

WATER QUALITY ASSESSMENT REPORT FOR UNITED KENO HILL MINES

Report Prepared for:

**Elsa Reclamation and Development Company
Whitehorse, Yukon**

Report Prepared by:

**Minnow Environmental Inc.
2 Lamb Street
Georgetown, Ontario
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July 2008

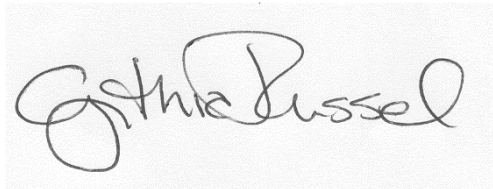
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A handwritten signature in black ink, reading "Cynthia Russel". The signature is written in a cursive style with a large, looped "C" and "R".

**Cynthia Russel, B.Sc.
Project Manager**

A handwritten signature in blue ink, reading "Patti Orr". The signature is written in a cursive style with a large, looped "P" and "O".

**Patti Orr, M.Sc.
Technical Reviewer**

July 2008

EXECUTIVE SUMMARY

United Keno Hill Mines Limited and UKH Minerals Ltd. were the previous owners of the properties located on and around Galena Hill, Keno Hill, and Sourdough Hill collectively known as the United Keno Hill Mining Property (UKHM). The UKHM is located in north-central Yukon Territory and is comprised of approximately 827 mineral claims covering the three mountains ("hills" named above) over an area of approximately 15,000 ha (about 29 km long and 8 km wide). Associated with the site are abandoned adits, buildings/structures, and waste material which represent a source of contaminants to the downstream watersheds.

In June 2005, Alexco Resource Corp was selected as the preferred purchaser of the UKHM assets. Alexco's subsidiary Elsa Reclamation and Development Company (ERDC) is required to develop a Reclamation Plan for the Existing State of the Mine.

As part of the closure planning process, long-term water quality performance will need to be assessed relative to relevant water uses and closure plan options. It is expected that historical sources associated with the UKHM may not allow for generic water quality guidelines to be achieved at all downstream locations and that alternative targets may need to be developed, depending on water use goals. In order to identify the parameters and locations of concern at the UKHM site, ERDC retained Minnow Environmental Inc. to assess the water quality data available for creeks and rivers downstream of the various UKHM sources.

Water quality data were compiled, evaluated and interpreted to identify parameters and locations of concern within the downstream waters relative to established guidelines and background. This information, combined with toxicity data and watershed use objectives, may then be used to develop an approach for water quality management, goals and objectives relative to identified water uses.

All water quality data were downloaded from the water quality database developed and managed for the UKHM by Access Consulting Group. At the time the data were downloaded, sample results were available for the period up to June 2007. Water quality data for 20 stations were analyzed in detail, including stations located on permanent surface water courses located upstream (reference/background) and downstream (exposed) of mine-related disturbances or inputs (e.g., adits, roads, rock piles, buildings, etc.). Analytical data for most of the selected stations dated back to the mid-1980's, however, sporadic data and poor method detection limits prior to 1994 limited the value of the older data and restricted the period of assessment to 1994-2007. Within this period, older data for some parameters was still hampered by inadequate analytical method detection limits and some data sets

were further truncated to the period mid-2004 - 2007. In total, analytical results corresponding to more than 2,000 individual data points were examined.

The upper range of background concentrations of some parameters, including aluminum, cadmium, copper, iron, phosphorus, sulphate, and zinc, exceeded federal or alternative guidelines for protection of aquatic life. The concentrations of numerous parameters measured at stations within the various watersheds downstream of UKHM exceeded both the applicable guideline and background benchmark in at least 10% of samples. However, a much smaller set of parameters and locations showed elevations above both the guideline and background benchmark in 50% or more of samples (i.e., median value): aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nitrite, phosphorus, selenium, silver, sulphate, and zinc. These generally occurred in the tributaries located immediately downstream of mine sources (Christal Creek, Lightning Creek, Flat Creek and No Cash Creek). In no instance did the median concentration of any parameter exceed both the guideline and background benchmark at South McQuesten River stations.

Contaminants of concern (COCs) were identified based on elevated frequency and magnitude of exceedance relative to both guideline or background (i.e., whichever value was higher); COCs were identified as cadmium and zinc. Other substances identified as having a high frequency and/or magnitude of exceedance above benchmarks (i.e., potential contaminants of concern; PCOCs): aluminum, arsenic, chromium, copper, manganese, nitrite, phosphorus, selenium and silver, lacked sufficient data and/or adequate analytical method detection limits at some or all stations to make a definitive conclusion regarding current risks to aquatic biota. Additional data need to be collected to determine if these substances should be considered mine-related COCs. There was also insufficient data (data for too few samples within and/or among locations) to make any assessment of mercury and cyanide concentrations, so these parameters also cannot be ruled out as COCs at this time.

Statistically significant decreases in zinc over time were indicated at most stations, with the most substantial decrease occurring at Christal Creek station KV-29 and immediately downstream at KV-30 between 2004 and 2007. Since 2006, remediation and treatment of the Galena 300 adit (primary source captured at KV-29) has occurred, which will likely result in additional future improvements in zinc concentrations downstream of this source. While no trends in cadmium were detected, this is likely due to the short time frame assessed (mid-2004 to 2007) relative to zinc (1994 to 2007). However, cadmium concentrations strongly correlated with zinc concentrations among stations, suggesting that cadmium concentrations have likely also decreased in Christal Creek over the same time period (1994 to 2007).

Based on toxicity data available in the scientific literature, concentrations of the COCs are below effect thresholds within the South McQuesten River. However, it is likely that concentrations of cadmium and zinc in some tributary areas may periodically be high enough to cause toxicity to some species.

Canadian water quality guidelines (CWQG) are currently being updated for cadmium and zinc, and conclusions presented herein should be revisited once available. However, even if the guidelines are raised somewhat, it is considered unlikely that water quality in tributaries immediately downstream of the UKHM discharges/sources will achieve these levels due to historical sources within the watershed. It is also expected that the development of site-specific water quality objectives (SSWQO) would be unlikely to result in values that could be achieved in these same areas, so an alternative approach for setting water quality expectations should be considered for these historically affected areas.

It is expected that concentrations within the South McQuesten River downstream of the UKHM will continue to meet water quality guidelines or background benchmark.

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1.0 INTRODUCTION

1.1 Background

United Keno Hill Mines Limited and UKH Minerals Ltd. were the previous owners of the properties located on and around Galena Hill, Keno Hill and Sourdough Hill collectively known as the Keno Hill Mining Property. For the purposes of this report these mining areas are referred to as the United Keno Hill Mining Property (UKHM). The UKHM area is located in north-central Yukon Territory and is comprised of approximately 827 mineral claims spanning three mountains; Galena Hill, Keno Hill and Sourdough Hill and covering an area of approximately 15,000 ha (about 29 km long and 8 km wide; Figures 1.1 and 1.2). Associated with the site are abandoned adits, buildings/structures, and waste material which represent a source of contaminants to the downstream watersheds.

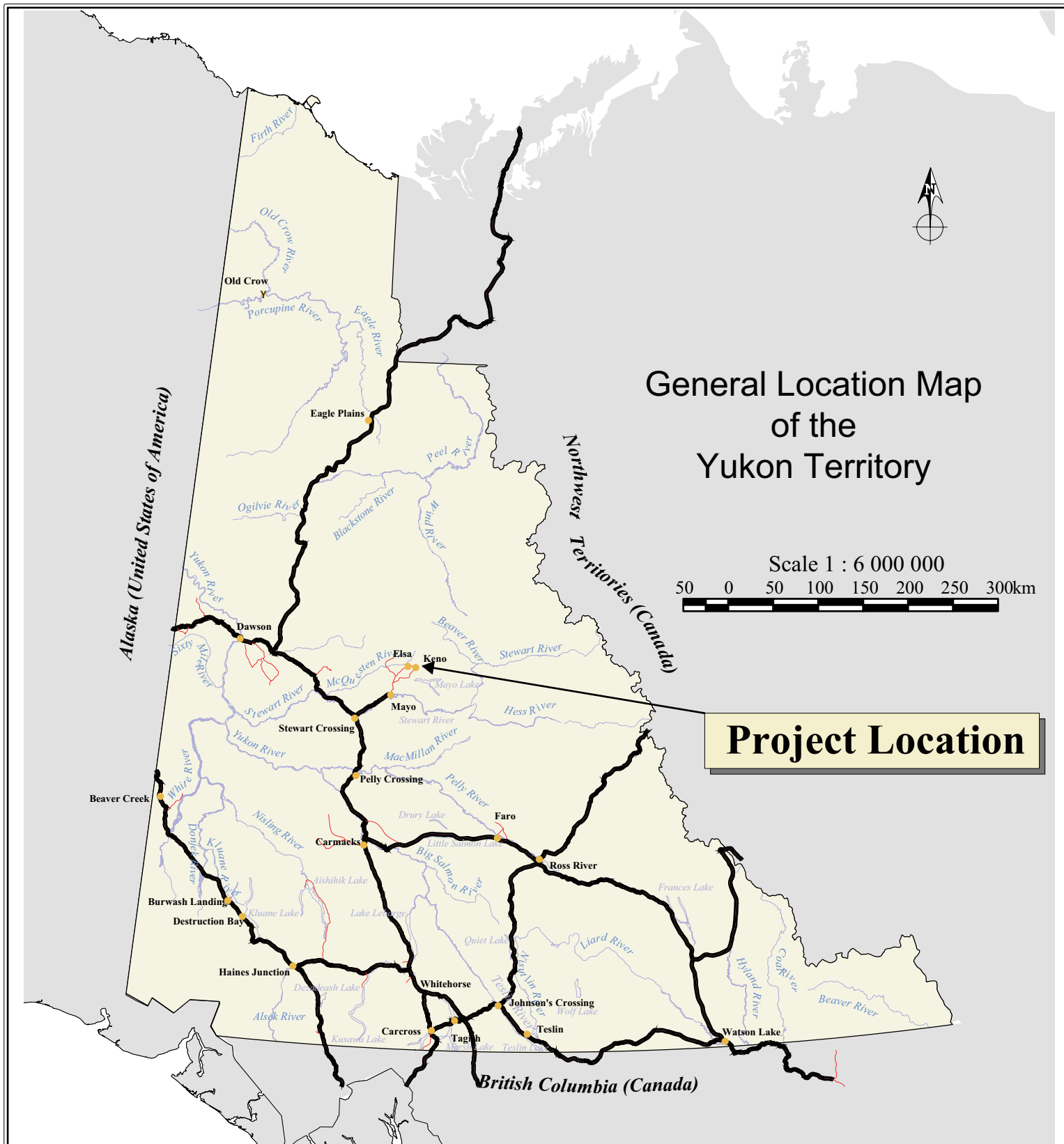
In June 2005, Alexco Resource Corp was selected as the preferred purchaser of the UKHM assets. As required in the purchase agreement, Alexco formed a company – Elsa Reclamation and Development Company Ltd. (ERDC), to own and manage the site. ERDC is required to develop a Reclamation Plan for the Existing State of the Mine.

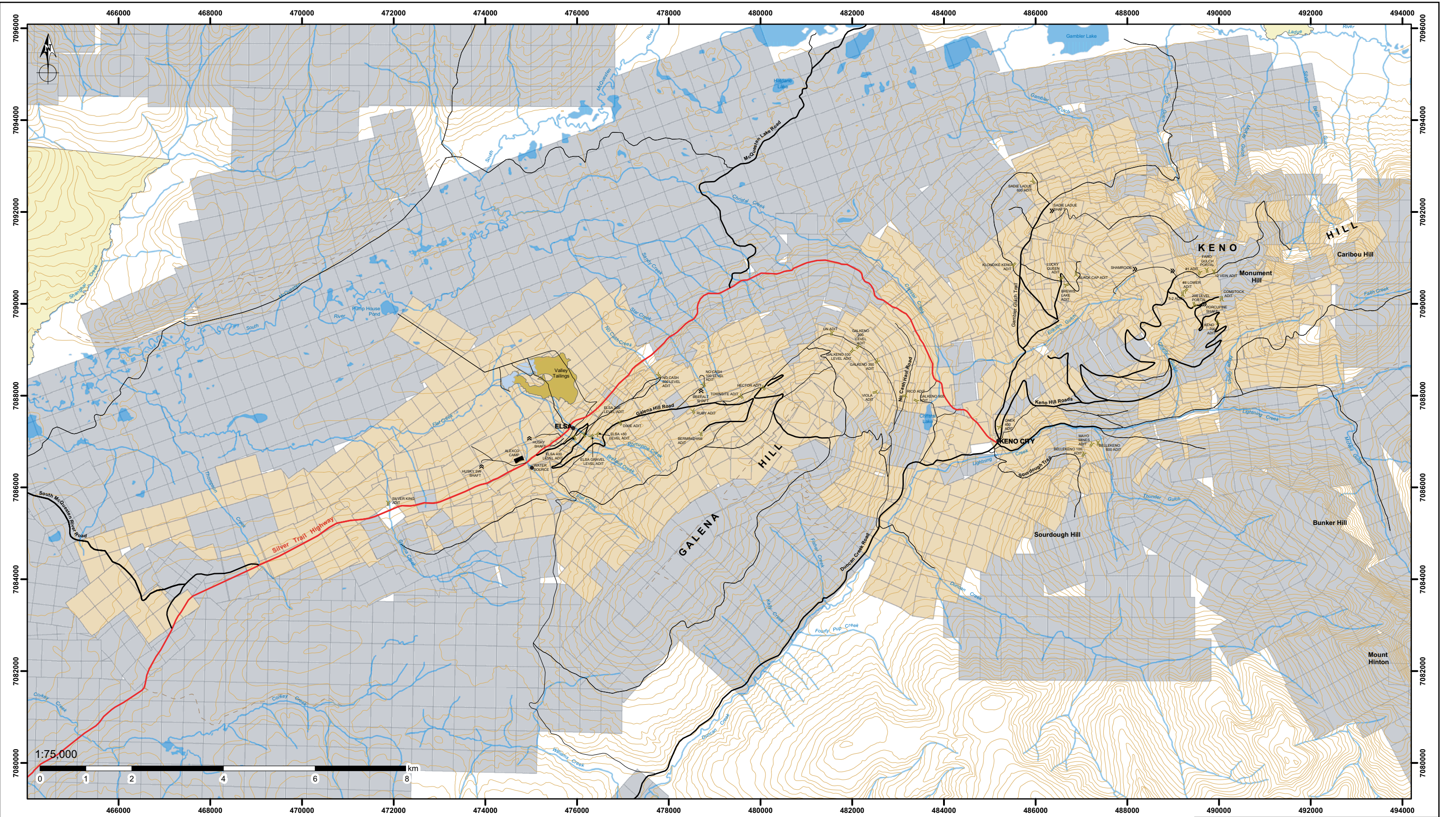
As part of the closure planning process, long-term water quality performance will need to be assessed relative to water uses and closure plan options. It is expected that due to historical sources and background geology associated with the UKHM, concentrations of some parameters may not achieve generic water quality guidelines in all locations and that alternative criteria may need to be developed. In order to identify the parameters and locations of concern at the UKHM site, ERDC retained Minnow Environmental Inc. to undertake a water quality assessment of the available data for the creeks and river downstream of the various UKHM sources.

1.2 Study Objectives

The objective of this assessment was to identify parameters and locations of concern within the downstream waters relative to established guidelines and background concentrations. This information, combined with toxicity data and watershed use objectives, may then be used to develop an approach for water quality goals and management relative to identified water uses.

In addition, this report will serve as a key supporting document for other ERDC initiatives, such as preparation of the Closure Plan and the development of a long-term monitoring program.





Legend

●

Town

—

Silver Trail

—

Secondary Road

—

Limited-use road

Topography

—

Trail

—

Watercourse

—

Waterbody

Mine Workings

—

Valley Tailings

—

Adit

—

Shaft (to surface - connection to underground not determined)

Quartz Claims

—

United Keno Hill Mines Limited Quartz Claim

—

Other Quartz Claim

First Nation Settlement Land

—

First Nation Settlement Land

Notes:
This map is for illustrative purposes only.
This is not a legal document.
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.
Quartz claim boundaries are current as of Sept. 15, 2006.
Data source: <http://geomatics.yukon.ca>.
Ownership is current as of Oct. 12, 2006. Digital claim status report obtained from the Mining Recorder website at <http://www.yukonminingrecorder.ca/>
Projection: UTM Zone 8 NAD83
NTS Sheet 105M/13 and 105M/14

Figure 1.2

Keno Hill Property Location Map

Ref: 2209

Date: July 2008

Source: Access Consulting Group

1.3 Approach

In order to meet the study objectives, a progressive assessment of the available water quality data was undertaken which included the following steps:

- Screen all data to identify and remove extreme outliers (i.e., those greater than 3 standard deviations from the mean and other clearly anomalous values) that could bias the assessment;
- Establish a background benchmark for each parameter based on the upper limit of background data distribution (mean + t * standard deviation) for the combined data from reference locations KV-1 and KV-37;
- Identify background benchmarks which exceed the appropriate provincial or federal guideline;
- Identify parameters with method detection limits above guidelines, cases which preclude conclusive determination of whether concentrations exceed the guideline;
- Determine the median, mean, standard deviation, minimum and maximum concentration for each parameter at each location;
- Determine which locations exceed background and/or guideline at measurable (10%) and substantial (50%) frequencies;
- Identify the parameters and locations where concentrations are highest (i.e., median value was two times greater than guideline or background, whichever was higher);
- Identify contaminants of concern (COCs) or potential contaminants of concern (PCOCs) based on elevated frequency and magnitude of concentrations relative to both background and guideline;
- Assess the proportion of total concentrations present in filtered ("dissolved") form for COCs and PCOCs;
- Assess trends over time for COCs to anticipate if concentrations are increasing or decreasing;
- Consider modifying factors and toxicity literature (basis for guideline development) to assess the opportunity for SSWQO development following the Canadian Council of Ministers of the Environment (CCME) guidelines;
- Provide recommendations on the establishment of water quality assessment criteria for the downstream watershed and general recommendations with respect to the current monitoring program.

1.4 Canadian Water Quality Guideline (CWQG) Updates

Environment Canada is in the process of updating the Canadian Water Quality Guidelines (CWQG) for metals. It is generally expected that the guidelines will be revised over the coming two to three years. Since revision to these guidelines could alter any conclusions made with respect to the risks of future aquatic impacts, Minnow identified an opportunity to work with Environment Canada to expedite the development of the guidelines for cadmium and zinc based on common concerns at a number of mine sites across Canada. As part of the contract to undertake a water quality assessment for the UKHM, ERDC participated as a sponsor of the guideline revisions for cadmium and zinc. The development of the revised guidelines is still underway and an update of the process and status is provided in Section 4.0 of this report.

1.5 Report Organization

Section 2.0 describes the type and sources of historical data evaluated in this study, as well as the approaches used to identify and evaluate the PCOCs and COCs and the key locations with elevated concentrations of PCOCs and COCs. The results of the water quality data assessment and the identification of PCOCs and COCs are presented in Section 3.0. Section 4.0 provides an overview of the process and status of revisions to the CWQG for cadmium and zinc. A description of the procedures for the development of Site Specific Water Quality Objectives (SSWQO) and a review of the opportunity to develop SSWQO downstream of UKHM is provided in Section 5.0. The summary and recommendations are provided in Section 6.0. References cited throughout the report are listed in Section 7.0.

2.0 METHODS

2.1 Data Base Used in Water Quality Assessment

The water quality assessment was based on an electronic database, provided by Access Consulting Group, comprising water quality data for sites within and downstream of the UKHM project area. The primary sources of the water quality data were monitoring programs conducted by Labarge Environmental Services, Access Consulting Group, ERDC, Environmental Protection Services of Environment Canada, UKHM and the Department of Indian and Northern Development (DIAND). Based on station descriptions provided in the Water License and discussions with Access Consulting Group, stations were categorized as receiving environment, reference, source area, or other station types. Only data for receiving environment and reference stations were considered in this assessment. As a result, data from 18 stations located within the various downstream watersheds; Lightning Creek, Christal Creek, No Cash Creek, Flat Creek and the South McQuesten River (Figure 2.1) and two reference stations within the South McQuesten River and Lightning Creek watersheds (KV-1 and KV-37, respectively) were evaluated (Table 2.1).

While data prior to 1994 was available, they were very sporadic and would not readily allow for comparisons between stations. Therefore, the data base used for the water quality assessment spanned the years from 1994 to 2007 (hereafter called the “original database”). In some instances the data base was modified, as described in Sections 2.2.2 and 2.2.3, by the removal of outliers and results reported as being less than the analytical Method Detection Limit (MDL). In cases where the MDL was higher than the applicable water quality guideline such data confounded the interpretation of water quality relative to these guidelines. Samples were often collected on a monthly basis, however there were inconsistencies among stations and water quality parameters with respect to the frequency and timing of sampling within years. In total, analytical data for 50 water quality parameters collected from the 18 receiving environment stations and 2 reference stations (Appendix Tables A.1-A.20) were included in the water quality assessment.

2.2 Data screening

2.2.1 Guidelines

In most cases, water quality parameters were screened against Canadian Water Quality Guidelines (CWQG; CCME 1999) (Table 2.2). British Columbia Water Quality Guidelines (BCWQG; BCMOE 2006) were used in cases where a CWQG was lacking and Provincial

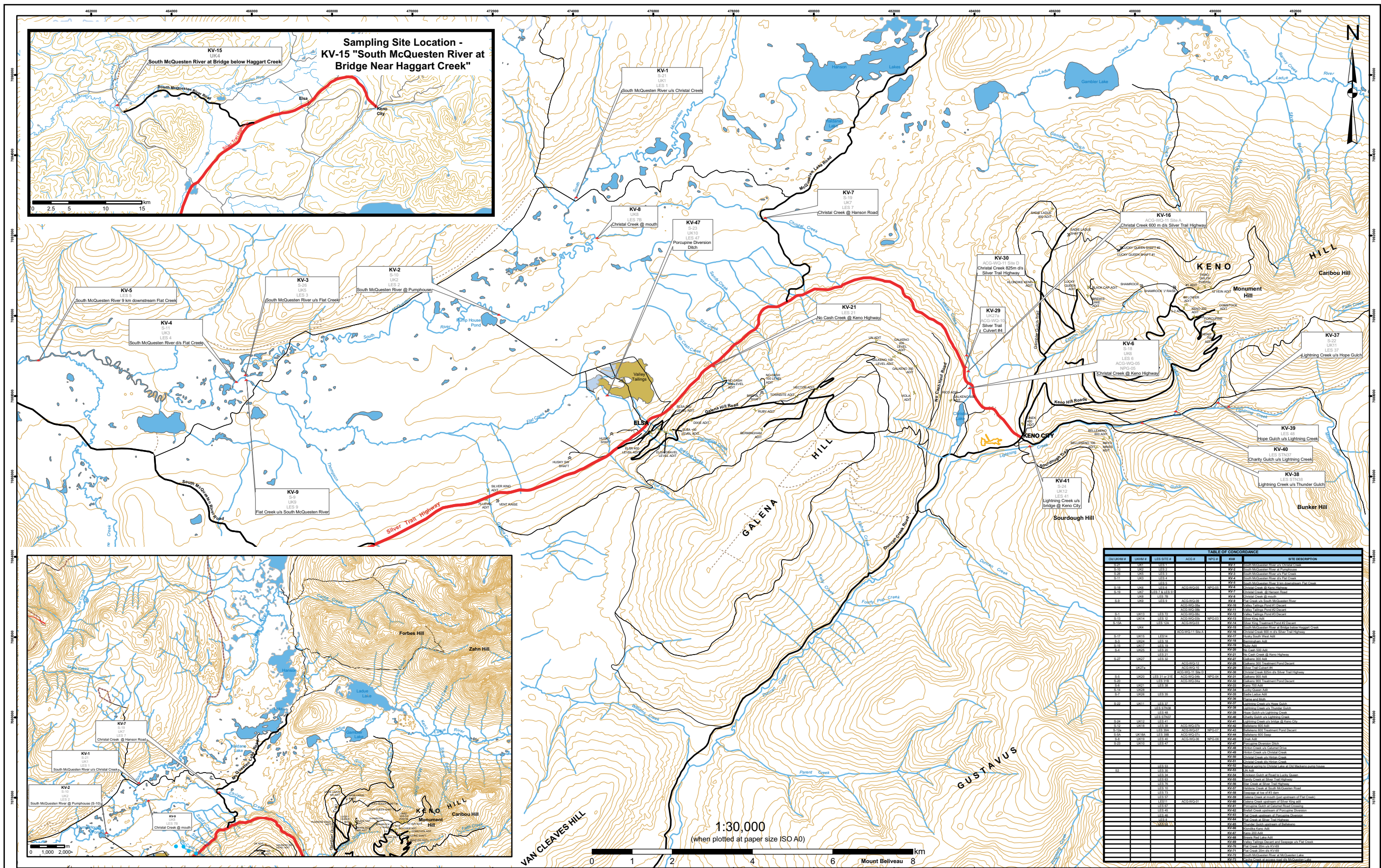


TABLE OF CONCORDANCE									
STATION #	ACQ #	LES SITE #	ACQ #	STATION #	ACQ #	LES SITE #	STATION #	ACQ #	LES SITE #
B-1	UK1	LES 1	ACQ-WQ-1	KV-1	UK1	LES 1	KV-1	UK1	LES 1
B-2	UK2	LES 2	ACQ-WQ-2	KV-2	UK2	LES 2	KV-2	UK2	LES 2
B-3	UK3	LES 3	ACQ-WQ-3	KV-3	UK3	LES 3	KV-3	UK3	LES 3
B-4	UK4	LES 4	ACQ-WQ-4	KV-4	UK4	LES 4	KV-4	UK4	LES 4
B-5	UK5	LES 5	ACQ-WQ-5	KV-5	UK5	LES 5	KV-5	UK5	LES 5
B-6	UK6	LES 6	ACQ-WQ-6	KV-6	UK6	LES 6	KV-6	UK6	LES 6
B-7	UK7	LES 7	ACQ-WQ-7	KV-7	UK7	LES 7	KV-7	UK7	LES 7
B-8	UK8	LES 8	ACQ-WQ-8	KV-8	UK8	LES 8	KV-8	UK8	LES 8
B-9	UK9	LES 9	ACQ-WQ-9	KV-9	UK9	LES 9	KV-9	UK9	LES 9
B-10	UK10	LES 10	ACQ-WQ-10	KV-10	UK10	LES 10	KV-10	UK10	LES 10
B-11	UK11	LES 11	ACQ-WQ-11	KV-11	UK11	LES 11	KV-11	UK11	LES 11
B-12	UK12	LES 12	ACQ-WQ-12	KV-12	UK12	LES 12	KV-12	UK12	LES 12
B-13	UK13	LES 13	ACQ-WQ-13	KV-13	UK13	LES 13	KV-13	UK13	LES 13
B-14	UK14	LES 14	ACQ-WQ-14	KV-14	UK14	LES 14	KV-14	UK14	LES 14
B-15	UK15	LES 15	ACQ-WQ-15	KV-15	UK15	LES 15	KV-15	UK15	LES 15
B-16	UK16	LES 16	ACQ-WQ-16	KV-16	UK16	LES 16	KV-16	UK16	LES 16
B-17	UK17	LES 17	ACQ-WQ-17	KV-17	UK17	LES 17	KV-17	UK17	LES 17
B-18	UK18	LES 18	ACQ-WQ-18	KV-18	UK18	LES 18	KV-18	UK18	LES 18
B-19	UK19	LES 19	ACQ-WQ-19	KV-19	UK19	LES 19	KV-19	UK19	LES 19
B-20	UK20	LES 20	ACQ-WQ-20	KV-20	UK20	LES 20	KV-20	UK20	LES 20
B-21	UK21	LES 21	ACQ-WQ-21	KV-21	UK21	LES 21	KV-21	UK21	LES 21
B-22	UK22	LES 22	ACQ-WQ-22	KV-22	UK22	LES 22	KV-22	UK22	LES 22
B-23	UK23	LES 23	ACQ-WQ-23	KV-23	UK23	LES 23	KV-23	UK23	LES 23
B-24	UK24	LES 24	ACQ-WQ-24	KV-24	UK24	LES 24	KV-24	UK24	LES 24
B-25	UK25	LES 25	ACQ-WQ-25	KV-25	UK25	LES 25	KV-25	UK25	LES 25
B-26	UK26	LES 26	ACQ-WQ-26	KV-26	UK26	LES 26	KV-26	UK26	LES 26
B-27	UK27	LES 27	ACQ-WQ-27	KV-27	UK27	LES 27	KV-27	UK27	LES 27
B-28	UK28	LES 28	ACQ-WQ-28	KV-28	UK28	LES 28	KV-28	UK28	LES 28
B-29	UK29	LES 29	ACQ-WQ-29	KV-29	UK29	LES 29	KV-29	UK29	LES 29
B-30	UK30	LES 30	ACQ-WQ-30	KV-30	UK30	LES 30	KV-30	UK30	LES 30
B-31	UK31	LES 31	ACQ-WQ-31	KV-31	UK31	LES 31	KV-31	UK31	LES 31
B-32	UK32	LES 32	ACQ-WQ-32	KV-32	UK32	LES 32	KV-32	UK32	LES 32
B-33	UK33	LES 33	ACQ-WQ-33	KV-33	UK33	LES 33	KV-33	UK33	LES 33
B-34	UK34	LES 34	ACQ-WQ-34	KV-34	UK34	LES 34	KV-34	UK34	LES 34
B-35	UK35	LES 35	ACQ-WQ-35	KV-35	UK35	LES 35	KV-35	UK35	LES 35
B-36	UK36	LES 36	ACQ-WQ-36	KV-36	UK36	LES 36	KV-36	UK36	LES 36
B-37	UK37	LES 37	ACQ-WQ-37	KV-37	UK37	LES 37	KV-37	UK37	LES 37
B-38	UK38	LES 38	ACQ-WQ-38	KV-38	UK38	LES 38	KV-38	UK38	LES 38
B-39	UK39	LES 39	ACQ-WQ-39	KV-39	UK39	LES 39	KV-39	UK39	LES 39
B-40	UK40	LES 40	ACQ-WQ-40	KV-40	UK40	LES 40	KV-40	UK40	LES 40
B-41	UK41	LES 41	ACQ-WQ-41	KV-41	UK41	LES 41	KV-41	UK41	LES 41
B-42	UK42	LES 42	ACQ-WQ-42	KV-42	UK42	LES 42	KV-42	UK42	LES 42
B-43	UK43	LES 43	ACQ-WQ-43	KV-43	UK43	LES 43	KV-43	UK43	LES 43
B-44	UK44	LES 44	ACQ-WQ-44	KV-44	UK44	LES 44	KV-44	UK44	LES 44
B-45	UK45	LES 45	ACQ-WQ-45	KV-45	UK45	LES 45	KV-45	UK45	LES 45
B-46	UK46	LES 46	ACQ-WQ-46	KV-46	UK46	LES 46	KV-46	UK46	LES 46
B-47	UK47	LES 47	ACQ-WQ-47	KV-47	UK47	LES 47	KV-47	UK47	LES 47

Surface Water Quality Stations

Legend

Station Name

Historic Station Number

Site Description

Water Quality Station

Water Quality

Adit

Shaft (to surface - connection to underground not determined)

Valley Tailings

Pit

Mine Workings

Adit

Shaft (to surface - connection to underground not determined)

Valley Tailings

Pit

Topography

Town

Silver Trail

Secondary Road

Limited-use road

Topography

Trail

Watercourse

Waterbody

Ref: 2209

Date: May 2008

Source: Access Consulting Group

Figure 2.1

Sampling Locations Assessed, United Keno

minnow environmental inc.

Table 2.1: Background and receiving environment stations used in water quality assessment

Watershed	Station	Station Descripton	Monitoring Frequency		UTM Coordinates	
			Monthly	Quarterly	Easting	Northing
Background Stations						
South McQuesten River	KV1	South McQuesten River u/s Christal Creek	X	X	474008	7092790
Lightning Creek	KV37	Lightning Creek u/s Hope Gulch		X	490315	7087776
Receiving Environment Stations						
Lightning Creek	KV39	Hope Gulch u/s Lightning Creek		X	490252	7087783
	KV40	Charity Gulch u/s Lightning Creek		X	488982	7087503
	KV38	Lightning Creek u/s Thunder Gulch		X	488193	7087341
	KV41	Lightning Creek u/s bridge @ Keno City		X	485429	7086764
Christal Creek	KV6	Christal Creek @ Keno Highway	X	X	483909	7088242
	KV16	Christal Creek 600 m d/s Silver Trail Highway		X	483887	7088863
	KV29	Silver Trail Culvert #4	X	X	483740	7088792
	KV30	Christal Creek 825m d/s Silver Trail Highway		X	483856	7089091
	KV7	Christal Creek @ Hanson Road	X	X	478657	7092413
	KV8	Christal Creek @ mouth	X	X	474585	7091944
No Cash Creek	KV21	No Cash Creek @ Keno Highway	X	X	477500	7088750
Flat Creek	KV9	Flat Creek u/s South McQuesten River		X	465836	7088410
	KV47	Porcupine Diversion Ditch		X	474516	7088026
South McQuesten River	KV2	South McQuesten River @ Pumphouse		X	472076	7090036
	KV3	South McQuesten River u/s Flat Creek		X	465846	7088534
	KV4	South McQuesten River d/s Flat Creek		X	465618	7088335
	KV5	South McQuesten River 9 km downstream Flat Creek		X	460691	7088873
	KV15	South McQuesten River at Bridge below Haggart Creek		X	449744	7085770

Table 2.2: Parameters and water quality guidelines.

Parameter	Units	CWQG ^a	BCWQG ^b	PWQO (Ontario) ^c
Alkalinity-T	mg/L			
Aluminum	mg/L	0.1 ^d	0.05	0.015 - 0.075 ^e
Ammonia-N	mg/L	0.24 ^f		0.25 ^f
Antimony	mg/L			0.02 ^e
Arsenic	mg/L	0.005	0.005	0.005 ^e
Barium	mg/L		1 ^g	
Beryllium	mg/L		0.0053 ^g	1.1 ^h
Bicarbonate	mg/L			
Bismuth	mg/L			
Boron	mg/L		1.2	0.2 ^e
Cadmium	mg/L	0.00005 ^h		
Calcium	mg/L			
Carbonate	mg/L			
Chromium	mg/L	0.001 ⁱ		0.0089 ^j
Cobalt	mg/L		0.004 ^e	0.0009
Conductivity	µS/cm			
Copper	mg/L	0.003 ^h	0.006 ^h	0.005 ^{e,h}
Cyanide (total)	mg/L	0.005 ^j		
Hardness	mg/L			
Hydroxide	mg/L			
Iron	mg/L	0.3		0.3
Lead	mg/L	0.004 ^h	0.009 ^h	0.005 ^{e,h}
Lithium	mg/L		0.096 ^g	
Magnesium	mg/L			
Manganese	mg/L		1.3 ^h	
Mercury	mg/L	0.000026 ^k	0.000004 - 0.00002 ^l	0.0002
Molybdenum	mg/L	0.073	1	0.04 ^e
Nickel	mg/L	0.11 ^h		0.025
Nitrate Nitrogen	mg/L	13	40	narrative
Nitrite Nitrogen	mg/L	0.06	0.02	0.06
pH	pH units	6.5-9.0	6.5 - 9.0	6.5 - 8.5
Phosphorus	mg/L			0.03 ^e
Potassium	mg/L		432 ^g	
Selenium	mg/L	0.001	0.002	0.1
Silicon	mg/L			
Silver	mg/L	0.0001	0.0015 ^h	0.0001
Sodium	mg/L			
Strontium	mg/L			
Sulphate	mg/L		50	
Sulphur	mg/L			
Thallium	mg/L	0.0008		0.0003 ^e
Thorium	mg/L			
Tin	mg/L			
Titanium	mg/L		2 ^g	
TDS	mg/L			
TSS	mg/L			
Uranium	mg/L			0.005 ^e
Vanadium	mg/L			0.006 ^e
Zinc	mg/L	0.03	0.06 ^h	0.02 ^e
Zirconium	mg/L			0.004 ^e

guideline selected for screening

^a Canadian Water Quality Guidelines (CCME 1999)

^b British Columbia Water Quality Guidelines (BCMOE 2006)

^c Provincial Water Quality Objectives (OMOE 1994)

^d 0.005 mg/L at pH<6.5; 0.1 mg/L at pH ≥ 6.5

^e interim objective or guideline

^f based on conservative assumption of pH 8.5 and temperature of 15 °C to achieve un-ionized ammonia of <0.02 mg/L

^g working water quality guideline for British Columbia

^h hardness dependent; average background value of 162 mg/L used to determine criterion

ⁱ hexavalent form

^j based on free cyanide

^k inorganic mercury

^l depending on proportion present as methyl mercury

Water Quality Objectives for Ontario (PWQO; OMOE 1994) were chosen in the absence of both CWQG and BCWQG (Table 2.2).

Some water quality guidelines vary on the basis of water hardness (e.g., cadmium, copper, lead, manganese, nickel; CCME 1999, BCMOE 2006). A water hardness of 162 mg/L (as CaCO_3) was used to select the appropriate guideline in such cases, as this represented the mean hardness of the pooled reference station data. This value can be considered conservative since median water hardnesses observed at receiving environment stations were often greater than 200 mg/L where toxicity may be somewhat less relative to water with hardness of 162 mg/L (Appendix Table A.41, Figure A.18).

The CWQG for aluminum are pH dependent with a guideline of 0.1 mg/L for waters equal to or greater than pH 6.5 whereas a more protective guideline of 0.005 mg/L applies to waters with a pH of less than 6.5 (CCME 1999). Since receiving environment stations waters were above pH 6.5 in all but one sample, 0.1 mg/L was used as the most relevant guideline for the water quality assessment (Appendix Table A.25, Figure A.2).

The CWQG for ammonia are expressed on the basis of un-ionized ammonia, which comprises an increasingly larger fraction of the total ammonia present in water as either water pH or temperature increase, or both (CCME 1999). Because the temperature and pH of surface waters near UKHM do not typically rise above 15°C or 8.5, respectively, it was considered conservative to use a value of 0.24 mg/L total ammonia as the benchmark, corresponding to the CWQG of 0.019 mg/L un-ionized ammonia under such conditions (Table 2.2).

Although separate CWQG exist for the two main valence states of chromium, laboratory speciation in water samples is not readily commercially available, so the lower value of 0.001 mg/L (for hexavalent chromium; CCME 1999) was used in water quality assessment (Table 2.2). This represents a conservative approach since reported water quality data corresponded to total chromium, whereas the hexavalent form would comprise only a fraction of the total.

The CWQG for cyanide and mercury are based on free or inorganic forms, respectively (CCME 1999); however available water quality data were for total concentrations of these parameters. Although this discrepancy would normally be addressed through interpretation of the data, cyanide and mercury were ultimately excluded from the water quality assessment based on inadequate sample sizes (Sections 2.2.2 and 2.2.3).

Except for total alkalinity (alkalinity-T) and pH, water concentrations of potential concern are those that are higher than selected benchmarks. In the case of total alkalinity and pH,

it is values below the benchmark that are of greatest interest in terms of potential effects to aquatic biota downstream of UKHM, and the data were evaluated accordingly.

2.2.2 Background Concentrations

Surface waters in mineralized areas often have metal concentrations that exceed generic water quality guidelines for the protection of aquatic life. In order to address this issue, data collected from two reference stations (KV-1 and KV-37) were summarized and used, in addition to applicable water quality guidelines, for evaluating water quality data at stations located downstream of the UKHM (Section 2.2.3). Background data also provided a basis for evaluating water quality parameters lacking an available guideline. However, since background data were available for only two stations, the full range of natural variability within the affected watersheds may not have been captured. The implications of this are discussed in Sections 3.0 and 5.0. Furthermore, there has been some concern recently that the water quality at KV-1 may be impacted by an unknown upstream source resulting in an observed increase in loading at KV-1 in 2007 (Dan Cornett, Access Consulting Group, pers. comm.). In order to address this issue, ERDC has added an additional reference location further upstream of KV-1 on the South McQuesten River (KV-72); however only two sets of sample data were available for this station, so its use as an appropriate reference area cannot be presently assessed. For the purpose of this assessment, it was assumed that the data used for KV-1 (up to 2007) was not yet affected by the suspected upstream source load. A comparative assessment of the two background stations on the South McQuesten River, and the background values presented herein, should be undertaken when more data for KV-72 are available.

Manipulation of Background Data Sets

Prior to using background data in water quality assessment, reference station data were evaluated and modified by the removal of data deemed to be problematic (Table 2.3; Appendix Tables A.1 and A.2). To this end, each water quality parameter underwent an initial screening process to remove outliers. Outliers were defined as values greater than ± 3 standard deviations from the mean and other clearly anomalous values and elevated MDLs (i.e., values reported as less than or equal to the MDL; Appendix A). In particular, antimony, bismuth, selenium and uranium had a relatively high proportion of outliers prior to 2005 attributable to high MDLs compared to more recent data and MDLs. In addition, approximately one third of the data for KV-37 on two dates (July 27, 1994 and July 12, 1995) consisted of outliers. As a result, all remaining water quality data for station KV-37 on these dates were considered suspect and were therefore removed (Appendix Table A.2).

Table 2.3: Data screening of background stations KV1 and KV37 for water quality assessment, United Keno Hill Mine, 1994 - 2007.

Parameter	Sample size (n)		Number of samples removed from original database			
	Original database	Water quality assessment database	Truncated by date ^a	Outliers ^b	<MDL ^c	Other ^d
Alkalinity -T	63	61	0	2	0	0
Aluminum	63	59	0	4	0	0
Ammonia-N	10	0	0	0	5	5
Antimony	76	29 ^e	0	29	3	15
Arsenic	86	44	41	1	0	0
Barium	62	60	0	2	0	0
Beryllium	62	0	0	3	59	0
Bicarbonate	40	40	0	0	0	0
Bismuth	58	0	0	14	44	0
Boron	55	54	0	1	0	0
Cadmium	90	44	45	1	0	0
Calcium	60	56	0	4	0	0
Carbonate	39	0	0	0	38	1
Chromium	62	40	17	2	3	0
Cobalt	75	44	30	1	0	0
Conductivity	102	100	0	2	0	0
Copper	102	44	57	1	0	0
Cyanide ^f	1	0	0	0	0	0
Hardness	43	42	0	1	0	0
Hydroxide	38	0	0	0	38	0
Iron	90	84	0	6	0	0
Lead	91	44	46	1	0	0
Lithium	58	43	14	1	0	0
Magnesium	71	68	0	3	0	0
Manganese	78	74	0	4	0	0
Mercury ^f	1	0	0	0	0	0
Molybdenum	74	40 ^e	0	2	31	1
Nickel	90	45	45	0	0	0
Nitrate Nitrogen	16	0	0	1	16	0
Nitrite Nitrogen	16	0	0	1	16	0
pH	81	79	0	2	0	0
Phosphorus	12	12	0	0	0	0
Potassium	60	49	0	3	8	0
Selenium	61	43	16	1	1	0
Silicon	61	59	0	2	0	0
Silver	62	35 ^e	0	0	20	7
Sodium	59	56	0	3	0	0
Strontium	61	58	0	3	0	0
Sulphate	55	25	29	1	0	0
Sulphur	61	57	0	4	0	0
Thallium	46	40 ^e	0	0	6	0
Thorium	4	0	0	0	4	0
Tin	61	39 ^e	0	0	21	1
Titanium	60	57	0	3	0	0
Total Dissolved Solids	25	22	0	3	0	0
Total Suspended Solids	81	77	0	4	0	0
Uranium	53	41	8	1	3	0
Vanadium	75	43	31	1	0	0
Zinc	90	88	0	2	0	0
Zirconium	55	39 ^e	0	0	16	0

^a data from 1994 to July 19, 2004 removed

^b values +/- 3 S.D. from the mean and values that could be considered outliers (i.e. noticeably greater or less than the mean). Includes <MDL values that were screened as outliers.

^c elevated <MDLs relative to recent sample data and <MDL values removed since the dataset consisted almost entirely of <MDLs. Includes data reported as ≥MDL but assumed to be <MDL.

^d values deleted since a large proportion of the original database consisted of outliers, <MDL values and/or values reported as ≥MDL but assumed to be <MDL.

^e background set at <MDL value. Sample size (n) for the water quality assessment is the number of samples reported at the given <MDL value.

^f original database had an inadequate sample size and was therefore excluded from the water quality assessment.

All outliers were reviewed to determine if the reported concentrations could be explained by a seasonal pattern that should be taken into account by the data, but in no case did outlier removal inappropriately alter the results of background data characterization. Furthermore, outliers in the background data set represented less than 5% of the original data set (Table 2.3), so their removal was not expected to influence the overall conclusions of the evaluation other than to eliminate problematic data and reduce bias.

Following outlier removal, data from the two background stations were pooled. A combined dataset was considered advantageous to increase the sample size for derivation of a background benchmark and to reflect spatial variation in background concentrations. While the two background stations represent different watersheds (South McQuesten River and Lightning Creek) they were considered similar enough to be pooled to form a single reference condition on which to compare downstream water quality.

The pooled reference (background) data set was again screened on a parameter by parameter basis for the presence of elevated and variable MDLs that may be skewing the data, particularly in earlier years, and for the adequacy of the sample sizes for establishing a reliable background benchmark (Table 2.4; Appendix Tables A.1 and A.2; Appendix Figures A.49 – A.98). The reference data set on which the background benchmark was based was either accepted without further modification (total alkalinity, aluminum, barium, bicarbonate, boron, calcium, conductivity, hardness, iron, magnesium, manganese, pH, phosphorus, silicon, sodium, strontium, sulphur, titanium, total dissolved solids, total suspended solids, zinc), modified by selectively removing elevated <MDL values (potassium, uranium), and/or truncated to exclude data prior to July 20, 2004 (arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, sulphate, vanadium). In addition, the data sets of a few parameters (antimony, molybdenum, silver, thallium, tin, zirconium) had high proportions of values at the MDL plus elevated MDLs in earlier years, in which cases the lowest recent MDL was assigned as the background benchmark (Table 2.4). Finally, some parameters had to be entirely excluded from background data assessment due to a high proportion of variable or elevated MDLs and/or a small sample size (ammonia, beryllium, bismuth, carbonate, cyanide, hydroxide, mercury, nitrate, nitrite, and thorium). Screening for outliers (± 3 standard deviations) was repeated using all truncated data sets (July 20, 2004 to 2007).

Values reported as less than the MDL that were not removed from the data sets were assumed to be equal to the MDL in all subsequent calculations.

Summary Statistics for Background Data

Table 2.4: Water quality guidelines and background values used for water quality assessment.

Parameter	Units	Guideline		Background
		Source	Value	
Alkalinity-T	mg/L	-	-	31.3 ^a
Aluminum	mg/L	CWQG ^b	0.1 ^c	0.66 ^d
Ammonia-N	mg/L	CWQG	0.24 ^e	na
Antimony	mg/L	PWQO ^f	0.02 ^g	< 0.0002 ^h
Arsenic	mg/L	CWQG	0.005	0.0034 ⁱ
Barium	mg/L	BCWQG ^j	1 ^k	0.089 ^d
Beryllium	mg/L	BCWQG	0.0053 ^k	na
Bicarbonate	mg/L	-	-	222 ^d
Bismuth	mg/L	-	-	na
Boron	mg/L	PWQO	0.2 ^g	0.013 ^d
Cadmium	mg/L	CWQG	0.00005 ^l	0.0006 ⁱ
Calcium	mg/L	-	-	69.9 ^d
Carbonate	mg/L	-	-	na
Chromium	mg/L	CWQG	0.001 ^m	0.00064 ⁱ
Cobalt	mg/L	BCWQG	0.004 ^k	0.0028 ⁱ
Conductivity	µS/cm	-	-	494 ^d
Copper	mg/L	CWQG	0.003 ^l	0.0071 ⁱ
Cyanide (total)	mg/L	CWQG	0.005 ⁿ	na
Hardness	mg/L	-	-	279 ^d
Hydroxide	mg/L	-	-	na
Iron	mg/L	CWQG	0.3	0.72 ^d
Lead	mg/L	CWQG	0.004 ^l	0.0021 ⁱ
Lithium	mg/L	BCWQG	0.096 ^k	0.0086 ⁱ
Magnesium	mg/L	-	-	23.8 ^d
Manganese	mg/L	BCWQG	1.3 ^l	0.17 ^d
Mercury	mg/L	CWQG	0.000026 ^o	na
Molybdenum	mg/L	CWQG	0.073	< 0.001 ^h
Nickel	mg/L	CWQG	0.11 ^l	0.025 ⁱ
Nitrate Nitrogen	mg/L	CWQG	13	na
Nitrite Nitrogen	mg/L	CWQG	0.06	na
pH	pH units	CWQG	6.5-9.0	7.14 ^a
Phosphorus	mg/L	PWQO	0.03 ^g	0.23 ^d
Potassium	mg/L	BCWQG	432	1.05 ^p
Selenium	mg/L	CWQG	0.001	0.0008 ⁱ
Silicon	mg/L	-	-	3.9 ^d
Silver	mg/L	CWQG	0.0001	< 0.0001 ^h
Sodium	mg/L	-	-	3.3 ^d
Strontium	mg/L	-	-	0.3 ^d
Sulphate	mg/L	BCWQG	50	107 ⁱ
Sulphur	mg/L	-	-	35.4 ^d
Thallium	mg/L	CWQG	0.0008	< 0.00005 ^h
Thorium	mg/L	-	-	na
Tin	mg/L	-	-	< 0.001 ^h
Titanium	mg/L	BCWQG	2 ^k	0.035 ^d
TDS	mg/L	-	-	311 ^d
TSS	mg/L	-	-	26.7 ^d
Uranium	mg/L	PWQO	0.005 ^g	0.0011 ⁱ
Vanadium	mg/L	PWQO	0.006 ^g	0.0013 ⁱ
Zinc	mg/L	CWQG	0.03	0.15 ^d
Zirconium	mg/L	PWQO	0.004 ^g	< 0.001 ^h

background exceeds selected guideline

^a mean - t-value x standard deviation of pooled background stations (KV1 and KV37)

^b Canadian Water Quality Guidelines (CCME 1999)

^c 0.005 mg/L at pH<6.5, [Ca²⁺]^l<4 mg/L and DOC<2 mg/L; 0.1 mg/L at pH ≥ 6.5; [Ca²⁺] ≥ 4 mg/L; DOC ≥ 2 mg/L

^d mean + t-value x standard deviation of pooled background stations (KV1 and KV37)

^e based on conservative assumption of pH 8.5 and temperature of 15 °C to achieve un-ionized ammonia of <0.02 mg/L

^f Provincial Water Quality Objectives (OMOE 1994)

^g interim objective or guideline

^h <MDL set as background

ⁱ mean + t-value x standard deviation of pooled background stations (KV1 and KV37) using data from July 20, 2004-2007 (excluding elevated <MDL values as required)

^j British Columbia Water Quality Guidelines (BCMOE 2006)

^k working water quality guideline for British Columbia

^l hardness dependent; average background hardness of 162 mg/L used to determine criterion

^m hexavalent form

ⁿ as free cyanide

^o inorganic mercury

^p mean + t-value x standard deviation of pooled background stations (KV1 and KV37) following removal of elevated <MDL values.

na background value not selected due to a high proportion of samples <MDL, variable MDLs and/or a small sample size.

Summary statistics including sample size (n), mean, median, standard deviation, minimum and maximum values were calculated for each parameter (Appendix Tables A.21 – A.23).

With the exception of background benchmarks set at a MDL value, background benchmarks were developed based on the calculation mean + (t-value x standard deviation), a statistic that reflects the upper range of the background data distribution (Table 2.4). A one-tailed t-value was selected based on the degrees of freedom corresponding to the sample size (background data only) for each parameter. Individual sample values would be expected to exceed this benchmark by chance alone approximately 5% of the time (i.e., the benchmark approximates the 95th percentile of a normally distributed data set). For total alkalinity and pH, the benchmark was defined as mean – t-value x standard deviation, since these water quality parameters are generally of concern to biota at the lower limit of their range downstream of mine drainage.

The calculated background benchmark exceeded the applicable water quality guideline for 7 parameters: aluminum, cadmium, copper, iron, phosphorus, sulphate and zinc (Table 2.4). In the assessment of data for stations downstream of the mines for these parameters, it was relevant to identify downstream stations having concentrations exceeding the background benchmark, rather than a guideline, to indicate areas of mine-related influence on water quality (below).

2.2.3 Receiving Environment Data Evaluation

Similar to reference stations, the original data sets for each parameter (1994 – 2007) measured at receiving environment stations were screened for outliers (i.e., values greater than ± 3 standard deviations from the mean, other clearly anomalous values and elevated MDLs; Appendix A). The water quality evaluation for 29 of 50 parameters was based on this modified data set. For 16 parameters data sets were truncated either to parallel the corresponding background benchmark data set or due to MDL-related issues newly identified in the receiving environment (see below). Screening for outliers (± 3 standard deviations) was repeated using all truncated data sets (July 20, 2004 to 2007).

Outliers represented only 2% of the original data set so their removal was not expected to influence the overall conclusions of the evaluation other than to eliminate problematic data and reduce bias.

The revised data sets for each parameter were plotted relative to background benchmarks and water quality guidelines to identify any additional data issues. Non-detectable values for which the MDL exceeded both guideline and background benchmark were removed for 11 parameters (arsenic, chromium, copper, lead, nitrite, phosphorus, selenium, silver, tin,

uranium, zirconium). At this time, data prior to July 20, 2004 were truncated for an additional four parameters (antimony, silver, thallium, tin, uranium) due to either a high proportion of values less than the MDLs, variable MDLs, and/or an obvious shift to lower MDLs in recent years. Two parameters, cyanide and mercury, were excluded from the remainder of the water quality assessment due to small sample sizes and a high proportion of values at or less than the MDL across stations (Table 2.5; Appendix Tables A.3 – A.20).

In total, 48 of 50 parameters were retained for subsequent analyses of the water quality assessment.

Summary statistics including sample size (n), mean, median, standard deviation, minimum and maximum values were calculated for each parameter and station downstream of the UKHM (Appendix Tables A.24 - A.71, Figures A.1 – A.48). In order to flag parameters and stations that may be of concern (Section 2.3), the percentage of data exceeding both the applicable background benchmark and guideline (sometimes just one or the other if both values were not available) was also summarized. The number of samples reported as <MDL, the percentage of <MDL samples where the MDL exceeded the guideline (or background benchmark if no guideline), and the percentage of samples > MDL and > guideline, were also summarized, serving as an indication of overall data quality with respect to reported MDLs (Appendix Tables A.24 - A.71).

2.3 Identification of COCs

Several steps were taken to identify COCs from among the 48 parameters for which adequate data were available for assessment, and to identify receiving environment stations where the COCs were found at elevated concentrations. As part of the process to determine COCs, a number of PCOCs were also identified.

At each station, the frequency and magnitude with which each parameter exceeded both the background benchmark and water quality guideline was evaluated (sometimes only background or guideline was used if the other was unavailable). In terms of frequency, parameters that exceeded the background benchmark and guideline¹ in at least 10% of samples at a given station were flagged as possible COCs. A 10% cut-off was chosen as a means of excluding parameters that may have exceeded background or guideline benchmarks simply by chance and therefore represent low potential for ecological consequence. The list of parameters was further refined by identifying those that had a guideline and exceeded this guideline (or background if available and higher than the

¹ Background or guideline in cases where only one or the other was available.

Table 2.5: Data screening of mine-exposed stations for water quality assessment, United Keno Hill Mine, 1994 - 2007.

Parameter	Sample size (n)		Number of samples removed from original database		
	Original database	Water quality assessment database	Truncated by date ^a	Outliers ^b	MDL >guideline, >background ^c
Alkalinity -T	393	389	0	4	0
Aluminum	431	412	0	19	0
Ammonia-N	81	81	0	0	0
Antimony	477	325	142	9	0
Arsenic	558	322	223	4	9
Barium	447	441	0	6	0
Beryllium	447	437	0	10	0
Bicarbonate	299	293	0	6	0
Bismuth	414	328	0	86	0
Boron	338	328	0	10	0
Cadmium	580	329	245	6	0
Calcium	432	421	0	11	0
Carbonate	313	307	0	6	0
Chromium	447	323	112	8	4
Cobalt	447	328	112	7	0
Conductivity	495	491	0	4	0
Copper	583	320	249	8	6
Cyanide	19	0	0	0	0
Hardness	349	347	0	2	0
Hydroxide	306	304	0	2	0
Iron	561	543	0	18	0
Lead	608	318	273	8	9
Lithium	418	325	89	4	0
Magnesium	431	427	0	4	0
Manganese	546	534	0	12	0
Mercury	12	0	0	0	0
Molybdenum	447	444	0	3	0
Nickel	559	332	224	3	0
Nitrate Nitrogen	114	113	0	1	0
Nitrite Nitrogen	116	80	0	6	30
pH	528	524	0	4	0
Phosphorus	117	107	0	2	8
Potassium	405	398	0	7	0
Selenium	447	319	112	10	6
Silicon	441	435	0	6	0
Silver	450	304	104	1	30
Sodium	428	424	0	4	0
Strontium	440	436	0	4	0
Sulphate	363	198	162	3	0
Sulphur	426	417	0	9	0
Thallium	352	320	25	6	0
Thorium	36	36	0	0	0
Tin	435	294	106	0	35
Titanium	435	422	0	13	0
Total Dissolved Solids	39	39	0	0	0
Total Suspended Solids	513	498	0	15	0
Uranium	405	325	70	3	7
Vanadium	439	320	110	9	0
Zinc	585	568	0	17	0
Zirconium	404	319	0	5	80

^a data from 1994 to July 19, 2004 removed

^b values +/- 3 S.D. from the mean and values that could be considered outliers (i.e. noticeably greater or less than the mean)

^c includes data reported as ≥MDL but assumed to be <MDL

guideline) in 50% or more of samples (i.e., the median value exceeded benchmark(s)). Of the parameters that exceeded the benchmark at a relatively high frequency ($\geq 50\%$ of samples), those with median values more than two times the guideline (or background if available and higher than the guideline) were flagged.

While included in the original receiving environment data base, it was determined in consultation with ERDC and with the aid of a topographic map showing UKHM site development, that stations KV-29 and KV-47, located in Christal and Flat Creeks, respectively, should be more appropriately designated as source rather than receiving environment stations. These stations represent human-made structures, lack natural habitat, are in close proximity to mine structures such as abandoned adits and tailings piles and receive little or no dilution water and thus do not represent receiving environment conditions. The water quality assessment and recommendations that ensued with respect to stations KV-29 and KV-47 reflected this reclassification (Sections 3.0 and 6.0).

2.4 Total Versus Dissolved Concentrations

Plots of total versus dissolved concentrations of metals considered to be preliminary COCs were used to assess the proportion of total metal present in filterable ("dissolved") form. While dissolved metal concentrations do not necessarily correspond to the proportion of metal that is bioavailable (toxic), they are generally considered to be better predictors of bioavailability than total metal levels. A 1:1 line corresponding to equal concentrations of the total and dissolved forms was shown on each plot (Figure 2.2). Data points falling well above this line indicated that only a fraction of the total metal concentration present was in dissolved form, which implied that the metal was predominantly in particulate form. Values falling well below the 1:1 line indicated cases where reported "dissolved" concentrations exceeded total. This situation suggests problems with the dissolved measurements (e.g., improper filtration method or contamination associated with filtration or analytical precision) since dissolved cannot possibly exceed total concentrations. Such cases should be investigated and rectified for future analyses.

2.5 Temporal Trend Analysis for COCs

In order to set appropriate targets for water quality performance and to assess mitigation/closure options relative to these targets, temporal trend analyses of COCs were performed. The existence and strength of increasing or decreasing trends may affect the choice of mitigation/closure options and/or affect water quality goals and management.

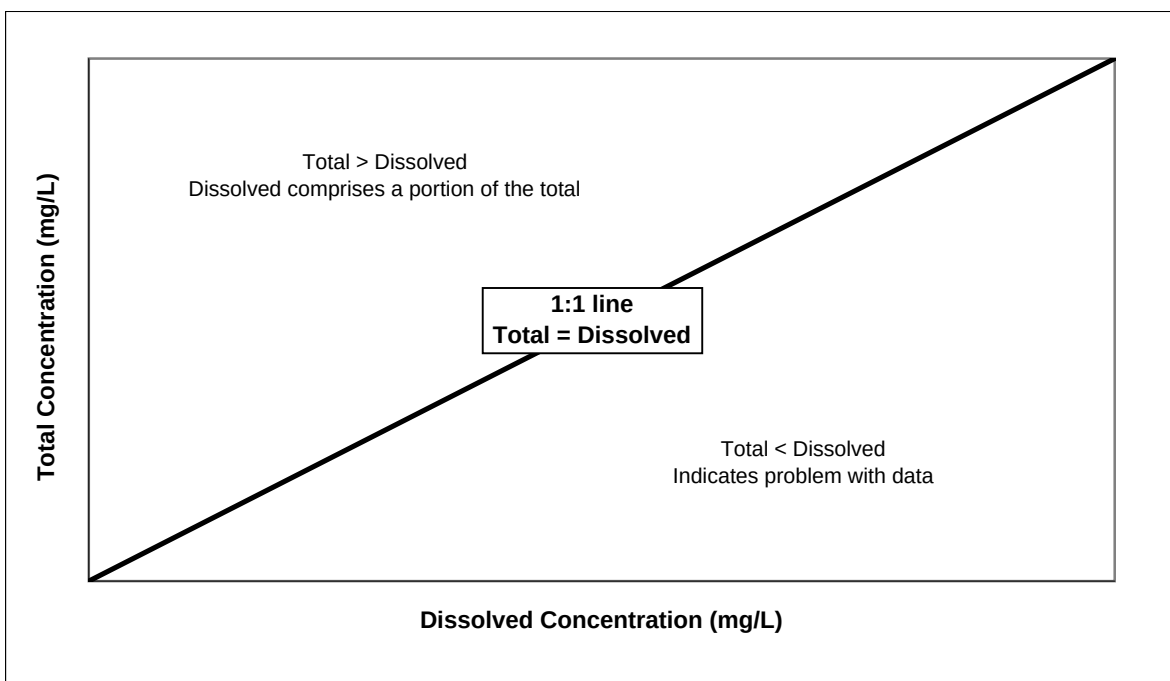


Figure 2.2: Comparison of total versus dissolved in water quality assessment, United Keno Hill Mines.

Temporal trend analysis involved statistical correlations of each COC and station of concern with the sample dates used for the water quality assessment (i.e., 1994 to 2007 or July 20, 2004 to 2007). Since most data were non-normal and/or non-linear, non-parametric Spearman Rank correlations were used to identify statistically-significant relationships (SPSS 2003). This test of correlation is appropriate since it does not require normally distributed data, nor does it necessarily imply a linear increasing or decreasing trend. The strength of a decreasing or increasing trend over time is indicated by Spearman's "rho" with values ranging from -1 (strong negative relationship) to +1 (strong positive relationship).

Non-parametric Spearman Rank correlations were also conducted between some pairs of COCs where the data set for one included a longer history (e.g., 1994-2007) than the data set for the other (e.g., mid-2004 - 2007). This was used to identify COCs that may be trending up or down but may not have been identified in the trend analysis because the data record was too short. This analysis could also indicate relationships relevant to management considerations. For example, if concentrations of certain COCs vary together (i.e., are correlated), then remedial action to decrease one could presumably lead to decreased concentrations of the other.

2.6 Review of Toxicity Data for COCs

Available toxicity data for the COCs were reviewed to identify and assess any possible toxicological implications of the observed concentrations downstream of the UKHM site. Information sources were USEPA (1985, 1987, 2001) water quality guideline documents, USEPA's EcoTox database (<http://cfpub.epa.gov/ecotox>) and scientific journal articles accessed through search engines such as the University of Guelph's Scholars Portal.

3.0 WATER QUALITY

3.1 Identifying Contaminants of Concern

Concentrations measured at stations downstream of the UKHM were compared to guidelines for the protection of aquatic life and background levels. The upper range of background concentrations exceeded applicable guidelines for some parameters, including aluminum, cadmium, copper, iron, phosphorus, sulphate and zinc (Table 2.4). Numerous contaminants measured at stations within the various watersheds downstream of UKHM exceeded both the applicable water quality guideline and/or background benchmark in at least 10% of samples (Table 3.1). However, a much smaller set of parameters and locations had concentrations exceeding the guideline benchmark (or background if available and higher than the guideline) at a frequency of 50% or more (i.e., median value; Table 3.2): aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nitrite, phosphorus, selenium, silver, sulphate and zinc. These cases pertained to tributaries located immediately downstream of mine sources (Christal Creek, Lightning Creek, Flat Creek and No Cash Creek). In no instance did median concentrations exceed guidelines and background in the South McQuesten River (Table 3.2).

Of the parameters with median concentrations above the guideline and/or background benchmark, the highest concentrations (i.e., median values twice the guideline or background if available and higher than the guideline) were associated with aluminum, cadmium, chromium, manganese, nitrite, phosphorus, silver, sulphate and zinc (Table 3.2). However, median concentrations of some of these parameters (i.e., aluminum, chromium, manganese, nitrite and silver) were based on a very small sample size (i.e., less than 3) at most stations where they were reported as being elevated and may not reflect the prevalent conditions at these locations (Table 3.2). Therefore, these parameters should not be considered COCs at this time. Total phosphorus concentration at KV-16 (median of 0.45 mg/L) was elevated by approximately two times the background benchmark (0.23 mg/L), both of which were considerably higher than the most relevant guideline (Ontario PWQO of 0.030 mg/L). These concentrations would typically be associated with a hyper-eutrophic system (Wetzel 2001) and are inconsistent with the observed conditions (e.g., no excessive plant, algal or periphyton growth) at this location. It is suspected that these phosphorus values may reflect anomalies associated with the analytical method employed (e.g., potential interference with another element in ICP scans). A more reliable method for total phosphorus measurement in water is

Table 3.1: Parameters exceeding both background concentrations and water quality guideline (if available) in more than 10% of samples collected at each location. Parameters in bold exceeded highest benchmark (background or guideline) in more than 50% of samples (i.e. median value exceeded both benchmarks) ^{1,2}.

Watercourse	Station	Parameter
Lightning Creek	KV39	As, Cd , Pb, NO₂ , Zn
	KV40	NO₂ , Se , S
	KV38	Ag
	KV41	Al, As, Cr, Fe, Pb, NO₂ , Si, Ag, TSS, Zn
Christal Creek	KV6	As, Cd , Ca, Conductivity, Hardness, Fe, Pb , Mg, Mn, NO₂ , Se, Si, Ag, SO₄ , S, TSS, U, Zn
	KV16	As, Cd , Ca, Cr, Conductivity, Hardness, Fe, Pb, Mg, Mn, NO₂ , P , Se, Si, Ag, Sr, SO₄ , S, U, Zn
	KV29	Alk-T, Al, As, Cd , Ca, Cr, Co, Conductivity, Cu, Hardness, Fe, Pb, Mg, Mn , NO₂ , P, Si, Ag, Sr, SO₄ , S, TDS, TSS, U, V, Zn
	KV30	Al, As, Cd , Ca, Cr, Conductivity, Hardness, Fe, Pb, Mg, Mn, NO₂ , P, Si, Ag, Sr, SO₄ , S, TDS, TSS, U, Zn
	KV7	As, Cd , Ca, Cr, Conductivity, Hardness, Fe, Pb, Mg, NO₂ , Si, Ag, SO₄ , S, TSS, Zn
	KV8	Cd , Ca, Conductivity, Hardness, Fe, Pb, Mg, NO₂ , P Si, Ag, Sr, SO₄ , S, Zn
No Cash Creek	KV21	Al, Cd , Ca, Cr , Cu , Hardness, Fe, Pb , Mg, Mn , NO₂ , S, Zn
Flat Creek	KV47	Al, As, HCO₃ , Cd , Ca, Cr, Conductivity, Hardness, Fe , Pb, Mg, Mn, Si, Ag , Sr, S, TDS, TSS, Zn
	KV9	HCO₃ , Ca, Cd , Conductivity, Hardness, Fe, Pb, Mg, Ag, SO₄ , S, Zn
South McQuesten River	KV2	Conductivity, Fe, Ag
	KV3	Ag
	KV4	Conductivity, Fe, Pb, Ag, Zn
	KV5	Conductivity, P Ag
	KV15	As, Conductivity, Fe, Ag, TSS

P parameters for which 50% or more of samples were below the method detection limit but above the guideline value

¹ 17 parameters were screened against only background or guideline since both were not available

² pH and total alkalinity (Alk-T) were screened for >10% of samples that were below benchmarks. CN and Hg were not included due to small sample sizes

Table 3.2: Locations where parameter concentrations exceeded both background levels and guideline (if available) in 50% or more of samples (i.e. median value exceeded). Highlight indicates median values exceeded benchmark(s) by a factor of two or more. Sample sizes (n) shown in parentheses for each parameter/location ^{1,2}.

Watercourse	Station	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nitrite	Phosphorus	Selenium	Silver	Sulphate	Zinc
Lightning Creek	KV39		√ (2)	√ (2)						√ (2)					√ (2)
	KV40											√ (1)			
	KV38														
	KV41														
Christal Creek	KV6			√ (36)				√ (35)						√ (21)	√ (81)
	KV16			√ (35)						√ (3)	√ (16)			√ (19)	√ (42)
	KV29			√ (35)					√ (40)	√ (4)				√ (22)	√ (42)
	KV30			√ (34)						√ (3)				√ (19)	√ (41)
	KV7			√ (37)										√ (20)	√ (79)
	KV8			√ (34)										√ (20)	√ (40)
No Cash Creek	KV21	√ (2)		√ (1)	√ (1)	√ (1)		√ (1)	√ (2)	√ (1)					√ (2)
Flat Creek	KV47			√ (3)			√ (14)						√ (2)		√ (16)
	KV9													√ (6)	
South McQuesten River	KV2														
	KV3														
	KV4														
	KV5														
	KV15														

√ median exceeded background and / or guideline

(#) sample size

¹ 6 parameters were screened only against guideline since a background benchmark was not available

² pH was screened for median values that were below guideline and background . CN and Hg were not included due to small sample sizes.

colourimetric determination (procedure 4500 PBE, APHA 1998). Therefore, future analyses for phosphorus should involve appropriate methods to determine if the total phosphorus concentrations previously reported are truly representative of current conditions, particularly at KV-16.

A number of additional parameters had median concentrations only slightly greater than (less than two times) the applicable guideline or background benchmark (whichever was higher): arsenic, copper, iron, lead, nitrite, and selenium (Table 3.2). Again, the median values were mostly based on small sample sizes and occurrences at few stations (arsenic, copper, nitrite and selenium). As a result, these parameters are not identified as COCs but are recommended for further data collection and evaluation (i.e., PCOCs). Furthermore, source areas KV-47 and KV-29 were the only locations showing substantially elevated iron or manganese concentrations. Since these parameters were not frequently elevated at receiving environment stations, they have not been classified as COCs.

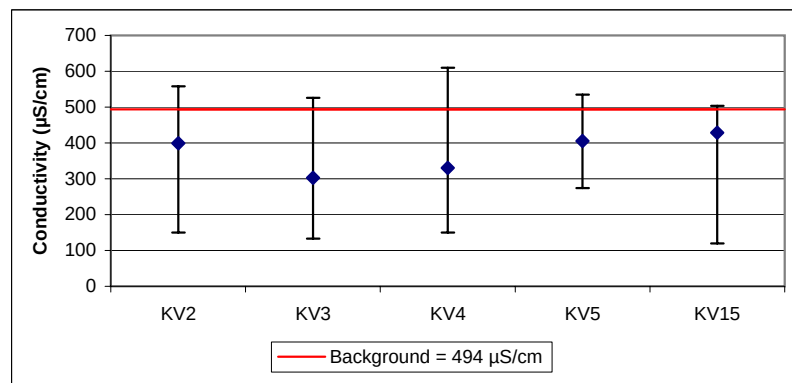
Overall, if the parameters with very limited sample sizes and phosphorus are excluded, the preliminary contaminants of concern at UKHM were identified as cadmium, sulphate, lead, and zinc. Additional data are required for aluminum, chromium, manganese, nitrite and silver at mine-exposed stations to determine if any should be included in the list of COCs at UKHM. Furthermore, there were insufficient data (one sample and not at all locations) to make any assessment of mercury and cyanide concentrations and these parameters also cannot be ruled out as COCs at this time.

It should be noted that the preliminary contaminants of concern are generally within acceptable levels in the South McQuesten River. Metals which were elevated in more than 10% of the samples were limited to arsenic, iron, lead, silver and zinc. However, maximum values of these parameters were close to the guideline or background whichever was higher (Figure 3.1) and the frequency of exceedance was typically less than 20% of samples (Appendix Tables A.28, A.43, A.44, A.57 and A.70). Furthermore, peak concentrations in the South McQuesten did not appear to be solely related to peaks at UKHM sources and may thus also reflect a combination of sources including natural background, potential upstream influences and previously disturbed areas of the UKHM.

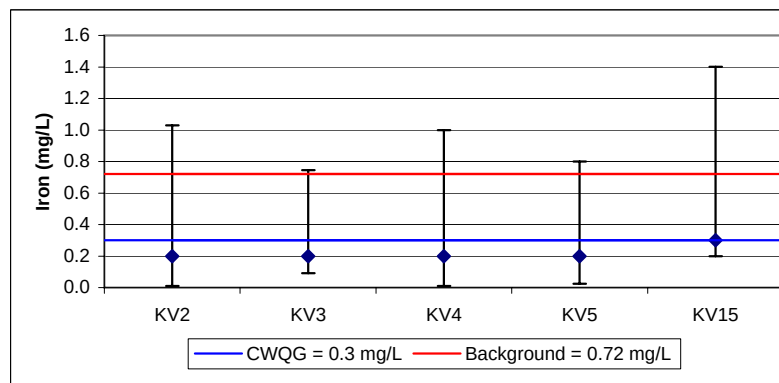
3.2 Relationship of Dissolved to Total Metal Concentrations

The relationship between total and dissolved metal concentrations was investigated for each preliminary COC (Figure 3.2). This was done only for the preliminary COCs because total concentrations of other metals were generally below levels of concern. As

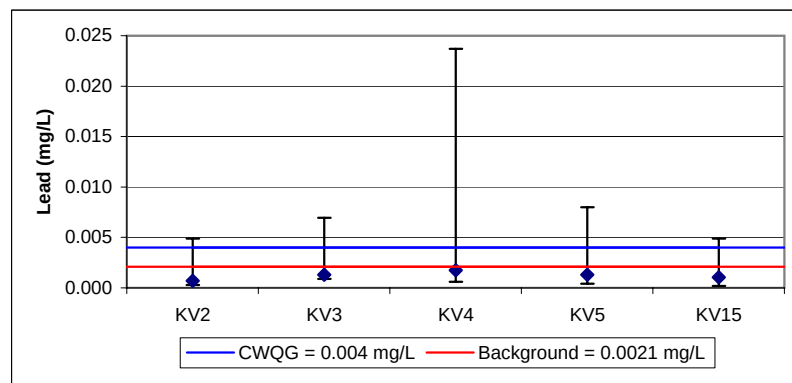
a)



b)



c)



d)

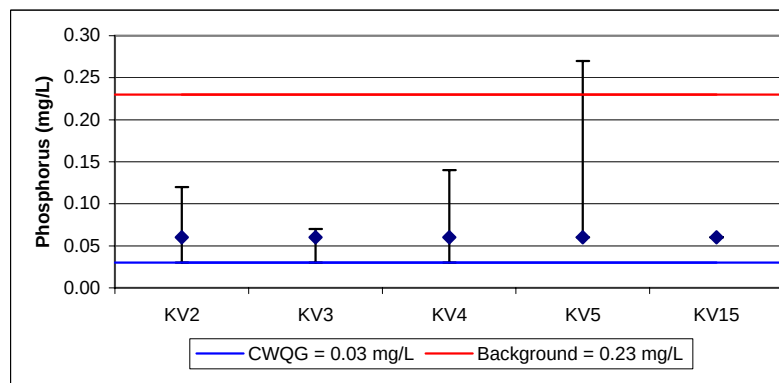
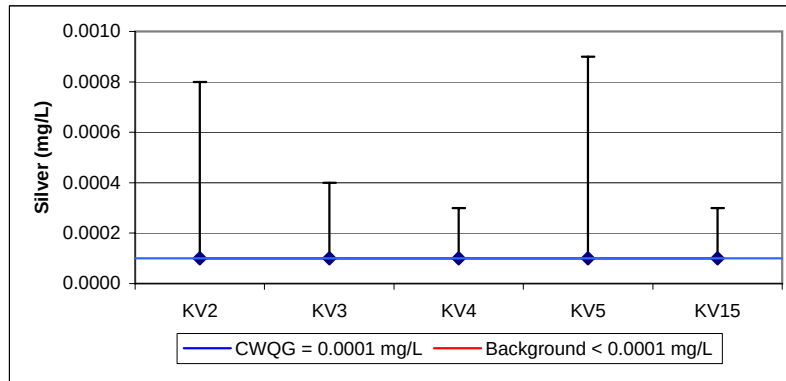
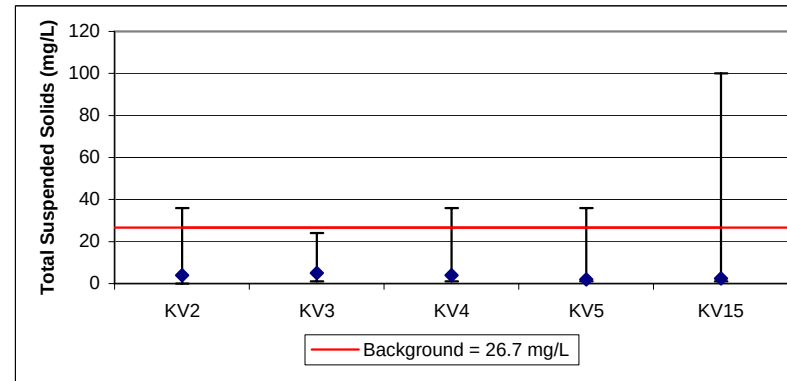


Figure 3.1: Parameters exceeding guideline and background or just guideline or background (if only one available) in over 10% of samples in the South McQuesten River, United Keno Hill Mine, 1994 - 2007. Data presented as medians with minimum and maximums.

e)



f)



g)

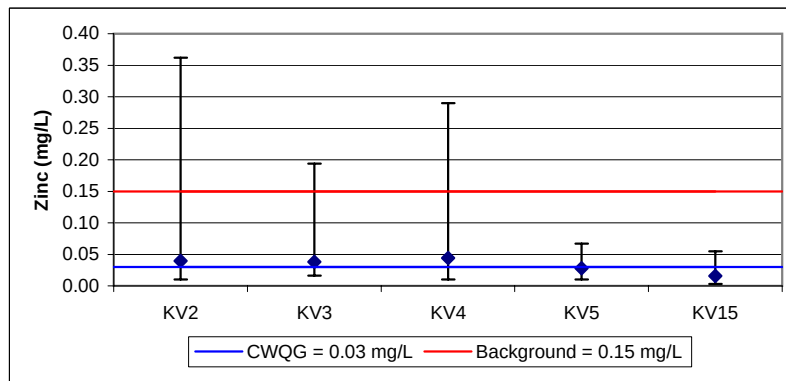
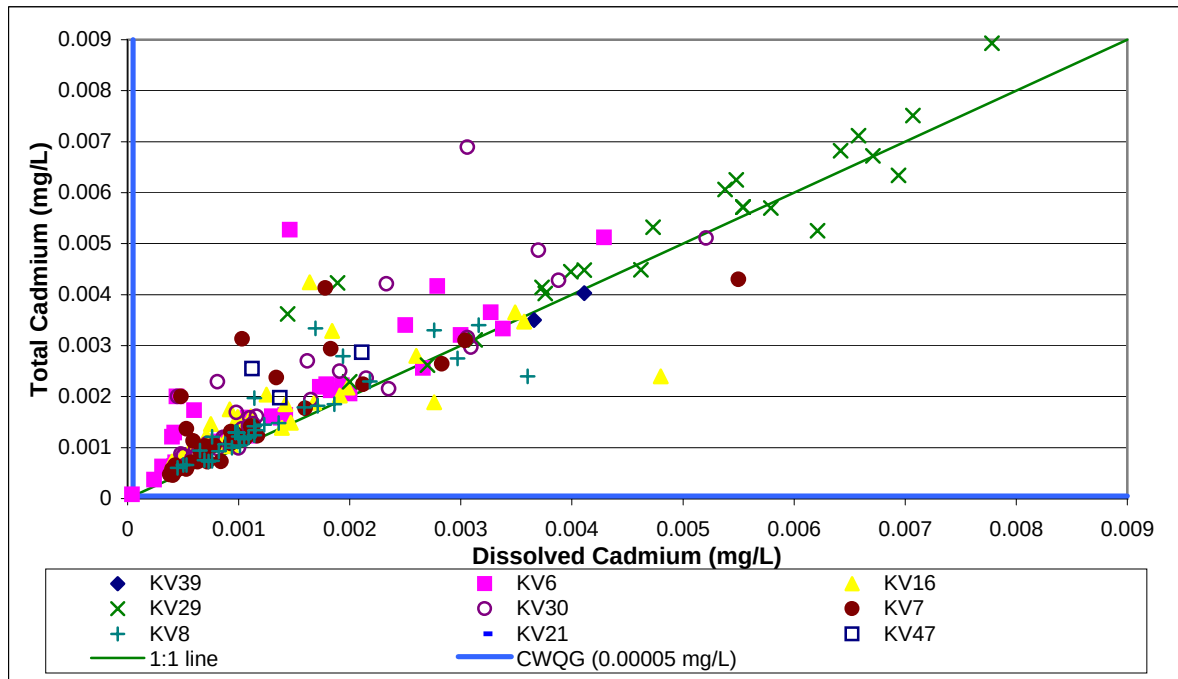


Figure 3.1: Parameters exceeding guideline and background or just guideline or background (if only one available) in over 10% of samples in the South McQuesten River, United Keno Hill Mine, 1994 - 2007. Data presented as medians with minimum and maximums.

a)



b)

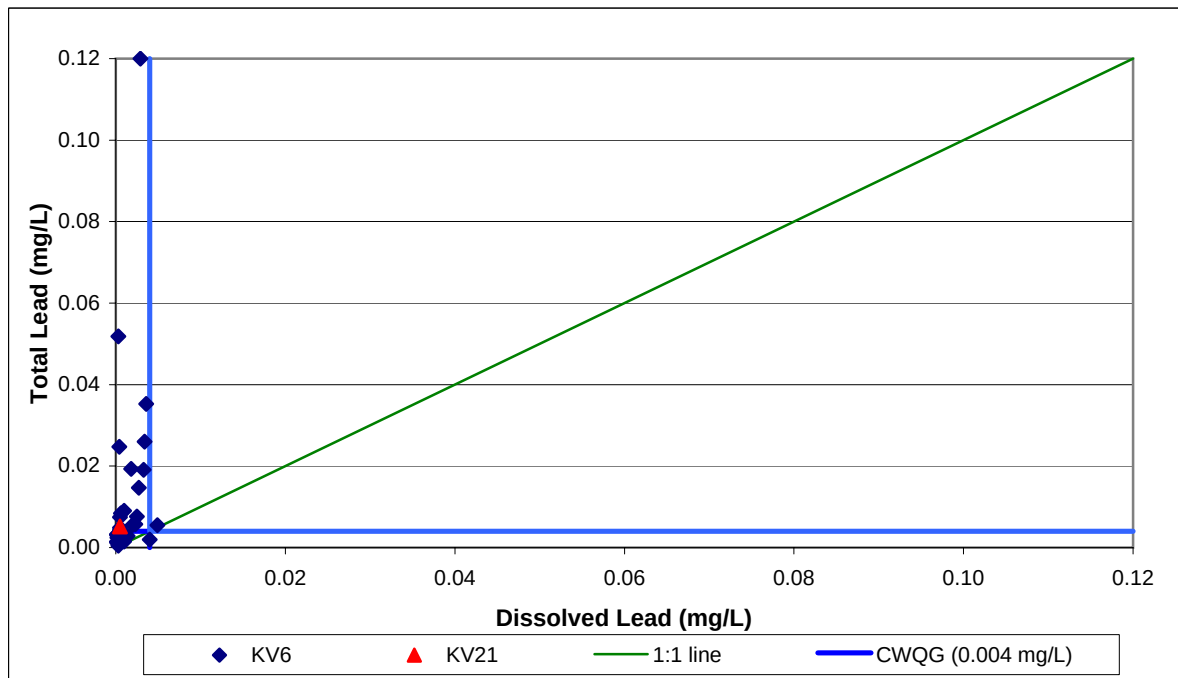
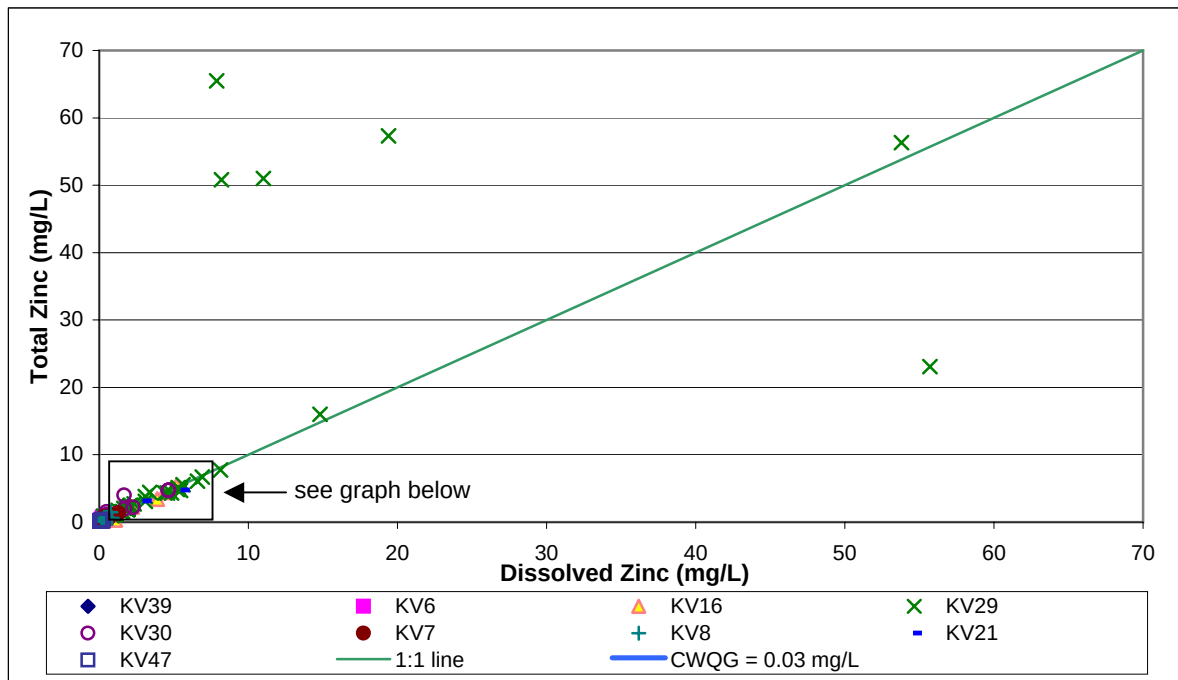


Figure 3.2: Total versus dissolved concentrations of contaminants of concern measured at stations where concentrations exceeded both background and guideline in 50% or more of samples.

c)



d)

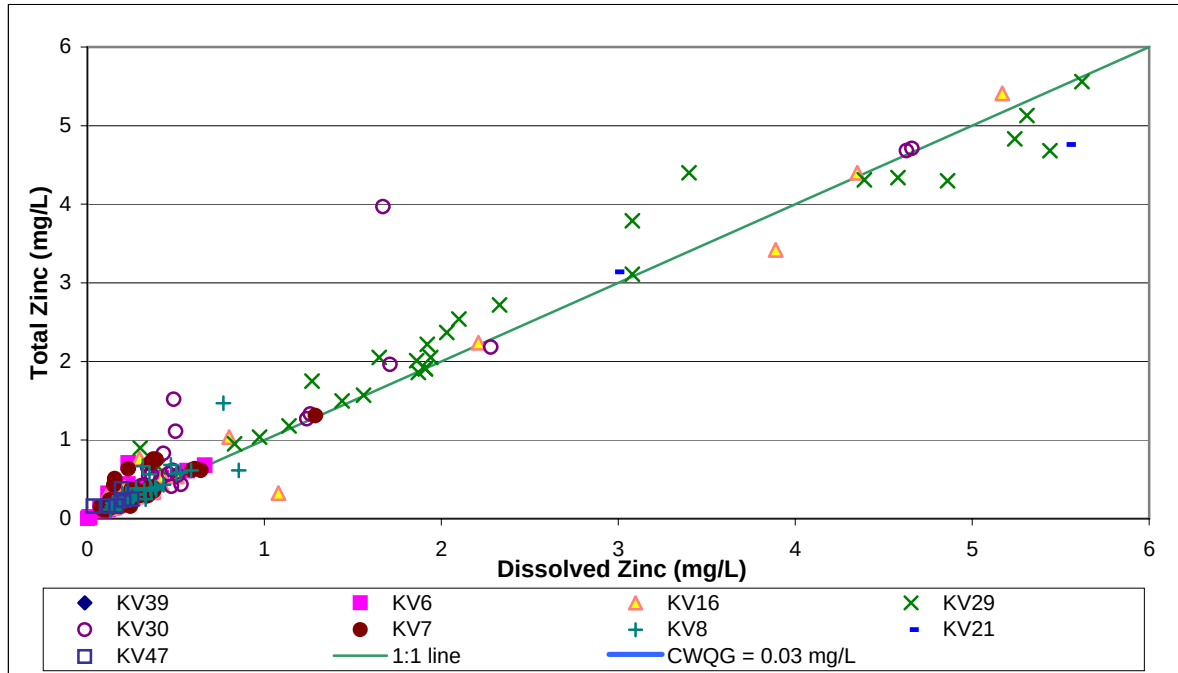


Figure 3.2: Total versus dissolved concentrations of contaminants of concern measured at stations where concentrations exceeded both background and guideline in 50% or more of samples.

noted in Section 2.4, values falling below the 1:1 line indicate cases where reported “dissolved “ concentrations exceeded total (impossible), suggesting problems with the dissolved measurements (e.g., improper filtration method or contamination associated with filtration or analytical precision) that should be investigated and rectified.

At stations where total concentrations were frequently elevated (median > guideline and background), cadmium and zinc were predominantly present in dissolved form (Figure 3.2a,d) although the proportions varied at the highest zinc concentrations (Figure 3.2c). Although total lead concentrations exceeded the CWQG at KV-6 and KV-21, concentrations of dissolved lead were almost always less than the guideline (Figure 3.2b). Since lead appears to be present largely in particulate rather than a potentially more bioavailable dissolved form and because dissolved lead concentrations were less than the CWQG, it was eliminated as a contaminant of potential concern. Therefore the list of preliminary COCs was revised to include cadmium, sulphate and zinc (not lead).

3.3 Temporal Trends

Trend analysis was conducted for all three preliminary COCs: cadmium, sulphate and zinc. However, historically elevated MDLs prior to 2004 resulted in the need to truncate the data sets assessed for cadmium and sulphate to the period mid-2004 to 2007. Trend analysis was not conducted on data sets with less than 10 sample results and as such trends were not assessed for cadmium or sulphate at KV-47.

Adequate data were available for zinc, and the analysis showed statistically significant decreases at most stations (Table 3.3). Data plots (Appendix Figures A.99 to A.105) showed that the most substantial decrease occurred at KV-29 and immediately downstream at KV-30 between 2004 and 2007. Since 2007, remediation and treatment of the Galena 300 adit (primary source captured at KV-29) has occurred, which will likely result in additional future improvements in zinc concentrations downstream of this source.

While no trends in cadmium were detected, this is likely due to the short time frame assessed (mid-2004 to 2007) relative to zinc (1994 to 2007). It is also possible that decreases in cadmium concentrations were masked by high annual variability due to a strong seasonal pattern observed at many of the downstream stations (Figure 3.3). Peak concentrations are observed in late June and early July following the freshet with concentrations falling to near background levels in the winter/early spring (Figure 3.3). This pattern is likely associated with runoff from upstream sources capturing dissolved cadmium in the drainage. However, cadmium concentrations also strongly correlated with

Table 3.3: Results of temporal trend analysis for preliminary contaminants of concern measured at stations near the United Keno Hill Mine. Data are presented for all stations having at least 10 measurements (i.e. samples) with adequate method detection limits.

