CANADA – BRITISH COLUMBIA
WATER QUALITY MONITORING AGREEMENT

WATER QUALITY ASSESSMENT OF PEND D'OREILLE RIVER AT U.S. BORDER (1997 – 2003)

Pommen Water Quality Consulting

November 2003

Environment Canada **Environnement Canada**

BRITISH COLUMBIA Ministry of Environment

Executive Summary

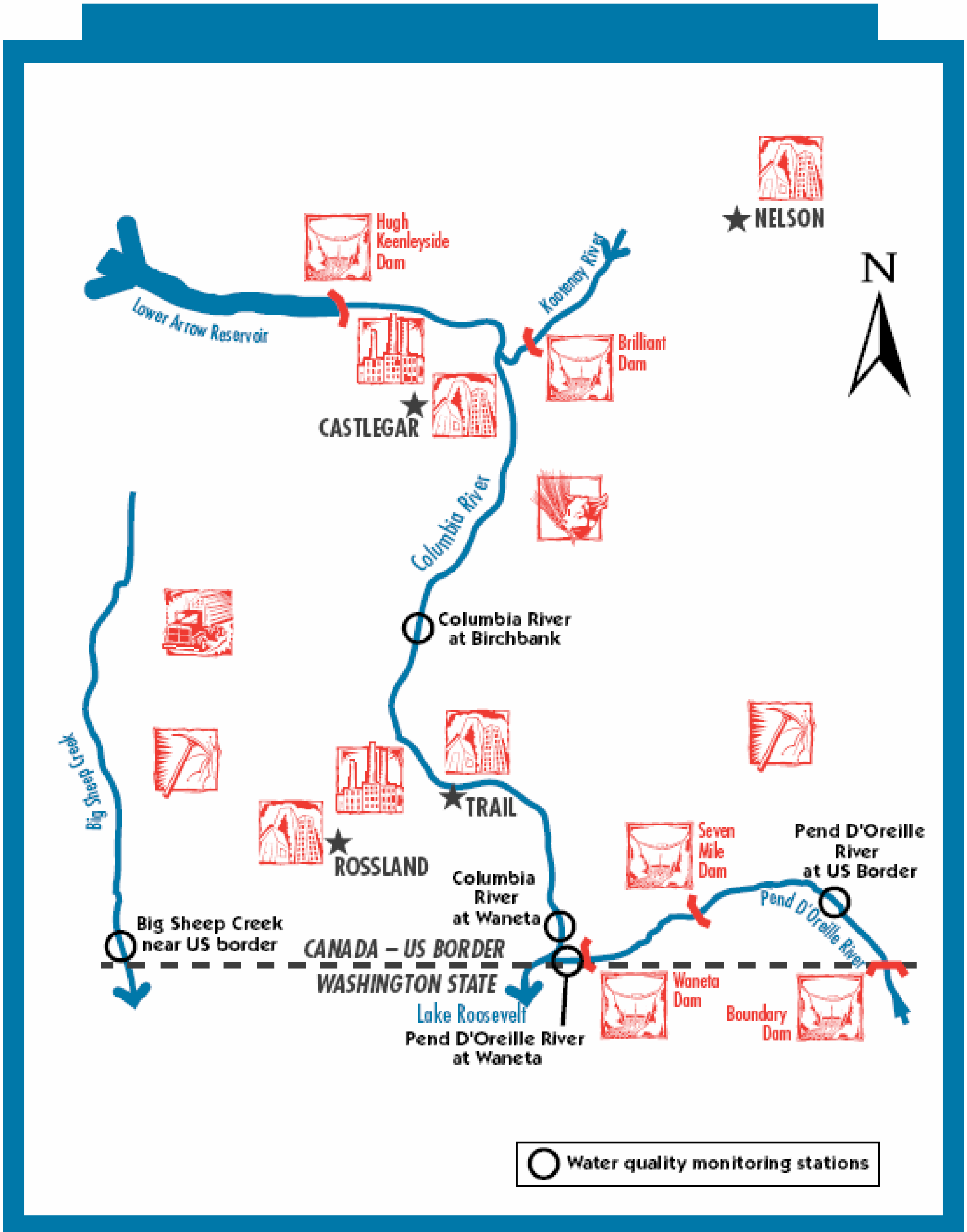
Ninety-eight percent of the Pend d'Oreille River watershed lies in the United States. The Canadian portion of the river is about 22 km long, and is located just above the US Border, southeast from Trail, B.C. (see map). This assessment is based on five years of water quality data collected between December 1997 and May 2003.

CONCLUSIONS

- The water was soft to moderately hard, with a low sensitivity to acids, and largely within the optimum aesthetic range for drinking water.
- Turbidity was low due to upstream reservoirs and Lake Pend Oreille, but filtration plus disinfection would be needed prior to drinking water use.
- Metal levels were low, except for aluminum, which exceeded the draft Canadian water quality guidelines for aquatic life at times, but this is not considered to be serious.
- Water temperatures exceeded aquatic life and aesthetic drinking water guidelines during the summer, when the water was warm enough for water-contact recreation, such as swimming. Lake Pend Oreille and the reservoirs on the river probably caused the higher than normal temperatures due to increased solar heating.
- The water quality at the US Border and Waneta stations was similar, with the exception of extractable cadmium. Cadmium levels at Waneta were higher than at the US Border, and exceeded aquatic life guidelines during 1998-2001, although there was an improving trend over time, possibly due to declining river flows and turbidity levels. Backwater from the Columbia River was probably not a factor in the 1998-2001 cadmium levels at Waneta that exceeded guidelines.

RECOMMENDATIONS

- Monitoring should continue in the Pend d'Oreille River at US Border as a downstream station for influences in the US and as reference station for the Pend d'Oreille River at Waneta.
- An investigation of the sources of cadmium between the US Border and Waneta stations should be undertaken, if aquatic life guidelines continue to be exceeded at Waneta.
- The sample collector should be encouraged to record any indications of backwater during sampling at the Pend d'Oreille River at Waneta station.
- The minimum detectable limit for extractable cadmium should be reduced to 0.002 μg/L or less, when the technology becomes available, to improve the reliability of the measurements.



Lower Columbia River Area

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1. Introduction

The Pend d'Oreille River at US Border (ENVIRODAT BC08NE0020, EMS E237439) water quality monitoring station is located 3 km downstream from the Canada-US border at Remac, B.C., just upstream from the Salmo River, and 6 km west from the Nelway border crossing (Map 1). The river drains 65,300 km^2 in the USA before entering B.C., where it drains an additional 1600 km^2 before joining the Columbia River at Waneta about 22 km downstream. Thus, 98% of the Pend d'Oreille drainage area lies in the USA, with only 2% in Canada. The Pend d'Oreille River accounts for 43% of the drainage area of the Columbia River as it enters the USA downstream from Waneta. Related federal-provincial water quality stations in the area that were used in this assessment are the Pend d'Oreille River at Waneta (ENVIRODAT BC08NE0029, EMS 0200021) and Columbia River at Waneta (ENVIRODAT BC08NE0001, EMS 0200559). The Pend d'Oreille River at Waneta station was moved from the north bank of the river downstream from Waneta Dam to the face of the dam in the tailrace on 15-Jan-98 because of concerns that the samples contained Columbia River water at times of high flow in the Columbia and low flow in the Pend d'Oreille.

The Pend d'Oreille River in B.C. is dominated by hydroelectric facilities, with the Boundary Dam at the Canada-US border, the Waneta Dam (1954) just upstream from the Columbia River, and the Seven Mile Dam (1979) midway between the two. The B.C. Ministry of Water, Land and Air Protection (WLAP) web site shows that there are six water licences on the Pend d'Oreille River, four for power generation and one each for irrigation and domestic use. The FishWizard on the WLAP web site indicates that the Pend d'Oreille provides habitat for a wide variety of fish species, including sports fish such as bull trout, rainbow trout, brook trout, mountain whitefish, and Westslope (Yellowstone) cutthroat trout. The three dams are migrational barriers to all fish.

We know little about the influences on water quality in the US portion of the watershed, but dams, forestry, agriculture and mining in Washington State are potential influences on the water quality of the river at the border. Teck Cominco American Inc. has a lead-zinc concentrator in Washington State at Metaline Falls on the Pend d'Oreille River about 10 km upstream from the Canada-US border, which has applied for a permit to discharge treated tailings pond supernatant to the river (Beatty 2003).

There are three closed mines in the B.C. portion of the watershed:

1. Reeves MacDonald Mines Ltd. operated a lead-zinc mine at Remac on the north bank of the Pend d'Oreille River during 1948-75. Tailings and mine water were discharged to the river until 1974.
2. Cominco Ltd. operated the H.B. (lead-zinc) Mine on Sheep Creek during 1955-78. Tailings were deposited in a 20-hectare tailings pond adjacent to the Salmo River south from Sheep Creek. Decant from the tailings pond discharged to the Salmo River, and in March 1975 an ice jam in the tailings pond caused tailings to enter the river. The tailings flume along Sheep Creek was in poor condition and there were numerous spills to the creek.

3. Canex Placer Ltd. operated a tungsten-lead-zinc mine on Lime Creek during 1953-73. Tailings and other mill effluents were discharged to a tailings pond that decanted to Lime Creek along with mine water. Lime Creek flows into Lost Creek, which flows into the South Salmo River (Ministry of Environment 1977 & 1979).

Environment Canada monitored flow in the Columbia River at the International Boundary (BC08NE058; 155,000 km^2) and Birchbank (BC08NE049; 88,100 km^2) during 1997-2001. The flow in the Pend d'Oreille River at Waneta (Figure 1) was estimated by subtraction. Figure 1 shows that peak flows occurred during spring freshet, with moderate flows during fall-winter due to releases from storage for electrical generation. A few very low flows occurred, perhaps reflecting the ability of Waneta Dam to completely stop flow releases for short periods. There was a declining trend in flows during 1997-2001.

Canada and B.C. began collecting water quality data at Pend d'Oreille River at US Border in December 1997. Water quality data have been collected every four weeks since then and monitoring is continuing at present. The reason for initiating monitoring at this station was to determine whether there were significant differences in water quality between the US border, where the river enters Canada, and Waneta, where the river joins the Columbia River and leaves Canada. Five and one-half years (Dec 1997- May 2003) of water quality data were used in this report. The data for the suite of water quality indicators are plotted in Figures 2 to 50.

2. Water Quality Assessment

The status and trends of water quality were assessed by plotting the water quality indicators over time and comparing the values to the Province's approved and working water quality guidelines (Ministry of Water, Land and Air Protection, 2001a & 2001b) and CCME guidelines (CCME 2002). Any levels or changes of the indicators over time that may have been harmful to sensitive water uses, such as drinking water, aquatic life, wildlife, recreation, irrigation and livestock, are described below in alphabetical order. Plots of the Pend d'Oreille River at US Border and Waneta were made for selected water quality indicators to compare the two stations, and extractable cadmium was plotted for the Pend d'Oreille and Columbia rivers at Waneta to assess whether there was a backwater effect of the Columbia on the Pend d'Oreille.

Water quality indicators that were plotted but not discussed because they easily met all water quality guidelines and showed no harmful trends were: barium, beryllium, boron, bromide, calcium, carbon (dissolved inorganic and organic), chloride, chromium, cobalt, colour, conductivity, fluoride, gallium, iron, lanthanum, lithium, magnesium, manganese, molybdenum, nickel, nitrogen (nitrate, nitrite and total dissolved), pH, potassium, rubidium, selenium, silica, silicon, sodium, strontium, sulphate, temperature (air), thallium, uranium, and vanadium.

Trace elements at this station were measured by total and extractable methods. Total and extractable samples are both acidified in the field with nitric acid to about pH 2.

Extractable samples are then analysed in the laboratory without further treatment, while total samples have additional nitric and hydrochloric acid added and are boiled to dryness before analysis. The additional extraction step for total metals has the potential to extract trace elements that are strongly bound to particulate matter and unlikely to be bio-available.

The water quality data for Pend d'Oreille River at US Border (1998-2000) and Waneta (1996-2000) were reviewed previously in data approval reports (Pommen Water Quality Consulting, 2002a & b). The recommendations of the data approval reports had not yet been implemented for the raw data received from ENVIRODAT for this assessment. Thus, prior to this assessment, the recommendations were applied to the data in terms of corrections, calculation of missing hardness values, and deletion of errors, probable errors and possible errors. Suspect values in the 2001-03 data that were corrected or deleted prior to assessment are contained in Table 1.

Alkalinity, total (Figure 2a) indicated that the river had a low sensitivity to acids, and that the levels at US Border and Waneta were virtually identical (Figure 2b).

Aluminum, total (Figure 3a) exceeded the 0.074-0.082 mg/L CCME (2003) interim draft guidelines for aquatic life (pH >6.4, DOC= 0.5-2.5 mg/L) 14 times, mainly during spring freshet when flow and turbidity (up to 4.6 NTU) were higher (Figure 3b). This is a common occurrence due to the high aluminum content of suspended sediment, and it is unlikely that the aluminum was in a bio-available form. The draft CCME guideline recognizes that background concentrations often exceed the interim guideline, and that background could be used as a site-specific objective. Also, the toxicity tests used to develop the guideline did not exceed pH 6.5, whereas the pH of the Pend d'Oreille River was 7.6-8.4. Figure 3c shows that aluminum levels at US border and Waneta were similar.

Arsenic, total (Figure 4a) levels were low, and virtually identical at US Border and Waneta (Figure 4b).

Cadmium, extractable (Figure 9a) values were below the most stringent hardness-dependent aquatic life guideline, and showed no change over time. At 0.005 μg/L, the MDL is only four times below the lowest applicable guideline (0.02 μg/L at hardness=60 mg/L), and should be lowered to at least 0.002 μg/L, when the technology becomes available. Figure 9b shows that the levels were higher at Waneta than US Border, exceeding aquatic life guidelines seven times during 1998-01, but possibly exhibiting an improving trend over time. The higher levels at Waneta may be due to waste discharges from the old mines at Remac and in the Salmo River basin or resuspension of previously discharged tailings. The cause of the apparent improving trend in the Pend d'Oreille River at Waneta may be due to the declining trend in flow and turbidity during 1997-2001 or 2003 as shown in Figures 1 and 47a, because there is some correlation between cadmium and flow and turbidity (R^2 of 25 and 31%, respectively), and since there was no waste abatement in the Pend d'Oreille basin in B.C. between the US border and Waneta stations. An investigation of potential sources of cadmium between the US Border and Waneta stations should be conducted.

There is a concern that the higher levels and improving trend might have due to the sampling of backwater from the Columbia River during high flow in the Columbia and low flow in the Pend d'Oreille (The Columbia River had higher cadmium levels than the Pend d'Oreille River due to waste discharges from the Cominco smelter at Trail, and an improving trend due to their abatement (Pommen *et al*., 2002)). The Pend d'Oreille station was moved upstream to the Waneta Dam on 15-Jan-98 (the second earliest result in the Waneta time series in Figure 9b) in an attempt to eliminate any possible influence of backwater from the Columbia River. Figure 9c shows paired extractable cadmium results from the Columbia and Pend d'Oreille rivers at Waneta for 1998-2003. Both show apparent improving trends, but appear to behave independently, and indeed the R^2 value for the paired values is only 0.11 (Figure 9d), indicating a very poor correlation.

The possibility of a backwater effect at high Columbia River flow and low Pend d'Oreille River flow was examined further by comparing their paired flow and Cd-E ratios in Figures 9e and 9f. If a backwater effect occurred, we would expect a negative correlation between the ratios (i.e., as the flow ratio goes up, the Cd-E ratio would go down because of the increased probability of collecting Columbia River water at the Pend d'Oreille station). Figure 9e shows that only four of 55 pairs had a high flow ratio (5.9-8.9) and a low Cd-E ratio (1.0-1.8), and Figure 9f shows that there was an extremely poor correlation of the ratios overall (R^2=0.01). The seven results that exceeded the aquatic life guidelines all occurred when the Columbia to Pend d'Oreille flow ratio was low (1.2-3), indicating that backwater from the Columbia was unlikely.

We conclude that it is possible that there was an occasional backwater effect at the Pend d'Oreille River at Waneta station after the 15-Jan-98 relocation of the sampling point, but that it probably did not influence the highest values that exceeded guidelines. The sample collector should be encouraged to record any indications of backwater during sampling.

Cadmium, total (Figure 9a) had an MDL (0.0001 mg/L) that was higher than the guidelines, and thus the data are not reliable for assessing their attainment. Extractable cadmium should be used for interpretations.

Coliforms, fecal (Figure 16) were monitored during Feb 2000-March 2002. The 10/100 mL drinking water guideline for use with only disinfection was exceeded once. Since turbidity often exceeded the 1 NTU drinking water guideline (Figure 47a), filtration plus disinfection would be needed before drinking water use.

Copper, extractable and total (Figure 19a) had similar values and met all guidelines, and had improving trends over time. The improving trends (R^2=0.24) may have been due to the declining trend in flow during 1997-2001. Turbidity also had somewhat of a improving trend over time (Figure 19c), but copper and turbidity were only weakly correlated (Figure 19d, R^2=0.17). Figure 19b shows that copper levels were similar at US Border and Waneta (when sampled on the same date), both meeting guidelines, and improving over time, perhaps due to declining flows.

Lead, extractable and total (Figure 25a) were similar and well below the aquatic life guideline. Figure 25b shows that extractable lead was slightly higher at Waneta than at US Border, but still well below the guideline.

Hardness (Figure 22) values were soft to moderately hard, lying within or just above the optimum aesthetic range for drinking water.

Phosphorus, total and total dissolved (Figure 35) showed that total phosphorus usually exceeded the lake guideline of 0.01 mg/L for drinking water and recreation, while total dissolved phosphorus usually met these guidelines. The total phosphorus was partially particulate-bound, as shown by the lower levels for total dissolved phosphorus, which better reflects the fraction available for algal growth.

Silver, extractable (Figure 40) was well below guidelines, while **total silver** (Figure 40) had a MDL (0.0001 mg/L) that was above the aquatic life guideline (0.00005 mg/L). Extractable silver should be used for interpretations.

Temperature, water (Figure 45a) exceeded the guideline for freshwater aquatic life (maximum of 19 degrees C) and the aesthetic guideline for drinking water (15 degrees C) every summer, when the water was warm enough for water-contact recreation. The summer water temperatures were higher than in free-flowing rivers in the area, and were probably caused by increased solar heating of the water in Lake Pend Oreille in Idaho and in the reservoirs created by the ten dams in the US (Ministry of the Environment 1977). Figure 45b shows that water temperatures at US Border and Waneta were very similar.

Turbidity (Figure 47a) is an optical measure of the amount of suspended sediment in water. Turbidity levels were low (<5 NTU) due to the settling of suspended sediments in Lake Pend Oreille and the reservoirs of the upstream dams, but filtration and disinfection would still be needed before the water is used for drinking, because the 1 NTU drinking water guideline was often exceeded. Turbidity levels at US Border and Waneta were similar (Figure 47b).

Zinc, extractable and total (Figure 50a) were quite similar, and well below the aquatic life guideline. Extractable zinc levels at Waneta were slightly greater than those at US Border (Figure 50b), but were still well below the guideline.

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Pommen Water Quality Consulting. 2002b. Water Quality Data Approval, Pend d'Oreille River at Waneta 1996-2000.

Table 1 Pend d'Oreille River at US Border - Suspect 2001-03 Data

Date/Time	Sample No.	Project No.	Indicator	Value	Action	Comments
22/04/2002 11:00	03PY000407	PY0331	Hardness	nil	calculated	76.5 mg/L
15/05/2002 10:30	03PY000171	PY0331	Hardness	nil	calculated	69.4 mg/L
19/06/2002 11:30	03PY000268	PY0331	Hardness	nil	calculated	70.1 mg/L
15/07/2002 11:00	03PY000311	PY0331	Hardness	nil	calculated	70.3 mg/L
12/08/2002 10:15	03PY000359	PY0331	Hardness	nil	calculated	77.1 mg/L
09/09/2002 10:00	03PY000530	PY0331	Hardness	nil	calculated	80.3 mg/L
09/09/2002 16:00	03PY000531	PY0334	Hardness	nil	calculated	80.9 mg/L
22/10/2002 12:30	03PY000595	PY0331	Hardness	nil	calculated	71.9 mg/L
19/11/2002 11:30	03PY000653	PY0331	Hardness	nil	calculated	81.6 mg/L
11/03/2003 11:15	03PY000642	PY0331	Hardness	nil	calculated	82.4 mg/L
07/04/2003 9:27	03PY000843	PY0331	Hardness	nil	calculated	74.2 mg/L
07/05/2003 10:45	03PY000877	PY0331	Hardness	nil	calculated	71.2 mg/L
7/12/2000 & earlier			Cr-E	all	deleted	Instrument errors, Cr-E > Cr-T
06/11/2001 11:15	01PY007139	PY0331	Cr-T	2.4 µg/L	deleted	120x Cr-E, 3-12x adjacent values, turbidity low
13/09/2001 10:30	01PY005612	PY0331	Alk-T	639 mg/L	deleted	8x replicate; highest 1997-2003 by 7x
13/02/2002 11:30	02PY000324	PY0331	Be-E	0.123 µg/L	deleted	2.5x Be-T, 21-45x adjacent values, turbidity low
15/05/2002 10:30	03PY000171	PY0331	P-TD	0	deleted	should be <MDL
07/04/2003 9:27	03PY000843	PY0331	P-TD	0	deleted	should be <MDL

