



QUARTERLY REPORT BOTTLED WATER QUALITY

(July-September, 2010)



PAKISTAN COUNCIL OF RESEARCH IN WATER RESOURCES
Ministry of Science & Technology
Khyban-e-johar, H-8/1, Islamabad.
www.pcrwr.gov.pk

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INTRODUCTION

Drinking water quality is deteriorating continually due to biological contamination from human waste, chemical pollutants from industries and agricultural inputs. Piped water also gets contaminated because pipes are laid very close to sewerage lines or open drains and cause many serious water borne diseases. It was found that 45% of infant deaths have been attributed to diarrhea and about 60% to overall infectious waterborne diseases in Pakistan. According to the World Health Organization (WHO) 25-30% of the diseases are gastro-intestinal in nature. The poor quality of drinking water has forced a large cross-section of citizens to buy bottled water. As a consequence of this expanding market a mushroom growth of bottled water industry in the country is witnessed during the last five years. However, many of the mineral water companies were found selling contaminated water. To monitor and improve the quality of bottled water, the government of Pakistan has designated the PCRWR as focal point agency.

1. Ministry of Science & Technology informed PCRWR Vide U.O. No. 5(21)/2004-ATA-II dated 17.10.2005 that the Cabinet in its meeting under the chairmanship of Prime Minister directed Ministry of Science & Technology to undertake regular survey/samples of bottled/mineral water at source of production, publicize the results on a quarterly basis and follow up with punitive/legal action.
2. Ministry of Science & Technology has assigned the task of quality monitoring of bottled water and publicize the results to PCRWR Vide U.O. No.1(1)/2005-Secy (MoST) dated 8.12.2005.

PCRWR SAMPLING METHODOLOGY

No. of Brands Collected	64	
No. of Cities Targeted	13 (Islamabad, Rawalpindi, Lahore, Bahawalpur, Multan, Peshawar, Quetta, Karachi, Hyderabad, Dera Ismail Khan, Faisalabad, Nawabshah, and Sialkot)	
Composition of Sampling Team	One Research Officer and Two Laboratory Assistants	
Sampling Procedure	Samples of sixty four commercially available brands of mineral/bottled water were collected from thirteen cities of four Provinces of Pakistan These samples were collected by the senior staff members of Head Office and Regional Offices of PCRWR from July-September, 2010. A set of four bottles of each brand was collected and sealed on site. Identification codes are allotted to all the brands according to PCRWR Bottled Water Classification System	
Transparency	Sample No. 1	Handed over to shopkeeper at the time of sample collection;
	Sample No. 2	Preserved in the National Water Quality Laboratory of PCRWR, Islamabad for future record,
	Sample No. 3	Used for Microbiological Analysis
	Sample No. 4	Used for physico-chemical analysis

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



PCRWR BOTTLED WATER CLASSIFICATION SYSTEM

Sr. No	Brand Name	PCRWR Code	City	Date of Collection	Date of Expiry	Claimed Bottled Water Type	Size	Name & Address of Seller/Shop Keeper	Manufacturer
1	Fairmount	BWM-01	Karachi	05.07.10	-	-	0.6 Liter	Iqbal Karyana Store Gali No 1 Liaqat Colony Shahwalliullah Road Nayabad Layari karachi	S S Sons Group Of Companies, Plot No B-225, Sector 41F Almajid Town, S.I.T.E Industrial Area Karachi.
2	Vey	BWM-02	Karachi	05.07.10	-	-	0.6 Liter	Gul medical and General Store Rabia Duplex Shop No 49 Block-C/1 Main University Road Karachi	Fluid Technology International Private Limited 424, Bhayani Centre Block –M, North Nazimabad, Karachi -7400
3	Better Life	BWM-03	Karachi	05.07.10	19.03.11	-	0.6 Liter	Al-Khyber General Store Gulistan-E Johar Block 2 Karachi	Faisalabad Oil Refinery Pvt Ltd, Fax 021-4750670
4	DeAar	BWM-04	Karachi	05.07.10	-	-	1.5 Liter	De Aar Water And Beverages (Pvt) Ltd Plot No B-32 Portion li Pak Cable Street Near Ghani Chorangi Site Karachi	DeAar Water & Beverage (Pvt) Ltd. Plot # B-32, S.I.T.E, Karachi Tel: 111-147-369.
5	Miracle	BWM-05	Karachi	05.07.10	-	-	1.5 Liter	Miracle Plot No Wsa-23 Block-14 F.B Area Karachi	Plot No WSA-23,Block-14,F.B Area Karachi
6	Iqrafina	BWM-06	Karachi	05.07.10	May 2011	-	1.5 Liter	Mushtaq bakery and general store Gali no 2 Shahwalliullah Road Nayabad Layari Karachi	Iqrafina and company email: iqra_finu@fastservice.com
7	Zindagi Plus	BWM-07	Karachi	05.07.10	Dec 2012	-	0.6 Liter	Mushtaq bakery and general store gali no 2 Shahwalliullah Road Nayabad Layari Karachi	Soft Water Technology Plot 4-A,4/19 Nazimabad No 4, Karachi
8	Safi mineral water	BWM-08	Dera Ismail Khan	28.07.10	12.2011	-	1.5 Liter	Sakhi Jan Near Grid Station Sheikh Yousaf Rod D.I Khan	Chasma Mineral Water, Near Grid Station, D.I Khan.
9	Hamalyia	BWM -09	Dera Ismail Khan	27.07.10	01.05.11	-	1.5 Liter	M.Asif D.I Khan Balochan Wali Kach Paid Khani Near Indus River D.I Khan	Water Solutions Pvt Ltd
10	Selina	BWM -10	Karachi	05.07.10	Dec 2011	-	0.6 Liter	Iqbal Karyana Store Gali No 1 Liaqat Colony Shah Walliullah Road Nayabd Layari Karaci	Soft Water Technology Plot 4-A, 4/19 Nazimabad No 4, Karachi.

