Gujarat Industries Power Company Limited

(Vastan Lignite Opencast Mine)

Village: Vastan
Ta. Mangrol, Di. Surat.

SIX MONTHLY

ENVIRONMENTAL MONITORING & ANALYSIS REPORT

For The Period of July - 2014 to December - 2014

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Project Consultant

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PREFACE

Consciousness at national level in the industrial sector is increasing day by with the focus on environment and sustainable development. A good environ management policy requires a consent 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 (MoEF), Govt. of India, New Delhi. It is mandatory to get the samples of Air / Gaseous Emission & Effluent, collected and analyzed from an approved laboratory Bi-Monthly & its analysis report should be submitted to GPCB & Six monthly analysis submitted to MoEF.

Gujarat Industries Power Company Limited (GIPCL) – Vastan Lignite Mines is situated at Village- Vastan, Tal. Mangrol, Dist. Surat. This Company engaged in the generation of Electricity. The Industry had awarded contract for monthly monitoring and analysis to M/s. ENPRO ENVIRO TECH AND ENGINEERS PVT. LTD., Surat.

M/s. ENPRO ENVIRO TECH AND ENGINEERS PVT. LTD., is a Leading Environmental Consultancy firm situated at Adajan Road, Surat. And is approved as Schedule –II environmental auditor by Gujarat Pollution Control Board. M/s. ENPRO ENVIRO TECH AND ENGINEERS PVT. LTD. have its own full fledge laboratory to measure the pollution parameters belongs to Air, Water, Hazardous etc.

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METHODOLOGY FOR ENVIRONMENTAL MONITORING

M/s Gujarat Industries Power Company Limited has awarded the work of Environmental monitoring of its Vastan Lignite Mines to ENPRO Enviro Tech and Engineers Pvt. Ltd. EN-PRO visits the Vastan Lignite Mines Quarterly to carry out environmental monitoring.

ENPRO follows the following methodology for carrying out monitoring of various components.

Water & Waste Quality Monitoring:
Ground and surface water samples are at their source using grab sampling. Surface and ground water samples are collected from core and buffer zones located near the mining area. Preserved samples are brought to Surat based EN-PRO's laboratory for analysis. For sampling & analysis methods various IS codes and APHA analysis methods are followed. The samples are analyzed for Physico-chemical & bacteriological properties mainly.

Ambient Air Quality Monitoring:
The wind direction and wind speed is monitored first and based on that sampling stations for ambient air quality monitoring are installed. The locations are so chosen such that at least one station falls in opposite wind direction from all stationary sources (Mining Area). The other stations are installed in two arrays. First array comprising minimum two stations located at apprx. 120^0 and at a distance of apprx. 2 Kms. from nearby stationery source falling in the wind directions. The second array comprising minimum two stations located in wind direction and at a distance of more than 2 Kms. from nearby stationery source falling in the wind directions. Also at two stations are installed in the nearby population area falling in the wind direction. The samples are collected using high volume air samplers for monitoring for 24 hours, preserved and brought to Surat based EN-PRO's laboratory for analysis. For sampling & analysis methods IS-5182 & CPCB Manual is followed. Main pollutants analyzed are Particulate matter ($PM_{2.5}$), Respirable particulate matter (PM_{10}), Sulfur dioxide, Oxides of Nitrogen & Carbon Monoxide.

Weather Monitoring:
Monitoring station for weather is selected based on wind direction. The station is so selected that it remains unobstructed from incoming wind. The micrometeorological data is collected on ambient temperature, humidity, wind speed and direction on hourly basis for 24 hours. For this monitoring IS – 8829 is followed. The equipments used are wind wane, anemometer and thermo hygrometer.

Noise Level Monitoring:
The main sources of noise are lignite handling and transportation equipments and systems in the mines. The noise level is monitored in the immediate vicinity of the source. Then the noise level is monitored at the locations falling in the villages in core and buffer zone of mines. Two sets of data are collected for day time and night time monitoring. The noise level is monitored using digital sound level meter.

Dust Fall Monitoring:
The dust fall resulting from mining and handling activities of lignite is monitored at several locations in the core and buffer zones. Large solid and liquid particles (typically greater than 10 µm in aerodynamic diameter) are collected via gravitational settling in an open mouth container for a period of a month. The container is washed with a known volume of distilled water, which is filtered and then evaporated. The mass of insoluble particles are determined by the weight gain of the filter after filtration. The mass of soluble particles are determined by the weight gain of a crucible after evaporation. Total mass gain is measured gravimetrically. The dust fall is measured using jars as per standard practice as per IS - 5182.

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Scope of work for (4 × 125 MW Surat Lignite Power Plant)

1. Ambient Air Monitoring

Sr. No.	No. of Stations and Location	Duration	Frequency of Sampling	Parameter	Method of Analysis
1	8 Nos. within the radius of 10 Km from the Core Zone.	24 hours	Quarterly	PM_{10}	IS 5182 part 23 2006
				$PM_{2.5}$	CPCB guideline
				SO_2	IS 5182 part II 2001
				NO_X	IS 5182 part VI 2006

2. Weather Monitoring Data

Sr. No.	No. of Stations and Location	Duration	Frequency	Parameter	Method of Analysis
1	1 No at Site office of the Mine	24 hours	Quarterly	Dry & Wet Bulb Temp, Relative Humidity, Wind Speed & Direction, Max & Min Tempe.	Using automatic temp recorder wind vane & Anemometer, Max & Min Thermometer & IS 8829.

3. Noise Monitoring Data

Sr. No.	No. of Stations and Location	Duration	Frequency	Parameter	Method of Analysis
1	8 Nos. at various location in the plant premises	24 hours	Once in a month	Day & Night Noise level	Using Sound level Meter

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4. Water & Waste Water Quality Monitoring

Sr. No.	No. of Stations and Location	Duration	Frequency	Parameter	Method of Analysis
1	5 Nos. of Bore well & 1 No. of Surface Water sample located both in core & Buffer Zones	1	Quarterly	Physico-Chemical, Heavy Metals, Biological & Microbiological parameters.	Analysis report carried out as per APHA 22st edition 2012 standard method for the examination of water and waste water.

5. Dust Fall Measurement

Sr. No.	No. of Stations and Location	Duration	Frequency	Parameter	Method of Analysis
1	7 Nos. within the radius of 10 km from the Core Zone.	Duration	Quarterly	Dust fall	Methods of air sampling and analysis, IS – 5182.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Bore Well Water Vastan Village

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 10:30 am	14 / 09 / 14 11:30 am	14 / 11 / 14 11:00 am
			RESULTS		
	General Parameters				
1.	pH (at 26^0 C)	-	6.41	7.56	7.08
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	24	18	12
5.	Total Dissolved Solids (TDS)	mg/L	1236	1152	1248
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	BDL	BDL	BDL
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
	Chemical Parameters				
10.	Chlorides (as Cl^-)	mg/L	360	459	395
11.	Sulphate (as SO_4^{-2})	mg/L	213	278	236
12.	Phosphate (as PO_4)	mg/L	0.6	0.3	0.5
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	1.0	1.5	1.1
15.	Free available Chlorine	mg/L	NIL	NIL	NIL
16.	Total Residual Chlorine	mg/L	NIL	NIL	NIL
17.	Total Hardness	mg/L	275	330	295
18.	Total Alkalinity	mg/L	155	145	180

