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 July 2018 to December-2018

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: July – 2018 to December – 2018

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	65.2	64.1
2	Kosamdi Village	57.9	53.8
3	Morambi Village	62.4	61.9
4	Lignite Cutting area	68.4	65.8
5	Dump Area	67.8	62.8
6	Feeder breaker	63.5	68.9
7	Harsani Village	62.4	61.5
8	Dansoli Village	60.9	60.1
	Limit	100	

Six Monthly Variation in Ambient Air Quality Data

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

Period: July – 2018 to December – 2018

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	32.9	34.5
2	Kosamdi Village	29.6	31.4
3	Morambi Village	34.8	38.9
4	Lignite Cutting area	38.7	35.9
5	Dump Area	38.5	35.1
6	Feeder breaker	34.6	35.9
7	Harsani Village	33.9	39.2
8	Dansoli Village	28.6	32.4
	Limit	60 $\mu g/m^3$	

Six Monthly Variation in Ambient Air Quality Data

Parameter: SO_2 (Sulphur Dioxide)

Period: July – 2018 to December – 2018

Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	18.4	19.3
2	Kosamdi Village	17.6	14.3
3	Morambi Village	19.5	21.8
4	Lignite Cutting area	22.2	26.7
5	Dump Area	19.1	20.1
6	Feeder breaker	18.3	25.4
7	Harsani Village	16.4	21.9
8	Dansoli Village	15.8	18.4
	Limit	80 $\mu g/m^3$	

Six Monthly Variation in Ambient Air Quality Data

Parameter: NO_X (Oxides of Nitrogen)

Period: July – 2018 to December – 2018

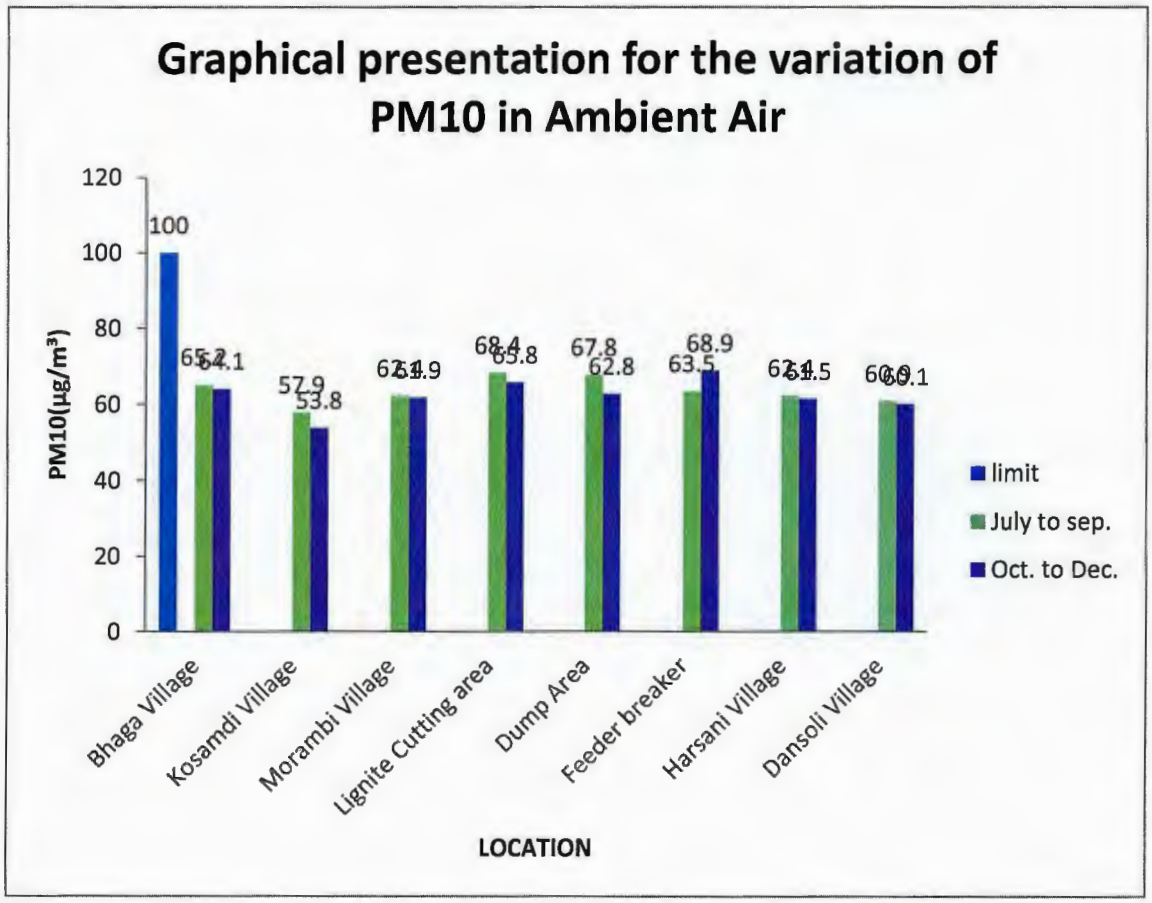
Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	13.9	11.7
2	Kosamdi Village	12.6	10.4
3	Morambi Village	13.4	17.9
4	Lignite Cutting area	14.5	17.1
5	Dump Area	14.2	18.1
6	Feeder breaker	13.6	16.3
7	Harsani Village	12.9	18.6
8	Dansoli Village	11.8	16.9
	Limit	80	

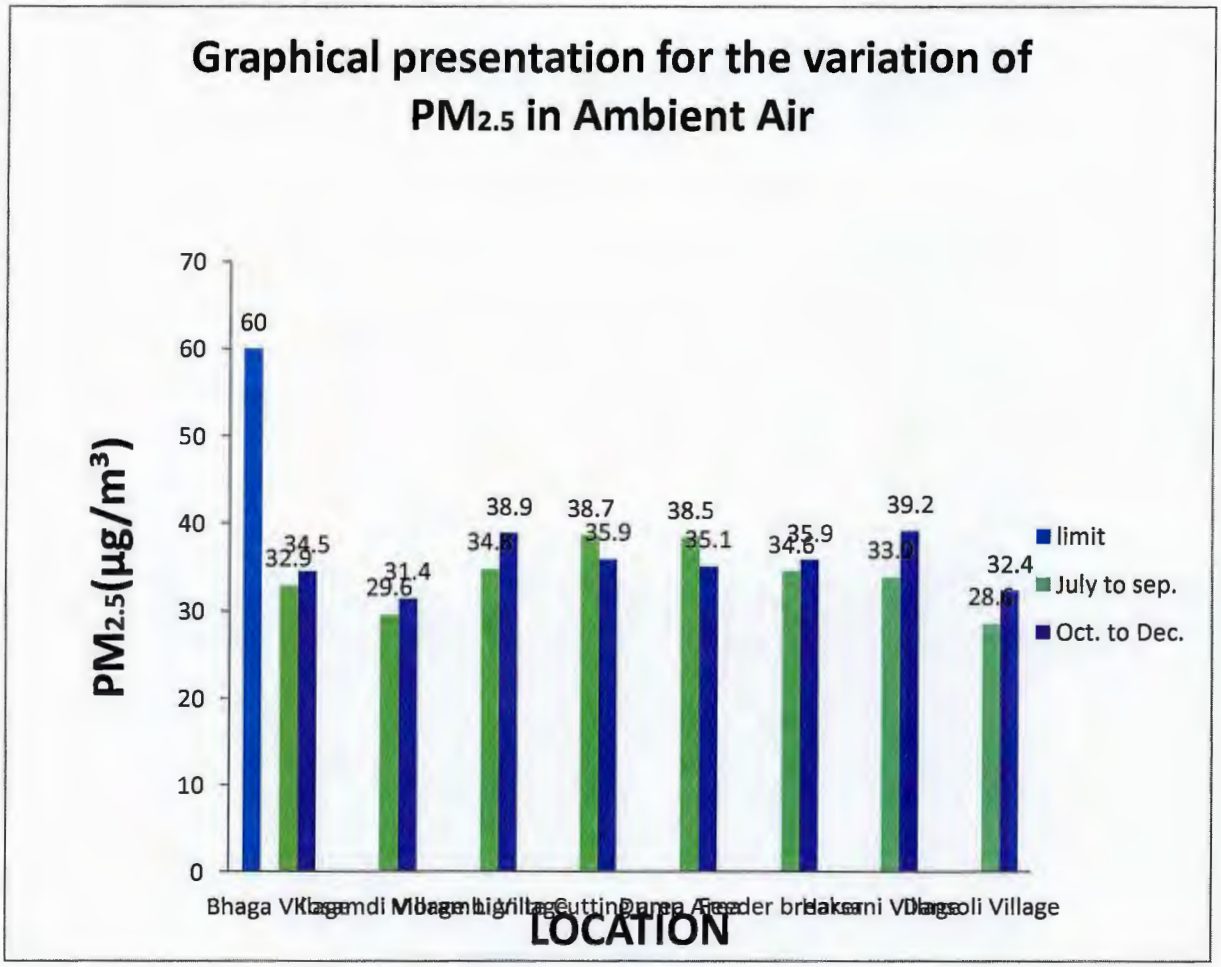
Six Monthly Variation in Ambient Air Quality Data

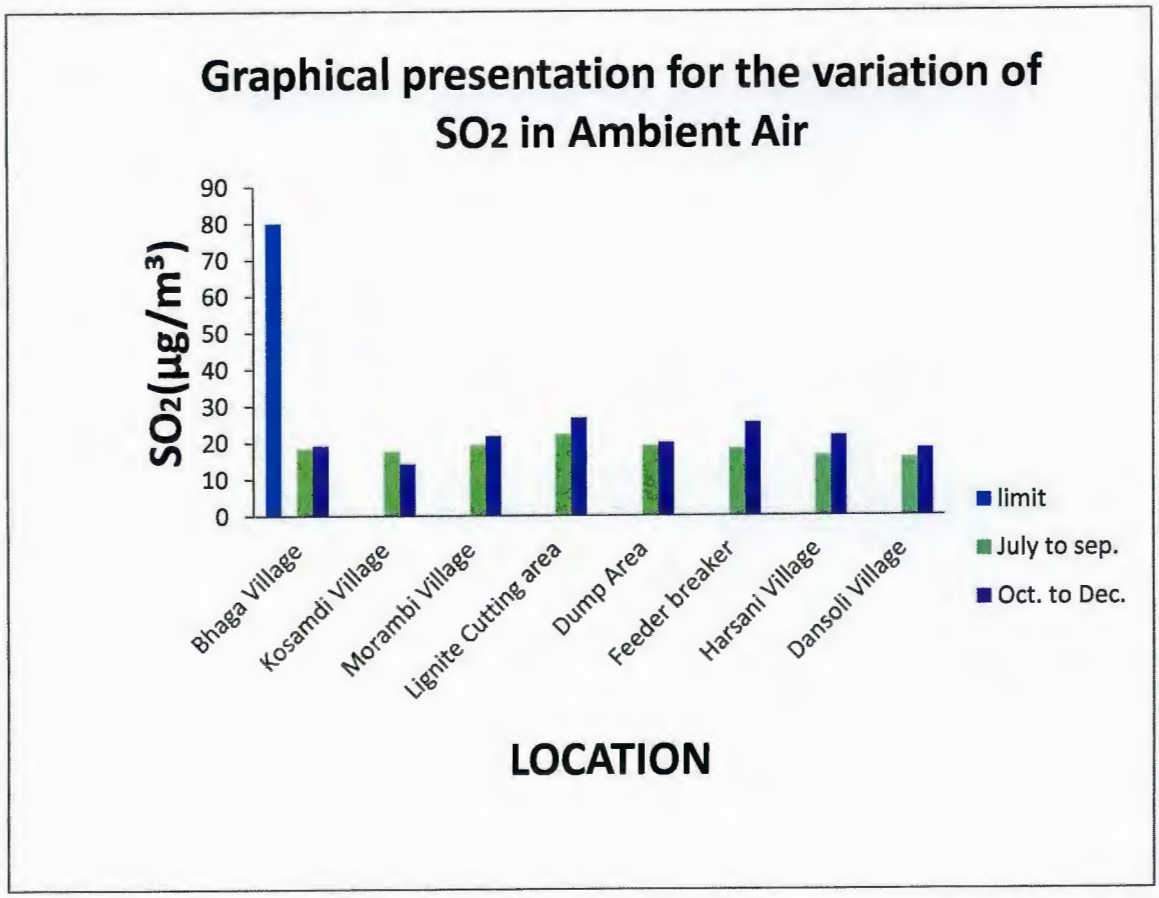
Parameter: CO (Carbon Monoxide)