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



11	Jel	BWM -11	Karachi	05.07.10	Dec 2010	-	0.6 Liter	Bismillah Bakery And General Store Mariam Manzil M.Khan Jamot Road Khada Nayabad Layari	Multi food industries plt no D-92 Malir industries area malir Karachi.
12	Max Fresh	BWM -12	Karachi	05.07.10	May 2011	-	0.6 Liter	Bismillah Bakery And General Store Mariam Manzil M.Khan Jamot Road Khada Nayabad Layari	MBBS Enterprises A-190 Panama Shopping Centre, Hasan Square Karachi.
13	AL-NOOR	BWM-13	Faisalabad	16.07.10	Dec 2010	Purified water	0.6 Liter	Mr Muzaffar Hussain Allied Hospital OPO Cafertia Faisalabad	AL-NOOR Enterprises Samundri Road Faisalabad.
14	WELL-Q	BWM-14	Faisalabad	16.07.10	June 2011	Pure drinking water	0.6 Liter	Haji Baba General Store Mahalla Akhbaraba St No 05 Near Allied Hospital	NXT International P-4 St No 2 Yousaf Town No 1 Satyana Raod, Faisalabad Pakistan.
15	Nation	BWM-15	Faisalabad	16.07.10	June 2011	Pure drinking water	0.6 Liter	Mr Muzaffar Hussain Allied Hospital OPO Cafertia Faisalabad	Hamza Brothers 9-Km G.T Road Rachna Town Shahdara Lahore
16	Mashmoom Aqua	BWM-16	Faisalabad	16.07.10	21.06.11	-	1.5 Liter	Mr Muzaffar Hussain Allied Hospital OPO Cafertia Faisalabad	Mashmoom (Pvt) Ltd Plot 153/154 Phase 5 Hattar Industrial Estate Hattar N.W.F.P
17	Legend	BWM-17	Nawabshah	21.06.10	12/2010	-	0.6 Liter	Ali Raza Regal Chowk Nawabshah	Mfi bottled by multi food industries plot no D-92, Malir Industrial Area Malir Karachi.
18	Kerry	BWM-18	Tando Jam	22.07.10	JUNE 2011	-	0.6 Liter	Al-Aziz Medical Store Tandojam	Aziz group Korangi Industrial Area Karachi.
19	Via	BWM-19	Tandojam	22.07.10	12/2011	-	0.6 Liter	Abdul Rehim Superstore Nawahut Bazaar Tandojam	Marketed By UN Brothers S.I.T.E Karachi.
20	Bio	BWM-20	Tandojam	22.07.10	11/2011	-	0.6 Liter	Abdul Rehim Superstore Nawahut Bazaar Tandojam	Aziz group Korangi Industrial Area Karachi.
21	Noble	BWM-21	Tandojam	22.07.10	12/2011	-	0.6 Liter	New Rahat Sweet Bakery and Nimko Nawahat Bazar	Bottled by Pak National Company Tower Market, Hakeem Habib Road Hyderabad
22	Zindagi	BWM-22	Peshawar	22.07.10	12/2011	-	0.6 Liter	HH Enterprises Industrial Area Jamrud Road Peshawar	H.H Enterprises Industry Area Jamrud Road Peshawar N.W.F.P
23	Atlantis Water	BWM-23	Peshawar	22.07.10	12/2011	-	1.5 Liter	De Goodar Shirkat SMC Pvt Ltd 107-A Industrial Estate Hayatabad Peshawar	Bottled By Source At DE GOODAR SHIRKAT SMC (Pvt) Ltd. 107-A Industrial Estate Hayatabad Peshawar.

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



24	Natural Aqwah Water	BWM-24	Peshawar	22.07.10	07/2011		0.6 Liter	R G Enterprises Nasir Bagh Raod University Board Peshawar	R G Enterprises Nasir Bagh Raod University Board Peshawar KPK Pakistan
25	New National	BWM-25	Peshawar	22.07.10	01/2011		0.6 Liter	Amir Jan R G Enterprises Nasir Bagh Raod University Board Peshawar	R G Enterprises Nasir Bagh Raod University Board Peshawar KPK Pakistan
26	Natural	BWM-26	Peshawar	22.07.10		Mineral Water	0.6 Liter	Mr Muhammad kausar FC Welfare Foundation Ali Masjid Landikotal	Khyber Food Products A Project of Frontier Corps Welfare Foundation Fort Balahisar Peshawar
27	Natural Khyber	BWM-27	Peshawar	22.07.10			0.6 Liter	Mr Muhammad kausar Khyber Food Products A Project of Frontier Corps Welfare Foundation	Khyber Food Products A Project of Frontier Corps Welfare Foundation Fort Balahisar Peshawar
28	Fresh Neslet	BWM-28	Peshawar	22.07.10			0.6 Liter	Mr Khatab jan Almasjid Landikotal Road Khyber Agency	Head Office near Almasjid Landikotal Road Khyber Agency
29	Khyber Aqua	BWM-29	Peshawar	23.07.10	04/2011		0.6 Liter	Mubashar Jamal Biokon Moya House No 47 St 1 Eidgah Colony Charsadda road Peshawar	Biokon Moya House No 47 St 1 Eidgah Colony Charsadda road Peshawar
30	Blue Water	BWM-30	Multan				0.6 Liter	-	Al-Hilal Industries (Pvt) Ltd Sultan Nagar Vehari Road Multan
31	Silver Spring	BWM-31	Multan				1.5 Liter	-	Bottled By : Blue Worlds Association Multan Pakistan
32	Sufi	BWM-32	Multan				1.5 Liter	-	Hadayat Food Stuffs Industries (Pvt) Ltd 1-B Garden Lock Garden Town Lahore
33	Pan Pura	BWM-33	Multan				1.5 Liter	--	Al-Aziz Enterprises Tufailabad 253-E-B Burewala
34	Pura Light	BWM-34	Multan				1.5 Liter		Pura Co; Pakistan
35	Classic Consumable	BWM-35	Multan				06 Liter		Plot No 1105-1106 Vehari Road Multan
36	Unique Water	BWM-36	Multan				06 Liter		M. Enterprises L.M.Q Road Multan
37	Nectar	BWM-37	Islamabad	03-08-2010			1.5 Liter	Kamran abbassi Plot No 25 Orchard Sector No 4 Islamabad	Plot No 14/10 Markaz G-7 Islamabad.
38	Ripple	BWM-38	Islamabad	03-08-2010	02.08.2011		1.5 Liter	Mr. Kaleem Plot 769 St No 06 Sector 3 Khana Road Al-Noor Colony RWP	Main Mirpur Road Al-Noor Colony Sector No 3 Corner of St No 6 Behind Fizaia Colony Rwp
39	A-One Natural Plus	BWM-39	Islamabad	03-08-2010			1.5 Liter	Mr.Asif St No 8 Al-Noor Colony RWP	Own Deep Well Source 252- Industrial Triangle Area Hummak Kahuta Road Islamabad

