium, Vorticella, Carchesium, Stentor, Colpidium, Coleps, Euplotes, Colopoda, Bodo</i>	Highly polluted waters, sewage and activated sludge	Bacteria eaters
		c) Crustacea:		
		1) <i>Bosmina, Daphnia</i>	Stagnant polluted waters	Indicators of pollution
		2) <i>Cyclops</i>	Step wells in tropical climate	Carrier host of guinea worm
iii)	Rotifers	a) Rotifers:		
		<i>Anurea, Rotaria, Philodina</i>	Polluted and Algae laden waters	Feed on algae
		b) Flagellates:		
		1) <i>Ceratium, Glenodinium, Dinobryon</i>	Peridinium	Rocky strata, iron bearing and acidic waters
		2) <i>Euglena, Phacus</i>	Polluted waters	Impart colour

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<i>Sl No.</i>	<i>Classification of Microscopic Organism</i>	<i>Group and Name of the Organism</i>	<i>Habitat</i>	<i>Effect of the Organisms and Significance</i>
(1)	(2)	(3)	(4)	(5)
iv)	Miscellaneous Organisms	a) Sponges, Hydra	Fresh water	Clog filters and affect purification systems
		b) Tubifex, Eristalls, Chironomids	Highly polluted waters, sewage and activated sludge and bottom deposits	Clog filters and render water unaesthetic
		c) Plumatella	Polluted waters	Produces biological slimes and causes filter operational difficulties
		c) Dreissena, Asellus	Polluted waters	Harbour pathogenic organisms

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## PLATES

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<b>RENUKOOT R-MS SAMPLING LOCATION PHOTOS (OCTOBER-2020)</b>		
S.No	LOCATION NAME	SAMPLING PHOTOS
1.	<b>Peziometer R-MS-1 (15-10-2020)</b>	
		
2.	<b>Renukoot Railway Station R-MS-2 (15-10-2020)</b>	
		

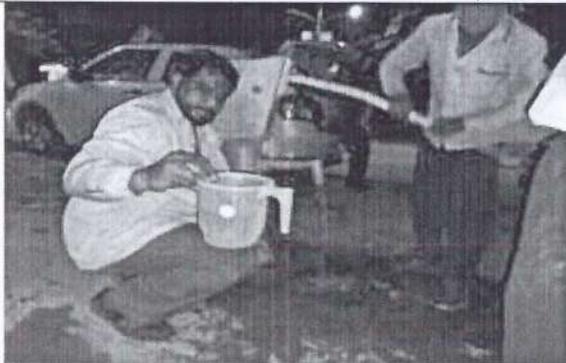
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<p>3.</p>	<p><b>Renukoot Dondiya Nala R-MS-3 (15-10-2020)</b></p>	
		
<p>4</p>	<p><b>Renukoot Lanka Colony R-MS-4 (15-10-2020)</b></p>	
		

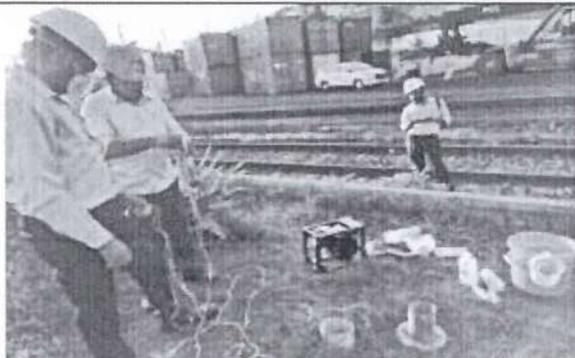
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<p>5.</p>	<p><b>Renukoot Govt. Inter College R-MS-5</b> <b>(15-10-2020)</b></p>	
<p>6.</p>	<p><b>Renukoot opposite Rihad Dam R-MS-6</b> <b>(15-10-2020)</b></p>	
		
		

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<p>7.</p>	<p>Renukoot Murligadi Shiv Mandir R-MS-7 (15-10-2020)</p>	
		
<p>8.</p>	<p>Monitoring well near SLF R-MS-8 (16-10-2020)</p>	
		

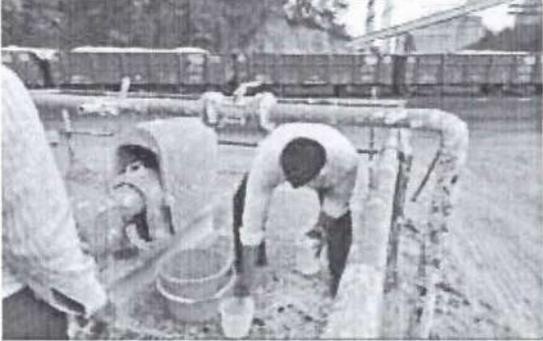
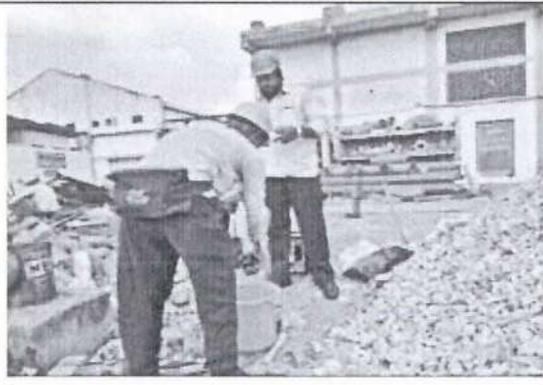
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<p>9.</p>	<p>Dongia Nallah R-MS-9 (16-10-2020)</p>	
		
<p>10.</p>	<p>Neeri ESID Drilled point R-MS-10 (16-10-2020)</p>	
		

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<p>11.</p>	<p>Monitoring well 1 Grasim R-MS-11 (16-10-2020)</p>	
<p>12.</p>	<p>Monitoring well 4 R-MS-12 (16-10-2020)</p>	
		
<p>13.</p>	<p>Monitoring well 3 R-MS-13 (16-10-2020)</p>	

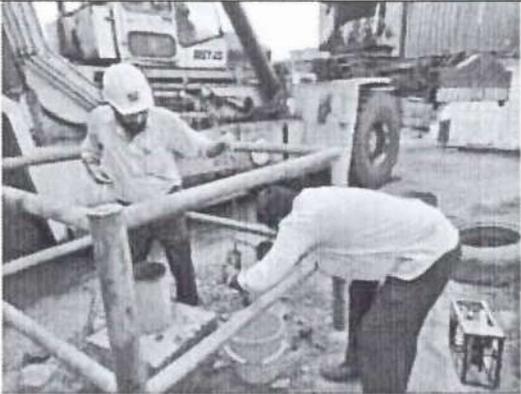
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14.	<b>Leachate R-MS-14 (16-10-2020)</b>	
15.	<b>Monitoring well near DM plant cooling tower R-MS-15 (17-10-2020)</b>	 
16.	<b>Monitoring well 10 R-MS-16 (17-10-2020)</b>	

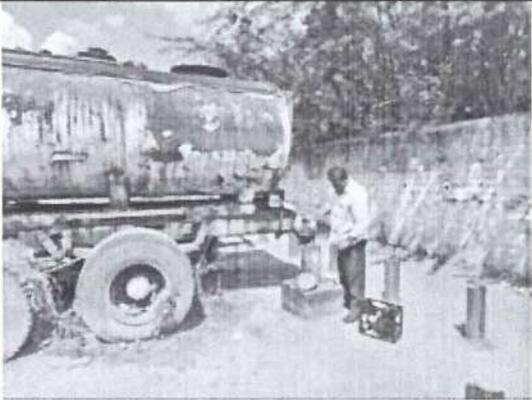
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17.	Monitoring well R-MS-17 (17-10-2020)	 
18.	Monitoring well R-MS-18 (17-10-2020)	

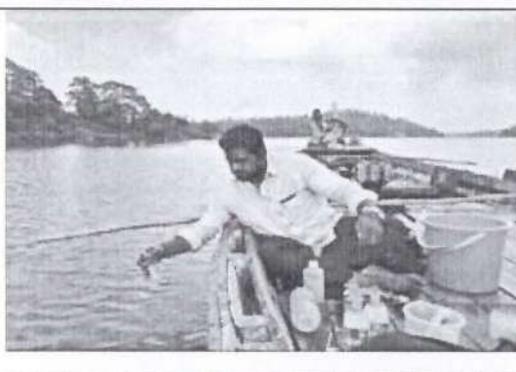
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19.	Monitoring well 8 R-MS-19 (17-10-2020)	 
20.	Monitoring well R-MS-20 (17-10-2020)	

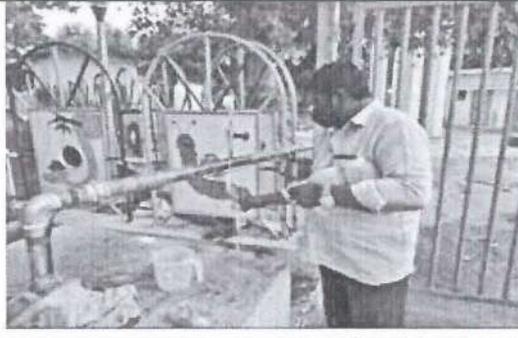
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<p>21.</p>	<p>Monitoring well Lal bunglow R-MS-21 (17-10-2020)</p>	
<p>22.</p>	<p>Grasim Intake R-MS/PL-22 (17-10-2020)</p>	
<p>23.</p>	<p>Dongia Nallah confluence with river R-MS/PL-23 (17-10-2020)</p>	

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24.	D/S River sample R-MS/PL-24 (17-10-2020)	 
25.	Shiv Park Area R-MS-25 (17-10-2020)	

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26.	Grasim Hitech Colony R-MS-26 (17-10-2020)	 

**Minutes of the meeting of Fly Ash Management and Utilization Mission  
held on 24.11.2022 at 15:00 hrs**

A virtual meeting on 'Ash Management and Utilization Mission', in respect to Hon'ble NGT's Order dated 18.01.2022 in the matter related to the issues of industrial pollution in Singrauli and Sonbhadra region of M.P. and U.P. respectively, was convened on 24<sup>th</sup> November, 2022 at 15:00 hrs. The list of participants is annexed at **Annexure I**.

During the meeting, following deliberations took place:

1. It was informed that the issues of pollution caused by TPPs and other industries, stone crushers, transportation and coal mining located in Singrauli district of M.P. and Sonbhadra district of U.P. have been raised under various cases to Hon'ble NGT on several instances.
2. It was shared that a team of MoEF&CC officials, Chairman, CPCB and representatives of NTPC visited Singrauli region of M.P.
3. Thereafter, MoEF&CC in its brief presentation (**Annexure II**), summarised the pollution related issues in both the regions, compliance directions given by the Hon'ble NGT and term of references of the Mission. It also reflected the present status of implementation of given directions based on the available compliance report from various stakeholders. The salient points of the presentation are as under:
  - a. The Hon'ble NGT order vide dated 18.01.2022 has emphasized 18 stakeholders from of both the regions to implement the recommendations of Joint Committee and prepare the action plan and implement it in a time bound manner.
  - b. In compliance with one of the direction of Hon'ble NGT in respect to formulation of general road map regarding utilization and management of ash generated by thermal power plants in these two regions as well as across the country, MoEF&CC has already issued a notification on ash utilization that mandates 100% utilization of ash and various other provisions that may lead to effective management of ash in scientific manner.

- c. The action points that emanates from the ash utilization notification dated 31.12.2021 are being taken into consideration and would be by expedited by concerned enforcement agency/ departments.
4. It was shared that the formulation of guidelines for technical specifications of ash ponds or dykes and procedure for annual certification of the ash pond or dyke has been initiated by Central Pollution Control Board as mandated under Para A (6) of ash utilization notification dated 31.12.2021.
5. CMD, NCL informed that for the purpose of mixing at least 25 per cent of ash on weight to weight basis of the materials used for external dump of overburden, backfilling or stowing of mine, low stripping ratio mines may be put on trial as there is possibility of mixing of ash with overburden in mine voids.

**After deliberations, following decisions were made:**

1. Secretariat to be established in CPCB for coordination, monitoring and supervision of the actions emanating from the deliberations and decisions of the Fly Ash Supervision and Utilization Mission. **(Action: CPCB)**
2. For effective prevention, control and abatement of industrial pollution in Singrauli and Sonbhadra districts, the actions plans prepared based on the recommendations of the Joint Committee, mentioned out in Para 15 of the Hon'ble NGT's Order dated 18.01.2022, to be scrupulously implemented in a time-bound manner as per the action plans at **Annexure III (Action: CPCB, State Govts of UP and MP, M/s NTPC Limited (Singrauli) Shakti Nagar Sonbhadra, M/s NTPC Rihand Super Thermal Power, M/s NTPC Limited Vindhyachal Super Thermal Power Plant, M/s Anpara Thermal Power Plant, M/s Obra Thermal Power Station, M/s NCL Bina Project, Bina, Sonbhadra, M/s NCL Dudhichuwa Project, Sonbhadra, M/s NCL Kakri Project, Sonbhadra, M/s NCL Khadia Project, Sonbhadra, M/s NCL Krishna Shila Project, M/s Renusagar Thermal Power Plant, Aluminum Smelter: M/s HINDALCO Industries Ltd, Renukoot, M/s Grasim Industries Limited Chemical Division, Renukoot, M/s M.P. Power Generating Co. Ltd. (MPPGCL), M/s Birla Carbon India Pvt. Ltd., Sonbhadra)**

3. CPCB and CEA to scrutinize the action plans submitted by the respective stakeholders as per Point No. 2 above to ensure that the action points have been prepared as per the recommendations of the Joint Committee as mentioned out in Para 15 of the Hon'ble NGT's Order dated 18.01.2022. CPCB to ensure that all the activities are covered and must have specific timelines **(Action: CPCB, CEA)**
4. In order to ensure 100% utilization of ash by lignite and coal based thermal power plants, effective monitoring and supervision of provisions of Ash Utilization Notification dated 31.12.2021 **(Annexure IV)** have to be scrupulously complied with. Respective stakeholders have been mapped in respect of the various activities mandated under the notification. CPCB to coordinate with all the regulatory/enforcing agencies and ensure the compliance of all the activities in a time bound and on a regular basis **(Action: CPCB, CEA, All State Govts, All stakeholders as per Annexure IV)**
5. Concerned District Magistrates of Singrauli and Sonbhadra to submit action plans immediately for effective prevention, control and abatement of pollution from stone crushers located at their respective districts. Further, the action plans submitted must be scrupulously implemented in a time bound manner. **(Action: State Govts of U.P. and M.P., District Magistrates – Sonbhara and Singrauli)**
6. M/s Anpara 'C' Lanco to submit action plans based on the recommendations in para 15 of the Hon'ble NGT's Order dated 18.01.2022 immediately. **(Action: M/s Anpara 'C' Lanco, State Govt of UP)**
7. Secretariat at CPCB to upload the action plans and the progress of the action plans on the web portal of CPCB by 5<sup>th</sup> of next month, the link of which may be placed on MoEFCC as well as the concerned State Government's and other stakeholders' websites. CPCB to put in place an IT based tool for updating the progress in regard to the implementation of action plans by respective stakeholders as well as in regard to the activities as per Point 4 above. **(Action: CPCB, State Govts of UP and MP, All stakeholders)**
8. Concerned State Governments, the State Environment Departments and concerned SPCBs to take all measures for the prevention, control and

abatement of the industrial pollution in Sonbhadra and Singrauli districts to bring down the pollution levels in these districts. The compliance of the conditions of CTOs as well as ECs in respect of all the industries, including the installation and functioning of all pollution control as well as monitoring devices, must be strictly complied with by all industrial/mining/ quarrying units. These compliances to be reported to CPCB on a monthly basis through a web portal that reflects the obligations and compliances as per CTO as well as EC in respect of all units **(Action: State Governments of U.P. and M.P.)**

9. All the industrial, coal and other mining activities as well as the stone quarrying and crushing in the districts of Sonbhadra and Singrauli must be carried out in compliance with the Air Act, Water Act and EP Act. Regular inspections and audits to be carried out by the concerned SPCBs **(Action: State Governments of U.P. and M.P.)**
10. The respective State Government to receive voluntary fund contributions out of the CSR funds from companies in respective districts. Concerned State Government to create a separate account to receive voluntary contributions and funds for environment restoration and relief. Concerned State Government to take measures for restoration of environment and provide relief to victims of damage in a manner as may be found appropriate from these funds. **(Action: State Governments of U.P. and M.P.)**
11. Concerned State Governments to arrange for conducting health and risk impact assessment studies of operations of TPPs and ash generating industries. **(Action: State Governments of U.P. and M.P.)**

**List of Participants**

- 1) Ms. Leena Nandan, Secretary, EFCC
- 2) Shri. Alok Kumar, Secretary, Power
- 3) Shri Anandji Prasad, Advisor, MoC
- 4) Shri. Naresh Pal Gangwar, Additional Secretary, MoEFCC
- 5) Dr. Satyendra Kumar, Director, MoEFCC
- 6) Shri N. Subrahmanyam, Scientist D, MoEFCC
- 7) Shri. Nazimuddin, Scientist F, CPCB
- 8) Shri MVR Reddy, ED, SSEA, NTPC
- 9) Managing Director, UPRVUNL
- 10) Shri Ajay Kumar Sharma, MS, UPPCB
- 11) Dr. Hemant Kumar Sharma, MPPCB, Jabalpur
- 12) Shri S C Naik, DGM Operations, NTPC
- 13) Shri Bhola Singh, CMD, NCL - SINGRAULI
- 14) Shri R N Shukla, Adani
- 15) Shri Basuraj Goswami, Executive Director, NTPC
- 16) Shri Sitiesh Barche, NTPC
- 17) Shri R D Patil, CPCB Lucknow
- 18) Shri A K Chattopadhyay, NTPC
- 19) Shri M. Devaraj, Chairman, UPPCL
- 20) Shri Ravindra Raghuvanshi, Birla Carbon
- 21) Dr. Bhola Kushwaha, Head, Environment, HPPL
- 22) Shri V R Shankar, M/s Hindalco
- 23) Shri Vivek Gupta, Aditya Birla
- 24) Shri V R Shankar, Aditya Birla
- 25) Shri. Harish Duhan, GM (Nigahi), NCL
- 26) M/s Sasan Ultra Mega Power Plant
- 27) Shri BG Setty, Addl. GM, NTPC
- 28) General Manager, Jhingurda Project, NCL
- 29) Chief General Manager, M/s Obra Thermal Power Station
- 30) Shri Utpal Sarkar, Aditya Birla
- 31) Regional Officer, Sonbhadra, UPPCB
- 32) Shri M Devaraj, Chairman, UPPCL
- 33) Regional Officer, Bhopal, MoEFCC
- 34) Regional Officer, Singrauli, MPPCB
- 35) Nodal Officer, Environment, Amhohri Project, NCL
- 36) Additional Chief Secretary, UP
- 37) Shri Dinesh Kumar Meena, NTPC
- 38) Shri V Santosh, NTPC
- 39) Shri Munish Jain, NTPC
- 40) Shri S C Naik, NTPC
- 41) Shri Sanjay Singh, Grasim Corporate
- 42) Shri Ramesh Babu, NTPC
- 43) Shri Anshul Chilbule, MPPCB Bhopal

- 44) Dushichua Project, NCL
- 45) Shri Alan Antony, Deputy Manager, Environment, Bina Project, NCL
- 46) Regional Director, CPCB, Bhopal
- 47) Shri R B Sindhur, SOM, Nigahi
- 48) Shri Gurdeep Singh, NTPC
- 49) ATP, Anpara
- 50) Shri Ravindra Nath Singh, Director (Thermal)
- 51) Shri Jitendra Yadav
- 52) Shri Rajiv Kumar, General Manager, NCL Khadia
- 53) Shri Manohar Kumar, Rosa Power
- 54) Shri Sunil Kumar Meena, Sc-D, CPCB
- 55) Additional Chief Secretary, Energy, UP

**Presentation  
on  
Industrial Pollution in Singrauli and Sonbhadra Districts  
&  
Effective Utilisation and Management of Fly Ash**



**HSM Division**  
Government of India  
Ministry of Environment, Forest & Climate Change

**24<sup>th</sup> November, 2022**

**Industries and Coal Mines in Singrauli and Sonbhadra****Singrauli District:**

- i. TPPs- 5 (NTPC Vindhyachal, Sasan UMPP, Jaypee Nigrie, Adani Power (MP) Ltd., and Hindalco Industries Ltd.)
- ii. Coal Mines- 8 (NCL - Jhingurda, Khadia, Block-B, Jayant, Amlohri, Nigahi, Dudhichua, and Bina)
- iii. Stone Crushers

**Sonbhadra District:**

- i. TPPs– 9 (NTPC Singrauli, NTPC Rihand, UPRVUNL Anpara A, B & D TPS, Lanco Anpara C TPS, UPRVUNL Obra TPS, Hindalco Industries Ltd. (Renukoot CPP), Hindalco Industries Ltd. (Renusagar CPP), UltraTech Cement Ltd. (Dalla Cement CPP),Grasim Industries Ltd. (CPP)
- ii. Coal Mines – 5 (NCL - Kakri, Krishnashila, Bina Extn., Dudhichua, Khadia)
- iii. Aluminium Smelter (Hindalco)
- iv. Stone Crushers

**Industrial Pollution in Singrauli and Sonbhadra Districts- Background**

- **Major issues of industrial pollution-**
  - Industrial pollution and ash management related issues
  - Installation of pollution control as well as monitoring devices
  - Discharge of wastewater and ash in Rihand reservoir/water bodies
  - Pollution by stone crushers, coal mining and transportation.
- **Joint Committee constituted -2018, report submitted-2019.**
- **Committee gave recommendations in respect of all industries**
- **Oversight Committee formed to review implementation**
- **Further, committees comprising of respective DMs constituted for compliance**
- **Hon'ble NGT vide Order dated 18.01.2022 directed to constitute Fly Ash Management and Utilization Mission.**
- **MoEF&CC vide OM dated 09.03.2022 constituted Fly Ash Management and Utilization Mission**

**Mission -Mandate**

- NGT directed the Mission to :-
  - Coordinate and monitor of ash utilization matters as well as all associated industrial pollution issues in Singrauli and Sonbhadra region
  - To take stock of the situation and to prepare action plan in the light of recommendations of Joint Committee in respect of Singrauli and Sonbhadra
  - To prepare general road map and monitoring of scientific ash utilisation and management including legacy ash
  - May review the progress on a monthly basis and may place the quarterly progress on website
  - May require voluntary financial contributions out of CSR funds from companies
  - May get separate account for restoration of environment and relief to victims of damage in a manner as may be found necessary
  - May consider the safeguards in ash utilisation notification dated 21.12.2021
  - May interact with stakeholders, including brick manufacturers for fly ash utilisation
  - May conduct public health and risk impact assessment in areas of operation of TPPs and other generators of ash
  - May consider use of beneficiated coal
  - May consider onsite and offsite crisis management plans with regard to ash ponds and dykes

**Status of Action Plans**~~1403~~

Action plans have been submitted by 15 stakeholders:

- M/s NTPC Limited (Singrauli) Shakti Nagar Sonbhadra,
- M/s NTPC Rihand Super Thermal Power,
- M/s NTPC Limited Vindhyachal Super Thermal Power Plant,
- M/s Anpara Thermal Power Plant
- M/s Obra Thermal Power Station
- M/s NCL Bina Project, Bina, Sonbhadra,
- M/s NCL Dudhichuwa Project, Sonbhadra,
- M/s NCL Kakri Project, Sonbhadra,
- M/s NCL Khadia Project, Sonbhadra,
- M/s NCL Krishna Shila Project,
- M/s Renuagar Thermal Power Plant, Aluminum Smelter:
- M/s HINDALCO Industries Ltd, Renukoot,
- M/s Grasim Industries Limited Chemical Division, Renukoot,
- M/s M.P. Power Generating Co. Ltd. (MPPGCL),
- M/s Birla Carbon India Pvt. Ltd., Sonbhadra.

Action plans from namely, M/s Anpara 'C' Lanco Thermal Power Station, and

Action plans w.r.t. Stone Crushers yet to be submitted by concerned DMs.

## Terms of Reference - Recommendations

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SI No.	Action	Recommendation
1	Coordinate and monitor ash utilization matters as well as all associated industrial pollution issues in Singrauli and Sonbhadra region	<ul style="list-style-type: none"><li>• MPPCB in respect of Singrauli, UPPCB in respect of Sonbhadra to enforce the action plans of industries as well as relating to stone crushers (submitted by DMs)</li><li>• CPCB to coordinate overall enforcement of all related matters</li></ul>

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## Terms of Reference - Recommendations

SI No.	Action	Recommendation
2	To take stock of the situation and to prepare action plan in the light of recommendations of Joint Committee in respect of Singrauli and Sonbhadra	<p>i. Action plans from the industries specified at Para 15 of NGT w.r.t Joint Committee recommendations received from 15 industries (TPPs, mines, Aluminium Smelters). Action plans yet to be received from:-</p> <ul style="list-style-type: none"><li>• M/s Anpara C Lanco Thermal Power Station;</li><li>• Stone crushers in Singrauli and Sonbhadra region.</li></ul> <p>ii. UP State Pollution Control Board (with respect to M/s Anpara C Lanco Thermal Power Station) and concerned District Magistrates (with respect to stone crushers) have been requested to obtain action plans.</p>

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**Terms of Reference - Recommendations**

SINo	Action	Recommendation
3	<p>(a) To prepare general road map and monitoring of scientific ash utilisation and management including legacy ash</p> <p>(b) May consider the safeguards in ash utilisation notification dated 21.12.2021</p> <p>(c) May interact with stakeholders, including brick manufacturers for fly ash utilisation</p>	<p>i. Ash Utilisation notification mandates 100% utilisation of ash</p> <p>ii. Different stakeholders/regulators have been given specific mandate as well as timelines</p> <p>iii. Detailed status is presented later slides</p> <p>iv. Technical specifications of ash ponds shall be as per the guidelines of CPCB made in consultation with CEA</p> <p>v. Guidelines shall lay down a procedure for annual certification of ash pond/dyke on its safety, environmental pollution, mode of disposal, water consumption/conservation in disposal, ash waster recycling and greenbelt, etc.</p> <p>vi. CPCB to prepare guidelines immediately.</p> <p>vii. Implementation Committee has been constituted under Ash Utilisation notification with concerned stakeholders. Fly ash brick manufacturers may be interacted.</p>

## Terms of Reference - Recommendations

SI No.	Action	Recommendation
4	May review the progress on a monthly basis and may place the quarterly progress on website	CPCB, State Governments of UP and MP, MPPCB and UPPCB to upload the monthly status on website by getting the progress of action plans submitted by industries

**Terms of Reference - Recommendations**

SI No.	Action	Recommendation
5	<p>(a) May require voluntary financial contributions out of CSR funds from companies</p> <p>(b) May get separate account for restoration of environment and relief to victims of damage in a manner as may be found necessary</p> <p>(d) May conduct public health and risk impact assessment in areas of operation of TPPs and other generators of ash</p>	<p>i. Respective State Governments may be requested to receive voluntary financial contributions from CSR funds of the companies</p> <p>ii. Concerned State Government may get a separate account created to receive voluntary contributions and funds for environment restoration and relief.</p> <p>iii. Concerned State Governments to arrange for conducting health and risk impact assessment studies of operations of TPPs and ash generating industries</p>

## Terms of Reference - Recommendations

4409

SI No.	Action	Recommendation
6	May consider use of beneficiated coal	MoEFCC vide notification dated 21.5.2020 removed the mandatory use of beneficiated coal for power plants and mandated to meet the emission norms and 100% ash utilisation as per prescribed timelines.

