दूरभाषः / Ph. : 0532–2569727

क्षेत्रीय कार्यालय, उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड
REGIONAL OFFICE, U. P. POLLUTION CONTROL BOARD

आवास विकास परिषद कालोनी, सेक्टर–10, योजना संख्या–3, झूँसी, प्रयागराज – 221506
Avas Vikas Parishad Colony, Sector-10, Scheme No. 3, Jhunsi, Prayagraj.
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संदर्भ सं0 6007-32/NGT/RO/544/2023 दिनांक 05/12/2023

E-Mail/Registered Post

To,

The Registrar,
National Green Tribunal
Principal Bench,
New Delhi
E-Mail- judicial-ngt@gov.in

Subject: - Compliance of direction issued by Hon'ble National Green Tribunal in Original Application No. 544/2023 Paras Nath & Anr. Versus Uttar Pradesh Pollution Control Board & Ors in order dated 15-09-2023.

Sir,

With reference to the above subject mentioned above, this is to inform you that in compliance of order issued on 15-09-2023 by Hon'ble National Green Tribunal in Original Application No. 544/2023 Paras Nath & Anr. Versus Uttar Pradesh Pollution Control Board & Ors. The compliance report is submitted for your kind perusal and necessary action please.

Encl.- As Above.

Your Sincerely

5/12/23

(R. K. Singh)
Regional Officer

Copy to:-

1. Member Secretary, U.P. Pollution Control Board Lucknow for information.
2. District Magistrate, Prayagraj.
3. Sri Pradeep Misra, Advocate Hon'ble Supreme Court/NGT, New Delhi for perusal and necessary action please.
4. Chief Law Officer, U.P. Pollution Control Board Lucknow for information.
5. Chief Environmental Officer (Circle-2), U.P. Pollution Control Board Lucknow for information.

5/12/23

Regional Officer

ac

Detailed Report To

Ascertain The Extent of Pollution and Damages Caused

by

Indian Farmers Fertilizers Cooperative Limited,

Phulpur, Prayagraj, Uttar Pradesh

(17th – 18th October 2023)

In the matter of

Paras Nath & Anr.

Vs.

Uttar Pradesh Pollution Control Board & Ors

[O.A. NO. 544/2023]

-Prepared by-

The Joint Committee of CPCB, UPPCB, CGWA and District Administrations of Prayagraj

Constituted by

Hon'ble National Green Tribunal

(Order dated 15st September, 2023)

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Joint Inspection Committee Report as per Hon'ble NGT Order Dated 15.09.2023 Carried in OA no. 544/2023 in the matter of Paras Nath & Anr. Vs. Uttar Pradesh Pollution Control Board & Ors

I. Order of Hon'ble NGT Dated 15.09.2023

The Hon'ble NGT in the matter of Paras Nath & Anr. Vs. Uttar Pradesh Pollution Control Board & Ors (O.A. NO. 544/2023) passed the following directions vide its order dated 15.09.2023 (Copy of order placed at Annexure – I):

"In view of the issue raised in the original application, we deem it proper to constitute a Joint Inspection Committee comprising of the Director deputed by the Member Secretary, Central Pollution Control Board (CPCB); Member Secretary, State Pollution Control Board (SPCB), Secretary, Central Ground Water Authority (CGWA) and District Magistrate, District Prayagraj. The District Magistrate will act as a nodal agency.

The Joint Inspection Committee will visit the site and examine if the Respondent No.8 is operating and producing ammonia without their being any consent and other requisite clearances from the competent authority, ascertain the extent of pollution and damages caused by Respondent No.8 and also suggest the remedial measures taken and to be taken."

In compliance of Hon'ble NGT order dated 15.09.2023, joint committee was constituted having representative from CPCB, Uttar Pradesh Pollution Control Board (UPPCB), Uttar Pradesh Groundwater Board (UPGWB) and District Administration Prayagraj.

II. Joint Survey of the Unit of IFFCO, Phulpur and its Surrounding Area

Joint teams comprising of Director & Scientist F, Water Quality Management (WQM) – II, CPCB along with team of officials from CPCB, Head Office, Delhi; Officials from Regional Directorate (RD) Lucknow; UPPCB; UPGWB; District Administration; Agriculture department; Horticulture department and medical officials from office of Chief Medical Officer (CMO), Prayagraj carried out inspection and survey of IFFCO, Phulpur and its surrounding areas during Oct 17-18, 2023.

The joint team conducted inspection of various aspects, including the industrial processes, safety management measures, and water consumption patterns within the manufacturing processes. Additionally, the team collected samples of groundwater and wastewater from various stages of the production process to assess their quality and potential environmental impact.

Joint teams collected samples of ground water from borewells, handpumps and samples of soil from agriculture lands under cultivation of affected areas, for assessment of any impact on soil and ground water. Joint teams also interacted with the villagers to evaluate the impact of pollution caused by IFFCO i.e., discharge of treated/untreated effluent and boiler ash on health of villagers, animal health and crop productivity. Photography and videography of monitoring/sampling were carried out during the survey.

Details of the site visit and locations:

1) Premises of the Unit
    a. Total Area – 931.52 acres
        i. Industrial area – 320 acres
        ii. Township area – 325.77 acres
        iii. CORDET area – 155 acres
        iv. Ash Pond area – 130.75 acres
2) Storm Water drain
    a. Origin from Tissaura Village, Phulpur Block, Prayagraj, Uttar Pradesh, U/s of IFFCO Phulpur Unit, traversing through 41 km and after passing low lying area i.e., Mugarson Lake it confluence with river Ganga
3) Village along Drain
    a. No. of villages mentioned in the complaint - 22
    b. No of villages inspected along the IFFCO drain - 10
4) Plant
    a. Phulpur – I (Ammonia – I and Urea – I)
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    c. Nano-Urea Fertilizer & Bottling
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5) Monitoring
    a. Water and wastewater sample
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- Drain Samples – 08
- Ash Pond - 01

b. Stack Monitoring

c. Ambient Air Quality Monitoring

III. Joint Survey and Inspection of M/s Indian Farmers Fertilizers Cooperative Limited (IFFCO), Phulpur, Prayagraj, Uttar Pradesh and Its Surrounding Areas Including IFFCO Drain During Oct. 17-18, 2023.

1. General Details of Unit

1.1. Consolidated Consent to Operate & Authorization

- The unit has obtained Consolidated Consent & Authorization (CCA) issued by UPPCB dated 21.12.2022 under Section-25 of the Water (Prevention & Control of Pollution) Act, 1974, 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 with a validity upto 31.12.2027. (Copy of CCA is placed at Annexure – II).
- The salient conditions of the Consolidated Consent to Operate & Authorization are as follows:

a. This CCA is valid for production of Nano-Urea/Nano-Sulphur/Nano-Micronutrients-36500 KL/Annum from Nano Fertilizer Plant and Urea- 5790 MT/day from Urea Production Plant. Ammonia 3300 MT/day and Carbon Dioxide - 4301 MT/day will be the Intermediate products during the process of manufacturing of Urea.

b. Industry shall treat the effluent to meet the effluent discharge standards for Fertilizer industries, as notified under Environment (Protection) Rule, 1986.

c. Industry shall treat nitrogenous wastewater through hydrolyser unit and non-nitrogenous waste water through RO based ETP. The treated water shall be reused in process, cooling water makeup, washing, ash quenching, water sprinkling and for irrigation purposes.

d. Industry shall not discharge any effluent outside the industry premises. Industry shall ensure ZLD.

e. Storm water drain shall be kept separate in such manner that industrial effluent does not get mixed with storm water.

f. Industry shall treat domestic effluent through STP as per norms and treated domestic effluent shall be used in irrigation/ gardening and water sprinkling for dust suppression.
g. Industry shall establish Miyawaki forest inside the industry premises in sufficient area and the treated effluent from the STP shall be used for forestation.
h. Industry shall maintain Electromagnetic flowmeters at water source and ETP outlet along with connectivity to CPCB and UPPCB server. The logbook of mentioned flowmeters reading shall be maintained.
i. The industry shall operate and maintain installed Online Effluent quality Monitoring System effectively and ensure continuous connectivity to CPCB and UPPCB server.
j. Ash pound shall be maintained in such a manner that ground water does not get affected.
k. Industry shall comply with the conditions of NOC issued by UPGWA for withdrawal of ground water and shall install rain water harvesting system as per design of Ground Water Authority.
l. Fly ash/ solid waste shall be disposed in such manner, so that no water, air and soil pollution take place
m. Industry shall operate and maintain APCS installed at existing 02 Primary Reformer Furnaces, 03 Boilers of capacity 125 TPH each, 02 Urea Priling Towers and 60 TPH HRSG, in such manner to achieve the emission standards for fertilizer unit, prescribed under Environmental (Protection) Rules, 1986.
n. The logbook for records of fly ash generation and its disposal shall be maintained properly.
o. Industry shall provide water sprinkling system at coal handling plant, conveyer belt to suppress the dust emission.
p. Industry shall install rain water harvesting system as per guidelines of ground water authority for recharging of ground water.
q. Industry shall store the hazardous waste safely and send it to TSDF/incinerator within Ninety days.

1.2. Environmental Clearance Conditions

- The unit obtained Environmental Clearance (EC) from MoEF&CC on dated 23rd March 1995 for additional ammonia plant of 1350 MT/day, 02 nos., of Urea plants of 1100 MT/day each and Turbo Generator Captive Power Plant (TG-CPP) of capacity 18 MW. Unit obtained EC from MoEF&CC on 14.07.2006 for capacity enhancement/de-bottlenecking and LNG conversion. The unit obtained another EC from MoEF&CC on dated 14th March 2022 for Modernization and Expansion of Existing Fertilizer Plant for Manufacturing of Nano Fertilizer at IFFCO Phulpur. (Copy of EC dated 23.03.1995, 14.07.2006 and 14.03.2022 are placed at Annexure – III, IV and V respectively).
- The salient conditions of the Environmental Clearance dated 14.03.2022 are as follows:

Specific Conditions:

a. All conditions stipulated in the earlier EC vide letter no. J J- 11011 /150/2006-IA II (I) dated 14.07.2006 shall strictly be complied with.

b. The project proponent shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

c. The project proponent shall utilize modern technologies for capturing of carbon emitted and shall also develop carbon sink/carbon sequestration resources capable of capturing more than emitted. The implementation report shall be submitted to the IRO, MoEF&CC in this regard.

d. The continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB servers. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

e. The storage of toxic/hazardous raw material shall be bare minimum with respect to quantity and inventory. Quantity and days of storage shall be submitted to the Regional Office of Ministry and SPCB along with the compliance report.

f. The occupational health center for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with the required safety kits/mask for personal protection.

g. Training shall be imparted to all employees on the safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

h. The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Fire - fighting system shall be as per the norms.

i. Necessary precautions shall be taken to avoid accidents and action plan shall be implemented for avoiding accidents. The Project proponent shall implement the onsite/offsite emergency plan/mock drill etc. and mitigation measures as prescribed under the rules and guidelines issued in the Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules, 1989, as amended time to time, and the Chemicals Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.

j. The solvent management shall be carried out as follows: (a) Reactor shall be connected to chilled brine condenser system. (b) Reactor and solvent handling pump shall have mechanical seals to prevent leakages. (c) Solvents shall be stored in a separate space specified with all safety measures. (d) Proper earthing shall be provided in all the electrical equipment wherever solvent handling is done. (e) Entire plant shall be flame proof. The solvent storage tanks shall be provided with breather valves to prevent losses. (f) All the solvent storage tanks shall be connected with vent condenser with chilled brine circulation.

k. Volatile organic compounds (VOCs) /Fugitive emissions shall be controlled at 99.97% with effective chillers/modern technology.

l. Total fresh-water requirement shall not exceed 35290 KLD Prior permissions in this regard shall be obtained from the concerned regulatory authority.

m. The storm water from the roof top shall be channelized through pipes to the storage tank constructed for harvesting of rainwater in the premises and harvested water shall be used for various industrial processes in the unit. No recharge shall be permitted within the premises. Process effluent/any wastewater shall not be allowed to mix with storm water.

n. The project proponent shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by- products from the process as raw materials or as raw material substitutes in other process. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapor recovery system. (f) Use of high- pressure hoses for equipment clearing to reduce wastewater generation.

o. The green belt of at least 5-10 m width shall be developed in nearly 36% of the total project area mainly along the plant periphery/ adjacent areas, as committed by the PP. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Trees have to be planted with spacing of 2 m x 2m and number of trees have to be increased accordingly (2500 trees/hectare). The plant species can be selected that will give better carbon sequestration and plantation shall be completed within six months

p. As committed by the project proponent the project proponent shall explore the usage of natural gas/bio briquettes

q. The activities and the action plan of the issues raised during public during to address the socio- economic issues in the study area, shall be completed as per the schedule presented before the Committee and as described in the EMP report in letter and spirit. The compliances report shall be submitted to IRO, MoEFCC Lucknow.

r. A separate Environmental Management Cell (having qualified people with Environmental Science/ Environmental Engineering/ specialization in the project area) equipped with full-fledged laboratory facility shall be set up to carry out the Environmental management and monitoring functions.

General Conditions

a. No further expansion or modifications in the plant, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change. A fresh reference shall be made to Change/SEIM, as applicable. In case the Ministry in case of deviations or alterations of deviations or alternations in the project proposal from those submitted to project proposal to this Ministry for clearance, a fresh reference shall be made to the Ministry/SEIM, as applicable, to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

b. The Project proponent shall strictly comply with the rules and guidelines issued under the Manufacture, Storage and Impact of Hazardous Chemicals (MSIHC) Rules, 1989, as amended time to time, the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, and Hazardous and Other Wastes (Management and Trans-Boundary Movement) Rues, 2016 and other rules notified under various Acts.

c. The energy source for lighting purposes shall be preferably LED based, or advanced having preference in energy conservation and environment betterment.

d. The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (night time).

e. The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. The activities shall be undertaken by involving local villages and administration. The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment.

f. The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forests and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose.

g. A copy of the clearance letter shall be sent by the project proponent to concern Panchayat, Zila Parishad/ Municipal Corporation, Urban local Body, and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal.

h. The project proponent shall also upload/submit six monthly reports on Parivesh Portal on the status of compliance of the stipulated Environmental Clearance Conditions including results of monitored data to the respective Integrated Regional Office of MoEF&CC, the respective Zonal Office of CPCB and SPCB. A copy of the Environmental Clearance and six-monthly compliance status report shall be posted on the website of the company.

i. The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Integrated Regional Office of MoEF&CC by e-mail.

j. The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available

with the SPCB/ Committee and may also be seen at Website of the Ministry and at https://parivesh.nic.in/. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.

k. The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.

1.3. No Objection Certificate (NOC) for ground water withdrawal

- The unit has obtained No Objection Certificate (NOC) from Uttar Pradesh Ground Water Department (UPGWD) for 18 no. of borewells. (Copy of NOCs is placed at Annexure – VI).
- Details of validity of NOCs and daily groundwater withdrawal permitted are mentioned below in Table 1:

Table 1: Details of validity of NOC from UPGWD and daily groundwater withdrawal permitted

S. No.	Borewell No.	NOC no.	Valid upto	Maximum Allowable Rate of Withdrawal (m^3/hr)	Maximum Allowable Running Hours Per Day	Daily withdrawal permitted (KLD)
	A	B	C	D	E	F = D*E
1.	Borewell No. 1	202112000310	14.02.2027	320	10	3200
2.	Borewell No. 2	202112000462	14.02.2027	320	14	4480
3.	Borewell No. 3	202112000469	14.02.2027	320	16	5120
4.	Borewell No. 4	202112000472	14.02.2027	320	12	3840
5.	Borewell No. 5	202112000476	14.02.2027	320	10	3200
6.	Borewell No. 6	202112000479	14.02.2027	320	14	4480
7.	Borewell No. 7	202112000482	14.02.2027	320	16	5120
8.	Borewell No. 8	202112000484	14.02.2027	320	12	3840
9.	Borewell No. 9	202112000488	14.02.2027	320	12	3840
10.	Borewell No. 10	202112000496	14.02.2027	320	14	4480
11.	Borewell No. 11	202112000497	14.02.2027	320	14	4480
12.	Borewell No. 12	202112000498	14.02.2027	320	10	3200
13.	Borewell No. 13	202112000499	14.02.2027	320	12	3840
14.	Borewell No. 14	202112000500	14.02.2027	320	10	3200
15.	Borewell No. 15	202112000501	14.02.2027	320	12	3840
16.	Borewell No. 16	202112000503	14.02.2027	320	16	5120
17.	Borewell No. 17	202112000505	14.02.2027	320	16	5120
18.	Borewell No. 18	202112000506	14.02.2027	320	14	4480

Remark: All NOCs are valid and total maximum allowable daily abstraction of ground water @ **74880 KLD i.e. 74.88 MLD**

1.4. Process Description for Ammonia, Urea and Nano – Fertilizer Plants

- IFFCO Phulpur unit primarily produces Urea using Ammonia as an intermediate product. Natural gas, steam, and air are used in the Ammonia plant to produce Ammonia as the primary output, with CO_2 as a byproduct. Ammonia and CO_2 are then used as raw materials in the Urea plant to produce Urea as the main product. The facility also generates power and steam through a Combined Power Plant (CPP) of 54 MW and waste heat recovery boilers of capacity 60 TPH.
- The Phulpur Unit consists of two Ammonia and Urea manufacturing complexes each, known as Ammonia-I and Ammonia-II, designed by M/s Kellog, USA, and M/s Haldor Topsoe, Denmark, respectively. The Urea-I and Urea-II Plants are based on the Snamprogetti self-stripping process. The brief overview of the manufacturing process and chemical reactions involved are given below:

1.4.1. Ammonia Production Plant

a) Feedstock Desulphurization

- Natural Gas contains sulphur compounds in the form of sulphides, disulphides, mercaptans, thiophenes etc. which are poisonous to the catalysts used in Ammonia plant. Here, sulfur compounds are hydrogenated to H_2S, typically using a cobalt molybdenum catalyst, and then adsorbed on pelletized zinc oxide. The remaining zinc sulfide is retained in the adsorption bed. Hydrogen for the reaction is usually recycled from the synthesis section. As informed by the unit the zinc oxide adsorption bed has not been exhausted till yet. Now the gas is sent to primary reformer.

b) Primary Reforming

- In primary reformer hydrocarbons are converted into hydrogen. The primary reformer contains numerous high-nickel chromium alloy tubes filled with a nickel-containing reforming catalyst. The overall reaction is highly endothermic, requiring additional heat to reach temperatures of 780-830°C at the reformer outlet. The heat for the primary reforming process is supplied by burning natural gas or other gaseous fuel, in the burners of a radiant box containing the tubes. Here, Regasified Liquefied Natural

Gas (RLNG), Steam is input material producing raw material for secondary reformer with exhaust gas (Flue gas) as output.

c) Secondary Reforming

- Due to the chemical equilibrium at the actual operating conditions, only 30-40% of the hydrocarbon feed is reformed in the primary reformer. Further reformation is carried out in the secondary reformer by internally combusting a portion of the gas with process air, which also provides the required nitrogen for the final synthesis gas.

d) Shift Conversion

- The resulting gas mixture is directed to the Shift Converters, where a substantial portion of carbon monoxide (CO) is converted into carbon dioxide (CO_2). Here, carbon mono oxide is converted into carbon dioxide and getting an additional mole of hydrogen. This exothermic reaction increases the yield of hydrogen and reduces the concentration of carbon monoxide, which can be a contaminant in the synthesis gas used for ammonia production. The gas is cooled in the process gas boiler where a large of excess steam present in the gas condenses to supply the regeneration heat for the regenerating Activated methyldiethanolamine (aMDEA) solution. Process condensate formed in the two exchangers is separated in a process gas knock out drum and sent for treatment in the condensate stripper (Ammonia Stripper Plant).

e) CO_2 Removal

- The process gas from the shift converter contain mainly H_2, N_2, CO_2 and the excess process steam. The gas is cooled and the excess steam is condensed before it enters the CO_2 removal system. The heat released during cooling/condensation is used for:
    - The regeneration of the CO_2 scrubbing solution
    - Boiler feed water preheat
- CO_2 is removed by absorption in a two stage Absorption process using aMDEA solution. CO_2 from the Process Gas is first absorbed in the CO_2 Bulk Absorber followed by Lean Absorber. CO_2 rich aMDEA solution is regenerated in the CO_2 regenerator. CO_2 coming out of the regenerator is cooled before supplying as a feed to the Urea Plant. Process flow diagram of CO_2 recovery plant is given in Figure 1 below:

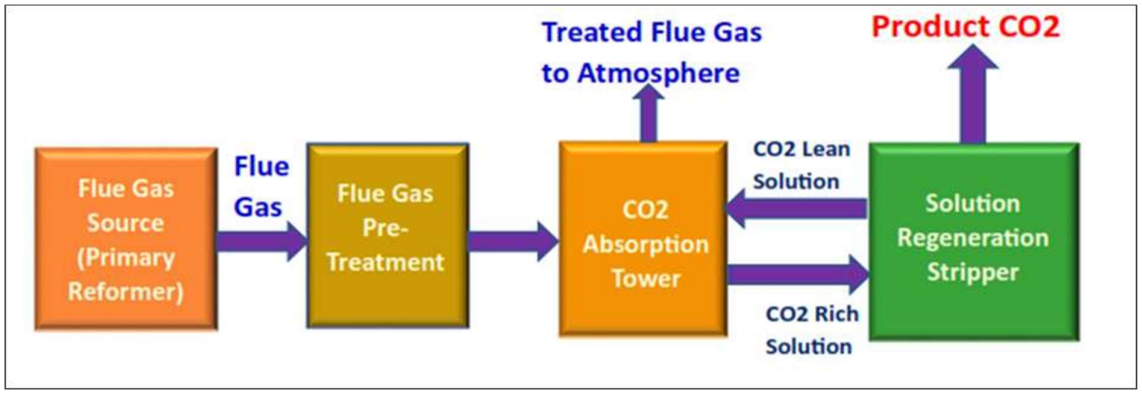

Figure 1: Process flow diagram of CO_2 recovery plant

f) Methanation

- The small amounts of CO and CO_2, remaining in the synthesis gas, are poisonous for the ammonia synthesis catalyst and must be removed by conversion to CH4 in the Methanator. To prevent poisoning of the ammonia synthesis catalyst by carbon dioxide and carbon monoxide, their concentrations must be reduced to less than 10 ppm. The Methanator is where remaining carbon oxides available in trace concentration re-converted back to methane over a Nickel catalyst in a reaction that is reversed from steam reforming.

g) Synthesis Gas Compression and Ammonia Synthesis

- The purified synthesis gas, mainly composed of nitrogen (N_2) and hydrogen (H_2), is compressed and sent to the Synthesis Gas Converter, where these gases react to form ammonia (NH_3), a critical component in Urea production. The produced ammonia gas is recovered by cooling the compressor discharge stream in a series of Refrigeration Chillers, allowing ammonia to condense into a liquid state, subsequently sent to the Urea plant for further processing.

1.4.2. Urea Production Plant

- The Urea production process is grounded in the Snamprogetti self-stripping method. Within this process, CO_2 is compressed using a turbine-driven centrifugal compressor. In the Urea reactor, ammonia and recycled carbonate react with CO_2 to produce Ammonium Carbonate, part of which dehydrates to form Urea. The resultant reaction products move into a steam-heated stripper, where most of the unreacted carbonate is removed as gaseous Ammonia and CO_2.

- The Urea solution, which still contains some carbonate, exits the bottom of the stripper. The purification of Urea takes place in the medium and low-pressure sections, where carbonate decomposition occurs. The low-pressure section typically results in a Urea concentration of about 72%. Vacuum concentrators are employed to further enhance the solution's concentration to 99.8% in two stages. The concentrated Urea solution is then pumped to the top of a 92-meter-high natural draft Prilling Tower, where it is sprayed using a rotating Prill Bucket. As the fine droplets descend through the tower, they come into contact with cold air and solidify to form Urea prills.
- The final product, Urea, is collected from the bottom of the Prill tower and sent to storage or bagging sections after Neem Coating. Neem coating on urea involves the application of neem oil onto urea granules after its production.

