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Appendix A.1

Table A.1:- Analysis of Physical Parameters in water samples during pre-monsoon season

S. No.	Sample Location	Latitude	Longitude	pH	D.O. (mg/L)	EC (µS/cm)	TDS (mg/L)	TSS (mg/L)	Salinity (ppt)	ORP (mV)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	7.0	4.4	331	165	330	0.06	122.5
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	6.9	5.1	325	162	235	0.06	130.3
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	6.9	5.7	317	158	545	0.05	145.4
4)	G.B.P.S.	24°12′32"N	83°0′16"E	6.9	4.5	338	164	343	0.06	121.5
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	6.6	5.0	410	205	390	0.19	138.1
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	6.9	4.6	336	163	428	0.06	129.8
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	7.1	5.2	332	166	425	0.06	141.3
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	7.0	5.3	349	178	315	0.16	135.6
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	7.0	4.7	340	170	234	0.06	121.7
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	7.2	5.1	356	179	411	0.17	133.0
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	7.2	5.3	282	141	295	0.13	132.0
12)	G.B.P.S.	24°12′34"N	83°0′14"E	7.1	5.2	338	169	263	0.06	130.0
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	7.3	5.4	306	153	264	0.14	134.4
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	7.3	5.6	350	175	251	0.16	130.8
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	7.4	4.9	338	169	218	0.16	133.5
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	7.5	5.2	365	183	227	0.17	365.0
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	7.3	4.6	328	164	316	0.06	138.9
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	7.2	5.4	325	162	109	0.06	144.6
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	7.1	5.7	408	204	267	0.10	144.0

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	7.3	5.5	239	119	262	0.11	123.7
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	7.4	4.8	260	131	295	0.12	117.2
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	7.3	4.6	320	160	389	0.05	116.0
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	7.3	4.7	214	107	272	0.10	121.0
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	7.2	5.0	375	188	286	0.06	125.0
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	7.1	5.5	539	270	247	0.03	132.0
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	7.2	4.2	547	274	238	0.05	134.2
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	7.2	5.1	582	291	387	0.02	121.0
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	7.9	5.0	536	268	265	0.07	109.0
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	7.5	4.9	528	264	229	0.06	117.0
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	7.3	5.0	515	258	204	0.04	113.2
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	8.0	5.2	764	382	383	0.05	141.0
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	7.0	5.1	541	271	301	0.05	129.0
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	7.9	5.4	770	385	345	0.04	135.0
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	6.9	5.1	552	276	297	0.04	120.0
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	7.1	5.3	394	197	368	0.06	137.0
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	7.4	6.0	749	375	259	0.04	116.0
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	8.0	5.3	519	260	231	0.05	109.0
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	8.2	4.9	586	293	260	0.07	115.0
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	7.2	5.4	401	201	393	0.06	126.0
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	7.3	5.1	512	256	226	0.06	143.0
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	7.9	5.1	531	266	258	0.06	139.0
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	7.1	5.4	508	254	317	0.05	121.8
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	7.3	5.2	569	285	364	0.05	126.7
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	8.0	5.7	525	263	303	0.03	131.0
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	7.8	5.0	523	261	319	0.06	189.7
46)	Anpara	24°11′47.7"N	82°44′55.5"E	7.0	5.4	537	269	179	0.06	121.7
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	6.6	0.3	593	297	321	0.19	143.3

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	6.6	0.9	636	316	338	0.20	146.6
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	6.8	2.7	397	195	298	0.19	123.0
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	7.9	5.6	1148	574	366	0.40	167.0
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	8.0	4.5	671	386	354	0.32	172.4
52)	Kakri	24°10′29.4"N	82°44′45.0"E	8.1	4.5	704	362	347	0.34	171.0
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	6.3	4.7	348	174	332	0.07	172.6
54)	Bina	24°10′5.2"N	82°44′36.2"E	6.4	4.6	256	128	292	0.02	173.3
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	7.7	4.7	319	160	286	0.06	159.1
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	8.8	4.7	277	138	373	0.03	151.4
57)	Jayant	24°10′31"N	82°39′29.2"E	7.3	5.2	520	261	356	0.25	178.5
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	7.3	5.7	529	265	302	0.25	182.5
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	7.2	5.0	1056	528	697	0.31	174.5
60)	Motwani Dam	24°7′54"N	82°39′23"E	7.5	4.9	1079	540	686	0.33	174.8
	Permissible limit for drinking water as suggested by WHO/BIS			**6.5-8.5**	**>5**	**300**	**500**	**500**	**10**	**650**

Appendix A.2

Table A.2:- Analysis of Physical Parameters in water samples during post monsoon season

S. No.	Sample Location	Latitude	Longitude	pH	D.O. (mg/L)	EC (µS/cm)	TDS (mg/L)	TSS (mg/L)	Salinity (ppt)	ORP (mV)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	7.5	4.2	367	184	252	0.05	130.4
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	7.7	4.6	354	177	156	0.03	134.3
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	8.2	4.8	377	189	365	0.06	143.5
4)	G.B.P.S.	24°12′32"N	83°0′16"E	8.0	4.3	434	217	165	0.05	137.4
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	8.1	4.4	365	233	115	0.06	128.5
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	8.2	4.9	411	206	151	0.05	131.3
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	7.8	4.6	406	203	150	0.06	145.9
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	8.2	4.6	411	206	237	0.04	141.7
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	8.4	5.0	456	228	158	0.05	135.9
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	8.1	5.1	465	233	232	0.03	139.7
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	7.9	4.3	431	216	217	0.07	129.2
12)	G.B.P.S.	24°12′34"N	83°0′14"E	7.6	5.2	561	281	187	0.08	125.3
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	7.6	5.4	382	191	285	0.07	127.4
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	7.9	4.9	390	195	271	0.08	128.2
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	7.6	4.8	370	185	238	0.06	131.6
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	8.1	5.1	430	215	249	0.06	136.7
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	8.2	4.3	465	233	341	0.05	139.9
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	8.3	5.3	489	245	132	0.04	141.5
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	8.3	4.8	496	248	191	0.03	142.7

