

SAMPLING AND ANALYSIS OF AMBIENT AIR QUALITY AND WATER QUALITY IN SELECTED INDUSTRIAL/CLUSTER AREAS AT VAPI

Submitted to

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Vapi Green Enviro Limited
Vapi

Prepared by:



BHAGAVATHI ANA LABS

BHAGAVATHI ANA LABS PVT. LTD.

(A BUREAU VERITAS GROUP COMPANY)

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**SAMPLING AND ANALYSIS OF AMBIENT AIR
QUALITY AND WATER QUALITY IN
SELECTED INDUSTRIAL/CLUSTER AREAS
AT VAPI**

For
**Vapi Green Enviro Limited
Vapi**

For and on behalf of M/s. Bhagavathi Ana Labs Pvt. Ltd.

Approved by : **Dr. Santosh Zargar**

Signed

: 

Position

: **Lab Manager**

Date

: 1/8/16

This report has been prepared by M/s. Bhagavathi Ana Labs Private Limited with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client. Name of the sampling locations /sample identity details –provided by client.

SAMPLING AND ANALYSIS OF AMBIENT AIR QUALITY AND WATER QUALITY IN SELECTED INDUSTRIAL/CLUSTER AREAS AT VAPI
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SAMPLING AND ANALYSIS OF AMBIENT AIR QUALITY AND WATER QUALITY IN SELECTED INDUSTRIAL/CLUSTER AREAS AT VAPI

1.0 PROJECT STUDY:

With a view to assess the environmental quality arising from the activities undertaken by M/s. **Vapi Green Enviro Limited**, **Vapi** retained M/s. Bhagavathi Ana Labs Private Limited for carrying out Environmental monitoring studies on Seasonal basis.

In this study report, results of Ambient Air Quality, Surface Water Quality & Ground Water Quality analysis data are presented for the month of **June 2016**.

2.0 DETAILS OF SAMPLING LOCATIONS

2.1 Ambient Air Quality

To assess the Environment monitoring around **Vapi** for baseline data on the Ambient Air, parameters like SO₂, NO₂, PM₁₀, PM_{2.5}, O₃, Lead, CO, Ammonia, Benzene, Benzo(a) pyrene, Arsenic, Nickel on seasonal basis were monitored at Eight locations around the Vapi in the month of **June-2016**. Samples were collected as per CPCB guidelines based on wind direction. The details of the sampling locations are given below in **Table-1**.

2.2 Surface and Ground Water Quality:

Surface and Ground Water Quality samples are collected from different locations to know the characteristics of Surface and Ground Water Quality. Samples were collected as per CPCB guidelines. The details of the sampling locations are given below in **Table-2**.

3.0 ANALYTICAL METHODOLOGY:

IS, APHA 22nd Edition, CPCB, EPA methods were followed for sampling and analysis of ambient air quality; surface & ground water quality.

4.0 DATA ANALYSIS

Test reports of Fieldwork during month of **June 2016** consisted of collection and analysis of samples of ambient air quality, surface & ground water quality at different locations around the **Vapi** are presented in Annexure-I.

ANNEXURE-1



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

Table-1 AAQ MONITORING LOCATIONS

SAMPLE CODE	NAME OF THE MONITORING LOCATION	DATE OF SAMPLING	LATITUDE	LONGITUDE
AAQ - 1	CETP, GIDC, VAPI	08.06.2016 to 12.06.2016	N 20°21'54.3"	E 072°54'25.7"
AAQ - 2	UBC Chemicals Pvt. Ltd., GIDC, Silvassa Road, VAPI	08.06.2016 to 12.06.2016	N 20°20'46.8"	E 072°55'30.7"
AAQ - 3	Kundar Chemicals Pvt. Ltd., Phase - II, GIDC Estate, VAPI	08.06.2016 to 12.06.2016	N 20°21'50.5"	E 072°56'0.26"
AAQ - 4	Micro Inks Limited, VAPI	08.06.2016 to 12.06.2016	N 20°22'08.6"	E 072°57'01.1"
AAQ - 5	Hightech Inks Pvt. Ltd. VAPI	08.06.2016 to 12.06.2016	N 20°20'54.6"	E 072°56'15.9"
AAQ - 6	Shreeji Waffers, VAPI	08.06.2016 to 12.06.2016	N 20°22'24.8"	E 072°55'41.0"
AAQ - 7	Centre of Excellence	08.06.2016 to 12.06.2016	N 20° 21' 09"	E 72° 54' 56.7"
AAQ - 8	GETCO PS-1	08.06.2016 to 12.06.2016	N 20° 22' 24"	E 72° 55' 51.4"

