McGinty Creek Water Quality Characterization
May 2009 – July 2012

YESAB Project Proposal Phase V/VI

June 2013

Prepared for:

Minto Explorations Ltd.

Table of Contents

List of Tables

List of Figures

List of Appendices

1 INTRODUCTION

Minto Explorations Ltd. (a wholly owned subsidiary of Capstone Mining Corp.) owns and operates the Minto Mine, a high-grade copper mine located approximately 240 km northwest of Whitehorse, Yukon (see Figure 1-1).

Access Consulting Group (ACG) and Minnow Environmental Inc. have worked in conjunction to prepare a baseline water quality characterization for McGinty Creek to assist with the assessment of future expansion plans for Minto Mine. Water quality data for McGinty Creek has been collected over the course of more than three years of monitoring since May 2009. Activity to date within the upper watershed consists of surface exploration in 2008 and 2009. While monitoring continues to take place, for the purpose of preparing this report the dataset is truncated at July 2012.

This report summarizes methods used in the evaluation of water quality data (Section 2.0), identification of elevated parameters (Section 3.0), characterization of elevated parameter concentrations (Section 4.0), and a summary of findings (Section 5.0).

MINTO MINE

CAPSTONE MINING CORP.
MINTO MINE
OPERATED BY MINTO EXPLORATIONS LTD.

MCGINTY CREEK WATER QUALITY CHARACTERIZATION MAY 2009 – JULY 2012

FIGURE 1-1

PROJECT LOCATION

ACCESS

2 METHODS

2.1 WATER QUALITY DATA HANDLING AND SUMMARIZATION

McGinty Creek was monitored between May 2009 and July 2012 by ACG on a monthly basis as conditions allowed. Minto Mine took over monitoring of the McGinty Creek watershed in August 2012. This report considers water quality results from samples collected between May 2009 and July 2012 (summary tables provided in Appendix A).

Water quality was monitored at five stations in the McGinty Creek watershed, described in Table 2-1, and shown in Figure 2-1.

Table 2-1: McGinty Creek Monitoring Station Locations.

Station	Description / Location
MN-0.2	Upper west arm of McGinty Creek (Reference Station)
MN-0.5	West arm of McGinty Creek just upstream of the confluence with the east arm
MN-1.5	Upper east arm of McGinty Creek downstream of the Minto North deposit
MN-2.5	East arm of McGinty Creek just upstream of confluence with the west arm
MN-4.5	Lower mainstream McGinty Creek near confluence with Yukon River

The east arm of McGinty Creek is considered the 'exposure tributary' as it originates downgradient of the Minto North deposit (where 2008 and 2009 surface exploration occurred), while the west arm of McGinty Creek is considered the 'reference tributary'.

381,000 382,000 383,000 384,000 385,000 386,000 387,000

6,954,000 6,953,000 6,952,000 6,951,000 6,950,000 6,949,000 6,948,000 6,947,000 6,946,000 6,945,000

N W E S

Yukon River

McGinty Creek

MN-4.5

MN-0.5

MN-2.5

MN-0.2

MN-1.5

PROPOSED
MINTO NORTH PIT

0 500 1,000 1,500 Meters

1:30,000 *When printed on 11 by 17 Inch paper*

National topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Reproduced under license from Her Majesty the Queen, as represented by the Minister of Natural Resources Canada. All rights reserved.
Datum: NAD 83; Projection: UTM Zone 8N

Monitoring Station

MineFeatureArea

Contour (100 ft interval)

McGinty Creek Catchment

Waterbody

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ACCESS

MCGINTY CREEK WATER QUALITY CHARACTERIZATION
MAY 2009 – JULY 2012

FIGURE 2-1
MCGINTY CREEK
MONITORING STATION LOCATIONS

JUNE 2013

I:\Minto\gis\mxd\Overview_Maps\04-WaterQuality\02-McGuinty Creek\Monitoring_Stations_May_2013.mxd
(Last edited by: jlindeman; 21/06/2013/16:25 PM)

Of the thirty-nine months between May 2009 and July 2012, monitoring of the McGinty Creek watershed occurred during twenty-nine months. Once winter conditions were established during 2009 to 2010 monthly monitoring, site visits during quarters 1 and 4 were diminished. November and December monitoring occurred in 2009 only while February and March monitoring occurred in 2010 only. McGinty Creek was visited in both January 2010 and January 2011.

For the most part, monthly sampling occurred during the open water season between April and October. Table 2-2 outlines sample frequency by station and quarter, though does not necessarily reflect the number of times a site was visited if conditions were not conducive to sample collection.

Table 2-2: McGinty Creek Sample Frequency by Station per Quarter.

	MN-0.2	MN-0.5	MN-1.5	MN-2.5	MN-4.5	Total # Samples per Quarter	% of Total Samples
Quarter 1	0	1	1	2	0	4	3%
Quarter 2	9	15	15	15	14	68	52%
Quarter 3	3	8	9	9	9	38	29%
Quarter 4	1	5	5	5	4	20	15%
Total Samples per Station	13	29	30	31	27	130	100%

Monitoring at the upper reference station MN-0.2 was suspended between June 2009 and April 2011 due to limited accessibility and helicopter landing issues; therefore station MN-0.2 has less than half the number of samples as the other stations.

This report focuses mainly on only those parameters with Canadian Water Quality Guidelines (CWQG) for the protection of freshwater aquatic life (CCME 1999). This set of guidelines is being used in the analysis of McGinty Creek water quality primarily to guide discussion since documented fisheries use in McGinty Creek is limited to the area of influence of the Yukon River exclusively. Parameters reviewed include the total metals aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, molybdenum, nickel, selenium, silver, thallium, zinc, pH, nitrate, nitrite, ammonia, and fluoride. Additional parameter results are presented in the summary tables in Appendix A. Total suspended solids (TSS) concentrations and the relationship with parameters of interest has also been considered.

The following statistical analysis and calculations were conducted for each parameter (undetected concentrations in water samples were substituted with ½ the reportable detection limit (RDL)):

- Average concentration,
- Count (number of results for a particular parameter),
- Minimum concentration,
- Maximum concentration,

- Geometric mean,
- Number of results below detection limit,
- Standard deviation,
- 1st quartile,
- Median,
- 3rd quartile,
- 95th percentile,
- Number of results above the CWQG, and
- Percent of results above the CWQG

Every parameter analyzed at each station was also assessed to identify outliers in the data, which were defined as concentrations exceeding the average concentration +/- 3 standard deviations. Outliers are shown in Appendix B with an indication if associated with elevated TSS, or high RDLs, or for another reason. No outliers have been removed from the water quality tables and summary statistics provided in Appendix A. Dates with samples returning data set outliers include:

- January 25, 2010: winter sampling event with samples collected from nearly standing water or overflow.
- August 18, 2010: recent rain event resulting in high flows and TSS.
- July 15, 2011: conditions noted as turbid with elevated flows.

2.2 Interpretation of Water Quality Data

McGinty Creek water quality data were interpreted using five steps:

1. Average water quality was compared to the respective CWQG for freshwater aquatic life (CCME 1999), which helps to identify parameters with naturally high concentrations (e.g., regularly exceeded guidelines).
2. Concentrations of water quality parameters were examined in individual samples and the percentage of samples exceeding the guideline determined.
3. Concentrations were plotted over time and examined for trends.
4. Boxplots depict summary statistics for parameters of interest.
5. Average concentrations at McGinty Creek stations were compared to the upper 95th percentile.

3 IDENTIFICATION OF ELEVATED PARAMETERS

Average concentrations of parameters with CWQGs were examined for all sample stations (Tables 3-1 through 3-5).

At reference station MN-0.2 (n = 13, see Table 3-1) on the west arm of McGinty Creek, average total aluminum, cadmium, chromium, copper, and iron were found to exceed the guideline or calculated average guideline for these parameters. Except in the case of copper, the geometric mean (measurement of central tendency) for these parameters is significantly lower than the average; however, all values except chromium still exceed the respective guideline. In the case of chromium, only two exceedances of the guideline were observed, with one being an outlier. Copper exceeded the CWQG in 100% of samples, followed by cadmium at 85%, aluminum at 46%, and iron at 39%. Chromium and field pH measurements exceeded the guideline twice each, or 15% of the time.

Downstream of MN-0.2 on the west arm of McGinty Creek at MN-0.5 (see Figure 2-1 and Table 3-2), average total aluminum, cadmium, chromium, copper, iron, and fluoride exceed the CWQG (or calculated average guideline based on average pH and hardness); however, the geometric mean for chromium and iron do not exceed the associated CWQG. Of the 29 samples collected at MN-0.5, fluoride exceeded the CWQG 86% of the time, followed by copper at 62%, aluminum at 55%, cadmium at 52%, iron at 38%, and chromium at 17%. Additionally, lead exceeded the CWQG three times (10% of the time), while zinc and pH each exceeded the guideline twice (7% of the time).

Average concentrations at station MN-1.5 (n = 30, see Table 3-3), located on the upper east exposure tributary of McGinty Creek, downgradient of the Minto North deposit, exceeded the guidelines for average total aluminum, cadmium, chromium, copper, iron and lead. Geometric means are significantly lower than the average, though all but lead still exceed the guidelines. Copper exceeded the CWQG in 100% of samples followed by aluminum at 90%, cadmium at 87%, iron at 73%, chromium at 37%, and lead at 30%. Additionally, field pH did not meet the guideline 24% of the time and zinc exceeded the CWQG 17% of the time. Lab measured pH, fluoride and arsenic exceed the CWQG three times each or 10% of the time. Ammonia, mercury, and silver exceeded the guideline once each.

Station MN-2.5 (n = 31, Table 3-4) located downstream of MN-1.5 on the exposure tributary has average concentrations of total aluminum, cadmium, chromium, copper, iron, and fluoride exceeding the respective CWQG. These are the same parameters whose average concentrations at MN-0.5 located downstream on the reference tributary also exceed the guidelines. Geometric means for total aluminum, cadmium, and chromium do not exceed the CWQG at MN-1.5. Fluoride exceeds the CWQG in 77% of samples, followed by copper at 55%, cadmium and iron at 45%, aluminum at 42% and chromium at 13%. Additionally, field pH did not meet the guideline three times (10%), lead exceeded the guideline twice (7%), and mercury and zinc had one exceedance each (~3%).

In lower McGinty Creek near the confluence with the Yukon River, station MN-4.5 (n = 27, Table 3-5) the same parameters as MN-0.5 and MN-2.5 have average concentrations exceeding the CWQG: total aluminum, cadmium, chromium, copper, iron, and fluoride. However, the geometric means for total cadmium, chromium and iron do not exceed the respective guidelines. Fluoride exceeds the CWQG in 85% of samples, followed by copper at 70%, cadmium at 52%, aluminum and iron at 48%, and chromium at 22%. Total zinc exceeded the guideline on three occasions (11%), lead exceeded twice (7%), and mercury once (4%).

Table 3-1: McGinty Creek Monitoring Station MN-0.2 Summary of Water Quality Data May 2009–July 2012.

	pH (field)	pH (lab)	Total Suspended Solids	Fluoride	Ammonia (N)	Nitrite (N)	Nitrate (N)	Aluminum (Al), total	Aluminum (Al), dissolved	Arsenic (As), total	Arsenic (As), dissolved	Cadmium (Cd), total	Cadmium (Cd), dissolved	Chromium (Cr), total	Chromium (Cr), dissolved	Copper (Cu), total	Copper (Cu), dissolved	Iron (Fe), total	Iron (Fe), dissolved	Lead (Pb), total	Lead (Pb), dissolved	Mercury (Hg), total	Mercury (Hg), dissolved	Molybdenum (Mo), total	Molybdenum (Mo), dissolved	Nickel (Ni), total	Nickel (Ni), dissolved	Selenium (Se), total	Selenium (Se), dissolved	Silver (Ag), total	Silver (Ag), dissolved	Thallium (Tl), total	Thallium (Tl), dissolved	Zinc (Zn), total	Zinc (Zn), dissolved
	pH units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline	6.5-9	6.5-9		0.12	0.343	0.06	3	100		5		0.0110*		1		2*		300		1*		0.026		73		36.15*		1		0.1		0.8		30	
Average	6.94	7.12	39.3	0.097	0.0238	0.008	0.041	666.5	91.2	0.674	0.389	0.0422	0.0232	1.41	0.39	4.94	3.3	1253	305	0.3842	0.0554	0.004834	0.007	0.16	0.187	2.62	1.76	0.07	0.057	0.0084	0.0039	0.0062	0.001	4.88	3.5
Count	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	10	13	13	13	13	13	13	13	13	13	13	13	13
Minimum	6.37	6.55	0.5	0.057	0.0025	0.0025	0.01	55.4	44.5	0.26	0.25	0.0025	0.0025	0.2	0.2	2.61	2.5	102	84	0.011	0.01	0.000005	0.005	0.025	0.025	1.06	1.04	0.04	0.02	0.0025	0.0025	0.001	0.001	0.5	0.1
Maximum	7.28	7.6	300	0.12	0.07	0.025	0.23	6460	199	2.86	0.78	0.118	0.053	12.3	0.9	16.5	5.27	9220	858	2.82	0.271	0.01	0.02	0.39	0.664	10.3	2.72	0.2	0.09	0.048	0.009	0.061	0.001	19	13.1
Geometric Mean	6.93	7.11	3.8	0.094	0.0135	0.0046	0.018	161.7	82.3	0.476	0.367	0.0251	0.0172	0.53	0.36	4.17	3.19	425	234	0.0948	0.0327	0.002855	0.006	0.131	0.133	2.11	1.7	0.064	0.054	0.0049	0.0034	0.0016	0.001	2.86	1.83
Count <DL	0	0	3	0	4	12	12	0	0	0	0	2	2	0	0	0	0	0	0	0	0	10	8	1	1	0	0	0	1	7	9	11	13	0	0
Standard Deviation	0.3	0.31	89.1	0.025	0.0209	0.0097	0.066	1761.5	47.2	0.747	0.149	0.0373	0.0147	3.3	0.19	3.84	0.97	2520	254	0.7796	0.0759	0.002208	0.005	0.1	0.185	2.46	0.43	0.041	0.017	0.0125	0.0023	0.0166	0	5.2	3.96
1st Quartile	6.83	6.89	1	0.08	0.0025	0.0025	0.01	79.9	61.2	0.27	0.28	0.015	0.016	0.3	0.3	2.86	2.63	199	126	0.0232	0.019	0.005	0.005	0.09	0.1	1.68	1.66	0.05	0.05	0.0025	0.0025	0.001	0.001	1.3	0.9
Median	6.95	7.06	1.7	0.11	0.024	0.0025	0.01	96.4	73.4	0.38	0.33	0.028	0.019	0.4	0.32	3.39	2.83	263	222	0.041	0.0251	0.005	0.005	0.143	0.13	1.9	1.73	0.06	0.05	0.0025	0.0025	0.001	0.001	3.7	1.61
3rd Quartile	7.19	7.3	10.4	0.12	0.033	0.007	0.01	146	114	0.539	0.462	0.059	0.035	0.5	0.4	5.24	3.58	540	316	0.241	0.038	0.005	0.005	0.202	0.16	2.27	1.97	0.07	0.069	0.007	0.005	0.001	0.001	7.2	5.1
95th Percentile	7.26	7.59	213.00	0.12	0.06	0.03	0.15	3226.00	177.4	1.93	0.621	0.11	0.04442	6.13	0.69	11.48	5.132	5380.00	829.8	1.71	0.2056	0.01	0.016	0.31	0.5692	6.81	2.318	0.13	0.078	0.03	0.0078	0.03	0.001	13.06	10.34
Count Over Guideline	2	0	0	0	0	0	0	6	0	0	0	11	0	2	0	13	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline	15	0	0	0	0	0	0	46	0	0	0	85	0	15	0	100	0	39	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Average concentrations exceeding the guideline are highlighted.

* Calculated average hardness specific cadmium, copper, lead and nickel guidelines.

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is based on pH and temperature not typically rising above 8.5 and 10 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.86[\log(\text{hardness})]-3.2)}$ µg/L

Nickel: $e^{(0.76[\ln(\text{hardness})]+1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)}$ * 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

Table 3-2: McGinty Creek Monitoring Station MN-0.5 Summary of Water Quality Data May 2009–July 2012.

	pH (field)	pH (lab)	Total Suspended Solids	Fluoride	Ammonia (N)	Nitrite (N)	Nitrate (N)	Aluminum (Al), total	Aluminum (Al), dissolved	Arsenic (As), total	Arsenic (As), dissolved	Cadmium (Cd), total	Cadmium (Cd), dissolved	Chromium (Cr), total	Chromium (Cr), dissolved	Copper (Cu), total	Copper (Cu), dissolved	Iron (Fe), total	Iron (Fe), dissolved	Lead (Pb), total	Lead (Pb), dissolved	Mercury (Hg), total	Mercury (Hg), dissolved	Molybdenum (Mo), total	Molybdenum (Mo), dissolved	Nickel (Ni), total	Nickel (Ni), dissolved	Selenium (Se), total	Selenium (Se), dissolved	Silver (Ag), total	Silver (Ag), dissolved	Thallium (Tl), total	Thallium (Tl), dissolved	Zinc (Zn), total	Zirconium (Zr), dissolved
	pH units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline	6.5-9	6.5-9		0.12	0.343	0.06	3	100		5		0.0262*		1		2.22*		300		2.329*		0.026		73		77.23*		1		0.1		0.8		30	
Average	7.49	7.71	81.7	0.26	0.0408	0.0058	0.105	736.5	53.3	0.863	0.429	0.0485	0.0185	1.49	0.31	4.84	2.16	1350	177	0.6845	0.0516	0.00524	0.008	0.725	0.746	3.24	1.26	0.173	0.167	0.0091	0.003	0.006	0.001	5.88	0.33
Count	28	29	29	28	29	28	28	29	29	29	29	29	29	29	29	29	29	29	29	29	29	25	19	29	29	29	29	29	29	29	29	29	29	29	29
Minimum	5.36	7.1	0.5	0.06	0.0025	0.0025	0.01	3.9	3.7	0.27	0.26	0.0025	0.0025	0.05	0.05	0.49	0.75	8	8	0.0025	0.006	0.000005	0.005	0.16	0.11	0.24	0.48	0.07	0.05	0.0025	0.0025	0.001	0.001	0.05	0.05
Maximum	8.23	8.2	673	0.66	0.33	0.025	1.69	6220	191	3.88	0.713	0.3	0.076	11.5	0.6	27.5	3.95	9170	716	5.63	0.198	0.01	0.02	1.34	1.43	18.6	2	0.3	0.4	0.052	0.007	0.059	0.001	33.1	0.7
Geometric Mean	7.46	7.7	11	0.23	0.0134	0.0038	0.033	128.9	31.4	0.572	0.412	0.0229	0.0118	0.48	0.25	2.82	1.97	288	109	0.1318	0.035	0.003865	0.007	0.609	0.622	1.71	1.16	0.162	0.154	0.005	0.0028	0.0019	0.001	2.43	0.28
Count <DL	0	0	5	0	12	25	16	0	0	0	0	2	7	2	3	0	0	0	0	1	0	22	13	0	0	0	0	0	0	17	25	21	29	1	1
Standard Deviation	0.69	0.33	178.7	0.13	0.0735	0.0073	0.313	1512.3	54.5	1.039	0.128	0.0744	0.0175	2.78	0.16	6.5	0.9	2620	161	1.4116	0.0487	0.002184	0.006	0.381	0.395	4.78	0.49	0.058	0.067	0.0126	0.0013	0.0127	0	8.61	0.18
1st Quartile	7.33	7.41	3	0.17	0.0025	0.0025	0.01	36.4	14.5	0.36	0.34	0.012	0.007	0.2	0.2	1.63	1.39	111	53	0.044	0.018	0.005	0.005	0.44	0.37	1.03	0.93	0.13	0.129	0.0025	0.0025	0.001	0.001	1.5	0.2
Median	7.76	7.82	6	0.25	0.019	0.0025	0.025	118	30.6	0.411	0.39	0.025	0.014	0.4	0.3	2.65	1.9	235	147	0.115	0.0305	0.005	0.005	0.683	0.78	1.56	1.14	0.18	0.17	0.0025	0.0025	0.001	0.001	2.3	0.3
3rd Quartile	7.86	8	46	0.34	0.039	0.0031	0.1	283	73.9	0.54	0.5	0.037	0.025	0.6	0.4	4.35	2.9	663	218	0.283	0.071	0.005	0.01	1.04	1.02	2.02	1.7	0.21	0.2	0.0074	0.0025	0.002	0.001	5.3	0.5
95th Percentile	8.04	8.1	534.00	0.4	0.18	0.0	0.13	3666.0	171.6	3.46	0.662	0.2	0.0528	7.12	0.6	19.9	3.61	7886.00	432	4.0	0.1528	0.01	0.02	1.3	1.382	15.16	1.99	0.2	0.236	0.03	0.006	0.0	0.001	26.86	0.6
Count Over Guideline	2	0	0	24	0	0	0	16	0	0	0	15	0	5	0	18	0	11	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
% Over Guideline	7	0	0	86	0	0	0	55	0	0	0	52	0	17	0	62	0	38	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0

Average concentrations exceeding the guideline are highlighted.

* Calculated average hardness specific cadmium, copper, lead and nickel guidelines.

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is based on pH and temperature not typically rising above 8.5 and 10 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.86[\log(\text{hardness})]-3.2)}$ µg/L

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Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)} * 0.2$ µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

Table 3-3: McGinty Creek Monitoring Station MN-1.5 Summary of Water Quality Data May 2009–July 2012.

	pH (field)	pH (lab)	Total Suspended Solids	Fluoride	Ammonia (N)	Nitrite (N)	Nitrate (N)	Aluminum (Al), total	Aluminum (Al), dissolved	Arsenic (As), total	Arsenic (As), dissolved	Cadmium (Cd), total	Cadmium (Cd), dissolved	Chromium (Cr), total	Chromium (Cr), dissolved	Copper (Cu), total	Copper (Cu), dissolved	Iron (Fe), total	Iron (Fe), dissolved	Lead (Pb), total	Lead (Pb), dissolved	Mercury (Hg), total	Mercury (Hg), dissolved	Molybdenum (Mo), total	Molybdenum (Mo), dissolved	Nickel (Ni), total	Nickel (Ni), dissolved	Selenium (Se), total	Selenium (Se), dissolved	Silver (Ag), total	Silver (Ag), dissolved	Thallium (Tl), total	Thallium (Tl), dissolved	Zinc (Zn), total	Zinc (Zn), dissolved
	pH units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline	6.5-9	6.5-9		0.12	0.343	0.06	3	100		5		0.0181*		1		2.19*		300		1.593*		0.026		73		55.27*		1		0.1		0.8		30	
Average	6.9	7.16	466.3	0.104	0.076	0.0063	0.042	3754.4	120.3	1.829	0.432	0.1205	0.0289	5.72	0.49	32.94	6.23	6795	512	2.0661	0.0701	0.008423	0.007	0.355	0.309	6.54	1.25	0.118	0.074	0.0304	0.0049	0.019	0.0011	21.94	3.7
Count	29	30	30	29	30	29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	26	19	30	30	30	30	30	30	30	30	30	30	30	30
Minimum	4.41	6	0.5	0.05	0.003	0.0025	0.01	35.2	34.2	0.19	0.15	0.0025	0.0025	0.2	0.2	3.05	3.02	168	126	0.01	0.008	0.000005	0.005	0.08	0.08	0.75	0.78	0.02	0.02	0.0025	0.0025	0.001	0.001	0.5	0.66
Maximum	8.3	8.1	8200	0.19	0.66	0.027	0.2	41400	220	16.4	1.06	1.07	0.106	68	0.9	316	8.66	67400	1620	20.3	0.527	0.03	0.02	2.2	0.76	63.7	2.33	0.9	0.15	0.34	0.018	0.27	0.003	225	12
Geometric Mean	6.84	7.15	24.7	0.1	0.021	0.0039	0.023	472.3	108.8	0.728	0.383	0.0484	0.0207	1.15	0.46	12.42	6.01	1179	387	0.259	0.039	0.005027	0.006	0.257	0.268	2.39	1.21	0.086	0.07	0.0104	0.0039	0.0034	0.0011	6.34	2.59
Count <DL	0	0	1	0	10	26	19	0	0	0	0	1	2	0	0	0	0	0	0	0	0	21	15	1	0	0	0	1	1	10	19	16	28	0	0
Standard Deviation	0.93	0.48	1504.6	0.027	0.134	0.0082	0.053	9390.7	49.9	3.358	0.225	0.2193	0.0231	13.99	0.16	69.14	1.56	15456	409	4.7366	0.1073	0.007798	0.005	0.405	0.163	13.86	0.33	0.155	0.022	0.064	0.0044	0.0511	0.0004	48.82	3.21
1st Quartile	6.69	6.91	2.2	0.09	0.003	0.0025	0.01	119.5	90.8	0.318	0.26	0.0238	0.0123	0.33	0.39	6.03	5.3	290	218	0.0502	0.0196	0.005	0.005	0.155	0.18	1.13	1.04	0.06	0.06	0.0025	0.0025	0.001	0.001	2.05	1.32
Median	7.14	7.24	12.8	0.11	0.034	0.0025	0.01	214.5	121	0.395	0.345	0.0525	0.0215	0.6	0.5	7.88	6.45	500	306	0.226	0.0275	0.005	0.005	0.245	0.28	1.27	1.15	0.08	0.07	0.0075	0.0025	0.001	0.001	6.1	2.05
3rd Quartile	7.42	7.49	198.2	0.11	0.077	0.0025	0.04	2320	148	1.315	0.585	0.096	0.0411	3.34	0.6	20.12	7.56	4898	812	1.45	0.0861	0.00725	0.005	0.318	0.378	3.93	1.42	0.11	0.08	0.0308	0.006	0.0123	0.001	12.75	5.5
95th Percentile	8.07	7.69	1265.00	0.13	0.29	0.03	0.16	22650.00	206.4	7.18	0.811	0.50	0.0677	29.17	0.7	163.77	8.13	37240.00	1234	11.80	0.24055	0.03	0.02	0.86	0.592	32.16	1.79	0.20	0.099	0.09	0.016245	0.07	0.00155	109.90	9.84
Count Over Guideline	7	3	0	3	1	0	0	27	0	3	0	26	0	11	0	30	0	22	0	9	0	1	0	0	0	0	0	0	0	1	0	0	0	5	0
% Over Guideline	24	10	0	10	3	0	0	90	0	10	0	87	0	37	0	100	0	73	0	30	0	4	0	0	0	0	0	0	0	3	0	0	0	17	0

Average concentrations exceeding the guideline are highlighted.

* Calculated average hardness specific cadmium, copper, lead and nickel guidelines.

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is based on pH and temperature not typically rising above 8.5 and 10 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.86[\log(\text{hardness})]-3.2)}$ µg/L

Nickel: $e^{(0.76[\ln(\text{hardness})]+1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)} * 0.2$ µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

Table 3-4: McGinty Creek Monitoring Station MN-2.5 Summary of Water Quality Data May 2009–July 2012.

	pH (field)	pH (lab)	Total Suspended Solids	Fluoride	Ammonia (N)	Nitrite (N)	Nitrate (N)	Aluminum (Al), total	Aluminum (Al), dissolved	Arsenic (As), total	Arsenic (As), dissolved	Cadmium (Cd), total	Cadmium (Cd), dissolved	Chromium (Cr), total	Chromium (Cr), dissolved	Copper (Cu), total	Copper (Cu), dissolved	Iron (Fe), total	Iron (Fe), dissolved	Lead (Pb), total	Lead (Pb), dissolved	Mercury (Hg), total	Mercury (Hg), dissolved	Molybdenum (Mo), total	Molybdenum (Mo), dissolved	Nickel (Ni), total	Nickel (Ni), dissolved	Selenium (Se), total	Selenium (Se), dissolved	Silver (Ag), total	Silver (Ag), dissolved	Thallium (Tl), total	Thallium (Tl), dissolved	Zinc (Zn), total	Zinc (Zn), dissolved
	pH units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline	6.5-9	6.5-9		0.12	0.343	0.06	3	100		5		0.0263*		1		2.26*		300		2.044*		0.026		73		76.85*		1		0.1		0.8		30	
Average	7.41	7.74	43.7	0.18	0.0398	0.0054	0.029	548.5	35.2	0.728	0.424	0.0399	0.0187	1.23	0.29	5.02	2.43	1205	196	0.5232	0.0696	0.005926	0.007	0.533	0.544	2.324	1.31	0.093	0.088	0.0097	0.0036	0.0048	0.001	4.77	2.08
Count	29	31	31	30	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	27	20	31	31	31	31	31	31	31	31	31	31	31	31
Minimum	4.1	7.1	0.5	0.06	0.0025	0.0025	0.01	10.4	7.1	0.25	0.2	0.0025	0.0025	0.05	0.05	1.22	1.23	40	35	0.006	0.0025	0.000005	0.005	0.12	0.11	0.7	0.73	0.02	0.04	0.0025	0.0025	0.001	0.001	0.3	0.4
Maximum	8.06	8.5	350	1.13	0.3	0.025	0.1	7560	112	3.9	1.49	0.16	0.075	15	0.7	35	4.63	11700	632	4	0.822	0.025	0.02	1.03	1.17	13.3	3.76	0.33	0.38	0.08	0.013	0.07	0.002	32	6.1
Geometric Mean	7.36	7.74	5	0.15	0.0142	0.0036	0.018	78.1	25.2	0.52	0.388	0.0198	0.0125	0.44	0.25	3.1	2.26	316	137	0.1188	0.0322	0.004326	0.006	0.459	0.472	1.671	1.237	0.081	0.08	0.0049	0.0032	0.0016	0.001	2.33	1.54
Count <DL	0	0	9	0	12	28	24	0	0	0	0	5	4	1	2	0	0	0	0	0	1	25	16	0	0	0	0	1	0	20	24	24	30	0	0
Standard Deviation	0.81	0.29	96.4	0.18	0.0638	0.0071	0.031	1489	30.6	0.815	0.231	0.0456	0.0181	2.9	0.13	7.28	0.95	2578	172	0.916	0.1488	0.004169	0.004	0.254	0.251	2.711	0.542	0.064	0.057	0.016	0.0025	0.0131	0.0002	6.78	1.68
1st Quartile	7.44	7.56	0.8	0.13	0.0025	0.0025	0.01	20.5	12.6	0.33	0.3	0.009	0.006	0.2	0.2	1.76	1.6	107	73	0.028	0.015	0.005	0.005	0.304	0.365	1.09	1	0.069	0.07	0.0025	0.0025	0.001	0.001	0.8	0.81
Median	7.62	7.81	4	0.16	0.021	0.0025	0.01	51	26.4	0.39	0.36	0.02	0.012	0.3	0.3	2.53	2.48	219	134	0.1	0.032	0.005	0.005	0.57	0.58	1.34	1.17	0.07	0.08	0.0025	0.0025	0.001	0.001	2.55	1.1
3rd Quartile	7.77	7.9	17.5	0.17	0.037	0.0025	0.048	180	43.9	0.555	0.475	0.0582	0.0244	0.5	0.36	3.96	2.92	566	269	0.4015	0.0635	0.005	0.005	0.732	0.695	1.855	1.475	0.1	0.09	0.009	0.0025	0.001	0.001	4.9	3.2
95th Percentile	8.04	8.05	295.00	0.19	0.17	0.025	0.10	2820	101.4	2.35	0.663	0.132	0.063	5.50	0.5	19.1	4.31	6160.00	568	2.115	0.189	0.01	0.011	0.875	0.885	7.51	1.79	0.22	0.119	0.04	0.0085	0.019	0.001	17.20	5.45
Count Over Guideline	3	0	0	23	0	0	0	13	0	0	0	14	0	4	0	17	0	14	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
% Over Guideline	10	0	0	77	0	0	0	42	0	0	0	45	0	13	0	55	0	45	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0

Average concentrations exceeding the guideline are highlighted.

* Calculated average hardness specific cadmium, copper, lead and nickel guidelines.

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is based on pH and temperature not typically rising above 8.5 and 10 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.86[\log(\text{hardness})]-3.2)}$ µg/L

Nickel: $e^{(0.76\ [\ln(\text{hardness})]+1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545\ [\ln(\text{hardness})]-1.465)}$ * 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

Table 3-5: McGinty Creek Monitoring Station MN-4.5 Summary of Water Quality Data May 2009–July 2012.

	pH (field)	pH (lab)	Total Suspended Solids	Fluoride	Ammonia (N)	Nitrite (N)	Nitrate (N)	Aluminum (Al), total	Aluminum (Al), dissolved	Arsenic (As), total	Arsenic (As), dissolved	Cadmium (Cd), total	Cadmium (Cd), dissolved	Chromium (Cr), total	Chromium (Cr), dissolved	Copper (Cu), total	Copper (Cu), dissolved	Iron (Fe), total	Iron (Fe), dissolved	Lead (Pb), total	Lead (Pb), dissolved	Mercury (Hg), total	Mercury (Hg), dissolved	Molybdenum (Mo), total	Molybdenum (Mo), dissolved	Nickel (Ni), total	Nickel (Ni), dissolved	Selenium (Se), total	Selenium (Se), dissolved	Silver (Ag), total	Silver (Ag), dissolved	Thallium (Tl), total	Thallium (Tl), dissolved	Zinc (Zn), total	Zinc (Zn), dissolved
	pH units	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline	6.5-9	6.5-9		0.12	0.343	0.06	3	100		5		0.0251*		1		2.11*		300		2.117*		0.026		73		74.5*		1		0.1		0.8		30	
Average	7.83	7.76	70.3	0.22	0.0355	0.0064	0.073	906.3	43.1	0.921	0.413	0.0478	0.0194	1.79	0.3	5.39	2.39	1691	168	0.6922	0.0715	0.005625	0.006	0.642	0.694	3.33	1.256	0.154	0.133	0.0094	0.003	0.0068	0.001	8.7	2.41
Count	25	27	27	26	27	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	24	17	27	27	27	27	27	27	27	27	27	27	27	27
Minimum	7.26	7.1	0.5	0.08	0.0025	0.0025	0.01	7.9	6.9	0.24	0.26	0.0025	0.0025	0.05	0.05	1.31	1.13	12	12	0.007	0.0025	0.000005	0.005	0.14	0.17	0.53	0.57	0.06	0.06	0.0025	0.0025	0.001	0.001	0.3	0.2
Maximum	8.16	8.1	570	0.35	0.27	0.025	0.3	12600	174	6.5	0.65	0.31	0.135	23	0.6	37	4.71	20100	562	7.4	0.467	0.025	0.02	1.03	1.22	24.8	1.88	0.4	0.2	0.08	0.011	0.09	0.001	63.1	14.4
Geometric Mean	7.82	7.75	8.7	0.21	0.0117	0.004	0.044	122.6	28.4	0.576	0.399	0.0229	0.0111	0.51	0.27	3.38	2.27	286	101	0.1395	0.0361	0.00401	0.006	0.564	0.622	1.86	1.194	0.145	0.129	0.0049	0.0027	0.0021	0.001	2.93	1.54
Count <DL	0	0	5	0	12	23	11	0	0	0	0	2	6	1	1	0	0	0	0	0	3	24	14	0	0	0	0	0	0	16	25	18	27	0	0
Standard Deviation	0.26	0.28	155.2	0.08	0.0614	0.0078	0.072	2499.1	44.1	1.362	0.112	0.0762	0.0262	4.52	0.13	7.81	0.81	4152	150	1.6171	0.0943	0.004251	0.004	0.286	0.282	5.23	0.389	0.06	0.031	0.0164	0.0018	0.0177	0	16.68	2.87
1st Quartile	7.67	7.55	2	0.18	0.0025	0.0025	0.013	35.8	15.6	0.375	0.335	0.01	0.006	0.2	0.2	1.88	1.79	82	43	0.052	0.0185	0.005	0.005	0.41	0.505	1.02	0.9	0.13	0.115	0.0025	0.0025	0.001	0.001	1.25	0.75
Median	7.89	7.84	6	0.22	0.013	0.0025	0.06	62.7	28.8	0.43	0.38	0.024	0.013	0.4	0.3	2.63	2.44	277	129	0.105	0.053	0.005	0.005	0.642	0.73	1.6	1.24	0.15	0.13	0.0025	0.0025	0.001	0.001	2.4	1.4
3rd Quartile	8.02	7.97	52	0.29	0.031	0.0044	0.1	379.5	47.5	0.635	0.463	0.0395	0.0249	0.93	0.4	4.27	2.89	972	226	0.312	0.073	0.005	0.005	0.895	0.911	2.68	1.63	0.17	0.15	0.0085	0.0025	0.0032	0.001	6.1	2.87
95th Percentile	8.13	8.08	479.00	0.33	0.16	0.03	0.21	3291.00	142.2	3.37	0.616	0.23	0.0423	5.96	0.5	20.10	3.56	7535.00	424	3.60	0.1928	0.01	0.012	1.02	1.027	12.68	1.837	0.21	0.17	0.04	0.0052	0.02	0.001	52.27	5.76
Count Over Guideline	0	0	0	22	0	0	0	13	0	1	0	14	0	6	0	19	0	13	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
% Over Guideline	0	0	0	85	0	0	0	48	0	4	0	52	0	22	0	70	0	48	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0

Average concentrations exceeding the guideline are highlighted.

* Calculated average hardness specific cadmium, copper, lead and nickel guidelines.

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is based on pH and temperature not typically rising above 8.5 and 10 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.86[\log(\text{hardness})]-3.2)}$ µg/L

Nickel: $e^{(0.76\ [\ln(\text{hardness})]+1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545\ [\ln(\text{hardness})]-1.465)}$ * 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

4 Characterization of Elevated Parameter Concentrations

4.1 Concentrations Over Time

For parameters that exceeded respective CWQGs in at least one sample, data were plotted over time for each station. Thirteen parameters meet this criteria including aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, silver, zinc, ammonia, fluoride, and pH (in situ measurement). Both total and dissolved metals are graphed (except in the case of dissolved mercury and silver since the majority of results were <RDL) as well as total suspended solids and total dissolved solids. For results below laboratory detection levels, ½ the RDL has been plotted. In addition to depicting the CWQGs on the graphs, 95th percentile for results from all stations is also shown (on total metals graphs only).

Of the fourteen parameters plotted, all except fluoride, mercury and pH show spikes in concentrations in the summers of 2010 (August), 2011 (July) and 2012 (June). The spikes correspond with spikes in TSS as a result of recent precipitation events. When TSS is elevated due to heavy rains or freshet, some TSS associated metals may naturally exceed CWQG (Minnow 2010a).

The CWQG for hardness-dependent parameters (cadmium, copper, and lead) shown on the figures represent an average calculated from the average CWQG for each station. Of the parameters plotted, several show the CWQG below the 95th percentile concentration calculated from results for all stations, such as: total aluminum, cadmium, chromium, copper, iron, lead, zinc, and fluoride. The 95th percentile concentrations for total arsenic, mercury, silver, ammonia, and pH are below the CWQG.

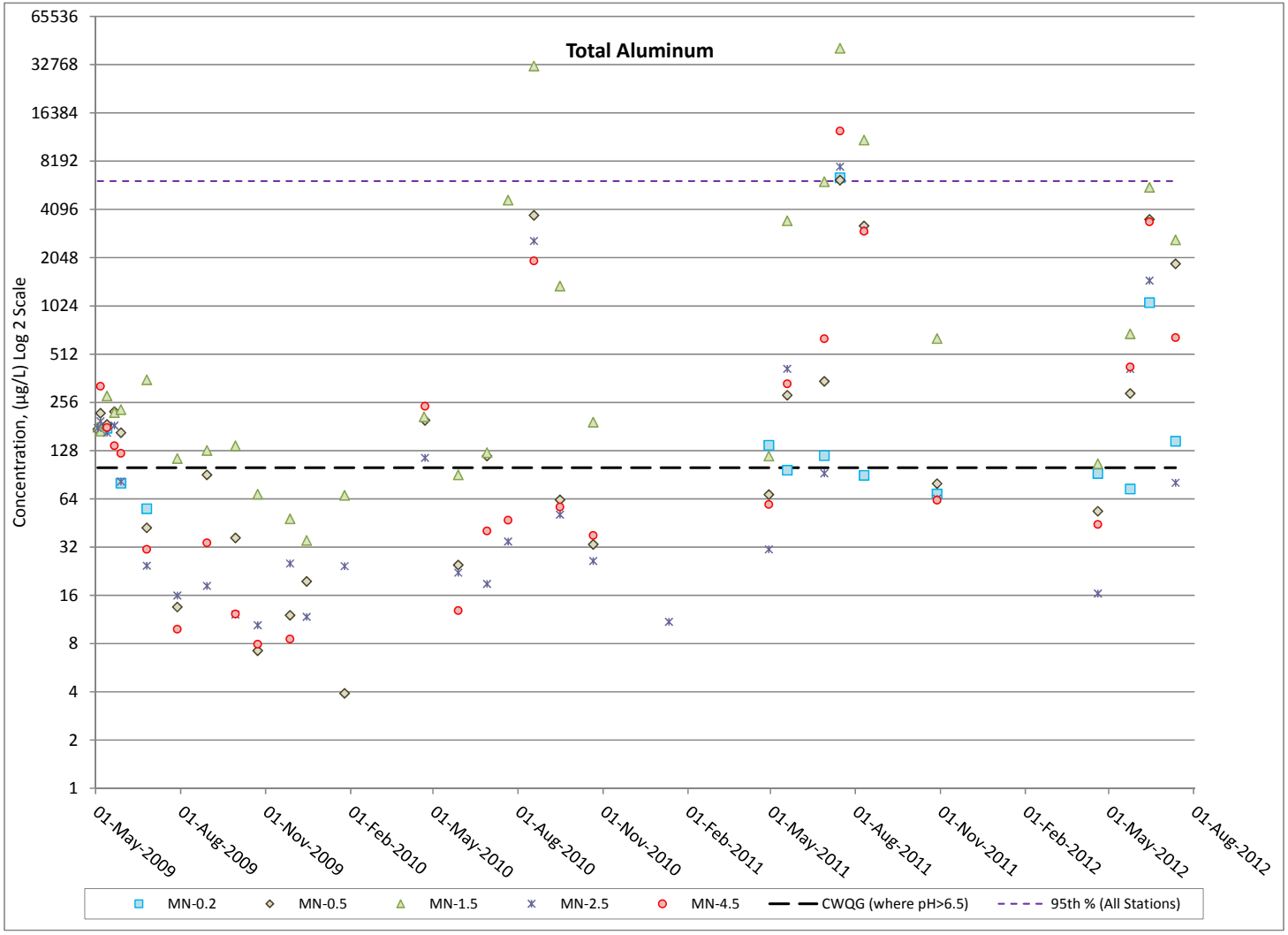

Figure 4-1: Concentrations of Total Aluminum in McGinty Creek.

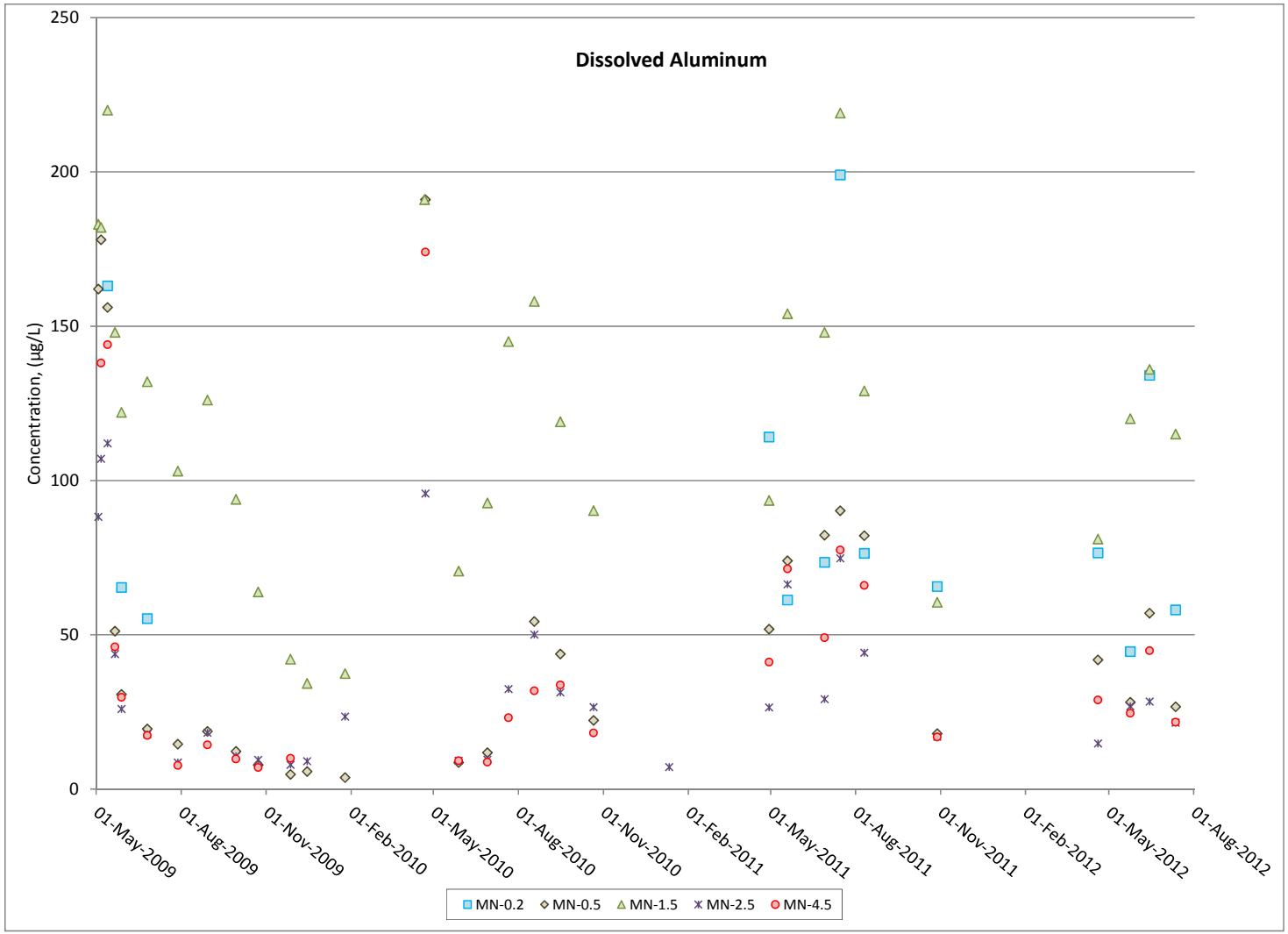

Figure 4-2: Concentrations of Dissolved Aluminum in McGinty Creek.