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## Terms of Reference - Recommendations

SI No.	Action	Recommendation
6	May consider onsite and offsite crisis management plans with regard to ash ponds and dykes	i. Concerned DMs to ensure onsite and offsite crisis management plans are in place for ash dykes in respective Districts.

### Provisions of Ash Utilisation Notification and responsibilities of stakeholders

Sl No.	Action	Status	Timeline	Enforcement Agency/Dept.
1	Constitution of Committee for to examine and review and recommend the eco-friendly ways of utilisation of ash, Para A(3)	Completed	-	CPCB
2	100% Utilisation of current ash by TPPs as per timelines, Para A(4)	Ongoing	As prescribed	SPCB/PCC
3	Guidelines for procedure for annual certification of the ash pond or dyke on its safety, environmental pollution, available volume, mode of disposal, water consumption or conservation in disposal, ash water recycling and greenbelt etc., Para A(6)	Ongoing	Immediate	CPCB and CEA
4	Loading, unloading, transport, storage and disposal of ash to be done in an environmentally sound manner by TPPs and all precautions to prevent air and water pollution to be taken, Para A(7)	Ongoing	Immediate	CPCB and SPCB/PCC
5	Installation of dedicated silos by TPPs for storage of dry fly ash for at least sixteen hours of ash, Para A(8)	Ongoing	Immediate	CPCB and SPCB/PCC
6	TPPs to provide real time data daily regarding the availability of ash by providing the link to CPCB's web portal or mobile phone app, Para A(9)	To be started	Immediate	CPCB and SPC/PCC

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Sl No.	Action	Status	Timeline	Enforcement Agency/Dept. <del>1112</del>
7	Mandatory utilisation of ash by government, semi-government and private agencies for construction activities within 300 kms of the TPPs, <i>Para B(1)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
8	Backfilling of ash in mine voids or mixing of ash with external overburden dumps under EPR by mines located within 300 km radius of TPPs, <i>Para B(3)</i>	Ongoing	Immediate	CPCB, SPCB/PCC, DGMS, IBM
9	Constitution of Committee for identification of mines for backfilling of mine voids with ash or mixing of ash with overburden dump, <i>Para B(5)</i>	Completed	-	CPCB
10	Committee to get the updated quarterly reports for identified mines, <i>Para B(5)</i>	Ongoing	Immediate	CPCB
11	Filling of low lying areas with ash for approved projects in accordance to the guidelines by CPCB, <i>Para B(6)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
12	SPCB to publish the approved low lying sites, location, area and permitted quantity annually on its website, <i>Para B(6)</i>	Ongoing	Annual	SPCB/PCC

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Sl No.	Action	Status	Timeline	Enforcement Agency <del>1110</del>
13	CPCB to put the guidelines in place for all types of activities envisaged under the notification, <i>Para B(7)</i>	Ongoing	Within one year of publication of notification	CPCB
14	Usage of ash bricks, tiles, sintered ash aggregate or other ash based products by all building construction projects located within a radius of 300 km from the TPP, provided these are made available at prices not higher than the price of alternative products, <i>Para B(8)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
15	Issuance of notice to agencies for mandatory utilization of ash & ash-based products, <i>Para D(1)</i>	Ongoing	On-need basis	Owners of TPPs, manufacturers of ash based products
16	Enforcement and monitoring of utilization of ash by TPPs, <i>Para E(1)</i>	Ongoing	Quarterly	CPCB, SPCB/PCC and District Magistrate
17	Development of web portal by CPCB for provisions under the notification, <i>Para E(1)</i>	Ongoing	Immediate	CPCB
18	TPPs to upload monthly information regarding ash generation and utilization, <i>Para E(2)(i)</i>	Ongoing	By 5th of next month	CPCB
19	TPPs to upload annual implementation report providing information about compliance of provisions in the notification, <i>Para E(2)(i)</i>	Yet to start	By 30th of April	SPCB/PCC
20	Compilation of annual reports submitted by TPPs by CPCB and CEA, <i>Para E(2)(i)</i>	Yet to start	By 31st of May	CPCB, CEA

Sl No.	Action	Status	Timeline	Enforcement Agency/Dept.
21	Constitution of a Committee for monitoring the implementation of the provisions of the notification, Para E(3)	Completed	-	CPCB
22	Meeting of the Committee to review annual implementation reports, Para E(3)	Ongoing	Once in six months	CPCB
23	Committee to hold stakeholder consultation for monitoring of ash utilization , Para E(3)	Ongoing	Once in six months	CPCB
24	Committee to submit six monthly report to MoEFCC, Para E(3)	Ongoing	Once in six months	CPCB
25	Constitution of State Level Committee to resolve disputes between TPPs and users of ash or manufacture of ash based products, Para E(4)	Ongoing	Immediate	CPCB
26	Compliance audit for ash disposal by TPPs and user agencies by auditors authorised by CPCB, Para E(5)	Ongoing	Annual	CPCB, SPCB/PCC
27	Audit report to be submitted to CPCB and concerned SPCB, Para E(5)	Yet to start	By 30th November every year	CPCB and SPCB/PCC
28	Initiation of action against non-compliant TPPs, Para E(5)	Yet to start	Within fifteen days of receipt of audit report	CPCB, SPCB/PCC

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### Action Plan based on the recommendation of Joint Committee

Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
1.	M/s NTPC Limited (Singrauli) Shakti Nagar Sonbhadra	Take measures to stop the discharge of ash pond overflow into the Rihand reservoir	Discharge of ash pond overflow has been stopped	Augmentation of AWRS capacity by installing another pump (2000 m <sup>3</sup> /hr. capacity).	-	July, 23	MPPCB
		Relocation of the OCEMS in order to achieve the desired iso-kinetic sampling for particulate matter	OCEMS is working in NTPC Singrauli	OCEMS at Chimney will be installed along with FGD installation	-	Dec, 26(As per FGD Timeline)	MPPCB
		Installation of third CAAQMS	Installed	-	-	-	MPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Connected	-	-	-	MPPCB
		Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan submitted	-	-	MPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Work of absorber and associated work is in progress. All three Chimneys construction have been completed. Efforts are being made to complete FGD installation.	-	Commissioning by Dec'26(As per FGD Timeline)	MPPCB
		Treatment of the MSW generated from their residential colony	-	Bio-methanation plant has been commissioned. Composting pits with covered shed are being constructed. Non-biodegradable waste (plastic waste) is being sent to registered recycler.	-	October, 23	MPPCB
		Undertake immediate measures to control fugitive emission in ash dyke area	-	Measures for regular water sprinkling have been taken and fugitive emission is under control in the dyke area.	-	-	MPPCB

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Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
2.	M/s NTPC Rihand Super Thermal Power Plant	Connection of CAAQMS to the CPCB/SPCB server	Connected to CPCB/UPPCB server	-	-	-	CPCB/UPPCB
		Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan Submitted	-	-	CPCB/UPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Civil and mechanical works for installation of FGD are in progress in full swing	-	Dec'26(As per FGD Timeline)	CPCB/UPPCB
3.	M/s NTPC Limited Vindhyachal Super Thermal Power Plant	Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan submitted	-	-	CPCB/UPPCB
		Explore possibilities for the construction of Ash mounds and submission of progress from time to time	NA	NA	NA	NA	CPCB/UPPCB

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Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
4.	M/s Renusagar Thermal Power Plant	Installation of sludge drying beds in the existing ETP	Installation of 02 No. Filter Press (of modern technology sludge drying beds) has been completed (Commissioning started)	Commissioning of the filter expected to be completed by end of November 2022	-	Nov, 2022	CPCB/UPPC B
		Relocation of the OCEMS in order to achieve the desired iso-kinetic sampling for particulate matter	For isokinetic sampling, installed new analyzers for Boiler#6 to #10	Connectivity with CPCB server to be provided	-	Connectivity by January, 2023	CPCB/UPPCB
		Submission of time bound action plan to relocate the existing CAAQMS	Relocated the existing 01 No. CAAQMS at lower altitude near Civil Office in March 2022. Data is linked with CPCB/SPCB server.	-	-	-	CPCB/UPPC B
		Completion of installation of another 02 CAAQMS	Installed	-	-	-	CPCB/UPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Connected	-	-	-	CPCB/UPPC B
		Submission of time-bound action plan for 100% fly ash utilization	-	Action plan submitted	-	-	CPCB/UPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Installation is expected to be completed by December 2023	-	Dec-23	CPCB/UPPC B
		Adoption of scientific approach for disposal of MSW	-	Non-biodegradable waste is being sent to vendors and Biodegradable waste is being converted to compost for in-house utilization	-	-	CPCB/UPPCB
		Undertake corrective measures to control the fugitive emissions from raw material storage and fly ash transportation areas	-	Waste sprinkling arrangements and rain guns are installed. Additional water sprinkling system installed	-	-	CPCB/UPPC B
		Submission of explanation for dumping the fly ash in haphazard manner	Ash disposed in haphazard manner has been reclaimed and area has been further cleaned	-	-	-	CPCB/UPPCB
Undertake immediate action for proper disposal of fly ash							

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SI No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be started		
5.	M/s Northern Coalfields Limited (NCL) (NCL Bina Project, Bina, Sonbhadra)	Submission of time bound action plan for controlling the fire in the coal stock yard	-	Action Plan submitted	-	-	CPCB/UPPC B
		Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities	-	A log book is being kept in CCTV Control Room and record fugitive emissions visible in CCTV cameras and corrective action taken on the report.	-	-	CPCB/UPPC B
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	-	Compliance of fully tarapualin covered trucks is being ensured	-	-	CPCB/UPPC B
		Effective tyre washing facility for transport vehicles	-	Tendering process for tyre washing facility has been completed and LOA has been issued	-	Mar-23	CPCB/UPPC B
		Treatment and disposal of MSW generated in the residential colony	-	Proper treatment and disposal of MSW generated in residential colony is ensured.	-	-	CPCB/UPPC B
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.	-	-	Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study	Dec, 23	CPCB/UPPC B
		Take corrective measures so that the site of CAAQMS is open from all directions	-	This being complied. Trees within the close vicinity of CAAQMS have been trimmed to minimize hindrance at the site.	-	-	UPPCB

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Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
6.	M/s Northern Coalfields Limited (NCL) (NCL Dudhichuwa Project, Sonbhadra)	Regular operations of ETP	-	Continuous operation of ETP is ensured	-	-	CPCB/UPP CB
		Utilization of the treated effluent to achieve zero discharge	-	Treated Effluent from ETP is used in Water sprinkling, Fire fighting and wahsing of HEMM and zero discharge is maintained.	-	-	CPCB/UPP CB
		Ensure that no treated/untreated effluent will be discharged into the Balia Nalla which finally meets the Rihand reservoir	-	Water from various sources is pumped to ETP. Treated Effluent from ETP is being used in water sprinkling, fire fighting and wahsing of HEMM.	-	-	CPCB/UPP CB
		Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities	-	CCTV network is utilized for monitoring of fugitive emissions. In case of appearance of fugitive emissions on CCTV, immediate action is taken.	-	-	CPCB/UPP CB
		Strengthen the vigilance mechanism to identify the default transporters and take stringent action against them	-	Only tarapauline covered trucks are allowed. CCTV has been installed at the exit check post. Security Guards at the check post has been posted at exit point to ensure the strict compliance.	-	-	CPCB/UPP CB
		Effective tire washing facility for transport vehicles	-	Proposal of tyre washing facility at Dudhichua Project is in final stage of completion.	-	May, 2023	CPCB/UPP CB
		Treatment and disposal of MSW generated in the residential colony	-	Wet waste is converted to compost and Dry waste is handled by Singrauli Municipal Corporation.	-	-	CPCB/UPP CB
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine	-	Field study at NCL in an operational mine related to mine backfilling through fly ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study.	-	Dec, 2023	CPCB/UPP CB

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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.	
			Completed	Ongoing	Yet to be Started			
7.	M/s Northern Coalfields Limited (NCL) (NCL Kakri Project, Sonbhadra)	Ensure that no treated or untreated effluent will be discharged into the Rihand reservoir through the drain	-	Compliance is being ensured. Nos fixed fog cannon is also in process of being hired.	-	May-23	CPCB/ UPPCB	
		Entrapment of seepage in the drain at mine water collection sump	Complied	-	-	-	CPCB/ UPPCB	
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	Complied	-	-	-	CPCB/ UPPCB	
		Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities.	-	-	-Monitoring of fugitive emissions inside the mines is being done through CMPDIL each fortnightly, and report is being communicated to UPPCB quarterly. CCTV have been installed only at strategic positions in mines. Monitoring of fugitive emissions throughout the mines through CCTV is not possible.	-	-	CPCB/ UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress	-	May, 2023	UPPCB	
		Treatment and disposal of MSW generated in the residential colony	-	The work has been commenced.	-	-	UPPCB	
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.	-	Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study.	-	Dec, 2023	CPCB/ UPPCB	
Open the site of CAAQMS from all the direction	Complied	-	-	-	-	-		

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SI No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/D Dept.
			Completed	Ongoing	Yet to be Started		
8.	M/s Northern Coalfields Limited (NCL) Khadia Project, Sonbhadra)	Continuous operations of the ETP	Yes	Compliance being ensured	-	-	-
		Ensure that no treated/untreated effluent will be discharged in to the environment	Complied	-	-	-	CPCB/UPPCB
		Regular operation of the water spraying system for effective control of fugitive dust emissions	-	Complied. Installation of 3 nos. of additional fixed fog cannon in progress	-	May'2023	CPCB/UPPCB
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	-	CCTV cameras installed. Truck without tarpaulin covering not allowed. One register has also been put at the Exit Gates for documenting any such violation and to take action against the security personnel manning the exit gates as well as against the defaulter trucks, if any.	-	-	CPCB/UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress	-	May'2023	CPCB/UPPCB
		Proper treatment and disposal of MSW generated in the residential colony	-	In progress	-	April'2023	CPCB/UPPCB
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine	-	Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Action plan will be submitted on the basis of recommendations of above mentioned study.	-	Dec'2023	CPCB/UPPCB
		Ensure that the site of CAAQMS is open from all the direction	Complied	-	-	-	CPCB/UPPCB

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SI No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dt.
			Completed	Ongoing	Yet to be Started		
8.	M/s Northern Coalfields Limited (NCL) (NCL Khadia Project, Sonbhadra)	Continuous operations of the ETP	Yes	Compliance being ensured	-	-	-
		Ensure that no treated/untreated effluent will be discharged in to the environment	Complied	-	-	-	CPCB/UPPCB
		Regular operation of the water spraying system for effective control of fugitive dust emissions	-	Complied. Installation of 3 nos. of additional fixed fog cannon in progress	-	May'2023	CPCB/UPPCB
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	-	CCTV cameras installed. Truck without tarpaulin covering not allowed. One register has also been put at the Exit Gates for documenting any such violation and to take action against the security personnel manning the exit gates as well as against the defaulter trucks, if any.	-	-	CPCB/UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress	-	May'2023	CPCB/UPPCB
		Proper treatment and disposal of MSW generated in the residential colony	-	In progress	-	April'2023	CPCB/UPPCB
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine	-	Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Action plan will be submitted on the basis of recommendations of above mentioned study.	-	Dec'2023	CPCB/UPPCB
		Ensure that the site of CAAQMS is open from all the direction	Complied	-	-	-	CPCB/UPPCB

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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be started		
9.	M/s Northern Coalfields Limited (NCL) (NCL Krishna Shila Project)	Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities.	62 CCTVs installed at different points in the mine. Monitoring of fugitive emissions is being done regularly from field and GM office.	-	-	-	CPCB/ UPPCB
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	The Transportation agencies have been instructed. Strict action are being taken against the uncovered trucks if found.	-	-	-	CPCB/ UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress. Tyre washing facility to be jointly developed for Bina and Krishnashila projects.	-	31.03.2023	CPCB/ UPPCB
		Proper treatment and disposal of MSW generated in their residential colony	-	The proposal for proper treatment and disposal of MSW generated in the residential colony is under tendering process.	-	30.06.2023	CPCB/ UPPCB
		Submission of the time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.	-	-	-	Dec-23	CPCB/ UPPCB

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.	
			Completed	Ongoing	Yet to be started			
10.	Aluminum Smelter: M/s HINDALCO Industries Ltd, Renukoot, Sonbhadra	Take corrective measures to achieve the ZLD	ZLD status achieved. Process Water Recycling Plant (PWRP) has been installed.	-	-	-	UPPCB	
		Ensure environment friendly disposal for the huge quantity of bottom ash stored in open inside the plant premises	ZLD status achieved. Process Water Recycling Plant (PWRP) has been installed.	-	-	-	CPCB/ UPPCB	
		Proper treatment and disposal of the MSW	-	Collected non-biodegradable waste is segregated for further disposal through re-processors/recyclers. Biodegradable waste is converted into vermicompost for inhouse utilization in our horticultural activities. Procurement of equipment's for segregation of collected waste category wise is in progress. Installation of new machines requisite civil and electrical job is in progress	-	-	-	CPCB/ UPPCB
		Undertake corrective measures to control the fugitive emission effectively	Dust Extraction & Dust Suppression System is installed at coal discharge point and conveyors. Rain guns in yard periphery used for controlling dust in coal storage area. Stacker mouths discharge are mounted with water sprinklers in all the crushers in coal handling plant area.	-	-	-	-	CPCB/ UPPCB

SI No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be started		
11.	M/s Grasim Industries Limited Chemical Division, Renukoot, Sonbhadra	Submission of the clarification regarding the discharge of chemically contaminated effluent into the drain	Action plan not required. Unit is ZLD. Already installed ETP, RO, MEE and STP and achieved Zero Liquid Discharge since 2017. Intimation to the Board about installation and commissioning of ZLD is done vide our letter No. GIL/ENV/17-18/204 dated 17.11.2017.	-	-	NA	1125 CPCB/UPPCB
		Ensure environment friendly disposal of all the brine sludge stored in open pit	Fully complied. At present no legacy brine sludge is stored inside the plant premises.	-	-	-	CPCB/UPPCB
		Completion of the remediation activities in the time bound manner of the area wherein the ash has been dumped	Complied. Process of reclamation has already been successfully completed.	-	-	-	CPCB/UPPCB
		Preparation and execution of an action plan to shift the mercury bearing brine sludge and the muck contaminated with chlorinated chemicals from the factory premises to the TSDF in consultation with the UPPCB	<p>•Matter sub-judiced before Hon'ble Apex Court.</p> <p>•On the basis of the Report of NEERI, Hon'ble Supreme Court has pleased to grant a stay against the NGT proceeding vide order dated 04.11.2019.</p> <p>In the interest of justice, it would be advisable to keep this issue in abeyance, till issue is disposed of by the Hon'ble Apex Court. Intimation through e-mail dated 14.11.2022 along with and Hard Copy, has been sent to MoEFCC.</p>	-	-	-	CPCB/UPPCB

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SI No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency Dept.
			Completed	Ongoing	Yet to be started		
12.	M.P. Power Generating Co. Ltd. (MPPGCL)	To check the strength of the bunds created around the dykes/low lying areas quarterly and one time especially before the on-set of the monsoon through expert agencies of repute and to submit Action Taken Reports to regional offices of MPPCB, CPCB & MoEF&CC periodically.	Ash dykes are proper & scientifically designed and present status is good for technical soundness, structural strength, stability, safety and is structurally sustainable and safe for adequacy for handling of fly ash generated from TPSs.  Advised to monitor the performance of the dyke using geotechnical instrumentation. Report submitted to MPPCB vide no. 2235 dated: 10/12/2019. To comply with NGT order dated: 18/01/2022.	-	-	-	CPCB/ MPPCB
		To obtain prior permission from MPPCB before any disposal of fly ash / bottom ash in the low lying areas and ensure disposal as per the CPCB guideline.	The condition is regularly prescribed by MPPCB during the renewal of Consent to Operate (CTO) every year and same is being complied by the thermal power stations of MPPGCL as and when required. Action plan for fly ash utilization has been submitted	-	---	Timeline for ash utilization 31.03.2023	CPCB/ MPPCB
13.	M/s Birla Carbon India Pvt. Ltd., Renukoot, Sonbhadra	Strict vigilance on the area from where the effluent was earlier reaching outside the plant boundary	-	The company has installed ETP & STP for treating effluent and sewage and achieved Zero liquid discharge since 2011.	-	-	CPCB/ UPPCB

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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
14.	M/s Obra Thermal Power Station (Power Plant)	Undertake action to trap the continuous flow of ash slurry from powerhouse and ash pond overflow water carrying ash into the river Renu	Ash dyke has been raised and there is no overflow of water carrying ash into river Renu. AWRS has been made functional for recycling of ash water.	-	-	-	1127 CPCB/UPPCB
		Restoration of the river bed areas on which a huge deposition of ash is visible in time-bound manner	-	Restoration of river bed area is under progress and 7800 Cum ash has been removed. Remaining quantity shall be done by June-2023.	-	Jun-23	
		Treatment of the industrial effluent, untreated effluent not to be discharged into the river Renu	-	ETP & STP are operational. No effluent is being discharged into river Renu.	-	-	CPCB/UPPCB
		Installation of an effluent collection and conveyance system for ETP & STP	A dedicated sump and sump pump house for all effluent collection has been completed and functional since April-2022.	-	-	-	CPCB/UPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Already connected. Data is available on CPCB/SPCB server.	-	-	-	
		Submission of time-bound action plan for 100% fly ash utilization	-	Action plan submitted.	-	-	CPCB/UPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	-	Due to space constraint for installation of wet FGD system, Dry Sorbent Injection FGD was approved. Further tendering is under progress.	-	CPCB/UPPCB
		Adoption of scientific approach for treatment and disposal of MSW	-	Door to Door collection of waste is being done and segregated as Dry and Wet waste. Tender for treatment and disposal of MSW will be floated by 5.12.2022.	-	April, 23	CPCB/UPPCB
		Installation of flow meters for measuring amount of ash slurry discharged and water recycled through AWRS	-	Flow meter supplied and installation shall be done by 20.12.2022.	-	Dec., 22	CPCB/UPPCB
		Installation of flow meters for measuring the amount of wastewater treated through the ETP and STP	-	Flow meter supplied and installation shall be done by 20.12.2022.	-	Dec., 22	CPCB/UPPCB
Fixing the personal responsibility of the officers seating at management level for causing environmental damage.	Responsibility of three officers of Chief Engineer level been fixed and disciplinary proceedings have been initiated.	-	-		CPCB/UPPCB		

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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
15.	M/s Anpara Thermal Power Plant (Power Plant)	Installation of flow meters to measure the amount of ash slurry discharged into the ash pond and the amount of water recovered and recycled	-	Flow meter has been installed in Units B & D and their commissioning will be completed by 15.12.2022. Commissioning in Unit A shall be completed by January-2023.	-	Jan-23	UPPCB 1128
		Entrapment of wastewater discharge containing ash into the Rihand reservoir through the drain at power house area	-	Installation of ETP for Anpara A & B is in progress and is likely to be completed by July-2023. Entrapment of waste water discharge is included in the scope of ETP contract.	-	Jul-23	UPPCB/CPC B
		Submission of explanation for not achieving ZLD in ETP & STP	-	Anpara A & B are more than 25 years old and there was no provision of ETP & STP. STP has been installed. Installation of ETP for Units A & B is in progress and will be completed by July-2023.	-	-	UPPCB/CPCB
		Submission of a time-bound action plan for achieving ZLD	-	STP has been installed. Installation of ETP for Units A & B is in progress and will be completed by July-2023.	-	Jul-23	UPPCB/CPC B
		Removal of deposited fly ash on the surface of the Rihand reservoir in time-bound manner	33000 Cum of fly ash deposited on the surface of the reservoir has been removed.	-	-	-	UPPCB/CPCB
		Submission of time-bound action plan for 100% fly ash utilization	-	Action plan has been submitted.	-	-	UPPCB/CPC B
		Provision to prevent the surface runoff water from the surrounding area reaching the ash dyke	Raising of the ash dyke done. There is no surface runoff water coming inside the ash dyke (except rain water of Morcha Nala).	-	-	-	
		Installation and commissioning of the FGD system in realization of the revised timeline	-	-	Installation of FGD in Unit D under progress and is likely to be completed by Dec 2023. Retendering was done and the latest bid was rejected as it was 106% higher than the estimate. Next bid will be floated by 30.11.2022.	Dec, 2023	UPPCB

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Annexure III 130

## Action Plans based on the recommendations of the Joint Committee

Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
1.	M/s NTPC Limited (Singrauli) Shakti Nagar Sonbhadra	Take measures to stop the discharge of ash pond overflow into the Rihand reservoir	Discharge of ash pond overflow has been stopped.	Augmentation of AWRS capacity by installing another pump (2000 m <sup>3</sup> /hr. capacity).	-	July, 23	MPPCB
		Relocation of the OCEMS in order to achieve the desired iso-kinetic sampling for particulate matter	OCEMS is working in NTPC Singrauli.	OCEMS at Chimney will be installed along with FGD installation.	-	Dec, 26(As per FGD Timeline)	MPPCB
		Installation of third CAAQMS	Installed	-	-	-	MPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Connected	-	-	-	MPPCB
		Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan submitted	-	-	MPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Work of absorber and associated work is in progress. All three Chimneys construction have been completed. Efforts are being made to complete FGD installation.	-	Commissioning by Dec'26(As per FGD Timeline)	MPPCB
		Treatment of the MSW generated from their residential colony	-	Bio-methanation plant has been commissioned. Composting pits with covered shed are being constructed. Non-biodegradable waste (plastic waste) is being sent to registered recycler.	-	October, 23	MPPCB
		Undertake immediate measures to control fugitive emission in ash dyke area	-	Measures for regular water sprinkling have been taken and fugitive emission is under control in the dyke area.	-	-	MPPCB

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SI No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
2.	M/s NTPC Rihand Super Thermal Power (Power Plant)	Connection of CAAQMS to the CPCB/SPCB server	Connected to CPCB/UPPCB server	-	-	-	CPCB/UPPCB
		Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan Submitted	-	-	CPCB/UPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Civil and mechanical works for installation of FGD are in progress in full swing	-	Dec'26(As per FGD Timeline)	CPCB/UPPCB
3.	M/s NTPC Limited Vindhyachal Super Thermal Power Plant	Submission of a time-bound action plan for 100% fly ash utilization	-	Action Plan submitted	-	-	CPCB/UPPCB
		Explore possibilities for the construction of Ash mounds and submission of progress from time to time	NA	NA	NA	NA	CPCB/UPPCB

