

# WATER QUALITY LABORATORY INORGANIC ANALYSES

#### PERIOD OF 01/01/2010 TO 12/31/2010

## Occoquan Reservoir – Griffith Water Treatment Plant Source Water

Agressive Index Number	ant <sup>2</sup> # of	Quant <sup>2</sup>																	
Alkalinity, Bicarbonate mg/L 28 39 30 40 50 49 54 64 67 54 55 60 49 67 26 Alkalinity, Carbonate mg/L 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	mit Tests	Limit	Min	Max	Average	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	Mar	Feb	Jan	Units <sup>1</sup>	Parameter
Alkalinity, Carbonate mg/L	- 12	-	10	11	10	11	10	11	11	11	10	10	10	10	10	11	10	Units	Aggressive Index Number
Alkalinity, Hydroxyl mg/L 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- 12	-	26	67	49	60	55	54	67	64	54	49	50	40	30	39	26	mg/L	Alkalinity, Bicarbonate
Alkalinity, Phenolphthalein         mg/L         0 <th< td=""><td>- 12</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>mg/L</td><td>Alkalinity, Carbonate</td></th<>	- 12	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	mg/L	Alkalinity, Carbonate
Alkalinify, Total mg/L 26 39 30 40 50 49 54 64 67 54 55 60 49 67 26 Bromide mg/L 0.02 0.04 0.02 0.04 0.03 0.03 0.03 0.03 0.03 0.03 0.03	- 12	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	mg/L	Alkalinity, Hydroxyl
Bromide	- 12	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	mg/L	Alkalinity, Phenolphthalein
Carbon Dioxide	- 12	-	26	67	49	60	55	54	67	64	54	49	50	40	30	39	26	mg/L	Alkalinity, Total
Chloride	01 12	0.01	0.02	0.04	0.03	0.03	0.02	0.03	0.04	0.04	0.03	0.03	0.04	0.02	0.02	0.04	0.02	mg/L	Bromide
Color   Units   92   88   117   44   25   34   38   30   32   53   33   28   51   117   25	- 12	-	3	17	8	8	17	7	7	8	8	10	8	4	5	3	5	mg/L	Carbon Dioxide
Dissolved Oxygen   mg/L   12.6   13.0   10.1   9.1   3.3   3.9   2.9   3.3   5.0   3.7   2.9   8.0   6.5   13.0   2.9   Fluoride   mg/L   BQL   BQL	.0 12	5.0	26.6	45.1	33.2	28.5	26.6	29.0	38.2	39.3	32.3	32.1	36.2	30.8	28.6	45.1	31.3	mg/L	Chloride
Fluoride mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	12	0	25	117	51	28	33	53	32	30	38	34	25	44	117	88	92	Units	Color
Hardness, Calcium  mg/L  30  53  32  46  54  56  57  70  69  55  55  63  53  70  30  Hardness, Total  mg/L  53  94  73  74  76  80  75  92  95  80  79  91  80  95  53  Methylene Blue Activated Substances  mg/L  N, Ammonia (Ammonia as N)  mg/L  N, Mitrate (Nitrate as N)  mg/L  N, Nitrate (Nitrite as N)  mg/L  Units  70  74  71  73  71  70  71  70  71  70  71  70  71  70  71  70  71  70  71  70  71  70  70	.0 12	0.0	2.9	13.0	6.5	8.0	2.9	3.7	5.0	3.3	2.9	3.9	3.3	9.1	10.1	13.0	12.6	mg/L	Dissolved Oxygen
Hardness, Total mg/L 53 94 73 74 76 80 75 92 95 80 79 91 80 95 53  Methylene Blue Activated Substances mg/L 0.054	.2 12	0.2	BQL	0.4	BQL	BQL	0.2	0.3	0.4	0.4	BQL	BQL	0.2	BQL	BQL	BQL	BQL	mg/L	Fluoride
Methylene Blue Activated Substances         mg/L               0.054            0.054	- 12	-	30	70	53	63	55	55	69	70	57	56	54	46	32	53	30	mg/L	Hardness, Calcium
N, Ammonia (Ammonia as N)  mg/L  n, Airrate (Nitrate as N)  mg/L  n, Nitrate (Nitrate as N)  ng/L  n, Nitrate (Nitrate as N)  ng/L	- 12	-	53	95	80	91	79	80	95	92	75	80	76	74	73	94	53	mg/L	Hardness, Total
