

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

WESTERN ZONE BENCH, PUNE

ORIGINAL APPLICATION NO. 124 OF 2017 (WZ)

In the Matter of-

Arvind Manohar Mahajan & Ors.

... Applicants

Versus.

M/s Benzo Chem Industries Pvt. Ltd. & Ors.

... Respondents

COMPLIANCE AFFIDAVIT ON BEHALF OF THE RESPONDENT NO. 1

PAPER BOOK

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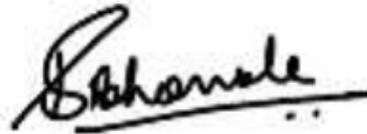
... Respondents

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Date: 26.05.2021



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BEFORE THE NATIONAL GREEN TRIBUNAL

WESTERN ZONE BENCH, PUNE

ORIGINAL APPLICATION NO. 124 OF 2017 (WZ)

NOTED AND RECORDED

Sr. No. 285-2021

Date: 25-5-2021

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25 MAY 2021

In the Matter of-

Arvind Manohar Mahajan & Ors.

... Applicants

Versus.

M/s Benzo Chem Industries Pvt. Ltd. & Ors.

... Respondents

COMPLIANCE AFFIDAVIT ON BEHALF OF THE RESPONDENT NO. 1

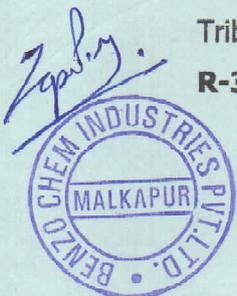
I, Mr. Pralhad^PZope, Age: 57 Years, Occupation: Director, Having Office At: Cawasji Patel Street, Fort, Mumbai- 400001, currently located at: M/s Benzo Chem Industries Pvt. Ltd., MIDC Area, Dasarkhed, Malkapur, Buldhana- 443101, do hereby state on solemn affirmation as:

1. That I am one of the Directors of the Respondent No. 1 Industry viz. M/s Benzo Chem Industries Pvt. Ltd. Vide the Board Resolution dated 21.05.2021, I am authorized to affirm the present Affidavit on behalf of the Respondent No. 1 before this Hon'ble Tribunal. I am also, well versed with the facts and circumstances arising in the present O. A. No. 124 of 2017 (WZ) and therefore also competent to file the present Affidavit on behalf of the Respondent No. 1. A copy of the Board Resolution dated 21.05.2021 is enclosed herewith as **ANNEXURE R-1**.
2. The Applicants in O. A. No. 124 of 2017 (WZ) had raised a question u/s 14 of the National Green Tribunal Act, 2010 pertaining to the pollution being caused to the land (soil) as well as the ground water in the Village of Dasarkheda, Tal- Malkapur, Dist- Buldhana due to the Industrial Operations of the Respondent No. 1 and therefore, the Applicants had sought closure of the Industrial Unit of the Respondent No. 1. This Hon'ble Tribunal, vide its order dated 24.07.2017 was pleased to issue notice in O. A. No. 124 of 2017 (WZ) which was made returnable on 28.08.2017. Thereafter, the Respondent No. 1 has filed a Reply in terms of Rule 16(2) of the National Green Tribunal Rules, 2011 opposing the O. A. No. 124 of 2017 (WZ) as filed by the Applicants. The Respondent No. 1 has also filed a M. A. No. 299 of 2017 raising Preliminary Objections to the O. A. No. 124 of 2017, the same being

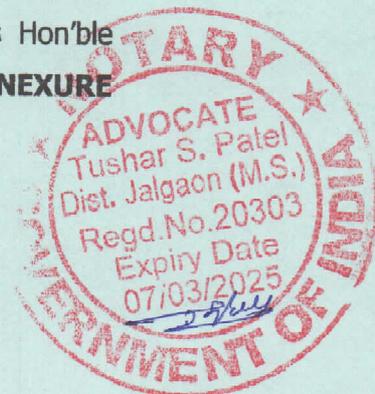


barred by limitation. This Hon'ble Tribunal on 31.10.2017 was pleased to hear the submissions of the Respondent No. 1 on the point of limitation; however, the Ld. Counsel appearing on behalf of the Applicants sought time to rebut the arguments put forth on behalf of the Respondent No. 1. The MA No. 299 of 2017 raising preliminary objection pertaining to limitation is partially heard by this Hon'ble Tribunal and therefore, the issue of limitation may be decided as a preliminary issue prior to the adjudication of OA No. 124 of 2017 on merits.

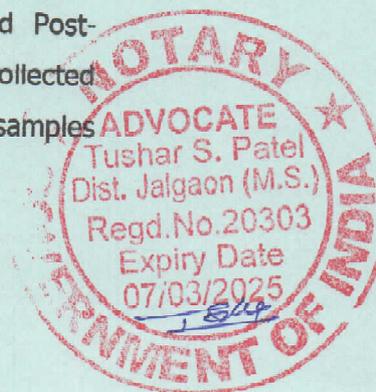
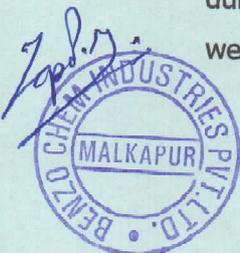
3. Thereafter, the matter was listed for hearing before this Hon'ble Tribunal on 08.12.2017. During the course of hearing on 08.12.2017, the Ld. Counsel appearing on behalf of Applicants made a statement that the Respondent No. 1 had duly compensated the Applicants at Rs. 40,000/- per acre of land and, therefore sought permission to withdraw the present Application. However, this Hon'ble Tribunal considered that the question raised in the present Application was not merely concerning individuals, but also the pollution of land and ground water. Therefore, this Hon'ble Tribunal vide its order dated 08.12.2017, was pleased to grant a period of 3 months to the Respondent No. 1 to engage NEERI, Nagpur for Assessment of Soil and Groundwater Pollution due to percolation of waste water as a consequence of the operations of Respondent No. 1 Industry within the periphery of 2 kms radius. Accordingly, even though, the Applicants were fairly compensated by the Respondent No. 1, this Hon'ble Tribunal refrained from allowing the O. A. No. 124 of 2017 (WZ) to be withdrawn at that stage. A copy of the order dated 08.12.2017 passed by this Hon'ble Tribunal in O. A. No. 124 of 2017 (WZ) is enclosed herewith as **ANNEXURE R-2**.
4. Thereafter, the O. A. No. 124 of 2017 (WZ) was listed before this Hon'ble Tribunal on 10.07.2018, wherein, the Ld. Advocate appearing on behalf of Respondent No. 1 sought time from this Hon'ble Tribunal to submit the Report of NEERI, Nagpur as directed by this Hon'ble Tribunal in its order dated 08.12.2017, as on 24.06.2018, the General Manager of the Respondent No. 1 had received a letter from NEERI, Nagpur seeking time to submit the aforesaid Report. The prayer seeking time by the Respondent No. 1 to submit the Report of NEERI, Nagpur was accepted by this Hon'ble Tribunal. A copy of the order dated 10.07.2018 passed by this Hon'ble Tribunal in O. A. No. 124 of 2017 (WZ) is enclosed herewith as **ANNEXURE R-3**.



Tushar S. Patel
ADVOCATE & NOTARY
E. No. No. MAH/2327/05
Notary Regd.No. 20303
Muktainagar, Dist. Jalgaon
Mob. No. 9970299947



5. In pursuance of the submissions made by the Ld. Counsel appearing on behalf of the Respondent No. 1 and as recorded in the order dated 10.07.2018, the Respondent No. 1 was to submit a copy of the Report of NEERI, Nagpur with regards to Assessment of Soil and Groundwater Pollution due to percolation of waste water from the units of the Respondent No. 1 Industry within a periphery of 2 kms radius. Accordingly, NEERI, Nagpur has submitted its Report of June, 2019 to the Respondent No. 1, which the Respondent No. 1 vide the present Affidavit is placing the same on record before this Hon'ble Tribunal.
6. In terms of the directions issued by the Respondent No. 2 dated 23.10.20217 as well the directions of this Hon'ble Tribunal dated 08.12.2017 and 10.07.2018, the Respondent No. 1 has received the CSIR-NEERI Report of June 2019. The main objectives of the CSIR-NEERI Report viz. "Assessment of Soil and Groundwater Pollution in and around Benzo Chem Industry" were as follows:
- *To conduct an audit of the manufacturing process and material balance.*
 - *To evaluate technical adequacy of the ETP and ZLD plant.*
 - *To collect and preserve the ground water and soil samples (Around 25 to 30 samples in total for 2 Km radius) from identified locations using standard methods.*
 - *To analyse ground water and soil sample for physio-chemical and heavy metals parameters with respect to manufacturing processes.*
 - *To assess the impact of the Industrial Activity on the soil and ground water.*
 - *To prepare final report of findings with spatial and statistical analysis.*
7. In order to analyze the groundwater, samples were collected from open dug wells, bore wells and handpump located within 500 mtrs and 2 kms periphery of the Respondent No. 1 Industry during the field visit. For the soil quality analysis, soil samples were collected within 500 mtrs and 2 kms periphery of the Respondent No. 1. The collection of samples at the Respondent No. 1 Industry was conducted in two phases- Pre-Monsoon Period and Post-Monsoon Period. For the Pre-Monsoon Period, the samples were collected during 19th-20th March, 2018 and for the Post-Monsoon Period, the samples were collected during 4th-5th December, 2018.



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8. On the basis of the study of water samples as well as the soil samples conducted by CSIR-NEERI, the analysis for various Physio-Chemicals Parameters of the samples was carried out as per Standard Methods for Examination of Water and Waste Water, 2017, 23rd Edition. The summary and recommendations of CSIR-NEERI in its Report on "Assessment of Soil and Groundwater Pollution in and around Benzo Chem Industry" are as follows:

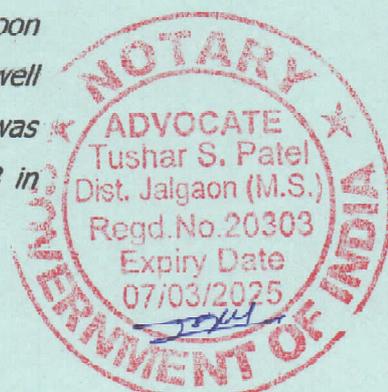
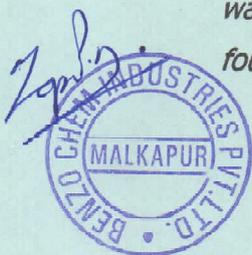
"Chapter 4 – SUMMARY AND RECOMMENDATIONS

4.1. Material Balance

- The ETPs of both the units 1 and 2 have sufficient capacity to take up the liquid load generated by each of the units. The plants have enough spare capacity to take up the shock loads as well.
- The MEE at the end of the plants, makes it possible for the industry to maintain zero liquid discharge (ZLD)
- The air scrubbers too have sufficient capacity to handle the loads of air pollutants generated in each unit.

4.2. Water Environment

- The farming as well as domestic activities are being performed with the water from dug well and bore wells. Electricity is available for a few hours in the morning and during late evening and night, hence water from these sources is used during these hours.
- The depth of these wells is between 40-100 ft and water was found upto 40 ft during summer season.
- The water samples from within 500m of the industry had pH: 6.1-7.8 and TDS, Ca, Mg and Chloride beyond permissible limits for drinking water standards in both pre and post monsoon.
- Extremely high organic content are observed in sample, COD of W8: 4152 mg/l (pre monsoon) and 3900 mg/l (post monsoon). and COD of W1, 6 and 7 in the range 274-313 mg/l. During post monsoon, W1 and W7 were observed to have COD of 248mg/l and 220 mg/l, respectively. Nitrate levels were also beyond permissible limits for Drinking water in W1, 2, 5, 6, 15, 18, 20 and 21 during pre monsoon and W7 in post monsoon. In general, the iron content in all the well waters is above the permissible limit of 0.3 mg/l. Manganese was found above permissible limits in samples from W1, 6, 7 and 8 in



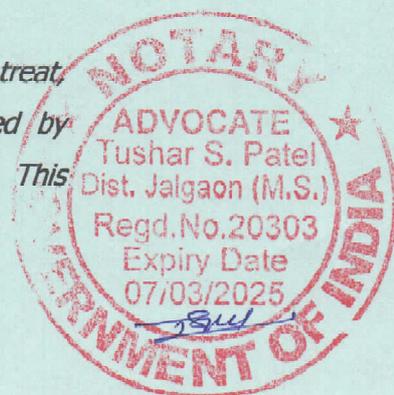
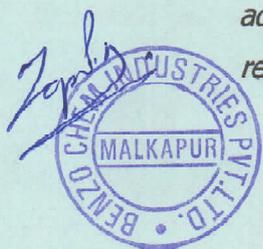
both pre and post monsoon except W6 which was not selected for post monsoon monitoring.

- Based on the groundwater GC-MS/MS analysis for fine chemicals (2C, MA, OCBC, OMPAA, OCPAA and PCPAA) used as raw materials as well as finished products of the Benzochem industry are observed in low concentration in the groundwater in the wells 1, 7 and 8 within 500m radius of Benzochem Pvt. Ltd for both pre and post monsoon seasons.
- For post monsoon, water quality of W20, W40 and H2 samples was monitored based on the results obtained in pre monsoon since no contamination with fine chemicals was observed. These three samples were selected to represent the other samples in the 2km radius but not falling within 500m.
- During pre monsoon monitoring, the bore well samples within 500 m of the industry had pH in the range 7.0-8.3 and TDS: 1800-2500 mg/l. The water is hard (Hardness 700- 1360 mg/l and Chloride: 997-1059 mg/l) as well as saline. Comparatively the hand pump samples had total hardness and chloride within permissible limits in absence of alternate source.
- The bore well and hand pump samples had no organic content (COD: not detected)
- During pre monsoon monitoring, the iron content in all these samples except H2 were found beyond acceptable limits for drinking water and GC-MS/MS analysis revealed that the samples were not contaminated with fine chemicals at this depth.

4.3. Recommendations for Water Environment

Based on the groundwater analysis for both pre and post monsoon seasons, fine chemical contaminants are observed in the groundwater specially in well no 1,7 and 8, which are adjacent to Benzochem Pvt. Ltd. Although, the concentrations of the fine chemicals contaminants are low, however, since the water quality does not meet drinking water standards, use of well water from W1, 7 and 8 for drinking and irrigation purposes should be discontinued immediately.

Some of the immediate measures are to be pump and treat, adsorption of residual organics by activated carbon followed by regular monitoring of the well water quality post treatment. This



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would restore well water quality as well prevent percolation of the contamination in the groundwater. The treatment option hence would be :

Pumping of ground water and its treatment via existing ETP of Benzochem Industries Private Limited (Pumping strategies with activated carbon water treatment/ Reverse Osmosis followed by Multiple effect Evaporation). The treatment of these well water should be carried out until the water quality becomes potable and fine chemicals are not detected. These wells are to be monitored at periodic intervals throughout the treatment procedure.

Further, in terms of priority, W8 has most number of fine chemicals and has the highest priority in terms of treatment. Considering the spare capacity in ETP of the industry, W8 water can be treated there along with the MEE. W1 and W7 are also to be treated and methods listed above can be utilized for these.

Alternatively, other options available for treatment of such contaminated ground water are:

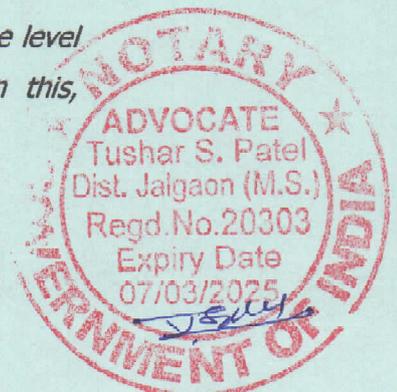
- Recharge of the wells
- In-situ groundwater treatment
- In-situ immobilization of the contaminants (sealing, stabilization, capping, cutting-off, fixing, advanced oxidation process)
- Permeable reactive barrier technology for treatment of dissolved phase organic fraction

Further exploration of the feasibility of either/or options mentioned above needs to be undertaken in order to prevent further deterioration and spread of groundwater quality.

4.4. Summary and Recommendation for Soil Environment

Soil samples were examined during the pre-monsoon period from the study area for general parameters as well as for the fine chemicals. The samples were taken from 15 cm and 30 cm before the surface. However, no fine chemicals were obtained in the samples at the respective depths. Soil sample from the query pit area (E1) was found to contain fine chemical.

Treatment of contaminated pit need to be assessed as per the level and depth of fine chemicals in the soil strata. Based on this, treatment options will be considered as per following



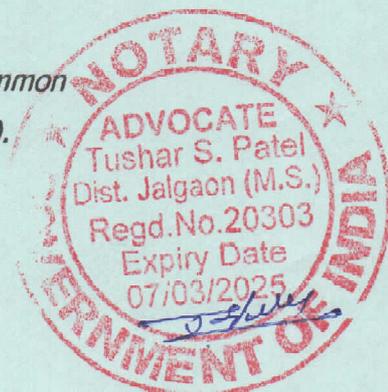
- *Soil depth analysis should be performed to assess the quantity of soil to be stabilized and check for no toxic leachates.*
- *Alternatively, the contaminated soil can be sent to Common Hazardous Waste Treatment and Disposal Facility (CHWTDF). Till the treatment option for contaminated soil in the query pit area is finalized, the query pit area must not be used for any purpose."*

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A copy of the CSIR-NEERI Report on "Assessment of Soil and Groundwater Pollution in and around Benzo Chem Industry" of June, 2019 is enclosed herewith as **ANNEXURE R-4**.

9. In terms of the recommendations given by CSIR NEERI, it was apparent that, the well water from the dug wells bearing No. W1, W7 and W8, which were adjacent to the Respondent No. 1 Industry did not meet the drinking standards and were suggested to be discontinued immediately. At the outset, it is submitted that, the Report submitted by CSIR NEERI itself suggests that W1 which falls behind the Respondent No. 1 Industry is a very old well (1952), not in use since 1994 and W6, W7 and W8 have not been in use for the past 5 years. Therefore, without prejudice, the Respondent No. 1 states that, primarily that the high values of PH, TDS, COD found at W1, W7 and W8 could be attributed to the non-use of the well water for a considerable amount of time. Irrespective, CSIR NEERI, recommended to the Respondent No. 1 that, the Respondent No. 1 should immediately undertake measures to pump and treat, adsorption of residual organics by activated carbon, followed by regular monitoring of the well water quality post treatment for W1, W7 and W8.
10. Besides the recommendations for restoration of well water, CSIR-NEERI, in the Report of 2019 has also recommended ways to restore the soil environment. The report of 2019 suggest that the soil sample from the query pit area (E1) was found to contain fine chemicals and therefore a treatment of the contaminated pit was to be assessed as per the level and depth of fine chemicals in the soil strata. Accordingly, CSIR-NEERI suggested the Respondent No. 1 to consider the following treatment options:

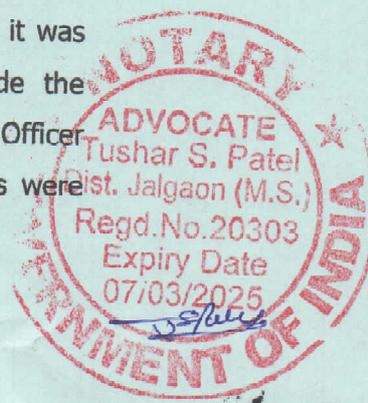
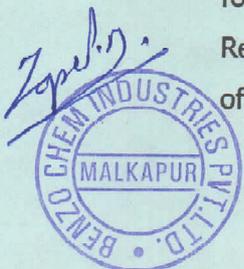
- *Soil depth analysis should be performed to assess the quantity of soil to be stabilized and check for no toxic leachates.*
- *Alternatively, the contaminated soil can be sent to Common Hazardous Waste Treatment and Disposal Facility (CHWTDF).*



11. In terms of the recommendations suggested by CSIR-NEERI, in its Report of June, 2019, the Respondent No. 1 has undertaken the following measures with regard to restoration of the Water Environment:

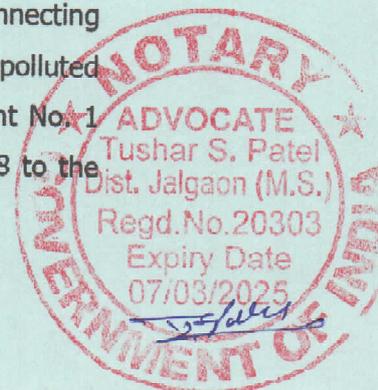
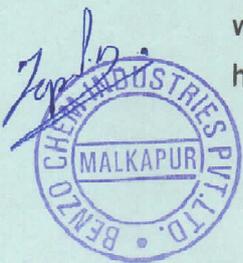
A. The restoration of well water of W8:

- a) CSIR-NEERI, in its recommendation to the Respondent No. 1 in its Report of June, 2019 had recommended that the use of W8 for drinking and irrigation purposes should be discontinued immediately. (**Refer Para 4.3 of the Report**). It was also suggested that, in terms of priority, W8 has most number of fine chemicals and therefore, ought to have highest priority in terms of treatment (**Refer Para 4.3 of the Report**). However, it is apparent to note that, W8 has not been in use for the past 5 years and no water as such is drawn from W8 for drinking or irrigation purposes. (**Refer Para 3.4 of the Report**)
- b) In terms of the recommendations issued by CSIR-NEERI, the Maharashtra Pollution Control Board on 29.09.2020 issued interim directions u/s 33-A of the Water (Prevention and Control of Pollution) Act, 1974 and u/s 31-A of the Air (Prevention and Control of Pollution) Act, 1981 and Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016. The Respondent No. 2 vide the directions dated 29.09.2020 directed the Respondent No. 1 to carry out the work as per the CSIR-NEERI Report proactively and the Respondent No. 1 was to carry out the well water restoration work as per the directions of the Board within 3 months period. A copy of the interim directions issued by the Maharashtra Pollution Control Board dated 29.09.2020 to the Respondent No. 1 Industry is enclosed herewith as **ANNEXURE R-5**.
- c) The Respondent No. 1 on 02.10.2020 Replied to the Interim directions issued by the Respondent No. 2 dated 29.09.2020. Vide the Reply dated 02.10.2020, the Respondent No. 1 categorically stated that, the contentions raised by the Respondent No. 2 in the interim directions dated 29.09.2020 were absolutely baseless and frivolous and much contrary to record. The Respondent No. 1 Industry was under constant surveillance of the Field Officers of the Respondent No. 2, who visited the site on more than one occasion. One such visit dated 27.11.2019 was undertaken to inspect the ETP of the Respondent No. 1 wherein, it was found that, there was no discharge of Trade Effluents outside the Respondent No. 1's Unit. Similar visit was undertaken by the Field Officer of the Respondent No. 2 on 17.07.2020 and several other visits were



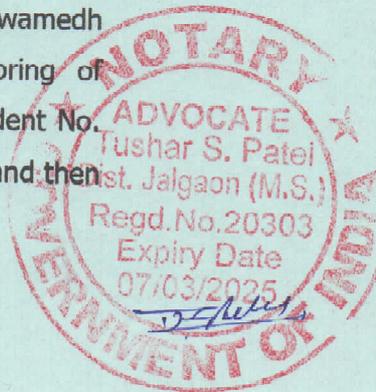
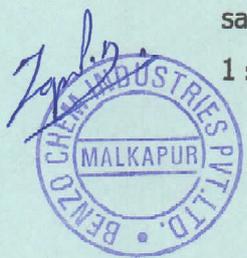
undertaken between November, 2019 to July, 2020. However, on no occasion, did the Field Officer of the Respondent No. 2 find discharge of Trade Effluents outside the Respondent No.1's Unit. Vide the letter dated 02.10.2020, the Respondent No. 1 also undertook to carry out the well restoration work as per the CSIR-NEERI Report. The Respondent No. 1 however, had informed the Respondent No. 2 that the Respondent No. 1 had approached the farmers to discuss the well restoration work but, the farmers aggressively refused to talk with the Respondent No. 1. Therefore, the Respondent No. 1 suggested that, the Respondent No. 1 could carry out the well restoration work only in the presence of the Officials of the Respondent No. 2 and the Revenue Department, under Police protection. A copy of the letter dated 02.10.2020 of the Respondent No. 1 to the Respondent No. 2 is enclosed herewith as **ANNEXURE R-6.**

- d) It is stated that, W8 is located at Gut No. 40 of village Dasarkhed, Taluka Malkapur, Dist. Buldhana. In the month of October, 2020 to February, 2021, cotton was being cultivated at Gut No. 40 of village Dasarkhed, Taluka Malkapur, Dist. Buldhana by the owner of Gut No. 40 viz. Mr. Ashok Patil. For the Respondent No. 1 to comply with the recommendations of CSIR- NEERI, it was necessary for the Respondent No. 1 to physically pump water from W8 into tankers and carry the same to the ETP of the Respondent No. 1 for further treatment. However, since there was a standing crop of cotton at Gut No. 40, the Respondent No. 1 was met with great opposition from the farmers from restoration of W8 as the same would destroy the standing crop. Therefore, the Respondent No. 1 was unable to physically reach Gut No. 40 where W8 is located till February 2021. After, persuasion from the officers of the Respondent No. 2, after the standing crop was harvested by the farmer only in February, 2021, the restoration work of W8 commenced by March, 2021. It is pertinent to note that, prior to commencing the restoration work for W8, the Respondent No. 1 had already restored W1 and W7.
- e) The restoration of W8 commenced on 21.03.2021 and was completed on 05.04.2021 i.e. within 15 days. In order to restore W8, the Respondent No. 1 pumped out the water from W8 by installing pipes and connecting the same to the water tankers that were used to transport the polluted water from W8 to ETP of the Respondent No. 1. The Respondent No. 1 had to install pipes admeasuring around 400-500m long from W8 to the



water tankers used for transportation. The pipes that were installed for pumping of the well water had to be dismantled daily as Gut No. 40 was not in the private ownership of Respondent No. 1. The Respondent No. 1, had deployed its own labor for the purpose of the installing and dismantling the pipes. Besides, laying down of the pipes, it is pertinent to note that there was no electricity available at site of W8. Therefore, in order to pump the polluted water from W8, the Respondent No. 1 had stationed a diesel generator acquired by the Respondent No. 1 for pumping the water. The Respondent No. 1 would run the diesel generator for 4 hours approximately daily to pump the polluted water from W8. The diesel required for running of the Diesel Generator was also procured by the Respondent No. 1 on its own. During the 4 hours that the generator was in operation, approximately two trips of water tankers could be completed. Therefore, approximately, 34,000 L of water was pumped out daily from W8, filled into water tankers and transported to the ETP of the Respondent No. 1 for further treatment.

