JVR OC - I MINE

Air Monitoring Locations

Station Code	Name of the Stations	Latitude	Longitude
CA7	JVR OC-1 Exp. PO Office	N 17^0 13'01.9''	E 80^0 49'15.6''
CA8	JVR OC-1 Exp. Base Workshop	N 17^0 12'54.5''	E 80^0 49'08.9''
CA10	JVR OC – II Pit Head CHP	N17^{0}12'31.7''	E80^{0}47'34.8''
BA5	Kistaram Village	N 17^0 12'50.5''	E 80^0 47'09.8''
BA6	Sathupalli Town	N 17^0 12'45.3''	E 80^0 50'01.9''
BA7	Venkatapuram Village	N 17^0 13'11.9''	E 80^0 50'05.0''
BA8	Pallewada Village	N 17^0 10'30.5''	E 80^0 44'28.7"
BA9	Rejarla Village	N 17^0 10'09.7''	E 80^0 48'29.8"
BA10	Chaudavaram Village	N 17^0 09'09.7''	E 80^0 45'30.4"

Ambient Air Quality at JVR OC-I Exp. PO Office (CA7)

Area : Kothagudem **Nature of Area** : Core Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards, GSR 742(E),Dated 25.09.2000		**250**	*	**120**	**120**
1.	06.01.2020	111	36.0	13.5	20.6
2.	24.01.2020	114	37.2	14.3	22.0
3.	07.02.2020	104	33.7	13.9	21.3
4.	22.02.2020	118	38.6	14.6	22.6
5.	07.03.2020	105	34.3	13.4	20.4
6.	21.03.2020	101	32.4	12.6	19.1
7.	08.04.2020	97	31.1	12.0	17.9
8.	22.04.2020	92	29.5	11.6	17.3
9.	08.05.2020	98	31.5	13.0	19.8
10.	22.05.2020	101	32.4	13.1	20.0
11.	06.06.2020	106	34.0	13.4	20.4
12.	22.06.2020	108	34.7	13.8	21.1
13.	07.07.2020	95	30.5	14.1	21.7
14.	22.07.2020	98	31.5	12.6	19.1
15.	07.08.2020	92	29.5	12.1	18.2
16.	24.08.2020	90	28.9	12.6	19.1
17.	07.09.2020	94	30.2	13.5	20.6
18.	22.09.2020	99	31.7	14.3	22.0
MIN		**90**	**28.9**	**11.6**	**17.3**
MAX		**118**	**38.6**	**14.6**	**22.6**
AVERAGE		**101.28**	**32.65**	**13.24**	**20.18**
98 PERCENTILE		**116.64**	**38.12**	**14.50**	**22.40**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at JVR OC-I Exp. Base Workshop (CA8)

Area : Kothagudem **Nature of Area** : Core Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
Coal mine standards, GSR 742(E),Dated 25.09.2000		**250**	*****	**120**	**120**
1.	06.01.2020	145	49.2	14.3	21.0
2.	24.01.2020	149	50.7	15.0	22.2
3.	07.02.2020	138	46.8	14.8	21.8
4.	22.02.2020	143	48.8	15.5	23.0
5.	07.03.2020	128	43.6	14.1	20.8
6.	21.03.2020	115	39.2	13.5	19.7
7.	08.04.2020	112	38.2	12.6	18.2
8.	22.04.2020	108	36.8	12.2	17.6
9.	08.05.2020	114	38.9	13.8	20.1
10.	22.05.2020	117	39.8	14.1	20.7
11.	06.06.2020	123	41.8	14.3	21.0
12.	22.06.2020	127	43.3	14.8	21.8
13.	07.07.2020	120	40.9	15.0	22.2
14.	22.07.2020	130	44.3	13.5	19.7
15.	07.08.2020	116	39.6	13.0	18.8
16.	24.08.2020	112	38.2	13.5	19.7
17.	07.09.2020	118	40.1	14.4	21.1
18.	22.09.2020	123	42.1	15.2	22.4
MIN		**108**	**36.8**	**12.2**	**17.6**
MAX		**149**	**50.7**	**15.5**	**23**
AVERAGE		**124.33**	**42.35**	**14.09**	**20.66**
98 PERCENTILE		**147.64**	**50.19**	**15.40**	**22.80**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at JVR OC-II Pit Head CHP (CA10)

Area : Kothagudem **Nature of Area** : Core Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards, GSR 742(E), Dated 25.09.2000		**250**	*****	**120**	**120**
1.	10.01.2020	230	73.6	15.3	22.8
2.	29.01.2020	236	76.6	16.0	24.1
3.	11.02.2020	232	74.2	15.5	24.0
4.	26.02.2020	230	74.8	16.2	24.6
5.	12.03.2020	225	73.1	14.8	22.0
6.	25.03.2020	197	64.0	14.1	20.9
7.	11.04.2020	190	61.8	13.1	19.4
8.	25.04.2020	184	59.8	12.9	18.8
9.	12.05.2020	198	64.4	14.4	21.3
10.	26.05.2020	203	67.2	14.1	20.9
11.	10.06.2020	208	68.8	14.9	22.2
12.	25.06.2020	210	69.5	15.5	23.1
13.	10.07.2020	205	67.9	15.7	23.4
14.	25.07.2020	210	67.4	14.1	20.9
15.	11.08.2020	194	58.4	13.7	20.0
16.	27.08.2020	190	57.2	14.1	20.9
17.	10.09.2020	201	60.5	15.3	22.8
18.	25.09.2020	211	63.5	16.0	24.1
MIN		**184**	**57.2**	**12.9**	**18.8**
MAX		**236**	**76.6**	**16.2**	**24.6**
AVERAGE		**208.56**	**66.82**	**14.76**	**22.01**
98 PERCENTILE		**234.64**	**75.99**	**16.13**	**24.43**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at Kistaram Village (BA5)

Area : Kothagudem **Nature of Area** : Buffer Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	10.01.2020	76	31.0	13.3	19.6
2.	29.01.2020	80	32.8	14.1	20.9
3.	11.02.2020	78	32.1	13.9	20.6
4.	26.02.2020	76	31.1	14.1	21.8
5.	12.03.2020	71	29.0	13.3	19.6
6.	25.03.2020	60	24.5	12.5	18.3
7.	11.04.2020	54	22	12.1	17.6
8.	25.04.2020	52	21.3	11.7	16.9
9.	12.05.2020	59	24.2	13.0	19.1
10.	26.05.2020	61	24.8	13.5	19.9
11.	10.06.2020	63	25.7	13.5	19.8
12.	25.06.2020	60	24.5	13.9	20.0
13.	10.07.2020	64	26.2	14.1	20.9
14.	25.07.2020	68	28.5	12.9	18.9
15.	11.08.2020	61	25.5	12.3	17.8
16.	27.08.2020	59	24.7	12.8	18.7
17.	10.09.2020	62	26.0	13.7	20.2
18.	25.09.2020	65	27.3	14.1	21.0
MIN		**52**	**21.3**	**11.7**	**16.9**
MAX		**80**	**32.8**	**14.1**	**21.8**
AVERAGE		**64.94**	**26.73**	**13.27**	**19.53**
98 PERCENTILE		**79.32**	**32.56**	**14.10**	**21.53**

Ambient Air Quality at Sathupalli Town (BA6)

Area : Kothagudem **Nature of Area** : Buffer Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	07.01.2020	67	27.6	13.8	20.3
2.	25.01.2020	70	29.2	14.6	21.4
3.	08.02.2020	62	25.7	14.4	21.2
4.	24.02.2020	60	24.9	14.1	22.2
5.	10.03.2020	64	26.6	13.6	19.9
6.	23.03.2020	52	21.6	13.1	19.1
7.	09.04.2020	50	20.3	12.2	17.4
8.	23.04.2020	47	19.2	11.7	16.7
9.	09.05.2020	53	22.1	13.1	19.0
10.	23.05.2020	55	22.7	13.6	19.9
11.	08.06.2020	56	23.4	13.8	20.3
12.	23.06.2020	54	22.4	13.7	20.0
13.	08.07.2020	57	23.7	14.6	21.6
14.	23.07.2020	55	22.8	13.1	19.0
15.	08.08.2020	49	20.4	12.5	18.1
16.	25.08.2020	51	21.2	13.3	19.3
17.	08.09.2020	54	22.2	13.6	19.9
18.	23.09.2020	56	23.3	14.3	21.1
MIN		**47**	**19.2**	**11.7**	**16.7**
MAX		**70**	**29.2**	**14.6**	**22.2**
AVERAGE		**56.22**	**23.29**	**13.51**	**19.80**
98 PERCENTILE		**68.98**	**28.66**	**14.60**	**22.00**

Ambient Air Quality at Venkatapuram Village (BA7)

Area : Kothagudem **Nature of Area** : Buffer Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	07.01.2020	63	26.2	12.2	17.7
2.	25.01.2020	67	27.6	13.1	19.2
3.	08.02.2020	60	25.0	13.0	18.9
4.	24.02.2020	63	26.0	13.6	20.1
5.	10.03.2020	59	24.4	12.5	18.1
6.	23.03.2020	50	20.7	11.6	16.7
7.	09.04.2020	47	19.4	11.6	16.6
8.	23.04.2020	45	18.6	11.1	15.7
9.	09.05.2020	50	20.8	12.1	17.4
10.	23.05.2020	52	21.3	12.4	18.0
11.	08.06.2020	53	22.0	12.6	18.3
12.	23.06.2020	55	22.7	13.0	19.0
13.	08.07.2020	53	21.9	12.9	18.8
14.	23.07.2020	56	23.1	12.1	17.4
15.	08.08.2020	50	20.7	11.2	15.9
16.	25.08.2020	52	21.5	11.9	17.1
17.	08.09.2020	55	22.5	12.5	18.2
18.	23.09.2020	57	23.7	13.0	19.0
MIN		**45**	**18.6**	**11.1**	**15.7**
MAX		**67**	**27.6**	**13.6**	**20.1**
AVERAGE		**54.83**	**22.67**	**12.36**	**17.89**
98 PERCENTILE		**65.64**	**27.12**	**13.43**	**19.79**

Ambient Air Quality at PallewadaVillage (BA8)

Area : Kothagudem **Nature of Area** : Buffer Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2020	58	24.0	11.4	16.5
2.	27.01.2020	61	25.0	12.1	17.6
3.	10.02.2020	56	23.1	11.8	17.5
4.	25.02.2020	53	21.6	12.3	18.0
5.	11.03.2020	55	22.4	11.3	16.2
6.	24.03.2020	49	20.0	10.5	14.9
7.	10.04.2020	44	17.9	10.5	14.8
8.	24.04.2020	42	17.0	10.1	14.2
9.	11.05.2020	48	19.4	10.9	15.5
10.	25.05.2020	49	19.9	11.2	16.1
11.	09.06.2020	50	20.6	11.3	16.2
12.	24.06.2020	52	21.2	11.6	16.7
13.	09.07.2020	50	20.4	11.7	16.8
14.	24.07.2020	52	21.2	10.9	15.5
15.	10.08.2020	47	19.9	10.2	14.4
16.	26.08.2020	49	21.0	10.5	14.9
17.	09.09.2020	51	22.0	11.2	16.0
18.	24.09.2020	54	23.1	11.6	16.8
MIN		**42**	**17**	**10.1**	**14.2**
MAX		**61**	**25**	**12.3**	**18**
AVERAGE		**51.11**	**21.09**	**11.17**	**16.03**
PERCENTILE		**59.98**	**24.66**	**12.23**	**17.86**

Ambient Air Quality at Rejarla Village (BA9)

Area	**:**	Kothagudem	**Nature of Area**	**:**	Buffer Zone
Period of Monitoring	**:**	January, 2020 – September, 2020	**Sampling Duration**	**:**	24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2020	65	26.7	12.1	17.8
2.	27.01.2020	68	28.8	13.0	19.2
3.	10.02.2020	63	26.2	12.5	18.4
4.	25.02.2020	65	27.5	13.4	19.9
5.	11.03.2020	67	28.3	12.2	18.0
6.	24.03.2020	53	22.4	11.6	16.8
7.	10.04.2020	47	20.1	11.3	16.3
8.	24.04.2020	45	18.9	10.9	15.6
9.	11.05.2020	53	22.4	11.7	17.0
10.	25.05.2020	54	23.0	12.2	17.9
11.	09.06.2020	56	23.8	12.1	17.7
12.	24.06.2020	58	24.5	12.7	18.8
13.	09.07.2020	55	23.8	12.5	18.4
14.	24.07.2020	58	25.1	11.6	16.9
15.	10.08.2020	52	22.5	10.9	15.7
16.	26.08.2020	54	23.4	11.5	16.7
17.	09.09.2020	57	24.6	12.0	17.6
18.	24.09.2020	60	25.8	12.5	18.4
MIN		**45**	**18.9**	**10.9**	**15.6**
MAX		**68**	**28.8**	**13.4**	**19.9**
AVERAGE		**57.22**	**24.32**	**12.04**	**17.62**
98 PERCENTILE		**67.66**	**28.63**	**13.26**	**19.66**

Ambient Air Quality at Chaudavaram Village (BA10)

Area : Kothagudem **Nature of Area** : Buffer Zone

Period of Monitoring : January, 2020 – September, 2020 **Sampling Duration** : 24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2020	59	24.4	11.7	17.1
2.	27.01.2020	62	26.6	12.4	18.3
3.	10.02.2020	60	24.7	12.2	18.0
4.	25.02.2020	59	25.3	12.7	18.8
5.	11.03.2020	56	24.0	11.6	17.0
6.	24.03.2020	51	21.8	11.0	16.0
7.	10.04.2020	46	19.5	11.0	15.8
8.	24.04.2020	44	18.7	10.6	15.3
9.	11.05.2020	49	21.1	11.4	16.6
10.	25.05.2020	51	21.8	11.7	17.1
11.	09.06.2020	53	22.6	11.8	17.2
12.	24.06.2020	54	23.1	12.0	17.7
13.	09.07.2020	50	21.4	12.1	17.8
14.	24.07.2020	51	22.3	11.2	16.2
15.	10.08.2020	46	20.0	10.8	15.3
16.	26.08.2020	48	21.0	10.9	15.7
17.	09.09.2020	50	22.1	11.7	17.1
18.	24.09.2020	53	23.2	11.6	17.6
MIN		**44**	**18.7**	**10.6**	**15.3**
MAX		**62**	**26.6**	**12.7**	**18.8**
AVERAGE		**52.33**	**22.42**	**11.58**	**16.92**
98 PERCENTILE		**61.32**	**26.16**	**12.60**	**18.63**

Summary of Ambient Air Quality Data Monitoring (January, 2020 - September, 2020)

Location code	Name of the location	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
Coal mine standards (commenced after 25.9.2000), GSR 742(E), Dated 25.09.2000		**250**			*****			**120**			**120**		
Core Zone		**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
CA7	JVR OC-I Exp. PO Office	90	118	101.28	28.9	38.6	32.65	11.6	14.6	13.24	17.3	22.6	20.18
CA10	JVR OC Pit Head CHP	184	236	208.56	57.2	76.6	66.82	12.9	16.2	14.76	18.8	24.6	22.01
CA8	JVR OC-I Exp. Base Workshop	108	149	124.33	36.8	50.7	42.35	12.2	15.5	14.09	17.6	23	20.66

** No $PM_{2.5}$ standard was specified for core zone*

Location code	Name of the location	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
NAAQ Standards, CPCB Dated: 18.11.2009		**100**			**60**			**80**			**80**		
Buffer Zone		**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
BA5	Kistaram Village	52	80	64.94	21.3	32.8	26.73	11.7	14.1	13.27	16.9	21.8	19.53
BA6	Sathupalli Town	47	70	56.22	19.2	29.2	23.29	11.7	14.6	13.51	16.7	22.2	19.80
BA7	Venkatapuram Village	45	67	54.83	18.6	27.6	22.67	11.1	13.6	12.36	15.7	20.1	17.89
BA8	Pallewada Village	42	61	51.11	17	25	21.09	10.1	12.3	11.17	14.2	18	16.03
BA9	Rejarla Village	45	68	57.22	18.9	28.8	24.32	10.9	13.4	12.04	15.6	19.9	17.62
BA10	Chaudavaram Village	44	62	52.33	18.7	26.6	22.42	10.6	12.7	11.58	15.3	18.8	16.92

WATER QUALITY

Surface Water Sampling Locations

Sl. No.	Sampling code	Date of sampling			Sampling Location	Latitude	Longitude
		(1st Quarter)	(2nd Quarter)	(3rd Quarter)			
1	SW-5	28.01.2020	26.05.2020	28.07.2020	Venkatapuram Cheruvu	N 17^0 13'24.2''	E 80^0 49'41.7'
2	SW-4	28.01.2020	26.05.2020	28.07.2020	Yedutla Cheruvu (Near Lankapalli)	N 17^0 14'39.2''	E 80^0 44'43.4''
3	SW-2	28.01.2020	26.05.2020	28.07.2020	Kistaram Tank	N 17^0 12'.31.1''	E 80^0 47'01.9''