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	7.8	5.0	441	221	184	0.03	123.6
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	7.9	5.3	456	228	216	0.05	126.1
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	7.8	4.4	459	230	209	0.04	129.1
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	7.7	4.6	379	190	194	0.05	130.2
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	7.9	4.9	445	223	168	0.08	138.5
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	7.7	5.2	677	339	158	0.07	132.1
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	7.8	4.5	582	291	211	0.07	149.6
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	7.8	4.9	593	297	188	0.07	148.5
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	8.1	4.5	766	333	150	0.05	147.5
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	8.3	5.3	699	350	126	0.04	127.2
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	8.4	5.5	682	341	208	0.05	129.5
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	8.5	4.7	853	427	223	0.05	146.7
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	7.7	4.9	639	320	266	0.05	148.2
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	7.6	4.2	971	486	219	0.06	143.1
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	7.7	4.7	599	300	190	0.05	141.9
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	7.6	4.8	580	290	181	0.06	131.7
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	8.0	5.1	766	383	153	0.06	136.9
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	7.9	5.3	558	279	182	0.06	124.6
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	7.8	5.1	633	317	215	0.05	126.9
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	8.1	4.0	449	225	146	0.05	123.7
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	8.2	4.5	663	332	179	0.04	134.6
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	8.2	4.7	575	288	239	0.06	135.5
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	8.4	4.4	594	297	286	0.07	137.3
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	8.3	4.9	635	318	225	0.05	138.2
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	8.4	4.6	648	324	241	0.08	129.3
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	7.6	4.8	592	296	155	0.07	141.7
46)	Anpara	24°11′47.7"N	82°44′55.5"E	7.9	4.7	789	345	151	0.05	124.5
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	7.7	4.9	787	394	143	0.08	132.8

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	8.2	4.3	772	386	158	0.06	121.5
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	7.8	4.7	562	281	123	0.06	132.7
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	8.0	4.2	971	486	187	0.06	135.8
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	8.0	4.4	689	395	177	0.05	121.9
52)	Kakri	24°10′29.4"N	82°44′45.0"E	8.1	4.7	383	192	169	0.05	125.6
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	7.9	5.1	538	219	154	0.05	129.4
54)	Bina	24°10′5.2"N	82°44′36.2"E	8.2	5.3	451	226	114	0.04	143.2
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	8.2	4.7	468	234	108	0.05	146.3
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	8.5	4.6	450	225	194	0.04	148.3
57)	Jayant	24°10′31"N	82°39′29.2"E	8.5	4.6	553	277	176	0.04	123.0
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	8.3	4.3	569	285	223	0.05	128.3
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	7.5	5.1	1212	606	219	0.06	135.8
60)	Motwani Dam	24°7′54"N	82°39′23"E	7.6	5.2	1231	616	207	0.08	134.0
	Permissible limit for drinking water as suggested by WHO/BIS			**6.5-8.5**	**>5**	**300**	**500**	**500**	**10**	**650**

Appendix A.3

Table A.3:- Analysis of Cations in water samples during pre-monsoon season

S. No.	Sample Location	Latitude	Longitude	Lithium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Calcium (mg/L)	Total Hardness (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	0.1	12.0	12.7	15.2	21.2	49.2
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	0.1	29.5	12.8	15.1	21.1	48.4
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	0.1	28.2	12.2	14.6	21.0	46.4
4)	G.B.P.S.	24°12′32"N	83°0′16"E	0.1	22.1	12.7	15.2	21.2	49.1
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	0.1	48.2	17.0	13.9	27.2	125.1
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	0.1	20.0	12.9	15.4	21.8	51.7
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	0.1	29.6	12.5	15.1	30.9	48.0
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	0.1	21.8	13.8	18.9	41.7	140.8
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	0.1	22.6	12.7	15.2	31.1	48.8
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	0.1	21.0	12.3	16.7	41.9	173.2
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	0.1	27.8	12.2	12.8	31.7	131.6
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.1	22.5	12.6	15.1	11.1	48.9
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.1	28.1	11.7	14.2	35.6	147.1
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	0.1	21.4	12.3	16.4	40.8	169.2
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	0.1	21.0	12.4	15.9	39.5	164.0
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	0.0	22.4	12.4	17.4	42.5	177.7
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	0.1	28.8	12.4	15.1	21.9	50.6
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	0.0	20.7	12.2	14.6	20.6	45.3
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	0.1	24.9	12.7	18.6	29.9	85.3

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.1	26.8	12.6	10.1	23.4	99.9
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	0.1	27.7	12.6	11.4	26.3	112.3
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	0.1	29.4	12.3	14.2	20.5	43.4
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	0.1	25.7	12.7	18.7	20.4	86.6
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	0.1	23.4	12.4	21.9	44.7	201.3
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	0.1	22.0	12.9	22.9	32.9	135.2
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	0.1	19.1	12.7	27.7	21.8	101.9
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	0.1	22.8	12.3	24.4	32.2	180.4
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	0.1	26.8	12.9	12.3	21.4	103.7
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	0.1	24.6	12.1	16.3	41.2	169.9
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	0.1	21.1	12.9	15.7	18.1	109.5
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	0.1	21.8	12.5	22.3	23.7	150.8
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	0.1	23.2	12.1	18.1	28.9	146.5
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	0.1	25.6	13.5	22.0	27.6	93.1
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.1	25.8	14.0	21.4	34.7	133.6
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.1	22.8	13.2	22.0	23.0	106.6
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.1	25.8	12.5	24.5	69.4	232.6
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	0.1	29.2	12.6	15.6	52.8	195.9
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	0.1	21.1	13.0	26.6	39.6	167.2
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	0.1	27.4	11.9	17.8	45.7	112.2
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	0.1	28.1	11.9	23.3	39.5	103.4
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	0.1	21.0	11.8	21.5	35.7	136.4
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	0.1	26.6	12.1	13.4	48.9	177.1
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	0.1	23.3	12.2	18.4	57.7	219.6
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	0.1	27.7	12.4	14.1	21.9	87.7
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	0.1	29.0	12.7	15.3	31.4	50.3
46)	Anpara	24°11′47.7"N	82°44′55.5"E	0.1	29.9	12.8	25.7	32.5	54.6
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	0.1	38.6	15.2	22.5	25.2	114.4