N, Nitrate (Nitrate as N) mg/L 0.7 0.9 0.6 0.6 0.9 0.7 BQL 0.9 0.5 1.2 1.4 1.9 0.9 1.9 BQL N, Nitrite (Nitrite as N) mg/L 0.01 0.01 0.01 0.01 0.01 0.02 0.02 0.05 0.22 0.01 0.03 0.04 0.22 0.01 pH Units 7.0 7.4 7.1 7.3 7.1 7.0 7.1 7.2 7.3 7.2 6.8 7.2 7.1 7.4 6.8 Phosphate as Phosphorous mg/L BQL BQL BQL BQL BQL BQL BQL BQL BQL BQ	)50 1	0.050	0.054	0.054	0.054						0.054							mg/L	Methylene Blue Activated Substances
N, Nitrite (Nitrite as N) mg/L	20 10	0.20	BQL	0.36	BQL			BQL	0.28	0.36	BQL	BQL	BQL	BQL	BQL	BQL	BQL	mg/L	N, Ammonia (Ammonia as N)
pH	.2 12	0.2	BQL	1.9	0.9	1.9	1.4	1.2	0.5	0.9	BQL	0.7	0.9	0.6	0.6	0.9	0.7	mg/L	N, Nitrate (Nitrate as N)
Phosphate as Phosphorous         mg/L         BQL         BQL </td <td>01 10</td> <td>0.01</td> <td>0.01</td> <td>0.22</td> <td>0.04</td> <td>0.03</td> <td>0.01</td> <td>0.22</td> <td></td> <td>0.05</td> <td>0.02</td> <td></td> <td>0.02</td> <td>0.01</td> <td>0.01</td> <td>0.01</td> <td>0.01</td> <td>mg/L</td> <td>N, Nitrite (Nitrite as N)</td>	01 10	0.01	0.01	0.22	0.04	0.03	0.01	0.22		0.05	0.02		0.02	0.01	0.01	0.01	0.01	mg/L	N, Nitrite (Nitrite as N)
Solids, Total Mg/L 138 183 137 131 166 161 159 216 203 200 191 182 172 216 131 Solids, Total Dissolved Mg/L 124 176 111 160 162 147 135 205 193 176 191 181 163 205 111 Solids, Total Suspended Mg/L 14 5 5 3 2 3 3 2 4 12 2 3 5 14 2 Specific Conductivity Mmhos/cm 184 286 192 235 269 258 249 363 355 278 285 302 271 363 184 Sulfate Mg/L 10.6 19.4 12.6 15.9 24.7 20.6 22.7 36.4 34.3 28.0 25.9 30.2 23.4 36.4 10.6 Temperature °C 2.9 4.8 10.1 13.8 15.7 21.5 24.6 25.4 24.0 17.6 15.7 8.8 15.4 25.4 2.9 Threshold Odor Number Units 4 6 8 6 6 1 7 1 13 39 29 31 4 13 39 1 Total Organic Carbon Mg/L 4.3 3.8 5.2 4.5 4.1 4.5 4.6 4.5 4.5 5.0 4.9 4.9 4.9 4.6 5.2 3.8	- 12	-	6.8	7.4	7.1	7.2	6.8	7.2	7.3	7.2	7.1	7.0	7.1	7.3	7.1	7.4	7.0	Units	pH
Solids, Total Dissolved mg/L 124 176 111 160 162 147 135 205 193 176 191 181 163 205 111 Solids, Total Suspended mg/L 14 5 5 5 3 2 3 3 2 4 12 2 3 5 14 2 Specific Conductivity µmhos/cm 184 286 192 235 269 258 249 363 355 278 285 302 271 363 184 Sulfate mg/L 10.6 19.4 12.6 15.9 24.7 20.6 22.7 36.4 34.3 28.0 25.9 30.2 23.4 36.4 10.6 Temperature °C 2.9 4.8 10.1 13.8 15.7 21.5 24.6 25.4 24.0 17.6 15.7 8.8 15.4 25.4 2.9 Threshold Odor Number Units 4 6 8 6 6 1 7 1 3 39 29 31 4 13 39 1 Total Organic Carbon mg/L 4.3 3.8 5.2 4.5 4.1 4.5 4.6 4.5 4.5 5.0 4.9 4.9 4.6 5.2 3.8	10 12	0.10	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	mg/L	Phosphate as Phosphorous
Solids, Total Suspended mg/L 14 5 5 3 2 3 3 2 4 12 2 3 5 14 2 Specific Conductivity µmhos/cm 184 286 192 235 269 258 249 363 355 278 285 302 271 363 184 Sulfate mg/L 10.6 19.4 12.6 15.9 24.7 20.6 22.7 36.4 34.3 28.0 25.9 30.2 23.4 36.4 10.6 Temperature °C 2.9 4.8 10.1 13.8 15.7 21.5 24.6 25.4 24.0 17.6 15.7 8.8 15.4 25.4 2.9 Threshold Odor Number Units 4 6 8 6 6 1 7 1 3 39 29 31 4 13 39 1 Total Organic Carbon mg/L 4.3 3.8 5.2 4.5 4.1 4.5 4.6 4.5 4.5 5.0 4.9 4.9 4.6 5.2 3.8	1 12	1	131	216	172	182	191	200	203	216	159	161	166	131	137	183	138	mg/L	Solids, Total