Watercourse	Station		Cadmium	Sulphate	Zinc
Christal Creek	KV6	Spearman 'rho'	-0.218	-0.392	-0.373
		p-value	0.201	0.079	0.001
		n	36	21	81
	KV16	Spearman 'rho'	0.154	-0.151	-0.020
		p-value	0.378	0.538	0.901
		n	35	19	42
	KV29	Spearman 'rho'	-0.084	0.228	-0.385
		p-value	0.633	0.308	0.012
		n	35	22	42
	KV30	Spearman 'rho'	-0.078	-0.414	-0.554
		p-value	0.662	0.0780	<0.001
		n	34	19	41
	KV7	Spearman 'rho'	-0.232	0.096	-0.268
		p-value	0.168	0.686	0.017
		n	37	20	79
	KV8	Spearman 'rho'	-0.159	-0.292	-0.572
		p-value	0.370	0.211	<0.001
		n	34	20	40
Flat Creek	KV47	Spearman 'rho'			-0.231
		p-value			0.389
		n			16

Significant increasing trend at $p < 0.05$

Significant decreasing trend at $p < 0.05$

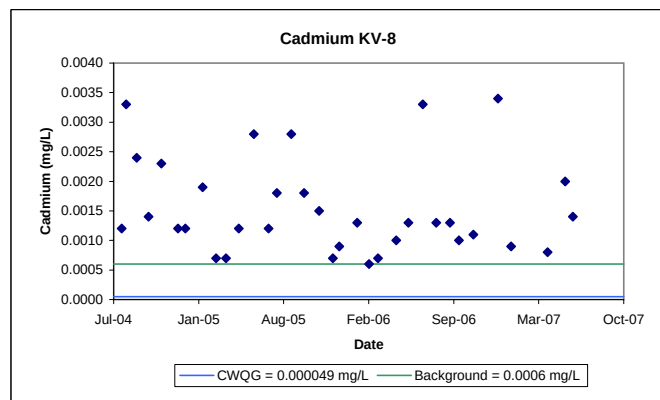
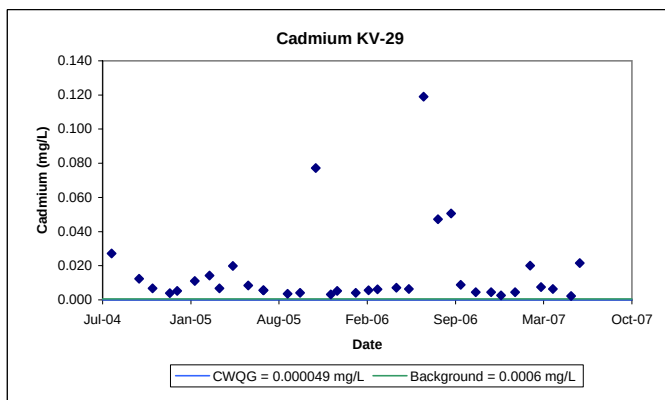
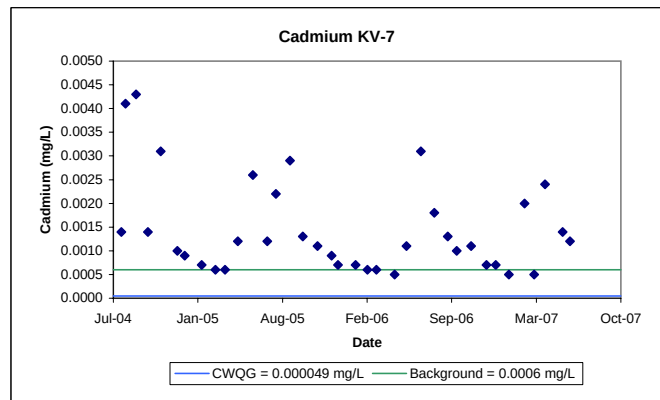
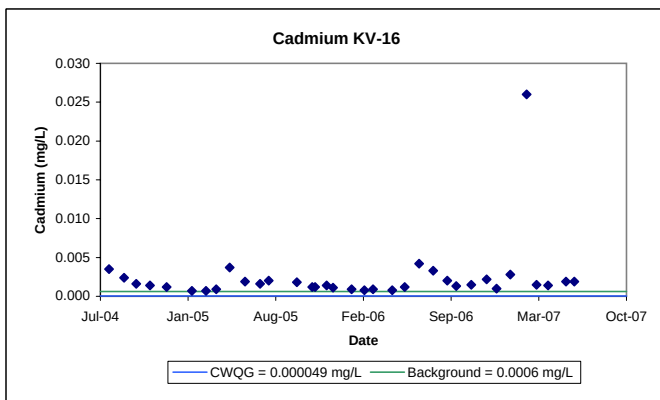
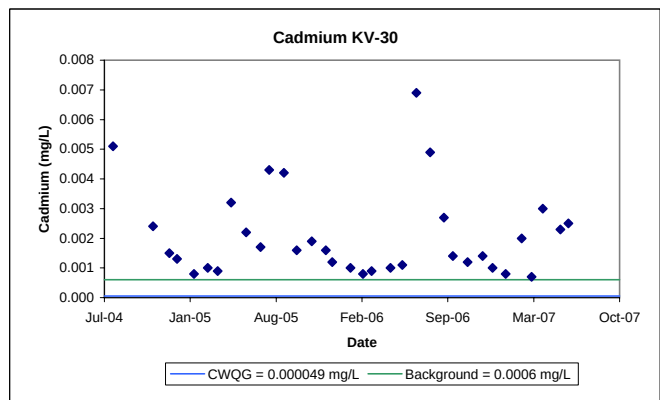
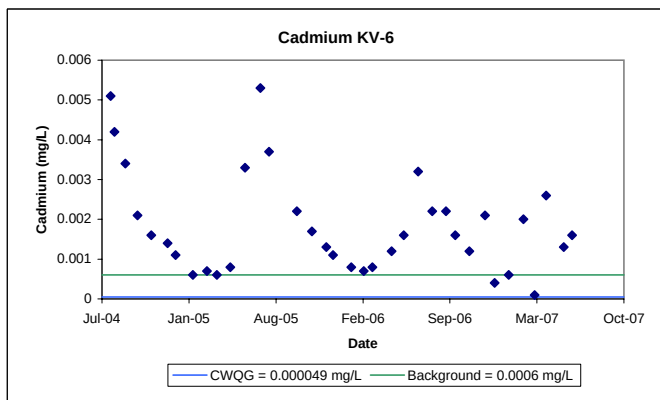


Figure 3.3: Cadmium concentrations measured in Christal Creek since 2004.

zinc suggesting that cadmium concentrations have likely also decreased over the same time period (1994 to 2006; Table 3.4).

3.4 Observed Concentrations Relative to Toxicity Data

Available toxicity literature for the preliminary COCs was reviewed to evaluate the ecological implications of the observed concentrations at UKHM.

3.4.1 Cadmium

Maximum cadmium concentrations in receiving waters near the UKHM (i.e., not including sources KV-47 and KV-29) ranged up to 0.026 mg/L at KV-16 (Christal Creek), but median concentrations were ≤ 0.003 mg/L at all stations (Appendix Table A.34, Figure A.11). This compares to Canadian Water Quality Guidelines (CWQG) for the protection of aquatic life (chronic exposure) of 0.00005 mg/L for waters with hardness of about 162 mg/L (mean background hardness for UKHM; Appendix Table A.23).

Acute cadmium toxicity to arctic grayling (*Thymallus arcticus*) has been reported at a concentration of 0.0049 mg/L (Buhl and Hamilton, 1991). However, this value relates to a water hardness of 50 mg/L and cadmium toxicity would be less at the higher water hardnesses (mean values ranging from 362 to 484 mg/L) typical of the stations (KV-6, KV-16, KV-30, KV-7, KV-8) where cadmium has been elevated. Nevertheless, concentrations as low as 0.00012 mg/L have been observed to cause toxicity to a wide range of biota (e.g., invertebrates and fish) over a range of water hardnesses, suggesting that cadmium toxicity may occur, on occasion at some stations near UKHM (e.g., KV-16). Maximum cadmium concentrations in the South McQuesten River were always ≤ 0.001 mg/L and usually < 0.0003 mg/L, which are below the acute and chronic toxicity thresholds for most species, particularly in hard water (e.g., 184 to 214 mg/L; Appendix Table A.41, Figure A.18 and USEPA 2001).

The CWQG for cadmium is presently being updated by Environment Canada and a draft guideline will likely be released for public comment sometime in 2008; the chronic exposure guideline is expected to rise and there will also be provision for short-term exposure to even higher concentrations (see Section 4.0). Re-evaluation of water quality data against the new guidelines may further limit the concerns regarding potential cadmium effects downstream of UKHM.

3.4.2 Zinc

As noted previously from correlation analysis (Table 3.4), zinc concentrations tended to be elevated coincident with elevated cadmium levels (i.e., stations nearest UKHM sources).

Table 3.4: Correlations of zinc with cadmium and sulphate for stations having a significant temporal trend for zinc, United Keno Hill Mine.

Watercourse	Station		Zn vs Cd	Zn vs SO ₄
Christal Creek	KV6	Spearman 'rho'	0.822	-0.210
		p-value	< 0.001	0.361
		n	36	21
	KV29	Spearman 'rho'	0.766	-0.155
		p-value	< 0.001	0.503
		n	35	21
	KV30	Spearman 'rho'	0.821	0.116
		p-value	< 0.001	0.636
		n	34	19
	KV7	Spearman 'rho'	0.786	-0.270
		p-value	< 0.001	0.249
		n	37	20
	KV8	Spearman 'rho'	0.752	0.070
		p-value	< 0.001	0.769
		n	34	20



Significant correlation at $p < 0.05$

Maximum concentrations ranged above 1 mg/L at stations on Christal Creek (KV-6, KV-16, KV-30, KV-7, and KV-8) although median concentrations were ≤ 0.42 mg/L at all stations (Appendix Table A.70, Figure A.47). The upper range of background concentrations near UKHM is 0.15 mg/L (Table 2.4), which is well above the current CWQG for zinc of 0.03 mg/L. As for cadmium, the federal guideline is presently under review with updated, draft values (for protection of aquatic life in short- and long-term exposures) expected to be released for public comment sometime in 2008. The new guideline, supported by more recent toxicity data from the scientific literature, will allow for better assessment of the potential effects of zinc on aquatic biota downstream of the mines. Concentrations in the South McQuesten River have typically been less than 0.04 mg/L (Appendix Table A.70, Figure A.47), which is only marginally above the current CWQG and well within the range of background concentrations.

3.4.3 Sulphate

Sulphate was identified as an issue based on comparison of concentrations measured downstream of the mines to a B.C. water quality guideline (Singleton 2000). This guideline is widely considered to be overly conservative. As for cadmium and zinc, concentrations of sulphate have been highest in Christal Creek but were generally less than 500 mg/L which, based on data presented in the literature, should not result in toxicity to aquatic biota (Mount and Gulley 1992; Singleton 2000; Davies 2007). Sulphate concentrations in the South McQuesten River have been less than half this value. On this basis, sulphate should be removed from the list of preliminary COCs at UKHM.

3.4.4 Summary

Concentrations of cadmium, zinc, and sulphate are below levels of concern within the South McQuesten River. However, it is likely that concentrations of cadmium and zinc in the various tributary stations located immediately downstream of the UKHM are sufficiently high to cause periodic and possibly chronic toxicity to some species. Based on available data, sulphate should be eliminated as a preliminary COC, resulting in a final list of COCs comprised of only cadmium and zinc.

4.0 CANADIAN WATER QUALITY GUIDELINE UPDATE

As noted previously, CWQG for cadmium and zinc are presently being updated. New, draft guidelines, with supporting data and rationales, are expected to be released for public review sometime in 2008. It is expected that the revised guidelines will provide both a short- and long-term exposure value which may allow for some seasonal fluctuations to be accommodated.

The guideline documents will also provide toxicological response curves for both the short- and long-term data set on which the guidelines will be based. These response curves may be used for developing water quality goals relative to the protection of specific species or conversely, for assessing the potential biological impacts of expected concentration ranges.

5.0 OPPORTUNITIES FOR THE DEVELOPMENT OF SITE SPECIFIC WATER QUALITY OBJECTIVES

The objective of the water quality assessment was to identify parameters and locations downstream of UKHM which do not achieve generic guidelines and to provide recommendations with respect to parameters and receiving environments that may be amenable to the development of Site Specific Water Quality Objectives (SSWQO). In assessing the opportunity for the development of SSWQO, the accepted procedures (described below) should be considered in light of the known concentration ranges of the COCs, factors that modify aquatic toxicity, and the expected changes to the CWQG for cadmium and zinc (see Section 4.0).

5.1 Optional Approaches for SSWQO Development

There are a number of accepted options for the development of SSWQOs (USEPA 1983, 1984; CCME 2003). These include the:

- Background Concentration Procedure (BCP);
- Recalculation Procedure (RCP);
- Water Effect Ratio Procedure (WERP); and
- Resident Species Procedure (RSP).

Two of the above procedures do not require toxicity testing (the BCP and RCP) and can be undertaken as a paper exercise if adequate data are available. Each procedure is briefly described below.

5.1.1 Background Concentration Procedure

The Background Concentration Procedure (BCP) recognizes that it is not possible to meet generic water quality guidelines in surface waters that have natural concentrations of substances that exceed the guidelines. Therefore, the concentration representing the upper limit of regional background concentrations can be established as a SSWQO. Statistical procedures for defining the upper limit of background have included the upper 95% confidence limit ($\text{mean} + t_{\alpha=0.05(2)} \times \text{standard error}$), $\text{mean} + t_{\alpha=0.05(1)} \times \text{standard deviation}$, and the 90th or 95th percentile, among others (BCMELP 1997; Hill et al. 2006, Roe et al. 2006).

5.1.2 Recalculation Procedure

The Recalculation Procedure (RCP) requires knowledge of the aquatic species that occur (or have historically occurred) in the watershed. The RCP involves the removal of data for species that are not resident to the watershed from the toxicity data set that was initially used to develop the guideline. A SSWQO is derived using the same methodology that was originally used to derive the generic objective, but only considers the reduced data set. If it can be demonstrated that the sensitive species that influenced the derivation of the generic water quality criterion do not occur locally, the recalculation will likely result in a new, higher SSWQO. Conversely, if the most sensitive species are resident in the watershed, then this method would not be expected to result in a change in the water quality criterion.

5.1.3 Water Effect Ratio Procedure

The Water Effect Ratio Procedure (WERP) can be beneficial under certain physical and chemical conditions. It is based on the fact that toxicity of metals in certain waters (e.g., those with high complexation capacity or hardness) may be less than was predicted by the laboratory toxicity tests which were used to derive the generic CWQG. Substances whose toxicity is greatly reduced in the presence of such materials, such as copper, are generally amenable to application of the WERP for SSWQO development.

In this method, a ratio is determined between the toxic concentration of a substance in site water versus the toxic concentration in laboratory water. If this ratio is > 1 , the data indicate the substance is less toxic in site water. The SSWQO is established by applying this ratio to the generic SSWQO. For example, if toxicity in site water does not occur until three times the concentration in laboratory water, a WER of three is used and the SSWQO would be three times the generic guideline.

5.1.4 Resident Species Procedure

The Resident Species Procedure (RSP) involves the development of a new objective from scratch, or *de novo*, using site water and species that are found locally. Development of an SSWQO from scratch is expensive because toxicity tests must be conducted with enough organisms to meet minimum data set requirements (typically several fish species, several invertebrate species and one each of a plant and algae species). However, it also provides a highly site-specific water quality objective because both site water and site organisms are used. Due to the expense, it is typically only considered as a last option.

5.2 Opportunity for SSWQO at UKHM

COCs identified at the UKHM are cadmium and zinc. The CWQG for both cadmium and zinc are currently in the process of being revised by Environment Canada. Based on:

- the low frequency at which these parameters exceed guidelines and background benchmarks (in the South McQuesten River),
- the observed concentration range, and
- the expectation that the revised cadmium CWQG will increase over the current value,

it is expected that concentrations within the South McQuesten River downstream of the UKHM will either achieve these revised guidelines or background.

Concentrations of cadmium and zinc in the tributaries immediately downstream of UKHM are sufficiently high that they are not expected to consistently achieve the revised CWQG. The opportunity to develop achievable SSWQO for these substances in these tributaries is unlikely given the following:

- Concentrations of cadmium and zinc in the downstream tributaries also exceed the upper limit of background and as such the **Background Concentration Procedure** will not yield a value that can be achieved in these areas.
- The aquatic biota found or potentially present near UKHM include species that are among the most sensitive to cadmium and zinc, or that are closely related to sensitive species reported in the scientific literature. Therefore, it seems unlikely that the **Recalculation Procedure** will yield a substantially higher SSWQO value than the generic guideline.
- The **Resident Species Procedure**, is unlikely to result in a beneficial SSWQO because the data do not suggest that the resident species will be more tolerant of cadmium and zinc than sensitive species identified in the literature. Furthermore, the number of tests that would need to be conducted and the requirement to use resident species that may not be readily transported to or currently cultured in commercial laboratories makes this procedure very time consuming and expensive (i.e., last resort).
- The influence of water hardness on cadmium and zinc toxicity is taken into account in the existing CWQG for cadmium and is expected to be accounted for in the

updated guidelines for both cadmium and zinc. Therefore, the usefulness of the **Water Effect Ratio Procedure (WERP)** for developing a SSWQO for cadmium or zinc would be largely dependent on the presence of other water quality factors that might substantially ameliorate the toxicity of these substances. The scientific literature generally suggests that the effects of factors such as pH, and dissolved organic carbon (DOC) on cadmium or zinc toxicity are relatively modest compared to the influence of hardness. Also, ameliorating effects from pH and DOC would be expected at lower and higher levels, respectively, than those typically observed in the region.

Therefore, it is unlikely that the generic CWQG could be raised to a level that could be achieved in the tributaries downstream of the UKHM and thus an alternative approach to establishing water quality expectations for these historically affected areas should be considered. This approach should consider human and ecological risk benchmarks for establishing water quality goals that will ensure the protection of human health and identified valued water uses (e.g. fisheries).

6.0 SUMMARY AND RECOMMENDATIONS

6.1 Summary of Findings

Data were analyzed for 20 water quality stations located on permanent surface water courses upstream (reference/background) and downstream (receiving environment) of mine-related disturbances or inputs (e.g., roads, rock piles, adits, tailings area, etc.) as well as two stations later identified as source areas. Analytical data for most of the selected stations dated back to the mid-1980's, however, sporadic data and poor method detection limits prior to 1994 limited the value of the older data and as such, the original data base used in the assessment extended from 1994 to 2007. In total, analytical results for more than 2,000 individual data points were examined as part of the water quality assessment.

The upper range of background concentrations exceeded applicable water quality guidelines for protection of aquatic life for some parameters, including aluminum, cadmium, copper, iron, phosphorus, sulphate and zinc. Numerous contaminants measured at stations within the various watersheds downstream of UKHM exceeded both the guideline and background benchmark (or just one of these in cases where both were not available) in at least 10% of samples. However, a much smaller set of parameters and locations exceeded the guideline and background benchmark at a frequency of at least 50% of samples (i.e., median value): aluminum, arsenic, cadmium, chromium, copper, Iron, lead, manganese, nitrite, selenium, silver, sulphate and zinc. These generally occurred in the tributary stations located immediately downstream of mine sources (Christal Creek, Lightning Creek, Flat Creek and No Cash Creek). In no instance did median concentrations exceed guidelines and background in the South McQuesten River. The analysis of all data resulted in identification of cadmium and zinc as the key contaminants of concern (COCs) at UKHM.

Statistically significant temporal decreases in zinc concentrations were indicated at most stations with the most substantial decrease occurring at KV-29 and immediately downstream at KV-30 between 2004 and 2006. Since 2006, remediation and treatment of the Galena 300 adit (primary source captured at KV-29) has occurred, which will likely result in additional future improvements in zinc concentrations downstream of this source. While no temporal trends in cadmium were detected, this was likely due to the short time frame assessed (mid-2004 to 2006) relative to zinc (1994 to 2006). However, cadmium concentrations were strongly correlated with zinc, suggesting that cadmium concentrations have likely also decreased over the same time period (1994 to 2006).

Based on the toxicity literature, concentrations of cadmium and zinc are below levels of concern within the South McQuesten River. However, it is likely that concentrations of cadmium and zinc in the various tributaries downstream of the UKHM are sufficiently high to cause periodic and possibly chronic toxicity to some species

CWQG are currently being updated for cadmium and zinc. However, it is considered unlikely that concentrations in the tributaries immediately downstream of the UKHM discharges/sources will achieve the new guidelines due to historical sources within the watershed. It is also not expected that the development of SSWQO procedures would yield a sufficient increase in the generic CWQG to be consistently achieved in the tributaries downstream of UKHM. Therefore, an alternative approach to establishing water quality expectations for these historically affected areas should be considered. This approach should consider the various water uses (e.g. fisheries) within the affected watersheds as well as human and ecological risk benchmarks to establish water quality goals which will ensure the protection of human health and valued water uses.

It is expected that concentrations within the South McQuesten River downstream of the UKHM will either achieve the revised CWQG or the background benchmark.

6.2 Recommendations for Future Monitoring

Based on the assessment of the water quality data associated with UKHM, the following recommendations are provided with respect to future monitoring:

- The locations of routine monitoring stations should be re-evaluated in terms of the information contained in this report. It would be appropriate to add additional routine sampling stations within the tributaries to more clearly delineate and track the spatial extent of mine influence on water quality (i.e., concentration gradient downstream), particularly in Flat Creek, Lightning Creek and No Cash Creek which have a relatively small number of sampling stations;
- Monitoring at additional reference stations should be considered and the appropriateness of using KV-1 relative to the new reference station KV-72 should be evaluated;
- The laboratory responsible for water quality analyses should be instructed to conduct total phosphorus analysis using the standard colourimetric method and a reasonable number of samples should be split and sent to a second laboratory for confirmation of total phosphorus concentrations;

- Dissolved organic carbon (DOC) should be added to the routine monitoring parameter list as it is a known modifier of zinc toxicity and is currently not included in the monitoring program. Stations to be monitored for DOC should include KV1, KV37, KV39, KV41, KV6, KV16, KV29, KV30, KV7, KV8, KV21, KV47, KV9, KV-4 and KV5. In addition, DOC should be included in the parameter list at any new reference stations.
- Future monitoring of metals should focus on total concentrations and determination of dissolved concentrations should be excluded;
- Analytical methods and associated method detection limits should be reviewed for arsenic, chromium, copper, cyanide, lead, mercury, nitrite, total phosphorus, selenium, silver, tin, uranium and zirconium to ensure that the reported MDL is consistently below the applicable water quality guidelines;
- More frequent monitoring (5 to 8 samples/year) should be undertaken for analysis of aluminum, arsenic, chromium, copper, cyanide (WAD and total), manganese, mercury, nitrite, selenium and silver, particularly in the tributaries, Christal Creek (KV6, KV16, KV29, and KV30), Lightning Creek (KV39 and KV40), Flat Creek (KV47), and No Cash Creek (KV21). The increased monitoring frequency should span the duration of a year in order to evaluate these parameters as possible COCs;
- Background benchmarks should be re-developed for all substances having a guideline once an adequate reference database has been developed with consistently low MDLs and including data for a greater number of reference stations;
- A long-term monitoring program should be developed to support the approved closure plan as well as operations under the Water Licence. An effective design should be statistically based and allow for meaningful change to be detected and responded to (i.e., adaptable). The program should be rationalized such that only relevant parameters and locations are monitored at a frequency relevant to detecting meaningful change over time; and
- An approach should be developed to establish water use goals and expectations for tributaries downstream of the UKHM based on water uses and protection goals.

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APPENDIX A

WATER QUALITY ASSESSMENT DATA

- **Original database including data removed**
- **Summary statistics and bar graphs**
- **Ratio of median over screening criteria**
- **Scatterplots of background station data**
- **Scatterplots of long-term temporal trends**

Appendix Table A.1: Water quality parameters for reference station KV1, United Keno Hill, 1994 - 2007¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium		
Units	as CaCO ₃ mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	water mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	water mg/L	Total mg/L	Total mg/L	µS/cm	Total mg/L	Total mg/L	as CaCO ₃ mg/L	water mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L		Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L		
Sample date																																							
31-May-94																																							
27-Jun-94																																							
26-Jul-94	88	0.100		0.02	0.02	0.0503	0.0002		0.02		0.0005	38.8		0.001	0.001	246	0.009				0.135	0.001	0.002	11	0.036		0.005	0.005						0.3	0.001	1.52	0.0001	1.3	
29-Jul-94																																							
7-Aug-94	93	0.050		0.02	0.02	0.0469	0.0002		0.02		0.0005	38.6		0.001	0.001	262	0.005			0.173	0.01	0.002	12.5			0.005	0.005					0.4	0.02	1.72	0.001	1.55			
27-Oct-94	111	0.030		0.02	0.02	0.0494	0.0002		0.02		0.0005	42.9		0.001	0.001	184	0.009			0.163	0.01		0.004	12.7	0.031		0.005	0.003				0.3	0.02	1.82	0.001	1.65			
31-Oct-94																																							
29-Nov-94																																							
6-Jul-95																																							
11-Aug-95					0.003						0.001					225	0.010				0.33	0.2			0.25														
4-Sep-95					0.001						0.001					195	0.002				0.2	0.01			0.044			0.12											
11-Oct-95					0.001						0.001					180	0.002				0.2	0.005			0.036			0.004											
1-Oct-95											0.001					390	0.002				0.2	0.005			0.49			0.008											
1-Jan-95																																							
6-Feb-95																																							
29-Mar-95																																							
27-Apr-95																																							
3-May-95																																							
6-Jun-95																																							
10-Jul-95	78	0.100		0.02	0.02	0.0466	0.0002		0.02		0.0005	36		0.001	0.001	295	0.013				0.206	0.01	0.003	11.2	0.042		0.005	0.007				0.2	0.02	1.59	0.001	1.49			
11-Aug-95																																							
3-Sep-95																																							
6-Sep-95	82																																						
9-Feb-96					0.001						0.001					243																							
5-Mar-96					0.001						0.001					290	0.002				0.4	0.005			0.13			0.002											
7-Apr-96					0.005						0.001					340	0.008				0.8	0.02			0.14			0.004											
28-Apr-96					0.005						0.001					205	0.012				0.2	0.015			0.046			0.006											
24-Jun-96					0.001						0.001					190	0.010				0.2	0.005			0.068			0.006											
3-Oct-96					0.01						0.01					225	0.004				0.2	0.005			0.076			0.014											
30-Oct-96											0.01					197	0.010				0.01	0.01			0.05			0.01											
30-Nov-96											0.01					210	0.010				0.2	0.01			0.04			0.01											
28-Jan-97											0.01					210	0.010				0.2	0.01			0.05			0.01											
26-Feb-97											0.01					375	0.010				0.8	0.01			0.08			0.01											
27-Mar-97	195				0.05						0.001					400	0.010				1	0.05			0.05			0.01											
21-Apr-97					0.05						0.001					290	0.010					0.05						0.01											
12-May-97	61				0.05						0.001					118	0.010					0.05					0.01												
30-Jun-97	106				0.05						0.001					260	0.010					0.05					0.01												
29-Jul-97	67	0.010		0.02	0.02	0.0193	0.0002				0.0007	88.9		0.001	0.001	0.015	0.012	0.012	363		0.175	0.012	34	0.38		0.005	0.003	0.02	1	7.9	0.06	0.4	0.02	0.25	0.001				
31-Jul-97	96				0.05						0.001					270	0.010					0.05					0.01												
20-Aug-97	98				0.05						0.001					273	0.010					0.05					0.03												
13-Sep-97	99				0.05						0.001					220	0.010					0.05					0.01												
10-Oct-97	120				0.05						0.001					360	0.010					0.05					0.01												
30-Nov-97	132				0.05						0.001					410	0.010					0.05					0.01												
15-Jan-98					0.05						0.001					400	0.010				1	0.05			0.14		0.01												
20-Jan-98	136				0.05						0.001					400	0.010					0.05					0.01												
1-Feb-98	158			0.05	0.05						0.001					410	0.010		210		1	0.05			0.06		0.01												
13-Mar-98	168			0.05	0.05						0.001					440	0.010				1	0.05			0.09		0.06												
12-Apr-98				0.05	0.05						0.001					450	0.010				1	0.05			0.05		0.01												
12-May-98	74			0.05	0.05						0.001					200	0.010				1	0.05			0.06		0.01												
11-Jul-01	87	0.240		0.02	0.02	0.0401	0.0006				0.0006	31.3	6	0.001	0.001	258	0.027			0.298	0.006			8.94	0.0902		0.01	0.009	0.023	0.002	7.89	0.06	0.4	0.02	1.5	0.002			
2-Aug-03	97	0.170	0.05	0.02	0.02	0.0458	0.0006	118	0.02		0.0006	39.2	6	0.001	0.001	0.017			140	0.097	0.006	0.006	14	0.046		0.01	0.007	0.01	0.1	0.06	0.3	0.02	1.6	0.002	1.38				
17-Dec-03	130	0.030		0.02	0.02	0.0551	0.0006	158	0.02		0.0006	47.1	6	0.001	0.001	0.003			176	0.134	0.006	0.006	14.7	0.048		0.01	0.004												
24-Jan-04																449																							
19-Feb-04	147	0.010		0.02	0.04	0.076	0.0006	180	0.02		0.0006	63.9	6	0.001	0.001	389	0.001		236	0.159	0.044	0.007	20.6	0.0351		0.01	0.006												
23-Mar-04	158	0.080		0.02	0.04	0.0833	0.0006	193	0.09		0.0033																												

Appendix Table A.1: Water quality parameters for background station KV1, United Keno Hill, 1994 - 2007¹.

Parameter	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample date													
31-May-94								210					
27-Jun-94								222					
26-Jul-94	0.17	45.5	16.2			0.01	0.001	179	5.00		0.002	0.013	0.001
29-Jul-94								185					
7-Aug-94	0.17		17.9			0.01	0.001	210	5.00		0.002	0.011	0.001
27-Oct-94	0.18		17.4			0.01	0.002	222	5.00		0.005	0.011	0.001
31-Oct-94								200					
29-Nov-94													
6-Jul-95									12			0.27	
11-Aug-95									8			0.04	
4-Sep-95									8			0.03	
11-Oct-95									8			0.29	
1-Jan-95													
6-Feb-95													
29-Mar-95													
27-Apr-95													
3-May-95													
6-Jun-95													
10-Jul-95	0.16	53.6	15.5			0.01	0.001	185	5.00		0.002	0.029	0.001
11-Aug-95													
3-Sep-95													
6-Sep-95		50.00						200	5.00				
9-Feb-96									4			0.016	
5-Mar-96									44			0.36	
7-Apr-96									44			0.058	
28-Apr-96									16			0.028	
24-Jun-96									2			0.062	
3-Oct-96												0.04	
30-Oct-96									12			0.03	
30-Nov-96									12			0.03	
28-Jan-97									184			0.04	
26-Feb-97									44			0.03	
27-Mar-97									4			0.01	
21-Apr-97		70							7			0.02	
12-May-97									32			0.06	
30-Jun-97		43.1							5		0.004	0.1	
29-Jul-97	0.281	318	102			0.005		608				0.084	
31-Jul-97		44.6							5			0.02	
20-Aug-97		47.3							5			0.07	
13-Sep-97		46										0.06	
10-Oct-97		48.8							5			0.01	
30-Nov-97		58.2							5			0.04	
15-Jan-98		72							5			0.001	
20-Jan-98		57							5			0.03	
1-Feb-98		73.7							26				
13-Mar-98		72							4			0.04	
12-Apr-98		83.9							5			0.01	
12-May-98		28.9							6			0.01	
11-Jul-01	0.129	46.5	12.8			0.006		127			0.004	0.065	
2-Aug-03	0.167	65.7	18.9	0.006		0.006	0.001		1	0.07	0.004	0.026	0.006
17-Dec-03	0.203	65.7	22.4		0.006	0.008	0.001		2	0.07	0.001	0.026	0.006
24-Jan-04								196					
19-Feb-04	0.244	75.9	26.7		0.006	0.01	0.004		2	0.07	0.001	0.013	0.006
23-Mar-04	0.254	83.2	32.2			0.01	0.013		3	0.07	0.001	0.027	0.006
24-Apr-04	0.26	80.6	27.8			0.01	0.004		3	0.07	0.001	0.016	0.006
19-May-04	0.083		7.8		0.006	0.01	0.044		54	0.07	0.002	0.058	0.006
15-Jun-04	0.16	49.2	14.4		0.006	0.01	0.004		9	0.07	0.001	0.029	0.006
20-Jul-04	0.19	58	18.6	0.00005		0.001	0.0018		1	0.0007	0.0002	0.03	0.001
30-Jul-04	0.152	59.6	19.3	0.00005		0.001	0.006		13	0.0008	0.0007	0.064	0.001
24-Aug-04	0.219	892	19.7			0.01	0.004		2	0.07	0.001	0.13	0.006
21-Sep-04	0.222	68.8	22.1	0.00005		0.001	0.0016		1	0.0008	0.0002	0.02	0.001
21-Oct-04	0.225	66.4	21.3	0.00005		0.001	0.0019		1	0.0009	0.0005	0.013	0.001
29-Nov-04	0.252	71.5	23.9	0.00005		0.001	0.0017		2	0.0009	0.0003	0.02	0.001
17-Dec-04		73.9	0.0265	0.00005			0.0019		1	0.0009		0.031	
26-Jan-05	0.238	92.3	28.4	0.00005		0.001	0.002	221	1	0.0008	0.0002	0.021	0.001
27-Feb-05	0.252	78.2	27.4	0.00005		0.001	0.0017		2	0.0008	0.0017	0.016	0.001
22-Mar-05	0.255	78	26	0.00005		0.001	0.002		2	0.0009	0.0002	0.02	0.001
21-Apr-05	0.238	71	24	0.00005		0.001	0.001	178	4	0.0008	0.0001	0.029	0.001
27-May-05	0.12	34	12.6	0.00005		0.001	0.0104		23	0.0005	0.0011	0.044	0.001
30-Jun-05	0.186	51	16.6	0.00005		0.001	0.0028	134	3	0.0008	0.0003	0.02	0.001
20-Jul-05	0.189		18.6	0.00005		0.001	0.0017		2	0.0006	0.0003	0.02	0.001
23-Aug-05	0.188		21	0.00005		0.001	0.0018		2	0.0008	0.0003	0.031	0.001
22-Sep-05	0.205	66	20.3	0.00005		0.001	0.0098		2	0.0007	0.0003	0.045	0.001
27-Oct-05	0.236		22.6	0.00005		0.001	0.0036	142	4	0.0007	0.0004	0.049	0.001
29-Nov-05	0.253	77	25.6	0.00005		0.001	0.0024		2	0.0009	0.0002	0.037	0.001
14-Dec-05	0.255	81	24.5	0.00005		0.001	0.0024		2	0.0008	0.0002	0.043	0.001
25-Jan-06	0.266	92	27	0.00005		0.001	0.0036	166	14	0.001	0.0002	0.047	0.001
22-Feb-06	0.239	103	29.1	0.00005		0.001	0.0018		2	0.0008	0.0001	0.038	0.001
15-Mar-06	0.258	96	30.7	0.00005		0.001	0.0022	225	2	0.0008	0.0003	0.03	0.001
27-Apr-06	0.248	82	25.9	0.00005		0.001	0.001	208	2	0.0007	0.0002	0.03	0.001
25-May-06	0.071	23.1	7.1	0.00005		0.001	0.0125		36	0.0005	0.0012	0.048	0.001
28-Jun-06	0.163		19.2	0.00005		0.001	0.0052	165		0.0007	0.0004	0.073	0.001
30-Jul-06	0.2		22.6	0.00005		0.001	0.0455			0.0005	0.0003	0.043	0.001
31-Aug-06	0.17		24.8	0.0001		0.002	0.0041			0.001	0.0003	0.12	0.002
21-Sep-06	0.181		23.5	0.00005		0.001	0.0059			0.0008	0.0005	0.153	0.001
25-Oct-06	0.212		23.6	0.0001		0.002	0.0025			0.001	0.0003	0.11	0.002
30-Nov-06	0.272		34.1	0.00005		0.001	0.0024			0.0009	0.0007	0.09	0.001
22-Dec-06	0.238		31.3	0.00005		0.001	0.0056			0.0007	0.0002	0.098	0.001
22-Jan-07	0.445		49.8	0.00005		0.001	0.0033			0.0014	0.0002	0.124	0.001
28-Feb-07	0.303		32.6	0.00005		0.001	0.0043			0.0007	0.0002	0.071	0.001
23-Mar-07													
18-Apr-07	0.223		38.4	0.00005		0.001	0.0556			0.0009	0.0035	0.154	0.001
29-May-07	0.14		13	0.0001		0.002	0.062			0.001	0.003	0.096	0.002
16-Jun-07	0.174		19.4	0.00005		0.001	0.0568			0.0006	0.0007	0.111	0.001
Summary statistics													
n	48	21	49	36	4	48	47	20	63	43	35	77	46
mean	0.21	110	24	0.0002	0.006	0.003	0.009	209	12	0.014	0.001	0.06	0.0019
standard deviation (S.D.)	0.06	180	14	0.0010	0.000	0.004	0.017	98	25	0.027	0.001	0.06	0.0019
mean - 3 S.D.	0.03	-430	-18	-0.0028	0.006	-0.008	-0.043	-86	-64	-0.068	-0.002	-0.13	-0.0038
mean + 3 S.D.	0.40	651	66	0.0032	0.006	0.015	0.061	504	87	0.095	0.003	0.24	0.0076

RED Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Elevated <MDL values (including≥MDL values that are assumed to be <MDL)

¹ summary statistics for arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, sulphate, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.2: Water quality parameters for reference station KV37, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample date																									
31-May-94																320									
28-Jun-94																310									
27-Jul-94	161	0.02		0.05	0.0131	0.0002	0.02		0.0076		110	0.001		0.001	0.013	515	0.043				0.01	0.002	12.9	0.03	0.005
29-Jul-94																515									
31-Oct-94																400									
6-Jun-95																345									
12-Jul-95	173	0.02		0.06	0.0127	0.0002	0.02		0.0083		108	0.001		0.001	0.014	546	0.019				0.01	0.003	14.9	0.021	0.005
11-Aug-95																350									
5-Sep-95	103																								
9-Feb-96				0.001						0.001					0.002	100	0.200				0.005			0.008	
5-Mar-96															0.06	120	0.130							0.03	
7-Apr-96				0.005											0.014	230	0.800							0.036	
28-Apr-96				0.005						0.001					0.014	70	0.800				0.015			0.036	
24-Jun-96				0.001						0.001					0.002	89	0.600				0.005			0.014	
3-Oct-96				0.01						0.01					0.01	103	0.010				0.01			0.01	
30-Oct-96										0.01					0.01	158	2.2				0.03			0.08	
30-Nov-96										0.01					0.01	118	0.200							0.01	
30-Jun-97				0.05						0.001					0.01	140					0.05				
10-Oct-97				0.05						0.001					0.01	210					0.05				
15-Jan-98				0.05						0.001					0.01	210	1.000				0.05			0.01	
1-Feb-98																170									
13-Mar-98	64	0.050		0.05				44		0.001					0.01	120	1.000				0.05			0.01	
14-May-98	72	0.050		0.05				40		0.001					0.01	90	1.000				0.05			0.01	
9-Jun-98	26.7	0.060		0.06	0.06	0.044	0.001				0.006	14.1		0.009	0.006		0.006			0.096	0.06		2.7	0.015	
2-Aug-03	31	0.010	0.05	0.02	0.02	0.0497	0.0006	38	0.02		0.0006	15.9	6	0.001	0.001		0.007		56	5	0.048	0.006	0.006	3.09	0.0122
24-Jan-04																129.9									
30-Jul-04	27	0.072	0.05	0.0002	0.0028	0.054	0.0001	33	0.0005	0.024	0.00001	16.4	6	0.0005	0.0001	105.3	0.001		52.1	5	0.2	0.0004	0.001	2.6	0.015
27-Feb-05	38	0.011		0.0002	0.0032	0.06	0.0001	47	0.0005	0.005	0.00001	17.6	6	0.0005	0.0001	130	0.001		53.4	5	0.1	0.0001	0.001	3.5	0.006
19-Jul-05	28	0.029	0.002	0.0002	0.0029	0.048	0.0001	6	0.0005	0.002	0.00001	15.7	34	0.0005	0.0001	106	0.001		52	5	0.1	0.0002	0.001	2.9	0.01
23-Aug-05	30	0.015	0.002	0.0002	0.0022	0.051	0.0001	37	0.0005	0.002	0.00001	17.9	6	0.0005	0.0001	129	0.001		53	5	0.1	0.0001	0.001	3.3	0.009
25-Jan-06	17	0.012		0.0002	0.003	0.067	0.0001	21	0.0005	0.002	0.00001	16.6	6	0.0005	0.0001		0.001		57	5	0.1	0.0004	0.001	2.9	0.005
16-Mar-06	32	0.013		0.0002	0.0033	0.064	0.0001	40	0.0005	0.002	0.00001	17.2	6	0.0005	0.0001	126.6	0.001		58	5	0.1	0.0004	0.001	3.3	0.005
26-May-06		0.277		0.00013	0.00498	0.0429	0.0005		0.0005	0.01	0.00005	10.6		0.0005	0.00024		0.002		35.8		0.463	0.000884	0.005	2.30	0.0205
30-Jul-06		0.014		0.0002	0.0023	0.054	0.0001		0.0005	0.005	0.00002	17.7		0.0005	0.0001		0.001				0.1	0.0001	0.001	3	0.006
28-Feb-07		0.064		0.0002	0.0038	0.068	0.0001		0.0005	0.002	0.00001	19		0.0005	0.0001	167	0.001				0.1	0.0004	0.001	3.7	0.01
Summary statistics																									
n	13	15	4	23	9	13	13	9	12	20	9	13	7	9	9	29	9	0	8	7	23	9	9	24	13
mean	62	0.05	0.03	0.020	0.0032	0.05	0.003	34	0.003	0.005	0.000016	14	10	0.00050	0.00012	211	0.0011	-	52	5	0.08	0.0003	0.0014	1.4	0.010
standard deviation (S.D.)	52	0.07	0.03	0.025	0.0008	0.02	0.007	13	0.006	0.006	0.000013	6	11	0.00000	0.00005	140	0.0004	-	7	0	0.10	0.0003	0.0013	1.6	0.005
mean - 3 S.D.	-96	-0.15	-0.06	-0.054	0.0006	-0.02	-0.019	-5	-0.015	-0.013	-0.000024	-6	-22	0.00050	-0.00002	-210	0.0000	-	31	5	-0.21	-0.0004	-0.0026	-3.3	-0.005
mean + 3 S.D.	219	0.25	0.11	0.094	0.0057	0.11	0.026	73	0.021	0.022	0.000056	33	42	0.00050	0.00026	632	0.0023	-	73	5	0.37	0.0011	0.0054	6.1	0.024

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Elevated <MDL values (Including ≥MDL values that are assumed to be <MDL)

¹ summary statistics for arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, sulphate, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.2: Water quality parameters for reference station KV37, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
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	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample date																									
31-May-94						6.9															4				
28-Jun-94						6.8															4				
27-Jul-94		0.004	0.06	0.4	2	8.1		0.02	3.54	0.001	2.1	0.25	44.1	150	0.01			0.001	0.01	387	5		0.89	0.001	
29-Jul-94						8.0															0				
31-Oct-94						8.2															0				
6-Jun-95						7.0															24				
12-Jul-95		0.006	0.06			8.1		0.02	4.3	0.001	2.27	0.27	51.6	147	0.01			0.001	0.01	397	5		0.868	0.001	
11-Aug-95						7.9															0				
5-Sep-95						8.1								197.0						428.00	5				
9-Feb-96		0.002																					0.014		
5-Mar-96																							0.02		
7-Apr-96		0.002																					0.056		
28-Apr-96		0.002																					0.056		
24-Jun-96		0.002																					0.018		
3-Oct-96		0.01																					0.01		
30-Oct-96		0.01																					0.12		
30-Nov-96		0.01																					0.01		
30-Jun-97		0.01																					0.05		
10-Oct-97		0.01																					0.01		
15-Jan-98		0.01																					0.001		
1-Feb-98																							0.08		
13-Mar-98		0.01																					0.11		
14-May-98		0.01																					0.01		
9-Jun-98		0.01	0.02	0.03	0.01	7.46		0.1	0.06	1.88	0.01	0.4	0.048	24.0	7.72			0.06	0.002		5		0.01	0.004	
2-Aug-03		0.01	0.001	0.01	0.1		0.06	0.3	0.06	2.5	0.002	0.54	0.052	26.6	7.3	0.006		0.006	0.001		1	0.07	0.002	0.004	0.006
24-Jan-04																				56					
30-Jul-04		0.001	0.0005	0.05	0.1	7.53		0.4	0.0004	2.14	0.0002	0.6	0.051	24.8	7.99	0.00005		0.001	0.0028		5	0.0005	0.0002	0.008	0.001
27-Feb-05		0.001	0.0005			7.8		0.4	0.0003	3.9	0.0001	1	0.068	18.1	6.6	0.00005		0.001	0.0007		2	0.0005	0.0005	0.001	0.001
19-Jul-05		0.001	0.0005	0.03	0.03	6.98		0.4	0.0005	2.42	0.0001	0.5	0.057		8	0.00005		0.001	0.001		3	0.0005	0.0002	0.001	0.001
23-Aug-05		0.001	0.0005	0.03	0.03	7.73		0.4	0.0005	2.5	0.0001	0.5	0.06		10	0.00005		0.001	0.001		2	0.0005	0.0001	0.002	0.001
25-Jan-06		0.001	0.0005			7.5		0.4	0.0004	3.48	0.0001	1	0.069	23.3	6.7	0.00005		0.001	0.0007		2	0.0005	0.0001	0.004	0.001
16-Mar-06		0.001	0.0005			7.2		0.4	0.0005	3.82	0.0001	0.9	0.066	22.7	7	0.00005		0.001	0.0006	60	2	0.0005	0.0002	0.003	0.001
26-May-06		0.000120	0.00117	0.001	0.0379	7.91	0.3	2	0.001	1.72	0.000028	2	0.0391	15.1		0.0001		0.0001	0.01		15.2	0.000078	0.001	0.005	
30-Jul-06		0.001	0.0005			7.74		0.4	0.0004	2.36	0.0001	0.6	0.058		9.4	0.00005		0.001	0.0474			0.0005	0.0001	0.01	0.001
28-Feb-07		0.001	0.0005			7.59		0.4	0.0003	3.94	0.0001	0.8	0.071		7.8	0.00005		0.001	0.0132			0.0005	0.0002	0.009	0.001
Summary statistics																									
n	0	25	9	7	7	19	2	13	9	13	13	13	13	5	12	10	0	13	13	5	18	10	9	13	9
mean	-	0.005	0.0006	0.08	0.3	7.6	0.18	0.4	0.0005	2.4	0.3	0.7	7	21	7	0.0007	-	0.006	0.008	266	5	0.00741	0.0003	0.004	0.0016
standard deviation (S.D.)	-	0.004	0.0002	0.14	0.7	0.4	0.17	0.5	0.0002	1.3	0.8	0.5	18	4	3	0.0019	-	0.016	0.013	190	6	0.02199	0.0003	0.003	0.0017
mean - 3 S.D.	-	-0.008	-0.0001	-0.35	-1.9	6.3	-0.33	-1.0	-0.0002	-1.5	-2.1	-0.7	-47	9	-3	-0.0050	-	-0.043	-0.031	-305	-13	-0.05857	-0.0006	-0.005	-0.0034
mean + 3 S.D.	-	0.018	0.0012	0.51	2.5	9.0	0.69	1.9	0.0011	6.2	2.8	2.1	61	33	16	0.0063	-	0.055	0.046	836	22	0.07339	0.0012	0.014	0.0066

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Elevated <MDL values (Including ≥MDL values that are assumed to be <MDL)

¹ summary statistics for arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, sulphate, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.3: Water quality parameters for station KV39, United Keno Hill, 1994 - 2007.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
19-Jul-05	47	0.008	0.003	0.0019	0.0091	0.045	0.0001	6	0.0005	0.002	0.0035	32.3	58	0.0005	0.0001		0.001		110	5	0.1	0.0025	0.003	5.7	0.005
26-May-06		0.0189		0.00174	0.00925	0.0364	0.0005		0.0005	0.01	0.00403	30.4		0.0005	0.0001		0.00210		96.5		0.03	0.00454	0.005	5.32	0.00805
Summary statistics																									
n	1	2	1	2	2	2	2	1	2	2	2	2	1	2	2	0	2	0	2	1	2	2	2	2	2
mean	47	0.013	0.003	0.0018	0.0092	0.041	0.0003	6	0.0005	0.006	0.0038	31	58	0.0005	0.0001	-	0.0016	-	103	5	0.065	0.0035	0.004	5.5	0.0065
standard deviation (S.D.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

Appendix Table A.3: Water quality parameters for station KV39, United Keno Hill, 1994 - 2007.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
19-Jul-05		0.001	0.001	0.03	0.05			0.4	0.0007	2.82	0.0001	0.9	0.108		20.3	0.00005		0.001	0.0014		2	0.0005	0.0001	0.271	0.001
26-May-06		0.000252	0.00121	0.001	0.226		0.3	2	0.001	1.80	0.000034	2	0.0777	56.8		0.0001		0.0001	0.01		3	0.000325	0.001	0.363	
Summary statistics																									
n	0	2	2	2	2	0	1	2	2	2	2	2	2	1	1	2	0	2	2	0	2	2	2	2	1
mean	-	0.00063	0.0011	0.016	0.14	-	0.3	1.2	0.00085	2.3	0.000067	1.5	0.093	57	20	0.000075	-	0.00055	0.0057	-	2.5	0.00041	0.00055	0.32	0.001
standard deviation (S.D.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

Appendix Table A.4: Water quality parameters for station KV40, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
2-Aug-03	41	0.01	0.05	0.02	0.02	0.654	0.0006	50	0.02		0.0006	43.6	6	0.001	0.001		0.008		160	5	0.003	0.006	0.006	12.2	0.0026
19-Jul-05	34	0.008	0.002	0.0002	0.0009	0.064	0.0001	6	0.0005	0.002	0.00004	42.6	41	0.0005	0.0001		0.001		159	5	0.1	0.0001	0.002	11.7	0.006
Summary statistics																									
n	2	2	2	1	1	2	2	2	2	1	1	2	2	1	1	0	1	0	2	2	2	1	1	2	2
mean	38	0.009	0.026	0.0002	0.0009	0.36	0.0004	28	0.010	0.002	0.00004	43	24	0.0005	0.0001	-	0.001	-	160	5	0.052	0.0001	0.002	12	0.0043
standard deviation (S.D.)	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.4: Water quality parameters for station KV40, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
2-Aug-03		0.01	0.001	0.05	0.5	8.22	0.06	0.3	0.02	2.9	0.002	0.83	0.143	137	38.2	0.006		0.006	0.001		1	0.07	0.006	0.008	0.006
19-Jul-05		0.001	0.0008	0.03	0.1			0.4	0.0014	2.91	0.0001	0.8	0.154		39.4	0.00005		0.001	0.0021		2	0.0005	0.0001	0.003	0.001
Summary statistics																									
n	0	2	1	2	2	1	1	2	1	2	1	2	2	0	2	1	0	1	2	0	2	1	1	2	2
mean	-	0.0055	0.0008	0.04	0.3	8.2	0.06	0.35	0.0014	2.9	0.0001	0.82	0.15	-	39	0.00005	-	0.001	0.0016	-	1.5	0.0005	0.0001	0.0055	0.0035
standard deviation (S.D.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.5: Water quality parameters for station KV38, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total		Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
2-Aug-03	37	0.01	0.05	0.02	0.02	0.0518	0.0006	45	0.02		0.0006	21.4	6	0.001	0.001		0.008		69	5	0.028	0.006	0.006	4.08	0.008
30-Jul-04	36	0.044	0.05	0.0004	0.0032	0.056	0.0001	43	0.0005	0.004	0.00044	20.2	6	0.0005	0.0001	129.2	0.001		66.5	5	0.1	0.0019	0.002	3.2	0.012
27-Feb-05	49	0.005		0.0003	0.0027	0.054	0.0001	60	0.0005	0.041	0.00016	25.3	6	0.0005	0.0001	188	0.001		77.9	5	0.1	0.0003	0.001	4.8	0.005
20-Jul-05	35	0.016	0.003	0.0003	0.0032	0.048	0.0001	6	0.0005	0.003	0.00025	19.8	42	0.0005	0.0001	133	0.001		65	5	0.1	0.0005	0.001	3.7	0.007
23-Aug-05	34	0.02	0.002	0.001	0.002	0.054	0.0005	42	0.002	0.01	0.00028	23	6	0.002	0.0005	155	0.005		66	5	0.5	0.0005	0.005	4	0.02
25-Jan-06	44	0.005		0.0002	0.0024	0.06	0.0001	54	0.0005	0.002	0.0001	23.4	6	0.0005	0.0001	134	0.001		78	5	0.1	0.0005	0.001	4	0.005
15-Mar-06	36	0.007		0.0002	0.0029	0.059	0.0001	44	0.0005	0.002	0.00013	25.4	6	0.0005	0.0001	161	0.001		82	5	0.1	0.0006	0.001	4.7	0.005
26-May-06		0.0909		0.00034	0.00394	0.0389	0.0005		0.0005	0.01	0.000476	15.5		0.0005	0.00011		0.00161		52.0		0.156	0.00166	0.005	3.23	0.0133
30-Jul-06		0.01		0.0003	0.0026	0.059	0.0001		0.0005	0.004	0.0002	22.8		0.0005	0.0001		0.001				0.1	0.0003	0.001	3.9	0.005
28-Feb-07		0.011		0.0002	0.0029	0.06	0.0001		0.0005	0.002	0.00008	26		0.0005	0.0001	154	0.001				0.1	0.0005	0.001	4.9	0.005
Summary statistics																									
n	7	10	4	9	9	10	10	7	10	9	9	10	7	9	9	7	9	0	8	7	10	9	9	10	10
mean	39	0.02	0.03	0.0004	0.0029	0.054	0.0002	42	0.003	0.009	0.0002	22	11	0.0007	0.00015	151	0.0015	-	70	5	0.14	0.0008	0.0020	4.1	0.009
standard deviation (S.D.)	6	0.03	0.03	0.0002	0.0006	0.007	0.0002	17	0.006	0.013	0.0001	3	14	0.0005	0.00013	21	0.0013	-	10	0	0.13	0.0006	0.0017	0.6	0.005
mean - 3 S.D.	22	-0.06	-0.06	-0.0004	0.0012	0.034	-0.0004	-10	-0.016	-0.029	-0.0002	13	-30	-0.0008	-0.00025	89	-0.0025	-	41	5	-0.25	-0.0010	-0.0032	2.2	-0.007
mean + 3 S.D.	55	0.10	0.11	0.0011	0.0045	0.074	0.0009	94	0.021	0.046	0.0007	32	52	0.0022	0.00054	212	0.0055	-	98	5	0.53	0.0025	0.0072	5.9	0.024

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.5: Water quality parameters for station KV38, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
2-Aug-03		0.01	0.001	0.01	0.1	7.8	0.06	0.3	0.02	2.8	0.002	0.68	0.068	38.6	10.9	0.006		0.006	0.001		1	0.07	0.003	0.036	0.006
30-Jul-04		0.001	0.0007	0.05	0.1	7.19		0.4	0.0005	2.28	0.0002	0.6	0.065	31.8	10	0.00005		0.001	0.0013		5	0.0005	0.0001	0.051	0.001
27-Feb-05		0.001	0.0005			7.17		0.4	0.0007	3.54	0.0001	1	0.086	35.6	12.2	0.00005		0.001	0.0008		2	0.0005	0.0005	0.02	0.001
20-Jul-05		0.001	0.0005	0.03	0.03	7.62		0.4	0.0006	2.59	0.0001	0.6	0.072		11.2	0.00005		0.001	0.0007		2	0.0005	0.0001	0.03	0.001
23-Aug-05		0.005	0.0025	0.03	0.04	7.7		2	0.001	2.7	0.0005	2	0.078		13	0.0002		0.005	0.002		2	0.002	0.0005	0.03	0.005
25-Jan-06		0.001	0.0005			7.28		0.4	0.0005	3.17	0.0001	1.1	0.085	43	11.6	0.00005		0.001	0.0008	62	2	0.0005	0.0001	0.014	0.001
15-Mar-06		0.001	0.0005			7.74		0.4	0.0006	3.6	0.0001	1	0.085	36	12.1	0.00005		0.001	0.0009	76	2	0.0005	0.0002	0.017	0.001
26-May-06		0.000142	0.00082	0.001	0.0593		0.3	2	0.001	1.70	0.000022	2	0.0491	25.4		0.0001		0.0001	0.01		6.5	0.000116	0.001	0.0435	
30-Jul-06		0.001	0.0005					0.4	0.0006	2.62	0.0001	0.7	0.075		12.7	0.00005		0.001	0.0573			0.0005	0.0001	0.025	0.001
28-Feb-07		0.001	0.0005			7.63		0.4	0.0005	3.53	0.0001	0.9	0.09		12.8	0.00005		0.001	0.001			0.0005	0.0001	0.014	0.001
Summary statistics																									
n	0	10	9	5	5	8	2	10	9	10	8	10	10	5	9	9	0	8	10	2	8	9	9	10	9
mean	-	0.002	0.0008	0.024	0.07	7.5	0.180	0.71	0.0007	2.9	0.0001	1.1	0.08	34	12	0.00007	-	0.0013	0.008	69.000	2.81	0.0006	0.0003	0.028	0.0020
standard deviation (S.D.)	-	0.003	0.0007	0.019	0.03	0.3	-	0.68	0.0002	0.6	0.0001	0.5	0.01	6	1	0.00005	-	0.0014	0.018	-	1.89	0.0005	0.0003	0.013	0.0020
mean - 3 S.D.	-	-0.007	-0.0012	-0.033	-0.03	6.7	-	-1.33	0.0001	1.0	-0.0003	-0.5	0.04	15	9	-0.00008	-	-0.0029	-0.046	-	-2.85	-0.0010	-0.0006	-0.010	-0.0040
mean + 3 S.D.	-	0.011	0.0027	0.082	0.16	8.3	-	2.75	0.0013	4.7	0.0006	2.6	0.11	54	15	0.00022	-	0.0056	0.061	-	8.48	0.0022	0.0012	0.066	0.0080

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.6: Water quality parameters for station KV41, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
3-Oct-96																112									
30-Oct-96																170									
30-Nov-96																128									
30-Jun-97	40				0.05						0.001					140	0.01					0.05			
10-Oct-97	56				0.05						0.001					210	0.01					0.05			
15-Jan-98					0.05						0.004					220	0.01				1	0.05			0.01
1-Feb-98																230									
13-Mar-98	64			0.05	0.05						0.001					220	0.01		111		1	0.05			0.01
12-May-98	52			0.05	0.05						0.003					180	0.01		95		1	0.05			0.03
9-Jun-98	29.20	0.08		0.06	0.06	0.047	0.001				0.006	17.1		0.018	0.006		0.006				0.212	0.06		3.1	0.015
3-Feb-01	59	0.0445	0.05	0.0005	0.0019	0.0598	0.0000		0.0004	0.0022	0.0001	37.3	6	0.0008	0.0001		0.0014		114	5	0.1019	0.0006	0.0037	6.19	0.0095
8-Nov-01																									
2-Aug-03	43	0.82	0.05	0.02	0.02	0.065	0.0006	53	0.02		0.0006	24.4	6	0.002	0.004		0.013		83	5	3.78	0.017	0.006	4.67	0.216
24-Jan-04																251									
24-Apr-04	60	0.03		0.02	0.04	0.0584	0.0006	73	0.02		0.0006	18.5	6	0.001	0.001		0.001		112	5	0.068	0.01	0.007	4.61	0.0022
30-Jul-04	36	0.782	0.05	0.0004	0.0051	0.072	0.0001	44	0.0005	0.004	0.00042	22.4	6	0.0012	0.0007	136.4	0.004		71.2	5	0.9	0.005	0.003	3.7	0.044
27-Feb-05	62	0.02		0.0002	0.002	0.052	0.0001	76	0.0005	0.023	0.00013	36.3	6	0.0005	0.0001	251	0.001		112	5	0.1	0.0005	0.002	6.4	0.01
30-Jun-05																150									
19-Jul-05	42	1.12	0.021	0.0005	0.0267	0.065	0.0001	6	0.0005	0.003	0.00023	22.8	51	0.0021	0.002	148	0.006		74	5	2.6	0.0166	0.003	4.3	0.113
22-Aug-05	44	1.8	0.006	0.0007	0.029	0.091	0.0001	54	0.0005	0.002	0.00031	25.5	6	0.0038	0.0024	167	0.008		76	5	4.6	0.0316	0.004	5	0.173
27-Oct-05	48	0.077	0.002	0.0003	0.0027	0.053	0.0001	59	0.0005	0.002	0.00017	29.7	6	0.0005	0.0002		0.001			5	0.1	0.0007	0.002	4.9	0.019
25-Jan-06	54	0.028		0.0002	0.0022	0.059	0.0001	66	0.0005	0.002	0.0001	31.8	6	0.0005	0.0001	201	0.001		100	5	0.1	0.0009	0.002	5.1	0.005
14-Mar-06	57	0.019		0.0002	0.002	0.055	0.0001	70	0.0005	0.002	0.00012	32.2	6	0.0005	0.0001	233	0.001		110	5	0.1	0.0008	0.002	5.6	0.008
26-May-06		0.322		0.00054	0.00317	0.0399	0.0005		0.0005	0.01	0.000306	15.8		0.00058	0.00026		0.00242		52.5		0.485	0.00219	0.005	3.14	0.0193
30-Jul-06		0.094		0.0002	0.0027	0.057	0.0001		0.0005	0.004	0.00014	24.7		0.0005	0.0009		0.001				0.2	0.0012	0.002	4.1	0.065
28-Feb-07		0.23		0.0002	0.004	0.052	0.0001		0.0005	0.002	0.00004	36.8		0.0005	0.0004	201	0.001				0.5	0.003	0.002	6.7	0.033
Summary statistics																									
n	15	14	6	10	10	14	14	9	13	11	10	14	10	10	10	18	10	0	12	10	17	10	10	14	17
mean	50	0.4	0.030	0.0003	0.008	0.059	0.0003	56	0.003	0.005	0.00020	27	11	0.0011	0.0007	186	0.003	-	93	5	1.0	0.006	0.0027	4.8	0.05
standard deviation (S.D.)	10	0.5	0.023	0.0002	0.011	0.012	0.0003	21	0.007	0.006	0.00012	7	14	0.0011	0.0008	44	0.003	-	21	0	1.4	0.010	0.0011	1.1	0.06
mean - 3 S.D.	19	-1.2	-0.039	-0.0002	-0.024	0.022	-0.0006	-8	-0.018	-0.014	-0.00016	5	-32	-0.0022	-0.0018	54	-0.005	-	31	5	-3.1	-0.024	-0.0005	1.4	-0.14
mean + 3 S.D.	81	2.0	0.099	0.0009	0.040	0.096	0.0011	120	0.025	0.024	0.00055	49	53	0.0043	0.0032	318	0.010	-	155	5	5.1	0.037	0.0059	8.2	0.23

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.6: Water quality parameters for station KV41, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
3-Oct-96						7.61															44				
30-Oct-96						7.28															16				
30-Nov-96						7.39															52				
30-Jun-97			0.01			7.7								32							9			0.18	
10-Oct-97			0.01			7.1								45.9							5			0.01	
15-Jan-98			0.01			7.3								51							5			0.004	
1-Feb-98						7.3															88			0.28	
13-Mar-98			0.01			7.4								54.9							42			0.11	
12-May-98			0.01			7.6								41							12			0.05	
9-Jun-98		0.01	0.02	0.05	0.01			0.1	0.06	2.12	0.01	0.5	0.057	32.00	9.97			0.06	0.002		5		0.01	0.058	
3-Feb-01	0.00011	0.0002	0.0008	0.177	0.002		0.0333	0.4444	0.0003	4.0	0.0001	1.0	0.0996	18.8	19.4	0.0011			0.0013		2		0.00003	0.0247	
8-Nov-01																									
2-Aug-03		0.01	0.006	0.01	0.1	7.88	0.07	0.3	0.02	4.1	0.002	0.67	0.071	40.9	11.9	0.006		0.006	0.027		52	0.07	0.006	0.582	0.006
24-Jan-04						7.16														108					
24-Apr-04		0.01	0.002				0.06	1	0.1	3.5	0.002	0.54	0.104	51.7	19.2			0.01	0.004		3	0.07	0.001	0.026	0.006
30-Jul-04		0.001	0.002	0.05	0.1	7.73		0.4	0.0004	3.16	0.0002	0.7	0.067	32.6	10.5	0.00005		0.001	0.0266		38	0.0005	0.0019	0.055	0.001
27-Feb-05		0.001	0.0005			7.16		0.4	0.001	3.39	0.0001	1.1	0.098	52.6	17.9	0.00005		0.001	0.0016		2	0.0009	0.0004	0.02	0.001
30-Jun-05						7.7																			
19-Jul-05		0.001	0.004	0.03	0.03	7.23		0.4	0.0006	4.48	0.0003	0.8	0.074		11.4	0.00005		0.001	0.0483		32	0.0005	0.0034	0.033	0.002
22-Aug-05		0.001	0.0044	0.03	0.04	7.89		0.4	0.0007	6.56	0.0009	0.7	0.075	13	0.00005			0.001	0.0899		62	0.0006	0.006	0.04	0.001
27-Oct-05		0.001	0.0008	0.1	0.1	7.81		0.4	0.0008	3	0.0001	2.4	0.099		15.4	0.00005		0.001	0.0152		5	0.0005	0.0004	0.027	0.001
25-Jan-06		0.001	0.0005			7.42		0.4	0.0007	3.01	0.0001	1	0.094	54	15.7	0.00005		0.001	0.0018	86	2	0.0006	0.0001	0.016	0.001
14-Mar-06		0.001	0.0005			8.76		0.4	0.0009	3.3	0.0001	1.4	0.092	50	15.7	0.00005		0.001	0.0016	110	4	0.0006	0.0003	0.019	0.001
26-May-06		0.000175	0.00136	0.001	0.0627		0.3	2	0.001	1.87	0.000059	2	0.0473	21.8		0.0001		0.0001	0.01		17.2	0.000183	0.001	0.0306	
30-Jul-06		0.001	0.0007					0.4	0.0006	2.71	0.0001	0.7	0.074		12.8	0.00005		0.001	0.0551			0.0005	0.0004	0.02	0.001
28-Feb-07		0.001	0.0017			7.81		0.4	0.001	3.58	0.0001	0.9	0.1		18.7	0.00005		0.001	0.0226			0.0007	0.0008	0.027	0.001
Summary statistics																									
n	1	14	10	8	8	20	4	14	10	14	10	14	14	5	13	10	0	10	14	3	21	10	10	20	11
mean	0.00011	0.003	0.0016	0.06	0.05	7.6	0.12	0.5	0.0008	3.5	0.00021	1.0	0.08	42	15	0.00006	-	0.0009	0.02	101	24	0.0006	0.0015	0.08	0.0020
standard deviation (S.D.)	-	0.004	0.0014	0.06	0.04	0.4	0.12	0.5	0.0002	1.1	0.00025	0.6	0.02	14	3	0.00002	-	0.0003	0.03	13	25	0.0002	0.0019	0.14	0.0020
mean - 3 S.D.	-	-0.009	-0.0027	-0.12	-0.07	6.4	-0.26	-0.9	0.0002	0.1	-0.00056	-0.6	0.03	-1	5	0.00001	-	0.0001	-0.06	61	-51	0.0000	-0.0042	-0.33	-0.0040
mean + 3 S.D.	-	0.015	0.0060	0.23	0.18	8.7	0.49	1.9	0.0014	6.9	0.00097	2.7	0.14	85	25	0.00010	-	0.0018	0.10	141	98	0.0011	0.0071	0.49	0.0080

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.7: Water quality parameters for station KV6, United Keno Hill, 1994 - 2007¹.

Parameter	Alkalinity-T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	
	as CaCO ₃	Total	Total	Total	Total	Total	Total	mg/L	Total	Total	Total	Total	mg/L	Total	Total	µS/cm	Total	Total	as CaCO ₃	mg/L	Total	Total	Total	Total	Total	Total	Total	Total	mg/L	mg/L	pH units	Total	Total	Total	Total	Total	Total	
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	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	mg/L	mg/L	mg/L	mg/L
Sample Date																																						
27-Jan-94																540		0.01				0.02																
24-Feb-94																780		0.01				0.02																
28-Mar-94																760		0.02				0.02																
23-Apr-94																210		0.01				0.01																
1-Jun-94																380		0.01				0.04																
29-Jul-94																800		0.01				0.1																
17-Aug-94																974		0.01				0.07																
29-Sep-94																550		0.06				0.06																
31-Oct-94											0.001					620	0.002				0.6	0.005			0.67													
29-Nov-94											0.001					700	0.002				0.4	0.015			1.12													
5-Jan-95											0.007					810	0.002				0.8	0.01			1.33													
29-Mar-95					0.003						0.001					1900	0.002				0.2	0.005			1.28													
27-Apr-95					0.004						0.017					520	0.002				0.8	0.04			1.91			0.02										
3-May-95					0.01						0.003					275	0.002				0.6	0.01			0.74			0.002										
6-Jul-95																530	0.01				0.49			0.73														
11-Jul-95					0.02						0.002						0.017				0.428	0.01			0.57			0.004										
11-Aug-95					0.008						0.001					460	0.002				0.4	0.01			0.42			0.002										
4-Sep-95					0.003						0.002					400	0.002				0.2	0.005			0.34			0.002										
11-Oct-95					0.003						0.001					300	0.002				0.2	0.005			0.11			0.006										
5-Nov-95					0.008						0.002					510	0.004				0.6	0.005			1.65			0.008										
12-Dec-95					0.005						0.001					355	0.002				0.4	0.01			2.6			0.008										
1-Jan-96					0.001						0.001					365	0.004				0.02	0.005			0.026			0.002										
9-Feb-96					0.001						0.001					530	0.002				0.2	0.005			0.098			0.002										
5-Mar-96					0.001						0.002					430	0.006				0.2	0.005			0.11			0.008										
7-Apr-96					0.005						0.001					450	0.014				0.2	0.015			0.064			0.002										
28-Apr-96					0.009						0.006					450	0.016				3.4	0.055			1.74			0.014										
24-Jun-96					0.003						0.001					500	0.002				0.2	0.015			0.014			0.004										
17-Jul-96	107										0.006					714	0.01		375		0.36	0.06			0.332				0.029	0.005								
18-Jul-96					0.03						0.004					340	0.002				0.2	0.02			0.25			0.006										
2-Aug-96					0.01						0.01					600	0.01				0.01	0.48			0.52			0.01										
16-Sep-96					0.01						0.01					360	0.01				0.01	0.01			0.34			0.01										
3-Oct-96					0.01						0.01					320	0.01				0.01	0.01			0.4			0.01										
30-Oct-96											0.01					440	0.01				0.2	0.01			0.39			0.01										
30-Nov-96											0.01					320	0.01				0.2	0.01			1.57			0.01										
21-May-97	32.3										0.006					242	0.006		119		1.01	0.06			0.498			0.021	0.005									
30-Jun-97	101				0.05						0.005					850	0.01				0.05						0.01											
10-Oct-97	142				0.05						0.001					800	0.01				0.05						0.01											
15-Jan-98					0.05						0.001					810	0.01				1	0.05			0.46			0.01										
1-Feb-98	144			0.05	0.05						0.001					880	0.01		506		1	0.05			2.3			0.01										
13-Mar-98	150			0.05	0.05						0.003					860	0.01		519		4	0.05			2.6			0.03										
12-Apr-98				0.05	0.05						0.005					990	0.01		559		2	0.05			1.25			0.16										
12-May-98	82			0.05	0.05						0.002					540	0.01		325		1	0.05			0.78			0.01										
24-May-01		2.24		0.02	0.02	0.149	0.0006				0.0031	72		0.003	0.003		0.036				6.44	0.013		13	1.11		0.01	0.013					1.3	0.02	4.5	0.002		
8-Feb-01	114	0.01	0.05	0.05	0.02	0.0702	0.0005		0.02		0.0015	163		0.001	0.001		0.002		503		0.246	0.005	0.013	23.4	1.06	0.01	0.004	0.25	0.5	7.70	0.05	0.6	0.02	3.96	0.002	1.61		
11-Jul-01	87	0.23		0.02	0.02	0.0507	0.0006				0.0018	84.6	6			638	0.02				0.853	0.013		14.9	0.399	0.01	0.008	0.047	0.002	7.7	0.06	0.4	0.02	2	0.002			
7-Mar-03		0.01		0.02	0.02	0.071	0.0006		0.02		0.0013	173		0.001	0.001		0.001				0.379	0.006	0.012	24.4	1.34	0.01	0.006			8.09	0.06	0.4	0.02	0.4	0.002	1.58		
2-Aug-03	132	1.09	0.05	0.02	0.02	0.0953	0.0006	160	0.02		0.0023	190	6			601	0.018		601	5	2.42	0.006	0.016	34.8	0.578	0.01	0.008	0.1	1		0.06	0.4	0.06	4.5	0.002	1.63		
12-Sept-03		0.01		0.02	0.02	0.0514	0.0006		0.02		0.0012	109		0.001	0.001		0.004				0.151	0.006	0.006	21.1	0.51	0.01	0.002				0.06	0.3	0.02	3.1	0.002	1.28		
31-Oct-03		0.01		0.02	0.02	0.0644	0.0006		0.02		0.0016	147		0.001	0.001		0.001				0.101	0.006	0.009	27.8	0.271	0.01	0.001			8.2	0.06	0.3	0.19	4.6	0.002	1.69		
17-Dec-03	113	0.01		0.02	0.02	0.0762	0.0006	138	0.02		0.0006	50.2	6	0.001	0.001		0.001			165	5	0.036	0.006	0.006	10.1	0.0364	0.01	0.001		8	0.06	0.3	0.02	2.8	0.002	0.97		
19-Feb-04	143	0.01		0.02	0.04	0.084	0.0006	175	0.02		0.0006	230	6	0.001	0.001	771	0.002			679	5	0.187	0.033	0.016	36.9	1.53	0.01	0.006			0.06	1	0.1	5.1	0.002	1.94		
23-Mar-04	143	0.01		0.02	0.04	0.0522	0.0033	175	0.29		0.0011	147	6	0.001	0.001	786	0.01			497	5	0.293	0.01	0.014	25.3	1.18	0.01	0.004		7.94	0.06	1	0.1	4.4	0.002	1.38		
24-Apr-																																						

Appendix Table A.7: Water quality parameters for station KV6, United Keno Hill, 1994 - 2007¹.

Parameter	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date													
27-Jan-94									4				
24-Feb-94									8				
28-Mar-94									8				
23-Apr-94									4				
1-Jun-94									8				
29-Jul-94									1				
17-Aug-94									8				
29-Sep-94									1				
31-Oct-94									1			0.68	
29-Nov-94									1			0.92	
5-Jan-95												0.87	
29-Mar-95									2			0.115	
27-Apr-95									12			1.75	
3-May-95									16			0.61	
6-Jul-95									4			0.54	
11-Jul-95									5			0.281	
11-Aug-95									16			0.25	
4-Sep-95									1			0.27	
11-Oct-95									16			0.27	
5-Nov-95									20			0.5	
12-Dec-95									4			0.36	
1-Jan-96									1			0.026	
9-Feb-96									4			0.022	
5-Mar-96									1			0.3	
7-Apr-96									1			0.008	
28-Apr-96									124			0.67	
24-Jun-96									5			0.67	
17-Jul-96		281							5				
18-Jul-96									19			0.31	
2-Aug-96									32			0.46	
16-Sep-96									96			0.29	
3-Oct-96									48			0.24	
30-Oct-96									48			0.25	
30-Nov-96									12			0.27	
21-May-97		80							19				
30-Jun-97		425							374			0.47	
10-Oct-97		307							5			0.1	
15-Jan-98		233							15			0.001	
1-Feb-98		385							30			0.33	
13-Mar-98		389							48			13.5	
12-Apr-98		165							24			0.25	
12-May-98		243							9			0.35	
24-May-01	0.126		53.8			0.006			512		0.01	1.05	
8-Feb-01	0.234	331	119	0.005		0.005	0.001		5	0.06	0.001	0.209	0.005
11-Jul-01	0.143	280	66.1			0.006			51		0.008	0.54	
7-Mar-03	0.213		120		0.006	0.006	0.001			0.07	0.019	0.168	0.006
2-Aug-03	0.279	467	149	0.006		0.006	0.029		98	0.07	0.022	0.9	0.006
12-Sept-03	0.177		73.3		0.006	0.012	0.004			0.07	0.001	0.292	0.006
31-Oct-03	0.232		86.7		0.006	0.013	0.001			0.07	0.001	0.259	0.006
17-Dec-03	0.141	63.4	21.3		0.006	0.006	0.001		2	0.07	0.001	0.001	0.006
19-Feb-04	0.272	429	144		0.006	0.01	0.004		2	0.07	0.001	0.164	0.006
23-Mar-04	0.252	343	126			0.01	0.004		2	0.07	0.001	0.177	0.006
24-Apr-04	0.255	349	116			0.006			3	0.07	0.001	0.171	0.006
19-May-04	0.054	62.7	21.1		0.006	0.01	0.028		5	0.07	0.002	0.164	0.006
17-Jun-04	0.183	281	88.9		0.007	0.01	0.004		2	0.09	0.001	0.35	0.006
21-Jul-04	0.237	317	116	0.00005		0.001	0.006		1	0.006	0.0001	0.678	0.001
30-Jul-04	0.23	281	95.3	0.00005		0.001	0.0078		5	0.0057	0.0002	0.52	0.001
24-Aug-04	0.273	72.5	91.4			0.01	0.093		2	0.07	0.001	0.396	0.006
21-Sept-04	0.238	271	87.2	0.00005		0.001	0.0051		1	0.0064	0.0001	0.291	0.001
22-Oct-04	0.248	287	97.4	0.00005		0.001	0.0067		1	0.0065	0.0006	0.27	0.001
29-Nov-04	0.248	315	95.2	0.00005		0.001	0.0065		2	0.0063	0.0002	0.255	0.001
17-Dec-04		307	0.105	0.00005			0.0063		1	0.007		0.237	
26-Jan-05	0.23	334	107	0.00005		0.001	0.0062		1	0.0068	0.0001	0.164	0.001
27-Feb-05	0.264	320	111	0.0005		0.01	0.0063		2	0.007	0.001	0.143	0.01
22-Mar-05	0.272	320	109	0.00005		0.001	0.005		2	0.0072	0.0001	0.185	0.001
22-Apr-05	0.254	300	105	0.00005		0.001	0.0062		2	0.0067	0.0001	0.149	0.001
26-May-05	0.157	170	60	0.00005		0.001	0.0155		17	0.0038	0.0015	0.38	0.001
30-Jun-05	0.229	250	85.2	0.00005		0.001	0.0172		36	0.0055	0.0014	0.438	0.001
20-Jul-05	0.212		78.2	0.00005		0.001	0.0081		80	0.0059	0.0006	0.389	0.001
22-Aug-05	0.176		71.3	0.00005		0.001	0.0192		8	0.0048	0.0017	0.709	0.001
22-Sep-05	0.192	248	71	0.00005		0.001	0.0049		2	0.0047	0.0002	0.275	0.001
27-Oct-05	0.229		77.7	0.00005		0.001	0.0089		2	0.0051	0.0004	0.322	0.001
29-Nov-05	0.229	250	91.6	0.00005		0.001	0.0056		2	0.0051	0.0002	0.228	0.001
14-Dec-05	0.224	293	84.2	0.00005		0.001	0.0043		2	0.0045	0.0001	0.166	0.001
25-Jan-06	0.228	297	82.1	0.00005		0.001	0.006		2	0.0054	0.0001	0.123	0.001
23-Feb-06	0.205	270	90	0.00005		0.001	0.0044		4	0.0047	0.0001	0.116	0.001
15-Mar-06	0.224	280	91.3	0.00005		0.001	0.006		2	0.0052	0.0002	0.13	0.001
28-Apr-06	0.229	87	94.8	0.00005		0.001	0.0038		2	0.0046	0.0002	0.147	0.001
28-May-06	0.095	106	35.2	0.00005		0.001	0.0081		12	0.0018	0.0007	0.218	0.001
28-Jun-06	0.179		73.2	0.00005		0.001	0.005			0.0044	0.0001	0.334	0.001
30-Jul-06	0.204		81	0.00005		0.001	0.0616			0.0044	0.0004	0.213	0.001
31-Aug-06	0.19		82.1	0.0001		0.002	0.005			0.0053	0.0002	0.249	0.002
21-Sep-06	0.186		79.4	0.00005		0.001	0.0046			0.0046	0.0001	0.223	0.001
24-Oct-06	0.185		78.2	0.00005		0.001	0.0054			0.0051	0.0001	0.182	0.001
29-Nov-06	0.581		221	0.00005		0.001	0.0116			0.0074	0.0002	0.611	0.001
21-Dec-06	0.148		48.6	0.00005		0.001	0.0184			0.0014	0.0011	0.022	0.001
22-Jan-07	0.218		91.8	0.00005		0.001	0.0068			0.0053	0.0002	0.106	0.001
25-Feb-07	0.234		85.7	0.00005		0.001	0.0058			0.0058	0.0001	0.101	0.001
23-Mar-07	0.196		66.6	0.00005		0.001	0.0005			0.0022	0.0001	0.015	0.001
18-Apr-07	0.232		81.7	0.00005		0.001	0.0005			0.0026	0.0004	0.169	0.001
29-May-07	0.11		42.5	0.0001		0.002				0.002	0.0023	0.14	0.002
17-Jun-07	0.179		71.4	0.00005		0.001	0.0025			0.0047	0.0005	0.244	0.001
Summary statistics													
n	49	21	50		36	36	48	-	75	37	36	82	47
mean	0.21	256	86	0.00007	0.0061	0.002	0.011	-	26	0.007	0.0005	0.5	0.0025
standard deviation (S.D.)	0.07	79	35	0.00008	0.0004	0.004	0.017	-	74	0.011	0.0005	1.5	0.0024
mean - 3 S.D.	0.00	20	-18	-0.00016	0.0050	-0.010	-0.041	-	-197	-0.026	-0.0012	-4.0	-0.0048
mean + 3 S.D.	0.43	492	191	0.00029	0.0073	0.013	0.063	-	249	0.039	0.0021	4.9	0.0098

RED Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above either guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.8: Water quality parameters for station KV16, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
17-Dec-03	103	0.07		0.02	0.02	0.0631	0.0006	126	0.02		0.0011	141	6	0.001	0.001		0.006		438	5	0.163	0.007	0.007	22	0.83
22-Jan-04																986									
5-Jan-04	138	0.038		0.0005	0.0037	0.075	0.0001	169	0.0005	0.005	0.00533	150	6	0.0005	0.0011		0.001		484	5	0.3	0.0127	0.011	28	4.46
19-Feb-04	138	0.06		0.02	0.04	0.0712	0.0006	169	0.02		0.0029	233	6	0.001	0.001	862	0.111		695	5	0.303	0.044	0.017	37.3	9.27
23-Mar-04	134	0.01		0.02	0.04	0.0467	0.0011	163	0.12		0.0078	153	6	0.001	0.001	842	0.002		528	5	0.233	0.028	0.042	25.6	6.19
24-Apr-04	145	0.01		0.02	0.04	0.0602	0.0006	177	0.02		0.0045	102	6	0.001	0.001	863	0.001		534	5	0.262	0.01	0.015	18.8	4.33
19-May-04	42	1.04		0.02	0.04	0.0847	0.0006	52	0.02		0.006	0.002	6	38.2	0.002	220	0.002		114	5	0.019	2.67	0.033	0.007	6.14
17-Jun-04	129	0.08		0.02	0.04	0.0538	0.0006	157	0.02		0.002	136	6	0.002	0.001		0.009		424	5	0.294	0.01	0.009	21.8	0.468
21-Jul-04	132	0.28		0.0006	0.0058	0.068	0.0001	161	0.0005	0.004	0.00347	146	6	0.0005	0.0006	900	0.003		470	5	0.6	0.0056	0.017	27.6	0.724
24-Aug-04	143	0.01		0.02	0.04	0.0578	0.0006	174	0.02		0.0024	144	6	0.001	0.001	800	0.003		500	5	0.157	0.01	0.014	24	0.446
21-Sep-04	130	0.039		0.0002	0.0031	0.058	0.0001	158	0.0005	0.002	0.00161	139	6	0.0005	0.0003		0.001		437	5	0.3	0.0015	0.013	25.8	0.342
22-Oct-04	141	0.019		0.0002	0.0023	0.06	0.0001	172	0.0005	0.003	0.0014	152	6	0.0005	0.0004		0.001		535	5	0.2	0.0009	0.014	28.5	0.365
29-Nov-04	150	0.017		0.0002	0.002	0.064	0.0001	182	0.0005	0.002	0.00117	148	6	0.0005	0.0003		0.001		495	5	0.2	0.0014	0.014	25.9	0.747
26-Jan-05	164	0.043		0.0003	0.0033	0.072	0.0001	200	0.0005	0.002	0.00073	160	6	0.0005	0.0007	1028	0.001		531	5	0.4	0.0043	0.013	28.6	1.73
27-Feb-05	154	0.023		0.0003	0.0031	0.069	0.0001	188	0.0007	0.002	0.00071		6	0.0005	0.0005		0.001		514	5	0.3	0.0044	0.015		
22-Mar-05	167	0.02		0.0002	0.0028	0.065	0.0001	204	0.0005	0.002	0.0009	169	6	0.0005	0.0004	1068	0.001		586	5	0.3	0.0022	0.013	28.3	1.38
22-Apr-05	145	0.13		0.0002	0.0069	0.062	0.0001	177	0.0005	0.002	0.00365	173	6	0.0005	0.0028	1025	0.001		536	5	1.2	0.004	0.015	28.6	2.97
27-May-05	90	0.573		0.0005	0.0057	0.06	0.0001	110	0.0005	0.004	0.00189	100	6	0.0012	0.0008	870	0.003		315	5	1.3	0.0098	0.009	16.8	0.465
30-Jun-05	118	0.093		0.0005	0.0042	0.063	0.0001	144	0.0005	0.002	0.0016	131	6	0.0005	0.0012	755	0.001		418	5	0.4	0.0052	0.01	24.2	0.315
20-Jul-05	138	0.103	0.025	0.0005	0.0052	0.06	0.0001	168	0.0005	0.005	0.00202	124	6	0.0005	0.0003	710	0.001		425	5	0.4	0.0075	0.012	24	0.369
23-Aug-05	113	6.15		0.0009	0.0639	0.221	0.0002	138	0.0005	0.004	0.0877	321	6	0.0106	0.0301		0.018		1000	5	18.5	0.0388	0.025	51.2	23.8
22-Sep-05	128	0.302	0.05	0.0003	0.0039	0.06	0.0001	156	0.0005	0.003	0.00175	123	6	0.0007	0.0007	874	0.002		398	5	0.8	0.0032	0.011	21	0.418
27-Oct-05	129	0.034	0.019	0.0002	0.0027	0.055	0.0001	157	0.0005	0.003	0.00122	136	6	0.0005	0.0006		0.001			5	0.2	0.0011	0.014	23.2	0.362
3-Nov-05	129	0.034		0.0002	0.0027	0.055	0.0001	157	0.0005	0.003	0.00122	136	6	0.0005	0.0006		0.001			5	0.2	0.0011	0.014	23.2	0.362
29-Nov-05	144	0.037		0.0003	0.0031	0.065	0.0001	176	0.0005	0.002	0.00145	138	6	0.0005	0.0004		0.002		447	5	0.3	0.0115	0.014	24.2	0.948
14-Dec-05	137	0.075		0.0002	0.003	0.061	0.0001	167	0.0005	0.003	0.00107	140	6	0.0005	0.0005	876	0.001		458	5	0.3	0.0065	0.014	24.7	0.989
25-Jan-06	142	0.12		0.0002	0.0034	0.07	0.0001	173	0.0005	0.002	0.00086	127	6	0.0005	0.0005	789	0.004		457	5	0.5	0.0036	0.01	21.7	0.902
23-Feb-06	138	0.088		0.0002	0.0036	0.066	0.0001	168	0.0005	0.003	0.0008	150	6	0.0005	0.0004		0.001		504	5	0.5	0.003	0.014	23.9	0.977
15-Mar-06	140	0.022		0.0002	0.0033	0.071	0.0001	171	0.0005	0.002	0.00091	152	6	0.0005	0.0007	746	0.001		464	5	0.4	0.004	0.015	26.6	1.04
28-Apr-06	146	0.023		0.0002	0.0027	0.059	0.0001	178	0.0005	0.002	0.00076	151	6	0.0005	0.0003		0.002		472	5	0.2	0.0024	0.01	23.2	0.751
26-May-06	92	1.14		0.0005	0.0063	0.063	0.0001	112	0.0005	0.002	0.00123	70.4	6	0.002	0.0013		0.005		214	5	2.1	0.0107	0.007	11.8	0.477
28-Jun-06		1.55		0.0005	0.0198	0.124	0.0001		0.0005	0.003	0.00424	115		0.0024	0.0043	727	0.015				6	0.0268	0.009	19.4	0.979
30-Jul-06		1.06		0.0007	0.0159	0.085	0.0001		0.0005	0.005	0.00329	142		0.002	0.0019		0.006				2.6	0.0129	0.013	24.5	0.905
31-Aug-06		0.19		0.0004	0.0052	0.068	0.0002		0.001	0.004	0.00204	135		0.001	0.0004	740	0.002				0.6	0.0059	0.01	24.8	0.375
21-Sep-06		0.107		0.0003	0.0037	0.058	0.0001		0.0005	0.002	0.00129	133		0.0005	0.0006	760	0.001				0.3	0.0025	0.011	23.9	0.255
25-Oct-06		0.366		0.0005	0.0054	0.068	0.0001		0.0005	0.002	0.00146	142		0.0008	0.0005	790	0.002				1	0.0104	0.012	25.6	0.354
29-Nov-06		0.006		0.0007	0.004	0.115	0.0001		0.0005	0.004	0.00218	296		0.0005	0.0005	572	0.001				0.1	0.0014	0.021	61	0.974
22-Dec-06		0.12		0.0004	0.0031	0.07	0.0001		0.0005	0.002	0.00103	149		0.0005	0.0006		0.002				0.4	0.0049	0.012	27.1	0.928
22-Jan-07		0.006		0.0002	0.0015	0.056	0.0001		0.0005	0.002	0.0028	581		0.0005	0.0001	1645	0.001				0.1	0.0005	0.057	107	0.232
28-Feb-07		823		0.01	0.0004	0.002	0.13		0.0002	0.001	0.026	0.00948		0.001	0.0003	3104	0.002				0.2	0.0006	0.19	184	0.257
23-Mar-07		0.005		0.0002	0.0035	0.074	0.0001		0.0005	0.002	0.00149	531		0.0005	0.0009	1999	0.001				0.1	0.0003	0.053	96.6	0.318
18-Apr-07		0.027		0.0002	0.0023	0.052	0.0001		0.0005	0.002	0.00139	166		0.0005	0.0003	827	0.001				0.2	0.0037	0.015	28.2	0.623
29-May-07		0.478		0.0004	0.0042	0.062	0.0002		0.001	0.004	0.00188	315		0.002	0.001	1215	0.002				1	0.0022	0.01	26.7	0.414
17-Jun-07		0.496		0.0005	0.0054	0.065	0.0001		0.0005	0.002	0.00185	121		0.0012	0.0007	591	0.003				1	0.0067	0.01	21.4	0.523
Summary statistics																									
n	30	43	3	36	36	43	43	30	43	36	36	42	30	36	36	28	36	0	28	30	43	36	36	42	42
mean	131	19	0.031	0.001	0.007	0.07	0.003	160	0.006	0.0028	0.005	166	6	0.0011	0.002	971	0.003	-	478	5	1.0	0.006	0.02	33	2
standard deviation (S.D.)	24	125	0.016	0.004	0.012	0.03	0.020	30	0.019	0.0011	0.015	107	0	0.0017	0.005	528	0.004	-	149	0	2.9	0.008	0.03	30	4
mean - 3 S.D.	58	-357	-0.018	-0.010	-0.029	-0.02	-0.056	71	-0.051	-0.0004	-0.040	-155	6	-0.0041	-0.013	-612	-0.008	-	32	5	-7.6	-0.016	-0.07	-58	-10
mean + 3 S.D.	204	396	0.081	0.012	0.043	0.16	0.063	249	0.063	0.0059	0.049	487	6	0.0062	0.016	2554	0.014	-	925	5	9.7	0.029	0.11	124	14