Groundwater Sampling Locations

Sl. No.	Sampling code	Date of sampling			Sampling Location	Latitude	Longitude
		(1st Quarter)	(2nd Quarter)	(3rd Quarter)			
1	GW-3	28.01.2020	26.05.2020	28.07.2020	Vengalaraonagar	N 17^0 12'40.3''	E 80^0 48'45.6''
2	GW7	28.01.2020	26.05.2020	28.07.2020	Cherukupalli Village	N 17^0 15'20.9''	E 80^0 46'41.3'
3	GW-4	28.01.2020	26.05.2020	28.07.2020	Rejarla Village	N 17^0 09'47.7''	E 80^0 48'12.0''
4	GW-6	28.01.2020	26.05.2020	28.07.2020	Kistaram Village	N 17^0 12'25.3''	E 80^0 46'45.3'
5	GW-5	28.01.2020	26.05.2020	28.07.2020	Pallewada Village	N 17^0 10'29.0''	E 80^0 44'29.2'

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No	Parameters	Unit	Test Method	CPCB Water quality Criteria			RESULT		
				Class A	Class B	Class C	SW-2 (**Kistaram Tank**)		
							(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1.	pH	-	4500-H^+B	6.5-8.5	6.5-8.5	6.0 – 9.0	7.2	7.8	7.9
2.	Temperature	ºC	2550. B	-	-	-	25.4	25.2	25.8
3.	Turbidity	NTU	2130. B	-	-	-	3.4	2.6	5.7
4.	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	317	1210	405
5.	Total Dissolved Solids	mg/L	2540.C	-	-	-	178	710	272
6.	Total Suspended Solids at 105º C	mg/L	2540. D	-	-	-	24	28	45
7.	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	5.1	5.8	6.3
8.	Bio chemical Oxygen Demand for 3 days at 27º C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	3	4	BDL
9.	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	220	220	220
10.	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	33	23	49
11.	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Absent	Absent	Present
12.	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	20	30	32
13.	Chlorides as Cl^-	mg/L	4500-Cl^-.B	-	-	-	55	195	55
14	Nitrites as NO_2	mg/L	4500-NO_2^-.B	-	-	-	BDL	0.02	BDL
15.	Nitrates as NO_3	mg/L	4500-NO_3^-.B	-	-	-	6	22	6.9
16.	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	-	-	-	13	109	28

S.No.	Parameters	Unit	Test Method	CPCB Water quality Criteria			RESULT		
				Class A	Class B	Class C	SW-2 (Kistaram Tank)		
							(1st Quarter)	(2nd Quarter)	(3rd Quarter)
17	Arsenic as As	mg/L	3120. B	-	-	-	BDL	BDL	BDL
18	Lead as Pb	mg/L	3120. B	-	-	-	BDL	BDL	BDL
19	Zinc as Zn	mg/L	3120. B	-	-	-	0.27	0.23	0.06
20	Cadmium as Cd	mg/L	3120. B	-	-	-	BDL	BDL	BDL
21	Total Chromium as Cr	mg/L	3120. B	-	-	-	BDL	BDL	BDL
22	Nickel as Ni	mg/L	3120. B	-	-	-	BDL	BDL	BDL
23	Iron as Fe	mg/L	3120. B	-	-	-	0.23	0.13	0.12
24	Copper as Cu	mg/L	3120-B	-	-	-	BDL	BDL	BDL
25	Boron as B	mg/L	3120-B	-	-	-	0.06	0.30	0.12
26	Colour	Pt-co	2120. B	-	-	-	10	10	5
27	Odour	TON	2150. B	-	-	-	No Odour Observed	No Odour Observed	No Odour Observed
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3 –C	-	-	-	BDL	BDL	BDL
29	Total Phosphates	mg/L	4500-P-D	-	-	-	BDL	BDL	BDL
30	Oil & Grease	mg/L	5520. B	-	-	-	<1	<1	<1
31	Fluoride	mg/L	4500-F^-.C	-	-	-	0.57	0.675	0.351
32	Phenolic compounds as C_6H_5OH	mg/L	5530-D	-	-	-	BDL	BDL	BDL
33	Selenium as Se	mg/L	3120-B	-	-	-	BDL	BDL	BDL

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-3 (Vengalaraonagar)			GW-5 (Pallewada Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1.	Colour	Pt-co-	2120. B	5	15	<5	<5	<5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H^+B	6.5 to 8.5	No relaxation	7.1	7.7	6.9	7.1	7.5	7.9
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	0.38	0.9	1.1	0.8	1.3	0.56
6.	Total Dissolved Solids at 180° C	mg/L	2540.C	500	2000	*630*	*675*	*905*	*932*	*995*	*1320*

General Parameters Concerning Substances Undesirable in Excessive Amounts

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-3 (Vengalaraonagar)			GW-5 (Pallewada Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	BDL	BDL	0.35	BDL
2	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.15	0.72	0.09	0.13	0.22	0.12
3	Boron as B	mg/L	3120-B	0.5	1.0	0.17	0.11	0.07	0.22	0.20	BDL
4	Calcium as Ca	mg/L	3500-Ca.B	75	200	42	36	70	68	70	126
5	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	131	131	170	197	197	453
6	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL	BDL	0.04
7	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.97	0.415	0.901	0.84	0.450	0.896
8	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL
9	Iron as Fe	mg/L	3120-B	0.3	No relaxation	0.19	0.13	0.17	0.26	0.65	0.24
10	Magnesium as Mg	mg/L	3500-Mg.B	30	100	41	36	52	66	57	87
11	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL
12	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	25	16	59	60	26	50
13	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL
14	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
15	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	200	400	35	63	55	48	118	65
17	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	300	245	435	355	287	330
18	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	275	240	390	440	410	675
19	Zinc as Zn	mg/L	3120-B	5	15	0.20	0.06	0.06	0.24	0.08	BDL

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-3 (Vengalaraonagar)			GW-5 (Pallewada Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan,β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative Analysi	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-3 (Vengalaraonagar)			GW-5 (Pallewada Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	*E. coli*	Presence or Absence/ 100mL	9221 F	-	-	Absent	Absent	Absent	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

*NTU – Nephelometric Turbidity Unit; TON – Threshold Odour Number; FTN – Flavor Threshold Number; BDL – Below Detection Limit, Detection Limit – Phenols – 0.1 mg/L; Mercury – 20 µg/L; Cyanide – 0.05 mg/L Hex. Chromium – 0.05 mg/L; Copper – 0.02 mg/L; Manganese – 0.01 mg/L; Cadmium – 0.01 mg/L; Selenium – 0.04 mg/L; Arsenic –0.04 mg/L; Lead – 0.04 mg/L; Aluminum – 0.04 mg/L; Chromium – 0.03 mg/L; Nickel – 0.03 mg/L; Residual free chlorine – 1 mg/L; Nitrites – 0.01 mg/L; Orthophosphates – 0.05 mg/L; ND-Not Detected; Detection Limit : Pesticides– 0.1 ppm; PAHs – 1 ppm .*Not Performed –PCBs, Trihalomethanes, Radioactive materials, Alachlor, Atrazine, Butachlor, Ethion, Monocrotophos.*

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT		
				Class A	Class B	Class C	SW-4 (Yedutla Cheruvu)		
							(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	pH	-	4500-H^+B	6.5 - 8.5	6.5 -8.5	6.0 – 9.0	7.3	7.4	7.5
2	Temperature	^oC	2550. B	-	-	-	25.5	25.1	25.0
3	Turbidity	NTU	2130. B	-	-	-	6.2	1.2	2.1
4	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	530	1192	315
5	Total Dissolved Solids at 180^o C	mg/L	2540.C	-	-	-	307	680	186
6	Total Suspended Solids at 105^o C	mg/L	2540. D	-	-	-	21	17	35
7	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	5.4	5.9	6.7
8	Bio chemical Oxygen Demand for 3 days at 27^o C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	3	3	BDL
9	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	140	240	140
10	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	11	53	27
11	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Absent	Absent	Absent
12	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	20	20	28
13	Chlorides as Cl^-	mg/L	4500-Cl^-.B	-	-	-	83	165	40
14	Nitrites as NO_2	mg/L	4500-NO_2^- .B	-	-	-	0.06	BDL	BDL
15	Nitrates as NO_3	mg/L	4500-NO_3^-.B	-	-	-	7	19	4.6
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	-	-	-	15	68	19

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT		
				Class A	Class B	Class C	SW-4 (Yedutla Cheruvu)		
							(1st Quarter)	(2nd Quarter)	(3rd Quarter)
17	Arsenic as As	mg/L	3120. B	-	-	-	BDL	BDL	BDL
18	Lead as Pb	mg/L	3120. B	-	-	-	BDL	BDL	BDL
19	Zinc as Zn	mg/L	3120. B	-	-	-	0.14	0.20	0.06
20	Cadmium as Cd	mg/L	3120. B	-	-	-	BDL	BDL	BDL
21	Total Chromium as Cr	mg/L	3120. B	-	-	-	BDL	BDL	BDL
22	Nickel as Ni	mg/L	3120. B	-	-	-	BDL	BDL	BDL
23	Iron as Fe	mg/L	3120. B	-	-	-	0.19	0.17	0.21
24	Copper as Cu	mg/L	3120-B	-	-	-	BDL	BDL	BDL
25	Boron as B	mg/L	3120-B	-	-	-	0.09	0.16	0.07
26	Colour	Pt-co	2120. B	-	-	-	5	10	5
27	Odour	TON	2150. B	-	-	-	No odour observed	No odour observed	No odour observed
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3-C	-	-	-	BDL	BDL	BDL
29	Total Phosphates	mg/L	4500-P-D	-	-	-	BDL	BDL	BDL
30	Oil & Grease	mg/L	5520. B	-	-	-	<1	<1	<1
31	Fluoride	mg/L	4500-F^-.C	-	-	-	0.49	0.570	0.195
32	Phenolic compounds as C_6H_5OH	mg/L	5530-D	-	-	-	BDL	BDL	BDL
33	Selenium as Se	mg/L	3120-B	-	-	-	BDL	BDL	BDL

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-4 (Rejarla Village)			GW-6 (Kistaram Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1.	Colour	Pt-co-	2120. B	5	15	<5	<5	<5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H^+B	6.5 to 8.5	No relaxation	7.1	7.8	7.7	7.0	7.7	7.9
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	0.60	1.3	0.9	0.92	1.0	0.34
6.	Total Dissolved Solids at 180° C	mg/L	2540.C	500	2000	*654*	*660*	*853*	*946*	*984*	*1010*

General Parameters Concerning Substances Undesirable in Excessive Amounts

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-4 (Rejarla Village)			GW-6 (Kistaram Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	0.13	BDL	BDL	BDL	0.06
2	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.07	0.18	0.18	0.07	0.10	0.07
3	Boron as B	mg/L	3120-B	0.5	1.0	0.20	0.35	0.3	0.19	0.04	0.05
4	Calcium as Ca	mg/L	3500-Ca.B	75	200	46	44	74	62	82	78
5	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	121	145	160	183	338	345
6	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL	BDL	BDL
7	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.64	0.72	0.711	0.65	0.56	0.581
8	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL
9	Iron as Fe	mg/L	3120-B	0.3	No relaxation	0.28	0.58	0.19	0.21	0.13	0.31
10	Magnesium as Mg	mg/L	3500-Mg.B	30	100	45	39	53	62	69	57
11	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL
12	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	43	11	48	15	31	56
13	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL
14	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
15	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	200	400	26	58	64	160	88	53
17	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	355	310	430	295	245	380
18	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	300	270	405	410	490	430
19	Zinc as Zn	mg/L	3120-B	5	15	0.16	0.05	0.26	0.29	0.06	BDL

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-4 (Rejarla Village)			GW-6 (Kistaram Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-4 (Rejarla Village)			GW-6 (Kistaram Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	*E. coli*	Presence or Absence/ 100 mL	9221 F	-	-	Absent	Absent	Absent	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

*NTU – Nephelometric Turbidity Unit; TON – Threshold Odour Number; FTN – Flavor Threshold Number; BDL – Below Detection Limit, Detection Limit – Phenols – 0.1 mg/L; Mercury – 20 µg/L; Cyanide – 0.05 mg/L Hex. Chromium – 0.05 mg/L; Copper – 0.02 mg/L; Manganese – 0.01 mg/L; Cadmium – 0.01 mg/L; Selenium – 0.04 mg/L; Arsenic –0.04 mg/L; Lead – 0.04 mg/L; Aluminum – 0.04 mg/L; Chromium – 0.03 mg/L; Nickel – 0.03 mg/L; Residual free chlorine – 1 mg/L; Nitrites – 0.01 mg/L; Orthophosphates – 0.05 mg/L; ND-Not Detected; Detection Limit : Pesticides– 0.1 ppm; PAHs – 1 ppm .*Not Performed –PCBs, Trihalomethanes, Radioactive materials, Alachlor, Atrazine, Butachlor, Ethion,*

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT		
				Class A	Class B	Class C	SW-5 (Venkatapuram Cheruvu)		
							(1^{st} Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)
1	pH	-	4500-H^+B	6.5 -8.5	6.5 -8.5	6.0 – 9.0	7.2	7.2	7.5
2	Temperature	ºC	2550. B	-	-	-	25.7	24.8	25.0
3	Turbidity	NTU	2130. B	-	-	-	2.5	2.6	2.1
4	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	258	710	315
5	Total Dissolved Solids at 180º C	mg/L	2540.C	-	-	-	147	430	186
6	Total Suspended Solids at 105º C	mg/L	2540. D	-	-	-	19	14	39
7	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	5.2	6.2	6.7
8	Bio chemical Oxygen Demand for 3 days at 27º C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	2	3	BDL
9	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	130	540	280
10	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	23	70	70
11	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Absent	Present	Present
12	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	18	30	28
13	Chlorides as Cl^-	mg/L	4500-Cl^-.B	-	-	-	57	88	40
14	Nitrites as NO_2	mg/L	4500-NO_2^-.B	-	-	-	BDL	0.02	BDL
15	Nitrates as NO_3	mg/L	4500-NO_3^-.B	-	-	-	2	12	4.6
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	-	-	-	30	55	23

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT		
				Class A	Class B	Class C	SW-5 (Venkatapuram Cheruvu)		
							(1st Quarter)	(2nd Quarter)	(3rd Quarter)
17	Arsenic as As	mg/L	3120. B		-	-	BDL	BDL	BDL
18	Lead as Pb	mg/L	3120. B		-	-	BDL	BDL	BDL
19	Zinc as Zn	mg/L	3120. B		-	-	0.17	0.08	0.11
20	Cadmium as Cd	mg/L	3120. B		-	-	BDL	BDL	BDL
21	Total Chromium as Cr	mg/L	3120. B		-	-	BDL	BDL	BDL
22	Nickel as Ni	mg/L	3120. B		-	-	BDL	BDL	BDL
23	Iron as Fe	mg/L	3120. B		-	-	0.11	0.18	0.23
24	Copper as Cu	mg/L	3120-B		-	-	BDL	BDL	BDL
25	Boron as B	mg/L	3120-B		-	-	0.08	0.20	0.14
26	Colour	Pt-co	2120. B		-	-	5	10	5
27	Odour	TON	2150. B		-	-	No odour observed	No odour Observed	No odour Observed
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3-C		-	-	BDL	BDL	BDL
29	Total Phosphates	mg/L	4500-P-D		-	-	BDL	BDL	BDL
30	Oil & Grease	mg/L	5520. B		-	-	<1	<1	<1
31	Fluoride	mg/L	4500-F^-.C				0.49	0.615	0.308
32	Phenolic compounds as C_6H_5OH	mg/L	5530-D				BDL	BDL	BDL
33	Selenium as Se	mg/L	3120-B				BDL	BDL	BDL

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT		
						GW-7 (Cherukupalli Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1.	Colour	Pt-co-	2120. B	5	15	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H+B	6.5 to 8.5	No relaxation	7.3	7.5	8.0
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	0.9	0.96	0.65
6.	Total Dissolved Solids at 180o C	mg/L	2540.C	500	2000	*640*	*724*	*790*

General Parameters Concerning Substances Undesirable in Excessive Amounts

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT		
						GW-7 (Cherukupalli Village)		
						(1^{st} Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)
1	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	0.05
2	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.46	0.16	0.07
3	Boron as B	mg/L	3120-B	0.5	1.0	0.20	0.08	0.08
4	Calcium as Ca	mg/L	3500-Ca.B	75	200	54	70	82
5	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	131	150	143
6	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	0.05	BDL
7	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.94	0.380	0.823
8	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL
9	Iron as Fe	mg/L	3120-B	0.3	No relaxation	0.24	0.40	0.25
10	Magnesium as Mg	mg/L	3500-Mg.B	30	100	53	53	58
11	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL
12	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	23	19	50
13	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL
14	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL
15	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	200	400	40	122	59
17	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	305	310	340
18	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	355	395	445
19	Zinc as Zn	mg/L	3120-B	5	15	0.22	0.04	0.06

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT		
						GW-7 (Cherukupalli Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT		
						GW-7 (Cherukupalli Village)		
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)
1	*E. coli*	Presence or Absence/ 100 mL	9221 F	-	-	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8