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 10:30 am	14 / 09 / 14 11:30 am	14 / 11 / 14 11:00 am
			RESULTS		
Heavy Metals					
19.	Iron (as Fe)	mg/L	0.080	0.076	0.058
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	0.40	0.22	0.30
22.	Hexavalent Chromium (asCr^{+6})	mg/L	0.03	0.02	0.04
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	80	125	152
26.	Magnesium (as Mg)	mg/L	42	20	28
27.	Sodium	%	BDL	BDL	BDL
Bio-Assay					
28	Bioassay Test	%	100	100	100
Bacteriological Analysis					
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Surface Water Vastan (Natural Pond)

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 01:00 pm	14 / 09 / 14 12:50 pm	14 / 11 / 14 12:30 pm
			RESULTS		
General Parameters					
1.	pH (at 26^0 C)	-	7.93	7.37	6.74
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	36	42	30
5.	Total Dissolved Solids (TDS)	mg/L	402	236	364
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	1.2	0.6	0.8
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
Chemical Parameters					
10.	Chlorides (as Cl^-)	mg/L	50	32	48
11.	Sulphate (as SO_4^{-2})	mg/L	52.6	62.4	74.2
12.	Phosphate (as PO_4)	mg/L	1.2	0.8	1.0
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	0.3	0.7	0.9
15.	Free available Chlorine	mg/L	NIL	NIL	NIL
16.	Total Residual Chlorine	mg/L	NIL	NIL	NIL
17.	Total Hardness	mg/L	110	125	105
18.	Total Alkalinity	mg/L	120	105	130

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 1:00 pm	14 / 09 / 14 12:50 pm	14 / 11 / 14 12:30 pm
			RESULTS		
	Heavy Metals				
19.	Iron (as Fe)	mg/L	0.48	0.56	0.68
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	0.18	0.10	0.14
22.	Hexavalent Chromium (asCr^{+6})	mg/L	0.057	0.042	0.069
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	36	26	24
26.	Magnesium (as Mg)	mg/L	18	16	12
27.	Sodium	%	BDL	BDL	BDL
	Bio-Assay				
28	Bioassay Test	%	90	90	90
	Bacteriological Analysis				
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Bore well water hand pump in Surali Village

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 11:15 am	14 / 09 / 14 12:15 pm	14 / 11 / 14 10:00 am
			RESULTS		
	General Parameters				
1.	pH (at 26^0 C)	-	7.51	7.42	7.63
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	32	38	26
5.	Total Dissolved Solids (TDS)	mg/L	620	894	748
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	0.8	1.0	0.4
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
	Chemical Parameters				
10.	Chlorides (as Cl^-)	mg/L	152	208	164
11.	Sulphate (as SO_4^{-2})	mg/L	66	90	82
12.	Phosphate (as PO_4)	mg/L	0.8	1.0	0.6
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	0.4	0.6	0.2
15.	Free available Chlorine	mg/L	Nil	Nil	Nil
16.	Total Residual Chlorine	mg/L	Nil	Nil	Nil
17.	Total Hardness	mg/L	210	315	260
18.	Total Alkalinity	mg/L	150	220	165

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 11:15 am	14 / 09 / 14 12:15 pm	14 / 11 / 14 10:00 am
			RESULTS		
	Heavy Metals				
19.	Iron (as Fe)	mg/L	0.51	0.66	0.71
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	BDL	BDL	BDL
22.	Hexavalent Chromium (asCr^{+6})	mg/L	BDL	BDL	BDL
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	60	86	78
26.	Magnesium (as Mg)	mg/L	24	28	20
27.	Sodium	%	BDL	BDL	BDL
	Bio-Assay				
28	Bioassay Test	%	90	90	90
	Bacteriological Analysis				
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Bore well water hand pump in Dungri Village

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 12:30 pm	14 / 09 / 14 01:30 am	14 / 11 / 14 02:30 am
			RESULTS		
	General Parameters				
1.	pH (at 26^0 C)	-	7.35	6.79	7.21
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	44	50	40
5.	Total Dissolved Solids (TDS)	mg/L	1360	1260	464
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	BDL	BDL	BDL
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
	Chemical Parameters				
10.	Chlorides (as Cl^-)	mg/L	486	505	457
11.	Sulphate (as SO_4^{-2})	mg/L	228	245	258
12.	Phosphate (as PO_4)	mg/L	0.3	0.6	0.2
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	0.2	0.3	0.5
15.	Free available Chlorine	mg/L	Nil	Nil	Nil
16.	Total Residual Chlorine	mg/L	Nil	Nil	Nil
17.	Total Hardness	mg/L	365	295	330
18.	Total Alkalinity	mg/L	200	225	195

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 12:30 pm	14 / 09 / 14 01:30 pm	14 / 11 / 14 02:30 pm
			RESULTS		
	Heavy Metals				
19.	Iron (as Fe)	mg/L	0.46	0.34	0.40
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	0.20	0.30	0.24
22.	Hexavalent Chromium (asCr^{+6})	mg/L	0.07	0.06	0.09
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	112	104	126
26.	Magnesium (as Mg)	mg/L	38	44	32
27.	Sodium	%	BDL	BDL	BDL
	Bio-Assay				
28	Bioassay Test	%	100	100	100
	Bacteriological Analysis				
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

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Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Bore well water Nr Tadkeshwar Village

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 11:50 am	14 / 09 / 14 10:30 am	14 / 11 / 14 11:50 am
			RESULTS		
	General Parameters				
1.	pH (at 26^0 C)	-	7.85	7.46	8.02
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	30	34	32
5.	Total Dissolved Solids (TDS)	mg/L	428	402	384
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	BDL	BDL	BDL
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
	Chemical Parameters				
10.	Chlorides (as Cl^-)	mg/L	80	56	78
11.	Sulphate (as SO_4^{-2})	mg/L	68	50	62
12.	Phosphate (as PO_4)	mg/L	0.5	0.4	0.7
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	0.7	0.5	0.3
15.	Free available Chlorine	mg/L	Nil	Nil	Nil
16.	Total Residual Chlorine	mg/L	Nil	Nil	Nil
17.	Total Hardness	mg/L	145	130	160
18.	Total Alkalinity	mg/L	110	140	120

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 11:50 am	14 / 09 / 14 10:30 am	14 / 11 / 14 11:50 am
			RESULTS		
	Heavy Metals				
19.	Iron (as Fe)	mg/L	0.62	0.52	0.70
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	BDL	BDL	BDL
22.	Hexavalent Chromium (asCr^{+6})	mg/L	BDL	BDL	BDL
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	24	30	34
26.	Magnesium (as Mg)	mg/L	18	13	16
27.	Sodium	%	BDL	BDL	BDL
	Bio-Assay				
28	Bioassay Test	%	100	100	100
	Bacteriological Analysis				
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Monthly Variation in July-2014 to December-2014

Report Period: July-2014 to December-2014
Sample: Bore well water Nani Naroli Village

Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 10:00 am	14 / 09 / 14 10:15 am	14 / 11 / 14 01:30 pm
			RESULTS		
General Parameters					
1.	pH (at 26^0 C)	-	7.83	6.94	7.53
2.	Color	Pt. Co.	Colorless	Colorless	Colorless
3.	Temperature	^{0}C	28	31	28
4.	Total Suspended Solids (TSS)	mg/L	36	26	22
5.	Total Dissolved Solids (TDS)	mg/L	1190	1096	1204
6.	Total Volatile Solids (TVS)	mg/L	BDL	BDL	BDL
7.	Oil & Grease	mg/L	BDL	BDL	BDL
8.	COD	mg/L	-	-	-
9.	BOD (3 days at 27^{0}C)	mg/L	-	-	-
Chemical Parameters					
10.	Chlorides (as Cl^-)	mg/L	212	254	226
11.	Sulphate (as SO_4^{-2})	mg/L	265	235	263
12.	Phosphate (as PO_4)	mg/L	1.4	1.2	1.5
13.	Phenolic Compound	mg/L	BDL	BDL	BDL
14.	Fluorides (as F^-)	mg/L	0.6	0.4	0.7
15.	Free available Chlorine	mg/L	Nil	Nil	Nil
16.	Total Residual Chlorine	mg/L	Nil	Nil	Nil
17.	Total Hardness	mg/L	390	320	410
18.	Total Alkalinity	mg/L	215	270	300

