Gujarat Industries Power Company Limited

At. : Nani Naroli,Ta.: Mangrol
Dist. : Surat -394112

Six Monthly Report of Valia and Mangrol Lignite Mines

ENVIRONMENTAL MONITORING & ANALYSIS REPORT

For the period of January 2019 to June-2019

Prepared By

ECOSYSTEM RESOURCE MANAGEMENT PVT. LTD.

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PREFACE

Consciousness at national level in the industrial sector is increasing day by day with the focus on environment and sustainable development. A good environment management policy requires a constant effort to analyses and monitors various operations and processes, to generate and transmit this information to the inspecting authority.

As per the Air & Water Consent Orders issued by **Gujarat Pollution Control Board** (GPCB) Gandhinagar & also as per the Environment Clearance certificate issued by Ministry of Environment, Forest and Climate Change (MoEF & CC), Govt. of India, New Delhi, it is mandatory to collect the samples of Air/Gaseous emissions and effluent, to analyses the samples from a recognized laboratory and submit the analysis reports to GPCB & MoEF.

Gujarat Industries Power Company Limited (GIPCL) - Surat Lignite Power Plant is situated at Village – Nani Naroli, Tal. Mangrol, Dist. Surat. This company engaged in the generation of Electricity. The Industry has awarded the contract for bimonthly monitoring and analysis to M/s. Ecosystem Resource Management Pvt. Ltd. Surat.

Ecosystem Resource Management Pvt. Ltd. is one of the leading companies in the field of Environmental Consultancy Service Providers in India. ERM has a well-equipped and developed **NABL Accredited and MoEF & CC** recognized laboratory to carry out the analysis in air, stack emission, fugitive emission, water & waste water, noise, soil, and solid waste etc.

Scope of work for Valia & Mangrol lignite Mine

I. Ambient Air Monitoring

Sr. No.	No. of stations & Location	Duration	Frequency	Parameters	Method of Analysis
1.	8 Nos within the radius of 10 km from the Core Zone and buffer zone.	24 hours	Bi-Monthly	PM_{10}	IS 5182 Part 23 2006/Reaffirmed 2017
				$PM_{2.5}$	SOP No.WI/5.4/02-B/03,Issue No.1Date:01/01/2010
				SO_2	IS 5182 Part II 2001/Reaffirmed 2017
				NO_2	IS 5182(Part VI):2006/Reaffirmed 2017
				CO	IS 5182(Part 10):1999/Reaffirmed 2014

II. Dust Fall measurement

Sr. No.	No. of station and locations	Duration	Frequency	Parameters	Method of analysis
1.	8 Nos within the radius of 10 km from the Core Zone and buffer zone.	One Month	Bi-Monthly	Dust fall	As per IS-5182

III. Noise Monitoring:

Sr. No.	Noise of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	8 Nos at various location within the plant premises	24 hours	Bi-Monthly	Day & night noise level	As per IS 9989 using the Noise level meter.

Weather Monitoring Data

Sr. No.	No. of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	1 No at site office of the Mine	24 hours	Bi-Monthly	Dry & Wet Bulb Temp. Relative Humidity wind speed & direction max & min. Temperature	As per IS 8829 on hourly basis for 24 hrs by using mechanical Instrument.

Water quality monitoring

Sr. No.	No. of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	10 Nos. of Bore well & 2 No. of Sump Water sample 2 No. of Pond water	1	Bi-Monthly	Physical parameters, Chemical Parameters, Heavy metals	As per the standard methods for the examination of water and waste water APHA 23rd Edition 2017 and various Indian standards IS 3025.

Six Monthly Variation in Ambient Air Quality Data

Parameter: PM_{10} (Particulate Matter)

Period: January – 2019 to June – 2019

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	67.2	61.5
2	Kosamdi Village	57.2	64.5
3	Morambi Village	64.3	63.4
4	Lignite Cutting area	71.1	58.5
5	Dump Area	64.1	65.4
6	Feeder breaker	70.1	70.2
7	Harsani Village	62.2	61.6
8	Dansoli Village	65.6	66.9
	Limit	100	

Six Monthly Variation in Ambient Air Quality Data

Parameter: $PM_{2.5}$ (Respirable Particulate Matter)

Period: January – 2019 to June – 2019

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	33.4	24.3
2	Kosamdi Village	25.3	34.7
3	Morambi Village	31.7	30.1
4	Lignite Cutting area	34.2	27.3
5	Dump Area	30.7	30.2
6	Feeder breaker	33.8	35.3
7	Harsani Village	35.3	31.8
8	Dansoli Village	31.9	33.7
	Limit	60 $\mu g/m^3$	

Six Monthly Variation in Ambient Air Quality Data

Parameter: SO_2 (Sulphur Dioxide)

Period: January – 2019 to June – 2019

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	16.7	16.7
2	Kosamdi Village	13.8	11.2
3	Morambi Village	15.3	15.3
4	Lignite Cutting area	17.4	16.7
5	Dump Area	16.2	15.3
6	Feeder breaker	20.6	18.5
7	Harsani Village	15.7	12.6
8	Dansoli Village	17.5	16.4
	Limit	80 $\mu g/m^3$	

Six Monthly Variation in Ambient Air Quality Data

Parameter: NO_X (Oxides of Nitrogen)

Period: January – 2019 to June – 2019

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	18.1	19.2
2	Kosamdi Village	15.5	13.6
3	Morambi Village	18.8	17.6
4	Lignite Cutting area	20.1	21.3
5	Dump Area	19.2	23.4
6	Feeder breaker	23.7	21.1
7	Harsani Village	17.4	19.8
8	Dansoli Village	21.4	20.3
	Limit	80	

Six Monthly Variation in Ambient Air Quality Data

Parameter: CO (Carbon Monoxide)

Period: January – 2019 to June – 2019

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	1084	1057
2	Kosamdi Village	1022	1093
3	Morambi Village	1112	1144
4	Lignite Cutting area	1245	1048
5	Dump Area	1068	1074
6	Feeder breaker	1207	1234
7	Harsani Village	1125	1125
8	Dansoli Village	1188	1157
	Limit	2000	

Six Monthly Variation in Ambient Air Quality Data

Parameter: Dust Fall

Period: January – 2019 to June – 2019

Sr. No.	Location	Results (T/Km^2/month)	
		Quarterly Jan to March - 2019	Quarterly April to June - 2019
1	Bhaga Village	1.7	1.5
2	Kosamdi Village	1.3	2.2
3	Morambi Village	2.6	2.0
4	Lignite Cutting area	3.4	2.1
5	Dump Area	2.9	2.6
6	Feeder breaker	3.2	3.3
7	Harsani Village	2.1	3.7
8	Dansoli Village	1.6	2.8
	Limit	10	

Six Monthly Variation in bore water Data

Location: Shah Nallah Upstream

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	26	30	Shall not exceed 5°c above the receiving water temp.
2	pH@ 25°C	pH unit	7.05	7.22	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	5	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	542	709	2100
6	Total volatile Solics	mg/L	3	3	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	133	145	1000
11	Sulphate	mg/L	43	48	300
12	Fluoride	mg/L	0.4	0.5	2.0
13	Phosphate as PO_4^{--}	mg/L	2.0	1.4	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.01	< 0.01	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.5	< 0.5	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	82	90	--
24	Magnesium	mg/L	36	42	--
25	Percentage Sodium	%	28	34	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bhaga Village (Valia Block)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	^0C	25	31	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 ^0C	pH unit	7.61	7.41	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 ^0C	mg/L	4	5	100
5	Total Dissolved Solids (TDS) @180 ^0C	mg/L	1452	1487	2100
6	Total volatile Solids	mg/L	3	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	475	476	1000
11	Sulphate	mg/L	182	180	300
12	Fluoride	mg/L	0.2	0.4	2.0
13	Phosphate as PO_4^{--}	mg/L	3.2	3.1	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	112	108	--
24	Magnesium	mg/L	71	70	--
25	Percentage Sodium	%	41	41	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Well (Charetha Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	^0C	25	30	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.30	7.43	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 ^0C	mg/L	4	6	100
5	Total Dissolved Solids (TDS) @180 ^0C	mg/L	443	602	2100
6	Total volatile Solids	mg/L	3	3	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20 ^0C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	84	94	1000
11	Sulphate	mg/L	53	61	300
12	Fluoride	mg/L	0.4	0.6	2.0
13	Phosphate as PO_4^{--}	mg/L	1.6	1.4	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	<0.10	3.0
23	Calcium	mg/L	74	81	--
24	Magnesium	mg/L	48	54	--
25	Percentage Sodium	%	32	38	--
26	Total Ccliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Well (Dansoli Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	25	30	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.49	7.50	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	6	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1215	1356	2100
6	Total volatile Solids	mg/L	5	5	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	503	514	1000
11	Sulphate	mg/L	147	156	300
12	Flucride	mg/L	0.5	0.8	2.0
13	Phosphate as PO_4^{--}	mg/L	2.1	1.6	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	72	74	--
24	Magnesium	mg/L	48	50	--
25	Percentage Sodium	%	54	55	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Harsani Village