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	0.1	42.7	16.7	27.2	44.3	140.2
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	0.1	49.9	18.7	19.3	25.4	101.4
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	0.1	37.0	14.4	33.2	95.2	292.2
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	0.1	27.1	17.9	38.0	71.2	292.7
52)	Kakri	24°10′29.4"N	82°44′45.0"E	0.1	26.5	26.2	34.7	64.7	304.1
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	0.1	28.0	12.8	14.6	31.1	46.5
54)	Bina	24°10′5.2"N	82°44′36.2"E	0.1	24.8	10.6	11.6	39.3	29.8
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	0.1	28.9	12.4	14.8	32.1	49.9
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	0.1	22.6	13.7	11.5	37.8	25.7
57)	Jayant	24°10′31"N	82°39′29.2"E	0.1	26.9	15.2	21.9	39.7	122.9
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	0.1	27.2	18.8	24.8	47.8	180.4
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	0.1	47.5	20.6	32.8	79.8	242.8
60)	Motwani Dam	24°7′54"N	82°39′23"E	0.1	49.5	20.1	34.4	77.5	268.9
	Permissible limit for drinking water as suggested by WHO/BIS			**nil**	**50**	**15**	**50**	**75**	**500**

Appendix A.4

Table A.4:- Analysis of Cations in water samples during post monsoon season

S. No.	Sample Location	Latitude	Longitude	Lithium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Calcium (mg/L)	Total Hardness (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	0.1	22.2	11.6	13.1	22.2	47.5
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	0.1	30.0	11.8	13.6	23.0	46.3
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	0.1	29.1	11.4	11.9	24.1	43.5
4)	G.B.P.S.	24°12′32"N	83°0′16"E	0.1	22.5	11.9	12.6	14.6	46.6
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	0.1	49.6	14.6	11.5	29.3	119.2
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	0.1	20.9	11.4	12.4	19.2	47.5
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	0.1	30.4	11.7	12.5	13.7	45.5
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	0.1	22.2	12.9	16.5	45.5	134.8
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	0.1	23.8	11.4	12.2	16.5	45.1
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	0.1	21.2	11.5	13.3	48.4	167.7
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	0.1	28.4	11.6	10.4	35.1	126.0
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.1	23.7	12.0	14.4	14.9	46.0
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.1	29.1	11.1	12.9	38.1	143.1
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	0.1	22.8	11.2	14.6	41.4	167.3
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	0.0	22.1	11.6	11.4	44.4	160.0
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	0.1	23.9	11.7	14.7	46.4	177.0
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	0.1	30.0	11.8	14.4	32.2	48.7
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	0.0	21.1	11.5	13.6	31.6	43.7
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	0.1	25.3	11.5	16.3	39.4	81.2

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.1	27.5	11.2	8.1	28.5	98.5
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	0.1	28.2	11.2	10.6	29.3	111.7
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	0.1	30.2	10.0	13.3	25.6	42.5
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	0.1	26.4	11.4	16.3	27.0	82.5
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	0.1	24.5	12.0	18.2	49.1	195.7
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	0.1	22.3	11.4	11.2	36.9	130.8
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	0.1	29.7	10.9	16.3	27.4	97.7
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	0.1	33.5	9.8	23.3	36.7	179.7
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	0.1	27.1	8.2	11.6	24.5	103.7
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	0.1	25.4	11.7	17.6	44.2	177.9
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	0.1	22.4	9.6	14.3	19.4	107.2
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	0.1	22.9	9.8	21.5	29.4	149.1
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	0.1	34.5	11.6	17.2	39.3	144.0
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	0.1	36.8	10.6	10.6	30.5	89.7
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.1	36.4	12.8	10.4	36.2	130.8
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.1	26.8	11.9	13.8	32.9	113.6
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.1	33.9	11.9	14.8	77.8	170.0
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	0.1	35.7	10.9	11.8	62.9	135.5
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	0.1	35.6	11.7	17.6	47.8	141.4
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	0.1	37.1	11.8	16.8	58.7	165.5
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	0.1	36.6	11.9	14.9	51.1	163.8
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	0.1	35.3	9.9	13.4	55.0	117.5
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	0.1	44.6	9.7	11.3	59.8	95.6
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	0.1	32.5	11.8	12.9	69.7	127.0
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	0.1	32.9	10.8	15.8	36.7	156.5
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	0.1	40.2	10.4	13.3	42.3	53.0
46)	Anpara	24°11′47.7"N	82°44′55.5"E	0.1	30.1	11.5	14.2	42.8	48.6
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	0.1	59.2	11.5	21.2	29.5	109.1

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	0.1	53.1	12.3	16.8	52.7	138.7
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	0.1	50.2	7.5	18.3	29.7	100.6
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	0.2	37.4	13.3	12.3	98.8	292.5
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	0.1	28.4	16.9	26.4	79.7	290.2
52)	Kakri	24°10′29.4"N	82°44′45.0"E	0.1	27.3	25.1	33.5	75.5	301.2
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	0.1	39.0	11.8	13.6	36.3	45.4
54)	Bina	24°10′5.2"N	82°44′36.2"E	0.1	35.2	10.4	11.0	40.4	30.2
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	0.1	39.3	11.5	13.4	33.5	47.7
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	0.1	23.6	12.7	11.1	48.5	25.6
57)	Jayant	24°10′31"N	82°39′29.2"E	0.1	27.2	13.0	10.2	40.7	118.4
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	0.1	28.4	17.3	13.1	58.3	174.5
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	0.1	49.5	19.2	21.3	80.3	237.9
60)	Motwani Dam	24°7′54"N	82°39′23"E	0.1	48.5	19.2	23.4	88.8	268.2
	Permissible limit for drinking water as suggested by WHO/BIS			**nil**	**50**	**15**	**50**	**75**	**50**