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Sr. No.	TEST PARAMETER	UNIT	SAMPLING DATE & TIME		
			Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
			16 / 07 / 14 10:00 am	14 / 09 / 14 10:15 am	14 / 11 / 14 01:30 pm
			RESULTS		
Heavy Metals					
19.	Iron (as Fe)	mg/L	0.38	0.26	0.42
20.	Copper (as Cu)	mg/L	BDL	BDL	BDL
21.	Total Chromium (as Cr^{+})	mg/L	1.20	1.38	1.46
22.	Hexavalent Chromium (asCr^{+6})	mg/L	0.11	0.08	0.15
23.	Zinc (as Zn)	mg/L	BDL	BDL	BDL
24.	Lead (as Pb)	mg/L	BDL	BDL	BDL
25.	Calcium (as Ca)	mg/L	178	157	198
26.	Magnesium (as Mg)	mg/L	56	34	48
27.	Sodium	%	BDL	BDL	BDL
Bio-Assay					
28	Bioassay Test	%	100	100	100
Bacteriological Analysis					
29.	Coliform Organism (MPN)	Per 100ml.	Nil	Nil	Nil

Note: BDL: - Below Detectable Limit.

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BORE WATER'S COMPARATIVE ANALYSIS REPORTS

Comparative Results For the Period of: July-2014 to December-2014

Parameter : TSS (mg/L)

Period : July-2014 to December-2014

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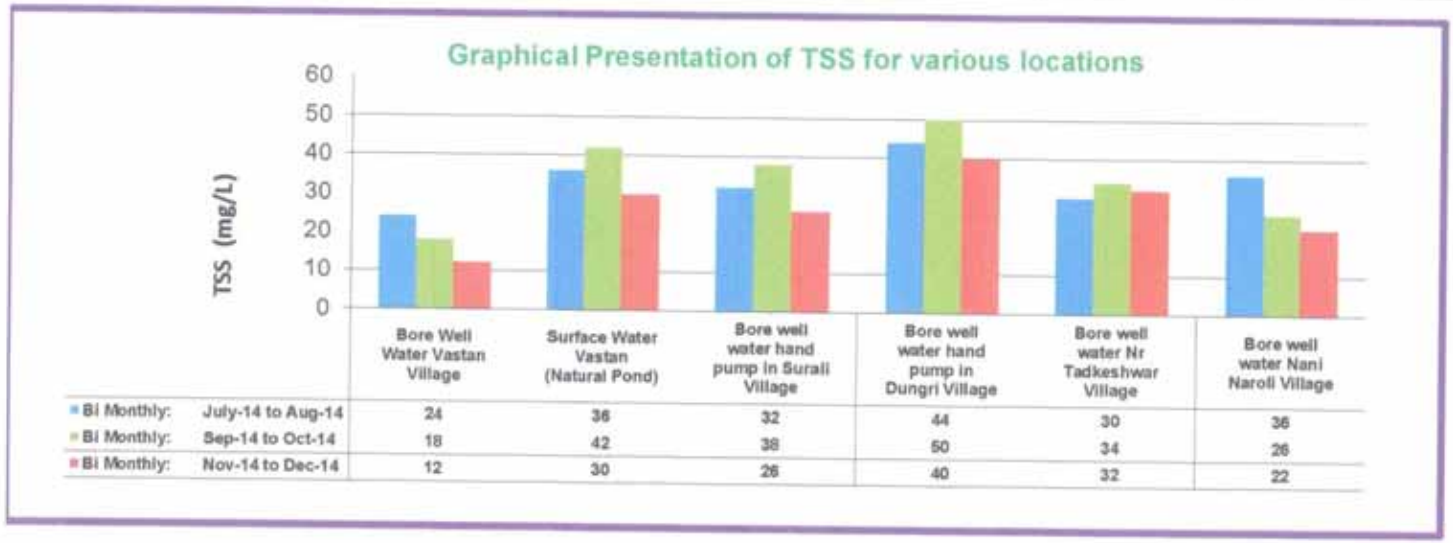
COMPARATIVE RESULTS OF TSS FOR VARIOUS LOCATIONS

Description	Bore Well Water Vastan Village	Surface Water Vastan (Natural Pond)	Bore well water hand pump in Surali Village	Bore well water hand pump in Dungri Village	Bore well water Nr Tadkeshwar Village	Bore well water Nani Naroli Village
Bi Monthly: July-14 to Aug-14	24	36	32	44	30	36
Bi Monthly: Sep-14 to Oct-14	18	42	38	50	34	26
Bi Monthly: Nov-14 to Dec-14	12	30	26	40	32	22



Comparative Results For the Period of: July-2014 to December-2014

Parameter : TDS (mg/L)