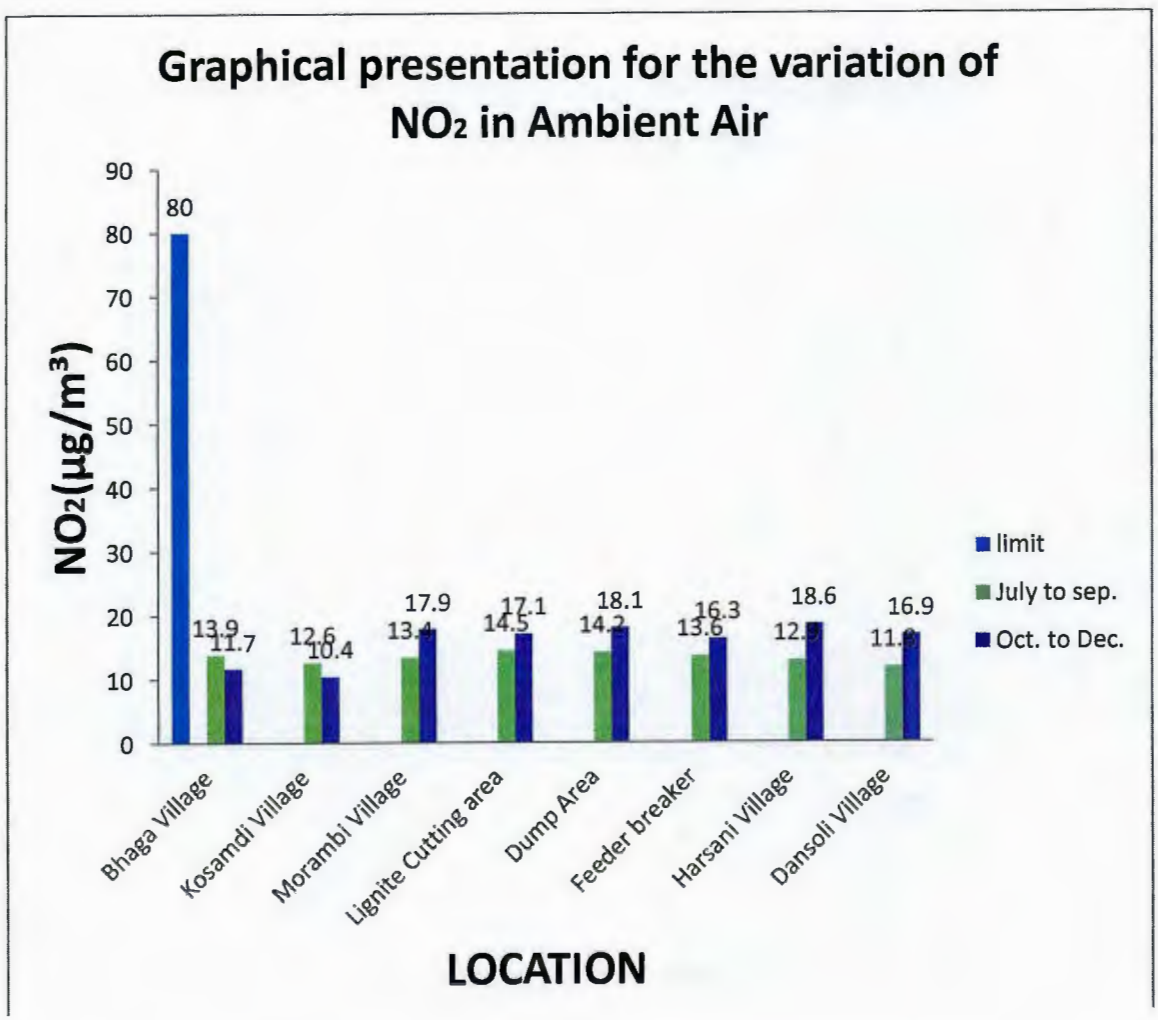
Period: July – 2018 to December – 2018

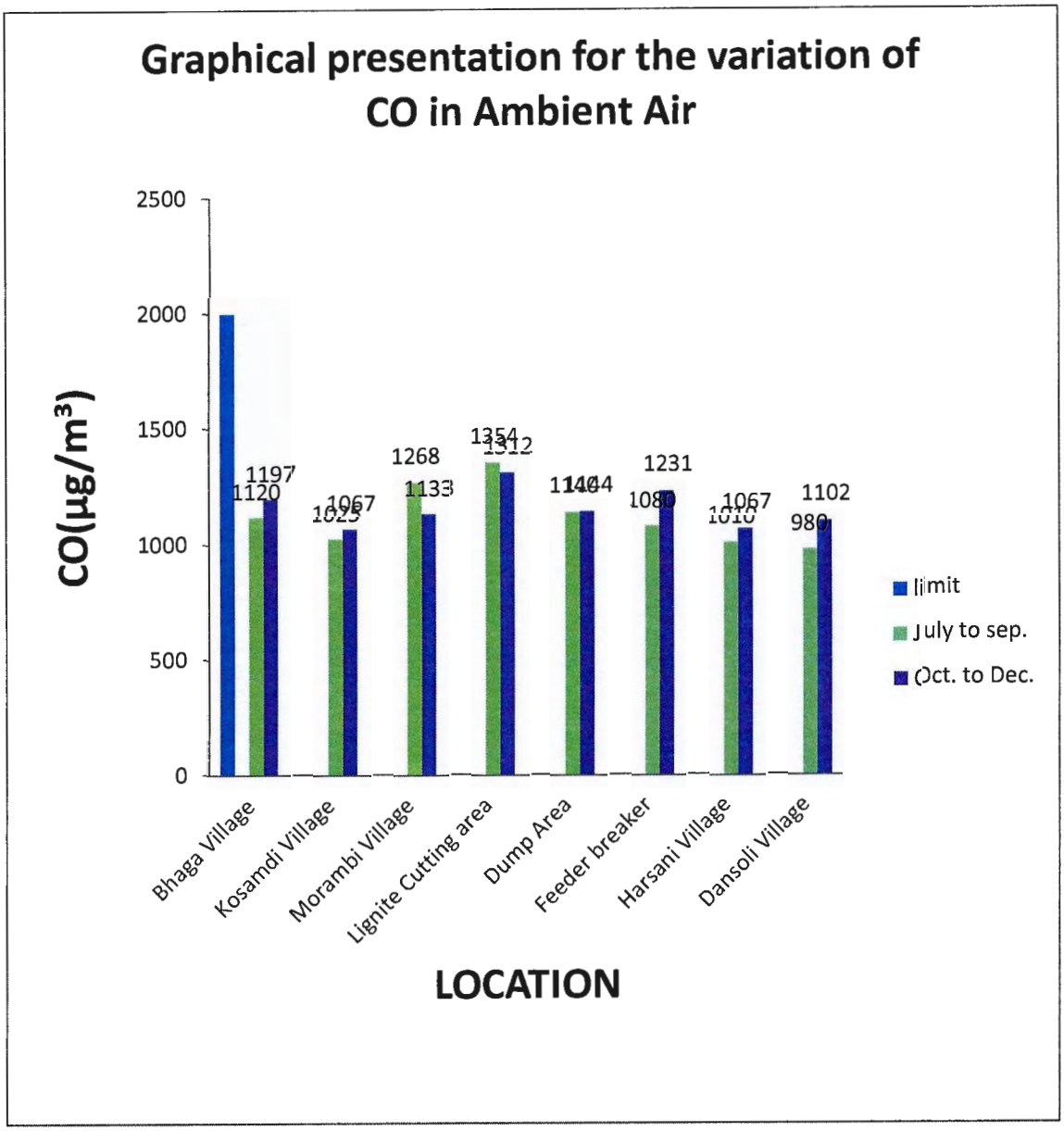
Sr. No.	Location	Results ($\mu g/m^3$)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	1120	1197
2	Kosamdi Village	1025	1067
3	Morambi Village	1268	1133
4	Lignite Cutting area	1354	1312
5	Dump Area	1140	1144
6	Feeder breaker	1080	1231
7	Harsani Village	1010	1067
8	Dansoli Village	980	1102
	Limit	2000	


Graphical presentation for the variation of PM10 in Ambient Air
PM10(µg/m³)
120
100
80
60
40
20
0
100
65.2
64.1
57.9
53.8
62.4
61.9
68.4
65.8
67.8
62.8
63.5
68.9
62.4
61.5
60.9
60.1
limit
July to sep.
Oct. to Dec.
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
PM2.5(µg/m³)
70
60
50
40
30
20
10
0
60
32.9
34.5
29.6
31.4
34.8
38.9
38.7
35.9
38.5
35.1
34.6
35.9
33.0
39.2
28.6
32.4
limit
July to sep.
Oct. to Dec.
Bhaga Village
LOCATION


Graphical presentation for the variation of SO2 in Ambient Air
SO2(µg/m3)
90
80
70
60
50
40
30
20
10
0
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
limit
July to sep.
Oct. to Dec.
LOCATION


Graphical presentation for the variation of NO2 in Ambient Air
NO2(µg/m3)
90
80
70
60
50
40
30
20
10
0
80
13.9
11.7
12.6
10.4
13.4
17.9
14.5
17.1
14.2
18.1
13.6
16.3
12.8
18.6
11.8
16.9
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
limit
July to sep.
Oct. to Dec.
LOCATION