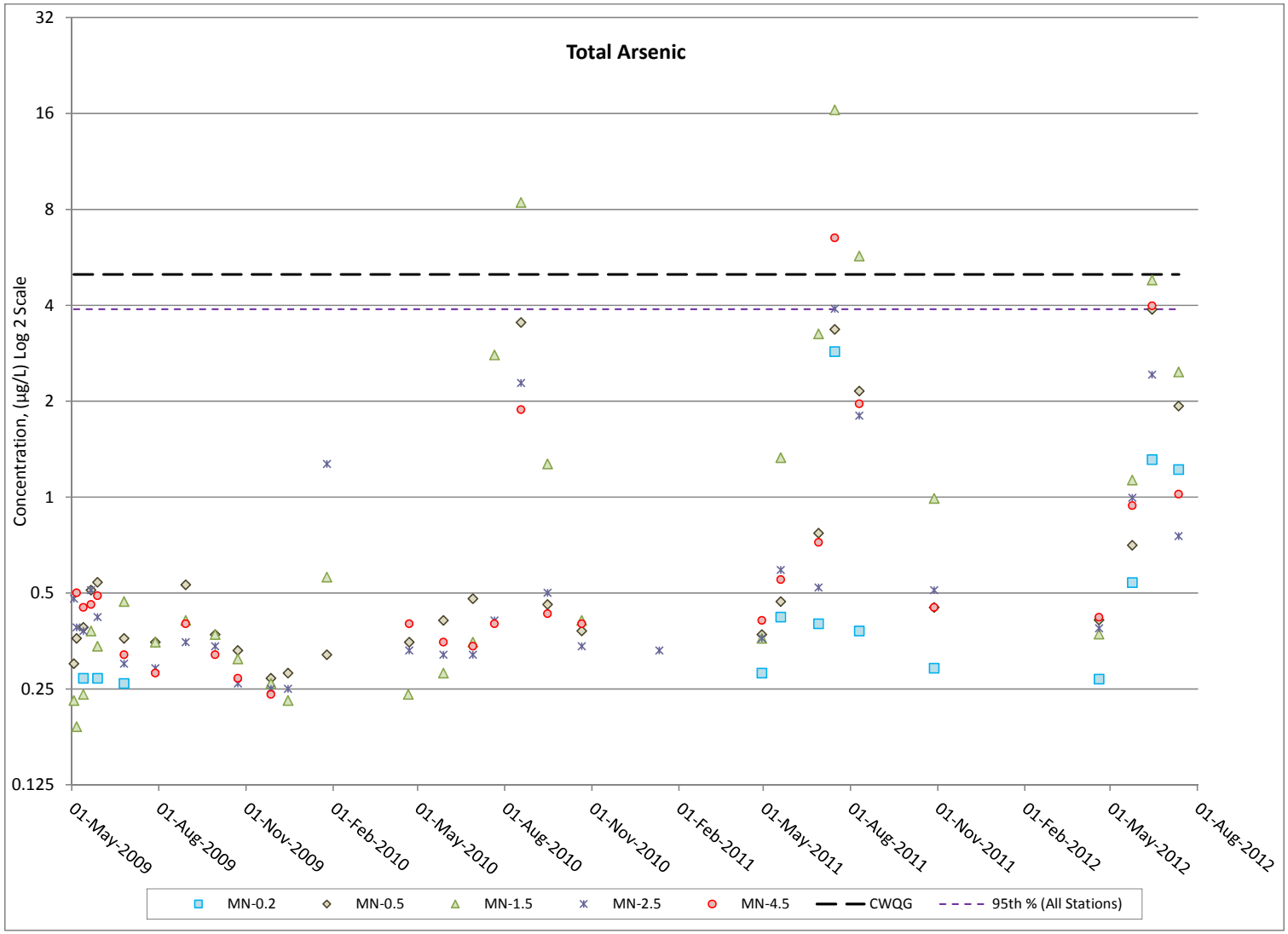

Figure 4-3: Concentrations of Total Arsenic in McGinty Creek.

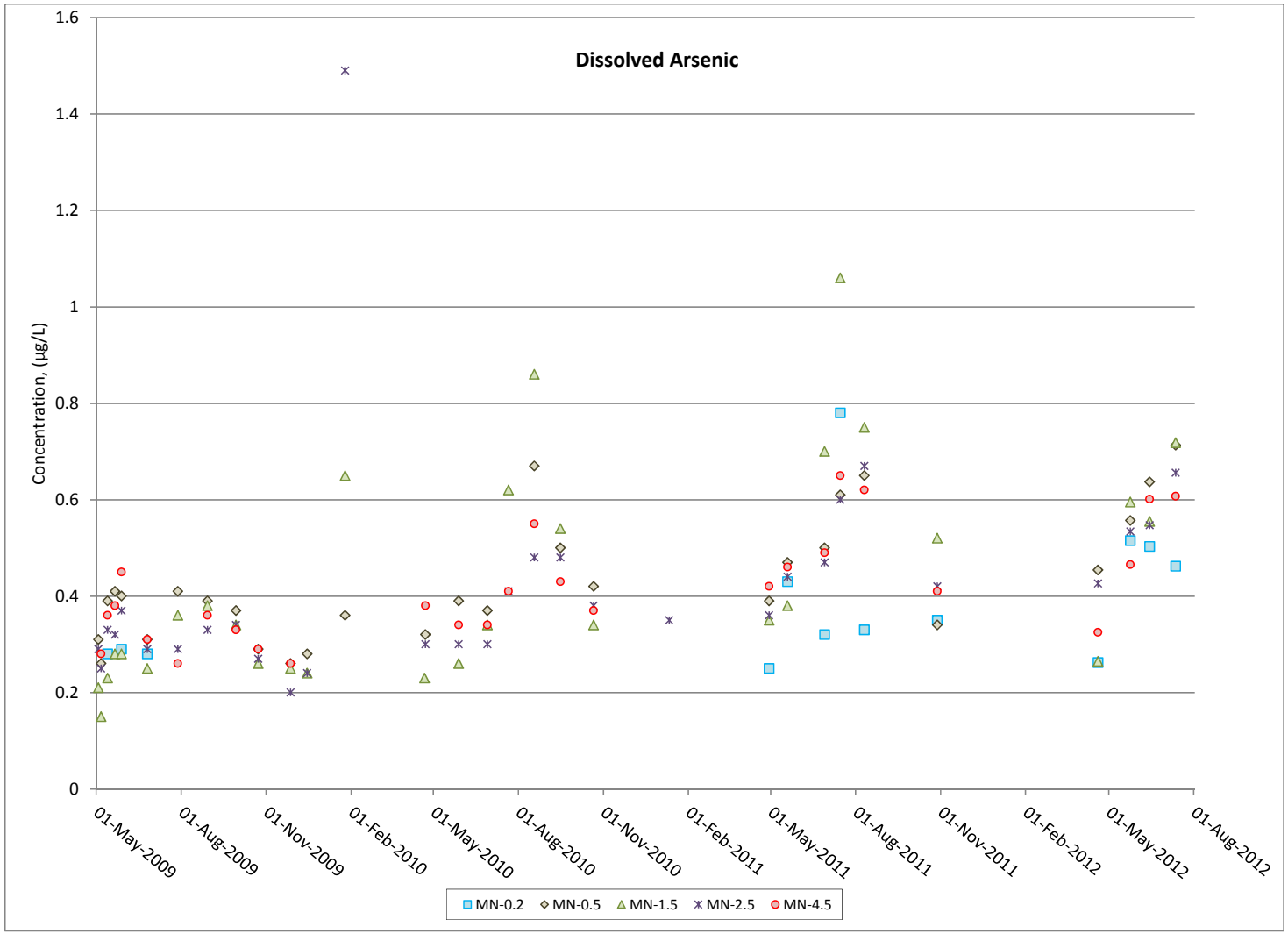

Figure 4-4: Concentrations of Dissolved Arsenic in McGinty Creek.

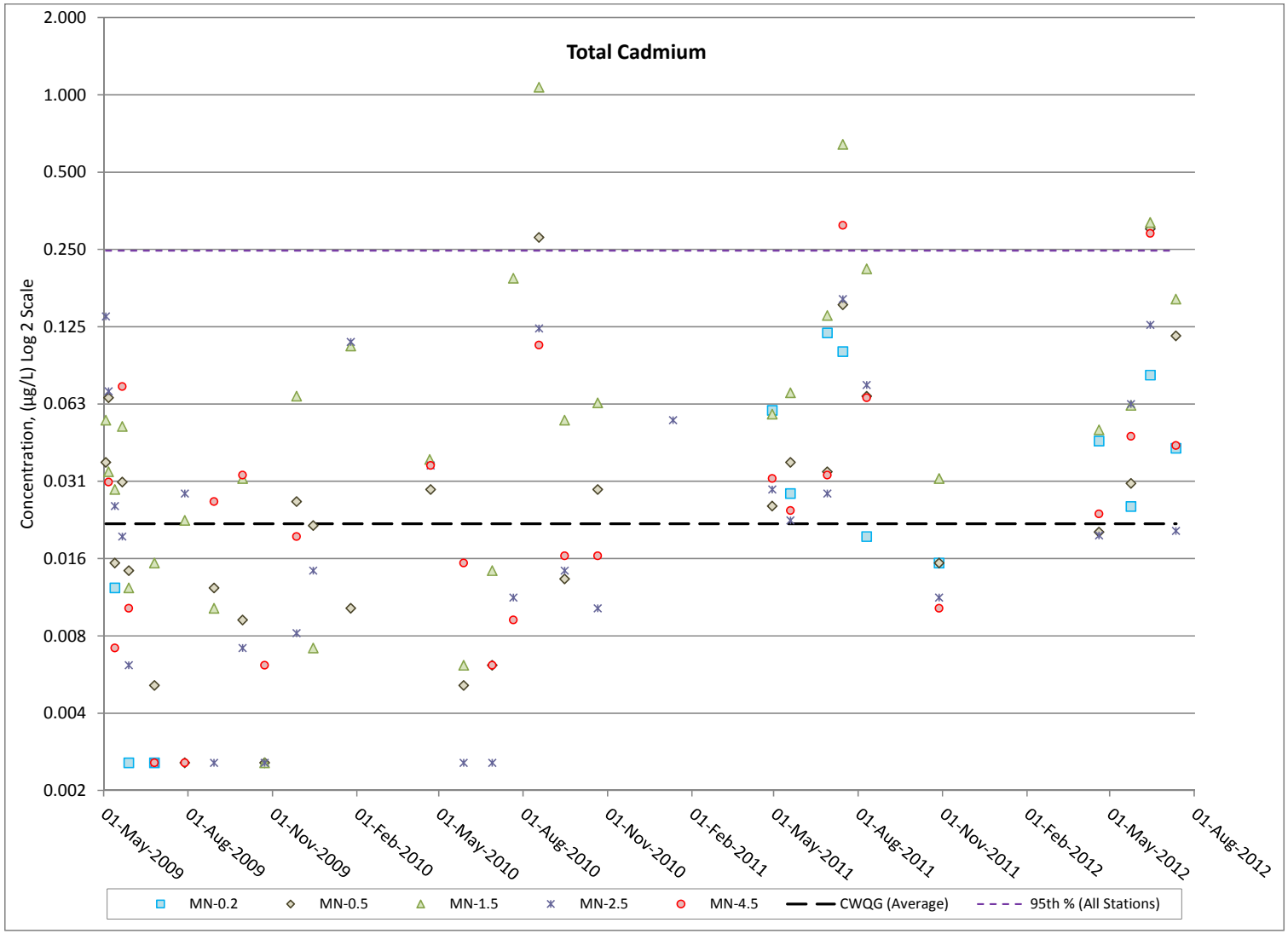

Figure 4-5: Concentrations of Total Cadmium in McGinty Creek.

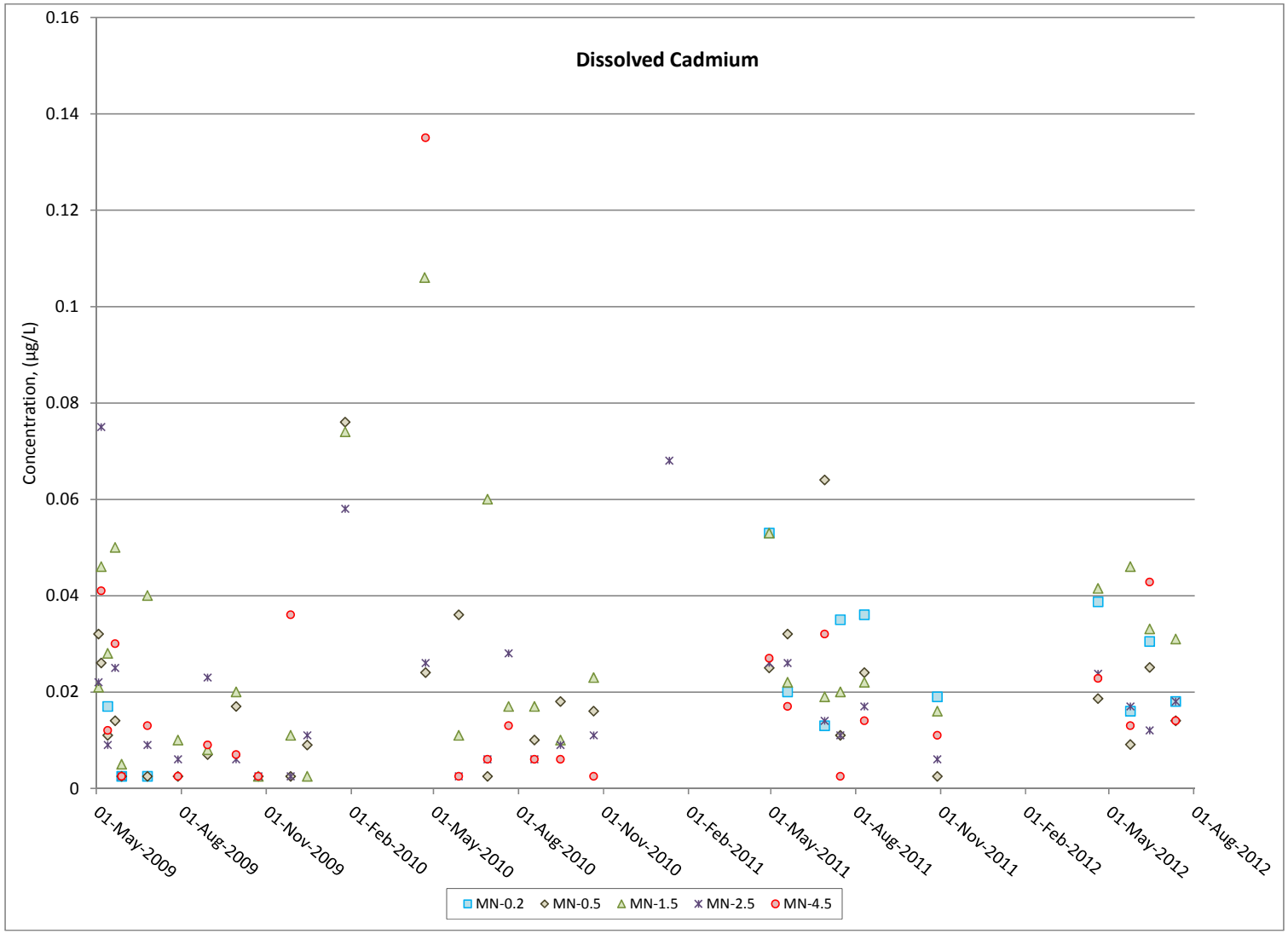

Figure 4-6: Concentrations of Dissolved Cadmium in McGinty Creek.

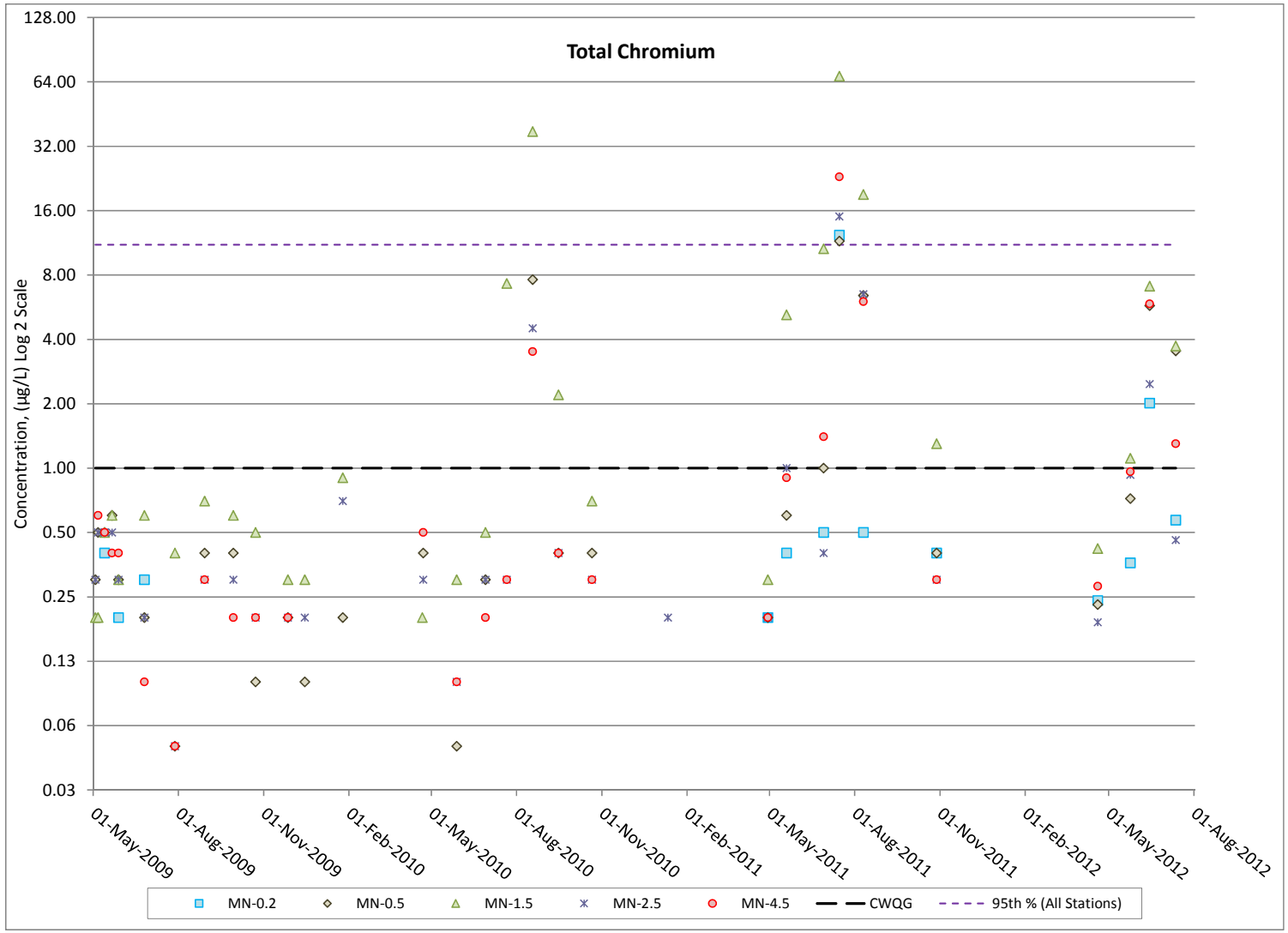

Figure 4-7: Concentrations of Total Chromium in McGinty Creek.

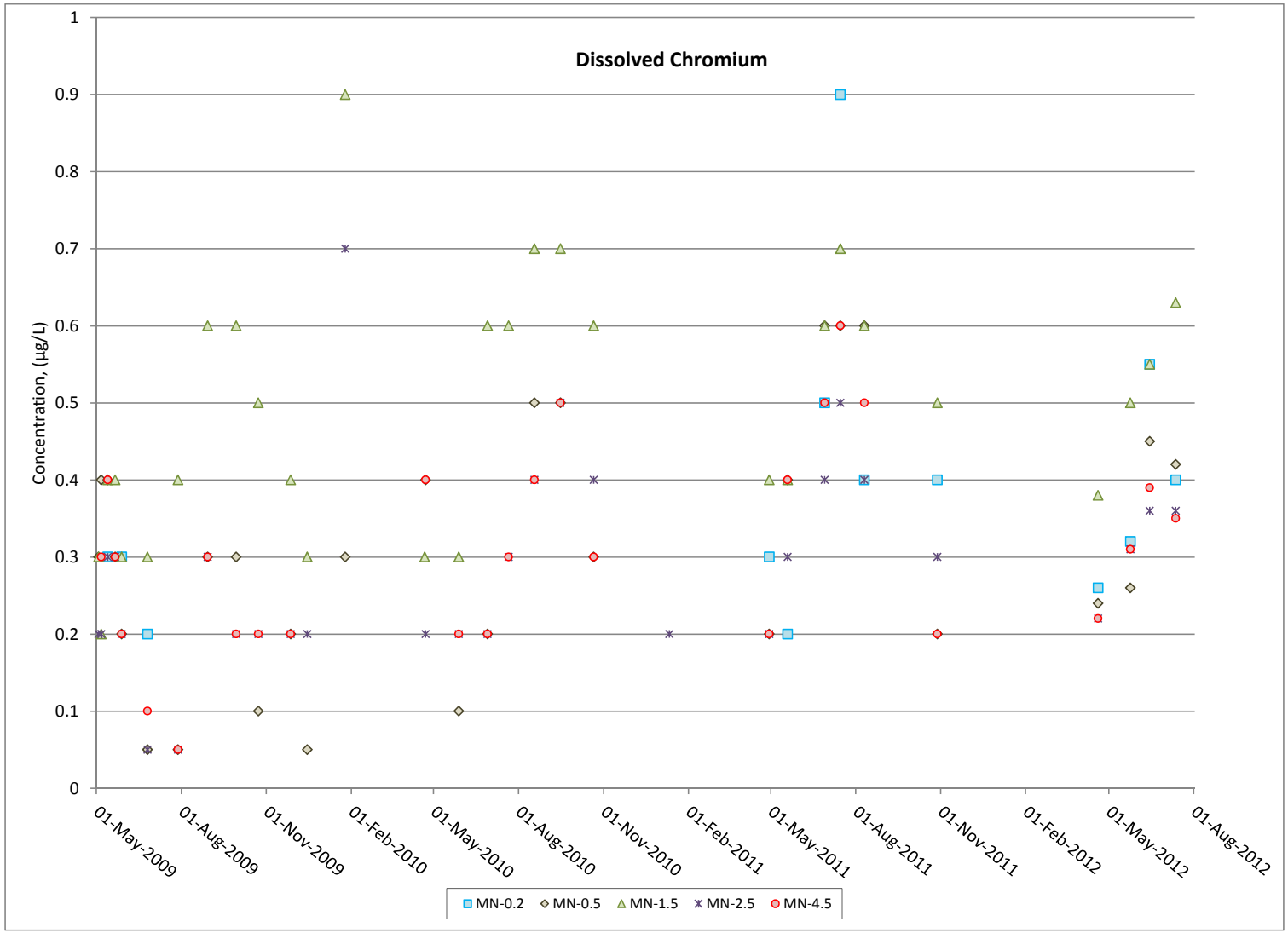

Figure 4-8: Concentrations of Dissolved Chromium in McGinty Creek.

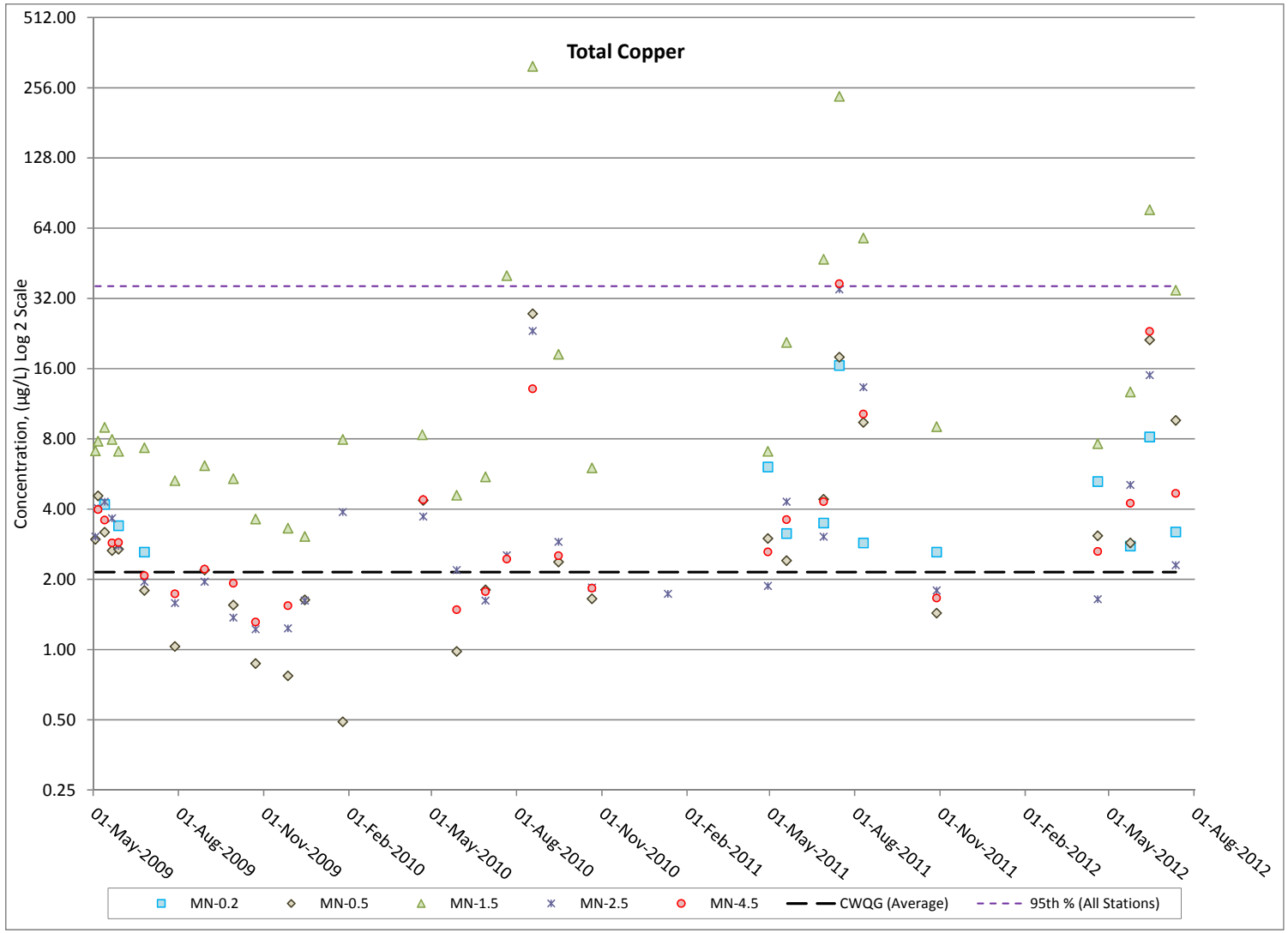

Figure 4-9: Concentrations of Total Copper in McGinty Creek.

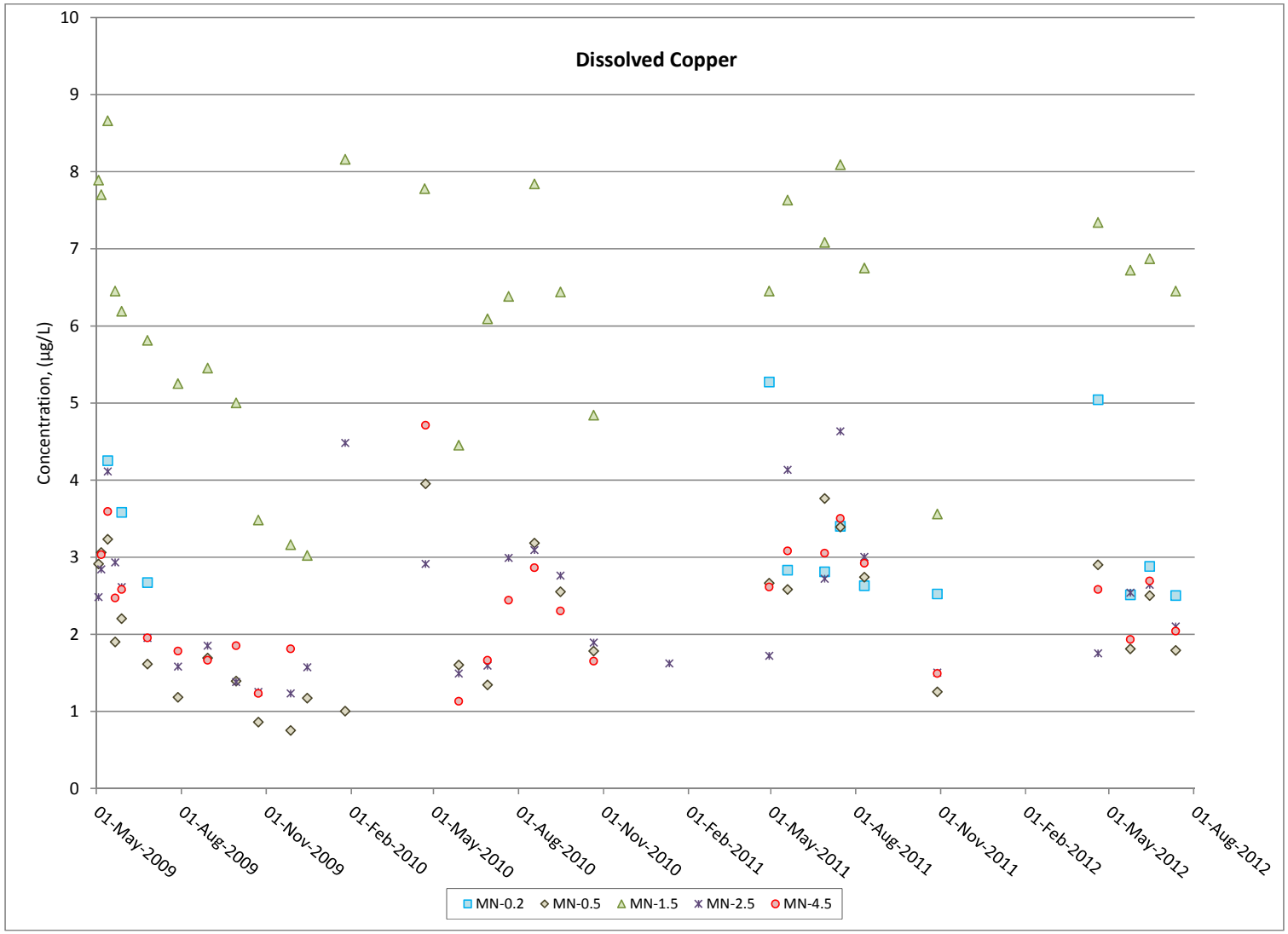

Figure 4-10: Concentrations of Dissolved Copper in McGinty Creek.

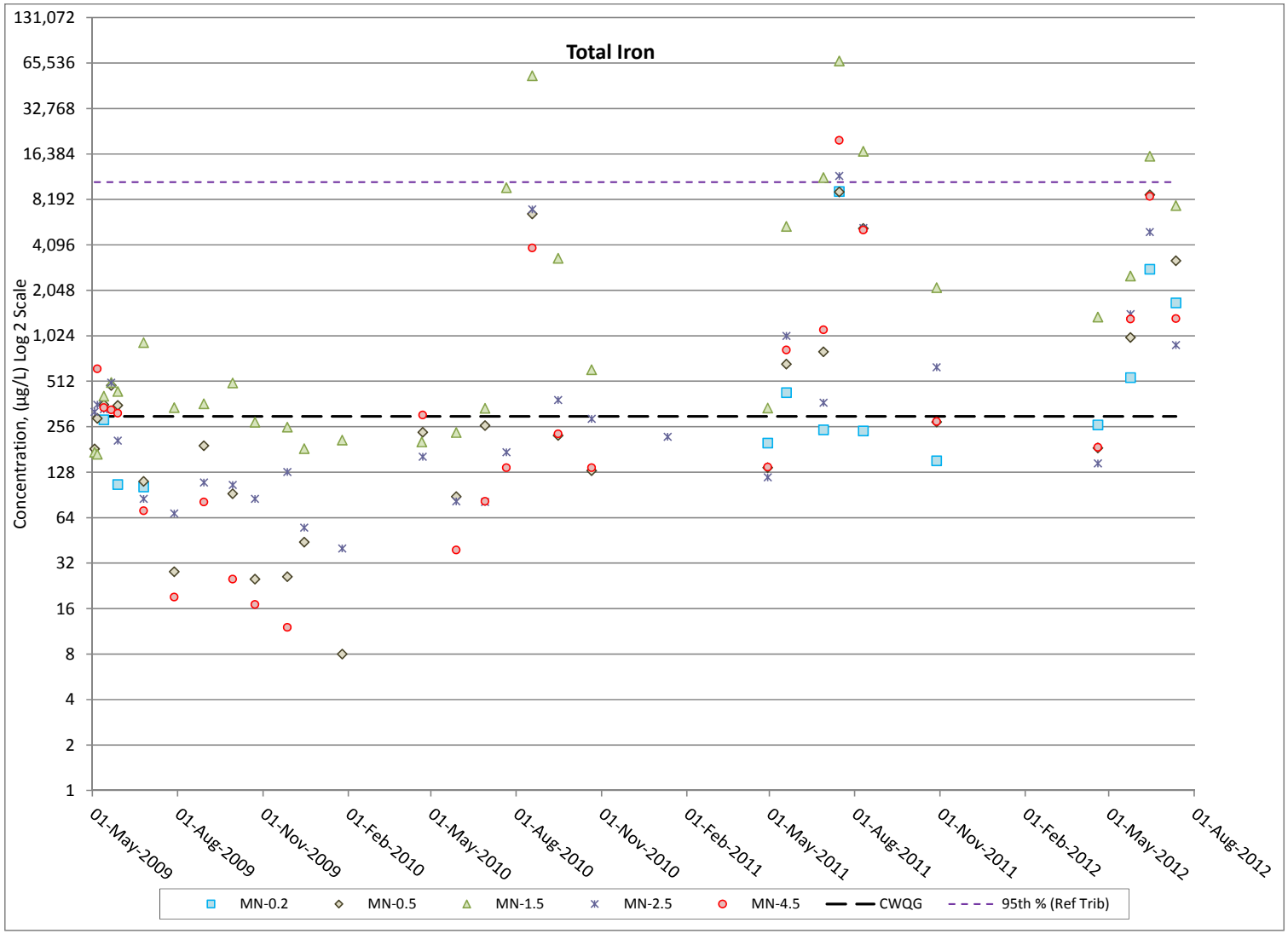

Figure 4-11: Concentrations of Total Iron in McGinty Creek.

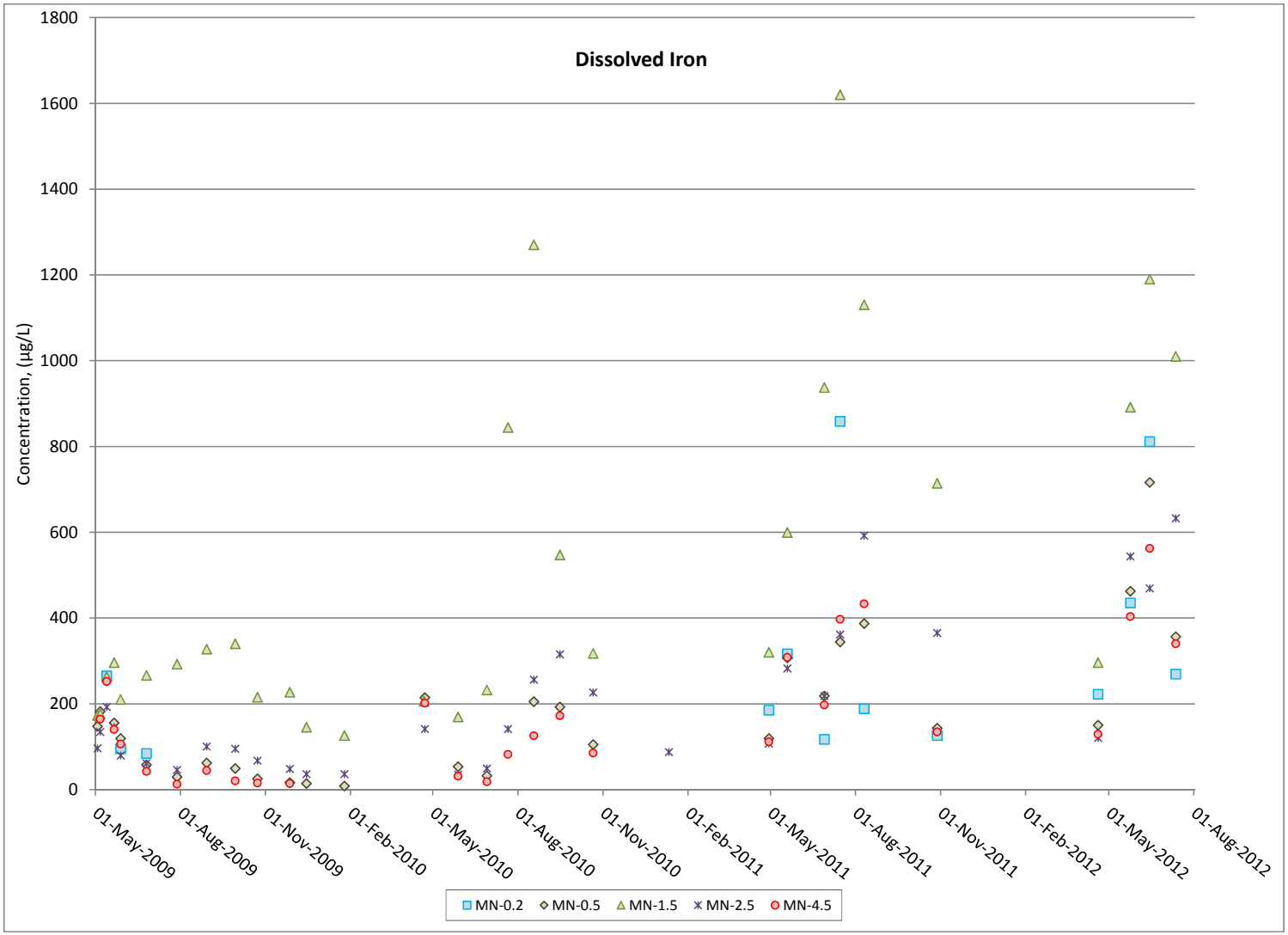

Figure 4-12: Concentrations of Dissolved Iron in McGinty Creek.

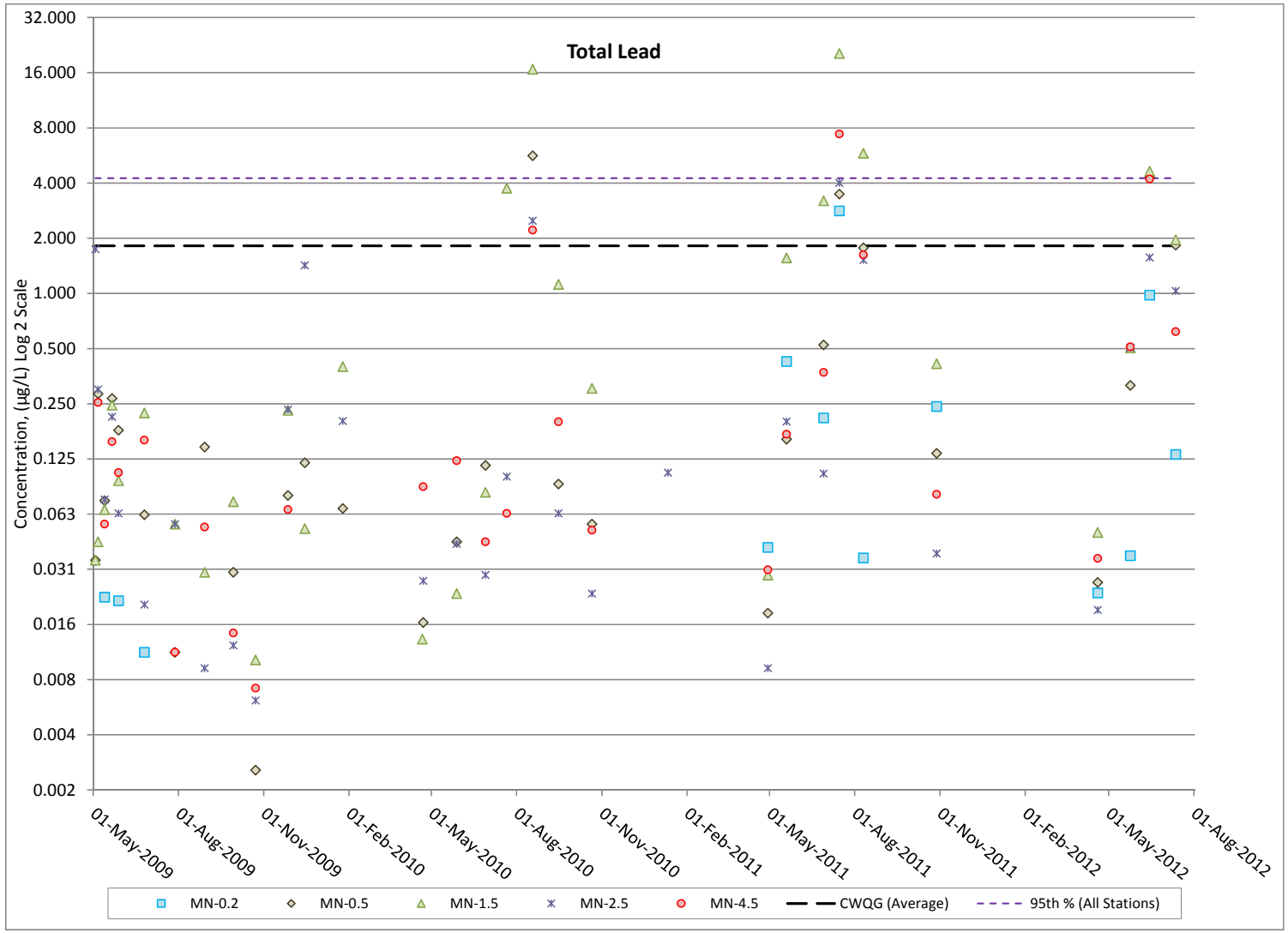

Figure 4-13: Concentrations of Total Lead in McGinty Creek.

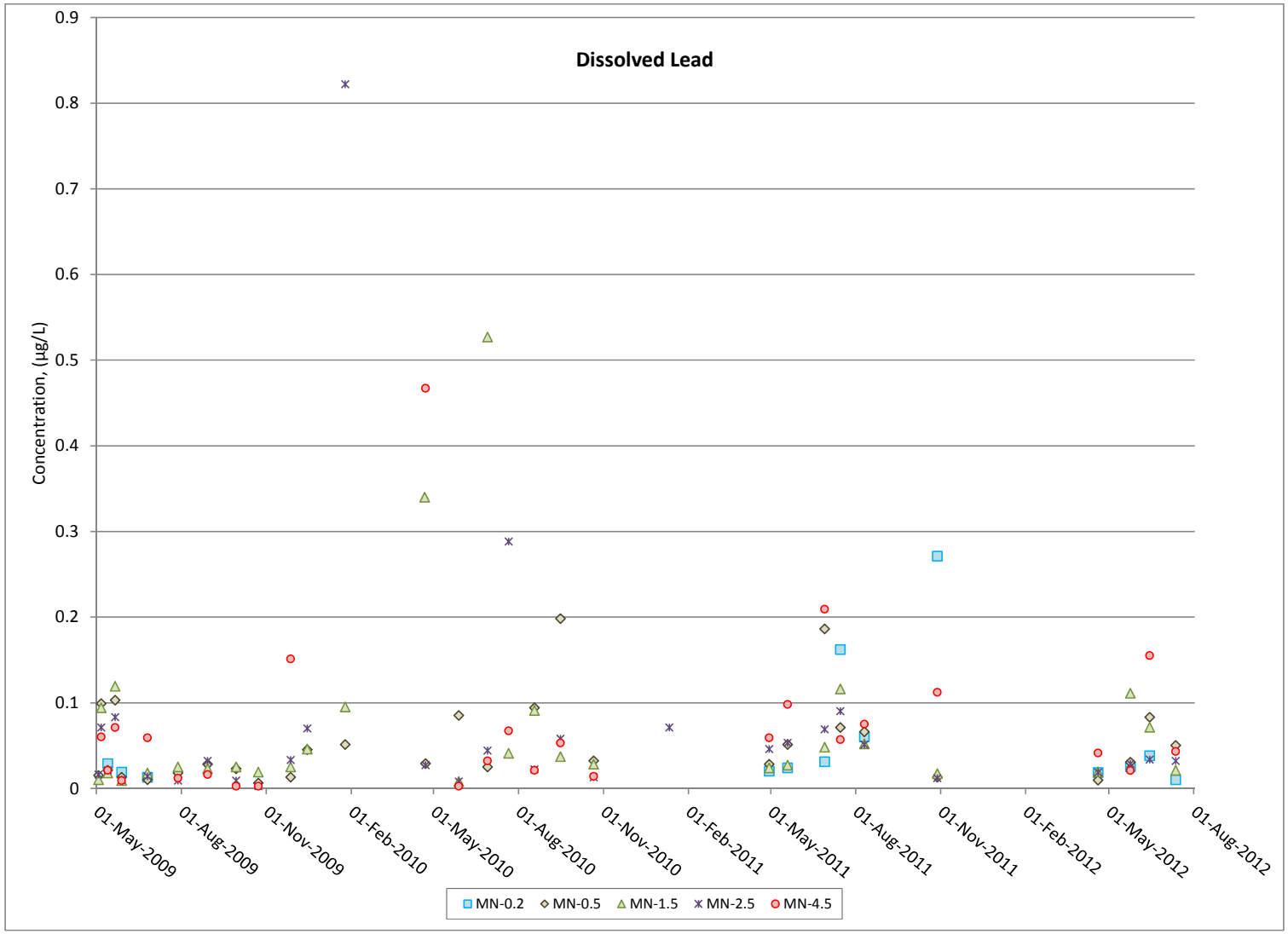

Figure 4-14: Concentrations of Dissolved Lead in McGinty Creek.

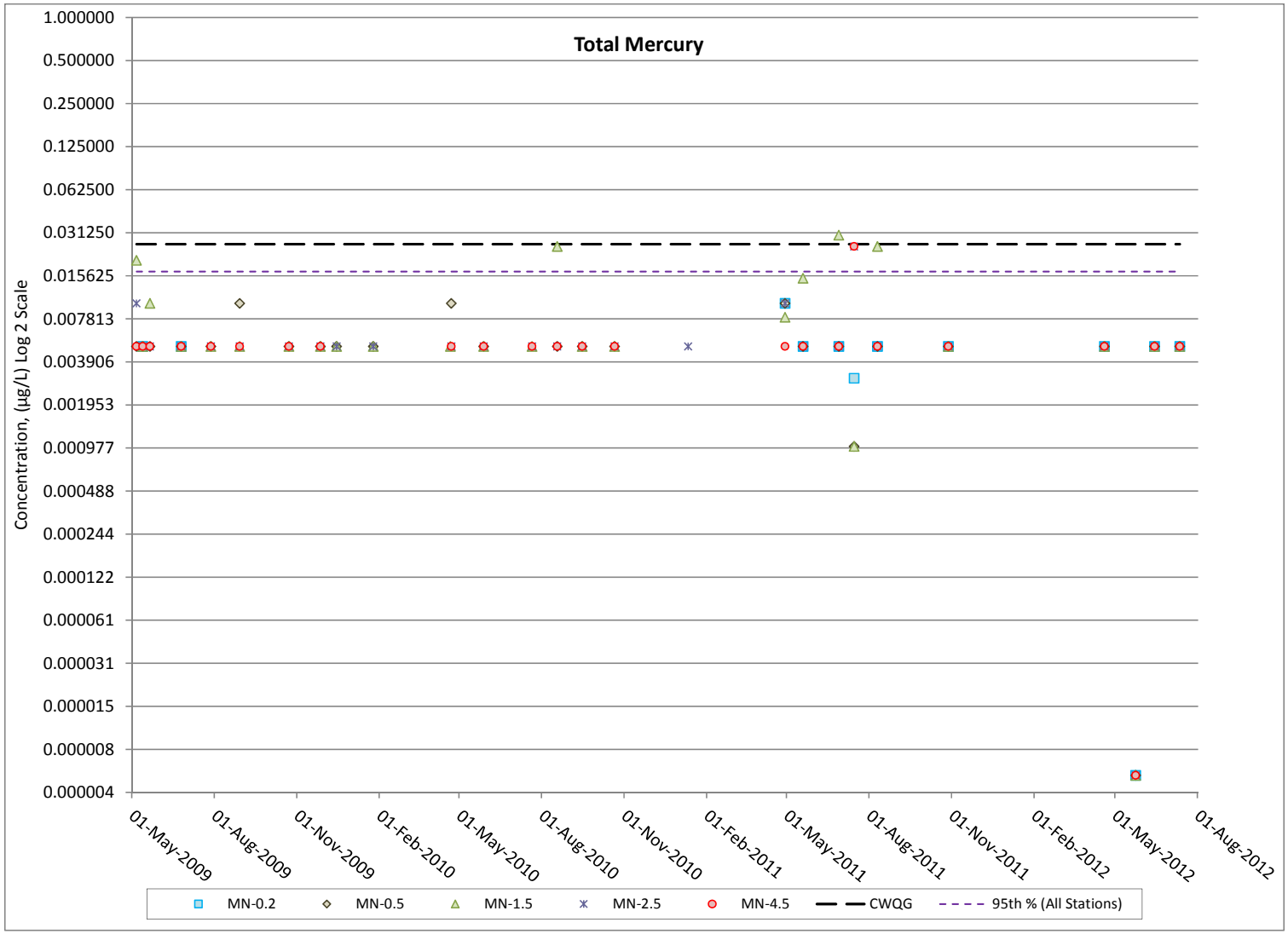

Figure 4-15: Concentrations of Total Mercury in McGinty Creek.