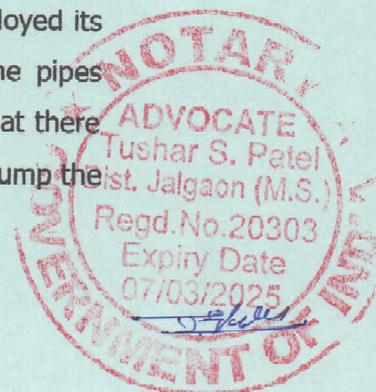
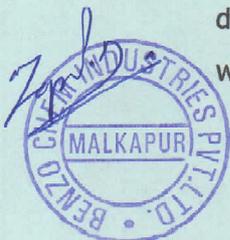
- f) The Respondent No. 1 issued a Work Order to Shivraj Water Suppliers, Dasarkhed dated 17.11.2020. As per the work order issued to Shivraj Water Suppliers, it was agreed that, the Water Supplier would provide water tankers having capacity of 17,000 L for which, the Respondent No. 1 would be paying an amount of Rs. 4,000/- per trip. A copy of the Work Order dated 17.11.2020 issued by Respondent No. 1 to Shivraj Water Suppliers is enclosed herewith as **ANNEXURE R-7**. In order to restore W8, Shivraj Water Suppliers had to undertake 24 trips between 23.03.2021 and 05.04.2021 (Barring the days when the unit of the Respondent No. 1 was closed). The Respondent No. 1 has pumped 4,08,000 Liters of polluted water from W8 and the same has been treated at the ETP of the Respondent No. 1. For the purpose of transporting 4,08,000 L of water from W8 to the ETP of the Respondent No. 1, the Respondent No. 1 paid an amount of Rs. 96,000/- to Shivraj Water Suppliers. This amount was paid to Shivraj Water Supplier through NEFT from authorized account of the Respondent No. 1.
- g) As on date, the restoration work of W8 is complete. The Respondent No. 1 has also called upon its own Environmental Consultant viz. Ashwamedh Engineers and Consultants, Nashik to undertake the monitoring of samples from W8. The Environmental Consultant of the Respondent No. 1 shall undertake the sampling of water from W8 on 19.05.2021 and then



the same shall be analyzed in the Government Accredited Laboratory of the Environmental Consultant of Respondent No. 1. The Respondent No. 1 undertakes to file the copy of the reports of its Environmental Consultant as and when available.

B. Restoration of Well Water of W1:

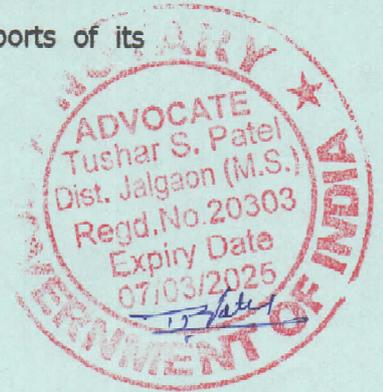
- a) CSIR- NEERI, in its recommendation to the Respondent No. 1 in its Report of June, 2019 had recommended that the use of W1 for drinking and irrigation purposes should be discontinued immediately. (**Refer Para 4.3 of the Report**). However, it is apparent to note that, CSIR-NEERI in its Report of June 2019 has categorically found that W1 which falls behind the Respondent No. 1 Industry and adjacent to a paper mill, is a very old well (1952) but not in use since 1994 and no water as such is drawn from W1 for drinking or irrigation purposes. (**Refer Para 3.4 of the Report**).
- b) It is stated that, W1 is located at Gut No. 29 of village Dasarkhed, Taluka Malkapur, Dist. Buldhana. Gut No. 29 of Village Dasarkhed, wherein W1 is located is a private ownership of Mr. Baburao Laxman Thakur. The officers of the Respondent No. 2 assisted the Respondent No. 1 in communicating with the local farmers and therefore In December 2020, Mr. Baburao Thakur was pleased to grant permission to the Respondent No. 1 to commence with the restoration work of W1. Since, there were bushes and vegetation on Gut No. 29, the Respondent No. 1 paved a way of about 400-500 m in and around Gut No. 29 so that the tankers appointed by the Respondent No. 1 could reach W1. After the vegetation was cleared, the work of the restoration of W1 commenced on 03.12.2020 and was completed on 23.12.2020 i.e. within 20 days. In order to restore W1, the Respondent No. 1 pumped out the water from W1 by installing pipes and connecting the same to the water tankers that were used to transport the polluted water from W1 to ETP of the Respondent No. 1. The Respondent No. 1 had to install pipes admeasuring around 300m long from W1 to the water tankers used for transportation. The pipes that were installed for pumping of the well water had to be dismantled daily as Gut No. 29 was not in the private ownership of Respondent No. 1. The Respondent No. 1, had deployed its own labor for the purpose of the installing and dismantling the pipes daily. Besides, laying down of the pipes, it is pertinent to note that there was no electricity available at site of W1. Therefore, in order to pump the



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polluted water from W1, the Respondent No. 1 had stationed a diesel generator acquired by the Respondent No. 1 for pumping the water. The Respondent No. 1 would run the diesel generator for 4 hours approximately daily to pump the polluted water from W1. The diesel required for running of the Diesel Generator was also procured by the Respondent No. 1 on its own. During the 4 hours that the generator was in operation, approximately two trips of water tankers could be completed. Therefore, approximately, 34,000 L of water was pumped out daily from W1, filled into water tankers and transported to the ETP of the Respondent No. 1 for further treatment.

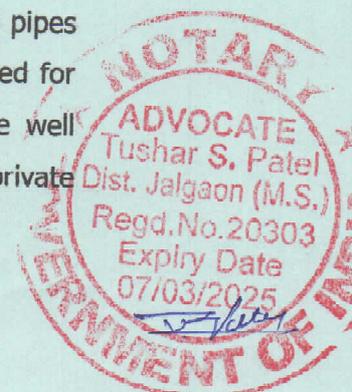
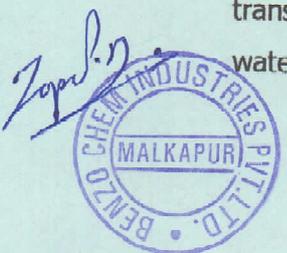
- c) The Respondent No. 1 issued a work order to Shivraj Water Suppliers, Dasarkhed dated 17.11.2020. As per the Work Order issued to Shivraj Water Suppliers, it was agreed that, the Water Tanker Supplier would provide water tankers having capacity of 17,000 Liters for which, the Respondent No. 1 would be paying an amount of Rs. 4,000/- per trip. A copy of the Work Order dated 17.11.2020 issued by Respondent No. 1 to Shivraj Water Suppliers is already annexed herein above as Annexure R-7. In order to restore W1, Shivraj Water Suppliers had to undertake 30 trips between 03.12.2020 and 23.12.2020 (barring the days when the Respondent No. 1 unit was closed). The Respondent No. 1 has pumped 5,10,000 L of polluted water and the same was treated at the ETP of the Respondent No. 1. For the purpose of transporting 5,10,000 L of water from W1 to the ETP of the Respondent No. 1, the Respondent No. 1 paid an amount of Rs. 1,20,000/- to Shivraj Water Suppliers. This amount was paid to Shivraj Water Supplier through NEFT from authorized account of the Respondent No. 1.
- d) As on date, the restoration work of W1 is complete. The Respondent No. 1 has also called upon its own Environmental Consultant viz. Ashwamedh Engineers and Consultants, Nashik to undertake the monitoring of samples from W1. The Environmental Consultant of the Respondent No. 1 shall undertake the sampling of water from W1 on 19.05.2021 and then the same shall be analyzed in the Government Accredited Laboratory of the Environmental Consultant of Respondent No. 1. The Respondent No. 1 undertakes to file the copy of the reports of its Environmental Consultant as and when available.



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C. Restoration of well water from W7:

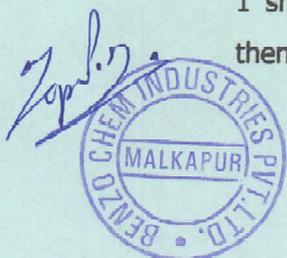
- a) CSIR-NEERI, in its recommendation to the Respondent No. 1 in its Report of June, 2019 had recommended that the use of W7 for drinking and irrigation purposes should be discontinued immediately. (**Refer Para 4.3 of the Report**). However, it is apparent to note that, W7 has not been in use for the past 5 years and no water as such is drawn from W7 for drinking or irrigation purposes. (**Refer Para 3.4 of the Report**)
- b) It is stated that, W7 is located at Gut No. 39 of village Dasarkhed, Taluka Malkapur, Dist. Buldhana. Gut No. 39 of Village Dasarkhed was owned by Mr. Bhagwan Ramkrishna Sonawane. Like the position in Gut No. 40, wherein the W8 is located, in the month of October, 2020 to February, 2021, cotton was being cultivated at Gut No. 39 of village Dasarkhed, Taluka Malkapur, Dist. Buldhana by the owner of Gut No. 39. For the Respondent No. 1 to comply with the recommendations of CSIR- NEERI, it was necessary for the Respondent No. 1 to physically pump water from W7 into tankers and carry the same to the ETP of the Respondent No. 1 for further treatment. However, since there was a standing crop of cotton at Gut No. 39, the Respondent No. 1 was met with great opposition from the farmers from restoration of W7 as the same would destroy the standing crop. Therefore, the Respondent No. 1 was unable to physically reach Gut No. 39 where W7 is located till January 2021. After, persuasion from the officers of the Respondent No. 2, after the standing crop was harvested by the farmer only in February, 2021, the restoration work of W7 commenced only in February 2021.
- c) The restoration of W7 commenced on 11.02.2021 and was completed on 25.03.2021 i.e. within 43 days. However, it is stated that the duration for restoring W7 was little on the longer side as for substantial period the water tankers appointed by the Respondent No. 1 were under maintenance for a period of about 10 days. Once the tankers were available, the Respondent No. 1 re-commenced with the restoration work of the W7. In order to restore W7, the Respondent No. 1 pumped out the water from W7 by installing pipes and connecting the same to the water tankers that were used to transport the polluted water from W7 to ETP of the Respondent No. 1. The Respondent No. 1 had to install pipes admeasuring around 400m long from W7 to the water tankers used for transportation. The pipes that were installed for pumping of the well water had to be dismantled daily as Gut No. 39 was not in the private



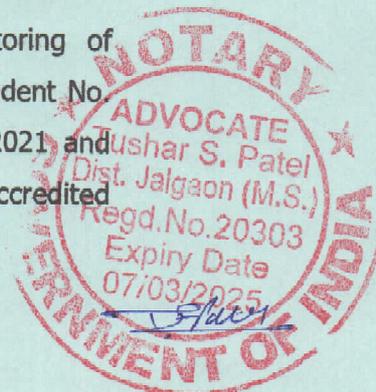
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Date: 25/3/24
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ownership of Respondent No. 1. The Respondent No. 1, had deployed its own labor for the purpose of the installing and dismantling the pipes. Besides, laying down of the pipes, it is pertinent to note that there was no electricity available at site of W7. Therefore, in order to pump the polluted water from W7, the Respondent No. 1 had stationed a diesel generator acquired by the Respondent No. 1 for pumping the water. The Respondent No. 1 would run the diesel generator for 4 hours approximately daily to pump the polluted water from W7. The diesel required for running of the Diesel Generator was also procured by the Respondent No. 1 on its own. During the 4 hours that the generator was in operation, approximately two trips of water tankers could be completed. Therefore, approximately, 34,000 L of water was pumped out daily from W7, filled into water tankers and transported to the ETP of the Respondent No. 1 for further treatment.

- d) The Respondent No. 1 issued a work order to Shivraj Water Suppliers, Dasarkhed dated 17.11.2020. As per the Work Order issued to the Shivraj Water Suppliers, it was agreed that, the Water Tanker Supplier would provide water tankers having capacity of 17,000 Liters for which, the Respondent No. 1 would be paying an amount of Rs. 4,000/- per trip. A copy of the Work Order dated 17.11.2020 issued by the Respondent No. 1 to Shivraj Water Suppliers is already annexed herein above as Annexure R-7. In order to restore W7, Shivraj Water Suppliers had to undertake 21 trips between 11.02.2020 and 25.03.2021 (barring the days when the Respondent No. 1 unit was closed and the days when the water tankers used by the Respondent No. 1 were under maintenance). The Respondent No. 1 has pumped 3,57,000 L of polluted water and the same was treated at the ETP of the Respondent No. 1. For the purpose of transporting 3,57,000 L of water from W7 to the ETP of the Respondent No. 1, the Respondent No. 1 paid an amount of Rs. 84,000/- to Shivraj Water Suppliers. This amount was paid to Shivraj Water Supplier through NEFT from authorized account of the Respondent No. 1.
- e) As on date, the restoration work of W7 is complete. The Respondent No. 1 has also called upon its own Environmental Consultant viz. Ashwamedh Engineers and Consultants, Nashik to undertake the monitoring of samples from W7. The Environmental Consultant of the Respondent No. 1 shall undertake the sampling of water from W7 on 19.05.2021 and then the same shall be analyzed in the Government Accredited



Tushar S. Patel
ADVOCATE & NOTARY
E. No. No. MAH/2327/05
Notary Regd.No. 20303
Muktainagar, Dist. Jalgaon
Mob. No. 9970294777

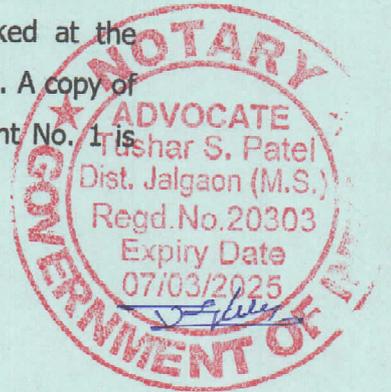


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Laboratory of the Environmental Consultant of Respondent No. 1. The Respondent No. 1 undertakes to file the copy of the reports of its Environmental Consultant as and when available.

12. In terms of the recommendations suggested by CSIR-NEERI, in its Report of June, 2019, the Respondent No. 1 has undertaken the following measures with regard to restoration of the Soil Environment:

- A. The CSIR-NEERI Report of 2021 has found that no fine chemicals were obtained in the samples taken from 15 cm and 30 cm below the surface. However, the soil samples from query pit area (E1), contained fine chemicals. In order to restore the soil environment CSIR -NEERI had recommended to send the contaminated soil to the Common Hazardous Waste Treatment and Disposal Facility (CHWTDF).
- B. It is submitted that the recommendations of CSIR-NEERI in the Report of June 2019 were received by the Respondent No. 1 in June 2019. However, the Respondent No. 2 only on 29.09.2020 directed the Respondent No. 1 to comply with the recommendations of CSIR-NEERI. In September 2020, Buldhana District was receiving its seasonal rainfall and therefore the Respondent No. 1 was not in a position to restore the soil environment as per the recommendations of CSIR-NEERI. It was only when the monsoons within the State of Maharashtra subsided in the month of October 2020 and therefore the restoration of soil could commence only after October 2020. Also, the restoration of soil could not commence immediately in October 2020 as the query pit area (E1) was filled with water and the area could be restored only once the ground had dried completely.
- C. The query pit area (E1) was completely dry by March 2021, thereafter the Respondent No. 1 commenced the restoration of the query pit area (E1). For the purpose of restoring the query pit area the Respondent No. 1 undertook the excavation of the polluted soil at the query pit area (E1) using a JCB and got the entire affected area by excavation. The Excavation work for entire polluted area was completed by the Respondent No. 1 by May 2021. A copy of the photographs showing the excavated query pit area (E1) is enclosed herewith as **ANNEXURE R-8**. A total of about 3 to 4 tons of polluted soil was excavated by Respondent No. 1. The excavated soil was collected by Respondent No. 1 in HDPE Woven Bags and is currently stocked at the earmarked Hazardous Waste Storage area of the Respondent No. 1. A copy of the photographs where the excavated soil collected by Respondent No. 1 is



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stocked in the Respondent No. 1's earmarked area are enclosed herewith as **ANNEXURE R-9.**

D. The Respondent No. 1 vide a letter dated 18.05.2021 addressed to the Respondent No. 2 has sought the permission of Respondent No. 2 to allow the Respondent No. 1 to transfer the excavated soil to a Common Hazardous Waste Treatment and Disposal Facility(CHWTDF) and in compliance to the recommendations of CSIR-NEERI Report of June 2019. A copy of the letter dated 18.05.2021 addressed by the Respondent No. 1 to the Respondent No. 2 is enclosed herewith as **ANNEXURE R-10.** Thus, if the Respondent No. 2 permits the transportation of the excavated soil to CHWTDF, the Respondent No. 1 would have then be in compliance of the CSIR-NEERI recommendations.

13. That the Respondent No. 1 as is evident from statements made herein above has complied with the recommendations of CSIR-NEERI in later and spirit. Also, the Respondent No. 1 vide a letter dated 16.05.2021 has requested the officers of CSIR-NEERI to inspect the present status of the recommendations qua the water environment as well as the soil environment as per the Report of June 2019. A copy of the letter dated 16.05.2021 addressed by the Respondent No. 1 to CSIR-NEERI is enclosed herewith as **ANNEXURE R-11.**

14. The Respondent No. 1 further undertakes that if any recommendations are suggested by CSIR-NEERI, the Respondent No. 1 undertakes to comply with the same immediately.

Whatever stated herein above is true and correct to the best of my knowledge and belief and nothing material has been concealed there from. Also, the Annexures enclosed herewith this Affidavit are true copies of the Original Documents. Solemnly affirmed at Muktainagar on 25th day of May, 2021.

NOTARY
ADVOCATE
Tushar S. Patel
Dist. Jalgaon (M.S.)
Regd.No.20303



Tushar S. Patel
DEPONENT



AFFIDAVIT

Solemnly affirmed and signed before me by
Shri. Mahesh P. Zore age-57
at Dasakhede who is identified by
Shri. Yogesh S. Londe
whom I know Personally.

Yogesh S. Londe

Sing.
BEFORE ME
only
Adv. Tushar S. Patel
Notary Govt. of India
Regd. No. 20303
Muktainagar, Dist. Jalgaon
Mob. No. 9970299947




भारत सरकार
Government of India


प्रल्हाद पंढरीनाथ झोपे
Pralhad Pandharinath Zope
 जन्म तारीख/DOB: 01/03/1964
 पुरुष/ MALE



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माझी आधार. माझी ओळख

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NOTARY
ADVOCATE
Tushar S. Patel
 Tushar S. Patel
 Dist. Jalgaon (M.S.)
 Regd. No. 20303
 Expiry Date
 07/03/2025
GOVERNMENT OF INDIA

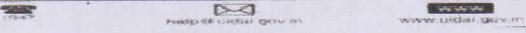

भारतीय विचिष्ट ओळख प्राधिकरण
Unique Identification Authority of India

पत्ता:
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Address:
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2293 4912 2460



BENZO CHEM INDUSTRIES PRIVATE LIMITED 439

Registered Office: 26/28-A, Cawasji Patel Street, Fort, Mumbai - 400 001

☎: +91- 22 - 43555888 • Fax No. 022-40057327 • Email: info@benzochem.co.in • Website: www.bcipl.com

CIN - U24100MH1986PTC041751

CERTIFIED TRUE COPY OF RESOLUTION PASSED AT THE MEETING OF BOARD OF DIRECTORS OF BENZO CHEM INDUSTRIES PRIVATE LIMITED FOR FY 2021-22 HELD ON THURSDAY DATED 20TH MAY, 2021 AT THE REGISTERED OFFICE OF THE COMPANY AT 11.30 A.M.

AUTHORITY TO MR. PRALHAD ZOPE, DIRECTOR OF THE COMPANY, TO DEAL WITH THE LEGAL MATTER FILED BEFORE THE NATIONAL GREEN TRIBUNAL, WESTERN ZONE BENCH, PUNE VIDE APPLICATION NO. 124/2017 (WZ):

“RESOLVED THAT Mr. Pralhad Zope, Director of the Company, be and is hereby severally authorized to appear, sign, verify, declare, affirm, make, present, submit and file all necessary notices, plaints, petitions, written statements, affidavits, undertakings, vakalatnamas, declarations, Appeals, Revisions, applications, statements, complaints, papers and documents and all proceedings and matters in connection with suit proceeding filed by Arvind Mahajan & Ors against the Company vide Application No.124/2017 (WZ) before the National Green Tribunal, Western Zone Bench, Pune.

RESOLVED FURTHER THAT Mr. Pralhad Zope, Director of the Company, be and is hereby severally authorized to, nominate, appoint and engage advocates, solicitors, counsel or other professionals and retainers; and to do all such acts, things, deeds as may be necessary or proper to deal with the matter.

RESOLVED FURTHER THAT Mr. Pralhad Zope, Director of the Company, be and is hereby severally authorized to delegate the authority conferred on him in favour of any officials or the authorized representatives of the Company, as he may deem fit in the best interests of the Company and such delegation may be made by them from time to time through Power of Attorney or by any other suitable way.”

FOR BENZO CHEM INDUSTRIES PVT. LTD.



**GAURAV MOHATTA
WHOLE TIME DIRECTOR
(DIN: 00604061)**



**PRAVIN PATIL
COMPANY SECRETARY
(M.NO. A24037)**



Schankle

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**BEFORE THE NATIONAL GREEN TRIBUNAL, WESTERN ZONE
BENCH, PUNE**

Application 124/2017(WZ)
Arvind Mahajan & Ors. V/s M/s. Benzo Chem. Industries Pvt.Ltd.
& Ors.