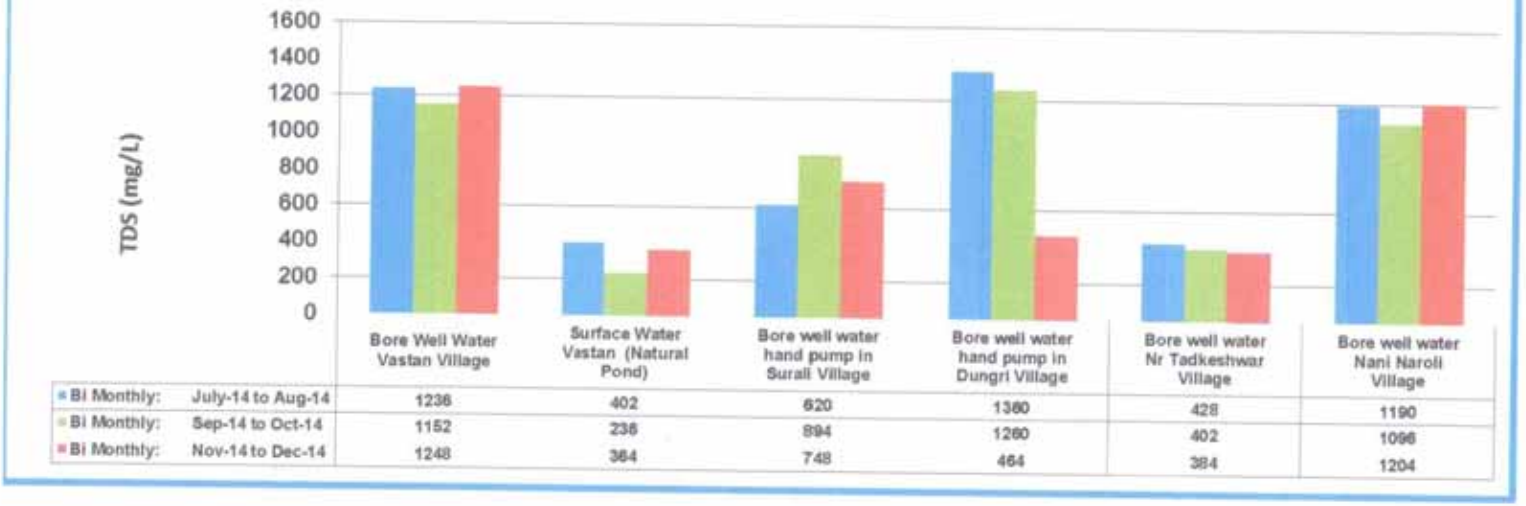
Period : July-2014 to December-2014

ENPRO
Environment, Energy, Water
Project Consultant

COMPARATIVE RESULTS OF TDS FOR VARIOUS LOCATIONS

Description	Bore Well Water Vastan Village	Surface Water Vastan (Natural Pond)	Bore well water hand pump in Surali Village	Bore well water hand pump in Dungri Village	Bore well water Nr Tadkeshwar Village	Bore well water Nani Naroli Village
Bi Monthly: July-14 to Aug-14	1236	402	620	1360	428	1190
Bi Monthly: Sep-14 to Oct-14	1152	236	894	1260	402	1096
Bi Monthly: Nov-14 to Dec-14	1248	364	748	464	384	1204

Graphical Presentation of TDS for various locations



AMBIENT AIR

COMPARATIVE ANALYSIS

REPORTS

Comparative Results For the Period of: July-2014 to December-2014

Parameter : PM_{10} (Particulate Matter) (µg/m3)

Period : July-2014 to December-2014

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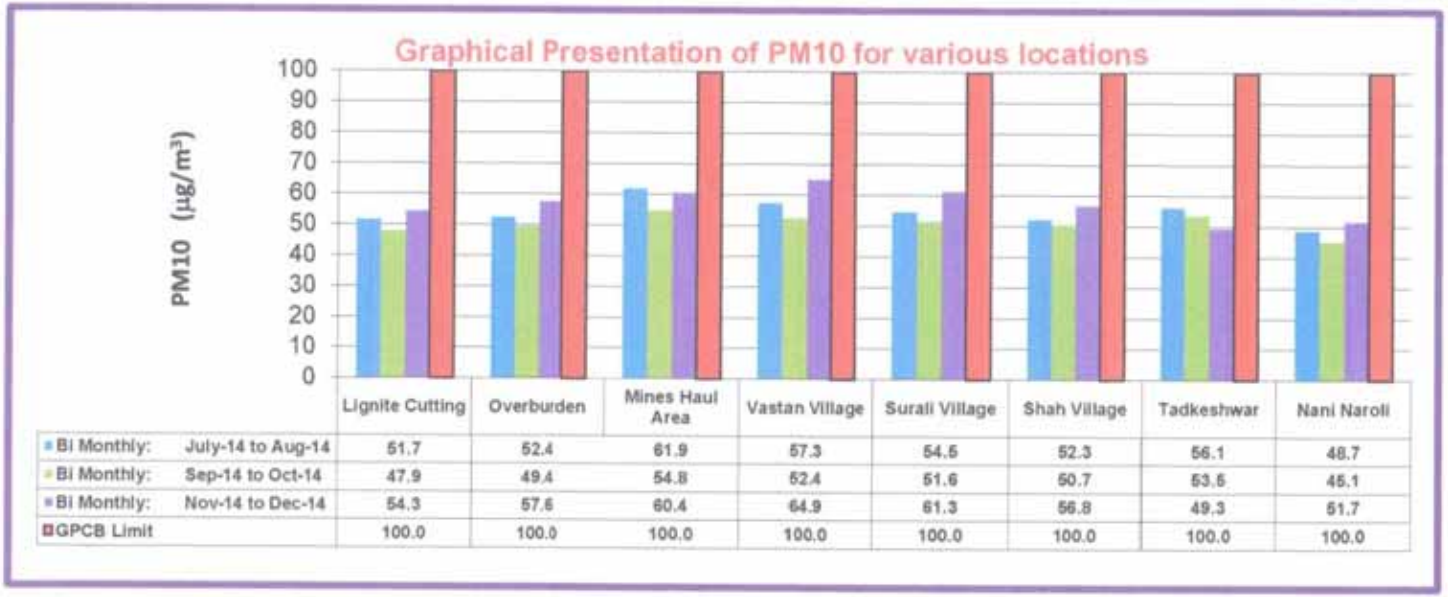
COMPARATIVE RESULTS OF PM_{10} FOR VARIOUS LOCATIONS

Description	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	51.7	52.4	61.9	57.3	54.5	52.3	56.1	48.7
Bi Monthly: Sep-14 to Oct-14	47.9	49.4	54.8	52.4	51.6	50.7	53.5	45.1
Bi Monthly: Nov-14 to Dec-14	54.3	57.6	60.4	64.9	61.3	56.8	49.3	51.7
GPCB Limit	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0



Comparative Results For the Period of:July-2014 to December-2014

Parameter : $PM_{2.5}$ (Particulate Matter) (µg/m3)

Period : July-2014 to December-2014

ENPRO
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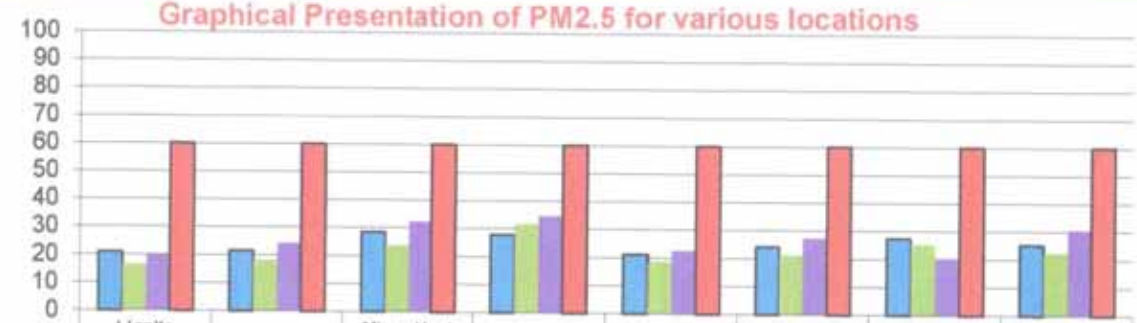
Project Consultant

COMPARATIVE RESULTS OF $PM_{2.5}$ FOR VARIOUS LOCATIONS

Description	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	20.9	21.6	28.4	28	21.2	24.1	27.3	25.3
Bi Monthly: Sep-14 to Oct-14	16.5	18.2	23.8	31.8	18.7	21.4	25.4	22.4
Bi Monthly: Nov-14 to Dec-14	19.8	24.3	32.3	34.7	22.6	27.4	20.4	30.6
GPCB Limit	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Graphical Presentation of PM2.5 for various locations



	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	20.9	21.6	28.4	28	21.2	24.1	27.3	25.3
Bi Monthly: Sep-14 to Oct-14	16.5	18.2	23.8	31.8	18.7	21.4	25.4	22.4
Bi Monthly: Nov-14 to Dec-14	19.8	24.3	32.3	34.7	22.6	27.4	20.4	30.6
GPCB Limit	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Comparative Results For the Period of: July-2014 to December-2014

Parameter : Sulfur Dioxide (SO_2) (µg/m3)

Period : July-2014 to December-2014

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COMPARATIVE RESULTS OF SO_2 FOR VARIOUS LOCATIONS

Description	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	25.1	20.8	22.3	18.4	23.4	28.9	24.7	21.2
Bi Monthly: Sep-14 to Oct-14	22.4	26.8	28.4	25.3	20.2	24.9	21.2	26.8
Bi Monthly: Nov-14 to Dec-14	28.7	21.2	25.6	22.6	20.4	30.1	18.2	28.3
GPCB Limit	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Graphical Presentation of SO2 for various locations

		Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly:	July-14 to Aug-14	25.1	20.8	22.3	18.4	23.4	28.9	24.7	21.2
Bi Monthly:	Sep-14 to Oct-14	22.4	26.8	28.4	25.3	20.2	24.9	21.2	26.8
Bi Monthly:	Nov-14 to Dec-14	28.7	21.2	25.6	22.6	20.4	30.1	18.2	28.3
GPCB Limit		80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Comparative Results For the Period of: July-2014 to December-2014

Parameter : Oxide of Nitrogen (NOx) (µg/m3)

Period : July-2014 to December-2014

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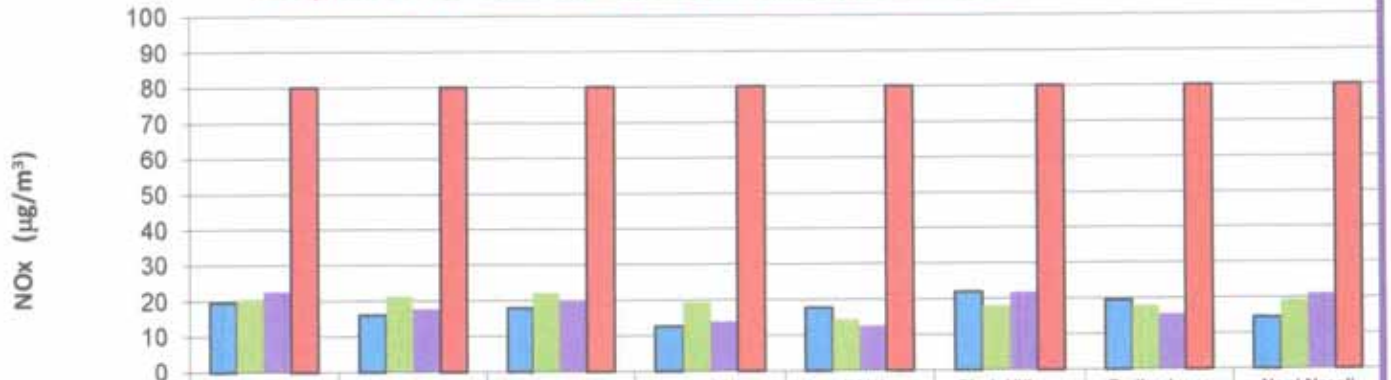
COMPARATIVE RESULTS OF NOx FOR VARIOUS LOCATIONS

Description	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	19.7	16.1	18.0	12.7	17.8	22.0	19.5	14.5
Bi Monthly: Sep-14 to Oct-14	20.7	21.3	22.1	19.5	14.5	18.1	17.9	19.4
Bi Monthly: Nov-14 to Dec-14	22.6	17.8	20.2	14.0	12.6	21.9	15.6	21.2
GPCB Limit	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Graphical Presentation of NOx for various locations



	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	19.7	16.1	18.0	12.7	17.8	22.0	19.5	14.5
Bi Monthly: Sep-14 to Oct-14	20.7	21.3	22.1	19.5	14.5	18.1	17.9	19.4
Bi Monthly: Nov-14 to Dec-14	22.6	17.8	20.2	14.0	12.6	21.9	15.6	21.2
GPCB Limit	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Comparative Results For the Period of: July-2014 to December-2014

Parameter : Carbon Monoxide (CO)(µg/m3)
Period : July-2014 to December-2014

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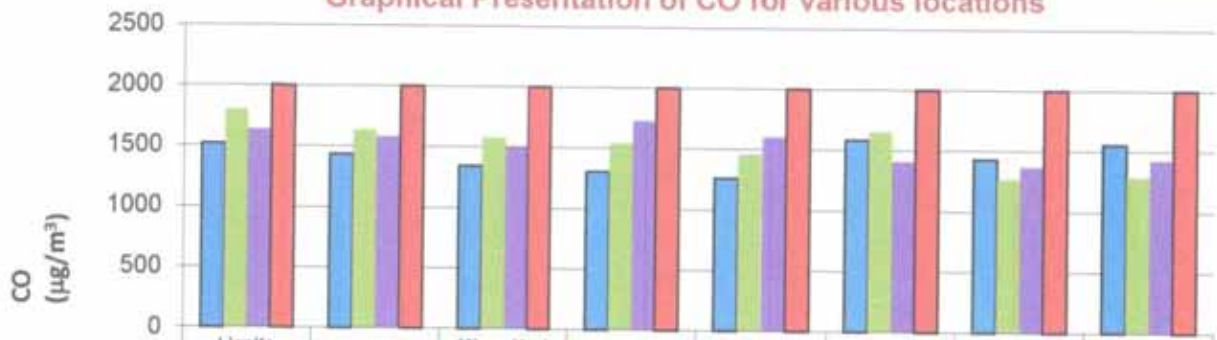
COMPARATIVE RESULTS OF CARBON MONOXIDE FOR VARIOUS LOCATIONS

Description	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	1520	1436	1346	1305	1260	1584	1430	1556
Bi Monthly: Sep-14 to Oct-14	1805	1636	1579	1545	1463	1652	1270	1287
Bi Monthly: Nov-14 to Dec-14	1640	1582	1498	1728	1604	1410	1368	1429
GPCB Limit	2000	2000	2000	2000	2000	2000	2000	2000

Graphical Presentation of CO for various locations



	Lignite Cutting	Overburden	Mines Haul Area	Vastan Village	Surali Village	Shah Village	Tadkeshwar	Nani Naroli
Bi Monthly: July-14 to Aug-14	1520	1436	1346	1305	1260	1584	1430	1556
Bi Monthly: Sep-14 to Oct-14	1805	1636	1579	1545	1463	1652	1270	1287
Bi Monthly: Nov-14 to Dec-14	1640	1582	1498	1728	1604	1410	1368	1429
GPCB Limit	2000	2000	2000	2000	2000	2000	2000	2000

DUST FALL MONITORING

COMPARATIVE ANALYSIS

REPORTS

Comparative Results For the Period of: July-2014 to December-2014

Dust Fall — Dust Fall (T/Km2/month)

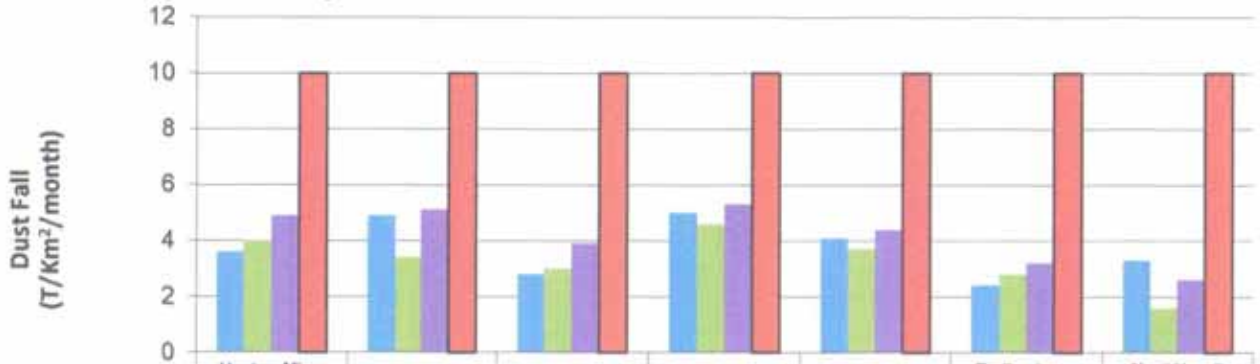
Period : July-2014 to December-2014

ENPRO Environment, Energy, Water Project Consultant

COMPARATIVE RESULTS OF DUST FALL FOR VARIOUS LOCATIONS

Description	Vastan Mine Area	Vastan Village	HDE Camp Area	Deep Nursery	Surali Village	Tadkeshwar Village	Nani Naroli Village Near PHC
Bi Monthly: July-14 to Aug-14	3.6	4.9	2.8	5.0	4.1	2.4	3.3
Bi Monthly: Sep-14 to Oct-14	4.0	3.4	3.0	4.6	3.7	2.8	1.6
Bi Monthly: Nov-14 to Dec-14	4.9	5.1	3.9	5.3	4.4	3.2	2.6
GPCB Limit	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Graphical Presentation of Dust Fall for various locations