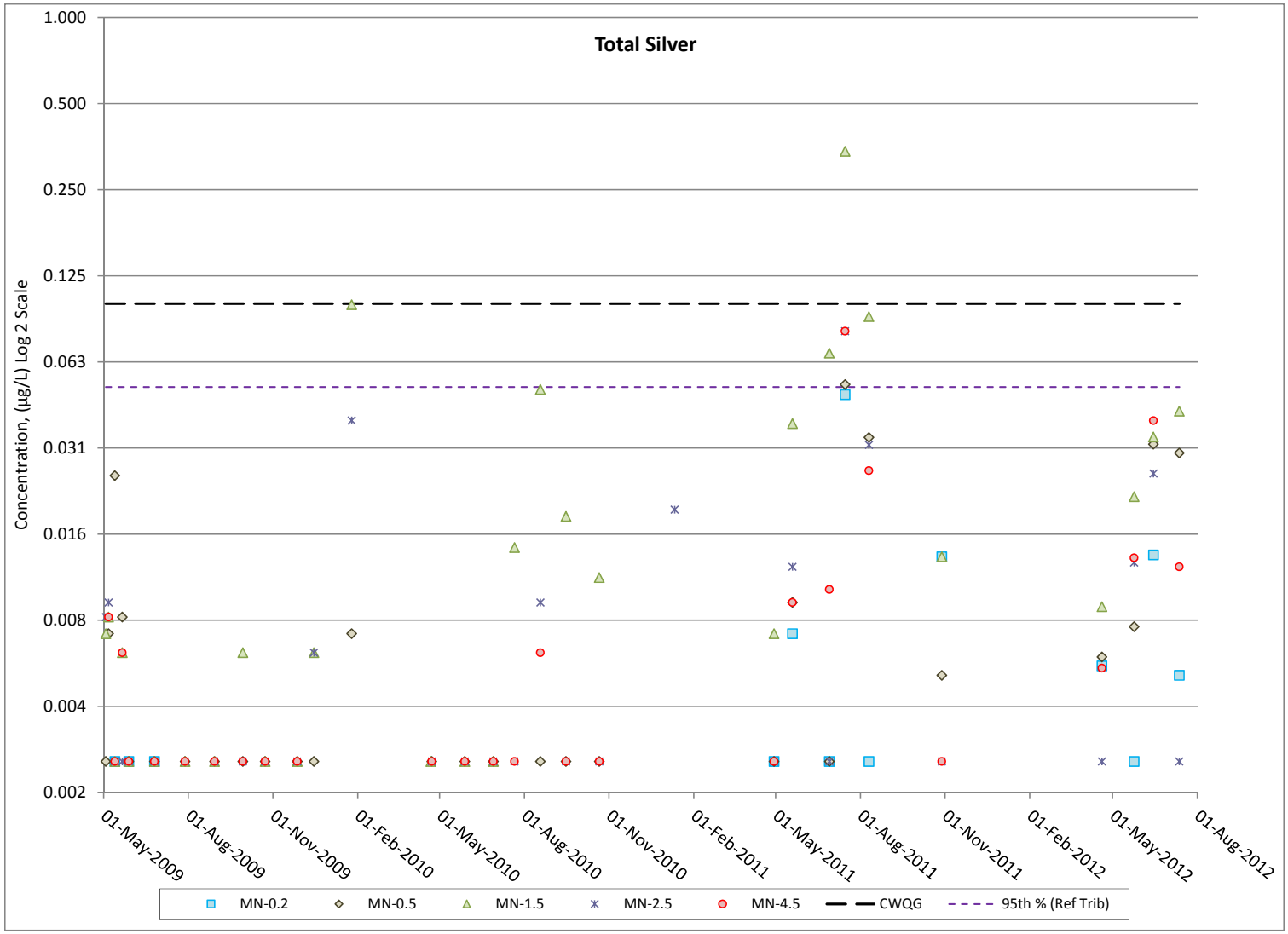

Figure 4-16: Concentrations of Total Silver in McGinty Creek.

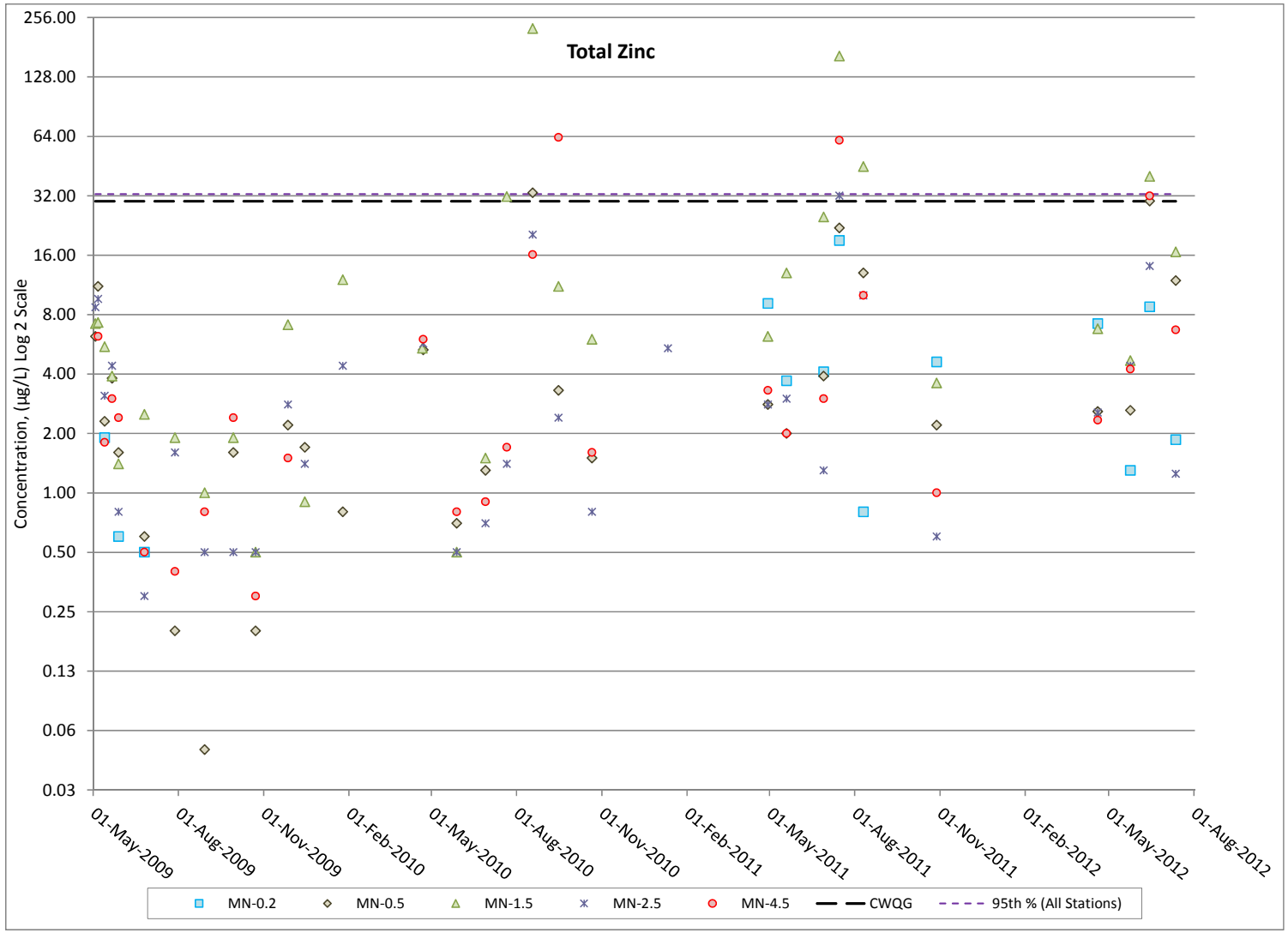

Figure 4-17: Concentrations of Total Zinc in McGinty Creek.

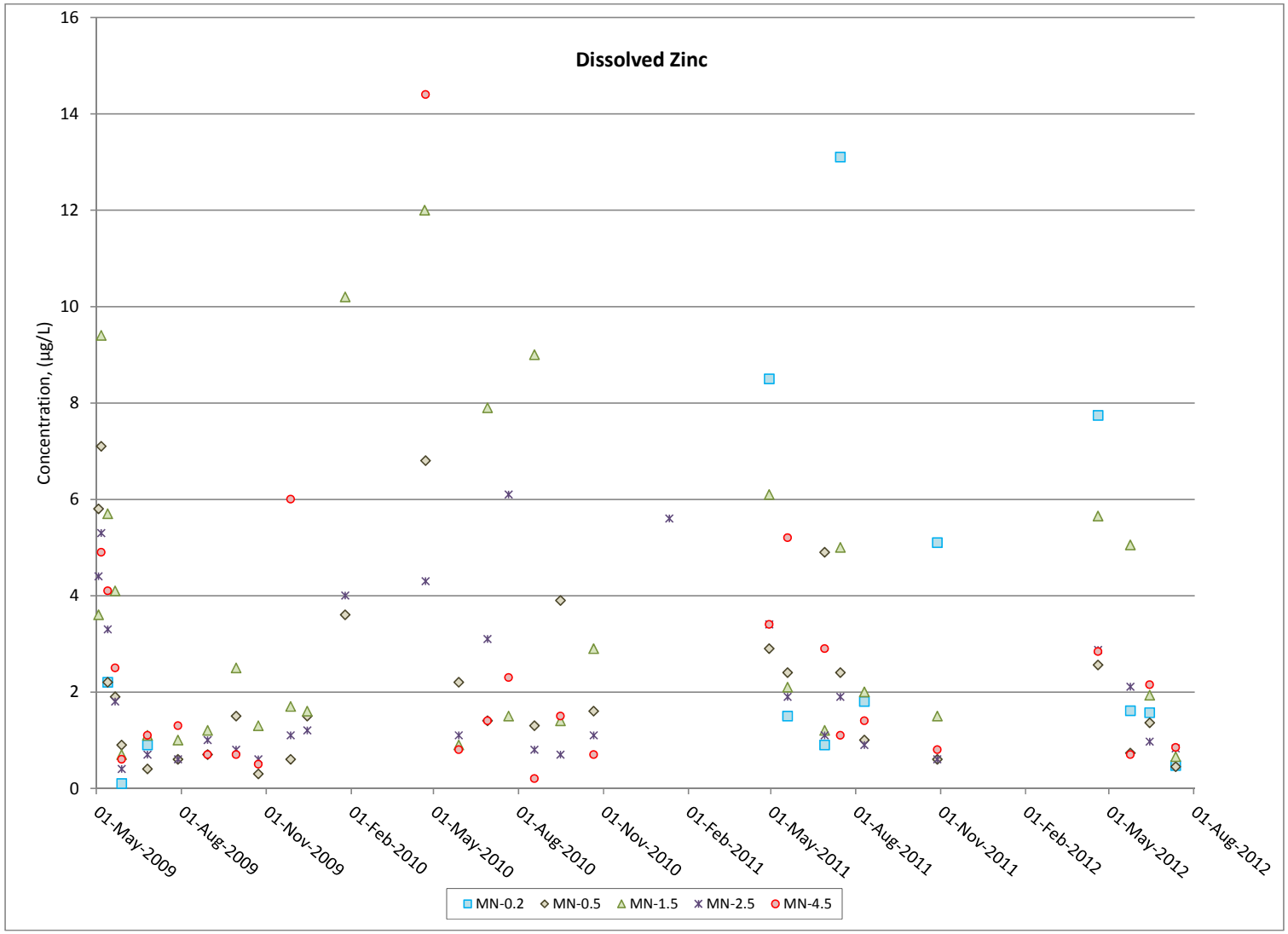

Figure 4-18: Concentrations of Dissolved Zinc in McGinty Creek.

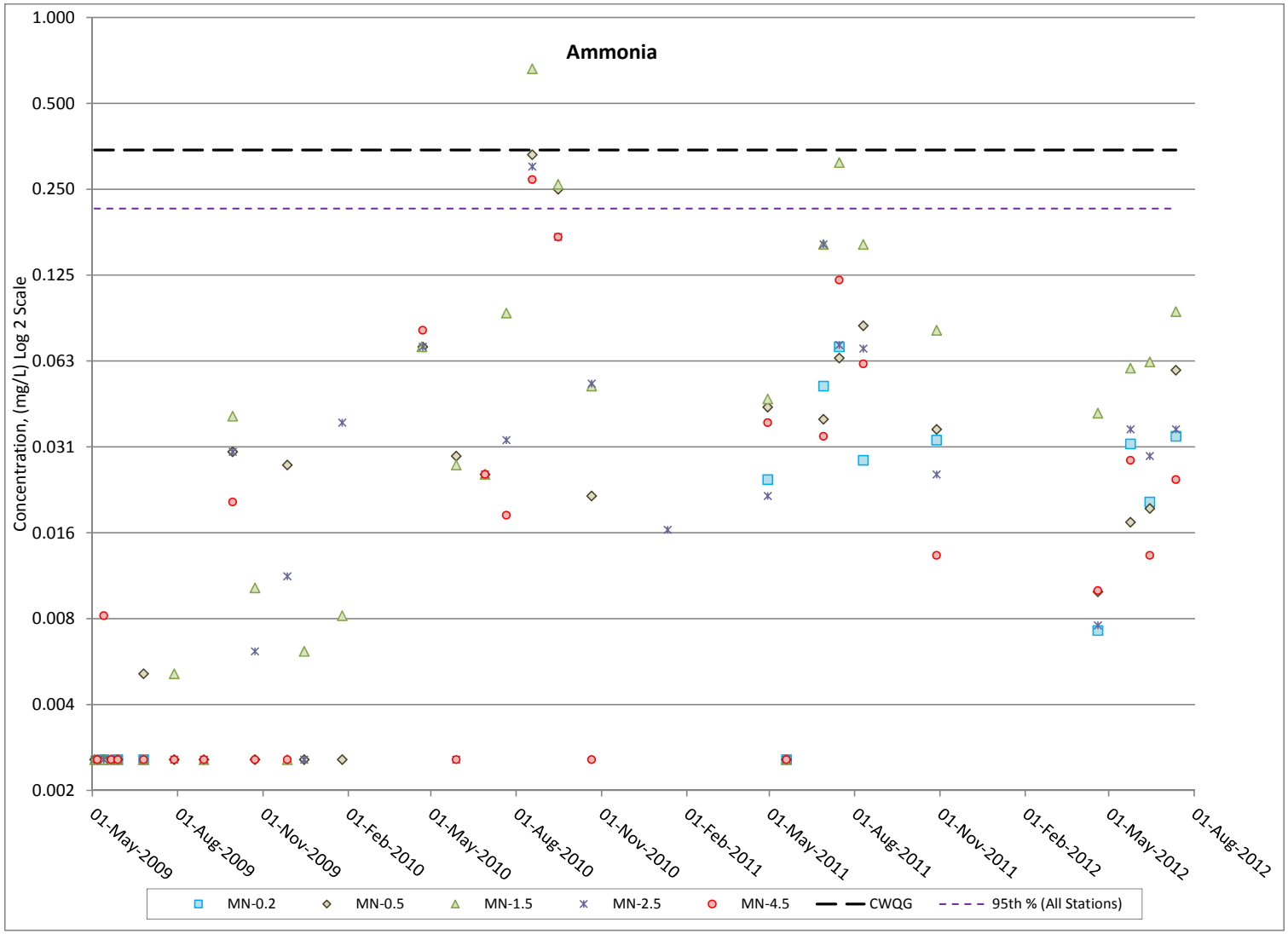

Figure 4-19: Concentrations of Ammonia in McGinty Creek.

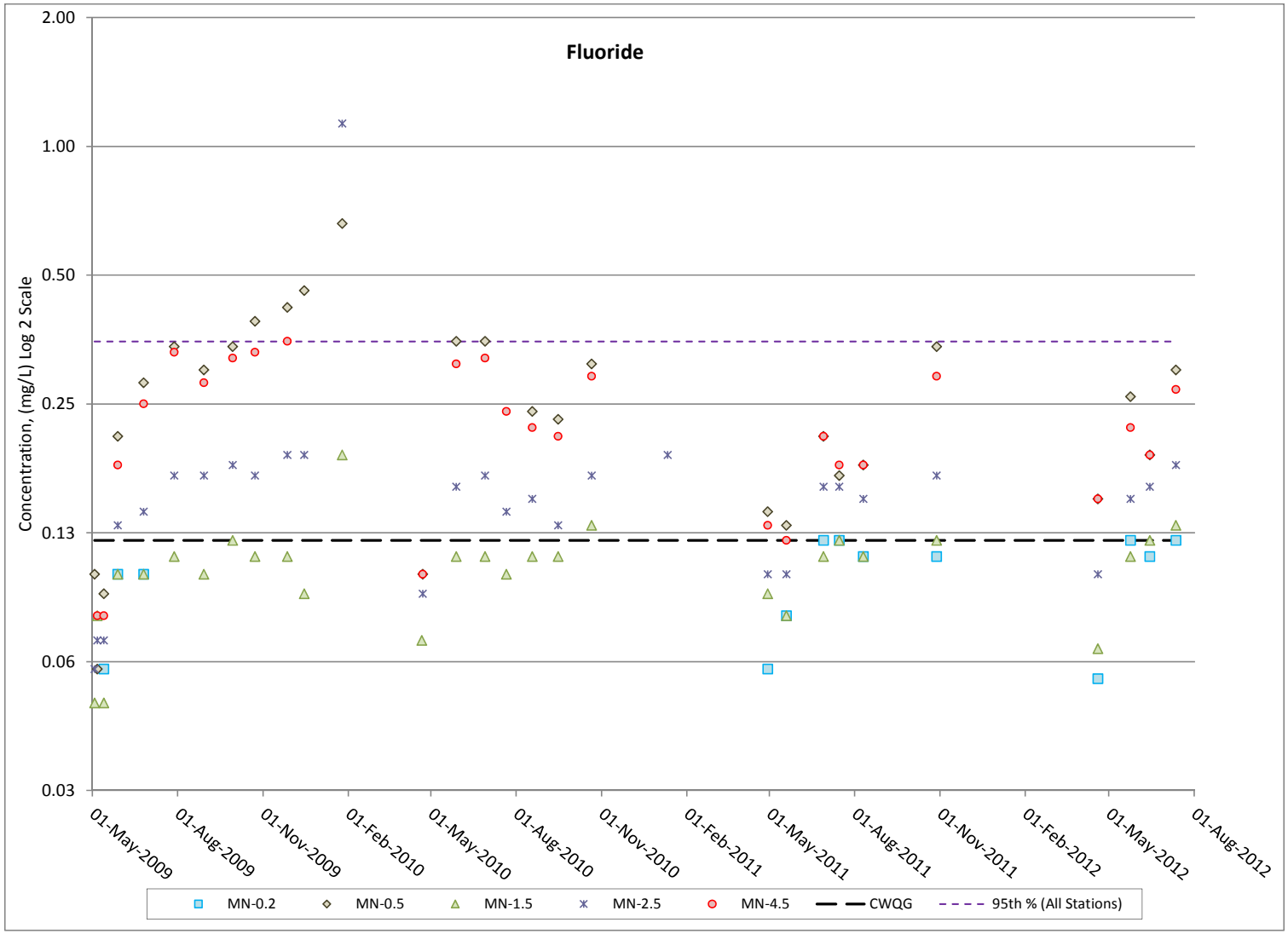

Figure 4-20: Concentrations of Fluoride in McGinty Creek.

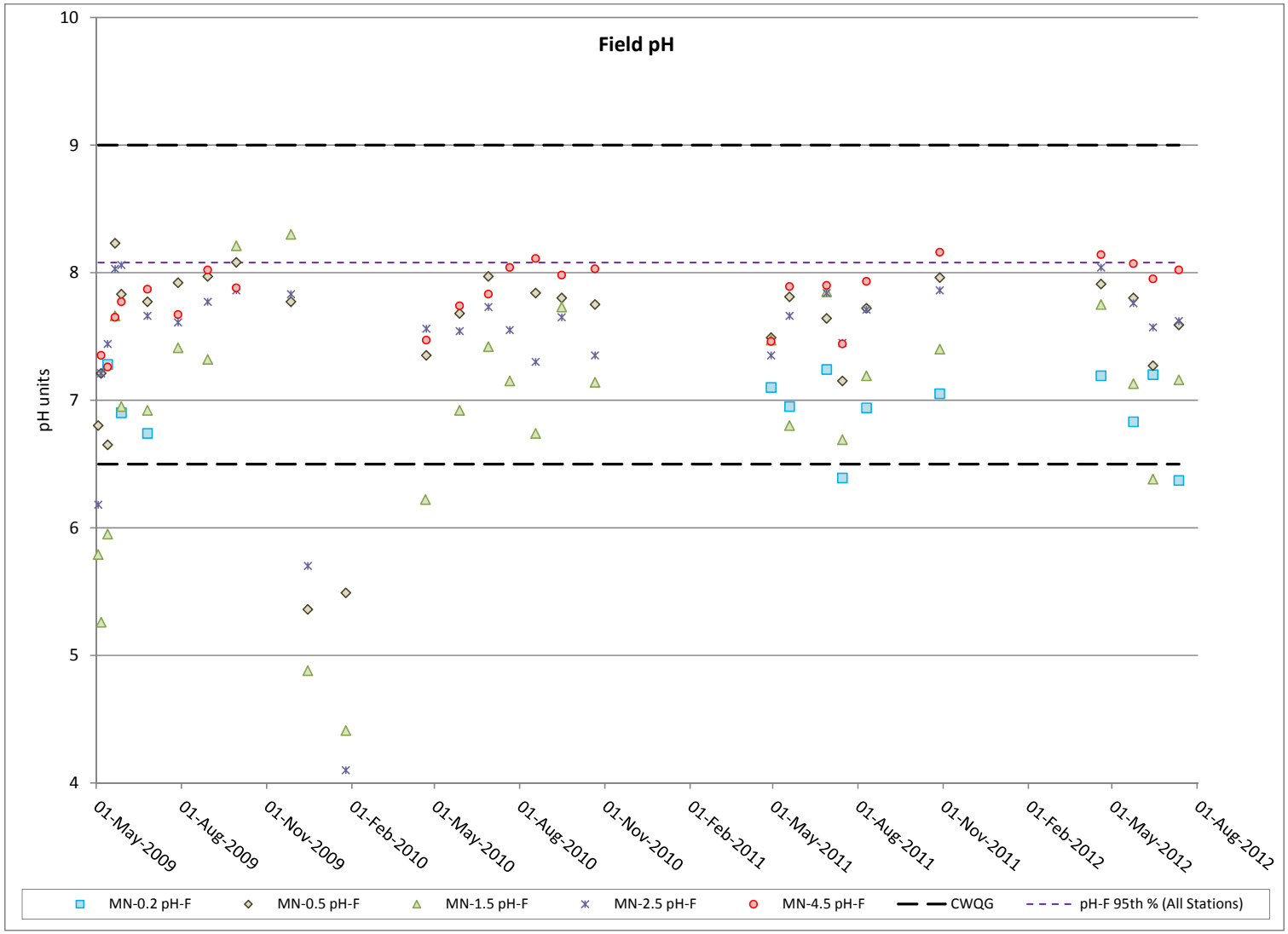

Figure 4-21: Field pH Measurements in McGinty Creek.

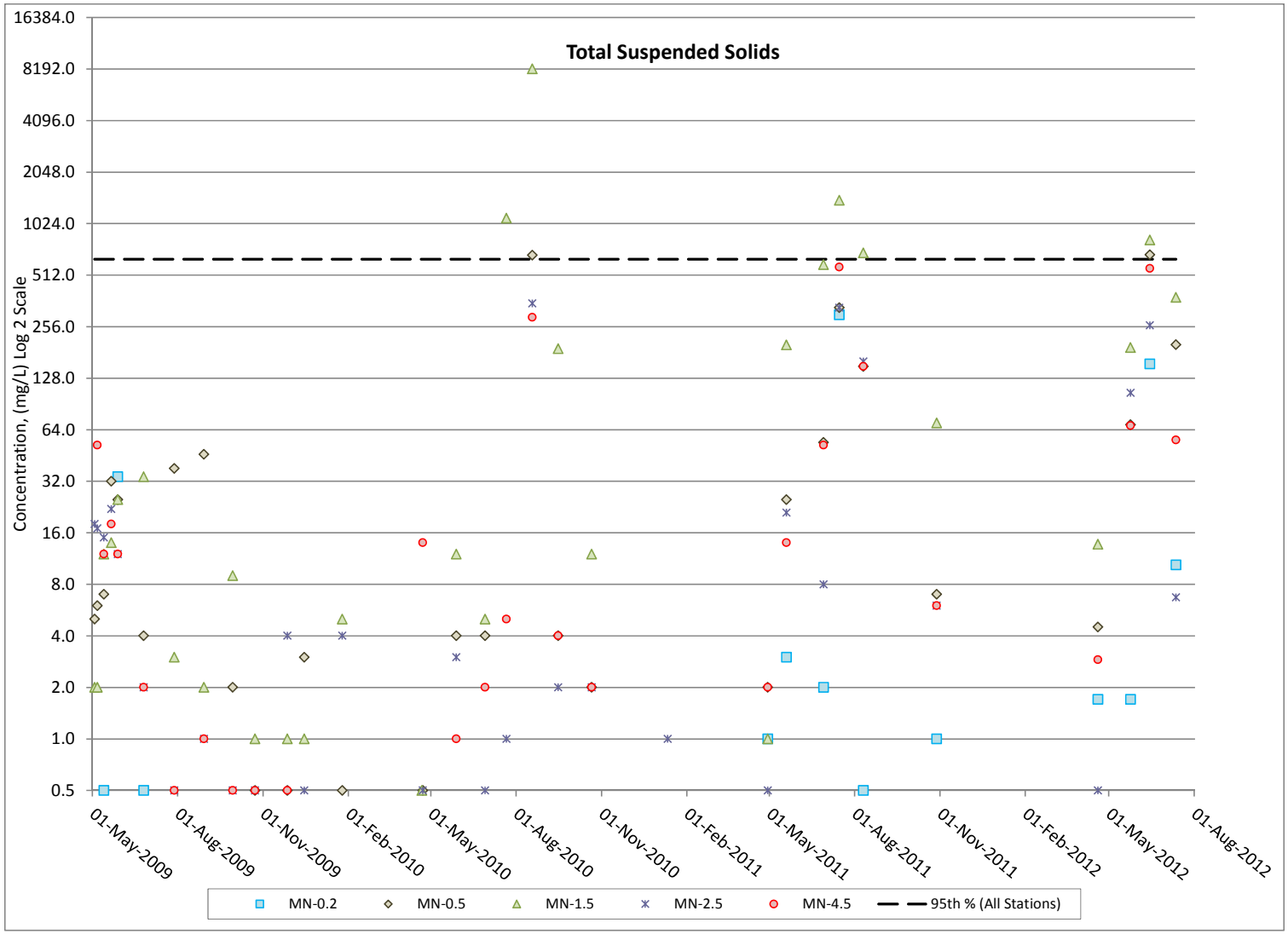

Figure 4-22: Concentrations of Total Suspended Solids in McGinty Creek.

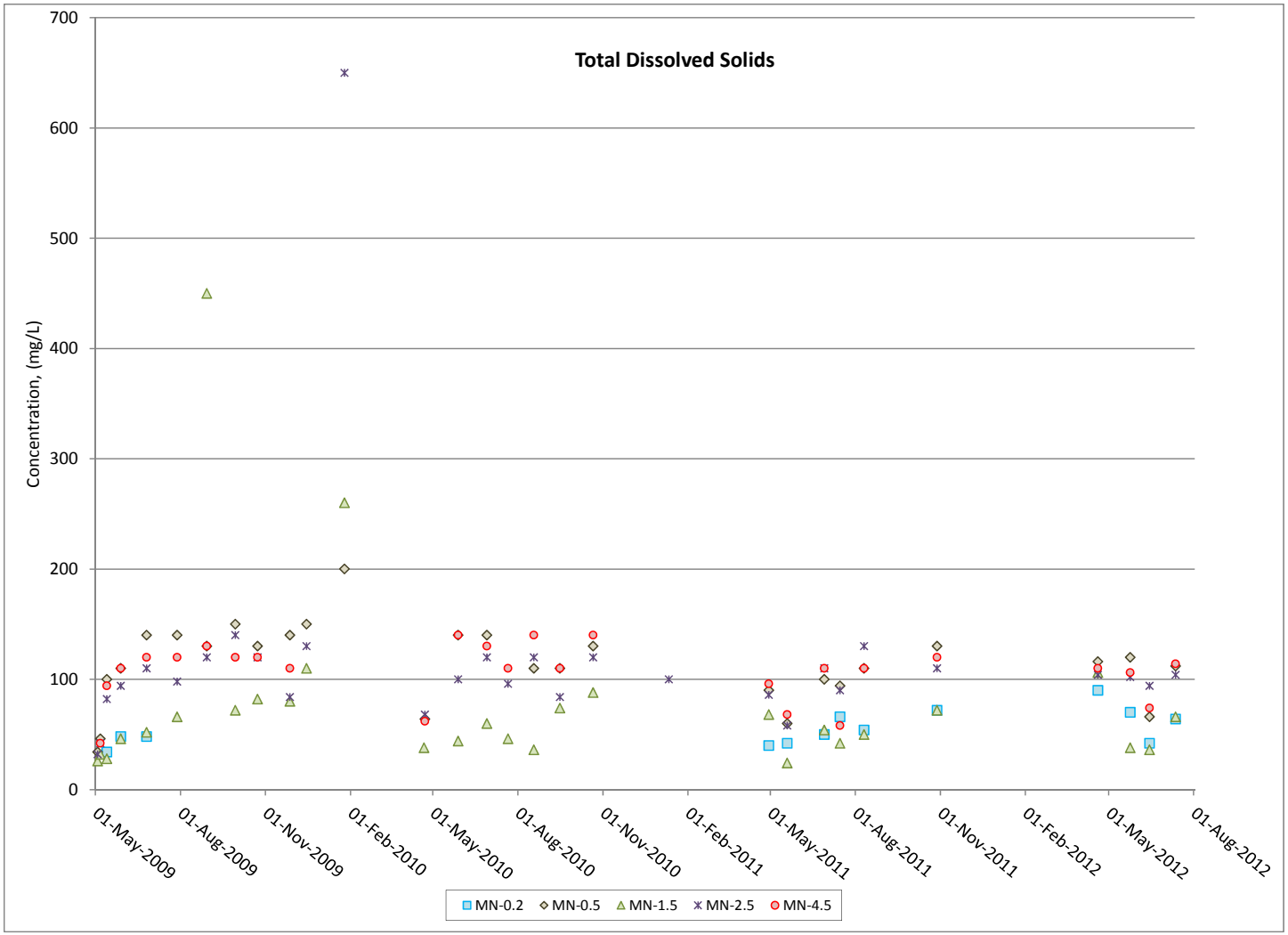

Figure 4-23: Concentrations of Total Dissolved Solids in McGinty Creek.

4.2 Boxplots and Mean Concentrations

Boxplots depicting minimum, maximum, median, 1st and 3rd quartile values from May 2009 to July 2012 are provided for previously graphed parameters that show the 95th percentile concentration, calculated from results for all stations, above the CWQG. Parameters that regularly exceed the CWQG include total aluminum, cadmium, chromium, copper, iron, lead, zinc, and fluoride and are further examined below, along with TSS. To give further perspective, the boxplots are accompanied by summary tables with annual average concentrations at each station as well as average values for each month that samples were collected. Parameters that have been shown to infrequently exceed the CWQG include arsenic, mercury, silver, ammonia, and pH, and have been omitted from the following section.

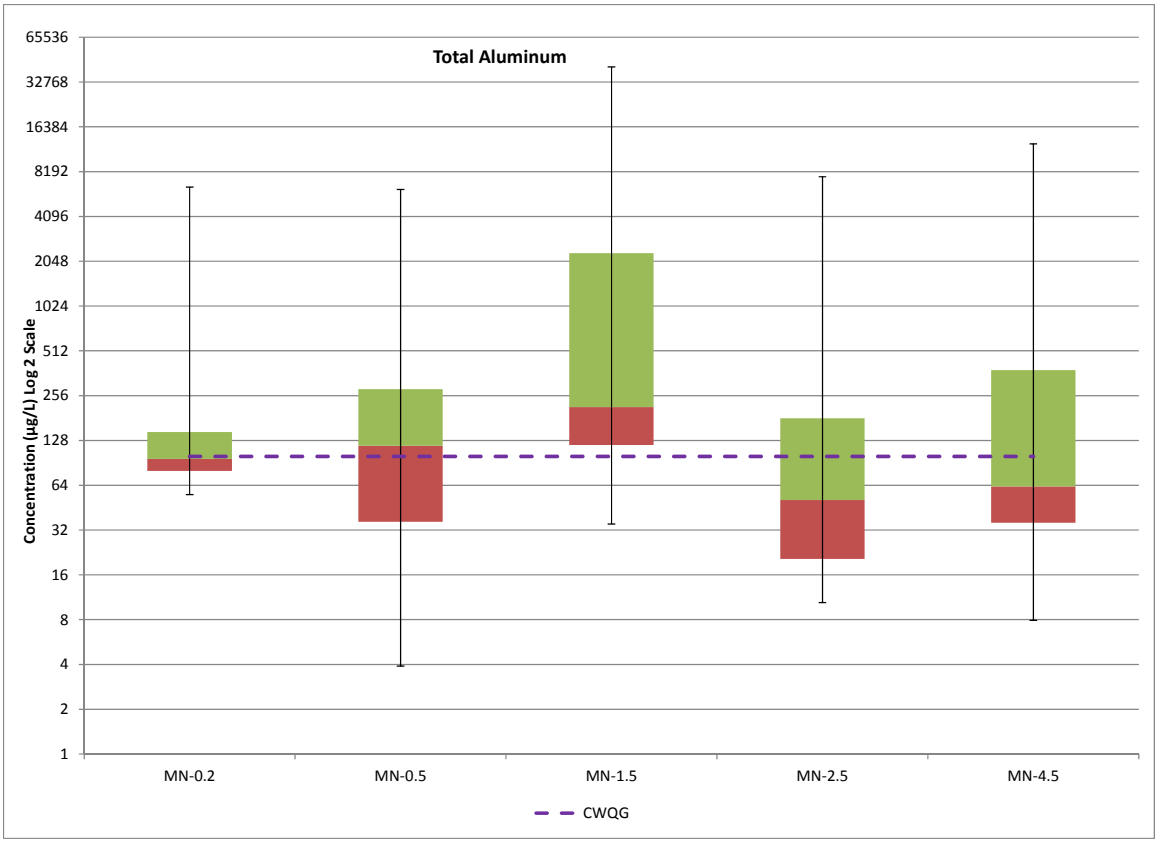

Figure 4-24: Total Aluminum Boxplots.

Table 4-1: McGinty Creek Annual and Monthly Mean Total Aluminum (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	666.5	3226.0			2	115.0	4	106.5	3	414.8	2	3303.0	1	89.4			1	68.6				
MN-0.5	29	736.5	3666.0	1	3.9	3	106.1	8	195.7	4	1011.5	3	2701.2	3	2356.7	2	49.7	3	39.9	1	12.0	1	19.5
MN-1.5	30	3754.4	22650.0	1	67.3	3	144.0	8	665.4	4	3041.8	4	12208.5	3	14442.7	2	748.5	3	299.8	1	47.9	1	35.2
MN-2.5	31	548.5	2820.0	2	17.6	3	54.1	8	206.4	4	401.4	4	1922.8	3	1886.1	2	31.6	3	33.5	1	25.2	1	11.7
MN-4.5	27	906.3	3291.0			3	115.0	7	218.8	4	1032.3	4	3326.2	3	1658.0	2	34.6	3	36.1	1	8.5		

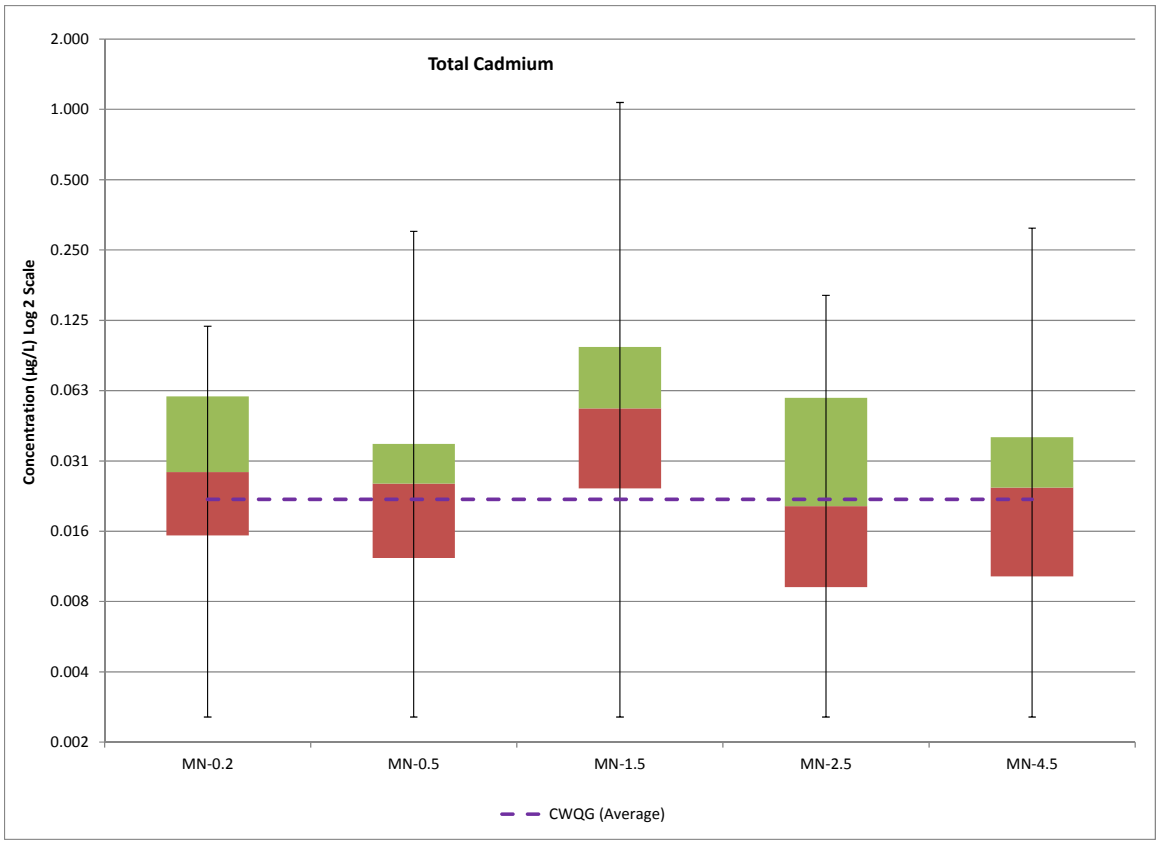

Figure 4-25: Total Cadmium Boxplots.

Table 4-2: McGinty Creek Annual and Monthly Mean Total Cadmium (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	0.042	0.107			2	0.052	4	0.017	3	0.067	2	0.071	1	0.019			1	0.015				
MN-0.5	29	0.048	0.228	1	0.010	3	0.025	8	0.029	4	0.086	3	0.090	3	0.119	2	0.011	3	0.016	1	0.026	1	0.021
MN-1.5	30	0.120	0.495	1	0.105	3	0.048	8	0.040	4	0.121	4	0.254	3	0.430	2	0.043	3	0.033	1	0.067	1	0.007
MN-2.5	31	0.040	0.132	2	0.082	3	0.028	8	0.043	4	0.040	4	0.055	3	0.067	2	0.011	3	0.008	1	0.008	1	0.014
MN-4.5	27	0.048	0.233			3	0.030	7	0.030	4	0.082	4	0.091	3	0.066	2	0.025	3	0.011	1	0.019		

Figure 4-26: Total Chromium Boxplots.

Table 4-3: McGinty Creek Annual and Monthly Mean Total Chromium (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	1.4	6.1			2	0.2	4	0.3	3	0.9	2	6.4	1	0.5			1	0.4				
MN-0.5	29	1.5	7.1	1	0.2	3	0.3	8	0.4	4	1.8	3	5.0	3	4.8	2	0.4	3	0.3	1	0.2	1	0.1
MN-1.5	30	5.7	29.2	1	0.9	3	0.3	8	1.1	4	4.7	4	19.9	3	19.1	2	1.4	3	0.8	1	0.3	1	0.3
MN-2.5	31	1.2	5.5	2	0.5	3	0.2	8	0.5	4	0.8	4	4.0	3	3.8	2	0.4	3	0.3	1	0.2	1	0.2
MN-4.5	27	1.8	6.0			3	0.3	7	0.6	4	1.9	4	6.2	3	3.3	2	0.3	3	0.3	1	0.2		

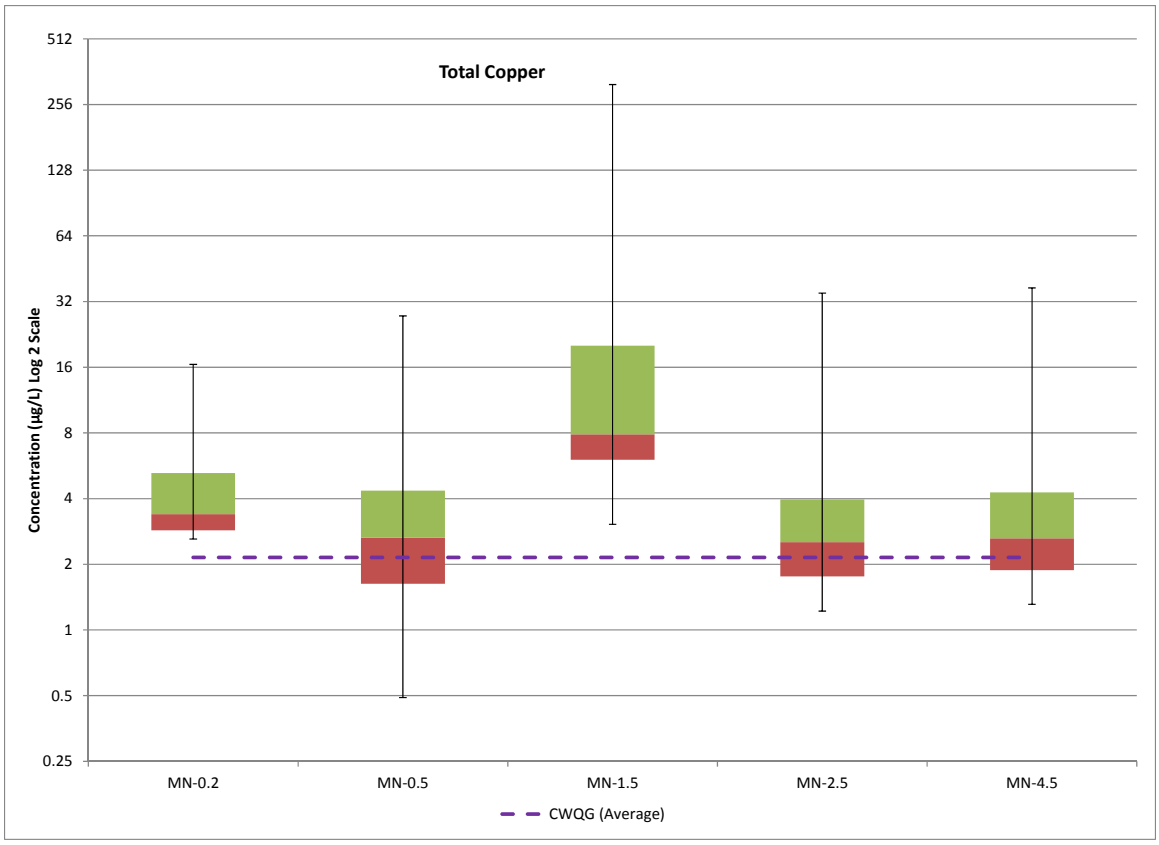

Figure 4-27: Total Copper Boxplots.