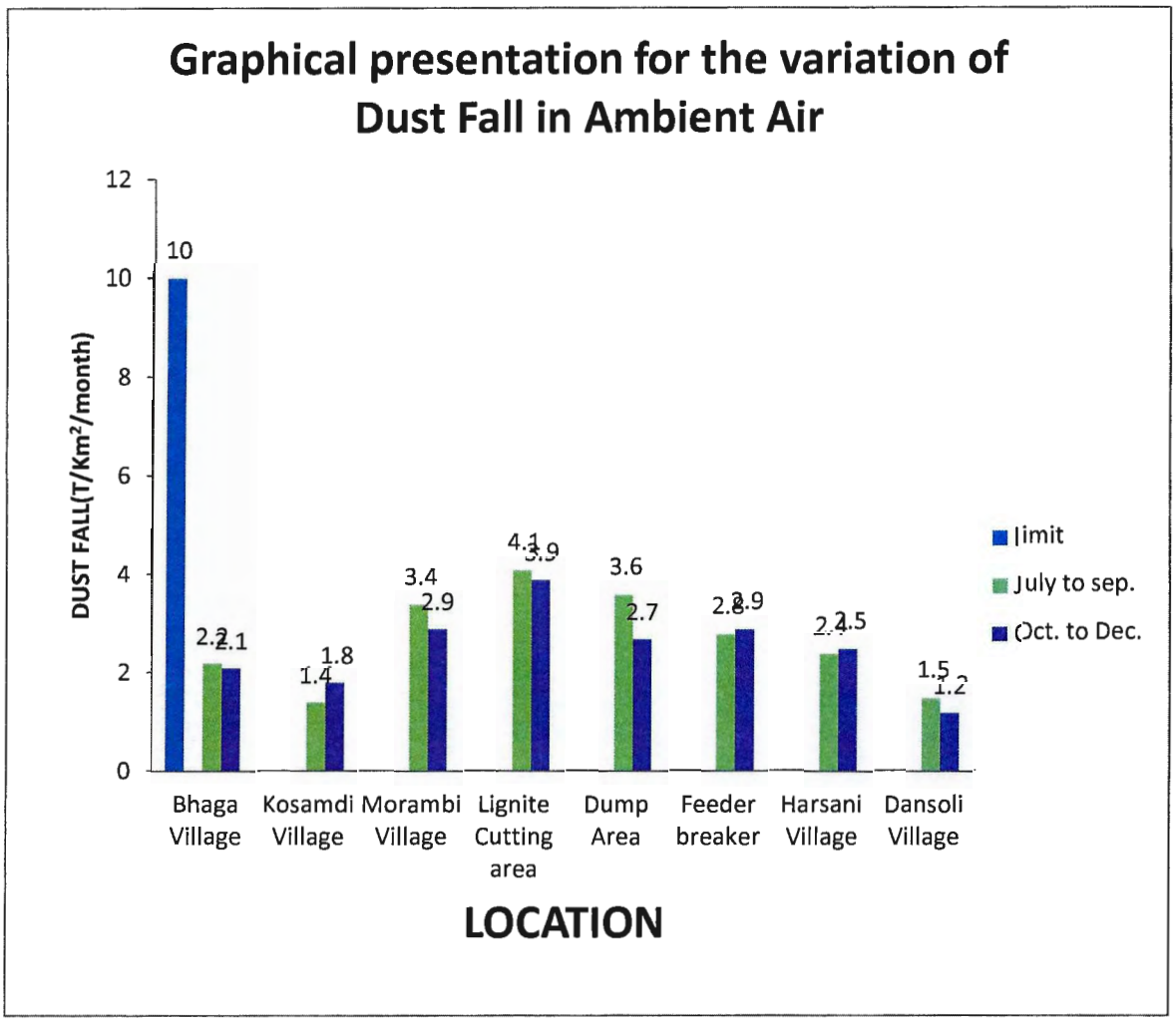

Graphical presentation for the variation of CO in Ambient Air
CO(µg/m³)
2500
2000
1500
1000
500
0
1120
1197
1268
1133
1354
1312
1231
1080
1067
1102
980
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION
limit
July to sep.
Oct. to Dec.

Six Monthly Variation in Ambient Air Quality Data

Parameter: Dust Fall

Period: July – 2018 to December – 2018

Sr. No.	Location	Results (T/Km^2/month)	
		Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
1	Bhaga Village	2.2	2.1
2	Kosamdi Village	1.4	1.8
3	Morambi Village	3.4	2.9
4	Lignite Cutting area	4.1	3.9
5	Dump Area	3.6	2.7
6	Feeder breaker	2.8	2.9
7	Harsani Village	2.4	2.5
8	Dansoli Village	1.5	1.2
	Limit	10	

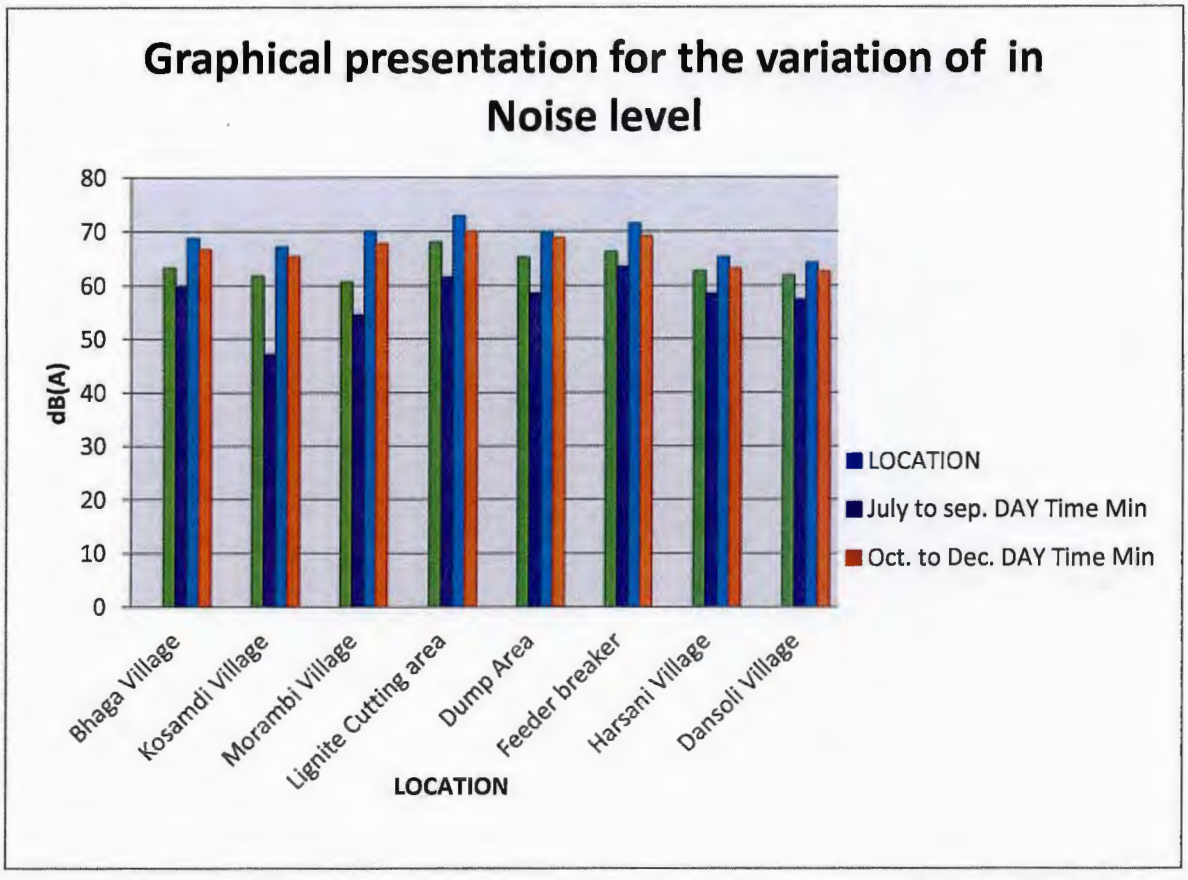

Graphical presentation for the variation of Dust Fall in Ambient Air
DUST FALL(T/Km²/month)
12
10
8
6
4
2
0
10
2.2
2.1
1.4
1.8
3.4
2.9
4.1
3.9
3.6
2.7
2.8
2.9
2.4
2.5
1.5
1.2
limit
July to sep.
Oct. to Dec.
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION

Six Monthly Variations in Noise Level Data

Parameter: Noise

Period: July – 2018 to December – 2018

SR. NO.	LOCATION	NOISE LEVEL, dB [A]							
		Quarterly July to Sept - 2018				Quarterly Oct to Dec - 2018			
		DAY Time		Night Time		DAY Time		Night Time	
		Max	Min	Max	Min	Max	Min	Max	Min
1	Bhaga Village	63.3	59.8	57.8	54.6	68.8	66.7	57.1	53.3
2	Kosamadi Village	61.9	47.2	58.2	54.1	67.2	65.4	54.2	52.5
3	Morambi Village	60.8	54.6	46.9	42.3	70.1	67.8	52.6	48.2
4	Lignite Cutting Area	68.1	61.6	60.1	56.2	72.9	70.1	57.1	51.6
5	Dump Area	65.2	58.6	57.8	51.4	69.8	68.9	58.3	54.3
6	Feeder Breaker	66.2	63.4	55.1	49.6	71.5	69.2	55.8	52.1
7	Harsani Village	62.7	58.5	56.8	50.2	65.2	63.1	57.4	50.3
8	Dansoli Village	61.9	57.4	62.5	56.7	64.1	62.6	56.2	51.8
	GPCB limit	75 (dB)		70(dB)		75 (dB)		70(dB)	


Graphical presentation for the variation of in Noise level
80
70
60
50
40
30
20
10
0
dB(A)
Bhaga Village
Kosamdi Village
Morambi Village
Lignite Cutting area
Dump Area
Feeder breaker
Harsani Village
Dansoli Village
LOCATION
LOCATION
July to sep. DAY Time Min
Oct. to Dec. DAY Time Min

Six Monthly Variations in Micro-meteorological data

Period : July – 2018 to December – 2018

Dry Bulb Temperature (^{0}C)		
Time in Hrs.	**Quarterly July to Sept - 2018**	**Quarterly Oct to Dec - 2018**
10.00	29	24
11.00	29	23
12.00	29	29
13.00	30	28
14.00	30.0	29
15.00	30.0	30.0
16.00	29.0	28.0
17.00	29.5	27.0
18.00	28.0	26.0
19.00	28.0	25.0
20.00	27.0	24.0
21.00	27.0	23.0
22.00	27.0	23.0
23.00	27.0	23.0
00.00	27.0	22.0
01.00	27.0	22.6
02.00	26.0	23.1
03.00	26.0	23.0
04.00	27.0	22.0
05.00	28.0	22.0
06.00	28.0	22.0
07.00	28.0	23.0
08.00	28.0	24.0
09.00	28.0	25.0
Maximum	**30**	**30**
Minimum	**26**	**22**
Average	**28**	**23.7**