	Vastan Mine Area	Vastan Village	HDE Camp Area	Deep Nursery	Surali Village	Tadkeshwar Village	Nani Naroli Village Near PHC
Bi Monthly: July-14 to Aug-14	3.6	4.9	2.8	5.0	4.1	2.4	3.3
Bi Monthly: Sep-14 to Oct-14	4.0	3.4	3.0	4.6	3.7	2.8	1.6
Bi Monthly: Nov-14 to Dec-14	4.9	5.1	3.9	5.3	4.4	3.2	2.6
GPCB Limit	10.0	10.0	10.0	10.0	10.0	10.0	10.0

NOISE LEVEL

COMPARATIVE ANALYSIS

REPORTS

Comparative Results For the Period of: July-2014 to December-2014

Parameter : Noise Level (For Day Time) dB(A)Leq.

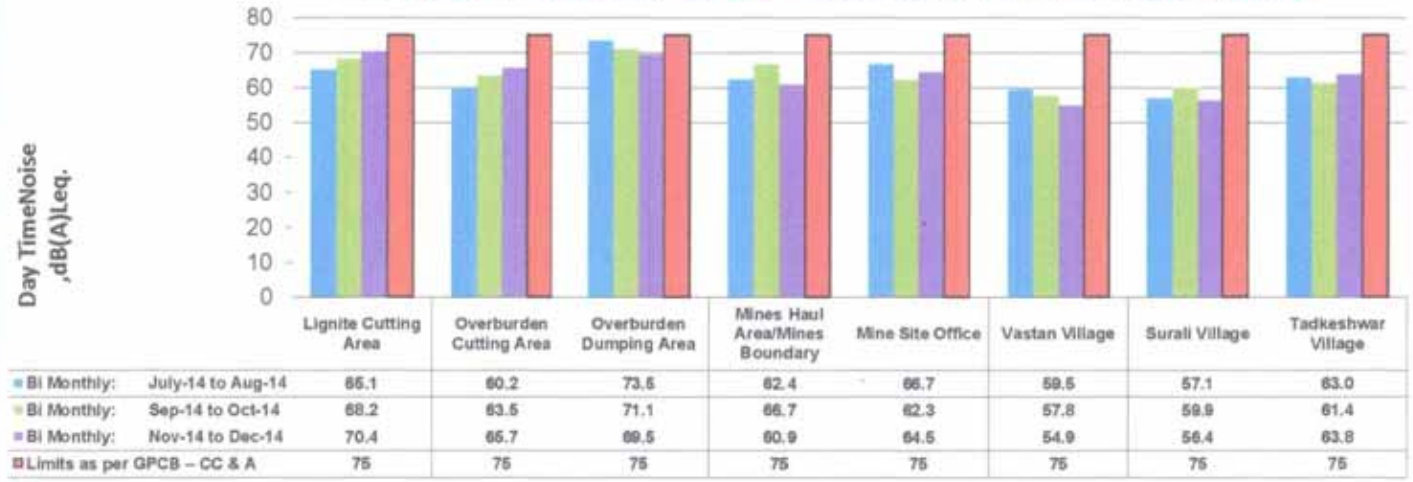
Period : July-2014 to December-2014

ENPRO
Environment, Energy, Water
Project Consultant

COMPARATIVE RESULTS OF NOISE LEVEL FOR VARIOUS LOCATIONS (DAY TIME)

Description	Lignite Cutting Area	Overburden Cutting Area	Overburden Dumping Area	Mines Haul Area/Mines Boundary	Mine Site Office	Vastan Village	Surali Village	Tadkeshwar Village
Bi Monthly: July-14 to Aug-14	65.1	60.2	73.5	62.4	66.7	59.5	57.1	63.0
Bi Monthly: Sep-14 to Oct-14	68.2	63.5	71.1	66.7	62.3	57.8	59.9	61.4
Bi Monthly: Nov-14 to Dec-14	70.4	65.7	69.5	60.9	64.5	54.9	56.4	63.8
Limits as per GPCB – CC & A	75	75	75	75	75	75	75	75

Graphical Presentation of Day Time Noise Level for various locations



Comparative Results For the Period of: July-2014 to December-2014

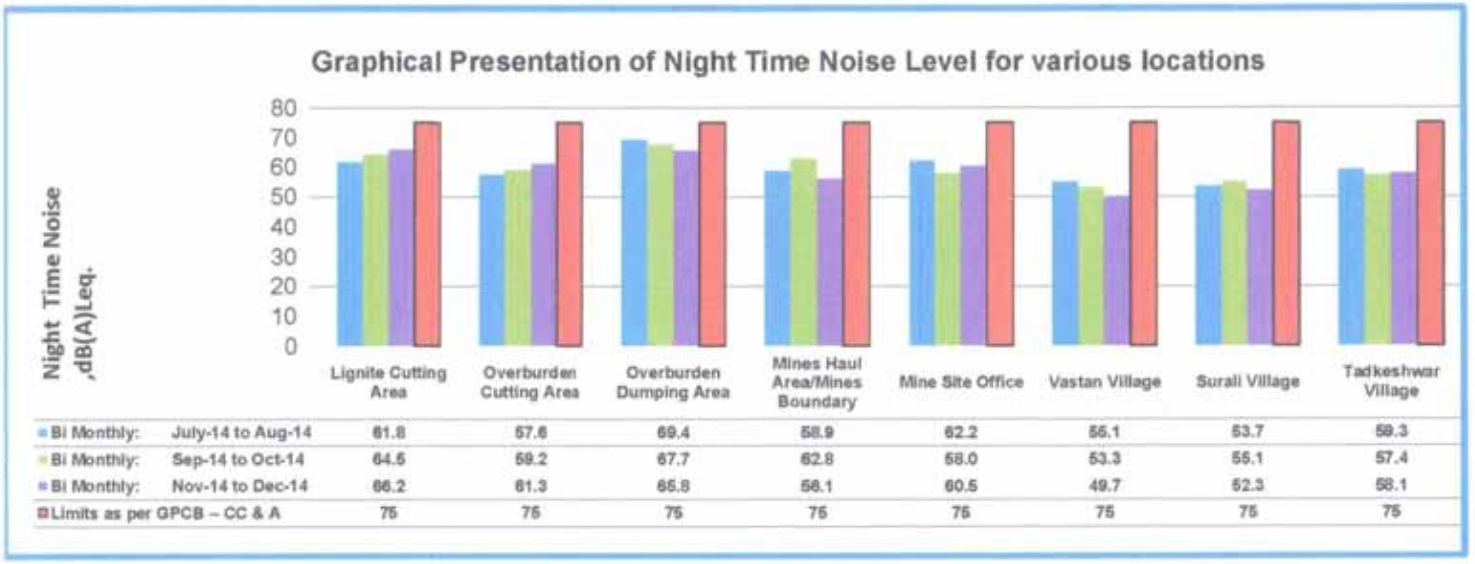
Parameter : Noise Level (For Night Time)dB(A)Leq.