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Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
4.	M/s Renusagar Thermal Power Plant	Installation of sludge drying beds in the existing ETP	Installation of 02 No. Filter Press (of modern technology sludge drying beds) has been completed (Commissioning started)	Commissioning of the filter expected to be completed by end of November 2022	-	Nov, 2022	CPCB/UPPCB
		Relocation of the OCEMS in order to achieve the desired iso-kinetic sampling for particulate matter	For isokinetic sampling, installed new analyzers for Boiler#6 to #10	Connectivity with CPCB server to be provided	-	Connectivity by January, 2023	CPCB/UPPCB
		Submission of time bound action plan to relocate the existing CAAQMS	Relocated the existing 01 No. CAAQMS at lower altitude near Civil Office in March 2022. Data is linked with CPCB/SPCB server.	-	-	-	CPCB/UPPCB
		Completion of installation of another 02 CAAQMS	Installed	-	-	-	CPCB/UPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Connected	-	-	-	CPCB/UPPCB
		Submission of time-bound action plan for 100% fly ash utilization	-	Action plan submitted	-	-	CPCB/UPPCB
		Installation and commissioning of the FGD system in realization of the revised timeline	-	Installation is expected to be completed by December 2023	-	Dec-23	CPCB/UPPCB
		Adoption of scientific approach for disposal of MSW	-	Non-biodegradable waste is being sent to vendors and Biodegradable waste is being converted to compost for in-house utilization	-	-	CPCB/UPPCB

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	Undertake corrective measures to control the fugitive emissions from raw material storage and fly ash transportation areas	-	Waste sprinkling arrangements and rain guns are installed. Additional water sprinkling system installed	-	-	CPCB/UPPCB 1133
	Submission of explanation for dumping the fly ash in haphazard manner	Ash disposed in haphazard manner has been reclaimed and area has been further cleaned				CPCB/UPPCB
	Undertake immediate action for proper disposal of fly ash					

Sl No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
5.	M/s Northern Coalfields Limited (NCL) (NCL Bina Project, Bina, Sonbhadra)	Submission of time bound action plan for controlling the fire in the coal stock yard	-	Action Plan submitted	-	-	CPCB/UPPCB
Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities		-	A log book is being kept in CCTV Control Room and record fugitive emissions visible in CCTV cameras and corrective action taken on the report.	-	-	CPCB/UPPCB	
Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them		-	Compliance of fully tarapualin covered trucks is being ensured	-	-	CPCB/UPPCB	
Effective tyre washing facility for transport vehicles		-	Tendering process for tyre washing facility has been completed and LOA has been issued	-	Mar-23	CPCB/UPPCB	
Treatment and disposal of MSW generated in the residential colony		-	Proper treatment and disposal of MSW generated in residential colony is ensured.	-	-	CPCB/UPPCB	

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	Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.	-	-	Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study	Dec, 23	CPCB/UPPCB	1135
	Take corrective measures so that the site of CAAQMS is open from all directions	-	This being complied. Trees within the close vicinity of CAAQMS have been trimmed to minimize hindrance at the site.	-	-	UPPCB	

SI No.	Stakeholders	Actions	Status			Timelines for Completion	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
6.	M/s Northern Coalfields Limited (NCL) (NCL Dudhichuwa Project, Sonbhadra)	Regular operations of ETP	-	Continuous operation of ETP is ensured	-	-	CPCB/UPPCB
		Utilization of the treated effluent to achieve zero discharge	-	Treated Effluent from ETP is used in Water sprinkling, Fire fighting and wahsing of HEMM and zero discharge is maintained.	-	-	CPCB/UPPCB
		Ensure that no treated/untreated effluent will be discharged into the Balia Nalla which finally meets the Rihand reservoir	-	Water from various sources is pumped to ETP. Treated Effluent from ETP is being used in water sprinkling, fire fighting and wahsing of HEMM.	-	-	CPCB/UPPCB
		Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities	-	CCTV network is utilized for monitoring of fugitive emissions. In case of appearance of fugitive emissions on CCTV, immediate action is taken.	-	-	CPCB/UPPCB
		Strengthen the vigilance mechanism to identify the default transporters and take stringent action against them	-	Only tarapauline covered trucks are allowed. CCTV has been installed at the exit check post. Security Guards at the check post has been posted at exit point to ensure the strict compliance.	-	-	CPCB/UPPCB
		Effective tire washing facility for transport vehicles	-	Proposal of tyre washing facility at Dudhichua Project is in final stage of completion.	-	May, 2023	CPCB/UPPCB
		Treatment and disposal of MSW generated in the residential colony	-	Wet waste is converted to compost and Dry waste is handled by Singrauli Municipal Corporation.	-	-	CPCB/UPPCB
		Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine	-	Field study at NCL in an operational mine related to mine backfilling through fly ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study.	-	Dec, 2023	CPCB/UPPCB

SI No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.	
			Completed	Ongoing	Yet to be Started			
7.	M/s Northern Coalfields Limited (NCL) (NCL Kakri Project, Sonbhadra)	Ensure that no treated or untreated effluent will be discharged into the Rihand reservoir through the drain	-	Compliance is being ensured. Nos fixed fog cannon is also in process of being hired.	-	May-23	CPCB/UPPCB	
		Entrapment of seepage in the drain at mine water collection sump	Complied	-	-	-	CPCB/UPPCB	
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	Complied				CPCB/UPPCB	
		Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities.	-	-	-Monitoring of fugitive emissions inside the mines is being done through CMPDIL each fortnightly, and report is being communicated to UPPCB quarterly. CCTV have been installed only at strategic positions in mines. Monitoring of fugitive emissions throughout the mines through CCTV is not possible.	-		CPCB/UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress	-		May, 2023	UPPCB
		Treatment and disposal of MSW generated in the residential colony	-	The work has been commenced.	-		-	UPPCB

	Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.		Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study.		Dec, 2023	CPQB/ UPPCB	138
	Open the site of CAAQMS from all the direction	Complied	-	-	-	-	

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be Started		
8.	M/s Northern Coalfields Limited (NCL) (NCL Khadia Project, Sonbhadra)	Continuous operations of the ETP	Yes	Compliance being ensured	-	-	-
		Ensure that no treated/untreated effluent will be discharged in to the environment	Complied	-	-	-	CPCB/UPPCB
		Regular operation of the water spraying system for effective control of fugitive dust emissions	-	Complied. Installation of 3 nos. of additional fixed fog cannon in progress	-	May'2023	CPCB/UPPCB
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	CCTV cameras installed. Truck without tarpaulin covering not allowed. One register has also been put at the Exit Gates for documenting any such violation and to take action against the security personnel manning the exit gates as well as against the defaulter trucks, if any.	-	-	-	CPCB/UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress	-	May'2023	CPCB/UPPCB
		Proper treatment and disposal of MSW generated in the residential colony	-	In progress	-	April'2023	CPCB/UPPCB

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	<p>Submission of time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine</p>	-	<p>Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Action plan will be submitted on the basis of recommendations of above mentioned study.</p>	-	Dec'2023	CPCB/ UPPCB 1140
	<p>Ensure that the site of CAAQMS is open from all the direction</p>	Complied	-	-	-	CPCB/ UPPCB

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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be started		
9.	M/s Northern Coalfields Limited (NCL) (NCL Krishna Shila Project)	Explore the possibility to monitor the status of fugitive emissions through the existing CCTV network provided for monitoring of production activities.	62 CCTVs installed at different points in the mine. Monitoring of fugitive emissions is being done regularly from field and GM office.	-	-	-	CPCB/UPPCB
		Strengthening of the vigilance mechanism to identify the default transporters and take stringent action against them	The Transportation agencies have been instructed. Strict action are being taken against the uncovered trucks if found.	-	-	-	CPCB/UPPCB
		Effective tyre washing facility for transport vehicles	-	In progress. Tyre washing facility to be jointly developed for Bina and Krishnashila projects.	-	31.03.2023	CPCB/UPPCB
		Proper treatment and disposal of MSW generated in their residential colony	-	The proposal for proper treatment and disposal of MSW generated in the residential colony is under tendering process.	-	30.06.2023	CPCB/UPPCB

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	Submission of the time-bound action plan for compliance with the provision of the Notification of 2009 regarding utilization of 25% fly ash along with Over Burden (OB) for back-filling the abandoned mine.	-	For utilization of fly ash, NCL had provided one pit of abandoned/closed Gorbil Mine to NTPC-Vindhyachal (VSTPP). MoU between NCL and NTPC-VSTPS has been done on 3rd Jan, 2019. Approx. 30 to 40 Million tons of fly ash will be accommodated in to this mine void. Field study at NCL in one mine related to mine Backfilling through Fly Ash and its stability analysis is under approval stage. Tentative schedule of completion is by December 2023. Action plan will be submitted on the basis of recommendations of above mentioned study.	Dec-23	CPCB/ UPPCB	1142
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Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.	
			Completed	Ongoing	Yet to be started			
10.	Aluminum Smelter: M/s HINDALCO Industries Ltd, Renukoot, Sonbhadra	Take corrective measures to achieve the ZLD	ZLD status achieved. Process Water Recycling Plant (PWRP) has been installed.	-	-	-	UPPCB	
		Ensure environment friendly disposal for the huge quantity of bottom ash stored in open inside the plant premises	ZLD status achieved. Process Water Recycling Plant (PWRP) has been installed.	-	-	-	CPCB/UPPCB	
		Proper treatment and disposal of the MSW	-	Collected non-biodegradable waste is segregated for further disposal through re-processors/recyclers. Biodegradable waste is converted into vermicompost for inhouse utilization in our horticultural activities. Procurement of equipment's for segregation of collected waste category wise is in progress. Installation of new machines requisite civil and electrical job is in progress	-	-	-	CPCB/UPPCB
		Undertake corrective measures to control the fugitive emission effectively	Dust Extraction & Dust Suppression System is installed at coal discharge point and conveyors. Rain guns in yard periphery used for controlling dust in coal storage area. Stacker mouths discharge are mounted with water sprinklers in all the crushers in coal handling plant area.	-	-	-	-	CPCB/UPPCB

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/Dept.
			Completed	Ongoing	Yet to be started		
11.	M/s Grasim Industries Limited Chemical Division, Renukoot, Sonbhadra	Submission of the clarification regarding the discharge of chemically contaminated effluent into the drain	Action plan not required. Unit is ZLD. Already installed ETP, RO, MEE and STP and achieved Zero Liquid Discharge since 2017. Intimation to the Board about installation and commissioning of ZLD is done vide our letter No. GIL/ENV/17-18/204 dated 17.11.2017.	-	-	NA	CPCB/ UPPCB
		Ensure environment friendly disposal of all the brine sludge stored in open pit	Fully complied. At present no legacy brine sludge is stored inside the plant premises.	-	-	-	CPCB/ UPPCB
		Completion of the remediation activities in the time bound manner of the area wherein the ash has been dumped	Complied. Process of reclamation has already been successfully completed.	-	-	-	CPCB/ UPPCB
		Preparation and execution of an action plan to shift the mercury bearing brine sludge and the muck contaminated with chlorinated chemicals from the factory premises to the TSDF in consultation with the UPPCB	<ul style="list-style-type: none"> <li>Matter sub-judiced before Hon'ble Apex Court.</li> <li>On the basis of the Report of NEERI, Hon'ble Supreme Court has pleased to grant a stay against the NGT proceeding vide order dated 04.11.2019.</li> </ul> <p>In the interest of justice, it would be advisable to keep this issue in abeyance, till issue is disposed of by the Hon'ble Apex Court. Intimation through e-mail dated 14.11.2022 along with and Hard Copy, has been sent to MoEFCC.</p>	-	-	-	CPCB/ UPPCB

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
12.	M.P. Power Generating Co. Ltd. (MPPGCL)	To check the strength of the bunds created around the dykes/low lying areas quarterly and one time especially before the on-set of the monsoon through expert agencies of repute and to submit Action Taken Reports to regional offices of MPPCB, CPCB & MoEF&CC periodically.	Ash dykes are proper & scientifically designed and present status is good for technical soundness, structural strength, stability, safety and is structurally sustainable and safe for adequacy for handling of fly ash generated from TPSs. Advised to monitor the performance of the dyke using geotechnical instrumentation. Report submitted to MPPCB vide no. 2235 dated: 10/12/2019. To comply with NGT order dated: 18/01/2022.	-	-	-	CPCB/ MPPCB
		To obtain prior permission from MPPCB before any disposal of fly ash / bottom ash in the low lying areas and ensure disposal as per the CPCB guideline.	The condition is regularly prescribed by MPPCB during the renewal of Consent to Operate (CTO) every year and same is being complied by the thermal power stations of MPPGCL as and when required. Action plan for fly ash utilization has been submitted	-	---	Timeline for ash utilization 31.03.2023	CPCB/ MPPCB
13.	M/s Birla Carbon India Pvt. Ltd., Renukoot, Sonbhadra	Strict vigilance on the area from where the effluent was earlier reaching outside the plant boundary	-	The company has installed ETP & STP for treating effluent and sewage and achieved Zero liquid discharge since 2011.	-	-	CPCB/ UPPCB

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
14.	M/s Obra Thermal Power Station (Power Plant)	Undertake action to trap the continuous flow of ash slurry from powerhouse and ash pond overflow water carrying ash into the river Renu	Ash dyke has been raised and there is no overflow of water carrying ash into river Renu. AWRS has been made functional for recycling of ash water.	-	-	-	CPCB/UPPCB
		Restoration of the river bed areas on which a huge deposition of ash is visible in time-bound manner	-	Restoration of river bed area is under progress and 7800 Cum ash has been removed. Remaining quantity shall be done by June-2023.	-	Jun-23	CPCB/UPPCB
		Treatment of the industrial effluent, untreated effluent not to be discharged into the river Renu	-	ETP & STP are operational. No effluent is being discharged into river Renu.	-	-	CPCB/UPPCB
		Installation of an effluent collection and conveyance system for ETP & STP	A dedicated sump and sump pump house for all effluent collection has been completed and functional since April-2022.	-	-	-	CPCB/UPPCB
		Connection of CAAQMS to the CPCB/SPCB server	Already connected. Data is available on CPCB/SPCB server.	-	-	-	CPCB/UPPCB
		Submission of time-bound action plan for 100% fly ash utilization	-	Action plan submitted.	-	-	CPCB/UPPCB

	Installation and commissioning of the FGD system in realization of the revised timeline	-	-	Due to space constraint for installation of wet FGD system, Dry Sorbent Injection FGD was approved. Further tendering is under progress.	-	CPCB/UPPCB
	Adoption of scientific approach for treatment and disposal of MSW	-	Door to Door collection of waste is being done and segregated as Dry and Wet waste. Tender for treatment and disposal of MSW will be floated by 5.12.2022.	-	April, 23	CPCB/UPPCB
	Installation of flow meters for measuring amount of ash slurry discharged and water recycled through AWRS	-	Flow meter supplied and installation shall be done by 20.12.2022.	-	Dec., 22	CPCB/UPPCB
	Installation of flow meters for measuring the amount of wastewater treated through the ETP and STP	-	Flow meter supplied and installation shall be done by 20.12.2022.	-	Dec., 22	CPCB/UPPCB
	Fixing the personal responsibility of the officers seating at management level for causing environmental damage.	Responsibility of three officers of Chief Engineer level been fixed and disciplinary proceedings have been initiated.	-	-	-	CPCB/UPPCB

Sl No.	Stakeholder	Actions	Status			Timeline	Enforcement Agency/ Dept.
			Completed	Ongoing	Yet to be started		
15.	M/s Anpara Thermal Power Plant (Power Plant)	Installation of flow meters to measure the amount of ash slurry discharged into the ash pond and the amount of water recovered and recycled	-	Flow meter has been installed in Units B & D and their commissioning will be completed by 15.12.2022. Commissioning in Unit A shall be completed by January-2023.	-	Jan-23	UPPCB
		Entrapment of wastewater discharge containing ash into the Rihand reservoir through the drain at power house area	-	Installation of ETP for Anpara A & B is in progress and is likely to be completed by July-2023. Entrapment of waste water discharge is included in the scope of ETP contract.	-	Jul-23	UPPCB/CPCB
		Submission of explanation for not achieving ZLD in ETP & STP	-	Anpara A & B are more than 25 years old and there was no provision of ETP & STP. STP has been installed. Installation of ETP for Units A & B is in progress and will be completed by July-2023.	-	-	UPPCB/CPCB
		Submission of a time-bound action plan for achieving ZLD	-	STP has been installed. Installation of ETP for Units A & B is in progress and will be completed by July-2023.	-	Jul-23	UPPCB/CPCB
		Removal of deposited fly ash on the surface of the Rihand reservoir in time-bound manner	33000 Cum of fly ash deposited on the surface of the reservoir has been removed.	-	-	-	UPPCB/CPCB

	Submission of time-bound action plan for 100% fly ash utilization	-	Action plan has been submitted.	-	-	UPPCB/CPQ
	Provision to prevent the surface runoff water from the surrounding area reaching the ash dyke	Raising of the ash dyke done. There is no surface runoff water coming inside the ash dyke (except rain water of Morcha Nala).	-	-	-	
	Installation and commissioning of the FGD system in realization of the revised timeline	-	-	Installation of FGD in Unit D under progress and is likely to be completed by Dec 2023. Retendering was done and the latest bid was rejected as it was 106% higher than the estimate. Next bid will be floated by 30.11.2022.	Dec, 2023	UPPCB

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## Annexure IV

SI No.	Action	Status	Timeline	Enforcement Agency/Dept.
1	Constitution of Committee for to examine and review and recommend the eco-friendly ways of utilisation of ash, <i>Para A(3)</i>	Completed	-	CPCB
2	100% Utilisation of current ash by thermal power plants as per timelines, <i>Para A(4)</i>	Ongoing	As prescribed	SPCB/PCC
3	Guidelines for procedure for annual certification of the ash pond or dyke on its safety, environmental pollution, available volume, mode of disposal, water consumption or conservation in disposal, ash water recycling and greenbelt etc., <i>Para A(6)</i>	Ongoing	Immediate	CPCB and CEA
4	Loading, unloading, transport, storage and disposal of ash to be done in an environmentally sound manner by thermal power plants and all precautions to prevent air and water pollution to be taken and status to be reported to concerned SPCB/PCC, <i>Para A(7)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
5	Installation of dedicated silos by TPPs for storage of dry fly ash for at least sixteen hours of ash based on installed capacity and report to concerned SPCB/PCC, inspection to be done by CPCB/SPCB/PCC from time to time, <i>Para A(8)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
6	Thermal power plants to provide real time data daily regarding the availability of ash by providing the link to CPCB's web portal or mobile phone app, <i>Para A(9)</i>	To be started	Immediate	CPCB and SPC/PCC
7	Mandatory utilisation of ash by government, semi-government and private agencies for construction activities within 300 kms of the thermal power plants, <i>Para B(1)</i>	Ongoing	Immediate	CPCB and SPCB/PCC

8	Backfilling of ash in mine voids or mixing of ash with external overburden dumps under EPR by mines located within 300 km radius of thermal power plants, <i>Para B(3)</i>	Ongoing	Immediate	CPCB, SPCB/PCC, DGMS, IBM
9	Constitution of Committee for identification of mines for backfilling of mine voids with ash or mixing of ash with overburden dump, <i>Para B(5)</i>	Completed	-	CPCB
10	Committee to get the updated quarterly reports for identified mines, <i>Para B(5)</i>	Ongoing	Immediate	CPCB
11	Filling of low lying areas with ash for approved projects with prior permission of SPCB in accordance to the guidelines by CPCB, <i>Para B(6)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
12	SPCB/PCC to publish the approved low lying sites, location, area and permitted quantity annually on its website, <i>Para B(6)</i>	Ongoing	Annual	SPCB/PCC
13	CPCB to put the guidelines in place for all types of activities envisaged under the notification <i>Para B(7)</i>	Ongoing	Within one year of publication of notification	CPCB
14	Usage of ash bricks, tiles, sintered ash aggregate or other ash based products by all building construction projects located within a radius of 300 km from the thermal power plant, provided these are made available at prices not higher than the price of alternative products, <i>Para B(8)</i>	Ongoing	Immediate	CPCB and SPCB/PCC
15	Issuance of notice to agencies for mandatory utilization of ash & ash-based products, <i>Para D(1)</i>	Ongoing	On-need basis	Owners of TPPs, manufacturers of ash based products
16	Enforcement and monitoring of utilization of ash by TPPs, <i>Para E(1)</i>	Ongoing	Quarterly	CPCB, SPCB/PCC and District Magistrate
17	Development of web portal by CPCB for provisions under the notification, <i>Para E(1)</i>	Ongoing	Immediate	CPCB

18	Thermal power plants to upload monthly information regarding ash generation and utilisation, <i>Para E(2)(i)</i>	Ongoing	By 5th of next month	CPCB
19	Thermal power plants to upload annual implementation report providing information about compliance of provisions in the notification, <i>Para E(2)(i)</i>	Yet to start	By 30th of April	SPCB/PCC
20	Compilation of annual reports submitted by thermal power plants by CPCB and CEA, <i>Para E(2)(i)</i>	Yet to start	By 31st of May	CPCB, CEA
21	Constitution of a Committee for monitoring the implementation of the provisions of the notification, <i>Para E(3)</i>	Completed	-	CPCB
22	Meeting of the Committee to review annual implementation reports, <i>Para E(3)</i>	Ongoing	Once in six months	CPCB
23	Committee to hold stakeholder consultation for monitoring of ash utilization, <i>Para E(3)</i>	Ongoing	Once in six months	CPCB
24	Committee to submit six monthly report to MoEFCC, <i>Para E(3)</i>	Ongoing	Once in six months	CPCB
25	Constitution of State Level Committee to resolve disputes between TPPs and users of ash or manufacture of ash based products, <i>Para E(4)</i>	Ongoing	Immediate	CPCB
26	Compliance audit for ash disposal by thermal power plants and user agencies by auditors authorised by CPCB, <i>Para E(5)</i>	Ongoing	Annual	CPCB, SPCB/PCC
27	Audit report to be submitted to CPCB and concerned SPCB, <i>Para E(5)</i>	Yet to start	By 30th November every year	CPCB and SPCB/PCC
28	Initiation of action against non-compliant thermal power plants, <i>Para E(5)</i>	Yet to start	Within fifteen days of receipt of audit report	CPCB, SPCB/PCC

THE SUPREME COURT OF INDIA  
CIVIL APPELLATE JURISDICTION

CIVIL APPEAL NO(s). 15-16/2020

HINDALCO INDUSTRIES LIMITED  
RENUKOOT PLANT

Appellant(s)

VERSUS

ASHWANI KUMAR DUBEY & ORS.

Respondent(s)

ORDER

1. The present appeals are directed against an order of the National Green Tribunal (NGT)<sup>1</sup>. The impugned order was made upon an application alleging about existence of a large number of thermal power plants in District Singrauli (in Madhya Pradesh) and District Sonbhadra (in Uttar Pradesh), causing acute pollution resulting in destruction of environment. It was also alleged, inter alia, that the industries were discharging mercury beyond prescribed norms, affecting the nervous system and causing disorders to the local inhabitants. The applicant had relied upon the 'Comprehensive Environmental Polluted Index Report' and stated that fly ash stored by

Validity unknown

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Industries created high pollution.

2. The NGT by its order dated 25.8.2014, constituted a Core

Committee and four Sub-Committees. The Core Committee was charged with monitoring hazards of industrial development in Singrauli. It consisted of 12 members including representatives of the Central Pollution Control Board (CPCB), Madhya Pradesh Pollution Control Board (MPPCB) and Uttar Pradesh Pollution Control Board (UPPCB) as well as the Director of Agricultural Research Institute and Director of Indian Institute of Toxicology Research. The Sub-Committee constituted for assessing impact of air quality comprised of the following:-

- a. Representative of the Central Pollution Control Board,
- b. Representative of the Madhya Pradesh Pollution Control Board,
- c. Representative of the Uttar Pradesh Pollution Control Board,
- d. An expert on air quality from National Environmental Engineering Research Institute, Nagpur
- e. An expert on air quality from IIT, Kanpur.

3. The report of the Core Committee constituted by NGT submitted its report in February, 2018 vis-a-vis the present appellant, had observed and recommended, inter alia, as follows:-

*"a) Industry shall achieve emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of all Baking furnaces. The emission from boilers shall be reduced to the level of 50 mg/Nm<sup>3</sup> from the existing norms of 150 mg/Nm<sup>3</sup> by December 31, 2019 retrofitting of existing ESPs and also meet emission limit of O<sub>2</sub> & NO<sub>x</sub> notified for industrial boilers.*

*b) Industry shall ensure that no red mud is leached out to*

*ground water during monsoon and post monsoon period. Piezometers/monitoring wells should be installed in and around the red mud disposal sites in consultation with the CGWB/concerned SGWB. Regular monitoring of the leachate should be carried out as per the sampling and analysis plan as proposed by the concerned SPCB. Besides, industry shall facilitate utilization of Red Mud in nearby cement industries, including those located in MP. The industry shall also explore the possibility of extraction of titanium and other heavy metals from the Red Mud.*

*c) The Core Committee was informed that the industry has taken a zero waste discharge initiative though no such action plan could be obtained. This action plan must be made ready within a month's time and submitted to UPPCB for necessary approval."*

4. The Committee had consulted representatives of industries including the present appellant before it prepared its report. After its report was circulated, the appellant represented to the Committee drawing to its notice that the relevant emission norms prescribed under the Environment Protection Act, Rule 3(iii) of the Environment Protection Rules, 1986 under Serial No. 70, for Boilers against "steam generation capacity of Boiler 15 Ton/hrs. & above" is 150 mg/Nm<sup>3</sup>, whereas the recommendation was to lower the emission standards to 50 mg/Nm<sup>3</sup>.

5. The representation, to the extent it is relevant, reads as follows:-

*"For our Aluminium Smelter, Renukoot*

<i>Earlier Recommendation</i>	<i>Point (ii) a) of final Recommendation</i>
<i>Industry shall achieve emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of</i>	<i>Industry shall achieve emission limit of 50 mg/Nm<sup>3</sup> for particulate matter in respect of all Baking furnaces. The emission from</i>

Baking furnace No. 3 & 4. The emission from Baking Furnace No.5 should also be limited to 50 mg/Nm <sup>3</sup> .	boilers shall be reduced to the level of 50 mg/Nm <sup>3</sup> from the existing 150 mg/Nm <sup>3</sup> by December 31, 2019 retrofitting of existing ESPs and also meet emission limit of So <sub>2</sub> & NO <sub>x</sub> notified for industrial boilers.
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**Our Comments**

*In Renukoot, the four Boilers (80 TPH, 80 TPH, 140 TPH and 150 TPH) along with ESP were commissioned and have been in operation for about 20 years to meet the requirement of steam in our process i.e. Alumina Refinery and Carbon Plant.*

*Relevant emission norms prescribed under the Environment Protection Act, Rule 3(iii) of the Environment Protection Rules, 1986 under Serial No. 70, for Boilers against "steam generation capacity of Boiler 15 Ton/hrs. & above" is 150 mg/Nm<sup>3</sup>, whereas the recommendation was to lower the emission standards to 50 mg/Nm<sup>3</sup>. The relevant page is attached for your kind reference as **Annexure II**.*

*We submit that control of SO<sub>2</sub> and NO<sub>x</sub> emission of our stacks are designed as per CPCB formula of  $H = 14(Q)0.3$ . The stack height provided is well above the required height calculated using CPCB formula.*

*The recommendation by the Core Committee to reduce the particulate matter emission levels to 50 mg/Nm<sup>3</sup> from the existing norms of 150 mg/Nm<sup>3</sup> by December 31, 2019 through retrofitting of existing ESP is not in conformity with the emission limit of 150 mg/Nm<sup>3</sup> for boilers with steam generation capacity of 15 Ton/Hrs. and and above specified under Serial No. 70 of the Environmental (Protection) Rules, 1986.*

*We seek your intervention for reconsideration of the above. We would also request for an opportunity to meet you and explain the details.*

*We remain available for any clarification/queries that might be required.*

*Thanking you in anticipation."*

**6. Upon circulation of the report by the NGT, comments and objections were sought for. However, the appellant did not respond. In the circumstances, the recommendations of the Committee were accepted by the NGT in its impugned order and the appellant was**

directed to reduce the emission from its boilers from 150 mg/Nm<sup>3</sup> to 50 mg/Nm<sup>3</sup>.