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.8: Water quality parameters for station KV16, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
17-Dec-03		0.01	0.002				0.06	0.7	0.02	4.1	0.002	2.01	0.208	287	96.7		0.006	0.022	0.001		2	0.07	0.001	0.187	0.006
22-Jan-04						7.1																			
5-Jan-04		0.001	0.013					0.4	0.0009	3.36	0.0001	2	0.28	340	114	0.00005		0.001	0.007		3	0.0072	0.0002	2.9	0.001
19-Feb-04		0.01	0.022				0.06	1	0.1	5	0.002	2.02	0.303	462		156	0.006	0.01	0.006			0.07	0.001	5.41	0.006
23-Mar-04		0.01	0.023			7.48	0.22	1	0.1	4.5	0.002	1.4	0.283	395	148			0.01	0.004		5	0.07	0.001	4.400	0.006
24-Apr-04		0.01	0.008			7.39	0.15	1	0.1	4.4	0.002	1.2	0.31	382	134			0.01	0.009		4	0.07	0.001	2.240	0.006
19-May-04		0.464	0.01			7.77	0.008	0.16	1	0.1	0.002	0.51	0.062	62.7	21.1		0.006	0.01	0.051		146	0.07	0.003	0.284	0.006
17-Jun-04		0.01	0.007			8.3	0.06	1	0.1	2	0.002	1.62	0.231	259	100		0.006	0.011	0.006		9	0.07	0.001	0.279	0.006
21-Jul-04		0.001	0.0053			8.3		0.4	0.0005	2.56	0.0002	1.7	0.3	326	106	0.00005		0.001	0.0138		11	0.0053	0.0008	0.536	0.001
24-Aug-04		0.01	0.002			7.6	0.06	1	0.1	2.6	0.002	1.28	0.306	274	103			0.01	0.094		3	0.07	0.001	0.326	0.006
21-Sep-04		0.001	0.0026			8.3	0.5		0.0008	2.8	0.0001	1.6	0.26	282	92.3	0.00005		0.001	0.007		4	0.0052	0.0002	0.245	0.001
22-Oct-04		0.001	0.0094					0.4	0.001	3.38	0.0001	1.8	0.3	334	106	0.00005		0.001	0.0079		2	0.0059	0.0004	0.25	0.001
29-Nov-04		0.001	0.004			7.2		0.5	0.0008	3.59	0.0003	1.8	0.307	319	104	0.00005		0.001	0.0049		2	0.0056	0.0005	0.243	0.001
26-Jan-05		0.001	0.0053			7.4		0.7	0.0006	4.12	0.0002	1.7	0.283	355	116	0.00005		0.001	0.0082		4	0.0062	0.0002	0.18	0.001
27-Feb-05		0.001	0.0041			7.1			0.0007	4.33	0.0001	1.5	0.3	343	114	0.00005		0.001	0.0068		2	0.0061	0.0013	0.168	0.001
22-Mar-05		0.001	0.004			8.95		0.6	0.0007	4.5	0.0001	2	0.35	390	125	0.00005		0.001	0.0058		2	0.006	0.0002	0.298	0.001
22-Apr-05		0.001	0.014			8.3	1		0.0007	4.4	0.0001	2	0.322	360	127	0.00005		0.001	0.025		14	0.0058	0.0006	3.42	0.001
27-May-05		0.001	0.0057			8.5		0.4	0.0005	3.92	0.0003	1.1	0.192	200	73	0.00005		0.001	0.0254		30	0.0033	0.0021	0.288	0.001
30-Jun-05		0.001	0.0029			8.2		0.4	0.0006	2.25	0.0001	1.3	0.282	260	98.6	0.00005		0.001	0.0065		6	0.0051	0.0004	0.196	0.001
20-Jul-05		0.001	0.0029	0.03	0.08	8.2	0.5		0.0007	2.61	0.0001	1.5	0.272		96.9	0.00005		0.001	0.0066		4	0.0053	0.0004	0.284	0.001
23-Aug-05		0.001	0.129				1.2		0.001	11.7	0.0008	2.5	0.642	900	298	0.00016		0.001	0.202		332	0.0038	0.02	35.9	0.003
22-Sep-05		0.001	0.0037			8.27	0.4		0.0005	3.31	0.0001	1.6	0.23	292	84	0.00005		0.001	0.0231		18	0.0042	0.001	0.29	0.001
27-Oct-05		0.001	0.0039	0.11	0.11			0.4	0.0011	3.43	0.0001	1.8	0.314		97.5	0.00005		0.001	0.0103		3	0.0049	0.0004	0.353	0.001
3-Nov-05		0.001	0.0039			8.3	0.4		0.0011	3.43	0.0001	1.8	0.314		97.5	0.00005		0.001	0.0103		3	0.0049	0.0004	0.353	0.001
29-Nov-05		0.001	0.0067				0.4		0.0008	3.92	0.0001	1.6	0.272	250	100	0.00005		0.001	0.0067		4	0.0047	0.0003	0.248	0.001
14-Dec-05		0.001	0.0037			6.6	0.5		0.001	3.98	0.0001	1.8	0.28	310	101	0.00005		0.001	0.0076		4	0.0043	0.0002	0.190	0.001
25-Jan-06		0.001	0.0024			7.1	0.5		0.0006	3.7	0.0001	1.7	0.275	1200	92.5	0.00005		0.001	0.0102		9	0.005	0.0004	0.135	0.001
23-Feb-06		0.001	0.0005				0.5		0.0011	4.25	0.0001	1.6	0.282	320	109	0.00005		0.001	0.0075		6	0.0047	0.0003	0.144	0.001
15-Mar-06		0.001	0.0035			7.4	0.5		0.0012	4.42	0.0001	1.6	0.306	330	109	0.00005		0.001	0.0078		6	0.0053	0.0003	0.178	0.001
28-Apr-06		0.001	0.0024					0.6	0.0009	3.87	0.0001	1.8	0.29	340	111	0.00005		0.001	0.0051		6	0.0043	0.0002	0.164	0.001
26-May-06		0.001	0.0045	0.03	0.04			0.8	0.0004	4.14	0.0001	1	0.135	150	49.8	0.00005		0.001	0.0439		52	0.0016	0.0036	0.274	0.001
28-Jun-06		0.001	0.0126			7.16		0.4	0.0005	3.9	0.0001	1.3	0.215		85.2	0.00005		0.001	0.0533			0.0039	0.0061	0.766	0.001
30-Jul-06		0.001	0.0085					0.4	0.001	3.51	0.0001	1.7	0.285		107	0.00005		0.001	0.0841			0.0041	0.0036	0.393	0.001
31-Aug-06		0.002	0.0065			7.1		0.8	0.0006	2.97	0.0002	2	0.255		103	0.0001		0.002	0.011			0.005	0.0006	0.284	0.002
21-Sep-06		0.001	0.0029			7.7		0.4	0.0006	2.76	0.0001	1.7	0.248		101	0.00005		0.001	0.0099			0.0045	0.0005	0.234	0.001
25-Oct-06		0.001	0.0023			7.2	0.5		0.0006	3.73	0.0002	1.8	0.254		98.3	0.00005		0.001	0.0186			0.005	0.0011	0.211	0.001
29-Nov-06		0.001	0.0046			7.76		1.7	0.0019	6.31	0.0001	3.6	0.604		230	0.00005		0.001	0.0095			0.0087	0.0001	0.384	0.001
22-Dec-06		0.001	0.0041			7.87		0.7	0.0007	4.22	0.0001	1.8	0.26		108	0.00005		0.001	0.0096			0.0048	0.0004	0.183	0.001
22-Jan-07		0.001	0.0075			6.79		2.1	0.0004	5.96	0.0001	5.2	1.18		537	0.00005		0.001	0.0314			0.0086	0.0002	1.04	0.001
28-Feb-07		0.002	0.017			7.45		2.8	0.001	10.2	0.0002	7.5	1.81		791	0.0001		0.002	0.0541			0.0096	0.0002	4.35	0.002
23-Mar-07		0.001	0.0038			7.67		2.3	0.0007	8.01	0.0001	5.3	1.04		474	0.00005		0.001	0.0292			0.0066	0.0001	0.442	0.001
18-Apr-07		0.001	0.0025			7.24		0.6	0.0007	4.27	0.0001	1.8	0.31		120	0.00005		0.001	0.0005			0.005	0.0001	0.34	0.001
29-May-07		0.002	0.0039			8.29		1	0.0004	3.11	0.0002	1	0.593		260	0.0001		0.002	0.0759			0.001	0.002	0.541	0.002
17-Jun-07		0.001	0.0044			8.13		0.5	0.0009	3.25	0.0001	1.8	0.25		92.8	0.00005		0.001	0.021			0.0041	0.0017	0.391	0.001
Summary statistics																									
n	0	43	36	3	3	33	18	31	36	43	36	43	43	20	42	35	4	36	43	0	29	36	36	43	43
mean	-	0.01	0.009	0.06	0.08	7.7	0.4	0.8	0.004	4.1	0.0002	2.0	0.4	377	148	0.00006	0.0060	0.0013	0.02	-	24	0.007	0.001	2	0.0019
standard deviation (S.D.)	-	0.07	0.021	0.05	0.04	0.6	0.3	0.6	0.017	2.0	0.0003	1.2	0.3	242	140	0.00002	0.0000	0.0015	0.04	-	65	0.011	0.003	6	0.0019
mean - 3 S.D.	-	-0.20	-0.054	-0.08	-0.03	6.0	-0.6	-1.0	-0.046	-1.8	-0.0008	-1.7	-0.5	-349	-273	-0.00001	0.0060	-0.0032	-0.08	-	-172	-0.026	-0.009	-15	-0.0036
mean + 3 S.D.	-	0.22	0.071	0.20	0.18	9.4	1.4	2.7	0.053	10.0	0.0012	5.7	1.3	1102	570	0.00013	0.0060	0.0059	0.13	-	220	0.040	0.012	18	0.0075

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.9: Water quality parameters for station KV29, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total		Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
31-Oct-03		0.01		0.07	0.02	0.0411	0.0006		0.02		0.028	321		0.003	0.003	3	0.001				0.002	0.006	0.017	56.4	46.6
17-Dec-03	14	0.01		0.06	0.02	0.0182	0.0006	18	0.02		0.0449	271	6	0.008	0.001		0.001		827	5	0.002	0.006	0.018	47.1	52.7
5-Jan-04																									
22-Jan-04																1970									
19-Feb-04	10	0.14		0.02	0.08	0.0204	0.0019	12	0.02		0.108	299	6	0.007	0.017	1521	0.004		943	5	0.316	0.167	0.033	58.1	121
23-Mar-04	12	0.13		0.03	0.1	0.0211	0.0178	15	0.03		0.118	225	6	0.001	0.011	1521	0.001		824	5	0.002	0.01	0.023	43.8	95
24-Apr-04	38	0.04		0.02	0.04	0.018	0.0006	46	0.02		0.11	146	6	0.001	0.02	1340	0.002		786	5	0.126	0.01	0.025	26.8	101
19-May-04		0.3		0.02	0.04	0.0324	0.0008		0.02		0.0197	133		0.003	0.002		0.017				0.778	0.044	0.016	19.3	17.3
17-Jun-04	106	15.3		0.02	0.18	0.697	0.0013	129	0.02		0.214	247	6	0.034	0.05		0.14		791	5	44.4	0.233	0.038	45.6	61.7
21-Jul-04		2.33		0.0003	0.0107	0.087	0.0001		0.0005	0.004	0.0271	268		0.0034	0.0055	1520	0.01				4.7	0.0116	0.014	50.7	12.9
24-Aug-04	383	9.69		0.02	0.13	0.353	0.0007	467	0.02		0.195	303	6	0.041	0.073	1380	0.103		938	5	41.8	0.082	0.029	55.5	45.7
22-Sep-04	65	1.3		0.0002	0.0051	0.059	0.0001	79	0.0005	0.002	0.0123	298	6	0.0019	0.0029	874	0.005		984	5	3.3	0.0055	0.011	57.3	3.76
22-Oct-04	73	0.111		0.0002	0.0009	0.017	0.0001	89	0.0005	0.002	0.00682	325	6	0.0005	0.0009	965	0.004		1100	5	0.2	0.0005	0.008	60.3	0.628
30-Nov-04	110	0.051		0.002	0.0004	0.015	0.0001	134	0.0005	0.002	0.00402	349	6	0.0005	0.0025	1735	0.002		1100	5	0.1	0.0018	0.007	61.5	0.982
17-Dec-04	103			0.0002	0.001	0.017	0.0001	126		0.002	0.00532		6	0.0005	0.0005	1440	0.004		1090	5		0.0018			
26-Jan-05	124	0.017		0.0002	0.0023	0.015	0.0001	152	0.0005	0.002	0.0111	365	6	0.0005	0.0023	1970	0.001		1210	5	0.3	0.0003	0.013	63.7	2.71
28-Feb-05	126	0.05		0.0053	0.002	0.032	0.001	154	0.0081	0.02	0.0142		6	0.005	0.0028		0.01		1190	5	0.3	0.0012	0.014		
23-Mar-05	103	0.02		0.0002	0.0006	0.022	0.0001	125	0.0005	0.002	0.00672	345	6	0.0005	0.0001	1864	0.003		1170	5	0.1	0.0001	0.011	54.9	0.12
22-Apr-05	143	0.623		0.0002	0.0206	0.038	0.0001	175	0.0005	0.002	0.0199	348	6	0.002	0.0105	1025	0.003		1090	5	3.9	0.0046	0.019	49.6	12.8
27-May-05	44	0.443		0.0002	0.0041	0.033	0.0001	54	0.0005	0.002	0.00854	286	6	0.0012	0.0017	1470	0.005		880	5	1.6	0.0046	0.011	43.8	1.38
30-Jun-05	84	0.164		0.0002	0.0009	0.021	0.0001	102	0.0005	0.002	0.00572	306	6	0.0005	0.0005		0.001		959	5	0.3	0.0006	0.009	51.9	0.332
1-Jul-05	84	0.164		0.0002	0.0009	0.021	0.0001	102	0.0005	0.002	0.00572	306	6	0.0005	0.0005	1478	0.001		959	5	0.3	0.0006	0.009	51.9	0.332
24-Aug-05	91	3.09		0.0004	0.0109	0.174	0.0001	111	0.0005	0.004	0.00362	305	6	0.0053	0.0056		0.011		972	5	5.1	0.0136	0.02	50.9	0.977
22-Sep-05	120	3.69	0.09	0.0005	0.0128	0.166	0.0001	147	0.0005	0.004	0.00423	309	6	0.0065	0.0059	1737	0.015		999	5	6.4	0.0203	0.017	52	0.853
27-Oct-05	176	0.79	0.025	0.0004	0.0668	0.033	0.0001	214	0.0005	0.003	0.0772	346	6	0.0014	0.0433	829	0.007			5	10	0.0131	0.019	51.6	28.4
30-Nov-05	98	0.017		0.0002	0.0006	0.018	0.0001	119	0.0005	0.002	0.00311	365	6	0.0005	0.0001		0.001		1170	5	0.1	0.0004	0.013	56.6	0.073
15-Dec-05	82	0.364		0.0002	0.0017	0.026	0.0001	100	0.0005	0.002	0.00525	335	6	0.0005	0.0006		0.002		1120	5	0.9	0.0032	0.014	47.2	0.194
26-Jan-06	126	0.01		0.0002	0.0004	0.019	0.0001	154	0.0005	0.002	0.00414	395	6	0.0005	0.0002	1566	0.001		1250	5	0.1	0.0001	0.015	54.9	0.005
24-Feb-06	136	0.007		0.0002	0.0002	0.016	0.0001	166	0.0005	0.002	0.0057	412	6	0.0005	0.0001	1385	0.001		1240	5	0.1	0.0003	0.02	52.1	0.027
16-Mar-06	140	0.066		0.0002	0.0006	0.034	0.0001	171	0.0005	0.002	0.00606	414	6	0.0005	0.0005	1411	0.002		1180	5	0.1	0.0011	0.02	60.6	0.016
28-Apr-06	101	0.05		0.002	0.002	0.03	0.001	123	0.005	0.02	0.00712	366	6	0.005	0.001	1773	0.01		1140	5	0.1	0.001	0.01	50.6	0.098
26-May-06	59	0.363		0.0002	0.0022	0.028	0.0001	72	0.0005	0.002	0.00625	202	6	0.0005	0.0016		0.003		601	5	0.7	0.0017	0.01	27.2	1.84
5-Jun-06																									
29-Jun-06		4.13		0.0011	0.104	0.135	0.0002		0.0005	0.005	0.119	314		0.0062	0.0254	1181	0.025				20.3	0.0672	0.024	42.9	25.7
13-Jul-06	89							109					6							5					
31-Jul-06		1.48		0.0002	0.0066	0.078	0.0001		0.0005	0.005	0.0472	325		0.0026	0.005		0.004				2.2	0.0097	0.017	43.7	18.3
2-Aug-06																									
30-Aug-06		0.91		0.0004	0.0051	0.045	0.0002		0.001	0.004	0.0506	333		0.001	0.0066	1700	0.006				1.3	0.0034	0.02	47.6	23.1
13-Sep-06																									
21-Sep-06		0.013		0.0002	0.0004	0.033	0.0001		0.0005	0.002	0.00893	334		0.0005	0.0018	1600	0.002				0.1	0.0006	0.015	46.9	3.06
25-Oct-06		0.026		0.0002	0.0007	0.023	0.0001		0.0005	0.002	0.00445	346		0.0005	0.0001	1710	0.002				0.1	0.0001	0.014	49.7	0.018
29-Nov-06		0.04		0.0002	0.0006	0.041	0.0001		0.0005	0.002	0.00449	409		0.0005	0.0001		0.002				0.1	0.0004	0.017	65.2	0.12
12-Dec-06																									
21-Dec-06		0.027		0.0002	0.0005	0.035	0.0001		0.0005	0.002	0.00262	398		0.0005	0.0001	1075	0.002				0.1	0.0003	0.02	57.4	0.027
22-Jan-07		0.017		0.0002	0.0005	0.041	0.0001		0.0005	0.002	0.00448	423		0.0005	0.0001	1842	0.001				0.3	0.0006	0.022	59.7	0.022
25-Feb-07		450		0.01	0.0004	0.0006	0.043		0.0002	0.001	0.02	0.00555		0.001	0.0002	1695	0.002				0.2	0.001	0.045	73.1	0.11
22-Mar-07		0.055		0.0002	0.0014	0.054	0.0001		0.0005	0.003	0.00751	511		0.0005	0.0008	1995	0.002				0.2	0.0015	0.027	84.2	0.424
18-Apr-07		0.009		0.0002	0.0006	0.033	0.0001		0.0005	0.003	0.00634	353		0.0005	0.0008	1558	0.002				0.1	0.0003	0.021	50.1	1.95
29-May-07		0.062		0.0004	0.001	0.043	0.0002		0.001	0.004	0.00229	304		0.001	0.002	1316	0.002				0.2	0.002	0.022	39.8	8.83
18-Jun-07		1.29		0.0002	0.0059	0.06	0.0001		0.0005	0.002	0.0216	270		0.0023	0.0023	1150	0.004				2	0.007	0.018	35.6	8.02
Summary statistics																									
n	28	42	2	36	36	43	43	28	42	35	36	41	28	36	36	33	36	0	26	28	42	36	35	41	41
mean	101	12	0.0575	0.001	0.011	0.06	0.002	124	0.005	0.004	0.02	315	6	0.003	0.006	1442	0.007	-	1020	5	4	0.007	0.017	51	17
standard deviation (S.D.)	69	69	-	0.004	0.029	0.12	0.007	84	0.008	0.004	0.04	87	0	0.007	0.014	405	0.017	-	166	0	10	0.017	0.007	12	30
mean - 3 S.D.	-105	-196	-	-0.010	-0.075	-0.28	-0.019	-128	-0.020	-0.009	-0.09	54	6	-0.018	-0.037	227	-0.044	-	523	5	-25	-0.045	-0.005	16	-73
mean + 3 S.D.	308	220	-	0.012	0.097	0.41	0.023																		

Appendix Table A.9: Water quality parameters for station KV29, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
31-Oct-03		0.01	0.046				0.06	0.3	0.11	5.5	0.002	1.86	0.434		363		0.006	0.03	0.001			0.07	0.001	27.7	0.006
17-Dec-03		0.01	0.146				0.06	0.4	0.02	5.8	0.002	1.71	0.404	960	330		0.006	0.028	0.001		2	0.07	0.001	56.3	0.006
5-Jan-04																									
22-Jan-04						7.18														860					
19-Feb-04		0.01	0.26				0.06	1	0.1	4.7	0.002	1.72	0.327	1060	411		0.006	0.01	0.009			0.07	0.001	22.8	0.006
23-Mar-04		0.11	0.287				0.23	1	0.1	4.7	0.002	1.27	0.39	1070	357			0.01	0.004			0.07	0.001	81.4	0.006
24-Apr-04		0.01	0.221			6.8	0.16	1	0.1	3.9	0.002	0.99	0.376	1000	314			0.01	0.019			0.07	0.001	23.1	0.006
19-May-04		0.01	0.046			7.5	0.06	1	0.1	2.2	0.002	0.98	0.184		111		0.008	0.01	0.034			0.07	0.001	12.7	0.01
17-Jun-04		0.02	0.218				1.13	1.1	0.1	20.4	0.002	2	0.448	775	222		0.027	0.022	0.464		2140	0.19	0.044	57.3	0.03
21-Jul-04		0.001	0.0564			7.5		0.6	0.0009	5.85	0.0003	2.3	0.483		263	0.00005		0.001	0.0922			0.0005	0.0062	11.3	0.002
24-Aug-04		0.01	0.286			7.8	1.34	1.8	0.1	15.2	0.002	2.05	0.615	895	287			0.01	0.344		1300	0.07	0.032	65.5	0.006
22-Sep-04		0.001	0.024			8.27		0.6	0.0006	5.56	0.0001	2.7		806	258	0.00005		0.001	0.059		84	0.0008	0.0035	4.31	0.001
22-Oct-04		0.001	0.0307			8.13		0.4	0.0004	3.51	0.0001	2.9	0.568	864	288	0.00005		0.001	0.0236		8	0.0011	0.0004	2.72	0.001
30-Nov-04		0.001	0.0121			7.37		0.4	0.0003	2.84	0.0005	2.8	0.646	989	291	0.00005		0.001	0.0185	770	9	0.0022	0.0004	2.22	0.001
17-Dec-04	0.0002	0.001	0.0124			7.4			0.0002		0.0001			899	0.33	0.00005			0.0205		37	0.002		2.37	
26-Jan-05		0.001	0.0212			7.18		0.4	0.0002	3.08	0.0001	2.2	0.568	1020	337	0.00005		0.001	0.0198	860	2	0.0018	0.0001	5.56	0.001
28-Feb-05		0.01	0.048						0.0023	3.21	0.001	2.2	0.673	1040	326	0.0005		0.01	0.021		6	0.005	0.001	6.1	0.01
23-Mar-05		0.001	0.017			7.9		0.4	0.0004	3	0.0001	2	0.713	970	306	0.00005		0.001	0.013		2	0.001	0.0002	3.11	0.001
22-Apr-05		0.001	0.049			8.3		0.7	0.0004	4.3	0.0001	2	0.664	910	306	0.0001		0.001	0.034	446	51	0.002	0.0028	16	0.001
27-May-05		0.001	0.0183			8.5		0.7	0.0004	3.78	0.0002	1.7	0.511	780	279	0.00005		0.001	0.0262		55	0.0005	0.0016	3.79	0.001
30-Jun-05		0.001	0.0095			8.1		0.6	0.0006	3.32	0.0001	1.9	0.571	810	280	0.00005		0.001	0.0177		11	0.0017	0.0005	1.91	0.001
1-Jul-05		0.001	0.0095			8.08		0.6	0.0006	3.32	0.0001	1.9	0.571	810	280	0.00005		0.001	0.0177	676	11	0.0017	0.0005	1.91	0.001
24-Aug-05		0.001	0.0175			8.2	0.8	0.0007	7.54	0.0003	2.7	0.647	271	850		0.00005		0.001	0.144		160	0.004	0.0097	0.658	0.002
22-Sep-05		0.001	0.0242		1.8	7.5		1.2	0.0012	10.2	0.0004	2.8	0.629	850	280	0.00005		0.001	0.157		234	0.0068	0.011	0.898	0.002
27-Oct-05		0.001	0.192	0.25	0.25	7.93		0.5	0.0016	4.94	0.0001	2.2	0.737		327	0.00011		0.001	0.0578	361	151	0.003	0.0045	50.8	0.001
30-Nov-05		0.001	0.0063			8.0		0.4	0.0002	2.72	0.0001	2	0.67	860	337	0.00005		0.001	0.0198		4	0.0047	0.0001	1.04	0.001
15-Dec-05		0.001	0.0092			8.0		0.4	0.0003	3.35	0.0001	1.8	0.554	1160	312	0.00005		0.001	0.0249		35	0.0016	0.0008	1.86	0.001
26-Jan-06		0.001	0.0066			7.21		0.4	0.0005	3.09	0.0001	2.1	0.773	1250	351	0.00005		0.001	0.0222	686	2	0.0057	0.0001	1.18	0.001
24-Feb-06		0.001	0.0005			6.79		0.5	0.0005	3.5	0.0001	1.8	0.701	1080	354	0.00005		0.001	0.0155		2	0.0042	0.0001	1.57	0.001
16-Mar-06		0.001	0.0116			8.3		0.4	0.0007	3.75	0.0001	2.1	0.769	1110	360	0.00005		0.001	0.0436	686	5	0.0045	0.0005	1.75	0.001
28-Apr-06		0.01	0.006			8.1		0.7	0.002	3.48	0.001	2.2	0.67	1060	329	0.0005		0.01	0.013	780	2	0.005	0.001	2.05	0.01
26-May-06		0.001	0.011	0.03	0.04			1	0.0002	2.72	0.0001	1.1	0.36	540	184	0.00005		0.001	0.0239		30	0.0009	0.001	4.4	0.001
5-Jun-06																									
29-Jun-06		0.001	0.136			7.81		1.2	0.0007	8.89	0.0007	2.1	0.615		297	0.0002		0.001	0.138	544		0.0024	0.0139	51	0.002
13-Jul-06					0.17									920							1480				
31-Jul-06		0.001	0.0323					0.6	0.0004	4.69	0.0002	2	0.564		298	0.00005		0.001	0.107			0.0022	0.005	4.68	0.001
2-Aug-06																									
30-Aug-06		0.002	0.0515			7.7		0.8	0.0005	4.64	0.0002	2.1	0.554		324	0.0001		0.002	0.0447			0.0028	0.0025	7.76	0.002
13-Sep-06																									
21-Sep-06		0.001	0.0155			8.2		0.4	0.0002	3.34	0.0001	1.8	0.58		305	0.00005		0.001	0.0184			0.0039	0.0002	2.05	0.001
25-Oct-06		0.001	0.0062			7.2		0.4	0.0002	3.25	0.0001	2.2	0.579		300	0.00005		0.001	0.0204			0.0034	0.0002	1.5	0.001
29-Nov-06		0.001	0.0082					0.5	0.0009	4.36	0.0001	2.5	0.839		389	0.00005		0.001	0.0174			0.0011	0.0002	2.01	0.001
12-Dec-06																									
21-Dec-06		0.001	0.0058			7.68		0.5	0.0006	4.06	0.0001	2.4	0.737		360	0.00005		0.001	0.0216			0.0047	0.0002	0.952	0.001
22-Jan-07		0.001	0.0125			5.1		0.5	0.0002	4.19	0.0001	2.6	0.785		378	0.00005		0.001	0.0224			0.0058	0.0002	2.54	0.001
25-Feb-07		0.002	0.0277			7.92		2	0.0004	4.38	0.0002	3.3	0.944		389	0.0001		0.002	0.0252			0.0063	0.0002	4.34	0.002
22-Mar-07		0.001	0.023			7.58		0.7	0.0007	5.2	0.0001	3.5	0.987		462	0.00005		0.001	0.0317			0.0075	0.0003	4.3	0.001
18-Apr-07		0.001	0.0252			7.6		0.6	0.0002	3.55	0.0001	2.1	0.583		320	0.00005		0.001	0.0242			0.0041	0.0002	5.13	0.001
29-May-07		0.002	0.014			7.91		1	0.0004	3.12	0.0002	2	0.572		294	0.0001		0.002	0.0656			0.001	0.0004	6.69	0.002
18-Jun-07		0.001	0.0269			7.96		0.8	0.0009	5.1	0.0002	2	0.507		254	0.00005		0.001	0.0567			0.0021	0.0043	4.83	0.001
Summary statistics																									
n	1	43	36	2	4	35	9	41	36	42	36	42	41	22	42	35	5	35	43	10	25	36	35	43	42
mean	0.0002	0.006	0.04	0.14	0.6	7.7	0.4	0.7	0.2	5	0.1	2.1	7	931	305	0.00009	0.011	0.0019	0.05	667	233	0.005	0.003	13	0.003
standard deviation (S.D.)	-	0.017	0.06	-	0.8	0.6	0.5	0.4	1.3	3	0.4	0.6	42	154	76	0.00011	0.009	0.0000	0.09	169	549	0.011	0.006	21	0.005
mean - 3 S.D.	-	-0.045	-0.13	-	-1.9	5.8	-1.1	-0.5	-3.6	-5	-1.3	0.4	-119	470	76	-0.00023	-0.017	0.0019	-0.21	161	-1413	-0.029	-0.015	-48	-0.012
mean + 3 S.D.	-	0.056	0.20	-	3.0	9.5	2.0	1.9	4.0	15	1.4	3.8	134	1392	534	0.00041	0.038	0.0019	0.32	1173	1879	0.039	0.021	75	0.018

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.10: Water quality parameters for station KV30, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total		Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
17-Dec-03	132	0.02		0.02	0.02	0.06	0.0006	161	0.02		0.0018	141	6	0.001	0.001		0.001		388	5	0.241	0.006	0.006	21.8	2.11
24-Jan-04																1051									
5-Jan-04	136	0.027		0.0004	0.0029	0.072	0.0001	165	0.0005	0.002	0.00565	163	6	0.0005	0.001		0.001		508	5	0.2	0.0097	0.013	29	4.4
19-Feb-04	139	0.01		0.02	0.04	0.0592	0.0006	170	0.02		0.0027	202	6	0.001	0.001	864	0.003		608	5	0.106	0.044	0.014	32.6	7.29
23-Mar-04	135	0.01		0.02	0.05	0.0522	0.0022	164	0.05		0.0089	154	6	0.001	0.003	882	0.01		547	5	0.288	0.028	0.007	26.8	7.65
24-Apr-04	142	0.02		0.02	0.04	0.0549	0.0006	173	0.02		0.0088	98.2	6	0.001	0.001	903	0.001		572	5	0.322	0.01	0.015	17.5	8.08
19-May-04	41	1.6		0.02	0.04	0.0912	0.0006	50	0.02		0.0021	41	6	0.003	0.002	203.9	0.017		120	5	3.44	0.033	0.007	6.92	0.899
17-Jun-04	131	1.31		0.02	0.04	0.113	0.0006	159	0.02		0.0278	144	6	0.004	0.006		0.024		461	5	4.2	0.033	0.013	25.6	5.74
21-Jul-04	117	0.344		0.0005	0.0055	0.065	0.0001	143	0.0005	0.004	0.00511	169	6	0.0006	0.0008	960	0.004		532	5	0.7	0.006	0.016	31.4	1.52
24-Aug-04	51	0.16		0.02	0.04	0.05	0.0006	62	0.02		0.0116	155	6	0.001	0.003	850	0.004		486	5	1.29	0.01	0.014	24.8	2.42
22-Oct-04	134	0.008		0.0003	0.0018	0.059	0.0001	163	0.0005	0.002	0.00236	162	6	0.0005	0.0003	1039	0.001		585	5	0.1	0.0006	0.014	30.8	0.286
29-Nov-04	146	0.011		0.0002	0.0018	0.063	0.0001	178	0.0005	0.002	0.00147	154	6	0.0005	0.0004	950	0.001		490	5	0.2	0.0013	0.01	27.6	0.728
17-Dec-04	148			0.0002	0.002	0.065	0.0001	180	0.002		0.00126		6	0.0005	0.0006	880	0.001		512	5		0.0021			
26-Jan-05	164	0.043		0.0003	0.0031	0.07	0.0001	199	0.0005	0.002	0.00084	171	6	0.0005	0.0008	1056	0.001		561	5	0.3	0.0039	0.013	30.5	1.7
27-Feb-05	160	0.05		0.005	0.0026	0.065	0.001	196	0.01	0.02	0.00099		6	0.005	0.001		0.01		558	5	0.3	0.0034	0.014		
22-Mar-05	160	0.01		0.0002	0.0028	0.063	0.0001	196	0.0005	0.002	0.00087	175	6	0.0005	0.0004	1071	0.001		568	5	0.2	0.0018	0.014	29.3	1.38
22-Apr-05	152	0.13		0.0002	0.0064	0.061	0.0001	185	0.0005	0.002	0.00316	178	6	0.0005	0.0024	1011	0.001		541	5	1	0.0035	0.016	29.6	2.67
27-May-05	90	0.777		0.0005	0.0066	0.064	0.0001	110	0.0005	0.004	0.00215	109	6	0.0016	0.0011	710	0.004		346	5	1.8	0.0101	0.01	18.4	0.473
30-Jun-05	121	0.079		0.0004	0.0041	0.059	0.0001	148	0.0005	0.002	0.00169	135	6	0.0005	0.0003	763	0.001		428	5	0.4	0.0048	0.01	25	0.297
20-Jul-05	131	0.635	0.025	0.0005	0.007	0.072	0.0001	160	0.0005	0.002	0.00428	136	6	0.0011	0.001	768	0.004		459	5	1.3	0.0099	0.012	25.8	1.15
23-Aug-05	120	0.398		0.0004	0.0056	0.067	0.0001	146	0.0005	0.002	0.00421	128	6	0.0009	0.0016		0.002		432	5	1.1	0.0049	0.012	22.2	1.1
22-Sep-05	133	0.024	0.05	0.0002	0.0024	0.049	0.0001	162	0.0005	0.002	0.00161	123	6	0.0005	0.0004	899	0.001		424	5	0.2	0.0013	0.01	20.8	0.536
27-Oct-05	128	0.036	0.017	0.0002	0.003	0.052	0.0001	156	0.0005	0.003	0.00194	144	6	0.0005	0.001	870	0.001			5	0.3	0.0017	0.012	24.4	0.658
29-Nov-05	142	0.051		0.0003	0.0032	0.067	0.0001	173	0.0005	0.002	0.00158	147	6	0.0005	0.0005		0.001		461	5	0.3	0.012	0.015	25.8	0.924
14-Dec-05	140	0.07		0.0002	0.0032	0.063	0.0001	171	0.0005	0.004	0.0012	144	6	0.0005	0.0005	882	0.001		472	5	0.3	0.0064	0.015	25.6	0.952
25-Jan-06	140	0.04		0.0002	0.0033	0.071	0.0001	171	0.0005	0.003	0.00095	141	6	0.0005	0.0005	859	0.001		478	5	0.4	0.0036	0.011	24.1	0.916
23-Feb-06	138	0.104		0.0002	0.0035	0.067	0.0001	169	0.0005	0.002	0.00082	161	6	0.0005	0.0004	619	0.001		524	5	0.5	0.0026	0.014	25.4	0.973
15-Mar-06	143	0.024		0.0002	0.0034	0.07	0.0001	174	0.0005	0.003	0.00087	156	6	0.0005	0.0007	685	0.002		408	5	0.4	0.0034	0.016	27.4	1.03
28-Apr-06	148	0.022		0.0002	0.0028	0.059	0.0001	180	0.0005	0.002	0.00096	164	6	0.0005	0.0003		0.001		501	5	0.2	0.0025	0.01	25.2	0.737
26-May-06	67	0.664		0.0004	0.0047	0.048	0.0001	81	0.0005	0.002	0.00108	70.2	6	0.001	0.0009		0.004	0.57	222	5	1.3	0.0078	0.006	11.6	0.437
28-Jun-06		1.74		0.0006	0.0196	0.113	0.0001		0.0005	0.003	0.00689	127		0.0028	0.0046	762	0.014				5.8	0.0246	0.01	21	1.57
30-Jul-06		1.04		0.0007	0.0124	0.089	0.0001		0.0005	0.005	0.00487	148		0.0019	0.002		0.006				2.5	0.0126	0.013	25	1.67
31-Aug-06		0.319		0.0005	0.0061	0.07	0.0002		0.001	0.004	0.0027	140		0.001	0.0006	810	0.002				0.9	0.008	0.01	25.2	0.708
21-Sep-06		0.11		0.0003	0.0034	0.055	0.0001		0.0005	0.002	0.00141	136		0.0005	0.0006	870	0.002				0.4	0.0026	0.011	24.2	0.287
25-Oct-06		0.07		0.0003	0.0028	0.056	0.0001		0.0005	0.002	0.00116	155		0.0005	0.0002	950	0.001				0.3	0.0026	0.012	27.6	0.293
29-Nov-06		0.313		0.0007	0.0065	0.086	0.0002		0.001	0.004	0.00137	158		0.001	0.0008	253	0.003				1	0.012	0.01	31	0.921
22-Dec-06		0.114		0.0003	0.0023	0.069	0.0001		0.0005	0.003	0.00098	145		0.0005	0.0005	191	0.001				0.3	0.0042	0.011	26.6	0.907
22-Jan-07		0.047		0.0002	0.0022	0.067	0.0001		0.0005	0.002	0.00078	162		0.0005	0.0003	840	0.001				0.3	0.0026	0.013	27.3	0.901
28-Feb-07		141		0.042	0.0002	0.0026	0.068		0.0001	0.0005	0.002	0.00063		0.0005	0.0004	690	0.001				0.4	0.0031	0.012	25.6	0.987
23-Mar-07		0.039		0.0002	0.003	0.07	0.0001		0.0005	0.002	0.00065	159		0.0006	0.0005	810	0.001				0.3	0.0036	0.013	27.6	1.18
18-Apr-07		0.011		0.0002	0.0015	0.037	0.0001		0.0005	0.002	0.00297	353		0.0005	0.0006	1509	0.001				0.1	0.0004	0.026	60.8	0.801
29-May-07		2.15		0.001	0.016	0.092	0.0002		0.001	0.006	0.00229	85.9		0.0042	0.0021	396	0.008				3.7	0.0447	0.01	13	0.804
17-Jun-07		0.62		0.0005	0.0059	0.067	0.0001		0.0005	0.002	0.0025	128		0.0013	0.0008	626	0.003				1.2	0.0074	0.011	22.3	0.803
Summary statistics																									
n	29	41	3	35	35	42	42	29	41	35	35	40	29	35	35	34	35	1	28	29	41	35	34	40	40
mean	129	4	0.031	0.002	0.006	0.07	0.002	157	0.005	0.003	0.0023	144	6	0.0010	0.0009	808	0.003	0.57	471	5	0.9	0.007	0.013	26	1.7
standard deviation (S.D.)	30	22	0.017	0.008	0.007	0.02	0.010	37	0.010	0.003	0.0022	50	0	0.0010	0.0009	260	0.003	-	107	0	1.3	0.008	0.003	8	2.0
mean - 3 S.D.	38	-62	-0.021	-0.021	-0.016	0.01	-0.030	47	-0.025	-0.006	-0.0042	-6	6	-0.0021	-0.0018	29	-0.006	-	152	5	-2.8	-0.018	0.003	2	-4.3
mean + 3 S.D.	219	70	0.082	0.025	0.027	0.12	0.033	267	0.035	0.013	0.0088	295	6	0.0041	0.0037	1587	0.011	-	791	5	4.7	0.031	0.022	49	7.8

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.10: Water quality parameters for station KV30, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
17-Dec-03		0.01	0.001				0.06	0.9	0.02	3.9	0.002	1.59	0.23	270	100		0.006	0.017	0.001		4	0.07	0.001	1.27	0.006
24-Jan-04						7.18														457					
5-Jan-04		0.001	0.0132					0.4	0.0008	3.06	0.0001	1.7	0.308	365		0.00005		0.001	0.0077	17.7	3	0.007	0.0001	3.05	0.001
19-Feb-04		0.01	0.019				0.06	1	0.1	4.3	0.002	1.8	0.283	429	144		0.006	0.01	0.004		25	0.07	0.001	4.68	0.006
23-Mar-04		0.01	0.03			7.6	0.16	1	0.1	4.5	0.002	1.58	0.291	418	156			0.01	0.017		8	0.07	0.001	5.79	0.006
24-Apr-04		0.01	0.017			7.46	0.12	1	0.1	4.3	0.002	1.06	0.309	428	145			0.01	0.009		7	0.07	0.001	4.71	0.006
19-May-04		0.01	0.01			7.51	0.12	1	0.1	3.2	0.002	0.57	0.071	72.6	24.4		0.006	0.01	0.071		117	0.07	0.007	0.65	0.006
17-Jun-04		0.01	0.028			8.1	0.1	1	0.1	3.2	0.002	1.8	0.271	324	111		0.012	0.01	0.048		152	0.09	0.004	6.54	0.006
21-Jul-04		0.001	0.0099			8.3		0.4	0.0008	2.81	0.0002	1.9	0.338	386	129	0.00005		0.001	0.0186		14	0.0047	0.001	1.33	0.001
24-Aug-04		0.01	0.012			7.4	0.94	1	0.1	3	0.002	1.46	0.331	787	121			0.01	0.108		44	0.07	0.001	3.97	0.006
22-Oct-04		0.001	0.0105			8.11		0.4	0.0008	3.28	0.0001	1.9	0.33	361	119	0.00005		0.001	0.0086		1	0.0052	0.0005	0.553	0.001
29-Nov-04		0.001	0.0041			7.25		0.4	0.0009	3.18	0.0005	1.8	0.322	342	108	0.00005		0.001	0.0062		2	0.0058	0.0003	0.389	0.001
17-Dec-04	0.0002	0.001	0.005			7.1			0.0006		0.0001			357	0.13	0.00005			0.0078		2	0.0062		0.427	
26-Jan-05		0.001	0.0053			7.28		0.7	0.0007	4.12	0.0002	1.8	0.295	370	123	0.00005		0.001	0.0089	459	4	0.0061	0.0002	0.248	0.001
27-Feb-05		0.01	0.01			7.2			0.002	4.34	0.001	1.7	0.346	457	128	0.0005		0.01	0.0079		2	0.0061	0.001	0.412	0.01
22-Mar-05		0.001	0.005			9.24		0.6	0.0008	4.5	0.0001	2	0.369	380	126	0.00005		0.001	0.0056		2	0.0055	0.0002	0.304	0.001
22-Apr-05		0.001	0.012			8.3		1	0.0007	4.5	0.0001	2	0.344	400	132	0.00005		0.001	0.0085	443	8	0.0059	0.0006	2.18	0.001
27-May-05		0.001	0.0068			8.6		0.5	0.0005	4.35	0.0002	1.1	0.216	240	83.7	0.00005		0.001	0.0401		52	0.0031	0.0028	0.437	0.001
30-Jun-05		0.001	0.003			8.33		0.4	0.0006	2.19	0.0001	1.4	0.296	300	103	0.00005		0.001	0.0071	366	8	0.005	0.0004	0.246	0.001
20-Jul-05		0.001	0.0055	0.03	0.09			0.6	0.0006	3.4	0.0001	1.5	0.305		111	0.00005		0.001	0.0239		33	0.0052	0.0018	0.616	0.001
23-Aug-05		0.001	0.0068			8.3		0.4	0.0006	3.19	0.0001	1.6	0.272	290	95.3	0.00005		0.003	0.0351		22	0.0042	0.0013	1.11	0.001
22-Sep-05		0.001	0.0029			8.27		0.4	0.0005	2.72	0.0001	1.6	0.234	280	86.6	0.00005		0.001	0.0064		24	0.004	0.0002	0.305	0.001
27-Oct-05		0.001	0.0052	0.13	0.13	7.98		0.4	0.001	3.39	0.0001	1.7	0.321	106	106	0.00005		0.001	0.0103		2	0.0046	0.0004	0.83	0.001
29-Nov-05		0.001	0.0035					0.4	0.0006	3.94	0.0001	1.7	0.295	260	108	0.00005		0.001	0.0076		2	0.0047	0.0002	0.279	0.001
14-Dec-05		0.001	0.0046			6.62		0.5	0.0008	3.95	0.0001	1.8	0.309	340	109	0.00005		0.001	0.0084		3	0.0044	0.0002	0.222	0.001
25-Jan-06		0.001	0.0026			7.22		0.5	0.0008	3.68	0.0001	2	0.311	440	104	0.00005		0.001	0.0076	372	6	0.0053	0.0002	0.164	0.001
23-Feb-06		0.001	0.0005			7.21		0.6	0.001	4.41	0.0001	1.8	0.308	330	117	0.00005		0.001	0.0102		3	0.0047	0.0004	0.162	0.001
15-Mar-06		0.001	0.0038			7.63		0.4	0.0012	4.52	0.0001	1.7	0.324	340	112	0.00005		0.001	0.0092	328	3	0.0052	0.0003	0.187	0.001
28-Apr-06		0.001	0.0028					0.6	0.0008	4.01	0.0001	1.7	0.327	370	123	0.00005		0.001	0.0051		4	0.0044	0.0002	0.222	0.001
26-May-06		0.001	0.0032	0.03	0.04			0.6	0.0004	3.05	0.0001	0.9	0.134	159	52.7	0.00005		0.001	0.0242		49	0.0015	0.0021	0.268	0.001
28-Jun-06		0.001	0.015			7.55		0.5	0.0008	4.27	0.0002	1.3	0.246		96.4	0.00005		0.001	0.0537	360		0.0038	0.0065	1.52	0.001
30-Jul-06		0.001	0.0083					0.4	0.001	3.64	0.0002	1.7	0.299		117	0.00005		0.001	0.0885			0.004	0.0035	0.551	0.001
31-Aug-06		0.002	0.0074			7.4		0.8	0.0006	3.13	0.0002	2	0.266		107	0.0001		0.002	0.016			0.0048	0.001	0.418	0.002
21-Sep-06		0.001	0.0034			8.2		0.4	0.0007	2.68	0.0001	1.4	0.26		106	0.00005		0.001	0.011			0.0043	0.0005	0.273	0.001
25-Oct-06		0.001	0.0014			8.6		0.5	0.0009	3.3	0.0001	1.9	0.285		110	0.00005		0.001	0.01			0.005	0.0003	0.221	0.001
29-Nov-06		0.002	0.005			7.94		0.8	0.001	5.41	0.0002	2	0.318		113	0.0001		0.002	0.018			0.006	0.0009	0.249	0.002
22-Dec-06		0.001	0.0041			7.68		0.6	0.0012	4.3	0.0001	1.7	0.265		106	0.00005		0.001	0.0094			0.0049	0.0004	0.168	0.001
22-Jan-07		0.001	0.0029			6.89		0.4	0.0006	4.28	0.0001	1.8	0.302		115	0.00005		0.001	0.0082			0.0052	0.0002	0.186	0.001
28-Feb-07		0.001	0.0036			7.8		0.4	0.0009	4.1	0.0001	1.6	0.297		98.6	0.00005		0.001	0.008			0.0053	0.0002	0.118	0.001
23-Mar-07		0.001	0.0033			7.39		0.6	0.0011	4.44	0.0001	1.6	0.306		114	0.00005		0.001	0.0079			0.0051	0.0002	0.111	0.001
18-Apr-07		0.001	0.0076			7.6		1.7	0.0008	4.52	0.0001	3.4	0.709		318	0.00005		0.001	0.0005			0.004	0.0001	1.96	0.001
29-May-07		0.002	0.0091			8.15		0.9	0.0004	6.27	0.0005	0.9	0.16		61.6	0.0001		0.002	0.187			0.002	0.0064	0.56	0.002
17-Jun-07		0.001	0.0053			8.11		0.4	0.0008	3.38	0.0001	1.9	0.274		101	0.00005		0.001	0.0216			0.004	0.0022	0.57	0.001
Summary statistics																									
n	1	42	35	3	3	35	7	40	35	41	35	41	41	20	41	34	4	34	42	8	29	35	34	42	41
mean	0.0002	0.003	0.006	0.06	0.09	7.8	0.2	0.6	0.004	3.8	0.0002	1.7	0.29	359	111	0.00007	0.008	0.0017	0.02	350	21	0.007	0.0011	1.2	0.0021
standard deviation (S.D.)	-	0.004	0.003	0.06	0.05	0.6	0.3	0.3	0.017	0.8	0.0004	0.4	0.09	122	44	0.00008	0.003	0.0022	0.03	143	35	0.011	0.0016	1.6	0.0023
mean - 3 S.D.	-	-0.008	-0.004	-0.11	-0.05	6.1	-0.7	-0.2	-0.047	1.5	-0.0008	0.4	0.03	-7	-21	-0.00017	-0.001	-0.0048	-0.08	-80	-84	-0.027	-0.0036	-3.8	-0.0046
mean + 3 S.D.	-	0.013	0.016	0.24	0.22	9.4	1.2	1.5	0.054	6.2	0.0013	3.0	0.56	725	242	0.00030	0.017	0.0081	0.13	780	126	0.040	0.0059	6.1	0.0089

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.11: Water quality parameters for station KV7, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	
	as CaCO ₃	Total	Total	Total	Total	Total	Total	mg/L	Total	Total	Total	Total	mg/L	Total	Total	μS/cm	Total	Total	as CaCO ₃	mg/L	Total	Total	Total	Total	Total	Total	Total	Total	mg/L	mg/L	pH units	Total	Total	Total	Total	Total	Total	Total	
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	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	mg/L	mg/L	mg/L	mg/L
Sample Date																																							
27-Jan-94																420		0.01				0.01																	7.9
24-Feb-94																470		0.01				0.01																	7.9
28-Mar-94																620		0.01				0.01																	7.9
23-Apr-94																270		0.01				0.02																	7.7
10-May-94																252			92.9					0.229															7.3
1-Jun-94																280		0.01				0.08																8.2	
26-Jul-94	135															554												1	2									8.29	
29-Jul-94																500		0.01				0.01																8.3	
17-Aug-94																653		0.01				0.08																7.9	
7-Sep-94	145			0.02	0.02	0.0437	0.0002				0.0005	108		0.001	0.001		0.002			0.073		0.006		20	0.071		0.005	0.002						0.001	2.88	0.0002	1.43	0.22	
29-Sep-94																420		0.01				0.01																8.1	
27-Oct-94	143			0.02	0.02	0.0389	0.0002				0.0006	104		0.001	0.001		0.002				0.11			19.5			0.005	0.002						0.002	2.95	0.001	2.16	0.19	
31-Oct-94											0.001					410					0.4					0.22												7.4	
29-Nov-94											0.001					560					0.2					0.19												7.42	
5-Jan-95											0.001					670					0.2					0.28												8	
6-Feb-95																																							
29-Mar-95					0.001						0.002					1300	0.002				0.2	0.005			0.54													7.2	
12-Apr-95	162			0.02	0.02	0.0459	0.0003				0.001	112		0.001	0.001		0.006			502	0.075	0.01		21.8	0.072		0.005	0.003	0.168	0.005				0.002	3.45	0.001	1.68	0.21	
26-Apr-95	57										0.0013						0.0019				0.019	0.06			0.524														
27-Apr-95					0.001						0.002					310	0.002				0.4	0.015			0.53			0.004										7.5	
3-May-95					0.006						0.001					190	0.002				0.2	0.01			0.24			0.004										8.2	
6-Jun-95											0.02																												
6-Jul-95				0.02	0.02	0.0393	0.0002				0.0035	49.1		0.001	0.001		0.016				0.22				0.11													7.86	
11-Jul-95	137			0.02	0.02	0.0449	0.0002				0.0035	125		0.001	0.001		0.016				0.952	0.05		8.74	0.92		0.005	0.008						0.002	2.49	0.001	0.86	0.1	
5-Aug-95	127			0.02	0.02						0.0005						0.016				0.069	0.01		22.1	0.035		0.005	0.001					0.002	3.43	0.001	1.72	0.22		
11-Aug-95					0.004						0.001					400	0.002				0.2	0.01			0.056														
4-Sep-95					0.001						0.001					340	0.002				0.2	0.005			0.072			0.002											
11-Oct-95					0.003						0.001					165	0.002				0.2	0.005			0.046			0.016											
5-Nov-95					0.009						0.005					700	0.012				0.4	0.005			0.3			0.008											
12-Dec-95					0.002						0.001					320	0.004				0.2	0.005			0.076			0.002											
1-Jan-96					0.001						0.007					600	0.002				0.2	0.005			0.054			0.004											
9-Feb-96					0.003						0.007					430	0.004				0.2	0.005			0.042			0.002											
5-Mar-96					0.001						0.001					300	0.006				0.2	0.005			0.008			0.006											
7-Apr-96					0.005						0.001					325	0.01				0.2	0.015			0.006			0.002											
28-Apr-96					0.004						0.003					250	0.012				0.2	0.015			0.006			0.006											
24-Jun-96					0.001						0.001					370	0.002				0.2	0.005			0.014			0.002											
18-Jul-96					0.006						0.004					180	0.006				3.2	0.05			0.63			0.008											
2-Aug-96					0.01						0.01					470	0.01				0.01	0.24			0.28			0.01											
16-Sep-96																270																							
17-Sep-96					0.01						0.01						0.01				0.01	0.02			0.16			0.01											
3-Oct-96					0.01						0.01					260	0.01				0.01	0.01			0.1			0.01											
30-Oct-96											0.01					365	0.01				0.2	0.02			0.11			0.01											
30-Nov-96											0.01					280	0.01				0.2	0.01			0.17			0.01											
30-Jun-97	134				0.05						0.002					520	0.01					0.05						0.01											
10-Oct-97	152				0.05						0.002					640	0.01					0.05						0.01											
15-Jan-98					0.05						0.004					700	0.01				1	0.05			0.5			0.01											
1-Feb-98	146			0.05	0.05						0.001					740	0.01			408	1	0.05			0.44			0.1											
13-Mar-98	162			0.05	0.05						0.001					730	0.01				1	0.05			0.31			0.01											
12-Apr-98				0.05	0.05						0.005					780	0.01				0.01	0.05			0.2			0.08											
12-May-98	66			0.05	0.05						0.003					350	0.01				1	0.05			0.31			0.01											
3-Feb-01	143	0.0174	0.05	0.0003	0.0018	0.0564	0.00001		0.0004	0.003	0.00067	135	6	0.00073	0.00017		0.00256			463	5	0.084	0.0006	0.02	25.7	0.33	0.0001	0.00047	0.0026	0.176	0.002	0.03	0.4	0.0004	3.98	0.00006	1.6	0.254	
11-Jul-01	89	0.18		0.02	0.03	0.042	0.0006				0.0022	54.4	6	0.002	0.001		0.043			403	0.511	0.02		11	0.154		0.01	0.006	0.043	0.002	7.9	0.08	0.6	0.02	2.1	0.002		0.112	
2-Aug-03	146	0.04	0.05	0.02	0.02	0.0569	0.0006	178	0.02		0.0008	113	6	0.001	0.001		0.012			399	5	0.122	0.006	0.008	25.1	0.232	0.01	0.002	0.05	0.									

Appendix Table A.11: Water quality parameters for station KV7, United Keno Hill, 1994 - 2007 ¹.

Parameter	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Units												
Sample Date												
27-Jan-94								4				
24-Feb-94								8				
28-Mar-94								4				
23-Apr-94								4				
10-May-94	68.9							6			0.334	
1-Jun-94								8				
26-Jul-94	197							5			0.507	
29-Jul-94								1				
17-Aug-94					0.01	0.002		8				
7-Sep-94								5		0.006	0.153	
29-Sep-94								1				
27-Oct-94					0.01	0.001		5		0.002	0.196	
31-Oct-94								1			0.43	
29-Nov-94								1			0.38	
5-Jan-95											0.67	
6-Feb-95								3				
29-Mar-95								2			0.56	
12-Apr-95	333				0.01	0.002		10		0.006	0.294	
26-Apr-95								53			0.359	
27-Apr-95								12			0.36	
3-May-95								16			0.23	
6-Jun-95								12				
6-Jul-95											0.38	
11-Jul-95	292		0.005		0.01	0.01		5			0.426	
5-Aug-95	216		0.002		0.01	0.002		5			0.157	
11-Aug-95								12			0.2	
4-Sep-95								1			0.24	
11-Oct-95								12			0.048	
5-Nov-95								20			1.05	
12-Dec-95								12			0.49	
1-Jan-96								29			1.08	
9-Feb-96								2			0.78	
5-Mar-96								1			0.11	
7-Apr-96								1			0.11	
28-Apr-96								16			0.36	
24-Jun-96								18			0.16	
18-Jul-96								3			0.54	
2-Aug-96								16			0.28	
16-Sep-96								36				
17-Sep-96											0.36	
3-Oct-96								56			0.28	
30-Oct-96											0.25	
30-Nov-96								36			0.22	
30-Jun-97	178							5			0.1	
10-Oct-97	186							5			0.3	
15-Jan-98	252							5			0.004	
1-Feb-98	277							37			0.2	
13-Mar-98	278							48			2.4	
12-Apr-98	318							10			0.12	
12-May-98	120							8			0.46	
3-Feb-01	104	98.7	0.001			0.00024		1		0.00003	0.15	
11-Jul-01	126	33.8			0.006			39		0.006	0.273	
2-Aug-03	292	84.3	0.006		0.006	0.001		1	0.07	0.014	0.312	0.006
17-Dec-03	227	81.2		0.006	0.009	0.001		2	0.07	0.001	0.618	0.006
24-Jan-04												
19-Feb-04	264	88.9		0.006	0.01	0.004		-	0.07	0.001	2.14	0.006
23-Mar-04	296	108			0.041	0.004		3	0.07	0.001	2.56	0.006
24-Apr-04	290	99.2			0.01	0.006		3	0.07	0.001	2.16	0.006
29-May-04	26	8.9		0.006	0.01	0.046		64	0.07	0.002	0.759	0.006
15-Jun-04	201	53.3		0.006	0.001	0.008		17	0.07	0.002	2.28	0.006
20-Jul-04	230	71.9	0.00005		0.001	0.0043		1	0.0026	0.0001	0.392	0.001
30-Jul-04	161	54.3	0.00005		0.001	0.0501		75	0.0021	0.0032	0.753	0.001
24-Aug-04	338	74.6			0.01	0.103		5	0.07	0.001	1.31	0.006
21-Sep-04	217	68.6	0.00005		0.001	0.0048		3	0.003	0.0001	0.387	0.001
21-Oct-04	254	84.6	0.00005		0.001	0.006		1	0.0027	0.0007	0.635	0.001
29-Nov-04	257	79	0.00005		0.001	0.004		2	0.0036	0.0005	0.291	0.001
17-Dec-04	260	0.0905	0.00005			0.0051		1	0.0041		0.275	
26-Jan-05	267	89.4	0.00005		0.001	0.0054		1	0.004	0.0004	0.216	0.001
27-Feb-05	269	94.6	0.0005		0.01	0.005		2	0.005	0.001	0.199	0.01
22-Mar-05	280	93.8	0.00005		0.001	0.004		2	0.005	0.0001	0.225	0.001
21-Apr-05	250	88.4	0.00005		0.001	0.0071		6	0.004	0.0004	0.613	0.001
27-May-05	105	35	0.00005		0.001	0.0139		22	0.0013	0.0014	0.297	0.001
30-Jun-05	186	56.1	0.00005		0.001	0.0005		2	0.0024	0.0002	0.191	0.001
20-Jul-05		61	0.00005		0.001	0.0044		2	0.0024	0.0004	0.318	0.001
23-Aug-05		56	0.00005		0.001	0.0046		10	0.0022	0.0005	0.71	0.001
22-Sep-05	162	46.7	0.00005		0.001	0.0063		5	0.0021	0.0005	0.233	0.001
27-Oct-05		63.9	0.00005		0.001	0.0062		2	0.0027	0.0004	0.356	0.001
29-Nov-05	190	64.2	0.00005		0.001	0.0053		2	0.0026	0.0002	0.204	0.001
14-Dec-05	260	74.7	0.00005		0.001	0.0042		4	0.0025	0.0001	0.168	0.001
25-Jan-06	340	77.6	0.00005		0.001	0.0055		2	0.0037	0.0001	0.142	0.001
22-Feb-06	240	81.2	0.00005		0.001	0.0044		4	0.0032	0.0001	0.13	0.001
15-Mar-06	240	83.9	0.00005		0.001	0.0063		4	0.0036	0.0002	0.17	0.001
27-Apr-06	284	88.7	0.00005		0.001	0.0036		2	0.003	0.0002	0.124	0.001
25-May-06		56	0.00005		0.001	0.0166		28	0.0006	0.0015	0.166	0.001
28-Jun-06		36.1	0.00005		0.001	0.0413			0.0015	0.0047	0.834	0.001
30-Jul-06		70.4	0.00005		0.001	0.0521			0.0021	0.0003	0.242	0.001
31-Aug-06		64.1	0.0001		0.002	0.0067			0.0028	0.0002	0.238	0.002
21-Sep-06		66.9	0.00005		0.001	0.0057			0.0026	0.0003	0.229	0.001
25-Oct-06		67.8	0.00005		0.001	0.005			0.0029	0.0001	0.217	0.001
30-Nov-06		72.6	0.00005		0.001	0.0038			0.0027	0.0001	0.202	0.001
22-Dec-06		77.6	0.00005		0.001	0.0051			0.0028	0.0001	0.174	0.001
22-Jan-07		80.5	0.00005		0.001	0.005			0.0033	0.0002	0.138	0.001
28-Feb-07		75.7	0.00005		0.001	0.0048			0.0033	0.0001	0.129	0.001
23-Mar-07		82.5	0.00005		0.001	0.0014			0.0035	0.0002	0.112	0.001
18-Apr-07		46.4	0.0001		0.002	0.0501			0.002	0.0044	0.372	0.002
19-May-07		28	0.0001		0.002	0.0634			0.001	0.0026	0.238	0.002
16-Jun-07		59.5	0.00005		0.001	0.055			0.0021	0.0004	0.252	0.001
Summary statistics												
n	21	46	36	4	36	50	0	77	37	36	85	43
mean	231	67	0.00007	0.0060	0.0016	0.013	-	11	0.005	0.0008	0.5	0.0022
standard deviation (S.D.)	69	24	0.00008	0.0000	0.0021	0.021	-	16	0.011	0.0012	0.5	0.0023
mean - 3 S.D.	24	-5	-0.00016	0.0060	-0.0047	-0.050	-	-36	-0.029	-0.0027	-1.1	-0.0047
mean + 3 S.D.	437	139	0.00029	0.0060	0.0079	0.076	-	59	0.038	0.0042	2.0	0.0091

RED Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.12: Water quality parameters for station KV8, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese	
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total	
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Sample Date																										
22-May-97	0.007										0.006						0.006			67.6	1.380	0.06			0.331	
13-Mar-98	156			0.05	0.05						0.001					690	0.01		467		1	0.05			0.1	
12-May-98	80			0.05	0.05						0.004					390	0.01		210		1	0.05			0.29	
11-Jun-98	118										0.006						0.006		291		0.139	0.06			0.08	
2-Aug-03	143	0.01	0.05	0.02	0.02	0.0556	0.0006	174	0.02		0.0011	113	6	0.001	0.001		0.011		407	5	0.082	0.006	0.009	24.9	0.144	
24-Jan-04																697										
23-Mar-04	149	0.06		0.02	0.06	0.0567	0.0022	181	0.12		0.0056	126	6	0.002	0.001	851	0.008		440	5	0.056	0.027	0.007	25.5	1.86	
24-Apr-04	109	0.01		0.02	0.04	0.0404	0.0006	133	0.02		0.0077	55.8	6	0.001	0.001		0.001		307	5	0.121	0.01	0.007	13.2	1.18	
19-May-04	24	0.37		0.02	0.06	0.0307	0.0006	29	0.02		0.006	20.7	6	0.001	0.001	127.4	0.021		67	5	1.19	0.056	0.007	4.31	0.398	
15-Jun-04	118	0.06		0.02	0.04	0.0497	0.0006	144	0.02		0.0056	88.2	6	0.001	0.001	565	0.007		286	5	0.416	0.022	0.007	16.7	1.28	
20-Jul-04	133	0.006		0.0005	0.0028	0.054	0.0001	162	0.0005	0.003	0.00121	113	6	0.0009	0.0001	740	0.004		416	5	0.1	0.0017	0.01	23.6	0.176	
30-Jul-04	102	0.306	0.05	0.0004	0.0043	0.055	0.0001	124	0.0005	0.033	0.0033	84.7	6	0.0005	0.0005	498	0.003		291	5	0.6	0.0068	0.007	18	0.264	
24-Aug-04	149	0.01		0.02	0.04	0.0511	0.0006	182	0.02		0.0024	116	6	0.001	0.001	670	0.002		425	5	0.033	0.01	0.009	21	0.391	
21-Sept-04	145	0.009		0.0003	0.0024	0.053	0.0001	176	0.0005	0.002	0.00145	113	6	0.0005	0.0002	759	0.002		375	5	0.2	0.0008	0.007	23.8	0.258	
21-Oct-04	173	0.005		0.0004	0.0024	0.061	0.0001	211	0.0005	0.002	0.0023	131	6	0.0005	0.0002	884	0.001		436	5	0.1	0.0007	0.008	28.6	0.231	
29-Nov-04	158	0.007		0.0005	0.0021	0.056	0.0001	193	0.0005	0.002	0.00122	122	6	0.0005	0.0001	789	0.001		406	5	0.1	0.0017	0.006	24.6	0.246	
17-Dec-04	160			0.0004	0.0026	0.057	0.0001	195		0.003	0.00117		6	0.0008	0.0002	660	0.007		461	5		0.0058				
26-Jan-05	164	0.005		0.0004	0.0014	0.061	0.0001	199	0.0005	0.002	0.00185	138	6	0.0005	0.0002	888	0.001		474	5	0.1	0.0011	0.008	28.1	0.285	
27-Feb-05	173	0.05		0.0054	0.002	0.064	0.001	211	0.0083	0.02	0.00074		6	0.005	0.001	697	0.01		480	5	0.1	0.0014	0.01			
22-Mar-05	171	0.02		0.0004	0.0022	0.058	0.0001	209	0.0005	0.002	0.00066	132	6	0.0005	0.0001	851	0.001		476	5	0.1	0.002	0.008	26.5	0.11	
21-Apr-05	156	0.16		0.0008	0.0028	0.052	0.0001	190	0.0005	0.002	0.00124	126	6	0.0005	0.0002	824	0.002		418	5	0.4	0.0052	0.009	24.8	0.21	
27-May-05	76	0.197		0.0005	0.0027	0.041	0.0001	93	0.0005	0.002	0.00275	54.8	6	0.0005	0.0002	430	0.002		188	5	0.5	0.0051	0.003	11.4	0.094	
30-Jun-05	129	0.005		0.0004	0.0024	0.053	0.0001	158	0.0005	0.002	0.0012	89.9	6	0.0005	0.0001	565	0.001		301	5	0.1	0.0013	0.005	18.8	0.074	
20-Jul-05	145	0.013	0.002	0.0004	0.0028	0.051	0.0001	176	0.0005	0.002	0.00182	94	6	0.0005	0.0001		0.001		321	5	0.1	0.0014	0.008	19.3	0.149	
23-Aug-05	137	0.05	0.002	0.0003	0.0028	0.05	0.0001	168	0.0005	0.002	0.00279	87.6	6	0.0005	0.0004	566	0.001		317	5	0.3	0.0023	0.005	18.8	0.386	
22-Sep-05	136	0.048	0.05	0.0003	0.0026	0.046	0.0001	166	0.0005	0.002	0.00179	83.6	6	0.0005	0.0002	759	0.001		285	5	0.2	0.0025	0.005	16.4	0.203	
27-Oct-05	144	0.014	0.008	0.0002	0.0024	0.049	0.0001	175	0.0005	0.003	0.00148	99.7	6	0.0005	0.0003	654	0.001			5	0.1	0.0008	0.008	19.5	0.135	
29-Nov-05	146	0.017		0.0002	0.0015	0.038	0.0001	178	0.0005	0.002	0.00073	80.3	6	0.0005	0.0001	824	0.001		299	5	0.1	0.0015	0.006	15.7	0.113	
14-Dec-05	146	0.013		0.0002	0.0018	0.053	0.0001	178	0.0005	0.004	0.00094	116	6	0.0005	0.0001	548	0.001		400	5	0.1	0.0013	0.01	22.7	0.221	
25-Jan-06	58	0.19		0.0004	0.0026	0.028	0.0001	71	0.0005	0.002	0.0013	110	6	0.0005	0.0002	734	0.003		100	5	0.4	0.0068	0.002	12.9	0.114	
22-Feb-06	151	0.014		0.0003	0.002	0.054	0.0001	184	0.0005	0.002	0.0006	122	6	0.0005	0.0001	691	0.001		392	5	0.2	0.0019	0.008	21.9	0.239	
15-Mar-06	156	0.008		0.0003	0.0018	0.064	0.0001	191	0.0005	0.002	0.00066	130	6	0.0009	0.0003	690	0.002		376	5	0.2	0.0033	0.01	26.8	0.132	
27-Apr-06	150	0.026		0.0003	0.002	0.053	0.0001	182	0.0005	0.002	0.00104	125	6	0.0005	0.0001	726	0.001		392	5	0.1	0.0016	0.007	22.4	0.117	
25-May-06	58	0.19		0.0004	0.0026	0.028	0.0001	71	0.0005	0.002	0.0013	31.7	6	0.0005	0.0002		0.003		100	5	0.4	0.0068	0.002	6.5	0.114	
28-Jun-06		1.2		0.0006	0.0114	0.069	0.0001		0.0005	0.003	0.00334	61.5		0.0022	0.0015	479	0.007				3	0.0197	0.005	12.3	0.349	
30-Jul-06		0.014		0.0004	0.003	0.059	0.0001		0.0005	0.005	0.00134	102		0.0005	0.0001		0.001				0.1	0.0014	0.007	19.2	0.202	
31-Aug-06		0.02		0.0004	0.0031	0.054	0.0002		0.001	0.004	0.00129	102		0.001	0.0002	600	0.002				0.2	0.002	0.006	20.8	0.18	
21-Sep-06		0.011		0.0003	0.0027	0.051	0.0001		0.0005	0.002	0.001	99.4		0.0005	0.0003	690	0.001				0.2	0.0014	0.006	19.9	0.148	
25-Oct-06		0.01		0.0003	0.0022	0.05	0.0001		0.0005	0.002	0.00107	104		0.0005	0.0001	740	0.001				0.1	0.001	0.007	21.2	0.1	
29-Nov-06																										
22-Dec-06		0.013		0.001	0.0036	0.09	0.0001		0.0005	0.003	0.0034	167		0.0005	0.0003		0.001				0.1	0.0021	0.01	36.4	0.426	
22-Jan-07		0.006		0.0004	0.0018	0.062	0.0001		0.0005	0.002	0.00093	144		0.0005	0.0001	804	0.004				0.1	0.0006	0.01	27.9	0.278	
27-Feb-07																										
28-Feb-07																										
23-Mar-07																										
18-Apr-07		0.059		0.0003	0.0016	0.023	0.0001		0.0005	0.002	0.00075	34		0.001	0.0001	259	0.002				0.1	0.002	0.003	13.7	0.079	
29-May-07		0.611		0.001	0.0077	0.043	0.0002		0.001	0.005	0.00197	42.5		0.002	0.0007	226	0.005				1	0.0286	0.003	7.4	0.286	
16-Jun-07		0.111		0.0005	0.0043	0.048	0.0001		0.0005	0.002	0.00142	80.8		0.0009	0.0002	449	0.002				0.3	0.005	0.006	16.2	0.16	
Summary statistics																										
n	33	38	6	34	34	39	39	29	38	33	34	37	29	34	34	36	34	0	31	30	42	34	33	37	41	
mean	128	0.10	0.03	0.001	0.004	0.052	0.0002	162	0.006	0.004	0.0015	98	6	0.0008	0.0003	639	0.0023	-	342	7	0.4	0.004	0.007	20	0.3	
standard deviation (S.D.)	43	0.22	0.03	0.003	0.007	0.012	0.0004	45	0.020	0.006	0.0008	34	0	0.0008	0.0003	186	0.0021	-	114	11	0.5	0.006	0.002	7	0.3	
mean - 3 S.D.	-1	-0.56	-0.05	-0.009	-0.016	0.015	-0.0009	27	-0.054	-0.014	-0.0009	-2	6	-0.0017	-0.0007	83	-0.0040	-	0	-27	-1.2	-0.013	0.000	0	-0.8	
mean + 3 S.D.	256	0.77	0.10	0.011	0.024	0.088	0.0014	297	0.067	0.022	0.0039	199	6	0.0033	0.0012	1196	0.0087	-	685	41	2.0	0.021	0.014	40	1.3	

RED Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above

Appendix Table A.12: Water quality parameters for station KV8, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
22-May-97														35.6											
13-Mar-98			0.01			7.4								267							60			0.9	
12-May-98			0.01			7.2								117							6			0.56	
11-Jun-98				0.064	0.005									180							5				
2-Aug-03		0.01	0.001	0.05	0.5	8.38	0.06	0.6	0.03	2.8	0.002	1.42	0.228	290	84	0.006		0.006	0.001		1	0.07	0.014	0.256	0.006
24-Jan-04						7.68																			
23-Mar-04		0.01	0.01			8.97	0.31	1	0.1	4	0.002	1.45	0.27	285	104			0.01	0.028		3	0.07	0.001	1.91	0.006
24-Apr-04		0.01	0.005				0.06	1	0.1	2.8	0.002	0.9	0.193	233	68.3			0.01	0.004		3	0.07	0.001	1.860	0.006
19-May-04		0.01	0.003			7.48	0.06	1	0.1	1.4	0.002	0.36	0.041	26	8.9		0.006	0.01	0.029			0.07	0.002	0.684	0.006
15-Jun-04		0.01	0.004			8.34	0.06	1	0.1	2.6	0.002	1.23	0.183	199	51.5		0.006	0.01	0.004			0.07	0.001	1.470	0.006
20-Jul-04		0.001	0.0026			8.3		0.4	0.0009	2.3	0.0003	1.4	0.256	256	77.7	0.00005		0.001	0.0049		1	0.0031	0.0001	0.322	0.001
30-Jul-04		0.001	0.004	0.05	0.1	7.15		0.4	0.0008	2.78	0.0003	1.1	0.183	160	52.4	0.00005		0.001	0.0119		14	0.0019	0.0009	0.569	0.001
24-Aug-04		0.01	0.002			8.4	0.13	1	0.1	2.5	0.002	1.17	0.277	273	74			0.01	0.007		2	0.07	0.001	0.614	0.006
21-Sept-04		0.001	0.0022			7.81		0.5	0.0006	2.71	0.0001	1.5	0.241	219	71	0.00005		0.001	0.0042		1	0.0029	0.0001	0.398	0.001
21-Oct-04		0.001	0.0081			7.72		0.6	0.0008	3.47	0.0001	1.7	0.293	249	82.6	0.00005		0.001	0.0058		1	0.003	0.003	0.614	0.001
29-Nov-04		0.001	0.0019			7.21		0.4	0.0009	3.1	0.0005	1.7	0.27	248	78.3	0.00005		0.001	0.004		2	0.0035	0.0003	0.385	0.001
17-Dec-04	0.0002	0.001	0.003			7.24			0.0007		0.0001			277	0.0881	0.00005			0.0064		1	0.0037		0.362	
26-Jan-05		0.001	0.0031			7.5		0.8	0.0006	3.75	0.0001	1.6	0.262	288	94	0.00005		0.001	0.0056		1	0.0039	0.0001	0.36	0.001
27-Feb-05		0.01	0.0061			7.68			0.002	4.3	0.001	2	0.319	274	100	0.0005		0.01	0.0061		2	0.005	0.001	0.291	0.01
22-Mar-05		0.001	0.002			8.97		0.6	0.0007	3.9	0.0001	2	0.305	310	91.7	0.00005		0.001	0.004		2	0.004	0.0001	0.2	0.001
21-Apr-05		0.001	0.011			8.4		0.9	0.0007	3.6	0.0002	2	0.273	230	85.2	0.00005		0.001	0.0068		5	0.004	0.0002	0.373	0.001
27-May-05		0.001	0.0022			8.7		0.4	0.0003	2.91	0.0002	0.8	0.13	103	34.2	0.00005		0.001	0.0065		4	0.0011	0.0007	0.43	0.001
30-Jun-05		0.001	0.0014			8.34		0.4	0.0006	2.3	0.0001	1.2	0.232	188	57	0.00005		0.001	0.0032		2	0.0023	0.0001	0.214	0.001
20-Jul-05		0.001	0.0017	0.03	0.05			0.6	0.0007	2.47	0.0001	1.3	0.229		62.8	0.00005		0.001	0.004		2	0.0023	0.0003	0.282	0.001
23-Aug-05		0.001	0.0012	0.03	0.06	8.13		0.4	0.0009	2.91	0.0001	1.1	0.197		54.6	0.00005		0.001	0.0038		3	0.0021	0.0002	0.564	0.001
22-Sep-05		0.001	0.0021			7.81		0.4	0.0007	2.74	0.0001	1.2	0.185	158	48	0.00005		0.001	0.0039		2	0.002	0.0003	0.301	0.001
27-Oct-05		0.001	0.0023	0.1	0.1	7.82		0.4	0.0011	3	0.0001	1.4	0.26		59.9	0.00005		0.001	0.006		2	0.0025	0.0003	0.388	0.001
29-Nov-05		0.001	0.0015			7.93		0.4	0.0007	2.47	0.0001	1.2	0.181	180	50.8	0.00005		0.001	0.0039		2	0.002	0.0001	0.182	0.001
14-Dec-05		0.001	0.0018			6.8		0.5	0.0006	3.54	0.0001	1.6	0.267		76.4	0.00005		0.001	0.0042		2	0.0027	0.0001	0.242	0.001
25-Jan-06		0.001	0.0016			7.16		0.4	0.0003	1.98	0.0001	0.7	0.074	50	66.4	0.00005		0.001	0.0066		9	0.0005	0.0006	0.196	0.001
22-Feb-06		0.001	0.0005			7.4		0.5	0.0009	3.67	0.0001	1.5	0.245	230	78.9	0.00013		0.001	0.0042		3	0.0041	0.0001	0.154	0.001
15-Mar-06		0.001	0.0021			7.16		0.5	0.0012	4.08	0.0001	1.6	0.288	267	83	0.00005		0.001	0.0061		2	0.0036	0.0002	0.198	0.001
27-Apr-06		0.001	0.0014					0.7	0.0008	3.45	0.0001	1.8	0.26	274	85.3	0.00005		0.001	0.0041		2	0.0027	0.0002	0.186	0.001
25-May-06		0.001	0.0016	0.03	0.03			0.4	0.0003	1.71	0.0001	0.7	0.074	50	16.5	0.00005		0.001	0.0066		9	0.0005	0.0006	0.196	0.001
28-Jun-06		0.001	0.0068			6.9		0.4	0.0005	3.72	0.0002	0.8	0.137		36.9	0.00005		0.001	0.031			0.0013	0.0036	0.669	0.001
30-Jul-06		0.001	0.0019					0.4	0.0008	2.63	0.0001	1.5	0.247		69.4	0.00005		0.001	0.044			0.0021	0.0002	0.197	0.001
31-Aug-06		0.002	0.0041			7.4		0.8	0.0005	2.88	0.0002	1	0.209		66.2	0.0001		0.002	0.0041			0.0027	0.0002	0.246	0.002
21-Sep-06		0.001	0.0017			7.9		0.4	0.0005	2.6	0.0001	1	0.211		66.2	0.00005		0.001	0.0041			0.0025	0.0001	0.227	0.001
25-Oct-06		0.001	0.0007			8.3		0.5	0.0007	3	0.0001	1.5	0.221		63	0.00005		0.001	0.0045			0.0027	0.0001	0.247	0.001
29-Nov-06																									
22-Dec-06		0.001	0.0029					1	0.0012	5.24	0.0001	2.3	0.338		112	0.00005		0.001	0.0068			0.0037	0.0002	0.586	0.001
22-Jan-07		0.001	0.0017			7.38		0.6	0.0008	4.4	0.0001	1.7	0.313		94.8	0.00005		0.001	0.0057			0.0034	0.0002	0.312	0.001
27-Feb-07																									
28-Feb-07																									
23-Mar-07																									
18-Apr-07		0.001	0.0011			7.5		1	0.0003	0.9	0.0001	0.9	0.073		33.1	0.00005		0.001	0.0392			0.0007	0.0003	0.118	0.001
29-May-07		0.002	0.0038			8.06		0.8	0.0004	2.55	0.0003	0.8	0.09		25.5	0.0001		0.002	0.0998			0.001	0.0022	0.318	0.002
16-Jun-07		0.001	0.0024			8.04		0.4	0.0006	2.56	0.0001	1.1	0.192		54.1	0.00005		0.001	0.0431			0.0018	0.0005	0.264	0.001
Summary statistics																									
n	1	39	34	7	7	36	6	37	34	38	34	38	38	20	39	33	2	33	39	0	30	34	33	41	38
mean	0.0002	0.003	0.0028	0.05	0.12	7.8	0.11	0.6	0.004	3.0	0.0002	1.3	0.22	214	65	0.0	0.006	0.0016	0.012	-	5	0.005	0.0006	0.5	0.0021
standard deviation (S.D.)	-	0.003	0.0022	0.03	0.17	0.6	0.10	0.2	0.017	0.9	0.0004	0.4	0.07	76	26	0.0	-	0.0022	0.018	-	11	0.012	0.0008	0.4	0.0023
mean - 3 S.D.	-	-0.008	-0.0038	-0.03	-0.39	6.1	-0.19	-0.1	-0.047	0.4	-0.0008	0.0	-0.01	-15	-13	0.0	-	-0.0049	-0.043	-	-27	-0.030	-0.0019	-0.8	-0.0047
mean + 3 S.D.	-	0.013	0.0094	0.13	0.63	9.5	0.41	1.3	0.055	5.5	0.0013	2.6	0.44	443	142	0.0	-	0.0081	0.068	-	37	0.039	0.0030	1.7	0.0089

RED Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

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¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.13: Water quality parameters for station KV21, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
2-Aug-03	148	10	0.05	0.02	0.02	0.0188	0.0006	180	0.02		0.0248	176	6	0.001	0.001		0.01		572	5	0.322	0.006	0.016	24.9	2.38
19-Jul-05	119	0.184	0.007	0.0016	0.0048	0.037	0.001	6	0.0005	0.02	0.0478	144	145	0.0024	0.0029		0.008		451	5	0.8	0.0052	0.02	23	4.02
Summary statistics																									
n	2	2	2	1	1	2	2	2	2	1	1	2	2	1	1	0	1	0	2	2	2	1	1	2	2
mean	133.5	5.092	0.0285	0.0016	0.0048	0.0279	0.0008	93	0.01025	0.02	0.0478	160	75.5	0.0024	0.0029	-	0.008	-	511.5	5	0.561	0.0052	0.02	23.95	3.2
standard deviation (S.D.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

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¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.13: Water quality parameters for station KV21, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
2-Aug-03		0.01	0.014	0.1	1	6.62	0.06	0.6	0.02	3.1	0.002	1.16	0.219	377	118	0.006		0.006	0.001		1	0.07	0.018	3.14	0.006
19-Jul-05		0.001	0.0249	0.03	0.07			0.5	0.0009	3.51	0.0001	1.1	0.24		112	0.00022		0.001	0.0092		9	0.0045	0.0006	4.76	0.001
Summary statistics																									
n	0	2	1	2	2	1	1	2	1	2	1	2	2	0	2	1	0	1	2	0	2	1	1	2	2
mean	-	0.0055	0.0249	0.065	0.535	6.62	0.06	0.55	0.0009	3.305	0.0001	1.13	0.2295	-	115	0.00022	-	0.001	0.0051	-	5	0.0045	0.0006	3.95	0.0035
standard deviation (S.D.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean - 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
mean + 3 S.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

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¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.14: Water quality parameters for station KV47, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
3-Oct-96																490									
27-May-97	73	0.4		0.02	0.02	0.038	0.0002				0.0039	47.6		0.001	0.001	325	0.016		163		1.36	0.204		9.21	0.581
30-Jun-97	192				0.05						0.008					660	0.01					0.05			
10-Oct-97	220				0.05						0.001					960	0.01					0.05			
15-Jan-98					0.05						0.003					1100	0.01				1	0.05			2.3
1-Feb-98	254			0.05	0.05						0.001					980	0.01		556		1	0.05			1.6
13-Mar-98	268			0.05	0.05						0.001					980	0.01		625		2	0.05			2.5
12-Apr-98				0.05	0.05						0.007					1100	0.01		586		1	0.05			3
12-May-98	88			0.05	0.05						0.001					350	0.01		198		2	0.05			1.05
28-Apr-99	212	0.03		0.02	0.02	0.0551	0.0002				0.0017	157		0.001	0.001	969	0.005				0.594	0.005		38	1.35
10-Jul-01	122	0.49		0.02	0.02	0.0603	0.0006				0.0038	61.2	6	0.002	0.002	464	0.032				2.34	0.242		11.8	0.856
2-Aug-03	206	0.78	0.11	0.02	0.02	0.0426	0.0006	251	0.02		0.0021	176	6	0.001	0.001		0.01		707	5	0.137	0.006	0.01	38.8	1.17
20-May-04	43	1.28		0.02	0.06	0.05	0.0006	52	0.02		0.0031	27.7	6	0.002	0.001	226	0.027		79	5	3.33	0.189	0.007	5.28	0.563
17-Jun-04	183	0.01		0.02	0.04	0.046	0.0006	223	0.02		0.0014	116	6	0.001	0.001		0.008		382	5	0.2	0.022	0.007	23.6	0.871
19-Jul-05	208	0.009	0.059	0.0004	0.0022	0.046	0.0001	6	0.0005	0.003	0.00198	123	253	0.0005	0.0003		0.001		454	5	0.3	0.0017	0.011	25.7	0.855
25-May-06		0.572		0.00406	0.0135	0.0369	0.0005		0.0005	0.01	0.00255	36.2		0.00089	0.00072		0.00644		111		1.86	0.130	0.005	7.17	0.517
31-Jul-06		1.09		0.0006	0.0051	0.094	0.0002		0.001	0.01	0.00287	158		0.002	0.002		0.004				2.2	0.0037	0.01	30.6	1.6
Summary statistics																									
n	12	9	2	3	3	9	9	4	6	3	3	9	5	3	3	12	3	0	10	4	14	3	3	9	14
mean	172	0.5	0.0845	0.0017	0.007	0.05	0.0004	133	0.010	0.008	0.0025	100	55	0.0011	0.0010	717	0.00381333	-	386	5	1.4	0.05	0.009	21	1.3
standard deviation (S.D.)	73	0.5	-	0.0021	0.006	0.02	0.0002	122	0.011	0.004	0.0005	58	110	0.0008	0.0009	331	0.0027248	-	233	0	0.9	0.07	0.003	13	0.8
mean - 3 S.D.	-47	-0.9	-	-0.0045	-0.011	0.00	-0.0003	-233	-0.021	-0.004	0.0011	-73	-276	-0.0012	-0.0016	-275	-0.0043611	-	-313	5	-1.4	-0.18	-0.001	-18	-1.0
mean + 3 S.D.	392	1.9	-	0.0079	0.025	0.10	0.0011	499	0.042	0.020	0.0038	274	387	0.0035	0.0037	1709	0.01198773	-	1085	5	4.2	0.27	0.018	61	3.7

RED

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Appendix Table A.14: Water quality parameters for station KV47, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
3-Oct-96						7.15															60				
27-May-97		0.005	0.003	0.05	0.05	7.5	0.06	0.7	0.02	1.94	0.001		0.11	558	28.3			0.005		230	36		0.005	0.241	
30-Jun-97			0.01			7.5								294							64			0.4	
10-Oct-97			0.01			6.7								330							79			0.21	
15-Jan-98			0.01			7.6								399							5			0.003	
1-Feb-98			0.01			7.5								361							44			0.26	
13-Mar-98			0.01			7.3								375							36			0.44	
12-Apr-98			0.01			6.9								383							7			0.44	
12-May-98			0.01			7.3								106							70			0.24	
28-Apr-99		0.005	0.002	0.223	0.007	8	0.06	1.8	0.01	4.4	0.001		0.356	1240	113			0.006		745	5		0.008	0.206	
10-Jul-01		0.01	0.006	0.065	0.002	7.9	0.06	0.4	0.02	2.5	0.002		0.163	127	32.1			0.007		327	69		0.008	0.246	
2-Aug-03		0.01	0.002	0.1	1	8.26	0.06	0.3	0.03	3.5	0.002	2.46	0.317	408	124	0.006		0.006	0.001		2	0.07	0.02	0.248	0.006
20-May-04		0.01	0.002			7.85	0.09	1.1	0.1	2.4	0.004	0.4	0.054	36.3	12.2		0.006	0.01	0.054		82	0.07	0.003	0.157	0.006
17-Jun-04		0.01	0.002				0.06	1	0.1	2.9	0.002	1.79	0.274	247	62.2		0.006	0.01	0.004		2	0.07	0.001	0.164	0.006
19-Jul-05		0.001	0.0018	0.03	0.06			0.5	0.0003	3.06	0.0001	1.6	0.33	81.1	0.00005			0.001	0.0051		2	0.0013	0.0001	0.237	0.001
25-May-06		0.000159	0.00237	0.001	0.0294		0.3	2	0.001	1.87	0.00214	2	0.0751	58.8	0.0001			0.00011	0.015		43.2	0.000366	0.0016	0.160	
31-Jul-06		0.002	0.0036					0.8	0.0007	4.8	0.0002	2.2	0.359	102	0.0001			0.002	0.0876			0.001	0.0036	0.379	0.002
Summary statistics																									
n	0	9	3	6	6	13	7	9	3	9	3	6	9	1	8	3	2	3	6	3	16	3	3	16	5
mean	-	0.006	0.0026	0.08	0.2	7.5	0.10	1.0	0.0007	3.0	0.0008	1.7	0.23	58.8	69	0.00008	0.006	0.0010	0.03	434	38	0.0009	0.0018	0.25	0.004
standard deviation (S.D.)	-	0.004	0.0009	0.08	0.4	0.4	0.09	0.6	0.0004	1.0	0.0012	0.7	0.13	-	42	0.00003	0.000	0.0009	0.04	274	30	0.0005	0.0018	0.12	0.002
mean - 3 S.D.	-	-0.007	-0.0002	-0.16	-1.0	6.2	-0.17	-0.8	-0.0004	0.0	-0.0026	-0.4	-0.15	-	-57	0.00000	0.006	-0.0018	-0.08	-387	-53	-0.0005	-0.0035	-0.09	-0.003
mean + 3 S.D.	-	0.019	0.0053	0.31	1.4	8.8	0.37	2.7	0.0017	6.1	0.0043	3.9	0.60	-	196	0.00017	0.006	0.0039	0.13	1255	129	0.0023	0.0070	0.60	0.012

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.15: Water quality parameters for station KV9, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
27-Jan-94																									
24-Feb-94																									
28-Mar-94																									
23-Apr-94																	0.0015				0.26	0.06			
12-Apr-95	167		0.005																243						
16-May-95	69		0.050	0.02	0.02	0.0164	0.0002				0.0015	42.9		0.001	0.001	320	0.017		155		0.336	0.04		11.5	0.11
1-Jun-94																									
27-Jun-94																									
29-Jul-94																									
3-Aug-95	164		0.050	0.02	0.02	0.0251	0.0002				0.0005	70.5		0.001	0.001	626	0.015		258		0.141	0.01		19.8	0.053
27-May-97	67	0.03		0.02	0.02	0.0203	0.0002				0.0036	39.2		0.001	0.001	285	0.013		139		0.243	0.041		9.92	0.0956
30-Jun-97	164				0.05						0.006					550	0.01					0.05			
10-Oct-97	106				0.05						0.001					740	0.01					0.05			
15-Jan-98					0.05						0.003	0.01				600	0.01				1	0.05			0.05
1-Feb-98	220			0.05	0.05						0.001					650	0.01		349		1	0.05			0.01
13-Mar-98	234			0.05	0.05						0.001					620	0.01		392		1	0.05			0.04
12-Apr-98				0.05	0.05						0.007					660	0.01		338		2	0.05			0.04
13-May-98	78			0.05	0.05						0.001					220	0.01		135		1	0.05			0.1
3-Feb-01	203	0.0076	0.05	0.0004	0.0005	0.105	0.00001		0.0004	0.002	0.00026	114	6	0.00061	0.00003		0.00239		416	5	0.049	0.001	0.007	29.1	0.0263
10-Jul-01	103	0.02		0.02	0.02	0.0187	0.0006				0.0011	41.4	6	0.001	0.001	357	0.012				0.141	0.026		10.6	0.086
8-Nov-01																									
2-Aug-03	197	0.01	0.05	0.02	0.02	0.0704	0.0006	241	0.02		0.0006	97.2	6	0.001	0.001		0.012		384	5	0.077	0.006	0.006	29.2	0.0331
24-Jan-04																775									
17-Jun-04	145	0.01		0.02	0.04	0.0411	0.0006	177	0.02		0.0006	70.8	6	0.001	0.001		0.01		248	5	0.053	0.022	0.007	17.9	0.0207
30-Jul-04	202	0.021	0.05	0.0011	0.0035	0.079	0.0001	247	0.0005	0.006	0.00069	112	6	0.0005	0.0004	574	0.007		410	5	0.2	0.0116	0.011	30.1	0.065
25-Jan-05	173	0.01		0.0002	0.0024	0.092	0.0001	211	0.0005	0.003	0.00014	66.1	6	0.0006	0.0002	751	0.001		265	5	0.2	0.0009	0.005	21.5	0.081
26-Feb-05																775									
19-Jul-05	194	0.018	0.003	0.0012	0.0036	0.06	0.0001	6	0.0005	0.002	0.00056	87.7	237	0.0005	0.0001	543	0.003		307	5	0.2	0.0139	0.005	23.1	0.068
22-Aug-05	167	0.006	0.002	0.0009	0.0027	0.043	0.0001	203	0.0005	0.002	0.00039	78.4	6	0.0005	0.0001	527	0.002		303	5	0.1	0.0058	0.004	20.9	0.042
27-Oct-05	190	0.005	0.027	0.0006	0.0016	0.05	0.0001	231	0.0005	0.004	0.00036	97.1	6	0.0005	0.0001		0.001			5	0.1	0.0033	0.006	23.9	0.076
25-Jan-06	204	0.005		0.0005	0.0006	0.105	0.0001	249	0.0005	0.003	0.0002	95.8	6	0.0005	0.0001	648	0.001		300	5	0.1	0.0013	0.003	24.6	0.036
14-Mar-06	196	0.005		0.0004	0.0006	0.101	0.0001	239	0.0005	0.002	0.00018	94.2	6	0.0005	0.0001	618	0.002		285	5	0.1	0.0024	0.003	25.8	0.051
26-Apr-06	219	0.005		0.0005	0.0006	0.099	0.0001	267	0.0005	0.002	0.00015	94.7	6	0.0005	0.0001	615	0.001		332	5	0.1	0.0017	0.002	24.4	0.063
26-May-06		0.0307		0.00191	0.00370	0.0196	0.0005		0.0005	0.01	0.000655	36.4		0.0005	0.0001		0.00343		129		0.204	0.0333	0.005	9.91	0.0754
31-Jul-06		0.005		0.0009	0.002	0.079	0.0001		0.0005	0.005	0.00038	89.5		0.0005	0.0001		0.001				0.1	0.0045	0.005	21.6	0.039
26-Feb-07		0.012		0.0004	0.0008	0.11	0.0001		0.0005	0.002	0.00025	94.9		0.0005	0.0001	590	0.001				0.1	0.0031	0.003	26.2	0.152
Summary statistics																									
n	21	16	9	11	11	18	18	10	14	12	11	18	12	11	11	21	11	0	19	11	24	11	11	18	23
mean	165	0.013	0.03	0.0008	0.0020	0.06	0.00021722	207	0.003	0.004	0.00036	79	25	0.00051	0.00014	574	0.0021	-	284	5	0.4	0.007	0.005	21	0.06
standard deviation (S.D.)	51	0.009	0.02	0.0005	0.0013	0.03	0.00020303	75	0.007	0.002	0.00020	25	67	0.00003	0.00009	157	0.0018	-	92	0	0.5	0.010	0.002	7	0.03
mean - 3 S.D.	11	-0.014	-0.04	-0.0007	-0.0018	-0.04	-0.0003919	-19	-0.018	-0.004	-0.00024	4	-175	0.00042	-0.00014	103	-0.0034	-	7	5	-1.1	-0.021	-0.003	1	-0.04
mean + 3 S.D.	319	0.039	0.10	0.0023	0.0058	0.17	0.00082631	433	0.025	0.011	0.00096	154	225	0.00060	0.00041	1044	0.0077	-	561	5	1.8	0.036	0.012	41	0.16

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.15: Water quality parameters for station KV9, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
27-Jan-94																									
24-Feb-94																									
28-Mar-94																									
23-Apr-94											0.01													0.033	
12-Apr-95				0.106	0.005									85.9										0.241	
16-May-95		0.005	0.002	0.200	2	7.8	0.06		0.02	1.56	0.001	1.24	0.1	86				0.01	0.002				0.002	0.241	
1-Jun-94																									
27-Jun-94																									
29-Jul-94																									
3-Aug-95		0.005	0.002	0.500	5	8.2	0.05		0.03	2.06	0.001	2.15	0.14	133				0.01	0.001				0.002	0.069	
27-May-97		0.005	0.003	0.05	0.05	7.5	0.06	0.7	0.02	1.39	0.001		0.09	456	21.3			0.005					0.004	0.224	
30-Jun-97			0.01			7.6								160							5			0.09	
10-Oct-97			0.01			7.1								192							5			0.09	
15-Jan-98			0.01			7.4								182							5			0.25	
1-Feb-98			0.01			7.40								166							30			0.08	
13-Mar-98			0.01			7.40								160							12			0.3	
12-Apr-98			0.16			6.80								163							5			0.02	
13-May-98			0.01			7.60								47							5			0.12	
3-Feb-01	0.0001	0.00016	0.0007	0.138	0.002		0.03	0.4	0.0004	2.86	0.00006	2.4	0.21	63.2	61.3	0.001			0.00002		1		0.00003	0.0253	
10-Jul-01		0.01	0.003	0.004	0.002	7.9	0.06	0.3	0.02	1.7	0.002		0.096	81.6	20.7			0.006					0.004	0.099	
8-Nov-01																									
2-Aug-03		0.01	0.001	0.05	0.5	8.12	0.06	0.7	0.02	2.8	0.002	2.54	0.203	201	58.9	0.006		0.009	0.001		2	0.07	0.012	0.036	0.006
24-Jan-04						7.37																			
17-Jun-04		0.01	0.002				0.06	1	0.1	1.9	0.002	1.83	0.166	114	31.1		0.006	0.01	0.004		2	0.07	0.001	0.039	0.006
30-Jul-04		0.001	0.0105	0.05	0.1	7.2		0.5	0.0002	2.87	0.0002	2.8	0.274	190	63.5	0.00005		0.001	0.0045		8	0.0014	0.0001	0.085	0.001
25-Jan-05		0.001	0.0044			7.27		0.8	0.0002	3.14	0.0001	3.1	0.222	96.5	31.1	0.00005		0.001	0.0019		1	0.0009	0.0001	0.035	0.001
26-Feb-05						7.37																			
19-Jul-05		0.001	0.001	0.03	0.03	7.49		0.4	0.0002	2.9	0.0001	2.1	0.217		44.7	0.00005		0.001	0.005		2	0.001	0.0002	0.048	0.001
22-Aug-05		0.001	0.0005	0.03	0.03	8		0.4	0.0004	2.7	0.0001	1.7	0.184		36.7	0.00005		0.001	0.0019		2	0.0009	0.0001	0.043	0.001
27-Oct-05		0.001	0.001	0.06	0.06	7.79		0.6	0.0002	2.96	0.0001	2.5	0.214		49.3	0.00005		0.001	0.0032		2	0.0011	0.0001	0.048	0.001
25-Jan-06		0.001	0.0005			6.88		0.6	0.0004	2.44	0.0001	2.2	0.216	151	47	0.00005		0.001	0.0031		2	0.0014	0.0001	0.022	0.001
14-Mar-06		0.001	0.0005			7.4		0.5	0.0004	2.56	0.0001	1.9	0.198	138	42.4	0.00005		0.001	0.0026		2	0.0013	0.0002	0.02	0.001
26-Apr-06		0.001	0.0005			7.31		0.6	0.0003	2.32	0.0001	2	0.201	139	44	0.00005		0.001	0.0016		2	0.0012	0.0001	0.02	0.001
26-May-06		0.000136	0.00085	0.001	0.005		0.3	2	0.001	1.34	0.000188	2	0.0729	41.6		0.0001		0.0001	0.01		3.2	0.000197	0.001	0.0648	
31-Jul-06		0.001	0.0005					0.5	0.0002	2.65	0.0001	2.1	0.205		42	0.00005		0.001	0.0572			0.0008	0.0001	0.037	0.001
26-Feb-07		0.001	0.0008			7.76		0.6	0.0002	2.54	0.0001	2	0.217		44.6	0.00005		0.001	0.0031			0.001	0.0001	0.026	0.001
Summary statistics																									
n	1	18	11	12	12	23	8	16	11	18	11	16	18	6	15	11	1	11	16	0	19	11	11	27	12
mean	0.0001	0.003	0.002	0.10	0.6	7.5	0.09	0.7	0.0003	2.4	0.00012	2.2	0.18	126	43	0.00005	0.006	0.0009	0.006	-	5	0.0010	0.0002	0.09	0.0018
standard deviation (S.D.)	-	0.004	0.003	0.14	1.5	0.4	0.09	0.4	0.0002	0.6	0.00004	0.4	0.06	51	13	0.00002	-	0.0003	0.014	-	7	0.0003	0.0003	0.08	0.0019
mean - 3 S.D.	-	-0.008	-0.007	-0.31	-3.8	6.4	-0.18	-0.5	-0.0004	0.6	0.00000	0.8	0.01	-27	4	0.00001	-	0.0001	-0.035	-	-15	0.0000	-0.0006	-0.16	-0.0040
mean + 3 S.D.	-	0.014	0.011	0.52	5.1	8.6	0.35	1.9	0.0010	4.1	0.00023	3.5	0.35	279	82	0.00010	-	0.0017	0.048	-	25	0.0020	0.0010	0.34	0.0077

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.16: Water quality parameters for station KV2, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																												
27-Jan-94																												
24-Feb-94																												
28-Mar-94																												
23-Apr-94																												
10-May-94	75				0.0133											199	0.01		83.7		1.03	0.01			0.176			
28-Jul-94	109	0.06		0.02	0.02	0.0002	0.02			0.0569	0.0005	44.4		0.001	0.001	274	0.004	0.005		0.124	0.001	0.002		12.8	0.038	0.005	0.003	
6-Sep-94	102	0.04		0.02	0.02	0.0002	0.02			0.0584	0.0005	44.8		0.001	0.001	299	0.003			0.157	0.01	0.002		13.4		0.005	0.005	
28-Oct-94	119	0.02		0.02	0.02	0.0003	0.02			0.0562	0.0005	46		0.001	0.001	341	0.009			0.157	0.01	0.003		13.2	0.045	0.005	0.004	
31-Oct-94																												
29-Nov-94																												
1-Jan-95																												
6-Feb-95																												
29-Mar-95																												
12-Apr-95	164				0.0004												0.0128		238		0.22	0.06			0.1			
27-Apr-95																												
3-May-95																												
6-Jun-95																												
14-Jul-95	96	0.06		0.02	0.02	0.0002	0.02			0.0529	0.0005	40.5		0.001	0.001	270	0.011			0.195	0.01	0.003		12.7	0.041	0.005	0.006	
11-Aug-95																												
3-Sep-95																												
7-Sep-95	89															273												
3-Oct-96					0.01						0.01					205	0.01				0.01	0.01			0.05		0.01	
30-Oct-96											0.01					240	0.01				0.2	0.01			0.05		0.01	
30-Nov-96											0.01					200	0.01				0.2	0.01			0.05		0.01	
30-Jun-97	100				0.05						0.001					260	0.01					0.05					0.01	
10-Oct-97	120				0.05						0.001					330	0.01					0.05					0.01	
15-Jan-98					0.05						0.001					440	0.01					0.05			0.1		0.01	
1-Feb-98	160			0.05	0.05						0.001					460	0.01		215		1	0.05			0.08		0.01	
13-Mar-98	188			0.05	0.05						0.001					500	0.01		265		1	0.05			0.11		0.01	
12-Apr-98				0.05	0.05						0.004					500	0.01		229		1	0.05			0.07		0.01	
12-May-98	80			0.05	0.05						0.001					210	0.01		111		1	0.05			0.1		0.01	
3-Feb-01	149	0.0288	0.05	0.0003	0.0015	0.0801	0.00001		0.0004	0.005	0.00016	70.8	6	0.00096	0.00009		0.00414		250	5	0.153	0.0007	0.01	18.9	0.0529	0.0001	0.00071	0.0044
10-Jul-01	86	0.21		0.02	0.02	0.0393	0.0006				0.0006	29.9	6	0.001	0.001	271	0.023			0.328	0.006			7.99	0.0612	0.01	0.007	
2-Aug-03	106	0.13	0.05	0.02	0.02	0.0511	0.0006	129	0.02		0.0006	42	6	0.001	0.001		0.013		169	5	0.084	0.006	0.006	14.4	0.0453	0.01	0.004	
17-Dec-03	113	0.03		0.02	0.02	0.0619	0.0006	138	0.02		0.0006	52.6	6	0.001	0.001		0.004		193	5	0.134	0.006	0.006	15.6	0.0709	0.01	0.003	
24-Jan-04																517												
19-Feb-04	168	0.01		0.02	0.04	0.096	0.0006	204	0.02		0.0006	79.8	6	0.001	0.001	421	0.001		281	5	0.107	0.044	0.007	24.2	0.186	0.01	0.004	
23-Mar-04	156	0.01		0.02	0.04	0.0922	0.0067	190	0.02		0.0011	66.7	6	0.008	0.001	433	0.003		252	5	0.161	0.051	0.007	21	0.227	0.02	0.004	
24-Apr-04	154	0.01		0.02	0.04	0.0795	0.0006	188	0.02		0.0006	35.6	6	0.001	0.001	410	0.001		238	5	0.147	0.01	0.007	11.8	0.118	0.01	0.003	
19-May-04		0.73		0.02	0.04	0.042	0.0006	57	0.02		0.0016	20.7	6	0.001	0.001	129.7	0.01		71	5	1.77	0.022	0.007	5.61	0.201	0.01	0.007	
15-Jun-04	95	0.2		0.02	0.04	0.048	0.0006	116	0.02		0.0006	37.4	6	0.001	0.001		0.007		136	5	0.316	0.022	0.007	10.7	0.0828	0.01	0.007	
20-Jul-04	108	0.116		0.0002	0.0017	0.062	0.0001	132	0.0005	0.003	0.00014	44.5	6	0.0005	0.0002	330	0.003		184	5	0.1	0.0008	0.006	14.2	0.043	0.001	0.0055	
30-Jul-04	99	0.686	0.05	0.0002	0.0023	0.061	0.0001	121	0.0005	0.032	0.00028	44.6	6	0.0005	0.0007	297	0.004		168	5	0.4	0.0018	0.006	13.6	0.084	0.001	0.0069	
24-Aug-04	102	0.09		0.02	0.04	0.0511	0.0006	125	0.02		0.0006	44.6	6	0.001	0.001	350	0.002		242	5	0.082	0.01	0.007	12.5	0.0489	0.01	0.004	
21-Sep-04	126	0.055		0.0002	0.0016	0.056	0.0001	153	0.0005	0.002	0.00016	52	6	0.0005	0.0003	411	0.001		199	5	0.2	0.0005	0.005	15.9	0.064	0.001	0.0057	
21-Oct-04	137	0.033		0.0002	0.0016	0.064	0.0001	167	0.0005	0.002	0.00014	54.9	6	0.0005	0.0002	412	0.001		217	5	0.1	0.0022	0.005	18.1	0.074	0.001	0.0064	
29-Nov-04	144	0.018		0.0002	0.0015	0.072	0.0001	175	0.0005	0.002	0.00013	56	6	0.0005	0.0001	463	0.001		218	5	0.2	0.0005	0.004	17.8	0.07	0.001	0.0043	
17-Dec-04	150			0.0001	0.0016	0.081	0.0001	182	0.0001	0.003	0.00028		6	0.0005	0.0001	460	0.001		238	5		0.0004			0.0002	0.001	0.0057	
26-Jan-05	170	0.012		0.0002	0.002	0.093	0.0001	207	0.0005	0.003	0.00016	68.5	6	0.0005	0.0002	531	0.001		268	5	0.2	0.0049	0.005	22.1	0.075	0.001	0.0049	
26-Feb-05	163	0.013		0.0002	0.0019	0.088	0.0001	198	0.0009	0.003	0.00014		6	0.0005	0.0001	517	0.001		248	5	0.2	0.0006	0.005			0.001	0.0035	
22-Mar-05	165	0.02		0.0002	0.002	0.088	0.0001	201	0.0005	0.004	0.00009	62.8	6	0.002	0.0001	501	0.016		261	5	0.2	0.0003	0.005	20	0.057	0.001	0.0069	
21-Apr-05	150	0.01		0.0002	0.001	0.072	0.0001	182	0.0005	0.002	0.0001	60.8	6	0.0005	0.0001	458	0.001		225	5	0.2	0.0003	0.005	19.1	0.052	0.001	0.003	
27-May-05	70	0.388		0.0002	0.002	0.046	0.0001	85	0.0005	0.002	0.00034	28.9	6	0.0008	0.001	230	0.003		110	5	0.8	0.0044	0.003	9	0.098	0.001	0.0076	
30-Jun-05	102	0.195		0.0002	0.0014	0.054	0.0001	124	0.0005	0.002	0.00018	39.7	6	0.0005	0.0006	298	0.002		150	5	0.3	0.0014	0.004	12.2	0.06	0.001	0.0062	
18-Jul-05	119	0.15	0.006	0.0002	0.0018	0.057	0.0001	145	0.0005	0.004	0.0002	43	6	0.0005	0.0004	298	0.002		168	5	0.2	0.0012	0.005	13.1	0.058	0.001	0.0066	
21-Aug-05	119	0.097	0.002	0.0002	0.0017	0.055	0.0001	145	0.0005	0.002	0.00027	48	6	0.0005	0.0004	344	0.002		188	5	0.2	0.0006	0.004	14.8	0.066	0.001	0.0054	
22-Sep-05	119	0.217	0.05	0.0002	0.0018	0.06	0.0001	145	0.0005	0.002	0.0004	47.1	6	0.0005	0.001	411	0.002		182	5	0.3	0.0019	0.004	13.4	0.075	0.001	0.0104	
27-Oct-05	130	0.13	0.015	0.0002	0.0016	0.059	0.0001	158	0.0005	0.003	0.00024	53.1	6	0.0005	0.0009	399	0.002			5	0.2	0.0007	0.006	15.4	0.079	0.001	0.0089	
29-Nov-05	138	0.056		0.0002	0.0012	0.056	0.0001	168	0.0005	0.002	0																	

Appendix Table A.16: Water quality parameters for station KV2, United Keno Hill, 1994 - 2007 ¹.