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



40	Dew Drops	BWM-40	Islamabad	03-08-2010	02.01.2011	-	06 Liter	Malik Mohsin Qutbal Town Khana Dak Islamabad	Bottled By Dew Drops Pakistan Ltd 308 Upper Mall Islamabad
41	Aqua Save	BWM-41	Sialkot	18.08.10		-	1.5 Liter	Tariq Anjum Julianwala village near Ugoki district Sialkot	SFS Mineral Water Company Waziraabad Road Julianwala Ugoki Sialkot
42	One Aqua	BWM-42	Sialkot	20.08.10	06/2011	-	1.5 Liter	Aqua One (Pvt) Ltd Daska Road Sialkot	Aqua One (Pvt) Ltd Daska Road Sialkot
43	Bake Master	BWM-43	Sialkot	20.08.10	07/2011	-	0.6 Liter	Near Larri Adda Sialkot	For Customer Services 0333-8656666 Near Lari Adda Sialkot
44	Isberg	BWM-44	Sialkot	18.08.10	07/2011	-	0.6 Liter	Ziauddin Bhatti Roadras Road Sagoki Police Station Sialkot	Premier Water Refining Company Sialkot
45	Niamat	BWM-45	Lahore	31.08.10		-	0.6 Liter		Water worlds Boby Plaza Compound, Opp, Govt, Munshi Hospital Bund Road (Ring road0, Lahore Tel, 92-42-7150190, 7150843
46	Clean Plus Extreme Water	BWM-46	Lahore	30.08.10		-	0.6 Liter		Bottled by clean Foods (Pvt)Ltd 46-J Gulberg III Lahore
47	Premier	BWM-47	Lahore	31.08.10	06/2011	-	0.6 Liter		Zafir Industries 19km near Highnoon Laboratories Multan Road Lahore
48	Aqua National	BWM-48	Lahore	31.08.10	08/2011	-	1.5 Liter		Milli Brothers 8- km, G.T Road Shahdara Lahore, 0333-4547000 0313 6756000
49	Active	BWM-49	Lahore	31.08.10	08/2011	-	1.5 Liter		Bottled By Ali Enterprises 106-E Plastic Dana Market Shah Alam Markaz Lahore
50	New Everest	BWM-50	Lahore	31.08.10	03/2011	-	1.5 Liter		Faisal Beverages (Pvt) Ltd 1-E Marghazar Colony Lahore
51	Lock	BWM-51	Lahore	31.08.10		-	1.5 Liter		Bottled by Aqua Safe (Pvt) Ltd 96 Macleod Road Lahore, Fax-042-37220415
52	Kinley	BWM-52	Lahore	30.08.10		-	1.5 Liter		Coca Cola Beverages Pakistan Ltd D-51 Estate Avenue S.I.T.E Karachi
53	Aquafina	BWM-53	Lahore	30.08.10		-	1.5 Liter		Riaz Bottlers Pvt Ltd 32-N Gulberg II Lahore under appointment from PepsiCo.
54	Nestle	BWM-54	Lahore	30.08.10		-	0.6 Liter		Nestle Pakistan Ltd 308 Upper Mall Lahore 54000.
55	Shahi Avisa	BWM-55	Bahawalpur	20.09.10	04/2011	-	0.6 Liter	Shan Bakers near Railway	Fun Factory C-18 Al-Hilal Society Karachi