7. Learned counsel appearing for the appellant urges that the recommendations accepted by the NGT are contrary to law as the applicable standard is not 50 mg/Nm<sup>3</sup> but 150 mg/Nm<sup>3</sup> and in the absence of alteration of the norms, by amendment to the Rules, the recommendations could not have been, *ipso facto*, accepted as standards imposed upon the appellant. It is also pointed out that neither the Committee nor the NGT has furnished any reason why the norm of 50 mg/Nm<sup>3</sup> could apply only to the appellant and not others.

8. Notice was issued to the contesting respondents (original applicant), yet they have not appeared before the Court. Mr. Pradeep Mishra, appearing for the Uttar Pradesh Pollution Control Board submitted that undoubtedly standards reflected in the statutory regime by way of rules framed under the Environment Protection Act, 1986 stipulate 150 mg/Nm<sup>3</sup> as the norm. It was submitted that the NGT has accepted the Expert Committee's recommendation. Mr. Mishra also conceded that the report does not state any reason why the 50 mg/Nm<sup>3</sup> standard has been applied only to the appellant and none of the other industries in the area or other similar industries.

9. Rule 3(2) of the Environment (Protection) Rules, 1986 and Serial No. 70 of Schedule I reads as follows:-

"3(2) Notwithstanding anything contained in sub-rule (1), the Central Board or a State Board may specify more stringent standards from those provided in Schedules I to IV in respect of any specific industry, operation or process depending upon the quality of the recipient system and after recording reasons, therefor, in writing."

xxxxx

xxxxx

xxxxx

Serial No. 70 of Schedule I

Sl. No.	Industry	Parameter	Standards	
70.	Boilers (Small)	Steam generation capacity (ton/hour)	Particulate matter	Emission (mg/Nm <sup>3</sup> )
		less than 2.	1200*	
		2 to less than 10	800*	
		10 to less than 15	600*	
		15 and above	150**	
		* to meet the respective standards, cyclone multicyclone is recommended as control equipment with the boiler. ** to meet the standard, bag filter/ESP is recommended as control equipment with the boiler."		

10. It is apparent that the appellant's concern that a new standard other than what has been prescribed by the statute, has been mandated is borne out. Entry 70 of the First Schedule to the Rules stipulates that for boilers with the capacity of 15 ton per hour or more, the emission standard is 150 mg/Nm<sup>3</sup>. The NGT was persuaded to accept the suggestions of the Committee, which recommended a stringent standard i.e. 50 mg/Nm<sup>3</sup>. While this was not permissible without amendment of Rules, at the same time this Court is alive of the fact that the Committee constituted by the NGT comprised of distinguished technical experts who, in their wisdom, recommended that the standard for the appellant ought to be 50 mg/Nm<sup>3</sup>, though they did not furnish any reason why other units were not expected to

follow that standard.

11. In the circumstances, this Court is of the opinion that rather than setting aside the impugned order entirely, it would be appropriate that the issue is remitted to the Central Pollution Control Board (CPCB) which should examine the feasibility of altering the standards applicable to industries like those of the appellant. This would, in our opinion, lend uniformity to the exercise and enable the CPCB to have wider consultations.

12. Accordingly, the impugned order is hereby modified. The issue with respect to the appropriate emission standards for boilers shall be re-examined by the CPCB having regard to all relevant factors after taking into consideration such views of technical and expert personnel as is necessary. The CPCB shall take up the exercise and complete it as early as possible, preferably within one year.

13. The appeals are allowed in terms of the aforesaid direction.

....., J.  
(S. Ravindra Bhat)

....., J.  
(Aravind Kumar)

New Delhi  
July 4, 2023

ITEM NO.39

COURT NO.9

SECTION XVII

S U P R E M E C O U R T O F I N D I A  
R E C O R D O F P R O C E E D I N G S

Civil Appeal No(s). 15-16/2020

HINDALCO INDUSTRIES LIMITED RENUKOOT PLANT

Appellant(s)

VERSUS

ASHWANI KUMAR DUBEY &amp; ORS.

Respondent(s)

IA No. 18613/2020 - AMENDMENT OF APPEAL / PETITION / I.A.  
IA No. 194291/2019 - EX-PARTE STAY  
IA No. 94276/2020 - EXEMPTION FROM FILING AFFIDAVIT)

Date : 04-07-2023 These matters were called on for hearing today.

CORAM : HON'BLE MR. JUSTICE S. RAVINDRA BHAT  
HON'BLE MR. JUSTICE ARAVIND KUMAR

For Appellant(s) Mr. Ashish Prasad, Adv.  
Ms. Mukta Dutta, Adv.  
Mr. Pruthvi Dhinoja, Adv.  
Mr. Mahfooz Ahsan Nazki, AOR

For Respondent(s) Mr. Ashutosh Kumar Sharma, AOR  
Mr. Avijit Roy, AOR

Mr. Pradeep Misra, AOR  
Mr. Daleep Dhyani, Adv.  
Mr. Suraj Sigh, Adv.  
Mr. Manoj Kumar Sharma, Adv.

Mr. Shailesh Madiyal, AOR  
Mr. Sudhanshu Prakash, Adv.  
Mr. Vinayaka S Pandit, Adv.  
Mr. Rajan Parmar, Adv.  
Mr. Akshay Kumar, Adv.  
Ms. Divija Mahajan, Adv.

Mr. Nitin Saluja, AOR

UPON hearing the counsel the Court made the following  
O R D E R

Appeal is allowed in terms of the signed order.

(DR. NAVEEN RAWAL)  
ASTT. REGISTRAR-cum-PS

(MATHEW ABRAHAM)  
COURT MASTER (NSH)

(Signed order is placed on the file)

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Annexure A 21/9  
OK 256

April 10, 2024

To  
The Member Secretary,  
U.P. Pollution Control Board,  
T.C 12 – V, Vibhuti Khand,  
Gomtinagar,  
LUCKNOW

**Sub: Progress Report under Section 21 / 22 of the Air (Prevention and Control Of Pollution) Act 1981 for the quarter (January'24 to March'24).**

1. The industry is operating by maintaining all installed air pollution control system effectively and are in compliance for emission norms under EP Rules 1986.
  - a) Please find attached Ambient Air Monitoring reports for four locations monitored by an approved laboratory on quarterly basis as Annexure – I.
  - b) Stack emission monitoring is being done by an approved laboratory on quarterly basis is as Annexure – II.
  - c) Calibration of installed OCEMS at our main process stacks (22 nos.) done by jointly with OEM & an approved laboratory on quarterly basis. The online emission data is being transmitted to CPCB server regularly. Please find attached Calibration report as Annexure –III.
  - d) Please find attached compliance report on recommendation of core committee constituted by Hon'ble NGT as Annexure – IV.
  - e) Ash generation and utilization for the quarter January'24 to March'24as mentioned below.

Month	January'24	February'24	March'24
Generation (MT)	27092.051	27061.894	32046.218
Utilization (MT)	29092.051	28072.865	32709.854

.....1

HINDALCO INDUSTRIES LIMITED  
Renucoat Works  
P.O. Renucoat - 231217  
Dist. Sonbhadra (U.P.)  
Telephone +91 5446 252077-79 / 254791-98  
Fax +91 5446 252107 / 252427

REGISTERED OFFICE  
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Fax +91 226691 7001

Website www.hindalco.com  
E mail hindalco@adityabirla.com  
Corporate Identity No. L27020MH1958PLC011238

उत्कृष्टता रसीद

दिनांक 22/04/24  
[Signature]  
[Stamp]

5828



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:2:

We hope you will please find the above in order.

Thanking you,

Yours faithfully,  
FOR HINDALCO INDUSTRIES LIMITED

Anil Singh  
Assistant General Manager (Environment)

cc: The Regional Officer,  
U.P. Pollution Control Board,  
House No. 162, Uttar Mohal  
Sonebhadra.

HINDALCO INDUSTRIES LIMITED  
Renukoot Works  
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Corporate Identity No. L27020MH1958PLC011238



# Prakriti Consultants Services

Category 'A' QCI-NADET Accredited EIA Consultant Organization  
 An Approved Laboratory From MoEF - CC & Umar Pradesh Pollution Control Board  
 (An ISO 14001 2015, ISO 9001-2015 and ISO 45001 2018 Certified Organization)  
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 E-mail: prakriti\_india@rediffmail.com, prakriticonsultantservices@gmail.com  
 Tel: 0522-4002545, Mobile: 09415515818,  
 GSTIN - 09AAJFP5925G1ZY

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## Stack Emission Data and Analytical Results of Baking Furnace



ULR- TC82412400000535

Report No.	Reference No.	Issue Date
PCS/SE/01/2024	PCS/HIL/03/2024	03/04/2024

1. Name & address of Industry	M/s Hindalco Industries Limited, PO- Renukoot, Dist- Sonbhadra (UP).		
2. Type of Industry	Aluminium Industry	7. Method of Sampling	PCS/WI/SAMP/20
3. Sample collected by	Mr. Asheesh & Mr. Shubham	8. Date of sampling	13/02/2024
4. Weather Condition	Clear Sky	9. Sample receipt in lab	23/03/2024
5. Sampling Location	Baking Furnace-4	10. Date of Analysis	23/03/2024- 28/03/2024
6. Lab Code	PCS24/24/311	11. Sample Analyzed By	Mr. Ajay Kumar

S. No.	Particulars	Value		
1.	Duct Attached to	Baking Furnace-4		
2.	Type of Stack	Circular		
3.	Stack height from Ground (m)	44.5		
4.	Type of Duct	Circular		
5.	Material of Construction of duct	M.S. with B.L.		
6.	Diameter of Stack (m)	2.0		
7.	Sampling Duration	30		
8.	Atmospheric Pressure (mmHg)	739		
9.	Atmospheric temperature ( <sup>o</sup> K)	303		
10.	Fuel Gas temperature ( <sup>o</sup> K)	332		
11.	Flue Gas Exist Velocity (m/s)	9.5		
12.	Flue Gas Exit Volume (Nm <sup>3</sup> /h)	145220.9		
	<b>Pollutants Concentration</b>	<b>Result</b>	<b>Standard</b>	<b>Method</b>
	PM (mg/Nm <sup>3</sup> )	37.0	50	IS 11255 (Part1),1985
	SO <sub>2</sub> (mg/Nm <sup>3</sup> )	141.5	-	IS 11255 (Part 2)
	NOx (mg/Nm <sup>3</sup> )	32.7	-	IS 11255 (Part7)/FGA
	CO(mg/Nm <sup>3</sup> )	652	-	PCS/SOP/ST/03
	Gaseous Fluoride (mg/Nm <sup>3</sup> )	1.17	-	PCS/SOP/ST/09: 2021
	Total F <sub>2</sub> (Kg/T)of Aluminium	0.020	0.3	PCS/SOP/ST/09: 2021

\*BDL- Below Detection Limit

- Note: 1. The results in the Test Report relate only to the items tested.  
 2. The report shall not be reproduced-except in full, without the written permission of laboratory.  
 3. The report shall not be used for any other purpose than declared by the sponsor.  
 4. Prakriti Consultants Services are not regulatory agency hence no part of this report should be used for legal purpose under any circumstances.  
 5. No deviation as per the standard method.

Authorized Signatory

(Dr. Divya Misra)  
 Managing Director

"End of this Test Report"

Page 1 of 2

Services Available:  
 Environmental Monitoring, Preparation of EIA/EMP, Baseline Data generation for Air, Water, Soil, Noise & Meteorology  
 Environmental and Safety Audit reports, Commissioning, Operation, Operation and Maintenance of NEPA/EP Clearance from  
 Ground Water Board, Compliance of E.C., MCR, Iron, UDFR, M.C.I.



# Prakriti Consultants Services

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Category 'A' QCI-NABET Accredited EIA Consultant Organization  
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Tel: 0522-4002545, Mobile: 09415518818,  
GSTIN: 09AAJFP5925G1ZY



## Stack Emission Data and Analytical Results of Baking Furnace

LR- TC824124000000536

Report No.	Reference No.	Issue Date		
CS/SE/20/2024	PCS/HIL/01/2024	03/04/2024		
Name & address of Industry	M/s Hindalco Industries Limited, PO- Renukoot, Dist- Sonbhadra (UP).			
Type of Industry	Aluminium Industry	7. Method of Sampling	PCS/WI/SAMP/20	
Sample collected by	Mr. Asheesh & Mr. Shubham	8. Date of sampling	22/02/2024	
Weather Condition	Clear Sky	9. Sample receipt in lab	23/03/2024	
Sampling Location	Baking Furnace-5	10. Date of Analysis	23/03/2024- 28/03/2024	
Lab Code	PCS24/24/312	11. Sample Analyzed By	Mr. Ajay Kumar	
S. No.	Particulars	Value		
1.	Stack Attached to/APCS Installed	Furnace-5 / FTP		
2.	Aluminium Production in MT/Day	333.45		
3.	Type of Fuel Used	LSHS Premium		
4.	Stack height from Ground (m)	45.0		
5.	Height of Sampling Point (m)	34.0		
6.	Quantity of Fuel Used (Lit/hr)	80.46		
7.	Stack Area (m <sup>2</sup> )	3.14		
8.	Material of Construction of duct	M.S. with B.L.		
9.	Diameter of Stack (m)	2.0		
10.	Sampling Duration	30		
11.	Atmospheric Pressure (mmHg)	741		
12.	Atmospheric temperature (°K)	300		
13.	Fuel Gas temperature (°K)	403		
14.	Flue Gas Exist Velocity (m/s)	12.2		
15.	Flue Gas Exit Volume (Nm <sup>3</sup> /h)	125154.91		
	Pollutants Concentration	Result	Standard	Method
	PM (mg/Nm <sup>3</sup> )	32.1	50	IS 11255 (Part1),1985
	SO <sub>2</sub> (mg/Nm <sup>3</sup> )	97.3	-	IS 11255 (Part 2)
	NOx (mg/Nm <sup>3</sup> )	30.7	-	IS 11255 (Part7)/FGA
	CO(mg/Nm <sup>3</sup> )	633	-	PCS/SOP/ST/03
	Gaseous Fluoride (mg/Nm <sup>3</sup> )	1.20	-	PCS/SOP/ST/09: 2021
	Total F <sub>2</sub> (Kg/T)of Aluminium	0.013	0.3	PCS/SOP/ST/09: 2021

\*The Environment (protection) Rules,1986 Page No. 430 Point No. 36

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3. The report shall not be used for any other purpose than declared by the sponsor.

4. Prakriti Consultants Services are not regulatory agency hence no part of this report should be used for legal purpose under any circumstances.

5. No Deviation as per the Standard Method

Authorized Signatory

  
(Dr. Divya Misra)  
Managing Director

"End of this Test Report"

Page 1 of 2

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GSTIN - 09AAJF5925G1ZY

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## Stack Emission Data and Analytical Results of Baking Furnace

R- TC82412400000537



Report No.	Reference No.	Issue Date
PCS/SE/21/2024	PCS/HIL/03/2024	03/04/2024

Name & address of Industry	M/s Hindalco Industries Limited, PO- Renukoot, Dist- Sonbhadra (UP).		
Type of Industry	Aluminium Industry	7. Method of Sampling	PCS/WI/SAMP/20
Sample collected by	Mr. Asheesh & Mr. Shubham	8. Date of sampling	22/02/2024
Weather Condition	Clear Sky	9. Sample receipt in lab	23/03/2024
Sampling Location	Baking Furnace-6	10. Date of Analysis	23/03/2024- 28/03/2024
Lab Code	PCS24/24/313	11. Sample Analyzed By	Mr. Ajay Kumar

No.	Particulars	Value		
1.	Stack Attached to/APCS Installed	Furnace-6 / FTP		
2.	Aluminium Production in MT/Day	577.97		
3.	Type of Fuel Used	LSHS Premium		
4.	Stack height from Ground (m)	58.0		
5.	Height of Sampling Point (m)	32.0		
6.	Quantity of Fuel Used (Lit/hr)	142.7		
7.	Stack Area (m <sup>2</sup> )	3.3		
8.	Material of Construction of duct	M.S. with B.L.		
9.	Diameter of Stack (m)	2.05		
10.	Sampling Duration	30		
11.	Atmospheric Pressure (mmHg)	742		
12.	Atmospheric temperature (°K)	301		
13.	Fuel Gas temperature (°K)	482		
14.	Flue Gas Exist Velocity (m/s)	13.4		
15.	Flue Gas Exit Volume (Nm <sup>3</sup> /h)	101571.6		
	<b>Pollutants Concentration</b>	<b>Result</b>	<b>Standard</b>	<b>Method</b>
	PM (mg/Nm <sup>3</sup> )	30.7	50	IS 11255 (Part1),1985
	SO <sub>2</sub> (mg/Nm <sup>3</sup> )	96.2	-	IS 11255 (Part 2)
	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	26.9	-	IS 11255 (Part7)/FGA
	CO(mg/Nm <sup>3</sup> )	682	-	PCS/SOP/ST/03
	Gaseous Fluoride (mg/Nm <sup>3</sup> )	2.11	-	PCS/SOP/ST/09: 2021
	Total F <sub>2</sub> (Kg/T)of Aluminium	0.012	0.3	PCS/SOP/ST/09: 2021

\*The Environment (protection) Rules,1986 Page No. 430 Point No. 36

- Note: 1. The results in the Test Report relate only to the items tested.  
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5. No Deviation as per the Standard Method

Authorized Signatory

  
(Dr. Divya Misra)  
Managing Director

"End of this Test Report"

Page 1 of 2

**Progress Report- O.A. No. 164 of 2018 In Re: Ashwani Kumar Dubey Vs. Union of India & Ors.**

The issue for consideration is the account of activities of Thermal Power Plants in District Sonbhadra in the State of Uttar Pradesh, acute pollution is being caused resulting in continued destruction of environment.

**M/s Hindalco Industries Ltd., (Aluminium Smelters) Renukoot, Sonbhadra:**

S. No.	Issues/ Directions by Hon'ble NGT	Compliance Status
1.	Status of steps taken by the TPPs for scientific disposal of fly ash in accordance with the statutory notification issued by the MoEF&CC dated 31.12.2018 under the provisions of EP Act requiring 100% utilization and disposal of fly ash (vide order dated 12.02.2020 in OA No. 117/2014)	We are operating 4 boilers of total capacity of 450 TPH along with co-generation facility of 84 MW. During the operation, Ash is being generated, we have established 100% utilization in compliance of Fly Ash Notification, 2021 as amended.

**Table**

TPPs/Industries	Year	Capacity (MW)	Coal/Lignite Consumption (Metric Tons)	Total Ash Generated (T)	Total Ash Utilization (T)	% Ash Utilization	Unutilized ash (MT)
M/s Hindalco Industries Ltd. (Aluminum Smelters) Renukoot	2021-22	84	633664	228681	377926	165.26*	55648
	2022-23	84	713808	280767	474900	169.14*	62117
	2023-24 (Till June 2023)	84	161839	61092	50346	82.41	11602

\* Earlier stored also was utilized.

2.	Status of Industry to achieve emission limit of 50 mg/nm <sup>3</sup> for particulate matter in respect of all Baking Furnaces for HIL Renukoot & Renusagar	In compliance with this direction, it is submitted that the industry has achieved emission limit of 50mg/Nm <sup>3</sup> for particulate matter in respect of all Baking Furnaces.
3.	Industry shall ensure that no red mud is leached out to groundwater during monsoon and post monsoon period. Piezometers/monitoring wells should be installed in and around the red mud disposal sites in consultation with the CGWB/SGWB. Regular monitoring of the leachate should be carried out as per the sampling and analysis plan as proposed by the concerned SPCB. Besides, industry shall facilitate utilization of red mud in nearby cement industries, including those located in MP. The industry shall also explore the possibility of extraction of titanium and other heavy metals from the red mud.	Hindalco has adopted advanced technology of Press Filter to increase % of solid in Red mud.  The well-transportable mud cake (75% solids) with negligible caustic concentration is disposed off in earmarked area specially surrounded by a strong earthen dam, that ensures that there is no seepage or runoff from the premises. No red mud leached out to the ground water. There has never been any incident of leaching out of red mud. As per CGWB, Allahabad vide letter no.4(6)/ST/CGWB/SU01/Alld/18-108 dated June 11,2018 Industry has constructed Piezometer at four locations. Four no's Piezometer have been

		<p>installed in and around red mud disposal site and ground water monitoring is being done as prescribed.</p> <p>The utilization of Bauxite Residue (Red mud) has been established very well with Cement Industries. During the period FY23, total Red Mud 1212439 MT which is approx. 112 % of our generation has been dispatched through rail/road to various cement industries.</p> <p>In the bauxite residue (Red mud), Titanium is present either in the form of rutile or anatase or it can coexist with other minerals. The Titanium recovery from bauxite residue (Red mud) is scarcely researched across the globe, and not claimed Titanium recovery process economically viable, energy efficient &amp; environment friendly. We have performed previously a lab trial in collaboration with M/s Neptune for precious metal recovery alongwith slag separation, generally slag contains mainly TiO<sub>2</sub>, but it was not successfully recovered due to process complexity.</p>
4.	<b>Achieving ZLD in ETP &amp; STP</b>	<p>100% Plant ZLD has been established from November 23, 2021 that has been also communicate to UPPCB. Regarding ZLD for domestic effluent we have already initiated close looping system to establish and streamline sewage water generated from our township colony that will segregate sewage water from other sources in Renukoot area.</p> <p>For the above purpose, we have engaged CSIR NEERI, Nagpur (NEERI) to conduct a detailed study for suggesting sustainable solution for utilization of treated sewage and way forward to implement ZLD in domestic effluents.</p> <p>However, in Parallel, we have also raised our concern for the utilization of treated sewage with District Paryavaran Samiti, Sonebhadra to guide us to identity the scope of utilization treated sewage water in District Sonbhadra for multiple purposes. But we are still waiting for a response from District Paryavaran Samiti, Sonebhadra.</p> <p>In the meanwhile, NEERI has submitted a study report in the month of February 2023 with the recommendation that Hindalco should</p>

		<p>immediately start working towards:</p> <ul style="list-style-type: none"> <li>• Reduction of domestic water consumption from the current level of 258 to 200 LCPD in Township.</li> <li>• Installation of additional tertiary treatment system like RO and associated equipment thereby enhancing quality of treated sewage such that BOD&lt;10 mg/L;COD:&lt;50mg/L:TSS:&lt;20mg/L: Fecal Coliform:&lt;100MPN</li> <li>• Explore option of reusing treated sewage for non-potable applications in the colony</li> <li>• Brining fresh river water consumption in the plant to Zero by Fy 2024</li> <li>• Completion of these actions by FY 2024.</li> <li>• With this Hindalco will have outfall of treated sewage of             <ul style="list-style-type: none"> <li>- Approx 8600 KLD now</li> <li>- Approx 2100KLD by FY 2024</li> <li>-</li> </ul> </li> </ul> <p>After 2024, Hindalco should continue exploring the possibility of further bringing down the domestic water consumption in its township as well as other option for further utilization of treated sewage to achieve ZLD as directed by the Uttar Pradesh State Pollution Control Board.</p> <p>However, we are not very certain of achieving the desired outcome as the recommendations are not practically feasible.</p> <p>Under the above facts as enumerated and as stated earlier, that requirement of green water for domestic purposes cannot be brought down as the need for green water is both hygienic and safe for domestic use. Even if we use recycled water for grey purposes, the overall consumption of water is not likely to come down. While we are ZLD in the plant, we would not be ZLD for the colony at any time in future. Having said that, the treated water in the colony is of very good quality and can be used for tertiary purposes (non-potable) and we are committed to work with the local administration to supply this water free of cost for any municipal/local uses and thus we were in dialogue with the Zila Paryavaran Samiti . Letter with justification along with NEERI report have been submitted to UPPCB on July 07, 2023, for exemption to comply with the ZLD</p>
--	--	--

		condition for domestic sewage.
5.	<b>Control of air pollution during coal storage, handling and transportation</b>	<p>Fugitive emission is being controlled by installation of Dust Extraction &amp; Dust Suppression System installed at coal discharge point and conveyors.</p> <p>We also operate fog gun/ water tankers in yard periphery for controlling dust in coal storage area &amp; Red mud area. Stacker mouths discharge are mounted with water sprinklers in all the crushers in coal handling plant area.</p>
6.	<b>Fly ash and bottom ash management</b>	<p>We are operating 4 boilers of total capacity of 450 TPH along with co-generation facility of 84 MW. During the operation, Ash is being generated, that is regularly dispatched (100% ) to various users in compliance of Fly Ash Notification, 2021 as amended.</p> <p>During FY 23, approx. <u>280767.221 MT</u> total ash (Fly Ash + Bottom Ash) is generated. We had dispatched approx. <u>474900 MT</u> ash including earlier stored to Cement Plants/In-house utilization /to develop low-lying areas which is <u>169.14 %</u> utilization.</p>
7.	<b>Treatment and disposal of MSW generated from residential area</b>	<p>At Hindalco Renukoot, we are collecting domestic waste generated from our colony &amp; market area through dedicated vehicles. We have installed combination of mechanized equipment for handling, segregation, treatment, and disposal of collected MSW waste. The cost of project would be approx. Rs. 163.51 lacs which includes equipment cost, civil &amp; electrical. The area is developed at RCC flooring with impervious lining. To implement it, we have purchased trommels of different sizes from 100 to 10 mm to segregate dry &amp; wet waste alongwith shredder and bailing press.</p> <p>Collected domestic waste through our dedicated vehicles which is approx. 18 MT/day (max.) which comprises Dry Waste &amp; Wet Waste that will be stored at earmarked area for treatment on daily basis. In first stage, waste is transferred into a hopper by JCB through a conveyer belt in 100 mm size of Trommel. As a resultant waste material above 100 mm is collected separately and below of 100 mm materials will be collected</p>

		<p>at bottom of belt. Small size of waste will be kept for decomposition for 45 days by adding organic matter. Materials above 100 mm sizes will be separated category-wise for further recycling/reuse/disposal. The collected dry waste will be further passed through shredder and bailing press for further disposal in an environment-friendly manner. Wet Waste that kept for 45 days after decomposition will be further passed through trommel of different sizes of 50 mm, 30 mm, &amp; 10 mm by adding organic fertilizer, microorganisms, and water. The final screened waste that will be collected from 10 mm trommel will be utilized as manure in our horticulture activities. The plant shall be commissioned by July 31,2023.</p>
8.	<p><b>Status of the Performance Guarantee to furnish the existing status of ambient air quality and water quality of Rihand reservoir and other water bodies including groundwater and Details status of CAAQMS installed in industries</b></p>	<p>Not Applicable</p>

कार्यालय प्रभागीय वनाधिकारी, ओबरा वन प्रभाग, ओबरा-सोनभद्र।  
पत्रांक-27/0/ओबरा/15 दिनांक, 10-05-2021.

सेवा में,

में0 हिन्दालको इण्डस्ट्रीज लि0,  
रेनुकूट-सोनभद्र।

विषय :- Permission to carry out site suitability study of abandoned stone quarry/mine voids at dalla, Sonebhadra (UP) to fill & rehabilitate the same by filling Red Mud (Bauxite Residue)/Fly Ash generated by Hindalco Industries Limited, P.O. Renukoot, Dist: Sonebhadra.