**CORAM: HON'BLE MR JUSTICE U.D.SALVI, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

Present: Applicant/Appellant : Ms.Beena S. Pardesi Adv
Mr Swapnil Medhe Adv
Respondent No.1 : Mr. Sangramsingh Bhonsle Adv
Mr. Siddharth Mehta Adv
Ms. Samrudhi Jain Adv
Respondent No.2 : Ms. Manasi Joshi Adv

Date and Remarks	Orders of the Tribunal
<p>Item No 7 December 8, 2017</p>	<p>Thirteen (13) villagers from village Dasarkheda, Taluka Malkapur, District Buldhana moved the present Application for closure of Respondent No.1 M/s M/s Benzo Chem. Industries Pvt. Ltd an industrial unit manufacturing Pharmaceuticals chemicals, Biocides, Agrochemicals, Perfumery chemicals, Adamantine, Acetophenone and Benzophenone, Bulk drugs, Anisole and Phenetole at Dasarkheda, Malkapur and for directions to pay suitable compensation to each of the Applicants towards loss caused due to degradation of their lands, well-water caused as a result of untreated effluent discharged in their lands, and further direction to Respondent No.2 MPCB, Respondent No.3 MIDC and Respondent No.4 Junior Inspector of Factories to take immediate measures in order to prevent further degradation of lands and well water.</p> <p>Learned Counsel appearing on behalf of the Applicants submits that Respondent No.1 has duly compensated the Applicants @ ₹40,000/- per acre of land and, therefore, permission be granted to withdraw the present Application.</p> <p>Questions raised in the present Application are not merely concerning the individuals but also the land and groundwater. The reply of MPCB reveals that Respondent-Board had issued directions under Section 33A of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 31A of the Air (Prevention and Control of Pollution) Act, 1981 on 23rd October, 2017 thereby directing the Respondent No.1 industry to engage NEERI, Nagpur for assessment of soil and groundwater pollution due to percolation of wastewater from the units within periphery of 2km radius, and three (3) months' time is required for getting the Report of NEERI along with recommendations for improvement in process, ETP performance and remediation as well as suitable technology to be adopted for</p>

Item No 7
December 8,
2017

remediation of soil and groundwater pollution. Report of NEERI is yet to come. We therefore cannot permit withdrawal of this Application at this stage.

List the case on 9th February, 2018.

....., JM
(Justice U.D.Salvi)

....., EM
(Dr. Nagin Nanda)

hkk



Shankar

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Assessment of Soil and Groundwater Pollution in and around Benzochem Industry

(Daraskhed, Buldhana, Maharashtra)



CSIR-National Environmental Engineering Research Institute



June 2019



Project Personnel

Project Team

Dr. Rita Dhodapkar

Mr. Jaydip Dey

Ms. Vijaya Upadhaya

Ms. Sonal

Ms. Saisaurabh Asoria

Principal Investigators

Dr. Ritesh Vijay

Er. Hemant Bherwani

Project Coordinator

Dr. Rakesh Kumar
Director, CSIR - NEERI

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Chapter 1 – INTRODUCTION

1.1. Background and Introduction

Established in 1986, Benzochem Industries is a privately owned firm by Mohatta Group. The company manufactures wide range of chemicals including Chlorophenol derivatives, Diclofenac Sodium and Miconazole Nitrate intermediates, Benzophenones, Acetophenones, Anisole and Phenetole derivatives. With time, the company diversified its production expertise and started producing derivatives based on Para Chloro Toluene, 2, 4-Dichloro Toluene, Meta Chloro Toluene, Ortho Chloro Toluene, 3, 4-Dichloro Toluene and specialty products like 2,4 Di Chloro Phenyl Acetyl Chloride, Para Chloro Benzyl Chloride, 2-Coumaranone, 3-isocoumaranone etc.

With respect to the project “Assessment of soil and groundwater pollution in and around Benzochem Industries, Dasarkhed, Malkapur, Dist. Buldhana” awarded to CSIR-NEERI by Benzochem Industries, Dasarkhed, CSIR-NEERI organized an initial scoping visit to the industry, Maharashtra Industrial Development Corporation (MIDC) area of Malkapur and nearby locations in order to understand the details of the plant under consideration and the nearby area in which sampling is to be carried out. The main objectives of the project are as follows:

- To conduct an audit of the manufacturing process and material balance.
- To evaluate technical adequacy of the ETP and ZLD plant.
- To collect and preserve the groundwater and soil samples (around 25-30 samples in total for 2 km radius) from identified locations using standard methods.
- To analyse groundwater and soil sample for physio-chemical and heavy metals parameters with respect to manufacturing processes.
- To assess the impact of industrial activity on the soil and groundwater.

- To prepare final report of findings with spatial and statistical analysis.

1.2. Details of Initial Site Visit:

In order to get started on the project and plan out the steps, CSIR-NEERI team had a detailed discussion with team of Benzochem Industries during their initial visit on 8th and 9th of February 2018, on their manufacturing process being followed at the plant and the types of chemicals being manufactured. CSIR-NEERI team visited both new and old plants located in the MIDC Malkapur area and saw the operation of manufacturing and Effluent Treatment Plant (ETP) installed within the industry premises. Further the operation of Multi Effect Evaporator (MEE) was also seen which helps Benzochem maintain their Zero Liquid Discharge operation. Data requirements, in order to fulfil the objectives were also discussed during the meeting.

The following **Figure-1** is the base map of the study region. While exploring the nearby area around the plant, CSIR-NEERI team covered the study area and identified the proposed sampling sites for collection of samples of water and soil. During this field visit, CSIR-NEERI team also interacted with the local stakeholders in order to understand their perspective of the problem.

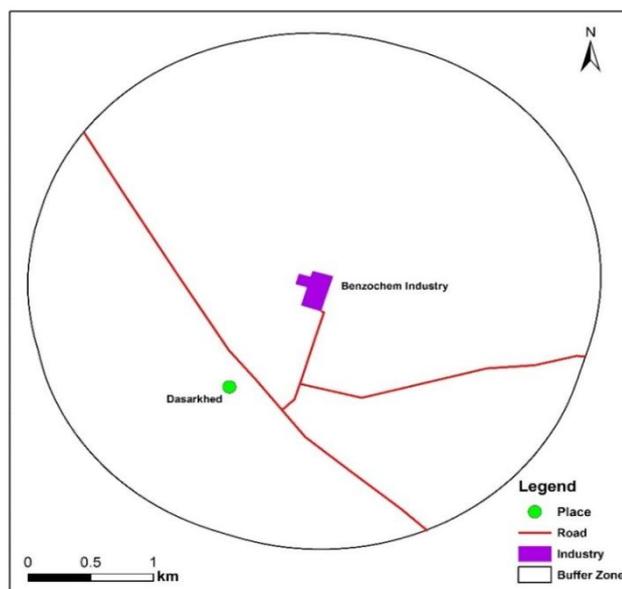


Figure 1.Base map (2km radius) of the study region around Benzochem Industries

The following data was retrieved from Benzochem during the initial visit of CSIR-NEERI team:

1. Maps of the study area including location of bore wells and wells in the study region
2. Details of Effluent Treatment Plant (ETP) and Multi Effect Evaporator (ETP) installed in the industry premises.
3. Production capacity of the plant for each of the product with corresponding load to ETP

In order to collect the primary data, sampling locations were decided and the samples were collected during 19-20 March 2018.

Chapter 2 – PLANT AUDIT AND MATERIAL BALANCE

Benzochem industries operate two units in the area of MIDC Malkapur. Operation wise both the plants are separate and produce different chemicals. The effluent treatment plant for the units are also separate. While Benzochem industries has consent to manufacture lot of chemicals but depending on the demand, there are only few chemicals produced in these Malkapur MIDC units. The following key chemicals are produced in the units:

UNIT 1:

- 2,4 Di Chloro Phenyl Acetyl Chloride
- 2, 5 Di Methyl Phenyl Acetyl Chloride(2, 5 DMPACL)
- 2, 4,6 Tri Methyl Phenyl Acetyl Chloride(2, 4,6 TMPACL)
- Para Chloro Benzyl Chloride (PCBC)
- Para Chloro Benzyl Cyanide(PCCN) (2,4 DCPACL)

UNIT 2:

- 2-Coumaranone (2C)
- Alpha Bromo-2-Chloro-Phenyl Acetic Acid Methyl Ester
- PCPAA
- 3- ISO Chromanone (3-IC)
- 2, 4, 6 Trimethyl Benzaldehyde (Mesitaldehyde) 84% In Acentone

2.1 Brief Process of Manufacturing

UNIT-1:

1. 2,4 Di Chloro Phenyl Acetyl Chloride (2,4 DCPACI):

The raw materials used in the process of manufacturing of 2,4 Di Chloro Phenyl Acetyl Chloride are 2, 4 Dichloro Benzyl Chloride (2, 4- DCBC); Sodium Cyanide (NaCN); TEA; PEG-400; TEBAC; Caustic Soda Lye/Flakes; HCl; Thionyl Chloride; DMF; Toluene. The first step towards manufacturing is Cynation which is Charge 2:4 DCBC & TEA, PEG-400 & TEBAC Solution, applied heating & do NaCN solution addition slowly to get Cr.2, 4-DCCN, followed by distillation, hydrolysis, centrifugation of filtered 2,4 DCPAA, chlorination using thionyl chloride and lastly distillation to produce pure 2,4, DCPACI.

On an average 385 Kgs per day of 2, 4 DCPACI was produced by the unit last year. Through mass balance, an effluent of 803 Kgs per ton of product was also produced during the manufacturing.

The total production by the unit for each chemical and corresponding effluent generation is given in the table below:

2. 2, 5-Dimethyl Phenyl Acetyl Chloride (2,5 DMPACI):

The raw materials used in the process of manufacturing of 2, 5-Dimethyl Phenyl Acetyl Chloride are Para Xylene, PF, HCl, TEAB, PEG-400, K₂ CO₃, Soda Ash, Sodium Cyanide, TEA, PEG-400, Soda Ash, Toluene, Caustic Soda Lye/Flakes, HCL, Thionyl Chloride. The first step towards manufacturing is Chlorination; which is charging of Para Xylene and addition of TEAB, PEG-400 & HCL. The reaction mass is heated to desired temperature and maintained for PF addition in order to achieve the conversion. After desired conversion is achieved, separation & washing with water is carried out,

followed by distillation, cyanation, redistillation, hydrolysis and acidification. The acidification is followed with centrifugation and drying in order to distil the desired product after chlorination. Distillation is the last step of the process yielding 2, 5 DMPACL.

On an average 1019 Kgs per day of 2, 5 DMPACL was produced by this unit last year. Through mass balance, it was determined that an effluent of 3395 Kgs per day was also produced during this manufacturing.

3. 2, 4, 6-Trimethyl Phenyl Acetyl Chloride:

The raw materials used in the process of manufacturing of 2, 4, 6-Trimethyl Phenyl Acetyl Chloride are Mesitylene, PF Solution, HCl, TEAB, PEG-400, K₂CO₃, Soda Ash, Sodium Cyanide (NaCN), TBAB Solution, Toluene, Caustic Soda Lye/Flakes, HCl, Thionyl Chloride. The first step towards manufacturing is chlorination which is addition of Mesitylene, TEAB, PEG-400 & HCL into the reactor. Heating the reaction mass to desired temperature is necessary for proper reaction to take place. PF Solution addition is started after completion of reaction. After desired conversion is achieved, separation & washing with water is carried out. After washing chloro mass is distilled, followed by cyanation, distillation, hydrolysis, acidification & centrifugation, drying, again chlorination and lastly distillation to produce pure 2, 4, 6 TMPACL.

On an average 320 Kgs per day of 2, 4, 6 TMPACL was produced by the unit last year. Though mass balance, an effluent of 1280 Kgs per was also produced during the manufacturing.

4. Para Chloro Benzyl Chloride (4- ChloroBenzyle Chloride):

Para Chloro Toluene (PCT), AIBN, and Chlorine are the raw materials used in the process of manufacturing of Para Chloro Benzyl Chloride. The first step towards manufacturing is chlorination which is Charging of PCT add AIBN in the reactor with the application of heat. The developed mass of chloro product is distilled under vacuum to produce pure PCBC

While this is one of the key products of Benzochem industries, the demand has been low for the product in the market. Hence, last year this product was not manufactured.

5. Para Chloro Benzyl Cyanide"(4-Chloro Benzyl Cyanide):

The raw materials used in the process of manufacturing of Para Chloro Benzyl Cyanide are Para Chloro Toluene (PCT), AIBN, Chlorine, Sodium Cyanide, TEA, PEG-400, Soda Ash, and Toluene for aqueous layer Extraction. Initially PCT is charged in the reactor along with AIBN and heat is applied to strip Cl_2 . The process is carried out till the desired conversion is achieved. This is followed by distillation to produce pure PCCN.

On an average 130 Kgs per day of PCBC was produced by the unit last year. Through mass balance, an effluent generation of 156 Kgs per day was estimated which is to be treated by the existing effluent treatment plant within the industry premises.

The effluent generation for each chemical and the production rate is summarised in the **Table 1** for Unit-1 of Benzochem Industries.

Table 1: Average Production and Effluent generation for unit-1

Sr. No.	Name of the product	Average production per day for 2016-17 (in Kgs)	Effluent Generation per day (in Kgs)
1	2.4 Di Chloro Phenyl Acetyl Chloride (2,4 DCPACL)	385	803
2	2.4 Di Methyl Phenyl Acetyl Chloride (2,5 DCPACL)	1019	3395

3	2,4 Tri Methyl Phenyl Acetyl Chloride (2,4 DCPACL)	320	1280
4	Para Chloro Benzyl Chloride (PCBC)	0	0
5	Para Chloro Benzyl Cyanide (PCCN)	130	156
TOTAL		1854	5,634

UNIT-2:

1. 2-Coumaranone (2C):

The raw materials used in the process of manufacturing 2-COUMARANONE (2C) are Ortho chlorobenzyle cyanide (OCCN); Sodium Hydroxide lye; Copper sulphate; Hydrochloric acid and Acetic anhydride

Firstly, Hydrolysis of OCCN with lye is carried out and this sodium salt of OCPAA is transferred to autoclave, further copper sulphate NaOH lye is added in it, then the product is acidified using HCl in acidifier, the wet OHPAA cake produced is filtered. Distillation is the second last step followed by blending with acetic anhydride.

On an average, 1013 Kgs per day of 2C was produced by the unit last year. Through mass balance, an effluent of 803 Kgs per was also produced during the manufacturing.

2. 3- IsoChromanone (3-IC):

Ortho Methyl phenyl acetic acid is charged to reactor along with chloro benzene, AIBN and heated to 90-95°C and subsequently the chlorine gas is purged. After getting desired conversion chlorination is stopped and mass is

cooled, centrifuged and dried to get chloromethyl phenyl acetic acid (CMPAA). The CMPAA is further cyclised using sodium carbonate in toluene at reflux temperature to get crude 3-Iso Chromanone. Finally the pure 3 ISO Chromanone is distilled.

On an average, 334 Kgs per day of 3- ISO CHROMANONE (3-IC) was produced by the unit last year. Through mass balance, an effluent of 2799 Kgs per was also produced during the manufacturing.

3. Alpha Bromo-2-Chloro-Phenyl Acetic Acid Methyl Ester:

OCPAA is chlorinated with Thionyl chloride to make Ortho Chloro phenyl acetyl chloride. This reaction mass is then brominated in presence of MCB. After getting desired conversion, the reaction mass is cooled to room temperature and esterified with methanol. Crude mass with is washed with water & then 10% sodium thiosulphate is added. The crude mass is vaccum distilled to achieve the desired product. 2-Chloro phenyl acetic acid (OCPAA); Thionyl chloride; Chloro benzene. (MCB); Bromine; Methanol Sodium Thiosulphate (STS); Toluene are the raw materials used in the process

Similar to PCBC, this is also one of the key products of unit 2, however in the last financial year alpha bromo was not produced in the plant.

On an average, 0.5128 Kgs per day of Para Chloro Phenyl Acetic Acid (PCPAA) was produced by the unit last year. Through mass balance, an effluent of 2488 Kgs per was also produced during the manufacturing.

4. Para Chloro Phenyl Acetic Acid (PCPAA):

Distilled PCCN, Caustic lye, Toluene, Sulphuric acid are the raw materials used for manufacture of PCPAA. Crude PCCN is distilled first to achieve high purity and is further fractionate at high vacuum. This pure PCCN is hydrolysed with sodium hydroxide and acidified by sulphuric acid. Centrifuge and drying leads to production of PCPAA.

On an average, 16.77 Kgs per day of MESITALEDEHYDE was produced by the unit last year. Through mass balance, an effluent of 354 Kgs per was also produced during the manufacturing.

5. 2, 4, 6 Trimethyl Benzaldehyde (Mesitaldehyde) 84% In Acetone:

The raw materials used in the process of manufacture of Mesitaldehyde are Mesitylene, chloral, Titanium chloride ($TiCl_4$), Methanol, Sodium carbonate (Na_2CO_3), Tri ethyl benzyl ammonium chloride (TEBAC). Acetone is used to get 84% solution of mesitaldehyde. Chloral and mesitylene are reacted in presence of titanium chloride. The product obtained is isolated after quenching, the reaction mass is hydrolysed with soda ash to make product mesitaldehyde. Distilled mesitaldehyde is mixed with acetone to get 84% concentration to get the final product.

The effluent generation for each chemical and the production rate is summarised in the **Table 2** for Unit-2 of Benzochem Industries:

Table 2: Average Production and Effluent generation for unit-2

Sr. No.	Product Name	Average production per day for last 12 months (in kgs)	Effluent generation per day (Kgs)
1.	2C	1013.00	8398
2.	3IC	334	2799
3.	Mesitaldehyde	16.77	354
4.	Alpha Bromo	0 (in last year)	0
5.	PCPAA	0.5128	2488
TOTAL		1364.28	14,039

2.2. Control Systems for Air and Water Pollution:

2.2.1. Air:

There are various control systems installed in the units for the control of air pollution. Most of the pollutants are gases which cannot be released into the atmosphere hence scrubbers are installed to recover them. HCL Scrubber, Ammonia Scrubber and the Hydrobromic Acid Scrubber and installed in both the units. The schemes of all these control systems are illustrated below along with a brief description of their process.

➤ HCL Scrubber:

The scrubber can handle 500 kg HCL/hr. During chlorination, Hydrochloric acid gas is generated & this gas is scrubbed in two columns with water circulation in it. Additional third column is also installed in series with caustic solution circulation for neutralisation if necessary. Dilute Hydrochloric acid produced is sold as a by-product or used in house for acidification.

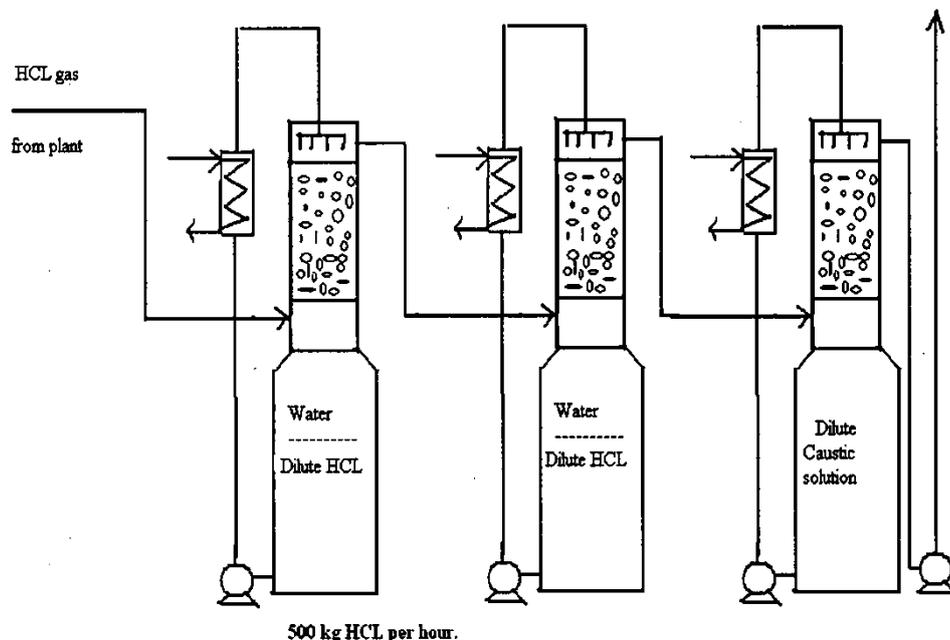


Figure 2: Scheme for the HCL Scrubber

➤ **Ammonia Scrubber:**

The capacity of this control system is 300 kg NH₃. (Volumetric flow rates 400 m³/hr). During the Hydrolyses reaction, ammonia gas is generated and ammonia is scrubbed in the scrubbing system, having total 3 scrubbing column. Ammonia gas generated in reaction is absorbed in water, which circulated through 1st column & 2nd column then blower is connected. Blower outlet is connected to 3rd column, which has circulation of dilute Sulphuric Acid. Circulation where remaining unabsorbed ammonia is neutralized and outlet is let out at height through vertical mounted probe. Ammonia solution of 20-25% is sold as by-product.

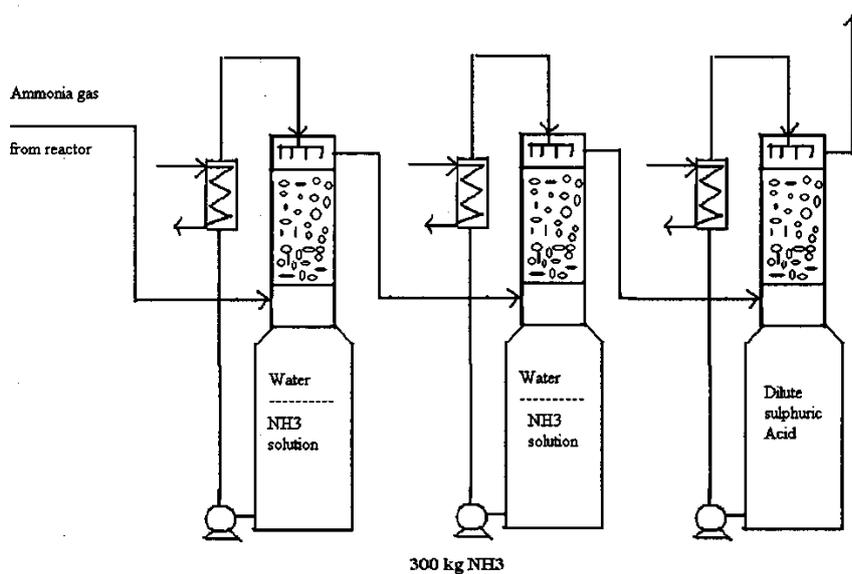


Figure 3: Scheme of Ammonia Scrubber

➤ **Hydrobromic Acid Scrubber:**

It has the same capacity as HCl Scrubber. During the bromination, Hydro bromic acid gas is generated, which is scrubbed in water to form Hydrobromic acid solution of 30-35%. Then residual gas is taken in to ejector system, where dilute caustic solution is in circulation, which forms Sodium Bromide. The system is operated under vacuum so no gas is released to air. Hydrobromic acid solution of 30-35% is sold on by-product.

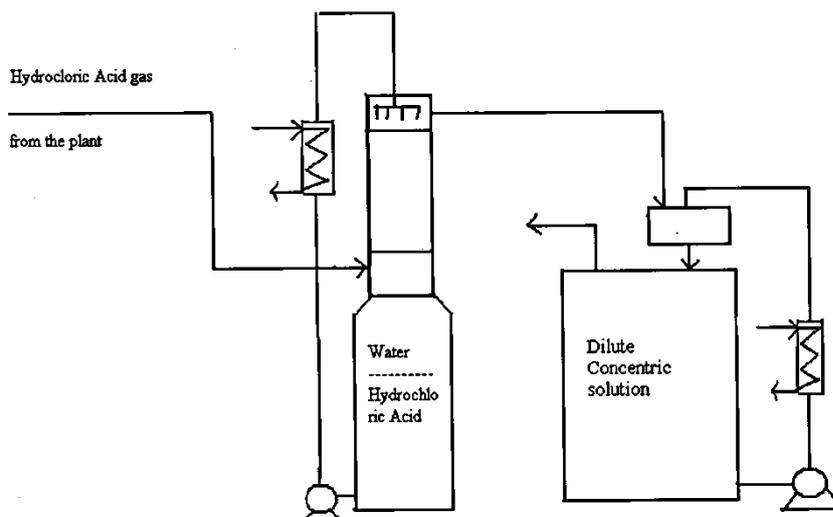


Figure 4: Scheme of Hydrobromic Acid Scrubber

Both the units are having similar units with capacities and actual load, as communicated by the industry are given in following tables.