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	25	30	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.46	7.62	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	5	5	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1194	1134	2100
6	Total volatile Solids	mg/L	4	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	221	232	1000
11	Sulphate	mg/L	41	48	300
12	Fluoride	mg/L.	0.8	0.4	2.0
13	Phosphate as PO_4^{--}	mg/L	2.2	2.3	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L.	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	<0.10	1.0
17	Lead	mg/L.	< 0.02	< 0.02	0.1
18	Copper	mg/L.	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	5.0
22	Iron	mg/L.	<0.10	<0.10	3.0
23	Calcium	mg/L.	176	175	--
24	Magnesium	mg/L.	83	82	--
25	Percentage Sodium	%	45	45	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Well (Kosambdi Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	26	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.37	7.52	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	7	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	2047	1804	2100
6	Total volatile Solids	mg/L	4	5	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	957	943	1000
11	Sulphate	mg/L	172	161	300
12	Fluoride	mg/L	0.4	0.6	2.0
13	Phosphate as PO_4^{--}	mg/L	2.2	1.2	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	149	138	--
24	Magnesium	mg/L	87	78	--
25	Percentage Sodium	%	27	20	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Water (Anoi Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	27	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.43	7.50	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	3	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1715	1605	2100
6	Total volatile Solids	mg/L	3	5	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	582	581	1000
11	Sulphate	mg/L	128	127	300
12	Fluoride	mg/L	0.4	0.6	2.0
13	Phosphate as PO_4^-	mg/L	2.8	2.7	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.01	< 0.01	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.5	< 0.5	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	5.0
22	Iron	mg/L	< 0.1	< 0.1	3.0
23	Calcium	mg/L	117	106	--
24	Magnesium	mg/L	40	32	--
25	Percentage Sodium	%	32	27.5	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Mine Water Sump – 1 (Vastan Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	26	30	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.21	7.51	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	7	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	857	715	2100
6	Total volatile Solids	mg/L	4	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	302	190	1000
11	Sulphate	mg/L	76	92	300
12	Fluoride	mg/L	0.4	0.6	2.0
13	Phosphate as PO_4^{--}	mg/L	1.1	2.0	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.50	< 0.10	3.0
23	Calcium	mg/L	84	93	--
24	Magnesium	mg/L	35	45	--
25	Percentage Sodium	%	42	97.2	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Mine Water Sump – 2

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	^{0}C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 ^{0}C	pH unit	7.22	7.33	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	5	4	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	633	654	2100
6	Total volatile Solids	mg/L	5	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20 ^{0}C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	138	143	1000
11	Sulphate	mg/L	72	76	300
12	Fluoride	mg/L	0.3	0.5	2.0
13	Phosphate as PO_4^{--}	mg/L	2.2	2.6	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	86	90	--
24	Magnesium	mg/L	49	53	--
25	Percentage Sodium	%	43	47	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Well (Morambli Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	^0C	26	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 ^0C	pH unit	7.30	7.1	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 ^0C	mg/L	4	5	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	532	609	2100
6	Total volatile Solids	mg/L	3	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20 ^0C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	110	119	1000
11	Sulphate	mg/L	47	55	300
12	Flucride	mg/L	0.7	0.9	2.0
13	Phosphate as PO_4^{--}	mg/L	1.9	2.4	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.50	< 0.50	3.0
23	Calcium	mg/L	94	95	--
24	Magnesium	mg/L	37	41	--
25	Percentage Sodium	%	38	35	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Bore Well (Mosali Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	^{0}C	25	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 ^{0}C	pH unit	7.24	7.44	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	3	6	100
5	Total Dissolved Solids (TDS) @180 ^{0}C	mg/L	1514	1407	2100
6	Total volatile Solids	mg/L	5.2	4.0	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20 ^{0}C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	706	702	1000
11	Sulphate	mg/L	181	181	300
12	Fluoride	mg/L	0.7	0.4	2.0
13	Phosphate as PO_4^{--}	mg/L	1.8	1.5	--
14	Total Residual Chlorine	mg/L	< 0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	< 0.10	< 0.10	3.0
23	Calcium	mg/L	132	130	--
24	Magnesium	mg/L	52	50	--
25	Percentage Sodium	%	47	46	--
26	Total Col form(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variation in bore water Data

Location: Pond Water (Shah Nala Village)

Period: January – 2019 to June – 2019

Sr. No.	Parameter	Unit	Quarterly Jan to March - 2019	Quarterly April to June - 2019	MoEF Limit
1	Temperature	°C	25	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.53	7.52	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	5	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	848	965	2100
6	Total volatile Solids	mg/L	5	4	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	281	280	1000
11	Sulphate	mg/L	119	115	300
12	Fluoride	mg/L	0.4	0.6	2.0
13	Phosphate as PO_4^-	mg/L	1.2	1.2	--
14	Total Residual Chlorine	mg/L	< 0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	<0.10	3.0
23	Calcium	mg/L	137	130	--
24	Magnesium	mg/L	58	56	--
25	Percentage Sodium	%	66	63	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

Six Monthly Variations in Noise Level Data

Parameter: Noise

Period: January – 2019 to June – 2019

SR. NO.	LOCATION	NOISE LEVEL, dB [A]							
		Quarterly Jan to March - 2019				Quarterly April to June - 2019			
		DAY Time		Night Time		DAY Time		Night Time	
		Max	Min	Max	Min	Max	Min	Max	Min
1	Bhaga Village	49.0	45.3	43.2	41.6	54.2	51.1	50.4	47.7
2	Kosamadi Village	50.0	46.1	44.6	42.8	55.8	53.1	52.2	48.6
3	Morambi Village	51.0	47.9	45.4	43.1	55.3	53.4	51.7	49.4
4	Lignite Cutting Area	60.0	56.8	53.7	50.6	70.1	67.3	60.3	57.3
5	Dump Area	63.0	61.7	59.5	56.7	71.3	68.4	62.7	58.9
6	Feeder Breaker	65.0	62.8	60.7	58.4	69.4	65.2	64.3	60.1
7	Harsani Village	52.0	49.3	47.6	44.2	53.4	50.9	48.7	45.1
8	Dansoli Village	50.0	47.7	45.9	42.7	52.0	49.2	48.3	45.3
	GPCB limit	75 (dB)		70(dB)		75 (dB)		70(dB)	

Six Monthly Variations in Micro-meteorological data

Period : January – 2019 to June – 2019

Dry Bulb Temperature (^{0}C)		
Time in Hrs.	Quarterly Jan to March - 2019	Quarterly April to June - 2019
10.00	28.0	31.4
11.00	29.1	32.4
12.00	31.0	33.5
13.00	31.0	33.0
14.00	31.1	33.6
15.00	31.0	33.4
16.00	30.0	33.2
17.00	30.2	33.4
18.00	30.6	33.2
19.00	30.0	32.5
20.00	29.4	31.5
21.00	28.0	31.2
22.00	27.5	32.6
23.00	27.1	32.7
00.00	26.0	33.4
01.00	26.0	33.1
02.00	26.1	33.0
03.00	26.0	33.2
04.00	26.4	33.5
05.00	26.3	33.7
06.00	26.0	33.5
07.00	27.1	34.4
08.00	27.7	35.8
09.00	28.0	36.7
Maximum	**31.1**	**36.7**
Minimum	**26.0**	**31.4**
Average	**28.3**	**33.2**

Six Monthly Variations in Micrometeorological data

Period : January – 2019 to June – 2019

Wet Bulb Temperature (^{0}C)		
Time in Hrs.	Quarterly Jan to March - 2019	Quarterly April to June - 2019
10.00	26.6	28.5
11.00	27.1	29.4
12.00	29.6	30.4
13.00	29.4	30.4
14.00	29.4	30.2
15.00	29.2	30.4
16.00	29.3	30.2
17.00	29.0	30.1
18.00	29.0	30.3
19.00	29.2	30.5
20.00	27.1	28.4
21.00	26.5	29.4
22.00	25.2	30.4
23.00	25.4	30.6
00.00	24.2	29.5
01.00	24.6	29.8
02.00	24.4	28.9
03.00	24.4	30.1
04.00	24.1	30.6
05.00	24.1	30.7
06.00	24.1	30.4
07.00	25.3	30.0
08.00	25.5	32.4
09.00	27.4	34.8
Maximum	**29.6**	**34.8**
Minimum	**24.1**	**28.4**
Average	**26.7**	**30.3**