Table 4-4: McGinty Creek Annual and Monthly Mean Total Copper (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	4.94	11.48			2	5.65	4	3.37	3	4.74	2	9.85	1	2.86			1	2.61				
MN-0.5	29	4.84	19.88	1	0.49	3	3.47	8	2.78	4	7.30	3	9.50	3	13.03	2	1.96	3	1.32	1	0.77	1	1.63
MN-1.5	30	32.94	163.77	1	7.94	3	7.67	8	9.61	4	34.13	4	78.75	3	126.71	2	11.90	3	6.21	1	3.31	1	3.05
MN-2.5	31	5.02	19.10	2	2.81	3	2.41	8	3.67	4	5.40	4	10.35	3	12.82	2	2.13	3	1.62	1	1.23	1	1.62
MN-4.5	27	5.39	20.10			3	3.21	7	3.23	4	7.81	4	11.46	3	8.50	2	2.22	3	1.60	1	1.54		

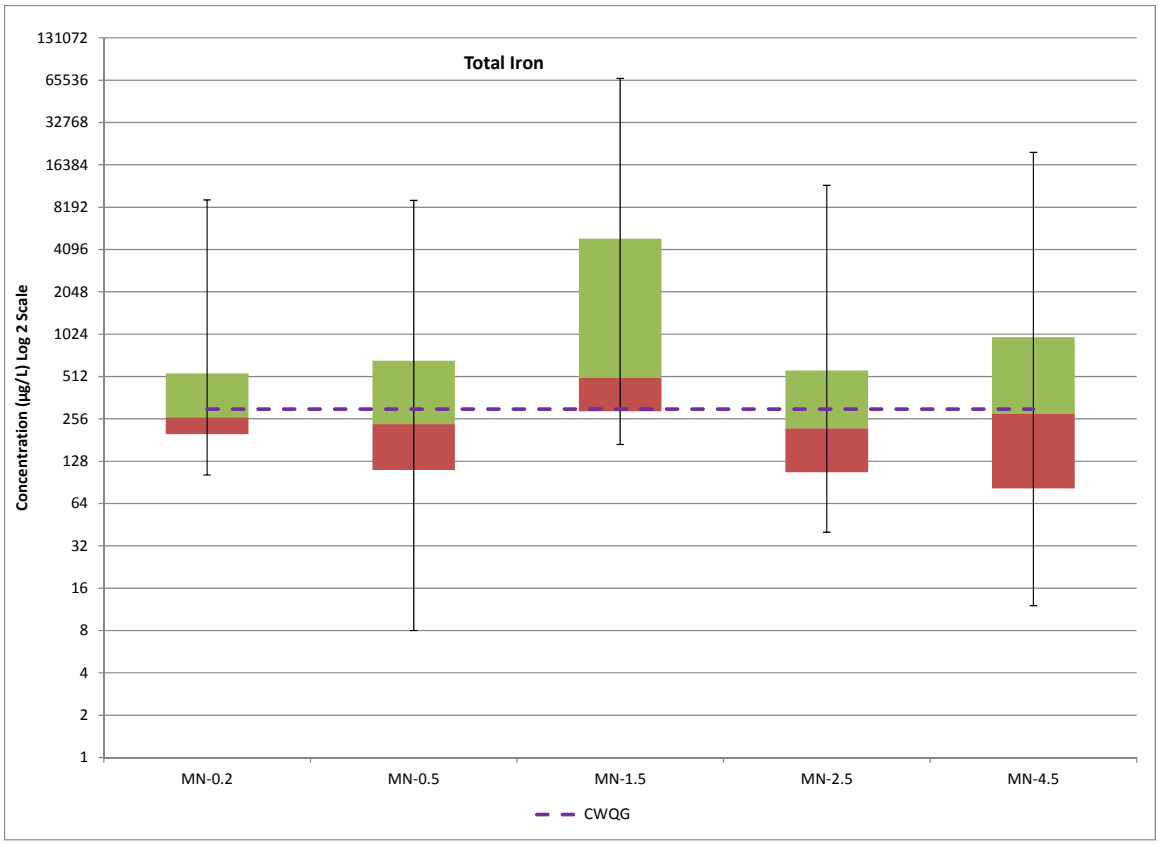

Figure 4-28: Total Iron Boxplots.

Table 4-5: McGinty Creek Annual and Monthly Mean Total Iron (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	1253	5380			2	231	4	340	3	1055	2	5455	1	240			1	152				
MN-0.5	29	1350	7886	1	8	3	186	8	426	4	2485	3	4136	3	4000	2	158	3	144	1	26	1	44
MN-1.5	30	6795	37240	1	208	3	634	8	1235	4	7115	4	21241	3	23721	2	1914	3	1004	1	254	1	183
MN-2.5	31	1205	6160	2	130	3	142	8	530	4	1376	4	3207	3	4143	2	245	3	335	1	128	1	55
MN-4.5	27	1691	7535			3	210	7	541	4	2461	4	5397	3	3034	2	127	3	144	1	12		

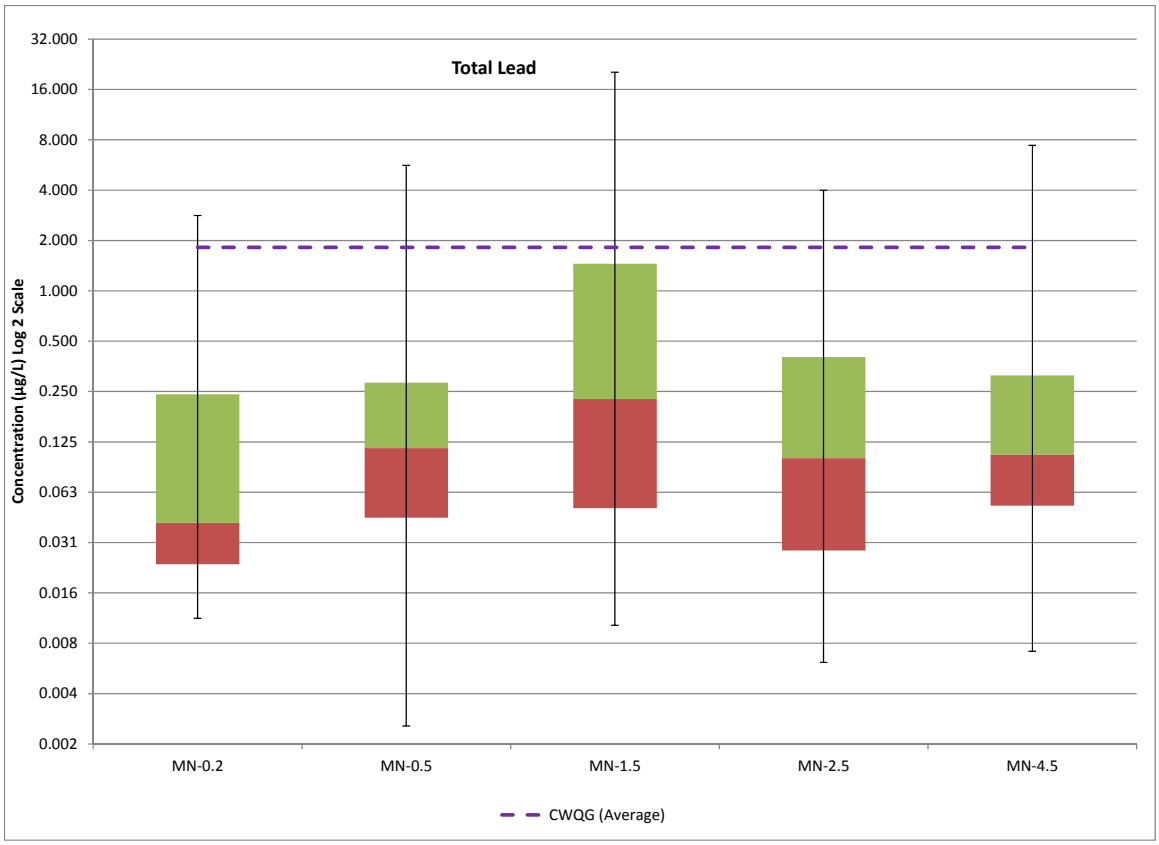

Figure 4-29: Total Lead Boxplots.

Table 4-6: McGinty Creek Annual and Monthly Mean Total Lead (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	2.623	6.808			2	1.110	4	1.915	3	2.630	2	6.285	1	1.810			1	1.950				
MN-0.5	29	0.684	3.966	1	0.067	3	0.020	8	0.170	4	1.248	3	1.774	3	2.515	2	0.061	3	0.064	1	0.079	1	0.119
MN-1.5	30	2.066	11.795	1	0.398	3	0.031	8	0.322	4	2.034	4	6.514	3	7.510	2	0.597	3	0.242	1	0.230	1	0.052
MN-2.5	31	0.523	2.115	2	0.153	3	0.018	8	0.392	4	0.431	4	1.296	3	1.340	2	0.038	3	0.022	1	0.232	1	1.420
MN-4.5	27	0.692	3.603			3	0.052	7	0.196	4	1.193	4	2.023	3	1.294	2	0.107	3	0.046	1	0.066		

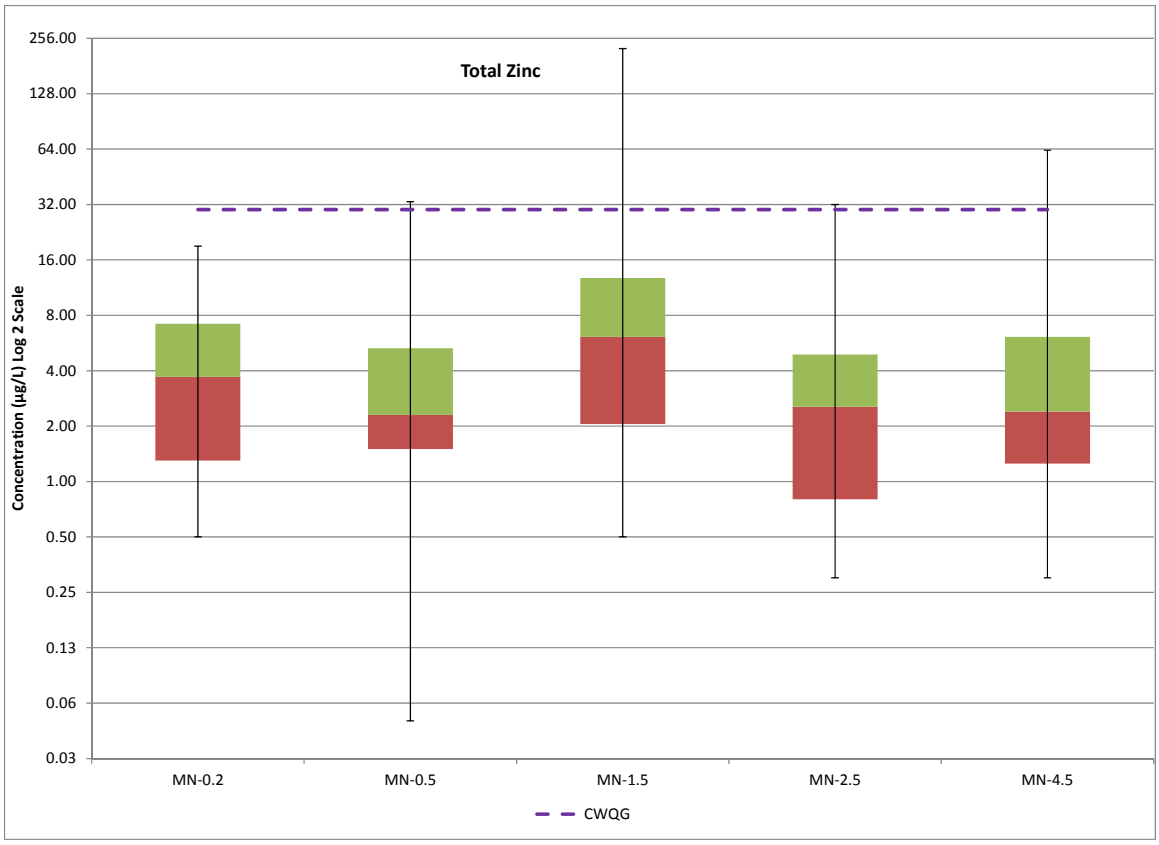

Figure 4-30: Total Zinc Boxplots.

Table 4-7: McGinty Creek Annual and Monthly Mean Total Zinc (µg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	4.9	13.1			2	8.2	4	1.9	3	4.5	2	10.4	1	0.8			1	4.6				
MN-0.5	29	5.9	26.9	1	0.8	3	3.6	8	3.8	4	9.0	3	11.4	3	15.4	2	2.5	3	1.3	1	2.2	1	1.7
MN-1.5	30	21.9	109.9	1	12.0	3	6.1	8	5.4	4	17.3	4	53.3	3	90.3	2	6.5	3	3.4	1	7.1	1	0.9
MN-2.5	31	4.8	17.2	2	4.9	3	3.7	8	4.3	4	4.1	4	9.1	3	10.3	2	1.5	3	0.6	1	2.8	1	1.4
MN-4.5	27	8.7	52.3			3	3.9	7	2.9	4	9.1	4	17.4	3	9.0	2	32.8	3	1.0	1	1.5		

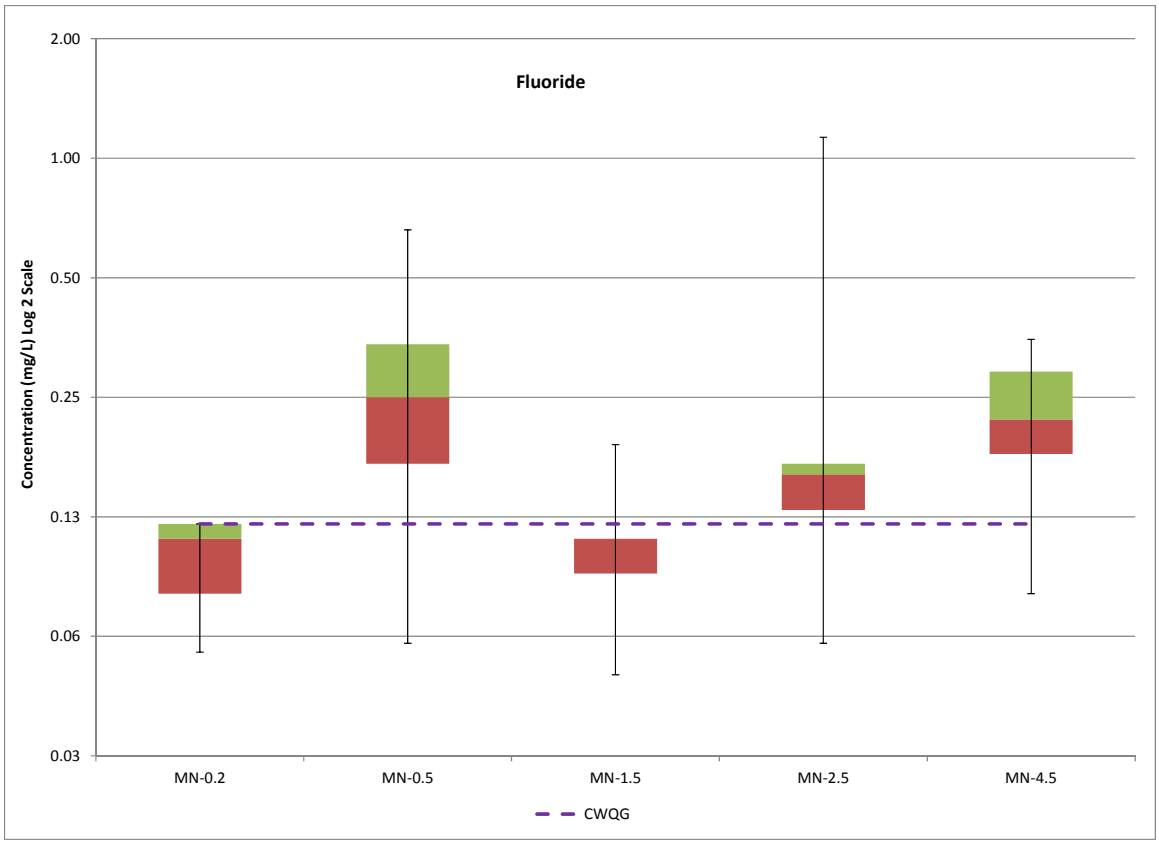

Figure 4-31: Fluoride Boxplots.

Table 4-8: McGinty Creek Frequency Distribution of Fluoride (mg/L), May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	0.10	0.12			2	0.06	4	0.09	3	0.11	2	0.12	1	0.11			1	0.11				
MN-0.5	28	0.26	0.45	1	0.66	3	0.13	7	0.17	4	0.26	3	0.27	3	0.24	2	0.29	3	0.35	1	0.42	1	0.46
MN-1.5	29	0.10	0.13	1	0.19	3	0.08	7	0.08	4	0.11	4	0.12	3	0.11	2	0.12	3	0.12	1	0.11	1	0.09
MN-2.5	30	0.18	0.19	2	0.66	3	0.10	7	0.11	4	0.16	4	0.16	3	0.16	2	0.16	3	0.17	1	0.19	1	0.19
MN-4.5	26	0.22	0.33			3	0.13	6	0.17	4	0.24	4	0.26	3	0.23	2	0.27	3	0.30	1	0.35		

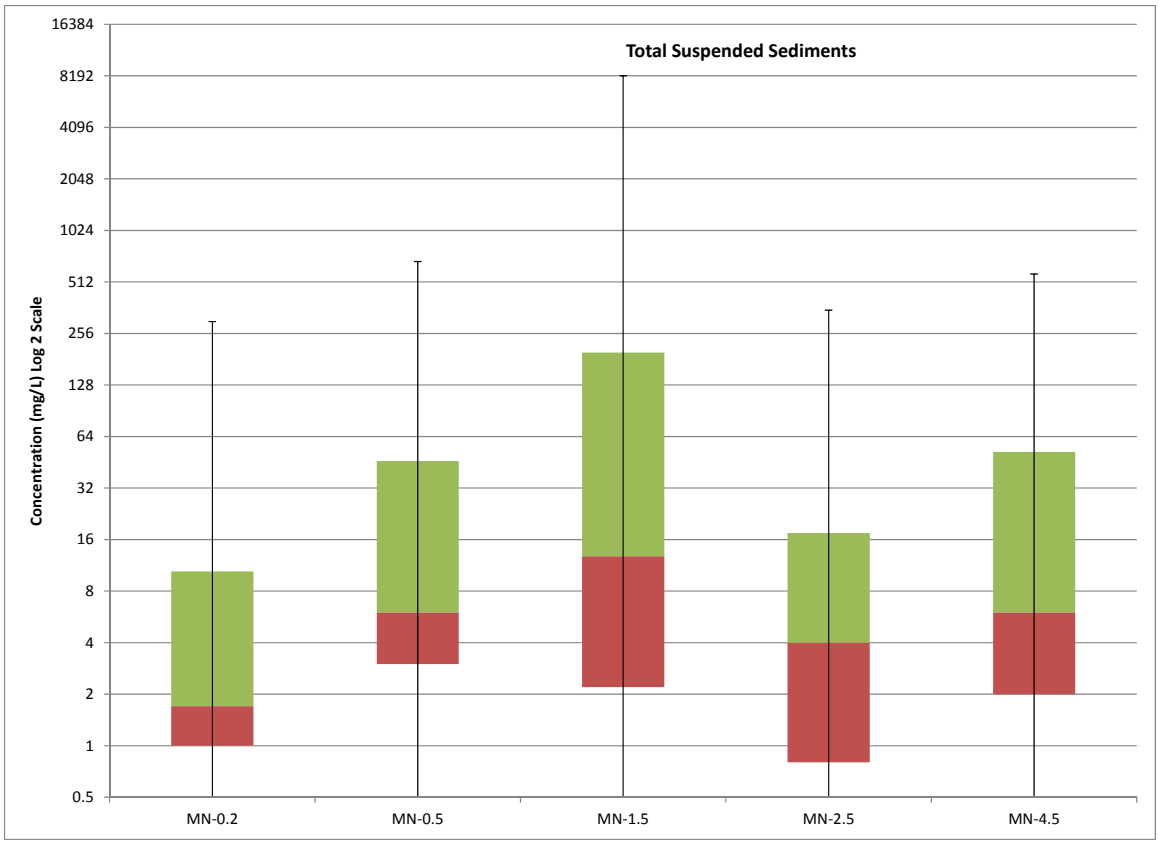

Figure 4-32: Total Suspended Sediments Boxplots.

Table 4-9: McGinty Creek Frequency Distribution of TSS, May 2009–July 2012.

Sample	Annual (all data)			January		April		May		June		July		August		September		October		November		December	
Station	n	mean	95th percentile	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n	mean
MN-0.2	13	39.3	213.0			2	1.4	4	9.8	3	52.5	2	155.2	1	0.5			1	1.0				
MN-0.5	29	81.7	534.0	1	0.5	3	2.3	8	21.6	4	183.8	3	189.7	3	288.7	2	3.0	3	3.2	1	0.5	1	3.0
MN-1.5	30	466.3	1265.0	1	5.0	3	5.1	8	57.5	4	362.8	4	720.5	3	2964.0	2	99.5	3	27.7	1	1.0	1	1.0
MN-2.5	31	43.7	295.0	2	2.5	3	0.5	8	26.6	4	67.6	4	84.6	3	170.3	2	1.3	3	2.8	1	4.0	1	0.5
MN-4.5	27	70.3	479.0			3	6.3	7	25.2	4	154.0	4	157.8	3	147.0	2	2.3	3	2.8	1	0.5		

4.3 BACKGROUND CONCENTRATIONS

Background concentrations at each station has been calculated (95th percentile) and provided within the previous Tables 3-1 through 3-5. The 95th percentile for all McGinty Creek stations is also depicted for comparison on the graphs shown in Figures 4-1 through 4-22 that also show the CWQG. Average and 95th percentile concentrations of select parameters at each station is shown below in Table 4-10. Table 4-11 shows average and 95th percentile for groupings of stations on the reference tributary of McGinty Creek, the exposure tributary, and the entire McGinty Creek dataset.

Table 4-10: Background Concentrations at McGinty Creek Stations.

	MN-0.2		MN-0.5		MN-1.5		MN-2.5		MN-4.5	
	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile
pH (field) (pH units)	6.94	7.26	7.49	8.04	6.9	8.07	7.41	8.04	7.83	8.13
Total Suspended Solids (mg/L)	39.3	213	81.7	534	466.3	1265	43.7	295	70.3	479
Aluminum (Al), total (µg/L)	666.5	3226	736.5	3666	3754.4	22650	548.5	2820	906.3	3291
Arsenic (As), total (µg/L)	0.674	1.93	0.863	3.462	1.829	7.185	0.728	2.35	0.921	3.374
Cadmium (Cd), total (µg/L)	0.0422	0.1072	0.0485	0.2276	0.1205	0.4951	0.0399	0.132	0.0478	0.2334
Chromium (Cr), total (µg/L)	1.41	6.126	1.49	7.12	5.72	29.175	1.23	5.5	1.79	5.955
Copper (Cu), total (µg/L)	4.94	11.484	4.84	19.88	32.94	163.77	5.02	19.1	5.39	20.1
Iron (Fe), total (µg/L)	1253	5380	1350	7886	6795	37240	1205	6160	1691	7535
Lead (Pb), total (µg/L)	0.3842	1.7142	0.6845	3.966	2.0661	11.795	0.5232	2.115	0.6922	3.603
Mercury (Hg), total (µg/L)	0.004834	0.00725	0.00524	0.01	0.008423	0.025	0.005926	0.01	0.005625	0.005
Silver (Ag), total (µg/L)	0.0084	0.02712	0.0091	0.0333	0.0304	0.09495	0.0097	0.0355	0.0094	0.03503
Zinc (Zn), total (µg/L)	4.88	13.06	5.88	26.86	21.94	109.9	4.77	17.2	8.7	52.27
Ammonia (N) (mg/L)	0.0238	0.0586	0.0408	0.1832	0.076	0.2875	0.0398	0.165	0.0355	0.155
Fluoride (mg/L)	0.097	0.12	0.26	0.446	0.104	0.13	0.18	0.19	0.22	0.33

Table 4-11: Background Concentrations of McGinty Creek Watershed.

	Reference Tributary (MN-0.2 & MN-0.5)		Exposure Tributary (MN-1.5 & MN-2.5)		All Stations	
	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile
pH (field) (pH units)	7.32	7.97	7.16	8.04	7.35	8.08
Total Suspended Solids (mg/L)	68.6	328.5	251.5	822	154.8	634
Aluminum (Al), total (µg/L)	714.8	3739.5	2125.2	7560	1416.4	6157
Arsenic (As), total (µg/L)	0.80	3.34	1.27	4.80	1.05	3.89
Cadmium (Cd), total (µg/L)	0.047	0.150	0.080	0.210	0.062	0.247
Chromium (Cr), total (µg/L)	1.5	7.5	3.4	15.0	2.5	11.1
Copper (Cu), total (µg/L)	4.87	17.83	18.75	58	11.49	36.1
Iron (Fe), total (µg/L)	1320	8659	3954	15800	2633	10667
Lead (Pb), total (µg/L)	0.592	3.447	1.282	4.630	0.936	4.250
Mercury (Hg), total (µg/L)	0.00511	0.01000	0.00715	0.02500	0.00617	0.01675
Silver (Ag), total (µg/L)	0.0089	0.0339	0.0199	0.0800	0.0142	0.0511
Zinc (Zn), total (µg/L)	5.57	21.85	13.21	40.1	9.81	32.61
Ammonia (N) (mg/L)	0.036	0.082	0.058	0.260	0.046	0.214
Fluoride (mg/L)	0.21	0.42	0.14	0.19	0.18	0.35

5 Summary of Findings

Parameters that show regular exceedances of the CWQG include total aluminum, cadmium, chromium, copper, iron, lead, zinc, and fluoride. Concentrations are typically highest at station MN-1.5.

Parameter concentrations appear lowest in the winter, rising again in the spring with peak levels recorded in July and August during precipitation/runoff events.

6 CLOSING STATEMENT

Access Consulting Group of Whitehorse, Yukon in conjunction with Minnow Environmental Inc., has prepared this McGinty Creek Water Quality Characterization for the Minto Project for the exclusive use of Minto Explorations Ltd., and is based on data and information collected during preliminary site investigations. ACG has followed standard professional procedures in conducting the investigations and in preparing the contents of this report. The material in this report reflects ACG's best judgment in light of the information available at the time of the preparation of this report. Any use that a third party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of the third parties. ACG accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. ACG believes that the contents of this report are substantively correct.

The information and data contained in this report, including without limitation, the results of any sampling and analyses conducted by ACG, are based solely on the conditions observed at the time of the field assessment and have been developed or obtained through the exercise of ACG's professional judgment and are set to the best of ACG's knowledge, information, and belief. Although every effort has been made to confirm that all such information and data is factual, complete and accurate, ACG offers no guarantees or warranties, either expressed or implied, with respect to such information or data.

ACG shall not by the act of issuing this report be deemed to have represented that any sampling and analyses conducted by it have been exhaustive or will identify all pertinent conditions at the site, and persons relying on the results thereof do so at their own risk.

7 References

[CCME] Canadian Council of Ministers of the Environment. 1999. Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment, Winnipeg. With updates.

Minnow Environmental Inc. 2010a. Relationship between metals and total suspended solids. Prepared for Minto Explorations Ltd. May 21, 2010.

APPENDIX A

MCGINTY CREEK WATER QUALITY DATA TABLES

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	pH (field)	pH (lab)	Conductivity (field)	Specific Conductivity (field)	Conductivity (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Discharge (Flow)	Total Suspended Solids	Total Dissolved Solids (field)	Total Dissolved Solids (lab)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Alkalinity, bicarbonate HCO3	Chloride	Fluoride	Sulphate, dissolved	Cyanide, total	Cyanide, Weak Acid Dissociable	Ion Balance	Ammonia (N)	Nitrite (N)	Nitrate (N)	Nitrite & Nitrate, as N	Dissolved Organic Carbon
			pH units	pH units	µS/cm	µS/cm	µS/cm	C	mg/L	%	mV	m3/s	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ratio	mg/L	mg/L	mg/L	mg/L	mg/L
CCME -Aquatic Life Guideline			6.5-9	6.5-9					5.5											120	0.12			0.005		0.343	0.06	3		
MN-0.2	Upper west arm of McGinty Creek (reference station)	13-May-09	7.28	6.8	83.0		37	-1.9					<1	41.6	34	19.8	19.6	10	13	1.1	0.06	<5	0.001		NC	<0.005	<0.005	<0.02	<0.02	28.4
		28-May-09	6.90	7.6	66.8		52	2.7	8.26	73.0			34	33.6	48	23.7	22.8	24	29	1.3	0.1	<0.5	0.0016		NC	<0.005	<0.005	<0.02	<0.02	18.1
		25-Jun-09	6.74	7.3	34.8		53		9.04	76.1			<1		48	20.6	21.6	22	27	<0.5	0.1	<0.5	0.001		NC	<0.005	<0.005	<0.02	<0.02	17.1
		29-Apr-11	7.1	6.55	28		53	0	13.14	99.2	131.4		1		40	25.5	24	9.5	12	2	0.06	<0.5	0.001	0.0015		0.024	<0.005	<0.02	<0.02	38
		19-May-11	6.95	6.89	25.8		44	2.2	10.33	76.3	141.8	0.0046	3		42	20.8	20	17	20	1.9	0.08	<0.5	0.0011	0.001		<0.005	<0.005	<0.02	<0.02	18.8
		28-Jun-11	7.24	7.23	34.7		55	5	9.43	82.6	40.3	0.0071	2		50	26.5	26.9	25	30	1.3	0.12	<0.5	0.0012	0.0013		0.051	<0.005	<0.02	<0.02	16.9
		15-Jul-11	**6.39**	7		50.2	50	5.4	10	88	288.7	0.0479	300		66	39.6	25.2	15	19	1.6	0.12	<0.5	0.0014	0.002		0.07	0.007	<0.02	<0.02	28.4
		10-Aug-11	6.94	7		63.5	64	7.2	9.06	75	209.8	0.0035	<1		54	31.3	28.4	29	35	1.6	0.11	<0.5	0.0013	0.002	NC	0.028	<0.005	<0.02	<0.02	17.2
		28-Oct-11	7.05	7.24		147	81	0.4					1		72	39.6	37.4	36	44	0.8	0.11	<0.5	<0.0005	<0.0005	NC	0.033	<0.005	<0.02	<0.02	13.4
		19-Apr-12	7.19	6.84		42.3	54.6	0	14.92	102	154		1.7		90	26.3	25.1	11.3	13.8	1.6	0.057	<0.50	0.00126	0.00053	NC	0.0071	<0.0050	<0.020	<0.020	31.8
		24-May-12	6.83	7.42		64.4	64.4	5.1	8.7	69	218.9	0.0005	1.7		70	28.6	28.6	30.6	37.3	1.4	0.12	<0.50	<0.00050	<0.00050	NC	0.032	<0.050	0.23	0.23	13.1
		14-Jun-12	7.2	7.06		55	49.4	2.6	12.98	96.6	65.5	0.0402	155		42	28.8	24.3	16	19.5	<5.0	0.11	<5.0	0.0013	0.00156	NC	0.02	<0.050	<0.20	<0.20	22.9
		12-Jul-12	**6.37**	7.58		57.3	68.7	7.2	9.31	77.4		0.0008	10.4		64	32.9	32.5	32.2	39.3	0.75	0.12	<0.50	0.00059	0.00143	NC	0.034	<0.050	<0.20	<0.20	16
Average			6.94	7.12	45.5	68.5	55.9	3	10.47	83.2	156.3	0.0149	39.3	37.6	55	28	25.9	21.4	26.1	1.39	0.097	0.6	0.00102	0.00118		0.0238	0.008	0.041	0.041	21.5
Count			13	13	6	7	13	12	11	11	8	7	13	2	13	13	13	13	13	13	13	13	13	10		13	13	13	13	13
Minimum			6.37	6.55	25.8	42.3	37	-1.9	8.26	69	40.3	0.0005	0.5	33.6	34	19.8	19.6	9.5	12	0.25	0.057	0.25	0.00025	0.00025		0.0025	0.0025	0.01	0.01	13.1
Maximum			7.28	7.6	83	147	81	7.2	14.92	102	288.7	0.0479	300	41.6	90	39.6	37.4	36	44	2.5	0.12	2.5	0.0016	0.002		0.07	0.025	0.23	0.23	38
Geometric Mean			6.93	7.11	41.1	63.2	54.8	2.4	10.28	82.5	133.4	0.0051	3.8	37.4	53	27.3	25.5	19.5	23.9	1.23	0.094	0.36	0.00089	0.00095		0.0135	0.0046	0.018	0.018	20.4
Count <DL			0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	0	13	2	2		4	12	12	12	0
Standard Deviation			0.3	0.31	23.6	35.4	11.3	3	2.19	11.5	81.8	0.0201	89.1	5.7	16	6.5	5	8.9	10.7	0.59	0.025	0.84	0.00042	0.00065		0.0209	0.0097	0.066	0.066	7.7
1st Quartile			6.83	6.89	29.7	52.6	50	0.3	9.05	75.5	114.9	0.0022	1	35.6	42	23.7	22.8	15	19	1.1	0.08	0.25	0.001	0.00065		0.0025	0.0025	0.01	0.01	16.9
Median			6.95	7.06	34.8	57.3	53	2.7	9.43	77.4	147.9	0.0046	1.7	37.6	50	26.5	25.1	22	27	1.4	0.11	0.25	0.0011	0.00136		0.024	0.0025	0.01	0.01	18.1
3rd Quartile			7.19	7.3	58.8	64	64	5.2	11.66	92.3	212.1	0.0236	10.4	39.6	66	31.3	28.4	29	35	1.6	0.12	0.25	0.0013	0.00154		0.033	0.007	0.01	0.01	28.4
95th Percentile			7.26	7.59	79.0	122.2	73.6	7.2	14.03	101	264.3	0.0456	213	41.2	79	39.6	34.5	33.7	41.2	2.2	0.12	2.5	0.00148	0.002		0.0586	0.025	0.152	0.152	34.3
Count Over Guideline			2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
% Over Guideline			15.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273[ln(hardness)]-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.86[log(hardness)]-3.2]}$ µg/L

Nickel: $e^{[0.76[ln(hardness)]+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545[ln(hardness)]-1.465]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies].

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Total Organic Carbon mg/L	Aluminum (Al), total µg/L	Antimony (Sb), total µg/L	Arsenic (As), total µg/L	Barium (Ba), total µg/L	Beryllium (Be), total µg/L	Bismuth (Bi), total µg/L	Boron (B), total µg/L	Cadmium (Cd), total µg/L	Calcium (Ca), total mg/L	Chromium (Cr), total µg/L	Cobalt (Co), total µg/L	Copper (Cu), total µg/L	Iron (Fe), total µg/L	Lead (Pb), total µg/L	Lithium (Li), total µg/L	Magnesium (Mg), total mg/L	Manganese (Mn), total µg/L	Mercury (Hg), total µg/L	Molybdenum (Mo), total µg/L	Nickel (Ni), total µg/L	Phosphorous (P), total µg/L	Potassium (K), total mg/L	Selenium (Se), total µg/L	Silicon (Si), total µg/L	Silver (Ag), total µg/L	Sodium (Na), total mg/L	Strontium (Sr), total µg/L	Sulphur (S), total mg/L	Thallium (Tl), total µg/L
CCME -Aquatic Life Guideline				*		5				1500	*		1		*	300	*				0.026	73	*			1		0.1				0.8
MN-0.2	Upper west arm of McGinty Creek (reference station)	13-May-09	28.2	**176**	0.04	0.27	24.7	0.02	<0.005	<50	**0.012**	5.2	0.4	0.224	**4.18**	284	0.022	<0.5	1.64	12.2	<0.01	0.08	1.9		1.4	0.07	3440	<0.005	1.38	29.4	<3	<0.002
		28-May-09	18.6	79.9	0.06	0.27	24.4	0.02	<0.005	<50	<0.005	6.14	0.2	0.144	**3.39**	106	0.021	<0.5	2.03	3.83		0.11	1.68		1.06	0.07	6240	<0.005	2.47	35.1	<3	<0.002
		25-Jun-09	18.1	55.4	0.07	0.26	24.3	0.02	<0.005	<50	<0.005	5.39	0.3	0.092	**2.61**	102	0.011	<0.5	1.73	5.91	<0.01	0.09	1.39		0.37	0.07	5480	<0.005	2.63	38.1	<3	<0.002
		29-Apr-11	40	**138**	0.02	0.28	26.6	0.02	<0.005	<50	**0.059**	6.19	0.2	0.181	**6.05**	199	0.041	<0.5	2.43	43.1	0.01	<0.05	1.16		2.26	0.04	3200	<0.005	1.9	35.9	<10	<0.002
		19-May-11	19.2	96.4	0.05	0.42	28.8	0.02	<0.005	<50	**0.028**	5.38	0.4	0.305	**3.14**	**430**	0.425	<0.5	1.78	77.5	<0.01	0.19	1.77		1.14	0.05	3030	0.007	1.56	34.6	<10	<0.002
		28-Jun-11	18.6	**119**	0.15	0.4	31	0.02	<0.005	<50	**0.118**	6.98	0.5	0.169	**3.48**	244	0.209	<0.5	2.21	16.8	<0.01	0.17	2.02		0.4	0.07	6670	<0.005	2.87	42.7	<10	<0.002
		15-Jul-11	29.9	**6460**	0.28	2.86	168	0.2	0.05	<50	**0.1**	9.3	**12.3**	4.49	**16.5**	**9220**	**2.82**	3.4	4	200	0.003	0.39	10.3		0.7	0.2	14700	0.048	2.6	67.4	<50	0.061
		10-Aug-11	19	89.4	0.08	0.38	37.6	0.03	<0.005	<50	**0.019**	8.07	0.5	0.192	**2.86**	240	0.036	<0.5	2.69	18.4	<0.01	0.26	1.81	8	0.4	0.05	7270	<0.005	2.87	53.7	<10	<0.002
		28-Oct-11	13.4	68.6	0.07	0.29	40.6	0.01	<0.005	<50	**0.015**	10.2	0.4	0.188	**2.61**	152	0.241	<0.5	3.42	62	<0.01	0.1	1.95	5	0.39	0.06	9180	0.013	3.47	59.2	<10	<0.002
		19-Apr-12	32.8	91.9	<0.020	0.268	22.7	0.011	<0.0050	<50	**0.0448**	6.74	0.24	0.181	**5.24**	263	0.0232	<0.50	2.3	44	<0.010	0.066	1.06	38.5	1.86	0.042	3350	0.0054	1.93	36.7	<10	<0.0020
		24-May-12	12.4	73.6	0.081	0.539	36.8	0.019	<0.0050	<50	**0.0249**	7.38	0.36	0.352	**2.77**	**540**	0.037	<0.50	2.46	140	<0.000010	0.26	2.31	18.7	0.833	0.053	5700	<0.0050	2.47	48.3	<10	<0.0020
		14-Jun-12	27.1	**1070**	0.098	1.31	90.5	0.096	<0.0050	<50	**0.0809**	7.26	**2.01**	2.02	**8.14**	**2820**	0.977	0.81	2.59	212	<0.010	0.143	4.48	119	0.507	0.079	5930	0.0132	2.53	47.8	<10	0.0084
		12-Jul-12	16.8	**146**	0.067	1.22	43.9	0.022	<0.0050	<50	**0.042**	8.56	0.57	0.502	**3.19**	**1690**	0.132	<0.50	2.8	178	<0.010	0.202	2.27	37.4	0.436	0.059	7380	0.005	3.06	56	<10	<0.0020
Average			22.6	666.5	0.083	0.674	46.1	0.039	0.0062	25	0.0422	7.14	1.41	0.695	4.94	1253	0.3842	0.54	2.47	77.98	0.004834	0.16	2.62	37.8	0.904	0.07	6275	0.0084	2.44	45	6	0.0062
Count			13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	13	13	6	13	13	13	13	13	13	13	13
Minimum			12.4	55.4	0.01	0.26	22.7	0.01	0.0025	25	0.0025	5.2	0.2	0.092	2.61	102	0.011	0.25	1.64	3.83	0.000005	0.025	1.06	5	0.37	0.04	3030	0.0025	1.38	29.4	2	0.001
Maximum			40	6460	0.28	2.86	168	0.2	0.05	25	0.118	10.2	12.3	4.49	16.5	9220	2.82	3.4	4	212	0.01	0.39	10.3	119	2.26	0.2	14700	0.048	3.47	67.4	25	0.061
Geometric Mean			21.3	161.7	0.062	0.476	37.6	0.025	0.0031	25	0.0251	6.99	0.53	0.314	4.17	425	0.0948	0.33	2.39	40.63	0.002855	0.131	2.11	22.5	0.743	0.064	5668	0.0049	2.37	43.7	4	0.0016
Count <DL			0	0	1	0	0	0	12	13	2	0	0	0	0	0	0	11	0	0	10	1	0	0	0	0	0	7	0	0	13	11
Standard Deviation			8.2	1761.5	0.069	0.747	40.7	0.053	0.0132	0	0.0373	1.55	3.3	1.247	3.84	2520	0.7796	0.87	0.67	77.27	0.002208	0.1	2.46	42.2	0.616	0.041	3155	0.0125	0.6	11.4	6	0.0166
1st Quartile			18.1	79.9	0.05	0.27	24.7	0.02	0.0025	25	0.015	6.14	0.3	0.181	2.86	199	0.0232	0.25	2.03	16.8	0.005	0.09	1.68	10.7	0.4	0.05	3440	0.0025	1.93	35.9	5	0.001
Median			19	96.4	0.07	0.38	31	0.02	0.0025	25	0.028	6.98	0.4	0.192	3.39	263	0.041	0.25	2.43	44	0.005	0.143	1.9	28	0.7	0.06	5930	0.0025	2.53	42.7	5	0.001
3rd Quartile			28.2	146	0.081	0.539	40.6	0.022	0.0025	25	0.059	8.07	0.5	0.352	5.24	540	0.241	0.25	2.69	140	0.005	0.202	2.27	38.2	1.14	0.07	7270	0.007	2.87	53.7	5	0.001
95th Percentile			35.7	3226	0.202	1.93	121.5	0.138	0.0215	25	0.1072	9.66	6.13	3.008	11.48	5380	1.7142	1.85	3.65	204.8	0.00725	0.312	6.81	98.9	2.02	0.127	11388	0.0271	3.22	62.5	13	0.0294
Count Over Guideline			0	6	0	0	0	0	0	0	11	0	2	0	13	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	46.2	0	0	0	0	0	0	84.6	0	15.4	0	100	38.5	7.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

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Cadmium: $10^{[0.86(\log(\text{hardness}))-3.2]}$ µg/L

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.465]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies].

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Tin (Sn), total µg/L	Titanium (Ti), total µg/L	Uranium (U), total µg/L	Vanadium (V), total µg/L	Zinc (Zn), total µg/L	Zirconium (Zr), total µg/L	Aluminum (Al), dissolved µg/L	Antimony (Sb), dissolved µg/L	Arsenic (As), dissolved µg/L	Barium (Ba), dissolved µg/L	Beryllium (Be), dissolved µg/L	Bismuth (Bi), dissolved µg/L	Boron (B), dissolved µg/L	Cadmium (Cd), dissolved µg/L	Calcium (Ca), dissolved mg/L	Chromium (Cr), dissolved µg/L	Cobalt (Co), dissolved µg/L	Copper (Cu), dissolved µg/L	Iron (Fe), dissolved µg/L	Lead (Pb), dissolved µg/L	Lithium (Li), dissolved µg/L	Magnesium (Mg), dissolved mg/L	Manganese (Mn), dissolved µg/L	Mercury (Hg), dissolved µg/L	Molybdenum (Mo), dissolved µg/L	Nickel (Ni), dissolved µg/L	Phosphorous (P), dissolved µg/L	Potassium (K), dissolved mg/L	Selenium (Se), dissolved µg/L	Silicon (Si), dissolved µg/L	Silver (Ag), dissolved µg/L	Sodium (Na), dissolved mg/L
CCME -Aquatic Life Guideline					15		30																												
MN-0.2	Upper west arm of McGinty Creek (reference station)	13-May-09	<0.01	3.4	0.029	0.9	1.9	0.4	163	0.05	0.28	25.3	0.03	<0.005	<50	0.017	5.11	0.3	0.205	4.25	265	0.029	<0.5	1.67	11.3	0.02	0.09	2.05		1.4	0.05	3310	<0.005	1.38
		28-May-09	<0.01	2.1	0.025	0.4	0.6	0.5	65.3	0.06	0.29	24.5	0.02	<0.005	<50	<0.005	5.84	0.3	0.129	3.58	95	0.019	0.5	1.99	0.8	<0.01	0.12	1.82		1.06	0.07	5260	<0.005	2.51
		25-Jun-09	<0.01	0.9	0.023	<0.2	0.5	0.4	55.2	0.08	0.28	24.7	<0.01	<0.005	<50	<0.005	5.76	0.2	0.094	2.67	84	0.013	<0.5	1.75	4.29	<0.01	0.1	1.49		0.4	0.06	5990	<0.005	2.59
		29-Apr-11	<0.01	1.2	0.015	0.3	9.1	0.2	114	0.02	0.25	24	0.01	<0.005	<50	0.053	5.96	0.3	0.177	5.27	185	0.02	<0.5	2.21	38.7	0.01	<0.05	1.04		2.23	0.04	2840	<0.005	1.79
		19-May-11	<0.01	2.7	0.029	1.1	3.7	0.3	61.2	0.05	0.43	28	0.01	<0.005	<50	0.02	5.12	0.2	0.284	2.83	316	0.024	<0.5	1.75	72.5		0.16	1.73		1.12	0.05	2860	<0.005	1.49
		28-Jun-11	0.03	2	0.031	0.8	4.1	0.4	73.4	0.07	0.32	28	0.02	<0.005	<50	0.013	7.07	0.5	0.081	2.81	117	0.031	<0.5	2.25	1.46	<0.01	0.13	1.73		0.4	0.07	7290	0.005	2.74
		15-Jul-11	<0.2	256	0.42	22.5	19	1.4	199	0.11	0.78	39.4	0.02	<0.005	<50	0.035	6.8	0.9	0.79	3.4	858	0.162	<0.5	2	81.2		0.16	2.72		0.21	0.09	6070	0.007	2.53
		10-Aug-11	<0.01	1.5	0.029	1	0.8	0.4	76.3	0.07	0.33	35.1	0.02	<0.005	<50	0.036	7.49	0.4	0.178	2.63	188	0.06	<0.5	2.35	16.8		0.14	1.66	6	0.39	0.05	6830	0.009	2.46
		28-Oct-11	0.03	1.2	0.012	0.5	4.6	0.3	65.6	0.08	0.35	40.7	<0.01	<0.005	<50	0.019	9.92	0.4	0.151	2.52	126	0.271	<0.5	3.07	56	<0.01	0.1	1.67	8	0.4	0.05	8590	0.007	3.27
		19-Apr-12	<0.20	1.81	0.0154	0.28	7.2	0.19	76.5	0.02	0.262	22.2	0.011	<0.0050	<50	0.0387	6.19	0.26	0.185	5.04	222	0.0184	<0.50	2.34	47.3	<0.010	0.055	1.05	29	1.86	<0.040	3120	<0.0050	1.91
		24-May-12	<0.20	2.22	0.02	0.67	1.3	0.33	44.5	0.076	0.515	36.2	0.015	<0.0050	<50	0.016	7.43	0.32	0.319	2.51	435	0.0251	<0.50	2.43	137	<0.010	0.506	2.05	12.9	0.835	0.05	5740	<0.0050	2.43
		14-Jun-12	<0.20	25.9	0.134	6.71	8.75	0.99	134	0.087	0.503	33.9	0.02	<0.0050	<50	0.0305	6.43	0.55	0.618	2.88	811	0.038	<0.50	2.01	116	<0.010	0.175	1.84	18.6	0.421	0.069	5230	<0.0050	2.43
		12-Jul-12	<0.20	4.03	0.027	1.57	1.86	0.53	58	0.066	0.462	36.1	0.016	<0.0050	<50	0.018	8.43	0.4	0.296	2.5	269	0.01	<0.50	2.77	105	<0.010	0.664	1.97	7	0.399	0.066	7230	<0.0050	3.05
Average			0.05	23.46	0.0623	2.83	4.88	0.49	91.2	0.065	0.389	30.6	0.016	0.0025	25	0.0232	6.73	0.39	0.27	3.3	305	0.0554	0.27	2.2	52.95	0.007	0.187	1.76	13.6	0.856	0.057	5412	0.0039	2.35
Count			13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	10	13	13	6	13	13	13	13	13
Minimum			0.01	0.9	0.012	0.1	0.5	0.19	44.5	0.02	0.25	22.2	0.005	0.0025	25	0.0025	5.11	0.2	0.081	2.5	84	0.01	0.25	1.67	0.8	0.005	0.025	1.04	6	0.21	0.02	2840	0.0025	1.38
Maximum			0.1	256	0.42	22.5	19	1.4	199	0.11	0.78	40.7	0.03	0.0025	25	0.053	9.92	0.9	0.79	5.27	858	0.271	0.5	3.07	137	0.02	0.664	2.72	29	2.23	0.09	8590	0.009	3.27
Geometric Mean			0.02	3.4	0.032	0.89	2.86	0.41	82.3	0.058	0.367	30	0.014	0.0025	25	0.0172	6.62	0.36	0.217	3.19	234	0.0327	0.26	2.17	24.16	0.006	0.133	1.7	11.5	0.666	0.054	5077	0.0034	2.28
Count <DL			11	0	0	1	0	0	0	0	0	0	2	13	13	2	0	0	0	0	0	0	12	0	0	8	1	0	0	0	1	0	9	0
Standard Deviation			0.05	70.18	0.1119	6.15	5.2	0.34	47.2	0.025	0.149	6.5	0.007	0	0	0.0147	1.36	0.19	0.209	0.97	254	0.0759	0.07	0.41	46.51	0.005	0.185	0.43	8.9	0.643	0.017	1886	0.0023	0.56
1st Quartile			0.01	1.5	0.02	0.4	1.3	0.3	61.2	0.05	0.28	24.7	0.01	0.0025	25	0.016	5.84	0.3	0.151	2.63	126	0.019	0.25	1.99	11.3	0.005	0.1	1.66	7.2	0.4	0.05	3310	0.0025	1.91
Median			0.03	2.1	0.027	0.8	3.7	0.4	73.4	0.07	0.33	28	0.016	0.0025	25	0.019	6.43	0.32	0.185	2.83	222	0.0251	0.25	2.21	47.3	0.005	0.13	1.73	10.4	0.421	0.05	5740	0.0025	2.46
3rd Quartile			0.1	3.4	0.029	1.1	7.2	0.5	114	0.08	0.462	36.1	0.02	0.0025	25	0.035	7.43	0.4	0.296	3.58	316	0.038	0.25	2.35	81.2	0.005	0.16	1.97	17.2	1.12	0.069	6830	0.005	2.59
95th Percentile			0.1	117.9	0.2484	13	13.1	1.15	177.4	0.096	0.621	39.9	0.024	0.0025	25	0.0444	9.03	0.69	0.687	5.13	830	0.2056	0.35	2.89	124.4	0.016	0.569	2.32	26.4	2.008	0.078	7810	0.0078	3.14
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

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McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Strontium (Sr), dissolved µg/L	Sulphur (S), dissolved mg/L	Thallium (Tl), dissolved µg/L	Tin (Sn), dissolved µg/L	Titanium (Ti), dissolved µg/L	Uranium (U), dissolved µg/L	Vanadium (V), dissolved µg/L	Zinc (Zn), dissolved µg/L	Zirconium (Zr), dissolved µg/L
CCME -Aquatic Life Guideline											
MN-0.2	Upper west arm of McGinty Creek (reference station)	13-May-09	30.4	<3	<0.002	<0.01	2.7	0.031	1	2.2	0.5
		28-May-09	36.5	<3	<0.002	0.03	0.9	0.021	0.4	0.1	0.4
		25-Jun-09	38.5	<3	<0.002	<0.01	0.8	0.028	0.3	0.9	0.5
		29-Apr-11	35.9	<10	<0.002	<0.01	1.3	0.016	0.3	8.5	0.2
		19-May-11	33.5	<10	<0.002	<0.01	1.2	0.023	0.9	1.5	0.2
		28-Jun-11	42	<10	<0.002	<0.01	0.9	0.018	0.3	0.9	0.4
		15-Jul-11	41.6	<10	<0.002	0.05	3.9	0.054	1.9	13.1	0.8
		10-Aug-11	50.9	<10	<0.002	<0.01	0.9	0.021	0.8	1.8	0.4
		28-Oct-11	57.2	<10	<0.002	0.04	1.4	0.015	0.4	5.1	0.3
		19-Apr-12	35.6	<10	<0.0020	<0.20	0.93	0.013	0.27	7.74	0.16
		24-May-12	48.7	<10	<0.0020	<0.20	0.86	0.0151	0.61	1.61	0.29
		14-Jun-12	39.4	<10	<0.0020	<0.20	2.73	0.0262	1.2	1.57	0.62
		12-Jul-12	55	<10	<0.0020	<0.20	0.77	0.02	0.55	0.47	0.39
Average			41.9	4	0.001	0.04	1.48	0.0232	0.69	3.5	0.4
Count			13	13	13	13	13	13	13	13	13
Minimum			30.4	2	0.001	0.01	0.77	0.013	0.27	0.1	0.16
Maximum			57.2	5	0.001	0.1	3.9	0.054	1.9	13.1	0.8
Geometric Mean			41.2	4	0.001	0.02	1.27	0.0215	0.57	1.83	0.36
Count <DL			0	13	13	10	0	0	0	0	0
Standard Deviation			8.5	2	0	0.04	0.99	0.0107	0.47	3.96	0.18
1st Quartile			35.9	5	0.001	0.01	0.9	0.016	0.3	0.9	0.29
Median			39.4	5	0.001	0.03	0.93	0.021	0.55	1.61	0.4
3rd Quartile			48.7	5	0.001	0.1	1.4	0.0262	0.9	5.1	0.5
95th Percentile			55.9	5	0.001	0.1	3.2	0.0402	1.48	10.3	0.69
Count Over Guideline			0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

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CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.86(\log(\text{hardness}))-3.2]}$ µg/L

Nickel: $e^{[0.76\,(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545\,(\ln(\text{hardness}))-1.465]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies].