1.4.3. Process Description of Nano-fertilizer Plant

- Nano Urea is a type of fertilizer that has very small particles of nitrogen and carbohydrate. Nano Urea manufacturing involves preparation reactors, final formulation reactor, and filtration. In one of the preparation reactor, a naturally occurring carbohydrate polymer made of glucose units is hydrolyzed in presence of acetic acid and water to form nanofiber of oligosaccharide. Nitrogenous compound is dissolved in another reactor to form a solution of desired concentration. All the materials in the preparation reactors are transferred to final formulation reactor where oligosaccharide nano fiber dispersed in deionized water interact with amide and / or nitrate particles as a result of nucleation and attachment efficiency leads to formation of stable nano cluster on the carbon skeleton of oligo and polysaccharide.
- After completing a full-length cycle in final formulation reactor, the sample is analysed for particle size along with other performance parameters to ensure the stability of Nano Urea. Once, the sample is tested OK, Nano Urea is stored in Storage tanks from where it is sent to Bottling line for packing in 500 mL bottles and dispatched through road to desired destination.

1.4.4. Process description of Nano-fertilizer Bottling Unit

- The bottling unit of nano fertilizer plant is designed to produce and fill liquid nano fertilizer into 500 mL or 250 mL bottles. The unit consists of a series of machines that perform different steps of the bottling process. First, the raw material (granules) is debagged and stored in silos. Then, it is conveyed to a volumetric feeder that feeds it

into an extruder of a blow molding machine. The blow molding machine creates HDPE bottles of various shapes and sizes, and also applies inline mold labels using a robotic arm. The bottles are then transferred to a product conveyor that either sends them to a bottling station or an empty bottle storage area. The bottling station has a filling machine that fills the liquid nano fertilizer into the bottles using valves that only work when a bottle is under them. The filling machine is connected to a capping machine that provides a cap for each bottle. The capped bottles are then sealed using an induction sealer. Finally, the bottles are checked for the correct amount of liquid using a bottle weigh checker that discards any underfilled or overfilled bottles. The unit also has ancillary equipment such as a grinder, a cooling tower, a chiller, and a PLC controller that support the main machines and ensure the quality and safety of the production cycle. No wastewater and flue gas exhaust is generated from bottling plant. Bottling plant unit has registered for Extended Producer Responsibility (EPR) for plastic waste recycling and its management.

2. Material Balance of Ammonia and Urea Plant

2.1. Input Materials for the Complete Industrial Process

- To understand the magnitude and complexity of the industrial process at Phulpur Unit I and II, analysis of the input materials required for their operations was carried out. The following materials are integral to the functioning of this industrial complex as per material balance sheet provided by the unit (copy of material balance sheet is placed at Annexure – VII):
  - RLNG – 137,028 Nm^3/hr
  - Ground Water – 1,367 m^3/hr
  - Total Air – 1,852,422 Nm^3/hr
  - Coal – 8 MT
  - Purchased Power – 0.4 MWH

2.2 Input and Output Analysis of Ammonia-I and Urea-I Plants

- The industrial processes of ammonia and urea production are vital components of the fertilizer industry. Detailed analysis of the input requirements for Ammonia-I Plant and Urea-I Plant, as well as the output of both plant as per material balance & log book provided by the unit and observation made by the joint team during visit are mentioned below:

Input of Ammonia-I Plant

Table 2: Input material of Ammonia - I plant

Input Ammonia - I			
Input Material	**As per Material Balance Provided by the Unit**	**As per Log book**	**On the day of Inspection (17.10.2023)**
RLNG Feed (Nm^3/hr)	31,956	32,444.5	33,863.71
RLNG Fuel (N m^3/hr)	13,815	22,512.7	31,022.88
Combustion Air (N m^3/hr)*	1,67,511	-	-
Process Air (N m^3/hr)#	47,530	-	47,545
Power (MWH)	2.5	-	-

**Combustion air is used to burn the fuel in the furnace of boilers and primary reformer*

#Process air is used in compressed form in secondary reformer to cater the requirement of nitrogen gas (N_2) for ammonia (NH_3) production.

- As per material balance provided by the unit, Combustion air is supplied at a rate of 167,511 Nm^3/hr and Process air, with a rate of 47,530 Nm^3/hr. RLNG feed, with rate of 31,956 Nm^3/hr, serves as the primary feedstock for ammonia synthesis. Additionally, 13,815 Nm^3/hr of RLNG is used as fuel for various processes in the plant. A power input of 2.5 MWH ensures the operation of machinery and auxiliary processes. Lastly, the complete process of Ammonia – I plant emits 210,368 Nm^3/hr of flue gas.
- As per logbook data provided by the unit and observation made during the visit, RLNG Feed consumption was 32,444.5 Nm^3/hr and 33,863.71 Nm^3/hr respectively, which is comparable with the value mention in material balance (31,956 Nm^3/hr) provided by the unit. Similarly, RLNG Fuel value as per logbook was found to be 22,512.7 Nm^3/hr and RLNG Fuel on the day of inspection was 31,022.88 Nm^3/hr; both values were higher than the value mentioned in material balance sheet (13,815 Nm^3/hr). Process air consumption (47,545 Nm^3/hr) on the day of visit was approximately same as per data given in material balance sheet (47,530 Nm^3/hr).

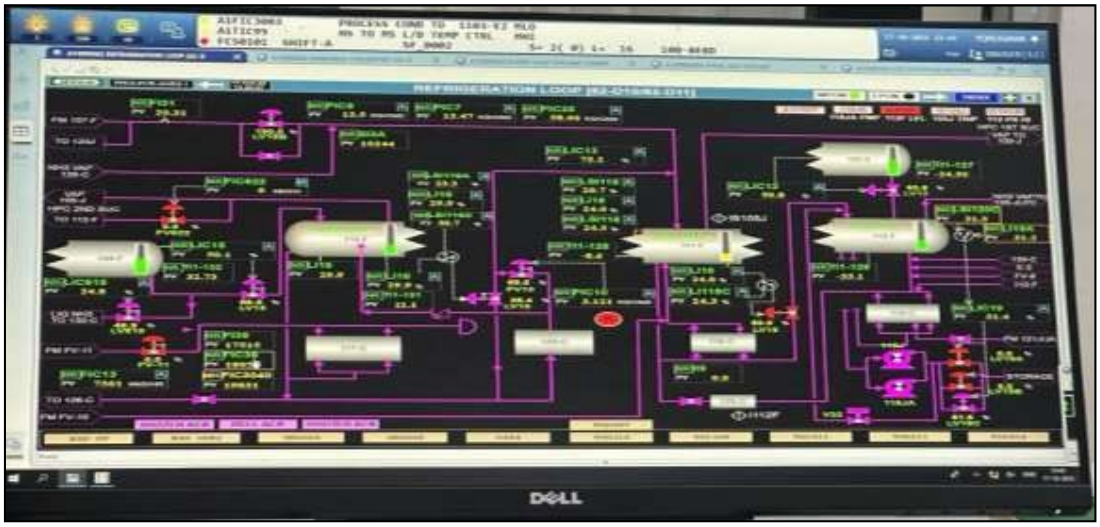

Figure 2: Process flow and material balance of Ammonia - I plant during visit

Input of Urea-I Plant

Table 3: Input material of Urea - I plant

Input Urea - I			
Input Material	**As per material balanc provided by the Unit**	**As per Lo book**	**On the day of Inspection (17.10.2023)**
Ammonia (MT/hr)	53	49.9	52.70
CO_2 (Nm^3/hr)	32,666	-	32491
Air to Prill Tower (Nm^3/hr)	645,269	-	-
Power (MWH)	10.6	-	-

- Ammonia, obtained from the Ammonia-I Plant, serves as a feedstock for urea production. As per material balance sheet provided by the unit, ammonia is produced at a rate of 53 metric tons per hour, similar value was observed during the visit (52.7 MT/hr) and as per logbook provided by the unit (49.9 MT/hr). Carbon dioxide (CO_2) is sourced from the Ammonia-I Plant at the rate of 32,666 Nm^3/hr (as per material balance sheet) and is further supplemented by an additional contribution from a CO_2 recovery plant. CO_2 consumption observed during visit was 32491 Nm^3/hr which is similar to the value presented in material balance sheet. The prill tower require air at a rate of 645,369 Nm^3/hr, for granulation. Furthermore, a power input of 10.6 MWH is consumed for the operation of Urea-I Plant.

Output of Urea-I Plant

- The Urea-I Plant produces 94.1 MT/hr of Urea (as per material balance sheet), whereas, as per observation made on the day of visit urea production from Urea-I plant was 94.3 MT/hr and as per logbook it was 88.3 MT/hr.

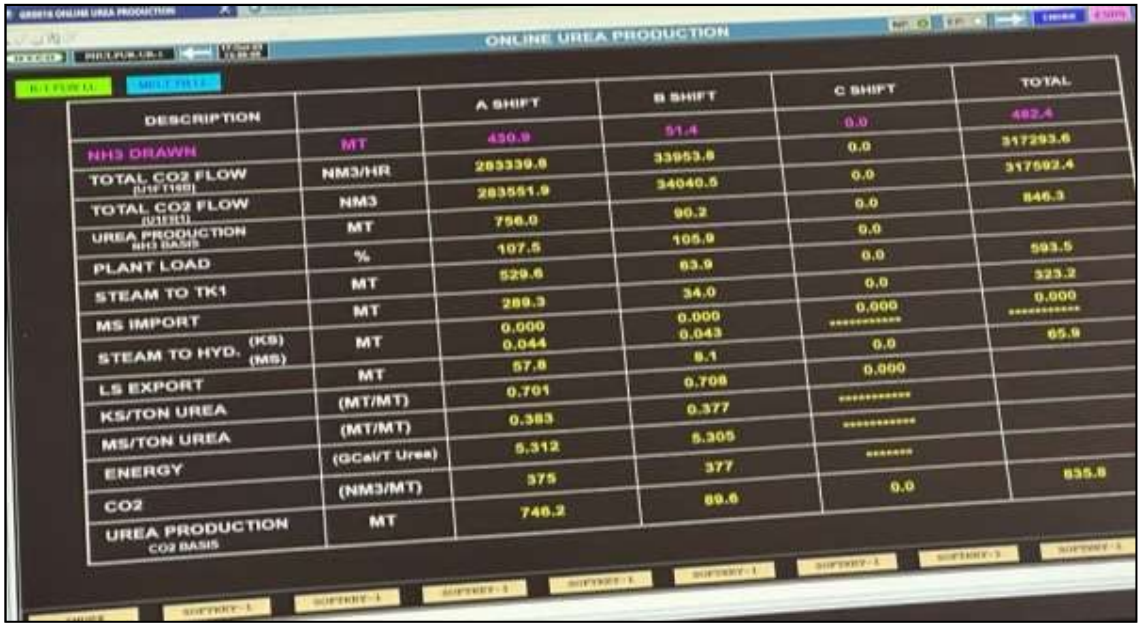

Figure 3: Material balance of Urea - I plant during visit

2.3 Input and Output Analysis of Ammonia-II and Urea-II Plants

Input of Ammonia-II Plant

Table 4: Input material of Ammonia - II plant

Input Ammonia - II			
Input Material	**As per material balance provided by the Unit**	**As per Log book**	**On the day of Inspection (17.10.2023)**
RLNG Feed (Nm^3/hr)	48,375	51281.21	51402.25
RLNG Fuel (Nm^3/hr)	27,654	28353.67	29098.625
Combution Air (Nm^3/hr)	509,632	-	-
Process Air (Nm^3/hr)	73,105	-	73146
Power (MWH)	4.5	-	-

- As per material balance provided by the unit, Combustion air, is supplied at a rate of 509,632 Nm^3/hr and Process air, at the rate of 73,105 Nm^3/hr. RLNG feed, with rate of 48,375 Nm^3/hr, serves as the primary feedstock for ammonia synthesis. Additionally,

27,654 Nm^3/hr of RLNG is used as fuel for various processes in the plant. A power input of 4.5 MWH ensures the operation of machinery and auxiliary processes. Lastly, the complete process of Ammonia – II plant emits 316,893 Nm^3/hr of flue gas.

- As per logbook data provided by the unit RLNG feed consumption was 51281.21 Nm^3/hr which is comparable to the value mention in material balance provided by the unit (48,375 Nm^3/hr). Also, as per observation made by joint team on the day of inspection RLNG feed consumption was 51402.25 Nm^3/hr which is similar to data of material balance sheet. Similarly, RLNG fuel data as per logbook was 28353.67 Nm^3/hr and RLNG fuel on the day of inspection was 29098.63 Nm^3/hr; all the values were comparable. Process air consumption on the day of visit (73146 Nm^3/hr) was approximately same as per data given in material balance sheet (73,105 Nm^3/hr).

Input of Urea-II Plant

Table 5: Input material of Urea - II plant

Input Urea - II			
Input Material	**As per material balance provided by the Unit**	**As per Log book**	**On the day of Inspection (17.10.2023)**
Ammonia (MT/hr)	81	79.2	80.82
CO_2 (Nm^3/hr)	50,671	-	60494.63
Power (MWH)	9.2	-	-

- Ammonia, obtained from the Ammonia-II Plant, serves as a critical feedstock for urea production in Urea – II plant. As per material balance sheet provided by the unit, ammonia produced at a rate of 81 metric tons per hour, similar value was obtained from the logbook provided by the unit (79.2 MT/hr) and observed during visit (80.82 MT/hr). Carbon dioxide (CO_2) is sourced from the Ammonia-II Plant at the rate of 50,671 Nm^3/hr (as per material balance sheet) and is further supplemented by an additional contribution from a CO_2 recovery plant. CO_2 consumption observed during visit was 60494.63 Nm^3/hr. Furthermore, a power input of 9.2 MWH is consumed for the operation of Urea-II Plant.

Output of Urea-II Plant

- The Urea-II Plant produces 140 MT/hr of Urea (as per material balance sheet), as per observation made on the day of visit urea production from Urea-II plant was 139.9 MT/hr and as per logbook it was 142.7 MT/hr.

Figure 4: Material flow balance of Urea - II plant during visit

2.4 CO_2 Recovery System

- The CO_2 Recovery System is a crucial component for managing carbon dioxide emissions. It operates as follows:
  - Input: 1.1 MWH of energy and steam from Ammonia-I & II and Urea-I & II
  - Output: 10,218 Nm^3/hr of CO_2 to Urea-I and Urea-II Plant
- The CO_2 Recovery System uses energy and steam from other plant sections to recover and redistribute carbon dioxide. It contributes 10,218 Nm^3/hr of CO_2 to Urea-I and Urea-II Plant as per requirement.

2.5 Captive Power Plant and Steam Generator

- The Captive Power Plant (CPP) & Steam Generation Plant (SGP) produce power and Steam. The grid power is distributed to both of the plant as per requirement.
- IFFCO has 2 nos. of steam turbine driven through Turbogenerator viz. TG-1 (12.5 MW) in Phulpur-I, TG-2 (18 MW) in Phulpur-II for fulfilling steam and power requirement of the complex.
- In addition, there is one Gas Turbine Generator (GTG) (23 MW) in captive power plant. To recover waste heat generated by GTG a Heat recovery boiler of 60 TPH is also installed.

- For Power backup, Diesel generator (DG) having capacity of 2 x 2700 KVA are installed in the unit. Apart from these captive sources there is also a provision to draw Purchase Power from UPPCL grid with Line-1 and Line-2. At present, there are two transformers of capacity 2X12.5 MVA each for receiving Purchase Power.
- Joint team has collected water sample from Ash Pond and groundwater from nearby village area to assess the impact of Ash pond on ground water. Stack monitoring was done at Prilling towers – Urea plant (1&2) and Primary Reformer - Ammonia plant (1&2) on 17/10/2023 as well as ambient air quality was monitored at two locations: (a) CORDET area; and (b) Unit's gate no. 2. The result of same are discussed in subsequent section 2.5.5.

2.5.1 Gas Turbine Generator and Heat Recovery Steam Generator (GTG-HRSG)

- **Gas Turbine Generator (GTG) (Capacity – 23 MW):** The Gas Turbine operates based on a principle known as the Brayton cycle. This cycle involves several steps: first, the turbine compresses air, then this compressed air mixes with fuel and ignites to produce hot gases. These hot gases expand through the turbine, powering the electric generator and converting their rotational energy into electrical power. Significant portion of the energy contained in these hot exhaust gases is directed to a Heat Recovery Steam Generator (HRSG), where it's used to generate steam.

- **Heat Recovery & Steam Generator (HRSG) (Capacity – 60 TPH):** The Gas Turbine comes with its own Heat Recovery Steam Generator (HRSG) situated at its exhaust end. When the plant runs, the Gas Turbine releases a large amount of exhaust flue gas that holds a lot of heat energy. The HRSG collects this wasted heat energy and turns it into superheated steam used in the plant's processes. By effectively capturing and reusing this exhaust heat, the system avoids wasting energy.

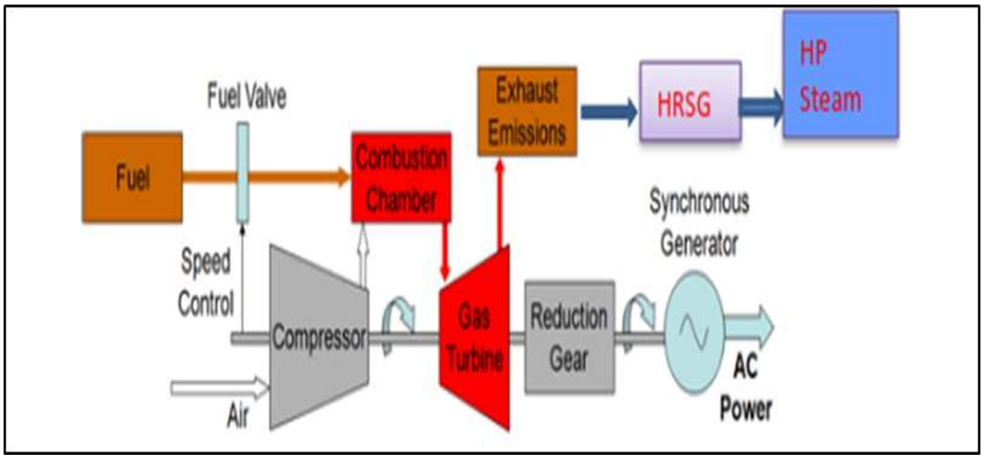

Figure 5: Flow-diagram of gas turbine and electric power generation

Input Parameters for GTG-HRSG

Table 6: Input material of GTG-HRSG

Input Material	As per material balance sheet	As per observation on the day of visit (17.10.2023)
RLNG Fuel (Nm^3/hr)	8,698	8,639.75
Combustion Air (Nm^3/hr)	255,105	255,105

- Here, both parameters, the Combustion Air input and the RLNG Fuel input, demonstrate a similarity between the observations made during visit on October 17th, 2023, and the values outlined in the material balance sheet.

Output Parameters of GTG-HRSG

Table 7: Output material of GTG-HRSG

Output Material	As per material balance sheet	As per observation on the day of visit (17.10.2023)
Power Output (MWH)	24.1	23.99
Flue Gas Emissions (Nm^3/hr)	233,000	233,000

- The recorded output parameters of the GTG-HRSG on October 17th, 2023, align notably well with the values specified in the material balance sheet. The Flue Gas Emissions remained precisely consistent at 233,000 Nm^3/hr in both records. Similar value were found for Power Output, with the observed value on the day of visit 23.99 MWH i.e., 24 MWH and material balance sheet value of 24.1 MWH.

2.5.2 Steam & Power Generator

- The Phulpur Fertilizer Plant relies on a diverse set of energy sources to meet its power and heat requirements.

Input Parameters for the Steam & Power Generator

- The Steam & Power Generator relies on a combination of energy sources to meet the plant's power and heat needs. The input parameters for this system are as follows:

Table 8: Input material of the Steam & Power Generator

Input Material	As per material balance sheet	As per observation on the day of visit (17.10.2023)
Coal (MT/hr)	8	7
RLNG Fuel (Nm^3/hr)	6,531	6,815.38
Combustion Air (Nm^3/hr)	154,170	154,170

- The input parameters for the Steam & Power Generator exhibit consistency between the figures outlined in the material balance sheet and the observed values on the day of the visit, October 17th, 2023. The Combustion Air input remained same at 154,170 Nm^3/hr in both records. While observed value on the day of inspection for RLNG Fuel and Coal (6815.38 Nm^3/hr and 7 MT/hr respectively), remain comparable with the value mentioned in material balance sheet for RLNG Fuel and Coal (6,531 Nm^3/hr and 8 MT/hr respectively).

Output Parameters of the Steam & Power Generator

- The efficiency of the Steam & Power Generator is reflected in its output parameters, which highlight its role in power generation and emissions control:

Table 9: Output material of the Steam & Power Generator

Output Material	As per material balance sheet	As per observation on the day of visit (17.10.2023)
Power Output (MWH)	3.81	3.51
Flue Gas Emissions (Nm^3/hr)	86,317	137,502

- Power Output observed on the day of the visit was recorded as 3.51 MWH, slightly lower than the expected 3.81 MWH. Additionally, a notable change was observed in the Flue Gas Emissions, with the recorded value of 137,502 Nm^3/hr differing significantly from the value as per material balance sheet i.e., 86,317 Nm^3/hr.

2.5.3 Energy Generation and Distribution

- The energy generation process within the Phulpur Fertilizer Plant involves two primary sources: the GTG-HRSG and the Steam & Power Generator. As per material balance

sheet Power generated from GTG-HRSG is approximately 24.1 megawatt-hours (MWH) and power generated from Steam & Power Generator is Approximately 3.81 MWH leading to power generation of 27.91 MWH energy whereas as per logbook (1st July to 15th October 2023) provided by the unit cumulative power generation was 25.03 MWH whereas on the day of inspection the power generation was 27.9 MWH i.e., same as material balance sheet.

- The generated energy is efficiently allocated to various plant sections is given in Table 10:

Table 10: Energy generation and distribution in the unit complex

Section	As per Material Balance Sheet (MWH)	As per Logbook (1sth July to 15th Oct. 2023) (MWH)	On the day of visit i.e., 17th October 2023 (MWH)
Ammonia - I	2.5	2.03	2.55
Ammonia - II	4.5	4.12	5.62
Urea - I	10.6	9.01	10.15
Urea - II	9.2	8.40	8.35
Township	-	0.95	0.84
Nao-fertilizer	-	0.53	0.41
CO_2 Recovery Plant	1.1	-	-

2.5.4 Steam Generation and Consumption

- The parameters related to steam generation and its distribution to various plant sections is mentioned in Table 11:

Table 11: Steam generation and distribution in the Unit complex

Steam Generation (Value in MT/hr)		Steam Consumption (Value in MT/hr)	
Generation Point	**Value**	**Consumption Point**	**Value**
Boiler 1, 2 and 3	98	**Ammonia - I**	52
GTG-HRSG	59	**Urea - I**	79
Ammonia-II waste Heat generation	120	**Urea - II**	119
Total	277	**CO_2 recovery Plant**	27
		Total	277

- The IFFCO Phulpur generate overall steam at the rate of 277 MT/hr (sourced from boilers 1, 2, and 3 @98 MT/hr, GTG-HRSG @59 MT/hr and waste heat from Ammonia-II @120 MT/hr of steam). Precise consumption of steam as per material balance sheet provided by the Unit at Ammonia – I (52 Mt/hr), Urea – I (79 MT/hr), Urea – II (119 MT/hr) and the CO_2 recovery Plant (27 MT/hr), summing up to the total

steam consumption of 277 MT/hr. Whereas, on the day of visit steam generation was from Boiler - 1 (65.1 MT/hr) and Boiler – 3 (44.2 MT/hr) summing to 109.4 MT/hr and steam consumption at Ammonia – I (20.7 MT/hr), Ammonia – II (3.0 MT/hr), Urea – I (677.1 MT/hr) and TG – 1 (14.9 MT/hr) summing to 105.7 MT/hr of consumption.

