Faro Background Data Evaluation

Report Prepared for:

Assessment and Abandoned Mines
Yukon Government
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TABLE OF CONTENTS

LIST OF FIGURES

After Page …

LIST OF TABLES

After Page …

GLOSSARY AND ACRONYMS

Anthropogenic - Having to do with the activities of man as opposed to those of nature, man-made, -modified or -influenced.

Background – Referring to the chemical, physical, and biological conditions that exist (or would exist) in the absence of anthropogenic influence. The condition observed at reference stations (see also "reference station").

Background benchmark – the concentration of a parameter reflecting conditions that exist (or would exist) in the absence of specific anthropogenic influences (e.g., effluent discharge).

Benchmark – a value used as the basis of comparison; also see background benchmark and water quality benchmark.

DL – analytical detection limit.

EA – Environmental Assessment.

Outlier – a value that is sufficiently outside the range of other values in a data set as to require special attention. Also see "statistical outlier".

Reference station – a location chosen to represent background conditions and thus used as the basis of comparisons for other stations that may be anthropogenically influenced.

Statistical outlier – in this project, a value outside the range defined by mean ± 3 standard deviations.

Summary statistics – statistics that describe key characteristics of values in a data set, such as mean, standard deviation, etc.

Water quality benchmark – a water quality criterion or toxicity value above which effects on aquatic biota may occur.

Water quality criteria – a general term that encompasses water quality guidelines, objectives, and standards.

1.0 INTRODUCTION

1.1 Background

The Faro Mine complex, near Faro, Yukon, includes two mines: the Faro Mine and Mill (Faro site) and Vangorda/Grum Mines (Vangorda site), which are located approximately 12 km apart (Figure 1.1). The complex was formerly owned by the Anvil Range Mining Corporation and produced lead and zinc concentrates to be extracted for lead, zinc, silver, and gold. The Faro site was mined between 1969 and 1992, while the Vangorda site was developed and mined between 1986 and 1998. Milling continued at Faro until April 1998, when all operations were terminated due to poor economic circumstances and projections, and the site went into receivership. Since then, management of the mine property has been under the direction of Deloitte and Touche Inc., acting as the court appointed Interim Receiver. In early 2009, site Care and Maintenance responsibilities will transfer to a contractor acting on behalf of the Yukon Government.

The Yukon government and its consultants, working with the federal government, Selkirk First Nation, and Ross River Dena Council are currently preparing a comprehensive closure plan for the abandoned Faro Mine complex. Before the closure plan can be implemented, it will be subject to regulatory assessment and approval processes. The plan requires regulatory approval in the form of a Water License issued under the *Waters Act* by the Yukon Water Board and will need to be acceptable to relevant government agencies, the First Nations and the public. The assessment process will be carried out through the Yukon Environmental and Socio-Economic Assessment Board under the *Yukon Environmental and Socio-Economic Assessment Act* (YESAA).

To support various projects associated with the mine closure Environmental Assessment (EA), water quality data will be summarized and evaluated. Integral to this will be comparison of water quality in aquatic environments receiving mine drainage to concentrations found in upstream reference areas ("background" data). This project was undertaken to characterize background concentrations near the Faro Mine.

1.2 Project Objectives and Approach

As noted above, this project was undertaken to characterize background water concentrations. Specifically, the goal was to collate available data for reference stations monitored near the Faro Mine during the period 2005-2007, inclusive, and

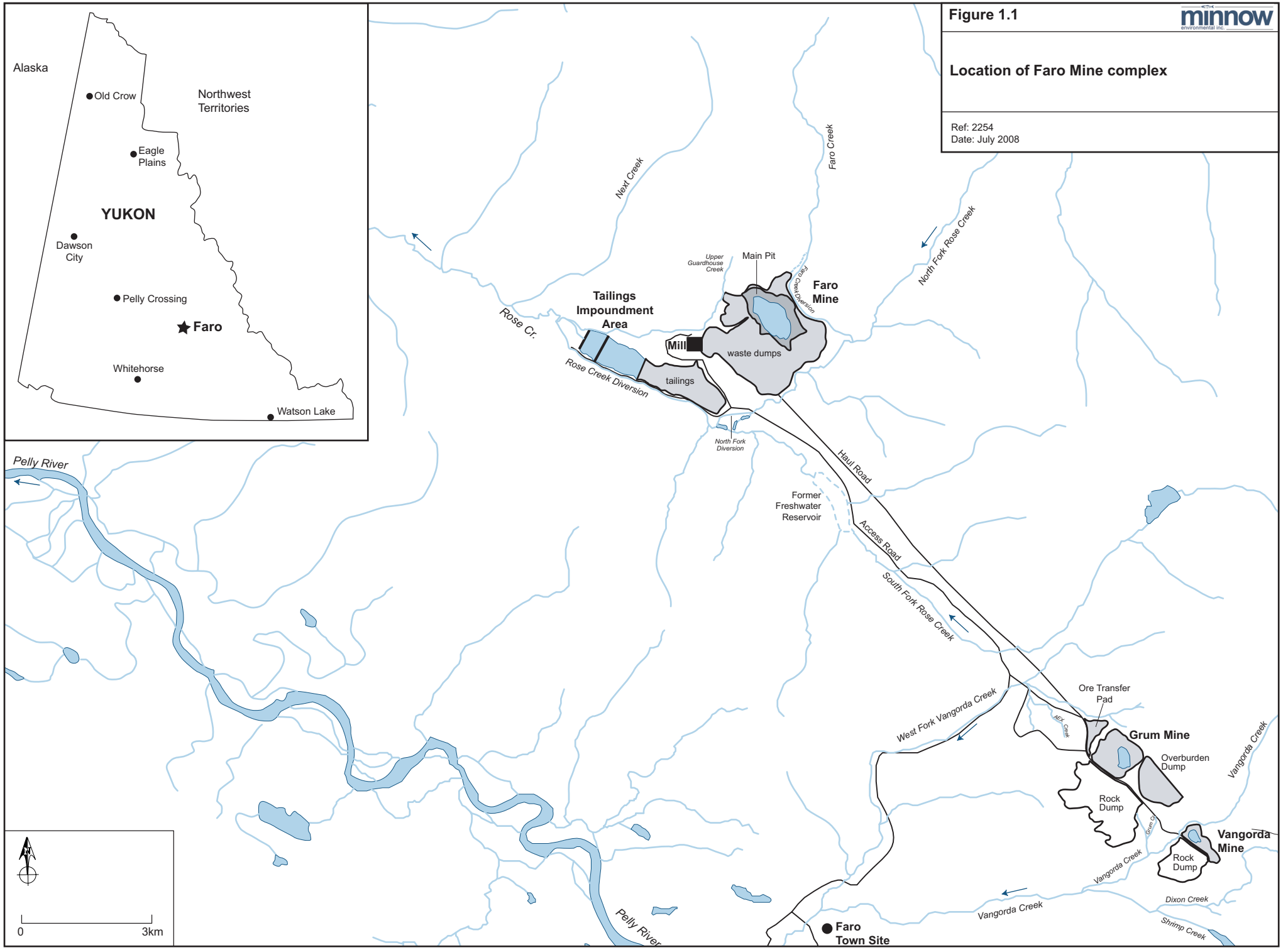


Figure 1.1
minnow environmental inc.
Location of Faro Mine complex
Ref: 2254
Date: July 2008
Alaska
Old Crow
Northwest Territories
Eagle Plains
YUKON
Dawson City
Pelly Crossing
Faro
Whitehorse
Watson Lake
Next Creek
Faro Creek
Upper Guardhouse Creek
Main Pit
Faro Creek Diversion
Faro Mine
North Fork Rose Creek
Tailings Impoundment Area
Rose Cr.
Mill
waste dumps
tailings
Rose Creek Diversion
North Fork Diversion
Haul Road
Former Freshwater Reservoir
Access Road
South Fork Rose Creek
Pelly River
West Fork Vangorda Creek
Ore Transfer Pad
AEX Creek
Grum Mine
Overburden Dump
Rock Dump
Grum Cr.
Vangorda Creek
Vangorda Mine
Rock Dump
Vangorda Creek
Dixon Creek
Shrimp Creek
Faro Town Site
Pelly River
N
0
3km

from these, compute summary statistics that may be useful in water quality evaluations supporting the Faro EA. The summary statistics include several that describe the range of concentrations for each water quality parameter and these have been evaluated to determine the one that best describes the limits of background conditions for all parameters excluding rare extreme values. The selected statistic has been proposed as the background "benchmark" for each parameter to serve in future water quality evaluations for the Faro Mine.

2.0 METHODS

2.1 Data Sources and General Approach

Water quality data used in this report were for the period 2005-2007 inclusive, that being the time frame agreed upon in early 2008 by representatives of the Yukon government and other scientists involved in projects related to Faro Mine closure. The data were compiled from several sources, including routine water quality monitoring data collected under the direction of the court-appointed receiver for the site (Deloitte and Touche Inc.), which were downloaded from the site database and provided to Minnow by Gartner Lee Limited (now AECOM). Data collected through monitoring programs conducted during this period by Access Consulting Group, Laberge Environmental Services, and Minnow Environmental Incorporated were added to the data set.

Detailed analyses of water quality data were undertaken for nine background/reference stations located on permanent surface water courses and situated upstream of mine-related disturbances or inputs (e.g., effluent discharges, site runoff, roads, rock piles, pits, groundwater upwelling, etc.). Seven stations were located within the Rose/Anvil watershed: FDU (Upper Faro Creek), R6 (Anvil Creek upstream of Rose Creek), R7 (North Fork Rose Creek upstream of the Faro Creek Diversion), W10 (upper Guardhouse Creek), USFR (Upper South Fork Rose Creek upstream of Haul Road), NEXC (Next Creek), 1st Trib Rose (Rose Creek Tributary upstream of K8; Figure 2.1). Two stations were located in the Vangorda watershed: V1 (Upper Vangorda Creek), UWF (Upper west Fork Vangorda Creek) (Figure 2.1). The frequency of water sampling varied among stations from one-time events to monthly samples. The date of collection, sampling location, and source of each datum included in this evaluation are shown in raw data tables presented in Appendix A (Table A.1).

The data for all stations were pooled to compute summary statistics describing the background concentrations of each parameter. Pooling data for all reference stations was considered justified because concentrations associated with mine influence are expected to well exceed the variability in conditions among reference areas. Also, a previous study showed that water quality differences among reference streams were just as likely to occur within the Rose-Anvil Creek and Vangorda Creek drainages as between them (Minnow 2007).

Data were evaluated for 36 metals (total concentrations) and 29 non-metals for a total of 65 parameters. Sample sizes greater than 90 were available for most metals,

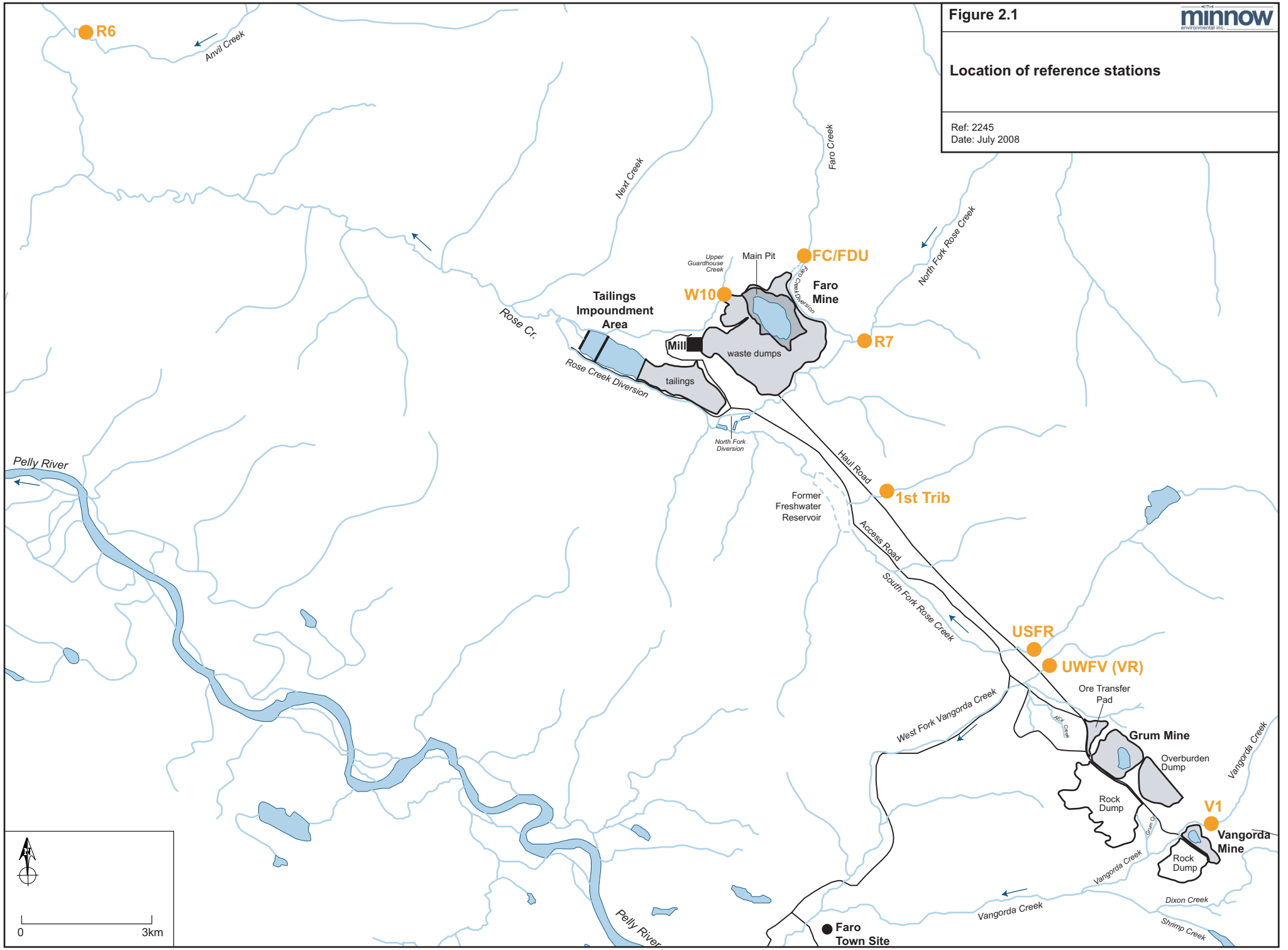


Figure 2.1
minnow environmental inc.
Location of reference stations
Ref: 2245
Date: July 2008
R6
Anvil Creek
Next Creek
Faro Creek
North Fork Rose Creek
Upper Guardhouse Creek
Main Pit
FC/FDU
W10
Faro Creek Diversion
Faro Mine
Tailings Impoundment Area
Rose Cr.
Mill
waste dumps
R7
Rose Creek Diversion
tailings
North Fork Diversion
Haul Road
1st Trib
Former Freshwater Reservoir
Access Road
South Fork Rose Creek
USFR
UWFV (VR)
Ore Transfer Pad
West Fork Vangorda Creek
AEX Creek
Grum Mine
Overburden Dump
Vangorda Creek
Rock Dump
V1
Grum Cr.
Vangorda Mine
Rock Dump
Vangorda Creek
Dixon Creek
Shrimp Creek
Pelly River
Pelly River
Faro Town Site
N
0
3km

whereas sample sizes for non-metal parameters were less consistent and varied between 17 to over 90 (Appendix Table A.1). Parameters having a total sample size of less than 10 were not included in the evaluation (total acidity [n=6], total dissolved solids measured *in situ* [n=8], and true colour [n=6]). Total phophorus values reported as part of metal scans using inductively coupled plasma (ICP) instrumentation (n=76) were also removed from the set of parameters based on the availability of phosphorus data from targeted nutrient analyses associated with superior (lower) analytical method detection limits (DLs).

To facilitate evaluations of water quality data for mine-exposed areas as part of the Faro EA and closure planning process, it was desirable to describe the range of background water quality. By so doing, it would be possible to define mine-exposed areas having concentrations outside of the range of background water quality. For most parameters, it is of particular interest to identify where concentrations are *above* the upper range of background concentrations, thus indicating areas of mine influence. For a few parameters, such as pH, alkalinity, and dissolved oxygen, areas showing lower-than-background levels may also be indicative of mine influence and were thus also of interest. The summary statistics were used to define background benchmarks representing the limits of background conditions to allow for future identification of parameters and locations that are influenced by the Faro Mine (i.e., concentrations falling outside of the background range).

Various approaches have been used in other studies to derive benchmarks that reflect the upper (or lower) range of background concentrations for a given parameter (e.g., 90th-99th percentile; CCME 2003, Roe et al. 2006), and there is currently no established consensus as to which measure is the most appropriate. Therefore, several options were reviewed in detail for this report to determine if any single summary statistic provides a reasonable measure of the upper range of background concentrations for all parameters such that this statistic can serve as the background benchmark in future water quality evaluations at Faro.

All steps involved in the data assessment and development of background benchmarks are described in the sections that follow.

2.2 Data Outliers

A preliminary data assessment was conducted to identify any data that may be suspect. Potential outliers were flagged as values greater or less than the mean ± 3 standard deviations for each parameter (i.e., statistical outliers). These values were

evaluated in the context of the other values reported for the same and other stations over the same time period (2005-2007). Values considered to be sufficiently outside of the range of other data as to be suspect and/or to potentially bias the summary statistics were removed from the data set. This resulted in the removal of only eight of the total of more than 4,000 water quality measurements considered (Appendix Tables A.1 and A.2). The rationale for removal of each value was documented (Appendix Table A.2). In addition, values reported as less than detection (<DL) were also excluded from the summary statistics for each parameter if the ½DL value (which was substituted for values reported as <DL in computations for summary statistics; see Section 2.3) exceeded relevant water quality criteria (water quality criteria selection is explained in Section 2.5). All values excluded from summary statistics were highlighted in the raw data table presented in Appendix A (Table A.1).

2.3 Summary Statistics

Summary statistics were computed for each parameter including sample size (n), median, mean, standard deviation, standard error, minimum and maximum values (Appendix Table A.1). Values reported as <DL were included in the computations at ½ the DL. To allow for evaluation of the influence of <DL values on the summary statistics, the following information was also noted for each parameter: all reported DLs, number and percentage of samples with values < DL, number and percentage of samples with values above the applicable water quality criterion (or below the criterion in the cases of alkalinity (all forms), pH, and dissolved oxygen; also see Section 2.4), and the number and percentage of samples reported as < DL where the detection limit was above the applicable water quality criterion (Appendix Table A.1). Additional statistics were computed for consideration as potential background benchmarks as described below.

2.4 Background Benchmarks

Various statistics were computed that described the upper and lower range of data for each parameter, including: 99th percentile, 95th percentile, 90th percentile, 1st percentile, 5th percentile, 10th percentile, and the mean ± *t*-value[1] x standard deviation (Appendix Table A.1). For most parameters the statistics describing the upper range of background concentrations are of greatest relevance because mine influence is expected to result in concentrations above background levels. However, at acid-generating mines such as Faro, mine influence may cause the concentrations of some

[1] One-tailed Student's *t*-value corresponding to degrees of freedom for the available sample size and α = 0.05.

parameters to be lower than background levels, as in the case of alkalinity (total and phenolphthalein alkalinity), bicarbonate, carbonate, hydroxide, dissolved oxygen, and pH. As a result, both upper and lower statistics were computed for all parameters, but the lower ones are of interest primarily for the limited number of parameters listed above.

The available data for each parameter were graphed on separate scatter plots along with the four estimates of the upper range of data (upper percentiles and mean + t-value x standard deviation) being considered for selection as the background benchmark (Appendix Figures A.1 to A.65). For the two types of alkalinity, bicarbonate, carbonate, dissolved oxygen, and pH, a second set of data plots were prepared showing estimates of the lower range of data (lower percentiles and mean – t-value x standard deviation). Hydroxide was not plotted twice since all data were reported as <DL, so upper and lower statistics were identical. Each scatter plot was reviewed for any data points that may be biasing estimates of the range of background data. A single high colour value combined with a relatively limited sample size (n=17) had the effect of raising the upper statistics to values that did not appear to adequately describe the upper range of the remainder of the data set (Appendix Figure A.66). Removal of this datum improved the fit of the summary statistics to the overall data set, and the summary statistics reported herein reflect this change.

Visual examination of the data plots for each parameter indicated that the 95th percentiles (or 5th percentiles for the two types of alkalinity, bicarbonate, carbonate, dissolved oxygen and pH) best reflected the range of most data for each parameter without bias by rare values observed at the extreme ends of each range (Appendix Figures A.1 to A.65). Consequently, the 95th percentile was recommended as the background benchmark for all parameters except in the cases of alkalinity, bicarbonate, carbonate, pH, for which the 5th percentile was selected as the background benchmark.

2.5 Water Quality Criteria

The background benchmarks were compared to water quality criteria to identify any substances that naturally exceed such criteria. Canadian water quality criteria for protection of aquatic life were used, if available. Otherwise, criteria from British Columbia or other jurisdictions, or occasionally toxicity data available in the scientific literature, were applied to provide a benchmark denoting the concentration above which effects on aquatic biota may occur (Appendix B).

3.0 RESULTS

Selected summary statistics for each parameter are presented in Table 3.1. The recommended upper background benchmark for each parameter has been presented in the table, except in the cases of alkalinity, bicarbonate, carbonate, dissolved oxygen and pH for which the lower benchmark is of greater interest at Faro Mine.

The background benchmarks for aluminum and cadmium slightly exceeded applicable water quality criteria for protection of aquatic life, indicating that the concentrations of these parameters are naturally elevated at Faro Mine (Table 3.2). This should be taken into account in future water quality evaluations at Faro Mine, such that the background benchmark for these parameters, rather than the applicable water quality benchmark, should be used to identify locations where the Faro Mine has influenced water quality with respect to these substances.

As cadmium is expected to be identified as a contaminant of concern in the Faro Mine EA, and because a large percentage of <DL values were removed from the data set because the DL exceeded the water quality criterion for cadmium (Appendix Table A.1), additional analyses were done to explore the effect on the benchmark of including reference area data from 2008. The resulting benchmark (0.000073 mg/L; Appendix Table A.3) was higher than the benchmark derived from the original data set (0.00004 mg/L) indicating that use of the original benchmark (2005-07 data) in water quality evaluations would be conservative. As DLs for silver and zirconium also often exceeded applicable criteria in 2005-07, a high percentage of the data was removed for these substances as well. However, inclusion of data from 2008 did not alter the benchmarks derived for these substances based on the original 2005-07 data set (Appendix Table A.3).

As the 95th percentile was selected as the background benchmark, it can be expected that approximately 5% of background values will exceed the benchmark even in the absence of any mine influence (and 5% of values will be below the 5th percentile benchmarks). Consequently, occasional values (i.e., ≤ 5%) outside of the background range will not necessarily signify mine influence, nor will exceedences only slightly more than this (e.g., perhaps up to 10% of samples) definitively signify mine influence either (unless the magnitude of exceedence, when it occurs, is consistently large and the data set is suitably large to confirm such a pattern). Generally, it is suggested that parameters and locations exceeding the benchmarks in more than 10% of receiving

Table 3.1: Summary statistics of background data for Faro Mine, Yukon, 2005 - 2007 (more details in Appendix Table A.1).

Measurements	Units	n	median	mean	standard deviation	minimum	maximum	Lower background benchmark	Upper background benchmark
Total metals									
Aluminum	mg/L	93	0.020	0.052	0.115	0.0025	0.99		0.156
Antimony	mg/L	93	0.0005	0.0004	0.0002	< 0.00002	< 0.001		< 0.001
Arsenic	mg/L	93	0.0005	0.0005	0.0003	< 0.0001	0.002		< 0.001
Barium	mg/L	93	0.0380	0.0437	0.0252	0.009	0.12		0.088
Beryllium	mg/L	93	0.0005	0.0004	0.0002	< 0.00001	< 0.001		< 0.001
Bismuth	mg/L	93	0.0005	0.0004	0.0002	< 0.000005	< 0.001		< 0.001
Boron	mg/L	93	0.03	0.02	0.02	0.003	0.12		< 0.05
Cadmium	mg/L	29	0.00001	0.00003	0.00007	< 0.00001	0.0004		0.00004
Calcium	mg/L	93	17.6	22.3	15.1	2.1	77.8		44.9
Chromium	mg/L	93	0.0005	0.0005	0.0004	< 0.0001	0.003		< 0.001
Cobalt	mg/L	93	0.0005	0.0004	0.0002	0.00001	< 0.001		< 0.001
Copper	mg/L	93	0.0005	0.0007	0.0006	0.0003	0.003		0.002
Iron	mg/L	93	0.070	0.113	0.182	0.005	1.41		0.246
Lead	mg/L	93	0.0005	0.0004	0.0002	0.000008	< 0.001		< 0.001
Lithium	mg/L	89	0.002	0.003	0.003	< 0.0002	0.011		0.008
Magnesium	mg/L	93	3.07	4.51	3.54	0.40	16		10.74
Manganese	mg/L	93	0.007	0.0122	0.0233	0.0004	0.15		0.0264
Mercury	mg/L	79	0.00001	0.00001	0.000004	< 0.00001	< 0.00005		< 0.00002
Molybdenum	mg/L	93	0.0003	0.0005	0.0003	0.00005	0.0014		0.00118
Nickel	mg/L	93	0.0005	0.0005	0.0002	0.0002	0.002		< 0.001
Potassium	mg/L	93	0.6	0.7	0.4	< 0.1	1.9		1.4
Selenium	mg/L	92	0.0005	0.0005	0.0003	< 0.00004	0.002		< 0.001
Silicon	mg/L	89	5.32	6.46	3.23	< 0.01	16.00		13.68
Silver	mg/L	28	0.000005	0.000009	0.000009	< 0.000005	< 0.00005		< 0.00005
Sodium	mg/L	93	1.94	2.15	0.75	0.77	5.50		3.41
Strontium	mg/L	93	0.07	0.09	0.05	0.013	0.25		0.18
Sulphur	mg/L	13	2	4	3	2	8		8
Tellurium	mg/L	71	0.0005	0.0005	0.0001	< 0.0002	0.001		< 0.001
Thallium	mg/L	93	0.00005	0.00004	0.00003	< 0.000002	0.0002		< 0.0001
Thorium	mg/L	70	0.00025	0.00023	0.00006	< 0.0001	< 0.0005		< 0.0005
Tin	mg/L	93	0.0005	0.0004	0.0004	< 0.00001	0.002		< 0.001
Titanium	mg/L	93	0.0005	0.001	0.002	0.0003	0.014		0.004
Uranium	mg/L	93	0.0007	0.0011	0.0011	< 0.0001	0.0078		0.0025
Vanadium	mg/L	93	0.0005	0.0004	0.0002	< 0.00005	0.001		< 0.001
Zinc	mg/L	93	0.0025	0.0048	0.0064	0.0004	0.0380		0.0164
Zirconium	mg/L	28	0.00017	0.00065	0.00086	< 0.0001	< 0.005		< 0.005
Non-metals									
Alkalinity - phenolphthalein	mg/L as CaCO3	22	0.25	0.25	0	< 0.5	< 0.5	< 0.5	
Alkalinity - Total	mg/L as CaCO3	43	37.0	60.5	49.3	11.6	159	14.8	
Ammonia - total	mg/L	86	0.005	0.009	0.010	< 0.005	0.070		0.030
Bicarbonate	mg/L	39	49.2	77.5	62.0	14.1	194	17.9	
Carbonate	mg/L	39	0.25	0.30	0.33	< 0.5	2.30	< 0.5	
Chloride - dissolved	mg/L	28	0.3	0.2	0.1	<0.2	< 0.5		< 0.5
Colour	CU	16	2.5	3.7	2.0	< 5	8		7
Conductivity - laboratory	µS/cm	93	123	147	92	19	382		303
Conductivity - in situ	µS/cm	23	97	139	119	29.3	379.0		350
Cyanide - weak acid dissociable	mg/L	17	0.00025	0.00025	0	< 0.0005	< 0.0005		< 0.0005
Dissolved oxygen - in situ	mg/L	18	12.12	12.12	1.40	9.10	14.65	10.23	
Dissolved oxygen - in situ	%	14	93.0	91.5	9.4	79.5	104.9	80	
Dissolved organic carbon	mg/L	22	1.6	1.8	0.8	0.6	3.5		3.1
Fluoride	mg/L	22	0.08	0.08	0.01	0.07	0.11		0.11
Hardness - dissolved	mg/L as CaCO3	23	37.9	58.8	51.9	11.5	178.0		169
Hardness - Total	mg/L as CaCO3	87	59.0	77.3	52.5	7.0	261		158
Hydroxide	mg/L	39	0.25	0.25	0	< 0.5	< 0.5	< 0.5	
Nitrate	mg/L	22	0.04	0.10	0.18	< 0.02	0.82		0.35
Nitrite	mg/L	22	0.0025	0.0025	0	< 0.005	< 0.005		< 0.005
Nitrate plus nitrite	mg/L	22	0.04	0.10	0.18	< 0.02	0.82		0.35
pH - Laboratory	pH units	24	7.70	7.71	0.34	6.93	8.30	7.08	
pH - in situ	pH units	89	7.70	7.60	0.55	4.73	8.44	6.58	
Sulphate	mg/L	92	8.14	9.25	9.21	1.04	80.10		20.3
Temperature - in situ	˚C	89	1.4	2.7	2.9	0	10.1	NA	NA
Total organic carbon	mg/L	22	2.1	1.9	0.9	0.6	3.4		3.3
Phosphorus - nutrient analysis	mg/L	22	0.0025	0.0028	0.0016	< 0.005	0.01		< 0.005
Total dissolved solids - laboratory	mg/L	22	63	80	49	28	180		180
Total suspended solids	mg/L	93	1	1	3	< 1	21		3
Turbidity	NTU	23	0.31	0.37	0.31	0.10	1.50		0.76

Table 3.2: Background benchmarks and selected criteria for evaluation of water quality at Faro Mine, Yukon.

Measurements	Units	Water quality benchmark[a]	Upper background benchmark	Lower background benchmark
Total metals				
Aluminum	mg/L	0.1	0.156	
Antimony	mg/L	0.02	< 0.001	
Arsenic	mg/L	0.005	< 0.001	
Barium	mg/L	1.0	0.088	
Beryllium	mg/L	1.1	< 0.001	
Bismuth	mg/L	0.26	< 0.001	
Boron	mg/L	1.2	< 0.05	
Cadmium	mg/L	0.00003	0.00004	
Calcium	mg/L	116	44.9	
Chromium	mg/L	0.001	< 0.001	
Cobalt	mg/L	0.004	< 0.001	
Copper	mg/L	0.002	0.002	
Iron	mg/L	0.3	0.246	
Lead	mg/L	0.002	< 0.001	
Lithium	mg/L		0.008	
Magnesium	mg/L	82	10.74	
Manganese	mg/L	1	0.0264	
Mercury	mg/L	0.000026	< 0.00002	
Molybdenum	mg/L	0.073	0.00118	
Nickel	mg/L	0.065	< 0.001	
Potassium	mg/L	53	1.4	
Selenium	mg/L	0.001	< 0.001	
Silicon	mg/L		13.68	
Silver	mg/L	0.0001	< 0.00005	
Sodium	mg/L	200	3.41	
Strontium	mg/L	9.3	0.18	
Sulphur	mg/L		8	
Tellurium	mg/L		< 0.001	
Thallium	mg/L	0.0008	< 0.0001	
Thorium	mg/L		< 0.0005	
Tin	mg/L	0.35	< 0.001	
Titanium	mg/L	1.83	0.004	
Uranium	mg/L	0.015	0.0025	
Vanadium	mg/L	0.006	< 0.001	
Zinc	mg/L	0.030	0.0164	
Zirconium	mg/L	0.004	< 0.005	
Non-metals				
Alkalinity - phenolphthalein	mg/L as $CaCO_3$			< 0.5
Alkalinity - Total	mg/L as $CaCO_3$	11.12		14.8
Ammonia - total	mg/L	0.24	0.030	
Bicarbonate	mg/L			17.9
Carbonate	mg/L			< 0.5
Chloride - dissolved	mg/L	250	< 0.5	
Colour	CU		7	
Conductivity - laboratory	µS/cm		303	
Conductivity - in situ	µS/cm		350	
Cyanide - weak acid dissociable	mg/L	0.005 (free)	< 0.0005	
Dissolved oxygen - in situ	mg/L	6.5 (min.)		10.23
Dissolved oxygen - in situ	%			80
Dissolved organic carbon	mg/L		3.1	
Fluoride	mg/L	0.12	0.11	
Hardness - dissolved	mg/L as $CaCO_3$		169	
Hardness - Total	mg/L as $CaCO_3$		158	
Hydroxide	mg/L			< 0.5
Nitrate	mg/L	13	0.35	
Nitrite	mg/L	0.06	< 0.005	
Nitrate plus nitrite	mg/L		0.35	
pH - Laboratory	pH units	6.5-9.0		7.08
pH - in situ	pH units	6.5-9.0		6.58
Phosphorus - nutrient analysis	mg/L	0.03	20.3	
Sulphate	mg/L	50	20.3	
Total organic carbon	mg/L		< 0.005	
Total dissolved solids - lab.	mg/L	500	180	
Total suspended solids	mg/L	8	3	
Turbidity	NTU	2	0.76	

background benchmark exceeds or is less than (for total alkalinity and pH) water quality criteria

[a] see Appendix Table B.1 for sources

water samples collected downstream of the Faro Mine can be considered indicative of mine influence.

4.0 REFERENCES

CCME (Canadian Council of Ministers of the Environment). 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives. In: Canadian Environmental Quality Guidelines, 1999 (plus updates), Canadian Council of Ministers of the Environment, Winnipeg.

Minnow Environmental Inc. 2007. Ecological Impact Assessment, Faro Mine, Yukon. Prepared for Faro Mine Closure Office, Whitehorse, Yukon. May 2007.

Roe, S., Hill, J., Schneider, U. and L. Swain. Re-thinking the Background Approach to Setting Site-specific Water Quality Guidelines (SSGs). Presented at 33rd Aquatic Toxicity Workshop, Jasper, Alberta. October 1-4, 2006.

APPENDIX A

Water Data

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
FC/FDU	GLL	Upper Faro Creek	2005	22-Jun-05	0.078	< 0.001	< 0.001	0.014	< 0.001	< 0.001	< 0.05	< 0.0002	3.27	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.002	0.66	0.002
FC/FDU	GLL	Upper Faro Creek	2005	19-Sep-05	0.047	< 0.001	< 0.001	0.015	< 0.001	< 0.001	< 0.05	< 0.0002	4.11	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.002	0.79	0.002
FC/FDU	GLL	Upper Faro Creek	2006	07-Jun-06	0.1	< 0.001	< 0.001	0.011	< 0.001	< 0.001	< 0.05	< 0.0002	2.14	< 0.001	< 0.001	0.001	0.07	< 0.001	0.002	0.43	0.001
FC/FDU	GLL	Upper Faro Creek	2006	18-Sep-06	0.068	< 0.001	< 0.001	0.014	< 0.001	< 0.001	< 0.05	< 0.0002	3.69	< 0.001	< 0.001	< 0.001	0.08	< 0.001	0.002	0.75	0.002
FC/FDU	GLL	Upper Faro Creek	2007	11-Jun-07	0.18	< 0.001	< 0.001	0.013	< 0.001	< 0.001	< 0.05	< 0.0002	2.07	< 0.001	< 0.001	0.001	0.14	< 0.001	< 0.005	0.4	0.004
FC/FDU	GLL	Upper Faro Creek	2007	2-Oct-07	0.057	< 0.001	< 0.001	0.013	< 0.001	< 0.001	< 0.05	< 0.0002	3.37	< 0.001	< 0.001	0.003	0.05	< 0.001	0.002	0.65	0.002
FC/FDU	Laberge	Upper Faro Creek	2007	26-Mar-07	0.074	< 0.0002	< 0.0002	0.026	< 0.0002	< 0.0002	< 0.01	0.00001	6.15	< 0.0002	< 0.0002	0.0004	0.08	0.0006	0.0025	1.38	0.0015
FC/FDU	Access	Upper Faro Creek	2007	25-Sep-07	0.0797	0.00006	0.0002	0.0129	< 0.00005	< 0.00005	< 0.008	0.00001	3.54	0.001	0.00005	0.0009	0.066	0.00032	0.0012	0.83	0.00261
FC/FDU	Access	Upper Faro Creek	2007	25-Oct-07	0.037	< 0.00002	0.0001	0.0156	0.00001	< 0.000005	< 0.005	0.000013	3.91	0.0001	0.000018	0.00047	0.033	0.000104	0.002	0.76	0.00105
FC/FDU	Access	Upper Faro Creek	2007	21-Nov-07	0.0322	< 0.00002	0.00006	0.0172	< 0.00001	< 0.000005	< 0.005	0.000009	4.27	0.0001	0.000015	0.00051	0.031	0.000152	0.0019	0.77	0.00089
FC/FDU	Access	Upper Faro Creek	2007	13-Dec-07	0.0293	< 0.00002	0.00008	0.0176	< 0.00001	< 0.000005	< 0.005	0.000009	4.87	0.0001	0.000019	0.00039	0.024	0.000088	0.0025	0.94	0.0007
R6	GLL	Anvil Ck u/s Rose Ck	2005	29-Mar-05	0.017	< 0.001	< 0.001	0.094	< 0.001	< 0.001	< 0.05	< 0.0002	77.8	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.004	16	0.018
R6	GLL	Anvil Ck u/s Rose Ck	2005	17-Aug-05	0.028	< 0.001	< 0.001	0.068	< 0.001	< 0.001	< 0.05	< 0.0002	43.7	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.001	11.8	0.014
R6	GLL	Anvil Ck u/s Rose Ck	2006	21-Feb-06	0.14	< 0.001	< 0.001	0.093	< 0.001	< 0.001	< 0.05	< 0.0002	49.5	0.003	< 0.001	0.003	0.18	< 0.001	0.003	11.3	0.014
R6	GLL	Anvil Ck u/s Rose Ck	2006	07-Aug-06	0.019	< 0.001	< 0.001	0.064	< 0.001	< 0.001	< 0.05	< 0.0002	40	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.002	10.6	0.012
R6	GLL	Anvil Ck u/s Rose Ck	2007	20-Feb-07	0.013	< 0.001	< 0.001	0.092	< 0.001	< 0.001	< 0.05	< 0.0002	48.7	< 0.001	< 0.001	< 0.001	0.09	< 0.001	0.002	10.7	0.011
R6	GLL	Anvil Ck u/s Rose Ck	2007	17-Aug-07	0.014	< 0.001	< 0.001	0.078	< 0.001	< 0.001	< 0.05	< 0.0002	35.3	< 0.001	< 0.001	< 0.001	0.16	< 0.001	< 0.005	10.7	0.01
R6	Access	Anvil Ck u/s Rose Ck	2007	26-Sep-07	0.0316	0.00011	< 0.0001	0.0642	< 0.00005	< 0.00005	< 0.008	0.00002	39.6	0.0017	0.00005	0.0007	0.148	0.0002	0.0015	10.4	0.0171
R6	Access	Anvil Ck u/s Rose Ck	2007	24-Oct-07	0.0079	0.00013	0.00045	0.0761	< 0.00001	< 0.000005	< 0.005	0.000019	44.1	0.0001	0.000036	0.00043	0.101	0.000091	0.0023	10.8	0.0188
R6	Access	Anvil Ck u/s Rose Ck	2007	22-Nov-07	0.0067	0.00013	0.00029	0.0887	< 0.00001	< 0.000005	< 0.005	0.00001	46	< 0.0001	0.000013	0.00035	0.051	0.000017	0.0022	10.3	0.00512
R6	Access	Anvil Ck u/s Rose Ck	2007	14-Dec-07	0.0141	0.0001	0.00045	0.0878	< 0.00001	< 0.000005	< 0.005	0.000013	47.7	0.0001	0.000042	0.00036	0.147	0.000034	0.0024	11.3	0.0208
R7	GLL	North Fork at R7	2005	21-Jan-05																	
R7	GLL	North Fork at R7	2005	22-Jan-05	0.01	< 0.001	< 0.001	0.068	< 0.001	< 0.001	< 0.05	< 0.0002	40.3	< 0.001	< 0.001	< 0.001	0.2	< 0.001	0.008	8.7	0.15
R7	GLL	North Fork at R7	2005	09-Feb-05	0.005	< 0.001	< 0.001	0.068	< 0.001	< 0.001	< 0.05	< 0.0002	40.6	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.007	7.88	0.014
R7	GLL	North Fork at R7	2005	14-Mar-05	0.018	< 0.001	< 0.001	0.077	< 0.001	< 0.001	< 0.05	< 0.0002	43.9	< 0.001	< 0.001	< 0.001	0.22	< 0.001	0.008	7.99	0.01
R7	GLL	North Fork at R7	2005	11-Apr-05	0.007	< 0.001	< 0.001	0.065	< 0.001	< 0.001	< 0.05	< 0.0002	39.9	< 0.001	< 0.001	< 0.001	0.07	< 0.001	0.008	7.85	0.005
R7	GLL	North Fork at R7	2005	09-May-05	0.31	< 0.001	0.001	0.031	< 0.001	< 0.001	< 0.05	< 0.0002	8.41	< 0.001	< 0.001	0.002	0.72	< 0.001	0.001	1.62	0.056
R7	GLL	North Fork at R7	2005	20-Jun-05	0.072	< 0.001	< 0.001	0.038	< 0.001	< 0.001	< 0.05	< 0.0002	19.6	< 0.001	< 0.001	< 0.001	0.22	< 0.001	0.002	4.65	0.019
R7	GLL	North Fork at R7	2005	26-Jul-05	0.038	< 0.001	< 0.001	0.048	< 0.001	< 0.001	< 0.05	< 0.0002	21.8	< 0.001	< 0.001	0.003	0.07	< 0.001	0.003	4.16	0.023
R7	GLL	North Fork at R7	2005	23-Aug-05	0.024	< 0.001	0.001	0.046	< 0.001	< 0.001	< 0.05	< 0.0002	29.7	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.004	6.01	0.024
R7	GLL	North Fork at R7	2005	06-Sep-05	0.02	< 0.001	< 0.001	0.042	< 0.001	< 0.001	< 0.05	< 0.0002	23.7	< 0.001	< 0.001	< 0.001	0.19	< 0.001	0.003	5.07	0.02
R7	GLL	North Fork at R7	2005	11-Oct-05	0.029	< 0.001	< 0.001	0.054	< 0.001	< 0.001	< 0.05	< 0.0002	30.6	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.004	6.57	0.026
R7	GLL	North Fork at R7	2005	02-Nov-05	0.01	< 0.001	< 0.001	0.058	< 0.001	< 0.001	< 0.05	< 0.0002	33.6	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.005	6.73	0.013
R7	GLL	North Fork at R7	2005	13-Dec-05	0.009	< 0.001	< 0.001	0.07	< 0.001	< 0.001	< 0.05	< 0.0002	37.3	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.007	7.33	0.015
R7	GLL	North Fork at R7	2006	24-Jan-06	0.008	< 0.001	< 0.001	0.069	< 0.001	< 0.001	< 0.05	< 0.0002	38.3	< 0.001	< 0.001	< 0.001	0.13	< 0.001	0.008	8.11	0.009
R7	GLL	North Fork at R7	2006	14-Feb-06	0.017	< 0.001	< 0.001	0.072	< 0.001	< 0.001	< 0.05	< 0.0002	39.2	< 0.001	< 0.001	< 0.001	0.08	< 0.001	0.008	8.16	0.009
R7	GLL	North Fork at R7	2006	25-Mar-06	< 0.005	< 0.001	< 0.001	0.072	< 0.001	< 0.001	< 0.05	< 0.0002	41.2	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.009	8.41	0.009
R7	GLL	North Fork at R7	2006	24-Apr-06	< 0.005	< 0.001	< 0.001	0.073	< 0.001	< 0.001	< 0.05	< 0.0002	38	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.008	7.46	0.008
R7	GLL	North Fork at R7	2006	18-May-06	0.26	< 0.001	0.001	0.038	< 0.001	< 0.001	< 0.05	< 0.0002	10	< 0.001	< 0.001	0.002	0.84	< 0.001	0.002	1.86	0.09
R7	GLL	North Fork at R7	2006	19-Jun-06	0.097	< 0.001	< 0.001	0.035	< 0.001	< 0.001	< 0.05	< 0.0002	17.5	< 0.001	< 0.001	< 0.001	0.23	< 0.001	0.002	3.73	0.016
R7	GLL	North Fork at R7	2006	17-Jul-06	0.052	< 0.001	< 0.001	0.039	< 0.001	< 0.001	< 0.05	< 0.0002	21.8	< 0.001	< 0.001	< 0.001	0.19	< 0.001	0.008	5.2	0.017
R7	GLL	North Fork at R7	2006	22-Aug-06	0.018	< 0.001	< 0.001	0.041	< 0.001	< 0.001	< 0.05	< 0.0002	23.1	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.003	4.51	0.014
R7	GLL	North Fork at R7	2006	12-Sep-06	0.019	< 0.001	< 0.001	0.038	< 0.001	< 0.001	< 0.05	< 0.0002	21.8	< 0.001	< 0.001	< 0.001	0.18	< 0.001	0.003	4.81	0.017
R7	GLL	North Fork at R7	2006	16-Oct-06	0.014	< 0.001	< 0.001	0.054	< 0.001	< 0.001	< 0.05	< 0.0002	29.9	< 0.001	< 0.001	< 0.001	0.11	< 0.001	0.005	6.17	0.017
R7	GLL	North Fork at R7	2006	14-Nov-06	0.014	< 0.001	< 0.001	0.066	< 0.001	< 0.001	< 0.05	< 0.0002	34.4	< 0.001	< 0.001	< 0.001	0.09	< 0.001	0.005	7.47	0.014
R7	GLL	North Fork at R7	2006	14-Dec-06	0.008	< 0.001	< 0.001	0.074	< 0.001	< 0.001	< 0.05	< 0.0002	37.8	< 0.001	< 0.001	< 0.001	0.09	< 0.001	0.007	7.72	0.014
R7	GLL	North Fork at R7	2007	14-Feb-07	0.007	< 0.001	< 0.001	0.071	< 0.001	< 0.001	< 0.05	< 0.0002	42.2	< 0.001	< 0.001	< 0.001	0.1	< 0.001	0.008	8.57	0.007
R7	GLL	North Fork at R7	2007	12-Mar-07	< 0.005	< 0.001	< 0.001	0.083	< 0.001	< 0.001	< 0.05	< 0.0002	43.8	< 0.001	< 0.001	< 0.001	0.09	< 0.001	0.011	9.05	0.008
R7	GLL	North Fork at R7	2007	19-Apr-07	0.007	< 0.001	< 0.001	0.076	< 0.001	< 0.001	< 0.05	< 0.0002	42.3	< 0.001	< 0.001	0.002	0.13	< 0.001	0.007	8.08	0.012
R7	GLL	North Fork at R7	2007	15-May-07	0.35	< 0.001	0.002	0.047	< 0.001	< 0.001	< 0.05	< 0.0002	14.1	0.002	< 0.001	0.002	1.41	< 0.001	< 0.005	2.79	0.14
R7	GLL	North Fork at R7	2007	19-Jun-07	0.095	< 0.001	< 0.001	0.039	< 0.001	< 0.001	< 0.05	< 0.0002	18.9	< 0.001	< 0.001	0.001	0.27	< 0.001	< 0.005	4.61	0.016
R7	GLL	North Fork at R7	2007	17-Jul-07	0.06	< 0.001	< 0.001	0.038	< 0.001	< 0.001	< 0.05	< 0.0002	15.6	< 0.001	< 0.001	< 0.001	0.16	< 0.001	< 0.005	3.45	0.012
R7	GLL	North Fork at R7	2007	14-Aug-07	0.1	< 0.001	< 0.001	0.045	< 0.001	< 0.001	< 0.05	0.0004	23.3	< 0.001	< 0.001	< 0.001	0.18	< 0.001	< 0.005	5.09	0.014
R7	GLL	North Fork at R7	2007	11-Sep-07	0.083	< 0.001	< 0.001	0.041	< 0.001	< 0.001	< 0.05	< 0.0002	16.7	< 0.001	< 0.001	< 0.001	0.3	< 0.001	< 0.001	3.63	0.027
R7	GLL	North Fork at R7	2007	23-Oct-07	0.01	< 0.001	< 0.001	0.052	< 0.001	< 0.001	< 0.05	< 0.0002	27.9	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.004	6.35	0.015
R7	GLL	North Fork at R7	2007	14-Nov-07	0.04	< 0.001	< 0.001	0.056	< 0.001	< 0.001	< 0.05	< 0.0002	33.5	< 0.001	< 0.001	< 0.001	0.1	< 0.001	0.004	6.74	0.013
R7	GLL	North Fork at R7	2007	09-Dec-07	0.021	< 0.001	< 0.001	0.059	< 0.001	< 0.001	< 0.05	< 0.0002	33.2	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.002	6.48	0.012
R7	Laberge	North Fork at R7	2007	27-Mar-07	0.015	< 0.0002	0.0004	0.085	< 0.0002	< 0.0002	< 0.01	0.00001	43.6	< 0.0002	< 0.0002	0.0003	0.06	< 0.0002	0.0098	9.19	0.0061
R7	Access	North Fork at R7	2007	23-Oct-07	0.01	< 0.001	< 0.001	0.052	< 0.001	< 0.001	< 0.05	< 0.0002	27.9	< 0.001	< 0.001	< 0.001	0.12	< 0.001	0.004	6.35	0.015
V1	GLL	V1, Vangorda Ck U/S	2005	07-Mar-05	0.012	< 0.001	< 0.001	0.037	< 0.001	< 0.001	< 0.05	< 0.0002	17.9	< 0.001	< 0.001	< 0.001	0.08	< 0.001	0.001	2.87	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2005	07-Jun-05	0.043	< 0.001	0.002	0.016	< 0.001	< 0.001	0.07	< 0.0002	6.03	0.001	< 0.001	0.002	0.09	< 0.001	< 0.001	0.75	0.002
V1	GLL	V1, Vangorda Ck U/S	2005	12-Sep-05	0.013	< 0.001	< 0.001	0.025	< 0.001	< 0.001	< 0.05	< 0.0002	9.61	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	1.3	0.001
V1	GLL	V1, Vangorda Ck U/S	2005	01-Dec-05	0.006	< 0.001	< 0.001	0.037	< 0.001	< 0.001	< 0.05	< 0.0002	14.7	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	2.46	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	20-Mar-06	0.99	< 0.001	0.001	0.12	< 0.001	< 0.001	0.12	< 0.0002	18.7	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.002	2.89	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	05-Jun-06	0.099	< 0.001	< 0.001	0.013	< 0.001	< 0.001	< 0.05	< 0.0002	4.31	< 0.001	< 0.001	< 0.001	0.14	< 0.001	< 0.001	0.64	0.005
V1	GLL	V1, Vangorda Ck U/S	2006	09-Jun-06	0.024	< 0.001	< 0.001	0.025	< 0.001	< 0.001	< 0.05	< 0.0002	9.48	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	1.4	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	06-Sep-06	0.024	< 0.001	< 0.001	0.025	< 0.001	< 0.001	< 0.05	< 0.0002	9.48	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	1.4	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2007	18-Jun-07	0.033	< 0.001	< 0.001	0.014	< 0.001	< 0.001	< 0.05	< 0.0002	6.62	< 0.001	< 0.001	< 0.001	0.07	< 0.001	< 0.005	0.97	0.014