Six Monthly Variations in Micrometeorological data

Period: July – 2018 to December – 2018

Wet Bulb Temperature (^{0}C)		
Time in Hrs.	**Quarterly July to Sept - 2018**	**Quarterly Oct to Dec - 2018**
10.00	27	22
11.00	27	22
12.00	27	26
13.00	27.5	25.4
14.00	27.5	27.1
15.00	27.5	27.4
16.00	26.5	26.3
17.00	26	26
18.00	25.5	24.1
19.00	25.5	23.5
20.00	24	22
21.00	24	21
22.00	24	21
23.00	24	21
00.00	24	20
01.00	24	21
02.00	24	20
03.00	24	21
04.00	26	20
05.00	25.5	20
06.00	25.5	21.3
07.00	25.5	21.0
08.00	25.5	22.8
09.00	25.5	23.6
Maximum	**27.5**	**26.0**
Minimum	**24.0**	**20.0**
Average	**25.5**	**21.9**

Six Monthly Variations in Micrometeorological data

Period: July – 2018 to December – 2018

Atmospheric Pressure (mm Hg)		
Time in Hrs.	**Quarterly July to Sept - 2018**	**Quarterly Oct to Dec - 2018**
10.00	757.1	760.2
11.00	757.4	760.2
12.00	757.6	758.1
13.00	757.9	758.2
14.00	760.0	756.8
15.00	758.2	755.5
16.00	760.0	755.2
17.00	757.1	750.8
18.00	757.6	754.8
19.00	758.2	755.2
20.00	758.6	756.2
21.00	759	758.1
22.00	760.0	759.2
23.00	754.2	760
00.00	756.0	760
01.00	757.6	759.5
02.00	757.9	758.5
03.00	760.0	758.8
04.00	758.2	757.1
05.00	760.0	759.1
06.00	757.6	757.2
07.00	757.9	758.2
08.00	760.0	759.1
09.00	758.2	758.8
Maximum	**760.0**	**760.2**
Minimum	**754.2**	**750.2**
Average	**758.2**	**757.7**

Six Monthly Variations in Micrometeorological data

Period : July – 2018 to December – 2018

Relative Humidity %		
Time in Hrs.	**Quarterly July to Sept - 2018**	**Quarterly Oct to Dec - 2018**
10.00	85	47
11.00	85	45
12.00	84	37
13.00	85	39
14.00	85	38
15.00	85	38
16.00	81	37
17.00	84	42
18.00	81	49
19.00	81	48
20.00	77	51
21.00	77	55
22.00	77	55
23.00	77	57
00.00	77	57
01.00	77	51
02.00	86	47
03.00	81	45
04.00	82	42
05.00	81	42
06.00	81	40
07.00	81	40
08.00	81	40
09.00	81	40
Maximum	**86**	**57**
Minimum	**71**	**37**
Average	**81.2**	**44.7**

Six Monthly Variations in Micrometeorological data

Period: July – 2018 to December – 2018

Wind Speed (km/hour)		
Time in Hrs.	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018
10.00	18	10
11.00	15	10
12.00	11	8
13.00	4.2	8
14.00	3.6	6
15.00	10	12
16.00	19	13
17.00	22	10
18.00	20	14
19.00	20.4	11
20.00	18	13
21.00	19	12
22.00	19	10
23.00	22	9
00.00	19	10
01.00	18	7
02.00	22	9
03.00	20	8
04.00	22	9
05.00	20	10
06.00	27	10
07.00	26	8
08.00	21	8
09.00	20	8
Maximum	**27**	**13**
Minimum	**3.6**	**6**
Average	**18.1**	**9.2**

Six Monthly Variations in Micrometeorological data

Period: July – 2018 to December – 2018

Wind Direction		
Time in Hrs.	**Quarterly July to Sept - 2018**	**Quarterly Oct to Dec - 2018**
10.00	WS	ENE
11.00	WS	ENE
12.00	SW	SE
13.00	SW	SE
14.00	SW	SW
15.00	WSW	WSW
16.00	WSW	WSW
17.00	WSW	WSW
18.00	WSW	WSW
19.00	WSW	WSW
20.00	WSW	WSW
21.00	WSW	WNW
22.00	WSW	WNW
23.00	WSW	WNW
00.00	WSW	WNW
01.00	WSW	SW
02.00	WSW	SW
03.00	WSW	SW
04.00	WSW	N
05.00	WSW	NNE
06.00	WSW	NNE
07.00	WSW	NNE
08.00	WSW	NNE
09.00	WSW	NNE
Maximum	**WSW**	**WSW**
Minimum	**SW**	**N**
Average	**WSW**	**WSW**

Six Monthly Variation in bore water Data

Location: Shah Nallah Upstream

Period: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	28	25	**Shall not exceed 5°c above the receiving water temp.**
2	pH@ 25°C	pH unit	7.19	7.31	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	2	3	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	575	551	**2100**
6	Total volatile Solids	mg/L	4	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	138	148	**1000**
11	Sulphate	mg/L	52	56	**300**
12	Fluoride	mg/L	0.2	0.5	**2.0**
13	Phosphate as PO_4^{--}	mg/L	2.4	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	<0.01	<0.01	**1.0**
17	Lead	mg/L	<0.02	<0.02	**0.1**
18	Copper	mg/L	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	98	91	--
24	Magnesium	mg/L	45	46	--
25	Percentage Sodium	%	20	26	--
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	26	26	**Shall not exceed 5˚c above the receiving water temp**
2	pH@ 25 ^{0}C	pH unit	7.43	7.43	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	**--**
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	5	6	**100**
5	Total Dissolved Solids (TDS) @180 ^{0}C	mg/L	1610	1498	**2100**
6	Total volatile Solids	mg/L	4	6	**--**
7	COD	mg/L	--	< 10	**250**
8	BOD (5 days at 20^o C)	mg/L	--	< 4	**30**
9	Oil & Grease	mg/L	<1	<1	**10**
10	Chloride	mg/L	456	443	**1000**
11	Sulphate	mg/L	182	178	**300**
12	Fluoride	mg/L	0.4	0.2	**2.0**
13	Phosphate as PO_4^{--}	mg/L	6.4	5.6	**--**
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	<0.01	<0.01	**1.0**
17	Lead	mg/L	<0.02	<0.02	**0.1**
18	Copper	mg/L	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	180	118	**--**
24	Magnesium	mg/L	62	76	**--**
25	Percentage Sodium	%	50	50	**--**
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	26	25	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.23	7.36	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	**--**
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	3	5	**100**
5	Total Dissolved Solids (TDS) @180 ^{0}C	mg/L	455	456	**2100**
6	Total volatile Solids	mg/L	6	3	**--**
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	96	91	**1000**
11	Sulphate	mg/L	30	28	**300**
12	Fluoride	mg/L	0.4	0.7	**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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	85	78	**--**
24	Magnesium	mg/L	40	41	**--**
25	Percentage Sodium	%	30	29	**--**
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 (Dansoli Village)

Period: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	24	26	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.14	7.24	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	6	5	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	1305	1176	**2100**
6	Total volatile Solids	mg/L	4.0	3.1	--
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	540	477	**1000**
11	Sulphate	mg/L	152	131	**300**
12	Fluoride	mg/L	0.1	0.4	**2.0**
13	Phosphate as PO_4^-	mg/L	3.1	2.9	--
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	45	67	--
24	Magnesium	mg/L	43	41	--
25	Percentage Sodium	%	110	111	--
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	28	25	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.23	7.33	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	3	6	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	1035	1108	**2100**
6	Total volatile Solids	mg/L	6	4	--
7	COD	mg/L	--	< 10	**250**
8	BOD (5 days at 20° C)	mg/L	--	< 4	**30**
9	Oil & Grease	mg/L	<1	<1	**10**
10	Chloride	mg/L	180	183	**1000**
11	Sulphate	mg/L	22	29	**300**
12	Fluoride	mg/L	0.5	0.7	**2.0**
13	Phosphate as PO_4^{--}	mg/L	6.4	4.9	--
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	180	164	--
24	Magnesium	mg/L	62	71	--
25	Percentage Sodium	%	60	58	--
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	26	25	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.32	7.20	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	7	5	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	2012	2121	**2100**
6	Total volatile Solids	mg/L	6	4	--
7	COD	mg/L	--	< 10	**250**
8	BOD (5 days at 20° C)	mg/L	--	< 4	**30**
9	Oil & Grease	mg/L	<1	<1	**10**
10	Chloride	mg/L	922	902	**1000**
11	Sulphate	mg/L	118	115	**300**
12	Fluoride	mg/L	0.6	0.4	**2.0**
13	Phosphate as PO_4^{--}	mg/L	5.6	4.2	--
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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	180	114	--
24	Magnesium	mg/L	25	78	--
25	Percentage Sodium	%	55	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 Water (Mangrol Village)

Period: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	28	26	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.23	7.35	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	5	7	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	730	698	**2100**
6	Total volatile Solids	mg/L	6	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	220	208	**1000**
11	Sulphate	mg/L	102	105	**300**
12	Fluoride	mg/L	0.4	0.7	**2.0**
13	Phosphate as PO_4^{--}	mg/L	1.1	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	<0.01	<0.01	**1.0**
17	Lead	mg/L	<0.02	<0.02	**0.1**
18	Copper	mg/L	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	72	90	--
24	Magnesium	mg/L	43	48	--
25	Percentage Sodium	%	120	101	--
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	28	26	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25 ^{0}C	pH unit	7.26	7.38	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	--
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	8	5	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	985	898	**2100**
6	Total volatile Solids	mg/L	6	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	365	335	**1000**
11	Sulphate	mg/L	115	98	**300**
12	Fluoride	mg/L	0.4	0.5	**2.0**
13	Phosphate as PO_4^{--}	mg/L	2.5	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	<0.01	<0.01	**1.0**
17	Lead	mg/L	<0.02	<0.02	**0.1**
18	Copper	mg/L	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	110	95	--
24	Magnesium	mg/L	32	41	--
25	Percentage Sodium	%	190	171	--
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	25	25	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25 ^{0}C	pH unit	7.13	7.14	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	**--**
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	4	7	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	563	592	**2100**
6	Total volatile Solids	mg/L	5	6	**--**
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	140	129	**1000**
11	Sulphate	mg/L	35	59	**300**
12	Fluoride	mg/L	0.4	0.3	**2.0**
13	Phosphate as PO_4^{--}	mg/L	2.4	3.2	**--**
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	90	79	**--**
24	Magnesium	mg/L	43	41	**--**
25	Percentage Sodium	%	70	65	**--**
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: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	24	26	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25 ^{0}C	pH unit	7.43	7.33	**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	480	498	**2100**
6	Total volatile Solids	mg/L	7	3	--
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	104	102	**1000**
11	Sulphate	mg/L	46	51	**300**
12	Fluoride	mg/L	0.3	0.7	**2.0**
13	Phosphate as PO_4^{--}	mg/L	2.1	2.9	--
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	87	91	--
24	Magnesium	mg/L	30	32	--
25	Percentage Sodium	%	60	60	--
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: July – 2018 to December – 2018