Six Monthly Variations in Micrometeorological data

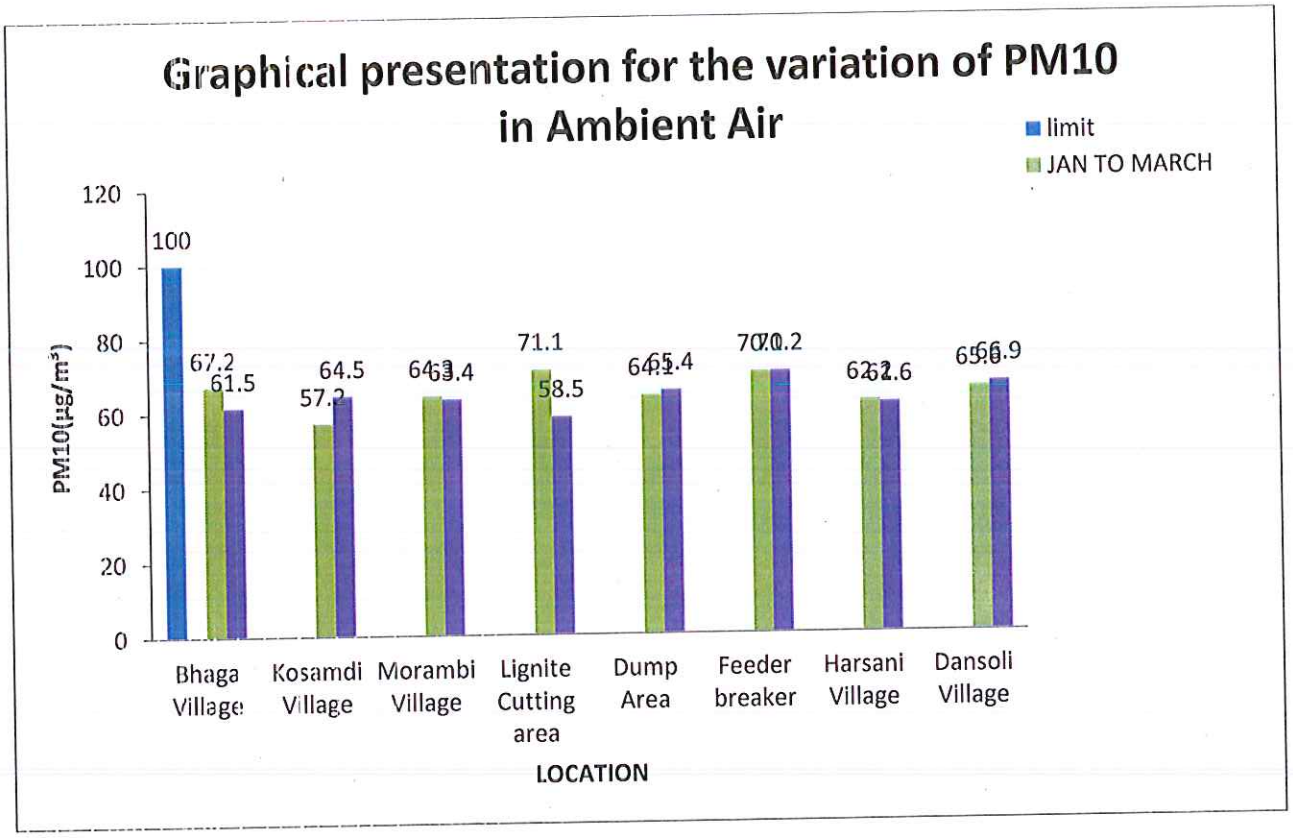
Period : January – 2019 to June – 2019

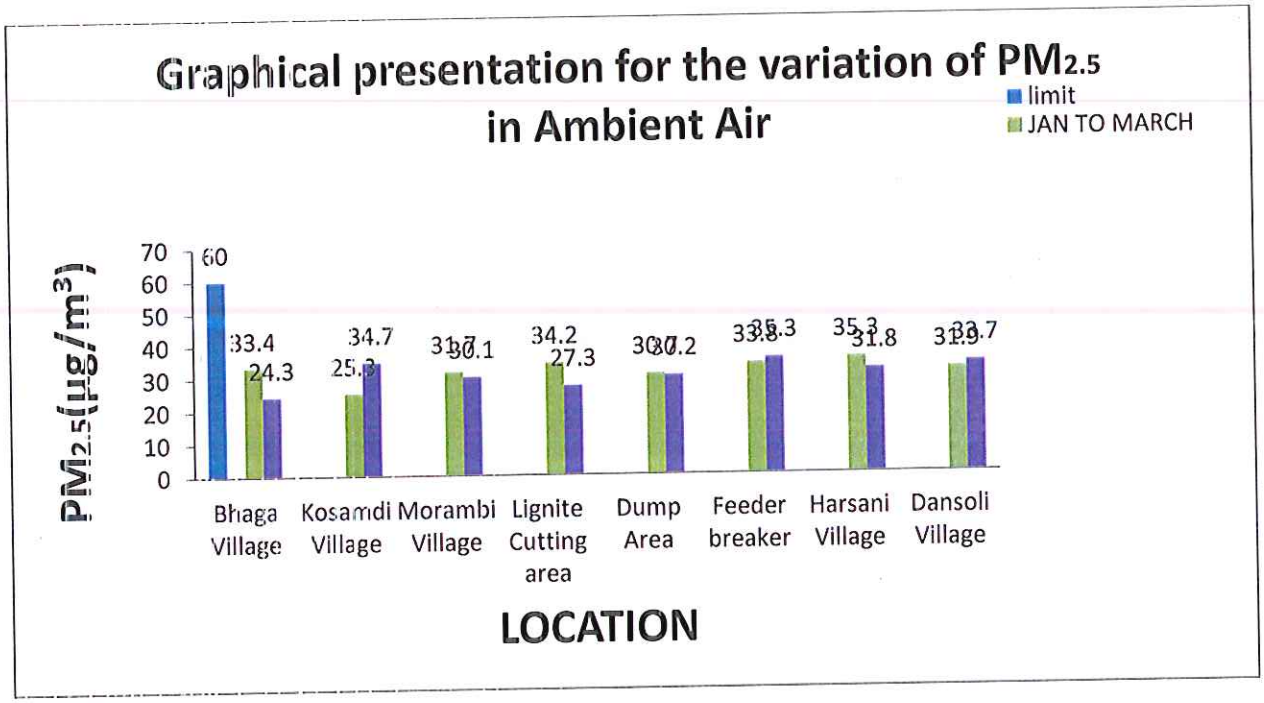
Relative Humidity %		
Time in Hrs.	Quarterly Jan to March - 2019	Quarterly April to June - 2019
10.00	60.0	62.3
11.00	55.8	59.7
12.00	45.1	54.7
13.00	42.3	55.0
14.00	41.8	55.1
15.00	40.5	55.2
16.00	40.2	58.3
17.00	40.6	60.1
18.00	40.0	64.7
19.00	45.8	67.9
20.00	47.0	71.2
21.00	48.2	75.3
22.00	51.9	77.3
23.00	55.9	77.6
00.00	63.1	77.1
01.00	65.7	78.5
02.00	68.3	79.0
03.00	71.0	79.3
04.00	69.8	78.1
05.00	68.2	77.9
06.00	67.0	77.5
07.00	65.3	73.5
08.00	60.1	68.2
09.00	56.2	65.2
Maximum	**71.0**	**79.3**
Minimum	**40.0**	**55.0**
Average	**54.5**	**68.7**