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
V1	GLL	V1, Vangorda Ck U/S	2007	24-Sep-07	0.012	< 0.001	< 0.001	0.022	< 0.001	< 0.001	< 0.05	< 0.0002	7.73	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	1.11	0.002
V1	GLL	V1, Vangorda Ck U/S	2007	10-Dec-07	0.006	< 0.001	< 0.001	0.032	< 0.001	< 0.001	< 0.05	< 0.0002	13.3	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.001	2.22	0.002
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07	0.0143	< 0.00005	0.0002	0.0257	< 0.00005	< 0.00005	< 0.008	< 0.00001	10.6	< 0.0002	< 0.00002	0.0004	0.027	0.00004		1.45	0.00076
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07																	
V1	Nordine	V1, Vangorda Ck U/S	2007	27-Mar-07	0.007	< 0.0002	0.0003	0.043	< 0.0002	< 0.0002	< 0.01	0.00001	16.8	< 0.0002	< 0.0002	0.0003	0.01	0.0002	0.0014	3.07	0.0004
V1	Access	V1, Vangorda Ck U/S	2007	26-Sep-07	0.0115	< 0.00005	< 0.0001	0.0246	< 0.00005	< 0.00005	< 0.008	< 0.00001	9.38	< 0.0002	< 0.00002	0.0004	0.019	0.00002	0.0008	1.29	0.00069
V1	Access	V1, Vangorda Ck U/S	2007	24-Oct-07	0.0077	0.00003	0.00022	0.0301	< 0.00001	< 0.000005	< 0.005	0.000036	11.8	0.0001	0.00001	0.00034	0.015	0.000214	0.0012	1.67	0.00077
V1	Access	V1, Vangorda Ck U/S	2007	22-Nov-07	0.0059	0.00003	0.00026	0.0333	< 0.00001	< 0.000005	< 0.005	0.000007	15.4	< 0.0001	0.000013	0.00029	0.008	0.000014	0.0012	2.4	0.00042
V1	Access	V1, Vangorda Ck U/S	2007	14-Dec-07	0.0051	0.00004	0.00029	0.0386	< 0.00001	< 0.000005	< 0.005	0.000023	15.8	< 0.0001	0.000023	0.00033	0.005	0.000008	0.0014	2.34	0.00072
W10	GLL	W10, GHC u/s NW Dump	2005	22-Jun-05	0.043	< 0.001	< 0.001	0.015	< 0.001	< 0.001	< 0.05	< 0.0002	16.1	< 0.001	< 0.001	0.001	< 0.05	< 0.001	< 0.001	2.11	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2005	20-Sep-05	0.012	< 0.001	< 0.001	0.018	< 0.001	< 0.001	< 0.05	< 0.0002	20	< 0.001	< 0.001	0.001	< 0.05	< 0.001	0.001	2.5	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2006	07-Jun-06	0.043	< 0.001	< 0.001	0.009	< 0.001	< 0.001	< 0.05	< 0.0002	8.92	< 0.001	< 0.001	0.002	< 0.05	< 0.001	0.002	1.16	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2006	18-Sep-06	0.011	< 0.001	< 0.001	0.018	< 0.001	< 0.001	< 0.05	< 0.0002	18.9	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	0.001	2.41	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2007	11-Jun-07	0.13	< 0.001	< 0.001	0.011	< 0.001	< 0.001	< 0.05	< 0.0002	7.67	< 0.001	< 0.001	0.003	0.14	< 0.001	< 0.005	1.04	0.003
W10	GLL	W10, GHC u/s NW Dump	2007	02-Oct-07	0.02	< 0.001	< 0.001	0.014	< 0.001	< 0.001	< 0.05	< 0.0002	15.1	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	1.81	0.007
W10	Access	W10, GHC u/s NW Dump	2007	25-Sep-07	0.0511	< 0.00005	0.0001	0.0134	< 0.00005	< 0.00005	< 0.008	0.00003	16.7	< 0.0002	0.00004	0.0011	0.054	0.00031	0.0011	2.13	0.00174
W10	Access	W10, GHC u/s NW Dump	2007	25-Oct-07	0.0125	0.00003	0.00012	0.0167	< 0.00001	< 0.000005	< 0.005	0.000018	17.3	< 0.0001	0.000014	0.00085	0.015	0.000134	0.0012	2.16	0.00045
UWFV/VR	Minnow	Upper West Fork Vangorda Ck	2007	25-Aug-07	0.0306	< 0.00005	< 0.0001	0.0287	< 0.00005	< 0.00005	< 0.008	0.00001	10.9	< 0.0002	0.00002	0.0006	0.031	0.00007		1.94	0.00106
UWFV/VR	Laberge	Upper West Fork Vangorda Ck	2007	27-Mar-07	0.024	< 0.0002	0.0002	0.038	< 0.0002	< 0.0002	< 0.01	0.00002	13.4	< 0.0002	< 0.0002	0.0005	0.03	0.0002	0.0004	2.62	0.0012
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	26-Sep-07	0.0627	< 0.00005	< 0.0001	0.0251	< 0.00005	< 0.00005	< 0.008	0.00001	8.85	0.0015	0.00006	0.0008	0.042	0.00016	< 0.0002	1.66	0.00107
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	25-Oct-07	0.0205	0.00002	0.00018	0.028	0.00001	< 0.000005	< 0.005	0.000036	9.89	0.0002	0.00002	0.00088	0.024	0.00032	< 0.0005	1.74	0.0018
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	21-Nov-07	0.0245	0.00003	0.00017	0.0327	0.00001	< 0.000005	< 0.005	0.000012	11	< 0.0001	0.000017	0.00045	0.027	0.000149	< 0.0005	1.83	0.00176
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	13-Dec-07	0.0286	0.0001	0.00021	0.0338	0.00002	< 0.000005	< 0.005	0.000026	12.3	0.0001	0.000028	0.00104	0.029	0.000347	0.0006	2.11	0.00267
USFR	Minnow	Upper South Fork Rose Ck u/s Haul Rd	2007	25-Aug-07	0.0263	< 0.00005	0.0003	0.025	< 0.00005	< 0.00005	< 0.008	< 0.00001	8.82	< 0.0002	0.00004	0.0004	0.164	0.0001		1.32	0.00959
USFR	Laberge	Upper South Fork Rose Ck u/s Haul Rd	2007	27-Mar-07	0.020	< 0.0002	0.0002	0.055	< 0.0002	< 0.0002	< 0.01	0.00001	17.6	< 0.0002	< 0.0002	0.0004	0.07	< 0.0002	0.0014	3.44	0.0017
NEC/NXT	Minnow	Next Ck	2007	25-Aug-07																	
NEC/NXT	Minnow	Next Ck	2007	26-Aug-07	0.0172	< 0.00005	< 0.0001	0.0256	< 0.00005	< 0.00005	< 0.008	0.00001	16.5	< 0.0002	< 0.00002	0.0006	0.014	0.00005		2.47	0.00035
1st Trib Rose	Laberge	Rose Ck Tributary u/s K8	2007	27-Mar-07	0.007	< 0.0002	0.0002	0.039	< 0.0002	< 0.0002	< 0.01	0.00001	25	< 0.0002	< 0.0002	0.0004	0.02	0.0004	0.0022	3.57	0.0006
n					93	93	93	93	93	93	93	29	93	93	93	93	93	93	89	93	93
detection limits					< 0.005	< 0.00002, < 0.00005, < 0.0002, < 0.001	< 0.001, < 0.0001, < 0.0002	< 0.000022	< 0.00001, < 0.00005, < 0.0002, < 0.001	< 0.000005, < 0.00005, < 0.0002, < 0.001	< 0.005, < 0.008, < 0.05, < 0.01	< 0.00001, < 0.0002	< 0.05	< 0.0001, < 0.0002, < 0.001	< 0.00002, < 0.0002, < 0.001	< 0.001	< 0.05	< 0.0002, < 0.001	< 0.0002, < 0.0005, < 0.001, < 0.005	< 0.05	< 0.001
minimum					0.0025	< 0.00002	< 0.0001	0.009	< 0.00001	< 0.000005	0.003	< 0.00001	2.1	< 0.0001	0.00001	0.0003	0.005	0.000008	< 0.0002	0.40	0.0004
maximum					0.99	< 0.001	0.002	0.12	< 0.001	< 0.001	0.12	0.0004	77.8	0.003	< 0.001	0.003	1.41	< 0.001	0.011	16	0.15
Summary statistics (< DL values taken at 1/2 DL)		**median**			0.020	0.0005	0.0005	0.0380	0.0005	0.0005	0.03	0.00001	17.6	0.0005	0.0005	0.0005	0.070	0.0005	0.002	3.07	0.007
		mean			0.052	0.0004	0.0005	0.0437	0.0004	0.0004	0.02	0.00003	22.3	0.0005	0.0004	0.0007	0.113	0.0004	0.003	4.51	0.0122
		standard deviation (SD)			0.115	0.0002	0.0003	0.0252	0.0002	0.0002	0.02	0.00007	15.1	0.0004	0.0002	0.0006	0.182	0.0002	0.003	3.54	0.0233
		standard error			0.012	0.00002	0.00003	0.0026	0.00002	0.00002	0.002	0.00001	1.6	0.00004	0.00002	0.0001	0.019	0.00002	0.0003	0.37	0.0024
		# < detection limit			3	81	65	0	89	93	91	3	0	79	74	50	19	67	21	0	9
		% < detection limit			3%	87%	70%	0%	96%	100%	98%	10%	0%	85%	80%	54%	20%	72%	24%	0%	10%
		# > criterion[1]			7	0	0	0	0	0	0	3	0	4	0	4	3	0	-	0	0
		% > criterion[1]			8%	0%	0%	0%	0%	0%	0%	10%	0%	4%	0%	4%	3%	0	-	0%	0%
		# < detection limit (1/2 detection limit > criterion)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
		% < detection limit (1/2 detection limit > criterion)			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	-	0%	0%
		99th percentile			0.401	0.0005	0.002	0.0961	0.0005	0.0005	0.07	0.00030	51.8	0.0021	0.0005	0.0030	0.886	0.00051	0.0099	12.14	0.1408
		95th percentile			0.156	0.0005	0.001	0.0882	0.0005	0.0005	0.025	0.00004	44.9	0.0010	0.0005	0.0020	0.246	0.00050	0.0080	10.74	0.0264
		90th percentile			0.099	0.0005	0.0005	0.0768	0.0005	0.0005	0.025	0.00003	43.3	0.0005	0.0005	0.0018	0.190	0.00050	0.0080	10.08	0.0198
		mean + t-value x SD			0.243	0.0007	0.001	0.0855	0.0007	0.0007	0.05	0.00015	47.4	0.0012	0.0007	0.0018	0.416	0.00069	0.0073	10.40	0.0509
		1st percentile			0.003	0.00001	0.00005	0.0108	0.000005	0.0000025	0.0025	0.000005	2.1	0.00005	0.00001	0.00030	0.008	0.000014	0.00023	0.43	0.00040
		5th percentile			0.006	0.000025	0.00006	0.0130	0.000005	0.0000025	0.0025	0.000005	3.6	0.00008	0.00001	0.00035	0.015	0.000038	0.00050	0.71	0.00050
		10th percentile			0.007	0.000025	0.0001	0.0140	0.00001	0.0000025	0.0025	0.000007	4.4	0.0001	0.00002	0.00040	0.024	0.000093	0.00050	0.80	0.00050
		mean - t-value x SD			-0.139	0.00003	-0.00004	0.0018	-0.0000002	-0.000003	-0.005	-0.00009	-2.9	-0.0002	0.000009	-0.00030	-0.190	0.000110	-0.0014	-1.38	-0.0265
upper background benchmark					0.156	< 0.001	< 0.001	0.088	< 0.001	< 0.001	< 0.05	0.00004	44.9	< 0.001	< 0.001	0.002	0.246	< 0.001	0.008	10.74	0.0264
lower background benchmark																					
water quality criterion[2]					0.1 (CCME)	0.02 (OMOE)	0.005 (CCME)	1 (CCME)	1.1 (OMOE)	0.26 (Alternate)	1.2 (BCMOE)	0.00003 (CCME)	116 (Alternate)	0.001 (CCME)	0.004 (BCMOE)	0.002 (CCME)	0.3 (CCME)	0.002 (CCME)	-	82 (Alternate)	1 (BCMOE)

outlier value removed from data set. See Table A.2 for removal rationale.

value removed from data set is less than detection limit and 1/2 detection limit exceeds guideline.

negative values were converted to zero for the computation of summary statistics since below-zero freezing points are unlikely in low-salinity waters.

Note: removed values were excluded from all summary statistic computations.

[1] # and % < criteria for total alkalinity, dissolved oxygen and pH.

[2] see Appendix Table B.1 for sources.

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphur	Tellurium	Thallium	Thorium	Tin	Titanium	Uranium	Vanadium
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
FC/FDU	GLL	Upper Faro Creek	2005	22-Jun-05	< 0.00002	< 0.0005	< 0.001	< 0.1	< 0.001	14	< 0.00025	1.64	0.02		< 0.001	< 0.0001	< 0.0005	< 0.001	0.001	< 0.0005	< 0.001
FC/FDU	GLL	Upper Faro Creek	2005	19-Sep-05	< 0.00002	< 0.0005	< 0.001	0.2	< 0.001	15.8	< 0.00025	1.92	0.023		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
FC/FDU	GLL	Upper Faro Creek	2006	07-Jun-06	< 0.00002	< 0.0005	< 0.001	0.3	< 0.001	3.7	< 0.00025	1.07	0.013		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
FC/FDU	GLL	Upper Faro Creek	2006	18-Sep-06	< 0.00002	< 0.0005	< 0.001	0.2	< 0.001	7.2	< 0.00025	1.73	0.021		< 0.001	< 0.0001	< 0.0005	< 0.001	0.002	< 0.0005	< 0.001
FC/FDU	GLL	Upper Faro Creek	2007	11-Jun-07	< 0.00002	< 0.0005	< 0.001	0.2	< 0.001	3.7	< 0.00025	1.2	0.014		< 0.001	< 0.0001	< 0.0005	< 0.001	0.002	< 0.0005	< 0.001
FC/FDU	GLL	Upper Faro Creek	2007	2-Oct-07	< 0.00002	< 0.0005	< 0.001	< 0.1	< 0.001	6.1	< 0.00025	1.86	0.02		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
FC/FDU	Laberge	Upper Faro Creek	2007	26-Mar-07	< 0.000015	< 0.0001	0.0004	0.31	< 0.0002	8.23	< 0.00005	2.89	0.033		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0021	< 0.0001	0.0002
FC/FDU	Access	Upper Faro Creek	2007	25-Sep-07	< 0.00001	0.00006	< 0.0005	0.142	< 0.0005	6.29	< 0.00001	2.18	0.0222			< 0.00005		< 0.00005	0.0014	0.00015	0.00014
FC/FDU	Access	Upper Faro Creek	2007	25-Oct-07		0.00005	0.00022	0.13	< 0.00004	5.87	< 0.000005	1.8	0.0264	< 3		< 0.000002		< 0.00001	0.0007	0.000123	< 0.0002
FC/FDU	Access	Upper Faro Creek	2007	21-Nov-07		0.00008	0.00024	0.16	< 0.00004	7.43	< 0.000005	1.69	0.0261	< 3		0.000002		< 0.00001	< 0.0005	0.0001	0.0003
FC/FDU	Access	Upper Faro Creek	2007	13-Dec-07		0.00008	0.00023	0.17	< 0.00004	7.54	< 0.000005	2.07	0.0296	< 3		0.000002		< 0.00001	< 0.0005	0.00009	< 0.0002
R6	GLL	Anvil Ck u/s Rose Ck	2005	29-Mar-05	< 0.00002	0.0014	< 0.001	1.9	< 0.001	12.8	0.0017	5.5	0.25		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0031	< 0.001
R6	GLL	Anvil Ck u/s Rose Ck	2005	17-Aug-05	< 0.00002	0.001	< 0.001	1	0.002	8.8	< 0.00025	1.41	0.12		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0017	< 0.001
R6	GLL	Anvil Ck u/s Rose Ck	2006	21-Feb-06	< 0.00002	0.0013	0.002	1.4	< 0.001	5.4	< 0.00025	2.38	0.14		< 0.001	< 0.0001	< 0.0005	0.002	< 0.001	0.0023	< 0.001
R6	GLL	Anvil Ck u/s Rose Ck	2006	07-Aug-06	< 0.00002	0.0011	< 0.001	0.9	< 0.001	4.4	< 0.00025	1.66	0.11		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0015	< 0.001
R6	GLL	Anvil Ck u/s Rose Ck	2007	20-Feb-07	< 0.00002	0.0012	< 0.001	1.4	< 0.001	5	< 0.00025	2.18	0.14		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0022	< 0.001
R6	GLL	Anvil Ck u/s Rose Ck	2007	17-Aug-07	< 0.00002	0.0009	< 0.001	1	< 0.001	3.4	< 0.00025	1.66	0.11		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0018	< 0.001
R6	Access	Anvil Ck u/s Rose Ck	2007	26-Sep-07	< 0.00001	0.0011	< 0.0005	0.988	< 0.0005	4.03	< 0.00001	2.06	0.106			< 0.00005		< 0.00005	0.0008	0.00165	0.00017
R6	Access	Anvil Ck u/s Rose Ck	2007	24-Oct-07		0.00125	0.00027	1.11	0.00071	4	0.00002	2.16	0.134	7		< 0.000002		0.00001	0.0006	0.00219	< 0.0002
R6	Access	Anvil Ck u/s Rose Ck	2007	22-Nov-07		0.00129	0.00023	1.15	0.0008	4.89	< 0.000005	1.69	0.139	8		< 0.000002		< 0.00001	< 0.0005	0.00231	< 0.0002
R6	Access	Anvil Ck u/s Rose Ck	2007	14-Dec-07		0.00116	0.00025	1.2	0.00073	4.81	< 0.000005	2.04	0.14	8		< 0.000002		< 0.00001	< 0.0005	0.0023	< 0.0002
R7	GLL	North Fork at R7	2005	21-Jan-05																	
R7	GLL	North Fork at R7	2005	22-Jan-05	< 0.00002	0.0007	< 0.001	1	< 0.001	12.3	< 0.00025	2.99	0.16		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.002	< 0.001
R7	GLL	North Fork at R7	2005	09-Feb-05	< 0.00002	0.0007	< 0.001	0.9	< 0.001	12.6	< 0.00025	3.24	0.16		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0021	< 0.001
R7	GLL	North Fork at R7	2005	14-Mar-05	< 0.00002	0.0009	< 0.001	1.2	< 0.001	14	< 0.00025	3.76	0.19		< 0.001	< 0.0001	< 0.0005	< 0.001	0.001	0.0024	< 0.001
R7	GLL	North Fork at R7	2005	11-Apr-05	< 0.00002	0.0008	< 0.001	1	< 0.001	13.2	< 0.00025	3.45	0.18		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0023	< 0.001
R7	GLL	North Fork at R7	2005	09-May-05	< 0.00002	< 0.0005	0.001	1.4	< 0.001	5.3	< 0.00025	0.8	0.035		< 0.001	< 0.0001	< 0.0005	< 0.001	0.008	< 0.0005	< 0.001
R7	GLL	North Fork at R7	2005	20-Jun-05	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	9.7	0.0004	1.56	0.07		< 0.001	< 0.0001	< 0.0005	< 0.001	0.002	0.0007	< 0.001
R7	GLL	North Fork at R7	2005	26-Jul-05	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	10.5	< 0.00025	1.7	0.091		< 0.001	< 0.0001	< 0.0005	< 0.001	0.001	0.0008	< 0.001
R7	GLL	North Fork at R7	2005	23-Aug-05	< 0.00002	0.0005	< 0.001	0.5	0.001	10	< 0.00025	2.11	0.11		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0011	< 0.001
R7	GLL	North Fork at R7	2005	06-Sep-05	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	10.8	< 0.00025	2.62	0.1		< 0.001	< 0.0001	0.002	< 0.001	< 0.001	0.0013	< 0.001
R7	GLL	North Fork at R7	2005	11-Oct-05	< 0.00002	0.0005	< 0.001	0.7	< 0.001	12.8	< 0.00025	2.32	0.12		< 0.001	< 0.0001	< 0.0005	0.002	0.001	0.0011	< 0.001
R7	GLL	North Fork at R7	2005	02-Nov-05	< 0.00002	0.0006	< 0.001	0.7	< 0.001	12.4	< 0.00025	2.1	0.13		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0016	< 0.001
R7	GLL	North Fork at R7	2005	13-Dec-05	< 0.00002	0.0006	< 0.001	0.8	< 0.001	5.9	< 0.00025	2.73	0.13		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0016	< 0.001
R7	GLL	North Fork at R7	2006	24-Jan-06	< 0.00002	0.0007	< 0.001	0.7	< 0.001	6.3	< 0.00025	3.03	0.15		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0018	< 0.001
R7	GLL	North Fork at R7	2006	14-Feb-06	< 0.00002	0.0008	< 0.001	1	0.002	6.2	< 0.00025	3.22	0.16		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.002	< 0.001
R7	GLL	North Fork at R7	2006	25-Mar-06	< 0.00002	0.0008	< 0.001	1.1	< 0.001	5.9	< 0.00025	3.38	0.16		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0024	< 0.001
R7	GLL	North Fork at R7	2006	24-Apr-06	< 0.00002	0.0008	< 0.001	1	< 0.001	5.2	< 0.00025	3.12	0.17		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.002	< 0.001
R7	GLL	North Fork at R7	2006	18-May-06	< 0.00002	< 0.0005	0.001	1.6	< 0.001	2.4	< 0.00025	0.77	0.041		< 0.001	< 0.0001	< 0.0005	< 0.001	0.007	< 0.0005	< 0.001
R7	GLL	North Fork at R7	2006	19-Jun-06	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	3.7	< 0.00025	1.39	0.059		< 0.001	< 0.0001	< 0.0005	< 0.001	0.002	0.0007	< 0.001
R7	GLL	North Fork at R7	2006	17-Jul-06	< 0.00002	< 0.0005	0.001	0.4	< 0.001	4.4	< 0.00025	1.66	0.073		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0006	< 0.001
R7	GLL	North Fork at R7	2006	22-Aug-06	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	4.5	< 0.00025	1.94	0.088		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0008	< 0.001
R7	GLL	North Fork at R7	2006	12-Sep-06	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	5	< 0.00025	1.93	0.084		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0007	< 0.001
R7	GLL	North Fork at R7	2006	16-Oct-06	< 0.00002	< 0.0005	< 0.001	0.7	< 0.001	4.5	< 0.00025	2.52	0.11		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0014	< 0.001
R7	GLL	North Fork at R7	2006	14-Nov-06	< 0.00002	0.0006	< 0.001	0.6	< 0.001	5.5	< 0.00025	2.74	0.14		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0019	< 0.001
R7	GLL	North Fork at R7	2006	14-Dec-06	< 0.00002	0.0006	< 0.001	0.9	< 0.001	5.7	< 0.00025	2.85	0.15		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0023	< 0.001
R7	GLL	North Fork at R7	2007	14-Feb-07	< 0.00002	0.0007	< 0.001	1	< 0.001	5.4	< 0.00025	3.34	0.16		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0025	< 0.001
R7	GLL	North Fork at R7	2007	12-Mar-07	< 0.00002	0.0009	< 0.001	1.2	< 0.001	5.8	< 0.00025	3.71	0.18		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.003	< 0.001
R7	GLL	North Fork at R7	2007	19-Apr-07	< 0.00002	0.0009	< 0.001	1.2	< 0.001	5.2	< 0.00025	3.15	0.19		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0022	< 0.001
R7	GLL	North Fork at R7	2007	15-May-07	< 0.00002	0.0008	0.001	1.6	< 0.001	3.7	< 0.00025	1.14	0.061		< 0.001	< 0.0001	< 0.0005	< 0.001	0.014	0.0005	0.001
R7	GLL	North Fork at R7	2007	19-Jun-07	< 0.00002	0.0005	< 0.001	0.6	< 0.001	3.8	< 0.00025	1.6	0.067		< 0.001	< 0.0001	< 0.0005	< 0.001	0.004	0.0008	< 0.001
R7	GLL	North Fork at R7	2007	17-Jul-07	< 0.00002	< 0.0005	< 0.001	0.3	< 0.001	4	< 0.00025	1.38	0.067		< 0.001	< 0.0001	< 0.0005	< 0.001	0.002	< 0.0005	< 0.001
R7	GLL	North Fork at R7	2007	14-Aug-07	< 0.00002	0.0007	0.001	0.5	0.002	4.2	< 0.00025	1.91	0.09		0.001	0.0002	< 0.0005	< 0.001	0.003	0.001	< 0.001
R7	GLL	North Fork at R7	2007	11-Sep-07	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	4.1	< 0.00025	1.59	0.07		< 0.001	< 0.0001	< 0.0005	< 0.001	0.004	0.0007	< 0.001
R7	GLL	North Fork at R7	2007	23-Oct-07	< 0.00002	< 0.0005	< 0.001	0.7	< 0.001	4.7	< 0.00025	2.44	0.12		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0012	< 0.001
R7	GLL	North Fork at R7	2007	14-Nov-07	< 0.00002	0.0006	< 0.001	0.8	< 0.001	5.4	< 0.00025	2.44	0.12		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0013	< 0.001
R7	GLL	North Fork at R7	2007	09-Dec-07	< 0.00002	0.0005	< 0.001	0.8	< 0.001	5	< 0.00025	2.36	0.13		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0017	< 0.001
R7	Laberge	North Fork at R7	2007	27-Mar-07	< 0.000015	0.0009	0.0004	1.13	0.0005	6.22	< 0.00005	3.96	0.183		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0005	0.0034	< 0.0002
R7	Access	North Fork at R7	2007	23-Oct-07	< 0.00002	< 0.0005	< 0.001	0.7	< 0.001	4.7	< 0.00025	2.44	0.12		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0012	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2005	07-Mar-05	< 0.00002	0.0006	< 0.001	1.4	< 0.001	10.7	< 0.00025	2.71	0.08		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0014	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2005	07-Jun-05	< 0.00002	< 0.0005	< 0.001	0.8	0.011	8.2	< 0.00025	1.61	0.03		< 0.001	< 0.0001	< 0.0005	< 0.001	0.001	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2005	12-Sep-05	< 0.00002	< 0.0005	< 0.001	0.3	< 0.001	7	< 0.00025	1.7	0.044		< 0.001	< 0.0001	< 0.0005	0.002	< 0.001	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2005	01-Dec-05	< 0.00002	0.0005	< 0.001	0.6	< 0.001	4.8	< 0.00025	1.89	0.068		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0006	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	20-Mar-06	< 0.00002	0.0007	< 0.001	0.6	< 0.001	5.2	< 0.00025	2.27	0.11		< 0.001	< 0.0001	< 0.0005	< 0.001	0.001	0.0012	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	05-Jun-06	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	2.4	< 0.00025	0.87	0.022		< 0.001	< 0.0001	< 0.0005	< 0.001	0.003	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	09-Jun-06	< 0.00002	< 0.0005	< 0.001	0.3	< 0.001	4.2	< 0.00025	1.79	0.052		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2006	06-Sep-06	< 0.00002	< 0.0005	< 0.001	0.3	< 0.001	4.2	< 0.00025	1.79	0.052		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2007	18-Jun-07	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	2.9	< 0.00025	1.89	0.03		< 0.001	0.0001	< 0.0005	< 0.001	0.002	< 0.0005	< 0.001

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphur	Tellurium	Thallium	Thorium	Tin	Titanium	Uranium	Vanadium
				Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
V1	GLL	V1, Vangorda Ck U/S	2007	24-Sep-07		< 0.0005	< 0.001	0.3	< 0.001	3.5	< 0.00025	1.64	0.042		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
V1	GLL	V1, Vangorda Ck U/S	2007	10-Dec-07	< 0.00002	0.0005	< 0.001	0.6	< 0.001	4.5	< 0.00025	2.27	0.065		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	0.0008	< 0.001
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07	< 0.00005	0.00023	< 0.0005	0.343	< 0.0005		< 0.00001	2.09	0.0539			< 0.00005		< 0.00005	< 0.0005	0.00031	< 0.00005
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07																	
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07																	
V1	Nordine	V1, Vangorda Ck U/S	2007	27-Mar-07	< 0.000015	0.0007	0.0004	0.64	< 0.0002	5.32	< 0.00005	2.46	0.078		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0003	0.0025	< 0.0002
V1	Access	V1, Vangorda Ck U/S	2007	26-Sep-07	< 0.00001	0.00019	< 0.0005	0.317	< 0.0005	3.96	< 0.00001	1.78	0.0476			< 0.00005		< 0.00005	< 0.0005	0.0003	< 0.00005
V1	Access	V1, Vangorda Ck U/S	2007	24-Oct-07		0.00031	0.00021	0.37	0.0001	4	< 0.000005	1.81	0.0636	4		< 0.000002		0.00013	< 0.0005	0.000522	< 0.0002
V1	Access	V1, Vangorda Ck U/S	2007	22-Nov-07		0.00044	0.00024	0.49	0.00015	5.73	< 0.000005	2.1	0.0724	5		< 0.000002		0.00001	< 0.0005	0.000646	< 0.0002
V1	Access	V1, Vangorda Ck U/S	2007	14-Dec-07		0.0005	0.00025	0.5	0.00015	4.89	< 0.000005	2.13	0.0784	5		0.000002		< 0.00001	< 0.0005	0.00094	< 0.0002
W10	GLL	W10, GHC u/s NW Dump	2005	22-Jun-05	< 0.00002	< 0.0005	< 0.001	0.5	< 0.001	14.7	< 0.00025	1.79	0.053		< 0.001	< 0.0001	< 0.0005	0.001	0.002	< 0.0005	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2005	20-Sep-05	< 0.00002	< 0.0005	< 0.001	0.6	< 0.001	16	< 0.00025	1.97	0.063		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2006	07-Jun-06	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	4.7	< 0.00025	1.26	0.027		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2006	18-Sep-06	< 0.00002	< 0.0005	< 0.001	0.6	< 0.001	7.1	< 0.00025	1.87	0.059		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2007	11-Jun-07	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	4.8	< 0.00025	1.3	0.028		< 0.001	< 0.0001	< 0.0005	< 0.001	0.003	< 0.0005	< 0.001
W10	GLL	W10, GHC u/s NW Dump	2007	02-Oct-07	< 0.00002	< 0.0005	< 0.001	0.4	< 0.001	5.7	< 0.00025	1.77	0.049		< 0.001	< 0.0001	< 0.0005	< 0.001	< 0.001	< 0.0005	< 0.001
W10	Access	W10, GHC u/s NW Dump	2007	25-Sep-07	< 0.00001	0.0002	< 0.0005	0.454	< 0.0005	6.05	< 0.00001	1.85	0.0541			< 0.00005		< 0.00005	0.0019	0.00011	0.00021
W10	Access	W10, GHC u/s NW Dump	2007	25-Oct-07		0.00019	0.00029	0.42	0.00005	5.42	< 0.000005	1.77	0.0619	< 3		< 0.000002		0.00001	< 0.0005	0.000117	< 0.0002
UWFV/VR	Minnow	Upper West Fork Vangorda Ck	2007	25-Aug-07	< 0.00005	0.00014	< 0.0005	0.326	< 0.0005		< 0.00001	1.93	0.054			< 0.00005		< 0.00005	< 0.0005	0.00037	< 0.00005
UWFV/VR	Laberge	Upper West Fork Vangorda Ck	2007	27-Mar-07	< 0.000015	< 0.0001	0.0003	0.73	< 0.0002	5.49	< 0.00005	2.06	0.064		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0006	0.0008	< 0.0002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	26-Sep-07	< 0.00001	0.00013	< 0.0005	0.347	< 0.0005	4.23	< 0.00001	2.23	0.042			< 0.00005		< 0.00005	0.0041	0.00035	0.00005
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	25-Oct-07		0.00013	0.00021	0.32	< 0.00004	4.08	< 0.000005	1.54	0.0529	< 3		0.000002		0.00005	< 0.0005	0.000409	< 0.0002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	21-Nov-07		0.00015	0.00017	0.36	< 0.00004	4.5	< 0.000005	1.41	0.0566	< 3		0.000002		< 0.00001	< 0.0005	0.000437	0.0002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	13-Dec-07		0.00013	0.00038	0.47	0.00006	5.1	< 0.000005	1.78	0.0601	< 3		0.000003		0.00003	< 0.0005	0.000433	< 0.0002
USFR	Minnow	Upper South Fork Rose Ck u/s Haul Rd	2007	25-Aug-07	< 0.00005	0.0003	< 0.0005	0.285	< 0.0005		< 0.00001	1.92	0.0495			< 0.00005		< 0.00005	0.0008	0.00029	0.00008
USFR	Laberge	Upper South Fork Rose Ck u/s Haul Rd	2007	27-Mar-07	< 0.000015	0.0007	0.0007	0.63	< 0.0002	5.24	< 0.00005	2.88	0.087		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0007	0.0024	< 0.0002
NEC/NXT	Minnow	Next Ck	2007	25-Aug-07																	
NEC/NXT	Minnow	Next Ck	2007	26-Aug-07	< 0.00005	0.00024	< 0.0005	0.522	< 0.0005		< 0.00001	2.37	0.0661			< 0.00005		< 0.00005	< 0.0005	0.00029	0.00006
1st Trib Rose	Laberge	Rose Ck Tributary u/s K8	2007	27-Mar-07	< 0.000015	< 0.0001	0.0003	0.74	< 0.0002	5.88	< 0.00005	2.91	0.138		< 0.0002	< 0.00002	< 0.0001	< 0.0002	0.0004	0.0078	< 0.0002
n					79	93	93	93	92	89	28	93	93	13	71	93	70	93	93	93	93
detection limits					< 0.00001, < 0.000015, < 0.00002, < 0.00005	< 0.0001, < 0.0005	< 0.0005, < 0.001	< 0.1	< 0.00004, < 0.0002, < 0.0005, < 0.001	< 0.01, < 0.05	< 0.000005, < 0.00001, < 0.00005, < 0.00025	< 0.05	< 0.00001, < 0.00005	< 3	< 0.0002, < 0.001	< 0.000002, < 0.00005, < 0.00002, < 0.0001	< 0.0001, < 0.0005	< 0.00001, < 0.00005, < 0.0002, < 0.001	< 0.0005, < 0.001	< 0.0001, < 0.0005	< 0.00005, < 0.0002, < 0.001
minimum					< 0.00001	0.00005	0.0002	< 0.1	< 0.00004	< 0.01	< 0.000005	0.77	0.013	2	< 0.0002	< 0.000002	< 0.0001	< 0.00001	0.0003	< 0.0001	< 0.00005
maximum					< 0.00005	0.0014	0.002	1.9	0.002	16.00	< 0.00005	5.50	0.25	8	0.001	0.0002	< 0.0005	0.002	0.014	0.0078	0.001
Summary statistics (< DL values taken at 1/2 DL)		**median**			0.00001	0.0003	0.0005	0.6	0.0005	5.32	0.000005	1.94	0.07	2	0.0005	0.00005	0.00025	0.0005	0.0005	0.0007	0.0005
		mean			0.00001	0.0005	0.0005	0.7	0.0005	6.46	0.000009	2.15	0.09	4	0.0005	0.00004	0.00023	0.0004	0.001	0.0011	0.0004
		standard deviation (SD)			0.000004	0.0003	0.0002	0.4	0.0003	3.23	0.000009	0.75	0.05	3	0.0001	0.00003	0.00006	0.0004	0.002	0.0011	0.0002
		standard error			0.0000004	0.00004	0.00002	0.04	0.00004	0.34	0.000002	0.08	0.01	0.7	0.00002	0.000003	0.00001	0.00004	0.0002	0.0001	0.00002
		# < detection limit			79	36	68	2	79	0	27	0	0	7	70	85	70	83	59	23	83
		% < detection limit			100%	39%	73%	2%	86%	0%	96%	0%	0%	54%	99%	91%	100%	89%	63%	25%	89%
		# > criterion[1]			0	0	0	0	3	-	0	0	0	-	-	0	-	0	0	0	0
		% > criterion[1]			0%	0%	0%	0%	3%	-	0%	0%	0%	-	-	0%	-	0%	0%	0%	0%
		# < detection limit (1/2 detection limit > criterion)			0	0	0	0	0	-	0	0	0	-	-	0	-	0	0	0	0
		% < detection limit (1/2 detection limit > criterion)			0%	0%	0%	0%	0%	-	0%	0%	0%	-	-	0%	-	0%	0%	0%	0%
		99th percentile			0.000025	0.001308	0.0011	1.6	0.002	15.82	0.000025	4.08	0.19	8	0.0006	0.0001	0.00025	0.002	0.008	0.0038	0.00054
		95th percentile			0.0000115	0.001176	0.0010	1.4	0.00076	13.68	0.000025	3.41	0.18	8	0.0005	0.00005	0.00025	0.0005	0.004	0.0025	0.0005
		90th percentile			0.000010	0.0009	0.00050	1.2	0.0005	12.44	0.000025	3.14	0.16	8	0.0005	0.00005	0.00025	0.0005	0.002	0.0023	0.0005
		mean + t-value x SD			0.000016	0.001033	0.00087	1.3	0.00103	11.84	0.000024	3.40	0.17	8	0.0007	0.00008	0.00033	0.001	0.004	0.0030	0.0007
		1st percentile			0.000005	0.000050	0.00021	0.1	0.00002	2.40	0.0000025	0.80	0.01	1.5	0.0001	0.000001	0.00005	0.000005	0.00025	0.00009	0.000025
		5th percentile			0.000005	0.000072	0.00023	0.2	0.00004	3.58	0.0000025	1.18	0.02	1.5	0.0001	0.000001	0.00005	0.000005	0.00025	0.0001	0.00007
		10th percentile			0.000008	0.000132	0.00025	0.3	0.00010	3.78	0.0000025	1.39	0.03	1.5	0.0005	0.000002	0.00025	0.00001	0.00025	0.00025	0.0001
		mean - t-value x SD			0.000004	-0.000098	0.000089	0.01	-0.00009	1.08	-0.000007	0.90	0.001	-1	0.0003	-0.000003	0.00014	-0.0002	-0.0020	-0.0007	0.00007
upper background benchmark					< 0.00002	0.00118	< 0.001	1.4	< 0.001	13.68	< 0.00005	3.41	0.18	8	< 0.001	< 0.0001	< 0.0005	< 0.001	0.004	0.0025	< 0.001
lower background benchmark																					
water quality criterion[2]					0.000026 (CCME)	0.073 (CCME)	0.065 (CCME)	53 (Alternate)	0.001 (CCME)	-	0.0001 (CCME)	200 (CCME)	9.3 (Alternate)	-	-	0.0008 (CCME)	-	0.35 (Alternate)	1.83 (Alternate)	0.015 (SE)	0.006 (OMOE)

outlier value removed from data set. See Table A.2 for removal rationale.

value removed from data set is less than detection limit and 1/2 detection limit exceeds guideline.

negative values were converted to zero for the computation of summary statistics since below-zero freezing points are unlikely in low-salinity waters.

Note: removed values were excluded from all summary statistic computations.

[1] # and % < criteria for total alkalinity, dissolved oxygen and pH.

[2] see Appendix Table B.1 for sources.

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Zinc	Zirconium	Alkalinity - phenolphthalein	Alkalinity - Total	Ammonia - total	Bicarbonate	Carbonate	Chloride - dissolved	Colour	Conductivity - laboratory	Conductivity - in situ	Cyanide - weak acid dissociable	Dissolved oxygen - in situ	Dissolved oxygen - in situ	Dissolved organic carbon	Fluoride
				Units	mg/L	mg/L	mg/L as CaCO3	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	CU	µS/cm	µS/cm	mg/L	mg/L	%	mg/L	mg/L
FC/FDU	GLL	Upper Faro Creek	2005	22-Jun-05	< 0.005	< 0.01			0.01					27						
FC/FDU	GLL	Upper Faro Creek	2005	19-Sep-05	0.007	< 0.01			< 0.01					33						
FC/FDU	GLL	Upper Faro Creek	2006	07-Jun-06	< 0.005	< 0.01			0.01					19						
FC/FDU	GLL	Upper Faro Creek	2006	18-Sep-06	< 0.005	< 0.01			< 0.01					36						
FC/FDU	GLL	Upper Faro Creek	2007	11-Jun-07	0.011	< 0.01			< 0.01					21						
FC/FDU	GLL	Upper Faro Creek	2007	2-Oct-07	< 0.005	< 0.01			0.02					33						
FC/FDU	Laberge	Upper Faro Creek	2007	26-Mar-07	0.003	< 0.002		29.4		35.9	< 0.5	< 0.2		56						
FC/FDU	Access	Upper Faro Creek	2007	25-Sep-07	0.0061	0.00028	< 0.5	11.6	<0.005	14.1	<0.5	<0.5		29	338	<0.0005	10.43		2.9	0.09
FC/FDU	Access	Upper Faro Creek	2007	25-Oct-07	0.0018	< 0.0001	< 0.5	14	<0.005	17	<0.5	<0.5		37	40.2	<0.0005	11.65	80.1	2.1	0.08
FC/FDU	Access	Upper Faro Creek	2007	21-Nov-07	0.0021	< 0.0001	< 0.5	15	<0.005	18	<0.5	<0.5		37	71.3	<0.0005	13.01		1.2	0.1
FC/FDU	Access	Upper Faro Creek	2007	13-Dec-07	0.0015	< 0.0001	< 0.5	17	<0.005	21	<0.5	<0.5		41	29.3	<0.0005			1.8	0.11
R6	GLL	Anvil Ck u/s Rose Ck	2005	29-Mar-05	0.006	< 0.01		135	< 0.01	165	< 0.5		< 5	382						
R6	GLL	Anvil Ck u/s Rose Ck	2005	17-Aug-05	< 0.005	< 0.01		122	< 0.01	148	< 0.5		5	240						
R6	GLL	Anvil Ck u/s Rose Ck	2006	21-Feb-06	0.006	< 0.01		143	0.01	174	< 0.5		< 5	317						
R6	GLL	Anvil Ck u/s Rose Ck	2006	07-Aug-06	< 0.005	< 0.01		132	< 0.01	157	2.3		< 5	277						
R6	GLL	Anvil Ck u/s Rose Ck	2007	20-Feb-07	< 0.005	< 0.01		159	0.02	194	< 0.5		< 5	301						
R6	GLL	Anvil Ck u/s Rose Ck	2007	17-Aug-07	< 0.005	< 0.01		140	< 0.01	171	< 0.5		7	263						
R6	Access	Anvil Ck u/s Rose Ck	2007	26-Sep-07	0.005	0.00012	< 0.5	120	<0.005	147	<0.5	<0.5		264		<0.0005	294		2.5	0.08
R6	Access	Anvil Ck u/s Rose Ck	2007	24-Oct-07	0.0009	0.0004	< 0.5	141	<0.005	172	<0.5	<0.5		307	337	<0.0005	14.65	101.3	1.4	0.08
R6	Access	Anvil Ck u/s Rose Ck	2007	22-Nov-07	0.0004	< 0.0001	< 0.5	140	<0.005	180	<0.5	<0.5		310	351	<0.0005	14.58	100	0.6	0.08
R6	Access	Anvil Ck u/s Rose Ck	2007	14-Dec-07	0.0006	< 0.0001	< 0.5	150	<0.005	180	<0.5	<0.5		320	379	<0.0005			0.6	0.08
R7	GLL	North Fork at R7	2005	21-Jan-05																
R7	GLL	North Fork at R7	2005	22-Jan-05	0.035	< 0.01			< 0.01					240						
R7	GLL	North Fork at R7	2005	09-Feb-05	0.025	< 0.01			0.02					240						
R7	GLL	North Fork at R7	2005	14-Mar-05	0.013	< 0.01			0.01					229						
R7	GLL	North Fork at R7	2005	11-Apr-05	< 0.005	< 0.01								238						
R7	GLL	North Fork at R7	2005	09-May-05	0.007	< 0.01			0.02					53						
R7	GLL	North Fork at R7	2005	20-Jun-05	< 0.005	< 0.01			0.07					133						
R7	GLL	North Fork at R7	2005	26-Jul-05	< 0.005	< 0.01			0.03					144						
R7	GLL	North Fork at R7	2005	23-Aug-05	< 0.005	< 0.01			< 0.01					157						
R7	GLL	North Fork at R7	2005	06-Sep-05	0.006	< 0.01			< 0.01					140						
R7	GLL	North Fork at R7	2005	11-Oct-05	< 0.005	< 0.01			0.02					145						
R7	GLL	North Fork at R7	2005	02-Nov-05	< 0.005	< 0.01			< 0.01					172						
R7	GLL	North Fork at R7	2005	13-Dec-05	< 0.005	< 0.01			< 0.01					236						
R7	GLL	North Fork at R7	2006	24-Jan-06	0.005	< 0.01			< 0.01					260						
R7	GLL	North Fork at R7	2006	14-Feb-06	0.01	< 0.01			0.01					264						
R7	GLL	North Fork at R7	2006	25-Mar-06	< 0.005	< 0.01			< 0.01					289						
R7	GLL	North Fork at R7	2006	24-Apr-06	< 0.005	< 0.01			0.01					278						
R7	GLL	North Fork at R7	2006	18-May-06	0.006	< 0.01			< 0.01					64						
R7	GLL	North Fork at R7	2006	19-Jun-06	< 0.005	< 0.01			< 0.01					111						
R7	GLL	North Fork at R7	2006	17-Jul-06	< 0.005	< 0.01			< 0.01					151						
R7	GLL	North Fork at R7	2006	22-Aug-06	< 0.005	< 0.01			0.02					154						
R7	GLL	North Fork at R7	2006	12-Sep-06	< 0.005	< 0.01			0.01					159						
R7	GLL	North Fork at R7	2006	16-Oct-06	< 0.005	< 0.01			< 0.01					263						
R7	GLL	North Fork at R7	2006	14-Nov-06	< 0.005	< 0.01			< 0.01					240						
R7	GLL	North Fork at R7	2006	14-Dec-06	< 0.005	< 0.01			< 0.01					267						
R7	GLL	North Fork at R7	2007	14-Feb-07	< 0.005	< 0.01			0.02					264						
R7	GLL	North Fork at R7	2007	12-Mar-07	< 0.005	< 0.01			0.03					260						
R7	GLL	North Fork at R7	2007	19-Apr-07	0.016	< 0.01			< 0.01					275						
R7	GLL	North Fork at R7	2007	15-May-07	0.007	< 0.01			0.02					95						
R7	GLL	North Fork at R7	2007	19-Jun-07	0.017	< 0.01			< 0.01					126						
R7	GLL	North Fork at R7	2007	17-Jul-07	< 0.005	< 0.01			< 0.01					126						
R7	GLL	North Fork at R7	2007	14-Aug-07	< 0.005	< 0.01			0.02					151						
R7	GLL	North Fork at R7	2007	11-Sep-07	0.011	< 0.01			0.02					131						
R7	GLL	North Fork at R7	2007	23-Oct-07	< 0.005	< 0.01			< 0.01					192						
R7	GLL	North Fork at R7	2007	14-Nov-07	< 0.005	< 0.01			0.02					213						
R7	GLL	North Fork at R7	2007	09-Dec-07	< 0.005	< 0.01			0.02					234						
R7	Laberge	North Fork at R7	2007	27-Mar-07	< 0.001	< 0.002		157		191	< 0.5	< 0.2		294						
R7	Access	North Fork at R7	2007	23-Oct-07	< 0.005	< 0.01			< 0.01					192						
V1	GLL	V1, Vangorda Ck U/S	2005	07-Mar-05	0.011	< 0.01			< 0.01				< 5	95						
V1	GLL	V1, Vangorda Ck U/S	2005	07-Jun-05	0.006	< 0.01		18.8	0.03	23	< 0.5		7	42						
V1	GLL	V1, Vangorda Ck U/S	2005	12-Sep-05	< 0.005	< 0.01			< 0.01				5	67						
V1	GLL	V1, Vangorda Ck U/S	2005	01-Dec-05	< 0.005	< 0.01		35.5	< 0.01	43.3	< 0.5		< 5	104						
V1	GLL	V1, Vangorda Ck U/S	2006	20-Mar-06	0.038	< 0.01		45.4	< 0.01	55.4	< 0.5		< 5	121						
V1	GLL	V1, Vangorda Ck U/S	2006	05-Jun-06	< 0.005	< 0.01		14.8	< 0.01	18.1	< 0.5		20	35						
V1	GLL	V1, Vangorda Ck U/S	2006	09-Jun-06	< 0.005	< 0.01		26.2	< 0.01	32	< 0.5		< 5	73						
V1	GLL	V1, Vangorda Ck U/S	2006	06-Sep-06	< 0.005	< 0.01		26.2	< 0.01	32	< 0.5		< 5	73						
V1	GLL	V1, Vangorda Ck U/S	2007	18-Jun-07	< 0.005	< 0.01		21.4	< 0.01	26.1	< 0.5		8	48						