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



								Station Railway Road BWP.	Pakistan
56	Pineo	BWM-56	Bahawalpur	20.09.10	12 months	-	0.6 Liter	Shan Bakers near Railway Station Railway Road BWP	Gysing Pak DDR-1, PSIE Bahawalpur
57	Piyaas	BWM-57	Bahawalpur	20.09.10	10.2011	-	0.6 Liter	Saleemi Medical Store opp bv. Hospital BWP	Arshad Industries Mouza Zakria Samma Satta 59-A Grain Market Bahawalpur
58	Aspen	BWM-58	Bahawalpur	20.09.10	01.09.11	-	0.6 Liter	Shabaz Cold Corner Bus Stand BWP	Gysing Pak DDR-1, PSIE Bahawalpur
59	Light Water	BWM-59	Bahawalpur	20.09.10	02/2011	-	0.6 Liter	Ahmed Pan Shop Bus Stand BWP	Umair Uzair (Pvt)Ltd 2-J St No A Block No Y New Multan
60	Aqua Hygienic	BWM-60	Quetta	23.09.10			1.5 Liter	Shifa Medical Store Jinnah Road Quetta	Zauhras (Pvt) Ltd A One City Street No 7 Brewery Road Quetta*963*63.4
61	Excellent Water	BWM-61	Quetta	21.09.10			1.5 Liter	Shifa Medical Store Jinnah Road Quetta	Industrial Area Quetta Pakistan A Product of SFP
62	Hydra	BWM-62	Islamabad	21.10.10			19 L	M.Asif Shafique Plot No 3 –A Industrial Area Islamabad	Pakistan PVC limited Plot No 1-4 and 31–A sector I-9 Industrial Area Islamabad
63	Sky Premier Water	BWM-63	Rawalpindi	22.10.10			19 L	M.Younas Ghorri Tour Phase 11 East Khana RWP	Sky Pvt Ltd A Project of Sky Cooling Towers and Engineering Pvt Ltd Hydrotech Engineering and Chemicals Lahore
64	Klassic Valley	BWM-64	Islamabad	25.10.10			19 L	Mehmood Malik Khurshid Market, F-10/1 Islamabad	TM Enterprises Bottle Water And General Order Suppliers Flat No 1 3-D Khurshid Market, F-10/1 Islamabad



WATER QUALITY PARAMETERS AND METHODS USED FOR ANALYSIS

Sr. #	PARAMETERS	ANALYTICAL METHOD
1.	Alkalinity (m.mol/l as CaCO ₃)	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 Coliform (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

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



WATER QUALITY PERMISSIBLE LIMITS FOR BOTTLED WATER

Sr. #	Parameter	Units	Permissible Limits		
			WHO	IBWA	PSQCA
1.	Alkalinity	(m.mol/l)	NGVS	NGVS	NGVS
2.	Bicarbonate	(mg/l)	NGVS	NGVS	NGVS
3.	Calcium	(mg/l)	NGVS	NGVS	100
4.	Carbonate	(mg/l)	NGVS	NGVS	NGVS
5.	Chloride	(mg/l)	250	250	250
6.	Co lour	(TCU)	15	NGVS	5
7.	Conductivity	(µS/cm)	NGVS	NGVS	NGVS
8.	Fluoride	(mg/l)	1.5	3	0.7
9.	Hardness	(mg/l)	NGVS	NGVS	NGVS
10.	Iron	(mg/l)	0.3	0.3	0.3
11.	Magnesium	(mg/l)	NGVS	NGVS	50
12.	Odor	-	Odorless	NGVS	Unobjectionable
13.	Nitrate-N	(mg/l)	10	10	10
14.	pH	-	6.5-8.5	NGVS	6.5-8.5
15.	Potassium	(mg/l)	NGVS	NGVS	10
16.	Sodium	(mg/l)	200	NGVS	50
17.	Sulfate	(mg/l)	250	250	250
18.	Taste	-	Unobject.	NGVS	Unobjectionable
19.	TDS	(mg/l)	1000	500	500
20.	Turbidity	(NTU)	5	NGVS	0.5
21.	Phosphate	(mg/l)	NGVS	NGVS	NGVS
22.	Arsenic	ppb	10	10	10
23.	Total Coliform	MPN/100ml	0	0	0
24.	E-Coli	MPN/100ml	0	0	0
25.	Total Plate Count	CFU/ml	-	-	At 22°C= <100/ml At 35°C=< 20/ml

WHO World Health Organization
IBWA International Bottled Water Association
PSQCA Pakistan Standards and Quality Control Authority

SUMMARY OF RESULTS OF PCRWR MONITORING

CONTAMINANTS OF POTENTIAL CONCERNS FOUND IN BOTTLED WATER BRANDS

Arsenic (Safe Limit : 10ppb)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	Hamaliya	BWM-09	-	ppb	12
2.	WELL-Q	BWM-14	Faisalabad	ppb	31
3.	Nation	BWM-15	Lahore	ppb	48
4.	Silver Spring	BWM-31	Multan	ppb	26
5.	Pan Pura	BWM-33	Burewala	ppb	35
6.	Pura Light	BWM-34	-	ppb	11
7.	Niamat	BWM-45	Lahore	ppb	28

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



8.	Clean Plus Extreme Water	BWM-46	Lahore	ppb	27
9.	Aqua National	BWM-48	Lahore	ppb	58
10.	Active	BWM-49	Lahore	ppb	26
11.	New Everest	BWM-50	Lahore	ppb	47
12.	Light Water	BWM-59	Multan	ppb	24

Sodium (Safe Limit : 50ppm)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	DeAar	BWM-4	Karachi	ppm	119
2.	Zindagi Plus	BWM-7	Karachi	ppm	68
3.	Selina	BWM-10	Karachi	ppm	58
4.	Nation	Bwm-15	Lahore	ppm	56
5.	Clean Plus Extreme Water	BWM-46	Lahore	ppm	114
6.	Lock	BWM-51	Lahore	ppm	57

Potassium (Safe Limit : 10ppm)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	Bio	BWM-20	Karachi	ppm	16

Fluoride (Safe Limit : 0.7ppm)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	DeAar	BWM-4	Karachi	ppm	9
2.	Excellent Water	BWM-61	Quetta	ppm	1

Calcium (Safe Limit : 100 ppm)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	Natural	BWM-26	Peshawar	ppm	118

pH (Safe Limit : 6.5-8.5)

Sr. No.	Brand Name	Code	City of Manufacturing	Unit	Results
1.	AL-NOOR	BWM-13	Faisalabad	-	6.05

Total Dissolved Solids (TDS) (Safe Limit : 500ppm)

Sr. No	Brand Name	Code	City of Manufacturing	Unit	Results
1.	Clean Plus Extreme Water	BWM-46	Lahore	ppm	529

