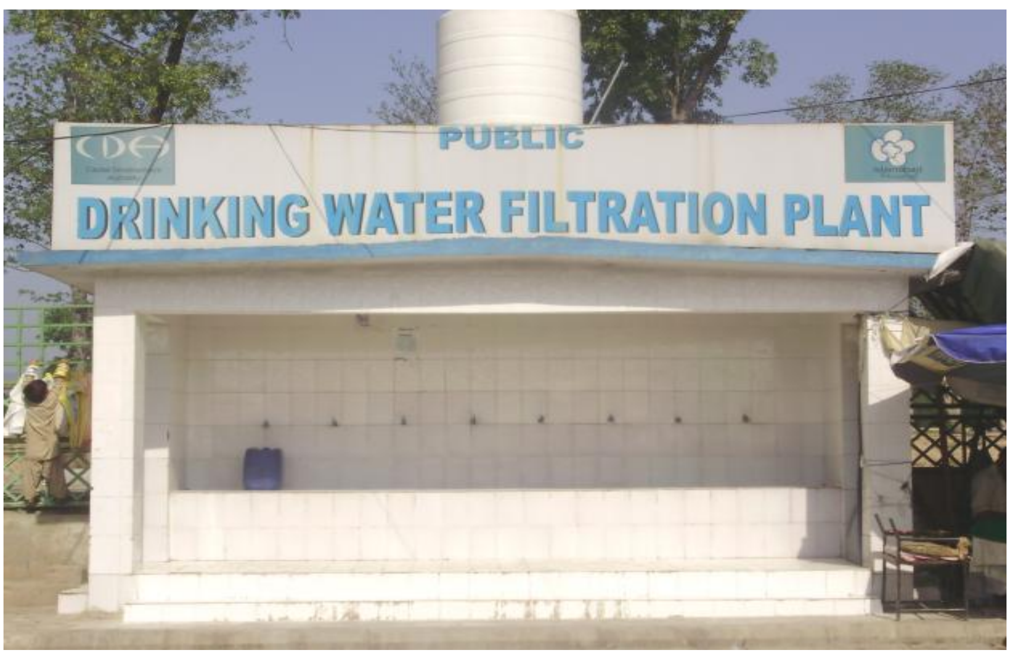
MONITORING REPORT

WATER QUALITY OF FILTRTAION PLANTS

ISLAMABAD

(July, 2010)



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INTRODUCTION

Safe water is one of the basic human needs and is considered as an unquestionable factor for good health. About 80% of the diseases and equivalent percentage of child deaths are attributed to water borne diseases. Water quality of both surface and ground water has been identified as one of the main issues in Pakistan, due to four major water quality tribulations such as bacteriological, arsenic, nitrate and fluoride contamination. Without addressing the prevailing water quality issues, the public health status cannot be improved. As one indication of the magnitude of the problem, it is estimated that 200,000 children die every year due to diarrhoeal diseases alone. It is further estimated that water related diseases cause annual national income losses of USD 380-883 million – or approximately 0.6-1.44 percent of GDP.

Safe water concerns have been highlighted intensely in last few years and many water purification technologies have been introduced in the country to remove undesirable chemicals, materials, and biological contaminants from raw water. However; the water that is reasonably contaminant free (and safe) one moment can become dangerously contaminated the next because of accident, neglect, or some natural event. One of the most notorious recent examples of water that was safe one day and dangerous the next day, was during the summer of 1993 in Milwaukee (USA) when one-fourth of the people living in the metro area (over 400,000) became ill with cryptosporidiosis. According to findings, the contamination of Milwaukee's water supply was a combination of natural events (heavy rains) and accident (improperly installed monitoring equipment) that allowed the parasite to pass though the city's purification system and into the distribution network. Usually, the water filtration options in practice to produce safe drinking water are Rapid Sand filters, Micro-filtration, Ultraviolet disinfection and Chlorination. Access to safe drinking water in Pakistan is a critical health issue that will increase with projected population growth.

Federal, provincial and local governments in Pakistan have installed many water filtration plants all over the country to provide safe drinking water to public. Sustainable supply of safe drinking water through these water filtration plants is an important issue as the efficacy of providing safe drinking water from these plants is dependent on operation and maintenance, capacity of plant operators and water quality monitoring.

Pakistan Council of Research in Water Resources (PCRWR) was designated as focal agency on 6th July, 2005 for water policy and water quality monitoring. To ensure the provision of safe drinking water, PCRWR is implementing several water quality monitoring initiatives in all over the country. Water quality monitoring of water filtration plants is also an important component of this task. In the same connection, this report is compiled based on water quality status of water filtration plants installed in capital territory of Islamabad. From time to time, PCRWR monitors the quality of water filtration plants installed by Capital Development Authority (CDA) to ensure the health and safety of general public.

