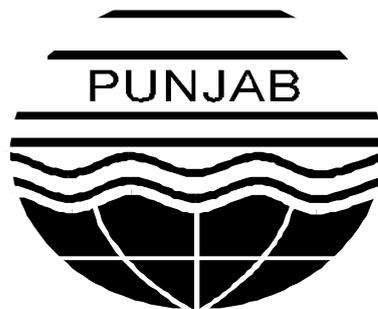


# **A Study Report**

**On**

**Contamination of Ground Water in the  
vicinity of industry namely M/s KRBLs Ltd, Village  
Bhasour, Dhuri Distt. Sangrur.**



**Carried out by PPCB under the guidance of**

**Dr. D.K Benbi, National Professor,  
Deptt. of Soil Science,  
Punjab Agriculture University, Ludhiana**

**PUNJAB POLLUTION CONTROL BOARD PATIALA**

**January 2020**

The industry was granted consent to operate under the Water Act, 1974 vide no. CTOW/Varied/SGR/2016/4631889 dated 08/12/2016 and the Air Act, 1981 vide no. CTOA/Varied/SGR/2016/4633319 dated 08/12/2016, both valid upto 31/03/2021 for the manufacturing of Raw rice @ 1448 TPD, Saila Rice @ 482 T/day, Rice Bran Oil @ 42 T/day, DOC @ 208 T/day, Power @ 10.5 Megawatt, Furfural @ 10 T/day, Furfuryl Alcohol @ 10 T/day.

A complaint regarding illegal disposal of wastewater into borehole and air pollution caused due to discharge of emissions arising from the industry causing harmful effects to the nearby agricultural fields of Sh. Jagtar Singh S/o Sh. Jangir Singh and Sh. Bharpur Singh S/o Sh. Jangir Singh, Residents of Village Babbanpur, Tehsil Dhuri, Distt. Sangrur was received in Regional Office.

To verify the contents of complaint, the site (under complaint) was visited by AEEs of Regional Office on 15/09/2017 and Sh. Jagtar Singh, complainant was contacted alleged that the wastewater generated from the process of the industry was being discharged into the borehole causing ground water contamination and polluted emissions were being discharged by the industry causing damage to their agricultural fields. During visit, he failed to point out any borehole in the vicinity and contended that groundwater sample may be collected from tubewell provided in his agricultural fields. Accordingly, samples were collected and results are annexed at **Anneure-1**.

During visit, the crops were observed in grown up state in the agricultural fields of complainant and no harmful effect was observed on the crops.

The industry was also visited surprisingly by the team of Board officers on 16/02/2018 and the effluent samples were collected from ash dump area and got analyzed for various parameters. The analysis results are annexed at **Anneure-2**:

The perusal of results reveals that samples were found not meeting the prescribed standards such as TDS, BOD, COD etc. of the Board. Accordingly, the industry was issued show cause notice along with an opportunity of personal hearing before the Member Secretary of the Board on 13.04.2018. After, the hearing it was decided as under:

1. The industry will ensure that the treated effluents discharged by the industry are utilized onto land for plantation/ irrigation only.
2. Environmental Engineer, Regional Office, Sangrur shall visit the industry to verify its contentions and submit his report/recommendations, within 3 weeks.

To check the compliance, of the decisions, the industry was again visited by AEE of Regional Office on 29/05/2018 and during visit, it was observed as under:

1. The ETP installed by the industry was found in operation
2. The trade effluent generated from the various processes as well as domestic effluent was being treated in the ETP installed by the industry.
3. The entire treated effluent was being discharged onto land for plantation in an area within the premises.

Thereafter, persistent complaints, regarding illegal discharge of wastewater into borehole by the industry causing ground water contamination and affecting the health and causing diseases such as cancer and death of residents of village Babbanpur were received in Regional Office.

Accordingly, to verify the contents of the complaint, the industry was visited by officer of the Board on 08/01/2019 and during visit, the complainant Sh. Lakhwinder Singh, resident of village Babbanpur was contacted. He alleged that the wastewater generated from the process of the industry was being discharged into the borehole causing ground water contamination, thereby causing cancerous diseases, resulting in death of residents of village Babbanpur. He failed to point out any borehole in the vicinity and contended that ground water sample may be collected from the tubewell provided in the agricultural fields of Sh. Johar Singh S/o Sh. Harnek Singh, village Babbanpur.

Thereafter, the premises of the industry were inspected by AEE of Regional Office on 08/01/2019 and during visit, no borehole was found in the vicinity. The ETP installed by the industry was found in operation and the treated trade effluent was being discharged onto land in plantation area measuring about 35 acres. The trade effluent samples from inlet and outlet of ETP were collected alongwith 02 no. groundwater samples from the bore wells provided inside the premises of the industry near to its plantation area and from the tubewell of Sh.

Johar Singh, S/o Sh. Harnek Singh, village Babbanpur) provided in his agricultural field and were sent to Head Office Lab, Patiala for analysis. The analysis results of samples collected from ETP and groundwater are annexed at **Annexure-3 & 4**.

Results in **Table-3** reveal that concentration of various parameters in the samples collected for outlet of ETP was found within the permissible limits as prescribed by the Board. As per the results mentioned in Table-4, the groundwater samples collected from tubewells/borewell provided inside the premises of the industry near to its plantation area and tubewell installed in the agricultural field of Sh. Johar Singh, S/o Sh. Harnek Singh, village Babbanpur, the concentration of parameters **TDS, Total Hardness and Total Alkalinity** was found beyond the prescribed limits as per the BIS standards IS 10500:2012..

Thereafter, another complaint from the office of the Hon'ble Chief Minister, Punjab was received in Regional Office on 31/01/2019 through Deputy Commissioner Office, Sangrur. Accordingly, the industry was again visited by AEE of Regional Office alongwith Sh. Deepak Rohila, SDM, Dhuri on 01/02/2019 and during visit, no illegal mode of effluent/ boreholes was found in the vicinity. Trade effluent samples from inlet and outlet of ETP installed by the industry were collected and groundwater samples from irrigation pump of Sh. Jagtar Singh, S/o Sh. Jagir Singh, village Babbanpur and Sh. Gurdev Singh S/o Sh. Ram Krishan Singh, village Bhasour were collected. The analysis results of samples collected from ETP and groundwater are annexed at **Annexure-5 & 6**.

Results tabulated in Table-5, reveal that concentration of various parameters in the samples collected from outlet of ETP provided in plantation area was found within the permissible limits as prescribed by the Board.

As per the results mentioned in Table-6, the groundwater samples collected from tubewells of Sh. Gurdev Singh S/o Sh. Ram Krishan, Village Bhasour, Dhuri and Sh. Jagtar Singh S/o Sh. Jagir Singh, Village Babbanpur, Dhuri, the concentrations of parameters i.e. TDS, COD, BOD, Chloride, Total Hardness and Total Alkalinity (Tubewell of Sh. Jagtar Singh S/o Sh. Jagir Singh, Village Babbanpur, Dhuri), Total Hardness and Total Alkalinity (Tubewell of Sh. Gurdev Singh S/o Sh. Ram Krishan, Village Bhasour, Dhuri) were found beyond the prescribed limits as per the BIS standards IS 10500:2012.