Parameter	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																						
27-Jan-94																		4				
24-Feb-94																		4				
28-Mar-94																		4				
23-Apr-94																		8				
10-May-94	0.1	1									29							27			0.362	
28-Jul-94	0.5	1	7.99		0.4	0.001	1.67	0.0001	1.37	0.17	52.6	17.5			0.01	0.001	197	5		0.003	0.027	0.001
6-Sep-94			8.20		0.5	0.02	1.86	0.001	1.62	0.17		20.7			0.01	0.001	226	5		0.002	0.017	0.001
28-Oct-94			7.89		0.6	0.02	1.95	0.001	1.66	0.17		18.6			0.01	0.002	228	5		0.005	0.027	0.001
31-Oct-94																		0				
29-Nov-94																		4				
1-Jan-95																		0				
6-Feb-95																		16				
29-Mar-95																		0				
12-Apr-95	0.094	0.005									83.8							10			0.048	
27-Apr-95																		4				
3-May-95																		32				
6-Jun-95																		20				
14-Jul-95			8.32		0.2	0.02	1.64	0.001	1.44	0.17	58	17.9			0.01	0.001	214	5		0.002	0.021	0.001
11-Aug-95																		0				
3-Sep-95																		8				
7-Sep-95			7.51								59.6						233.00	5				
3-Oct-96			7.1															36			0.01	
30-Oct-96			8.04															60			0.05	
30-Nov-96			7.83															32			0.04	
30-Jun-97			8								44.5							5			0.02	
10-Oct-97			7.1								52.2							5			0.01	
15-Jan-98			6.9								84							5			0.06	
1-Feb-98			7.3								87.9							16			0.94	
13-Mar-98			7.2								89							36			0.06	
12-Apr-98			7								104							5			0.01	
12-May-98			7.4								34							10			0.07	
3-Feb-01	0.114	0.002		0.03	0.5	0.0006	3.45	0.00006	2.3	0.217	30	30.5	0.001			0.00016		1		0.00003	0.0308	
10-Jul-01	0.036	0.002	8	0.06	0.4	0.02	1.5	0.002		0.111	51.2	12.7			0.006		147	22		0.003	0.059	
2-Aug-03	0.05	0.5		0.06	0.6	0.08	1.6	0.002	1.38	0.16	67.8	20.4	0.006		0.006	0.001		1	0.07	0.006	0.025	0.006
17-Dec-03				0.06	0.7	0.02	2.6	0.002	2.44	0.189	73.9	24.9		0.006	0.02	0.001		2	0.07	0.001	0.056	0.006
24-Jan-04			7.52														223					
19-Feb-04				0.06	1	0.1	3.6	0.002	3.44	0.256	99	36.7		0.006	0.01	0.004		2	0.07	0.001	0.142	0.006
23-Mar-04			7.62	0.08	1	0.1	3.5	0.002	2.93	0.243	96.1	38			0.013	0.004		3	0.07	0.001	0.206	0.006
24-Apr-04			7.74	0.06	1	0.1	3.1	0.002	1.89	0.252	87.2	31.6			0.01	0.004		3	0.07	0.001	0.116	0.006
19-May-04			8.01	0.06	1	0.1	1.8	0.002	0.61	0.057	16	5.6		0.006	0.01	0.042		46	0.07	0.001	0.158	0.006
15-Jun-04				0.06	1	0.1	1.7	0.002	1.02	0.151	53	13.3	0.006		0.01	0.004		10	0.07	0.001	0.059	0.006
20-Jul-04			8.1		0.4	0.0005	1.54	0.0005	1.5	0.184	69	21.8	0.00005		0.001	0.0015		1	0.0007	0.0002	0.04	0.001
30-Jul-04	0.05	0.1	7.61		0.6	0.0005	2.42	0.0004	1.6	0.157	66.1	21.3	0.00005		0.001	0.0069		8	0.0009	0.0006	0.08	0.001
24-Aug-04			8.5	0.12	1	0.1	1.6	0.002	1.2	0.211	64.2	20.8			0.01	0.004		2	0.07	0.001	0.043	0.006
21-Sep-04			7.66		1	0.0005	1.71	0.0001	1.8	0.222	75.9	24	0.00005		0.001	0.0016		2	0.0009	0.0001	0.038	0.001
21-Oct-04			7.72		0.7	0.0005	1.94	0.0001	2	0.225	87.2	23.4	0.00005		0.001	0.0023		2	0.0009	0.0005	0.029	0.001
29-Nov-04			6.9		0.7	0.0005	2.36	0.0008	2.8	0.243	78.4	26.2	0.00005		0.001	0.0016		2	0.001	0.0003	0.038	0.001
17-Dec-04			7.7			0.0004		0.0001			86	0.0295	0.00005			0.0019		2	0.0011		0.046	
26-Jan-05			7.52		0.9	0.0002	3.2	0.0001	3.2	0.227	99.9	31.6	0.00005		0.001	0.002	231	1	0.0009	0.0001	0.038	0.001
26-Feb-05			7.18			0.0005	3.17	0.0001	2.7	0.238	89.8	30.4	0.00005		0.001	0.0021		2	0.001	0.0014	0.03	0.001
22-Mar-05			8.76		0.6	0.0003	3.2	0.0001	3	0.264	88	29	0.00005		0.001	0.002		2	0.001	0.0001	0.035	0.001
21-Apr-05			8.5		1	0.0004	2.8	0.0001	4	0.242	84	28	0.00005		0.001	0.002	199	2	0.001	0.0001	0.029	0.001
27-May-05				0.4	0.0003	2.47	0.0003	0.9	0.118	0.118	36	12.5	0.00005		0.001	0.0111		17	0.0005	0.0012	0.057	0.001
30-Jun-05			8.05	0.4	0.0003	1.97	0.0001	1.1	0.18	0.18	55	17	0.00005		0.001	0.0041		4	0.0006	0.0004	0.026	0.001
18-Jul-05	0.03	0.03			0.4	0.0004	2	0.0001	1.4	0.188		19.4	0.00005		0.001	0.002		2	0.0007	0.0003	0.028	0.001
21-Aug-05	0.03	0.03	7.59	0.4	0.0006	2.03	0.0001	1.4	0.178	0.178		22.7	0.00005		0.001	0.0015		2	0.0008	0.0002	0.04	0.001
22-Sep-05			7.66		0.4	0.0006	2.04	0.0001	1.6	0.203	68	21.5	0.00005		0.001	0.0102		3	0.0008	0.0004	0.068	0.001
27-Oct-05	0.04	0.04	7.8		0.7	0.0006	2.23	0.0001	1.8	0.234		24.2	0.00005		0.001	0.0036	173	4	0.0008	0.0004	0.058	0.001
29-Nov-05			7.8	0.4	0.0002	1.97	0.0001	1.4	0.183	0.183	82	20.4	0.00005		0.001	0.0019		2	0.0007	0.0001	0.038	0.001
14-Dec-05			7.36		0.5	0.0006	2.45	0.0001	2.2	0.224	89	25.1	0.00005		0.001	0.0026		2	0.0008	0.0002	0.081	0.001
24-Jan-06			6.81		0.7	0.0006	2.81	0.0001	2.5	0.235	103	28.5	0.00005		0.001	0.0019	205	2	0.001	0.0001	0.038	0.001
22-Feb-06			7.26		0.8	0.0006	3.24	0.0001	2.6	0.223	96	31	0.00005		0.001	0.0016		2	0.001	0.0001	0.037	0.001
15-Mar-06			7.62		0.8	0.0005	3.58	0.0001	2.8	0.234	104	32.1	0.00005		0.001	0.0022	257	2	0.001	0.0002	0.039	0.001
27-Apr-06			7.45		0.8	0.0006	2.99	0.0001	2.7	0.233	96	30.8	0.00005		0.001	0.0012	208	2	0.0008	0.0002	0.035	0.001
25-May-06	0.03	0.03			0.6	0.0005	1.76	0.0001	0.8	0.076	26.2	7.9	0.00005		0.001	0.0108		24	0.0005	0.001	0.054	0.001
31-Jul-06					0.4	0.0005	1.54	0.0001	1.4	0.186		21.9	0.00005		0.001	0.055			0.0005	0.0002	0.034	0.001
28-Feb-07			7.73		0.9	0.0005	3.37	0.0001	2.8	0.259		31.9	0.00005		0.001	0.0019			0.0008	0.0001	0.061	0.001
Summary statistics																						
n	11	11	42	10	37	26	38	26	37	38	21	39	25	3	25	38	13	64	26	25	51	36
mean	0.10	0.2	7.7	0.07	0.7	0.004	2.4	0.0002	2.0	0.20	78	23	0.00005	0.006	0.001	0.005	211	9	0.003	0.0004	0.07	0.0021
standard deviation (S.D.)	0.14	0.4	0.5	0.02	0.2	0.020	0.7	0.0004	0.8	0.05	21	8	0	0.000	0.005	0.011	28	12	0.014	0.0004	0.14	0.0021
mean - 3 S.D.	-0.31	-0.9	6.3	0.00	-0.1	-0.054	0.3	-0.0010	-0.5	0.05	16	-2	0.00005	0.006	-0.013	-0.027	126	-28	-0.037	-0.0007	-0.33	-0.0042
mean + 3 S.D.	0.51	1.4	9.0	0.13	1.4	0.063	4.5	0.0014	4.4	0.34	140	48	0.00005	0.006	0.016	0.038	296	4				

Appendix Table A.17: Water quality parameters for station KV3, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	μS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
28-Jul-94	108	0.06		0.02	0.02	0.0668	0.0002		0.02		0.0005	49.1		0.001	0.001	278	0.008	0.005			0.199	0.001	0.002	13.9	0.047
6-Sep-94	105	0.04		0.02	0.02	0.063	0.0002		0.02		0.0005	45.6		0.001	0.001	303	0.003			0.213	0.01	0.002	13.7		
26-Oct-94	129	0.03		0.02	0.02	0.0612	0.0002		0.02		0.0005	49.7		0.001	0.001	320	0.005			0.234	0.01	0.002	14.3	0.072	
12-Apr-95	166										0.0003						0.001		244		0.245	0.06			
26-Apr-95	94	0.03		0.02	0.02	0.0557	0.0002		0.02		0.0005	43.3		0.001	0.001	322	0.017			0.28	0.01	0.002	12.5	0.08	
12-Jul-95	94	0.07		0.02	0.02	0.0556	0.0002		0.02		0.0005	39.8		0.001	0.001	272	0.016			0.16	0.01	0.003	12.2	0.051	
6-Sep-95	96															275									
21-May-97	46.9										0.006					133	0.006		64.4		0.991	0.06			
20-Aug-97	112				0.05						0.001					306	0.01					0.05			
10-Oct-97																380						0.05			
3-Feb-01	145	0.0185	0.05	0.0003	0.0016	0.08	0.00001		0.0004	0.004	0.00016	70.5	6	0.00077	0.00011		0.00196		251	5	0.175	0.0007	0.01	18.7	0.0555
10-Jul-01	90	0.21		0.02	0.02	0.0398	0.0006				0.0006	30	6	0.001	0.001	274	0.012			0.369	0.006		8.07	0.0743	
2-Aug-03	109	0.11	0.05	0.02	0.02	0.0538	0.0006	133	0.02		0.0006	42.9	6	0.001	0.001		0.013		176	5	0.092	0.006	0.006	14.7	0.0434
24-Jan-04																526									
17-Jun-04	98	0.16		0.02	0.04	0.0558	0.0006	119	0.02		0.0006	42.9	6	0.001	0.001		0.009		156	5	0.224	0.022	0.007	12.2	0.073
30-Jul-04	88	0.719	0.05	0.0002	0.0022	0.059	0.0001	107	0.0005	0.036	0.00028	41.3	6	0.0005	0.0007	264	0.005		155	5	0.3	0.0018	0.007	13.1	0.085
24-Aug-04	115	0.08		0.02	0.04	0.05	0.0006	140	0.02		0.001	51	6	0.001	0.001	300	0.004		263	5	0.145	0.01	0.007	12.8	0.222
25-Jan-05	173	0.01		0.0002	0.0024	0.092	0.0001	211	0.0005	0.003	0.00014	66.1	6	0.0006	0.0002	368	0.001		265	5	0.2	0.0009	0.005	21.5	0.081
27-Feb-05	169	0.014		0.0002	0.002	0.082	0.0001	206	0.0005	0.008	0.00013	67.8	6	0.0005	0.0001	526	0.001		253	5	0.2	0.0013	0.004	21.4	0.063
29-Jun-05																297									
19-Jul-05	112	0.114	0.01	0.0002	0.0021	0.058	0.0001	6	0.0005	0.002	0.00019	44.2	137	0.0005	0.0002	300	0.002		162	5	0.2	0.0014	0.004	13.6	0.057
22-Aug-05	118	0.08	0.003	0.0002	0.0019	0.058	0.0001	143	0.0005	0.002	0.00025	49	6	0.0005	0.0003	352	0.001		192	5	0.2	0.0013	0.004	15.1	0.072
27-Oct-05		0.125		0.0002	0.0021	0.062	0.0001		0.0005	0.003	0.00025	53.8		0.0005	0.0008		0.009			0.2	0.0012	0.007	15.5	0.116	
25-Jan-06	153	0.02		0.0003	0.0017	0.088	0.0001	186	0.0005	0.004	0.00013	63.5	6	0.0005	0.0001	203	0.001		237	5	0.2	0.0012	0.005	18.2	0.075
14-Mar-06	175	0.015		0.0002	0.0021	0.099	0.0001	213	0.0005	0.004	0.00016	70.4	6	0.0005	0.0001	472	0.001		275	5	0.2	0.0011	0.005	21.5	0.08
26-May-06		0.319		0.00029	0.00269	0.0406	0.0005		0.0005	0.01	0.000396	26.0		0.0005	0.00072		0.00317		93.4		0.745	0.00694	0.005	7.51	0.0978
31-Jul-06		0.16		0.0004	0.002	0.066	0.0002		0.001	0.008	0.00024	46.5		0.001	0.0005		0.004				0.2	0.001	0.006	14	0.058
26-Feb-07		0.05		0.0002	0.0023	0.096	0.0001		0.0005	0.004	0.00028	68.9		0.0005	0.0002	482	0.001				0.3	0.0018	0.005	22.3	0.102
Summary statistics																									
n	21	21	5	12	12	21	21	10	20	12	12	21	12	12	12	21	12	1	14	11	23	12	12	21	20
mean	119	0.12	0.03	0.002	0.005	0.07	0.00024	146	0.008	0.007	0.0003	51	17	0.0006	0.0004	331	0.003	0.005	199	5.00	0.27	0.002	0.0053	15	0.08
standard deviation (S.D.)	33	0.16	0.02	0.006	0.011	0.02	0.00020	63	0.010	0.009	0.0002	13	38	0.0002	0.0003	100	0.002	-	67	0	0.20	0.003	0.0012	4	0.04
mean - 3 S.D.	18	-0.36	-0.04	-0.015	-0.028	0.01	-0.00037	-43	-0.021	-0.021	-0.0004	12	-97	0.0000	-0.0005	31	-0.005	-	-2	5	-0.33	-0.006	0.0019	3	-0.03
mean + 3 S.D.	219	0.59	0.10	0.019	0.038	0.12	0.00085	336	0.038	0.035	0.0010	89	130	0.0012	0.0014	631	0.010	-	400	5	0.87	0.011	0.0088	28	0.19

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.17: Water quality parameters for station KV3, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
28-Jul-94		0.005	0.003	0.5	1	8.26			0.001	1.88	0.0001	1.61	0.19	51.6	20.5			0.01	0.001		5		0.004	0.018	0.001
6-Sep-94		0.005	0.006			8.06			0.02	1.86	0.001	1.71	0.17		20.9			0.01	0.001		5		0.002	0.016	0.001
26-Oct-94		0.005	0.004			7.92			0.02	2.06	0.001	1.85	0.18		19.8			0.01	0.002		5		0.003	0.023	0.001
12-Apr-95				0.098	0.005						0.01			85.2							10			0.036	
26-Apr-95		0.005	0.004			7.89			0.02	2.58	0.001	1.8	0.15		19.7			0.01	0.01		5		0.003	0.075	0.001
12-Jul-95		0.005	0.004			8.10			0.02	1.68	0.001	1.75	0.16	56.8	17.3			0.01	0.001		5		0.002	0.019	0.001
6-Sep-95						7.63								61.6							5				
21-May-97				0.005	0.005	7.45					0.01			18							16			0.067	
20-Aug-97			0.01			8.07								53.7							5			0.05	
10-Oct-97						7.1															24			0.25	
3-Feb-01	0.0001	0.00072	0.0042	0.119	0.002		0.03	0.5	0.0004	3.42	0.00006	2.3	0.214	30.2	30.1	0.001			0.0001		1		0.00003	0.0314	
10-Jul-01		0.01	0.007	0.032	0.002	8	0.06	0.3	0.02	1.5	0.002		0.108	52.3	12.7			0.006					0.004	0.057	
2-Aug-03		0.01	0.003	0.05	0.5	8.41	0.06	0.7	0.04	1.6	0.002	1.46	0.168	69.6	0.2	0.006		0.006	20.7		1	0.07	0.006	0.022	0.006
24-Jan-04						7.05																			
17-Jun-04		0.01	0.006				0.06	1	0.1	1.9	0.002	1.19	0.171	52.3	16.7		0.006	0.011	0.004		11	0.07	0.001	0.049	0.006
30-Jul-04		0.001	0.0087	0.05	0.1	7.81		0.5	0.0005	2.46	0.0004	1.6	0.143	62.8	20.7	0.00005		0.001	0.0032		4	0.0007	0.0004	0.075	0.001
24-Aug-04		0.01	0.003			9.2	0.07	1.6	0.1	1.6	0.002	1.5	0.221	70.4	22			0.01	0.004		2	0.07	0.001	0.194	0.006
25-Jan-05		0.001	0.0044			7.15		0.8	0.0002	3.14	0.0001	3.1	0.222	96.5	31.1	0.00005		0.001	0.0019		1	0.0009	0.0001	0.035	0.001
27-Feb-05		0.001	0.0028			7.05		0.7	0.0003	3.3	0.0002	2.9	0.25	92.5	31.3	0.00005		0.001	0.0015		2	0.0011	0.0018	0.034	0.001
29-Jun-05						7.87																			
19-Jul-05		0.001	0.0058	0.03	0.03	7.72		0.4	0.0004	2.01	0.0001	1.3	0.185		19.6	0.00005		0.001	0.0014		1	0.0007	0.0003	0.024	0.001
22-Aug-05		0.001	0.005	0.03	0.03	8.04		0.4	0.0005	2.07	0.0001	1.4	0.181		22.7	0.00005		0.001	0.0013		2	0.0008	0.0002	0.038	0.001
27-Oct-05		0.001	0.0097					0.8	0.0006	2.21	0.0001	1.9	0.24		23.5	0.00005		0.001	0.0029			0.0008	0.0005	0.072	0.001
25-Jan-06		0.001	0.0049			7.27		0.7	0.0005	2.89	0.0001	2.6	0.243	93	29.2	0.00005		0.001	0.0021		2	0.0011	0.0001	0.04	0.001
14-Mar-06		0.001	0.0035			7.51		0.8	0.0005	3.56	0.0001	2.8	0.234	104	31.8	0.00005		0.001	0.0024		2	0.0011	0.0003	0.038	0.001
26-May-06		0.000467	0.00624	0.001	0.0166		0.3	2	0.001	1.55	0.000099	2	0.0820	27.3		0.0001		0.00018	0.01		33.2	0.000357	0.0010	0.0530	
31-Jul-06		0.002	0.0088					0.8	0.0005	1.5	0.002	1	0.19		23.1	0.0001		0.002	0.0405			0.001	0.0003	0.034	0.002
26-Feb-07		0.001	0.0096			7.78		0.8	0.0004	3.4	0.0001	2.8	0.268		32	0.00005		0.001	0.0024			0.0008	0.0001	0.063	0.001
Summary statistics																									
n	1	21	12	10	10	22	6	16	12	21	12	20	21	7	20	11	1	12	20	0	22	12	12	25	18
mean	0.0001	0.004	0.006	0.09	0.2	7.8	0.10	0.8	0.009	2.3	0.0004	1.9	0.19	78	22	0.00006	0.01	0.0018	1	-	7	0.007	0.0005	0.06	0.0019
standard deviation (S.D.)	-	0.004	0.003	0.15	0.3	0.5	0.10	0.4	0.029	0.7	0.0007	0.6	0.05	27	8	0.00002	-	0.0026	5	-	8	0.020	0.0005	0.05	0.0019
mean - 3 S.D.	-	-0.007	-0.002	-0.35	-0.8	6.3	-0.20	-0.5	-0.077	0.2	-0.0017	0.1	0.05	-2	-1	0.00000	-	-0.0061	-13	-	-18	-0.053	-0.0010	-0.10	-0.0038
mean + 3 S.D.	-	0.014	0.014	0.54	1.2	9.3	0.40	2.1	0.095	4.4	0.0026	3.8	0.33	159	45	0.00012	-	0.0096	15	-	31	0.067	0.0020	0.22	0.0076

- RED
- Values that are less than the method detection limit
-
- Values that are greater than 3 standard deviations away from the mean (i.e. outliers)
-
- Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)
-
- Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available
-
- Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.18: Water quality parameters for station KV4, United Keno Hill, 1994 - 2007¹.

Paramer	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
27-Jan-94																320						0.02			
24-Feb-94																330						0.02			
28-Mar-94																360						0.02			
23-Apr-94																340						0.01			
1-Jun-94																200						0.03			
27-Jun-94																200						0.03			
29-Jul-94																460						0.01			
17-Aug-94																340						0.1			
29-Sep-94																380						0.18			
31-Oct-94											0.001					280	0.004				0.6	0.02			0.1
29-Nov-94											0.001					450	0.002				0.4	0.015			0.155
5-Jan-95											0.001					470	0.002				0.2	0.005			0.066
9-Feb-95																									
29-Mar-95					0.006						0.001					400	0.002				1	0.02			0.29
12-Apr-95	205			0.06	0.06	0.12	0.001			0.01	0.0003	107		0.006	0.006		0.0014		380		0.042	0.06		28.9	0.029
27-Apr-95					0.003						0.001					295	0.002				0.2	0.02			0.2
3-May-95					0.01						0.002					160	0.006				0.4	0.07			0.14
16-May-95	73			0.02	0.02	0.0252	0.0002				0.0013	42.2		0.001	0.001	313	0.051		154		0.4	0.03		11.4	0.095
6-Jul-95											0.01					350	0.01				0.16	0.17			0.12
11-Jul-95					0.02						0.001						0.011				0.194	0.01			0.057
3-Aug-95	115			0.02	0.02	0.0389	0.0002				0.0005	40.5		0.001	0.001	402	0.013		151		0.131	0.01		12.1	0.038
11-Aug-95					0.001						0.001					195	0.004				0.2	0.05			0.05
4-Sep-95					0.003						0.001					190	0.002				0.2	0.005			0.038
11-Oct-95					0.006						0.001					205	0.002				0.2	0.005			0.62
5-Nov-95					0.002						0.001					215	0.002				0.2	0.005			0.064
12-Dec-95					0.003						0.001					190	0.002				0.2	0.005			0.115
1-Jan-96					0.001						0.001					170	0.002				0.2	0.005			0.115
9-Feb-96					0.001						0.001					150	0.002				0.2	0.005			0.098
5-Mar-96					0.005						0.001					190	0.006				0.4	0.025			0.1
7-Apr-96					0.005						0.001					560	0.01				0.2	0.015			0.08
28-Apr-96					0.004						0.004					500	0.014				0.2	0.055			0.34
24-Jun-96					0.001						0.001					190	0.002				0.2	0.01			0.052
18-Jul-96					0.003						0.002					210	0.006				0.2	0.045			0.094
2-Aug-96					0.01						0.01					310	0.01				0.01	0.01			0.1
16-Sep-96					0.01						0.01					220	0.01				0.01	0.01			0.07
27-Mar-97	180				0.05						0.001					250	0.01					0.05			
30-Jun-97	111				0.05						0.004					270	0.01					0.05			
10-Oct-97	138				0.05						0.001					610	0.01					0.05			
15-Jan-98					0.05						0.001					480	0.01				1	0.05			0.11
1-Feb-98	170			0.05	0.05						0.001					470	0.01		253		1	0.05			0.08
13-Mar-98	180			0.05	0.05						0.003					470	0.01		255		1	0.05			0.09
12-Apr-98				0.05	0.05						0.004					500	0.01		264		1	0.05			0.06
13-May-98	74			0.05	0.05						0.001					210	0.01		127		1	0.05			0.1
8-Nov-01																									
3-Feb-01	148	0.0213	0.05	0.0003	0.0018	0.0789	0.00001		0.0004	0.003	0.00014	68.5	6	0.0007	0.00004		0.00199		251	5	0.175	0.0007	0.01	18.3	0.0537
10-Jul-01	91	0.18	0.05	0.02	0.02	0.0354	0.0006				0.0008	32.3	6	0.001	0.001	294	0.019				0.33	0.013		8.61	0.0789
2-Aug-03	113	0.11	0.05	0.02	0.02	0.0554	0.0006	138	0.02		0.0006	47.2	6	0.001	0.001		0.012		184	5	0.104	0.006	0.006	15.9	0.0453
24-Jan-04																527									
17-Jun-04	104	0.17		0.02	0.04	0.0543	0.0006	126	0.02		0.0006	45.4	6	0.001	0.001		0.009		164	5	0.291	0.011	0.007	12.7	0.0907
30-Jul-04	98	0.648	0.05	0.0003	0.0024	0.062	0.0001	119	0.0005	0.065	0.00038	48.2	6	0.0005	0.0009		0.005		174	5	0.4	0.0041	0.007	14.6	0.092
24-Aug-04	117	0.08		0.02	0.04	0.0544	0.0006	143	0.02		0.0008	54.6	6	0.001	0.001	330	0.003		216	5	0.147	0.01	0.007	13.6	0.168
27-Feb-05	160	0.006		0.0002	0.0018	0.082	0.0001	196	0.0005	0.008	0.00013	66.5	6	0.0005	0.0001	527	0.001		250	5	0.2	0.0006	0.004	20.9	0.057
19-Jul-05	120	0.098	0.009	0.0003	0.0022	0.057	0.0001	146	0.0005	0.002	0.00023	48.3	6	0.0005	0.0002		0.002		181	5	0.2	0.0025	0.004	14.5	0.056
22-Aug-05	130	0.064	0.002	0.0003	0.0022	0.055	0.0001	159	0.0005	0.002	0.00028	55.1	6	0.0005	0.0002	397	0.001		216	5	0.2	0.0024	0.005	16.3	0.063
27-Oct-05	133	0.104	0.014	0.0002	0.0021	0.064	0.0001	162	0.0005	0.003	0.00027	59.8	6	0.0005	0.0007		0.002			5	0.2	0.0022	0.006	16.6	0.102
25-Jan-06	147	0.019		0.0002	0.0017	0.092	0.0001	179	0.0005	0.003	0.00015	66.7	6	0.0005	0.0001	369	0.001		244	5	0.2	0.001	0.005	18.9	0.076
14-Mar-06	172	0.011		0.0002	0.002	0.097	0.0001	210	0.0005	0.003	0.00016	69.5	6	0.0005	0.0001	485	0.001		273	5	0.2	0.0011	0.005	21.2	0.078
26-May-06		0.0896		0.00155	0.00311	0.0249	0.0005		0.0005	0.01	0.000566	32.6		0.0005	0.00023		0.00343		122		0.276	0.0237	0.005	9.09	0.0730
31-Jul-06		0.143		0.0002	0.0018	0.068	0.0001		0.0005	0.005	0.00035	51.1		0.0005	0.0006		0.003				0.1	0.001	0.006	14.6	0.06
26-Feb-07		0.028		0.0002	0.002	0.094	0.0001		0.0005	0.003	0.00026	68.9		0.0005	0.0002	521	0.001				0.2	0.0013	0.005	22.1	0.099
Summary statistics																									
n	21	15	7	11	11	18	18	10	14	12	11	18	12	11	11	48	11	0	18	11	45	11	11	18	45
mean	132	0.12	0.032	0.002	0.006	0.06	0.0003	158	0.005	0.010	0.00033	56	6	0.00055	0.0004	339	0.0021	-	214	5	0.32	0.005	0.0054	16	0.11
standard deviation (S.D.)	36	0.16	0.023	0.006	0.011	0.03	0.0003	30	0.008	0.018	0.00020	18	0	0.00015	0.0003	127	0.0013	-	64	0	0.29	0.007	0.0010	5	0.10
mean - 3 S.D.	24	-0.35	-0.035	-0.016	-0.029	-0.01	-0.0006	69	-0.020	-0.043	-0.00028	3	6	0.00009	-0.0006	-43	-0.0019	-	22	5	-0.54	-0.016	0.0023	1	-0.19
mean + 3 S.D.	241	0.59	0.100	0.020	0.040	0.14	0.0011	247	0.030	0.063	0.00093	108	6	0.00100	0.0014	720	0.0061	-	407	5	1.19	0.025	0.0084	31	0.40

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.18: Water quality parameters for station KV4, United Keno Hill, 1994 - 2007¹.

Paramer	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
27-Jan-94						7.7															4				
24-Feb-94						7.6															8				
28-Mar-94						7.6															4				
23-Apr-94						7.9															8				
1-Jun-94						7.8															8				
27-Jun-94						7.9															4				
29-Jul-94						7.9															8				
17-Aug-94						8															1				
29-Sep-94						7.7															1				
31-Oct-94						7.7															1			0.062	
29-Nov-94						7.49															1			0.064	
5-Jan-95						7.83																		0.048	
9-Feb-95																									
29-Mar-95						7.2															12			0.058	
12-Apr-95		0.01	0.02	0.127	0.005				0.06	2.58	0.01	2.8	0.216	177.7				0.06	0.002		10		0.01	0.026	
27-Apr-95			0.002			8.5															4			0.23	
3-May-95			0.002			8.17															8			0.29	
16-May-95		0.005	0.003	0.2	2	7.9			0.02	1.69	0.001	1.24	0.1	77.3				0.01	0.003		11		0.003	0.198	
6-Jul-95						7.79																		0.5	
11-Jul-95			0.005																		5			0.028	
3-Aug-95		0.005	0.004	0.2	2	8.1			0.02	1.4	0.001	1.36	0.12	69.5				0.01	0.001		5		0.002	0.025	
11-Aug-95			0.02			7.72																		0.082	
4-Sep-95			0.004			8.1															1			0.028	
11-Oct-95			0.002			7.17															1			0.094	
5-Nov-95			0.004			7.39															1			0.04	
12-Dec-95			0.004			7.06															4			0.038	
1-Jan-96			0.002			7.76															1			0.03	
9-Feb-96			0.002			7.28															3			0.034	
5-Mar-96			0.008			7.17															1			0.03	
7-Apr-96			0.002			8.1															4			0.032	
28-Apr-96			0.002			7.16															4			0.04	
24-Jun-96			0.006			7.64															14			0.054	
18-Jul-96			0.004			7.66																		0.19	
2-Aug-96			0.01			7.63															1			0.6	
16-Sep-96			0.01			7.82															36			0.09	
27-Mar-97			0.01			6.92															16			0.01	
30-Jun-97			0.01			7.8								55.6							5			0.02	
10-Oct-97			0.01			7.2								63.1							5			0.01	
15-Jan-98			0.02			7.5								88							5			0.07	
1-Feb-98			0.01			7.3								91.8							18			0.23	
13-Mar-98			0.01			7.5								92.6							8			0.06	
12-Apr-98			0.04			6.9								109							5			0.02	
13-May-98			0.01			7.7								41							8			0.09	
8-Nov-01	0.0001	0.00063	0.004	0.119	0.002		0.03	0.5	0.0004	3.3	0.00006	2.2	0.209	30.4	29.3	0.001			0.00017		1		0.00003	0.034	
10-Jul-01		0.01	0.007	0.024	0.002	7.9	0.06	1	0.02	1.6	0.002		0.107	58.6	14.3			0.006					0.003	0.067	
2-Aug-03		0.01	0.003	0.05	0.5	8.08	0.06	0.4	0.02	1.7	0.002	1.5	0.172	70.2	23.4	0.006		0.006	0.001		1	0.07	0.006	0.025	0.006
24-Jan-04						7.14																			
17-Jun-04		0.01	0.007				0.06	1	0.1	1.9	0.002	1.24	0.162	58.9	14.4		0.006	0.01	0.004		8	0.07	0.001	0.066	0.006
30-Jul-04		0.001	0.0084	0.05	0.1	7.94		0.5	0.0005	2.54	0.0003	1.7	0.153	72.3	24.4	0.00005		0.001	0.0048		2	0.0008	0.0004	0.08	0.001
24-Aug-04		0.01	0.003			8.9	0.14	2	0.1	1.7	0.002	1.46	0.23	70.4	23.8			0.01	0.004		2	0.07	0.001	0.141	0.006
27-Feb-05		0.001	0.0022			7.14		0.5	0.0003	3.21	0.0001	2.8	0.234	94.7	30.8	0.00005		0.001	0.0015		2	0.001	0.001	0.031	0.001
19-Jul-05		0.001	0.0052	0.03	0.03	7.88		0.4	0.0004	2.11	0.0001	1.4	0.185		22.2	0.00005		0.001	0.0013		4	0.0008	0.0002	0.025	0.001
22-Aug-05		0.001	0.004	0.03	0.03	7.44		0.4	0.0007	2.24	0.0001	1.4	0.18		26	0.00005		0.001	0.0016		2	0.0008	0.0002	0.038	0.001
27-Oct-05		0.001	0.0081	0.04	0.04	7.89		0.6	0.0006	2.31	0.0001	1.9	0.238		27.1	0.00005		0.001	0.0034		2	0.0008	0.0004	0.064	0.001
25-Jan-06		0.001	0.005			7.16		0.7	0.0005	2.97	0.0001	2.7	0.244	94	30.4	0.00005		0.001	0.002		2	0.0011	0.0001	0.038	0.001
14-Mar-06		0.001	0.0035			7.27		0.8	0.0005	3.5	0.0001	2.8	0.228	104	31.9	0.00005		0.001	0.0021		2	0.001	0.0002	0.037	0.001
26-May-06		0.000250	0.00243	0.001	0.0075		0.3	2	0.001	1.34	0.000250	2	0.0777	37.7		0.0001		0.0001	0.01		93.2	0.000251	0.001	0.0623	
31-Jul-06		0.001	0.0087					0.4	0.0005	1.69	0.0001	1.6	0.201		25.3	0.00005		0.001	0.0619			0.0005	0.0002	0.031	0.001
26-Feb-07		0.001	0.0095			7.62		0.8	0.0003	3.35	0.0001	2.8	0.263		32.2	0.00005		0.001	0.002			0.0008	0.0001	0.058	0.001
Summary statistics																									
n	1	18	11	11	11	52	6	15	11	18	11	17	18	6	14	10	1	11	17	0	50	11	11	48	12
mean	0.0001	0.004	0.005	0.08	0.4	7.6	0.11	0.8	0.010	2.3	0.0003	1.9	0.18	79	25	0.00006	0.006	0.0017	0.006	-	7	0.007	0.0004	0.09	0.0023
standard deviation (S.D.)	-	0.004	0.003	0.07	0.8	0.4	0.10	0.5	0.030	0.7	0.0006	0.6	0.05	24	6	0.00002	-	0.0028	0.015	-	14	0.021	0.0004	0.12	0.0023
mean - 3 S.D.	-	-0.008	-0.003	-0.13	-1.9	6.5	-0.19	-0.8	-0.080	0.1	-0.0014	0.1	0.02	6	8	0.00001	-	-0.0065	-0.037	-	-34	-0.056	-0.0007	-0.26	-0.0045
mean + 3 S.D.	-	0.016	0.014	0.29	2.8	8.8	0.41	2.4	0.100	4.4	0.0020	3.8	0.35	151	43	0.00010	-	0.0100	0.050	-	49	0.070	0.0016	0.43	0.0090

RED

Values that are less than the method detection limit

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Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.19: Water quality parameters for station KV5, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total		Total	Total	Total	Total		Total	Total		Total	Total	as CaCO ₃		Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
6-Jul-94	120	0.03		0.02	0.02	0.0671	0.0002		0.02		0.0005	49.9		0.001	0.001	331	0.003				0.237	0.01	0.002	14.8	
29-Jul-94	114	0.05		0.02	0.02	0.0638	0.0002		0.02		0.0005	47.7		0.001	0.001	292	0.002				0.16	0.001	0.004	13.6	0.04
26-Oct-94	135	0.02		0.02	0.02	0.0679	0.0002		0.02		0.0005	52.8		0.001	0.001	318	0.005		135		0.263	0.01	0.003	15	0.072
12-Jul-95	110	0.04		0.02	0.02	0.0601	0.0002		0.02		0.0005	44.7		0.001	0.001	295	0.011		110		0.074	0.01	0.002	13.5	0.041
10-Jul-01	90	0.21		0.02	0.02	0.0398	0.0006				0.0006	30	6	0.001	0.001	274	0.012				0.369	0.006		8.07	0.0743
2-Aug-03	115	0.08	0.05	0.02	0.02	0.0576	0.0006	140	0.02		0.0006	45.4	6	0.001	0.001		0.012		185	5	0.11	0.006	0.006	15.3	0.0396
24-Jan-04																522									
20-May-04	49	0.04		0.02	0.04	0.0275	0.0006	60	0.02		0.0006	19.7	6	0.001	0.001	408	0.004		71	5	0.167	0.011	0.007	5.21	0.0035
14-Jun-04	102	0.06		0.02	0.04	0.053	0.0006	124	0.02		0.0006	42.9	6	0.001	0.001		0.03		156	5	0.024	0.011	0.007	12	0.0573
30-Jul-04	98	0.616	0.05	0.0015	0.004	0.061	0.0001	119	0.0005	0.049	0.00026	44.5	6	0.0005	0.0004		0.004		170	5	0.3	0.0028	0.006	13.5	0.072
24-Aug-04	121	0.06		0.02	0.04	0.0567	0.0006	148	0.02		0.0006	47.5	6	0.001	0.001	300	0.002		212	5	0.195	0.01	0.007	13.3	0.133
22-Sep-04	134	0.017		0.0002	0.0032	0.067	0.0001	163	0.0005	0.002	0.00008	0.0005	6	0.0001	0.006	429			210	5		0.0004	0.004		
22-Oct-04	147	0.023		0.0005	0.0035	0.076	0.0001	179	0.0005	0.003	0.00014	58.6	6	0.0005	0.0002	449	0.003		203	5	0.2	0.002	0.005	19	0.076
30-Nov-04	154	0.014		0.0024	0.003	0.081	0.0001	188	0.0005	0.002	0.00013	57.1	6	0.0005	0.0001	474	0.002		197	5	0.2	0.0018	0.004	17.9	0.072
25-Jan-05	180	0.008		0.0002	0.003	0.101	0.0001	219	0.0005	0.005	0.00014	68.2	6	0.0005	0.0001	535	0.001		262	5	0.2	0.0006	0.004	21.9	0.066
26-Feb-05	173	0.01		0.0002	0.0027	0.094	0.0001	211	0.0005	0.009	0.00009		6	0.0005	0.0001	522	0.009		251	5	0.2	0.0008	0.004		
20-Apr-05	169	0.005		0.0002	0.0037	0.097	0.0001	206	0.0005	0.003	0.00003	63.9	6	0.0005	0.0001		0.001		237	5	0.3	0.0008	0.006	19.1	0.1
26-May-05	42	0.658		0.0006	0.0063	0.037	0.0001	51	0.0005	0.002	0.00004	19.6	6	0.0012	0.0006		0.003		72	5	1.4	0.0016	0.003	5.5	0.043
29-Jun-05	106	0.116		0.0002	0.0028	0.058	0.0001	129	0.0005	0.002	0.00015	41.8	6	0.0005	0.0002	304	0.002		161	5	0.2	0.0026	0.004	12.6	0.06
19-Jul-05	130	0.107	0.008	0.0002	0.0039	0.061	0.0001	159	0.0005	0.004	0.00017	44.9	6	0.0005	0.0002	307	0.002		176	5	0.2	0.0016	0.005	13.3	0.054
22-Aug-05	127	0.068	0.002	0.0002	0.0041	0.059	0.0001	154	0.0005	0.002	0.00018	51.2	6	0.0005	0.0002	359	0.002		196	5	0.2	0.0017	0.004	15.3	0.058
21-Sep-05																429									
27-Oct-05	134	0.097	0.018	0.0002	0.0039	0.062	0.0001	163	0.0005	0.003	0.0002	53.9	6	0.0005	0.0006	405	0.002			5	0.3	0.0013	0.005	15.1	0.078
28-Nov-05	140	0.035		0.0002	0.003	0.075	0.0001	171	0.0005	0.003	0.00013	59.6	6	0.0005	0.0001	435	0.001		223	5	0.2	0.0017	0.006	17	0.092
13-Dec-05	148	0.034		0.0002	0.0034	0.075	0.0001	180	0.0005	0.005	0.00018	63.2	6	0.0005	0.0001	445	0.003		223	5	0.2	0.0012	0.007	18.3	0.091
24-Jan-06	160	0.018		0.0002	0.004	0.098	0.0001	195	0.0005	0.004	0.00012	60.8	6	0.0005	0.0001	372	0.001		235	5	0.2	0.001	0.004	17.3	0.069
22-Feb-06	159	0.012		0.0002	0.003	0.086	0.0001	194	0.0005	0.003	0.00018	65.7	6	0.0005	0.0001	405	0.001		263	5	0.2	0.0009	0.004	17.5	0.166
14-Mar-06	172	0.027		0.0002	0.0039	0.103	0.0001	209	0.0005	0.005	0.00016	72.8	6	0.0005	0.0003	468	0.003		268	5	0.3	0.0043	0.005	22	0.09
26-Apr-06	165	0.009		0.0002	0.0035	0.086	0.0001	201	0.0005	0.003	0.00008	65.3	6	0.0005	0.0001	341	0.001		237	5	0.2	0.0008	0.004	18.3	0.053
26-May-06	66	0.397		0.0005	0.0046	0.04	0.0001	80	0.0005	0.002	0.00034	24.3	6	0.0006	0.0006		0.003		86	5	0.8	0.008	0.002	6.3	0.086
31-Jul-06		0.136		0.0002	0.003	0.069	0.0001		0.0005	0.006	0.00017	50.1		0.0005	0.0004		0.002				0.2	0.001	0.005	14.3	0.05
26-Feb-07		0.016		0.0002	0.0028	0.098	0.0001		0.0005	0.004	0.00016	68.7		0.0005	0.0001	471	0.001				0.2	0.0009	0.004	21.7	0.083
Summary statistics																									
n	28	30	5	22	22	30	30	23	29	21	22	29	24	22	22	25	21	0	24	23	29	22	22	28	27
mean	127	0.10	0.026	0.001	0.005	0.07	0.00020	158	0.006	0.006	0.00017	49	6	0.0005	0.0005	396	0.0023	-	189	5	0.3	0.0022	0.0046	15	0.07
standard deviation (S.D.)	36	0.17	0.023	0.004	0.008	0.02	0.00019	47	0.009	0.010	0.00012	17	0	0.0002	0.0012	80	0.0018	-	59	0	0.3	0.0024	0.0012	5	0.03
mean - 3 S.D.	19	-0.40	-0.043	-0.011	-0.018	0.01	-0.00036	17	-0.021	-0.024	-0.00018	-2	6	-0.0001	-0.0032	155	-0.0030	-	11	5	-0.5	-0.0050	0.0010	1	-0.02
mean + 3 S.D.	235	0.60	0.095	0.014	0.029	0.13	0.00076	300	0.032	0.036	0.00052	99	6	0.0012	0.0043	636	0.0076	-	367	5	1.0	0.0094	0.0083	29	0.16

- RED
- Values that are less than the method detection limit
-
- Values that are greater than 3 standard deviations away from the mean (i.e. outliers)
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- Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)
-
- Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available
-
- Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.19: Water quality parameters for station KV5, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Solids	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
Units	Total mg/L	Total mg/L	Total mg/L	mg/L	mg/L	pH units	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Dissolved mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L	Total mg/L
Sample Date																									
6-Jul-94		0.005	0.003			8.18		0.5	0.02	1.98	0.001	2.04	0.18		19.7			0.01	0.001		5		0.002	0.013	0.001
29-Jul-94		0.005	0.003	0.5	1	8.23		0.4	0.001	1.75	0.0001	1.64	0.18	53.8	21.9			0.01	0.001		5		0.004	0.01	0.001
26-Oct-94		0.005	0.004			7.4		0.4	0.02	2.4	0.001	2.09	0.19		18.4			0.01	0.002		5		0.004	0.022	0.001
12-Jul-95		0.005	0.003			8.34		0.5	0.02	1.82	0.001	1.87	0.18	60.4				0.01	0.001		5		0.002	0.01	0.001
10-Jul-01		0.01	0.007	0.032	0.002	8	0.06	0.3	0.02	1.5	0.002		0.108	52.3	12.7			0.006			17		0.004	0.057	
2-Aug-03		0.01	0.003	0.05	0.5	8.33	0.06	0.3	0.02	1.7	0.002	1.58	0.174	64.6	21.1	0.006		0.006	0.001		1	0.07	0.006	0.017	0.006
24-Jan-04						7.15																			
20-May-04		0.01	0.002			7.71	0.06	1	0.1	1.1	0.002	0.55	0.057	16	5.5		0.005	0.01	0.004		26	0.06	0.001	0.037	0.005
14-Jun-04		0.01	0.003				0.06	1	0.1	1.6	0.002	1.22	0.165	51.8	13.2		0.005	0.01	0.004		156	0.06	0.001	0.028	0.005
30-Jul-04		0.001	0.0066	0.05	0.1	8.22		0.5	0.0005	2.4	0.0003	1.6	0.159	67.1	20.5	0.00005		0.001	0.0036		4	0.0008	0.0004	0.067	0.001
24-Aug-04		0.01	0.002			8.9	0.27	1.3	0.1	1.6	0.002	1.3	0.223	78.5	21.1			0.01	0.004		2	0.07	0.001	0.104	0.006
22-Sep-04		0.001	0.0038			7.81			0.0005	1.91	0.0001		0.209	70.9	23.6	0.00005		0.001	0.0026		1	0.0008	0.0006	0.02	
22-Oct-04		0.001	0.006			8.45		0.7	0.0004	2.22	0.0001	2.2	0.231	72.4	23.9	0.00005		0.001	0.002		1	0.001	0.0006	0.025	0.001
30-Nov-04		0.001	0.0035			7.4		0.6	0.0003	2.3	0.0009	2.5	0.259	76.4	24.9	0.00005		0.001	0.0016		2	0.001	0.0005	0.036	0.001
25-Jan-05		0.001	0.0035			7.28		0.7	0.0002	3.39	0.0001	3.2	0.231	89.4	28.8	0.00005		0.001	0.0018		1	0.001	0.0002	0.026	0.001
26-Feb-05		0.001	0.0024			7.15			0.0003	3.44	0.0001	3	0.253	89.4	30	0.00005		0.001	0.0014		2	0.0011	0.001	0.026	0.001
20-Apr-05		0.001	0.002					0.7	0.0003	3.4	0.0001	3	0.245	75	25	0.00005		0.001	0.002		2	0.001	0.0001	0.03	0.001
26-May-05		0.001	0.0024					0.6	0.0002	4.29	0.0002	0.9	0.096	22	8.5	0.00005		0.001	0.0207		36	0.0005	0.0017	0.012	0.002
29-Jun-05		0.001	0.0051			7.99		0.4	0.0003	2.05	0.0001	1.2	0.189	50	17.4	0.00005		0.001	0.0021		2	0.0006	0.0003	0.019	0.001
19-Jul-05		0.001	0.0045	0.03	0.03			0.4	0.0004	2.18	0.0001	1.4	0.193		18.5	0.00005		0.001	0.002		4	0.0008	0.0004	0.019	0.001
22-Aug-05		0.001	0.0035	0.03	0.03	8.17		0.4	0.0005	2.25	0.0001	1.4	0.182		21.5	0.00005		0.001	0.0016		3	0.0009	0.0002	0.059	0.001
21-Sep-05						7.81																			
27-Oct-05		0.001	0.0069	0.05	0.05	7.91		0.6	0.0005	2.34	0.0001	1.8	0.234		22.4	0.00005		0.001	0.0026		4	0.0008	0.0004	0.049	0.001
28-Nov-05		0.001	0.0047			7.02		0.5	0.0003	2.76	0.0001	2.4	0.23	80	25	0.00005		0.001	0.002		2	0.001	0.0001	0.038	0.001
13-Dec-05		0.001	0.0054			7.54		0.7	0.0005	3.01	0.0001	2.5	0.25	87	26.7	0.00005		0.001	0.002		2	0.0009	0.0001	0.042	0.001
24-Jan-06		0.001	0.0037			7.81		0.7	0.0006	3.01	0.0001	2.7	0.253	110	25.7	0.00005		0.001	0.0019		2	0.0011	0.0001	0.032	0.001
22-Feb-06		0.001	0.0023			7.07		0.7	0.0007	3.21	0.0001	2.6	0.215	90	27.6	0.00005		0.001	0.0014		3	0.0009	0.0001	0.035	0.001
14-Mar-06		0.001	0.0034			7.69		0.8	0.0006	3.93	0.0001	3.1	0.262	95	30.9	0.00005		0.001	0.0026		2	0.0011	0.0003	0.039	0.001
26-Apr-06		0.001	0.0028			7.15		0.8	0.0007	3.25	0.0001	2.6	0.237	87	28.1	0.00005		0.001	0.0012		2	0.0008	0.0002	0.022	0.001
26-May-06		0.001	0.0046	0.03	0.04			0.6	0.0004	1.95	0.0001	1.1	0.086	27.5	8.4	0.00005		0.001	0.0117		20	0.0005	0.0011	0.046	0.001
31-Jul-06		0.001	0.0068					0.4	0.0005	1.8	0.0001	1.6	0.202		21.8	0.00005		0.001	0.0517			0.0006	0.0002	0.022	0.001
26-Feb-07		0.001	0.0073			7.71		0.8	0.0004	3.56	0.0001	2.9	0.273		29.6	0.00005		0.001	0.002			0.0008	0.0001	0.044	0.001
Summary statistics																									
n	0	30	22	8	8	26	5	28	22	30	22	28	30	17	29	21	2	22	29	0	28	22	22	30	28
mean	-	0.003	0.0042	0.10	0.2	7.8	0.10	0.6	0.005	2.5	0.0002	2.0	0.20	75	21	0.00005	0.005	0.0014	0.005	-	11	0.004	0.0004	0.034	0.0017
standard deviation (S.D.)	-	0.003	0.0017	0.16	0.4	0.5	0.09	0.2	0.021	0.8	0.0004	0.7	0.05	23	7	0.00	-	0.0019	0.010	-	30	0.015	0.0004	0.020	0.0016
mean - 3 S.D.	-	-0.007	-0.0008	-0.39	-0.8	6.3	-0.18	-0.1	-0.059	0.1	-0.0011	-0.2	0.03	6	2	0.00005	-	-0.0043	-0.025	-	-77	-0.040	-0.0008	-0.026	-0.0032
mean + 3 S.D.	-	0.013	0.0093	0.59	1.3	9.3	0.38	1.3	0.069	4.9	0.0015	4.2	0.36	143	41	0.00005	-	0.0072	0.034	-	100	0.048	0.0017	0.093	0.0065

- RED
- Values that are less than the method detection limit
-
- Values that are greater than 3 standard deviations away from the mean (i.e. outliers)
-
- Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)
-
- Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available
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- Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.20: Water quality parameters for station KV15, United Keno Hill, 1994 - 2007 ¹.

Parameter	Alkalinity -T	Aluminum	Ammonia-N	Antimony	Arsenic	Barium	Beryllium	Bicarbonate	Bismuth	Boron	Cadmium	Calcium	Carbonate	Chromium	Cobalt	Conductivity	Copper	Cyanide	Hardness	Hydroxide	Iron	Lead	Lithium	Magnesium	Manganese
	as CaCO ₃	Total	Total	Total	Total	Total	Total	water	Total	Total	Total	Total	water	Total	Total		Total	Total	as CaCO ₃	water	Total	Total	Total	Total	Total
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	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Date																									
13-Mar-98	194			0.05	0.05						0.002					450	0.01		241		1	0.05			0.15
12-May-98	46			0.05	0.05						0.001					120	0.01		63		4	0.05			0.11
24-Apr-04	170	0.01		0.02	0.04	0.104	0.0006	207	0.02		0.0006	33.3	6	0.001	0.001	408	0.001		241	5	0.54	0.01	0.007	11.5	0.103
15-Jun-04	81	0.09		0.02	0.04	0.0408	0.0006	99	0.02		0.0006	33	6	0.001	0.001		0.009		123	5	0.198	0.022	0.007	10.3	0.0113
30-Jul-04	92	0.184	0.05	0.0005	0.0041	0.056	0.0001	113	0.0005	0.029	0.00003	38.8	6	0.0005	0.0003		0.002		148	5	0.3	0.0011	0.006	11.5	0.03
26-Jan-05	170	0.012		0.0002	0.002	0.093	0.0001	207	0.0005	0.003	0.00016	68.5	6	0.0005	0.0002		0.001		268	5	0.2	0.0049	0.005	22.1	0.075
26-Feb-05	163	0.013		0.0002	0.0019	0.088	0.0001	198	0.0009	0.003	0.00014		6	0.0005	0.0001		0.001		248	5	0.2	0.0006	0.005		
21-Mar-05	178	0.01		0.0002	0.0044	0.11	0.0001	216	0.0005	0.004	0.00012	64.7	6	0.0005	0.0001	504	0.001		252	5	0.4	0.0008	0.005	20	0.086
20-Apr-05	169	0.005		0.0002	0.0037	0.097	0.0001	206	0.0005	0.003	0.00003	63.9	6	0.0005	0.0001	470	0.001		237	5	0.3	0.0008	0.006	19.1	0.1
26-May-05	42	0.658		0.0006	0.0063	0.037	0.0001	51	0.0005	0.002	0.00004	19.6	6	0.0012	0.0006		0.003		72	5	1.4	0.0016	0.003	5.5	0.043
29-Jun-05	109	0.051		0.0003	0.0037	0.06	0.0001	133	0.0005	0.002	0.0001	44.2	6	0.0005	0.0001	303	0.001		154	5	0.2	0.0015	0.004	13.1	0.111
19-Jul-05	130	0.062	0.009	0.0004	0.0045	0.058	0.0001	159	0.0005	0.006	0.00006	40.7	6	0.0005	0.0001	290	0.001		165	5	0.2	0.001	0.005	12.2	0.054
23-Aug-05	134	0.018		0.0003	0.0217	0.054	0.0001	164	0.0005	0.002	0.00003	48.2	6	0.0005	0.0001		0.001		182	5	0.3	0.0002	0.002	12.7	0.024
21-Sep-05	148	0.074	0.05	0.0003	0.0232	0.053	0.0001	6	0.0005	0.002	0.00002	48	5	0.0005	0.0001		0.001		178	40	0.4	0.0002	0.002	12.8	0.035
26-Oct-05																									
31-Jul-06		0.081		0.0002	0.0043	0.077	0.0001		0.0005	0.006	0.00011	49		0.0005	0.0001		0.002				0.3	0.0017	0.005	13.6	0.057
26-Feb-07		0.021		0.0002	0.0065	0.116	0.0001		0.0005	0.004	0.00023	66.8		0.0005	0.0002	485	0.002				0.6	0.0034	0.005	20.1	0.193
Summary statistics																									
n	14	14	3	12	12	14	14	12	14	12	12	13	12	12	12	8	12	0	14	12	16	12	12	13	15
mean	130	0.09	0.04	0.00030	0.007	0.07	0.00017	147	0.003	0.006	0.00009	48	5.9	0.0006	0.00018	379	0.0014	-	184	8	0.7	0.0015	0.0044	14	0.08
standard deviation (S.D.)	49	0.17	0.02	0.00013	0.007	0.03	0.00018	68	0.007	0.008	0.00007	15	0.3	0.0002	0.00015	132	0.0007	-	67	10	1.0	0.0014	0.0014	5	0.05
mean - 3 S.D.	-18	-0.42	-0.03	-0.00010	-0.015	0.00	-0.00037	-58	-0.018	-0.017	-0.00011	3	5.1	0.0000	-0.00027	-17	-0.0006	-	-18	-22	-2.2	-0.0026	0.0003	0	-0.07
mean + 3 S.D.	278	0.60	0.11	0.00070	0.029	0.15	0.00072	351	0.025	0.028	0.00029	93	6.8	0.0012	0.00062	774	0.0034	-	385	38	3.5	0.0056	0.0086	28	0.23

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Appendix Table A.20: Water quality parameters for station KV15, United Keno Hill, 1994 - 2007 ¹.

Parameter	Mercury	Molybdenum	Nickel	Nitrate Nitrogen	Nitrite Nitrogen	pH	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate	Sulphur	Thallium	Thorium	Tin	Titanium	Total Dissolved Soilds	Total Suspended Solids	Uranium	Vanadium	Zinc	Zirconium
	Total	Total	Total				Total	Total	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total	Dissolved	Total	Total	Total	Total	Total
Units	mg/L	mg/L	mg/L	mg/L	mg/L	pH 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	mg/L	mg/L
Sample Date																									
13-Mar-98			0.01			7.50								71.6							52			0.05	
12-May-98			0.02			7.10								18							77			0.01	
24-Apr-04		0.01	0.002			7.71	0.06	1	0.1	3.7	0.002	1.99	0.256	80.1	27.8			0.01	0.004		3	0.07	0.001	0.055	0.006
15-Jun-04		0.01	0.002				0.06	1	0.1	3.7	0.002	1.5	0.169	44	11.1	0.006		0.011	0.004		2	0.07	0.001	0.003	0.006
30-Jul-04		0.001	0.0022	0.05	0.1			0.8	0.0005	3.24	0.0003	1.6	0.176	51.4	16	0.00005		0.001	0.0049		100	0.0008	0.0004	0.018	0.001
26-Jan-05		0.001	0.0049					0.9	0.0002	3.2	0.0001	3.2	0.227	99.9	31.6	0.00005		0.001	0.002		1	0.0009	0.0001	0.038	0.001
26-Feb-05		0.001	0.0035						0.0005	3.17	0.0001	2.7	0.238	89.8	30.4	0.00005		0.001	0.0021		2	0.001	0.0014	0.03	0.001
21-Mar-05		0.001	0.002			9.07		0.6	0.0004	3.8	0.0001	3	0.273	76	25	0.00005		0.001	0.001		2	0.0009	0.0002	0.017	0.001
20-Apr-05		0.001	0.002			7.9		0.7	0.0003	3.4	0.0001	3	0.245	75	25	0.00005		0.001	0.002		2	0.001	0.0001	0.03	0.001
26-May-05		0.001	0.0024					0.6	0.0002	4.29	0.0002	0.9	0.096	22	8.5	0.00005		0.001	0.0207		36	0.0005	0.0017	0.012	0.002
29-Jun-05		0.001	0.0029			7.9		0.5	0.0003	2.67	0.0001	1.4	0.194	52	18.5	0.00005		0.001	0.0011		2	0.0007	0.0002	0.012	0.001
19-Jul-05		0.001	0.0025	0.03	0.03	7.91		0.6	0.0003	2.99	0.0001	1.4	0.2		17.6	0.00005		0.001	0.0015		2	0.0008	0.0003	0.009	0.001
23-Aug-05		0.001	0.0014					0.4	0.0002	2.24	0.0001	1.4	0.194	40	13.2	0.00005		0.001	0.0014		4	0.0006	0.0002	0.003	0.001
21-Sep-05		0.001	0.0014					0.4	0.0002	2.68	0.0001	1.4	0.178		12.6	0.00005		0.001	0.0035		8	0.0008	0.0004	0.003	0.001
26-Oct-05																									
31-Jul-06		0.001	0.0052					0.4	0.0005	1.84	0.0001	1.7	0.203		19.8	0.00005		0.001	0.0496			0.0005	0.0002	0.014	0.001
26-Feb-07		0.001	0.0054			7.66		0.8	0.0004	3.84	0.0001	2.8	0.272		25.4	0.00005		0.001	0.0018			0.0007	0.0001	0.035	0.001
Summary statistics																									
n	0	14	12	2	2	8	2	13	12	14	12	14	14	8	14	12	0	12	14	0	14	12	12	16	14
mean	-	0.002	0.0030	0.04	0.065	7.8	0.06	0.7	0.00033	3.2	0.00013	2.0	0.21	63	20	0.00005	-	0.001	0.007	-	21	0.0008	0.0004	0.021	0.0018
standard deviation (S.D.)	-	0.003	0.0014	-	-	0.6	-	0.2	0.00012	0.7	0.00006	0.8	0.05	26	7	0	-	0	0.013	-	33	0.0002	0.0005	0.017	0.0018
mean - 3 S.D.	-	-0.008	-0.0013	-	-	6.1	-	0.0	-0.00004	1.2	-0.00006	-0.3	0.07	-16	-2	0.00005	-	0.001	-0.033	-	-77	0.0002	-0.0012	-0.029	-0.0036
mean + 3 S.D.	-	0.012	0.0073	-	-	9.5	-	1.3	0.00070	5.2	0.00031	4.3	0.35	142	42	0.00005	-	0.001	0.047	-	119	0.0013	0.0020	0.071	0.0072

RED

Values that are less than the method detection limit

Values that are greater than 3 standard deviations away from the mean (i.e. outliers)

Values that are not greater than 3 standard deviations away from the mean but could be considered outliers (e.g. 2 orders of magnitude or more away from the mean)

Values that are less than the method detection limit but above both guideline and background or above either guideline or background if only one available

Values that are assumed to be less than the method detection limit but are above both guideline and background or above either guideline or background if only one available

¹ summary statistics for antimony, arsenic, cadmium, chromium, cobalt, copper, lead, lithium, nickel, selenium, silver, sulphate, thallium, tin, uranium, and vanadium are for data from July 20, 2004 - 2007.

Table A.21: Summary Statistics for Reference Station KV1, 1994 - 2007.

Parameter	n	mean	median	stdev	min	max
Alkalinity -T	50	116	114	33	50	195
Aluminum	47	0.232	0.111	0.303	0.005	1.270
Ammonia-N	6	0.0292	0.0320	0.0231	0.0030	0.0500
Antimony	34	0.0002	0.0002	0.0001	0.0002	0.0005
Arsenic	36	0.0026	0.0014	0.0064	0.0002	0.0400
Barium	49	0.0594	0.0551	0.0200	0.0019	0.1220
Beryllium	48	0.0002	0.0001	0.0002	0.0001	0.0006
Bicarbonate	31	148	153	38	61	205
Bismuth	34	0.0005	0.0005	0.0002	0.0001	0.0010
Boron	35	0.0046	0.0030	0.0060	0.0005	0.0340
Cadmium	36	0.0004	0.0002	0.0007	0.0000	0.0040
Calcium	45	47	45	13	20	89
Carbonate	32	6	6	0	6	6
Chromium	36	0.0007	0.0005	0.0005	0.0005	0.0030
Cobalt	36	0.0012	0.0006	0.0014	0.0001	0.0053
Conductivity	73	330	345	102	118	590
Copper	36	0.0038	0.0025	0.0031	0.0010	0.0150
Cyanide	1	0.0120	0.0120	-	0.0120	0.0120
Hardness	34	188	205	49	72	255
Hydroxide	31	5	5	0	5	5
Iron	64	0.33	0.20	0.28	0.01	1.00
Lead	36	0.0009	0.0003	0.0019	0.0001	0.0100
Lithium	34	0.0055	0.0050	0.0017	0.0020	0.0120
Magnesium	46	15.4	14.5	4.9	5.4	31.9
Manganese	63	0.0880	0.0630	0.0562	0.0144	0.2800
Mercury	1	0.0002	0.0002	-	0.0002	0.0002
Molybdenum	49	0.0031	0.0010	0.0035	0.0010	0.0100
Nickel	36	0.0123	0.0086	0.0083	0.0040	0.0316
Nitrate Nitrogen	9	0.084	0.030	0.157	0.010	0.500
Nitrite Nitrogen	9	0.2580	0.0300	0.4220	0.0020	1.0
pH	62	7.8	7.8	0.3	7.0	8.4
Phosphorus	10	0.078	0.060	0.040	0.060	0.180
Potassium	39	0.6	0.5	0.3	0.2	1.5
Selenium	35	0.0005	0.0004	0.0002	0.0002	0.0010
Silicon	48	2.37	2.11	0.88	0.25	5.08
Silver	49	0.0006	0.0001	0.0007	0.0001	0.0020
Sodium	45	2.0	1.7	0.9	0.8	3.8
Strontium	47	0.2063	0.2120	0.0512	0.0710	0.3030
Sulphate	20	71	73	20	23	103
Sulphur	47	22.9	22.6	7.7	7.1	49.8
Thallium	36	0.0002	0.0001	0.0010	0.0001	0.0060
Thorium	4	0.006	0.006	0	0.006	0.006
Tin	48	0.0034	0.0010	0.0037	0.0010	0.0100
Titanium	47	0.0092	0.0025	0.0174	0.0010	0.0820
TDS	19	188	196	30	127	225
TSS	62	9.0	5.0	12.2	1.0	54.0
Uranium	32	0.0008	0.0008	0.0002	0.0005	0.0014
Vanadium	35	0.0006	0.0003	0.0008	0.0001	0.0035
Zinc	77	0.0563	0.0370	0.0619	0.0010	0.3600
Zirconium	46	0.0019	0.0010	0.0019	0.0010	0.0060

Table A.22: Summary Statistics for Reference Station KV37, 1994 - 2007.

Parameter	n	mean	median	stdev	min	max
Alkalinity -T	11	43	31	26	17	103
Aluminum	12	0.033	0.022	0.024	0.010	0.072
Ammonia-N	4	0.026	0.03	0.02771281	0.002	0.05
Antimony	13	0.0011	0.0002	0.0018	0.0001	0.0050
Arsenic	9	0.0032	0.0030	0.0008	0.0022	0.0050
Barium	11	0.0548	0.0540	0.0088	0.0429	0.0680
Beryllium	11	0.0003	0.0001	0.0003	0.0001	0.0010
Bicarbonate	9	34	38	13	6	47
Bismuth	9	0.0005	0.0005	0	0.0005	0.0005
Boron	19	0.0036	0	0.004	0.001	0.01
Cadmium	9	0.00002	0	0.00001	0.00001	0.00005
Calcium	11	16.2	16.6	2.3	10.6	19.0
Carbonate	7	10	6	11	6	34
Chromium	9	0.0005	0.0005	0	0.0005	0.0005
Cobalt	9	0.00012	0	0.00005	0.0001	0.00024
Conductivity	27	187	130	113	70	515
Copper	9	0.0011	0.0010	0.0004	0.0010	0.0022
Cyanide	0	-	-	-	-	-
Hardness	8	52	53	7	36	58
Hydroxide	7	5	5	0	5	5
Iron	20	0.068	0.050	0.048	0.005	0.200
Lead	9	0.0003	0.0004	0.0003	0.0001	0.0009
Lithium	9	0.0014	0.0010	0.0013	0.0010	0.0050
Magnesium	22	1.5	1.2	1.6	0.008	3.7
Manganese	11	0.010	0.010	0.005	0.005	0.021
Mercury	0	-	-	-	-	-
Molybdenum	23	0.0050	0.0020	0.0045	0.0001	0.0100
Nickel	9	0.0006	0.0005	0.0002	0.0005	0.0012
Nitrate Nitrogen	6	0.0253	0.0300	0.0174	0.0010	0.0500
Nitrite Nitrogen	6	0.0505	0.0340	0.0399	0.0050	0.1000
pH	17	7.6	7.6	0.4	6.8	8.2
Phosphorus	2	0.18	0.18	0.17	0.06	0.30
Potassium	10	0.36	0.40	0.10	0.10	0.40
Selenium	8	0.0004	0.0004	0.0001	0.0003	0.0005
Silicon	11	2.79	2.50	0.84	1.72	3.94
Silver	10	0.00029	0.00010	0.00060	0.00003	0.00200
Sodium	11	0.80	0.60	0.45	0.40	2.00
Strontium	11	0.06	0.06	0.01	0.04	0.07
Sulphate	5	20.8	22.7	4.1	15.1	24.8
Sulphur	10	7.9	7.8	1.1	6.6	10.0
Thallium	10	0.00065	0.00	0.00187986	0.00005	0.006
Thorium	0	-	-	-	-	-
Tin	10	0.0014	0.0010	0.0016	0.0001	0.0060
Titanium	10	0.0033	0.0010	0.0045	0.0006	0.0132
TDS	3	181	60	214	56	428
TSS	15	3.3	2.0	3.7	0	15.2
Uranium	9	0.0005	0.0005	0.0001	0.0001	0.0005
Vanadium	9	0.0003	0.0002	0.0003	0.0001	0.0010
Zinc	11	0.0046	0.0040	0.0031	0.0010	0.0100
Zirconium	9	0.0016	0.0010	0.0017	0.0010	0.0060

Table A.23: Summary Statistics for Reference Stations (KV1 & KV37) Pooled Data, 1994 - 2007.

Parameter	n	mean	median	stdev	min	max
Alkalinity -T	61	103	103	43	17	195
Aluminum	59	0.192	0.072	0.282	0.005	1.270
Ammonia-N	10	0.028	0.032	0.024	0.002	0.050
Antimony	47	0.0005	0.0002	0.0010	0.0001	0.0050
Arsenic	45	0.0027	0.0015	0.0058	0.0002	0.0400
Barium	60	0.0586	0.0540	0.0185	0.0019	0.1220
Beryllium	59	0.0002	0.0001	0.0002	0.0001	0.0010
Bicarbonate	40	122	135	59	6	205
Bismuth	43	0.00053	0.00050	0.00014	0.00010	0.00100
Boron	54	0.0042	0.0030	0.0053	0.0005	0.0340
Cadmium	45	0.00030	0.00012	0.00061	0.00001	0.00400
Calcium	56	41	42	17	11	89
Carbonate	39	6.7	6.0	4.5	6.0	34.0
Chromium	45	0.0006	0.0005	0.0004	0.0005	0.0030
Cobalt	45	0.0010	0.0004	0.0013	0.0001	0.0053
Conductivity	100	292	290	122	70	590
Copper	45	0.0033	0.0020	0.0030	0.0010	0.0150
Cyanide	1	0.0120	0.0120	-	0.0120	0.0120
Hardness	42	162	180	70	36	255
Hydroxide	38	5	5	0	5	5
Iron	84	0.270	0.200	0.268	0.005	1
Lead	45	0.0008	0.0003	0.0017	0.0001	0.01
Lithium	43	0.0046	0.0050	0.0023	0.0010	0.0120
Magnesium	68	10.9	12.3	7.7	0.008	31.9
Manganese	74	0.076	0.057	0.059	0.005	0.280
Mercury	1	0.0002	0.0002	-	0.0002	0.0002
Molybdenum	72	0.0037	0.0010	0.0039	0.0001	0.0100
Nickel	45	0.0099	0.0070	0.0088	0.0005	0.0316
Nitrate Nitrogen	15	0.060	0.030	0.123	0.001	0.500
Nitrite Nitrogen	15	0.175	0.030	0.337	0.002	1
pH	79	7.7	7.7	0.4	6.8	8.4
Phosphorus	12	0.10	0.06	0.07	0.06	0.30
Potassium	49	0.56	0.40	0.29	0.10	1.50
Selenium	43	0.0005	0.0004	0.0002	0.0002	0.0010
Silicon	59	2.45	2.36	0.88	0.25	5.08
Silver	59	0.0005	0.0001	0.0007	0.0000	0.0020
Sodium	56	1.7	1.5	0.9	0.4	3.8
Strontium	58	0.178	0.189	0.075	0.039	0.303
Sulphate	25	61	69	27	15	103
Sulphur	57	20	20	9	7	50
Thallium	46	0.0003	0.0001	0.0012	0.0001	0.0060
Thorium	4	0.006	0.006	0	0.006	0.006
Tin	58	0.0030	0.0010	0.0035	0.0001	0.0100
Titanium	57	0.0081	0.0024	0.0161	0.0006	0.0820
TDS	22	187	191	72	56	428
TSS	77	7.8987	4.0000	11.3079	0.0000	54.0000
Uranium	41	0.0007	0.0007	0.0002	0.0001	0.0014
Vanadium	44	0.0005	0.0003	0.0007	0.0001	0.0035
Zinc	88	0.050	0.030	0.060	0.001	0.360
Zirconium	55	0.0019	0.0010	0.0019	0.0010	0.0060

Table A.24: Total Alkalinity (mg/L CaCO₃) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, < Background	% > DL, < Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	1	47	47	-	47	47	0
KV40	0	0	2	38	38	5	34	41	0
KV38	0	0	7	39	36	6	34	49	0
KV41	0	7	15	50	52	10	29	64	0
KV6	0	0	39	125	130	26	47	171	0
KV16	0	0	29	134	138	18	90	167	0
KV29	0	11	28	101	100	69	10	383	0
KV30	0	0	29	129	136	30	41	164	0
KV7	0	0	44	137	145	28	56	169	0
KV8	0	0	32	132	145	37	24	173	0
KV21	0	0	2	134	134	21	119	148	0
KV47	0	0	12	172	199	73	43	268	0
KV9	0	0	21	165	173	51	67	234	0
KV2	0	0	44	127	123	32	58	188	0
KV3	0	0	21	119	112	33	47	175	0
KV4	0	0	21	132	130	36	73	205	0
KV5	0	0	28	127	132	36	42	180	0
KV15	0	0	14	130	141	49	42	194	0

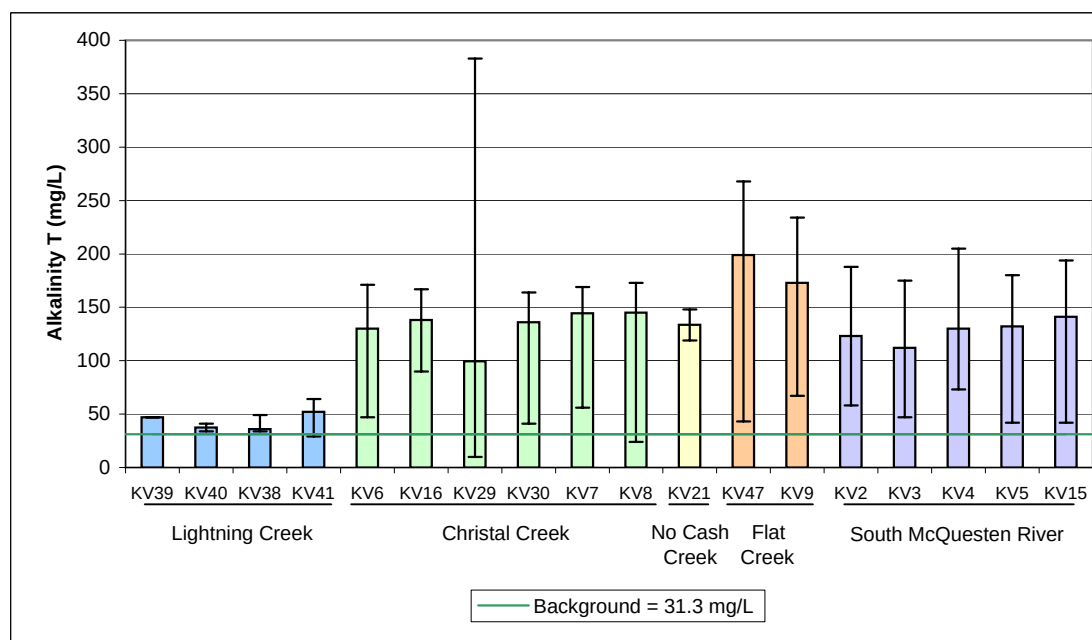


Figure A.1: Alkalinity (mg/L CaCO₃) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.25: Aluminum (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.013	0.013	0.008	0.008	0.02	0
KV40	0	0	0	2	0.009	0.009	0.001	0.008	0.01	1
KV38	0	0	0	10	0.022	0.011	0.027	0.005	0.09	4
KV41	0	43	29	14	0.390	0.087	0.543	0.019	1.80	0
KV6	0	24	2	46	0.089	0.019	0.158	0.005	0.76	12
KV16	0	39	10	41	0.218	0.070	0.361	0.005	1.55	4
KV29	0	51	27	41	1.156	0.111	2.859	0.007	15.3	3
KV30	0	45	18	40	0.331	0.070	0.532	0.008	2.15	1
KV7	0	20	5	41	0.096	0.029	0.190	0.008	0.87	4
KV8	0	22	0	37	0.074	0.014	0.126	0.005	0.61	7
KV21	0	100	50	2	5.092	5.092	6.941	0.184	10.0	0
KV47	0	67	33	9	0.518	0.490	0.468	0.009	1.28	1
KV9	0	0	0	16	0.013	0.010	0.009	0.005	0.03	7
KV2	0	31	0	36	0.088	0.048	0.099	0.010	0.39	3
KV3	0	35	0	20	0.086	0.065	0.079	0.010	0.32	0
KV4	0	36	0	14	0.080	0.085	0.058	0.006	0.18	0
KV5	0	18	0	28	0.062	0.035	0.081	0.005	0.40	0
KV15	0	8	0	13	0.049	0.021	0.051	0.005	0.18	1

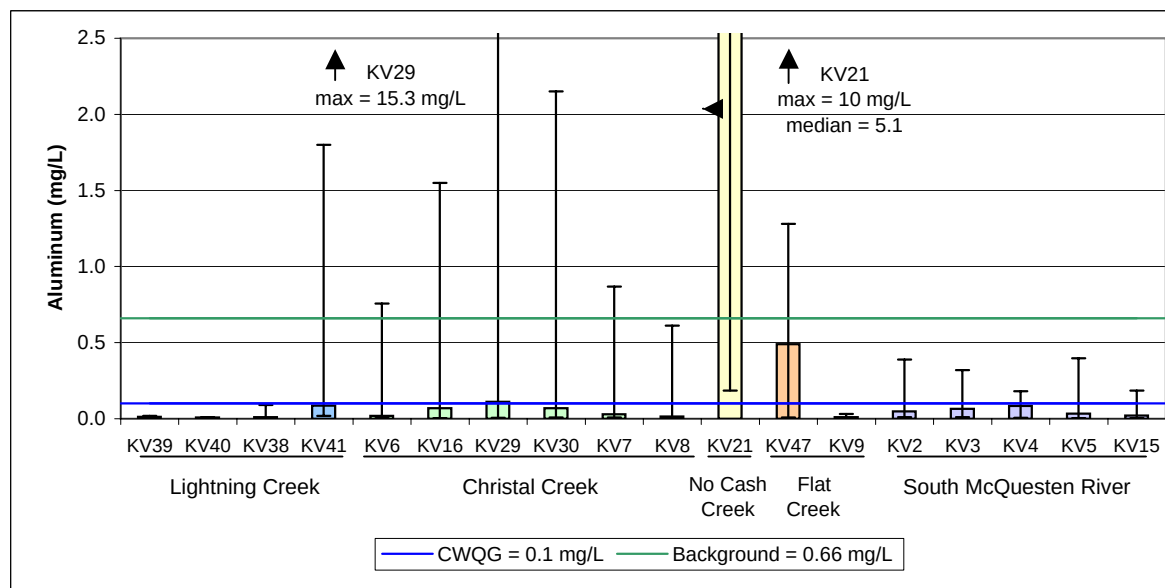


Figure A.2: Aluminum (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.26: Ammonia (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	1	0.003	0.003	-	0.003	0.003	0
KV40	0	0	2	0.026	0.026	0.034	0.002	0.050	2
KV38	0	0	4	0.026	0.027	0.027	0.002	0.050	3
KV41	0	0	6	0.030	0.036	0.023	0.002	0.050	4
KV6	0	0	7	0.032	0.050	0.022	0.004	0.050	3
KV16	0	0	3	0.031	0.025	0.016	0.019	0.050	0
KV29	0	0	2	0.058	0.058	0.046	0.025	0.090	0
KV30	0	0	3	0.031	0.025	0.017	0.017	0.050	0
KV7	0	0	7	0.030	0.050	0.025	0.002	0.050	5
KV8	0	0	6	0.027	0.029	0.025	0.002	0.050	4
KV21	0	0	2	0.029	0.029	0.030	0.007	0.050	1
KV47	0	0	2	0.085	0.085	0.036	0.059	0.110	0
KV9	0	0	9	0.032	0.050	0.023	0.002	0.050	6
KV2	0	0	7	0.032	0.050	0.023	0.002	0.050	4
KV3	0	0	5	0.033	0.050	0.024	0.003	0.050	3
KV4	0	0	7	0.032	0.050	0.023	0.002	0.050	5
KV5	0	0	5	0.026	0.018	0.023	0.002	0.050	2
KV15	0	0	3	0.036	0.050	0.024	0.009	0.050	1

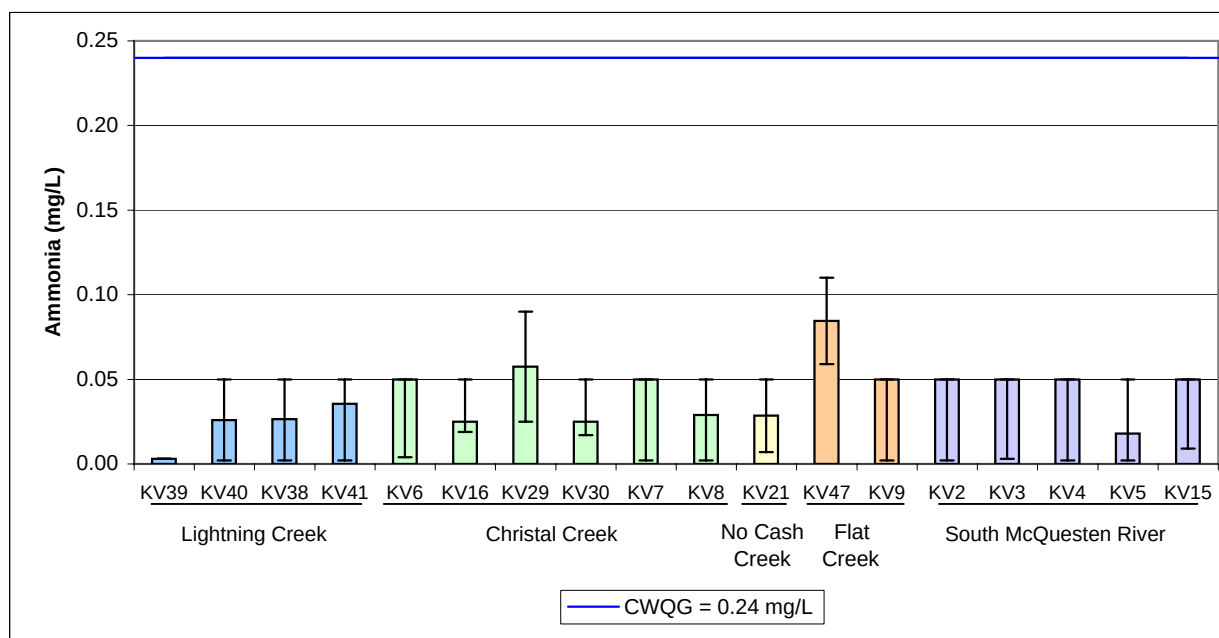


Figure A.3: Ammonia (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.27: Antimony (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.00182	0.00182	0.00011	0.0017	0.0019	0
KV40	0	0	0	1	0.0002	0.0002	-	0.0002	0.0002	1
KV38	0	0	0	9	0.00036	0.0003	0.00025	0.0002	0.001	1
KV41	0	0	0	10	0.00034	0.00025	0.00018	0.0002	0.0007	0
KV6	0	0	0	35	0.00073	0.0004	0.00098	0.0002	0.005	6
KV16	0	0	0	35	0.00063	0.0003	0.00164	0.0002	0.01	8
KV29	0	0	0	35	0.00079	0.0002	0.00186	0.0002	0.01	23
KV30	0	0	0	34	0.00107	0.0003	0.00344	0.0002	0.02	6
KV7	0	0	0	36	0.00061	0.00025	0.0012	0.0002	0.006	11
KV8	0	0	0	33	0.00057	0.0004	0.00089	0.0002	0.0054	2
KV21	0	0	0	1	0.0016	0.0016	-	0.0016	0.0016	0
KV47	0	0	0	3	0.00169	0.0006	0.00206	0.0004	0.00406	0
KV9	0	0	0	11	0.00078	0.0006	0.00049	0.0002	0.00191	1
KV2	0	0	0	25	0.0002	0.0002	0.00002	0.0001	0.0002	23
KV3	0	0	0	11	0.00024	0.0002	0.0001	0.0002	0.0004	9
KV4	0	0	0	11	0.00215	0.0002	0.00593	0.0002	0.02	6
KV5	0	0	0	21	0.00041	0.0002	0.00054	0.0002	0.0024	15
KV15	0	0	0	12	0.0003	0.00025	0.00013	0.0002	0.0006	3

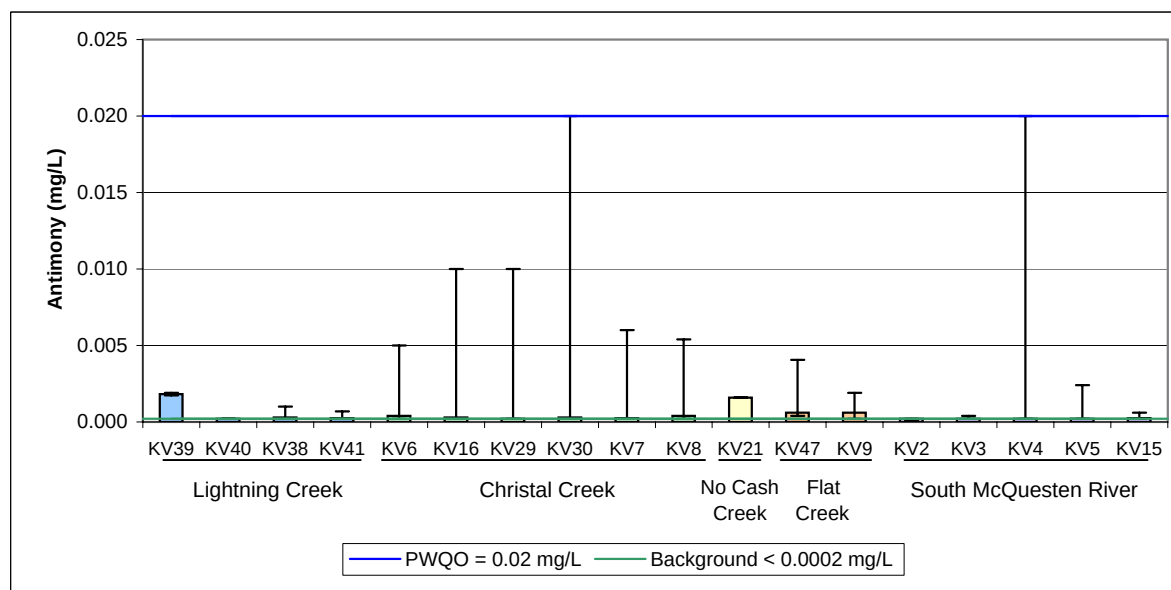


Figure A.4: Antimony (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004-2007.