Figure 1 Flow in Pend d'Oreille River at Waneta, 1997-2001

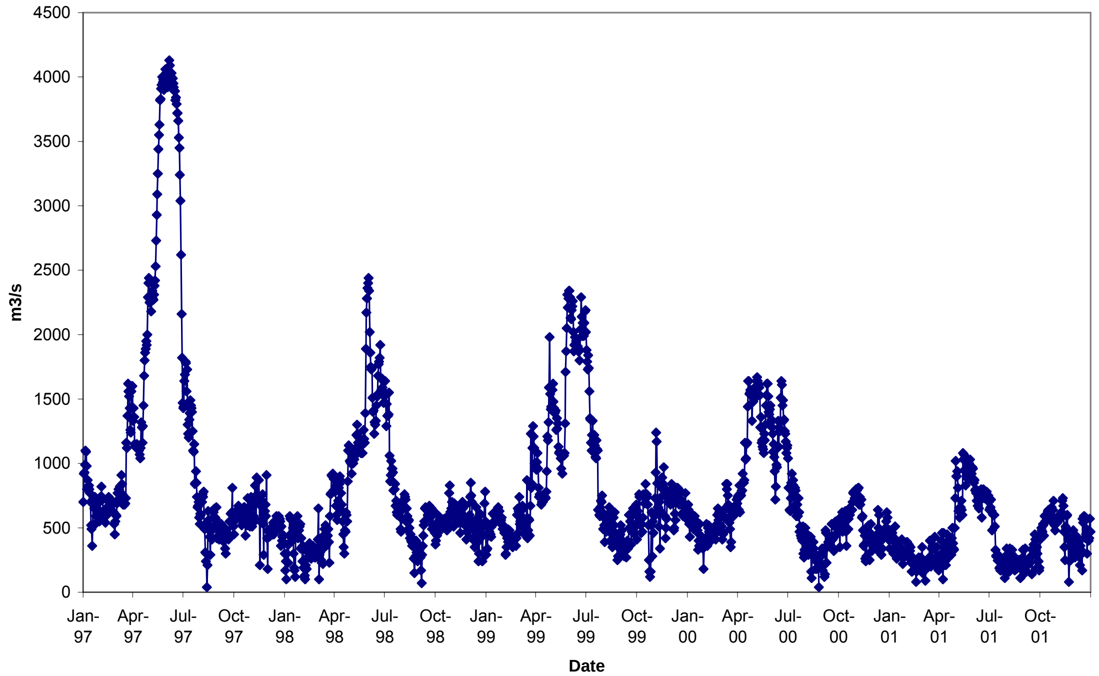


Figure 2a Alkalinity, Total

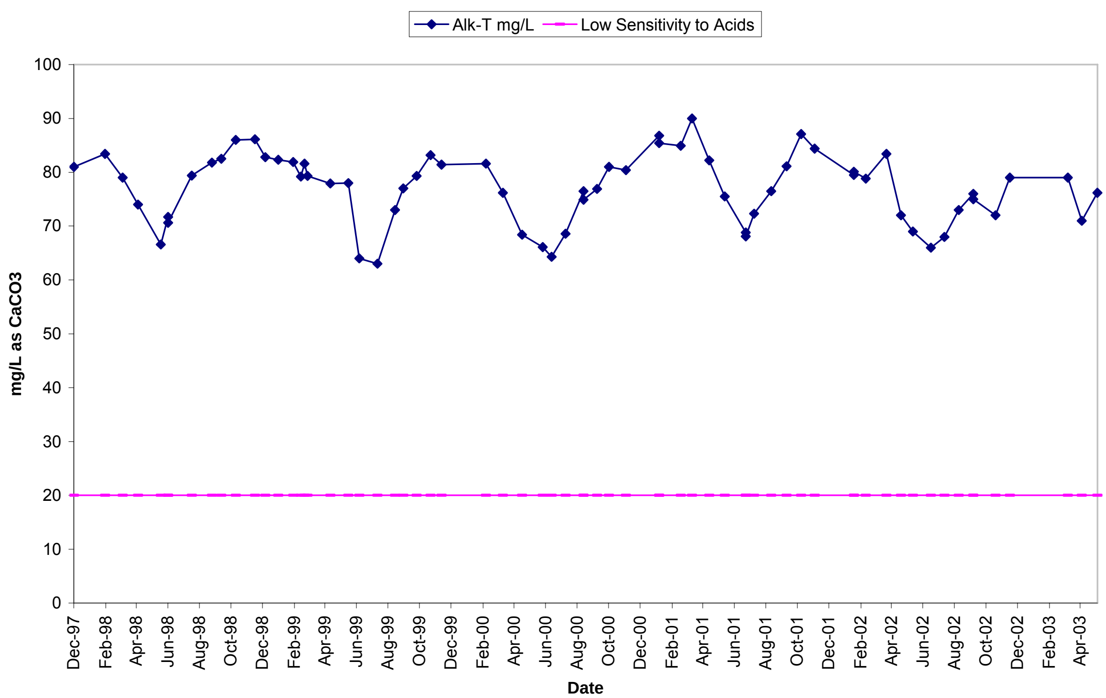


Figure 2b Alkalinity, Total at US Border & Waneta

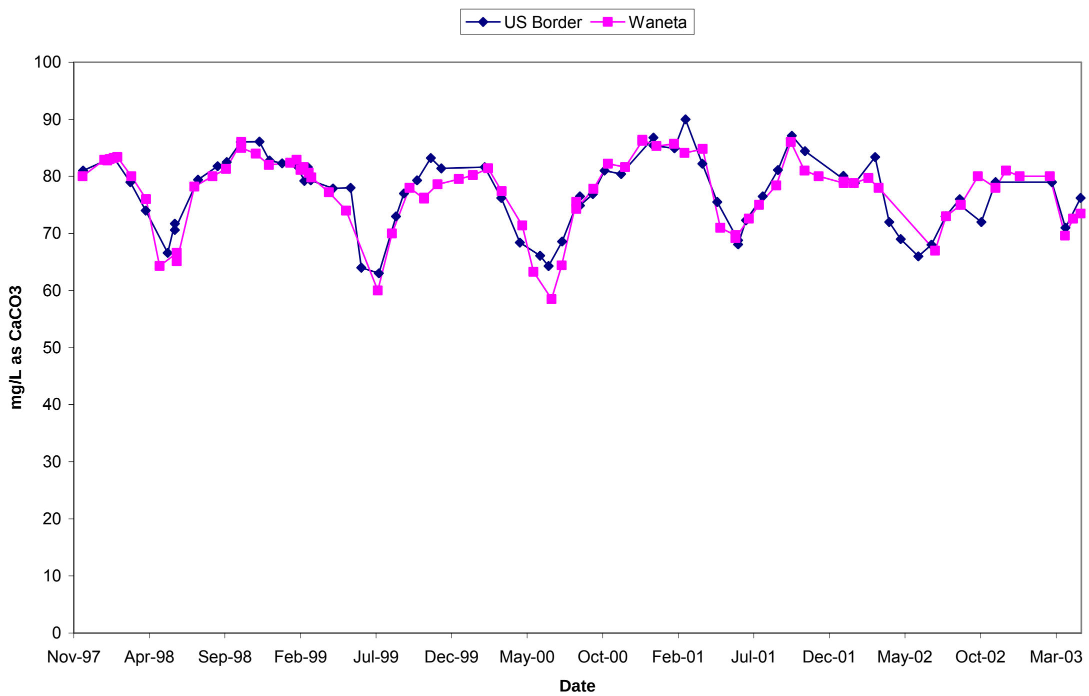
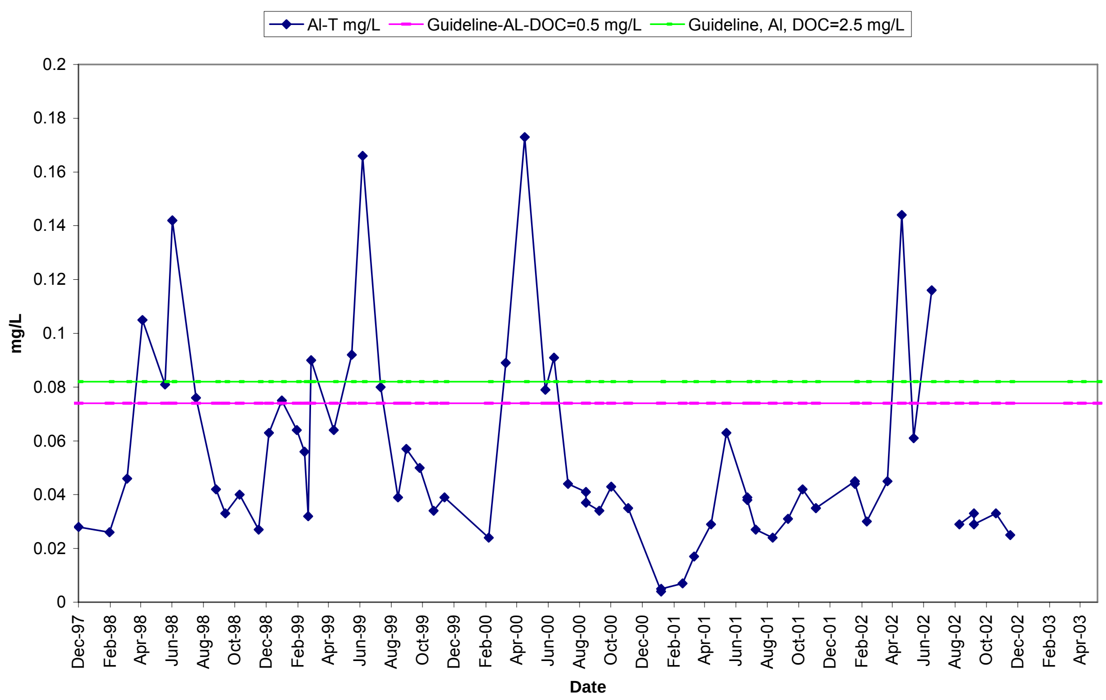


Figure 3a Aluminum, Total



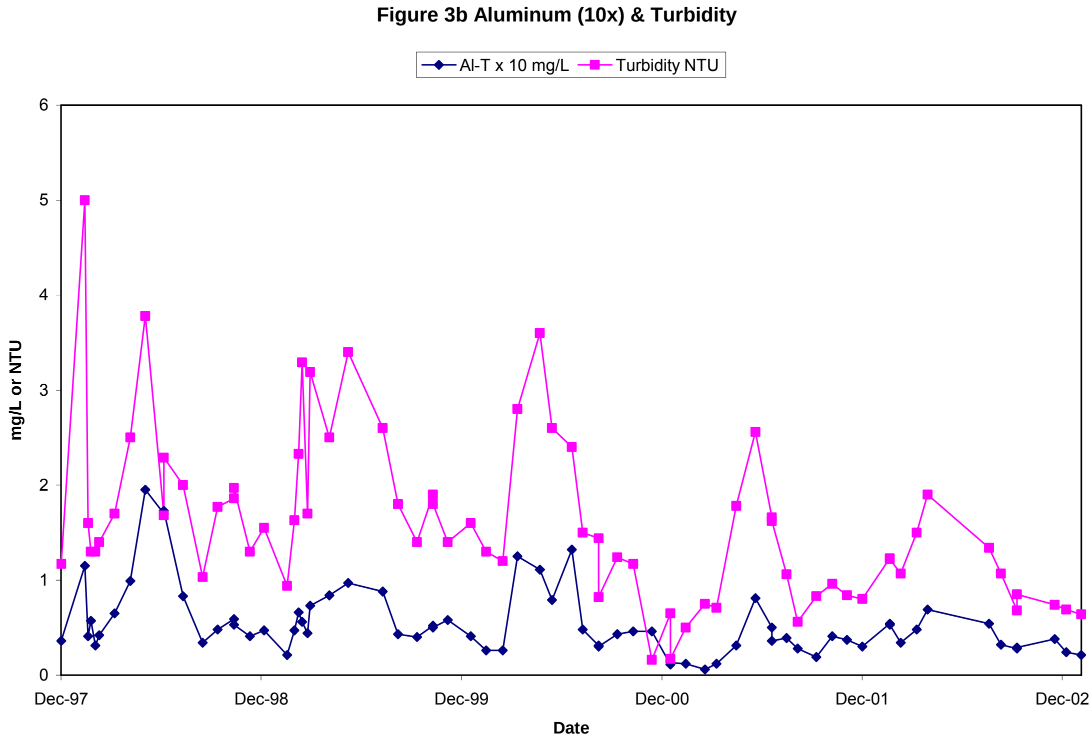


Figure 3b Aluminum (10x) & Turbidity
Al-T x 10 mg/L
Turbidity NTU
mg/L or NTU
0
1
2
3
4
5
6
Dec-97
Dec-98
Dec-99
Dec-00
Dec-01
Dec-02
Date

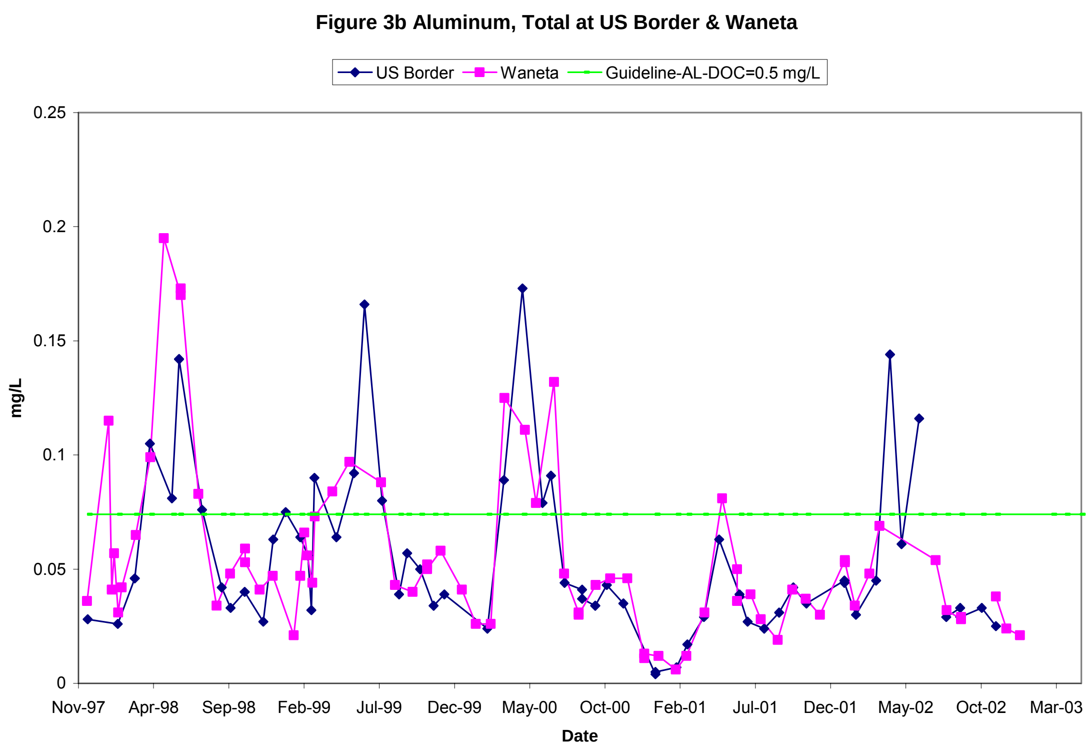


Figure 3b Aluminum, Total at US Border & Waneta
US Border
Waneta
Guideline-AL-DOC=0.5 mg/L
mg/L
0
0.05
0.1
0.15
0.2
0.25
Nov-97
Apr-98
Sep-98
Feb-99
Jul-99
Dec-99
May-00
Oct-00
Feb-01
Jul-01
Dec-01
May-02
Oct-02
Mar-03
Date