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Zinc	Zirconium	Alkalinity - phenolphthalein	Alkalinity - Total	Ammonia - total	Bicarbonate	Carbonate	Chloride - dissolved	Colour	Conductivity - laboratory	Conductivity - in situ	Cyanide - weak acid dissociable	Dissolved oxygen - in situ	Dissolved oxygen - in situ	Dissolved organic carbon	Fluoride
				Units	mg/L	mg/L	mg/L as CaCO3	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	CU	µS/cm	µS/cm	mg/L	mg/L	%	mg/L	mg/L
V1	GLL	V1, Vangorda Ck U/S	2007	24-Sep-07	0.006	< 0.01		25.8	< 0.01	31.5	< 0.5		< 5	71						
V1	GLL	V1, Vangorda Ck U/S	2007	10-Dec-07	< 0.005	< 0.01		40.3	< 0.01	49.2	< 0.5		< 5	106						
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07	0.0027	< 0.005	<0.5	24.4	<0.005			<0.5		71	48		12.2	98.8	1.4	0.07
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07											48		12.2	99.0		
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07											49		12.1	98.5		
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07											43		12.8	99.1		
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07											44		13.6	105		
V1	Nordine	V1, Vangorda Ck U/S	2007	27-Mar-07	< 0.001	< 0.002		53.5		65.3	< 0.5	< 0.2		125						
V1	Access	V1, Vangorda Ck U/S	2007	26-Sep-07	0.0012	0.00012	< 0.5	22.2	<0.005	27	<0.5	<0.5		66		<0.0005	75.5		0.7	0.08
V1	Access	V1, Vangorda Ck U/S	2007	24-Oct-07	0.0013	< 0.0001	< 0.5	32.1	<0.005	39.1	<0.5	<0.5		90	60.4	<0.0005	12	81.9	1.3	0.08
V1	Access	V1, Vangorda Ck U/S	2007	22-Nov-07	0.0006	< 0.0001	< 0.5	37	<0.005	46	<0.5	<0.5		100	99.4	<0.0005			1.4	0.09
V1	Access	V1, Vangorda Ck U/S	2007	14-Dec-07	0.0009	< 0.0001	< 0.5	42	<0.005	51	<0.5	<0.5		110	320	<0.0005			1.1	0.1
W10	GLL	W10, GHC u/s NW Dump	2005	22-Jun-05	< 0.005	< 0.01			< 0.01					98						
W10	GLL	W10, GHC u/s NW Dump	2005	20-Sep-05	0.005	< 0.01			< 0.01					107						
W10	GLL	W10, GHC u/s NW Dump	2006	07-Jun-06	< 0.005	< 0.01			< 0.01					62						
W10	GLL	W10, GHC u/s NW Dump	2006	18-Sep-06	< 0.005	< 0.01			< 0.01					123						
W10	GLL	W10, GHC u/s NW Dump	2007	11-Jun-07	0.008	< 0.01			0.04					55						
W10	GLL	W10, GHC u/s NW Dump	2007	02-Oct-07	0.023	< 0.01			< 0.01					106						
W10	Access	W10, GHC u/s NW Dump	2007	25-Sep-07	0.0062	0.00022	< 0.5	47.2	<0.005	57.6	<0.5	<0.5		101	113.5	<0.0005	10.8		3.5	0.11
W10	Access	W10, GHC u/s NW Dump	2007	25-Oct-07	0.0017	< 0.0001	< 0.5	52.4	<0.005	63.9	<0.5	<0.5		114	126.2	<0.0005	11.47	79.5	2.8	0.09
UWFV/VR	Minnow	Upper West Fork Vangorda Ck	2007	25-Aug-07	0.0021	< 0.005	<0.5	30.6	<0.005			<0.5		75	97		10.8	84.0	3.1	0.08
UWFV/VR	Laberge	Upper West Fork Vangorda Ck	2007	27-Mar-07	0.001	< 0.002		45.1		55	< 0.5	0.32		103						
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	26-Sep-07	0.0049	0.00023	< 0.5	26	<0.005	31.7	<0.5	<0.5		62		<0.0005	70.4		2.5	0.08
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	25-Oct-07	0.0024	0.0001	< 0.5	30.2	0.009	36.8	<0.5	<0.5		76	84		12.42	85.1	2.1	0.07
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	21-Nov-07	0.0009	< 0.0001	< 0.5	32	0.028	40	<0.5	<0.5		79	102.8	<0.0005	13.04		1.2	0.07
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	13-Dec-07	0.0031	0.0001	< 0.5	35	<0.005	42	<0.5	<0.5		85	212	<0.0005			1.4	0.08
USFR	Minnow	Upper South Fork Rose Ck u/s Haul Rd	2007	25-Aug-07	0.0019	< 0.005	<0.5	21.9	<0.005			<0.5		59	60		9.1	81.3	1.9	0.07
USFR	Laberge	Upper South Fork Rose Ck u/s Haul Rd	2007	27-Mar-07	< 0.001	< 0.002		63.3		77.2	< 0.5	< 0.2		130						
NEC/NXT	Minnow	Next Ck	2007	25-Aug-07											136		11.4	87.5		
NEC/NXT	Minnow	Next Ck	2007	26-Aug-07	0.0019	< 0.005	<0.5	47.4	<0.005			<0.5		102					2.7	0.09
1st Trib Rose	Laberge	Rose Ck Tributary u/s K8	2007	27-Mar-07	0.001	< 0.002		78.2		95.3	< 0.5	< 0.2		168						
n					93	28	22	43	86	39	39	28	16	93	23	17	18	14	22	22
detection limits					< 0.001, < 0.005	< 0.0001, < 0.002, < 0.005, < 0.01	< 0.5	< 0.5	< 0.005, < 0.01	-	< 0.5	< 0.2, < 0.5	< 5	< 1	-	< 0.0005	-	-	< 0.5	< 0.01, < 0.05
minimum					0.0004	< 0.0001	< 0.5	11.6	< 0.005	14.1	< 0.5	<0.2	<5	19	29.3	< 0.0005	9.10	79.5	0.6	0.07
maximum					0.0380	< 0.005	< 0.5	159	0.070	194	2.30	< 0.5	8	382	379.0	< 0.0005	14.65	104.9	3.5	0.11
Summary statistics (< DL values taken at 1/2 DL)		**median**			0.0025	0.00017	0.25	37.0	0.005	49.2	0.25	0.3	2.5	123	97	0.00025	12.12	93.0	1.6	0.08
		mean			0.0048	0.00065	0.25	60.5	0.009	77.5	0.30	0.2	3.7	147	139	0.00025	12.12	91.5	1.8	0.08
		standard deviation (SD)			0.0064	0.00086	0	49.3	0.010	62.0	0.33	0.1	2.0	92	119	0	1.40	9.4	0.8	0.01
		standard error			0.0007	0.00016	0	7.52	0.001	9.92	0.05	0.01	0.5	10	24.7	0	0.33	2.5	0.2	0.003
		# < detection limit			45	20	22	0	60	0	38	27	11	0	0	17	0	0	0	0
		% < detection limit			48%	71%	100%	0%	70%	0%	97%	96%	69%	0%	0%	100%	0%	0%	0%	0%
		# > criterion[1]			2	0	-	0	0	-	-	0	-	-	-	0	0	-	-	0
		% > criterion[1]			2%	0%	-	0%	0%	-	-	0%	-	-	-	0%	0%	-	-	0%
		# < detection limit (1/2 detection limit > criterion)			0	0	-	0	0	-	-	0	-	-	-	0	0	-	-	0
		% < detection limit (1/2 detection limit > criterion)			0%	0%	-	0%	0%	-	-	0%	-	-	-	0%	0%	-	-	0%
		99th percentile			0.0352	0.0025	0.25	158	0.045	193	1.5	0.30	8	325	372.8	0.00025	14.64	104.4	3.4	0.11
		95th percentile			0.0164	0.0025	0.25	149	0.030	181	0.25	0.25	7	303	349.7	0.00025	14.59	102.6	3.1	0.11
		90th percentile			0.0108	0.0025	0.25	141	0.020	175	0.25	0.25	7	277	337.8	0.00025	13.88	100.9	2.9	0.10
		mean + t-value x SD			0.0155	0.0021	0.25	143	0.027	182	0.86	0.33	7	299	342.4	0.00025	14.56	108.1	3.3	0.10
		1st percentile			0.0005	0.00005	0.25	12.6	0.0025	15.2	0.25	0.10	2.5	21	31.7	0.00025	9.33	79.6	0.6	0.07
		5th percentile			0.0006	0.00005	0.25	14.8	0.0025	17.9	0.25	0.10	2.5	33	40.5	0.00025	10.23	79.9	0.6	0.07
		10th percentile			0.0010	0.00005	0.25	17.4	0.0025	20.4	0.25	0.10	2.5	38	43.2	0.00025	10.69	80.5	0.7	0.07
		mean - t-value x SD			-0.0059	-0.00078	0.25	-22.4	-0.008	-27.0	-0.25	0.12	0.2	-6	-65.0	0.00025	9.68	74.9	0.4	0.06
upper background benchmark					0.0164	< 0.005			0.030			< 0.5	7	303	350	< 0.0005			3.1	0.11
lower background benchmark							< 0.5	14.8		17.9	< 0.5						10.23	80		
water quality criterion[2]					0.03 (CCME)	0.004 (OMOE)	-	11.1 (OMOE)	0.24 (CCME)	-	-	250 (CCME)	-	-	-	0.005 (CCME)	6.5 (CCME)	-	-	0.12 (CCME)

outlier value removed from data set. See Table A.2 for removal rationale.

value removed from data set is less than detection limit and 1/2 detection limit exceeds guideline.

negative values were converted to zero for the computation of summary statistics since below-zero freezing points are unlikely in low-salinity waters.

Note: removed values were excluded from all summary statistic computations.

[1] # and % < criteria for total alkalinity, dissolved oxygen and pH.

[2] see Appendix Table B.1 for sources.

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Hardness - dissolved	Hardness - Total	Hydroxide	Nitrate	Nitrite	Nitrate plus nitrite	pH - Laboratory	pH - in situ	Sulphate	Temperature - in situ	Total organic carbon	Phosphorus - nutrient analysis	Total dissolved solids - laboratory	Total suspended solids	Turbidity
				Units	mg/L as CaCO3	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	pH units	pH units	mg/L	˚C	mg/L	mg/L	mg/L	mg/L	NTU
FC/FDU	GLL	Upper Faro Creek	2005	22-Jun-05		11						7.4	1.6	7.4				< 1	
FC/FDU	GLL	Upper Faro Creek	2005	19-Sep-05		14						7.9	2.1	6.5				1	
FC/FDU	GLL	Upper Faro Creek	2006	07-Jun-06		7						7.9	1.13	1				< 1	
FC/FDU	GLL	Upper Faro Creek	2006	18-Sep-06		12						7.5	1.97	2.1				1	
FC/FDU	GLL	Upper Faro Creek	2007	11-Jun-07								7.1	1.04	4.6				1	
FC/FDU	GLL	Upper Faro Creek	2007	2-Oct-07		11						7.2	1.99	1				< 1	
FC/FDU	Laberge	Upper Faro Creek	2007	26-Mar-07		21.1	< 0.5				6.93		1.76					1	1.5
FC/FDU	Access	Upper Faro Creek	2007	25-Sep-07	11.5	12.2	<0.5	<0.02	<0.005	<0.02	7.4	6.85	1.2	2.4	2.8	<0.005	40	2	
FC/FDU	Access	Upper Faro Creek	2007	25-Oct-07	13.6	12.9	<0.5	<0.02	<0.005	<0.02	7.4	6.84	2.6	-1	2.1	<0.005	34	< 1	
FC/FDU	Access	Upper Faro Creek	2007	21-Nov-07	15.1	13.8	<0.5	0.02	<0.005	0.02	7.5	6.45	2.4	0.2	1	<0.005	28	< 1	
FC/FDU	Access	Upper Faro Creek	2007	13-Dec-07	16.2	16	<0.5	0.04	<0.005	0.04	7.6	8.01	2.9	0.3	1.6	<0.005	46	< 1	
R6	GLL	Anvil Ck u/s Rose Ck	2005	29-Mar-05		261	< 0.5					7.5	80.1	0.5				< 1	0.31
R6	GLL	Anvil Ck u/s Rose Ck	2005	17-Aug-05		158	< 0.5					8	19.3	7.3				2	0.35
R6	GLL	Anvil Ck u/s Rose Ck	2006	21-Feb-06		170	< 0.5					7.9	20.4	0.9				< 1	0.67
R6	GLL	Anvil Ck u/s Rose Ck	2006	07-Aug-06		144	< 0.5					8.1	20	6				< 1	0.36
R6	GLL	Anvil Ck u/s Rose Ck	2007	20-Feb-07		166	< 0.5					8.3	19.5	-0.2				< 1	0.7
R6	GLL	Anvil Ck u/s Rose Ck	2007	17-Aug-07		132	< 0.5					8.1	20.2	9.3				< 1	0.42
R6	Access	Anvil Ck u/s Rose Ck	2007	26-Sep-07	147	141	<0.5	0.09	<0.005	0.09	8.3	8.21	19.6	1.4	2.4	<0.005	178	< 1	
R6	Access	Anvil Ck u/s Rose Ck	2007	24-Oct-07	156	155	<0.5	0.36	<0.005	0.36	8.3	8.1	24	-1	1.4	<0.005	180	< 1	
R6	Access	Anvil Ck u/s Rose Ck	2007	22-Nov-07	178	157	<0.5	0.19	<0.005	0.19	8.1	7.85	24.7	-0.5	1.1	<0.005	170	< 1	
R6	Access	Anvil Ck u/s Rose Ck	2007	14-Dec-07	170	166	<0.5	0.2	<0.005	0.2	8.2	7.99	23.5	0.1	0.6	<0.005	180	2	
R7	GLL	North Fork at R7	2005	21-Jan-05								7.3		-0.5					
R7	GLL	North Fork at R7	2005	22-Jan-05		133							10					< 1	
R7	GLL	North Fork at R7	2005	09-Feb-05		134						7.4	8.2	0.5				< 1	
R7	GLL	North Fork at R7	2005	14-Mar-05		143						7.8	9.1	0.7				< 1	
R7	GLL	North Fork at R7	2005	11-Apr-05		132						7.7	8.9	1.5				< 1	
R7	GLL	North Fork at R7	2005	09-May-05		28						7.8	1.7	3				15	
R7	GLL	North Fork at R7	2005	20-Jun-05		68						7.9	6.5	8.9				2	
R7	GLL	North Fork at R7	2005	26-Jul-05		72						7.6	6.9	7.7				< 1	
R7	GLL	North Fork at R7	2005	23-Aug-05		99						7.7	7.2	6				< 1	
R7	GLL	North Fork at R7	2005	06-Sep-05		80						8.1	7.5	5.5				< 1	
R7	GLL	North Fork at R7	2005	11-Oct-05		103						7.7	7.97	0.8				< 1	
R7	GLL	North Fork at R7	2005	02-Nov-05		112						7.9	8.85	0.3				< 1	
R7	GLL	North Fork at R7	2005	13-Dec-05		123						7.6	16.9	0.1				< 1	
R7	GLL	North Fork at R7	2006	24-Jan-06		129						8	10.1	-0.7				< 1	
R7	GLL	North Fork at R7	2006	14-Feb-06		132						7.7	11	0.8				< 1	
R7	GLL	North Fork at R7	2006	25-Mar-06		138						7.8	10.7	1.1				< 1	
R7	GLL	North Fork at R7	2006	24-Apr-06		126						8	9.73	1.4				< 1	
R7	GLL	North Fork at R7	2006	18-May-06		33						8.2	2.14	0.2				13	
R7	GLL	North Fork at R7	2006	19-Jun-06		59						8	5.52	4.8				4	
R7	GLL	North Fork at R7	2006	17-Jul-06		76						8		7.5				2	
R7	GLL	North Fork at R7	2006	22-Aug-06		76						7.9	6.97	6.6				< 1	
R7	GLL	North Fork at R7	2006	12-Sep-06		74						8	7.2	4				< 1	
R7	GLL	North Fork at R7	2006	16-Oct-06		100						7.9	8.07	0.3				< 1	
R7	GLL	North Fork at R7	2006	14-Nov-06		117						7.8	9.81	-0.8				< 1	
R7	GLL	North Fork at R7	2006	14-Dec-06		126						7.8	11.2	-0.1				< 1	
R7	GLL	North Fork at R7	2007	14-Feb-07		141						7.8	9.86	-0.1				< 1	
R7	GLL	North Fork at R7	2007	12-Mar-07		147						8	10.5	0.2				< 1	
R7	GLL	North Fork at R7	2007	19-Apr-07		139						7.7	11.1	0.2				< 1	
R7	GLL	North Fork at R7	2007	15-May-07		47						7.6	8.22	0.4				21	
R7	GLL	North Fork at R7	2007	19-Jun-07		66						7.9	6.36	5.5				3	
R7	GLL	North Fork at R7	2007	17-Jul-07		53						7.7	5.62	7.9				3	
R7	GLL	North Fork at R7	2007	14-Aug-07		79						7.7	7.28	7.5				2	
R7	GLL	North Fork at R7	2007	11-Sep-07		57						7.5	6.9	6.8				5	
R7	GLL	North Fork at R7	2007	23-Oct-07		96						7.8	9.33	0.4				< 1	
R7	GLL	North Fork at R7	2007	14-Nov-07		112						7.6	9.18	0				< 1	
R7	GLL	North Fork at R7	2007	09-Dec-07		110						7.4	9.73	0				< 1	
R7	Laberge	North Fork at R7	2007	27-Mar-07		147	< 0.5				7.77		10.6					< 1	0.43
R7	Access	North Fork at R7	2007	23-Oct-07	92	96							9.33					<1	
V1	GLL	V1, Vangorda Ck U/S	2005	07-Mar-05		56							10.7					< 1	0.1
V1	GLL	V1, Vangorda Ck U/S	2005	07-Jun-05		18	< 0.5					7	4.6	4				1	0.35
V1	GLL	V1, Vangorda Ck U/S	2005	12-Sep-05		29						8	10.5	7.1				< 1	0.26
V1	GLL	V1, Vangorda Ck U/S	2005	01-Dec-05		47	< 0.5					8.1	10.8	-0.6				< 1	0.18
V1	GLL	V1, Vangorda Ck U/S	2006	20-Mar-06		59	< 0.5					8.1	10.8	0.8				< 1	0.16
V1	GLL	V1, Vangorda Ck U/S	2006	05-Jun-06		13	< 0.5					8.3	3.62	1.2				3	0.77
V1	GLL	V1, Vangorda Ck U/S	2006	09-Jun-06		29	< 0.5					8.1	9.71	4.1				< 1	0.2
V1	GLL	V1, Vangorda Ck U/S	2006	06-Sep-06		29	< 0.5					8.1	9.71	4.1				< 1	0.2
V1	GLL	V1, Vangorda Ck U/S	2007	18-Jun-07		21	< 0.5					7.5	5.31	4.2				< 1	0.27

Table A.1: Total metal and non-metal parameter data and summary statistics for background stations near Faro Mine, Yukon, 2005 - 2007.

Station	Source	Name	Year	Date	Hardness - dissolved	Hardness - Total	Hydroxide	Nitrate	Nitrite	Nitrate plus nitrite	pH - Laboratory	pH - in situ	Sulphate	Temperature - in situ	Total organic carbon	Phosphorus - nutrient analysis	Total dissolved solids - laboratory	Total suspended solids	Turbidity
				Units	mg/L as CaCO3	mg/L as CaCO3	mg/L	mg/L	mg/L	mg/L	pH units	pH units	mg/L	˚C	mg/L	mg/L	mg/L	mg/L	NTU
V1	GLL	V1, Vangorda Ck U/S	2007	24-Sep-07		26	< 0.5					7.2	9.75	0.9				< 1	0.16
V1	GLL	V1, Vangorda Ck U/S	2007	10-Dec-07		42	< 0.5					7.6	11.3	2.6				< 1	0.11
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07	30.8			<0.02	<0.005	<0.02		6.85	8.9	6.3	2	0.01	54	<1	
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07								6.52		6.5					
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07								6.91		6.5					
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07								6.56		4.5					
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07								6.37		4.5					
V1	Nordine	V1, Vangorda Ck U/S	2007	27-Mar-07		54.5	< 0.5				7.57		10					< 1	0.11
V1	Access	V1, Vangorda Ck U/S	2007	26-Sep-07	30.5	28.7	<0.5	0.03	<0.005	0.03	7.6	7.58	9.7	2	0.8	<0.005	88	< 1	
V1	Access	V1, Vangorda Ck U/S	2007	24-Oct-07	37.9	36.3	<0.5	0.82	<0.005	0.82	7.8	7.69	11.8	-1	1.2	<0.005	54	< 1	
V1	Access	V1, Vangorda Ck U/S	2007	22-Nov-07	49	48.3	<0.5	0.06	<0.005	0.06	7.8	7.25	12.4	0	1.1	<0.005	60	< 1	
V1	Access	V1, Vangorda Ck U/S	2007	14-Dec-07	50.7	49	<0.5	0.09	<0.005	0.09	7.9	8.01	12	0.1	0.8	<0.005	80	< 1	
W10	GLL	W10, GHC u/s NW Dump	2005	22-Jun-05		49						7.5	3.4	7.4				< 1	
W10	GLL	W10, GHC u/s NW Dump	2005	20-Sep-05		60						7.9	4.2	5				1	
W10	GLL	W10, GHC u/s NW Dump	2006	07-Jun-06		27						7.9	3.01	2.5				< 1	
W10	GLL	W10, GHC u/s NW Dump	2006	18-Sep-06		57						7.8	3.48	2				< 1	
W10	GLL	W10, GHC u/s NW Dump	2007	11-Jun-07								7.2	2.5	3.2				3	
W10	GLL	W10, GHC u/s NW Dump	2007	02-Oct-07		45						7.7	4.11	1.1				< 1	
W10	Access	W10, GHC u/s NW Dump	2007	25-Sep-07	52	50.4	<0.5	<0.02	<0.005	<0.02	7.9	7.38	3.7	1.1	3.4	<0.005	80	1	
W10	Access	W10, GHC u/s NW Dump	2007	25-Oct-07	52.4	52.2	<0.5	<0.02	<0.005	<0.02	7.9	7.4	4.3	-1.5	2.8	<0.005	78	< 1	
UWFV/VR	Minnow	Upper West Fork Vangorda Ck	2007	25-Aug-07	35			<0.02	<0.005	<0.02		4.73	4.2	4.7	3.3	<0.005	62	<1	
UWFV/VR	Laberge	Upper West Fork Vangorda Ck	2007	27-Mar-07		44.2	< 0.5				7.02		6.54					< 1	0.41
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	26-Sep-07	30.3	28.9	<0.5	<0.02	<0.005	<0.02	7.7	7.3	5	1.4	2.7	<0.005	64	< 1	
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	25-Oct-07	33	31.8	<0.5	0.11	<0.005	0.11	7.7	6.6	7.8	-1	2.1	<0.005	54	1	
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	21-Nov-07	37.7	35	<0.5	0.05	<0.005	0.05	7.7	6.87	7.1	-0.2	0.6	<0.005	44	< 1	
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	13-Dec-07	38.7	39.3	<0.5	0.06	<0.005	0.06	7.7	8.44	7	0.1	2.8	<0.005	66	3	
USFR	Minnow	Upper South Fork Rose Ck u/s Haul Rd	2007	25-Aug-07	26.1			<0.02	<0.005	<0.02		7.08	5.5	10.1	2.7	<0.005	50	1	
USFR	Laberge	Upper South Fork Rose Ck u/s Haul Rd	2007	27-Mar-07		58.2	< 0.5				7.54		5.67					< 1	0.45
NEC/NXT	Minnow	Next Ck	2007	25-Aug-07								7.50		4.2					
NEC/NXT	Minnow	Next Ck	2007	26-Aug-07	49.7			<0.02	<0.005	<0.02			2.4		3.2	<0.005	78	<1	
1st Trib Rose	Laberge	Rose Ck Tributary u/s K8	2007	27-Mar-07		77.1	< 0.5				7.75		11.1					< 1	0.14
n					23	87	39	22	22	22	24	89	92	89	22	22	22	93	23
detection limits					< 0.5	< 0.5	< 0.5	< 0.02	< 0.005	< 0.02	< 0.1	-	< 0.5, < 5	-	< 0.5	< 0.005	< 10	< 1	-
minimum					11.5	7.0	< 0.5	< 0.02	< 0.005	< 0.02	6.93	4.73	1.04	0	0.6	< 0.005	28	< 1	0.10
maximum					178.0	261	< 0.5	0.82	< 0.005	0.82	8.30	8.44	80.10	10.1	3.4	0.01	180	21	1.50
Summary statistics (< DL values taken at 1/2 DL)	**median**				37.9	59.0	0.25	0.04	0.0025	0.04	7.70	7.70	8.14	1.4	2.1	0.0025	63	1	0.31
	mean				58.8	77.3	0.25	0.10	0.0025	0.10	7.71	7.60	9.25	2.7	1.9	0.0028	80	1	0.37
	standard deviation (SD)				51.9	52.5	0	0.18	0	0.18	0.34	0.55	9.21	2.9	0.9	0.0016	49	3	0.31
	standard error				10.8	5.6	0	0.04	0	0.04	0.069	0.06	0.96	0.3	0.2	0.0003	10.5	0	0.06
	# < detection limit				0	0	39	9	22	9	0	0	0	0	0	21	0	68	0
	% < detection limit				0%	0%	100%	41%	100%	41%	0%	0%	0%	0%	0%	95%	0%	73%	0%
	# > criterion[1]				-	-	-	0	0	-	0	3	1	-	-	0	0	0	-
	% > criterion[1]				-	-	-	0%	0%	-	0%	3%	1%	-	-	0%	0%	0%	-
	# < detection limit (1/2 detection limit > criterion)				-	-	-	0	0	-	0	0	0	-	-	0	0	0	0
	% < detection limit (1/2 detection limit > criterion)				-	-	-	0%	0%	-	0%	0%	0%	-	-	0%	0%	0%	0%
	99th percentile				176.2	182.7	0.25	0.72	0.0025	0.72	8.30	8.32	29.69	9.4	3.4	0.0084	180	15	1.34
	95th percentile				168.6	157.7	0.25	0.35	0.0025	0.35	8.29	8.16	20.29	7.6	3.3	0.0025	180	3	0.76
	90th percentile				154.2	145.2	0.25	0.20	0.0025	0.20	8.17	8.10	19.06	7.3	3.2	0.0025	177	3	0.69
	mean + t-value x SD				147.9	164.5	0.25	0.41	0.0025	0.41	8.29	8.51	24.56	7.6	3.6	0.006	165	6	0.91
	1st percentile				12.0	10.4	0.25	0.01	0.0025	0.01	6.95	6.17	1.12	0	0.6	0.0025	29	1	0.10
	5th percentile				13.8	12.4	0.25	0.01	0.0025	0.01	7.08	6.58	1.73	0	0.6	0.0025	34	1	0.11
	10th percentile				15.3	15.2	0.25	0.01	0.0025	0.01	7.40	6.87	2.17	0	0.8	0.0025	40	1	0.12
	mean - t-value x SD				-30.3	-9.9	0.25	-0.21	0.0025	-0.21	7.13	6.69	-6.06	-2.1	0.3	0.00009	-4	-4	-0.16
upper background benchmark					169	158		0.35	< 0.005	0.35			20.3	NA	3.3	< 0.005	180	3	0.76
lower background benchmark							< 0.5				7.08	6.58		NA					
water quality criterion[2]					-	-	-	13 (CCME)	0.06 (CCME)	-	6.5-9.0 (CCME)	6.5-9.0 (CCME)	50 (BCMOE)	-	-	0.03 (OMOE)	500 (CCME)	8 (CCME)	-

outlier value removed from data set. See Table A.2 for removal rationale.

value removed from data set is less than detection limit and 1/2 detection limit exceeds guideline.

negative values were converted to zero for the computation of summary statistics since below-zero freezing points are unlikely in low-salinity waters.

Note: removed values were excluded from all summary statistic computations.

[1] # and % < criteria for total alkalinity, dissolved oxygen and pH.

[2] see Appendix Table B.1 for sources.

Table A.2: Outlier values removed from background data computations, Faro Mine, Yukon, 2005 - 2007.

Parameter	Station ID	Station Description	Date	Outlier value	Rationale for removal[a]
Selenium	V1	Vangorda Ck U/S	7-Jun-05	0.011 mg/L	Statistical outlier. It is considerably higher than the rest of the data (data range = < 0.00004 - 0.002 mg/L).
Thorium	R7	North Fork Rose Creek	6-Sep-05	0.002 mg/L	Statistical outlier. It is the only quantifiable value (i.e. all other values are below the method detection limit of 0.0005 mg/L) and may represent an analytical, reporting, or entry error.
Colour	V1	Vangorda Ck U/S	5-Jun-06	20 CU	Statistical outlier. Other values ranged between <5 and 8 CU. This datum substantially increased the background benchmark if included in the data set and thus was removed.
Dissolved oxygen	R6	Anvil Ck u/s Rose Ck	26-Sep-07	294 mg/L	Statistical outlier. Maximum saturation in water is about 15 mg/L (0°C and atmospheric pressure of 790 mmHg). Datum must be an error.
	V1	Vangorda Ck U/S	26-Sep-07	75.5 mg/L	These are not statistical outliers, but are also outside the range of normal oxygen concentrations in surface waters.
	UWFV/VR	Upper West Fork Vangorda Ck	26-Sep-07	70.4 mg/L	
Silver	R6	Anvil Ck u/s Rose Ck	29-Mar-05	0.0017 mg/L	0.0017 mg/L was identified as a statistical outlier while 0.0004 mg/L was not. These values are conspicuous because all but one other value (at 0.00002 mg/L) were below detection (<0.00025 mg/L or lower) as would be expected for silver in natural surface waters. Low TSS values for those dates indicate the silver values cannot be attributed to a high-flow (high particulate) event.
	R7	North Fork Rose Creek	20-Jun-05	0.0004 mg/L	

[a] Statistical outliers were values outside the range defined by 3 standard deviations from the mean.

Table A.3: Total cadmium, silver and zirconium concentrations and summary statistics based on samples collected 2005 - 2008 inclusive.

Station	Source	Name	Year	Date	Cadmium	Silver	Zirconium
				Units	mg/L	mg/L	mg/L
FC/FDU	GLL	Upper Faro Creek	2005	22-Jun-05	< 0.0002	< 0.00025	< 0.01
FC/FDU	GLL	Upper Faro Creek	2005	19-Sep-05	< 0.0002	< 0.00025	< 0.01
FC/FDU	GLL	Upper Faro Creek	2006	07-Jun-06	< 0.0002	< 0.00025	< 0.01
FC/FDU	GLL	Upper Faro Creek	2006	18-Sep-06	< 0.0002	< 0.00025	< 0.01
FC/FDU	GLL	Upper Faro Creek	2007	11-Jun-07	< 0.0002	< 0.00025	< 0.01
FC/FDU	GLL	Upper Faro Creek	2007	2-Oct-07	< 0.0002	< 0.00025	< 0.01
FC/FDU	Laberge	Upper Faro Creek	2007	26-Mar-07	0.00001	< 0.00005	< 0.002
FC/FDU	Access	Upper Faro Creek	2007	25-Sep-07	0.00001	< 0.00001	0.00028
FC/FDU	Access	Upper Faro Creek	2007	25-Oct-07	0.000013	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2007	21-Nov-07	0.000009	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2007	13-Dec-07	0.000009	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2008	24-Jan-08	0.000008	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2008	21-Feb-08	0.00001	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2008	11-Mar-08	0.000013	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2008	29-Apr-08	0.000014	< 0.000005	< 0.0001
FC/FDU	Access	Upper Faro Creek	2008	22-May-08	0.000071	0.000012	0.0002
FC/FDU	Access	Upper Faro Creek	2008	25-Jun-08	0.000019	< 0.000005	0.0002
FC/FDU	Access	Upper Faro Creek	2008	30-Jul-08	0.000027	< 0.000005	0.0002
FC/FDU	Access	Upper Faro Creek	2008	18-Sep-08	0.000011	< 0.000005	0.0002
FC/FDU	Access	Upper Faro Creek	2008	7-Oct-08	0.000009	0.0191	0.0001
R6	GLL	Anvil Ck u/s Rose Ck	2005	29-Mar-05	< 0.0002	0.0017	< 0.01
R6	GLL	Anvil Ck u/s Rose Ck	2005	17-Aug-05	< 0.0002	< 0.00025	< 0.01
R6	GLL	Anvil Ck u/s Rose Ck	2006	21-Feb-06	< 0.0002	< 0.00025	< 0.01
R6	GLL	Anvil Ck u/s Rose Ck	2006	07-Aug-06	< 0.0002	< 0.00025	< 0.01
R6	GLL	Anvil Ck u/s Rose Ck	2007	20-Feb-07	< 0.0002	< 0.00025	< 0.01
R6	GLL	Anvil Ck u/s Rose Ck	2007	17-Aug-07	< 0.0002	< 0.00025	< 0.01
R6	Access	Anvil Ck u/s Rose Ck	2007	26-Sep-07	0.00002	< 0.00001	0.00012
R6	Access	Anvil Ck u/s Rose Ck	2007	24-Oct-07	0.000019	0.00002	0.0004
R6	Access	Anvil Ck u/s Rose Ck	2007	22-Nov-07	0.00001	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2007	14-Dec-07	0.000013	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	23-Jan-08	0.000013	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	20-Feb-08	0.000013	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	13-Mar-08	0.000007	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	28-Apr-08	0.000013	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	21-May-08	0.000074	0.000008	0.0003
R6	Access	Anvil Ck u/s Rose Ck	2008	24-Jun-08	0.000052	0.000009	0.0002
R6	Access	Anvil Ck u/s Rose Ck	2008	29-Jul-08	0.000015	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	17-Sep-08	0.00002	< 0.000005	< 0.0001
R6	Access	Anvil Ck u/s Rose Ck	2008	8-Oct-08	0.000016	0.111	0.00101
R7	GLL	North Fork at R7	2005	21-Jan-05			
R7	GLL	North Fork at R7	2005	22-Jan-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	09-Feb-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	14-Mar-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	11-Apr-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	09-May-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	20-Jun-05	< 0.0002	0.0004	< 0.01
R7	GLL	North Fork at R7	2005	26-Jul-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	23-Aug-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	06-Sep-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	11-Oct-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	02-Nov-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2005	13-Dec-05	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	24-Jan-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	14-Feb-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	25-Mar-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	24-Apr-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	18-May-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	19-Jun-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	17-Jul-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	22-Aug-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	12-Sep-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	16-Oct-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	14-Nov-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2006	14-Dec-06	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	14-Feb-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	12-Mar-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	19-Apr-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	15-May-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	19-Jun-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	17-Jul-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	14-Aug-07	0.0004	< 0.00025	< 0.01

Table A.3: Total cadmium, silver and zirconium concentrations and summary statistics based on samples collected 2005 - 2008 inclusive.

Station	Source	Name	Year	Date	Cadmium	Silver	Zirconium
R7	GLL	North Fork at R7	2007	11-Sep-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	23-Oct-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	14-Nov-07	< 0.0002	< 0.00025	< 0.01
R7	GLL	North Fork at R7	2007	09-Dec-07	< 0.0002	< 0.00025	< 0.01
R7	Laberge	North Fork at R7	2007	27-Mar-07	0.00001	< 0.00005	< 0.002
R7	Access	North Fork at R7	2007	23-Oct-07	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2005	07-Mar-05	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2005	07-Jun-05	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2005	12-Sep-05	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2005	01-Dec-05	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2006	20-Mar-06	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2006	05-Jun-06	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2006	09-Jun-06	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2006	06-Sep-06	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2007	18-Jun-07	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2007	24-Sep-07	< 0.0002	< 0.00025	< 0.01
V1	GLL	V1, Vangorda Ck U/S	2007	10-Dec-07	< 0.0002	< 0.00025	< 0.01
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07	< 0.00001	< 0.00001	< 0.005
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07			
V1	Minnow	V1, Vangorda Ck U/S	2007	28-Aug-07			
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07			
V1	Minnow	V1, Vangorda Ck U/S	2007	29-Aug-07			
V1	Nordine	V1, Vangorda Ck U/S	2007	27-Mar-07	0.00001	< 0.00005	< 0.002
V1	Access	V1, Vangorda Ck U/S	2007	26-Sep-07	< 0.00001	< 0.00001	0.00012
V1	Access	V1, Vangorda Ck U/S	2007	24-Oct-07	0.000036	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2007	22-Nov-07	0.000007	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2007	14-Dec-07	0.000023	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	23-Jan-08	0.000008	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	21-Feb-08	0.000006	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	11-Mar-08	0.000006	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	29-Apr-08	0.000007	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	22-May-08	0.000114	0.000007	0.0002
V1	Access	V1, Vangorda Ck U/S	2008	25-Jun-08	< 0.000005	< 0.000005	0.0001
V1	Access	V1, Vangorda Ck U/S	2008	29-Jul-08	0.000011	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	17-Sep-08	0.000009	< 0.000005	< 0.0001
V1	Access	V1, Vangorda Ck U/S	2008	7-Oct-08	< 0.000005	0.0561	0.00113
W10	GLL	W10, GHC u/s NW Dump	2005	22-Jun-05	< 0.0002	< 0.00025	< 0.01
W10	GLL	W10, GHC u/s NW Dump	2005	20-Sep-05	< 0.0002	< 0.00025	< 0.01
W10	GLL	W10, GHC u/s NW Dump	2006	07-Jun-06	< 0.0002	< 0.00025	< 0.01
W10	GLL	W10, GHC u/s NW Dump	2006	18-Sep-06	< 0.0002	< 0.00025	< 0.01
W10	GLL	W10, GHC u/s NW Dump	2007	11-Jun-07	< 0.0002	< 0.00025	< 0.01
W10	GLL	W10, GHC u/s NW Dump	2007	02-Oct-07	< 0.0002	< 0.00025	< 0.01
W10	Access	W10, GHC u/s NW Dump	2007	25-Sep-07	0.00003	< 0.00001	0.00022
W10	Access	W10, GHC u/s NW Dump	2007	25-Oct-07	0.000018	< 0.000005	< 0.0001
UWFV/VR	Minnow	Upper West Fork Vangorda Ck	2007	25-Aug-07	0.00001	< 0.00001	< 0.005
UWFV/VR	Laberge	Upper West Fork Vangorda Ck	2007	27-Mar-07	0.00002	< 0.00005	< 0.002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	26-Sep-07	0.00001	< 0.00001	0.00023
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	25-Oct-07	0.000036	< 0.000005	0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	21-Nov-07	0.000012	< 0.000005	< 0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2007	13-Dec-07	0.000026	< 0.000005	0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	24-Jan-08	0.000067	0.000007	0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	21-Feb-08	0.000016	< 0.000005	< 0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	11-Mar-08	0.000015	< 0.000005	< 0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	29-Apr-08	0.000048	0.000005	0.0001
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	22-May-08	0.000113	0.000029	0.0005
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	25-Jun-08	0.000015	0.000005	0.0003
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	29-Jul-08	0.000016	< 0.000005	0.0002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	17-Sep-08	0.000011	< 0.000005	0.0002
UWFV/VR	Access	Upper West Fork Vangorda Ck	2008	7-Oct-08	0.000009	0.0412	0.0003
USFR	Minnow	Upper South Fork Rose Ck u/s Haul Rd	2007	25-Aug-07	< 0.00001	< 0.00001	< 0.005
USFR	Laberge	Upper South Fork Rose Ck u/s Haul Rd	2007	27-Mar-07	0.00001	< 0.00005	< 0.002
NEC/NXT	Minnow	Next Ck	2007	25-Aug-07			
NEC/NXT	Minnow	Next Ck	2007	26-Aug-07	0.00001	< 0.00001	< 0.005
1st Trib Rose	Laberge	Rose Ck Tributary u/s K8	2007	27-Mar-07	0.00001	< 0.00005	< 0.002

Table A.3: Total cadmium, silver and zirconium concentrations and summary statistics based on samples collected 2005 - 2008 inclusive.

Station	Source	Name	Year	Date	Cadmium	Silver	Zirconium
				n	65	60	64
				detection limits	< 0.000005, < 0.00001, < 0.0002	< 0.000005, < 0.00001, < 0.00005, < 0.00025	< 0.0001, < 0.002, < 0.005, < 0.01
				minimum	< 0.000005	< 0.000005	< 0.0001
				maximum	0.0004	0.000029	< 0.005
Summary statistics (< DL values taken at 1/2 DL)				**median**	0.000013	0.0000025	0.00010
				mean	0.000026	0.000006	0.00038
				standard deviation (SD)	0.000052	0.000008	0.00063
				standard error	0.000006	0.000001	0.00008
				# < detection limit	5	51	38
				% < detection limit	8%	85%	59%
				# > criterion[1]	10	0	0
				% > criterion[1]	15%	0%	0%
				# < detection limit (1/2 detection limit > criterion)	0	0	0
				% < detection limit (1/2 detection limit > criterion)	0%	0%	0%
				99th percentile	0.00022	0.000027	0.0025
				95th percentile	0.000073	0.000025	0.0023
				90th percentile	0.00005	0.000025	0.0010
				mean + t-value x SD	0.00011	0.000019	0.0014
				1st percentile	0.000003	0.0000025	0.00005
				5th percentile	0.000005	0.0000025	0.00005
				10th percentile	0.000006	0.0000025	0.00005
				mean - t-value x SD	-0.00006	-0.000006	-0.00067
				upper background benchmark	0.000073	< 0.00005	0.0023
				lower background benchmark			
				water quality criterion[2]	0.00003 (CCME)	0.0001 (CCME)	0.004 (OMOE)

outlier value removed from data set.

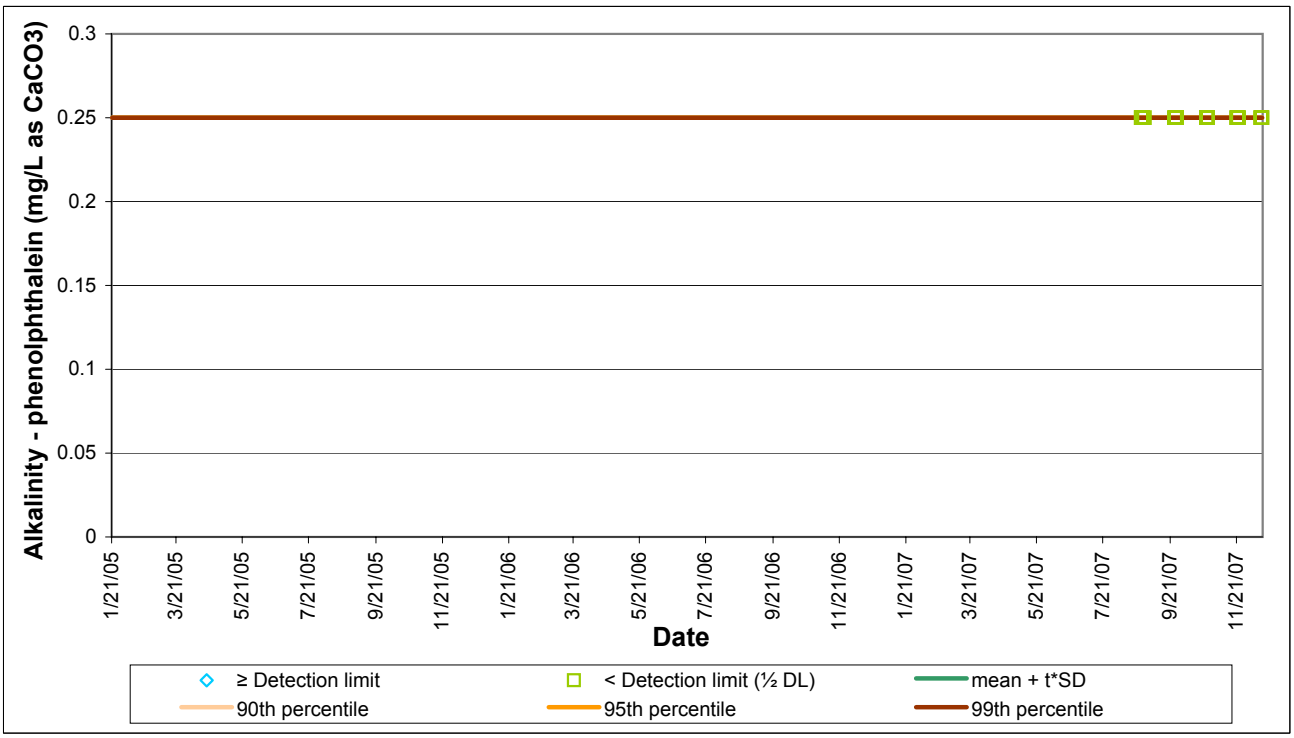
value removed from data set is less than detection limit and 1/2 detection limit exceeds guideline.

Note: removed values were excluded from all summary statistic computations.

[1] # and % < criteria for total alkalinity, dissolved oxygen and pH.

