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GHHP QA/QC assessment of the 2022 water and sediment quality data

Purpose: To identify potential QA/QC issues from the 2022 reporting year.

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1. Summary of GHHP QA/QC assessment of the water quality and sediment quality data from the 2022 reporting year

1. **Dissolved metals**

- There are 22 dissolved metal cases where the filtered values were higher than the total values. These cases represent 1.7% of the dissolved metal data. Half of cases (n = 11) were between filtered and total zinc. The majority of cases (n = 20) showed a relative percent difference less than 50%.

2. **Field and travel blanks (FB/TB)**

- There are 37 cases where a FB/TB sample showed a positive result. These cases represent 6.9% of the FB/TB data. About half of cases (n = 18) were total phosphorous samples. The majority of positive cases (n = 23) were trace signatures. Trace signatures are those where a value is equal to or rounds down to the limit of reporting value for that particular measure.
- If trace signatures are not counted towards the positive blank total, there are 14 cases (2.6% of the FB/TB data) showing a positive blank result.

3. **Duplicate samples**

- There are 17 cases where the duplicate sample concentrations were greater than 10 times the limit of reporting value and had a relative percent difference greater than 50% of the main sample concentration. These cases represent 2.4% of the main/duplicate data.

4. **Limit of reporting values**

- All limit of reporting values were consistent between quarterly samples and the previous reporting year (2021).

Table 1.1. Dissolved metals cases where the filtered values were higher than the total values. Relative percent difference (RPD) is also shown.

Case No.	Metal	Sampling Event	Site	Filtered (µg/L)	Total (µg/L)	RPD
Case 1	Copper	Aug-21	WB30	1.2	1.1	9
Case 2		Mar-22	IH10	1.1	<1	10
Case 3			STI60	1.2	<1	18
Case 4			WB50	1.5	1.4	7
Case 5	Manganese	Mar-22	NW70	7.2	2.9	85
Case 6	Nickel	Aug-21	NW30	1.8	1.5	18
Case 7			NW60	1.3	<1	26
Case 8			WB40	1.1	<1	10
Case 9		Mar-22	NW60	1.2	1.1	9
Case 10			STI30	1.2	1.1	9
Case 11			WB40	1.1	<1	10
Case 12			Zinc	Nov-21	BR10	1.7
Case 13	NW40	1.1			<1	10
Case 14	NW80	2			1.8	11
Case 15	RB20	1.3			<1	26
Case 16	RCI40	1.2			<1	18
Case 17	Mar-22	BC30		4.6	4.3	7
Case 18		IH10		1.3	1.2	8
Case 19		NW80		1.2	1	18
Case 20		STI30		2.8	2.7	4
Case 21		STI60		1.8	1.7	6
Case 22		Jun-22		MH20	1.9	1.7

Table 1.2. Positive field blank (FB) and travel blank (TB) samples.

Case No.	Parameter	Sampling Event	Sample	Concentration (µg/L)	Case No.	Parameter	Sampling Event	Sample	Concentration (µg/L)	
Case 1	Aluminium Total	Aug-21	FB2	10	Case 25	Ammonia	Aug-21	FB2	2	
Case 2			FB3	7	Case 26		Nov-21	FB1	2	
Case 3			TB2	14	Case 27			FB4	2	
Case 4	Zinc Total	Jun-22	FB3	1	Case 28			TB1	2	
Case 5	Phosphorus Total	Aug-21	FB1	3	Case 29		NOx	Nov-21	TB2	3
Case 6			TB1	4	Case 30				TB3	3
Case 7			TB2	3	Case 31				TB4	3
Case 8			TB3	3	Case 32	Jun-22			FB3	2
Case 9		Nov-21	Nov-21	FB1	4	Case 33	Nov-21	FB1	2	
Case 10				FB2	3	Case 34		FB4	2	
Case 11				FB3	3	Case 35	Mar-22	FB1	2	
Case 12				FB4	3	Case 36		FB3	2	
Case 13				TB1	3	Case 37		FB4	4	
Case 14		TB2	3							
Case 15		Mar-22	Mar-22	FB1	3					
Case 16				FB2	3					
Case 17				FB3	3					
Case 18				FB4	3					
Case 19				TB1	3					
Case 20				TB2	3					
Case 21				TB3	4					
Case 22				TB4	4					
Case 23	Nitrogen Total	Aug-21	TB3	50						
Case 24		Mar-22	FB2	50						

Table 1.3. Duplicate sample concentrations greater than 10 times the limit of reporting value, with a relative percent difference (RPD) greater than 50% of the main sample concentration.

Case No.	Water quality parameter	Sampling Event	Site	Main sample (µg/L)	Duplicate sample (µg/L)	RPD
Case 1	Aluminium Total	Aug-21	WB60	750	2160	97
Case 2		Nov-21	AC30	340	180	62
Case 3			CR10	1500	430	111
Case 4			STI10	110	270	84
Case 5			WB20	760	1400	59
Case 6		Mar-22	IH20	430	250	53
Case 7	Manganese Total	Aug-21	WB60	17	44	89
Case 8		Nov-21	WB20	22	39	56
Case 9		Mar-22	AC40	7.2	15	70
Case 10	NOx	Jun-22	IH30	<2	28	173
Case 11	Chlorophyll-a	Aug-21	BR20	0.42	0.21	67
Case 12		Nov-21	BR10	1.16	0.54	73
Case 13			MH10	1.26	0.75	51
Case 14			OH20	1.36	2.66	65
Case 15			RCI10	1.25	0.69	58
Case 16		Jun-22	CR30	2.22	0.48	129
Case 17			NW30	0.31	0.52	51
Case No.	Sediment quality parameter	Sampling Event	Site	Main sample (µg/L)	Duplicate sample (µg/L)	RPD
Case 1	Arsenic	May-22	AC20	20	34	52

Table 1.4. Limit of reporting values for the 2022 reporting year.