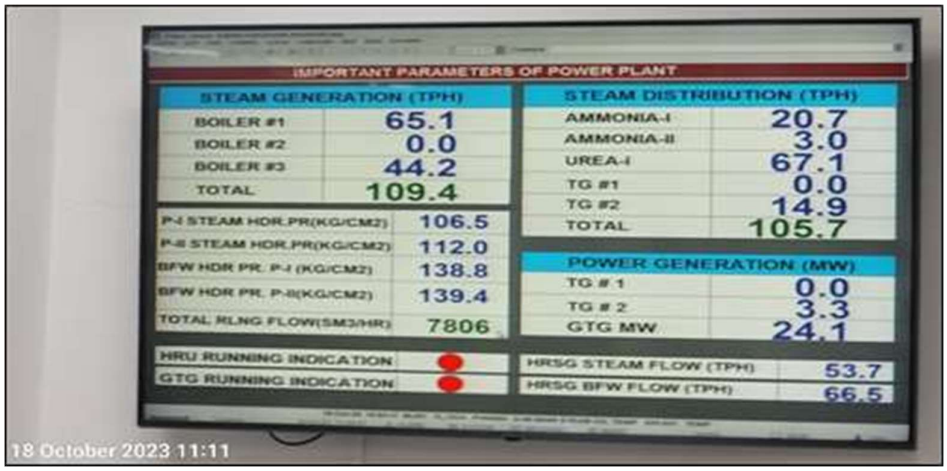

Figure 6: Steam and power generation on the day of visit

2.5.5 Ash Pond

- IFFCO, has been using approximately 8 metric tons of coal per hour for its steam and power generation processes. This consistent consumption rate amounts to a substantial daily coal usage of 192 metric tons. The combustion of coal in these processes leads to the production of ash, upto 40% of it being in the form of ash. Notably, this ash consists of two components: 85-90% is fly ash, and the remaining 10-15% is categorized as bottom ash.
- To manage the disposal of dry fly ash, IFFCO is selling it to M/s Hansh Chandan Enterprises and M/s SM Enterprises both located in Kanheti, Uttar Pradesh. These two enterprises further sell it to Cement industries like M/s Adani Industries, M/s Kanodia Cem Pvt. Ltd etc. The unit provided the data of quantity of fly ash sold to M/s Hansh Chandan Enterprises and M/s SM Enterprises.
- **Details of Coal Consumption:**

Table 12: Coal consumption details

Months	Coal Consumption (MT)	Boiler Operational Days
July	13212	31
August	10916	31

September	153	1
October	3286	11
Total	27567	74
Coal Consumption (MT/day)		**372.527**
Coal Consumption (MT/hr)		**15.52196**

- **Details of Ash Generation and disposal:**

Table 13: Ash generation and disposal details

All the figures are in MT	July	August	September	Total
Total Ash Generated	5237	4287	60	9584
Fly Ash Generated	4448	3643	54	8145
Bottom Ash Generated	789	644	6	1439
Fly Ash sent to ash pond	800	0	208.86	1008.86
Fly Ash sent to ash Silo for sale	3590	3584	54	7228
Fly Ash dispatched (sold) from ash silo	3593.59	3443.03	119.89	7156.51
Pond ash dispatched (free)	5240	1660	2160	9060
Fly Ash (free) given to brick plant & other use by tractor	58	59	0	117

- The Ash Pond, covering an area of 130.74 acres, comprises two lagoons for disposal of Ash and one lagoon for disposal of Lime Slurry located behind the boundary wall of the IFFCO unit. Examining the records from the last three months, covering the period from July to September, it is revealed that 8145 metric tons of fly ash and 1439 metric tons of bottom ash were produced during this timeframe. Out of the total fly ash, 7156.51 metric tons of fly ash were dispatched (sold) from the ash silo. Meanwhile, the generated bottom ash is disposed-off in form of slurry into the lagoon. Thus, out of total fly ash generated 8145 MT around 89.3 % are disposed to Cement industry and Brick Kiln. As per details provided by the unit (Refer Annexure - VIII) out of total Ash generation around 206.63% is utilized (including legacy Ash) in 2022-23 which is in compliance with Fly Ash Notification S.O. 763 (e) dated 14th September 1999, its amendment S.O. 2804 (E) dated 3rd November 2009 and further amendment S.O. 254 (E) dated 25th January 2016.
- Samples were collected from wastewater accumulated in ash pond and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 14 below:

Table 14: Analysis result of samples collected from ash pond

Parameters	Value
pH	7.95
Colour	5
TSS	13.5
TDS	1570
Sulphate	281
Phosphate	0.04
Nitrate	36.6
Nitrite	1.9
Ammoniacal Nitrogen	10.2
Free Ammonia	0.024
TKN	16.5
COD	50.3
BOD	6.27
Cr	ND
Cu	ND
Cd	ND
Pb	0.0139
Fe	4.6306
Ni	ND
Zn	0.6825
Mn	0.3529
As	ND

All parameters except pH and Colour (Hazen) are expressed in mg/L.

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2.5.5 Stack and Ambient Air Quality monitoring

a) Stack monitoring:

- There are six stacks found during visit, the details of stack are mentioned in table 15 below:

Table 15: Stack details

Particular	Stack 1			Stack 2	Stack 3	Stack 4	Stack 5	Stack 6
Stack Attached to Plant	**Boiler-1 (125 TPH)**	**Boiler-2 (125 TPH)**	**Boiler-3 (125 TPH)**	**HRSG**	**Primary Reformer-I**	**Primary Reformer-II**	**Prilling Tower-I**	**Prilling Tower-II**
Stack Height above ground level(meters)	100	100	100	30	33	30	96	104
Stack Height above factory room(meters)	90	90	90	27	30	27	86	94
Inner Dimension of Stack Top (in meters)	3	3	3	2.8	3.6	2.9	22	26
Fuel Gas Temp(°C)	141	141	141	180	138	139	35	38
Draft Type	Balanced draft			Forced draft	Balanced draft	Balanced draft	Natural draft	Natural draft
Material Of Construction	RCC			MS	MS	MS	RCC	RCC
Pollution Control Equipment's	Electrostatic precipitator			DLN Combustor (in Gas Turbine)	Low NOx Burner	Low NOx Burner	Not Applicable	Not Applicable
Air Pollution Monitoring Devices	Online SPM Monitoring (OCEMS), Online NOx & SOx Analyser have been installed on trial basis			SOx, NOx, CO Analyser in DCS	Weekly sample analysis in in-house Laboratory for NOx	Weekly sample analysis in in-house Laboratory for NOx	Weekly sample analysis in in-house Laboratory for Urea dust	Weekly sample analysis in in-house Laboratory for Urea dust
Fuel Name	COAL			Natural Gas	Natural Gas	Natural Gas	-	-

- Stack monitoring occurred at four stacks, encompassing induced draft systems serving as Air Pollution Control Systems (APCS) for two existing Primary Reformers, each equipped with 100-meter stacks for 125 TPH boilers (3). Additionally, there were Prilling Towers standing at heights of 96 meters and 104 meters, operating on a natural draft system.

- The laboratory analysis outcomes from the stack monitoring conducted on October 17th, 2023, at the Prilling towers (Urea plant 1&2) and Primary Reformer (Ammonia plant 1&2) are presented below in Table 16:

Table 16: Analysis result of stack monitoring

S. no.	Source of sampling	Stack attached to	Stack height	Flue gas velocity	Particulate Matter (Urea dust)	Standard (E (P) Rules, 1986)	NO_x	Standard (E (P) Rules, 1986)
1.	Prilling Tower no. 1	Prilling Tower	96 m	4.019	34 mg/Nm^3	150 mg/Nm^3 (pre 1982 units)	-	-
2.	Prilling Tower no. 2	Prilling Tower	104 m	3.517	36 mg/Nm^3	50 mg/Nm^3 (post 1982 units)	-	-
3.	Ammonia plant	Primary Reformer Ammonia Unit 1	33 m	-	-	-	90 ppm	400 mg/Nm^3 for oxides of nitrogen (as NO_2)
4.	Ammonia plant	Primary Reformer Ammonia Unit 2	30 m	-	-	-	70 ppm	

- The concentration of particulate matter and NO_X in the emission was meeting the emission norms notified in Environment (Protection) Rules, 1986. (Copy of Stack monitoring report is placed at Annexure – XA)

b) Ambient air quality monitoring:

- Ambient air quality was monitored at two locations: (a) CORDET area; and (b) Unit's gate no. 4. The laboratory analysis results of ambient air monitoring carried out on 17/10/2023 are given below in Table 17:

Table 17: Analysis result of Ambient Air Quality Monitoring

S. No.	Monitoring location	Sulphur dioxide (µg/m^3)	Nitrogen dioxide (µg/m^3)	Particulate matter PM10 (Less than 10 micron) (µg/m^3)	Particulate matter PM2.5 (Less than 2.5 micron) (µg/m^3)
1.	CORDET	11 (24 hourly)	21 (24 hourly)	55 (24 hourly)	34 (24 hourly)
2.	Gate no. 4	15 (24 hourly)	28 (24 hourly)	59 (24 hourly)	32 (24 hourly)
Standard (National Ambient Air Quality Standards)		80	80	100	60

- The ambient air quality was meeting the National Ambient Air Quality Standards (notification dated 18/11/2009). (Copy of Ambient air monitoring report is placed at Annexure – XB)

2.6 Overall Flue Gas Emission

- The Phulpur Fertilizer Plant emits a total of 984,080 Nm^3/hr of flue gas, with contributions from different sections. The details of same is mentioned in Table 18:

Table 18: Overall Flue Gas emission from Phulpur - I and Phulpur - II unit

Section	As per Material Balance Sheet	On the day of visit i.e., 17th October 2023
Ammonia-I (Nm^3/hr)	210,368	210367.8
Ammonia-II (Nm^3/hr)	316,893	316893
GTG-HRSG (Nm^3/hr)	233,000	233000
Steam & Power Generator (Nm^3/hr)	137,502	137502
CO_2 Recovery System (Nm^3/hr)	86,317	86317.25

- The values of flue gas emission mentioned in above table shows that observed value on the day of inspection align completely with values given in material balance sheet.

2.7 Overall Outputs of the Complete System

Table 19: Overall Output from Phulpur - I and II

Section	As per Material Balance Sheet	On the day of visit i.e., 17th October 2023
Urea (MT/hr)	235	234.125
Air (Nm^3/hr)	1,650,135	1650135
Total Flue Gas (Nm^3/hr)	984,080	984080
Waste Water for Irrigation/Horticulture/Ash Pond (m^3/hr)	166	166
Water Loss in Cooling Tower, Evaporation, and Drift Loss (m^3/hr)	1,197	1197

- Urea is manufactured at a combined rate of 235 metric tons per hour from Urea I & II plants. Simultaneously, flue gas at the rate of 984,080 Nm^3/hr, is emitted throughout the production process.
- The plant generates 166 m^3/hr of wastewater, primarily repurposed for irrigation, horticulture, and the Ash Pond. Additionally, Water Loss in Cooling Tower, Evaporation, and Drift Loss, reaches upto 1,197 m^3/hr. Notably, the recorded values closely align with those given in the material balance sheet.
- The joint team collected/obtained data from 1st July to 15th October, 2023 for ammonia production, urea production and Nano – Fertilizer production. Details are mentioned in Tables 20, 21 and 22, respectively:

Table 20: Month wise Ammonia production

Month	Ammonia Production (in MT)	No. of operational days	Ammonia Production (in MT/day)
July, 2023	79545.3	31	2565.98
August, 2023	94928.7	31	3062.22
Sep, 2023	57912.2	30	1930.41
Oct, 2023	38408.4	15	2560.56
Total Ammonia Production – 270794.6 MT Total no. of operational days – 107 Average Production – 2530.79 MT/day			

- As per the data provided by unit for duration 1st July to 15th October, 2023, the average production of Ammonia was 2530.79 MT/day against the permitted capacity of 3300 MT/day, which is in **compliance with consent conditions.**

- Month wise data for urea production is mentioned in Table 21 below:

Table 21: Month wise Urea production

Month	Urea Production (in MT)	No. of operational days	Urea Production (in MT/day)
July, 2023	139682.6	31	4505.89
August, 2023	172048.9	31	5549.96
Sep, 2023	104938.1	30	3497.94
Oct, 2023	68656	15	4577.07
Total Urea Production – 485325.6 MT **Total no. of operational days – 107** **Average Production – 4535.75 MT/day**			

- As per the data provided by unit for duration 1st July to 15th October, 2023, the average production of Urea was 4535.75 MT/day against the permitted capacity of 5790 MT/day, which is in **compliance with consent conditions.**
- Month wise data for Nano – Fertilizer production is mentioned in Table 22 below:

Table 22: Month wise Nano - Fertilizer production

Month	Nano – Fertilizer Production (in KL)	No. of operational days	Urea Production (in KL/day)
July, 2023	36.5	8	4.56
August, 2023	4	1	4.00
Sep, 2023	20.5	4	5.13
Oct, 2023	59.46	15	3.96
Total Nano - Fertilizer Production – 120.46 KL **Total no. of operational days – 28** **Average Production – 4.3 KL/day**			

- As per the data provided by unit for duration 1st July to 15th October, 2023, the average production of Nano – Fertilizer was 4.3 KL/day. Considering this average production, annual production will be 1569.5 KL/annum for 365 operational days against the consented production capacity of 36500 KL/annum, which is in **Compliance with consent conditions.**

3. Groundwater abstraction and groundwater quality

- The unit has 18 nos. of borewells for meeting fresh water requirement for industrial purposes, domestic requirement within plant and township and greenbelt development.
- As per the No Objection Certificates (NOC's) issued by Uttar Pradesh Ground Water Department (UPGWD), the unit can abstract ground water @74880 KLD combinedly from 18 no. of borewells.

- Co-ordinates of all the 18 borewells is given below in Table 23:

Table 23: Status of 18 nos. of borewells along with coordinates found during current joint inspection

S. No.	Borewell No.	Latitude	Longitude
1.	Borewell No. 1	25.539886	82.055526
2.	Borewell No. 2	25.542094	82.053733
3.	Borewell No. 3	25.541329	82.055474
4.	Borewell No. 4	25.540172	82.058333
5.	Borewell No. 5	25.538527	82.063946
6.	Borewell No. 6	25.540630	82.063061
7.	Borewell No. 7	25.537057	82.067806
8.	Borewell No. 8	25.535459	82.053833
9.	Borewell No. 9	25.538181	82.056541
10.	Borewell No. 10	25.537203	82.059040
11.	Borewell No. 11	25.536260	82.064127
12.	Borewell No. 12	25.535506	82.066888
13.	Borewell No. 13	25.534340	82.066366
14.	Borewell No. 14	25.532038	82.064143
15.	Borewell No. 15	25.532801	82.061028
16.	Borewell No. 16	25.534555	82.059537
17.	Borewell No. 17	25.535042	82.055201
18.	Borewell No. 18	25.537113	82.065399

- The unit has installed electro-magnetic flow meters (with totalizer) at all 18 no. of borewells in compliance with NOC conditions. At the time of joint inspection, reading of flow meters installed on all borewells were noted and are mentioned below in Table 24:

Table 24: Reading of flow meters installed on all borewells

S. No.	Borewell No.	Flow meter installed (Yes/No)	Instantaneous reading* (m^3/hr)	Totalizer reading (m^3)
1.	Borewell No. 1	Yes	114	284293.68
2.	Borewell No. 2	Yes	0	3240336.1
3.	Borewell No. 3	Yes	0	1012028.2
4.	Borewell No. 4	Yes	210.65	1569890.94
5.	Borewell No. 5	Yes	97.22	763326.57
6.	Borewell No. 6	Yes	133.56	7458848.7
7.	Borewell No. 7	Yes	200.6	858174.6
8.	Borewell No. 8	Yes	0	1327352.17
9.	Borewell No. 9	Yes	0	511367.78
10.	Borewell No. 10	Yes	0	7300909.87
11.	Borewell No. 11	Yes	0.00	2746752.91
12.	Borewell No. 12	Yes	112	3825295.48
13.	Borewell No. 13	Yes	0	3074724.73
14.	Borewell No. 14	Yes	0.0	3189102
15.	Borewell No. 15	Yes	180	1197673.98
16.	Borewell No. 16	Yes	137.19	2970715.6

17.	Borewell No. 17	Yes	0	52238.18
18.	Borewell No. 18	Yes	121.88	3041819.62

*Flow 0.0 m^3/hr has been observed due to the batch mode of operation of borewells as per requirement

- As per the record/data of fresh water abstraction from all borewells provided by the unit, the total freshwater consumption from 1st July to 15th October, 2023, through these 18 borewells is mentioned in Table 25 below:

Table 25: Quantity of fresh water abstraction from 1st July to 15th October, 2023, as per log book submitted by the unit

Borewell no.	Borewell wise average groundwater abstraction values in each month (in KLD)				Overall avg. ground water abstraction per day (in KLD)	Daily permitted ground water abstraction as per NOC (in KLD)
	July	Aug	Sep	Oct		
Borewell -1	3386.36	3451.75	3196.43	3652	3421.64	3200
Borewell -2	3930.83	3943.77	2038.5	3989	3475.53	4480
Borewell -3	4667.41	4473.11	4310.93	4505.5	4489.24	5120
Borewell -4	3482.12	3567.69	3588.61	3592.375	3557.70	3840
Borewell -5	2900.06	2875.76	2898.36	0	2891.39	3200
Borewell -6	3905.85	3940.96	3646	3808	3825.20	4480
Borewell -7	4679.78	0	0	4793.36	4736.57	5120
Borewell -8	0	0	0	3619.25	3619.25	3840
Borewell -9	3286.5	3616.66	3531.6	3550.5	3496.32	3840
Borewell -10	3781.52	3967.15	4114.33	4183	4011.50	4480
Borewell -11	4020.5	0	3869.77	3920.09	3936.79	4480
Borewell -12	2814.62	2894.08	2954.45	2864.7	2881.96	3200
Borewell -13	3578	3556.25	0	0	3567.13	3840
Borewell -14	2725.87	2908.5	2623.83	2422.8	2670.25	3200
Borewell -15	3167.16	3319	3433.93	2931.28	3212.84	3840
Borewell -16	4028.10	4105.8	4095.33	4191.230	4105.12	5120
Borewell -17	3600.07	3641.14	4135.73	2741.66	3529.65	5120
Borewell -18	3749.63	3434.84	3661.91	3635.33	3620.43	4480
Total	**61704.38**	**53696.46**	**52099.71**	**58400.08**	**65048.49**	**74880.00**

- As per the logbook/data of borewells provided for groundwater withdrawal, the unit has abstracted groundwater @ **65048.49** KL/day for duration 01.07.2023 to 15.10.2023 **which is within the permissible limit of 74880 KL/day groundwater abstraction calculated from values mentioned in the NOCs issued by UPGWD.**

- The abstracted water from all borewells is conveyed through a common header line to 02 no. of storage tanks of 16000 m^3 capacity each. The stored fresh water is then supplied to following locations:
    - DM Plant
    - Softening Plant
    - Service water (Urea + Nano Plant)
    - Fire hydrant system
    - Cooperative Rural Development Trust (CORDET) area
    - Township
- The joint team asked the unit to provide log book data (from 1st July to 15th October, 2023) of fresh consumption at different sections i.e. DM Plant, Softening Plant, Service water (Urea + Nano Plant), Fire hydrant, CORDET area and Township, however unit could not provide the same. Therefore, the fresh water consumption at different locations/processes could not be estimated.
- As per the physical observations of joint team and discussions made with unit representatives, the water flow diagram (showing use and distribution of fresh water in different sections of the unit including effluent and sewage management) prepared by joint team is shown below in Figure 7:

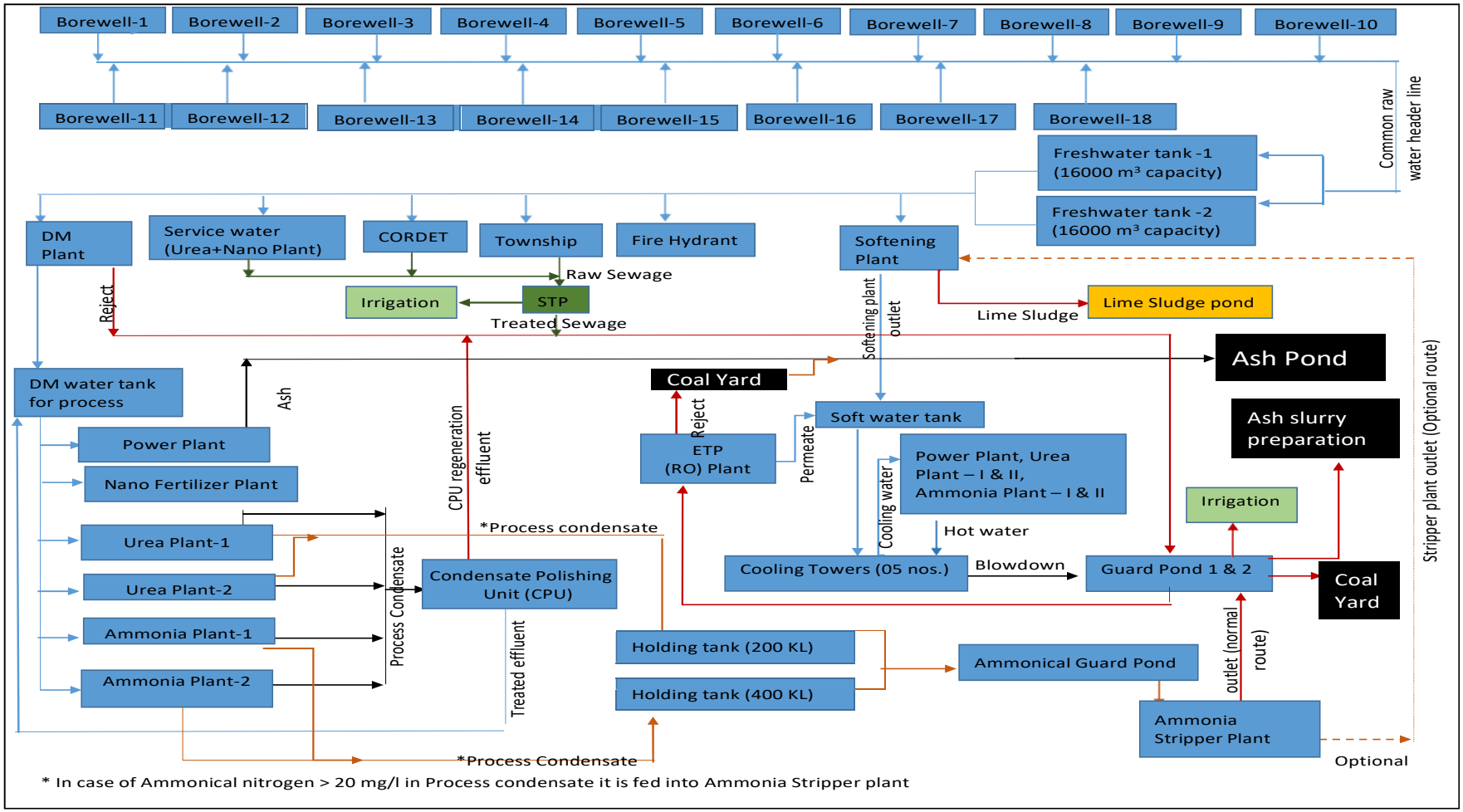


Figure 7: Uses and distribution of fresh water in different sections of the unit including wastewater (effluent & sewage) management scheme

- The Unit has installed 02 nos. of Piezowells within the premises to monitor the groundwater table, however the joint team observed that there was no provision for sample collection from Piezowells.
- Samples were collected from borewells within the premises of IFFCO to assess the ground water quality and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned below in Table 26:

Table 26: Analysis results of samples collected from Borewells within unit premises

Parameters	Borewell - 4	Borewell - 12	Borewell - 18	BIS IS 10500:2012 (Permissible limit in absence of alternative source)
pH	6.93	7.21	7.22	**6.5-8.5**
Colour (Hazen)	05	05	05	**15**
Conductivity (µS/cm)	821	719	714	**-**
TDS	547	434	450	**2000**
Total Hardness	309	230	310	**600**
Calcium as Ca^{2+}	113	84	109	**200**
Magnesium as Mg^{2+}	6.3	4.6	9.4	**100**
Sodium as Na^{+}	336	311	312	**-**
Potassium as K^{+}	3.08	2.68	3.36	**-**
Chloride	46.7	50.1	21.3	**1000**
Fluoride	BDL	BDL	BDL	**1.5**
Sulphate	68.5	63.1	39.2	**400**
Phosphate	0.08	2.63	2.47	**-**
Nitrate	3.45	2.53	7.98	**45**
Nitrite	BDL	BDL	BDL	**-**
Ammonical Nitrogen (NH_3-N)	BDL	BDL	BDL	**-**
Total Alkalinity	445	303	423	**600**
Carbonate	0.0	0.0	0.0	**-**
Bi-Carbonate	445	303	423	**-**
COD	9.43	6.64	BDL	**-**
Cr	ND	ND	ND	0.05
Cu	ND	ND	ND	1.5
Cd	ND	ND	ND	0.003
Pb	**0.0139**	ND	ND	0.01

Parameters	Borewell - 4	Borewell - 12	Borewell - 18	BIS IS 10500:2012 (Permissible limit in absence of alternative source)
Fe	0.0785	**1.2366**	**0.6254**	0.3
Ni	ND	ND	ND	0.02
Zn	0.0579	0.0644	ND	15
Mn	0.0523	0.1525	0.0666	0.3
As	ND	ND	ND	0.05

Note: All values are in mg/l except pH, colour, and conductivity; ND-Not detected; BDL-Below detection limit

- Analysis results of samples collected from Borewell located within IFFCO campus were found within the permissible limit as per BIS IS 10500:2012.
- The unit has installed a De-Mineralization (DM) plant of capacity 560 m^3/hr to treat groundwater and make it suitable for various processes in the power plant, the urea plants (I and II), and the ammonia plants (I and II).
- Unit has also installed a Softening Plant for combined treatment of Raw water (i.e. ground water) and Treated effluent from Ammonia stripper plant and the treated water from Softening plant is used as make up in 05 nos. of Cooling towers
- Samples were collected from Softening Plant to assess the efficiency of softening plant and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 27 below:

Table 27: Analysis results of samples collected from Softening Plant

Parameters	Inlet of Softening plant	Outlet of Softening plant	Feed to Cooling Tower from Softening plant
pH	8.16	10.1	10.1
Colour (Hazen)	5	5	5
TSS (mg/l)	3.02	23.5	31.4
TDS (mg/l)	548	362	360
Sulphate (mg/l)	55.2	70	72.3
Phosphate (mg/l)	0.46	0.06	0.12
Nitrate (mg/l)	7.17	4.96	5.68
Nitrite (mg/l)	2.56	BDL	BDL
Ammonical Nitrogen (mg/l)	BDL	BDL	BDL
Free Ammonia (mg/l)	0.298	0.128	0.191
TKN (mg/l)	4.18	2.51	1.12
COD (mg/l)	8.44	10.5	14.5
BOD (mg/l)	BDL	BDL	BDL

- Characteristics of water samples collected from outlet of Softening plant match with the characteristics of water samples collected from feed to cooling tower which indicates that unit is using treated water from Softening plant as make up in Cooling towers.