Table A.28: Arsenic (mg/L) Summary Statistics for Receiving Environment Stations, July 20, 2004-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n<MDL
KV39	0	100	100	2	0.00918	0.00918	0.0001	0.0091	0.0093	0
KV40	0	0	0	1	0.0009	0.0009	-	0.0009	0.0009	0
KV38	0	0	0	9	0.00287	0.0029	0.0006	0.002	0.0039	0
KV41	0	30	30	10	0.00796	0.00294	0.0105	0.002	0.029	0
KV6	0	31	31	35	0.00535	0.0033	0.0051	0.0002	0.0261	1
KV16	0	29	29	34	0.00451	0.00345	0.0037	0.0004	0.0198	1
KV29	0	26	26	34	0.00504	0.001	0.0118	0.0002	0.0668	2
KV30	0	32	32	34	0.00473	0.00325	0.004	0.0002	0.0196	1
KV7	0	14	14	36	0.00341	0.002	0.0035	0.0002	0.015	2
KV8	0	6	6	33	0.00292	0.0026	0.0019	0.0014	0.0114	1
KV21	0	0	0	1	0.0048	0.0048	-	0.0048	0.0048	0
KV47	0	67	67	3	0.00693	0.0051	0.0059	0.0022	0.0135	0
KV9	0	0	0	11	0.00201	0.002	0.0013	0.0006	0.0037	0
KV2	0	0	0	25	0.00171	0.0017	0.0003	0.001	0.0023	0
KV3	0	0	0	11	0.00214	0.0021	0.0003	0.0017	0.0027	0
KV4	0	0	0	10	0.00213	0.00205	0.0004	0.0017	0.0031	0
KV5	0	5	5	21	0.00359	0.0035	0.0008	0.0027	0.0063	0
KV15	0	33	33	12	0.00719	0.00435	0.0073	0.0019	0.0232	0

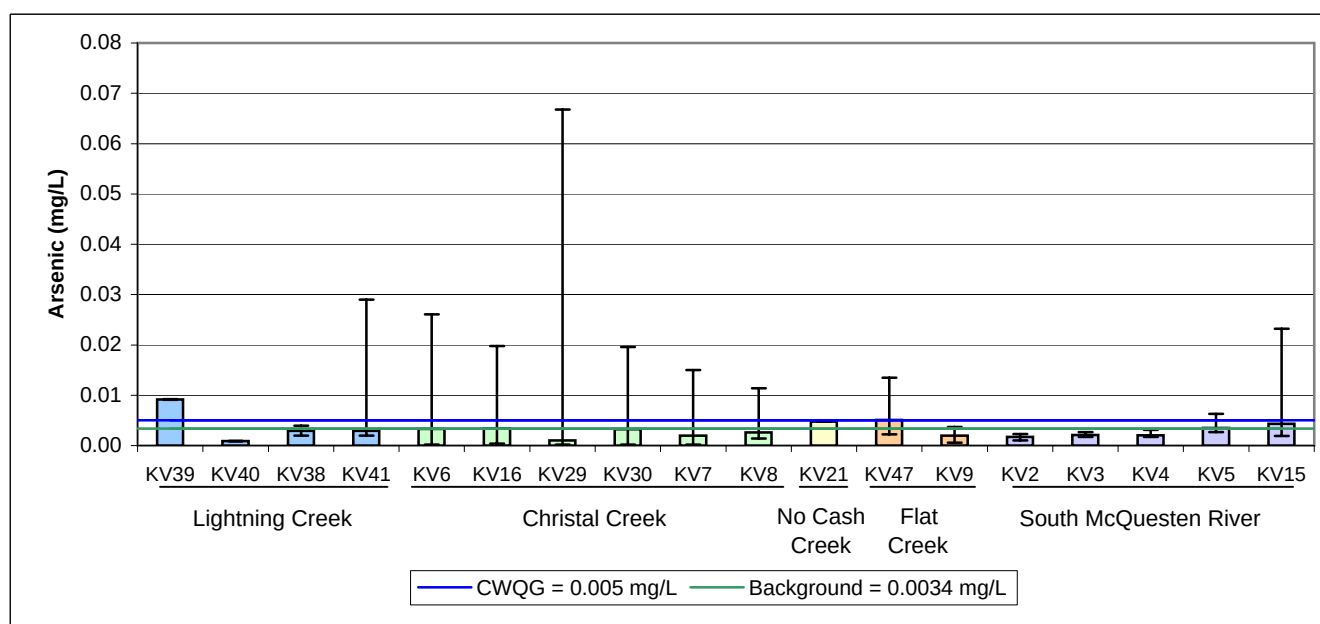


Figure A.5: Arsenic (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

Table A.29: Barium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.041	0.041	0.006	0.036	0.045	0
KV40	0	0	0	2	0.359	0.359	0.417	0.064	0.654	0
KV38	0	0	0	10	0.054	0.055	0.007	0.039	0.060	0
KV41	0	0	0	14	0.059	0.058	0.012	0.040	0.091	0
KV6	0	0	0	48	0.062	0.065	0.016	0.002	0.095	0
KV16	0	0	0	42	0.065	0.063	0.017	0.002	0.124	0
KV29	0	0	0	42	0.049	0.033	0.061	0.001	0.353	0
KV30	0	0	0	41	0.067	0.065	0.015	0.037	0.113	0
KV7	0	0	0	51	0.055	0.055	0.013	0.001	0.092	0
KV8	0	0	0	38	0.051	0.053	0.010	0.023	0.069	0
KV21	0	0	0	2	0.028	0.028	0.013	0.019	0.037	0
KV47	0	0	0	9	0.052	0.046	0.017	0.037	0.094	0
KV9	0	0	0	18	0.063	0.065	0.034	0.016	0.110	0
KV2	0	0	0	39	0.061	0.061	0.026	0.000	0.096	3
KV3	0	0	0	21	0.066	0.061	0.017	0.040	0.099	0
KV4	0	0	0	18	0.064	0.060	0.026	0.025	0.120	0
KV5	0	0	0	30	0.069	0.067	0.020	0.028	0.103	0
KV15	0	0	0	14	0.075	0.069	0.027	0.037	0.116	0

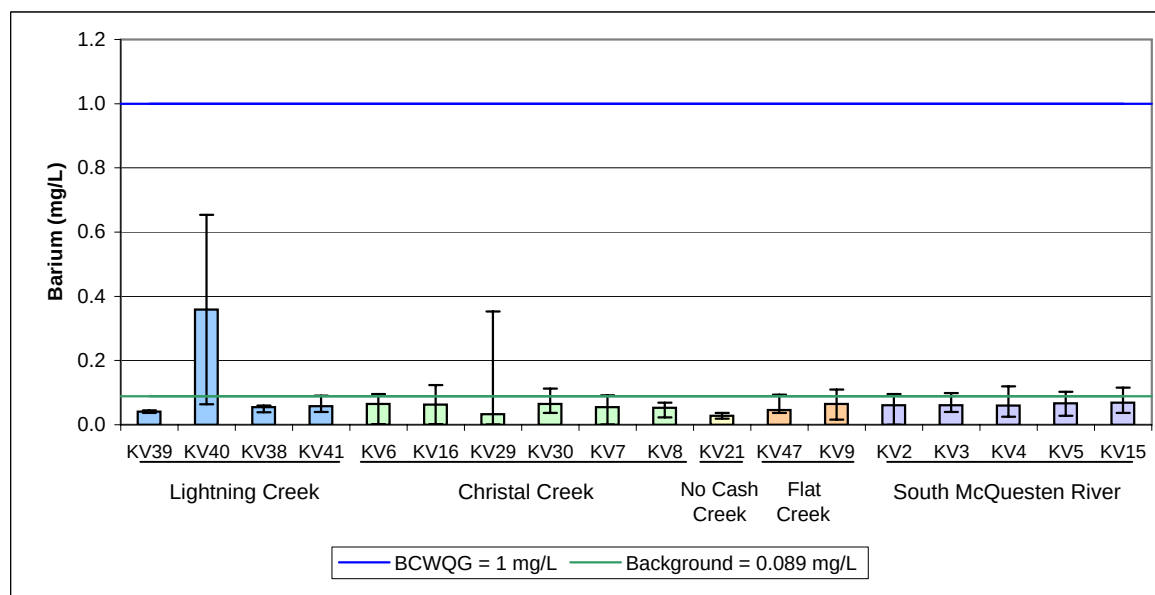


Figure A.6: Barium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.30: Beryllium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0003	0.0003	0.0003	0.0001	0.0005	2
KV40	0	0	0	2	0.0004	0.0004	0.0004	0.0001	0.0006	2
KV38	0	0	0	10	0.0002	0.0001	0.0002	0.0001	0.0006	10
KV41	0	0	0	14	0.0003	0.0001	0.0003	0.0000	0.0010	12
KV6	0	0	0	49	0.0003	0.0001	0.0005	0.0001	0.0033	46
KV16	0	0	0	42	0.0002	0.0001	0.0002	0.0001	0.0011	39
KV29	0	2	2	42	0.0007	0.0001	0.0027	0.0001	0.0178	34
KV30	0	0	0	41	0.0003	0.0001	0.0004	0.0001	0.0022	40
KV7	0	0	0	50	0.0003	0.0001	0.0004	0.0000	0.0022	43
KV8	0	0	0	38	0.0002	0.0001	0.0002	0.0001	0.0010	38
KV21	0	0	0	2	0.0008	0.0008	0.0003	0.0006	0.0010	2
KV47	0	0	0	9	0.0004	0.0005	0.0002	0.0001	0.0006	6
KV9	0	0	0	18	0.0002	0.0001	0.0002	0.0000	0.0006	18
KV2	0	3	3	35	0.0004	0.0001	0.0011	0.0000	0.0067	34
KV3	0	0	0	21	0.0002	0.0002	0.0002	0.0000	0.0006	20
KV4	0	0	0	18	0.0003	0.0001	0.0003	0.0000	0.0010	14
KV5	0	0	0	30	0.0002	0.0001	0.0002	0.0001	0.0006	28
KV15	0	0	0	14	0.0002	0.0001	0.0002	0.0001	0.0006	14

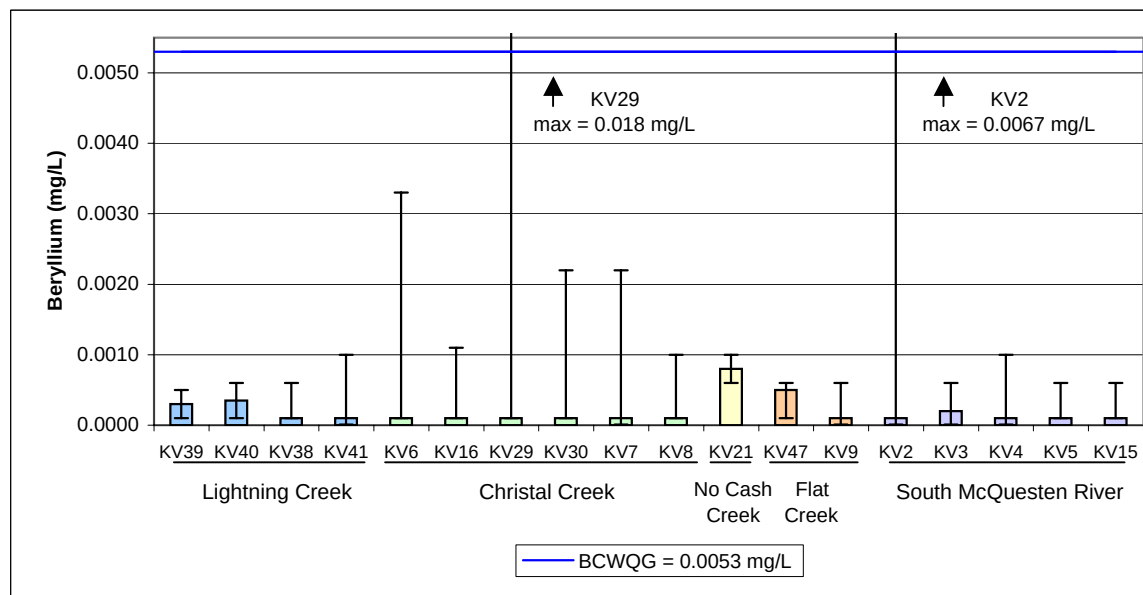


Figure A.7: Beryllium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.31: Bicarbonate (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	1	6	6	-	6	6	1
KV40	0	0	2	28	28	31	6	50	1
KV38	0	0	7	42	44	17	6	60	1
KV41	0	0	9	56	59	21	6	76	1
KV6	0	0	30	159	161	25	89	209	0
KV16	0	0	29	164	168	22	110	204	0
KV29	0	0	27	111	119	51	12	214	0
KV30	0	0	29	157	165	37	50	199	0
KV7	0	0	30	171	178	30	69	206	0
KV8	0	0	29	162	176	45	29	211	0
KV21	0	0	2	93	93	123	6	180	1
KV47	0	50	4	133	138	122	6	251	1
KV9	0	67	9	229	239	28	177	267	0
KV2	0	0	31	156	166	40	57	207	0
KV3	0	0	10	146	142	63	6	213	1
KV4	0	0	10	158	153	30	119	210	0
KV5	0	0	23	158	163	47	51	219	0
KV15	0	0	11	159	164	54	51	216	0

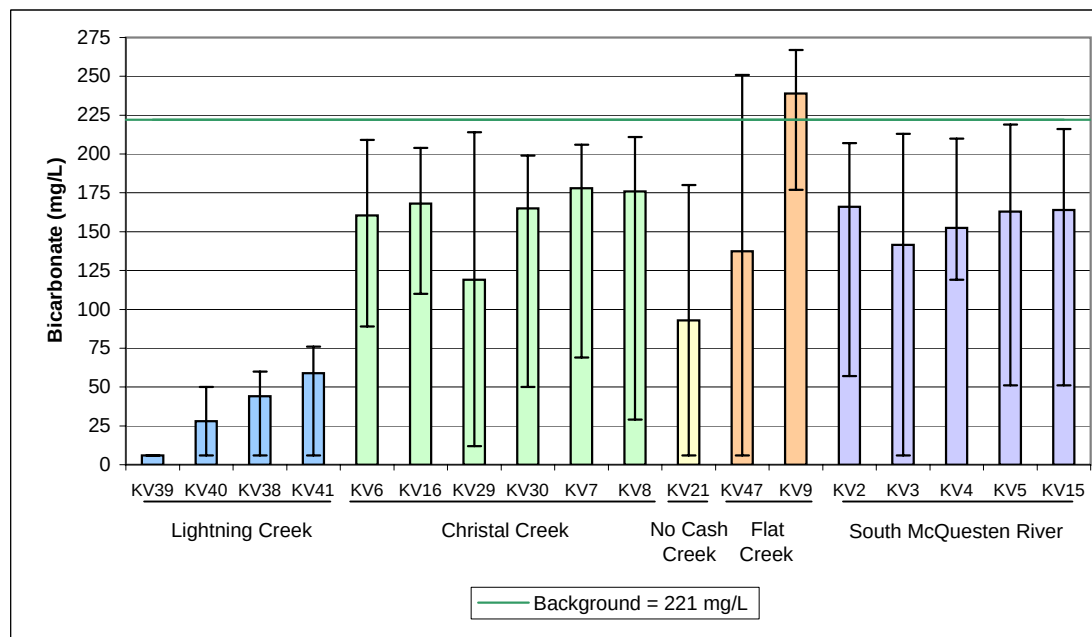


Figure A.8: Bicarbonate (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.32: Bismuth (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	na	na	2	0.0005	0.0005	0.00000	0.0005	0.0005	2
KV40	na	na	2	0.0103	0.0103	0.01379	0.0005	0.0200	2
KV38	na	na	9	0.0007	0.0005	0.00050	0.0005	0.0020	9
KV41	na	na	11	0.0005	0.0005	0.00002	0.0004	0.0005	10
KV6	na	na	35	0.0008	0.0005	0.00154	0.0001	0.0096	34
KV16	na	na	36	0.0005	0.0005	0.00013	0.0002	0.0010	35
KV29	na	na	34	0.0009	0.0005	0.00150	0.0002	0.0081	33
KV30	na	na	33	0.0005	0.0005	0.00017	0.0001	0.0010	33
KV7	na	na	36	0.0008	0.0005	0.00142	0.0001	0.0090	34
KV8	na	na	32	0.0008	0.0005	0.00138	0.0005	0.0083	31
KV21	na	na	2	0.0103	0.0103	0.01379	0.0005	0.0200	2
KV47	na	na	3	0.0007	0.0005	0.00029	0.0005	0.0010	3
KV9	na	na	12	0.0005	0.0005	0.00003	0.0004	0.0005	12
KV2	na	na	25	0.0005	0.0005	0.00008	0.0004	0.0009	23
KV3	na	na	12	0.0005	0.0005	0.00015	0.0004	0.0010	12
KV4	na	na	11	0.0005	0.0005	0.00003	0.0004	0.0005	11
KV5	na	na	21	0.0005	0.0005	0.00000	0.0005	0.0005	21
KV15	na	na	12	0.0005	0.0005	0.00012	0.0005	0.0009	11

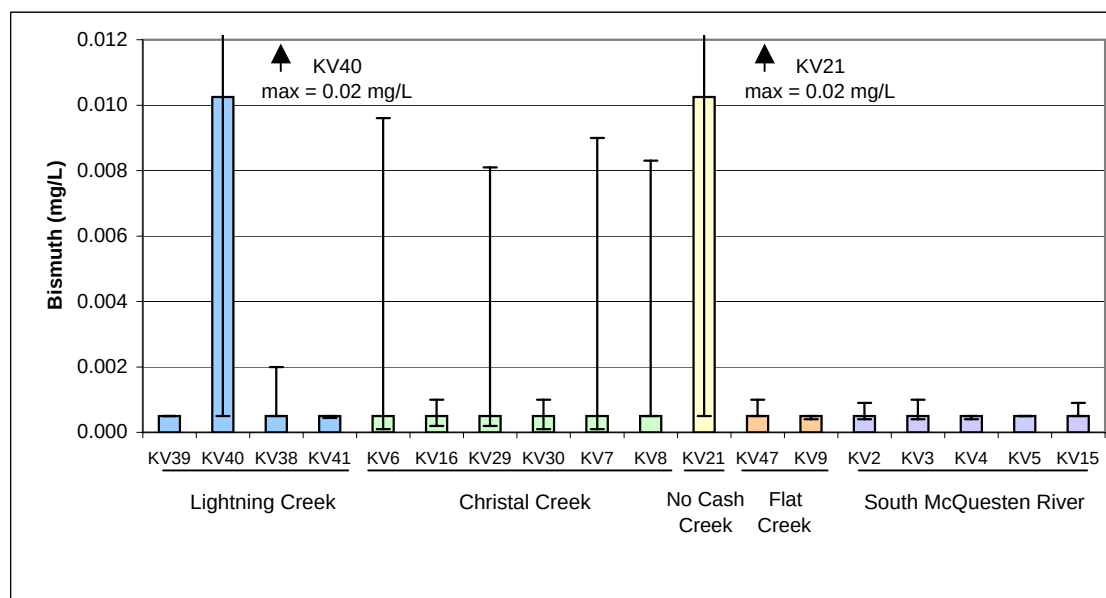


Figure A.9: Bismuth (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.33: Boron (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.006	0.006	0.006	0.002	0.010	2
KV40	0	0	0	1	0.002	0.002	-	0.002	0.002	1
KV38	0	0	0	9	0.009	0.004	0.013	0.002	0.041	5
KV41	0	0	0	11	0.005	0.002	0.006	0.002	0.023	6
KV6	0	0	0	35	0.003	0.002	0.003	0.001	0.020	11
KV16	0	0	0	36	0.003	0.002	0.001	0.001	0.005	13
KV29	0	0	0	33	0.003	0.002	0.001	0.001	0.005	18
KV30	0	0	0	34	0.003	0.002	0.001	0.001	0.006	15
KV7	0	0	0	36	0.003	0.002	0.004	0.001	0.020	18
KV8	0	0	0	32	0.003	0.002	0.003	0.002	0.020	18
KV21	0	0	0	1	0.020	0.020	-	0.020	0.020	1
KV47	0	0	0	3	0.008	0.010	0.004	0.003	0.010	1
KV9	0	0	0	12	0.004	0.003	0.002	0.002	0.010	5
KV2	0	0	0	30	0.011	0.003	0.019	0.002	0.058	4
KV3	0	0	0	11	0.005	0.004	0.003	0.002	0.010	3
KV4	0	0	0	11	0.005	0.003	0.003	0.002	0.010	2
KV5	0	0	0	20	0.004	0.003	0.002	0.002	0.009	4
KV15	0	0	0	11	0.003	0.003	0.002	0.002	0.006	2

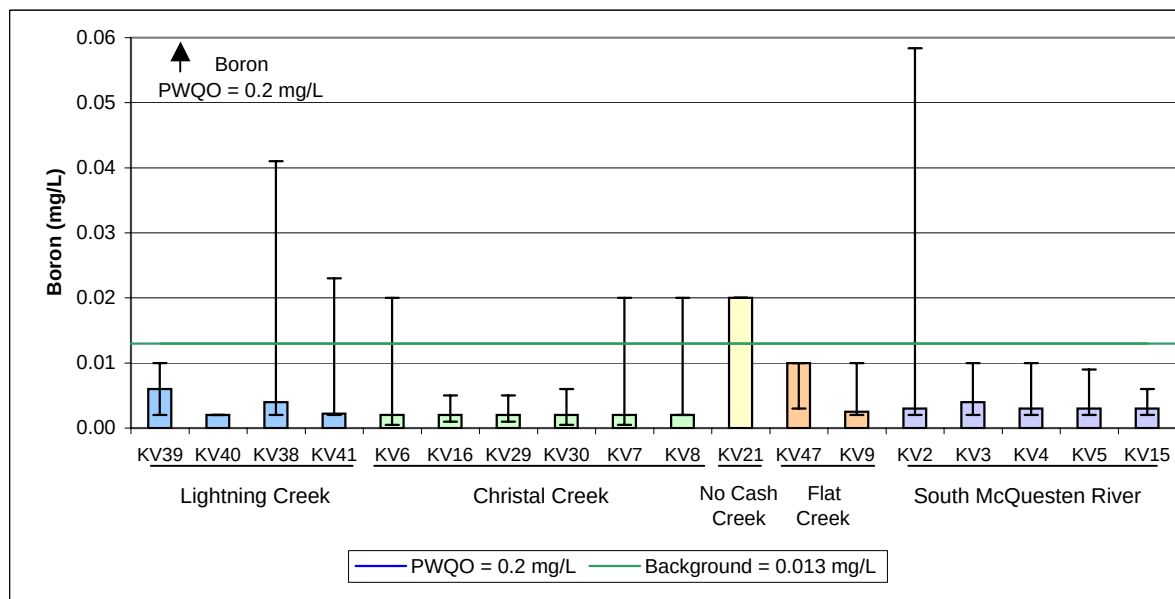


Figure A.10: Boron (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.34: Cadmium (mg/L) Summary Statistics for Receiving Environment Stations, July 20, 2004-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	100	100	2	0.00377	0.00377	0.00037	0.00350	0.00403	0
KV40	0	0	0	1	0.00004	0.00004	0.00000	0.00004	0.00004	0
KV38	0	100	0	9	0.00024	0.00020	0.00014	0.00008	0.00048	0
KV41	0	90	0	10	0.00020	0.00016	0.00012	0.00004	0.00042	0
KV6	0	100	92	36	0.00185	0.00159	0.00128	0.00008	0.00527	0
KV16	0	100	100	35	0.00239	0.00146	0.00420	0.00071	0.02600	0
KV29	0	100	100	35	0.01570	0.00634	0.02396	0.00229	0.11900	0
KV30	0	100	100	34	0.00206	0.00153	0.00148	0.00065	0.00689	0
KV7	0	100	81	37	0.00144	0.00113	0.00101	0.00046	0.00430	0
KV8	0	100	97	34	0.00154	0.00130	0.00080	0.00060	0.00340	0
KV21	0	100	100	1	0.04780	0.04780	0.00000	0.04780	0.04780	0
KV47	0	100	100	3	0.00247	0.00255	0.00045	0.00198	0.00287	0
KV9	0	100	18	11	0.00036	0.00036	0.00020	0.00014	0.00069	0
KV2	4	96	0	25	0.00020	0.00018	0.00009	0.00009	0.00040	0
KV3	0	100	8	12	0.00029	0.00025	0.00024	0.00013	0.00100	0
KV4	0	100	9	11	0.00033	0.00027	0.00020	0.00013	0.00080	0
KV5	4	86	0	21	0.00015	0.00015	0.00007	0.00003	0.00034	0
KV15	0	58	0	12	0.00009	0.00008	0.00007	0.00002	0.00023	0

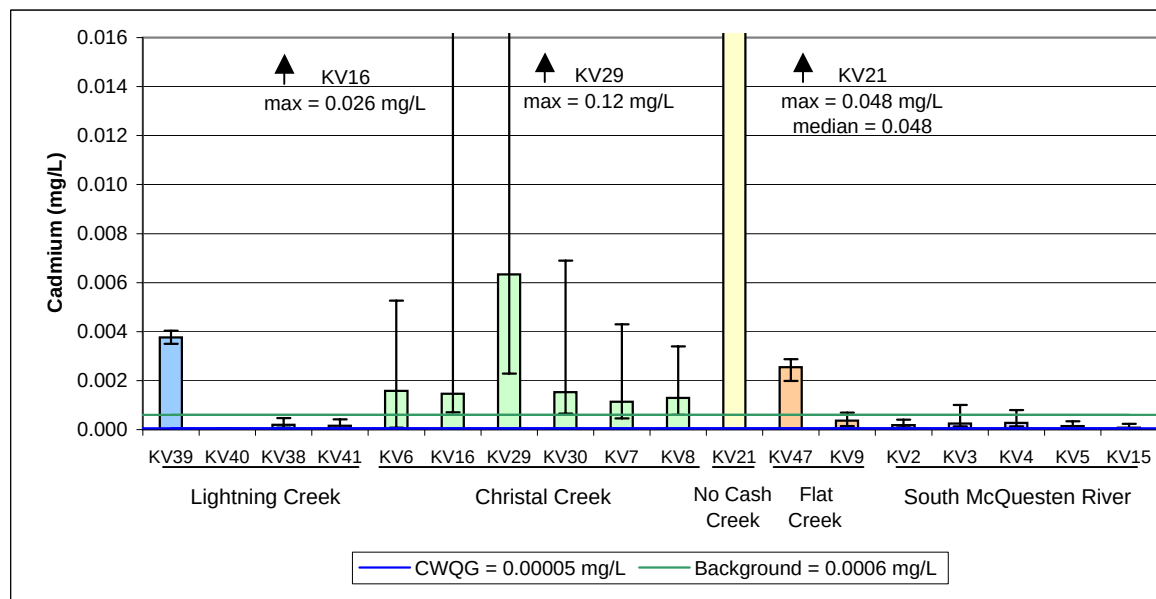


Figure A.11: Cadmium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

Table A.35: Calcium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	31	31	1.3	30	32	0
KV40	0	0	2	43	43	0.7	43	44	0
KV38	0	0	10	22	23	3.2	16	26	0
KV41	0	0	14	27	25	7.3	16	37	0
KV6	0	91	46	120	120	35	37	230	0
KV16	0	100	38	154	142	53	70	321	0
KV29	0	100	40	323	325	72	133	511	0
KV30	0	97	38	142	146	30	41	202	0
KV7	0	83	48	101	110	30	25	164	0
KV8	0	81	37	98	102	34	21	167	0
KV21	0	100	2	160	160	23	144	176	0
KV47	0	56	9	100	116	58	28	176	0
KV9	0	72	18	79	89	25	36	114	0
KV2	0	8	37	50	47	14	21	80	0
KV3	0	10	21	51	49	13	26	71	0
KV4	0	6	18	56	53	18	32	107	0
KV5	0	4	28	51	51	14	20	73	0
KV15	0	0	13	48	48	15	20	69	0

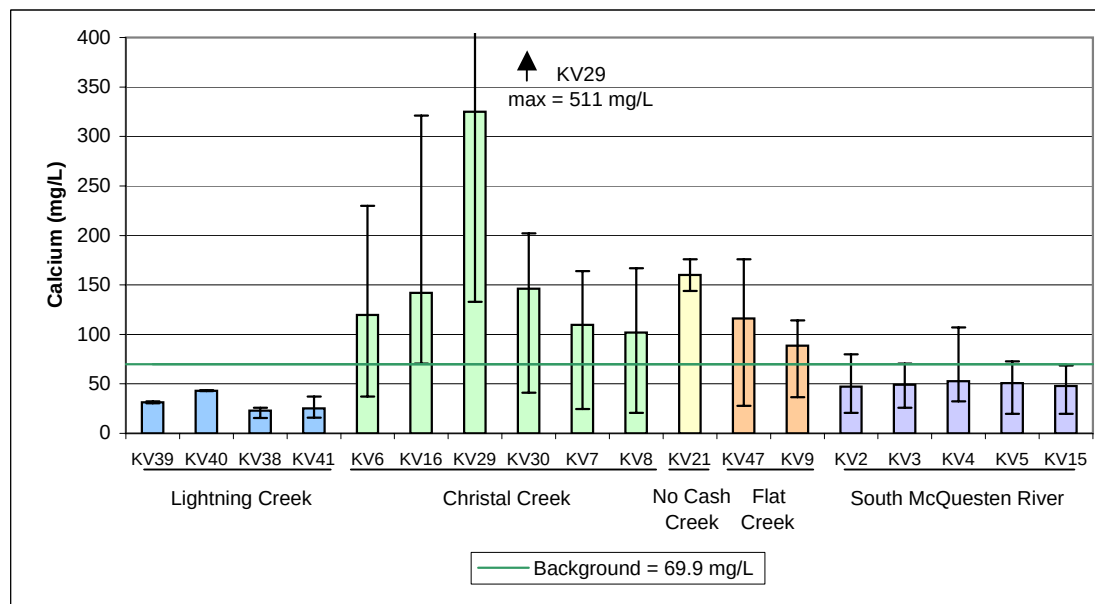


Figure A.12: Calcium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.36: Carbonate (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	na	na	1	58	58	-	58	58	0
KV40	na	na	2	24	24	25	6	41	1
KV38	na	na	6	6	6	0	6	6	6
KV41	na	na	9	6	6	0	6	6	9
KV6	na	na	32	6	6	0	6	6	31
KV16	na	na	30	6	6	0	6	6	30
KV29	na	na	28	6	6	0	6	6	27
KV30	na	na	29	6	6	0	6	6	29
KV7	na	na	33	6	6	0	6	6	31
KV8	na	na	29	6	6	0	6	6	29
KV21	na	na	2	76	76	98	6	145	1
KV47	na	na	4	6	6	0	6	6	3
KV9	na	na	11	6	6	0	6	6	11
KV2	na	na	33	6	6	0	6	6	32
KV3	na	na	11	6	6	0	6	6	11
KV4	na	na	12	6	6	0	6	6	12
KV5	na	na	24	6	6	0	6	6	23
KV15	na	na	11	6	6	0	6	6	11

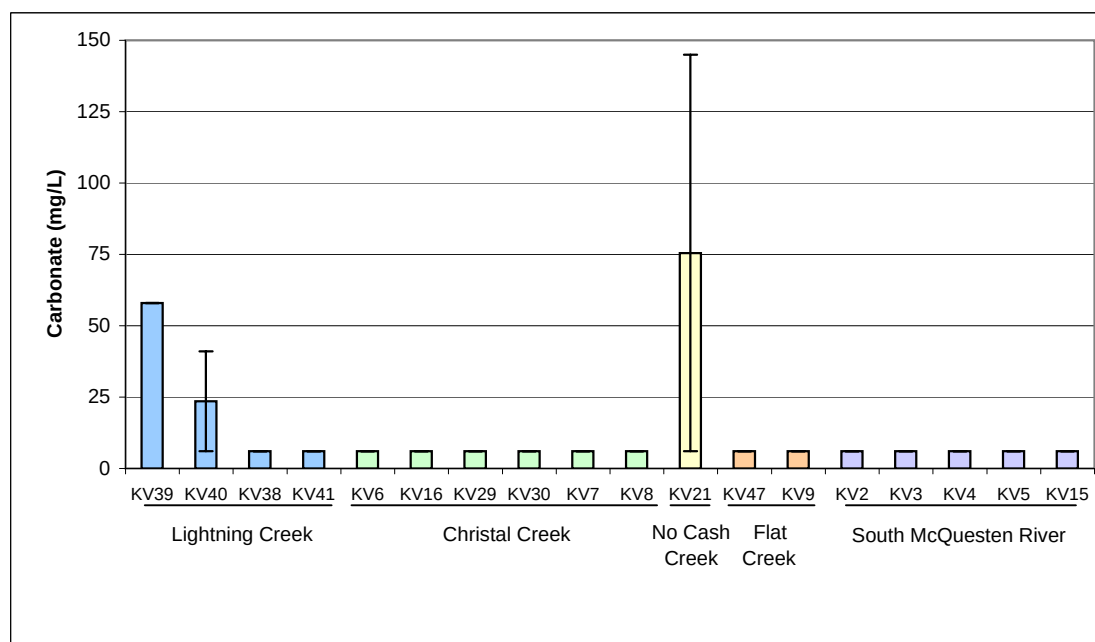


Figure A.13: Carbonate (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.37: Chromium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0005	0.0005	0.00000	0.0005	0.0005	2
KV40	0	0	0	1	0.0005	0.0005	-	0.0005	0.0005	1
KV38	0	0	0	8	0.0005	0.0005	0	0.0005	0.0005	8
KV41	0	30	30	10	0.00107	0.0005	0.00109	0.0005	0.0038	5
KV6	0	8	8	36	0.00071	0.0005	0.00037	0.0005	0.002	22
KV16	0	19	19	36	0.00105	0.0005	0.00172	0.0005	0.0106	26
KV29	0	30	30	33	0.00139	0.0005	0.00166	0.0005	0.0065	20
KV30	0	15	15	33	0.00077	0.0005	0.00051	0.0005	0.0028	23
KV7	0	11	11	35	0.00074	0.0005	0.00053	0.0005	0.0026	27
KV8	0	6	6	33	0.00069	0.0005	0.00041	0.0005	0.0022	24
KV21	0	100	100	1	0.0024	0.0024	0.00000	0.0024	0.0024	0
KV47	0	33	33	3	0.00113	0.00089	0.00078	0.0005	0.002	1
KV9	0	0	0	11	0.00051	0.0005	3E-05	0.0005	0.0006	10
KV2	0	0	0	25	0.00053	0.0005	0.00011	0.0005	0.001	24
KV3	0	0	0	12	0.00059	0.0005	0.00019	0.0005	0.001	11
KV4	0	0	0	11	0.00055	0.0005	0.00015	0.0005	0.001	11
KV5	0	0	0	21	0.00051	0.0005	0.00014	0.0001	0.001	20
KV15	0	8	8	12	0.00056	0.0005	0.0002	0.0005	0.0012	11

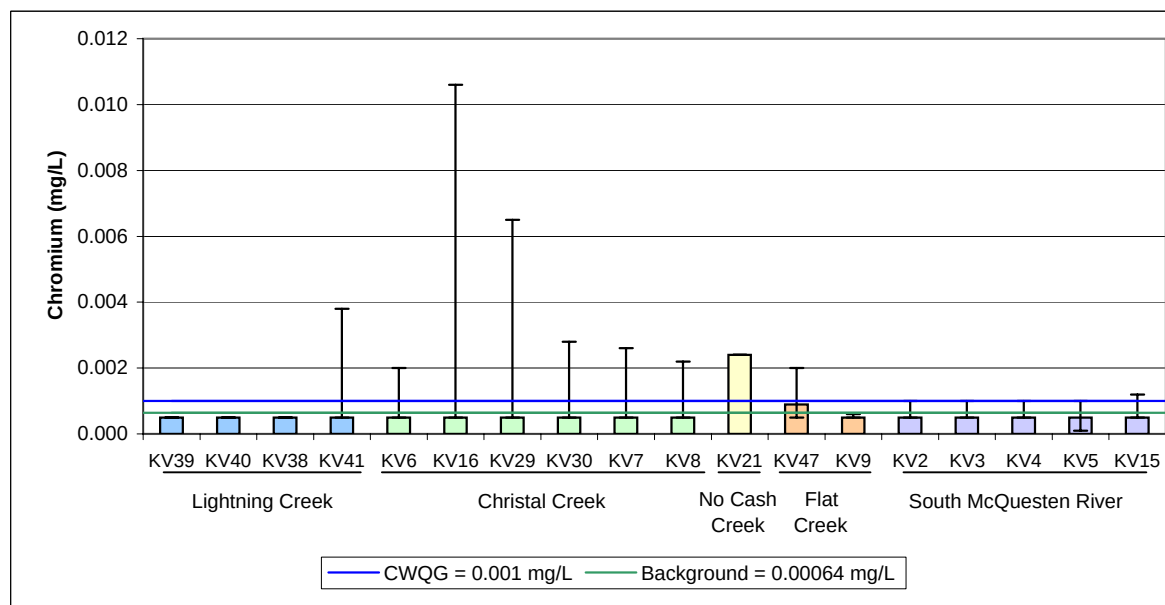


Figure A.14: Chromium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

**Table A.38: Cobalt (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% <DL, >BCWQG	% >DL, >BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0001	0.0001	0.0000	0.0001	0.0001	2
KV40	0	0	0	1	0.0001	0.0001	0.0000	0.0001	0.0001	1
KV38	0	0	0	9	0.0001	0.0001	0.0001	0.0001	0.0005	7
KV41	0	0	0	10	0.0007	0.0003	0.0008	0.0001	0.0024	3
KV6	0	0	0	36	0.0005	0.0004	0.0003	0.0001	0.0014	4
KV16	0	3	3	35	0.0008	0.0006	0.0008	0.0001	0.0043	2
KV29	0	23	23	35	0.0039	0.0010	0.0083	0.0001	0.0433	9
KV30	0	0	0	34	0.0008	0.0006	0.0007	0.0002	0.0030	1
KV7	0	0	0	36	0.0004	0.0002	0.0004	0.0001	0.0020	10
KV8	0	0	0	33	0.0003	0.0002	0.0002	0.0001	0.0010	13
KV21	0	0	0	1	0.0029	0.0029	0.0000	0.0029	0.0029	0
KV47	0	0	0	3	0.0010	0.0007	0.0009	0.0003	0.0020	0
KV9	0	0	0	11	0.0001	0.0001	0.0001	0.0001	0.0004	8
KV2	0	0	0	26	0.0004	0.0002	0.0003	0.0001	0.0010	4
KV3	0	0	0	12	0.0004	0.0003	0.0003	0.0001	0.0010	2
KV4	0	0	0	11	0.0004	0.0002	0.0003	0.0001	0.0010	2
KV5	0	0	0	21	0.0003	0.0002	0.0002	0.0001	0.0010	5
KV15	0	0	0	12	0.0002	0.0001	0.0001	0.0001	0.0006	4

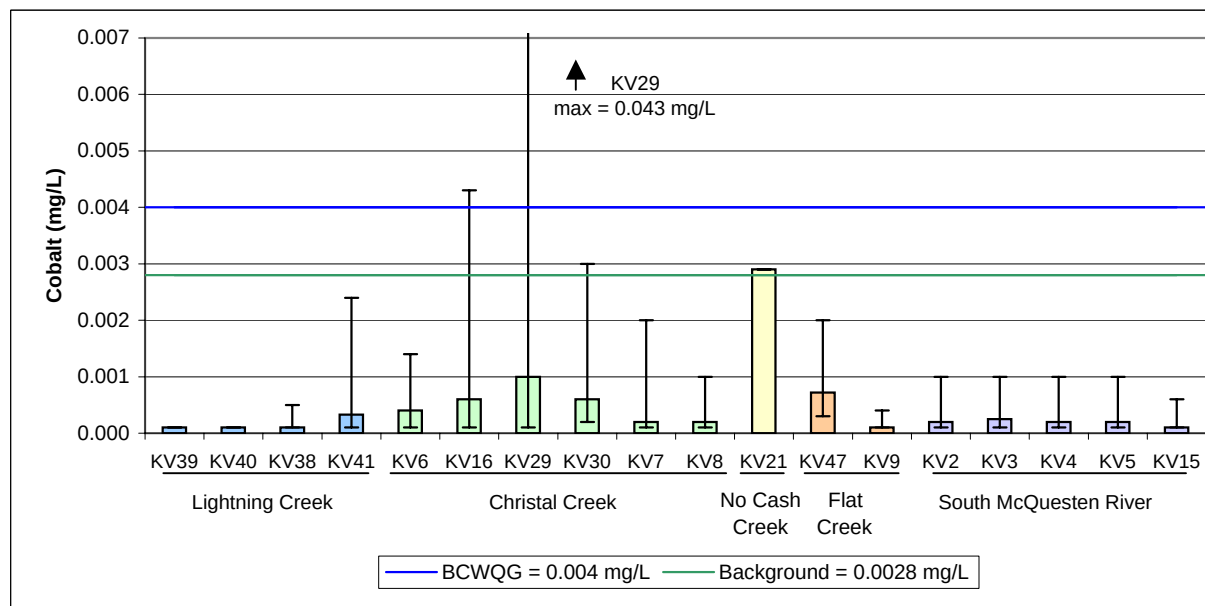


**Figure A.15: Cobalt (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.39: Conductivity (uS/cm) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background*	% > Background	n	mean	median	stdev	min	max	n <MDL
KV39	-	-	-	-	-	-	-	-	-
KV40	-	-	-	-	-	-	-	-	-
KV38	0	0	7	151	154	21	129	188	0
KV41	0	0	18	186	191	44	112	251	0
KV6	0	74	76	637	649	208	210	1145	0
KV16	0	96	27	892	842	328	220	1999	0
KV29	0	97	33	1442	1520	405	3	1995	0
KV30	0	88	34	808	862	260	191	1509	0
KV7	0	58	80	529	558	187	133	880	0
KV8	0	81	36	639	690	186	127	888	0
KV21	-	-	-	-	-	-	-	-	-
KV47	0	58	12	717	810	331	226	1100	0
KV9	0	81	21	574	615	157	220	775	0
KV2	0	16	45	368	399	107	130	538	0
KV3	0	10	21	331	303	100	133	526	0
KV4	0	15	48	339	330	127	150	610	0
KV5	0	12	25	396	405	80	274	535	0
KV15	0	13	8	379	429	132	120	504	0

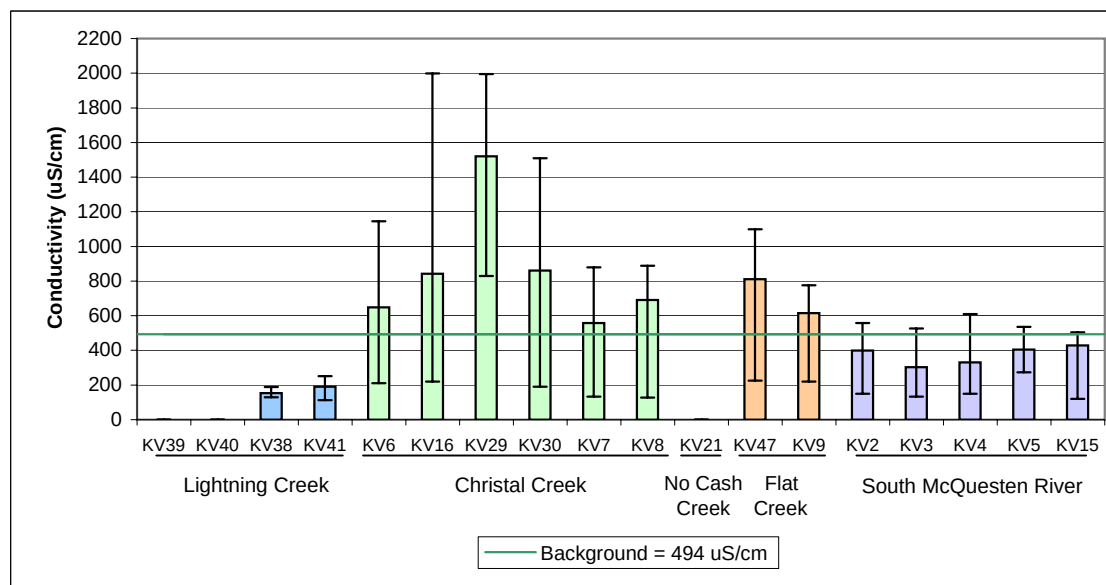


Figure A.16: Conductivity (uS/cm) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.40: Copper (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0016	0.0016	0.0008	0.0010	0.0021	1
KV40	0	0	0	1	0.0010	0.0010	-	0.0010	0.0010	1
KV38	11	0	0	9	0.0015	0.0010	0.0013	0.0010	0.0050	7
KV41	0	30	10	10	0.0026	0.0010	0.0025	0.0010	0.0080	4
KV6	0	9	0	35	0.0018	0.0010	0.0013	0.0010	0.0070	19
KV16	0	9	0	34	0.0018	0.0010	0.0012	0.0010	0.0060	16
KV29	0	36	12	33	0.0042	0.0020	0.0049	0.0010	0.0250	2
KV30	0	21	3	33	0.0021	0.0010	0.0017	0.0010	0.0080	15
KV7	0	20	3	35	0.0021	0.0010	0.0020	0.0010	0.0100	16
KV8	0	15	0	33	0.0021	0.0010	0.0016	0.0010	0.0070	12
KV21	0	100	100	1	0.0080	0.0080	-	0.0080	0.0080	0
KV47	0	67	0	3	0.0038	0.0040	0.0027	0.0010	0.0064	1
KV9	0	18	0	11	0.0021	0.0010	0.0018	0.0010	0.0070	1
KV2	0	4	0	25	0.0017	0.0010	0.0009	0.0010	0.0040	7
KV3	0	0	8	12	0.0028	0.0015	0.0025	0.0010	0.0090	5
KV4	0	18	0	11	0.0021	0.0020	0.0013	0.0010	0.0050	3
KV5	0	5	0	20	0.0020	0.0020	0.0009	0.0010	0.0040	5
KV15	0	0	0	12	0.0014	0.0010	0.0007	0.0010	0.0030	3

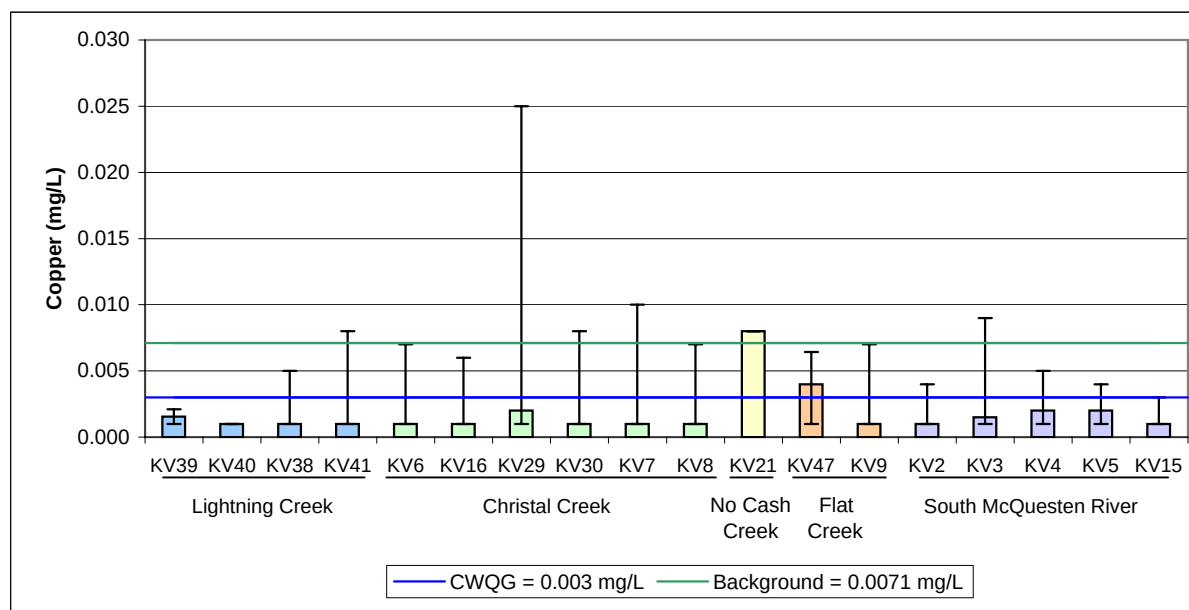


**Figure A.17: Copper (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.41: Hardness (mg/L CaCO₃) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	103	103	10	97	110	0
KV40	0	0	2	160	160	1	159	160	0
KV38	0	0	8	70	68	10	52	82	0
KV41	0	0	12	93	98	21	53	114	0
KV6	0	89	37	415	419	124	117	679	0
KV16	0	93	27	459	470	110	114	695	0
KV29	0	100	26	1020	1045	166	601	1250	0
KV30	0	96	27	484	490	83	222	608	0
KV7	0	86	37	362	399	107	72	502	0
KV8	0	84	31	342	376	114	67	480	0
KV21	0	100	2	512	512	86	451	572	0
KV47	0	60	10	386	418	233	79	707	0
KV9	0	58	19	284	300	92	129	416	0
KV2	0	3	37	197	215	60	70	281	0
KV3	0	0	14	199	215	67	64	275	0
KV4	0	6	18	214	216	64	122	380	0
KV5	0	0	24	189	200	59	71	268	0
KV15	0	0	14	184	180	67	63	268	0

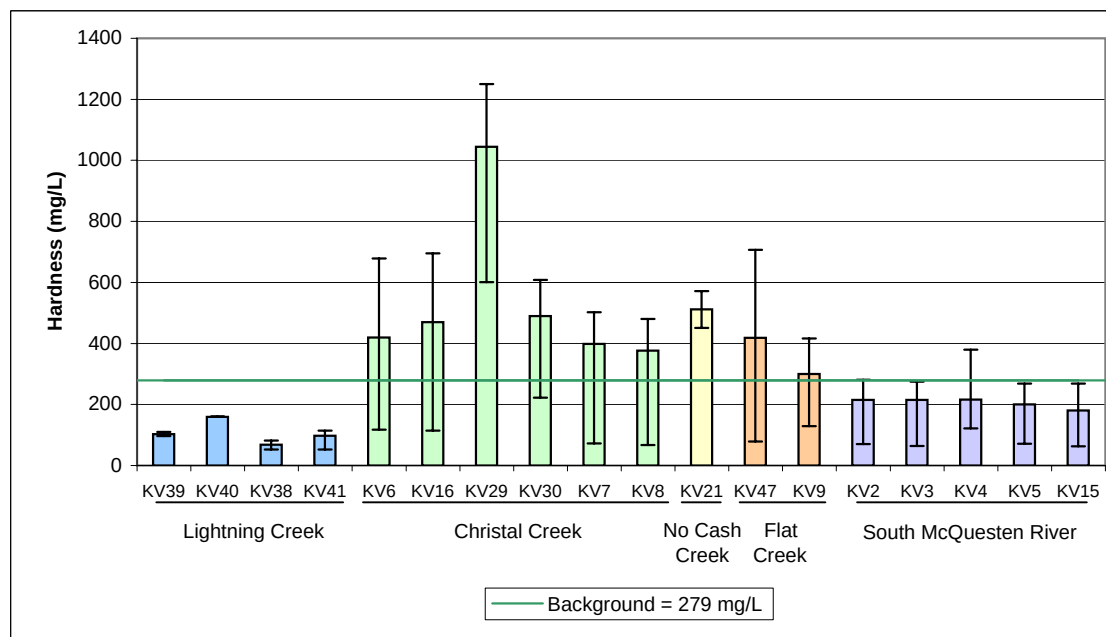


Figure A.18: Hardness (mg/L CaCO₃) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.42: Hydroxide (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	na	na	1	5	5	-	5	5	1
KV40	na	na	2	5	5	0	5	5	2
KV38	na	na	7	5	5	0	5	5	7
KV41	na	na	10	5	5	0	5	5	10
KV6	na	na	31	5	5	0	5	5	31
KV16	na	na	30	5	5	0	5	5	30
KV29	na	na	28	5	5	0	5	5	27
KV30	na	na	29	5	5	0	5	5	29
KV7	na	na	32	5	5	0	5	5	30
KV8	na	na	29	5	5	0	5	5	29
KV21	na	na	2	5	5	0	5	5	2
KV47	na	na	4	5	5	0	5	5	4
KV9	na	na	11	5	5	0	5	5	11
KV2	na	na	32	5	5	0	5	5	32
KV3	na	na	11	5	5	0	5	5	11
KV4	na	na	11	5	5	0	5	5	11
KV5	na	na	23	5	5	0	5	5	23
KV15	na	na	11	5	5	0	5	5	11

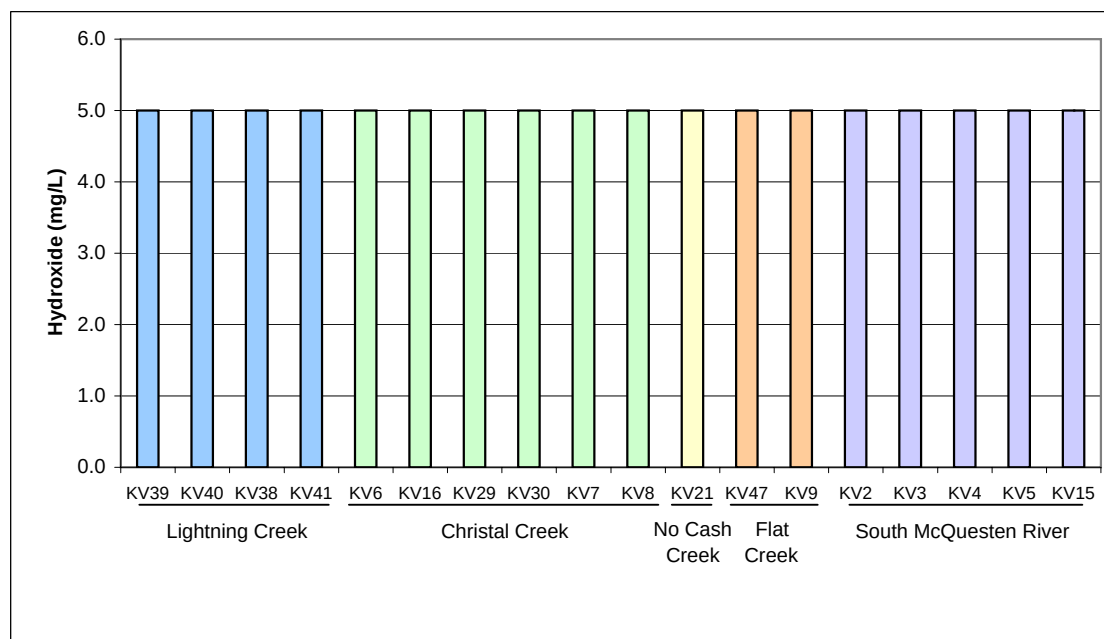


Figure A.19: Hydroxide (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.43: Iron (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.07	0.07	0.05	0.030	0.10	2
KV40	0	0	0	2	0.05	0.05	0.07	0.003	0.10	1
KV38	10	0	0	10	0.14	0.10	0.13	0.028	0.50	8
KV41	0	53	41	17	0.99	0.49	1.37	0.068	4.60	3
KV6	0	37	19	79	0.48	0.20	0.65	0.010	3.50	4
KV16	0	45	21	42	0.63	0.30	1.00	0.019	6.00	4
KV29	0	41	35	37	1.81	0.30	3.81	0.100	20.3	10
KV30	0	53	33	40	0.82	0.36	1.00	0.100	4.20	2
KV7	0	25	16	77	0.34	0.20	0.46	0.010	2.34	8
KV8	0	27	12	41	0.30	0.12	0.34	0.033	1.38	7
KV21	0	100	50	2	0.56	0.56	0.34	0.322	0.80	0
KV47	0	79	71	14	1.38	1.18	0.94	0.137	3.33	0
KV9	0	22	17	23	0.30	0.14	0.34	0.049	1.00	7
KV2	0	23	17	47	0.31	0.20	0.30	0.010	1.03	0
KV3	0	9	5	22	0.24	0.20	0.13	0.092	0.75	1
KV4	0	29	13	45	0.32	0.20	0.29	0.010	1.00	0
KV5	0	7	4	28	0.23	0.20	0.13	0.024	0.80	0
KV15	0	40	13	15	0.44	0.30	0.34	0.198	1.40	0

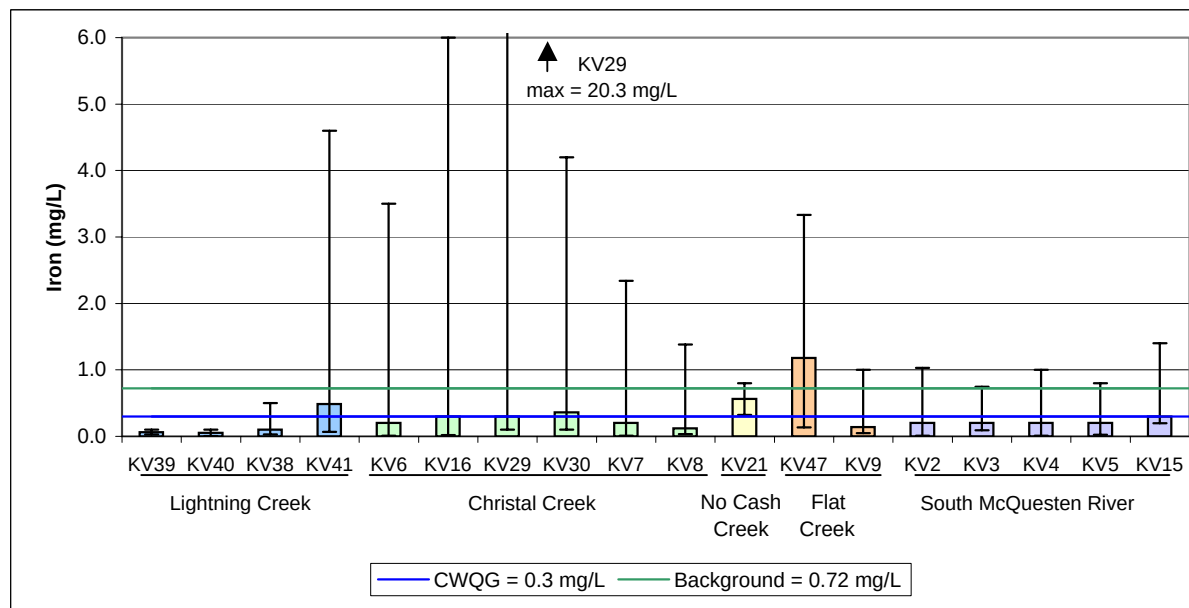


Figure A.20: Iron (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.44: Lead (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	50	50	2	0.00352	0.00352	0.00144	0.0025	0.00454	0
KV40	0	0	0	1	0.0001	0.0001	-	0.0001	0.0001	0
KV38	0	0	0	9	0.0008	0.0005	0.0006	0.0003	0.0019	1
KV41	0	30	30	10	0.0062	0.0017	0.0101	0.0005	0.0316	0
KV6	0	60	60	35	0.01489	0.0049	0.02413	0.0005	0.12	0
KV16	0	44	44	34	0.00508	0.00385	0.00512	0.0003	0.0268	0
KV29	0	26	26	34	0.00338	0.00115	0.00485	0.0001	0.0203	2
KV30	0	42	42	33	0.00537	0.0036	0.00486	0.0004	0.0246	0
KV7	0	14	14	35	0.00372	0.0015	0.00635	0.0004	0.024	1
KV8	0	23	23	31	0.00256	0.0017	0.00197	0.0006	0.0068	0
KV21	0	100	100	1	0.0052	0.0052	-	0.0052	0.0052	0
KV47	0	33	33	3	0.0451	0.0037	0.0735	0.0017	0.1300	0
KV9	0	45	45	11	0.0074	0.0033	0.0096	0.0009	0.0333	0
KV2	0	8	8	25	0.00127	0.0007	0.0013	0.0003	0.0049	0
KV3	0	9	9	11	0.00181	0.0013	0.00172	0.0009	0.00694	0
KV4	0	20	20	10	0.00399	0.00175	0.007	0.0006	0.0237	0
KV5	0	10	10	21	0.0018	0.0013	0.00168	0.0004	0.008	0
KV15	0	8	8	12	0.00148	0.00105	0.00137	0.0002	0.0049	0

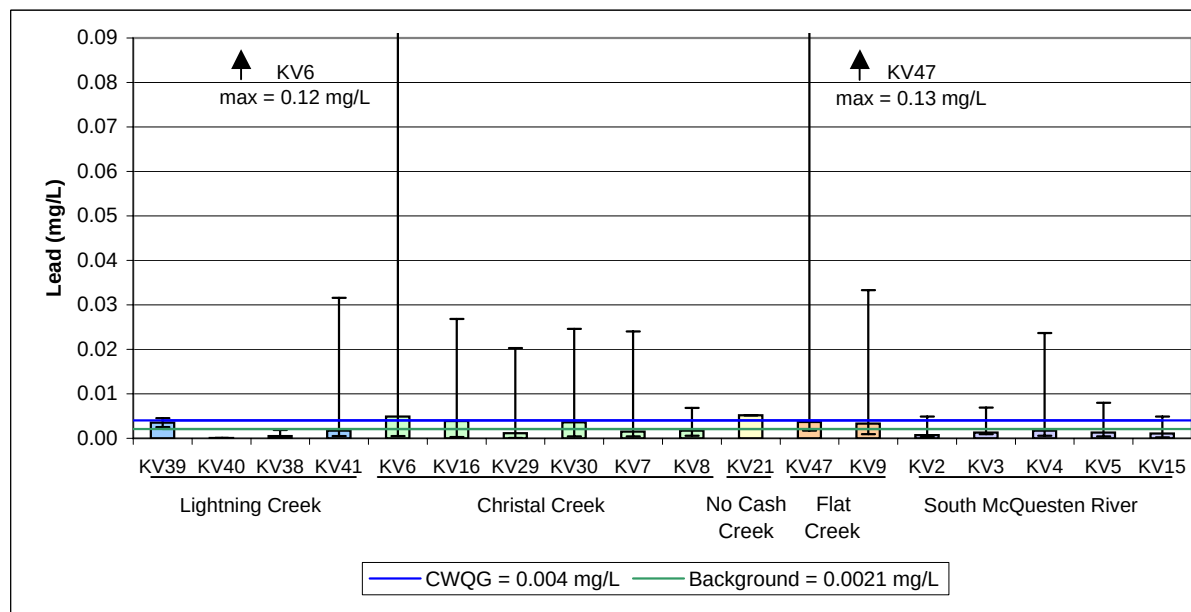


**Figure A.21: Lead (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

**Table A.45: Lithium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n<MDL
KV39	0	0	0	2	0.004	0.004	0.001	0.003	0.005	1
KV40	0	0	0	1	0.002	0.002	0.000	0.002	0.002	0
KV38	0	0	0	9	0.002	0.001	0.002	0.001	0.005	2
KV41	0	0	0	10	0.003	0.002	0.001	0.002	0.005	1
KV6	0	0	0	35	0.011	0.012	0.004	0.004	0.023	0
KV16	0	0	0	35	0.015	0.013	0.010	0.007	0.057	0
KV29	0	0	0	34	0.016	0.016	0.005	0.007	0.029	0
KV30	0	0	0	33	0.012	0.012	0.002	0.006	0.016	0
KV7	0	0	0	36	0.007	0.008	0.002	0.003	0.011	0
KV8	0	0	0	33	0.007	0.007	0.002	0.002	0.010	1
KV21	0	0	0	1	0.020	0.020	0.000	0.020	0.020	0
KV47	0	0	0	3	0.009	0.010	0.003	0.005	0.011	1
KV9	0	0	0	11	0.005	0.005	0.002	0.002	0.011	1
KV2	0	0	0	25	0.005	0.005	0.001	0.002	0.007	1
KV3	0	0	0	12	0.005	0.005	0.001	0.004	0.007	2
KV4	0	0	0	11	0.005	0.005	0.001	0.004	0.007	2
KV5	0	0	0	22	0.005	0.004	0.001	0.002	0.007	1
KV15	0	0	0	12	0.004	0.005	0.001	0.002	0.006	0

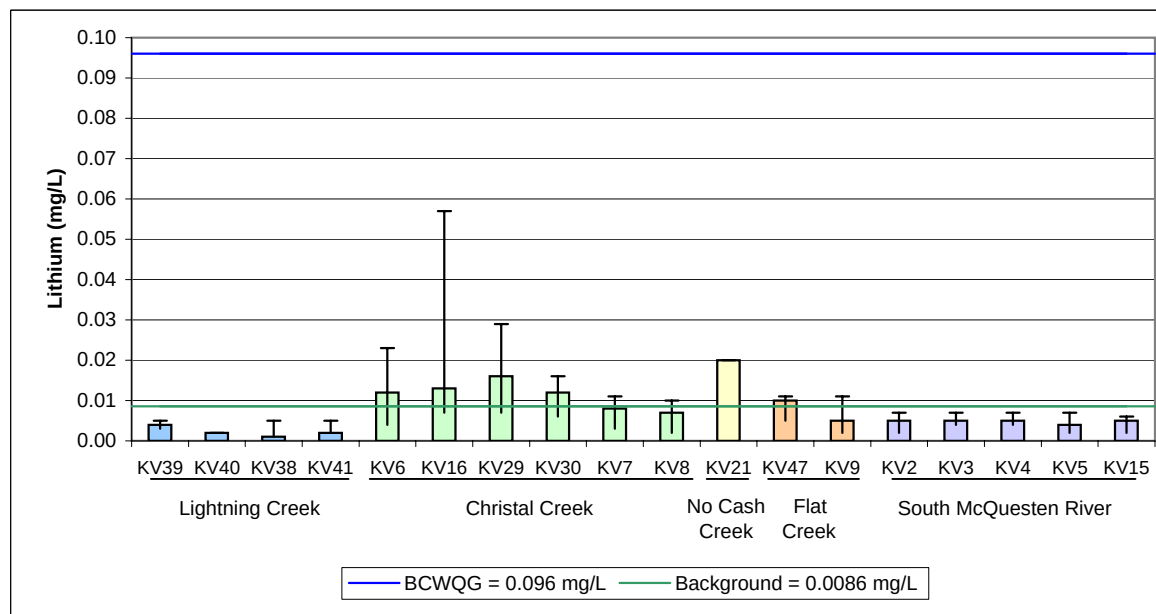


Figure A.22: Lithium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

Table A.46: Magnesium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	5.5	5.5	0.3	5.3	5.7	0
KV40	0	0	2	12	12	0.4	12	12	0
KV38	0	0	10	4.1	4.0	0.6	3.2	4.9	0
KV41	0	0	14	4.8	4.8	1.1	3.1	6.7	0
KV6	0	28	47	21	21	6.4	6.1	37	0
KV16	0	70	40	30	25	19	12	107	0
KV29	0	98	41	51	52	12	19	84	0
KV30	0	74	39	25	26	5.4	6.9	33	0
KV7	0	31	49	20	22	5.5	5.2	28	0
KV8	0	27	37	20	20	6.7	4.3	36	0
KV21	0	50	2	24	24	1.3	23	25	0
KV47	0	44	9	21	24	13	5.3	39	0
KV9	0	44	18	21	22	6.7	10	30	0
KV2	0	3	37	15	14	4.4	5.6	24	0
KV3	0	0	21	15	14	4.1	7.5	22	0
KV4	0	6	18	16	15	5.0	8.6	29	0
KV5	0	0	28	15	15	4.5	5.2	22	0
KV15	0	0	13	14	13	4.7	5.5	22	0

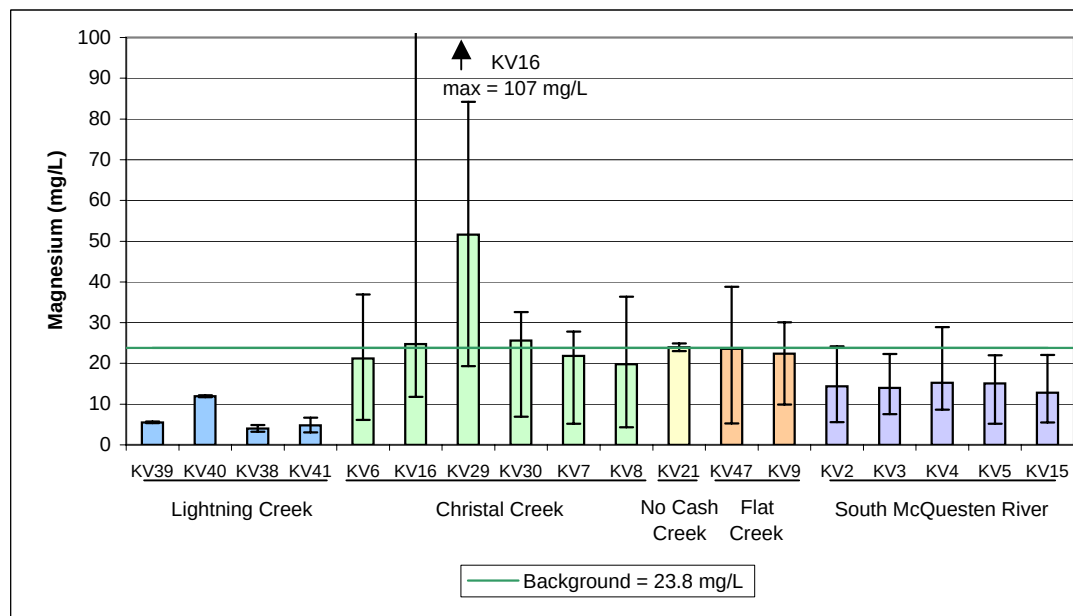


Figure A.23: Magnesium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.47: Manganese (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.01	0.01	0.00	0.01	0.01	1
KV40	0	0	0	2	0.00	0.00	0.00	0.00	0.01	0
KV38	0	0	0	10	0.01	0.01	0.01	0.01	0.02	6
KV41	0	0	0	17	0.05	0.02	0.06	0.00	0.22	0
KV6	0	16	16	80	0.77	0.56	0.61	0.01	2.60	0
KV16	0	20	20	41	1.36	0.72	1.95	0.23	9.27	0
KV29	0	53	53	40	14	1.61	25	0.01	101	0
KV30	0	31	31	39	1.56	0.92	1.75	0.29	7.65	0
KV7	0	0	0	75	0.29	0.24	0.22	0.01	0.92	0
KV8	0	0	0	40	0.20	0.26	0.25	0.07	1.28	0
KV21	0	100	100	2	3.20	3.20	1.16	2.38	4.02	0
KV47	0	43	43	14	1.34	1.11	0.78	0.52	3.00	0
KV9	0	0	0	23	0.06	0.05	0.03	0.01	0.15	0
KV2	0	0	0	45	0.08	0.07	0.04	0.04	0.20	0
KV3	0	0	0	19	0.07	0.07	0.02	0.04	0.12	0
KV4	0	0	0	44	0.10	0.09	0.06	0.03	0.34	0
KV5	0	0	0	26	0.07	0.07	0.03	0.00	0.13	0
KV15	0	0	0	15	0.08	0.08	0.05	0.01	0.19	0

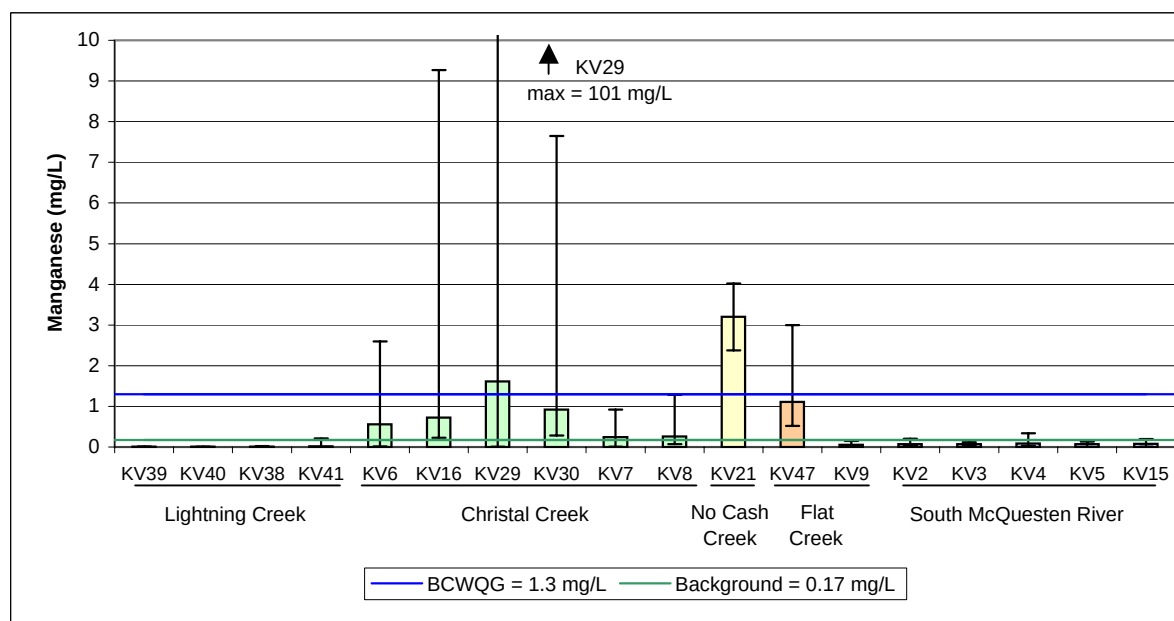


Figure A.24: Manganese (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.48: Molybdenum (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.001	0.001	0.001	0.0003	0.001	1
KV40	0	0	0	2	0.006	0.006	0.006	0.0010	0.010	2
KV38	0	0	0	10	0.002	0.001	0.003	0.0001	0.010	9
KV41	0	0	0	14	0.003	0.001	0.004	0.0002	0.010	11
KV6	0	0	0	50	0.004	0.001	0.004	0.0010	0.010	46
KV16	0	0	0	42	0.002	0.001	0.003	0.0010	0.010	41
KV29	0	0	0	42	0.003	0.001	0.004	0.0010	0.020	38
KV30	0	0	0	42	0.003	0.001	0.004	0.0010	0.010	41
KV7	0	0	0	51	0.003	0.001	0.004	0.0005	0.010	44
KV8	0	0	0	39	0.003	0.001	0.003	0.0010	0.010	39
KV21	0	0	0	2	0.006	0.006	0.006	0.0010	0.010	2
KV47	0	0	0	9	0.006	0.005	0.004	0.0002	0.010	4
KV9	0	0	0	18	0.003	0.001	0.004	0.0001	0.010	15
KV2	0	0	0	38	0.003	0.001	0.004	0.0007	0.010	34
KV3	0	0	0	21	0.004	0.001	0.004	0.0005	0.010	15
KV4	0	0	0	18	0.004	0.001	0.004	0.0003	0.010	11
KV5	0	0	0	30	0.003	0.001	0.003	0.0010	0.010	25
KV15	0	0	0	14	0.002	0.001	0.003	0.0010	0.010	11

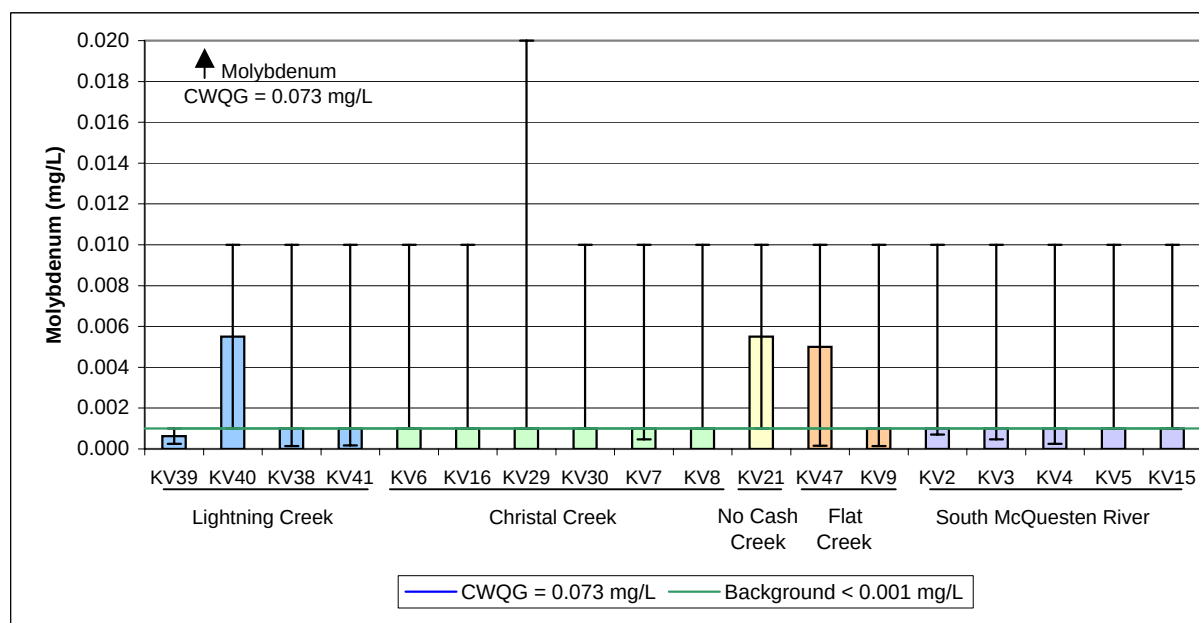


Figure A.25: Molybdenum (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.49: Nickel (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n<MDL
KV39	0	0	0	2	0.001	0.001	0.000	0.001	0.001	0
KV40	0	0	0	1	0.001	0.001	0.000	0.001	0.001	0
KV38	0	0	0	9	0.001	0.001	0.001	0.001	0.003	6
KV41	0	0	0	10	0.002	0.001	0.001	0.001	0.004	3
KV6	0	0	0	37	0.004	0.004	0.002	0.001	0.009	2
KV16	0	0	0	35	0.005	0.004	0.004	0.001	0.017	2
KV29	0	6	6	35	0.028	0.017	0.037	0.001	0.192	0
KV30	0	0	0	35	0.006	0.005	0.003	0.001	0.015	0
KV7	0	0	0	37	0.003	0.002	0.002	0.001	0.009	1
KV8	0	0	0	33	0.003	0.002	0.002	0.001	0.008	2
KV21	0	0	0	1	0.025	0.025	0.000	0.025	0.025	0
KV47	0	0	0	3	0.003	0.002	0.001	0.002	0.004	0
KV9	0	0	0	11	0.002	0.001	0.003	0.001	0.011	3
KV2	0	0	0	26	0.006	0.006	0.002	0.003	0.010	0
KV3	0	0	0	12	0.006	0.005	0.003	0.003	0.010	0
KV4	0	0	0	11	0.005	0.005	0.003	0.002	0.010	0
KV5	0	0	0	22	0.004	0.004	0.002	0.002	0.007	0
KV15	0	0	0	12	0.003	0.002	0.001	0.001	0.005	0

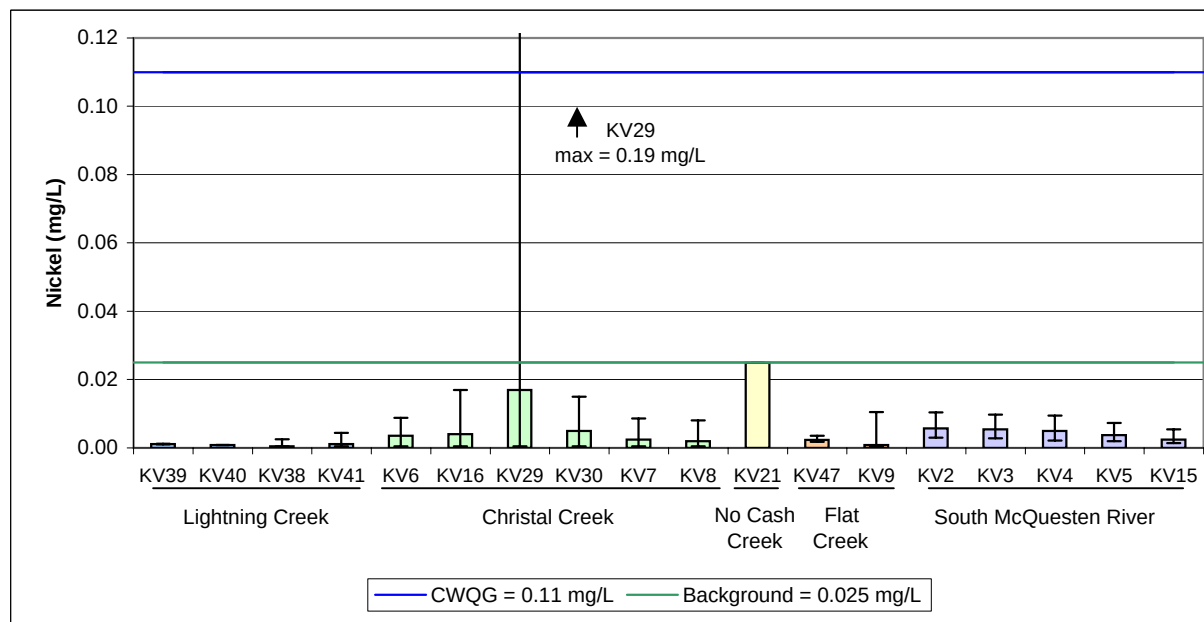


**Figure A.26: Nickel (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.50: Nitrate (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	0.02	0.02	0.02	0.001	0.03	2
KV40	0	0	2	0.04	0.04	0.01	0.030	0.05	2
KV38	0	0	5	0.02	0.03	0.02	0.001	0.05	5
KV41	0	0	8	0.06	0.04	0.06	0.001	0.18	5
KV6	0	0	10	0.07	0.04	0.07	0.021	0.25	5
KV16	0	0	3	0.06	0.03	0.05	0.030	0.11	1
KV29	0	0	2	0.14	0.14	0.16	0.030	0.25	1
KV30	0	0	3	0.06	0.03	0.06	0.030	0.13	1
KV7	0	0	9	0.08	0.05	0.06	0.030	0.18	4
KV8	0	0	7	0.05	0.05	0.03	0.030	0.10	5
KV21	0	0	2	0.07	0.07	0.05	0.030	0.10	2
KV47	0	0	6	0.08	0.06	0.08	0.001	0.22	3
KV9	0	0	12	0.10	0.05	0.14	0.001	0.50	9
KV2	0	0	11	0.10	0.05	0.14	0.030	0.50	5
KV3	0	0	10	0.09	0.04	0.15	0.001	0.50	6
KV4	0	0	11	0.08	0.05	0.07	0.001	0.20	5
KV5	0	0	8	0.10	0.04	0.16	0.030	0.50	4
KV15	0	0	2	0.04	0.04	0.01	0.030	0.05	1

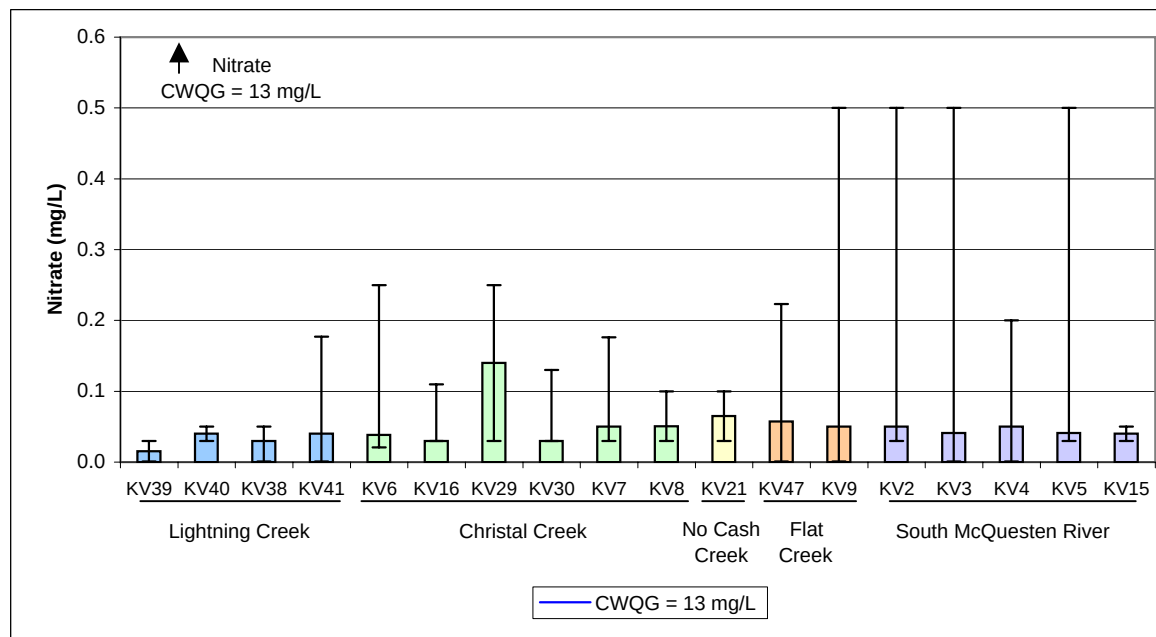


Figure A.27: Nitrate (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.51: Nitrite (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	50	2	0.138	0.138	0.124	0.050	0.226	0
KV40	-	-	0	-	-	-	-	-	-
KV38	0	0	3	0.043	0.040	0.015	0.030	0.059	1
KV41	0	20	5	0.028	0.030	0.025	0.002	0.063	1
KV6	0	29	7	0.045	0.050	0.044	0.002	0.120	0
KV16	0	67	3	0.077	0.080	0.035	0.040	0.110	0
KV29	0	75	4	0.565	0.210	0.828	0.040	1.800	0
KV30	0	67	3	0.087	0.090	0.045	0.040	0.130	0
KV7	0	38	8	0.060	0.050	0.067	0.002	0.200	2
KV8	0	0	4	0.040	0.036	0.024	0.005	0.060	0
KV21	0	100	1	0.070	0.070	-	0.070	0.070	0
KV47	0	0	5	0.030	0.029	0.026	0.002	0.060	0
KV9	0	0	8	0.023	0.018	0.023	0.002	0.060	7
KV2	0	0	7	0.020	0.030	0.016	0.002	0.040	5
KV3	0	0	7	0.013	0.005	0.013	0.002	0.030	6
KV4	0	0	7	0.017	0.008	0.016	0.002	0.040	4
KV5	0	0	5	0.030	0.030	0.018	0.002	0.050	1
KV15	0	0	1	0.030	0.030	-	0.030	0.030	0