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	pH (field)	pH (lab)	Conductivity (field)	Specific Conductivity (field)	Conductivity (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Discharge (Flow)	Total Suspended Solids	Total Dissolved Solids (field)	Total Dissolved Solids (lab)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Alkalinity, bicarbonate HCO3	Chloride	Fluoride	Sulphate, dissolved	Cyanide, total	Cyanide, Weak Acid Dissociable	Ion Balance	Ammonia (N)	Nitrite (N)	Nitrate (N)	Nitrite & Nitrate, as N	Dissolved Organic Carbon
			pH units	pH units	µS/cm	µS/cm	µS/cm	C	mg/L	%	mV	m3/s	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ratio	mg/L	mg/L	mg/L	mg/L	mg/L
CCME -Aquatic Life Guideline			6.5-9	6.5-9					5.5											120	0.12			0.005		0.343	0.06	3		
MN-0.5	West arm of McGinty Creek just upstream of confluence with east arm	03-May-09	6.80	7.1	57.9		43	-1.8				1.3868	5	29	34	25.8	26.3	13	16	2.2	0.1	<1	0.0016		NC	<0.005	0.006	<0.02	<0.02	
		06-May-09	7.21	7.1	59.7		49	-0.5				0.7539	6	29.8	46	28.3	26.8	15	18	1.9	0.06	<0.5	0.0009		NC	<0.005	<0.005	<0.02	<0.02	33.1
		13-May-09	6.65	7.1	49.5		64	-0.7				0.3115	7	24.9	100	34.9	35.2	26	32	1.6	0.09	<5	0.0022		NC	<0.005	<0.005	<0.02	<0.02	30.8
		21-May-09	8.23	7.8	137.8		100	-1.8	10.77	83.4		0.1440	32	68.8		51.1	50.1					<0.5				<0.005				15.6
		28-May-09	7.83	7.8	155.3		115	-1.8	12.96	92.9		0.0402	25	77.7	110	59.4	58.3	52	63	1.5	**0.21**	<0.5	0.0015		NC	<0.005	<0.005	<0.02	<0.02	17.3
		25-Jun-09	7.77	8	97.4		160	3.5	13.36	100	163.2		4		140	70.2	73.2	74	91	<0.5	**0.28**	21	0.0007		NC	0.005	<0.005	0.07	0.07	12.8
		28-Jul-09	7.92	8.1	144.5		230	5.3	10.79	85.3	150.9	0.0131	38		140	107	113	110	130	0.8	**0.34**	12	0.0006		NC	<0.005	<0.005	0.04	0.04	8.2
		29-Aug-09	7.97	7.9	113.1		183	3.9	11.51	87.7	98.6	0.0224	46		130	89.3	88.6	86	110	<0.5	**0.3**	9.3	0.0009		NC	<0.005	<0.005	0.02	0.02	13.4
		29-Sep-09	8.08	8	108.2		206	-0.1	13.48	91.9	75.5		2		150	98.6	98	95	120	1.1	**0.34**	8.9	0.0006		NC	0.03	<0.005	0.03	0.03	12.3
		23-Oct-09		8.1			230					0.0178	<1		130	108	116	110	130	1.2	**0.39**	14	<0.0005			<0.005	<0.005	0.1	0.1	7
		27-Nov-09	7.77	8	144.6		266	-0.1	12.14	83	104.7	0.0460	<1		140	124	127	130	150	1.1	**0.42**	31			0.86	0.027	<0.005	1.69	1.69	5.4
		15-Dec-09	**5.36**	8	78.2		278	0			150	0	3		150	129	133	140	160	0.6	**0.46**	17	0.0008		0.97	<0.005	<0.005	0.13	0.13	4.6
		25-Jan-10	**5.49**	8	139.7		330	-0.1	**1.61**	11.6	121.3		<1		200	159	163	150	190	0.9	**0.66**	23	<0.0005		1.1	<0.005	<0.005	0.12	0.12	4.5
		22-Apr-10	7.35	7.3	41.2		69	0.0	11.83	86.7	159.6		<1		64	41.2	42.9	28	34	2	0.1	<0.5	0.0012			0.07	<0.03	<0.1	<0.1	48.7
		28-May-10	7.68	8.2	103.8		194	0.3	14.15	98.2	338.2	0.0294	4		140	86.2	87.6	92	110	<0.5	**0.35**	10	0.0009			0.029	<0.005	<0.02	<0.02	8.3
		28-Jun-10	7.97	7.76	189.9		189	3.8	11.45	93	79.3	0.0227	4		140	88.8	90.2	89	110	<0.5	**0.35**	11	0.0007			<0.05	<0.005	0.06	0.06	10
		18-Aug-10	7.84	7.82	144.3		154	5.7	10.52	90.6	34.4		670		110	108	73.7	72	88	0.9	**0.24**	2.2	0.0011			0.33	0.01	<0.02	0.03	20.4
		15-Sep-10	7.80	7.87	85.1		147	2.7	13.24	97.7	298.0	0.0541	4		110	66.1	74.2	66	81	<0.5	**0.23**	6.5	0.0014			0.25	<0.005	0.02	0.02	19.4
		21-Oct-10	7.75	7.9	89.3		184	-0.1			321.1	0.0166	<4		130	87.6	92.5	85	100	<0.5	**0.31**	7.5	<0.0005	<0.0005		0.021	<0.005	0.07	0.07	13.4
		11-Jan-11										0																		
		29-Apr-11	7.49	7.38		100.7	97	0	13.75	100.6	138.1		2		90	52	48.2	42	52	2.1	**0.14**	<5	0.0011	0.0014		0.043	<0.005	<0.02	<0.02	36
		19-May-11	7.81	7.29	37.3		70	0.3	14.64	99.9	105.7	0.2660	25		60	35.9	35.7	31	38	2	**0.13**	<0.5	0.0013	0.0015		<0.005	<0.005	<0.02	<0.02	25.2
		28-Jun-11	7.64	7.52	73.3		118	4.8	11.97	101.3	53.7	0.1284	54		100	61.9	62.4	53	64	1.7	**0.21**	<0.5	0.0013	0.0015		0.039	<0.005	<0.02	<0.02	21.9
		15-Jul-11	7.15	7.41		88.4	90	6.2	10.3	90	304.5	0.2847	330		94	64.8	44.8	38	47	1.5	**0.17**	<0.5	0.001	0.0016		0.064	0.005	<0.02	<0.02	27
		10-Aug-11	7.72	7.3		105.6	110	5.6	12.48	99.3	256.1	0.1429	150		110	68.9	53.6	48	58	1.7	**0.18**	<0.5	0.0018	0.0014	NC	0.083	<0.005	<0.02	<0.02	22.7
		28-Oct-11	7.96	7.92		420	210	0.2					7		130	105	101	90	110	0.6	**0.34**	8.9	<0.0005	<0.0005	NC	0.036	<0.005	0.12	0.12	9.3
		19-Apr-12	7.91	7.55		101.1	102	0	15.56	105.2			4.5		116	54.7	51.3	43.9	53.6	1.4	**0.15**	<0.50	0.00096	<0.00050	NC	0.0097	<0.0050	<0.020	<0.020	32.9
		24-May-12	7.8	7.87		129.3	131	0.6	15.7	110	262.5	0.0799	68.5		120	64.5	63.8	59.7	72.9	1	**0.26**	2.3	0.00089	0.00089	NC	0.017	<0.050	<0.20	<0.20	13.4
		14-Jun-12	7.27	7.54		94.4	88.8	2.3	14.54	105.6	110.6	0.2157	673		66	75.3	44.1	39.2	47.9	1.2	**0.19**	<0.50	0.00105	0.00084	NC	0.019	<0.050	<0.20	<0.20	19.9
		12-Jul-12	7.59	7.95		138.4	171	4.6	13.61	105.6		0.0513	201		112	93.6	82.9	78.7	96	0.95	**0.3**	3.1	0.00125	0.00124	NC	0.058	<0.050	<0.20	<0.20	13.2
Average			7.49	7.71	102.5	147.2	151	1.5	12.29	91.8	166.3	0.1831	81.7	46	113	77.2	74.4	69.9	84.7	1.12	0.26	6.75	0.00099	0.00101	0.98	0.0408	0.0058	0.105	0.106	18.1
Count			28	29	20	8	29	28	22	22	20	22	29	5	28	29	29	28	28	28	28	29	27	11	3	29	28	28	28	28
Minimum			5.36	7.1	37.3	88.4	43	-1.8	1.61	11.6	34.4	0	0.5	24.9	34	25.8	26.3	13	16	0.25	0.06	0.25	0.00025	0.00025	0.86	0.0025	0.0025	0.01	0.01	4.5
Maximum			8.23	8.2	189.9	420	330	6.2	15.7	110	338.2	1.3868	673	77.7	200	159	163	150	190	2.2	0.66	31	0.0022	0.0016	1.1	0.33	0.025	1.69	1.69	48.7
Geometric Mean			7.46	7.7	93.2	126.9	133.4	1.5	11.56	86.6	140.3	0.1056	11	40.9	106	70.4	67	59.3	72.2	0.9	0.23	2.19	0.00086	0.00081	0.97	0.0134	0.0038	0.033	0.034	15.1
Count <DL			0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6	0	13	4	3	0	12	25	16	15	0
Standard Deviation			0.69	0.33	43	111.5	73	2.5	2.86	19.5	95.1	0.3181	178.7	25.1	36	32.2	34.2	36.9	44.1	0.64	0.13	8.1	0.00048	0.00054	0.12	0.0735	0.0073	0.313	0.313	10.9
1st Quartile			7.33	7.41	69.9	99.1	97	-0.1	11.46	88.3	103.2	0.0225	3	29	98	54.7	48.2	41.3	51	0.6	0.17	0.25	0.0007	0.00055	0.92	0.0025	0.0025	0.01	0.01	9.8
Median			7.76	7.82	100.6	103.3	147	0.2	12.72	95.3	144.1	0.0527	6	29.8	114	70.2	73.2	69	84.5	1.1	0.25	2.5	0.00096	0.00124	0.97	0.019	0.0025	0.025	0.03	14.5
3rd Quartile			7.86	8	140.8	131.6	194	3.8	13.71	100.4	257.7	0.1978	46	68.8	140	98.6	92.5	90.5	110	1.62	0.34	10	0.00128	0.00145	1.04	0.039	0.0031	0.1	0.1	23.3
95th Percentile			8.04	8.1	157.0	321.4	273.2	5.7	15.51	105.6	322.0	0.7317	534	75.9	150	127	130.6	136.5	156.5	2.07	0.45	22.2	0.00174	0.00155	1.09	0.1832	0.025	0.127	0.127	35.0
Count Over Guideline			2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0
% Over Guideline			7.1	0	0	0	0	0	4.5	0	0	0	0	0	0	0	0	0	0	0	85.7	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.83[\log(\text{hardness})]-3.2)}$ µg/L.

Nickel: $e^{(0.76[\ln(\text{hardness})]+0.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 180 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Total Organic Carbon mg/L	Aluminum (Al), total µg/L	Antimony (Sb), total µg/L	Arsenic (As), total µg/L	Barium (Ba), total µg/L	Beryllium (Be), total µg/L	Bismuth (Bi), total µg/L	Boron (B), total µg/L	Cadmium (Cd), total µg/L	Calcium (Ca), total mg/L	Chromium (Cr), total µg/L	Cobalt (Co), total µg/L	Copper (Cu), total µg/L	Iron (Fe), total µg/L	Lead (Pb), total µg/L	Lithium (Li), total µg/L	Magnesium (Mg), total mg/L	Manganese (Mn), total µg/L	Mercury (Hg), total µg/L	Molybdenum (Mo), total µg/L	Nickel (Ni), total µg/L	Phosphorous (P), total µg/L	Potassium (K), total mg/L	Selenium (Se), total µg/L	Silicon (Si), total µg/L	Silver (Ag), total µg/L
CCME -Aquatic Life Guideline				*		5				1500	*		1		*	300	*				0.026	73	*			1		0.1
MN-0.5	West arm of McGinty Creek just upstream of confluence with east arm	03-May-09	40.2	**174**	0.03	0.3	23.3	0.02	<0.005	<50	**0.037**	7.17	0.3	0.217	**2.96**	182	0.035	<0.5	1.92	36.5		0.18	1.2		1.41	0.08	1720	<0.005
		06-May-09	33.8	**219**	0.06	0.36	28	0.02	<0.005	<50	**0.066**	7.73	0.5	0.308	**4.55**	290	0.283	<0.5	2.18	35.2	<0.01	0.16	2.06		1.24	0.07	1890	0.007
		13-May-09	30.4	**186**	0.04	0.39	29.3	0.03	<0.005	<50	**0.015**	9.78	0.5	0.243	**3.18**	**358**	0.074	<0.5	2.55	25.7	<0.01	0.23	1.91		0.91	0.08	3030	0.025
		21-May-09	17	**224**	0.07	0.51	36	0.02	<0.005	<50	**0.031**	14.1	0.6	0.358	**2.65**	**479**	0.267	0.7	3.84	62.9	<0.01	0.54	1.85		0.84	0.13	3730	0.008
		28-May-09	19.3	**165**	0.08	0.54	37.1	0.02	<0.005	<50	0.014	16.8	0.3	0.304	**2.69**	**354**	0.179	0.7	4.24	46.8		0.59	1.68		0.7	0.14	4970	<0.005
		25-Jun-09	12.8	42.1	0.11	0.36	37.4	0.01	<0.005	<50	0.005	19.8	0.2	0.092	1.79	111	0.062	0.8	5.07	5.03	<0.01	0.98	1.18		0.55	0.22	4730	<0.005
		28-Jul-09	8.5	13.5	0.07	0.35	49.6	<0.01	<0.005	<50	<0.005	31.1	<0.1	0.042	1.03	28	0.011	0.9	7.21	2.53	<0.01	1.33	0.71		0.76	0.17	5490	<0.005
		29-Aug-09	13.3	90	0.1	0.53	45.9	0.02	<0.005	<50	0.012	25.3	0.4	0.167	**2.19**	191	0.145	0.9	6.34	13.8	0.01	0.96	1.6		0.63	0.2	6790	<0.005
		29-Sep-09	11.8	36.4	0.07	0.37	44	<0.01	<0.005	<50	0.009	27.8	0.4	0.096	1.55	92	0.03	1	7.1	7.93		1.06	1.03		0.7	0.17	6460	<0.005
		23-Oct-09	7.7	7.2	0.06	0.33	46.8	<0.01	<0.005	<50	<0.005	30.5	0.1	0.037	0.87	25	<0.005	1.1	7.69	3.58	<0.01	1.28	0.65		0.72	0.24	6380	<0.005
		27-Nov-09	5.7	12	0.05	0.27	54.5	<0.01	<0.005	<50	0.026	36.7	0.2	0.034	0.77	26	0.079	1.3	7.9	4.07	<0.01	1.32	0.45		0.86	0.2	6850	<0.005
		15-Dec-09	4.6	**19.5**	0.1	0.28	62.1	<0.01	<0.005	<50	0.021	37.2	0.1	0.052	1.63	44	0.119	1.3	8.79	5.76	<0.01	1.34	0.54		0.99	0.25	5770	<0.005
		25-Jan-10	4.4	3.9	0.04	0.32	53.3	<0.01	<0.005	<50	0.01	45.7	0.2	0.03	0.49	8	0.067	2.3	10.8	0.88	<0.01	1.04	0.24		1.68	0.3	7190	0.007
		22-Apr-10	62	**197**	0.03	0.35	30.9	0.03	<0.005	<50	**0.029**	11.3	0.4	0.136	**4.35**	235	0.016	0.7	3.15	10.6	0.01	0.21	1.56		1.33	0.09	3050	<0.005
		28-May-10	8	24.7	0.06	0.41	43.5	<0.01	0.012	<50	0.005	24.6	<0.1	0.091	0.98	88	0.044	0.8	6	17.7	<0.01	1.14	0.84		0.84	0.2	4600	<0.005
		28-Jun-10	10.1	**118**	0.09	0.48	48.4	0.02	<0.005	<50	0.006	24.9	0.3	0.203	1.8	260	0.115	0.8	6.45	20.3		1.08	1.35		0.76	0.16	5260	<0.005
		18-Aug-10	22.7	**3750**	0.19	3.53	234	0.37	0.009	<50	**0.278**	28.2	**7.6**	6.37	**27.5**	**6560**	**5.63**	3.5	9.12	387	<0.01	0.52	18.6		0.79	0.21	9530	<0.005
		15-Sep-10	19.3	63	0.09	0.46	40.9	0.01	<0.005	<50	0.013	17.7	0.4	0.126	**2.37**	224	0.091	<0.5	5.34	14.4	<0.01	0.76	1.63		0.48	0.15	5560	<0.005
		21-Oct-10	12.7	33.2	0.08	0.38	45.3	<0.01	<0.005	<50	0.029	24.2	0.4	0.083	1.65	131	0.055	0.8	6.59	9.06	<0.01	0.95	1.08		0.6	0.18	6570	<0.005
		11-Jan-11																										
		29-Apr-11	36	67.8	0.04	0.37	36.4	0.01	<0.005	<50	**0.025**	15.1	0.2	0.1	**2.99**	137	0.018	<0.5	3.47	8.06	0.01	0.3	1.13		2.47	0.1	3820	<0.005
		19-May-11	26.7	**283**	0.06	0.47	32.4	0.02	<0.02	<50	**0.037**	10.3	0.6	0.29	**2.4**	**663**	0.16	0.5	2.4	31.7	<0.01	0.44	1.6		0.7	0.13	3480	0.009
		28-Jun-11	23.5	**346**	0.14	0.77	45.1	0.04	<0.005	<50	**0.034**	17.4	1	0.543	**4.4**	**800**	0.523	0.8	4.49	47.9	<0.01	0.5	2.93		0.41	0.17	6220	<0.005
		15-Jul-11	26.9	**6220**	0.29	3.36	160	0.23	0.06	<50	**0.152**	16.1	**11.5**	5	**17.9**	**9170**	**3.48**	4.4	6	282	<0.002	0.66	14.2		0.9	0.24	14800	0.052
		10-Aug-11	23.1	**3230**	0.23	2.15	101	0.12	0.03	<50	**0.067**	18.5	**6.4**	2.34	**9.4**	**5250**	1.77	2.7	5.5	113	<0.01	0.73	7.4	145	0.7	0.19	12000	0.034
		28-Oct-11	9.7	79.4	0.07	0.45	51.2	<0.01	<0.005	<50	0.015	30	0.4	0.141	1.43	275	0.134	0.9	7.27	27.8	<0.01	0.91	1.08	19	0.69	0.2	7100	0.005
		19-Apr-12	30.4	53.4	0.031	0.411	31.9	0.011	<0.0050	<50	**0.0198**	16	0.23	0.0923	**3.07**	185	0.0265	0.59	3.55	9.21	<0.010	0.39	1.01	62.8	2.15	0.106	3960	0.0058
		24-May-12	15.5	**290**	0.079	0.705	47.3	0.03	<0.0050	<50	**0.0306**	18	0.72	0.442	**2.86**	**997**	0.314	0.79	4.77	57.4	<0.000010	0.683	2.02	68.6	0.742	0.216	5100	0.0074
		14-Jun-12	26.5	**3540**	0.141	3.88	230	0.311	0.0077	<50	**0.3**	20.3	**5.75**	6.3	**21.2**	**8770**	**4.29**	2.52	6	645	<0.010	0.212	15.8	815	0.629	0.198	9130	0.0322
		12-Jul-12	15.2	**1870**	0.146	1.93	117	0.114	0.011	<50	**0.115**	25.9	**3.53**	2.04	**9.58**	**3210**	1.83	1.73	7.01	118	<0.010	0.537	6.6	147	0.681	0.219	8910	0.03
Average			19.9	736.5	0.091	0.863	63.5	0.052	0.0067	25	0.0485	21.66	1.49	0.9061	4.84	1350	0.6845	1.16	5.61	70.68	0.00524	0.725	3.24	209.6	0.926	0.173	6003	0.0091
Count			29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	25	29	29	6	29	29	29	29
Minimum			4.4	3.9	0.03	0.27	23.3	0.005	0.0025	25	0.0025	7.17	0.05	0.03	0.49	8	0.0025	0.25	1.92	0.88	0.000005	0.16	0.24	19	0.41	0.07	1720	0.0025
Maximum			62	6220	0.29	3.88	234	0.37	0.06	25	0.3	45.7	11.5	6.37	27.5	9170	5.63	4.4	10.8	645	0.01	1.34	18.6	815	2.47	0.3	14800	0.052
Geometric Mean			16.3	128.9	0.077	0.572	51.4	0.019	0.0038	25	0.0229	19.65	0.48	0.2337	2.82	288	0.1318	0.86	5.14	21.99	0.003865	0.609	1.71	106	0.844	0.162	5392	0.005
Count <DL			0	0	0	0	0	9	23	29	2	0	2	0	0	0	1	5	0	0	22	0	0	0	0	0	0	17
Standard Deviation			12.8	1512.3	0.061	1.039	54.7	0.093	0.0117	0	0.0744	9.36	2.78	1.8153	6.5	2620	1.4116	1.01	2.22	139.58	0.002184	0.381	4.78	300.8	0.475	0.058	2857	0.0126
1st Quartile			10.1	36.4	0.06	0.36	36.4	0.005	0.0025	25	0.012	16	0.2	0.092	1.63	111	0.044	0.7	3.84	8.06	0.005	0.44	1.03	64.2	0.69	0.13	3960	0.0025
Median			17	118	0.07	0.411	45.3	0.02	0.0025	25	0.025	19.8	0.4	0.167	2.65	235	0.115	0.8	6	20.3	0.005	0.683	1.56	106.8	0.76	0.18	5560	0.0025
3rd Quartile			26.7	283	0.1	0.54	53.3	0.03	0.0025	25	0.037	27.8	0.6	0.358	4.35	663	0.283	1.3	7.1	47.9	0.005	1.04	2.02	146.5	0.91	0.21	6850	0.0074
95th Percentile			38.5	3666	0.21	3.46	202	0.279	0.0228	25	0.2276	37	7.12	5.78	19.88	7886	3.966	3.18	8.99	345	0.01	1.326	15.16	648	1.962	0.246	11012	0.0333
Count Over Guideline			0	16	0	0	0	0	0	0	15	0	5	0	18	11	3	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	55.2	0	0	0	0	0	0	51.7	0	17.2	0	62.1	37.9	10.3	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273 \times [\ln(\text{hardness})] - 4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.83 \times [\log(\text{hardness})] - 2.46)}$ µg/L

Nickel: $e^{(0.76 \times [\ln(\text{hardness})] + 1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545 \times [\ln(\text{hardness})] - 1.465)}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 180 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Sodium (Na), total	Strontium (Sr), total	Sulphur (S), total	Thallium (Tl), total	Tin (Sn), total	Titanium (Ti), total	Uranium (U), total	Vanadium (V), total	Zinc (Zn), total	Zirconium (Zr), total	Aluminum (Al), dissolved	Antimony (Sb), dissolved	Arsenic (As), dissolved	Barium (Ba), dissolved	Beryllium (Be), dissolved	Bismuth (Bi), dissolved	Boron (B), dissolved	Cadmium (Cd), dissolved	Calcium (Ca), dissolved	Chromium (Cr), dissolved	Cobalt (Co), dissolved	Copper (Cu), dissolved	Iron (Fe), dissolved	Lead (Pb), dissolved	Lithium (Li), dissolved	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved
			mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline						0.8			15		30																						
MN-0.5	West arm of McGinty Creek just upstream of confluence with east arm	03-May-09	0.78	40.8	<3	<0.002	<0.01	2.3	0.068	0.3	6.2	0.4	162	0.04	0.31	21.4	0.02	<0.005	<50	0.032	7.26	0.3	0.197	2.91	147	0.015	<0.5	1.99	33.1		0.11	1.23
		06-May-09	1	45.1	<3	<0.002	0.03	3.4	0.066	0.8	11.1	0.4	178	0.07	0.26	23.3	0.02	<0.005	<50	0.026	7.37	0.4	0.212	3.06	182	0.099	<0.5	2.04	27.9	0.02	0.24	1.81
		13-May-09	1.47	58.7	<3	<0.002	<0.01	3.8	0.104	0.7	2.3	0.6	156	0.07	0.39	26.6	0.03	<0.005	<50	0.011	9.69	0.4	0.169	3.23	253	0.021	<0.5	2.67	20.4	0.01	0.23	1.86
		21-May-09	2.82	102	<3	0.002	<0.01	9	0.272	1.3	3.8	0.4	51.1	0.07	0.41	28.8	0.01	<0.005	<50	0.014	14	0.3	0.168	1.9	155	0.103	<0.5	3.67	44.2	0.02	0.53	1.14
		28-May-09	3.15	112	<3	<0.002	<0.01	4.5	0.251	1.5	1.6	0.5	30.6	0.07	0.4	31.2	0.02	<0.005	<50	<0.005	16.5	0.2	0.056	2.2	119	0.013	0.6	4.17	0.24	<0.01	0.61	1.41
		25-Jun-09	4.29	153	4	<0.002	<0.01	1.7	0.292	0.8	0.6	0.3	19.4	0.1	0.31	37.7	<0.01	<0.005	<50	<0.005	20.9	<0.1	0.055	1.61	57	0.01	0.7	5.11	1.46	<0.01	0.98	1.05
		28-Jul-09	5.75	211	5	<0.002	<0.01	0.8	0.552	0.6	0.2	0.2	14.5	0.07	0.41	49.3	<0.01	<0.005	<50	<0.005	32.8	<0.1	0.045	1.18	29	0.018	1.1	7.63	1.76	<0.01	1.43	0.77
		29-Aug-09	4.98	169	4	<0.002	<0.01	3.2	0.309	0.8	<0.1	0.3	18.6	0.09	0.39	42.5	<0.01	<0.005	<50	0.007	25.1	0.3	0.062	1.69	62	0.028	0.9	6.28	5.56	<0.01	0.98	1.07
		29-Sep-09	5.57	180	5	<0.002	<0.01	1.6	0.387	0.5	1.6	0.3	12.2	0.08	0.37	43.3	<0.01	<0.005	<50	0.017	28	0.3	0.06	1.39	49	0.023	0.9	6.85	6.02		1.03	0.97
		23-Oct-09	6.05	200	6	<0.002	<0.01	<0.5	0.545	0.3	0.2	0.1	7.7	0.06	0.29	49.7	<0.01	<0.005	<50	<0.005	33	0.1	0.037	0.86	25	0.006	1	8.25	3.95	0.01	1.34	0.66
		27-Nov-09	5.86	241	6	<0.002	<0.01	<0.5	0.668	0.3	2.2	0.1	4.7	0.05	0.26	55.6	<0.01	<0.005	<50	<0.005	36.6	0.2	0.037	0.75	16	0.013	1.1	8.57	3.39	<0.01	1.33	0.48
		15-Dec-09	7.14	269	5	<0.002	<0.01	<0.5	0.757	0.4	1.7	<0.1	5.6	0.09	0.28	62.7	<0.01	<0.005	<50	0.009	38.3	<0.1	0.034	1.17	14	0.045	1.3	8.98	3.01	<0.01	1.41	0.51
		25-Jan-10	11.5	270	9	<0.002	<0.01	0.7	1.31	0.3	0.8	<0.1	3.7	0.08	0.36	54.7	<0.01	<0.005	<50	0.076	46.4	0.3	0.04	1	8	0.051	2.4	11.4	1.24	<0.01	1.16	0.52
		22-Apr-10	1.88	68.8	<10	<0.002	<0.01	2.2	0.081	0.3	5.3	0.5	191	0.03	0.32	28	0.03	<0.005	<50	0.024	12	0.4	0.123	3.95	214	0.029	0.5	3.16	10.1	0.02	0.21	1.64
		28-May-10	4.56	183	<10	<0.002	<0.01	0.6	0.543	0.6	0.7	0.1	8.5	0.07	0.39	41.1	<0.01	<0.005	<50	0.036	25	0.1	0.064	1.6	53	0.085	0.8	6.14	6.02		1.07	0.9
		28-Jun-10	5.13	188	<10	<0.002	<0.01	3.9	0.433	1.1	1.3	0.2	11.7	0.07	0.37	44.9	<0.01	<0.005	<50	<0.005	25.8	0.2	0.043	1.34	32	0.025	0.8	6.26	2.06		1.02	0.93
		18-Aug-10	4.38	179	<10	0.024	<0.01	42.5	0.732	21.6	**33.1**	1.6	54.2	0.12	0.67	45	0.02	<0.005	<50	0.01	20.5	0.5	0.159	3.18	205	0.094	0.7	5.46	25.4		0.79	1.97
		15-Sep-10	4.01	127	<10	<0.002	<0.01	1.8	0.206	0.8	3.3	0.5	43.7	0.1	0.5	40.3	0.02	<0.005	<50	0.018	20.7	0.5	0.095	2.55	192	0.198	0.6	5.47	12.4		0.73	1.81
		21-Oct-10	4.59	167	<10	<0.002	<0.01	0.8	0.344	0.4	1.5	0.3	22.2	0.09	0.42	45.9	<0.01	<0.005	<50	0.016	25.8	0.3	0.067	1.78	105	0.032	0.8	6.83	8.75		0.88	1.12
		11-Jan-11																															
		29-Apr-11	1.88	93	<10	<0.002	<0.01	0.8	0.114	0.4	2.8	0.2	51.8	0.03	0.39	31.9	<0.01	<0.005	<50	0.025	14.1	0.2	0.077	2.66	119	0.028	0.5	3.16	5.57	0.01	0.25	0.93
		19-May-11	1.5	73.4	<50	0.003	<0.2	9	0.141	1.2	2	0.5	73.9	0.05	0.47	25.8	0.02	<0.005	<50	0.032	10	0.4	0.167	2.58	307	0.051	<0.5	2.6	22		0.34	1.7
		28-Jun-11	3.27	108	<10	0.003	<0.01	11.2	0.224	2.3	3.9	0.6	82.2	0.16	0.5	34.9	0.02	<0.005	<50	0.064	17.8	0.6	0.108	3.76	218	0.186	0.6	4.36	7.19	<0.01	0.6	2
		15-Jul-11	3.2	117	<50	0.059	<0.2	246	0.61	21.1	22	1.7	90.1	0.13	0.61	30.8	0.03	<0.005	<50	0.011	12.3	0.6	0.181	3.39	344	0.071	<0.5	3.44	16.4		0.36	2
		10-Aug-11	3.5	116	<50	0.031	<0.2	151	0.401	12	13	1.2	82.1	0.12	0.65	38.7	0.02	<0.005	<50	0.024	15.1	0.6	0.213	2.74	387	0.066	0.6	3.84	26.9		0.46	1.97
		28-Oct-11	5.22	191	<10	<0.002	<0.01	2.8	0.46	0.8	2.2	0.2	17.9	0.06	0.34	52.2	<0.01	<0.005	<50	<0.005	28.9	0.2	0.081	1.25	143	0.013	0.9	7.04	23.7	<0.01	0.94	0.9
		19-Apr-12	2.19	103	<10	<0.0020	<0.20	1.57	0.107	0.39	2.58	0.22	41.8	0.032	0.454	31	0.011	<0.0050	<50	0.0186	14.9	0.24	0.0723	2.9	150	0.0095	0.6	3.41	7.9	<0.010	0.37	1.04
		24-May-12	3.31	121	<10	<0.0020	<0.20	10.9	0.302	2.2	2.62	0.44	28.1	0.066	0.557	36.8	<0.010	<0.0050	<50	0.0091	17.9	0.26	0.113	1.81	462	0.0305	0.58	4.65	24.6	<0.010	0.78	1.19
		14-Jun-12	2.96	134	<10	0.0195	<0.20	60	0.734	22.4	**30.1**	1.6	56.9	0.107	0.637	29.2	0.012	<0.0050	<50	0.0251	12.4	0.45	0.203	2.5	716	0.083	<0.50	3.2	22.4	<0.010	0.515	1.67
		12-Jul-12	4.52	165	<10	0.012	0.26	47.7	0.479	8.37	11.9	1.14	26.6	0.085	0.713	47	<0.010	<0.0050	<50	0.014	23.2	0.42	0.172	1.79	356	0.05	0.59	6.06	38	<0.010	0.928	1.33
Average			4.02	144.3	7	0.006	0.03	21.54	0.396	3.61	5.88	0.51	53.3	0.078	0.429	39	0.012	0.0025	25	0.0185	21.11	0.31	0.1073	2.16	177	0.0516	0.7	5.27	14.19	0.008	0.746	1.26
Count			29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	19	29	29
Minimum			0.78	40.8	2	0.001	0.01	0.25	0.066	0.3	0.05	0.05	3.7	0.03	0.26	21.4	0.005	0.0025	25	0.0025	7.26	0.05	0.034	0.75	8	0.006	0.25	1.99	0.24	0.005	0.11	0.48
Maximum			11.5	270	25	0.059	0.26	246	1.31	22.4	33.1	1.7	191	0.16	0.713	62.7	0.03	0.0025	25	0.076	46.4	0.6	0.213	3.95	716	0.198	2.4	11.4	44.2	0.02	1.43	2
Geometric Mean			3.44	130	5	0.0019	0.01	3.58	0.304	1.13	2.43	0.34	31.4	0.072	0.412	37.6	0.01	0.0025	25	0.0118	18.93	0.25	0.0901	1.97	109	0.035	0.59	4.78	8.3	0.007	0.622	1.16
Count <DL			0	0	21	21	27	3	0	0	1	2	0	0	0	0	15	29	29	7	0	3	0	0	0	0	7	0	0	13	0	0
Standard Deviation			2.18	62	7	0.0127	0.06	52.8	0.277	6.74	8.61	0.47	54.5	0.031	0.128	10.6	0.009	0	0	0.0175	9.87	0.16	0.0618	0.9	161	0.0487	0.44	2.32	12.34	0.006	0.395	0.49
1st Quartile			2.82	103	5	0.001	0.01	0.8	0.206	0.4	1.5	0.2	14.5	0.06	0.34	30.8	0.005	0.0025	25	0.007	14	0.2	0.056	1.39	53	0.018	0.5	3.41	3.95	0.005	0.37	0.93
Median			4.01	134	5	0.001	0.01	2.8	0.344	0.8	2.3	0.4	30.6	0.07	0.39	38.7	0.005	0.0025	25	0.014	20.5	0.3	0.081	1.9	147	0.0305	0.6	5.11	8.75	0.005	0.78	1.14
3rd Quartile			5.13	183	5	0.002	0.03	9	0.545	1.5	5.3	0.5	73.9	0.09	0.5	45.9	0.02	0.0025	25	0.025	25.8	0.4	0.168	2.9	218	0.071	0.9	6.83	23.7	0.01	1.02	1.7
95th Percentile			6.70	257.8	25	0.0282	0.1	114.6	0.748	21.4	26.86	1.6	171.6	0.126	0.662	55.2	0.03	0.0025	25	0.0528	37.62	0.6	0.2084	3.61	432	0.1528	1.22	8.82	36.04	0.02	1.382	1.99
Count Over Guideline			0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	6.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{(1.273[\ln(\text{hardness})]-4.705)}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{(0.83[\log(\text{hardness})]-2.46)}$ µg/L.

Nickel: $e^{(0.76[\ln(\text{hardness})]+1.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 180 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Phosphorous (P), dissolved µg/L	Potassium (K), dissolved mg/L	Selenium (Se), dissolved µg/L	Silicon (Si), dissolved µg/L	Silver (Ag), dissolved µg/L	Sodium (Na), dissolved mg/L	Strontium (Sr), dissolved µg/L	Sulphur (S), dissolved mg/L	Thallium (Tl), dissolved µg/L	Tin (Sn), dissolved µg/L	Titanium (Ti), dissolved µg/L	Uranium (U), dissolved µg/L	Vanadium (V), dissolved µg/L	Zinc (Zn), dissolved µg/L	Zirconium (Zr), dissolved µg/L
CCME -Aquatic Life Guideline																	
MN-0.5	West arm of McGinty Creek just upstream of confluence with east arm	03-May-09		1.44	0.09	1770	<0.005	0.83	40.3	<3	<0.002	<0.01	1.6	0.059	0.4	5.8	0.4
		06-May-09		1.18	0.05	1640	<0.005	0.95	42.7	<3	<0.002	<0.01	2.1	0.064	0.5	7.1	0.4
		13-May-09		0.91	0.1	2930	<0.005	1.63	59.8	<3	<0.002	<0.01	1.5	0.111	0.9	2.2	0.6
		21-May-09		0.83	0.14	3530	<0.005	2.74	101	<3	<0.002	<0.01	0.5	0.217	0.7	1.9	0.3
		28-May-09		0.69	0.13	4170	<0.005	3.29	113	<3	<0.002	<0.01	0.7	0.221	0.9	0.9	0.4
		25-Jun-09		0.57	0.19	5340	<0.005	4.23	154	3	<0.002	<0.01	0.7	0.298	0.8	0.4	0.3
		28-Jul-09		0.82	0.21	6620	<0.005	6.13	221	4	<0.002	<0.01	0.7	0.577	0.7	0.6	0.2
		29-Aug-09		0.61	0.18	5800	<0.005	4.82	174	3	<0.002	<0.01	0.5	0.305	0.5	0.7	0.3
		29-Sep-09		0.68	0.17	6430	<0.005	5.54	178	4	<0.002	<0.01	0.7	0.386	0.4	1.5	0.2
		23-Oct-09		0.8	0.23	6030	<0.005	6.39	215	5	<0.002	<0.01	0.6	0.593	0.3	0.3	0.1
		27-Nov-09		0.88	0.24	6230	<0.005	6.58	247	5	<0.002	<0.01	<0.5	0.706	0.3	0.6	0.1
		15-Dec-09		1.02	0.23	5290	<0.005	7.37	279	5	<0.002	<0.01	<0.5	0.796	0.4	1.5	0.1
		25-Jan-10		1.76	0.4	8420	<0.005	12.1	287	9	<0.002	<0.01	<0.5	1.42	0.4	3.6	<0.1
		22-Apr-10		1.42	0.09	2900	0.007	1.92	69.8	<10	<0.002	<0.01	1.7	0.084	0.5	6.8	0.5
		28-May-10		1	0.21	4490	<0.005	4.93	178	<10	<0.002	0.02	<0.5	0.53	0.7	2.2	0.1
		28-Jun-10		0.73	0.16	5400	<0.005	5.07	186	<10	<0.002	<0.01	<0.5	0.408	0.5	1.4	0.2
		18-Aug-10		0.54	0.18	5740	0.006	4.02	126	<10	<0.002	<0.01	3.4	0.271	1.3	1.3	0.6
		15-Sep-10		0.5	0.2	6630	<0.005	3.91	130	<10	<0.002	<0.01	1.1	0.258	0.6	3.9	0.5
		21-Oct-10		0.65	0.18	7110	<0.005	4.8	167	<10	<0.002	<0.01	<0.5	0.322	0.5	1.6	0.3
		11-Jan-11															
		29-Apr-11		2.33	0.09	3580	<0.005	1.73	89	<10	<0.002	<0.01	0.9	0.111	0.4	2.9	0.2
		19-May-11		0.72	0.1	3140	<0.005	1.72	66	<10	<0.002	<0.01	1.4	0.127	0.9	2.4	0.4
		28-Jun-11		0.47	0.17	6370	0.006	3.5	103	<10	<0.002	0.04	2.4	0.137	0.6	4.9	0.5
		15-Jul-11		0.27	0.14	5920	<0.005	2.89	75.3	<10	<0.002	0.03	2.7	0.086	1.3	2.4	0.7
		10-Aug-11	12	0.33	0.14	5990	0.006	2.93	93.8	<10	<0.002	0.02	2.2	0.155	1.5	1	0.6
		28-Oct-11	10	0.71	0.22	6660	<0.005	5.05	191	<10	<0.002	<0.01	<0.5	0.47	0.6	0.6	0.2
		19-Apr-12	49.1	2.07	0.099	3650	<0.0050	2.13	102	<10	<0.0020	<0.20	<0.50	0.0963	0.38	2.56	0.19
		24-May-12	18.4	0.726	0.166	4860	<0.0050	3.36	118	<10	<0.0020	<0.20	0.91	0.252	1.06	0.73	0.28
		14-Jun-12	17.7	0.444	0.129	5330	<0.0050	2.85	78	<10	<0.0020	<0.20	1.64	0.0848	1.4	1.36	0.5
		12-Jul-12	14	0.572	0.195	6100	<0.0050	4.55	153	<10	<0.0020	0.24	1.19	0.352	1.25	0.45	0.38
Average			20.2	0.885	0.167	5106	0.003	4.07	139.2	4	0.001	0.03	1.07	0.3275	0.71	2.19	0.33
Count			6	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Minimum			10	0.27	0.05	1640	0.0025	0.83	40.3	2	0.001	0.01	0.25	0.059	0.3	0.3	0.05
Maximum			49.1	2.33	0.4	8420	0.007	12.1	287	9	0.001	0.24	3.4	1.42	1.5	7.1	0.7
Geometric Mean			17.3	0.78	0.154	4782	0.0028	3.47	122.8	4	0.001	0.01	0.77	0.2365	0.64	1.55	0.28
Count <DL			0	0	0	0	25	0	0	21	29	24	8	0	0	0	1
Standard Deviation			14.5	0.494	0.067	1646	0.0013	2.32	67.9	2	0	0.05	0.85	0.291	0.35	1.89	0.18
1st Quartile			12.5	0.572	0.129	3650	0.0025	2.74	89	4	0.001	0.01	0.25	0.111	0.4	0.73	0.2
Median			15.8	0.726	0.17	5400	0.0025	3.91	126	5	0.001	0.01	0.7	0.258	0.6	1.5	0.3
3rd Quartile			18.2	1	0.2	6230	0.0025	5.05	178	5	0.001	0.02	1.6	0.408	0.9	2.56	0.5
95th Percentile			41.4	1.946	0.236	6930	0.006	7.05	266.2	5	0.001	0.1	2.58	0.76	1.36	6.4	0.6
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

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Cadmium: $10^{(0.83[\log(\text{hardness})]-2.46)}$ µg/L.