Appendix A.5

Table A.5:- Analysis of Anions in water samples during pre-monsoon season

S. No.	Sample Location	Latitude	Longitude	Fluoride (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Sulphate (mg/L)	Phosphate (mg/L)	Bicarbonate (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	1.1	55.5	10.9	72.7	1.3	156
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	1.1	55.5	12.4	71.0	1.3	145
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	1.2	54.3	11.8	70.2	1.1	139
4)	G.B.P.S.	24°12′32"N	83°0′16"E	1.3	55.7	10.9	72.7	1.1	148
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	1.3	51.1	24.2	92.6	3.6	152
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	1.1	65.5	11.5	72.2	1.0	155
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	1.1	54.8	11.0	71.5	1.1	142
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	1.2	57.9	20.7	77.6	3.9	147
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	1.2	55.6	10.8	71.3	1.1	141
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	1.1	53.4	12.7	74.0	1.2	133
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	1.0	54.0	11.6	76.7	1.2	143
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.7	55.4	10.5	73.1	1.1	138
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.9	53.3	11.8	74.7	1.0	129
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	1.0	53.9	11.7	75.1	0.8	143
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	1.1	54.0	11.7	75.5	1.0	152
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	1.2	54.0	11.7	75.0	0.1	130
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	1.2	54.9	10.3	82.5	0.1	133
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	1.3	54.6	11.1	81.1	1.0	149
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	1.3	54.7	11.2	70.0	1.1	138

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.9	55.5	11.5	70.7	1.1	142
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	1.2	55.2	11.3	79.7	0.9	147
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	1.3	54.3	11.3	80.0	0.7	135
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	1.3	55.4	11.2	81.2	1.0	139
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	1.6	55.8	11.6	80.1	1.1	141
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	1.2	55.7	11.4	70.5	1.3	126
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	1.2	56.0	11.3	71.3	1.2	135
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	1.3	43.8	11.8	71.8	1.1	159
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	1.3	53.5	11.9	71.9	1.3	137
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	1.7	54.0	11.7	72.3	1.6	142
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	1.2	54.0	11.8	79.9	1.2	133
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	1.1	54.6	11.2	80.5	1.2	138
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	1.4	55.2	11.7	81.7	1.3	151
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	1.4	47.3	11.6	79.7	1.3	154
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.7	44.7	11.3	79.8	1.4	157
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.6	55.9	11.7	80.3	1.2	146
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.7	55.2	11.2	80.5	1.5	145
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	1.5	55.9	11.7	61.3	1.2	122
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	1.2	54.9	11.6	71.5	1.4	148
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	1.3	53.8	11.5	60.5	1.3	135
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	1.2	54.9	11.4	69.4	1.3	140
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	1.2	55.0	11.8	70.5	1.5	143
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	1.2	55.7	11.6	69.5	1.5	147
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	1.2	47.2	11.4	71.2	1.2	139
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	1.2	45.3	11.8	70.4	1.3	133
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	1.5	54.6	11.0	91.1	1.0	138
46)	Anpara	24°11′47.7"N	82°44′55.5"E	1.6	55.7	11.0	94.3	0.9	196
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	1.7	89.9	10.0	90.1	4.6	217

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	1.7	87.0	10.3	87.4	18.1	236
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	1.7	96.3	56.8	122.0	5.8	224
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	1.7	76.9	41.6	735.5	1.1	330
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	1.4	70.9	35.9	453.4	1.1	357
52)	Kakri	24°10′29.4"N	82°44′45.0"E	1.5	75.9	32.5	475.7	1.3	362
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	1.3	79.1	30.6	99.4	1.2	236
54)	Bina	24°10′5.2"N	82°44′36.2"E	1.3	72.8	30.4	71.0	1.2	193
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	1.6	75.2	40.9	111.6	1.2	185
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	1.6	72.4	31.6	122.0	1.2	176
57)	Jayant	24°10′31"N	82°39′29.2"E	1.6	90.1	97.2	141.8	1.2	256
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	1.4	91.1	54.1	257.1	1.3	312
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	1.7	94.0	68.7	329.2	6.8	308
60)	Motwani Dam	24°7′54"N	82°39′23"E	1.6	90.6	66.0	377.2	6.5	360
	Permissible limit for drinking water as suggested by WHO/BIS			**1.5**	**250**	**45**	**150**	**nil**	**200**

Appendix A.6

Table A.6:- Analysis of Anions in water samples during post monsoon season

S. No.	Sample Location	Latitude	Longitude	Fluoride (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Sulphate (mg/L)	Phosphate (mg/L)	Bicarbonate (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	1.0	42.9	9.8	68.8	0.9	174
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	0.9	44.4	10.2	67.0	0.8	166
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	1.0	52.5	11.4	66.3	0.4	148
4)	G.B.P.S.	24°12′32"N	83°0′16"E	0.8	46.2	9.1	69.6	1.0	159
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	1.1	45.7	20.1	85.6	2.7	171
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	0.9	52.2	8.0	55.2	0.9	173
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	0.9	48.6	10.6	66.5	0.8	167
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	0.8	44.4	16.5	62.6	2.1	165
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	0.7	46.4	10.5	68.0	1.0	162
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	1.0	41.2	9.5	66.9	0.8	156
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	0.6	49.5	9.6	63.7	0.7	157
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.6	53.1	10.0	69.0	0.7	158
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.8	41.1	10.3	61.6	0.7	145
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	0.7	45.2	10.9	62.1	0.6	167
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	0.9	50.1	9.0	62.5	0.8	178
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	1.0	48.7	9.1	62.0	0.0	157
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	1.1	49.2	10.7	65.2	1.0	154
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	1.2	51.1	10.0	74.6	0.9	161
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	1.1	51.7	10.2	63.0	1.0	159