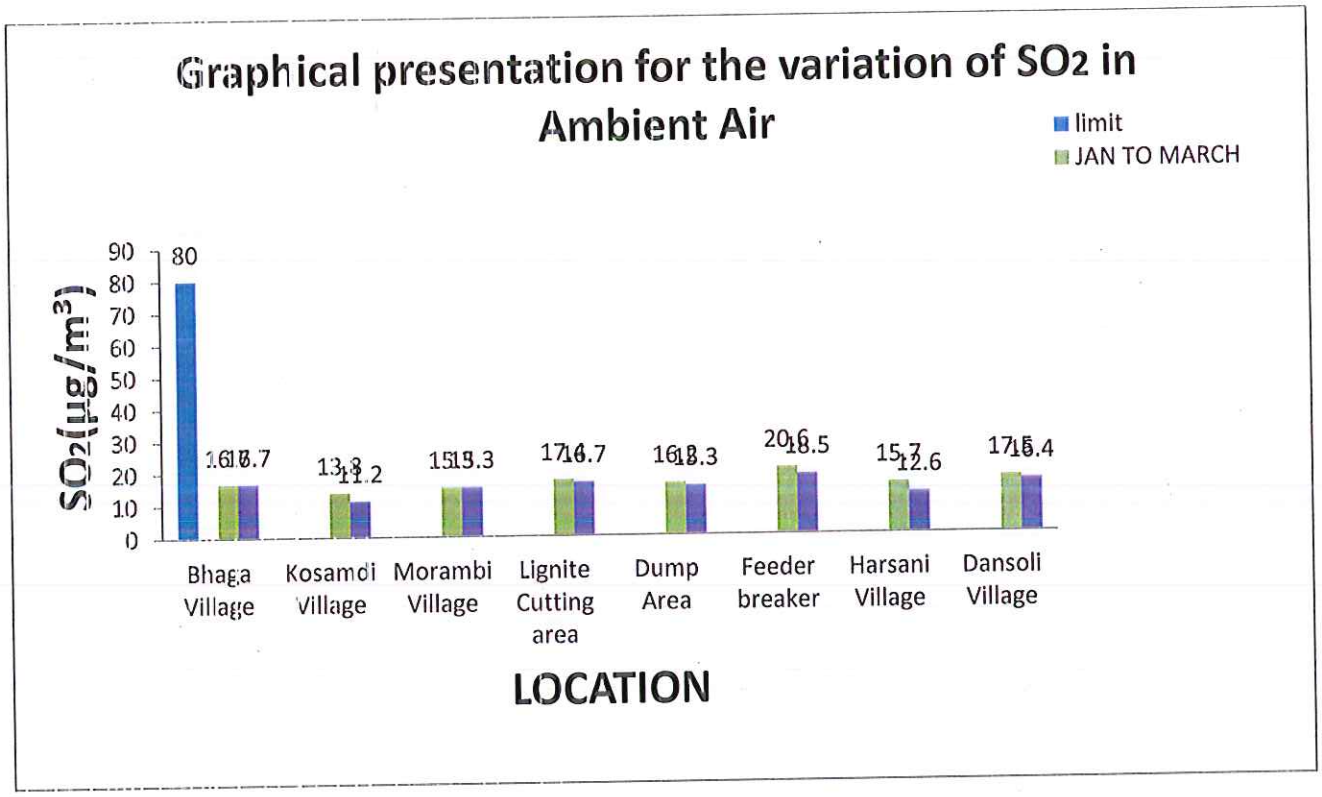
Six Monthly Variations in Micrometeorological data

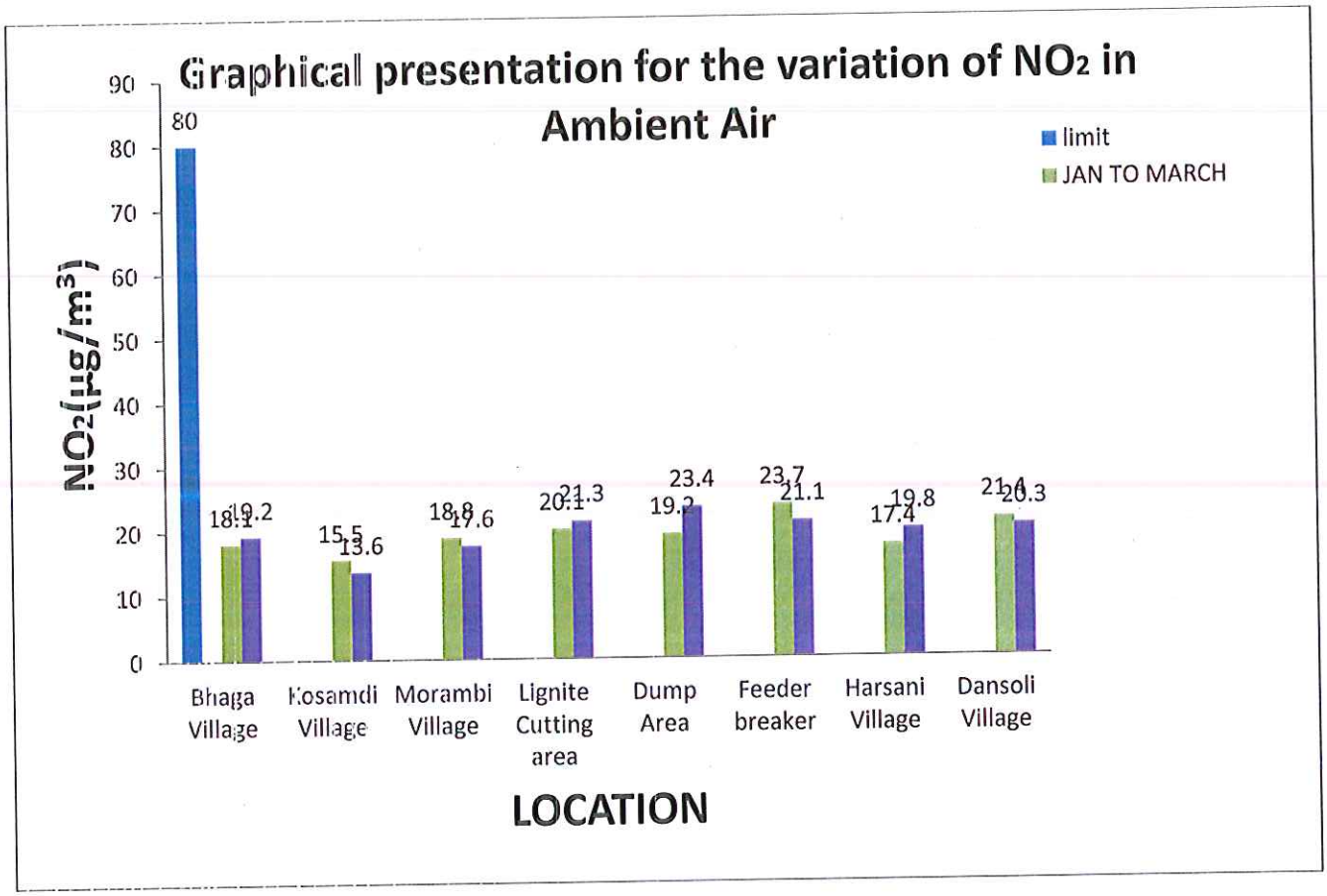
Period : January – 2019 to June – 2019

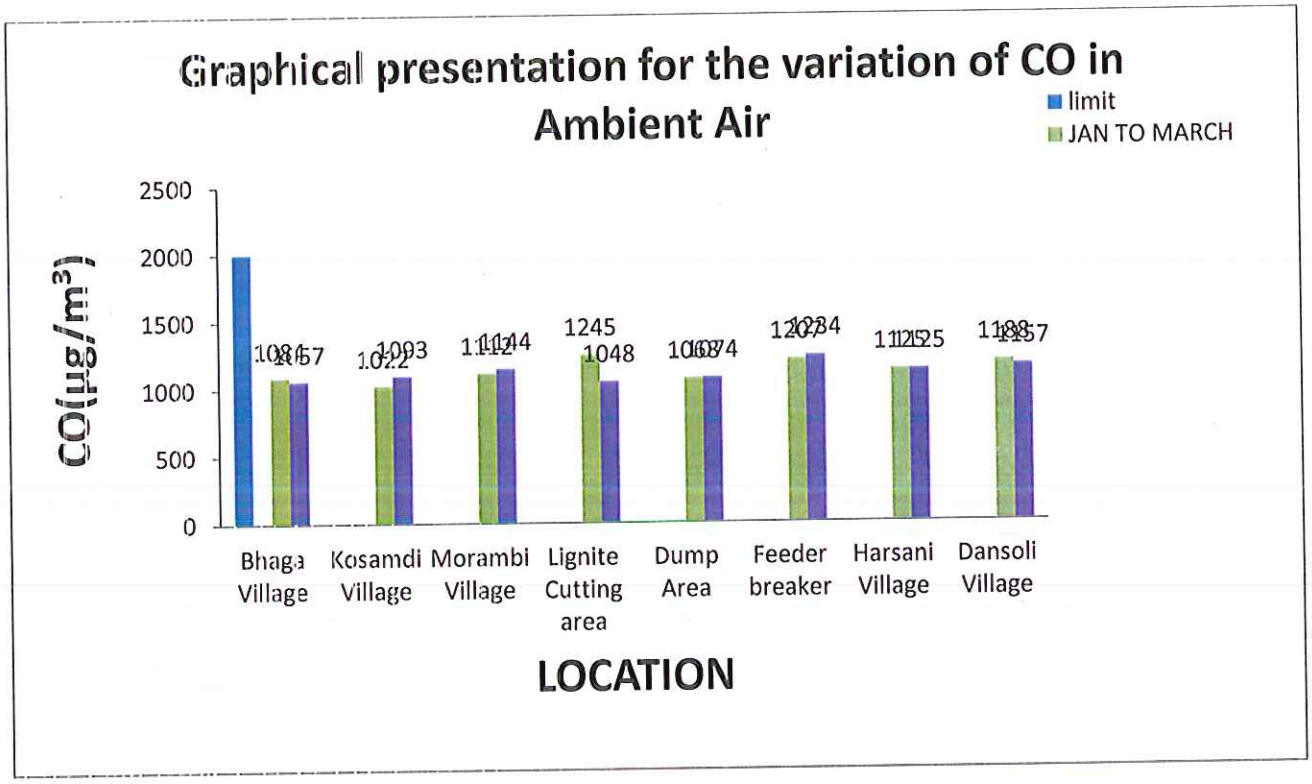
Wind Speed (km/hour)		
Time in Hrs.	Quarterly Jan to March - 2019	Quarterly April to June - 2019
10.00	7	17
11.00	8	18
12.00	12	19
13.00	13	20
14.00	15	21
15.00	17	21
16.00	17	21
17.00	15	20
18.00	16	21
19.00	16	21
20.00	15	20
21.00	15	21
22.00	13	21
23.00	11	21
00.00	10	21
01.00	8	18
02.00	7	17
03.00	6	17
04.00	6	16
05.00	7	15
06.00	7	14
07.00	8	14
08.00	9	16
09.00	10	17
Maximum	**17**	**21**
Minimum	**6**	**14**
Average	**11.2**	**18.6**

