Water Tank Sampling, May 2024

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- The chemical water quality in rainwater-harvested water tanks was assessed at 10 residential properties and 4 schools in Bermuda in May 2024 in accordance with the requirements of Belco's Operating License.
- Sample locations were determined by input from Belco and DENR in response to concerns from residents over the potential for drinking water contamination resulting from atmospheric deposition of exhaust emissions on roof surfaces.
- Water samples were analysed for total dissolved solids (TDS), total suspended solids (TSS), pH, a suite of 31 metals, a suite of 21 polycyclic aromatic hydrocarbons (PAHs – also called polyaromatic hydrocarbons), and a suite of polychlorinated dioxins and furans (PCDDs and PCDFs – at 10 of the sites only).
- The results were compared with Primary and Secondary Drinking Water Standards in effect in Bermuda and the USA.
- The Bermuda Secondary Drinking Water Standard for aluminium (Al) was exceeded at one private residence, and the Bermuda Secondary Drinking Water Standard for iron (Fe) was exceeded at one private residence and at one of the school locations. Exceedance of Secondary Drinking Water Standards generally results in aesthetic and cosmetic effects (i.e. appearance, odour, and taste of water) and does not indicate an immediate health risk.
- The US Action Level Limit for lead (Pb) was exceeded at one private residence.
- No other Primary or Secondary Drinking Water Standards were exceeded.
- In response to the elevated lead (Pb) detected at one residence, a follow up analysis of water at the residence and three neighboring residences was conducted to investigate the issue. None of these samples, including from the original residence, exceeded the US Action Level Limit for lead (Pb).

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1 - Sampling

Water sampling was conducted by BIOS personnel on 6, 7 and 20 May 2024, witnessed by representatives from BELCO and DENR. All water samples were collected from a spigot or faucet located as close to the foot valve as possible and prior to any domestic water treatment processes.

Samples were collected in pre-cleaned bottles supplied by the analytical laboratory. At each location, bottles were handled while wearing new nitrile gloves to avoid sample contamination.

Water was sampled from tanks at the following locations:

Site 1) Francis Patton School

Site 2) BHS

Site 3) 26 Pitts Bay Rd

Site 4) Astwood Cl

Site 5) 111 St Johns Rd

Site 6) 13 Twin Lane Dr

Site 7) 3 Twin Lane Dr

Site 8) 93 St Johns Rd

Site 9) 4 Juniper Hill Dr

Site 10) 15 Cemetery Ln

Site 11) Port Royal Primary School

Site 12) 1 Underhill Crescent

Site 13) Cedar Crest

Site 14) BHS IB

After filling, sample containers were immediately labelled and double-bagged in polyethylene "zip-lock" bags and kept in coolers with freezer blocks which were frozen at -60°C for 24 hours immediately prior to use. After sampling all sites, the samples were transported immediately to the local courier facility (FedEx) for express shipping to the analytical laboratory. Chain of custody forms were completed by BIOS personnel to record all sample information and these were dispatched with the samples. The containers were shipped using FedEx Priority Alert service to ensure that they would be kept refrigerated in the event of any delay during shipping.

All chemical analyses were performed by Bureau Veritas Laboratories, Bedford, Nova Scotia, Canada. BV Labs are accredited by the Standards Council of Canada and conform with the requirements of ISO/IEC 17025:2005. All analytical results from BV Labs were sent in duplicate to BIOS and BELCO.

Water samples were analysed for total dissolved solids (TDS) and total suspended solids (TSS), water pH, a suite of 31 metals, and a suite of 21 polycyclic aromatic hydrocarbons (PAHs) at all sites, and a suite of 17 polychlorinated-dioxins and -furans (PCDD/Fs) at 10 of the loctions.

2 - Results

Analytical results for water from the 14 locations are shown in Table 2 (inorganics and metals), Table 3 (PAHs), and Table 4 (PCDD/Fs). These results were compared with the drinking water standards in effect in Bermuda, as legislated by the Department of Health, and also with the US Federal drinking water regulations established by the US Environmental Protection Agency (EPA). Both sets of standards are shown in Table 1, below.