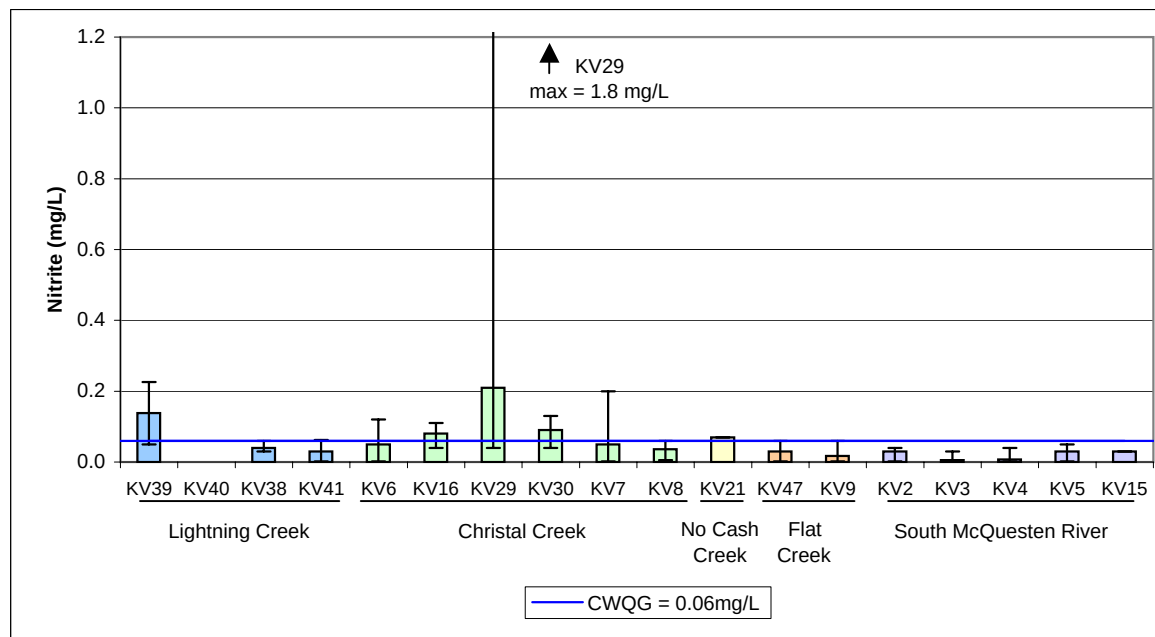


Figure A.28: Nitrite (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.52: pH Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% > CWQG	% < CWQG	% >Background, >CWQG	% <Background, <CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	-	-	-	-	-	-	-	-	-	-	-
KV40	0	0	0	0	1	8.22	8.22	-	8.22	8.22	0
KV38	0	0	0	0	8	7.52	7.63	0.26	7.17	7.80	0
KV41	0	0	0	0	19	7.50	7.42	0.27	7.10	7.89	0
KV6	0	0	0	0	85	7.72	7.70	0.45	6.90	8.95	0
KV16	0	0	0	0	33	7.70	7.67	0.57	6.58	8.95	0
KV29	0	0	0	0	34	7.75	7.86	0.43	6.79	8.50	0
KV30	3	0	3	0	35	7.76	7.63	0.56	6.62	9.24	0
KV7	0	1	0	1	87	7.69	7.70	0.47	6.31	8.70	0
KV8	0	0	0	0	36	7.79	7.77	0.56	6.84	8.97	0
KV21	0	0	0	0	1	6.62	6.62	-	6.62	6.62	0
KV47	0	0	0	0	13	7.50	7.50	0.44	6.70	8.26	0
KV9	0	0	0	0	23	7.51	7.40	0.36	6.80	8.20	0
KV2	0	0	0	0	42	7.67	7.66	0.45	6.81	8.76	0
KV3	5	0	5	0	22	7.79	7.84	0.51	7.05	9.20	0
KV4	0	0	0	0	51	7.62	7.70	0.36	6.90	8.50	0
KV5	0	0	0	0	26	7.79	7.81	0.49	7.02	8.90	0
KV15	13	0	13	0	8	7.85	7.81	0.57	7.10	9.07	0

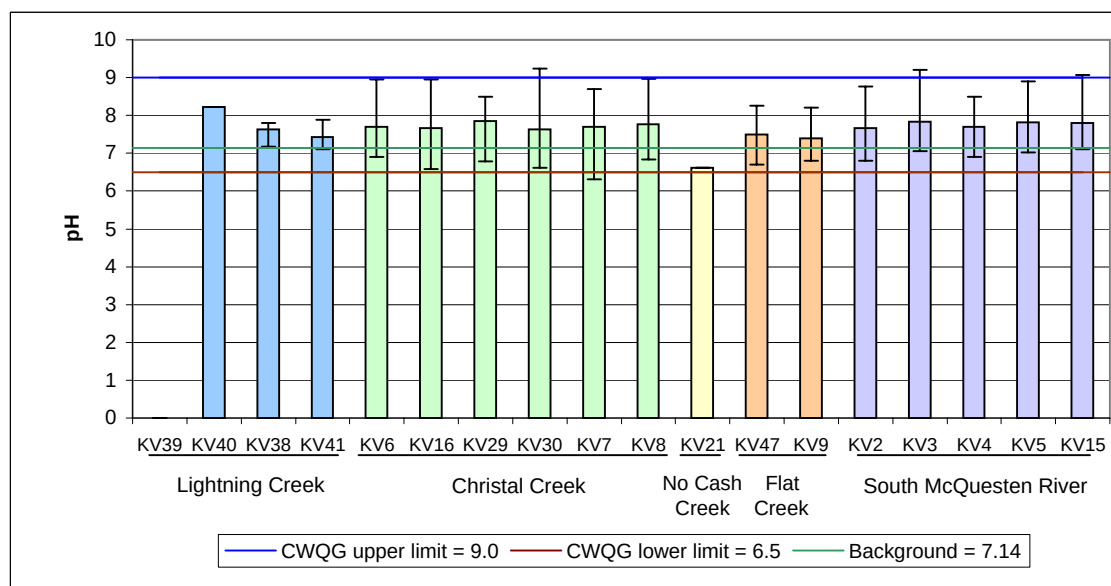


Figure A.29: pH Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.53: Phosphorus (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	N <MDL
KV39	-	-	-	0	-	-	-	-	-	0
KV40	100	0	0	1	0.06	0.06	-	0.06	0.06	1
KV38	100	0	0	1	0.06	0.06	-	0.06	0.06	1
KV41	33	67	0	3	0.05	0.06	0.02	0.03	0.07	1
KV6	77	15	0	13	0.06	0.06	0.01	0.05	0.08	10
KV16	25	75	63	16	0.41	0.45	0.33	0.06	1.20	4
KV29	44	56	44	9	0.43	0.16	0.51	0.06	1.34	4
KV30	29	71	14	7	0.22	0.12	0.32	0.06	0.94	2
KV7	30	60	0	10	0.08	0.07	0.04	0.03	0.18	4
KV8	67	33	17	6	0.11	0.06	0.10	0.06	0.31	4
KV21	100	0	0	1	0.06	0.06	-	0.06	0.06	2
KV47	33	67	0	6	0.07	0.06	0.01	0.06	0.09	2
KV9	86	0	0	7	0.05	0.06	0.01	0.03	0.06	7
KV2	50	40	0	10	0.07	0.06	0.02	0.03	0.12	6
KV3	60	20	0	5	0.06	0.06	0.02	0.03	0.07	4
KV4	40	40	0	5	0.07	0.06	0.04	0.03	0.14	3
KV5	60	40	20	5	0.10	0.06	0.09	0.06	0.27	3
KV15	100	100	0	2	0.06	0.06	0	0.06	0.06	2

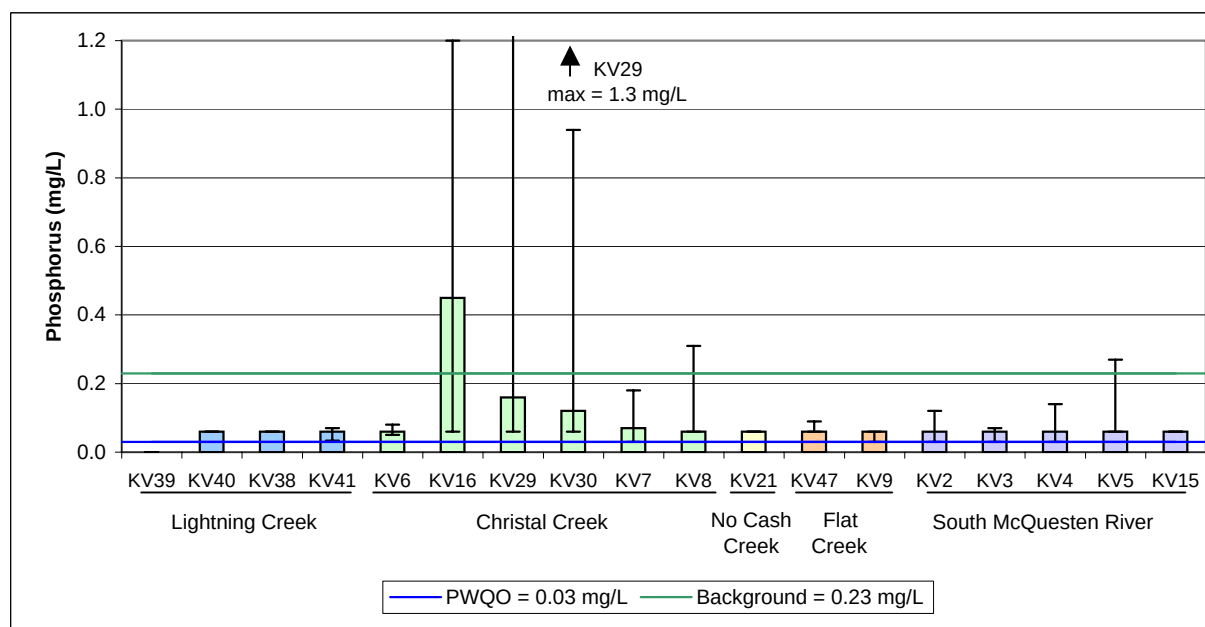


Figure A.30: Phosphorus (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.54: Potassium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	1.2	1.2	1.1	0.4	2.0	2
KV40	0	0	0	2	0.4	0.4	0.1	0.3	0.4	2
KV38	0	0	0	10	0.7	0.4	0.7	0.3	2.0	10
KV41	0	0	0	13	0.4	0.4	0.2	0.1	1.0	10
KV6	0	0	0	47	0.6	0.4	0.3	0.3	1.6	24
KV16	0	0	0	30	0.8	0.6	0.5	0.2	2.3	13
KV29	0	0	0	39	0.7	0.6	0.3	0.3	1.8	15
KV30	0	0	0	39	0.6	0.5	0.2	0.4	1.0	17
KV7	0	0	0	43	0.6	0.5	0.2	0.4	1.0	20
KV8	0	0	0	37	0.6	0.5	0.2	0.4	1.0	21
KV21	0	0	0	2	0.6	0.6	0.1	0.5	0.6	0
KV47	0	0	0	9	1.0	0.8	0.6	0.3	2.0	3
KV9	0	0	0	16	0.7	0.6	0.4	0.3	2.0	5
KV2	0	0	0	37	0.7	0.6	0.2	0.2	1.0	11
KV3	0	0	0	16	0.8	0.8	0.4	0.3	2.0	6
KV4	0	0	0	15	0.8	0.6	0.5	0.4	2.0	4
KV5	0	0	0	28	0.6	0.6	0.2	0.3	1.3	5
KV15	0	0	0	13	0.7	0.6	0.2	0.4	1.0	4

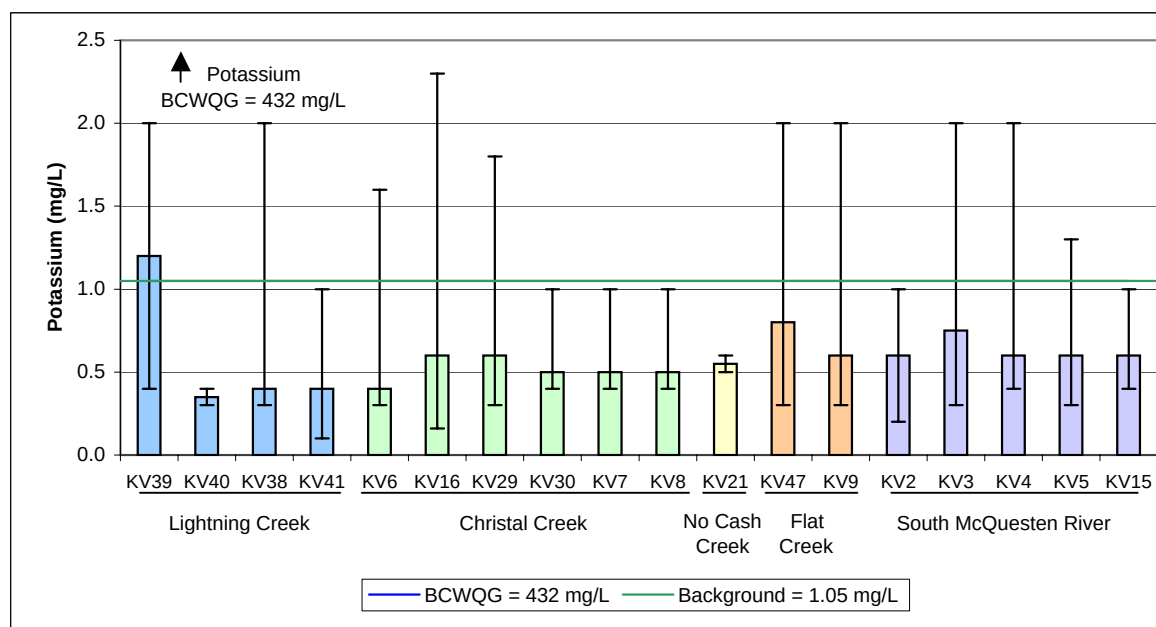


Figure A.31: Potassium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.55: Selenium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004 - 2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0009	0.0009	0.0002	0.0007	0.0010	1
KV40	0	100	100	1	0.0014	0.0014	-	0.0014	0.0014	0
KV38	0	0	0	9	0.0007	0.0006	0.0002	0.0005	0.0010	2
KV41	0	0	0	10	0.0008	0.0008	0.0002	0.0004	0.0010	1
KV6	0	20	20	35	0.0009	0.0009	0.0004	0.0003	0.0030	1
KV16	0	14	14	35	0.0008	0.0007	0.0003	0.0004	0.0019	1
KV29	0	9	9	33	0.0006	0.0004	0.0004	0.0002	0.0023	8
KV30	0	9	9	33	0.0008	0.0008	0.0002	0.0004	0.0012	1
KV7	0	9	9	35	0.0007	0.0007	0.0002	0.0003	0.0013	2
KV8	0	9	9	32	0.0007	0.0007	0.0002	0.0003	0.0012	1
KV21	0	0	0	1	0.0009	0.0009	-	0.0009	0.0009	0
KV47	0	0	0	3	0.0007	0.0007	0.0004	0.0003	0.0010	1
KV9	0	0	0	11	0.0003	0.0002	0.0002	0.0002	0.0010	3
KV2	0	0	0	25	0.0005	0.0005	0.0001	0.0002	0.0006	2
KV3	0	0	0	11	0.0005	0.0005	0.0002	0.0002	0.0010	1
KV4	0	0	0	10	0.0005	0.0005	0.0002	0.0003	0.0010	1
KV5	0	0	0	21	0.0004	0.0004	0.0001	0.0002	0.0007	2
KV15	0	0	0	12	0.0003	0.0003	0.0001	0.0002	0.0005	3

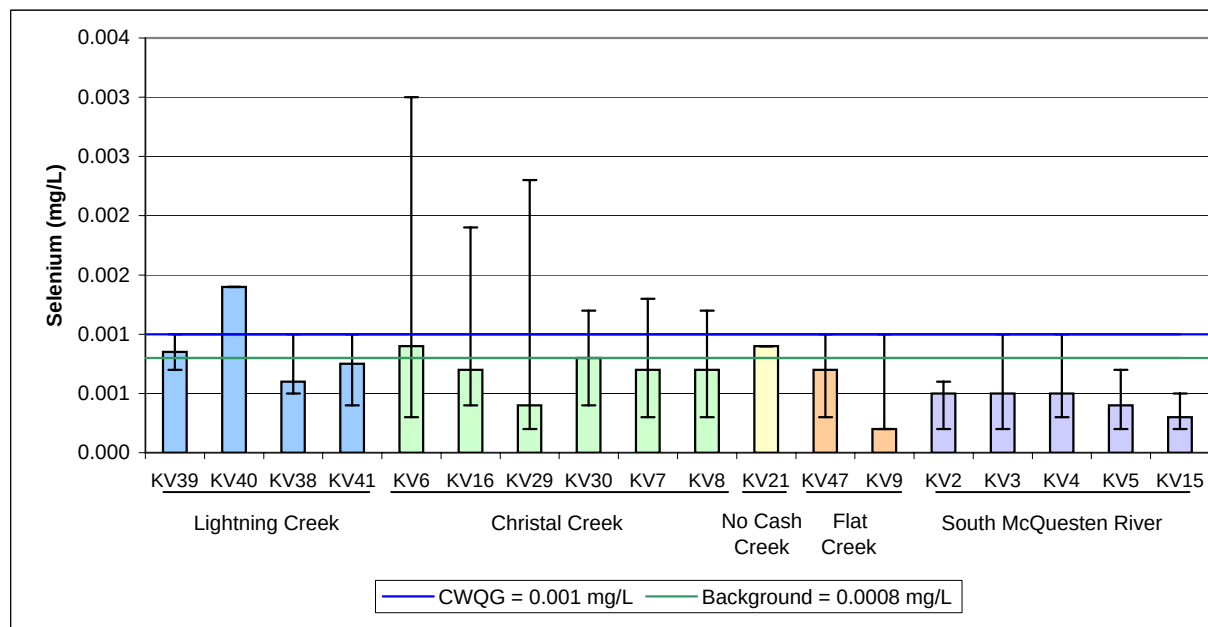


**Figure A.32: Selenium (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.56: Silicon (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	2.3	2.3	0.72	1.8	2.8	0
KV40	0	0	2	2.9	2.9	0.01	2.9	2.9	0
KV38	0	0	10	2.9	2.8	0.61	1.7	3.6	0
KV41	0	29	14	3.5	3.3	1.14	1.9	6.6	0
KV6	0	42	48	3.4	3.4	1.13	0.4	6.2	0
KV16	0	46	41	3.8	3.9	1.24	0.1	8.0	1
KV29	0	48	40	4.5	3.8	2.32	2.2	15	0
KV30	0	50	40	3.8	3.9	0.69	2.2	5.4	0
KV7	0	18	50	3.3	3.4	0.64	1.9	5.0	0
KV8	0	13	38	3.0	2.8	0.85	0.9	5.2	0
KV21	0	0	2	3.3	3.3	0.29	3.1	3.5	0
KV47	0	22	9	3.0	2.9	1.03	1.9	4.8	0
KV9	0	0	18	2.4	2.6	0.57	1.3	3.1	0
KV2	0	0	38	2.4	2.1	0.69	1.5	3.6	0
KV3	0	0	21	2.3	2.1	0.71	1.5	3.6	0
KV4	0	0	18	2.3	2.2	0.72	1.3	3.5	0
KV5	0	7	30	2.5	2.3	0.80	1.1	4.3	0
KV15	0	7	14	3.2	3.2	0.67	1.8	4.3	0

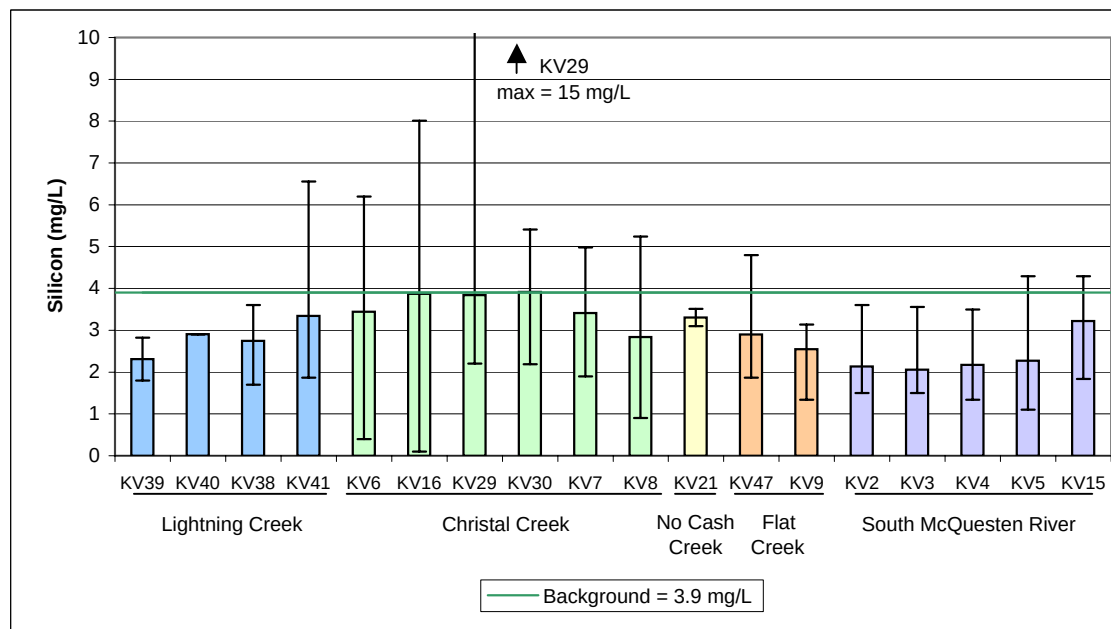


Figure A.33: Silicon (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.57: Silver (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004 - 2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n<MDL
KV39	0	0	0	2	0.0001	0.0001	0.0000	0.0000	0.0001	1
KV40	0	0	0	1	0.0001	0.0001	-	0.0001	0.0001	1
KV38	0	13	13	8	0.0001	0.0001	4.8E-05	0.000022	0.0002	6
KV41	0	30	30	10	0.00021	0.0001	0.00025	0.000059	0.0009	6
KV6	0	32	32	34	0.0003	0.0001	0.00046	0.0001	0.0019	21
KV16	0	19	19	32	0.00014	0.0001	0.00013	0.0001	0.0008	24
KV29	0	24	24	29	0.00016	0.0001	0.00014	0.0001	0.0007	19
KV30	0	23	23	31	0.00014	0.0001	0.0001	0.0001	0.0005	21
KV7	0	26	26	34	0.00015	0.0001	0.00011	0.0001	0.0005	24
KV8	0	23	23	31	0.00014	0.0001	9.2E-05	0.0001	0.0005	19
KV21	0	0	0	1	0.0001	0.0001	-	0.0001	0.0001	1
KV47	0	50	50	2	0.00112	0.00112	0.00144	0.0001	0.00214	1
KV9	0	18	18	11	0.00012	0.0001	3.8E-05	0.0001	0.0002	7
KV2	0	16	16	25	0.00016	0.0001	0.00017	0.0001	0.0008	16
KV3	0	20	20	10	0.00014	0.0001	9.7E-05	0.000099	0.0004	6
KV4	0	20	20	10	0.00014	0.0001	7.5E-05	0.0001	0.0003	7
KV5	0	14	14	21	0.00015	0.0001	0.00018	0.0001	0.0009	16
KV15	0	17	17	12	0.00013	0.0001	6.2E-05	0.0001	0.0003	9

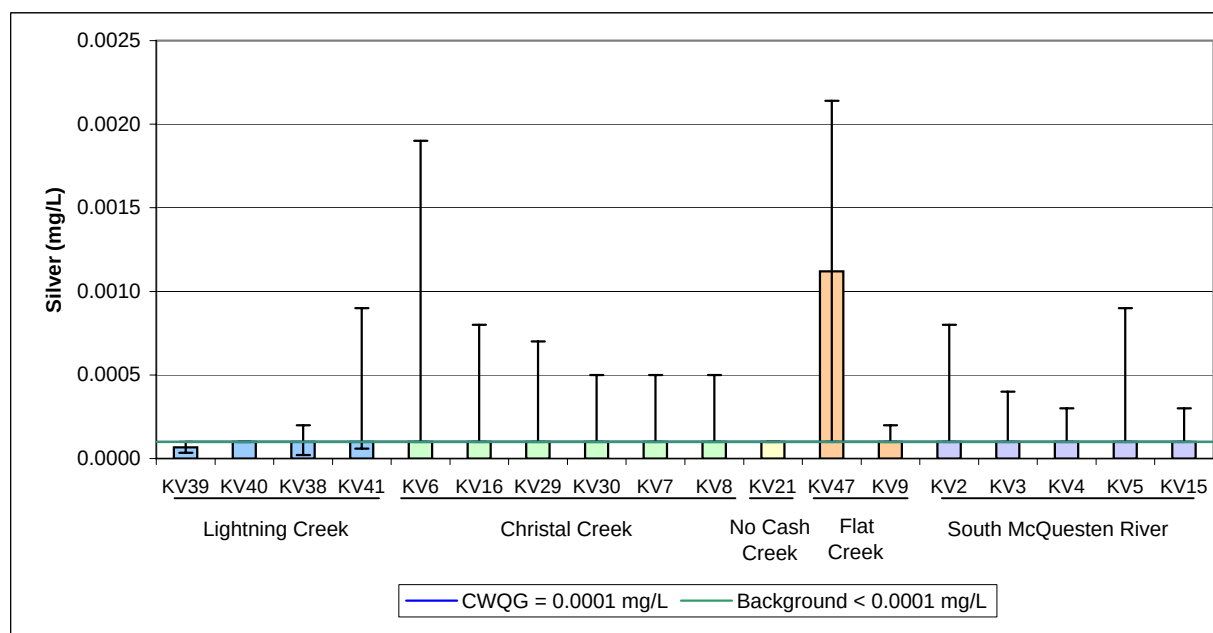


**Figure A.34: Silver (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.58: Sodium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	1.5	1.5	0.8	0.9	2.0	1
KV40	0	0	2	0.8	0.8	0.0	0.8	0.8	0
KV38	0	0	10	1.1	1.0	0.5	0.6	2.0	2
KV41	0	0	14	1.0	0.9	0.6	0.5	2.4	1
KV6	0	0	45	1.4	1.4	0.3	0.5	2.0	1
KV16	0	7	42	1.9	1.7	0.9	0.5	5.3	0
KV29	0	5	42	2.1	2.0	0.6	0.6	3.5	0
KV30	0	0	40	1.6	1.7	0.3	0.6	2.0	0
KV7	0	0	49	1.4	1.5	0.4	0.4	2.2	1
KV8	0	0	38	1.3	1.4	0.4	0.4	2.3	1
KV21	0	0	2	1.1	1.1	0.0	1.1	1.2	0
KV47	0	0	6	1.7	1.9	0.7	0.4	2.5	1
KV9	0	0	16	2.2	2.1	0.4	1.2	3.1	1
KV2	0	5	37	2.0	1.8	0.8	0.6	4.0	0
KV3	0	0	20	1.9	1.8	0.6	1.0	3.1	1
KV4	0	0	17	1.9	1.7	0.6	1.2	2.8	1
KV5	0	0	28	2.0	2.0	0.7	0.6	3.2	0
KV15	0	0	14	2.0	1.7	0.8	0.9	3.2	0

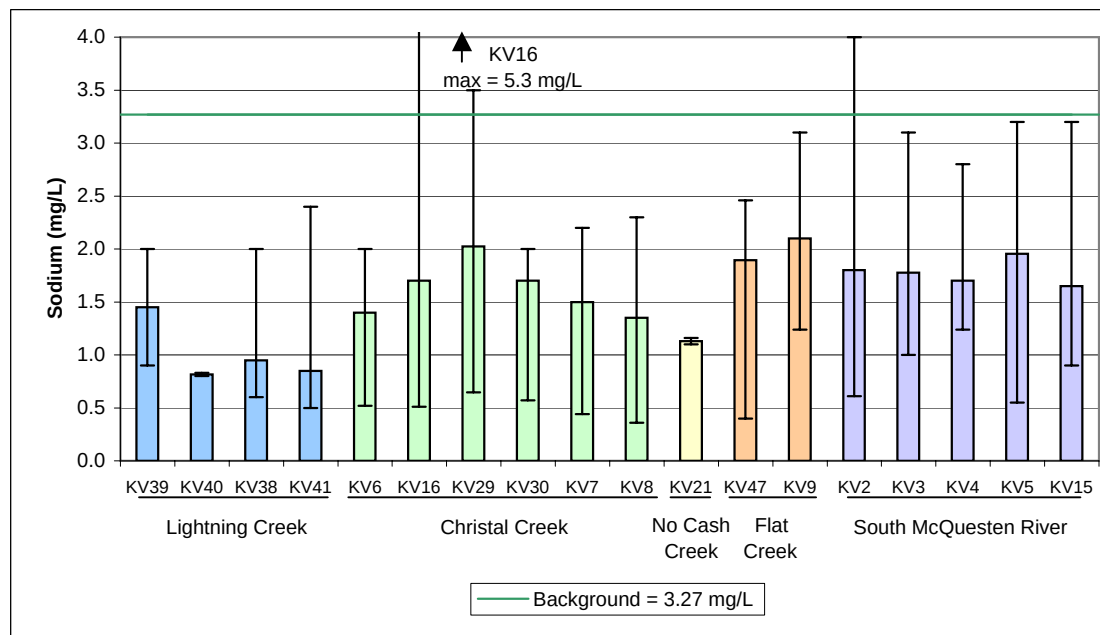


Figure A.35: Sodium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.59: Strontium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	0.09	0.09	0.02	0.08	0.11	0
KV40	0	0	2	0.15	0.15	0.01	0.14	0.15	0
KV38	0	0	10	0.08	0.08	0.01	0.05	0.09	0
KV41	0	0	14	0.08	0.08	0.02	0.05	0.10	0
KV6	0	0	48	0.21	0.22	0.05	0.05	0.28	0
KV16	0	36	42	0.33	0.28	0.20	0.06	1.18	0
KV29	0	98	40	0.60	0.58	0.16	0.18	0.99	0
KV30	0	48	40	0.28	0.30	0.06	0.07	0.37	0
KV7	0	2	50	0.22	0.23	0.06	0.05	0.32	0
KV8	0	11	38	0.22	0.23	0.07	0.04	0.34	0
KV21	0	0	2	0.23	0.23	0.01	0.22	0.24	0
KV47	0	44	9	0.23	0.27	0.13	0.05	0.36	0
KV9	0	0	18	0.18	0.20	0.06	0.07	0.27	0
KV2	0	0	38	0.20	0.21	0.05	0.06	0.26	0
KV3	0	0	21	0.19	0.19	0.05	0.08	0.27	0
KV4	0	0	18	0.18	0.19	0.05	0.08	0.26	0
KV5	0	0	30	0.20	0.21	0.05	0.06	0.27	0
KV15	0	0	14	0.21	0.20	0.05	0.10	0.27	0

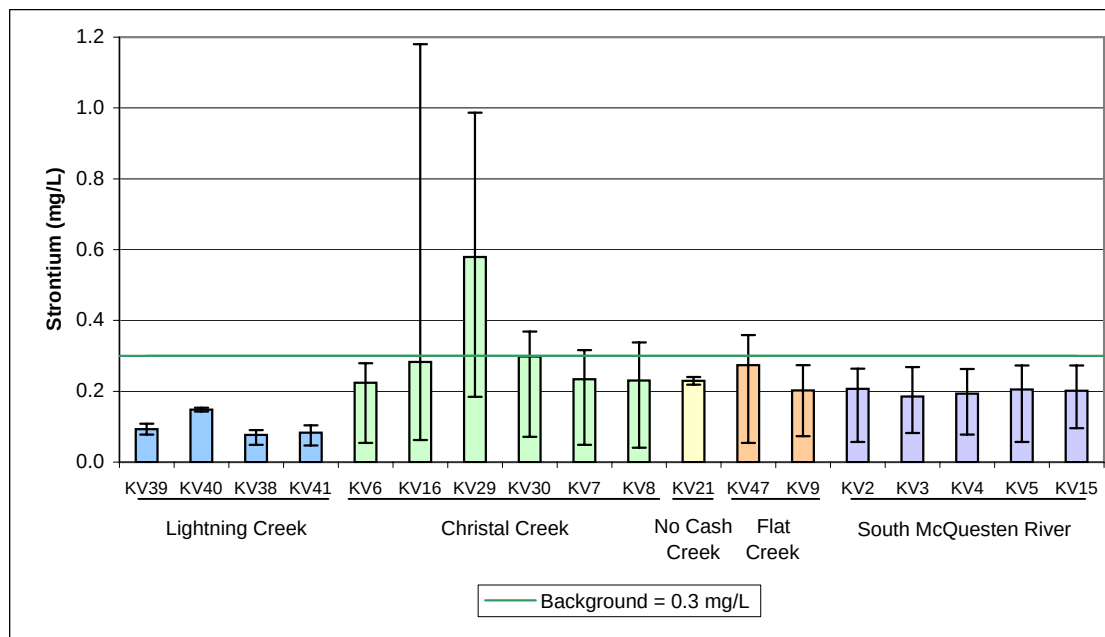


Figure A.36: Strontium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.60: Sulphate (mg/L) Summary Statistics for Receiving Environment Stations, July 20, 2004-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	100	0	1	57	57	-	57	57	0
KV40	-	-	-	-	-	-	-	-	-	-
KV38	0	0	0	5	34	36	6	25	43	0
KV41	0	40	0	5	42	50	14	22	54	0
KV6	0	100	86	21	256	281	79	73	334	0
KV16	0	100	100	19	333	320	149	150	900	0
KV29	0	100	100	22	931	905	154	540	1250	0
KV30	0	100	100	19	337	342	71	159	457	0
KV7	0	100	95	20	240	252	57	105	340	0
KV8	0	90	85	20	214	239	76	50	310	1
KV21	-	-	-	-	-	-	-	-	-	-
KV47	0	100	0	1	59	59	-	59	59	0
KV9	0	83	67	6	126	139	51	42	190	0
KV2	0	90	0	21	78	84	21	26	104	0
KV3	0	86	0	7	78	93	27	27	104	0
KV4	0	83	0	6	79	83	24	38	104	0
KV5	0	82	6	17	75	79	23	22	110	0
KV15	0	75	0	8	63	64	26	22	100	0

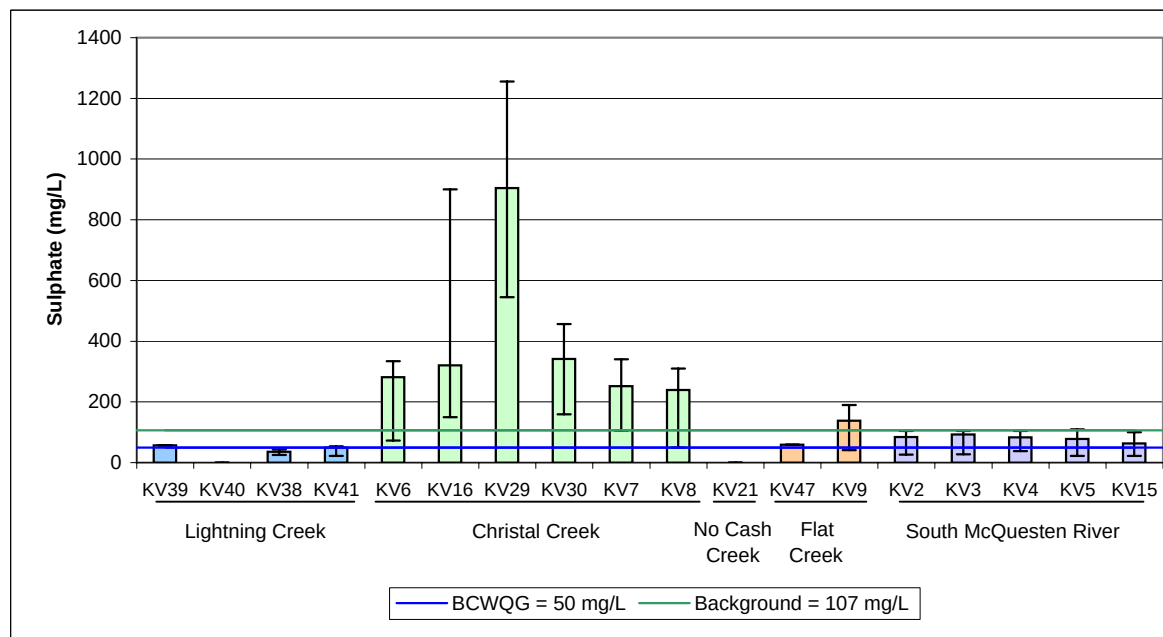


Figure A.37: Sulphate (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

Table A.61: Sulphur (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	1	20	20	-	20	20	0
KV40	0	100	2	39	39	0.8	38	39	0
KV38	0	0	9	12	12	1.0	10	13	0
KV41	0	0	13	15	15	3	10	19	0
KV6	0	94	48	85	85	27	21	149	0
KV16	0	98	41	133	104	98	21	537	0
KV29	0	100	41	313	312	60	111	462	0
KV30	0	97	39	108	110	24	24	156	0
KV7	0	89	45	69	73	22	9	108	0
KV8	0	87	38	66	67	24	9	112	0
KV21	0	100	2	115	115	4	112	118	0
KV47	0	63	8	69	72	42	12	124	0
KV9	0	73	15	43	44	13	21	64	0
KV2	0	5	38	23	23	7	6	38	0
KV3	0	0	20	22	21	8	0	32	1
KV4	0	0	14	25	26	6	14	32	0
KV5	0	0	29	21	22	7	6	31	0
KV15	0	0	14	20	19	7	9	32	0

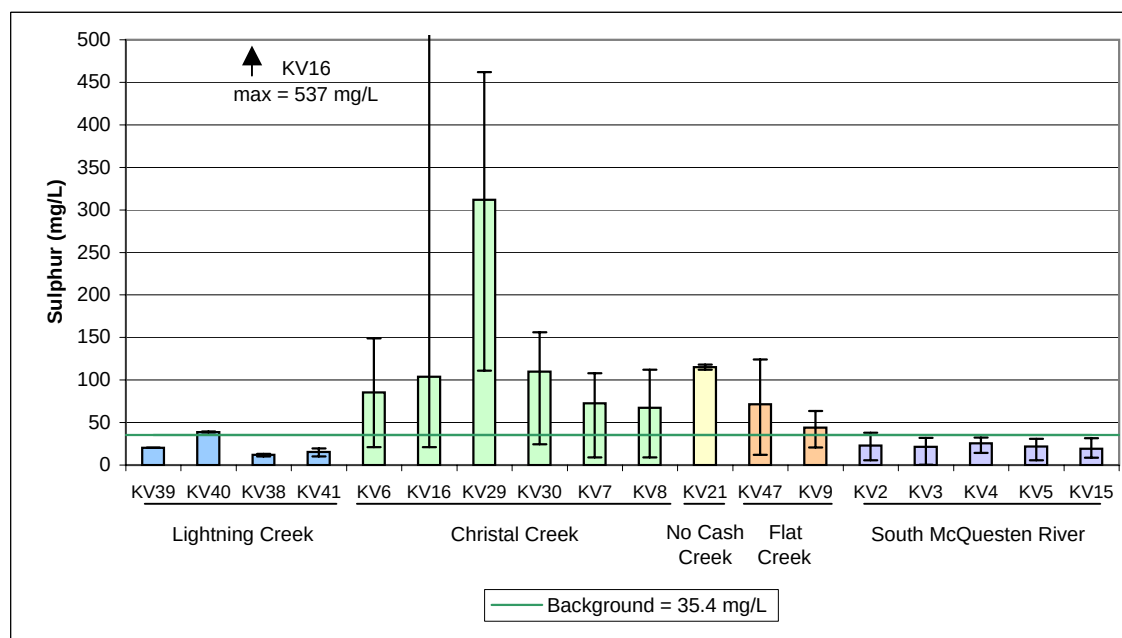


Figure A.38: Sulphur (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.62: Thallium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004 - 2007.**

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.00008	0.00008	0.0000	0.00005	0.00010	2
KV40	0	0	0	1	0.00005	0.00005	-	0.00005	0.00005	1
KV38	0	0	0	9	0.00007	0.00005	0.00005	0.00005	0.00020	9
KV41	0	0	0	10	0.0001	0.00005	0.0000	0.00005	0.00010	10
KV6	0	0	0	35	0.00005	0.00005	0.0000	0.00005	0.00010	35
KV16	0	0	0	35	0.00006	0.00005	0.0000	0.00005	0.00016	34
KV29	0	0	0	33	0.00006	0.00005	0.0000	0.00005	0.00020	29
KV30	0	0	0	33	0.00005	0.00005	0.0000	0.00005	0.00010	33
KV7	0	0	0	36	0.00007	0.00005	0.0001	0.00005	0.00050	35
KV8	0	0	0	32	0.00006	0.00005	0.0000	0.00005	0.00013	32
KV21	0	0	0	1	0.00022	0.00022	-	0.00022	0.00022	0
KV47	0	0	0	3	0.00008	0.00010	0.0000	0.00005	0.00010	3
KV9	0	0	0	11	0.00005	0.00005	0.0000	0.00005	0.00010	11
KV2	0	0	0	25	0.00005	0.00005	0.0000	0.00005	0.00005	25
KV3	0	0	0	11	0.00006	0.00005	0.0000	0.00005	0.00010	11
KV4	0	0	0	10	0.00006	0.00005	0.0000	0.00005	0.00010	10
KV5	0	0	0	21	0.00005	0.00005	0.0000	0.00005	0.00005	21
KV15	0	0	0	12	0.00005	0.00005	0.0000	0.00005	0.00005	12

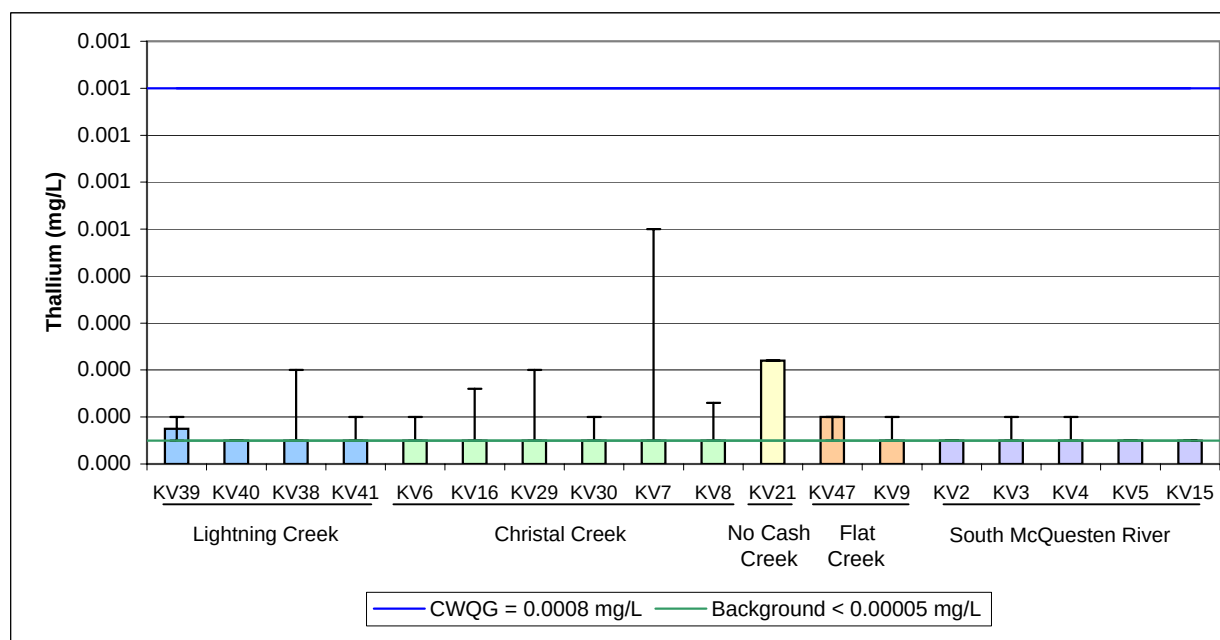


Figure A.39: Thallium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

Table A.63: Thorium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2006.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	na	na	-	-	-	-	-	-	-
KV40	na	na	-	-	-	-	-	-	-
KV38	na	na	-	-	-	-	-	-	-
KV41	na	na	-	-	-	-	-	-	-
KV6	na	na	7	0.006	0.006	0.0004	0.006	0.007	6
KV16	na	na	4	0.006	0.006	0.0000	0.006	0.006	4
KV29	na	na	5	0.011	0.006	0.0092	0.006	0.027	3
KV30	na	na	4	0.008	0.006	0.0030	0.006	0.012	3
KV7	na	na	4	0.006	0.006	0.0000	0.006	0.006	3
KV8	na	na	2	0.006	0.006	0.0000	0.006	0.006	2
KV21	na	na	-	-	-	-	-	-	-
KV47	na	na	2	0.006	0.006	0.0000	0.006	0.006	2
KV9	na	na	1	0.006	0.006	-	0.006	0.006	1
KV2	na	na	3	0.006	0.006	0.0000	0.006	0.006	3
KV3	na	na	1	0.006	0.006	-	0.006	0.006	1
KV4	na	na	1	0.006	0.006	-	0.006	0.006	1
KV5	na	na	2	0.005	0.005	0.0000	0.005	0.005	2
KV15	na	na	-	-	-	-	-	-	-

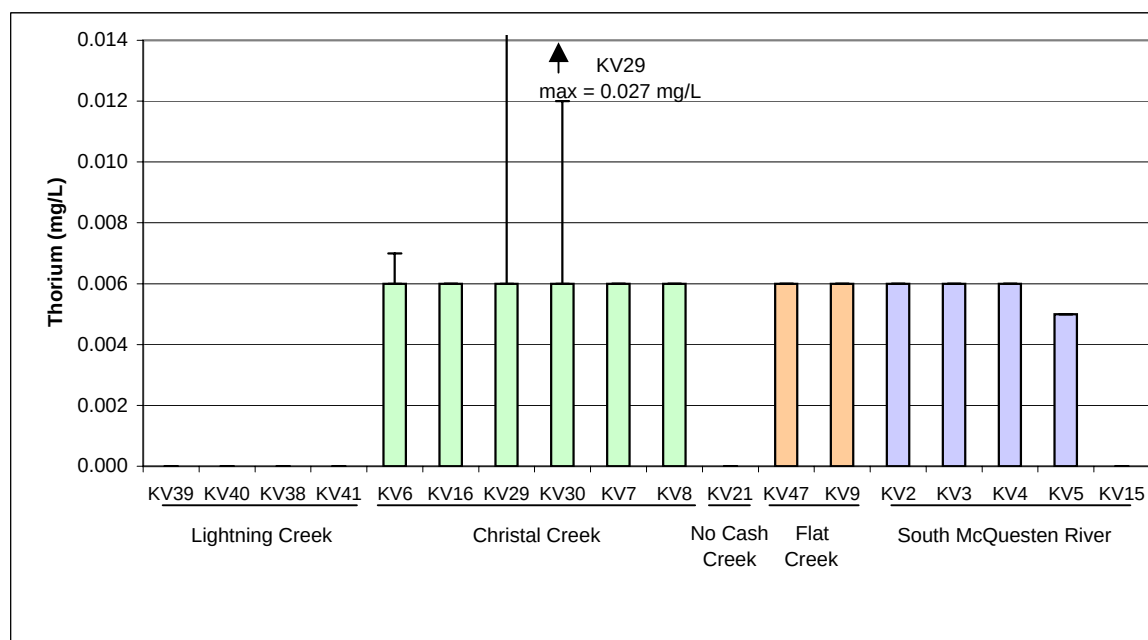


Figure A.40: Thorium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.64: Tin (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004 - 2007.**

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	0.0006	0.0006	0.0006	0.0001	0.0010	2
KV40	0	0	1	0.0010	0.0010	-	0.0010	0.0010	1
KV38	0	0	8	0.0009	0.0010	0.0003	0.0001	0.0010	8
KV41	0	0	10	0.0009	0.0010	0.0003	0.0001	0.0010	10
KV6	0	0	32	0.0010	0.0010	0.0037	0.0010	0.0010	31
KV16	0	0	32	0.0010	0.0010	0.0000	0.0010	0.0010	32
KV29	0	0	29	0.0010	0.0010	0.0000	0.0010	0.0010	29
KV30	0	3	29	0.0011	0.0010	0.0004	0.0010	0.0030	25
KV7	0	0	31	0.0010	0.0010	0.0000	0.0010	0.0010	29
KV8	0	0	29	0.0010	0.0010	0.0000	0.0010	0.0010	29
KV21	0	0	1	0.0010	0.0010	-	0.0010	0.0010	1
KV47	0	0	2	0.0006	0.0006	0.0006	0.0001	0.0010	1
KV9	0	0	11	0.0009	0.0010	0.0003	0.0001	0.0010	11
KV2	0	0	24	0.0010	0.0010	0.0042	0.0010	0.0010	23
KV3	0	0	10	0.0009	0.0010	0.0003	0.0002	0.0010	9
KV4	0	0	10	0.0009	0.0010	0.0003	0.0001	0.0010	10
KV5	0	0	21	0.0010	0.0010	0.0000	0.0010	0.0010	21
KV15	0	0	12	0.0010	0.0010	0.0000	0.0010	0.0010	12

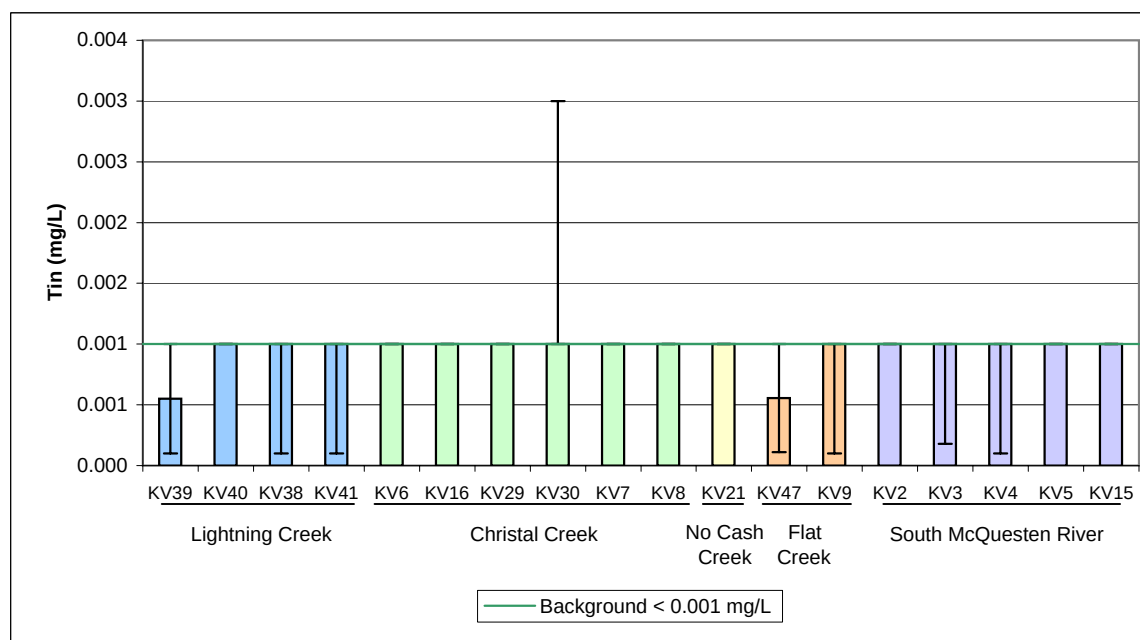


**Figure A.41: Tin (mg/L) Median Values with Minimum and Maximum for Receiving
Environment Stations, July 20, 2004 - 2007.**

Table A.65: Titanium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > BCWQG	% > DL, > BCWQG	% >Background, >BCWQG	n	mean	median	stdev	min	max	N <MDL
KV39	0	0	0	2	0.006	0.006	0.006	0.0014	0.010	1
KV40	0	0	0	2	0.002	0.002	0.001	0.0010	0.002	1
KV38	0	0	0	10	0.008	0.001	0.018	0.0007	0.057	3
KV41	0	0	0	14	0.022	0.013	0.026	0.0013	0.090	2
KV6	0	0	0	47	0.009	0.006	0.013	0.0005	0.062	9
KV16	0	0	0	42	0.020	0.010	0.023	0.0005	0.094	3
KV29	0	0	0	42	0.045	0.023	0.060	0.0010	0.344	3
KV30	0	0	0	41	0.019	0.009	0.023	0.0005	0.108	3
KV7	0	0	0	49	0.012	0.005	0.017	0.0002	0.063	5
KV8	0	0	0	38	0.010	0.006	0.012	0.0010	0.044	3
KV21	0	0	0	2	0.005	0.005	0.006	0.0010	0.009	1
KV47	0	0	0	6	0.028	0.010	0.035	0.0010	0.088	2
KV9	0	0	0	15	0.003	0.003	0.002	0.0000	0.010	5
KV2	0	0	0	36	0.003	0.002	0.003	0.0002	0.011	9
KV3	0	0	0	19	0.005	0.002	0.009	0.0001	0.041	6
KV4	0	0	0	16	0.003	0.002	0.002	0.0002	0.010	4
KV5	0	0	0	28	0.003	0.002	0.004	0.0010	0.021	7
KV15	0	0	0	13	0.004	0.002	0.005	0.0010	0.021	2

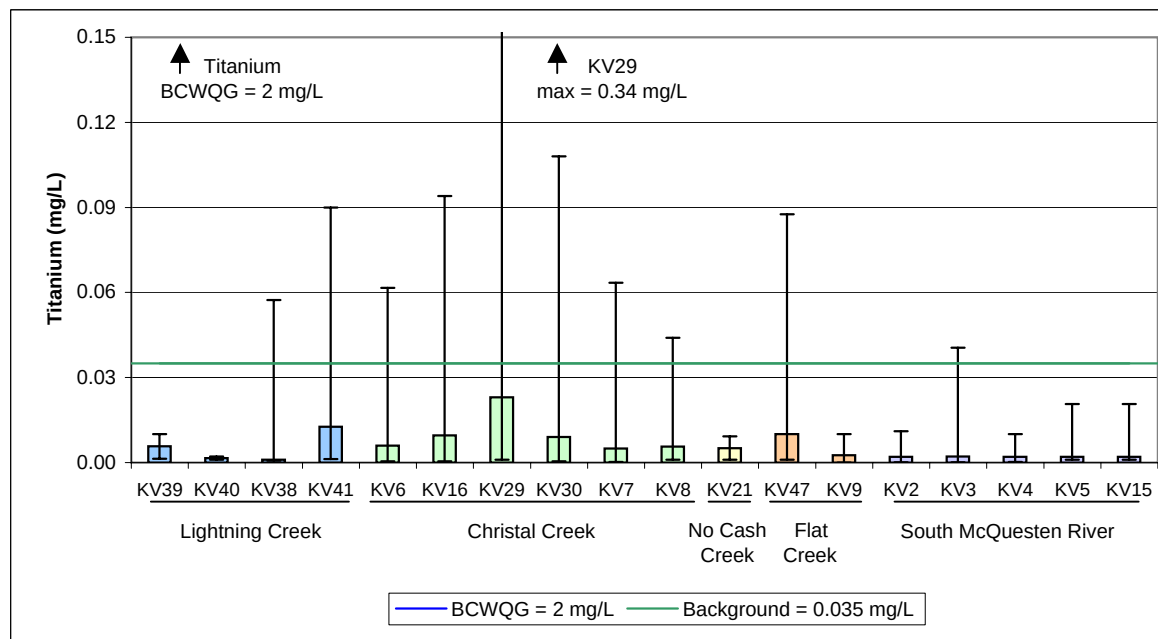


Figure A.42: Titanium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.66: Total Dissolved Solids (mg/l) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	-	-	-	-	-	-	-	-	-
KV40	-	-	-	-	-	-	-	-	-
KV38	0	0	2	69	69	9.9	62	76	0
KV41	0	0	3	101	108	13	86	110	0
KV6	-	-	-	-	-	-	-	-	-
KV16	-	-	-	-	-	-	-	-	-
KV29	0	100	10	667	686	169	361	860	0
KV30	0	88	8	350	369	143	18	459	0
KV7	-	-	-	-	-	-	-	-	-
KV8	-	-	-	-	-	-	-	-	-
KV21	-	-	-	-	-	-	-	-	-
KV47	0	67	3	434	327	274	230	745	0
KV9	-	-	-	-	-	-	-	-	-
KV2	0	0	13	211	214	28	147	257	0
KV3	-	-	-	-	-	-	-	-	-
KV4	-	-	-	-	-	-	-	-	-
KV5	-	-	-	-	-	-	-	-	-
KV15	-	-	-	-	-	-	-	-	-

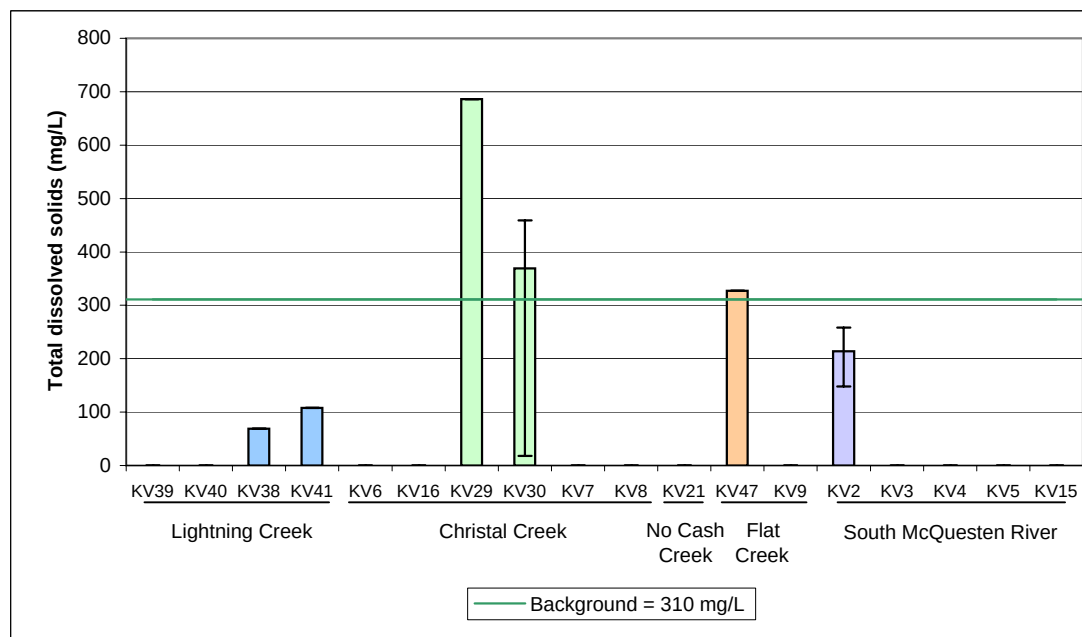


Figure A.43: Total Dissolved Solids (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.67: Total Suspended Solids (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > Background	% > DL, > Background	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	2	3	3	0.7	2.0	3.0	2
KV40	0	0	2	2	2	0.7	1.0	2.0	2
KV38	0	0	8	3	2	1.9	1.0	6.5	6
KV41	0	38	21	24	12	25	2.0	88	2
KV6	0	15	73	14	4	24	1.0	124	20
KV16	0	7	27	8	4	11	2.0	52	4
KV29	0	46	24	153	11	386	2.0	1480	3
KV30	0	18	28	16	5	25	1.0	117	7
KV7	0	12	75	10	5	13	1.0	56	15
KV8	0	0	29	3	2	3	1.0	14	18
KV21	0	0	2	5	5	6	1.0	9	1
KV47	0	63	16	38	40	30	2.0	82	2
KV9	0	0	18	4	2	3	1.0	12	9
KV2	0	8	62	7	4	9	0.0	36	18
KV3	0	0	21	5	5	6	1.0	24	16
KV4	0	2	49	6	4	6	1.0	36	6
KV5	0	4	27	6	2	9	1.0	36	17
KV15	0	29	14	21	3	33	1.0	100	7

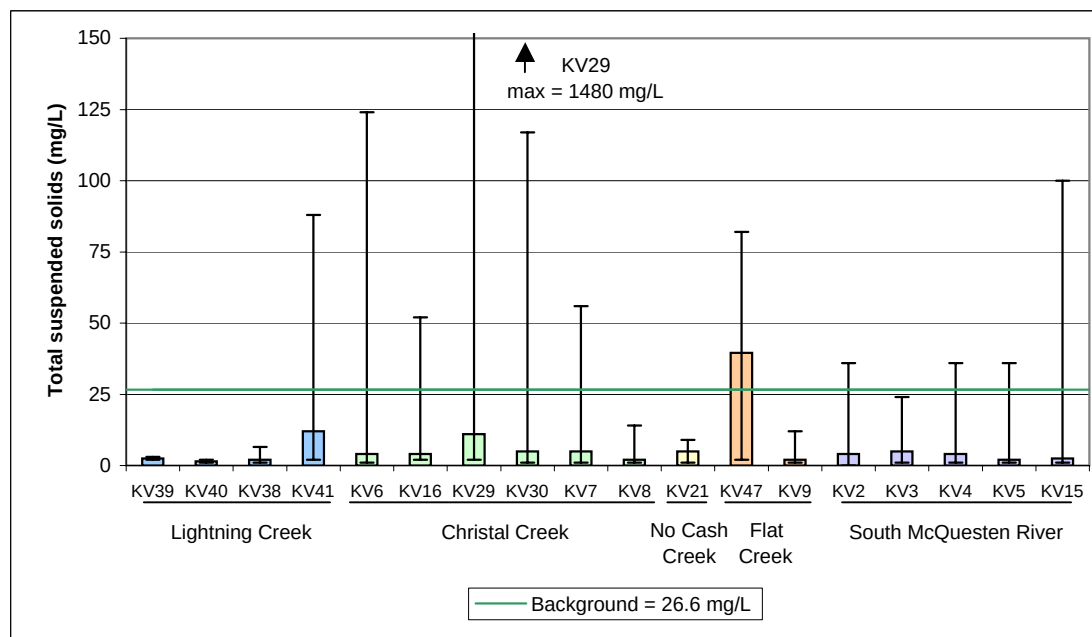


Figure A.44: Total Suspended Solids (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

**Table A.68: Uranium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004 - 2007.**

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0004	0.0004	0.0001	0.0003	0.001	1
KV40	0	0	0	1	0.0005	0.0005	-	0.0005	0.0005	1
KV38	0	0	0	9	0.0006	0.0005	0.0005	0.0001	0.002	8
KV41	0	0	0	10	0.0006	0.0006	0.0002	0.0002	0.001	3
KV6	0	58	58	36	0.0051	0.0052	0.0015	0.0014	0.007	0
KV16	0	43	43	35	0.0051	0.0050	0.0017	0.0010	0.010	0
KV29	0	14	14	35	0.0031	0.0024	0.0020	0.0005	0.008	5
KV30	0	41	41	34	0.0047	0.0049	0.0011	0.0015	0.006	0
KV7	0	0	0	36	0.0028	0.0027	0.0010	0.0006	0.005	2
KV8	0	0	0	33	0.0026	0.0027	0.0011	0.0005	0.005	2
KV21	0	0	0	1	0.0045	0.0045	-	0.0045	0.005	0
KV47	0	0	0	3	0.0009	0.0010	0.0005	0.0004	0.001	1
KV9	0	0	0	11	0.0010	0.0010	0.0003	0.0002	0.001	0
KV2	0	0	0	25	0.0008	0.0008	0.0002	0.0005	0.001	2
KV3	0	0	0	11	0.0009	0.0008	0.0002	0.0004	0.001	1
KV4	0	0	0	10	0.0008	0.0008	0.0002	0.0003	0.001	0
KV5	0	0	0	21	0.0009	0.0009	0.0002	0.0005	0.001	2
KV15	0	0	0	12	0.0008	0.0008	0.0002	0.0005	0.001	1

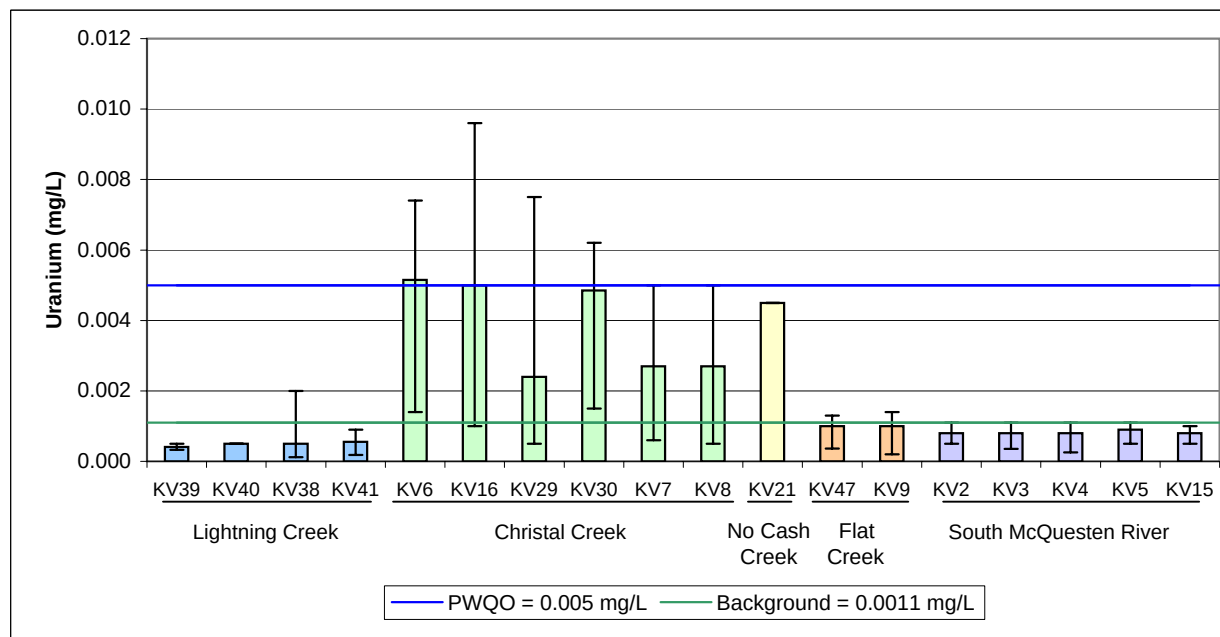


Figure A.45: Uranium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 2004 - 2007.

**Table A.69: Vanadium (mg/L) Summary Statistics for Receiving Environment Stations,
July 20, 2004-2007.**

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	2	0.0006	0.0006	0.0006	0.0001	0.0010	2
KV40	0	0	0	1	0.0001	0.0001	0.0000	0.0001	0.0001	1
KV38	0	0	0	9	0.0003	0.0001	0.0003	0.0001	0.0010	4
KV41	0	0	0	10	0.0015	0.0006	0.0019	0.0001	0.0060	1
KV6	0	0	0	35	0.0004	0.0002	0.0004	0.0001	0.0017	9
KV16	0	3	2	35	0.0009	0.0004	0.0013	0.0001	0.0061	2
KV29	0	12	12	34	0.0022	0.0005	0.0034	0.0001	0.0139	2
KV30	0	0	0	32	0.0008	0.0004	0.0008	0.0001	0.0035	3
KV7	0	0	0	34	0.0005	0.0003	0.0007	0.0001	0.0032	5
KV8	0	0	0	31	0.0004	0.0002	0.0004	0.0001	0.0022	7
KV21	0	0	0	1	0.0006	0.0006	0.0000	0.0006	0.0006	0
KV47	0	0	0	3	0.0018	0.0016	0.0018	0.0001	0.0036	0
KV9	0	0	0	11	0.0002	0.0001	0.0003	0.0001	0.0010	5
KV2	0	0	0	25	0.0004	0.0002	0.0004	0.0001	0.0014	5
KV3	0	0	0	12	0.0005	0.0003	0.0005	0.0001	0.0018	2
KV4	0	0	0	11	0.0004	0.0002	0.0004	0.0001	0.0010	3
KV5	0	0	0	22	0.0004	0.0003	0.0004	0.0001	0.0017	2
KV15	0	0	0	12	0.0004	0.0002	0.0005	0.0001	0.0017	2

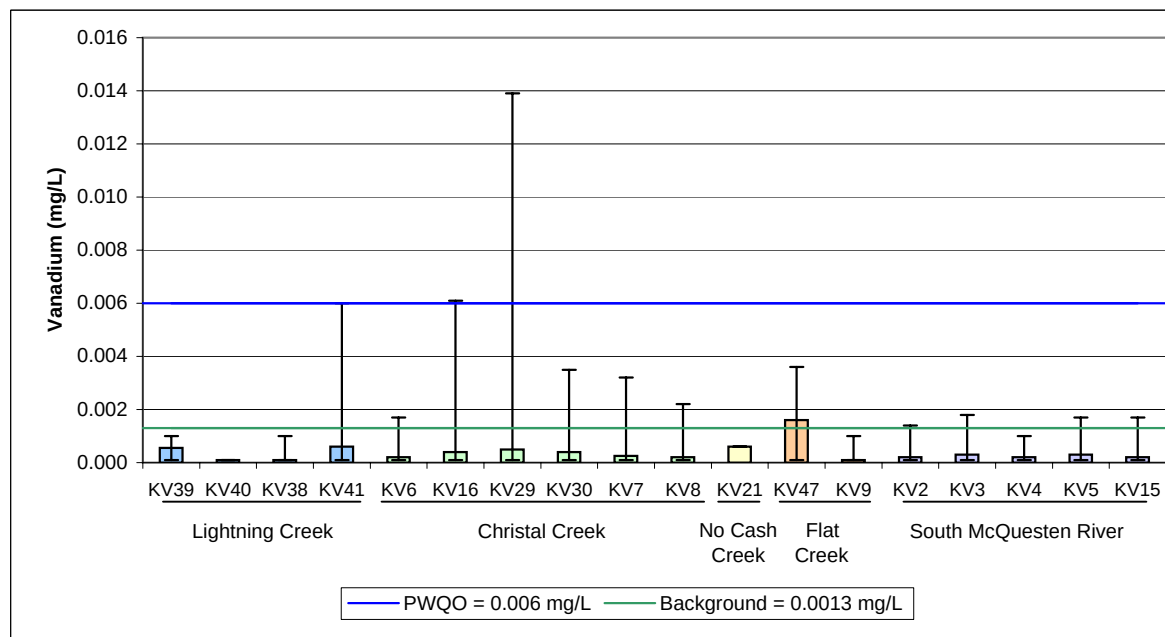


Figure A.46: Vanadium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, July 20, 1004 - 2007.

Table A.70: Zinc (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > CWQG	% > DL, > CWQG	% >Background, >CWQG	n	mean	median	stdev	min	max	n <MDL
KV39	0	100	100	2	0.32	0.32	0.065	0.271	0.36	0
KV40	0	0	0	2	0.01	0.01	0.004	0.003	0.01	0
KV38	0	30	0	10	0.03	0.03	0.013	0.014	0.05	0
KV41	0	47	11	19	0.05	0.03	0.068	0.004	0.28	0
KV6	0	91	78	81	0.33	0.26	0.275	0.001	1.75	0
KV16	0	100	95	42	0.81	0.29	1.305	0.135	5.41	0
KV29	0	100	100	42	11.7	4.31	17.78	0.658	65.5	0
KV30	0	100	95	41	1.02	0.42	1.413	0.111	5.79	0
KV7	0	100	85	79	0.34	0.27	0.238	0.048	1.31	0
KV8	0	100	98	40	0.42	0.32	0.341	0.118	1.86	0
KV21	0	100	100	2	3.95	3.95	1.146	3.140	4.76	0
KV47	0	94	94	16	0.25	0.24	0.116	0.003	0.44	0
KV9	0	78	19	27	0.09	0.05	0.084	0.020	0.30	0
KV2	0	72	6	50	0.06	0.04	0.057	0.010	0.36	0
KV3	0	75	4	24	0.05	0.04	0.036	0.016	0.19	0
KV4	0	74	11	46	0.07	0.04	0.063	0.010	0.29	0
KV5	0	45	0	29	0.03	0.03	0.015	0.010	0.07	0
KV15	0	25	0	16	0.02	0.02	0.017	0.003	0.06	0

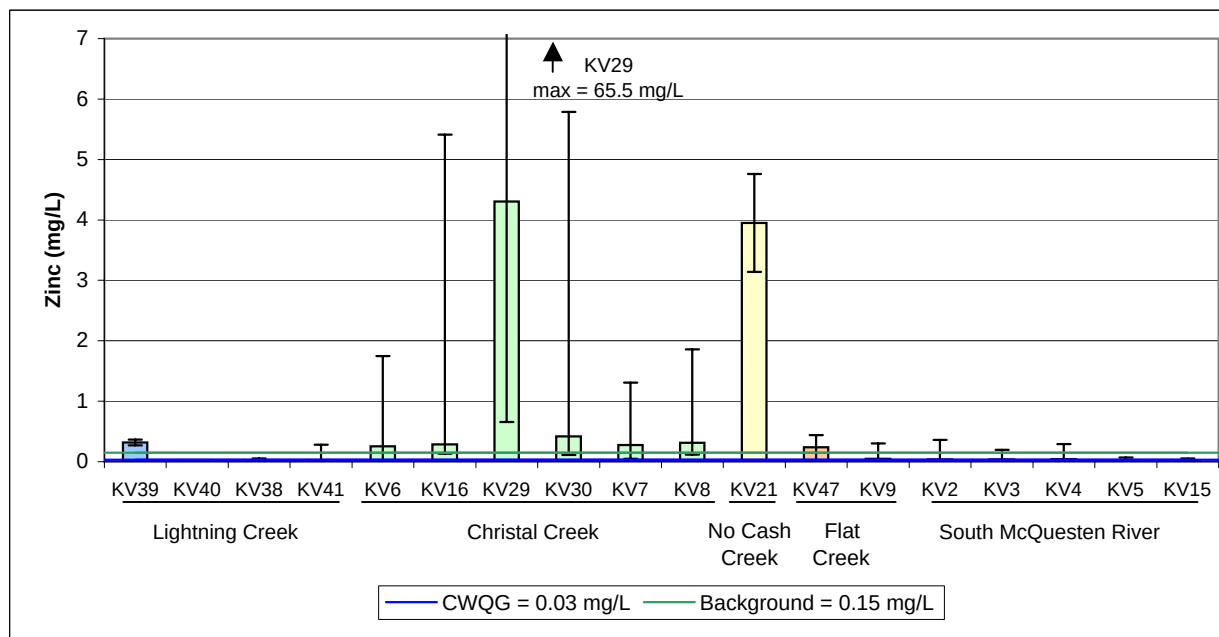


Figure A.47: Zinc (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.71: Zirconium (mg/L) Summary Statistics for Receiving Environment Stations, 1994-2007.

Station	% < DL, > PWQO	% > DL, > PWQO	% >Background, >PWQO	n	mean	median	stdev	min	max	n <MDL
KV39	0	0	0	1	0.001	0.001	-	0.001	0.001	1
KV40	0	0	0	1	0.001	0.001	-	0.001	0.001	1
KV38	0	0	0	7	0.001	0.001	0.000	0.001	0.001	7
KV41	0	0	0	9	0.001	0.001	0.000	0.001	0.002	7
KV6	0	0	0	34	0.001	0.001	0.000	0.001	0.002	34
KV16	0	0	0	36	0.001	0.001	0.000	0.001	0.003	35
KV29	0	0	0	32	0.001	0.001	0.000	0.001	0.002	27
KV30	0	0	0	33	0.001	0.001	0.000	0.001	0.002	32
KV7	0	0	0	34	0.001	0.001	0.000	0.001	0.002	30
KV8	0	0	0	31	0.001	0.001	0.000	0.001	0.002	30
KV21	0	0	0	1	0.001	0.001	-	0.001	0.001	1
KV47	0	0	0	2	0.002	0.002	0.001	0.001	0.002	2
KV9	0	0	0	10	0.001	0.001	0.000	0.001	0.001	10
KV2	0	0	0	28	0.001	0.001	0.000	0.001	0.001	27
KV3	0	0	0	15	0.001	0.001	0.000	0.001	0.002	14
KV4	0	0	0	9	0.001	0.001	0.000	0.001	0.001	9
KV5	0	0	0	24	0.001	0.001	0.000	0.001	0.002	23
KV15	0	0	0	12	0.001	0.001	0.000	0.001	0.002	11

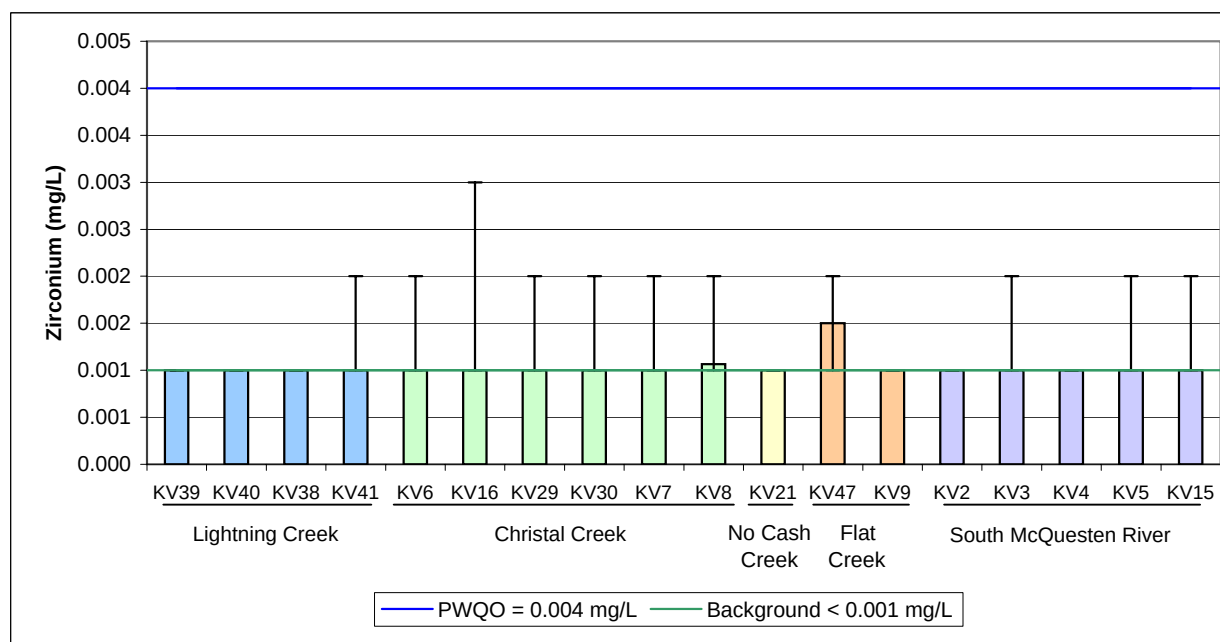


Figure A.48: Zirconium (mg/L) Median Values with Minimum and Maximum for Receiving Environment Stations, 1994 - 2007.

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Aluminum		Ammonia		Antimony		Arsenic		Barium	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	CWQG ^{a,b}	Background ^c	CWQG ^{a,d}	na	PWQG ^{e,f}	Background ^g	CWQG ^a	Background ^h	BCWQG ^{i,j}	Background ^c
Watercourse	Station	0.1	0.66	0.24	na	0.02	< 0.0002	0.005	0.0034	1	0.089
Lightning Creek	KV39	0.1	0.0	0.0	-	0.1	9.1	1.8	2.7	0.0	0.5
	KV40	0.1	0.0	0.1	-	0.0	1.0	0.2	0.3	0.4	4.0
	KV38	0.1	0.0	0.1	-	0.0	1.5	0.6	0.9	0.1	0.6
	KV41	0.9	0.1	0.1	-	0.0	1.3	0.6	0.9	0.1	0.6
Christal Creek	KV6	0.2	0.0	0.2	-	0.0	2.0	0.7	1.0	0.1	0.7
	KV16	0.7	0.1	0.1	-	0.0	1.5	0.7	1.0	0.1	0.7
	KV29	1.1	0.2	0.2	-	0.0	1.0	0.2	0.3	0.0	0.4
	KV30	0.7	0.1	0.1	-	0.0	1.5	0.7	1.0	0.1	0.7
	KV7	0.3	0.0	0.2	-	0.0	1.3	0.4	0.6	0.1	0.6
	KV8	0.1	0.0	0.1	-	0.0	2.0	0.5	0.8	0.1	0.6
No Cash Creek	KV21	50.9	7.7	0.1	-	0.1	8.0	1.0	1.4	0.0	0.3
Flat Creek	KV47	4.9	0.7	0.4	-	0.0	3.0	1.0	1.5	0.0	0.5
	KV9	0.1	0.0	0.2	-	0.0	3.0	0.4	0.6	0.1	0.7
South McQuesten River	KV2	0.5	0.1	0.2	-	0.0	1.0	0.3	0.5	0.1	0.7
	KV3	0.7	0.1	0.2	-	0.0	1.0	0.4	0.6	0.1	0.7
	KV4	0.8	0.1	0.2	-	0.0	1.0	0.4	0.6	0.1	0.7
	KV5	0.3	0.1	0.1	-	0.0	1.0	0.7	1.0	0.1	0.8
	KV15	0.2	0.0	0.2	-	0.0	1.3	0.9	1.3	0.1	0.8

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

		Beryllium		Bicarbonate		Bismuth		Boron		Cadmium	
	Unit	mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	BCWQG ^{i,j}	na	na	Background ^c	na	na	PWQO ^{e,f}	Background ^c	CWQG ^{a,k}	Background ^h
Watercourse	Station	0.0053	na	na	222	na	na	0.2	0.013	0.00005	0.0006
Lightning Creek	KV39	0.1	-	-	0.0	-	-	0.0	0.5	76.8	6.3
	KV40	0.1	-	-	0.1	-	-	0.0	0.2	0.8	0.1
	KV38	0.0	-	-	0.2	-	-	0.0	0.3	4.1	0.3
	KV41	0.0	-	-	0.3	-	-	0.0	0.2	3.2	0.3
Christal Creek	KV6	0.0	-	-	0.7	-	-	0.0	0.2	32.3	2.6
	KV16	0.0	-	-	0.8	-	-	0.0	0.2	29.8	2.4
	KV29	0.0	-	-	0.5	-	-	0.0	0.2	129.4	10.6
	KV30	0.0	-	-	0.7	-	-	0.0	0.2	32.2	2.6
	KV7	0.0	-	-	0.8	-	-	0.0	0.2	23.1	1.9
	KV8	0.0	-	-	0.8	-	-	0.0	0.2	26.4	2.2
	KV21	0.2	-	-	0.4	-	-	0.1	1.5	975.5	79.7
Flat Creek	KV47	0.1	-	-	0.6	-	-	0.1	0.8	52.0	4.3
	KV9	0.0	-	-	1.1	-	-	0.0	0.2	7.3	0.6
South McQuesten River	KV2	0.0	-	-	0.7	-	-	0.0	0.2	3.7	0.3
	KV3	0.0	-	-	0.6	-	-	0.0	0.3	5.0	0.4
	KV4	0.0	-	-	0.7	-	-	0.0	0.2	5.5	0.5
	KV5	0.0	-	-	0.7	-	-	0.0	0.2	3.1	0.3
	KV15	0.0	-	-	0.7	-	-	0.0	0.2	1.6	0.1

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Calcium		Carbonate		Chromium		Cobalt		Conductivity	
		mg/L		mg/L		mg/L		mg/L		uS/cm	
	Criteria	na	Background ^c	na	na	CWQG ^{a,i}	Background ^h	BCWQG ^{i,j}	Background ^h	na	Background ^c
Watercourse	Station	na	69.9	na	na	0.001	0.0006	0.004	0.0028	na	494
Lightning Creek	KV39	-	0.4	-	-	0.5	0.8	0.0	0.0	-	-
	KV40	-	0.6	-	-	0.5	0.8	0.0	0.0	-	-
	KV38	-	0.3	-	-	0.5	0.8	0.0	0.0	-	0.3
	KV41	-	0.4	-	-	0.5	0.8	0.1	0.1	-	0.4
Christal Creek	KV6	-	1.7	-	-	0.5	0.8	0.1	0.1	-	1.3
	KV16	-	2.0	-	-	0.5	0.8	0.2	0.2	-	1.7
	KV29	-	4.6	-	-	0.5	0.8	0.3	0.4	-	3.1
	KV30	-	2.1	-	-	0.5	0.8	0.2	0.2	-	1.7
	KV7	-	1.6	-	-	0.5	0.8	0.1	0.1	-	1.1
	KV8	-	1.5	-	-	0.5	0.8	0.1	0.1	-	1.4
	KV21	-	2.3	-	-	2.4	3.8	0.7	1.0	-	-
Flat Creek	KV47	-	1.7	-	-	0.9	1.4	0.2	0.3	-	1.6
	KV9	-	1.3	-	-	0.5	0.8	0.0	0.0	-	1.2
South McQuesten River	KV2	-	0.7	-	-	0.5	0.8	0.1	0.1	-	0.8
	KV3	-	0.7	-	-	0.5	0.8	0.1	0.1	-	0.6
	KV4	-	0.8	-	-	0.5	0.8	0.1	0.1	-	0.7
	KV5	-	0.7	-	-	0.5	0.8	0.1	0.1	-	0.8
	KV15	-	0.7	-	-	0.5	0.8	0.0	0.0	-	0.9

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Copper		Hardness		Hydroxide		Iron		Lead	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	CWQG ^{a,k}	Background ^h	na	Background ^c	na	na	CWQG ^a	Background ^c	CWQG ^{a,k}	Background ^h
Watercourse	Station	0.003	0.0071	na	279	na	na	0.3	0.72	0.004	0.0021
Lightning Creek	KV39	0.5	0.2	-	0.4	-	-	0.2	0.1	0.9	1.7
	KV40	0.3	0.1	-	0.6	-	-	0.2	0.1	0.0	0.0
	KV38	0.3	0.1	-	0.2	-	-	0.3	0.1	0.1	0.2
	KV41	0.3	0.1	-	0.3	-	-	1.6	0.7	0.4	0.8
Christal Creek	KV6	0.3	0.1	-	1.5	-	-	0.7	0.3	1.2	2.3
	KV16	0.3	0.1	-	1.7	-	-	1.0	0.4	1.0	1.8
	KV29	0.7	0.3	-	3.7	-	-	1.0	0.4	0.3	0.6
	KV30	0.3	0.1	-	1.8	-	-	1.2	0.5	0.9	1.7
	KV7	0.3	0.1	-	1.4	-	-	0.7	0.3	0.4	0.7
	KV8	0.3	0.1	-	1.3	-	-	0.4	0.2	0.4	0.8
No Cash Creek	KV21	2.7	1.1	-	1.8	-	-	1.9	0.8	1.3	2.5
Flat Creek	KV47	1.3	0.6	-	1.5	-	-	3.9	1.6	0.9	1.8
	KV9	0.3	0.1	-	1.1	-	-	0.5	0.2	0.8	1.6
South McQuesten River	KV2	0.3	0.1	-	0.8	-	-	0.7	0.3	0.2	0.3
	KV3	0.5	0.2	-	0.8	-	-	0.7	0.3	0.3	0.6
	KV4	0.7	0.3	-	0.8	-	-	0.7	0.3	0.4	0.8
	KV5	0.7	0.3	-	0.7	-	-	0.7	0.3	0.3	0.6
	KV15	0.3	0.1	-	0.6	-	-	1.0	0.4	0.3	0.5

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Lithium		Magnesium		Manganese		Molybdenum		Nickel	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	BCWQG ^{i,j}	Background ^h	na	Background ^c	BCWQG ^{i,k}	Background ^c	CWQG ^a	Background ^g	CWQG ^{a,k}	Background ^h
Watercourse	Station	0.096	0.0086	na	24	1.3	0.17	0.073	< 0.001	0.11	0.025
Lightning Creek	KV39	0.0	0.5	-	0.2	0.0	0.0	0.0	0.6	0.0	0.0
	KV40	0.0	0.2	-	0.5	0.0	0.0	0.1	5.5	0.0	0.0
	KV38	0.0	0.1	-	0.2	0.0	0.0	0.0	1.0	0.0	0.0
	KV41	0.0	0.2	-	0.2	0.0	0.1	0.0	1.0	0.0	0.0
Christal Creek	KV6	0.1	1.4	-	0.9	0.4	3.3	0.0	1.0	0.0	0.1
	KV16	0.1	1.5	-	1.0	0.6	4.3	0.0	1.0	0.0	0.2
	KV29	0.2	1.9	-	2.2	1.2	9.5	0.0	1.0	0.2	0.7
	KV30	0.1	1.4	-	1.1	0.7	5.4	0.0	1.0	0.0	0.2
	KV7	0.1	0.9	-	0.9	0.2	1.4	0.0	1.0	0.0	0.1
	KV8	0.1	0.8	-	0.8	0.2	1.5	0.0	1.0	0.0	0.1
	KV21	0.2	2.3	-	1.0	2.5	18.8	0.1	5.5	0.2	1.0
Flat Creek	KV47	0.1	1.2	-	1.0	0.9	6.5	0.1	5.0	0.0	0.1
	KV9	0.1	0.6	-	0.9	0.0	0.3	0.0	1.0	0.0	0.0
South McQuesten River	KV2	0.1	0.6	-	0.6	0.1	0.4	0.0	1.0	0.1	0.2
	KV3	0.1	0.6	-	0.6	0.1	0.4	0.0	1.0	0.0	0.2
	KV4	0.1	0.6	-	0.6	0.1	0.5	0.0	1.0	0.0	0.2
	KV5	0.0	0.5	-	0.6	0.1	0.4	0.0	1.0	0.0	0.1
	KV15	0.1	0.6	-	0.5	0.1	0.4	0.0	1.0	0.0	0.1

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

		Nitrate		Nitrite		Phosphorus ^m		Potassium		Selenium	
	Unit	mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	CWQG ^a	na	CWQG ^a	na	PWQO ^{e,f}	Background ^c	BCWQG ⁱ	Background ⁿ	CWQG ^a	Background ⁿ
Watercourse	Station	13	na	0.06	na	0.03	0.23	432	1.05	0.001	0.0008
Lightning Creek	KV39	0.0	-	2.3	-	-	-	0.0	1.1	0.9	1.1
	KV40	0.0	-	-	-	2.0	0.3	0.0	0.3	1.4	1.8
	KV38	0.0	-	0.7	-	2.0	0.3	0.0	0.4	0.6	0.8
	KV41	0.0	-	0.5	-	2.0	0.3	0.0	0.4	0.8	0.9
Christal Creek	KV6	0.0	-	0.8	-	2.0	0.3	0.0	0.4	0.9	1.1
	KV16	0.0	-	1.3	-	15.0	2.0	0.0	0.6	0.7	0.9
	KV29	0.0	-	3.5	-	5.3	0.7	0.0	0.6	0.4	0.5
	KV30	0.0	-	1.5	-	4.0	0.5	0.0	0.5	0.8	1.0
	KV7	0.0	-	0.8	-	2.3	0.3	0.0	0.5	0.7	0.9
	KV8	0.0	-	0.6	-	2.0	0.3	0.0	0.5	0.7	0.9
No Cash Creek	KV21	0.0	-	1.2	-	2.0	0.3	0.0	0.5	0.9	1.1
Flat Creek	KV47	0.0	-	0.5	-	2.0	0.3	0.0	0.8	0.7	0.9
	KV9	0.0	-	0.3	-	2.0	0.3	0.0	0.6	0.2	0.3
South McQuesten River	KV2	0.0	-	0.5	-	2.0	0.3	0.0	0.6	0.5	0.6
	KV3	0.0	-	0.1	-	2.0	0.3	0.0	0.7	0.5	0.6
	KV4	0.0	-	0.1	-	2.0	0.3	0.0	0.6	0.5	0.6
	KV5	0.0	-	0.5	-	2.0	0.3	0.0	0.6	0.4	0.5
	KV15	0.0	-	0.5	-	2.0	0.3	0.0	0.6	0.3	0.4

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Silicon		Silver		Sodium		Strontium		Sulphate	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	na	Background ^c	CWQG ^a	Background ^g	na	Background ^c	na	Background ^c	BCWQG ⁱ	Background ^h
Watercourse	Station	na	3.9	0.0001	< 0.0001	na	3.3	na	0.3	50	107
Lightning Creek	KV39	-	0.6	0.7	0.7	-	0.4	-	0.3	1.1	0.5
	KV40	-	0.7	1.0	1.0	-	0.2	-	0.5	0.0	0.0
	KV38	-	0.7	1.0	1.0	-	0.3	-	0.3	0.7	0.3
	KV41	-	0.9	1.0	1.0	-	0.3	-	0.3	1.0	0.5
Christal Creek	KV6	-	0.9	1.0	1.0	-	0.4	-	0.7	5.6	2.6
	KV16	-	1.0	1.0	1.0	-	0.5	-	0.9	6.4	3.0
	KV29	-	1.0	1.0	1.0	-	0.6	-	1.9	18.0	8.4
	KV30	-	1.0	1.0	1.0	-	0.5	-	1.0	6.8	3.2
	KV7	-	0.9	1.0	1.0	-	0.5	-	0.8	5.0	2.4
	KV8	-	0.7	1.0	1.0	-	0.4	-	0.8	4.8	2.2
No Cash Creek	KV21	-	0.8	1.0	1.0	-	0.3	-	0.8	0.0	0.0
Flat Creek	KV47	-	0.7	11.2	11.2	-	0.6	-	0.9	1.2	0.5
	KV9	-	0.7	1.0	1.0	-	0.6	-	0.7	2.8	1.3
South McQuesten River	KV2	-	0.5	1.0	1.0	-	0.6	-	0.7	1.7	0.8
	KV3	-	0.5	1.0	1.0	-	0.5	-	0.6	1.9	0.9
	KV4	-	0.6	1.0	1.0	-	0.5	-	0.6	1.7	0.8
	KV5	-	0.6	1.0	1.0	-	0.6	-	0.7	1.6	0.7
	KV15	-	0.8	1.0	1.0	-	0.5	-	0.7	1.3	0.6

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Sulphur		Thallium		Thorium		Tin		Titanium	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	na	Background ^c	CWQG ^a	Background ^g	na	na	na	Background ^g	BCWQG ^{ij}	Background ^c
Watercourse	Station	na	35	0.0008	< 0.00005	na	na	na	< 0.001	2	0.035
Lightning Creek	KV39	-	0.6	0.1	1.5	-	-	-	0.6	0.0	0.2
	KV40	-	1.1	0.1	1.0	-	-	-	1.0	0.0	0.0
	KV38	-	0.3	0.1	1.0	-	-	-	1.0	0.0	0.0
	KV41	-	0.4	0.1	1.0	-	-	-	1.0	0.0	0.4
Christal Creek	KV6	-	2.4	0.1	1.0	-	-	-	1.0	0.0	0.2
	KV16	-	2.9	0.1	1.0	-	-	-	1.0	0.0	0.3
	KV29	-	8.8	0.1	1.0	-	-	-	1.0	0.0	0.7
	KV30	-	3.1	0.1	1.0	-	-	-	1.0	0.0	0.3
	KV7	-	2.1	0.1	1.0	-	-	-	1.0	0.0	0.1
	KV8	-	1.9	0.1	1.0	-	-	-	1.0	0.0	0.2
	KV21	-	3.3	0.3	4.4	-	-	-	1.0	0.0	0.1
Flat Creek	KV47	-	2.0	0.1	2.0	-	-	-	0.6	0.0	0.3
	KV9	-	1.2	0.1	1.0	-	-	-	1.0	0.0	0.1
South McQuesten River	KV2	-	0.7	0.1	1.0	-	-	-	1.0	0.0	0.1
	KV3	-	0.6	0.1	1.0	-	-	-	1.0	0.0	0.1
	KV4	-	0.7	0.1	1.0	-	-	-	1.0	0.0	0.1
	KV5	-	0.6	0.1	1.0	-	-	-	1.0	0.0	0.1
	KV15	-	0.5	0.1	1.0	-	-	-	1.0	0.0	0.1

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	TDS		TSS		Uranium		Vanadium		Zinc	
		mg/L		mg/L		mg/L		mg/L		mg/L	
	Criteria	na	Background ^c	na	Background ^c	PWQO ^{e,f}	Background ^h	PWQO ^{e,f}	Background ^h	CWQG ^a	Background ^c
Watercourse	Station	na	311	na	27	0.005	0.0011	0.006	0.0013	0.03	0.15
Lightning Creek	KV39	-	-	-	0.1	0.1	0.4	0.1	0.4	10.6	2.1
	KV40	-	-	-	0.1	0.1	0.5	0.0	0.1	0.2	0.0
	KV38	-	-	-	0.1	0.1	0.5	0.0	0.1	0.9	0.2
	KV41	-	0.4	-	0.5	0.1	0.5	0.1	0.5	0.9	0.2
Christal Creek	KV6	-	-	-	0.2	1.0	4.7	0.0	0.2	8.5	1.7
	KV16	-	-	-	0.2	1.0	4.5	0.1	0.3	9.5	1.9
	KV29	-	2.2	-	0.4	0.5	2.2	0.1	0.4	143.5	28.7
	KV30	-	1.2	-	0.2	1.0	4.4	0.1	0.3	13.9	2.8
	KV7	-	-	-	0.2	0.5	2.5	0.1	0.2	9.1	1.8
	KV8	-	-	-	0.1	0.5	2.5	0.0	0.2	10.5	2.1
	KV21	-	-	-	0.2	0.9	4.1	0.1	0.5	131.7	26.3
Flat Creek	KV47	-	1.1	-	1.5	0.2	0.9	0.3	1.2	8.0	1.6
	KV9	-	-	-	0.1	0.2	0.9	0.0	0.1	1.6	0.3
South McQuesten River	KV2	-	0.7	-	0.2	0.2	0.7	0.0	0.2	1.3	0.3
	KV3	-	-	-	0.2	0.2	0.7	0.1	0.2	1.3	0.3
	KV4	-	-	-	0.2	0.2	0.7	0.0	0.2	1.5	0.3
	KV5	-	-	-	0.1	0.2	0.8	0.1	0.2	0.9	0.2
	KV15	-	-	-	0.1	0.2	0.7	0.0	0.2	0.5	0.1

Table A.72: Ratio of median over guideline and/or background for receiving environment parameters. Bolded if ratio > 1 for both guideline and background¹ and highlighted if ratio ≥ 2.