Specific Conductivity         µmhos/cm         184         286         192         235         269         258         249         363         355         278         285         302         271         363         184           Sulfate         mg/L         10.6         19.4         12.6         15.9         24.7         20.6         22.7         36.4         34.3         28.0         25.9         30.2         23.4         36.4         10.6           Temperature         °C         2.9         4.8         10.1         13.8         15.7         21.5         24.6         25.4         24.0         17.6         15.7         8.8         15.4         25.4         2.9           Threshold Odor Number         Units         4         6         8         6         6         1         7         13         39         29         31         4         13         39         1           Total Organic Carbon         mg/L         4.3         3.8         5.2         4.5         4.1         4.5         4.6         4.5         4.5         5.0         4.9         4.6         5.2         3.8	1 12	1	111	205	163	181	191	176	193	205	135	147	162	160	111	176	124	mg/L	Solids, Total Dissolved
Sulfate         mg/L         10.6         19.4         12.6         15.9         24.7         20.6         22.7         36.4         34.3         28.0         25.9         30.2         23.4         36.4         10.6           Temperature         °C         2.9         4.8         10.1         13.8         15.7         21.5         24.6         25.4         24.0         17.6         15.7         8.8         15.4         25.4         2.9           Threshold Odor Number         Units         4         6         8         6         6         1         7         13         39         29         31         4         13         39         1           Total Organic Carbon         mg/L         4.3         3.8         5.2         4.5         4.1         4.5         4.6         4.5         4.5         5.0         4.9         4.9         4.6         5.2         3.8	1 12	1	2	14	5	3	2	12	4	2	3	3	2	3	5	5	14	mg/L	Solids, Total Suspended
Temperature         °C         2.9         4.8         10.1         13.8         15.7         21.5         24.6         25.4         24.0         17.6         15.7         8.8         15.4         25.4         2.9           Threshold Odor Number         Units         4         6         8         6         6         1         7         13         39         29         31         4         13         39         1           Total Organic Carbon         mg/L         4.3         3.8         5.2         4.5         4.1         4.5         4.6         4.5         4.5         5.0         4.9         4.9         4.6         5.2         3.8	) 12	0	184	363	271	302	285	278	355	363	249	258	269	235	192	286	184	µmhos/cm	Specific Conductivity
Threshold Odor Number Units 4 6 8 6 6 1 7 13 39 29 31 4 13 39 1 Total Organic Carbon mg/L 4.3 3.8 5.2 4.5 4.1 4.5 4.6 4.5 4.5 5.0 4.9 4.9 4.6 5.2 3.8	.0 12	5.0	10.6	36.4	23.4	30.2	25.9	28.0	34.3	36.4	22.7	20.6	24.7	15.9	12.6	19.4	10.6	mg/L	Sulfate
Total Organic Carbon mg/L 4.3 3.8 5.2 4.5 4.1 4.5 4.6 4.5 5.0 4.9 4.9 4.6 5.2 3.8	- 12	-	2.9	25.4	15.4	8.8	15.7	17.6	24.0	25.4	24.6	21.5	15.7	13.8	10.1	4.8	2.9	°C	Temperature
	) 12	0	1	39	13	4	31	29	39	13	7	1	6	6	8	6	4	Units	Threshold Odor Number
T.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.5 12	0.5	3.8	5.2	4.6	4.9	4.9	5.0	4.5	4.5	4.6	4.5	4.1	4.5	5.2	3.8	4.3	mg/L	Total Organic Carbon
Turbidity NTU   42   14   20   5.6   1.8   3.2   3.6   4.1   3.4   16   3.3   3.8   10   42   1.8	00 12	0.00	1.8	42	10	3.8	3.3	16	3.4	4.1	3.6	3.2	1.8	5.6	20	14	42	NTU	Turbidity