PCRWR SAMPLING METHODOLOGY

No. of Plants installed in Islamabad by CDA	33
No. of Plants Monitored	32
Reason of un-monitored filtration plant(s)	A filtration plant installed near CDA Hospital was found permanently closed by CDA due to unavailability of water supply.
Composition of Sampling Team	Sampling team comprised of well experienced professionals i.e a Research Officer and a Laboratory Assistant from National Water Quality Laboratory of PCRWR.
Objectives of the Programme	1 To evaluate the quality of drinking water being supplied to general public by CDA water filtration plants 2 To highlight the need of further improvements in water treatment process and water quality monitoring on routine basis. 3 To safeguard the public health against contaminated drinking water.
Sampling Procedure	Following the American Public Health Association Protocols for water sampling, testing and quality control, water samples were collected from each filtration plant. For this purpose, four types of samples were collected from each site, preserved and transported to National water Quality Laboratory. Types of the water samples collected are as following;

Sample Type	Preservative	WQ Parameters
Type A	Sterilized sampling bottles for microbiological analysis	Total Coliforms, Faecal Coliforms & E-coli (indicator organisms)
Type B	2ml/liter HNO_3 as preservative for trace elements	Metals and heavy metals like arsenic, lead, mercury, zinc, chromium, copper
Type C	1ml/100ml boric acid as preservative	Nitrate (N)
Type D	No preservative	Physical and aesthetic parameters. Major Cations and anions

	Field blank and replicate samples[1] for quality control purpose were also collected. One out of twenty sites was selected for replicate and field blank samples, which were analyzed to evaluate the reproducibility of analytical results and the quality of distilled water respectively.

Figure-1: Water Sampling from CDA Filtration Plants by PCRWR Professionals (July, 2010)

[1] **Field Blank** is a blank solution (Deionized water) that is subjected to all aspects of sample collection, field processing, preservation, transportation, and laboratory handling as an environmental sample.

Replicate Samples is a group of samples, collected in a manner that the samples are thought to be essentially identical in composition.

PCRWR LABORATORY FACILITIES

It is worthwhile to mention here that PCRWR has an ISO-17025 accredited NWQL having analytical capabilities for wide range of physicochemical (inorganic and organic parameters) and microbiological parameters. PCRWR Water Quality Laboratories have a well defined quality control mechanism to generate reliable data. National Water Quality Laboratory (NWQL) participates regularly in FAPAS International Proficiency Programme (UK) as a part of its quality assurance plan.

Figure-2: Technical Facilities of National Water Quality Laboratory (NWQL) of PCRWR

PCRWR IDENTIFICATION CODES ALLOTED TO CDA FILTRATION PLANTS

Sr. No.	ID Code	Location	Operational Status
1.	CDA-1	I-8/3, Islamabad	Operational
2.	CDA-2	I-9/4, Islamabad	-do-
3.	CDA-3	G-9/2, Islamabad	-do-
4.	CDA-4	G-9/3, Islamabad	-do-
5.	CDA-5	Sitara Market, G-7/2, Islamabad	-do-
6.	CDA-6	G-7/4, Islamabad	-do-
7.	CDA-7	Abpara G-6, Islamabad	-do-
8.	CDA-8	F-6/1, Islamabad	-do-
9.	CDA-9	G-6/1-2, Islamabad	-do-
10.	CDA-10	G-10/2,	-do-
11.	CDA-11	G-11/2	-do-
12.	CDA-12	G-11/3	-do-
13.	CDA-13	F-10 Markaz	-do-
14.	CDA-14	F-10/1	-do-
15.	CDA-15	G-10 Markaz	-do-
16.	CDA-16	I-10 Markaz	-do-
17.	CDA-17	I-10/1	-do-
18.	CDA-18	I-10/4	-do-
19.	CDA-19	I-9 Mangal Bazar	-do-
20.	CDA-20	I-10/2	-do-
21.	CDA-21	I-8/1	-do-
22.	CDA-22	G-8/2	-do-
23.	CDA-23	G-8/1	-do-
24.	CDA-24	Minister Colony	-do-
25.	CDA-25	Pak Sectariet, P Block	-do-
26.	CDA-26	Parliament House	-do-
27.	CDA-27	Awan-e-Sadar Colony	-do-
28.	CDA-28	Parliament Lodges	-do-
29.	CDA-29	Masjid Noor Qadimi	-do-
30.	CDA-30	Abpara Bazar, G-6	-do-
31.	CDA-31	Margalla Town	-do-
32.	CDA-32	I-10/2, Chambeli Road	-do-
33.	CDA-33	G-6/2	**Un-operational**