Figure 4a Arsenic, Total

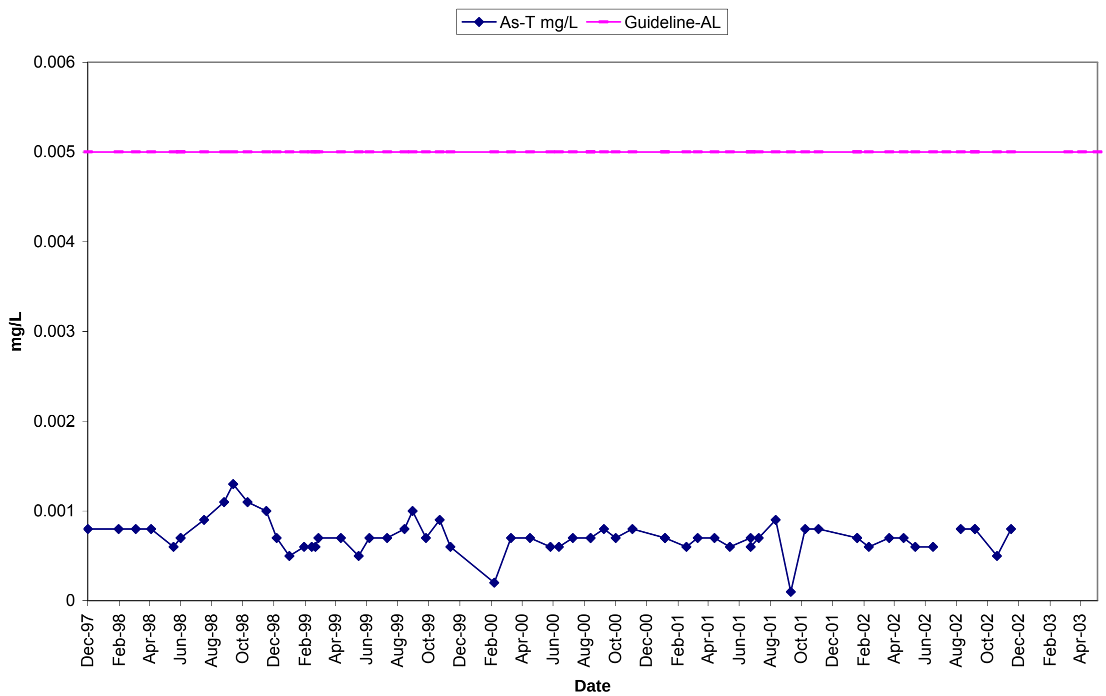


Figure 4b Arsenic, Total at US Border & Waneta

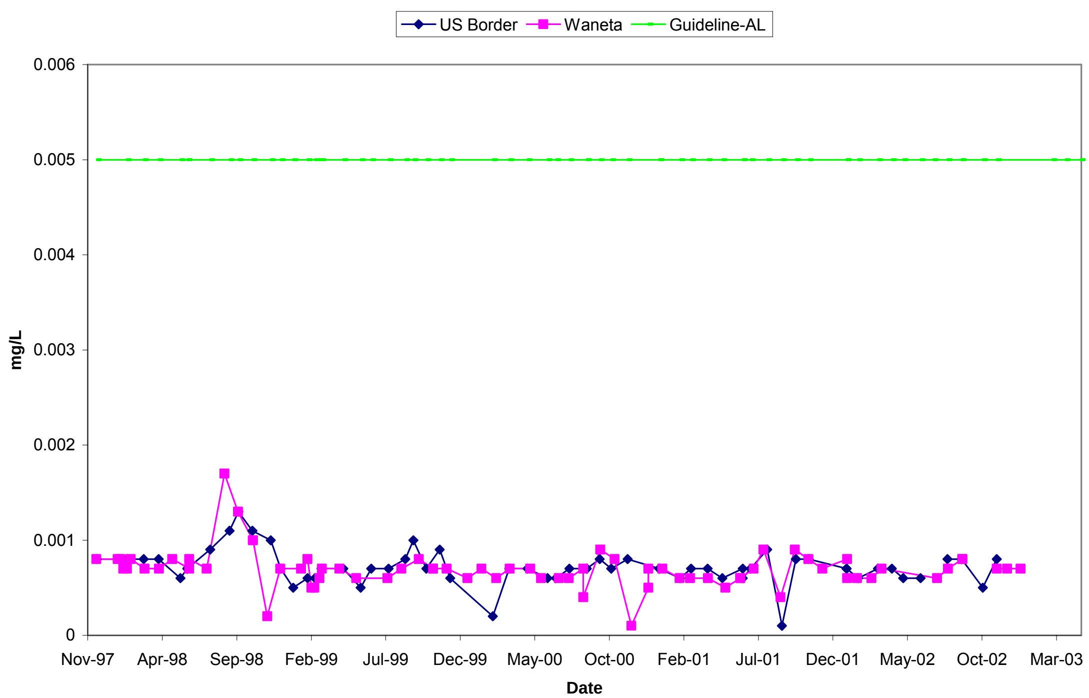


Figure 5 Barium

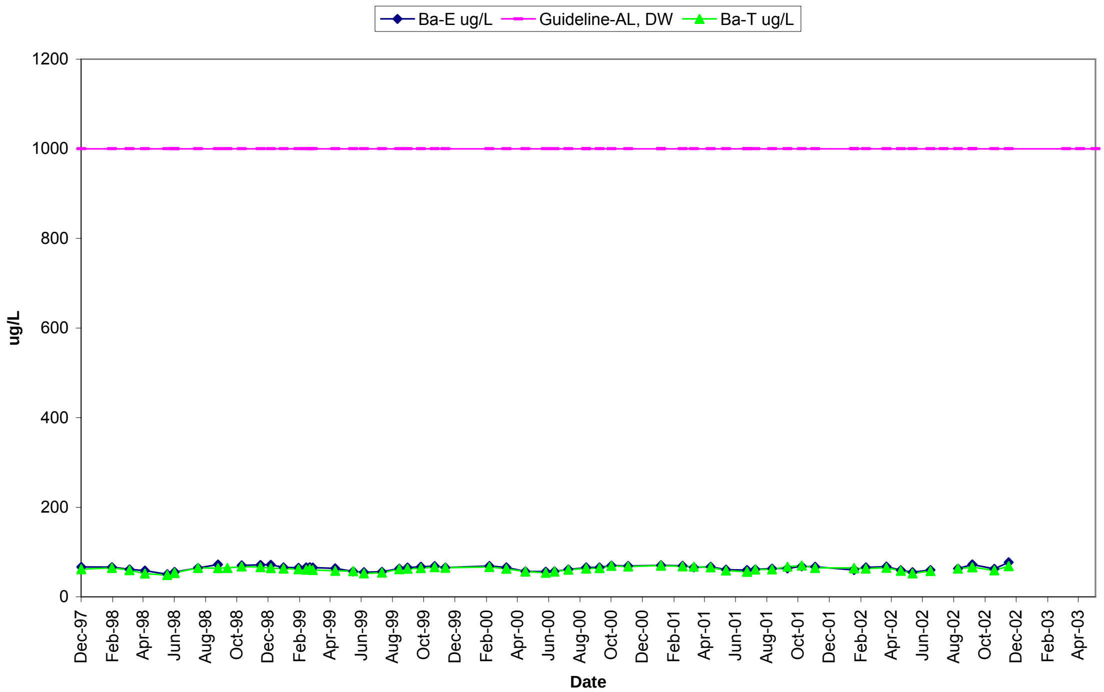


Figure 6 Beryllium

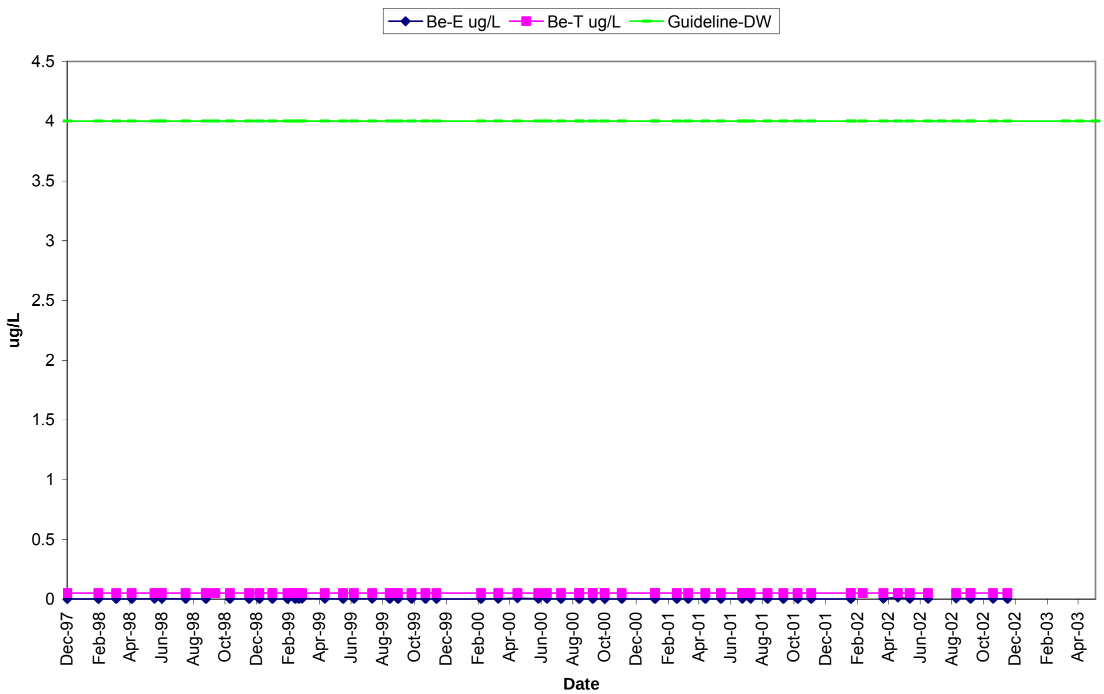


Figure 7 Boron, Extractable

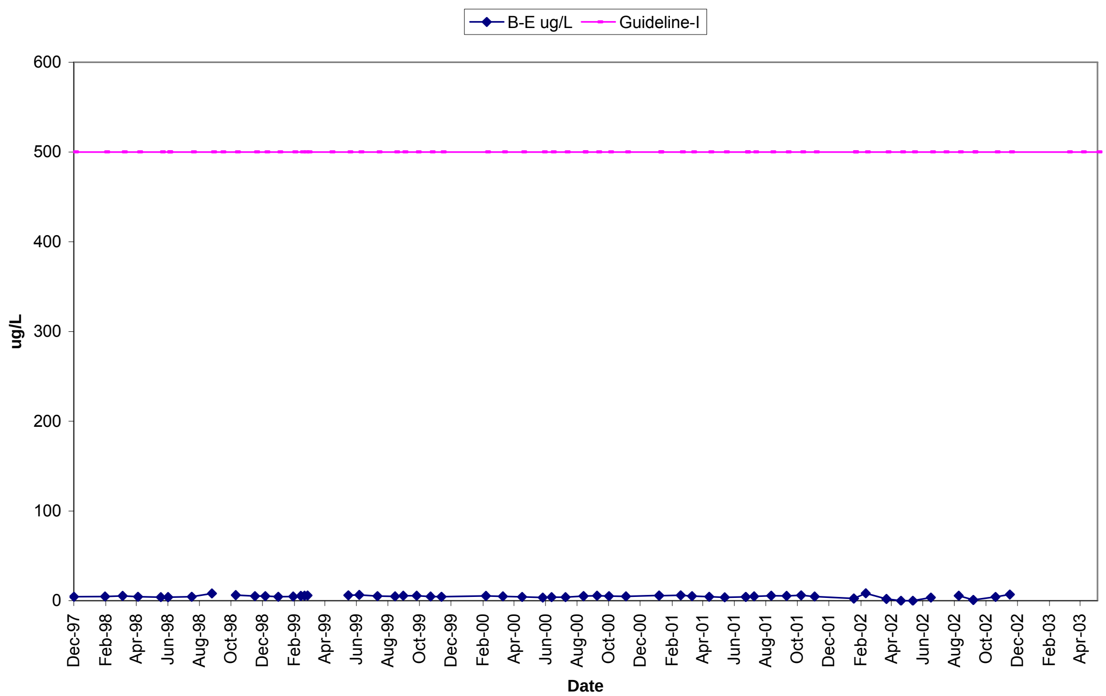


Figure 8 Bromide, Dissolved

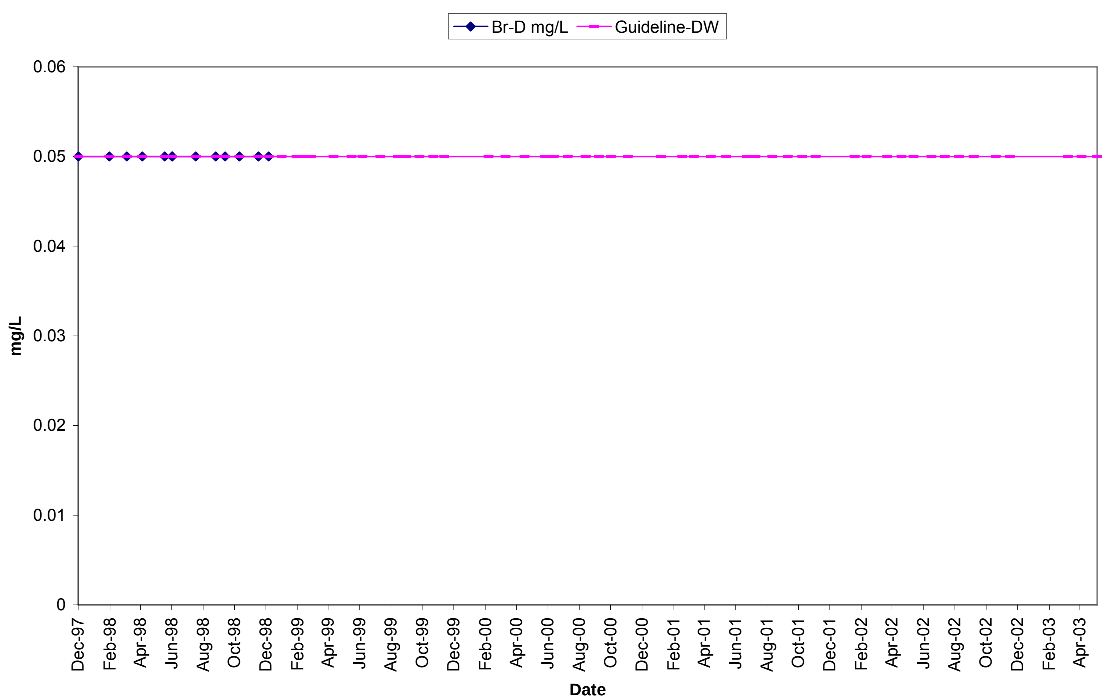


Figure 9a Cadmium

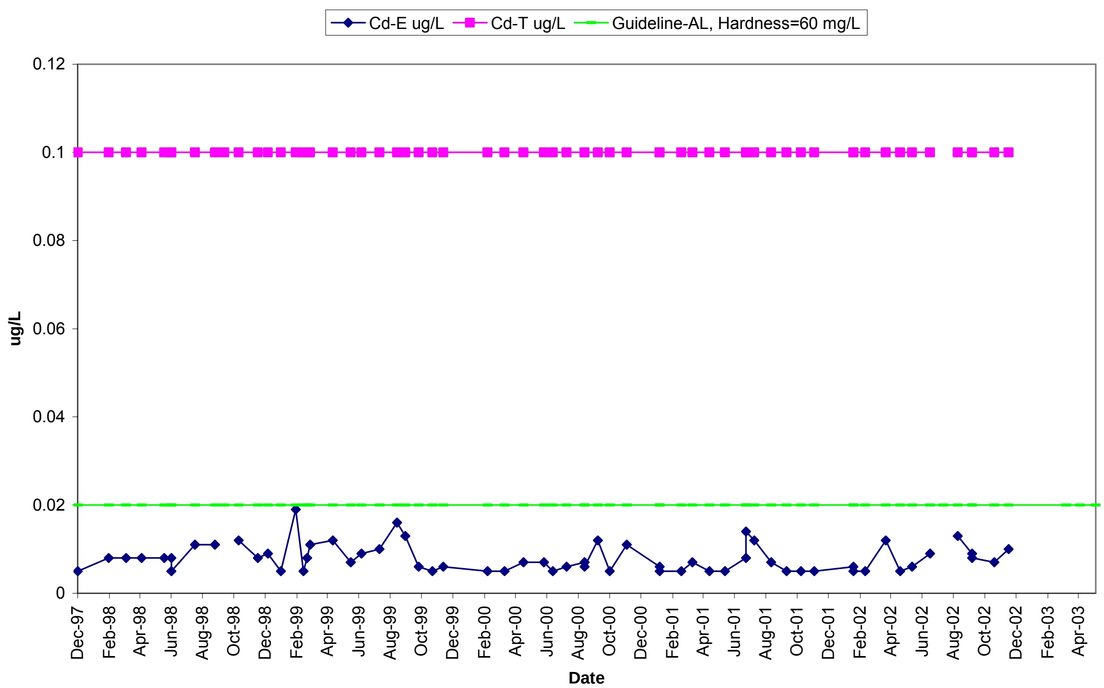


Figure 9b Cadmium, Extractable at US Border & Waneta

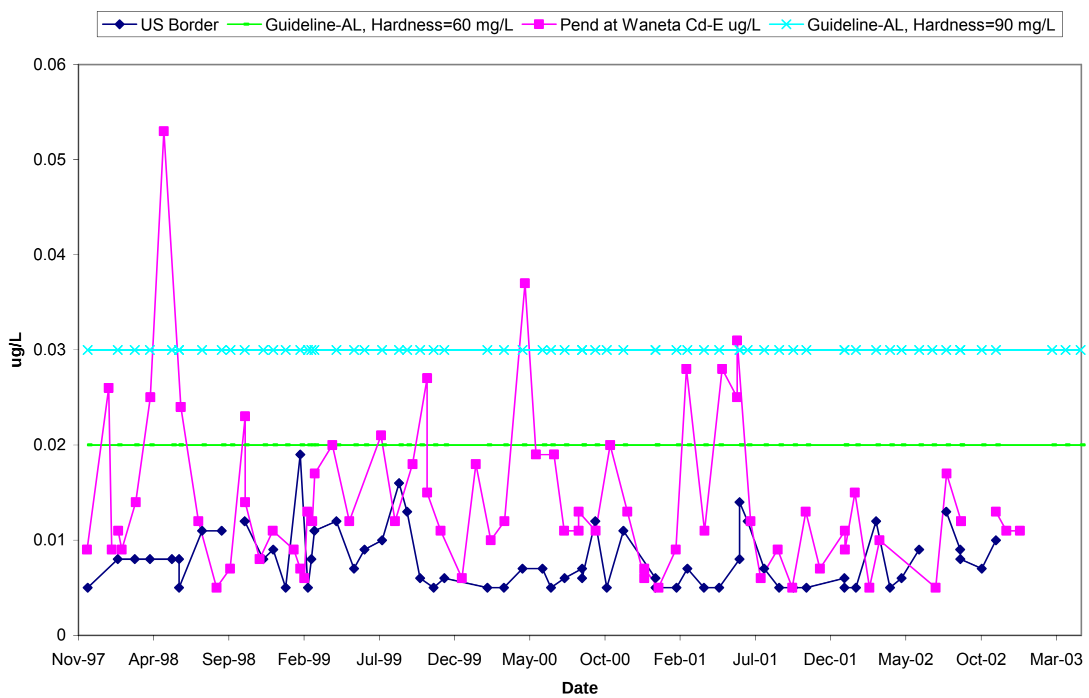


Figure 9c Columbia & Pend d'Oreille Rivers at Waneta - Cadmium Extractable Pairs, 1998-2003

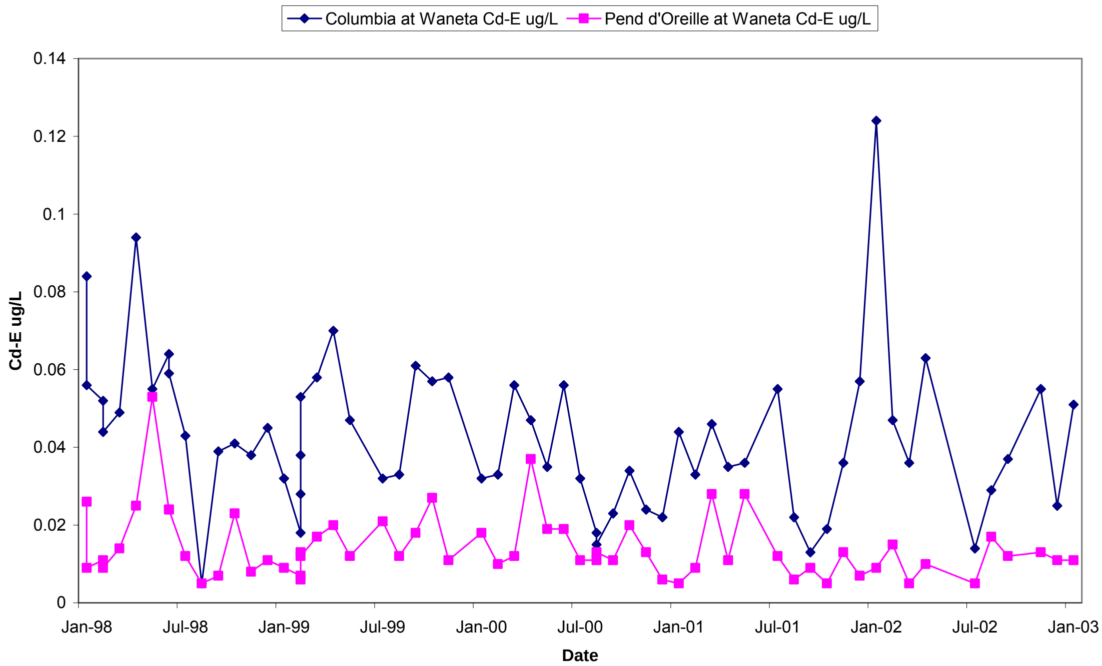


Figure 9d Columbia & Pend d'Oreille Rivers at Waneta - Extractable Cadmium Correlation 1998-2003