The industry was again visited by the team of the Board officers headed by Hon'ble Chairman of the Board on dated 07/02/2019. During visit, a meeting with the complainants and residents of village Babbanpur was held by the Hon'ble Chairman of the Board. The complainants and the residents of village Babbanpur alleged that the ground water quality of the area has been affected due to discharge of industrial wastewater into borewells, causing cancerous disease and death of residents of village Babbanpur. However, during visit, they failed to point out any borehole in the vicinity.

However, trade effluent samples were collected from inlet as well as outlet of ETP and 08 no. groundwater samples from irrigation tubewells installed in village Babbanpur, Tehsil Dhuri and village Bhasaur, Tehsil Dhuri were collected and sent to PBTI Lab, Mohali for analysis. The analysis results of monitoring of ETP and Ground water samples are annexed at **Annexure-7 & 8**.

The analysis results of the groundwater samples collected from various tube wells located in surrounding area around the premises of the industry, reveals the higher presence of TSS, BOD and COD (In tubewell no. B-1, 2, 4, 5, 6, 7, 10 and 11), TDS (In tubewell no. B-1, 2, 4, 5, 6 and 11), Chloride (In tubewell no. B-2, 5 and 11), Boron (In tubewell no. B-2), Iron (In tubewell no. B-1) and Amonical Nitrogen (In tubewell no. B-4)

The analysis report of groundwater sample collected from piezometer (In tubewell no. B-11) installed by the industry in plantation area also reveals the presence BOD, COD, TDS, TSS, Chloride, which shows that the groundwater of the plantation area as well as the surrounding area has been contaminated, which may be due to the industrial activity being carried out by the industry.

It is pertinent to mention here that the matter with regard to traces of different pollutants in the ground water samples was discussed with Worthy Chairman of the Board on 22.03.2019 in the presence of Chief Environmental Engineer(B), Senior Environmental Engineer, Zonal Office-II, Patiala, Environmental Engineer, Zonal Office-II, Patiala and Sh. R.K Sharma (COO) of the industry. After, detailed deliberation with regard to cause of traces of different pollutants in the ground water samples, it was decided that more deliberations are required in this matter in the presence of industry representative and experts from PBTI Lab, Mohali

to decide further line of action in the matter. Meanwhile, the industry shall short list institutes / agencies of repute from whom detailed study w.r.t traces of pollutants can be carried out.

Accordingly, Dr. D.K Benbi, National Professor, Deptt. of Soil Science, Punjab Agriculture University, Ludhiana was engaged as expert to identify the cause of contamination in the ground water. Accordingly, the site was visited by the team of the officer of the Board alongwith Dr. D.K Benbi, National Professor, Deptt. of Soil Science, Punjab Agriculture University, Ludhiana on 07.05.2019 to carry out reconnaissance survey. It was recommended that a detailed study needs to be conducted to identify the source and extent of contamination in the groundwater and effluents emanating from the industry.

Dr. D.K. Benbi, interpreted the results and found that the PBTI did a qualitative analysis of a water sample during March, 2019. In the analysis report, PBTI has identified the presence of some organic compounds, though their concentrations were not quantified. The source of these compounds in water sample is not obvious. These organic compounds are generally not present in groundwater and could be due to some current or past anthropogenic activity. It has to be ascertained whether one or more of these compounds are used in the industrial processes including extractive milling of rice, solvent extraction and manufacture of rice bran oil and manufacture of furfural. If any of these compounds is used in a process, it has to be ensured by regular monitoring by PPCB of all the possible sources of contamination that there is no leakage to soil and water. The present report of PBTI provides only qualitative information, however it is important that the concentration of these compounds be measured in the tubewell water and collated with permissible limits. Furthermore, the water pumped from other tubewells in the vicinity of the one with contaminated water needs to be analyzed for making an assessment of the spatial extent of the problem. If this happens to be the only tubewell with contaminated water, running of the pump for extended period of time with continuous monitoring of quality may provide some indications. Water samples from the running pump may be collected at regular intervals and analyzed as per the previous report for organic compounds.

If the problem persists, a comprehensive study involving regular monitoring, chemical characterization of resources of the area may help in identifying the source and pathway of entry of these chemicals into groundwater. The PPCB could collaborate with PBTI for desired chemical analyses.

Thereafter, complainants of different villagers (Representatives of BKU) which are existing in the vicinity of the industry namely M/s KRBL Ltd., village Bhasaur, Tehsil Dhuri, met with Worthy Chairman of the Board and submitted representation regarding ground water pollution caused due to the said industry in its nearby area. It was discussed that as per earlier monitoring of tubewells in the vicinity of the industry, carried out by the Board, only one tube well has shown excess parameters and water drained has also pale yellow color. As such, a detailed monitoring of this tubewell needs to be conducted over a period of time to arrive at some conclusion.

In this regard, a meeting was fixed on 19.9.2019 in the office of Worthy Chairman of the Board, Patiala with Environmental Engineer, Regional Office, Sangrur, industry namely M/s KRBL Ltd., to discuss the further line of action in the matter. It was also decided to call Sh. Kirpal Singh, Dhuri, (Mobile no. 7889092942) and Sh. Harbans SinghLadda (Mobile no. 9779897660), representative of BKU in the said meeting.

Accordingly, a meeting was held by the Worthy Chairman of the Board on 19/09/2019, with the complainants of different villages (Representative of BKU), existing in the vicinity of the industry namely M/S KRBL Ltd., Village Bhasaur, Tehsil Dhuri. It was decided as under: -

1. Dewatering from the tubewell under compliant be carried out for one week. The tubewell will be operated continuously with a break of half hour after every 4 hours.
2. The sampling will be carried out during operations of tubewell for all the seven days as per time schedule below:
  - i) First sample at Zero hour i.e. immediately after start of tubewell on the first day.
  - ii) After every 4 hours of operation i.e. immediately before stopping for half hour break, after every 4 hours of operations, during first 3 days.

- iii) After every 8 hours of operation (4 hours operation + half hour break + 4 hours operation) for remaining 4 days.
3. The samples shall be sent to state water lab. for analysis of various parameters to the trend of quality of water, over a period of time.
4. For compliance as above. a committee was constituted to do the needful immediately in consultation with members:
  - i. Sh. Harjeet Singh, Environmental Engineer. Regional Office, Sangrur
  - ii. Sh. Maninder Singh, Asstt. Environmental Engineer, Regional Office, Sangrur. Sh. Khaleel Mohammad, Project Associate, Water Lab. Head Office, Patiala
  - iii. Representative of the industry namely M/S KRBL Limited, Village Bhasaur. Distt. Sangrur.
  - iv. One representative of the complainants in consultation with Shi. Kirpal Singh, Dhuri and Sh. Harbans Singh Ladda.