[2] see Appendix Table B.1 for sources.

a)



b)

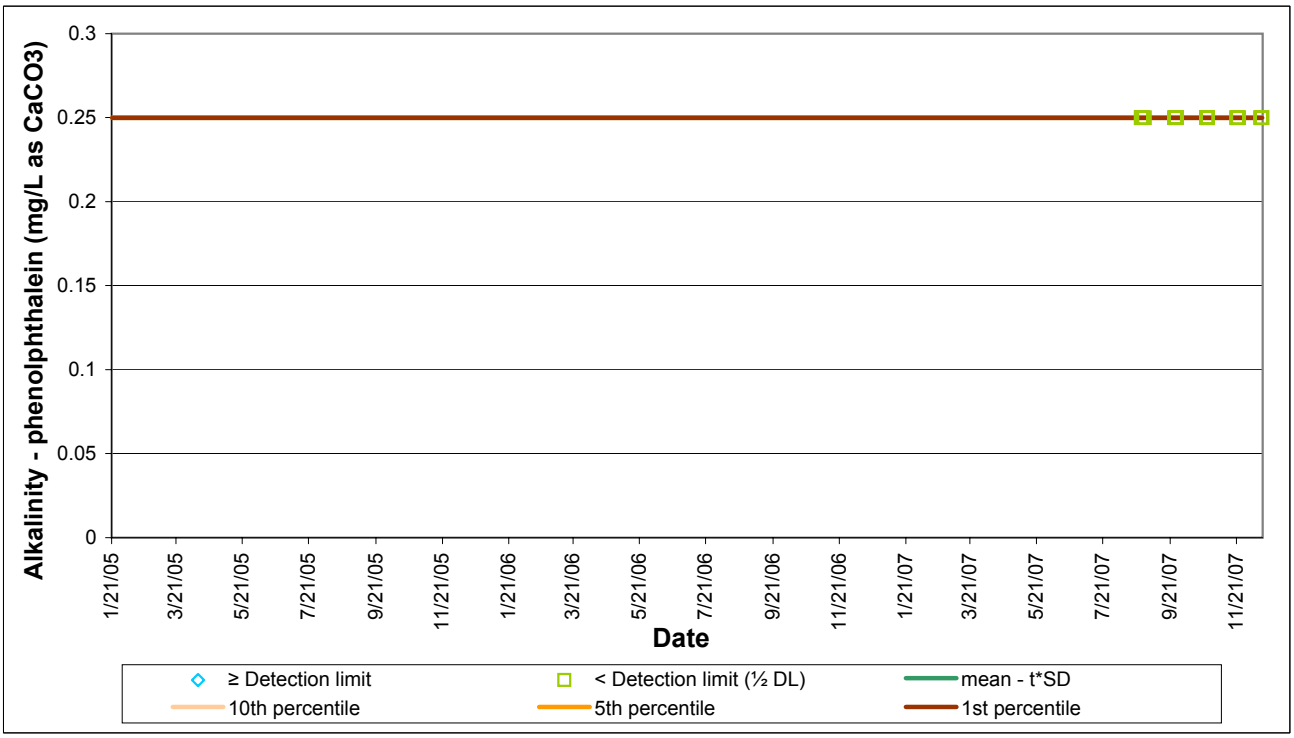
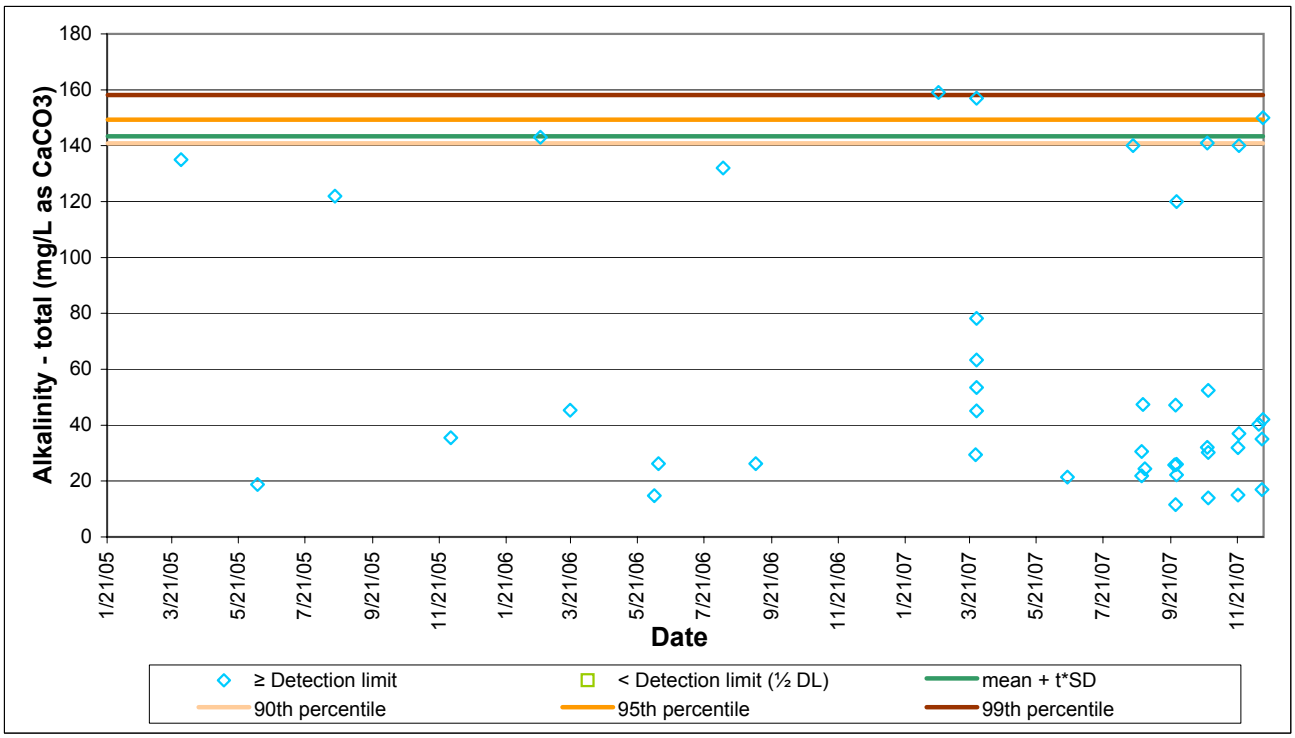


Figure A.1: Background (reference station) concentrations of phenolphthalein alkalinity measured near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

a)



b)

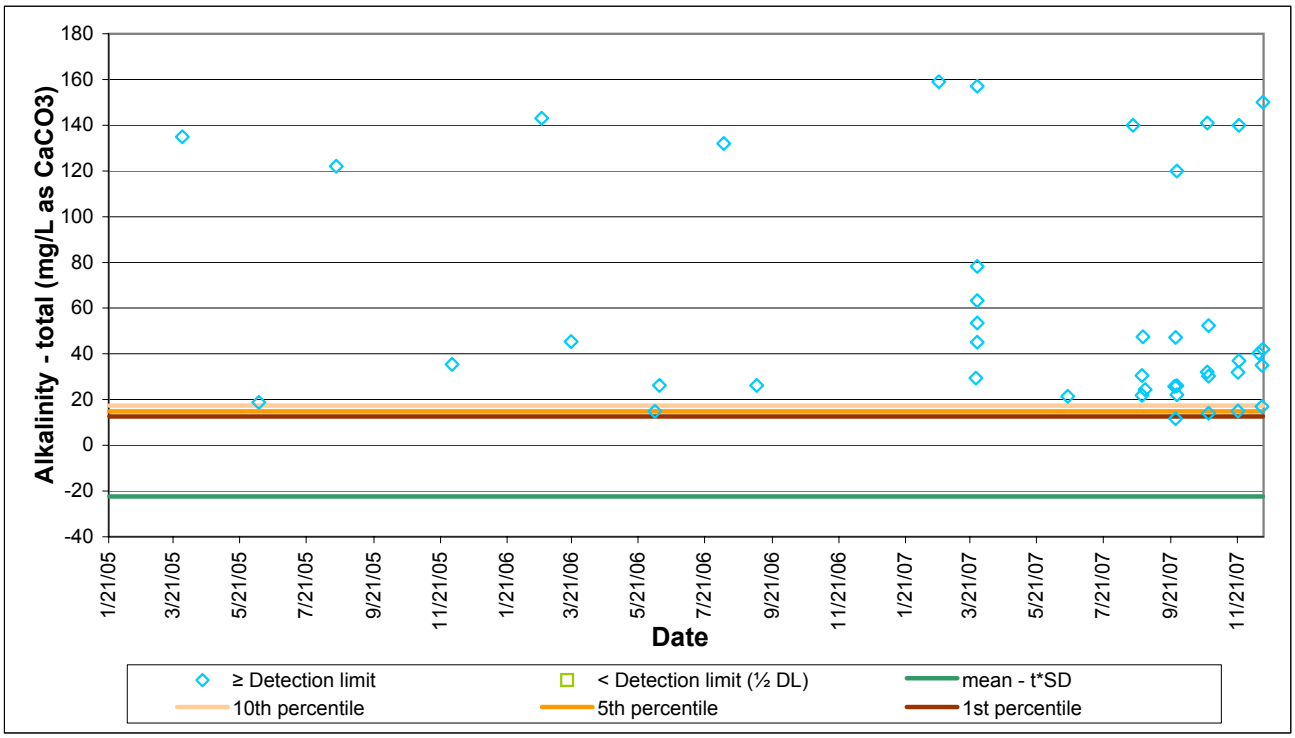


Figure A.2: Background (reference station) concentrations of total alkalinity measured near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

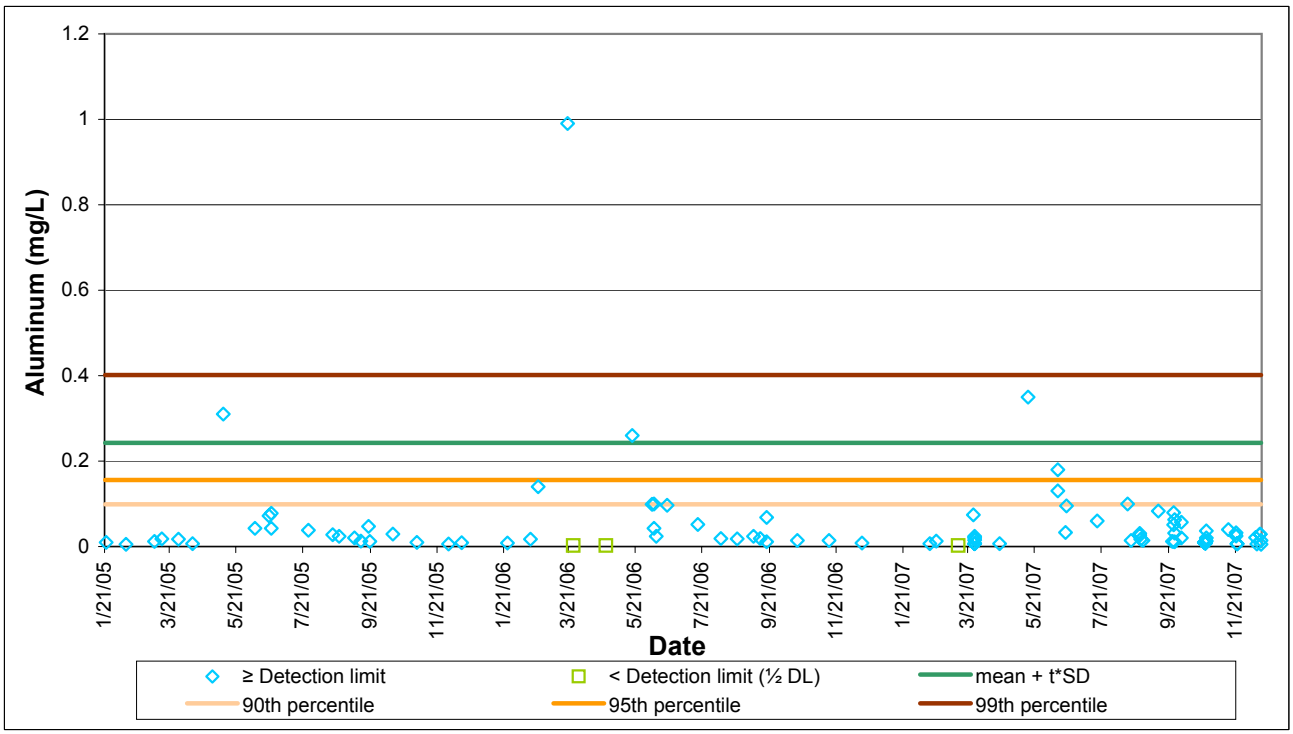


Figure A.3: Background (reference station) concentrations of aluminum measured near Faro Mine, Yukon, 2005 - 2007.

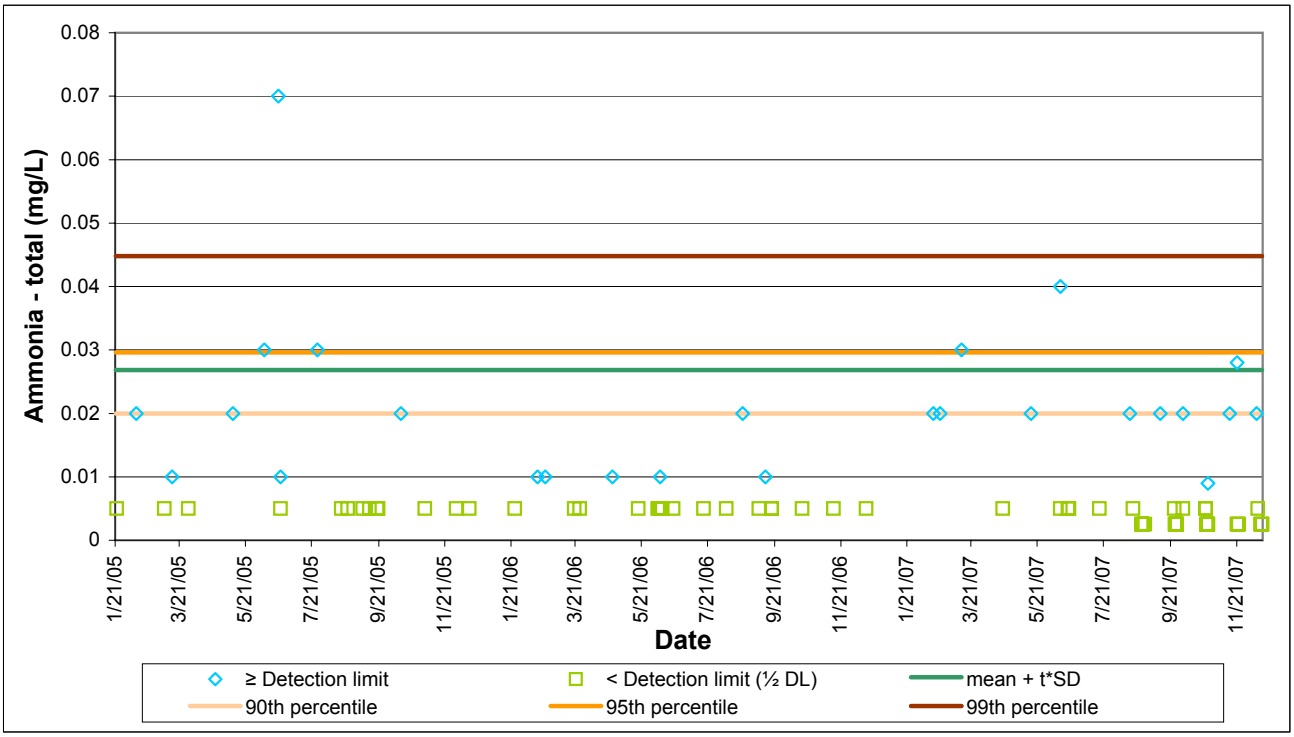


Figure A.4: Background (reference station) concentrations of total ammonia measured near Faro Mine, Yukon, 2005 - 2007.

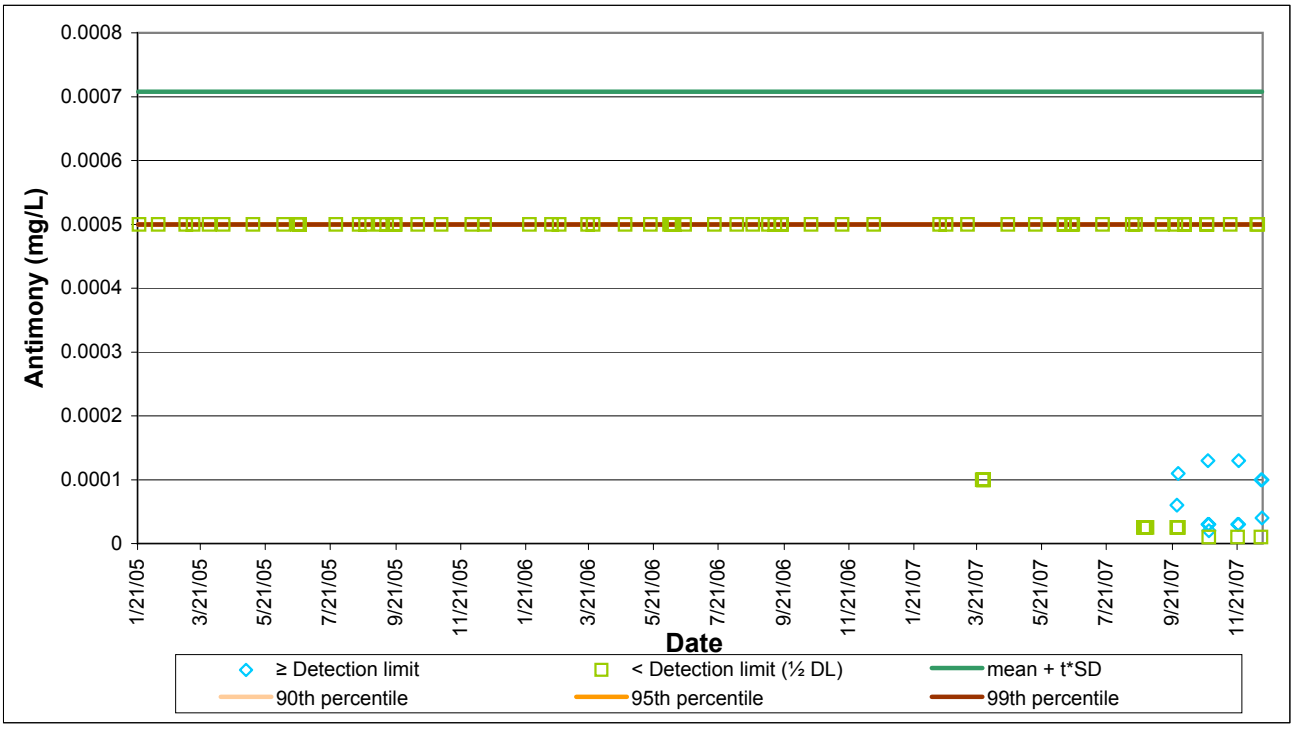


Figure A.5: Background (reference station) concentrations of antimony measured near Faro Mine, Yukon, 2005 - 2007.

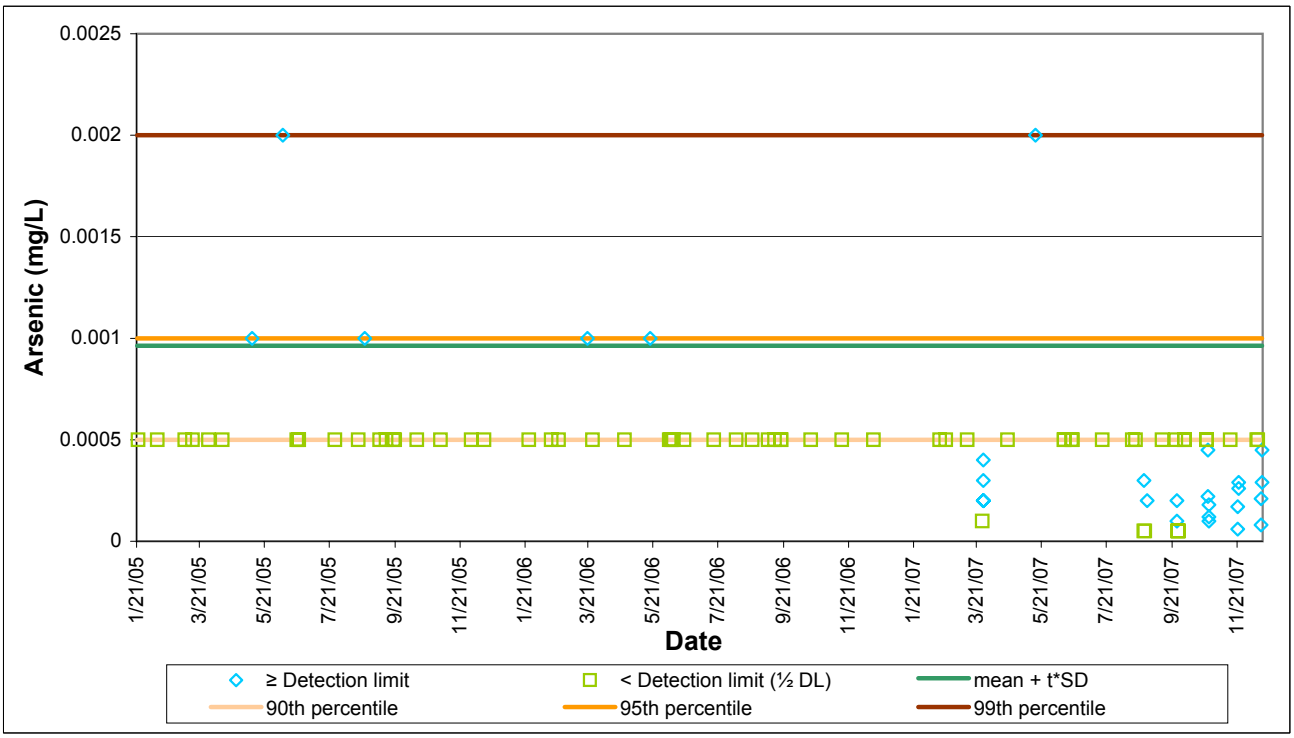


Figure A.6: Background (reference station) concentrations of arsenic measured near Faro Mine, Yukon, 2005 - 2007.

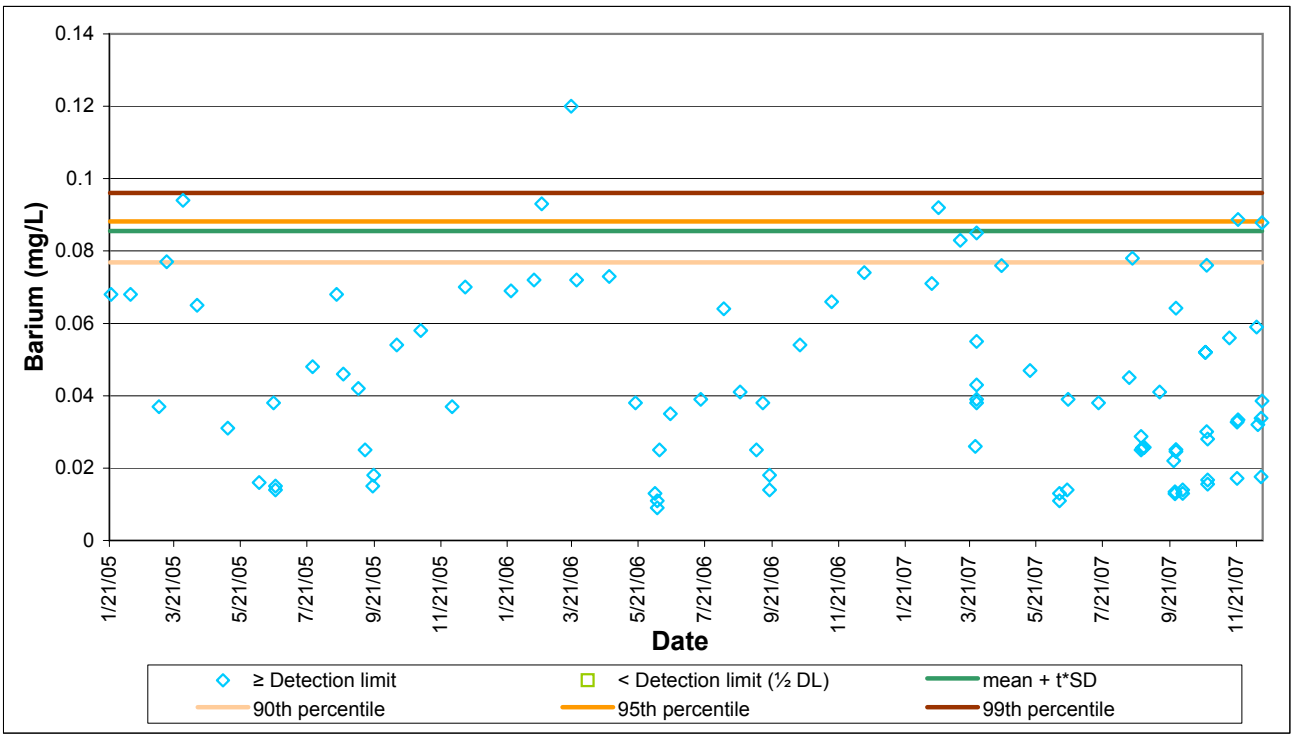


Figure A.7: Background (reference station) concentrations of barium measured near Faro Mine, Yukon, 2005 - 2007.

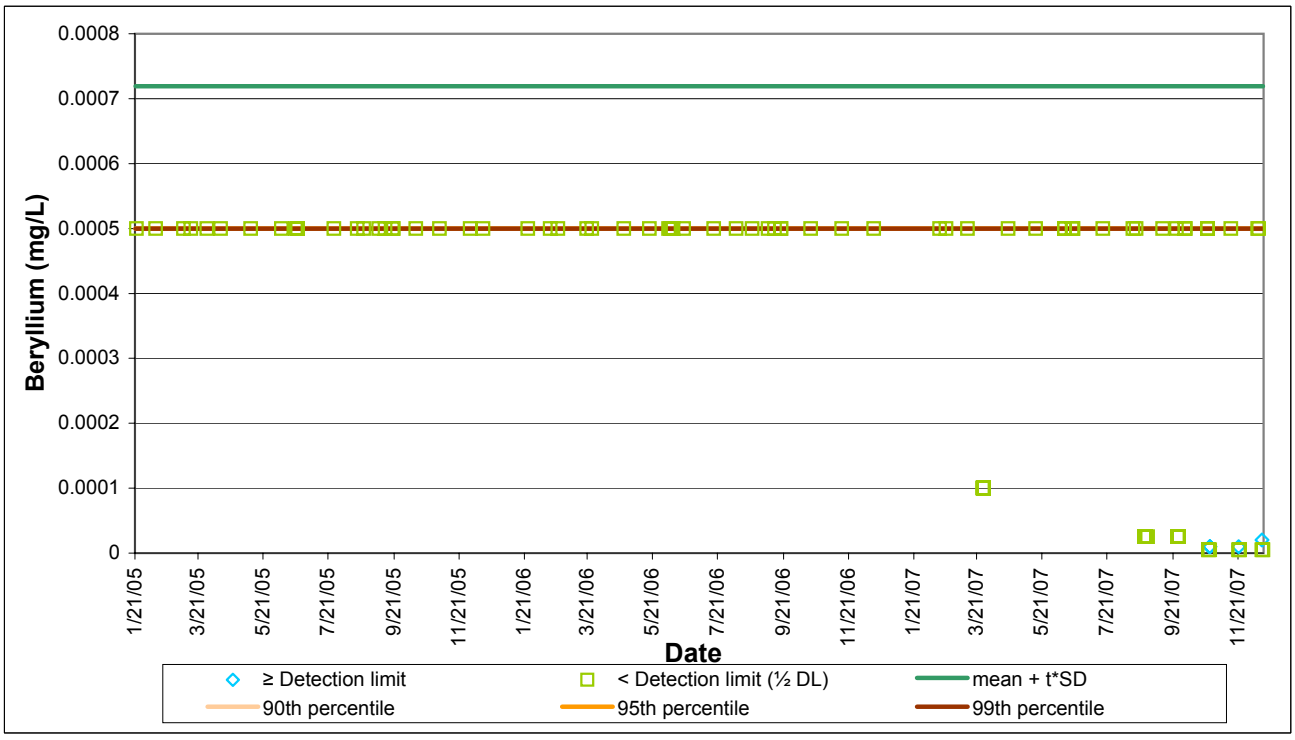
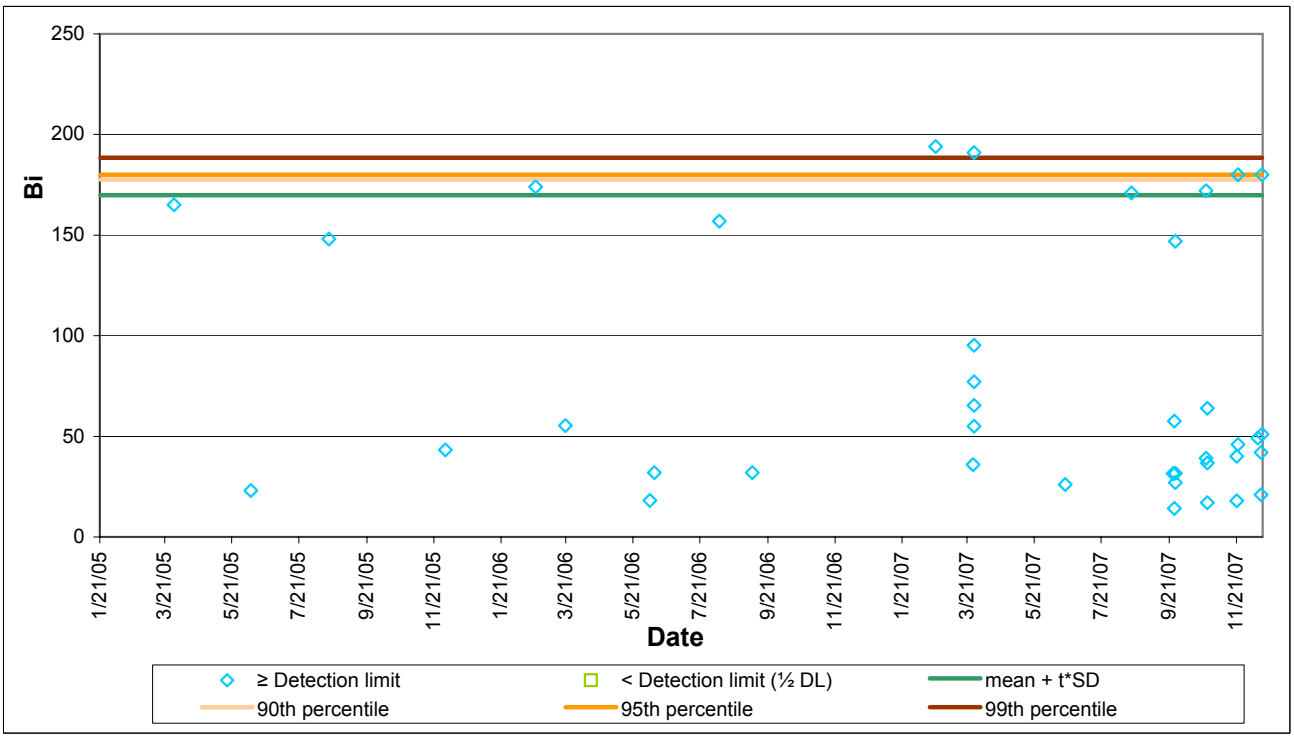


Figure A.8: Background (reference station) concentrations of beryllium measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

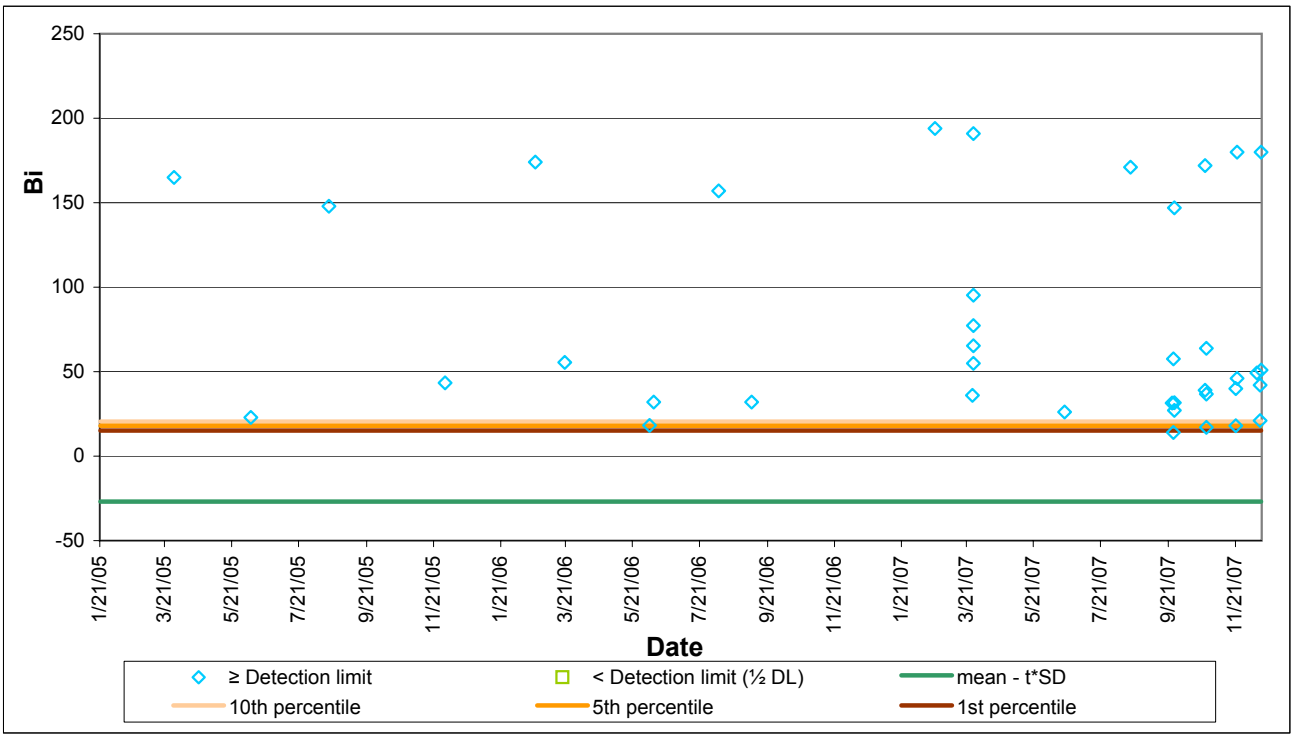


Figure A.9: Background (reference station) concentrations of bicarbonate measured near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

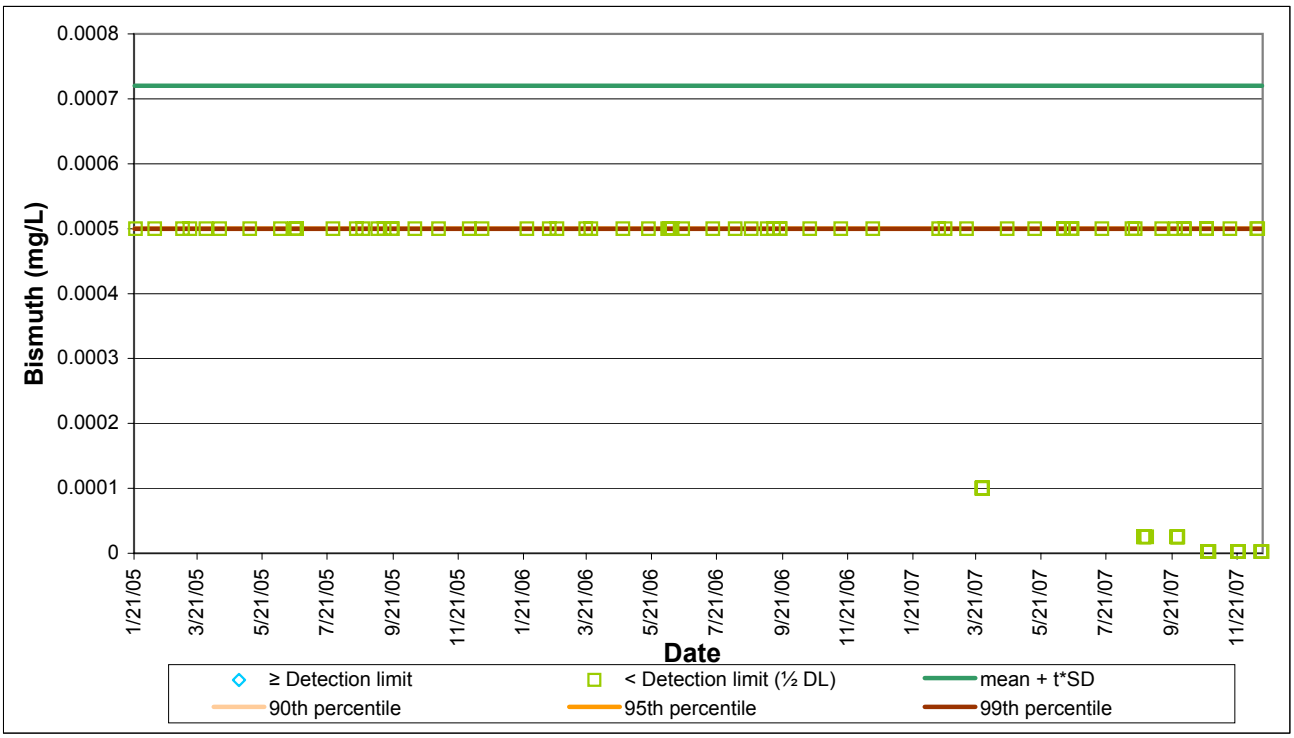


Figure A.10: Background (reference station) concentrations of bismuth measured near Faro Mine, Yukon, 2005 - 2007.

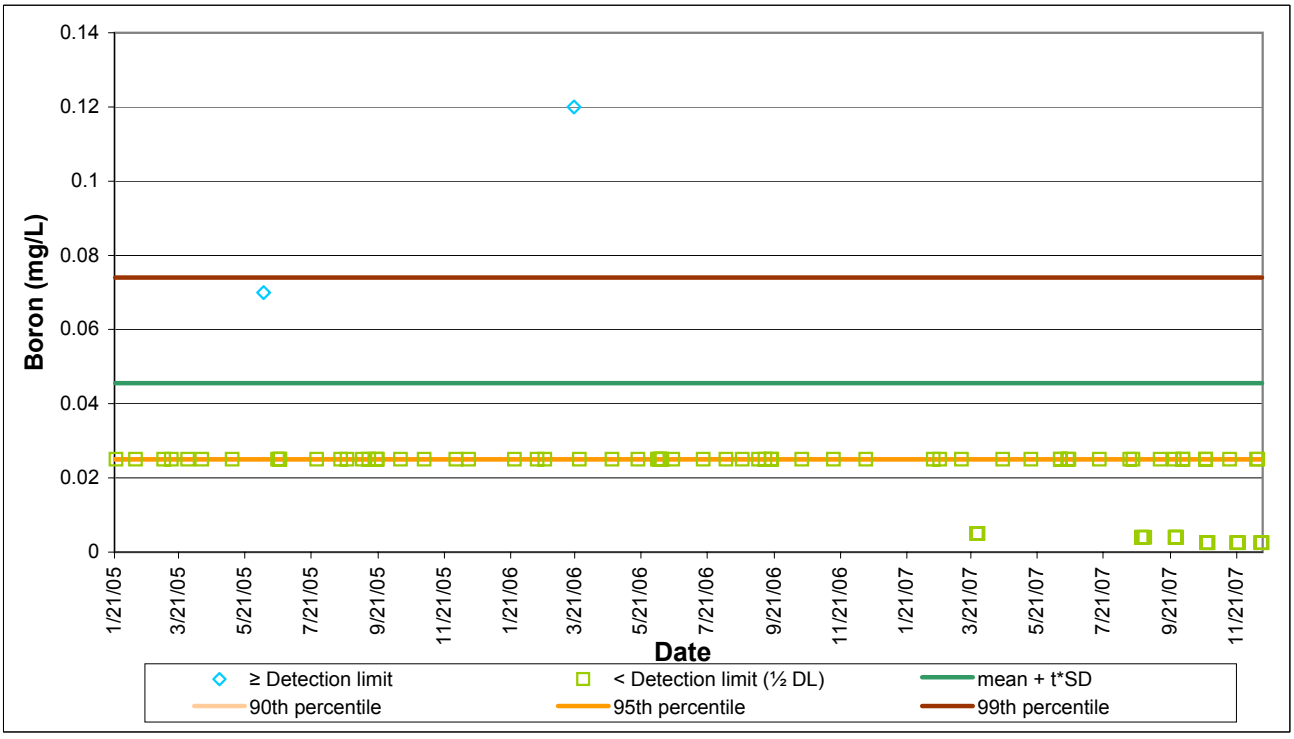


Figure A.11: Background (reference station) concentrations of boron measured near Faro Mine, Yukon, 2005 - 2007.

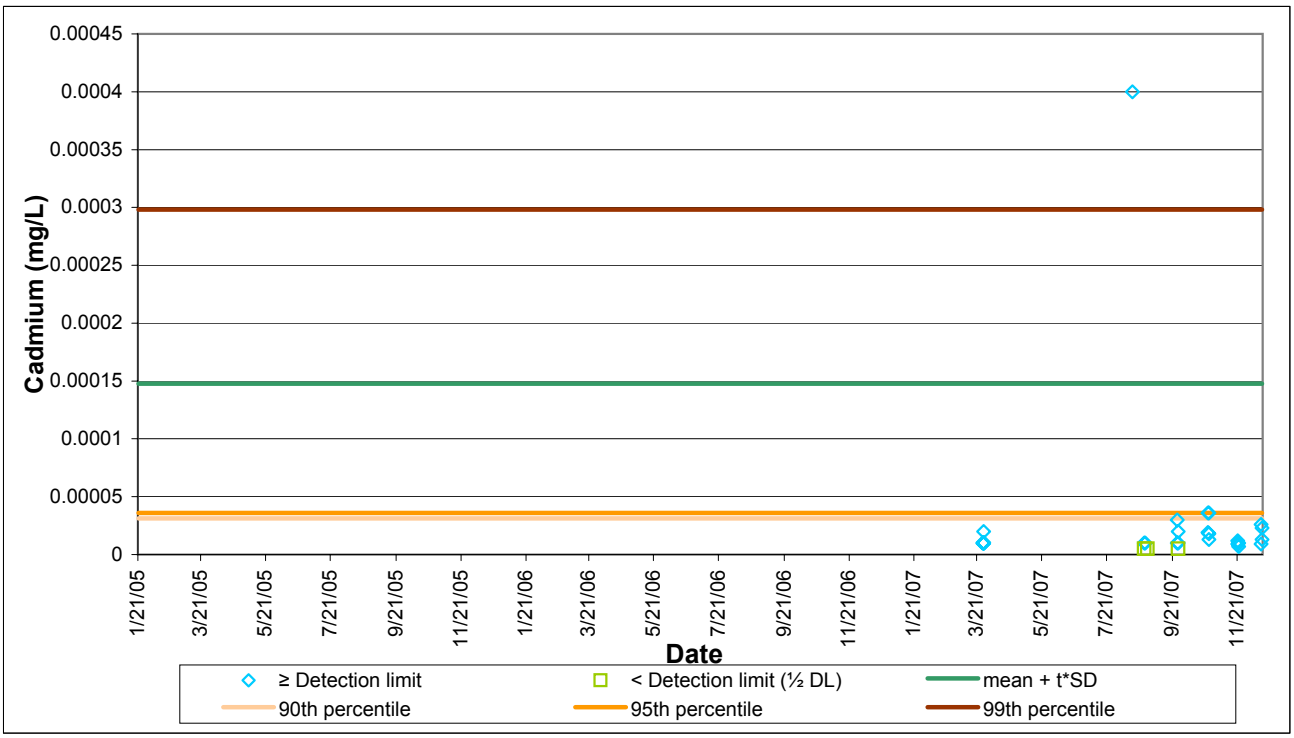


Figure A.12: Background (reference station) concentrations of cadmium measured near Faro Mine, Yukon, 2005 - 2007.

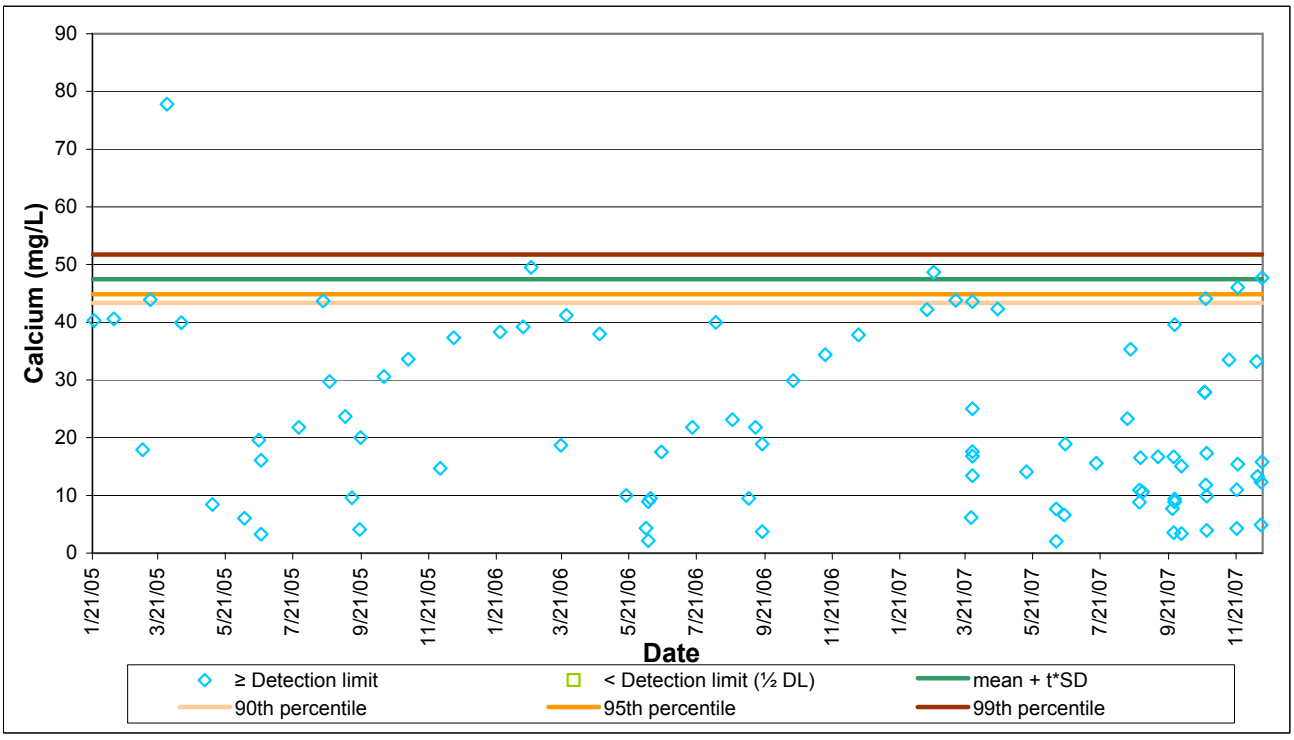
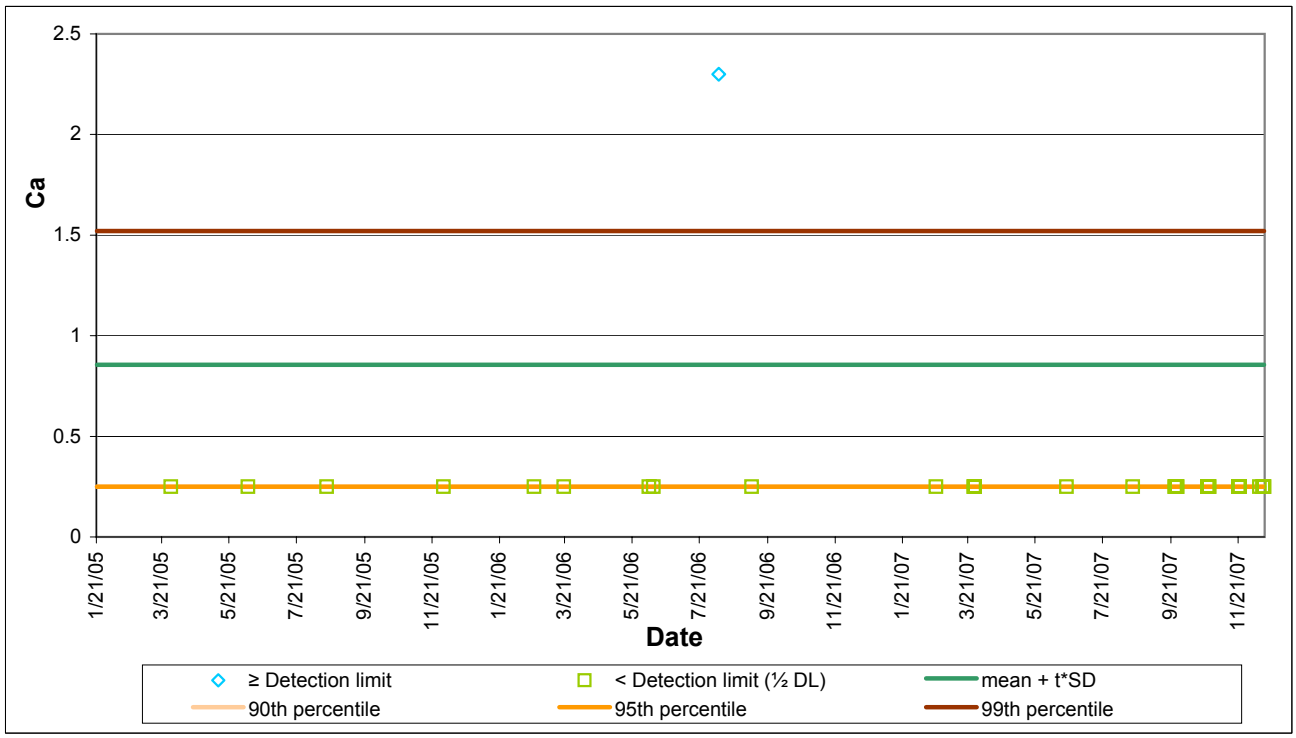


Figure A.13: Background (reference station) concentrations of calcium measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

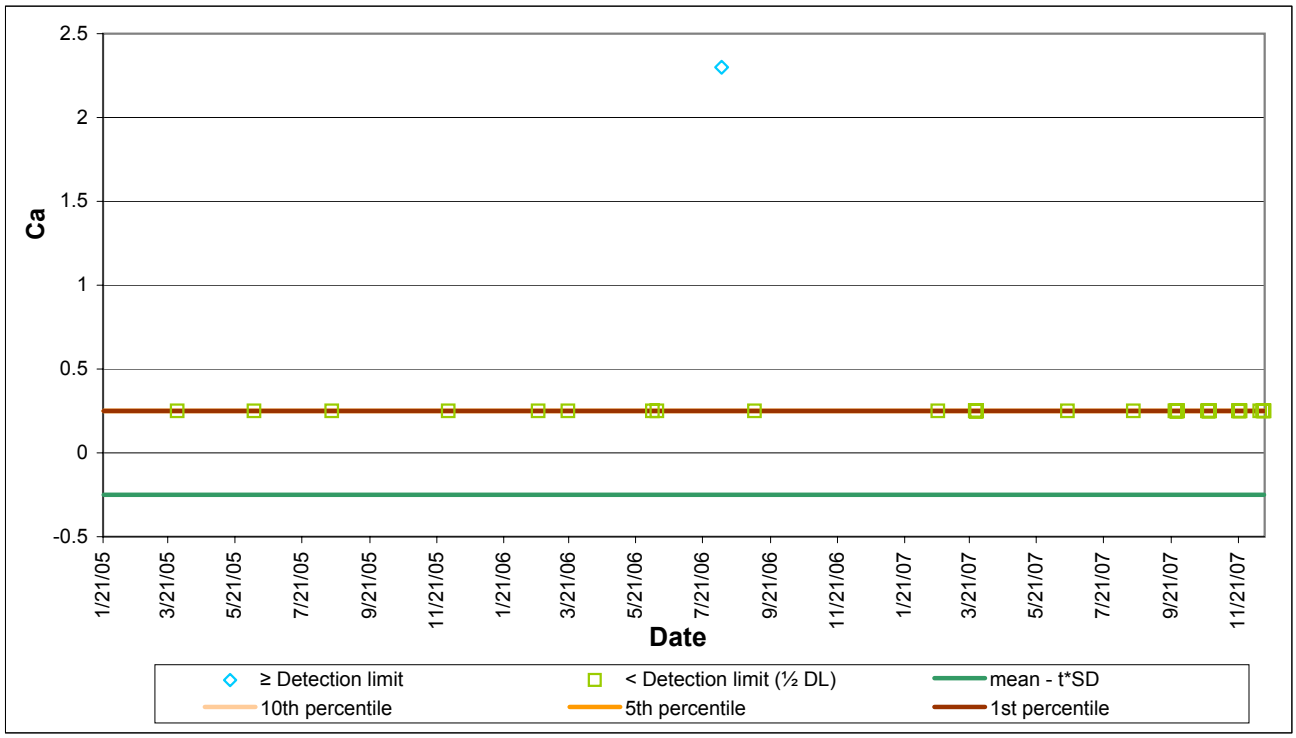


Figure A.14: Background (reference station) concentrations of carbonate measured near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

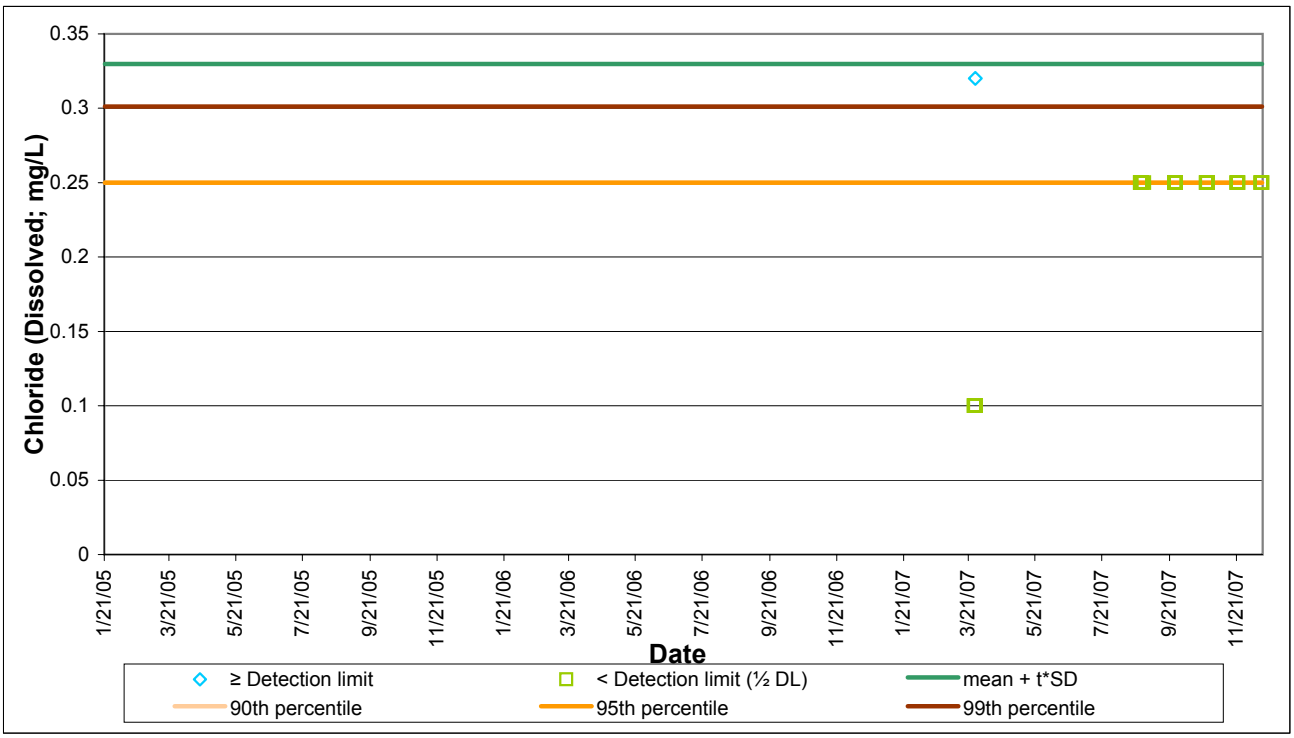


Figure A.15: Background (reference station) concentrations of chloride measured near Faro Mine, Yukon, 2005 - 2007.

