

Reviewer Comments and Proponent Responses

Project: Cantung Mining and Milling
Board: Mackenzie Valley Land and Water Board
Organization: North American Tungsten (NATCL) - Cantung

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Fisheries and Oceans Canada (DFO) - Ms. Anna-Maija LaFlamme				
1		DFO has reviewed the document in accordance with our mandate and has no comments at this time.	DFO has no recommendations at this time.	-
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Parks Canada - Alexandra Taylor				
1		Parks Canada has reviewed the application and has no comments at this time.		-
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
CIRNAC (Yellowknife) - Megan Larose				
1	General comment	CIRNAC-Resource and Land Management (RLM) reviewed the Type A water licence renewal application documents submitted for the Cantung Mine Site. It is understood that the purpose of the renewal is to ensure that care and maintenance activities at the Cantung Site remain under an active water licence while regulatory proceedings for Water Licence MV2023L2-0001 and Land Use Permit MV2023D0010 are underway. CIRNAC-RLM have no comments about the renewal application at this time; however, will continue to follow the progress of this proceeding and would like the opportunity to review the draft licence at the appropriate time.	none	-
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
MVLWB - Kimberley Murray				
1	Licence MV2015L2-0003 Requirements - Plans, Reports,	NATCL has proposed the same scope and terms and conditions for Licence MV2023L2-0006 as the current Licence (MV2015L2-0003). The Guide to the Water Licensing Process (Section 6.2) indicates that reference to documents that have not changed should be provided with Renewal Applications. In the Application Form, NATCL has provided	NATCL to provide reference to all documents (plans, reports, and studies) that were submitted under the current Licence that have not changed.	Pleased see the attached table.

	Studies	links for the most recent versions of the Waste Management Plan, Spill Contingency Plan, Water Management Plan (called Water Management and Mine-site Erosion and Sediment Protection Plan as per Part G, Condition 3 of the current Licence), and Engagement Plan approved under the current Licence. To better understand if any conditions from the current Licence would not be appropriate for inclusion in the draft Licence MV2023L2-0006, NATCL should provide reference to all documents (plans, reports, and studies) submitted under the current Licence that have not changed.		
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Transport Canada - Mr. Scott Kidd				
1		Transport Canada has reviewed the proponent's Application for a renewal of a Type A Water License and notes that project works (water intake in the Flat River at Surveillance Network Program (SNP) station 4-1) are in a navigable waterway. Since its enactment in August 2019, all works in, on, over, under, through or across navigable waters are regulated under the Canadian Navigable Waters Act (CNWA). A project's possible impacts to navigation are dependent on whether the waterway is navigable, and if navigable, the type of work being undertaken, e.g., minor or major work as defined in the CNWA.	<p>The proponent will need to determine the applicability of the Canadian Navigable Waters Act (CNWA) by using Transport Canada's Navigation Protection Program (NPP) Online Project Review Tool: https://npp-submissions-demandes-ppn.tc.canada.ca/projectreview-outildexamenduprojet. During the review, the proponent will be asked a series of questions to assist them in determining their responsibilities under the CNWA.</p> <p>Given the details of this project, Transport Canada recommends in particular that the proponent self-assess against the CNWA Minor Works Order (see link to project review tool provided and details in attached PDF awareness document for Outfalls and Intakes). A copy of the official Minor Works Order can be found at https://laws.justice.gc.ca/eng/regulations/SOR-2021-170/index.html. If ALL criteria have been met, work can proceed in compliance with the Minor Works Order.</p>	NATC is the owner of an existing and historic water intake on the Flat River, which is navigable waters. NATC plans to continue to repair, maintain, operate and use this water intake. Should it be required, NATC will follow-up with Transport Canada's Navigation Protection Program - Prairie and Northern Region office directly to ensure ongoing compliance of this intake pursuant to the CNWA.

			In the event that clarification is required, the proponent can contact Transport Canada's Navigation Protection Program - Prairie and Northern Region office directly to discuss the project: NPPPNR-PPNRPN@tc.gc.ca.	
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
GNWT-ENR - EAM (Environmental Assessment and Monitoring) - Environmental Regulatory Analyst				
1	GNWT-ECC Cover Letter	Please see attached.	N/A	-
2	Water Licensing Criteria	In Section 6 of the Application Form, the following triggers for this type A licence are checked: to obtain water, to cross a watercourse, to modify the bed or bank of a watercourse, to divert water and to deposit waste. GNWT-ECC notes that some of these criteria do not have triggers for type A licences as outlined in the Mackenzie Valley Federal Areas Waters Regulations. This includes to cross a watercourse, to modify the bed or bank of a watercourse and to divert water. It is GNWT-ECC's understanding that the MVLWB does not exclude below-threshold water uses or deposits of waste or any other applicable activity set out in s. 6 of the Application Form from the scope of a licence once a licence is required. However the correct trigger(s) for a type A licence should be identified on the application form. Any applicable activities that would otherwise only trigger a type B licence should also be identified on the Application Form.	GNWT-ECC recommends North American Tungsten Corporation Ltd (NATC) clarify the water licensing criteria that trigger a type A licence and that would otherwise only trigger a type B licence in Section 6 of the Application Form.	In its application, NATC has attempted to mirror the application for the existing Type A water licence to the greatest extent possible for process efficiency. Regarding water use: NATC wishes to continue the current licenced water uses. However, it notes that only one 'use' was checked in the 2015 application form, and it understands that several uses may apply under the current legislation and related interpretation.
3	Term of Extension	GNWT-ECC notes that section 13 of the Application Form describes the need for a two-year extension of the current Type A licence (MV2015L2-0003) while acknowledging that the Type B 'renewal' licence (MV2023L2-0001) proceeding will likely be completed by mid-2024. The need for a two-year term is unclear to GNWT-ECC as are the activities covered under each authorization. For example, both authorizations may be active concurrently, which could lead to confusion on which authorization permits which specific activities.	GNWT-ECC recommends that NATC provide further rationale on the need for a two-year extension and provide additional information on how they expect the administration of both licences will proceed (i.e., will both the Type A and Type B licences be authorizing the site at the same time, will NATC apply for cancellation of the Type A immediately upon issuance of a Type B, etc.)	NATC has applied for a licence duration of 2 years, based on the advice of MVLWB staff and in consideration of process uncertainties associated with the Type B water licence application. For example, following submission of its responses to party comments on the Type B water licence application on June 6, 2023, NATC is still awaiting direction from the MVLWB on next steps in the

		GNWT-ECC also notes that the Type A licence would require cancellation as per section 72.12 (1)(c) of the Mackenzie Valley Resource Management Act (MVRMA), which requires the Minister's approval under s. 72.13 of the MVRMA. S. 72.12(c) of the MVRMA allows the initiation of a licence cancellation by either the licensee, or by the Board if it is determined to be in the public interest.		process, including a Preliminary Screening decision, and a decision on whether the application may proceed as a Type B or if it needs to be resubmitted as a Type A. Should NATC be required to resubmit an application for a Type A licence instead of a Type B, additional process time will be required.
4	Public Hearing	As GNWT-ECC has previously noted on the draft work plan, GNWT-ECC does not anticipate there being a need for a technical session or public hearing for this proceeding, as any issue could be discussed in the concurrent Type B proceeding. GNWT-ECC expects this Type A renewal proceeding can proceed as a written proceeding.	N/A	-
5	Link to Type B Proceeding	In review of the Type B 'renewal' licence proceeding (MV2023L2-0001), GNWT-ECC recommended that the Board require NATC to withdraw its current application and submit an application for renewal of a Type A water licence. GNWT-ECC notes this recommendation still stands. GNWT-ECC recognizes that this change to a Type A water licence would still require the current licence be renewed as it expires January 27, 2024.	N/A	-
6	Deposit of Waste	In Section 6 of the Application Form, NATC identifies "to deposit waste" as a criterion that triggers the Type A licence. However, in the Application Form for the on-going Type B proceeding, "to deposit waste" was not identified as a criterion that triggers the Type B licence. GNWT-ECC notes it is unclear why the criteria selected for each application form differ, specifically regarding "to deposit waste".	GNWT-ECC recommends NATC clarify why the criteria selected in the Type A and Type B licence Application Forms differ, specifically regarding "to deposit waste".	In its application, NATC has attempted to mirror the application for the existing Type A water licence to the greatest extent possible for process efficiency.
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Naha Dehe Dene Band (NDDDB) - Elliot Holland				
1	General	As noted, the purpose of this Application is for a type A water licence so the Applicant (NATCL) can continue its current licenced activities while the regulatory proceeding for Permit MV2023D0010 and Licence MV2023L2-0001 is	NDDDB views this as an administrative process that should not distract from the longer-term licencing of care and maintenance under Permit MV2023D0010 and Licence MV2023L2-	-

		ongoing. The scope of the Project includes the same scope as the current Licence MV2015L2-0003, as outlined in the Application Package. The Applicant is requesting no changes to the current Licence MV2015L2-0003 terms and conditions.	0001. NDDB recommends that Parties focus on an efficient and timely process with respect to the extension of current Licence MV2015L2-0003.	
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
North American Tungsten (NATCL) - Cantung - Sharleen Hamm NATCL				
1	Response to MVLWB, comment 1 (second attachment)	Historical Data and Interpretation Report		



CANADIAN NAVIGABLE WATERS ACT — DESIGNATED CLASS OF MINOR WORKS UNDER THE *MINOR WORKS ORDER*

Outfalls and Water Intakes

Outfalls and water intakes that meets the following criteria are designated as minor works:

- a) The outfall or water intake does not extend vertically above the bed of the navigable water more than:
 - (i) in the case of a navigable water of less than **15 m** in depthⁱ, **5%** of the depth of the water , or
 - (ii) in any other case, **1 m**;
- b) The outfall or water intake does not alter either the level or the flow of the navigable water to the point of interfering with navigation;
- c) The outfall or water intake is more than **30 m** from a navigation channel; and
- d) The outfall or water intake is not associated with an existing or proposed dam, weir or an existing or proposed reservoir of water created by the construction of a dam or weir.

Reposition or remove

If an outfall or water intake designated as a minor work under this class no longer meets the minimum depth criteria identified above, the owner of the outfall or water intake must, as soon as possible, reposition the outfall or water intake to meet the minimum depth criteria or remove the outfall or water intake

General Requirements

Prior notifications

Before beginning the construction, placement, alteration, rebuilding, removal or decommissioning of outfalls or water intakes in, on, over, under, through or across a charted navigable waterⁱⁱ, the owner of the minor work must deposit information on Transport Canada's registry describing the activity and the minor work's location, publish a notice on Transport Canada site entitled "Publish a notification of work " on the [external submission site](#) for the Navigation Protection Program, as amended from time to time, unless the minor work has gone through a federal or provincial review process.

Furthermore, the owner of the work must, in writing, notify at least 48 hours before a **Canadian Coast Guard Marine Communications and Traffic Services Centre** of the day on which construction, placement, alteration, rebuilding, removal or decommission of the work is expected to begin. The owner must also notify the **Canadian Hydrographic Service and the Canadian Coast Guard Marine Communications and Traffic Services Centre** upon completion.

During the construction, placement, alteration, rebuilding, removal decommissioning, repair or maintenance of a minor work, the owner of the work must ensure:

- a) that vessels can navigate safely through or around the work site or, if navigation is interrupted by any activity related to the construction, placement, alteration, rebuilding, removal, decommission, repair or maintenance of the work, that a suitable means, such as a portage, exists to allow vessels to resume navigation upstream and downstream of the work site;
- b) that the perimeter of the work site is visible from sunset to sunrise and during periods of restricted visibility by the placement of
 - (i) yellow flashing lights,
 - (ii) cautionary buoys with retro-reflective material, or
 - (iii) cautionary buoys with yellow flashing lights.
- c) that any cables or pipes that are in, on, over, through or across the navigable water are not left unattended unless
 - (i) the cable or pipe is lying on the bed of the navigable water, or
 - (ii) the cable meets the requirements of *Overhead Systems*, CAN/CSA C22.3 No. 1, as amended from time to time.

Buoys referred in the *Minor Works Order* must meet the following criteria:

- a) The part of the buoy that shows above the surface of the water is at least 15.25 cm wide and at least 30.5 cm high;
- b) The buoy, including the buoy's anchor, is constructed and maintained in a manner and with materials that ensure that it remains in position after the buoy has been anchored; and
- c) The buoy complies with the requirements set out in the section entitled "Floating Aids to Navigation (Buoys)" of TP 968, entitled *Canadian Aids to Navigation System* and published by the Canadian Coast Guard, as amended from time to time.

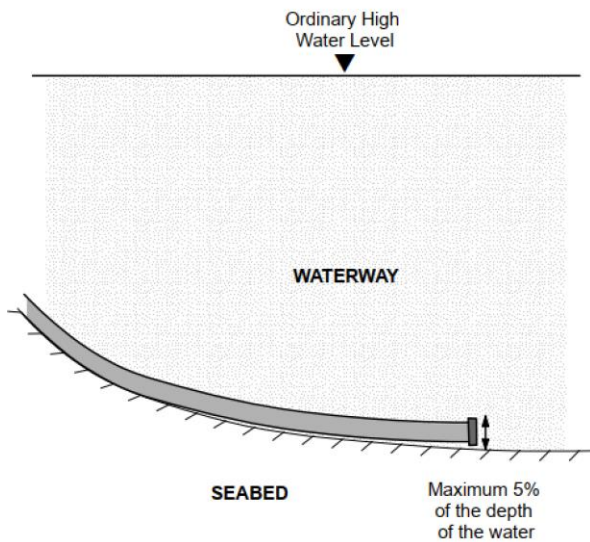
The official *Minor Works Order* can be viewed at: <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-170/>

Contact the Navigation Protection Program (NPP) office in your region with any questions or concerns you may have: <https://tc.canada.ca/en/marine/contact-navigation-protection-program-receiver-wreck>.

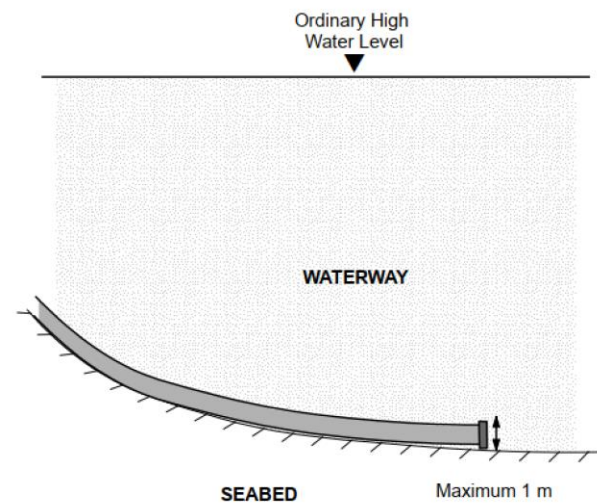
SECTION VIEW

First Option

Navigable water of less than 15 m in depth

**Second Option**

In any other case

ⁱ Measurements — Depth or height

Unless otherwise indicated, any depth or height referred to in this Order is measured from the ordinary high water level at the site where the minor work is situated.

ⁱⁱ Charted navigable water means navigable waters for which nautical charts are produced by the Canadian Hydrographic Service or the National Oceanic and Atmospheric Administration of the United States.



August 4, 2023

Kimberley Murray
Regulatory Specialist
Mackenzie Valley Land and Water Board
4922 - 48th Street
Yellowknife, NT X1A 2P6

Dear Kimberley Murray,

RE: Cantung Mining and Milling Type A Renewal Licence Application (MV2023L2-0006)

The Department of Environment and Climate Change, Government of the Northwest Territories has reviewed the application at reference based on its mandated responsibilities under the *Waters Act* and has included comments and recommendations for consideration of the Mackenzie Valley Land and Water Board.

For any technical questions, please contact Bill Pain, Environmental Management Scientist with the Regulatory and Permitting Division at Bill_Pain@gov.nt.ca

Should you have any questions or concerns, please do not hesitate to contact gnwt_ea@gov.nt.ca.

Sincerely,

Shakita Jensen
Regulatory Analyst
Department of Environment and Climate Change



July 28, 2023

Kimberley Murray
Regulatory Specialist
Box 2130 4922-48th Street
Mackenzie Valley Land and Water Board
Yellowknife, NT

Re: Cantung Type A Renewal Licence Application (MV2023L2-0006)

Dear Ms. Murray,

Parks Canada has reviewed the information submitted to the Mackenzie Valley Land and Water Board (MVLWB) regarding the above-mentioned application. Parks Canada has no comments at this time.

As outlined in the response to Cantung's Type B Renewal Licence and new Type A Permit (MV2023L2-0001 and MV2023D0010), Parks Canada is committed to working with all parties to expedite the regulatory process and ensure that reclamation and closure of the site can move forward as effectively and efficiently as possible in order to minimise the risks to Nahanni National Park Reserve and all downstream water users.

Craig McKinnon
Acting Superintendent
Nahanni National Park Reserve
Fort Simpson, NT

NORTH AMERICAN TUNGSTEN CORPORATION

HISTORICAL DATA AND INTERPRETATION REPORT OF WATER QUALITY AT THE CANTUNG MINE, NWT



REPORT

MAY 2012 (REVISED JANUARY 2013)
ISSUED FOR USE
EBA FILE: Y22101275.001

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A TETRA TECH COMPANY

LIMITATIONS OF REPORT

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EXECUTIVE SUMMARY

North American Tungsten Corporation Ltd. (NATCL) retained EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA), to prepare a Historical Data and Interpretation Report of the Water Quality at the Cantung Mine, consistent with Item F12 in MVLWB Water Licence MW2002L2-0019. This report serves to:

1. Identify and present all historical water quality sampling data available for the Cantung Mine;
2. Illustrate all trends from these data;
3. Provide an analysis of these trends; and
4. Provide an analysis as to how these provisions contribute to future closure and reclamation planning.

As discussed in this report, the historical assessment of surface water quality parameters at the Cantung Mine focussed on the key parameters traditionally specified in the water licence and the Metal Mining Effluent Regulations. On this basis, the parameters examined and discussed in more detail included arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids.

To allow the presentation of historic and more recent data extending for the period of record from the early 1980s to present, all of the data were treated as being valid, with the general understanding that minimum detection limits (MDL) have decreased as analysis methods have evolved. For data manipulation purposes, where sample values were clearly reported as less than the detection limit, half the value of the detection limit was used for computations and graphics production. In circumstances where it was not possible to determine what the detection limit was (particularly for some of the more historic data), the reported values were used.

Surface Water Quality

Based on the historical review of results that have been presented and discussed in this report, it is readily apparent that the historic and current operations of the Cantung Mine have had very limited effects on the quality of the Flat River water for the water licence parameters assessed at all three surface water sampling sites during the period of record.

Typically at all surface water quality stations sampled, with minor and generally isolated exceptions, mainly in the early 1980s, when the then Canada Tungsten Mine was in operation and in the early and late 1990s when the mine was closed, the concentrations of the key water licence parameters assessed have consistently remained at or below the current CCME guideline values for the protection of freshwater aquatic life.

In addition, as noted for all key metals parameters analyzed over the period of record, following the implementation of improved QA/QC procedures by NATCL in July 2005, total metals concentrations at all three Flat River stations dropped to well below the current CCME guideline values for each of the respective parameters.

The surface receiving water quality monitoring program has consistently demonstrated no appreciable difference in water quality of the Flat River between the sampling stations extending from 3 km upstream of the mine site to 1 km downstream of the mine site.

Groundwater Quality

Similar to the assessment of surface water quality, the assessment of groundwater quality parameters also focussed on the key parameters traditionally specified in the water licence as well as the Metal Mining Effluent Regulations. On this basis, the parameters examined and discussed in more detail included arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids.

Due to the large number of groundwater sampling sites monitored at the Cantung Mine site, NATCL and EBA determined that in the interests of time and efficiency, the assessment historical and current groundwater quality would be focussed on a more limited number of key SNP groundwater sampling stations. In particular the stations that were selected for further analysis were:

- S4-27-1/16 East (down-gradient) of TP2 on the Flat River floodplain, also referred to as MW1-1;
- S4-27-5/13 South (down-gradient) of TP3 west of airstrip north end;
- S4-27-7 East (down-gradient) of TP4 on the Flat River floodplain, also referred to as BH 43;
- S4-28-1 East (down-gradient) of TP3 near airstrip road/groundwater, also referred to as MW-6 and pumping well PW1(designated as MMER FDP); and
- S4-27-17 Northwest of freshwater pump house (background station).

Metals

assessment of the available historical and more recent groundwater quality data set has determined that in general, the concentrations of total metals in the groundwater stations examined at all piezometer depths, with very few exceptions were consistently at or below the current MVLWB MAC groundwater quality parameters for the period of record from 1982 to the present.

Isolated occurrences of elevated total metal levels in groundwater were typically recorded in the mid-1980s, shortly before and after the then Canada Tungsten Mine closed down for an extended shutdown period. However, as previously indicated, some of these elevated values were due to the high detection limits employed at the time by the laboratory.

During the 1990s, when the mine was closed, the concentrations of total metals in the groundwater stations assessed were consistently at or below the current MVLWB MAC groundwater quality parameters with few exceptions.

During the period 2000 to present, the concentrations of total metals in the groundwater at groundwater monitoring stations assessed were consistently at or below the current MVLWB MAC groundwater quality parameters and the MMER requirements, with a few minor exceptions, particularly for total copper and zinc.

Total Suspended Solids

Total suspended solids (TSS) values in groundwater, however, have exceeded the current MVLWB MAC criterion (15 mg/l) at a number of groundwater SNP sites for varying periods of time during the entire period of record.

The single highest value recorded for TSS (10,000 mg/l) reported in the groundwater over the period of record assessed by DIAND (1985-1999) was registered at Station 4-27-7 P12 (located below the toe of TP4 at 0-1.3 m) on November 24, 1986, several months after the mine had shut down its operations (DIAND 2001). This elevated TSS value corresponds with the single highest reading of total zinc reported for the same piezometer on the same day.

Other particularly elevated groundwater TSS results reported during the extended period of record reviewed by DIAND included:

- 1,250 mg/l TSS at Station 4-27-9 (located below the toe of TP2 at 0 -8.1 m) on October 11, 1999;
- 1,490 mg/l TSS at Station 4-27-4 P7 (located near the Flat River below TP4/TP3 at 2 m) on June 30, 1999;
- 620 mg/l TSS at Station 4-27-1 P10 (located directly adjacent to 4-27-9 at 9 m) on August 12, 1985; and
- 427 mg/l TSS at Station 4-27-5 P6 (located between TP3 and the airstrip) on June 30, 1986.

However, no clear trends for TSS in the groundwater were noted by DIAND (2001). This conclusion is quite consistent with the available mine data presented in this report for this period of time.

Notably elevated TSS values in the 1990s at S4-27-1 were primarily limited to Piezometer 10, which consistently reported higher TSS during the period May 1996 to October 1997 in the range of 123 to 184 mg/l, when the mine was in an extended period of closure.

During the period 2003 to 2008, TSS values in the groundwater at S4-27-1 Piezometer 10 remained elevated above the current MAC value of 15 mg/l, ranging from 44.3 to 235 mg/l. Since being replaced by S4-27-16 in August 2009, TSS values have continued to be elevated above the MAC value for TSS, ranging from 32-96.5 mg/l. However it should be noted that these elevated TSS values were within the range of TSS values recorded at S4-27-1 during the period of record for this station, including the 1990s, when the mine was in an extended closure period.

Notably elevated TSS values at S4-27-5 in the 1990s were primarily limited to Piezometer 13, which reported higher TSS in May, July and October 1996, with recorded TSS values of 51, 53 and 310 mg/l, respectively, and TSS values of 45 and 80 mg/l in October 1997 at Piezometers 1 and 8. Since 2000, with the exception of one TSS value of 691 mg/l recorded at Piezometer 3 on September 9, 2002, all TSS values at this station have remained well below the current MAC criterion.

TSS values at stations S4-27-7, S4-28-1 and S4-27-17 have generally remained below the MVLWB MAC criterion with isolated, occasional minor exceedences.

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Figure 30	Total Zinc Concentrations (mg/l) in Groundwater, Station S4-27-7, 1980s – Present
Figure 31	Total Suspended Solids Concentrations (mg/l) in Groundwater, Station S4-27-7, 1980s – Present
Figure 32	Total Arsenic, Cadmium, and Copper Concentrations (mg/l) in Groundwater, Station S4-28-1, 2003 – Present
Figure 33	Total Lead, Nickel, and Zinc Concentrations (mg/l) in Groundwater, Station S4-28-1, 2003 – Present
Figure 34	Total Suspended Solids Concentrations (mg/l) in Groundwater, Station S4-28-1, 2003 – Present
Figure 35	Total Arsenic, Cadmium, and Copper Concentrations (mg/l) in Groundwater, Station S4-27-17, 2009 – Present
Figure 36	Total Lead, Nickel, and Zinc Concentrations (mg/l) in Groundwater, Station S4-27-17, 2009 – Present
Figure 37	Total Suspended Solids Concentrations (mg/l) in Groundwater, Station S4-27-17, 2009 – Present

APPENDICES

Appendix A	EBA's Geo-environmental Report - General Conditions
Appendix B	Cantung Mine Compliance Report (DIAND 2001)

1.0 INTRODUCTION

North American Tungsten Corporation Ltd. (NATCL) retained EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA), to prepare a Historical Data and Interpretation Report of Water Quality at the Cantung Mine, consistent with Item F12 in Mackenzie Valley Land and Water Board (MVLWB) Water Licence MW2002L2-0019. This report summarizes and interprets historical water quality trends and addresses comments on the 2010 Historical Data and Interpretation Report submitted by NATCL (NATCL 2010).

The Cantung Mine site is located near the headwaters of the Flat River, approximately 300 km north of Watson Lake, just east of the Yukon border in the Northwest Territories (NWT). Figure 1 shows the general site location. Figure 2 presents a recent satellite view of the Cantung Mine Area site plan.

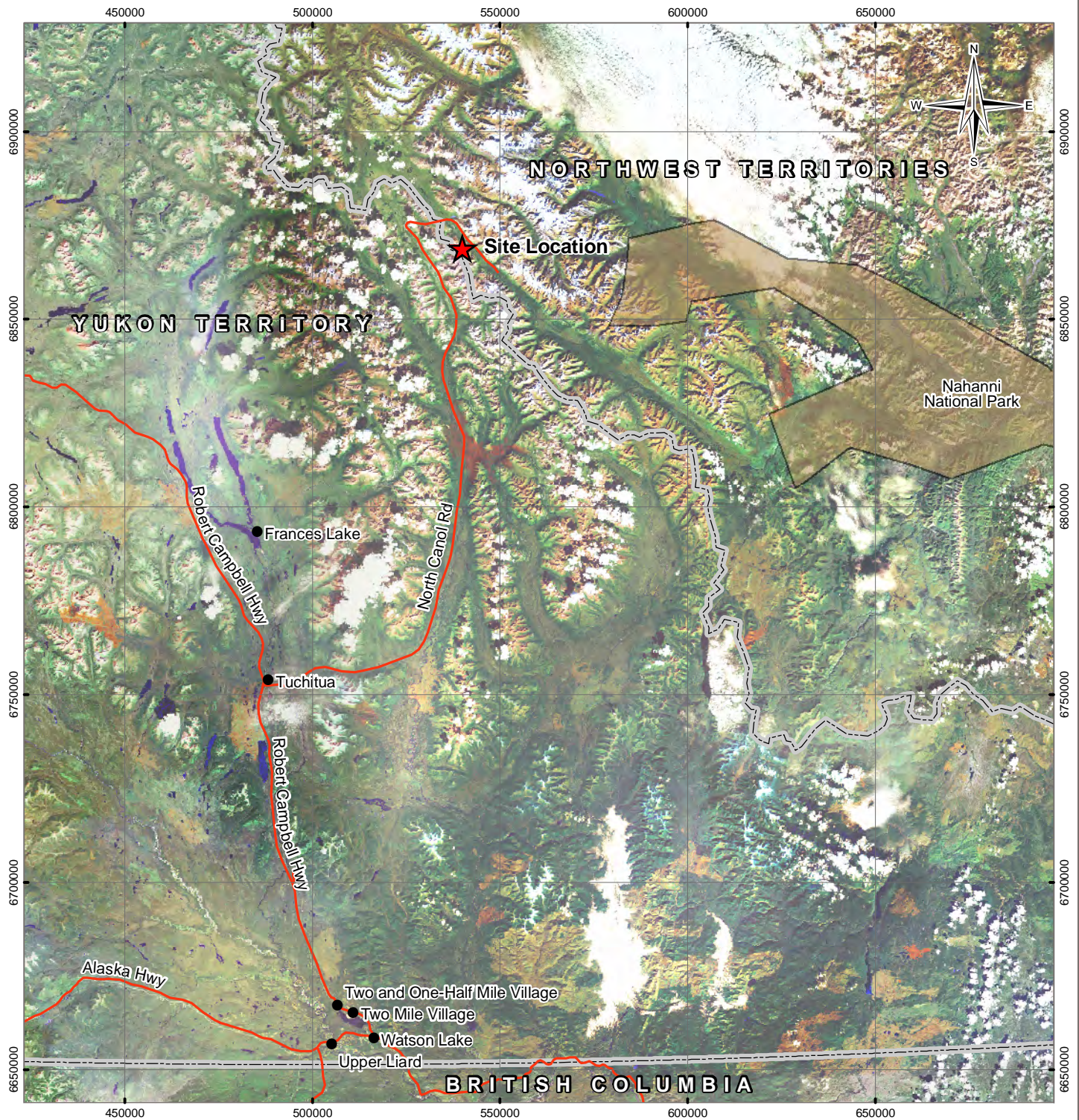
1.1 Objectives

The objectives of this report are to:






1. Identify and present all historical water quality sampling data available for the Cantung Mine;
2. Illustrate all trends from these data;
3. Provide an analysis of these trends; and
4. Provide an analysis as to how these provisions contribute to future closure and reclamation planning.

The project was completed under EBA's– General Conditions for conducting environmental work. A copy of these conditions is provided in Appendix A.

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LEGEND

-  Site Location
-  Community
-  Road
-  National Park
-  Provincial/Territorial Border

NOTES

Base data source:
ESRI Data & Maps
Yukon Geomatics

STATUS
ISSUED FOR USE

CANTUNG MINE

Site Location

PROJECTION
UTM Zone 9

DATUM
NAD83

CLIENT



Scale: 1:1,500,000
20 10 0 20
Kilometres

FILE NO.
Y22101275_Figure01_SiteLocation.mxd

PROJECT NO.
Y22101275.001

DWN
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EBA-VANC

DATE
May 8, 2012



Figure 1



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LEGEND

- Historic Tailings in Flat River Floodplain

- NOTES
1. Base data sources: Imagery provided by NATC
 2. Interior boundary of Tailings Pond 5 is approximate

STATUS
ISSUED FOR USE

CANTUNG MINE

Site Plan



PROJECTION UTM Zone 9	DATUM NAD83	CLIENT 
Scale: 1:10,000 200 100 0 200 Metres		
FILE NO. Y22101275_Figure02_SitePlan.mxd		
PROJECT NO. Y22101275.001	DWN MEZ	CKD SL
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DATE May 8, 2012		 A TETRA TECH COMPANY

Figure 2

2.0 CANTUNG MINE HISTORY

Prospectors discovered the Cantung Mine tungsten deposit in 1954 while looking for copper. In 1959, the Canada Tungsten Mining Corporation Ltd. was formed to acquire and develop the property. The Cantung Mine commenced production from an open pit at the rate of 300 tons per day (tpd) in 1962; operations were suspended in 1963 due to low tungsten prices and in 1966 due to a fire that destroyed the mill. The construction of a new 350 tpd mill was completed in 1967 and, in 1969 the capacity was increased to 450 tpd.

In 1971, drilling discovered the "E Zone". This zone was accessed through an adit collared at the valley bottom, close to the town site. The mill began to process the underground ore in 1974.

In 1975, the mill was further expanded to 500 tpd; this was followed by a major mill expansion in 1979 to 1,000 tpd.

In 1985, Amax Inc. consolidated ownership of the Cantung Mine and transferred all tungsten assets, including the Mactung Project at MacMillan Pass, to Canada Tungsten Mining Corporation, retaining majority control. Aur Resources Inc. (Aur) purchased Amax Inc.'s controlling interest in 1995 and Canada Tungsten and Aur merged in 1996.

In 1997, North American Tungsten Corporation Ltd. (NATCL) purchased the Cantung Mine, together with the related tungsten assets of the former Canada Tungsten Inc., from Aur.

After an improvement in tungsten prices in 2000, NATCL reopened the Cantung Mine in December 2001 and resumed underground production and milling. In December 2003, NATCL was placed under the protection of the *Companies Creditors Arrangement Act*, and the mine was closed. In November 2004, NATCL successfully completed a creditor arrangement, allowing planning for reopening to commence. Preparatory work for the reopening began in July 2005, and production resumed in late September 2005. The Cantung Mine suspended operations in October 2009 and resumed production in October 2010.

There are five Tailings Storage Facilities (also known as Tailings Ponds (TP) within the Cantung Mine site: two reclaimed facilities, one inactive facility and two operational facilities.

Tailings Storage Facilities 1 and 2 are located immediately east and below the mill site and were in use from 1965 until the early 1970s. Both facilities have been drained and covered with 1 to 3 metres of fill cover.

Tailings Storage Facilities 3, 4, and 5 are located south of the town site. Tailings Storage Facility 3 was operational from 1974 to 2007. This facility currently remains inactive and uncovered.

Tailings Storage Facility 4 was constructed in the mid-1970s. This facility was operated as an exfiltration pond from 1975 to 2007, at which time it became the primary tailings storage facility.

Tailings Storage Facility 5 was constructed in 2006 and has operated as an exfiltration pond from 2007 to present. As TP5 is located at a higher elevation than TP4, a system of pumps delivers the effluent to TP5 rather than the traditional decant system. This method of settling and exfiltration ensures that effluent is thoroughly filtered and solids are not released to the groundwater.

3.0 SURFACE AND GROUNDWATER MONITORING

According to available records, periodic sampling of the Flat River above and below the Cantung Mine was begun as early as 1966 (the year it opened) by the Water Quality Branch, Inland Waters Directorate, Environment Canada (Sigma Resource Consultants Ltd. 1976). The former Canada Tungsten Mining Corporation commenced water quality sampling in 1973, two years prior to the establishment of a Surveillance Program that was required under the first Conditional Water Licence (Number N 3L3-004) for the Cantung Mine issued by the then Northwest Territories Water Board on June 30, 1975.

More comprehensive water quality monitoring has been conducted at the Cantung Mine site since the early 1980s. The monitoring programs have been conducted to support the requirements under the various water licences that have been issued for the Cantung Mine site. The historical water quality data are not continuous due to long term closures (1986-2001) and short term closures (2003-2005 and 2009-2010). Historical water quality data, prior to NATCL's purchase of the Cantung Mine, are relatively intermittent due to change of ownership and loss of records. In February 2011, NATCL reviewed all archived data reports at the Aboriginal Affairs and Northern Development Canada (AANDC) office in Fort Simpson to have a more continuous record of information.

All historical data (pre-2001) were reported routinely to the NWT Water Board and the Department of Indian and Northern Affairs (DIAND, now AANDC). All current water quality data (2001 – present) have been reported routinely to the MVLWB and AANDC.

Since restarting operations in 2005, the Cantung Mine has also been subject to the requirements of the federal Metal Mining Effluent Regulations (MMER). Quarterly and annual reports along with an initial (2006) Environmental Effects Monitoring Study have been submitted to Environment Canada.

The Surveillance Network Program (SNP) attached to the current Water Licence states specific monitoring requirements for each station at the mine site. This includes monitoring frequency (Item A of the SNP) and Sampling and Analysis Requirements (Item B). Table 1 summarizes these requirements for surface and groundwater monitoring.