*NTU – Nephelometric Turbidity Unit; TON – Threshold Odour Number; FTN – Flavor Threshold Number; BDL – Below Detection Limit, Detection Limit – Phenols – 0.1 mg/L; Mercury – 20 µg/L; Cyanide – 0.05 mg/L Hex. Chromium – 0.05 mg/L; Copper – 0.02 mg/L; Manganese – 0.01 mg/L; Cadmium – 0.01 mg/L; Selenium – 0.04 mg/L; Arsenic –0.04 mg/L; Lead – 0.04 mg/L; Aluminum – 0.04 mg/L; Chromium – 0.03 mg/L; Nickel – 0.03 mg/L; Residual free chlorine – 1 mg/L; Nitrites – 0.01 mg/L; Orthophosphates – 0.05 mg/L; ND-Not Detected; Detection Limit : Pesticides– 0.1 ppm; PAHs – 1 ppm .*Not Performed –PCBs Trihalomethanes, Radioactive materials, Alachlor, Atrazine, Butachlor, Ethion,*

EFFLUENTS

Effluents sampling locations

Sl.No.	Sample Code	Name of the Location	Latitude	Longitude
1.	EW6	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	N 17^0 13'09.1''	E 80^0 47'55.0''
2.	EW7	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	N 17^0 12'53.5''	E 80^0 49'05.0''
3.	EW8	JVR OC-I Exp. OB Dump Surface Runoff Settling Tank Outlet (JVR OC-I Exp.)	N 17^0 12'09.9''	E 80^0 47'35.6''
4.	EW10	JVR OC-II Mine Discharge	N17^0 09'31.0''	E80^{0}45'29.0''
5.	EW11	JVR OC-II OB Dump surface runoff settling tank Out let	N17^0 ^{0}12'16.0''	E80^0 46'43''

Characteristics of Effluents – JVR OC-I Exp. Mine Discharge (JVR OC-I Exp) (EW6)

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas

(2) Area : Kothagudem

(3) Sampling Location & Code : JVR OC-I Exp. Mine Discharge (JVR OC-I Exp.) (EW6)

(4) Nature of the Component : Effluents

(5) Period of Monitoring : January, 2020 – September, 2020

S.No.	Date of Sampling	pH	TSS at 105^{0}C	TDS at 180^{0}C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H$^+$B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2020	7.4	11	910	21	3	<1
2.	30.01.2020	6.2	24	1040	27	7	<1
3.	15.02.2020	6.9	14	1020	24	4	<1
4.	29.02.2020	6.9	7	1170	18	2	<1
5.	15.03.2020	6.1	15	1085	20	3	<1
6.	30.03.2020	6.0	9	920	16	2	<1
7.	15.04.2020	6.9	7	960	18	3	<1
8.	30.04.2020	7.5	76	980	29	7	<1
9.	15.05.2020	7.7	14	1290	23	4	<1
10.	30.05.2020	7.6	12	1320	22	3	<1
11.	15.06.2020	7.4	9	985	17	2	<1
12.	30.06.2020	7.4	6	1140	14	2	<1
13.	15.07.2020	7.0	17	1080	16	2	<1
14.	30.07.2020	7.6	16	890	17	2	<1
15.	15.08.2020	7.6	19	980	21	3	<1
16.	30.08.2020	6.7	29	950	22	3	<1
17.	15.09.2020	7.3	10	870	18	2	<1
18.	30.09.2020	7.09	14	990	16	2	<1

Characteristics of Effluents - JVR OC-I Exp. Base Workshop ETP Outlet

(JVR OC-I Exp.) (EW7)

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas

(2) Area : Kothagudem

(3) Sampling Location & Code : JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.) (EW7)

(4) Nature of the Component : Effluents

(5) Period of Monitoring : January, 2020 – September, 2020

S.No.	Date of Sampling	pH	TSS at 105^{0}C	TDS at 180^{0}C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H$^+$B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2020	7.7	8	890	17	2	5.3
2.	30.01.2020	6.8	7	930	18	3	6.7
3.	15.02.2020	7.1	12	950	21	3	6.1
4.	29.02.2020	7.1	6	1100	17	2	5.2
5.	15.03.2020	6.9	16	940	22	4	6.0
6.	30.03.2020	7.2	26	870	25	6	6.5
7.	15.04.2020	7.5	12	910	22	4	5.7
8.	30.04.2020	6.8	12	850	30	8	6.7
9.	15.05.2020	6.6	8	1170	19	3	6.1
10.	30.05.2020	7.8	6	1120	18	2	7.0
11.	15.06.2020	6.9	11	920	20	3	5.9
12.	30.06.2020	7.5	13	1060	19	3	5.6
13.	15.07.2020	6.8	22	1020	20	2	4.9
14.	30.07.2020	7.4	29	1090	23	3	5.4
15.	15.08.2020	7.2	10	1110	18	2	6.6
16.	30.08.2020	6.4	11	990	20	3	6.0
17.	15.09.2020	7.8	8	780	16	2	4.1
18.	30.09.2020	7.64	10	860	22	3	4.6

Characteristics of Effluents – JVR OC-I OB Dump Surface Runoff Settling Tank Outlet (JVR OC-I) (EW8)

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas

(2) Area : Kothagudem

(3) Sampling Location & Code : JVR OC-I Exp. OB Dump Surface Runoff Settling Tank Outlet

(JVR OC-I Exp.) (EW8)

(4) Nature of the Component : Effluents

(5) Period of Monitoring : January, 2020 – September, 2020

S.No.	Date of Sampling	pH	TSS at 105^{0}C	TDS at 180^{0}C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H$^+$B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2020	7.1	10	1040	22	3	<1
2.	30.01.2020	5.7	12	1090	20	3	<1
3.	15.02.2020	7.2	34	1180	23	3	<1
4.	29.02.2020	7.3	15	1070	23	3	<1
5.	15.03.2020	7.3	24	1170	20	3	<1
6.	30.03.2020	6.8	20	952	23	4	<1
7.	15.04.2020	7.8	9	1060	20	3	<1
8.	30.04.2020	7.4	36	1040	25	4	<1
9.	15.05.2020	7.3	9	1110	21	3	<1
10.	30.05.2020	8.0	10	1260	20	3	<1
11.	15.06.2020	6.5	21	1220	26	5	<1
12.	30.06.2020	7.9	11	1175	23	4	<1
13.	15.07.2020	6.7	14	930	22	3	<1
14.	30.07.2020	6.7	18	920	25	4	<1
15.	15.08.2020	7.8	16	900	24	5	<1
16.	30.08.2020	6.9	14	1090	23	4	<1
17.	15.09.2020	6.5	12	620	23	4	<1
18.	30.09.2020	7.06	16	810	19	2	<1

Characteristics of Effluents – JVR OC-II Mine Discharge (EW10)

1. Project Name : Post Project Environmental Monitoring in SCCL Mining areas
2. Area : Kothagudem
3. Sampling Location & Code : JVR OC-II Mine Discharge (EW10)
4. Nature of the Component : Effluents
5. Period of Monitoring : January, 2020 – September, 2020

S.No.	Date of Sampling	pH	TSS at 105^{0}C	TDS at 180^{0}C	COD	BOD	Oil & Grease
Unit		**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
Test Method		**4500-H$^+$B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines		**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2020	7.5	6	1050	19	3	<1
2.	30.01.2020	6.5	9	1020	21	3	<1
3.	15.02.2020	7.5	6	1030	16	2	<1
4.	29.02.2020	5.9	14	1120	22	3	<1
5.	15.03.2020	6.8	8	1010	14	3	<1
6.	30.03.2020	7.3	13	1028	20	3	<1
7.	15.04.2020	7.4	7	1130	21	3	<1
8.	30.04.2020	7.8	46	1130	26	5	<1
9.	15.05.2020	7.8	19	1120	22	3	<1
10.	30.05.2020	7.3	14	1210	21	3	<1
11.	15.06.2020	6.8	9	1180	24	4	<1
12.	30.06.2020	7.8	12	610	18	2	<1
13.	15.07.2020	7.2	13	780	15	2	<1
14.	30.07.2020	7.4	19	970	16	2	<1
15.	15.08.2020	6.9	6	940	14	2	<1
16.	30.08.2020	6.9	16	890	15	2	<1
17.	15.09.2020	7.1	7	940	17	2	<1
18.	30.09.2020	7.42	9	980	18	2	<1

Characteristics of Effluents – JVR OC-II OB Dump surface runoff settling tank Outlet (EW11)

1. Project Name : Post Project Environmental Monitoring in SCCL Mining areas
2. Area : Kothagudem
3. Sampling Location & Code : JVR OC-II OB Dump surface runoff settling tank Out let (EW11)
4. Nature of the Component : Effluents
5. Period of Monitoring : January, 2020 – September, 2020

S.No.	Date of Sampling	pH	TSS at 105^{0}C	TDS at 180^{0}C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H$^+$B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2020	7.2	13	880	22	3	<1
2.	30.01.2020	6.8	8	950	19	3	<1
3.	15.02.2020	7.6	10	930	22	3	<1
4.	29.02.2020	7.0	12	1090	15	2	<1
5.	15.03.2020	7.6	12	915	18	4	<1
6.	30.03.2020	7.2	18	886	27	6	<1
7.	15.04.2020	7.7	10	990	15	2	<1
8.	30.04.2020	7.3	39	1010	24	4	<1
9.	15.05.2020	8.0	10	1280	20	3	<1
10.	30.05.2020	7.2	19	1170	25	4	<1
11.	15.06.2020	7.1	17	1090	23	4	<1
12.	30.06.2020	7.5	17	1014	22	3	<1
13.	15.07.2020	7.4	23	890	20	2	<1
14.	30.07.2020	7.5	26	920	14	2	<1
15.	15.08.2020	7.0	40	920	23	4	<1
16.	30.08.2020	6.6	7	1090	17	2	<1
17.	15.09.2020	6.9	17	920	24	4	<1
18.	30.09.2020	6.77	20	880	24	4	<1

AMBIENT NOISE LEVELS

Noise Quality Monitoring

Noise monitoring locations

S.No	Station code	Station Name	Latitude	Longitude
Core Zone				
1	CN 5	JVR OC - I Site Office	N 17^0 13'01.9''	E 080^0 49'15.6''
2	CN 6	JVR OC - I Base Workshop	N 17^0 12'54.5''	E 080^0 49'18.9''
Buffer Zone				
3	BN 4	Kistaram Village	N 17^{0}12'50.5''	E 80^0 47'09.8''
4	BN 5	Sathupalli Town	N 17^0 12'45.3''	E 80^0 50'01.9''
5	BN 6	Rejarla Village	N17^0 10'09.7''	E 80^0 48'29.8''

Summary of Noise Levels in January, 2020

Location Code	Monitoring stations	Standard limits of Noise		January 1st Fortnight			January 2nd Fortnight		
				Noise levels in dB (A)					
Core Zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN 5	JVR OC - I Site Office	75	70	10.01.2020	62.8	47.3	29.01.2020	60.7	45.5
CN 6	JVR OC - I Base Workshop	75	70	10.01.2020	69.9	55.1	29.01.2020	70.7	53.0
Buffer Zone									
BN 4	Kistaram Village	55	45	07.01.2020	51.7	42.2	25.01.2020	52.5	39.4
BN 5	Sathupalli Town	55	45	06.01.2020	51.9	41.7	24.01.2020	52.7	40.0
BN 6	Rejarla Village	55	45	07.01.2020	52.1	40.7	25.01.2020	52.8	39.6

Summary of Noise Levels in February, 2020

Location Code	Monitoring stations	Standard limits of Noise		February 1st fortnight			February 2nd fortnight		
				Noise levels in dB (A)					
Core Zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN 5	JVR OC - I Site Office	75	70	11.02.2020	61.1	45.8	26.02.2020	61.8	47.0
CN 6	JVR OC - I Base Workshop	75	70	11.02.2020	67.5	50.6	26.02.2020	68.8	52.3
Buffer Zone									
BN 4	Kistaram Village	55	45	08.02.2020	52.0	40.0	24.02.2020	51.9	40.8
BN 5	Sathupalli Town	55	45	07.02.2020	51.4	39.6	22.02.2020	51.0	40.1
BN 6	Rejarla Village	55	45	08.02.2020	51.8	39.9	24.02.2020	51.6	39.2

Summary of Noise Levels in March, 2020

Location Code	Monitoring stations	Standard limits of Noise		March 1st fortnight			March 2nd fortnight		
				Noise levels in dB (A)					
Core Zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN 5	JVR OC - I Site Office	75	70	12.03.2020	60.2	46.1	25.03.2020	57.5	42.5
CN 6	JVR OC - I Base Workshop	75	70	12.03.2020	65.4	50.1	25.03.2020	62.5	46.2
Buffer Zone									
BN 4	Kistaram Village	55	45	10.03.2020	51.2	39.2	23.03.2020	48.9	36.2
BN 5	Sathupalli Town	55	45	07.03.2020	50.8	38.9	21.03.2020	48.5	35.9
BN 6	Rejarla Village	55	45	10.03.2020	51.1	39.1	23.03.2020	48.8	36.1

Noise Levels : **Period: Apr' 2020 to Sep'2020**

Station Code	Monitoring Stations	Noise Standards		Apr 1st FN			Apr 2nd FN			May 1st FN			May 2nd FN		
Core Zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN5	JVR OC - I Site Office	75	70	11.04.2020	56.1	41.5	25.04.2020	56.0	41.0	12.05.2020	59.3	44.6	26.05.2020	58.3	43.6
CN6	JVR OC - I Base Workshop	75	70	11.04.2020	61.5	45.1	25.04.2020	60.9	44.9	12.05.2020	65.1	48.9	26.05.2020	63.8	47.7
Buffer Zone															
BN4	Kistaram Village	55	45	09.04.2020	48.2	35.6	23.04.2020	48.1	35.1	09.05.2020	50.4	38.4	23.05.2020	49.7	37.4
BN6	Rejarla Village	55	45	09.04.2020	48.1	35.6	23.04.2020	47.9	35.2	09.05.2020	50.3	38.0	23.05.2020	49.5	37.1
BN5	Sathupalli Town	55	45	08.04.2020	47.8	35.4	22.04.2020	47.1	35.0	08.05.2020	49.9	38.0	22.05.2020	49.0	37.1

Station Code	Monitoring Stations	Noise Standards		June 1st FN			June 2nd FN			July 1st FN			July 2nd FN		
Core zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN5	JVR OC - I Site Office	75	70	10.06.2020	61.2	46.5	25.06.2020	59.6	44.9	10.07.2020	60.6	46.1	25.07.2020	60.5	46.0
CN6	JVR OC - I Base Workshop	75	70	10.06.2020	67.0	50.9	25.06.2020	65.3	49.2	10.07.2020	64.5	49.0	25.07.2020	65.6	49.9
Buffer zone															
BN4	Kistaram Village	55	45	08.06.2020	51.2	38.9	23.06.2020	50.4	38.2	08.07.2020	52.0	39.5	23.07.2020	51.2	38.9
BN6	Rejarla Village	55	45	08.06.2020	50.4	38.3	23.06.2020	50.1	37.8	08.07.2020	50.9	38.7	23.07.2020	50.5	38.3
BN5	Sathupalli Town	55	45	06.06.2020	50.5	38.4	22.06.2020	49.8	37.8	07.07.2020	50.1	38.1	22.07.2020	50.1	38.1

Station Code	Monitoring Stations	Noise Standards		Aug 1st FN			Aug 2nd FN			Sep 1st Fn			Sep 2nd fn		
Core zone		Day time	Night time	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night	Date of Sampling	Leq Day	Leq Night
CN5	JVR OC - I Site Office	75	70	11.08.2020	63.5	48.3	27.08.2020	61.6	46.8	10.09.2020	62.2	47.3	25.09.2020	61.6	46.8
CN6	JVR OC - I Base Workshop	75	70	11.08.2020	68.9	52.4	27.08.2020	66.8	50.8	10.09.2020	65.8	50.0	25.09.2020	66.9	50.8
Buffer zone															
BN4	Kistaram Village	55	45	08.08.2020	52.7	40.1	25.08.2020	51.8	39.4	08.09.2020	51.1	38.8	23.09.2020	52.5	39.9
BN6	Rejarla Village	55	45	08.08.2020	52.0	39.5	25.08.2020	51.0	38.8	08.09.2020	51.5	39.1	23.09.2020	52.2	39.7
BN5	Sathupalli Town	55	45	07.08.2020	51.6	39.3	24.08.2020	50.7	38.5	07.09.2020	51.9	39.4	22.09.2020	50.6	38.5