		BERMUDA		USA	
	Units	Primary Std	Secondary Std	Primary Std	Secondary Std
Total Dissolved Solids	mg/L		500		500
Total Mercury (Hg)	µg/L	2.0		2.0	
Total Aluminum (Al)	µg/L		200		200
Total Antimony (Sb)	µg/L			6.0	
Total Arsenic (As)	µg/L	10		10	
Total Barium (Ba)	µg/L			2000	
Total Beryllium (Be)	µg/L			4.0	
Total Cadmium (Cd)	µg/L	5.0		5.0	
Total Chromium (Cr)	µg/L	100		100	
Total Copper (Cu)	µg/L		1000	1300*	1000
Total Iron (Fe)	µg/L		300		300
Total Lead (Pb)	µg/L			15*	
Total Manganese (Mn)	µg/L		50		50
Total Selenium (Se)	µg/L	50		50	
Total Silver (Ag)	µg/L		100		100
Total Thallium (Tl)	µg/L			2.0	
Total Uranium (U)	µg/L			30	
Total Zinc (Zn)	µg/L		5000		5000
Benzo(a)pyrene	µg/L			0.2	
2,3,7,8-Tetra CDD	pg/L			30	

Table 1: Drinking water standards in effect in Bermuda and USA. * denotes action level limit - see text below for explanation.

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		1	2	3	4	5	6	7	RDL
		Francis Patton	BHS	26 Pitts Bay Rd	Astwood Cl	111 St Johns Rd	13 Twin Lane Dr	3 Twin Lane Dr	
Inorganics									
Total Dissolved Solids	mg/L	52	62	52	97	430	66	360	10
pH	pH	7.47	7.81	7.62	7.79	7.95	7.86	7.97	n/a
Total Suspended Solids	mg/L	ND	1	ND	ND	ND	ND	10	1.0
Metals									
Total Mercury (Hg)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.013
Total Aluminum (Al)	µg/L	18	150	140	86	7	170	750	5.0
Total Antimony (Sb)	µg/L	ND	ND	ND	ND	ND	ND	ND	1.0
Total Arsenic (As)	µg/L	ND	ND	ND	ND	2.9	ND	ND	1.0
Total Barium (Ba)	µg/L	3.8	4.8	7.3	5.4	6	5.3	14.0	1.0
Total Beryllium (Be)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Bismuth (Bi)	µg/L	ND	ND	ND	ND	ND	ND	ND	2.0
Total Boron (B)	µg/L	ND	ND	ND	ND	ND	ND	1300	50
Total Cadmium (Cd)	µg/L	0.027	ND	ND	ND	ND	0.017	0.037	0.010
Total Calcium (Ca)	µg/L	6200	13000	9200	17000	88000	11000	11000	100
Total Chromium (Cr)	µg/L	ND	ND	ND	ND	ND	ND	2.1	1.0
Total Cobalt (Co)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.40
Total Copper (Cu)	µg/L	220	2	3	4	73	44	7	0.50
Total Iron (Fe)	µg/L	61	1700	110	ND	ND	ND	410	50
Total Lead (Pb)	µg/L	6.3	0.89	0.66	0.52	1.80	5.6	2.6	0.50
Total Magnesium (Mg)	µg/L	950	800	600	1200	4600	940	1400	100
Total Manganese (Mn)	µg/L	ND	2.8	2.1	ND	25	ND	10	2.0
Total Molybdenum (Mo)	µg/L	ND	ND	ND	ND	2.4	ND	ND	2.0
Total Nickel (Ni)	µg/L	ND	ND	ND	ND	3.7	ND	8.6	2.0
Total Phosphorus (P)	µg/L	ND	ND	ND	ND	ND	ND	ND	100
Total Potassium (K)	µg/L	380	410	390	510	10000	450	4400	100
Total Selenium (Se)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.50
Total Silver (Ag)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Sodium (Na)	µg/L	8800	7400	7000	14000	51000	9700	110000	100
Total Strontium (Sr)	µg/L	57	71	59	200	1700	78	42	2.0
Total Thallium (Tl)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Tin (Sn)	µg/L	2.2	ND	ND	ND	ND	ND	ND	2.0
Total Titanium (Ti)	µg/L	ND	ND	ND	ND	ND	ND	52	2.0
Total Uranium (U)	µg/L	ND	ND	ND	ND	0.54	ND	ND	0.10
Total Vanadium (V)	µg/L	ND	4.2	ND	11.0	ND	4.0	2.9	2.0
Total Zinc (Zn)	µg/L	110	760	14	20.0	7	83	55	5.0

Table 2: Total Dissolved Solids, Total Suspended Solids, pH and Total Metals in tank water at 14 locations in Bermuda, May 2024. ND = not detected; RDL = Reportable Detection Limit. Red shading indicates an exceedance of a drinking water standard – see text for further information.