4. Effluent Management Scheme:

4.1. Effluent streams generation

- Effluent streams generated from different production units and their disposal routes (as per material balance provided by the unit and verified by joint team) are mentioned below:
    - Process condensate generated from Ammonia – I plant @ 47 m^3/hr, Ammonia – II plant @ 78 m^3/hr, Urea – I plant @ 38.2 m^3/hr and Urea – II plant @ 81.4 m^3/hr. All the process condensates are feed to Condensate Polishing Unit (CPU) when concentration of Ammonical Nitrogen is less than 20 mg/l and if the concentration of Ammonical Nitrogen exceeds 20 mg/l then it is routed to Ammonia Stripper plant through Ammonical guard pond
    - Turbine Condensate generated from Ammonia – II plant @ 113 m^3/hr and Urea – II plant @ 24.5 m^3/hr. All the turbine condensates are feed to CPU.
    - Steam Condensate generated from Urea – I plant @ 42.8 m^3/hr and Urea – II plant @ 52.1 m^3/hr. All the steam condensates are feed to CPU.
    - Reject from DM plant @ 19 m^3/hr – Feed to Guard pond 1 & 2
    - Wastewater generated from regeneration of resins in Ion – Exchange based CPU @ 34 m^3/hr and feed to Guard pond 1 & 2
    - Reject from ETP (RO) plant @ 29.25 m^3/hr used for spraying in Coal yard

4.2. Effluent management/treatment system

- For management/treatment of effluent streams generated from different processes, unit has installed following effluent management/treatment units:
    - Condensate Polishing Unit (CPU) of capacity 620 m^3/hr based on Ion – Exchange technology
    - Three nos. of guard ponds (guard pond no. 1 of capacity 10000 m^3, guard pond no. 2 of capacity 7000 m^3 & Ammonical Guard pond of capacity 7000 m^3)
    - Reverse Osmosis (RO) based ETP (of overall capacity 170 m^3/hr having three stage RO membrane of capacity 150 m^3/hr)

- Ammonia Stripper plant of capacity 30 m^3/hr.

➢ Details of all the above-mentioned effluent management/treatment units is described below in section 4.2.1 to 4.2.4.

4.2.1. Condensate Polishing unit (CPU)

➢ The unit has installed Condensate Polishing Unit (CPU) of 620 m^3/hr capacity for treatment of following:

- Process condensate generated from Ammonia – I plant, Ammonia – II plant, Urea – I plant and Urea – II plant when concentration of Ammonical Nitrogen in Process condensate < 20 mg/l
- Turbine Condensate generated from Ammonia – II plant and Urea – II plant
- Steam Condensate generated from Urea – I plant and Urea – II plant

➢ During visit, CPU was found operational.

➢ The CPU is based on Ion – Exchange technology. Treated condensate from CPU is being fed into DM water holding tank for reuse in process sections of Power Plant, Urea Plant – I & II, Ammonia Plant – I & II. Wastewater generated from regeneration of resins in Ion – Exchange is feed to Guard ponds 1 & 2

➢ Detailed scheme of inflow and outflow from CPU is shown below Figure 8:

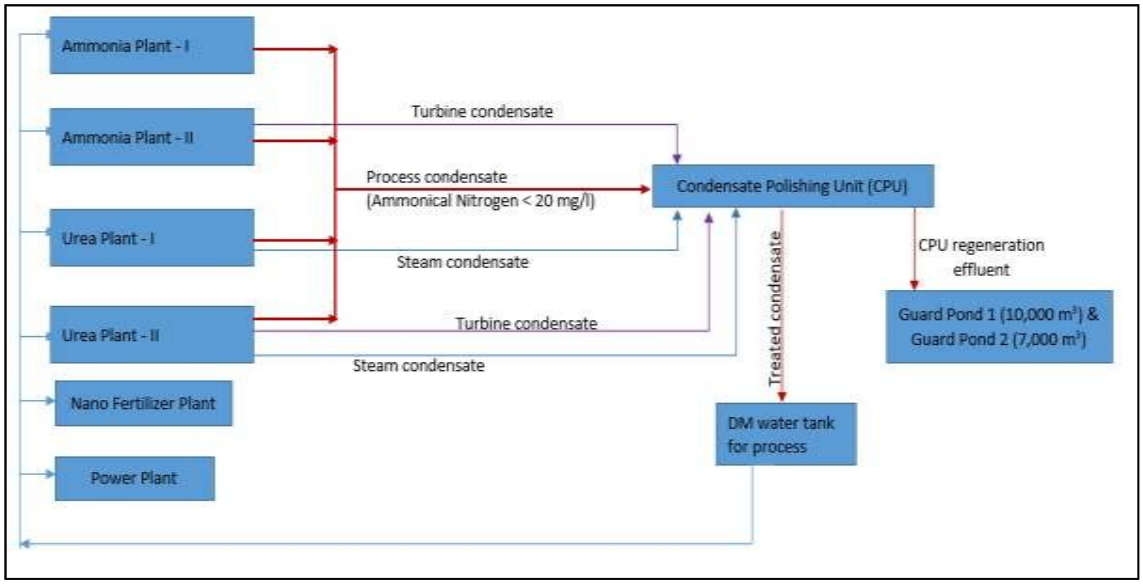


Figure 8: Inflow and outflow diagram of CPU

➢ As per material balance sheet provided by the unit, around 477 m^3/hr of Combined condensate (i.e. Process Condensate, Steam Condensate & Turbine Condensate) is fed

into CPU. Treated Condensate is generated from CPU @ 443 m^3/hr & Wastewater from regeneration of resins is generated @ 34 m^3/hr.

- Treated Condensate from CPU after mixing with DM water is utilized at Power Plant, Urea Plant – I & II, Ammonia Plant – I & II.
- During visit, it was observed by the joint team that flow meters have not been installed at inlet & outlet of CPU.
- No flow meters have been installed at utilization points, hence quantity of treated condensate reused at different process sections could not be determined.
- Samples were also collected by the joint team from Inlet and outlet (i.e. permeate) of CPU and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 28 below:

Table 28: Analysis results of samples collected from Inlet and outlet (i.e. permeate) of CPU

Parameters	CPU Inlet	CPU Outlet
pH	9.48	7.33
Colour (Hazen)	5	5
TSS (mg/l)	BDL	BDL
TDS (mg/l)	18	BDL
Sulphate (mg/l)	11.6	BDL
Phosphate (mg/l)	0.08	0.38
Nitrate (mg/l)	BDL	BDL
Nitrite (mg/l)	BDL	BDL
Ammonical Nitrogen (mg/l)	5.27	BDL
Free Ammonia (mg/l)	0.05	0
TKN (mg/l)	5.86	BDL
COD (mg/l)	78.4	67.6
BOD (mg/l)	43.7	36.7

4.2.2. Guard Ponds

- The unit has three guard ponds for storing different types of effluents as mentioned below:
  - Guard pond no. 1 (capacity: 10,000 m^3) and guard pond no. 2 (capacity: 7,000 m^3) for combined storage of reject from DM Plant, wastewater generated from regeneration of resins in Ion – Exchange based CPU, Blowdowns from 05 nos. of Cooling towers, outlet of ammonia stripper plant and treated sewage from Sewage Treatment Plant (STP) of capacity 03 MLD
  - Ammonical Guard pond of capacity 7,000 m^3 for storing process condensate having high Ammonical nitrogen concentration > 20 mg/l generated from

Ammonia Plant – I & II and Urea Plant – I & II and feeding to Ammonia Stripper plant for removal of Ammonical nitrogen

- Detailed scheme of inflow and outflow from Guard ponds is shown in Figure 9 below:

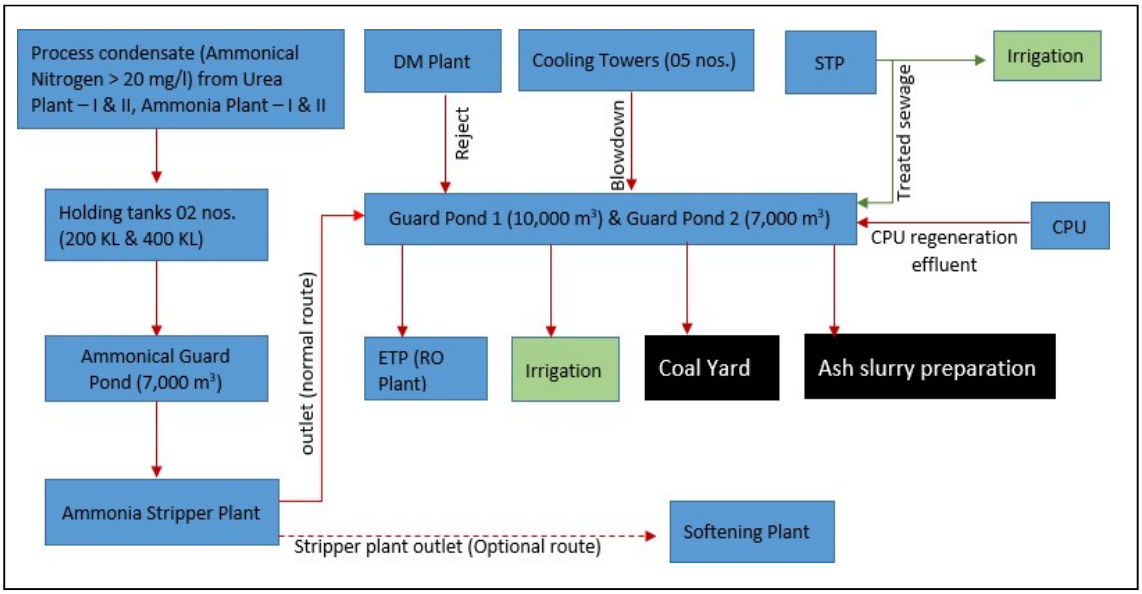


Figure 9: Inflow and outflow water balance of Guard ponds

- As per the material balance provided unit, Guard ponds – 1 & 2 receive DM plant reject @ 19 m^3/hr, regeneration wastewater from CPU @ 34 m^3/hr, Blowdowns from 05 nos. of Cooling towers @ 184 m^3/hr, outlet of ammonia stripper plant @ 29 m^3/hr and treated sewage from STP @ 29 m^3/hr.
- It was observed by Joint team that unit has not installed flow meters at inlet and outlet of any Guard ponds, hence no logbooks were available for quantity of wastewater feed to guard ponds and utilized from guard ponds.
- The joint team also observed that unit is using wastewater directly from guard ponds 2 for irrigation purposes, accordingly samples were collected and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 29 below:

Table 29: Analysis results of samples collected for wastewater used directly from guard pond – 2 for irrigation purposes

Parameters	Wastewater directly used from guard pond- 2 for irrigation	Standards as per CCA issued by UPPCB	Standards notified under E (P) Rules, 1986	Compliance status
pH	7.15	6.5 – 8.5	6.5 – 8.5	Complying
Colour (Hazen)	10	-	-	-

TSS (mg/l)	22.8	100	100	Complying
TDS (mg/l)	3023	-	-	-
Phosphate (mg/l)	0.8	-	-	-
Nitrate (mg/l)	6.5	10	10	Complying
Nitrite (mg/l)	1.6	-	-	-
Ammonical Nitrogen (mg/l)	33.1	50	50	Complying
Free Ammonia (mg/l)	0.359	2.0	2.0	Complying
TKN (mg/l)	52.7	75	75	Complying
COD (mg/l)	211	250	-	Complying
BOD (mg/l)	**48**	**30**	**-**	**Non-Complying**
Oil & Grease (mg/l)	9.56	-	10	Complying
Cyanide	0.012	-	0.1	Complying

- Samples were also collected by the joint team from inlet & outlet of guard pond no. 2, and from Ammonical guard pond. The analysis results (Copy of water sample analysis report is placed at Annexure – IX) of same are mentioned in Table 30 below:

Table 30: Analysis results of samples collected from inlet & outlet of guard pond no. 2 and from Ammoniacal guard pond

Parameters	**Inlet of guard pond no. 2**	**Outlet of guard pond no. 2**	**From Ammonical guard pond**
pH	7.5	7.35	8
Colour (Hazen)	15	15	-
TSS (mg/l)	3.38	4.76	-
TDS (mg/l)	2427	3092	-
Sulphate (mg/l)	402	431	-
Phosphate (mg/l)	0.13	1.9	-
Nitrate (mg/l)	39.8	49.8	-
Nitrite (mg/l)	1.74	1.71	-
Ammonical Nitrogen (mg/l)	22.7	56.8	120
Free Ammonia (mg/l)	2.19	0.961	10.3
TKN (mg/l)	23.4	57.7	344
COD (mg/l)	90.5	135	-
BOD (mg/l)	29.6	11	-
Oil & Grease (mg/l)	-	-	-
Cyanide	-	0.034	-

4.2.3. ETP RO Plant

- The unit has installed Reverse Osmosis (RO) based ETP (of overall capacity 170 m^3/hr i.e. 4080 KLD and individual three stage RO membrane capacity 150 m^3/hr i.e. 3600 KLD) for treatment of wastewater stored in Guard ponds – 1& 2.
- During visit, ETP was found operational.
- Detailed scheme of inflow and outflow from ETP is shown below in Figure 10:

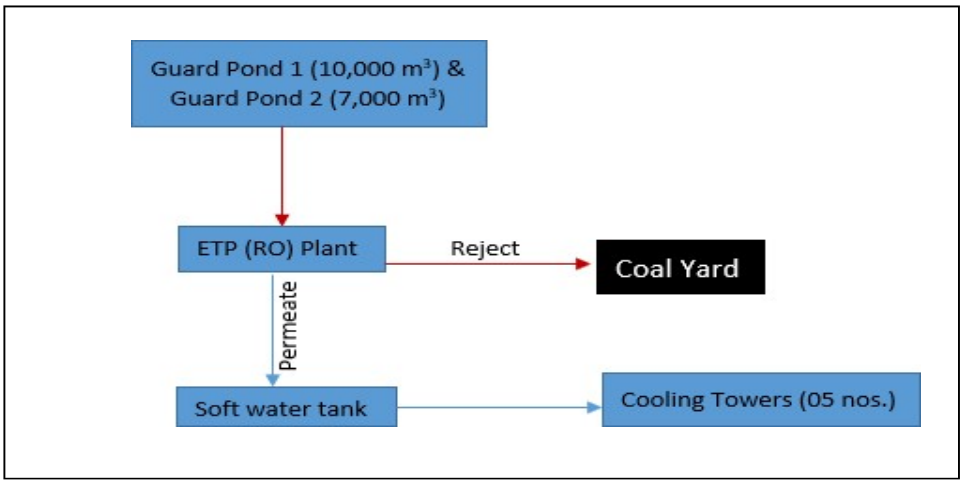


Figure 10: Inflow and Outflow diagram of ETP

- The treatment scheme of ETP comprises of Collection tank → Clarifier → Pressure Sand Filters (PSF) → Activated Carbon Filter (ACF) → Micron Filter → 03 stage RO plant → Permeate to Cooling towers (for reuse as make up water) and reject to Coal yard (for spraying).
- Detailed treatment scheme of ETP (RO) plant is shown below in Figure 11:

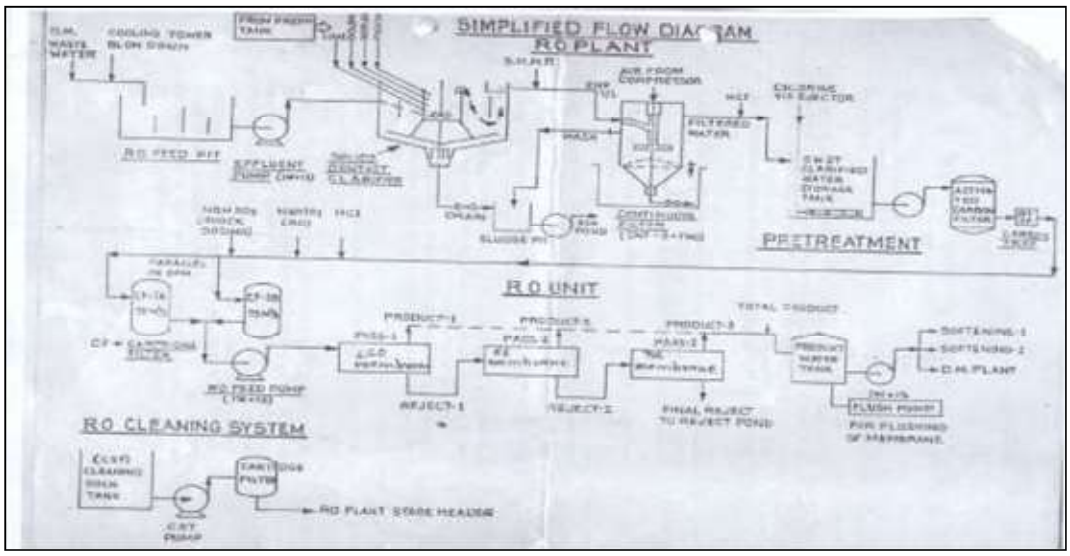


Figure 11: Detailed treatment scheme of ETP (RO) plant

- As per the logbook data provided by unit, the month wise quantity of effluent feed to ETP (RO Plant), Permeate and reject from ETP (RO Plant) is mentioned in Table 31 below:

Table 31: Month wise quantity of effluent feed to ETP (RO Plant), Permeate and reject from ETP (RO Plant)

Month	No. of operational days	Total Feed to Clarifier of ETP (RO) Plant (KL)	Feed to RO membranes (KL)	Permeate from ETP (KL)	Reject from ETP (KL)
July, 2023	25	86904	74184	56064	18120
August, 2023	27	93768	83256	63792	19464
Sep, 2023	10	30864	29400	22200	7200
Oct, 2023	11	44544	38208	31302	6456
Total	73	256080	225048	173358	51240
Avg. (KLD)		3507.94	3082.85	2374.76	701.92
Avg. daily effluent feed – 3507.94 KLD Avg. daily permeate generation – 2374.76 KLD Avg. daily reject from RO plant – 701.92 KLD					
% Loss = 12.3% which may be attributed to loss of water content in form of Sludge generated from Clarifier installed before RO membranes					

- Reject was being used for spray in coal yard and treated effluent i.e. ETP RO permeate was being reused as makeup in 05 no. of Cooling towers.
- Samples were also collected by the joint team from feed to Clarifier, feed to RO membrane section, permeate and reject generated from ETP (RO) plant. The analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned below in Table 32:

Table 32: Analysis results of samples collected from feed to Clarifier, feed to RO membrane section, permeate and reject generated from ETP (RO) plant

Parameters	Feed to Clarifier	Feed to RO membrane section	RO Permeate	RO Reject
pH	7.36	6.83	6.6	6.01
Colour (Hazen)	15	05	10	20
TSS (mg/l)	8.64	BDL	BDL	5.57
TDS (mg/l)	2897	2713	240	8190
Sulphate (mg/l)	1284	1279	66.2	3379
Phosphate (mg/l)	3.82	0.11	0.06	0.11
Nitrate (mg/l)	87.2	75.6	20.2	198
Nitrite (mg/l)	1.93	2.43	2.94	1.77
Ammonical Nitrogen (mg/l)	1.59	-	0.59	13.9

Parameters	Feed to Clarifier	Feed to RO membrane section	RO Permeate	RO Reject
Free Ammonia (mg/l)	0.02	-	0.0	0.016
TKN (mg/l)	26.5	-	2.23	14.2
COD (mg/l)	35.1	42.9	5.74	97.9
BOD (mg/l)	13.7	6.73	BDL	18
Cyanide	0.031	-	0.033	0.021

- The unit has installed flow meters at following locations in ETP section and readings were noted as mentioned in Table 33 below:

Table 33: Readings of flow meters installed at Inlet and Outlet of ETP (RO plant) and Ammonia stripper plant

Flow meter installation at ETP	Instantaneous flow rate (m^3/hr)	Totalizer (m^3)
Feed to Clarifier	146	1510657.3
Feed to RO membranes	133	9864833
RO Permeate	97	329258.9
RO Reject	29.7	197018.5

4.2.4. Ammonia Stripper Plant

- The unit has installed Ammonia Stripper plant of 30 m^3/hr capacity for treatment of Process condensate generated from Ammonia – I plant, Ammonia – II plant, Urea – I plant and Urea – II plant if the concentration of Ammonical Nitrogen exceeds 20 mg/l.
- During visit, Ammonia Stripper plant was found operational.
- Detailed scheme of inflow and outflow from Ammonia Stripper plant is shown in Figure 12 below:

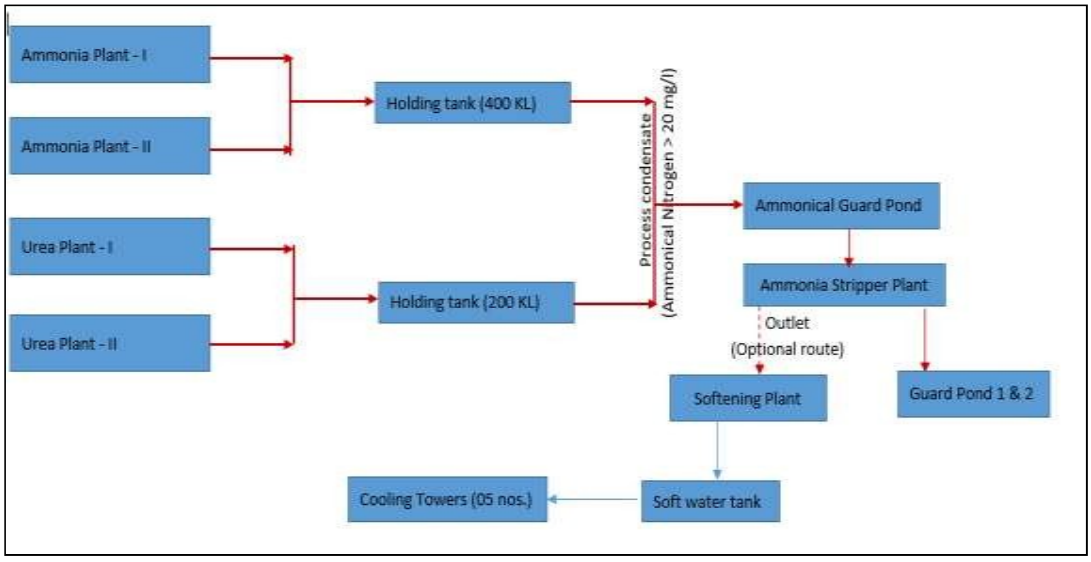


Figure 12: Diagram detailing inflow and outflow from Ammonia Stripper

- The unit has installed flow meter only at inlet of Ammonia Stripper Plant but not at outlet, hence logbooks were available for quantity of effluent feed to ammonia stripper plant.
- The joint inspection team observed that, treated effluent from Stripper plant is fed into Guard Ponds - 1 & 2, however unit has also provided a provision for using outlet of stripper plant as feed to Softening Plant for further polishing and reused as makeup in 05 no. of Cooling towers.
- As per the logbook data provided by unit, the month wise quantity of effluent feed to Ammonia stripper plant is mentioned below in Table 34:

Table 34: Month wise quantity of effluent feed to Ammonia Stripper plant

Month	**No. of operational days**	**Feed to Ammonia Stripper plant (KL)**
July, 2023	31	915
August, 2023	31	915
September, 2023	17	504
October, 2023	18	530
Total	97	2864
Avg. daily effluent feed – 29.52 KLD		

- Samples were also collected by the joint team from Inlet and outlet of Ammonia stripper plant and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 35 below:

Table 35: Analysis results of samples collected from Inlet and outlet of Ammonia stripper plant

Parameters	**Inlet of Ammonia stripper plant**	**Outlet of Ammonia stripper plant**
pH	9.71	10
Colour (Hazen)	15	10
TSS (mg/l)	55.7	BDL
TDS (mg/l)	462	393
Sulphate (mg/l)	111	57.6
Phosphate (mg/l)	0.49	0.12
Nitrate (mg/l)	5.22	32.6
Nitrite (mg/l)	BDL	1.10
Ammonical Nitrogen (mg/l)	4.43	120
Free Ammonia (mg/l)	5.03	62.5
TKN (mg/l)	640	137
COD (mg/l)	217	103
BOD (mg/l)	116	59
Cyanide (mg/l)	0.014	0.008

5. Sewage management scheme

- After different domestic uses of freshwater in Industrial campus (Urea + Nano plant), CORDET area and township, wastewater having domestic origins is generated known as Sewage.
- As per the data provided the unit, the total combined rate of sewage generation from Industrial campus (Urea + Nano plant), CORDET area and township is 33 m^3/hr (i.e. approx. 792 KLD)
- For treatment of sewage, the unit has installed a Sewage Treatment Plant (STP) of capacity 03 MLD.
- Sewage generation and distribution scheme is presented in Figure 13 below:

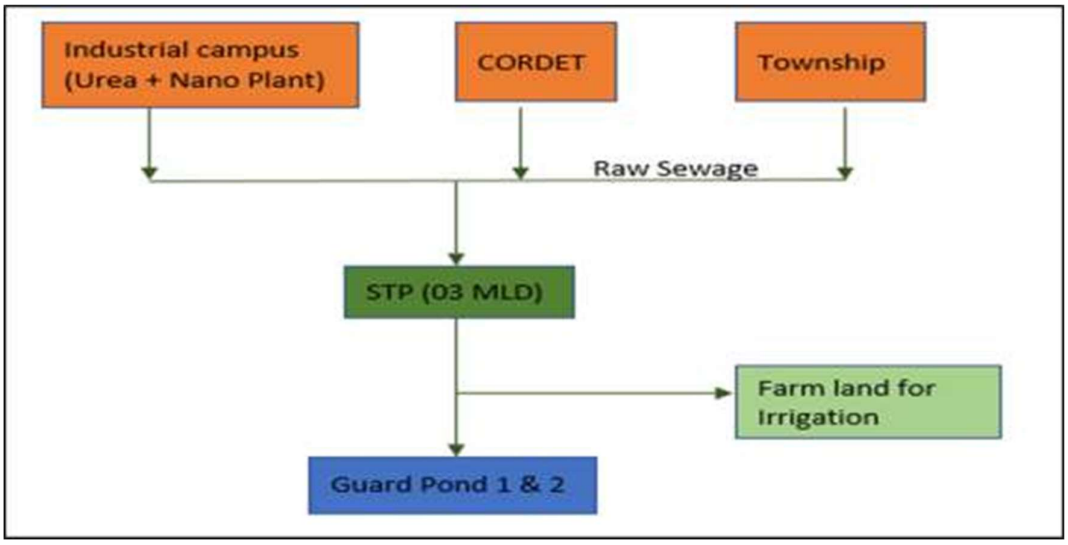


Figure 13: Sewage generation and distribution

- During visit, STP was found operational.
- The treatment scheme of STP comprises of Raw sewage collection tank → Aeration Tank → Clarifier → Clarifier water tank → Pressure Sand Filters (PSF) → Activated Carbon Filter → Disinfection → Treated sewage tank → Guard Pond - 1 & 2 and CORDET farm land (for irrigation).
- Detailed treatment scheme of STP is shown in Figure 14 below:

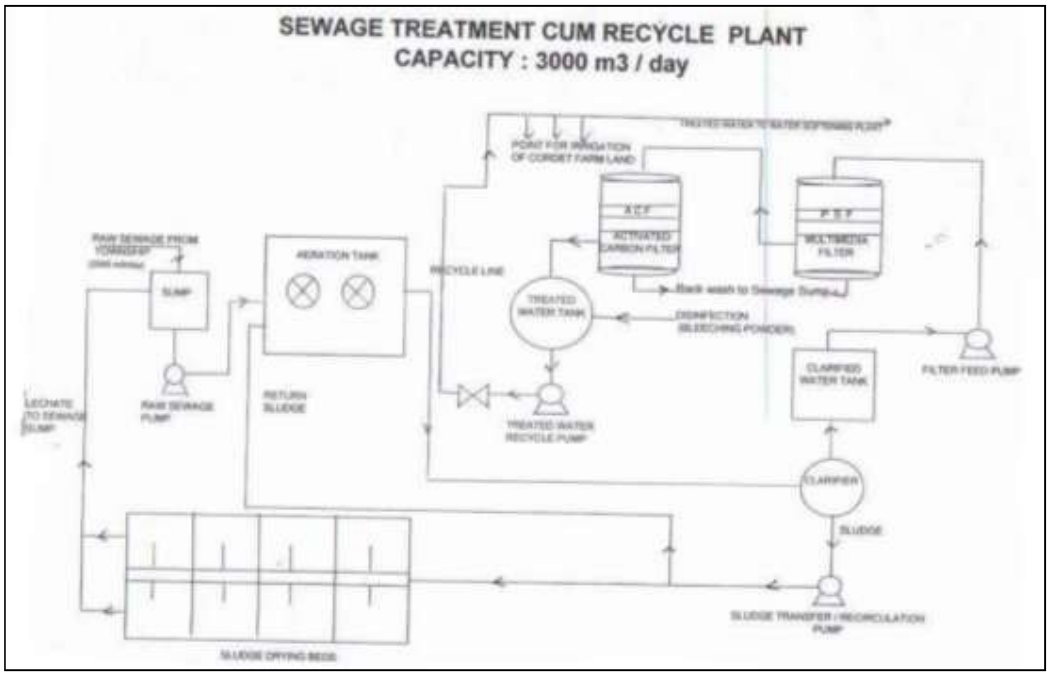


Figure 14: Detailed treatment scheme of STP

- It was also observed that unit is carrying out disinfection of treated sewage using bleaching powder.
- Treated sewage is used for irrigation of farm land (155 acres) and for feed to Guard ponds – 1 & 2 for further polishing from ETP RO plant.
- During visit, the joint team observed that unit has not installed flow meter (with totalizer) at inlet and outlet of STP, hence no logbook data was available for quantity of sewage fed and treated from STP.
- Samples were also collected by the joint team from STP inlet, Aeration tank, STP outlet (after Activated Carbon Filter) and STP outlet (treated sewage holding tank) and analysis results (Copy of water sample analysis report is placed at Annexure – IX) are mentioned in Table 36 below:

Table 36: Analysis results of samples collected from STP inlet, Aeration tank, STP outlet (after Activated Carbon Filter) and STP outlet (treated sewage holding tank)

Parameters	**STP Inlet**	**STP outlet (after Activated Carbon Filter)**	**STP outlet (treated sewage holding tank)**	**Discharge standards notified vide MoEF&CC notification G.S.R. 1265(E). dated 13.10.2017**	**Compliance status**
pH	7.36	8.10	8.32	6.5 – 9.0	Complying
Colour (Hazen)	10	10	10	-	-
TSS (mg/l)	BDL	2.76	3.06	100	Complying
TDS (mg/l)	626	674	680	-	-
Sulphate (mg/l)	92.9	96.5	114	-	-
Phosphate (mg/l)	2.65	3.81	2.68	-	-
Nitrate (mg/l)	BDL	28.2	30.7	-	-
Nitrite (mg/l)	BDL	BDL	BDL	-	-
Ammonical Nitrogen (mg/l)	6.74	BDL	BDL	-	-
Free Ammonia (mg/l)	0.007	0.002	0.000	-	-
TKN (mg/l)	6.97	0.837	BDL	-	-
COD (mg/l)	51.7	11.8	6.76	-	-
BOD (mg/l)	23.2	BDL	BDL	30	Complying
Oil & Grease (mg/l)	-	BDL	-	-	-
Total Coliform (MPN/100 ml)	-	7.9×10^4	1.3×10^4	-	-
Fecal Coliform (MPN/100 ml)	-	1.7×10^4	**4.5×10^3**	<1000	**Non-Complying**
Aeration Tank: MLSS – 4015 mg/l & MLVSS – 1930 mg/l					

- Analysis results of samples collected from STP outlet (i.e. treated sewage holding tank) indicates that STP is **Non-complying** w.r.t Discharge standards notified vide MoEF&CC notification G.S.R. 1265(E). dated 13.10.2017.

Note: All samples collected from the unit were sealed in the presence of unit representative, duplicate samples were provided to the unit's representative and also a notice of intention to have sample analyzed (Form-1) was issued to the unit. A copy of the same is placed at Annexure-XI. The samples have been analyzed in laboratories of CPCB, Regional Directorate Lucknow, HO Delhi and in UPPCB HO Lucknow.

IV. Pollution source mapping of IFFCO drain and groundwater quality in the villages along the drain

- Indian Farmers Fertiliser Cooperative Limited (IFFCO) (here in after referred as 'the unit') is situated in the catchment area of a natural watercourse that carries storm water along with untreated sewage from the villages in its vicinity. This natural watercourse (here in after referred as 'IFFCO drain') originates near Tisaura village in Phulpur Block, Prayagraj district, approximately 1.2 kilometers upstream of the unit. It travels approximately 41 kilometers before meeting the River Ganga near Dumduma village in Prayagraj district.
- The monitoring team interacted with residents from villages within the catchment area of IFFCO drain. On November 18, 2023, the team held discussions with petitioner Sh. Parasnath from Khudaypur village and Sh. Ramsurat from Baro village. The residents informed the team about the adverse effects of pollution attributed to IFFCO, Phulpur. The petitioner discussed on past crop damage due to industrial effluent discharge and compensation amount for same. Additionally, during the conversation, the petitioner pointed out specific sites requiring sampling. In response, the monitoring team gathered groundwater and soil samples from these precise sites as requested by the petitioner. The findings and results are elaborated in the subsequent sections.
- The pollution source mapping of the IFFCO drain was carried out from its origin to confluence with river Ganga during Oct 17th – 18th, 2023. The IFFCO drain was monitored at eleven locations, out of which wastewater samples from the drain were collected at eight locations and the drain was found dry at three locations. To assess the impact of drain on river Ganga, water samples of river Ganga were also collected before and after the confluence of the IFFCO drain. A map illustrating the monitoring locations along the IFFCO drain and River Ganga is provided in Figure 15:

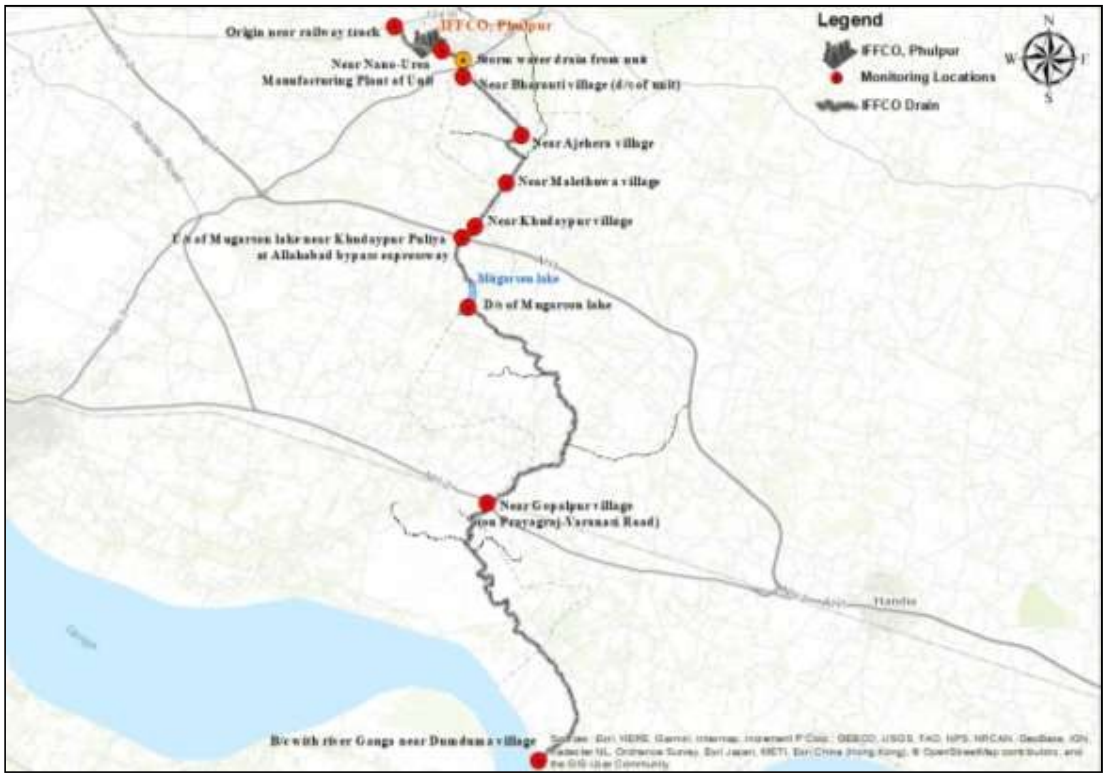


Figure 15 :Location map showing monitoring locations on the IFFCO drain and River Ganga

- Wastewater samples were analyzed for pH, colour, BOD, COD, TSS, TDS, nitrate, nitrite, phosphate, sulphate, ammoniacal nitrogen, TKN and free ammonia (Copy of water sample analysis report is placed at Annexure – IX). Analysis results of samples collected from IFFCO drain are tabulated below in Table 37:

Table 37: Laboratory analysis results of samples collected from drain

S. No.	Monitoring location	pH	Temperature	Color	BOD	COD	TSS	TDS	Nitrate	Nitrite	Phosphate	Sulphate	Ammoniacal Nitrogen	TKN	Free Ammonia
1.	IFFCO drain at origin (upstream of unit)	7.54	24.5	50	34	80	37	440.8	2.96	Not analyzed	4.8	34.5	20.46	18.48	BDL
2.	IFFCO drain near Nano-Urea manufacturing plant of the unit	9.28	33	10	25.9	42.2	83.4	966	BDL	2.1	2.41	105	1.86	11.2	0.024
3.	Storm water drain from unit	8.7	26	15	BDL	19.2	BDL	742	BDL	BDL	0.57	127	BDL	3.06	NIL
4.	IFFCO drain near Bharauti village (downstream of unit)	8.27	27.4	25	20	24	31	616	1.52	Not analyzed	4.6	31.8	24.28	18.36	BDL
5.	IFFCO drain near Ajehera village	7.52	25.6	25	40	60	32	730	1.83	Not analyzed	5.9	38.6	28.36	20.28	BDL
6.	IFFCO drain near Khudaypur village	7.24	24	40	9.7	30.4	34	631	3.1	1.17	2.17	38.6	0.63	2.23	0.541
7.	IFFCO drain downstream of Mugarson lake	7.03	25.6	50	30	48	9	614.8	1.62	Not analyzed	4.8	40.3	24.36	36.34	BDL

S. No.	Monitoring location	pH	Temperature	Color	BOD	COD	TSS	TDS	Nitrate	Nitrite	Phosphate	Sulphate	Ammoniacal Nitrogen	TKN	Free Ammonia
8.	IFFCO drain before confluence with river Ganga near Dumduma village	7.83	33	45	80	112	692	435	2.86	Not analyzed	5.3	38.9	22.36	19.24	BDL
9.	Storm water drain near ETP (RO plant)	7.90	28	25	9.67	43.6	7.59	1908	56.5	2.23	2.28	614	10.9	12.3	0.105
10.	Storm water drain near Urea Plant – I	9.31	33	25	33	91.5	9.27	288	5.09	0.22	0.71	42.7	35.1	442	21
11.	Storm water drain near Ammonia Plant – I	7.80	58	20	15.1	39.5	2.76	379	BDL	2.72	1.05	78.6	1.83	1.95	0.02
12.	Storm water drain near Ammonia Plant – II	7.49	35	05	5.90	16.9	BDL	943	34.4	3.13	2.63	210	2.26	2.79	0.033
13.	Storm water drain near Urea Plant – II	7.64	28	05	12.9	29.4	5.67	689	4.69	BDL	1.28	71.7	7.86	8.64	0.075
14.	Storm water drain at end point near Guard pond-2	8.16	29	05	5.24	23.9	BDL	1108	20	2.88	0.92	286	3.76	8.09	0.036

All parameters are expressed in mg/L except pH, temperature (ºC) and color (Hazen).

- The monitoring locations on IFFCO drain are given below in Table 38:

Table 38 Monitoring locations on IFFCO drain

S. no.	Monitoring locations on IFFCO drain	Date of monitoring	Flow (MLD)	Geographical coordinates		Sample collected
				Latitude	Longitude	
1.	IFFCO drain upstream of unit (1.2 Kms from origin)	17/10/2023	Stagnant	25.542591	82.038932	Yes
2.	IFFCO drain near Nano-Urea manufacturing plant of the unit	18/10/2023	Stagnant	25.535068	82.053565	Yes
3.	Storm water drain from unit	18/10/2023	Stagnant	25.532106	82.060239	Yes
4.	IFFCO drain near Bharauti village (0.7 Kms from unit)	17/10/2023	Stagnant	25.526886	82.060337	Yes
5.	IFFCO drain near Ajehera village (3.5 Kms from unit)	17/10/2023	Stagnant	25.508877	82.078141	Yes
6.	IFFCO drain near Malethuwa village (5.9 Kms from unit)	17/10/2023	Dry	25.494253	82.073467	No
7.	IFFCO drain near Khudaypur village (7.7 Kms from unit)	18/10/2023	Stagnant	25.480758	82.063971	Yes
8.	IFFCO drain at upstream of Mugarson lake near Khudaypur Puliya at Allahabad bypass expressway (8.4 Kms from unit)	17/10/2023	Dry	25.477247	82.059920	No
9.	IFFCO drain downstream of Mugarson lake (11 Kms from unit)	17/10/2023	Stagnant	25.455773	82.061860	Yes
10.	IFFCO drain near Gopalpur village (on Prayagraj-Varanasi Road) (22.3 Kms from unit)	18/10/2023	Dry	25.395432	82.067698	No

S. no.	Monitoring locations on IFFCO drain	Date of monitoring	Flow (MLD)	Geographical coordinates		Sample collected
				Latitude	Longitude	
11.	IFFCO drain before confluence with river Ganga near Dumduma village (37.1 Kms from unit)	18/10/2023	0.2 MLD	25.316192	82.083574	Yes

IFFCO drain upstream of unit:

- The IFFCO drain was monitored near the railway track, adjacent to the unit's boundary wall, about 1.2 km from its origin near Tissaura village. This location on drain is upstream of the unit. Stagnant water was observed in the drain (Figure 16 and 17). Analysis of wastewater samples collected from the drain indicates BOD-34 mg/L, COD-80 mg/L and TSS-37 mg/L. Wastewater characteristics indicated that the drain carries domestic sewage.

Figure 16: IFFCO drain at origin

Figure 17: IFFCO drain at upstream of unit (stagnant water in drain)

IFFCO drain near Nano-Urea manufacturing plant of unit:

- At around 3.1 kilometers downstream from the origin, wastewater sampling was done from the IFFCO drain near the Nano-Urea manufacturing plant of the unit (Figure 18). Laboratory analysis results indicated that BOD, COD and TSS as 25.9 mg/L, 42.2 mg/L and 37 mg/L, respectively.

Discharge of storm water drain from unit into IFFCO drain:

- A storm water drain that carries treated domestic wastewater from the unit joins the IFFCO drain within the unit's boundary, about 3.8 kilometers downstream from the

unit. The storm water drain was sampled before it merged with the IFFCO drain (Figure 19). The wastewater analysis showed that the storm water drain had BOD-BDL, COD-19.2 mg/L and TSS-BDL mg/L.

Figure 18: IFFCO drain near Nano-Urea manufacturing plant of the unit

Figure 19: Storm water drain emanating from unit

- Seven samples of groundwater were collected from six villages near the unit namely Beer Kaji & Sarai Abdulmalik (located at left bank of IFFCO drain); and Pali, Fazilapur, Jaferpur & Mansi Khurd (located at right bank of IFFCO drain). The villages Beer Kaji, Sarai Abdulmalik, Pali, Fazilapur and Mansi Khurd villages are located at approximately 800 m, 1 Km, 872 m, 40 m and 938 m, respectively, from IFFCO drain and Jaferpur village is located at approximately 1.97 kilometers from the IFFCO drain. The map showing groundwater monitoring locations is shown in Figure 20. Groundwater samples were collected from hand-pumps located in villages Beer Kaji (depth-120 feets), Sarai Abdulmalik (depth-120 feets), Pali (depth-60 feets), Fazilapur (depth-35 & 200 feets), Jaferpur (depth-120 feets) & Mansi Khurd (depth-120 feets) (Figures 21 to 27).
- The groundwater samples collected from five villages (Beer Kaji, Sarai Abdulmalik, Pali, Fazilapur and Mansi Khurd) located within the periphery of 1 kilometer of the unit appeared clear and were meeting the drinking water standards (IS 10500:2012) except TDS at Fazilapur village (648 mg/L against norm of 600 mg/L), Iron at Pali (0.4485 mg/l), Mansi Khurd (0.4002 mg/L) and Fazilapur (near IFFCO drain) (2.33845 mg/l), Lead at Beer Kaji (0.0833 mg/L) and Sarai Abdulmalik (0.0833 mg/L) and Manganese at Pali (0.3171 mg/L) and Fazilapur (near IFFCO drain) (0.3243 mg/L).