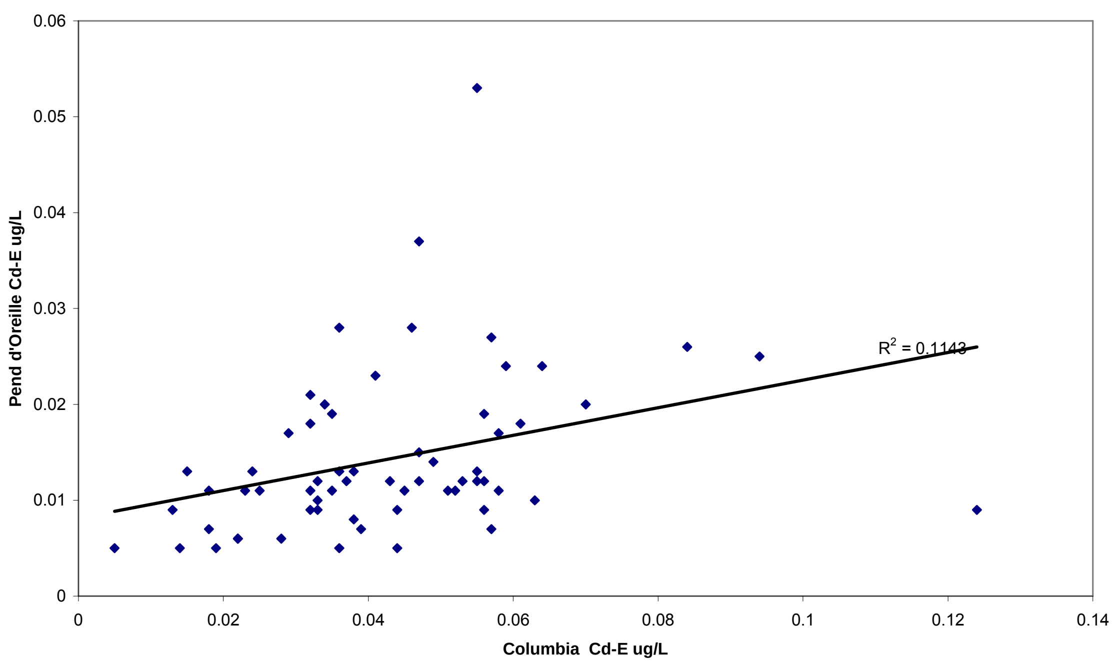


Figure 9e Columbia & Pend d'Oreille Cd-E & Flow Ratios

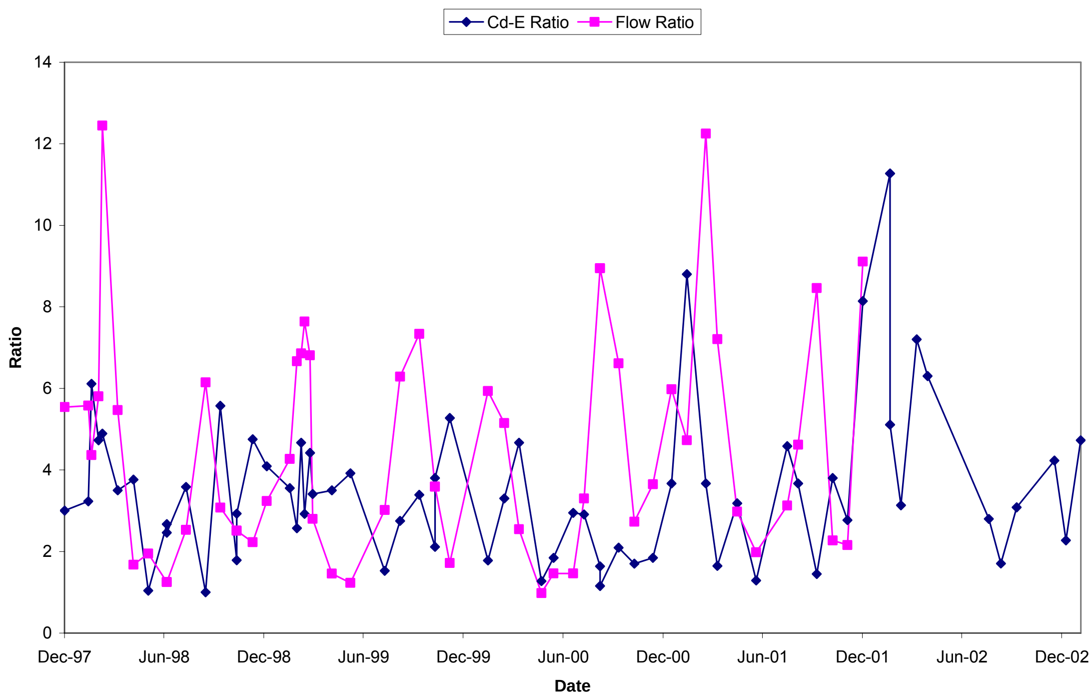


Figure 9f Columbia & Pend d'Oreille at Waneta, Cd-E Ratio versus Flow Ratio

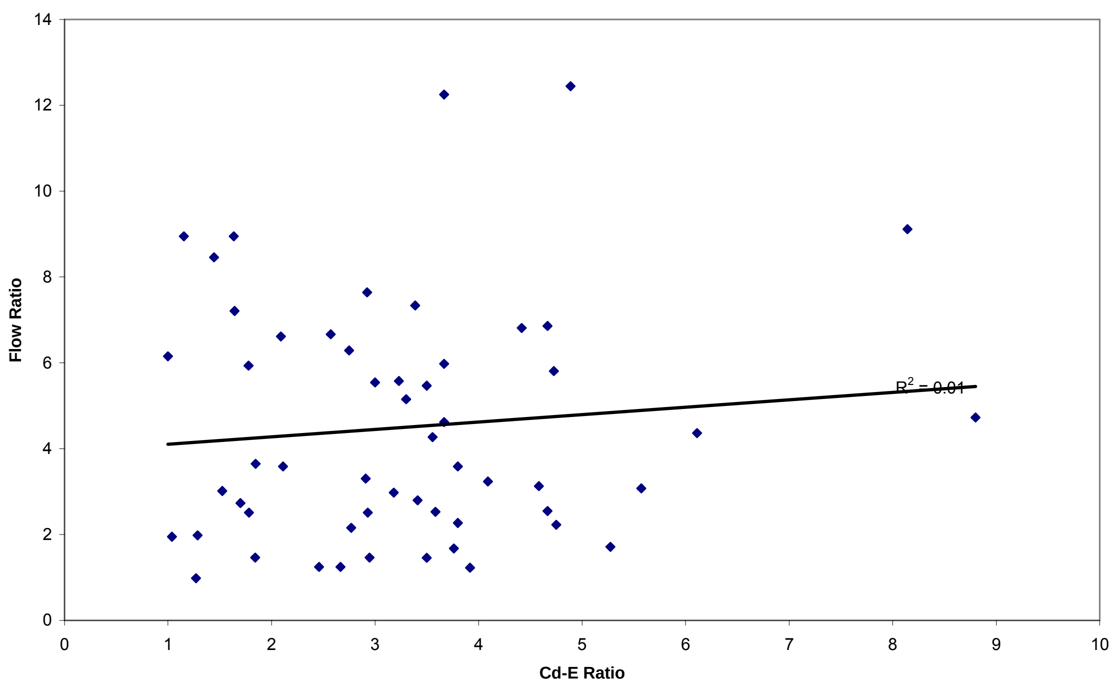


Figure 10 Calcium

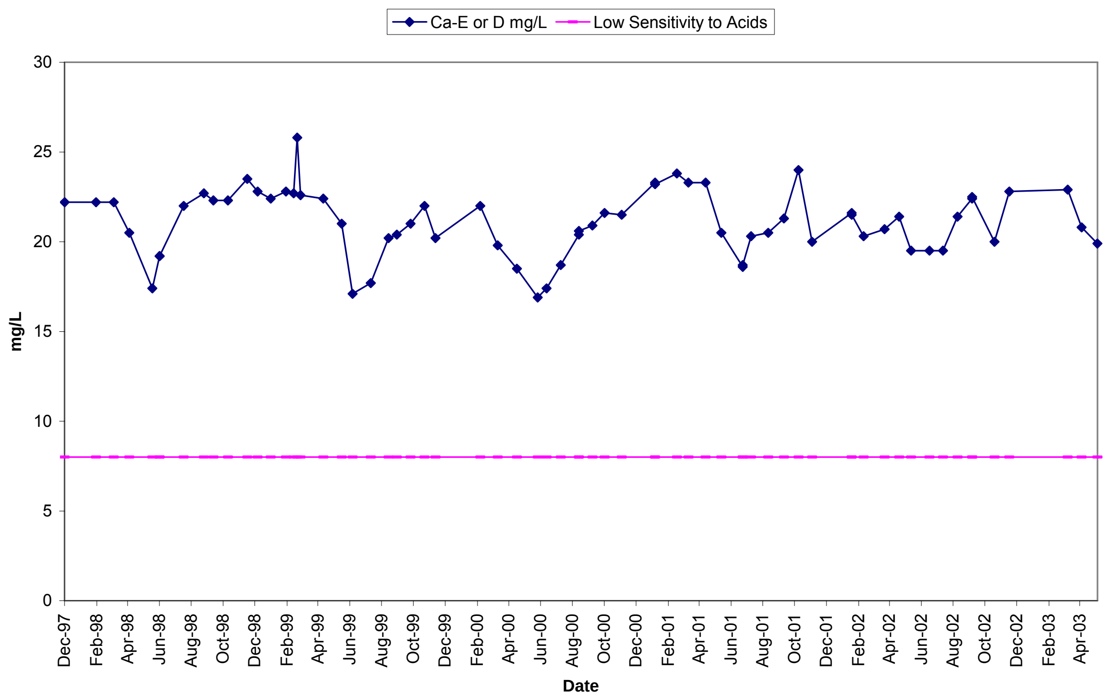


Figure 11 Carbon, Dissolved Inorganic

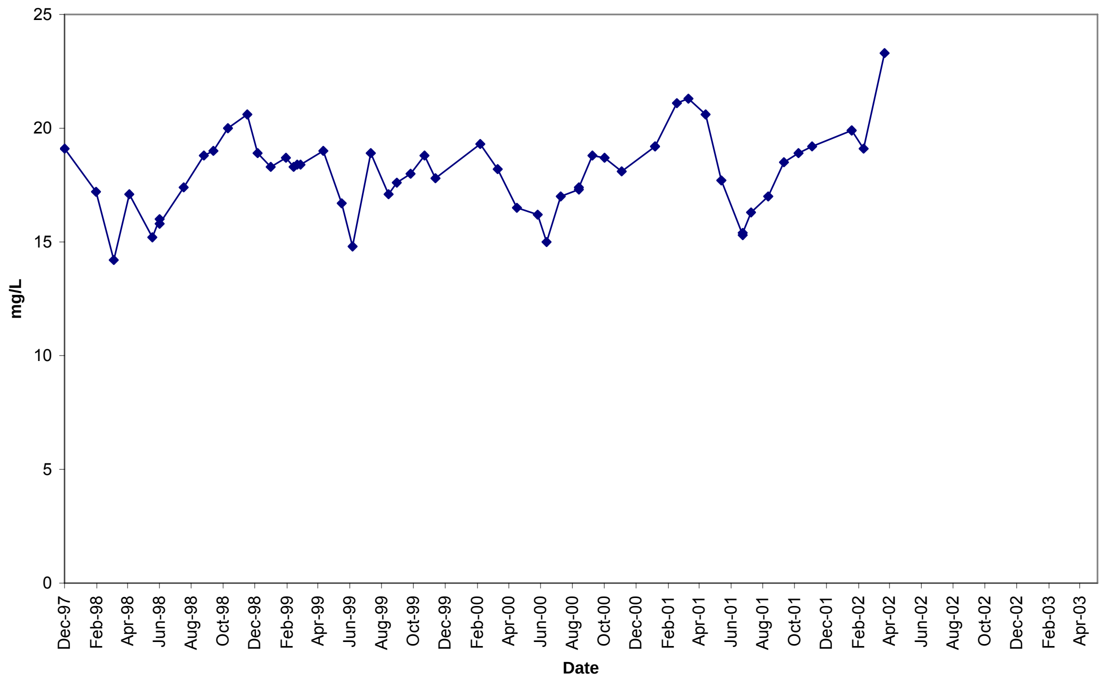


Figure 12 Carbon, Dissolved Organic

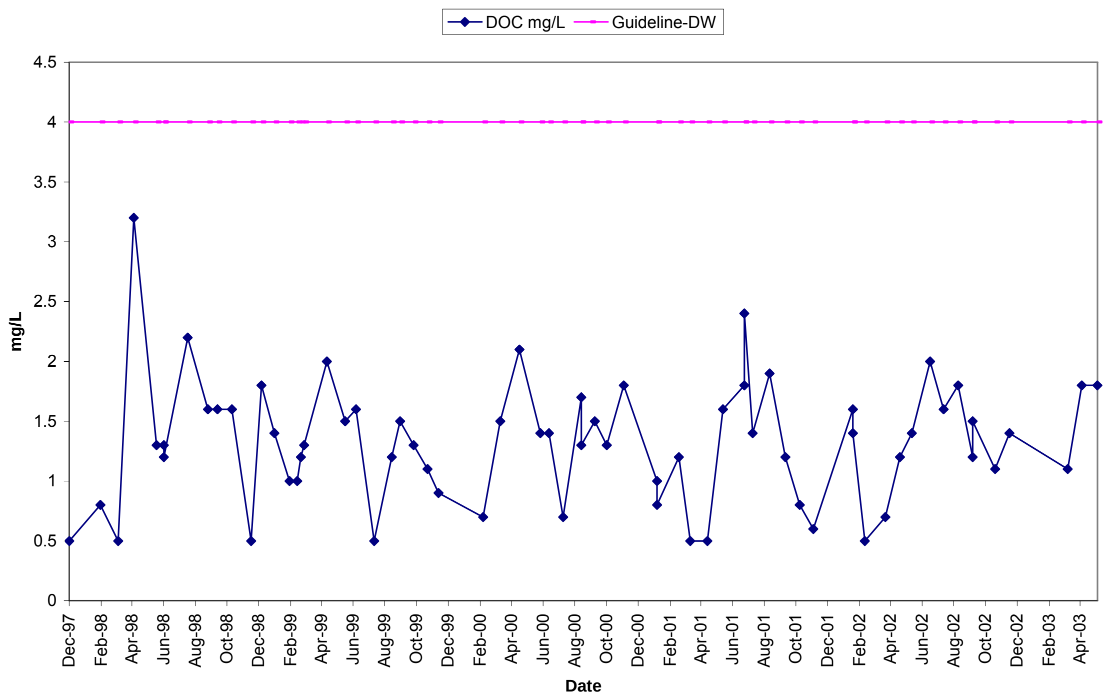


Figure 13 Chloride, Dissolved

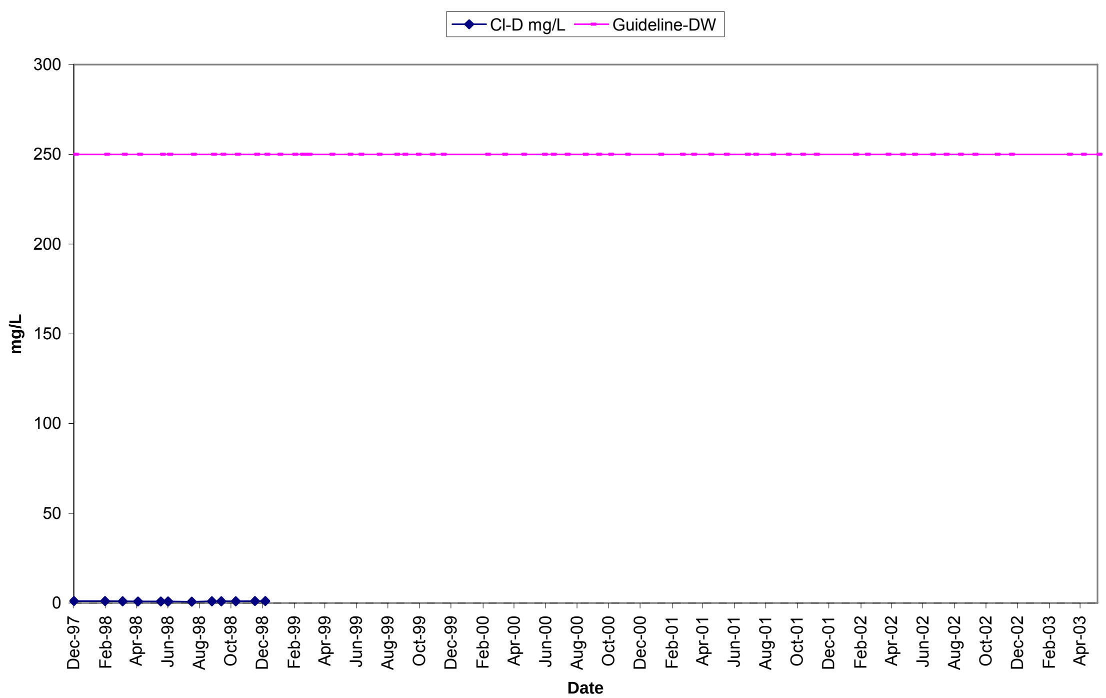


Figure 14 Chromium

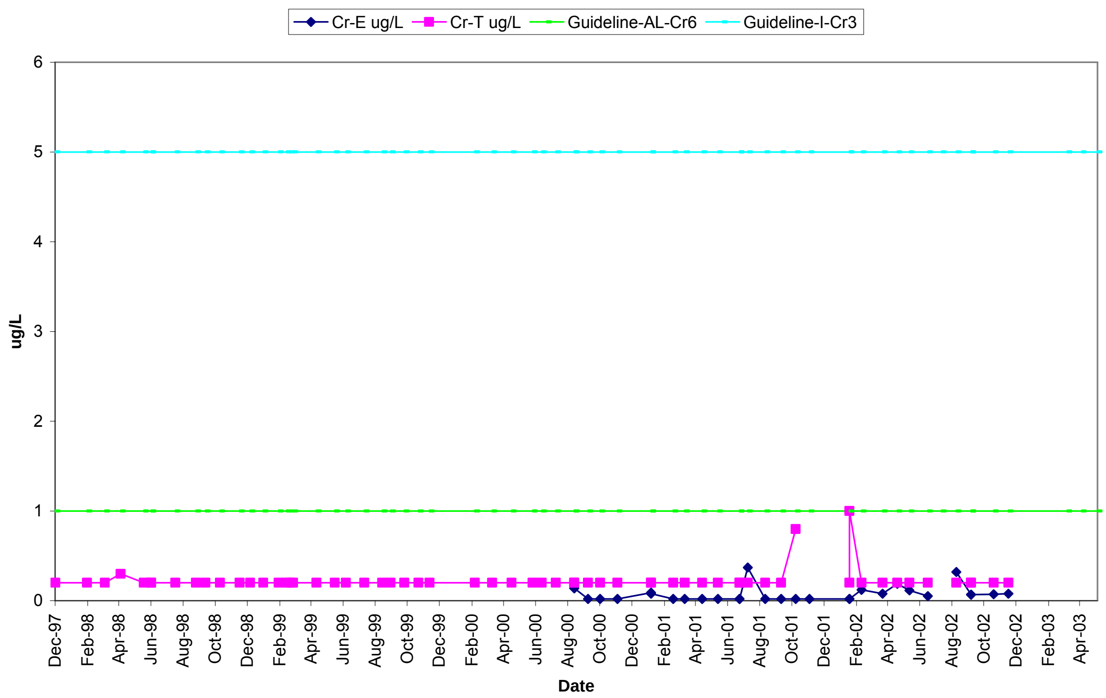


Figure 15 Cobalt

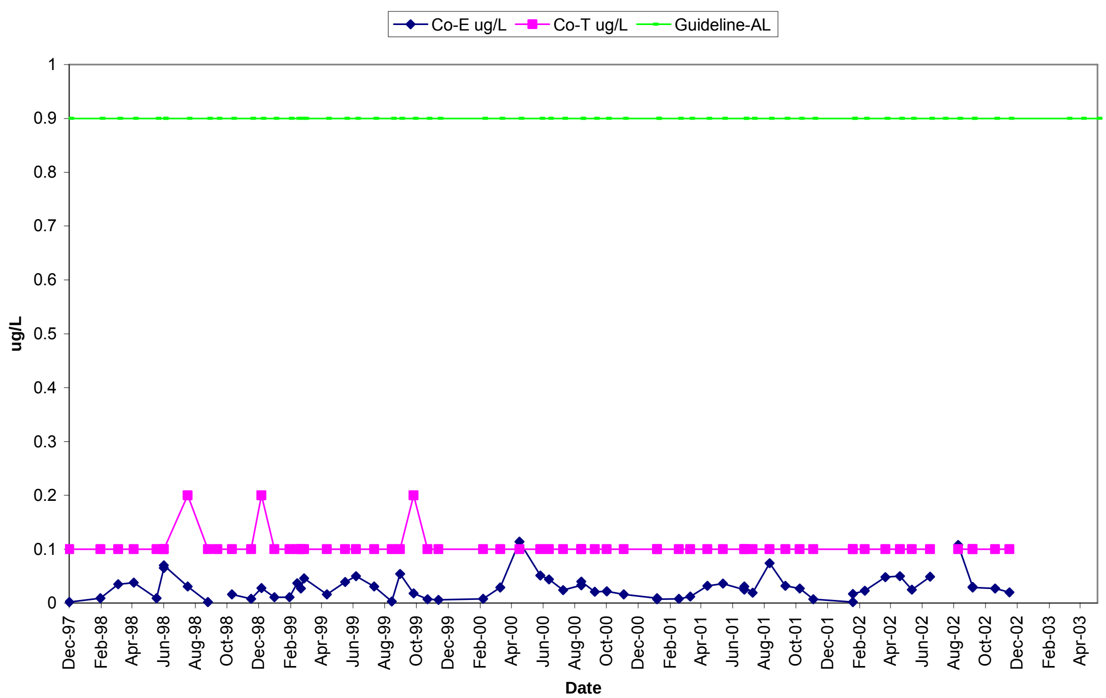


Figure 16 Coliforms, Fecal

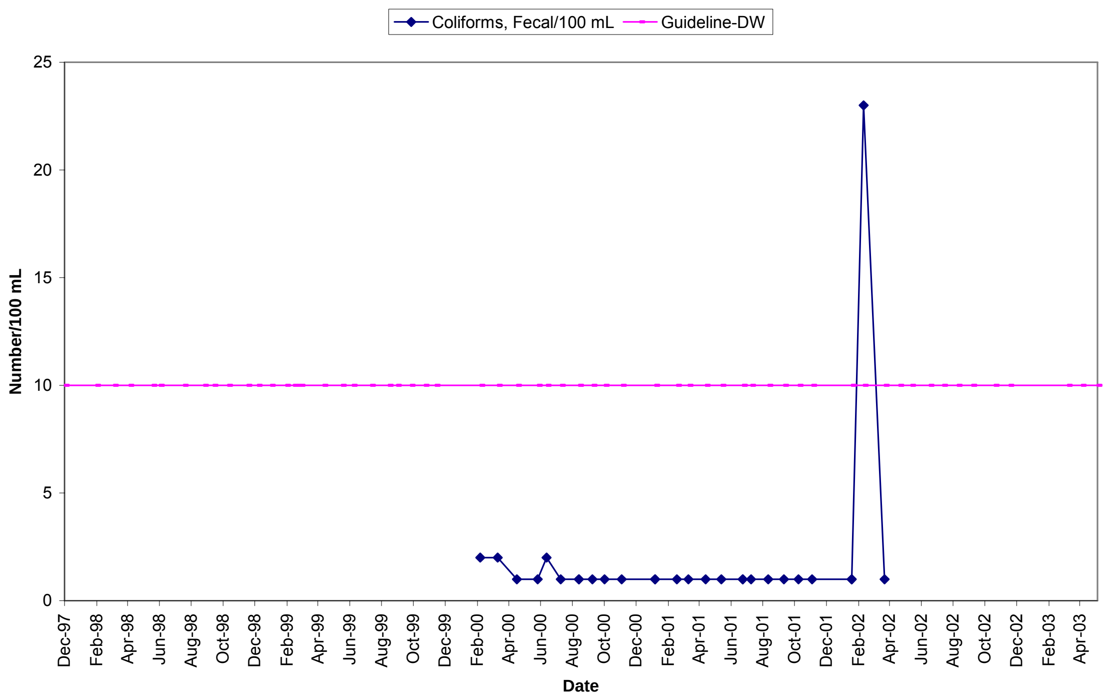


Figure 17 Colour, True

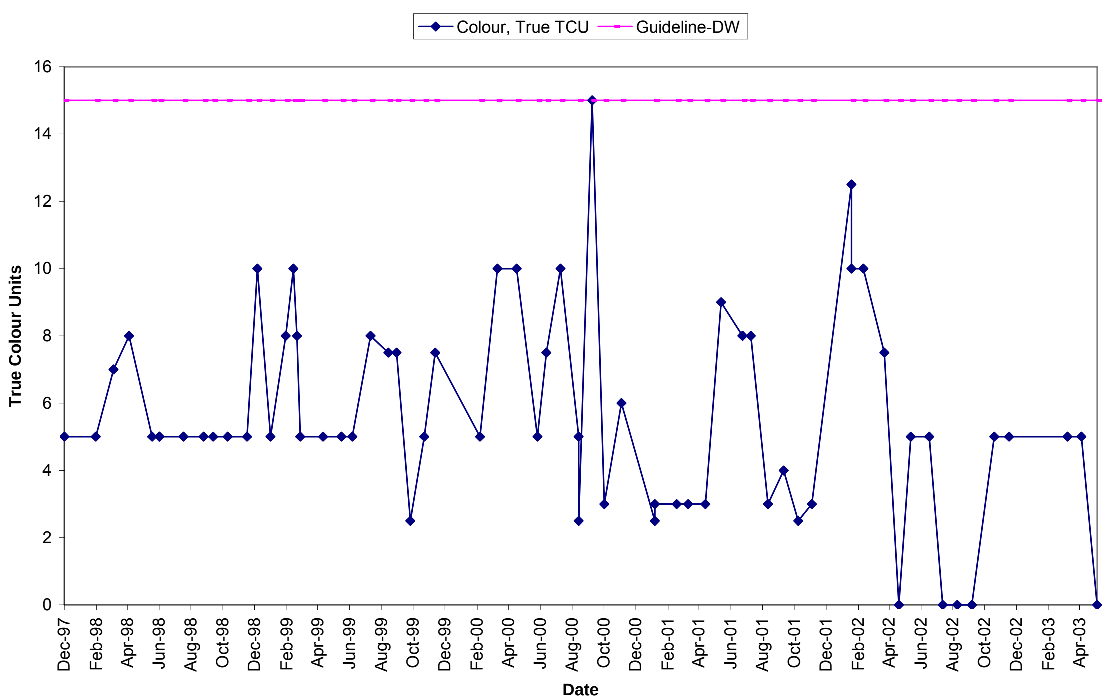


Figure 18 Conductance, Specific

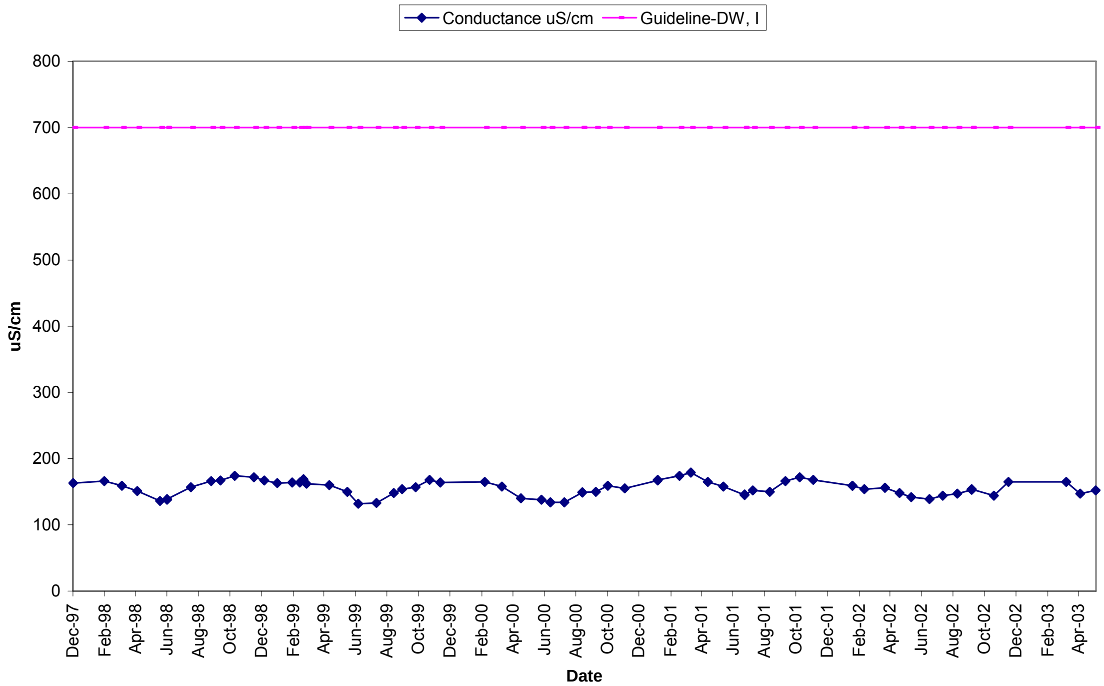