Table-2 SURFACE WATER SAMPLING LOCATIONS

SAMPLE CODE	NAME OF THE SAMPLING LOCATION	DATE OF SAMPLING	LATITUDE	LONGITUDE
SW - 1	River Damanganga after Silvassa	08.06.2016 to 12.06.2016	N 20°17'53.9"	E 72°58'34.8"
SW - 2	CETP	08.06.2016 to 12.06.2016	N 20°20'35.9"	E 72°54'23.4"
SW - 3	River Kolak at Pataliya	08.06.2016 to 12.06.2016	N 20° 27' 40.5"	E 72° 53' 12.0"
SW - 4	Chhiri Lake	08.06.2016 to 12.06.2016	N 20° 22' 03.5"	E 72° 57.19.1"
SW - 5	Bikhadi near NH-8	08.06.2016 to 12.06.2016	N 20°22'17.9"	E 72°54'53.9"
SW - 6	Zaricause Way	08.06.2016 to 12.06.2016	N 20°20'35.9"	E 72°52'50.8"
SW - 7	Kolak River at Koteswar Mahadev	08.06.2016 to 12.06.2016	N 20°26'16.8"	E 72°54'04.7"
SW - 8	Bill khadi downstream near PS-1*	08.06.2016 to 12.06.2016	N 20°22'29.4"	E 72°55'51.7"

*: sampling not done due to unavailability of surface water at sample point.



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

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Table-2 GROUND WATER SAMPLING LOCATIONS

SAMPLE CODE	NAME OF THE SAMPLING LOCATION	DATE OF SAMPLING	LATITUDE	LONGITUDE
GW - 1	Rajasthan Bhavan near Sameer Apartments, Chanod Village	08.06.2016 to 12.06.2016	N 20°20'44.4"	E 072°56'18.3"
GW - 2	Kashyap Desai, Namdha	08.06.2016 to 12.06.2016	N 20° 21' 19.0"	E 72° 53.13.6"
GW - 3	TSDF Site South East Direction to GIDC, VAPI	08.06.2016 to 12.06.2016	N 20°20'30.2"	E 72°56'38.8"
GW - 4	Shree S D Shinde Kanchana Nagar, North to GIDC, Chhiri Village.	08.06.2016 to 12.06.2016	N 20°22'43.0"	E 72°56'34.9"
GW - 5	Swaminarayan of Gurukul at 150m on the bank of BhilKhadi near NH-8, Selav Village	08.06.2016 to 12.06.2016	N 21°32'32.6"	E 72°59'03.3"
GW - 6	Zilla Panchayat near Gram Panchayat, Kata Falia, Namadha Village and 100m from River Daman Ganga	08.06.2016 to 12.06.2016	N 20°21'18.6"	E 72°53'11.0"
GW - 7	Netaji Chawl	08.06.2016 to 12.06.2016	N 20° 22' 43.5"	E 72° 56'34.5"
GW - 8	Girishbhai Farm	08.06.2016 to 12.06.2016	N 20° 20' 23.1"	E 72° 59' 40.1"



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

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AMBIENT AIR QUALITY MONITORING

Location: CETP

S.No.	Pollutant(s)	Units	Results			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	13.5	15.4	16.8	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	24.7	24.7	28.7	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	76	88	76	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	42	45	44	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	17.3	19.2	25	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.19	0.21	0.33	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	32.4	30.1	23.8	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	3.6	2.6	2.2	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