Unit-1:

Table 3: Capacity and Actual Load of Scrubbers in unit-1

Sr. No.	Scrubber Type	Capacity	Actual Load
1	HCL Scrubber	120 kg/hr	66.33 kg/hr
2	Ammonia Scrubber	100 kg/hr	30.00 kg/hr

Unit-2:

Table 4: Capacity and Actual Load of Scrubbers in unit 2

Sr.No	Scrubber types	capacity	Actual Load
1	HCL scrubber	500 kg/hr	128.53 kg/hr
2	Ammonia Scrubber	300 kg/hr	134.65 kg/hr
3	Hydro bromic acid scrubber	500 kg/hr	55.59 kg/hr

2.2.2. Water:

The chemicals manufactured in both the units of Benzochem Industries at Malkapur are complex in nature and hence the effluent also contains lot of chemicals and is to be treated meticulously in order to not to pollute the surrounding water bodies or land. Both the units have separate effluent treatment plant along with multi effect evaporator which helps them maintain a zero liquid discharge policy. The schematics of effluent treatment plants of both units are given in the following **figures 5-7**.

Each of the ETP contains a collection tank to collect and equalise the influent from various production units. The collection tank is followed by neutralisation tank in which lime/caustic is added as per the requirement. Further the water from neutralisation tank is taken to clarifier and further to primary effluent settling tank. Aeration is carried out after settling and followed by secondary clarifier and settling. The water from secondary settling tank is taken to pressure filters and activated carbon filters. Finally the filtered effluent is taken to Multi Effect Evaporator so that there is absolutely not liquid discharge. The salts produced from MEE are sold as by products. The sludge from the clarifiers and settlers are taken to drying beds and sent to hazardous waste facility.

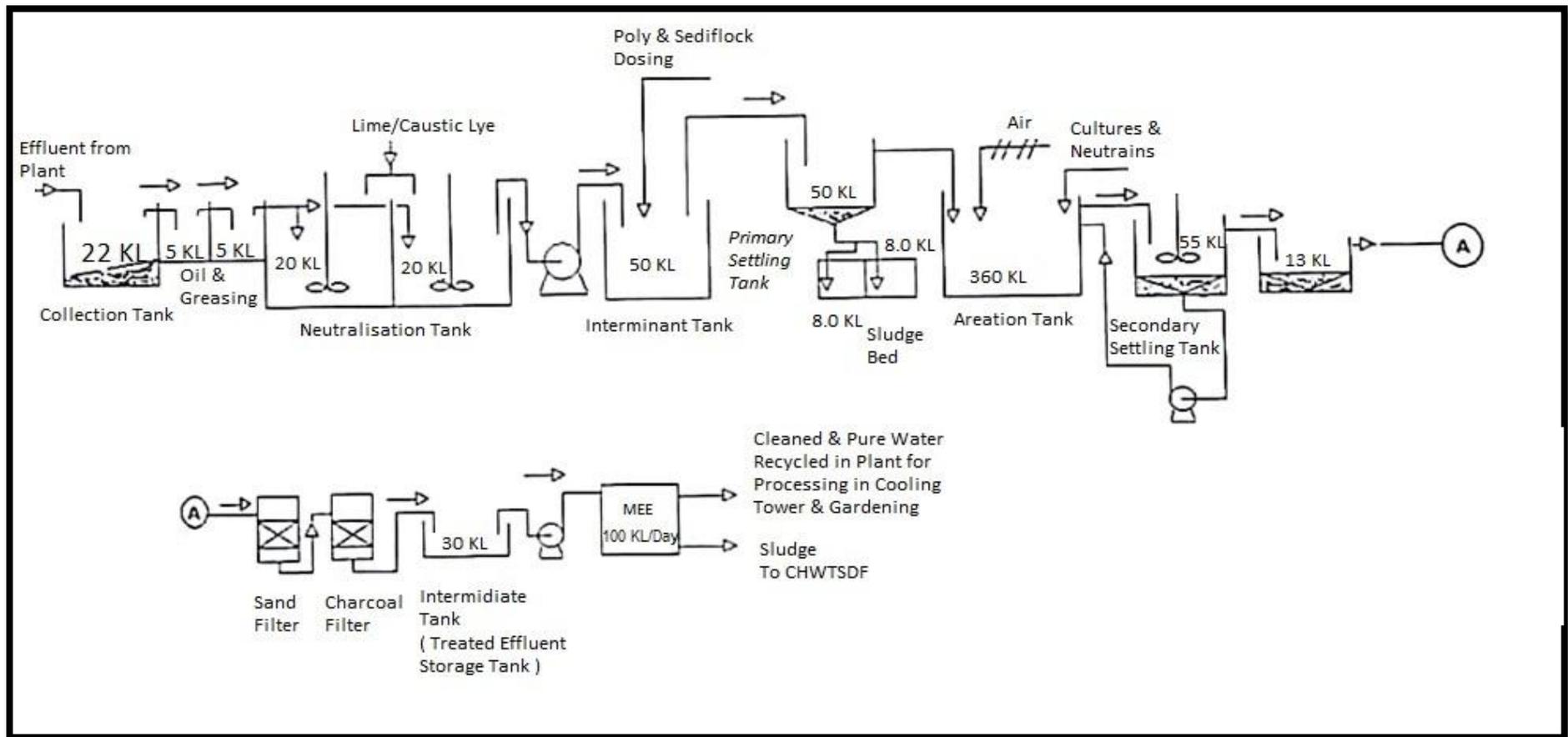


Figure 5: Effluent Treatment Plant of UNIT-1 along with MEE

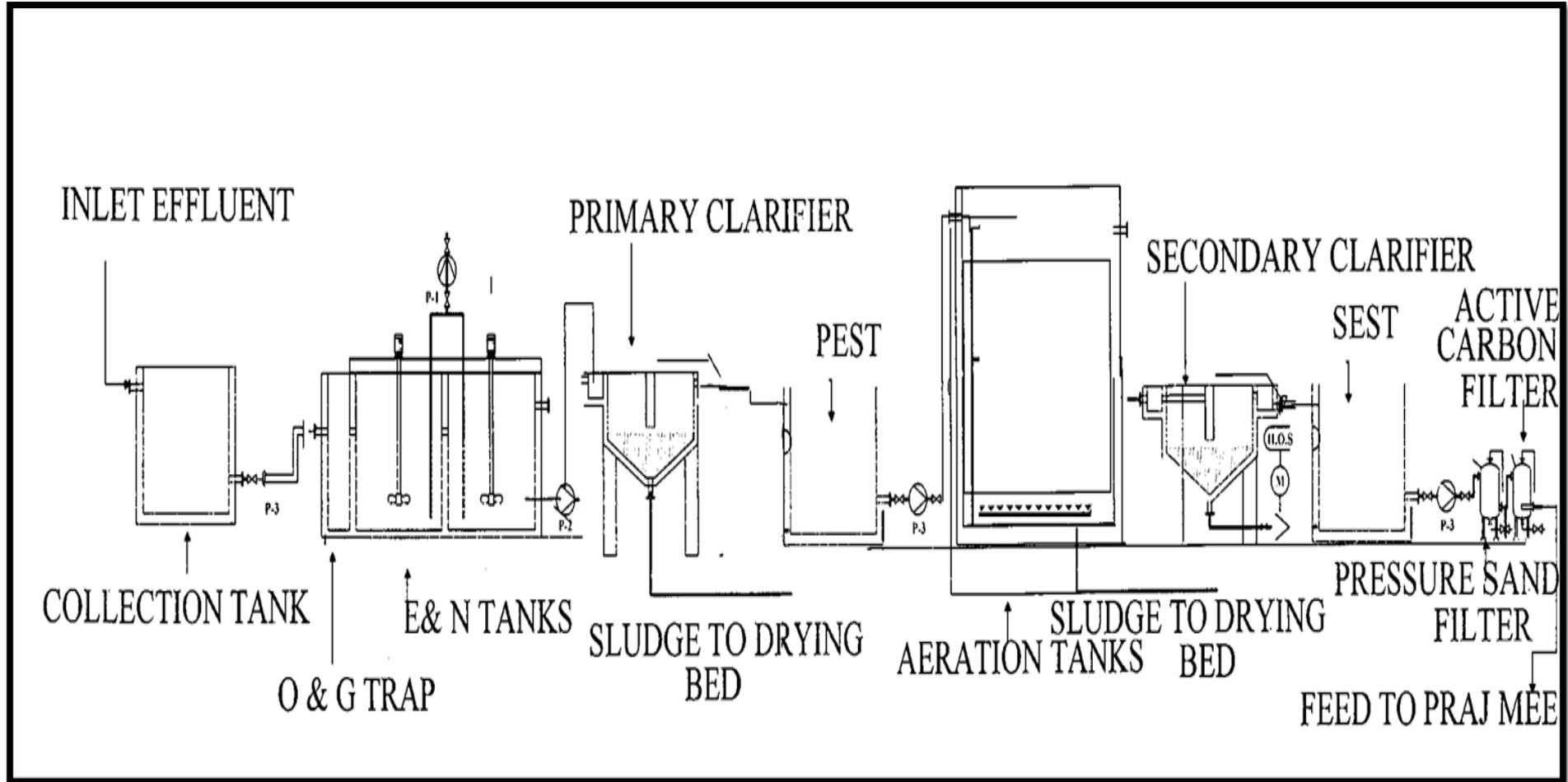


Figure 6: Effluent Treatment Plant of UNIT-2

(Followed by Multi Effect Evaporator (MEE))

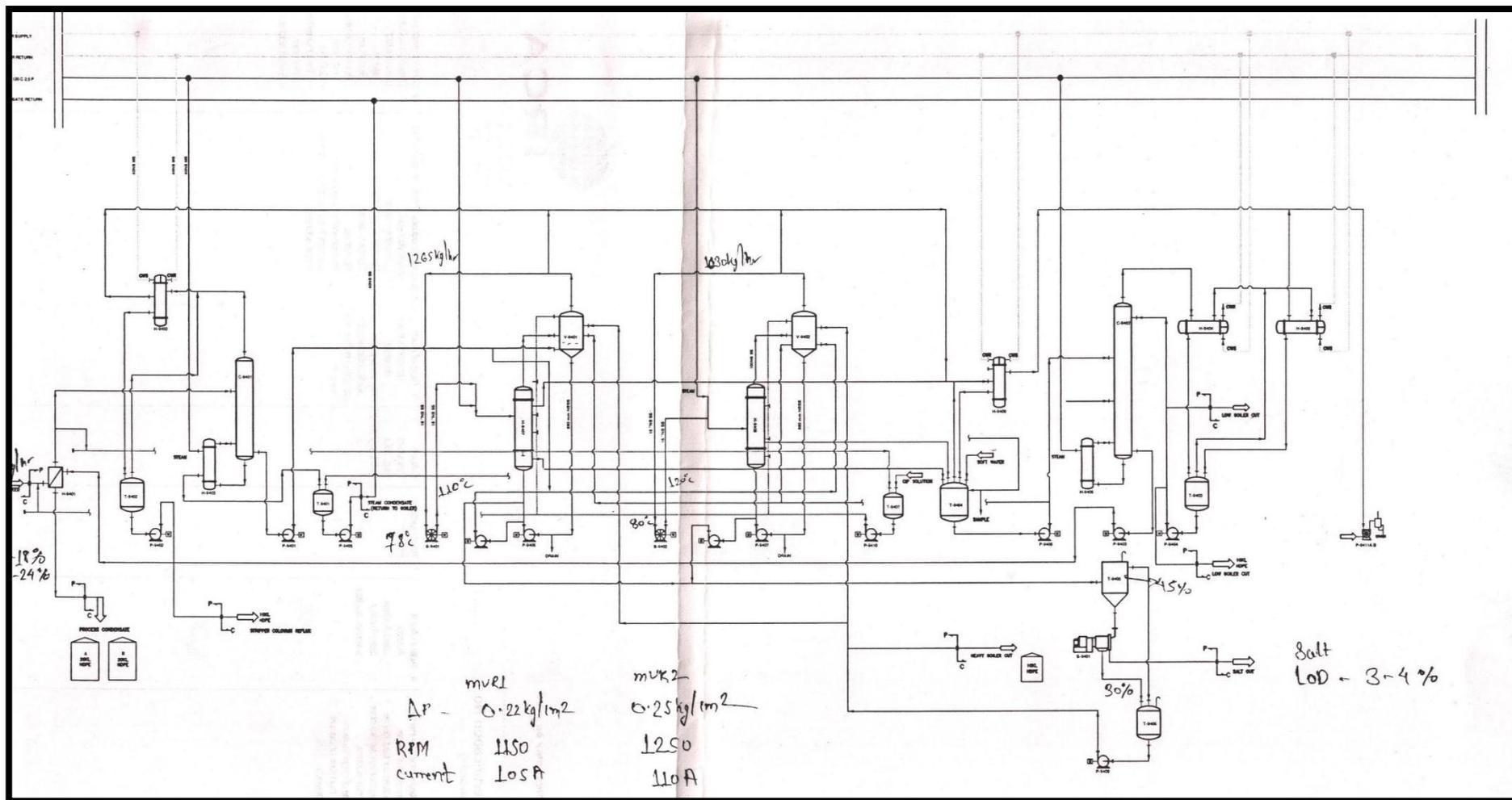


Figure 7: Multi Effect Evaporator

ETP of Unit 1 has a capacity of handling 100 m³/day while of unit 2 has a higher capacity of 120 m³ /day. Unit 1 on an average have produced 5,634 KGs of effluent per day. Even if we assume a wider density range of 800 to 1200, the effluent rate is about 5 to 7 m³/day. The unit 1 ETP has more than sufficient capacity for treatment of wastewater.

Similarly, Unit-2 produces an effluent of 14,039 Kgs per day. Using similar density range, the effluent rate is about 12 to 18 m³/day; the ETP has sufficient capacity to treat the load.

The actual inlet of ETPs of Unit-1 and 2 along with their output is given in the following tables. This is as per the information received from the industry.

Unit-1:

Table 5: Inlet and Outlet Parameters of ETP at unit-1

Sr. No.	Parameter	ETP Inlet	Treated Effluent(MEE Outlet)
1	pH	1 to 5	7 to 8
2	SS	50 to 200	5 to 60
3	BOD	1000 to 1200	5 to 25
4	COD	20000 to 30000	150 to 200
5	Oil & Grease	4 to 25	< 1 to BDL
6	TDS	25000 to 35000	800 to 1600
7	Chloride	11000 to 18000	200 to 500
8	Sulphate	7000 to 10000	80 to 350
9	Cyanide	< 0.001 to BDL	< 0.001 to BDL
Note: All parameter are in PPM except pH			

Unit-2:**Table 6: Inlet and Outlet Parameters of ETP at unit-2**

Sr. No	Parameter	ETP Inlet	Treated Effluent (MEE outlet)
1	pH	2 to 3	7.5 to 8.7
2	SS	70 to 110	10 to 45
3	BOD	320 to 3500	10 to 40
4	COD	25000 to 30000	70 to 230
5	Oil & Grease	2.3 to 25	< 1 to Nil
6	TDS	18000 to 52000	180 to 600
7	Chloride	1700 to 8500	110 to 500
8	Sulphate	1500 to 8000	150 to 420
9	Cyanide	< 0.001 to BDL	< 0.001 to BDL
Note: All parameter in PPM except pH			

Chapter 3 – DATA COLLECTION AND ANALYSIS

3.1. Data Collection:

Sampling locations were decided based on various factors like buffer zones of 500 m and 2 km, accessibility, drainage of the region etc. The study of water and soil environment was conducted by CSIR-NEERI officials at 19-21 March, 2018. The ground water samples were collected from open dug well bore well and hand pump during the field visit, preserved and brought to lab for analysis. The onsite parameters like pH, Dissolved Oxygen, Temperature, Total Dissolved solids were measured and recorded. The following **Figure 8 and 9** indicates the sampling locations of water and soil respectively, in the 500m and 2 km buffer. The details of the sampling locations are given in the **Table7 and 8**. Data collection by team of CSIR-NEERI along with local and company representatives are shown in photographs.

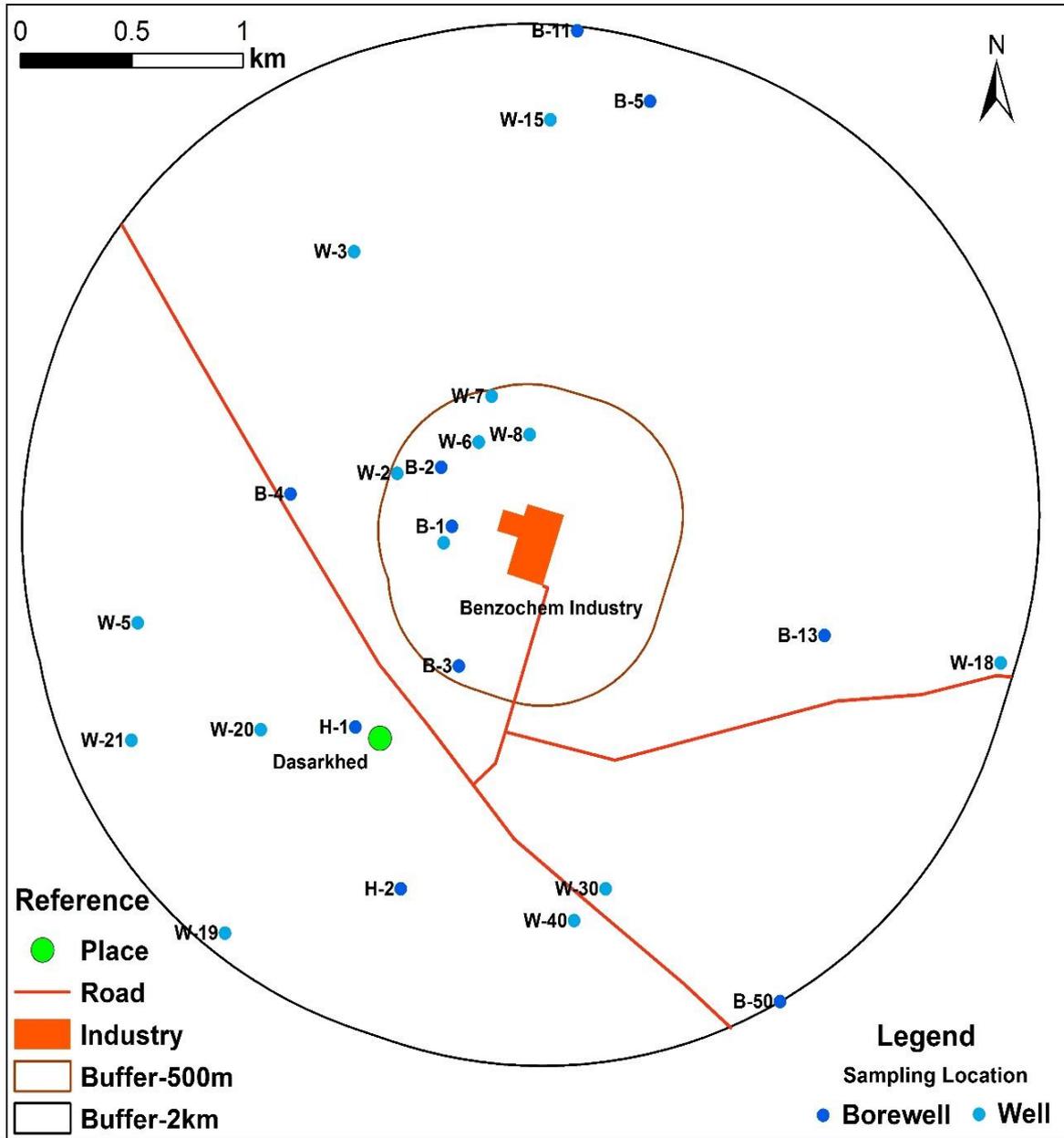


Figure 8: Water Sampling Locations in 500m and 2 km Buffer

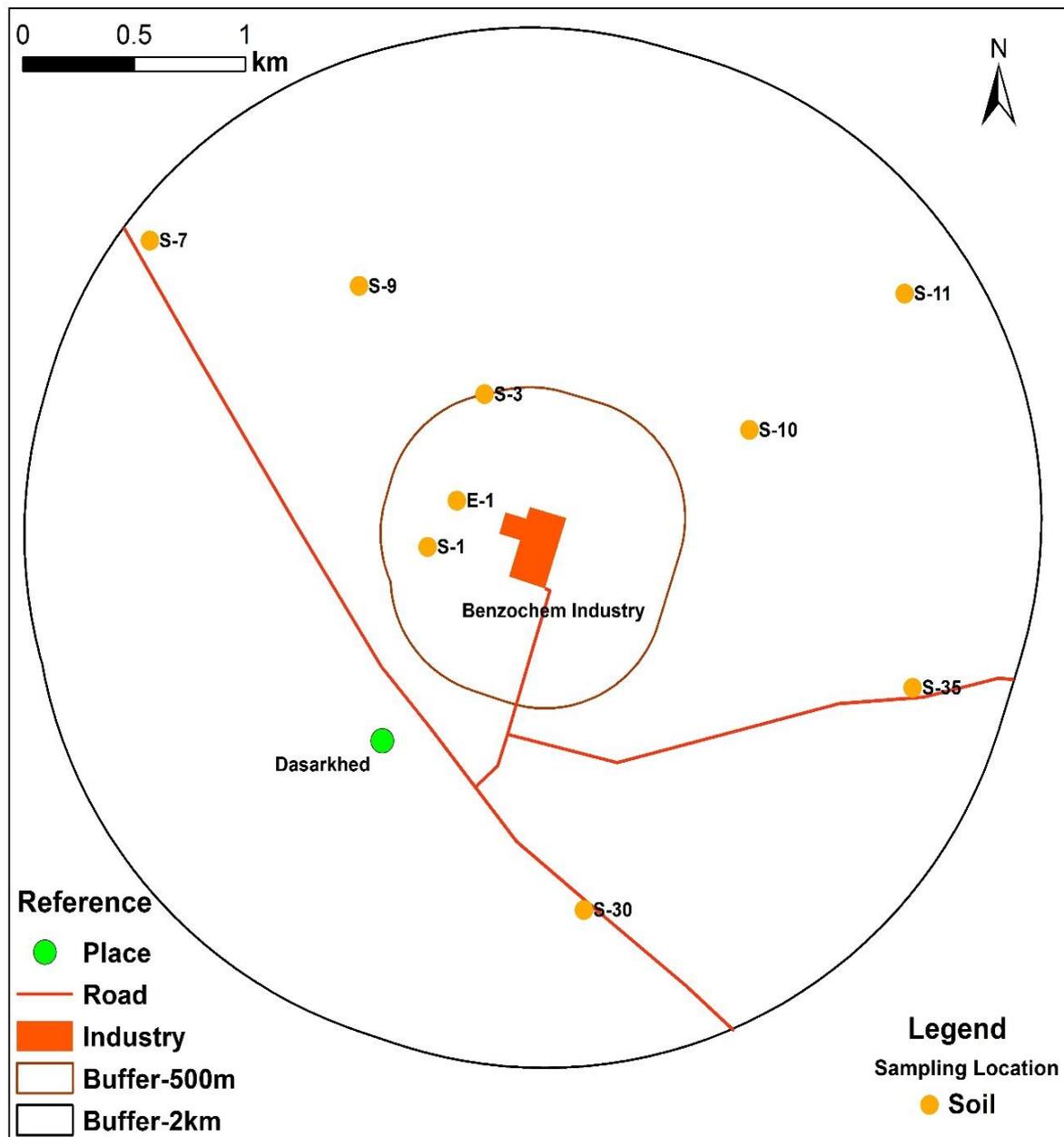


Figure 9: Soil Sampling Locations in 500m and 2 km Buffer

Table 7: Soil Sampling Locations

Sample ID	Latitude	Longitude
S-3	20° 58' 41.944" N	76° 11' 10.790" E
S-1	20° 59' 29.976" N	76° 11' 33.659" E
S-35	20° 58' 2.136" N	76° 12' 13.172" E
S-30	20° 57' 31.993" N	76° 11' 25.246" E
S-7	20° 59' 2.792" N	76° 10' 21.985" E
S-9	20° 58' 56.624" N	76° 10' 52.480" E
S-10	20° 58' 37.093" N	76° 11' 49.358" E
S-11	20° 58' 55.596" N	76° 12' 11.973" E

Table8:Bore well and Well Sampling Locations

Sample ID	Latitude	Longitude	Depth Well
B-1	20° 58' 23.617" N	76° 11' 6.356" E	850
B-11	20° 59' 30.743" N	76° 11' 24.612" E	0
B-13	20° 58' 8.868" N	76° 12' 0.648" E	900
B-2	20° 58' 31.627" N	76° 11' 4.783" E	575
B-3	20° 58' 4.731" N	76° 11' 7.345" E	200
B-4	20° 58' 28.031" N	76° 10' 42.809" E	900
B-5	20° 59' 21.199" N	76° 11' 35.214" E	700
B-50	20° 57' 19.313" N	76° 11' 54.150" E	0
E-1	20° 58' 27.565" N	76° 11' 6.715" E	0
H-1	20° 57' 56.444" N	76° 10' 52.309" E	0
H-2	20° 57' 34.574" N	76° 10' 58.904" E	230
W-1	20° 58' 21.418" N	76° 11' 5.136" E	50
W-15	20° 59' 18.679" N	76° 11' 20.713" E	100
W-18	20° 58' 5.138" N	76° 12' 26.302" E	110
W-19	20° 57' 28.580" N	76° 10' 33.281" E	70
W-2	20° 58' 30.835" N	76° 10' 58.379" E	0
W-20	20° 57' 56.110" N	76° 10' 38.500" E	115
W-21	20° 57' 54.680" N	76° 10' 19.657" E	80
W-3	20° 59' 0.833" N	76° 10' 52.096" E	100
W-30	20° 57' 34.574" N	76° 11' 28.734" E	150
W-40	20° 57' 30.262" N	76° 11' 24.148" E	100
W-5	20° 58' 10.574" N	76° 10' 20.564" E	100
W-6	20° 58' 35.062" N	76° 11' 10.248" E	0
W-7	20° 58' 41.271" N	76° 11' 12.140" E	0
W-8	20° 58' 36.052" N	76° 11' 17.693" E	0

Pictures showing Sample Collection and On-site Measurement:



Dug well from which the Sample was taken



Borewell Sampling



Onsite TDS, pH measurement

Soil Sampling



Sampling at Quarry Pit excavated area

Further, Advanced Spaceborne Thermal Emission and Reflection Radiometer Digital Elevation Model (ASTER DEM) having 30m spatial resolution was used to see the elevation of the study area and the DEM was downloaded from [usgs.gov/earth explorer](https://www.usgs.gov/earth-explorer). Elevation range of the study area is varying from 136 to 215 metre from the mean sea level. DEM was further used for stream ordering using ArcMap 10.5 software. The study area obtained 1st to 3rd order of drainages and most of the drainages are flowing in north-west direction towards Purna River and some are flowing in east direction. Drainage and DEM is shown in **Figure 10**.