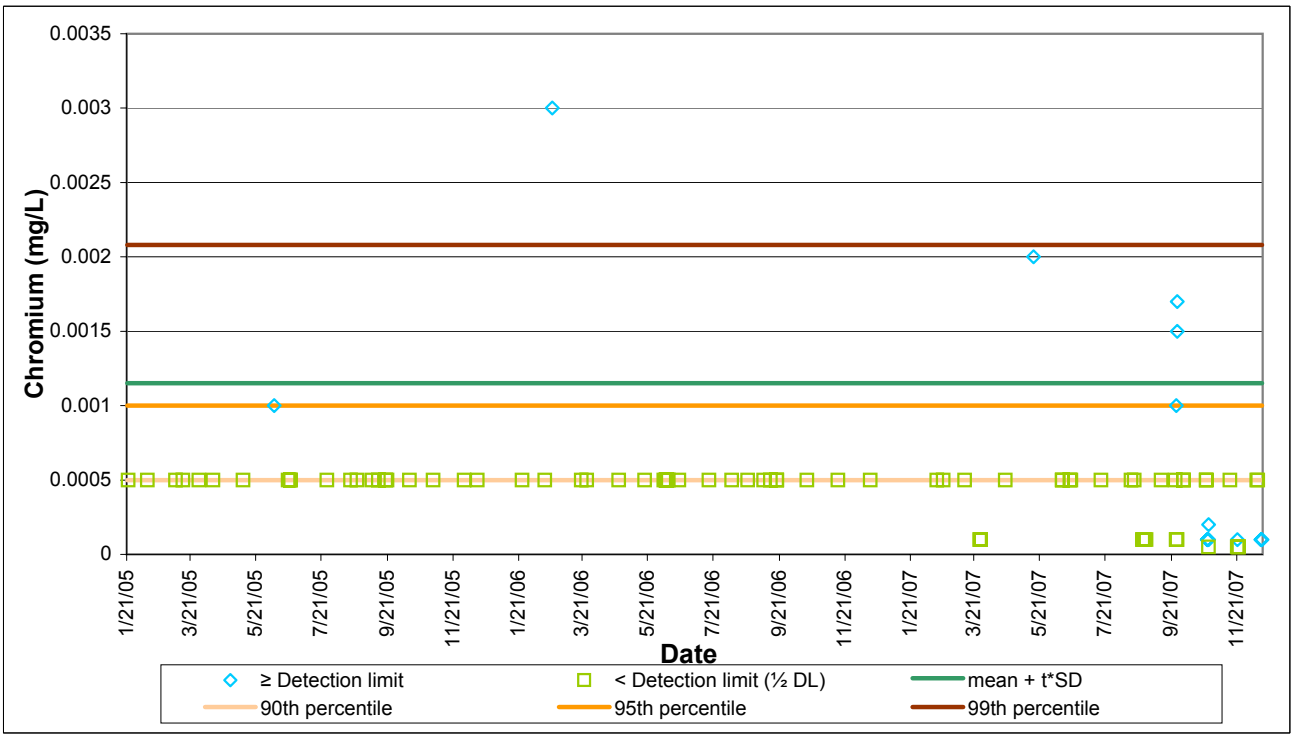


Figure A.16: Background (reference station) concentrations of chromium measured near Faro Mine, Yukon, 2005 - 2007.

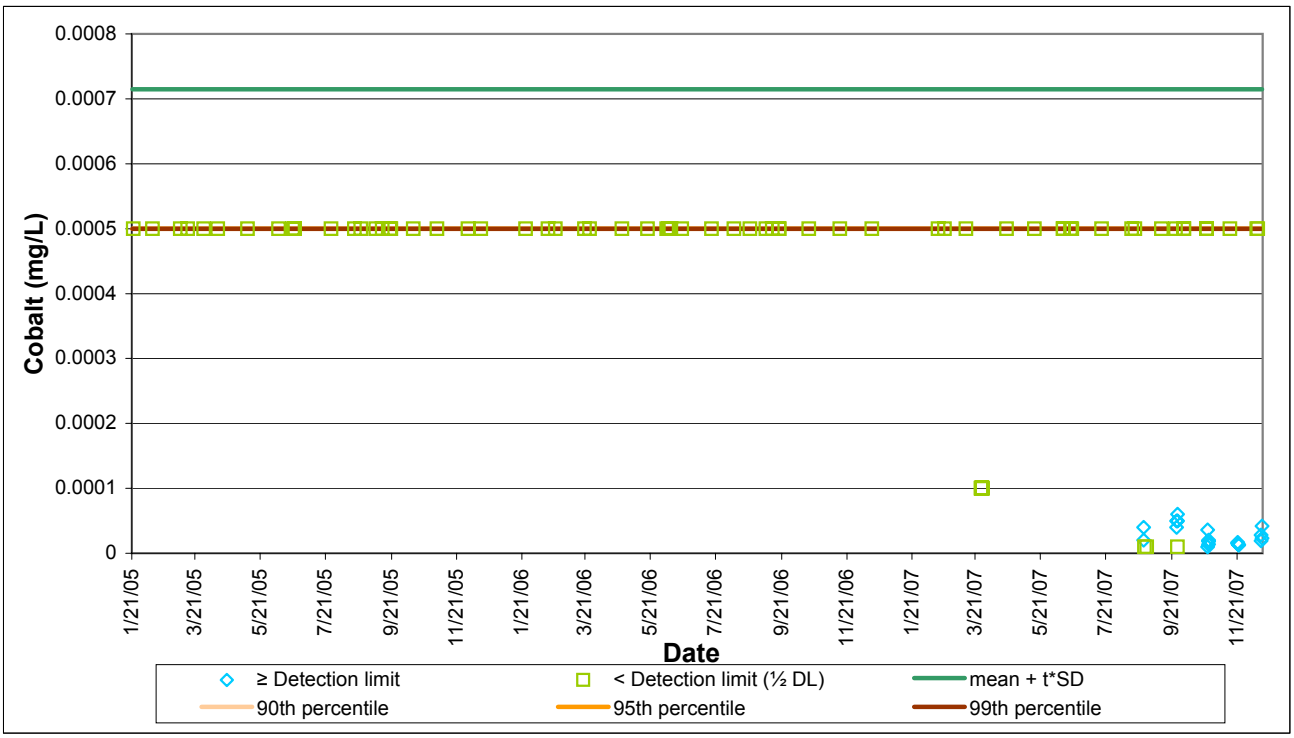


Figure A.17: Background (reference station) concentrations of cobalt measured near Faro Mine, Yukon, 2005 - 2007.

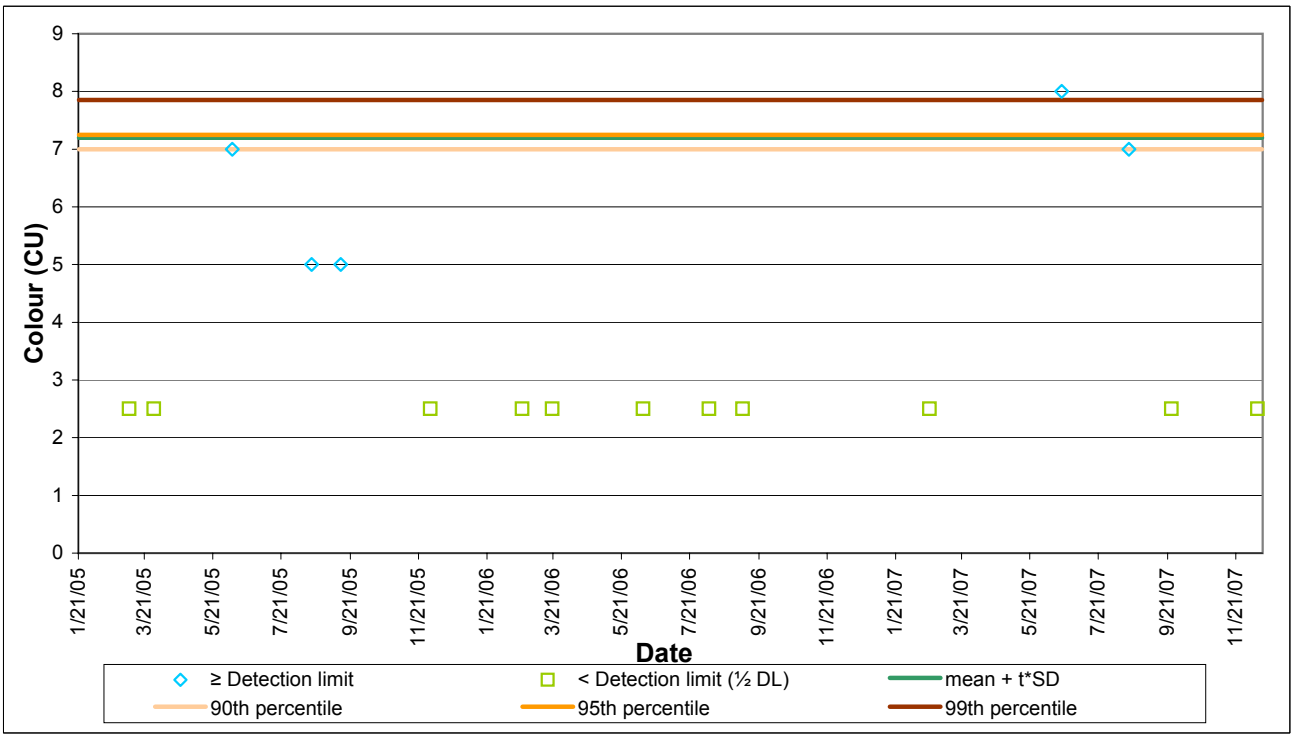


Figure A.18: Background (reference station) colour measured near Faro Mine, Yukon, 2005 - 2007.

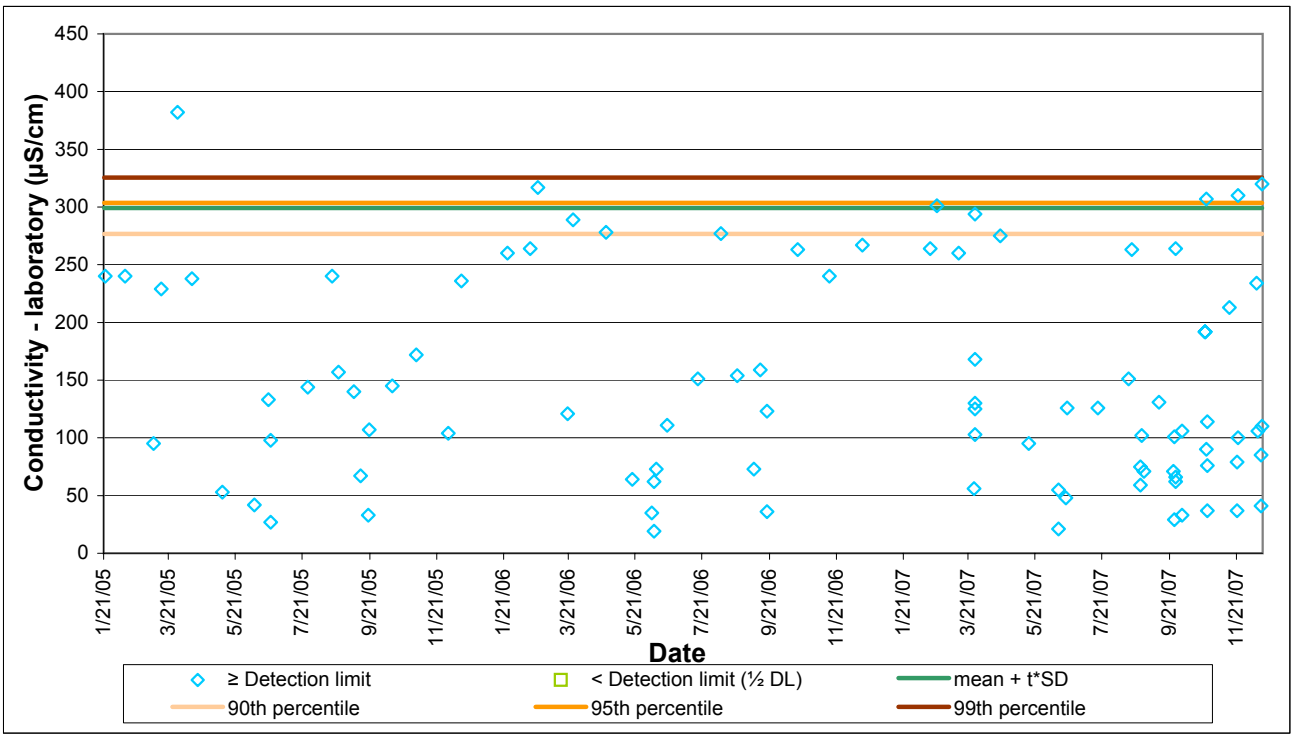


Figure A.19: Background (reference station) conductivities measured in laboratory samples collected near Faro Mine, Yukon, 2005 - 2007.

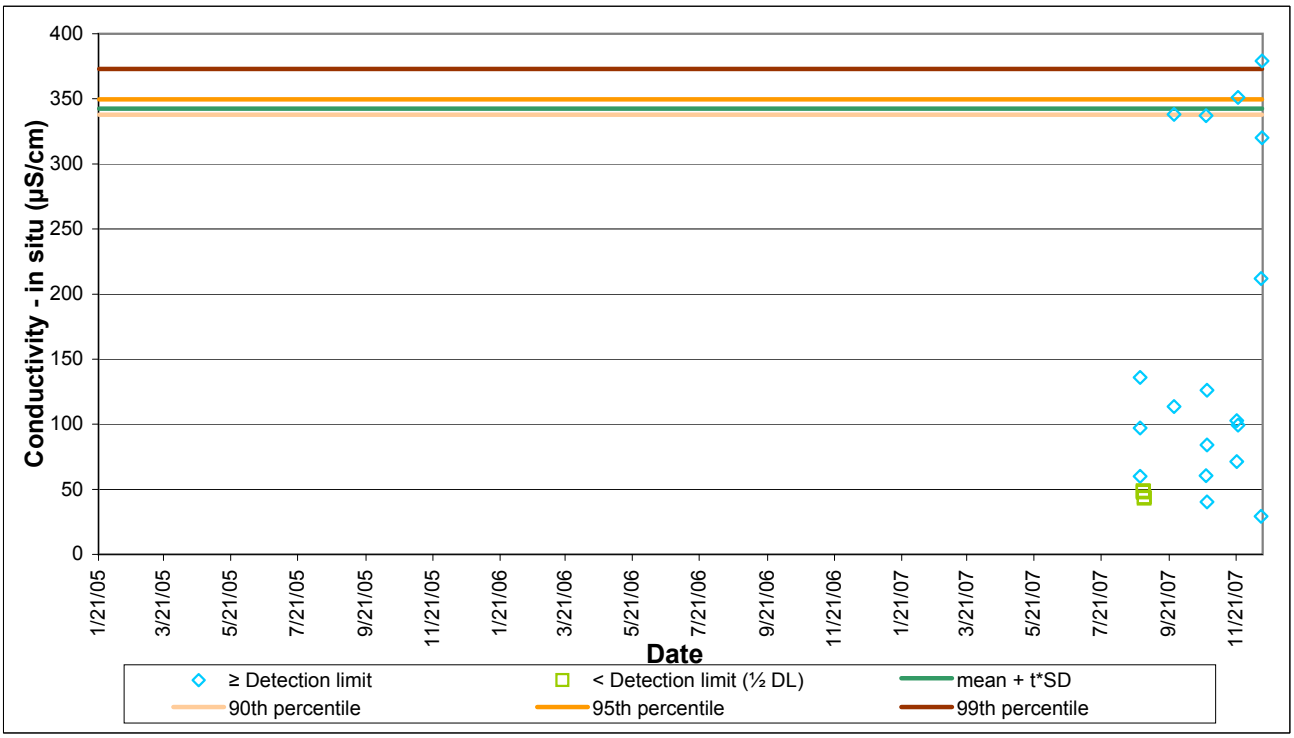


Figure A.20: Background (reference station) conductivities measured in situ near Faro Mine, Yukon, 2005 - 2007.

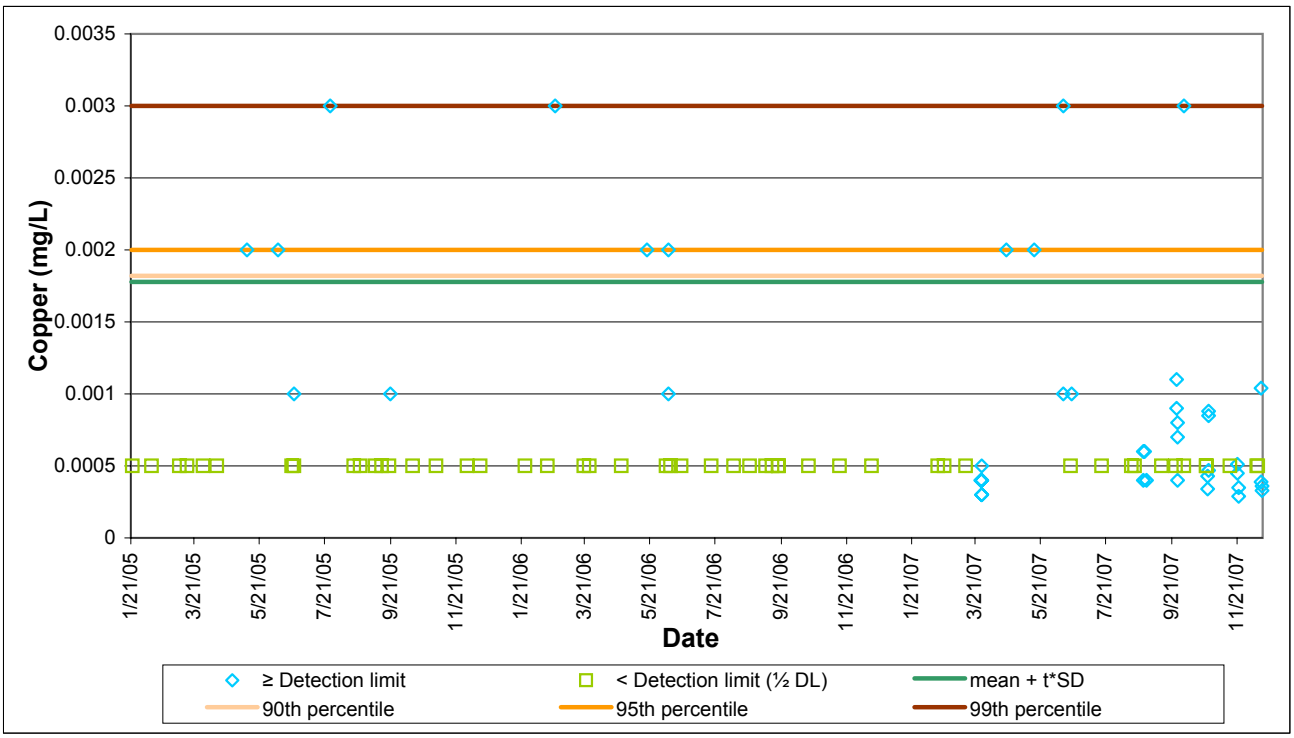


Figure A.21: Background (reference station) concentrations of copper measured near Faro Mine, Yukon, 2005 - 2007.

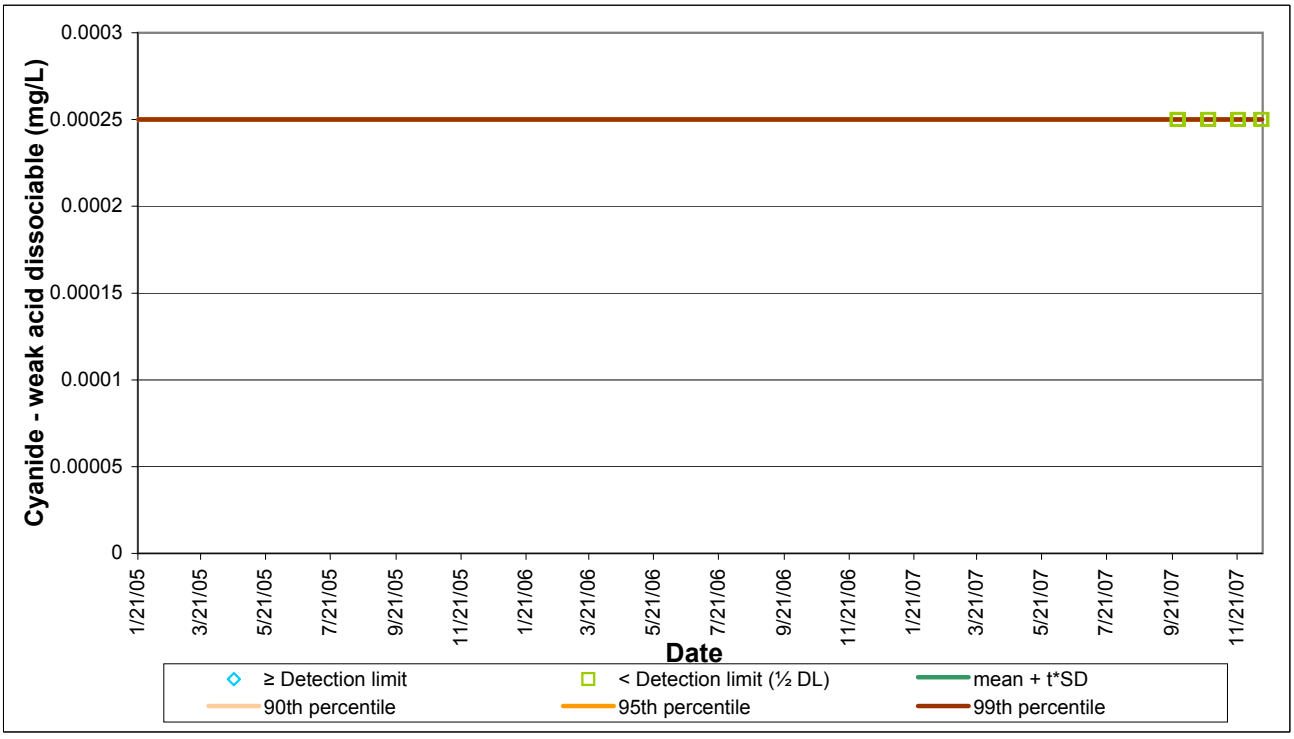
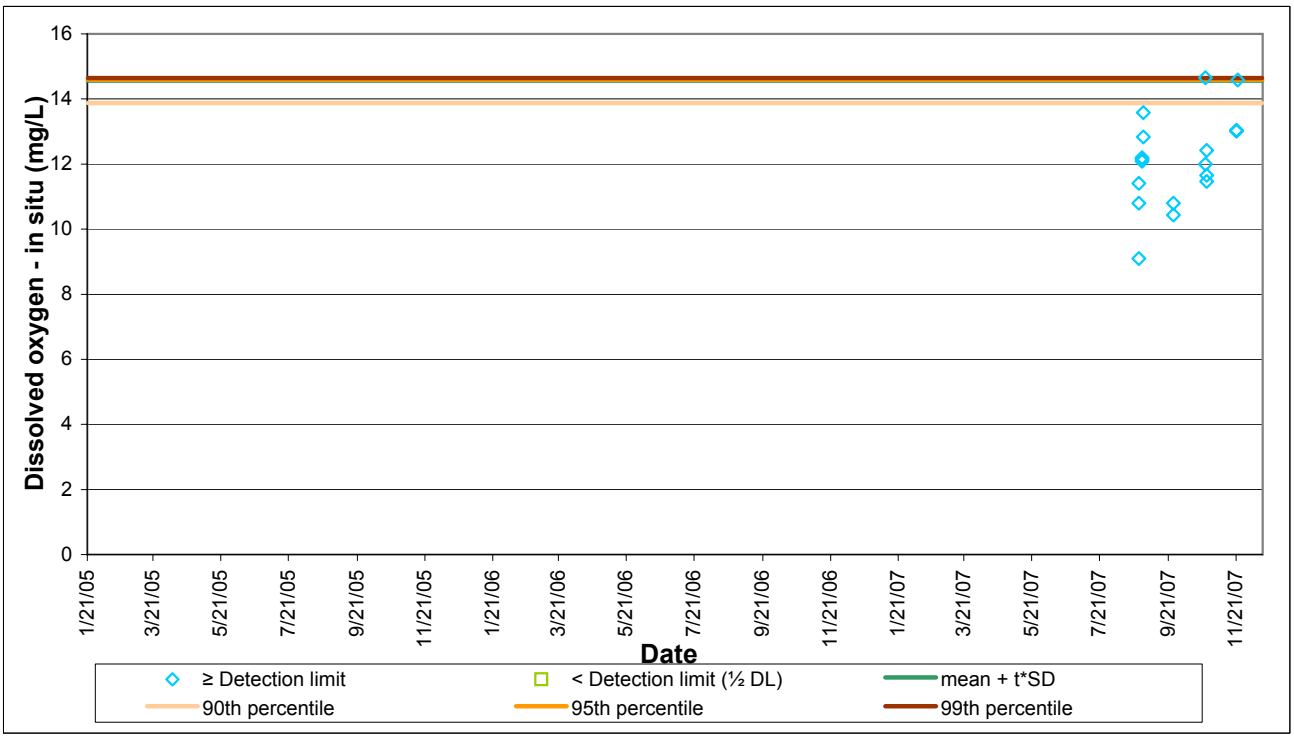


Figure A.22: Background (reference station) concentrations of weak acid dissociable cyanide measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

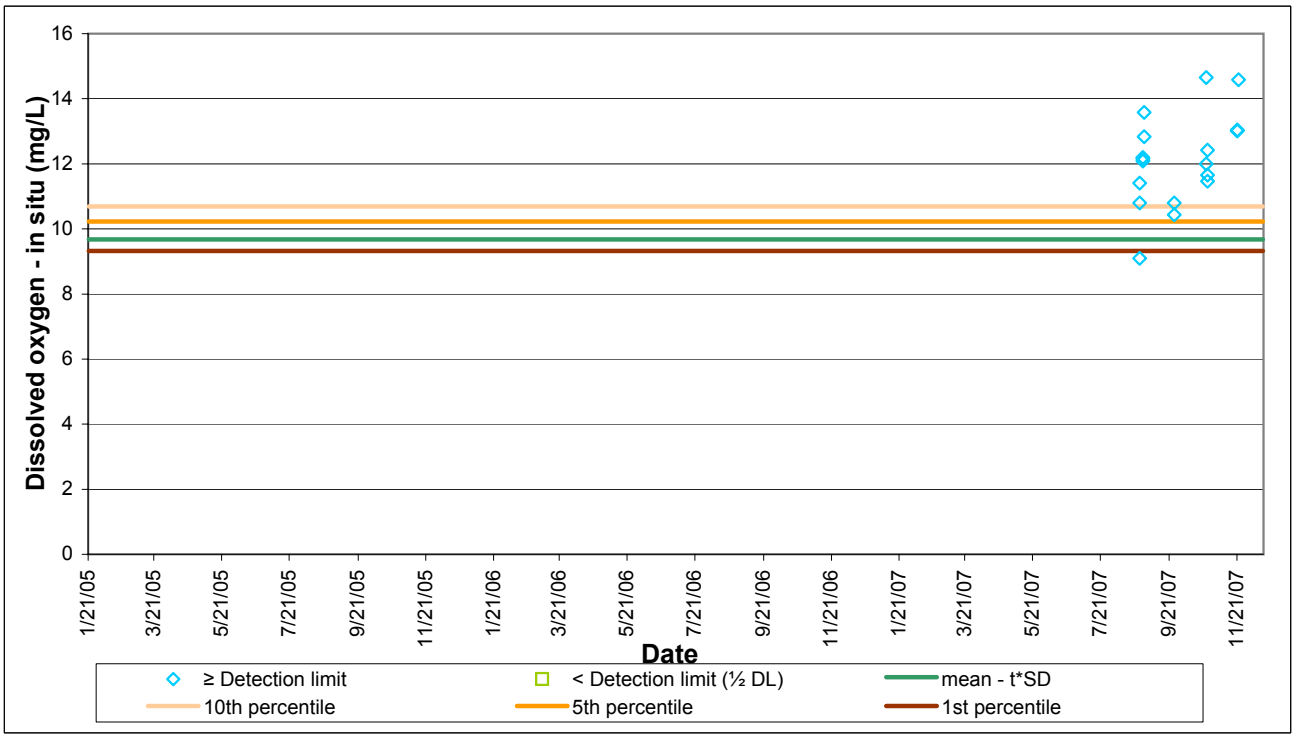
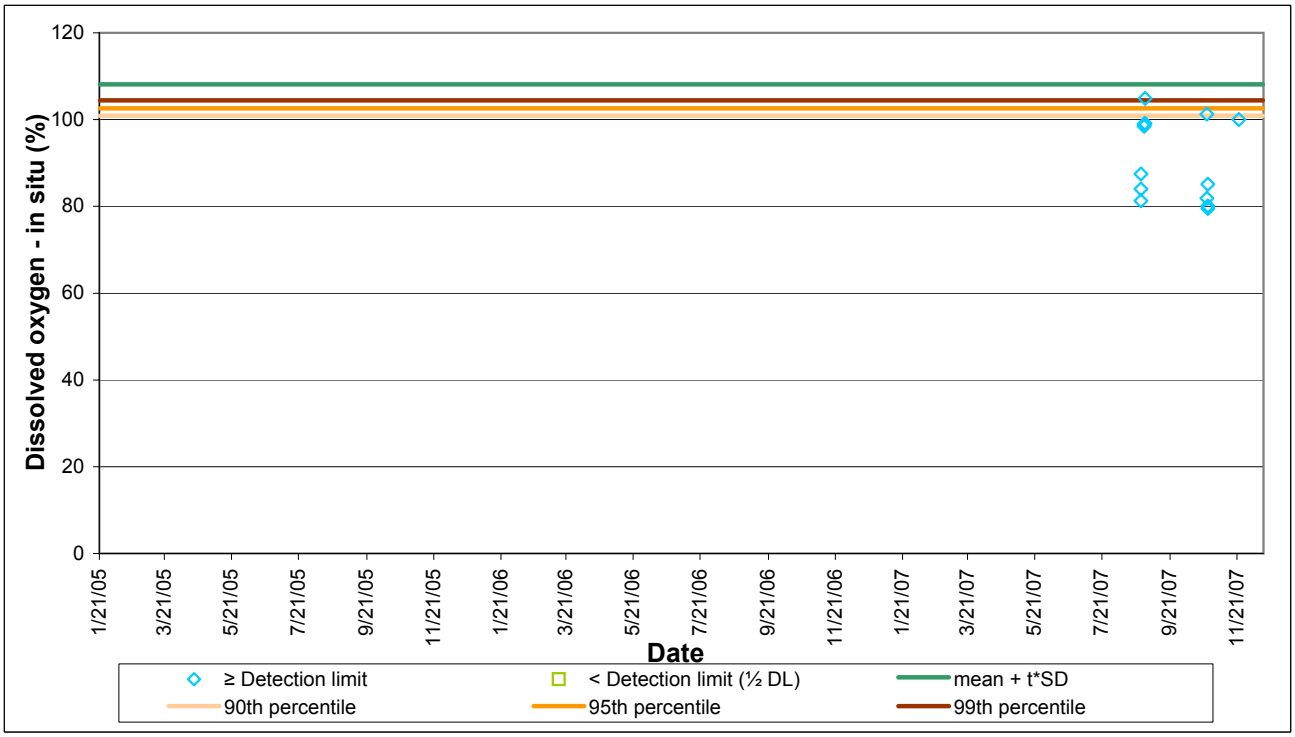


Figure A.23: Background (reference station) concentrations of dissolved oxygen measured in situ near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

a)



b)

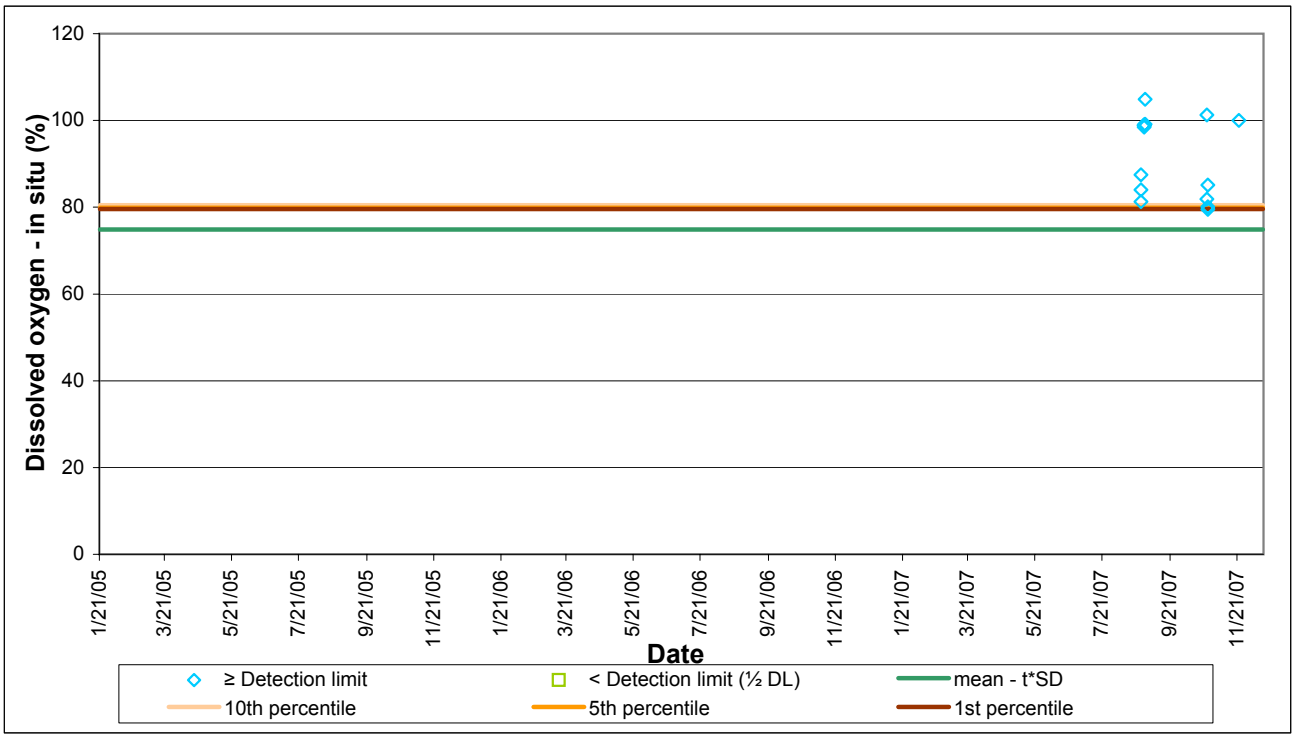


Figure A.24: Background (reference station) percentages of dissolved oxygen measured in situ near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

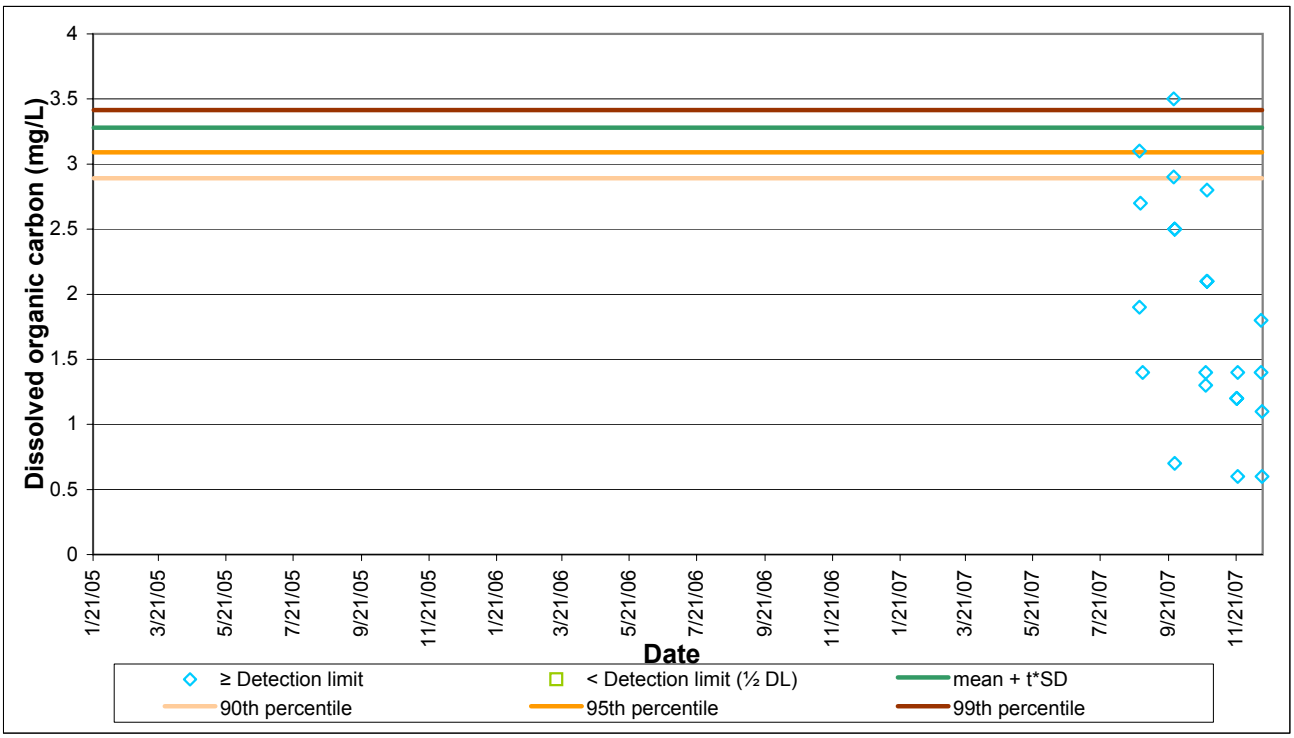


Figure A.25: Background (reference station) concentrations of dissolved organic carbon measured near Faro Mine, Yukon, 2005 - 2007.

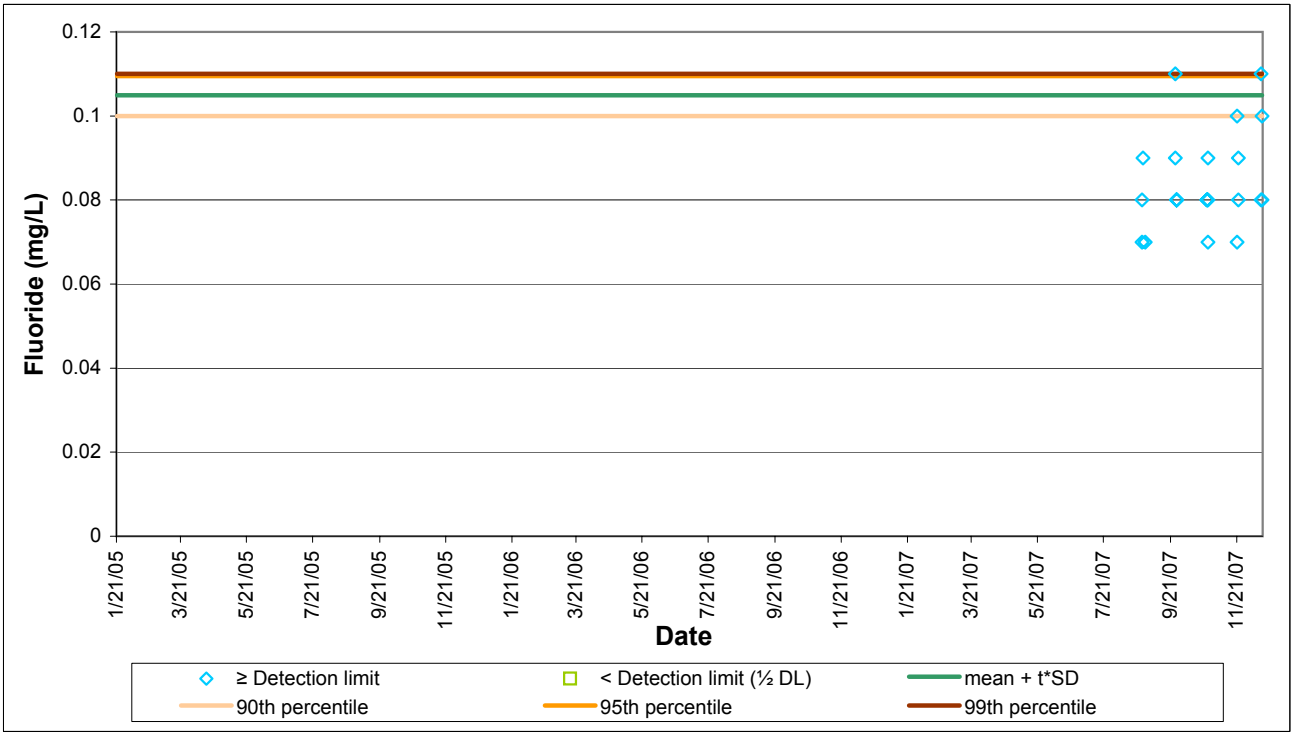


Figure A.26: Background (reference station) concentrations of fluoride measured near Faro Mine, Yukon, 2005 - 2007.

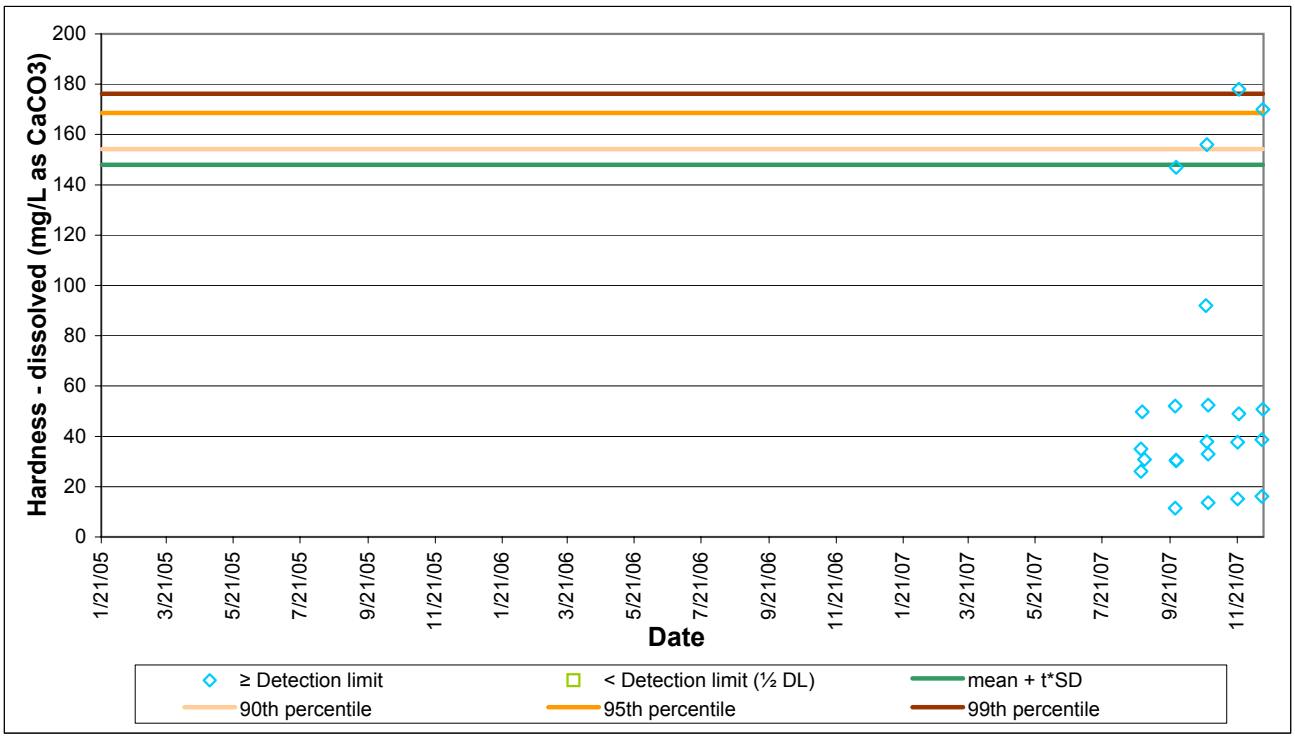


Figure A.27: Background (reference station) concentrations of dissolved hardness measured near Faro Mine, Yukon, 2005 - 2007.