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.8	47.5	10.9	63.7	1.0	163
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	1.1	46.7	8.7	62.2	0.4	168
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	1.2	49.4	7.9	73.0	0.5	152
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	1.2	47.0	9.1	74.1	0.8	156
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	1.5	49.6	10.3	74.6	1.1	162
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	1.2	49.2	9.5	64.3	0.9	147
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	1.1	43.2	8.1	65.5	1.1	156
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	1.2	31.6	8.5	65.1	1.0	172
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	1.2	51.7	10.8	66.8	1.1	158
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	1.4	41.4	10.9	67.5	1.3	167
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	1.1	42.2	10.5	64.3	1.0	154
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	1.0	51.4	10.2	75.3	1.1	161
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	1.3	32.4	7.3	76.5	1.0	179
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	1.1	35.9	8.6	64.3	0.8	184
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.4	42.6	9.5	64.6	1.2	182
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.5	42.3	10.9	75.1	1.1	169
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.5	52.1	10.1	76.4	1.1	166
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	1.4	52.6	10.1	57.3	1.1	145
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	1.0	51.2	10.9	67.5	1.2	167
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	1.1	49.9	9.7	56.5	1.2	164
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	1.1	47.3	8.3	56.4	1.1	169
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	1.0	49.4	7.7	67.5	1.3	171
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	0.8	48.1	10.3	56.5	1.3	174
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	0.9	53.3	10.9	68.2	0.9	158
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	1.4	42.7	9.0	67.4	0.8	152
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	1.3	43.0	9.1	87.1	0.7	159
46)	Anpara	24°11′47.7"N	82°44′55.5"E	1.3	43.0	9.1	87.3	0.6	224
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	1.4	64.7	9.3	83.1	3.6	236

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	1.6	62.1	9.1	80.4	16.8	257
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	1.3	91.0	42.3	15.0	4.6	247
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	1.4	62.2	9.9	728.7	1.1	356
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	1.2	55.6	11.5	446.2	0.9	373
52)	Kakri	24°10′29.4"N	82°44′45.0"E	1.2	70.4	9.8	468.6	1.0	389
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	1.0	64.0	27.3	85.8	1.0	251
54)	Bina	24°10′5.2"N	82°44′36.2"E	1.0	50.6	9.1	60.6	0.7	210
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	1.2	42.1	9.5	97.1	0.6	219
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	1.4	50.6	9.8	117.6	0.8	204
57)	Jayant	24°10′31"N	82°39′29.2"E	1.2	74.3	93.4	137.3	0.7	279
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	1.2	66.4	50.1	253.5	1.1	342
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	1.4	88.4	54.5	323.5	4.3	351
60)	Motwani Dam	24°7′54"N	82°39′23"E	1.2	85.2	52.2	371.2	4.9	387
	Permissible limit for drinking water as suggested by WHO/BIS			**1.5**	**250**	**45**	**150**	**nil**	**200**

Appendix A.7

Table A.7:- Analysis of Heavy Metals in water samples during pre-monsoon season

S. No.	Sample Location	Latitude	Longitude	Iron (mg/L)	Copper (mg/L)	Lead (mg/L)	Zinc (mg/L)	Nickel (mg/L)	Chromium (mg/L)	Cadmium (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	0.72	1.01	0.04	2.61	0.01	0.01	0.01
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	0.77	1.02	0.08	2.59	0.02	0.02	0.01
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	0.68	1.02	0.09	2.51	0.02	0.01	0.01
4)	G.B.P.S.	24°12′32"N	83°0′16"E	0.71	1.02	0.02	2.69	0.03	0.01	0.01
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	0.92	1.02	0.03	2.53	0.02	0.01	0.01
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	0.83	1.00	0.05	2.52	0.03	0.01	0.01
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	0.62	1.00	0.04	2.57	0.02	0.01	0.01
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	0.96	1.01	0.05	2.62	0.03	0.02	0.02
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	0.87	1.01	0.07	2.76	0.03	0.01	0.02
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	0.76	1.02	0.08	2.68	0.04	0.01	0.01
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	0.89	1.01	0.11	2.63	0.05	0.01	0.02
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.61	1.01	0.16	2.64	0.04	0.01	0.02
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.46	1.02	0.12	2.72	0.07	0.01	0.02
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	0.54	1.02	0.13	2.54	0.05	0.01	0.02
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	0.83	1.02	0.19	2.61	0.06	0.01	0.02
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	0.91	1.02	0.08	2.83	0.06	0.01	0.02
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	0.77	1.01	0.04	2.86	0.03	0.01	0.02
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	0.62	1.01	0.06	2.79	0.04	0.01	0.02
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	0.84	1.01	0.07	2.72	0.05	0.01	0.02

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.71	1.01	0.02	2.59	0.05	0.01	0.03
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	0.75	1.02	0.21	2.57	0.06	0.02	0.02
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	0.68	1.02	0.21	2.66	0.06	0.02	0.01
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	0.61	1.03	0.22	2.62	0.05	0.02	0.02
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	0.81	1.01	0.17	2.68	0.06	0.01	0.02
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	0.57	1.02	0.15	2.61	0.08	0.01	0.02
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	0.12	1.02	0.12	2.49	0.06	0.01	0.02
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	0.47	1.01	0.06	2.50	0.03	0.01	0.02
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	0.47	1.02	0.01	2.59	0.07	0.02	0.02
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	0.66	1.02	0.01	2.41	0.05	0.02	0.03
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	0.76	1.01	0.02	2.58	0.08	0.01	0.02
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	0.72	1.00	0.02	2.76	0.08	0.02	0.02
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	0.68	1.01	0.01	2.71	0.07	0.02	0.03
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	0.54	1.02	0.15	2.89	0.08	0.01	0.03
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.21	1.02	0.02	2.74	0.08	0.01	0.02
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.25	1.02	0.02	2.56	0.07	0.01	0.03
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.87	1.02	0.03	2.52	0.06	0.01	0.04
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	0.18	1.02	0.11	1.79	0.07	0.01	0.04
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	0.49	1.03	0.11	1.42	0.07	0.01	0.03
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	0.76	1.03	0.11	1.65	0.07	0.01	0.03
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	0.71	1.02	0.10	1.54	0.05	0.01	0.02
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	0.87	1.03	0.10	1.59	0.03	0.01	0.03
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	0.85	1.02	0.12	1.62	0.01	0.01	0.02
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	0.74	1.01	0.12	1.71	0.02	0.02	0.02
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	0.62	1.02	0.12	1.77	0.05	0.02	0.02
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	0.65	1.03	0.16	2.98	0.05	0.02	0.01
46)	Anpara	24°11′47.7"N	82°44′55.5"E	1.19	1.52	0.16	2.30	0.09	0.04	0.08
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	1.20	1.66	0.28	1.69	0.12	0.05	0.09