	Unit	Zirconium	
		mg/L	
	Criteria	PWQO ^e	Background ^g
Watercourse	Station	0.004	< 0.001
Lightning Creek	KV39	0.3	1.0
	KV40	0.3	1.0
	KV38	0.3	1.0
	KV41	0.3	1.0
Christal Creek	KV6	0.3	1.0
	KV16	0.3	1.0
	KV29	0.3	1.0
	KV30	0.3	1.0
	KV7	0.3	1.0
	KV8	0.3	1.1
No Cash Creek	KV21	0.3	1.0
Flat Creek	KV47	0.4	1.5
	KV9	0.3	1.0
South McQuesten River	KV2	0.3	1.0
	KV3	0.3	1.0
	KV4	0.3	1.0
	KV5	0.3	1.0
	KV15	0.3	1.0

¹ If no background available than only ratio with guideline considered.

^a Canadian Water Quality Guidelines (CCME 1999)

^b 0.005 mg/L at pH<6.5; 0.1 mg/L at pH ≥ 6.5

^c 95th percentile of pooled background stations (KV1 & KV37)

^d based on conservative assumption of pH 8.5 and temperature of 15 °C to achieve un-ionized ammonia of <0.02 mg/L

^e Provincial Water Quality Objectives (OMOE 1994)

^f interim objective

^g <MDL set as background

^h 95th percentile of pooled background stations (KV1 & KV37) using data from July 20, 2004 - 2007 (excluding elevated <MDL values as required)

ⁱ British Columbia Water Quality Guidelines (BCMOE 2006)

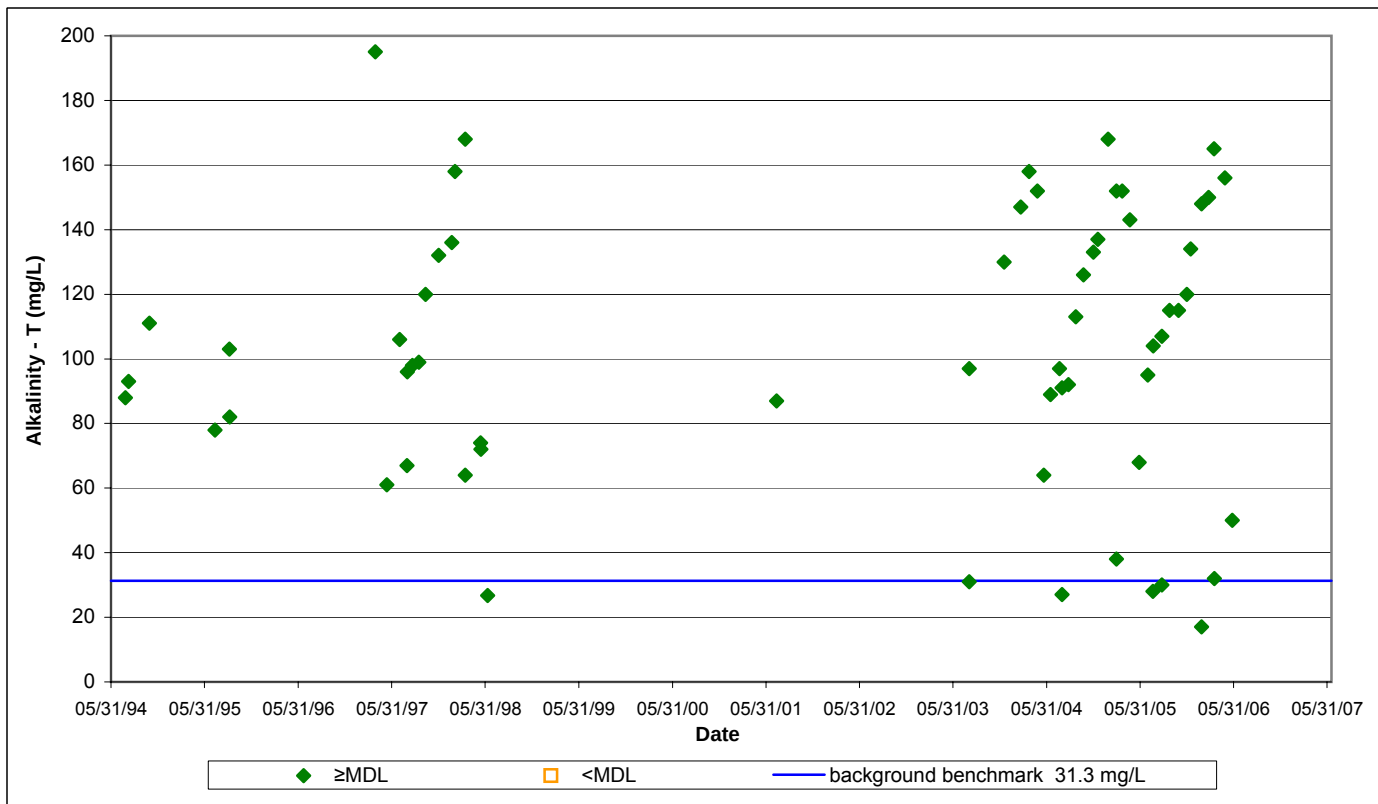
^j Working water quality guideline for British Columbia

^k hardness dependent; value of 162 mg/L as CaCO₃ used to determine criterion

^l hexavalent form

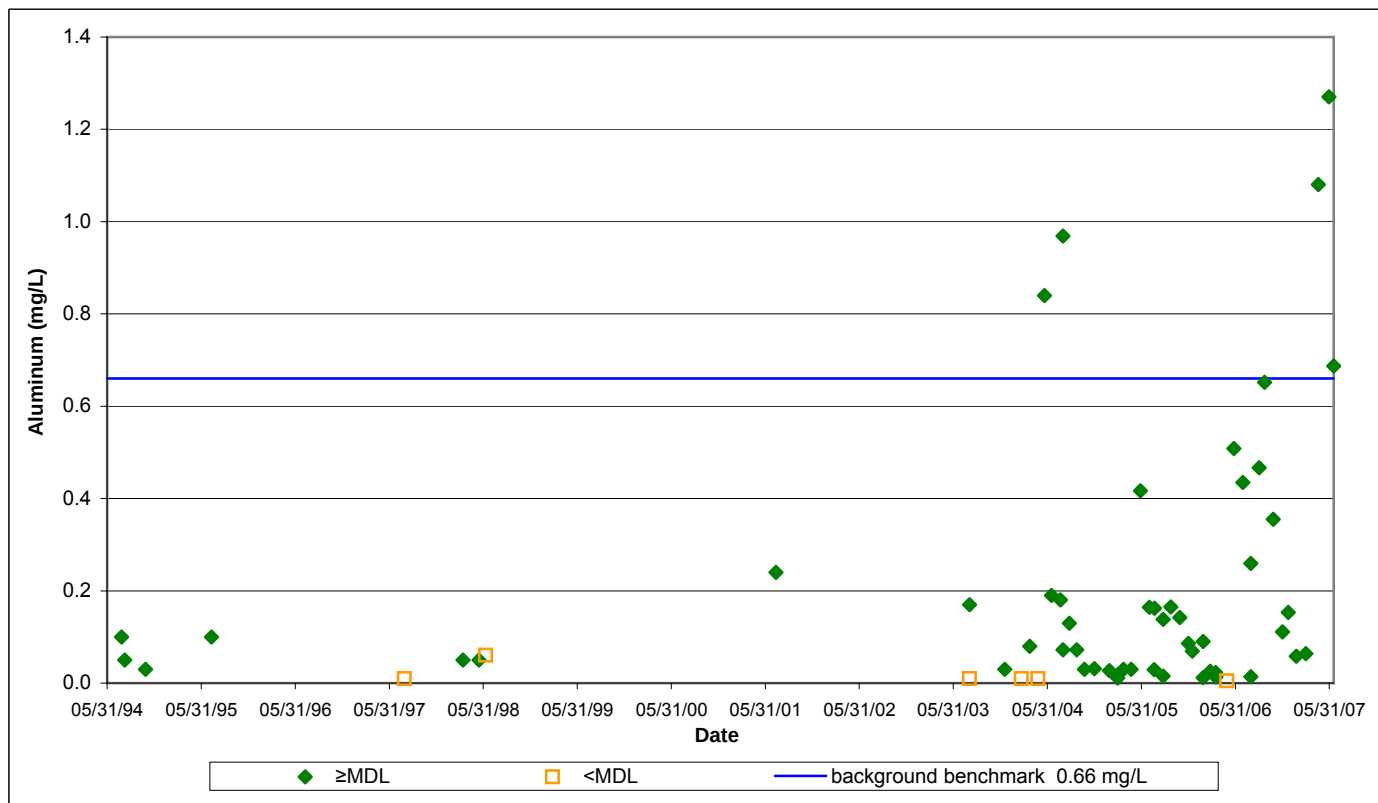
^m ≥ 50% of samples from KV40, KV38, KV6, KV8, KV21, KV9, KV2, KV3, KV5 and KV15 were <DL, >guideline

ⁿ 95th percentile of pooled background stations (KV1 & KV37) following removal of elevated <MDL values



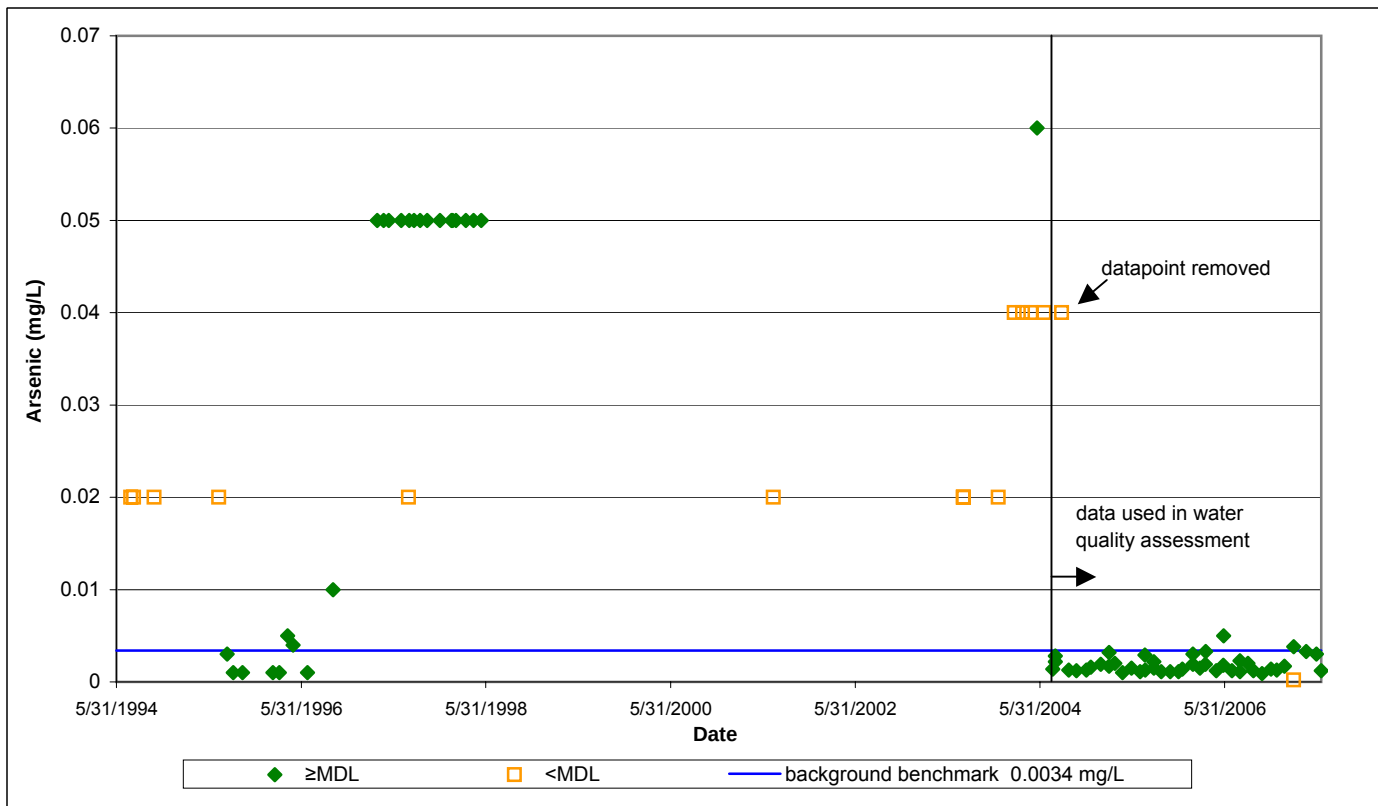
¹ Dataset used to develop a background benchmark as shown

Figure A.49: Scatterplot of alkalinity-T concentrations over time for background stations KV1 & KV37¹.



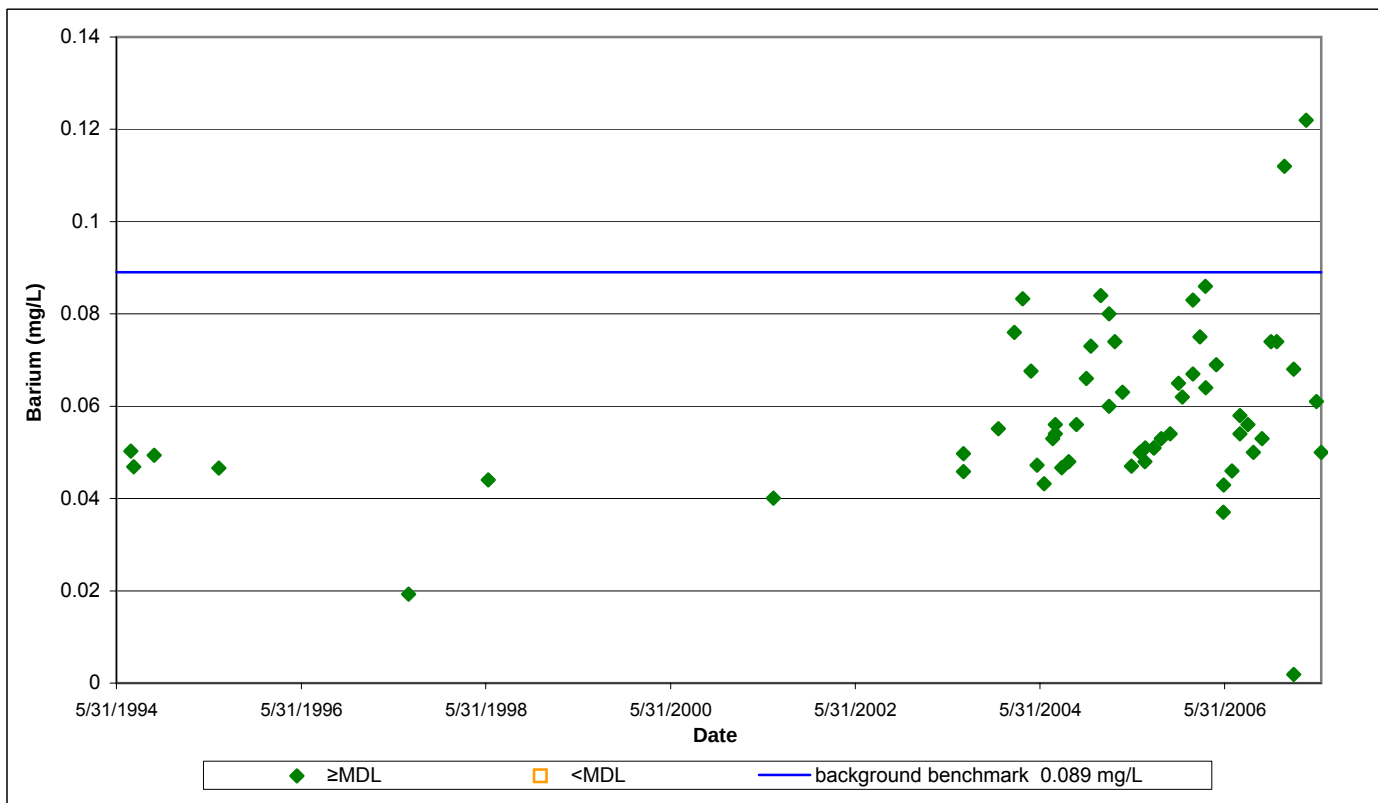
¹ Dataset used to develop a background benchmark as shown

Figure A.50: Scatterplot of aluminum concentrations over time for background stations KV1 & KV37¹.



¹ Dataset used to develop background benchmark truncated to July 20, 2004 and elevated <MDL removed

Figure A.53: Scatterplot of arsenic concentrations over time for background stations KV1 & KV37¹.



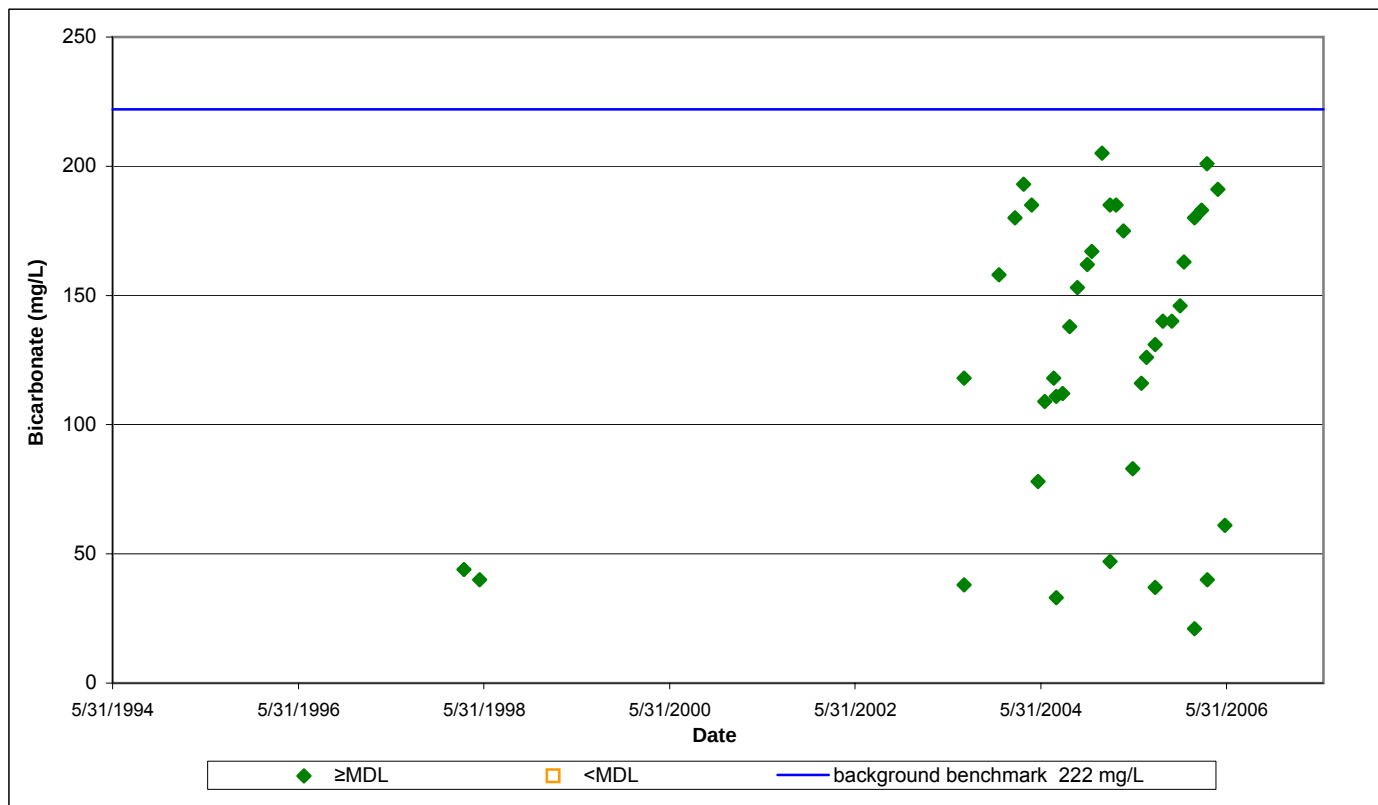
¹ Dataset used to develop a background benchmark as shown

Figure A.54: Scatterplot of barium concentrations over time for background stations KV1 & KV37.



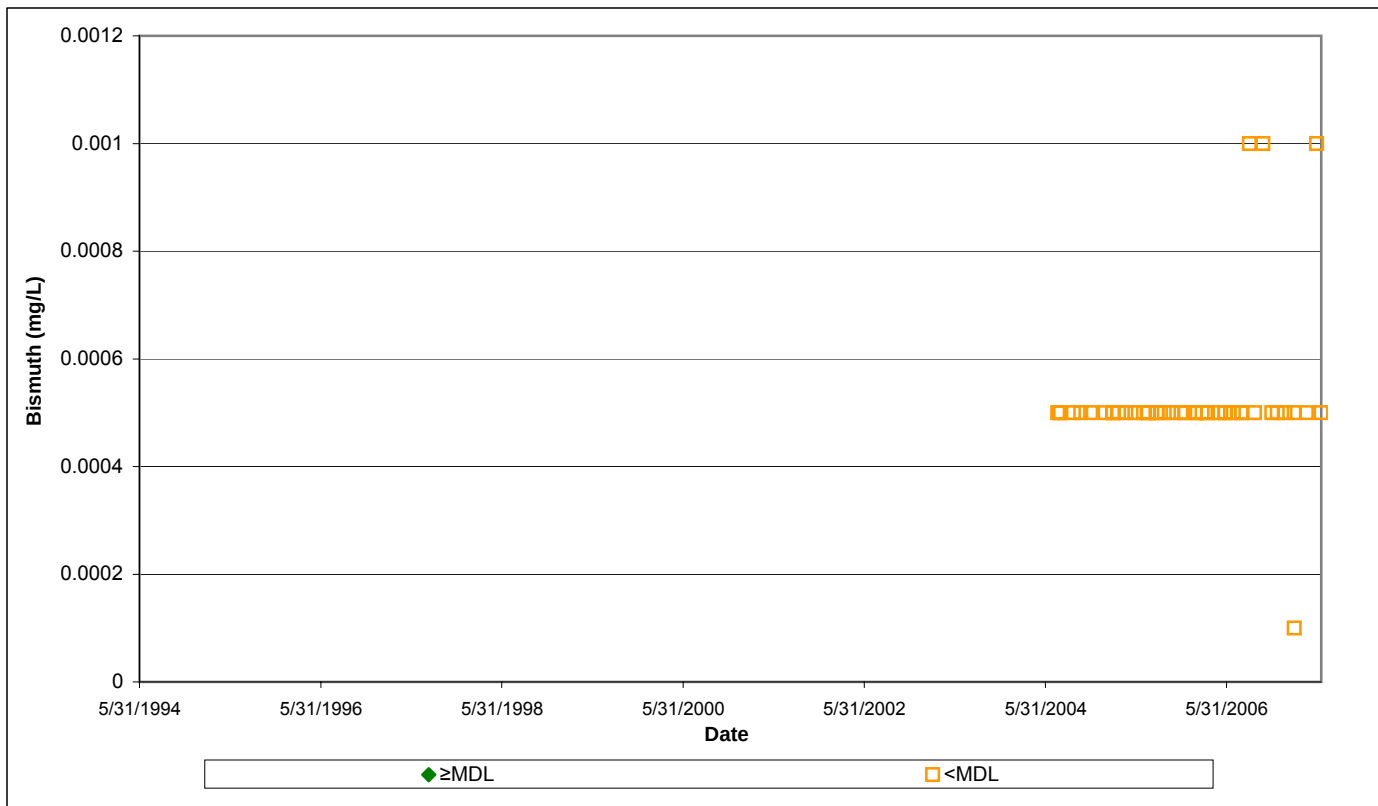
¹ Dataset not used to develop a background benchmark since all data < MDLs and < MDLs variable

Figure A.55: Scatterplot of beryllium concentrations over time for background stations KV1 & KV37¹.



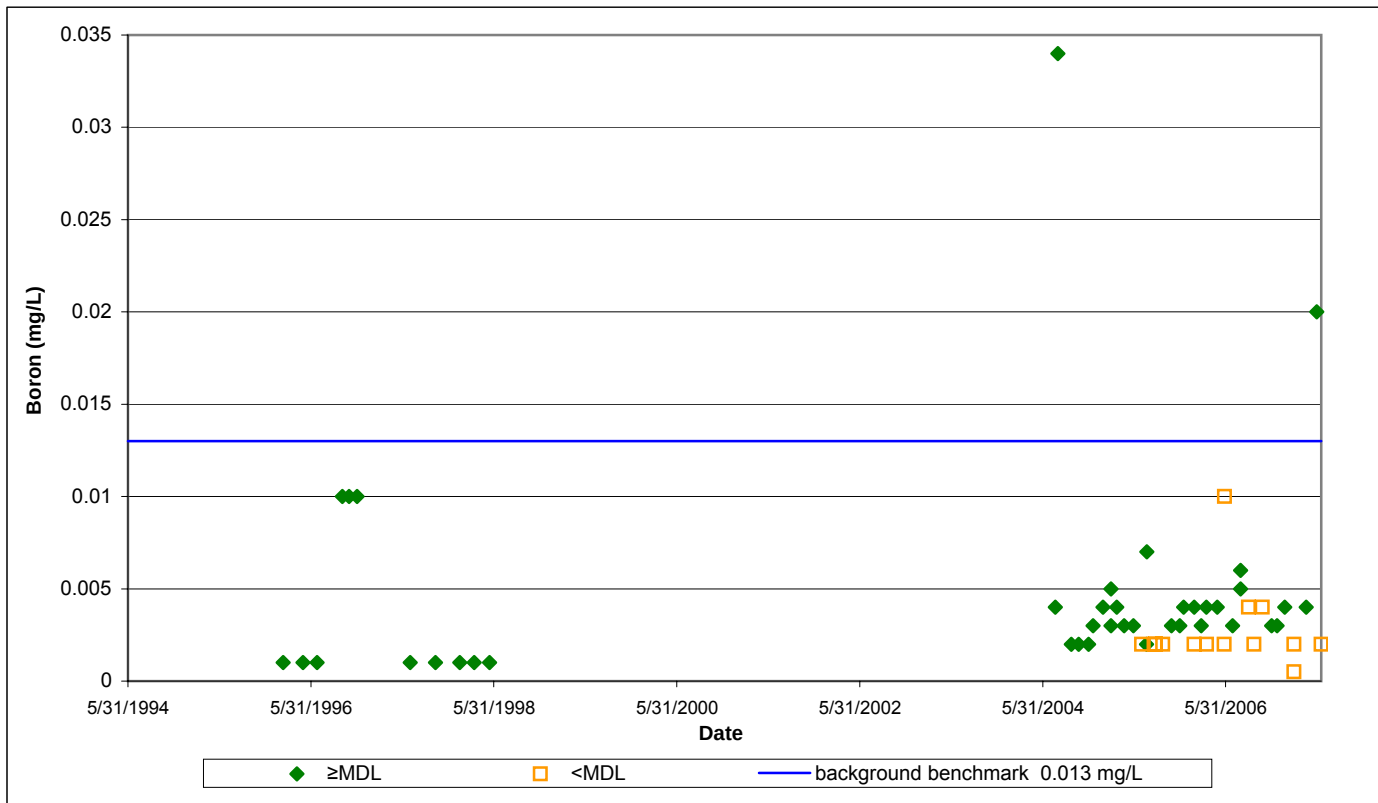
¹ Dataset used to develop a background benchmark as shown

Figure A.56: Scatterplot of bicarbonate concentrations over time for background stations KV1 & KV37¹.



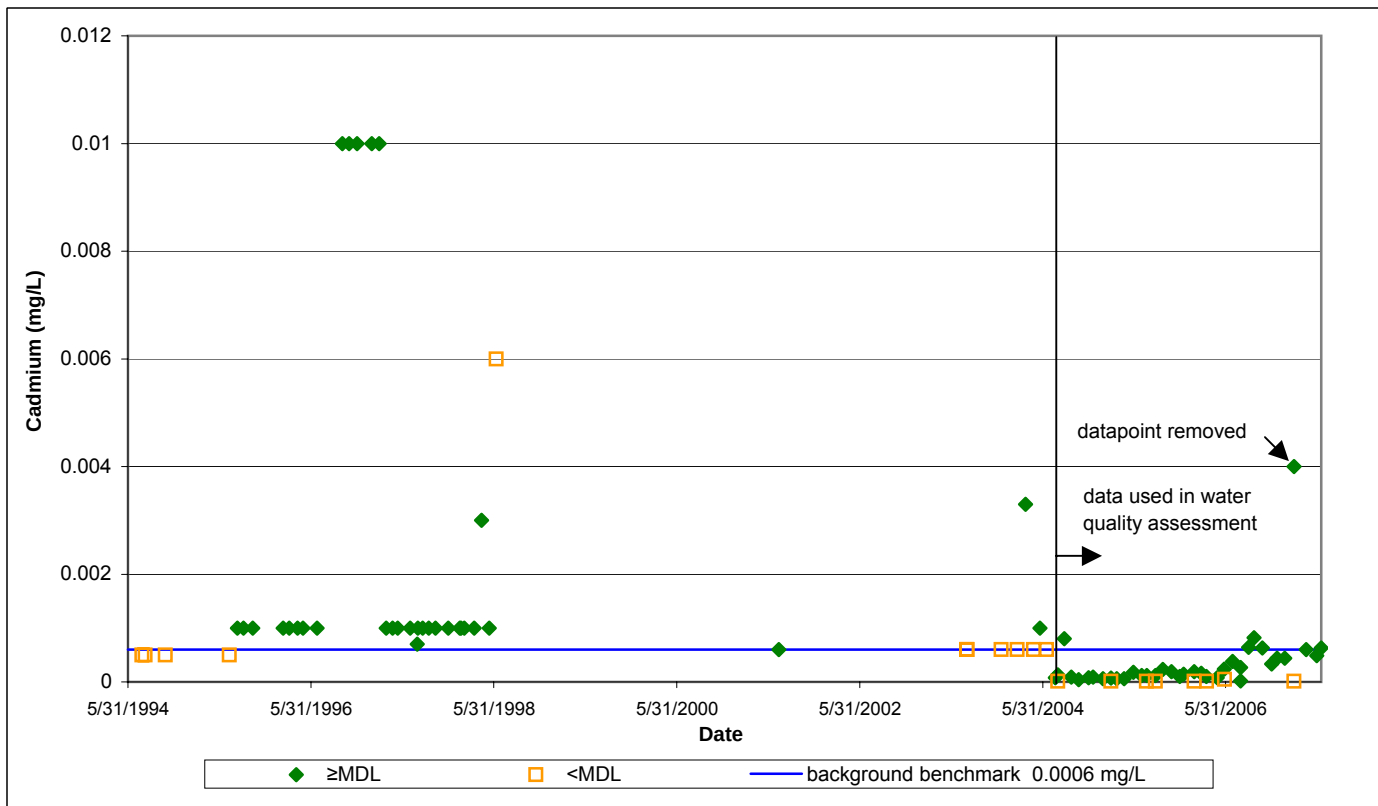
¹ Dataset not used to develop a background benchmark since all data < MDLs and < MDLs variable

Figure A.57: Scatterplot of bismuth concentrations over time for background stations KV1 & KV37¹.



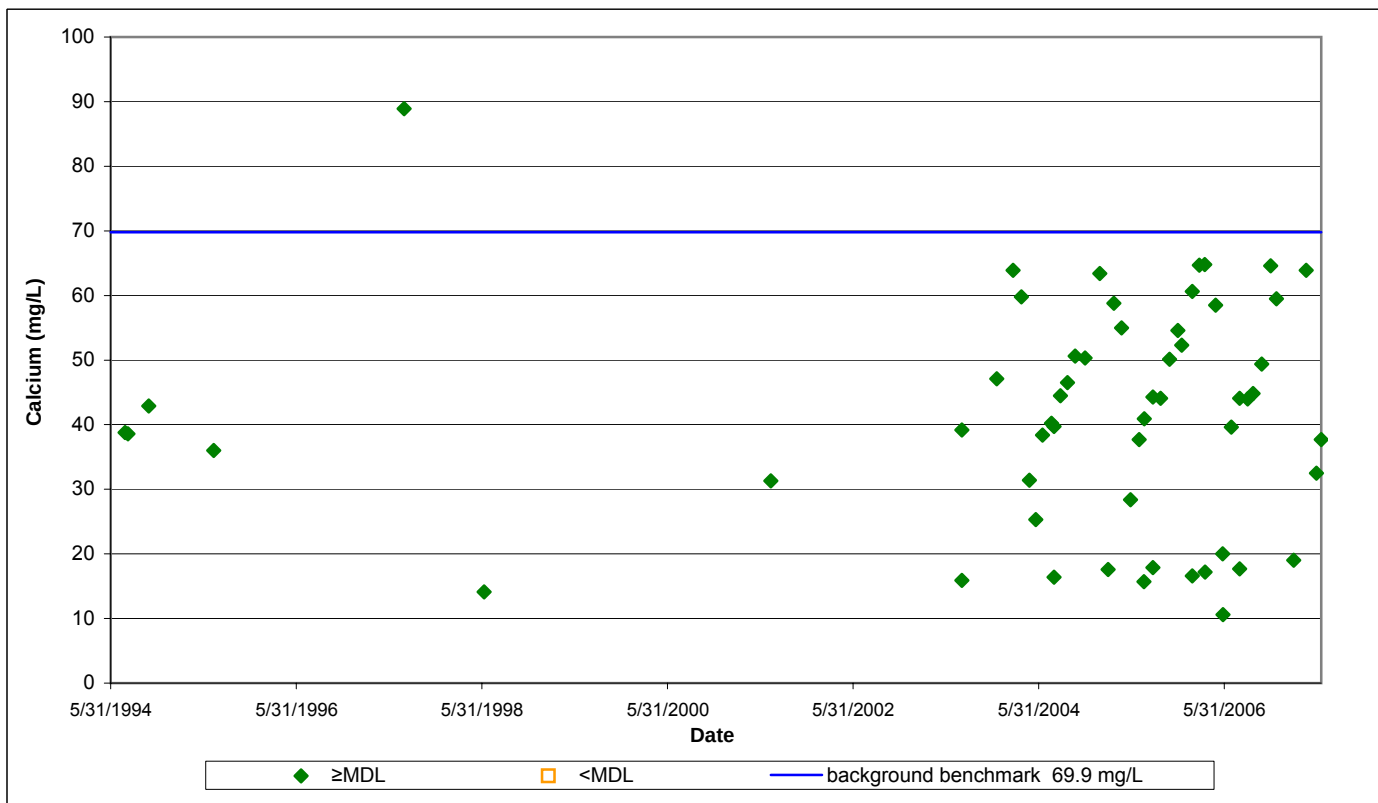
¹ Dataset used to develop a background benchmark as shown

Figure A.58: Scatterplot of boron concentrations over time for background stations KV1 & KV37¹.



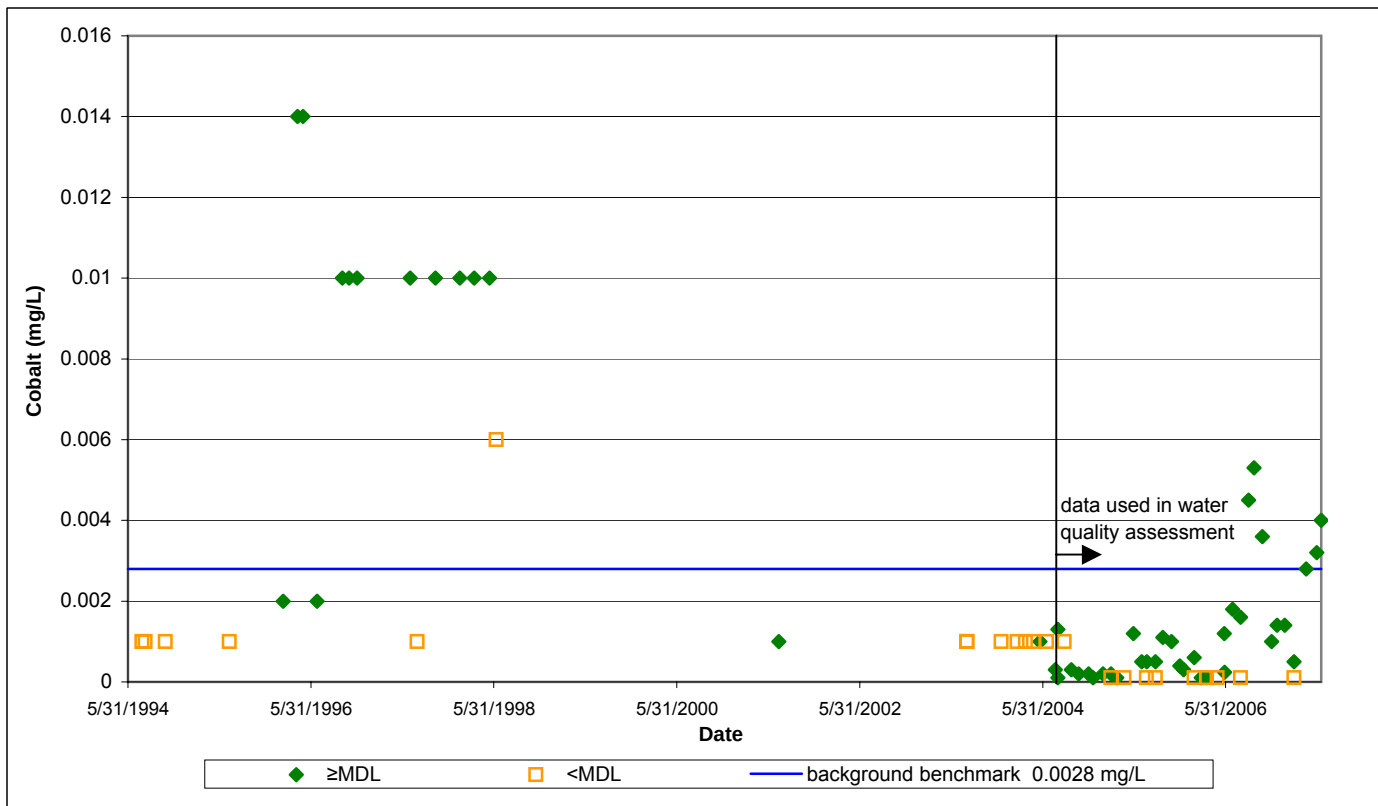
¹ Dataset used to develop background benchmark truncated to July 20, 2004 and outlier datapoint removed

Figure A.59: Scatterplot of cadmium concentrations over time for background stations KV1 & KV37¹.



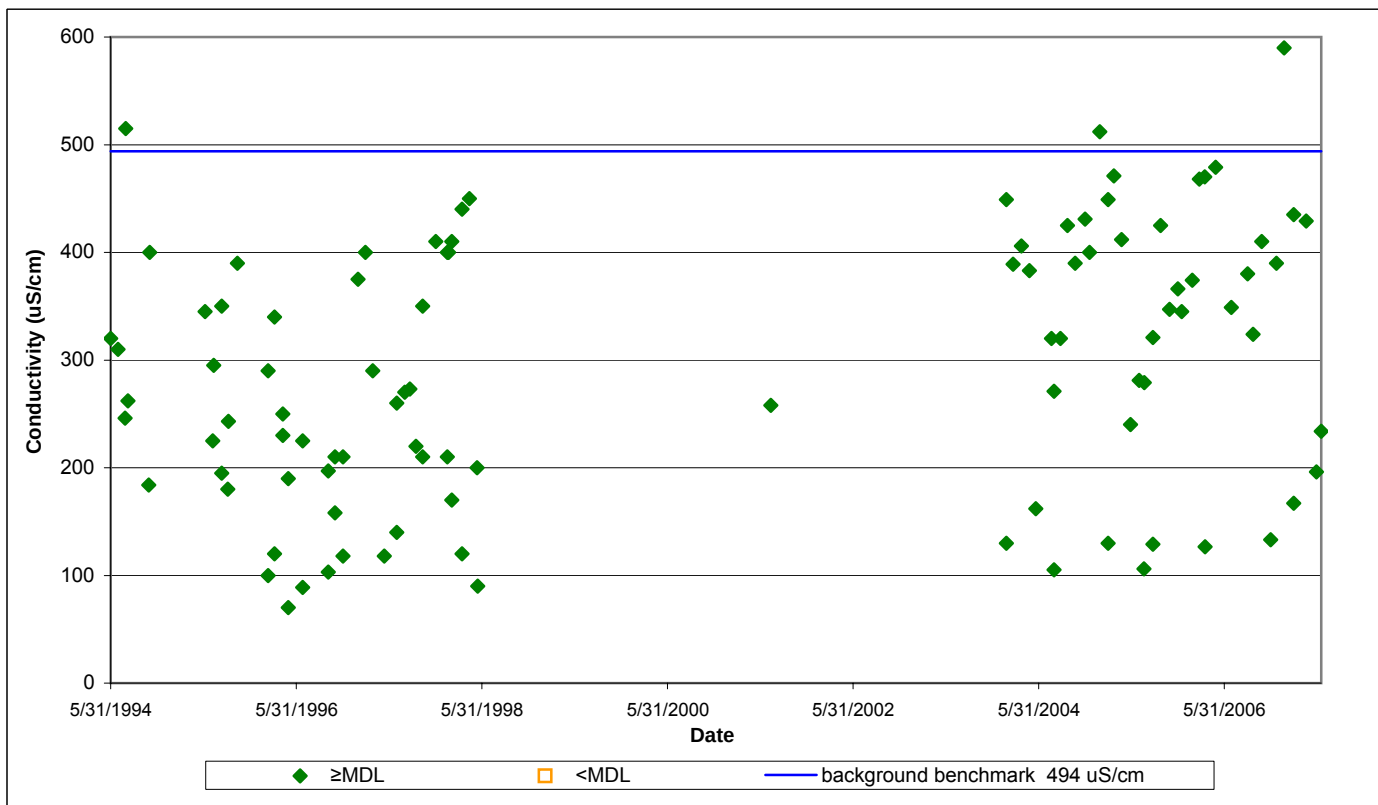
¹ Dataset used to develop a background benchmark as shown

Figure A.60: Scatterplot of calcium concentrations over time for background stations KV1 & KV37¹.



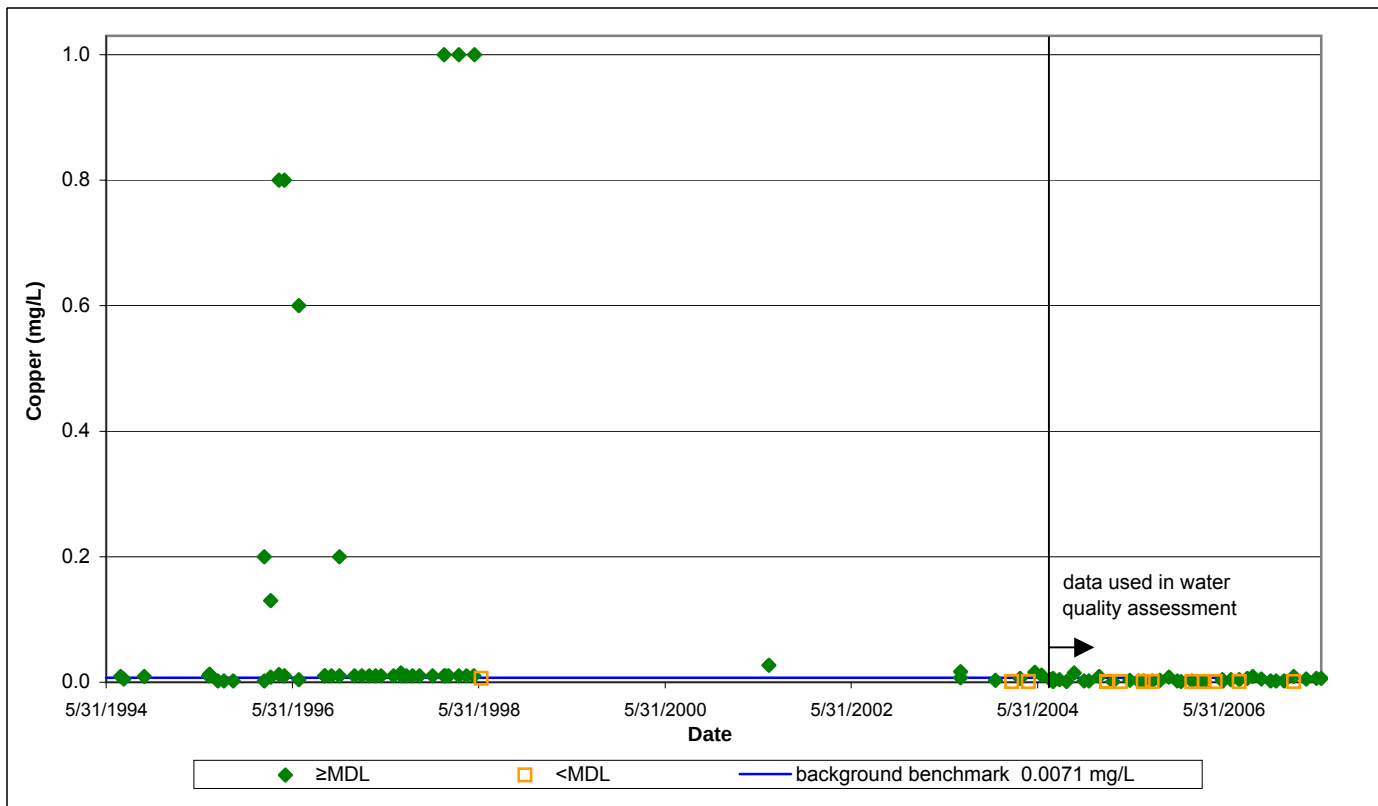
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.63: Scatterplot of cobalt concentrations over time for background stations KV1 & KV37¹.



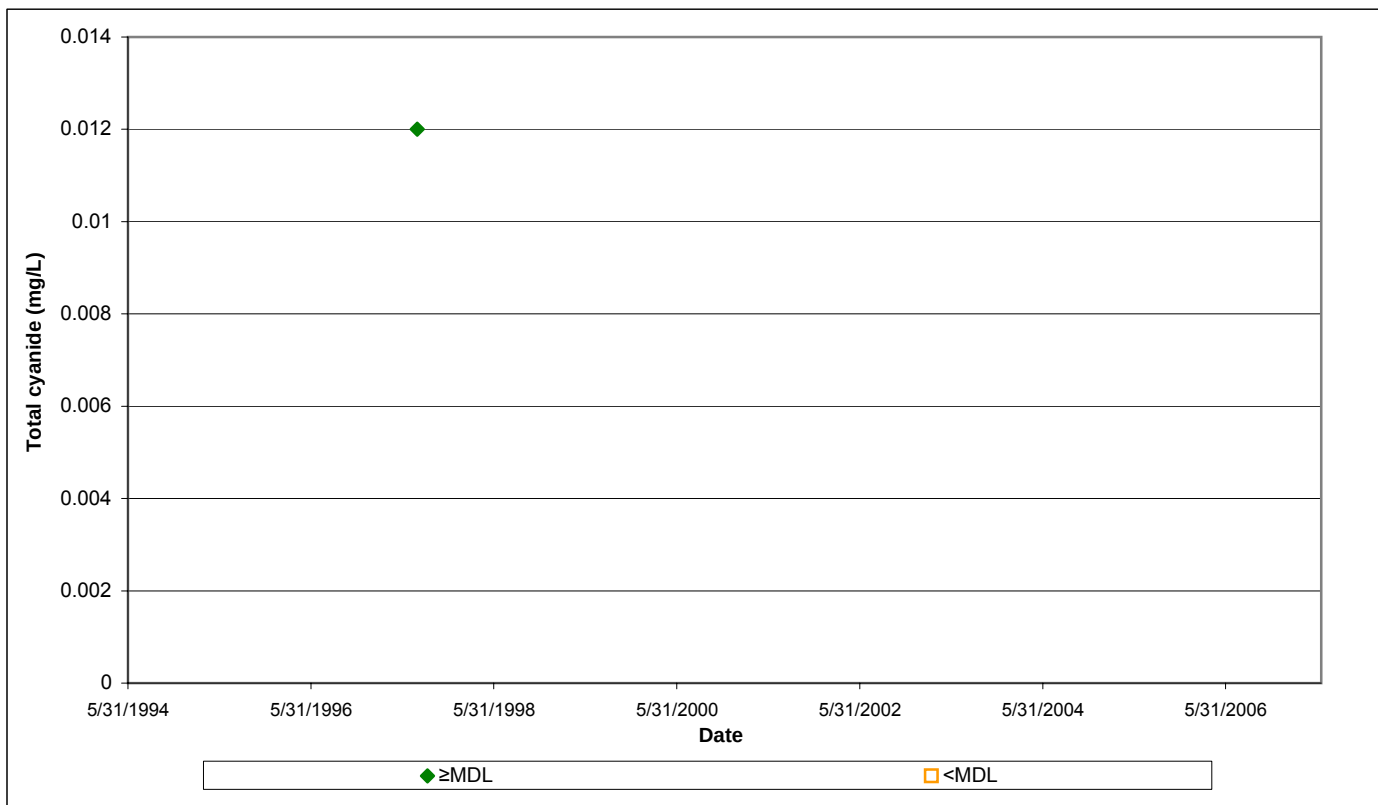
¹ Dataset used to develop a background benchmark as shown

Figure A.64: Scatterplot of conductivity over time for background stations KV1 & KV37¹.



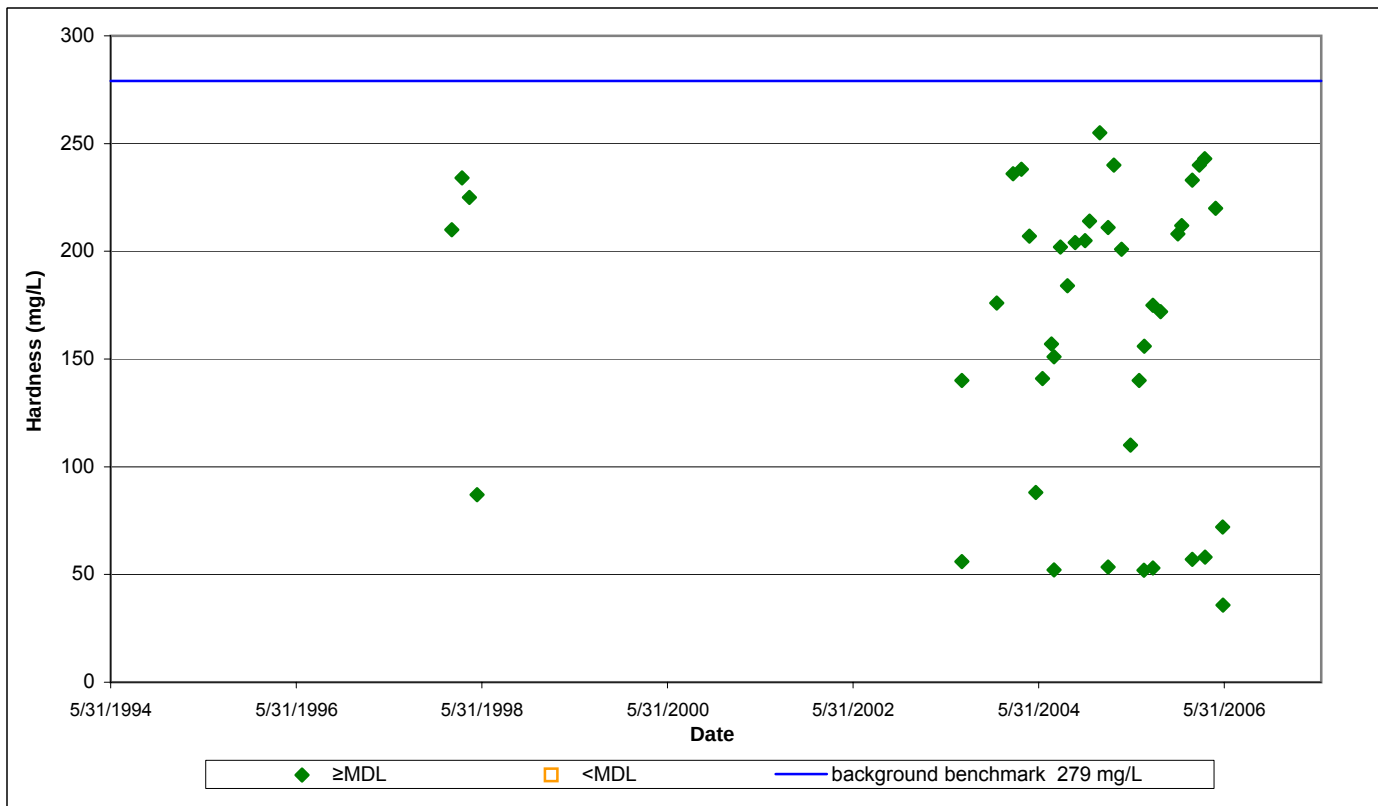
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.65: Scatterplot of copper concentrations over time for background stations KV1 & KV37¹.



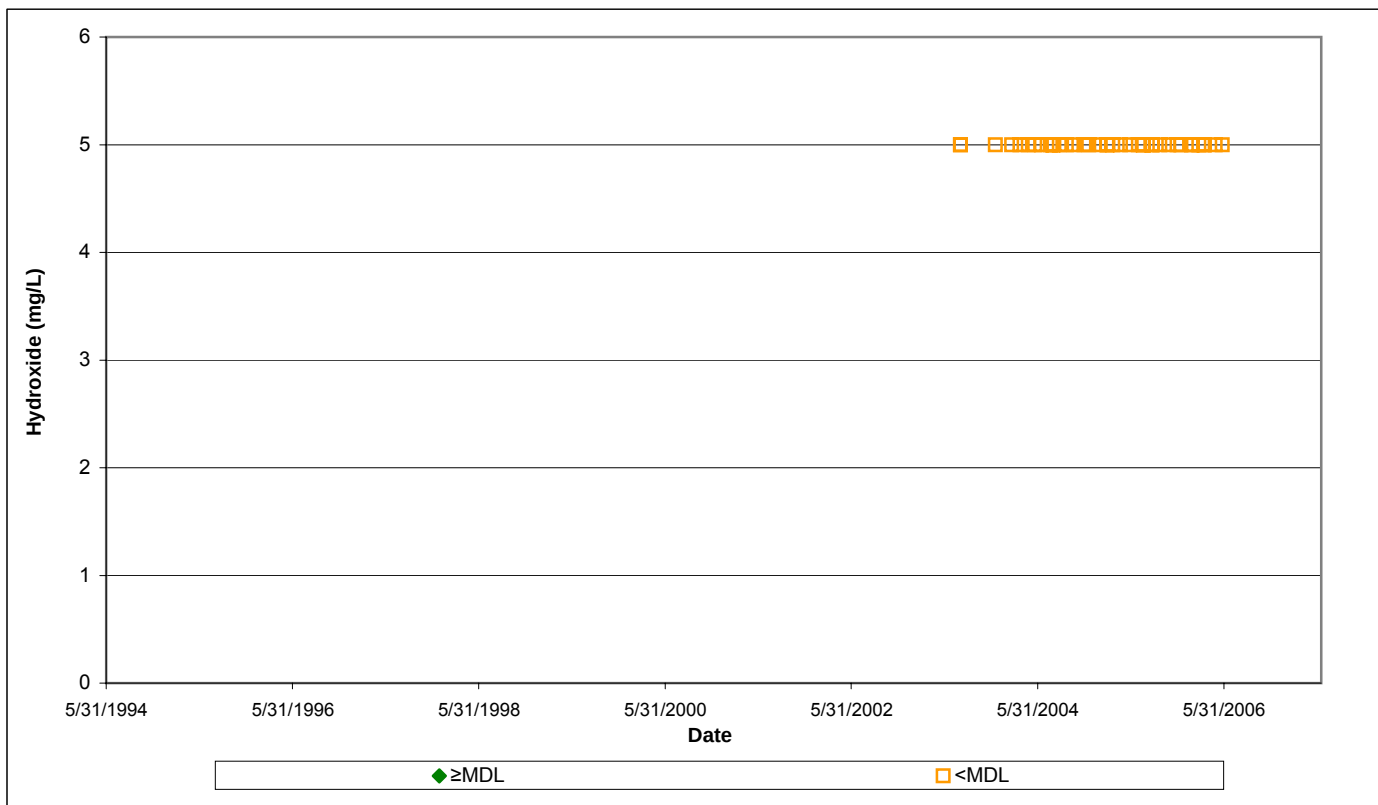
¹ Dataset not used to develop a background benchmark due to the small sample size

Figure A.66: Scatterplot of total cyanide concentrations over time for background stations KV1 & KV37¹.



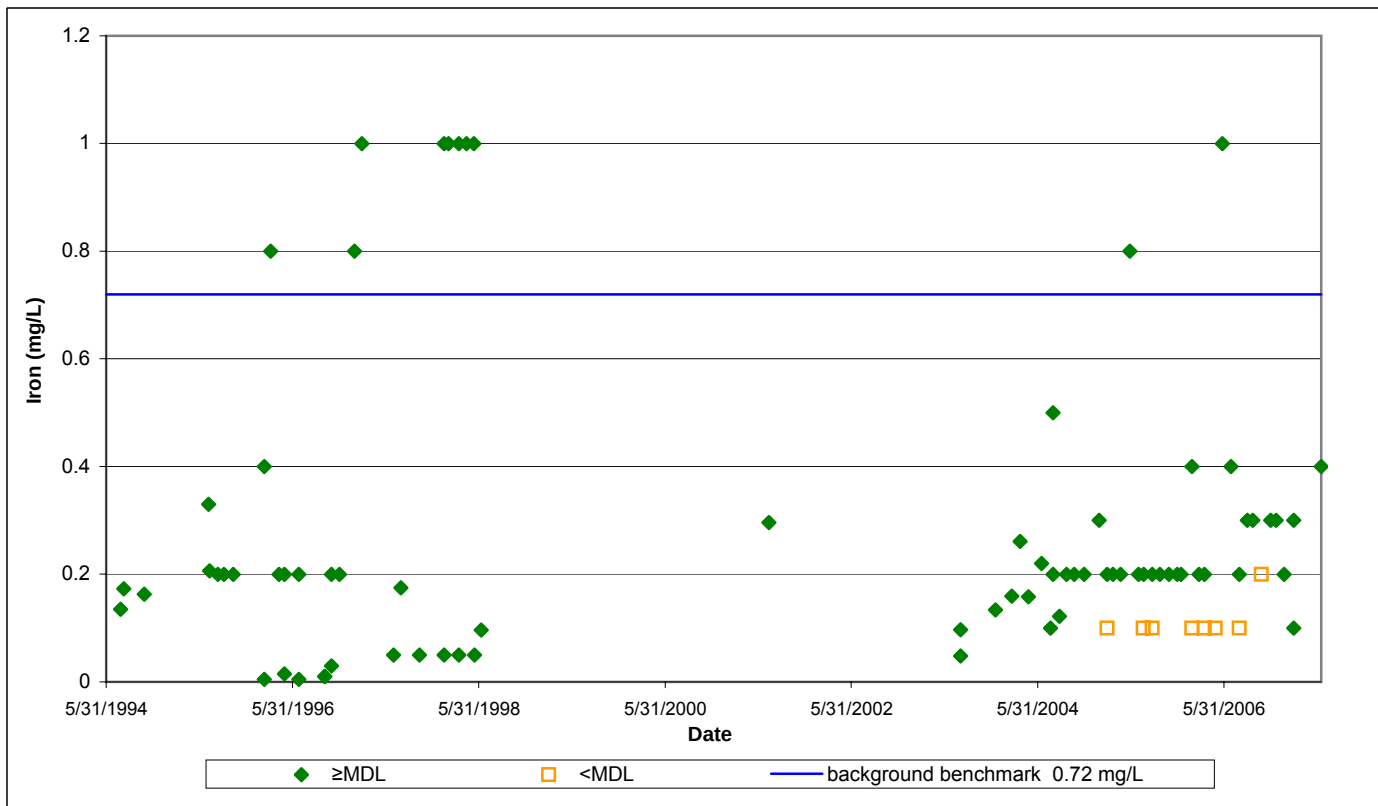
¹ Dataset used to develop a background benchmark as shown

Figure A.67: Scatterplot of hardness concentrations over time for background stations KV1 & KV37¹.



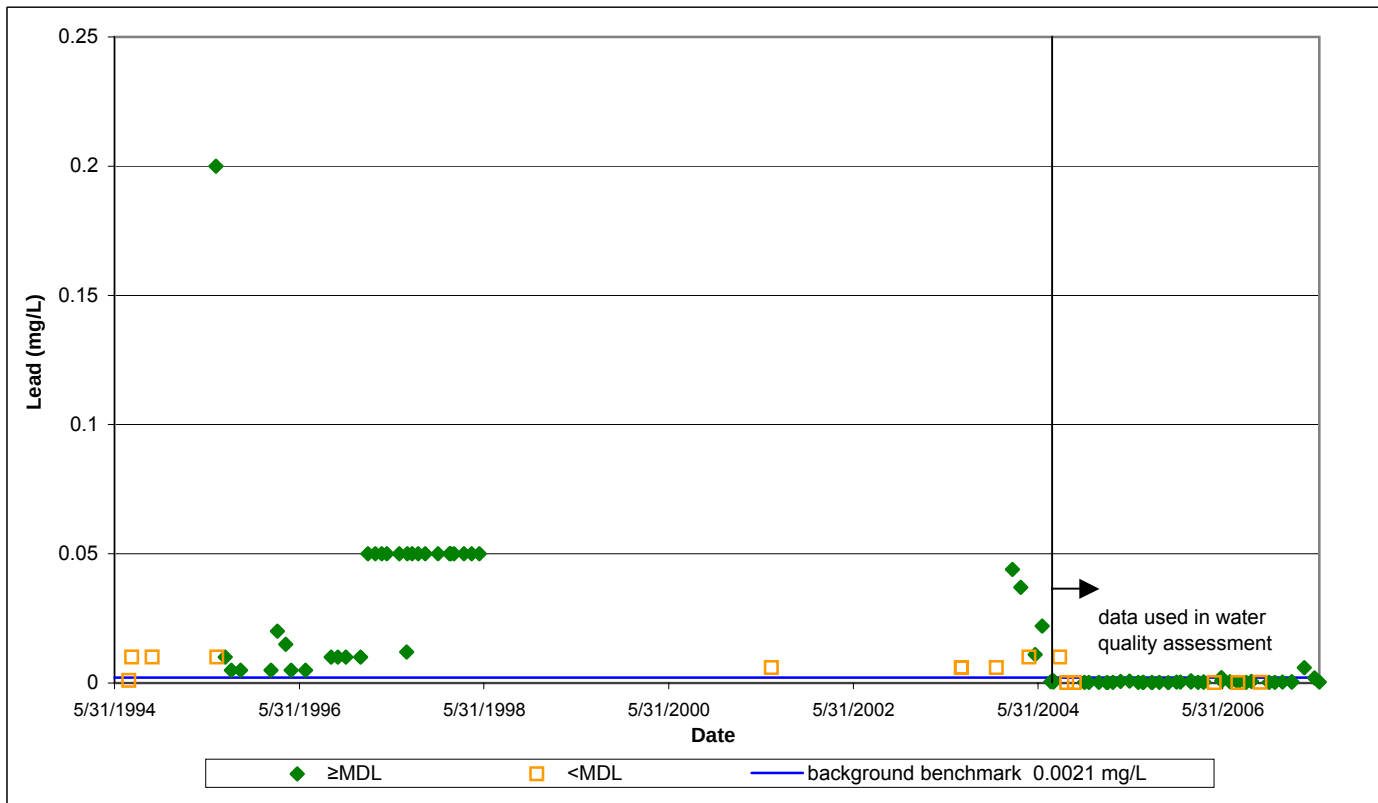
¹ Dataset not used to develop a background benchmark since all data $<$ MDLs

Figure A.68: Scatterplot of hydroxide concentrations over time for background stations KV1 & KV37¹.



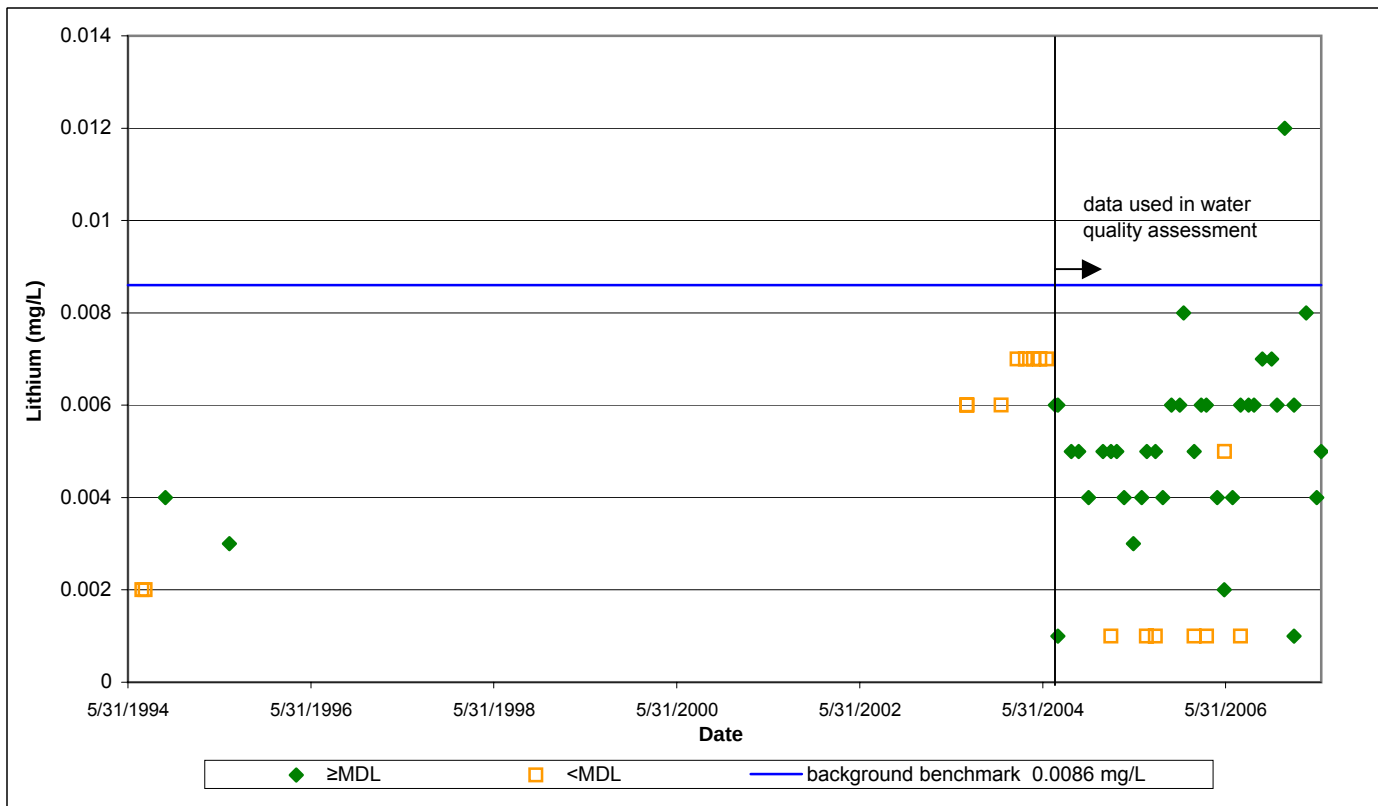
¹ Dataset used to develop a background benchmark as shown

Figure A.69: Scatterplot of iron concentrations over time for background stations KV1 & KV37¹.



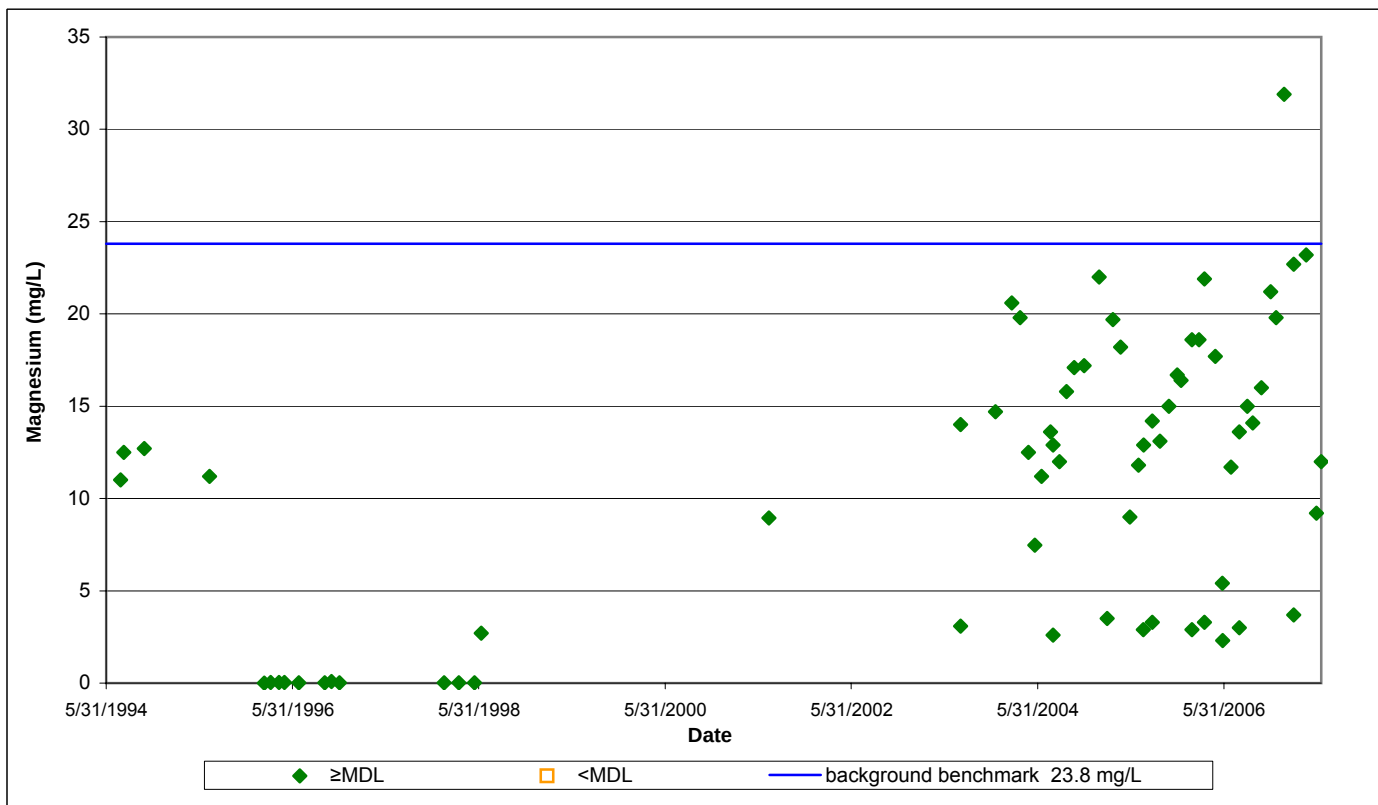
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.70: Scatterplot of lead concentrations over time for background stations KV1 & KV37¹.



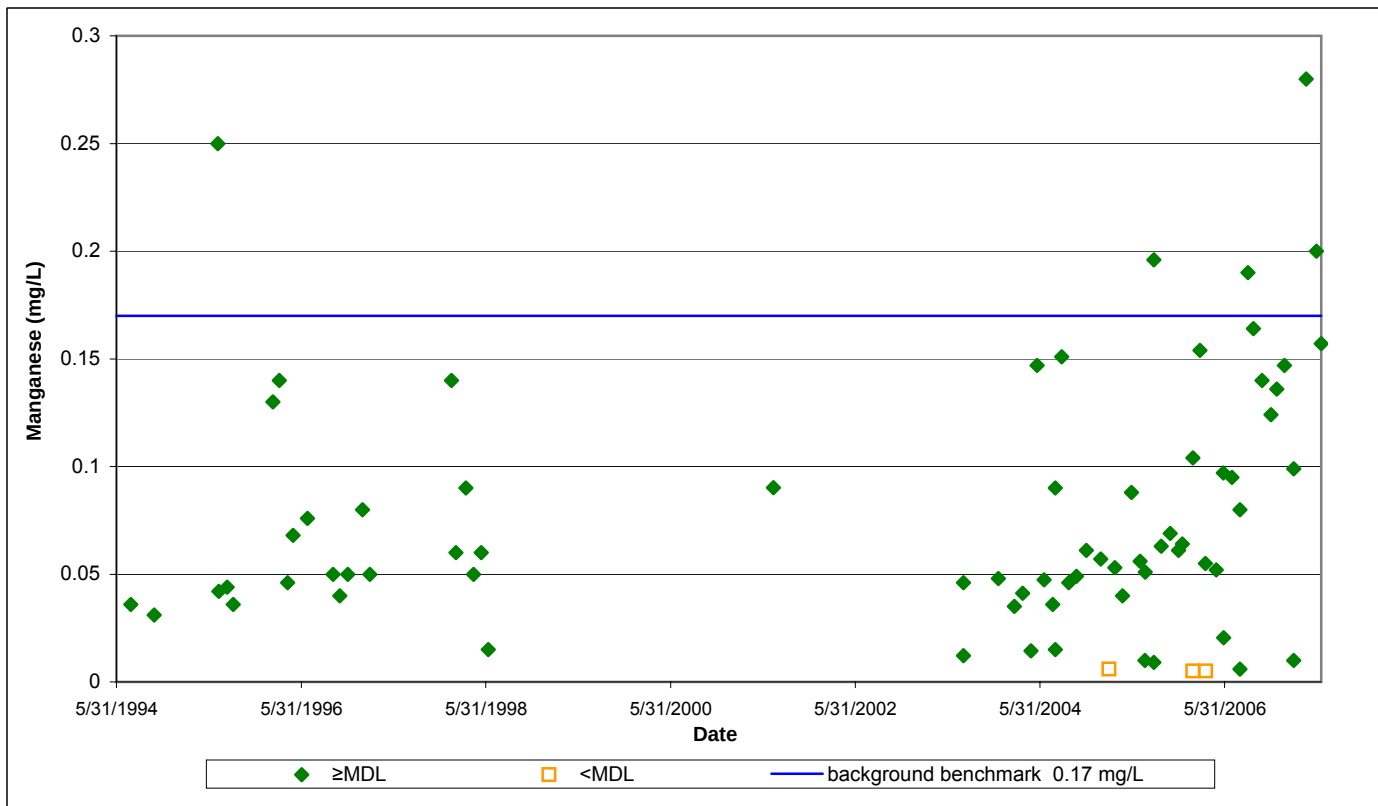
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.71: Scatterplot of lithium concentrations over time for background stations KV1 & KV37¹.



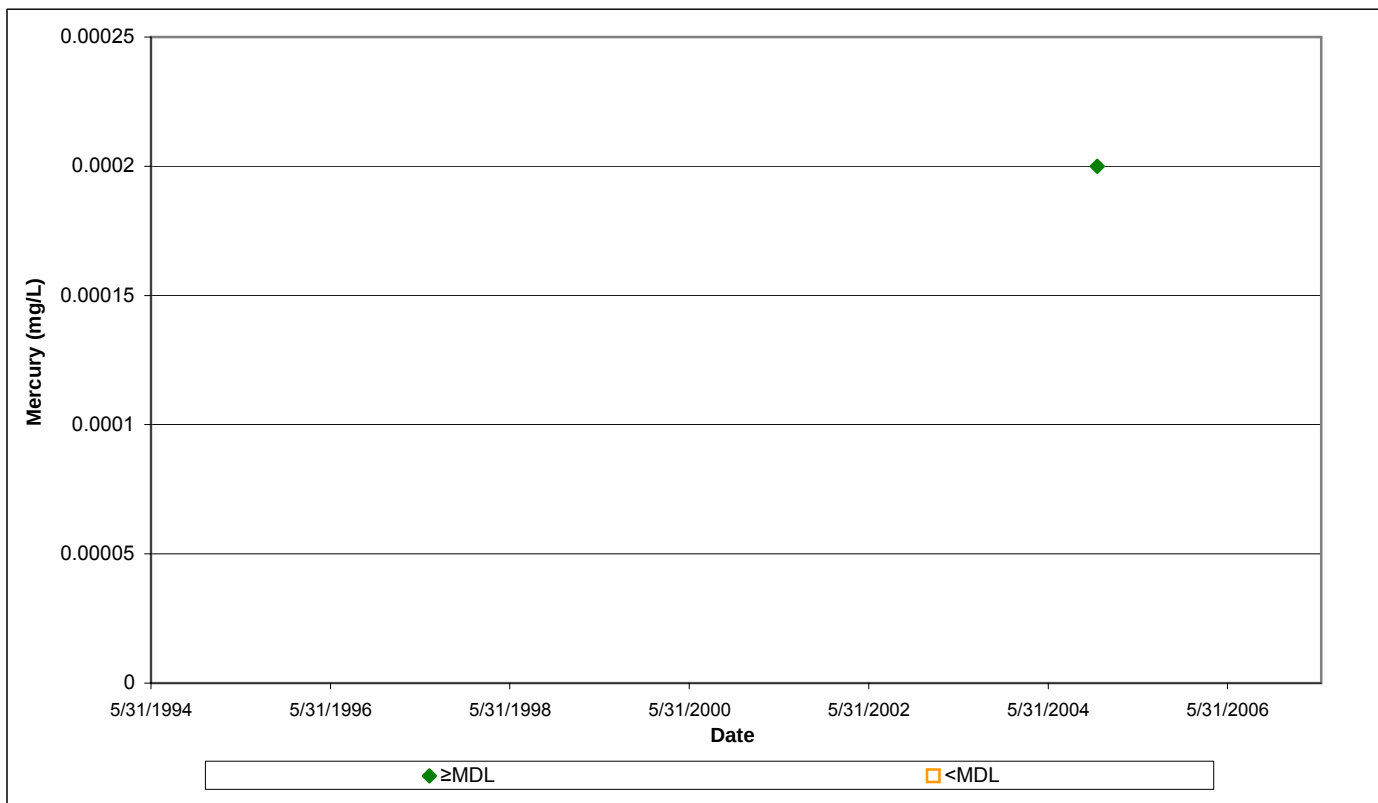
¹ Dataset used to develop a background benchmark as shown

Figure A.72: Scatterplot of magnesium concentrations over time for background stations KV1 & KV37¹.



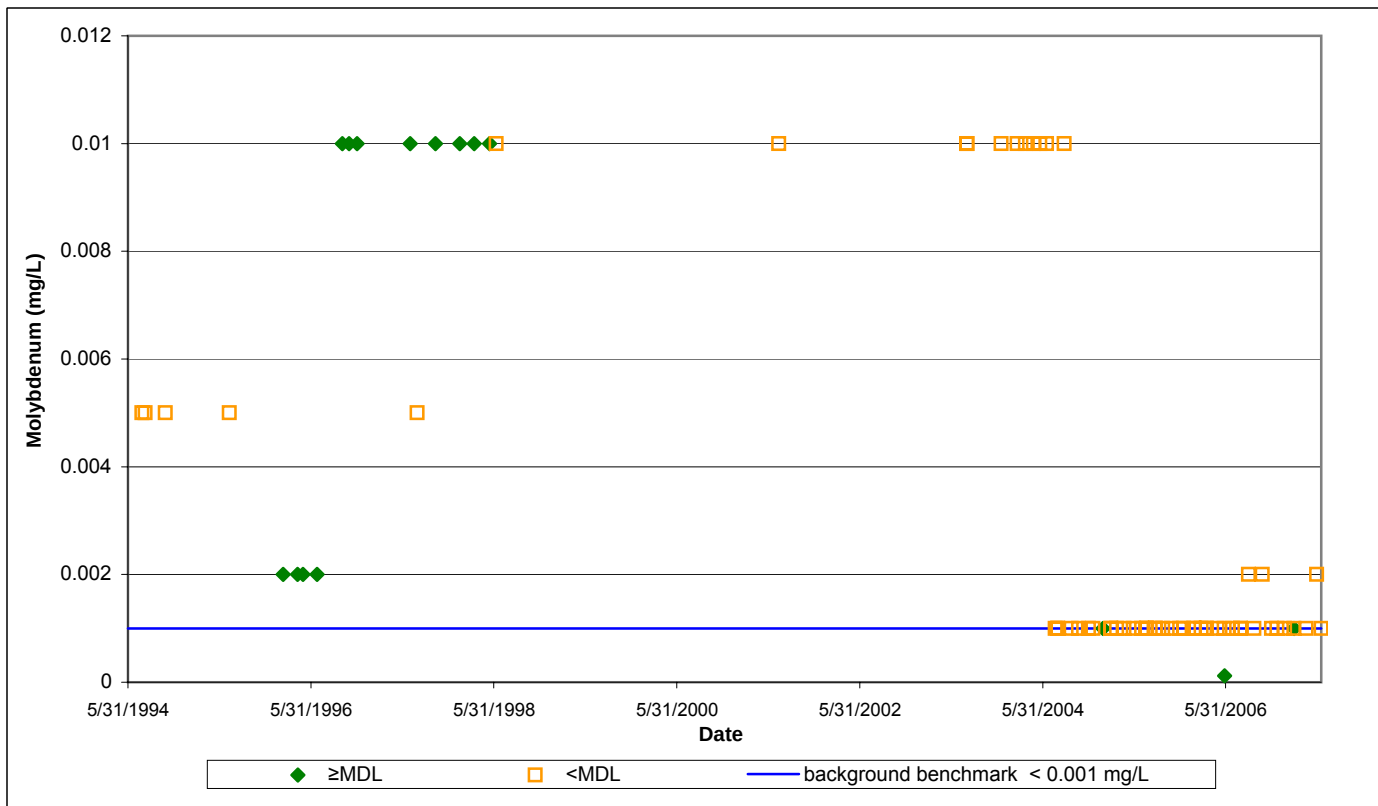
¹ Dataset used to develop a background benchmark as shown

Figure A.73: Scatterplot of manganese concentrations over time for background stations KV1 & KV37¹.



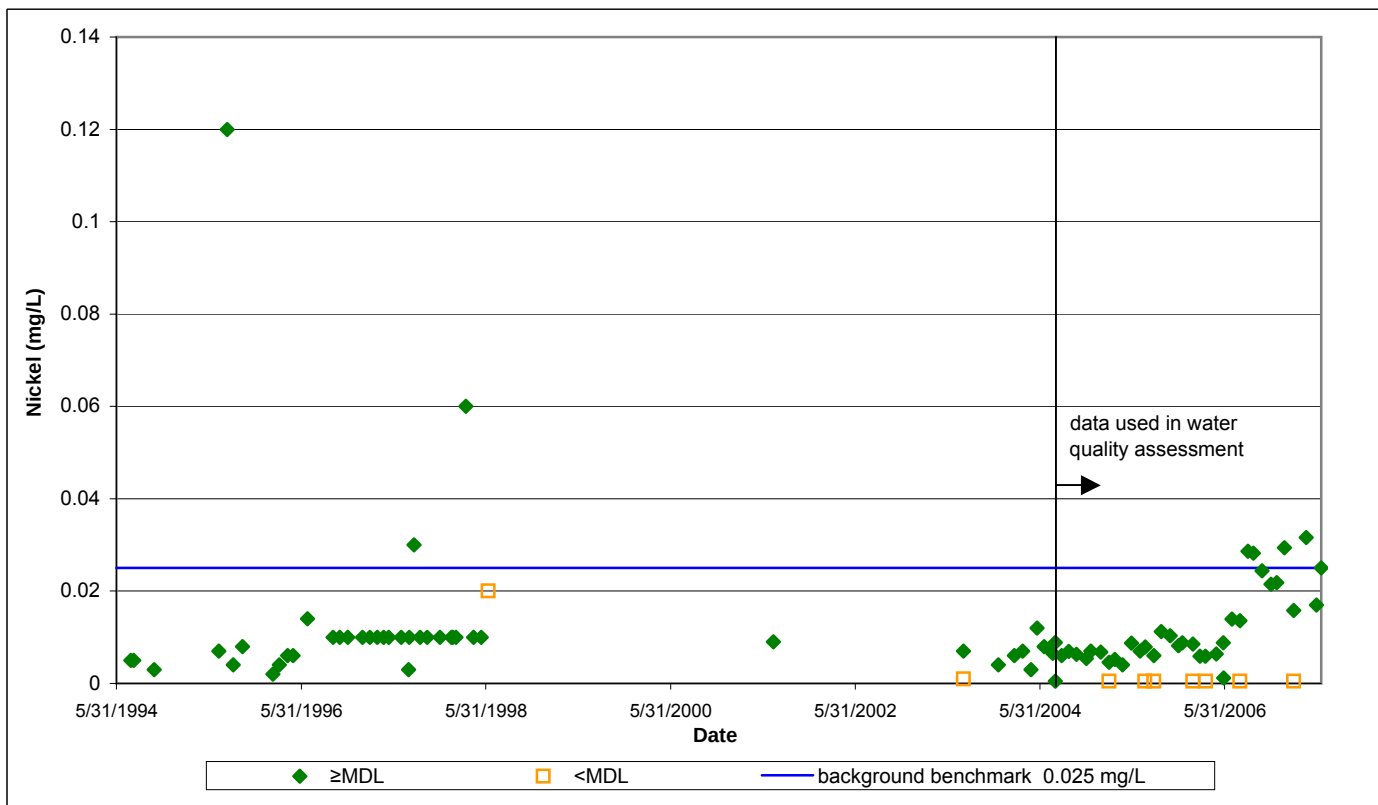
¹ Dataset not used to develop a background benchmark due to the small sample size

Figure A.74: Scatterplot of mercury concentrations over time for background stations KV1 & KV37¹.



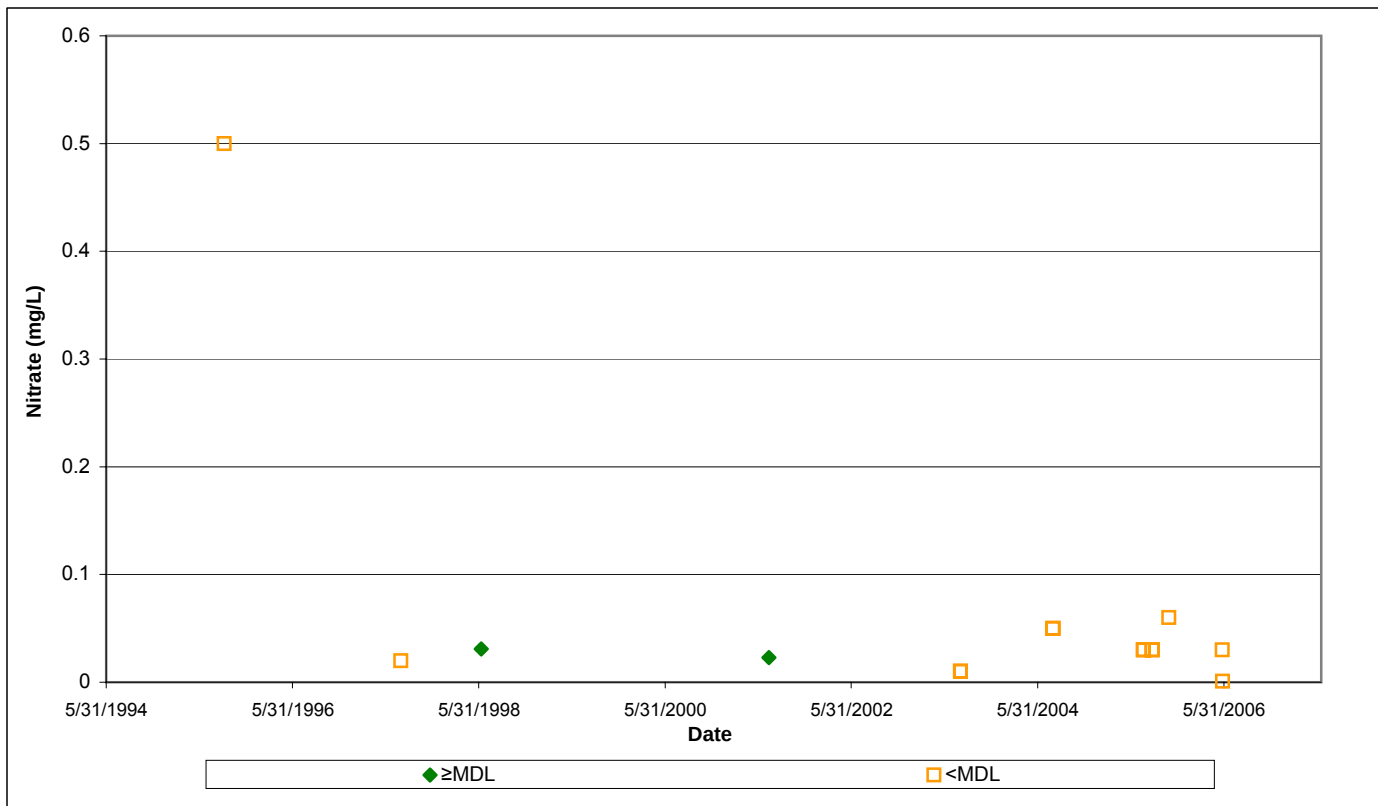
¹ Lowest most recent $<$ MDL value set as background benchmark

Figure A.75: Scatterplot of molybdenum concentrations over time for background stations KV1 & KV37¹.



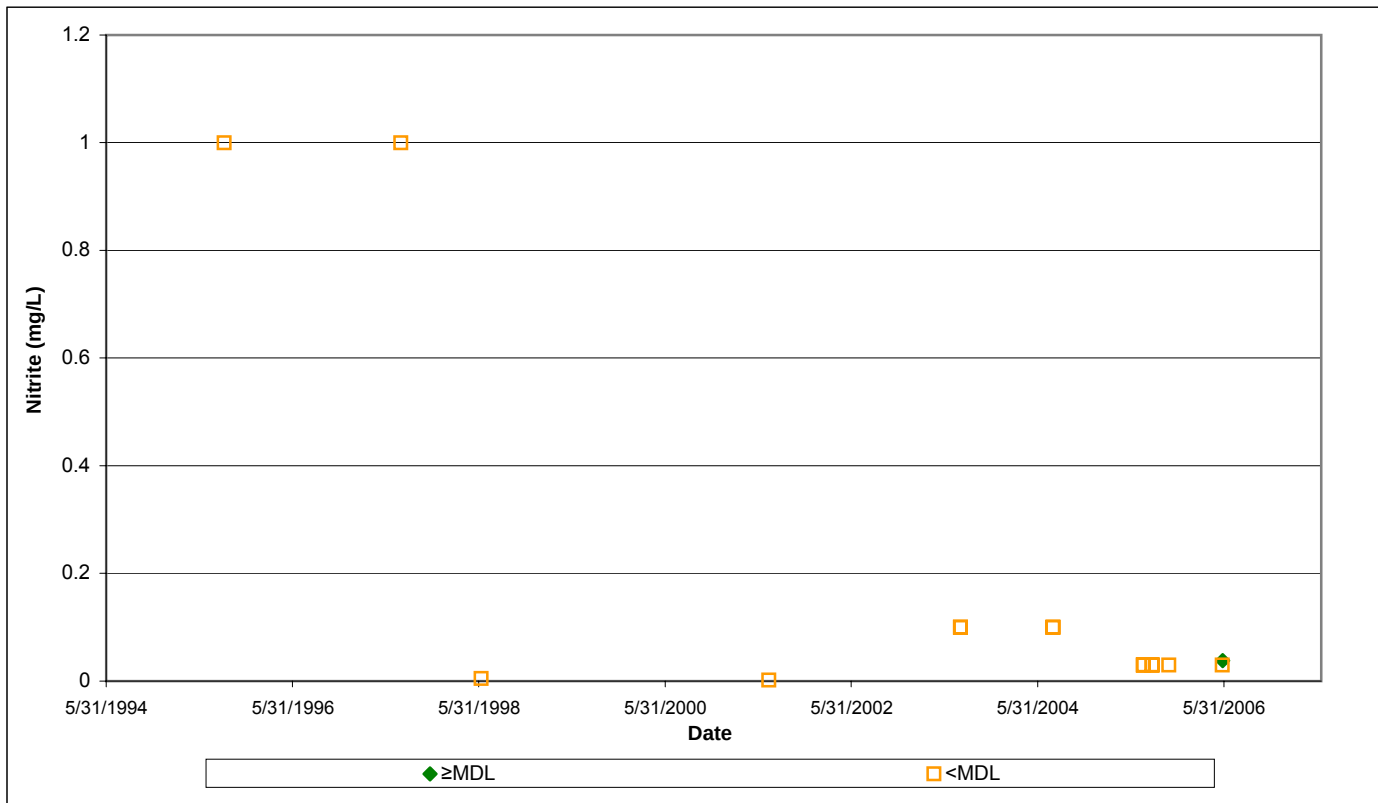
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.76: Scatterplot of nickel concentrations over time for background stations KV1 & KV37¹.