Nickel: $e^{(0.76[\ln(\text{hardness})]+0.06)}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{(0.8545[\ln(\text{hardness})]-1.465)}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	pH (field)	pH (lab)	Conductivity (field)	Specific Conductivity (field)	Conductivity (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Discharge (Flow)	Total Suspended Solids	Total Dissolved Solids (field)	Total Dissolved Solids (lab)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Alkalinity, bicarbonate HCO3	Chloride	Fluoride	Sulphate, dissolved	Cyanide, total	Cyanide, Weak Acid Dissociable	Ion Balance	Ammonia (N)	Nitrite (N)	Nitrate (N)
			pH units	pH units	µS/cm	µS/cm	µS/cm	C	mg/L	%	mV	m3/s	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ratio	mg/L	mg/L	mg/L
CCME -Aquatic Life Guideline			6.5-9	6.5-9					5.5											120	0.12			0.005		0.343	0.06	3
MN-1.5	Upper east arm of	3-May-09	**5.79**	**6.3**	44.80		31	-0.5				0.0536	2	22.3	26	15.4	16.2	5.5	6.7	2.2	0.05	<0.5	0.0015		NC	<0.005	0.005	<0.02
	McGinty Creek	6-May-09	**5.26**	**6**	30.50		26	-1.9				0.0520	2	15	32	12	12.5	3.9	4.8	1.9	0.08	<0.5	0.001		NC	<0.005	<0.005	<0.02
	downstream of Minto	13-May-09	**5.95**	**6**	42.90		29	-1.8				0.0237	12	21.4	28	15	14.3	4	4.9	1.5	0.05	<5	0.001		NC	<0.005	<0.005	<0.02
	North deposit	21-May-09	7.66	7.1	54.50		39	-1.8	12.00	85.2		0.0078	14	27.2		18	18.3					<0.5				<0.005		
		28-May-09	6.95	7.2	68.30		50	-0.8	12.30	91.2		0.0086	25	34.1	46	25.1	24.3	16	20	1.6	0.1	<0.5	0.0013		NC	<0.005	<0.005	<0.02
		25-Jun-09	6.92	7.2	32.00		53	3.2	12.9	96.4	110		34		52	23.5	22.6	14	17	0.7	0.1	0.8	0.001		NC	<0.005	<0.005	<0.02
		28-Jul-09	7.41	7.5	50.30		79	5.3	10.01	79.1	53.5	0.0020	3		66	36.8	37	32	39	1.4	0.11	3.1	0.0011		NC	0.005	<0.005	<0.02
		29-Aug-09	7.32	7.4	39.50		63	3.8	11.03	83.6	58.7	0.0050	2		450	29.3	30.5	35	43	0.9	0.1	<0.5	0.0012		NC	<0.005	<0.005	<0.02
		29-Sep-09	8.21	7.6	41.00		72	-0.1	12.52	85.6	97		9		72	34.8	35.5	32	39	0.9	0.12	<0.5	0.0009		NC	0.04	<0.005	<0.02
		23-Oct-09		7.5			93					0.0008	1		82	46.5	47.3	47	57	0.7	0.11	<0.5	0.0007			0.01	<0.005	0.02
		27-Nov-09	8.3	7.5	59.90		119	-0.1	7.3	50	35.9	0.0035	1		80	55.1	56.2	61	75	0.9	0.11	1.4	0.0006		NC	<0.005	<0.005	0.2
		15-Dec-09	**4.88**	7.5	85.40		142	0			120.1		1		110	64.2	66	74	90	0.6	0.09	2.1	<0.0005		NC	0.006	<0.005	<0.02
		25-Jan-10	**4.41**	8.1	220.60		370	0	8.29	56.5	129.7		5		260	189	206	190	230	1.9	**0.19**	3.1	<0.0005		1.2	0.008	<0.005	0.04
		23-Feb-10										0																
		22-Mar-10										0																
		21-Apr-10	**6.22**	6.7	24.30		41	0.0	11.39	86.7	142.2	0.0245	<1		38	21.8	21.8	10	12	1.5	0.07	<0.5	0.001			0.07	<0.03	0.2
		28-May-10	6.92	7.6	35.20		64	1.3	11.95	84.9	281.9	0.0002	12		44	27.3	28	30	36	<0.5	0.11	<0.5	0.0009			0.027	<0.005	<0.02
		28-Jun-10	7.42	7.26	40.60		71	3.9	11.6	97.8	22.8	0.0042	5		60	32.3	32.4	31	38	<0.5	0.11	0.8	0.0007			<0.05	<0.005	<0.02
		21-Jul-10	7.15	7.22	32.70		54	4.5	11.23	96	-6.1	0.0076	1100		46	53.8	24.4	21	26	1	0.1	4.8	0.0017			0.092	<0.005	<0.02
		18-Aug-10	6.74	6.82	45.70		41	5.1	10.17	88.1	18.2		8200		36	223	19.7	13	16	0.5	0.11	<0.5	0.0043			**0.66**	0.006	0.04
		15-Sep-10	7.73	7.37	43.40		77	1.9	12.49	90.3	223.2	0.0052	190		74	42.1	38.2	32	39	<0.5	0.11	0.9	0.0018			0.26	<0.005	0.04
		21-Oct-10	7.14	7.76	53.50		100	-0.1	9.86	46.5	325.6		12		88	49.1	48.2	49	60	<0.5	**0.13**	<0.5	0.0005	0.0007		0.051	<0.005	0.07
		11-Jan-11										0																
		29-Apr-11	7.47	7.19	40.40		77	0	12.97	98.5	97.3		1		68	36.3	35.3	29	35	2.8	0.09	<5	0.0013	0.0018		0.046	<0.005	<0.02
		19-May-11	6.8	6.82	16.30		31	0.1	13.72	96.2	119.5	0.0233	200		24	24.7	14.7	11	14	2.2	0.08	<0.5	0.0018	0.0019		<0.005	<0.005	<0.02
		28-Jun-11	7.85	7.16	34.60		54	4	11.77	101.3	136	0.0097	590		54	44.5	27.5	21	26	1.2	0.11	<0.5	0.002	0.002		0.16	<0.005	0.03
		15-Jul-11	6.69	6.66		44.4	39	4.2	10.8	92		0.0486	1400		42	131	18.8	11	14	2.2	0.12	<5	0.0017	0.0026		0.31	0.027	<0.02
		10-Aug-11	7.19	7.04		64.8	61	4.6	12.38	95.8	78.3	0.0186	690		50	61.3	30.2	28	34	1.6	0.11	<0.5	0.0011	0.0017	NC	0.16	<0.005	<0.02
		28-Oct-11	7.4	7.45		224	114	0.2					70		72	63.1	56	51	63	0.6	0.12	<0.5	0.0007	<0.0005	NC	0.08	<0.005	0.08
		19-Apr-12	7.75	7.31		71.3	78.5	0	13.29	91.2	142.8	0	13.7		106	39.3	38.9	34.4	41.9	1.6	0.067	<0.50	0.00103	0.00073		0.041	<0.0050	0.039
		24-May-12	7.13	7.4		57.4	57.4	1.7	13.8	99	233.9	0.0730	193		38	30.1	27.6	25.1	30.6	1.1	0.11	<0.50	0.00069	<0.00050	NC	0.059	<0.050	<0.20
		14-Jun-12	**6.38**	6.86		58.6	50.2	1.9	13.61	98.1	62.9	0.0407	822		36	57.6	25.3	20.1	24.5	1.1	0.12	<0.50	0.00161	0.00166	NC	0.062	<0.050	<0.20
		12-Jul-12	7.16	7.36		64.2	76.7	4.7	12.97	101		0.0044	379		66	48.7	36.8	30.4	37	0.96	**0.13**	<0.50	0.00137	0.00159	NC	0.093	<0.050	<0.20
Average			6.9	7.16	51.65	83.5	75.1	1.5	11.68	87.1	118.3	0.01668056	466.3	24	77	51.7	37	33.2	40.5	1.19	0.104	0.97	0.00121	0.00138	1.2	0.076	0.0063	0.042
Count			29	30	22	7	30	29	24	24	21	25	30	5	29	30	30	29	29	29	29	30	29	11	1	30	29	29
Minimum			4.41	6	16.3	44.4	26	-1.9	7.3	46.5	-6.1	0	0.5	15	24	12	12.5	3.9	4.8	0.25	0.05	0.25	0.00025	0.00025	1.2	0.003	0.0025	0.01
Maximum			8.3	8.1	220.6	224	370	5.3	13.8	101.3	325.6	0.073	8200	34.1	450	223	206	190	230	2.8	0.19	4.8	0.0043	0.0026	1.2	0.66	0.027	0.2
Geometric Mean			6.84	7.15	44.42	71.9	63	1.6	11.55	85.5	78.3	0.01984095	24.7	23.1	60	39.9	30.5	23.6	28.8	0.98	0.1	0.53	0.00103	0.00109	1.2	0.021	0.0039	0.023
Count <DL			0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4	0	22	2	2	0	10	26	19
Standard Deviation			0.93	0.48	40.55	62.5	62.3	2.3	1.65	15.2	86.8	0.02083393	1504.6	7.1	84	47.9	34.6	34.6	41.9	0.68	0.027	1.21	0.00075	0.00077	0	0.134	0.0082	0.053
1st Quartile			6.69	6.91	34.75	58	43.2	-0.1	10.97	85.1	58.7	0.002	2.2	21.4	38	25.7	22	14	17	0.7	0.09	0.25	0.0007	0.00071	1.2	0.003	0.0025	0.01
Median			7.14	7.24	41.95	64.2	62	0.2	11.97	91.2	110	0.00760819	12.8	22.3	54	38	29.1	29	35	1.1	0.11	0.25	0.00103	0.00166	1.2	0.034	0.0025	0.01
3rd Quartile			7.42	7.49	52.7	68	78.1	3.9	12.92	96.8	142.2	0.0237153	198.2	27.2	74	54.8	37.9	34.4	41.9	1.6	0.11	1.27	0.0015	0.00185	1.2	0.077	0.0025	0.04
95th Percentile			8.07	7.69	84.55	178.2	131.7	4.9	13.70	100.7	281.9	0.0533076	1265	32.7	200	162.9	61.6	68.8	84	2.2	0.13	3.1	0.00192	0.0023	1.2	0.288	0.025	0.16
Count Over Guideline			7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0
% Over Guideline			24.1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.3	0	0	0	0	3.3	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guidelines: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L.

Nickel: $e^{[0.76(\ln(\text{hardness}))+0.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Nitrite & Nitrate, as N	Dissolved Organic Carbon	Total Organic Carbon	Aluminum (Al), total	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Iron (Fe), total	Lead (Pb), total	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Phosphorous (P), total	Potassium (K), total	Selenium (Se), total
			mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
CCME -Aquatic Life Guideline						*		5				1500	*		1		*	300	*				0.026	73	*			1
MN-1.5	Upper east arm of McGinty Creek downstream of Minto North deposit	3-May-09	<0.02		35.9	179	0.02	0.23	17.3	0.02	<0.005	<50	0.054	4.09	0.2	0.249	7.1	173	0.035	<0.5	1.25	60.5		0.14	0.92		1.93	0.07
		6-May-09	<0.02	28.3	31.7	169	0.03	0.19	13.1	0.02	<0.005	<50	0.034	3.15	0.2	0.284	7.81	168	0.044	<0.5	1	61.7	0.02	0.08	0.97		1.77	0.04
		13-May-09	<0.02	32.8	30.3	280	0.02	0.24	22.1	0.03	<0.005	<50	0.029	4	0.5	0.624	8.95	407	0.066	<0.5	1.21	74.5	<0.01	0.08	1.24		1.73	0.05
		21-May-09		21.2	23	221	0.05	0.38	24.4	0.03	<0.005	<50	0.051	4.71	0.6	0.61	7.95	501	0.245	<0.5	1.5	76	0.01	0.18	1.21		1.31	0.05
		28-May-09	<0.02	20	21.6	230	0.05	0.34	27.9	0.02	<0.005	<50	0.012	6.63	0.3	0.314	7.07	438	0.095	<0.5	2.07	24.2		0.17	1.26		0.98	0.06
		25-Jun-09	<0.02	<0.5	19.2	353	0.06	0.47	32.4	0.03	<0.005	<50	0.015	6.25	0.6	0.424	7.32	922	0.222	0.6	1.92	20.4	<0.01	0.14	1.27		0.42	0.08
		28-Jul-09	<0.02	17.2	17.4	114	0.08	0.35	32.5	0.01	<0.005	<50	0.022	9.93	0.4	0.202	5.29	342	0.055	<0.5	2.92	15.1	<0.01	0.24	1.13		0.39	0.09
		29-Aug-09	<0.02	19.9	19.4	128	0.08	0.41	27.6	0.02	<0.005	<50	0.01	7.79	0.7	0.223	6.13	362	0.03	<0.5	2.38	13.7	<0.01	0.25	1.24		0.35	0.08
		29-Sep-09	<0.02	16.2	17	137	0.08	0.37	28.9	0.02	<0.005	<50	0.032	9.27	0.6	0.251	5.4	498	0.073	<0.5	2.82	17.9		0.29	1.28		0.36	0.08
		23-Oct-09	0.02	12.2	13.2	68.4	0.07	0.31	29.8	0.01	<0.005	<50	<0.005	12.3	0.5	0.147	3.62	274	0.01	<0.5	3.8	9.71	<0.01	0.28	0.95		0.33	0.07
		27-Nov-09	0.2	10.9	10.6	47.9	0.07	0.26	38.2	0.01	<0.005	<50	0.067	15.3	0.3	0.166	3.31	254	0.23	<0.5	4.13	18	<0.01	0.3	0.87		0.39	<0.04
		15-Dec-09	<0.02	10	9.8	35.2	0.08	0.23	45.7	<0.01	<0.005	<50	0.007	17.1	0.3	0.203	3.05	183	0.052	<0.5	5.23	24.4	<0.01	0.29	0.75		0.42	0.04
		25-Jan-10	0.04	25.2	25.1	67.3	0.23	0.56	117	0.02	<0.005	<50	0.105	45.4	0.9	0.381	7.94	208	0.398	1	18.4	42.3	<0.01	0.66	2.05		2.26	0.11
		23-Feb-10																										
		22-Mar-10																										
		21-Apr-10	0.2	38	39	208	<0.02	0.24	22.1	0.03	<0.005	<50	0.038	5.67	0.2	0.218	8.32	203	0.013	0.5	1.85	37.8	<0.01	0.1	1.19		1.72	0.06
		28-May-10	<0.02	12.9	13	90	0.05	0.28	25.7	0.01	<0.005	<50	0.006	7.18	0.3	0.164	4.58	234	0.023	<0.5	2.27	10.9	<0.01	0.22	1.01		0.52	0.06
		28-Jun-10	<0.02	15.4	15.3	124	0.06	0.35	30.4	0.02	<0.005	<50	0.014	8.57	0.5	0.196	5.49	338	0.082	<0.5	2.65	12.1		0.24	1.28		0.32	0.07
		21-Jul-10	<0.02	18.7	18.8	4680	0.1	2.79	324	0.41	<0.005	<50	0.193	14.2	7.3	7.78	40	9770	3.74	3.4	4.47	420	<0.01	0.12	11.4		0.41	0.15
		18-Aug-10	0.04	21.3	38.6	32100	0.2	8.4	1960	2.76	<0.03	<300	1.07	52.5	37.5	50.6	316	53800	16.7	17	22.2	2320	<0.05	<0.3	63.7		1.1	0.2
		15-Sep-10	0.04	18.5	18.1	1360	0.1	1.27	99.9	0.12	<0.005	<50	0.054	11	2.2	1.96	18.4	3330	1.12	0.8	3.54	126	<0.01	0.26	3.73		0.44	0.08
		21-Oct-10	0.07	12.5	12.7	192	0.13	0.41	42.9	0.02	<0.005	<50	0.063	13.2	0.7	0.538	6	609	0.303	<0.5	3.9	52.4	<0.01	0.38	1.51		0.43	0.08
		11-Jan-11																										
		29-Apr-11	<0.02	34	34	118	0.03	0.36	29.5	0.01	<0.005	<50	0.057	9.3	0.3	0.462	7.07	340	0.029	<0.5	3.17	102	0.008	0.14	1.13		2.19	0.05
		19-May-11	<0.02	25.9	26.3	3470	0.12	1.33	84	0.1	0.02	<50	0.069	5.9	5.2	2.55	20.7	5420	1.56	2.1	2.4	203	0.015	0.43	4		1.5	0.11
		28-Jun-11	0.03	17.5	22.6	6080	0.21	3.25	180	0.23	0.05	<50	0.138	10.6	10.6	5.56	47	11400	3.2	3.4	4.4	256	0.03	0.62	8.8		0.7	0.18
		15-Jul-11	0.04	23.9	31.3	41400	0.9	16.4	879	1.37	0.3	<300	0.64	27	68	27.9	235	67400	20.3	21	16	1060	<0.002	2.2	46.2		3	0.9
		10-Aug-11	<0.02	16.8	20.1	11100	0.4	5.7	273	0.45	<0.1	<300	0.21	14	19	7.81	58	17000	5.8	7	6	352	<0.05	1	15	831	1	0.2
		28-Oct-11	0.08	11.4	12.4	639	0.09	0.99	64.6	0.04	<0.005	<50	0.032	17.6	1.3	1.05	9.02	2130	0.413	<0.5	4.63	114	<0.01	0.28	2.1	69	0.43	0.09
		19-Apr-12	0.039	28.5	32.1	106	0.042	0.371	32.6	0.013	<0.0050	<50	0.0495	10.6	0.42	0.937	7.62	1360	0.0496	<0.50	3.1	149	<0.010	0.197	1.02	45.7	1.9	0.058
		24-May-12	<0.20	19.1	18.4	684	0.081	1.13	56.5	0.057	<0.0050	<50	0.0617	8.06	1.11	1.34	12.7	2540	0.505	0.53	2.41	128	<0.000010	0.678	2.14	156	0.827	0.123
		14-Jun-12	<0.20	18.8	23.9	5610	0.137	4.8	333	0.465	0.0071	<50	0.318	14.7	7.08	9.52	76.7	15800	4.63	2.91	5.1	535	<0.010	0.199	11.6	1040	0.671	0.189
		12-Jul-12	<0.20	16.3	18.8	2640	0.106	2.47	158	0.17	0.007	<50	0.16	12.8	3.72	3.91	34.7	7450	1.96	1.31	4.09	260	<0.010	0.324	5.23	312	0.481	0.097
Average			0.043	19.4	22.3	3754.4	0.123	1.829	168.4	0.217	0.0169	38	0.1205	12.96	5.72	4.219	32.94	6795	2.0661	2.19	4.69	219.89	0.008423	0.355	6.54	408.9	1.009	0.118
Count			29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	26	30	30	6	30	30
Minimum			0.01	0.2	9.8	35.2	0.01	0.19	13.1	0.005	0.0025	25	0.0025	3.15	0.2	0.147	3.05	168	0.01	0.25	1	9.71	0.000005	0.08	0.75	45.7	0.32	0.02
Maximum			0.2	38	39	41400	0.9	16.4	1960	2.76	0.3	150	1.07	52.5	68	50.6	316	67400	20.3	21	22.2	2320	0.03	2.2	63.7	1040	3	0.9
Geometric Mean			0.024	16.3	20.8	472.3	0.079	0.728	61.8	0.045	0.0044	30	0.0484	10.31	1.15	0.87	12.42	1179	0.259	0.64	3.41	74.28	0.005027	0.257	2.39	225.8	0.785	0.086
Count <DL			18	1	0	0	1	0	0	1	25	30	1	0	0	0	0	0	0	17	0	0	21	1	0	0	0	1
Standard Deviation			0.053	8	8.4	9390.7	0.167	3.358	379	0.55	0.0549	38	0.2193	11.03	13.99	10.305	69.14	15456	4.7366	4.83	5.04	451.89	0.007798	0.405	13.86	423.6	0.74	0.155
1st Quartile			0.01	15.4	17.1	119.5	0.05	0.318	28.1	0.02	0.0025	25	0.0238	6.77	0.33	0.23	6.03	290	0.0502	0.25	2.3	21.35	0.005	0.155	1.13	90.8	0.42	0.06
Median			0.01	18.7	19.8	214.5	0.08	0.395	35.4	0.025	0.0025	25	0.0525	10.27	0.6	0.5	7.88	500	0.226	0.25	3.13	68.1	0.005	0.245	1.27	234	0.685	0.08
3rd Quartile			0.04	23.9	29.3	2320	0.116	1.315	112.7	0.115	0.0025	25	0.096	14.15	3.34	2.402	20.12	4898	1.45	1.23	4.45	189.5	0.00725	0.318	3.93	701.2	1.665	0.11
95th Percentile			0.16	33.5	37.4	22650	0.324	7.185	633.3	0.963	0.05	150	0.4951	37.12	29.17	19.629	163.765	37240	11.795	12.5	17.32	823.7	0.025	0.855	32.16	987.8	2.229	0.2
Count Over Guideline			0	0	0	27	0	3	0	0	0	0	26	0	11	0	30	22	9	0	0	0	3	0	0	0	0	0
% Over Guideline			0	0	0	90	0	10	0	0	0	0	86.7	0	36.7	0	100	73.3	30	0	0	0	11.5	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guidelines: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273[\ln(\text{hardness})]-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83[\log(\text{hardness})]-2.46]}$ µg/L

Nickel: $e^{[0.76[\ln(\text{hardness})]+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545[\ln(\text{hardness})]-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 154 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Silicon (Si), total µg/L	Silver (Ag), total µg/L	Sodium (Na), total mg/L	Strontium (Sr), total µg/L	Sulphur (S), total mg/L	Thallium (Tl), total µg/L	Tin (Sn), total µg/L	Titanium (Ti), total µg/L	Uranium (U), total µg/L	Vanadium (V), total µg/L	Zinc (Zn), total µg/L	Zirconium (Zr), total µg/L	Aluminum (Al), dissolved µg/L	Antimony (Sb), dissolved µg/L	Arsenic (As), dissolved µg/L	Barium (Ba), dissolved µg/L	Beryllium (Be), dissolved µg/L	Bismuth (Bi), dissolved µg/L	Boron (B), dissolved µg/L	Cadmium (Cd), dissolved µg/L	Calcium (Ca), dissolved mg/L	Chromium (Cr), dissolved µg/L	Cobalt (Co), dissolved µg/L	Copper (Cu), dissolved µg/L	Iron (Fe), dissolved µg/L	Lead (Pb), dissolved µg/L	Lithium (Li), dissolved µg/L	Magnesium (Mg), dissolved mg/L
CCME -Aquatic Life Guideline				0.1				0.8			15		30																		
MN-1.5	Upper east arm of McGinty Creek downstream of Minto North deposit	3-May-09	1490	0.007	0.73	21.1	<3	<0.002	0.15	2.9	0.027	<0.2	7.2	0.4	183	0.03	0.21	17.2	0.02	<0.005	<50	0.021	4.29	0.3	0.266	7.89	173	0.01	<0.5	1.32
		6-May-09	1340	0.008	0.64	15.4	<3	<0.002	<0.01	1.6	0.017	0.6	7.3	0.3	182	0.2	0.15	14.3	0.02	<0.005	<50	0.046	3.32	0.2	0.296	7.7	176	0.094	<0.5	1.03
		13-May-09	2460	<0.005	0.96	20.2	<3	<0.002	<0.01	6	0.033	1.3	5.5	0.5	220	0.03	0.23	19.7	0.02	<0.005	<50	0.028	3.8	0.4	0.564	8.66	263	0.018	<0.5	1.17
		21-May-09	2580	0.006	1.5	25.5	<3	<0.002	<0.01	5.1	0.048	1.5	3.9	0.4	148	0.05	0.28	20.9	0.02	<0.005	<50	0.05	4.81	0.4	0.526	6.45	296	0.119	<0.5	1.52
		28-May-09	4080	<0.005	1.76	33.1	<3	<0.002	<0.01	5.9	0.051	1.2	1.4	0.5	122	0.04	0.28	22.9	0.02	<0.005	<50	0.005	6.43	0.3	0.079	6.19	210	0.009	<0.5	2.01
		25-Jun-09	4140	<0.005	2.07	37.8	<3	0.002	<0.01	11.2	0.064	1.9	2.5	0.6	132	0.06	0.25	24.7	<0.01	<0.005	<50	0.04	6.13	0.3	0.125	5.81	266	0.018	<0.5	1.78
		28-Jul-09	6070	<0.005	2.93	51.3	<3	<0.002	<0.01	2	0.03	0.7	1.9	1.1	103	0.06	0.36	32.1	0.01	<0.005	<50	0.01	9.99	0.4	0.205	5.25	292	0.025	<0.5	2.93
		29-Aug-09	5830	<0.005	2.68	41.2	<3	<0.002	<0.01	1.8	0.031	0.6	1	0.7	126	0.08	0.38	27.4	0.02	<0.005	<50	0.008	8.29	0.6	0.189	5.45	327	0.023	<0.5	2.39
		29-Sep-09	6780	0.006	2.71	47.3	<3	<0.002	<0.01	3.5	0.031	0.8	1.9	0.6	93.8	0.07	0.34	26.6	0.01	<0.005	<50	0.02	9.48	0.6	0.214	5	340	0.025	<0.5	2.88
		23-Oct-09	7390	<0.005	3	58.4	<3	<0.002	<0.01	1.6	0.024	0.4	0.5	0.5	63.8	0.07	0.26	30.6	0.01	<0.005	<50	<0.005	12.6	0.5	0.157	3.48	215	0.019	<0.5	3.86
		27-Nov-09	8400	<0.005	2.81	70	<3	<0.002	0.03	1	0.024	0.3	7.1	0.4	42	0.07	0.25	38.1	<0.01	<0.005	<50	0.011	15.1	0.4	0.166	3.16	227	0.025	<0.5	4.5
		15-Dec-09	6670	0.006	3.24	86.8	<3	<0.002	<0.01	<0.5	0.019	0.2	0.9	0.3	34.2	0.07	0.24	47.8	<0.01	<0.005	<50	<0.005	17.5	0.3	0.209	3.02	145	0.046	<0.5	5.4
		25-Jan-10	16900	0.099	11.3	219	<3	<0.002	0.09	1.8	0.047	0.5	12	0.6	37.4	0.19	0.65	123	0.01	<0.005	<50	0.074	49.2	0.9	0.405	8.16	126	0.095	1.1	20.3
		23-Feb-10																													
		22-Mar-10																													
		21-Apr-10	2420	<0.005	1.35	29	<10	<0.002	<0.01	3.2	0.029	<0.2	5.4	0.3	191	0.09	0.23	20.2	0.02	<0.005	<50	0.106	5.93	0.3	0.186	7.78	206	0.34	<0.5	1.71
		28-May-10	4400	<0.005	2.07	40.2	<10	<0.002	<0.01	1.2	0.025	0.6	0.5	0.4	70.6	0.06	0.26	25.4	0.02	<0.005	<50	0.011	7.39	0.3	0.133	4.45	169	0.008	<0.5	2.32
		28-Jun-10	5390	<0.005	2.61	48.2	<10	0.002	0.01	2.4	0.033	0.7	1.5	0.5	92.7	0.1	0.34	29.3	0.01	<0.005	<50	0.06	8.65	0.6	0.231	6.09	232	0.527	<0.5	2.62
		21-Jul-10	9710	0.014	2.1	79.6	<10	0.014	<0.01	54.4	0.958	29.2	**31.7**	1.8	145	0.08	0.62	30.1	0.03	<0.005	<50	0.017	6.61	0.6	1.25	6.38	844	0.041	<0.5	1.92
		18-Aug-10	32000	0.05	3	329	<50	0.06	<0.05	190	5.66	237	**225**	4.1	158	0.12	0.86	32.1	0.02	<0.005	<50	0.017	5.23	0.7	1.73	7.84	1270	0.091	<0.5	1.61
		15-Sep-10	7130	0.018	2.61	60.1	<10	0.007	<0.01	42.4	0.283	10.5	11.1	1.1	119	0.08	0.54	36.4	0.02	<0.005	<50	0.01	10.4	0.7	0.725	6.44	547	0.037	<0.5	3
		21-Oct-10	7410	0.011	2.72	65.3	<10	<0.002	0.02	6.3	0.069	1.3	6	0.6	90.2	0.09	0.34	41.1	0.01	<0.005	<50	0.023	12.9	0.6	0.435	4.84	317	0.028	<0.5	3.91
		11-Jan-11																													
		29-Apr-11	4680	0.007	2.23	46.7	<10	0.002	<0.01	1.5	0.028	0.4	6.2	0.3	93.5	0.03	0.35	25.9	0.01	<0.005	<50	0.053	9.32	0.4	0.434	6.45	320	0.024	0.6	2.91
		19-May-11	7700	0.038	1.2	36.2	<50	0.03	<0.2	150	0.218	12.4	13	0.6	154	0.04	0.38	24.6	0.02	<0.005	<50	0.022	3.91	0.4	0.913	7.63	599	0.027	<0.5	1.2
		28-Jun-11	12600	0.067	2.4	63.6	<50	0.042	<0.2	223	0.623	30.8	25	1	148	0.09	0.7	34.2	0.02	<0.005	<50	0.019	7.32	0.6	0.913	7.08	937	0.048	<0.5	2.25
		15-Jul-11	65100	**0.34**	4	192	<300	0.27	<1	1370	3.02	173	**163**	2.6	219	0.1	1.06	32.1	0.03	<0.005	<50	0.02	5.01	0.7	1.21	8.09	1620	0.116	<0.5	1.53
		10-Aug-11	22700	0.09	3	96.7	<300	0.08	<1	471	1	44	**45**	1.1	129	0.1	0.75	38.3	0.02	<0.005	<50	0.022	8.3	0.6	0.997	6.75	1130	0.052	<0.5	2.29
		28-Oct-11	9430	0.013	3.02	75.9	<10	0.006	<0.01	19.7	0.134	5.2	3.6	0.6	60.5	0.08	0.52	44.5	<0.01	<0.005	<50	0.016	15.6	0.5	0.587	3.56	714	0.017	<0.5	4.13
		19-Apr-12	4430	0.0087	1.92	49.3	<10	<0.0020	<0.20	1.97	0.0248	0.79	6.77	0.34	81	0.038	0.265	28.7	0.012	<0.0050	<50	0.0415	10.2	0.38	0.482	7.34	296	0.0191	0.51	3.24
		24-May-12	4560	0.0211	1.9	42.3	<10	0.0039	<0.20	27.7	0.128	5.58	4.68	0.71	120	0.072	0.595	32.3	0.02	<0.0050	<50	0.046	7.5	0.5	0.673	6.72	891	0.111	<0.50	2.16
		14-Jun-12	9890	0.0341	2.34	82.9	<10	0.0203	<0.20	106	1.01	50.7	**40.1**	2.02	136	0.08	0.555	35	0.021	<0.0050	<50	0.0331	6.84	0.55	1.16	6.87	1190	0.0712	<0.50	1.99
		12-Jul-12	8210	0.042	2.94	69.7	<10	0.015	<0.20	79.9	0.415	21.5	16.6	1.24	115	0.069	0.718	44	0.013	<0.0050	<50	0.031	9.94	0.63	1.33	6.45	1010	0.021	<0.50	2.9
Average			9730	0.0304	2.59	71.1	15	0.019	0.07	93.18	0.4701	21.13	21.94	0.87	120.3	0.078	0.432	33.3	0.016	0.0025	25	0.0289	9.73	0.49	0.56	6.23	512	0.0701	0.3	3.09
Count			30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Minimum			1340	0.0025	0.64	15.4	2	0.001	0.01	0.25	0.017	0.1	0.5	0.3	34.2	0.03	0.15	14.3	0.005	0.0025	25	0.0025	3.32	0.2	0.079	3.02	126	0.008	0.25	1.03
Maximum			65100	0.34	11.3	329	150	0.27	0.5	1370	5.66	237	225	4.1	220	0.2	1.06	123	0.03	0.0025	25	0.106	49.2	0.9	1.73	8.66	1620	0.527	1.1	20.3
Geometric Mean			6580	0.0104	2.24	55.1	4	0.0034	0.02	9.85	0.0945	2.34	6.34	0.67	108.8	0.07	0.383	30.5	0.014	0.0025	25	0.0207	8.14	0.46	0.408	6.01	387	0.039	0.28	2.47
Count <DL			0	10	0	0	30	16	25	1	0	2	0	0	0	0	0	0	4	30	30	2	0	0	0	0	0	0	27	0
Standard Deviation			12246	0.064	1.82	65.8	37	0.0511	0.13	260.67	1.1479	52.46	48.82	0.82	49.9	0.039	0.225	18.8	0.007	0	0	0.0231	8.27	0.16	0.439	1.56	409	0.1073	0.17	3.42
1st Quartile			4408	0.0025	1.9	38.4	2	0.001	0.01	1.84	0.0283	0.6	2.05	0.4	90.8	0.06	0.26	24.9	0.01	0.0025	25	0.0123	5.98	0.39	0.206	5.3	218	0.0196	0.25	1.73
Median			6725	0.0075	2.5	50.3	5	0.001	0.01	5.5	0.0475	1.25	6.1	0.6	121	0.071	0.345	30.4	0.02	0.0025	25	0.0215	7.89	0.5	0.434	6.45	306	0.0275	0.25	2.3
3rd Quartile			9172	0.0308	2.94	74.4	5	0.0123	0.1	51.4	0.2667	11.93	12.75	1.08	148	0.09	0.585	36	0.02	0.0025	25	0.0411	10.15	0.6	0.866	7.56	812	0.0861	0.25	2.98
95th Percentile			27815	0.09495	3.66	206.9	94	0.071	0.34	359.4	2.1155	117.965	109.9	2.34	206.4	0.159	0.811	46.3	0.02595	0.0025	25	0.0677	16.65	0.7	1.294	8.13	1234	0.24055	0.56	5.00
Count Over Guideline			0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	3.3	0	0	0	0	0	0	0	0	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guidelines: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L

Nickel: $e^{[0.76(\ln(\text{hardness}))+0.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Manganese (Mn), dissolved µg/L	Mercury (Hg), dissolved µg/L	Molybdenum (Mo), dissolved µg/L	Nickel (Ni), dissolved µg/L	Phosphorous (P), dissolved µg/L	Potassium (K), dissolved mg/L	Selenium (Se), dissolved µg/L	Silicon (Si), dissolved µg/L	Silver (Ag), dissolved µg/L	Sodium (Na), dissolved mg/L	Strontium (Sr), dissolved µg/L	Sulphur (S), dissolved mg/L	Thallium (Tl), dissolved µg/L	Tin (Sn), dissolved µg/L	Titanium (Ti), dissolved µg/L	Uranium (U), dissolved µg/L	Vanadium (V), dissolved µg/L	Zinc (Zn), dissolved µg/L	Zirconium (Zr), dissolved µg/L
CCME -Aquatic Life Guideline																					
MN-1.5	Upper east arm of McGinty Creek downstream of Minto North deposit	3-May-09	64.9		0.14	0.91		2.06	0.06	1470	0.007	0.84	21.4	<3	<0.002	0.01	2.1	0.027	0.4	3.6	0.3
		6-May-09	65.1	0.01	0.12	0.95		1.91	<0.04	1260	0.006	0.68	17.1	<3	<0.002	0.01	1.9	0.018	0.8	9.4	0.3
		13-May-09	71	0.02	0.09	1.14		1.73	0.06	2310	<0.005	0.94	20.2	<3	<0.002	<0.01	1.7	0.031	1	5.7	0.4
		21-May-09	70.9	0.01	0.14	1.13		1.38	0.04	2590	<0.005	1.41	25.7	<3	<0.002	0.02	1.1	0.031	1	4.1	0.4
		28-May-09	0.28	<0.01	0.17	1.1		0.99	0.07	3540	<0.005	1.85	33.5	<3	<0.002	<0.01	1.5	0.034	0.6	0.7	0.4
		25-Jun-09	3.99	<0.01	0.16	1		0.42	0.08	4320	<0.005	2.06	36	<3	<0.002	<0.01	0.9	0.034	0.5	1.1	0.5
		28-Jul-09	15.1	<0.01	0.24	1.15		0.37	0.07	6250	<0.005	2.96	51.9	<3	<0.002	<0.01	1.6	0.028	0.6	1	0.6
		29-Aug-09	13.4	<0.01	0.27	1.18		0.37	0.08	5850	<0.005	2.64	43.8	<3	<0.002	<0.01	1.5	0.032	0.6	1.2	0.6
		29-Sep-09	15.9		0.29	1.15		0.36	0.07	7100	<0.005	2.76	46.3	<3	<0.002	<0.01	1	0.025	0.5	2.5	0.6
		23-Oct-09	9.67	<0.01	0.27	0.96		0.34	0.07	7020	<0.005	2.99	58.4	<3	<0.002	<0.01	0.7	0.023	0.4	1.3	0.5
		27-Nov-09	17.1	<0.01	0.29	0.91		0.37	0.06	7840	<0.005	3.1	74.4	<3	<0.002	<0.01	0.8	0.019	0.4	1.7	0.4
		15-Dec-09	25.1	<0.01	0.29	0.78		0.45	0.05	6690	<0.005	3.38	91.2	<3	<0.002	<0.01	<0.5	0.018	0.2	1.6	0.3
		25-Jan-10	45.6	<0.01	0.76	2.33		2.54	0.15	18900	0.018	12.5	247	3	<0.002	0.03	1	0.055	0.7	10.2	0.6
		23-Feb-10																			
		22-Mar-10																			
		21-Apr-10	34.9	0.02	0.54	1.17		1.68	0.07	2180	0.018	3.6	29.4	14	0.003	0.57	1.6	0.035	0.5	12	0.3
		28-May-10	7.55		0.21	1.04		0.55	0.07	4150	<0.005	2.17	39.8	<10	<0.002	<0.01	0.8	0.024	0.5	0.9	0.4
		28-Jun-10	14.9		0.27	1.58		0.5	0.07	5420	<0.005	3.16	47.7	<10	<0.002	0.09	1	0.027	0.4	7.9	0.5
		21-Jul-10	143		0.25	1.69		0.29	0.08	5410	<0.005	2.41	37.5	<10	<0.002	<0.01	3.4	0.046	1.4	1.5	0.9
		18-Aug-10	166		0.37	1.88		0.3	0.09	5370	<0.005	2.32	31.7	<10	<0.002	<0.01	2.9	0.061	2.2	9	0.8
		15-Sep-10	82.1		0.44	1.43		0.43	0.09	7080	<0.005	2.63	51.3	<10	<0.002	<0.01	2	0.057	1.2	1.4	0.7
		21-Oct-10	50.1		0.34	1.2		0.42	0.07	7270	<0.005	2.7	64.9	<10	<0.002	<0.01	0.7	0.057	0.7	2.9	0.6
		11-Jan-11																			
		29-Apr-11	97.4	<0.01	0.08	1.01		2.16	0.06	4570	0.008	2.29	45.3	<10	<0.002	<0.01	1.1	0.024	0.4	6.1	0.2
		19-May-11	121		0.25	1.08		1.03	0.06	1930	0.006	0.98	22.6	<10	<0.002	<0.01	1.6	0.036	1.4	2.1	0.3
		28-Jun-11	101	<0.01	0.38	1.36		0.46	0.09	5970	0.006	2.5	38.7	<10	<0.002	0.01	2.4	0.04	1.7	1.2	0.6
		15-Jul-11	98.2		0.44	1.61		0.32	0.08	5330	0.006	2.1	30.6	<10	<0.002	<0.01	4.4	0.044	2.5	5	0.7
		10-Aug-11	110		0.56	1.43	15	0.37	0.08	5780	<0.005	2.27	44.7	<10	<0.002	<0.01	2.4	0.052	1.9	2	0.6
		28-Oct-11	95.7	<0.01	0.37	1.14	15	0.41	0.08	7680	<0.005	2.78	72.9	<10	<0.002	<0.01	1.2	0.061	1	1.5	0.4
		19-Apr-12	93.8	<0.010	0.145	1.06	32.7	1.97	0.05	4270	<0.0050	2.03	51	<10	<0.0020	<0.20	0.95	0.0179	0.44	5.65	0.29
		24-May-12	97.4	<0.010	0.354	1.24	27.1	0.828	0.103	4250	0.0141	1.9	38.9	<10	<0.0020	<0.20	2.42	0.0359	1.35	5.05	0.45
		14-Jun-12	121	<0.010	0.421	1.41	18.1	0.507	0.092	5280	0.0063	2.22	36.2	<10	<0.0020	<0.20	2.23	0.0294	1.46	1.93	0.59
		12-Jul-12	155	<0.010	0.619	1.43	20.8	0.39	0.093	5790	0.005	2.92	53.4	<10	0.002	<0.20	2.28	0.047	1.57	0.66	0.57
Average			66.9	0.007	0.309	1.25	21.5	0.864	0.074	5429	0.0049	2.64	50.1	4	0.0011	0.04	1.65	0.0356	0.94	3.7	0.49
Count			30	19	30	30	6	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Minimum			0.28	0.005	0.08	0.78	15	0.29	0.02	1260	0.0025	0.68	17.1	2	0.001	0.01	0.25	0.0179	0.2	0.66	0.2
Maximum			166	0.02	0.76	2.33	32.7	2.54	0.15	18900	0.018	12.5	247	14	0.003	0.57	4.4	0.061	2.5	12	0.9
Geometric Mean			40.02	0.006	0.268	1.21	20.5	0.656	0.07	4710	0.0039	2.26	42.7	3	0.0011	0.01	1.42	0.0333	0.78	2.59	0.47
Count <DL			0	15	0	0	0	0	1	0	19	0	0	28	28	23	1	0	0	0	0
Standard Deviation			48.76	0.005	0.163	0.33	7.1	0.698	0.022	3164	0.0044	2.01	40.9	3	0.0004	0.11	0.9	0.0134	0.6	3.21	0.17
1st Quartile			16.2	0.005	0.18	1.04	15.8	0.37	0.06	4175	0.0025	2.04	32.1	2	0.001	0.01	1	0.0255	0.5	1.32	0.4
Median			68	0.005	0.28	1.15	19.5	0.455	0.07	5390	0.0025	2.37	41.8	5	0.001	0.01	1.55	0.033	0.7	2.05	0.5
3rd Quartile			98	0.005	0.378	1.42	25.5	1.292	0.08	6580	0.006	2.88	51.8	5	0.001	0.02	2.2	0.0455	1.39	5.5	0.6
95th Percentile			149.6	0.02	0.592	1.79	31.3	2.115	0.099	7768	0.016245	3.50	83.6	5	0.00155	0.1	3.18	0.0592	2.07	9.84	0.76
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

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Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	pH (field)	pH (lab)	Conductivity (field)	Specific Conductivity (field)	Conductivity (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Discharge (Flow)	Total Suspended Solids	Total Dissolved Solids (field)	Total Dissolved Solids (lab)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Alkalinity, bicarbonate HCO3	Chloride	Fluoride	Sulphate, dissolved	Cyanide, total	Cyanide, Weak Acid Dissociable	Ion Balance	Ammonia (N)	Nitrite (N)	Nitrate (N)
			pH units	pH units	µS/cm	µS/cm	µS/cm	C	mg/L	%	mV	m3/s	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ratio	mg/L	mg/L	mg/L
CCME -Aquatic Life Guideline			6.5-9	6.5-9					5.5											120	0.12			0.005		0.343	0.06	3
MN-2.5	East arm of McGinty Creek just upstream of confluence with west arm	3-May-09	**6.18**	7.1	53.50		41	-1.9				1.0972	18	26.7	32	23.7	23.2	14	17	2	0.06	<0.5	0.0013		NC	<0.005	<0.005	<0.02
		6-May-09	7.21	7.2	54.10		40	-1.9				0.6733	17	36.3	42	24.9	23.4	15	18	3.1	0.07	<0.5	0.0008		NC	<0.005	0.007	<0.02
		13-May-09	7.44	7.3	72.60		53	-1.8				0.1548	15	36.3	82	31.8	31	24	29	1.5	0.07	<5	0.0008		NC	<0.005	<0.005	<0.02
		21-May-09	8.03	7.6	101.20		76	-1.1	13.49	94.9		0.0703	22	50.5		38.9	38					<0.5				<0.005		
		28-May-09	8.06	7.7	131.80		98	-0.4	13.15	94.0		0.0692	12	65.8	94	53.9	52.3	48	59	1.7	**0.13**	<0.5	0.0014		NC	<0.005	<0.005	<0.02
		25-Jun-09	7.66	7.9	76.80		130	3.4	13.67	102.8	167.4		2		110	56.1	58.7	63	77	<0.5	**0.14**	<0.5	0.0008		NC	<0.005	<0.005	<0.02
		28-Jul-09	7.61	8	119.60		190	4.3	11.06	85	158	0.0070	<1		98	93.6	91.3	95	120	0.8	**0.17**	1.1	0.0007		NC	<0.005	<0.005	<0.02
		29-Aug-09	7.77	7.9	94.60		153	3.7	11.7	88.6	67.1	0.0161	1		120	73.7	75.6	77	94	0.6	**0.17**	<0.5	0.0009		NC	<0.005	<0.005	0.06
		29-Sep-09	7.86	8.1	97.30		162	-0.1	13.47	92.1	49.2	0.0120	<1		140	84.2	85.5	90	110	1.3	**0.18**	0.8	0.0005		NC	0.03	<0.005	<0.02
		23-Oct-09		7.9			172					0.0076	<1		120	83.3	86	87	110	1.1	**0.17**	2.3	<0.0005			0.006	<0.005	0.03
		27-Nov-09	7.83	7.9	102.40		187	-0.1	9.33	63.8	62.9	0.0003	4		84	88.7	90.8	94	110	0.8	**0.19**	3.1	<0.0005		NC	0.011	<0.005	0.05
		15-Dec-09	**5.7**	7.8	73.20		214	0.5			169.6		<1		130	95	101	110	130	0.7	**0.19**	5.5	0.0011		NC	<0.005	<0.005	<0.02
		25-Jan-10	**4.1**	8.5	445.10		818	-0.1	6.94	47.0	116.5		4		650	448	479	450	520	4.7	**1.13**	30	0.0021		1.1	0.038	<0.005	<0.02
		23-Feb-10										0																
		22-Mar-10										0																
		22-Apr-10	7.56	7.6	41.60		73	0.0	11.70	86.4	114.3		<1		68	40.3	37.1	33	41	1.6	0.09	<5	0.001			0.07	<0.03	<0.1
		28-May-10	7.54	8	73.80		133	0.9	13.16	92.7	339.2	0.0078	3		100	59.3	63.5	68	83	<0.5	**0.16**	<0.5	0.0008			<0.005	<0.005	<0.02
		28-Jun-10	7.73	7.79	95.10		163	3.8	11.07	90.50	65.2	0.0077	<1		120	76	79.3	84	100	<0.5	**0.17**	<0.5	0.0008			<0.05	<0.005	<0.02
		21-Jul-10	7.55	7.93	80.10		134	5.5	11	94.60	40.7	0.0234	1		96	59.8	61.2	69	84	0.9	**0.14**	<0.5	0.0013			0.033	<0.005	<0.02
		18-Aug-10	7.3	7.85	89.80		145	6.2	10.22	89.40	39		350		120	88.6	74.9	72	87	0.9	**0.15**	<0.5	0.0007			0.3	<0.005	<0.02
		15-Sep-10	7.65	7.89	83.90		150	1.6	13.21	94.8	304.6	0.0231	2		84	68.7	78.7	73	89	<0.5	**0.13**	1.7	0.0012			0.17	<0.005	<0.02
		21-Oct-10	7.35	7.96	88.00		172	-0.1	12.15	83.3	316.4	0.0121	<4		120	82.6	84.3	86	100	0.5	**0.17**	<0.5	<0.0005	<0.0005		0.052	<0.005	0.04
		11-Jan-11		7.52			208						1		100	97.9	94.9	97	120	1.2	**0.19**	5.1	<0.0005	<0.0005		0.016	<0.005	0.07
		29-Apr-11	7.35	7.43	49.40		93	0	13.69	102	137.9		<1		86	46.7	44.6	44	53	1.6	0.1	<0.5	0.0015	0.0011		0.021	<0.005	<0.02
		19-May-11	7.66	7.36	33.60		63	0.30	14.52	99.50	124.60	0.1305	21		58	36	31.6	32	39	2	0.1	<0.5	0.0027	0.0018		<0.005	<0.005	<0.02
		28-Jun-11	7.84	7.81	91.00		149	4	12.27	102.8	46.5	0.0796	8		110	77.4	82.6	76	93	1.4	**0.16**	<0.5	0.0015	0.0014		0.16	<0.005	<0.02
		15-Jul-11	7.45	7.48		109.4	109	5.6	10.6	91	257.8	0.2202	330		90	76.8	54.7	52	64	1.7	**0.16**	<0.5	0.0011	0.0015		0.071	0.006	<0.02
		10-Aug-11	7.71	7.48		130.4	132	5.3	12.46	98.4	249.4	0.0766	160		130	78.5	63	64	78	1.6	**0.15**	<0.5	0.0008	0.0013	NC	0.069	<0.005	<0.02
		28-Oct-11	7.86	7.84		357	181	0.2					6		110	94.1	86.9	84	100	1.1	**0.17**	0.9	<0.0005	<0.0005	NC	0.025	<0.005	0.07
		19-Apr-12	8.04	7.61		115.7	115	0	15.22	104	98.1		<1.0		104	58.7	56	52.7	64.3	1.8	0.1	<0.50	0.00113	<0.00050	NC	0.0074	<0.0050	<0.020
		24-May-12	7.76	7.87		116.9	119	1.9	14.6	105	259.7		105		102	60.5	60.4	59.5	72.6	1	**0.15**	<0.50	0.00088	<0.00050	NC	0.036	<0.050	<0.20
		14-Jun-12	7.57	7.74		126.9	116	3	14.09	105.1	89.1	0.0667	260		94	68.3	60.1	56.9	69.4	<5.0	**0.16**	<5.0	0.00099	0.0011	NC	0.029	<0.050	<0.20
		12-Jul-12	7.62	7.93		133.5	163	4.4	13.46	103.9		0.0285	6.7		104	81.9	81.3	80	97.5	1.1	**0.18**	<0.50	<0.00050	<0.00050	NC	0.036	<0.050	<0.20
Average			7.41	7.74	97.66	155.7	153	1.62	12.34	92.15	148.78	0.1210	43.7	43.1	117	79	78.4	78.3	94.3	1.3	0.18	2.02	0.00094	0.00081	1.1	0.0398	0.0054	0.029
Count			29	31	22	7	31	29	24	24	22	23	31	5	30	31	31	30	30	30	30	31	30	12	1	31	30	30
Minimum			4.1	7.1	33.6	109.4	40	-1.9	6.94	47	39	0	0.5	26.7	32	23.7	23.2	14	17	0.2	0.06	0.25	0.00025	0.00025	1.1	0.0025	0.0025	0.01
Maximum			8.06	8.5	445.1	357	818	6.2	15.22	105.1	339.2	1.0972	350	65.8	650	448	479	450	520	4.7	1.13	30	0.0027	0.0018	1.1	0.3	0.025	0.1
Geometric Mean			7.36	7.74	83.42	142	128	1.6	12.18	90.96	119.34	0.0461	5	41.1	100	66.5	64.7	63.1	76.5	1.1	0.15	0.62	0.00078	0.00058	1.1	0.0142	0.0036	0.018
Count <DL			0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	5	0	22	6	6	0	12	28	24
Standard Deviation			0.81	0.29	81.29	89.2	132	2.49	1.89	13.32	97.11	0.2557	96.4	15.3	104	71.8	77.5	74.4	85.8	0.9	0.18	5.38	0.00056	0.00061	0	0.0638	0.0071	0.031
1st Quartile			7.44	7.56	72.75	116.3	104	-0.1	11.07	89.2	65.67	0.0077	0.8	36.3	87	55	53.5	52.2	64.1	0.8	0.13	0.25	0.0007	0.00025	1.1	0.0025	0.0025	0.01
Median			7.62	7.81	85.95	126.9	134	0.5	12.8	94.3	120.55	0.0234	4	36.3	101	73.7	63.5	70.5	85.5	1.1	0.16	0.25	0.00084	0.00068	1.1	0.021	0.0025	0.01
3rd Quartile			7.77	7.9	96.75	131.9	168	3.8	13.54	102.2	229.45	0.0781	17.5	50.5	120	83.8	84.9	85.5	100	1.7	0.17	2	0.00118	0.00133	1.1	0.037	0.0025	0.048
95th Percentile			8.04	8.05	131.19	290.0	211	5.6	14.59	104.9	315.8	0.6279	295	62.74	136	96.5	98.0	104.2	125.5	2.8	0.19	5.3	0.00183	0.00164	1.1	0.165	0.025	0.1
Count Over Guideline			3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0
% Over Guideline			10.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76.7	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L.