The Ground water samples were collected from the tubewell owned by Sh. Jagtar Singh of Village Babbanpur, Tehsil Dhuri, Distt. Sangrur w.e.f. 24/09/2019 by the team constituted by the Board. Further, during the sampling dated 24/09/2019, the sample of piezometer installed in the plantation area of the industry (i.e. M/s KRBL Limited) was also collected. All the samples collected during the period 24/09/2019 to 29/09/2019 were sent to PBTI, Mohali for analysis of various parameters.

In the meanwhile, during the sampling on 28/09/2019, the residents of village (complainants) arrived at the site and stopped the team to continue with the running of tubewell and collection of water samples. Later on, Sh. Yadwinder Singh, member of BKU arrived at site and convinced the complainants to let the team to continue the study of the tubewell and accordingly, complainants agreed and sampling was again carried out by the team on 28/09/2019. Thereafter on 29/09/2019, the complainants again gathered at the site, (after collection of ground water samples of tubewell during morning time) and stopped the team to collect water samples from the tubewell. Sh. Jagtar Singh, owner of the tubewell, disconnected the power supply of the DG set, provided to the tubewell. Therefore, the water sample of the tubewell could not be collected thereafter on dated

29/09/2019. The analysis results of the Ground water samples are annexed at **Annexure-9**. The GCMS/MS Profiling of ground water samples (analysis provided by PBTI) collected from the tubewell of Sh. Jagtar Singh, Vill. Bhasur, Dhuri on 23/09/2019 to 29/09/2019 are annexed at **Annexure-10**.

It is pertinent to mention here that in the meeting taken by Worthy Chairman of the Board, with Shi. DK Benbi PAU, Ludhiana, Dr. Sarabjit Singh TIET, Patiala, Sh. Santosh Kumar PBTI and Sh. RK Sharma, COO representative of the industry (M/S KRBL limited) on 26/09/2019, it was decided that the PBTI will collect trade effluent samples from inlet as well as outlet of treatment facility provided in the furfural section and ETP installed by the industry

Accordingly, the matter was discussed with Sh. Santosh Kumar PBTI Mohali, by Regional Office and he informed that because of his busy schedule, the sampling could not be conducted by PBTI immediately. However, samples from the industrial premises were collected on 23/10/2019 and sent to PBTI, Lab for analysis of various parameters. The analysis results of the said samples are annexed at **Annexure-11**. The GCMS/MS Profiling of samples (analysis provided by PBTI) collected from industry on 23/10/2019 is annexed at **Annexure-12**.

Thereafter, an expert opinion of Sh. Dinesh Benbi, National Prof. of PAU was obtained on the analysis results of samples analysed by PBTI. He was of the opinion that ground water samples from two other locations are required to be collected and get it analyzed from PBTI lab for different parameters. Accordingly, 02 no. samples were collected by the PBTI from Distt. Sangrur and Mohali and results are annexed at **Annexure-13**. The GCMS/MS Profiling of samples (analysis provided by PBTI) is annexed at **Annexure-14**. Now, Dr D. K. Benbi submitted his report which is as under:

### **Organic compounds**

PBTI performed a qualitative analysis of water samples collected during September, 2019 from different process-sites within the KRBL premises and some locations outside the factory. In the analysis report, PBTI has indicated the presence of several organic compounds, though their concentrations have not been quantified. A comparison of analyses of various samples showed that some organic

compounds were detected in almost all the samples though the number of compounds identified varied in a few samples as shown in Table-15 annexed at **Annexure-15**. While five organic compounds had been detected in the samples from inlet and outlet of ETP, the outlet of furfural section showed the presence of additional compounds as listed in **Table-15**. The source of these compounds is not apparent.

The sample from the plantation area and other sampling sites outside the factory also showed the presence of most of these compounds. In the tubewell water of Jagtar Singh, sampled on 23<sup>rd</sup> September a large number of organic compounds (25-30) including those found in the samples from within the factory premises were identified (Table 12). However, running the tubewell intermittently from Sept 23 to Sept 29, 2019 and regular monitoring of the water quality indicated that several compounds that were initially present could not be detected in the subsequent analyses.

After running the tubewell for 6 days, only 10 organic compounds were detected on 29<sup>th</sup> September, 2019 (Table 15) and these compounds were the same as detected in the samples from within and outside the factory premises. Furthermore, ground water samples collected from about 10 km on either side (north and south) of the factory as well as from Mohali (Table 14) also showed the presence of the same organic compounds as found in the tubewell water of Jagtar Singh, plantation area of KRBL and other locations within the factory premises.

The report on water analysis indicates greater spatial extent of the problem. However, specific source(s) of these organic compounds cannot be identified as these can result from a variety of surface activities including industrial effluents, use of agricultural chemicals (pesticides), leakage from fuel tanks and septic tanks etc. Because of lack of quantitative information, it is not possible to relate these analyses to some reference permissible limits.

### **Inorganic Components**

The samples collected on 23.10.2019 from inlet and outlet of ETP were also analysed for several chemical parameters. The treated effluent showed high pH (9.14) and high concentration of total dissolved salts (TDS). Compared to untreated

effluent, the treated effluent showed increase in pH (6.02 to 9.14), TDS (1080 to 2210 mg/l), Chloride (260 to 1300 mg/l), sulfate (54 to 120 mg/l), sodium (111 to 870 mg/l) and conductivity (201 to 4.29 dS/m). The analysis of aeration tank water showed high biochemical oxygen demand (BOD), chemical oxygen demand (COD), chloride, sulphate, sodium and potassium. The treated effluent outlet of parboiled section had low pH (5.22), high BOD and COD, TDS, phosphates, chloride, sulfate, phosphate, sodium and potassium and the values were generally higher than in untreated effluent from the same section. The treated effluent of Furfural section had very low pH (3.27) and high BOD, COD, TDS, chloride, sulphate and phosphates. All these analyses indicate that untreated effluents from DM plant, cooling tower etc. are directly added to the outlet of the main ETP disposed to plantation area. These effluents must be treated for minimizing the pollution hazard before mixing with the ETP outlet. Otherwise disposal of untreated water mixed with treated effluent from the ETP to land or surface bodies can have adverse impact on groundwater and soil health.

A meeting was held by the Chairman of the Board on 07.01.2020 with experts and industry to discuss the analysis report and identify the cause of contamination in the ground water. The representative of the industry informed that self-monitoring of the ETP is also being carried out regularly in the laboratory established by the industry. Accordingly, the industry was asked to supply the said data to the Board. It was also decided during meeting that the soil sample from plantation area of the industry, from area other than plantation from the industrial premises and from outside the industry be collected by the Environmental Engineer, Regional Office Sangrur along with PBTI lab Mohali and get it analyzed from PBTI for different parameters. After detailed deliberation, it was decided as under:

1. The Environmental Engineer, Regional Office, Sangrur shall supply the list of pesticides being used by the farmers in District Sangrur to identify the cause of existence of different compounds in the ground water samples. Accordingly, the list has been sent by the Environmental Engineer, Regional Office, Sangrur and same is annexed at **Annexure-16**.
2. The industry has submitted the self-monitoring results of ETP and these are annexed at **Annexure-17**. The analysis is limited to only four parameters

(pH, TDS, BOD, COD) and information on inorganic analysis is lacking, though the analysis of reported parameter is within the permissible limits.