Vehicular Emissions Study

S.No	Eqpt Type/Capacity	Eqpt Name	Make	D.O.C	Cummlated Hrs As On 30.05.2020	Tested date	H.S.U % 65	K m-1 2.45	TEST STATUS
1	DUMPER-35T	C-1	BEML	17.02.2015	20033	20.05.2020	32.7	0.42	PASS
2	DUMPER-35T	C-2	BEML	17.02.2015	26862	20.05.2020	-	-	BD
3	DUMPER-35T	C3	BEML	17.06.2015	19152	20.05.2020	30.4	0.82	PASS
4	DUMPER-35T	C5	BEML	17.06.2015	19071	20.05.2020	85.9	4.15	FAIL
5	DUMPER-35T	C6	BEML	17.06.2015	17857	20.05.2020	81.3	4.18	FAIL
6	DUMPER-35T	C7	BEML	17.02.2015	19212	20.05.2020	63.3	2.35	PASS
7	DUMPER-35T	C8	BEML	29.07.2015	19041	20.05.2020	64.0	2.41	PASS
8	DUMPER-35T	C9	BEML	07.08.2015	19115	20.05.2020	86.7	4.35	FAIL
9	DUMPER-35T	C10	BEML	08.08.2015	18475	21.05.2020	92.9	4.20	FAIL
10	DUMPER-35T	C11	BEML	28.07.2015	19589	21.05.2020	86.1	3.54	FAIL
11	DUMPER-35T	C12	BEML	28.07.2015	21636	21.05.2020	90.7	5.45	FAIL
12	DUMPER-35T	C13	BEML	29.07.2015	18044	21.05.2020	44.7	0.94	PASS
13	DUMPER-35T	C14	BEML	29.07.2015	19149	21.05.2020	40.8	1.34	PASS
14	DUMPER-35T	C15	BEML	09.10.2015	19085	21.05.2020	78.1	3.12	FAIL
15	DUMPER-60T	60-1	BEML	25.01.2017	9755	21.05.2020	19.4	0.35	PASS
16	DUMPER60T	60-2	BEML	25.01.2017	10008	21.05.2020	43.5	1.54	PASS
17	DUMPER60T	60-3	BEML	25.01.2017	8828	22.05.2020	39.5	0.45	PASS
18	DUMPER60T	60-5	BEML	25.01.2017	10552	22.05.2020	37.4	1.04	PASS
19	DUMPER60T	60-6	BEML	28.08.2017	8562	22.05.2020	34.4	0.95	PASS
20	DUMPER60T	60-7	BEML	28.08.2017	10577	22.05.2020	24.2	0.53	PASS
21	DUMPER60T	60-8	BEML	28.08.2017	9562	22.05.2020	15.2	0.12	PASS
22	DUMPER60T	60-9	BEML	28.08.2017	10402	22.05.2020	18.8	0.24	PASS
23	DUMPER60T	60-10	BEML	28.08.2017	10167	22.05.2020	35.4	0.41	PASS
24	DUMPER60T	60-11	BEML	28.08.2017	10126	22.05.2020	25.0	0.64	PASS
25	DUMPER60T	60-12	BEML	28.08.2017	10412	22.05.2020	29.8	0.19	PASS
26	DUMPER60T	60-13	BEML	28.08.2017	10634	23.05.2020	14.5	0.19	PASS
27	DUMPER60T	60-14	BEML	11.03.2019	5690	23.05.2020	28.4	0.10	PASS
28	DUMPER60T	60-15	BEML	11.03.2019	4354	23.05.2020	25.3	0.28	PASS
29	DUMPER60T	60-16	BEML	11.03.2019	4275	30.05.2020	25.4	0.54	PASS
30	DUMPER60T	60-17	BEML	11.03.2019	3776	23.05.2020	19.4	0.35	PASS
31	WATER SPRINKLER	WT-3	BEML	28.10.2015	11693	23.05.2020	83.2	4.25	FAIL
32	WATER SPRINKLER	WT-5	BEML	20.10.2017	6124	23.05.2020	64.1	2.40	PASS
33	WATER SPRINKLER	WT-6	BEML	19.01.2018	5908	23.05.2020	80.7	3.48	FAIL
34	MOTOR GRADER	MG-2	BEML	06.02.2013	15545	30.05.2020	39.5	1.05	PASS
35	DOZER	D-7	BEML	31.10.2017	7822	25.05.2020	17.5	0.14	PASS
36	MOTOR GRADER	MG-3	BEML	16.12.2015	8678	25.05.2020	25.2	0.24	PASS
37	SHOVEL	S1	L&T	1.11.2015	27711	25.05.2020	44.2	1.34	PASS
38	SHOVEL	LC-3	TATA	25.07.2018	5344	25.05.2020	28.4	0.54	PASS
39	DOZER	D-8	BEML	28.12.2013	7670	25.05.2020	24.4	0.23	PASS
40	MOTOR GRADER	MG-5	KOMATSU	01.05.2018	4702	25.05.2020	38.4	0.25	PASS

41	TYRE HANDLER	14-TH-1	BEML	14.11.2017	587	26.05.2020	79.9	3.41	FAIL
42	SHOVEL	S-2	KOMATSU	25.1O.2015	25993	26.05.2020	57.2	0.94	PASS
43	SHOVEL	S-5	TATA	25.04.2018	11717	26.05.2020	38.5	0.74	PASS
44	CRANE	C-3	ACE	25.04.2019	1512	27.05.2020	24.3	0.12	PASS
45	DOZER	D-10	KOMAT	17.03.2008	2584	27.05.2020	14.2	0.34	PASS
46	LOADER	LC-2	VALVO	03.09.2017	15708	27.05.2020	35.3	1.00	PASS
47	DOZER	D-9	KOMAT	09.O7.2019	2749	28.05.2020	16.2	0.41	PASS
48	DRILL	DM-5	REVATHI	25.05.2015	7400	28.05.2020	20.0	0.51	PASS
49	DRILL	DM-6	ATLAS	26.08.2017	2840	28.05.2020	19.0	0.45	PASS
50	LOADER	L-3	L&T	30.04.2019	1854	29.05.2020	13.2	0.31	PASS
51	SHOVEL	S-6	BEML	11.11.2019	2413	29.05.2020	15.1	0.32	PASS
52	TYRE HANDLER	14-TH-2	BEML	14.10.2015	NA	29.05.2020	57.6	1.95	PASS
53	DOZER	D-5	BEML	11.04.2015	10489	29.05.2020	70.2	3.18	FAIL
54	DOZER	D-6	BEML	16.09.2017	7400	29.05.2020	20.4	0.52	PASS
55	SHOVEL	LC-2	TATA	11.04.2015	14821	30.05.2020	44.3	1.32	PASS
56	SHOVEL	S-3	TATA	22.10.2017	15452	30.05.2020	40.5	1.24	PASS

Air Monitoring Locations

Station Code	Name of the Stations	Latitude	Longitude
CA7	JVR OC-1 Exp. PO Office	N 17^0 12’51.9’’	E 80^0 49’15.6’’
CA8	JVR OC-1 Exp. Base Workshop	N 17^0 12’54.5’’	E 80^0 49’08.9’’
CA10	JVR OC – II Pit Head CHP	N$17^0$12’31.7’’	E$80^0$47’34.8’’
BA5	Kistaram Village	N 17^0 12’50.5’’	E 80^0 46’59.8’’
BA6	Sathupalli Town	N 17^0 12’45.3’’	E 80^0 50’019’’
BA7	Venkatapuram Village	N 17^0 13’11.9’’	E 80^0 50’05.0’’
BA8	Pallewada Village	N 17^0 10’30.5’’	E 80^0 44’28.7”
BA9	Rejarla Village	N 17^0 10’09.7’’	E 80^0 48’29.8”
BA10	Chaudavaram Village	N 17^0 09’09.7’’	E 80^0 45’30.4”

Ambient Air Quality at JVR OC-I Exp. PO Office (CA7)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Core Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards, GSR 742(E),Dated 25.09.2000		**250**	*****	**120**	**120**
1.	07.01.2019	105	35.0	13.3	19.3
2.	25.01.2019	118	38.3	13.0	18.9
3.	08.02.2019	113	37.9	12.5	18.2
4.	22.02.2019	102	32.9	12.8	18.6
5.	08.03.2019	109	35.5	13.6	20.1
6.	24.03.2019	115	37.4	14.8	22.1
7.	09.04.2019	119	45.9	13.8	20.8
8.	20.04.2019	125	38.8	13.3	18.7
9.	07.05.2019	119	38.6	12.9	18.8
10.	25.05.2019	126	40.7	12.9	18.0
11.	11.06.2019	120	38.9	14.4	21.8
12.	30.06.2019	117	38.0	14.0	21.5
13.	10.07.2019	99	30.2	14.8	22.6
14.	24.07.2019	94	28.2	13.3	20.3
15.	07.08.2019	102	33.0	13.7	20.5
16.	21.08.2019	114	36.9	14.1	21.6
17.	09.09.2019	118	38.2	13.7	20.9
18.	23.09.2019	93	30.1	14.4	22.0
19.	09.10.2019	110	35.6	13.6	21.1
20.	22.10.2019	113	36.6	15.0	21.6
21.	08.11.2019	116	37.7	13.9	21.3
22.	22.11.2019	119	38.6	14.4	22.1
23.	07.12.2019	121	39.2	14.4	22.2
24.	24.12.2019	124	40.6	14.9	23.1
	Min	**93**	**28.2**	**12.5**	**18**
	Max	**126**	**45.9**	**15**	**23.1**
	Average	**112.96**	**36.78**	**13.81**	**20.67**
	98 Percentile	**125.54**	**43.508**	**14.954**	**22.87**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at JVR OC-I Exp. Base Workshop (CA8)

Area : Kothagudem
Nature of Area : Core Zone
Period of Monitoring : January, 2019 – December, 2019
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards, GSR 742(E), Dated 25.09.2000		**250**	*****	**120**	**120**
1.	07.01.2019	132	46.2	15.4	22.9
2.	25.01.2019	148	50.1	14.6	21.8
3.	08.02.2019	140	49.2	14.0	20.7
4.	22.02.2019	152	51.7	13.8	20.3
5.	08.03.2019	139	47.2	14.0	20.7
6.	24.03.2019	147	49.7	15.2	22.8
7.	09.04.2019	147	57.6	14.3	21.1
8.	20.04.2019	150	51.1	13.6	19.3
9.	07.05.2019	156	52.9	13.7	20.8
10.	25.05.2019	165	55.8	13.8	19.5
11.	11.06.2019	159	53.9	14.8	22.5
12.	30.06.2019	152	51.4	14.4	21.2
13.	10.07.2019	128	39.1	15.0	23.0
14.	24.07.2019	121	36.4	13.4	19.6
15.	07.08.2019	125	42.4	13.8	20.0
16.	21.08.2019	132	44.7	14.3	20.8
17.	09.09.2019	138	46.8	13.9	20.2
18.	23.09.2019	118	40.0	14.5	21.3
19.	09.10.2019	135	45.8	13.8	20.5
20.	22.10.2019	139	47.0	15.1	21.9
21.	08.11.2019	143	48.4	14.1	20.7
22.	22.11.2019	146	49.6	15.3	22.6
23.	07.12.2019	149	50.5	14.6	21.6
24.	24.12.2019	153	52.1	15.8	23.5
	Min	**118**	**36.4**	**13.4**	**19.3**
	Max	**165**	**57.6**	**15.8**	**23.5**
	Average	**142.25**	**48.32**	**14.38**	**21.22**
	Percentile	**162.24**	**56.772**	**15.616**	**23.27**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at JVR OC Pit Head CHP (CA10)

Area : Kothagudem
Nature of Area : Core Zone
Period of Monitoring : January, 2019 – December, 2019
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards, GSR 742(E), Dated 25.09.2000		**250**	*****	**120**	**120**
1.	10.01.2019	221	70.6	15.5	23.1
2.	29.01.2019	230	78.3	13.5	19.8
3.	12.02.2019	217	69.2	13.9	20.5
4.	26.02.2019	224	71.7	14.3	21.1
5.	14.03.2019	220	70.2	14.4	21.4
6.	28.03.2019	232	74.1	15.6	23.5
7.	13.04.2019	217	67.2	14.0	18.9
8.	29.04.2019	234	78.6	14.8	20.1
9.	13.05.2019	230	73.6	14.3	21.0
10.	30.05.2019	243	77.6	14.5	21.1
11.	14.06.2019	220	70.4	15.2	22.6
12.	30.06.2019	231	73.9	15.5	23.2
13.	13.07.2019	195	59.5	15.4	22.8
14.	27.07.2019	190	57.2	14.4	21.3
15.	10.08.2019	194	62.1	14.2	20.8
16.	26.08.2019	198	63.4	14.7	21.6
17.	12.09.2019	202	64.6	14.3	21.0
18.	26.09.2019	188	60.2	14.9	22.0
19.	12.10.2019	215	68.8	14.1	21.2
20.	25.10.2019	221	70.7	15.5	22.1
21.	12.11.2019	227	72.8	14.5	21.5
22.	26.11.2019	225	72.0	15.8	23.6
23.	12.12.2019	219	70.1	15.0	22.4
24.	27.12.2019	208	67.6	16.3	24.5
	Min	**188**	**57.2**	**13.5**	**18.9**
	Max	**243**	**78.6**	**16.3**	**24.5**
	Average	**216.71**	**69.35**	**14.78**	**21.71**
	98Percentile	**238.86**	**78.46**	**16.07**	**24.09**

** No standard was specified for $PM_{2.5}$ in core zone*

Ambient Air Quality at Kistaram Village (BA5)

Area	:	Kothagudem	**Nature of Area**	**:**	Buffer Zone
Period of Monitoring	:	January, 2019 – December, 2019	**Sampling Duration**	**:**	24hrs period

S.No.	Date of Sampling	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	10.01.2019	79	32.3	13.1	19.0
2.	29.01.2019	76	31.7	12.1	17.5
3.	12.02.2019	72	29	11.9	17.0
4.	26.02.2019	75	30.2	12.8	18.7
5.	14.03.2019	76	30.7	12.1	17.4
6.	28.03.2019	80	32.4	13.0	19.1
7.	13.04.2019	76	29.5	13.1	17.8
8.	29.04.2019	78	31.2	13.8	19.0
9.	13.05.2019	78	31.4	13.1	17.9
10.	30.05.2019	75	30.2	13.8	18.5
11.	14.06.2019	79	31.8	13.0	19.0
12.	30.06.2019	77	31.2	14.4	21.5
13.	13.07.2019	68	26.8	13.1	18.2
14.	27.07.2019	64	32.0	13.6	20.0
15.	10.08.2019	66	26.6	12.1	17.4
16.	26.08.2019	70	28.2	12.6	18.3
17.	12.09.2019	68	27.4	12.2	17.7
18.	26.09.2019	65	26.6	12.8	18.6
19.	12.10.2019	69	27.8	12.2	18.1
20.	25.10.2019	72	29.4	13.4	18.8
21.	12.11.2019	75	30.6	12.8	18.7
22.	26.11.2019	73	29.9	14.1	21.0
23.	12.12.2019	70	28.6	13.5	19.9
24.	27.12.2019	74	30.2	14.6	21.8
	Min	**64**	**26.6**	**11.9**	**17**
	Max	**80**	**32.4**	**14.6**	**21.8**
	Average	**73.13**	**29.82**	**13.05**	**18.79**
	98 Percentile	**79.54**	**32.35**	**14.51**	**21.66**

Ambient Air Quality at Sathupalli Town (BA6)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Buffer Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	08.01.2019	60	24.7	12.3	17.6
2.	28.01.2019	63	26.2	12.2	17.5
3.	09.02.2019	60	24.9	12.0	17.2
4.	23.02.2019	63	25.8	11.6	16.6
5.	09.03.2019	60	25.0	10.8	15.3
6.	24.03.2019	64	26.5	11.6	16.5
7.	09.04.2019	63	24.4	12.2	16.4
8.	21.04.2019	59	26.7	12.3	16.6
9.	08.05.2019	66	27.4	12.2	16.8
10.	26.05.2019	70	28.9	12.8	17.4
11.	12.06.2019	73	30.3	11.1	15.7
12.	26.06.2019	65	26.8	13.0	18.9
13.	11.07.2019	57	23.1	10.9	15.3
14.	25.07.2019	54	27.0	12.3	17.7
15.	08.08.2019	51	21.1	10.4	13.9
16.	22.08.2019	58	24.0	10.8	15.2
17.	10.09.2019	53	21.9	10.5	14.6
18.	24.09.2019	51	21.2	11.0	15.5
19.	10.10.2019	56	23.1	10.5	15.0
20.	23.10.2019	58	23.9	11.7	15.8
21.	09.11.2019	62	25.6	11.0	15.5
22.	23.11.2019	65	27.1	12.9	18.7
23.	10.12.2019	60	24.8	11.6	16.5
24.	25.12.2019	63	26.3	13.6	19.8
	Min	**51**	**21.1**	**10.4**	**13.9**
	Max	**73**	**30.3**	**13.6**	**19.8**
	Average	**60.58**	**25.28**	**11.72**	**16.50**
	98 Percentile	**71.62**	**29.66**	**13.32**	**19.39**

Ambient Air Quality at Venkatapuram Village (BA7)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Buffer Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	08.01.2019	55	22.5	12.0	17.1
2.	25.01.2019	58	24.2	11.2	15.9
3.	09.02.2019	56	22.6	11.4	16.3
4.	23.02.2019	53	21.3	11.8	16.9
5.	10.03.2019	57	23.1	10.4	14.5
6.	25.03.2019	60	24.6	11.1	15.7
7.	10.04.2019	58	22.9	10.9	14.4
8.	26.04.2019	60	24.8	12.0	16.1
9.	09.05.2019	58	23.7	11.9	18.4
10.	27.05.2019	61	25.0	12.2	17.0
11.	12.06.2019	65	26.5	10.7	16.1
12.	29.06.2019	59	23.9	12.5	18.1
13.	11.07.2019	52	26.8	10.5	14.7
14.	25.07.2019	49	24.5	11.8	16.8
15.	08.08.2019	48	26.5	10.7	13.9
16.	22.08.2019	55	22.2	11.2	15.9
17.	10.09.2019	52	21.0	10.8	15.3
18.	24.09.2019	50	20.7	11.4	16.2
19.	10.10.2019	53	21.4	10.8	15.6
20.	23.10.2019	55	22.7	12.0	16.4
21.	09.11.2019	60	24.8	11.3	16.2
22.	23.11.2019	63	26.1	12.5	18.1
23.	10.12.2019	57	23.5	11.8	17.0
24.	25.12.2019	60	24.8	13.0	19.0
	Min	**48**	**20.7**	**10.4**	**13.9**
	Max	**65**	**26.8**	**13**	**19**
	Average	**56.42**	**23.75**	**11.50**	**16.32**
	98 Percentile	**64.08**	**26.66**	**12.77**	**18.72**