BACTERIOLOGICAL CONTAMINATION (TOTAL COLIFORMS & FECAL COLIFORMS)

Sr. No	Brand Name	Code	Results	
			Total Coliforms (CFU/100ml)	Fecal Coliforms (CFU/100ml)
1.	Miracle	BWM--5	10	0
2.	Jel	BWM-11	08	0

CFU: Colony forming unit

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



All the bottled/Mineral water brands were also tested for Total Plate Count. The criteria of PSQCA and most of the international bottled water standards is to collect and analyze the samples within 12- 24 hours of production and compare the results with the permissible limit for Total Plate Count recommended by PSQCA and other international standards. Out of total 64 brands, 25 brands found beyond the PSQCA limit of 20 CFU /ml for Total Plate Count at 37°C, are listed below:

BACTERIOLOGICAL: (Total Coliforms & Total Plate Count)				
Sr. No	Brand Name	Code	Results	
			Total Coliforms CFU/100ml	Total Plate Count CFU/ml
1.	Better Life	BWM-3	Nil	50
2.	DeAar	BWM-4	Nil	53
3.	Miracle	BWM--5	10	210
4.	Safi mineral water	BWM-8	Nil	28
5.	Selina	BWM-10	Nil	45
6.	AL-NOOR	BWM-13	Nil	35
7.	WELL-Q	BWM-14	Nil	23
8.	Bio	BWM-20	Nil	85
9.	Atlantis Water	BWM-23	Nil	25
10.	Blue Water	BWM-30	Nil	58
11.	Sufi	BWM-32	Nil	55
12.	Pan Pura	BWM-33	Nil	25
13.	Classic Consumable	BWM-35	Nil	75
14.	Unique Water	BWM-36	Nil	25
15.	Nectar	BWM-37	Nil	30
16.	Ripple	BWM-38	Nil	30
17.	Dew Drops	BWM-40	Nil	52
18.	Aqua Save	BWM-41	Nil	23
19.	One Aqua	BWM-42	Nil	33
20.	Bake Master	BWM-43	Nil	25
21.	Clean Plus Extreme Water	BWM-46	Nil	23
22.	Premier	BWM-47	Nil	28
23.	Pineo	BWM-56	Nil	24
24.	Aspen	BWM-58	Nil	28
25.	Aqua Hygienic	BWM-60	Nil	58

The excessive level of Total Plate Count indicate the overall sanitation quality, water treatment plant efficiency, after growth in transmission lines and the general bacterial composition of source water.(Judith Whittier, 2008).

As most of the samples of bottled/mineral water brands were not collected within 12-24 hours of production. Therefore, we have not considered these brands in the category of unsafe bottled water brands. In the same context, the recommendations of Pakistan Standards Quality Control Authority (PSQCA), International Bottled Water Association (IBWA) and European Union are as following:

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



1. According to Pakistan Standards Quality Control Authority (PSQCA), Ministry of Science and Technology, the limit for Total Plate Count i.e. <100 CFU/ml at 20-22 °C and <20 CFU/ml at 37 °C is subjected to monitor within 12 hours of bottling (Pakistan Standards Specification for Bottled Drinking Water, 3rd Revision).
2. The International Bottled water Association (IBWA) recommends that plants meet a level of <30 cfu/ml at bottling, and <200 cfu/ml in 90% of samples tested 5 days after bottling (NRDC, 2000).
3. The European Union (EU) has adopted an enforceable bottled water standard of 100 colonies per 100 ml (at 22°C) at bottling (NRDC, 2000).

PCRWR TESTING: SAFE BRANDS

Sr. No	Brand Name	Code	Quality (Safe/Unsafe)	
			Chemical	Microbiological
1.	Fairmount	BWM-1	Safe	Safe
2.	Vey	BWM-2	Safe	Safe
3.	Better Life	BWM-3	Safe	Safe
4.	Iqrafina	BWM-6	Safe	Safe
5.	Safi mineral water	BWM-8	Safe	Safe
6.	Max Fresh	BWM-12	Safe	Safe
7.	Mashmoom Aqua	BWM-16	Safe	Safe
8.	Legend	BWM-17	Safe	Safe
9.	Kerry	BWM-18	Safe	Safe
10.	Via	BWM-19	Safe	Safe
11.	Noble	BWM-21	Safe	Safe
12.	Zindagi	BWM-22	Safe	Safe
13.	Atlantis Water	BWM-23	Safe	Safe
14.	Natural Aqwah Water	BWM--24	Safe	Safe
15.	New National	BWM-25	Safe	Safe
16.	Natural Khyber	BWM-27	Safe	Safe
17.	Fresh Neslet	BWM-28	Safe	Safe
18.	Khyber Aqua	BWM-29	Safe	Safe
19.	Blue Water	BWM-30	Safe	Safe
20.	Sufi	BWM-32	Safe	Safe
21.	Classic Consumable	BWM-35	Safe	Safe
22.	Unique Water	BWM-36	Safe	Safe
23.	Nectar	BWM-37	Safe	Safe
24.	Ripple	BWM-38	Safe	Safe
25.	A-One Natural Plus	BWM-39	Safe	Safe
26.	Dew Drops	BWM-40	Safe	Safe
27.	Aqua Save	BWM-41	Safe	Safe
28.	One Aqua	BWM-42	Safe	Safe

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



29.	Bake Master	BWM-43	Safe	Safe
30.	Isberg	BWM-44	Safe	Safe
31.	Premier	BWM-47	Safe	Safe
32.	Kinley	BWM-52	Safe	Safe
33.	Aquafina	BWM-53	Safe	Safe
34.	Nestle	BWM-54	Safe	Safe
35.	Shahi Avisa	BWM-55	Safe	Safe
36.	Pineo	BWM-56	Safe	Safe
37.	Piyaas	BWM-57	Safe	Safe
38.	Aspen	BWM-58	Safe	Safe
39.	Aqua Hygienic	BWM-60	Safe	Safe
40.	Hydra	BWM-62	Safe	Safe
41.	Sky Premier Water	BWM-63	Safe	Safe
42.	Klassic Valley	BWM-64	Safe	Safe