3. The ground water samples of different districts including Bathinda, Fazlika, Gurudaspur, Hoshiarpur, Ludhiana and Amritsar be collected and get analysed from Board's lab as well as PBTI Lab for different parameters. Accordingly, samples from above mentioned districts are being collected by the scientific staff of Head Office, Laboratory.
4. Soil samples from the inside as well outside the industrial premises shall be collected by the PBTI lab in association with RO, Sangrur and to have preliminary indications about the status of soil health.

**Recommendation:**

- i) The periodic analysis of water and effluent samples from the factory premises as well as from outside indicates the presence of organic compounds in the groundwater. Though the tubewell water of Jagtar Singh initially showed the presence of some additional compounds yet continuous running of the tubewell for 6 days led to disappearance of these additional compounds suggesting that the problem is confined to that particular tubewell only. Presence of certain compounds in all the samples from different locations suggests a wider spread of the problem, may be on a regional scale, with respect to contamination with organic compounds. Apparently, the presence of these compounds could not be correlated with the effluents emanating from the industry. The analysis of samples collected from other districts in the state will further help in identifying the spatial extent, if any of the problem. A well designed study needs to be conducted to identify the source of these contaminants and their concentration.
- ii) The analysis of effluent from the industry showed elevated levels of inorganic salts particularly that of Na and chloride, high pH and conductivity. Disposal of treated waste water with high salts onto land for plantation can have detrimental effects on soil and groundwater. The industry should take appropriate measures for mitigation of the problem. Since such waste water is being added to the plantation area for more than 10 years, the industry should undertake a well-designed project. The industry may undertake two

phase project for characterization, collation with industrial processes, impact analysis on ground and water resources in the region involving farmers' fields.

## Anneuxure-1

**Table-1**

**Analysis Results of Ground Water Sample collected from Submersible pump (450 ft) installed in agricultural land of Sh. Jagtar Singh S/o Sh. Jagsir Singh, Village Babbanpur, Dhuri on 15.09.2017 .**

<b>Sr. No.</b>	<b>Parameters</b>	<b>From Submersible pump (450 ft) installed in agricultural land of Sh. Jagtar Singh S/o Sh. Jagsir Singh, Village Babbanpur, Dhuri</b>
1.	pH	6.7
2.	Total Dissolved Solids mg/l	1211
3.	Total Suspended Solids mg/l	6
4.	Chloride mg/l	352
5.	Sulphate mg/l	61
6.	Total Hardness as CaCO <sub>3</sub> mg/l	606
7.	Total Alkalinity as CaCO <sub>3</sub> mg/l	586
8.	Chemical Oxygen Demand mg/l	15
9.	Bio-chemical Oxygen Demand mg/l	BDL
10.	Total Coliform MPN/100 ml	BDL
11.	Fecal Coliform MPN/100 ml	BDL

## Annexure-2

**Table -2**

### Analysis results of the samples collected from the Industry on 16/02/2018

<b>Point of sample collection</b>	<b>pH</b>	<b>TSS mg/l</b>	<b>BOD mg/l</b>	<b>TDS mg/l</b>	<b>COD mg/l</b>	<b>Chloride mg/l</b>	<b>Sulphate mg/l</b>
Effluent flowing from one pocket to other in ash dump area.	5.3	188	240	2084	1020	-	-
Effluent from pipe line leading to ash dump area.	6.2	226	303	2472	1213	-	-
Open drain leading to plantation area	7.5	11	12	1543	64	-	-
Inlet to Effluent Treatment Plant	4.7	466	625	2581	2413	-	-
Final Outlet of Effluent Treatment Plant	7.2	42	47	1927	179	-	-
Submersible pump near Ash dump	6.8	BDL	BDL	904	BDL	54	21

**Anneure-3**

**Table -3**

**Analysis results of Monitoring of ETP collected on 8/01/2019**

<b>Sr. No.</b>	<b>Parameters</b>	<b>Inlet of ETP</b>	<b>Outlet of ETP</b>	<b>Aeration tank-I</b>	<b>Aeration tank-2</b>
1.	pH	5.34	76	-	-
2.	Total Suspended Solids (mg/l)	142	24	-	-
3.	Total Dissolved Solids (mg/l)	5594	610	-	-
4.	Chemical Oxygen Demand (mg/l)	1840	72	-	-
5.	Bio-chemical Oxygen Demand (mg/l)	850	18	-	-
6.	Oil & Grease (mg/l)		BDL	-	-
7.	Mixed Liquid Suspended Solids (mg/l)	-	-	2460	3230
8.	Mixed Liquid Volatile Suspended Solids (mg/l)	-	-	1590	2260

## Anneure-4

**Table-4**

**Analysis results of Ground Water Samples collected from Tubewell of Sh. Johar Singh Slo Sh. Harnek Singh, Village Babbanpur and borewell inside premises of industry near to it's plantation area on 8/01/2019**

<b>Sr. No.</b>	<b>Parameters</b>	<b>From Tubewell of Sh. Johar Singh Slo Sh. Harnek Singh, Village Babbanpur (8.1.2019)</b>	<b>Borewell inside premises of industry near to it's plantation area (8.1.2019)</b>
1.	pH	7.16	7.06
2.	Total Suspended Solids (mg/l)	BDL	BDL
3.	Total Dissolved Solids (mg/l)	712	614
4.	Chemical Oxygen Demand (mg/l)	BDL	BDL
5.	Bio-chemical Oxygen Demand (mg/l)	BDL	BDL
6.	Chloride (mg/l)	16	47
7.	Sulphate (mg/l)	32	31
8.	Total Hardness (mg/l)	475	440
9.	Total Alkalinity (mg/l)	550	476
10.	Total Coliform MPN/100 (mg/l)	BDL	BDL
11.	Fecal Coliform MPN/100 (mg/l)	BDL	BDL

## Annexure-5

**Table-5**

**Analysis Results of Treated Trade Effluent Samples collected on**

<b>Sr. no.</b>	<b>Parameters</b>	<b>From Outlet of ETP provided in plantation area (1.2.2019)</b>
1.	pH	7.56
2.	Total Suspended Solids (mg/l)	82
3.	Total Dissolved Solids (mg/l)	1278
4.	Chemical Oxygen Demand (mg/l)	97
5.	Bio-chemical Oxygen Demand (mg/l)	37
6.	Oil & Grease (mg/l)	4.6