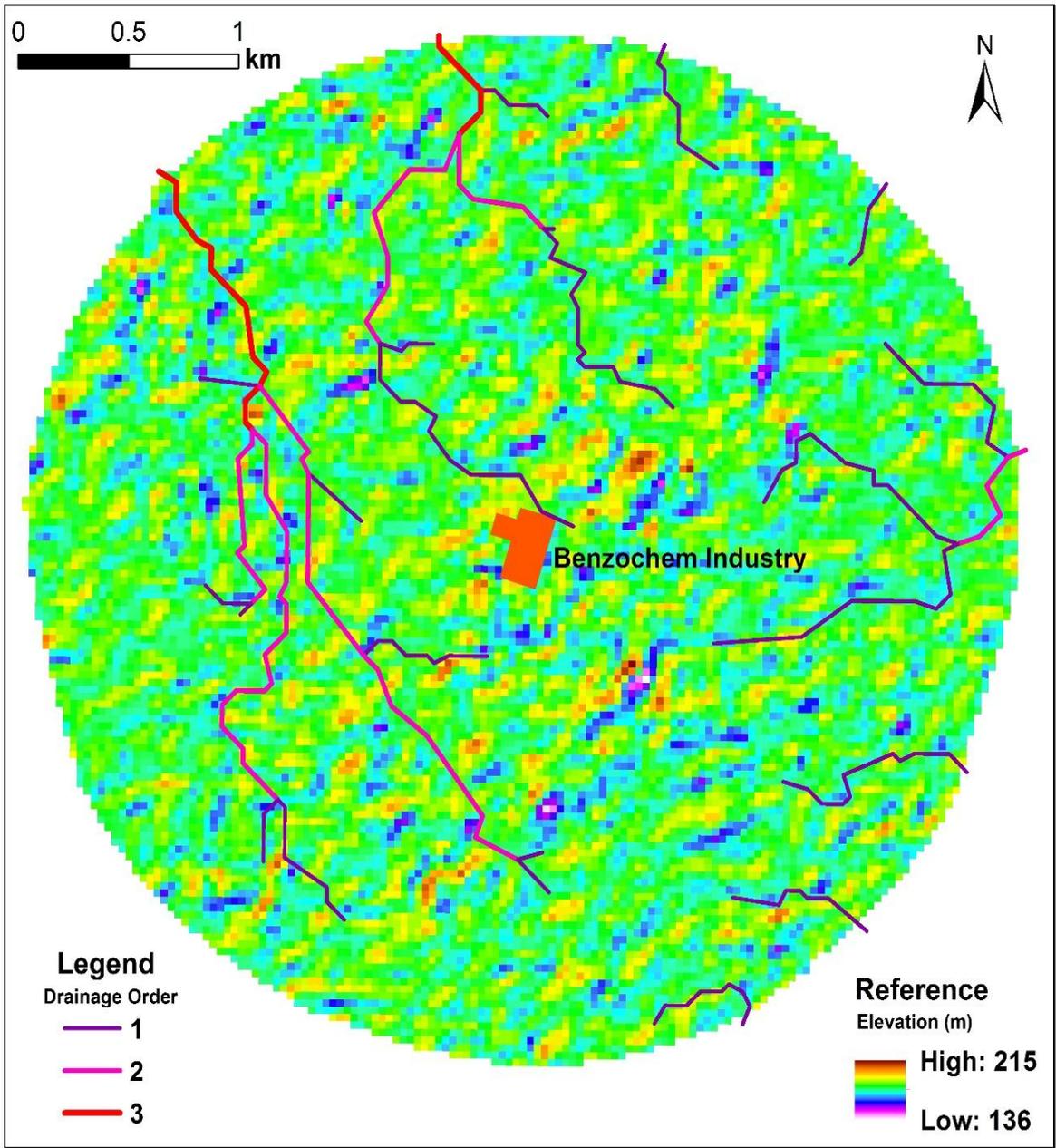


Figure 10: Drainage and DEM of the 2km Buffer

3.2. Sample Preparation:

The water samples were extracted with Dichloromethane by the conventional liquid- liquid extraction method. The samples were first filtered with Whatman paper No.42 to remove the suspended solids. The compounds to be detected were all soluble in DCM, hexane, toluene and acetone. One litre of the filtered sample was taken in a separating funnel and extracted with 20 ml aliquots of DCM threetimes. The organic layer was allowed to separate for 10 minutes and passed through anhydrous sodium sulphate to remove any moisture from DCM. The organic solvent was concentrated using a rotary evaporator to dryness and then reconstituted with 1-2ml DCM. The reconstituted volume was again passed through anhydrous sodium sulphate as a precaution to remove any trace of moisture and transferred into vials for GC-MS/MS analysis.

The soil sample was prepared for GC-MS analysis by performing the soxhlet extraction. 10g of sieved (10 mm ASTM) soil and 10g Sodium sulphate were kept in a extraction thimble (Whatman 28mmx100mm , single thickness, cellulose) and soxhlet extraction was performed with dichloromethane at 40°C. The extraction was done for 20 cycles and extract was evaporated in rotary evaporator to dryness. The extract was reconstituted with 5 mL DCM and analysed by GC-MS.

All standards of the major Chemicals used for the production were obtained from Benzochem Industries along with the finished products with 99% purity (**Table 9**). The standards were prepared in the concentration range 0.1-5 mg/L. The analysis was done using GC-MS/MS

Table 9: Major Raw Materials and finished products

<i>Finished Products</i>	<i>Raw Materials</i>
2-Coumaranone	Ortho chloro benzyl cyanide (OCBC)
3-Coumaranone	O-Methyl Phenyl Acetic Acid (OMPAA)
Alpha Bromo Ortho Chloro Phenyl Acetic Acid Methyl Ester(OCPM)	O-Chloro Phenyl Acetic Acid (OCPAA)
Para Chloro Phenyl Acetic Acid (PCPAA)	Para chloro benzyl cyanide
Mesitaldehyde	Mesitylene

3.3. GC-MS/MS Analysis:

The GC-MS analysis was carried out on a MS MODEL- CLARUS 600 C mass spectrometer and Turbo mass Software equipped with a GC CLARUS 680. The Method used was as given below:

Column- Capillary DB-5, Detector- MS

Scan time- 40-350 min, EI +Total Run time- 55min

Oven temperature program:

Initial temp - 50°C for 20 minutes.

Ramp 1- 10°C/min to 80°C, hold for 8 min.

Ramp 2- 5°C/min to 100°C, hold for 5 min.

Ramp 3- 10°C/min to 280°C, hold for 10 min.

3.4. Water Quality Analysis:

The analysis for various physicochemical parameters of the samples was carried out as per Standard Methods for Examination of Water & Wastewater, 2017, 23rd edition.

The open dug well water quality is presented in **Tables 10-12**. It was observed that samples W1, W2, W6, W7 and W8 have high Total Dissolved Solids, Total Hardness, Calcium, Magnesium and Chlorides. According to the CPCB water quality for irrigation purposes. In general, all the samples were within 500m of the industry as seen in **Figure 11**. The sample W6 and W8 have pH in acidic range of 6.3 and 6.1, respectively and W3 sample had an alkaline pH of 8.9 which is beyond the permissible limits for irrigation purposes. The samples W1, 2, 3, 5, 7, 8, 15, 18, 19, 21 have conductivity beyond 2250 $\mu\text{S}/\text{cm}$, which is Water Quality Criteria for designated best use in irrigation purposes. The sample from W1 which falls behind the Benzochem and adjacent paper mill industry is a very old well (1952) but not in use since 1994 has 5300mg/L Total Dissolved solids (TDS), very high suspended solids (1710 mg/L) and Chloride concentration of 2447 mg/L indicating saline water. The samples from W6, W7 and W8 had TDS of 7700, 9100 and 25700 mg/L and have not been in use for the past five years. The other well samples, W6, 20, 30 and 40 between 500m and 2 km radius had Total Dissolved solids in the range 608 -1800 mg/L.

Table 10 gives the organic and nutrient parameter characteristics of well waters. The COD value of sample within the 500m boundary varied between 39 -313 mg/L. Extremely high value of 4152 mg/L in terms of Chemical Oxygen Demand (COD) was observed in W8 sample, which also falls within 500m radius of the industry indicating contamination of well from outside sources.

11 metals were analysed for the well waters using ICP-OES. Samples were filtered and preserved with nitric acid as per procedure before analysis. They were in the range 0.685 -15.914 mg/L in the samples within 500m of the industry. The water quality criteria for Boron is 2mg/l for irrigation purposes and all samples meet within this criteria.

The water quality of bore well and hand pump is given in **Tables 12-14**. The bore well and hand pump water are used for drinking and irrigation purposes. The pH of all samples is within range; however, the TDS is higher than permissible limits for sample B1 and B3. The water of B1, 2, 3, 11 and H1 are hard water with total

hardness above 600 mg/L permissible limit according to prescribed limits for drinking water. The nitrate levels of both the hand pumps are beyond permissible limits of 45 mg/L. B1 sample has more than acceptable limits for Total Chromium, Iron and lead. All samples except B11 and H2 are showing iron concentrations above acceptable limit for drinking water of 0.3 mg/L. Lead contamination in water is also seen for B2 and 3, whereas Nickel is seen above permissible limit for B3, 4, 11, 50 and both the hand pumps.

Table 16 gives the list of fine chemicals which were analysed for the water samples along with the retention time and m/z ratios in GC-MS/MS spectra. The first m/z fragment gives the molecular ion at m/z with other m/z fragments. The raw materials used and the finished products both could be identified by GC-MS/MS and the spectra is presented in Annexure-I. The compounds are further confirmed through already loaded NIST Library in MS records.

The results obtained for water samples for the presence of fine chemicals are given in **Table 17**. It is observed that all open dug well W1, W7 and W8 samples falling within the 500m radius are contaminated. Mesityl aldehyde chemical was observed in the concentration range 0.00021-0.0013mg/L. 2 Coumarone was detected in W1, 7 and 8 samples. O-Chloro benzyl cyanide was detected in samples W7 and W8. O Methyl Phenyl acetic acid and para Chloro Phenyl acetic acid were found present in W8 sample (See Annexure I). It may be noted that the chemical oxygen demand of the dug well samples within 500m radius except W2 are in the range 296-4152 mg/L, indicating high amount of organic in well waters.

Table 18 presents the water quality of Bore well and hand pump sample with respect to fine chemicals. It is observed that fine chemicals were not detected in these waters in all the locations.

3.5. Soil quality:

Soil samples were collected from 15cm and 30cm depth for characterization from sampling points located in all directions from the industry keeping topography of

the land as reference. Standard Operating Procedures for soil analysis, as laid down by CSIR-NEERI (NABL accredited), was performed.

The general soil characteristics are presented in **Table 19**. Soil pH or soil reaction is an indication of the acidity or alkalinity of soil and is measured in pH units. Soil pH is defined as the negative logarithm of the hydrogen ion concentration. The pH scale goes from 0 to 14 with pH 7 as the neutral point. As the amount of hydrogen ions in the soil increases, then the soil pH decreases thus becoming more acidic. From pH 7 to 0 the soil is increasingly more acidic and from pH 7 to 14 the soil is increasingly more alkaline or basic. It is observed that the soil in the study area is slightly alkaline to moderately alkaline. The effect of soil pH is great on the solubility of minerals or nutrients. Fourteen of the seventeen essential plant nutrients are obtained from the soil. Before a nutrient can be used by plants it must be dissolved in the soil solution. Most minerals and nutrients are more soluble or available in acid soils than in neutral or slightly alkaline soils.

Phosphorus is never readily soluble in the soil but is most available in soil with a pH range centered around 6.5. Extremely and strongly acid soils (pH 4.0-5.0) can have high concentrations of soluble aluminium, iron and manganese which may be toxic to the growth of some plants. A pH range of approximately 6 to 7 promotes the most ready availability of plant nutrients. The soil has a slightly alkaline to moderately alkaline pH; hence Phosphorus is unlikely to be available to plants as nutrients. Total Phosphate concentrations were found to be in the range 0.78-27.3 kg/ha as P.

Soil electrical conductivity (EC) is a measurement that correlates with soil properties that affect crop productivity, including soil texture, cation exchange capacity (CEC), drainage conditions, organic matter level, salinity, and subsoil characteristics. Electrical conductivity (EC) is the most common measure of soil salinity and is indicative of the ability of an aqueous solution to carry an electric current. Plants are detrimentally affected, both physically and chemically, by excess salts in some soils and by high levels of exchangeable sodium in others.

The electrical conductivity of soils varies depending on the amount of moisture held by soil particles. Sands have a low conductivity, silts have a medium conductivity, and clays have a high conductivity. Consequently, EC correlates strongly to soil particle size and texture. The soils in the periphery of the industry are in the range w.r.t Conductivity measurements.

Potassium (K) is an essential nutrient for plant growth. It's classified as a macronutrient because plants take up large quantities of K during their life cycle. Potassium is associated with the movement of water, nutrients and carbohydrates in plant tissue. It's involved with enzyme activation within the plant, which affects protein, starch and adenosine triphosphate (ATP) production. The production of ATP can regulate the rate of photosynthesis.

Potassium also helps regulate the opening and closing of the stomata, which regulates the exchange of water vapour, oxygen and carbon dioxide. If K is deficient or not supplied in adequate amounts, it stunts plant growth and reduces yield. The available Potassium in the soil up to 15 cm and 30 cm depth, within 500m radius, were in the concentration range 139-796 kg/ha and 155-670 kg/ha, respectively. Soil samples up to 15 cm and 30 cm depth, within the 2km periphery had 351-998 kg/ha and 321-755 kg/ha.

Available nitrogen reflects the release of mineral nitrogen from organic matter by soil microorganisms. It is measured in milligrams of nitrogen per kilogram of soil (mg/kg) and is also known as potentially mineralizable nitrogen. Values of soil nitrogen supply can be classed into one of five descriptive categories from "Very Low" to "Very High". The higher the value for soil nitrogen supply the more likely it is that the microorganisms in a soil will convert more organic nitrogen into mineral nitrogen for plant uptake.

However, in coarse textured soils with higher values of soil nitrogen supply, it is also more likely that nitrate will be leached down the soil profile out of reach of plant roots and possibly into waterways. Intermediate levels of soil nitrogen supply provide a balance between maximizing nitrogen availability for plant

uptake and minimizing the risk of nitrate leaching. The samples from all locations in the study area were found to have very low (< 140 kg/ha) to low category (140-280 kg/ha) available nitrogen in the soil. The sample from location S11 was found to have medium quality soil with respect to available nitrogen.

The metals in the soil sample were analysed after digestion with concentrated nitric acid and the results are given in **Table 20**. It is observed that the metals concentrations in all soil samples were in the range commonly found in soil. The soil samples up to 30 cm did not show any presence of the fine chemicals studied **Table 15**.

The soil sample from Quarry pit was also analysed and the results are presented in **Table 21**. The pH was found to be 7.5 i.e. moderately alkaline with low conductivity (0.082 dS/m). The available nitrogen and Potassium were 906 and 130 kg/ha, respectively. No significant concentrations of metals were found in the sample (**Table 22**).

The sample showed presence of mestiladehydewhen the soxhlet extract was subjected to GC –MS/MS analysis (Table 23).All chromatograms of standards and samples are presented in **Annexure I**.

Table 10: Water Quality of open Dug Wells: Physico-Chemical parameters

Sr. No.	Sample	pH	DO	Temp °C	Alkalinity	Cond $\mu\text{S/cm}$	TSS	TDS	Total Hardness CaCO_3	Ca	Mg	Chloride	Na	K	SAR
CPCB Water Quality Criteria for irrigation		6.5-8.5	-		-	2250	-	-	-	-	-	-	-	-	26
1	W1	6.6	4.2	20.3	160	<u>7600</u>	1710	5300	4220	808	528	2447	1700	28	11.4
2	W2	7.5	3.0	18.8	60	<u>6900</u>	22	4800	2000	336	278.4	1552	630	10	6.1
3	W3	<u>8.9</u>	1.3	18.2	164	<u>1840</u>	462	1300	590	60	105.6	208	420	1	7.5
4	W5	7.5	4.8	22.6	112	<u>1980</u>	6	1300	720	112	105.6	416	34	0.4	0.2
5	W6	<u>6.3</u>	1.3	21	148	1140	94	7700	9120	1680	1180.8	4140	900	0.6	3.7
6	W7	6.5	2.5	22	148	<u>12900</u>	6	9100	8900	880	1608	5705	1020	0.6	5.1
7	W8	<u>6.1</u>	0.2	20.8	220	<u>36300</u>	156	25700	16280	4320	1315	9971	2640	1.0	10.9
8	W15	7.5	4.2	24	72	2200	10	1500	480	80	67.2	575	12	0.2	0.2
9	W18	7.9	5.2	23	80	1800	24	1300	500	104	57.6	370	10	0.2	0.2
10	W19	8.5	5.9	20	20	<u>2300</u>	6	1600	450	116	38.4	884	66	0.4	1.4
11	W20	8.2	5.4	21.2	80	1980	10	1300	1000	59.2	204	668	13	0.2	0.2
12	W21	7.7	4.0	21	72	<u>2600</u>	8	1800	740	112	110.4	925	36	0.4	0.6
13	W30	7.7	3.8	23.5	100	870	6	608	360	72	43.2	109	110	0.4	2.5
14	W40	7.9	0.9	21	88	1000	8	716	380	67.2	51	92	111	3.2	2.5

*Units are mg/l except for pH, temperature, SAR (sodium absorption ratio) and conductivity.

Table 11: Water Quality of open dug wells: Organic and nutrient parameters

<i>Sample</i>	<i>COD</i>	<i>Sulphate</i>	<i>Phosphate PO4</i>	<i>Nitrate</i>
CPCB Water Quality Criteria for irrigation	-		-	-
<i>W1</i>	296	350	BDL	70
<i>W2</i>	39	160	BDL	67
<i>W3</i>	63	BDL	BDL	4
<i>W5</i>	14	66	BDL	55
<i>W6</i>	313	491	BDL	52
<i>W7</i>	274	428	BDL	44
<i>W8</i>	4152	462	BDL	BDL
<i>W15</i>	155	91	BDL	47
<i>W18</i>	106	119	BDL	67
<i>W19</i>	91	150	BDL	7.0
<i>W20</i>	98	24	BDL	61
<i>W21</i>	120	33	BDL	70
<i>W30</i>	95	96	BDL	38
<i>W40</i>	81	28	BDL	26

*Units are mg/L

Table 12: Water Quality of open dug wells: Metals

<i>SAMPLE</i>	<i>Al</i>	<i>B</i>	<i>Cd</i>	<i>Co</i>	<i>T. Cr</i>	<i>Cu</i>	<i>Fe</i>	<i>Mn</i>	<i>Ni</i>	<i>Pb</i>	<i>Zn</i>
CPCB Water Quality Criteria for irrigation	-	2	-	-	-	-	-	-	-	-	-
<i>W1</i>	3.57	0.180	0.003	BDL	0.026	0.055	15.914	5.85	BDL	0.009	0.030
<i>W2</i>	0.00	0.445	BDL	0.063	0.033	0.010	2.676	0.11	BDL	0.009	BDL
<i>W3</i>	2.08	0.050	0.001	BDL	0.012	0.020	6.352	0.56	BDL	0.004	BDL
<i>W5</i>	BDL	0.184	BDL	BDL	0.034	BDL	0.953	0.02	BDL	0.009	BDL
<i>W6</i>	BDL	0.423	BDL	BDL	0.010	BDL	2.200	12.93	BDL	0.003	BDL
<i>W7</i>	BDL	0.943	BDL	BDL	0.004	0.005	0.685	15.99	BDL	0.016	0.008
<i>W8</i>	BDL	0.718	BDL	BDL	0.004	0.005	9.454	22.26	BDL	0.015	0.022
<i>W15</i>	BDL	0.133	BDL	BDL	0.027	BDL	1.075	0.01	BDL	0.003	BDL
<i>W18</i>	0.52	0.012	BDL	BDL	0.012	0.005	1.684	0.15	BDL	0.023	0.062
<i>W19</i>	0.15	0.712	BDL	BDL	0.029	BDL	0.410	BDL	BDL	0.007	0.014
<i>W20</i>	BDL	0.144	BDL	BDL	0.030	BDL	0.417	BDL	BDL	0.005	BDL
<i>W21</i>	BDL	0.139	BDL	BDL	0.031	0.002	0.367	BDL	BDL	0.042	BDL
<i>W30</i>	BDL	0.076	BDL	BDL	0.034	0.001	0.973	0.05	BDL	0.059	0.015
<i>W40</i>	0.07	0.125	0.002	BDL	0.288	0.072	14.176	1.95	BDL	0.068	0.114

*Units are mg/L

Table 13: Water Quality of Bore Wells and Hand pump: Physico-Chemical parameter

Sr No	Sample	pH	DO	Temp °C	Alkalinity	Cond mS/cm	TSS	TDS	Depth (ft.)	Total Hardness CaCO ₃	Ca	Mg	Chloride	Na	K
IS 10500:2012 Acceptable/ Permissible		6.5-8.5	-		200/600	-	-	500/2000	-	200/600	75/200	30/100	250/1000	-	
1.	B1	7.8	0.74	31	12	3.1	10	<u>2200</u>	850	<u>1360</u>	160	<u>230</u>	<u>1059</u>	646	0.8
2.	B2	8.3	3.6	31	8	2.6	8	<u>1800</u>	575	<u>700</u>	164	69.6	<u>1007</u>	490	0.8
3.	B3	7.0	3.4	25	112	3.6	4	<u>2500</u>	200	<u>1040</u>	<u>240</u>	<u>105.6</u>	997	720	0.4
4.	B4	7.3	2.5	30	64	2.9	6	<u>2000</u>	900	500	136	38.4	781	380	0.6
5.	B5	8.7	4.0	25	68	5.5	10	387	700	300	56	38.4	142	52	1.6
6.	B11	8.3	4.5	22	8	2.0	12	1400		<u>900</u>	80	<u>168</u>	399	362	0.8
7.	B13	8.1	0.85	27	20	1.8	2	1300	900	400	134.4	15.36	378	92	0.6
8.	B50	8.2	5.5	27	52	1.0	BDL	716		184	54.4	5.04	124	256	3.2
9.	H1	7.6	3.3	25.3	100	16.3	BDL	1100		<u>680</u>	43.2	<u>137.28</u>	230	342	2
10.	H2	7.4	1.5	26	108	1.1	BDL	734	230	440	88	52.8	201	140	4

*Units are mg/L except for pH, temperature and conductivity

Table 14: Water Quality of Bore Wells and Hand pump:Organic and nutrient parameters

<i>Sample</i>	<i>COD</i>	<i>Sulphate</i>	<i>Phosphate PO4</i>	<i>Nitrate</i>
IS 10500:2012	-	200/400		45
B1	BDL	112	BDL	9
B2	BDL	160	BDL	8
B3	BDL	150	BDL	33
B4	BDL	4	BDL	5
B5	BDL	214	BDL	9
B11	BDL	114	BDL	12
B13	BDL	94	BDL	18
B50	BDL	56	BDL	30
H1	7.0	74	BDL	68
H2	BDL	58	BDL	61

*Units are mg/L.