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AMBIENT AIR QUALITY MONITORING

Location: UBC Chemical

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	15.7	17.3	14.5	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	28.7	30.1	24.6	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	84	68	92	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	36	40	51	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	9.7	11.4	17	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.21	0.27	0.21	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	23.5	26.4	31.4	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	2.6	2.4	1.6	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual

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AMBIENT AIR QUALITY MONITORING

Location: Kundar Chemical

S.No.	Pollutant(s)	Units	Results			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	14.5	16.3	13.8	IS 5182 (Part 2) – 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	29.4	30.4	26.4	IS 5182 (Part 6) – 2001, Jacob & Hochheiser – Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	88	74	86	IS 5182 (Part – 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	44	51	49	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	14.2	16.4	22	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.32	0.38	0.31	USEPA Method – IO-3.5, (ICP – MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part – 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	22.9	26.5	28.4	Method 401 – Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method – TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method – TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method – IO-3.5, (ICP – MS Method) & CPCB Manual
12	Nickel	ng/m ³	3.2	2.9	2.7	USEPA Method – IO-3.5, (ICP – MS Method) & CPCB Manual

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AMBIENT AIR QUALITY MONITORING

Location: Microink Ltd

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	16.4	14.2	15.1	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	31.2	33.4	24.8	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	96	83	89	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	52	54	54	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	17.6	18.7	29	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.34	0.37	0.41	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	24.7	26.4	34.7	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	3.4	3.1	2.4	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual

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AMBIENT AIR QUALITY MONITORING

Location: Hi-Tech Inks

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	11.6	13.4	16.5	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	21.4	24.3	32.4	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	96	89	82	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	48	47	56	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	21	23.4	24	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.39	0.42	0.37	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	26.4	28.4	24.6	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	3.2	3.4	2.8	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

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AMBIENT AIR QUALITY MONITORING

Location: Shreeji Wafers

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	19.4	16.4	13.7	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	38.4	34.5	29.7	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	86	98	96	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	38	57	53	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	23	21	23	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.28	0.29	0.36	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	30.5	27.5	34.6	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	1.8	2.7	3.4	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



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AMBIENT AIR QUALITY MONITORING

Location: Shreeji Wafers

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	19.4	16.4	13.7	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	38.4	34.5	29.7	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	86	98	96	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	38	57	53	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	23	21	23	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.28	0.29	0.36	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	30.5	27.5	34.6	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	1.8	2.7	3.4	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



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AMBIENT AIR QUALITY MONITORING

Location: CoE

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	10.5	10.5	16.7	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	22.6	19.4	33.4	IS 5182 (Part 6) - 2001, Jacob & Hochheiser - Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	72	79	74	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	34	31	57	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	19.4	17.3	24	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.21	0.018	0.35	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	21.9	18.7	26.8	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	2.7	2.6	3.2	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



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Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

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AMBIENT AIR QUALITY MONITORING

Location: GETCO PS-1

S.No.	Pollutant(s)	Units	RESULTS			Test Methods
			08.06.2016	10.06.2016	12.06.2016	
1	SO ₂	µg/m ³	13.2	11.6	14.5	IS 5182 (Part 2) - 2001, West & Gaeke Method) & CPCB Manual
2	NO ₂	µg/m ³	24.2	21.8	31.7	IS 5182 (Part 6) - 2001, Jacob & Hochheiser Sodium Arsenite Method) & CPCB Manual
3	PM ₁₀	µg/m ³	86	88	102	IS 5182 (Part - 23), 1999, RA 2009, Cyclone Flow Technique & CPCB Manual
4	PM _{2.5}	µg/m ³	41	34	58	Internal SOP & CPCB Manual
5	O ₃	µg/m ³	19	16	26	IS 5182 (Part 9), 1974, RA 2009, UV Spectrophotometric Method/ISC Method No.411, 3 rd Edition 1989 & CPCB Manual
6	Lead	µg/m ³	0.24	0.24	0.38	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
7	CO	mg/m ³	<2	<2	<2	IS 5182 (Part - 10), 1999, RA 2009, GC Method & CPCB Manual
8	Ammonia	µg/m ³	18.6	16.8	24.3	Method 401 - Air Sampling and Analysis, APHA, 3 rd Edition & CPCB Manual
9	Benzene	µg/m ³	<3	<3	<3	USEPA Method - TO-3, Absorption and Desorption followed by GC-MS & CPCB Manual
10	Benzo(a) pyrene	ng/m ³	<0.5	<0.5	<0.5	USEPA Method - TO-13A & CPCB Manual
11	Arsenic	ng/m ³	<0.9	<0.9	<0.9	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual
12	Nickel	ng/m ³	2.4	3.1	2.7	USEPA Method - IO-3.5, (ICP - MS Method) & CPCB Manual