PCRWR TESTING: UNSAFE BRANDS

Sr. No	Brand Name	Code	Quality (Safe/Unsafe)	
			Chemical	Microbiological
1.	DeAar	BWM-4	Safe	Unsafe
2.	Miracle	BWM--5	Unsafe	Safe
3.	Zindagi Plus	BWM-7	Unsafe	Safe
4.	Hamaliya	BWM-09	Unsafe	Safe
5.	Selina	BWM-10	Unsafe	Safe
6.	Jel	BWM-11	Safe	Unsafe
7.	AL-NOOR	BWM-13	Unsafe	Safe
8.	WELL-Q	BWM-14	Unsafe	Safe
9.	Nation	BWM-15	Unsafe	Safe
10.	Bio	BWM-20	Unsafe	Safe
11.	Natural	BWM-26	Unsafe	Safe
12.	Silver Spring	BWM-31	Unsafe	Safe
13.	Pan Pura	BWM-33	Unsafe	Safe
14.	Pura Light	BWM-34	Unsafe	Safe
15.	Niamat	BWM-45	Unsafe	Safe
16.	Clean Plus Extreme Water	BWM-46	Unsafe	Safe
17.	Aqua National	BWM-48	Unsafe	Safe
18.	Active	BWM-49	Unsafe	Safe
19.	New Everest	BWM-50	Unsafe	Safe
20.	Lock	BWM-51	Unsafe	Safe
21.	Light Water	BWM-59	Unsafe	Safe
22.	Excellent Water	BWM-61	Unsafe	Safe

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



MARKET CONSISTENCY IN TWO NEIGHBORING QUARTERS

Sr. No	Consistent Brands	New Brands	Unavailable Brands
1.	Fairmount	Vey	Al-Saudia
2.	Better Life	Miarcle	Life
3.	DeAar	Iqrafina	Super Life
4.	Max Fresh	Zindagi Plus	Eeman
5.	Nation	Safi mineral water	Coozy
6.	Kerry	Hamaliya	So Safe
7.	Via	Selina	Sahil
8.	Noble	Jel	Aqua rich
9.	Natural Aqwah Water	AL-NOOR	Al-Habib
10.	New National	WELL-Q	Spring Fresh
11.	Natural Mineral Water	Legend	Alfa
12.	Khyber Aqua	Bio	Hydropsy
13.	Blue Water	Zindagi	Asal
14.	Sufi	Atlantis Water	Golden
15.	Pan Pura	Natural Khyber	Pak Crystal
16.	Classic Consumable	Fresh Neslet	Gourmet
17.	Unique Water	Silver Spring	Taiba
18.	Nectar	Pura Light	Blue Gold
19.	A-One Natural Plus	Ripple	Al-Sahar
20.	Aqua Save	Dew Drops	Viking
21.	Bake Master	One Aqua	Sprinkle
22.	Isberg	Clean Plus Extreme Water	Aktiv
23.	Niamat	Premier	Saka
24.	Aqua National	Active	Barish
25.	Lock	Shahi Avisa	Omni
26.	Kinley	Pineo	Maza
27.	Aquafina	Aspen	Snow Valley
28.	Nestle	Excellent Water	Pacific
29.	Piyaas	Hydra	First water
30.	Light Water	Sky Premier Water	Hunza
31.	Aqua Hygienic	Klassic Valley	Sparklet
32.	Mashmoom Aqua	New Everest	Vital
33.			Clear
34.			Fine Soul

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



DISEASE POTENTIAL FROM CONTAMINATED BOTTLED WATER

Sr. No	Contaminant	Diseases Impacts
1.	Bacteriological Contamination	Cholera, Diarrhea, Dysentery, Hepatitis, Typhoid
2	Arsenic	Cancer (lungs, bladder, skin, prostate, kidney, nose and liver), diabetes kidney diseases, hypertension, heart diseases, birth defects, black foot diseases.
3.	Potassium	Lung cancer, Hyperkalemia, Abnormal breakdown of protein
4.	Fluoride	Skeletal and dental fluorosis
5.	Sodium	Hypertension

CONCLUSIONS

Sr. No	Item	Conclusion	
		No.	% age
1.	Total No. Brands Collected	64	-
2.	Overall safe brands	42	66
3.	No. of overall unsafe brands	22	34
4.	No. of Chemically safe brands	44	69
5.	No. of Chemically unsafe brands	20	31
6.	No. of Microbiologically safe brands	62	97
7.	No. of Microbiologically unsafe brands	02	03
8.	No. of Consistent brands in Market	32	50
9.	No. of brands disappeared from market	34	53
10.	No. of new brands	32	50

Detailed water quality status of each bottled water brand is available at Annexure-1