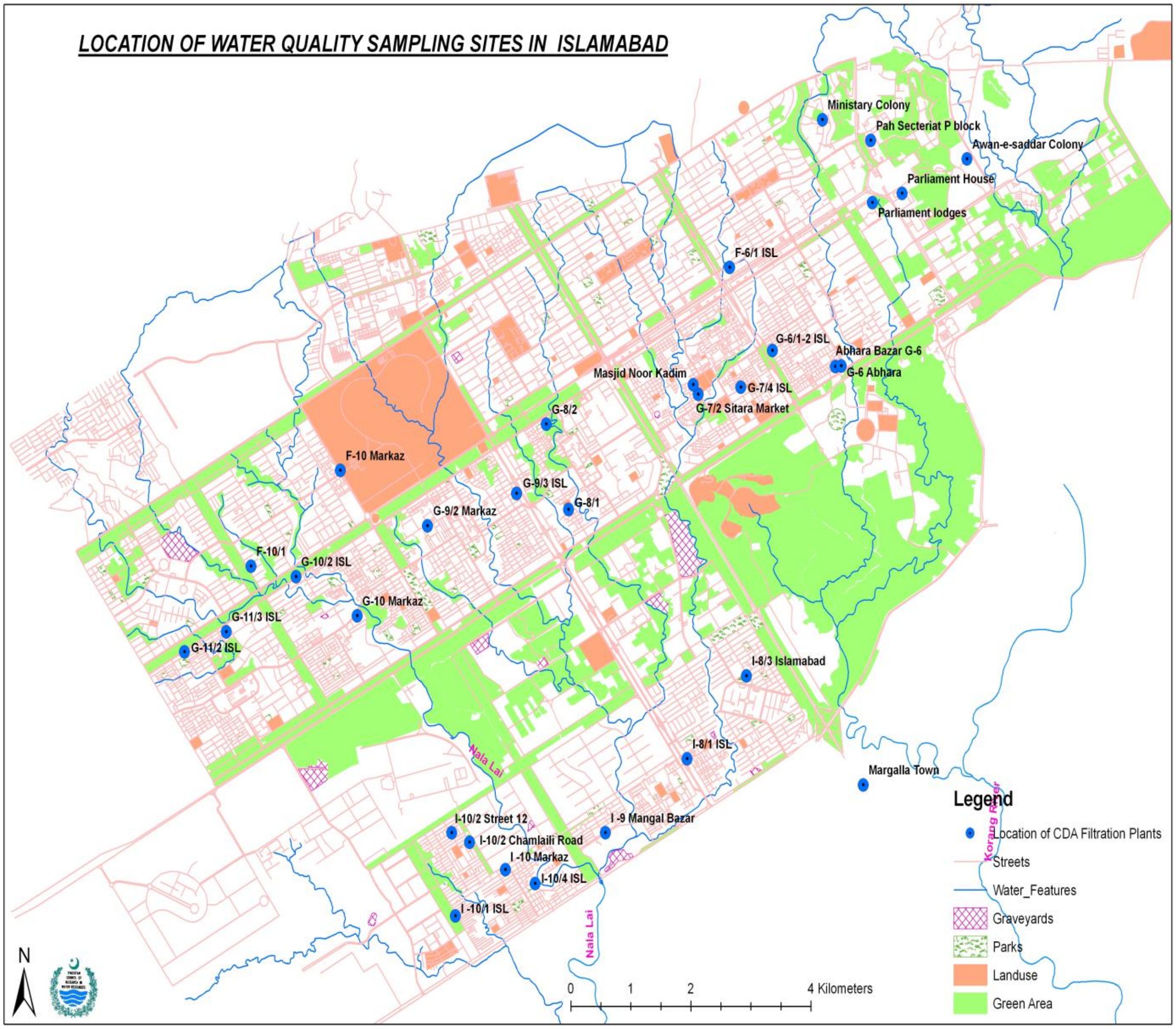

Figure-3: Locations of CDA water Filtration Plants in Capital Territory of Islamabad

WATER QUALITY PARAMETERS AND METHODS USED FOR ANALYSIS

Sr. #	Parameters	Analytical Method
1.	Alkalinity (m.mol/l as CaCO3)	2320, Standard method (1992)
2.	Arsenic (ppb)	AAS Vario 6, Analytik Jena AG
3.	Bicarbonate	2320, Standard method (1992)
4.	Calcium (mg/l)	3500-Ca-D, Standard Method (1992)
5.	Carbonate (mg/l)	2320, Standard method (1992)
6.	Chloride (mg/l)	Titration (Silver Nitrate), Standard Method (1992)
7.	Color (TCU)	Sensory Test
8.	Conductivity (μS/cm)	E.C meter, Hach-44600-00, USA
9.	Hardness (mg/l)	EDTA Titration, Standard Method (1992)
10.	Magnesium (mg/l)	2340-C, Standard Method (1992)
11.	Nitrate Nitrogen (mg/l)	Cd. Reduction (Hach-8171) by Spectrophotometer
12.	Odor	Sensory Test
13.	pH	pH Meter, Hanna Instrument, Model 8519, Italy
14.	Potassium (mg/l)	Flame photometer PFP7, UK
15.	Sodium (mg/l)	Flame photometer PFP7, UK
16.	Sulfate (mg/l)	SulfaVer4 (Hach-8051) by Spectrophotometer
17.	Phosphate (mg/l)	8190 and 8048 (Hach)
18.	Taste	Sensory Test
19.	TDS (mg/l)	2540C, Standard method (1992)
20.	Turbidity (NTU)	Turbidity Meter, Lamotte, Model 2008, USA
21.	Fluoride (mg/l)	4500-F C. ion-Selective Electrode Method Standard method (1992)
22.	Iron (mg/l)	FerroVer method (HACH Cat. 21057-69)
23.	Total Coliforms (MPN/100ml)	9221-B,Multiple tube fermentation Technique, Standard Methods for the Examination of Water and Waste Water
24.	E. Coli (MPN/100ml)	9221-E,Multiple tube fermentation Technique, Standard Methods for the Examination of Water and Waste Water
25.	Total Plate Count (TPC) (CFU/ml)	9215-B, Heterotrophic Plate Count. Standard Methods for the Examination of Water and Waste Water