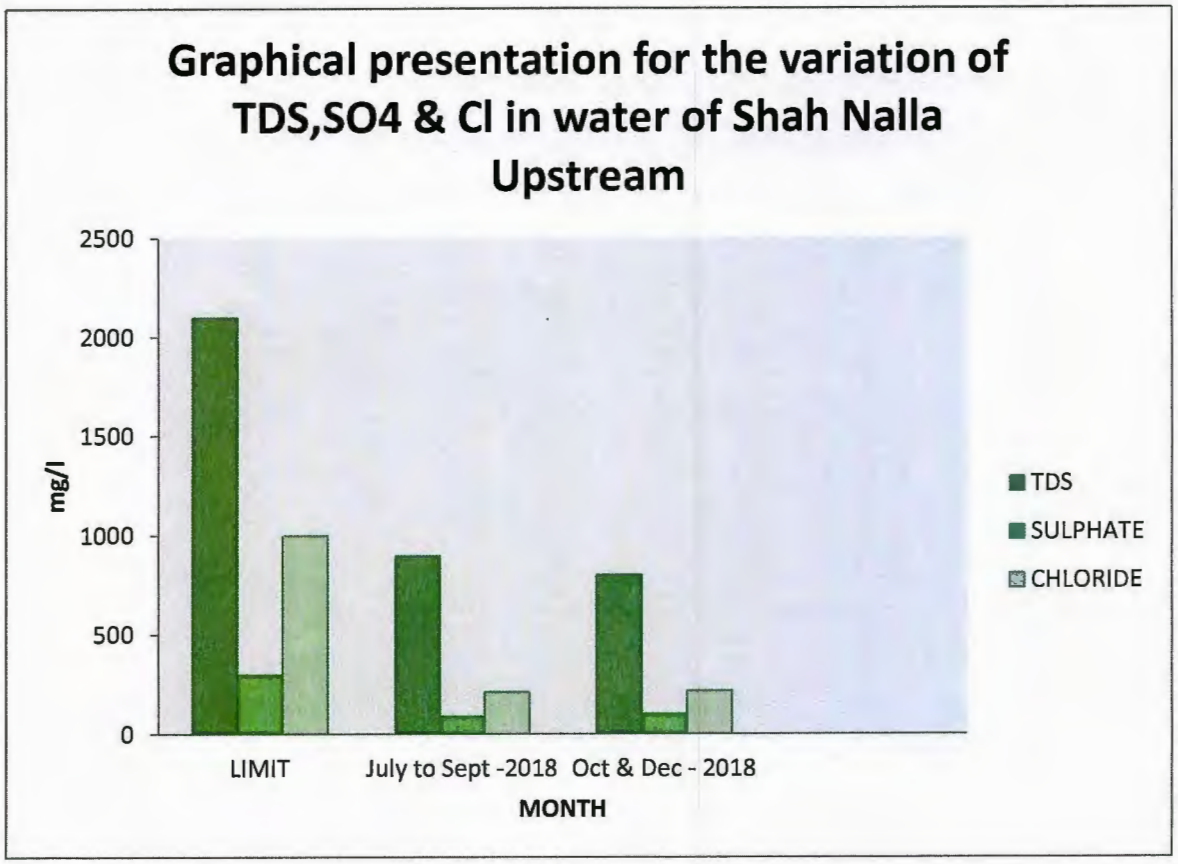
Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	^{0}C	24	27	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25 ^{0}C	pH unit	7.32	7.11	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	**--**
4	Total Suspended Solids (TSS) @105 ^{0}C	mg/L	4.0	3.7	**100**
5	Total Dissolved Solids (TDS) @180 ^{0}C	mg/L	1940	1575	**2100**
6	Total volatile Solids	mg/L	5	5.8	**--**
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	822	684	**1000**
11	Sulphate	mg/L	205	169	**300**
12	Fluoride	mg/L	0.5	0.7	**2.0**
13	Phosphate as PO_4^-	mg/L	2.6	2.8	**--**
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	145	125	**--**
24	Magnesium	mg/L	42	41	**--**
25	Percentage Sodium	%	90	87	**--**
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: Pond Water (Shah Nala Village)

Period: July – 2018 to December – 2018

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2018	Quarterly Oct to Dec - 2018	MoEF Limit
1	Temperature	°C	25	25	**Shall not exceed 5°c above the receiving water temp**
2	pH@ 25°C	pH unit	7.04	7.23	**5.5-9.0**
3	Colour	pt. Co. Scale	<5	<5	**--**
4	Total Suspended Solids (TSS) @105 °C	mg/L	5	3	**100**
5	Total Dissolved Solids (TDS) @180° C	mg/L	896	801	**2100**
6	Total volatile Solids	mg/L	4	6	**--**
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	212	218	**1000**
11	Sulphate	mg/L	90	102	**300**
12	Fluoride	mg/L	0.5	0.7	**2.0**
13	Phosphate as PO_4^{---}	mg/L	2.7	3.2	**--**
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	<0.01	<0.01	**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	<0.05	<0.05	**3.0**
23	Calcium	mg/L	140	122	**--**
24	Magnesium	mg/L	79	51	**--**
25	Percentage Sodium	%	110	106	**--**
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**