**1/02/2019**

**Annexure-6**

**Table-6**

**Analysis results of Samples collected from tubewell of Sh. Gurdev Singh Slo Sh. Ram Krishan, Village Bhasour, Dhuri tubewell and from tubewell of SH. Jagtar Singh Slo Sh. Jagir Singh, Village Babbanpur, Dhuri on 1/02/2019**

<b>Sr. No.</b>	<b>Parameters</b>	<b>From tubewell of Sh. Gurdev Singh Slo Sh. Ram Krishan, Village Bhasour, Dhuri (1.2.2019)</b>	<b>From tubewell of SH. Jagtar Singh Slo Sh. Jagir Singh, Village Babbanpur, Dhuri (1.2.2019)</b>
1.	pH	7.15	687
2.	Total Suspended Solids (mg/l)	BDL	BDL
3.	Total Dissolved Solids (mg/l)	496	1706
4.	Chemical Oxygen Demand (mg/l)	BDL	51
5.	Bio-chemical Oxygen Demand (mg/l)	BDL	6
6.	Chloride (mg/l)	56	592
7.	Sulphate (mg/l)	69	95
8.	Total Hardness (mg/l)	409	802
9.	Total Alkalinity (mg/l)	362	828
10.	Total Coliform MPN/100 (mg/l)	BDL	BDL
11.	Fecal Coliform MPN/100 (mg/l)	BDL	BDL

## Annexure-7

**Table-7**

**Analysis results of treated/ untreated trade effluent samples collected on 7.2.2019**

<b>Sr. No.</b>	<b>Parameters</b>	<b>Inlet of Effluent Treatment Plant(B-8)</b>	<b>Outlet of ETP (B-3)</b>	<b>Aeration tank (B-9)</b>
1.	pH	4.84	7.13	-
2.	TSS (mg/l)	325	59	-
3.	BOD (mg/l)	2300	19	-
4.	COD (mg/l)	4800	104	-
5.	MLSS (mg/l)	-	-	4510
6.	MLVSS (mg/l)	-	-	1990



**Annexure-8**

**Table-8**

**Analysis results of Ground water samples collected on 7.2.2019**

Sr. No.	Parameters	Tube well B-1	Tube well B-2	Tube well B-4	Tube well B-5	Tube well B-6	Tube well B-7	Tube well B-10	Tube well B-11
1.	pH	7.49	7.68	7.81	7.48	7.52	7.94	8.02	7.48
2.	TSS	16	13	9	8	14	5	3	307
3.	Ammonical Nitrogen	BDL	BDL	5.6	BDL	BDL	BDL	BDL	BDL
4.	Nickle	BDL	BDL						
5.	Zinc	0.02	BDL	0.02	BDL	0.01	0.009	0.007	0.31
6.	Copper	BDL	BDL						
7.	Lead	BDL	BDL						
8.	Chromium	BDL	BDL						
9.	Iron	0.39	0.01	BDL	BDL	0.26	0.02	BDL	0.06
10.	BOD	<1	<b>13</b>	4.60	<1	<1	<1	<1	<b>28</b>
11.	COD	13	<b>244</b>	112	37	16	10	7	<b>216</b>
12.	Arsenic	BDL	0.009						
13.	Cadmium	BDL	0.002						
14.	Fluoride	0.13	BDL	0.49	0.24	BDL	0.5	0.19	0.19
15.	Total Phosphate	BDL	2.4						
16.	TDS	717	1710	816	1207	829	235	296	808

17.	Chloride	68	590	230	290	17	7	7	330
18.	Sulphate	70	67 44		61	130	32	37	40
19.	Total Choliform	2	7	5	<1	<1	<1	8	11
20.	Sodium	44.3	375	125	140	906	19	55	185
21.	Potassium	10.1	66	3 5 10.4		9.9	4.6	5.3	11.9
22.	Anionic Surface Active agent	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23.	Faecal Coliform	<1	<1	<1	<1	<1	<1	<1	<1
24.	Boron	0.25	0.73	0.42	0.46	0.36	0.13	0.25	0.45
25.	Pesticide Residue-2-Dichlorophenoxyacetic acid	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26.	Pesticide Residue Alpha BHC	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27.	Pesticide Residue Beta BHC	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.	Pesticide Residue Gamma BHC	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.	Pesticide Residue Delta BHC	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30.	Pesticide Residue DDT-o, p'	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.	Pesticide Residue DDT-p, p'	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
32.	Pesticide Residue DDE-p, p'	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
33.	Pesticide Residue DDE-op	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

34.	Pesticide Residue DDD- p,p'	BDL							
35.	Pesticide Residue DDD- o,p'	BDL							
36.	PesticideResidueEndesulfan (Alpha)	BDL							
37.	Pesticide Residue Endosulfan (Beta)	BDL							
38.	Pesticide Residue Endosulfan Sulphate	BDL							
39.	PesticideResidue Aldrin	BDL							
40.	Pesticide Residue Dieldrin	BDL							
41.	Pesticide Residue Phorates, oxygen analogues their sulphoxidessulphones	BDL							
42.	Pesticide Residue Butachior	BDL							
43.	Pesticide Residue Alachlor	BDL							
44.	Pesticide Residue Atrazine	BDL							
45.	PesticideResidue Isoproturn	BDL							
46.	Pesticide Residue Chlorphyriphos	BDL							

47.	Pesticide Residue Malathion	BDL							
48.	Pesticide Residue MethyI parathion	BDL							
49.	Pesticide Residue Ethion	BDL							
50.	Pesticide Residue Monocrotophos	BDL							
51.	HYdroxy Methyl Furfural (HMF)	BDL							
52.	Oil & Grease	-	BDL	-	-	-	-	-	-

**Annexure-9**

**Table-9**

**Analysis results of ground water samples collected from the tubewell of Sh. Jagtar Singh, Vill. Bhasur, Dhuri from 24/09/2019 to 29/09/2019.**

Sr. No	Parameter	23.09.2019 at 8.00 A.M	23.9.2019 at 8.30 P.M	23.09.2019 at 4.30 P.M	23.09.2019 at 12.00 P.M	24.09.2019 at 9 A.M	24.09.2019 at 1.30 P.M	24.09.2019 at 6.00 P.M	25.09.2019 at 8.00 A.M	25.09.2019 at 12.30 P.M`	25.09.2019 at 5.00 P.M	26.09.2019 at 8.30 A.M	26.9.2019 at 5.00 P.M	27.09.2019 at 8.30 A.M	27.09.2019 at 05:00 pm	28.09.2019 at 08.30 am	28.09.2019 at 5.00 P.M	29.09.2019 at 9 A.M	23.09.2019 at 8 A.M (PZ-plantation)
1.	pH	6.89	7.04	7.24	7.17	7.27	7.24	6.97	6.83	6.86	6.78	8.14	8.08	8.26	8.12	8.02	8.05	8.11	7.74
2.	TSS, mg/I	11	5	9	6	11	12	7	7	18	9	13	11	11	14	11	14	12	2
3.	Nickel (as Ni), mg/I	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)
4.	Zinc (as Zn), mg/I	0.01	0.02	0.02	0.01	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	0.06	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	BDL (MDL 0.005)	0.76
5.	Lead (as Pb), mg/I	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)	BDL (MDL : 0.005)
6.	Chromium (as Cr),	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	0.006	BDL (MDL : )	BDL (MDL : )	BDL (MDL : )	0.006