Ambient Air Quality at Pallewada Village (BA8)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Buffer Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2019	50	20.3	11.4	16.1
2.	28.01.2019	56	22.7	11.5	16.4
3.	11.02.2019	50	20.6	11.2	15.8
4.	25.02.2019	56	22.6	10.7	15.0
5.	11.03.2019	53	21.3	10.3	14.4
6.	26.03.2019	56	22.3	10.9	15.3
7.	11.04.2019	56	20.6	10.3	13.5
8.	27.04.2019	55	22.4	10.5	14.3
9.	10.05.2019	55	22.1	10.5	15.2
10.	28.05.2019	58	23.3	11.0	15.8
11.	13.06.2019	56	22.5	10.5	15.4
12.	30.06.2019	55	22.3	10.9	15.7
13.	12.07.2019	49	22.2	10.3	14.4
14.	26.07.2019	46	23.0	10.2	14.4
15.	09.08.2019	47	24.3	9.5	13.3
16.	24.08.2019	51	20.6	10.0	13.9
17.	11.09.2019	49	22.5	9.6	13.2
18.	25.09.2019	48	24.6	10.1	14.2
19.	11.10.2019	50	20.2	10.0	14.4
20.	24.10.2019	52	21.2	10.8	14.4
21.	11.11.2019	55	22.7	10.3	14.6
22.	25.11.2019	58	23.7	11.3	16.2
23.	11.12.2019	56	23.1	10.8	15.4
24.	26.12.2019	59	24.1	11.8	17.0
	Min	**46**	**20.2**	**9.5**	**13.2**
	Max	**59**	**24.6**	**11.8**	**17**
	Average	**53.17**	**22.30**	**10.60**	**14.93**
	98 Percentile	**58.54**	**24.46**	**11.66**	**16.72**

Ambient Air Quality at Rejarla Village (BA9)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Buffer Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2019	58	24.4	12.5	17.9
2.	28.01.2019	62	25.9	10.8	15.2
3.	11.02.2019	63	26.8	10.8	15.2
4.	25.02.2019	66	27.2	11.6	16.6
5.	11.03.2019	61	25.4	10.7	15.0
6.	26.03.2019	65	27.0	11.5	16.4
7.	11.04.2019	62	26.8	11.7	15.6
8.	27.04.2019	60	28.4	11.6	15.4
9.	10.05.2019	69	28.8	11.6	16.0
10.	28.05.2019	72	30.0	11.9	17.1
11.	13.06.2019	70	29.2	11.0	15.8
12.	30.06.2019	67	27.6	12.1	17.7
13.	12.07.2019	59	23.7	10.8	15.4
14.	26.07.2019	56	28.0	11.4	16.4
15.	09.08.2019	54	22.3	9.9	14.0
16.	24.08.2019	59	24.4	10.3	14.6
17.	11.09.2019	56	23.1	10.0	13.9
18.	25.09.2019	53	21.9	10.5	15.0
19.	11.10.2019	61	25.2	10.4	15.1
20.	24.10.2019	64	26.4	11.2	15.2
21.	11.11.2019	66	27.3	10.7	15.3
22.	25.11.2019	69	29.2	12.1	17.8
23.	11.12.2019	58	24.0	11.2	16.2
24.	26.12.2019	61	25.9	12.9	19.0
	Min	**53**	**21.9**	**9.9**	**13.9**
	Max	**72**	**30**	**12.9**	**19**
	Average	**62.13**	**26.20**	**11.22**	**15.91**
	98 Percentile	**71.08**	**29.63**	**12.72**	**18.49**

Ambient Air Quality at Chaudavaram Village (BA10)

Area : Kothagudem
Period of Monitoring : January, 2019 – December, 2019
Nature of Area : Buffer Zone
Sampling Duration : 24hrs period

S.No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards, CPCB Dated: 18.11.2009		**100**	**60**	**80**	**80**
1.	09.01.2019	53	21.3	11.3	15.9
2.	29.01.2019	58	23.2	10.6	14.9
3.	11.02.2019	54	21.5	10.4	14.5
4.	25.02.2019	58	23.5	11.3	16.0
5.	13.03.2019	55	22.0	10.3	14.4
6.	27.03.2019	59	23.7	11.2	15.8
7.	12.04.2019	58	21.5	12.2	15.9
8.	28.04.2019	54	23.7	11.3	15.1
9.	11.05.2019	61	24.5	12.0	16.9
10.	29.05.2019	59	23.7	12.4	17.5
11.	13.06.2019	57	22.9	10.8	15.4
12.	29.06.2019	58	23.5	11.8	17.2
13.	12.07.2019	52	20.2	10.5	15.0
14.	26.07.2019	49	24.5	11.0	15.9
15.	09.08.2019	52	21.0	9.7	13.6
16.	24.08.2019	54	21.8	10.2	14.4
17.	11.09.2019	50	20.2	9.8	13.8
18.	25.09.2019	52	22.0	10.4	14.9
19.	11.10.2019	57	23.0	9.8	14.3
20.	24.10.2019	59	24.8	11.1	15.1
21.	11.11.2019	60	24.8	10.2	14.5
22.	25.11.2019	63	27.1	11.5	16.7
23.	11.12.2019	56	23.1	10.7	15.4
24.	26.12.2019	59	25.3	12.0	17.7
	Min	**49**	**20.2**	**9.7**	**13.6**
	Max	**63**	**27.1**	**12.4**	**17.7**
	Average	**56.13**	**23.03**	**10.94**	**15.45**
	98 Percentile	**62.08**	**26.27**	**12.31**	**17.61**

Summary of Ambient Air Quality Data Monitoring (January 2019 – December 2019)

Location code	Name of the location	PM_{10} (µg/m^3)			$PM_{2.5}$ (µg/m^3)			SO_2 (µg/m^3)			NO_2 (µg/m^3)		
Coal mine standards (commenced after 25.9.2000), GSR 742(E), Dated 25.09.2000		**250**			*****			**120**			**120**		
Core Zone		**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
CA7	JVR OC-I Exp. PO Office	93	126	112.96	28.2	45.9	36.78	12.5	15	13.81	18	23.1	20.67
CA8	JVR OC Pit Head CHP	188	243	216.71	57.2	78.6	69.35	13.5	16.3	14.72	18.9	24.5	21.71
CA10	JVR OC-I Exp. Base Workshop	118	165	142.25	36.4	57.6	48.32	13.4	15.8	14.32	19.3	23.5	21.22

** No $PM_{2.5}$ standard was specified for core zone*

(B) Summary of Ambient Air Quality data monitoring (September 2018 – August 2019)

Location code	Name of the location	PM_{10} (µg/m^3)			$PM_{2.5}$ (µg/m^3)			SO_2 (µg/m^3)			NO_2 (µg/m^3)		
NAAQ Standards, CPCB Dated: 18.11.2009		**100**			**60**			**80**			**80**		
Buffer Zone		**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
BA5	Kistaram Village	64	80	73.13	26.6	32.4	29.82	11.9	14.6	13.05	17	21.8	18.79
BA6	Sathupalli Town	51	73	60.58	21.1	30.3	25.28	10.4	13.6	11.72	13.9	19.8	16.50
BA7	Venkatapuram Village	48	65	56.42	20.7	26.8	23.75	10.4	13	11.50	13.9	19.0	16.32
BA8	Pallewada Village	46	59	53.17	20.2	24.6	22.30	9.5	11.8	10.60	13.2	17.0	14.93
BA9	Rejarla Village	53	72	62.13	21.9	30.0	26.20	9.9	12.9	11.22	13.9	19.0	15.91
BA10	Chaudavaram Village	49	63	56.13	20.2	27.1	23.03	9.7	12.4	10.94	13.6	17.7	15.45

WATER QUALITY

Surface Water Sampling Locations

Sl. No.	Sampling code	Date of sampling				Sampling Location	Latitude	Longitude
		(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)			
1	SW-5	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Venkatapuram Cheruvu	N 17^0 13'24.2''	E 80^0 49'41.7'
2	SW-4	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Yedutla Cheruvu (Near Lankapalli)	N 17^0 14'39.2''	E 80^0 44'43.4''
3	SW-2	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Kistaram Tank	N 17^0 12'.31.1''	E 80^0 47'01.9''

Groundwater Sampling Locations

Sl. No.	Sampling code	Date of sampling				Sampling Location	Latitude	Longitude
		(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)			
1	GW-3	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Vengalaraonagar	N 17^0 12'40.3''	E 80^0 48'45.6''
2	GW7	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Cherukupalli Village	N 17^0 15'20.9''	E 80^0 46'41.3'
3	GW-4	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Rejarla Village	N 17^0 09'47.7''	E 80^0 48'12.0''
4	GW-6	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Kistaram Village	N 17^0 12'25.3''	E 80^0 46'45.3'
5	GW-5	06.02.2019	16.05.2019	06.08.2019	05.11.2019	Pallewada Village	N 17^0 10'29.0''	E 80^0 44'29.2'

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-5 (Venkatapuram Cheruvu)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
1	pH	-	4500-H^{+}B	6.5 -8.5	6.5 -8.5	6 - 9	7.5	7.4	6.9	
2	Temperature	ºC	2550. B	-	-	-	25.4	25.2	25.7	
3	Turbidity	NTU	2130. B	-	-	-	9	2.1	15	
4	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	310	670	214	
5	Total Dissolved Solids at 180^{o} C	mg/L	2540.C	-	-	-	176	380	107	
6	Total Suspended Solids at 105^{o} C	mg/L	2540. D	-	-	-	15	8	38	
7	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	5.9	5.4	6.1	
8	Bio chemical Oxygen Demand for 3 days at 27^{o} C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	4	4	4	
9	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	350	540	240	
10	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	70	49	13	
11	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Present	Present	Absent	
12	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	20	12	24	
13	Chlorides as Cl^{-}	mg/L	4500-Cl^{-}.B	-	-	-	42	98	28	
14	Nitrites as NO_2	mg/L	4500-NO_2^{-}.B	-	-	-	BDL	BDL	BDL	
15	Nitrates as NO_3	mg/L	4500-NO_3^{-}.B	-	-	-	7.2	24	2.1	
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	--	-	-	12	49	15	

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-5 (Venkatapuram Cheruvu)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
17	Arsenic as As	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
18	Lead as Pb	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
19	Zinc as Zn	mg/L	3120. B	-	-	-	0.25	0.16	0.73	
20	Cadmium as Cd	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
21	Total Chromium as Cr	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
22	Nickel as Ni	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
23	Iron as Fe	mg/L	3120. B	-	-	-	0.86	1.86	1.47	
24	Copper as Cu	mg/L	3120-B	-	-	-	BDL	BDL	BDL	
25	Boron as B	mg/L	3120-B	-	-	-	0.45	0.15	0.88	
26	Colour	Pt-co	2120. B	-	-	-	20	20	25	
27	Odour	TON	2150. B	-	-	-	No odour observed	No odour observed	No odour observed	
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3 -C	-	-	-	BDL	BDL	BDL	
29	Total Phosphates	mg/L	4500-P-D	-	-	-	BDL	BDL	BDL	
30	Oil & Grease	mg/L	5520. B	-	-	-	<1	<1	<1	

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-4 (Yedutla Cheruvu)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
1	pH	-	4500-H^{+}B	6.5 -8.5	6.5 -8.5	6 - 9	7.3	7.6	7.0	
2	Temperature	ºC	2550. B	-	-	-	25.2	25.1	25.6	
3	Turbidity	NTU	2130. B	-	-	-	5	3.6	9.2	
4	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	866	1400	422	
5	Total Dissolved Solids at 180^{o} C	mg/L	2540.C	-	-	-	460	812	245	
6	Total Suspended Solids at 105^{o} C	mg/L	2540. D	-	-	-	16	14	28	
7	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	6.1	5.6	6.1	
8	Bio chemical Oxygen Demand for 3 days at 27^{o} C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	4	4	3	
9	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	280	1600	170	
10	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	46	94	13	
11	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Present	Present	Absent	
12	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	30	16	22	
13	Chlorides as Cl^{-}	mg/L	4500-Cl^{-}.B	-	-	-	120	152	40	
14	Nitrites as NO_2	mg/L	4500-NO_2^{-}.B	-	-	-	BDL	BDL	BDL	
15	Nitrates as NO_3	mg/L	4500-NO_3^{-}.B	-	-	-	7	54	5.9	
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	--	-	-	52	88	30	

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-4 (**Yedutla Cheruvu**)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
17	Arsenic as As	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
18	Lead as Pb	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
19	Zinc as Zn	mg/L	3120. B	-	-	-	0.14	0.15	1.92	
20	Cadmium as Cd	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
21	Total Chromium as Cr	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
22	Nickel as Ni	mg/L	3120. B	-	-	-	BDL	BDL	BDL	
23	Iron as Fe	mg/L	3120. B	-	-	-	0.86	2.86	0.36	
24	Copper as Cu	mg/L	3120-B	-	-	-	BDL	BDL	0.05	
25	Boron as B	mg/L	3120-B	-	-	-	0.45	0.17	1.06	
26	Colour	Pt-co	2120. B	-	-	-	25	20	15	
27	Odour	TON	2150. B	-	-	-	No odour observed	No odour observed	No odour observed	
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3-C	-	-	-	BDL	BDL	BDL	
29	Total Phosphates	mg/L	4500-P-D	-	-	-	BDL	BDL	BDL	
30	Oil & Grease	mg/L	5520. B	-	-	-	<1	<1	<1	

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-2 (**Kistaram Tank**)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
1	Ph	-	4500-H^+B	6.5 -8.5	6.5 -8.5	6 - 9	6.8	7.6	6.5	7.8
2	Temperature	ºC	2550. B	-	-	-	25.6	25.1	25.6	25.4
3	Turbidity	NTU	2130. B	-	-	-	5	6.7	10	1.0
4	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	1570	2440	260	325
5	Total Dissolved Solids at 180^o C	mg/L	2540.C	-	-	-	910	1400	140	188
6	Total Suspended Solids at 105^o C	mg/L	2540. D	-	-	-	22	16	36	12
7	Dissolved Oxygen	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	5.8	5.3	5.8	6.4
8	Bio chemical Oxygen Demand for 3 days at 27^o C	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	6	6	5	5
9	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	23	70	240	220
10	Fecal Coliforms	MPN/100mL	9221 E	-	-	-	2	13	23	23
11	*E. coli*	Presence or Absence/ MPN/100 mL	9221 F	-	-	-	Absent	Absent	Absent	Absent
12	Chemical Oxygen Demand	mg/L	5220. D	-	-	-	40	24	30	20
13	Chlorides as Cl^-	mg/L	4500-Cl^-.B	-	-	-	113	188	35	25
14	Nitrites as NO_2	mg/L	4500-NO_2^-.B	-	-	-	BDL	BDL	BDL	BDL
15	Nitrates as NO_3	mg/L	4500-NO_3^-.B	-	-	-	3	21	2.1	5.2
16	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	-	-	-	64	100	16	9.7

S.No.	Parameters	Unit	Test Method	CPCB Water Quality Criteria			RESULT			
				Class A	Class B	Class C	SW-2 (Kistaram Tank)			
							(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
17	Arsenic as As	mg/L	3120. B	-	-	-	BDL	BDL	BDL	BDL
18	Lead as Pb	mg/L	3120. B	-	-	-	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/L	3120. B	-	-	-	0.18	0.08	0.09	0.28
20	Cadmium as Cd	mg/L	3120. B	-	-	-	BDL	BDL	BDL	BDL
21	Total Chromium as Cr	mg/L	3120. B	-	-	-	BDL	BDL	BDL	BDL
22	Nickel as Ni	mg/L	3120. B	-	-	-	BDL	BDL	BDL	BDL
23	Iron as Fe	mg/L	3120. B	-	-	-	1.40	0.37	0.58	0.16
24	Copper as Cu	mg/L	3120-B	-	-	-	0.05	BDL	0.08	BDL
25	Boron as B	mg/L	3120-B	-	-	-	0.12	0.18	0.75	0.21
26	Colour	Pt-co	2120. B	-	-	-	5	15	35	20
27	Odour	TON	2150. B	-	-	-	No odour observed	No odour observed	No Odour observed	No Odour observed
28	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3-C	-	-	-	BDL	BDL	BDL	BDL
29	Total Phosphates	mg/L	4500-P-D	-	-	-	BDL	BDL	BDL	BDL
30	Oil & Grease	mg/L	5520. B	-	-	-	<1	<1	<1	<1
31	Fluoride	mg/L	4500-F^-.C	-	-	-	-	-	-	1.1
32	Phenolic compounds as C_6H_5OH	mg/L	5530-D	-	-	-	-	-	-	BDL
33	Selenium as Se	mg/L	3120-B	-	-	-	-	-	-	BDL