Table 1: Cantung Mine SNP Stations, Monitoring Frequency and Parameters

Station	Monitoring Frequency	Parameters
4-5 4-13 4-20 4-29 4-32 to 4-33/4-33RR 4-40 to 4-42	Monthly	ICP Metal Scan Total Ammonia, Sulphate Alkalinity EPH/Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Total Suspended Solids (TSS) Total Dissolved Solids (TDS)
4-6	Monthly	ICP Metal Scan Total Ammonia Sulphate Alkalinity Biochemical Oxygen Demand (BOD) EPH/BTEX

Table 1: Cantung Mine SNP Stations, Monitoring Frequency and Parameters

Station	Monitoring Frequency	Parameters
		TSS TDS Faecal Coliforms Nutrients
4-27-4 4-27-7 to 4-27-17 4-28-2	Tri-annual	ICP Metal Scan Sulphate Alkalinity EPH/BTEX TSS Nutrients Cyanide (annual only)
4-28-1 (Final Discharge Point)	Monthly	ICP Metal Scan Sulphate Alkalinity EPH/BTEX TSS Nutrients Cyanide (annual only)
4-30	Monthly	ICP Metal Scan Sulphate Alkalinity Total Ammonia TDS
4-34 4-36 4-3 to 4-39	When Seepage is visible	ICP Metal Scan Sulphate Alkalinity EPH/BTEX Total Ammonia TSS TDS

3.1 Sample Collection Network

The current surface water and groundwater quality monitoring program at the Cantung Mine involves an active network of sampling stations (including effluent, surface water quality and groundwater quality stations). Surface and groundwater monitoring sites are located upstream of the facility, at various locations along the Flat River and the tailings storage facilities, and downstream of all industrial activity. In addition there are four final discharge points that are sampled weekly. Figure 3 illustrates the historic and current regulatory sample collection points at the Cantung Mine. Table 2 provides an index of the sample sites that are currently active.

Table 2: Index of Active Cantung Mine Sample Sites

Sample Point	Description of Location
Cantung Operations Water Quality Sample Points	
S4-6	Decant from Active Tailings Pond
S4-13	E Portal Drain Water
S4-30	Mill Tailings Box in the Mill
S4-42	Mine water pump in the Mill
Flat River Water Quality Sample Points	
S4-1	Flat River at the mine and mill freshwater intake (volume only)
S4-5	Flat River at bridge downstream from airstrip
S4-29	Flat River 3 km upstream from pumphouse
S4-33	Far field downstream station 8.5 km - Flat River
S4-33RR	Far field reserve downstream station 2.0 km - Flat River
S4-40	Flat River between TP2 and TP4
S4-41	Flat River downstream of TP3
Groundwater Water Quality Sample Points	
S4-27-4	Groundwater monitoring well MW 5, east of TP3 near airstrip road
S4-27-7	Groundwater monitoring well BH 43, east of TP4 on Flat River floodplain
S4-27-8 BH44-1	Groundwater monitoring well BH 44-1, east of TP4/3 on Flat River floodplain
S4-27-8 BH44-2	Groundwater monitoring well BH 44-2, east of TP4/3 on Flat River floodplain
S4-27-8 BH44-4	Groundwater monitoring well BH 44-4, east of TP4/3 on Flat River floodplain
S4-27-9	Groundwater monitoring well BH 53, east of TP2 on Flat River floodplain, SE of TP2
S4-27-10	Groundwater monitoring well TP4-07-MW01, east of TP4 near bridge over Flat River
S4-27-11	Groundwater monitoring well TP5-07-MW01, east of TP5, south of TP3, north of road
S4-27-12	Groundwater monitoring well TP3-07-MW01, southeast of TP3 near airstrip north end
S4-27-13	Groundwater monitoring well TP3-07-MW02, south of TP3 west of airstrip north end
S4-27-14	Groundwater monitoring well TP5-09-MW03, southeast of TP5 (between small creek and TP5)
S4-27-15	Groundwater monitoring well TP5-09-MW04, southeast of airstrip
S4-27-16	Groundwater monitoring well TP2-09-MW01, east of TP1 and TP2
S4-27-17	Groundwater monitoring well US-09-MW01, upstream of mine site
S4-28-1	Groundwater pumping well PW 1, east of TP3 near airstrip road (designated as final discharge point in MMER)
S4-28-2	Groundwater pumping well PW 2, east of TP4/3 near airstrip road
System 4: Surface Water Quality Sample Points	
S4-20	Drainage culvert from natural pond adjacent to the east corner of TP3
S4-32	Sardine Creek Downstream / Sardine Creek upstream of main access road

3.2 Historical Data Sources and Tabulation

The amount of historical (pre-2001) water monitoring records is very limited due to the changing ownership of the Cantung Mine at the time. North American Tungsten Corporation Ltd. reviewed AANDC's (Fort Simpson) historical records to compile a more complete monitoring record. The AANDC's Fort Simpson office is the historical recipient of all data reports from the Cantung Mine during operations prior to 2001.

In addition, past reports were reviewed for data content and, wherever possible, these data were also included in the data set.

In 2010, NATCL began the process of database development, using a proprietary database (FULCRUM) operated by Knight Piesold Ltd. (KPL). Due to the use of different nomenclature for monitoring sites tables of concordance had to be developed before the information could be uploaded. As well, prior to 2001, different reporting methods and different analytical methods were also used. Since 2001, NATCL has conducted water quality monitoring with strict adherence to quality assurance and quality control (QA/QC) guidelines. The database of historical data was completed in February 2012.

The historical chemistry data were provided to EBA by NATCL's data management consultant (KPL). EBA uploaded the FULCRUM data, as provided by KPL into its internal database (ESdat). ESdat is a specialist environmental database system, used by environmental managers, particularly those concerned with contaminated / industrial sites, groundwater investigations, landfill and regulatory compliance.

ESdat allows for efficient importing from a range of systems or data sources into a central environmental database. The system provides data comparison and analysis, comprehensive reporting, and integration with other software. The system also performs QA/QC analysis and has automatic data validation checks.

NATCL is pleased to provide the complete KPL database to the MVLWB on a CD attached to this report.

4.0 SURFACE WATER QUALITY

As previously indicated, according to available records, periodic sampling of the Flat River above and below the Cantung Mine was begun as early as 1966 (the year it opened) by the Water Quality Branch, Inland Waters Directorate, Environment Canada (Sigma Resource Consultants Ltd. 1976). DIAND, with the assistance of the former Canada Tungsten Mining Corporation commenced water quality sampling in 1973, two years prior to the establishment of a Surveillance Program required under the first Conditional Water Licence (Number N-3L3-004) for the Cantung Mine issued by the then Northwest Territories Water Board on June 30, 1975.

The following sub-sections discuss the results of the few documents that NATCL/EBA were able to locate related to the early years of operation at the Cantung Mine.

4.1 Environmental Protection Services (Environment Canada) 1973

In 1973 the federal Environmental Protection Service of Environment Canada conducted a preliminary study focused on water quality, sediment quality and the benthic biota of the Flat River (Environmental Protection Service 1973). At that time the historic tailings deposited into the Flat River floodplain were

being retained by a causeway that had been constructed across the Flat River. River flow was directed through three culverts beneath the causeway, which restricted the flow. As reported by Environmental Protection Service (1973), a water quality monitoring program was initiated early in 1973 by DIAND (now AANDC). Samples were collected by personnel of Canada Tungsten and forwarded for analysis to the Inland Waters Laboratory of Environment Canada in Calgary, Alberta. Table 3 presents the results reported in Table 1 of the Environmental Protection Service (1973) report.

Table 3: Summary of 1973 Water Analysis (Environmental Protection Service 1973)

Location and Sample Date	Cu (mg/l)	Temp (°C)	Nitrate-Nitrite (mg/l)	pH	Turbidity (NTU)	Cond. (µmho/cm)	Hardness (CaCO ₃)
Intake Water at Flat River Pumphouse (upstream S4-1)							
March 28	0.036	0.5	0.07	7.4	1.9	269	136
May 17	0.015	1.0	0.03	7.9	4.8	166	80.5
June 5	0.015	4.0	0.03	7.7	1.6	190	91.4
Sardine Creek							
May 17	x	x	2.4	8.2	68	501	212
June 5	0.015	3.0	1.8	7.9	5.7	423	186
Causeway Culvert (formerly S4-5)							
March 28	<0.013	0.5	0.97	8.3	21	303	147
May 17	x	1.0	x	7.9	43	5,805	92.9
June 5	0.015	4.0	0.07	7.1	1.5	209	101
Decant from Old Tailings Pond (TP1 and TP2)							
March 28	0.025	4.0	2.6	7.3	12	539	183
May 17	0.32	10.0	0.25	8.6	94	415	146
June 5	1.3	13.0	0.09	8.3	32	461	148
Flat River (1 mile downstream – S4-5)							
March 28	<0.013	x	0.10	8.5	13	298	144
May 17	x	1.0	0.11	8.2	15	198	89.4
June 5	0.03	4.0	0.03	7.7	3.3	199	91.6

DIAND program, samples collected by Canada Tungsten personnel, samples analyzed by Environment Canada

X - denotes no results

Source: Table 1 from Environmental Protection Service 1973

Although the data presented are limited, of particular note is that the average background concentration of total copper (0.022 mg/l) sampled at the intake of the Flat River pumphouse (upstream of the historic Flat River tailings deposit), was comparable but slightly higher than the average concentration of total copper (0.014 mg/l) flowing through the causeway culverts, downstream of the tailings deposit. One mile (1.6 km) downstream of this site, the average concentration of total copper in Flat River water (0.022 mg/l) was consistent with the background results recorded for the upstream location.

Water hardness ranged from an average of 102.6 mg/l at the upstream site, to 113.6 mg/l at the causeway culvert and 108.3 mg/l at the downstream site. Water pH ranged from an average of 7.7 at the upstream site, to 7.8 at the causeway culvert and 8.0 at the downstream site.

Nitrate/nitrite and conductivity were the only chemical parameters analyzed that showed some downstream effect related to the historic tailings retained by the causeway. Average nitrate/nitrite concentrations ranged from 0.04 mg/l at the upstream site, to 0.52 mg/l at the causeway culvert and 0.08 mg/l at the downstream site.

Average conductivity ranged from 102.6 µmho/cm at the upstream site, to 2,105 µmho/cm at the causeway culvert and 231 µmho/cm at the downstream site. However, it should be noted that the high value recorded at the causeway culvert was due to one particularly high reading (5,805 µmho/cm) recorded on May 17, 1973, which may have been associated with the initiation of spring freshet.

4.2 Sigma Resource Consultants Ltd. (1976)

Sigma Resource Consultants Ltd. (Sigma) was retained by Canada Tungsten Mining Corporation in May, 1976, to undertake a study to determine the zone of influence and the impact of Cantung's mining and milling operation on the aquatic ecosystem of the Flat River in accordance with Terms of Reference provided by the Northwest Territories Water Board. As part of the study, Sigma reviewed water quality data obtained and reported by the Water Quality Branch, Waters Directorate periodically from 1966 to 1975.

Specifically, Sigma reviewed data summaries received from the National Water Quality Data Bank. Unfortunately, NATCL/EBA have not been able to locate any of these historic reports, but a summary of the more relevant water quality parameters and sampling dates for various stations reported by Sigma for that period is provided in Table 4.

As can be noted, this table presents results for a considerable number of parameters and includes dissolved and total (extractable values) for most of the metals reported. However, the following discussion will be limited to the total form of metals parameters specified in the water licence, nutrients, water hardness and pH.

The periods of record and number of samples collected for the data presented for the three key stations discussed in this report were:

- Flat River above the Pumphouse (water intake - S4-1) – August 24, 1966 to December 9, 1975 - 31 samples;
- Flat River at Causeway Culvert (formerly S4-5) - August 24, 1966 to August 13, 1975 – 27 samples;
- Flat River approx. 1 mile (1.6 km) downstream of Tailings Ponds (S4-5) – March 28, 1973 to December 9, 1975 – 18 samples.

Based on the data presented, the average total copper concentration recorded in Flat River water collected above the pumphouse (representing background) for the period of record was 0.009 mg/l. This compared with average total copper concentrations of 0.02 mg/l downstream at the Flat River causeway culverts, and 0.024 mg/l at the station located one mile downstream of the tailings pond. These concentrations are generally consistent with the more limited copper data reported by Environmental Protection Service (1973).

Table 4: Summary of Water Quality Results – Water Quality Branch, Inland Waters Directorate

STATION No. & DESCRIPTION	PERIOD OF RECORD		pH	Turbidity (J.T.U.)	Total Dissolved Solids (mg/L)	Total Hardness as CaCO ₃ (mg/L)	Total Organic Carbon (mg/L)	Total Nitrite (mg/L)	Total Phosphorus (mg/L)	Arsenic Dissolved (mg/L)	Cadmium Extractable (mg/L)	Cyanide (mg/L)	Copper (mg/L)		Iron (mg/L)		Lead (mg/L)		Zinc (mg/L)	
													Dissolved	Extractable	Dissolved	Extractable	Dissolved	Extractable	Dissolved	Extractable
00NW10EA0001 Flat River Above Mine Raw Water Intake	24/08/66 – 9/12/75	No. Smpls	31	30	20	28	17	11	15	18	5	2	12	25	14	26	11	21	11	18
		Low	7.3	<0.1	63	27	<0.5	.01	<.003	0	<.002	0	<.001	<.001	.01	.02	<.001	<.001	<.001	<.001
		High	8.3	23	185	173	6.5	.41	.015	.005	<.03	.018	.22	.036	.17	2.20	<.05	.05	.016	.16
		Average	-	4(5)	119(41)	107(41)	2.4(1.6)	.22	.006(.004)	.002(.002)		.009(.013)	.03(.06)	.009(.008)	.06(.05)	.27(.42)	.01(.01)	.01(.02)	.005(.005)	.02(.04)
		Median	7.7	3.1	127	130	2.0	.22	<.005	.001	<.01	.009	<.01	<.01	<.04	.16	.004	.004	.003	<.013
00NW10EA0002 Flat River at Causeway Culvert	24/08/66 – 13/08/75	No. Smpls	27	27	14	19	14	11	15	19	5	2	9	26	12	21	9	19	9	14
		Low	7.1	0.8	70	63	<0.5	.08	<.003	0	<.002	0	<.001	<.001	<.001	.1	<.003	<.003	.001	<.01
		High	8.0	125	174	159	15.0	.73	.09	.013	<.03	.002	<.013	.09	14.5	22	<.05	<.05	<.016	.09
		Av. (S.D.)	-	19(27)	120(42)	108(37)	3.3(4)	.37	.016(.022)	.003(.004)	.01(.01)	.001(.001)	.007(.004)	.02(.02)	1.6(4.2)	2.4(5.2)	.01(.02)	.01(.02)	.005(.004)	.03(.03)
		Median	7.8	7	117	101	2.0	.34	.010	.001	.006	0	<.008	.01	.05	.65	<.004	.005	.003	.02
00NW10EA0003 Sardine Creek at Watson Lake Road	22/05/70 –13/08/75	No. Smpls	18	18	12	13	9	7	8	11	5	1	5	13	5	13	5	10	5	10
		Low	7.5	0.4	93	81	<0.5	.85	<.003	0	<.002	.003	<.001	.003	<.001	<.05	<.001	<.001	.001	.002
		High	8.2	200	240	213	5.0	2.4	.067	.033	<.03	.003	.004	.07	.07	25	.004	<.05	.019	.13
		Average	-	33(54)	165(46)	141(43)	2.3(1.8)	1.47	.013 (.022)	.007(.01)	.01(.01)		.002(.001)	.02(.02)	.04(.03)	3.6(6.6)	.003(.001)	.01(.02)	.007(.008)	.051(.052)
		Median	8.0	6.2	166	146	1.4	1.26	.006	.004	<.007		.002	<.01	<.04	1.4	<.004	<.006	.005	.02
00NW10EA0004 Flat River Near Mouth	26/05/72 –24/04/74	No. Smpls	9	9	7	8	1	1	1	1	1		1	1	1	1	1	1	1	1
		Low	7.7	0.5	100	86	32	.15	.015	<.004	<.002		.002	<.006	.21	.44	<.01	<.006	<.01	.013
		High	8.2	30.0	231	214	32	.15	.015	<.004	<.002		.002	<.006	.21	.44	<.01	<.006	<.01	.013
		Average	-	11.6(11.2)	162(50)	164(50)	32													
		Median	8.0	7.6	149	177														
00NW10EA0005 Flat River Approx. 1 Mile D/Stream of Tailing Pond	28/03/73 – 09/12/75	No. Smpls	18	17	11	11	12	12	15	17	5		10	15	9	15	10	15	10	6
		Low	7.5	1.2	60	48	<1.0	.07	<.003	<.001	.002		.002	.002	.02	.17	<.003	<.003	<.001	<.01
		High	8.4	33	174	146	24	.57	.031	.072	<.03		.045	.067	.13	3.7	<.05	<.05	<.016	.11
		Average	-	10(9)	112(48)	123(36)	4(6)	.31	.01(.009)	.011(.021)	.01(.01)		.021(.018)	.024(.020)	.06(.04)	.96(.97)	.01(.01)	.01(.02)	.004(.004)	.04(.04)
		Median	8.0	5.8	105	144	2.0	.31	.006	.002	.006		0.14	<.015	<.04	.83	<.004	.005	<.003	.019

(#) = Standard Deviation

Source: Sigma Resource Consultants Ltd. 1976

Average total cadmium concentrations, reported for all three sites, were regularly below the detection limit of the time (0.002 mg/l) and was reported as 0.01 mg/l at all three sites. Similarly, average total lead concentrations were also reported as 0.01 mg/l at all three sites. Average total zinc concentrations appeared to increase marginally with distance downstream, ranging from 0.02 mg/l at the upstream (background) station, to 0.03 mg/l below the causeway culverts and 0.04 mg/l at the station located one mile downstream of the tailings pond.

Average total nitrate concentrations, reported for all three sites, increased marginally with distance downstream, ranging from 0.22 mg/l at the upstream (background) station to 0.37 mg/l below the causeway culverts and 0.31 mg/l at the station located one mile downstream of the tailings pond. Average total phosphorus concentrations ranged from 0.006 mg/l at the upstream station to 0.016 mg/l below the causeway culverts, and 0.01 mg/l at the station located one mile downstream of the tailings ponds.

Water hardness ranged from an average of 107 mg/l at the upstream site, to 108 mg/l at the causeway culverts and 123 mg/l at the downstream site. Water pH ranged from a median of 7.7 at the upstream site, to 7.8 at the causeway culvert and 8.0 at the downstream site.

4.3 1980 to Present Surface Water Quality Reporting

For purposes of this report, the assessment of surface water and groundwater quality parameters focussed on the key parameters traditionally specified in the water licence and the MMER. On this basis, the parameters examined and discussed in more detail include arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids (TSS).

In addition, to allow the presentation of historic and more recent data extending for the period of record from the early 1980s to present, all of the data were treated as being valid, with the general understanding that minimum detection limits (MDL) have decreased as analysis methods have evolved. For data manipulation purposes, where sample values were clearly reported as less than the detection limit, half the value of the detection limit was used for computations and graphics production. In circumstances where it was not possible to determine what the detection limit was (particularly for some of the more historic data), the reported values were used.

Using these assumptions, the Surveillance Network Program (SNP) surface water quality stations assessed for the period of record (early 1980s to present) were:

- S4-29 Flat River 3 km upstream from pumphouse;
- S4-5 Flat River at the bridge downstream from airstrip (below the mine);
- S4-33 Flat River far field site located approx. 8.5 km downstream of S4-5.

Table 5 presents all of the data evaluated for these three surface water quality stations and the selected parameters for the period of record. In addition, for the reporting of copper, zinc and total suspended solids data, it should be noted that additional data reported by DIAND (2001) were imported into the ESdat database and incorporated into the respective figures for these two parameters.

Figures 4 to 10 present the Flat River surface water quality trends in relation to the established Canadian Council of Ministers of the Environment (CCME) water quality guideline values for the protection of freshwater aquatic life. The following subsections discuss the results for each of the key parameters.

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-29								
S4-29	31/03/1982	0.005	0.005	0.03	0.025	0.025	0.01	120
S4-29	15/06/1982	0.005		0.005	0.025	0.025	0.52	38
S4-29	06/07/1982	0.0005	0.0005	0.0005	0.0005	0.0025	0.0027	35
S4-29	22/09/1982	0.0005	0.0005	0.0005	0.0005	0.002	0.002	48
S4-29	06/10/1982	0.001	0.0001	0.0005	0.00025	0.0005	0.015	65
S4-29	10/12/1982	0.0005	0.00014	0.0005	0.0003	0.00125	0.009	
S4-29	22/02/1983	0.001	0.00005	0.0015	0.0005	0.0005	0.0025	92
S4-29	15/06/1983	0.0005	0.00005	0.0005	0.0001	0.0005	0.009	40
S4-29	31/08/1983	0.0036	0.00005	0.00025	0.0001	0.0005	0.0025	55
S4-29	24/11/1983	0.0005	0.00005	0.00025	0.0001	0.0033	0.013	110
S4-29	25/11/1983			0.01				
S4-29	30/12/1983			0.02				
S4-29	27/01/1984			0.01				
S4-29	24/02/1984			0.01				
S4-29	25/02/1984	0.0005	0.00005	0.0005	0.0005	0.0005	0.019	98
S4-29	04/07/1984	0.0005	0.00005	0.0008	0.0001	0.0005	0.005	36
S4-29	18/01/1985			0.02			0.02	
S4-29	15/02/1985			0.08			0.02	
S4-29	15/03/1985			0.02			0.04	
S4-29	30/03/1985			0.01				
S4-29	12/04/1985			0.02			0.02	
S4-29	24/04/1985	0.0005	0.00005	0.0014	0.0001	0.0005	0.01	98
S4-29	27/04/1985			0.01				
S4-29	17/05/1985			0.02			0.02	
S4-29	14/06/1985			0.02			0.02	
S4-29	28/06/1985			0.01				
S4-29	12/07/1985			0.02			0.02	
S4-29	15/08/1985	0.0005	0.0004	0.0019		0.005	0.0075	34
S4-29	16/08/1985			0.02			0.02	
S4-29	30/08/1985			0.01				
S4-29	13/09/1985			0.02			0.02	
S4-29	27/09/1985			0.01				
S4-29	18/10/1985			0.02			0.02	
S4-29	15/11/1985			0.12			0.02	
S4-29	13/12/1985			0.02			0.02	
S4-29	16/01/1986			0.02			0.02	
S4-29	29/01/1986	0.0005	0.00005	0.00025	0.00025	0.0025	0.0075	2.5
S4-29	13/02/1986			0.04			0.16	

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-29	13/03/1986			0.02			0.14	
S4-29	17/04/1986			0.02			0.14	
S4-29	15/05/1986			0.02			0.12	
S4-29	28/05/1986	0.0007	0.00005	0.0016	0.00025	0.0025	0.0075	7
S4-29	12/06/1986			0.02			0.04	
S4-29	17/07/1986			0.02			0.08	
S4-29	15/08/1986			0.02			0.14	
S4-29	08/09/1986	0.0014	0.00005	0.00025	0.0005	0.0025	0.0075	3.1
S4-29	18/09/1986			0.02			0.06	
S4-29	03/10/1986			0.02			0.1	
S4-29	24/11/1986			0.06			0.14	
S4-29	15/12/1986			0.02			0.16	
S4-29	03/01/1987			0.02			0.02	
S4-29	15/02/1987			0.02			0.02	
S4-29	15/04/1987			0.02			0.02	
S4-29	05/05/1987			0.02			0.02	
S4-29	13/06/1987			0.02			0.02	
S4-29	17/07/1987	0.0005	0.00025	0.0005	0.001	0.0005	0.0005	
S4-29	24/07/1987			0.02			0.04	
S4-29	02/09/1987			0.02			0.02	
S4-29	30/10/1987			0.02			0.04	
S4-29	15/11/1987			0.02			0.02	
S4-29	15/12/1987			0.02			0.04	
S4-29	15/01/1991			0.06			0.08	
S4-29	15/02/1991			0.04			0.06	
S4-29	15/03/1991			0.02			0.08	
S4-29	27/04/1991			0.05			0.1	
S4-29	15/05/1991			0.02			0.16	
S4-29	24/06/1991			0.02			0.02	
S4-29	15/07/1991			0.02			0.04	
S4-29	25/08/1991			0.02			0.02	
S4-29	15/09/1991			0.02			0.02	
S4-29	04/11/1991			0.01			0.08	
S4-29	15/12/1991			0.04			0.08	
S4-29	20/02/1996			0.001			0.005	
S4-29	29/04/1996	0.1	0.005	0.0005	0.0025	0.01	0.0025	7
S4-29	30/05/1996	0.1	0.005	0.002	0.0025	0.01	0.0025	15
S4-29	30/06/1996	0.1	0.005	0.0005	0.0025	0.01	0.0025	2
S4-29	01/03/1997	0.0005	0.005	0.0005	0.0005	0.001	0.0025	3
S4-29	31/05/1997	0.0006	0.005	0.0005	0.0025	0.002	0.0025	2
S4-29	27/06/1997	0.0008	0.005	0.0005	0.0025	0.002	0.0025	4
S4-29	29/08/1997	0.0006	0.005	0.0005	0.0025	0.002	0.0025	2
S4-29	12/09/1997	0.0008	0.005	0.0005	0.0025	0.002	0.0025	4

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-29	29/09/1997	0.0007	0.005	0.0005	0.0025	0.002	0.0025	2
S4-29	10/10/1997	0.0003	0.005	0.0005	0.0025	0.002	0.005	5
S4-29	19/06/1998	0.0008	0.005	0.0005	0.0025	0.002	0.0025	4
S4-29	29/07/1998	0.0006	0.005	0.0005	0.0025	0.002	0.0025	4
S4-29	30/07/1998	0.0012	0.005	0.0005	0.0025	0.002	0.0025	6
S4-29	28/09/1998	0.001	0.005	0.0005	0.0025	0.001	0.0025	1.5
S4-29	31/05/1999	0.0008	0.005	0.0005	0.0025	0.002	0.0025	6
S4-29	30/06/1999	0.0017	0.005	0.0005	0.0025	0.003	0.005	11
S4-29	29/07/1999	0.1	0.005	0.005	0.0025	0.0025	0.005	3
S4-29	30/07/1999	0.0011	0.005	0.0005	0.0025	0.003	0.005	5
S4-29	27/09/1999	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	26/06/2000	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	26/10/2000	0.1	0.005	0.005	0.0025	0.0025	0.0025	6
S4-29	27/05/2001	0.1	0.01	0.01	0.05	0.05	0.005	3
S4-29	02/06/2001	0.1	0.01	0.01	0.05	0.05	0.005	11
S4-29	09/07/2001	0.1	0.01	0.01	0.05	0.05	0.006	4
S4-29	31/07/2001	0.0011	0.0002	0.001	0.001	0.05	0.006	4
S4-29	31/08/2001	0.2	0.01	0.01	0.05	0.05	0.005	3
S4-29	28/09/2001	0.2	0.01	0.01	0.05	0.05	0.01	39
S4-29	20/06/2002	0.1	0.005	0.005	0.0025	0.0025	0.0025	3
S4-29	22/07/2002	0.1	0.005	0.005	0.0025	0.0025	0.0025	5
S4-29	09/08/2002	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	07/09/2002	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	08/01/2003	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	12/02/2003	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	27/03/2003	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	08/04/2003	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	17/06/2003	0.1	0.005	0.005	0.0025	0.0025	0.0025	1.5
S4-29	29/07/2003	0.0008	0.005	0.005	0.0025	0.0025	0.0025	22
S4-29	04/05/2004	0.1		0.005	0.0025	0.0025	0.0091	3
S4-29	02/05/2005	0.1	0.005	0.005	0.025	0.025	0.0025	3.7
S4-29	12/06/2005	0.1	0.005	0.005	0.025	0.025	0.0025	8.3
S4-29	17/07/2005	0.00062	0.000025	0.00035	0.000113	0.00257	0.0031	3.5
S4-29	26/10/2005	0.0005	0.000025	0.00019	0.000025	0.00209	0.0041	1.5
S4-29	14/04/2006	0.00048	0.000025	0.00019	0.000025	0.0012	0.0034	1.5
S4-29	16/04/2006	0.00054	0.000025	0.00031	0.000063	0.00095	0.0036	1.5
S4-29	17/04/2006	0.0005	0.000025	0.00022	0.000025	0.00092	0.0036	1.5
S4-29	14/05/2006	0.001	0.000025	0.00041	0.000166	0.00207	0.0025	3.7
S4-29	20/05/2006	0.00105	0.000057	0.0008	0.000233	0.0022	0.0043	6.7
S4-29	07/06/2006	0.00075	0.000025	0.00781	0.000227	0.00284	0.0032	1.5
S4-29	09/07/2006	0.00069	0.000025	0.00034	0.000108	0.00252	0.0031	1.5
S4-29	13/10/2006	0.00081	0.000025	0.00043	0.000164	0.00289	0.0056	4.1
S4-29	05/11/2006	0.00045	0.000025	0.00035	0.000055	0.00209	0.0152	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-29	11/11/2006	0.00047	0.000025	0.00035	0.00224	0.00161	0.0066	1.5
S4-29	16/12/2006	0.00074	0.000025	0.00047	0.000025	0.00118	0.0057	1.5
S4-29	07/01/2007	0.00045	0.000059	0.0205	0.000025	0.00149	0.0069	1.5
S4-29	11/02/2007	0.00043	0.000025	0.0009	0.000025	0.00135	0.0046	1.5
S4-29	04/03/2007	0.00046	0.000025	0.00034	0.000025	0.00187	0.004	1.5
S4-29	18/03/2007	0.00041	0.000025	0.00027	0.000324	0.00115	0.0087	1.5
S4-29	07/04/2007	0.00047	0.000025	0.00067	0.000085	0.00126	0.0045	1.5
S4-29	06/05/2007	0.00177	0.00008	0.00088	0.000634	0.00323	0.0096	21.8
S4-29	03/06/2007	0.00132	0.000025	0.0005	0.000467	0.00301	0.0056	12
S4-29	01/07/2007	0.00065	0.000025	0.00033	0.000091	0.00265	0.0028	3
S4-29	05/08/2007	0.00142	0.000025	0.00061	0.000422	0.00293	0.0038	3.2
S4-29	02/09/2007	0.00085	0.000025	0.00037	0.000159	0.00281	0.0043	1.5
S4-29	07/10/2007	0.00063	0.000025	0.00033	0.00008	0.00224	0.0036	1.5
S4-29	04/11/2007	0.00054	0.000025	0.0003	0.000025	0.00194	0.0031	1.5
S4-29	11/11/2007	0.00052	0.000025	0.00028	0.000082	0.00168	0.004	1.5
S4-29	23/11/2007	0.0005	0.000025	0.00019	0.000025	0.00156	0.0051	1.5
S4-29	24/11/2007	0.00066	0.000025	0.00016	0.000025	0.00167	0.004	1.5
S4-29	25/11/2007	0.00054	0.000025	0.0002	0.000025	0.00172	0.0054	1.5
S4-29	26/11/2007	0.00049	0.000025	0.00016	0.000025	0.00176	0.0038	1.5
S4-29	02/12/2007	0.00047	0.000025	0.00027	0.000025	0.00157	0.0038	1.5
S4-29	09/12/2007	0.00044	0.000025	0.00015	0.000025	0.00156	0.0024	
S4-29	06/01/2008	0.00048	0.000025	0.00015	0.000025	0.00171	0.0036	1.5
S4-29	17/02/2008	0.0005	0.000025	0.0002	0.000055	0.00137	0.0031	1.5
S4-29	02/03/2008	0.00052	0.000025	0.00015	0.000025	0.00144	0.0035	1.5
S4-29	06/04/2008	0.00049	0.000025	0.00016	0.000025	0.00122	0.0031	1.5
S4-29	11/05/2008	0.00112	0.000051	0.0004	0.000261	0.00236	0.005	8.9
S4-29	15/06/2008	0.00067	0.000025	0.00037	0.000075	0.00275	0.0034	1.5
S4-29	17/06/2008	0.0006	0.000025	0.00039	0.00006	0.00242	0.0028	1.5
S4-29	13/07/2008	0.00075	0.000025	0.00074	0.000391	0.00355	0.0055	4.3
S4-29	10/08/2008	0.00077	0.000025	0.00034	0.000119	0.00276	0.0032	11.1
S4-29	28/09/2008	0.0005	0.000025	0.00027	0.000025	0.00316	0.0041	1.5
S4-29	12/10/2008	0.0005	0.000025	0.00047	0.000025	0.00292	0.0036	1.5
S4-29	02/11/2008	0.00044	0.000025	0.00013	0.000025	0.00198	0.0034	1.5
S4-29	07/12/2008	0.00049	0.000025	0.00075	0.000025	0.00181	0.0168	1.5
S4-29	04/01/2009	0.00047	0.000025	0.00043	0.000025	0.00159	0.0035	1.5
S4-29	15/02/2009	0.00046	0.000061	0.00095	0.000055	0.00157	0.0044	1.5
S4-29	08/03/2009	0.00042	0.000025	0.00026	0.000051	0.00135	0.0054	1.5
S4-29	19/04/2009	0.00041	0.000025	0.00018	0.000025	0.00127	0.0026	1.5
S4-29	10/05/2009	0.00117	0.000058	0.0007	0.000326	0.00264	0.0066	1.5
S4-29	14/06/2009	0.00078	0.000025	0.00063	0.000216	0.002	0.0035	1.5
S4-29	12/07/2009	0.00062	0.000025	0.00042	0.00013	0.00298	0.0053	1.5
S4-29	09/08/2009	0.00162	0.000025	0.0136	0.001	0.00299	0.0058	10
S4-29	20/09/2009	0.00056	0.000025	0.0003	0.000025	0.00217	0.002	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-29	11/10/2009	0.00052	0.000025	0.00023	0.000025	0.00265	0.0032	1.5
S4-29	22/11/2009	0.00042	0.000025	0.00028	0.000025	0.00193	0.0043	1.5
S4-29	13/12/2009	0.00042	0.000025	0.00024	0.000025	0.00162	0.0036	1.5
S4-29	03/01/2010	0.00045	0.000025	0.00038	0.000025	0.00154	0.0036	1.5
S4-29	14/02/2010	0.00046	0.000025	0.00019	0.000025	0.00151	0.0052	1.5
S4-29	07/03/2010	0.00045	0.000025	0.00025	0.000025	0.00135	0.0035	1.5
S4-29	11/04/2010	0.00039	0.000025	0.0115	0.000051	0.00123	0.0085	1.5
S4-29	16/05/2010	0.00081	0.000025	0.00025	0.000288	0.0016	0.0024	1.5
S4-29	13/06/2010	0.00057	0.000025	0.00066	0.000068	0.00297	0.0024	1.5
S4-29	27/06/2010	0.0012	0.000025	0.00079	0.000499	0.00354	0.0055	10.7
S4-29	11/07/2010	0.00071	0.000025	0.00044	0.000156	0.00256	0.0025	1.5
S4-29	15/08/2010	0.00141	0.000025	0.0006	0.000416	0.00334	0.0052	24.4
S4-29	12/09/2010	0.00058	0.000025	0.00032	0.000025	0.00321	0.0026	8.3
S4-29	19/09/2010	0.0006	0.000025	0.00038	0.000078	0.00321	0.0036	1.5
S4-29	17/10/2010	0.00055	0.000025	0.00025	0.000073	0.00214	0.0037	1.5
S4-29	07/11/2010	0.00042	0.000025	0.00025	0.000025	0.00188	0.003	1.5
S4-29	05/12/2010	0.00046	0.000025	0.00025	0.000025	0.00177	0.0188	1.5
S4-29	02/01/2011	0.00045	0.000025	0.00025	0.000025	0.00143	0.0015	1.5
S4-29	03/01/2011	0.0005	0.000041	0.001	0.0005	0.004	0.004	1
S4-29	20/02/2011	0.00044	0.000025	0.00146	0.000252	0.00159	0.0041	1.5
S4-29	13/03/2011	0.00043	0.000025	0.00025	0.000025	0.00084	0.0015	1.5
S4-29	24/04/2011	0.001	0.000072	0.001	0.0005	0.003	0.004	1.5
S4-29	08/05/2011	0.001	0.00006	0.003	0.0005	0.004	0.004	1.5
S4-29	12/06/2011	0.0005	0.0000125	0.001	0.0005	0.004	0.005	1
S4-29	17/07/2011	0.002	0.000025	0.002	0.0005	0.01	0.013	8
S4-29	14/08/2011	0.0005	0.0000125	0.001	0.0005	0.005	0.005	0.5
S4-29	11/09/2011	0.001	0.0000125	0.001	0.003	0.007	0.008	0.5
S4-29	09/10/2011	0.0005	0.000032	0.001	0.0005	0.005	0.004	0.5
S4-29	06/11/2011	0.0005	0.000028	0.001	0.0005	0.005	0.006	1
S4-29	11/12/2011	0.00063	0.00004	0.0005	0.0001	0.002	0.006	0.5
S4-29	08/01/2012	0.0005	0.00004	0.001	0.00002	0.002	0.005	0.5
S4-29	12/02/2012	0.00025	0.00003	0.0005	0.000005	0.001	0.003	3
S4-29	04/03/2012	0.0006	0.00003	0.0005	0.000005	0.001	0.003	2
S4-33								
S4-33	29/04/1996	0.1	0.005	0.0005	0.025	0.01	0.0025	2
S4-33	30/05/1996	0.1	0.005	0.004	0.025	0.01	0.01	57
S4-33	30/06/1996	0.1	0.005	0.0005	0.025	0.01	0.0025	3
S4-33	01/03/1997	0.001	0.005	0.0005	0.0005	0.0005	0.0025	1
S4-33	31/05/1997	0.0013	0.005	0.001	0.025	0.002	0.0025	8
S4-33	27/06/1997	0.0014	0.005	0.001	0.025	0.001	0.0025	11
S4-33	29/08/1997	0.0016	0.005	0.0005	0.025	0.001	0.0025	9
S4-33	12/09/1997	0.0014	0.005	0.001	0.025	0.001	0.0025	11
S4-33	29/09/1997	0.0011	0.005	0.0005	0.025	0.001	0.0025	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-33	10/10/1997	0.0008	0.005	0.0005	0.025	0.002	0.0025	5
S4-33	19/06/1998	0.0008	0.005	0.004	0.025	0.002	0.007	8
S4-33	29/07/1998	0.0013	0.005	0.0005	0.025	0.002	0.0025	6
S4-33	30/07/1998	0.0027	0.005	0.0005	0.025	0.001	0.0025	9
S4-33	28/09/1998	0.0003	0.005	0.0005	0.025	0.002	0.0025	1.5
S4-33	31/05/1999	0.0007	0.005	0.0005	0.025	0.001	0.008	1.5
S4-33	30/06/1999	0.0024	0.005	0.002	0.025	0.002	0.0025	9
S4-33	29/07/1999	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-33	30/07/1999	0.0014	0.005	0.001	0.025	0.003	0.005	4
S4-33	27/09/1999	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-33	26/06/2000	0.1	0.005	0.005	0.025	0.025	0.0025	5
S4-33	26/10/2000	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-33	13/10/2006	0.0009	0.000025	0.00039	0.000064	0.00167	0.0037	1.5
S4-33	14/01/2007	0.00061	0.000025	0.00091	0.000025	0.00083	0.0023	1.5
S4-33	07/04/2007	0.0006	0.000025	0.00035	0.000025	0.00051	0.0011	1.5
S4-33	29/04/2007	0.00091	0.000025	0.00121	0.000162	0.00214	0.002	6.5
S4-33	13/05/2007	0.00126	0.000058	0.00102	0.000152	0.00137	0.0028	1.5
S4-33	03/06/2007	0.00278	0.000059	0.00264	0.000648	0.0024	0.0067	25.7
S4-33	07/06/2007	0.00301	0.000065	0.00591	0.00134	0.0106	0.0164	42.3
S4-33	01/07/2007	0.00132	0.000025	0.0006	0.000083	0.00144	0.0014	3.7
S4-33	02/09/2007	0.00141	0.000025	0.00036	0.000119	0.00177	0.0031	1.5
S4-33	09/09/2007	0.00116	0.000025	0.00063	0.00006	0.00812	0.0076	1.5
S4-33	02/12/2007	0.00063	0.000025	0.00039	0.000025	0.00095	0.0021	1.5
S4-33	17/02/2008	0.00069	0.000025	0.00067	0.000845	0.00078	0.0018	1.5
S4-33	02/03/2008	0.00066	0.000025	0.00041	0.000025	0.00076	0.0015	1.5
S4-33	06/04/2008	0.00071	0.000025	0.0004	0.000025	0.00065	0.0005	1.5
S4-33	10/08/2008	0.00223	0.000053	0.00224	0.000618	0.00935	0.0127	1.5
S4-33	11/09/2008	0.00139	0.000025	0.0007	0.000118	0.00869	0.0098	1.5
S4-33	02/10/2008	0.00122	0.000025	0.00088	0.000025	0.0103	0.01	1.5
S4-33	30/11/2008	0.00098	0.000025	0.00074	0.000074	0.0063	0.0066	3.9
S4-33	14/12/2008	0.00064	0.000025	0.00034	0.000025	0.00086	0.0034	1.5
S4-33	25/01/2009	0.00062	0.000025	0.0004	0.000025	0.00103	0.0013	1.5
S4-33	28/02/2009	0.00058	0.000025	0.00033	0.000025	0.00093	0.001	1.5
S4-33	15/03/2009	0.00061	0.000025	0.00045	0.000025	0.0008	0.0047	1.5
S4-33	12/04/2009	0.00081	0.000025	0.00069	0.000025	0.0008	0.0013	1.5
S4-33	28/05/2009	0.0036	0.00006	0.00436	0.000737	0.00284	0.0071	13.6
S4-33	22/06/2009	0.00134	0.000025	0.00119	0.000141	0.00804	0.0084	5.7
S4-33	19/07/2009	0.00326	0.000025	0.0001	0.000072	0.00025	0.0015	1.5
S4-33	11/08/2009	0.00425	0.000086	0.0035	0.00259	0.00864	0.0177	90
S4-33	05/09/2009	0.00157	0.000025	0.00056	0.000118	0.00743	0.0067	1.5
S4-33	09/10/2009	0.00082	0.00005	0.00051	0.00005	0.0085	0.0072	1.5
S4-33	21/11/2009	0.00057	0.000025	0.00061	0.000063	0.00117	0.0029	1.5
S4-33	24/01/2010	0.00065	0.000025	0.00026	0.000025	0.00089	0.0011	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-33	14/03/2010	0.00055	0.000025	0.00037	0.000025	0.00076	0.0015	1.5
S4-33	09/05/2010	0.001	0.000025	0.0005	0.000076	0.00085	0.0019	1.5
S4-33	13/06/2010	0.00108	0.000025	0.00132	0.000138	0.00214	0.0022	1.5
S4-33	18/07/2010	0.00165	0.000025	0.0005	0.000189	0.00175	0.0022	1.5
S4-33	22/08/2010	0.00143	0.000025	0.00063	0.000141	0.00252	0.0031	1.5
S4-33	12/09/2010	0.00105	0.000025	0.00035	0.000025	0.00234	0.0016	1.5
S4-33	26/09/2010	0.0008	0.000025	0.00058	0.000072	0.00964	0.0083	1.5
S4-33	17/10/2010	0.00086	0.000025	0.00025	0.000072	0.00146	0.0015	1.5
S4-33	07/11/2010	0.00065	0.000025	0.00025	0.000025	0.00124	0.0015	1.5
S4-33	19/12/2010	0.0006	0.000025	0.00025	0.000025	0.00083	0.0015	1.5
S4-33	09/01/2011	0.00065	0.000025	0.00025	0.000025	0.00082	0.0015	1.5
S4-33	27/02/2011	0.00052	0.000025	0.00056	0.000025	0.00181	0.0015	1.5
S4-33	24/04/2011	0.001	0.000025	0.001	0.0005	0.0015	0.0015	1.5
S4-33	09/05/2011	0.001	0.000032	0.001	0.0005	0.0015	0.0015	2
S4-33	22/05/2011	0.002	0.000043	0.001	0.0005	0.005	0.01	21
S4-33	12/06/2011	0.001	0.000032	0.001	0.0005	0.004	0.004	5
S4-33	10/07/2011	0.001	0.000025	0.001	0.0005	0.0015	0.008	3
S4-33	31/07/2011	0.002	0.000063	0.003	0.0005	0.008	0.014	47
S4-33	14/08/2011	0.001	0.0000125	0.001	0.0005	0.004	0.004	2
S4-33	11/09/2011	0.001	0.000035	0.001	0.0005	0.013	0.013	0.5
S4-33	09/10/2011	0.0005	0.000041	0.001	0.0005	0.005	0.003	10
S4-33	06/11/2011	0.0005	0.000034	0.001	0.0005	0.004	0.004	1
S4-33	11/12/2011	0.00063	0.00003	0.0005	0.00003	0.001	0.002	0.5
S4-33	08/01/2012	0.0007	0.00004	0.001	0.00004	0.001	0.005	1
S4-33	12/02/2012	0.0006	0.00004	0.003	0.000005	0.0005	0.004	4
S4-33	04/03/2012	0.0006	0.00003	0.0005	0.000005	0.0005	0.002	0.5
S4-5								
S4-5	31/03/1982	0.005	0.005	0.04	0.025	0.025	0.005	130
S4-5	15/06/1982	0.005		0.1	0.025	0.025	0.72	40
S4-5	06/07/1982	0.0005	0.0005	0.004	0.0005	0.0025	0.0035	24
S4-5	22/09/1982	0.0005	0.0005	0.0005	0.001	0.031	0.011	110
S4-5	06/10/1982	0.0005	0.0001	0.0005	0.00025	0.0005	0.014	78
S4-5	29/10/1982			0.01	0.025	0.01		0.5
S4-5	26/11/1982			0.01	0.02	0.01		1
S4-5	10/12/1982	0.0005	0.00021	0.0005	0.00023	0.00125	0.009	110
S4-5	31/12/1982			0.01	0.02	0.01		2
S4-5	28/01/1983			0.01	0.02	0.01		1
S4-5	22/02/1983	0.001	0.00005	0.00025	0.00025	0.0005	0.0025	110
S4-5	28/02/1983			0.01	0.02	0.01		0.5
S4-5	25/03/1983			0.01	0.02	0.04		0.5
S4-5	29/04/1983			0.01	0.02	0.01		7
S4-5	27/05/1983			0.01	0.02	0.01		6
S4-5	15/06/1983	0.0005	0.0001	0.002	0.0001	0.001	0.008	47