Annexure-1

Chemical and Microbiological Quality of Bottled/Mineral Water Brands

Brand Name	Brand Code	Turbidity	pH	EC	TDS	Ca	Mg	Hard	HCO ₃	Cl	Na	F	PO ₄	Fe	K	NO ₃	SO ₄	As	Total Coliforms	Fecal Coliforms	Total Plate Count
PSQCA Bottled Water Standards	-	0.5	6.5 - 8.5	NGVS	500	100	50	NGVS	NGVS	250	50	0.7	NGVS	0.3	10	10	250	10	0/100 ml	0/100 ml	<20 at 37°C
Detection Limits	-	0.2	0.02	0.287	-	2	1	5	5	2	1	0.03	0.03	0.03	0.2	0.06	0.4	0.1	-	-	-
Units	-	NTU		µS/cm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	CFU /100ml	CFU /100 ml	CFU/ml
Fairmount	BWM-1	BDL	7.08	414	228	24	7	90	50	63	43	0.4	0.05	BDL	3	0.4	57	BDL	Nil	Nil	19
Vey	BWM-2	BDL	6.85	315	173	32	10	120	20	71	03	0.1	BDL	BDL	7	BDL	16	BDL	Nil	Nil	0
Better Life	BWM-3	BDL	6.82	485	267	54	12	185	25	127	09	0.3	BDL	BDL	0.4	BDL	13	BDL	Nil	Nil	50
DeAar	BWM-4	BDL	6.69	374	206	20	17	120	40	71	119	9	BDL	BDL	0.3	2	32	BDL	Nil	Nil	53
Miracle	BWM--5	BDL	7.15	377	207	20	13	105	70	60	31	0.5	0.04	BDL	6	1	37	BDL	10	Nil	210
Iqrafina	BWM-6	BDL	6.53	313	172	32	07	110	15	73	09	0.2	0.04	BDL	2	1	13	BDL	Nil	Nil	08
Zindagi Plus	BWM--7	BDL	6.99	438	241	14	09	70	75	73	68	0.1	BDL	BDL	2	4	14	BDL	Nil	Nil	12
Safi mineral water	BWM-8	BDL	6.95	301	166	28	13	125	55	54	12	0.2	BDL	BDL	0.5	BDL	21	BDL	Nil	Nil	28
Hamalyia	BWM-9	BDL	7.05	399	219	36	15	150	135	06	18	0.4	0.12	BDL	4	0.2	45	12	Nil	Nil	20
Selina	BWM-10	BDL	6.69	389	214	10	06	50	75	69	58	0.2	BDL	BDL	1	3	11	BDL	Nil	Nil	45
Jel	BWM-11	BDL	6.85	286	157	16	15	100	20	65	11	0.2	BDL	BDL	3	1	14	BDL	08	Nil	18
Max Fresh	BWM-12	BDL	6.84	378	208	12	11	75	50	54	41	0.2	BDL	BDL	1	BDL	27	BDL	Nil	Nil	05
AL-NOOR	BWM-13	BDL	6.05	22	12	0	0	0	05	03	03	0.1	BDL	BDL	BDL	BDL	BDL	BDL	Nil	Nil	35
WELL-Q	BWM-14	BDL	7.91	284	156	24	12	110	125	04	14	0.3	BDL	BDL	2	0.2	21	31	Nil	Nil	23
Nation	BWM-15	BDL	7.91	495	272	32	10	120	220	13	56	0.3	0.04	BDL	2.5	2	27	48	Nil	Nil	0

The highlighted results indicate the concentration level beyond the PSQCA Bottled Water Standards.

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



Mashmoom Aqua	BWM-16	BDL	7.52	307	169	32	15	140	150	06	08	0.1	BDL	BDL	0.5	2	9	0.3	Nil	Nil	0
Legend	BWM-17	BDL	6.66	242	133	20	12	100	25	50	10	BDL	0.07	BDL	2	2	22	BDL	Nil	Nil	0
Kerry	BWM-18	BDL	7.68	518	285	32	12	130	50	70	38	0.3	0.05	BDL	7	BDL	34	01	Nil	Nil	20
Via	BWM-19	BDL	7.38	400	220	16	17	110	70	71	29	0.2	BDL	BDL	6	2	22	01	Nil	Nil	15
Bio	BWM-20	BDL	7.53	332	183	24	13	115	35	62	BDL	BDL	BDL	BDL	16	BDL	20	BDL	Nil	Nil	85
Noble	BWM-21	BDL	7.39	417	229	28	19	150	100	41	19	0.3	0.07	BDL	2.5	0.4	50	01	Nil	Nil	0
Zindagi	BWM-22	BDL	8.22	477	262	40	24	200	195	10	18	0.4	BDL	BDL	2.5	5	30	01	Nil	Nil	12
Atlantis Water	BWM-23	BDL	7.66	335	184	28	13	125	40	77	10	0.3	BDL	BDL	BDL	BDL	9	07	Nil	Nil	25
Natural Aqwah Water	BWM--24	BDL	8.00	417	229	34	24	185	185	07	15	0.2	0.04	BDL	2	3	33	01	Nil	Nil	18
New National	BWM-25	BDL	7.76	417	229	36	21	175	185	07	14	0.3	BDL	BDL	1	3	22	0.4	Nil	Nil	20
Natural	BWM-26	BDL	7.98	660	396	118	04	310	250	37	14	0.6	0.05	BDL	1	7	43	0.3	Nil	Nil	0
Natural Khyber	BWM-27	BDL	8.01	586	322	54	34	275	230	22	14	0.5	0.07	BDL	1	7	42	0.3	Nil	Nil	0
Fresh Neslet	BWM-28	BDL	8.00	555	305	60	24	250	220	14	13	0.5	0.04	BDL	1	6	43	0.5	Nil	Nil	18
Khyber Aqua	BWM-29	BDL	7.59	388	213	20	27	160	155	12	15	0.1	BDL	BDL	1	4	25	0.2	Nil	Nil	15
Blue Water	BWM-30	BDL	7.50	314	173	24	13	115	35	53	14	0.1	BDL	BDL	1	BDL	47	03	Nil	Nil	58
Silver Spring	BWM-31	BDL	7.62	352	194	40	12	150	125	14	11	0.1	0.05	BDL	2	0.2	46	26	Nil	Nil	18
Sufi	BWM-32	BDL	7.60	366	201	40	07	130	35	76	10	BDL	BDL	BDL	BDL	BDL	21	01	Nil	Nil	55
Pan Pura	BWM-33	BDL	7.54	377	207	34	11	130	85	45	21	0.1	BDL	BDL	1	0.1	41	35	Nil	Nil	25
Pura Light	BWM-34	BDL	7.40	366	201	36	07	120	15	94	11	BDL	BDL	BDL	0.4	BDL	6	11	Nil	Nil	15
Classic Consumable	BWM-35	BDL	7.76	431	237	20	22	140	75	64	30	0.1	BDL	BDL	3	BDL	43	02	Nil	Nil	75
Unique Water	BWM-36	BDL	7.52	258	142	08	18	95	70	13	14	BDL	BDL	BDL	3	BDL	50	06	Nil	Nil	25
Nectar	BWM-37	BDL	7.39	421	232	52	15	190	195	10	11	0.2	BDL	BDL	0.5	1	12	0.4	Nil	Nil	30
Ripple	BWM-38	BDL	7.55	284	156	32	07	110	20	63	03	0.2	BDL	BDL	BDL	0.1	16	BDL	Nil	Nil	30
A-One Natural Plus	BWM-39	BDL	7.64	356	196	24	21	145	35	63	08	0.1	BDL	BDL	BDL	0.2	49	BDL	Nil	Nil	13
Dew Drops	BWM-40	BDL	7.60	394	217	40	17	170	175	09	13	0.3	BDL	BDL	1	BDL	28	0.3	Nil	Nil	52
Aqua Save	BWM-41	BDL	7.33	355	195	40	12	150	20	79	02	0.3	0.04	BDL	2.5	BDL	34	02	Nil	Nil	23
One Aqua	BWM-42	BDL	7.89	405	223	40	19	180	185	16	14	0.3	BDL	BDL	4	BDL	8	08.	Nil	Nil	33
Bake Master	BWM-43	BDL	7.69	330	182	20	15	110	45	55	16	0.3	0.05	BDL	4	BDL	42	01	Nil	Nil	25