- The wastewater characteristics of IFFCO drain from origin to Bharauti village showed BOD in the range of 20-34 mg/L, COD as 24-80 mg/L and TSS as 31-83.4 mg/L which indicated no impact of industrial discharge on IFFCO drain. However, high TDS in groundwater of Fazilapur village could be attributed to geogenic sources. (Copy of water sample analysis report is placed at Annexure – IX). Analysis results of samples collected from Hand pumps/Borewells in catchment area of IFFCO drain are tabulated in Table 39:

Table 39: Groundwater analysis results

S. No.	Monitoring location	pH	Colour	Conductivity	Alkalinity	Carbonates	Bicarbonates	COD	TDS	Total Hardness	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	Cl^{-}	F^{-}	SO_4^{2-}	PO_4^{3-}	NO_3^{-}	NO_2^{-}	NH_3-N
1.	Beer Kaji, Phulpur	7.72	10	690	464	NIL	56.6	16	400.2	220	30.4	34.9	97	2.6	1.4	0.46	21.5	0.38	8.45	-	BDL
2.	Sarai Abdulmalik	7.04	10	1830	576	NIL	70.27	8	1061.4	520	80	77.7	324	4.2	29.63	0.51	42.5	0.49	12.45	-	BDL
3.	Pali, Phulpur	6.89	10	1420	364	NIL	44.4	12	823.6	444	84.8	56.3	394	5.9	20.02	0.56	32.5	0.45	10.95	-	BDL
4.	Fazilapur	7.01	10	2900	436	NIL	53.19	8	1682	**648**	97.6	96.6	424	4.5	60.06	0.43	46.5	0.39	16.5	-	BDL
5.	Fazilapur (near IFFCO drain)	7.17	10	1000	508	NIL	61.97	8	580	512	62.4	86.5	44	4.6	6.40	0.38	29.5	0.48	10	-	BDL
6.	Jaferpur Urf Babuganj	7.02	10	3900	**804**	NIL	98	12	**2262**	**760**	132.8	**104**	236	3.6	71.47	0.39	68	0.51	14.5	-	BDL
7.	Mansi Khurd	7.24	10	900	428	NIL	52.2	20	522	460	46.4	83.5	86	3.7	8.6	0.42	32.5	0.46	12.5	-	BDL

S. No.	Monitoring location	pH	Colour	Conductivity	Alkalinity	Carbonates	Bicarbonates	COD	TDS	Total Hardness	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	Cl^{-}	F^{-}	SO_4^{2-}	PO_4^{3-}	NO_3^{-}	NO_2^{-}	NH_3-N
8.	Ajehara	6.75	10	1890	340	NIL	41.4	16	1096.2	**680**	148.8	74.8	84	4.9	52.85	0.36	38.5	0.52	13.25	-	BDL
9.	Malethuwa	6.92	15	1940	468	NIL	57	16	1125.2	552	116.8	63.1	298	1.5	38.44	0.34	34.5	0.56	12.75	-	BDL
10.	Khudaypur	7.24	5	872	401	0	401	7.81	478	365	130	9.7	310	4.29	58.7	BDL	42.3	0.59	6.30	BDL	BDL
11.	Dumduma, Phulpur	6.82	10	950	464	NIL	56.6	48	551	368	139.2	4.86	206	4.5	8.6	0.38	32.5	0.53	10.45	-	BDL
Drinking water standards (Permissible limit in the absence of alternate source) – IS 10500:2012		6.5 - 8.5	15	-	600	-	-	-	2000	600	200	100	-	-	1000	1.5	400	-	45	-	-

All parameters are expressed in mg/L except pH and color (Hazen).

Analysis results of metal concentrations in groundwater

S. No.	Monitoring location	Cr	Cu	Cd	Pb	Fe	Ni	Zn	Mn	As
1.	Beer Kaji	ND	ND	ND	**0.0833**	0.1911	ND	0.175	0.0737	ND
2.	Sarai Abdulmalik	ND	ND	ND	**0.0833**	0.2715	ND	0.0481	0.0523	ND
3.	Pali	ND	ND	ND	ND	**0.4485**	ND	0.0124	**0.3171**	ND
4.	Fazilapur	ND	ND	ND	ND	0.2233	ND	0.3702	0.0523	ND
5.	Fazilapur (near IFFCO drain)	ND	ND	ND	ND	**2.33845**	ND	0.4450	**0.3243**	ND
6.	Jaferpur	ND	ND	ND	**0.0139**	**0.8506**	ND	0.5361	0.2742	ND
7.	Mansi Khurd	ND	ND	ND	ND	**0.4002**	ND	0.1067	0.1167	ND
8.	Ajehara	ND	ND	ND	ND	**1.2366**	ND	0.2694	0.2670	ND
9.	Malethuwa	ND	ND	ND	ND	**2.4269**	ND	0.0612	0.2241	ND
10.	Khudaypur	ND	ND	ND	ND	**0.4967**	ND	0.1685	0.1095	ND
11.	Dumduma	ND	ND	ND	ND	**14.5712**	ND	0.0416	0.2312	ND
Drinking water standards (Permissible limit in the absence of alternate source) – IS 10500:2012		0.05	1.5	0.003	0.01	0.3	0.02	15	0.3	0.05

Metal concentrations are expressed in mg/l; ND-Not detected

Figure 20: Location map showing groundwater monitoring locations

- Another groundwater sample was collected from a hand-pump (depth-120 feets) in Jaferpur village, which is located at approximately 1.97 kilometers from the right bank of IFFCO drain. The monitoring team observed clear groundwater and analysis showed pH-7.02, Color-10 Hazen, Conductivity-3900 µS/cm, Alkalinity-804 mg/L, Carbonates-NIL, Biocarbonates-98 mg/L, COD-12 mg/L, TDS-2262 mg/L, Total Hardness-760 mg/L, Ca^{2+}-132.8 mg/L, Mg^{2+}-104 mg/L, Na^{+}-236 mg/L, K^{+}-3.6 mg/L, Cl^{-}-71.47 mg/L, F^{-}-0.39 mg/L, SO_4^{2-}-68 mg/L, PO_4^{3-}-0.51 mg/L, NO_3^{-}-14.5 mg/L and NH_3-N-BDL. Groundwater was not meeting the drinking water standards (IS 10500:2012) w.r.t. Alkalinity (804 mg/L against norm of 600 mg/L), TDS (2262 mg/L against norm of 2000 mg/L), Total Hardness (760 mg/L against norm of 600 mg/L), Mg^{2+} (104 mg/L against norm of 100 mg/L) and Fe (0.8506 mg/L against norm of 0.3 mg/l). Jaferpur village is located at a distance of 1.97 kilometers from the IFFCO drain therefore no impact of IFFCO drain on groundwater quality at Jaferpur village and high Alkalinity, TDS, Hardness, Mg^{2+} and Fe may be attributed to the geogenic sources.

Figure 21: Groundwater collected in Beer Kaji villa

Figure 22: Groundwater collected in Sarai Abdul Malik village

Figure 23: Groundwater collected in Pali village

Figure 24: Groundwater collected in Fazilapur village

Figure 25: Groundwater collected in Fazilapur village (near IFCCO drain)

Figure 26: Groundwater collected in Jaferpur village

Figure 27: Groundwater collected in Mansi Khurd village

IFFCO drain near Bharauti village (downstream of unit):

- After approximately 0.7 kilometers downstream of the unit, wastewater sampling from the IFFCO drain were carried out near Bharauti village (Figure 28 and 29). The water from the IFFCO drain was used by local farmers for irrigating nearby agricultural fields. The growth of macrophytes, such as water hyacinth (scientific name - *Eichhornia crassipes* (Mart.) Solms), was observed in the drain. Laboratory analysis results indicated that BOD-20 mg/L, COD-24 mg/L and TSS-31 mg/L. Wastewater analysis results did not indicate any impact of industrial discharge on IFFCO drain.

Figure 28: IFFCO drain near Bharauti village (stagnant water in drain)

Figure 29: Eutrophication in IFFCO drain near Bharauti village

IFFCO drain near Ajehera and Malethuwa villages:

- Further, at around 3.5 kilometers downstream of the unit, wastewater sampling was done from the IFFCO drain near Ajehera village, and laboratory analysis results indicated BOD-40 mg/L, COD-60 mg/L and TSS-32 mg/L. Continuing approximately 5.9 kilometers downstream of the unit, the drain was found to be dry near Malethuwa village (Figure 31).

Figure 30: Drain near Ajehera village (stagnant water in drain)

Figure 31: Drain near Malethuwa village (no water in drain)

- Groundwater samples were collected from hand-pumps in Ajehara and Malethuwa villages. In Ajehara village, groundwater sample was collected from a hand-pump (depth-30 feets) located at approximately 100 m from the right bank of IFFCO drain (Figure 32 and 33). The groundwater sample appeared clear and analysis showed pH-6.75, Color-10 Hazen, Conductivity-1890 µS/cm, Alkalinity-340 mg/L, Carbonates-NIL, Biocarbonates-41.4 mg/L, COD-16 mg/L, TDS-1096.2 mg/L, Total Hardness-680 mg/L, Ca^{2+}-148.8 mg/L, Mg^{2+}-74.8 mg/L, Na^{+}-84 mg/L, K^{+}-4.9 mg/L, Cl^{-}-52.85 mg/L, F^{-}-0.36 mg/L, SO_4^{2-}-38.5 mg/L, PO_4^{3-}-0.52 mg/L, NO_3^{-}-13.25 mg/L and NH_3-N-BDL. Groundwater was meeting the drinking water standards (IS 10500:2012) except Total Hardness (680 mg/L against norm of 600 mg/L) and Iron (1.2366 mg/l against norm of 0.3 mg/L). High hardness and Iron in groundwater at Ajehera village may be attributed to geogenic sources.
- Another groundwater sample was collected from a hand-pump (depth-30 feets) in Malethuwa village, which is located at approximately 46 m from the right bank of

IFFCO drain (Figure 33). The monitoring team observed odour in groundwater and analysis showed pH-6.92, Color-15 Hazen, Conductivity-1940 µS/cm, Alkalinity-468 mg/L, Carbonates-NIL, Biocarbonates-57 mg/L, COD-16 mg/L, TDS-1125.2 mg/L, Total Hardness-552 mg/L, Ca^{2+}-116.8 mg/L, Mg^{2+}-63.1 mg/L, Na^{+}-298 mg/L, K^{+}-1.5 mg/L, Cl^{-}-38.44 mg/L, F^{-}-0.34 mg/L, SO_4^{2-}-34.5 mg/L, PO_4^{3-}-0.56 mg/L, NO_3^{-}-12.75 mg/L and NH_3-N-BDL. Groundwater was meeting the drinking water standards (IS 10500:2012) except and Iron (2.4269 mg/l against norm of 0.3 mg/L).

Figure 32: Groundwater collected in Ajehara village

Figure 33: Groundwater collected in Malethuwa village

IFFCO drain near Khudaypur village:

- The monitoring team collected wastewater samples from the IFFCO drain near Khudaypur village, about 7.7 kilometers downstream of the unit. The monitoring team interacted with Sh. Ramsurat Yadav, the petitioner in the case (OA no. 544/2023), who informed that the villagers get skin diseases from touching the contaminated water from the drain at Khudaypur. During monitoring, stagnant water was found in the IFFCO drain, and the growth of macrophytes, such as water hyacinth, was observed (Figure 34 and 35). Laboratory analysis results indicated that BOD-9.7 mg/L, COD-30.4 mg/L and TSS-34 mg/L.

Figure 34: IFFCO drain near Khudaypur village (stagnant water in drain)

Figure 35: Eutrophication in IFFCO drain Khudaypur village

- A groundwater sample was also collected from a hand-pump (depth-120 feets) in Khudaypur village, which is located at approximately 200 m from the right bank of IFFCO drain (Figure 36). Groundwater analysis showed pH-7.24, Color-5 Hazen, Conductivity-872 µS/cm, Alkalinity-401 mg/L, Carbonates-NIL, Biocarbonates-401 mg/L, COD-7.81 mg/L, TDS-478 mg/L, Total Hardness-365 mg/L, Ca^{2+}-130 mg/L, Mg^{2+}-9.7 mg/L, Na^{+}-310 mg/L, K^{+}-4.29 mg/L, Cl^{-}-58.7 mg/L, F^{-}-BDL, SO_4^{2-}-42.5 mg/L, PO_4^{3-}-0.59 mg/L, NO_2^{-}-BDL, NO_3^{-}-6.3 mg/L and NH_3-N-BDL. Groundwater was meeting the drinking water standards (IS 10500:2012) except Khudaypur (0.4967 mg/L against norm of 0.3 mg/L).

Figure 36: Groundwater collected in Khudaypur village

IFFCO drain at upstream of Mugarson lake at Allahabad bypass expressway:

- At a distance of 8.4 kilometers downstream of the unit, the IFFCO drain was found to be dry at the Allahabad bypass expressway (Figure 37).

Figure 37: IFFCO drain at Allahabad bypass expressway (no water in drain)

IFFCO drain downstream of Mugarson lake:

- The IFFCO drain ultimately discharges into a lake near Mugarson village. Mugarson Lake is a natural water body covering an area of approximately 25 hectares. This lake receives untreated sewage through various small channels from neighboring villages, such as Chikhari, Rasulpur, Chandauhan, Perwezabad, and others. The eutrophication of the lake, characterized by the excessive growth of macrophytes, has been observed. Water from the lake is directed towards the Ganga River. Wastewater samples were collected from the IFFCO drain, just downstream of the lake near Mugarson village (Figure 38 and 39). Laboratory analysis results indicated that BOD-30 mg/L, COD-48 mg/L and TSS-9 mg/L.

Figure 38: IFFCO drain at downstream of Mugarson lake (stagnant water in drain)

Figure 39: Eutrophication in IFFCO drain at downstream of Mugarson lake

IFFCO drain from Gopalpur village to confluence with River Ganga near Dumduma village:

- The IFFCO drain was dry at about 22.3 kms downstream of the unit near Gopalpur village (on Prayagraj-Varanasi Road) (Figure 40). Further downstream, at about 37.1 kilometers from the unit, wastewater sampling from the IFFCO drain was done before its confluence with the River Ganga near Dumduma village. Very less flow (0.2 MLD) in the IFFCO drain was observed, which discharged into the River Ganga on its left bank (Figure 41). The discharge of untreated sewage from villages in the catchment, such as Dumduma, Ganeshipur, Mand, etc., may attribute for this flow in the IFFCO drain prior to its confluence with the River Ganga. BOD-80 mg/L, COD-112 mg/L and TSS-692 mg/L were found in the drain before its confluence with the River Ganga.

Figure 40: IFFCO drain near Gopalpur village (no water in drain)

Figure 41: Confluence point of IFFCO drain with river Ganga near Dumduma village

- A groundwater sample was also collected from a hand-pump (depth-110 feets) in Dumduma village, which is located at approximately 250 m from the left bank of IFFCO drain (Figure 42). Groundwater analysis showed pH-6.82, Color-10 Hazen, Conductivity-950 µS/cm, Alkalinity-464 mg/L, Carbonates-NIL, Biocarbonates-56.6 mg/L, COD-48 mg/L, TDS-551 mg/L, Total Hardness-368 mg/L, Ca^{2+}-139.2 mg/L, Mg^{2+}-4.86 mg/L, Na^{+}-206 mg/L, K^{+}-4.5 mg/L, Cl^{-}-8.6 mg/L, F^{-}-0.38 mg/L, SO_4^{2-}-32.5 mg/L, PO_4^{3-}-0.53 mg/L, NO_3^{-}-10.45 mg/L and NH_3-N-BDL. Groundwater was meeting the drinking water standards (IS 10500:2012) except Iron (14.5712 mg/l against norm of 0.3 mg/l).

Figure 42: Groundwater in Dumduma village

Observations & findings:

Indian Farmers Fertiliser Cooperative Limited (IFFCO) is situated in the catchment area of a natural watercourse that carries storm water along with untreated sewage from the villages in its vicinity. The natural water course, i.e., IFFCO drain, originates near Tisaura village in Phulpur Block, Prayagraj district, approximately 1.2 kilometers upstream of the unit and traverses a distance of approximately 41 kilometers before meeting the River Ganga near Dumduma village in Prayagraj district. The IFFCO drain was monitored at eleven locations, out of which wastewater samples from the drain were collected at eight locations and drain was found dry at three locations.

- **Origin to upstream of the unit:**

Wastewater characteristics of IFFCO drain (BOD: 25.9-34 mg/L, COD: 42.2-80 mg/L and TSS: 37-83.4 mg/L) from origin till upstream of the unit indicated that the drain carry domestic sewage. Storm water drain (BOD-BDL, COD-19.2 mg/L and TSS-BDL) from the unit meets the drain but no impact of storm water drain on IFFCO drain was observed.

- **Downstream of the unit to Gopalpur village (on Prayagraj-Varanasi Road):**

At downstream of the unit, BOD-20 mg/L, COD-24 mg/L and TSS-31 mg/L were found in the IFFCO drain which indicated that there is no impact of industrial discharge on IFFCO drain. Groundwater samples collected from six villages within the periphery of 1 kilometer of the unit were meeting the drinking water standards (IS 10500:2012) except TDS at Fazilapur village (648 mg/L against norm of 600 mg/L). High TDS in groundwater of Fazilapur village could be attributed to geological sources. Groundwater sample collected from Jaferpur village (located at approximately 1.97 kilometers from the right bank of IFFCO drain) was not meeting the drinking water standards (IS 10500:2012) w.r.t. Alkalinity, TDS, Total Hardness and Mg^{2+}. Jaferpur village is located at a distance of 1.97 kilometers from the IFFCO drain therefore no impact of IFFCO drain was observed on groundwater quality at Jaferpur village and high Alkalinity, TDS, Hardness and Mg^{2+} may be attributed to the geogenic sources.

Further, before discharging into Mugarson lake, the IFFCO drain was found stagnant at Ajehera village and Khudaypur village and dry near Malethuwa village and at Allahabad-bypass expressway. Wastewater characteristics (BOD: 9.7-40 mg/L, COD: 30.4-60 mg/L and

TSS: 32-34 mg/L) did not show any impact of industrial discharge on the drain. BOD-30 mg/L, COD-48 mg/L and TSS-9 mg/L were found in IFFCO drain at downstream of Mugarson lake. IFFCO drain was again found dry near Gopalpur village (on Prayagraj-Varanasi Road). Groundwater at Malethuwa and Khudaypur villages was meeting the drinking water standards (IS 10500:2012). However, at Ajehera village, groundwater was meeting the drinking water standards (IS 10500:2012) except Total Hardness (680 mg/L against norm of 600 mg/L) which may be attributed to geogenic sources.

- **Before confluence with River Ganga:**

Further, very less flow in IFFCO drain (0.2 MLD) was observed before its confluence with the River Ganga near Dumduma village due to the discharge of untreated sewage from villages in the catchment area of the drain, such as Dumduma, Ganeshipur, Mand, etc., Wastewater characteristics (BOD-80 mg/L, COD-112 mg/L and TSS-692 mg/L) indicated that the drain carries untreated sewage of nearby villages and discharges into River Ganga. Groundwater at Dumduma village was meeting the drinking water standards (IS 10500:2012).

V. Comprehensive Survey: Impact Analysis of Environmental Factors on Surrounding Villages

The monitoring team conducted Health survey of surrounding village of the Unit through questionnaire (copy of questionnaire of health survey is place at Annexure XII) on 17-18th October 2023. Notably, a medical official from the CMO office was part of this survey team. The questionnaire encompassed inquiries spanning various categories: General Information, Environmental Impact, Health Impact, Effects on Land & Crops, Livestock Health, and Incidents related to Pollution.

This comprehensive survey involved 21 families (a copy of filled survey questionnaire is placed at Annexure - XIII). From the findings, it became evident that there were no observable impacts on the health of villagers, the soil or crops, and even the livestock in the surrounding villages of the unit.

VI. Consent Compliance

S. no.	Condition	Compliance status
1.	The CCA is valid for production of Nano-Urea/Nano-Sulphur/Nano-Micronutrients – 36500 KL/Annum from Nano Fertilizer Plant and Urea-5790 MT/day from Urea Production Plant. Ammonia 3300 MT/day and Carbon Dioxide – 4301 MT/day will be the Intermediate products during the process of manufacturing of Urea.	CCA No. 170943/UPPCB/Allahabad (UPPCBRO)/CTO/both/PRAYAGRAJ/2022 Dated 21/12/2022 is granted to IFFCO Phulpur Unit by UPPCB. All conditions are being complied.
2.	Industry shall treat the effluent to meet the effluent discharge standards for Fertilizer industries, as notified under Environment (Protection) Rules, 1986.	The effluent produced by the Unit undergoes treatment in CPU, Ammonia Stripper and RO based ETP and is subsequently recycled into the cooling water system via makeup in the softening plant. The Nano Urea Plant generates a minimal quantity of effluent. After treatment, this effluent is completely repurposed in the horticulture and green belt area being developed within the Nano Plant premises.
3.	Industry shall treat Nitrogenous wastewater through Hydrolyser Unit and Non-Nitrogenous Waste water through RO based ETP. The treated water shall be reused in process, cooling water makeup, washing, ash quenching, water sprinkling and for	Nitrogenous wastewater generated in both the existing units of Urea Plant is being treated in hydrolyser and non-nitrogenous wastewater is being treated in RO based ETP. Treated water, after ETP, is used into cooling water makeup whereas extra effluent water, which is collected in guard

S. no.	Condition	Compliance status
	irrigation purposes.	pond, is directly used in dust suppression in coal yard, as ash slurry water and irrigation purpose in CORDET farmland.
4.	Industry shall not discharge any effluent outside the industry premises, Industry shall ensure ZLD.	Any effluent generated in plant premises is not being discharged outside the industry. Unit insure ZLD, except during the rainy season.
5.	Storm Water drain shall be kept separate in such manner that industrial effluent does not get mixed with storm water.	Storm water drains are kept separate, and no industrial waste is getting mixed with storm water.
6.	Industry shall treat domestic effluent through STP as per norms and treated domestic effluent shall be used in irrigation/gardening and water sprinkling for dust suppression.	Domestic effluent is being treated in existing STP (capacity-3000 KLD), whereas a new STP of capacity 10 KLD, installed in Nano Urea Plant as per EMP given in EIA Report.
7.	Industry shall establish Miyawaki forest inside the industry premises in sufficient area and the treated effluent from the STP shall be used for forestation.	Miyawaki forest is being developed inside the industry premise in approx. 0.9 Ha. Area. An additional area of approx. 0.5 Ha is also being developed with consultation of Social Forestry Department Prayagraj.
8.	Industry shall maintain Electromagnetic flowmeters at water source and ETP outlet along with connectivity to CPCB and UPPCB server. The logbook of mentioned Flowmeters reading shall be maintained.	Electromagnetic flow meters have already been installed in all the water sources (borewells for ground water withdrawal) and at ETP outlet. Connectivity of Effluent water flow meter is provided to CPCB & UPPCB servers.
9.	The industry shall operate and maintain installed Online Effluent Quality Monitoring System effectively and ensure continuous connectivity to CPCB and UPPCB server.	The Online Effluent Quality Monitoring System has already been installed and its connectivity is provided to CPCB & UPPCB servers. The OCEMS instruments are also being calibrated by a third party on half-yearly basis.
10.	Ash pond shall be maintained in such a manner that ground water does not get affected.	The Ash Pond, cover an area of 130.74 acres, comprises two Ash Ponds and one Lime Slurry Pond. Out of total Ash generation around 206.63% is utilized (including legacy Ash) in 2022-23 which is in compliance with Fly Ash Notification S.O. 763 (e) dated 14th September 1999, its amendment S.O. 2804 (E) dated 3rd November 2009 and further amendment S.O. 254 (E) dated

S. no.	Condition	Compliance status
		25th January 2016.
11.	Industry shall comply with the conditions of NOC issued by UPGWA for withdrawal of ground water and shall install rain water harvesting system as per design of Ground Water Authority.	As per the logbook/data of borewells provided for groundwater withdrawal, the unit has abstracted groundwater @ **65048.49** KL/day for duration 01.07.2023 to 15.10.2023 **which is within the permissible limit of 74880 KL/day groundwater abstraction calculated from values mentioned in the NOCs issued by UPGWD.** There are five rainwater harvesting systems that have been installed in IFFCO township premises for rainwater harvesting. A pond of dimension 120 m x 120 m x 2.5 m, is also being constructed for rainwater collection and ground water recharge.
12.	Fly ash / solid waste shall be disposed in such manner, so that no water, air and soil pollution take place.	Fly ash generated in the plant is being sold mostly to cement and bottom ash collected in Ash Pond, is also being sold out to kiln owners of brick manufacturer. Other solid waste (lime sludge) generated in the plant is collected in separate area of Ash Pond, where it is dried up and then sold out to other parties which are interested in using it.
13.	Industry shall operate and maintain APCS installed at existing 02 Primary Reformer Furnaces, 03 Boilers of capacity 125 TPH each, 02 Urea Prilling Towers and 60 TPH HRSG, in such manner to achieve the emission standards for fertilizer unit, prescribed under Environmental (Protection), Rules, 1986.	There are induced draft systems installed as APCS at existing 02 Nos. Primary Reformers, 100-meter stack height for 125 TPH boilers (3) and 96 meter & 104- meter height Prilling towers, based on natural draft system. All the Emission standards are being followed and complied with, as per the Environment (Protection) Rules, 1986.
14.	The logbook for records of fly ash generation and its disposal shall be maintained properly.	Logbook for records of fly ash generation & its disposal is being maintained regularly by the Power Plant Department.
15.	Industry shall provide water sprinkling system at coal handling plant, conveyer belt to suppress the dust emission.	Water sprinkling system is installed at coal handling plant and conveyor belt area to suppress the dust emission. Treated effluent is reused in dust suppression.
16.	Industry shall install rain water harvesting system as per guidelines of ground water authority for recharging of ground water.	Rainwater Harvesting System has been installed to tap and harvest rainwater in IFFCO premises and are working properly. Regular maintenance and cleaning are also being done. A lake of dimension 120 m x 120 m x 2.50 m is also being constructed in

S. no.	Condition	Compliance status
		CORDET area for the rainwater harvesting.
17.	Industry shall store the hazardous waste safely and send it to TSDF/incinerator within Ninety days.	All Hazardous waste stored safely in the prescribed/designated place only and sold out to the authorized parties only through M-Junction platform within due course of time.