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-5	24/06/1983			0.01	0.04	0.02		24
S4-5	29/07/1983			0.02	0.04	0.01		11
S4-5	26/08/1983			0.01	0.02	0.01		
S4-5	31/08/1983	0.0041	0.000025	0.0006	0.00005	0.0005	0.0025	65
S4-5	30/09/1983			0.01	0.02	0.01		0.5
S4-5	24/11/1983	0.0011	0.00005	0.001	0.00005	0.0055	0.005	110
S4-5	25/11/1983			0.01				
S4-5	30/12/1983			0.01				
S4-5	24/02/1984			0.01				
S4-5	25/02/1984	0.0005	0.00005	0.0042	0.0005	0.0005	0.021	120
S4-5	04/07/1984	0.0005	0.00005	0.0012	0.0002	0.0005	0.005	42
S4-5	18/01/1985			0.02			0.02	
S4-5	15/03/1985			0.02			0.04	
S4-5	30/03/1985			0.02				
S4-5	12/04/1985			0.02			0.02	
S4-5	24/04/1985	0.0005	0.00005	0.001	0.00005	0.005	0.01	117
S4-5	27/04/1985			0.02				
S4-5	17/05/1985			0.02			0.02	
S4-5	14/06/1985			0.02			0.02	
S4-5	28/06/1985			0.01				
S4-5	12/07/1985			0.02			0.02	
S4-5	15/08/1985	0.0005	0.0002	0.001		0.005	0.0075	32
S4-5	16/08/1985			0.02			0.02	
S4-5	30/08/1985			0.01				
S4-5	13/09/1985			0.02			0.02	
S4-5	27/09/1985			0.01				
S4-5	18/10/1985			0.02			0.02	
S4-5	15/11/1985			0.02			0.02	
S4-5	13/12/1985			0.02			0.02	
S4-5	16/01/1986			0.02			0.04	
S4-5	29/01/1986	0.0005	0.00005	0.00025	0.00025	0.0025	0.0075	8.69
S4-5	13/02/1986			0.02			0.16	
S4-5	13/03/1986			0.02			0.12	
S4-5	17/04/1986			0.04			0.14	
S4-5	15/05/1986			0.02			0.1	
S4-5	28/05/1986	0.0009	0.0008	0.0072	0.0011	0.0025	0.0075	16
S4-5	12/06/1986			0.02			0.06	
S4-5	17/07/1986			0.02			0.1	
S4-5	15/08/1986			0.02			0.18	
S4-5	08/09/1986	0.0063	0.00005	0.00025	0.0005	0.0025	0.0075	1.5
S4-5	18/09/1986			0.02			0.06	
S4-5	03/10/1986			0.02			0.1	
S4-5	24/11/1986			0.02			0.02	

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-5	15/12/1986			0.02			0.16	
S4-5	03/01/1987			0.02			0.02	
S4-5	15/02/1987			0.02			0.02	
S4-5	15/04/1987			0.04			0.02	
S4-5	05/05/1987			0.02			0.06	
S4-5	13/06/1987			0.02			0.02	
S4-5	17/07/1987	0.001	0.00025	0.0005	0.002	0.002	0.0005	5
S4-5	24/07/1987			0.02			0.04	
S4-5	02/09/1987			0.02			0.02	
S4-5	30/10/1987			0.02			0.02	
S4-5	15/11/1987			0.02			0.02	
S4-5	15/12/1987			0.02			0.02	
S4-5	15/01/1991			0.02			0.12	
S4-5	15/02/1991			0.02			0.08	
S4-5	15/03/1991			0.02			0.08	
S4-5	27/04/1991			0.05			0.12	
S4-5	15/05/1991			0.02			0.01	
S4-5	24/06/1991			0.02			0.04	
S4-5	15/07/1991			0.02			0.04	
S4-5	25/08/1991			0.02			0.02	
S4-5	04/11/1991			0.01			0.12	
S4-5	15/12/1991			0.04			0.08	
S4-5	20/02/1996			0.001			0.005	
S4-5	29/04/1996	0.1	0.005	0.002	0.025	0.01	0.0025	15
S4-5	30/05/1996	0.1	0.005	0.004	0.025	0.01	0.006	39
S4-5	30/06/1996	0.1	0.005	0.0005	0.025	0.01	0.0025	4
S4-5	01/03/1997	0.0005	0.005	0.0005	0.0005	0.0005	0.006	1
S4-5	31/05/1997	0.0008	0.005	0.001	0.025	0.002	0.0025	5
S4-5	27/06/1997	0.0009	0.005	0.002	0.025	0.001	0.007	8
S4-5	29/08/1997	0.0009	0.005	0.0005	0.025	0.002	0.0025	3
S4-5	12/09/1997	0.0009	0.005	0.002	0.025	0.001	0.007	8
S4-5	29/09/1997	0.0006	0.005	0.0005	0.025	0.001	0.0025	0.5
S4-5	10/10/1997	0.0008	0.005	0.0005	0.025	0.002	0.005	10
S4-5	19/06/1998	0.0008	0.005	0.0005	0.025	0.002	0.0025	3
S4-5	29/07/1998	0.0007	0.005	0.0005	0.025	0.002	0.0025	5
S4-5	30/07/1998	0.0013	0.005	0.0005	0.025	0.002	0.0025	6
S4-5	28/09/1998	0.0004	0.005	0.005	0.025	0.002	0.0025	0.5
S4-5	31/05/1999	0.0006	0.005	0.005	0.025	0.002	0.0025	1.5
S4-5	30/06/1999	0.002	0.005	0.0005	0.025	0.002	0.0025	6
S4-5	29/07/1999	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-5	30/07/1999	0.0016	0.005	0.001	0.025	0.003	0.005	11
S4-5	27/09/1999	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-5	26/06/2000	0.1	0.005	0.005	0.025	0.025	0.0025	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-5	26/10/2000	0.1	0.005	0.005	0.025	0.025	0.0025	3
S4-5	31/05/2001	0.2	0.01	0.01	0.05	0.05	0.005	14
S4-5	11/06/2001	0.2	0.01	0.01	0.05	0.05	0.013	46
S4-5	09/07/2001	0.2	0.01	0.01	0.05	0.05	0.005	11
S4-5	03/08/2001	0.0021	0.0002	0.001	0.001	0.05	0.005	6
S4-5	31/08/2001	0.2	0.01	0.01	0.05	0.05	0.005	4
S4-5	28/09/2001	0.2	0.01	0.01	0.05	0.05	0.005	11
S4-5	20/06/2002	0.1	0.005	0.005	0.025	0.025	0.0025	10
S4-5	22/07/2002	0.1	0.005	0.005	0.025	0.025	0.0025	4
S4-5	09/08/2002	0.1	0.005	0.005	0.025	0.025	0.0025	7
S4-5	07/09/2002	0.1	0.005	0.005	0.025	0.025	0.0025	17
S4-5	08/01/2003	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-5	12/02/2003	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-5	27/03/2003	0.1	0.005	0.005	0.025	0.025	0.0025	10
S4-5	08/04/2003	0.1	0.005	0.005	0.025	0.025	0.0025	1.5
S4-5	17/06/2003	0.1	0.005	0.005	0.025	0.025	0.0025	8
S4-5	29/07/2003	0.0014	0.005	0.005	0.025	0.025	0.0025	10
S4-5	04/05/2004	0.1		0.005	0.025	0.025	0.0025	8.5
S4-5	12/06/2005	0.1	0.005	0.005	0.025	0.025	0.0025	9.9
S4-5	17/07/2005	0.00174	0.000053	0.00185	0.000369	0.00193	0.0035	3
S4-5	26/10/2005	0.00076	0.000025	0.0003	0.000025	0.00118	0.0025	1.5
S4-5	14/04/2006	0.00073	0.000025	0.00179	0.000176	0.00068	0.0023	1.5
S4-5	16/04/2006	0.00074	0.000025	0.00161	0.00012	0.00025	0.0019	1.5
S4-5	17/04/2006	0.00075	0.000025	0.00058	0.000051	0.00025	0.0019	1.5
S4-5	14/05/2006	0.00167	0.000025	0.00697	0.0002	0.00154	0.002	10.4
S4-5	20/05/2006	0.00157	0.000025	0.00245	0.00033	0.00158	0.0049	9.3
S4-5	07/06/2006	0.00125	0.000025	0.0117	0.000215	0.00197	0.003	11.2
S4-5	09/07/2006	0.0016	0.000025	0.00065	0.000152	0.00173	0.0022	1.5
S4-5	13/10/2006	0.00086	0.000025	0.0146	0.000025	0.0014	0.002	1.5
S4-5	05/11/2006	0.00073	0.000025	0.00063	0.000059	0.00153	0.0027	1.5
S4-5	11/11/2006	0.0007	0.000025	0.00325	0.000025	0.00099	0.0033	1.5
S4-5	16/12/2006	0.0006	0.000025	0.00033	0.000025	0.00107	0.0019	5.5
S4-5	07/01/2007	0.00125	0.000062	0.00163	0.000254	0.00128	0.0101	5
S4-5	11/02/2007	0.00064	0.000025	0.0521	0.000025	0.00078	0.0037	1.5
S4-5	04/03/2007	0.00063	0.000025	0.00109	0.000148	0.00126	0.0028	1.5
S4-5	18/03/2007	0.00063	0.000025	0.0003	0.000025	0.0008	0.0018	1.5
S4-5	07/04/2007	0.00062	0.000025	0.00022	0.000025	0.00075	0.0014	1.5
S4-5	06/05/2007	0.00118	0.000025	0.00301	0.000143	0.0014	0.0033	5.1
S4-5	03/06/2007	0.00279	0.000025	0.00252	0.000743	0.0025	0.007	25.3
S4-5	01/07/2007	0.00168	0.000025	0.0008	0.000158	0.00137	0.0021	4.3
S4-5	05/08/2007	0.00236	0.000025	0.00134	0.000482	0.00207	0.0055	7.2
S4-5	02/09/2007	0.00137	0.000025	0.00048	0.000105	0.00164	0.0022	1.5
S4-5	07/10/2007	0.00082	0.000025	0.00038	0.00006	0.00156	0.0017	1.5

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-5	04/11/2007	0.00078	0.000025	0.00022	0.000025	0.00116	0.0015	1.5
S4-5	11/11/2007	0.00074	0.000025	0.00036	0.000025	0.00093	0.0019	1.5
S4-5	23/11/2007	0.00081	0.000025	0.00023	0.000025	0.00105	0.0019	1.5
S4-5	24/11/2007	0.00077	0.000025	0.00022	0.000025	0.00105	0.002	1.5
S4-5	25/11/2007	0.00085	0.000025	0.00053	0.000111	0.00101	0.0036	1.5
S4-5	26/11/2007	0.00081	0.000025	0.00025	0.000025	0.00097	0.0018	1.5
S4-5	02/12/2007	0.0007	0.000025	0.00029	0.000025	0.00091	0.0026	1.5
S4-5	06/01/2008	0.00083	0.000025	0.00022	0.000025	0.00101	0.0033	1.5
S4-5	17/02/2008	0.00074	0.000025	0.00092	0.000051	0.00086	0.0022	1.5
S4-5	02/03/2008	0.00071	0.000025	0.00036	0.000025	0.00082	0.0016	1.5
S4-5	06/04/2008	0.00089	0.000025	0.00031	0.000025	0.00083	0.0017	1.5
S4-5	11/05/2008	0.00128	0.000025	0.00115	0.000127	0.0016	0.0029	5.6
S4-5	15/06/2008	0.00115	0.000025	0.00069	0.000148	0.00161	0.002	1.5
S4-5	17/06/2008	0.00127	0.000025	0.00081	0.000117	0.00175	0.0024	1.5
S4-5	13/07/2008	0.0017	0.000025	0.00161	0.000476	0.0023	0.0035	6.3
S4-5	10/08/2008	0.00213	0.000025	0.00113	0.000278	0.00225	0.0055	33.8
S4-5	28/09/2008	0.00086	0.000025	0.00065	0.000077	0.00216	0.0033	1.5
S4-5	12/10/2008	0.00088	0.000025	0.00034	0.000025	0.00194	0.0021	1.5
S4-5	02/11/2008	0.0007	0.000025	0.00031	0.000025	0.00141	0.0026	1.5
S4-5	07/12/2008	0.0008	0.000025	0.00038	0.000025	0.00118	0.0022	1.5
S4-5	04/01/2009	0.00074	0.000025	0.00045	0.000025	0.00095	0.0017	5.5
S4-5	15/02/2009	0.0007	0.000025	0.00035	0.000025	0.00067	0.0018	1.5
S4-5	08/03/2009	0.00062	0.000025	0.00027	0.000025	0.00071	0.0014	1.5
S4-5	19/04/2009	0.00072	0.000025	0.00037	0.000025	0.00099	0.0005	1.5
S4-5	10/05/2009	0.00128	0.000063	0.00254	0.000199	0.00191	0.0045	6.9
S4-5	14/06/2009	0.00154	0.000025	0.00254	0.000315	0.0015	0.0005	7
S4-5	12/07/2009	0.00283	0.000025	0.00185	0.000535	0.00213	0.0067	12
S4-5	09/08/2009	0.003	0.000025	0.00126	0.000483	0.00203	0.0042	10
S4-5	20/09/2009	0.00134	0.000025	0.0005	0.000114	0.00189	0.0025	1.5
S4-5	11/10/2009	0.00081	0.000025	0.0004	0.000025	0.00163	0.0017	1.5
S4-5	22/11/2009	0.00063	0.000025	0.00031	0.000025	0.00113	0.0026	1.5
S4-5	13/12/2009	0.00079	0.000025	0.00034	0.000025	0.00106	0.0017	1.5
S4-5	03/01/2010	0.00065	0.000025	0.0003	0.000025	0.0009	0.0021	1.5
S4-5	14/02/2010	0.00062	0.000025	0.00026	0.000025	0.00089	0.0022	1.5
S4-5	07/03/2010	0.00068	0.000025	0.00025	0.000025	0.0009	0.0017	1.5
S4-5	11/04/2010	0.00063	0.000025	0.00028	0.000025	0.001	0.0021	1.5
S4-5	16/05/2010	0.00113	0.000025	0.00025	0.000083	0.00094	0.0013	1.5
S4-5	13/06/2010	0.00108	0.000025	0.00128	0.000177	0.00208	0.0022	12.9
S4-5	27/06/2010	0.00413	0.000057	0.00532	0.00144	0.00336	0.0084	17.3
S4-5	11/07/2010	0.00166	0.000025	0.00077	0.000248	0.00182	0.0026	1.5
S4-5	15/08/2010	0.00211	0.000025	0.00081	0.000375	0.00206	0.0031	9.8
S4-5	12/09/2010	0.00101	0.000025	0.00035	0.000025	0.00223	0.0014	1.5
S4-5	19/09/2010	0.00088	0.000025	0.0004	0.000025	0.00206	0.0021	3.1

Table 5: Concentrations of Selected Water Licence Parameters in Flat River Surface Waters, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-5	17/10/2010	0.00078	0.000025	0.00025	0.000025	0.00144	0.0015	1.5
S4-5	07/11/2010	0.00071	0.000025	0.00025	0.000025	0.00131	0.0015	3
S4-5	05/12/2010	0.00121	0.000025	0.00092	0.000129	0.00121	0.0015	3.5
S4-5	02/01/2011	0.00079	0.000025	0.00025	0.000055	0.00085	0.0015	1.5
S4-5	03/01/2011	0.001	0.000035	0.001	0.0005	0.0015	0.008	0.5
S4-5	20/02/2011	0.0006	0.000025	0.00025	0.000025	0.00074	0.0015	1.5
S4-5	13/03/2011	0.00069	0.000025	0.00025	0.000025	0.00053	0.0015	1.5
S4-5	24/04/2011	0.001	0.0000125	0.001	0.0005	0.0015	0.0015	2
S4-5	07/05/2011	0.001	0.000035	0.001	0.0005	0.0015	0.0015	4
S4-5	08/05/2011	0.001	0.000035	0.002	0.0005	0.0015	0.0015	4
S4-5	12/06/2011	0.002	0.000047	0.003	0.0005	0.004	0.006	2
S4-5	17/07/2011	0.002	0.000027	0.001	0.0005	0.0015	0.005	6
S4-5	14/08/2011	0.001	0.0000125	0.001	0.0005	0.003	0.004	1
S4-5	11/09/2011	0.001	0.000068	0.003	0.0005	0.005	0.007	5
S4-5	09/10/2011	0.0005	0.000035	0.001	0.0005	0.004	0.003	0.5
S4-5	06/11/2011	0.0005	0.000043	0.001	0.0005	0.004	0.005	1
S4-5	11/12/2011	0.00088	0.00004	0.001	0.00008	0.001	0.0025	0.5
S4-5	08/01/2012	0.0007	0.00004	0.001	0.00002	0.001	0.0025	2
S4-5	12/02/2012	0.0009	0.00004	0.0005	0.000005	0.0005	0.003	2
S4-5	04/03/2012	0.0005	0.00003	0.001	0.000005	0.0005	0.002	0.5

4.3.1 Arsenic

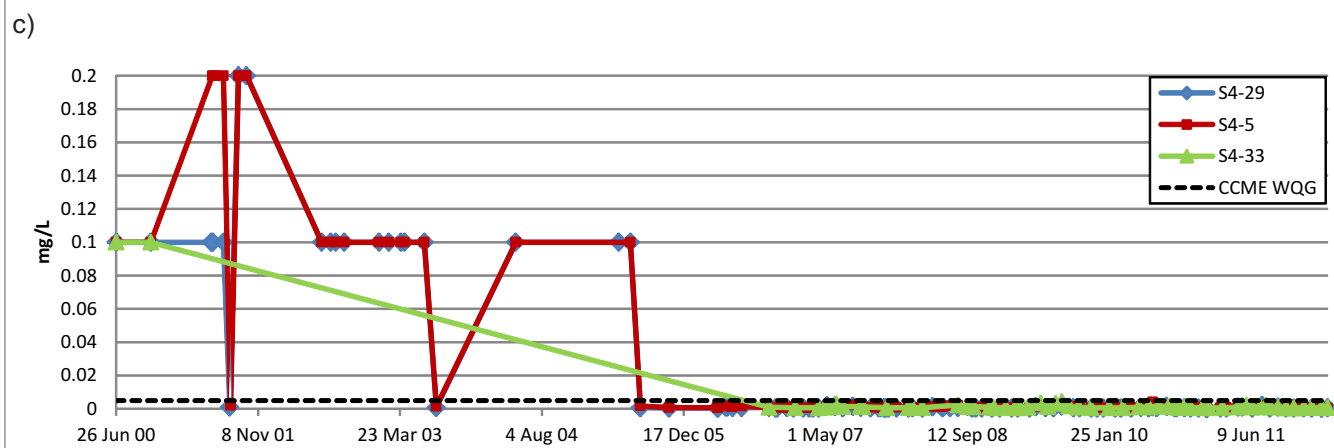
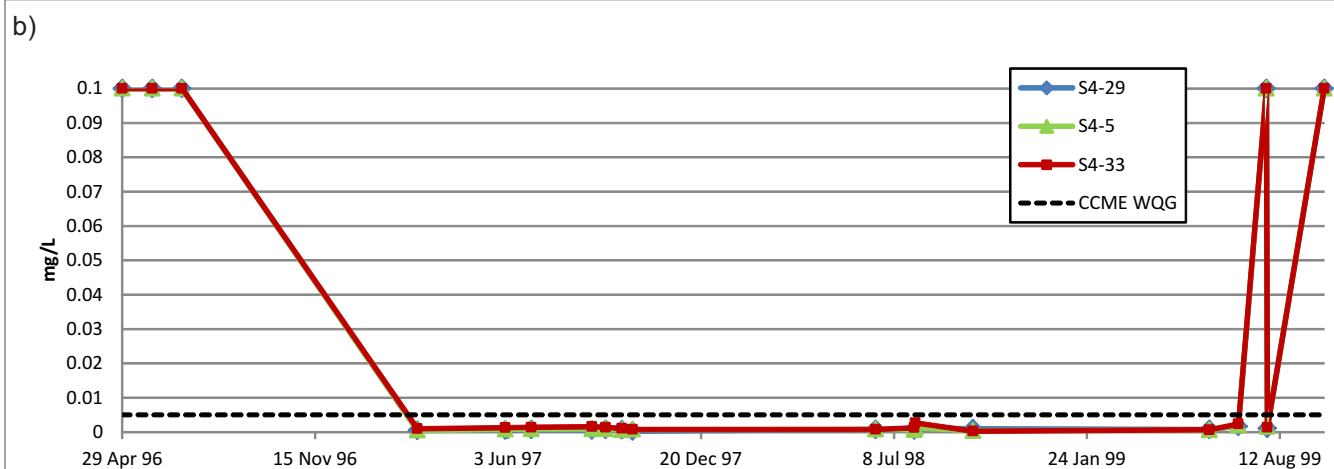
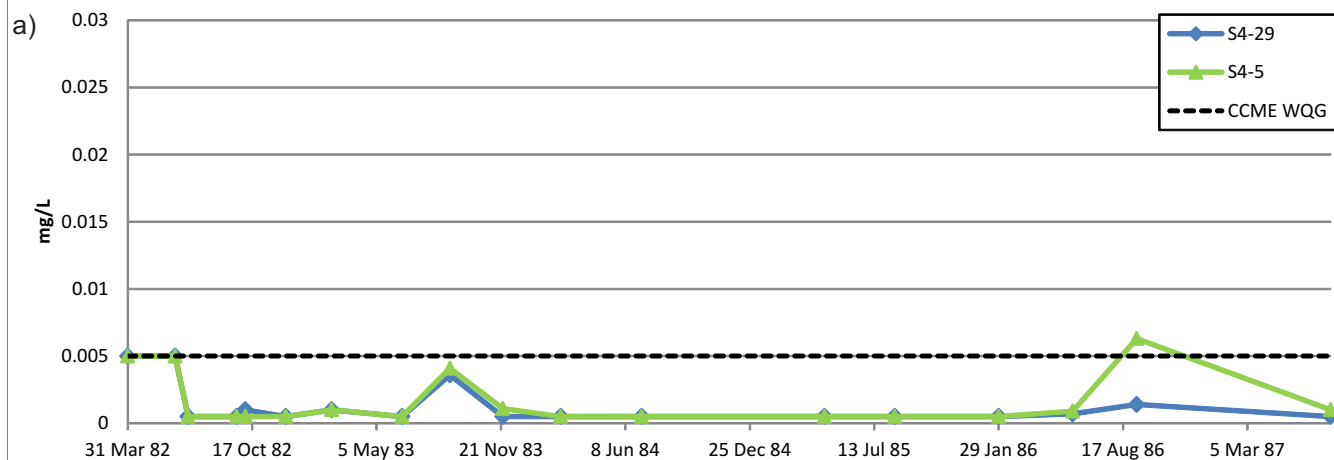
Figure 4 and Table 5 present all of the available data for total arsenic, for the period of record as contained in the FULCRUM database. As indicated in this figure, during the 1980s, when the then Canada Tungsten Mine was operational (1982 to mid-1986), total arsenic concentrations in the surface waters at the two Flat River sites being sampled at that time (S4-29, S4-5) were consistently below the current CCME guideline value of 0.005 mg/l. The only exception recorded was a single measurement of 0.0063 mg/l at S4-5 of 0.0063 mg/l on September 8, 1986.

During the 1990s, when the Canada Tungsten mine was closed and in a state of care and maintenance, total arsenic concentrations in the surface waters at the three Flat River sites sampled at that time (S4-29, S4-5 and S4-33) remained consistently below the current CCME guideline value of 0.005 mg/l, with the exception of three records in 1996 and two records in 1999 when total arsenic values of 0.1 mg/l were recorded at all three sites.

The mine was re-opened as the Cantung Mine in December 2001 and closed two years later (December 2003). This was followed by a phased re-opening that extended from July to September 2005. Mining operations continued through to October 2009 when operations were again suspended to October 2010. The mine has continued to operate since that time.

During the period June 2000 to August 2004, surface water total arsenic concentrations of 0.1 mg/l were recorded on a number of occasions at both S4-29 (upstream background) and S4-5 (directly below the mine infrastructure). The highest concentrations of total arsenic (0.2 mg/l) measured in the surface waters for the entire period of record were recorded on two occasions at S4-29 (October 31 and September 28 2001) and on five occasions at S4-5 (May 05 to September 28, 2001).

Since 2005, when improved QA/QC procedures were implemented by NATCL, total arsenic concentrations in the surface waters of the Flat River at all three sampling stations (S4-29, S4-5 and S4-33) have consistently remained well below (typically one magnitude below) the CCME guideline value of 0.005 mg/l.