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Nitrite & Nitrate, as N	Dissolved Organic Carbon	Total Organic Carbon	Aluminum (Al), total	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Iron (Fe), total	Lead (Pb), total	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Phosphorous (P), total	Potassium (K), total	Selenium (Se), total
			mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
CCME -Aquatic Life Guideline						*		5				1500	*		1			*	300	*				0.026	73	*			1
MN-2.5	East arm of McGinty Creek just upstream of confluence with west arm	3-May-09	<0.02		30	177	0.05	0.48	24.4	0.02	<0.005	<50	0.137	6.4	0.3	0.275	3.04	320	1.74	<0.5	1.88	43.7		0.15	1.21		1.65	0.06
		6-May-09	<0.02	25.9	26.5	195	0.07	0.39	21.9	0.03	<0.005	<50	0.07	6.67	0.5	0.376	4.03	358	0.299	<0.5	2.02	53.8	0.01	0.12	1.77		1.58	0.04
		13-May-09	<0.02	28.8	26.6	165	0.21	0.38	24.5	0.03	<0.005	<50	0.025	8.63	0.5	0.258	4.3	334	0.075	<0.5	2.5	39.1	<0.01	0.17	1.76		1.19	0.07
		21-May-09		18.9	20.3	183	0.07	0.51	28.5	0.02	<0.005	<50	0.019	10.4	0.5	0.363	3.65	500	0.212	0.5	3.13	75.7	<0.01	0.32	2.01		0.9	0.09
		28-May-09	<0.02	18.2	19.6	81.8	0.08	0.42	28.6	0.02	<0.005	<50	0.006	14.6	0.3	0.181	2.78	207	0.063	0.5	4.23	39.7		0.38	1.61		0.69	0.07
		25-Jun-09	<0.02	16.5	13.8	24.4	0.09	0.3	27.3	0.01	<0.005	<50	<0.005	15.4	0.2	0.076	1.95	85	0.02	0.7	4.3	9.43	<0.01	0.53	1.03		0.42	0.08
		28-Jul-09	<0.02	10	10.1	15.9	0.13	0.29	39.3	<0.01	<0.005	<50	0.028	26.4	<0.1	0.073	1.58	68	0.055	0.9	6.73	14.7	<0.01	0.86	0.99		0.76	0.06
		29-Aug-09	0.06	13.8	14.1	18.3	0.08	0.35	32.8	<0.01	0.007	<50	<0.005	20.3	0.3	0.103	1.95	109	0.009	0.6	5.55	25.8	<0.01	0.64	1.28		0.5	0.08
		29-Sep-09	<0.02	11.5	11.4	12.1	0.08	0.34	33.1	0.01	<0.005	<50	0.007	23	0.3	0.114	1.37	105	0.012	0.8	6.47	29.7		0.7	1.14		0.53	0.07
		23-Oct-09	0.03	9.7	10.7	10.4	0.07	0.26	34.2	<0.01	<0.005	<50	<0.005	23	0.2	0.086	1.22	85	0.006	1	6.29	25.3	<0.01	0.74	0.98		0.64	0.07
		27-Nov-09	0.05	7.3	9.5	25.2	0.06	0.25	41	<0.01	<0.005	<50	0.008	25.6	0.2	0.097	1.23	128	0.232	1.2	6.01	34.4	<0.01	0.89	0.7		0.9	<0.04
		15-Dec-09	<0.02	8	8.2	11.7	0.11	0.25	51.2	<0.01	<0.005	<50	0.014	26.2	0.2	0.048	1.62	55	1.42	1	7.19	10.7	<0.01	0.77	0.8		1.05	0.06
		25-Jan-10	<0.02	45	44	24.3	0.23	1.27	149	0.01	<0.005	<50	0.109	109	0.7	0.261	3.88	40	0.201	7.3	42.5	44.5	<0.01	1.03	2.23		8.27	0.33
		23-Feb-10																										
		22-Mar-10																										
		22-Apr-10	<0.1	36.7	36.2	115	0.03	0.33	23.5	0.02	<0.005	<50	0.036	10.7	0.3	0.115	3.71	162	0.027	0.6	3.31	10.8	<0.01	0.22	1.41		1.68	0.07
		28-May-10	<0.02	9.6	9.6	22.1	0.06	0.32	29.4	<0.01	<0.005	<50	<0.005	16.3	0.1	0.078	2.19	82	0.043	0.5	4.51	15.9	<0.01	0.63	1.1		0.59	0.06
		28-Jun-10	<0.02	10.5	10.8	18.8	0.07	0.32	34.5	<0.01	<0.005	<50	<0.005	21.1	0.3	0.084	1.62	81	0.029	0.8	5.69	9.04		0.68	1.15		0.58	0.07
		21-Jul-10	<0.02	16.6	15	34.6	0.1	0.41	33	<0.01	<0.005	<50	0.011	16.8	0.3	0.091	2.53	173	0.1	0.7	4.32	14.4	<0.01	0.52	1.24		0.4	0.07
		18-Aug-10	<0.02	17.5	20.3	2600	0.12	2.28	177	0.24	<0.005	<50	0.123	23.2	4.5	4.84	23.2	7030	2.49	1.8	7.48	789	<0.01	0.26	8.72		0.64	0.1
		15-Sep-10	<0.02	14.9	14.9	51	0.09	0.5	37.9	<0.01	<0.005	<50	0.014	18.4	0.4	0.192	2.89	384	0.063	<0.5	5.52	59.9	<0.01	0.57	1.71		0.44	0.08
		21-Oct-10	0.04	11.7	11.9	26.1	0.07	0.34	40.1	<0.01	<0.005	<50	0.01	22.4	0.3	0.156	1.84	288	0.023	0.6	6.45	71.7	<0.01	0.68	1.24		0.5	0.07
		11-Jan-11	0.07	7.9	7.6	10.9	0.09	0.33	51.2	<0.01	<0.005	<50	0.054	26.1	0.2	0.226	1.73	219	0.105	1.1	7.98	81	<0.01	0.73	1.08		1.05	0.07
		29-Apr-11	<0.02	25	24	30.9	0.03	0.36	24.6	<0.01	<0.005	<50	0.029	12.4	0.2	0.078	1.87	118	0.009	<0.5	3.82	16.8	0.01	0.16	0.96		2.41	0.06
		19-May-11	<0.02	25.2	26.4	414	0.08	0.59	32.9	0.03	<0.02	<50	0.022	9.9	1	0.46	4.3	1020	0.2	<0.5	2.7	110	<0.01	0.34	1.9		1	0.1
		28-Jun-11	<0.02	20.1	20.4	92.3	0.13	0.52	38.8	0.01	<0.005	<50	0.028	21.2	0.4	0.179	3.04	369	0.104	0.6	5.92	36.8	<0.01	0.47	1.81		0.38	0.1
		15-Jul-11	<0.02	19.1	22.7	7560	0.3	3.9	207	0.29	<0.1	<300	0.16	19	15	5.3	35	11700	4	4	7	352	<0.05	0.8	13.3		<1	0.3
		10-Aug-11	<0.02	16.1	18.9	3040	0.22	1.8	103	0.11	0.03	<50	0.074	21.1	6.5	2.42	13.3	5290	1.52	2.3	6.3	179	<0.01	0.78	6.3	133	0.6	0.14
		28-Oct-11	0.07	9	9.7	64	0.06	0.51	43.3	<0.01	<0.005	<50	0.011	26.4	0.3	0.358	1.79	633	0.038	0.6	6.84	208	<0.01	0.7	1.34	19	0.54	0.1
		19-Apr-12	<0.020	22.4	23.1	16.4	0.031	0.387	24.9	<0.010	<0.0050	<50	0.0192	16	0.19	0.0806	1.64	146	0.0187	<0.50	4.58	19.8	<0.010	0.251	0.837	73.4	2.25	0.081
		24-May-12	<0.20	15.6	14.6	413	0.088	0.995	54.6	0.044	<0.0050	<50	0.0624	16.3	0.93	0.764	5.07	1420	0.504	0.69	4.85	115	<0.000010	0.397	2.81	111	0.724	0.102
		14-Jun-12	<0.20	13.7	17.7	1470	0.125	2.42	127	0.153	<0.0050	<50	0.127	17.9	2.47	3.17	15	4970	1.57	1.18	5.71	556	<0.010	0.289	6.05	205	0.527	0.138
		12-Jul-12	<0.20	12.3	12.9	80.5	0.085	0.754	42.1	<0.010	<0.0050	<50	0.02	22.4	0.46	0.304	2.3	886	1.03	0.56	6.34	107	<0.010	0.734	1.59	24.2	0.467	0.067
Average			0.029	17.2	18.1	548.5	0.1	0.728	53.6	0.036	0.0053	29	0.0399	21.07	1.23	0.6841	5.02	1205	0.5232	1.04	6.39	103.18	0.005926	0.533	2.324	94.3	1.108	0.093
Count			30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	27	31	31	6	31	31
Minimum			0.01	7.3	7.6	10.4	0.03	0.25	21.9	0.005	0.0025	25	0.0025	6.4	0.05	0.048	1.22	40	0.006	0.25	1.88	9.04	0.000005	0.12	0.7	19	0.38	0.02
Maximum			0.1	45	44	7560	0.3	3.9	207	0.29	0.05	150	0.16	109	15	5.3	35	11700	4	7.3	42.5	789	0.025	1.03	13.3	205	8.27	0.33
Geometric Mean			0.018	15.5	16.4	78.1	0.086	0.52	42.5	0.013	0.0032	26	0.0198	17.98	0.44	0.238	3.1	316	0.1188	0.69	5.22	47.42	0.004326	0.459	1.671	68.4	0.813	0.081
Count <DL			24	0	0	0	0	0	0	15	29	31	5	0	1	0	0	0	0	7	0	0	25	0	0	0	1	1
Standard Deviation			0.031	8.7	8.6	1489	0.062	0.815	47.3	0.069	0.0097	22	0.0456	17.38	2.9	1.3502	7.28	2578	0.916	1.38	6.9	170.78	0.004169	0.254	2.711	70.8	1.431	0.064
1st Quartile			0.01	10.8	11.1	20.5	0.07	0.33	28.6	0.005	0.0025	25	0.009	15	0.2	0.0885	1.76	107	0.028	0.5	4.27	18.3	0.005	0.304	1.09	36.5	0.514	0.069
Median			0.01	15.9	15	51	0.08	0.39	34.5	0.01	0.0025	25	0.02	19	0.3	0.181	2.53	219	0.1	0.6	5.69	39.7	0.005	0.57	1.34	92.2	0.64	0.07
3rd Quartile			0.048	19.9	22.9	180	0.115	0.555	47.2	0.025	0.0025	25	0.0582	23	0.5	0.3605	3.96	566	0.4015	1	6.46	94	0.005	0.732	1.855	127.5	1.05	0.1
95th Percentile			0.1	33.1	33.1	2820	0.225	2.35	163	0.197	0.02	25	0.132	26.4	5.5	4.005	19.1	6160	2.115	3.15	7.73	454	0.01	0.875	7.51	187	2.33	0.22
Count Over Guideline			0	0	0	13	0	0	0	0	0	0	14	0	4	0	17	14	2	0	0	0	1	0	0	0	0	0
% Over Guideline			0	0	0	41.9	0	0	0	0	0	0	45.2	0	12.9	0	54.8	45.2	6.5	0	0	0	3.7	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guidelines: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

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Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: If pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 154 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Silicon (Si), total µg/L	Silver (Ag), total µg/L	Sodium (Na), total mg/L	Strontium (Sr), total µg/L	Sulphur (S), total mg/L	Thallium (Tl), total µg/L	Tin (Sn), total µg/L	Titanium (Ti), total µg/L	Uranium (U), total µg/L	Vanadium (V), total µg/L	Zinc (Zn), total µg/L	Zirconium (Zr), total µg/L	Aluminum (Al), dissolved µg/L	Antimony (Sb), dissolved µg/L	Arsenic (As), dissolved µg/L	Barium (Ba), dissolved µg/L	Beryllium (Be), dissolved µg/L	Bismuth (Bi), dissolved µg/L	Boron (B), dissolved µg/L	Cadmium (Cd), dissolved µg/L	Calcium (Ca), dissolved mg/L	Chromium (Cr), dissolved µg/L	Cobalt (Co), dissolved µg/L	Copper (Cu), dissolved µg/L	Iron (Fe), dissolved µg/L	Lead (Pb), dissolved µg/L	Lithium (Li), dissolved µg/L	Magnesium (Mg), dissolved mg/L
CCME -Aquatic Life Guideline				0.1				0.8			15		30																		
MN-2.5	East arm of McGinty Creek just upstream of confluence with west arm	3-May-09	2120	0.008	0.7	27.4	<3	<0.002	0.01	5.8	0.043	0.5	8.7	0.4	88.2	0.04	0.29	17.2	0.01	<0.005	<50	0.022	6.21	0.2	0.139	2.48	96	0.016	<0.5	1.87
		6-May-09	2060	0.009	0.84	28.7	<3	<0.002	0.03	5.2	0.035	1	9.6	0.4	107	0.08	0.25	17.9	0.01	<0.005	<50	0.075	6.23	0.2	0.221	2.84	134	0.071	<0.5	1.9
		13-May-09	3600	<0.005	1.25	36.3	<3	<0.002	<0.01	3.9	0.047	0.9	3.1	0.6	112	0.06	0.33	21.5	0.02	<0.005	<50	0.009	8.36	0.3	0.173	4.11	192	0.021	<0.5	2.45
		21-May-09	3890	<0.005	2.03	49.1	<3	0.003	<0.01	6.6	0.072	1.2	4.4	0.4	43.7	0.08	0.32	22.6	0.01	<0.005	<50	0.025	10.2	0.3	0.145	2.93	145	0.083	<0.5	3.04
		28-May-09	5070	<0.005	2.49	60.6	<3	<0.002	<0.01	3.1	0.059	0.8	0.8	0.4	25.9	0.08	0.37	26.2	0.01	<0.005	<50	<0.005	14.2	0.2	0.067	2.61	79	0.01	0.5	4.1
		25-Jun-09	4800	<0.005	2.99	81.4	<3	<0.002	<0.01	1.6	0.071	0.3	0.3	0.3	17.7	0.09	0.29	28	0.01	<0.005	<50	0.009	16.3	<0.1	0.081	1.95	61	0.014	0.7	4.39
		28-Jul-09	6050	<0.005	3.98	122	<3	<0.002	0.02	0.9	0.152	0.4	1.6	0.2	8.5	0.06	0.29	38.1	<0.01	<0.005	<50	0.006	26.1	<0.1	0.065	1.58	46	0.009	0.9	6.32
		29-Aug-09	6370	<0.005	3.61	95.6	<3	<0.002	<0.01	<0.5	0.081	0.2	0.5	0.3	18.2	0.09	0.33	33.5	0.01	<0.005	<50	0.023	21.2	0.3	0.09	1.85	100	0.032	0.8	5.49
		29-Sep-09	6380	<0.005	4.03	100	<3	<0.002	<0.01	<0.5	0.111	<0.2	0.5	0.3	10.6	0.08	0.34	34.5	<0.01	<0.005	<50	0.006	23.7	0.2	0.119	1.38	95	0.009	0.7	6.36
		23-Oct-09	6720	<0.005	3.92	106	<3	<0.002	<0.01	<0.5	0.111	<0.2	0.5	0.2	9.4	0.06	0.27	33.6	<0.01	<0.005	<50	<0.005	23.7	0.2	0.066	1.25	67	<0.005	1	6.5
		27-Nov-09	6990	<0.005	3.27	120	<3	<0.002	<0.01	0.9	0.147	<0.2	2.8	0.2	7.8	0.06	0.2	38.6	<0.01	<0.005	<50	<0.005	25.7	0.2	0.059	1.23	48	0.033	1.1	6.49
		15-Dec-09	6060	0.006	4.09	143	<3	<0.002	<0.01	<0.5	0.122	<0.2	1.4	0.2	9	0.09	0.24	49.9	<0.01	<0.005	<50	0.011	27.8	0.2	0.054	1.57	36	0.07	1.1	7.58
		25-Jan-10	35100	0.039	27.4	545	14	<0.002	0.04	1.2	0.384	0.4	4.4	0.5	23.4	0.22	1.49	156	0.02	0.016	<50	0.058	116	0.7	0.314	4.48	36	0.822	7.8	46.3
		23-Feb-10																													
		22-Mar-10																													
		22-Apr-10	3350	<0.005	2.13	44.1	<10	<0.002	<0.01	1.9	0.032	<0.2	5.7	0.4	95.7	0.05	0.3	21.8	0.01	<0.005	<50	0.026	10	0.2	0.092	2.91	141	0.027	<0.5	2.94
		28-May-10	4660	<0.005	2.88	80.4	<10	<0.002	0.02	<0.5	0.103	0.4	0.5	0.2	9.1	0.07	0.3	29.8	0.01	<0.005	<50	<0.005	17.2	0.2	0.069	1.49	35	0.008	0.5	4.99
		28-Jun-10	5510	<0.005	3.64	107	<10	<0.002	<0.01	0.6	0.096	0.3	0.7	0.2	9.5	0.09	0.3	34.2	<0.01	<0.005	<50	0.006	22	0.2	0.061	1.59	49	0.044	0.7	5.92
		21-Jul-10	5780	<0.005	2.86	81.3	<10	<0.002	<0.01	1.3	0.068	0.5	1.4	0.3	32.4	0.11	0.41	33.6	<0.01	<0.005	<50	0.028	16.9	0.3	0.117	2.99	141	0.288	0.7	4.61
		18-Aug-10	9040	0.009	3.86	116	<10	0.011	<0.01	42.7	0.561	18.4	20.3	1.3	50	0.11	0.48	43.3	0.02	<0.005	<50	0.006	20.8	0.4	0.157	3.09	256	0.022	0.6	5.56
		15-Sep-10	5950	<0.005	3.5	90.3	<10	<0.002	<0.01	1.3	0.111	0.6	2.4	0.4	31.3	0.09	0.48	39.4	0.01	<0.005	<50	0.009	21.8	0.5	0.184	2.76	315	0.058	0.6	5.88
		21-Oct-10	6950	<0.005	3.72	107	<10	<0.002	<0.01	<0.5	0.126	0.2	0.8	0.3	26.5	0.07	0.38	40.9	<0.01	<0.005	<50	0.011	22.7	0.4	0.165	1.89	226	0.013	0.7	6.69
		11-Jan-11	6490	0.019	4.89	125	<10	<0.002	0.01	<0.5	0.087	0.2	5.4	0.4	7.1	0.09	0.35	50.8	<0.01	<0.005	<50	0.068	25.9	0.2	0.213	1.62	87	0.071	1.2	7.35
		29-Apr-11	4570	<0.005	1.89	54.3	<10	<0.002	<0.01	0.5	0.025	0.2	2.8	0.2	26.4	0.03	0.36	23.1	<0.01	<0.005	<50	0.026	11.9	0.2	0.085	1.72	107	0.046	<0.5	3.62
		19-May-11	4180	0.012	1.5	46.5	<50	0.004	<0.2	17	0.07	1.8	3	0.4	66.3	0.05	0.44	23.4	0.01	<0.005	<50	0.026	8.76	0.3	0.193	4.13	282	0.053	<0.5	2.37
		28-Jun-11	5540	<0.005	3.56	94.1	<10	<0.002	0.02	3.9	0.115	1	1.3	0.4	29.1	0.12	0.47	38.6	0.01	<0.005	<50	0.014	22.7	0.4	0.114	2.72	218	0.069	<0.5	6.29
		15-Jul-11	18400	0.08	3	111	<300	0.07	<1	253	0.58	26	**32**	1.1	74.7	0.14	0.6	40.5	0.02	<0.005	<50	0.011	15	0.5	0.31	4.63	361	0.09	<0.5	4.22
		10-Aug-11	11200	0.032	3.5	103	<50	0.027	<0.2	135	0.44	12.6	10	0.8	44.1	0.11	0.67	42.6	0.01	<0.005	<50	0.017	17.3	0.4	0.329	3	592	0.051	0.5	4.78
		28-Oct-11	7880	<0.005	4.09	112	<10	<0.002	<0.01	2.3	0.151	0.7	0.6	0.3	16.9	0.06	0.42	44	<0.01	<0.005	<50	0.006	24.3	0.3	0.307	1.5	365	0.012	0.7	6.39
		19-Apr-12	4940	<0.0050	2.61	65.6	<10	<0.0020	<0.20	<0.50	0.0266	<0.20	2.55	0.15	14.7	0.033	0.426	25.4	<0.010	<0.0050	<50	0.0238	14.8	0.22	0.0768	1.75	120	0.0183	0.52	4.62
		24-May-12	5510	0.0124	2.71	77.8	<10	0.0021	1.62	15.4	0.2	3.32	4.4	0.45	26.8	0.084	0.534	35.2	0.012	<0.0050	<50	0.017	16.5	0.31	0.202	2.54	543	0.0286	<0.50	4.67
		14-Jun-12	6890	0.0254	3.13	92.3	<10	0.0065	<0.20	36.5	0.376	12.2	14.1	0.84	28.3	0.084	0.547	35	<0.010	<0.0050	<50	0.012	16.3	0.36	0.209	2.64	469	0.0335	<0.50	4.7
		12-Jul-12	6410	<0.0050	3.95	105	<10	<0.0020	<0.20	3.64	0.12	1.17	1.25	0.37	21.5	0.079	0.656	39.2	<0.010	<0.0050	<50	0.018	22.1	0.36	0.224	2.1	632	0.032	0.56	6.33
Average			7047	0.0097	3.81	100.9	10	0.0048	0.09	17.62	0.1523	2.77	4.77	0.42	35.2	0.083	0.424	37.4	0.009	0.0029	25	0.0187	21.05	0.29	0.1516	2.43	196	0.0696	0.79	6.28
Count			31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Minimum			2060	0.0025	0.7	27.4	2	0.001	0.01	0.25	0.025	0.1	0.3	0.15	7.1	0.03	0.2	17.2	0.005	0.0025	25	0.0025	6.21	0.05	0.054	1.23	35	0.0025	0.25	1.87
Maximum			35100	0.08	27.4	545	150	0.07	1.62	253	0.58	26	32	1.3	112	0.22	1.49	156	0.02	0.016	25	0.075	116	0.7	0.329	4.63	632	0.822	7.8	46.3
Geometric Mean			5928	0.0049	2.99	84.4	4	0.0016	0.02	2.16	0.106	0.62	2.33	0.36	25.2	0.076	0.388	33.8	0.008	0.0027	25	0.0125	17.64	0.25	0.1304	2.26	137	0.0322	0.53	4.99
Count <DL			0	20	0	0	30	24	23	8	0	6	0	0	0	0	0	0	14	30	31	4	0	2	0	0	0	1	11	0
Standard Deviation			5971	0.016	4.5	87.9	27	0.0131	0.3	50.49	0.1508	6.07	6.78	0.26	30.6	0.036	0.231	23.8	0.005	0.0024	0	0.0181	18.69	0.13	0.084	0.95	172	0.1488	1.33	7.6
1st Quartile			4730	0.0025	2.55	63.1	2	0.001	0.01	0.38	0.069	0.2	0.8	0.25	12.6	0.06	0.3	25.8	0.005	0.0025	25	0.006	14.5	0.2	0.0789	1.6	73	0.015	0.25	4.16
Median			5950	0.0025	3.27	94.1	5	0.001	0.01	1.6	0.111	0.5	2.55	0.4	26.4	0.08	0.36	34.5	0.01	0.0025	25	0.012	17.3	0.3	0.139	2.48	134	0.032	0.56	4.99
3rd Quartile			6805	0.009	3.89	109	5	0.001	0.04	5.5	0.149	1.08	4.9	0.4	43.9	0.09	0.475	40	0.01	0.0025	25	0.0244	23.2	0.36	0.2055	2.92	269	0.0635	0.7	6.35
95th Percentile			14800	0.0355	4.49	134	25	0.019	0.3	88.85	0.5005	15.5	17.2	0.97	101.4	0.13	0.663	50.4	0.02	0.0025	25	0.063	26.95	0.5	0.312	4.31	568	0.189	1.15	7.47
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 284 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Manganese (Mn), dissolved µg/L	Mercury (Hg), dissolved µg/L	Molybdenum (Mo), dissolved µg/L	Nickel (Ni), dissolved µg/L	Phosphorous (P), dissolved µg/L	Potassium (K), dissolved mg/L	Selenium (Se), dissolved µg/L	Silicon (Si), dissolved µg/L	Silver (Ag), dissolved µg/L	Sodium (Na), dissolved mg/L	Strontium (Sr), dissolved µg/L	Sulphur (S), dissolved mg/L	Thallium (Tl), dissolved µg/L	Tin (Sn), dissolved µg/L	Titanium (Ti), dissolved µg/L	Uranium (U), dissolved µg/L	Vanadium (V), dissolved µg/L	Zinc (Zn), dissolved µg/L	Zirconium (Zr), dissolved µg/L
CCME -Aquatic Life Guideline																					
MN-2.5	East arm of McGinty Creek just upstream of confluence with west arm	3-May-09	20.1		0.11	0.91		1.67	0.07	1990	0.008	0.74	26.7	<3	<0.002	<0.01	0.9	0.024	0.3	4.4	0.3
		6-May-09	34.1	0.01	0.14	1.04		1.51	0.04	1850	0.006	0.78	27.5	<3	<0.002	0.01	0.9	0.025	0.5	5.3	0.3
		13-May-09	23	0.01	0.17	1.58		1.19	0.08	3380	<0.005	1.21	36.2	<3	<0.002	<0.01	1.2	0.042	0.7	3.3	0.5
		21-May-09	42	<0.01	0.35	1.35		0.89	0.08	3950	<0.005	1.96	48.5	<3	<0.002	<0.01	0.9	0.042	0.5	1.8	0.3
		28-May-09	0.35	<0.01	0.38	1.56		0.68	0.07	4510	<0.005	2.56	63.1	<3	<0.002	<0.01	0.6	0.052	0.5	0.4	0.3
		25-Jun-09	6.77	<0.01	0.53	1.05		0.45	0.08	4990	<0.005	3.02	82.4	<3	<0.002	<0.01	0.8	0.064	0.3	0.7	0.3
		28-Jul-09	13.5	<0.01	0.83	0.9		0.72	0.06	5980	<0.005	3.86	120	<3	<0.002	<0.01	<0.5	0.146	0.3	0.6	0.2
		29-Aug-09	23.7	<0.01	0.63	1.17		0.54	0.08	6400	<0.005	4.35	101	<3	<0.002	<0.01	0.5	0.085	0.2	1	0.3
		29-Sep-09	28.6		0.68	1.16		0.54	0.06	6550	<0.005	4.03	105	<3	<0.002	<0.01	<0.5	0.118	<0.2	0.8	0.2
		23-Oct-09	24.4	<0.01	0.75	0.96		0.67	0.08	6170	<0.005	4.06	107	<3	<0.002	<0.01	<0.5	0.11	<0.2	0.6	0.2
		27-Nov-09	14.9	<0.01	0.94	0.73		0.92	0.07	7070	<0.005	3.69	126	<3	<0.002	<0.01	<0.5	0.147	<0.2	1.1	0.2
		15-Dec-09	9.54	<0.01	0.79	0.77		1.07	0.06	5960	<0.005	4.27	143	<3	<0.002	<0.01	<0.5	0.131	<0.2	1.2	0.2
		25-Jan-10	47.6	0.01	1.17	3.76		8.78	0.38	38800	0.013	29.5	591	14	<0.002	0.02	0.7	0.458	0.5	4	0.6
		23-Feb-10																			
		22-Mar-10																			
		22-Apr-10	8.86	0.02	0.22	1.14		1.55	0.07	2990	<0.005	1.61	44.3	<10	0.002	0.03	1.1	0.035	0.3	4.3	0.4
		28-May-10	9.8		0.62	1.08		0.64	0.07	4420	<0.005	3.21	81.9	<10	<0.002	<0.01	<0.5	0.105	0.3	1.1	0.2
		28-Jun-10	6.52		0.7	1.14		0.6	0.07	5870	<0.005	3.75	106	<10	<0.002	<0.01	<0.5	0.099	0.3	3.1	0.2
		21-Jul-10	13.9		0.54	1.5		0.42	0.07	5740	<0.005	3.08	83.9	<10	<0.002	0.01	0.8	0.071	0.5	6.1	0.4
		18-Aug-10	16.8		0.54	1.47		0.49	0.1	6400	<0.005	3.61	91.1	<10	<0.002	<0.01	1.5	0.13	1	0.8	0.4
		15-Sep-10	60.3		0.59	1.48		0.47	0.1	7240	<0.005	3.56	93.7	<10	<0.002	<0.01	1	0.117	0.6	0.7	0.4
		21-Oct-10	75.7		0.67	1.35		0.51	0.07	6980	<0.005	3.84	103	<10	<0.002	<0.01	<0.5	0.126	0.4	1.1	0.3
		11-Jan-11	77.4	<0.01	0.69	0.92		1.08	0.06	6200	0.009	4.6	132	<10	<0.002	<0.01	<0.5	0.089	<0.2	5.6	0.4
		29-Apr-11	14.8	<0.01	0.16	0.9		2.34	0.06	4250	0.006	1.81	54.5	<10	<0.002	<0.01	0.5	0.029	0.2	3.4	0.2
		19-May-11	54.2		0.31	1.45		0.87	0.08	3360	<0.005	1.37	40.5	<10	<0.002	<0.01	1.1	0.048	0.8	1.9	0.4
		28-Jun-11	19	<0.01	0.53	1.88		0.44	0.11	5900	0.005	3.68	94.2	<10	<0.002	0.04	1	0.093	0.3	1.1	0.3
		15-Jul-11	37.4		0.43	1.7		0.27	0.09	6110	<0.005	3	69.9	<10	<0.002	0.01	2.5	0.07	1.4	1.9	0.5
		10-Aug-11	78.9		0.58	1.48	13	0.32	0.08	5930	<0.005	3.11	82	<10	<0.002	<0.01	1.4	0.131	1.6	0.9	0.5
		28-Oct-11	193	<0.01	0.7	1.13	12	0.54	0.09	6920	<0.005	3.8	113	<10	<0.002	<0.01	<0.5	0.158	0.5	0.6	0.2
		19-Apr-12	19.2	<0.010	0.221	0.784	63.8	2.18	0.06	4680	0.006	2.46	66.5	<10	<0.0020	<0.20	<0.50	0.0203	0.2	2.87	0.12
		24-May-12	54.2	<0.010	0.54	1.47	16.6	0.709	0.128	5530	<0.0050	2.78	72.9	<10	<0.0020	<0.20	1.15	0.0886	0.89	2.11	0.3
		14-Jun-12	36.5	<0.010	0.585	1.47	16.3	0.453	0.094	5780	<0.0050	3.1	73.6	<10	<0.0020	<0.20	0.61	0.0747	0.99	0.97	0.34
		12-Jul-12	93.7	<0.010	0.759	1.32	16.9	0.466	0.102	6270	<0.0050	3.97	105	<10	<0.0020	<0.20	0.86	0.117	0.82	0.83	0.32
Average			37.38	0.007	0.544	1.31	23.1	1.096	0.088	6393	0.0036	3.88	99.5	4	0.001	0.02	0.73	0.0982	0.5	2.08	0.32
Count			31	20	31	31	6	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Minimum			0.35	0.005	0.11	0.73	12	0.27	0.04	1850	0.0025	0.74	26.7	2	0.001	0.01	0.25	0.0203	0.1	0.4	0.12
Maximum			193	0.02	1.17	3.76	63.8	8.78	0.38	38800	0.013	29.5	591	14	0.002	0.1	2.5	0.458	1.6	6.1	0.6
Geometric Mean			23.55	0.006	0.472	1.237	18.9	0.779	0.08	5396	0.0032	2.98	81.6	3	0.001	0.01	0.58	0.0789	0.37	1.54	0.3
Count <DL			0	16	0	0	0	0	0	0	24	0	0	30	30	25	11	0	5	0	0
Standard Deviation			37.94	0.004	0.251	0.542	20	1.518	0.057	6185	0.0025	4.87	96.2	3	0.0002	0.03	0.51	0.0782	0.38	1.68	0.11
1st Quartile			14.35	0.005	0.365	1	13.8	0.48	0.07	4465	0.0025	2.51	64.8	2	0.001	0.01	0.25	0.05	0.25	0.81	0.2
Median			23.7	0.005	0.58	1.17	16.5	0.67	0.08	5900	0.0025	3.21	83.9	5	0.001	0.01	0.7	0.089	0.4	1.1	0.3
3rd Quartile			50.9	0.005	0.695	1.475	16.8	1.075	0.09	6335	0.0025	3.85	105.5	5	0.001	0.01	1	0.122	0.65	3.2	0.4
95th Percentile			86.3	0.011	0.885	1.79	52.1	2.26	0.119	7155	0.0085	4.48	137.5	5	0.001	0.1	1.45	0.1525	1.2	5.45	0.5
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guidelines: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L. [If no field pH result, lab pH is used; if no pH results, a guideline of 5 µg/L is used].

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log(\text{hardness}))-2.46]}$ µg/L.

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.702]}$ 0.2 µg/L (minimum guideline of 2 ug/L if hardness <82 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	pH (field)	pH (lab)	Conductivity (field)	Specific Conductivity (field)	Conductivity (lab)	Temperature (field)	Dissolved Oxygen (field)	Dissolved Oxygen (field)	ORP (field)	Discharge (Flow)	Staff Gauge Water Level	Total Suspended Solids	Total Dissolved Solids (field)	Total Dissolved Solids (lab)	Hardness (from total)	Hardness (from dissolved)	Alkalinity, total	Alkalinity, bicarbonate HCO3	Chloride	Fluoride	Sulphate, dissolved	Cyanide, total	Cyanide, Weak Acid Dissociable	Ion Balance	Ammonia (N)	Nitrite (N)
			pH units	pH units	µS/cm	µS/cm	µS/cm	C	mg/L	%	mV	m3/s	m	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ratio	mg/L	mg/L
CCME -Aquatic Life Guideline			6.5-9	6.5-9					5.5												120	0.12			0.005		0.343	0.06
MN-4.5	Mainstem McGinty Creek near confluence with Yukon River	6-May-09	7.35	7.1	47.00		44	-1.5				1.2304		52	29.1	42	28.2	25.8	15	18	1.5	0.08	<0.5	0.0009		NC	<0.005	0.005
		13-May-09	7.26	7.3	76.60		57	-1.5				0.4572		12	37.3	94	32.9	33.8	25	30	<5	0.08	<0.5	0.0009		NC	0.008	0.017
		21-May-09	7.65	7.8	124.50		96	0.8	9.59	81.8		0.2105		18	62.1		44.3	47.6					<0.5				<0.005	
		28-May-09	7.77	7.8	143.90		115	0.0	10.34	89.2		0.1185		12	74.4	110	59.6	60.4	53	64	1.7	**0.18**	<0.5	0.0014		NC	<0.005	<0.005
		25-Jun-09	7.87	7.9	90.80		150	3.8	13.77	104	134			2		120	67.3	66.7	70	85	0.6	**0.25**	6.5	0.0007		NC	<0.005	<0.005
		28-Jul-09	7.67	8	129.30		210	5	10.95	85.8	163.7	0.0017		<1		120	98.8	99.4	99	120	0.6	**0.33**	8.5	0.0007		NC	<0.005	<0.005
		29-Aug-09	8.02	7.9			177	4.1	11.4	87.7	75.9	0.0344		1		130	84.8	86.5	85	100	<0.5	**0.28**	6.2	0.0008		NC	<0.005	<0.005
		29-Sep-09	7.88	8	109.60		196	1	12.34	86.6	104.5	0.0070		<1		120	86.2	93.2	94	110	0.6	**0.32**	7.6	<0.0005		NC	0.02	<0.005
		23-Oct-09		8.1			206					0.0086		<1		120	103	107	100	120	1	**0.33**	9.9	<0.0005			<0.005	<0.005
		27-Nov-09		8			224							<1		110	105	108	110	130	1	**0.35**	9.1	<0.0005		NC	<0.005	<0.005
		15-Dec-09										0																
		25-Jan-10										0																
		23-Feb-10										0																
		22-Mar-10										0																
		22-Apr-10	7.47	7.3	41.50		68	0.0	12.30	90.0	326.0	0.7960		14		62	41.8	39.8	30	36	1.9	0.1	<5	<0.0005			0.08	<0.03
		28-May-10	7.74	8.1	110.30		182	4.0	12.96	98.9	333.8	0.0260		1		140	78.2	82.5	88	110	<0.5	**0.31**	8.1	0.0008			<0.005	<0.005
		28-Jun-10	7.83	7.83	112.40		198	4.5	11.4	93.00	97.3	0.0087		2		130	84.6	88.5	89	110	<0.5	**0.32**	8	<0.0005			<0.05	<0.005
		21-Jul-10	8.04	7.98	95.20		154	6.6	11.86	102.9	71.4	0.0406		5		110	66.3	69.4	75	92	1	**0.24**	1.4	0.0012			0.018	<0.005
		18-Aug-10	8.11	7.84	147.50		153	6.4	10.9	94.10	53.0			290		140	91.2	75.5	73	89	0.7	**0.22**	1.1	<0.0005			0.27	<0.005
		15-Sep-10	7.98	7.95	88.40		154	2.4	13.59	99.4	286.3	0.1272		4		110	69.4	77.2	74	91	<0.5	**0.21**	3.3	0.0014			0.17	<0.005
		21-Oct-10	8.03	8.03	69.30		191	-0.1			336.3	0.0230	0.24	<4		140	95.8	94.3	91	110	0.5	**0.29**	6.4	<0.0005	<0.0005		<0.005	<0.005
		11-Jan-11										0.0000																
		29-Apr-11	7.46	7.48	54.00		101	0	14.33	103.5	124.2	0.2154	0.445	2		96	55.7	52.7	46	56	1.9	**0.13**	<0.5	0.0008	0.001		0.038	<0.005
		19-May-11	7.89	7.37	37.90		71	1.1	14.86	102.6	169.3	0.2737	0.325	14		68	40.6	36.1	33	40	2.4	0.12	<5	0.0015	0.0013		<0.005	<0.005
		28-Jun-11	7.9	7.74	83.90		132	5.1	12.3	104.2	63.9	0.2253	0.285	52		110	62.9	72.9	61	74	1.7	**0.21**	<0.5	0.0018	0.0016		0.034	<0.005
		15-Jul-11	7.44	7.51		97.1	97	6.5	10.7	94	318.1	0.6670	0.55	570		58	101	48.4	44	54	1.7	**0.18**	<0.5	0.0018	0.0021		0.12	0.006
		10-Aug-11	7.93	7.43		118.8	120	5.9	12.69	101.5	277.3	0.2461	0.33	150		110	73.8	59.5	56	68	1.6	**0.18**	<0.5	0.0006	0.0012	NC	0.061	<0.005
		28-Oct-11	8.16	7.89		19	209	0.2				0.0160	0.298	6		120	109	98.3	92	110	1	**0.29**	6.6	<0.0005	<0.0005	NC	0.013	<0.005
		19-Apr-12	8.14	7.59		111.3	111	0	16.95	109.3	144.4	0.3307	0.346	2.9		110	59.2	55.2	49.5	60.4	1.4	**0.15**	<0.50	0.00136	<0.00050	NC	0.0098	<0.0050
		24-May-12	8.07	7.91			133	2.2	15.1	110	262.5	0.1372	0.258	67.7		106	64.4	61.8	61.3	74.8	1.2	**0.22**	<0.50	<0.00050	<0.00050	NC	0.028	<0.050
		14-Jun-12	7.95	7.62		109.9	101	2.8	14.95	110.9	108.3	0.3556	0.325	560		74	80.1	51.3	45.3	55.3	<5.0	**0.19**	<5.0	0.00128	0.00106	NC	0.013	<0.050
		12-Jul-12	8.02	7.97		140.5	173	5.5	13.68	109.8		0.0560	0.21	55.7		114	86.9	83.1	81.2	99.1	1.2	**0.27**	1.24	<0.00050	<0.00050	NC	0.024	<0.050
Average			7.83	7.76	91.9	99.4	142	2.6	12.71	98.06	181.6	0.1936	0.328	70.3	50.7	106	73	69.4	66.9	81	1.2	0.22	3.48	0.00079	0.00086		0.0355	0.0064
Count			25	27	17	6	27	25	21	21	19	29	11	27	4	26	27	27	26	26	26	26	27	26	11		27	26
Minimum			7.26	7.1	37.9	19	44	-1.5	9.59	81.8	53	0	0.21	0.5	29.1	42	28.2	25.8	15	18	0.2	0.08	0.25	0.00025	0.00025		0.0025	0.0025
Maximum			8.16	8.1	147.5	140.5	224	6.6	16.95	110.9	336.3	1.2304	0.55	570	74.4	140	109	108	110	130	2.5	0.35	9.9	0.0018	0.0021		0.27	0.025
Geometric Mean			7.82	7.75	85	85	131	2.1	12.59	97.67	153.1	0.1324	0.317	8.7	47.3	102	69	65.2	60.8	73.7	1	0.21	1.5	0.00061	0.00062		0.0117	0.004
Count <DL			0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6	0	13	10	5		12	23
Standard Deviation			0.26	0.28	34.5	41.9	52	2.6	1.86	8.91	103.5	0.2856	0.096	155.2	21.1	26	22.9	23.3	25.8	30.9	0.7	0.08	3.47	0.00053	0.00066		0.0614	0.0078
1st Quartile			7.67	7.55	69.3	100.3	101	0	11.4	90	100.9	0.0086	0.271	2	35.2	98	59.4	52	46.9	57.1	0.6	0.18	0.25	0.00025	0.00025		0.0025	0.0025
Median			7.89	7.84	90.8	110.6	150	2.4	12.34	99.4	144.4	0.056	0.325	6	49.7	110	73.8	69.4	71.5	87	1.1	0.22	2.5	0.00075	0.001		0.013	0.0025
3rd Quartile			8.02	7.97	112.4	116.9	186	5	13.77	104	281.8	0.2461	0.338	52	65.2	120	89.1	87.5	88.8	110	1.7	0.29	6.55	0.00126	0.00125		0.031	0.0044
95th Percentile			8.13	8.08	144.62	135.1	210	6.5	15.1	110	334.1	0.7444	0.498	479	72.6	140	104.4	104.7	99.8	120	2.5	0.33	8.92	0.00173	0.00185		0.155	0.025
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0		0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84.6	0	0	0		0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ **µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).**