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		8	9	10	11	12	13	14	RDL
		93 St Johns Rd	4 Juniper Hill Dr	15 Cemetery Ln	PR Prim Sch	Underhill C	Cedar Crest	BHS IB	
Inorganics									
Total Dissolved Solids	mg/L	45	74	350	51	71	53	47	10
pH	pH	7.43	7.95	7.78	8.15	7.92	8.78	7.90	n/a
Total Suspended Solids	mg/L	ND	ND	ND	ND	ND	ND	ND	1.0
Metals									
Total Mercury (Hg)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.013
Total Aluminum (Al)	µg/L	33	96	36	11	49	99	120	5.0
Total Antimony (Sb)	µg/L	ND	ND	ND	ND	ND	ND	ND	1.0
Total Arsenic (As)	µg/L	ND	ND	ND	ND	ND	ND	ND	1.0
Total Barium (Ba)	µg/L	2.7	4.8	3.3	3.1	29.0	6.1	14.0	1.0
Total Beryllium (Be)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Bismuth (Bi)	µg/L	ND	ND	ND	ND	ND	ND	ND	2.0
Total Boron (B)	µg/L	ND	ND	1100	ND	ND	ND	ND	50
Total Cadmium (Cd)	µg/L	ND	ND	ND	0.046	ND	ND	0.017	0.010
Total Calcium (Ca)	µg/L	8000	14000	17000	10000	10000	12000	13000	100
Total Chromium (Cr)	µg/L	ND	ND	ND	ND	2.7	ND	ND	1.0
Total Cobalt (Co)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.40
Total Copper (Cu)	µg/L	3.6	2	53	150	98	1.3	2	0.50
Total Iron (Fe)	µg/L	ND	ND	85	100	56	ND	ND	50
Total Lead (Pb)	µg/L	ND	0.6	2.4	3.3	80.0	ND	1.1	0.50
Total Magnesium (Mg)	µg/L	690	790	2400	1300	680	660	760	100
Total Manganese (Mn)	µg/L	ND	ND	2.1	ND	ND	ND	3.2	2.0
Total Molybdenum (Mo)	µg/L	ND	ND	ND	ND	ND	ND	ND	2.0
Total Nickel (Ni)	µg/L	ND	ND	ND	ND	ND	ND	ND	2.0
Total Phosphorus (P)	µg/L	ND	ND	ND	ND	ND	ND	ND	100
Total Potassium (K)	µg/L	240	390	4600	610	1200	250	400	100
Total Selenium (Se)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.50
Total Silver (Ag)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Sodium (Na)	µg/L	6000	7500	110000	14000	7000	6300	6500	100
Total Strontium (Sr)	µg/L	42	82	410	360	130	120	180	2.0
Total Thallium (Tl)	µg/L	ND	ND	ND	ND	ND	ND	ND	0.10
Total Tin (Sn)	µg/L	ND	ND	ND	2.1	ND	ND	ND	2.0
Total Titanium (Ti)	µg/L	ND	ND	ND	ND	ND	ND	ND	2.0
Total Uranium (U)	µg/L	ND	ND	0.13	ND	ND	ND	ND	0.10
Total Vanadium (V)	µg/L	9.8	6	2.2	ND	6.1	2	ND	2.0
Total Zinc (Zn)	µg/L	160	10	29	84	750	ND	25	5.0

Table 2 (cont.): Total Dissolved Solids, Total Suspended Solids, pH and Total Metals in tank water at 14 locations in Bermuda, May 2024. ND = not detected; RDL = Reportable Detection Limit. Red shading indicates an exceedance of a drinking water standard – see text for further information.

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		1	2	3	4	5	6	7	RDL
		Francis Patton	BHS	26 Pitts Bay Rd	Astwood Cl	111 St Johns Rd	13 Twin Lane Dr	3 Twin Lane Dr	
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.050
2-Methylnaphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.050
Acenaphthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Acenaphthylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(a)anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(a)pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(b)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(b/j)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.020
Benzo(g,h,i)perylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(j)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(k)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Chrysene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Dibenzo(a,h)anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Fluorene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Indeno(1,2,3-cd)pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Naphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.200
Perylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Phenanthrene	µg/L	0.011	ND	0.016	0.013	0.018	0.015	0.016	0.010
Pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010