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CANTUNG MINE

Total Arsenic (mg/L) in Flat River Surface Water, 1980s – Present



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Figure 4

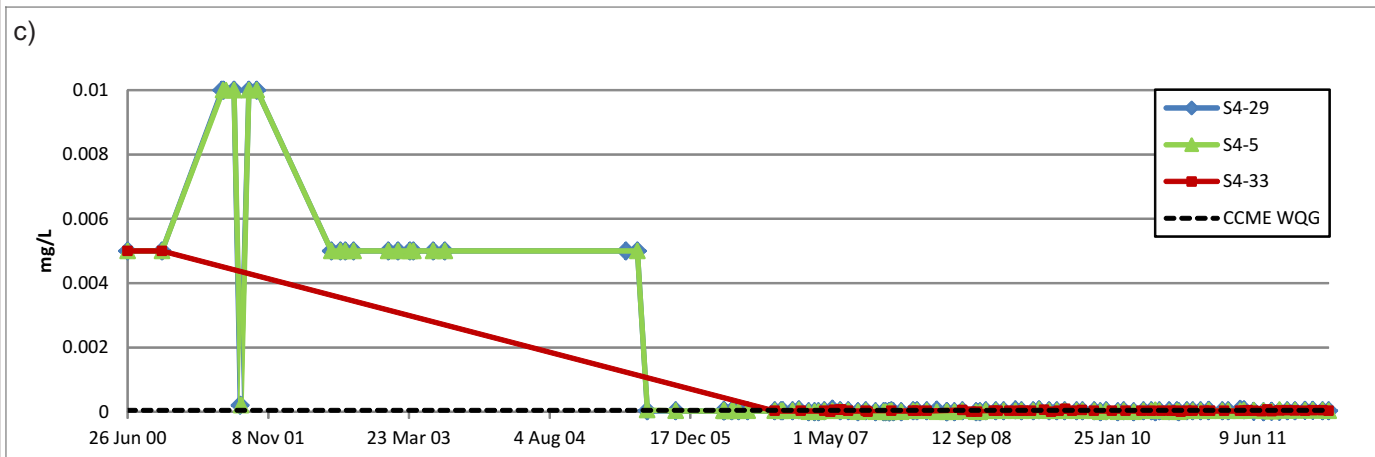
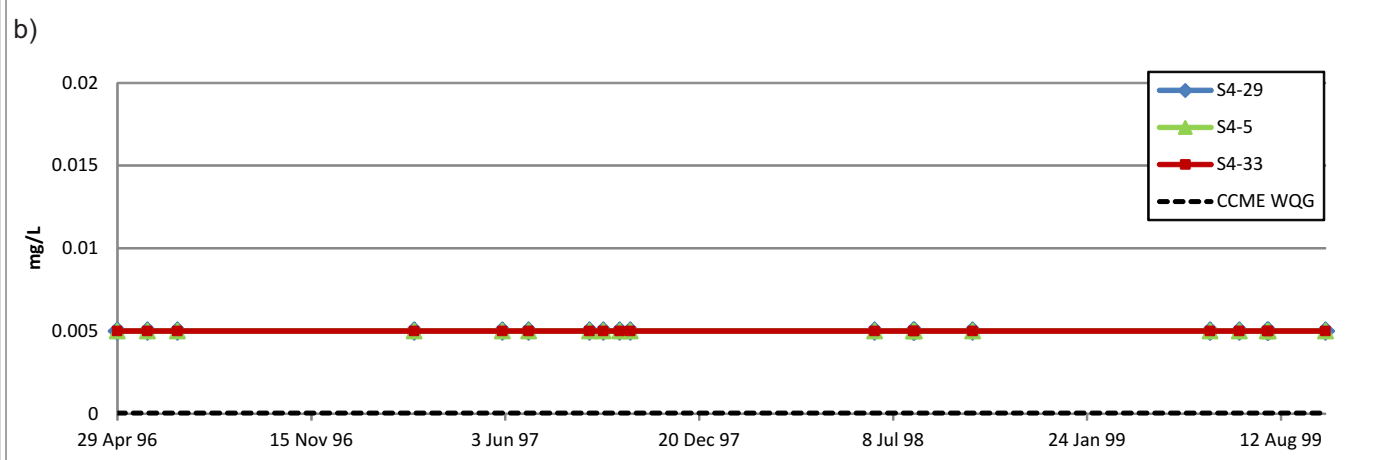
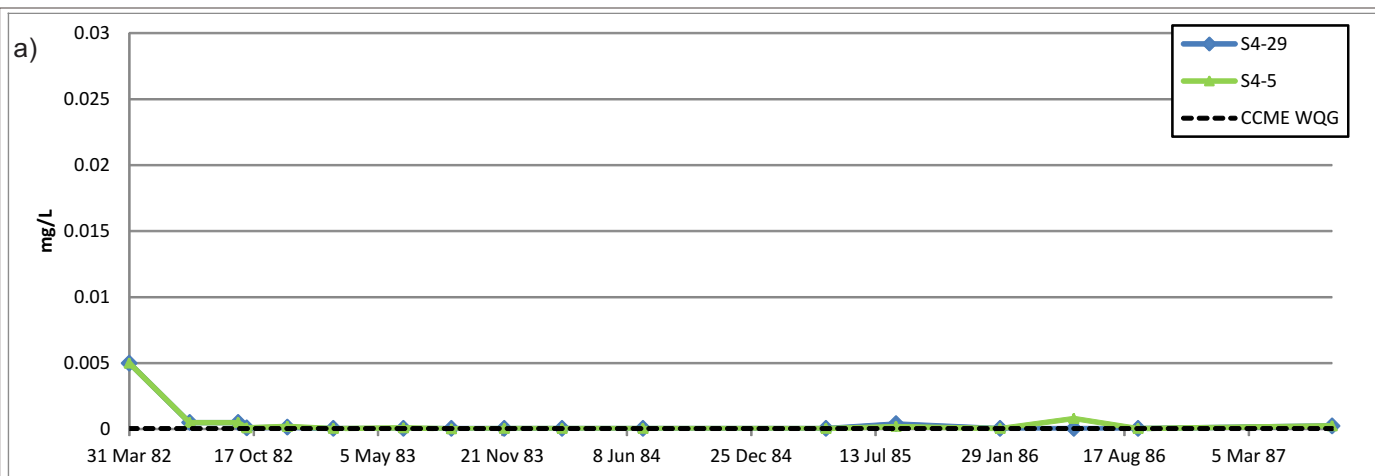
STATUS
ISSUED FOR USE

4.3.2 Cadmium

Figure 5 and Table 5 present all of the available data for total cadmium, for the period of record contained in the FULCRUM database. As indicated in this figure, during the 1980s, total cadmium concentrations in the surface waters at the two Flat River sites sampled at that time (S4-29, S4-5) were consistently at the limits of detection, ranging from 0.0005 to 0.005 mg/l, compared with the current CCME guideline value for total cadmium in surface water of 0.00005 mg/l.

During the 1990s, when the Canada Tungsten mine was closed and in a state of care and maintenance, total cadmium concentrations in the surface waters at the three Flat River sites being sampled at that time (S4-29, S4-5 and S4-33) consistently remained around the detection limit used (0.005 mg/l).

During the period May27 to September 28, 2001, prior to mine re-opening, total cadmium concentrations of 0.01 mg/l were recorded on five occasions at S4-29 (upstream background) and S4-5 (directly below the mine infrastructure). The cause of these marginally increased values is unknown. Since 2005, when improved QA/QC procedures were implemented by NATCL, total cadmium concentrations in the surface waters of the Flat River at all three sampling stations (S4-29, S4-5 and S4-33) have consistently remained at or below the CCME guideline value of 0.00005 mg/l.



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CANTUNG MINE

Total Cadmium (mg/L) in Flat River Surface Water, 1980s – Present



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Figure 5

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4.3.3 Copper

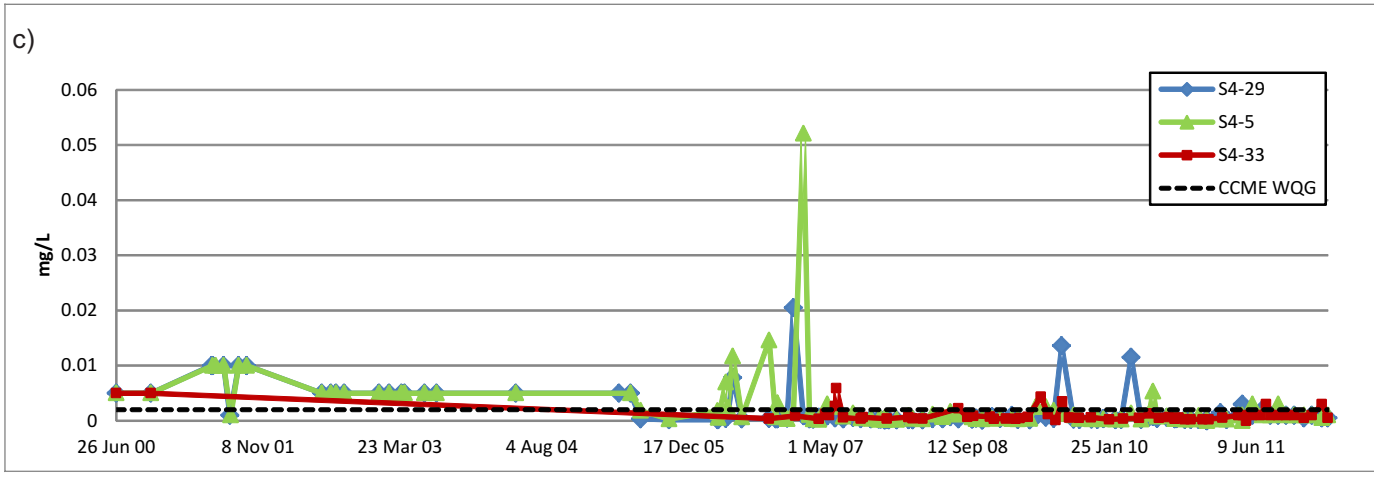
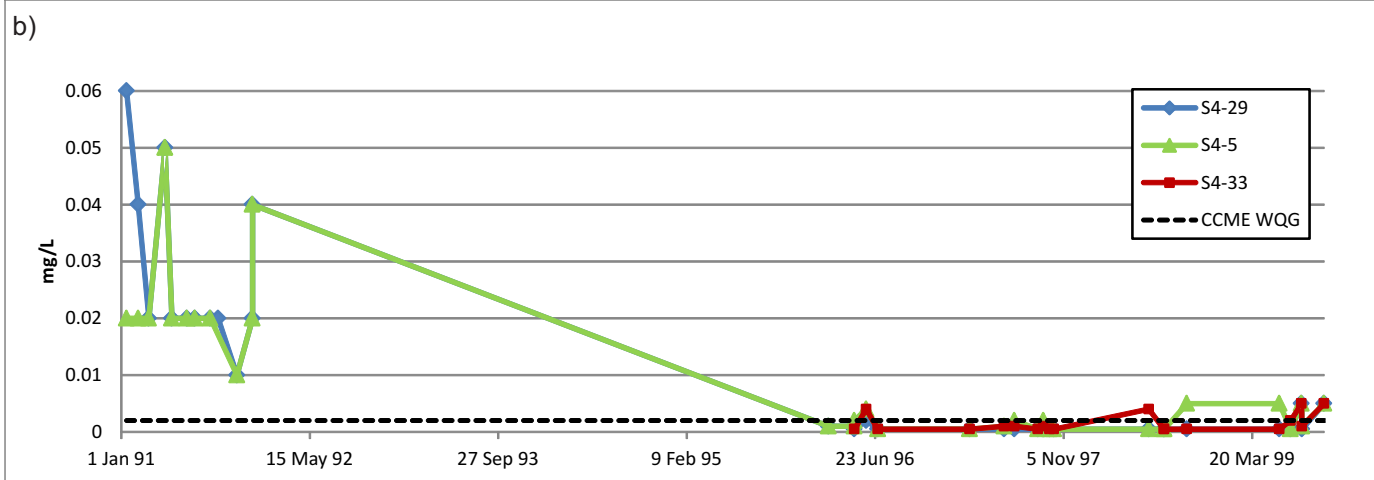
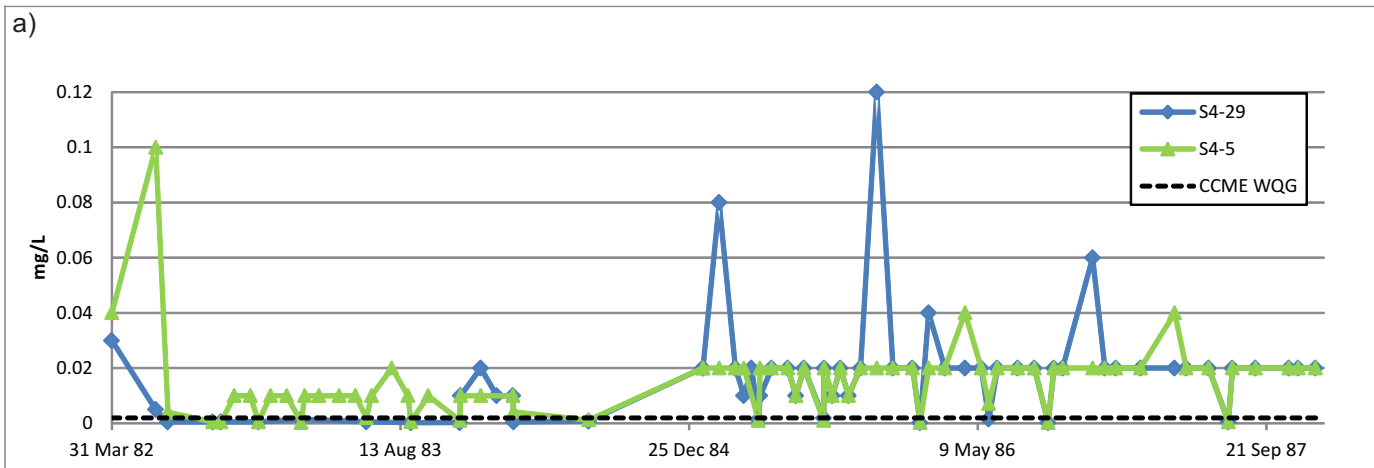
Figure 6 and Table 5 present all of the available data for total copper, for the period of record as contained in the FULCRUM database. In addition, as previously indicated, for total copper the additional data reported by DIAND (2001) were imported into the ESdat database and incorporated into Figure 6 and Table 5. As indicated in Figure 6, during the 1980s, when the then Canada Tungsten Mine was operational (1982 to mid-1986), total copper concentrations in the surface waters at the two Flat River sites being sampled at that time (S4-29, S4-5) were consistently at or below 0.02 mg/l and commonly below the current CCME guideline value of 0.002 mg/l.

Four main exceptions to this general observation were noted in the DIAND (2001) data that were incorporated into the ESdat database. These included three slightly elevated total copper results (0.12, 0.08 and 0.06 mg/l) reported for S4-29 (upstream background) in 1985 and 1986, and one total copper result (0.10 mg/l) reported for S4-5 (directly downstream of mine infrastructure) in June, 1982.

During the 1990s, when the Canada Tungsten mine was closed and in a state of care and maintenance, total copper concentrations in the surface waters at the three Flat River sites sampled at that time (S4-29, S4-5 and S4-33) continued to generally remain at or below 0.02 mg/l through to the end of 1991, when data were unavailable until 1996. The most notable minor exceptions to this general observation were two results (0.06 and 0.04 mg/l) that were recorded at S4-29 (upstream background) in January and February, 1991, and two results (0.05 and 0.04 mg/l) recorded at S4-5 in May and December, 1991. During the period February 1996 to September 1999, total copper concentrations recorded were generally at or below the current CCME guideline value of 0.002 mg/l.

The mine was re-opened as the Cantung Mine in December 2001 and closed two years later (December 2003). This was followed by a phased re-opening that extended from July to September 2005. Mining operations continued through to October 2009 when operations were again suspended to October 2010. The mine has continued to operate since that time.

During the period of June 2000 to August 2004, surface water total copper concentrations recorded at all three Flat River surface water quality stations were generally at or below 0.01 mg/l and after mid-May, 2005, when improved QA/QC procedures were implemented by NATCL, total copper concentrations have generally remained at or below the CCME guideline value of 0.002 mg/l. The only exception to this general trend was a single isolated reading of 0.05 mg/l that was recorded at S4-5 in February 2007.



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CANTUNG MINE

Total Copper (mg/L) in Flat River Surface Water, 1980s – Present

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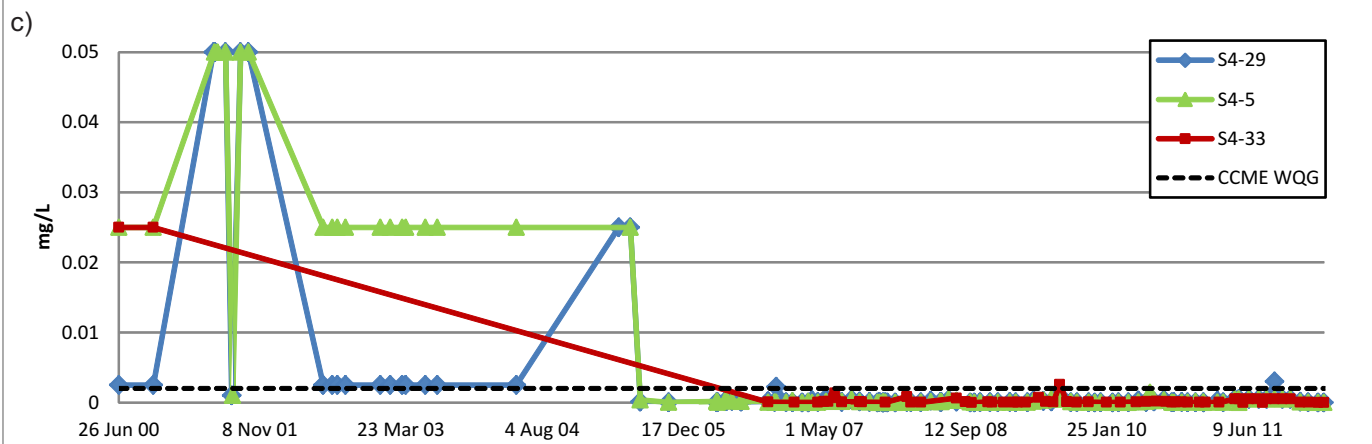
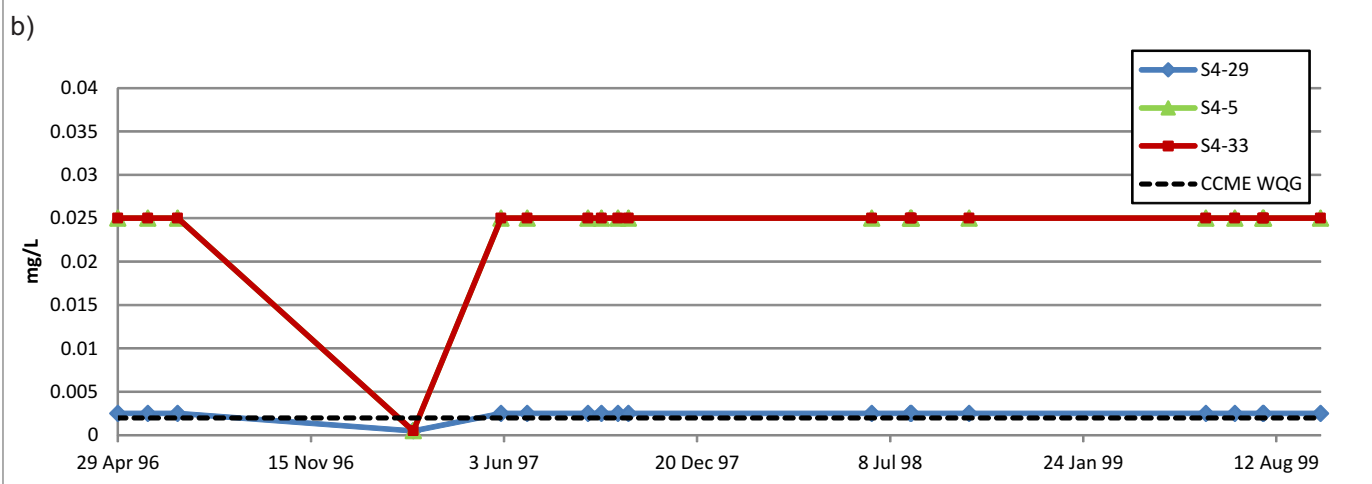
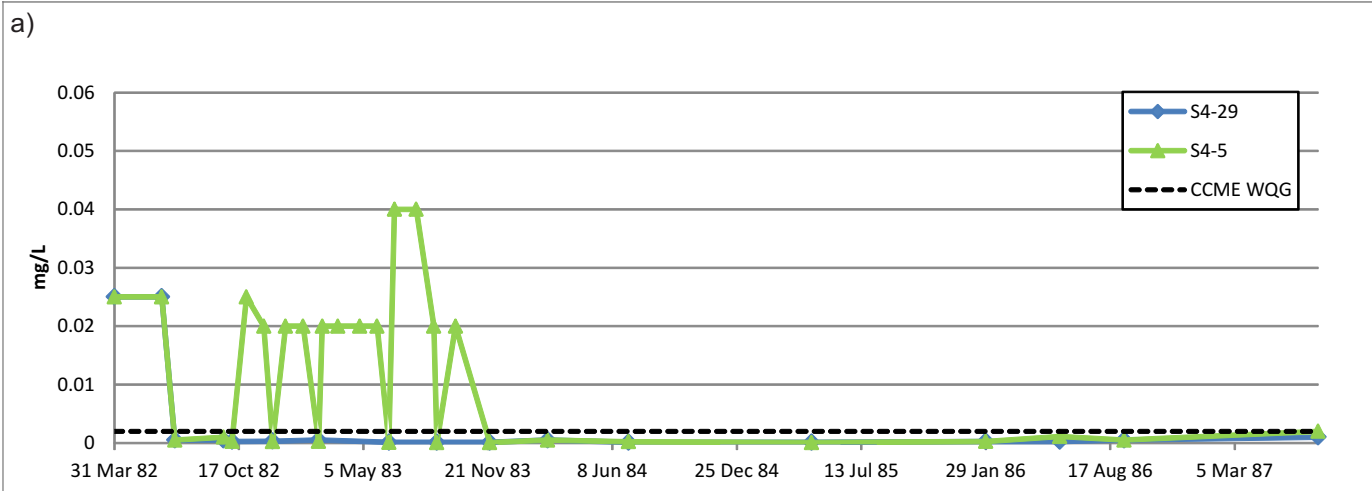
Figure 6

4.3.4 Lead

Figure 7 and Table 5 present all of the available data for total lead, for the period of record contained in the FULCRUM database. As indicated in this figure, during the 1980s, total lead concentrations in the surface waters at the two Flat River sites sampled at that time (S4-29, S4-5) were generally at or below the current CCME guideline value of 0.002 mg/l. The main exceptions to this general trend occurred during the period October 1982 to September 1983, when nine total lead values of 0.02 mg/l and two values of 0.04 mg/l were recorded at S4-5 located directly downstream of the mine. These results were interspersed with six other results that were below 0.00025 mg/l.

During the 1990s, when the Canada Tungsten mine was closed and in a state of care and maintenance, total lead concentrations in the surface waters of the Flat River at S4-29 (upstream background) were consistently at or below the current CCME guideline value of 0.0002 mg/l. However, at both S4-5 and S4-33 the total lead concentrations were generally higher at 0.025 mg/l.

The highest concentrations of lead in the surface waters of the Flat River for the entire period of record occurred between May and September 2001, when five elevated measurements of 0.05 mg/l were recorded at both S4-29 (upstream background) and S4-5. Slightly elevated levels of total lead continued to be recorded, primarily at S4-5 until June 2005. Following the implementation of improved QA/QC procedures by NATCL in July 2005, total lead concentrations at all three Flat River stations dropped to well below the current CCME guideline value of 0.002 mg/l. Since that time, total lead concentrations have generally remained at or below the CCME guideline value of 0.002 mg/l.



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CANTUNG MINE

Total Lead (mg/L) in Flat River Surface Water, 1980s – Present



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Figure 7

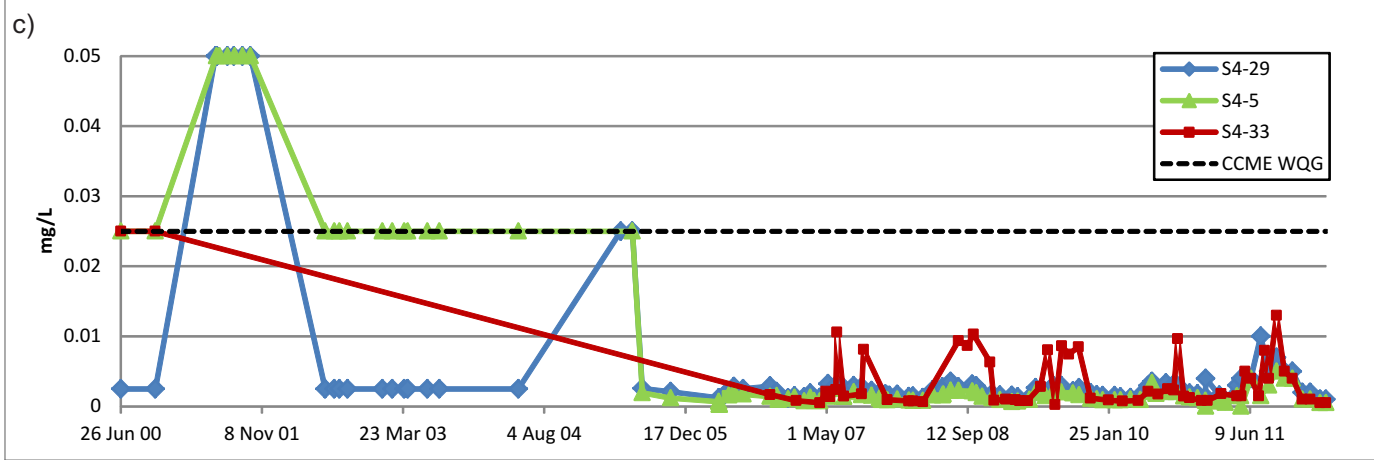
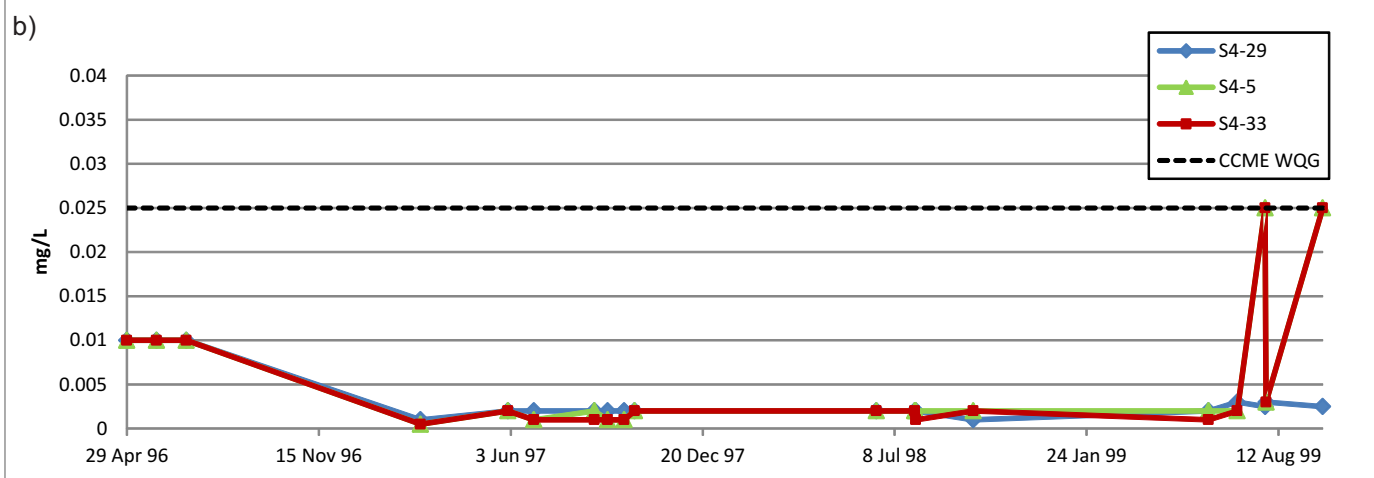
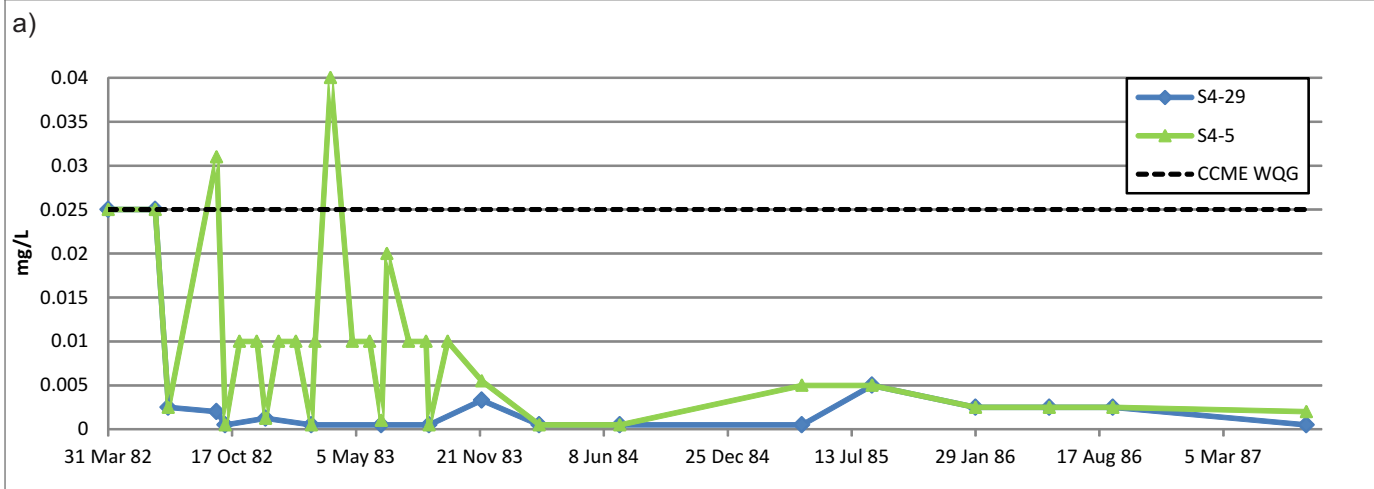
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4.3.5 Nickel

Figure 8 and Table 5 present all of the available data for total nickel, for the period of record contained in the FULCRUM database. As indicated in this figure, for the entire period of record, total nickel concentrations in the Flat River at all three stations, with very few exceptions, have consistently been recorded at concentrations below the current CCME guideline value for total nickel of 0.025 mg/l.

Exceptions included two isolated events in the early 1980s and five sampling events undertaken in 1991. Two minor elevated readings (0.03 and 0.04 mg/l), above the current CCME guideline value (0.025 mg/l), were recorded at S4-5 in September 1982 and in March 1983, respectively. In 1991, all five of the sampling events undertaken at S4-29 (upstream background) and S4-5 (directly downstream of the mine) reported total nickel concentrations of 0.05 mg/l.

In addition, as noted with the other metals analyzed over the period of record, following the implementation of improved QA/QC procedures by NATCL in July 2005, total nickel concentrations at all three Flat River stations remained below the current CCME guideline value for total nickel of 0.025 mg/l.



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CANTUNG MINE

Total Nickel (mg/L) in Flat River Surface Water, 1980s – Present



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Figure 8

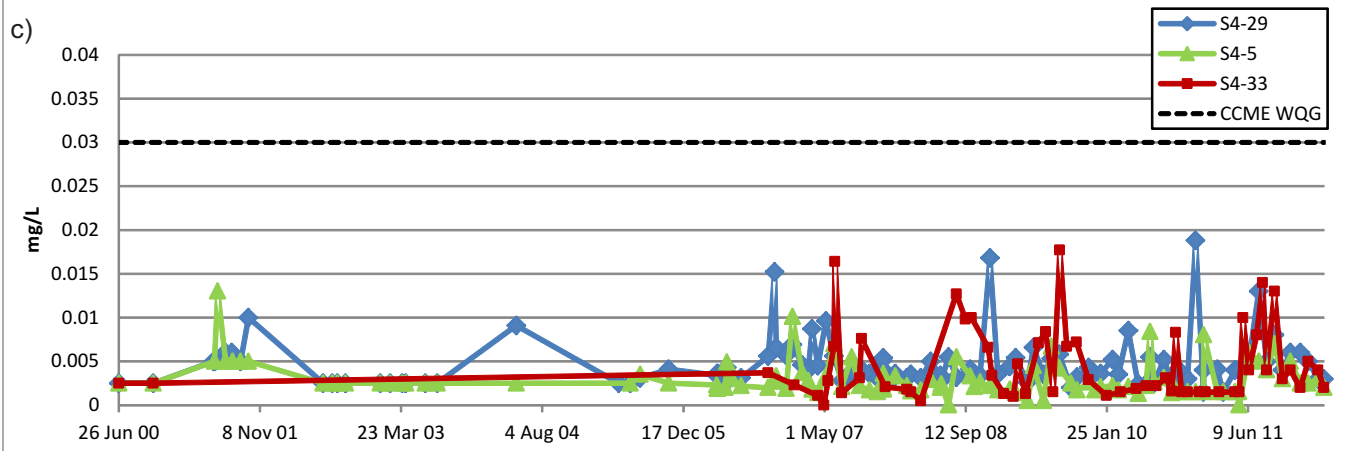
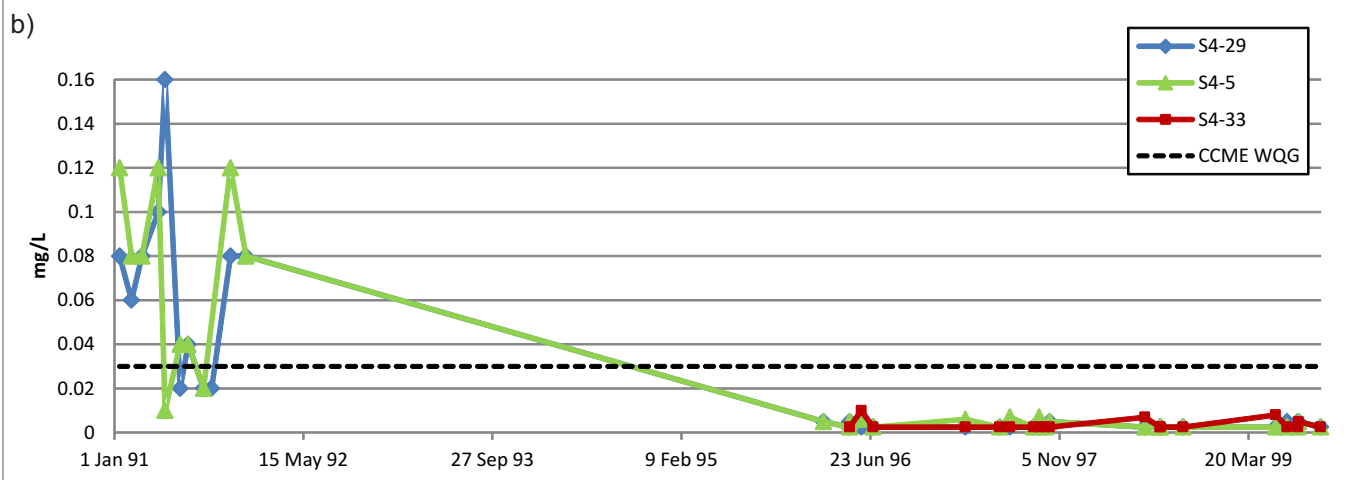
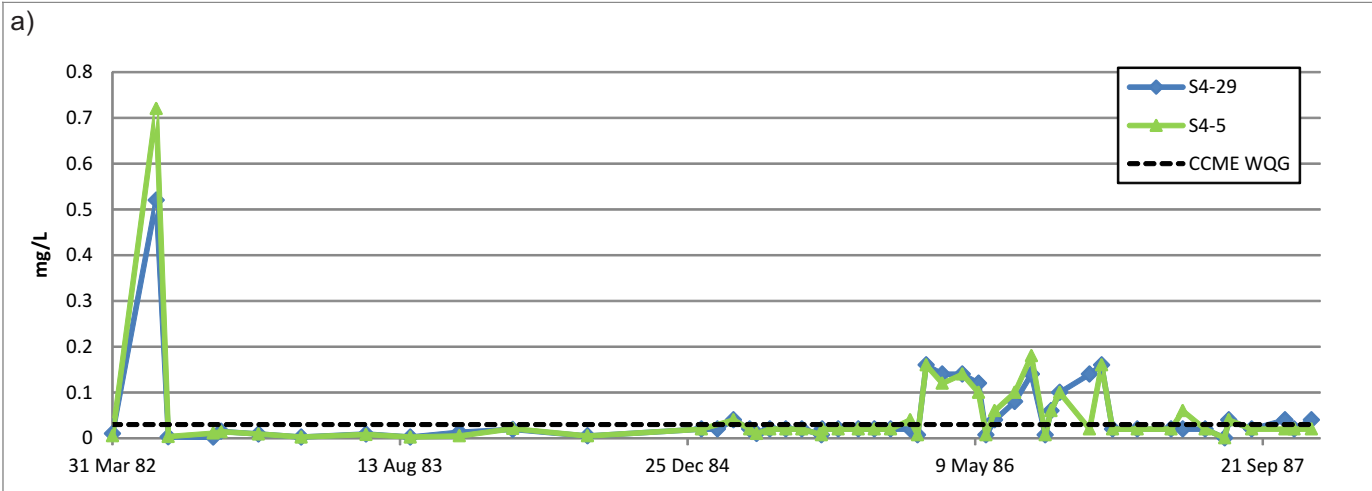
STATUS
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4.3.6 Zinc

Figure 9 and Table 5 present all of the available data for total zinc, for the period of record contained in the FULCRUM database. In addition, as previously indicated, for total zinc the additional data reported by DIAND (2001) were imported into the ESdat database and incorporated into Figure 9 and Table 5. As indicated in this figure, for the entire period of record, total zinc concentrations in the Flat River at all three stations, with very few exceptions, have consistently been recorded at concentrations below the current CCME guideline value for total zinc of 0.03 mg/l.

These exceptions included isolated events in the early 1980s and most of the sampling events undertaken in 1986 and 1991. Elevated readings (0.52 and 0.72 mg/l), above the current CCME guideline value (0.03 mg/l), were recorded at S4-29 (upstream background) and S4-5 (directly downstream of the mine) in June 1982, respectively. During the period of February to December 1986, total zinc concentrations reported by DIAND (2001) were regularly reported to be in the range of 0.1 to 0.2 mg/l at both stations. In 1991, most sampling events throughout the year reported concentrations at both stations in the range of 0.04 to 0.12 mg/l, with one higher value (0.16 mg/l) being reported in May 1991 at S4-29.

From April 1996 to the present, total zinc concentrations at all three Flat River stations have remained well below the current CCME guideline value of 0.03 mg/l.