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-3 (Vengalarao nagar)				GW-7 (Cherukupalli Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1.	Colour	Pt-co-	2120. B	5	15	5	<5	<5	<5	5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H^+B	6.5 to 8.5	No relaxation	7.4	7.4	7.2	7.3	7.1	7.8	8.2	7.8
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	1.8	1.1	1.0	1.02	1.56	2.0	0.9	1.0
6.	Total Dissolved Solids at 180^o C	mg/L	2540.C	500	2000	635	590	530	*605*	540	1145	630	*614*

General Parameters Concerning Substances Undesirable in Excessive Amounts

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-3 (Vengalarao nagar)				GW-7 (Cherukupalli Village)			
						(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)	(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
1.	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL
2.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.36	0.23	0.66	0.10	0.18	0.18	S	0.38
3.	Boron as B	mg/L	3120-B	0.5	1.0	0.14	0.16	0.78	0.09	0.08	0.15	0.5	0.09
4.	Calcium as Ca	mg/L	3500-Ca.B	75	200	74	50	88	*120*	60	136	70	58
5.	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	152	148	132	125	109	305	120	120
6.	Copper as Cu	mg/L	3120-B	0.05	1.5	0.03	BDL	0.05	BDL	0.04	BDL	BDL	BDL
7.	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.54	0.39	0.36	0.36	0.65	0.75	0.39	0.38
8.	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9.	Iron as Fe	mg/L	3120-B	0.3	No relaxation	*0.48*	0.22	0.48	0.15	*0.41*	0.53	0.65	0.16
10.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	27	18	32	25	31	47	47	*76*
11.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	0.06	BDL
12.	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	*47*	*47*	17	22	21	21	29	21
13.	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16.	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	200	400	30	55	40	29	28	108	36	35
17.	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	205	131	131	173	257	299	299	*236*
18.	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	295	200	350	*405*	280	535	370	*460*
19.	Zinc as Zn	mg/L	3120-B	5	15	0.16	0.22	0.39	0.19	0.28	0.18	0.15	0.31

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-3 (Vengalarao nagar)				GW-7 (Cherukupalli Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	ND	BDL	BDL	BDL	ND
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative Analysis	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND	ND	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-3 (Vengalarao nagar)				GW-7 (Cherukupalli Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	*E. coli*	Presence or Absence/ 100 mL	9221 F	-	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-4 (Rejarla Village)				GW-6 (Kistaram Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1.	Colour	Pt-co-	2120. B	5	15	5	<5	<5	<5	5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H^+B	6.5 to 8.5	No relaxation	7.0	7.5	7.2	7.6	6.9	7.5	7.3	7.6
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	1.2	1.8	0.52	1.3	1.32	1.9	0.60	1.2
6.	Total Dissolved Solids at 180^o C	mg/L	2540.C	500	2000	590	720	690	*626*	890	1160	1272	*1119*

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-4 (Rejarla Village)				GW-6 (Kistaram Village)			
						(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)	(1st Quarter)	(2^{nd} Quarter)	(3^{rd} Quarter)	(4^{th} Quarter)
1.	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	**0.03**	BDL	0.08	BDL	**BDL**	BDL	0.06
2.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.42	0.14	0.26	0.09	0.34	0.23	0.36	0.52
3.	Boron as B	mg/L	3120-B	0.5	1.0	0.08	0.15	0.23	0.19	0.12	0.16	0.38	0.18
4.	Calcium as Ca	mg/L	3500-Ca.B	75	200	44	74	80	68	72	140	270	*208*
5.	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	132	158	165	128	197	360	465	*280*
6.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL	0.06	BDL	BDL	BDL
7.	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.61	0.44	0.42	0.38	0.73	0.7	0.76	0.65
8.	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9.	Iron as Fe	mg/L	3120-B	0.3	No relaxation	0.26	*0.38*	0.21	0.12	0.21	0.24	*0.90*	0.23
10.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	59	28	53	*66*	71	66	85	*63*
11.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	*51*	*51*	20	40	12	29	50	10
13.	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16.	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	200	400	22	69	49	23	47	97	98	183
17.	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	268	252	252	200	241	147	147	*205*
18.	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	355	300	420	*440*	475	*620*	*1025*	*780*
19.	Zinc as Zn	mg/L	3120-B	5	15	0.32	0.15	0.15	0.22	0.26	0.10	0.30	0.19

General Parameters Concerning Substances Undesirable in Excessive Amounts

Parameters Concerning Toxic Substances

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-4 (Rejarla Village)				GW-6 (Kistaram Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	ND	BDL	BDL	BDL	ND
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND	ND	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	0.05	BDL	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-4 (Rejarla Village)				GW-6 (Kistaram Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)	(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	*E. coli*	Presence or Absence/ 100 mL	9221 F	-	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

NTU – Nephelometric Turbidity Unit; TON – Threshold Odour Number; FTN – Flavor Threshold Number; BDL – Below Detection Limit, Detection Limit – Phenols – 0.1 mg/L; Mercury – 20 µg/L; Cyanide – 0.05 mg/L Hex. Chromium – 0.05 mg/L; Copper – 0.02 mg/L; Manganese – 0.01 mg/L; Cadmium – 0.01 mg/L; Selenium – 0.04 mg/L; Arsenic –0.04 mg/L; Lead – 0.04 mg/L; Aluminum – 0.04 mg/L; Chromium – 0.03 mg/L; Nickel – 0.03 mg/L; Residual free chlorine – 1 mg/L; Nitrites – 0.01 mg/L; Orthophosphates – 0.05 mg/L; ND-Not Detected; Detection Limit : Pesticides– 0.1 ppm; PAHs – 1 ppm

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-5 (Pallewada Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1.	Colour	Pt-co-	2120. B	5	15	5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	pH	-	4500-H^+B	6.5 to 8.5	No relaxation	6.9	7.7	7.1	7.8
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Turbidity	NTU	2130. B	1	5	1.32	1.7	1.0	1.20
6.	Total Dissolved Solids at 180^o C	mg/L	2540.C	500	2000	890	890	810	*982*

General Parameters Concerning Substances Undesirable in Excessive Amounts

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-5 (Pallewada Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1.	Aluminium as Al	mg/L	3120-B	0.03	0.2	0.03	0.05	BDL	0.07
2.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.28	0.19	0.39	0.2
3.	Boron as B	mg/L	3120-B	0.5	1.0	0.12	0.16	0.25	0.26
4.	Calcium as Ca	mg/L	3500-Ca.B	75	200	72	82	130	*96*
5.	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	197	245	193	*270*
6.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL
7.	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.73	0.68	0.55	0.66
8.	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL
9.	Iron as Fe	mg/L	3120-B	0.3	No relaxation	0.27	0.53	0.27	*0.31*
10.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	71	44	38	*100*
11.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL
12.	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	12	12	36	*80*
13.	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL
14.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
15.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL
16.	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-}.E	200	400	47	72	50	59
17.	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	241	305	305	*236*
18.	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	475	385	480	*650*
19.	Zinc as Zn	mg/L	3120-B	5	15	0.20	0.10	0.27	0.26

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-5 (Pallewada Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN-.F	0.05	No relaxation	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
4	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	ND
5	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL
6	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL
7	**Pesticides:** α–BHC, β-BHC, γ-BHC, δ-BHC,o,p-DDT, p,p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative Analysis	6630. D	Absent	0.001	ND	ND	ND	ND
8	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND
9	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL
10	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL

Bacteriological Quality of Drinking water

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-5 (Pallewada Village)			
						(1st Quarter)	(2nd Quarter)	(3rd Quarter)	(4th Quarter)
1	*E. coli*	Presence or Absence/ 100 mL	9221 F	-	-	Absent	Absent	Absent	Absent
2	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8
3	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8

NTU – Nephelometric Turbidity Unit; TON – Threshold Odour Number; FTN – Flavor Threshold Number; BDL – Below Detection Limit, Detection Limit – Phenols – 0.1 mg/L; Mercury – 20 µg/L; Cyanide – 0.05 mg/L Hex. Chromium – 0.05 mg/L; Copper – 0.02 mg/L; Manganese – 0.01 mg/L; Cadmium – 0.01 mg/L; Selenium – 0.04 mg/L; Arsenic –0.04 mg/L; Lead – 0.04 mg/L; Aluminum – 0.04 mg/L; Chromium – 0.03 mg/L; Nickel – 0.03 mg/L; Residual free chlorine – 1 mg/L; Nitrites – 0.01 mg/L; Orthophosphates – 0.05 mg/L; ND-Not Detected; Detection Limit : Pesticides– 0.1 ppm; PAHs – 1 ppm.

EFFLUENTS

Effluents sampling locations

Sl.No.	Sample Code	Name of the Location	Latitude	Longitude
1.	EW6	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	N 17^0 13'09.1''	E 80^0 47'55.0''
2.	EW7	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	N 17^0 12'53.5''	E 80^0 49'05.0''
3.	EW8	JVR OC-I Exp. OB Dump Surface Runoff Settling Tank Outlet (JVR OC-I Exp.)	N 17^0 12'09.9''	E 80^0 47'35.6''
4.	EW 10	JVR OC-2 Mine Discharge	N17^0 09'31.0''	E$80^0$45'29.0''

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas

(2) Area : Kothagudem

(3) Sampling Location & Code : JVR OC-I Exp. Mine Discharge (JVR OC-I Exp.) (EW6)

(4) Nature of the Component : Effluents

(5) Period of Monitoring : January 2019 to December 2019

Characteristics of Effluents – JVR OC-I Exp. Mine Discharge (JVR OC-I Exp) (EW6)

S.No.	Date of Sampling	pH	TSS at 105^0C	TDS at 180^0C	COD	BOD	Oil & Grease
	Unit	--	mg/L	mg/L	mg/L	mg/l	mg/L
	Test Method	4500-H^+B	2540-D	2540-C	5220-D	IS 3025	5520-B
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	5.5 to 9.0	100	--	250	30	10
1.	15.01.2019	6.8	7	550	18	4	<1
2.	30.01.2019	7.8	9	610	16	3	<1
3.	15.02.2019	6.1	26	640	19	4	<1
4.	28.02.2019	7.3	12	1010	17	5	<1
5.	15.03.2019	6.0	10	1030	20	4	<1
6.	31.03.2019	7.4	21	690	23	5	<1
7.	15.04.2019	7.6	15	770	28	7	<1
8.	30.04.2019	7.8	7	910	19	4	<1
9.	15.05.2019	6.8	8	890	22	5	<1
10.	30.05.2019	7.3	7	970	21	4	<1
11.	15.06.2019	7.6	25	1080	23	5	<1
12.	30.06.2019	7.7	20	1030	29	6	<1
13.	15.07.2019	7.9	13	1010	25	4	<1
14.	30.07.2019	7.4	9	960	19	3	<1
15.	15.08.2019	7.7	19	900	25	6	<1
16.	30.08.2019	7.9	9	990	19	3	<1
17.	15.09.2019	7.4	8	1010	21	4	<1
18.	30.09.2019	7.7	10	850	22	4	<1
19.	15.10.2019	6.7	14	1060	18	2	<1
20.	30.10.2019	6.8	19	860	24	4	<1
21.	15.11.2019	7.0	6	1090	14	2	<1
22.	30.11.2019	7.0	7	890	16	2	<1
23.	15.12.2019	6.2	9	920	20	3	<1
24.	30.12.2019	6.8	19	880	19	3	<1

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas
(2) Area : Kothagudem
(3) Sampling Location & Code : JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.) (EW7)
(4) Nature of the Component : Effluents
(5) Period of Monitoring : January 2019 to December 2019

Characteristics of Effluents - JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.) (EW7)

S.No.	Date of Sampling	pH	TSS at 105^0C	TDS at 180^0C	COD	BOD	Oil & Grease
	Unit	--	mg/L	mg/L	mg/L	mg/l	mg/L
	Test Method	4500-H^+B	2540-D	2540-C	5220-D	IS 3025	5520-B
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	5.5 to 9.0	100	--	250	30	10
1.	15.01.2019	6.9	19	590	23	6	3.2
2.	30.01.2019	7.2	14	710	25	5	3.0
3.	15.02.2019	7.1	22	590	23	6	3.6
4.	28.02.2019	6.7	8	500	15	4	3.1
5.	15.03.2019	7.6	14	610	22	5	3.9
6.	31.03.2019	7.6	16	560	25	6	4.0
7.	15.04.2019	7.4	29	550	27	6	5.1
8.	30.04.2019	7.9	12	790	25	6	5.9
9.	15.05.2019	6.6	6	990	24	7	5.4
10.	30.05.2019	7.4	16	1010	28	6	5.0
11.	15.06.2019	6.7	19	1060	26	7	5.7
12.	30.06.2019	6.8	26	1090	35	9	7.1
13.	15.07.2019	7.9	19	1040	29	6	6.4
14.	30.07.2019	8.2	15	1020	21	5	5.7
15.	15.08.2019	8.2	12	990	20	4	5.1
16.	30.08.2019	7.6	18	1070	28	8	6.1
17.	15.09.2019	6.9	24	1040	29	9	6.9
18.	30.09.2019	6.8	8	820	20	3	5.7
19.	15.10.2019	6.8	7	900	22	2	5.3
20.	30.10.2019	6.9	13	1060	21	3	5.9
21.	15.11.2019	6.7	12	960	25	6	6.5
22.	30.11.2019	6.9	20	830	29	8	6.9
23.	15.12.2019	7.2	26	870	25	6	6.5
24.	30.12.2019	7.5	27	910	21	3	6.0

(1) Project Name : Post Project Environmental Monitoring in SCCL Mining areas

(2) Area : Kothagudem

(3) Sampling Location & Code : JVR OC-I Exp. OB Dump Surface Runoff Settling Tank Outlet (JVR OC-I Exp.) (EW8)

(4) Nature of the Component : Effluents

(5) Period of Monitoring : January 2019 to December 2019

Characteristics of Effluents – JVR OC-I OB Dump Surface Runoff Settling Tank Outlet (JVR OC-I) (EW8)

S.No.	Date of Sampling	pH	TSS at 105^0C	TDS at 180^0C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H^+B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2019	7.2	8	1470	21	5	<1
2.	30.01.2019	7.9	16	1050	23	4	<1
3.	15.02.2019	7.2	9	1230	20	5	<1
4.	28.02.2019	6.5	11	1020	19	6	<1
5.	15.03.2019	7.4	20	1160	17	4	<1
6.	31.03.2019	7.5	19	1120	29	8	<1
7.	15.04.2019	8.2	9	810	24	7	<1
8.	30.04.2019	7.8	8	840	19	3	<1
9.	15.05.2019	6.9	9	940	29	6	<1
10.	30.05.2019	6.9	13	800	23	5	<1
11.	15.06.2019	7.1	12	890	24	6	<1
12.	30.06.2019	7.4	17	920	30	7	<1
13.	15.07.2019	8.2	13	980	27	5	<1
14.	30.07.2019	7.7	12	950	28	7	<1
15.	15.08.2019	8.3	9	850	24	5	<1
16.	30.08.2019	8.0	14	950	24	5	<1
17.	15.09.2019	7.3	17	1080	22	4	<1
18.	30.09.2019	6.2	13	910	27	6	<1
19.	15.10.2019	7.1	6	990	30	9	<1
20.	30.10.2019	6.9	17	980	28	8	<1
21.	15.11.2019	7.3	14	1030	23	4	<1
22.	30.11.2019	7.2	16	1130	26	5	<1
23.	15.12.2019	6.8	20	880	23	4	<1
24.	30.12.2019	6.9	23	870	25	6	<1

Characteristics of Effluents – JVR OC-II Mine Discharge (EW10)

1. Project Name : Post Project Environmental Monitoring in SCCL Mining areas
2. Area : Kothagudem
3. Sampling Location & Code : JVR OC-II Mine Discharge (EW10)
4. Nature of the Component : Effluents
5. Period of Monitoring : January 2019 to December 2019

S.No.	Date of Sampling	pH	TSS at 105^0C	TDS at 180^0C	COD	BOD	Oil & Grease
	Unit	**--**	**mg/L**	**mg/L**	**mg/L**	**mg/l**	**mg/L**
	Test Method	**4500-H^+B**	**2540-D**	**2540-C**	**5220-D**	**IS 3025**	**5520-B**
	MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines	**5.5 to 9.0**	**100**	**--**	**250**	**30**	**10**
1.	15.01.2019	7.6	9	570	15	3	<1
2.	30.01.2019	7.6	7	620	19	5	<1
3.	15.02.2019	7.4	23	1070	21	4	<1
4.	28.02.2019	7.2	26	900	24	6	<1
5.	15.03.2019	8.1	17	530	26	7	<1
6.	31.03.2019	7.2	15	840	21	3	<1
7.	15.04.2019	7.7	17	1030	25	5	<1
8.	30.04.2019	7.6	15	1010	28	8	<1
9.	15.05.2019	7.2	8	1070	19	3	<1
10.	30.05.2019	7.4	22	1120	31	11	<1
11.	15.06.2019	8.0	10	1140	20	5	<1
12.	30.06.2019	7.6	12	1080	25	6	<1
13.	15.07.2019	8.2	10	960	21	3	<1
14.	30.07.2019	8.3	8	970	17	3	<1
15.	15.08.2019	8.1	7	910	19	4	<1
16.	30.08.2019	7.9	10	890	23	4	<1
17.	15.09.2019	7.8	13	1040	26	6	<1
18.	30.09.2019	7.4	9	1160	18	3	<1
19.	15.10.2019	6.9	8	1080	20	3	<1
20.	30.10.2019	7.1	18	960	24	5	<1
21.	15.11.2019	6.9	8	1490	17	2	<1
22.	30.11.2019	7.6	10	1060	20	3	<1
23.	15.12.2019	7.3	13	1010	21	3	<1
24.	30.12.2019	7.6	28	1070	23	3	<1