सन्दर्भ:- आपके कार्यालय का पत्र दिनांक-06.05.2021.

महोदय,

आपके उपरोक्त सन्दर्भित के कम में डाला खनन क्षेत्र में Red Mud (Bauxite Residue)/Fly Ash भरने हेतु site suitability study की अनुमति इस शर्त के साथ दी जाती है कि फलाई ऐश/रेड मड भरने का कार्य वन संरक्षण अधिनियम के अन्तर्गत अनुमति प्राप्त करने के उपरान्त ही किया जायेगा।

भवदीय

(प्रखर मिश्रा)

प्रभागीय वनाधिकारी

ओबरा वन प्रभाग, ओबरा-सोनभद्र।

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**OFFICE OF THE DIVISIONAL FOREST  
OFFICER, OBRA FOREST DIVISION,  
OBRA-SONBHADRA.**

Letter No.2710/Obra/15

Dated:10-05-2021

To,

M/s Hindalco Industries Ltd.,  
Renukoot-Sonbhadra

Sub: Permission to Carry Out Site Suitability Study of Abandoned Stone Quarry/Mine Voids at Dalla, Sonebhadra (up) to fill & rehabilitate the same by filling red mud Indalco Industries Limited, P.O. Renukoot, District: Sonebhadra.

Ref:- Your office letter dated 06.05.2021.

Sir,

In continuance of your above reference letter permission of Site Suitability Study to fill RED MUD (Bauxite Residue)/fly in the mining sector Dala is given with the condition that fly ash/red mud filling work will be done only after obtaining the permission under the Forest Protection Act.

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Sincerely

Sd/-  
(Prakhar Mishra)  
Divisional Forest Officer  
Obra Forest Division, Obra-Sonbhadra

Government of India  
Ministry of Environment, Forest and Climate Change  
(Forest Conservation Division)

\*\*\*

Indira Paryavaran Bhawan,  
Alignaj, Jorbagh Road,  
New Delhi - 110003

Dated: 15<sup>th</sup> March, 2023

**OFFICE MEMORANDUM**

**Sub: Backfilling of abandoned mine voids/stone quarries with fly ash and red mud located in the forest areas – reg.**

The undersigned is directed to refer to the meeting of the Advisory Committee held on 23.02.2023 on the above subject relating to backfilling of abandoned mines voids/stone quarries with flyash and red mud located in the forest areas. A copy of the minutes of the meeting of the Advisory Committee may kindly be seen at [www.parivesh.nic.in](http://www.parivesh.nic.in). The Advisory Committee after, detailed deliberations on the decision taken in the meeting dated 27.12.2022 held under the chairmanship of DGF&SS and taking into consideration the 'in-principle' approval of the State Government of Uttar Pradesh recommended the pilot study for backfilling of the abandoned mine voides/stone quarries with fly ash and red mud located in forest areas.

Based on the recommendation of the Advisory Committee and approval of the same by the competent authority of the Ministry, the Central Government hereby convey its approval for undertaking the pilot study in for backfilling of mining voides involving area of 0.55 ha forest land in the State of Uttar Pradesh subject to following:

- i. Pilot study to assess the impact of filling the abandoned mining voids in forest areas with red mud and/or fly ash will be undertaken by the IIFM, Bhopal as lead agency in the abandoned mining void of 0.55 ha identified by the AAI. A detailed methodology, along with financial estimate will be prepared by the IIFM in consultation with the Central Pollution Control Board.
- ii. AAI will provide the detail of preliminary assessments as available with them to Regional Director, Central Pollution Control Board, Lucknow and IIT/BHU and the later based on their assessment will suggest the strategy to be adopted for undertaking the proposed pilot study. Suggestions of Regional Director, CPCB and IIT/BHU will be incorporated into the proposed pilot study by the IIFM, Bhopal.
- iii. Cost to be incurred on the proposed pilot study will be borne by the AAI.
- iv. State Forest Department, Government of Uttar Pradesh will make necessary arrangements to provide suitable area of abandoned mine void for the proposed pilot study and will involve their staff in monitoring of the activities

and plantation activities.

- v. The data and results of the study will be in public domain and will not have any intellectual property or copy rights for any of the agency involved in this study.

**Signed by Charan Jeet  
Singh**

**Date: 16-03-2023 12:52:51**

**(Charan Jeet Singh)**

Scientist 'D'

Distribution to:

1. The Member Secretary, Central Pollution Control Board, MoEF&CC, New Delhi
2. Principal Secretary (Forests), State Government of Uttar Pradesh, Lucknow
3. PCCF & HoFF, Government of Uttar Pradesh, Lucknow
4. Nodal Officer (FCA), O/o PCCF, Government of Uttar Pradesh, Lucknow
5. Director, Indian Institute of Forest Management, Nehru Nagar, Bhopal, Madhya Pradesh (Kind Attn : Shri Om Prakash Madguni)
6. Regional Director, CPCB, Lucknow
7. Director, Indian Institute of Technology, BHU
8. Director, TERI (Kind Attn: Shri V. V. Sharma, Sr. Director)
9. Chairman, Aluminium Association of India
10. Guard File

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F. No. 11/3/2018- HSMD  
Government of India  
Ministry of Environment, Forest & Climate Change  
(HSM Division)

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

Dated: 8<sup>th</sup> June, 2023

OFFICE MEMORANDUM

**Sub.: Minutes of the third meeting of 'Fly Ash Management and Utilization Mission' held on 01.05.2023 - reg.**

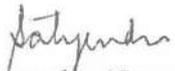
The undersigned is directed to enclose herewith the minutes of the third meeting of "Fly Ash Management and Utilization Mission" held under the Chairpersonship of Secretary (EF&CC) on 01.05.2023 at 11:00 hrs at Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, New Delhi.

2. It is requested to furnish the action taken report to Central Pollution Control Board.

This issues with the approval of the Competent Authority

**Encl.:** as above

Yours sincerely,

  
(Dr. Satyendra Kumar)  
Director  
Ph: 011-20819291  
Email: satyendra.kumar07@nic.in

To:

1. Secretary (Coal), Ministry of Coal, New Delhi
2. Secretary (Power), Ministry of Power, New Delhi
3. Secretary (Mines), Ministry of Mines, New Delhi
4. Chief Secretary, State of Uttar Pradesh
5. Chief Secretary, State of Madhya Pradesh
6. Chairman, CPCB, New Delhi
7. Additional Chief Secretary/Principal Secretary, Energy, Government of Uttar Pradesh

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8. Additional Chief Secretary/Principal Secretary, Energy, Government of Madhya Pradesh
9. Additional Chief Secretary/Principal Secretary, Industries, Government of Uttar Pradesh
10. Additional Chief Secretary/Principal Secretary, Industries, Government of Madhya Pradesh
11. Director General, Directorate General of Mines Safety, Jharkhand
12. Additional Chief Secretary/Principal Secretary, Environment Department, Government of Madhya Pradesh
13. Additional Chief Secretary/Principal Secretary, Environment Department, Government of Uttar Pradesh
14. Chairman, UPPCB, Uttar Pradesh
15. Chairman, MPPCB, Madhya Pradesh
16. District Magistrate, Sonbhadra, U.P. (for stone crushers and all private mines)
17. District Magistrate, Singrauli, M.P. (for stone crushers and all private mines)
18. CMD, M/s NTPC Limited
19. CMD, M/s Lanco Anpara Power Pvt. Ltd.
20. CMD, M/s Hindalco Industries Ltd.
21. CMD, M/s UPRVUNL
22. CMD, M/s Grasim Industries Limited, Chemical Division, Renukoot, Sonbhadra
23. CMD, M/s Birla Carbon India Pvt. Ltd., Renukoot, Sonbhadra

Copy to:-

1. PPS to Secretary (EF&CC)
2. PPS to AS(NPG)
3. Guard File

**Minutes of the meeting of Fly Ash Management and Utilization Mission  
held on 01.05.2023 at 11:00 hrs**

The third meeting on 'Ash Management and Utilization Mission' was convened on 1<sup>st</sup> May, 2023 at 11:00 hrs to review the status of actions taken based on the recommendations of the Mission established in the meeting held on 31.01.2023. The list of participants is annexed at **Annexure I**.

(a) During the meeting, **following discussions were held:**

1. Ash generation and utilization by all TPPs in the country was reviewed. 186 TPPs (2,11,620 MW) generated 262.6 million tonnes during FY 2021-22. Overall ash utilization in the country was 94.7%. The details of ash utilization by TPPs are as below:
  - i. 80 % (1<sup>st</sup> compliance cycle of 3 years): 144 TPPs
  - ii. 60-80 % (1<sup>st</sup> compliance cycle of 4 years): 21 TPPs
  - iii. <60 % (1<sup>st</sup> compliance cycle of 5 years): 38 TPPs
- 12 TPPs: non-operational; 01 TPP: data not received
2. Ash utilization percentage of various thermal power plants in Singrauli and Sonbhadra region was reviewed. The region generated 29.3 MT during FY 2022-23 and utilized 14.13 MT (48%). The details of ash utilization during FY 2021-22 & 2022-23 are as under:
  - i. Nigrie, JP Associates: 89.55% & 100.8%
  - ii. M/s Sasan TPS: 52.3% & 109.4%
  - iii. M/s Mahan Energen TPS: 25.46% & 100%
  - iv. M/s NTPC Vindhyanchal: 53% & 37.31 %
  - v. M/s Singrauli: 57.5% & 40.16%
  - vi. Rihand: 59.2% & 52.9%
  - vii. Anpara A, B & D, UPVUNL: 2.62% & 1.89%
  - viii. Obra B, UPVUNL: 5.4% & 15.34%
  - ix. Anpara 'C' Lanco TPS: 12.8% & 11.67%

3. M/s Vindhyanchal informed that tender for supplying ash for road construction projects was under process. It was informed that despite the allotment of the Gorbi mine to the power plant, infrastructure development for ash disposal was still in progress.
4. Action plans of stone crushers from Govt. of M.P. were received. Field inspections were carried out by a team of District Collector, SPCB and Mining Officers. Principal Secretary, Environment Dept. Govt. of M.P. reviewed the progress of implementation of action plans on 25.04.2023. Out of 63 stone crushers, the following have installed one or other pollution control measures:
  - 23: dust containment cum suppress system
  - 24: wind breaking wall
  - 60: water sprinkling
  - 43: greenbelt
5. The crushers located in M.P. were directed to install the remaining pollution control measures within three months.
6. Action Plans of stone crushers from U.P. (Sonbhadra District) were submitted on 21.04.2023. Around 200 stone crushers of large capacities are located at single location, causing air pollution in the region. Govt. of U.P. informed that seven defaulters out of 220 stone crushers had been closed and monitoring of air quality is carried out on weekly basis.
7. Oversight Committees of U.P. and M.P. comprising official from CPCB, SPCB and District Magistrate had carried out field inspections in February, 2023. CPCB forwarded the inspection reports of UPPCB and MPPCB for taking action on violations on 20.02.2023.
8. Principal Secretary, Deptt. Of Environment, Govt. of M.P. reviewed overall progress of actions mandated under the Mission on 25.04.2023 and issued following directions:
  - a. Vindhyachal TPP, Sasan Power, Mahan Energen, M/s Hindalco, M/s JP Nigrie, were given directions and timelines to install pollution control measures and achieve 100% ash utilisation.

- b. Northern Coalfields Ltd. directed to conduct feasibility study for mixing of ash in OB dumps and backfilling of ash in voids of working mines.
  - c. Coal mines were mandated to procure mechanical sweepers, fog and mist sprinklers for taking up dust mitigation measures.
  - d. Coal mines were directed to set up coal handling plant and railway siding for evacuation of coal through rail to match to the expanded production capacities.
  - e. Jayant, Dudhichua and Nigahi coal mines were issued notices for taking dust pollution control measures for avoiding contamination of water bodies. Notices served to impose environmental compensation.
  - f. Suliyari open cast mine, Amelia coal mine, Mohar and Mohar Amlori coal mine and Amelia north coal mine were directed to set-up concrete roads and procure mechanical sweepers and water sprinkling machines for control of air pollution.
  - g. 8 railway sidings (ECR-3, WCR-3 and NCL-2) were directed for ensuring installation of air pollution control measures.
  - h. PWD was directed to inspect the construction of roads for control of air pollution.
9. Obra TPS had discharged ash into nearby nalla and M/s Anpara TPS had discharged ash into Rihand reservoir from the ash ponds. MPPCB imposed Environmental Compensation on UPRUVNL. The company informed that 51000 m<sup>3</sup> of ash from the nalla near to Obra TPS and 66000 m<sup>3</sup> of ash from Rihand reservoir had been desilted so far. The desilted ash had been used for filling up of low lying areas.
10. Central Level Working Group constituted under Additional Secretary, Ministry of Coal for allocation of coal mines for disposal of ash convened a meeting on 31.03.2023, and decided that further scientific studies for allocation of working mines for disposal of ash is not required in operational mines in view of safety issues.
11. Studies conducted by CIMFR have shown that backfilling of ash in Gare Palma IV (working mine) providing good results since 15 years and suggested that

similar study may be conducted on mine-to-mine basis. Further, Sasan coal mine has conducted a study regarding mixing of OB with ash and have shown favourable results.

12. NCL has initiated studies to be conducted by CIMFR in operational mines and the reports will be submitted by December, 2023.
13. Ministry of Coal has provided the status of identification of mines for backfilling of ash in mine voids:
  - a. 32 abandoned mines identified
    - o Ash filling is ongoing/ completed: 10 mines
    - o MoU is in process: 02 mines
    - o Identified: 09 mines
  - b. 18 Underground (UG) coal mines of CIL
  - c. 01 Opencast mine and 09 UG mines of SCCL (100 lakh m<sup>3</sup> bottom ash is expected to be utilized)
14. Ministry of Mines has identified 82 abandoned mines (other than coal) for filling mine voids with ash.
15. M/s Anpara, UPVUNL has requested NCL and Ministry of Coal to allot pit no. 3 of Gorbi mine for disposal of ash. NCL informed that the proposal will be submitted for Board's approval. Ministry of Coal has informed that Pit no.3 of Gorbi mine will be allocated once all statutory requirements have been met by the respective TPP.
16. NTPC mentioned that TPPs may be notified regarding the closure of the mines in advance as it takes approximately 4-5 years for infrastructure development for transportation and disposal in mine voids.
17. M/s Hindalco informed that signing of MoU between DFO, U.P, Aluminium Association of India and IIFM Bhopal is under process for backfilling of Dala abandoned stone quarry with fly ash and red mud. Request made to NCL to allot one pit of Gorbi mine for filling it with red mud and fly ash.

18. NH39 from Sidhi to Waidhan, Singrauli for about 92 km is constructed by NHAI in M.P. It was requested that ash may be utilized in the said road construction project.
19. Committee of Implementation of Ash Utilization Notification, 2021 and Committee for identification of mines under chairpersonship of Chairman, CPCB convened meeting on 18.02.2023 and Ministry of Coal was requested to update the status of allocation and initiation of backfilling, list out mines likely to be available and undertake mine (operational) specific studies for disposal of ash.
20. CPCB has identified organizations for annual certification of ash dykes in line with Ash Utilization Notification, 2021. Certification of ash dykes of thermal power plants located at Singrauli district have been done during the month of February, 2023.
21. M/o Power issued show-cause notice to 43 TPPs (37 TPP were having less than 60% of ash utilization and 06 TPPs having 60-80% ash utilization percentage). MPPCB and UPPCB issued notices to coal mines for imposing Environmental Compensation for non-compliances and no response was received from the respective Coal mine.
22. MPPGCL made several requests for allotment of abandoned mines of SECL for utilizing ash from Amarkantak TPS, Chachai for backfilling of mine voids with ash. It was informed that SECL is not allotting the said mine voids as it has been transformed into a water body.
23. Respective Committee of MoEFCC, CPCB and SPCBs constituted as per the directions of NGT in O.A. No. 862 of 2022 regarding pollution due to road transportation of ash of thermal power plants in Singrauli and Sonbhadra region carried out field inspections and submitted the reports to NGT in March 2023.
24. In line with Ash Utilization Notification, 2021, CPCB has developed ash portal on 19.12.2022 for enabling TPPs to furnish details of fly ash generation and utilization/ disposal. 180 TPPs out of 186 TPPs have uploaded the ash data on portal.
25. Director, DGMS mentioned that factor of safety of 1.5 is to be maintained to ensure long term stability and safety of OB dumps mixing with ash. Site specific

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studies needs to be done to determine the percentage of ash to be mixed in the OB dumps. Further, ash can be used in place of sand stowing carried for filling up of underground mine voids.

26. The guidelines for technical specifications and annual certification of ash ponds/dykes have been further modified in view of amendment ash notification 30.12.2022 and CEA will obtain concurrence of Ministry of Power on the said guidelines.
27. Govt. of U.P. has directed District Magistrate, Sonbhadra to open a separate account to receive voluntary contributions and funds for environment restoration and relief.
28. Regarding health impact study, Madhya Pradesh Pollution Control Board nominated ICMR- NIREH for conducting health and risk impact assessment studies of operations of TPPs and ash generating industries. Govt. of U.P is yet to submit the status.
29. District Magistrate of Singrauli District, Madhya Pradesh has identified different SHGs and initiated skilling and outreach programme for promoting switch over to ash based brick/product manufacturing under State Rural Livelihood Mission. Action in this regard is yet to be taken by UP Govt.
30. Government of M.P. and U.P. have directed respective District Magistrates to take enforcement measures regarding mandatory use of ash based products/bricks on obligated entities such as building construction agencies.

(b) The following decisions were made during the meeting:

1. Allocation of pits no. 3 of Gorbi abandoned mine to Anpara TPP, UPRVUNL for backfilling within one month. Allotment of abandoned mine of SECL to Amarkantak TPP, M.P. to M/s MPPGCL and abandoned mine of WCL to TPPs.

**(Action: Ministry of Coal, NCL, SECL and WCL)**

2. Updating the list of coal mines approaching for closure of mine in 3-5 years so that TPPs can engage with coal mines for setting up of infrastructure for transportation and disposal of ash in mine voids.

**(Action: Ministry of Coal)**

3. Updating information of 82 identified abandoned mines (other than coal) and setting-up procedure for signing of MoU between the identified mines and TPPs. Steps for identification of more mines for enabling TPPs achieve 100% ash utilisation.

**(Action: Ministry of Mines)**

4. Issue necessary instructions regarding not requiring permission from DGMS for filling up of mine voids and mixing of ash in OB dumps, and SOP for carrying out feasibility studies in respect of all mines.

**(Action: Ministry of Coal and Ministry of Mines)**

5. Stipulation of specific conditions in Environmental Clearances of coal mines and non-coal mines for conducting feasibility studies for assessment of voids for backfilling of ash and mixing of ash with overburden, taking up backfilling ash and OB mixing activities during operations as well as post closure of mines in line with the Ash Utilization Notification, 2021

**(Action: MoEF&CC)**

6. Utilization of ash in the road construction project NH39 from Sidhi to Waidhan, Singrauli, M.P. for 92 km. MoRTH may be requested to issue necessary instructions to NHAI to engage with TPPs for utilization of ash.

**(Action: MoEF&CC and MoRTH)**

7. Ministry of Coal may be apprised about the action initiated by MPPCB and UPPCB on environmental non-compliances of coal mines in Singrauli and Sonbhadra region.

**(Action: MoEFC&CC)**

8. Examination of actions plans submitted by thermal power plants and stone crushers and carry out continued verification of the implementation of action plans of TPPs, Industries, mines and stone crushers in Singrauli and Sonbhadra region.

**(Action: CPCB)**

9. Examine the inspection and compliance reports of Anpara and Obra TPPS w.r.t. desilting ash from Rihand Reservoir and Renu River and disposal of desilted ash in low lying areas.

**(Action: CPCB)**

10. Finalization of guidelines for technical specifications and annual certification of ash ponds/dykes.

**(Action: CPCB and CEA)**

11. Dust containment and suppression measures are to be taken by the stone crushers. Carry out assessment of air quality in and around stone crushers on regular basis to verify the impact of mitigation measures taken by the stone crushers.

**(Action: Stone crushers in Singrauli and Sonbhadra region, MPPCB & UPPCB)**

12. All thermal power plants and stone crushers shall update the progress in regard to the implementation of action plans by respective stakeholders.

**(Action: All TPPs and stone crushers in Singrauli and Sonbhadra region)**

13. Creation of separate account to receive voluntary contributions and funds for environment restoration and relief. State Government to take measures for restoration of environment and provide relief to victims of damage in a manner as may be found appropriate from these funds.

**(Action: Env Dept., Government of U.P.)**

14. Submission of one-year action plan along with specific deliverables in respect of conducting health and risk impact assessment studies of operations of TPPs and ash generating industries, within one month.

**(Action: State Governments of U.P. and M.P.)**

15. Enforcement measures regarding mandatory use of ash based products/bricks by all building construction agencies within 300 km radius of TPPs prescribed under Ash Utilisation Notification, 2021, shall be implemented.

**(Action: UPPCB, MPPCB, concerned District Magistrates)**

16. Skilling and outreach programmes to be conducted on similar lines of training of SHGs by M.P. for promoting switch over to ash based brick/ product manufacturing.

**(Action: Govt. of U.P. and M.P.)**

17. Anpara TPP and Obra TPP to desilt the remaining ash discharged in Rihand Reservoir and Renu River by May, 2023. Desilted ash disposed in low lying areas to be stabilized with soil cover and grass/ green belt to avoid pollution.

**(Action: M/s UPRVUNL)**

18. Assessment and monitoring of desilting activities in water bodies where Anpara and Obra discharged ash, and stabilization activities of low lying area where desilted ash is filled up to verify the status of remedial measures taken, by June, 2023.

**(Action: UPPCB and Forest Department, Govt. of UP)**

19. Inter-state transportation of ash is to be permitted for utilization of ash in the specified eco-friendly purposes along with safeguards for pollution control and mitigation.

**(Action: Govt. of UP and M.P.)**

20. Submission of action plan indicating the timelines for initiation and completion of feasibility studies for assessing the area and volume available for ash backfilling in mine voids and mixing of ash in OB dumps in all NCL mines.

**(Action: NCL)**

21. Submission of time-bound action plan for achieving 100% utilization of ash by TPPs. Cost-benefit analysis to be conducted for outweighing benefits of bearing ash transportation cost/promotion of ash based product manufacturing/coal transportation cost vis-à-vis environmental compensation.

**(Action: UPRVUNL, NTPC and Anpara Lanco, All TPPs)**

22. A study on mixing of red mud with ash in Gorbi abandoned mine is to be carried out to neutralize acidic water of Gorbi mine pit.

**(Action: NTPC and NCL)**

23. Effective implementation of the mandate of 100% utilisation of ash by TPPs across the country must be ensured. In this regard, the compliance matrix shared along with the minutes of the first meeting must be implemented in a time bound manner and on a regular basis.

**(Action: CPCB, CEA, All State Govts. (having TPPs), All stakeholders as per Compliance Matrix)**

## Annexure I

## List of Participants

1. Smt. Leena Nandan, Secretary, EF&CC
2. Shri Tanmay Kumar, Chairman, CPCB
3. Shri Naresh Pal Gangwar, Additional Secretary, MoEFCC
4. Shri Deepal Goal, Director, MoC
5. Shri Dheeraj Kumar, DS, M/o Mines
6. Shri Tirupathi Reddy Kommidi, Additional Chief Manager, NLC India Ltd., MoC
7. Shri Nazimuddin, Scientist F, CPCB
8. Shri N. Subrahmanyam, Scientist D, MoEFCC
9. Shri Chandra Mohan Thakur, PDS- Env., GoMP & MS, MPPCB
10. Shri Ajay K. Sharma, MS, UPPCB
11. Shri Mohammed Niyazi, Dir. (S&T), DGMS
12. Shri Ashutosh Kr. Dubey, ADM, Sonbhadra
13. Shri Manjeet K. Sinha, AGM-IT, NTPC
14. Shri MVR Reddy, ED, SSEA, NTPC
15. Shri S.K. Takhele, CGM (SEA), NTPC
16. Shri Chetan Awsathi, STA to ED (SSEA), NTPC
17. Shri Durga Nand Jha, JRF, CPCB
18. RO, MPPCB, Singrauli
19. Shri Hemant K. Sharma, Director (Environment), GoMP
20. Shri Rajendra Singh, CEO, UPPCB
21. Shri R.K. Gupta, Superintending Engineer, MPPCB
22. Shri Umesh Kr. Gupta, AEE, UPPCB, Sonbhadra
23. Shri Gulshan Raj, CE, CD, CEA
24. Shri Amit Kumar, Director, CD, CEA
25. Ms. Rehana Beg, Resident Engineer, M.P. Power Generating Company Limited
26. Shri Ravikant Raut, Chief Chemist, M.P. Power Generating Company Limited
27. Shri M. L. Patel, Chief Engineer, M.P. Power Generating Company Limited
28. Shri Ashok Rai, Mining Officer, Singrauli
29. Shri Ranjeet Nirmal, DMO GBN, Mining Dept. Govt. of UP
30. Shri Sanjeev Kumar, GM (Env. &F), NCL

31. Dr. Avinash Tripathi, Officer on Special Duty, NOIDA Authority
32. Shri R. K. Sharma, Project Eng., Noida Authority
33. Shri M. Narasimha Murthy, V.P., Lanco Anpara Power Ltd.
34. Shri Himanshu Verma, Sr. Manager, Lanco Anpara Power Ltd.
35. Shri Santosh Kumar Singh, Head, Adani, Mohan Energy Ltd.
36. Shri S.K. Dutta, Director (Project), UPRVUNL
37. Dr. Vijay Kr. Yadav, AGM (Environment), Grasim Industries Ltd., Renukoot
38. Shri Sayed M Islam, Manager (EHS), Birla Carbon, Renukoot
39. Shri Ashwani Tyagi, NTPC
40. Shri Vinay Ramaiya
41. Ms. Vaishali Surawar, Hindalco
42. Shri Rajashekar, NTPC
43. Shri P N Sharma, IBM
44. Shri Bharat Bhushan Chugh, Associate, NTPC
45. Shri Debanjan Basak, RPSG
46. Shri Ajit Kumar, NTPC
47. Dr. Neeraj Verma, RRT 1
48. Shri Pushpender Gaur IBM RO, Gandhinagar
49. Prof. (Dr.) Partha Ghosh
50. Shri Surajit Basu
51. Dr. Vinod K Verma, Sr VP, Aditya Birla
52. Dr. Sanjoy Chakraborty, RPSG
53. Ms. Soubhagya Tripathy, Hindalco Aditya Birla
54. Shri Mukesh Mukesh, Aditya Birla

**Subject :- Visit of Working Committee Members & Other experts to Proposed Project Site i.e. backfilling of abandoned mine voids/ stone quarries with red mud and bottom ash/ fly ash for afforestation at Dalla , Dist. Sonbhadra, UP.**

As per the outcome of the meeting held on May 29, 2023 at IIFM, Bhopal in hybrid mode, a visit of Working Committee members has been organized on June 7, 2023, forenoon at the proposed site in Dalla Range, Obra Forest Division. Following members have visited the site -

1. Dr. D.K. Soni , Regional Directorate, CPCB, Lucknow.
2. Mr. Anurag Priyedarshi, IFS, DFO, Obra.
3. Dr. Om Prakash Madguni, IIFM, Bhopal.
4. Dr. C.P. Kala , IIFM, Bhopal p
5. Dr. Vinod Verma , Representative of AAI
6. Mr. Mukesh Mittal , Representative of AAI
- Others Visitors/Experts :-**
7. Dr. Arun Prasad , Professor IIT, BHU
8. Dr. H.K. Pandey , Professor , MNNIT, Prayagraj
9. Mr. Abhishek Kumar Rai , SDO Forest , Obra
10. Mr. Indrajit Pal, RFO, Dalla
11. Col. JMT Arafaat , Delhi Office , Representative of AAI
12. Mr. H.P.Patil , Geotechnical Expert, Genstru

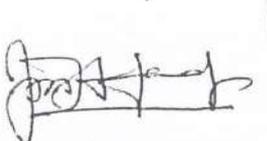
The members visited all the Mines Voids and the surrounding areas to understand the present status of different landscapes, old mining structures and rock formations (Lithology & Geological structure). Experts went through the Geological formation and gave their opinion that the formation is rigid and having natural strength to bear the pressure during dewatering, filling of void with admixture and afforestation work, etc. Ocular observations were made on the water in the proposed void and neighboring water bodies. It has been found that the water level in the proposed study mine void is relatively lower as compared to the adjacent pond, indicating that no percolation of water is taking place in the adjacent pond. Another indicator is that the water in the proposed void having high nutrients in comparison to the water in other mining voids.