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CLIENT



CANTUNG MINE

Total Zinc (mg/L) in Flat River Surface Water, 1980s – Present



PROJECT NO.
Y22101275.001

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May 4, 2012

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Figure 9

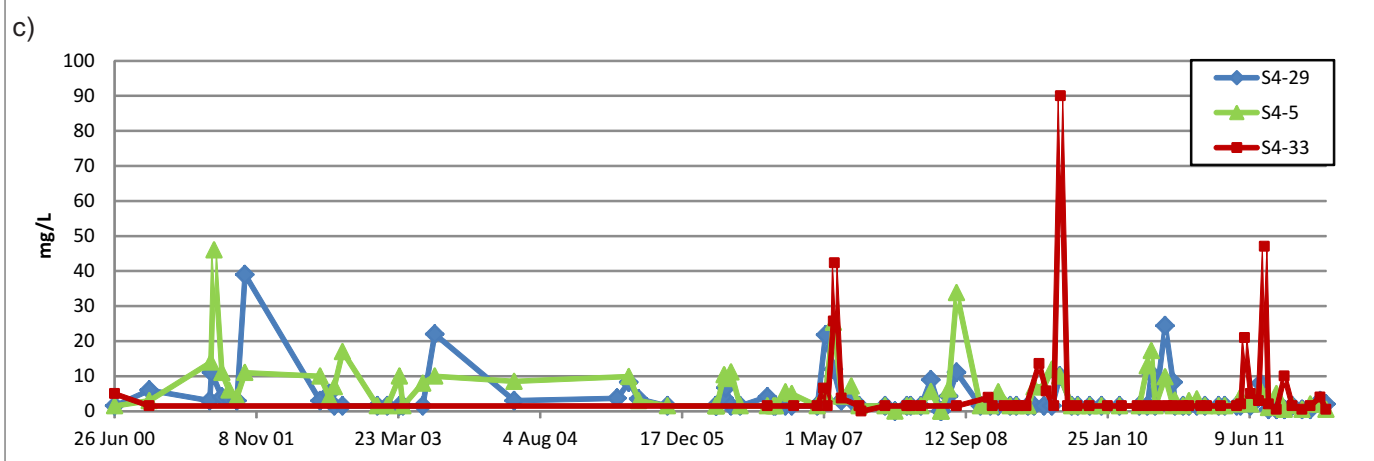
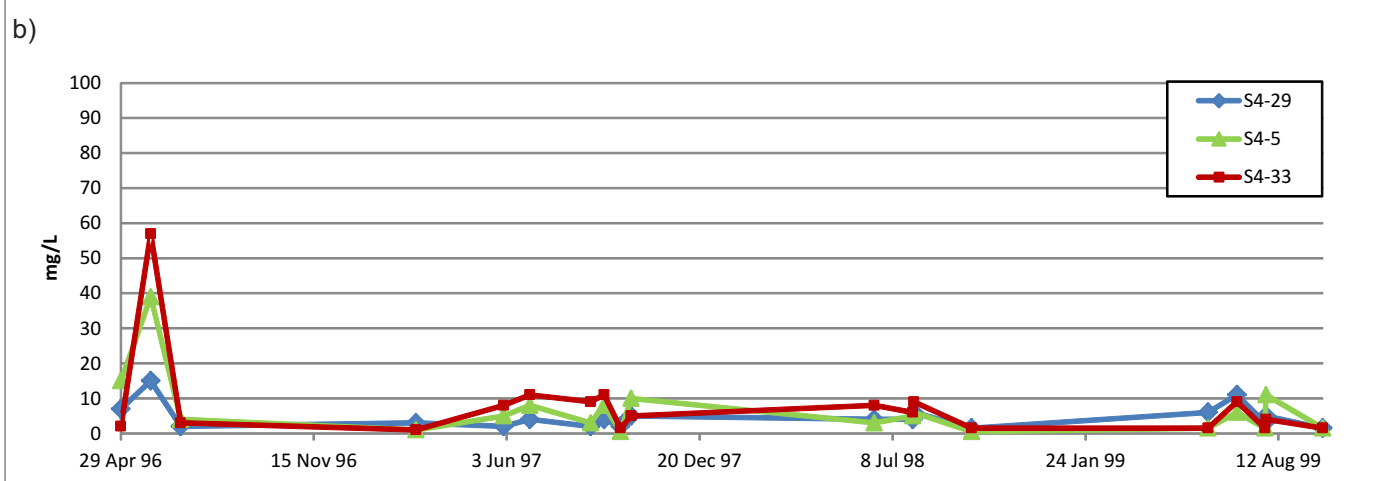
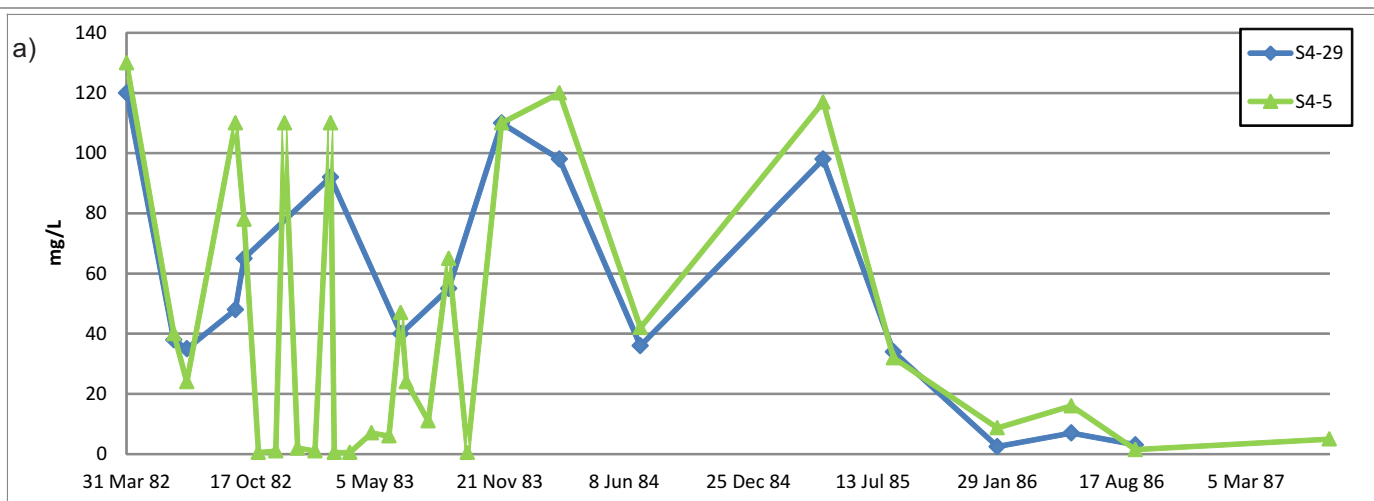
STATUS
ISSUED FOR USE

4.3.7 Total Suspended Solids

Figure 10 and Table 5 present all of the available data for total suspended solids (TSS), for the period of record contained in the FULCRUM database. In addition, as previously indicated, for TSS the additional data reported by DIAND (2001) were imported into the ESdat database and have been incorporated into Figure 10 and Table 5.

As indicated in Figure 10 and Table 5, on an annual basis, TSS concentrations recorded for all three Flat River stations have typically ranged from 1 to 10 mg/l. As would be expected, the peak TSS values recorded over the period of record have typically been associated with natural spring freshet and rainfall events in the open water period, extending from May to September.

Short-term TSS values above 80 mg/l for the period of record have only been reported for a few instances during the period 1982 to 1985. During that time, the higher TSS values recorded at S4-29 (upstream background) were typically reflected at S4-5, the downstream station located below the mine infrastructure.



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CLIENT



A TETRA TECH COMPANY

CANTUNG MINE

Total Suspended Solids (mg/L) in Flat River Surface Water, 1980s – Present

PROJECT NO.
Y22101275.001

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DATE
May 9, 2012

Figure 10

STATUS
ISSUED FOR USE

4.4 Summary of Surface Water Quality

As discussed in this report, the historical assessment of surface water quality parameters at the Cantung Mine focussed on the key parameters traditionally specified in the water licence and the MMER. On this basis, the parameters examined and discussed in more detail include arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids.

In addition, to allow the presentation of historic and more recent data extending for the period of record from the early 1980s to present, all of the data were treated as being valid, with the general understanding that minimum detection limits (MDL) have decreased as analysis methods have evolved. For data manipulation purposes, where sample values were clearly reported as less than the detection limit, half the value of the detection limit was used for computations and graphics production. In circumstances where it was not possible to determine what the detection limit was (particularly for some of the more historic data), the reported values were used.

Based on the historical review of results that have been presented and discussed in this report, it is readily apparent that the historic and current operations of the Cantung Mine have had very limited effects on the quality of the Flat River water for the water licence parameters assessed at all three surface water sampling stations during the period of record.

Concentrations of the key water licence parameters assessed have typically remained at or below the current CCME guideline values for the protection of freshwater aquatic life, with minor and generally isolated exceptions, mainly in the early 1980s, when the then Canada Tungsten Mine was in operation and in the early and late 1990s when the mine was closed.

In addition, as noted for all key metals parameters analyzed over the period of record, following the implementation of improved QA/QC procedures by NATCL in July 2005, total metals concentrations at all three Flat River stations dropped to well below the current CCME guideline values for each of the respective parameters.

The surface receiving water quality monitoring program has consistently demonstrated no appreciable difference in water quality of the Flat River between the sampling stations extending from 3 km upstream of the mine site to 1 km downstream of the mine site.

5.0 GROUNDWATER QUALITY

5.1 DIAND Cantung Mine Compliance Report for 1985-1999

In 2001, DIAND prepared a Compliance Report on the Cantung Mine covering the period 1985 to 1999. This was a particularly unique period of time as 1985 was the last year of full production of the Cantung Mine prior to its shutdown in the first half of 1986 until it was reactivated in 2001. This report provides a great deal of useful data and information on the condition and status of the groundwater during that period of time and thus it has been provided in Appendix B of this report.

The Compliance Report evaluated available Surveillance Network Program (SNP) data for a number of SNP stations including, of particular interest to this Historic Interpretation Report, data for groundwater sampling sites 4-27-1 to 4-27-9. As indicated by DIAND (2001), since there were approximately 20 years of complete data, a decision was made to analyze the available data for a few key years. The years selected were:

- 1985 (year of full production);
- 1986 (half a year of production, half shutdown);
- 1987 (one year after shutdown);
- 1991 (five years after shutdown);
- 1996 (ten years after shutdown); and
- 1999 (thirteen years after shutdown, and the most recent data analyzed).

The selected data were collated into tables and are included in Appendices G to O of the DIAND (2001) report. To further reduce the amount of data for analysis, the data were graphed by sampling station, but only if at least one value was above a licence limit for a particular parameter at that station. The graphs generated for this analysis are presented in Appendices B to F of the DIAND (2001) report.

The groundwater data reviewed and analyzed by DIAND involved an assessment of data from a total of 66 different piezometers as distributed among each of the nine groundwater wells. As indicated in the report, to simplify the presentation and analysis of the data, the piezometer results were discussed on a very general basis. Appendices G to M provide further information on the individual piezometers (DIAND 2001).

The SNP set maximum acceptable concentrations for the following parameters that were regulated at these sites, including pH, total copper, total zinc, oil and grease and suspended solids. Conductivity and temperature were also commonly analyzed at these sites, but these parameters were not regulated at that time (DIAND 2001). Based on DIAND's review and analysis of all of the data examined, the following were the key findings of the DIAND (2001) report for the groundwater of the Cantung Mine area.

Total Copper - The limit for total copper in the groundwater, as set out in the water licence, was 0.20 mg/l. Only two piezometers recorded total copper concentrations that were higher than the licence limit for the extended period of record analyzed by DIAND. These elevated values occurred at stations 4-27-7 P12 and 4-27-9. As illustrated in the copper graphs provided in Appendix D of the DIAND (2011) report, the single

elevated value (0.8 mg/l) recorded over the period of record examined for the 4-27-7 P12 site (located directly below the toe of TP4 at 0-1.3 m) occurred on November 11, 1986 a number of months following shutdown of the Cantung Mine.

The other two isolated but minor elevated values recorded at Station 4-27-9 (located directly below TP2 at 0-8.1 m) for total copper over the period of record occurred on September 18, 1986 (0.28 mg/l) and November 4, 1991 ((0.28 mg/l). No other total copper values above licenced limits were noted by DIAND (2001) in any of the other groundwater data examined for the period of record.

Total Zinc – The limit for total zinc in the groundwater, as set out in the water licence, was 0.20 mg/l. In total 14 piezometers had at least one sample over the licence limit throughout the extended period of record analyzed by DIAND. Table 6 summarizes the elevated groundwater quality sample results for total zinc during the period January 4, 1985 to September 27, 1999.

Table 6: Elevated Groundwater Sampling Results for Total Zinc Reported for the Period January 4, 1985 to September 27, 1999

Groundwater Sampling Site	Zn (mg/l)	Sampling Date (M/D/Y)
4-27-1 P1	0.28	11/4/91
4-27-1 P6	0.24	11/4/91
4-27-1 P10	0.32	11/4/91
4-27-2 P4	0.24	11/4/91
4-27-3 P1	0.28	11/4/91
4-27-4 P8	1.17	11/25/85
4-27-4 P9	0.24	11/4/91
4-27-4 P5	0.24	11/4/91
4-27-5 P8	0.28	11/25/85
4-27-5 P13	0.24	4/27/91
4-27-5 P13	0.32	4/4/91
4-27-7 P12	5.10	11/24/86
4-27-9 BH53	0.72	6/30/86
4-27-9 BH53	0.28	11/4/91

As noted in Table 6, two elevated values for total zinc (1.17 mg/l and 0.28 mg/l) were recorded in groundwater on November 25, 1985, when the Cantung Mine was still in full operation, at stations 4-27-4 P8 (located near the Flat River below TP4/TP3) and 4-27-5 P8 (located between TP4 and the airstrip), respectively.

Two elevated values for total zinc were recorded in 1986. The highest concentration of zinc (5.10 mg/l) recorded at any time during the extended period of record reviewed by DIAND, was registered at Station 4-27-7 P12 (located below the toe of TP4 at 0-1.3 m) on November 24, 1986, several months after the mine had shut-down its operations. The other elevated value (0.72 mg/l) was recorded at Station 4-27-9 (located below the toe of TP2).

All of the other elevated total zinc values recorded over the extended period of record reviewed by DIAND occurred on November 11, 1991, approximately 5 years following the mid-1986 closure of the Cantung Mine. On that single day of groundwater sampling, elevated total zinc values ranging from 0.24 to 0.32 mg/l were recorded at stations 4-27-1 to 4-27-5 and 4-27-9. NATCL/EBA are not aware of any reason(s) for these apparent elevated values. However, it is most important to note that no other elevated total zinc values were recorded throughout the extended period of record reviewed by DIAND (2001), including the 13 years between mid-1986 and the end of 1999, when the Cantung Mine was not in operation.

Total Suspended Solids - The limit for total suspended solids (TSS) in the groundwater, as set out in the water licence, was 50 mg/l. In total 42 out of the 66 piezometers reviewed by DIAND in the 1985 to 1999 data set had at least one TSS value over this licence limit. In particular, Stations 4-27-4 (located near the Flat River below TP4/TP3) and 4-27-5 (located between TP3 and the airstrip) both had nine piezometers with at least one sample over the TSS licence limit.

The single highest value recorded for TSS (10,000 mg/l) reported in the groundwater over the extended period of record was registered at Station 4-27-7 P12 (located below the toe of TP4 at 0-1.3 m) on November 24, 1986, several months after the mine had shut down its operations. This elevated TSS value corresponds with the single highest reading of total zinc reported for the same piezometer on the same day.

Other particularly elevated groundwater TSS results reported during the extended period of record reviewed by DIAND included:

- 1,250 mg/l TSS at Station 4-27-9 (located below the toe of TP2 at 0 -8.1 m) on October 11, 1999;
- 1,490 mg/l TSS at Station 4-27-4 P7 (located near the Flat River below TP4/TP3 at 2 m) on June 30, 1999;
- 620 mg/l TSS at Station 4-27-1 P10 (located directly adjacent to 4-27-9 at 9 m) on August 12, 1985; and
- 427 mg/l TSS at Station 4-27-5 P6 (located between TP3 and the airstrip) on June 30, 1986.

However, no clear trends for TSS in the groundwater were noted during the extended period of record reviewed by DIAND (2001).

5.2 1980 to Present Groundwater Quality Reporting

For purposes of this report, the assessment of groundwater quality parameters also focussed on the key parameters traditionally specified in the water licence and the MMER. On this basis, the parameters examined and discussed in more detail include arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids.

In addition, to allow the presentation of historic and more recent data extending for the period of record from the early 1980s to present, all of the data were treated as being valid, with the general understanding that minimum detection limits (MDL) have decreased as analysis methods have evolved. For data manipulation purposes, where sample values were clearly reported as less than the detection limit, half the

value of the detection limit was used for computations and graphics production. In circumstances where it was not possible to determine what the detection limit was (particularly for some of the more historic data), the reported values were used.

Due to the large number of groundwater sampling sites monitored at the Cantung Mine site, as illustrated in Figure 3 and summarized in Table 2, NATCL and EBA determined that in the interests of time and efficiency, the historical and current groundwater quality assessment focus on a more limited number of key SNP groundwater sampling stations. In particular the stations that were selected for further analysis were:

- S4-27-1/16 East (down-gradient) of TP2 on the Flat River floodplain, also referred to as MW1-1;
- S4-27-5/13 South (down-gradient) of TP3 west of airstrip north end;
- S4-27-7 East (down-gradient) of TP4 on the Flat River floodplain, also referred to as BH 43;
- S4-28-1 East (down-gradient) of TP3 near airstrip road/groundwater, also referred to as MW-6 and pumping well PW1(designated as MMER final discharge point); and
- S4-27-17 Northwest of freshwater pump house (background station).

Part E.11 of the Water Licence specifies the maximum average concentrations (MACs) for the compliance parameters: total metals (arsenic, cadmium, copper, lead, nickel, zinc), total suspended solids, and total ammonia as summarized in Table 7. The Water Licence defines a “Maximum Average Concentration” and a “Maximum Concentration of Any Grab Sample” for each compliance parameter. “Average Concentration”, according to the definition in the Water Licence, means the “discrete average of four consecutive analytical results, or if less than four analytical results, the discrete average of the analytical results collected during a batch decant”. In addition to the above mentioned compliance parameters, the pH at the designated sampling locations must be between 6.0 and 9.0 as a requirement of Part E.12 of the Water Licence.

However, it should be noted that in general, dissolved metals concentrations rather than total metals concentrations are used for assessment of groundwater quality because of the natural filtration properties of aquifer materials. Total metal concentrations are commonly used in surface water only (except for the assessment of drinking water quality and the assessment of aquatic life).

Particulate matter in groundwater is usually retained by the aquifer matrix. Suspended solids in groundwater samples are generally introduced into the sample during the sampling process or occur as a result of oxidation of the sample once it has been collected. Nevertheless, because both the MVLWB water licence and MMER specify total concentrations of metals, total values are discussed in the following subsections.

Table 7: MVLWB Water Licence MV2002L2-0019 Groundwater Quality Parameters

Compliance Parameter	Maximum Average Concentration (mg/l)	Maximum Concentration of Any Grab Sample (mg/l)
Total Arsenic	0.20	0.40
Total Cadmium	0.01	0.02
Total Copper	0.20	0.40
Total Lead	0.20	0.40
Total Nickel	0.40	0.80
Total Zinc	0.20	0.40
Total Suspended Solids	15.0	30.0
Total Ammonia	5.00	10.00
pH	Less than 6.0 - Greater than 9.0	

Tables 8 to 12 present all of the data evaluated for each of the five selected ground water quality monitoring stations and the selected parameters for the period of record. In addition, for the reporting of total copper and zinc data, the additional data reported by DIAND (2001) were imported into the ESdat database and these data have been incorporated into the respective figures for these two parameters.

Figures 11 to 37 present the data trends generated in relation to the MVLWB water licence Maximum Average Concentrations. These regulated concentrations are generally comparable to or more conservative than the MMER authorized concentrations that have also been specifically established for Station S4-28-1. The following subsections discuss the results for each of these five groundwater monitoring stations and the key parameters.

5.2.1 Groundwater Station S4-27-1/16

Groundwater monitoring Station S4-27-1 was established in January 1983 and as previously indicated is located directly east and down-gradient of TP2 on the Flat River floodplain. This station, also referred to as MW1, is a multi-level installation with a total of ten piezometers installed at the following depths:

- | | | | |
|----------------|--------|-----------------|--------|
| ▪ Piezometer 1 | 36.6 m | ▪ Piezometer 6 | 21.3 m |
| ▪ Piezometer 2 | 33.6 m | ▪ Piezometer 7 | 18.3 m |
| ▪ Piezometer 3 | 30.5 m | ▪ Piezometer 8 | 15.2 m |
| ▪ Piezometer 4 | 27.4 m | ▪ Piezometer 9 | 12.1 m |
| ▪ Piezometer 5 | 24.3 | ▪ Piezometer 10 | 9.1 m |

Figures 11 to 17 and Table 8 present all of the available groundwater quality data for Station S4-27-1 for the period of record. It should be noted that this station was replaced with Station S4-27-16 in August, 2009 and the data generated since that time have been incorporated into Table 8 and the referenced figures.

As noted in Figures 11 to 17 and Table 8, during the 1980s, the concentrations of total metals in S4-27-1 groundwater at all piezometer depths were consistently below the current MVLWB MAC groundwater

quality parameters, with very few exceptions which occurred primarily in May and September 1986, shortly before and after the then Canada Tungsten Mine closed down for an extended shutdown period.

In May 1986, elevated total values for each of these metals above the current MACs were recorded in the groundwater at several of the S4-27-1 piezometers, as summarized below:

- Piezometer 2 total arsenic (<0.5 mg/l), cadmium (<0.1 mg/l), copper (<0.5 mg/l), lead (<0.5 mg/l), nickel (<5 mg/l) and zinc (<15 mg/l)
- Piezometer 4 total arsenic (<0.5 mg/l), cadmium (0.1 mg/l), copper (<0.5 mg/l), lead (<0.5 mg/l), nickel (<5 mg/l) and zinc (<15 mg/l)
- Piezometer 8 total arsenic (<0.5 mg/l), cadmium (1.2 mg/l), copper (<0.5 mg/l), lead (<0.5 mg/l), nickel (7.7 mg/l) and zinc (<15 mg/l).

As can be noted, the values recorded for total arsenic, copper, lead, nickel and zinc appeared to be largely due to the high detection limits employed at the time by the laboratory.

In September 1986, elevated total values for most of these metals above the current MACs were also recorded in the groundwater at several of the S4-27-1 piezometers, as summarized below:

- Piezometer 2 total arsenic (2.7 mg/l), cadmium (<0.1 mg/l) copper (<0.5 mg/l), nickel (<5 mg/l) and zinc (<15 mg/l)
- Piezometer 7 total arsenic (15.2 mg/l), cadmium (0.7 mg/l), copper (<0.5 mg/l), nickel (5.8 mg/l) and zinc (<15 mg/l)
- Piezometer 10 total arsenic (0.9 mg/l), cadmium (0.9 mg/l), copper (5.9 mg/l), nickel (<5 mg/l), zinc (29 mg/l) and TSS (47 mg/l).

Notable elevated TSS values in the 1980s were reported at Piezometer 4 in December 1982 (93 mg/l), at Piezometer 10 in August 1983 (200 mg/l), July 1984 (84 mg/l), August 1985 (670 mg/l) and September 1986 (47 mg/l) and at Piezometer 3 in January 1986 (71 mg/l).

During the 1990s, the concentrations of total metals in S4-27-1 groundwater at all piezometer depths were consistently at or below the current MVLWB MAC groundwater quality parameters, with three minor exceptions. In November 1991 the total zinc concentrations recorded at Piezometers 1, 6 and 10 were measured at 0.28, 0.24 and 0.32 mg/l, respectively.

Notable elevated TSS values in the 1990s at S4-27-1 were primarily limited to Piezometer 10, which consistently reported higher TSS during the period May 1996 to October 1997 in the range of 123 to 184 mg/l, when the mine was in an extended period of closure. It is also important to note that these elevated TSS values were not reflected in the total metals results reported during the decade of the 1990s.

During the period 2000 to August 2008, when Station S4-27-1 was still operational, the concentrations of total metals in S4-27-1 groundwater at all piezometer depths were consistently at or below the current MVLWB MAC groundwater quality parameters, with a few minor exceptions for total copper and zinc.

In September 2002 a single isolated total copper concentration of 0.53 mg/l was recorded at Piezometer 10. This was followed in July 2003 with a single copper concentration of 0.24 mg/l recorded at

Piezometer 1. Total zinc was elevated on several occasions, primarily in Piezometer 10, with the highest concentration of zinc (1.54 mg/l) recorded in September 2002, and several readings in the range of 0.39 to 0.92 mg/l being recorded during the infrequent sampling that occurred in 2003 (1 sample), 2006 (1 sample) and 2008 (3 samples).

However, TSS values in the groundwater at S4-27-1 Piezometer 10 remained elevated above the current MAC value of 15 mg/l, ranging from 44.3 to 235 mg/l during the period 2003 to 2008.

Since the beginning of sampling at Station S4-27-16 in August 2009, which replaced S4-27-1, the concentrations of total metals in S4-27-16 groundwater have consistently been below the current MVLWB MAC groundwater quality parameters.

However, TSS values in the groundwater at S4-27-16 during the period August 2009 to August 2011 were consistently recorded above the MAC value for TSS, ranging from 32-96.5 mg/l. These elevated TSS values fall within the range of TSS values recorded at S4-27-1 during the period of record for this station, including the 1990s, when the mine was in an extended closure period.

Table 8: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-1/16, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-1								
S4-27-1-1	08/12/1982	0.0019	0.00046	0.0017	0.00063	0.0029	0.021	27
S4-27-1-1	22/11/1983	0.0061	<0.0001	0.0012	<0.0001	0.0067	0.018	19
S4-27-1-1	05/07/1984	0.0038	0.0001	0.003	0.0034	0.002	0.02	5
S4-27-1-1	21/01/1985			0.001			0.005	
S4-27-1-1	25/03/1985			0.004			0.005	
S4-27-1-1	22/04/1985	<0.001	<0.0001	0.0005	0.00139	<0.01	<0.001	5.8
S4-27-1-1	27/05/1985			0.001			0.005	
S4-27-1-1	12/08/1985			0.001			<0.005	<1
S4-27-1-1	14/08/1985	0.0015	0.0002	<0.0005		<0.01	<0.015	<5
S4-27-1-1	24/09/1985			0.001			0.002	
S4-27-1-1	25/11/1985			0.041			0.054	
S4-27-1-1	02/09/1987			0.04				
S4-27-1-1	04/11/1991			0.04			0.28	
S4-27-1-1	28/07/2003	0.0041	<0.01	0.24	<0.05	<0.05	0.36	18
S4-27-1-1	16/08/2008	0.00141	<0.0001	0.00092	0.00028	<0.001	0.0058	3.7
S4-27-1-2	08/12/1982	0.0017	0.00026	<0.001	<0.0002	<0.0025	0.015	21
S4-27-1-2	22/11/1983	0.0037	0.0003	<0.0005	<0.0001	0.005	<0.01	<5
S4-27-1-2	05/07/1984	0.0027	<0.0001	0.0006	<0.0001	<0.001	0.012	<5
S4-27-1-2	27/05/1986	<0.5	<0.1	<0.5	<0.5	<5	<15	<5
S4-27-1-2	30/06/1986			0.002			0.005	
S4-27-1-2	08/09/1986	2.7	<0.1	<0.5	<0.1	<5	<15	<3
S4-27-1-2	18/09/1986			0.001			0.013	
S4-27-1-2	24/11/1986			0.02			0.14	
S4-27-1-2	23/03/1987			0.06			0.1	
S4-27-1-2	13/06/1987			0.02			0.02	

Table 8: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-1/16, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-1-2	30/10/1987			0.02				
S4-27-1-2	27/04/1991			0.02			0.02	
S4-27-1-2	11/10/1996	<0.2	<0.01	<0.001	<0.05	<0.02	0.008	3
S4-27-1-2	31/07/1997	0.0333	<0.01	<0.001	<0.05	<0.001	0.007	2
S4-27-1-2	10/10/1997	0.0015	<0.01	0.001	<0.05	<0.001	<0.005	3
S4-27-1-2	30/07/1998	0.0009	<0.01	<0.001	<0.05	<0.002	0.006	<1
S4-27-1-2	31/05/1999	0.0005	<0.01	<0.001	<0.05	<0.001	0.008	<3
S4-27-1-2	30/06/1999	0.001	<0.01	<0.001	<0.05	0.002	0.011	5
S4-27-1-2	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.006	3
S4-27-1-2	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	
S4-27-1-2	07/09/2002	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	8
S4-27-1-2	12/08/2003	0.0019	<0.01	0.11	<0.05	<0.05	0.279	6
S4-27-1-2	18/10/2005	0.00241	<0.0001	<0.0002	<0.0001	<0.001	<0.002	3.7
S4-27-1-2	23/07/2006	0.00221	0.00011	0.00027	0.00016	<0.001	0.002	4.4
S4-27-1-2	02/09/2006	0.00248	<0.0001	<0.0002	<0.0001	<0.001	0.0031	3.3
S4-27-1-2	20/07/2007	0.00137	0.00035	0.00024	0.00012	<0.001	0.0034	<3
S4-27-1-2	18/08/2007	0.00163	<0.0001	0.00024	<0.0001	<0.001	<0.002	<3
S4-27-1-3	08/12/1982	<0.001	0.00026	<0.001	<0.0002	0.0027	0.012	7
S4-27-1-3	22/11/1983	0.0011	<0.0001	<0.0005	<0.0001	0.0056	<0.01	<5
S4-27-1-3	05/07/1984	0.0011	<0.0001	<0.0005	<0.0001	<0.001	0.016	<5
S4-27-1-3	28/01/1986	<0.001	0.0002	<0.0005	<0.0005	<0.005	<0.015	71
S4-27-1-3	21/06/1998	0.0011	<0.01	0.001	<0.05	0.001	0.012	5
S4-27-1-3	28/09/1998	0.0007	<0.01	0.001	<0.05	0.001	0.015	1
S4-27-1-3	29/07/1999	0.0006	<0.01	<0.002	<0.05	<0.001	<0.005	<3
S4-27-1-3	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	3
S4-27-1-3	20/06/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.066	
S4-27-1-3	20/06/2006	0.0426	0.00245	0.00515	0.00187	0.0032	0.0398	80
S4-27-1-3	05/07/2008	0.00136	0.00175	0.0011	0.00015	0.0013	0.0054	7.9
S4-27-1-3	09/08/2008	0.00099	0.00011	0.00038	<0.0001	0.0011	0.0049	5.1
S4-27-1-4	08/12/1982	<0.001	0.00072	0.0028	0.00036	0.0039	0.028	93
S4-27-1-4	22/11/1983	<0.001	<0.0001	0.0006	<0.0001	0.0028	0.018	<5
S4-27-1-4	05/07/1984	<0.001	0.0002	0.0007	<0.0001	<0.001	0.056	5
S4-27-1-4	22/04/1985	<0.001	<0.0001	0.00081	<0.0001	<0.01	<0.001	<5
S4-27-1-4	27/05/1986	<0.5	0.1	<0.5	<0.5	<5	<15	<5
S4-27-1-4	24/06/1991			0.02			0.02	
S4-27-1-4	20/02/1996			0.006				
S4-27-1-4	30/05/1996	<0.2	<0.01	0.006	<0.05	<0.02	0.039	25
S4-27-1-4	30/07/1996	<0.2	<0.01	0.004	<0.05	<0.02	0.035	35
S4-27-1-4	28/09/1998	0.0003	<0.01	<0.001	<0.05	0.001	0.006	5
S4-27-1-4	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.009	4
S4-27-1-5	08/12/1982	<0.001	0.00033	<0.001	<0.0002	<0.0025	0.016	14
S4-27-1-5	22/11/1983	0.0014	<0.0001	<0.0005	<0.0001	0.0025	<0.01	<5
S4-27-1-5	05/07/1984	<0.001	0.0001	0.0006	<0.0001	<0.001	0.01	<5

Table 8: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-1/16, 1980s – Present

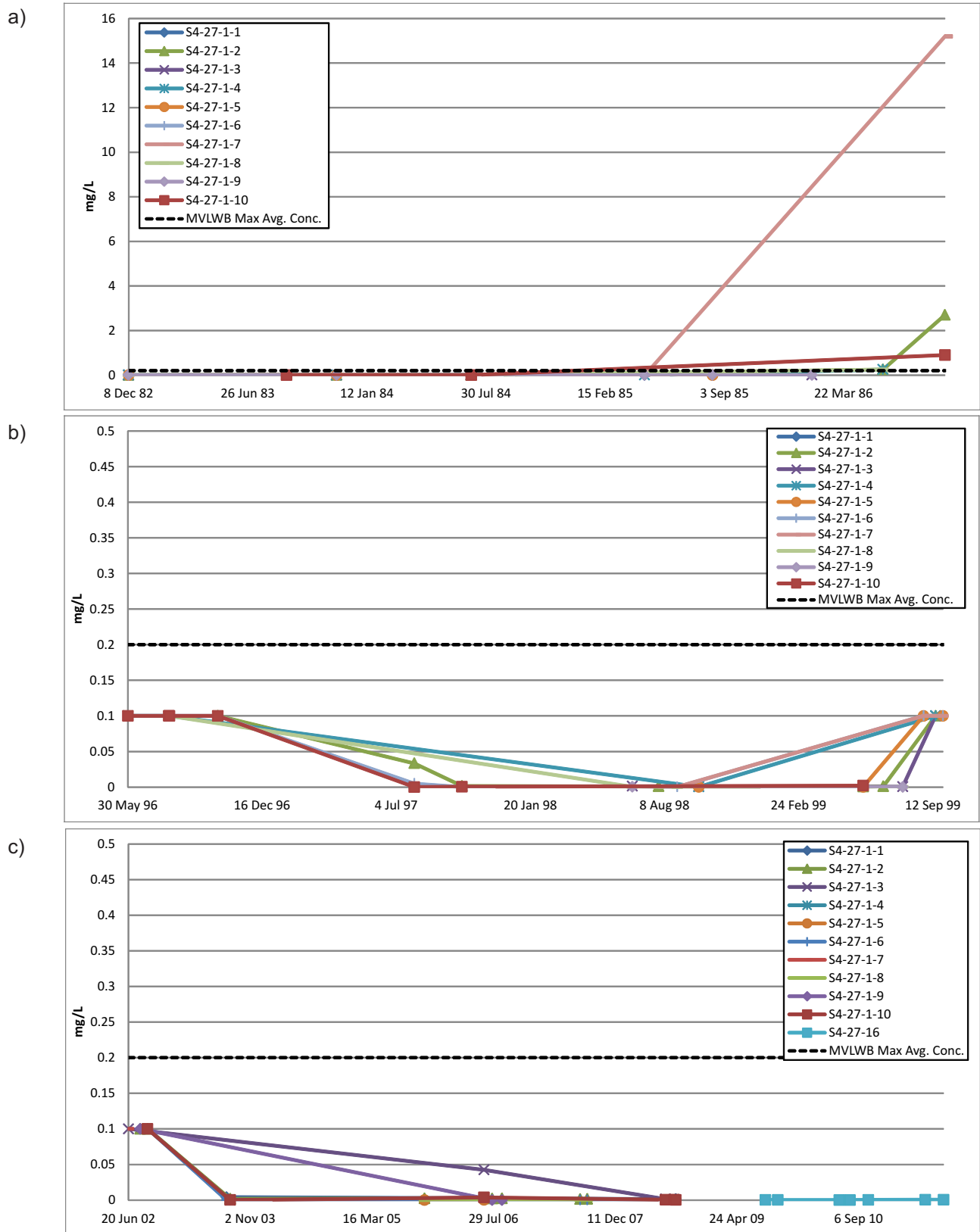
Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-1-5	21/01/1985			0.002			0.005	
S4-27-1-5	25/03/1985			0.001			0.005	
S4-27-1-5	27/05/1985			0.001			0.005	
S4-27-1-5	12/08/1985			<0.001			<0.005	4
S4-27-1-5	14/08/1985	<0.001	0.0002	<0.0005		<0.01	<0.015	<5
S4-27-1-5	24/09/1985			0.001			0.003	
S4-27-1-5	02/09/1987			0.02			0.04	
S4-27-1-5	28/09/1998	0.0002	<0.01	<0.001	<0.05	0.002	<0.005	2
S4-27-1-5	31/05/1999	0.0003	<0.01	<0.001	<0.05	0.003	0.009	<3
S4-27-1-5	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.006	<3
S4-27-1-5	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-1-5	18/10/2005	<0.0002	0.00025	0.00068	<0.0001	<0.001	0.0044	<3
S4-27-1-5	20/06/2006	0.00023	0.00223	0.00082	<0.0001	<0.001	0.0072	<3
S4-27-1-6	08/12/1982	<0.001	0.00092	<0.001	<0.0002	0.0119	0.018	8
S4-27-1-6	22/11/1983	<0.001	<0.0001	<0.0005	<0.0001	0.0087	<0.01	<5
S4-27-1-6	05/07/1984	<0.001	0.0009	0.0007	<0.0001	0.0075	0.02	<5
S4-27-1-6	30/10/1987			0.02				
S4-27-1-6	04/11/1991			0.04			0.24	
S4-27-1-6	20/02/1996			0.001				
S4-27-1-6	30/05/1996	<0.2	<0.01	<0.001	<0.05	<0.02	<0.005	16
S4-27-1-6	11/10/1996	<0.2	<0.01	<0.001	<0.05	<0.02	<0.005	<1
S4-27-1-6	31/07/1997	0.005	<0.01	<0.001	<0.05	0.002	<0.005	2
S4-27-1-6	10/10/1997	0.0002	<0.01	<0.005	<0.05	0.003	<0.005	<2
S4-27-1-6	27/08/1998	0.0002	<0.01	0.001	<0.05	0.004	0.011	4
S4-27-1-6	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.012	<3
S4-27-1-6	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-1-6	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.024	<3
S4-27-1-6	07/09/2002	<0.2	<0.01	0.02	<0.05	0.07	0.112	754
S4-27-1-6	28/07/2003	<0.0005	<0.01	0.04	<0.05	<0.05	0.121	9
S4-27-1-6	12/08/2003	<0.0005	<0.01	0.06	<0.05	<0.05	0.2	<3
S4-27-1-6	23/07/2006	0.00039	0.0022	0.013	0.00088	0.0068	0.0231	<3
S4-27-1-6	02/09/2006	<0.0002	0.0003	0.00189	0.00034	0.0044	0.0081	9.3
S4-27-1-6	20/07/2007	<0.0005	0.00066	0.00592	0.00034	0.0097	0.0127	<3
S4-27-1-6	18/08/2007	<0.0005	0.0003	<0.0005	<0.00025	0.0051	<0.005	8.7
S4-27-1-6	16/08/2008	<0.0002	0.00025	0.00113	0.00024	0.0041	0.0091	<3
S4-27-1-7	08/12/1982	<0.001	0.00051	<0.001	<0.0002	0.0055	0.016	<5
S4-27-1-7	30/08/1983	0.0028	0.0008	0.0015	0.0002	0.0078	0.009	
S4-27-1-7	22/11/1983	0.0016	<0.0001	<0.0005	<0.0001	0.0042	0.018	<5
S4-27-1-7	05/07/1984	<0.001	0.0006	0.0009	<0.0001	0.0154	0.018	<5
S4-27-1-7	22/04/1985	<0.001	<0.0001	0.0005	<0.0001	<0.01	<0.001	<5
S4-27-1-7	08/09/1986	15.2	0.7	<0.5	<0.1	5.8	<15	<3
S4-27-1-7	27/04/1991			0.02			0.02	
S4-27-1-7	30/07/1998	0.0002	<0.01	<0.001	<0.05	<0.002	<0.005	<1