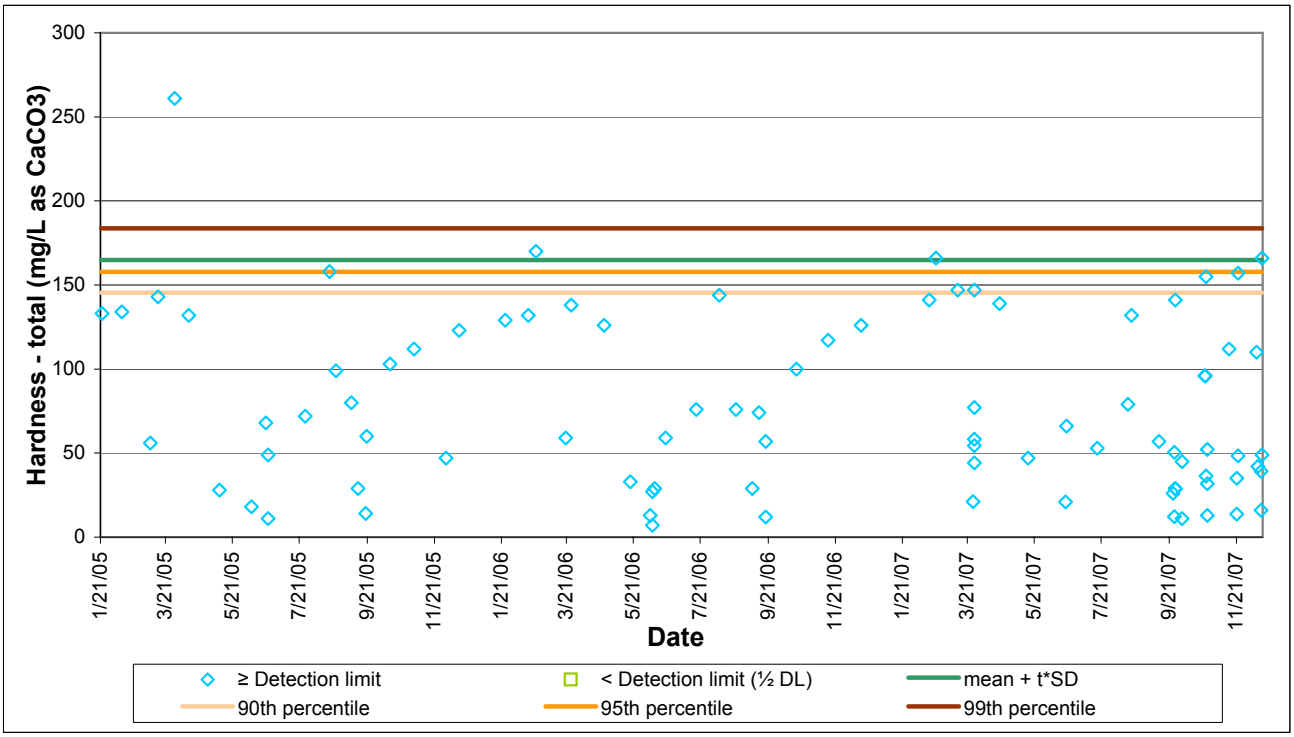


Figure A.28: Background (reference station) concentrations of total hardness measured near Faro Mine, Yukon, 2005 - 2007.

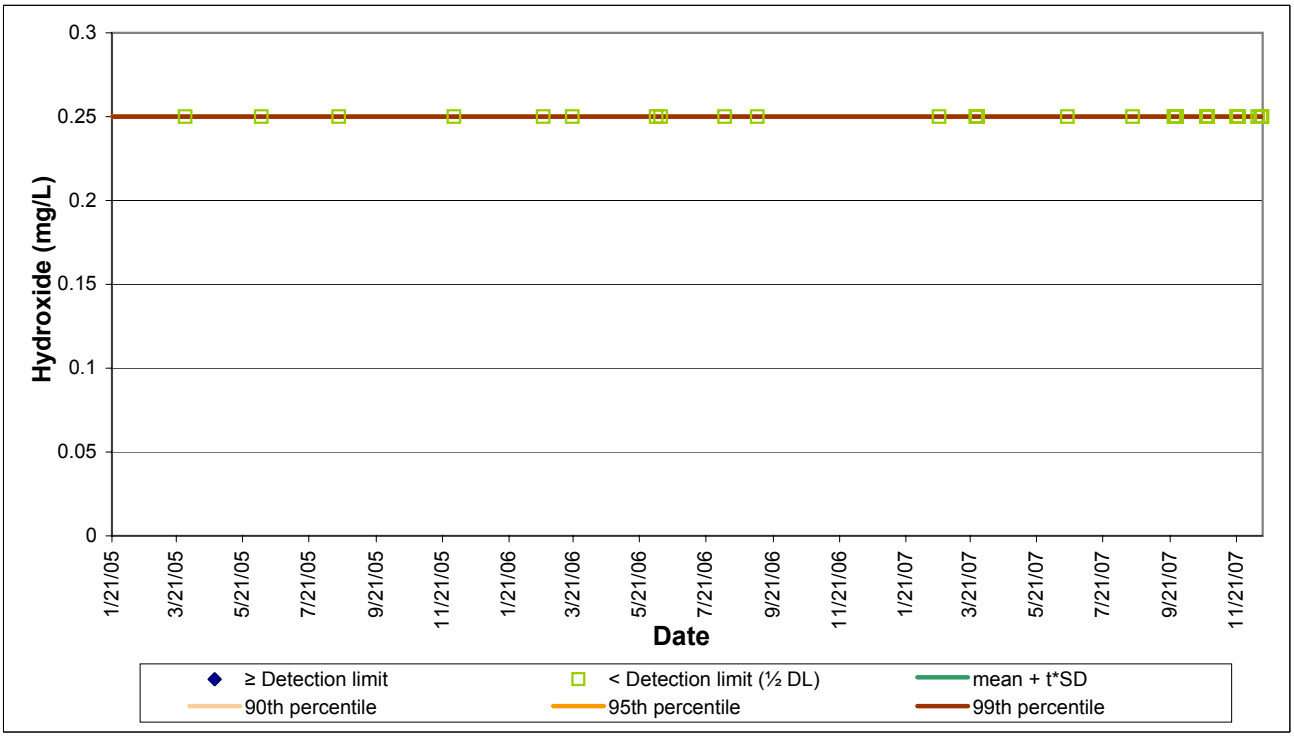


Figure A.29: Background (reference station) concentrations of hydroxide measured near Faro Mine, Yukon, 2005 - 2007.

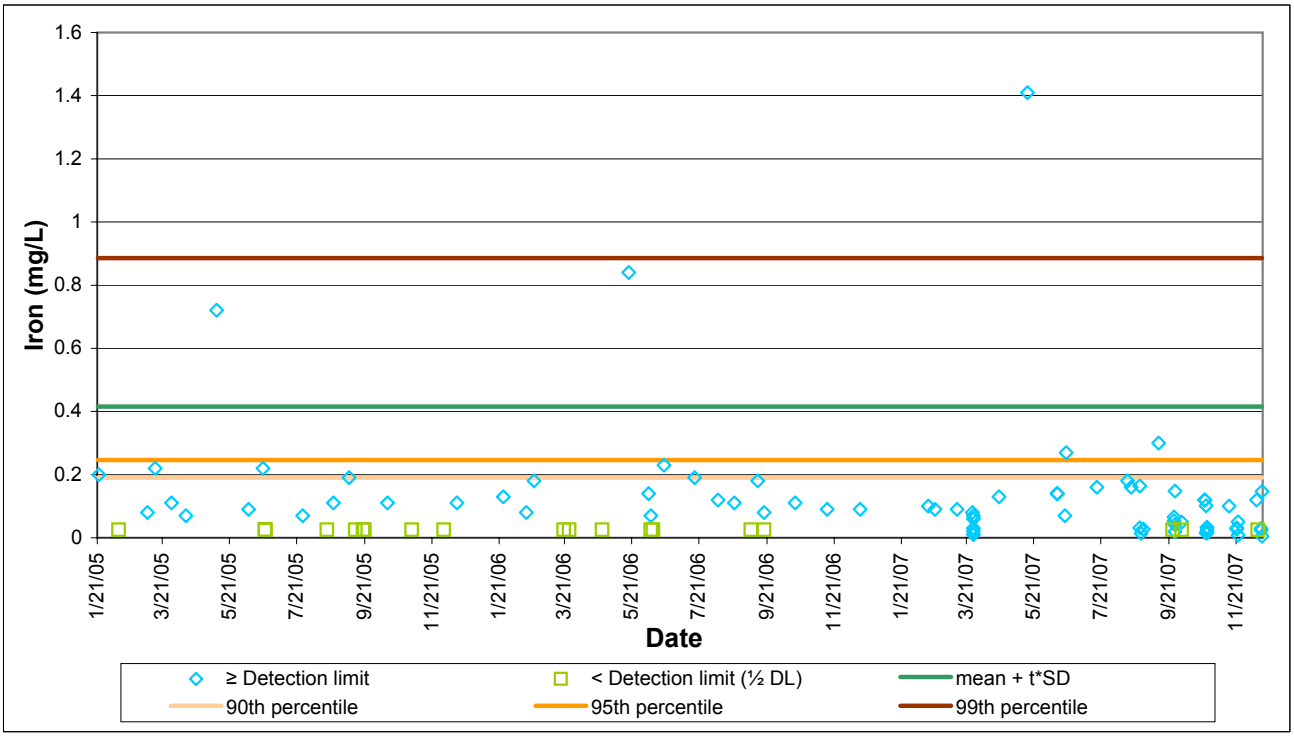


Figure A.30: Background (reference station) concentrations of iron measured near Faro Mine, Yukon, 2005 - 2007.

Figure A.31: Background (reference station) concentrations of lead measured near Faro Mine, Yukon, 2005 - 2007.

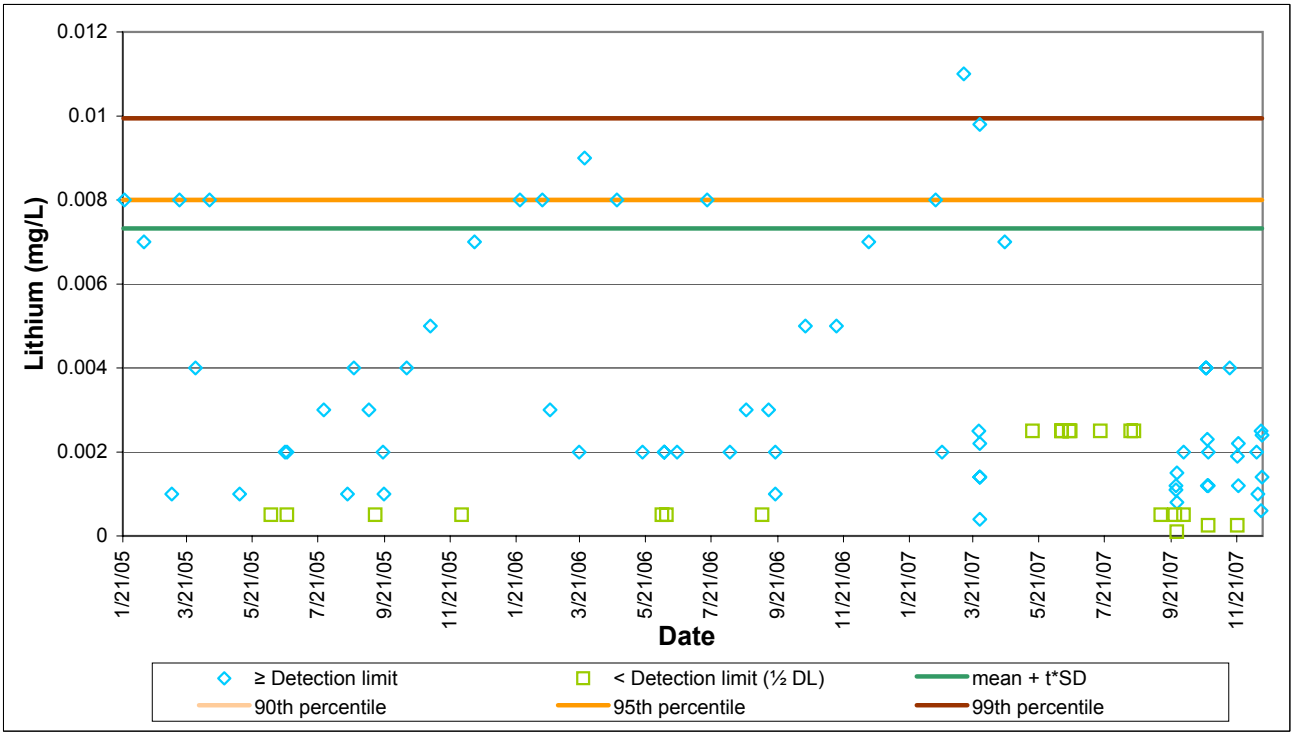


Figure A.32: Background (reference station) concentrations of lithium measured near Faro Mine, Yukon, 2005 - 2007.

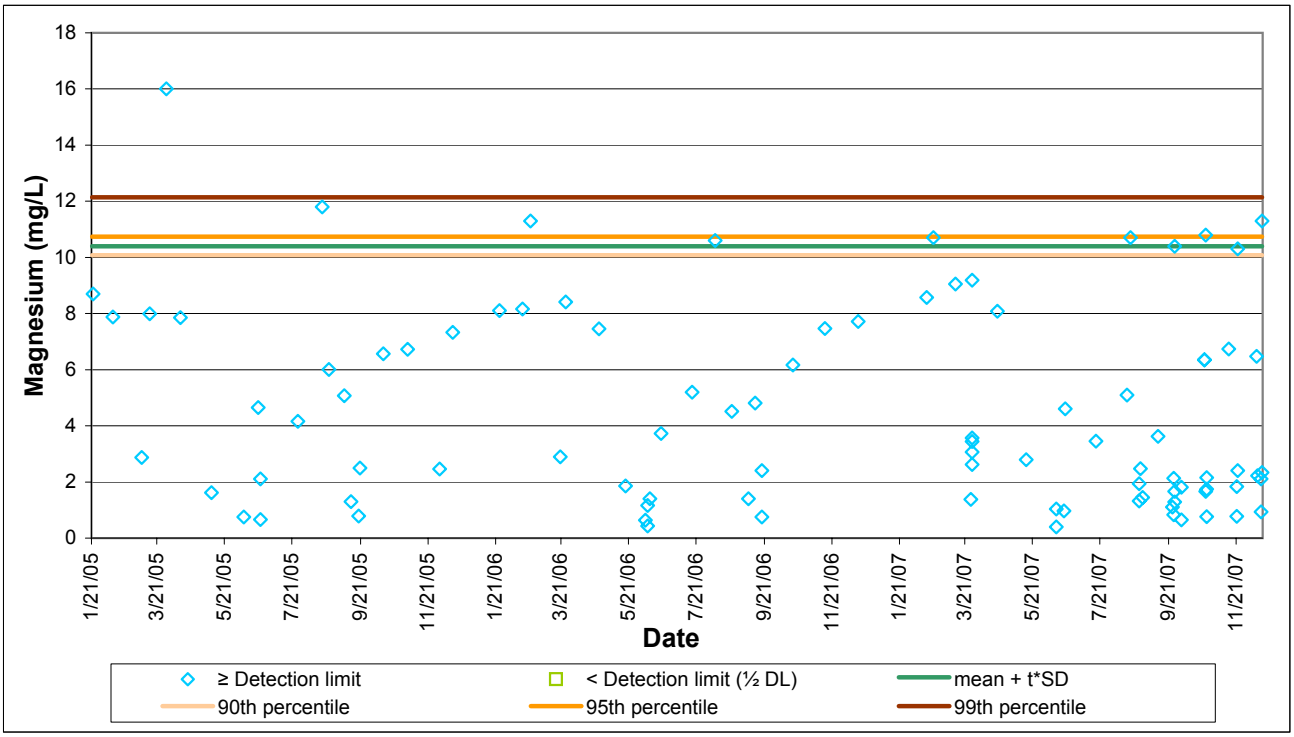


Figure A.33: Background (reference station) concentrations of magnesium measured near Faro Mine, Yukon, 2005 - 2007.

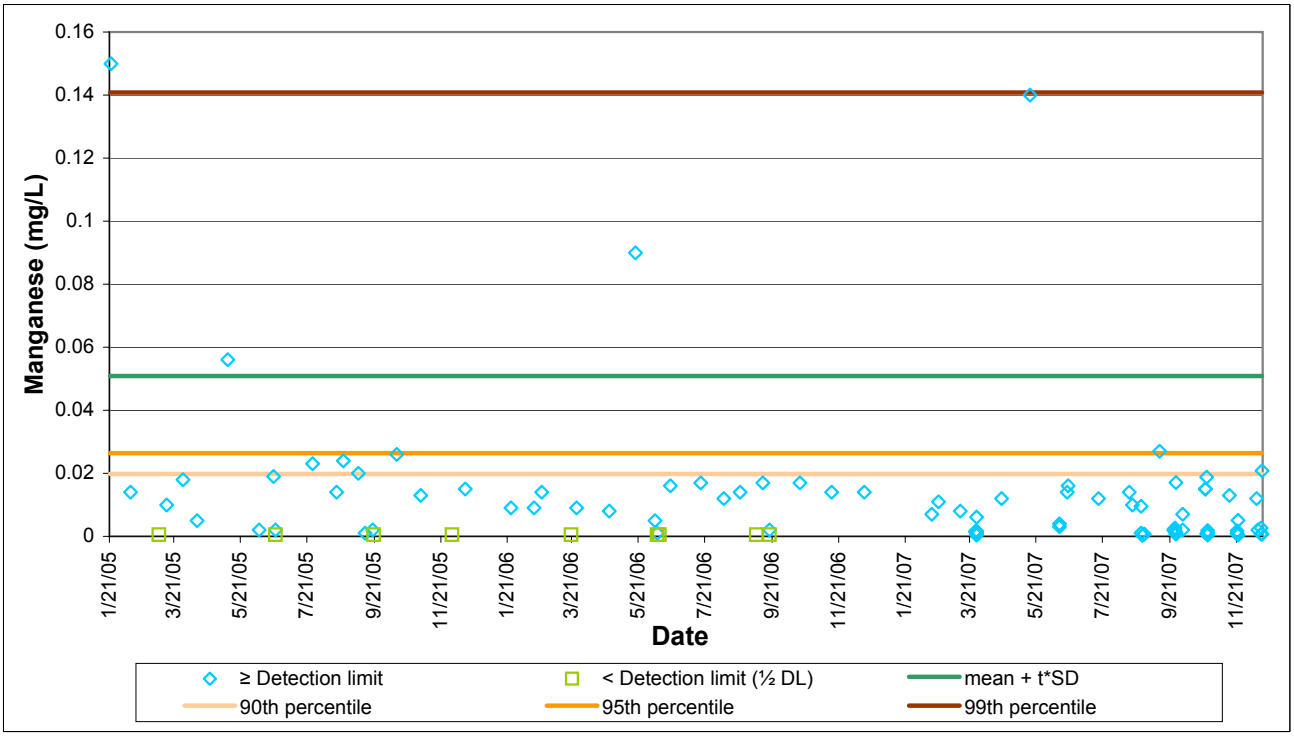


Figure A.34: Background (reference station) concentrations of manganese measured near Faro Mine, Yukon, 2005 - 2007.

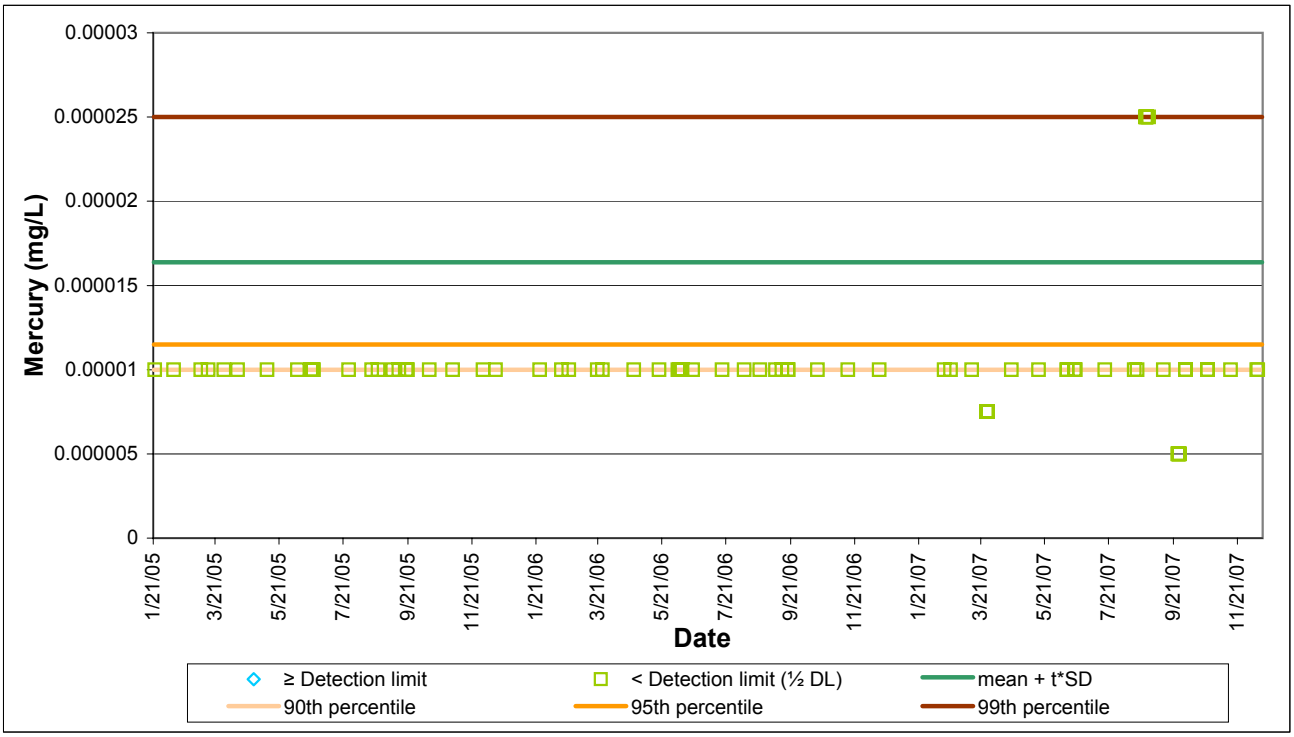


Figure A.35: Background (reference station) concentrations of mercury measured near Faro Mine, Yukon, 2005 - 2007.

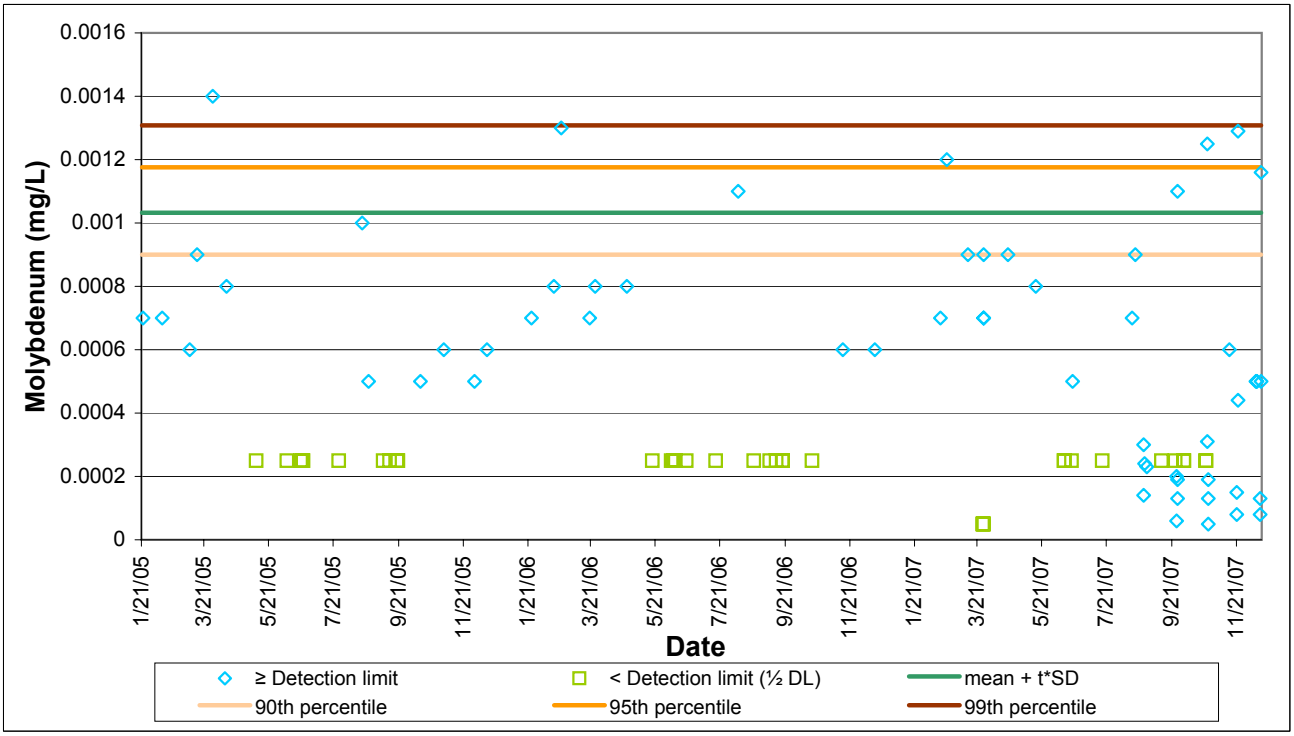


Figure A.36: Background (reference station) concentrations of molybdenum measured near Faro Mine, Yukon, 2005 - 2007.

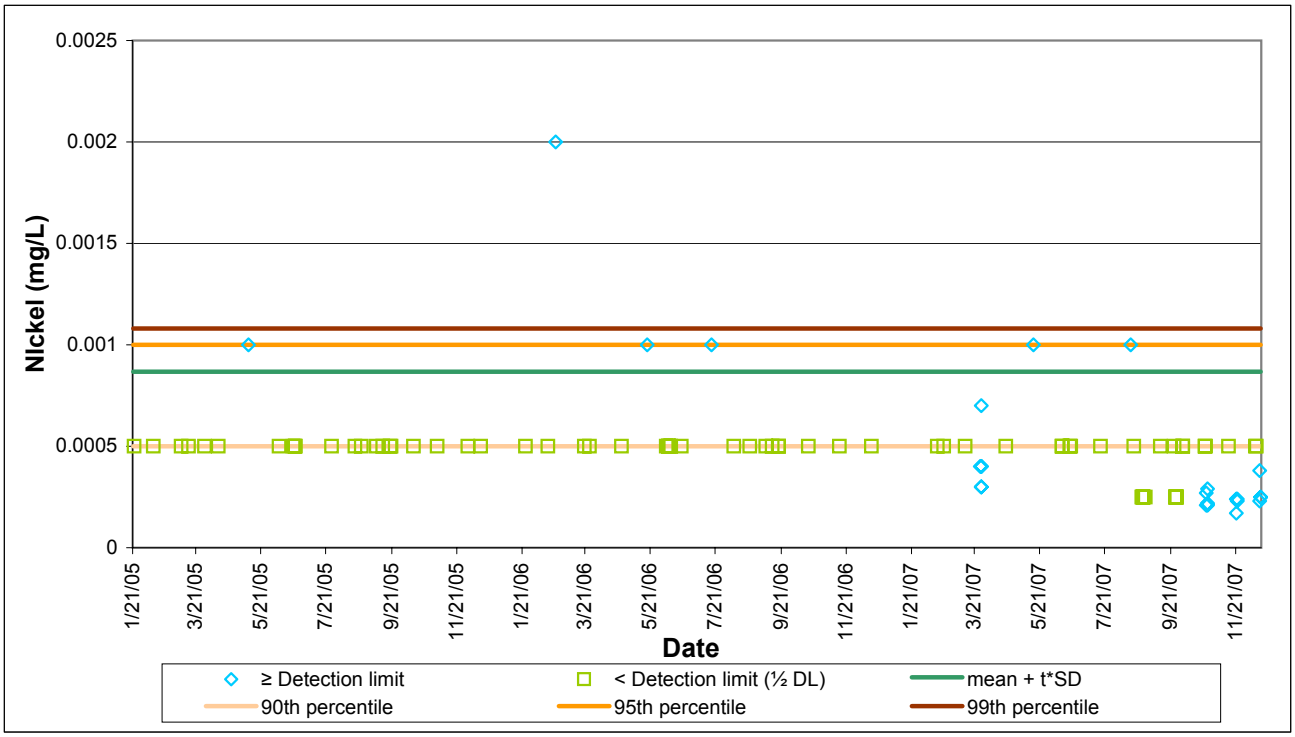


Figure A.37: Background (reference station) concentrations of nickel measured near Faro Mine, Yukon, 2005 - 2007.

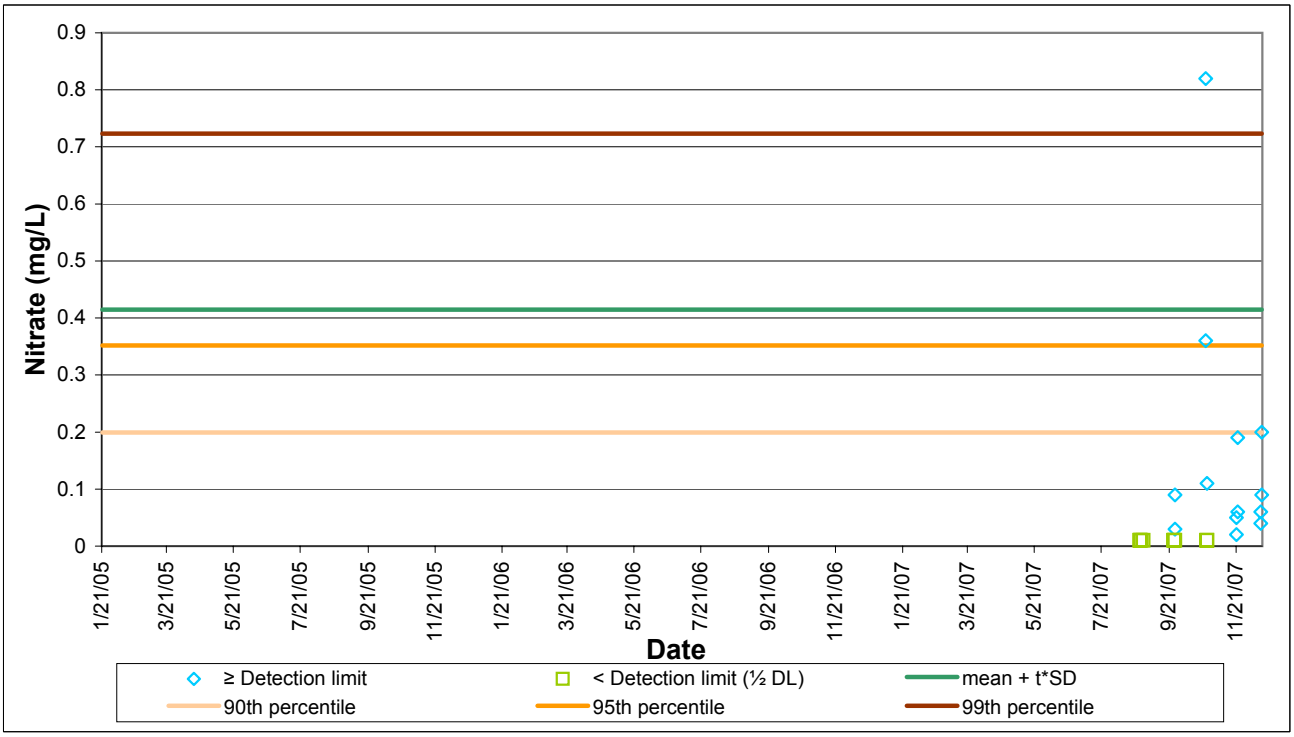


Figure A.38: Background (reference station) concentrations of nitrate measured near Faro Mine, Yukon, 2005 - 2007.

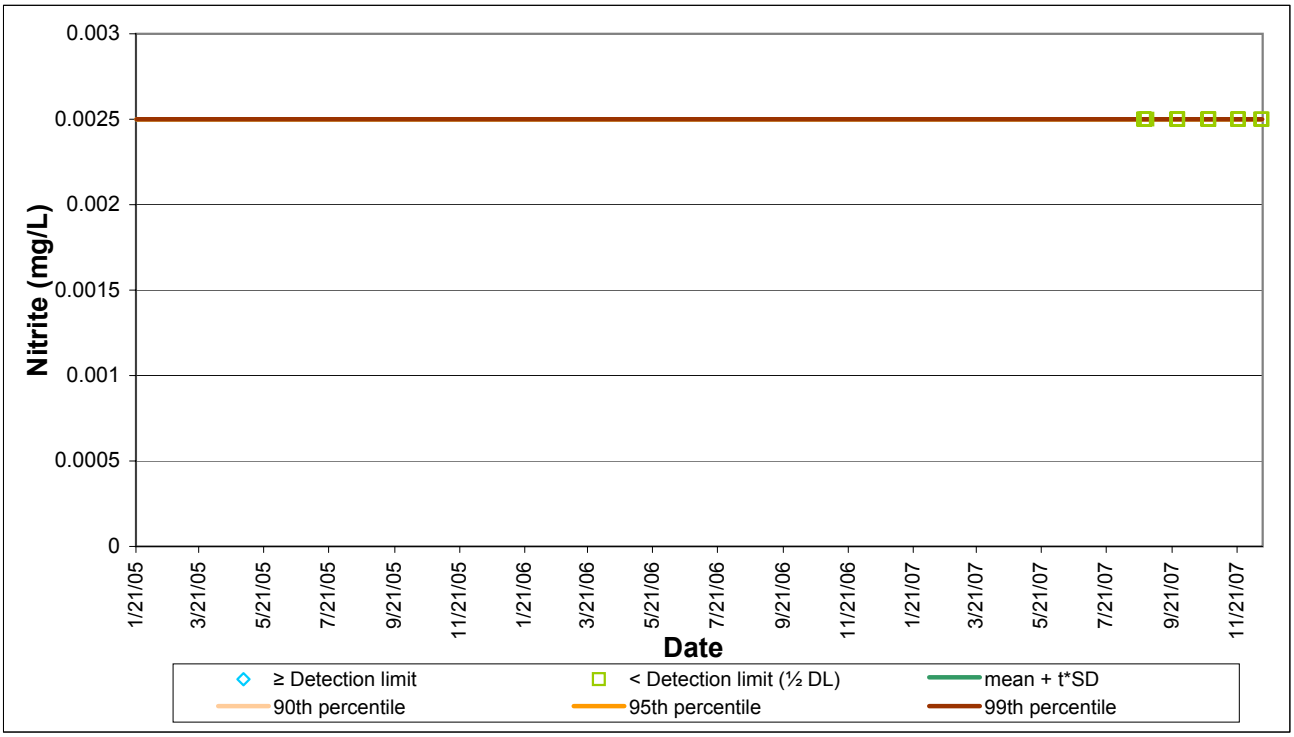


Figure A.39: Background (reference station) concentrations of nitrite measured near Faro Mine, Yukon, 2005 - 2007.

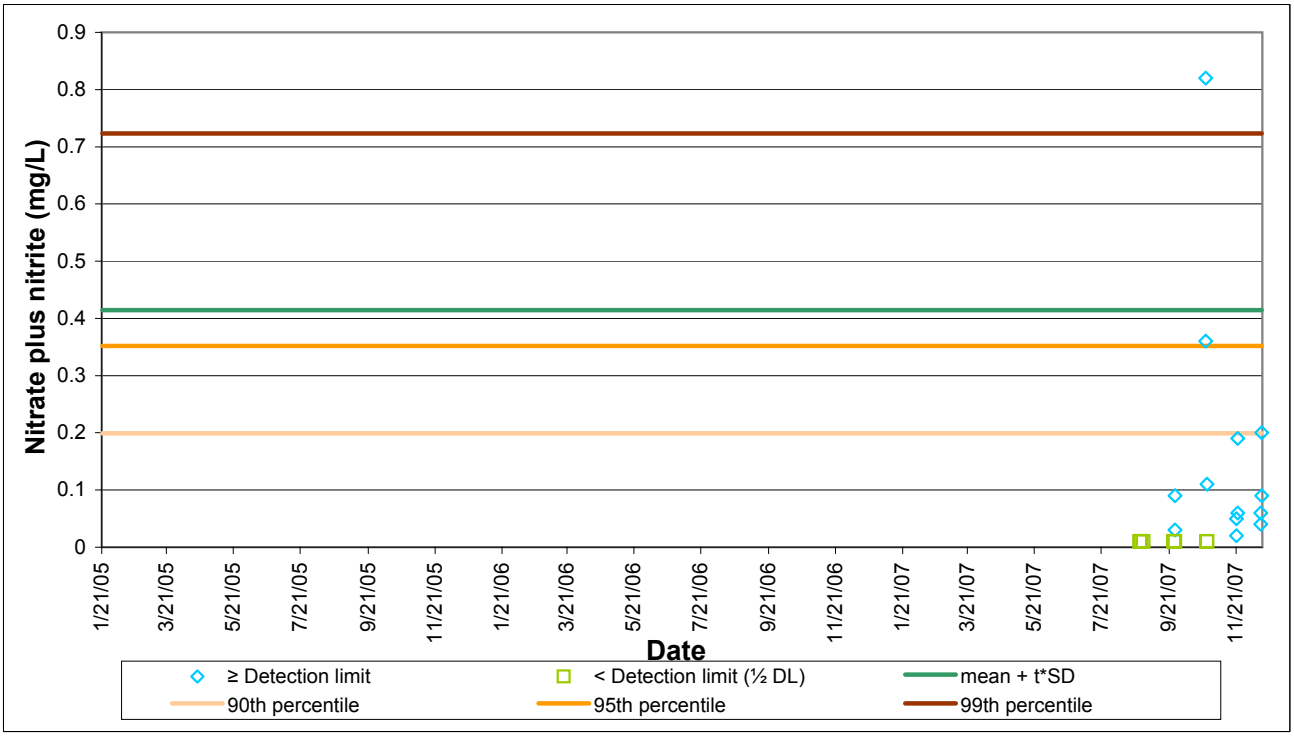
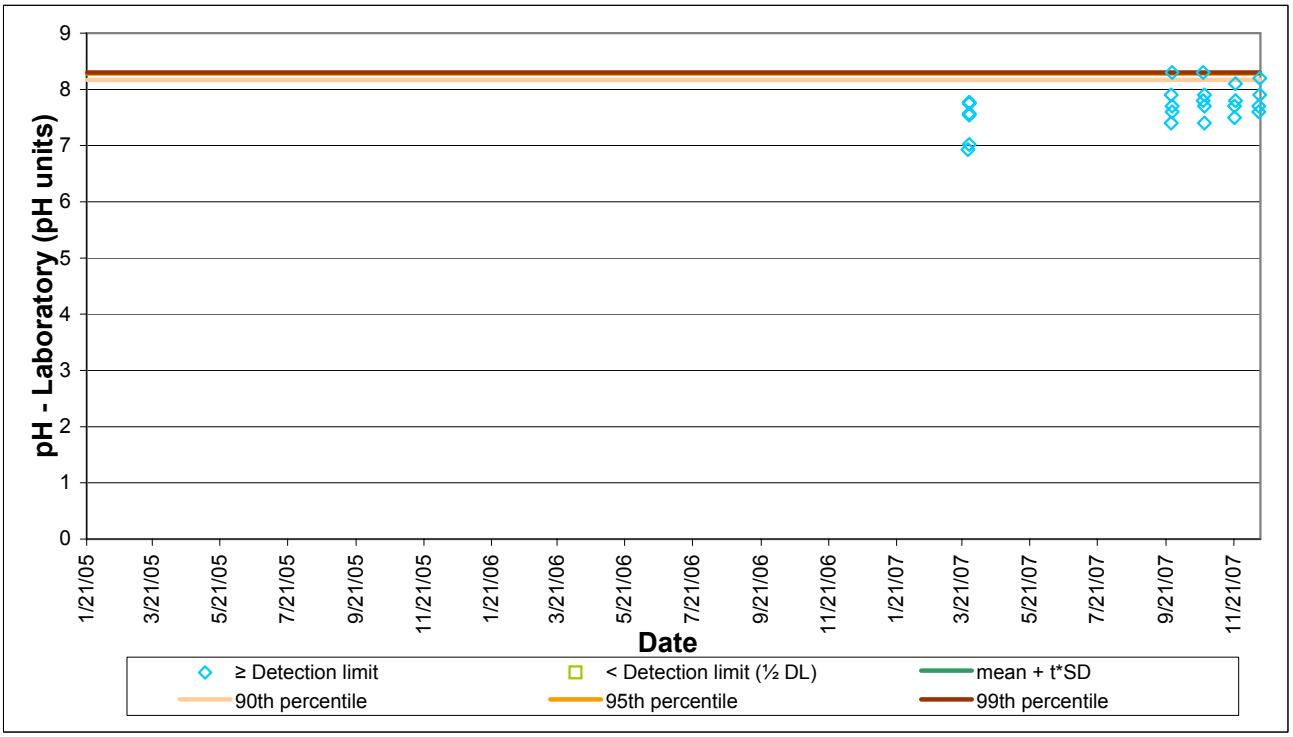


Figure A.40: Background (reference station) concentrations of nitrate plus nitrite measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

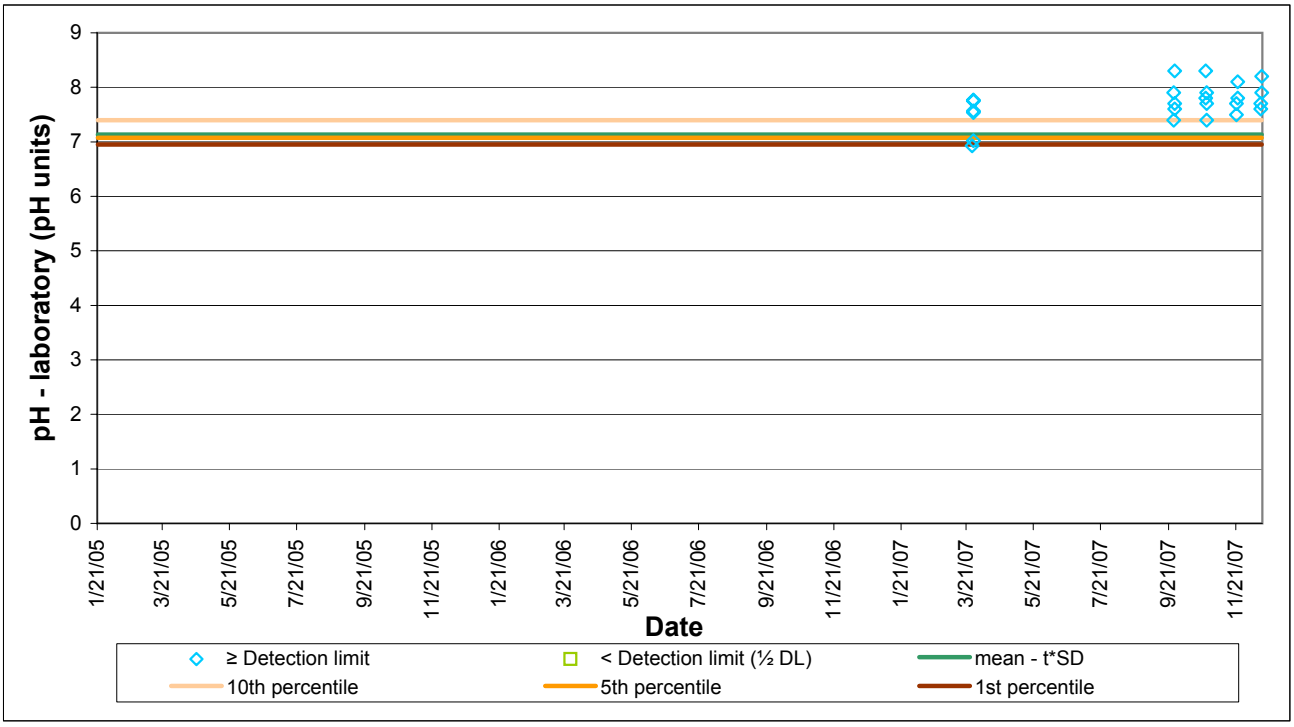
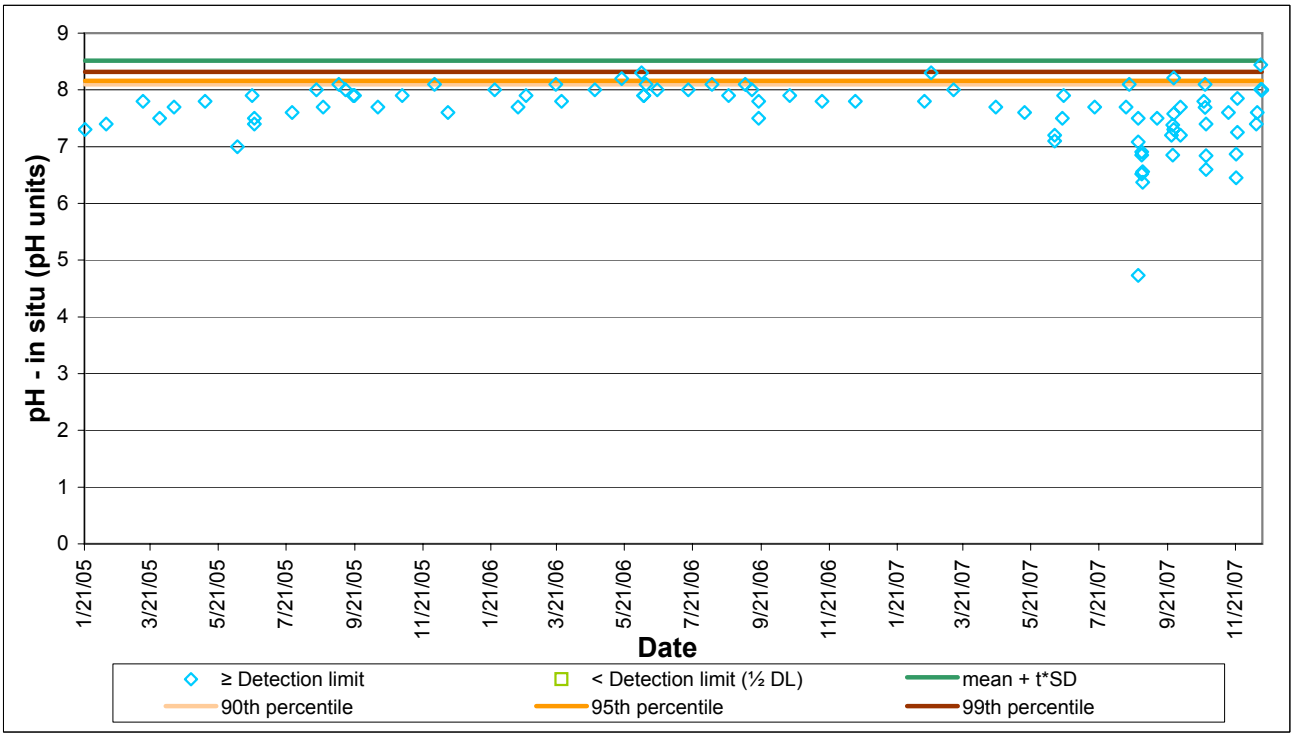


Figure A.41: Background (reference station) concentrations of pH measured in laboratory samples collected near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

a)



b)

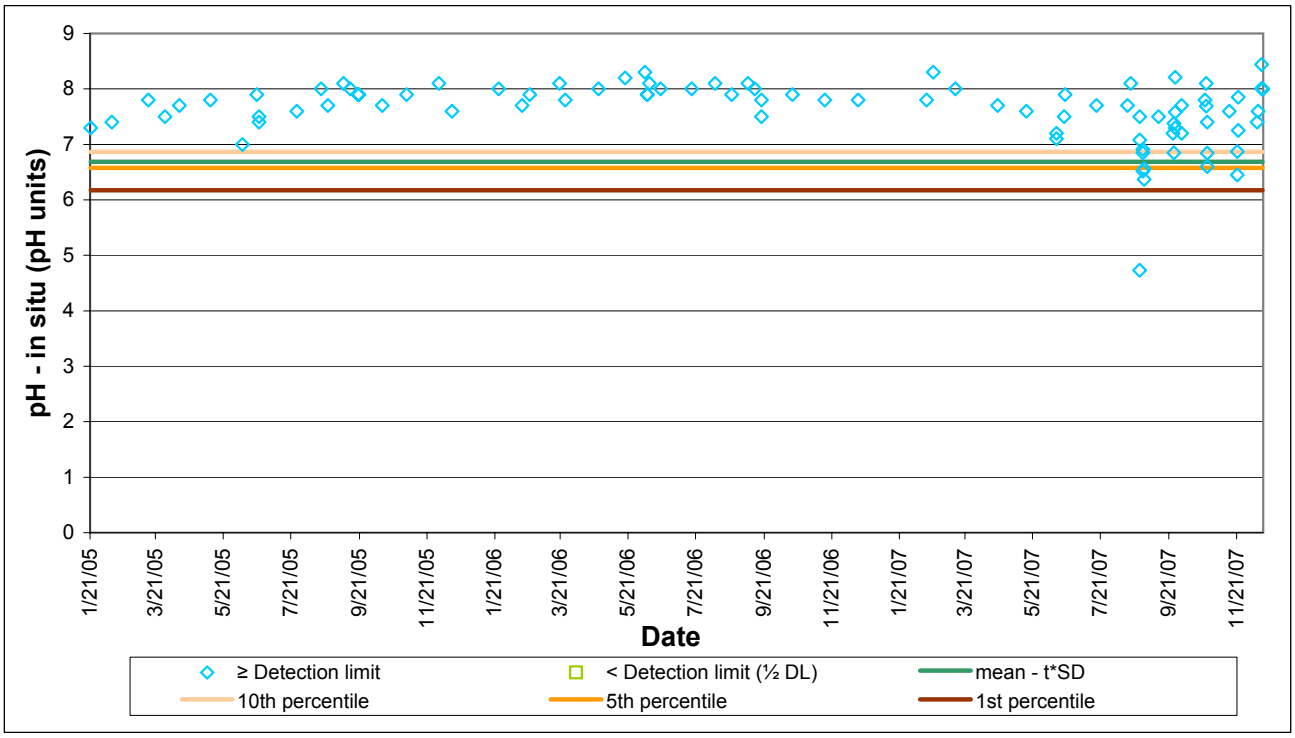


Figure A.42: Background (reference station) concentrations of pH measured in situ near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

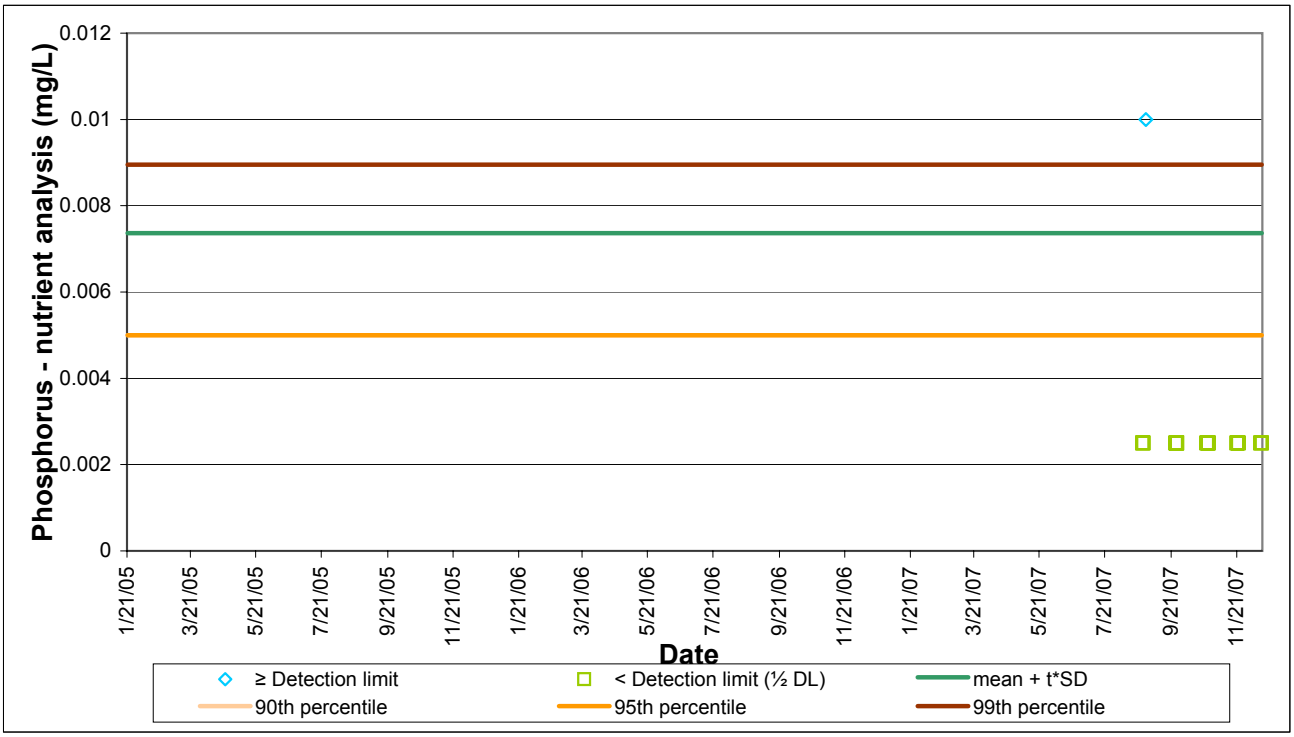


Figure A.43: Background (reference station) concentrations of phosphorus measured near Faro Mine, Yukon, 2005 - 2007.