In the interaction with the local community during the visit, it emerged that the dependency on the proposed pond is nil and no water from this pond is being used by the locals for any purpose. Further, no fishing is taking place in the proposed pond. However, some villagers were observed fishing in the nearby pond.

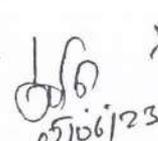
The Committee members and Experts discussed the modalities of dewatering and conducting Geophysical and Geotectonic studies. During the meeting, the following has been decided:

1. Permission/Clarification under Forest Conservation Act, 1980 is required for the pilot study: The timeframe of one working week/at the earliest is proposed to obtain the requisite forest permission/ clarification from the competent authority to carry out the Pilot Study which will include dewatering, filling of mine void & afforestation, etc.
2. Testing of water: Water quality characteristic w.r.t. pH, Hardness , SAR (CA, MG, NA, K, N ), EC, DO, TSS, BOD, COD required to be carried-out from the NABL accredited Labs.
3. Utilization of the pond water: Avenues for use of pond water for other purposes need to be explored with due permission from the concern competent authority i.e. SPCB/Irrigation Department. Since the permission for study is only for one void, shifting/ transferring of water

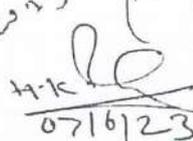
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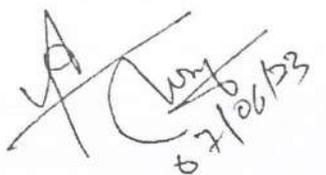
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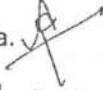
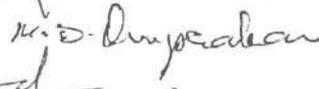
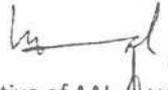
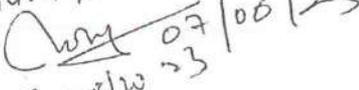
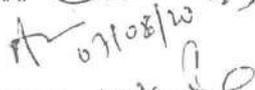
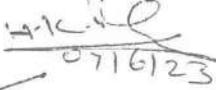
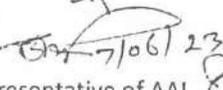
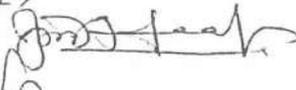
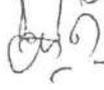


  
07/06/23

to the other nearby mine void in the forest is not allowed without permission from the competent forest authority.

4. Conduct of the Geological, Geotectonic and Geophysical, groundwater study in the area: After dewatering of the pond/ void these studies shall be carried out to understand the groundwater level, primary and secondary porosity, strength of the geological formation, leakages, etc. All the studies will be conducted by concerned expert institution such as IIT BHU, MNNIT etc.
5. Once these studies have been conducted, the Working Committee will once again meet to decide on a further course of action and formatting the SOP of the project in case everyone agreed/ due approval.

The visit and discussions concluded with a vote of thanks.

1. Dr. D.K. Soni , Regional Directorate, CPCB, Lucknow.  07/06/23
2. Mr. Anurag Priyadarshi, IFS, DFO, Obra. 
3. Dr. Om Prakash Madguni, IIFM, Bhopal. 
4. Dr. C.P. Kala , IIFM, Bhopal 
5. Dr. Vinod Verma , Representative of AAI 
6. Mr. Mukesh Mittal , Representative of AAI  07/06/23
7. Dr. Arun Prasad , Professor IIT, BHU  07/08/23
8. Dr. H.K. Pandey , Professor , MNNIT, Prayagraj  07/06/23
9. Mr. Abhishek Rai , SDO Forest , Obra 
10. Mr. Indrajit Pal, RFO, Dalla  07/06/23
11. Col. JMT Arafaat , Delhi Office , Representative of AAI 
12. Mr. H.P.Patil , Geotechnical Expert, Genstru 

कार्यालय प्रभागीय वनाधिकारी, ओबरा वन प्रभाग, ओबरा-सोनभद्र।  
पत्रांक-2689/ओबरा/33 , दिनांक, ओबरा, जून, 17 - 2023।

सेवा में,

निदेशक (आई0आई0एफ0एम0)  
भारतीय वन प्रबंध संस्थान,  
पर्यावरण वन और जलवायु परिवर्तन मंत्रालय,  
भारत सरकार का स्वायत्त संस्थान, नेहरू नगर,  
भोपाल-462003, मध्य प्रदेश।

17 Jun 2023

विषय-

“Backfilling of abandoned mine voids/stone quarries with red mud and bottom ash/fly ash”

सन्दर्भ-

भारत सरकार, वन, पर्यावरण एवं जलवायु परिवर्तन का पत्रांक- FC-11/124/2021-FC, दिनांक 15.03.2023, Meeting held on 29<sup>th</sup> May 2023 at 11.00 AM at IIFM, Bhopal (through hybrid mode) under the Chairpersonship of PCCF (HoFF), Uttar Pradesh, प्रधान मुख्य वन संरक्षक और विभागाध्यक्ष, उत्तर प्रदेश, लखनऊ का पत्रांक-906/36-8 (एन0जी0टी0), दिनांक 02.06.2023 एवं मुख्य वन संरक्षक, मीरजापुर क्षेत्र, मीरजापुर का पत्रांक-4003/मी0क्षे0/33, दिनांक 02.06.2023।

महोदय,

भारत सरकार के उपरोक्त सन्दर्भित पत्र के क्रम में दिनांक 29 मई 2023 को प्रधान मुख्य वन संरक्षक और विभागाध्यक्ष, लखनऊ, उत्तर प्रदेश, महोदय की अध्यक्षता में IIFM भोपाल में हुई बैठक (through hybrid mode) में जल निकासी के संबंध में हुए विमर्श एवं प्रधान मुख्य वन संरक्षक और विभागाध्यक्ष, उत्तर प्रदेश, लखनऊ का उपरोक्त सन्दर्भित पत्र जो मुख्य वन संरक्षक, मीरजापुर मण्डल, मीरजापुर को प्रेषित है, के क्रम में मुख्य वन संरक्षक, मीरजापुर क्षेत्र, मीरजापुर के उपरोक्त सन्दर्भित पत्र द्वारा पत्र में उल्लिखित बिन्दुओं का समावेश सुनिश्चित करने एवं कृत कार्यवाही से अवगत कराने हेतु निर्देशित किया गया है। सन्दर्भित पत्र द्वारा नियमानुसार आवश्यक अनुमति निर्गत करने एवं निर्गत की जाने वाली अनुमति में अन्य शर्तों/बिन्दुओं के अतिरिक्त निम्नलिखित शर्तों/बिन्दुओं का समावेश सुनिश्चित किए जाने हेतु भी निर्देशित किया गया है :-

1. सम्पूर्ण प्रक्रिया में जलीय जीव जन्तुओं की सुरक्षा सुनिश्चित की जाये।
2. छोड़ी गयी खदानों/पत्थर खदानों, जिनसे पानी निकाला जाना हो, में जल निकासी में पूर्व जलीय जन्तुओं जैसे-कछुआ, मछली आदि की उपस्थिति की जांच कर ली जाये तथा जल निकासी से पूर्व उन्हें सुरक्षित स्थल पर पुनर्वासित किया जाये।
3. छोड़ी गयी खदानों/पत्थर खदानों, जिनसे पानी निकाला जाना हो, में जल निकासी की प्रक्रिया में इस बात का विशेष रूप से ध्यान रखा जाये कि उनकी दीवारों में स्खलन न हो। दीवारों की Stability सुनिश्चित की जाये।

4. पूर्ण घटनाक्रम की वीडियो ग्राफी सुनिश्चित की जाये और प्रक्रिया से संबंधित अभिलेख सुरक्षित रखे जायें।
5. निकासी किये गये जल का आस-पास के क्षेत्रों में spill-over न होने के लिये सुरक्षात्मक उपाय किये जायें तथा जल का संरक्षण सुनिश्चित किया जाये।

उक्त निर्देश के क्रम में जल निकासी की अनुमति उपरोक्त शर्तों के साथ निर्गत की जाती है। जल निकासी से सम्बन्धित सभी कार्य नियमानुसार पूर्ण किए जाये। बिन्दु संख्या-2 में उल्लिखित चि एवं समस्त कार्य नियमानुसार कराये जाने की निगरानी हेतु इस वन प्रभाग से उप प्रभागीय अधिकारी, चोपन एवं क्षेत्रीय वन अधिकारी, डाला को नामित किया जाता है।

भवदीय,

(अनुराग प्रियदर्शी)

प्रभागीय वनाधिकारी,

ओबरा वन प्रभाग, ओबरा-सोनभद्र।

संख्या-

(1)/समदिनांक।

प्रतिलिपि- निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

1. प्रधान मुख्य वन संरक्षक और विभागाध्यक्ष, उत्तर प्रदेश, लखनऊ।
2. मुख्य वन संरक्षक, नोडल अधिकारी, उत्तर प्रदेश, लखनऊ।
3. मुख्य वन संरक्षक, मीरजापुर क्षेत्र, मीरजापुर।
4. Regional Director, CPCB, Lucknow.
5. उप प्रभागीय वनाधिकारी, चोपन।
6. Chairman, एल्युमिनियम एसोसिएशन ऑफ इण्डिया (AAI)
7. क्षेत्रीय वन अधिकारी, डाला रेंज।

(अनुराग प्रियदर्शी)

प्रभागीय वनाधिकारी,

ओबरा वन प्रभाग, ओबरा-सोनभद्र।

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**OFFICE DIVISIONAL FOREST OFFICER,  
OBRA FOREST DIVISION, OBRA-  
SONBHADRA**

Letter No.2689/Obra/33 dated, Obra, June  
17, 2023 |

To,

The Director (IIFM)  
Indian Institute of Forest Management,  
Ministry of Environment Forest and  
Climate Change,  
Autonomous Institute of Govt of India,  
Nehru Nagar, Bhopal-462003, Madhya  
Pradesh.

**Sub: “Backfilling of Abandoned Mine  
Voids/Stone Quarries with Red Mud  
and Bottom Ash/Fly Ash”**

Ref- Letter No.15.03.2023 dated 15.03.2023  
of Govt of India, Ministry of  
Environment Forest and Climate  
Change, Meeting Held on 29th May  
2023 at 11.00 am at IIFM, Bhopal

(Through Hybrid Mode) Under The Chairpersonship of PCCF (HoFF), Uttar Pradesh, Letter No.906/36-8 (NGT), dated 02.06.2023 of Principal Chief Conservator of Forest Conservator and Head of Department, Uttar Pradesh, Lucknow and Letter No.4003/m.a./33, dated 02.06.2023 of Chief Conservator of Forests, Mirjapur Area, Mirjapur area, Mirjapur area, Mirjapur area, Mirjapur

Sir,

In continuance of the above referred letter of Govt India, the discussion held in respect of the water drainage in the meeting held under the chairmanship of Principal Chief Conservator of Forest Conservator and Head of Department in IIFM Bhopal on 29 May 2023 in IIFM Bhopal (Through Hybrid Mode) and in continuance of the above reference letter of the Chief Forest Conservator, Mirjapur region, Mirjapur which is sent to

Chief Conservator of Forests, Mirjapur Circle, Mirjapur, it is directed to ensure the incorporation of the points mentioned in the letter by above reference letter of the Chief Conservator of Forests, Mirjapur Circle, Mirjapur and to inform from the action taken. By the reference letter it has also been directed to issue necessary permission as per rules and in addition to other conditions/points in the permission to be issued, it has also been directed to ensure the incorporation of the following conditions/points By the following conditions / points have also been directed to ensure the inclusion of the following conditions/points:-

1. Security of aquatic animals should be ensured in the entire process.
2. In the drainage mines/stone mines, which have to be drained, the presence

of pre-aquatic animals such as ingredients, fish etc. should be checked in drainage and they should be rehabilitated on a safe site before drainage.

3. In the process of drainage in the left mines/stone mines, which are to be drained, special care should be taken that there is no ejaculation in their walls. Stability of the walls should be ensured.
4. Videography of complete developments should be ensured and records related to the process should be kept safe.
5. Drained water should be taken to not be spill-over in the surrounding areas and conservation of water should be ensured.

In pursuance of the said instructions, the permission for drainage is issued with

the above conditions. All the work related to drainage should be completed as per rules. Sub Divisional Circle, Chopan and Regional Forest Officer, Dala is nominated from this forest division to monitor the mentioned investigation and all the work as per rules.

Sincerely,

Sd

/-

(Anurag Priyadarshi)  
Divisional Forest Officer,  
Obra Forest Division, Obra-Sonbhadra.

Letter No.(1) even dated

Copy sent to the following for information and necessary action.

1. Principal Chief Conservator of Forests and Head of Department, Uttar Pradesh, Lucknow.
2. Chief Conservator of Forests, Nodal Officer, Uttar Pradesh, Lucknow.

3. Chief Conservator of Forests, Mirjapur  
Area, Mirjapur.
4. Regional Director, CPCB, Lucknow.
5. Sub Divisional Forest Officer, Chopan.
6. Chairman, Aluminum Association of  
India (AAI)
7. Regional Forest Officer, Dala Range.

Sd/-

(Anurag Priyadarshi)

Divisional Forest Officer,

Obra Forest Division, Obra-Sonbhadra



Annexure R21/15 295

**भारतीय वन प्रबंध संस्थान**  
**INDIAN INSTITUTE OF**  
**FOREST MANAGEMENT**

(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय,  
भारत सरकार का एक स्वायत्तशासी संस्थान)  
(An Autonomous Institute of the Ministry of Environment,  
Forests & Climate Change, Government of India)

Omprakash Madguni, Ph.D.  
Assistant Professor

IIFM/MDO/AAI/2023  
17.6.2023

To  
Chairman,  
Aluminium Association of India (AAI)

Sub: Pilot Project, "Backfilling of abandoned mine voids/ stone quarries with red mud and bottom ash/ fly ash"

Ref: Letter from DFO, Obra, Sonbhadra to the Director, IIFM, vide letter no. 2689/Obra/33, dated 17.6.2023

Dear Sir,

With reference to the above, I have been directed to convey you that permission has been given to dewater the proposed void with the following conditions and instructions:

1. The AAI should ensure the safety of the aquatic life in the void during the entire process,
2. The AAI will carry out a survey and document the availability of aquatic life (fauna) such as turtles, fish, etc. before the dewatering, and if it is available, rehabilitate the same,
3. The AAI ensures that the walls of the void are not damaged, and stability of the walls be ensured during the dewatering,
4. The AAI team will Videography the entire work and all the related records be kept secure and shared with the IIFM and DFO, Obra.
5. The AAI team will take necessary precautions to avoid spillover in the surroundings and conservation of the water.

The water will be transferred to the adjacent void identified for the purpose, and there will be no spillage of water on nearby land as a precautionary measure. Water samples at different depths will be collected and analysed as a record.

The AAI will carry out the work under the supervision of the ACF/SDO, Chopan, and RFO, Dala, who have been nominated by the DFO, Obra, for the same.

I hope the AAI will follow all the conditions stipulated by the DFO, Obra.

*M. D. Omprakash Madguni*  
(Omprakash Madguni)

Copy to the following for kind information

1. PCCF & HoFF, Uttar Pradesh, Lucknow
2. Director, IIFM, Bhopal
3. CCF, Nodal Officer, Uttar Pradesh, Lucknow
4. CCF, Mirjapur region, Mirjapur, Uttar Pradesh
5. Regional Directorate, CPCB, Lucknow
6. DFO, Obra, Sonbhadra, Uttar Pradesh
7. ACF, Chopan

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Annexure R21/16

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F. No. 11/3/2018- HSMD  
Government of India  
Ministry of Environment, Forest & Climate Change  
(HSM Division)

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

Dated: 2<sup>nd</sup> August, 2023

OFFICE MEMORANDUM

**Sub.: Minutes of the fourth meeting of 'Fly Ash Management and Utilization Mission' held on 04.07.2023 - reg.**

The undersigned is directed to refer the fourth meeting of 'Fly Ash Management and Utilization Mission' held on 04.07.2023 at 11:00 hrs at Indira Paryavaran Bhawan, New Delhi to review the status of actions taken based on the decisions made by the Mission in the meeting held on 01.05.2023.

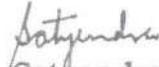
2. In view of the above, minutes of the fourth meeting of 'Fly Ash Management and Utilization Mission' is enclosed herewith.

3. It is requested to furnish the action taken report to Central Pollution Control Board.

This issues with the approval of the Competent Authority.

**Encl.:** As stated

Yours sincerely,

  
(Dr. Satyendra Kumar)  
Director

Ph: 011-20819291

Email: satyendra.kumar07@nic.in

To:

1. Secretary (Coal), Ministry of Coal, New Delhi
2. Secretary (Power), Ministry of Power, New Delhi
3. Secretary (Mines), Ministry of Mines, New Delhi
4. Chief Secretary, State of Uttar Pradesh
5. Chief Secretary, State of Madhya Pradesh
6. Chairman, CPCB, New Delhi

7. Additional Chief Secretary/Principal Secretary, Energy, Government of Uttar Pradesh
8. Additional Chief Secretary/Principal Secretary, Energy, Government of Madhya Pradesh
9. Additional Chief Secretary/Principal Secretary, Industries, Government of Uttar Pradesh
10. Additional Chief Secretary/Principal Secretary, Industries, Government of Madhya Pradesh
11. Director General, Directorate General of Mines Safety, Jharkhand
12. Additional Chief Secretary/Principal Secretary, Environment Department, Government of Madhya Pradesh
13. Additional Chief Secretary/Principal Secretary, Environment Department, Government of Uttar Pradesh
14. Chairman, UPPCB, Uttar Pradesh
15. Chairman, MPPCB, Madhya Pradesh
16. District Magistrate, Sonbhadra, U.P. (for stone crushers and all private mines)
17. District Magistrate, Singrauli, M.P. (for stone crushers and all private mines)
18. CMD, M/s NTPC Limited
19. CMD, M/s Lanco Anpara Power Pvt. Ltd.
20. CMD, M/s Hindalco Industries Ltd.
21. CMD, M/s UPRVUNL
22. CMD, M/s Grasim Industries Limited, Chemical Division, Renukoot, Sonbhadra
23. CMD, M/s Birla Carbon India Pvt. Ltd., Renukoot, Sonbhadra

Copy to:-

1. PPS to Secretary (EF&CC)
2. PPS to AS(NPG)
3. Guard File

**Minutes of the 4<sup>th</sup> meeting of Fly Ash Management and Utilization Mission****held on 04.07.2023 at 11:00 hrs**

The fourth meeting on 'Fly Ash Management and Utilization Mission' was convened on 4<sup>th</sup> July, 2023 at 11:00 hr to review the status of actions taken based on the recommendations/decisions made by the Mission in the meeting held on 01.05.2023. The list of participants is annexed at **Annexure I**.

**a. During the meeting, following discussions were held:**

1. Central Level Working Group constituted under Additional Secretary, Ministry of Coal for allocation of coal mines for disposal of ash to thermal power plants convened a meeting on 04.05.2023, and allocated Gorbi Pit- 2 and 3 of NCL to NTPC Vindhyanchal and Anpara TPS, UPRVUNL, respectively.
2. Status of allocation of abandoned mines to TPPs for backfilling of ash:
  - i. Sarni UG of WCL allocated to Satpura TPS of MPPGCL: draft MoU has been shared with MPPGCL for acceptance.
  - ii. Sharda OC (OPQR patch) of SECL allocated to Amarkantak TPS, M.P. to M/s MPPGCL-volume of 1.6 lakh m<sup>3</sup> (15%) void was made available, out of which 90,000 m<sup>3</sup> has been filled so far. Remaining 85% void was made available to MB Power Ltd.
  - iii. Sharada OC of SECL, Trench-1 was allocated to:
    - a. Amarkantak TPS, MPPGCL, Chachai- 0.9 lakh m<sup>3</sup> (16 km)
    - b. NTPC, Sipat- 10.93 lakh m<sup>3</sup> (187 km)
    - c. NTPC, Korba- 12.53 lakh m<sup>3</sup> (199 km)
    - d. SGTPS, MPPGCL, Birsinghpur- 5.63 lakh m<sup>3</sup> (78 km)
  - iv. M/s NCL informed that three meetings were held and the draft MoU with M/s UPRVUNL (Anpara TPP) for signing had been shared. M/s UPRVUNL informed that the MoU would be signed immediately within a week for initiation of backfilling activities.

- v. MPPGCL informed that as per the agreement, 90,000 CuM ash had been filled into the mine void of Sharda OC (OPQR patch) out of allocated void of 1.6 lakh CuM. Sharda OC has a capacity 30 lakh CuM out of which major portion of mine voids was given to M/s MB Power Ltd. It was informed that Amarkantak Power Plant, Chachai of MPPGCL is located at 16 km from the Sharda mine voids and ash can be easily transported to the void.
  - vi. MPPGCL requested to consider the allocation of Trench 2 or 3 of Sharda OC for backfilling of remaining quantity of ash as the mine is located in M.P. and ATPS of MPPGCL does not have any alternate allocation.
3. It was informed that mine void of Sharada OC (Trench 1), Chachai of SECL is used as water reservoir and meets the water requirement for industrial & community use. CIL informed that adjacent void, Trench-2 could be allotted to Amarkantak TPS, MPPGCL, Chachai.
  4. MPPGCL shared that Sarni underground mine of WCL was yet to be allocated as MoU was under finalization due to issues related to mine safety. DGMS in this regard stated that individual mine may conduct scientific study in respect of factor of safety and submit the report.
  5. It was informed that Singareni UG coal mine (SCCL) had filled up fly ash in the mine voids by ensuring the safety parameters. The SOP followed in this regard may be used for ash filling in mine voids of other UG mines.
  6. M/o Coal informed that 22 mines of CIL had been allocated for backfilling activities. The physical progress of ash back filling is dismal. NTPC has filled 32 lakhs CuM ash so far out of 655 lakhs CuM voids made available. NTPC has shared 5-year action plan for utilization of legacy ash. MPPCB was requested to permit 3000 CuM ash transportation per day against 1400 CuM. MPPCB informed that there was no restriction on quantity of ash transportation. However, District Administration allows transportation only during night time to avoid traffic and maintain safety.
  7. M/o Coal informed that about 4-5 operational mines would get closed in next few years and made available for backfilling of ash. NCL informed that two

operational mines of NCL namely Kakri Opencast Project (March, 2024) & Krishnashila Opencast Project (March, 2027) are approaching for closure by March, 2024 and March 2027, respectively.

8. NCL expressed no objection for conducting the study on mixing of red mud with ash in Gorbi abandoned mine and stated that NTPC and Hindalco Industries may carry out the said study on mutually agreed terms. NTPC expressed that appropriate safeguards in regard to discharge of wastewater from the mine into the water bodies may be considered.
9. Feasibility study to assess the area/volume available for ash backfilling and mixing of ash in with OB of NCL mines is ongoing at Nigahi operational mine by CIMFR. Approval for conducting study for Amlori, Jayant, Khadia and Dudhichua mines at M.P. is under process.
10. Ministry of Mines has shared the list of 207 identified non-coal mines for backfilling with fly ash. Further, directions were issued to all the Regional Controllers of Mines to identify more working mines, where mineral was exhausted, for backfilling activities. The list of 207 identified non-coal mines is presented below:
  - i. 82 abandoned mines: list shared earlier
  - ii. 56 mines: surrendered to State Govt.
  - iii. 57 mines: part surrendered
  - iv. Pits of 12 working mines: available for backfilling with fly ash
11. CPCB informed that the list of 207 identified non-coal has been made available on Fly Ash Management Mission's website. CEA has circulated the list to all the TPPs.
12. Anpara TPP has desilted 1.52 lakh CuM deposited ash from Rihand reservoir and desiltation of remaining 50,000 CuM ash will be completed by July, 2023. Further, desilted ash is being used to fill low lying areas. Total 58000 CuM deposited ash have been completely desilted from Renu river by Obra TPP. Desilted ash has been disposed in low lying areas in Obra Sector 2 & 3 and stabilized with soil. Development of green belt is under progress.

13. UPPCB informed that the assessment and monitoring of desilting activities in water bodies due to Anpara and Obra discharged ash will be conducted after June, 2023.
14. Regular inspections are being carried out by UPPCB and MPPCB to verify implementation of action plan by TPPs, stone crushers and industries. UPPCB is yet to submit the compliance report. The Oversight Committee conducted field inspection in the month of May, 2023.
15. Meetings were held under Principal Secretary, Env. Dept., GoMP on 09.05.2023 & 27.06.2023 to review the implementation of action plan and issued following directions:
  - i. NHAI, MP Road Development Corporation and PWD were instructed regarding compulsory use of ash in all the road construction projects in the area.
  - ii. 4 TPPs (NTPC, Amarkantak TPP, Sanjay Gandhi TPP, Shri Shingaji TPP) having % ash utilization less than 55% were directed to submit action plan for 100% ash utilization.
  - iii. NTPC Vindhyanchal was directed to complete modernization process of ESP (within 2 months), install water sprinkler system to control fugitive dust emission from ash dyke and construction of fly ash storage silos (16 hrs capacity).
  - iv. Sasan Power Ltd. was directed for laying 25 km long pipeline for transportation of ash. Mahan Energen Ltd. were directed to complete arrangement of merry-go-round and conveyer system for coal transportation and initiate transportation of ash through rail. Mohar & Mohar Amlori Extension Coal Project of Sasan Power Ltd. was directed to conduct study for mixing ash with overburden.
  - v. All TPPs were directed to submit ash dyke safety study report by reputed institute.
  - vi. NCL coal mines were directed to use 18 procured fog cannons to prevent fugitive dust emission. NCL Amlori Project were directed to establish

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ETP. APMDC Ltd. were instructed regarding coal transportation through rail by March, 2025.