	mg/I	0.005)	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )	0.005 )
7.	Iron (as Fe), mg/I	0.9	0.09	0.08	0.09	0.01	0.02	0.10	0.02	0.02	0.01	0.02	0.02	0.03	0.05	0.01	0.02	0.05	0.15
8.	Color,Cu	84	65	69	77	63	70	69	68	67	67	64	70	62	62	63.4	63.4	62	19
9.	BOD3 at 27oC mg/I	< 1	< 1	< 1	< 1	6.3	7.4	7.2	7.9	9	6.5	8.4	7.6	8.9	76	7.9	7.3	10	< 1
10.	COD Total, mg/I	52	48	50	48	65	54	70	56	54	60	55	58	66	67	89	81	64.8	4
11.	Arsenic (As), mg/I	BDL (MDL : 0.005)																	
12.	Fluoride ( as F), mg/I	0.8	0.4	0.2	0.3	0.6	0.4	0.5	0.7	0.7	0.5	0.3	0.4	0.5	0.7	0.5	0.5	0.3	0.4
13.	Dissolved Phosphates ( as P), mg/I	0.9	0.8	0.7	1	0.8	1.3	0.7	0.8	0.7	1.2	0.7	0.7	1	1	0.8	0.9	0.9	0.3
14.	TDS, mg/I	1150	1378	1352	1295	1367	1367	1533	1501	1561	1568	1630	1202	1325	1391	1260	1323	1201	569
15.	Chloride (as Cl), mg/I	455	430	435	425	420	430	430	400	410	415	540	510	400	390	410	390	390	75
16.	Sulphate (as SO4), mg/I	65	76	64	76	74	68	68	47	37	39	74	80	74	70	74	70	70	78
17.	Alkalinity (as	620	680	580	540	800	680	800	780	800	440	760	780	780	780	780	760	700	350

	CaCO <sub>3</sub> ), mg/I																		
18.	Sodium (as Na), mg/I	320	351	336	350	324	355	387	332	337	331	350	333	321	348	317	346	347	64
19.	Potassium (as K), mg/I	50	52	52	52	51	54	47	50	52	51	53	51	50	52	52	53	53	7.4
20.	Calcium (as Ca), mg/I	160	112	96	128	168	184	184	168	168	168	152	160	168	152	200	224	184	40
21.	Magnesium (as Mg), mg/I	83	102	107	34	73	68	53	73	78	53	83	73	58	83	48.6	34	58	63
22.	Conductivity, uS/cm	2.34	2.26	2.18	2.16	2.48	2.46	2.47	2.47	2.47	2.47	2.48	2.45	2.45	2.45	2.45	2.45	2.45	0.8
23.	Hardness Total (as CaCO <sub>3</sub> ), mg/I	740	700	680	460	720	740	680	720	740	640	720	700	660	720	700	700	700	360

**Annexure-10**

**Table-10**

**GCMS/MS Profiling of Ground Water samples (analysis provided by PBTI) Collected from from the tubewell of Sh. Jagtar Singh, Vill. Bhasur, Dhuri on 23/09/2019 to 29/09/2019.**

Sr. No.	Compound	23.9.2019 at 8.00 A.M(PZ-Plantation)	28.9.2019 at 5.00 P.M	29.9.2019 at 9.00A.M	27.9.2019 at 8.30 A.M	26.9.2019 at 5.00 P.M	26.9.2019 at 8.30 A.M	25.9.2019 at 5.00 P.M	25.9.2019 at 12.30 P.M`	25.9.2019 at 8.00 A.M	24.9.2019 at 6.00 P.M	24.9.2019 at 1.30 P.M	24.9.2019 at 9 A.M	23.9.2019 at 8 A.M	23.9.2019 at 8.30 P.M	23.09.2019 st 4.30 P.M	23.09.2019 at 12.00 P.M	28.09.2019 at 8.30 A.M	27.09.2019 at 5.00 P.M
1.	1H-Pyrrole-2-Cabonitrile	√	√	√	√	√	√	√	-	-	√	√	√	√	√	√	√	√	√
2.	Acetamide	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3.	Dimethyl Sulphide	-	-	√	√	-	-	-	√	√	-	-	√	√	√	√	√	√	-
4.	Benzene	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
5.	Ethanol	√	-	-	-	-	√	√	√	√	-	√	√	√	-	-	√	-	-
6.	2-Methoxy-5-Nitro-biphenyl	-	√	√	√	√	√	√	√	√	-	-	√	√	-	-	√	√	√
7.	S-Ethyl elanethiolate	-	-	-	-	√	√	√	√	-	-	-	-	√	-	-	-	-	-
8.	2 H-Pyran-2-One	-	-	-	-	√	√	√	√	-	-	-	√	√	-	-	√	-	-
9.	2,4-Pyrimidinediamine	-	√	-	√	√	√	√	√	-	-	-	√	√	-	-	√	√	√
10.	Aniline	-	-	-	-	-	-	-	-	√	-	-	-	√	-	-	√	-	-

11.	Vinylsulfo namide	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-
12.	7H- Pyrrolo (2,3-d) pyrimidin- 4-amine	√	√	√	√	√	√	√	√	√	-	-	-	√	-	-	√	√	√	
13.	N- Thiobuty- o- morpholin e	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	√	-	-	
14.	Lenacil	-	-	-	-	√	√	√	√	√	-	-	-	√	-	-	-	-	-	
15.	Hydroxy- 2-methyl	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	
16.	3- Pyridinol	-	-	-	-	√	√	√	√	√	-	-	√	√	-	-	√	-	-	
17.	Pyridiniu m	-	-	-	√	√	√	√	√	√	√	√	√	√	-	-	√	-	√	
18.	Ethyne	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
19.	Methanam ine	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
20.	Propane	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	
21.	1,2,4- Triazolo (4,3a) pyrazine	-	-	-	-	-	-	-	-	-	√	√	√	√	√	-	-	-	-	
22.	I-Leucine	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	
23.	Acetic Acid	-	-	-	√	√	√	√	√	√	-	-	-	√	√	-	-	-	-	
24.	Benzenes ulfonyl- dichlorom ethanesulf onyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	-	
25.	p- xylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	-	

26.	Fuamric Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	-
27.	Fluorene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-
28.	Carbamot hioic Acid	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	√	-	-
29.	3-Methoxyp henyl (acetonitri le)	-	-	-	-	-	-	-	-	-	-	-	-	√	√	-	√	-	-
30.	Pyridol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-
31.	Benzenam ine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-
32.	N-(4-Chloroben zenesulfo nyl)azetidi n-3-one	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-
33.	2H-Benzotria zole	√	-	-	-	-	-	-	-	-	-	-	-	-	√	√	√	-	-
34.	1,2,5-Thiadiazol e	√	-	-	-	-	-	-	-	-	-	-	-	-	√	√	√	-	-
35.	3,4-Diamino-1,2,4 (4H)-triazole	√	-	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-