WATER QUALITY PERMISSIBLE LIMITS FOR DRINKING WATER

Sr. #	Parameter	Units	Permissible Limits	
			WHO	PSQCA
1.	Alkalinity	(m.mol/l)	NGVS	NGVS
2.	Bicarbonate	(mg/l)	NGVS	NGVS
3.	Calcium	(mg/l)	NGVS	NGVS
4.	Carbonate	(mg/l)	NGVS	NGVS
5.	Chloride	(mg/l)	250	250
6.	Co lour	(TCU)	15	Colorless
7.	Conductivity	(µS/cm)	NGVS	NGVS
8.	Fluoride	(mg/l)	1.5	1.5
9.	Hardness	(mg/l)	NGVS	500
10	Iron	(mg/l)	0.3	0.3
11.	Magnesium	(mg/l)	NGVS	NGVS
12.	Odor	-	Odorless	Unobjectionable
13.	Nitrate-N	(mg/l)	10	10
14.	pH	-	6.5-8.5	6.5-8.5
15.	Potassium	(mg/l)	NGVS	NGVS
16.	Sodium	(mg/l)	200	NGVS
17.	Sulfate	(mg/l)	250	NGVS
18.	Taste	-	Unobject.	Unobjectionable
19.	TDS	(mg/l)	1000	1000
20.	Turbidity	(NTU)	5	<5
21.	Phosphate	(mg/l)	NGVS	NGVS
22.	Arsenic	ppb	10	50
23.	Total Coliforms	MPN/100ml	0	0
24.	E-Coli	MPN/100ml	0	0
25.	Total Plate Count	CFU/ml	-	500 CFU/ml

WHO World Health Organization
PSQCA Pakistan Standards and Quality Control Authority

SUMMARY OF RESULTS OF PCRWR WATER QUALITY MONITORING

1. In total, 32 filtration plants were monitored.
2. Analytical results of all the filtration plants were compared with WHO and PSQCA permissible limits for Drinking water.
3. Water samples of all the filtration plants were found safe with respect to physico-chemical water quality parameters.
4. Out of total 32 monitored filtration plants, 09 plants have shown prevalence of bacteriological contamination in the water being supplied.
5. Level of Free Residual Chlorine was found below Detection limit (0.05 ppm).

CONTAMINANTS OF POTENTIAL CONCERNS FOUND IN DRINKING WATER BEING SUPPLIED BY CDA WATER FILTRATION PLANTS

Bacteriological Contamination (Total Coliforms, Fecal Coliforms & E-coli)					
Sr. No	Filtration Plant ID Code	Location	Results		
			Total Coliforms (MPN/100ml)	Fecal Coliforms (MPN/100ml)	E-coli (+ve/-ve)
1.	CDA-2	I-9/4, Islamabad	2	-ve	-ve
2.	CDA-8	F-6/1, Islamabad	8	8	+ve
3.	CDA-14	F-10/1	14	7	-ve
4.	CDA-15	G-10 Markaz	17	17	-ve
5.	CDA-19	I-9 Mangal Bazar	4	4	-ve
6.	CDA-20	I-10/2	33	14	-ve
7.	CDA-22	G-8/2	02	02	-ve
8.	CDA-23	G-8/1	14	11	+ve
9.	CDA-30	Abpara Bazar, G-6	08	08	-ve

MPN: Most Probable Number

FILTRATION PLANTS PROVIDING SAFE DRINKING WATER

Sr. No	Filtration Plant ID Code	Location	Quality (Safe/Unsafe)	
			Chemical	Microbiological
1.	CDA-1	I-8/3, Islamabad	Safe	Safe
2.	CDA-3	G-9/2, Islamabad	Safe	Safe
3.	CDA-4	G-9/3, Islamabad	Safe	Safe
4.	CDA-5	Sitara Market, G-7/2	Safe	Safe
5.	CDA-6	G-7/4, Islamabad	Safe	Safe
6.	CDA-7	Abpara G-6, Islamabad	Safe	Safe
7.	CDA-9	G-6/1-2, Islamabad	Safe	Safe
8.	CDA-10	G-10/2,	Safe	Safe
9.	CDA-11	G-11/2	Safe	Safe
10.	CDA-12	G-11/3	Safe	Safe
11.	CDA-13	F-10 Markaz	Safe	Safe
12.	CDA-16	I-10 Markaz	Safe	Safe
13.	CDA-17	I-10/1	Safe	Safe
14.	CDA-18	I-10/4	Safe	Safe
15.	CDA-21	I-8/1	Safe	Safe
16.	CDA-24	Minister Colony	Safe	Safe
17.	CDA-25	Pak Sectariet, P Block	Safe	Safe
18.	CDA-26	Parliament House	Safe	Safe
19.	CDA-27	Awan-e-Sadar Colony	Safe	Safe
20.	CDA-28	Parliament Lodges	Safe	Safe
21.	CDA-29	Masjid Noor Qadimi	Safe	Safe
22.	CDA-31	Margalla Town	Safe	Safe
23.	CDA-32	I-10/2, Chambeli Road	Safe	Safe