- vii. ECL was instructed to construct boundary wall, concrete roads and install water sprinklers in railway sidings by Dec, 2023. WCL was directed for timely completion of construction of Bargavan, Gondwali and Gajara Bahra railway siding.
  - viii. 3 stone crushers which have not taken pollution control measures, were directed to be closed and remaining crushers were directed to meet timelines for pollution control.
16. Secretary, Env. Dept. issued directions to the concerned departments for mandatory use of ash based products by all building construction agencies. A meeting was held on 09.05.2023 under Chief Secretary, Govt. of M.P. and 27.06.2023 under PS, Env. Dept. on implementation of action plan. Directions were issued to concerned stakeholders to utilize ash by roads construction agency, ash based products manufacturers and coal mines.
  17. UPPCB informed that air pollution control system such as covered conveyer system, covered jaw crusher, water sprinkling arrangement, wind breaking wall, green belt, pucca roads have been installed in all 313 stone crushers and also no new stone crushers is allowed to established. 155 stone crushers were inspected out of which 47 defaulting units were issued show-cause notices under Air Act. Further, an area of 10 Ha is afforested by Miyawaki technique for the control of dust pollution.
  18. MPPCB conducted air quality monitoring around Phulwari, Sonbhadra District on 22.06.2023 & 23.06.2023. It was stated that due to the installation of pollution control systems such as water sprinkler, greenbelt development, wind breaking wall and dust containment cum suppress system and due to precipitation on 22.06.2023, the results were found within the prescribed standards (PM<sub>10</sub>: 100 µg/m<sup>3</sup>). Further, out of 63 inspected stone crushers, 3 crushers are to be closed and remaining crushers to meet timelines for pollution control.

19. M/s Hindalco informed that pits of Dala abandoned stone quarry is partially filled with water and are available for disposal of fly ash. Formulation of SoP by Aluminium Association of India and IIFM Bhopal is under process for conducting pilot study on mixing of red mud with fly ash for backfilling of Dala abandoned stone quarry.
20. State Govts. informed that inter-state transportation of ash has not been banned and no application was received for inter-state ash transportation.
21. CPCB has finalized guidelines for technical specifications and annual certification of ash ponds/dykes on 27.06.2023.
22. Stipulation of conditions in Environmental Clearances of coal mines and non-coal mines for conducting feasibility studies for assessment of voids for backfilling activities is under consideration by Expert Appraisal Committee (Coal Mining).
23. MoEF&CC on 4.05.2023 requested NHAI to utilize ash in all road construction projects enabling TPPs to achieve 100% ash utilization.
24. Collector of Singrauli District, Madhya Pradesh had organised a workshop on 24.06.2023 for identified SHGs for promoting switch over to ash based brick/product manufacturing. Further, directions were given to the TPPs for ensuring availability of fly ash to these SHGs. Govt. of U.P. has directed TPPs to organise skilling and outreach programme. TPPs are promoting 31 MSMEs engaged in manufacturing ash based products/ brick manufacturers.
25. Proposals from AIIMS, Bhopal for conducting health and risk impact assessment studies in Sonbhadra and Singrauli region were sanctioned on 30.06.2023 and 27.06.2023, respectively.
26. Govt. of U.P. has opened a separate account to receive voluntary contributions and funds for environment restoration and relief. It was discussed that the funds already collected under Environmental Compensation for recovering damages and remediation activities in Singrauli and Sonbhadra region may be transferred to the accounts recently created by State Government for effective utilisation for improving environment (air, water and soil) specific to this region.

27. Time-bound action plan for utilization of legacy ash were received from NTPC (Rihand Nagar & Shaktinagar), UPRVUNL (Obra TPS & UPRVUNL Anpara TPS) and Lanco Anpara Power Ltd.
28. NTPC informed that they have engaged with NHAI for road construction projects for the supply of ash. Along with this and filling of mine voids would increase the utilisation to 70%.

b. The **following recommendations were made** during the meeting:

1. SOP to be developed in respect of working mine (opencast and underground mines) for safety related issues in allocation of mines. Also, SOP to be formulated for carrying out feasibility studies for filling up of mine voids in respect of all mines.

**(Action: Ministry of Labour and Employment, and DGMS)**

2. Updating list of identified abandoned mines for enabling TPPs to approach the concerned mines for backfilling of mine voids with ash for achieving 100% ash utilisation. SOP for signing-up of MoU between the identified mines and TPPs to be finalised.

**(Action: Ministry of Mines)**

3. Details of SOP followed for Singareni underground mine (SCCL) for ash filling in mine voids may be shared with WCL and NCL for adoption of similar SOP conditions in the MoU to be signed with TPPs. A copy may be shared with MoEFCC.

**(Action: Ministry of Coal)**

4. Status regarding details of identified mine voids, allocation to TPPs, signing of MoU and quantity of ash filled up against the available volume may be shared and may be put up on the website and updated monthly.

**(Action: Ministry of Coal)**

5. List of coal mines approaching for closure of mines in 3-5 years to be updated and shared with MoP & TPPs for making early allocation, signing of MoU and preparatory activities for initiation of backfilling of ash.

**(Action: Ministry of Coal)**

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6. A scientific methodology with GIS mapping may be evolved for allocation of mine voids/ mixing of OB dumps with ash to TPPs based on proximity to the mine and transportation distance so that the environmental impacts/ costs of transportation can be minimised. In case of Sharda OC mine (Trench -1, 2 & 3), existing allocation of 90,000 m<sup>3</sup> to Amarkantak TPS, MPPGCL may be reviewed and it may be increased as the TPP is 16 kms from the said mine.

**(Action: Ministry of Coal)**

7. Completion of feasibility study for Nigahi operational mine within two months and submission timelines for initiation and completion of feasibility studies for other working mines for assessment of area and volume available for ash backfilling in mine voids and mixing of ash in OB dumps in all NCL mines. Findings of feasibility study of Nigahi operational mine shall be presented during the next meeting of the Mission.

**(Action: Ministry of Coal and NCL)**

8. Meeting with all TPPs to get the details about abandoned mines which may be geographically favourable to the TPPs and furnish the list of TPPs along with priority list of abandoned mines.

**(Action: MoP, CEA)**

9. M/o Labour and Employment and DGMS to be communicated regarding finalisation of SOP in regard to backfilling of ash in opencast and underground mines ( for both abandoned as well as working mines)and mixing of ash with overburden in dumps. A separate meeting may be convened with DGMS, M/o Coal and M/o Mines in this regard.

**(Action: MoEF&CC)**

10. Third-party audit for verification of implementation of action plans of TPPs, industries, stone crushers and coal mines in Singrauli and Sonbhadra region including desilting activities and reclamation of low lying areas carried out, may be undertaken through empanelled institutions/agencies and the report in this regard may be furnished during the next meeting of Mission. CPCB may work

out the cost to be incurred by individual industry in case of unit specific audit and jointly by cluster of industries in case of cluster specific audit.

**(Action: CPCB)**

11. In order to ensure 100% utilization of ash by all lignite and coal based thermal power plants across the country, effective monitoring and supervision of provisions of Ash Utilization Notification dated 31.12.2021 have to be scrupulously complied with. Respective stakeholders have been mapped in respect of the various activities mandated under the notification which has been shared with CPCB with the minutes of previous meeting. CPCB to coordinate with all the regulatory/enforcing agencies and ensure the compliance of all the activities in a time bound and on a regular basis

**(Action: CPCB, MoP, CEA, All State Govts, All stakeholders)**

12. Directorate of Mines and Geology may update the list of abandoned mines available in their respective States and make it available on State Govts. website including abandoned stone crushers. This may be put up on the website and updated every month.

**(Action: State Govts. of U.P. and M.P.)**

13. Environmental Compensation collected by respective SPCBs from the industries of Singrauli and Sonbhadra region prior to the opening of specific accounts and kept in common EC fund, may be transferred to respective accounts created by the State Govts, in addition to voluntary contributions. A mechanism to be put in place to utilise the funds received from this region to be used only for the said region for restoration of environment and relief. Further, State Forest Department may be engaged for carrying out measures for restoration of environment.

**(Action: State Govts. of U.P. & M.P.)**

14. Increase in utilisation of quantum of ash for making ash based products or eco-bricks through SHGs may be assessed by comparing pre- and post-skilling and outreach programmes. This may be updated every three months. SHGs to be

involved in making eco-bricks that can be used in tree plantation/afforestation, toilet construction activities of the public utility projects.

**(Action: State Govts. of U.P. & M.P.)**

15. Implementation of effective enforcement measures regarding mandatory use of ash based products/bricks by all building construction agencies within 300 km radius of TPPs as prescribed in Ash Utilisation Notification, 2021 and implementation of additional measures beyond the Notification, to minimise the disposal of ash in mine voids and low lying areas.

**(Action: State Govts. of U.P. and M.P.)**

16. Study on mixing of red mud with ash and its environmental aspects such as leaching of heavy metals into ground and surface water may be conducted and the results may be shared with CPCB.

**(Action: State Govt. of M.P., MPPCB)**

17. Ambient air quality monitoring in and around stone crushers to be conducted and baseline data of last two years (same season) be analysed to verify impact of mitigation measures taken by stone crushers. This may be carried out on a regular basis and data may be compiled in a continuous manner to assess the improvements as well as its sustainability. Carry out continuous evaluation of CEPI Score of Singrauli and Sonbhadara region and compile the data over the time in a continuous manner to assess the progress made. A presentation in this regard along with the implementation of CEPI action plan and verification/monitoring of desilting activities of Obra & Anpara (UPRVUNL) may be made during next meeting of the Mission.

**(Action: State Govts. of U.P. and M.P., UPPCB and MPPCB)**

18. SOP to be laid down for stipulation of measures to be taken during road transportation of ash, in the permission/ Consent to Operate issued for backfilling of mine void with ash and mixing the ash with OB.

**(Action: State Govt. of U.P. and M.P., MPPCB and UPPCB)**

19. Finalization and signing of MoU with M/s NCL for initiation of backfilling activities in Gorbi Pit-3, within a week and timelines for commencing backfilling activities to be shared. Action taken report in this regard may be submitted to the MoEF&CC.

**(Action: State Govt. of U.P., Anpara TPP, UPRVUNL, MoC and NCL)**

20. Carry out desiltation of remaining quantity of ash discharged in Rihand reservoir by Anpara TPP. Desilted ash disposed in low lying areas to be stabilized with soil cover and grass/ green belt. Progress to be updated on the website on monthly basis.

**(Action: State Govt. of U.P., Anpara and Obra TPP, UPRVUNL)**

21. All the pending/ ongoing activities in respect of implementation of decisions made during 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> meeting of the Mission shall be undertaken and action taken report shall be furnished. Progress to be updated on the website on monthly basis. Necessary formats may be put up on the website to enable all stakeholders to upload the progress online. Login and passwords for all stakeholders to be generated immediately.

**(Action: Concerned Ministry/ CPCB/ State Govts./ SPCBs/ Organisation)**

## Annexure I

List of Participants

1. Smt. Leena Nandan, Secretary, EF&CC
2. Shri Tanmay Kumar, Chairman, CPCB
3. Shri Naresh Pal Gangwar, Additional Secretary, MoEFCC
4. Sh. Anandji Prasad, Advisor (Project), MoC
5. Dr. Satyendra Kumar, Director, MoEFCC
6. Shri Tirupathi Reddy Kommidi, Additional Chief Manager, MoC
7. Shri, Anupam Shukla, Special Secretary, Department of Additional Sources of Energy, Govt. of U.P.
8. Shri Chandra Mohan Thakur, MS, MPPCB
9. Shri Ajay K. Sharma, MS, UPPCB
10. Shri Ashutosh Kumar Dubey, ADM, Sonbhadra, U.P.
11. Shri Nazimuddin, Scientist F, CPCB
12. Shri N. Subrahmanyam, Scientist D, MoEFCC
13. Shri Upendar Rapolu, Deputy Director, S&T, DGMS
14. Shri Amit Kumar, Director, CD, CEA
15. Shri P.S. Mohan Kumar, Deputy Director, CEA, MoP
16. Shri Ashish Kumar, Senior Mines Officer, Directorate of Geology and Mines, GoUP.
17. RO, MPPCB, Singrauli
18. Shri R.K. Gupta, Superintending Engineer, MPPCB
19. Shri Gaurav Gahlot, Scientist C, CPCB
20. Shri Ramesh Babu, Director (Operations), NTPC
21. Shri S.K. Takhele, CGM (SSEA), NTPC
22. Shri G., Rajashekar, GM (AMG), NTPC

23. Shri Ashwani Tyagi, DGM, NTPC
24. Shri Sanjeev Kumar, GM (Env. & Forest), NCL
25. Shri S.K. Dutta, Director (Technology), UPRVUNL
26. Shri Anand Kumar, Chief Engineer, UPRVUNL Shri Ravikant Raut, Chief Chemist, MPPGCL
27. Ms. Rehana Beg, Resident Engineer, MPPGCL
28. Shri Himanshu Verma, Sr. Manager, Lanco Anpara Power Ltd.
29. Shri Mukesh Mittal, Vice President (Env. & Sustainability), Hindalco
30. Shri Vinay Kr. Yadav, AGM (Environment), Grasim Industries Ltd.,
31. Renukoot
32. Dr. Vinod K. Verma, Head Regulatory Affairs, Hindalco
33. Shri Shripal Singh, DGM (Civil), NOIDA
34. Shri S.K. Bhargava, Executive Engineer, MPIDC, Bhopal
35. Shri Shubham Pundeer, Manager (Project), YEIDA
36. Jitendra Prasad, Additional Vice President (EHS), Sasan Power Ltd.
37. Shri K.K. Mahobe, CE Civil AU& PC
38. DMF, Singrauli, MP
39. CSPGL





### Uttar Pradesh Pollution Control Board

Building. No TC-12V Vibhuti Khand, Gomti Nagar, Lucknow-226010

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197196/UPPCB/Sonebhadra(UPPCBRO)/CTO/both/SONBHADRA/2023

Date: 07/12/2023

To,

M/s

**PILOT STUDY**

**Plot No. 7536 gha, Village- Billi Markundi, Forest Compartment No.5, Dala Range, Obra Forest Division, Sonbhadra,SONBHADRA,231219**

**Application Id-  
23633599**

**Consolidated Consent to Operate and Authorisation hereinafter referred to as the CCA (Consolidated Consent & authorization) (Fresh) under Section-25 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section-21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization under Rule-6(2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 notified under Environment (Protection) Act, 1986 as applicable (to be referred hereinafter as Water Act, Air Act and HW Rules respectively).**

CCA is hereby granted to **PILOT STUDY** located at **Plot No. 7536 gha, Village- Billi Markundi, Forest Compartment No.5, Dala Range, Obra Forest Division, Sonbhadra,SONBHADRA,231219**. subject to the provisions of the **Water Act, Air Act and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016** and the orders that may be made further and subject to following terms and conditions :-

1. This CCA **PILOT STUDY** granted for the period from **07/12/2023 to 31/12/2027** and valid for manufacturing of following products.

S No	Product	Quantity	Unit
1	Filling of Abandoned Mine with Red Mud and Fly Ash		Metric Tonnes/Day

2. **Conditions under Water(Prevention and Control of Pollution) Act -1974 as amended :-**

(i) The daily quantity of effluent discharge (KLD) :-

Kind of Effluent	Quantity(KLD)	Treatment facility	Discharge point
Domestic	5.0 KLD	Septic Tank	Soak Pit

(ii) Trade Effluent Treatment and Disposal :-The applicant shall operate Effluent Treatment Plant consisting of primary/secondary and tertiary treatment as is required with reference to influent quantity and quality.

In case of stoppage of functioning of ETP, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately.

(iii) The treated effluent shall be recycled to the maximum extent and should be reused within the premises for gardening etc. Quality of the treated effluent shall meet to the following general and specific standards as prescribed under Environment (Protection) Rules, 1986 and applicable to the unit from time-to-time :-

**Industrial Effluent Quality Standard**

S.No.	Parameter	Standard
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(iv) Sewage Treatment and Disposal :- The applicant shall provide comprehensive STP as is required with reference to influent quantity and quality. In case of stoppage of functioning of STP, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately.

(v) The treated sewage shall be reused in gardening as far as possible. The STP shall be maintained continuously so as to achieve the quality of the treated sewage to the following standards.

S No.	Parameters	Standards
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### 3. Conditions under Air (Prevention and Control of Pollution) Act -1981 as amended :-

i) The applicant shall use following fuel and install a comprehensive control system consisting of control equipment as required with reference to generation of emissions and operate and maintain the same continuously so as to achieve the level of pollutants to the following standards.

#### Air Pollution Source Details

S No.	Air Pollution Source	Type of fuel	Stack no	Control Device	Height of Stack
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#### Emission Quality Standards

S No.	Stack no	Parameters	Standards
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In case of stoppage of functioning of air pollution control equipment, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately

(ii) The unit will not use any type of restricted fuel.

iii) Noise from the D.G. Set and other source(s) should be controlled by providing an acoustic enclosure as is required for meeting the ambient noise standards for night and day time as prescribed for respective areas/zones (Industrial, Commercial, Residential, Silence) which are as follows :-

Day time : from 6.00 a.m. to 10.00 p.m., Night time: from 10.00 p.m. to 6.00 a.m.

Standards for Noise level in db(A) Leq	Industrial Area		Commercial Area		Residential Area		Silence Zone	
	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time
	75	70	65	55	55	45	50	40

### 4. Conditions under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 :-

The Factory Manager of M/s PILOT STUDY. is hereby granted an authorization to operate a facility for collection and storage of Hazardous wastes. The authorization is granted to operate a facility for generation, collection and storage of hazardous wastes within factory premises for following category of wastes:-

S.No.	Category of Hazardous Waste as per the Schedules I, II and III of these rules	Authorised mode of disposal or recycling or utilisation or co-processing, etc.	Quantity(ton/annum)
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**The authorization shall be in force and shall be valid upto 31/12/2027.** The authorization is subject to the conditions stated below and such conditions as may be specified in the rules for the time being in force under Environment (Protection) Act, 1986.

**Terms and conditions of Hazardous Waste authorization :-**

- (i) The authorization shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
- (ii) The authorization and its renewal shall be produced for inspection at the request of an officer authorized by the SPCB.
- (iii) The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous wastes without obtaining prior permission of the SPCB.
- (iv) Any unauthorized changes in personnel, equipment as working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
- (v) It is the duty of the authorized person to take prior permission of the SPCB to close down the facility.
- (vi) An application for the renewal of an authorization shall be made as laid down under these rules.
- (vii) The unit shall comply with any other conditions specified in the guidelines issued by the MoEF or CPCB/SPCB from time to time.
- (viii) The authorization is valid for temporary storage of Hazardous Waste within premises only.
- (ix) The authorized agency shall ensure that on-line data with regard to quantity and nature of hazardous chemicals being used in the plant as well as air emission and waste generated within premises is displayed on Display Board of size 6x4 feet outside the main factory gate within premises
- (x) It is duty of the authorized person to take prior permission of this Board to close and cleanup the facility for treatment, storage and disposal of hazardous waste.
- (xi) The applicant shall maintain record of hazardous waste in Form-3 and shall submit annual return in Form-4 on or before the 30th day of June following to the financial year to which that return relates.
- (xii) In no case any hazardous waste shall be disposed off on land, in any drain, or into any water stream. All spillage must also be safely collected and stored.
- (xiii) Before the hazardous waste is stored or dumped in the facility, applicant must conduct a detailed physical and chemical analysis of hazardous waste sample and report to the Board.
- (xiv) Dried hazardous sludge from the process in the plant shall be stored in double lined HDPE pit constructed with R.C.C. or such material which does not react with the waste contained in it.
- (xv) The storage area should be fenced properly and Sign/Notice Board indicating 'Danger' and 'Hazardous' shall be displayed at appropriate position both in Hindi and English.
- (xvi) The industry shall store non-ferrous metal waste, used oil/spent oil waste in sealed drums placed on impervious floor under covered shed. Hazardous waste if required shall be sold only to Registered Recyclers/Re-processors.
- (xvii) In case of any transportation of hazardous waste, the details in Form-10 of the Hazardous and Other Wastes Rules, 2016 shall be submitted to the Board.

**5. Essential documents to be submitted by the Industry/Unit as Applicable:-**

- (i) Annual return in Form-4 and Waste Disposal Manifest in Form-10 under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and Third Party Audit Report.
- (ii) Environment Statement in Form-V of Environment (Protection) Rules, 1986.
- (iii) Quarterly compliance report of the CCA, photograph of ETP/APCs/Waste Storage Area.

6. Competent Authority reserves the right to change/modify/add any time any condition of this CCA.

7. Unit has to comply with the following specific & general conditions. Non compliance of any provision of this CCA and provisions of the Water Act, Air Act and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 will results in legal action under the aforesaid Acts and Rules.

8. In compliance to the G.O 1011/81-7-2021-09 (Writ)/2016 dated.13.10.2021 issued by Department of Environment, Forest and Climate Change, Uttar Pradesh. You are directed to develop Miyawaki Forest as

per the SOP available at URL:-<http://www.upecp.in/TrainingSession.aspx> for ensuring timely compliance of this direction, you are hereby directed to submit a bank guarantee with minimum validity of one year of the amount equivalent to the sum of initial consent fees (Air and Water) or Rs. 50,000/- (Rs. Fifty Thousand Only) whichever is more, within 30 days from the date of issuance of this certificate. In case of non-compliance of this direction, your consent will be revoked by the Board.

9. If the unit uses the ground water and requires the permission from SGWA/CGWA for water abstraction then the industry will have to obtain No objection certificate for abstraction of ground water. It will be the responsibility of the industry to comply with the various conditions of the NOC obtained from the competent authority and submit to the Board, within 3 months time failing which CTO will be revoked.

#### **General Conditions:-**

1. The applicant shall get analysed the samples of effluent/emission/hazardous wastes at least once in a three month from the laboratory recognized by the MoEF and shall report to the UPPCB.
2. The applicant shall however, not without the prior consent of the Board bring into use any new or altered outlet for the discharge of effluent or gases emission or sewage waste from the unit.
3. Treated Industrial waste water and domestic waste water shall be disposed jointly at one disposal point. The applicant shall provide discharge measurement equipment at final disposal point.
4. The applicant shall strictly comply with conditions of this CCA and submit compliance report of stipulated conditions within 30 days of receipt of this CCA. If at any point of time, it is found that the industry is not complying with stipulated conditions or any further direction/instruction issued by the Board, legal action shall be initiated against the applicant.
5. The applicant shall maintain good house keeping. All valves/pipes/sewer/drains etc. must be leak-proof
6. The industry shall provide uninterrupted entry to the STP/ETP inlet and outlet points, Air Pollution Control equipment and stack for smooth sampling/monitoring of efficiency of pollution control systems.
7. The industry shall provide Inspection Book at the time of inspection to the Board's officials.
8. Whenever due to any accident or other unforeseen act or event, such emission occurs or is apprehended to occur in excess of standards laid down, such information shall be reported to the Board's offices and all other concerned offices. In case of failure of pollution control equipment, the production process connected to it shall be stopped with immediate effect.
9. The industry shall operate in a manner so that all emissions be emitted through designated chimney/stack only.
10. In case of any damage to the agriculture productivity, human habitation etc. by the operation of industry, it shall be imperative to stop production in the industry with immediate effect and such information shall be reported to Board's offices. The industry shall be liable to pay compensation also in such cases as decided by the Competent Authority.
11. The applicant shall apply before the 60 days of expiry of CCA or any change in production types/production capacity/manufacturing process/capacity enhancement etc. or any change in effluent discharge point or emission point
12. The Board reserves the right to revoke/add/modify any stipulated condition issued along with CCA, as may be necessary.

#### **Specific Conditions:-**

1. This CCA is valid for Pilot Study to assess the impact of filling the Abandoned Mines at Plot No. 7536 gha, Area 0.55 Hectare, Village- Billi Markundi, Forest Compartment No.5, Dala Range, Obra Forest Division, Sonbhadra with Red Mud and/or Fly Ash.
2. Proponent shall submit the technical feasibility report with design details prepared by reputed technical institute within 03 months, thereafter the backfilling of red mud should be done and Unit shall comply with the suggestions given by that technical institute.

3. Proponent shall comply with the provisions of notification no. S.O. 5481(E) dated 31.12.2021 regarding Fly ash utilization issued by MoEF&CC and Guidelines for handling and management of Red Mud generated from Alumina Plants.
4. Proponent shall provide suitable Effluent Treatment Plant for treatment of waste water/leachate accumulated over the pond during its operation, seepage water etc. and also made provisions for utilization/disposal of treated water.
5. Proponent shall use liner and prepare the base to make it impervious before starting the operation at backfilling site.
6. Proponent should first mix redmud , flyash and stablising agent to stabilize the lot and get its TCLP test done through UPPCB lab and after the test passes TCLP test than only backfilling of the stabilized lot should be done.
7. Red Mud/Fly Ash shall be transported only through covered vehicles having PUC certificate.
8. The Collection, Loading, Transportation, Unloading, Filling of Red Mud shall be done in such a manner that ambient air quality of surrounding area does not get affected.
9. Ambient Air quality monitoring of the surrounding area of the site shall be done twice a month by the NABL Accredited/MoEF&CC approved laboratory and monitoring report shall be submitted to the Board.
10. Proponent shall develop the site for backfilling of abandoned mines with mixture of Red Mud and Fly Ash in such a manner that underground water does not gets contaminated.
11. The land shall be developed with proper lining as per the guidelines of CPCB regarding Dry ash disposal.
12. The analysis report of ground water of the proposed site analyzed by NABL Accredited/MoEF&CC approved Laboratory shall be submitted on monthly basis to the Board.
13. Red Mud/ Fly Ash shall be filled in abandoned mines in such manner, so that no water, air and soil pollution takes place. Industry shall comply with provisions of Fly Ash notification S.O. 254(E) dated 25-01-2016 as amended and shall submit the compliance report quarterly.
14. The filling of Red Mud in abandoned mines shall be done in the layer of 30 cm after compacting through a vibratory roller. After filling of Red Mud upto adequate height, the disposal site shall be filled with a soil layer of minimum 30 cm high.
15. The three tier plantation (Large tree, small tree and shrubs) shall be done in 10 meter area around the proposed site.
16. Industry should also take insurance under public liability insurance Act, for providing sufficient compensation in case of any untoward accident.
17. Proponent shall establish 2 Nos. Piezometers for monitoring of ground water quality at the backfilling site.
18. Storm water drain shall be made to discharge the rain water.
19. Proponent shall obtain necessary permission from the UPGWA, if required.
20. All approach roads shall be sprinkled with water to suppress the dust emission.
21. Proponent shall provide barbed wire fencing around the proposed site, so that animals could not be entered in the site.
22. Proponent shall abide by the directions issued by Hon'ble Court, Hon'ble NGT, MoEF&CC, CPCB and UPPCB from time to time.
23. Proponent shall also make effective arrangement for controlling leachate pollution/dust emission.
24. Proponent shall make proper arrangement so that there is no air pollution, during windy condition.
25. Proponent shall install proper water sprinkling system to suppress dust during backfilling of Red Mud/Fly Ash in the abandoned mines at proposed site.
26. Proponent shall comply with the provisions of Hazardous and Other Waste (Management and Transboundary Movement) Rules 2016. The generated hazardous waste shall be disposed through Common TSDF/Authorized Recyclers and its details in Form-10 shall be submitted to the Board from time to time.

27. A time bound program for the development of green belt shall be submitted within 01 month.
28. Proponent shall comply with the provisions of Environment (Protection) Act 1986, Water (Prevention and Control of Pollution) Act, 1974 as amended, Air (Prevention and Control of Pollution) Act, 1981 as amended.