Cadmium: $10^{[0.83(\log(\text{hardness}))-3.46]}$ **µg/L**

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ **µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)**

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.465]} * 0.2$ **µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).**

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Nitrate (N)	Nitrite & Nitrate, as N	Dissolved Organic Carbon	Total Organic Carbon	Aluminum (Al), total	Antimony (Sb), total	Arsenic (As), total	Barium (Ba), total	Beryllium (Be), total	Bismuth (Bi), total	Boron (B), total	Cadmium (Cd), total	Calcium (Ca), total	Chromium (Cr), total	Cobalt (Co), total	Copper (Cu), total	Iron (Fe), total	Lead (Pb), total	Lithium (Li), total	Magnesium (Mg), total	Manganese (Mn), total	Mercury (Hg), total	Molybdenum (Mo), total	Nickel (Ni), total	Phosphorous (P), total	Potassium (K), total
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
CCME -Aquatic Life Guideline			3				*		5				1500	*		1		*	300	*				0.026	73	*		
MN-4.5	Mainstem McGinty Creek near confluence with Yukon River	6-May-09	<0.02	<0.02	27.5	30.4	**322**	0.06	0.5	33.8	0.03	<0.005	<50	**0.031**	7.63	0.6	0.532	**3.98**	**617**	0.254	<0.5	2.22	62.3	<0.01	0.14	1.93		1.35
		13-May-09	0.11	0.13	29.8	32.8	**178**	0.05	0.45	26.1	0.02	<0.005	<50	0.007	8.98	0.5	0.19	**3.58**	**342**	0.055	<0.5	2.55	15.1	<0.01	0.22	1.9		1.01
		21-May-09			17.1	18	**137**	0.07	0.46	30.4	0.02	<0.005	<50	**0.073**	12.1	0.4	0.261	**2.86**	**331**	0.155	0.6	3.42	34.7	<0.01	0.43	1.6		0.81
		28-May-09	<0.02	<0.02	19.1	19.1	**123**	0.07	0.49	34.4	0.02	<0.005	<50	0.01	16.7	0.4	0.22	**2.87**	**314**	0.105	0.5	4.34	25.4		0.5	1.8		0.74
		25-Jun-09	0.05	0.05	13.4	12.7	30.9	0.11	0.32	34.6	<0.01	<0.005	<50	<0.005	18.9	0.1	0.08	**2.07**	71	0.158	0.9	4.9	2.8	<0.01	0.87	1.09		0.54
		28-Jul-09	0.12	0.12	9	9	9.8	0.08	0.28	45.3	<0.01	<0.005	<50	<0.005	28.6	<0.1	0.043	1.73	19	0.011	1	6.65	1.68	<0.01	0.99	0.61		0.83
		29-Aug-09	0.24	0.24	12.7	12.7	33.9	0.1	0.4	41.1	<0.01	<0.005	<50	0.026	24	0.3	0.085	**2.21**	81	0.053	1	6.06	4.23	<0.01	0.89	1.11		0.66
		29-Sep-09	0.07	0.07	10	9.4	12.2	0.09	0.32	39.9	<0.01	<0.005	<50	**0.033**	24.4	0.2	0.055	1.92	25	0.014	1	6.15	1.97		0.91	0.88		0.83
		23-Oct-09	0.09	0.09	8	7.9	7.9	0.07	0.27	44.4	<0.01	<0.005	<50	0.006	29.2	0.2	0.043	1.31	17	0.007	1.1	7.27	0.65	<0.01	1.03	0.72		0.8
		27-Nov-09	0.3	0.3	6.7	7.2	8.5	0.07	0.24	47.5	<0.01	<0.005	<50	0.019	31.2	0.2	0.034	1.54	12	0.066	1	6.68	0.5	<0.01	1.03	0.53		0.8
		15-Dec-09																										
		25-Jan-10																										
		23-Feb-10																										
		22-Mar-10																										
		22-Apr-10	<0.1	<0.1	44.7	44.6	**242**	0.03	0.4	31.8	0.03	<0.005	<50	**0.036**	11.3	0.5	0.236	**4.38**	**305**	0.088	0.6	3.3	22.1	<0.01	0.18	1.73		1.48
		28-May-10	0.02	0.02	8.1	8.1	12.8	0.07	0.35	37.7	<0.01	<0.005	<50	0.015	22.3	0.1	0.046	1.48	39	0.122	0.7	5.51	3.54	<0.01	1	0.84		0.79
		28-Jun-10	<0.02	<0.02	12.5	12.7	40.3	0.08	0.34	41.8	<0.01	<0.005	<50	0.006	23.7	0.2	0.098	1.77	82	0.044	0.8	6.15	10.4		0.93	0.98		0.82
		21-Jul-10	0.02	0.02	17.2	16.4	47	0.09	0.4	39.5	0.01	<0.005	<50	0.009	18.9	0.3	0.098	**2.44**	137	0.063	0.9	4.66	5.92	<0.01	0.77	1.2		0.5
		18-Aug-10	<0.02	<0.02	3.2	16	**1950**	0.13	1.88	130	0.17	0.005	<50	**0.106**	24.7	**3.5**	2.96	**13.1**	**3900**	2.21	1.9	7.15	286	<0.01	0.31	8.21		0.73
		15-Sep-10	0.05	0.05	17	17.1	56.9	0.09	0.43	39.8	0.01	<0.005	<50	0.016	18.8	0.4	0.122	**2.52**	229	0.199	0.6	5.43	11.5	<0.01	0.64	4.03		0.51
		21-Oct-10	0.11	0.11	12.5	12.8	37.8	0.09	0.4	47.1	<0.01	<0.005	<50	0.016	27	0.3	0.076	1.83	137	0.051	0.9	6.87	5.31	<0.01	0.85	1.17		0.69
		11-Jan-11																										
		29-Apr-11	<0.02	<0.02	29	30	58.9	0.04	0.41	34.1	<0.01	<0.005	<50	**0.032**	15.9	0.2	0.094	**2.62**	138	0.031	0.6	3.91	9.76	<0.01	0.28	1.12		2.66
		19-May-11	0.09	0.09	26.8	27.8	**334**	0.07	0.55	33	0.03	<0.02	<50	**0.024**	11.3	0.9	0.34	**3.6**	**824**	0.17	0.6	3	41.5	<0.01	0.41	1.9		0.9
		28-Jun-11	0.07	0.07	20.5	21.9	**638**	0.1	0.72	46	0.04	<0.02	<50	**0.033**	17.2	**1.4**	0.58	**4.3**	**1120**	0.37	0.9	4.8	49.9	<0.01	0.58	2.8		0.5
		15-Jul-11	0.02	0.03	24.6	26.7	**12600**	0.5	**6.5**	317	0.53	<0.1	<300	**0.31**	24	**23**	10.2	**37**	**20100**	**7.4**	8	10	670	**<0.05**	0.9	24.8		2
		10-Aug-11	<0.02	<0.02	20	20.4	**2990**	0.21	1.96	98.6	0.12	0.03	<50	**0.066**	20	**6**	2.37	**10.2**	**5120**	1.62	2.5	5.8	134	<0.01	0.72	6.6	160	0.7
		28-Oct-11	0.13	0.13	9.7	10	62.7	0.07	0.45	48.6	<0.01	<0.005	<50	0.01	31.1	0.3	0.138	1.66	277	0.08	0.9	7.59	30.9	<0.01	0.81	1.05	14	0.72
		19-Apr-12	<0.020	<0.020	27.8	27.4	44.2	0.034	0.419	31.7	0.012	<0.0050	<50	**0.0233**	17.3	0.28	0.109	**2.63**	187	0.0358	0.59	3.86	10.7	<0.010	0.41	1	84.4	2.23
		24-May-12	<0.20	<0.20	13.5	13.7	**425**	0.081	0.94	55.6	0.044	<0.0050	<50	**0.0467**	17.7	0.96	0.689	**4.23**	**1320**	0.51	0.75	4.92	104	<0.000010	0.535	2.57	68.2	0.797
		14-Jun-12	<0.20	<0.20	17.1	23.6	**3420**	0.159	3.98	224	0.317	0.0065	<50	**0.288**	21.6	**5.85**	6.36	**23.1**	**8570**	**4.2**	2.52	6.32	715	<0.010	0.37	14.6	635	0.684
		12-Jul-12	<0.20	<0.20	13.7	13.1	**648**	0.098	1.02	66.2	0.042	0.005	<50	**0.043**	24.2	**1.3**	0.715	**4.66**	**1330**	0.617	1.05	6.43	47.6	<0.010	0.642	3.03	50.4	0.62
Average			0.073	0.075	17.5	18.6	906.3	0.1	0.921	63	0.056	0.0062	30	0.0478	20.32	1.79	0.992	5.39	1691	0.6922	1.2	5.41	85.46	0.005625	0.642	3.33	168.7	0.952
Count			26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	24	27	27	6	27
Minimum			0.01	0.01	3.2	7.2	7.9	0.03	0.24	26.1	0.005	0.0025	25	0.0025	7.63	0.05	0.034	1.31	12	0.007	0.25	2.22	0.5	0.000005	0.14	0.53	14	0.5
Maximum			0.3	0.3	44.7	44.6	12600	0.5	6.5	317	0.53	0.05	150	0.31	31.2	23	10.2	37	20100	7.4	8	10	715	0.025	1.03	24.8	635	2.66
Geometric Mean			0.044	0.045	15.2	16.6	122.6	0.084	0.576	49.3	0.017	0.0037	27	0.0229	19.15	0.51	0.233	3.38	286	0.1395	0.89	5.11	17.08	0.00401	0.564	1.86	86.3	0.855
Count <DL			11	11	0	0	0	0	0	0	11	23	27	2	0	1	0	0	0	0	2	0	0	24	0	0	0	0
Standard Deviation			0.072	0.072	9.2	9.3	2499.1	0.088	1.362	65	0.116	0.0104	24	0.0762	6.52	4.52	2.273	7.81	4152	1.6171	1.47	1.76	184.8	0.004251	0.286	5.23	233.5	0.54
1st Quartile			0.013	0.013	11.2	12.7	35.8	0.07	0.375	34.2	0.005	0.0025	25	0.01	16.95	0.2	0.083	1.88	82	0.052	0.6	4.12	4.77	0.005	0.41	1.02	54.9	0.687
Median			0.06	0.06	17	16.4	62.7	0.08	0.43	41.1	0.012	0.0025	25	0.024	20	0.4	0.138	2.63	277	0.105	0.9	5.51	15.1	0.005	0.642	1.6	76.3	0.797
3rd Quartile			0.1	0.1	22.6	25.1	379.5	0.099	0.635	48	0.035	0.0037	25	0.0395	24.3	0.93	0.556	4.27	972	0.312	1	6.54	48.75	0.005	0.895	2.68	141.1	0.865
95th Percentile			0.213	0.213	29.6	32.1	3291	0.195	3.37	195.8	0.273	0.024	25	0.2334	30.53	5.96	5.34	20.1	7535	3.603	2.51	7.49	554.8	0.005	1.021	12.68	516.3	2.161
Count Over Guideline			0	0	0	0	13	0	1	0	0	0	0	14	0	6	0	19	13	2	0	0	0	1	0	0	0	0
% Over Guideline			0	0	0	0	48.1	0	3.7	0	0	0	0	51.9	0	22.2	0	70.4	48.1	7.4	0	0	0	4.2	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{[1.273(\ln[\text{hardness}])-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83(\log[\text{hardness}])-3.53]}$ µg/L

Nickel: $e^{[0.76(\ln[\text{hardness}])+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545(\ln[\text{hardness}])-1.465]} * 0.2$ µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Selenium (Se), total µg/L	Silicon (Si), total µg/L	Silver (Ag), total µg/L	Sodium (Na), total mg/L	Strontium (Sr), total µg/L	Sulphur (S), total mg/L	Thallium (Tl), total µg/L	Tin (Sn), total µg/L	Titanium (Ti), total µg/L	Uranium (U), total µg/L	Vanadium (V), total µg/L	Zinc (Zn), total µg/L	Zirconium (Zr), total µg/L	Aluminum (Al), dissolved µg/L	Antimony (Sb), dissolved µg/L	Arsenic (As), dissolved µg/L	Barium (Ba), dissolved µg/L	Beryllium (Be), dissolved µg/L	Bismuth (Bi), dissolved µg/L	Boron (B), dissolved µg/L	Cadmium (Cd), dissolved µg/L	Calcium (Ca), dissolved mg/L	Chromium (Cr), dissolved µg/L	Cobalt (Co), dissolved µg/L	Copper (Cu), dissolved µg/L	Iron (Fe), dissolved µg/L	Lead (Pb), dissolved µg/L	Lithium (Li), dissolved µg/L
CCME -Aquatic Life Guideline			1		0.1				0.8				15	30																	
MN-4.5	Mainstem McGinty Creek near confluence with Yukon River	6-May-09	0.06	2090	0.008	0.93	39.6	<3	<0.002	<0.01	9.3	0.082	1.5	6.2	0.5	138	0.07	0.28	21.4	0.02	<0.005	<50	0.041	7.03	0.3	0.212	3.03	164	0.06	<0.5
		13-May-09	0.13	3460	<0.005	1.44	47.1	<3	<0.002	<0.01	3.5	0.087	0.8	1.8	0.6	144	0.06	0.36	24.9	0.03	<0.005	<50	0.012	9.3	0.4	0.154	3.59	252	0.021	<0.5
		21-May-09	0.12	3810	0.006	2.39	78.6	<3	<0.002	<0.01	3.8	0.2	1.1	3	0.4	46	0.07	0.38	27	0.02	<0.005	<50	0.03	13.1	0.3	0.133	2.47	140	0.071	0.5
		28-May-09	0.11	4550	<0.005	3.04	97.5	<3	0.002	<0.01	4.6	0.183	1.1	2.4	0.4	29.7	0.08	0.45	30.6	0.01	<0.005	<50	<0.005	16.8	0.2	0.068	2.58	106	0.009	0.7
		25-Jun-09	0.16	4740	<0.005	3.84	132	<3	<0.002	<0.01	0.9	0.296	0.5	0.5	0.3	17.3	0.1	0.31	32.8	0.01	<0.005	<50	0.013	19	0.1	0.05	1.95	42	0.059	0.8
		28-Jul-09	0.18	6200	<0.005	4.92	171	4	<0.002	<0.01	<0.5	1.15	0.5	0.4	0.2	7.6	0.08	0.26	43.7	<0.01	<0.005	<50	<0.005	29.1	<0.1	0.037	1.78	12	0.012	1
		29-Aug-09	0.15	6320	<0.005	4.51	148	<3	<0.002	<0.01	1.2	0.351	0.5	0.8	0.3	14.3	0.09	0.36	39.7	<0.01	<0.005	<50	0.009	24.9	0.3	0.045	1.66	44	0.016	0.9
		29-Sep-09	0.21	5920	<0.005	4.59	147	3	<0.002	<0.01	<0.5	0.766	0.2	2.4	0.2	9.7	0.08	0.33	42.4	<0.01	<0.005	<50	0.007	26.9	0.2	0.041	1.85	20	<0.005	1
		23-Oct-09	0.16	6180	<0.005	5.31	177	4	<0.002	<0.01	<0.5	0.807	0.3	0.3	0.2	6.9	0.07	0.29	42.7	<0.01	<0.005	<50	<0.005	30.2	0.2	0.04	1.23	15	<0.005	1.2
		27-Nov-09	0.17	6080	<0.005	4.48	183	4	<0.002	0.02	<0.5	1.73	0.2	1.5	0.2	9.9	0.09	0.26	46.1	<0.01	<0.005	<50	0.036	31.1	0.2	0.035	1.81	14	0.151	1.1
		15-Dec-09																													
		25-Jan-10																													
		23-Feb-10																													
		22-Mar-10																													
		22-Apr-10	0.07	2710	<0.005	1.8	63.4	<10	<0.002	<0.01	5.1	0.092	0.6	6	0.5	174	0.11	0.38	25.6	0.02	<0.005	<50	0.135	11.1	0.4	0.127	4.71	201	0.467	0.5
		28-May-10	0.15	4500	<0.005	4.27	150	<10	<0.002	0.01	<0.5	0.532	0.4	0.8	0.1	9.1	0.07	0.34	40.7	<0.01	<0.005	<50	<0.005	23.3	0.2	0.047	1.13	31	<0.005	0.8
		28-Jun-10	0.14	4950	<0.005	4.59	161	<10	<0.002	<0.01	1.2	0.847	0.6	0.9	0.2	8.7	0.09	0.34	42.1	<0.01	<0.005	<50	0.006	25.1	0.2	0.045	1.66	18	0.032	0.8
		21-Jul-10	0.15	5410	<0.005	3.45	121	<10	<0.002	<0.01	1.9	0.244	0.8	1.7	0.4	23.1	0.1	0.41	38.6	0.01	<0.005	<50	0.013	19.6	0.3	0.067	2.44	82	0.067	0.8
		18-Aug-10	0.13	8600	0.006	4.04	147	<10	0.01	<0.01	33.2	0.592	11.3	16.1	1	31.8	0.11	0.55	43.1	0.01	<0.005	<50	0.006	21	0.4	0.064	2.86	125	0.021	0.6
		15-Sep-10	0.13	5720	<0.005	3.84	119	<10	<0.002	0.04	1.2	0.227	0.7	**63.1**	0.4	33.7	0.1	0.43	40.7	0.01	<0.005	<50	0.006	21.8	0.5	0.08	2.3	172	0.053	0.7
		21-Oct-10	0.17	7080	<0.005	4.52	160	<10	<0.002	<0.01	1	0.425	0.4	1.6	0.3	18.1	0.08	0.37	46.2	<0.01	<0.005	<50	<0.005	26.3	0.3	0.061	1.65	85	0.014	0.9
		11-Jan-11																													
		29-Apr-11	0.1	4300	<0.005	2.03	83.5	<10	<0.002	<0.01	1.1	0.101	0.3	3.3	0.2	41.1	0.05	0.42	30.4	<0.01	<0.005	<50	0.027	15.1	0.2	0.088	2.61	111	0.059	0.6
		19-May-11	0.12	4170	0.009	1.8	63.8	<50	0.004	<0.2	14	0.124	1.6	2	0.5	71.3	0.05	0.46	25.7	0.02	<0.005	<50	0.017	10.1	0.4	0.155	3.08	308	0.098	0.7
		28-Jun-11	0.13	5760	0.01	3.2	106	<50	0.008	<0.2	26	0.253	3	3	0.6	49	0.12	0.49	36.6	0.01	<0.005	<50	0.032	20.4	0.5	0.099	3.05	197	0.209	0.5
		15-Jul-11	0.4	27200	0.08	4	167	<300	0.09	<1	480	1.14	46	**61**	1.8	77.4	0.13	0.65	34.1	0.02	<0.005	<50	<0.005	13.3	0.6	0.242	3.5	397	0.057	<0.5
		10-Aug-11	0.17	11300	0.026	3.5	113	<50	0.027	<0.2	131	0.441	11.7	10	1	65.9	0.12	0.62	39.1	0.02	<0.005	<50	0.014	16.7	0.5	0.225	2.92	433	0.075	0.6
		28-Oct-11	0.2	7450	<0.005	5.08	169	<10	<0.002	<0.01	2.2	0.471	0.7	1	0.2	16.8	0.08	0.41	50	<0.01	<0.005	<50	0.011	27.4	0.2	0.092	1.49	134	0.112	0.9
		19-Apr-12	0.141	4280	0.0053	2.29	99.1	<10	<0.0020	<0.20	1.84	0.121	0.48	2.33	0.2	28.8	0.043	0.325	31.6	<0.010	<0.0050	<50	0.0228	15.9	0.22	0.0752	2.58	129	0.0411	0.57
		24-May-12	0.142	5180	0.0129	3.16	107	<10	0.0023	<0.20	16.6	0.326	3.13	4.23	0.49	24.5	0.07	0.465	36.2	<0.010	<0.0050	<50	0.013	17.1	0.31	0.137	1.93	403	0.0209	0.56
		14-Jun-12	0.188	8930	0.0389	3.08	135	<10	0.0179	3.55	61.9	0.853	23.8	**31.9**	1.31	44.8	0.112	0.601	31.1	0.015	<0.0050	<50	0.0428	14.2	0.39	0.143	2.69	562	0.155	<0.50
		12-Jul-12	0.171	6910	0.012	4.44	144	<10	0.005	<0.20	21.5	0.327	3.44	6.69	0.55	21.6	0.087	0.607	42.9	<0.010	<0.0050	<50	0.014	23.2	0.35	0.119	2.04	340	0.043	0.63
Average			0.154	6437	0.0094	3.5	123.3	12	0.0068	0.18	30.53	0.473	4.28	8.7	0.48	43.1	0.086	0.413	36.5	0.011	0.0025	25	0.0194	19.59	0.3	0.0993	2.39	168	0.0715	0.68
Count			27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Minimum			0.06	2090	0.0025	0.93	39.6	2	0.001	0.01	0.25	0.082	0.2	0.3	0.1	6.9	0.043	0.26	21.4	0.005	0.0025	25	0.0025	7.03	0.05	0.035	1.13	12	0.0025	0.25
Maximum			0.4	27200	0.08	5.31	183	150	0.09	3.55	480	1.73	46	63.1	1.8	174	0.13	0.65	50	0.03	0.0025	25	0.135	31.1	0.6	0.242	4.71	562	0.467	1.2
Geometric Mean			0.145	5638	0.0049	3.25	115	5	0.0021	0.02	3.53	0.336	1.16	2.93	0.38	28.4	0.083	0.399	35.7	0.009	0.0025	25	0.0111	18.34	0.27	0.0841	2.27	101	0.0361	0.62
Count <DL			0	0	16	0	0	23	18	23	5	0	0	0	0	0	0	0	0	13	27	27	6	0	1	0	0	0	3	4
Standard Deviation			0.06	4586	0.0164	1.2	41.2	29	0.0177	0.68	93.87	0.403	9.79	16.68	0.39	44.1	0.023	0.112	7.6	0.007	0	0	0.0262	6.74	0.13	0.0596	0.81	150	0.0943	0.26
1st Quartile			0.13	4400	0.0025	2.71	98.3	4	0.001	0.01	1.05	0.192	0.49	1.25	0.2	15.6	0.07	0.335	30.9	0.005	0.0025	25	0.006	14.65	0.2	0.0485	1.79	43	0.0185	0.53
Median			0.15	5720	0.0025	3.84	132	5	0.001	0.01	2.2	0.327	0.7	2.4	0.4	28.8	0.08	0.38	38.6	0.01	0.0025	25	0.013	19.6	0.3	0.08	2.44	129	0.053	0.7
3rd Quartile			0.17	6615	0.0085	4.5	155	5	0.0032	0.1	15.3	0.679	2.3	6.1	0.53	47.5	0.1	0.463	42.5	0.018	0.0025	25	0.0249	25	0.4	0.135	2.89	226	0.073	0.85
95th Percentile			0.207	10589	0.0350	5.03	175.2	25	0.0243	0.38	110.3	1.147	20.2	52.27	1.22	142.2	0.12	0.616	46.2	0.02	0.0025	25	0.0423	29.9	0.5	0.221	3.56	424	0.1928	1.07
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	11.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{[1.273(\ln(\text{hardness}))-4.705]}$ **µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).**

Cadmium: $10^{[0.83(\log(\text{hardness}))-3.53]}$ **µg/L**

Nickel: $e^{[0.76(\ln(\text{hardness}))+1.06]}$ **µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)**

Copper: $e^{[0.8545(\ln(\text{hardness}))-1.465]} * 0.2$ **µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).**

McGinty Creek Surface Water Quality

Minto Mine

May 2009 - July 2012

Station Name	Station Description	Sample Date	Magnesium (Mg), dissolved	Manganese (Mn), dissolved	Mercury (Hg), dissolved	Molybdenum (Mo), dissolved	Nickel (Ni), dissolved	Phosphorous (P), dissolved	Potassium (K), dissolved	Selenium (Se), dissolved	Silicon (Si), dissolved	Silver (Ag), dissolved	Sodium (Na), dissolved	Strontium (Sr), dissolved	Sulphur (S), dissolved	Thallium (Tl), dissolved	Tin (Sn), dissolved	Titanium (Ti), dissolved	Uranium (U), dissolved	Vanadium (V), dissolved	Zinc (Zn), dissolved	Zirconium (Zr), dissolved
			mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CCME -Aquatic Life Guideline																						
MN-4.5	Mainstem McGinty Creek near confluence with Yukon River	6-May-09	2.01	27.8	0.01	0.17	1.24		1.33	0.06	1760	<0.005	0.91	36.8	<3	<0.002	<0.01	1.8	0.053	0.6	4.9	0.4
		13-May-09	2.57	5.75	0.01	0.2	1.84		1.02	0.1	3250	<0.005	1.46	49.5	<3	<0.002	<0.01	1.5	0.083	0.7	4.1	0.6
		21-May-09	3.61	12.7	<0.01	0.46	1.66		0.88	0.12	3860	<0.005	2.62	81.2	<3	<0.002	<0.01	0.7	0.17	0.7	2.5	0.4
		28-May-09	4.48	0.19	<0.01	0.57	1.5		0.75	0.13	4580	<0.005	3.21	96.1	<3	<0.002	<0.01	0.7	0.169	0.7	0.6	0.4
		25-Jun-09	4.7	0.52	<0.01	0.82	1.16		0.55	0.15	4810	<0.005	3.74	129	<3	<0.002	<0.01	0.7	0.28	0.5	1.1	0.3
		28-Jul-09	6.5	1.06	<0.01	0.99	0.72		0.83	0.16	5850	<0.005	4.93	171	4	<0.002	<0.01	<0.5	1.14	0.5	1.3	0.2
		29-Aug-09	5.89	1.03	<0.01	0.86	0.98		0.67	0.13	5970	<0.005	4.36	151	<3	<0.002	<0.01	<0.5	0.362	0.4	0.7	0.3
		29-Sep-09	6.31	1.4		0.95	0.9		0.77	0.13	6060	<0.005	4.82	157	<3	<0.002	<0.01	<0.5	0.813	0.3	0.7	0.2
		23-Oct-09	7.66	0.54	<0.01	0.99	0.76		0.84	0.17	5600	<0.005	5.54	173	4	<0.002	<0.01	<0.5	0.797	0.3	0.5	0.2
		27-Nov-09	7.32	0.63	<0.01	1.03	0.57		0.82	0.2	5510	<0.005	4.99	184	3	<0.002	0.01	0.8	1.79	0.3	6	0.2
		15-Dec-09																				
		25-Jan-10																				
		23-Feb-10																				
		22-Mar-10																				
		22-Apr-10	2.93	15.6	0.02	1.22	1.47		1.51	0.09	2860	0.011	26.6	62.8	17	<0.002	0.07	2	0.078	0.5	14.4	0.5
		28-May-10	5.9	0.76		0.95	0.85		0.84	0.17	4290	<0.005	4.43	155	<10	<0.002	<0.01	<0.5	0.563	0.4	0.8	0.2
		28-Jun-10	6.27	1.6		1.02	0.84		0.84	0.14	5100	<0.005	4.7	164	<10	<0.002	0.02	<0.5	0.848	0.5	1.4	0.2
		21-Jul-10	4.95	1.73		0.79	1.67		0.54	0.15	5540	<0.005	3.71	124	<10	<0.002	0.02	1.2	0.24	0.7	2.3	0.4
		18-Aug-10	5.58	0.86		0.73	1.47		0.6	0.13	5850	<0.005	3.99	123	<10	<0.002	<0.01	1.3	0.231	1.3	0.2	0.4
		15-Sep-10	5.56	6.66		0.72	1.38		0.54	0.13	6790	<0.005	3.79	128	<10	<0.002	<0.01	1	0.25	0.6	1.5	0.4
		21-Oct-10	6.93	2.72		0.8	1.05		0.69	0.17	7030	<0.005	4.52	155	<10	<0.002	<0.01	<0.5	0.41	0.4	0.7	0.3
		11-Jan-11																				
		29-Apr-11	3.65	7.26	<0.01	0.26	0.99		2.64	0.09	3950	<0.005	1.98	84	<10	<0.002	<0.01	0.6	0.103	0.4	3.4	0.2
		19-May-11	2.63	12.1		0.31	1.64		0.79	0.1	3400	<0.005	1.63	57.6	<10	<0.002	<0.01	1.2	0.102	0.8	5.2	0.5
		28-Jun-11	5.37	4.49	<0.01	0.59	1.83		0.52	0.14	6020	<0.005	3.71	109	<10	<0.002	0.4	1.4	0.162	0.6	2.9	0.4
		15-Jul-11	3.71	27.2		0.41	1.88		0.3	0.13	5850	<0.005	2.9	72.1	<10	<0.002	<0.01	2.3	0.102	1.6	1.1	0.7
		10-Aug-11	4.3	27.9		0.55	1.62	13	0.37	0.11	5890	<0.005	3.07	92.8	<10	<0.002	<0.01	1.9	0.188	1.7	1.4	0.6
		28-Oct-11	7.24	27	<0.01	0.85	0.9	10	0.73	0.17	6260	<0.005	4.86	170	<10	<0.002	<0.01	<0.5	0.477	0.6	0.8	0.2
		19-Apr-12	3.78	6.85	<0.010	0.383	0.892	68.5	2.19	0.096	3930	<0.0050	2.26	99.4	<10	<0.0020	<0.20	<0.50	0.116	0.38	2.84	0.19
		24-May-12	4.62	28.2	<0.010	0.667	1.14	15.9	0.74	0.131	4810	<0.0050	3.09	102	<10	<0.0020	<0.20	0.57	0.237	0.99	0.7	0.27
		14-Jun-12	3.86	13.2	<0.010	0.57	1.65	19.2	0.516	0.139	5430	0.0063	3.12	82.4	<10	<0.0020	<0.20	1.92	0.109	1.32	2.15	0.45
		12-Jul-12	6.08	14.9	<0.010	0.873	1.3	14.1	0.572	0.15	6020	<0.0050	4.35	138	<10	<0.0020	<0.20	0.97	0.297	1.04	0.85	0.35
Average			4.98	9.28	0.006	0.694	1.256	23.5	0.866	0.133	5047	0.003	4.42	116.6	4	0.001	0.04	0.92	0.377	0.7	2.41	0.35
Count			27	27	17	27	27	6	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Minimum			2.01	0.19	0.005	0.17	0.57	10	0.3	0.06	1760	0.0025	0.91	36.8	2	0.001	0.01	0.25	0.053	0.3	0.2	0.19
Maximum			7.66	28.2	0.02	1.22	1.88	68.5	2.64	0.2	7030	0.011	26.6	184	17	0.001	0.4	2.3	1.79	1.7	14.4	0.7
Geometric Mean			4.71	3.99	0.006	0.622	1.194	18.4	0.767	0.129	4852	0.0027	3.57	108	4	0.001	0.01	0.69	0.249	0.61	1.54	0.32
Count <DL			0	0	14	0	0	0	0	0	0	25	0	0	23	27	22	9	0	0	0	0
Standard Deviation			1.57	10.1	0.004	0.282	0.389	22.3	0.518	0.031	1272	0.0018	4.59	42.4	3	0	0.08	0.65	0.398	0.39	2.87	0.14
1st Quartile			3.75	1.04	0.005	0.505	0.9	13.3	0.561	0.115	4120	0.0025	2.98	83.2	2	0.001	0.01	0.25	0.113	0.4	0.75	0.2
Median			4.95	5.75	0.005	0.73	1.24	15	0.75	0.13	5510	0.0025	3.74	123	5	0.001	0.01	0.7	0.237	0.6	1.4	0.35
3rd Quartile			6.17	14.05	0.005	0.911	1.63	18.4	0.84	0.15	5930	0.0025	4.61	155	5	0.001	0.02	1.35	0.444	0.75	2.87	0.4
95th Percentile			7.30	27.87	0.012	1.027	1.837	56.2	1.986	0.17	6631	0.0052	5.38	172.4	5	0.001	0.1	1.98	1.052	1.52	5.76	0.6
Count Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Over Guideline			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Duplicate samples are omitted.

Where result is less than laboratory detection levels, a value of half the reported detection limit is used to calculate statistics.

CCME - Aquatic Life Guideline: Water quality results are compared with CCME guidelines for protection of freshwater aquatic life with exceedances highlighted in bold red text.

Chromium guideline is conservative as it is for hexavalent chromium which comprises a fraction of the total.

Cyanide guideline is conservative as based on free form of cyanide; if WAD cyanide is below the guideline then free cyanide will be also.

Ammonia guideline is conservative based on pH and temperature not typically rising above 8.5 and 15 degrees celsius respectively.

Where CCME guideline is represented by an asterisk (*), a calculation is used to determine the guideline for each individual sample as per below:

Aluminum: if pH <6.5, guideline = 5 µg/L; otherwise the guideline is 100 µg/L (if no field pH result, lab pH is used; if no pH results, a guideline of 5 ug/L is used).

Lead: $e^{[1.273[\ln(\text{hardness})]-4.705]}$ µg/L (minimum guideline of 1 ug/L if hardness <60 mg/L or unknown; if hardness is >180 mg/L, a guideline of 7 ug/L applies).

Cadmium: $10^{[0.83[\log(\text{hardness})]-3.53]}$ µg/L

Nickel: $e^{[0.76[\ln(\text{hardness})]+1.06]}$ µg/L (minimum guideline of 25 ug/L if hardness <60 mg/L or unknown; if hardness >180 mg/L, a guideline of 150 µg/L applies)

Copper: $e^{[0.8545[\ln(\text{hardness})]-1.465]}$ * 0.2 µg/L (minimum guideline of 2 ug/L if hardness <83 mg/L or unknown; if hardness > 184 mg/L a guideline of 4 µg/L applies).

APPENDIX B

DATA OUTLIER ANALYSIS

Appendix C - McGinty Creek Water Quality Summary of Outliers (May 2009 to July 2012)

Station Name	MN-0.2							MN-0.5							MN-1.5							MN-2.5							MN-4.5						
Parameter	# of Samples	# of Outliers	# Outliers Associated with Elevated TSS	# Outliers Associated with High RDL	Other Reason for Outlier	Date	Comment	# of Samples	# of Outliers	# Outliers Associated with Elevated TSS	# Outliers Associated with High RDL	Other Reason for Outlier	Date	Comment	# of Samples	# of Outliers	# Outliers Associated with Elevated TSS	# Outliers Associated with High RDL	Other Reason for Outlier	Date/s	Comment	# of Samples	# of Outliers	# Outliers Associated with Elevated TSS	# Outliers Associated with High RDL	Other Reason for Outlier	Date/s	Comment	# of Samples	# of Outliers	# Outliers Associated with Elevated TSS	# Outliers Associated with High RDL	Other Reason for Outlier	Date/s	Comment
pH (field)	13	0						28	1			1	12/15/2009	winter sampling	29	0						29	1			1	1/25/2010		25	0					
pH (lab)	13	0						29	0						30	0						31	0						27	0					
Conductivity (field)	6	0						20	0						22	1			1	1/25/2010	TDS = 260 mg/L	22	1			1	1/25/2010		17	0					
Specific Conductivity (field)	7	0						8	0						7	0						7	0						6	0					
Conductivity (lab)	13	0						29	0						30	1			1	1/25/2010	TDS = 260 mg/L	31	1			1	1/25/2010		27	0					
Temperature (field)	12	0						28	0						29	0						29	0						25	0					
Dissolved Oxygen (field)	11	0						22	1			1	1/25/2010	suspect sample from overflow	24	0						24	0						21	0					
Dissolved Oxygen (field)	11	0						22	1			1	1/25/2010	suspect sample from overflow	24	0						24	1			1	1/25/2010		21	0					
ORP (field)	8	0						20	0						21	0						22	0						19	0					
Discharge (Flow)	7	0						22	1			1	5/3/2009	freshet	25	0						23	1			1	5/3/2009	freshet	29	1			1	5/6/2009	freshet
Staff Gauge Water Level	n/a	0						n/a	0						n/a	0							0						11	0					
Total Suspended Solids	13	0						29	2	2			8/18/2010; 6/14/2012	recent rain event	30	1	1			8/18/2010	recent rain event	31	1	1			8/18/2010	recent rain event	27	2	2			15/07/2011; 14/06/2012	recent rainfall June 2012
Total Dissolved Solids (field)	2	0						5	0						5	0						5	0						4	0					
Total Dissolved Solids (lab)	13	0						28	0						29	1			1	8/29/2009		30	1			1	1/25/2010	TDS = 650 mg/L	26	0					
Hardness (from total)	13	0						29	0						30	1	1			8/18/2010	TSS = 8200 mg/L	31	1			1	1/25/2010		27	0					
Hardness (from dissolved)	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Alkalinity, total	13	0						28	0						29	1			1	1/25/2010		30	1			1	1/25/2010		26	0					
Alkalinity, bicarbonate HCO3	13	0						28	0						29	1			1	1/25/2010		30	1			1	1/25/2010		26	0					
Alkalinity, hydroxide OH	13	0						28	0						29	0						30	0						26	0					
Alkalinity, carbonate CO3	13	0						28	0						29	0						30	1			1	1/25/2010		26	0					
Alkalinity, PP carbonate CO3	13	0						28	0						29	0						30	1			1	1/25/2010		26	0					
Chloride	13	0						28	0						29	0						30	1			1	1/25/2010		26	0					
Fluoride	13	0						28	1			1	1/25/2010	suspect sample from overflow	29	1			1	1/25/2010		30	1			1	1/25/2010		26	0					
Sulphate, dissolved	13	0						29	0						30	1	1			7/21/2010	TSS = 1100 mg/L	31	1			1	1/25/2010		27	0					
Cyanide, total	13	0						27	0						29	1	1			8/18/2010	TSS = 8200 mg/L	30	1			1	5/19/2011	5X RDL	26	0					
Cyanide, Weak Acid Dissociable	10	0						11	0						11	0						12	0						11	0					
Ion Balance	9	0						17	0					all NC except 3	16	1				1/25/2010	= 1.1; all rest NC	17	1				1/25/2010	= 1.1; all rest NC	14	0					
Ammonia (N)	13	0						29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			8/18/2010	TSS = 350 mg/L	27	1	1			8/18/2010	TSS = 290 mg/L
Nitrite (N)	13	0						28	0						29	0						30	0						26	0					
Nitrate (N)	13	0						28	1			1	11/27/2009	elevated nutrients	29	0						30	0						26	1			1	11/27/2009	
Nitrite & Nitrate, as N	13	0						28	1			1	11/27/2009	elevated nutrients	29	0						30	0						26	1			1	11/27/2009	
Dissolved Organic Carbon	13	0						28	0						29	0						30	1			1	1/25/2010		27	0					
Total Organic Carbon	13	0						29	1			1	4/22/2010		30	0						31	1			1	1/25/2010		27	0					
Aluminum (Al), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	2	2			8/18/2010; 7/15/2011	TSS = 8200 mg/L & 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Antimony (Sb), total	13	0						29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Arsenic (As), total	13	0						29	0						30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Barium (Ba), total	13	0						29	2	2			8/18/2010; 6/14/2012	TSS = 670 mg/L & 673 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Beryllium (Be), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Bismuth (Bi), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Boron (B), total	13	0						29	0						30	0						31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Cadmium (Cd), total	13	0						29	2				8/18/2010; 6/14/2012	TSS = 670 mg/L & 673 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	0						27	2	2			15/07/2011; 14/06/2012	TSS = 570 mg/L & 560 mg/L
Calcium (Ca), total	13	0						29	0						30	1	1			8/18/2010	TSS = 8200 mg/L	31	1			1	1/25/2010		27	0					
Chromium (Cr), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Cobalt (Co), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	2	2			15/07/2011; 18/08/2010	TSS = 330 mg/L & 350 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Copper (Cu), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Iron (Fe), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	0				8/18/2010	TSS = 670 mg/L	30	2	2			8/18/2010; 7/15/2011	TSS = 8200 mg/L & 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Lead (Pb), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			8/18/2010	TSS = 670 mg/L	30	2	2			8/18/2010; 7/15/2011	TSS = 8200 mg/L & 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Lithium (Li), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	2	2			8/18/2010; 7/15/2011	TSS = 8200 mg/L & 1400 mg/L	31	1			1	1/25/2010		27	1	1			7/15/2011	TSS = 570 mg/L
Magnesium (Mg), total	13	0						29	0						30	1	1			8/18/2010	TSS = 8200 mg/L	31	1			1	1/25/2010		27	0					
Manganese (Mn), total	13	0						29	1	1			6/14/2012	TSS = 673 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			8/18/2010	TSS = 350 mg/L	27	2	2			15/07/2011; 14/06/2012	TSS = 570 mg/L & 560 mg/L
Mercury (Hg), total	12	0						25	0						26	0						27	1		1		7/15/2011	<RDL	24	1		1		7/15/2011	= RDL
Molybdenum (Mo), total	13	0						29	0						30	1	1			7/15/2011	TSS = 1400 mg/L	31	0						27	0					
Nickel (Ni), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Phosphorous (P), total	6	0						6	0						6	0						6	0						6	0					
Potassium (K), total	13	0						29	1			1	4/29/2011		30	0						31	1			1	1/25/2010		27	1			1	4/29/2011	
Selenium (Se), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	0						30	1	1			7/15/2011	TSS = 1400 mg/L	31	2	1		1	25/01/2010; 15/7/2011	TSS = 330 mg/L July 2011	27	1	1			7/15/2011	TSS = 570 mg/L
Silicon (Si), total	13	0						29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1			1	1/25/2010		27	1	1			7/15/2011	TSS = 570 mg/L
Silver (Ag), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Sodium (Na), total	13	0						29	1			1	1/25/2010	suspect sample from overflow	30	1						31	1			1	1/25/2010		27	0					
Strontium (Sr), total	13	0						29	0						30	1						31	1			1	1/25/2010		27	0					
Sulphur (S), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	0						30	2		2		7/15/2011; 8/10/2011	<RDL (300 mg/L)	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Thallium (Tl), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Tin (Sn), total	13	0						29	1			1	7/12/2012	<2X RDL; one of two results >RDL	30	2		2		7/15/2011; 8/10/2011	<RDL (1 ug/L)	31	1			1	5/24/2012		27	1	1			6/14/2012	TSS = 560 mg/L
Titanium (Ti), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1	1			7/15/2011	TSS = 330 mg/L	30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Uranium (U), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	1			1	1/25/2010	suspect sample from overflow	30	1				8/18/2010	TSS = 8200 mg/L	31	0						27	1			1	11/27/2009	
Vanadium (V), total	13	1	1			7/15/2011	TSS = 300 mg/L	29	0						30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Zinc (Zn), total	13	0						29	1	1			8/18/2010	TSS = 670 mg/L	30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	2	1		1	15/07/2011; 15/09/2010	TSS = 570 mg/L July 2011
Zirconium (Zr), total	13	0						29	0						30	1	1			8/18/2010	TSS = 8200 mg/L	31	1	1			8/18/2010	TSS = 350 mg/L	27	1	1			7/15/2011	TSS = 570 mg/L
Aluminum (Al), dissolved	13	0						29	0						30	0						31	0						27	0					
Antimony (Sb), dissolved	13	0						29	0						30	1			1	5/6/2009	Dissolved > total. Possible trace field filter contamination.	31	1			1	1/25/2010		27	0					
Arsenic (As), dissolved	13	0						29	0						30	0						31	1			1	1/25/2010		27	0					
Barium (Ba), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Beryllium (Be), dissolved	13	0						29	0						30	0						31	0						27	0					
Bismuth (Bi), dissolved	13	0						29	0						30	0						31	1			1	1/25/2010	3X RDL	27	0					
Boron (B), dissolved	13	0						29	0						30	0						31	0						27	0					
Cadmium (Cd), dissolved	13	0						29	1			1	1/25/2010	suspect sample from overflow	30	1			1	4/21/2010		31	1			1	5/6/2009		27	1			1	4/22/2010	
Calcium (Ca), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Chromium (Cr), dissolved	13	0						29	0						30	0						31	1			1	1/25/2010	7X RDL	27	0					
Cobalt (Co), dissolved	13	0						29	0						30	0						31	0						27	0					
Copper (Cu), dissolved	13	0						29	0						30	0						31	0						27	0					
Iron (Fe), dissolved	13	0						29	1	1			6/14/2012	TSS = 673 mg/L	30	0						31	0						27	0					
Lead (Pb), dissolved	13	0						29	1			1	9/15/2010		30	1			1	6/28/2010		31	1			1	1/25/2010		27	1			1	4/22/2010	
Lithium (Li), dissolved	13	1		1	5/28/2009	result = RDL; all others <RDL		29	1			1	1/25/2010	suspect sample from overflow	30	1			1	1/25/2010	2X RDL	31	1			1	1/25/2010		27	0					
Magnesium (Mg), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Manganese (Mn), dissolved	13	0						29	0						30	0						31	1			1	10/28/2011		27	0					
Mercury (Hg), dissolved	10	0						19	0						19	0						20	1			1	4/22/2010	2X RDL	17	1			1	4/22/2010	2X RDL
Molybdenum (Mo), dissolved	13	0						29	0						30	0						31	0						27	0					
Nickel (Ni), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Phosphorous (P), dissolved	6	0						6	0						6	0						6	0						6	0					
Potassium (K), dissolved	13	0						29	0						30	0						31	1			1	1/25/2010		27	1			1	4/29/2011	
Selenium (Se), dissolved	13	0						29	1			1	1/25/2010	suspect sample from overflow	30	1			1	1/25/2010	4X RDL	31	1			1	1/25/2010		27	0					
Silicon (Si), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Silver (Ag), dissolved	13	0						29	1			1	4/22/2010	<2X RDL; one of four results >RDL	30	0						31	1			1	1/25/2010		27	1			1	4/22/2010	2X RDL
Sodium (Na), dissolved	13	0						29	1			1	1/25/2010	suspect sample from overflow	30	1			1	1/25/2010		31	1			1	1/25/2010		27	1			1	4/22/2010	
Strontium (Sr), dissolved	13	0						29	0						30	1			1	1/25/2010		31	1			1	1/25/2010		27	0					
Sulphur (S), dissolved	13	0						29	0						30	1			1	4/21/2010	<2X RDL	31	1			1	1/25/2010		27	1			1	4/22/2010	
Thallium (Tl), dissolved	13	0						29	0						30	1			1	4/21/2010	<2X RDL	31	1			1	4/22/2010	= RDL, other results <RDL	27	0					
Tin (Sn), dissolved	13	0						29	1			1	7/12/2012	<2X RDL; one of five results >RDL	30	1			1	4/21/2010		31	0						27	1			1	6/28/2011	
Titanium (Ti), dissolved	13	0						29	0						30	1	1			7/15/2011	TSS = 1400 mg/L	31	1	1			7/15/2011	TSS = 330 mg/L	27	0					
Uranium (U), dissolved	13	0						29	1			1	1/25/2010	suspect sample from overflow	30	0						31	1			1	1/25/2010		27	1			1	11/27/2009	
Vanadium (V), dissolved	13	0						29	0						30	0						31	0						27	0					
Zinc (Zn), dissolved	13	0						29	0						30	0						31	0						27	1			1	4/22/2010	
Zirconium (Zr), dissolved	13	0						29	0						30	0						31	0						27	0					