**Annexure-11**

**Table-11**

**Analysis results of sample collected from industrial premises on 23.10.2019**

Sr. No.	Parameter	Inlet of ETP	A T	Combined effluent of parboiled and furfural section	Outlet of parboiled section	Outlet of furfural section	Outlet of furfural section after lime dosing	Outlet of ETP	Results of samples analysed by PPCBlab/PBTI lab		
									8/1/2019(PPCB)	1/2/2019(PPCB)	7/2/2019(PBTI)
1.	pH	6.02	7.28	5.54	5.22	2.18	3.27	9.14	7.6	7.56	7.13
2.	Total Suspended Solids (TSS), mg/I	522	4733	193	169	179	173	Result awaited	24	82	59
3.	Nickel (as Ni), mg/I	0.02	0.07	0.02	0.03	0.03	0.02	BDL (MDL 0.01)	--	---	---
4.	Zinc (as Zn), mg/I	0.26	1.40	0.24	0.25	0.50	0.24	0.04	--	---	---
5.	Lead ( as Pb), mg/I	0.01	0.01	BDL (MDL : 0.01)	BDL (MDL : 0.01)	BDL (MDL : 0.01)	0.01	BDL (MDL 0.01)	--	---	---
6.	Chromium (as Cr), mg/I	0.02	0.05	0.01	0.01	0.02	0.02	BDL (MDL 0.01)	--	---	---
7.	Iron (as Fe), mg/I	3.49	23.93	3.61	3.55	4.15	4.97	0.62	--	---	---
8.	Color, CU	2450	910	725	1133	522	164	600	--	---	---
9.	Biochemical Oxygen Demand (BOD3 at 27oC), mg/I	690	860	873	496	135	433	28	18	37	19
10.	Chemical Oxygen Demand (COD)	1652	1869	1707	1626	975	1382	101	72	97	104

	, mg/l										
11.	Arsenic (As), mg/l	0.0 1	B DL (M DL 0.0 1)	0.01	0.0 2	0.0 2	0.01	BDL (MD L : 0.01)	--	---	---
12.	Fluoride ( as F), mg/l	0.3	1.6	0.4	BD L (M DL , 0.1)	0.5	1.9	1.63	--	---	---
13.	Dissolved Phosphates ( as P), mg/l	43. 8	42. 5	33.8	33. 8	28. 8	21.3	4.5	--	---	---
14.	Total Dissolved Solids (TDS), mg/l	105 0	13 00	780	103 0	201 2	880	2210	610	1278	--
15.	Chloride (as Cl), mg/l	260	26 0	160	225	210	180	1300	--	---	---
16.	Sulphate (as SO <sub>4</sub> ), mg/l	54	3	64	46	145 0	550	120	--	---	---
17.	Alkalinity (as CaCO <sub>3</sub> ), mg/l	420	96 0	240	260	640	460	480	--	---	---
18.	Sodium (as Na), mg/l	111	94	70	73	86	83	870	--	---	---
19.	Potassium (as K), mg/l	396	43 0	315	485	497	320	100	--	---	---
20.	Calcium (as Ca), mg/l	68	11 2	80	40	22	44	60	--	---	---
21.	Magnesium (as Mg), mg/l	46	9.7	19	29	42. 5	36	36	--	---	---
22.	Conductivity,m S/cm	2.1 0	2.6 3	1.590	2.1 5	5.5 8	1.885	4.29	--	---	---
23.	Hardness Total (as CaCO <sub>3</sub> ), mg/l	360	32 0	280	220	230	260	300	--	---	---

## Annexure-12

**Table-12**

**The GCMS/MS Profiling of samples (analysis provided by PBTI) collected from the industry on 23/10/2019.**

	Compound	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Inlet of ETP	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Outlet of ETP	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Aeration tank	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Combined Effluent of Parboiled and Furfural section	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Outlet of Parboiled section	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Outlet of Furfural section	M/s KRBL Limited, Village Bhasour, Tehsil Dhuri, Distt. Sangrur-Outlet of Furfural section after neutralisation with lime dosing
1.	1H-Pyrrole-2-carbonitrile	✓	✓	✓	✓	✓	✓	✓
2.	Acetamide	✓	✓	✓	✓	✓	✓	✓
3.	Dimethyl sulphide				✓	✓	✓	✓
4.	Benzene	✓	✓	✓	✓	✓	✓	✓
5.	Ethanol							
6.	2-Methoxy-5-nitro-biphenyl						✓	✓
7.	S-Ethyl etanethioate							
8.	2H-Pyran-2-one							
9.	2,4-Pyrimidinediamine							
10.	Aniline							
11.	Vinylsulfonamide							

12.	7H-Pyrrolo(2,3-d)pyrimidin-4-amine	✓	✓	✓	✓	✓	✓	✓
13.	N-Thiobutyro-morpholine							
14.	Lenacil							
15.	2-Propanamine, N-(1,1-dimethylethyl)N-hydroxy-2-methyl							
16.	3-Pyridinol						✓	✓
17.	Pyridinium	✓	✓	✓	✓	✓	✓	✓
18.	Ethyne						✓	✓
19.	Methanamine							
20.	Propane						✓	✓
21.	1,2,4-Triazolo(4,3a)pyrazine						✓	✓
22.	I-Leucine							
23.	Acetic acid			✓	✓			
24.	Benzenesulfonyl-dichloromethanesulfonyl Chloride							
25.	p-xylene							
26.	Fuamic acid							
27.	Fulorone							
28.	Carbamothioic acid							
29.	3-Methoxyphenyl(acetonitrile)							
30.	Pyridol							
31.	Benzenamine			✓	✓			
32.	N-(4-Chlorobenzenesulfonyl)azetidin-3-one							
33.	2H-Benzotriazole							
34.	1,2,5-Thiadiazole,3,4-dichloro-1,1-dioxide							
35.	3,4-Diamino-1,2,4-triazole			✓	✓	✓	✓	✓

**Annexure-13**

**Table-13**

**Analysis results of ground water samples collected from Kissan service Center ,10 Km South from KRBL Ltd.,and Malerkotla Truck Union, 10 Km North from KRBL Ltd., on 08.11.2019.**