Effluents sampling locations in Kothagudem Mining area

Sl. No.	Date of sampling	Sample Code	Name of the Location	Latitude	Longitude
1.	16.07.2019	EW-6	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	N 17˚ 12' 47.5"	E 80˚ 47' 49.8"
2.	16.07.2019	EW-7	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	N 17˚ 12' 31.9"	E 80˚ 48' 38.8"
3.	16.07.2019	EW-8	JVR OC-I Exp. OB Dump surface run off settling tank outlet (JVR OC-I Exp.)	N 17˚ 12' 24.2"	E 80˚ 47' 38.0"
4.	16.07.2019	EW 10	JVR OC-2 Mine Discharge	$N17^0$ 09'31.0''	$E80^0$45'29.0''

S.No	Test Parameter (s)	Unit	Test Method	Standards Part –A: Effluents (GSR 801) (E)			Result			
				Inland surface water	**Public sewers**	**Land for irrigation**	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	JVR OC-I Exp. OB Dump surface run off settling tank outlet (JVR OC-I Exp.)	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	JVR OC-2 Mine discharge
				(a)	**(b)**	**(c)**	**EW-7**	**EW-8**	**EW-6**	**EW-10**
1	Colour	Pt-co-Scale	2120. B	*	--	*	10	5	<5	<5
2	Odour	TON	2150. B	*	--	*	No odour observed	No odour observed	No odour observed	No odour observed
3	Total Suspended Solids	mg/L	2540. D	100	600	200	33	18	19	16
4	Particle size of suspended solids	mg/L		Shall pass 850 Micron IS sieve	--	--	Pass	Pass	Pass	Pass
5	pH	--	4500-H^{+}B	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	8.1	7.9	6.8	7.8
6	Temperature	°C	2550. B	Shall not exceed 5˚C above the receiving water temperature	--	--	25.5	25.3	25.5	25.3
7	Oil & Grease	mg/L	5520. B	10	20	10	5.6	<1	<1	<1
8	Ammonical Nitrogen	mg/L	4500-NH_3-C	50	50	--	BDL	BDL	BDL	BDL
9	Total Kjeldahl Nitrogen	mg/L	4500-N_{org}.C	100	--	--	BDL	BDL	BDL	BDL
10	Free Ammonia	mg/L	4500-NH_3-D	5.0	--	--	BDL	BDL	BDL	BDL
11	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS:3025	30	350	100	9	4	6	3
12	Chemical Oxygen Demand	mg/L	5220. D	250	--	--	36	24	24	26
13	Arsenic as As	mg/L	3120.B	0.2	0.2	0.2	BDL	BDL	BDL	BDL
14	Mercury as Hg	µg/L	3500-Hg.B	0.01	0.01	--	BDL	BDL	BDL	BDL
15	Lead as Pb	mg/L	3120.B	0.1	1.0	--	BDL	BDL	BDL	BDL
16	Cadmium as Cd	mg/L	3120.B	2.0	1.0	--	BDL	BDL	BDL	BDL
17	Hexavalent Chromium as Cr^{+6}	mg/L	3500-Cr^{+6}.B	0.1	2.0	--	BDL	BDL	BDL	BDL
18	Total Chromium as Cr	mg/L	3120.B	2.0	2.0	--	BDL	BDL	BDL	BDL
19	Copper as Cu	mg/L	3120.B	3.0	3.0	--	0.05	0.1 0	0.04	0.71
20	Zinc as Zn	mg/L	3120.B	5.0	15	--	0.62	1.34	0.15	0.92
21	Selenium as Se	mg/L	3120.B	0.05	0.05	--	BDL	BDL	BDL	BDL

S.No	Test Parameter (s)	Unit	Test Method	Standards Part –A: Effluents (GSR 801) (E)			Result			
				Inland surface water	Public sewers	Land for irrigation	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	JVR OC-I Exp. OB Dump surface run off settling tank outlet (JVR OC-I Exp.)	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	JVR OC-2 Mine discharge
				(a)	(b)	(c)	EW-7	EW-8	EW-6	EW-10
22	Nickel as Ni	mg/L	3120.B	3.0	3.0	--	BDL	BDL	BDL	BDL
23	Fluoride as F^-	mg/L	4500-F.C	2.0	15	--	0.47	0.92	0.28	0.52
24	Dissolved Phosphates	mg/L	4500-P.D	5.0	--	--	BDL	BDL	BDL	BDL
25	Sulphide	mg/L	4500-S^{2-}.G	2.0	--	--	BDL	BDL	BDL	BDL
26	Phenolic Compounds as C_6H_5OH	mg/L	5530-D	1.0	5.0	--	BDL	BDL	BDL	BDL
27	Bio-assay test	% survival	8010 F,G & H	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90 % survival of fish after 96 hours in 100 % effluent	100 % survival of fish after 96 hours in 100 % effluent	100 % survival of fish after 96 hours in 100 % effluent	100 % survival of fish after 96 hours in 100 % effluent
28	Manganese as Mn	mg/L	3120.B	2	2	--	BDL	BDL	BDL	BDL
29	Iron as Fe	mg/L	3120.B	3	3	--	0.63	0.48	0.94	0.58
30	Vanadium as V	mg/L	3120.B	0.2	0.2	--	BDL	BDL	BDL	BDL
31	Nitrate Nitrogen	mg/L	PDA	10	--	--	BDL	BDL	BDL	BDL
32	Total residual chlorine	mg/L	4500-Cl -B	1.0	--	--	BDL	BDL	BDL	BDL

BDL: Below Detection Limit. Minimum detection limit: Ammonical Nitrogen – 5 mg/L; Free Ammonia – 0.03mg/L; Arsenic – 0.02 mg /L ; Mercury – 20 µg/L; Lead - 0.04 mg/L; Cadmium – 0.01 mg/L; Hex. Chromium – 0.05 mg/L; Total Chromium – 0.02 mg/L; Copper – 0.02 mg/L; Selenium – 0.04mg /L ; Nickel – 0.03 mg/L; Dissolved Phosphates – 0.02 mg/L; Sulphide – 1 mg/L; Phenols 0.1 mg/L; Manganese – 0.01 mg/L; Iron – 0.02 mg/L; Vanadium- 0.01mg/L; TKN-5 mg/L; Residual free chlorine-1mg/L.

AMBIENT NOISE LEVELS

Noise monitoring locations

S.No	Station code	Station Name	Latitude	Longitude
Core Zone				
1	CN 5	JVR OC - I Site Office	N 17^0 12’61.9’’	E 080^0 48’75.6’’
2	CN 6	JVR OC - I Base Workshop	N 17^0 12’54.5’’	E 080^0 48’68.9’’
Buffer Zone				
3	BN 4	Kistaram Village	N $17^0$12’50.5’’	E 80^0 46’69.8’’
4	BN 5	Sathupalli Town	N 17^0 12’45.3’’	E 80^0 50’01.9’’
5	BN 6	Rejarla Village	N17^0 10’09.7’’	E 80^0 48’29.8’’’

Summary of Noise Levels (September 2018 to August 2019)

Code	Monitoring stations	Standard limits of Noise		Jan 1st Fortnight		Jan 2nd Fortnight		Feb 1st Fortnight		Feb 2nd Fortnight		March 1st Fortnight		March 2nd Fortnight	
				Noise levels in dB (A)											
		Day time	Night time	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night
Core Zone															
CN 5	JVR OC - I Site Office	75	70	61.0	45.0	66.6	52.7	63.5	55.2	60.3	43.5	60.6	44.0	61.1	44.6
CN 6	JVR OC - I Base Workshop	75	70	67.3	50.8	60.5	37.7	67.2	51.6	69.3	51.6	69.3	51.7	68.8	52.5
Buffer Zone															
BN 4	Kistaram Village	55	45	52.8	43.4	52.0	41.0	53.3	44.2	52.8	42.3	52.8	42.5	51.9	41.2
BN 5	Sathupalli Town	55	45	51.4	40.8	52.7	40.0	52.3	41.7	51.8	41.3	50.8	41.5	51.5	40.7
BN 6	Rejarla Village	55	45	52.4	41.7	53.1	39.2	51.9	41.8	52.5	40.5	50.5	40.5	50.3	39.4

Code	Monitoring stations	Standard limits of Noise		April 1st Fortnight		April 2nd Fortnight		May 1st Fortnight		May 2nd Fortnight		June 1st Fortnight		June 2nd Fortnight	
				Noise levels in dB (A)											
		Day time	Night time	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night
Core Zone															
CN 5	JVR OC - I Site Office	75	70	61.6	44.6	68.7	52.6	60.8	45.1	62.2	44.0	61.7	44.6	65.5	42.1
CN 6	JVR OC - I Base Workshop	75	70	69.2	52.0	61.0	44.5	69.0	55.2	68.5	53.1	69.8	52.4	71.4	53.7
Buffer Zone															
BN 4	Kistaram Village	55	45	51.4	40.9	50.9	40.4	51.0	40.0	51.8	41.3	52.3	41.9	52.5	41.5
BN 5	Sathupalli Town	55	45	50.6	40.0	52.0	41.6	51.7	41.6	52.2	40.8	52.8	41.3	51.2	40.5
BN 6	Rejarla Village	55	45	49.6	38.9	51.0	40.3	49.9	39.5	51.5	40.9	52.1	40.0	51.9	41.0

Code	Monitoring stations	Standard limits of Noise		July 1st Fortnight		July 2nd Fortnight		August 1st Fortnight		August 2nd Fortnight		September 1st Fortnight		September 2nd Fortnight	
				Noise levels in dB (A)											
		Day time	Night time	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night
Core Zone															
CN 5	JVR OC - I Site Office	75	70	61.0	44.9	61.7	40.4	62.6	46.1	63.3	41.6	65.7	47.1	60.1	40.7
CN 6	JVR OC - I Base Workshop	75	70	68.7	52.2	70.1	52.6	70.6	53.7	72.0	54.1	72.1	54.8	68.4	53.0
Buffer Zone															
BN 4	Kistaram Village	55	45	51.4	41.9	52.1	42.2	52.9	42.4	53.6	42.7	53.9	43.3	52.5	41.8
BN 5	Sathupalli Town	55	45	50.7	40.0	52.9	42.0	52.4	40.4	52.4	42.4	53.4	41.2	51.8	41.5
BN 6	Rejarla Village	55	45	49.9	38.9	52.2	40.8	51.8	39.6	53.0	41.5	52.8	40.4	51.9	40.6

Code	Monitoring stations	Standard limits of Noise		October 1st Fortnight		October 2nd Fortnight		November 1st fortnight		November 2nd fortnight		December 1st Fortnight		December 2nd Fortnight	
				Noise levels in dB (A)											
		Day time	Night time	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night	Leq Day	Leq Night
Core Zone															
CN 5	JVR OC - I Site Office	75	70	63.3	48.8	62.0	45.3	62.9	48.1	63.4	47.1	59.9	43.4	60.7	44.2
CN 6	JVR OC - I Base Workshop	75	70	70.5	55.5	69.0	54.2	70.0	55.9	70.8	54.8	71.5	55.8	69.3	51.7
Buffer Zone															
BN 4	Kistaram Village	55	45	52.4	42.9	50.8	41.0	51.8	42.0	52.2	42.3	51.7	41.3	53.5	43.1
BN 5	Sathupalli Town	55	45	51.6	41.0	52.0	41.9	52.0	41.5	51.4	41.4	50.9	40.8	52.4	42.1
BN 6	Rejarla Village	55	45	52.2	40.0	51.7	40.9	52.2	40.5	50.2	40.4	51.2	41.2	51.3	40.4

Note: 1. Daytime is reckoned in between 6 a.m and 10 p.m *2. Night time is reckoned in between 10 p.m and 6 a.m.*

Yearly summary of Ambient Noise Levels (January 2019 to December 2019)

Sample code	Monitoring stations	Leq (min)		Leq (max)		Standard limits of Noise	
Core Zone		**Day**	**Night**	**Day**	**Night**	**Day time**	**Night time**
CN 5	JVR OC - I Site Office	59.9	40.4	68.7	55.2	**75**	**70**
CN 6	JVR OC - I Base Workshop	60.5	37.7	72.1	55.9	**75**	**70**
Buffer Zone							
BN 4	Kistaram Village	50.8	40.0	53.9	44.2	**55**	**45**
BN 5	Sathupalli Town	50.6	40.0	53.4	42.4	**55**	**45**
BN 6	Rejarla Village	49.6	38.9	53.1	41.8	**55**	**45**

VEHICULAR EMISSION STUDY

JVR- OCP-2019 (Sathupalli)

S.No	Eqpt Type/Capacity	Eqpt Name	Make	D.O.C	Cummlated Hrs As On 30.05.2019	Tested date	H.S.U % 65	K m-1 2.45	TEST STATUS
1	DUMPER-35T	C-1	BEML	17.02.2015	17501	4.06.2019	46.5	1.45	PASS
2	DUMPER-35T	C-2	BEML	17.02.2015	18087	6.06.2019	30.9	0.84	PASS
3	DUMPER-35T	C3	BEML	17.06.2015	15930	4.06.2019	26.6	0.71	**PASS**
4	DUMPER-35T	C5	BEML	17.06.2015	15975	6.06.2019	49.2	1.57	PASS
5	DUMPER-35T	C6	BEML	17.06.2015	15529	5.06.2019	67.9	2.64	**FAIL**
6	DUMPER-35T	C7	BEML	17.02.2015	16182	4.06.2019	81.6	3.93	**FAIL**
7	DUMPER-35T	C8	BEML	29.07.2015	15839	3.06.2019	53.7	1.79	PASS
8	DUMPER-35T	C9	BEML	07.08.2015	16215	4.06.2019	50.4	1.63	PASS
9	DUMPER-35T	C10	BEML	08.08.2015	15814	4.06.2019	88.4	5.00	**FAIL**
10	DUMPER-35T	C11	BEML	28.07.2015	16500	3.06.2019	69.5	2.76	**FAIL**
11	DUMPER-35T	C12	BEML	28.07.2015	18219	3.06.2019	71.5	2.91	**FAIL**
12	DUMPER-35T	C13	BEML	29.07.2015	15098	7.06.2019	17.7	2.05	PASS
13	DUMPER-35T	C14	BEML	29.07.2015	16686	4.06.2019	83.9	4.24	**FAIL**
14	DUMPER-35T	C15	BEML	09.10.2015	16205	4.06.2019	90.6	5.49	**FAIL**
15	DUMPER-60T	60-1	BEML	25.01.2017	6653	5.06.2019	19.0	0.49	PASS
16	DUMPER60T	60-2	BEML	25.01.2017	7403	4.06.2019	25.4	0.62	PASS
17	DUMPER60T	60-3	BEML	25.01.2017	6196	5.06.2019	46.8	1.46	PASS
18	DUMPER60T	60-5	BEML	25.01.2017	6813	3.06.2019	14.2	0.35	PASS
19	DUMPER60T	60-6	BEML	28.08.2017	5424	5.06.2019	17.2	0.43	PASS
20	DUMPER60T	60-7	BEML	28.08.2017	6958	3.06.2019	23.6	0.62	PASS
21	DUMPER60T	60-8	BEML	28.08.2017	5440	3.06.2019	20.2	0.52	PASS
22	DUMPER60T	60-9	BEML	28.08.2017	7046	6.06.2019	22.7	0.59	PASS
23	DUMPER60T	60-10	BEML	28.08.2017	6277	3.06.2019	21.3	0.55	PASS
24	DUMPER60T	60-11	BEML	28.08.2017	6631	4.06.2019	16.4	0.46	PASS
25	DUMPER60T	60-12	BEML	28.08.2017	6803	6.06.2019	15.4	0.38	PASS
26	DUMPER60T	60-13	BEML	28.08.2017	6578	4.06.2019	61.1	0.40	PASS
27	DUMPER60T	60-14	BEML	11.03.2019	630	6.06.2019	41.0	1.22	PASS
28	DUMPER60T	60-15	BEML	11.03.2019	798	5.06.2019	17.3	0.44	PASS
29	DUMPER60T	60-16	BEML	11.03.2019	580	5.06.2019	8.2	0.18	PASS
30	DUMPER60T	60-17	BEML	11.03.2019	706	5.06.2019	16.2	0.41	PASS
31	WATER SPRINKLER	WT-3	BEML	28.10.2015	9585	7.06.2019	45.1	0.39	PASS
32	WATER SPRINKLER	WT-5	BEML	20.10.2017	3777	4.06.2019	77.7	3.43	**FAIL**
33	WATER SPRINKLER	WT-6	BEML	19.01.2018	4199	6.06.2019	55.3	0.57	PASS
34	MOTOR GRADER	MG-2	BEML	06.02.2013	14745	5.06.2019	45.1	0.36	PASS
35	DOZER	D-7	BEML	31.10.2017	5068	7.06.2019	7.0	0.16	PASS