Table 15: Water Quality of Bore well and Hand pump: Metal

<i>SAMPLE</i>	<i>Al</i>	<i>B</i>	<i>Cd</i>	<i>Co</i>	<i>T. Cr</i>	<i>Cu</i>	<i>Fe</i>	<i>Mn</i>	<i>Ni</i>	<i>Pb</i>	<i>Zn</i>
<i>IS 10500:2012</i>	0.03/0.2	0.5/1.0	0.003	-	0.05	0.05	0.3	0.1/0.3	0.02	0.01	5
<i>Detection Limit</i>	0.011	0.0015	0.0015	0.003	0.0015	0.0034	0.0003	0.0008	0.0008	0.0067	0.0133
<i>B1</i>	0.04	BDL	0.001	BDL	<u>0.058</u>	BDL	<u>3.388</u>	0.45	BDL	<u>0.017</u>	0.022
<i>B2</i>	0.08	0.289	BDL	BDL	0.008	0.048	<u>1.389</u>	0.17	BDL	<u>0.031</u>	0.100
<i>B3</i>	0.03	0.257	BDL	BDL	0.008	BDL	<u>1.401</u>	0.02	<u>0.064</u>	<u>0.024</u>	0
<i>B4</i>	0.04	0.093	BDL	BDL	BDL	BDL	<u>0.420</u>	0.00	<u>0.083</u>	0.003	0
<i>B5</i>	BDL	0.568	BDL	BDL	BDL	BDL	<u>0.402</u>	0.00	0	0.007	0
<i>B11</i>	BDL	0.365	BDL	BDL	BDL	BDL	<u>0.163</u>	0.00	<u>0.031</u>	0	0
<i>B13</i>	0.02	0.232	BDL	BDL	BDL	BDL	<u>0.352</u>	0.05	0.016	0.002	0
<i>B50</i>	0.043	0.002	BDL	BDL	0.012	BDL	<u>0.310</u>	0.00	<u>0.169</u>	0	0
<i>H1</i>	0.056	0.122	BDL	BDL	BDL	BDL	<u>0.324</u>	0.00	<u>0.115</u>	0.001	0
<i>H2</i>	0.066	0.072	BDL	BDL	BDL	BDL	0.222	0.00	<u>0.079</u>	0.001	0

*Units are mg/l except for pH, temperature and conductivity

Table16: List of Fine Chemicals (raw materials and finished products) with retention time in GC-MS/MS spectra and m/z ratio

Sr No	Standards	Retention time (min)	Characterization fragments (m/z)
A	Mesitylene	14.09	120,105,98
B	2-Coumaranone	27.56	134,78
C	Mesitaldehyde	29.34	147,119,120
D	O-Chloro Benzyl Cyanide	30.17	116,117,114
E	O-Methyl Phenyl Acetic Acid (OMPAA)	30.52	105,150,152
F	O-Chloro Phenyl Acetic Acid (OCPAA)	31.88	125, 170, 91
G	Para Chloro Phenyl Acetic Acid (PCPAA)	32.19	125, 89
H	3-Coumaranone	32.86	104,105,91
I	Alpha Bromo Ortho Chloro Phenyl Acetic Acid Methyl Ester (OCPM)	33.8	185

Table 17: Water quality of open dug wells with respect to Fine chemicals

Sample	Mesti	2C	MA	OCBC	OMPAA	OCPAA	PCPAA	3C	α -Bromo
Concentration in mg/L									
W1	ND	0.0014	0.00021	ND	ND	ND	0.0026	ND	ND
W2	ND	ND	ND	ND	ND	ND	ND	ND	ND
W3	ND	ND	ND	ND	ND	ND	BDL	ND	ND
W5	ND	ND	ND	ND	ND	ND	ND	ND	ND
W6	ND	ND	ND	ND	ND	ND	ND	ND	ND
W7	ND	0.0010	0.00027	0.0002	ND	0.0002	ND	ND	ND
W8	ND	0.0006	0.00071	0.0028	0.0014	ND	0.0014	ND	ND
W15	ND	ND	ND	ND	ND	ND	ND	ND	ND
W18	ND	ND	ND	ND	ND	ND	ND	ND	ND
W19	ND	ND	ND	ND	ND	ND	ND	ND	ND
W20	ND	ND	ND	ND	ND	ND	ND	ND	ND
W21	ND	ND	ND	ND	ND	ND	ND	ND	ND
W30	ND	ND	ND	ND	ND	ND	ND	ND	ND
W 40	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 18: Water quality of bore wells and hand pump samples with respect to Fine chemicals

Sample	Mesti	2C	MA	OCBC	OMPAA	OCPAA	PCPAA	3C	α -Bromo
Concentration in mg/L									
B1	ND	ND	ND	ND	ND	ND	ND	ND	ND
B2	ND	ND	ND	ND	ND	ND	ND	ND	ND
B3	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4	ND	ND	ND	ND	ND	ND	ND	ND	ND
B5	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11	ND	ND	ND	ND	ND	ND	ND	ND	ND
B13	ND	ND	ND	ND	ND	ND	ND	ND	ND
B50	ND	ND	ND	ND	ND	ND	ND	ND	ND
H1	ND	ND	ND	ND	ND	ND	ND	ND	ND
H2	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 19: Soil quality within 500m and 2 km periphery of Benzochem industry

Sample Name	pH	Electric Conductivity	Available Potassium	Total Nitrogen	Available Nitrogen	Total Phosphate P
		dS/m	kg/ha			
S1 15 cm	7.9	0.342	139	138	65	0.78
S1 30 cm	7.7	0.799	155	73.9	129	9.9
S3 15 cm	7.7	0.196	<u>796</u>	601	83.2	2.0
S3 30 cm	7.7	0.332	<u>617</u>	138	101	5.6
S7 15 cm	7.6	0.060	351	305	111	4.9
S7 30 cm	7.5	0.039	321	138	120	4.9
S9 15 cm	8.7	0.193	<u>832</u>	924	83.1	4.5
S9 30 cm	7.9	0.281	<u>780</u>	878	92.4	4.1
S10 15 cm	8.2	0.098	<u>787</u>	971	83.1	10.7
S10 30 cm	8.1	0.106	<u>622</u>	46.2	139	6.9
S11 15 cm	8.1	0.107	<u>894</u>	1109	212	9.2
S11 30 cm	8.5	0.085	<u>540</u>	878	369	2.8
S30 15 cm	7.9	0.092	<u>472</u>	757	120	9.2
S30 30 cm	8.1	0.080	<u>426</u>	785	110	7.6
S35 15 cm	7.5	0.184	<u>998</u>	1294	102	7.7



Sample Name	pH	Electric Conductivity	Available Potassium	Total Nitrogen	Available Nitrogen	Total Phosphate P
S35 30 cm	7.6	0.119	<u>755</u>	572	92.4	<u>27.3</u>

Table 20: Soil quality within 500m and 2 km periphery of Benzochem industry: Metal

Sample	Al	B	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn
	mg/kg										
S1 15 cm	6700	50	2	BDL	BDL	70	12000	1000	20	BDL	20
S1 30 cm	7700	50	2	BDL	10	70	13100	800	20	BDL	30
S3 15 cm	15200	80	3	BDL	40	90	16800	1000	40	1	60
S3 30 cm	14600	80	3	BDL	40	90	16200	900	40	1	50
S7 15 cm	12400	70	2	BDL	40	80	14600	800	30	2	50
S7 30 cm	12900	90	3	BDL	30	90	16700	700	30	1	50
S9 15 cm	12200	70	2	BDL	30	70	14300	700	30	1	50
S9 30 cm	11200	80	3	BDL	30	80	15600	700	30	1	40
S10 15 cm	12700	60	2	BDL	30	60	12800	700	40	3	50
S10 30 cm	12200	60	2	BDL	30	50	12800	700	40	5	60
S11 15 cm	8100	50	2	BDL	20	60	11500	600	30	1	40
S11 30 cm	8800	60	2	BDL	30	70	12500	900	40	1	50
S30 15 cm	12200	70	2	BDL	30	80	14300	900	40	2	50
S30 30 cm	11100	60	2	BDL	30	70	13600	800	30	1	50
S35 15 cm	10200	60	2	BDL	30	70	13400	800	40	2	50
S35 30 cm	9200	50	2	BDL	30	60	12500	700	30	2	50

Table 21: Soil Characteristics from Quarry Pit

Sample Name	pH	Electric Conductivity	Available Potassium	Total Nitrogen	Available Nitrogen	Total Phosphate P
		dS/m	kg/ha			
E1	7.5	0.082	130	906	120	5.5

Table 22: Soil Characteristics from Quarry Pit: Metal

Sample	Al	B	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn
	mg/kg										
E1	10000	80	3	BDL	20	110	15600	1900	30	1	40

Table 23: Soil quality of Query pit Area: Fine Chemicals

Sample	Mesti	2C	MA	OCBC	OMPAA	OCPAA	PCPAA	3C	α-Bromo
Query pit Area	ND	ND	0.018	ND	ND	ND	ND	ND	ND
Soil (mg/Kg)									

The results have been represented in the form of figures as well. **Figure 11** shows the pH level at various sampling locations. The TDS and COD levels are indicated in **Figure 12** and **13**. The presence of fine chemicals is indicated in **Figure 14**.

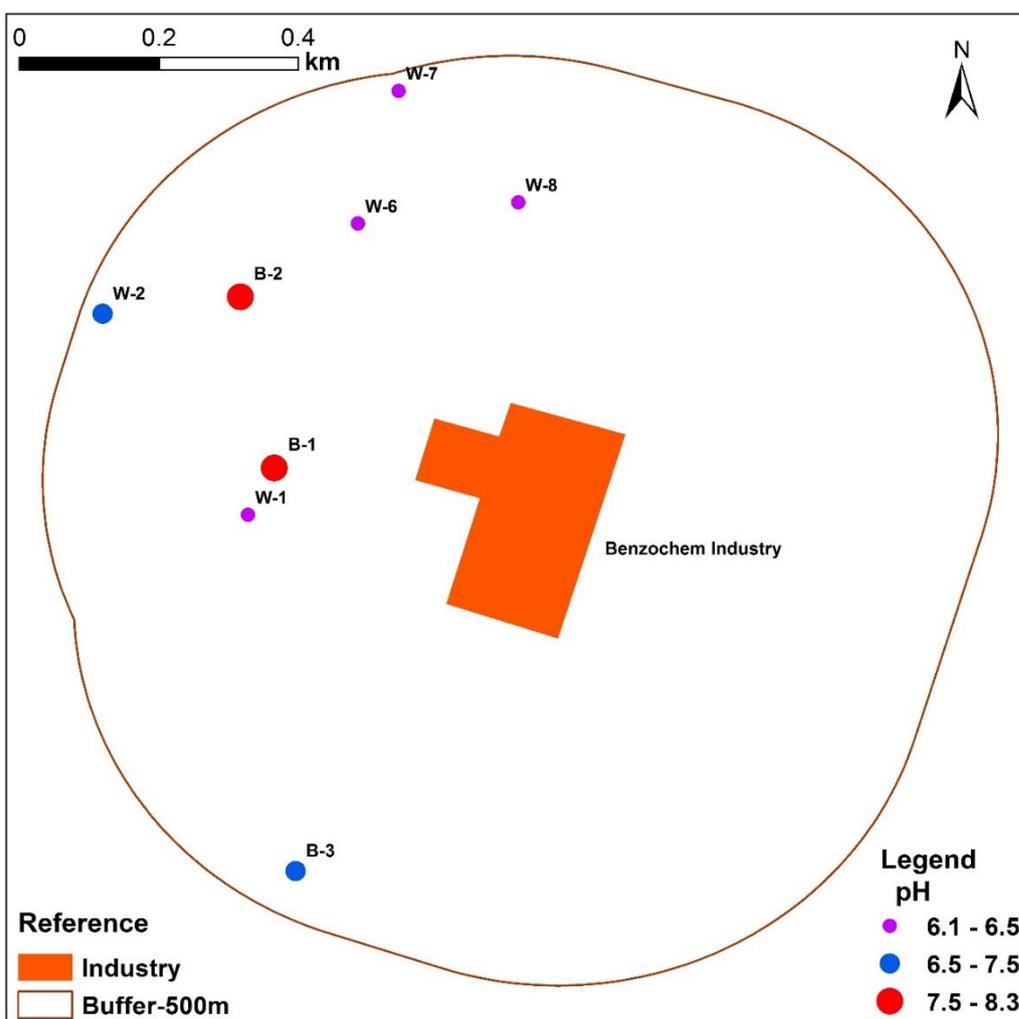


Figure 11: pH at Sampling Locations

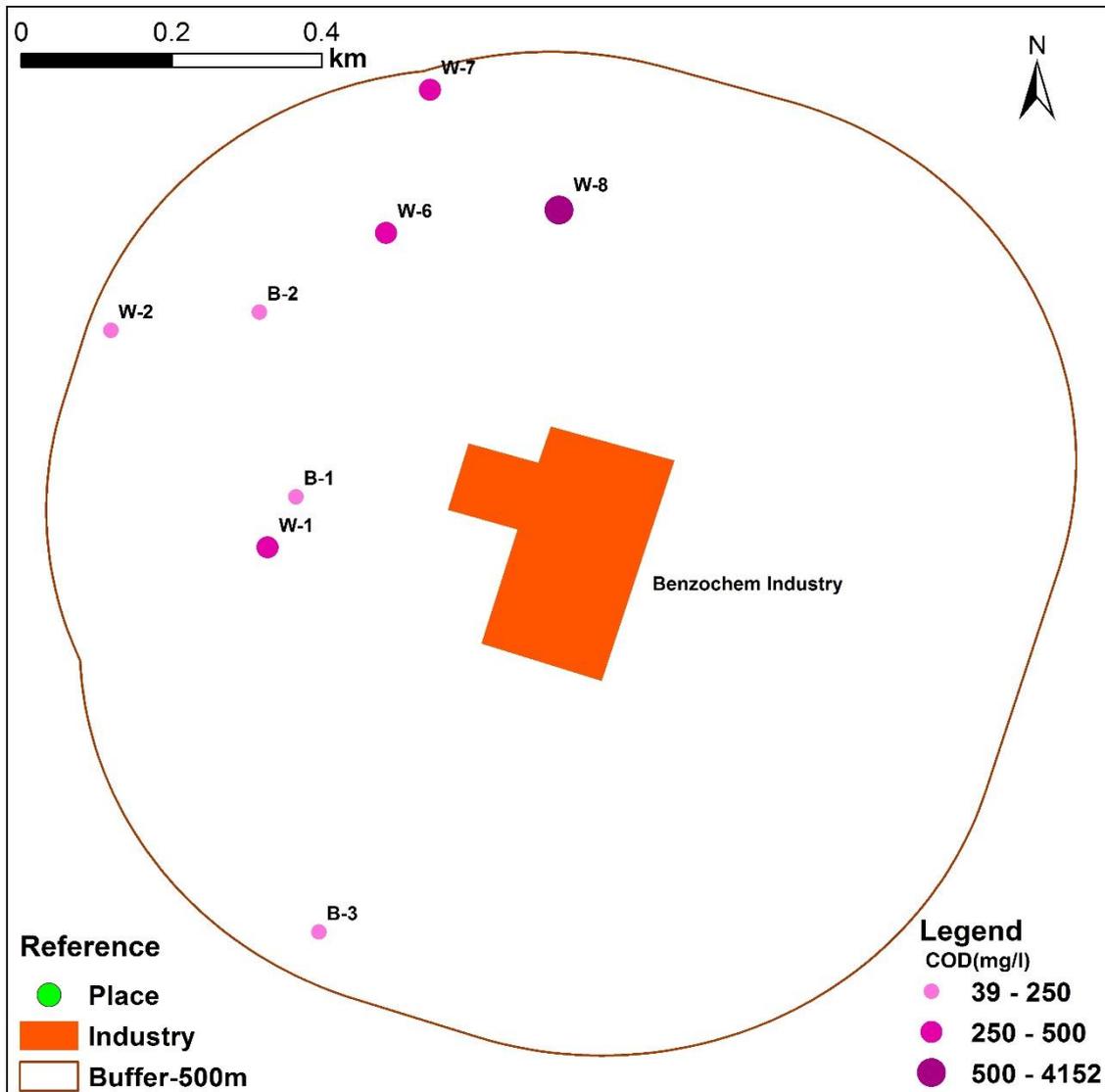


Figure 12: COD at Sampling Locations

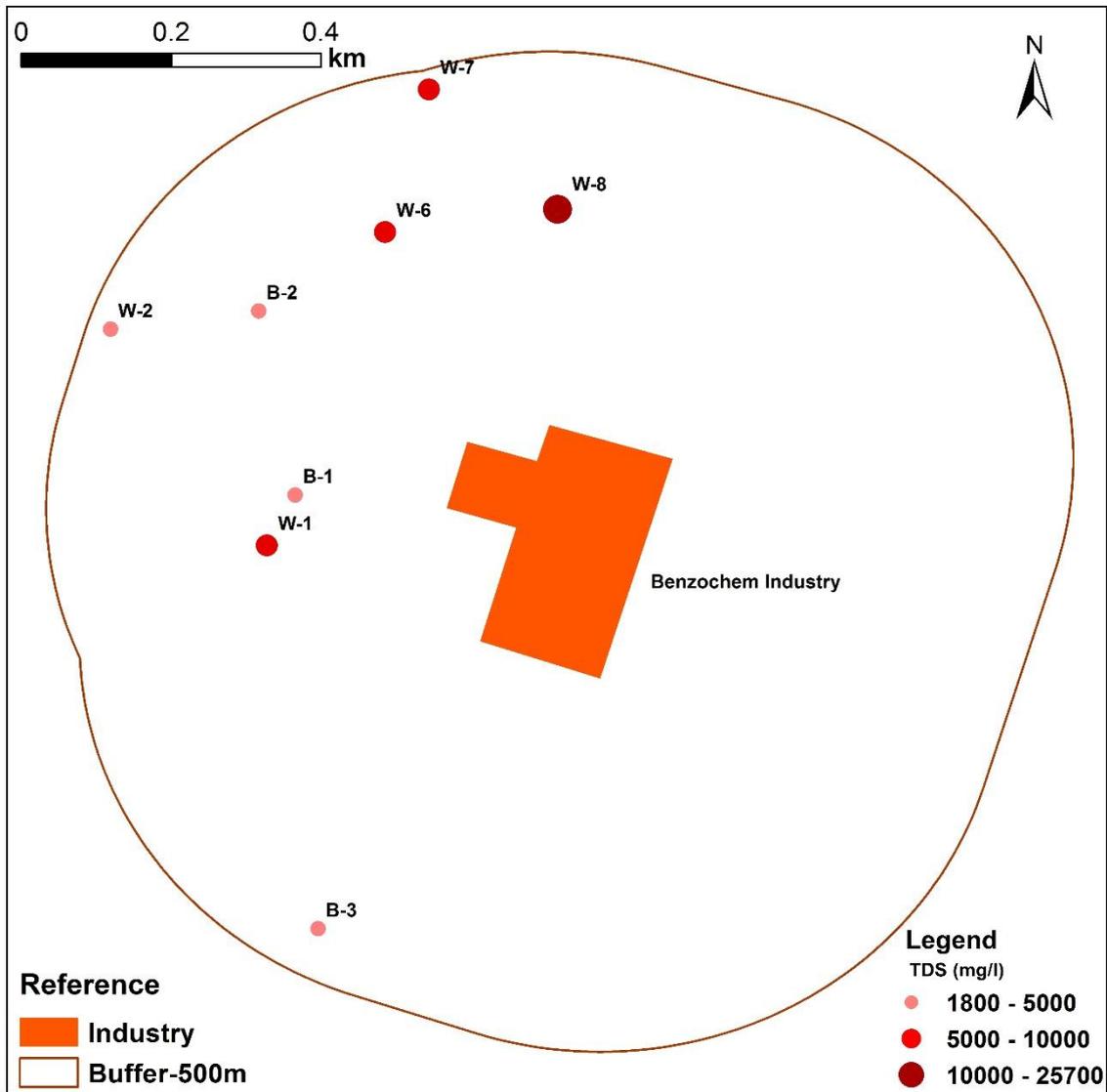


Figure 13: TDS at Sampling Locations

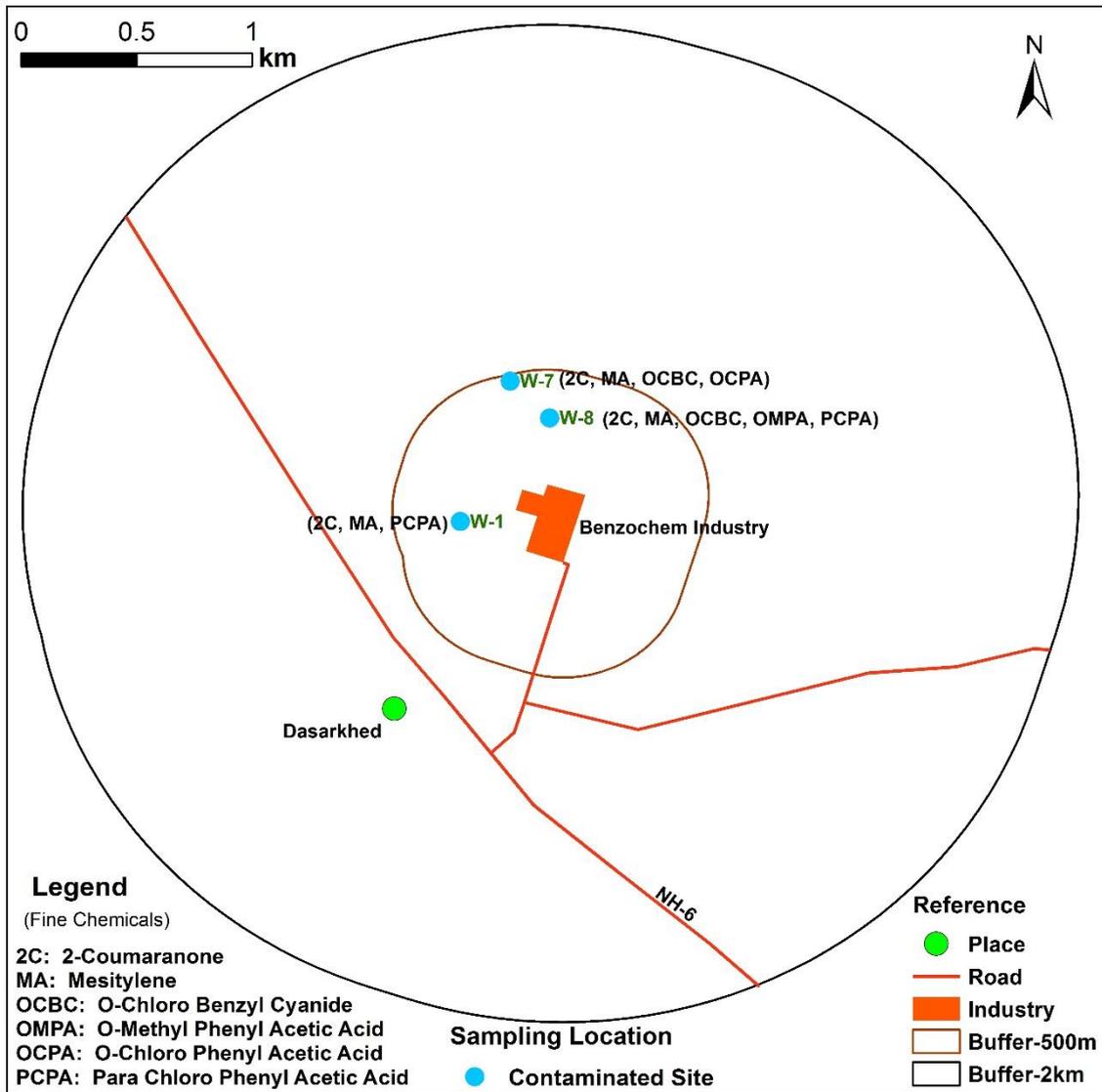


Figure 14: Presence of Fine Chemicals at Water Samples

3.6 Post Monsoon Monitoring

The study of water samples was conducted by CSIR-NEERI officials on 4th and 5th December 2018 for post monsoon season from selected sampling sites. The sites were selected based on the results obtained in the first sampling, the topography of land and its use. The ground water samples were collected from open dug wells W1, W3, W7, W8, W20 and W40 as well as from hand pump H2 during the field visit, preserved and brought to lab for analysis. The onsite parameters like pH, conductivity and Total Dissolved solids were measured and recorded. The analysis for various physicochemical parameters of the samples was carried out as per Standard Methods for Examination of Water & Wastewater, 2017, 23rd edition.