BQL = The lowest quantitation limit of all analyses for the particular parameter, Below Quantitation Limit.

 $<sup>^{1}</sup>$ mg/L=milligrams per liter,  $\mu$ g/L=micrograms per liter

<sup>&</sup>lt;sup>2</sup> Quant Limit = Quantitation Limit = Lowest level of measurement.



# WATER QUALITY LABORATORY METAL ANALYSES

### PERIOD OF 01/01/2010 TO 12/31/2010

### Occoquan Reservoir - Griffith Water Treatment Plant Source Water

																	Quant <sup>2</sup>	# of
Parameter	Units <sup>1</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average	Max	Min	Limit	Tests
Aluminum	μg/L	827			292			36.8			254		-	352	827	36.8	25.0	4
Antimony	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	2.0	4
Arsenic	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	2.0	4
Barium	μg/L	28.9			31.2			34.5			40.9			33.9	40.9	28.9	25.0	4
Beryllium	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	2.0	4
Cadmium	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	2.0	4
Calcium	mg/L	12.0			16.3			19.6		-	22.8	-	-	17.7	22.8	12.0	1.0	4
Chromium	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	5.0	4
Copper	μg/L	BQL	BQL	BQL	25.0	12												
Iron	μg/L	1060	816	1150	396	106	138	132	254	332	448	155	239	436	1150	106	25.0	12
Lead	μg/L	BQL			BQL			BQL		-	BQL	-	-	BQL	BQL	BQL	2.0	4
Magnesium	mg/L	3.9			4.9			5.2			5.0			4.8	5.2	3.9	1.0	4
Manganese	μg/L	76.1	61.4	38.9	37.9	73.9	218	286	484	556	494	320	126	231	556	37.9	25.0	12
Mercury	μg/L	BQL						BQL						BQL	BQL	BQL	0.50	2
Nickel	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	5.0	4
Potassium	mg/L	2.6			2.4			3.9			4.6			3.4	4.6	2.4	1.0	4
Selenium	μg/L	BQL			BQL			BQL		-	BQL	-	-	BQL	BQL	BQL	5.0	4
Silicon	mg/L	5.3			3.8			3.2			3.2			3.9	5.3	3.2	1.0	4
Silver	μg/L	BQL			BQL			BQL		-	BQL	-	-	BQL	BQL	BQL	5.0	4
Sodium	mg/L	18.8	26.9	17.9	19.5	21.4	19.7	21.4	28.2	27.9	20.1	20.1	22.2	22.0	28.2	17.9	1.0	12
Thallium	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	2.0	4
Zinc	μg/L	BQL			BQL			BQL			BQL			BQL	BQL	BQL	25.0	4

BQL = The lowest quantitation limit of all analyses for the particular parameter, Below Quantitation Limit.

 $<sup>^{1}</sup>$ mg/L=milligrams per liter,  $\mu$ g/L=micrograms per liter

<sup>&</sup>lt;sup>2</sup> Quant Limit = Quantitation Limit = Lowest level of measurement.