FILTRATION PLANTS PROVIDING UNSAFE DRINKING WATER

Sr. No	Filtration Plant ID Code	Code	Quality (Safe/Unsafe)	
			Chemical	Microbiological
1.	CDA-2	I-9/4, Islamabad	Safe	Unsafe
2.	CDA-8	F-6/1, Islamabad	Safe	Unsafe
3.	CDA-14	F-10/1	Safe	Unsafe
4.	CDA-15	G-10 Markaz	Safe	Unsafe
5.	CDA-19	I-9 Mangal Bazar	Safe	Unsafe
6.	CDA-20	I-10/2	Safe	Unsafe
7.	CDA-22	G-8/2	Safe	Unsafe
8.	CDA-23	G-8/1	Safe	Unsafe
9.	CDA-30	Abpara Bazar, G-6	Safe	Unsafe

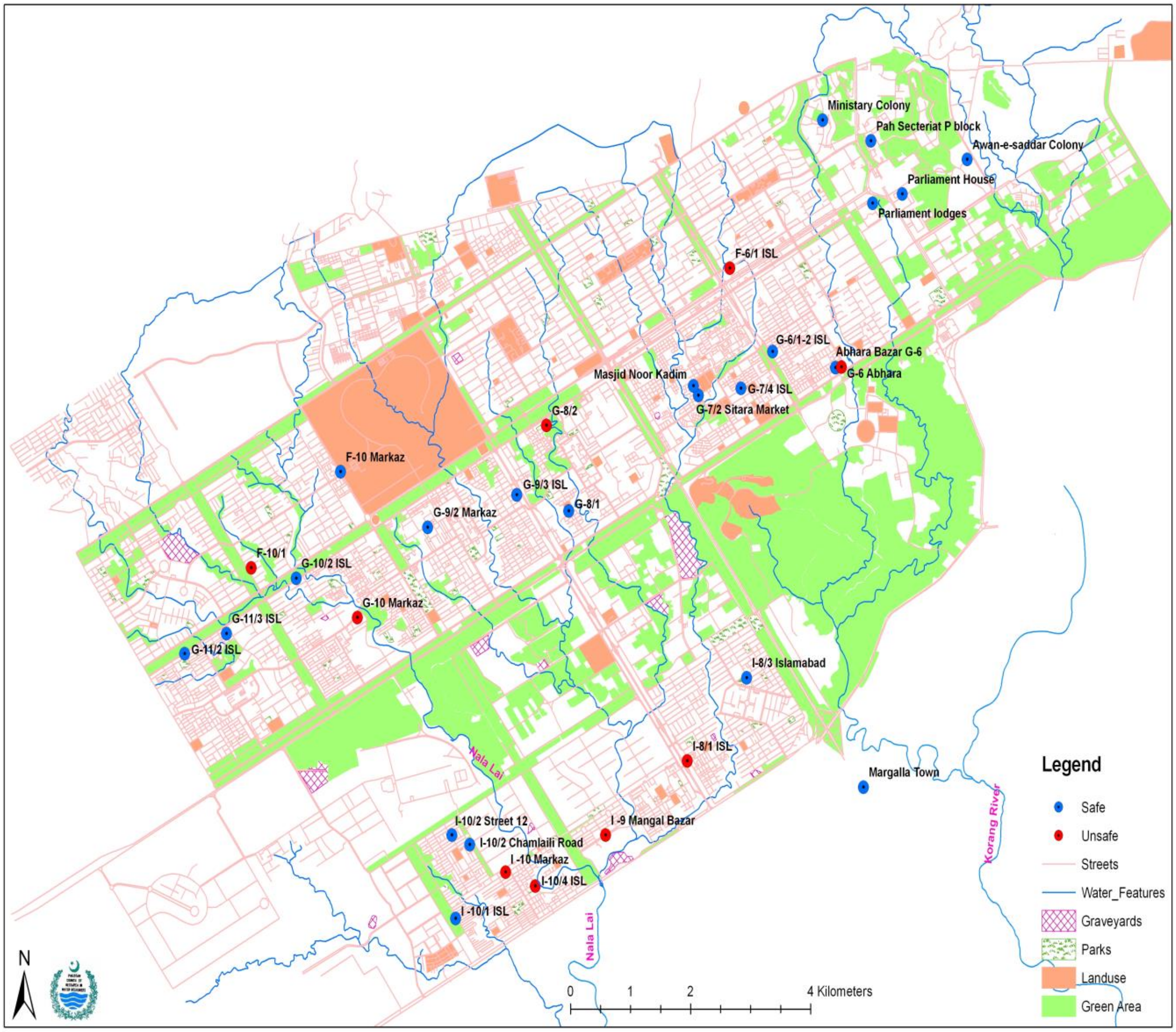

Figure-4: Distribution of Bacteriological Contamination in CDA Water Filtration Plants

DISEASE POTENTIAL FROM CONTAMINATED WATER

Sr. No	Contaminant	Diseases Impacts
1.	Bacteriological Contamination	Gastro-enteritis, Cholera, Diarrhea, Dysentery, Hepatitis A & E, Typhoid

OVERALL CONCLUSIONS

Sr. No	Item	Conclusion	
		No.	% age
1.	Total No. of Filtration Plants Monitored	32	-
2.	Filtration Plants Providing Safe Water	23	72
3.	Filtration Plants Providing Unsafe Water	09	28
4.	Filtration Plants Having Problem of Chemical Contamination	00	00
5.	Filtration Plants Having Problem of Microbiological Contamination	09	28

Detailed Water Quality Status of each water filtration plant is given at Annexure-1.