Period : July-2014 to December-2014

ENPRO Environment, Energy, Water Project Consultant

COMPARATIVE RESULTS OF NOISE LEVEL FOR VARIOUS LOCATIONS (NIGHT TIME)

Description	Lignite Cutting Area	Overburden Cutting Area	Overburden Dumping Area	Mines Haul Area/Mines Boundary	Mine Site Office	Vastan Village	Surali Village	Tadkeshwar Village
Bi Monthly: July-14 to Aug-14	61.8	57.6	69.4	58.9	62.2	55.1	53.7	59.3
Bi Monthly: Sep-14 to Oct-14	64.5	59.2	67.7	62.8	58.0	53.3	55.1	57.4
Bi Monthly: Nov-14 to Dec-14	66.2	61.3	65.8	56.1	60.5	49.7	52.3	58.1
Limits as per GPCB – CC & A	75	75	75	75	75	75	75	75



WEATHER MONITORING DATA

ENPRO
Environment, Energy, Water
Project Consultant

Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Variation in Relative Humidity for the period of July-2014 to December-2014

Sr. No.	Time in Hrs.	Monitoring Date		
		Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
		15 / 07 / 14 to 16 / 07 / 14	12 / 09 / 14 to 13 / 09 / 14	14 / 11 / 14 to 15 / 11 / 14
1.	10:00	65	62	52
2.	11:00	62	58	42
3.	12:00	59	62	29
4.	13:00	59	58	19
5.	14:00	56	53	29
6.	15:00	59	58	24
7.	16:00	62	62	29
8.	17:00	65	62	39
9.	18:00	65	62	44
10.	19:00	70	70	52
11.	20:00	73	70	55
12.	21:00	73	70	57
13.	22:00	76	73	57
14.	23:00	76	73	60
15.	24:00	80	73	60
16.	01:00	80	73	66
17.	02:00	80	73	60
18.	03:00	73	70	66
19.	04:00	70	70	60
20.	05:00	67	68	66
21.	06:00	67	65	66
22.	07:00	67	65	60
23.	08:00	65	62	57
24.	09:00	65	62	55
	24 hrs. Max.	80	73	66
	24 hrs. Min.	56	53	19
	24 hrs. Avg.	68.1	65.6	50.2

ANALYSED BY

CHECKED BY

ENPRO
Environment, Energy, Water Project Consultant

Work Order No: SLPP/Mine/Envt. Monitoring 2014-15/4036 Date: 21 / 05 / 14

Variation in Temperature for the period of July-2014 to December-2014

Sr. No.	Time in Hrs.	Monitoring Date		
		Bi Monthly: July.-14 to Aug.-14	Bi Monthly: Sep.-14 to Oct.-14	Bi Monthly: Nov.14 to Dec.-14
		15 / 07 / 14 to 16 / 07 / 14	12 / 09 / 14 to 13 / 09 / 14	14 / 11 / 14 to 15 / 11 / 14
1.	10:00	29.5	30.5	29.5
2.	11:00	30.0	31.5	31.0
3.	12:00	30.5	31.0	32.5
4.	13:00	30.5	31.5	34.0
5.	14:00	31.0	32.0	32.5
6.	15:00	30.5	31.5	33.0
7.	16:00	30.0	31.0	32.5
8.	17:00	29.5	30.5	31.5
9.	18:00	29.0	30.0	30.5
10.	19:00	27.5	28.5	29.5
11.	20:00	27.0	28.0	29.0
12.	21:00	27.0	28.0	28.5
13.	22:00	26.5	27.5	28.5
14.	23:00	26.5	27.5	28.0
15.	24:00	26.0	27.0	28.0
16.	1:00	26.0	27.0	27.5
17.	2:00	26.0	27.5	28.0
18.	3:00	27.0	28.0	27.5
19.	4:00	27.5	28.5	28.0
20.	5:00	28.0	29.0	27.5
21.	6:00	28.5	29.5	27.5
22.	7:00	28.5	29.5	28.0
23.	8:00	29.0	30.0	28.5
24.	9:00	29.5	30.5	29.0
24 hrs. Max.		**31.0**	**32.0**	**34.0**
24 hrs. Min.		**26.0**	**27.0**	**27.5**
24 hrs. Avg.		**28.4**	**29.4**	**29.6**

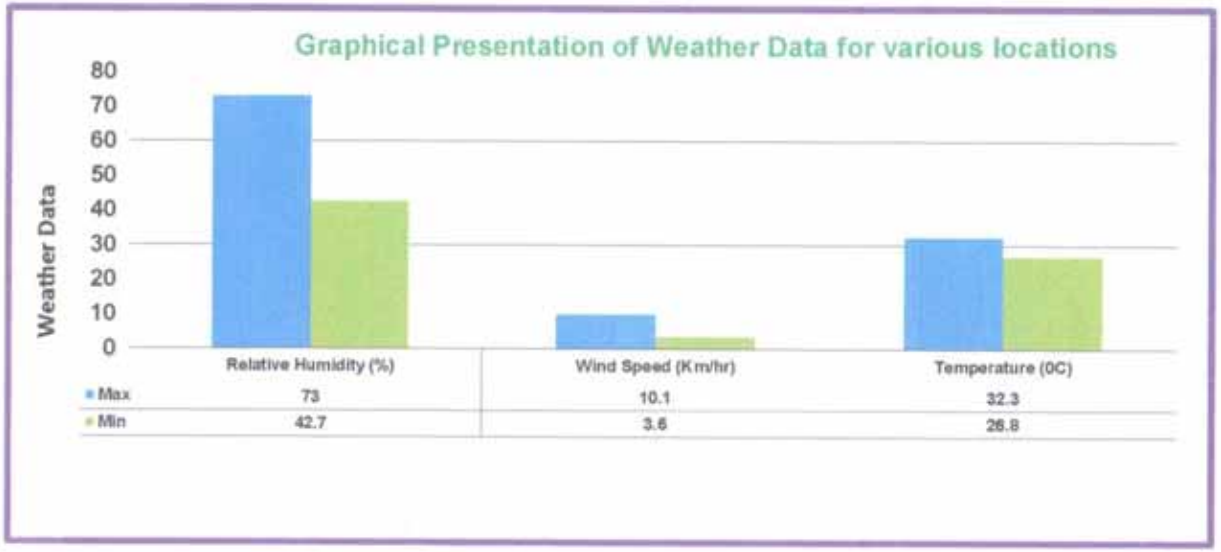
ANALYSED BY

CHECKED BY

Comparative Results For the Period of: July-2014 to December-2014

Period : July-2014 to December-2014

WEATHER MONITORING AT VASTAN MINE			
Description	Relative Humidity (%)	Wind Speed (Km/hr)	Temperature (^{0}C)
Max	73	10.1	32.3
Min	42.7	3.6	26.8