Table 8: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-1/16, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-1-7	27/08/1998	0.0003	<0.01	<0.001	<0.05	0.002	0.006	2
S4-27-1-7	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.007	<3
S4-27-1-7	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.014	<3
S4-27-1-7	20/06/2002	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-1-8	08/12/1982	<0.001	0.00168	<0.001	<0.0002	0.0142	0.022	<5
S4-27-1-8	30/08/1983	0.0029	0.0009	<0.0005	0.0001	0.02	<0.005	<5
S4-27-1-8	22/11/1983	<0.001	0.0006	0.0008	<0.0001	0.0249	0.022	<5
S4-27-1-8	05/07/1984	<0.001	0.0008	0.001	<0.0001	0.0183	0.021	<5
S4-27-1-8	27/05/1986	<0.5	1.2	<0.5	<0.5	7.7	<15	<5
S4-27-1-8	30/06/1986			0.002			0.016	
S4-27-1-8	18/09/1986			0.006			0.032	
S4-27-1-8	24/11/1986			0.04			0.12	
S4-27-1-8	23/03/1987			0.02			0.04	
S4-27-1-8	13/06/1987			0.02			0.02	
S4-27-1-8	30/10/1987						0.04	
S4-27-1-8	24/06/1991			0.02			0.04	
S4-27-1-8	30/07/1996	<0.2	<0.01	0.001	<0.05	<0.02	0.017	11
S4-27-1-8	21/06/1998	0.0003	<0.01	0.001	<0.05	0.006	0.01	6
S4-27-1-8	30/07/1998	0.0002	<0.01	0.001	<0.05	0.005	0.009	3
S4-27-1-8	27/08/1998	0.0001	<0.01	0.002	<0.05	0.006	0.01	2
S4-27-1-8	29/07/1999	0.0002	<0.01	<0.002	<0.05	0.004	0.005	<3
S4-27-1-8	18/10/2005	<0.0002	0.00148	0.0005	<0.0001	0.0205	0.0194	<3
S4-27-1-8	20/07/2007	<0.0005	0.00165	0.00112	<0.00025	0.0229	0.0207	3.8
S4-27-1-8	18/08/2007	<0.0005	0.00122	<0.0005	<0.00025	0.0218	0.0166	24.7
S4-27-1-9	08/12/1982	<0.001	0.00073	<0.001	<0.0002	0.0061	0.015	<5
S4-27-1-9	30/08/1983	0.003	0.005	<0.0005	<0.0001	0.0075	<0.005	<5
S4-27-1-9	22/11/1983	<0.001	0.0003	0.001	<0.0001	0.0155	0.018	<5
S4-27-1-9	05/07/1984	<0.001	0.0003	0.0034	<0.0001	0.0094	0.264	<5
S4-27-1-9	21/01/1985			0.001			0.005	
S4-27-1-9	25/03/1985			0.002			0.005	
S4-27-1-9	22/04/1985	<0.001	<0.0001	0.0015	<0.0001	<0.01	<0.001	<5
S4-27-1-9	27/05/1985			0.001			0.005	
S4-27-1-9	12/08/1985			0.001			<0.005	<1
S4-27-1-9	14/08/1985	<0.001	<0.0001	0.0006		<0.01	<0.015	<5
S4-27-1-9	24/09/1985			0.001			0.004	
S4-27-1-9	25/11/1985			0.002			0.005	
S4-27-1-9	28/01/1986	<0.001	0.0002	<0.0005	0.0006	<0.005	<0.015	<5
S4-27-1-9	02/09/1987			0.02			0.04	
S4-27-1-9	21/06/1998	0.0003	<0.01	<0.002	<0.05	0.003	0.012	4
S4-27-1-9	29/07/1999	0.0001	<0.01	<0.002	<0.05	0.001	0.008	<3
S4-27-1-9	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.025	<3
S4-27-1-9	23/07/2006	<0.0002	0.0006	0.00046	0.00019	0.0042	0.007	72.4
S4-27-1-9	02/09/2006	0.00011	0.000389	0.00052	0.000084	0.00081	0.0033	3.3

Table 8: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-1/16, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-1-10	30/08/1983	0.003	<0.00005	0.002	<0.0001	<0.001	0.006	200
S4-27-1-10	05/07/1984	0.0031	<0.0001	0.0053	<0.0001	<0.001	0.031	84
S4-27-1-10	12/08/1985			0.008			0.015	670
S4-27-1-10	08/09/1986	0.9	0.9	5.9	<0.1	<5	29	47
S4-27-1-10	18/09/1986			0.017			0.047	
S4-27-1-10	23/03/1987			0.02			0.06	
S4-27-1-10	13/06/1987			0.02			0.02	
S4-27-1-10	30/10/1987			0.02			0.04	
S4-27-1-10	27/04/1991			0.04			0.04	
S4-27-1-10	04/11/1991			0.12			0.32	
S4-27-1-10	20/02/1996			0.022				
S4-27-1-10	30/05/1996	<0.2	<0.01	0.022	<0.05	<0.02	0.066	160
S4-27-1-10	30/07/1996	<0.2	<0.01	0.026	<0.05	<0.02	0.091	184
S4-27-1-10	31/07/1996	<0.2	<0.01	0.015	<0.05	<0.02	0.056	176
S4-27-1-10	11/10/1996	<0.2	<0.01	0.021	<0.05	<0.02	0.134	138
S4-27-1-10	31/07/1997	<0.0001	<0.01	<0.001	<0.05	0.001	0.048	123
S4-27-1-10	10/10/1997	0.0005	<0.01	0.004	<0.05	<0.001	0.032	160
S4-27-1-10	31/05/1999	0.0021	<0.01	<0.001	<0.05	0.001	0.01	12
S4-27-1-10	06/09/2002	<0.2	<0.01	0.53	<0.05	<0.05	1.54	
S4-27-1-10	12/08/2003	<0.0005	<0.01	0.06	<0.05	<0.05	0.389	126
S4-27-1-10	20/06/2006	0.0038	0.00387	0.0425	0.00204	0.0083	0.397	235
S4-27-1-10	05/07/2008	<0.001	0.00117	0.0049	<0.0005	0.0074	0.86	145
S4-27-1-10	09/08/2008	<0.001	<0.0005	0.0022	<0.0005	0.006	0.923	118
S4-27-1-10	16/08/2008	<0.0005	<0.00025	0.00121	<0.00025	<0.0025	0.722	44.3
S4-27-16								
S4-27-16	19/08/2009	0.00033	<0.0001	0.00022	<0.0001	0.0046	0.0031	96.5
S4-27-16	09/10/2009	0.00024	<0.0001	0.00024	<0.0001	0.0032	0.0055	32
S4-27-16	19/06/2010	<0.0002	<0.0001	0.00088	<0.0001	0.0026	0.0078	34.8
S4-27-16	02/08/2010	<0.0002	<0.0001	0.00093	<0.0001	0.0036	0.004	54.8
S4-27-16	16/10/2010	0.0003	0.00021	0.0023	<0.0001	0.0043	<0.006	67.6
S4-27-16	07/06/2011	<0.001	0.000059	<0.002	<0.001	0.008	0.009	37
S4-27-16	21/08/2011	<0.001	0.00008	<0.002	<0.001	0.011	0.011	170



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A TETRA TECH COMPANY

CANTUNG MINE

Total Arsenic Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present

PROJECT NO.
Y22101275.001

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DATE
May 8, 2012

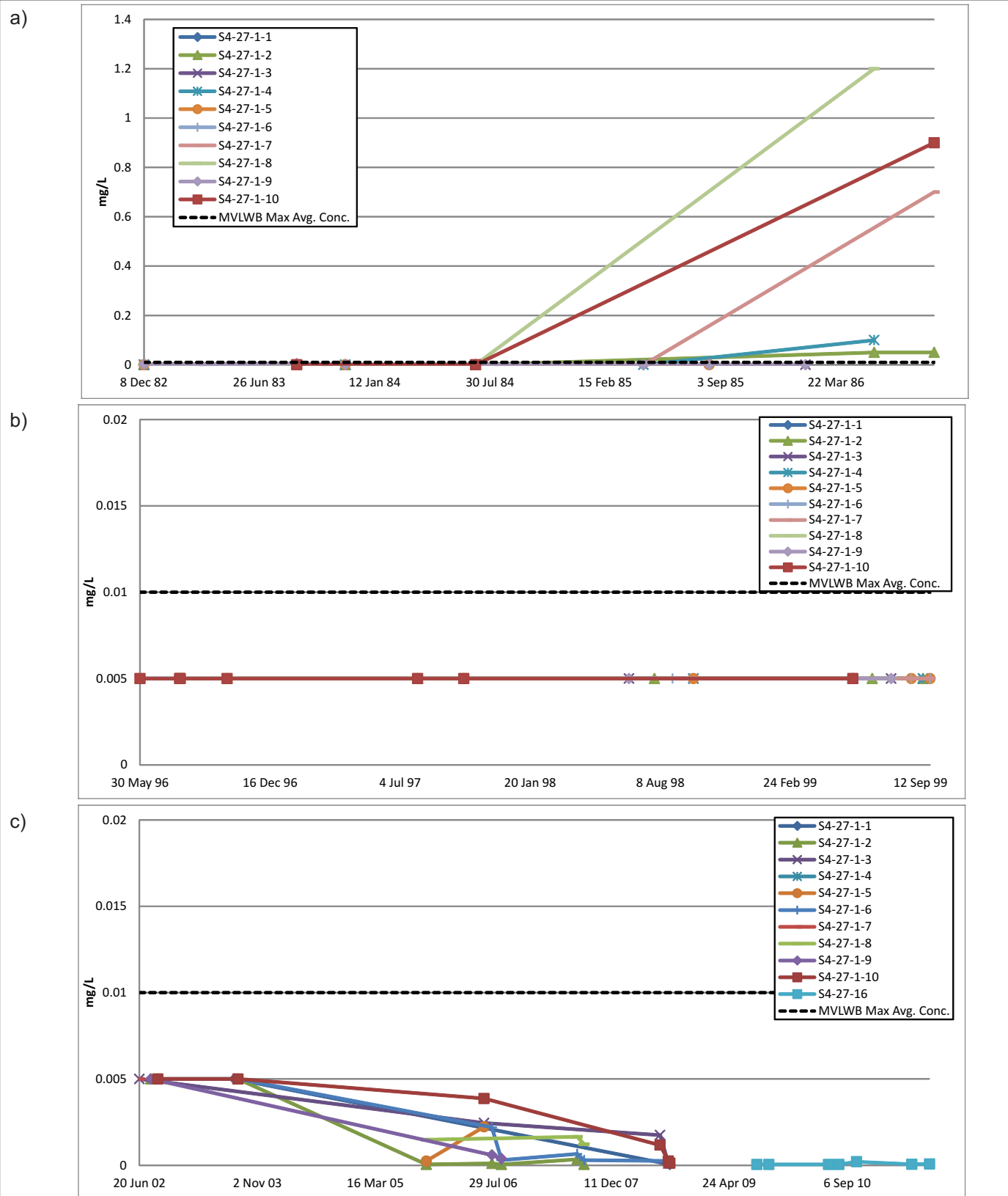
CKD
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APVD
SH

REV
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Figure 11

STATUS
ISSUED FOR USE



CLIENT



STATUS
ISSUED FOR USE

CANTUNG MINE

Total Cadmium Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present

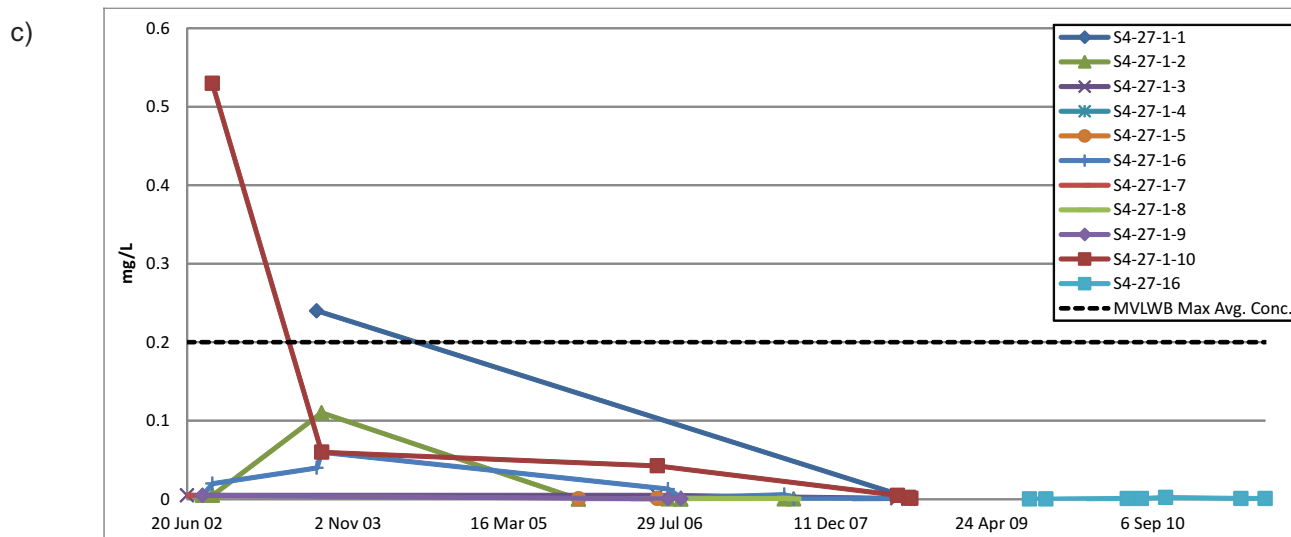
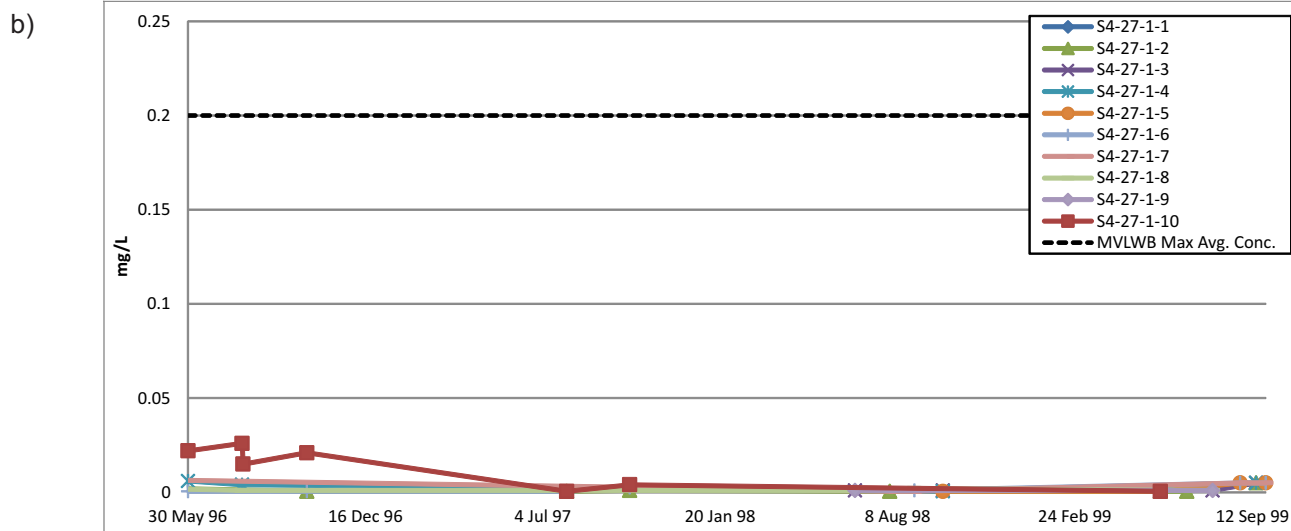
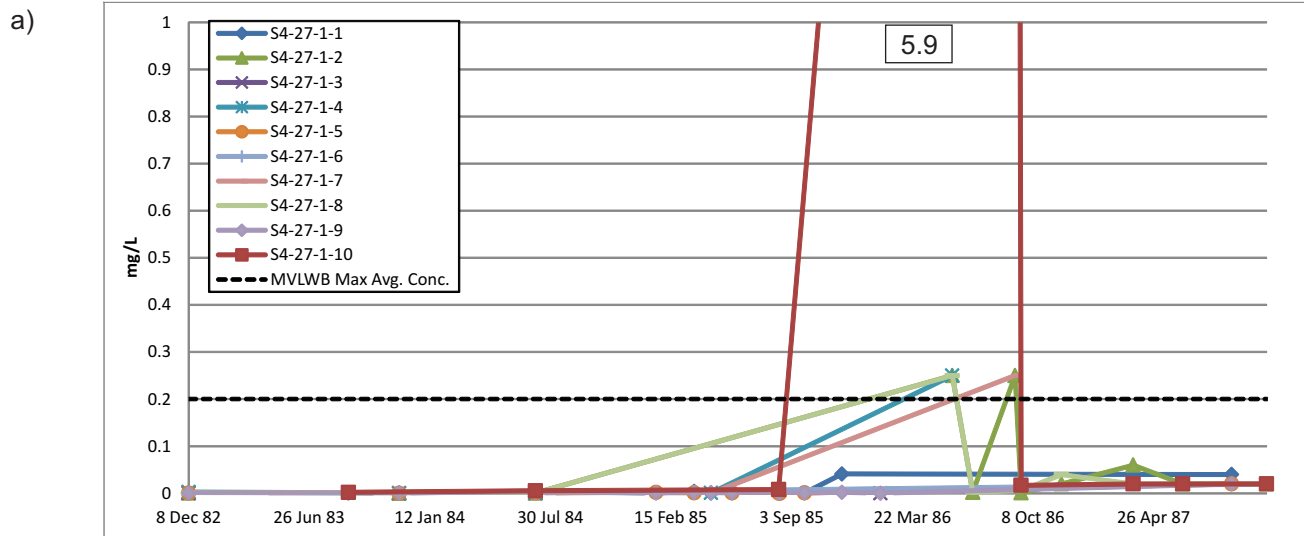
PROJECT NO.
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MEZ SH SH 0

DATE
May 8, 2012

Figure 12



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A TETRA TECH COMPANY

CANTUNG MINE

Total Copper Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present

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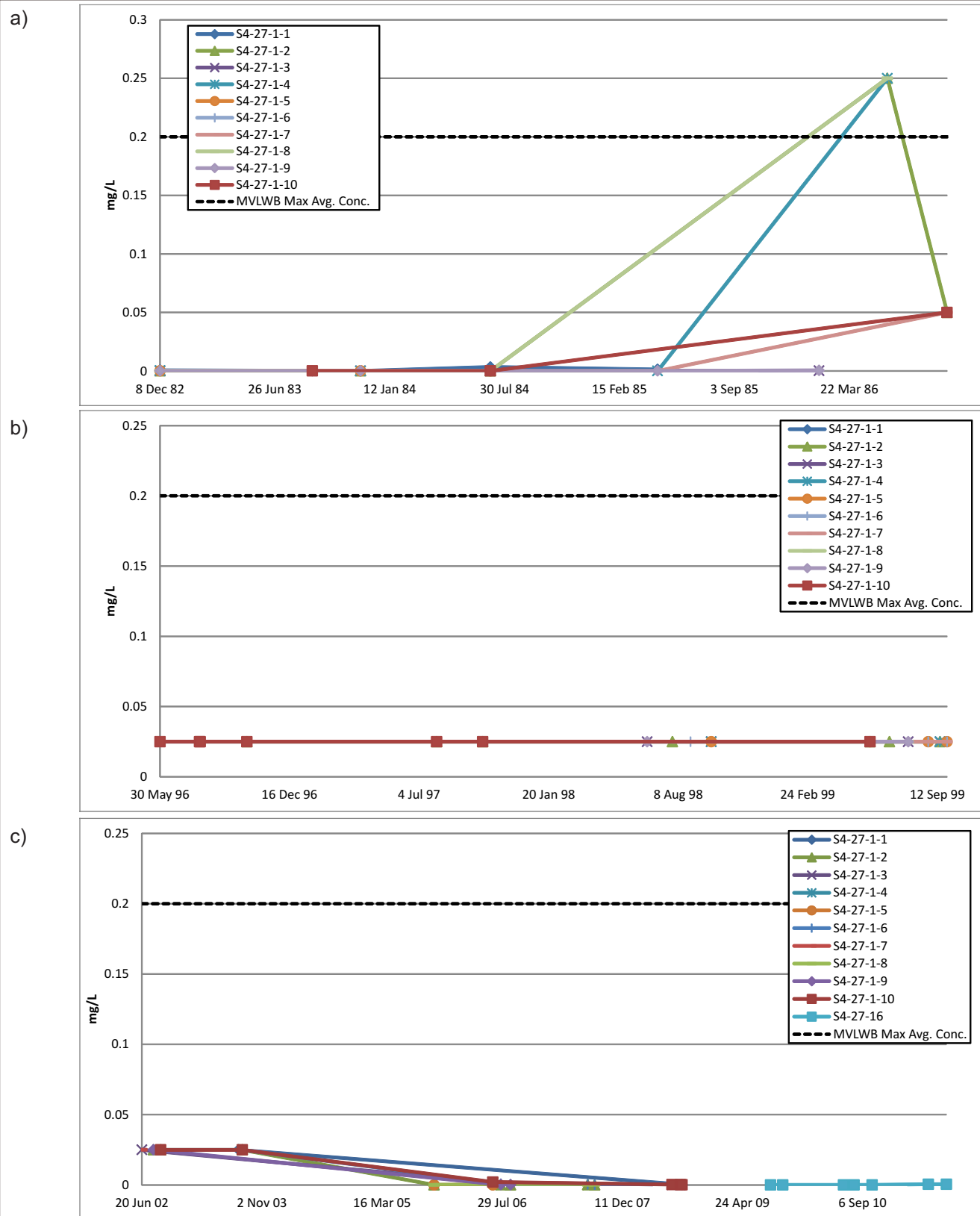
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May 9, 2012

Figure 13

STATUS

ISSUED FOR USE



CLIENT



A TETRA TECH COMPANY

CANTUNG MINE

**Total Lead Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present**

PROJECT NO.

Y22101275.001

DWN

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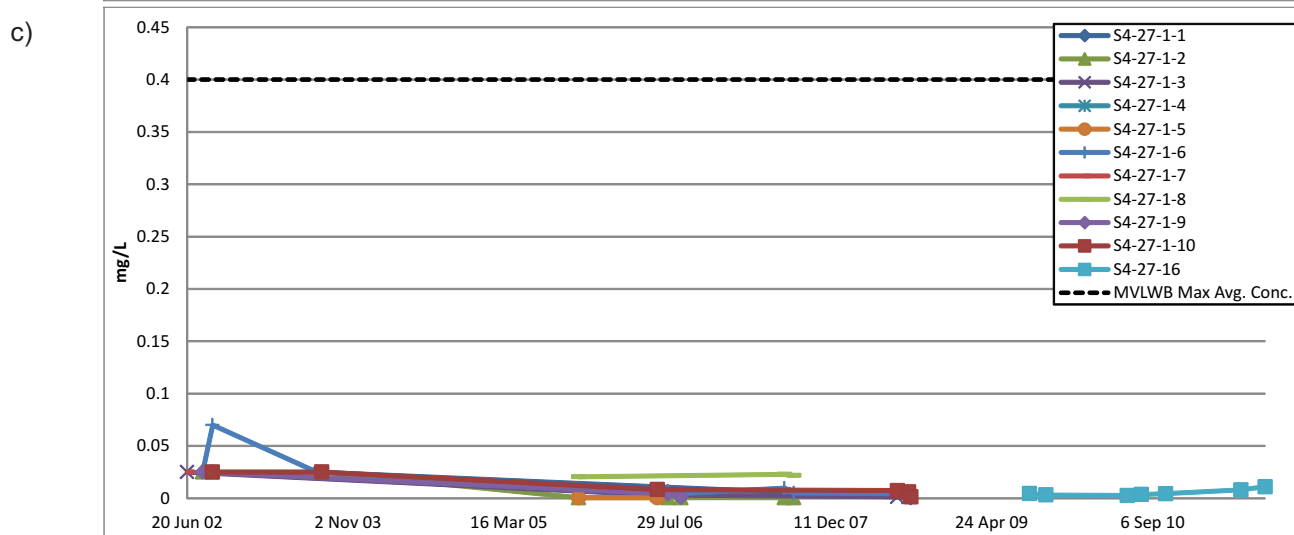
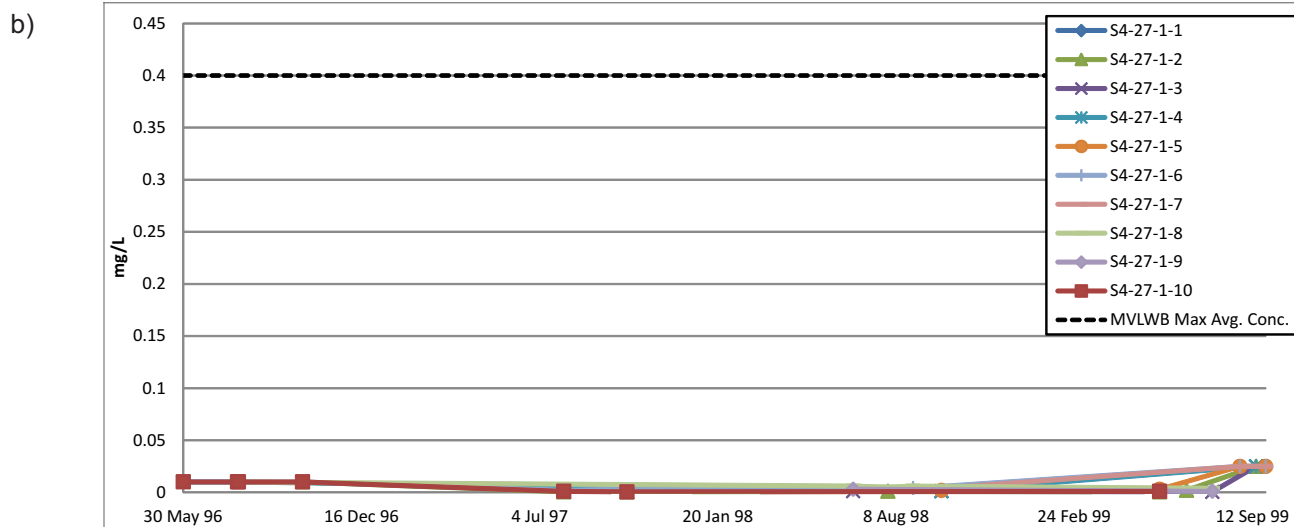
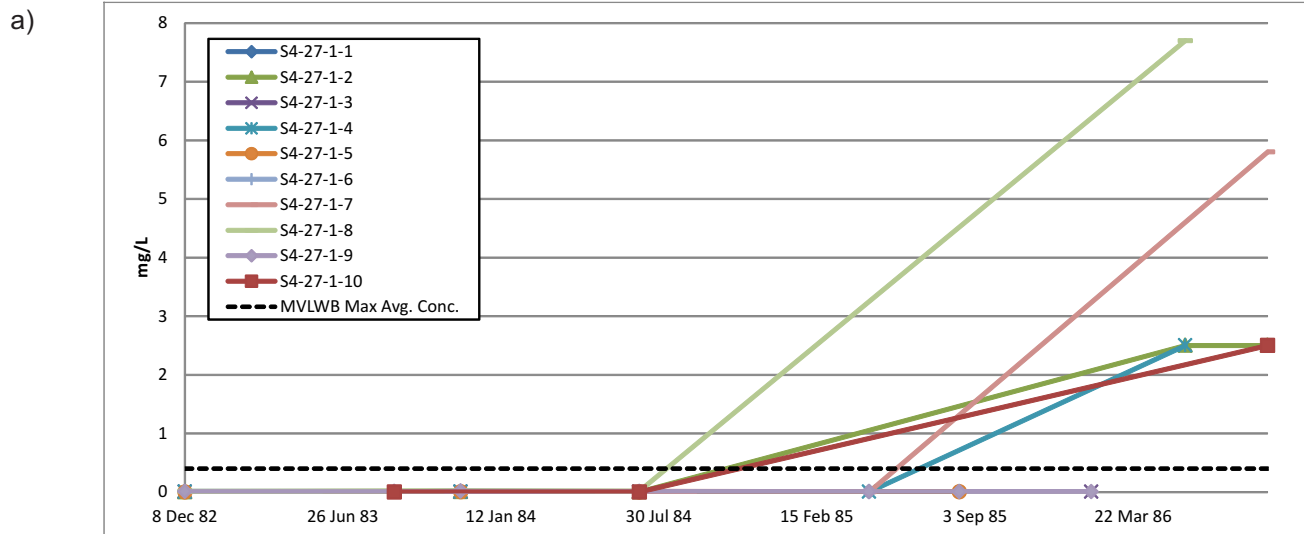
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May 8, 2012

Figure 14

STATUS

ISSUED FOR USE



CLIENT



CANTUNG MINE

Total Nickel Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present



A TETRA TECH COMPANY

PROJECT NO.
Y22101275.001

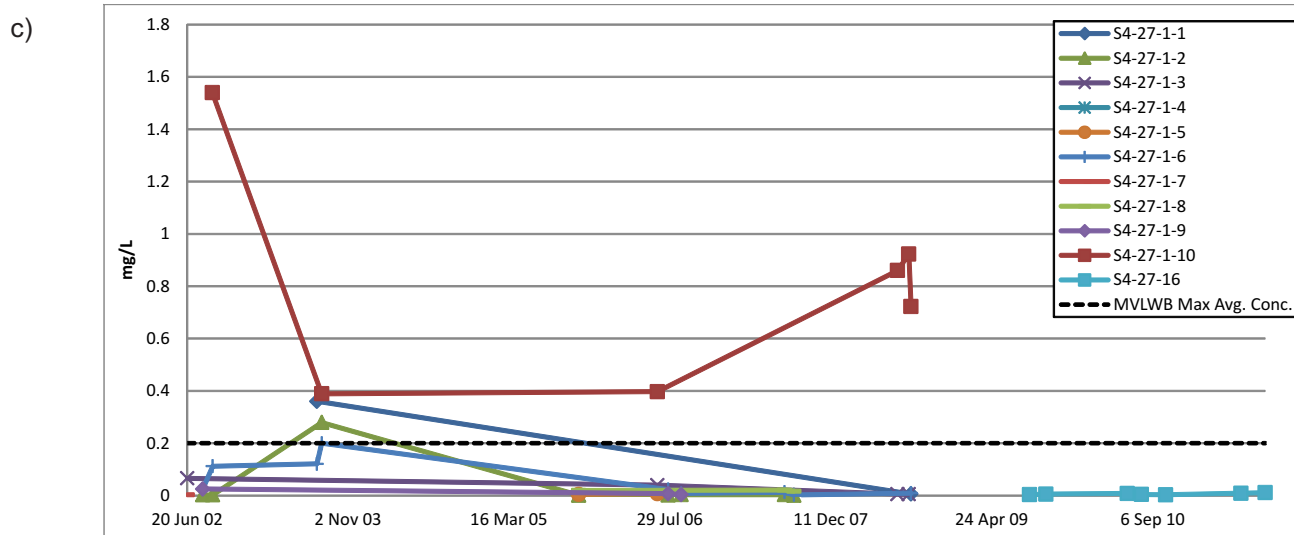
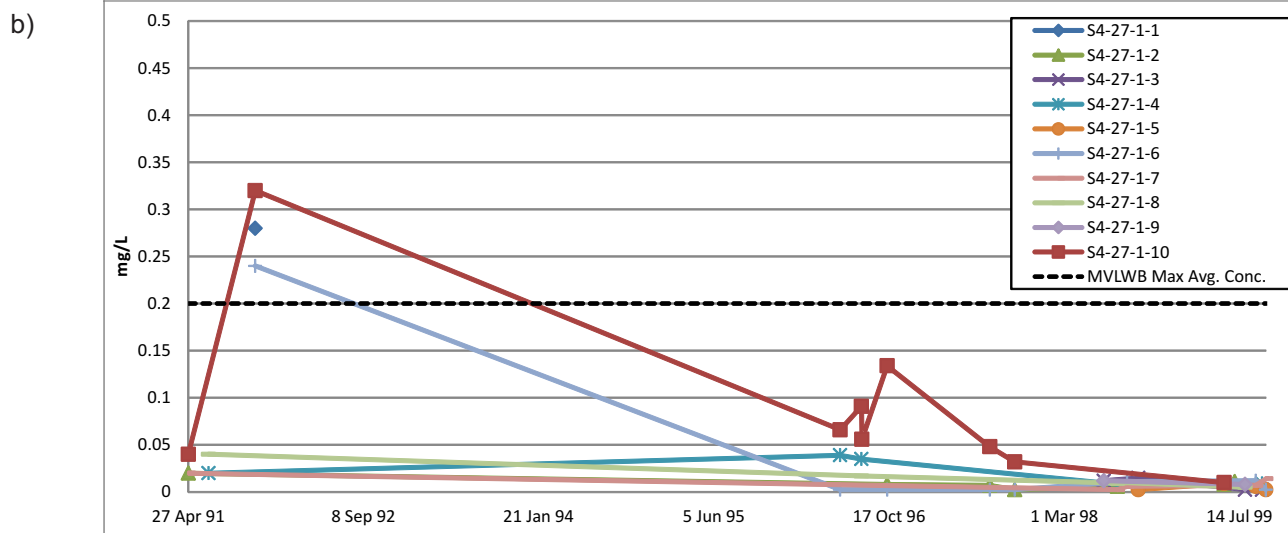
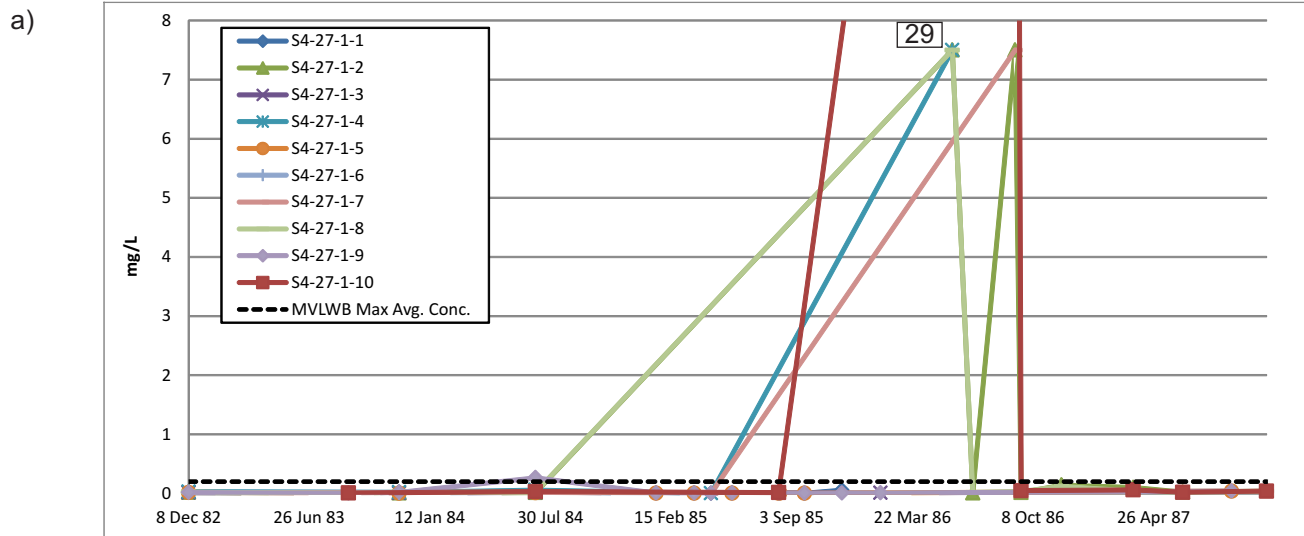
OFFICE
EBA-VANC

DWN CKD APVD REV
MEZ SH SH 0

DATE
May 8, 2012

Figure 15

STATUS
ISSUED FOR USE



CLIENT



A TETRA TECH COMPANY

CANTUNG MINE

Total Zinc Concentrations (mg/L) in
Groundwater, Station S4-27-1/16,
1980s – Present

PROJECT NO.