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY Location- Damanganga after Silvassa

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	6.53	6.51	6.62	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	12	11	13	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	6.8	6.6	7.2	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	12	14	10	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	2.4	IS 3025: Part - 44
9	Conductivity (EC)	μS/cm	150	220	194	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	0.02	0.02	0.02	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	0.18	0.16	0.19	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	0.2	0.18	0.21	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.3	1.2	1.4	IS 3025: Part - 60
17	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	0.89	0.86	0.88	By Calculation
20	Total Coliform	MPN/100ml	60	56	32	IS 1622
21	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	0.8	0.7	0.8	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	0.42	0.46	0.52	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	0.08	0.07	0.08	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.4	0.12	0.36	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY

Location- CETP

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.85	7.81	7.79	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	2.2	1.8	2.4	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	14	12	14	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	3.9	3.8	3.9	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	228	230	232	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	18	12	14	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	9050	8670	8840	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	0.45	0.4	0.44	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	21.4	32	28	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	21.85	32.4	28.44	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	0.9	0.8	0.8	IS 3025: Part - 60
17	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	5.1	4.8	4.6	By Calculation
20	Total Coliform	MPN/100ml	100	80	60	IS 1622
21	Faecal Coliform	MPN/100ml	18	14	12	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	28.9	36.4	37.5	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	15.2	20.4	23.2	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	0.28	0.3	0.24	IS 3025: Part - 49
32	Nickel as Ni	mg/l	0.09	0.1	0.09	IS 3025: Part - 54
33	Copper as Cu	mg/l	0.07	0.08	0.08	IS 3025: Part - 42
34	Hexavalent Chromium as Cr6 ⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	0.11	0.09	0.09	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.41	0.38	0.4	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	0.42	0.36	0.4	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY Location- River Kolak at Pataliya Bridge

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	6.58	6.61	6.52	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	22	23	25	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	4.6	4.2	4.4	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	42	36	52	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	7	5.6	7.8	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	540	512	572	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	<0.01	<0.01	<0.01	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	1.2	1.1	1.14	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.2	1.1	1.14	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.12	1.18	1.2	IS 3025: Part - 60
17	Sulphides as S ⁻	mg/l	1.2	1	1.4	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	1.8	1.6	1.7	By Calculation
20	Total Coliform	MPN/100ml	180	140	180	IS 1622
21	Faecal Coliform	MPN/100ml	20	22	24	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	2.2	2.7	2.2	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	1.4	1.2	1.1	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.36	0.31	0.35	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY

Location- Chhiri Lake

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.23	7.18	7.21	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	10	8	8	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	4.8	5.2	4.8	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	32	22	24	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	3.5 ✓	4 ✓	3.1 ✓	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	150	140	136	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	<0.01	<0.01	<0.01	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	0.8	1.5	1.1	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	0.8 ✓	1.5 ✓	1.1 ✓	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.46	1.42	1.44	IS 3025: Part - 60
17	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	0.92	0.94	0.9	By Calculation
20	Total Coliform	MPN/100ml	60	56	32	IS 1622
21	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	0.78	0.82	0.68	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	0.48	0.34	0.36	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.28	0.31	0.26	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas**VAPI - GUJARAT****SURFACE WATER QUALITY**
Location- Bikhadi near NH-8