Graphical presentation for the variation of TDS,SO4 & Cl in water of Shah Nalla Upstream
2500
2000
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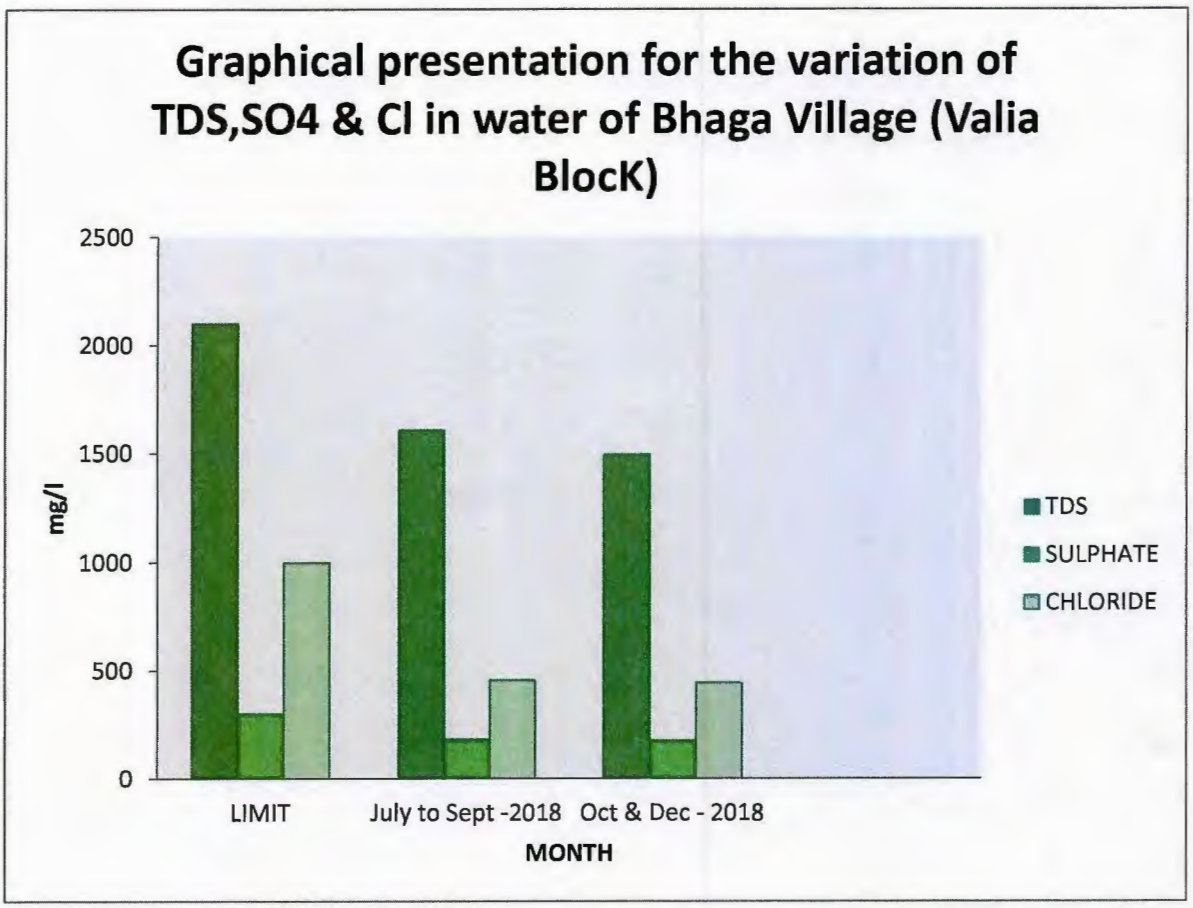
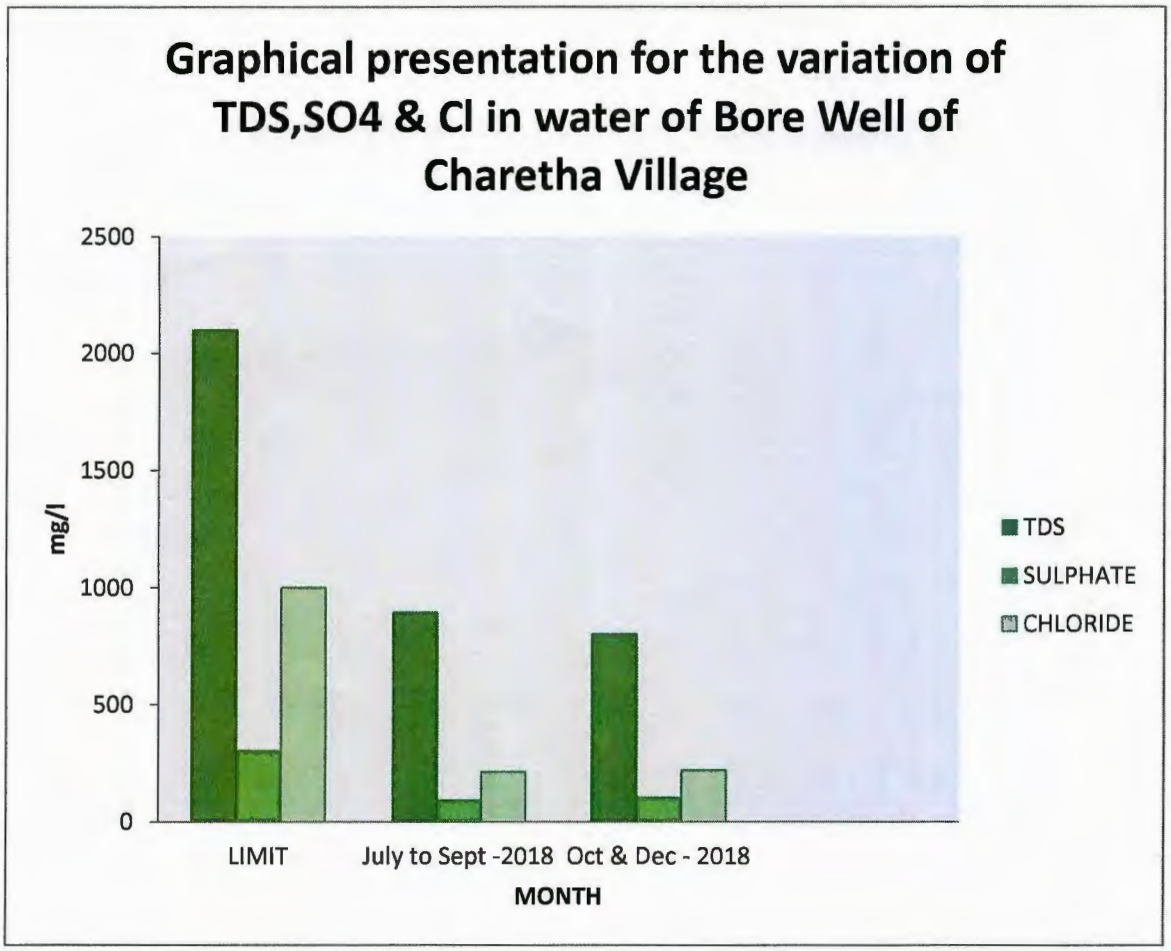
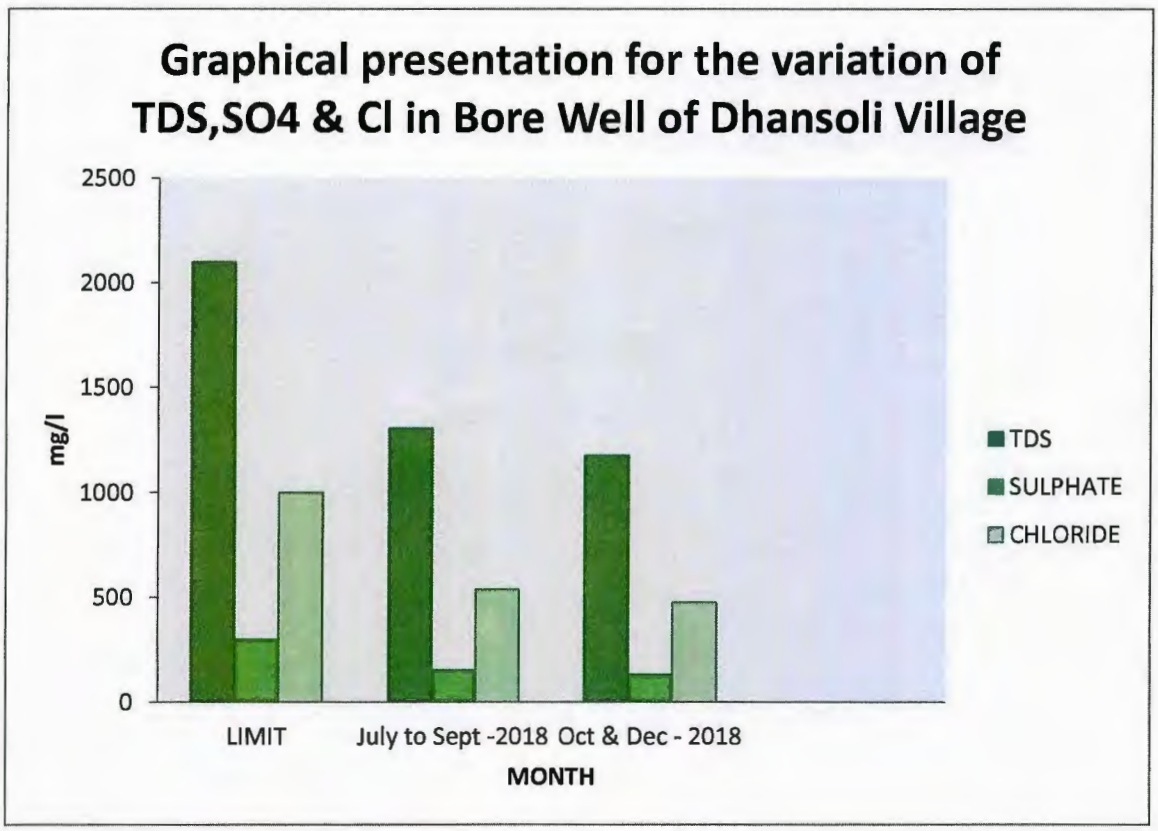
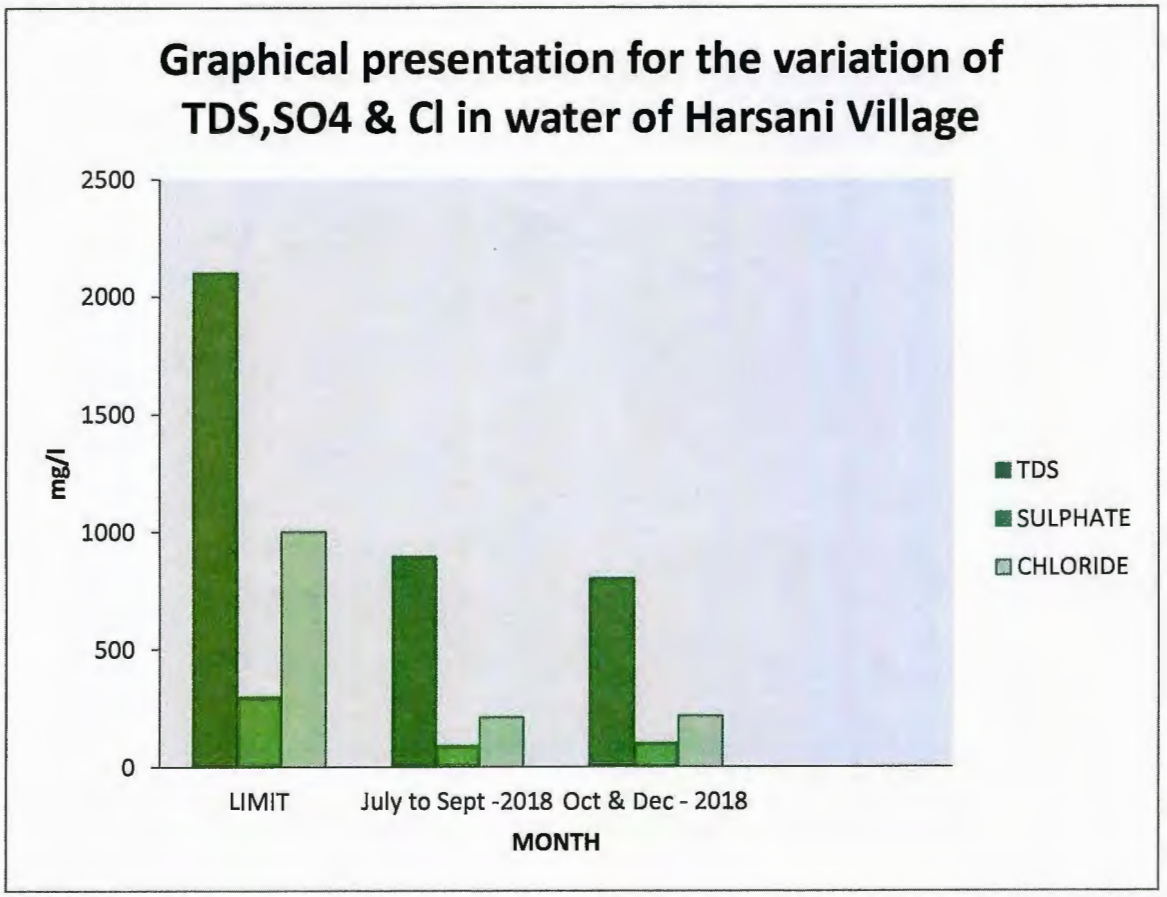
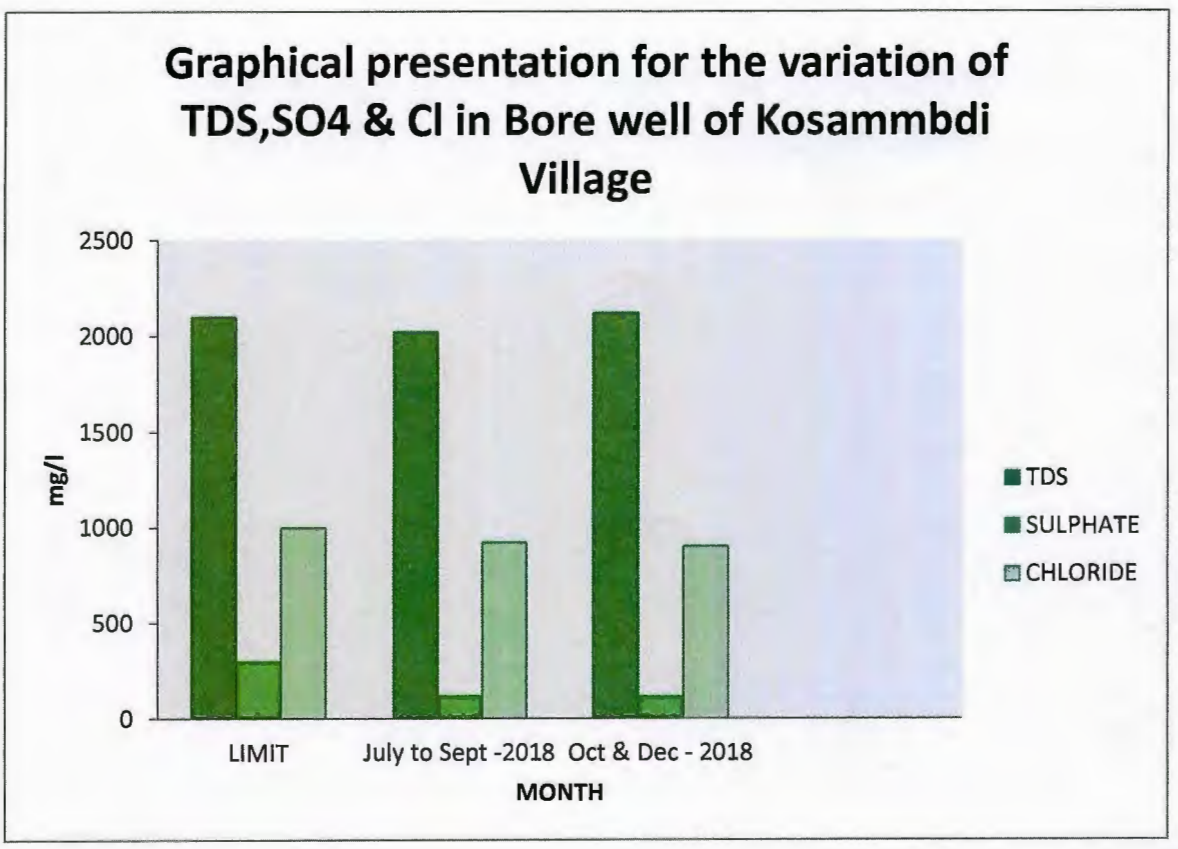
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