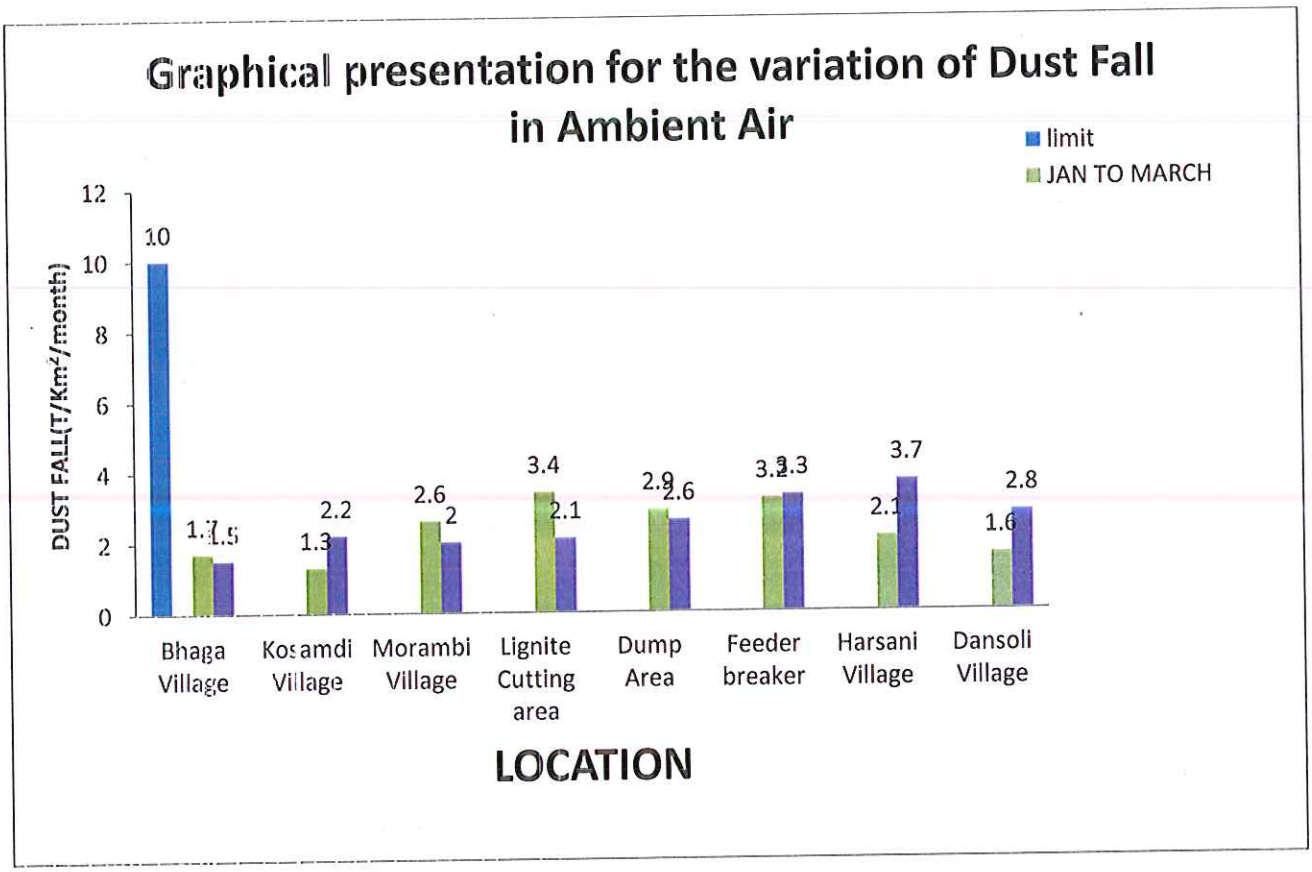

Graphical presentation for the variation of PM10 in Ambient Air
limit
JAN TO MARCH
PM10(µg/m³)
120
100
80
60
40
20
0
100
67.2
61.5
64.5
57.2
71.1
58.5
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

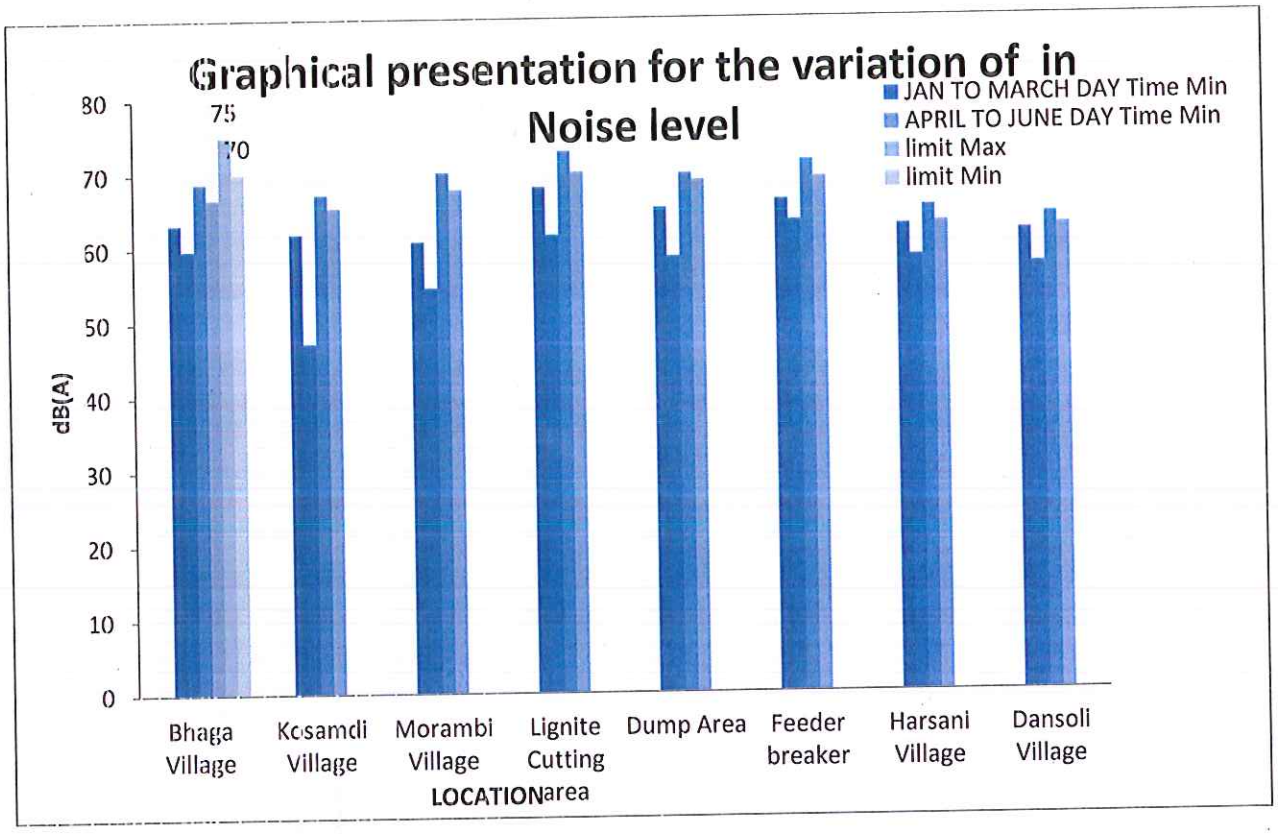

Graphical presentation for the variation of PM2.5 in Ambient Air
limit
JAN TO MARCH
PM2.5(µg/m³)
70
60
50
40
30
20
10
0
60
33.4
24.3
34.7
34.2
27.3
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