RAJENDRA  
SINGH

Digitally signed by  
RAJENDRA SINGH  
Date: 2023.12.11  
13:42:25 +05'30'

**Chief Environmental Officer Circle-2**

Copy to:

Regional Officer, UPPCB, Sonbhadra with direction to send the compliance report of CCA conditions on quarterly basis to Head Office.

RAJENDR  
A SINGH

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RAJENDRA SINGH  
Date: 2023.12.11  
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**Chief Environmental Officer Circle-2**



**मिशन LiFE - पर्यावरण के लिए जीवन शैली**  
(Lifestyle For Environment)  
**जनसहभागिता का सन्देश**



- स्वच्छता – देशसेवा में अपने परिवेश की स्वच्छता हेतु अपना सक्रिय योगदान सुनिश्चित करें
- संकल्प लें -एकल उपयोग प्लास्टिक उत्पाद जैसे कप, तश्तरी, चम्मच, स्ट्रॉ, ईयरबड्स आदि का उपयोग न हो एवं पर्यावरण अनुकूल विकल्पों जैसे कागज/पत्तों से बने दोने या कटलरी को प्राथमिकता दी जाय ।
- एकल उपयोग प्लास्टिक उत्पाद के प्रयोग को रोकने एवं प्लास्टिक बैग के बजाय कपड़े के थैले का उपयोग करने मात्र से 375 मिलियन टन ठोस (प्लास्टिक) कचरे का उत्सर्जन बचाया जा सकता है
- चक्रीय अर्थव्यवस्था (सर्कुलर इकोनॉमी) का समुचित कार्यान्वयन वर्ष 2030 तक लगभग 14 लाख करोड़ रुपये की अतिरिक्त बचत उत्पन्न कर सकता है | वेस्ट /अपशिष्ट फेकने के पूर्व सोचें, ये किसी का संसाधन तो नहीं ...?
- अनुपयोगी इलेक्ट्रिक / इलेक्ट्रॉनिक उत्पाद को कचरे में फेकने से रुकें | इसके उपयुक्त निस्तारण हेतु इसे प्राधिकृत ई – वेस्ट रीसाइकलर को दें | प्राधिकृत ई-रीसाइक्लिंग इकाई में अनुपयोगी इलेक्ट्रिक / इलेक्ट्रॉनिक उत्पाद को देने मात्र से 0.75 मिलियन टन तक ई-कचरे का पुनर्चक्रण किया जा सकता है एवं ई-कचरे के विषम पर्यावरणीय दुष्प्रभाव से बचा जा सकता है
- बाहर जाने समय - सोचें कि क्या आपको वास्तव में परिवहन की आवश्यकता है - वह भी क्या व्यक्तिगत रूप से ? छोटी दूरी के लिए पैदल चलना पसंद करें, अथवा सम्भव हो तो कार पूल के रूप में संसाधन को साझा करें अथवा सार्वजनिक परिवहन पर विचार करें
- घरेलू स्तर पर कम से कम ठोस अपशिष्ट का उत्सर्जन करें और इनका प्रथाङ्कीकरण करें
- उपयोगी शेष खाद्य सामग्री आपके स्वयं प्रयास अथवा निकटस्थ सक्रिय स्वयं सेवी संस्थाओं की सहायता से समाज के वंचित वर्ग तक पहुंचाई जा सकती है | वहीं अनुपयोगी भोजन /खाद्य सामग्री को कंपोस्ट (वर्मी कम्पोस्ट) करने से 15 अरब टन भोजन को नष्ट होने से बचाया जा सकता है
- ध्यान रखें - उपयुक्त नल और शावर के उपयोग से पानी की खपत को 30 - 40% तक कम किया जा सकता है। एवं उपयोग में न होने पर नलों को बंद रखने मात्र से 9 ट्रिलियन लीटर पानी बचाया जा सकता है
- ट्रेफिक लाइट/रेलवे क्रॉसिंग पर कार/स्कूटर के इंजन बंद करने मात्र से 22.5 विलियन kWh तक ऊर्जा की बचत हो सकती है
- परम्परागत बल्ब के स्थान पर CFL का उपयोग बिजली की खपत में प्रभावी कमी लाते हैं | उपयोग में न होने पर बिजली उपकरणों को बंद करें | स्टार रेटेड विद्युत उपकरणों के उपयोग को प्राथमिकता दें

हमारे द्वारा अपनी जीवन शैली की प्राथमिकताओं का उचित और पर्यावरण अनुकूल पुनर्निर्धारण समाज और पर्यावरण के प्रति हमारा दायित्व है |

**Consent to Operate compliance of various conditions**

Sr. No.	Condition	Status								
1.	<p>This CCA PILOT STUDY granted for the period from 07/12/2023 to 31/12/2027 and valid for manufacturing of following products.</p> <table border="1"> <thead> <tr> <th>S No</th> <th>Product</th> <th>Quantity</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Filling of Abandoned Mine with Red Mud and Fly Ash</td> <td></td> <td>Metric Tonnes/Day</td> </tr> </tbody> </table>	S No	Product	Quantity	Unit	1	Filling of Abandoned Mine with Red Mud and Fly Ash		Metric Tonnes/Day	Noted, will comply
S No	Product	Quantity	Unit							
1	Filling of Abandoned Mine with Red Mud and Fly Ash		Metric Tonnes/Day							
<b>Conditions under Water (Prevention and Control of Pollution) Act -1974 as amended</b>										
2.	<p>(i) The daily quantity of effluent discharge (KLD)</p> <table border="1"> <thead> <tr> <th>Kind of Effluent</th> <th>Quantity(KLD)</th> <th>Treatment facility</th> <th>Discharge point</th> </tr> </thead> <tbody> <tr> <td>Domestic</td> <td>5.0 KLD</td> <td>Septic Tank</td> <td>Soak Pit</td> </tr> </tbody> </table>	Kind of Effluent	Quantity(KLD)	Treatment facility	Discharge point	Domestic	5.0 KLD	Septic Tank	Soak Pit	This is a pilot project for backfilling abandoned mine with Red mud and Fly ash where there will be no effluent to be generated. However there is a need of 5 KLD of water will be used available in the nearby pond (surface water) for plantation.
Kind of Effluent	Quantity(KLD)	Treatment facility	Discharge point							
Domestic	5.0 KLD	Septic Tank	Soak Pit							
	<p>(ii) Trade Effluent Treatment and Disposal: The applicant shall operate Effluent Treatment Plant consisting of primary/secondary and tertiary treatment as is required with reference to influent quantity and quality. In case of stoppage of functioning of ETP, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately.</p>	Wish to submit that the pilot project involves the backfilling of abandoned void/ quarry and plantation (afforestation) on the capping of back-filled void. Hence, there is no trade effluent in this pilot project.								
	<p>(iii) The treated effluent shall be recycled to the maximum extent and should be reused within the premises for gardening etc. Quality of the treated effluent shall meet to the following general and specific standards as prescribed under Environment (Protection) Rules, 1986 and applicable to the unit from time-to-time.</p>	May kindly note that this project involve only the backfilling of void and afforestation over it and hence, there will no trade effluent in this project, so this condition is not applicable.								
	<p>(iv) Sewage Treatment and Disposal: The applicant shall provide comprehensive STP as is required wither reference to influent quantity and quality. In case of stoppage of functioning of STP, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately</p>	Since this project is backfilling and afforestation, there will be no trade effluent, so this condition is not applicable								
	<p>(iv) The treated sewage shall be reused in gardening as far as possible. The STP shall be maintained continuously so as to achieve the quality of the treated sewage to the following standards.</p>	There is no trade effluent in this project as this is the backfilling of abandoned mine for afforestation purpose, so this condition is not applicable								
<b>3. Conditions under Air (Prevention and Control of Pollution) Act -1981 as amended</b>										
	<p>(i) The applicant shall use following fuel and install a comprehensive control system consisting of control equipment as required with reference to generation of emissions and operate and maintain the same continuously so as to achieve the level of pollutants to the following standards. In case of stoppage</p>	This project involves the filling of abandoned mine void and afforestation over it. Hence, there is no requirement of machinery and fuel to be								

*M.D. Srinivasan*

	of functioning of air pollution control equipment, production has to be stopped immediately and this Board has to be intimated by fax/phone/email with a report in this regard to be dispatched immediately	utilised in this project so this conditions are not applicable.																									
	(ii) The unit will not use any type of restricted fuel.	Noted																									
	Noise from the D.G. Set and other source(s) should be controlled by providing an acoustic enclosure as is required for meeting the ambient noise standards for night and day time as prescribed for respective areas/zones (Industrial, Commercial, Residential, Silence) which are as follows: Day time: from 6.00 a.m. to 10.00 p.m., Night time: from 10.00 p.m. to 6.00 a.m.	Noted and adhere to it Will be complied																									
	<table border="1"> <thead> <tr> <th rowspan="3">Standards for Noise level in db(A) Leq</th> <th colspan="2">Industrial Area</th> <th colspan="2">Commercial Area</th> <th colspan="2">Residential Area</th> <th colspan="2">Silence Zone</th> </tr> <tr> <th>Day Time</th> <th>Night Time</th> <th>Day Time</th> <th>Night Time</th> <th>Day Time</th> <th>Night Time</th> <th>Day Time</th> <th>Night Time</th> </tr> </thead> <tbody> <tr> <td>75</td> <td>70</td> <td>65</td> <td>55</td> <td>55</td> <td>45</td> <td>50</td> <td>40</td> </tr> </tbody> </table>	Standards for Noise level in db(A) Leq	Industrial Area		Commercial Area		Residential Area		Silence Zone		Day Time	Night Time	75	70	65	55	55	45	50	40							
Standards for Noise level in db(A) Leq	Industrial Area		Commercial Area		Residential Area		Silence Zone																				
	Day Time		Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time																		
	75	70	65	55	55	45	50	40																			
<b>4. Conditions under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016</b>																											
(i)	The authorization shall comply with the provisions of the Environment (Protection) Act, 1986, and their rules made there under.	Noted																									
(ii)	The authorization and its renewal shall be produced for inspection at the request of an officer authorized by the SPCB.	Agreed.																									
(iii)	The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous wastes without obtaining prior permission of the SPCB.	Noted																									
(iv)	Any unauthorized changes in personnel, equipment as working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.	We agree to the condition.																									
(v)	It is the duty of the authorized person to take prior permission of the SPCB to close down the facility.	Noted																									
(vi)	An application for the renewal of an authorization shall be made as laid down under these rules.	Noted																									
(vii)	The unit shall comply with any other conditions specified in the guidelines issued by the MoEF&CC or- CPCB/SPCB from time to time.	Ensure that, we will comply with any other conditions specified in the guidelines issued by the MoEF&CC or CPCB/SPCB from time to time.																									
(viii)	The authorization is valid for temporary storage of Hazardous Waste within premises only.	Noted																									
(ix)	The authorized agency shall ensure that on-line data with regard to quantity and nature of hazardous chemicals being used in the plant as well as air emission and waste generated within	This condition is not applicable for us as this is a pilot project for backfilling abandoned mine																									

H.D. Imprakash

	premises is displayed on Display Board of size 6x4 feet outside the main factory gate within premises.	with Red mud, Fly ash and afforestation over the soil capping, where there is no hazardous waste generated from the backfilling and afforestation activities.
(x)	It is duty of the authorized person to take prior permission of this Board to close and clean-up the facility for treatment, storage and disposal of hazardous waste.	Not Applicable to this project as it involves afforestation work
(xi)	The applicant shall maintain record of hazardous waste in Form-3 and shall submit annual return in Form-4 on or before the 30th day of June following to the financial year to which that return relates. (xii) In no case any hazardous waste shall be disposed-off on land, in any drain, or into any water stream. All spillages must also be safely collected and stored.	This condition is not applicable as this is abandoned mine backfilling and afforestation project.
(xii)	Before the hazardous waste is stored or dumped in the facility, applicant must conduct a detailed physical and chemical analysis of hazardous waste sample and report to the Board.	This condition is not applicable as this is abandoned mine backfilling project.
(xiii)	Dried hazardous sludge from the process in the plant shall be stored in double lined HDPE pit constructed with R.C.C. or such material which does not react with the waste contained in it. (xv) The storage area should be fenced properly and Sign/Notice Board indicating 'Danger' and 'Hazardous' shall be displayed at appropriate position both in Hindi and English.	This condition is not applicable as this project is not going to produce any sludge as it involves abandoned mine backfilling and afforestation works.
(xiv)	The industry shall store non-ferrous metal waste, used oil/spent oil waste in sealed drums placed on impervious floor under covered shed. Hazardous waste if required shall be sold only to Registered Recyclers/Re-processors.	Noted
(xv)	In case of any transportation of hazardous waste, the details in Form-10 of the Hazardous and Other Wastes Rules, 2016 shall be submitted to the Board.	This condition is not applicable as this is involves backfilling of the abandoned mine voids and afforestation.
<b>5. Essential documents to be submitted by the Industry/Unit as Applicable: -</b>		
(i)	Annual return in Form-4 and Waste Disposal Manifest in Form-10 under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and Third Party Audit Report.	This condition is not applicable to this project as the project work involves backfilling and afforestation on abandoned mine void.
(ii)	Environment Statement in Form-V of Environment (Protection) Rules, 1986.	This condition is not applicable to this project as this is backfilling of abandoned mine void and afforestation.
(iii)	Quarterly compliance report of the CCA, photograph of ETP/APCs/Waste Storage Area.	This condition is not applicable as this is abandoned mine backfilling and afforestation project, there is no need of any ETP. However, water sprinkler. Water tanker, etc. needs to be deployed to control any dust emission due to loading & unloading and road transportation, etc. Quarterly

*H.D. Omprakash*

		compliance report will be submitted in your good office.
6	Competent Authority reserves the right to change/modify/add any time any condition of this CCA.	Noted
7	Unit has to comply with the following specific & general conditions. Non-compliance of any provision of this CCA and provisions of the Water Act, Air Act and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 will results in legal action under the aforesaid Acts and Rules.	Noted
8	In compliance to the G.O 1011/81-7-2021-09 (Writ)/2016 dated.13.10.2021 issued by Department of Environment, Forest and Climate Change, Uttar Pradesh. You are directed to develop Miyawaki Forest as per the SOP available at URL:- <a href="http://www.upecp.in/TrainingSession.aspx">http://www.upecp.in/TrainingSession.aspx</a> for ensuring timely compliance of this direction, you are hereby directed to submit a bank guarantee with minimum validity of one year of the amount equivalent to the sum of initial consent fees (Air and Water) or Rs. 50,000/- (Rs. Fifty Thousand Only) whichever is more, within 30 days from the date of issuance of this certificate. In case of noncompliance of this direction, your consent will be revoked by the Board.	As per Detail Project Report (DPR), Plantation/ green cover activity will be started after completing backfilling, laying to native soil cover and other required activities. We made Bank Guarantee of Rs. 50,000/- (Rs. Fifty Thousand Only) valid up to one-year period. Original copy of Bank Guarantee of Rs. 50,000/- (Rs. Fifty Thousand Only) enclosed herewith as <b>Annexure-I</b>
9	If the unit uses the groundwater and requires the permission from SGWA/CGWA for water abstraction, then the industry will have to obtain No objection certificate for abstraction of ground water. It will be the responsibility of the industry to comply with the various conditions of the NOC obtained from the competent authority and submit to the Board, within 3 months' time failing which CTO will be revoked.	This condition is not applicable. In this project no bore well will be dug, no groundwater will be utilised for the project purpose.
<b>General Conditions:</b>		
1	The applicant shall get analysed the samples of effluent/emission/hazardous wastes at least once in a three month from the laboratory recognized by the MoEF&CC and shall report to the UPPCB.	This condition is not applicable as this is abandoned mine backfilling and afforestation project and there is no effluent/emission/hazardous wastes will be generated due to backfilling activity except-Fugitive dust emission will be generated due to road transport, material loading & unloading which will be control by deploying water sprinkler, water tanker etc. and other dust controlling arrangement
2	The applicant shall however, not without the prior consent of the Board bring into use any new or altered outlet for the discharge of effluent or gases emission or sewage waste from the unit.	Noted.
3	Treated Industrial wastewater and domestic wastewater shall be disposed jointly at one disposal point. The applicant shall provide discharge measurement equipment at final disposal point.	This is a pilot project for backfilling abandoned mine with Red mud and Fly ash, cover with top soil to support plantation where there is no effluent generated.

H.D. Impeakash

4	The applicant shall strictly comply with conditions of this CCA and submit compliance report of stipulated conditions within 30 days of receipt of this CCA. If at any point of time, it is found that the industry is not complying with stipulated conditions or any further direction/instruction issued by the Board, legal action shall be initiated against the applicant.	We accept the condition, we will strictly comply with conditions given in CTO consent and submit compliance report to the Board.
5	The applicant shall maintain good housekeeping. All valves/pipes/sewer/drains etc. must be leak-proof. The industry shall provide uninterrupted entry to the STP/ETP inlet and outlet points, Air Pollution Control equipment and stack for smooth sampling/monitoring of efficiency of pollution control systems.	We will maintain good housekeeping at backfilling site. However, this project involves backfilling abandoned mine with Red mud and Fly ash and afforestation where there is no effluent & stationery emission generated except- DG operation for Emergency electricity supply.
6	The industry shall provide Inspection Book at the time of inspection to the Board's officials.	Noted.
7	Whenever due to any accident or other unforeseen act or event, such emission occurs or is apprehended to occur in excess of standards laid down, such information shall be reported to the Board's offices and all other concerned offices. In case of failure of pollution control equipment, the production process connected to it shall be stopped with immediate effect.	Noted.
8	The industry shall operate in a manner so that all emissions be emitted through designated chimney/stack only.	Not applicable to this project, as there is no designated chimney/stack needs to be constructed/ installed for backfilling of void and plantation project.
9	In case of any damage to the agriculture productivity, human habitation etc. by the operation of industry, it shall be imperative to stop production in the industry with immediate effect and such information shall be reported to Board's offices. The industry shall be liable to pay compensation also in such cases as decided by the Competent Authority.	Noted.
10	The applicant shall apply before the 60 days of expiry of CCA or any change in production types/production capacity/manufacturing process/capacity enhancement etc. or any change in effluent discharge point or emission point.	Noted.
11	The Board reserves the right to revoke/add/modify any stipulated condition issued along with CCA, as may be necessary.	Noted.
<b>Specific Conditions:</b>		
1	This CCA is valid for Pilot Study to assess the impact of filling the Abandoned Mines at Plot No. 7536 gha, Area 0.55 Hectare, Village- Billi Markundi, Forest Compartment No.5, Dala Range, Obra Forest Division, Sonbhadra with Red Mud and/or Fly Ash.	Noted.
2	Proponent shall submit the technical feasibility report with design details prepared by reputed technical institute within 03 months, thereafter the backfilling of red mud should be done and Unit shall comply with the suggestions given by that technical institute.	We have uploaded the Detail Project Report at the time of submitting CCA application at Nivesh Mitra Portal. We are attaching herewith DPR as an

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		<b>Annexure – II</b> for ready reference
3	Proponent shall comply with the provisions of notification no. S.O. 5481(E) dated 31.12.2021 regarding Fly ash utilization issued by MoEF&CC and Guidelines for handling and management of Red Mud generated from Alumina Plants.	We are adhere and will comply all applicable condition given in Fly ash utilization guideline issued by MoEF&CC and Guidelines for handling and management of Red Mud generated from Alumina Plants.
4	Proponent shall provide suitable Effluent Treatment Plant for treatment of wastewater/leachate accumulated over the pond during its operation, seepage water etc. and also made provisions for utilization/disposal of treated water.	This is pilot project for backfilling and afforestation of abandoned mine void with Red mud and Fly ash where there will be no effluent generated. For leachate, we will construct Leachate collection system for leachate accumulated over the pond during its operation, water collection from the bottom for seepage water collection, etc. If the leachate collected is not meeting the leachate standard, the same will be taken to the ETP plant for treatment.
5	Proponent shall use liner and prepare the base to make it impervious before starting the operation at backfilling site.	As per the DRP, a soil layer will be layed in the bottom and above that a double liner will be used so as to prepare the base to make it impervious before starting the operation of backfilling of the void with red mud and fly ash.
6	Proponent should first mix red mud, fly ash and stabilising agent to stabilize the lot and get its TCLP test done through UPPCB lab and after the test passes TCLP test than only backfilling of the stabilized lot should be done.	Noted. Backfilling will be done with Red Mud and fly ash. Red mud and Fly ash TCLP test done through UPPCB laboratory, Lucknow. All results have been within norms. Red mud and Fly ash TCLP test report enclosed herewith as <b>Annexure-III</b> .
7	Red Mud/Fly Ash shall be transported only through covered vehicles having PUC certificate.	Noted. We ensure that, Red Mud/Fly Ash will be transported only through covered vehicles having PUC certificate.
8	The Collection, Loading, Transportation, Unloading, Filling of Red Mud shall be done in such a manner that ambient air quality of surrounding area does not get affected.	We ensure that, the Collection, Loading, Transportation, Unloading,

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		Filling of Red Mud shall be done in such a manner that ambient air quality of surrounding area does not get affected.
9	Ambient Air quality monitoring of the surrounding area of the site shall be done twice a month by the NABL Accredited/MoEF&CC approved laboratory and monitoring report shall be submitted to the Board.	Ambient Air quality monitoring of the surrounding area of the site will be done twice a month by the NABL Accredited/MoEF&CC approved laboratory and monitoring report will be submitted to the Board on regular basis.
10	Proponent shall develop the site for backfilling of abandoned mines with mixture of Red Mud and Fly Ash in such a manner that underground water does not gets contaminated.	Noted. We will develop the site with proper/ efficient lining for backfilling of abandoned mines with Red Mud and Fly Ash in such a manner that it will not interact and underground water does not gets contaminated.
11	The land shall be developed with proper lining as per the guidelines of CPCB regarding Dry ash disposal.	We agree to the condition, proper lining as mentioned in the DPR and will be deployed at site. After completing lining work, Red mud filling work will be started.
12	The analysis report of ground water of the proposed site analysed by NABL Accredited/MoEF&CC approved Laboratory shall be submitted on monthly basis to the Board.	Noted. However, we are enclosing herewith the base line Groundwater analysis test report by NABL Accredited/MoEF&CC approved Laboratory as <b>Annexure-IV</b> for ready reference.
13	Red Mud/ Fly Ash shall be filled in abandoned mines in such manner, so that no water, air and soil pollution takes place. Industry shall comply with provisions of Fly Ash notification S.O. 254(E) dated 2501-2016 as amended and shall submit the compliance report quarterly.	Noted and will be complied Red Mud/ Fly Ash will be filled in abandoned mine in such a manner, so that no water, air and soil pollution takes place. We will comply with provisions of Fly Ash notification S.O. 254(E) dated 2501-2016 as amended and will be submitted the compliance report to the UPPCB on quarterly basis.

*A.D. Omprakash*

14	The filling of Red Mud in abandoned mines shall be done in the layer of 30 cm after compacting through a vibratory roller. After filling of Red Mud up to adequate height, the disposal site shall be filled with a soil layer of minimum 30 cm high.	Will be complied.
15	The three-tier plantation (Large tree, small tree and shrubs) shall be done in 10 meter area around the proposed site.	The three-tier plantation work that involves the planting, introduction of grass, shrubs/ herbs, which will be followed by planting of large tree, small trees, etc. shall be done in 10-meter area around the proposed project site. Plantation will be done after backfilling work completed & plantation will be done as per the expert consultation and developed plantation plan.
16	Industry should also take insurance under public liability insurance Act, for providing sufficient compensation in case of any untoward accident.	Will be complied Public liability insurance Policy has been for Backfilling project for providing sufficient compensation in case of any untoward accident. Copy of Public liability insurance Policy is enclosed herewith as <b>Annexure-V</b> for ready reference
17	Proponent shall establish 2 Nos. Piezometers for monitoring of ground water quality at the backfilling site.	Noted and will be complied We will be establishing 2 numbers of Piezometers for monitoring of groundwater quantity and water sample analysis for water quality at the backfilling site.
18	Storm water drain shall be made to discharge the rainwater.	Noted and will be complied
19	Proponent shall obtain necessary permission from the UPGWA, if required.	This condition is not applicable to this project, since there is no groundwater use is involved
20	All approach roads shall be sprinkled with water to suppress the dust emission.	Noted and will be complied
21	Proponent shall provide barbed wire fencing around the proposed site, so that animals could not be entered in the site.	Noted, Will be ensured that no animal will stray into the project site.
22	Proponent shall abide by the directions issued by Hon'ble Court, Hon'ble NGT, MoEF&CC, CPCB and UPPCB from time to time.	Noted
23	Proponent shall also make effective arrangement for controlling leachate pollution/dust emission.	Noted and agreed. We will make effective arrangement for controlling leachate pollution/dust emission. For leachate, we will be constructed Leachate

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		collection system for leachate accumulated over the pond during its operation, seepage water etc. For dust emission, water sprinkler, water tanker will be deployed at site to avoid dust emission.
24	Proponent shall make proper arrangement so that there is no air pollution, during windy condition.	Agreed We will make proper arrangement like water sprinkler, water tanker so that there will not be any air pollution, during windy condition.
25	Proponent shall install proper water sprinkling system to suppress dust during backfilling of Red Mud/Fly Ash in the abandoned mines at proposed site.	Noted Proper arrangements will be made
26	Proponent shall comply with the provisions of Hazardous and Other Waste (Management and Transboundary Movement) Rules 2016. The generated hazardous waste shall be disposed through Common TSDF/Authorized Recyclers and its details in Form-10 shall be submitted to the Board from time to time.	In this project, there will not be any Hazardous Waste generation as this project involves backfilling of abandoned mine void for afforestation purpose. Further the filling material is non-hazardous, so this condition is not applicable to this project.
27	A time bound program for the development of green belt shall be submitted within 01 month.	Plantation will be done after completing backfilling grass, herbs, etc. initially and subsequently native species will be planted. Plantation program for green belt development is enclosed herewith as <b>Annexure-VI</b> for ready reference.
28	Proponent shall comply with the provisions of Environment (Protection) Act 1986, Water (Prevention and Control of Pollution) Act, 1974 as amended, Air (Prevention and Control of Pollution) Act, 1981 as amended.	Noted, will be complied

We hope the above response is in order and fulfilling the requirements.

**Thanking you,**

**Yours faithfully,**

**DFO-**

**Obra Forest Division, UP Forest dept.  
Sonbhadra (UP)**

*H. D. Omprakash*

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Enclosed: - As Above

H.D. Gupkar



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Ashish kumar <ashishkr604@gmail.com>

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**OA No. 164 of 2018 - Ashwani Kumar Dubey v. Union of India and Ors. - NGT  
Principal Bench**

1 message

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**Hasnat Nazki** <hasnatnazki@acaralaw.com>  
To: "ashwanik.advocate@gmail.com" <ashwanik.advocate@gmail.com>  
Cc: Ashish kumar <ashishkr604@gmail.com>

Mon, Jul 8, 2024 at 11:01 AM

Dear Sir,

Please find attached the link to the Objections to the report dated 11.01.2022 on behalf of Respondent No. 16 as well as Respondent No. 21 in the captioned matter.

 [Objections - Service](#)

Regards

Hasnat Nazki

Associate I [Profile](#)



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