Figure 19a Copper

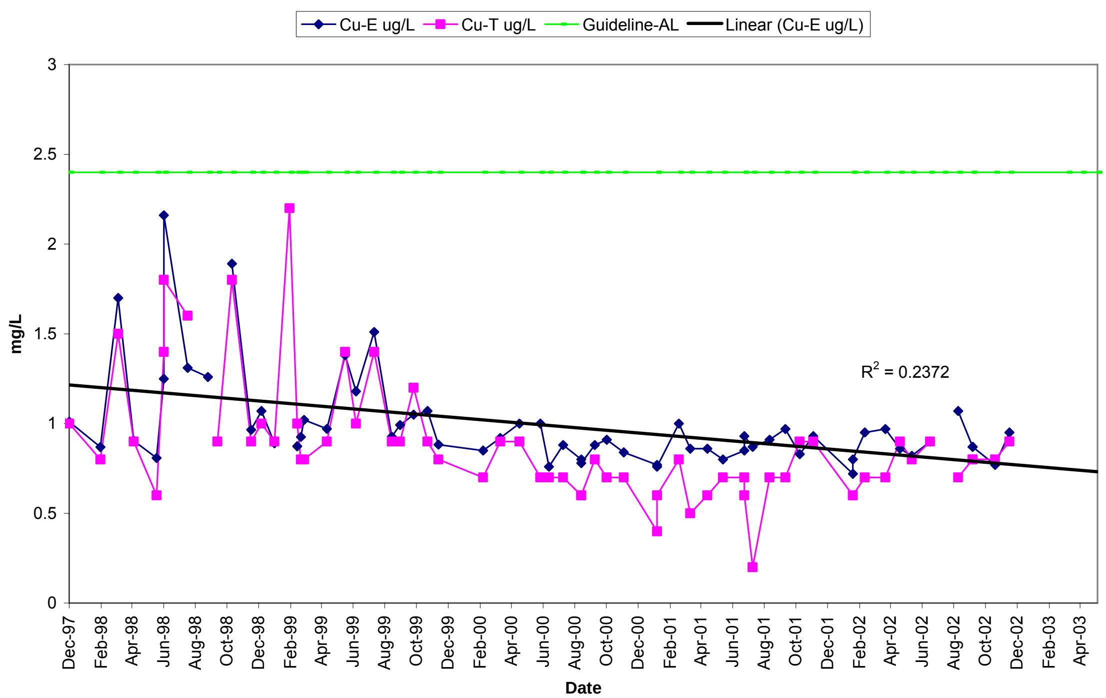


Figure 19b Copper, Extractable at US Border & Waneta

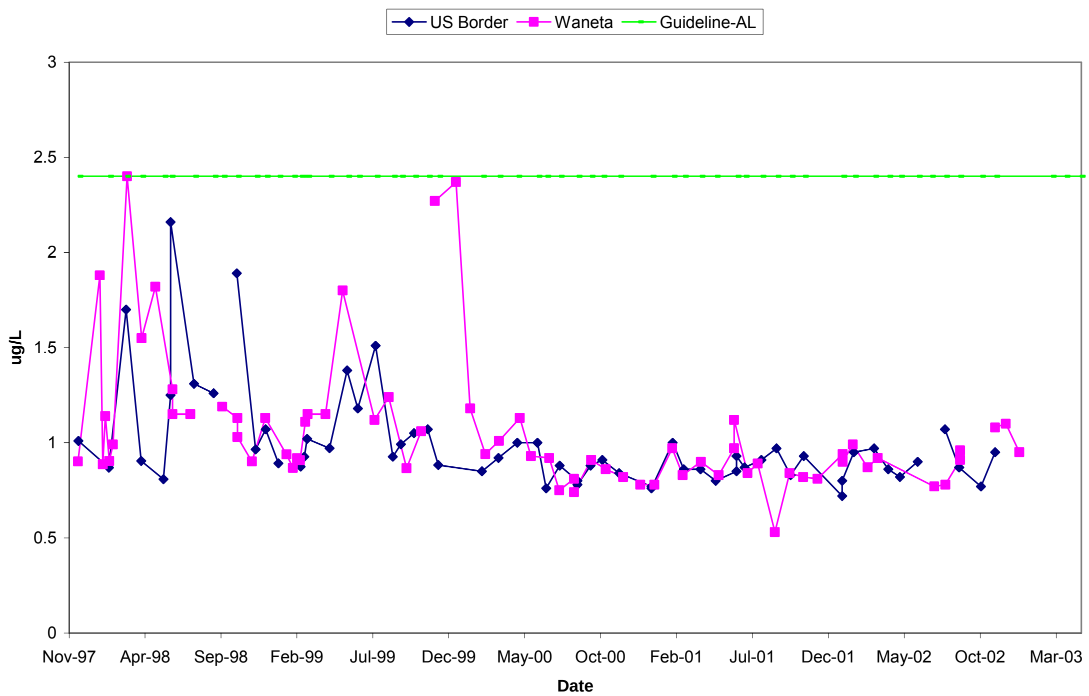


Figure 19c Copper, Extractable & Turbidity

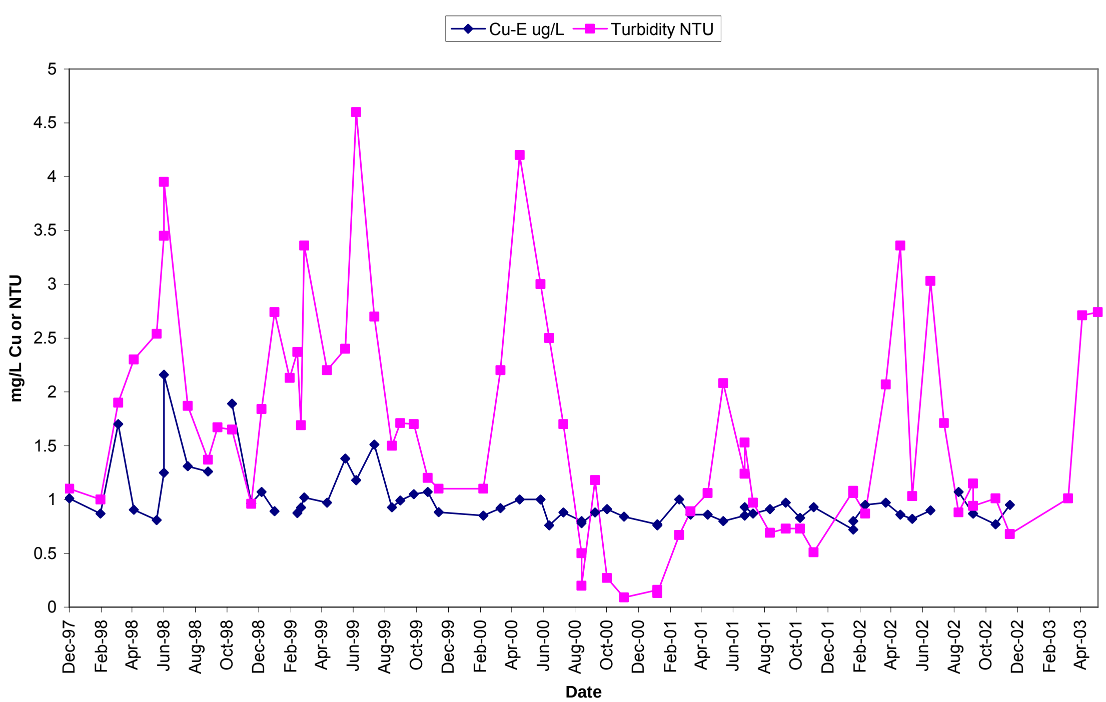


Figure 19d Copper, Extractable versusTurbidity

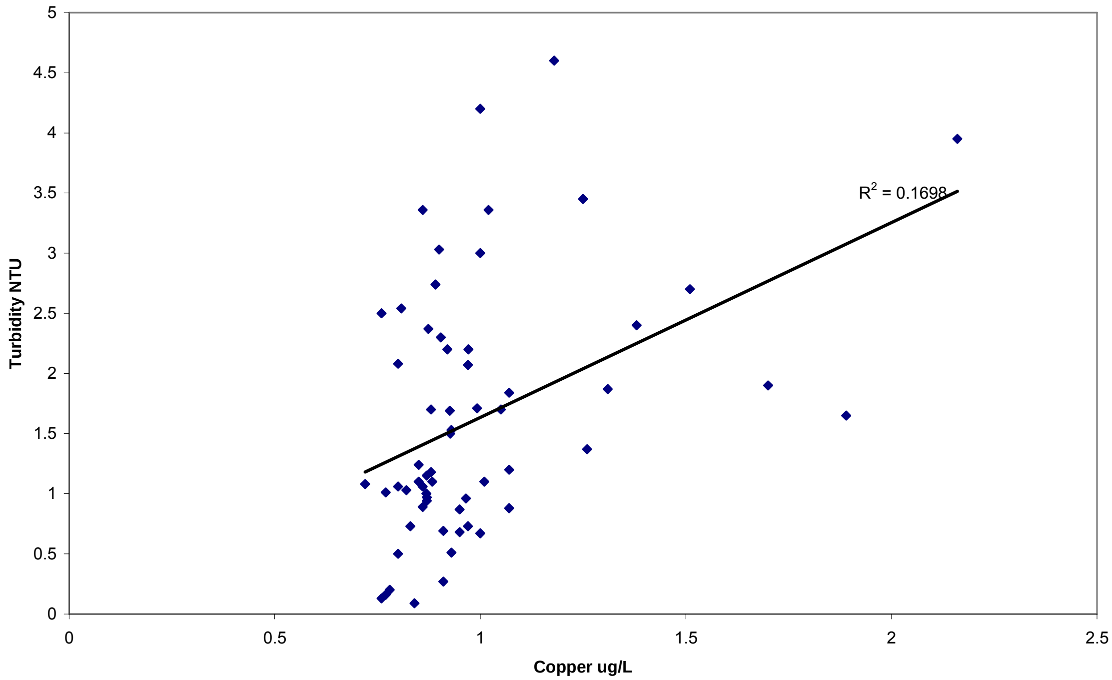


Figure 20 Fluoride, Dissolved

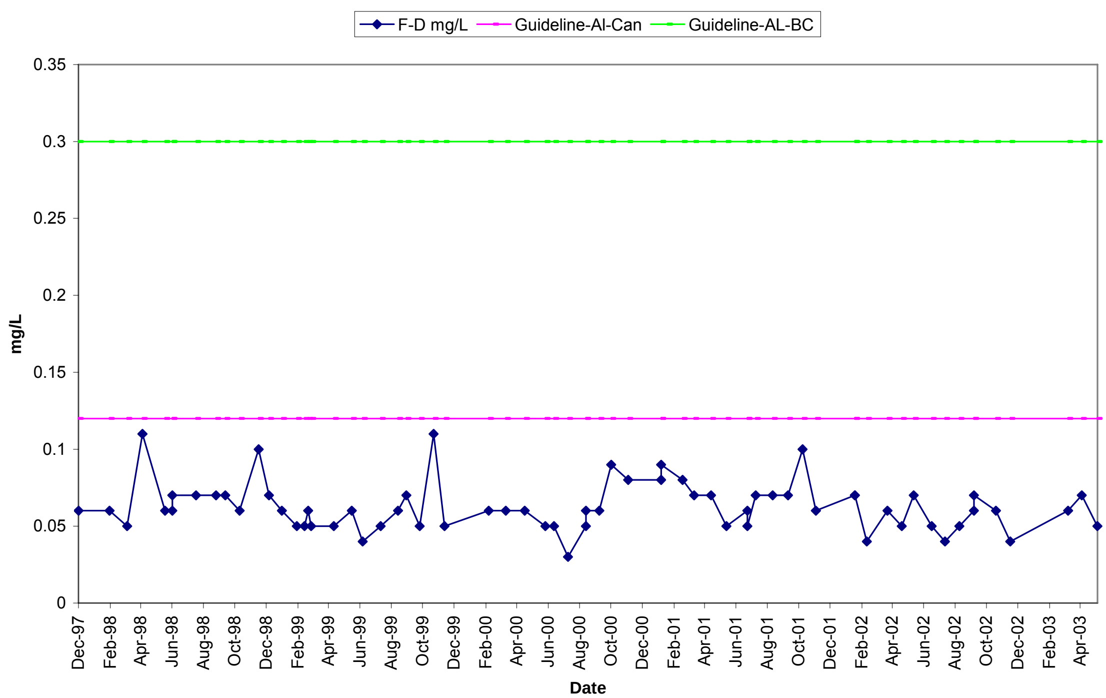


Figure 21 Gallium, Extractable

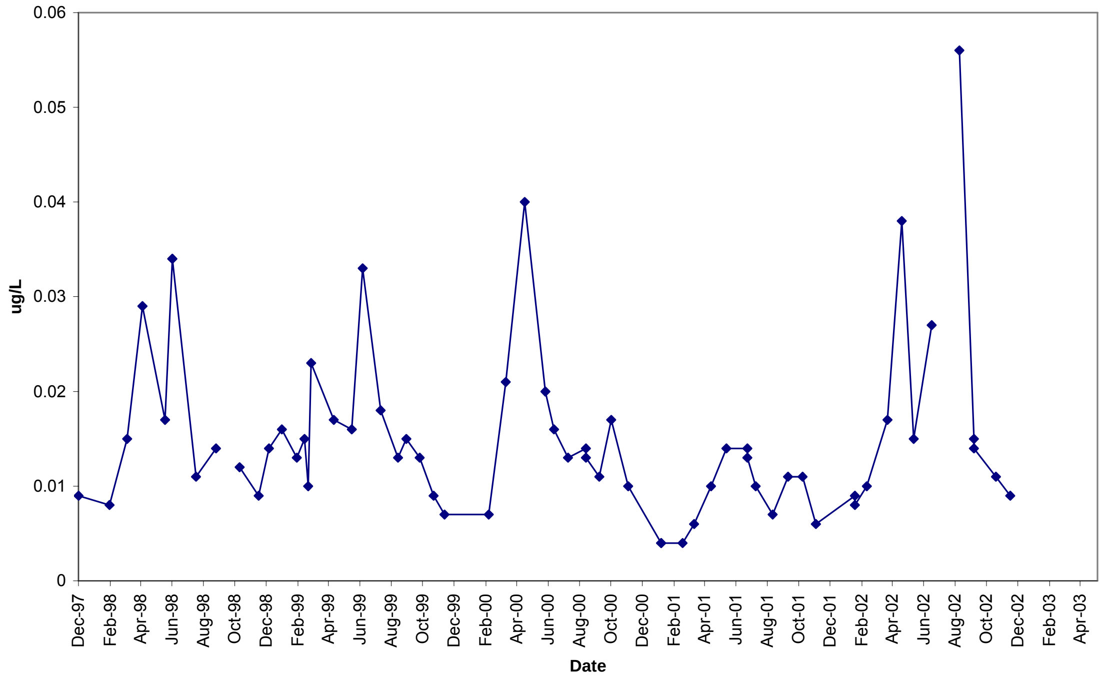


Figure 22 Hardness

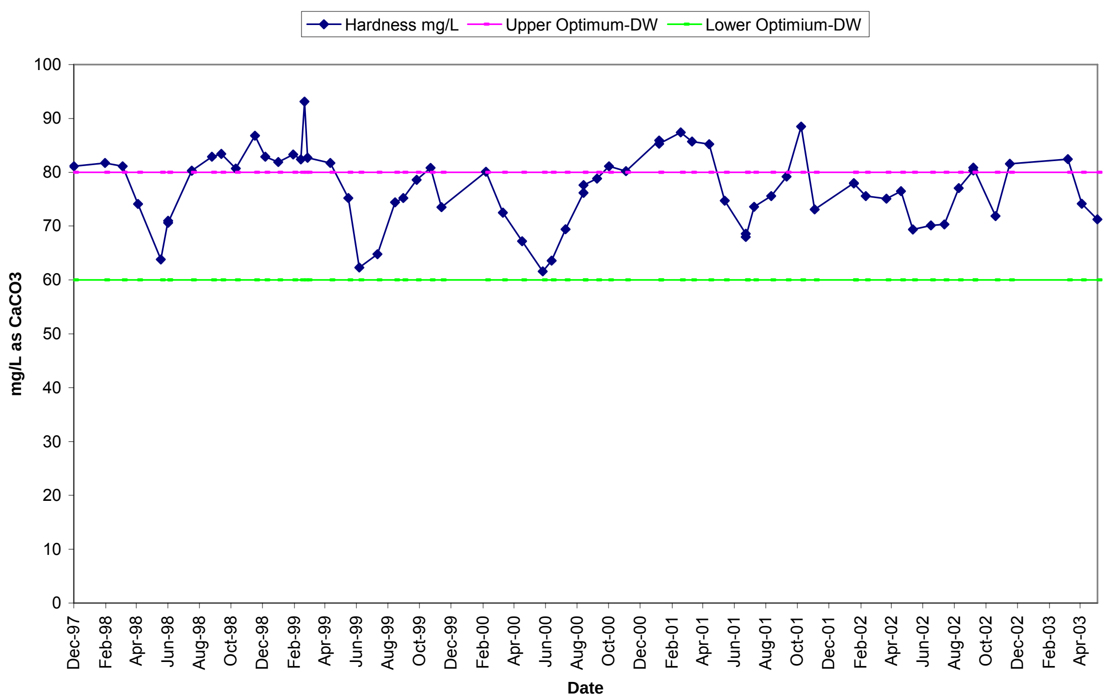


Figure 23 Iron, Total

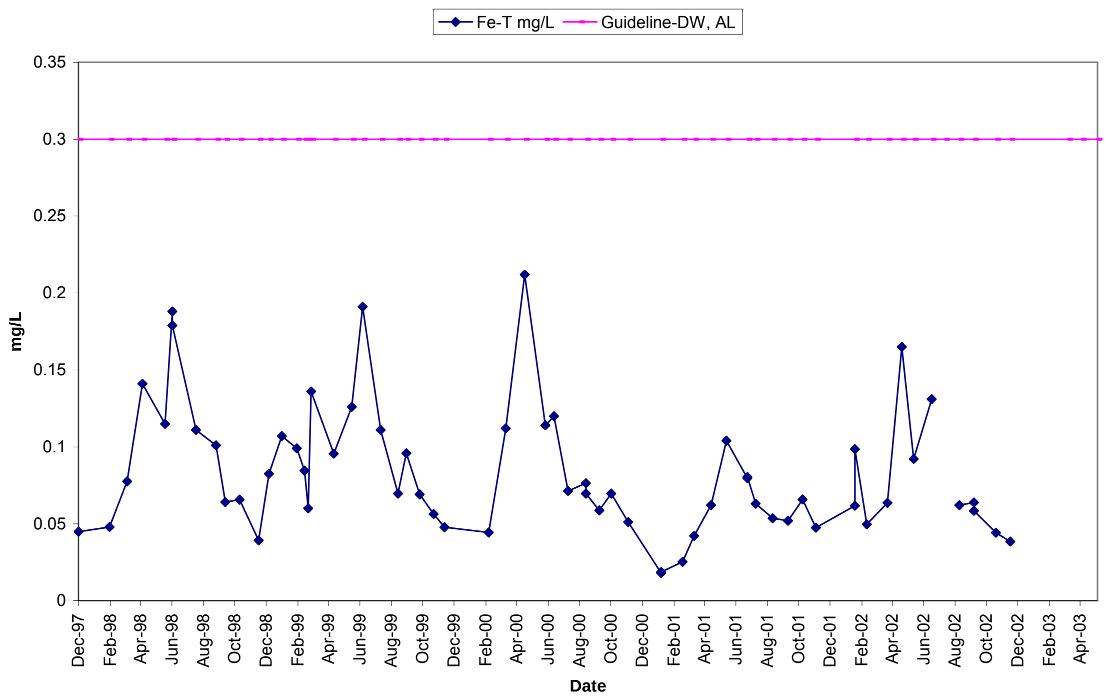


Figure 24 Lanthanum, Extractable

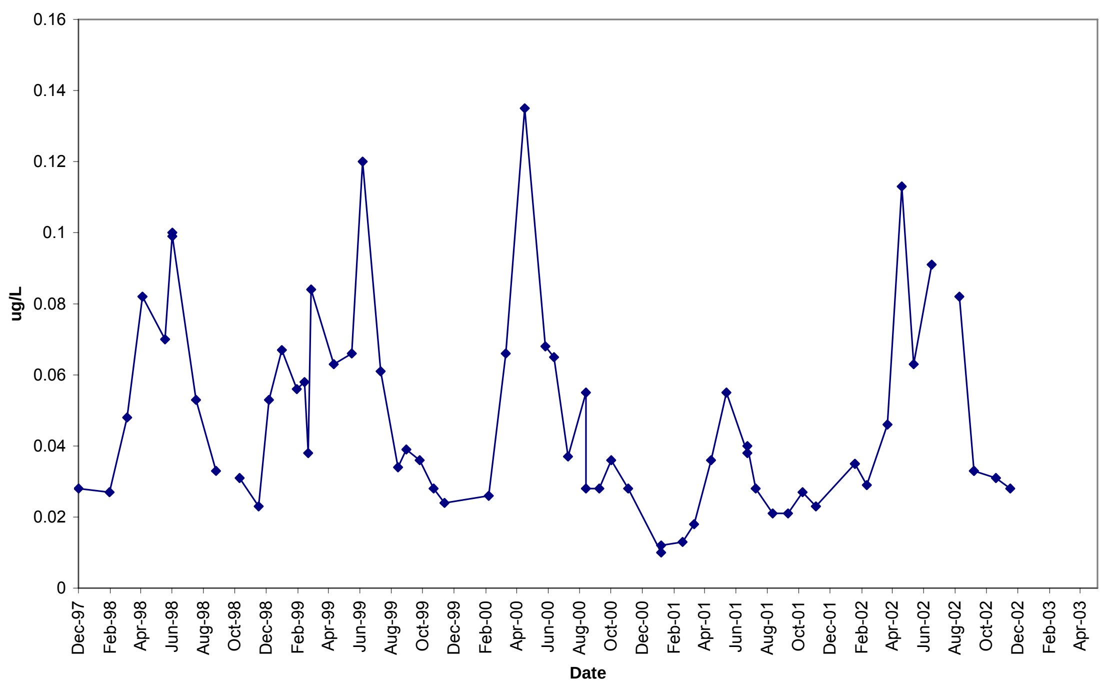


Figure 25a Lead

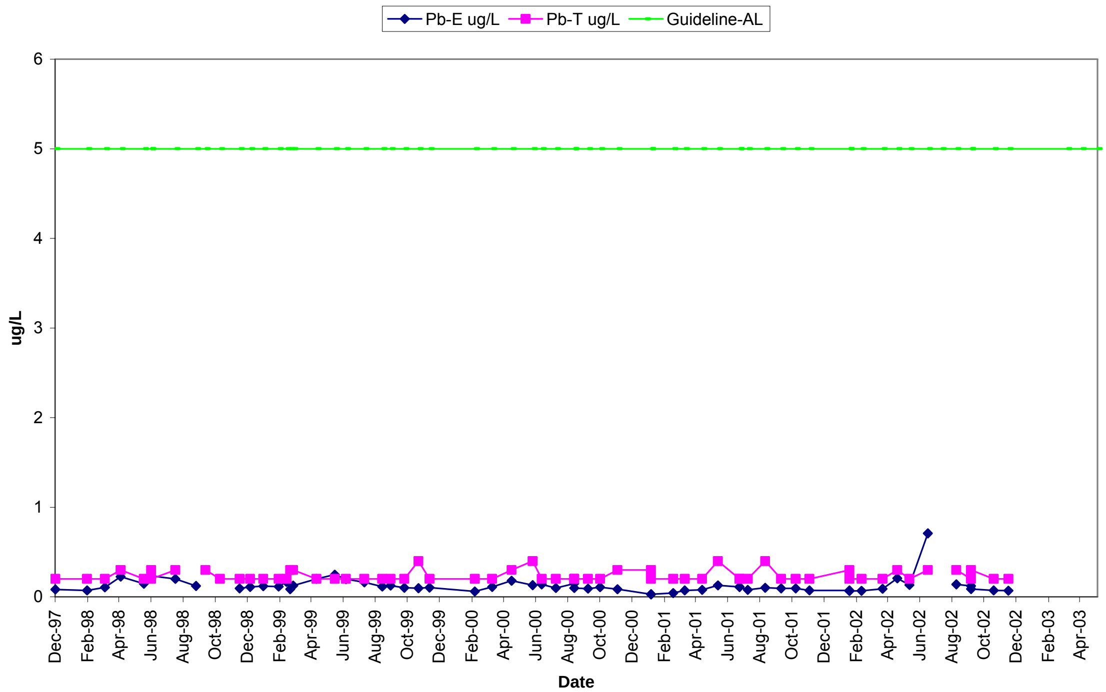


Figure 25b Lead, Extractable at US Border & Waneta

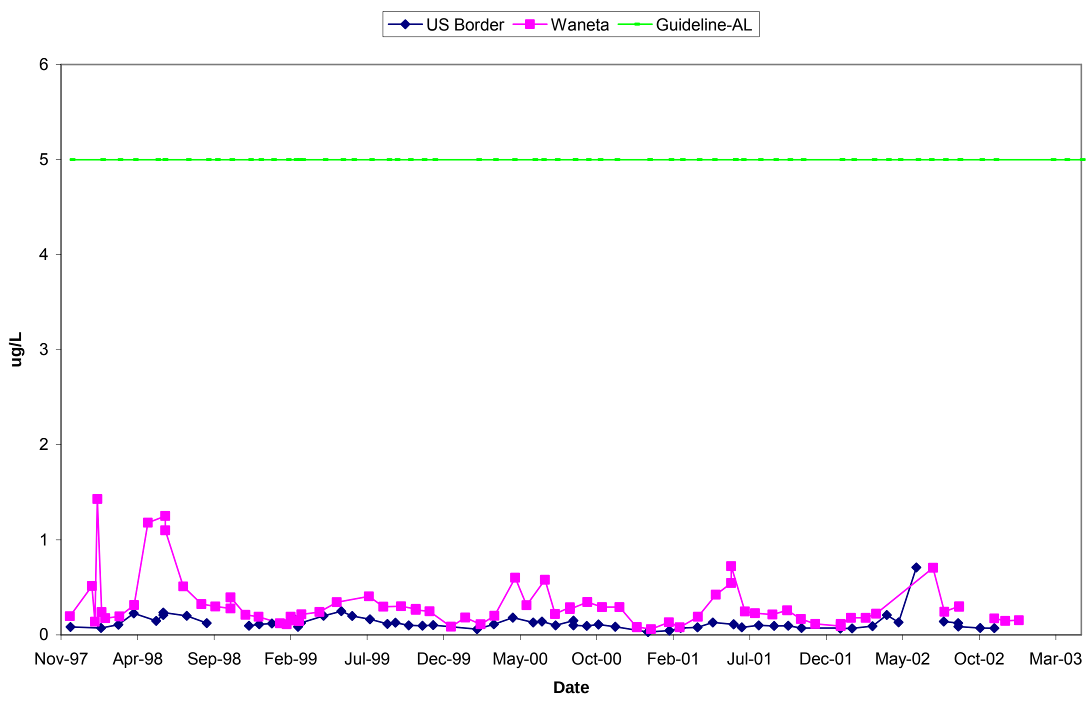


Figure 26a Lithium