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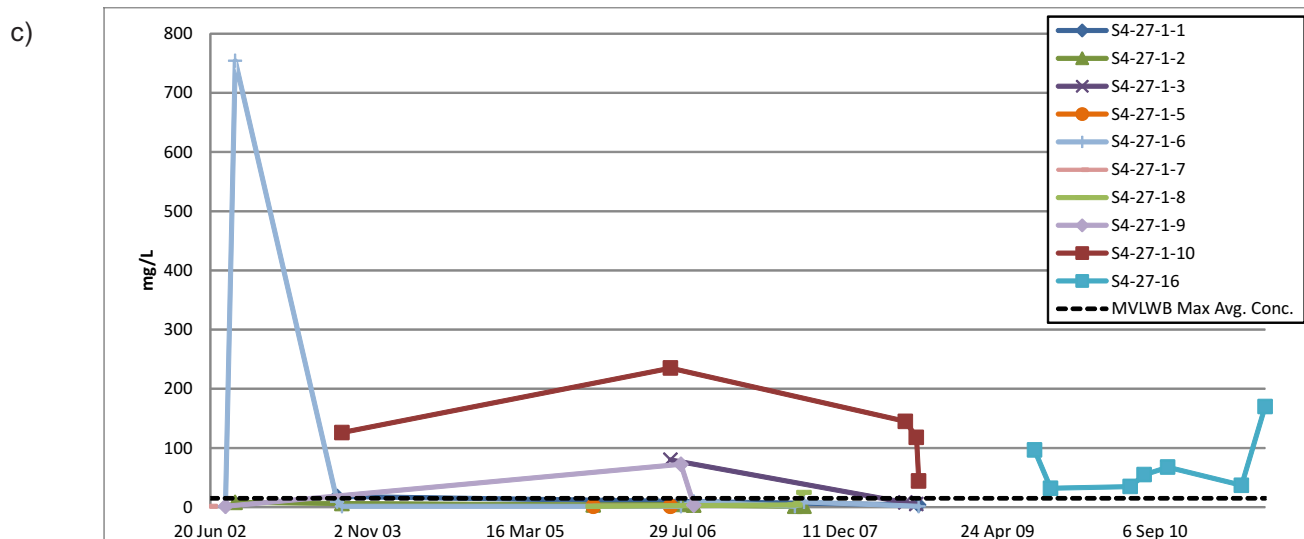
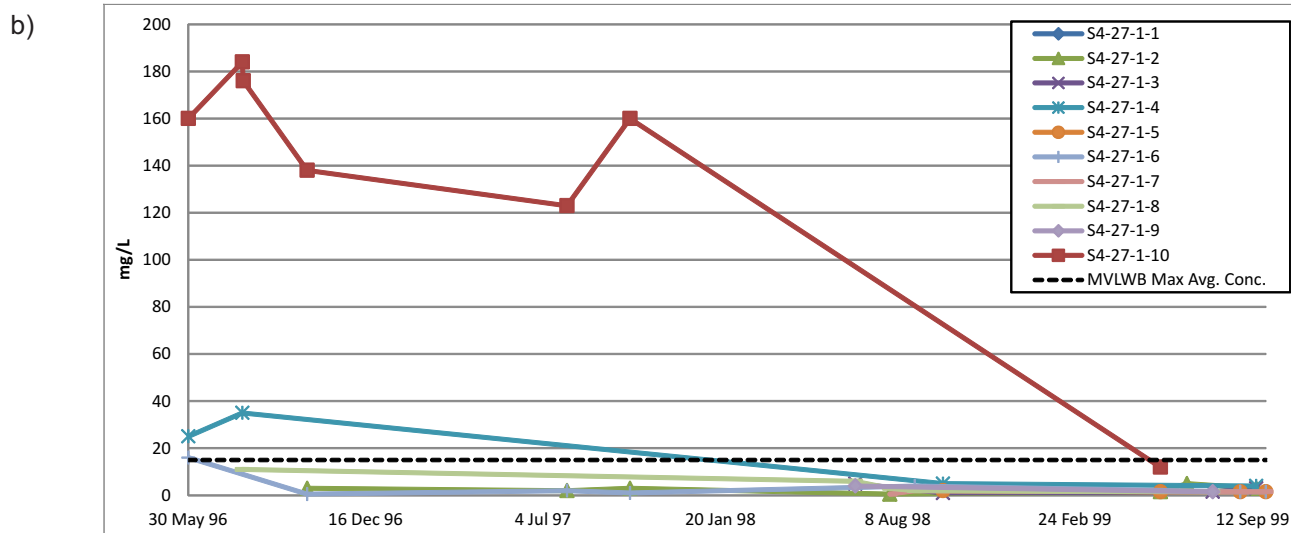
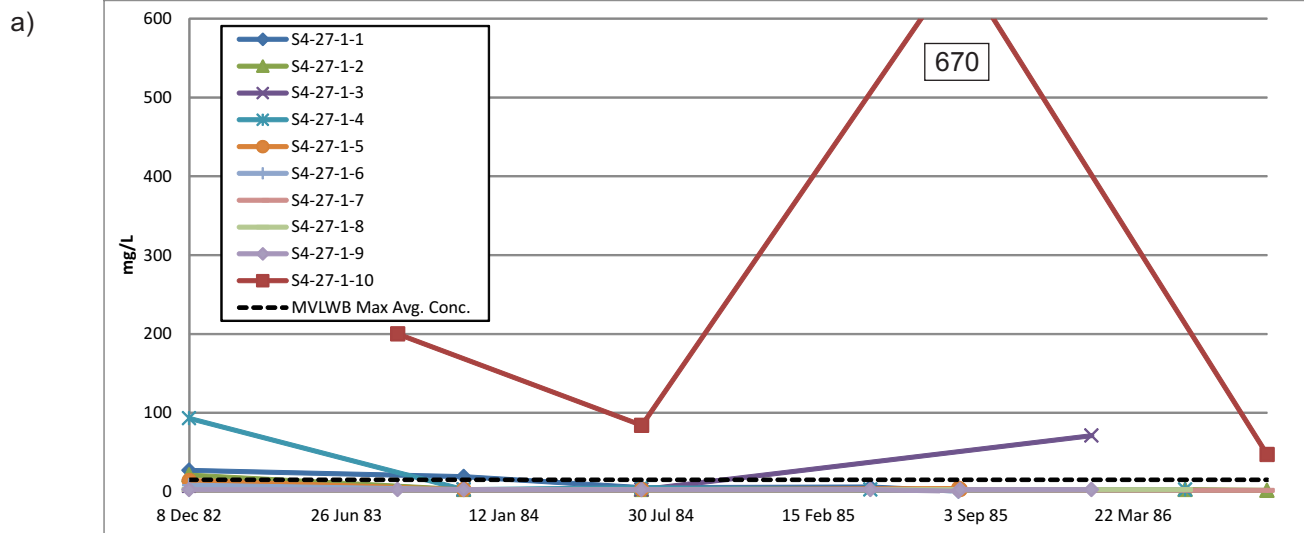
DATE

May 9, 2012

Figure 16

STATUS

ISSUED FOR USE



5.2.2 Groundwater Station S4-27-5/13

Groundwater monitoring Station S4-27-5 was also established in January 1983 and is located down-gradient to the south of TP3 west of the north end of the existing airstrip. This station, also referred to as MW6, is a multi-level installation with a total of 13 piezometers installed at the following depths:

▪ Piezometer 1	51.3 m	▪ Piezometer 8	30.0 m
▪ Piezometer 2	48.3 m	▪ Piezometer 9	26.9 m
▪ Piezometer 3	45.2 m	▪ Piezometer 10	23.9 m
▪ Piezometer 4	42.2 m	▪ Piezometer 11	20.8 m
▪ Piezometer 5	39.1 m	▪ Piezometer 12	17.8 m
▪ Piezometer 6	36.1 m	▪ Piezometer 13	14.7 m
▪ Piezometer 7	33.0 m		

Figures 18 to 24 and Table 9 present all of the available groundwater quality data for Station S4-27-5 for the period of record. It should be noted that this station was replaced with Station S4-27-13 in June 2009 and the data generated since that time have been incorporated into Table 9 and the referenced figures.

As noted in Figures 18 to 24 and Table 9, during the 1980s, the concentrations of total metals in S4-27-5 groundwater at all piezometer depths were consistently below the current MVLWB MAC groundwater quality parameters, with very few exceptions. In particular, total arsenic, cadmium, copper, lead and nickel values recorded were consistently below the current MVLWB MAC groundwater criteria.

As indicated in Figure 23, total zinc was only elevated above the current MAC criterion at Piezometer 8 on one occasion (November 1985) when a groundwater concentration of 0.28 mg/l of total zinc was recorded. Total zinc also reached 0.2 mg/l (the MAC criterion for zinc) at Piezometer 8 in June 1986 and at Piezometer 6 in March 1987.

Notable elevated TSS values in the 1980s were reported at Piezometers 6, 7 and 8 in December 1982 (120, 1,900 and 96 mg/l, respectively), at Piezometer 13 in April 1984 (120 mg/l) and at Piezometers 4 and 5 in August, 1985 (170 and 90 mg/l).

During the 1990s, the concentrations of total metals in S4-27-5 groundwater at all piezometer depths were consistently at or below the current MVLWB MAC groundwater quality parameters, with a few minor exceptions for total zinc.

In April and November 1991 total zinc concentrations recorded at Piezometer 13 were measured at 0.24 and 0.32 mg/l, respectively. In November 1991, Piezometers 1 and 8 recorded concentrations of 0.28 and 0.20 mg/l, respectively. In 1997 a total zinc reading of 0.22 mg/l was recorded at Piezometer 1. All of these data were reported in DIAND (2001) and were recorded during the extended period when the mine was in an extended period of closure.

Notable elevated TSS values in the 1990s at S4-27-5 were primarily limited to Piezometer 13, which reported higher TSS in May, July and October 1996 with recorded TSS values of 51, 53 and 310 mg/l, respectively. Elevated TSS values of 45 and 80 mg/l were recorded in October 1997 at Piezometers 1 and 8. It is again important to note that these elevated TSS values were not reflected in the total metals results reported during the decade of the 1990s.

Since 2000, the limited groundwater quality sampling that has taken place at Station S4-27-5 and at replacement Station S4-27-13 in June 2009 indicates that the concentrations of total metals have been consistently at or below the current MVLWB MAC groundwater quality parameters. Since 2000, with the exception of one TSS value of 691 mg/l recorded at Piezometer 3 on September 9, 2002, all TSS values at this station have remained well below the current MAC criterion.

Table 9: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-5/13, 1980s – Present

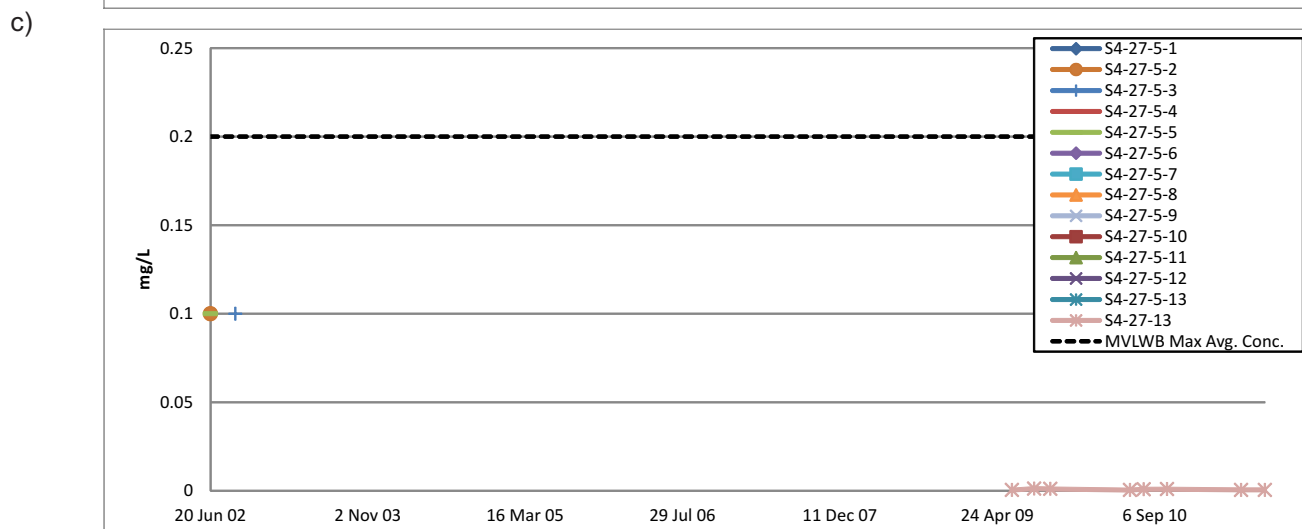
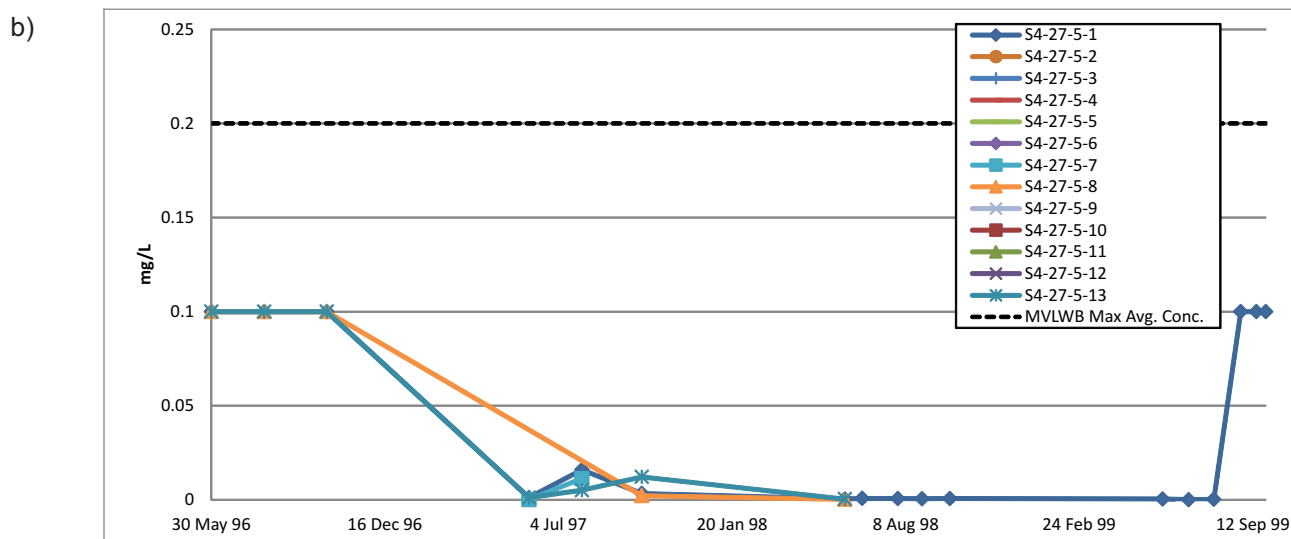
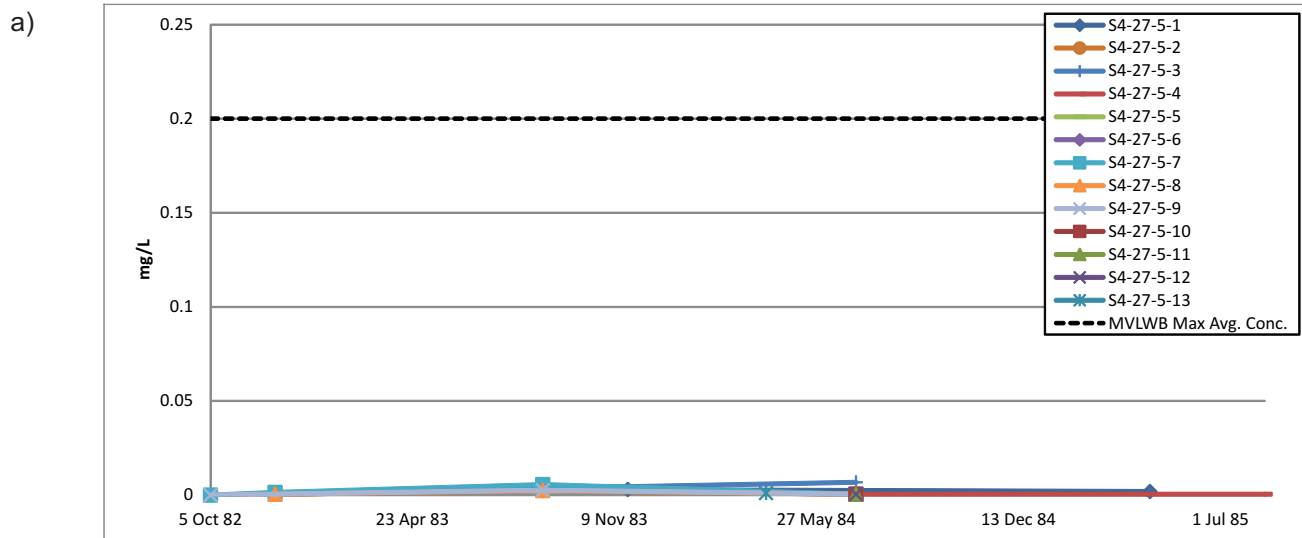
Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-5							
S4-27-5-1	22/11/1983	0.0029	<0.0001	0.0011	0.0071	0.022	<5
S4-27-5-1	21/01/1985			0.002		0.007	
S4-27-5-1	25/03/1985			0.001		0.005	
S4-27-5-1	22/04/1985	0.0019	<0.0001	0.0011	<0.01	<0.02	4.2
S4-27-5-1	27/05/1985			0.001		0.005	
S4-27-5-1	12/08/1985			0.001		<0.005	20
S4-27-5-1	27/04/1991			0.03		0.06	
S4-27-5-1	24/06/1991			0.02		0.08	
S4-27-5-1	04/11/1991			0.04		0.28	
S4-27-5-1	20/02/1996			0.007			
S4-27-5-1	30/05/1996	<0.2	<0.01	0.007	<0.02	0.013	11
S4-27-5-1	30/07/1996	<0.2	<0.01	0.007	<0.02	0.021	9
S4-27-5-1	10/10/1996	<0.2	<0.01	0.004	<0.02	0.026	7
S4-27-5-1	31/05/1997	0.0012	<0.01	0.005	0.003	0.034	9
S4-27-5-1	31/07/1997	0.016	<0.01	0.004	0.017	0.012	13
S4-27-5-1	08/10/1997	0.0034	<0.01	0.059	0.023	0.218	45
S4-27-5-1	30/05/1998	0.0005	<0.01	0.017	0.006	0.07	17
S4-27-5-1	19/06/1998	0.0008	<0.01	0.02	0.006	0.049	24
S4-27-5-1	30/07/1998	0.0007	<0.01	0.03	0.007	0.066	17
S4-27-5-1	27/08/1998	0.0006	<0.01	0.02	0.005	0.058	13
S4-27-5-1	28/09/1998	0.0007	<0.01	0.02	0.004	0.05	18
S4-27-5-1	31/05/1999	0.0005	<0.01	0.03	0.004	0.067	27
S4-27-5-1	30/06/1999	0.0001	<0.01	0.008	0.002	0.035	<3
S4-27-5-1	29/07/1999	0.0003	<0.01	0.013	0.003	0.031	3
S4-27-5-1	29/08/1999	<0.2	<0.01	0.02	<0.05	0.028	3
S4-27-5-1	16/09/1999	<0.2	<0.01	0.02	<0.05	0.052	26
S4-27-5-1	27/09/1999	<0.2	<0.01	0.03	<0.05	0.058	11
S4-27-5-2	08/12/1982	<0.001	0.00185	0.0018	<0.0025	0.021	8
S4-27-5-2	30/08/1983	0.0036	<0.00005	0.0008	0.002	<0.005	<5
S4-27-5-2	05/07/1984	<0.001	0.0002	0.0017	0.0018	0.034	<5
S4-27-5-2	30/06/1986			0.004		0.013	
S4-27-5-2	18/09/1986			0.036		0.14	
S4-27-5-2	20/06/2002	<0.2	<0.01	0.01	<0.05	0.047	36
S4-27-5-3	08/12/1982	<0.001	0.00074	0.0011	<0.0025	0.015	25
S4-27-5-3	30/08/1983	0.0036	0.0002	0.0006	0.0025	0.011	<5
S4-27-5-3	05/07/1984	0.0068	0.0006	0.0067	0.0083	0.106	12

Table 9: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-5/13, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-5-3	30/06/1986			0.003		0.018	
S4-27-5-3	07/09/2002	<0.2	<0.01	0.12	<0.05	0.17	691
S4-27-5-4	05/10/1982	0.000001	<0.0002	<0.001	<0.001	0.015	
S4-27-5-4	08/12/1982	<0.001	0.00023	<0.001	<0.0025	0.017	23
S4-27-5-4	30/08/1983	0.0023	<0.00005	<0.0005	0.002	<0.005	<5
S4-27-5-4	05/07/1984	<0.001	<0.0001	0.0006	<0.001	<0.01	13
S4-27-5-4	14/08/1985	<0.001	0.0001	0.0013	<0.01	0.0158	170
S4-27-5-4	25/11/1985			0.011		0.016	
S4-27-5-4	27/03/1986			0.004		0.005	
S4-27-5-5	08/12/1982	<0.001	0.00017	<0.001	<0.0025	0.014	11
S4-27-5-5	30/08/1983	0.0023	<0.00005	<0.0005	0.002	<0.005	<5
S4-27-5-5	05/07/1984	<0.001	<0.0001	0.0007	<0.001	<0.01	<5
S4-27-5-5	25/03/1985			0.001		0.005	
S4-27-5-5	27/05/1985			0.003		0.025	
S4-27-5-5	12/08/1985			0.005		0.029	90.4
S4-27-5-5	24/09/1985			0.001		0.002	
S4-27-5-5	27/03/1986			0.004			
S4-27-5-5	23/03/1987			0.02		0.04	
S4-27-5-5	13/06/1987			0.02		0.02	
S4-27-5-5	02/09/1987			0.02		0.02	
S4-27-5-5	30/10/1987			0.02		0.02	
S4-27-5-5	20/06/2002	<0.2	<0.01	0.03	<0.05	0.053	16
S4-27-5-6	08/12/1982	<0.001	0.00115	0.0051	0.0034	0.041	120
S4-27-5-6	30/08/1983	0.0024	<0.00005	<0.0005	<0.001	<0.005	<5
S4-27-5-6	05/07/1984	<0.001	0.0001	0.0011	<0.001	0.012	<5
S4-27-5-6	23/03/1987			0.02		0.2	
S4-27-5-6	13/06/1987			0.02		0.12	
S4-27-5-6	02/09/1987			0.06		0.02	
S4-27-5-6	30/10/1987			0.02		0.02	
S4-27-5-7	05/10/1982	0.000003	0.0002	<0.001	<0.001	0.022	
S4-27-5-7	08/12/1982	0.0014	0.00438		0.1885	0.0903	1900
S4-27-5-7	30/08/1983	0.0056	<0.00005	<0.0005	<0.001	<0.005	<5
S4-27-5-7	05/07/1984	<0.001	<0.0001	0.0004	<0.001	<0.01	<5
S4-27-5-7	23/03/1987			0.02		0.12	
S4-27-5-7	31/05/1997	0.0001	<0.01	<0.001	<0.001	0.006	3
S4-27-5-7	31/07/1997	0.0113	<0.01	0.005	0.004	0.039	26
S4-27-5-8	08/12/1982	<0.001	0.00099	0.0053	<0.0025	0.036	96
S4-27-5-8	30/08/1983	0.0024	<0.00005	<0.0005	<0.001	<0.005	<5
S4-27-5-8	05/07/1984	<0.001	0.0005	0.0021	0.0013	0.019	<5
S4-27-5-8	25/03/1985			0.001		0.005	
S4-27-5-8	27/05/1985			0.011		0.055	
S4-27-5-8	12/08/1985			0.001		<0.005	28.8
S4-27-5-8	24/09/1985			0.001		0.002	

Table 9: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-5/13, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-5-8	25/11/1985			0.042		0.28	
S4-27-5-8	27/03/1986			0.011		0.087	
S4-27-5-8	30/06/1986			0.033		0.2	
S4-27-5-8	18/09/1986			0.024		0.15	
S4-27-5-8	27/04/1991			0.04		0.1	
S4-27-5-8	24/06/1991			0.02		0.02	
S4-27-5-8	04/11/1991			0.04		0.2	
S4-27-5-8	20/02/1996			0.007		0.036	
S4-27-5-8	30/05/1996	<0.2	<0.01	0.007	<0.02	0.036	23
S4-27-5-8	30/07/1996	<0.2	<0.01	0.004	<0.02	0.032	6
S4-27-5-8	10/10/1996	<0.2	<0.01	0.001	<0.02	0.01	<1
S4-27-5-8	08/10/1997	0.0022	<0.01	0.063	0.023	0.171	80
S4-27-5-8	30/05/1998	0.0003	<0.01	0.006	0.003	0.026	6
S4-27-5-9	05/10/1982	0.000001	0.0006	<0.001	<0.001	0.023	
S4-27-5-9	30/08/1983	0.0026	<0.00005	0.0007	0.002	<0.005	<5
S4-27-5-9	05/07/1984	<0.001	0.0001	0.0007	0.0016	<0.01	19
S4-27-5-10	05/07/1984	<0.001	<0.0001	0.0008	<0.001	<0.01	<5
S4-27-5-10	13/06/1987			0.02		0.02	
S4-27-5-10	02/09/1987			0.02		0.12	
S4-27-5-11	05/07/1984	<0.001	<0.0001	<0.0005	<0.001	<0.01	9
S4-27-5-11	30/10/1987			0.02		0.02	
S4-27-5-12	05/07/1984	<0.001	0.0002	0.0007	<0.001	<0.01	5
S4-27-5-13	07/04/1984	0.001	0.0005	0.0019	0.0057	0.012	120
S4-27-5-13	27/04/1991			0.06		0.24	
S4-27-5-13	24/06/1991			0.02		0.04	
S4-27-5-13	04/11/1991			0.08		0.32	
S4-27-5-13	20/02/1996			0.004		0.024	
S4-27-5-13	30/05/1996	<0.2	<0.01	0.004	<0.02	0.024	51
S4-27-5-13	30/07/1996	<0.2	<0.01	0.002	<0.02	0.021	53
S4-27-5-13	10/10/1996	<0.2	<0.01	<0.001	<0.02	0.005	5
S4-27-5-13	31/05/1997	0.0012	<0.01	0.001	0.002	0.009	10
S4-27-5-13	31/07/1997	0.0051	<0.01	0.001	0.003	0.011	16
S4-27-5-13	08/10/1997	0.0122	<0.01	0.046	0.053	0.187	310
S4-27-5-13	30/05/1998	0.0004	<0.01	0.008	0.002	0.025	11
S4-27-13							
S4-27-13	09/06/2009	0.00044	0.00019	<0.0002	<0.001	<0.002	<3
S4-27-13	19/08/2009	0.00124	0.00013	0.0003	<0.001	0.0036	12.8
S4-27-13	09/10/2009	0.00107	<0.0003	<0.0002	<0.001	<0.002	<3
S4-27-13	19/06/2010	0.00041	<0.0001	<0.0002	<0.001	<0.002	<3
S4-27-13	02/08/2010	0.00087	<0.00015	0.00019	<0.0005	0.001	<3
S4-27-13	15/10/2010	0.00095	<0.0002	<0.0005	<0.0005	<0.003	<3
S4-27-13	07/06/2011	<0.001	0.000058	<0.002	<0.003	0.008	2
S4-27-13	22/08/2011	<0.001	0.000084	<0.002	<0.003	0.003	<1



CLIENT



CANTUNG MINE

Total Arsenic Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present



PROJECT NO.
Y22101275.001

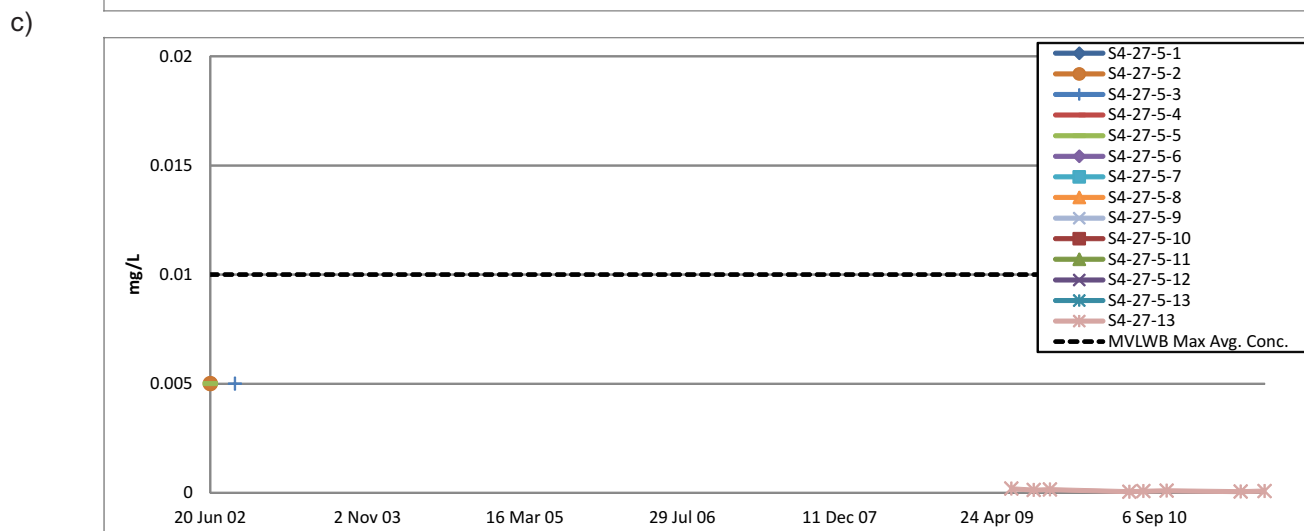
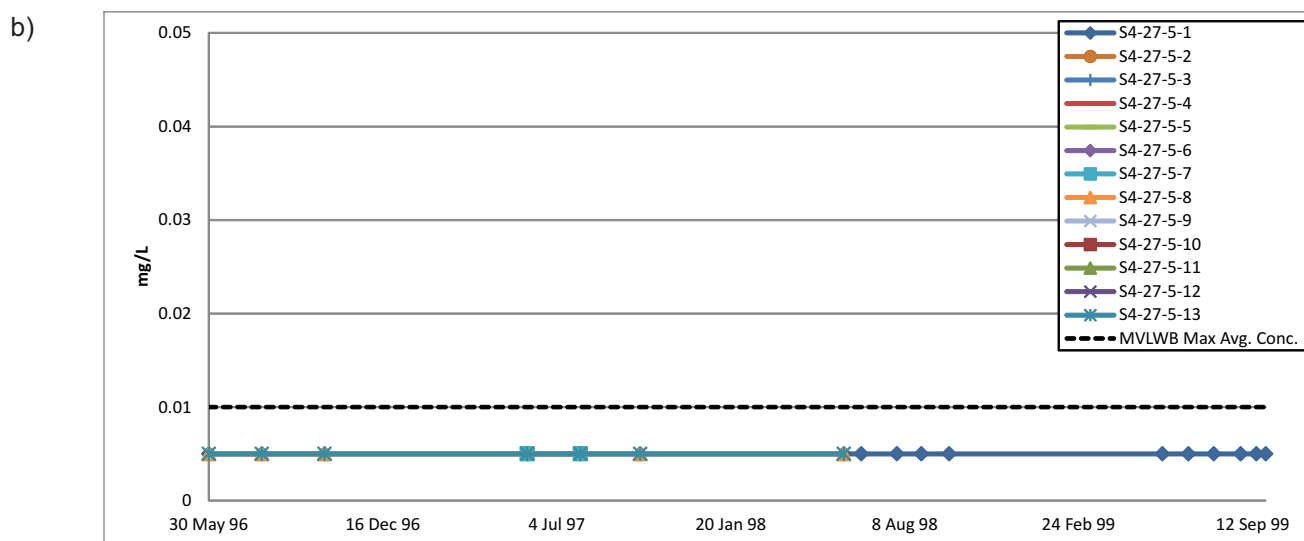
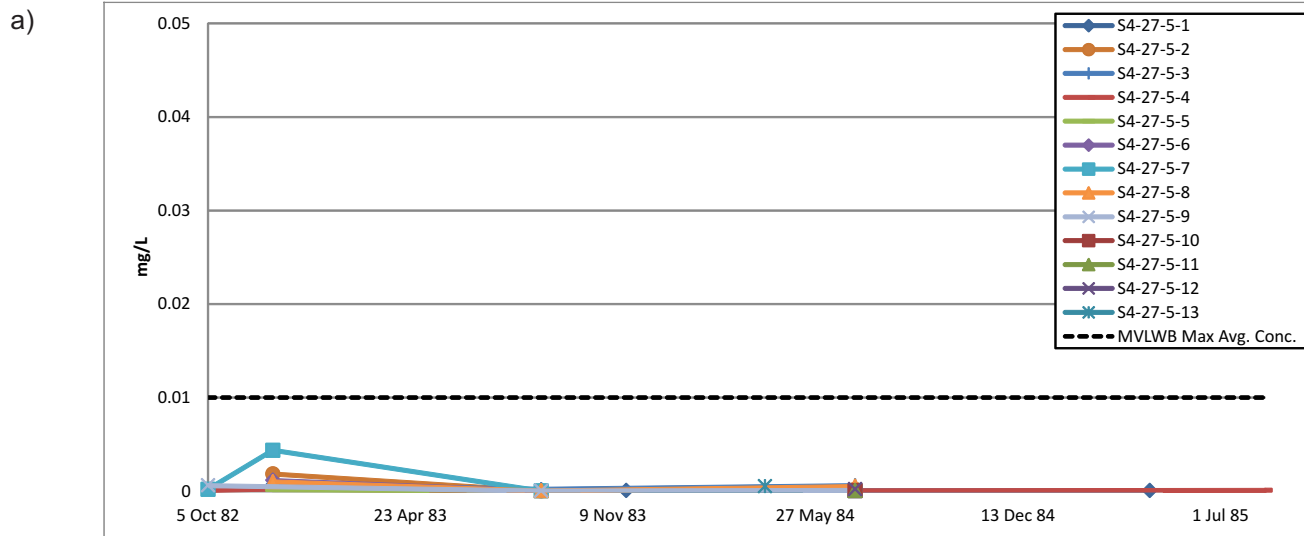
DWN CKD APVD
MEZ SH SH