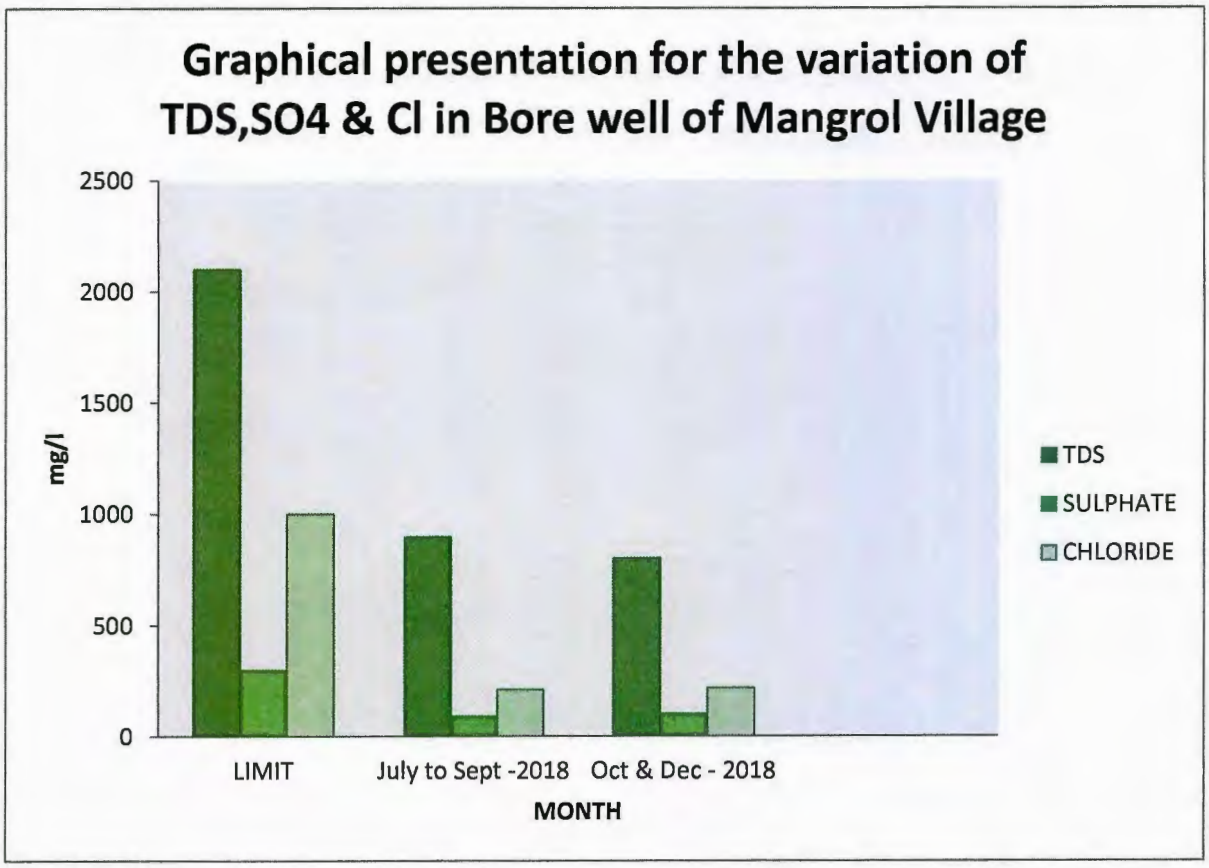

Graphical presentation for the variation of TDS,SO4 & Cl in water of Bhaga Village (Valia BlocK)
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

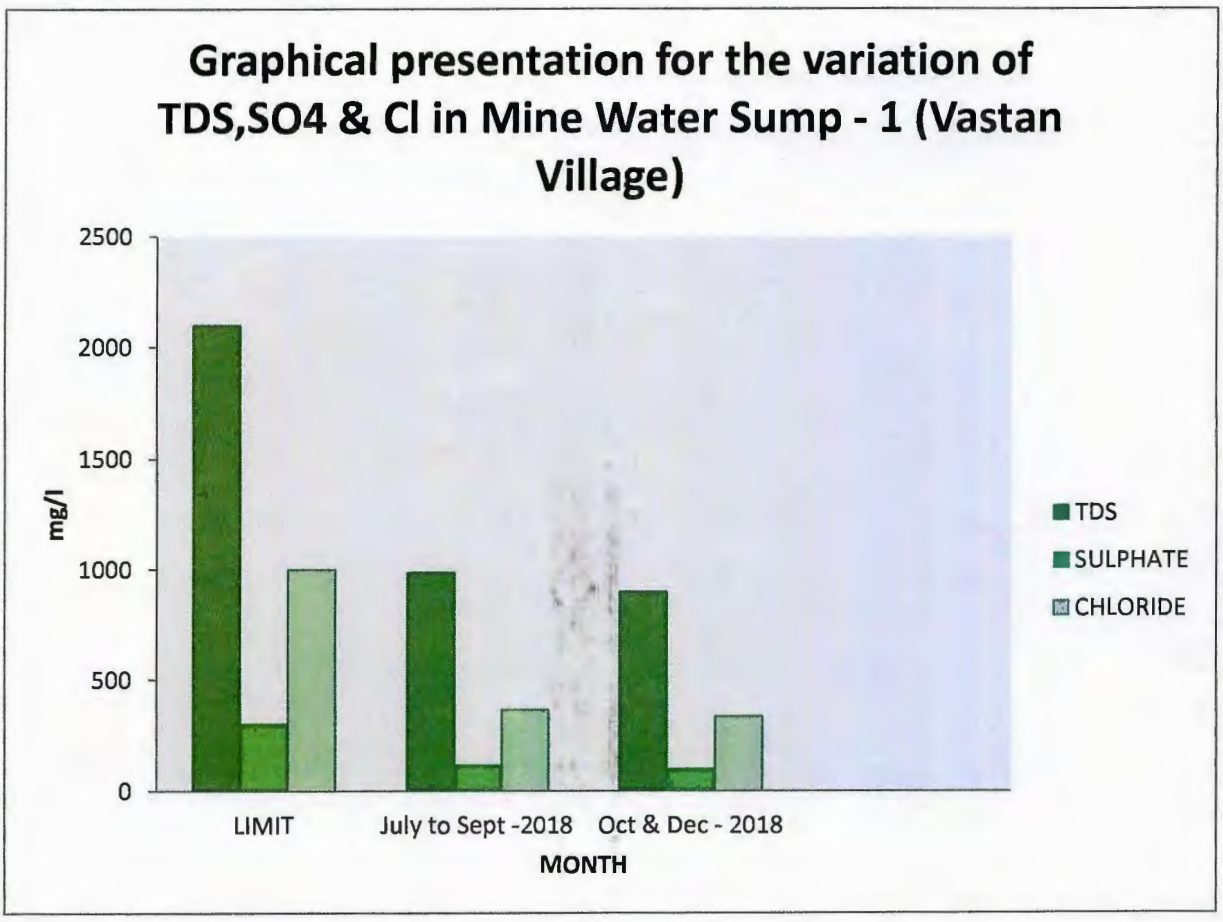

Graphical presentation for the variation of TDS,SO4 & Cl in water of Bore Well of Charetha Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

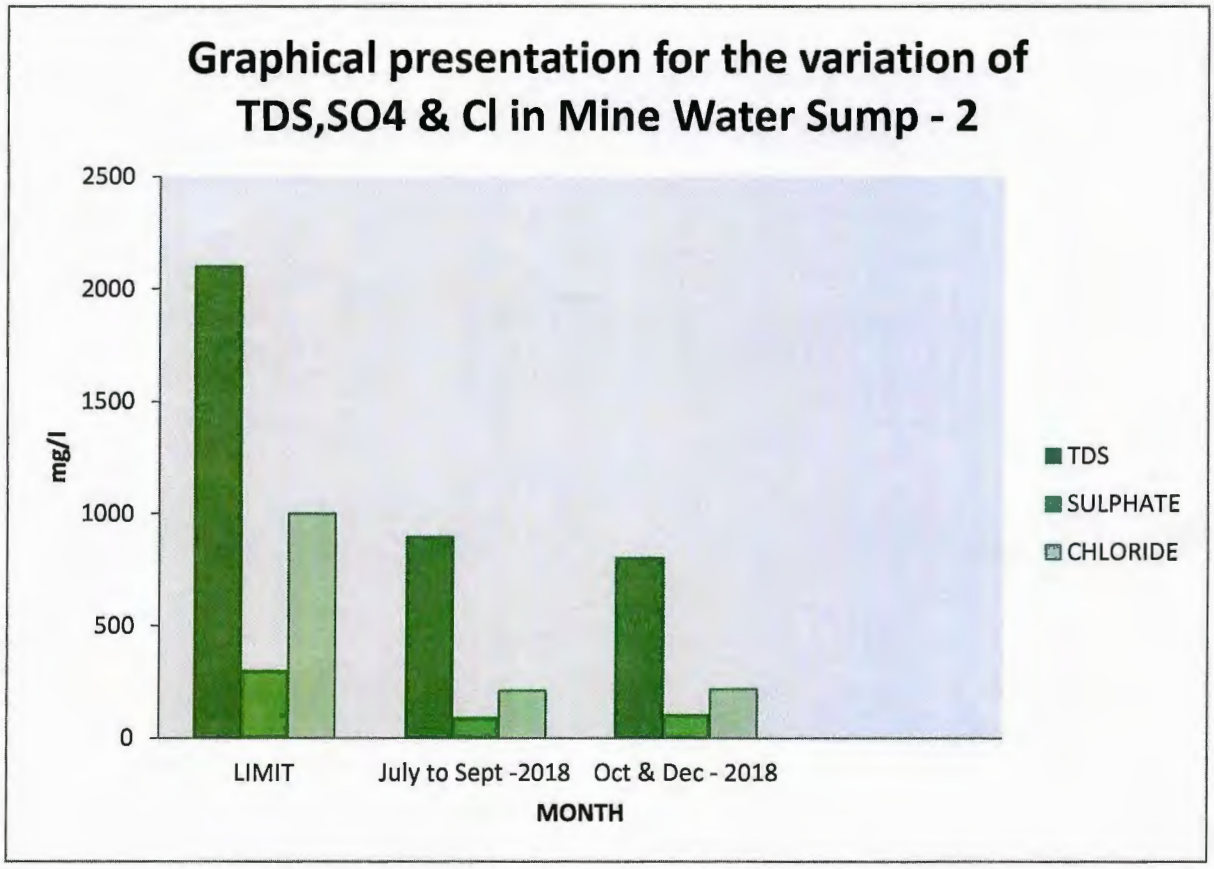

Graphical presentation for the variation of TDS,SO4 & Cl in Bore Well of Dhansoli Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