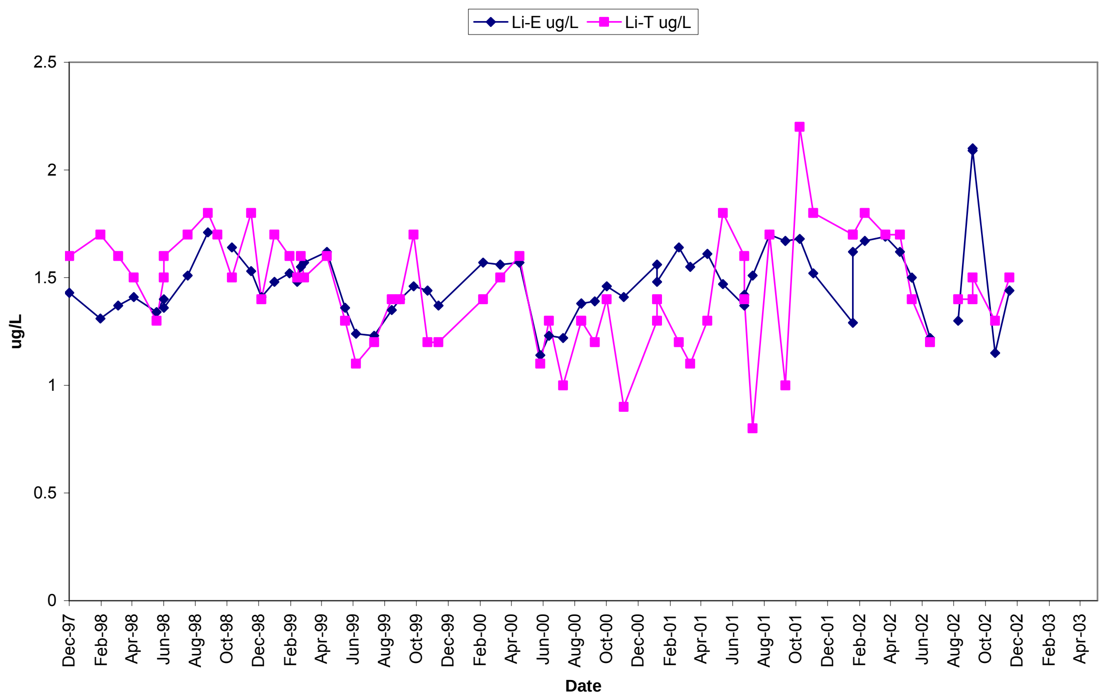


Figure 26b Lithium versus Guideline

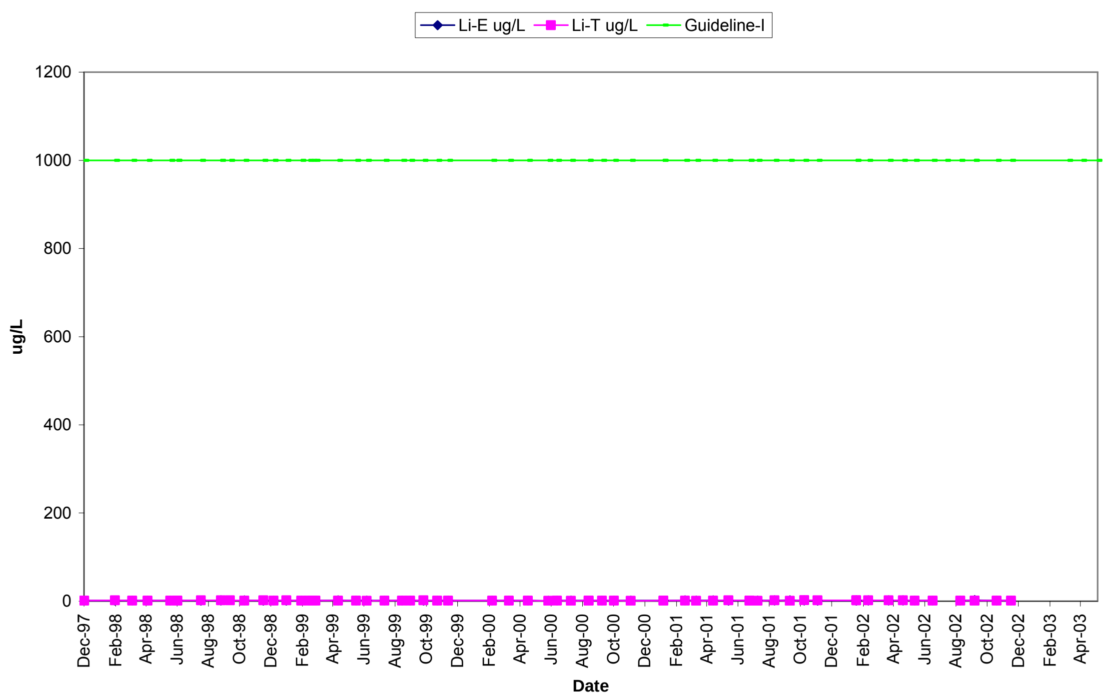


Figure 27 Magnesium

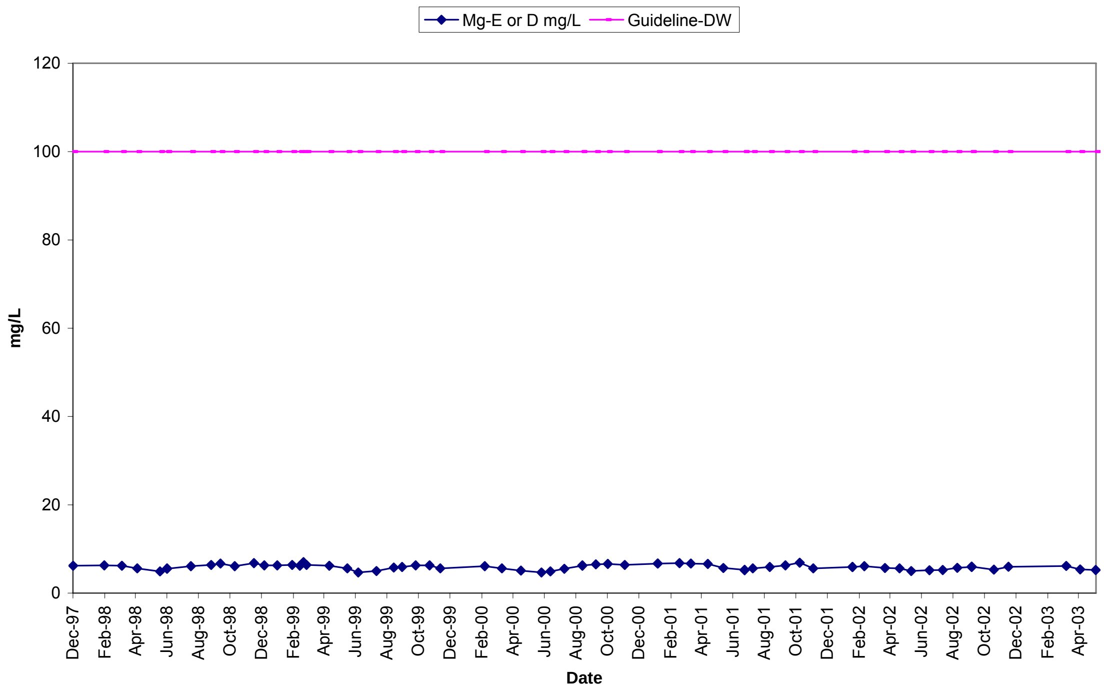


Figure 28 Manganese

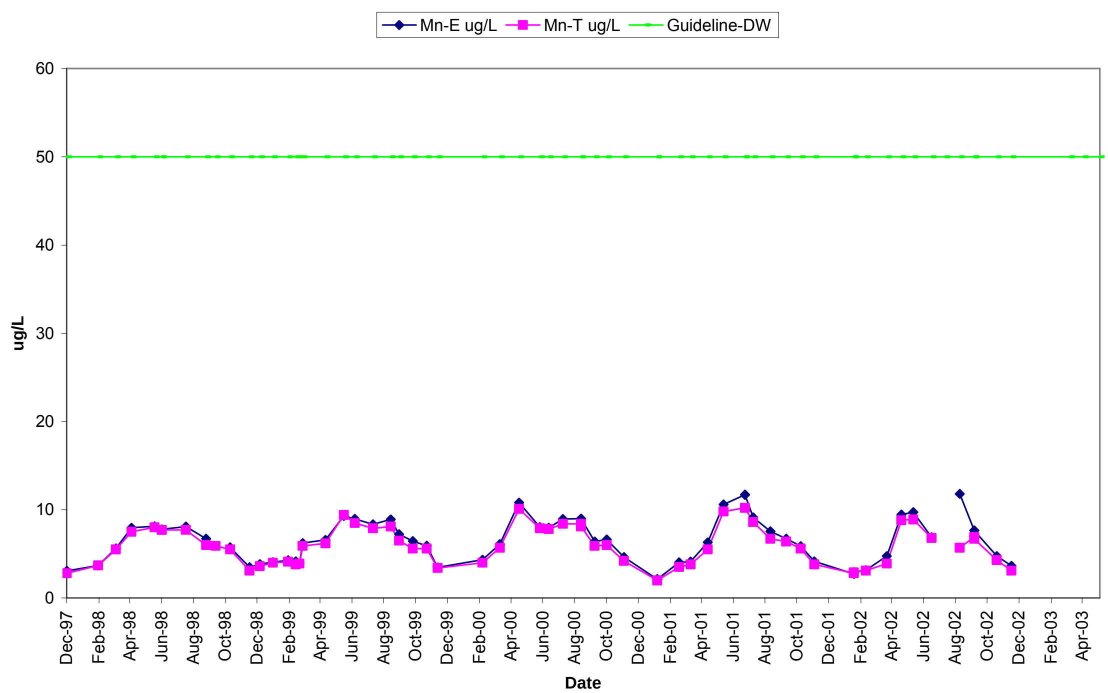


Figure 29 Molybdenum, Total

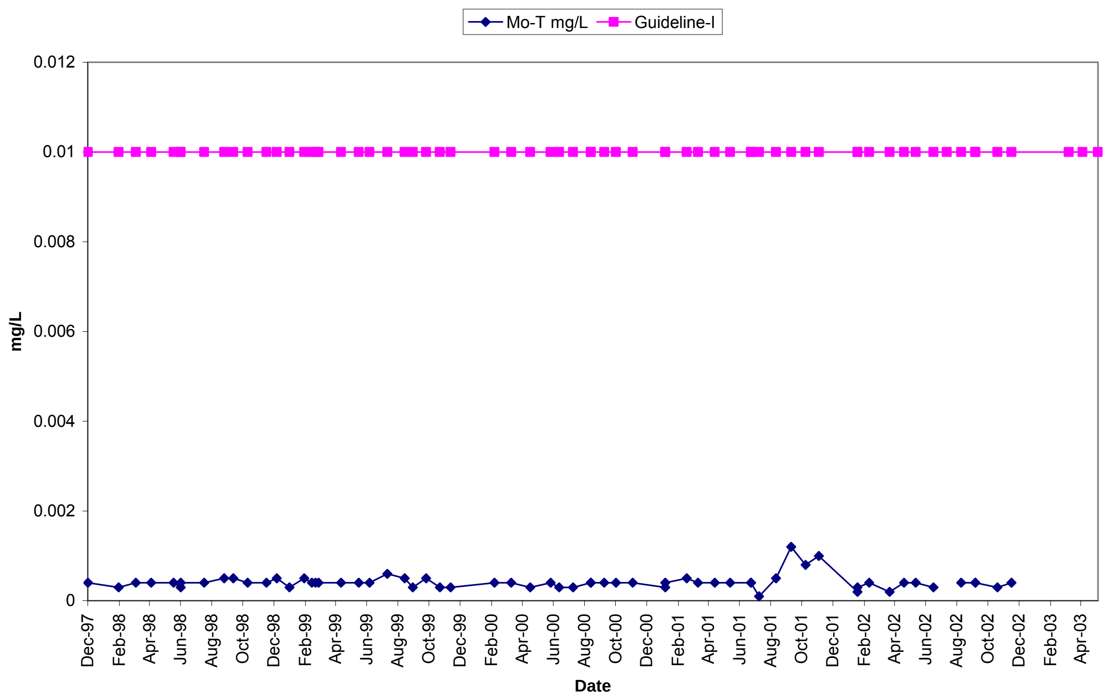


Figure 30 Nickel

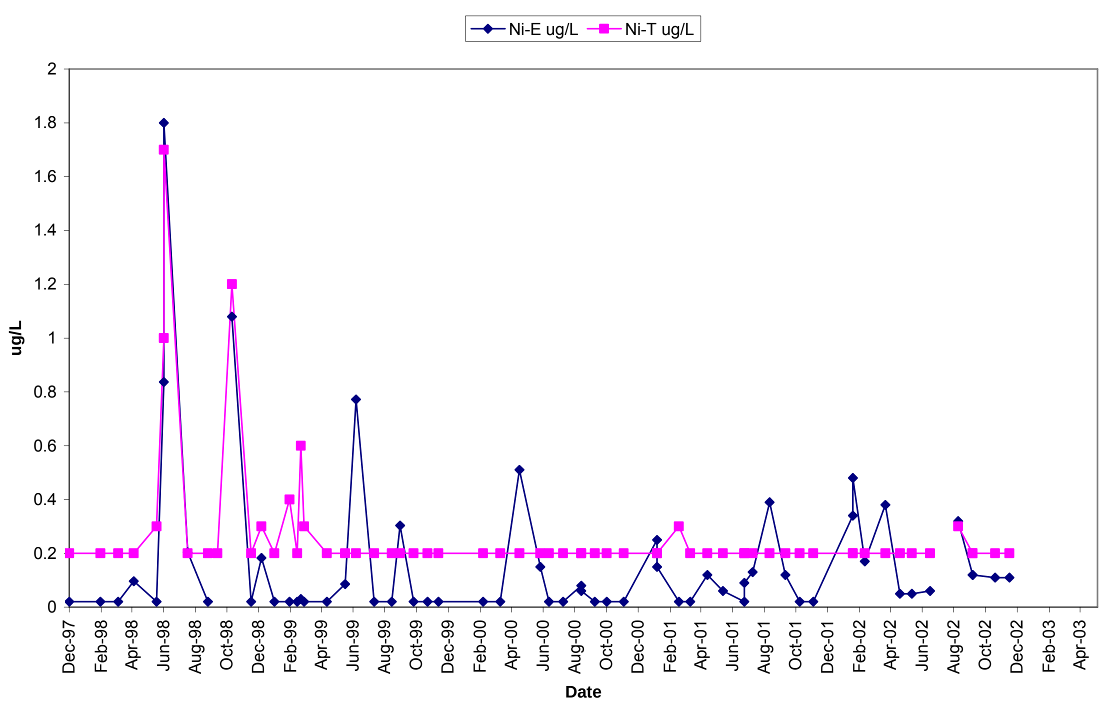


Figure 30 Nickel versus Guideline

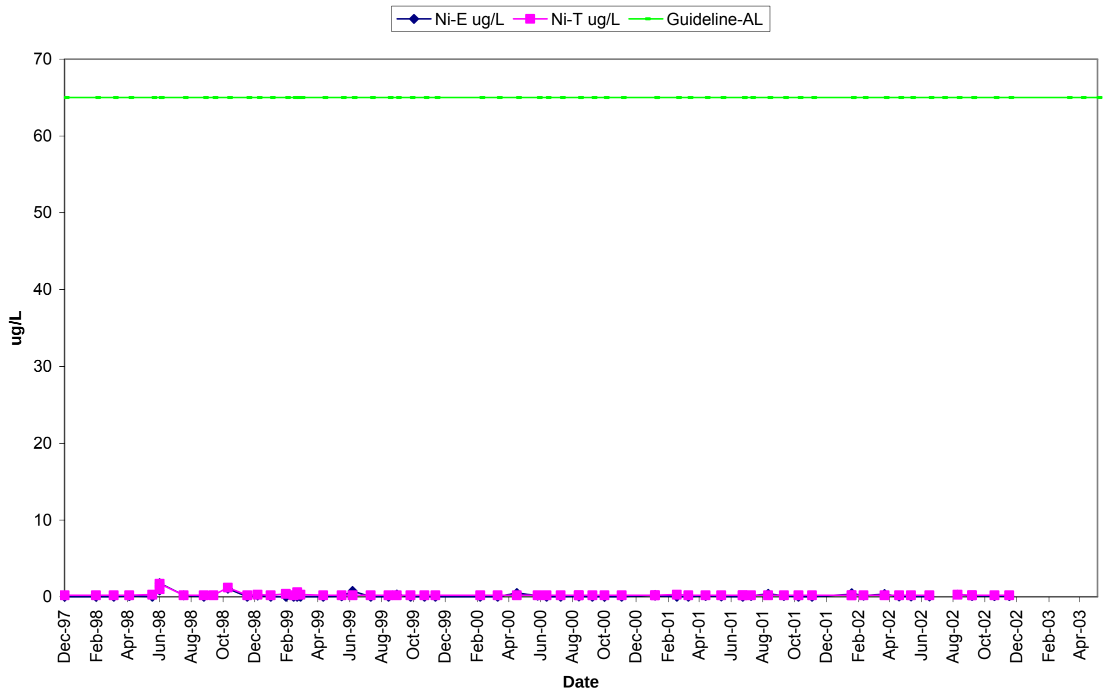


Figure 31 Nitrate-Nitrogen

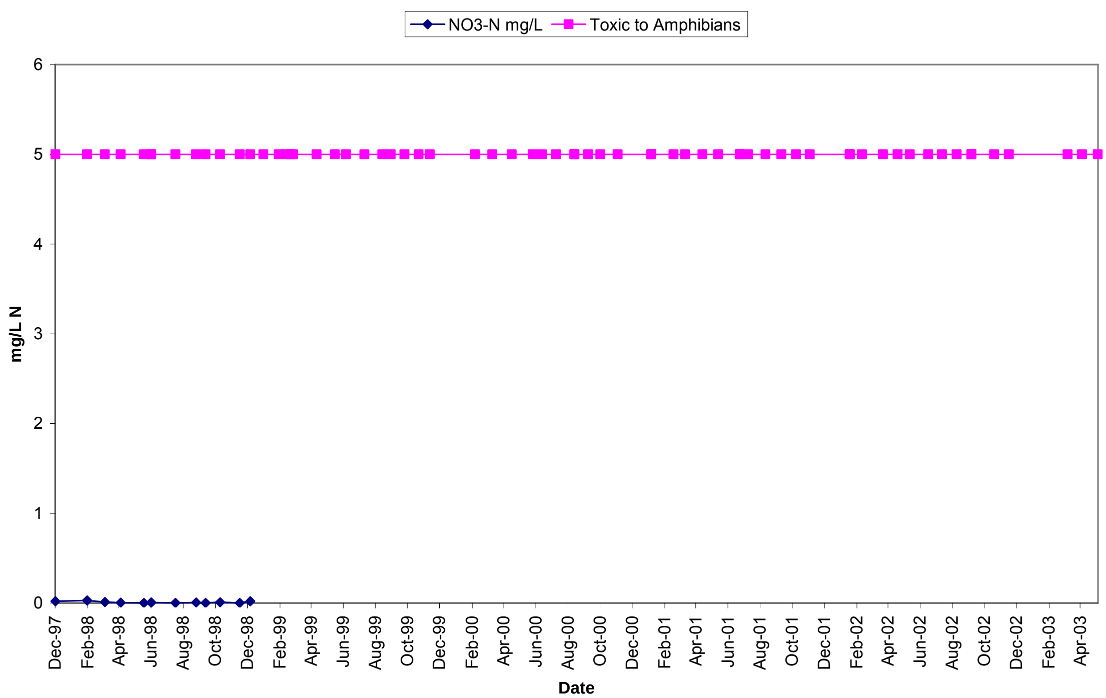


Figure 32 Nitrite-Nitrogen

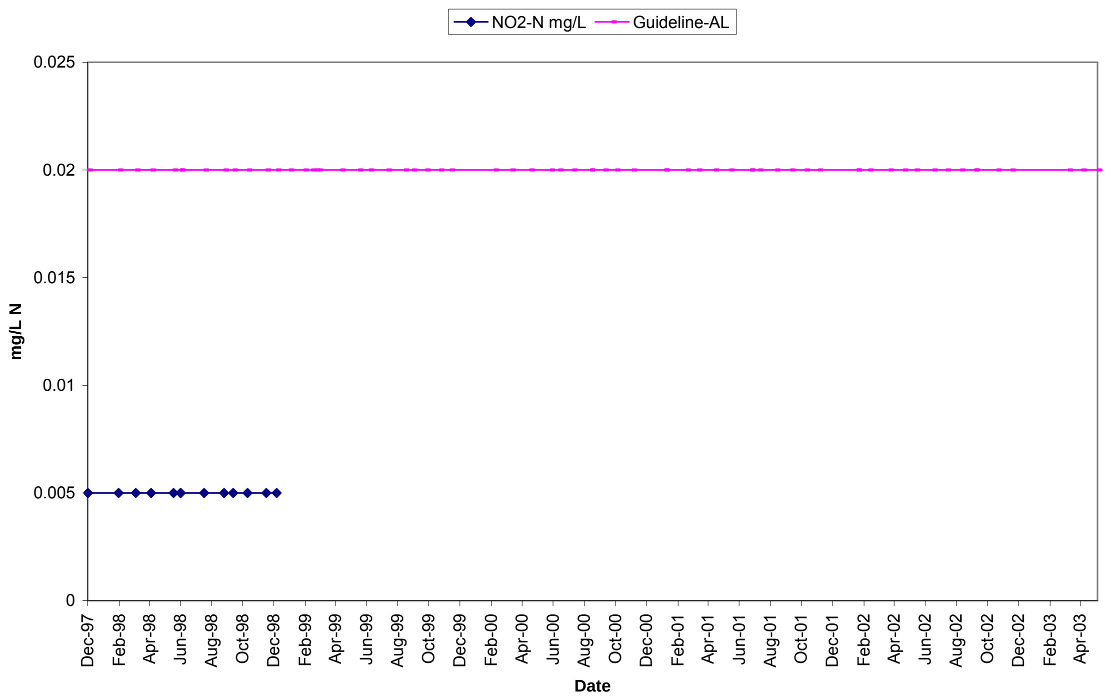


Figure 33 Nitrogen, Total Dissolved

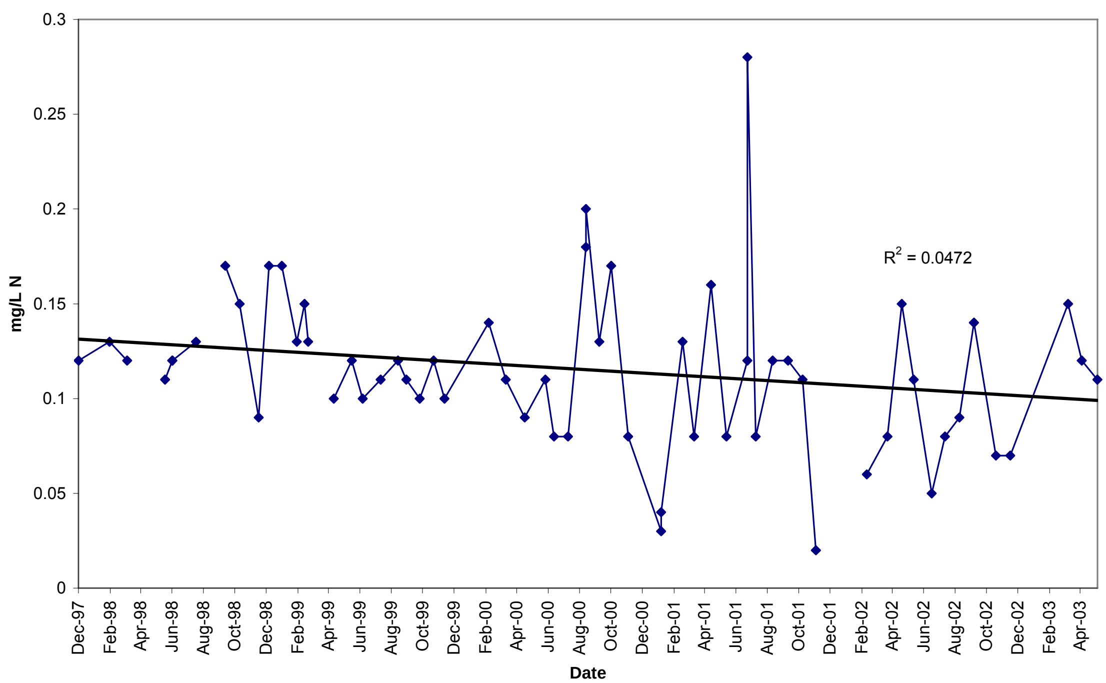


Figure 34 pH

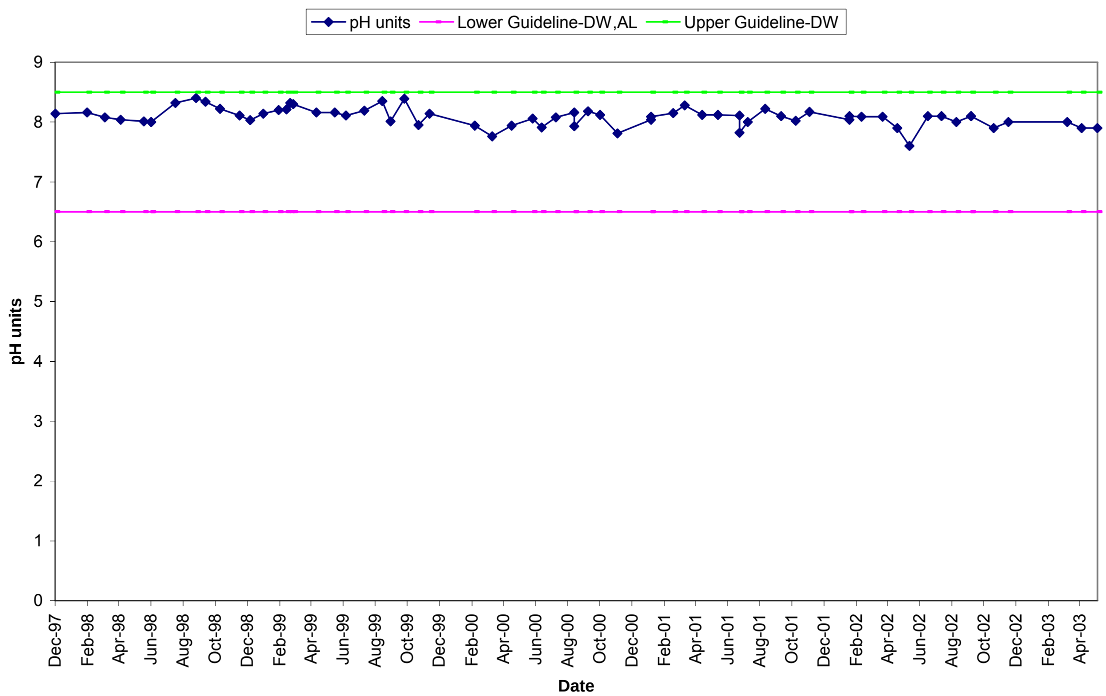


Figure 35 Phosphorus

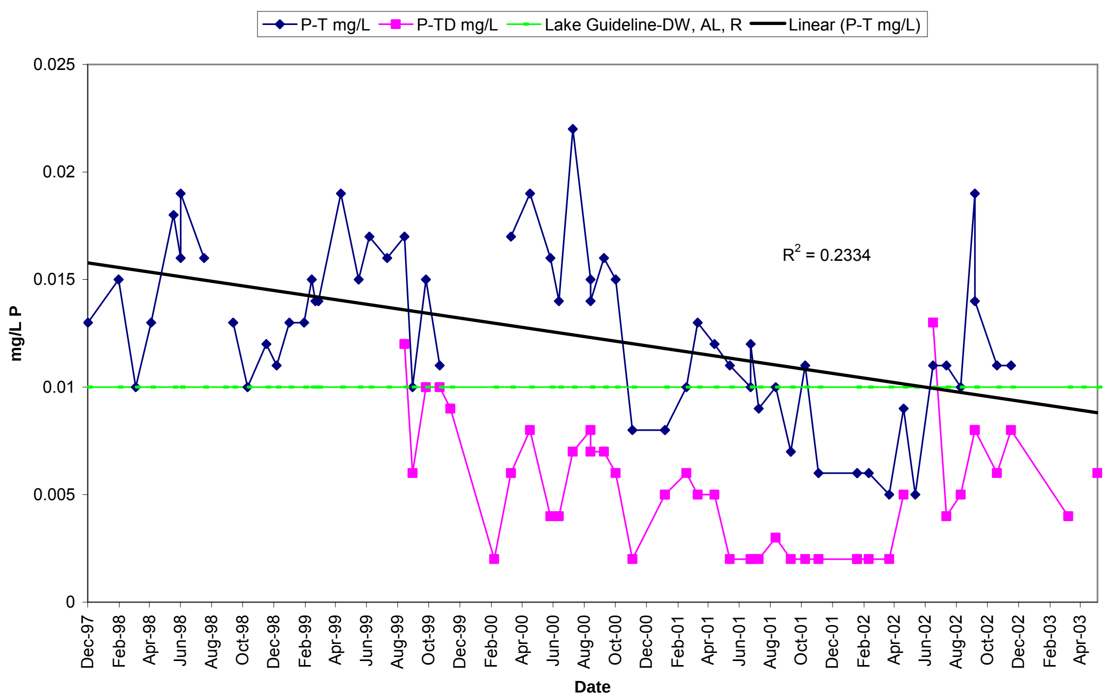


Figure 36 Potassium

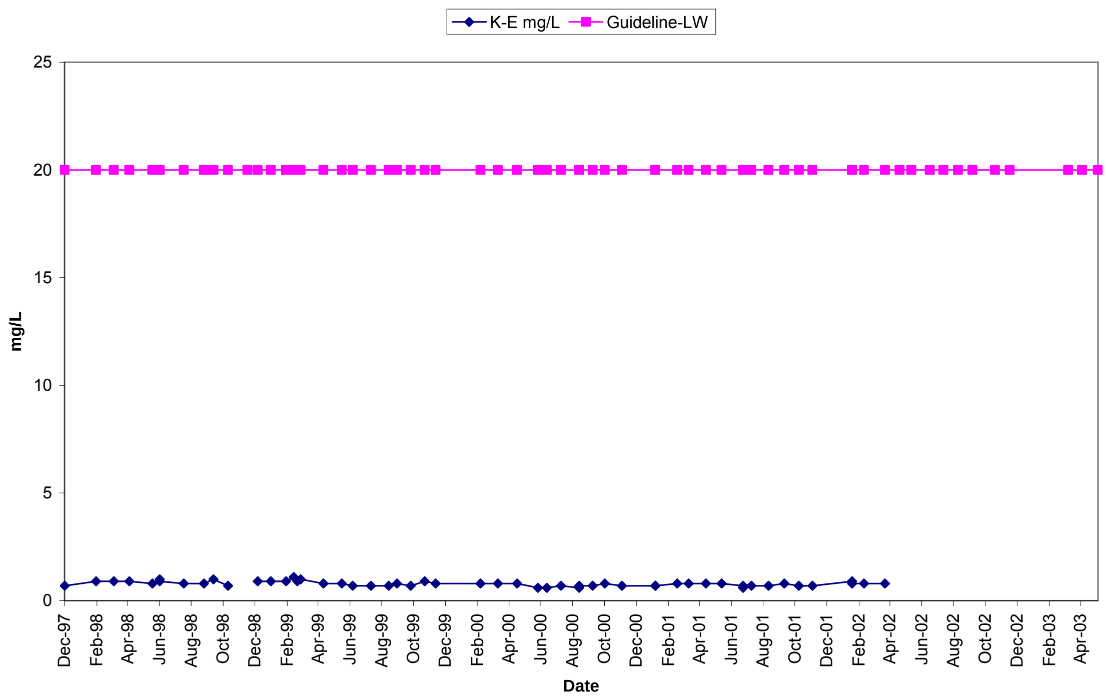


Figure 37 Rubidium, Extractable