The open dug well and hand pump water quality for post monsoon is presented in **Tables 24**. It was observed that samples W1, W3, W7 and W8 have high Total Dissolved Solids, Total Hardness, Calcium, Magnesium and Chlorides. In general, all these samples are within 500m of the industry. The sample W8 has pH in acidic range i.e. 6.3 and beyond water quality criteria for irrigation purposes during post monsoon season also.

The conductivity of well samples W1, 3, 7 and 8 are beyond the water quality criteria fit for irrigation purposes i.e. 2250 $\mu\text{S}/\text{cm}$. The sample from W1 has high Total dissolved solids of 5140 mg/l, very high suspended solids, 350 mg/l and Chloride concentration of 3503 mg/l indicating saline water. The samples from W7 and W8 had TDS of 7240 and 17000 mg/l and have not been in use for the past five years. The other well samples between 500m and 2 km radius W20 and W40 had Total Dissolved solids in the range 493 -723 mg/l. The sodium absorption ratio (SAR) values of all samples are within the prescribed criteria for irrigation purposes.

Table 25 gives the organic and nutrient parameter characteristics of well waters. The COD value of sample within the 500m boundary varied between 16 -248 mg/l. Extremely high value of 3900 mg/l in terms of Chemical Oxygen Demand (COD)

was observed in W8 sample, which also falls within 500m radius of the industry indicating contamination of well from outside sources.

11 metals were analysed for the well waters using ICP-OES. Samples were filtered and preserved with nitric acid as per procedure before analysis. Iron concentrations were in the range 0.18– 4.2 mg/l in the samples within 500m of the industry. The Boron concentrations of all wells were below the criteria for irrigation purposes (**Table 26**).

The water quality of hand pump is given in **Table 24**. The hand pump water is used for drinking and irrigation purposes. The pH of all samples is within range, however, the TDS is higher than permissible limits for sample H2. The water is hard water with total hardness above 600 mg/l permissible limit according to drinking water prescribed standards for drinking. The concentration of metals is within acceptable and permissible limits for drinking water.

It is observed from **Table 27** that all open dug well W1, W7 and W8 samples falling within the 500m radius are contaminated in post monsoon season. Mesitaldehyde chemical was observed in the concentration range 0.00015-0.00045 mg/l. 2 Coumarone was detected in W1, 7 and 8 samples in the range 0.0004-0.0008 mg/l. O-Chloro benzyl cyanide was detected in samples W7 and W8. O Methyl Phenyl acetic acid and para Chloro Phenyl acetic acid were found present in W8 sample. The values of chemical oxygen demand of the dug well samples within 500m radius except W2 are in the range 220-3900 mg/l, indicating high amount of organic in well waters. During the post monsoon seasons no contaminants from the fine chemicals list was observed in any of the hand pump samples.

Table 24: Post Monsoon Monitoring: Water Quality of open Dug Wells and hand pump: Physico-Chemical parameters

Sr No	Sample	pH	Alkalinity	Cond. $\mu\text{S/cm}$	SS mg/L	TDS mg/L	Total Hardness CaCO_3	Ca	Mg	Chloride	Na	K	SAR
CPCB Water Quality Criteria for irrigation		6.5 - 8.5	-	2250	-	-	-	-	-	-	-	-	26
1	W1	7.2	550	8566	350	5140	4150	1194	284	3503	748	4.8	5
2	W3	7.8	210	5640	94	3720	4400	1138	379	3684	179	2.7	1.2
3	W7	6.6	470	12400	33	7240	13500	2806	1579	8284	636	3.1	2.4
4	W8	6.3	750	35000	78	17000	15200	4368	1044	12088	3292	16.0	9.5
5	W20	8.3	280	1095	5	723	570	128	61	500	161	1.5	2.9
6	W40	7.7	280	740	17	493	550	72.1	90	220	113	1.6	2.4
7	H2	7.5	290	1320	4	845	920	112	155	220	133	2.4	1.9

*Units are mg/l except for pH, temperature & SAR (sodium absorption ratio).

Table 25 :Post Monsoon Monitoring Water Quality of open dug wells & hand pump:

Organic and nutrient parameters

Sample	COD	Sulphate	Phosphate PO ₄	Nitrate
CPCB Water Quality Criteria for irrigation	-	-	-	-
W1	248	20	3.6	20.0
W3	16	24	BDL	4.7
W7	220	50	3.3	<u>54.7</u>
W8	3900	120	4.9	43.5
W20	240	2	BDL	4.9
W40	80	16	BDL	0.4
H2	12	0.2	0.2	1.2

Table 26: Post Monsoon Monitoring: Water Quality of open dug wells and hand pump: Metal

SAMPLE	Al	B	Cd	Co	T. Cr	Cu	Fe	Mn	Ni	Pb	Zn
CPCB Water Quality Criteria for irrigation	-	2	-	-	-	-	-	-	-	-	-
W1	0.61	0.10	BDL	BDL	0.008	0.008	3.3	3.5	BDL	0.001	0.073
W3	BDL	0.03	BDL	BDL	0.011	BDL	0.32	0.08	0.062	BDL	BDL
W7	BDL	0.49	BDL	0.012	BDL	BDL	0.18	8.1	0.062	BDL	0.005
W8	BDL	0.41	BDL	BDL	0.006	BDL	4.2	11.3	0.036	BDL	0.028
W20	BDL	0.01	BDL	BDL	BDL	BDL	0.21	0.11	0.016	BDL	0.007
W40	BDL	BDL	BDL	BDL	BDL	BDL	0.091	0.10	0.032	BDL	BDL
H2	BDL	BDL	BDL	BDL	0.003	BDL	0.13	0.02	BDL	BDL	BDL

**Units are in mg/L*

Table 27 : Post Monsoon:Water quality of open dug wells wrt Fine chemicals

Sample	Mesti	2C	MA	OCBC	OMPAA	OCPAA	PCPAA	3C	α - Bromo
Concentration in mg/L									
W1	ND	0.0008	0.00015	ND	ND	ND	0.0015	ND	ND
W7	ND	0.0004	0.00018	0.00014	ND	0.00011	ND	ND	ND
W8	ND	0.0004	0.00045	0.0018	0.0011	ND	0.0082	ND	ND

Chapter 4 – SUMMARY AND RECOMMENDATIONS

4.1. Material Balance

- The ETPs of both the units 1 and 2 have sufficient capacity to take up the liquid load generated by each of the units. The plants have enough spare capacity to take up the shock loads as well.
- The MEE at the end of the plants, makes it possible for the industry to maintain zero liquid discharge (ZLD)
- The air scrubbers too have sufficient capacity to handle the loads of air pollutants generated in each unit.

4.2. Water Environment

- The farming as well as domestic activities are being performed with the water from dug well and bore wells. Electricity is available for a few hours in the morning and during late evening and night, hence water from these sources is used during these hours.
- The depth of these wells is between 40-100 ft and water was found upto 40 ft during summer season.
- The water samples from within 500m of the industry had pH: 6.1-7.8 and TDS, Ca, Mg and Chloride beyond permissible limits for drinking water standards in both pre and post monsoon.
- Extremely high organic content are observed in sample, COD of W8: 4152 mg/l (pre monsoon) and 3900 mg/l (post monsoon).—and COD of W1, 6 and 7 in the range 274-313 mg/l. During post monsoon, W1 and W7 were observed to have COD of 248mg/l and 220 mg/l, respectively. Nitrate levels were also beyond permissible limits for Drinking water in W1, 2, 5, 6 15,18,20 and 21 during pre monsoon and W7 in post monsoon. In general, the iron content in all the well waters is above the permissible limit of 0.3 mg/l. Manganese was found above

permissible limits in samples from W1,6, 7 and 8 in both pre and post monsoon except W6 which was not selected for post monsoon monitoring.

- Based on the groundwater GC-MS/MS analysis for fine chemicals (2C, MA, OCBC, OMPAA, OCPAA and PCPAA) used as raw materials as well as finished products of the Benzochem industry are observed in low concentration in the groundwater in the wells 1, 7 and 8 within 500m radius of Benzochem Pvt. Ltd for both pre and post monsoon seasons.
- For post monsoon, water quality of W20, W40 and H2 samples was monitored based on the results obtained in pre monsoon since no contamination with fine chemicals was observed. These three samples were selected to represent the other samples in the 2km radius but not falling within 500m.
- During pre monsoon monitoring, the bore well samples within 500 m of the industry had pH in the range 7.0-8.3 and TDS: 1800-2500 mg/l. The water is hard (Hardness 700- 1360 mg/l and Chloride: 997-1059 mg/l) as well as saline. Comparatively the hand pump samples had total hardness and chloride within permissible limits in absence of alternate source.
- The bore well and hand pump samples had no organic content (COD: not detected)
- During pre monsoon monitoring, the iron content in all these samples except H2 were found beyond acceptable limits for drinking water and GC-MS/MS analysis revealed that the samples were not contaminated with fine chemicals at this depth.

4.3. Recommendations for Water Environment

Based on the groundwater analysis for both pre and post monsoon seasons, fine chemical contaminants are observed in the groundwater specially in well no 1,7 and 8, which are adjacent to Benzochem Pvt. Ltd. Although, the concentrations of the fine chemicals contaminants are low, however, since the water quality does

not meet drinking water standards, use of well water from W1, 7 and 8 for drinking and irrigation purposes should be discontinued immediately.

Some of the immediate measures are to be pump and treat, adsorption of residual organics by activated carbon followed by regular monitoring of the well water quality post treatment. This would restore well water quality as well prevent percolation of the contamination in the groundwater. The treatment option hence would be :

Pumping of ground water and its treatment via existing ETP of Benzochem Industries Private Limited (Pumping strategies with activated carbon water treatment/ Reverse Osmosis followed by Multiple effect Evaporation). The treatment of these well water should be carried out until the water quality becomes potable and fine chemicals are not detected. These wells are to be monitored at periodic intervals throughout the treatment procedure.

Further, in terms of priority, W8 has most number of fine chemicals and has the highest priority in terms of treatment. Considering the spare capacity in ETP of the industry, W8 water can be treated there along with the MEE. W1 and W7 are also to be treated and methods listed above can be utilized for these.

Alternatively, other options available for treatment of such contaminated ground water are:

- Recharge of the wells
- In-situ groundwater treatment
- In-situ immobilization of the contaminants (sealing, stabilization, capping, cutting-off, fixing, advanced oxidation process)
- Permeable reactive barrier technology for treatment of dissolved phase organic fraction

Further exploration of the feasibility of either/or options mentioned above needs to be undertaken in order to prevent further deterioration and spread of groundwater quality.

4.4. Summary and Recommendation for Soil Environment

Soil samples were examined during the pre-monsoon period from the study area for general parameters as well as for the fine chemicals. The samples were taken from 15 cm and 30 cm before the surface. However, no fine chemicals were obtained in the samples at the respective depths. Soil sample from the query pit area (E1) was found to contain fine chemical.

Treatment of contaminated pit need to be assessed as per the level and depth of fine chemicals in the soil strata. Based on this, treatment options will be considered as per following

- Soil depth analysis should be performed to assess the quantity of soil to be stabilized and check for no toxic leachates.
- Alternatively, the contaminated soil can be sent to Common Hazardous Waste Treatment and Disposal Facility (CHWTDF).

Till the treatment option for contaminated soil in the query pit area is finalized, the query pit area must not be used for any purpose.

Annexure - I

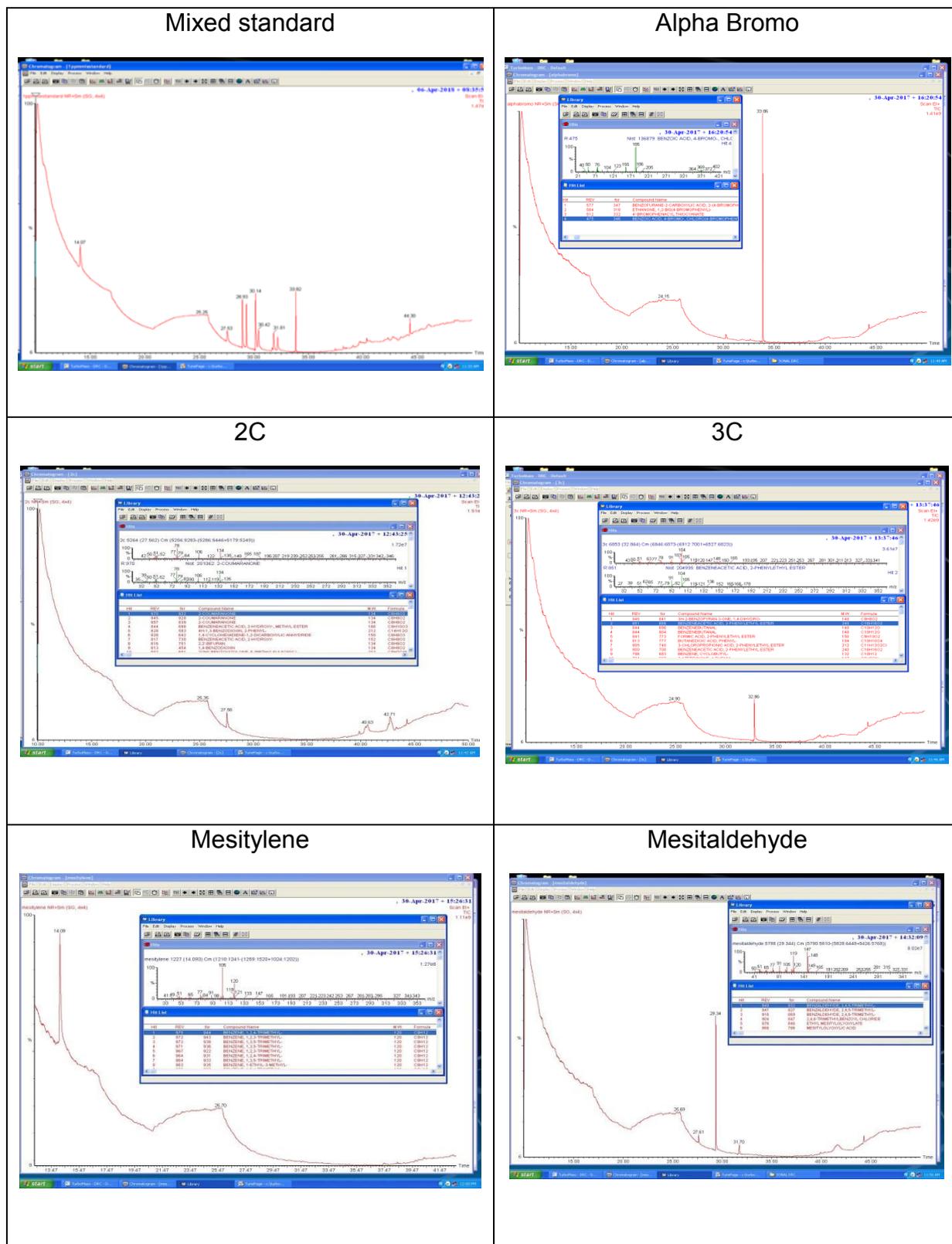


Plate 1: Chromatograms of fine chemicals

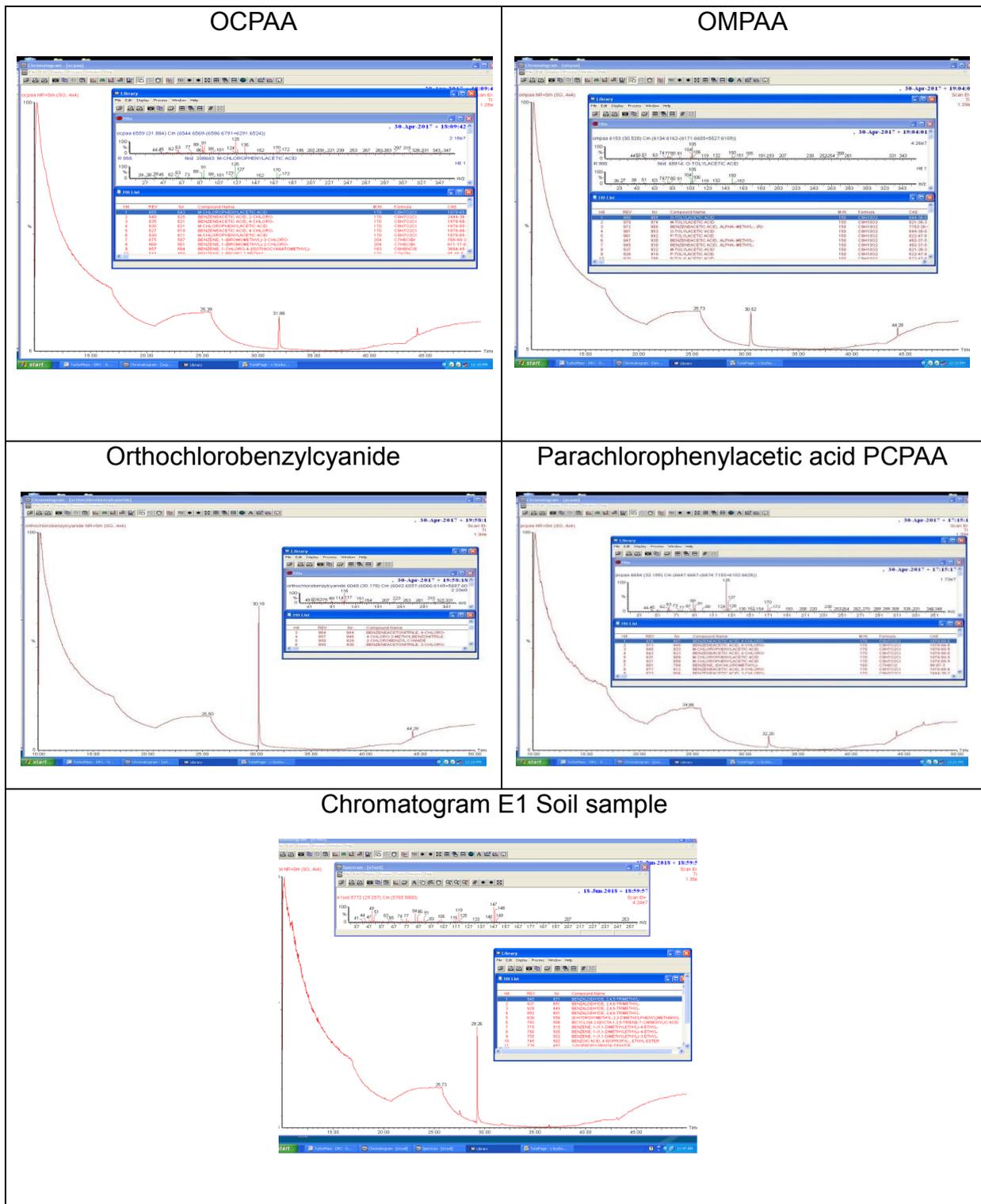
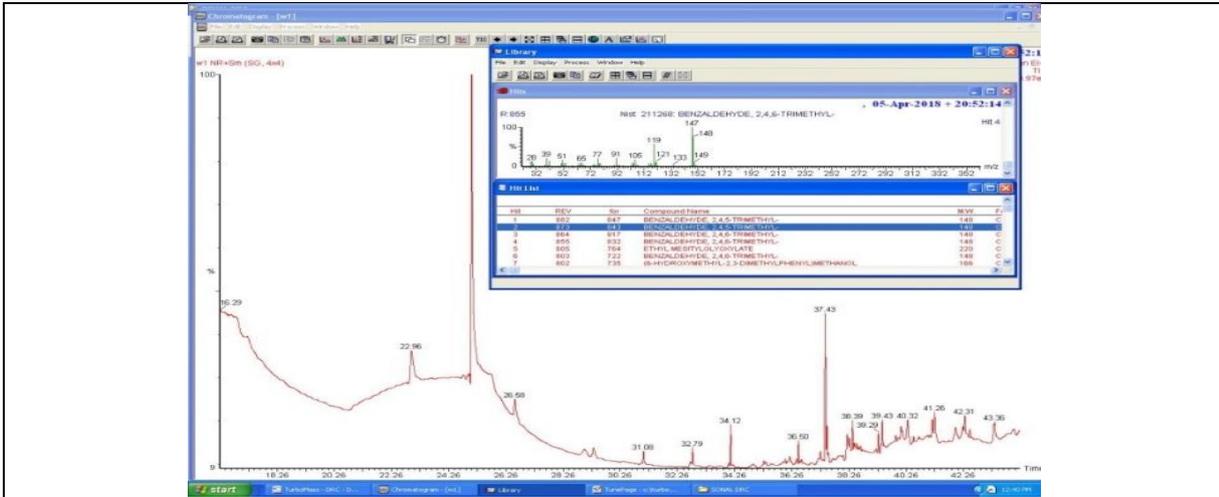
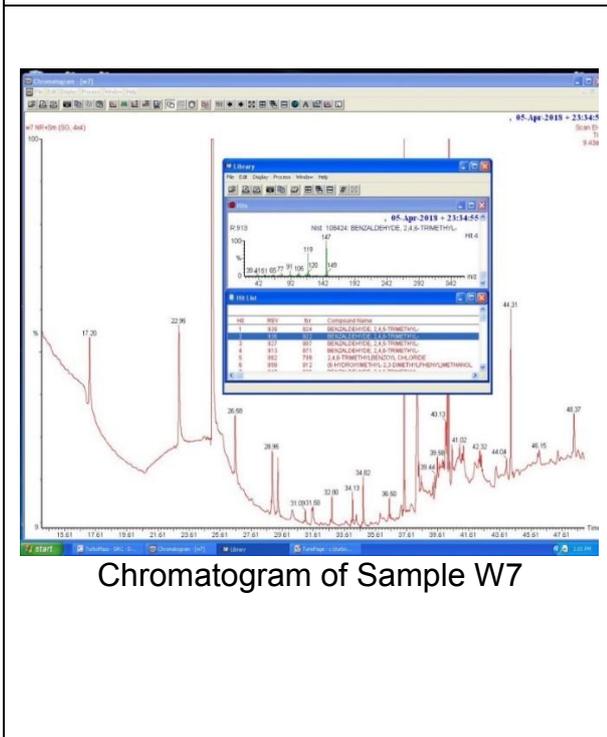


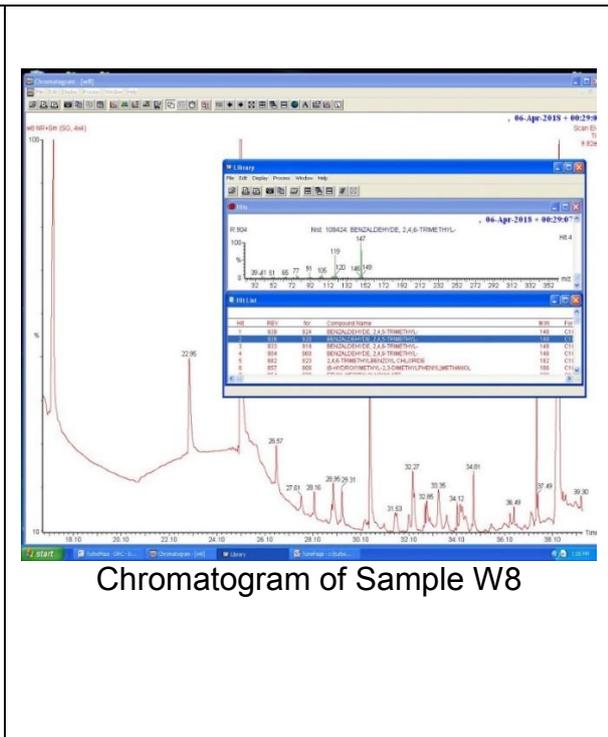
Plate2: Chromatograms of fine chemicals



Chromatogram of Sample W1



Chromatogram of Sample W7



Chromatogram of Sample W8

Plate3: Chromatograms of Samples

MAHARASHTRA POLLUTION CONTROL BOARD

Regional Office Amravati

Tel. No. (0721)-2563593/94
 fax : (0721) -2563597
 e-mail : roramravati@mpcb.gov.in



Sahkar Surbhi Bapat Wadi, Near
 Vivekanand Colony, Amravati.
 Pin-444601.