S.No	Eqpt Type/Capacity	Eqpt Name	Make	D.O.C	Cummlated Hrs As On 30.05.2019	Tested date	H.S.U % 65	K m-1 2.45	TEST STATUS
36	MOTOR GRADER	MG-3	BEML	16.12.2015	7547	5.06.2019	17.3	0.44	PASS
37	SHOVEL	S1	L&T	1.11.2015	21961	4.06.2019	39.6	0.17	PASS
38	SHOVEL	LC-3	TATA	25.07.2018	2721	5.06.2019	18.0	0.49	PASS
39	DOZER	D-8	BEML	28.12.2013	11697	7.06.2019	49.2	1.57	PASS
40	MOTOR GRADER	MG-5	KOMATSU	01.05.2018	7511	5.06.2019	15.4	0.38	PASS
41	TYRE HANDLER	14-TH-1	BEML	14.11.2017	182	6.06.2019	77.9	3.51	**FAIL**
42	TYRE HANDLER	14-TH-2	BEML	14.11.2017	195	7.06.2019	85.2	4.44	**FAIL**
43	SHOVEL	S-2	KOMATSU	25.1O.2015	20679	5.06.2019	51.3	0.93	PASS
44	SHOVEL	S-5	TATA	25.04.2018	6505	4.06.2019	30.8	0.85	PASS
45	CRANE	C-6	ACE	25.04.2019	1415	7.06.2019	15.8	0.39	PASS
46	LOADER	LC-1	TATA	17.03.2008	20256	5.06.2019	17.9	0.45	PASS
47	LOADER	LC-2	VALVO	03.09.2017	10722	7.06.2019	14.9	0.39	PASS
48	DOZER	D-5	BEML	11.04.2015	9287	7.06.2019	30.4	0.84	PASS
49	DOZER	D-6	BEML	16.09.2017	5511	7.06.2019	29.1	0.35	PASS
50	SHOVEL	LC-2	TATA	11.04.2015	13144	8.06.2019	34.6	0.98	PASS
51	SHOVEL	S-3	TATA	22.10.2017	10087	8.06.2019	-	-	**BD**

S.No	Eqpt Type/Capacity	Eqpt Name	Make	D.O.C	Cummlated Hrs As On 30.05.2019	Tested date	H.S.U % 65	K m-1 2.45	TEST STATUS
1	DUMPER-35T	C-1	BEML	17.02.2015	18071	1.10.2019	74.9	3.26	FAIL
2	DUMPER-35T	C-2	BEML	17.02.2015	18057	1.10.2019	35.8	1.02	PASS
3	DUMPER-35T	C3	BEML	17.06.2015	16930	1.10.2019	35.5	1.01	PASS
4	DUMPER-35T	C5	BEML	17.06.2015	16956	1.10.2019	86.4	4.32	FAIL
5	DUMPER-35T	C6	BEML	17.06.2015	16373	1.10.2019	26.4	0.65	PASS
6	DUMPER-35T	C7	BEML	17.02.2015	17196	2.10.2019	43.2	1.26	PASS
7	DUMPER-35T	C8	BEML	29.07.2015	17030	12.10.2019	-	-	BD
8	DUMPER-35T	C9	BEML	07.08.2015	17387	2.10.2019	38.8	2.05	PASS
9	DUMPER-35T	C10	BEML	08.08.2015	16630	2.10.2019	62.4	2.41	PASS
10	DUMPER-35T	C11	BEML	28.07.2015	17561	2.10.2019	43.2	1.30	PASS
11	DUMPER-35T	C12	BEML	28.07.2015	19324	2.10.2019	63.5	2.39	PASS
12	DUMPER-35T	C13	BEML	29.07.2015	16123	2.10.2019	17.5	2.02	PASS
13	DUMPER-35T	C14	BEML	29.07.2015	7284	3.10.2019	35.4	0.84	PASS
14	DUMPER-35T	C15	BEML	09.10.2015	17230	3.10.2019	84.7	4.30	FAIL
15	DUMPER-60T	60-1	BEML	25.01.2017	7915	3.10.2019	28.5	0.58	PASS
16	DUMPER60T	60-2	BEML	25.01.2017	8184	3.10.2019	34.5	0.95	PASS
17	DUMPER60T	60-3	BEML	25.01.2017	7033	3.10.2019	42.3	1.42	PASS
18	DUMPER60T	60-5	BEML	25.01.2017	8205	4.10.2019	14.2	0.28	PASS
19	DUMPER60T	60-6	BEML	28.08.2017	6261	4.10.2019	34.4	0.39	PASS
20	DUMPER60T	60-7	BEML	28.08.2017	6796	4.10.2019	33.4	0.85	PASS
21	DUMPER60T	60-8	BEML	28.08.2017	6796	4.10.2019	35.5	1.32	PASS
22	DUMPER60T	60-9	BEML	28.08.2017	7910	4.10.2019	26.1	0.68	PASS
23	DUMPER60T	60-10	BEML	28.08.2017	7419	5.10.2019	30.5	0.92	PASS
24	DUMPER60T	60-11	BEML	28.08.2017	7747	5.10.2019	28.3	0.56	PASS
25	DUMPER60T	60-12	BEML	28.08.2017	8150	5.10.2019	54.4	1.92	PASS
26	DUMPER60T	60-13	BEML	28.08.2017	7727	5.10.2019	20.9	0.04	PASS
27	DUMPER60T	60-14	BEML	11.03.2019	1910	5.10.2019	22.6	0.62	PASS
28	DUMPER60T	60-15	BEML	11.03.2019	1929	6.10.2019	43.3	0.25	PASS
29	DUMPER60T	60-16	BEML	11.03.2019	1198	6.10.2019	13.4	0.21	PASS
30	DUMPER60T	60-17	BEML	11.03.2019	1383	6.10.2019	42.6	1.35	PASS
31	WATER SPRINKLER	WT-3	BEML	28.10.2015	9931	6.10.2019	64.0	2.20	PASS
32	WATER SPRINKLER	WT-5	BEML	20.10.2017	4392	6.10.2019	75.2	3.20	FAIL
33	WATER SPRINKLER	WT-6	BEML	19.01.2018	4557	7.10.2019	73.3	3.24	FAIL
34	MOTOR GRADER	MG-2	BEML	06.02.2013	14856	7.10.2019	48.2	0.38	PASS
35	DOZER	D-7	BEML	31.10.2017	6104	7.10.2019	12.1	0.19	PASS

36	MOTOR GRADER	MG-3	BEML	16.12.2015	7954	7.10.2019	35.2	1.00	PASS
37	SHOVEL	S1	L&T	1.11.2015	NA	7.10.2019	43.2	0.26	PASS
38	SHOVEL	LC-3	TATA	25.07.2018	648	8.10.2019	10.3	0.21	PASS
39	DOZER	D-8	BEML	28.12.2013	6936	8.10.2019	54.2	1.93	PASS
40	MOTOR GRADER	MG-5	KOMAT SU	01.05.2018	10211	8.10.2019	19.8	0.39	PASS
41	TYRE HANDLER	14-TH-1	BEML	14.11.2017	NA	8.10.2019	71.7	3.01	FAIL
42	DOZER	D-10	KOMAT	09.07.2019	535	8.10.2019	8.5	0.24	PASS
43	SHOVEL	S-2	KOMAT SU	25.1O.2015	NA	9.10.2019	54.3	0.96	PASS
44	SHOVEL	S-5	TATA	25.04.2018	NA	9.10.2019	33.5	0.52	PASS
45	CRANE	C-6	ACE	25.04.2019	1415	7.10.2019	15.8	0.39	PASS
46	DOZER	D-9	KOMAT	09.07.2019	704	11.10.2019	10.2	0.21	PASS
47	LOADER	LC-2	VALVO	03.09.2017	12615	10.10.2019	18.4	0.45	PASS
48	DOZER	D-5	BEML	11.04.2015	9216	10.10.2019	34.2	0.89	PASS
49	DOZER	D-6	BEML	16.09.2017	45214	11.10.2019	32.1	0.39	PASS
50	SHOVEL	LC-2	TATA	11.04.2015	12565	11.10.2019	35.4	0.94	PASS
51	SHOVEL	S-3	TATA	22.10.2017	NA	11.10.2019	48.5	0.52	PASS

HEAVY METALS IN PARTICULATE MATTER (PM) AND COAL

HEAVY METALS IN PARTICULATE MATTER (PM)

Particulate Matter (PM) sampling locations are presented in Table

Particulate Matter (PM) Sampling locations

S.No.	Sample code	Sampling Location
1.	S-1	JVR OC Base Workshop
2.	S-5	Kistaram

Summary of Heavy metals in Particulate Matter (PM)

The Particulate Matter (PM) samples collected from the above sites were analyzed for Metals viz Chromium (as Cr), Cadmium (as Cd), Lead (as Pb), Zinc (as Zn), Iron (as Fe), Cobalt (as Co), Manganese (as Mn), Copper (as Cu), Molybdenum (as Mo), Nickel (as Ni), Vanadium (as V), Silver (as Ag), Aluminum (as Al), Arsenic (as As) and Selenium (as Se). The results for these parameters are presented in Table

Heavy Metals in Particulate Matter (PM)

S. No.	Parameters	Unit	Test method	RESULT	
				S1	S5
				2019	2019
1.	Chromium as Cr	mg/Kg	SW-846-6010 B	10	6
2.	Cadmium as Cd	mg/Kg	SW-846-6010 B	BDL	BDL
3.	Lead as Pb	mg/Kg	SW-846-6010 B	18	14
4.	Zinc as Zn	mg/Kg	SW-846-6010 B	645	482
5.	Iron as Fe	mg/Kg	SW-846-6010 B	1242	622
6.	Cobalt as Co	mg/Kg	SW-846-6010 B	BDL	BDL
7.	Manganese as Mn	mg/Kg	SW-846-6010 B	54	38
8.	Copper as Cu	mg/Kg	SW-846-6010 B	4	6
9.	Molybdenum as Mo	mg/Kg	SW-846-6010 B	BDL	BDL
10.	Nickel as Ni	mg/Kg	SW-846-6010 B	BDL	BDL
11.	Vanadium as V	mg/Kg	SW-846-6010 B	282	284
12.	Silver as Ag	mg/Kg	SW-846-6010 B	BDL	BDL
13.	Aluminum as Al	mg/Kg	SW-846-6010 B	840	710
14.	Arsenic as As	mg/Kg	SW-846-6010 B	BDL	BDL
15.	Selenium as Se	mg/Kg	SW-846-6010 B	BDL	BDL

BDL: Below Detection Limit. Detection Limit : Cd – 1.4 ng/m^3*; Co – 2* ng/m^3*; Ag – 2* ng/m^3*, As – 2* ng/m^3*; Se – 2* ng/m^3

HEAVY METALS IN COAL

Selection of Coal sampling locations presented in Table

Coal sampling locations

S.No.	Sample code	Sampling Location
1.	C-1	JVR OC-I Exp.

Characteristics of Coal

Coal samples collected from the above sites were analyzed for Metals viz as Cr), Cadmium (as Cd), Lead (as Pb), Zinc (as Zn), Iron (as Fe), Cobalt (as Co), Manganese (as Mn), Copper (as Cu), Molybdenum (as Mo), Nickel (as Ni), Vanadium (as V), Silver (as Ag), Aluminum (as Al), Arsenic (as As) and Selenium (as Se). The results for these parameters are presented in Table

Heavy metals in Coal

S.No.	Parameters	Unit	Test method	RESULT
				C1
				2019
1.	Chromium as Cr	mg/Kg	SW-846-6010 B	36
2.	Cadmium as Cd	mg/Kg	SW-846-6010 B	BDL
3.	Lead as Pb	mg/Kg	SW-846-6010 B	21
4.	Zinc as Zn	mg/Kg	SW-846-6010 B	28
5.	Iron as Fe	mg/Kg	SW-846-6010 B	5687
6.	Cobalt as Co	mg/Kg	SW-846-6010 B	BDL
7.	Manganese as Mn	mg/Kg	SW-846-6010 B	89
8.	Copper as Cu	mg/Kg	SW-846-6010 B	23
9.	Molybdenum as Mo	mg/Kg	SW-846-6010 B	BDL
10.	Nickel as Ni	mg/Kg	SW-846-6010 B	BDL
11.	Vanadium as V	mg/Kg	SW-846-6010 B	18
12.	Silver as Ag	mg/Kg	SW-846-6010 B	BDL
13.	Aluminum as Al	mg/Kg	SW-846-6010 B	896
14.	Arsenic as As	mg/Kg	SW-846-6010 B	BDL
15.	Selenium as Se	mg/Kg	SW-846-6010 B	BDL

BDL: Below Detection Limit. Detection Limit: Cd – 0.04 mg/kg; Pb – 0.4 mg/kg; Co – 0.2 mg/kg; Cu – 0.2 mg/kg; Ag – 0.02 mg/kg; As – 0.5 mg/kg; Se – 0.5 mg/kg; Mo- 0.1 mg/kg,

PPEM VALUES OF AIR, NOISE & EFFLUENTS OF JVROC MINE MONITORED BY EPTRI-HYDERABAD

Ambient Air Quality monitoring data :-

Name of the location	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)			Period
Coal mine standards (commenced after 25.9.2000), GSR 742(E), Dated 25.09.2000	**250**			*			**120**			**120**			
Core Zone	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	
JVR OC-I Exp. PO Office	93	126	112.96	28.2	45.9	36.78	12.5	15	13.81	18	23.1	20.67	Jan2019 to Dec 2019
JVR OC Pit Head CHP	188	243	216.71	57.2	78.6	69.35	13.5	16.3	14.78	18.9	24.5	21.71	Jan2019 to Dec 2019
JVR OC-I Exp. Base Workshop	118	165	142.25	36.4	57.6	48.32	13.4	15.8	14.38	19.3	23.5	21.22	Jan2019 to Dec 2019

- **No standard for $PM_{2.5}$ was specified for the core zone.*

Name of the location	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)			Period
NAAQ Standards, CPCB Dated: 18.11.2009	**100**			**60**			**80**			**80**			
Buffer Zone	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	
Kistaram Village	64	80	73.13	26.6	32.4	29.82	11.9	14.6	13.05	17	21.8	18.79	Jan2019 to Dec 2019
Sathupalli Town	51	73	60.58	21.1	30.3	25.28	10.4	13.6	11.72	13.9	19.8	16.50	Jan2019 to Dec 2019
Venkatapuram Village	48	65	56.42	20.7	26.8	23.75	10.4	13	11.50	13.9	19.0	16.32	Jan2019 to Dec 2019
Pallewada Village	46	59	53.17	20.2	24.6	22.30	9.5	11.8	10.60	13.2	17.0	14.93	Jan2019 to Dec 2019
Rejarla Village	53	72	62.13	21.9	30.0	26.20	9.9	12.9	11.22	13.9	19.0	15.91	Jan2019 to Dec 2019
Chaudavaram Village	49	63	56.13	20.2	27.1	23.03	9.7	12.4	10.94	13.6	17.7	15.45	Jan2019 to Dec 2019

Noise Quality data :-

Sample code	Monitoring stations	Leq (min)		Leq (max)		Standard limits Of Noise Pollution (Regulation and Control) Rules, 2000 Ministry of Environment & Forests (Notification) New Delhi, 14th February, 2000		Period
Core Zone		**Day**	**Night**	**Day**	**Night**	**Day time**	**Night time**	
CN 5	JVR OC - I Site Office	59.9	40.4	68.7	55.2	**75**	**70**	Jan2019 to Dec 2019
CN 6	JVR OC - I Base Workshop	60.5	37.7	72.1	55.9	**75**	**70**	Jan2019 to Dec 2019
Buffer Zone								
BN 4	Kistaram Village	50.8	40.0	53.9	44.2	**55**	**45**	Jan2019 to Dec 2019
BN 5	Sathupalli Town	50.6	40.0	53.4	42.4	**55**	**45**	Jan2019 to Dec 2019
BN 6	Rejarla Village	49.6	38.9	53.1	41.8	**55**	**45**	Jan2019 to Dec 2019

Note: 1. Daytime is reckoned in between 6 a.m and 10 p.m

2. Night time is reckoned in between 10 p.m and 6 a.m

Effluents Data :-

MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines		pH (at 25°C)		Total Suspended Solids at 105 ºC		TDS		Chemical Oxygen Demand		BOD		Oil & Grease		Period
	Unit	--		mg/L		mg/L		mg/L		mg/l		mg/L		
		5.5 to 9.0		100		--		250		30		10		
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
EW-1	JVR OC -I Exp. Mine Discharge (JVR OC-I Exp.)	6.0	7.9	6	26	550	1090	14	29	2	7	<1	<1	Jan2019 to Dec 2019
EW-2	JVR OC-I Exp. Base Workshop ETP Outlet (JVR OC-I Exp.)	6.6	8.2	6	29	500	1090	15	35	2	9	3	7.1	Jan2019 to Dec 2019
EW-3	JVR OC-I Exp. OB Dump surface run off settling tank outlet (JVR OC-I Exp.)	6.2	8.3	6	23	800	1470	17	30	3	9	3	9	Jan2019 to Dec 2019
EW 10	JVR OC-2 Mine Discharge	6.9	8.3	7	28	530	1490	15	31	2	11	<1	<1	Jan2019 to Dec 2019