RECOMMENDATIONS

In order to improve the drinking water being supplied by CDA filtration plants, following actions are recommended:

1. Capacity of plant operator must be developed for effective chlorination, analysis of free residual chlorine on daily basis and bacteriological contamination on weekly basis. In this respect, a log book should be maintained by plant operator and verified by concerned authorities on daily basis. Capacity building of CDA plant operators and management for O&M of filtration plants is also recommended.
2. Hygienic conditions at the plant site and its surroundings should be maintained.
3. Replacements and maintenance of Ultraviolet Lamps/Filtration Cartridges should be carried out in time for continuous supply of safe drinking water.

REFERENCES

- APHA, AWWA and WEF, D.E 1992 Standard Methods for the Examination of Water and Wastewater. American Public Health Association, American Water Works Association and Water Environment Federation, 18th Edition, Washington, DC.
- WHO Guidelines for Drinking-Water Quality. http://www.searo.who.int/EN/Section314_4295.htm#who
- Pakistan Standards Specification for Bottled Drinking Water, 3rd Revision 9PS:4639-2004. Pakistan Standards Quality Control Authority, Karachi, Pakistan.

Annexure-I

Analytical Results of CDA Filtration Plants

Sr. No	Client Sample Code	Lab Sample Code	Turbidly	Color	pH	EC	TDS	Ca	Mg	Hardness	Alkalinity
		Guideline Values (PSQCA)	**5**	**Colorless**	**6.5 - 8.5**	**NGVS**	**1000**	**NGVS**	**NGVS**	**500**	**NGVS**
		Units	***NTU***	_	-	***µS/cm***	***ppm***	***ppm***	***ppm***	***ppm***	***ppm***
		Detection Limit	***0.2***	_	***0.02***	**0.2875**	_	***2***	***1***	***5***	_
1	I-8/3, Islamabad	INT-MCL-003 (1)-10	BDL	Colorless	7.19	694	382	84	24	310	310
2	I-9/4, Islamabad	INT-MCL-003 (2)-10	BDL	Colorless	6.85	779	428	78	40	360	355
3	G-9/2, Islamabad	INT-MCL-003 (3)-10	BDL	Colorless	6.95	806	443	64	32	290	335
4	G-9/3, Islamabad	INT-MCL-003 (4)-10	BDL	Colorless	7.18	688	378	88	23	315	300
5	Sitara Market, G-7/2	INT-MCL-006 (1)-10	BDL	Colorless	7.2	610	336	48	40	285	290
6	G-7/4, Islamabad	INT-MCL-006 (2)-10	BDL	Colorless	7.5	567	312	64	32	290	265
7	Abpara G-6, Islamabad	INT-MCL-006 (3)-10	BDL	Colorless	7.82	430	237	42	21	190	160
8	F-6/1, Islamabad	INT-MCL-006 (4)-10	BDL	Colorless	6.97	757	416	96	19	320	305
9	G-6/1-2, Islamabad	INT-MCL-010-10	BDL	Colorless	7.26	584	321	78	18	270	260
10	G-10/2,	INT-MCL-012 (1)-10	BDL	Colorless	7.06	844	464	78	30	320	320
11	G-11/2	INT-MCL-012 (2)-10	BDL	Colorless	7.23	504	302	58	26	250	200
12	G-11/3	INT-MCL-012 (3)-10	BDL	Colorless	7.1	811	446	90	11	270	330
13	F-10 Markaz	INT-MCL-012 (4)-10	BDL	Colorless	7.59	390	215	48	17	190	110
14	F-10/1	INT-MCL-012 (5)-10	BDL	Colorless	6.98	980	539	64	44	340	320
15	G-10 Markaz	INT-MCL-012 (6)-10	BDL	Colorless	7.12	917	504	84	32	340	320
16	I-10 Markaz	INT-MCL-017 (1)-10	BDL	Colorless	7.38	545	300	60	17	220	220
17	I-10/1	INT-MCL-017 (2)-10	BDL	Colorless	7.18	780	429	76	22	280	350
18	I-10/4	INT-MCL-017 (3)-10	BDL	Colorless	7.01	770	424	90	13	280	320
19	I-9 Mangal Bazar	INT-MCL-018 (1)-10	BDL	Colorless	7.05	792	436	88	32	350	360
20	I-10/2	INT-MCL-018 (2)-10	BDL	Colorless	7.35	610	336	60	24	250	245
21	I-8/1	INT-MCL-018 (3)-10	BDL	Coloress	6.97	765	421	88	22	310	325
22	G-8/2	INT-MCL-018 (4)-10	BDL	Coloress	7.04	722	397	88	22	310	345
23	G-8/1	INT-MCL-018 (5)-10	BDL	Coloress	6.89	790	435	96	21	355	325
24	Minister Colony	INT-MCL-024 (1)-10	BDL	Coloress	7.34	402	221	48	12	170	145
25	Pak Sectariet, P Block	INT-MCL-024 (2)-10	BDL	Coloress	7.4	388	231	60	7	180	150
26	Parliament House	INT-MCL-024 (3)-10	BDL	Coloress	7.46	390	215	48	15	180	150
27	Awan-e-Sadar Colony	INT-MCL-024 (4)-10	BDL	Coloress	7.45	384	211	60	7	180	140
28	Parliament Lodges	INT-MCL-024 (5)-10	BDL	Coloress	7.25	672	370	80	18	275	290
29	Masjid Noor Qadimi	INT-MCL-026 (1)-10	BDL	Coloress	6.94	698	384	92	27	340	335
30	Abpara Bazar, G-6	INT-MCL-026 (1)-10	BDL	Coloress	7.31	391	215	40	29	220	155
31	Margalla Town	INT-MCL-026 (1)-10	BDL	Coloress	7.15	548	301	76	15	250	235
32	I-10/2, Chambeli Road	INT-MCL-026 (1)-10	BDL	Coloress	7.36	516	284	56	24	240	230