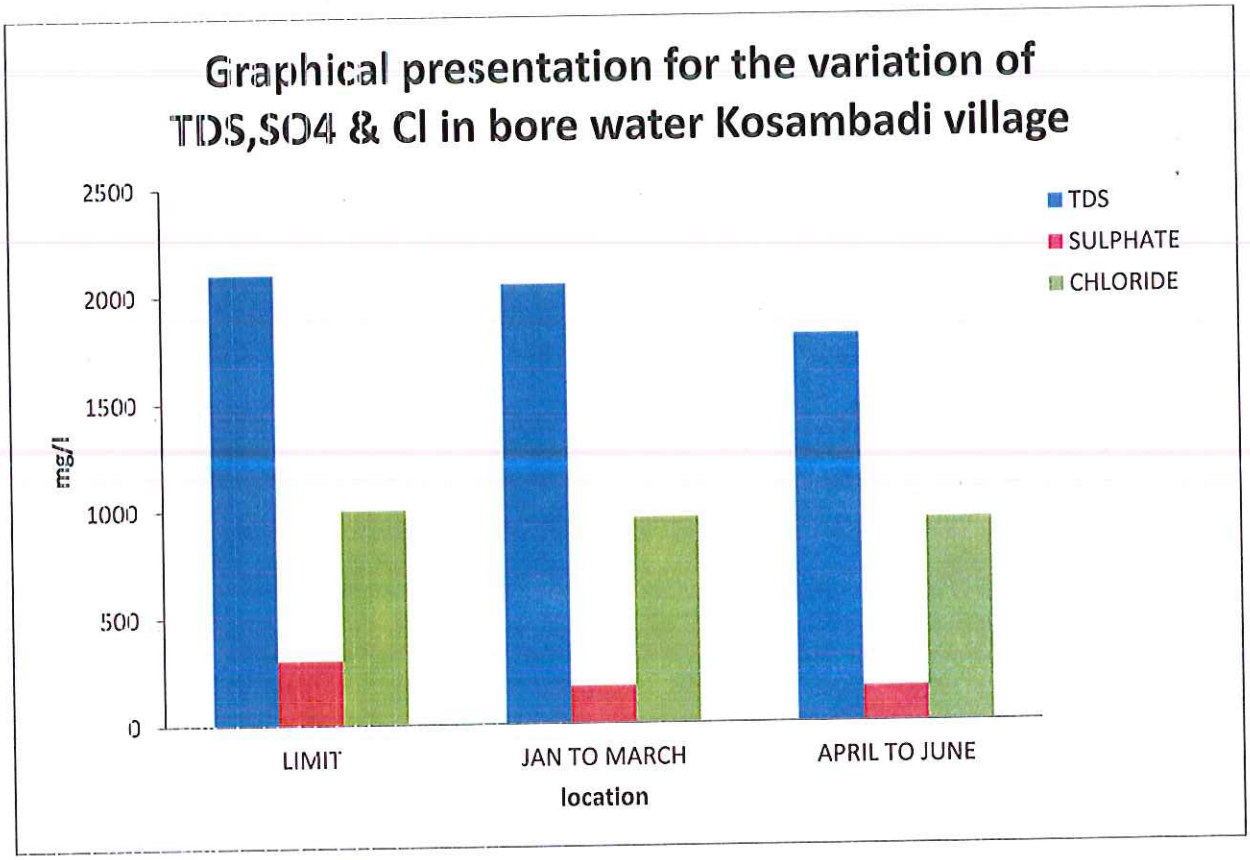

Graphical presentation for the variation of SO2 in Ambient Air
limit
JAN TO MARCH
SO2(µg/m3)
90
80
70
60
50
40
30
20
10
0
80
16
16.7
13.8
11.2
15
15.3
17
16.7
16
16.3
20
18.5
15.7
12.6
17
15.4
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

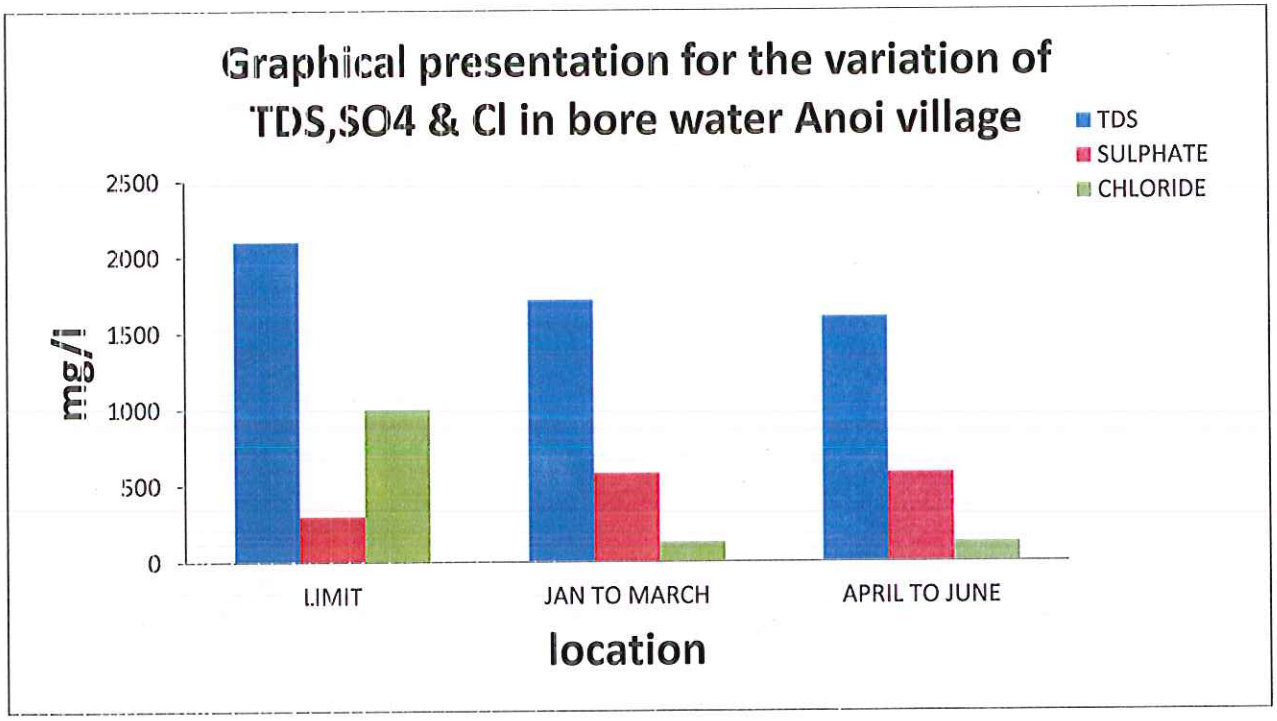

Graphical presentation for the variation of NO2 in Ambient Air
limit
JAN TO MARCH
NO2(µg/m3)
90
80
70
60
50
40
30
20
10
0
80
18.1
19.2
15.5
13.6
18.8
17.6
20.1
21.3
19.2
23.4
23.7
21.1
17.4
19.8
21
20.3
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

