

NOTES ON TREATED WATER SAMPLE ANALYSIS RESULTS, JULY 2021

1 INTRODUCTION

On 5th July 2021, four samples of treated water from the four water treatment works (WTW) on St Helena Island were collected from the freight forwarders, Zedcore, and delivered to the CSIR Laboratories in Stellenbosch. The samples had been shipped from St Helena in a cooler box with ice bricks and were apparently kept on board MV *Helena* in the cold storage room. When they were collected from Zedcore, the samples were in a cold condition. The results for the four WTW samples are largely consistent with previous results and therefore, I have no doubt that the samples were maintained in a cold condition throughout their transport. The results certificates received from the Laboratory are included in Appendix A.

2 TREATED WATER SAMPLE RESULTS

In this section, the results received are compared to the results of the three previous samples from each WTW and interpreted in terms of their suitability for domestic use, using Table 1 as a reference. In order to facilitate the interpretation of the results in terms of the fitness for domestic use, the following colour codes have been used:

No shading: water is within the guideline limits

Green: water will have slight aesthetic effects (taste, colour), but no adverse health effects;

Yellow: water will have moderate aesthetic effects, but no significant health effects;

Orange: water will have severe aesthetic effects and minor to moderate health effects;

Red: water will have very severe aesthetic effects and moderate to significant health effects.

Table 1: Range of fitness classes for domestic use

Parameter (all as mg/l except where indicated)	Within guideline limits for no adverse effects	Slight aesthetic effects; no adverse health effects	Moderate aesthetic effects; no significant health effects	Severe aesthetic effects; minor to moderate health effects	Very severe aesthetic effects; moderate to significant health effects
Sodium (Na)	<100	100 - 400	400 - 600	600 - 1,000	>1,000
Ammonia (NH ₄)	<1	1 - 2	2 - 10	>10	
Sulphate (SO ₄)	<200	200 - 400	400 - 600	600 - 1,000	>1,000
Chloride (Cl)	<100	100 - 200	200 - 600	600 - 1,200	>1,200
Nitrate (NO ₃)	<6	-	-	6 - 20	>20
Conductivity (eC) as mS/m	<70	70 - 150	150 - 300	300 - 450	>450
pH units	6 - 9	-	-	4 - 6 9 - 11	<4 >11
Aluminium (Al)	<0.15	0.15 - 0.5	>0.5 (in presence of Fe and Mn)	>1	
Copper (Cu)	<1	1 - 3	3 - 30	30 - 200	>200
Iron (Fe)	<0.1	0.1 - 0.3	0.3 - 1.0	1 - 10	>10
Lead (Pb) as ppb	<10	-	-	10 - 100	>100
Manganese (Mn)	<0.05	0.05 - 1.0	1 - 5	5 - 14	>14
Zinc (Zn)	<3	3 - 5	5 - 10	10 - 50	>50

Note that the Feb18, Aug20 and Jul21 samples were analysed by the same laboratory at the CSIR in Stellenbosch, while the Nov18 samples were analysed by the Hospital Lab on St Helena using new equipment.

2.1 Red Hill WTW

The results for treated water from the Red Hill WTW are shown in Table 2 below. The quality of water produced at the Red Hill WTW is consistent with previous sample results, although there has been an increase in iron concentration (0.34 mg/l) compared to the previous year's result. This means that the water may be slightly discoloured and have a moderately bitter or metallic taste, but no adverse health effects. Manganese continues to be within acceptable limits.

Table 2: Red Hill WTW: treated water samples

Parameters (mg/l except where indicated)	RH23 Feb18	RH23 Nov18	RH23 Aug20	RH23 Jul21
Potassium	1.4	1.4	1.8	ND
Sodium	36	33.4	41	45
Magnesium	4.6	2.38	7.4	6.3
Calcium	3.8	0.09	6.3	7.8
Sulphate	12	8	NR	9.6
Chloride	49	NR	62	57
Nitrate	<0.1	0.3	0.06	<0.05
Phosphate	<0.05	0.34	<0.05	0.05
Conductivity (mS/m)	23	22.4	33	30
pH (units)	7.4	ND	7.1	7.5
Aluminium	0.02	0.006	0.05	0.02
Copper	<0.01	0	<0.01	<0.01
Iron	0.05	0.505	0.13	0.34
Manganese	<0.01	0.5	<0.03	<0.03
Suspended solids	ND	ND	ND	1