Monitoring Report of Drinking Water Filtration Plants

Sr. No	Client Sample Code	Lab Sample Code	HCO3	CO3	Cl	Na	Fl	Fe	K	NO3	SO4
		Guideline Values (PSQCA)	NGVS	NGVS	250	NGVS	1.5	0.3	NGVS	10	NGVS
		Units	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
		Detection Limit	*5*	*5*	*2*	*1*	*0.03*	*0.03*	*0.2*	*0.06*	*0.4*
1	I-8/3, Islamabad	INT-MCL-003 (1)-10	310	BDL	19	25	0.2	0.03	1.5	3.8	24
2	I-9/4, Islamabad	INT-MCL-003 (2)-10	355	BDL	22	25	0.19	0.04	1.2	4	33
3	G-9/2, Islamabad	INT-MCL-003 (3)-10	335	BDL	7	53	0.18	BDL	1.4	4	56
4	G-9/3, Islamabad	INT-MCL-003 (4)-10	300	BDL	8	25	0.14	BDL	1.6	4	35
5	Sitara Market, G-7/2, Islamabad	INT-MCL-006 (1)-10	290	BDL	8	14	0.3	BDL	1.6	2.3	25
6	G-7/4, Islamabad	INT-MCL-006 (2)-10	265	BDL	9	17	0.3	BDL	1.2	1.4	24
7	Abpara G-6, Islamabad	INT-MCL-006 (3)-10	160	BDL	8	16	0.25	BDL	2.5	1	65
8	F-6/1, Islamabad	INT-MCL-006 (4)-10	305	BDL	21	22	0.32	BDL	0.8	5.5	24
9	G-6/1-2, Islamabad	INT-MCL-010-10	260	BDL	9	13	0.39	BDL	1.1	1	27
10	G-10/2,	INT-MCL-012 (1)-10	320	BDL	24	38	0.42	BDL	1.1	6	65
11	G-11/2	INT-MCL-012 (2)-10	200	BDL	7	16	0.43	0.03	1.1	2	65
12	G-11/3	INT-MCL-012 (3)-10	330	BDL	20	50	0.46	BDL	1.1	4	45
13	F-10 Markaz	INT-MCL-012 (4)-10	110	BDL	5	5	0.46	BDL	1	1	85
14	F-10/1	INT-MCL-012 (5)-10	320	BDL	42	48	0.41	0.03	1.4	10	74
15	G-10 Markaz	INT-MCL-012 (6)-10	320	BDL	24	38	0.55	0.04	1.3	10	65
16	I-10 Markaz	INT-MCL-017 (1)-10	220	BDL	13	16	0.43	BDL	1.5	2	23
17	I-10/1	INT-MCL-017 (2)-10	350	BDL	16	47	0.5	BDL	1.4	4	30
18	I-10/4	INT-MCL-017 (3)-10	320	BDL	22	40	0.37	BDL	1.3	3	30
19	I-9 Mangal Bazar	INT-MCL-018 (1)-10	360	BDL	23	33	0.32	BDL	1.3	5	32
20	I-10/2	INT-MCL-018 (2)-10	245	BDL	23	25	0.33	BDL	1.5	3	33
21	I-8/1	INT-MCL-018 (3)-10	325	BDL	21	27	0.43	BDL	1.1	3	20
22	G-8/2	INT-MCL-018 (4)-10	345	BDL	10	24	0.49	0.03	1.1	3	26
23	G-8/1	INT-MCL-018 (5)-10	355	BDL	21	30	0.54	BDL	0.9	5	28
24	Minister Colony	INT-MCL-024 (1)-10	145	BDL	12	13	0.14	BDL	2.3	1	47
25	Pak Sectariet, P Block	INT-MCL-024 (2)-10	150	BDL	10	13	0.13	BDL	2.2	1	34
26	Parliament House	INT-MCL-024 (3)-10	150	BDL	10	13	0.18	BDL	2.2	1	36
27	Awan-e-Sadar Colony	INT-MCL-024 (4)-10	140	BDL	12	13	0.14	BDL	2.2	1	34
28	Parliament Lodges	INT-MCL-024 (5)-10	290	BDL	16	22	0.36	0.03	0.4	2	31
29	Masjid Noor Qadimi	INT-MCL-026 (1)-10	335	BDL	14	11	0.17	BDL	1	3	37
30	Abpara Bazar, G-6	INT-MCL-026 (1)-10	155	BDL	10	11	0.29	BDL	2	1	52
31	Margalla Town	INT-MCL-026 (1)-10	235	BDL	12	12	0.28	0.03	0.8	1	41
32	I-10/2, Chambeli Road	INT-MCL-026 (1)-10	230	BDL	11	11	0.33	BDL	1.2	1	36