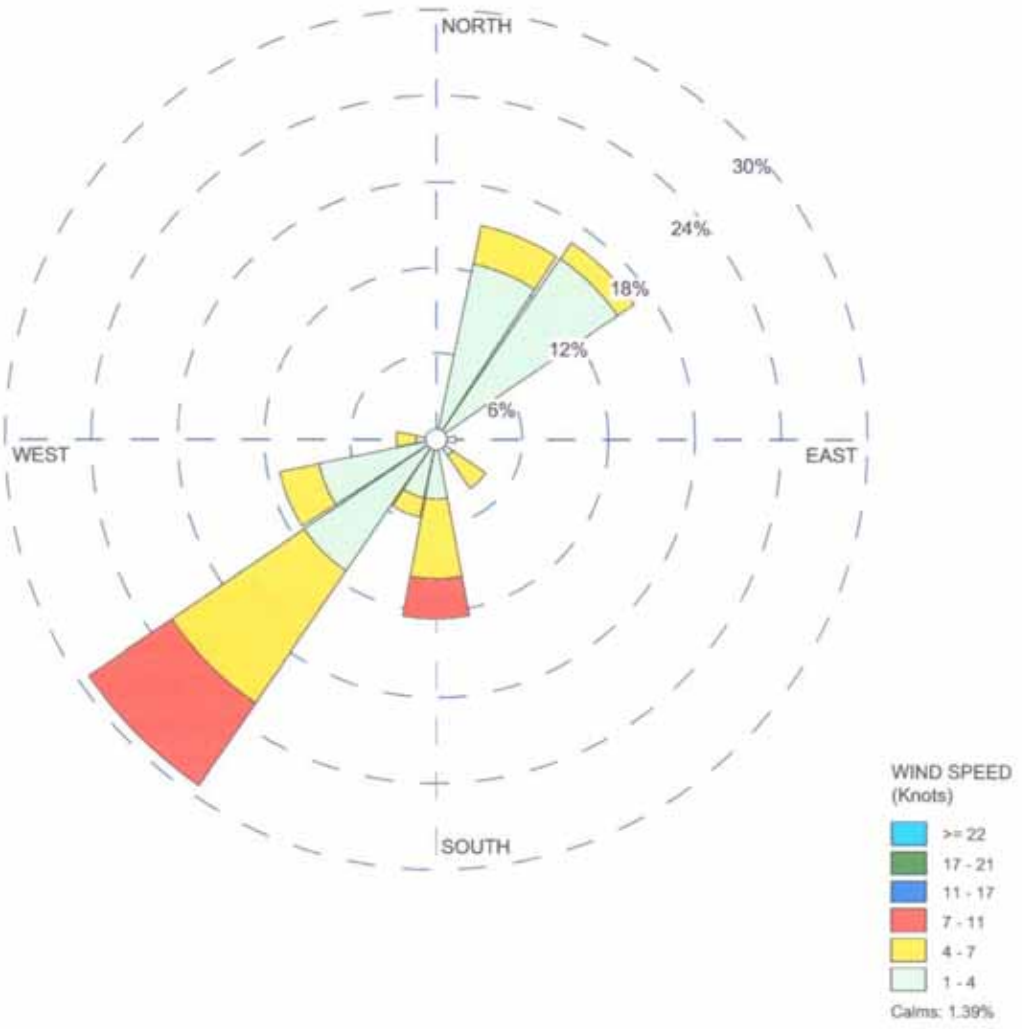


WIND ROSE PLOT:

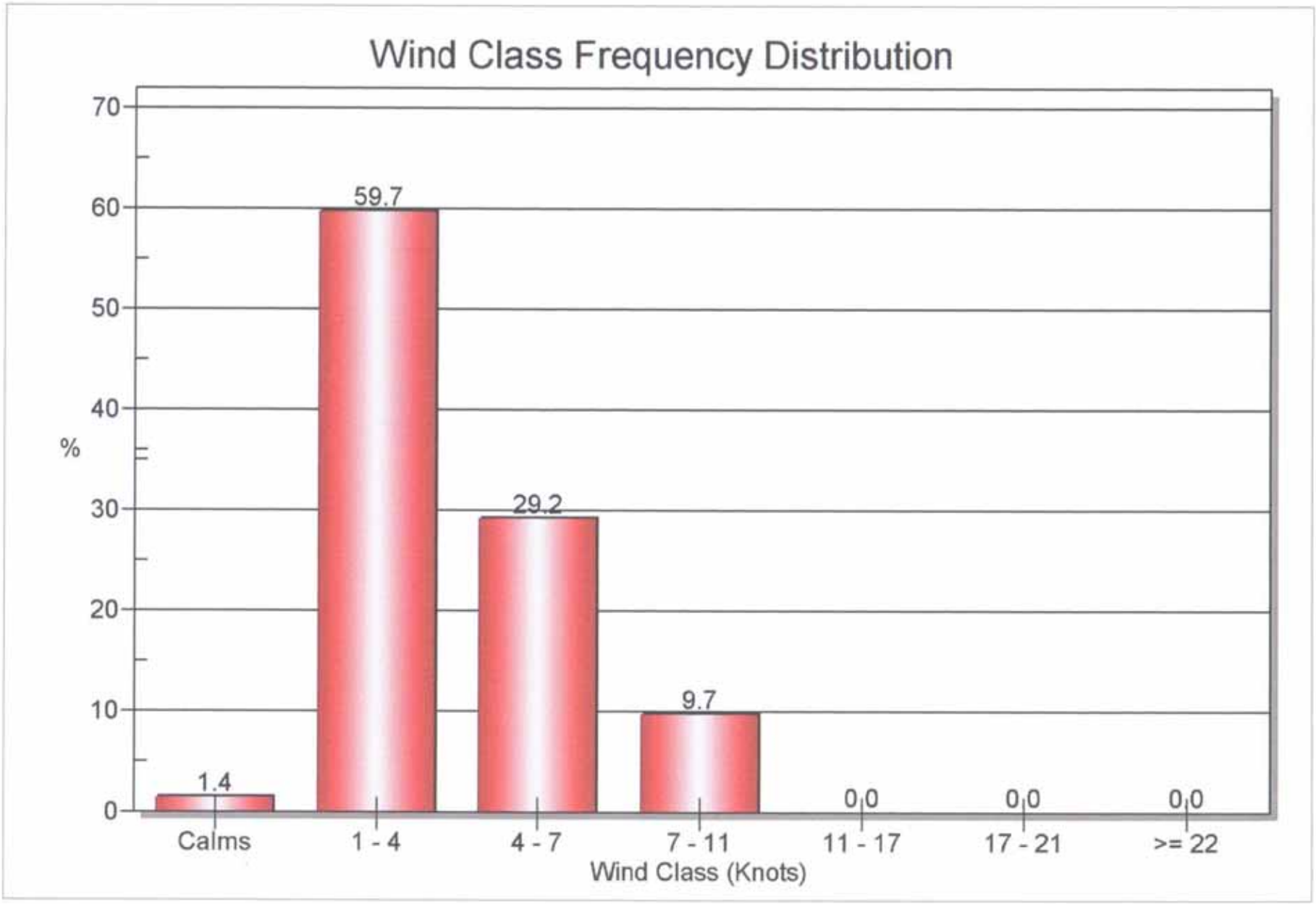
Station # 03

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 15/07/2014 - 00:00** **End Date: 15/11/2014 - 09:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **1.39%**	TOTAL COUNT: **72 hrs.**	
	AVG. WIND SPEED: **3.93 Knots**	DATE: **31/12/2014**	PROJECT NO:



WRPLOT View Freeware 7.0.0 - Lakes Environmental Software