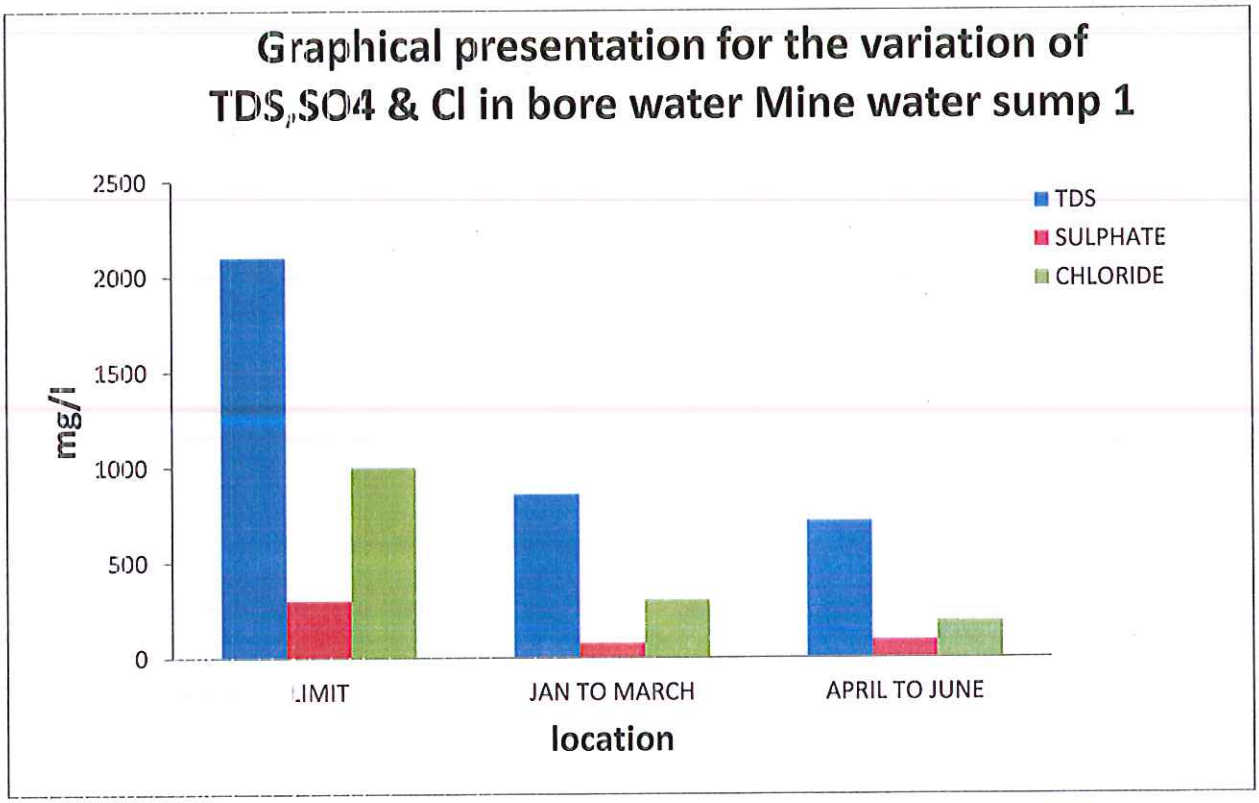

Graphical presentation for the variation of CO in Ambient Air
limit
JAN TO MARCH
CO(µg/m³)
2500
2000
1500
1000
500
0
1245
1048
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

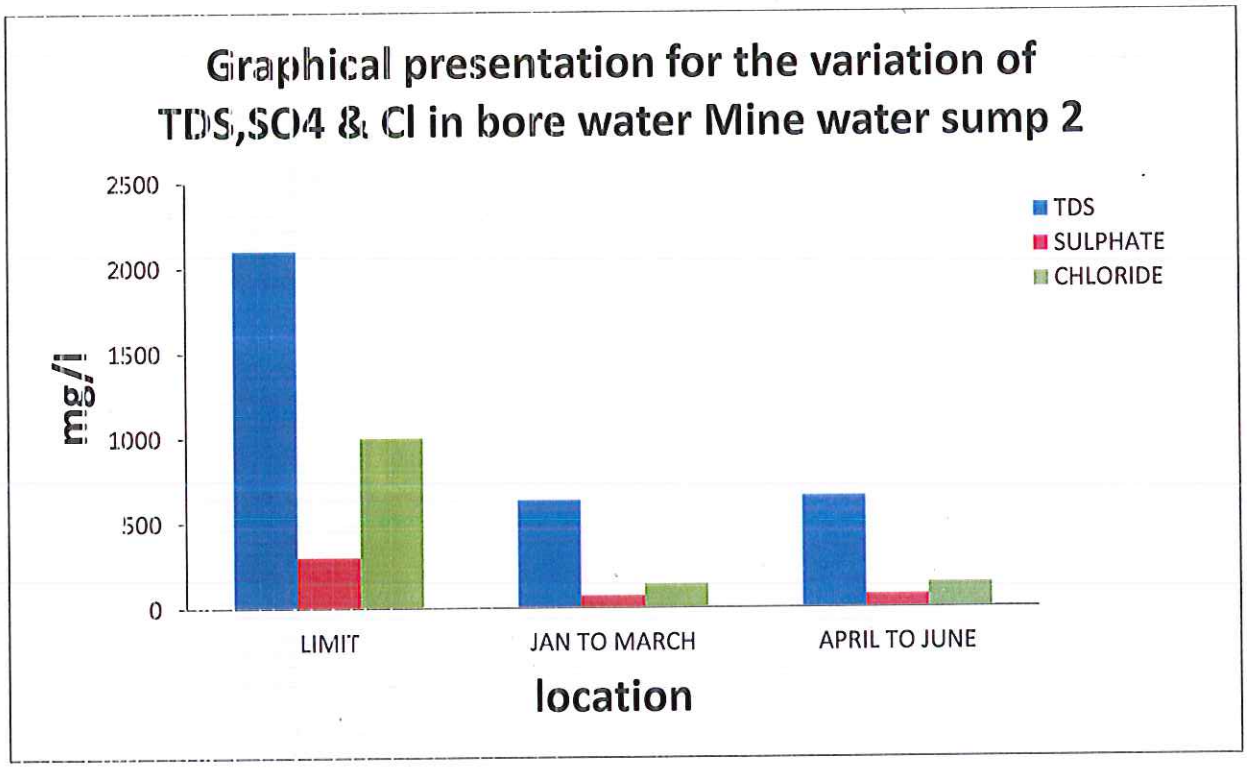

Graphical presentation for the variation of Dust Fall in Ambient Air
limit
JAN TO MARCH
DUST FALL(T/Km²/month)
12
10
8
6
4
2
0
10
1.3
2.2
2.6
2
3.4
2.1
2.9
2.6
3.7
2.8
1.6
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

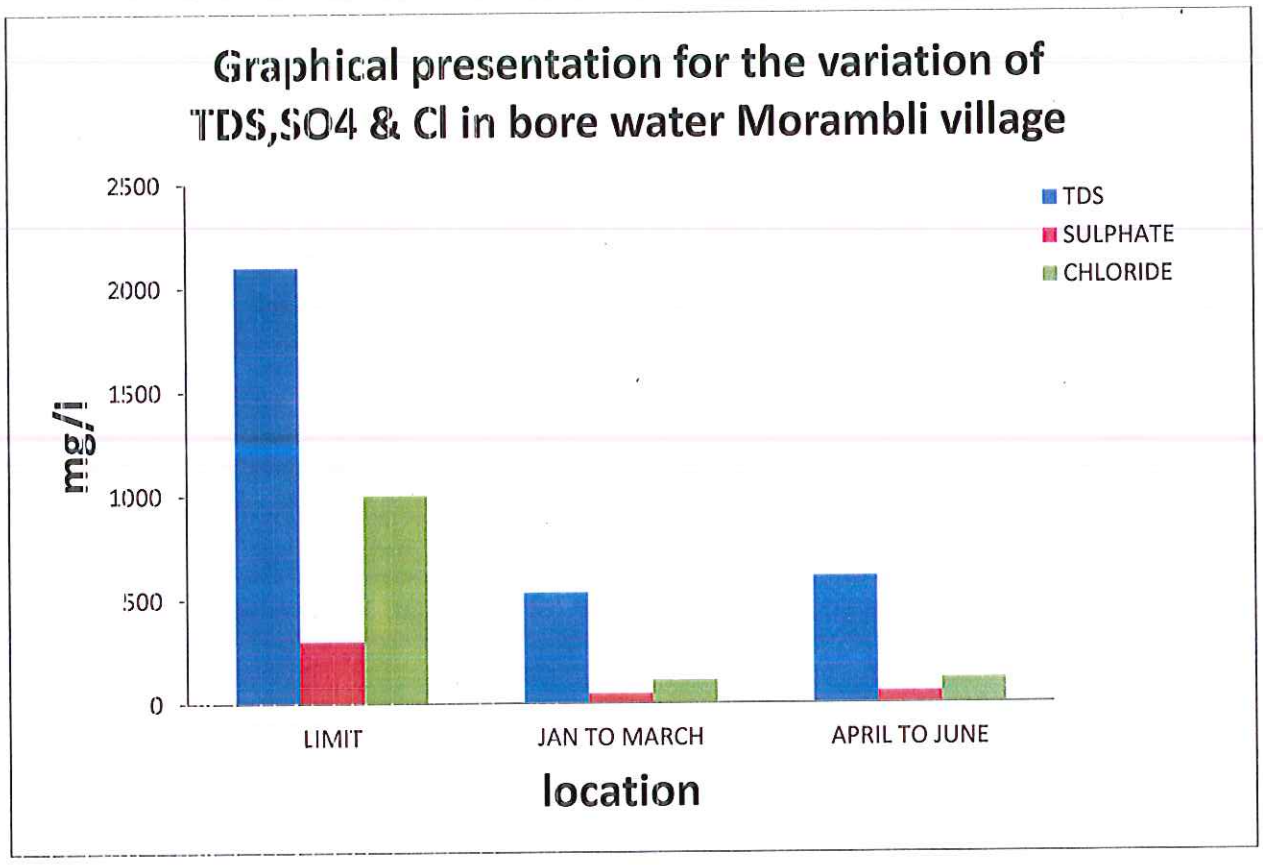

Graphical presentation for the variation of in Noise level
JAN TO MARCH DAY Time Min
APRIL TO JUNE DAY Time Min
limit Max
limit Min
80
70
60
50
40
30
20
10
0
75
70
dB(A)
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATIONarea

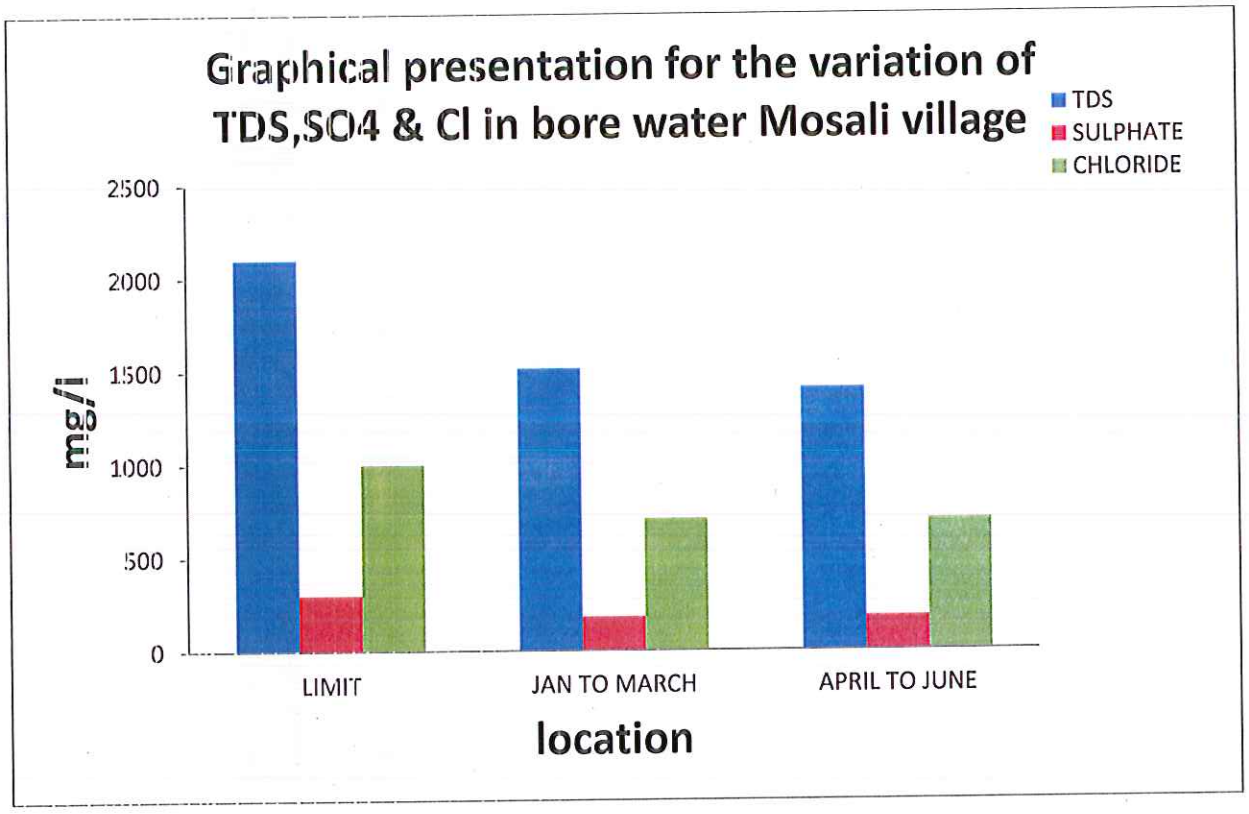

Graphical presentation for the variation of TDS,SO4 & Cl in bore water Kosambadi village
TDS
SULPHATE
CHLORIDE
2500
2000
1500
1000
500
0
mg/l
LIMIT
JAN TO MARCH
APRIL TO JUNE
location

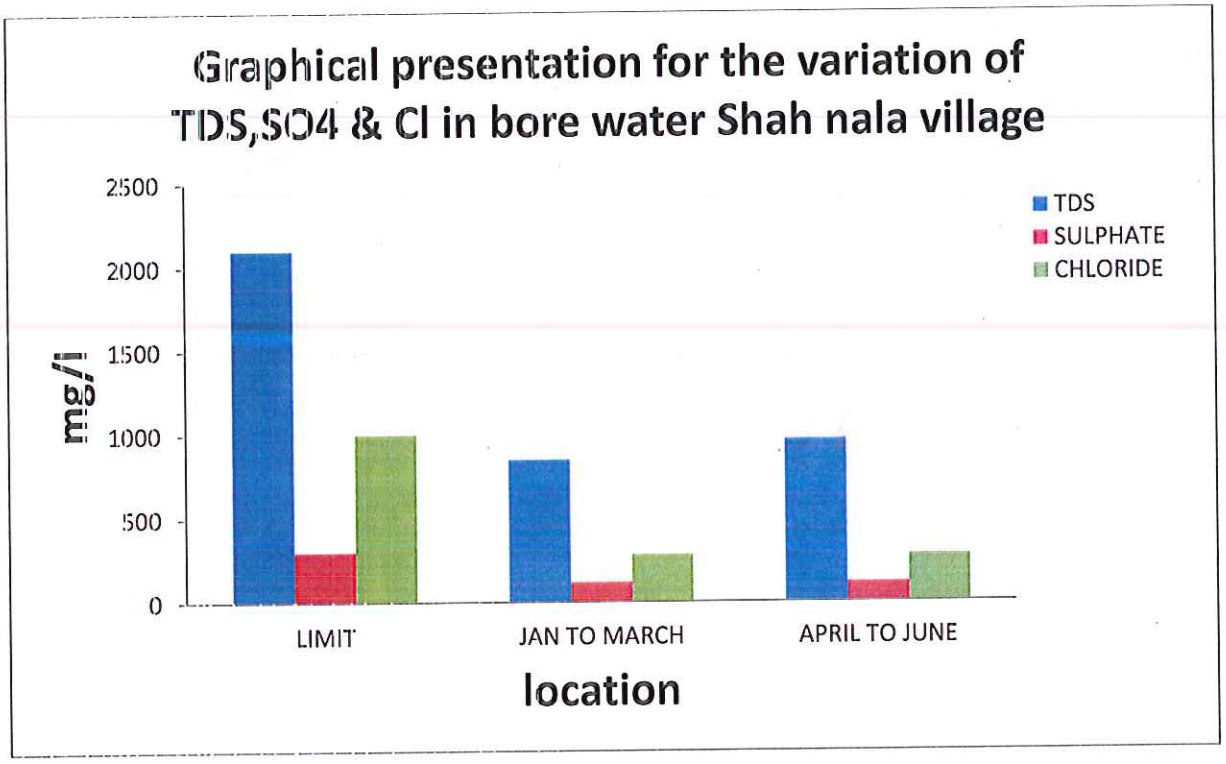

Graphical presentation for the variation of TDS,SO4 & Cl in bore water Anoi village
TDS
SULPHATE
CHLORIDE
2500
2000
1500
1000
500
0
mg/l
LIMIT
JAN TO MARCH
APRIL TO JUNE
location


Graphical presentation for the variation of TDS,SO4 & Cl in bore water Mine water sump 1
TDS
SULPHATE
CHLORIDE
2500
2000
1500
1000
500
0
mg/l
LIMIT
JAN TO MARCH
APRIL TO JUNE
location


Graphical presentation for the variation of
TDS,SO4 & Cl in bore water Mine water sump 2
2500
2000
1500
1000
500
0
mg/l
TDS
SULPHATE
CHLORIDE
LIMIT
JAN TO MARCH
APRIL TO JUNE
location


Graphical presentation for the variation of
TDS,SO4 & Cl in bore water Morambli village
2500
2000
1500
1000
500
0
mg/l
TDS
SULPHATE
CHLORIDE
LIMIT
JAN TO MARCH
APRIL TO JUNE
location


Graphical presentation for the variation of TDS,SO4 & Cl in bore water Mosali village
TDS
SULPHATE
CHLORIDE
2500
2000
1500
1000
500
0
mg/l
LIMIT
JAN TO MARCH
APRIL TO JUNE
location


Graphical presentation for the variation of TDS,SO4 & Cl in bore water Shah nala village
TDS
SULPHATE
CHLORIDE
2500
2000
1500
1000
500
0
mg/l
LIMIT
JAN TO MARCH
APRIL TO JUNE
location