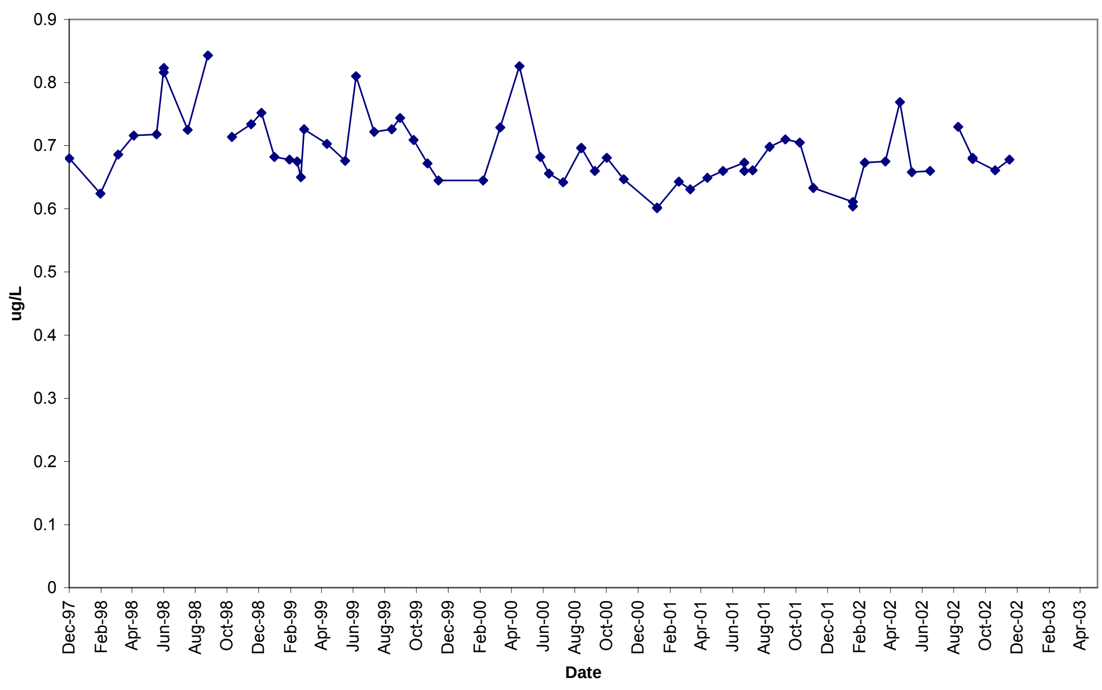


Figure 38 Selenium, Total

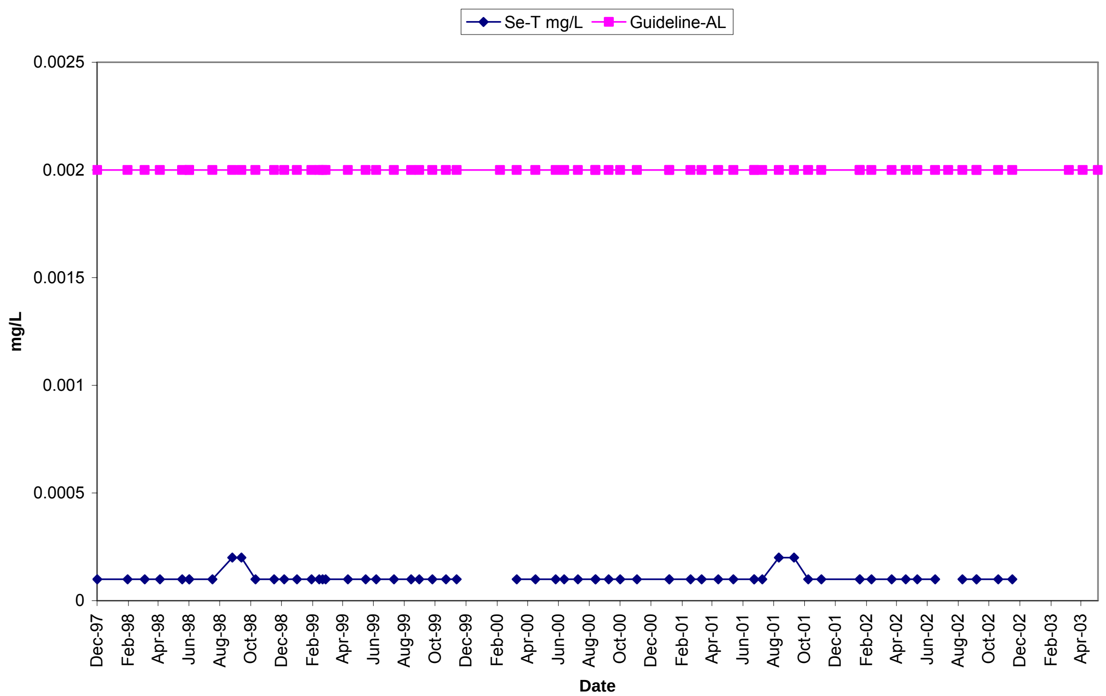


Figure 39 Silicon

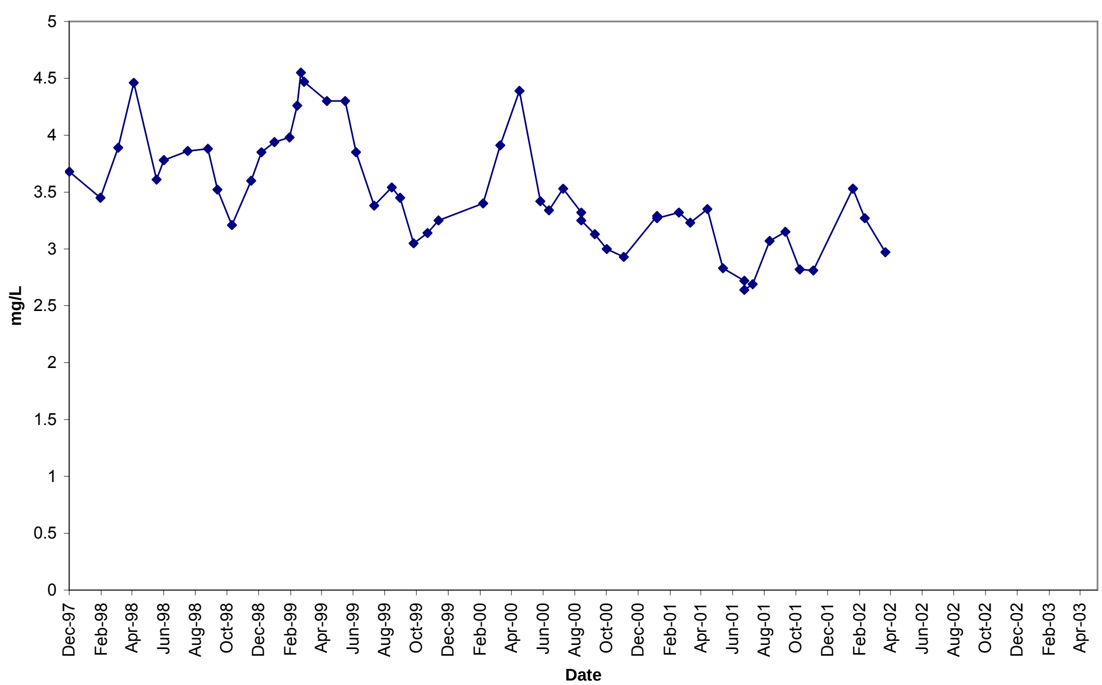


Figure 40 Silver

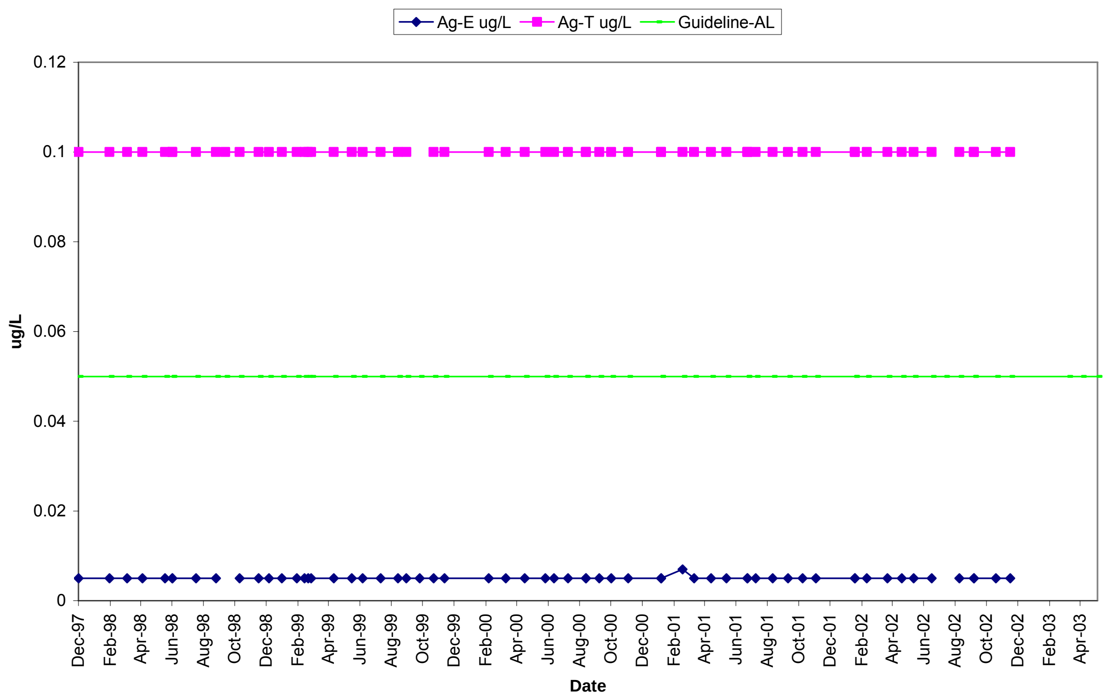


Figure 41 Sodium

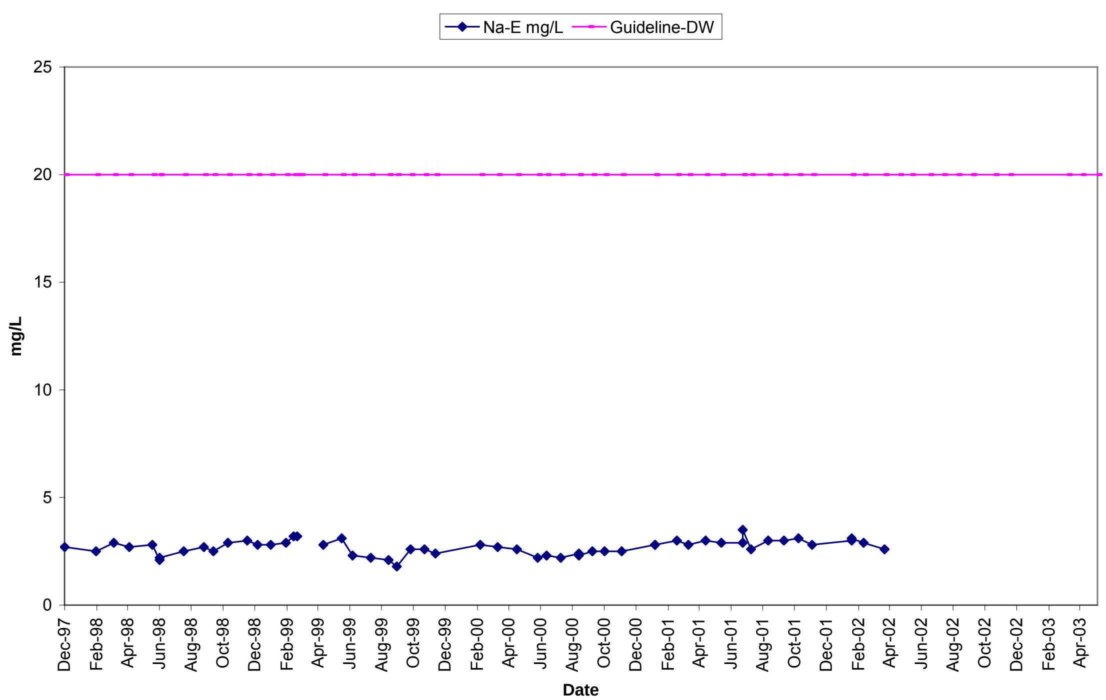


Figure 42 Strontium

Figure 43 Sulphate

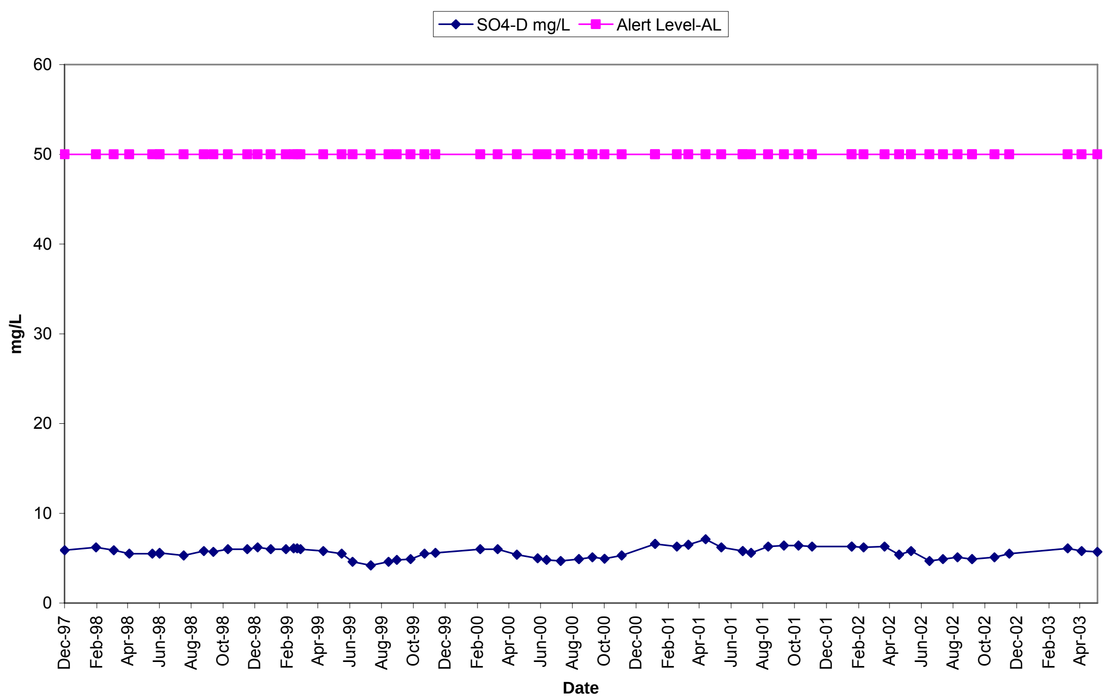


Figure 44 Temperature, Air

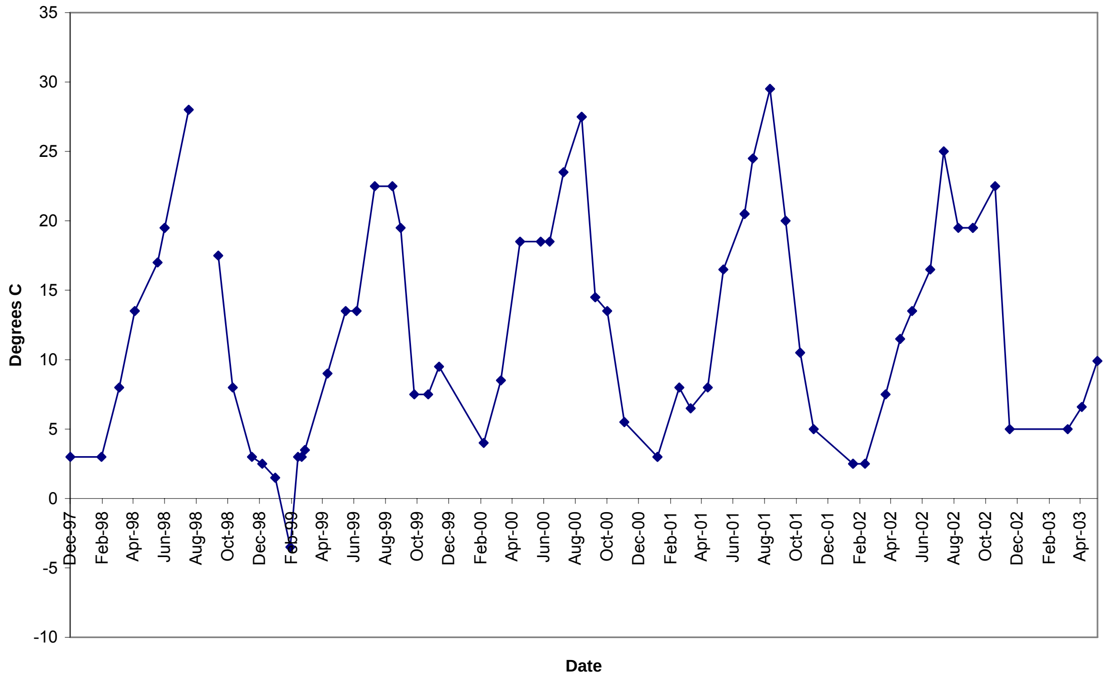


Figure 45a Temperature, Water

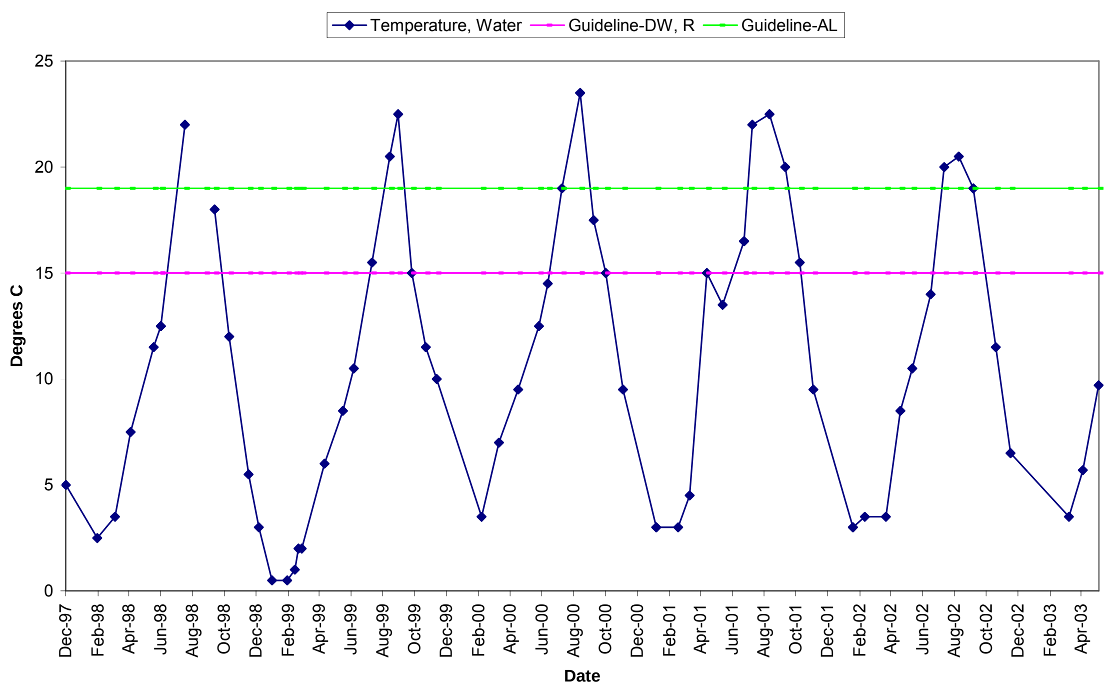


Figure 45b Temperature, Water at US Border & Waneta

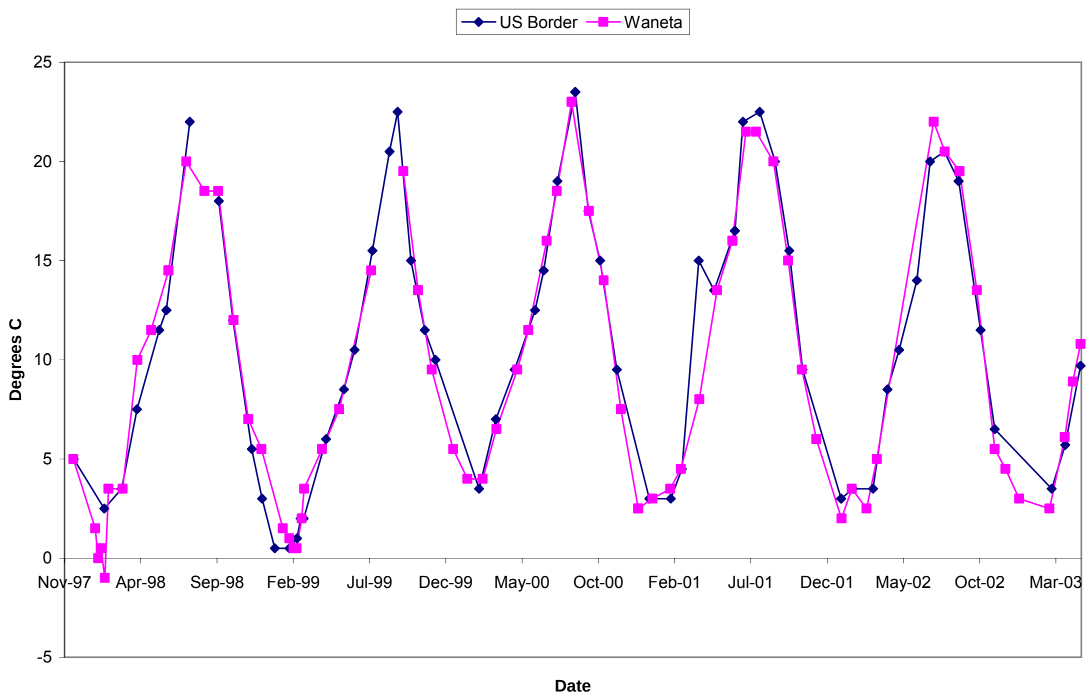
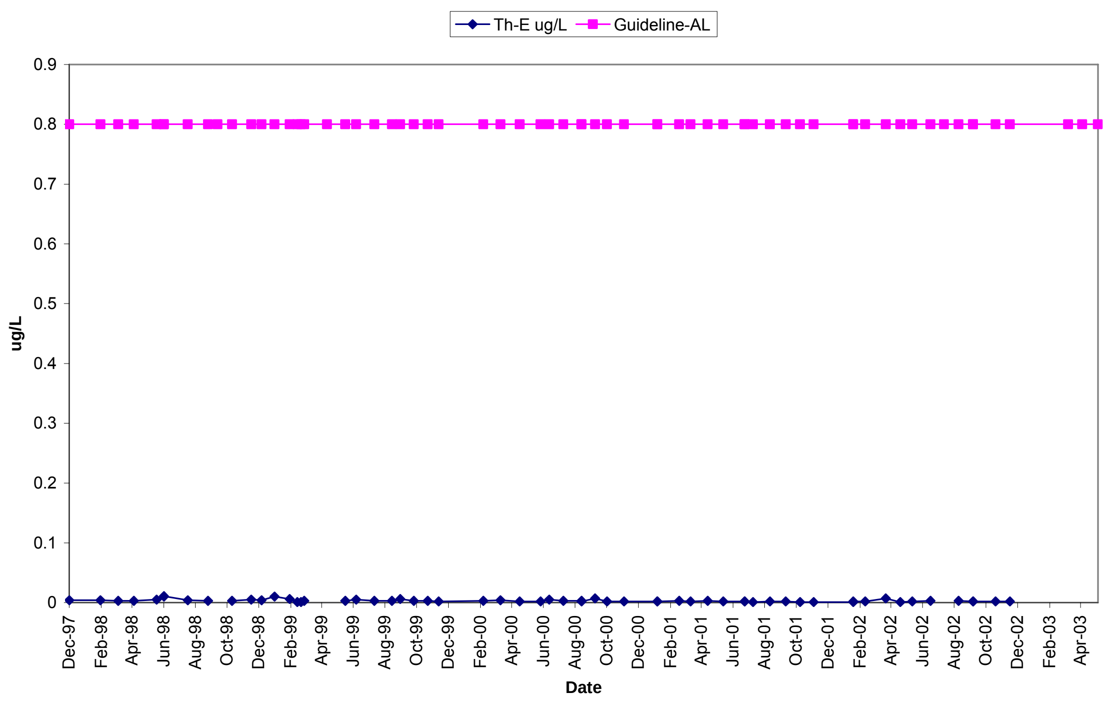


Figure 46 Thallium



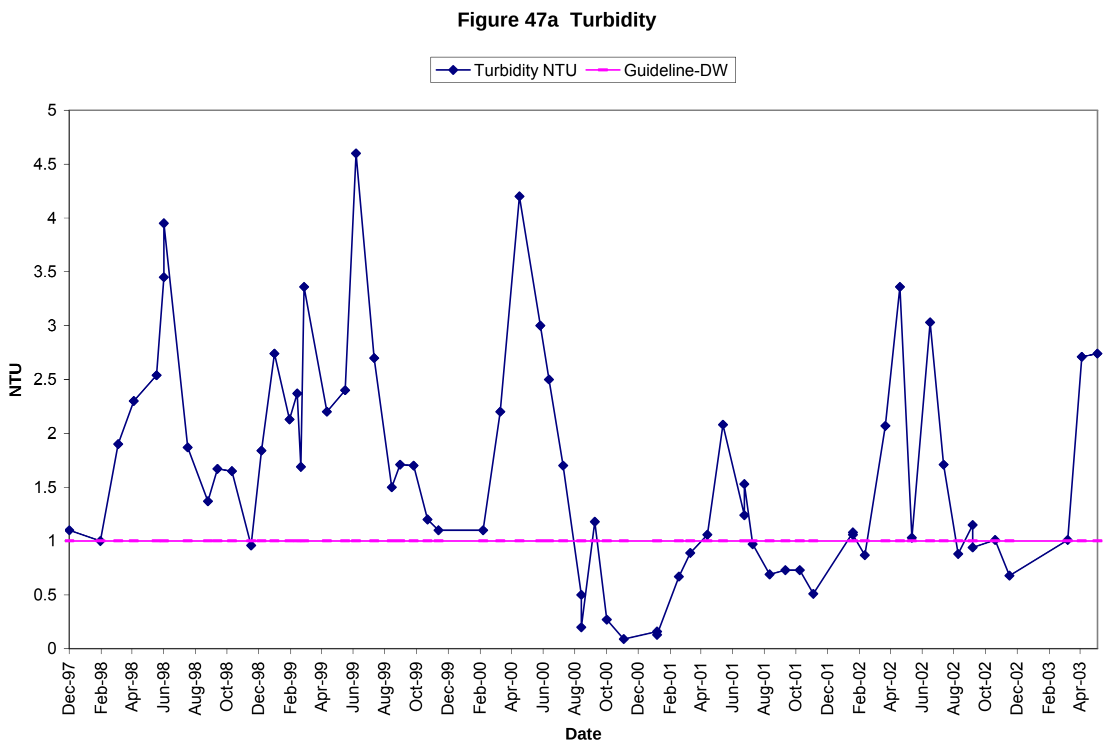


Figure 47a Turbidity
Turbidity NTU
Guideline-DW
NTU
Date
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
Feb-00
Apr-00
Jun-00
Aug-00
Oct-00
Dec-00