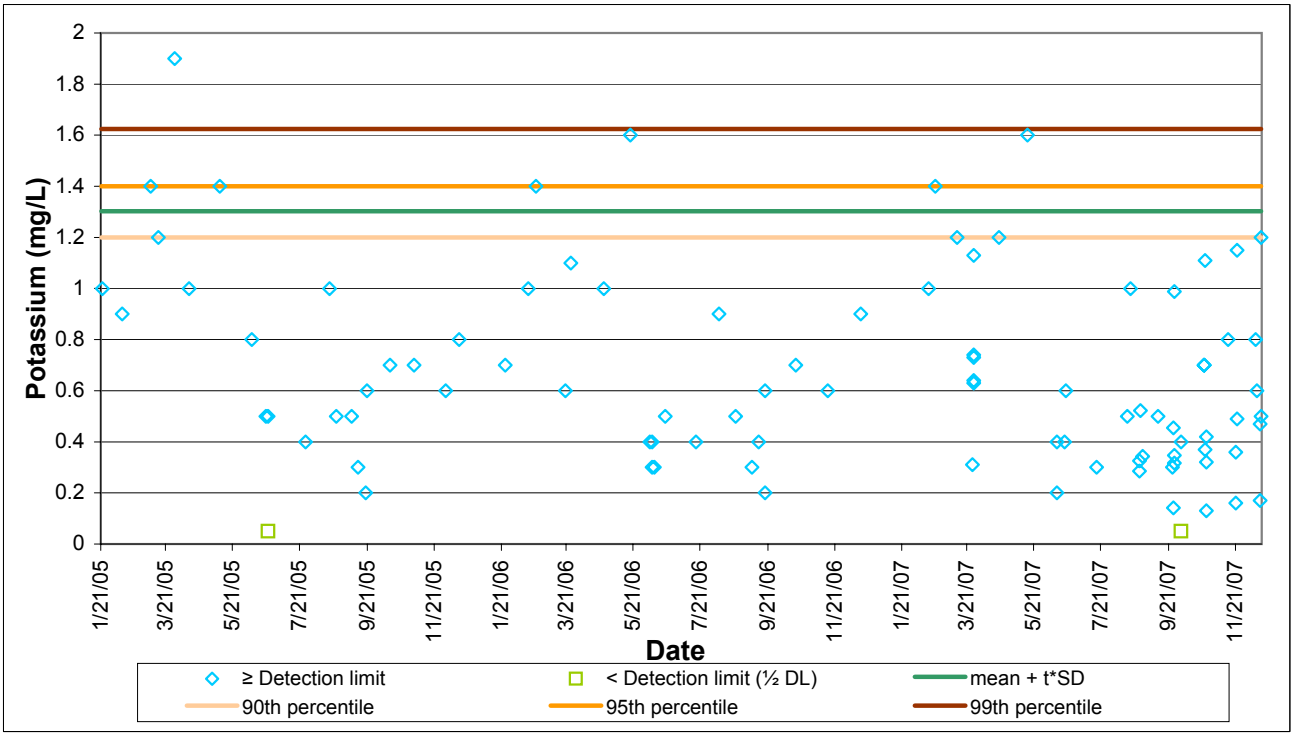


Figure A.44: Background (reference station) concentrations of potassium measured near Faro Mine, Yukon, 2005 - 2007.

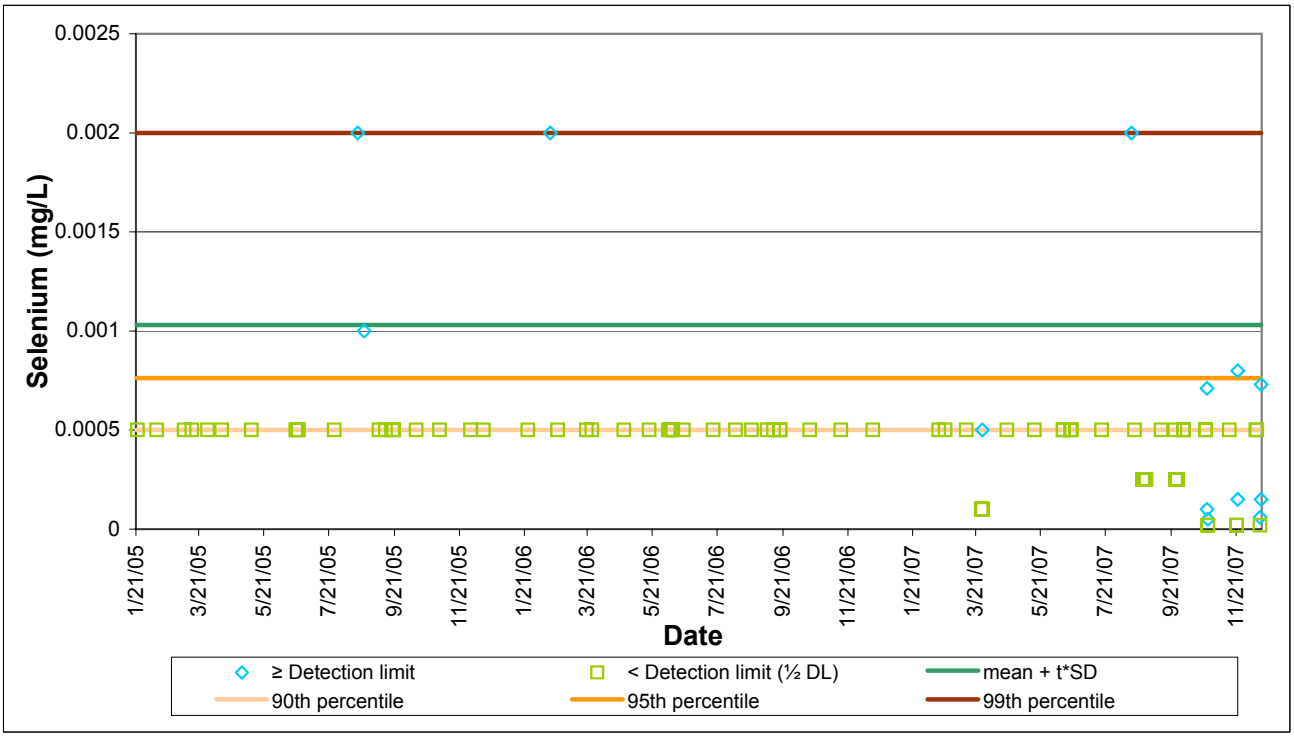


Figure A.45: Background (reference station) concentrations of selenium measured near Faro Mine, Yukon, 2005 - 2007.

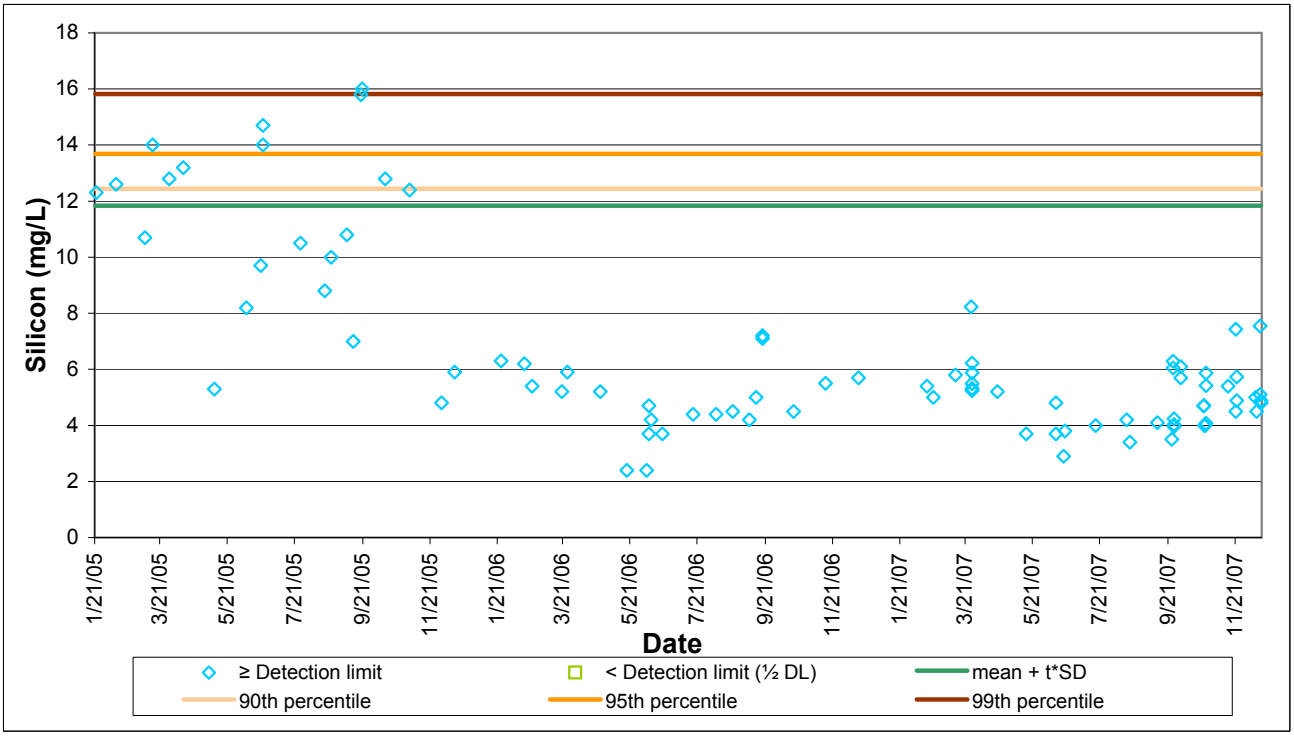


Figure A.46: Background (reference station) concentrations of silicon measured near Faro Mine, Yukon, 2005 - 2007.

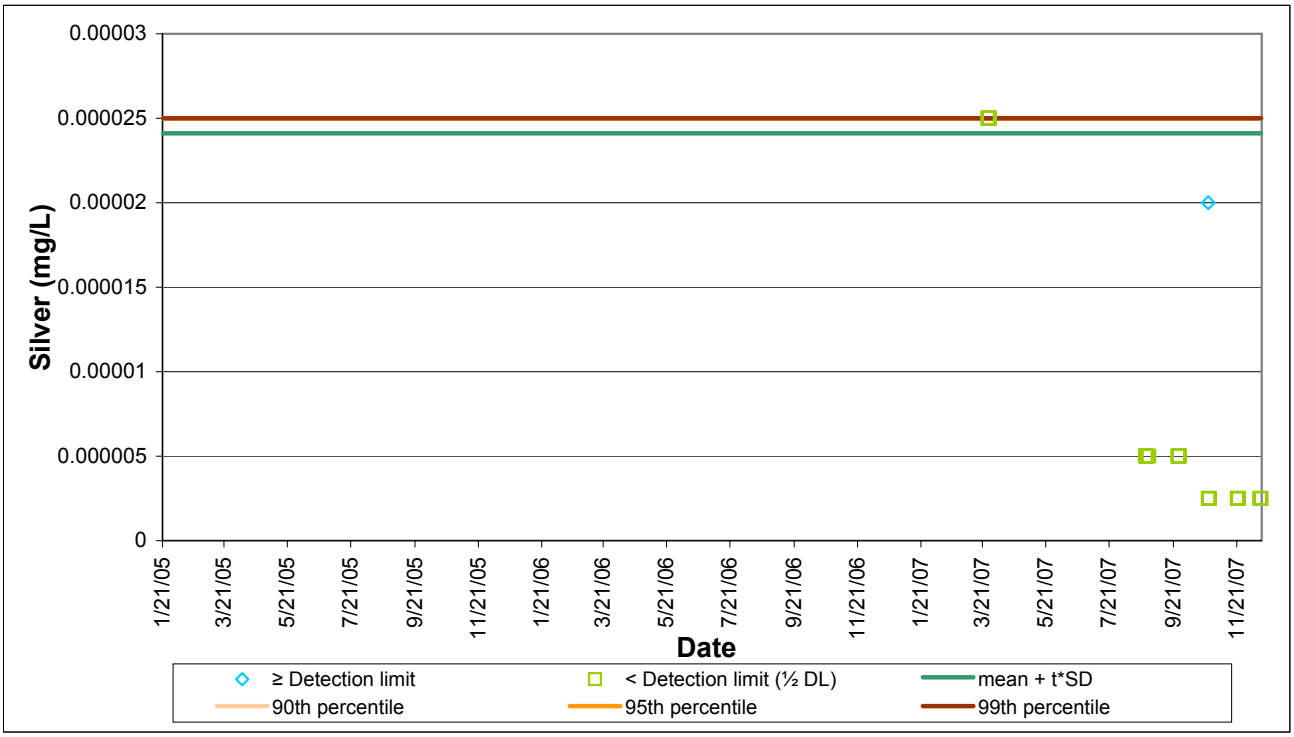


Figure A.47: Background (reference station) concentrations of silver measured near Faro Mine, Yukon, 2005 - 2007.

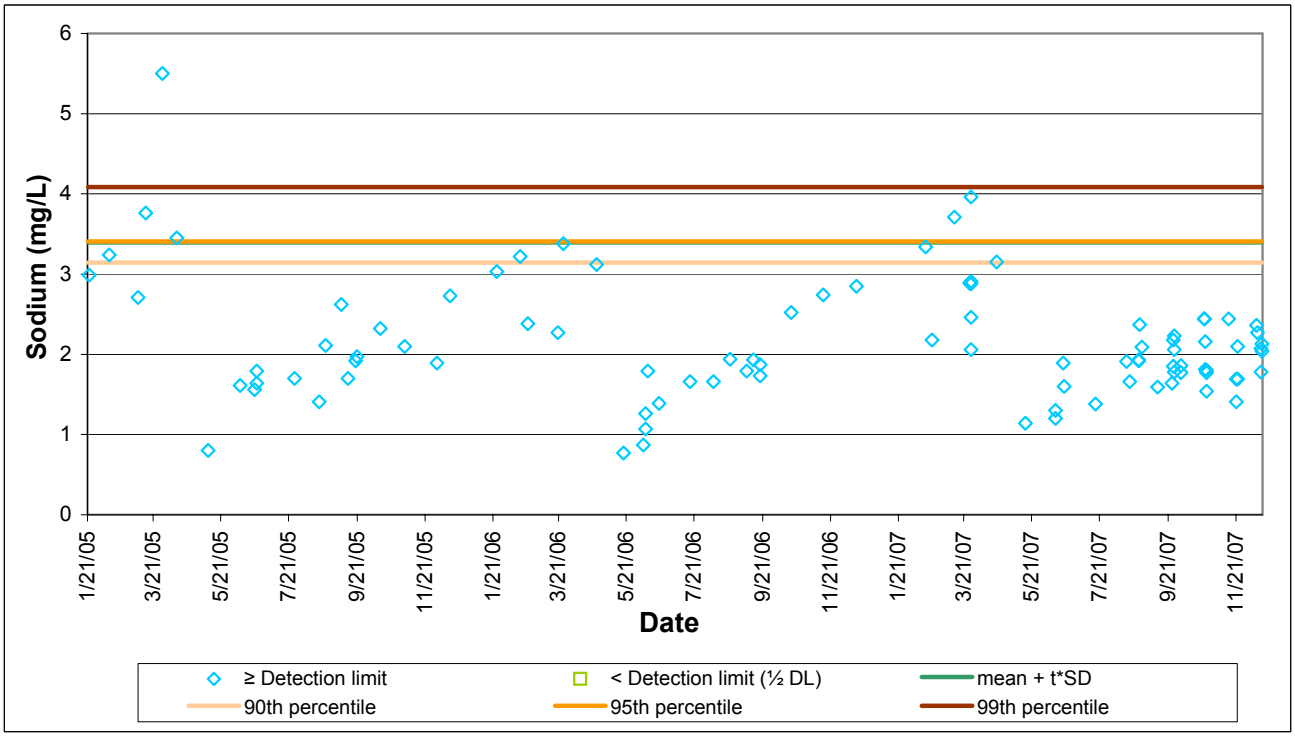


Figure A.48: Background (reference station) concentrations of sodium measured near Faro Mine, Yukon, 2005 - 2007.

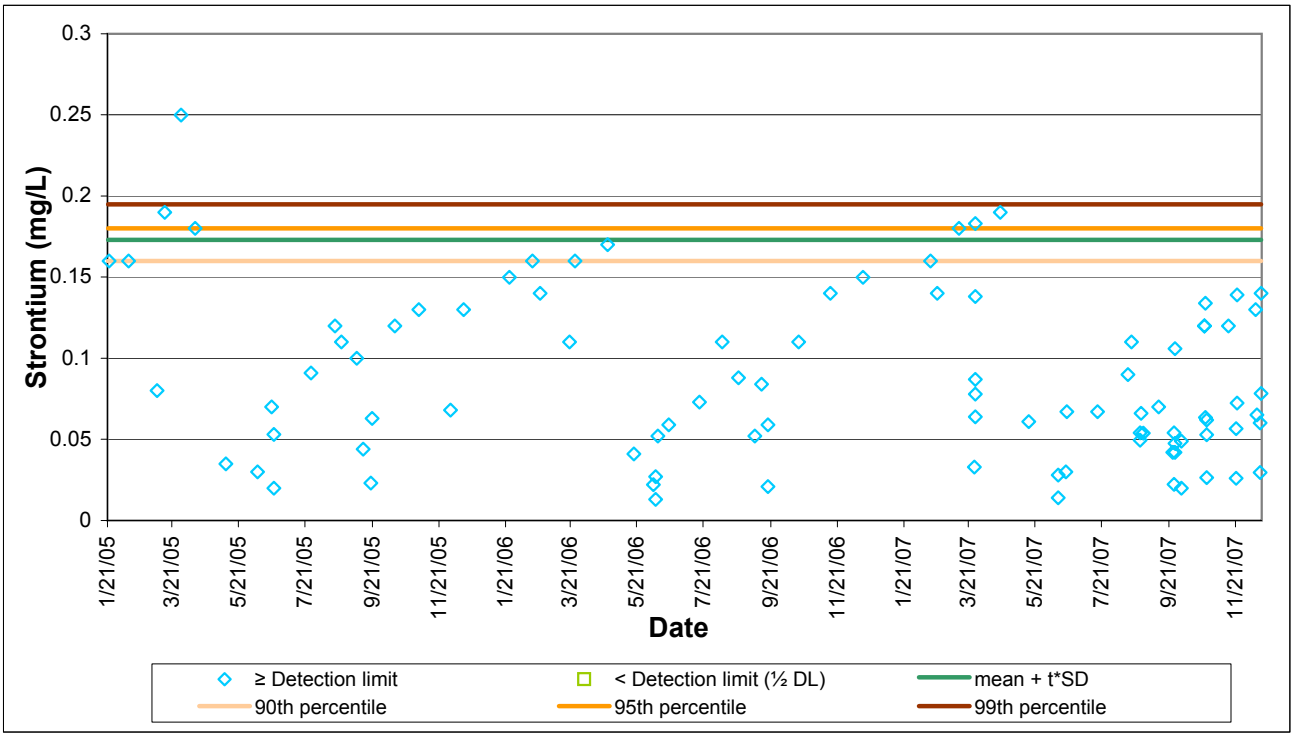


Figure A.49: Background (reference station) concentrations of strontium measured near Faro Mine, Yukon, 2005 - 2007.

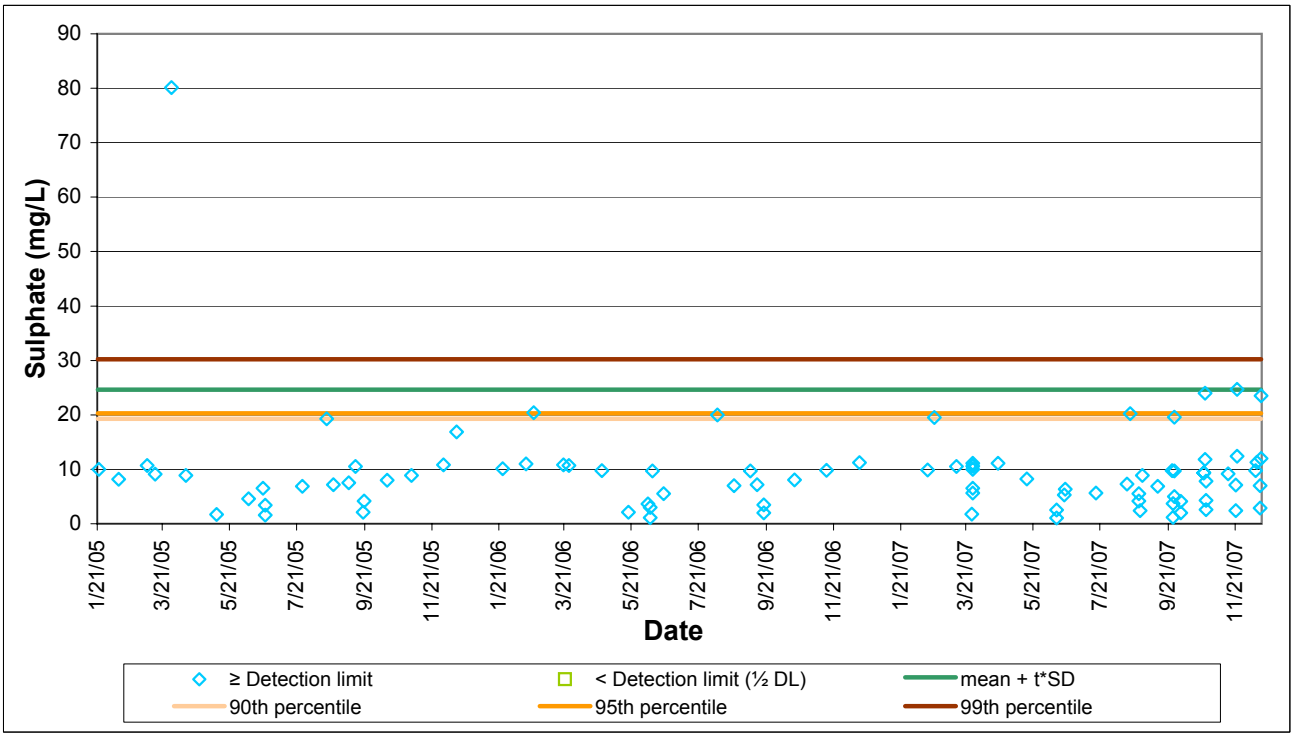


Figure A.50: Background (reference station) concentrations of sulphate measured near Faro Mine, Yukon, 2005 - 2007.

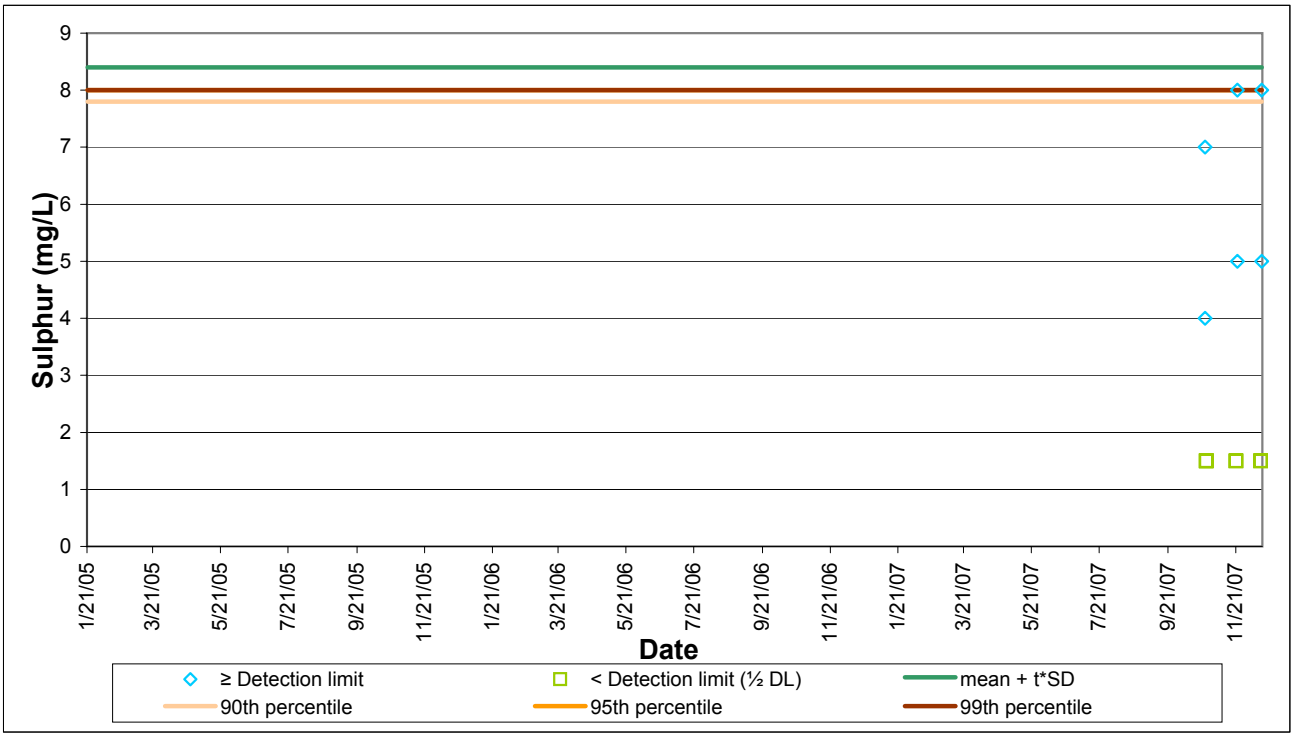


Figure A.51: Background (reference station) concentrations of sulphur measured near Faro Mine, Yukon, 2005 - 2007.

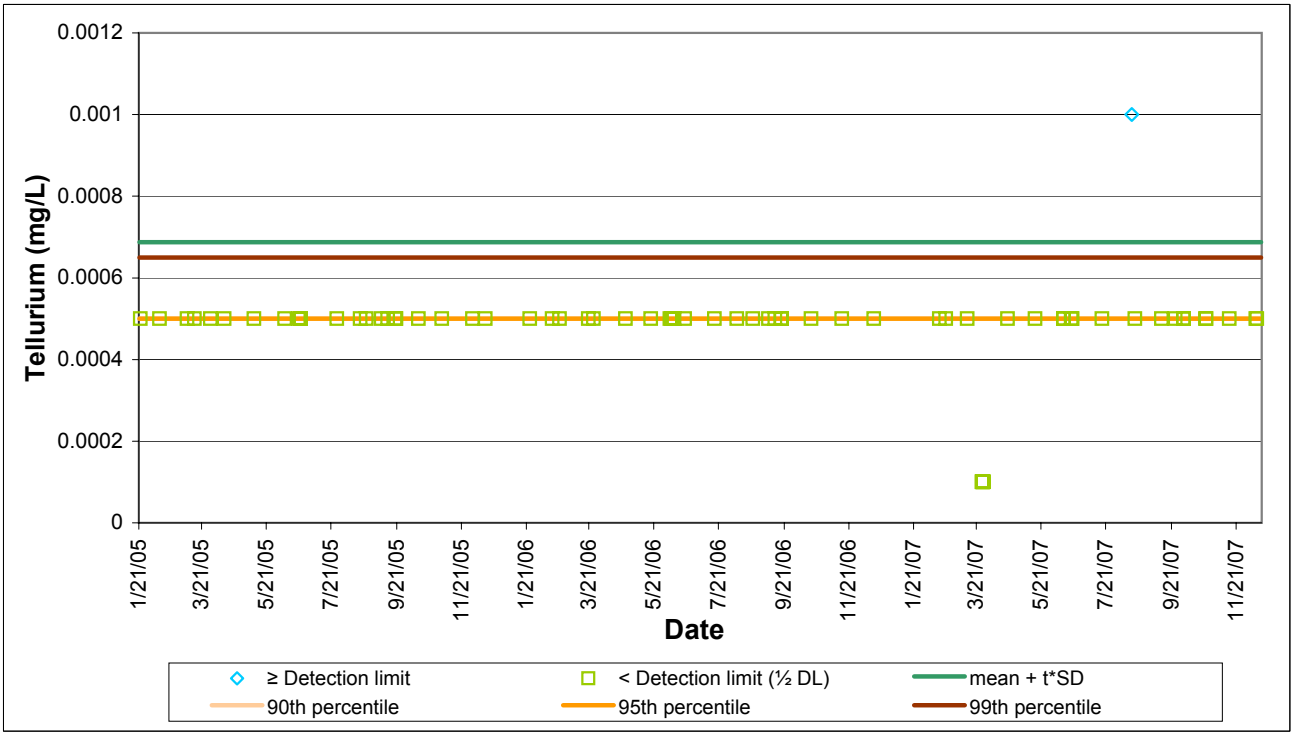
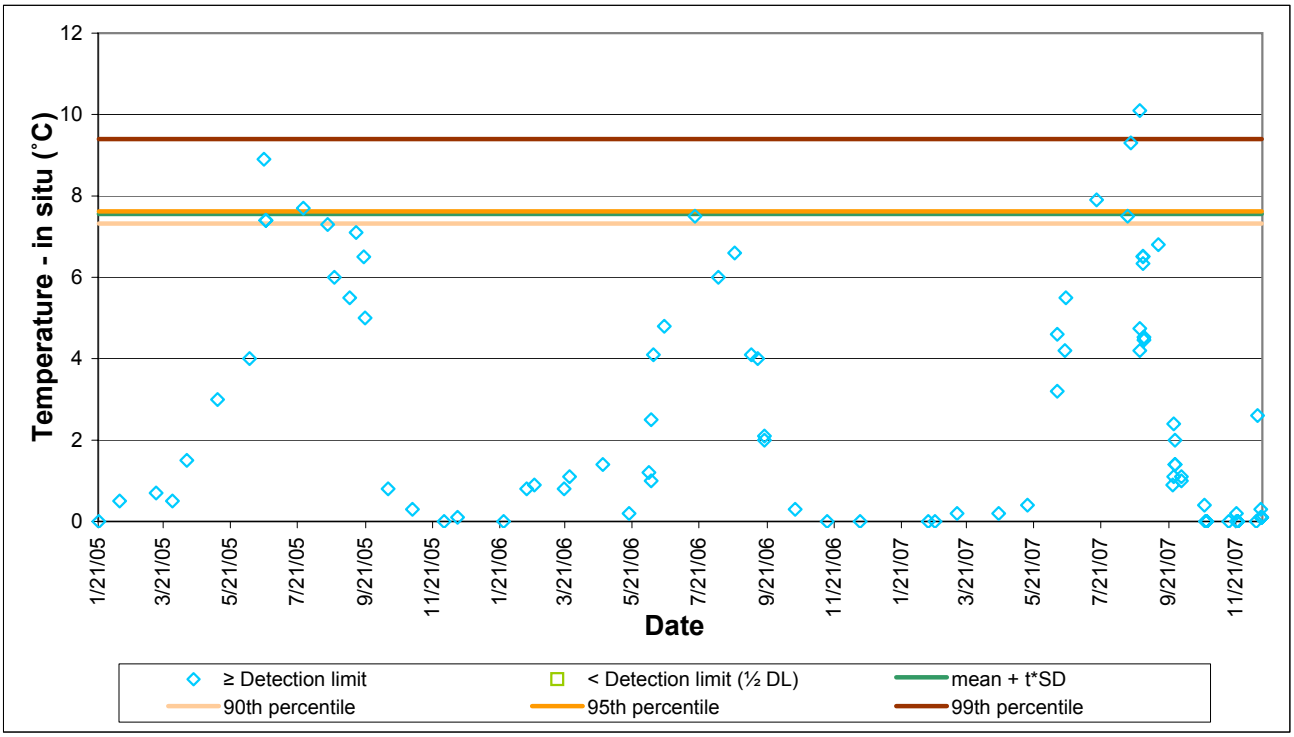


Figure A.52: Background (reference station) concentrations of tellurium measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

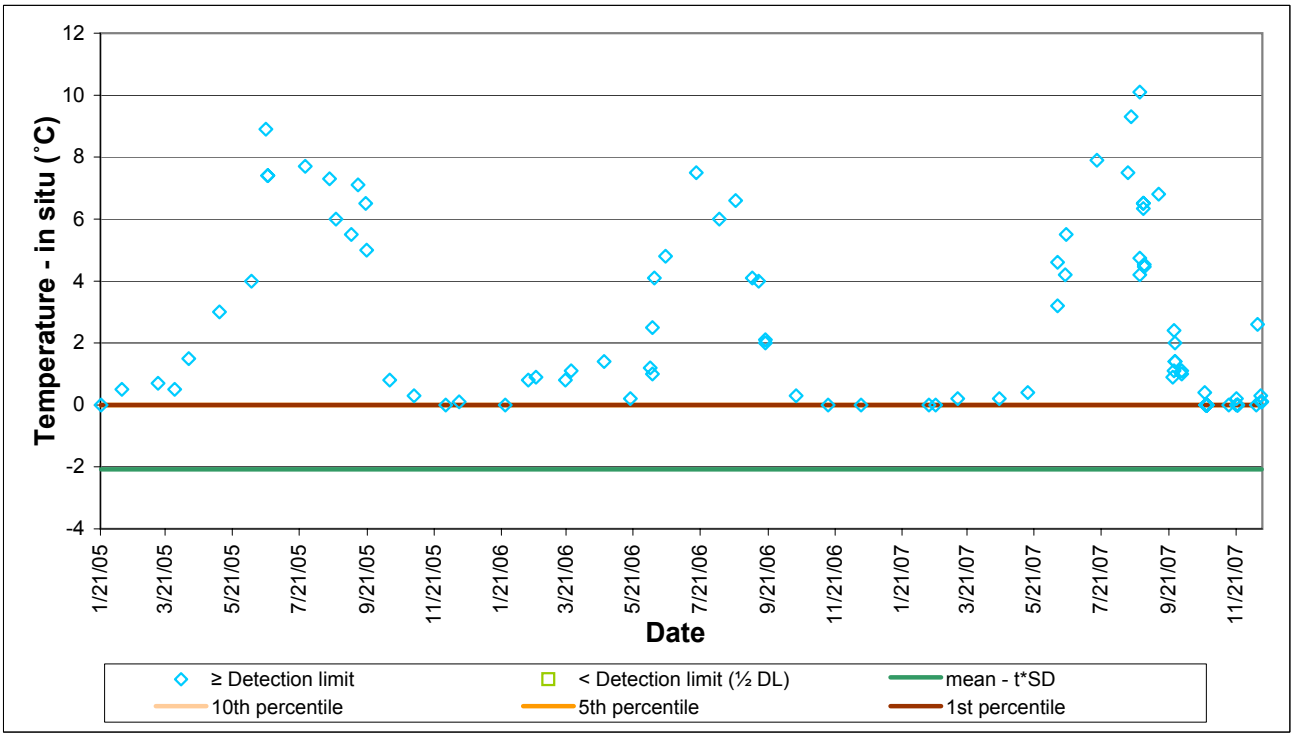


Figure A.53: Background (reference station) temperatures measured in situ near Faro Mine, Yukon, 2005 - 2007: a) upper data range summary statistics; b) lower data range summary statistics.

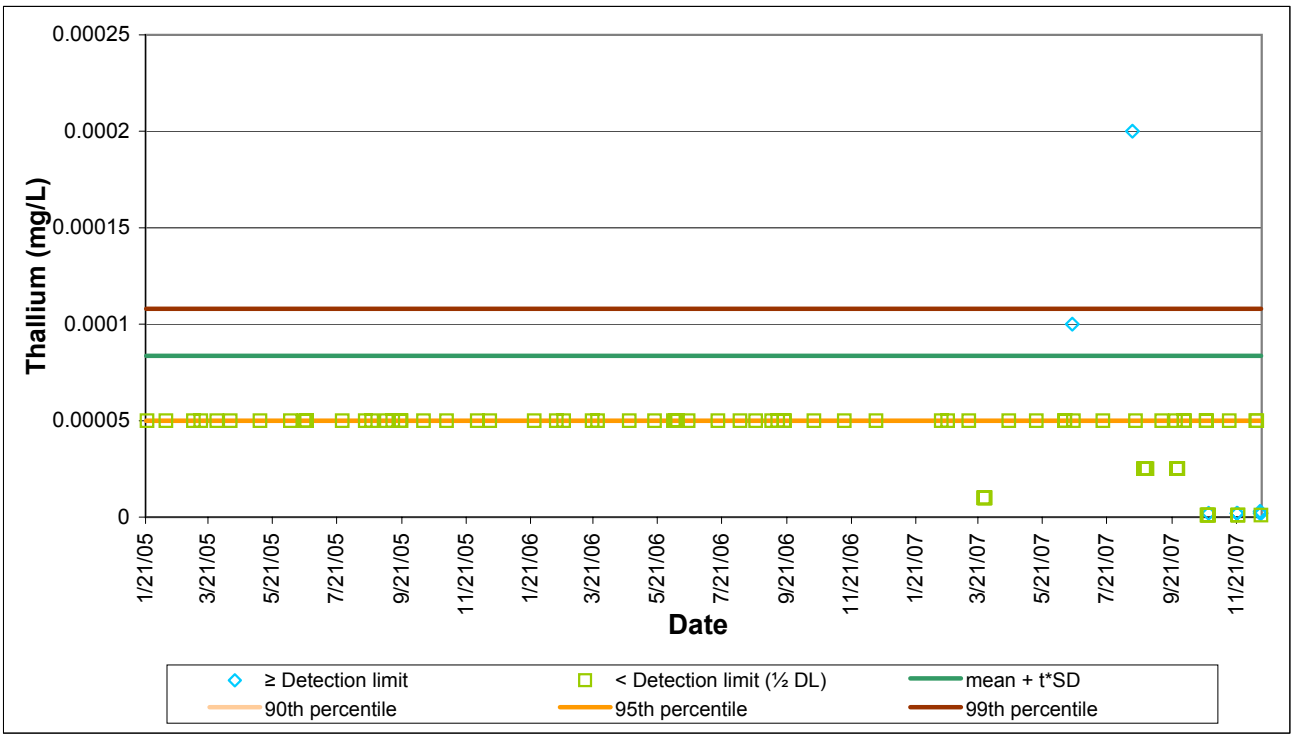


Figure A.54: Background (reference station) concentrations of thallium measured near Faro Mine, Yukon, 2005 - 2007.

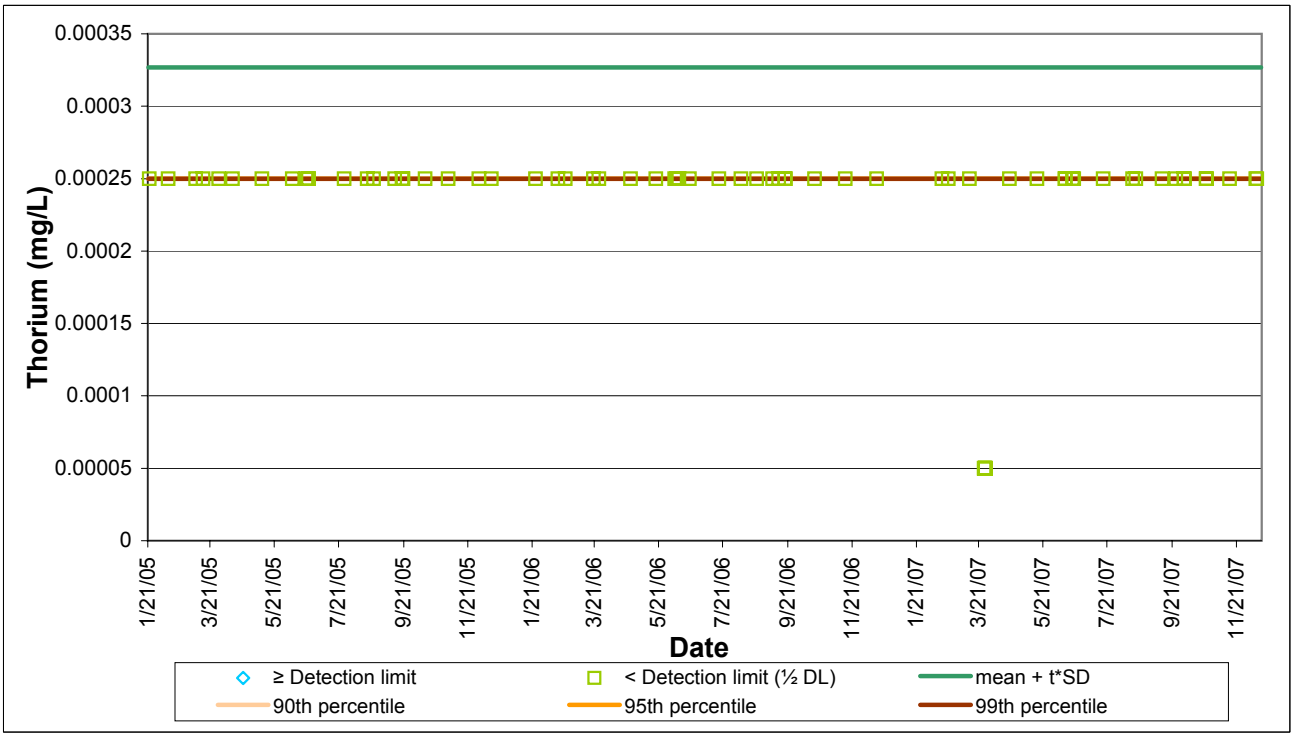


Figure A.55: Background (reference station) concentrations of thorium measured near Faro Mine, Yukon, 2005 - 2007.

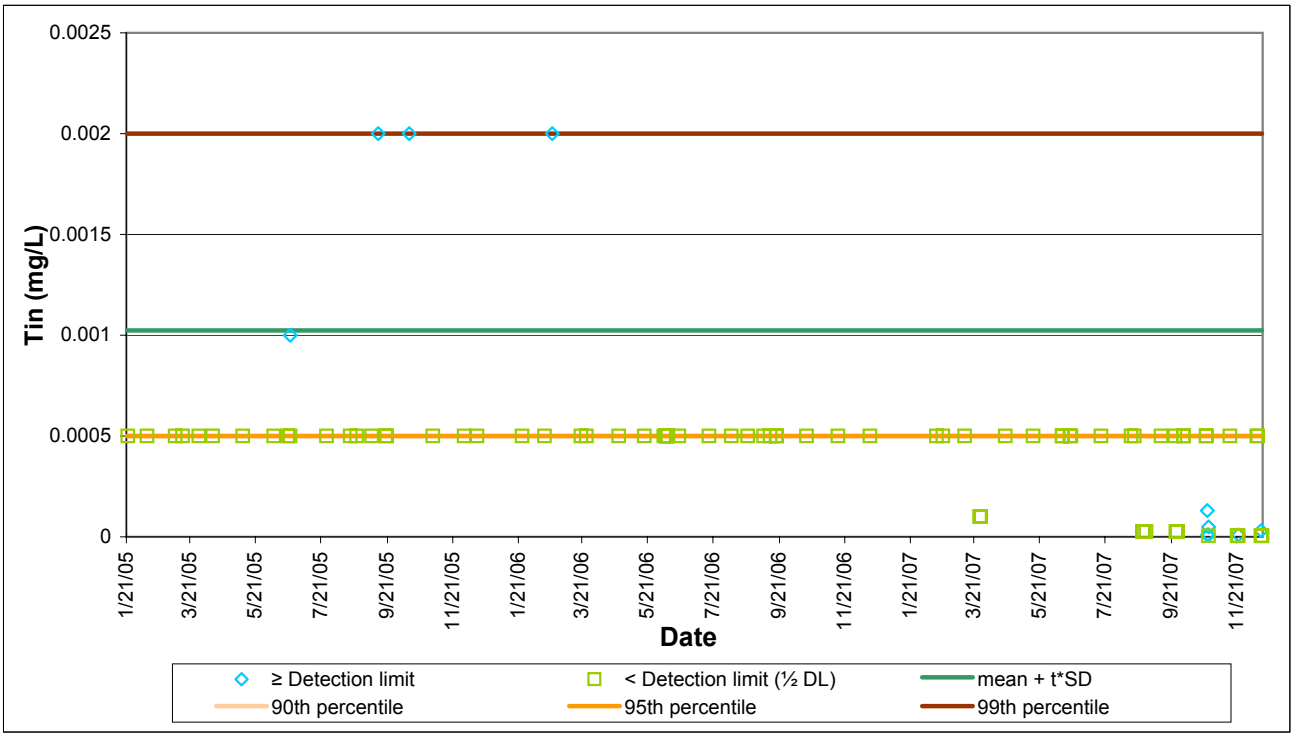


Figure A.56: Background (reference station) concentrations of tin measured near Faro Mine, Yukon, 2005 - 2007.