		8	9	10	11	12	13	14	RDL
		93 St Johns Rd	4 Juniper Hill Dr	15 Cemetery Ln	PR Prim Sch	Underhill C	Cedar Crest	BHS IB	
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.050
2-Methylnaphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.050
Acenaphthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Acenaphthylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(a)anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(a)pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(b)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(b/j)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.020
Benzo(g,h,i)perylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(j)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Benzo(k)fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Chrysene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Dibenzo(a,h)anthracene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Fluoranthene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Fluorene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Indeno(1,2,3-cd)pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Naphthalene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.200
Perylene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010
Phenanthrene	µg/L	0.013	ND	ND	ND	ND	ND	0.012	0.010
Pyrene	µg/L	ND	ND	ND	ND	ND	ND	ND	0.010

Table 3: PAHs in tank water at 14 locations in Bermuda, May 2024. ND = not detected; RDL = Reportable Detection Limit.

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		1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Francis Patton	BHS	26 Pitts Bay Rd	Astwood Cl	111 St Johns Rd	13 Twin Lane Dr	3 Twin Lane Dr	93 St Johns Rd	4 Juniper Hill Dr	15 Cemetery Ln	PR Prim Sch	Underhill C	Cedar Crest	BHS IB
Dioxins & Furans															
2,3,7,8-Tetra CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,7,8-Penta CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,4,7,8-Hexa CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,6,7,8-Hexa CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,7,8,9-Hexa CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,4,6,7,8-Hepta CDD	pg/L	ND	ND	ND	ND	ND	ND	3.88	ND	ND	ND	-	-	-	-
Octa CDD	pg/L	ND	ND	ND	ND	ND	ND	27.4	ND	5.28	ND	-	-	-	-
Total Tetra CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Penta CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Hexa CDD	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Hepta CDD	pg/L	ND	ND	ND	ND	ND	ND	3.88	ND	ND	ND	-	-	-	-
2,3,7,8-Tetra CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,7,8-Penta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
2,3,4,7,8-Penta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,4,7,8-Hexa CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,6,7,8-Hexa CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
2,3,4,6,7,8-Hexa CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,7,8,9-Hexa CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,4,6,7,8-Hepta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
1,2,3,4,7,8,9-Hepta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Octa CDF	pg/L	ND	ND	ND	ND	ND	ND	4.86	ND	ND	ND	-	-	-	-
Total Tetra CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Penta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Hexa CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
Total Hepta CDF	pg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
TEQ 0.5DL	pg/L	2.25	2.26	2.34	2.25	2.08	1.97	2.08	2.00	2.03	2.08	-	-	-	-

Table 4: PCDD/Fs in tank water at 14 locations in Bermuda, May 2024. ND = not detected.

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Primary Drinking Water Standards are established to be protective of human health. Exceedance of these values indicates a potential risk from consumption. Under US Federal law, levels of lead (Pb) and copper (Cu) in water are regulated by a Treatment Technique that requires water suppliers to control the corrosiveness of their water. If more than 10 percent of tap water samples exceed the Action Level limit, water suppliers must take additional corrective steps to ensure that their distributed water is in compliance. This approach is not applicable to Bermuda when considering domestic water supplied by rainwater harvesting to individual premises. One private residence (location 12) showed an exceedance of the Action Level limit for lead (Pb), a possible source of which is corrosion of old lead-containing plumbing or other fixtures. Further investigation was advised and conducted, as described below.

Secondary Drinking Water Standards are established for protection on aesthetic or taste grounds. Exceedance of these values may cause negative visual and/or taste and odour responses.

Comparison of the data in Table 2 with the standards in Table 1 indicate three incidences of a Secondary Drinking Water Standard being exceeded:

1) Tank water at one private residence (location 7) exceeded the standard for aluminium (sample concentration 750 μg/L versus a secondary standard of 200 μg/L). High concentrations of aluminium (Al) may arise from soil present in the water tank (Al is naturally present at high concentrations in local soil), or from the corrosion of aluminium fittings located in or close to the roof-tank system.

2) Water from one of the school sites (location 2) and one private residence (location 7) exceeded the standard for iron (sample concentration 1700 and 410 μg/L, respectively, versus a

secondary standard of 300 μg/L). High concentrations of iron (Fe) in water may be indicative of: i) dissolution of wind-blown rust particles; ii) corrosion of plumbing, roof fixtures, etc.; iii) input from soil (local soil naturally has a high Fe content). Exceedance of the secondary DWS for Fe may result in the tank water developing a metallic taste when consumed and the presence of reddish-brown staining on water fixtures and laundry. The higher value of iron at the main BHS site (location 2) versus a lower value at the BHS IB site (location 14) most likely reflects the presence of older plumbing, which is subject to a higher degree of corrosion, at the former site.