2.2 Hutt's Gate WTW

The quality of the treated water from Hutt's Gate WTW is relatively good, with the current results being similar to those obtained in February 2018 (Table 3). The concentration of dissolved iron has decreased slightly, but there may still be a slight metallic taste to the water or some staining. This will not have any adverse impacts on health. Manganese levels are within the guideline limits

Table 3: Hutt's Gate WTW: treated water samples

Parameters (mg/l except where indicated)	HG22 Feb18	HG22 Nov18	HG22 Aug20	HG22 Jul21
Potassium	1.6	1.1	1.4	ND
Sodium	45	31.1	30	49
Magnesium	7.7	3.29	3.5	5.6
Calcium	8.3	ND	3.9	8.4
Sulphate	9.2	6	ND	13

Parameters (mg/l except where indicated)	HG22 Feb18	HG22 Nov18	HG22 Aug20	HG22 Jul21
Chloride	66	ND	48	63
Nitrate	0.1	0.4	<0.05	<0.05
Phosphate	0.05	0.45	0.05	0.08
Conductivity (mS/m)	32	23.9	22	32
pH (units)	7.7	ND	7.2	7.2
Aluminium	0.03	0.008	0.04	0.05
Copper	<0.01	0	<0.01	<0.01
Iron	0.12	0.019	0.38	0.15
Manganese	<0.01	0.7	<0.03	<0.03
Suspended solids	ND	ND	ND	<1

2.3 Levelwood WTW

The results from the latest sample are fairly consistent with previous results, especially the last sample taken in August 2020 (Table 4). The quality of the water is good and aluminium and manganese are now well within the guideline limits, while the result for iron just exceeds the 'no effects' threshold of 0.1 mg/l and as a consequence, the water may have a very slight metallic taste.

Table 4: Levelwood WTW: treated water samples

Parameters (mg/l except where indicated)	LW20 Feb18	LW20 Nov18	LW20 Aug20	LW20 Jul21
Potassium	1.8	1.5	2.0	ND
Sodium	26	25.8	43	42
Magnesium	4.9	15.82	4.1	5.7
Calcium	6.4	2.16	4.5	5.1
Sulphate	8.1	6	NR	26
Chloride	55	NR	66	53
Nitrate	<0.1	0.6	<0.05	<0.05
Orthophosphate	0.1	0.45	0.07	0.05
Conductivity (mS/m)	21	19.58	29	28
pH (units)	7.5	ND	7.0	7.1
Aluminium	0.07	0.04	0.19	0.02
Copper	<0.01	0.45	<0.01	<0.01
Iron	0.15	0.136	0.37	0.17
Manganese	<0.01	0.4	<0.03	<0.03
Suspended solids	ND	ND	ND	2

2.4 Jamestown WTW

The latest results are all generally higher than the two previous results, indicating increased salinity, as reflected in elevated sodium and chloride results. While this water will not have any adverse health effects, it could taste slightly salty. Both iron and manganese have improved since November 2018.

Table 5: Jamestown WTW: treated water samples

Parameters (mg/l except where indicated)	JT21 Feb18	JT21 Nov18	JT21 Aug20	JT21 Jul21
Potassium	2.5	2.9	2.9	ND
Sodium	92	74.7	88	100
Magnesium	14	1.64	10	14
Calcium	11	<0.05	8.7	15
Sulphate	30	27	ND	32
Chloride	114	ND	107	116
Nitrate	0.3	0.8	0.13	0.54
Orthophosphate	0.14	0.72	0.12	0.16
Conductivity (mS/m)	58	55	54	64
pH (units)	7.9	ND	7.4	7.9
Aluminium	0.08	0.007	0.64	0.05
Copper	<0.01	0.01	<0.01	<0.01
Iron	0.16	0.47	0.44	0.05
Manganese	<0.01	0.5	<0.03	<0.03
Suspended solids	ND	ND	ND	1

2.5 Summary

All samples are fit for human consumption from a health perspective, based on the inorganic results received from the July 2021 set of samples. The samples were not analysed for microbiological constituents due to the lag time between sample collection in St Helena and sample analysis in South Africa, which is too long for microbiological analyses. The following points summarise the situation:

- The results are consistent with previous results and within the normal range of variability;
- Iron is still problematic in the Red Hill treated water and present in the Hutt's Gate and Levelwood treated water but at lower concentrations. These concentrations do not present a health hazard, but will make the water taste slightly to moderately metallic and may cause some discolouration;
- All samples are within the recommended threshold limits for manganese and aluminium.

3 RECOMMENDATIONS

The water quality results are consistent with previous results and therefore, there is no need for any corrective actions or follow-up testing.

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APPENDIX A: RESULTS CERTIFICATE