VII. Environmental Clearance Compliance

Specific conditions		
S. no.	**Condition**	**Compliance status**
1.	All conditions stipulated in the earlier EC vide letter no. J J- 11011 /150/2006-IA II (I) dated 14/07/2006 shall strictly be complied with.	All conditions stipulated in the earlier EC vide letter no. J-11011 /150/2006-IA II (I) dated 14/07/2006 are being complied with regularly.
2.	The project proponent shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.	The Unit comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project are implemented with the commissioning of project.
3.	The project proponent shall utilize modern technologies for capturing of carbon emitted and shall also develop carbon sink/carbon sequestration resources capable of capturing more than emitted The implementation report shall be submitted to the IRO, MoEF&CC in this regard.	The Unit has installed a Carbon Dioxide Recovery (CDR) plant to capture CO_2 from flue gases generated in Primary Reformer furnace. The CO_2 is absorbed in solution, in absorber and then stripped off in stripper. The recovered CO_2 is used as intermediate raw material for Urea production in Urea Plant. CDR Plant capacity is 450 MTPD CO_2 recovery. Phulpur Unit is having COM Projects under which certified emission reduction (CER) in terms of CO_2 emission reduction are certified by UNFCC.

Specific conditions		
S. no.	**Condition**	**Compliance status**
4.	The continuous online (24×7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB servers. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.	The continuous online (24×7) monitoring system for stack emission has already been installed for measurement of the flue gas discharge and the pollutants concentration and the data are being transmitted to the CPCB server. Online connectivity to SPCB server has also been provided. For online continuous monitoring of effluent, web camera with night vision capability has been installed at the remote end of effluent Guard Pond.
5.	The storage of toxic/hazardous raw material shall be bare minimum with respect to quantity and inventory. Quantity and days of storage shall be submitted to the Regional Office of Ministry and SPCB along with the compliance report.	Storage of toxic/hazardous raw material are bare minimum with respect to quantity and inventory in existing Urea Production Plant. It is being followed in Nano fertilizer unit also. Average monthly status of storage of hazardous chemicals (sulphuric acid, hydrochloric acid, Sodium hydroxide and Chlorine tonners) in existing plant, are 66.8 MT, 498 MT, 168 MT and 16.2 tonners, respectively).
6.	The occupational health center for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with the required safety kits/mask for personal protection.	The Occupational Health Center (OHC) for surveillance of the worker's health is already available in the plant premises. One pharmacist, assistance staff and one emergency Ambulance is always (24×7) made available in OHC center. Safety kits/masks are always provided for personal protection to all workers & employees at the time of duty hours. Besides the Occupational Health Centre, in IFFCO Phulpur, there is a fully operative 16 bed Hospital with three qualified doctors to deal with any kind of emergency.
7.	Training shall be imparted to all employees on the safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.	• Training and awareness programs to all employees as well as contract labors regarding demonstration of fire extinguishers and use of Personal Protective Equipment (PPEs) is given as per training calendar every month. • At IFFCO Phulpur, an animated safety video was developed for induction training of visitors

Specific conditions		
S. no.	**Condition**	**Compliance status**
		regarding safety norms to abide by inside the factory premises & giving them brief introduction on Emergency Procedures to be followed in case of any emergencies and Raw materials/chemicals being handed or stored at our plant. • IFFCO has also developed L&D (Learning and Development) Hub which was started keeping specially COVID-19 in mind. To minimize the gathering of employees & contractor's worker, IFFCO made a team of young, experienced & technical employees to shoot a video and upload it on L&D Hub so that any employee could take safety training anytime. • Toolbox Talk or 5 Minutes Safety Talk before commencing of any job is imparted to workers as a safety practices. This includes discussing Standard procedures (SOPs) to be followed to given job, hazards associated with the job & accordingly use of PPE's (Personal Protective Equipment) to complete the job.
8.	The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Fire – fighting system shall be as per the norms.	To tackle any emergency, IFFCO Phulpur Unit is having a dedicated Fire and Safety department with well qualified and trained fire inspectors equipped with: • <u>Fixed Firefighting installations like Fire hydrants, smoke detectors etc.:</u> Well established under-ground and above-ground fire hydrant network is connected to a fire water pump house. Fire Hydrants, Fire Monitors, Foam Monitors are installed throughout the plant at strategic locations. • <u>First Aid Fire Fighting Equipment:</u> Mostly three types of extinguishers (i.e., Mechanical Foam Type, Dry Powder Chemical Type & Carbon

Specific conditions		
S. no.	**Condition**	**Compliance status**
		Dioxide Type) of varying capacity in sufficient quantity are placed at strategic locations within the plant. • Mobile Fire Fighting equipment: 04 Nos. Fire tenders are stationed at IFFCO Phulpur Fire & Safety Department for any kind of major emergencies & 01 No. Fire Utility Jeep. These are equipped with various firefighting equipment like fire extinguishers, Branch pipes nozzles, Hoses etc.
9.	Necessary precautions shall be taken to avoid accidents and action plan shall be implemented for avoiding accidents. The Project proponent shall implement the onsite/offsite emergency plan/mock drill etc. and mitigation measures as prescribed under the rules and guidelines issued in the Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules, 1989, as amended time to time, and the Chemicals Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.	• To avoid accidents standard operating procedures are available. Safety inspections and regular plant rounds are carried out to identify any unsafe act or unsafe conditions existing inside the plant. • Online near miss reporting system has been designed for record keeping along with efficient implementation of corrective actions for reduction in unsafe acts and conditions. • Both internal & external expert facilities are called for safety training for employees and contract workers. Behavior based Safety awareness programs are conducted to minimize unsafe actions & conditions. • IFFCO Phulpur is having well prepared and established On-Site emergency plan in compliance to Section 42 (B) of Factories Act 1948 & Schedule 11 of MSI HC Rules 1989. As per Statutory Requirements, Mock drills are conducted twice a year to check readiness and preparedness to handle any emergency. The last Mock Drill was conducted on 27/06/2023.
10.	The solvent management shall be carried out as follows: (a) Reactor shall be connected to chilled brine condenser system. (b) Reactor and solvent handling pump shall have mechanical	No Solvent is being used in the plant.

Specific conditions		
S. no.	**Condition**	**Compliance status**
	seals to prevent leakages. (c) Solvents shall be stored in a separate space specified with all safety measures. (d) Proper earthing shall be provided in all the electrical equipment wherever solvent handling is done. (e) Entire plant shall be flame proof. The solvent storage tanks shall be provided with breather valves to prevent losses. (f) All the solvent storage tanks shall be connected with vent condenser with chilled brine circulation.	
11.	Volatile organic compounds (VOCs)/ Fugitive emissions shall be controlled at 99.97% with effective chillers/ modern technology.	There is no source of VOC in the plant. Detailed controlled measures for Fugitive emissions have been submitted on 24-08-2023.
12.	Total fresh-water requirement shall not exceed 35290 KLD Prior permissions in this regard shall be obtained from the concerned regulatory authority.	Fresh (raw) water requirement for the existing Urea Production Plant is approx. 34340 KLD in FY 2022-23. After expansion of Nano Urea Project, an additional requirement of raw water is 95 KLD, which is being supplied by existing facility. Therefore, total freshwater requirement is 35290 KLD. In this regard, the NOC for Ground Water Withdrawal is obtained from the Ground Water Department, Govt. of Uttar Pradesh.
13.	The storm water from the roof top shall be channelized through pipes to the storage tank constructed for harvesting of rainwater in the premises and harvested water shall be used for various industrial processes in the unit. No recharge shall be permitted within the premises. Process effluent/any wastewater shall not be allowed to mix with storm water.	Rainwater harvesting systems have been constructed in township premises to harvest and recharge rainwater into the ground in the rainy season. Collection of roof top water in plant area may cause polluting the collected water whenever any plant emergency or breakdown will take place. Therefore, no recharge is being done on the plant premises as per CGWA Notification dated 24th Sept. 2020, Clause No. 4.1 - (v) and (vi). mix with storm water. Civil work for construction of the lake in CORDET area is going on to recharge and reuse the runoff rainwater to the maximum extent.
14.	The project proponent shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize	Measures have been taken to minimize wastewater generation e.g., jacket cooling water, R.V. sealing water BFW pump sealing water are being reused as

Specific conditions		
S. no.	**Condition**	**Compliance status**
	waste; (b) Reuse of by- products from the process as raw materials or as raw material substitutes in other process. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapor recovery system. (f) Use of high-pressure hoses for equipment clearing to reduce wastewater generation.	feed water in steam generation after adequate treatment in Condensate Polisher Unit. However, we have also undertaken waste minimization measures by metering and control of quantities to minimize waste in existing and expansion project premise also. There is no by-product generating during the manufacturing process of urea and Nano Fertilizer, which could be used as raw material in further. Close Feed system will be used for batch reactors. During shut down of plant, cleaning of equipment is carried out by hydro-jet cleaning which involves high pressure and in turn reduces wastewater generation.
15.	The green belt of at least 5-10 m width shall be developed in nearly 36% of the total project area mainly along the plant periphery/ adjacent areas, as committed by the PP. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Trees have to be planted with spacing of 2 m x 2m and number of trees have to be increased accordingly (2500 trees/hectare). The plant species can be selected that will give better carbon sequestration and plantation shall be completed within six months.	Dense green belt area has been developed in 268.7-acre area of existing plant premise and township area of IFFCO Phulpur unit which is approx. 34.6% of total area. Green belt of at least 5-10 meters' width, is being developed in proposed expansion of Nano Urea plant. After expansion of Nano Urea, the total area under green belt will be around 272.9 acre (approx. 35.20% of total area). In the proposed green belt area, we have consulted with the State Forest Department and as per guidelines of CPCB, for plant species. Tree spacing of 2×2 meters and no. of trees per hectare are planned accordingly for better carbon sequestration.
16.	As committed by the project proponent the project proponent shall explore the usage of natural gas/bio briquettes.	The unit is using coal as fuel in the coal•fired boilers to generate steam. Natural Gas is used as supplementary fuel and possibilities are being explored for promoting clean energy measures.
17.	The activities and the action plan of the issues raised during public hearing to	To address the socio-economic issues raised during public hearing, the unit has

Specific conditions		
S. no.	**Condition**	**Compliance status**
	address the socio- economic issues in the study area, shall be completed as per the schedule presented before the Committee and as described in the EMP report in letter and spirit. The compliances report shall be submitted to IRO, MoEFCC Lucknow.	submitted the schedule as described in the EMP. Around 165 casual contract workers and 40 permanent employees have been employed in the project. Regular residential and non-residential training is provided to farmers of nearby villages (approx. 25-35 farmers per month) to enhance farming skills. Safety related issues are being addressed to all employees and to involve farmers, in training of spraying of Nano Fertilizer (Liquid) to achieve sustainable farming. Compliance status is submitted regularly to IRO, MoEF&CC, Lucknow.
18.	A separate Environmental Management Cell (having qualified people with Environmental Science/ Environmental Engineering/ specialization in the project area) equippedwith full-fledged laboratory facility shall be set up to carry out the Environmental management and monitoring functions.	A separate Environmental Management Cell having qualified people is working under the GM (Technical). An Environment Management Committee is also constituted by the competent authority to enhance awareness and address the issues in plant premises. A well-equipped and full-fledged laboratory facility has already been set up to carry out the environmental management and monitoring functions. Hierarchy and Responsibility of EPC is already submitted to the IRO, MoEF&CC Lucknow.

General conditions		
S. no.	**Condition**	**Compliance status**
1.	No further expansion or modifications in the plant, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change. A fresh reference shall be made to Change/SEIM, as applicable. In case the Ministry in case of deviations or alterations of deviations or alternations in	Complied

General conditions		
S. no.	**Condition**	**Compliance status**
	the project proposal from those submitted to project proposal to this Ministry for clearance, a fresh reference shall be made to the Ministry/SEIM, as applicable, to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	
2.	The Project proponent shall strictly comply with the rules and guidelines issued under the Manufacture, Storage and Impact of Hazardous Chemicals (MSIHC) Rules, 1989, as amended time to time, the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, and Hazardous and Other Wastes (Management and Trans-Boundary Movement) Rues, 2016 and other rules notified under various Acts.	The Unit follows and complies with the rules and regulations made under Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended in October 1994 and 2000, the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, and Hazardous and Other Wastes (Management and Trans-Boundary Movement) Rules, 2016. Quarterly inspection of major Accident Hazardous Installations Viz. Ammonia storage tanks, Chlorine storage, and wash system (installed in cooling towers) are being done regularly internally and corrective actions are being taken if any deviation is observed. Safety audit of the complex is being done annually by an external agency and the report is submitted to the Directorate of Factories after complying with the recommendations. Hazardous wastes generated at IFFCO Phulpur Unit are spent catalysts and Waste lube oil. These are stored in covered drums under a shed on the cemented platform and sold to authorized recyclers as per Hazardous and Other Wastes (Management and Trans• Boundary Movement) Rules, 2016. Annual return in Form-4 is submitted annually to UPPCB.
3.	The energy source for lighting purposes shall be preferably LED	We have already initiated the installation of solar panels as renewable

General conditions		
S. no.	**Condition**	**Compliance status**
	based, or advanced having preference in energy conservation and environment betterment.	energy sources for LED based lighting purposes. From April, 2023 to September, 2023, approx. 7.94 Lakh KWH solar power generated and fed into the Plant Grid for utilization to LED lighting in Plant and Township premise.
4.	The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (night time).	Noise levels in and around the plant area are monitored regularly. Acoustic hoods, silencers and the ceiling of control room are adopted to control noise in plant area. The ambient noise levels are measured in various places in the plant.
5.	The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. The activities shall be undertaken by involving local villages and administration. The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment.	IFFCO Phulpur Unit undertake various measures and activities under IRDP for improving the socio-economic conditions of nearby area. Lot of activities such as construction of rooms in nearby school buildings, distribution and training of school children, distribution of blankets, tricycles among the local villagers, distribution of harvesting tools and training to the farmers are being carried out by the IFFCO Phulpur as community welfare measures. Besides these activities, local villagers involved in the construction and commissioning phase of the project at the maximum extent through contractor. Details of IRDP is submitted to MoEF&CC on 24-08-2023.
6.	The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forests and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds	Funds, as directed in EIA towards capital cost (3.09 crore) and recurring cost (17 lac) per annum to implement the conditions stipulated by MoEF&CC have been earmarked in the project head fund. This fund will be utilized as per the direction given by MoEF&CC, in all concerned jobs.

General conditions		
S. no.	**Condition**	**Compliance status**
	so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose.	
7.	A copy of the clearance letter shall be sent by the project proponent to concern Panchayat, Zila Parishad/ Municipal Corporation, Urban local Body, and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal.	A copy of the Environmental Clearance letter has been sent to Chairman, Nagar Panchayat (Town Area) Phulpur and Chairman, Zila Panchayat, Prayagraj.
8.	The project proponent shall also upload/submit six monthly reports on Parivesh Portal on the status of compliance of the stipulated Environmental Clearance Conditions including results of monitored data to the respective Integrated Regional Office of MoEF&CC, the respective Zonal Office of CPCB and SPCB. A copy of the Environmental Clearance and six-monthly compliance status report shall be posted on the website of the company.	Six monthly compliance reports including monitoring data will be uploaded on Parivesh Portal and will be submitted to the regional Offices of CPCB and SPCB.
9.	The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Integrated Regional Office of MoEF&CC by e-mail.	The environmental statement for each financial year ending 31st March, in Form-V, is submitted regularly to the U.P. Pollution Control Board, IRO MoEF&CC, Lucknow and other concerned authorities. A copy of the Environmental Statement and Compliance of Environmental Clearance has been put on the IFFCO website. Copy of Form-V is submitted by the unit on 24-08-2023.
10.	The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/ Committee and may also be seen at Website of the Ministry and at https://parivesh.nic.in/. This shall be advertised within seven days from the date of issue of the clearance letter, at	The information regarding environmental clearance accorded by the MoEF&CC is published in "Hindustan Samvad" dt. 18/03/2022, "Swatantra Prabhat" dt. 18/03/2022 (Hindi News Paper) dt. and "Pioneer News Service" dt. 20/03/2022 and "Jeevan Express News" dt. 19/03/2022 (English News Papers) and some others vernacular language newspapers. The

General conditions		
S. no.	**Condition**	**Compliance status**
	least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.	cutting of advertisement in newspapers has been sent to IRO Lucknow on 12-05-2022.
11.	The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.	The financial closure of the project will be completed on or before 31st December 2023. Consent to Establish (CTE) to start the project has been issued by UPPCB Lucknow on 27th March, 2022.

VIII. Compliance to Report of the Joint Committee in the Matter of O.A. 04/2021

S. no.	Recommendations made by Joint Committee in the Matter of O.A. 04/2021	Compliance status
1.	Preparation of master trip logic (Emergency) for extreme ammonia leakage condition so that safe shutdown can be ensured automatically with minimum operator intervention. Provision of one dedicated hard-wired plant emergency trip switch when pressed shall ensure all action envisaged under the extreme ammonia leakage emergency condition. It should stop the plant with the operation of that switch.	An interlock IS-100 has been provided to be operated by the operator from the control room in case of excessive ammonia leakage. This interlock close all the valves supplying ammonia to the system and no further leakage.
2.	Standard Operating Procedure (SOP) shall be prepared for all industrial activities handling hazardous chemicals. The pressure test and leak test must be ensured after replacement of valves, pipe, joints etc. as per the instrument manual as per standard established procedure.	Standard Operating Procedures (SOP) exists for all the activities including handling of hazardous chemicals. After installation or repairing of any pipelines these are checked as per the specified NDT procedures before taken in service.
3.	Mock drills must be conducted regularly to the employees in controlled environment on actions to be taken during failures, gas leakage etc.	Mock drills are conducted regularly for the employees. In these mock drills officials from local authorities also participates.
4.	Provision of forced air blanketing system at the entry gate of CCR.	Forced air blanketing system has been provided at the entry gate of all CCRs.
5.	Provision of dedicated solenoid / motor operated firewater nozzle just above ammonia feed pumps (in addition to the	Water curtains have been installed at various strategic locations which operate automatically. New ammonia pumps have

S. no.	Recommendations made by Joint Committee in the Matter of O.A. 04/2021	Compliance status
	existing water curtain) to reduce the impact of ammonia leakage in extreme emergency.	been commissioned in Oct., 2023 and dedicated water spray/ curtain system has been installed.
6.	Water curtain system / AC system needs to be linked with the high ammonia alarm received from ammonia sensor in field / control room. Whenever high ammonia content alarm is received from ammonia sensor, it should start water curtain system and stop CCR AC system.	Water curtain system linked with the high ammonia alarm. It operates automatically when receives high ammonia content alarm from ammonia sensors. It also stops AC system simultaneously.
7.	Reducing the level being maintained in Ammonia Receiver Tank to 50% (Existing practice 80%). This will reduce the release volume during extreme ammonia leakage.	Level in Ammonia receiver Tank (V-1) maintained at 55- 60%.
8.	Installation of ammonia sensor in CCR. On higher ammonia content, AC units shall be made to trip automatically.	Ammonia sensors have been installed at various strategic points and in case of high ammonia content water curtains operate automatically and switch off the AC system.
9.	The unit shall conduct comprehensive safety & hazard audit, identify the non-compliances and take corrective actions for the non-compliances identified. Emergency plans shall be established to deal with leaks. The risk assessment should identify the control measures necessary in an emergency. These are likely to include, for example instructions to identify the leak and close key valves. Such valves should be marked and identified on drawings. Regular checks of such valves should be undertaken to ensure correct operation. A clear documented emergency procedure should be drawn up which details the precise duties of all staff and arrangements for evacuation, rescue, first aid, resuscitation, plant isolation etc.	HAZOP study was conducted by Deepak Industrial Consultant Ghaziabad in the Year 2021 and actions have been taken on their findings/observations.
10.	The plant where the ammonia receiver tanks and ammonia High pressure pump assembly are placed is very congested and during any unwarranted situations, it is difficult to escape. The unit shall re-design ammonia receiver tank as well as ammonia high Pressure assembly to have more working space for the personnel. Adequate means of escape and rescue	As per the recommendation, New Centrifugal High-Pressure ammonia pumps have been installed away from the existing plant and sufficient space is available for escaping.

S. no.	Recommendations made by Joint Committee in the Matter of O.A. 04/2021	Compliance status
	shall be provided.	
11.	To install Emergency warm water showers and eyewash stations in locations where ammonia is handled for decontamination. They allow workers to flush away ammonia that can cause injury.	Water showers and eyewash stations have already been installed at various locations where chances of ammonia leakages are probable.
12.	To install automatic tripping system during pressure build-up, leaks etc.	Automatic tripping system already exists in all the plants as per the licensors and OEM recommendations during pressure build up and leaks etc.
13.	All pipework containing ammonia shall be identified by colour coding or labelling and positioned and protected to prevent damage. It is good practice to uniquely identify part of the system that contain gas or liquid and the direction of low.	The Unit follow the colour coding on different pipe lines as per IS 2379.
14.	The unit shall install ammonia sensor and emergency ventilation may be interlinked with ammonia sensor.	Ammonia sensors have been installed at different locations and during high ammonia concentration, it automatically starts water curtain system and switch of the AC system.
15.	To install check valves, relief valves at appropriate locations. Flow meters, sensors, measuring devices have to be regularly calibrated. Vents from relief valves shall be directed to a safe place.	Check Valves, Relief valves, etc. are provided during designing and erection of the plant itself, however if needs arise suitable changes are carried out following Management of Change (MOC) procedure. All the instrumentation devices such as flowmetes, Pressure /Temperature Gauges, etc. are calibrated regularly. All the vents are directed to a safe place in all the plants.
16.	Seals, glands and gaskets shall be regularly inspected, without dismantling. Leak test should be conducted in all piping, valves, seals, flanges, and other pertinent equipment at least four times a year. Some methods that can be used for leak testing are Sulphur sticks, litmus paper, or a portable meter equipped with a flexible probe.	Inspection of all the piping system including ammonia is a regular practice using various NDT techniques and appropriate actions are taken for replacement / repair, if any deformity is found. These inspections are done using latest available technologies.
17.	All ammonia carrying piping should be periodically inspected for failed insulation / vapour barrier, rust, and corrosion. Ammonia piping underneath failed insulation should be carefully inspected for corrosion. Damaged and deteriorated ammonia piping should be replaced. All uninsulated piping should	Inspection of all the piping system including ammonia piping is a regular practice using various ND techniques and appropriate action are taken for replacement / repair, any deformity is found. The inspections are done using late available technologies.