The water from the two locations that showed an exceedance of aluminium (Al) and/or iron (Fe) recorded the only reported values of suspended solids (1.0 and 10 mg/L at locations 2 and 7, respectively) and one (location 7) was visibly turbid (i.e. cloudy water), suggesting that observed results at both locations probably arises from suspended sediment particles in the water.

3 - Lead in Tank Water

In response to the elevated lead (Pb) detected at one residence, a follow up sampling of water at the residence and three neighboring residences was conducted on 24 July 2024 to analyse for a suite of metals to investigate the issue.

Site 1B) 3 Underhill Crescent

Site 2B) 1 Underhill Crescent

Site 3B) 11 Underhill Crescent

Site 4B) 115 St. John's Rd

Samples were collected and processed as described above, and the results are shown in Table 5.

		1B	2B	3B	4B	RDL
		3 Underhill C	1 Underhill C	11 Underhill C	115 St. John's R	
Metals						
Total Mercury (Hg)	µg/L	ND	ND	ND	ND	0.013
Total Aluminum (Al)	µg/L	110	40	210	160	5.0
Total Antimony (Sb)	µg/L	ND	ND	ND	ND	1.0
Total Arsenic (As)	µg/L	ND	ND	ND	ND	1.0
Total Barium (Ba)	µg/L	8.0	25.0	6.0	5.6	1.0
Total Beryllium (Be)	µg/L	ND	ND	ND	ND	0.10
Total Bismuth (Bi)	µg/L	ND	ND	ND	ND	2.0
Total Boron (B)	µg/L	480	ND	ND	ND	50
Total Cadmium (Cd)	µg/L	ND	ND	0.018	ND	0.010
Total Calcium (Ca)	µg/L	11000	8900	16000	15000	100
Total Chromium (Cr)	µg/L	ND	ND	ND	ND	1.0
Total Cobalt (Co)	µg/L	ND	ND	ND	ND	0.40
Total Copper (Cu)	µg/L	4	4	9	7	0.50
Total Iron (Fe)	µg/L	310	ND	ND	ND	50
Total Lead (Pb)	µg/L	0.87	3.3	0.89	ND	0.50
Total Magnesium (Mg)	µg/L	670	490	780	640	100
Total Manganese (Mn)	µg/L	2.3	ND	ND	ND	2.0
Total Molybdenum (Mo)	µg/L	ND	ND	ND	ND	2.0
Total Nickel (Ni)	µg/L	ND	ND	ND	ND	2.0
Total Phosphorus (P)	µg/L	ND	ND	ND	ND	100
Total Potassium (K)	µg/L	1900	870	700	370	100
Total Selenium (Se)	µg/L	ND	ND	ND	ND	0.50
Total Silver (Ag)	µg/L	ND	ND	ND	ND	0.10
Total Sodium (Na)	µg/L	41000	4700	9500	5400	100
Total Strontium (Sr)	µg/L	130	110	140	110	2.0
Total Thallium (Tl)	µg/L	ND	ND	ND	ND	0.10
Total Tin (Sn)	µg/L	ND	ND	ND	ND	2.0
Total Titanium (Ti)	µg/L	ND	ND	4.9	ND	2.0
Total Uranium (U)	µg/L	ND	ND	ND	ND	0.10
Total Vanadium (V)	µg/L	6.1	5.1	5.0	10.0	2.0
Total Zinc (Zn)	µg/L	27	160	28	24.0	5.0

Table 5: Total Metals in tank water at 4 locations in Bermuda, July 2024. ND = not detected; RDL = Reportable Detection Limit. Red shading indicates an exceedance of a drinking water standard – see text for further information.

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None of these samples, including from the original residence, exceeded the US Action Level Limit for lead (Pb). The difference in results between the May and July sampling events reflects the variability of water quality in a dynamic system that is constantly changing as the water in the tank gets used and replenished. For this reason, concentrations of individual chemicals can be expected to change between sampling events. It would be advisable for the owner of the property to survey the existing plumbing for any potential lead pipes or other hardware and fixtures.

At the additional three properties, one residence exceeded the secondary drinking water standard for aluminium (sample concentration 210 μg/L versus a secondary standard of 200 μg/L), and one residence exceeded the secondary drinking water standard for iron (sample concentration 310 μg/L versus a secondary standard of 300 μg/L).

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