Sr. No.	Parameter	GW Samples - Kissan service Center ,10 Km South from KRBL	GW Sample- Malerkotla, Truck Union, 10 Km North from KRBL
1.	pH	7.35	7.04
2.	Total Suspended Solids (TSS), mg/I	BDL (MDL :1)	BDL (MDL :1)
3.	Nickel (as Ni), mg/I	BDL (MDL 0.005)	BDL (MDL 0.005)
4.	Zinc (as Zn), mg/I	0.03	0.04
5.	Lead ( as Pb), mg/I	BDL (MDL : 0.005)	BDL (MDL : 0.005)
6.	Chromium (as Cr), mg/I	BDL (MDL : 0.005)	BDL (MDL : 0.005)
7.	Iron (as Fe), mg/I	BDL (MDL : 0.01)	BDL (MDL : 0.01)
8.	Color, CU	BDL (MDL : 1)	BDL (MDL : 1)
9.	Biochemical Oxygen Demand (BOD3 at 27oC), mg/I	< 1	< 1
10.	Chemical Oxygen Demand (COD), mg/I	10	11
11.	Arsenic (As), mg/I	BDL (MDL : 0.005)	BDL (MDL : 0.005)
12.	Fluoride ( as F), mg/I	0.36	0.33
13.	Dissolved Phosphates ( as P), mg/I	BDL (MDL : 1)	BDL (MDL : 1)
14.	Total Dissolved Solids (TDS), mg/I	333	516
15.	Chloride (as Cl), mg/I	14	41
16.	Sulphate (as SO4), mg/I	58	32
17.	Alkalinity (as CaCO3), mg/I	302	326
18.	Calcium (as Ca), mg/I	64	77
19.	Magnesium (as Mg), mg/I	28.7	25.3
20.	Conductivity,uS/cm	573	837
21.	Hardness Total (as CaCO3), mg/I	278	296

**Annexure-14**

**Table-14**

**GCMS/MS Profiling of samples (analysis provided by PBTI)**

Sr. No.	Compounds	From Main Tubewell near Gate no. 1 (Tubewell Water, Depth 450 Feet) collected On 18.11.2019	Malerkotla Truck Union (10 KM North from KRBL) collected On 7.11.2019	Kissan service center Malerkotla Truck Union, (10 KM North from KRBL) collected On 7.11.2019
1.	1H-Pyrrole-2-Cabonitrile	✓	✓	✓
2.	Propanoyl Chloride	✓		-
3.	Acetamide	✓	✓	✓
3.	Dimethyl Sulphide	-	-	✓
4.	Benzene	✓	✓	✓
5.	2-Methoxy-5-Nitro-biphenyl	✓	-	✓
6.	7H-Pyrrolo (2,3-d) pyrimidin-4-amine	✓	✓	✓
7.	3-Pyridinol	✓	-	-
8.	Pyridinium	✓	✓	✓
9.	Methanamine	✓	✓	✓
10.	Propane	✓	✓	✓
11.	Ethyne	✓	-	✓
12.	2H-Benzotriazole	✓	-	-
13.	1,2,5-Thiadiazole	✓	-	-
14.	1-Naphthalenethiol	✓	-	-
15.	2,4-Pyrimidinediamine	✓	-	-
16.	3,4-Diamino-1,2,4 (4H)-triazole	✓	-	-

## Annexure-15

**Table-15**

**GCMS/MS Profiling of Water samples (analysis provided by PBTI).**

Compound identified	T/W Jagtar Singh 29.09.19 at 9 am	Plant ation area KRBL	KRBL: Inlet and outlet of ETP	KRBL: Outlet Furfural section	~10 km South of KRBL	~10 km North of KRBL
1H-Pyrrole-2-carbonitrile	√	√	√	√	√	√
Acetamide	√	√	√	√	√	√
Dimethyl Sulfide	√	√		√	√	
Benzene	√	√	√	√	√	√
2-Methoxy-5-Nitro-biphenyl	√	√		√	√	
7H-Pyrrolo(2,3-d)pyrimidin-4-am	√	√	√	√	√	√
Ethyne	√	√		√	√	
Methanamine	√	√			√	√
Propane	√	√		√	√	√
I-Leucine	√					
Pyridinium			√	√	√	√
2,4-Pyrimidinediamine		√				
3,4-Diamino-1,2,4-triazole				√		
Benzenamine				√		
Acetic acid				√		

## Annexure-16

**Table-16 Consumption of Pesticides in District Sangrur**

Year	Kharif (MT)				Rabi (MT)				Grand Total (MT)			
	Insecticide	Weedicide	Fungicide	Total	Insecticide	Weedicide	Fungicide	Total	Insecticide	Weedicide	Fungicide	Total
2007-08	675	360	50	1085	82	98	2.8	182.8	757	458	52.8	1267.8
2008-09	675	360	50	1085	75	100	3	178	750	460	53	1263
2009-10	660	350	55	1065	73	100	4	177	733	450	59	1242
2010-11	650	350	60	1060	135	325	15	475	785	675	75	1535
2011-12	645	325	80	1050	125	300	20	445	770	625	100	1495
2012-13	640	320	85	1045	130	315	22	467	770	635	107	1512
2013-14	640	310	95	1045	137	315	27	479	777	625	122	1524
2014-15	630	320	100	1050	130	305	41	476	760	625	141	1526
2015-16	610	325	105	1040	125	295	50	470	735	620	155	1510
2016-17	610	345	155	1110	115	295	52	462	725	640	207	1572
2017-18	626	351	155	1132	123	299	54	476	749	650	209	1608

## Annexure-17

**Table-17**

### Self-monitoring results of ETP - Month Nov 2019

DATE	PH	Final Outlet Effluent Parameters				
		TSS MG/L	TDS MG/L	COD MG/L	BOD MG/L	FLOW KL/DAY
11/1/2019	7.6	90	1150	200	65	1050
11/2/2019	7.5	70	1180	150	50	1175
11/3/2019	7.3	80	1130	180	60	1360
11/4/2019	7.2	90	1160	160	55	1290
11/5/2019	7.4	60	1120	170	55	1280
11/6/2019	7.7	80	1140	190	60	1300
11/7/2019	7.9	70	1110	150	50	975
11/8/2019	8.1	90	1180	180	60	1141
11/9/2019	7	60	1170	150	50	900
11/10/2019	7.3	80	1200	200	65	900
11/11/2019	7.5	70	1190	160	55	1050
11/12/2019	7.6	90	1200	190	65	1011
11/13/2019	7.3	80	1140	200	65	1100
11/14/2019	7.2	70	1160	150	50	1029
11/15/2019	7.4	90	1200	170	60	960
11/16/2019	7.7	70	1130	180	60	1150
11/17/2019	7.8	90	1160	190	65	1030
11/18/2019	8.1	80	1130	200	65	1000
11/19/2019	7.6	60	1110	150	50	940
11/20/2019	7.5	90	1140	180	60	880
11/21/2019	7.4	70	1180	150	50	638
11/22/2019	7.2	80	1190	160	50	847
11/23/2019	7.1	90	1150	200	65	841
11/24/2019	7	60	1200	170	60	737
11/25/2019	7.7	80	1140	200	65	705
11/26/2019	7.8	70	1120	150	50	785
11/27/2019	7.5	70	1160	190	60	870
11/28/2019	7.3	80	1130	160	55	1045
11/29/2019	7.4	90	1140	150	50	914
11/30/2019	7.7	70	1170	200	65	781