Type	Parameter	Limit of reporting value
Water	Aluminium Filtered	5 µg/L
	Aluminium Total	5 µg/L
	Copper Filtered	1 µg/L
	Copper Total	1 µg/L
	Lead Filtered	1 µg/L
	Lead Total	1 µg/L
	Manganese Filtered	1 µg/L
	Manganese Total	1 µg/L
	Nickel Filtered	1 µg/L
	Nickel Total	1 µg/L
	Zinc Filtered	1 µg/L
	Zinc Total	1 µg/L
	Orthophosphate-P	2 µg/L
	Total Phosphorous	3 µg/L
	Total Nitrogen	20 µg/L
	Ammonia-N	2 µg/L
NOx	2 µg/L	
Chlorophyll- <i>a</i>	0.02 µg/L	
Sediment	Arsenic	0.5 mg/kg
	Cadmium	0.5 mg/kg
	Copper	0.5 mg/kg
	Lead	0.5 mg/kg
	Mercury	0.01 mg/kg
	Nickel	0.5 mg/kg
	Zinc	0.5 mg/kg

2. GHHP reported measures only - Summary of QA/QC assessment of water and sediment quality data from the 2022 reporting year

***As only GHHP reported measures were included in the analysis; orthophosphate, ammonia, and NOx were excluded.**

1. **Dissolved metals**

- There are 22 dissolved metal cases where the filtered values were higher than the total values. These cases represent 1.7% of the dissolved metal data. Half of cases (n = 11) were between filtered and total zinc. The majority of cases (n = 20) showed a relative percent difference less than 50%.

2. **Field and travel blanks (FB/TB)**

- There are 24 cases where a FB/TB sample showed a positive result. These cases represent 5.3% of the FB/TB data. Three quarters of cases (n = 18) were total phosphorous samples. The majority of positive cases (n = 14) were trace signatures. Trace signatures are those where a value is equal to or rounds down to the limit of reporting value for that particular measure.
- If trace signatures are not counted towards the positive blank total, there are 10 cases (2.2% of the FB/TB data) showing a positive blank result.

3. **Duplicate samples**

- There are 16 cases where the duplicate sample concentrations were greater than 10 times the limit of reporting value and had a relative percent difference greater than 50% of the main sample concentration. These cases represent 2.7% of the main/duplicate data.

4. **Limit of reporting values**

- All limit of reporting values were consistent between quarterly samples and the previous reporting year (2021).

Table 2.1. Dissolved metals cases where the filtered values were higher than the total values. Relative percent difference (RPD) is also shown.

Case No.	Metal	Sampling Event	Site	Filtered (µg/L)	Total (µg/L)	RPD
Case 1	Copper	Aug-21	WB30	1.2	1.1	9
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Table 2.2. Positive field blank (FB) and travel blank (TB) samples.

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Case 8			TB3	3	
Case 9		Nov-21	FB1	4	
Case 10			FB2	3	
Case 11			FB3	3	
Case 12			FB4	3	
Case 13			TB1	3	
Case 14			TB2	3	
Case 15		Mar-22	FB1	3	
Case 16			FB2	3	
Case 17			FB3	3	
Case 18			FB4	3	
Case 19			TB1	3	
Case 20			TB2	3	
Case 21			TB3	4	
Case 22			TB4	4	
Case 23		Nitrogen Total	Aug-21	TB3	50
Case 24			Mar-22	FB2	50

Table 2.3. Duplicate sample concentrations greater than 10 times the limit of reporting value, with a relative percent difference (RPD) greater than 50% of the main sample concentration.

Case No.	Water quality parameter	Sampling Event	Site	Main sample (µg/L)	Duplicate sample (µg/L)	RPD
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	Copper Total	1 µg/L
	Lead Filtered	1 µg/L
	Lead Total	1 µg/L
	Manganese Filtered	1 µg/L
	Manganese Total	1 µg/L
	Nickel Filtered	1 µg/L
	Nickel Total	1 µg/L
	Zinc Filtered	1 µg/L
	Zinc Total	1 µg/L
	Orthophosphate-P	2 µg/L
	Total Phosphorous	3 µg/L
	Total Nitrogen	20 µg/L
	Ammonia-N	2 µg/L
	NOx	2 µg/L
Chlorophyll- <i>a</i>	0.02 µg/L	
Sediment	Arsenic	0.5 mg/kg
	Cadmium	0.5 mg/kg
	Copper	0.5 mg/kg
	Lead	0.5 mg/kg
	Mercury	0.01 mg/kg
	Nickel	0.5 mg/kg
	Zinc	0.5 mg/kg