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Greyish	Greyish	Greyish	IS 3025: Part - 4
2	Odour (Smell)	-	Non-Agreeable	Non-Agreeable	Non-Agreeable	IS 3025: Part - 5
3	pH	-	6.98	6.93	6.96	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	36	34	32	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	3.8	3.9	3.7	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	38	48	36	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	7.5 ✓	9.4 ✓	7 ✓	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	520	480	620	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.01	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	1.4	1.9	1.8	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.41 ✓	1.91 ✓	1.81 ✓	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.42	1.38	1.41	IS 3025: Part - 60
17	Sulphides as S ⁻²	mg/l	1.6	1.4	1.2	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	1.5	1.4	1.8	By Calculation
20	Total Coliform	MPN/100ml	170	120	110	IS 1622
21	Faecal Coliform	MPN/100ml	18	16	14	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	2.4	2.3	2.6	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	1.2	1	0.8	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	0.14	0.1	0.11	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr6 ⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	0.29	0.31	0.26	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.8	0.7	0.84	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	0.2	0.18	0.28	IS 3025: Part - 57



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY

Location- Zaricause Way

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Yellowish	Yellowish	Yellowish	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	6.62	6.58	6.55	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	45	47	44	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	3.6	4.1	3.6	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	46	64	52	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	4.8	7.5	6.5	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	2300	2340	2360	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	0.64	0.48	0.42	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	1.4	1.8	1.7	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	2.04	2.28	2.12	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.11	1.09	1.03	IS 3025: Part - 60
17	Sulphides as S ⁻²	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	2.2	1.8	2	By Calculation
20	Total Coliform	MPN/100ml	80	60	80	IS 1622
21	Faecal Coliform	MPN/100ml	18	16	20	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	2.4	2.2	2.1	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	1.3	1.2	1.1	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	0.19	0.21	0.21	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.51	0.48	0.41	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	0.12	0.14	0.18	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

SURFACE WATER QUALITY

Location- Kolak River at Koteswar Mahadev temple

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.12	7.1	7.1	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	<1	<1	<1	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	7	7	6	IS 3025: Part - 17
6	Dissolved Oxygen (DO)	mg/l	3.1	3.2	3.2	IS 3025: Part - 38
7	Chemical Oxygen Demand (COD)	mg/l	36	54	44	IS 3025: Part - 58
8	Bio-chemical Oxygen Demand (BOD)	mg/l	7.8	8	7.6	IS 3025: Part - 44
9	Conductivity (EC)	µS/cm	520	530	520	IS 3025: Part - 14
10	Nitrite-nitrogen as N	mg/l	0.26	0.23	0.25	APHA 4500 - NO ₂ .B
11	Nitrate-Nitrogen as N	mg/l	1.1	1.12	1.2	APHA 4500 - NO ₃ .B
12	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.36	1.35	1.45	By Calculation
13	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
14	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
15	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
16	Fluoride as F ⁻	mg/l	1.4	1.6	1.6	IS 3025: Part - 60
17	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
18	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
19	Sodium Absorption Ratio (SAR)	-	1.5	1.4	1.82	By Calculation
20	Total Coliform	MPN/100ml	140	180	160	IS 1622
21	Faecal Coliform	MPN/100ml	18	24	26	IS 1622
22	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
23	Total Kjeldal Nitrogen (TKN)	mg/l	1.6	1.8	1.5	APHA 4500 - Norg.B
24	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	0.8	0.9	0.6	APHA 4500 - NH ₃
25	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
26	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
27	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
28	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
29	PCB	mg/l	N.D	N.D	N.D	EPA 508
30	PCT	mg/l	N.D	N.D	N.D	EPA 508
31	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
32	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
33	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
34	Hexavalent Chromium as Cr6 ⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
35	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
36	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
37	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
38	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
39	Manganese as Mn	mg/l	0.03	0.03	0.02	APHA 3111 - B
40	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
41	Iron as Fe	mg/l	0.36	0.44	0.42	IS 3025: Part - 53
42	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
43	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
44	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY Location- Zila Panchayat Namda