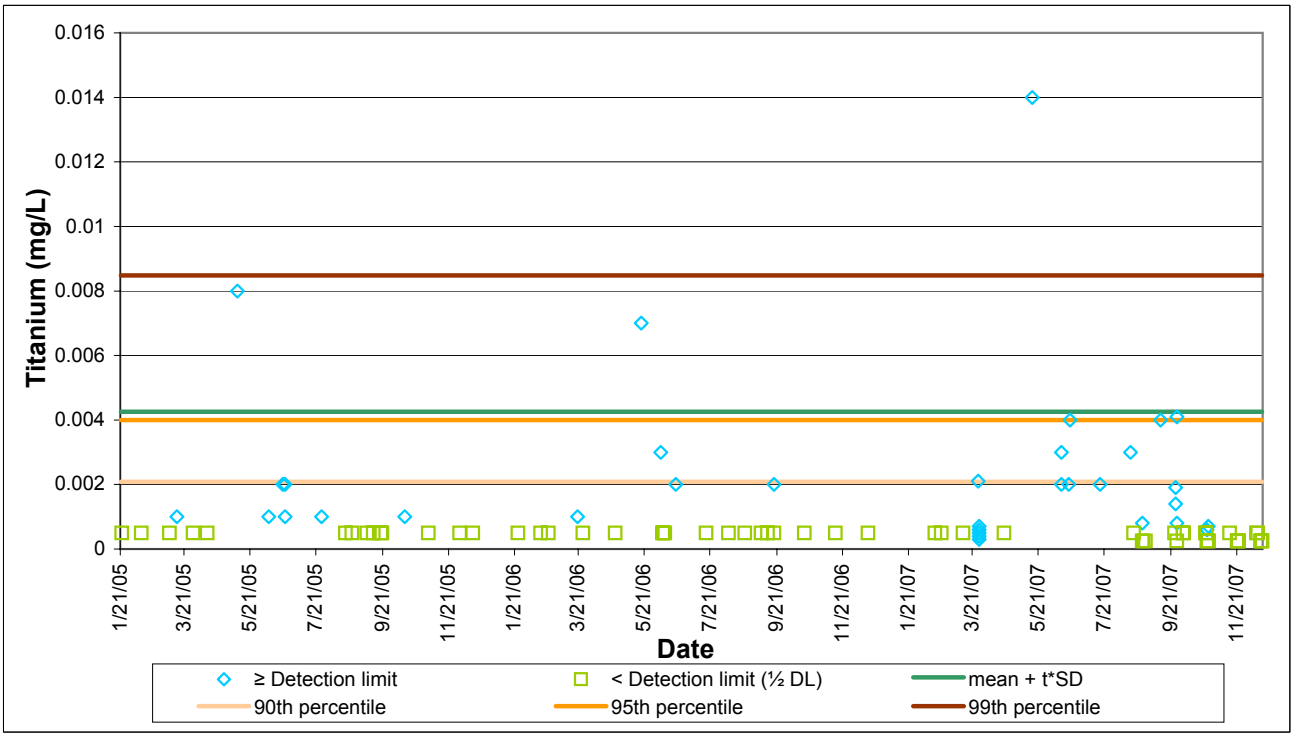


Figure A.57: Background (reference station) concentrations of titanium measured near Faro Mine, Yukon, 2005 - 2007.

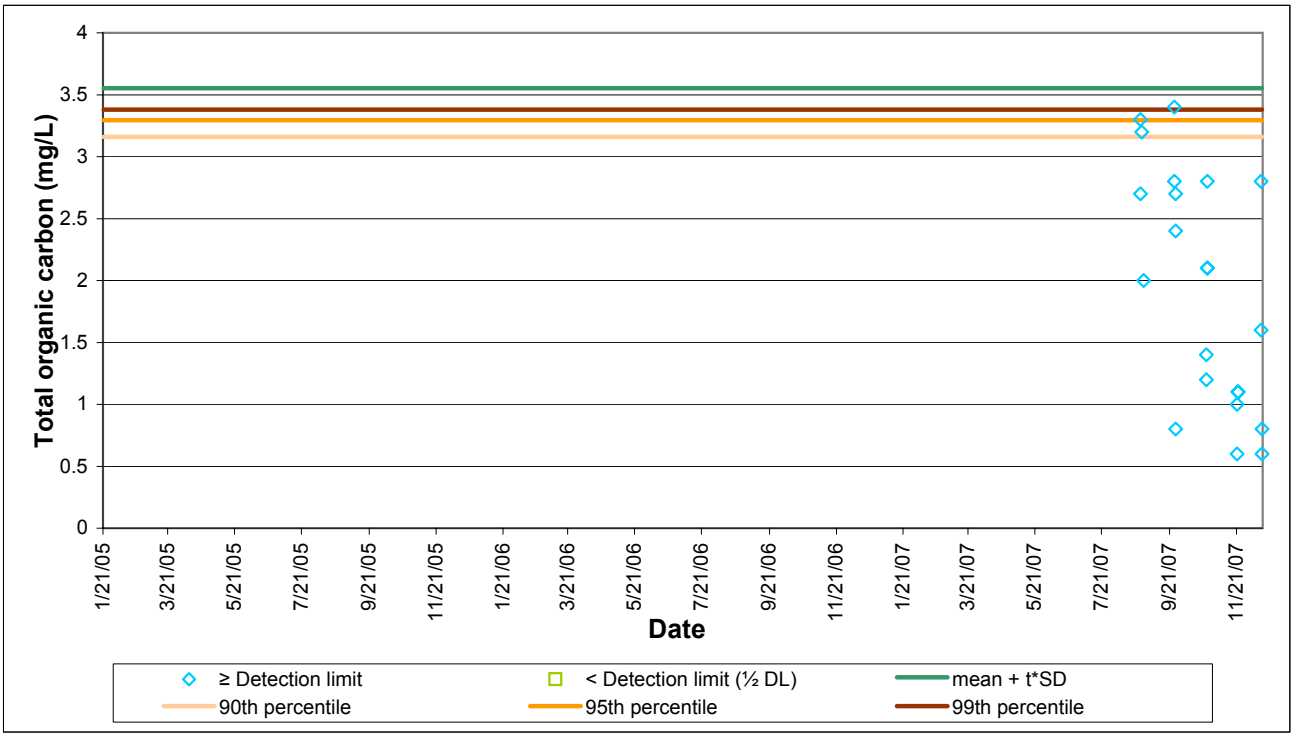


Figure A.58: Background (reference station) concentrations of total organic carbon measured near Faro Mine, Yukon, 2005 - 2007.

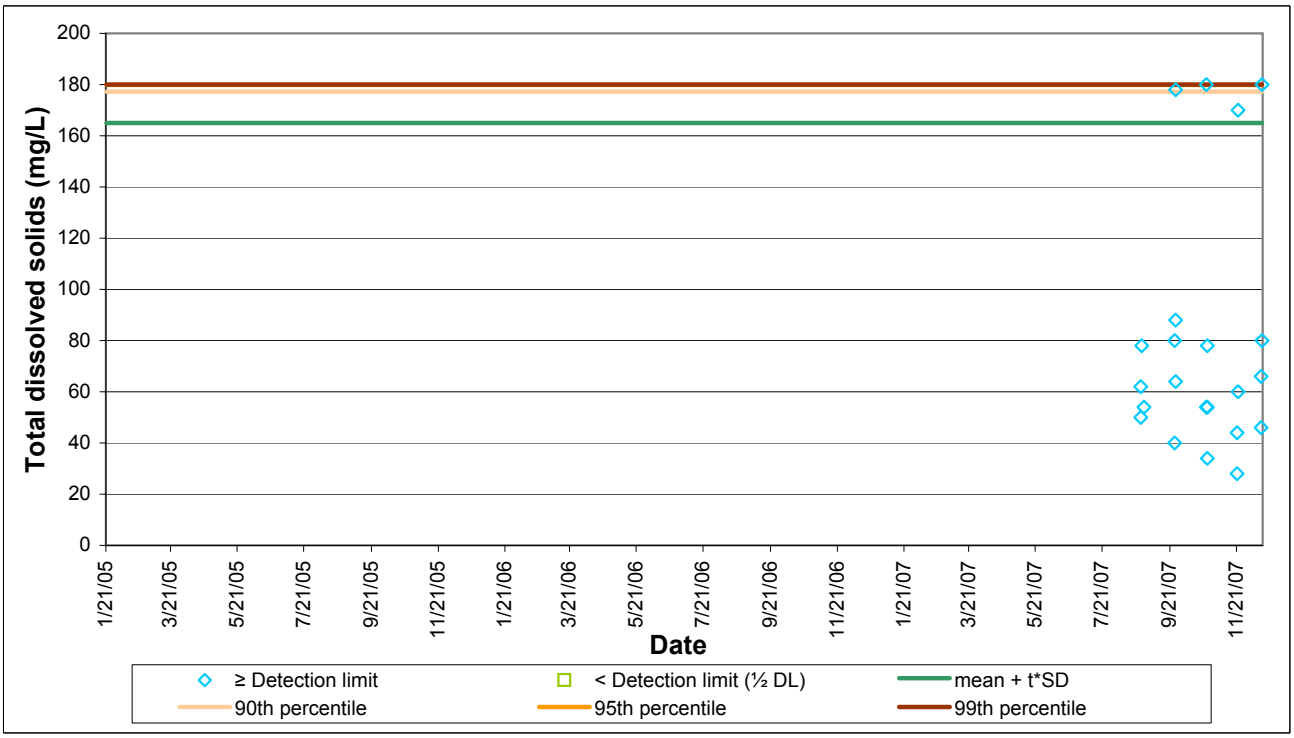


Figure A.59: Background (reference station) concentrations of total dissolved solids measured near Faro Mine, Yukon, 2005 - 2007.

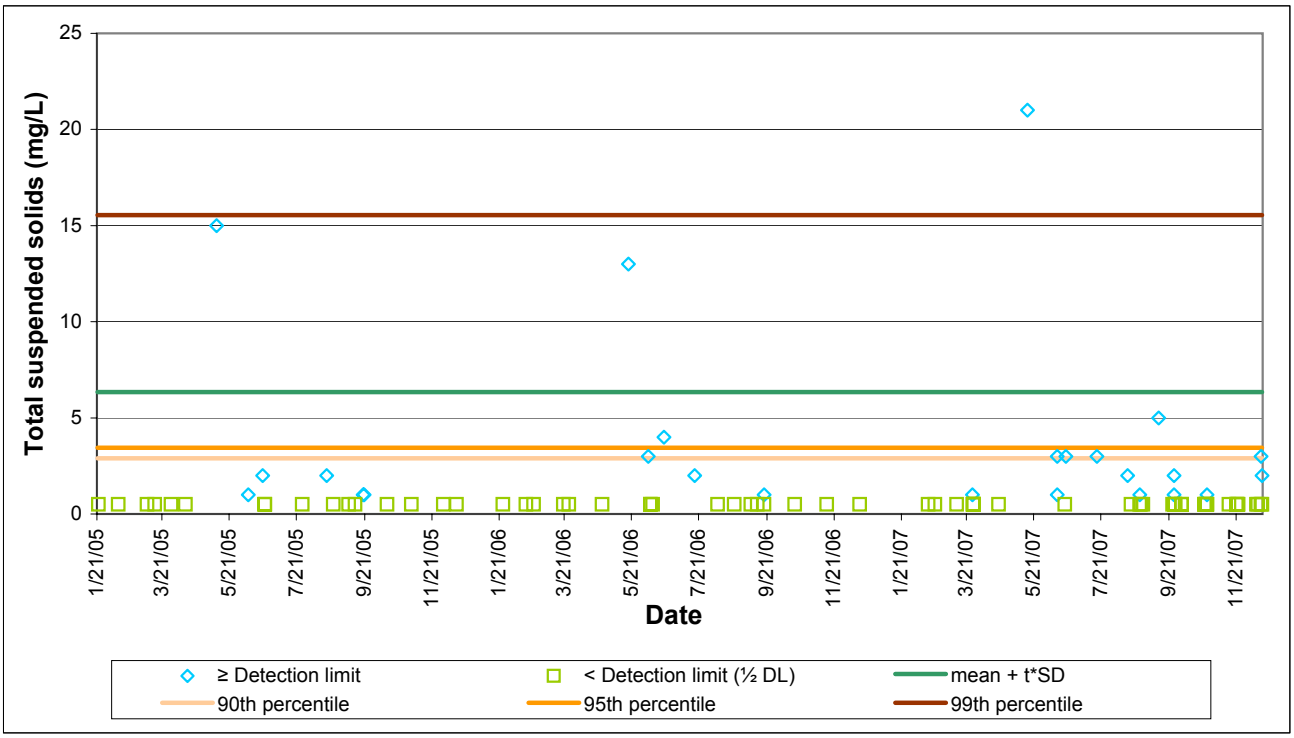


Figure A.60: Background (reference station) concentrations of total suspended solids measured near Faro Mine, Yukon, 2005 - 2007.

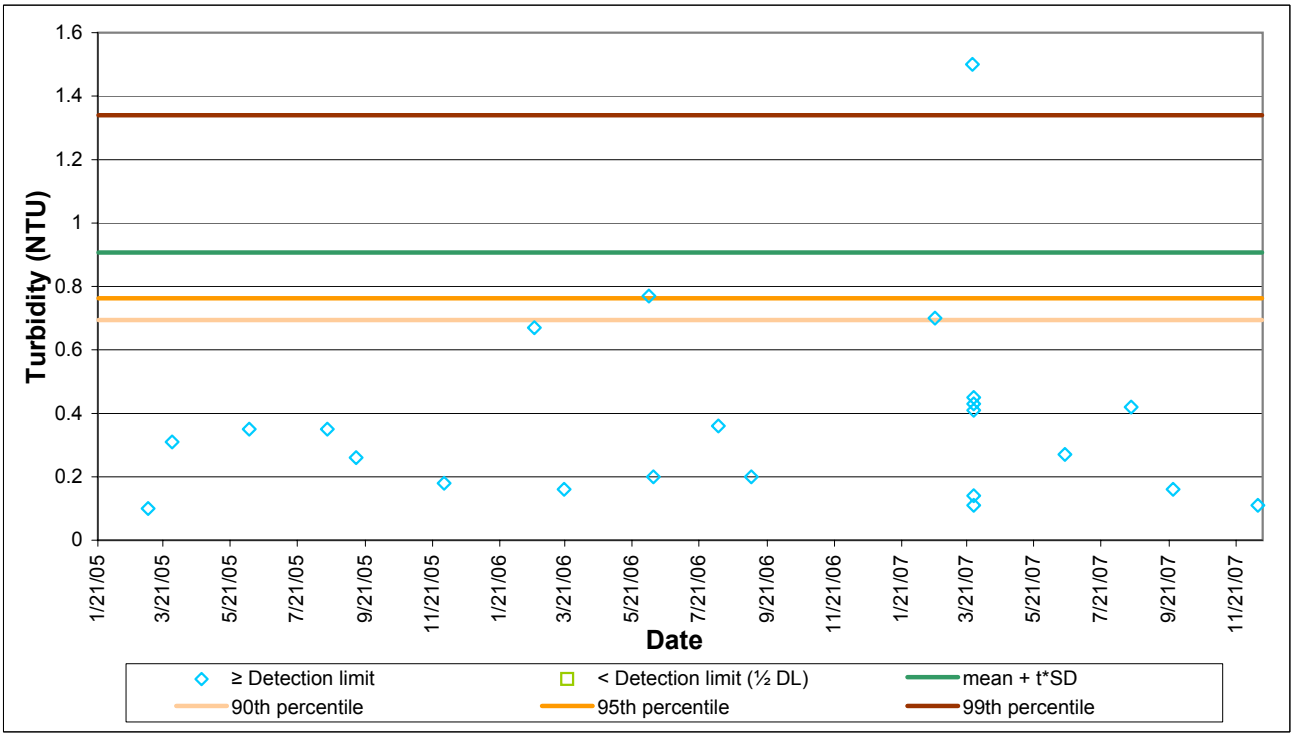


Figure A.61: Background (reference station) turbidities measured near Faro Mine, Yukon, 2005 - 2007.

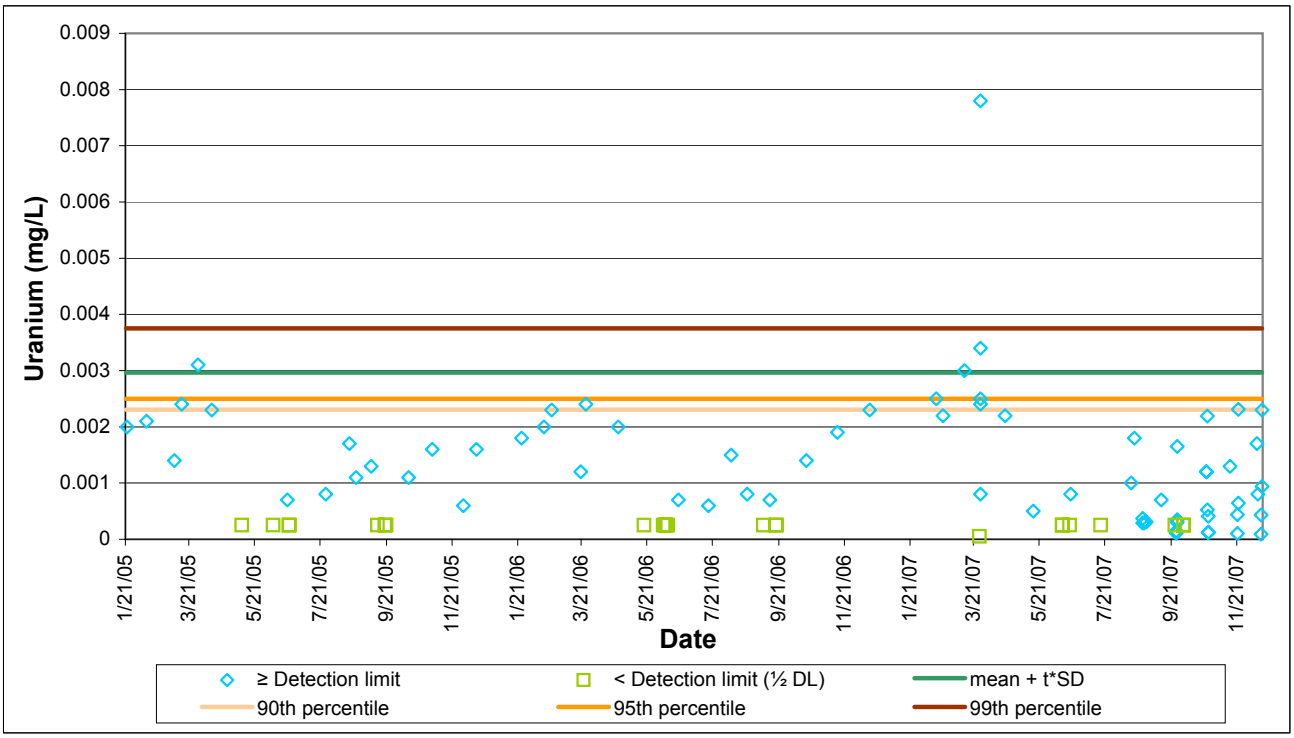


Figure A.62: Background (reference station) concentrations of uranium measured near Faro Mine, Yukon, 2005 - 2007.

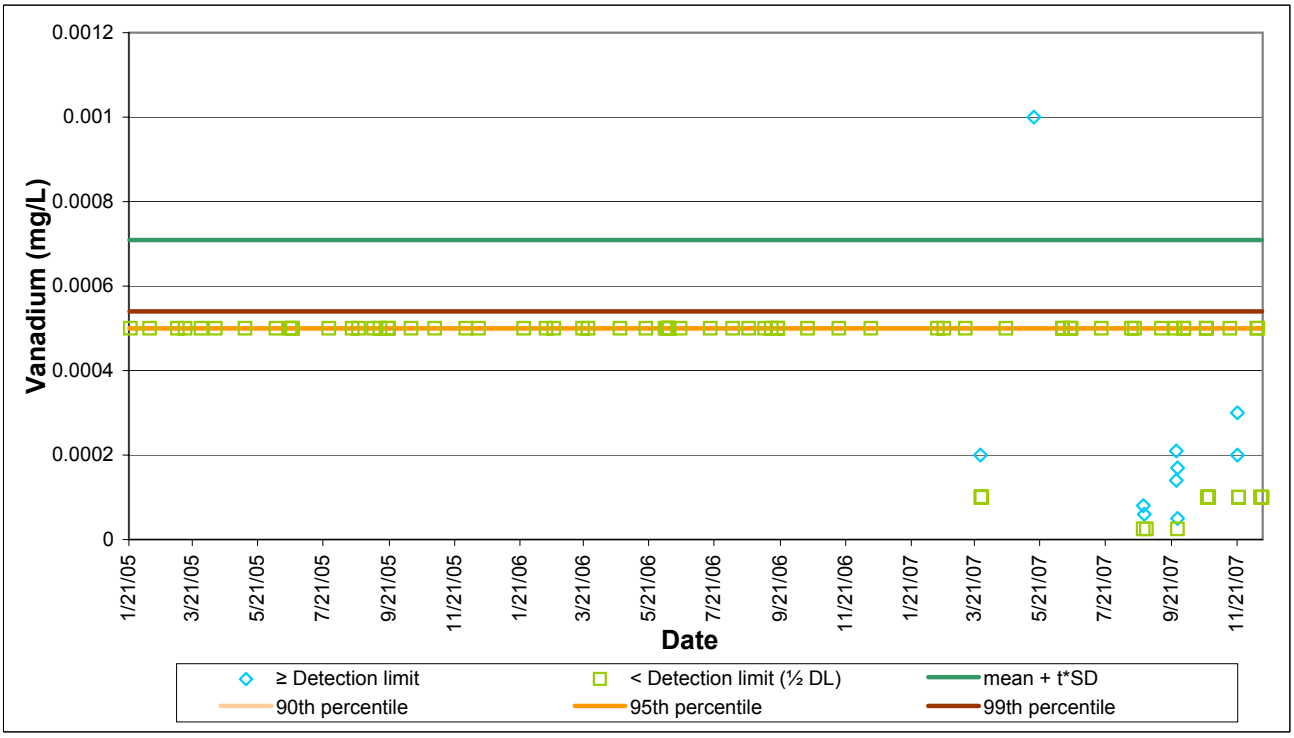


Figure A.63: Background (reference station) concentrations of vanadium measured near Faro Mine, Yukon, 2005 - 2007.

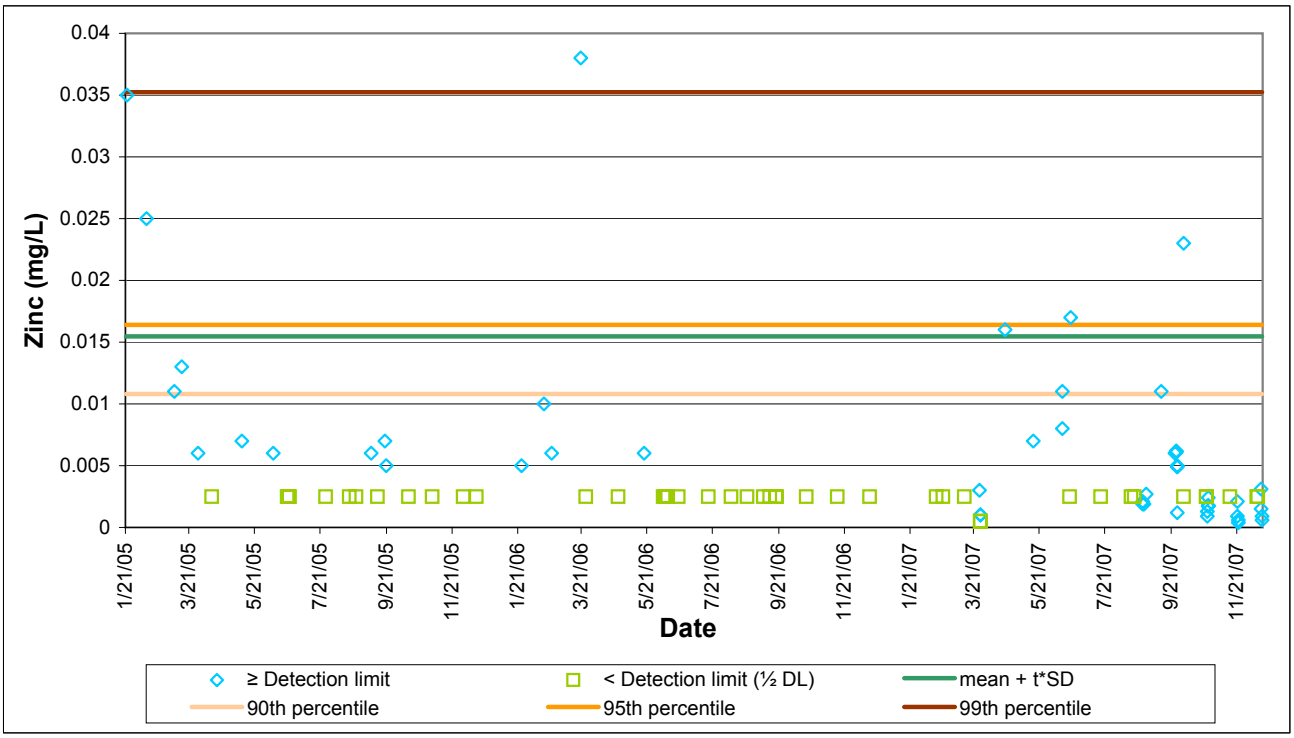


Figure A.64: Background (reference station) concentrations of zinc measured near Faro Mine, Yukon, 2005 - 2007.

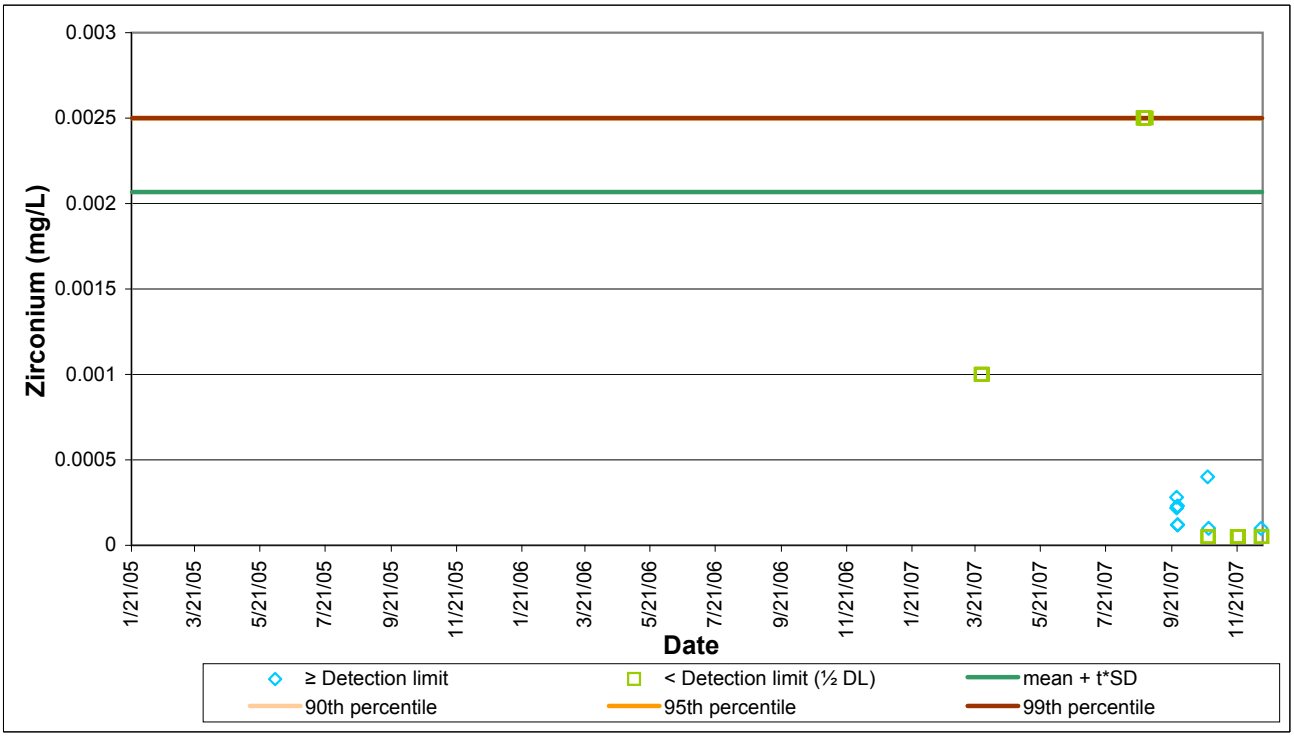
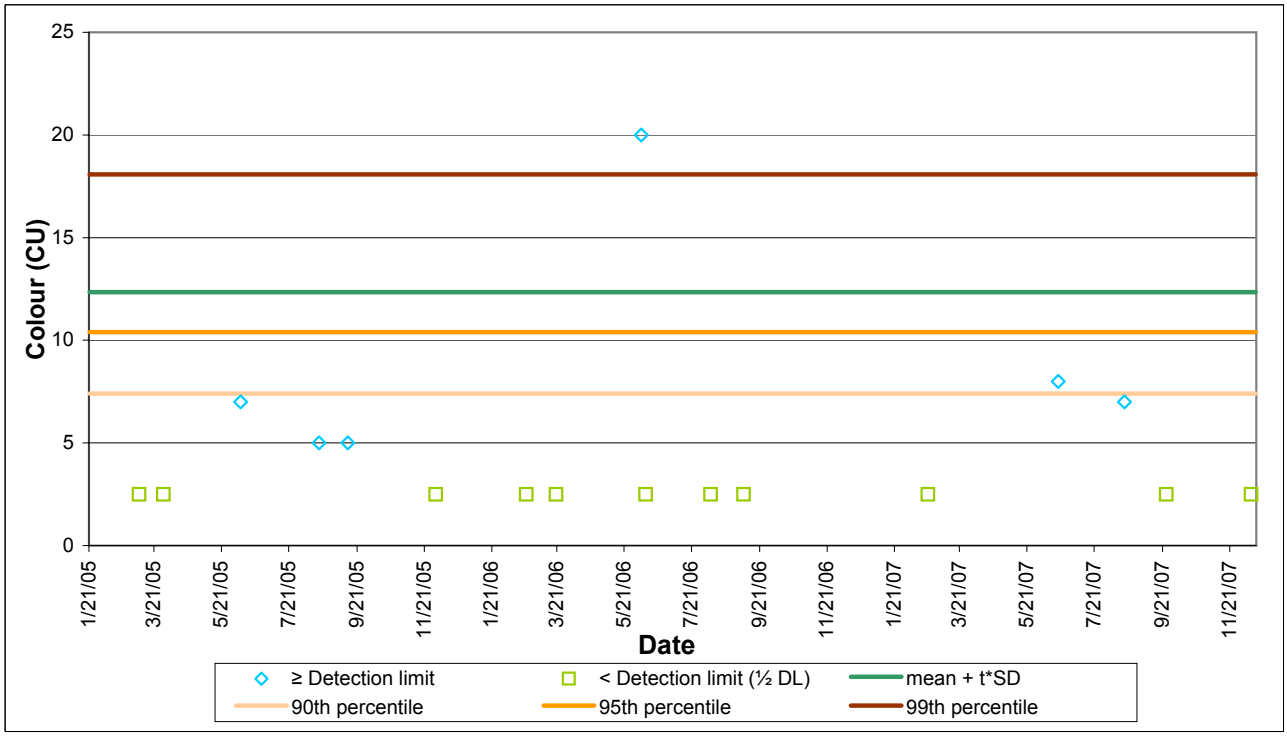


Figure A.65: Background (reference station) concentrations of zirconium measured near Faro Mine, Yukon, 2005 - 2007.

a)



b)

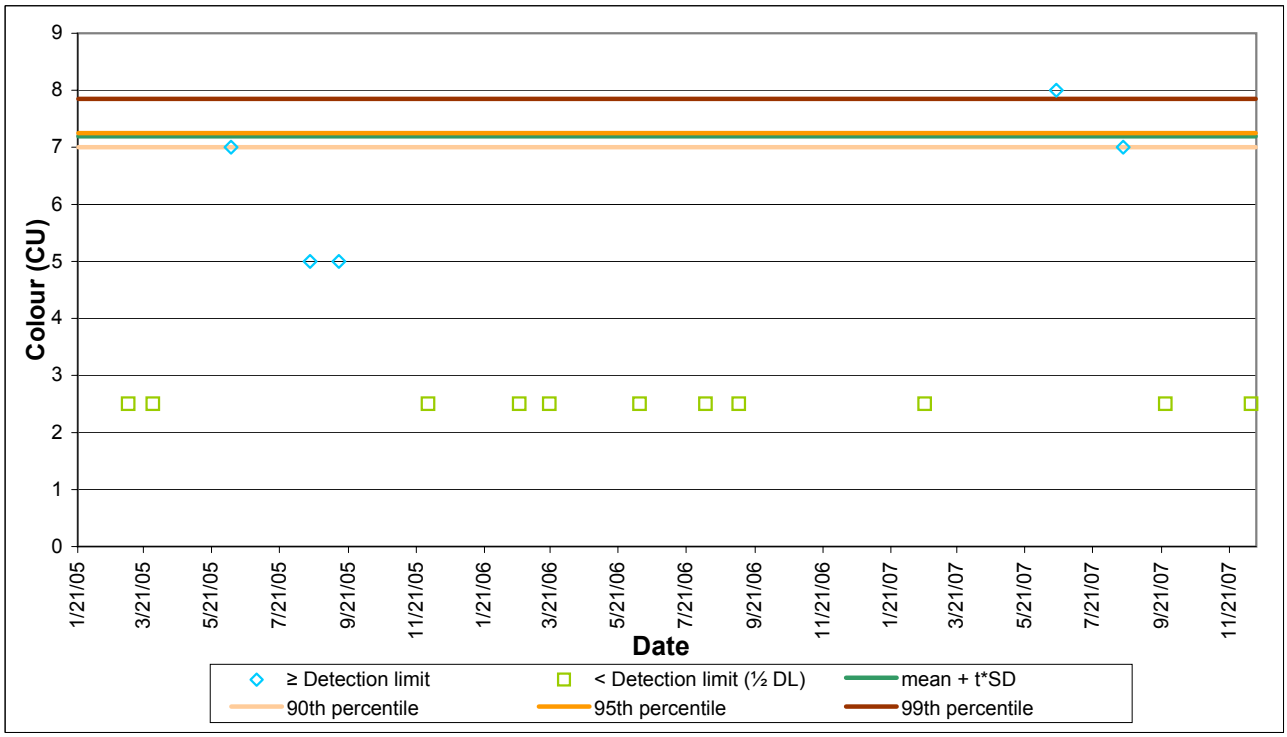


Figure A.66: Background (reference station) colour measured near Faro Mine, Yukon, 2005 - 2007: a) all data; b) removed elevated datapoint reported June 5, 2006 from Vangorda Creek upstream station (V1).

APPENDIX B

Water Quality Criteria

Appendix B: Selection of Benchmarks for Water Quality Evaluation

In all cases where a Canadian water quality guideline (CWQG) exists for a parameter, such a guideline was selected as the benchmark for evaluation of water quality at Faro (Tables B.1 and B.2). In the absence of a CWQG, the most conservative provincial water quality criterion from British Columbia, Saskatchewan, or Ontario was selected, if such value(s) existed. An exception was the uranium guideline from Saskatchewan which is based on more recent information than the Ontario water quality objective for uranium. In the absence of either a Canadian or provincial criterion, a Canadian drinking water quality guideline was selected. For parameters for which no water quality criteria have been developed, alternative benchmarks (provided by Senes) were identified that represent a low- or no- observed effect concentration reported in the scientific literature for a sensitive aquatic species.

Some water quality criteria vary on the basis of water hardness (aluminum, beryllium cadmium, copper, lead, manganese, nickel). In such cases, the criterion corresponding to a hardness of 100 mg/L as $CaCO_3$ was selected. Although some reference and negligibly-influenced surface waters in the vicinity of Faro mine have lower mean water hardness than 100 mg/L, the receiving waters in which elevated metal levels are sometimes found (and are therefore of potential concern) also have elevated water hardness. For example, mean water hardness concentrations at mine-influenced stations such as X2, X14, R2-R11, V27, and V8 are all >100 mg/L (Minnow 2007). Although hardness values at these stations are occasionally lower, such cases tend to be associated with periods of high precipitation or snowmelt when metal levels also tend to be diluted. A hardness value of 100 mg/L can be considered conservative since water hardness concentrations of up to 793 mg/L (X-14, Minnow 2007) have been observed in mine-affected areas.

In the case of total alkalinity and total suspended solids, the available water quality criteria are expressed as a change relative to background concentrations (Table B.2). In these cases, background values reported in this study were used for deriving the water quality benchmarks.

The CWQG for ammonia is expressed on the basis of un-ionized ammonia, which comprises an increasing fraction of the total ammonia present in water as either water pH or temperature increases (or both). Because the temperature and pH of surface waters near Faro rarely rise above 15°C or 8.5, respectively, it is conservative to use as the benchmark the total ammonia concentration corresponding to an un-ionized concentration of 0.019 mg/L (the CWQG) under such conditions (Table B.2).

Although separate CWQGs exist for the two main valence states of chromium, speciation of chromium in water samples is not readily available from commercial laboratories and the lower value of 0.001 mg/L (for hexavalent chromium) is generally applied for data screening purposes.

Except for alkalinity and pH, concentrations of potential concern are those that are higher than the selected benchmark. In the case of alkalinity and pH, it is values below the benchmark that are of greatest interest at an acid-generating site like Faro.

Table B.1: Water quality criteria relative to Maxxam DLs (August 2008).

Measurements	Units	Water quality criteria					Alternative Aquatic Effects-Based Benchmarks[e]
		Canadian water quality guideline (for protection of FW aquatic life)[a]	British Columbia (freshwater)[b]	Saskatchewan[c]	Ontario Provincial Water Quality Objective[d]	Canadian Drinking Water Quality Guideline[a]	
Total metals							
Aluminum	mg/L	0.005 - 0.100[g]	0.05	0.005 - 0.100[g]	0.015 - 0.075[h]	0.1	
Antimony	mg/L				0.02[h]	0.006	0.15[i]
Arsenic	mg/L	0.005	0.005	0.005	0.005[h]	0.005 proposed	
Barium	mg/L					1.0	5.8[j]
Beryllium	mg/L				0.011 - 1.1[k]		0.0038[l]
Bismuth	mg/L						0.26[m]
Boron	mg/L		1.2		0.2[h]	5.000	
Cadmium	mg/L	0.000017 or more depending on hardness[B]		0.000017 or more depending on hardness[B]	0.0001 - 0.0005[h]	0.005	
Calcium	mg/L						116[j]
Chromium	mg/L	0.001 (hexavalent), 0.0089 (trivalent)		0.001 (hexavalent), 0.0089 (trivalent)	0.001 (hexavalent), 0.0089 (trivalent)	0.05	
Cobalt	mg/L		0.004		0.0009		
Copper	mg/L	0.002-0.004[n]	0.002-0.008[o]	0.002-0.004[n]	0.001-0.005[h]	1.0[p]	
Iron	mg/L	0.3		0.3	0.300	0.3[p]	
Lead	mg/L	0.001 - 0.007[q]	0.005-0.011[o]	0.001 - 0.007[q]	0.001 - 0.005[h]	0.010	
Lithium	mg/L						
Magnesium	mg/L						82[j]
Manganese	mg/L		0.7 - 1.9[o]			0.05[k]	
Mercury	ug/L	0.026[r] (0.004)[s]	0.004 - 0.02[s]	0.026[r]	0.2 (filtered)	1.0	
Molybdenum	mg/L	0.073	1		0.04[h]		
Nickel	mg/L	0.025 - 0.150[t]		0.025 - 0.150[t]	0.025		
Potassium	mg/L						53[j]
Selenium	mg/L	0.001	0.002	0.001	0.100	0.01	
Silicon	mg/L						
Silver	mg/L	0.0001	0.00005/0.0015[u]	0.0001	0.0001		
Sodium	mg/L					200[p]	680[s]
Strontium	mg/L						9.3[v]
Sulphur	mg/L						
Tellurium	mg/L						
Thallium	mg/L	0.0008			0.0003[h]		
Thorium	mg/L						
Tin	mg/L						0.35[j]
Titanium	mg/L						1.83[w]
Uranium	mg/L			0.015	0.005[h]	0.02	0.011[x]
Vanadium	mg/L				0.006[h]		0.024[y]
Zinc	mg/L	0.030	0.0075-0.090[o]	0.030	0.02[h]	5.0	
Zirconium	mg/L				0.004		548[z]
Non-metals							
Alkalinity - phenolphthalein	mg/L as $CaCO_3$						
Alkalinity - Total	mg/L as $CaCO_3$				no decreases more than 25% of natural concentration[f]		
Ammonia - total	mg/L	0.24[A]	1.9[A]		0.25[A]		
Bicarbonate	mg/L						
Carbonate	mg/L						
Chloride - dissolved	mg/L					250[p]	
Colour	CU						
Conductivity - laboratory	µS/cm						
Conductivity - in situ	µS/cm						
Cyanide - weak acid dissociable	mg/L	0.005 (free)	0.01		0.005 (free)	0.2	
Dissolved oxygen - in situ	mg/L	6.5 - 9.5[D,E]	5 - 11[E]		5 - 8[D,E]		
Dissolved oxygen - in situ	%				54 - 63[D,E]		
Dissolved organic carbon	mg/L						
Fluoride	mg/L	0.120				1.5	
Hardness - dissolved	mg/L as $CaCO_3$						
Hardness - Total	mg/L as $CaCO_3$						
Hydroxide	mg/L						
Nitrate	mg/L	13	40		narrative	10	
Nitrite	mg/L	0.06	0.02-0.2[C]		0.06	3.2	
Nitrate plus nitrite	mg/L						
pH - Laboratory	pH units	6.5-9.0	6.5 - 9.0		6.5-8.5	6.5-8.5	
pH - in situ	pH units	6.5-9.0	6.5 - 9.0		6.5-8.5	6.5-8.5	
Phosphorus - nutrient analysis	mg/L		0.005-0.015 (lakes)		0.03 for rivers[h]		
Sulphate	mg/L		50			500[p]	
Temperature - in situ	˚C						
Total organic carbon	mg/L						
Total dissolved solids - lab.	mg/L					500[p]	
Total suspended solids	mg/L	no more than 5 mg/L above background[f]	< 25 mg/L above background in 24 hours				
Turbidity	NTU		2				

[a] CCME (Canadian Council of Ministers of the Environment). 1999. Canadian Environmental Quality Guidelines. 1999 (plus updates), Canadian Council of Ministers of the Environment, Winnipeg

[b] BCMOE (British Columbia Ministry of Environment). 2006. British Columbia Approved Water Quality Guidelines (Criteria), 2006 Edition. Updated August 2006. For parameters with both maximum and 30-day average values, the 30-d average is shown.

[c] Saskatchewan Environment. 2006. Surface Water Quality Objectives. Interim Edition. EPB356. July 2006. 9pp.

[d] OMOE (Ontario Ministry of Environment and Energy). 1994. Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment and Energy (Ontario), July 1994

[e] toxicity reference value for most sensitive aquatic receptor (aquatic plants, phytoplankton, benthic invertebrates, zooplankton, fish). From Senes Consultants Limited, Richmond Hill, Ontario.

[f] computed from data presented in this report and shown in Table B.2

[g] 0.005 mg/L at pH<6.5, Ca<4 mg/L and DOC<2 mg/L; 0.1 mg/L at pH ≥ 6.5; $[Ca^{2+}]$ ≥ 4 mg/L; DOC ≥ 2 mg/L

[h] interim objective

[i] for phytoplankton; U.S. EPA (United States Environmental Protection Agency). 1978. In-depth Studies on Health and Environmental Impacts of Selected Water Pollutants. Contract No. 68-0104646, U.S. EPA, Duluth, MN.

[j] for zooplankton; Biesinger, K.E. and G.M. Christensen. 1982. Effects of Varioue Metals on Survival, Growth, Reproduction, and Metabolism of *Daphnia magna*. *J. Fish. Res. Bd. Canada.* 29:1691-1700.

[k] 0.011 for hardness <75 mg/L and 1.1 for hardness >75 mg/L.

[l] for zooplankton; Kimball, G. n.d. The Effects of Lesser Known Metals and One Organic to Fathead minnows [*Pimephales promelas*] and *Daphnia magna*. U.S. Environmental Protection Agency, Duluth, MN.

[m] Khangarot, B.S. 1991. Toxicity of Metals to a Freshwater Tubificid Worm, Tubifex tubifex (Muller) Bull.Environ.Contam.Toxicol. 46:906-912

[n] 0.002 at $[CaCO_3]$ = 0-120 mg/L, 0.003 at $[CaCO_3]$ = 120-180 mg/L, 0.004 at $[CaCO_3]$ > 180 mg/L

[o] for hardnesses ranging between 25 and 300 mg/L, respectively

[p] Canadian drinking water quality guideline, aesthetic objective (CCME 1999).

[q] 0.001 at $[CaCO_3]$ = 0-60 mg/L, 0.002 at $[CaCO^3]$ = 60-120 mg/L, 0.004 at $[CaCO_3]$ = 120-180 mg/L, 0.007 at $[CaCO_3]$ > 180 mg/L

[r] Inorganic mercury

[s] Organic mercury

[t] 0.025 at $[CaCO_3]$ = 0-60 mg/L, 0.065 at $[CaCO^3]$ = 60-120 mg/L, 0.110 at $[CaCO_3]$ = 120-180 mg/L, 0.150 at $[CaCO_3]$ > 180 mg/L

[u] hardnesses of ≤100 mg/L and >100 mg/L, respectively

[v] for fish; Dwyer, F.J., S.A. Burch, C.G. Ingersoll, and J.B. Hunn 1992 Toxicity of Trace Element and Salinity Mixtures to Striped Bass (Morone saxatilis) and Daphnia magna. Environ.Toxicol.Chem. 11(4):513-520

[w] for fish; Birge, W.J., J.A. Black, A.G. Westerman, and J.E. Hudson. 1979. In: C. Gale (Ed.) EPA-600/9-80-022, Oil Shale Symposium: Sampling, Analysis and Quality Assurance, March 1979, U.S. EPA, Cincinnati, OH: 519-534 (US NTIS PB80-221435).

[x] for phytoplankton and zooplankton; Franklin, N.M., J.L.Stauber, S.J. Markich, and R.P. Lim. 2000. pH-dependent Toxicity of Copper and Uranium to a Tropical Freshwater Algae (*Chlorella sp*.). *Aquatic Toxicology*. 48:275-289.

[y] for benthic invertebrates; Fargasova, A. 1997. Sensitivity of *Chironomus plumosus* Larvae to V^{5+}, Mo^{6+}, Mn^{2+}, Ni^{2+}, Cu^{2+}, and Cu^{+} Metal Ions and their Combinations. *Bull. Environ. Contam. Toxicol.* 59(1):956-962.

[z] Cushman, R.M, S.G. Hildebrand, R.H. Strand, and R.M. Anderson. 1977. The Toxicity of 35 Trace Elements in Coal to Freshwater Biota: A Data Base with Automated Retrieval Capabilities. ORNL/TM-5793. Oak Ridge National Laboratory.

[A] based on conservative assumption of pH 8.5 and temperature of 15C to achieve un-ionized ammonia of <0.02 mg/L

[B] CWQG for cadmium = $10^{\{0.86[\log(\text{hardness})] - 3.2\}}$ in ug/L

[C] Depends on chloride concentration

[D] for cold water streams

[E] lower end of range is applicable for protecting early life-stages

Table B.2: Selected benchmarks for evaluation of water quality at Faro Mine, Yukon.

Measurements	Units	Selected water quality benchmarks[a]
Total metals		
Aluminum	mg/L	0.1
Antimony	mg/L	0.02
Arsenic	mg/L	0.005
Barium	mg/L	1.0
Beryllium	mg/L	1.1
Bismuth	mg/L	0.26
Boron	mg/L	1.2
Cadmium	mg/L	0.00003
Calcium	mg/L	116
Chromium	mg/L	0.001
Cobalt	mg/L	0.004
Copper	mg/L	0.002
Iron	mg/L	0.3
Lead	mg/L	0.002
Lithium	mg/L	
Magnesium	mg/L	82
Manganese	mg/L	1
Mercury	mg/L	0.000026
Molybdenum	mg/L	0.073
Nickel	mg/L	0.065
Potassium	mg/L	53
Selenium	mg/L	0.001
Silicon	mg/L	
Silver	mg/L	0.0001
Sodium	mg/L	200
Strontium	mg/L	9.3
Sulphur	mg/L	
Tellurium	mg/L	
Thallium	mg/L	0.0008
Thorium	mg/L	
Tin	mg/L	0.35
Titanium	mg/L	1.83
Uranium	mg/L	0.015
Vanadium	mg/L	0.006
Zinc	mg/L	0.030
Zirconium	mg/L	0.004
Non-metals		
Alkalinity - phenolphthalein	mg/L as $CaCO_3$	
Alkalinity - Total	mg/L as $CaCO_3$	11.1[b]
Ammonia - total	mg/L	0.24
Bicarbonate	mg/L	
Carbonate	mg/L	
Chloride - dissolved	mg/L	250
Colour	CU	
Conductivity - laboratory	µS/cm	
Conductivity - in situ	µS/cm	
Cyanide - weak acid dissociable	mg/L	0.005 (free)
Dissolved oxygen - in situ	mg/L	6.5 (minimum)
Dissolved oxygen - in situ	%	
Dissolved organic carbon	mg/L	
Fluoride	mg/L	0.12
Hardness - dissolved	mg/L as $CaCO_3$	
Hardness - Total	mg/L as $CaCO_3$	
Hydroxide	mg/L	
Nitrate	mg/L	13
Nitrite	mg/L	0.06
Nitrate plus nitrite	mg/L	
pH - Laboratory	pH units	6.5-9.0
pH - in situ	pH units	6.5-9.0
Phosphorus - nutrient analysis	mg/L	0.03
Sulphate	mg/L	50
Temperature - in situ	˚C	
Total organic carbon	mg/L	
Total dissolved solids - lab.	mg/L	500
Total suspended solids	mg/L	8[c]
Turbidity	NTU	2

[a] Benchmarks were selected from relevant water quality criteria as shown in Appendix Table B.1.

[b] Represents a 25% decrease below lower background benchmark of 14.8 mg/L reported in this study.

[c] Based on an increase of 5 mg/L above upper background benchmark of 3 mg/L reported in this study.