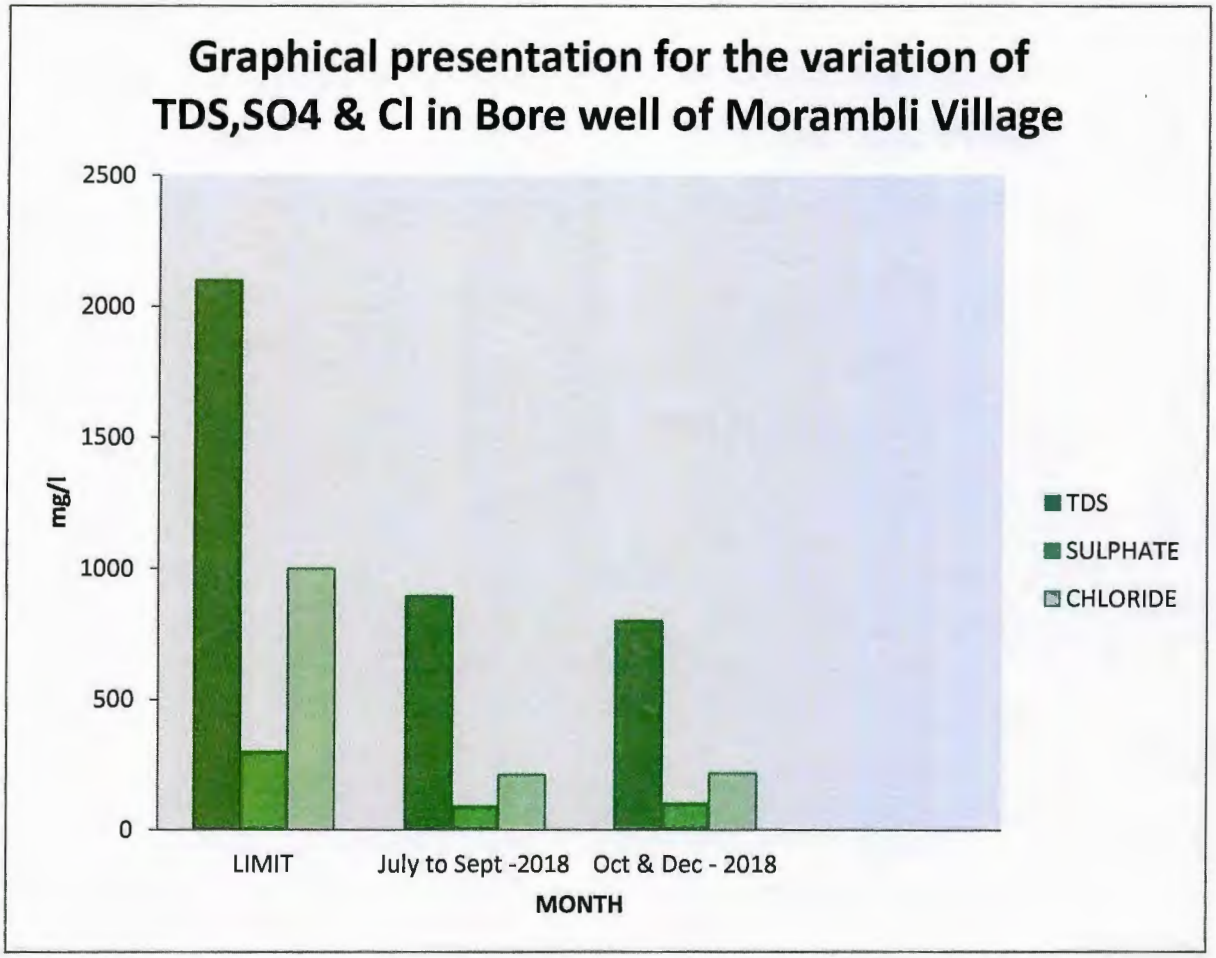

Graphical presentation for the variation of TDS,SO4 & Cl in water of Harsani Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

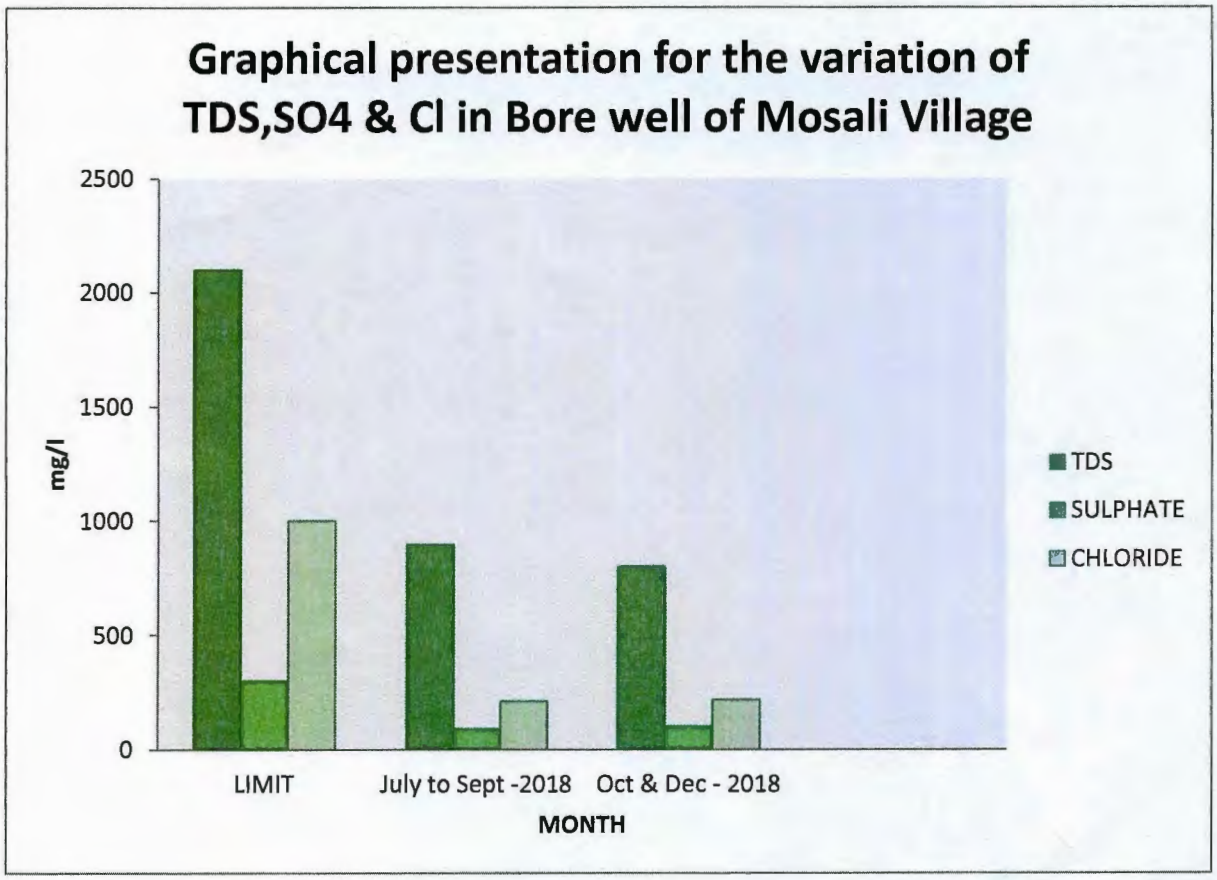

Graphical presentation for the variation of TDS,SO4 & Cl in Bore well of Kosammbdi Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE

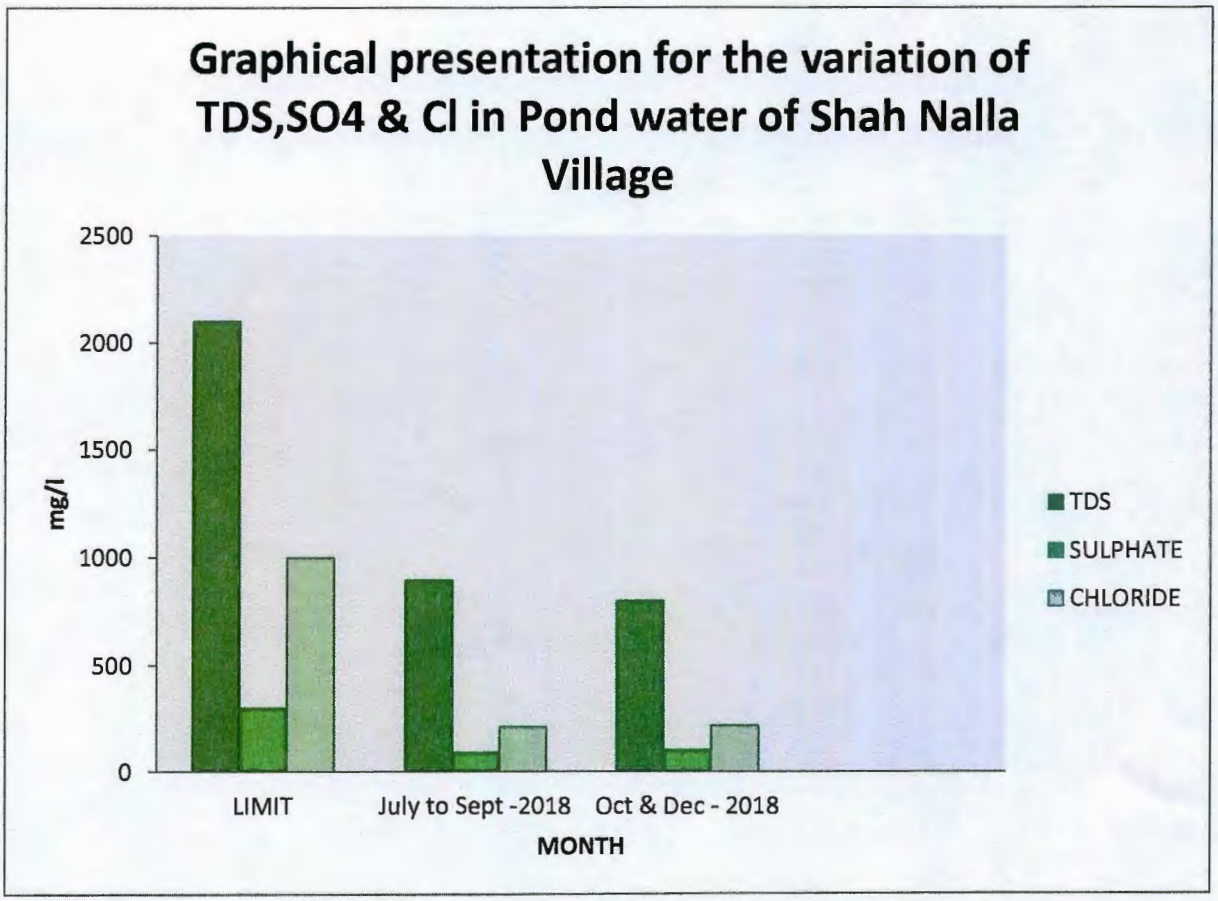

Graphical presentation for the variation of TDS,SO4 & Cl in Bore well of Mangrol Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE


Graphical presentation for the variation of TDS,SO4 & Cl in Mine Water Sump - 1 (Vastan Village)
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE


Graphical presentation for the variation of TDS,SO4 & Cl in Mine Water Sump - 2
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE


Graphical presentation for the variation of TDS,SO4 & Cl in Bore well of Morambli Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE


Graphical presentation for the variation of TDS,SO4 & Cl in Bore well of Mosali Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE


Graphical presentation for the variation of TDS,SO4 & Cl in Pond water of Shah Nalla Village
2500
2000
1500
1000
500
0
mg/l
LIMIT
July to Sept -2018
Oct & Dec - 2018
MONTH
TDS
SULPHATE
CHLORIDE