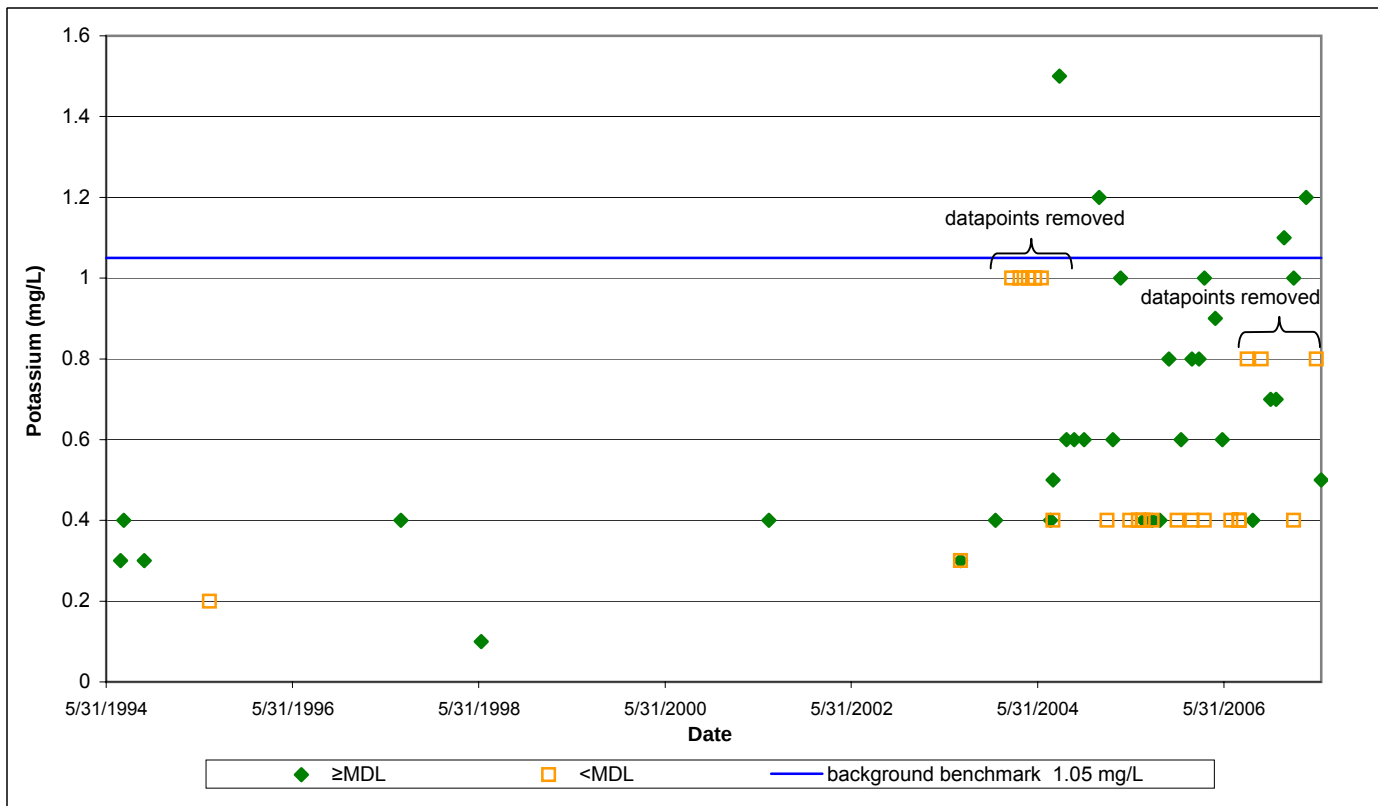
¹ Dataset not used to develop a background benchmark due to the high proportion of $<$ MDLs and variable $<$ MDLs

Figure A.77: Scatterplot of nitrate concentrations over time for background stations KV1 & KV37¹.



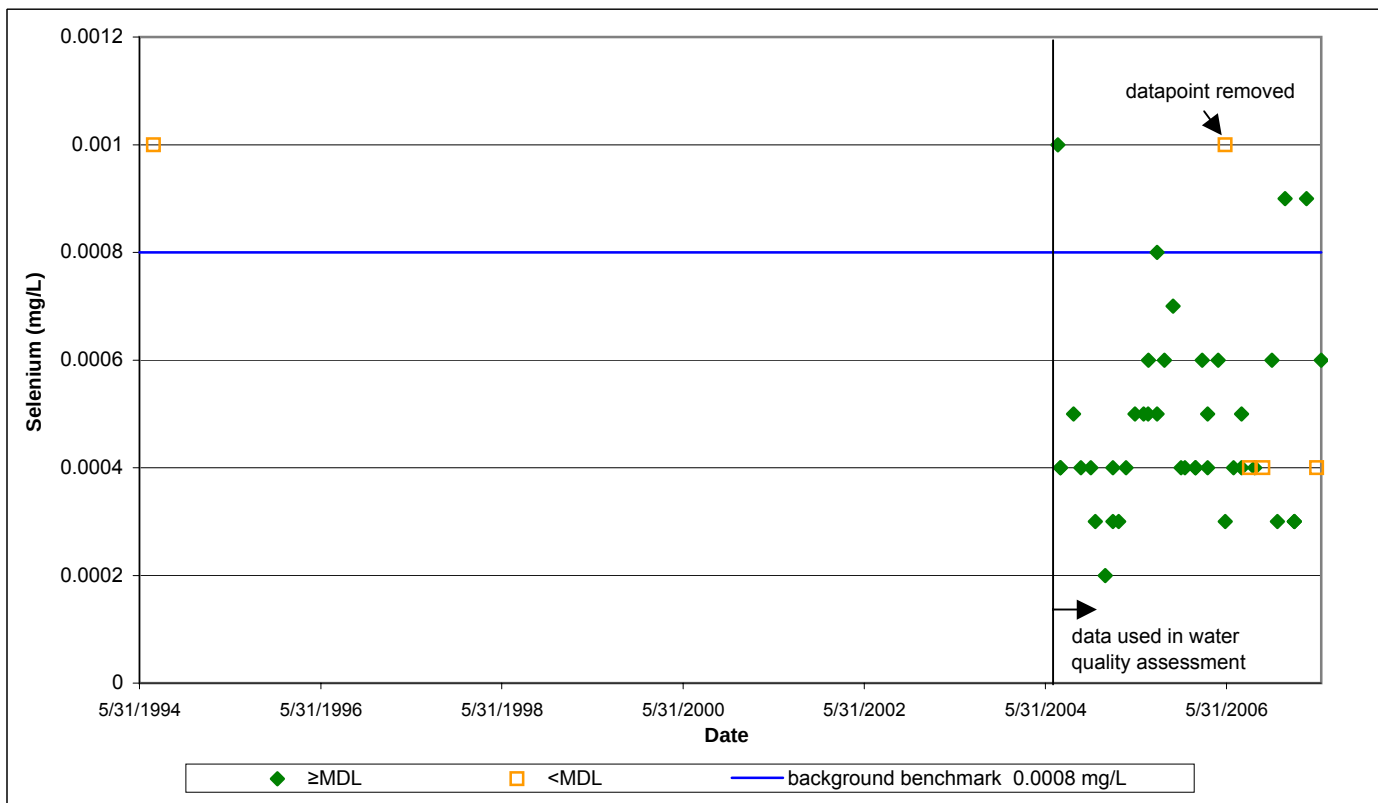
¹ Dataset not used to develop a background benchmark due to the high proportion of $<$ MDLs and variable $<$ MDLs

Figure A.78: Scatterplot of nitrite concentrations over time for background stations KV1 & KV37¹.



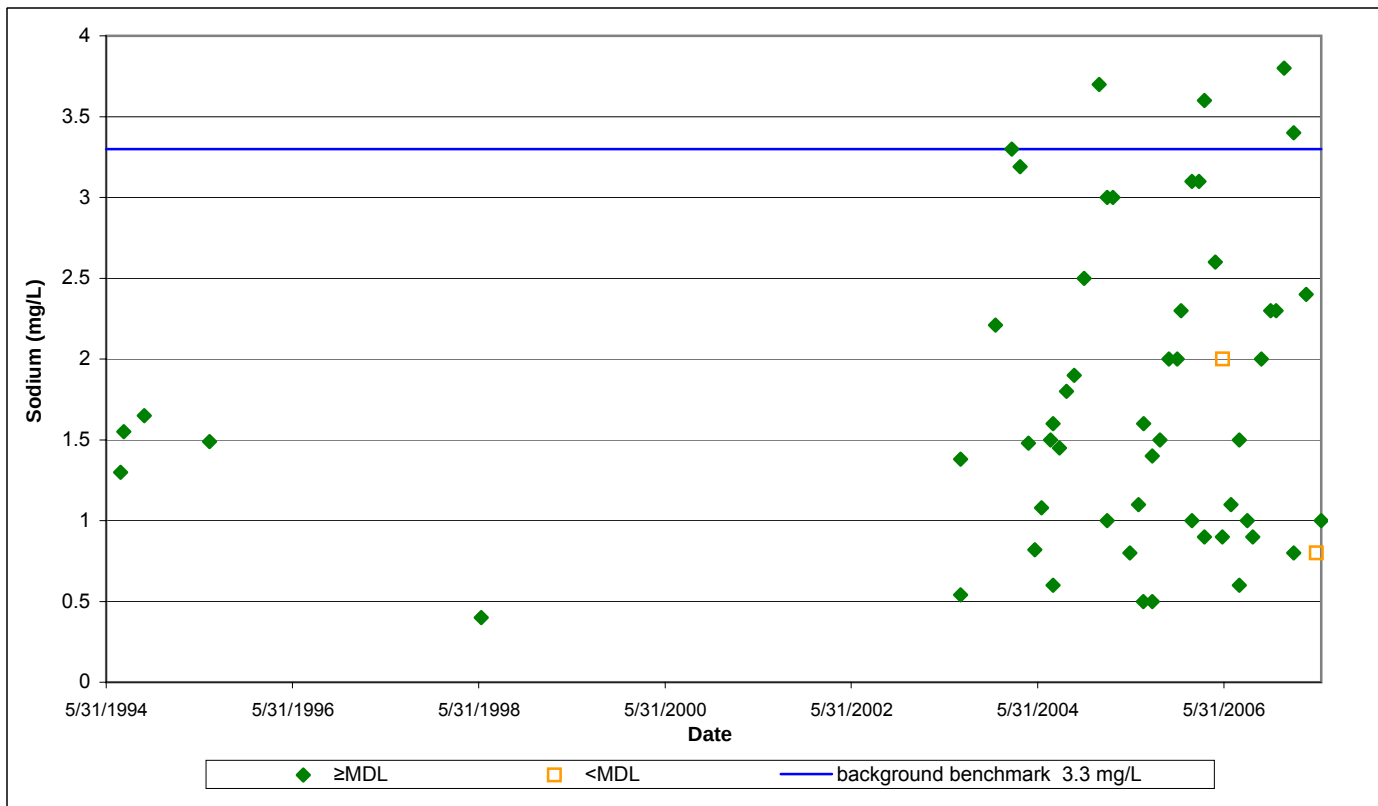
¹ Dataset used to develop background benchmark modified with the removal of elevated < MDLs

Figure A.81: Scatterplot of potassium concentrations over time for background stations KV1 & KV37¹.



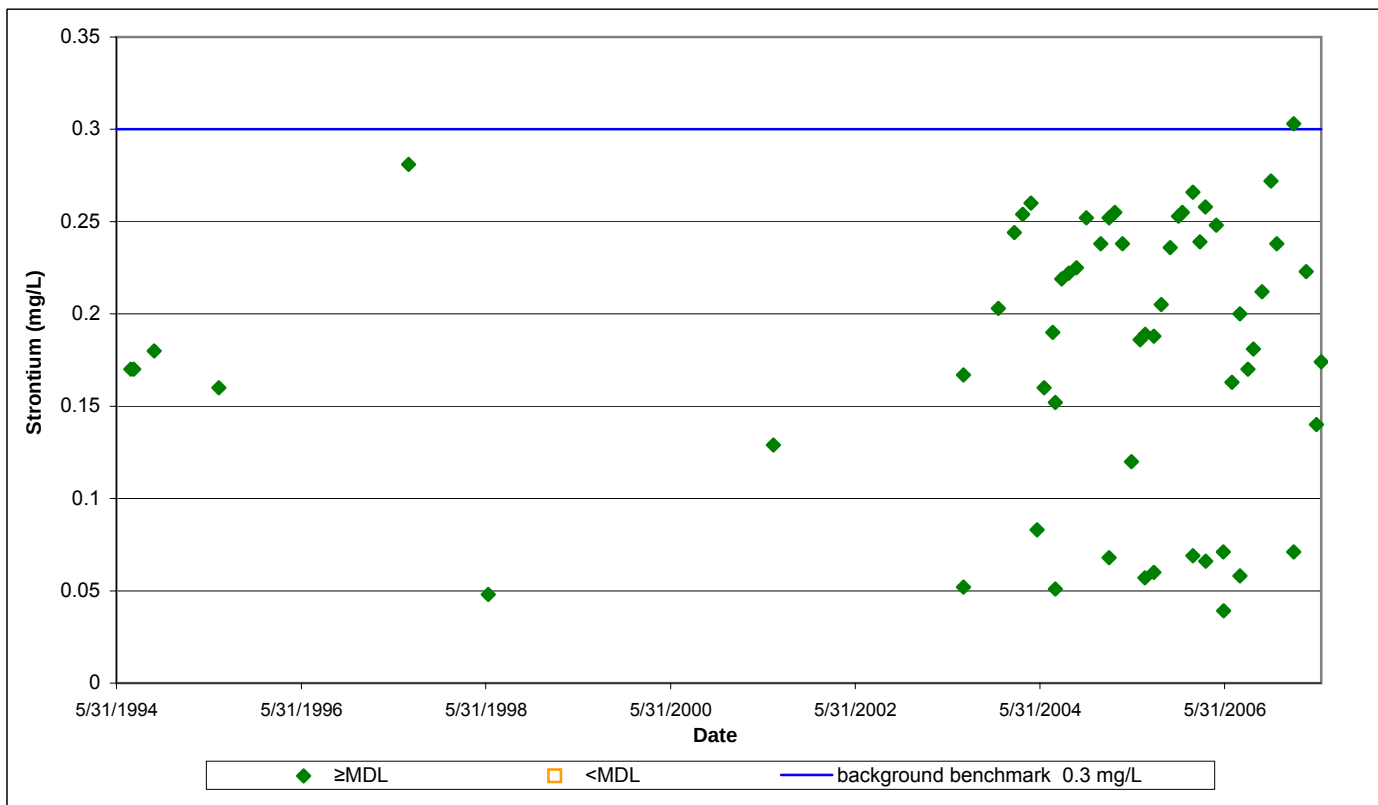
¹ Dataset used to develop background benchmark truncated to July 20, 2004 and elevated < MDL removed

Figure A.82: Scatterplot of selenium concentrations over time for background stations KV1 & KV37¹.



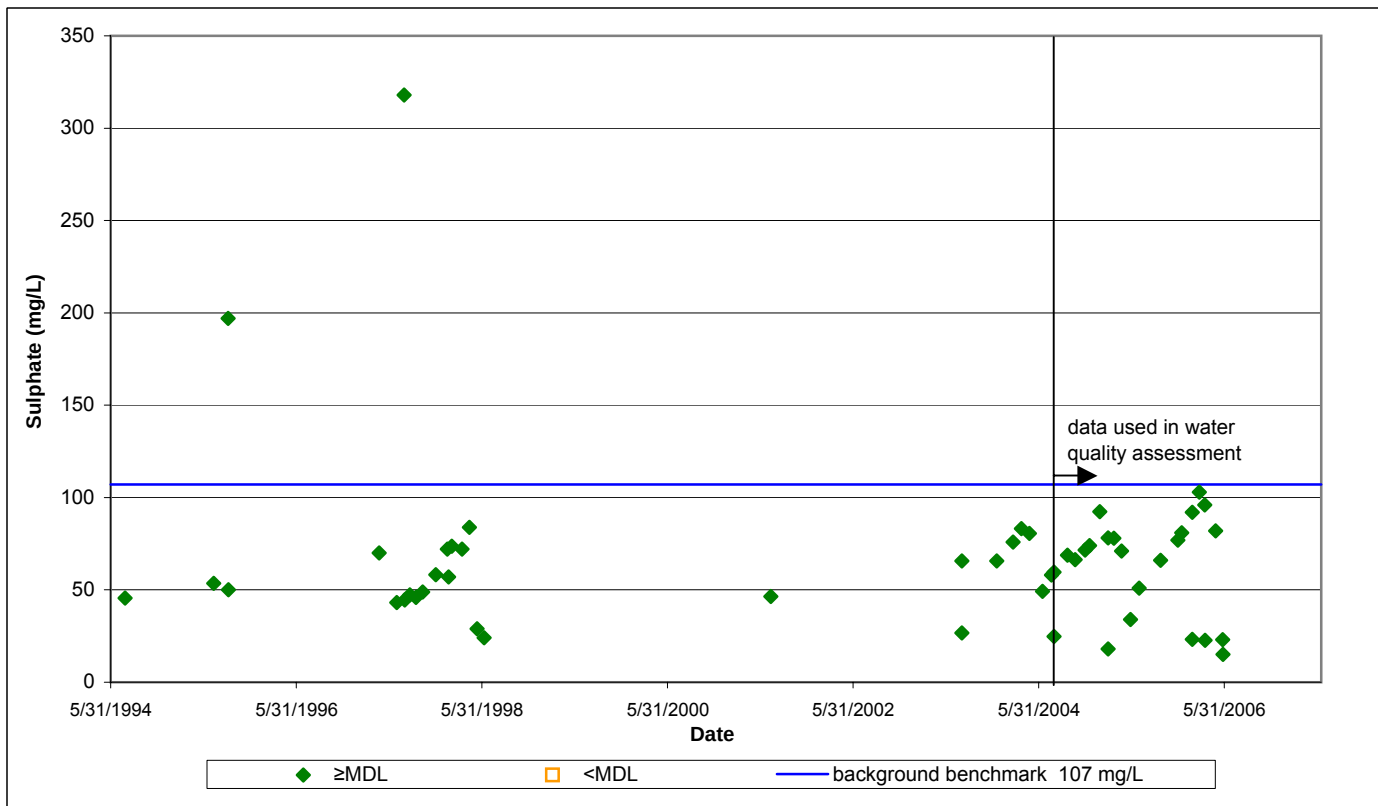
¹ Dataset used to develop a background benchmark as shown

Figure A.85: Scatterplot of sodium concentrations over time for background stations KV1 & KV37 ¹.



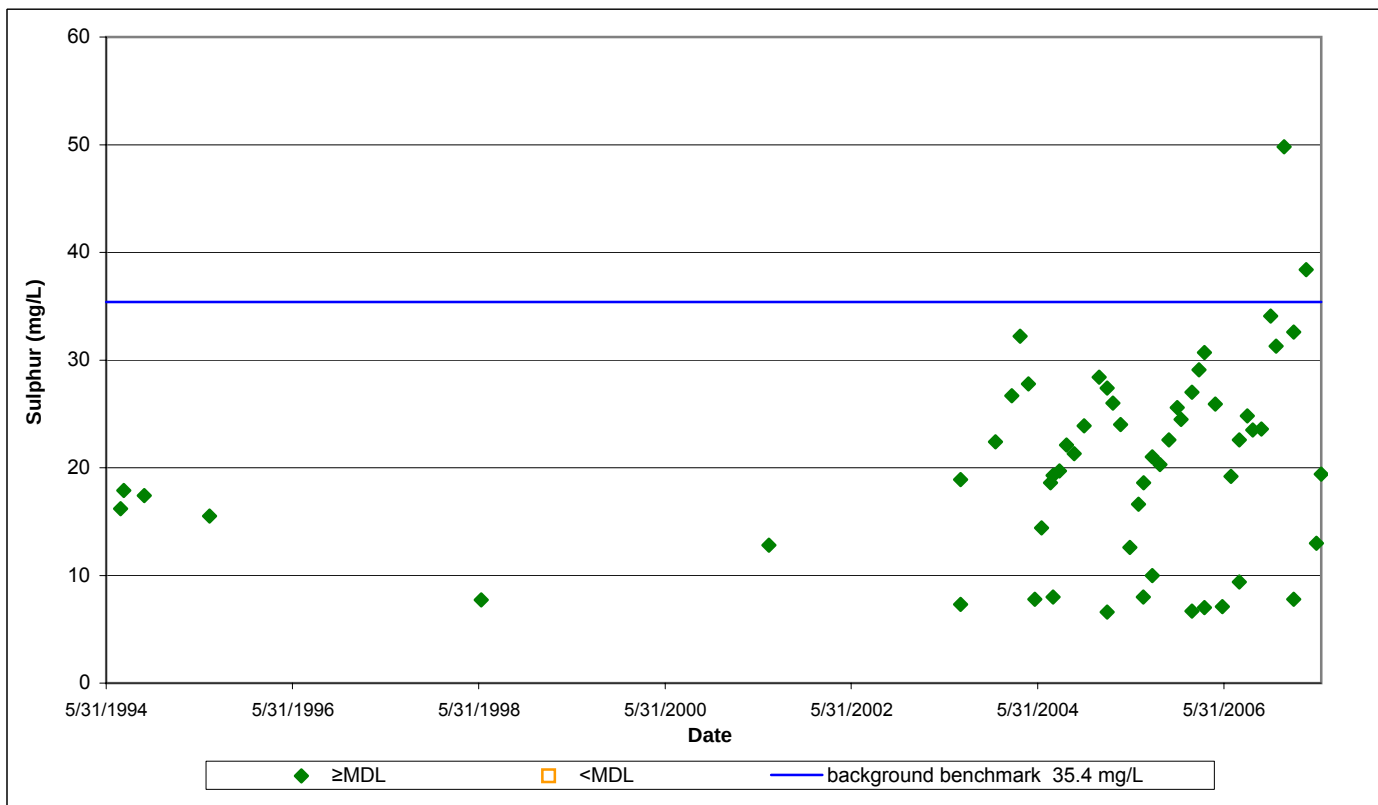
¹ Dataset used to develop a background benchmark as shown

Figure A.86: Scatterplot of strontium concentrations over time for background stations KV1 & KV37 ¹.



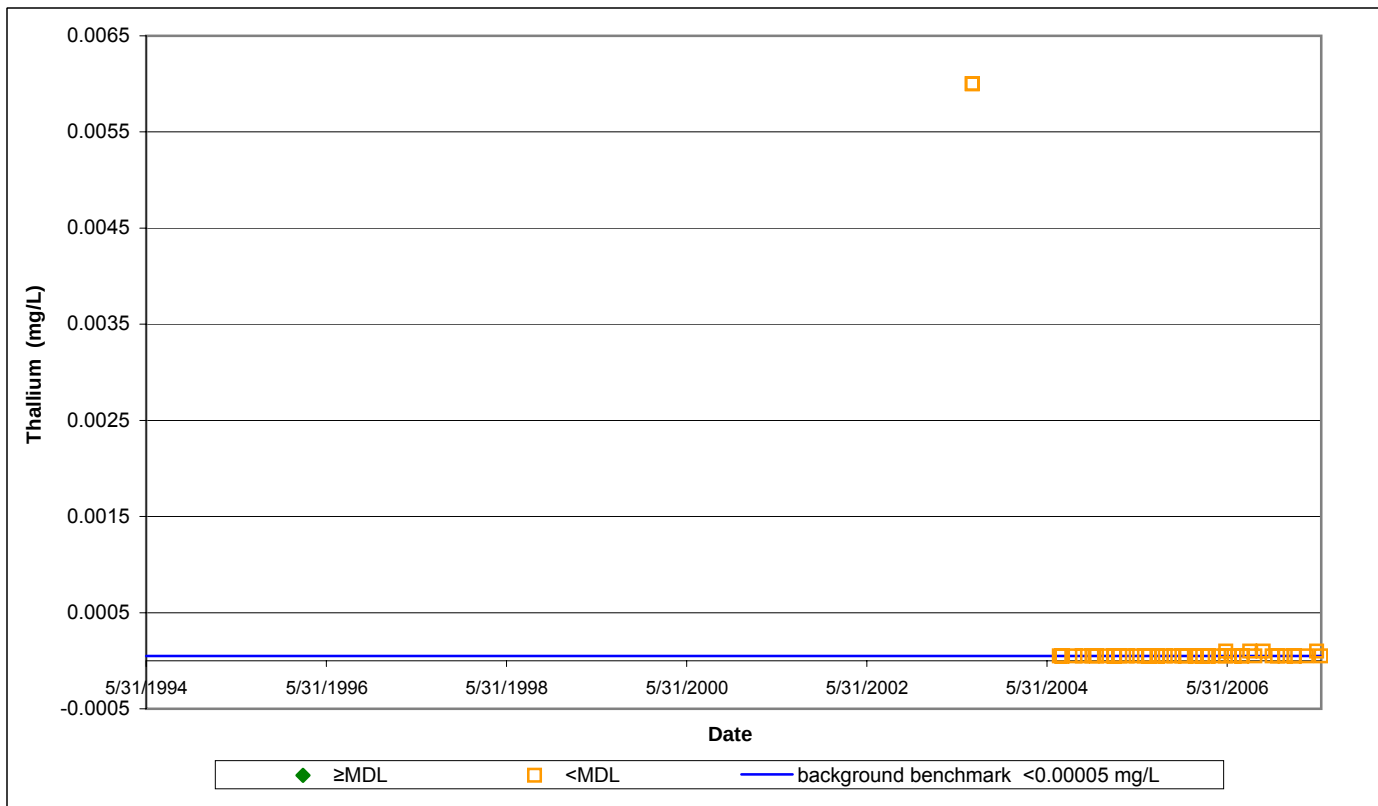
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.87: Scatterplot of sulphate concentrations over time for background stations KV1 & KV37 ¹.



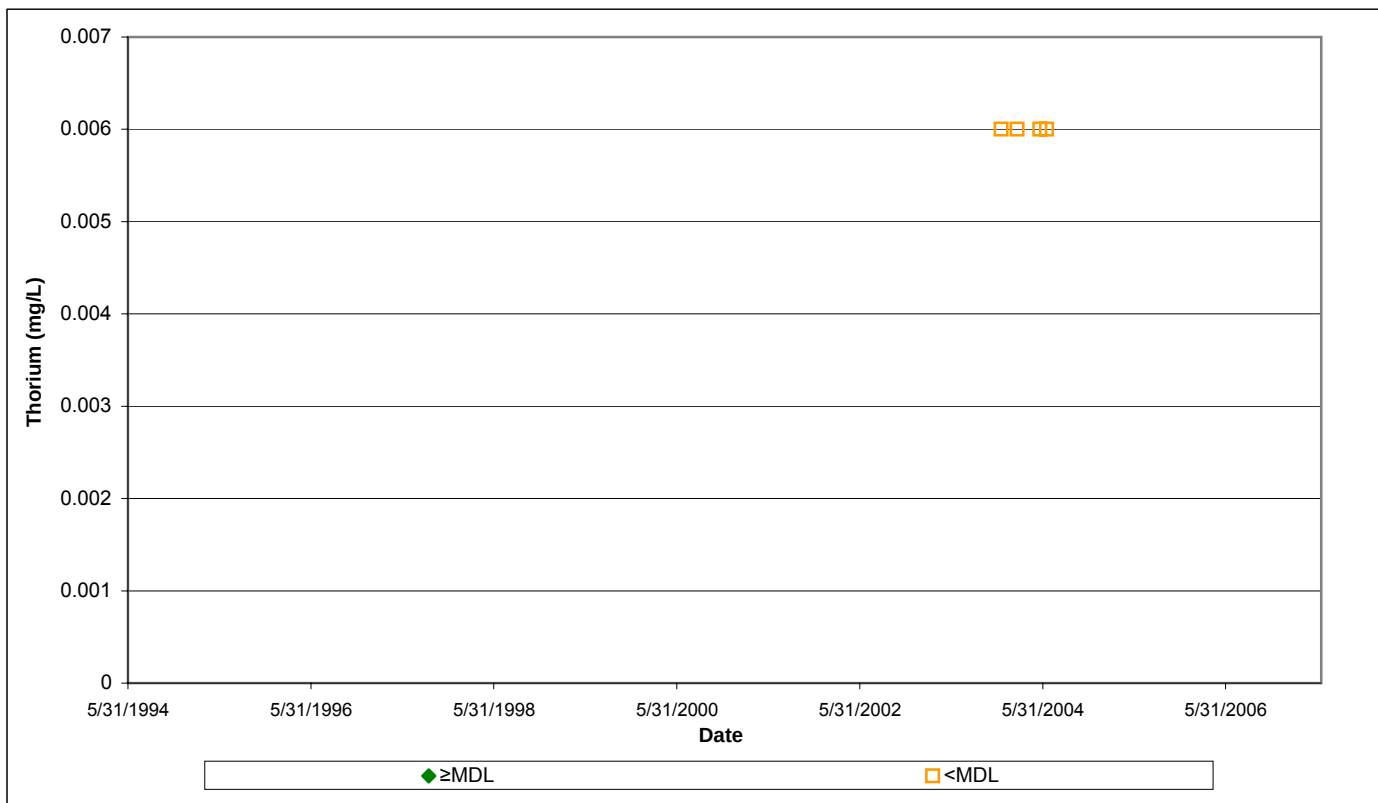
¹ Dataset used to develop a background benchmark as shown

Figure A.88: Scatterplot of sulphur concentrations over time for background stations KV1 & KV37 ¹.



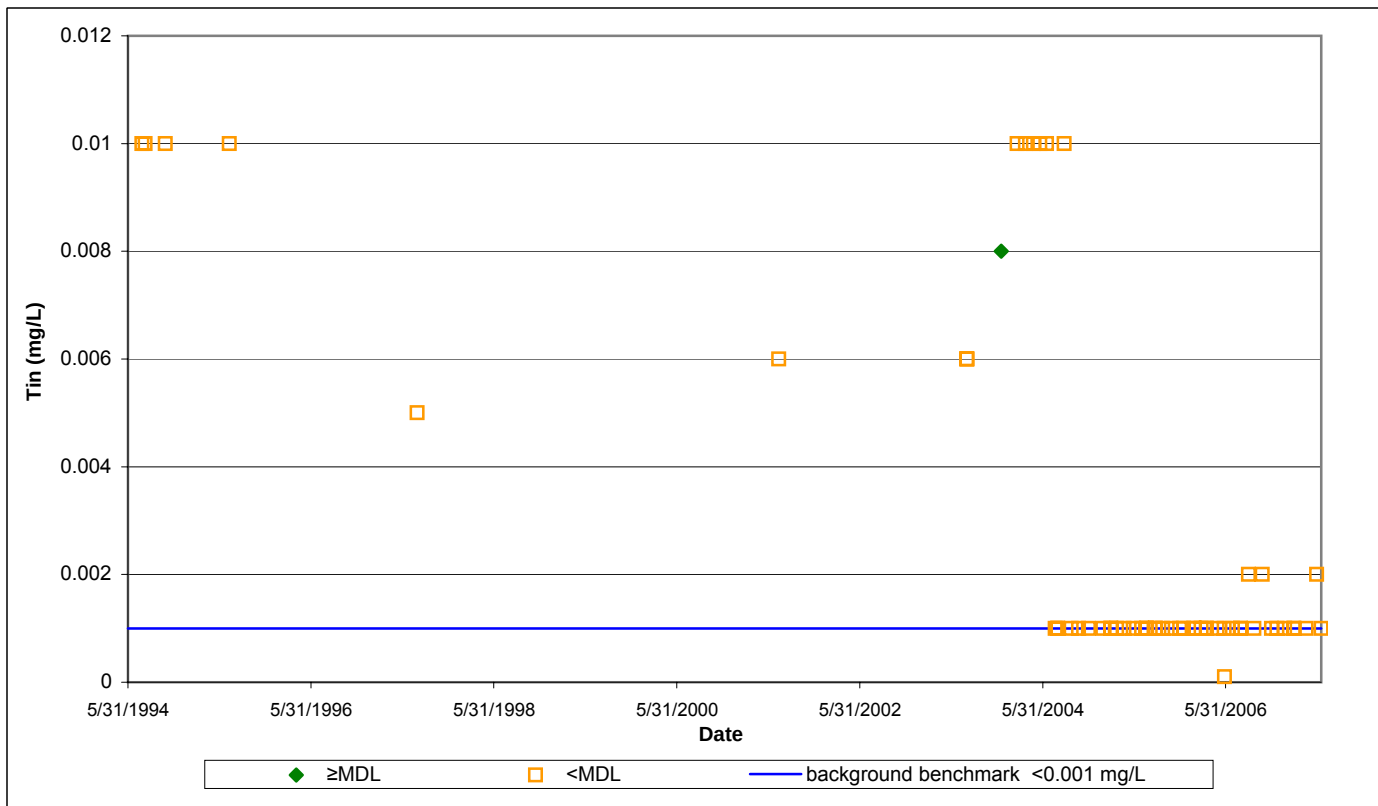
¹ Lowest most recent < MDL value set as background benchmark

Figure A.89: Scatterplot of thallium concentrations over time for background stations KV1 & KV37¹.



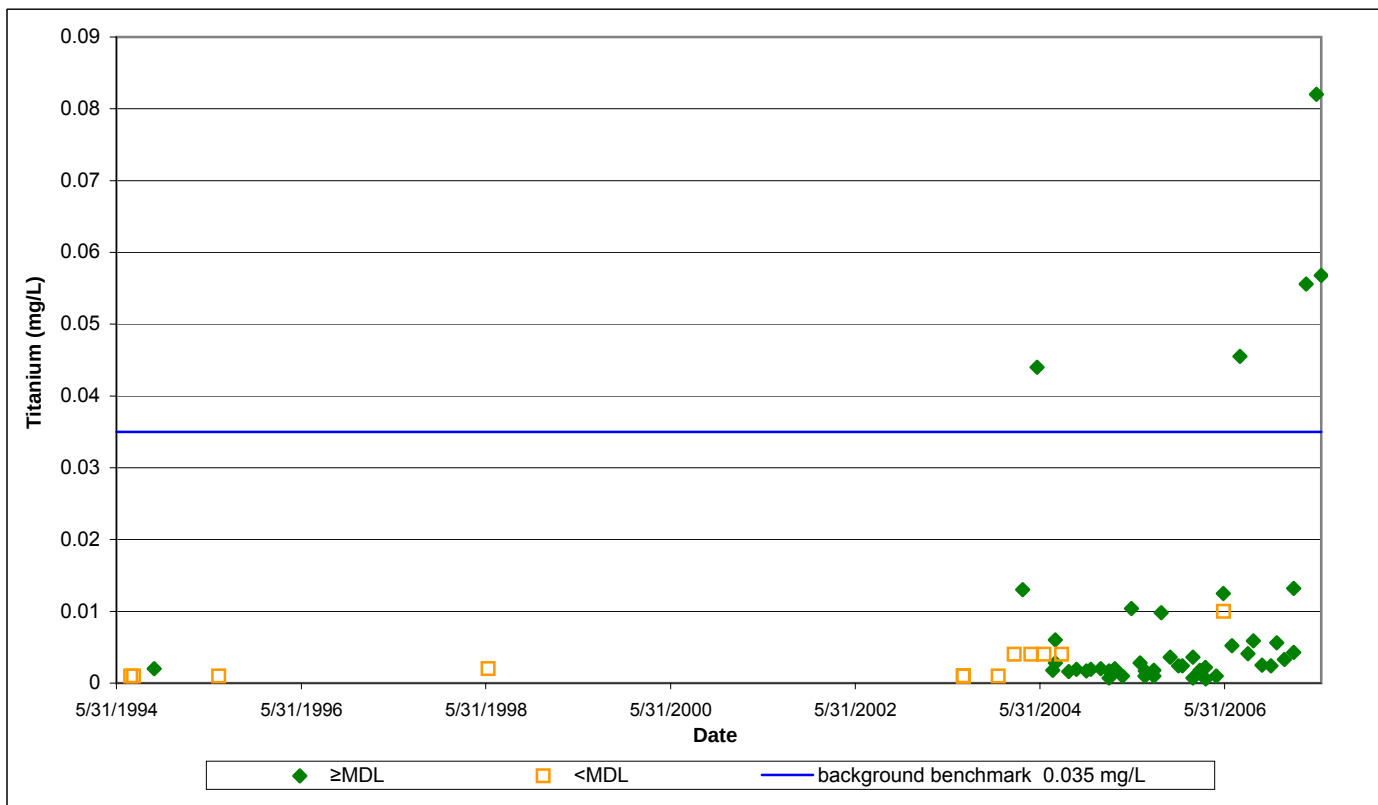
¹ Dataset not used to develop a background benchmark due the small sample size and all data being < MDL

Figure A.90: Scatterplot of thorium concentrations over time for background stations KV1 & KV37¹.



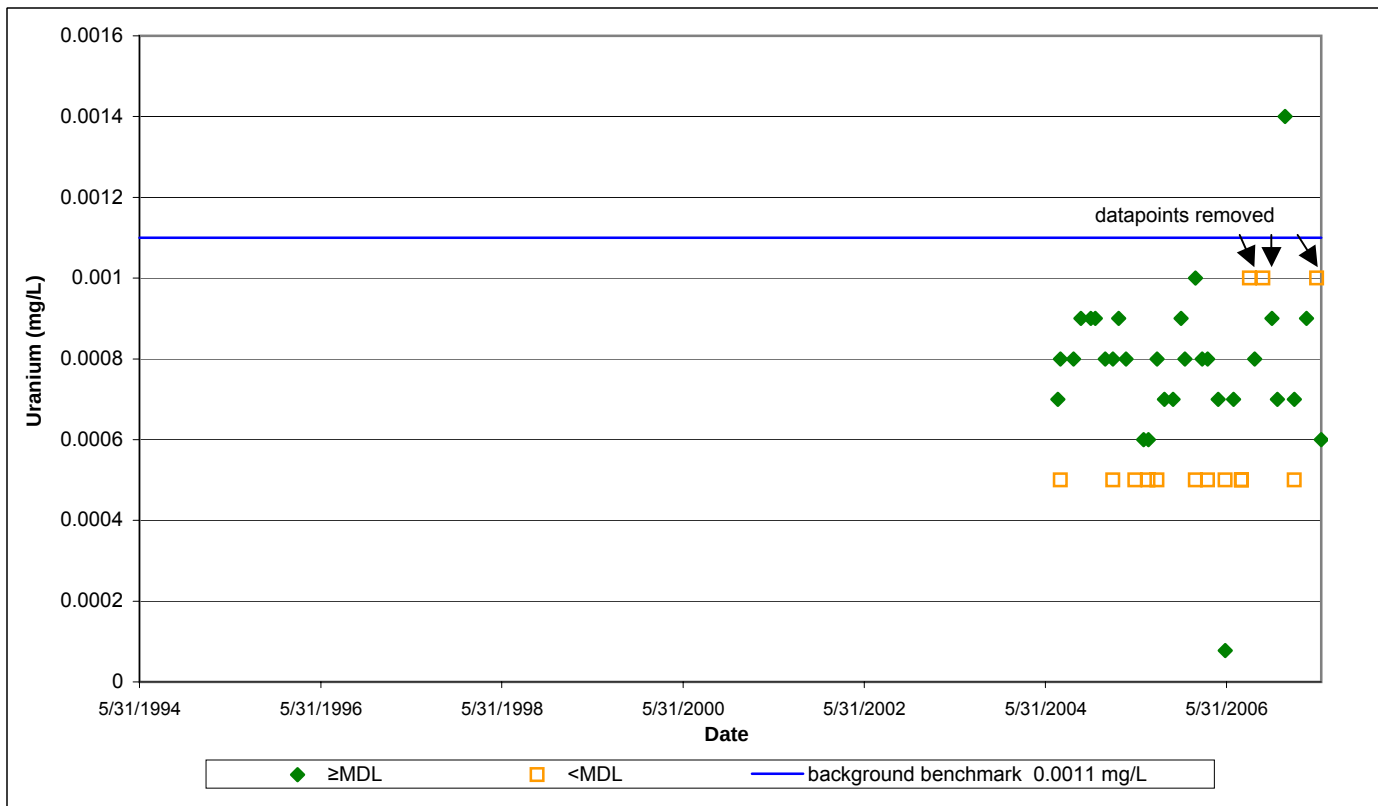
¹ Lowest most recent $<$ MDL value set as background benchmark

Figure A.91: Scatterplot of tin concentrations over time for background stations KV1 & KV37¹.



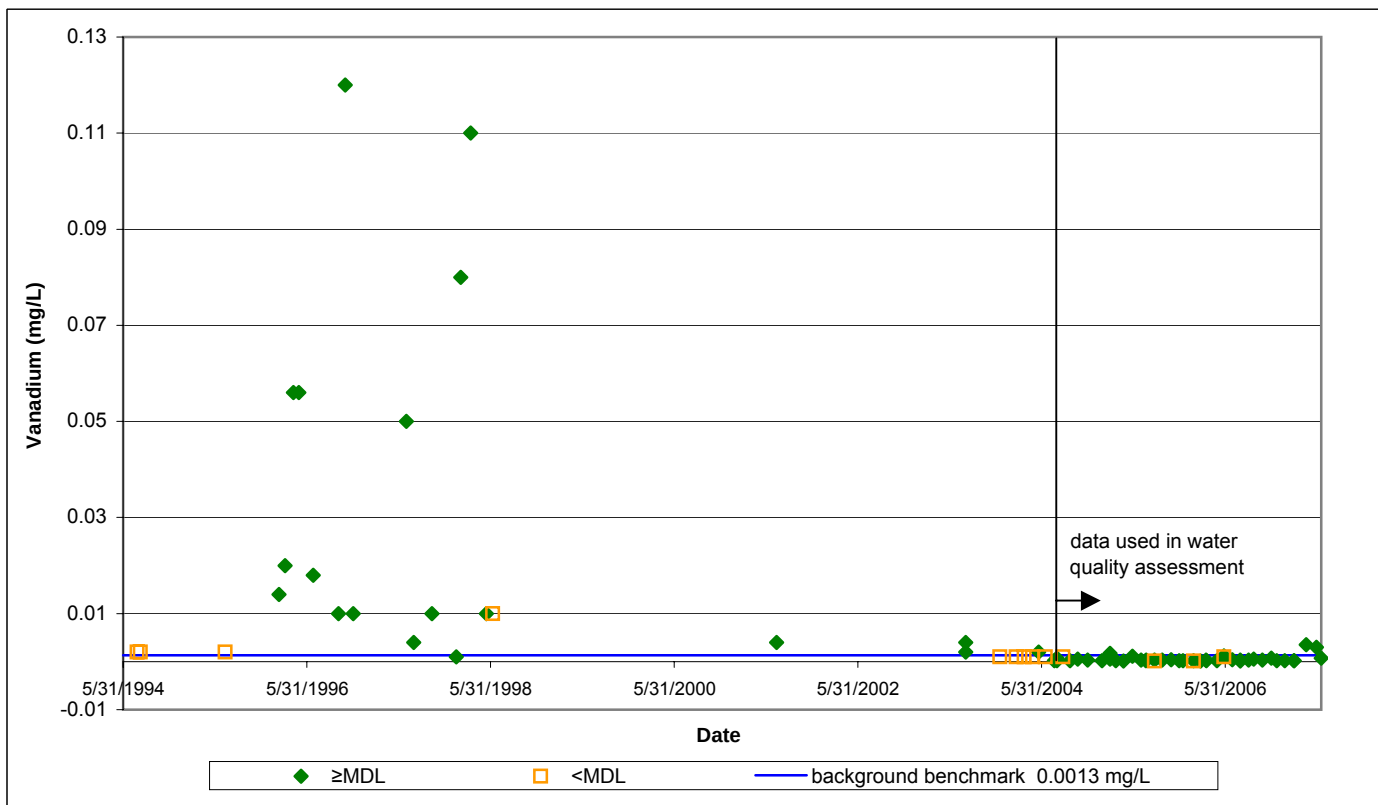
¹ Dataset used to develop a background benchmark as shown

Figure A.92: Scatterplot of titanium concentrations over time for background stations KV1 & KV37¹.



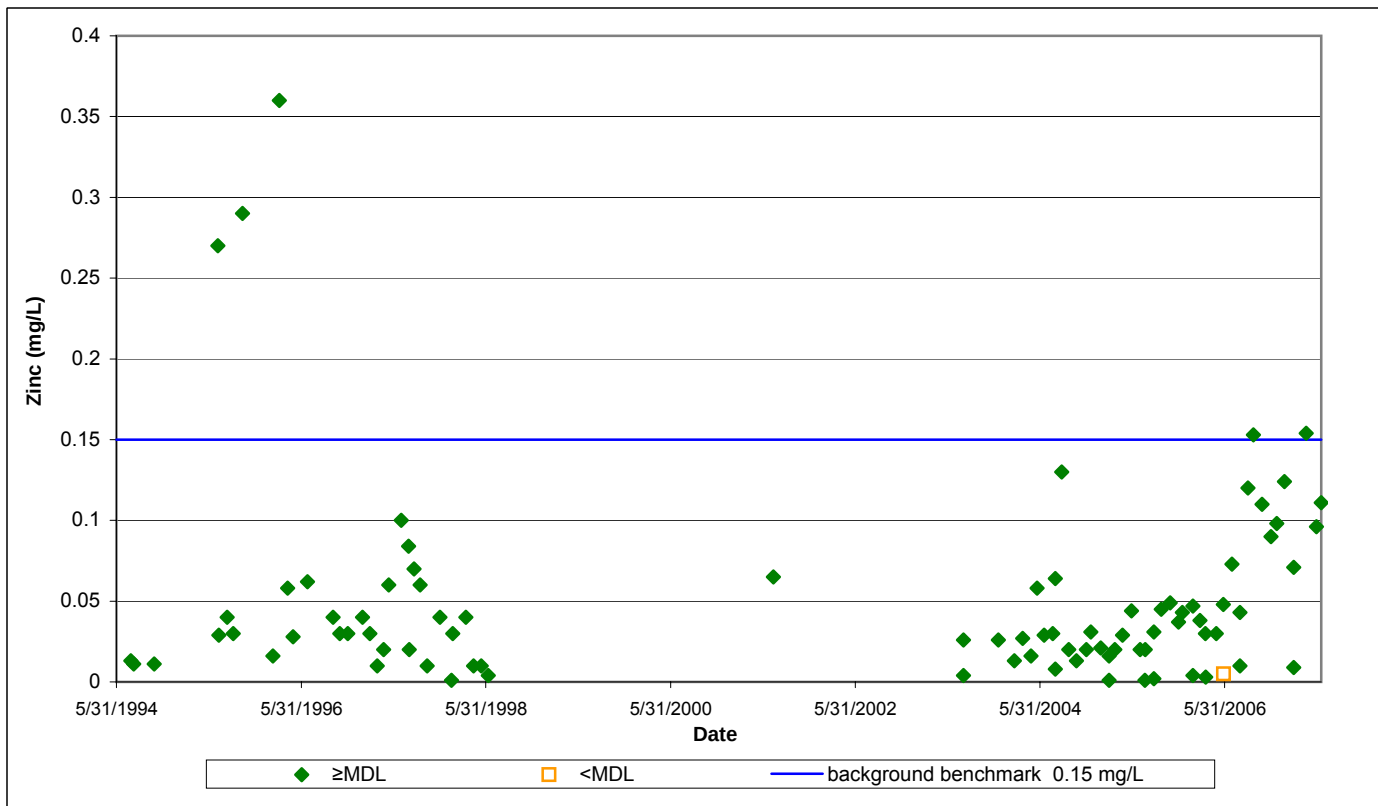
¹ Dataset used to develop background benchmark modified with the removal of elevated $<$ MDLs

Figure A.95: Scatterplot of uranium concentrations over time for background stations KV1 & KV37 ¹.



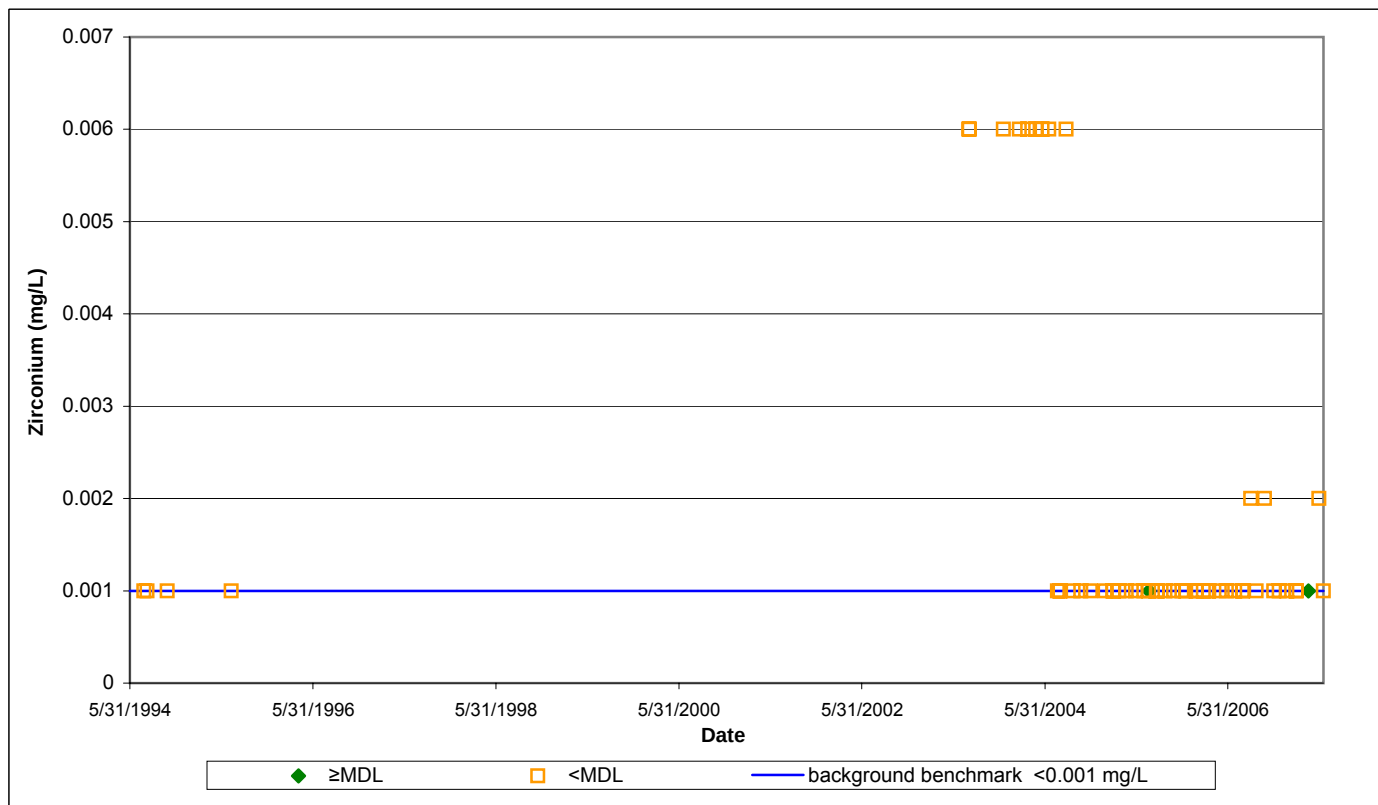
¹ Dataset used to develop background benchmark truncated to July 20, 2004

Figure A.96: Scatterplot of vanadium concentrations over time for background stations KV1 & KV37 ¹.



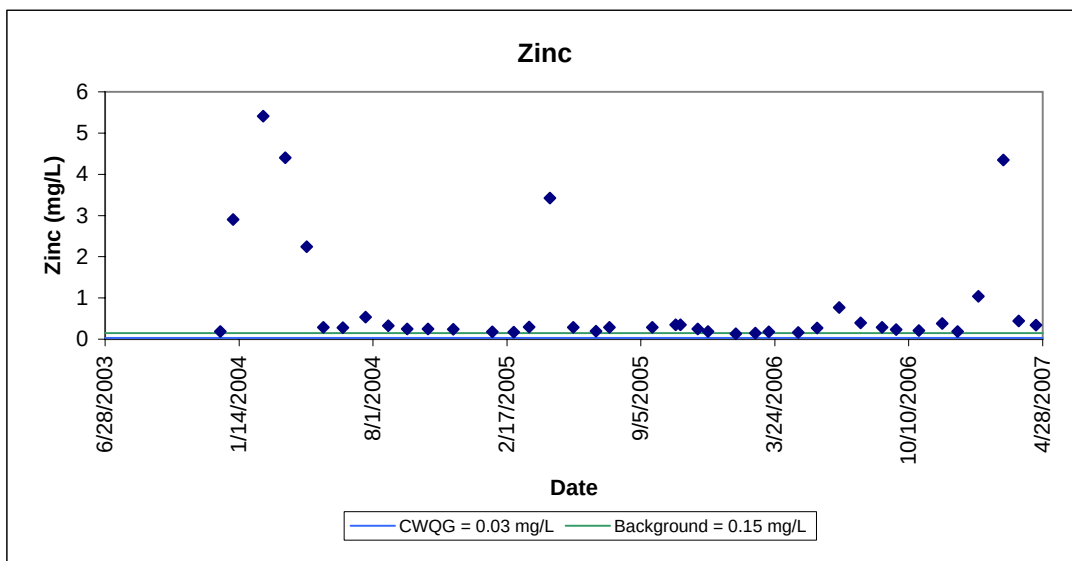
¹ Dataset used to develop a background benchmark as shown

Figure A.97: Scatterplot of zinc concentrations over time for background stations KV1 & KV37¹.

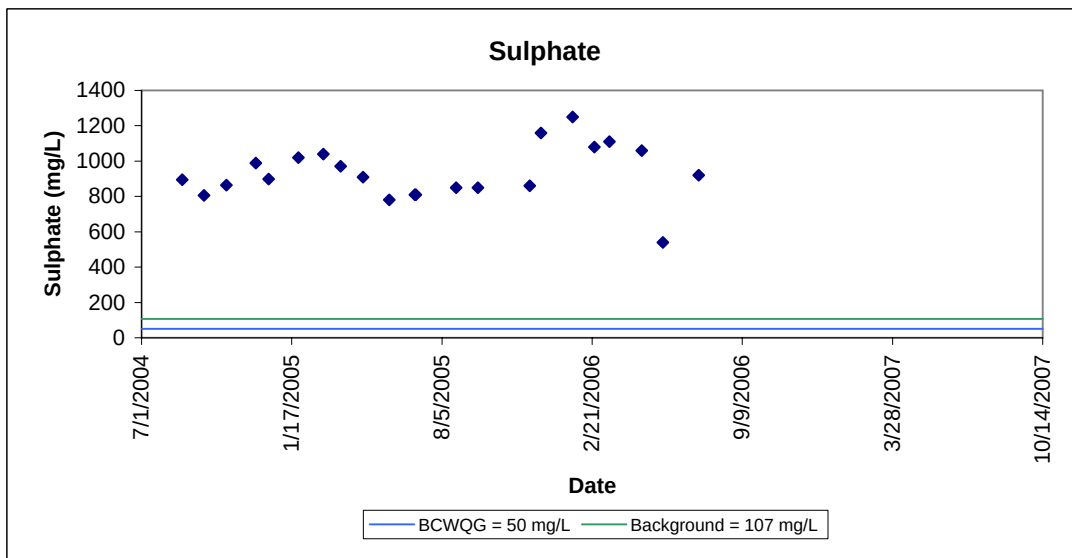
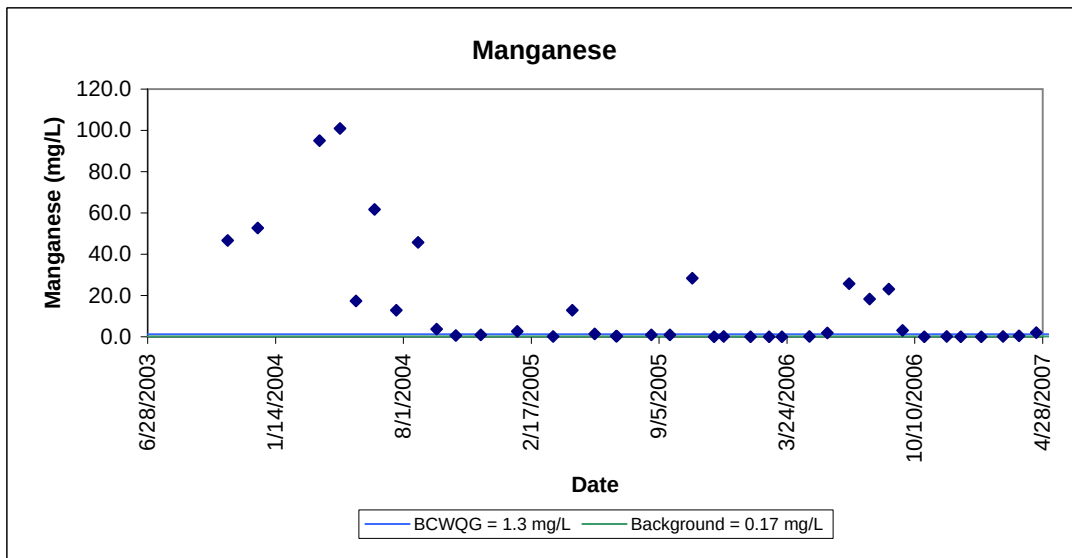
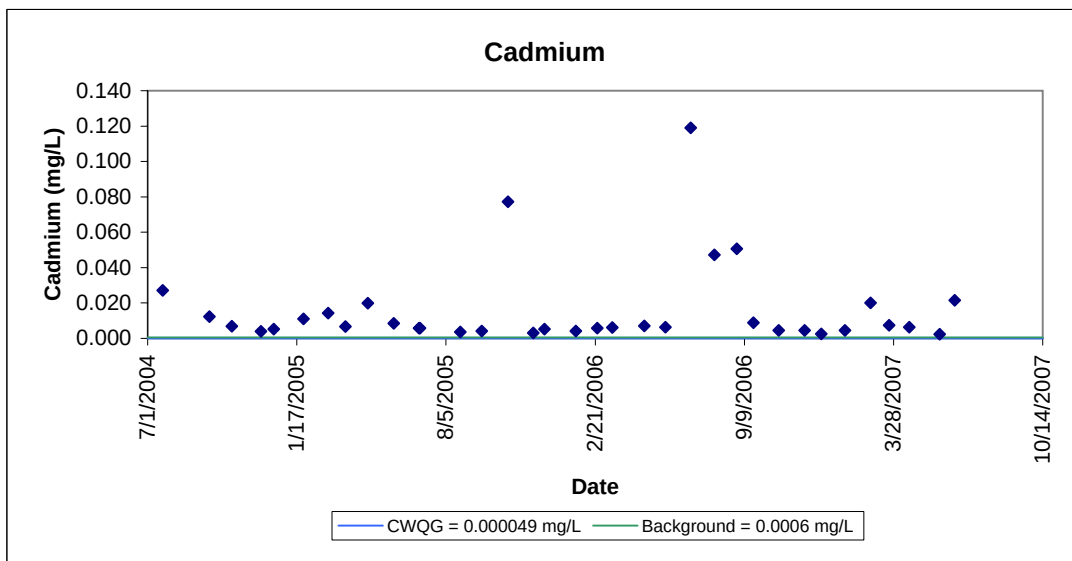


¹ Lowest most recent < MDL value set as background benchmark

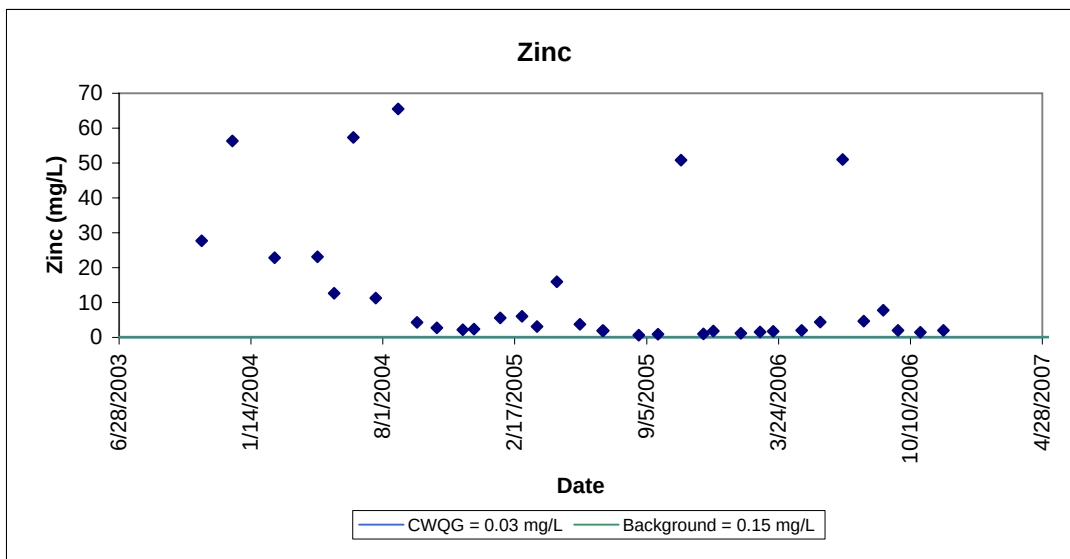
Figure A.98: Scatterplot of zirconium concentrations over time for background stations KV1 & KV37¹.



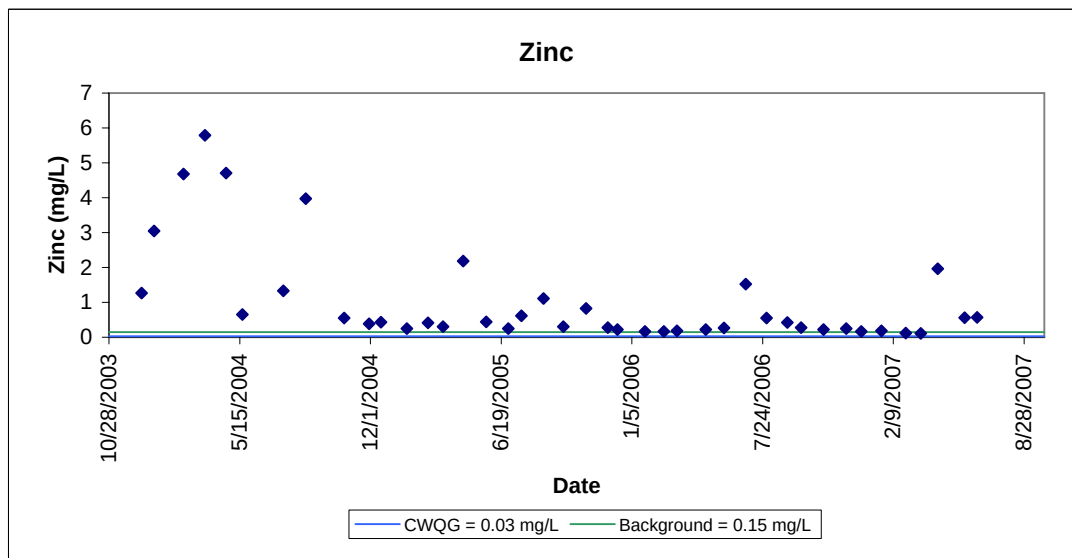
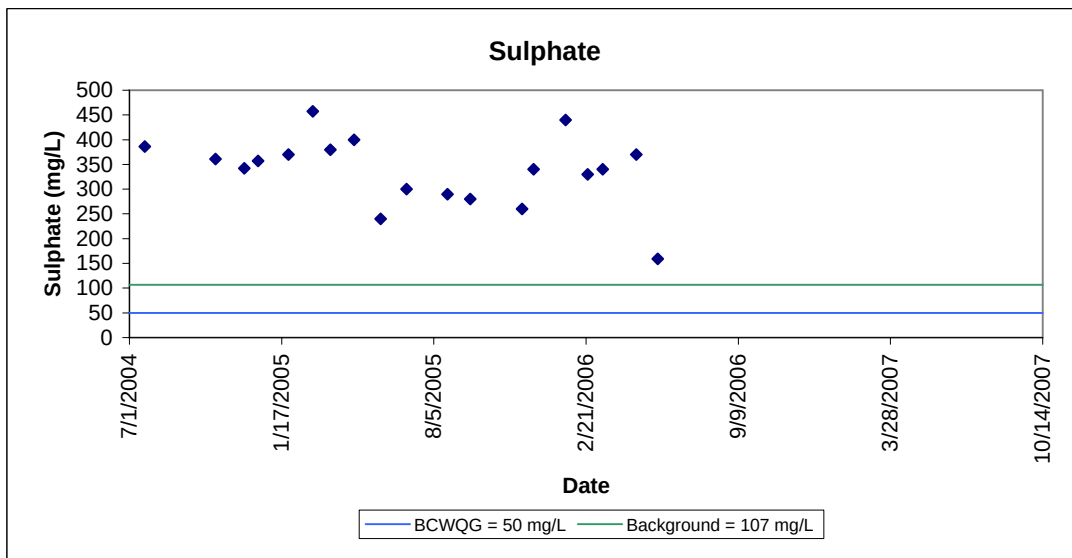
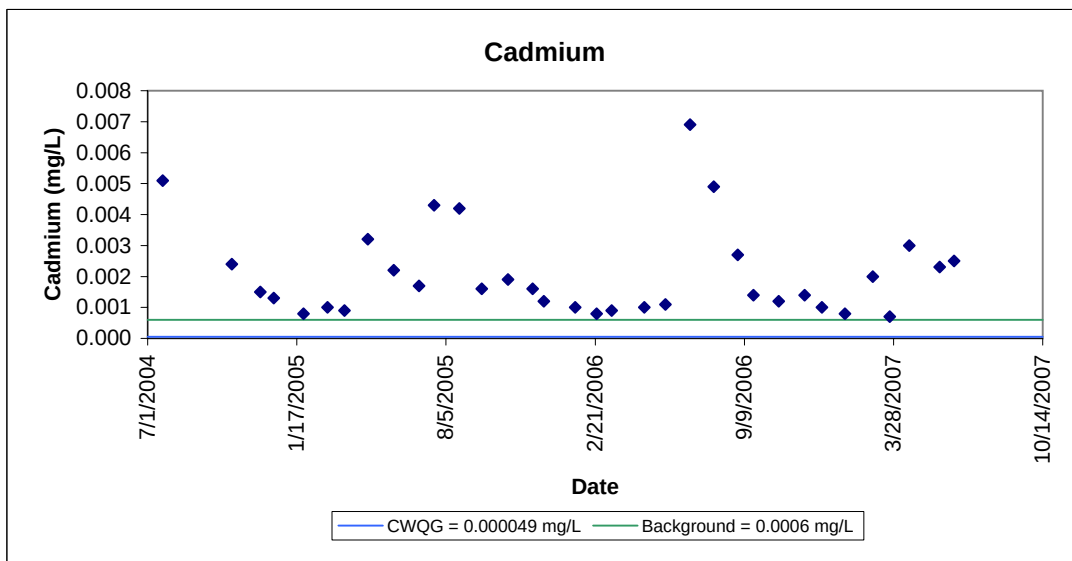
Appendix Figure A.100: Long-Term Temporal Trends for KV16, United Keno Hill, 1994 - 2007.



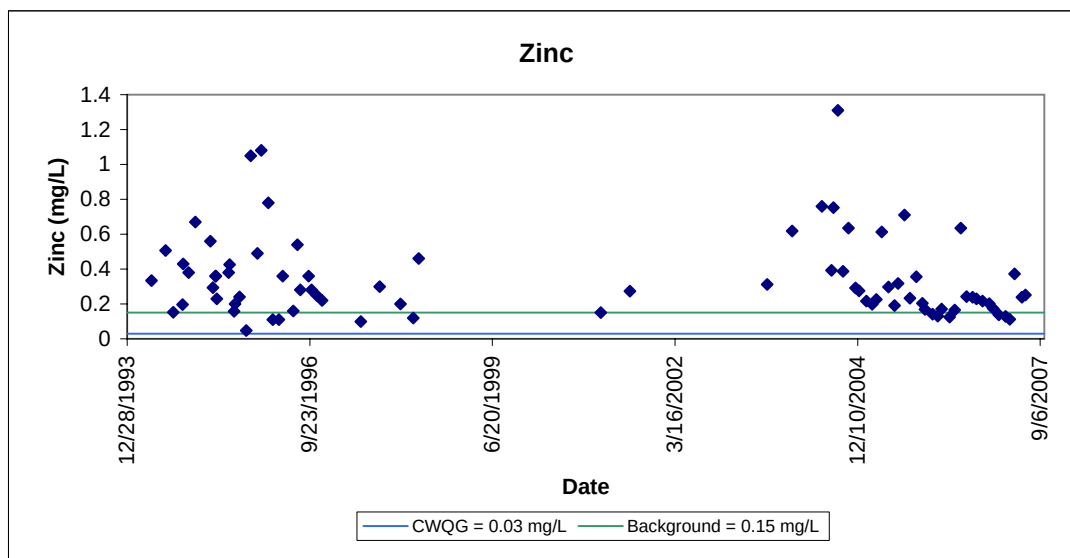
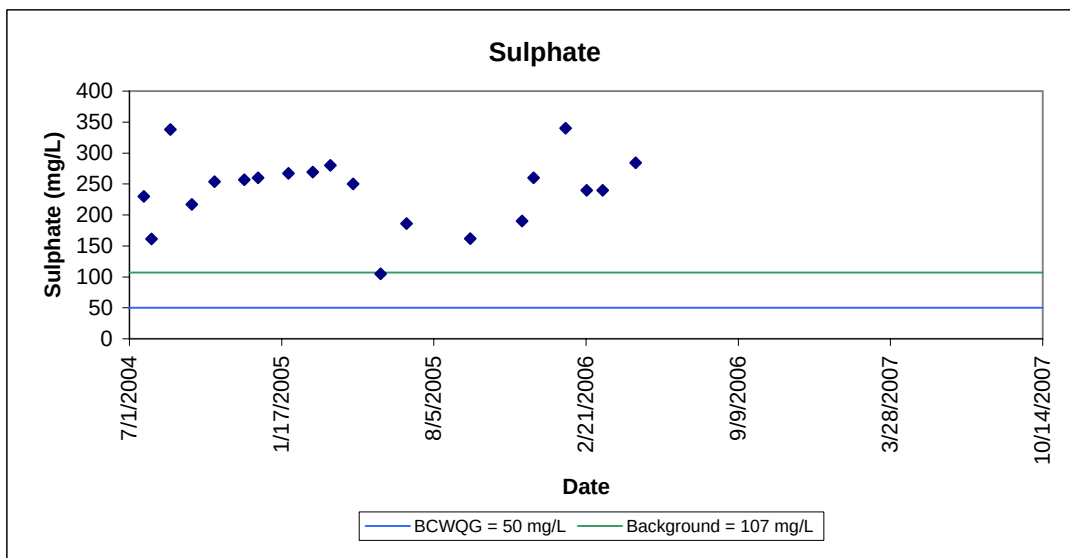
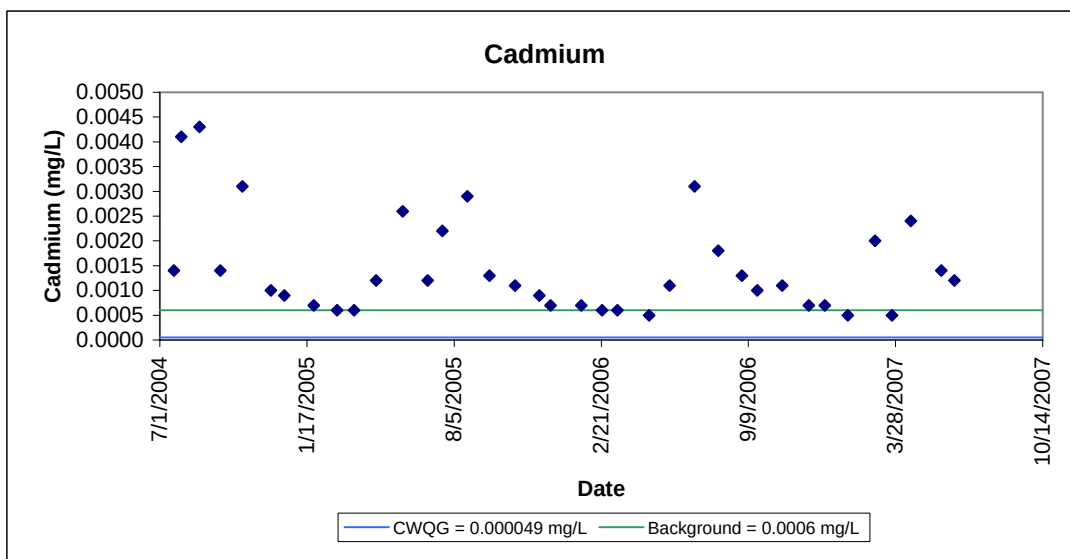
Appendix Figure A.101: Long-Term Temporal Trends for KV29, United Keno Hill, 1994 - 2007.



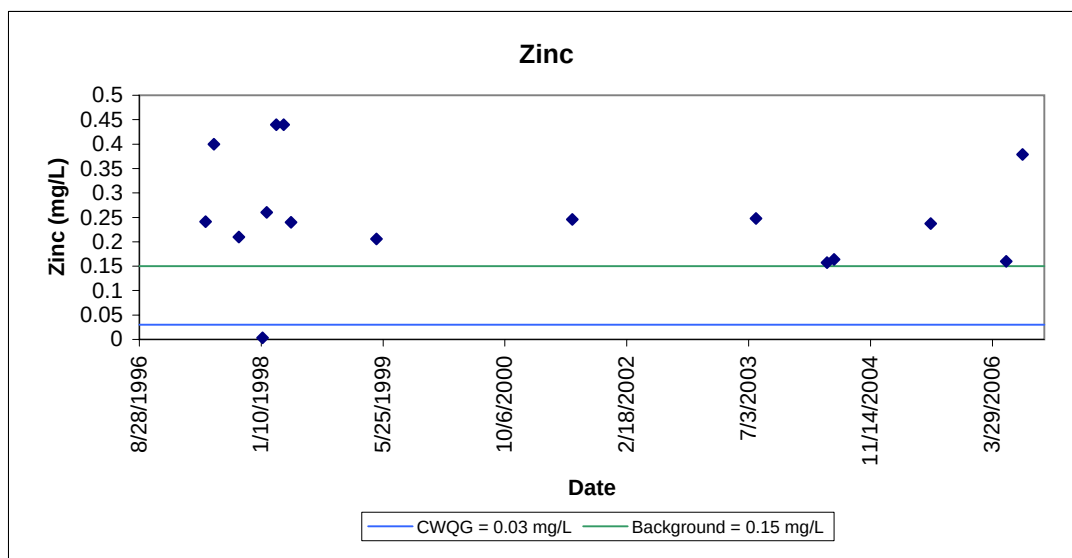
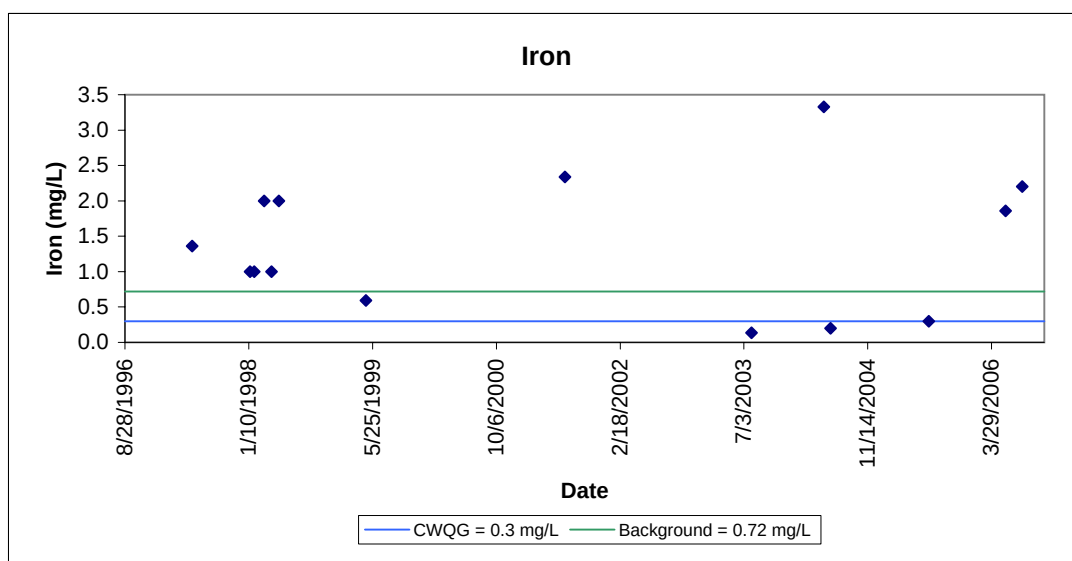
Appendix Figure A.101: Long-Term Temporal Trends for KV29, United Keno Hill, 1994 - 2007.



Appendix Figure A.102: Long-Term Temporal Trends for KV30, United Keno Hill, 1994 - 2007.



Appendix Figure A.103: Long-Term Temporal Trends for KV7, United Keno Hill, 1994 - 2007.



Appendix Figure A.105: Long-Term Temporal Trends for KV47, United Keno Hill, 1994 - 2007.

APPENDIX B

TOXICITY SUMMARY INFORMATION FOR CADMIUM AND ZINC

Appendix Table B.1: Summary of Studies Reporting Cadmium Toxicity to Aquatic Biota at Concentrations ≤ 0.01 mg/L

Source	Type	Scientific Name	Common Name	Hardness (mg/L as CaCO3)	Effect Concentration ^a (mg/L)	Hardness Adjusted Value ^b (mg/L)	Reference ^c
EPA 2001	Acute	<i>Oncorhynchus mykiss</i>	Rainbow trout (1130 mg)	30.2	0.00038	0.0006	Stratus Consulting 1999
		<i>Oncorhynchus mykiss</i>	Rainbow trout (659 mg)	29.3	0.00047	0.0008	Stratus Consulting 1999
		<i>Oncorhynchus mykiss</i>	Rainbow trout (1150 mg)	31.7	0.00051	0.0008	Stratus Consulting 1999
		<i>Daphnia magna</i> (genotype A)	Water flea	170	0.0036	0.0010	Baird et al. 1991
		<i>Oncorhynchus mykiss</i>	Rainbow trout (263 mg)	30.7	0.00071	0.0012	Stratus Consulting 1999
		<i>Daphnia magna</i> (genotype B)	Water flea	170	0.0045	0.0013	Baird et al. 1991
		<i>Morone saxatilis</i>	Striped bass (larva)	34.5	0.001	0.0015	Hughes 1973
		<i>Salvelinus confluentus</i>	Bull trout (76.1 mg)	30.7	0.00091	0.0015	Stratus Consulting 1999
		<i>Salvelinus confluentus</i>	Bull trout (218 mg)	30.2	0.0009	0.0015	Stratus Consulting 1999
		<i>Oncorhynchus mykiss</i>	Rainbow trout (289 mg)	89.3	0.00285	0.0016	Stratus Consulting 1999
		<i>Salvelinus confluentus</i>	Bull trout (221 mg)	31.7	0.001	0.0016	Stratus Consulting 1999
		<i>Salmo trutta</i>	Brown trout	43.5	0.0014	0.0016	Spehar and Carlson 1984a,b
		<i>Morone saxatilis</i>	Striped bass (63 d)	285	0.01	0.0017	Palawski et al. 1985
		<i>Salvelinus confluentus</i>	Bull trout (200 mg)	29.3	0.00099	0.0017	Stratus Consulting 1999
		<i>Salvelinus fontinalis</i>	Brook trout	42	<0.0015	<0.00179	Carroll et al. 1979
		<i>Oncorhynchus mykiss</i>	Rainbow trout (juv)	41	0.0015	0.0018	Buhl and Hamilton 1991
		<i>Oncorhynchus mykiss</i>	Rainbow trout (299 mg)	30	0.00129	0.0022	Stratus Consulting 1999
		<i>Oncorhynchus mykiss</i>	Rainbow trout (parr)	23	0.001	0.0022	Chapman 1978
		<i>Daphnia magna</i> (genotype A-1)	Water flea	170	0.009	0.0026	Baird et al. 1991
		<i>Daphnia magna</i> (genotype A-2)	Water flea	170	0.009	0.0026	Baird et al. 1991
		<i>Oncorhynchus mykiss</i>	Rainbow trout	43.5	0.0023	0.0027	Spehar and Carlson 1984a,b
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (juv)	21	0.0011	0.0027	Finlayson and Verrue 1982
		<i>Daphnia magna</i> (<24hr)	Water flea	170	0.0095	0.0027	Guilhermino et al. 1996
		<i>Oncorhynchus mykiss</i>	Rainbow trout (fry)	9.2	<0.0005	<0.00280	Cusimano et al. 1986
		<i>Oncorhynchus mykiss</i>	Rainbow trout	31	0.00175	0.0028	Davies 1976
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (juv)	25	0.00141	0.0029	Chapman 1982
		<i>Oncorhynchus mykiss</i>	Rainbow trout (swim-up)	23	0.0013	0.0029	Chapman 1975, 1978
		<i>Morone saxatilis</i>	Striped bass (fingerling)	34.5	0.002	0.0029	Hughes 1973
		<i>Salvelinus confluentus</i>	Bull trout (72.7 mg)	89.3	0.00606	0.0034	Stratus Consulting 1999
		<i>Oncorhynchus mykiss</i>	Rainbow trout (8.8 g)	44.4	0.003	0.0034	Phipps and Holcombe 1985
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (swim-up)	23	0.0018	0.0040	Chapman 1975, 1978
		<i>Tanytarsus dissimilis</i>	Chironomid	47	0.0038	0.0040	Anderson et al. 1980
		<i>Oncorhynchus kisutch</i>	Coho salmon (juv)	41	0.0034	0.0042	Buhl and Hamilton 1991
		<i>Salvelinus confluentus</i>	Bull trout (84.2 mg)	30	0.00289	0.0049	Stratus Consulting 1999
		<i>Morone saxatilis</i>	Striped bass (63 d)	40	0.004	0.0050	Palawski et al. 1985
		<i>Oncorhynchus kisutch</i>	Coho salmon (parr)	22	0.0027	0.0062	Chapman 1975
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (smolt)	23	>0.0029	>0.00639	Chapman 1975, 1978
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon	23	0.0035	0.0077	Chapman 1975, 1978
		<i>Oncorhynchus mykiss</i>	Rainbow trout (smolt)	23	0.0041, >0.0029	0.00903, >0.00639	Chapman 1975
		<i>Daphnia magna</i> (<24hr)	Water flea	51	0.0099	0.0097	Chapman et al. Manuscript
		<i>Utterbackia imbecilis</i>	Mussel (juv)	39	0.009	0.0116	Keller and Zam 1991
		<i>Simocephalus serrulatus</i>	Water flea	11.1	0.007	0.0323	Giesy et al. 1977
		<i>Daphnia magna</i>	Water flea	-	<0.0016	-	Anderson 1948
		<i>Daphnia magna</i> (one instar)	Water flea	-	0.00247	-	Barata and Baird 2000
		<i>Daphnia magna</i> (two instars)	Water flea	-	0.00334	-	Barata and Baird 2000
		<i>Oncorhynchus mykiss</i>	Rainbow trout	-	0.006	-	Kumada et al. 1973
		<i>Oncorhynchus mykiss</i>	Rainbow trout	-	0.006	-	Kumada et al. 1980
		<i>Oncorhynchus mykiss</i>	Rainbow trout (2 mo)	-	0.0066	-	Hale 1977
		<i>Oncorhynchus mykiss</i>	Rainbow trout	-	0.007	-	Kumada et al. 1973
	Chronic	<i>Daphnia magna</i>	Water flea	103	0.00021	0.00012	Chapman et al. Manuscript
		<i>Daphnia magna</i>	Water flea	53	0.00015	0.00015	Chapman et al. Manuscript
		<i>Daphnia magna</i>	Water flea	209	0.00044	0.00015	Chapman et al. Manuscript
		<i>Hyalella azteca</i>	Amphipod	280	0.00098	0.00028	Ingersoll and Kemble Unpublished
		<i>Daphnia magna</i>	Water flea	130	<0.0019	<0.00092	Borgmann et al. 1989
		<i>Oncorhynchus mykiss</i>	Rainbow trout (270d)	250	0.0043	0.00131	Brown et al. 1994
		<i>Salvelinus fontinalis</i>	Brook trout	37	0.0017	0.00217	Sauter et al. 1976
		<i>Salvelinus fontinalis</i>	Brook trout	44	0.002	0.00225	Eaton et al. 1978
		<i>Oncorhynchus kisutch</i>	Coho salmon (Lk. Supr)	44	0.0021	0.00231	Eaton et al. 1978
		<i>Oncorhynchus tshawytscha</i>	Chinnok salmon	25	0.0016	0.00261	Chapman 1975
		<i>Salvelinus fontinalis</i>	Brook trout	44	0.0024	0.00264	Benoit et al. 1976
		<i>Chironomus tentans</i>	Midge	280	0.01	0.00280	Ingersoll and Kemble Unpublished
		<i>Daphnia magna</i>	Water flea	150	0.0071	0.00313	Bodar et al. 1988b
		<i>Aplexa hypnorum</i>	Snail	45.3	0.0035	0.00372	Holcombe et al. 1984
		<i>Jordanella floridae</i>	Flagfish	47.5	0.0044	0.00459	Carlson et al. 1982
		<i>Jordanella floridae</i>	Flagfish	47.5	0.005	0.00518	Carlson et al. 1982
		<i>Daphnia pulex</i>	Water flea	65	0.0075	0.00617	Niederlehner 1984
		<i>Aplexa hypnorum</i>	Snail	45.3	0.0058	0.00624	Holcombe et al. 1984
		<i>Jordanella floridae</i>	Flagfish	44	0.0058	0.00637	Spehar 1976a
		<i>Salmo trutta</i>	Brown trout	44	0.0067	0.00733	Eaton et al. 1978
		<i>Catostomus commersoni</i>	White sucker	44	0.0071	0.00780	Eaton et al. 1978
		<i>Oncorhynchus kisutch</i>	Coho salmon (West Coast)	44	0.0072	0.00787	Eaton et al. 1978
		<i>Salmo salar</i>	Atlantic salmon	23.5	0.0045	0.00792	Rombough and Garside 1982
		<i>Salvelinus namaycush</i>	Lake trout	44	0.0074	0.00809	Eaton et al. 1978
		<i>Esox Lucius</i>	Northern pike	44	0.0074	0.00809	Eaton et al. 1978
		<i>Micopterus dolomieu</i>	Smallmouth bass	44	0.0074	0.00812	Eaton et al. 1978
		<i>Pimephales promelas</i>	Fathead minnow	44	0.01	0.01099	spehar and Fiandt 1986
	Plants	<i>Asterionella formosa</i>	Diatom	-	0.002	-	Conway 1978
		(mixed sp.)	Algae	11.1	0.005	-	Giesy et al. 1979
		<i>Scenedesmus quadricauda</i>	Diatom	-	0.0061	-	Klass et al. 1974
		<i>Chara vulgaris</i>	Alga	-	0.0095	-	Heumann 1987
		<i>Salvina natans</i>	Fern	-	0.01	-	Hutchinson and Czyrska 1972
		<i>Lemna valdiviana</i>	Duckweed	-	0.01	-	Hutchinson and Czyrska 1972
Other Recent Data		<i>Oncorhynchus mykiss</i>	Rainbow trout	30	0.00035	-	Hansen et al. 2002
		<i>Salvelinus confluentus</i>	Bull trout	30	0.00083	-	Hansen et al. 2002
		<i>Hydra viridissima</i>	Green hydra	20	0.003	-	Holdway et al. 2001
		<i>Hydra vulgaris</i>	Pink hydra	20	0.0085	-	Holdway et al. 2001

^a Data represent a variety of endpoints (eg. LC50 or ED50 for acute tests and some chronic tests, as well as highest no-effect concentrations or chronic threshold values for chronic tests).

^b As reported by USEPA (2001) for hardness of 50 mg/L as CaCO₃

^c References cited in USEPA 2001.

Appendix Table B.2: Summary of Studies Reporting Zinc Toxicity to Aquatic Biota at Concentrations ≤ 0.1 mg/L

Scientific Name			Common Name	Hardness (mg/L as CaCO3)	Effect Concentration ^a (mg/L)	Hardness- Adjusted Values ^b (mg/L)	Reference ^c
US EPA 1987	Acute	<i>Ceriodaphnia reticulata</i>	Water flea	45	0.032	0.03499	Carlson and Roush 1985
		<i>Ceriodaphnia reticulata</i>	Water flea	45	0.041	0.04482	Carlson and Roush 1985
		<i>Oncorhynchus mykiss</i>	Rainbow trout (fry)	9.2	0.066	0.277	Cusimano et al. 1986
		<i>Daphnia magna</i>	Water flea	45	0.068	0.07435	Mount and Norberg 1984
		<i>Daphnia magna</i>	Water flea	-	<0.07195	-	Anderson 1948
		<i>Ceriodaphnia reticulata</i>	Water flea	45	0.076	0.0831	Mount and Norberg 1984
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (juv)	21	0.084	0.1752	Finlayson and Verrue 1982
		<i>Salmo clarki</i>	Cutthroat trout (fingerling)	-	0.090	-	Rabe and Sappington 1970
		<i>Oncorhynchus mykiss</i>	Rainbow trout (swim-up alevin)	23	0.093	0.1796	Chapman 1975, 1978b
		<i>Oncorhynchus tshawytscha</i>	Chinook salmon (swim-up alevin)	23	0.097	0.1873	Chapman 1975, 1978b
	Chronic	<i>Daphnia magna</i>	Water flea	45.3	0.100	0.1089	Biesinger and Cristensen 1972
		<i>Jordanella floridae</i>	Flagfish	44	0.03641	-	Spehar 1976a,b
		<i>Daphnia magna</i>	Water flea	211	0.04673	-	Chapman et al. Manuscript
	Plants	<i>Daphnia magna</i>	Water flea	104	0.04729	-	Chapman et al. Manuscript
		<i>Selenastrum capricornutum</i>	Green alga	-	0.030	-	Bartlett et al. 1974
		<i>Selenastrum capricornutum</i>	Green alga	-	0.0404	-	Greene et al. 1975
		<i>Selenastrum capricornutum</i>	Green alga	-	0.0509	-	Turbak et al. 1986
		<i>Selenastrum capricornutum</i>	Green alga	-	0.068	-	Greene et al. 1975
USEPA Ecotox Database (post US EPA 1987)		<i>Salmo trutta</i>	Brown trout	-	0.0049-0.0196	-	Sayer et al 1989
		<i>Ambassis ranga</i>	Indian freshwater perch	-	0.008109	-	Gaikwad S.A. 1989
		<i>Asellus aquaticus</i>	Isopod	-	0.01	-	Migliore and Nicola Giudici 1990
		<i>Moina macrocopa</i>	Water flea	-	0.01	-	Wong. 1993
		<i>Etroplus maculatus</i>	Pearlspot	-	0.0105	-	Gaikwad S.A. 1989
		<i>Daphnia magna</i>	Water flea	-	0.0125	-	Paulaskis and Winner 1988
		<i>Tilapia mossambica</i>	Mozambique tilapia	-	0.012625	-	Gaikwad S.A. 1989
		Insect community	Insect community	85	0.015	-	Clements et al. 1988
		<i>Ceriodaphnia dubia</i>	Water flea	-	0.02	-	Masters et al. 1991
		<i>Moina irrasa</i>	Water flea	-	0.025	-	Zou 1997
		<i>Pimephales promelas</i>	Fathead minnow	-	0.029	-	Norberg-King T.J. 1987
		<i>Ephydatia fluviatilis</i>	Freshwater sponge	30	0.032	-	Francis and Harrison 1988
		<i>Moina irrasa</i>	Water flea	-	0.03379	-	Zou and Bu 1994
		<i>Corbicula sp.</i>	Asiatic clam	70.7	0.034	-	Farris et al. 1989
		<i>Erpobdella octulata</i>	Leech	15	0.06	-	Willis 1989
		<i>Pimephales promelas</i>	Fathead minnow	-	0.06	-	Gale et al. 1992
		<i>Ceriodaphnia dubia</i>	Water flea	-	0.0605	-	Bitton et al. 1995
		<i>Ceriodaphnia dubia</i>	Water flea	-	0.065	-	Belanger and Cherry 1990
		<i>Potamopyrgus jenkinsi</i>	Snail	-	0.0715	-	Dorgelo et al. 1995
		<i>Colpidium sp.</i>	Protozoan	-	0.072	-	Pratt et al. 1997
		<i>Hyaella azteca</i>	Scud	-	0.073	-	Phipps et al. 1995
		<i>Ancylus fluviatilis</i>	Mollusc	-	0.08	-	Willis 1988
		<i>Moina macrocopa</i>	Water flea	-	0.094	-	Pokethitiyook et al. 1987
		<i>Oncorhynchus mykiss</i>	Rainbow trout	-	0.095	-	Anadu et al. 1989
Recent Articles		<i>Oncorhynchus mykiss</i>	Rainbow trout	30	0.024-0.053	-	Hansen et al. 2002
		<i>Daphnia magna</i>	Water flea	-	0.028	-	DeSchamphelaere et al. 2004
		<i>Salvelinus confluentus</i>	Bull trout	30	0.030-0.080	-	Hansen et al. 2002
		<i>Cottus bairdi</i>	Mottled sculpin	46.3	0.032	-	Woodling et al 2002
		<i>Tanytarsus dissimilis</i>	Chironomid	46.8	0.0368	-	Anderson et al. 1980
		<i>Cottus bairdi</i>	Mottled sculpin	48.6	0.038	-	Woodling et al 2002
		<i>Chlorella sp.</i>	Alga	40-48	0.052	-	Wilde et al 2006
		<i>Ceriodaphnia dubia</i>	Water flea	125	0.070	-	Hyne et al 2005

^a Data represent a variety of endpoints (eg. LC50 or ED50 for acute tests and some chronic tests, as well as highest no-effect concentrations or chronic threshold values for chronic tests).

^b As reported by USEPA (1987) for hardness of 50 mg/L as CaCO₃.

^c References cited in USEPA 1987.