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	1.69	1.61	0.18	2.52	0.14	0.03	0.06
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	1.15	1.12	0.21	2.16	0.19	0.03	0.08
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	1.02	1.13	0.42	3.21	0.15	0.08	0.21
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	0.68	1.20	0.12	2.19	0.09	0.04	0.15
52)	Kakri	24°10′29.4"N	82°44′45.0"E	0.93	1.21	0.12	2.01	0.08	0.03	0.11
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	0.95	1.12	0.10	1.89	0.08	0.03	0.14
54)	Bina	24°10′5.2"N	82°44′36.2"E	0.98	1.11	0.11	1.43	0.16	0.04	0.12
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	0.91	1.13	0.12	1.37	0.18	0.04	0.13
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	0.93	1.22	0.12	1.45	0.15	0.03	0.16
57)	Jayant	24°10′31"N	82°39′29.2"E	0.99	1.32	0.11	3.09	0.12	0.03	0.19
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	0.91	1.42	0.21	4.27	0.11	0.02	0.17
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	2.13	1.83	0.35	5.76	0.29	0.06	0.26
60)	Motwani Dam	24°7′54"N	82°39′23"E	1.54	1.70	0.48	5.82	0.23	0.05	0.22
	Permissible limit for drinking water as suggested by WHO/BIS			**1.0**	**1.5**	**0.15**	**5.0**	**0.20**	**0.01**	**0.10**

Appendix A.8

Table A.8:- Analysis of Heavy Metals in water samples during post monsoon season

S. No.	Sample Location	Latitude	Longitude	Iron (mg/L)	Copper (mg/L)	Lead (mg/L)	Zinc (mg/L)	Nickel (mg/L)	Chromium (mg/L)	Cadmium (mg/L)
1)	G.B.P.S.	24°12′27.7"N	83°0′10.5"E	0.68	1.01	0.03	2.52	0.01	0.01	0.01
2)	G.B.P.S.	24°12′5.6"N	83°59′41.1"E	0.64	1.01	0.06	2.48	0.01	0.01	0.00
3)	G.B.P.S.	24°12′3.6"N	83°58′2.3"E	0.65	1.01	0.07	2.42	0.02	0.00	0.00
4)	G.B.P.S.	24°12′32"N	83°0′16"E	0.69	1.02	0.01	2.54	0.02	0.00	0.00
5)	G.B.P.S.	24°11′56.5"N	83°59′41.1"E	0.88	1.02	0.02	2.42	0.01	0.01	0.00
6)	G.B.P.S.	24°12′30.9"N	83°0′8.0"E	0.71	1.00	0.04	2.45	0.03	0.00	0.01
7)	G.B.P.S.	24°12′23.4"N	83°0′21.8"E	0.57	1.00	0.03	2.46	0.02	0.00	0.01
8)	G.B.P.S.	24°7′41.6"N	83°47′40.8"E	0.92	1.01	0.04	2.51	0.02	0.01	0.01
9)	G.B.P.S.	24°12′35.8"N	83°0′12.3"E	0.71	1.00	0.06	2.67	0.02	0.00	0.02
10)	G.B.P.S.	24°11′57.4"N	82°58′55.1"E	0.72	1.02	0.05	2.57	0.03	0.00	0.01
11)	G.B.P.S.	24°11′12.5"N	83°55′35.5"E	0.75	1.01	0.01	2.52	0.05	0.00	0.02
12)	G.B.P.S.	24°12′34"N	83°0′14"E	0.54	1.01	0.14	2.53	0.03	0.00	0.01
13)	G.B.P.S.	24°12′26.9"N	83°45′53.3"E	0.41	1.02	0.10	2.69	0.07	0.01	0.01
14)	G.B.P.S.	24°7′13.1"N	82°46′9.3"E	0.52	1.01	0.11	2.51	0.04	0.01	0.02
15)	G.B.P.S.	24°11′12.5"N	82°54′14.0"E	71.00	1.01	0.16	2.57	0.06	0.00	0.02
16)	G.B.P.S.	24°11′22.7"N	83°53′23.3"E	0.88	1.02	0.06	2.79	0.06	0.01	0.02
17)	G.B.P.S.	24°11′9.1"N	82°52′58.6"E	0.73	1.01	0.03	2.81	0.02	0.01	0.02
18)	G.B.P.S.	24°10′35.5"N	82°52′15.5"E	0.58	1.00	0.04	2.72	0.04	0.01	0.01
19)	G.B.P.S.	24°11′38.9"N	82°50′7.0"E	0.82	1.00	0.06	2.68	0.04	0.01	0.02