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.65	7.58	7.51	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	6	8	8	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	10	12	11	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	782	780	770	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	<0.01	<0.01	<0.01	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	1.1	1.2	1.15	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.11	1.21	1.16	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	0.65	0.7	0.68	IS 3025: Part - 60
16	Sulphides as S ²⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.4	1.42	1.38	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	0.09	0.08	0.09	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.08	0.07	0.08	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas**VAPI - GUJARAT****GROUND WATER QUALITY****Location- Kashyap Desai Namda**

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.02	7.1	7.08	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	7	7	9	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	10	8	12	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	1230	1240	1210	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.02	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	2.1	1.8	1.9	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	2.11 ✓	1.81 ✓	1.91 ✓	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	0.62	0.64	0.6	IS 3025: Part - 60
16	Sulphides as S ²⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.6	1.5	1.62	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	0.1	0.1	0.11	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.03	0.05	0.05	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location- Swami Narayan Gurukul

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.28	7.29	7.31	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	6	5	5	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	13	10	12	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	810	812	820	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.01	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	1.7	1.6	1.5	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.71	1.61	1.51	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	0.65	0.7	0.72	IS 3025: Part - 60
16	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.8	2.2	2.1	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	0.16	0.14	0.15	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.01	0.01	0.01	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location- S.D. Shinde Chhiri

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.21	7.23	7.25	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	8	9	9	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	8	12	14	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	μS/cm	620	640	630	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.01	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	1.2	0.9	1.3	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.21	0.91	1.31	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	1.1	1.2	1.1	IS 3025: Part - 60
16	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.82	1.9	2	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	0.25	0.22	0.23	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.02	0.02	0.01	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	0.12	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location- Netaji Chawl

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.31	7.28	7.25	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	4	4	6	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	12	14	10	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	1320	1340	1330	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.02	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	1.4	1.4	1.5	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.41	1.41	1.51	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	1.1	1.2	0.9	IS 3025: Part - 60
16	Sulphides as S ⁻²	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.74	1.9	2.1	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location-TSDF Site

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	
3	pH	-	7.36	7.31	7.29	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	9	10	9	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	18	14	18	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	1300	1350	1320	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.04	0.04	0.04	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	3.74	4.12	3.84	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	3.75	4.13	3.85	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	0.8	0.9	1.2	IS 3025: Part - 60
16	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	1.84	1.9	2.1	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	0.27	0.25	0.28	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.09	0.1	0.08	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	0.14	0.12	0.12	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location- Girishbhai Farm

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.26	7.21	7.25	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	6	5	5	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	13	19	16	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	1860	2040	1920	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.01	0.01	0.01	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	1.18	1.17	1.19	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	1.19 ✓	1.18 ✓	1.2 ✓	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	1.28	1.3	1.26	IS 3025: Part - 60
16	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	4.81	4.5	4.3	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr ⁶⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.02	0.02	0.03	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	0.08	<0.1	<0.1	IS 3025: Part - 57



BHAGAVATHI ANA LABS

Sampling and Analysis of Ambient Air Quality and Water Quality in selected Industrial/Cluster Areas