Feb-01
Apr-01
Jun-01
Aug-01
Oct-01
Dec-01
Feb-02
Apr-02
Jun-02
Aug-02
Oct-02
Dec-02
Feb-03
Apr-03

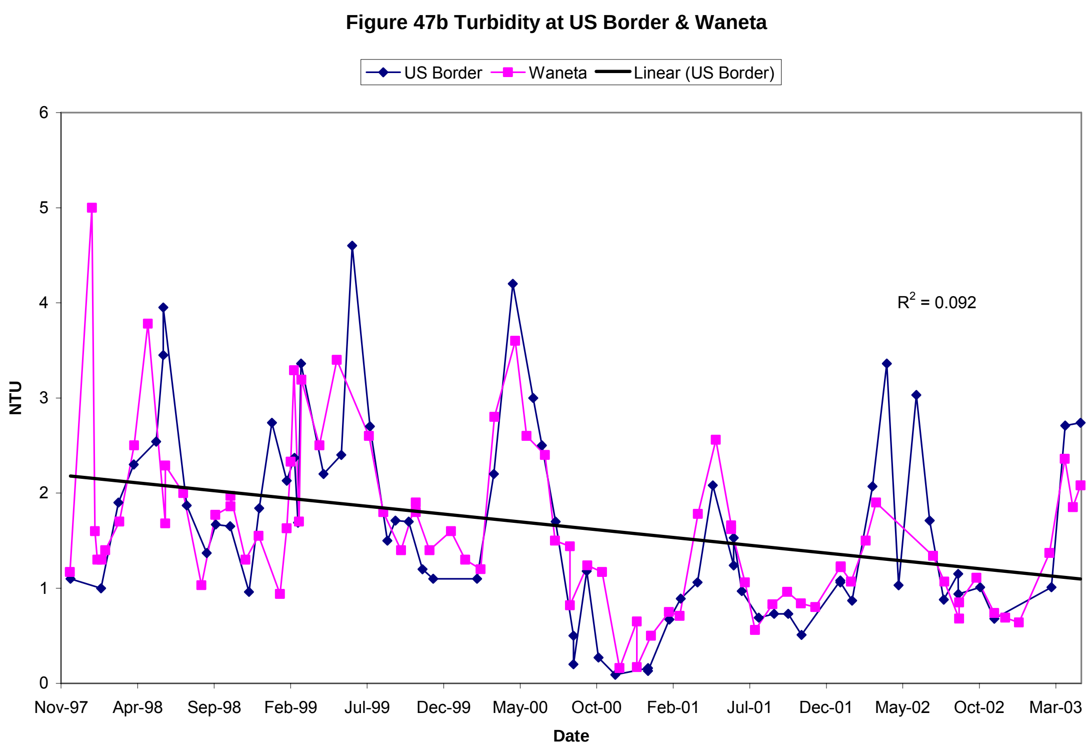


Figure 47b Turbidity at US Border & Waneta
US Border
Waneta
Linear (US Border)
R^2 = 0.092
NTU
Date
0
1
2
3
4
5
6
Nov-97
Apr-98
Sep-98
Feb-99
Jul-99
Dec-99
May-00
Oct-00
Feb-01
Jul-01
Dec-01
May-02
Oct-02
Mar-03

Figure 48 Uranium

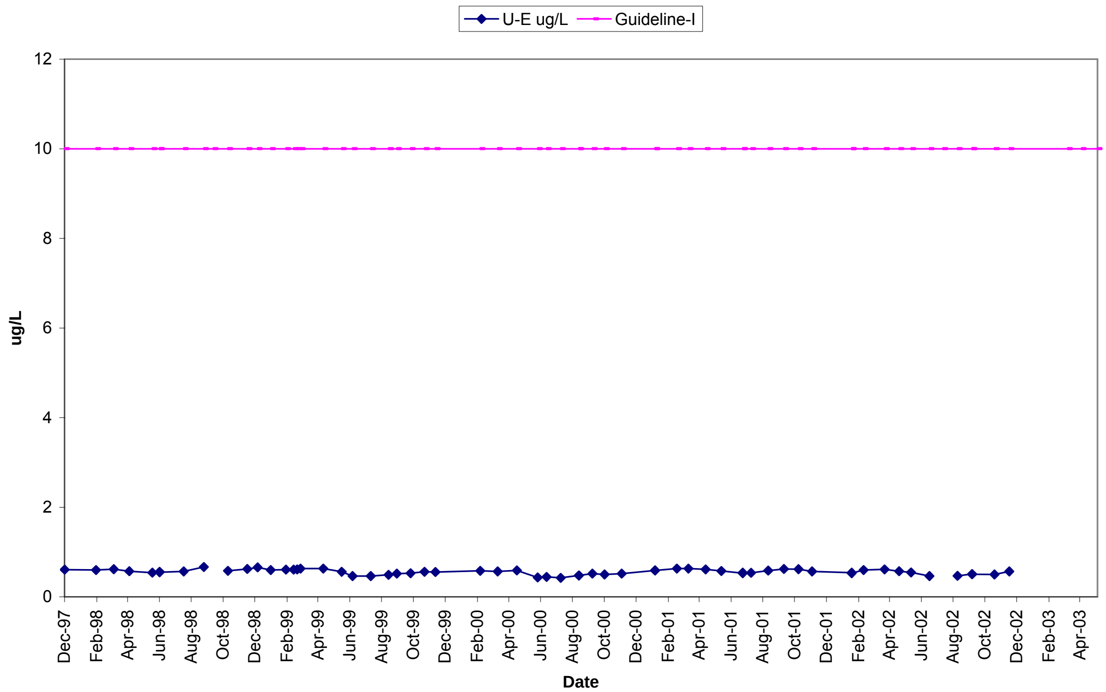


Figure 49a Vanadium

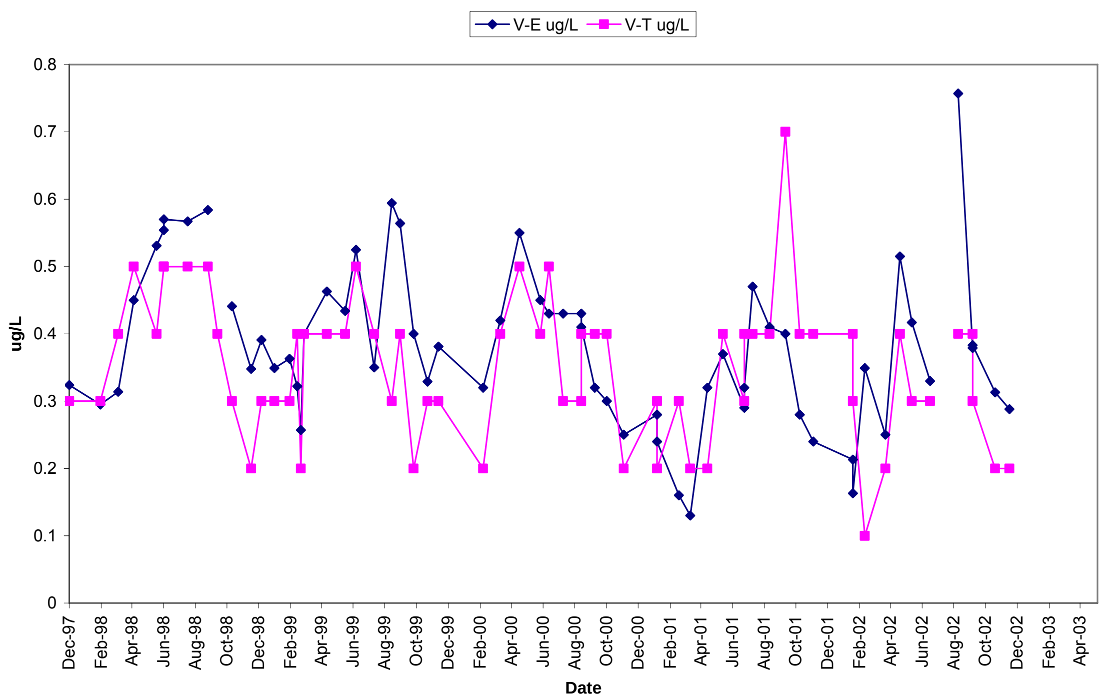


Figure 49b Vanadium

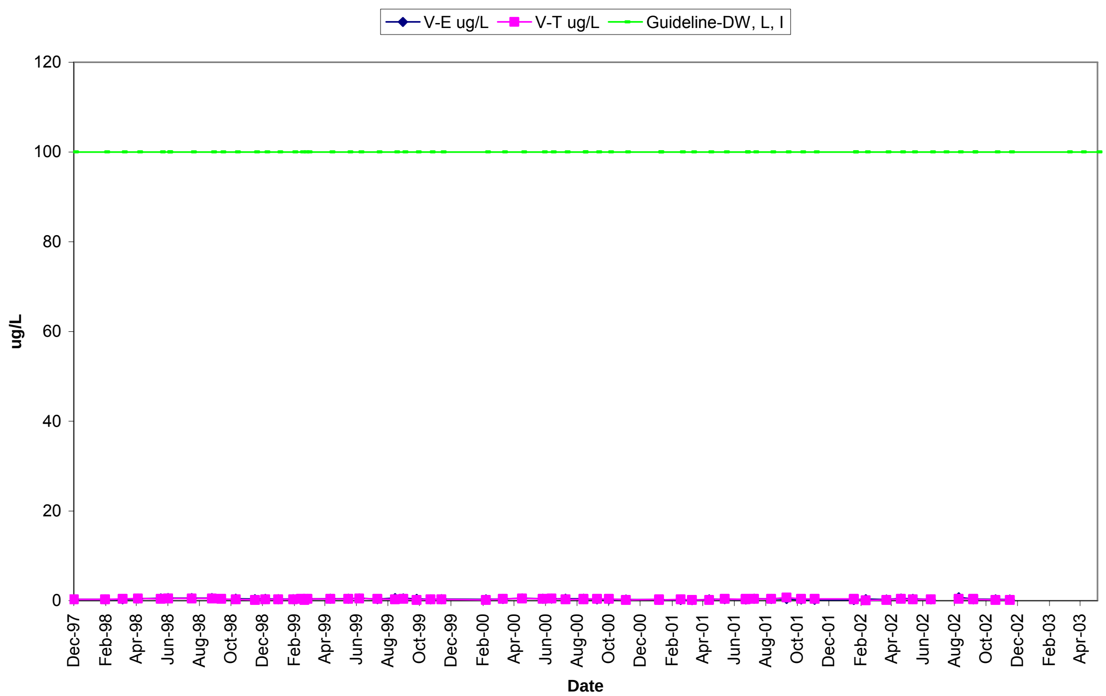
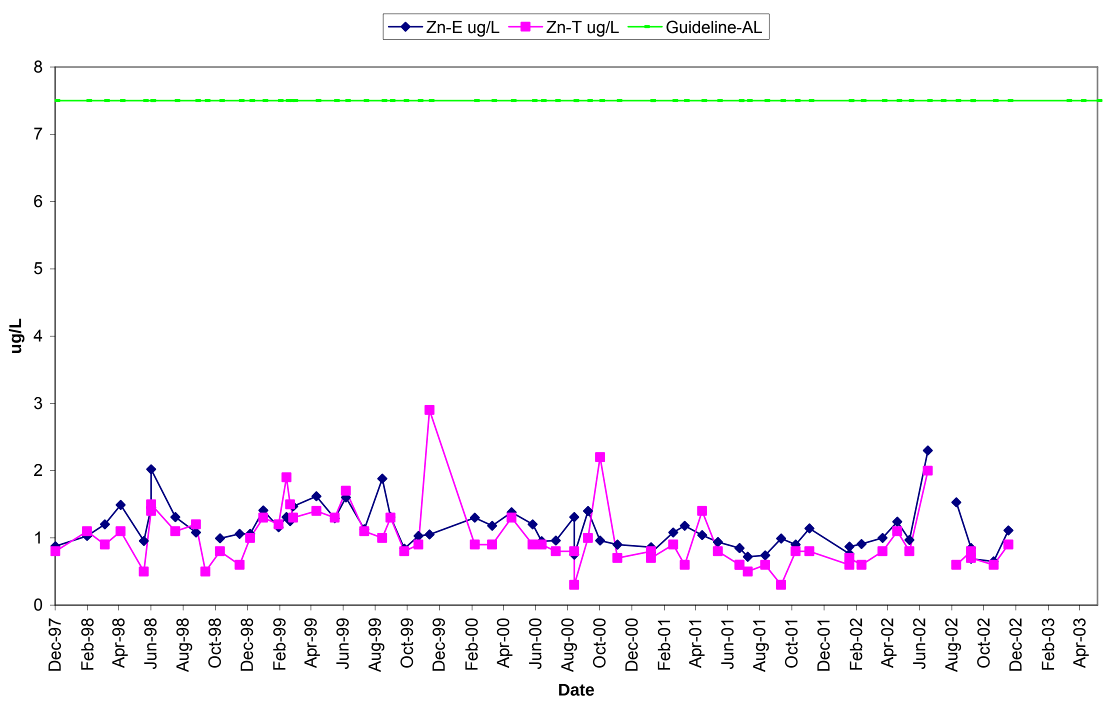


Figure 50a Zinc



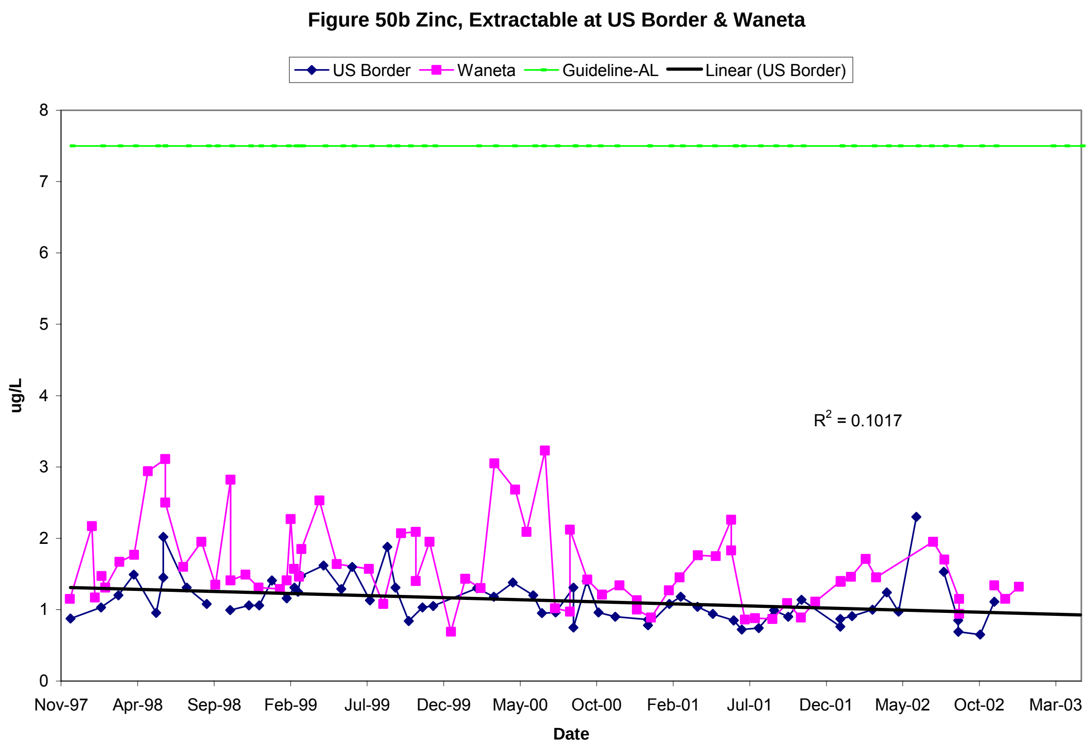


Figure 50b Zinc, Extractable at US Border & Waneta
US Border
Waneta
Guideline-AL
Linear (US Border)
8
7
6
5
4
3
2
1
0
ug/L
R2 = 0.1017
Nov-97
Apr-98
Sep-98
Feb-99
Jul-99
Dec-99
May-00
Oct-00
Feb-01
Jul-01
Dec-01
May-02
Oct-02
Mar-03
Date