S. no.	Recommendations made by Joint Committee in the Matter of O.A. 04/2021	Compliance status
	be cleaned, primed, and painted with an appropriate coating to protect the pipe from corrosion as well as being consistent with the colour coding scheme.	
18.	Only fully trained and qualified operators shall be permitted to operate ammonia systems. The operator is required to take refresher training at least every 3 years to ensure the employee understands and adheres to the current operating procedures related to the process. To impart training to all employees on SOP's, product process, safety aspects. The employees shall be given hands on experience with the product process under the supervision of senior employees. The units only after ensuring that adequate training is imparted to its employees will engage the employees for independent works. Overall, the industries should be prepared for emergency response readiness & effectiveness in terms of major & minor accidents.	At IFFCO extensive training of at least two years is provided before handing over the system to operate. Also first the employee is posted in the field and after sufficient experience he or she is shifted to panel operation on DCS. Regular Refresher training programmes are conducted on SOPs, process and safety aspects
19.	To install suitable gas sensors and alarm system in the unit at appropriate locations where emission of gas is suspected so that any gas leaked is detected and the employees are immediately alerted. In sensitive areas of the unit where gas leakages are suspected, the unit shall work out an emergency prepared plan to vent out the gases safely.	Ammonia sensors have been installed at various locations which give alarm in control room to alert the operators in case of high ammonia concentration. All the vents are connected to vents at suitable height so that the persons working in leakage prone areas are not affected.
20.	The unit shall provide essential Personnel protective equipment like nose mask, Helmets, Safety Shoes, Safety Glasses, chemical Proof Gloves, chemical proof body suit / clothing, self-contained breathing apparatus to all its employees and make it mandatory that the employees have t wear PPE's during working hours.	All the personnel Protective equipment have been provided to all the employees and use of these has been mandatory for all. PPE's provided are checked by a committee at regular intervals.
21.	The safety measure including valve regulated system shall be regularly checked and the concerned workers involved in the activity shall be properly trained.	All the safety measures incorporated in the plant including valve regulatory system are checked regularly for its functionality and the concerned employees are trained properly before handling them for its operation.
22.	The industries shall update the	The same has been updated regularly and

S. no.	Recommendations made by Joint Committee in the Matter of O.A. 04/2021	Compliance status
	comprehensive safety audit, on-site and off-site emergency plans and risk analysis reports periodically as per the protocol and ensure that the reports are furnished to Zonal Office.	send to Zonal Office
23.	Portable Ammonia masks needs to be kept at critical locations (like HP pump area/ Ammonia receiver tank area / MP Ammonia absorber area / LP carbonate solution tank V-3 area) for use in any emergency.	Portable Ammonia Masks have been provided in sufficient quantity in all CCRs for use in any emergency.
24.	A Safety mock drill on failure of tie rods / plunger of HP ammonia pump should also be taken up as soon as possible. During safety mock drill, it should be made imperative if the concerned employee are using BA set / on line mask or not.	Now these types o f p u m p s have been discontinued and new centrifugal pumps have been commissioned. During Mock drill, all concerned employees use PPE, BA set / on li mask
25.	Hazard identification and evaluation in a local community, preparation of Guiding Principles for Accident Prevention, Preparedness and Response for onsite and offsite emergency plans has to be reviewed.	Awareness training program in nearby villages are carried out regularly to handle the emergency situation.

IX. Observations

- **Industrial Process**

  - The IFFCO Phulpur unit consists of five main process plants: Ammonia – I, Ammonia – II, Urea – I, Urea – II, and Nano fertilizer plants. Additionally, the unit includes a Captive Power plant alongside these core process facilities.
  - Ammonia – I plant, Ammonia – II plant, Urea – I plant, Urea – II plant and Captive Power plant were found operational during visit whereas the Nano fertilizer plant was non – operational.
  - The unit has obtained Consolidated Consent & Authorization (CCA) issued by UPPCB on dated 21.12.2022 under Section-25 of the Water (Prevention & Control of Pollution) Act, 1974, 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 with a validity upto 31.12.2027 for production of Nano-Urea/ Nano-Sulphur/ Nano-Micronutrients-36500 KL/Annum from Nano Fertilizer Plant and Urea- 5790 MT/day from Urea Production Plant. Ammonia 3300 MT/day and Carbon Dioxide - 4301 MT/day will be the Intermediate products during the process of manufacturing of Urea.

- During visit, it was observed that unit has installed 18 nos. of Borewells within its premises.
- The unit has obtained No Objection Certificate (NOC) from Uttar Pradesh Ground Water Department (UPGWD) for all 18 nos. of borewells, all having validity upto 14.02.2027 for a combined abstraction of ground water @ 74880 KLD.
- The unit has installed electromagnetic flow meters with totalizer at all 18 nos. of Borewells and maintained logbook for the same.
- As per the logbook data of all Borewells provided by unit, the unit has abstracted groundwater at an average rate of **65048.49** KL/day against the permitted quantity of 74880 KLD.
- During visit, the joint team observed that unit is consuming freshwater for industrial uses in DM plant (for use in process) & Softening plant (for makeup in 05 nos. of cooling towers), for domestic uses in Urea & Nano plant, CORDET area and Township. The unit is also using freshwater in Fire hydrant system. However, it was also observed that unit has not installed flow meters at freshwater consumption/ utilization points.
- The DM plant is being used for treatment of groundwater to make it suitable for use in boilers and other process areas.
- Unit has installed 03 no. of boilers of capacity 125 TPH each using coal and natural gas as fuel. Generated ash from boilers is stored in unlined Ash ponds.
- It was also observed that unit is consuming natural gas as raw material for production of ammonia (intermediate product) which is further used for manufacturing of Urea.

➢ **Effluent Management System**

- During visit, the joint team observed that for treatment of Process condensate generated from Ammonia – I & II plant, Urea – I & II plant, unit has installed Ion – exchange technology-based Condensate Polishing Unit (CPU) for treatment of process condensate having concentration of Ammonical Nitrogen less than 20 mg/l.

- The softening plant is being used for treatment of groundwater to make it suitable for use as makeup water in 05 nos. of Cooling towers. Unit is performing lime dosing in softening plant for removal of hardness in groundwater and lime sludge is being stored separately near ash pond in unlined area.
- As per the material balance provided by unit, water loss combinedly from 05 nos. of cooling towers is 1314 m^3/hr (i.e., 31,536 KLD ~31.5 MLD) i.e., loss in form of blow down @ 184 m^3/hr (4416 KLD) and evaporation loss @ 1130 m^3/hr (27120 KLD).
- Turbine Condensate generated from Ammonia – II plant & Urea – II plant and Steam Condensate generated from Urea – I plant & Urea – II plant is also treated in CPU.
- It was observed that unit has not installed flow meters at effluent/process condensate generation points.
- Treated condensate from CPU (after mixing with DM water) was being utilized at Power Plant, Urea Plant – I & II, Ammonia Plant – I & II and Wastewater generated from regeneration of resins in Ion – Exchange was being stored in Guard ponds 1 & 2.
- Unit has not installed flow meters at inlet and outlet of CPU.
- For treatment of process condensate having concentration of Ammonical Nitrogen greater than 20 mg/l, unit has installed Ammonia Stripper plant. Unit has installed flow meter at inlet but not at outlet of Ammonia Stripper plant.
- The unit has established three Guard ponds to manage specific types of wastewater - Guard Pond No. 1 (with a capacity of 10,000 m^3) and Guard Pond No. 2 (with a capacity of 7,000 m^3) are designated for storing rejects from the DM Plant, wastewater produced during the regeneration of resins in the Ion-Exchange-based CPU, blowdowns from five cooling towers, treated effluent from the ammonia stripper plant, and treated sewage from the Sewage Treatment Plant (STP). Another Guard Pond (with a capacity of 7,000 m^3) is allocated for storing process condensate containing Ammonical Nitrogen concentrations exceeding 20 mg/l, generated from the operations of the Ammonia – I & II plants, as well as the Urea – I & II plants.
- For treatment of wastewater stored in Guard ponds -1 & 2, unit has installed Reverse Osmosis (RO) based ETP (of overall capacity 170 m^3/hr i.e. 4080 KLD including individual three stage RO membrane capacity 150 m^3/hr i.e. 3600 KLD).
- Treated effluent i.e., Permeate from ETP RO plant was being used for makeup in 05 no. of Cooling towers and Reject was being used for spray in coal yard.

- The joint team also observed that wastewater stored in guard pond – 1 & 2 is being used for Ash slurry preparation, sprinkling in coal yard, irrigation in farm land without any treatment.
- Sample of wastewater being directly used from guard ponds – 2 for irrigation was collected and analysis results show pH – 7.15 (against the consented norm of 6.5 – 8.5), TSS – 22.8 mg/l (against the consented norm of 100 mg/l), Nitrate – 6.5 mg/l (against the consented norm of 10 mg/l), Ammonical Nitrogen – 33.1 mg/l (against the consented norm of 50 mg/l), Free ammonia – 0.359 mg/l (against the consented norm of 02 mg/l), TKN – 52.7 mg/l (against the consented norm of 75 mg/l), COD – 211 mg/l (against the consented norm of 250 mg/l), **BOD – 48 mg/l (against the consented norm of 30 mg/l)**, Oil & grease – 9.56 mg/l (against the notified norm of 10 mg/l), Cyanide – 0.012 mg/l (against the consented norm of 0.1 mg/l), Colour – 10 hazen, TDS – 3023 mg/l, Phosphate – 0.8 mg/l and Nitrite – 1.6 mg/l. These results indicate that wastewater stored in guard pond – 2 directly being used for irrigation purposes/ land application is **not complying** with the stipulated discharge norms.
- Unit has not installed flow meter at Inlet and Outlet of Guard ponds.
- For treatment of sewage generated from industrial premises and township, the unit has installed a Sewage Treatment Plant (STP0 of capacity 03 MLD. The treatment scheme in STP consists of Physical and Biological treatment followed by tertiary treatment through Pressure Sand Filter (PSF) and Activated Carbon Filter (ACF) followed by disinfection through bleaching powder.
- STP was found operational during visit.
- The treated sewage is partially stored in guard ponds – 1 & 2 and partially used for irrigation in farm lands (150 acres). Sample of treated sewage being used for irrigation was collected by joint team and analysis results show pH – 8.32 (against the notified norm of 6.5 – 9.0), TSS – 3.06 mg/l (against the notified norm of 100 mg/l), BOD – BDL mg/l (against the notified norm of 30 mg/l), **Fecal Coliform – 4.5 x 10^3 MPN/100 ml (against the notified norm of 1000 MPN/100 ml)**, Colour – 10 hazen, TDS – 680 mg/l, Sulphate – 114 mg/l, Phosphate – 2.68 mg/l, Nitrate – 30.7 mg/l, Nitrite – BDL Ammonical Nitrogen – BDL, Free ammonia – zero, TKN – BDL, COD – 6.76 mg/l, Total Coliform – 1.3 x 10^4 MPN/100 ml. These results indicate that treated sewage being used for irrigation purposes/ land application is **not complying** with the stipulated discharge norms.

- Unit has not installed flow meter at inlet and outlet of STP.

➢ **Pollution source mapping of IFFCO drain:**

- IFFCO drain originates near Tisaura village in Phulpur Block, Prayagraj district, approximately 1.2 kilometers upstream of the unit and traverses a distance of approximately 41 kilometers before meeting the River Ganga near Dumduma village in Prayagraj district.
- Wastewater characteristics of IFFCO drain (BOD: 25.9-34 mg/L, COD: 42.2-80 mg/L and TSS: 37-83.4 mg/L) from origin till upstream of the unit indicated that the drain carry domestic sewage. Storm water drain (BOD-BDL, COD-19.2 mg/L and TSS-BDL) emanating from the unit meets the drain but no impact of storm water drain on IFFCO drain was observed.
- Wastewater characteristics of IFFCO drain (BOD-20 mg/L, COD-24 mg/L and TSS-31 mg/L) at downstream of unit near Bharauti village indicated that there is no impact of industrial discharge on IFFCO drain.
- Further, before discharging into Mugarson lake, the IFFCO drain was found stagnant at Ajehera village and Khudaypur village and dry near Malethuwa village and at Allahabad-bypass expressway. Wastewater characteristics (BOD: 9.7-40 mg/L, COD: 30.4-60 mg/L and TSS: 32-34 mg/L) in this stretch did not show any impact of industrial discharge on IFFCO drain.
- At downstream of Mugarson lake, BOD-30 mg/L, COD-48 mg/L and TSS-9 mg/L were found in IFFCO drain. IFFCO drain was again found dry near Gopalpur village (on Prayagraj-Varanasi Road).
- Before confluence with River Ganga near Dumduma village, very less flow in IFFCO drain (0.2 MLD) was observed before its confluence with the River Ganga due to the discharge of untreated sewage from villages in the catchment area of the drain, such as Dumduma, Ganeshipur, Mand, and others. Wastewater characteristics (BOD-80 mg/L, COD-112 mg/L and TSS-692 mg/L) indicated that the drain carries untreated sewage of nearby villages and discharges into River Ganga.
- During inspection, IFFCO Phulpur was not discharging any wastewater into IFFCO drain which impacted its quality. The drain carry sewage and have significant flow during monsoon season. During the time of monitoring (Oct 17th – 18th, 2023), the drain was either found stagnant or dry from its origin to confluence with river Ganga.

The drain regains flow just before its confluence with river Ganga due to discharge of untreated sewage from nearby villages in the catchment.

- **Groundwater:**

  - Groundwater samples collected from six villages within the periphery of 1 kilometer of the unit were meeting the drinking water standards (IS 10500:2012) except TDS at Fazilapur village (648 mg/L against norm of 600 mg/L). High TDS in groundwater of Fazilapur village could be attributed to geological sources.
  - Groundwater sample collected from Jaferpur village (located at approximately 1.97 kilometers from the right bank of IFFCO drain) was not meeting the drinking water standards (IS 10500:2012) w.r.t. Alkalinity, TDS, Total Hardness and Mg2+. Jaferpur village is located at a distance of 1.97 kilometers from the IFFCO drain therefore no impact of IFFCO drain was observed on groundwater quality at Jaferpur village and high Alkalinity, TDS, Hardness and Mg2+ may be attributed to the geogenic sources.
  - Groundwater at Malethuwa and Khudaypur villages was meeting the drinking water standards (IS 10500:2012). However, at Ajehera village, groundwater was meeting the drinking water standards (IS 10500:2012) except Total Hardness (680 mg/L against norm of 600 mg/L) which may be attributed to geogenic sources.
  - Near confluence point of IFFCO drain with River Ganga near Dumduma village, the groundwater was meeting the drinking water standards (IS 10500:2012).

X. Recommendations

- **Fresh water consumption:**

  - The unit shall maintain logbooks for fresh consumption at different sections i.e. DM Plant, Softening Plant, Service water, Fire hydrant, Township and CORDET area.

- **Effluent generation:**

  - The unit shall maintain logbooks for Outlet of Ammonia Stripper Plant, Inlet and Outlet (permeate and reject) of CPU and feed and utilization of effluent from Guard Ponds.
  - The unit shall install flow meters at Outlet of Ammonia Stripper Plant and Inlet & outlet of Guard Ponds and maintain logbooks for the same.

- **Condensate Polishing Unit (CPU):**
  - The unit shall install flow meters at inlet and outlet of CPU (treated effluent/condensate and regeneration water) and maintain logbooks for the same.
  - The unit shall install flow meters to separately quantify reuse of treated effluent/condensate from CPU in process sections of Power Plant, Urea Plant – I & II, Ammonia Plant – I & II.

- **Ammonia Stripper Plant:**
  - The unit shall install flow meter at outlet of Ammonia Stripper Plant and maintain logbooks for the same on daily basis.

- **Guard Ponds:**
  - The unit shall install flow meters at Inlet and Outlet of Guard Ponds No. 1 (capacity: 10,000 m^3), 2 (7000 m^3) and Ammonical guard pond (7000 m^3).
  - Unit shall not use water stored in guard pond directly in irrigation without treatment and ensure compliance with the discharge norms mentioned in the CCA.

- **Sewage Treatment Plant (STP):**
  - The unit shall install flow meters at the Inlet and outlet of STP and maintain logbooks for the same on daily basis.
  - The unit shall properly carry out the disinfection of treated sewage and ensure compliance with the discharge norms.

- **Ash Pond:**
  - The unit shall submit an Ash Management Plan for addressing the disposal and management of legacy ash.

- **Groundwater:**
  - In view of high concentration of Iron, Lead and Manganese in the groundwater samples collected from villages nearby ash pond of the Unit, it is recommended that UPPCB shall carry out detailed assessment of groundwater quality including ground water sampling & analysis in and around the unit to ascertain the groundwater contamination, if any, and need for remediation. Depending on such study, detailed remedial action plan be also prepared and executed by UPPCB in time bound manner.

XI. Conclusion

1. Joint committee comprising of Director & Scientist F, Water Quality Management (WQM)-II Division, CPCB and officials from UPPCB, UP groundwater department, district administration of Prayagraj, agriculture department, horticulture department and medical officials from the office of Chief Medical Officer (CMO) carried out inspection and survey of IFFCO, Phulpur and its surrounding areas during Oct 17-18, 2023 in compliance to Hon'ble NGT order dated 15/09/2023 in OA No. 544/2023. Details of site visit undertaken by committee are mentioned in Section II.

2. The petitioner, in OA No. 544/2023, raised issues regarding groundwater abstraction, groundwater contamination, pollution in drain and impact on human health, crops and cattle. Regarding the petition, the committee took following actions:

    a. The joint committee interacted with residents from villages surrounding IFFCO unit and petitioner Sh. Parasnath from Khudaypur village and Sh. Ramsurat from Baro village. The residents informed the team about the adverse effects of pollution attributed to IFFCO, Phulpur. The petitioner discussed on past crop damage due to industrial effluent discharge and compensation amount for same. Additionally, during the conversation, the petitioner pointed out specific sites requiring sampling. In response, the monitoring team gathered groundwater and soil samples from these precise sites as requested by the petitioner. No industrial impact on crop was observed during the joint committee visit. The detail of interaction is mentioned in Section IV and V.

    b. The Joint committee interacted with the villagers to evaluate the impact of pollution caused by the IFFCO i.e., discharge of treated/untreated effluent and boiler ash on health of villagers, animal health and crop productivity. Photography and videography of monitoring/sampling were carried out during the survey. The Joint committee conducted health survey of surrounding villages of the Unit through questionnaire (Annexure- XII). The questionnaire encompassed inquiries spanning various categories: General Information, Environmental Impact, Health Impact, Effects on Land & Crops, Livestock Health, and Incidents related to Pollution. This comprehensive survey involved 21 families (Annexure- XIII). The committee

concluded that there were no observable impacts on the health of villagers, the soil or crops, and even the livestock in the surrounding villages of the unit.

c. The Joint Committee assessed groundwater abstraction data through logbook maintained by the unit. As per the logbook/data of borewells provided for groundwater withdrawal, the unit has abstracted groundwater @ 65048.49 KL/day for duration 01.07.2023 to 15.10.2023 which is within the permissible limit of 74880 KL/day groundwater abstraction calculated from values mentioned in the NOCs issued by UPGWD. The details are mentioned in section III – subsection 3.

3. The committee visited the industry, i.e., M/s IFFCO, Phulpur and examined if the industry is operating and producing ammonia without consent and other requisite clearances from the competent authority. The committee observed that the unit has obtained Consolidated Consent & Authorization issued by UPPCB on 21.12.2022 under Section-25 of the Water (Prevention & Control of Pollution) Act, 1974, 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 with a validity upto 31.12.2027 (Annexure - II). The CCA is valid for production of Nano-Urea/Nano-Sulphur/Nano-Micronutrients-36500 KL/Annum from Nano Fertilizer Plant and Urea- 5790 MT/day from Urea Production Plant. Also, in the CCA it is mentioned that Ammonia 3300 MT/day and Carbon Dioxide - 4301 MT/day will be the Intermediate products during the process of manufacturing of Urea.

   The unit obtained Environmental Clearance (EC) from MoEF&CC on dated 23rd March 1995 for additional ammonia plant of 1350 MT/day, 02 nos, of Urea plants of 1100 MT/day each and Turbo Generator Captive Power Plant (TG-CPP) of capacity 18 MW. Unit obtained EC from MoEF&CC on 14.07.2006 for capacity enhancement/de-bottlenecking and LNG conversion The unit obtained another EC from MoEF&CC on dated 14th March 2022 for Modernization and Expansion of Existing Fertilizer Plant for Manufacturing of Nano Fertilizer at IFFCO Phulpur (Copy of EC dated 23.03.1995, 14.07.2006 and 14.03.2022 are placed at Annexure – III, IV and V respectively).

4. The committee carried out mapping and monitoring of IFFCO drain from its origin near Tisaura village in Phulpur Block, Prayagraj district to confluence with river Ganga. The

major observations regarding IFFCO drain monitoring are mentioned in Section IV. The committee made following conclusions:

a. Wastewater characteristics of IFFCO from origin till upstream of the unit indicated that the drain carry domestic sewage. Storm water drain emanating from the unit meets the drain but no impact of storm water drain on IFFCO drain was observed.

b. Wastewater characteristics of IFFCO drain at downstream of unit near Bharauti village indicated that there is no impact of industrial discharge on IFFCO drain.

c. Before discharging into Mugarson lake, the IFFCO drain was found stagnant at Ajehera village and Khudaypur village and dry near Malethuwa village and at Allahabad-bypass expressway. Wastewater in this stretch did not show any impact of industrial discharge on IFFCO drain. At downstream of Mugarson lake, BOD-30 mg/L, COD-48 mg/L and TSS-9 mg/L were found in IFFCO drain. IFFCO drain was again found dry near Gopalpur village (on Prayagraj-Varanasi Road).

d. Before confluence with River Ganga near Dumduma village, very less flow in IFFCO drain (0.2 MLD) was observed before its confluence with the River Ganga due to the discharge of untreated sewage from villages in the catchment area of the drain, such as Dumduma, Ganeshipur, Mand, and others. Wastewater characteristics (BOD-80 mg/L, COD-112 mg/L and TSS-692 mg/L) indicated that the drain carries untreated sewage of nearby villages and discharges into River Ganga.

5. The committee also collected groundwater samples in the surrounding villages of the unit and in the catchment area of IFFCO drain. The major observations regarding groundwater monitoring are mentioned in Section IV. The committee made following conclusions:

a. Groundwater samples collected from six villages within the periphery of 1 kilometer of the unit were meeting the drinking water standards except TDS at Fazilapur village which could be attributed to geological sources.

b. Groundwater sample collected from Jaferpur village (located at approximately 1.97 kilometers from the right bank of IFFCO drain) was not meeting the drinking water standards w.r.t. Alkalinity, TDS, Total Hardness and Mg2+. Jaferpur village is located at a distance of 1.97 kilometers from the IFFCO drain therefore no impact of IFFCO

drain was observed on groundwater quality at Jaferpur village and high Alkalinity, TDS, Hardness and Mg2+ may be attributed to the geogenic sources.

c. Groundwater at Malethuwa and Khudaypur villages was meeting the drinking water standards w.r.t. BIS 10500:2012. However, at Ajehera village, groundwater was meeting the drinking water standards except Total Hardness which may be attributed to geogenic sources.

d. Near confluence point of IFFCO drain with River Ganga near Dumduma village, the groundwater was meeting the drinking water standards.

6. The committee carried out inspection of IFFCO, Phulpur. Detailed inspection report of M/s IFFCO, Phulpur is at Section III. The recommendations of the committee w.r.t. M/s IFFCO, Phulpur are mentioned in Section XI. The committee concluded that:

a. The unit has requisite permission from UPGWD for groundwater abstraction, EC from MoEF&CC and CCA from UPPCB.

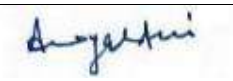
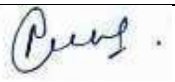
b. The unit has not installed flowmeter at freshwater utilization point, effluent generation point, recycling & reuse point, guard pond inlet & outlet and STP inlet & outlet.

c. Analysis result of sample collected from guard ponds - 02 being directly used for irrigation indicate non-compliance with the stipulated discharge norms in terms of BOD.

d. Analysis result of sample collected from STP outlet being used for irrigation indicate non-compliance with the stipulated discharge norms in terms of FC.

e. Stack monitoring results indicates compliance with stipulated emission norms and ambient air quality monitoring results meets National Ambient Air Quality Standards (NAAQS).

Signature of inspecting officials:

S. No.	Name of Officers	Signature
1.	Dr. Ajit Kumar Vidyarthi, Sc-'F', CPCB Delhi	
2.	Sh. Ajeet Kumar Jaiswal, SDM Phulpur, Prayagraj	
3.	Ms. Reena Satavan, Sc- 'E', CPCB Delhi	
4.	Sh. Ramesh Kumar Singh, RO Prayagraj, UPPCB	
5.	Dr. Raj Kishore Singh, Sc-'D', CPCB Delhi	
6.	Sh. Avadhesh Kumar Tripathi, Sc-'C' CPCB Lucknow	
7.	Dr. Prabhat Ranjan, Sc- 'B', CPCB Delhi	
8.	Sh. Ravi Shanker Patel, Hydrologist, UPGWD	

Photographs taken during visit within unit premises

Primary Clarifier in ETP (RO Plant)

Multi-Grade Filter in ETP (RO Plant)

Micron Filters in ETP (RO Plant)

Reverse Osmosis (RO) Plant

Ammonical Guard Pond

Guard Pond - 2

Ammonia Stripper Plant

STP Inlet channel

Filtration units in STP

STP outlet line

Piezo well – 1 (Near Borewell – 5)

Piezo well – 2 (Near Borewell – 15)

Photographs of some borewells within unit premises

Storm water drain near ETP (RO Plant)

Storm water drain near Urea Plant - I

Storm water drain near Ammonia Plant - I

Storm water drain near Ammonia Plant - II

Storm water drain near Urea Plant - II

Storm water drain near Guard Pond – 2