No :MPCB/ID/2009290001

Date :-29/09/2020

To,

✓ M/s. Benzochem Industries Pvt. Ltd.
 P. No. B-24, 25,MIDC-Dasarkhed,
 Tal.-Malkapur,Dist.-Buldana.

Sub:-Interim Direction under section 33A of the Water (P and CP) Act 1974,
 And under section 31A of the Air (P and CP) Act 1981 and Hazardous
 And Other Wastes (Management and Transboundary Movement)
 Rules,2016 .

Ref. :-1)Consent to Operate granted by M.P.C.Boardvalid upto28/02/2022.

- 2) Application no. 124/2017 (WZ) filed at Hon'ble National Green Tribunal (WZ) Pune regarding deterioration of well water quality due to the discharge of effluent from your industry into the agricultural land.
- 3) Complaint lodged by farmers from Dasarkhed, Tal.-Malkapur, Dist.-Buldana received through SDM, Malkapur dtd. 17/10/2019.
- 4) Board Official visit dtd. 27/11/2019.
- 5) Legislative Assembly Starred Question no.12278 raised by Hon'ble Shri Rajesh Ekade, Malkapur.
- 6) Board Official visit dtd. 17/07/2020.
- 7) Proposal for initiation of action submitted by Sub-Regional Officer, Akola through legal module on 17/07/2020.
- 8) Proposed Directions issued by M.P.C.Board vide letter no. MPCB/PD/2007200001 dtd. 20/07/2020.
- 9) Complaint received from Sub-Engineer, MIDC Sub Division, Khamgaon, Dist.-Buldana on 24/07/2020.
- 10) Letter received from SDO Malkapur, Dist.-Buldana on 30/07/2020.
- 11) Visit of Board Officials dtd. 30/07/2020.
- 12) Proposal for initiation of action submitted at JD(Air) section, HQ, Mumbai through legal module dtd. 14/08/2020.
- 13) Directives given by Hon'ble Member Secretary and Joint Director (APC) during the course of Personal Hearing extended to you on 25/08/2020 at 3.00 PM through Microsoft Teams (online).

 In accordance with Legislative Assembly Starred Question no.12278 raised by Hon'ble Shri Rajesh Ekade, Malkapur during the Legislative Assembly Session-2020 cited at ref. No. 6, in respect of discharge of industrial effluent from your industry through tanker into the agriculture land leading damage to the standing crops of the agriculturists of village

ChikhaliRanthamb and non compliances observed by Board Officials during visit on 17/07/2020, Sub-Regional Officer Akola has submitted proposal for initiation of action against your industry through legal module dtd. 17/07/2020.

During visit dtd. 17/07/2020 it is observed that you have not taken precautionary measures in respect of arresting contaminated rain water run-off letting outside the industry premises. This office has issued Proposed Directions to your industry against the non-compliances vide letter cited at ref. No 9. This shows your negligent attitude towards the compliance of the Consent Conditions.

The O.A. no. 124/2017 (WZ) filed at Hon'ble National Green Tribunal (WZ) Pune regarding deterioration of well water quality due to the discharge of effluent from your industry in the agriculture land. The Board has issued Directions vide letter dtd. 23/10/2017 to engage NEERI to carry out the soil and ground water quality assessment within periphery of 2 km's radius and impact on agriculture if any. Accordingly, the soil and ground water quality assessment has been carried out within periphery of 2 km's by NEERI and recommended restoration of well water quality of 3 open wells which are more contaminated.

In accordance with ref. No. 11 and 12 this office has again received complaints from Sub-Engineer, MIDC Sub Division and SDO Malkapur, Dist.-Buldana regarding damage of crops due to the discharge of effluent from your industry into the nearby farmlands. For the verification of contents of the complaints Board Officials again visited to your industry on 30/07/2020 and observed that the coloured effluent along with rain water runoff is going towards the agriculture land.

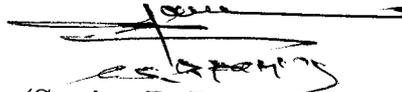
In view of consistent violation of the Consent Conditions this office has submitted the proposal at Board Office, Mumbai through legal Module on 14/8/2020 and recommended to extend personal hearing to your industry. In accordance with this Personal Hearing extended to your industry representative on 25/08/2020 at 3.00 pm online through Microsoft Teams app under the chairmanship of Hon'ble Member Secretary and in the presence of Joint Director (Air Pollution Control).

Issues related with above incidence were discussed in detail. Considering your assurances to improve environment in your industry area and after due deliberations, following interim directions are issued under Section 33A of the Water (P and CP) Act, 1974 and 31A of the Air (P and CP) Act, 1981 for :

1. Industry shall carry out the work as per the NEERI report proactively.
2. Industry shall carry out well water restoration work as per the directions of the Board within 3 months period.
3. You shall make arrangements to arrest the contaminated rainwater run-off letting outside the industry premises.
4. You shall submit the Bank Guarantee of Rs. 5.0 Lakh's towards the compliance of these Interim Directions. The Bank Guarantee shall be submitted in favour of Regional Officer, M.P.C.Board, Amravati within 15 days from the date of issue of these directions.
5. It is decided that existing Bank Guarantee of Rs. 2.0 Lakh submitted by you is to be forfeited.

You are hereby directed to comply the above Interim Direction. You shall submit your reply/objections within a period of 15 days from the date of receipt of these directions. In case, you fail to comply with the above Directions, the Board will have no option than to issue final directions as deemed fit in your case such as disconnection of electricity and water supply of your industry, along with suitable legal action without giving you any further opportunity which may please be noted.

FOR AND ON BEHALF OF THE
MAHARASHTRA POLLUTION CONTROL BOARD


(Sanjay D. Patil)
Regional Officer, Amravati

Copy submitted to :

1. The Hon'ble Member Secretary, MPC Board, Mumbai
2. The Joint Director (APC), MPC Board, Mumbai.
3. The Law Officer (HQ), MPC Board Mumbai.

Copy to :-

Sub-Regional Officer, MPCB, Akola:

He is directed to serve the copy of Interim Directions to industry and submit the monthly progress report in respect of water quality restoration work of three open wells and ensure compliance of the Interim Directions issued.



-TRUE COPY-



BENZO CHEM INDUSTRIES PRIVATE LIMITED

Work : B-24/25, MIDC Area, Dasarkhed,
Malkapur - 443 112, (Dist. Buldhana)
Phone No. : (07267) 262678 / 79 / 81
Fax : (07267) 262680
E-mail : benzoeou@rediffmail.com

Registered Office : Plot No. 26, 28 A,
Cawasji Patel Street, Opp. Yazdhani Bakery
Fort, Mumbai - 400 001.
Phone No. (022) 43555888
Fax : (022) 40057327
E-mail : gcpl@bom3.vsnl.net.in Website : www.bcipl.com

Corporate Identity No. U24100MH1986PTC041751

Date: 02/10/2020

To,

The Regional Officer Amravati,
Maharashtra Pollution control board,
Sahkar Surbhi Bapat Wadi,
Near Vivekanand colony, Amravati - 444 601.

Subject: Reply to Interim direction issued under Section 33A of the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution), Act, 1981 and Other Wastes (Management and Transboundary Movement) Rules, 2016

Reference:

- 1) Consent operate granted by MPC board valid up to 28/02/2012
- 2) Application no.124/2017(WZ) filed at Hon'ble National Green tribunal (WZ) Pune regarding deterioration of well water quality.
- 3) Complaint lodged by farmers to SDM, Malkapur dated 17.10.2019.
- 4) Visit of Board officials for investigation of complaint 27.11.2019.
- 5) SRO- Akola visited our unit on 17.07.2020 regarding LAQ.
- 6) Proposed direction issued by you on 20.07.2020 and our reply dated 24 .07.2020.
- 7) Deputy Engineer MIDC letter dated 23.07.2020 and our reply dated 26.07.2020.
- 8) Visit of your field officers to our plant on 30.07.2020 for investigation of complaint mentioned in MIDC letter and our reply dated 07.08.2020. -
- 9) Your Letter No MPCB/ID/2009290001 DATED 29/09/2020.

Respected Sir,

We have gone through the above referred Interim Direction and submitting herewith following few points for your consideration:

- 1) Though our Industry falls in Medium Scale category, we have invested around Rs. 5 Crore to provide full-fledged ETP along with MEE to achieve zero liquid discharge (ZLD). We have commissioned ZLD system in year 2010.



BENZO CHEM INDUSTRIES PRIVATE LIMITED 515

Work : B-24/25, MIDC Area, Dasarkhed,
Malkapur - 443 112, (Dist. Buldhana)
Phone No. : (07267) 262678 / 79 / 81
Fax : (07267) 262680
E-mail : benzoeou@rediffmail.com

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Fax : (022) 40057327
E-mail : gcpl@bom3.vsnl.net.in Website : www.bcipl.com

Corporate Identity No. U24100MH1986PTC041751

- 2) The complaint dated 17.10.2019 was submitted to SDM Malkapur by farmers. Your Field Officer Mr.Nandkishor Patil visited our unit on 27.11.2019 for investigation of said complaint and inspected our ETP and backside area of our company. During the visit he observed that our ETP was in operation and there was no discharge of our trade effluent outside our factory premises into backside Nala.
- 3) Sub Regional officer,Akola visited our plant on 17.07.2020 to investigate assembly question raised by Honorable MLA. During the visit he observed that the ETP was in operation, there was no discharge of our trade effluent outside the factory premises.
- 4) Regional officer,Amravati issued the Proposed Direction on 20.07.2020. We have submitted the reply on 24.07.2020 and informed that the complaint made by farmers to SDM Malkapur was investigated by your Field Officer on 27/11/2019. During the investigation the Field Officer has not found any discharge of our trade effluent into backside nala nor observed any signs of discharge.
- 5) Hon'ble Member Secretary extended us personal hearing on 25.08.2020. We have submitted our say and compliance made by company to comply consent conditions and directions issued by MPCB from time to time.
- 6) MPCB officials are regularly visiting and inspecting our unit. We are enclosing their visit reports for the period of Nov-2019 to July 2020. Your officers are inspecting/verifying the ETP operation and recycling system during their visit to our factory and found that we are recycling treated effluent for achieving ZLD.
- 7) Deputy Engineer MIDC issued letter on 23.07.2020 regarding the damages of crop of nearby farmers, due to discharge of our trade effluent and the reply was submitted on 26.07.2020 to MIDC. We have informed MIDC that we have provided full fledged ETP along with MEE to achieve ZLD. We have studied the nature and course waterflow in the backside nalla and observed that in no case nalla water can reach to their field due to 4-5 feet level difference of field and nalla. It can be concluded that the question of damaging of crops of said farmers due to our effluent doesn't arise.

Your Field Officers also visited the unit for investigation of said complaint on 30-07-2020 . During the visit they observed that our ETP was in operation and treated trade effluent was being recycled in process. They not found any discharge of our trade effluent outside the factory premises. We have also submitted action taken report on this visit report on 07/08/2020.

- 8) Due to pandemic our plant was closed for some period and also now the plant is not operated for full capacity and we are facing financial crises , hence it is requested not to encash our bank guarantee of Rs. 2 Lakhs and permit us for not to submit fresh BG of Rs.5 Lakhs, as we have complied your consent conditions.





BENZO CHEM INDUSTRIES PRIVATE LIMITED

516

Work : B-24/25, MIDC Area, Dasarkhed,
Malkapur - 443 112, (Dist. Buldhana)
Phone No. : (07267) 262678 / 79 / 81
Fax : (07267) 262680
E-mail : benzoeou@rediffmail.com

Registered Office : Plot No. 26, 28 A,
Cawasji Patel Street, Opp. Yazdhani Bakery
Fort, Mumbai - 400 001.
Phone No. (022) 43555888
Fax : (022) 40057327
E-mail : gcpl@bom3.vsnl.net.in Website : www.bcipl.com

Corporate Identity No. U24100MH1986PTC041751

- 9) We are willing to carry out well water restoration work as per the NEERI's report and MPCB directions, we have approached to the farmer to discuss the same and they aggressively refused to talk in this regard. Hence we need to carry out the restoration of well water in presence of MPCB and Revenue department officials under police protection.

In view of above, you are requested to consider our above submission and issue suitable modified direction at the earliest so that we can start the work of restoration of well water.

Yours truly,

Thanking you,

For Benzo Chem Industries Pvt LTD,

Authorized signatory

ENCL:1. MPCB Visit report of 27.11.2019, 17.07.2020 and 30.07.2020

2. Compliance of visit report 30.07.2020.

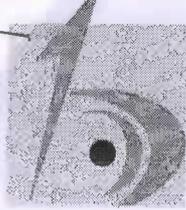
3. Reply of Deputy Engineer MIDC letter.

Copy to:

- 1) The Hon'ble Member Secretary, MPCB, Mumbai.
- 2) The Joint Director (APC), MPC Board, Mumbai.
- 3) The Law Officer (HQ), MPC Board, Mumbai.
- 4) The Sub-Regional Officer, MPCB Akola.

-TRUE COPY-





BENZO CHEM

BENZO CHEM INDUSTRIES PRIVATE LIMITED

ANNEXURE R-7
517

Works: B-26, 27 & B-14/15, M.I.D.C. Area, Dasarkhed,
Malkapur – 443 112, (Dist. Buldhana)
Phone No. : (07267)262391, 262245
Fax: (07267)262680
E-mail: benzoeou@rediffmail.com

Registered Office: 26 / 28 – A,
Cawasji Patel Street, Fort,
Mumbai – 400 001 (INDIA).
Phone No. : (022)24320921/22/23 Fax No. 022-
Corporate Identity No. U24100MH1986PTC041751
Email gcpl@bom3.vsnl.net.in, Website: www.bcipl.com

Job Work Order No. BCML/MLKADJ011/20-21

Dt. 17.11.2020

To,
Shivraj Water Suppliers
Dasarkhed

SUB: WORK ORDER

Dear Sir,

This is with reference to your quotation Dated 17.11.2020 & telephonic discussions had with us, we are pleased to release our work order towards Water Tanker Trip. The details of which are as under:

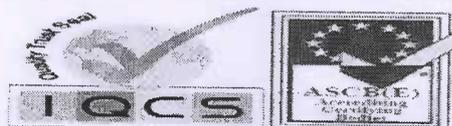
Sr. No.	Particulars	Rates
1	Water Tanker Trip (capacity 17000 Ltr. Each)	Rs.4000/-

❖ The billing will be based on actual no. of Trips.

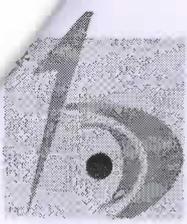
1) SCOPE OF WORK:

- A) All the material required as per the estimate provided by you shall be arranged and brought by you at your cost & risk. **Yes / No**
- B) All necessary machinery, tools & tackles, consumables, etc., which are required to carry out the job shall be brought by you at your cost & risk. **Yes / No**
- C) If required, Benzo Chem Industries Pvt. Ltd., Malkapur will provide the power & water. **Yes / No**
- D) You shall ensure that the quality of work will be as agreed which will be verified and certified by our technician. Your invoice shall be approved after thorough checking & inspection of the entire work. **Yes / No**
- E) Completion of work should be done as per our schedule after receipt of the job work order.
- F) Any damage / loss to company assets by your workmen will be recovered and debited to your account. **Yes / No**
- G) Above mentioned rates are **with** / without material unless & until specified.
- H) The estimated costing for the work is Rs 400000.00 To variation + - 10% as agreed.

CONT....



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BENZO CHEM

BENZO CHEM INDUSTRIES PRIVATE LIMITED

518

Works: B-26, 27 & B-14/15, M.I.D.C. Area, Dasarkhed,
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Corporate Identity No. U24100MH1986PTC041751
Email gcpl@bom3.vsnl.net.in, Website: www.bcipl.com

(2)

- 1) Kindly ensure that all necessary devices, instruments & apparatus shall be available for carrying and the specified tests.

(2) Other terms & conditions governing to the contract:

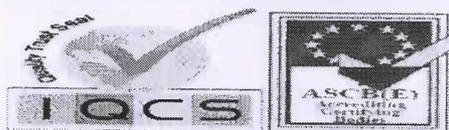
(1) Payment:

- A) Depending upon nature of work the advance payment NIL shall be decided.
Yes / No IF Yes NIL %
- B) 100% payment will be paid immediate after successful completion of work certified by the concerned Engineer / Incharge.
Yes / No
- C) 90% payment will be paid after successful completion of work certified by the concerned Engineer / Incharge.
Yes / No
- D) Balance 10% will be paid after one year for contract of civil nature and for fabrication work it will be 10 for six months from the date of submission of bill and will be kept on hold as a retention amount. **Yes / No**
- E) Penalty @1% will be charged on gross amount per week if the work is not completed within the stipulated period. We give you grace period for further..... Days. **Yes / No**
- F) You shall submit the bills within 15 days from completion of work and checking will be completed within 15 days thereafter.
- G) Measurement sheet should be on your printed letter head with continuous numbering on each page with reference no. of this job work order.
- H) All taxes like GST, T.D.S., W.C.T., etc. will be extra as applicable. **Yes / No**

Statutory Obligations:

- A) It is expressly agreed between the parties that contractor shall comply with all the laws applicable to him for example, Minimum Wages Act 1948, Provident Fund & Miscellaneous Provisions Act 1952, Employees Compensation Act 1923, Contract Labour (Regulation & Abolition) Act, 1970, any other applicable insurance laws, etc. and in case any responsibility has fastened on the company for any of the responsibility of the Contractor, the Contractor shall indemnify the company to the extent the liability is fastened on it and shall keep the company indemnified. It is agreed between the parties that Contractor shall take all the obligations to comply all other statutory obligations under various statues shall be undertaken by you.
- B) During the execution of work, it will be mandatory on the part of contractor that required safety appliance shall be provided for carrying out the job to ensure no accident takes place or any accident-prone situation arises.

Cont.....



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BENZO CHEM

BENZO CHEM INDUSTRIES PRIVATE LIMITED **519**

Works: B-26, 27 & B-14/15, M.I.D.C. Area, Dasarkhed, **Registered Office:** 26 / 28 - A,
Malkapur - 443 112, (Dist. Buldhana)
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(3)

- C) Movement of All required machinery, tools & tackles, consumables, etc., which are required to carry out the job should be informed to Security personnel as well as to the Stores department while entering & leaving the premises for keeping the records.
- D) If work is not found satisfactory then bills will be rejected and upon satisfactory rectification of it, same will be resubmitted which may attract the penalty clause of 2 (e). Depending upon the nature and requirements of work, the bills shall be subject to deduction with regard to assessment of its quality and quantity from the point of deviation from the requirements of work order.
- E) If any scrap / waste are generated during carrying out the work then same shall be kept properly separated with intimation to Maintenance / Store department.

Please sign the duplicate copy hereof as a token of your acceptance of scope, terms & conditions of contract.

Thanking You.

For Benzo Chem Industries Pvt. Ltd. (Malkapur EOU)

(P. N. ZOPE)
Plant Head

Signature of Contractor
Name:

For & On behalf of

-TRUE COPY-



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THE PHOTOGRAPHS SHOWING THE EXCAVATED QUERY PIT AREA (E1)



THE PHOTOGRAPHS WHERE THE EXCAVATED SOIL COLLECTED BY RESPONDENT NO. 1 IS STOCKED IN THE RESPONDENT NO. 1'S EARMARKED AREA



BENZO CHEM INDUSTRIES PRIVATE LIMITED

522



Work : B-24/25, MIDC Area, Dasarkhed,
Malkapur - 443 112, (Dist. Buldhana)
Phone No. : (07267) 262678 / 79 / 81
Fax : (07267) 262680
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E-mail : gcpl@bom3.vsnl.net.in Website : www.bcipl.com

Corporate Identity No. U24100MH1986PTC041751

Date: 18/05/2021

To,

**The Regional Officer Amravati,
Maharashtra Pollution control board,
Sahkar Surbhi Bapat Wadi,
Near Vivekanand colony, Amravati - 444 601.**

Subject: Compliance in respect of Honorable NGT order.

Reference: 1) Order passed by Honorable NGT dated 08.12.217.

2) 2) NEERI final report June – 2019.

3) MPCB interim direction MPCB/ID/2009290001 DATED 29/09/2020.

4) Our Letter EHS/2021/01 16.05.2021

Respected Sir,

With respect to above mentioned subject, we have completed decontamination work for W-1; W – 7, W- 8 well as well as soil decontamination work of query fit area as per finding & recommendation of NEERI, Nagpur.

We request you to permit us to send contaminated soil of query pit area for disposal at common hazardous waste treatment storage & disposal facility, Butibori, Nagpur. As per guideline of NEERI, Nagpur report to make compliance of Honorable NGT and MPCB order.

Please do needful accordingly.

Thanking you,



BENZO CHEM INDUSTRIES PRIVATE LIMITED ⁵²³

Work : B-24/25, MIDC Area, Dasarkhed,
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E-mail : gcpl@bom3.vsnl.net.in Website : www.bcipl.com

Corporate Identity No. U24100MH1986PTC041751

Yours faithfully,
For **Benzo Chem Industries Pvt Ltd.**

Mr.M.A.Sapkal
(Plant Head)
B-24, 25, MIDC Area, Dasarkhed,
Area, Dasarkhed,
Malkapur

Mr. P.N.zope
(Plant Head)
B-26,27 & B-14, B-15MIDC
Malkapur

Copy to: SRO, MPCB, Akola.

-TRUE COOPY-



BENZO CHEM INDUSTRIES PRIVATE LIMITED

Works: B-24, 25, M.I.D.C. Area, Dasarkhed,
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Fort, MUMBAI 400001.
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CIN U24100MH1986PTC041751
E-mail : gcpl@bom3.vsnl.net.in Website: www.bcipl.com

EHS/2021/01

May 16, 2021

To,
The Director,
NEERI, Nehru Marg,
Nagpur, 440020,
India

Subject: Compliance in respect of Honorable NGT order.

Reference: 1) Order passed by honorable NGT dated 08.12.2020.
2) NEERI final report June – 2019.
3) MPCB interim direction MPCB/ID/2009290001 DATED 29/09/2020.

Dear Sir,

With respect to above mentioned subject, we have completed decontamination work for W-1, W – 7, W- 8 well as well as soil decontamination work of query fit area as per finding & recommendation of NEERI, Nagpur.

We are pleasure to invite you for sampling of water & soil for reassessment of present status.

Please do needful accordingly.

Yours faithfully,
Thanking you,

For BENZO CHEM INDUSTRIES LTD

Authorized Signatory

**B-24, 25 MIDC Area, Dasarkhed Area,
Malkapur**

C.C: SRO, MPCB Akola.
RO, MPCB Amravati.

Authorized Signatory

**B-26, 27 & B 14,15 MIDC Area, Dasarkhed Area,
Malkapur**



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