20)	G.B.P.S.	24°11′0.3"N	82°49′3.9"E	0.69	1.01	0.01	2.52	0.05	0.01	0.03
21)	G.B.P.S.	24°10′30.7"N	83°48′4.9"E	0.71	1.01	0.20	2.54	0.05	0.01	0.02
22)	G.B.P.S.	24°9′43.6"N	82°47′31.9"E	0.64	1.01	0.21	2.61	0.06	0.01	0.01
23)	G.B.P.S.	24°9′7.6"N	82°47′20.8"E	0.55	1.02	0.21	2.56	0.05	0.02	0.01
24)	G.B.P.S.	24°5′57.6"N	83°43′37.8"E	0.79	1.00	0.13	2.62	0.05	0.01	0.02
25)	G.B.P.S.	24°12′17.81"N	82°54′39.25"E	0.55	1.01	0.11	2.58	0.07	0.00	0.01
26)	G.B.P.S.	24°11′45.21"N	83°1′9.21"E	0.11	1.01	0.10	2.46	0.05	0.00	0.02
27)	G.B.P.S.	24°11′36.92"N	83°2′6.5"E	0.43	1.01	0.05	2.47	0.03	0.01	0.02
28)	G.B.P.S.	24°11′54.54"N	83°2′39.12"E	0.35	1.01	0.01	2.57	0.06	0.01	0.02
29)	G.B.P.S.	24°11′59.67"N	83°2′32.41"E	0.54	1.02	0.01	2.39	0.05	0.02	0.02
30)	G.B.P.S.	24°11′20.08"N	83°1′23.58"E	0.72	1.01	0.01	2.55	0.08	0.01	0.02
31)	G.B.P.S.	24°11′10"N	83°0′48.73"E	0.61	1.00	0.01	2.72	0.08	0.02	0.02
32)	G.B.P.S.	24°11′48.34"N	83°3′40.2"E	0.66	1.01	0.01	2.68	0.07	0.02	0.03
33)	G.B.P.S.	24°12′10.51"N	83°0′41.48"E	0.53	1.01	0.11	2.86	0.07	0.01	0.03
34)	G.B.P.S.	24°11′45.12"N	82°54′12.32"E	0.18	1.02	0.01	1.72	0.08	0.00	0.02
35)	G.B.P.S.	24°10′52.17"N	83°51′11.46"E	0.23	1.02	0.02	1.53	0.06	0.01	0.03
36)	G.B.P.S.	24°9′36.93"N	83°46′25.08"E	0.84	1.02	0.03	1.51	0.05	0.00	0.03
37)	G.B.P.S.	24°4′33.19"N	82°41′30.85"E	0.14	1.02	0.01	1.77	0.06	0.00	0.04
38)	G.B.P.S.	24°3′59.67"N	82°41′15.46"E	0.46	1.02	0.01	1.41	0.07	0.01	0.03
39)	G.B.P.S.	24°3′10.09"N	82°40′31.26"E	0.63	1.02	0.01	1.62	0.07	0.00	0.02
40)	G.B.P.S.	24°3′19.75"N	82°39′33.5"E	0.62	1.02	0.00	1.53	0.05	0.00	0.02
41)	G.B.P.S.	24°2′27.6"N	82°38′49"E	0.74	1.02	0.00	1.56	0.03	0.01	0.02
42)	G.B.P.S.	24°2′26.26"N	82°38′5.43"E	0.72	1.02	0.10	1.59	0.01	0.01	0.02
43)	G.B.P.S.	24°2′2.57"N	82°37′12.04"E	0.62	1.01	0.02	1.68	0.02	0.01	0.01
44)	G.B.P.S.	24°3′36.93"N	83°42′22.66"E	0.51	1.02	0.02	1.74	0.05	0.02	0.02
45)	Rihand Dam	24°5′14.7"N	82°42′50.4"E	0.63	1.02	0.11	2.95	0.05	0.02	0.01
46)	Anpara	24°11′47.7"N	82°44′55.5"E	0.97	1.42	0.15	2.10	0.09	0.04	0.06
47)	Hindalco	24°13′12.2"N	82°1′48.8"E	1.05	1.55	0.24	1.62	0.11	0.05	0.07

48)	NTPC Singrauli	24°6′31.1"N	82°42′36.5"E	1.63	1.51	0.16	2.48	0.13	0.03	0.05
49)	NTPC Vindhyanchal	24°5′29.3"N	82°41′11.1"E	1.11	1.10	0.18	2.13	0.17	0.03	0.07
50)	Jhingurdah	24°12′23.3"N	82°44′12.5"E	1.00	1.10	0.41	3.18	0.14	0.08	0.20
51)	Nigahi	24°9′1.8"N	82°36′19.0"E	0.56	1.10	0.12	2.17	0.09	0.04	0.13
52)	Kakri	24°10′29.4"N	82°44′45.0"E	0.81	1.11	0.11	1.97	0.08	0.03	0.09
53)	Krishnashila	24°9′31.2"N	82°44′45.0"E	0.82	1.01	0.10	1.84	0.07	0.03	0.12
54)	Bina	24°10′5.2"N	82°44′36.2"E	0.95	1.01	0.11	1.41	0.15	0.03	0.11
55)	Dudhichua	24°9′26.9"N	82°41′31.1"E	0.90	1.02	0.11	1.35	0.16	0.03	0.12
56)	Krishnashila+Bina	24°5′59.8"N	82°44′26.8"E	0.81	1.18	0.11	1.43	0.14	0.03	0.13
57)	Jayant	24°10′31"N	82°39′29.2"E	0.96	1.22	0.11	3.05	0.10	0.02	0.17
58)	Amlohri	24°8′28.4"N	82°35′34.2"E	0.85	1.32	0.19	4.26	0.10	0.02	0.15
59)	Baliya Nalla	24°7′20"N	82°40′3.0"E	2.10	1.73	0.32	5.73	0.26	0.06	0.23
60)	Motwani Dam	24°7′54"N	82°39′23"E	1.51	1.60	0.45	5.79	0.21	0.05	0.21
	Permissible limit for drinking water as suggested by WHO/BIS			**1.0**	**1.50**	**0.15**	**5.0**	**0.20**	**0.01**	**0.10**

Appendix A.9

Table A.9:- Analytical Precision and Accuracy of various equipments

S. No.	Instrument Name And Model	Minimum Detection Limit	Manufacturer Certifying The Values
1)	Ion Chromatography : *Metrohm 930 Compact IC, Switzerland* For Anions : *Metrosep A Supp 5, 250/4.0* For Cations : *Metrosep C4 150/4.0*	0.01 mg/L	Metrohm India Limited
2)	Induced Couple Plasma-Optical Emission Spectrometer : *Optima 7000 DV*	0.0006 mg/L	PerkinElmer Inc., USA
3)	Atomic Absorption Spectrometer : *AAnalyst 800*	Cd - 0.07 x 10^{-9} mg/L Cr - 0.2 x 10^{-9} mg/L Zn - 0.33 x 10^{-9} mg/L Ni - 3.6 x10^{-9} mg/L Pb - 4.5 x 10^{-9} mg/L Cu - 0.75 x 10^{-9} mg/L Fe - 0.1 x10^{-9} mg/L	PerkinElmer Inc., USA
4)	Multi Parameter Apparatus : *Hanna Hi 9828*	pH - 0.01 ORP - 0.1 mV D.O. - 0.01 mg/L TDS - 1 mg/L Salinity - 0.01 mg/L E.C. - 1 µS/cm	Hanna Instruments, USA

GLOSSARY

The important terms used in this thesis are explained as Glossary.

Band - The specific wavelength interval in the electromagnetic spectrum.