VAPI - GUJARAT

GROUND WATER QUALITY

Location- Rajasthan Bhavan

Sr. No.	Test Parameters	UOM	Results			Test Method
			08.06.2016	10.06.2016	12.06.2016	
1	Colour	Hazen	Colourless	Colourless	Colourless	IS 3025: Part - 4
2	Odour (Smell)	-	Agreeable	Agreeable	Agreeable	IS 3025: Part - 5
3	pH	-	7.31	7.25	7.29	IS 3025: Part - 11
4	Oil & Grease (O&G)	mg/l	BDL	BDL	BDL	IS 3025: Part - 39
5	Suspended Solids (SS)	mg/l	7	6	6	IS 3025: Part - 17
6	Chemical Oxygen Demand (COD)	mg/l	14	18	14	IS 3025: Part - 58
7	Bio-chemical Oxygen Demand (BOD)	mg/l	<2	<2	<2	IS 3025: Part - 44
8	Conductivity (EC)	µS/cm	680	674	682	IS 3025: Part - 14
9	Nitrite-nitrogen as N	mg/l	0.04	0.04	0.03	APHA 4500 - NO ₂ .B
10	Nitrate-Nitrogen as N	mg/l	0.8	0.6	0.7	APHA 4500 - NO ₃ .B
11	Total Nitrogen (NO ₂ + NO ₃)	mg/l	0.81	0.61	0.71	By Calculation
12	Free Ammonia	mg/l	<0.02	<0.02	<0.02	APHA 4500 - NH ₃ .C
13	Total Residual Chlorine	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 26
14	Cyanide as CN ⁻	mg/l	BDL	BDL	BDL	IS 3025: Part - 27
15	Fluoride as F ⁻	mg/l	0.7	0.65	0.66	IS 3025: Part - 60
16	Sulphides as S ⁻	mg/l	<0.1	<0.1	<0.1	IS 3025: Part - 29
17	Dissolved Phosphates as P	mg/l	<0.01	<0.01	<0.01	APHA 4500 - P.D
18	Sodium Absorption Ratio (SAR)	-	2.56	2.41	2.48	By Calculation
19	Total Coliform	MPN/100ml	<2	<2	<2	IS 1622
20	Faecal Coliform	MPN/100ml	<2	<2	<2	IS 1622
21	Total Phosphorous	mg/l	<0.1	<0.1	<0.1	APHA 4500 - P.D
22	Total Kjeldal Nitrogen (TKN)	mg/l	<1	<1	<1	APHA 4500 - Norg.B
23	Total Ammonia (NH ₄ +NH ₃)-Nitrogen	mg/l	<1	<1	<1	APHA 4500 - NH ₃
24	Phenolic Compounds as C ₆ H ₅ OH	mg/l	<0.001	<0.001	<0.001	IS 3025: Part - 43
25	Surface Active Agent	mg/l	<0.1	<0.1	<0.1	IS 13428
26	Organo-chlorine Pesticides(OCP)	mg/l	N.D	N.D	N.D	EPA 508
27	PAH's	mg/l	N.D	N.D	N.D	EPA 525.2
28	PCB	mg/l	N.D	N.D	N.D	EPA 508
29	PCT	mg/l	N.D	N.D	N.D	EPA 508
30	Zinc as Zn	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 49
31	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 54
32	Copper as Cu	mg/l	<0.01	<0.01	<0.01	IS 3025: Part - 42
33	Hexavalent Chromium as Cr6 ⁺	mg/l	BDL	BDL	BDL	APHA 3500 - Cr. D
34	Total Chromium as Cr	mg/l	BDL	BDL	BDL	IS 3025: Part - 52
35	Arsenic as As	mg/l	BDL	BDL	BDL	IS 3025: Part - 37
36	Lead as Pb	mg/l	BDL	BDL	BDL	IS 3025: Part - 47
37	Cadmium as Cd	mg/l	BDL	BDL	BDL	IS 3025: Part - 41
38	Manganese as Mn	mg/l	<0.01	<0.01	<0.01	APHA 3111 - B
39	Mercury as Hg	mg/l	BDL	BDL	BDL	IS 3025: Part - 48
40	Iron as Fe	mg/l	0.01	0.01	0.02	IS 3025: Part - 53
41	Vanadium as V	mg/l	BDL	BDL	BDL	APHA 3111 - D
42	Selenium as Se	mg/l	BDL	BDL	BDL	IS 3025: Part - 56
43	Boron as B	mg/l	<0.1	<0.1	0.12	IS 3025: Part - 57