Monitoring Report of Drinking Water Filtration Plants

Sr. No	Client Sample Code	Lab Sample Code	Po4	As	Total Coliform	Fecal Coliform	E.Coli	presence/absence
		Guideline Values (PSQCA)	NGVS	50	0	0	-ve	-ve
		Units	*ppm*	*ppb*	MPN/100ml	MPN/100ml	+ve/ -ve	_
		Detection Limit	*0.03*	*0.106*	_	_	_	_
1	I-8/3, Islamabad	INT-MCL-003 (1)-10	BDL	0.5225	-ve	-ve	-ve	-ve
2	**I-9/4, Islamabad**	**INT-MCL-003 (2)-10**	**BDL**	**0.6097**	**2**	**-ve**	**-ve**	**+ve**
3	G-9/2, Islamabad	INT-MCL-003 (3)-10	0.04	0.9085	-ve	-ve	-ve	-ve
4	G-9/3, Islamabad	INT-MCL-003 (4)-10	BDL	0.4059	-ve	-ve	-ve	-ve
5	Sitara Market, G-7/2, Islamabad	INT-MCL-006 (1)-10	0.05	0.71	-ve	-ve	-ve	-ve
6	G-7/4, Islamabad	INT-MCL-006 (2)-10	0.04	0.255	-ve	-ve	-ve	-ve
7	Abpara G-6, Islamabad	INT-MCL-006 (3)-10	BDL	1.1164	-ve	-ve	-ve	-ve
8	**F-6/1, Islamabad**	**INT-MCL-006 (4)-10**	**0.11**	**0.642**	**8**	**8**	**8**	**+ve**
9	G-6/1-2, Islamabad	INT-MCL-010-10	0.05	0.4674	-ve	-ve	-ve	-ve
10	G-10/2,	INT-MCL-012 (1)-10	0.09	0.484	-ve	-ve	-ve	-ve
11	G-11/2	INT-MCL-012 (2)-10	0.05	0.6144	-ve	-ve	-ve	-ve
12	G-11/3	INT-MCL-012 (3)-10	0.11	0.2626	-ve	-ve	-ve	-ve
13	F-10 Markaz	INT-MCL-012 (4)-10	0.14	1.219	-ve	-ve	-ve	-ve
14	**F-10/1**	**INT-MCL-012 (5)-10**	**0.17**	**0.524**	**14**	**7**	**-ve**	**+ve**
15	**G-10 Markaz**	**INT-MCL-012 (6)-10**	**0.07**	**1.492**	**17**	**17**	**-ve**	**+ve**
16	I-10 Markaz	INT-MCL-017 (1)-10	0.06	0.6411	-ve	-ve	-ve	-ve
17	I-10/1	INT-MCL-017 (2)-10	0.1	0.4403	-ve	-ve	-ve	-ve
18	I-10/4	INT-MCL-017 (3)-10	0.07	0.5178	-ve	-ve	-ve	-ve
19	**I-9 Mangal Bazar**	**INT-MCL-018 (1)-10**	**0.36**	**0.598**	**4**	**4**	**-ve**	**-ve**
20	**I-10/2**	**INT-MCL-018 (2)-10**	**BDL**	**0.637**	**33**	**14**	**-ve**	**+ve**
21	I-8/1	INT-MCL-018 (3)-10	0.07	0.761	-ve	-ve	-ve	-ve
22	**G-8/2**	**INT-MCL-018 (4)-10**	**0.08**	**0.6087**	**02**	**02**	**-ve**	**-ve**
23	**G-8/1**	**INT-MCL-018 (5)-10**	**0.05**	**0.575**	**14**	**11**	**+ve**	**+ve**
24	Minister Colony	INT-MCL-024 (1)-10	BDL	1.022	-ve	-ve	-v	-ve
25	Pak Sectariet, P Block	INT-MCL-024 (2)-10	BDL	1.007	-ve	-ve	-v	-ve
26	Parliament House	INT-MCL-024 (3)-10	BDL	1.106	-ve	-ve	-v	-ve
27	Awan-e-Sadar Colony	INT-MCL-024 (4)-10	0.05	0.968	-ve	-ve	-v	-ve
28	Parliament Lodges	INT-MCL-024 (5)-10	0.08	0.868	-ve	-ve	-v	-ve
29	Masjid Noor Qadimi	INT-MCL-026 (1)-10	BDL	0.828	-ve	-ve	-v	-ve
30	**Abpara Bazar, G-6**	**INT-MCL-026 (1)-10**	**BDL**	**0.89**	**08**	**08**	**-ve**	**+ve**
31	Margalla Town	INT-MCL-026 (1)-10	BDL	0.519	-ve	-ve	-ve	-ve
32	I-10/2, Chambeli Road	INT-MCL-026 (1)-10	BDL	0.5329	-ve	-ve	-ve	-ve

NGVS= No Guideline Value Set, MPN=Most Probable Number, TDS= Total dissolved Solids, NTU= Nephelometric Turbidity unit, BDL=Below Detection Limit