Bioaccumulation - is defined as the 'net result of uptake, transformation and elimination of a substance in an organism due to all routes of exposure (i.e., air, water, sediment/soil, and food)' and degradation as 'the decomposition of organic molecules to smaller molecules and eventually to carbon dioxide, water, and salts.'

Bioconcentration - refers to uptake of contaminants from the external environment only (usually water).

Biomagnification - is any concentration of a toxin, such as pesticides or metals, in the tissues of tolerant organisms at successively higher levels in a food chain.

Contaminants – defines any physical, chemical, biological or radiological substance or matter in water.

Digital Elevation Model (DEM) - is a digital representation of ground surface topography or terrain. It is also widely known as a digital terrain model (DTM). While the term can be used for any representation of terrain as GIS data, it is generally restricted to the use of a raster grid of elevation values.

Dissolved Oxygen - Dissolved Oxygen is the amount of gaseous oxygen dissolved in the water.

Electrical Conductivity - it is a measure of water's capability to pass electrical flow. This ability is directly related to the concentration of ions in the water. These conductive ions come from dissolved salts and inorganic materials such as alkalis, chlorides, sulfides and carbonate compounds.

Electromagnetic spectrum - the range of electromagnetic radiation wavelengths and frequencies. They are usually divided into seven categories: radio, microwave, infrared, visible, ultra-violet, x-ray, and gamma-ray radiation.

False Colour Composite - An artificially generated colour image in which blue, green and red colours are assigned to the wavelength regions to which they do not belong in nature. For example, in standard a False Colour Composite blue is assigned to green radiations (0.5 to 0.6 μm), green is assigned to red radiations (0.6 to 0.7 μm and red is assigned to Near Infrared radiation (0.7 to 0.8 μm).

Geographic Information System (GIS) - the manipulating of data stored and indexed according to geographic coordinates of it's elements.

Hardness – The definition of water hardness is the amount of dissolved calcium and magnesium in the water.

Hierarchical Cluster Analysis - can be defined as the technique of unsupervised pattern recognition where classes are divided into clusters or groups on the basis of dissimilarities amongst the different classes while classifying them on the basis of similarities within the class.

Image - an illustrative representation acquired by satellite systems comprising of data arrays.

Land Use/ Land Cover - refers to the categorization or classification of human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analysis of appropriate source materials.

Landsat - Land Remote-Sensing Satellite, a series of satellites developed to gather data of Earth's resources in a systematic manner. Operated by US Earth Observation Satellite

Company and used for: land use inventory, crop/forestry assessment, geological and mineralogical studies, and cartography.

Multispectral Scanner System - A scanning system used to collect data over a variety of different wavelength ranges is called a multispectral scanner. It operates in spectral bands ranging from 0.3-14 μm. These are line scanning devices observing the Earth perpendicular to the orbital track.

Oxidation Reduction Potential - Redox potential is a measure of the tendency of a chemical species to acquire electrons from or lose electrons to an electrode and thereby be reduced or oxidised respectively.

pH - is defined as the negative logarithm of H+ ion concentration. Hence, it can be considered as a measure of the acidity or alkalinity of a solution. The pH scale usually ranges from 0 to 14.

Phytodegradation - This involves plants and associated microbes for degradation of organic pollutant.

Phytoextraction - This technique involves the use of plants for removal of metals from the soil & concentrate them in the harvestable parts of plants.

Phytoremediation - is defined as the use of living green plants for in situ removal, degradation, and containment of contaminants in soils, surface waters, and groundwater.

Phytostabilization - It involves plants to reduce the mobility and bioavailability of pollutants in the environment either by immobilisation or by prevention of migration.

Phytovolatilisation - It is defined as the volatilisation of pollutants into the atmosphere via plants.

Remote sensing - the gathering of information about the Earth from a distance, without actually coming in contact with it.

Resolution - ability to separate two discernable objects.

Rhizofiltration - It includes absorption of metals from streams through plants roots.

Sustainable – means meeting our own needs without compromising the ability of future generations to meet their own needs.

Thermal Infrared Sensor - measures land surface temperature in two thermal bands with a new technology that applies quantum physics to detect heat.

Total Dissolved Solids - is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized, or micro-granular (colloidal sol) suspended form.

Total Suspended Solids - are particles that are larger than 2 microns found in the water column. These solids include anything drifting or floating in the water, from sediment, silt and sand to plankton and algae.

Triangulated Irregular Network - is a 3D surface model derived from irregularly spaced points and break line features.

Water Pollution – can be defined as the release of substances into subsurface groundwater or into lakes, streams, rivers, estuaries, and oceans to the point where the substances interfere with beneficial use of the water or with the natural functioning of ecosystems.

Water Quality Index - A water quality index provides a single number (like a grade) that expresses overall water quality at a certain location and time based on several water quality parameters.

LIST OF PUBLICATIONS

1) Evaluation of Reservoir Water Quality Using Water Quality Index in Govind Ballabh Pant Sagar Reservoir, India - Ramita Varshney and Aarif Jamal (2018). Rasayan Journal of Chemistry, 11 (3), 1177-1182 (2018). DOI: http://dx.doi.org/10.31788/rjc.2018.1134023.

2) A Multivariate Statistical Analysis Approach for the Assessment of Water Quality in Govind Ballabh Pant Sagar Reservoir – Ramita Varshney and Aarif Jamal (2019). Rasayan Journal of Chemistry, 12 (1), 251-256 (2019). DOI: http://dx.doi.org/10.31788/rjc.2019.1215056.

Papers Presented in Conferences

3) An Assessment of Water Quality of Rihand River (India) using Multivariate Statistical Techniques – Ramita Varshney, Ashish Kumar Vishwakarma, Ashwani Kumar Sonkar and Aarif Jamal (2019). Accepted and Published in Proceedings of the International Conference on "River Health; Assessment to Restoration (RHAR-2019)".

4) Economic Rehabilitation of Local population in the post mining situation – A. Jamal, R. Kumar, S. Ratan, R. Varshney, S. Shirin (2017). Accepted and Published in CEMEPE/SECOTOX. Proceedings of the Sixth international Conference on Environmental Management, Engineering, Planning and Economics, Thessaloniki, Greece, June 25-30, 2017, pp. 876-885.