The highlighted results indicate the concentration level beyond the PSQCA Bottled Water Standards.

July-September, 2010

PCRWR QUARTERLY REPORT-BOTTLED WATER QUALITY



Isberg	BWM-44	BDL	7.66	324	178	20	15	110	45	60	16	0.4	BDL	BDL	4	BDL	24	01	Nil	Nil	15
Niamat	BWM-45	BDL	7.93	322	177	20	21	135	145	07	21	0.3	BDL	BDL	2	0.1	26	28	Nil	Nil	20
Clean Plus Extreme Water	BWM-46	BDL	7.88	881	529	28	32	200	355	32	114	0.4	0.07	BDL	4	0.3	95	27	Nil	Nil	23
Premier	BWM-47	BDL	7.08	359	197	26	13	120	75	60	36	0.2	0.05	BDL	0.4	1	21	02	Nil	Nil	28
Aqua National	BWM-48	BDL	7.87	277	152	36	09	125	120	04	07	0.2	BDL	BDL	2	0.1	26	58	Nil	Nil	05
Active	BWM-49	BDL	8.13	286	157	24	17	130	135	06	13	0.3	BDL	BDL	2	BDL	21	26	Nil	Nil	14
New Everest	BWM-50	BDL	8.09	411	226	28	19	150	160	26	24	0.1	BDL	BDL	3	0.2	27	47	Nil	Nil	15
Lock	BWM-51	BDL	7.70	613	368	32	21	165	100	70	57	0.2	BDL	BDL	3	0.1	120	06	Nil	Nil	20
Kinley	BWM-52	BDL	7.47	542	298	34	27	195	65	106	26	0.1	BDL	BDL	3	BDL	41	01	Nil	Nil	0
Aquafina	BWM-53	BDL	7.02	209	115	34	18	85	20	24	13	0.1	0.05	BDL	1	0.2	57	0.1	Nil	Nil	0
Nestle	BWM-54	BDL	7.09	377	207	04	10	135	40	75	12	0.5	BDL	BDL	0.3	BDL	20	3	Nil	Nil	0
Shahi Avisa	BWM-55	BDL	6.99	300	165	38	11	135	25	70	03	0.1	BDL	BDL	2	BDL	07	BDL	Nil	Nil	18
Pineo	BWM-56	BDL	8.09	510	281	36	22	190	145	61	27	0.2	0.07	BDL	3	0.1	35	10	Nil	Nil	24
Piyaas	BWM-57	BDL	7.40	428	235	40	22	180	20	114	06	BDL	BDL	BDL	0.3	0.2	BDL	01	Nil	Nil	2
Aspen	BWM-58	BDL	7.65	474	261	36	10	150	45	94	30	0.1	BDL	BDL	0.4	BDL	59	01	Nil	Nil	28
Light Water	BWM-59	BDL	7.83	594	327	44	29	250	120	35	19	BDL	0.08	BDL	4	0.1	130	24	Nil	Nil	07
Aqua Hygienic	BWM-60	BDL	8.13	324	178	28	22	160	140	28	09	0.5	0.04	BDL	1	1	30	0.6	Nil	Nil	58
Excellent Water	BWM-61	BDL	8.37	508	279	48	22	210	180	48	22	1	0.05	BDL	1	5	16	0.5	Nil	Nil	18
Hydra	BWM-62	BDL	7.52	429	236	42	19	185	175	10	26	0.1	BDL	BDL	1	1	39	0.5	Nil	Nil	1
Sky Premier Water	BWM-63	BDL	7.02	531	292	60	17	220	105	76	19	0.1	0.05	BDL	1	2	57	0.3	Nil	Nil	0
Klassic Valley	BWM-64	BDL	7.31	398	219	40	17	170	155	11	20	0.2	0.04	BDL	1	3	25	0.4	Nil	Nil	2

NGVS =No Guideline Value Set
BDL = Below Detection Limits

The highlighted results indicate the concentration level beyond the PSQCA Bottled Water Standards.