Figure 18

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DATE
May 8, 2012

STATUS
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CLIENT



CANTUNG MINE

Total Cadmium Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present



PROJECT NO.
Y22101275.001

DWN CKD APVD
MEZ SH SH

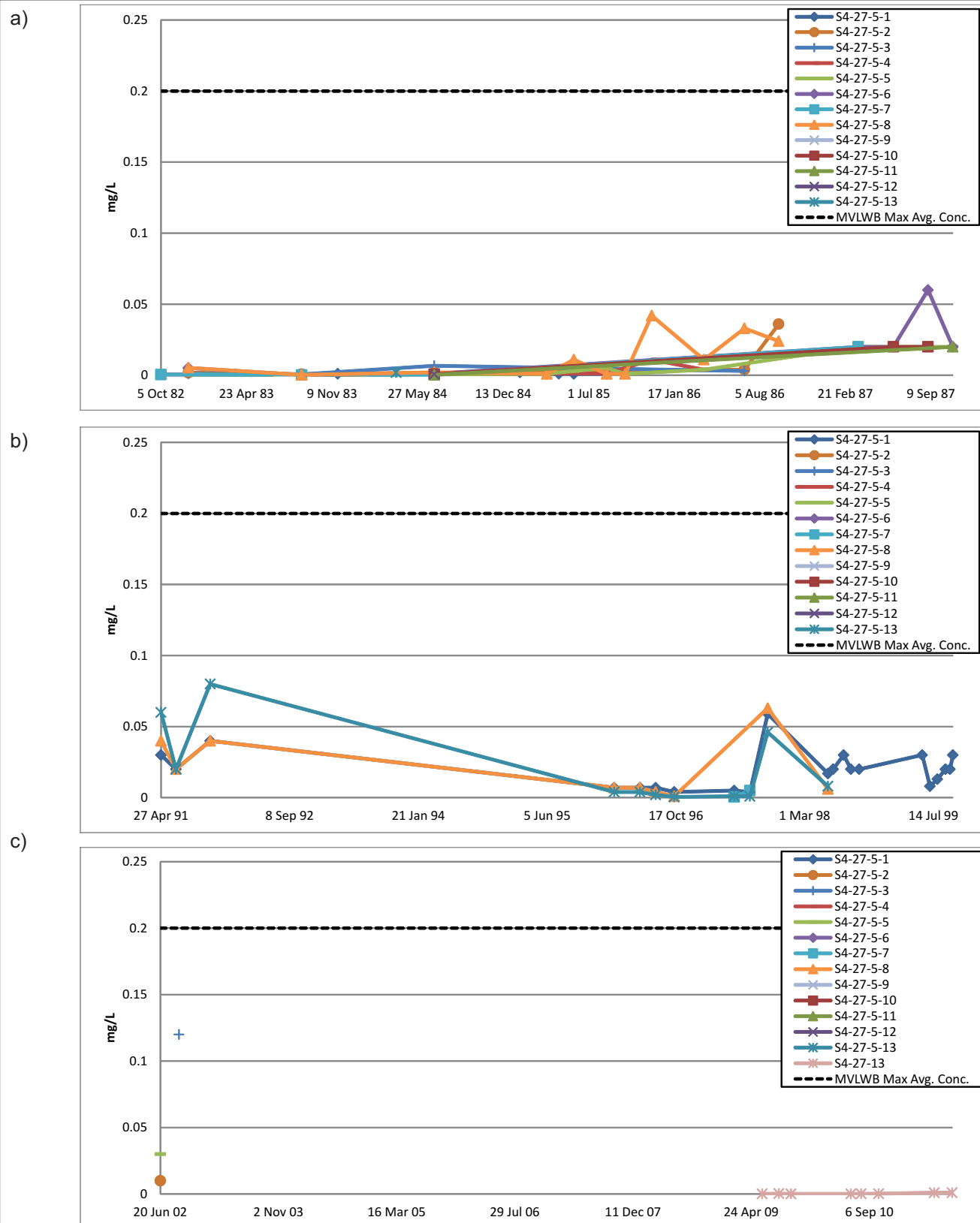
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EBA-VANC

DATE
May 8, 2012

Figure 19

STATUS
ISSUED FOR USE



CLIENT



CANTUNG MINE

**Total Copper Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present**

STATUS
ISSUED FOR USE



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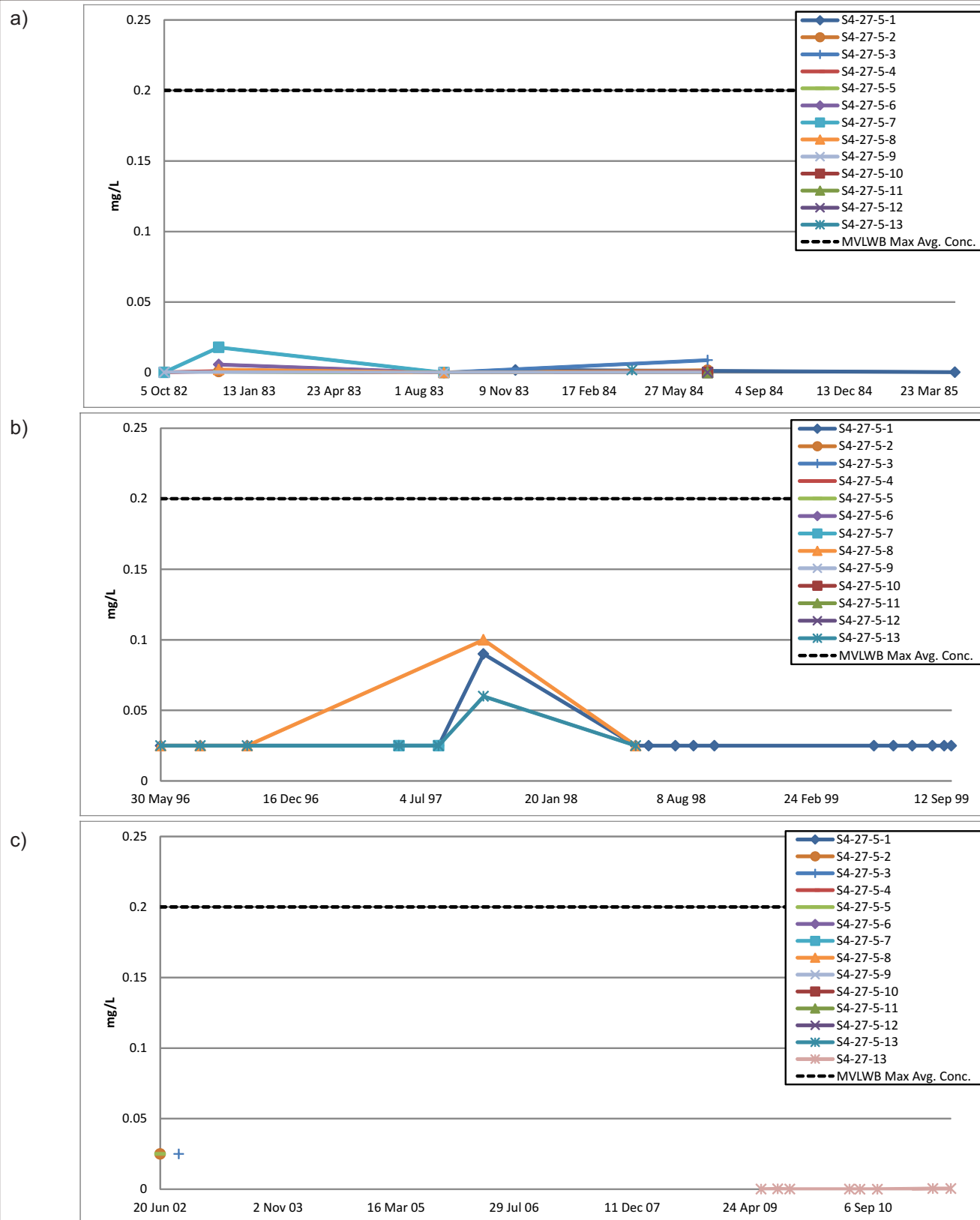
PROJECT NO.
Y22101275.001

OFFICE
EBA-VANC

DWN CKD APVD
MEZ SH SH

DATE
May 8, 2012

Figure 20



CLIENT



CANTUNG MINE

**Total Lead Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present**

STATUS
ISSUED FOR USE



A TETRA TECH COMPANY

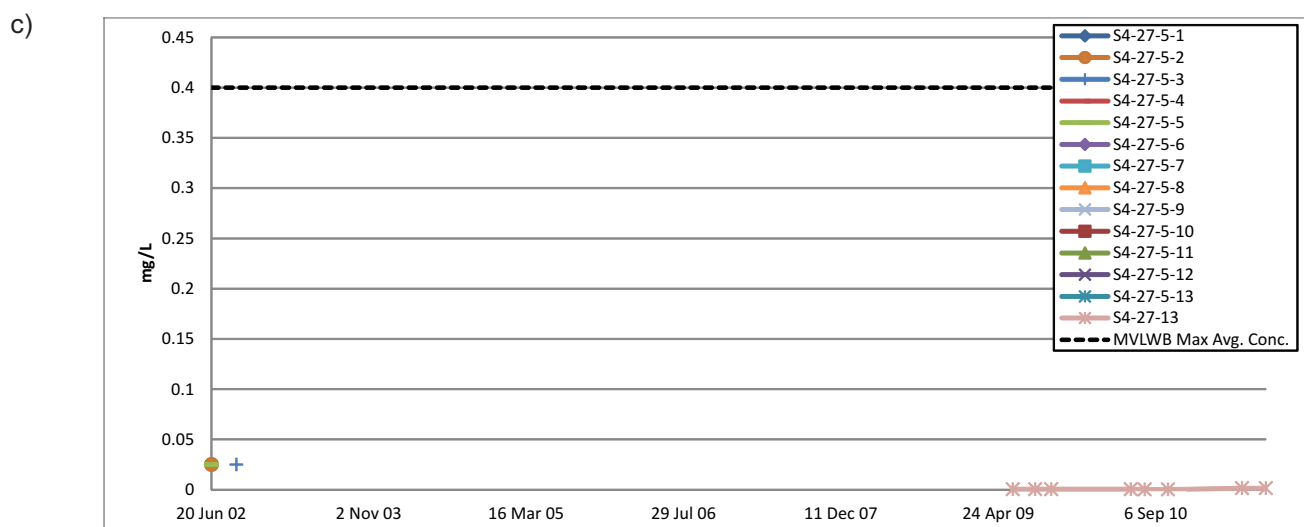
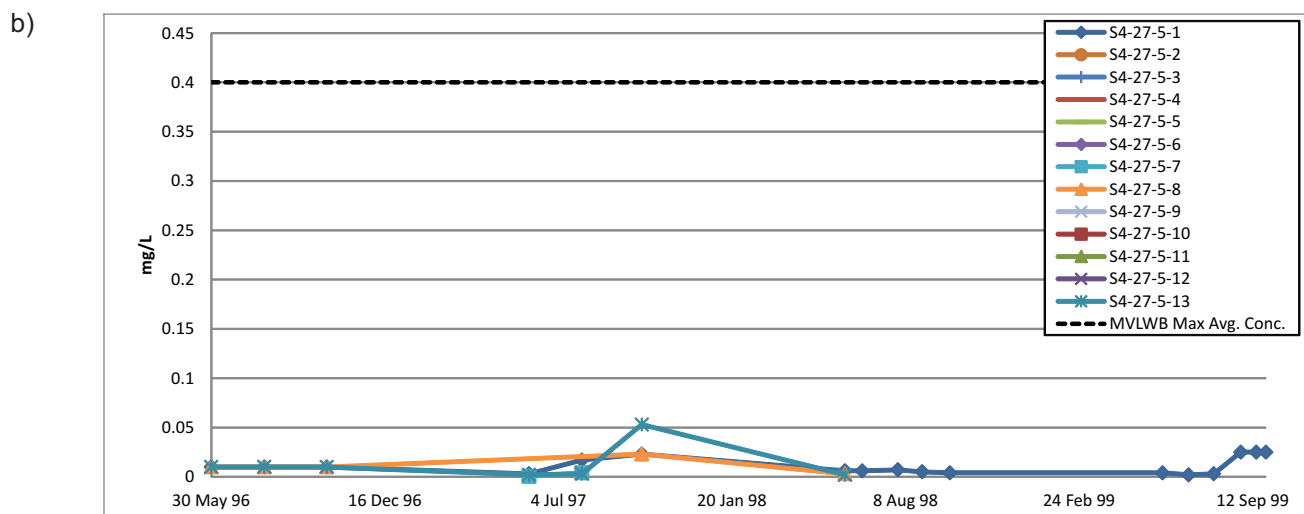
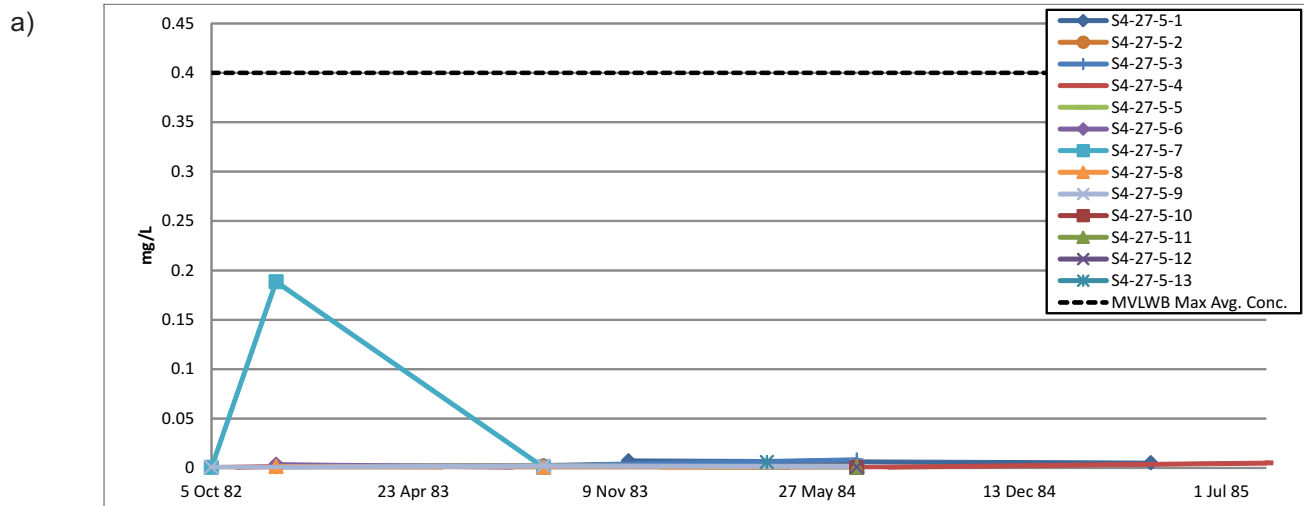
PROJECT NO.
Y22101275.001

OFFICE
EBA-VANC

DWN CKD APVD REV
MEZ SH SH 0

DATE
May 8, 2012

Figure 21



CLIENT



A TETRA TECH COMPANY

CANTUNG MINE

Total Nickel Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present

PROJECT NO.

Y22101275.001

OFFICE

EBA-VANC

DWN

MEZ

CKD

SH

APVD

SH

REV

0

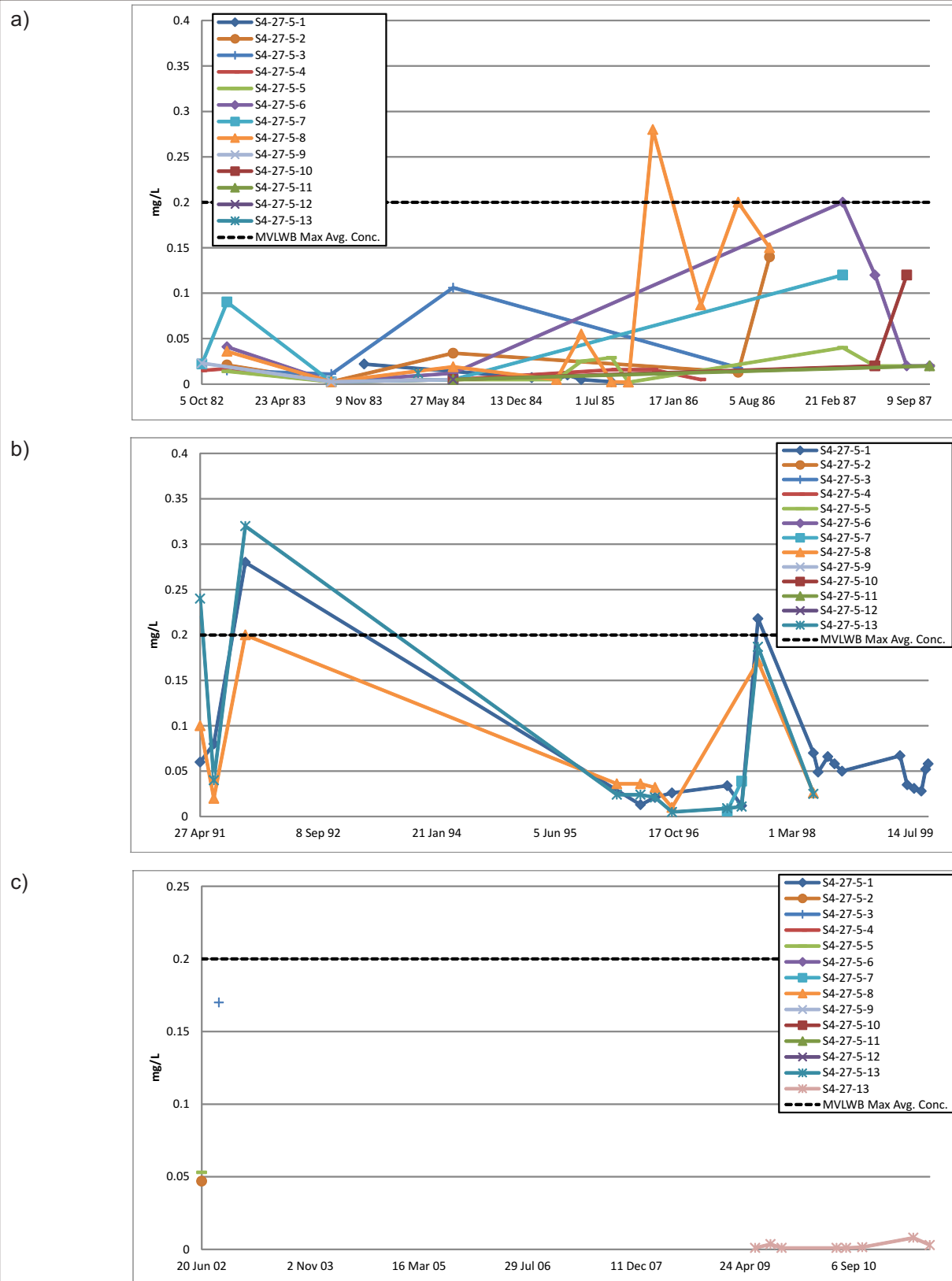
DATE

May 8, 2012

Figure 22

STATUS

ISSUED FOR USE



CLIENT



CANTUNG MINE

**Total Zinc Concentrations (mg/L) in
Groundwater, Station S4-27-5/13,
1980s – Present**



A TETRA TECH COMPANY

PROJECT NO.

Y22101275.001

DWN

MEZ

CKD

SH

APVD

SH

REV

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OFFICE

EBA-VANC

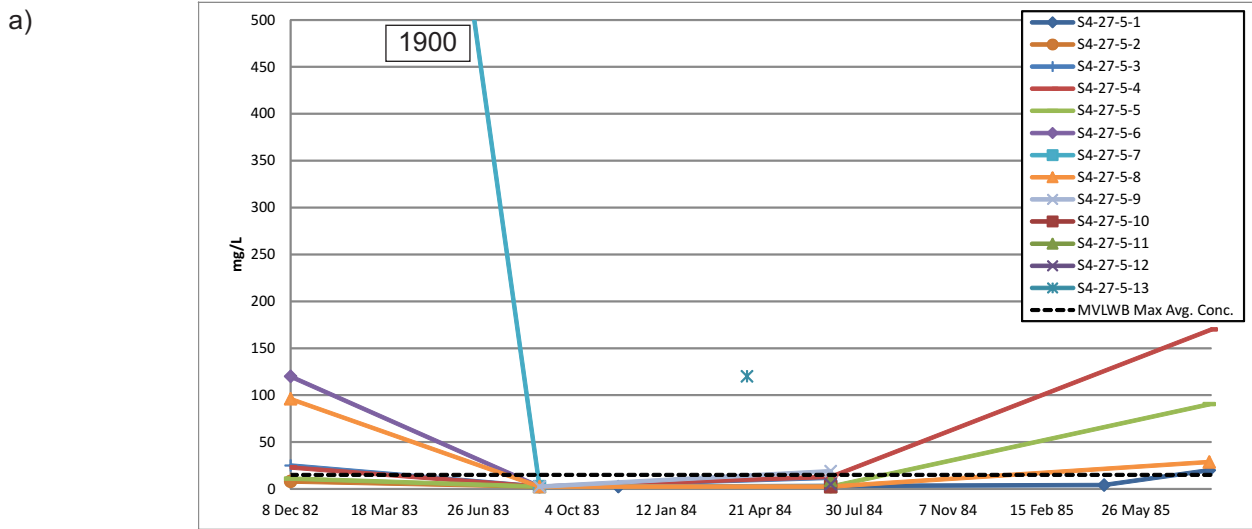
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May 8, 2012

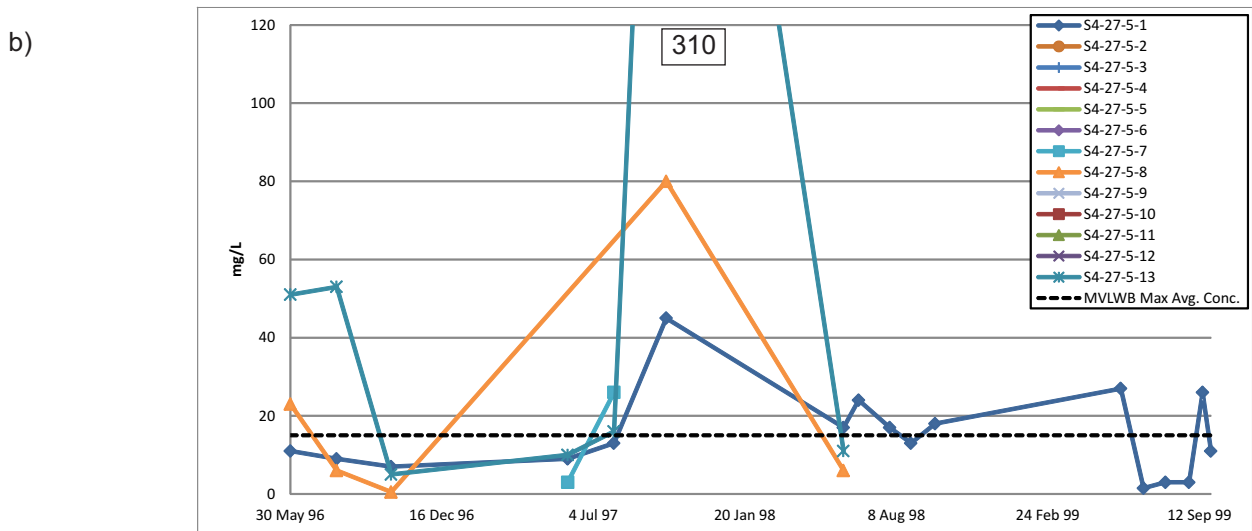
Figure 23

STATUS

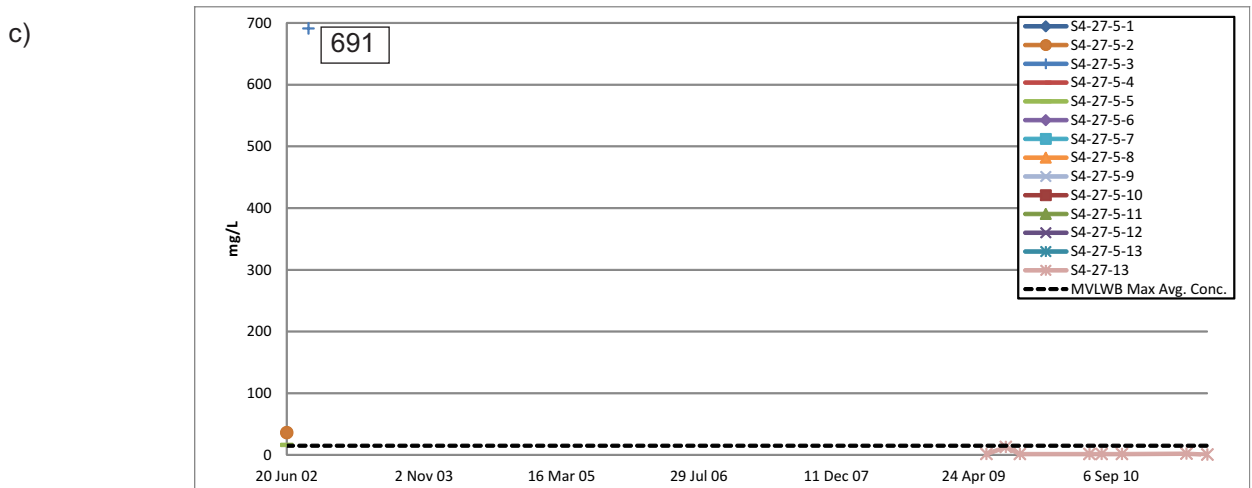
ISSUED FOR USE



data point off scale = 1900



data point off scale = 310



CLIENT



CANTUNG MINE

Total Suspended Solids Concentrations
(mg/L) in Groundwater,
Station S4-27-5/13, 1980s – Present



A TETRA TECH COMPANY

PROJECT NO.
Y22101275.001

OFFICE
EBA-VANC

DWN CKD APVD REV
MEZ SH SH 0

DATE
May 9, 2012

Figure 24

STATUS
ISSUED FOR USE

5.2.3 Groundwater Station S4-27-7

Groundwater monitoring Station S4-27-7 was established in June 1981 and is located down-gradient to the east of TP4 on the Flat River floodplain. This station, also referred to as BH 43, is a multi-level installation with a total of 12 piezometers installed at the following depths:

▪ Piezometer 1	18.1 m	▪ Piezometer 7	8.9 m
▪ Piezometer 2	16.5 m	▪ Piezometer 8	7.4 m
▪ Piezometer 3	15.0 m	▪ Piezometer 9	6.9 m
▪ Piezometer 4	13.5 m	▪ Piezometer 10	4.3 m
▪ Piezometer 5	12.0 m	▪ Piezometer 11	2.8 m
▪ Piezometer 6	10.4 m	▪ Piezometer 12	1.9 m

Figures 25 to 31 and Table 10 present all of the available groundwater quality data for Station S4-27-7 for the period of record.

As noted in Figures 25 to 31 and Table 10, during the 1980s, the concentrations of total metals in S4-27-7 groundwater at all piezometer depths were consistently below the current MVLWB MAC groundwater quality parameters, with very few exceptions. The exceptions occurred during the one day sampling events completed in May, September and November 1986 and in July 1987.

In May 1986 the groundwater in Piezometer 1 recorded slightly elevated total metals values for total arsenic (0.6 mg/l), cadmium (0.1 mg/l), lead (0.25 mg/l), nickel (2.5 mg/l) and zinc (7.5 mg/l). Both the lead and zinc values were due to the higher detection limits used at the time.

In September 1986 several total metals parameters were elevated in Piezometers 1, 2 and 4 as summarized below:

- Piezometer 1 total arsenic (1.9 mg/l) and lead (0.5 mg/l)
- Piezometer 2 total arsenic (1.9 mg/l), lead (0.5 mg/l), nickel (2.5 mg/l) and zinc (7.5 mg/l)
- Piezometer 4 total copper (1.7 mg/l), lead (0.5 mg/l), nickel (2.5 mg/l) and zinc (7.5 mg/l)

In November 1986 total copper (0.8 mg/l) was elevated in Piezometer 12. As previously noted, the values recorded for total lead, nickel and zinc appeared to be largely due to the high detection limits employed at the time by the laboratory.

The other exceptions occurred in July 1987 when several metals parameters were elevated in Piezometers 2 and 5. At that time a total arsenic value of 2 mg/l was recorded in Piezometer 5 and elevated detection limit values for cadmium (0.25 mg/l), copper (0.5 mg/l) and lead (0.5 mg/l) were recorded in Piezometer 2.

During the 1980s only one notably elevated TSS value was documented and this occurred in April 1984, when a reading of 140 mg/l was recorded in Piezometer 11 at S4-27-7.

During the 1990s, when the mine was closed, the concentrations of total metals in S4-27-7 groundwater at all piezometer depths were consistently at or below the current MVLWB MAC groundwater quality parameters, one isolated exception for total zinc. In November 1991, a total zinc value of 16 mg/l was recorded in Piezometer 1.

TSS values during the 1990s, generally remained below the current MVLWB MAC groundwater quality TSS parameter, with only one elevated reading of 30 mg/l occurring in Piezometer 9 in May 1997, a couple of readings of 20 mg/l in Piezometer 3 in May and June 1998 and a single reading of 22 mg/l in Piezometer 9 in August 1999.

From the year 2000 to the present, the concentrations of total metals in S4-27-7 groundwater have consistently been well below the current MVLWB MAC groundwater quality parameters. However, TSS values in the groundwater during this period of time have occasionally been elevated above the MVLWB MAC parameters. In particular, a TSS concentration of 128 mg/l was recorded from a single sample in Piezometer 9 in October 2002 and two other slightly elevated TSS values were recorded from this Piezometer in October 2007 (34.4 mg/l) and in June 2010 (39.5 mg/l).

Table 10: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-7, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-7								
S4-27-7-1	22/11/1983	0.0018	<0.0001	<0.0005	0.0011	0.0043	<0.01	<5
S4-27-7-1	05/07/1984	<0.001	<0.0001	0.0009	<0.0001	<0.001	0.01	<5
S4-27-7-1	21/01/1985			0.001			0.005	
S4-27-7-1	25/03/1985			0.001			0.005	
S4-27-7-1	22/04/1985	<0.001	<0.0001	0.0012	<0.0001	<0.01	<0.02	<5
S4-27-7-1	27/05/1985			0.001			0.005	
S4-27-7-1	12/08/1985			<0.001			<0.005	12.2
S4-27-7-1	14/08/1985	<0.001	0.0003	<0.0005		<0.01	<0.015	<5
S4-27-7-1	24/09/1985			0.001			0.004	
S4-27-7-1	25/11/1985			0.003			0.005	
S4-27-7-1	27/05/1986	0.6	0.1	<0.5	<0.5	<5	<15	<5
S4-27-7-1	30/06/1986			0.003			0.005	
S4-27-7-1	08/09/1986	1.9		<0.5	<1	<5	<15	<3
S4-27-7-1	18/09/1986			0.001			0.024	
S4-27-7-1	24/11/1986			0.02			0.04	
S4-27-7-1	23/03/1987			0.02			0.1	
S4-27-7-1	13/06/1987			0.02			0.02	
S4-27-7-1	02/09/1987			0.02			0.02	
S4-27-7-1	30/10/1987			0.02			0.02	
S4-27-7-1	24/06/1991			0.02			0.12	
S4-27-7-1	04/11/1991			0.01			0.16	
S4-27-7-1	30/07/1996	<0.2	<0.01	<0.001	<0.05	<0.02	0.014	3
S4-27-7-1	12/10/1996	<0.2	<0.01	<0.001	<0.05	<0.02	0.01	1
S4-27-7-1	31/07/1997	0.0072	<0.01	<0.001	<0.05	<0.002	0.007	<1
S4-27-7-1	10/10/1997	0.0015	<0.01	<0.001	<0.05	0.001	0.006	8

Table 10: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-7, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-7-1	27/08/1998	0.0015	<0.01	<0.001	<0.05	0.001	0.013	4
S4-27-7-1	31/05/1999	0.0011	<0.01	<0.001	<0.05	0.001	0.009	<3
S4-27-7-1	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.01	<3
S4-27-7-1	27/05/2001			<0.01			0.007	<3
S4-27-7-1	02/06/2001			<0.01			0.006	<3
S4-27-7-1	20/06/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.017	6
S4-27-7-1	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-7-1	06/09/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.005	24
S4-27-7-1	17/10/2005	0.00163	0.000095	0.00012	<0.00005	0.0008	0.0039	<3
S4-27-7-1	20/06/2006	0.00176	0.000167	0.00034	<0.00005	0.00069	0.0049	3.3
S4-27-7-1	23/07/2006	0.00175	<0.00005	0.00021	<0.00005	0.00076	0.0053	<3
S4-27-7-1	02/09/2006	0.00185	0.000207	0.0004	<0.00005	0.00078	0.0047	<3
S4-27-7-1	20/07/2007	0.00152	0.000084	<0.0001	<0.00005	0.00102	0.007	3.8
S4-27-7-1	19/08/2007	0.00165	0.00008	<0.0001	<0.00005	0.00099	0.0034	7.3
S4-27-7-1	05/07/2008	0.00162	0.000145	0.00019	<0.00005	0.00122	0.006	9.3
S4-27-7-1	16/08/2008	0.00165	<0.00005	0.00016	<0.00005	0.00103	0.0064	<3
S4-27-7-1	09/06/2009	0.00134	<0.00005	0.00017	<0.00005	0.00075	0.0035	<3
S4-27-7-1	18/08/2009	0.00131	<0.00005	<0.0001	<0.00005	0.00129	0.0038	<3
S4-27-7-1	19/06/2010	0.00099	<0.00005	<0.0012	<0.00005	0.00135	0.0037	<3
S4-27-7-1	02/08/2010	0.00091	<0.00005	<0.0009	<0.00005	0.00099	0.0025	<3
S4-27-7-1	16/10/2010	0.00107	<0.00005	<0.0005	<0.00005	0.00167	<0.003	<3
S4-27-7-1	07/06/2011	0.001	<0.000025	<0.002	<0.001	0.005	0.005	<2
S4-27-7-1	21/08/2011	0.001	<0.000025	<0.002	<0.001	0.004	0.005	<1
S4-27-7-2	22/11/1983	0.0023	<0.0001	<0.0005	0.0016	0.0042	<0.01	<5
S4-27-7-2	05/07/1984	<0.001	<0.0001	0.0008	<0.0001	<0.001	0.016	<5
S4-27-7-2	08/09/1986	1.9		<0.5	<1	<5	<15	11
S4-27-7-2	17/07/1987	1	<0.5	<1	<1	<1	<1	<2
S4-27-7-2	30/10/1987			0.02			0.04	
S4-27-7-2	30/06/1999	0.0026	<0.01	<0.001	<0.05	<0.001	0.01	13
S4-27-7-2	29/07/1999	0.0033	<0.01	<0.003	<0.05	0.001	0.016	<3
S4-27-7-3	22/11/1983	0.003	<0.0001	<0.0005	0.0025	0.0037	<0.01	<5
S4-27-7-3	05/07/1984	<0.001	<0.0001	0.0006	<0.0001	<0.001	0.016	<5
S4-27-7-3	30/10/1987			0.02			0.04	
S4-27-7-3	30/05/1998	0.0019	<0.01	<0.001	<0.05	<0.001	0.006	21
S4-27-7-3	20/06/1998	0.002	<0.01	<0.001	<0.05	<0.001	0.009	21
S4-27-7-3	27/08/1998	0.0019	<0.01	<0.001	<0.05	<0.001	<0.005	10
S4-27-7-4	05/07/1984	0.0014	<0.0001	0.0011	<0.0001	<0.001	0.044	<5
S4-27-7-4	25/11/1985			0.002			0.005	
S4-27-7-4	27/03/1986			0.032			0.016	
S4-27-7-4	08/09/1986	<0.5		1.7	<1	<5	<15	<3
S4-27-7-4	13/06/1987			0.02			0.02	
S4-27-7-4	02/09/1987			0.02				
S4-27-7-4	31/05/1997	0.0015	<0.01	0.004	<0.05	0.001	0.103	3

Table 10: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-7, 1980s – Present

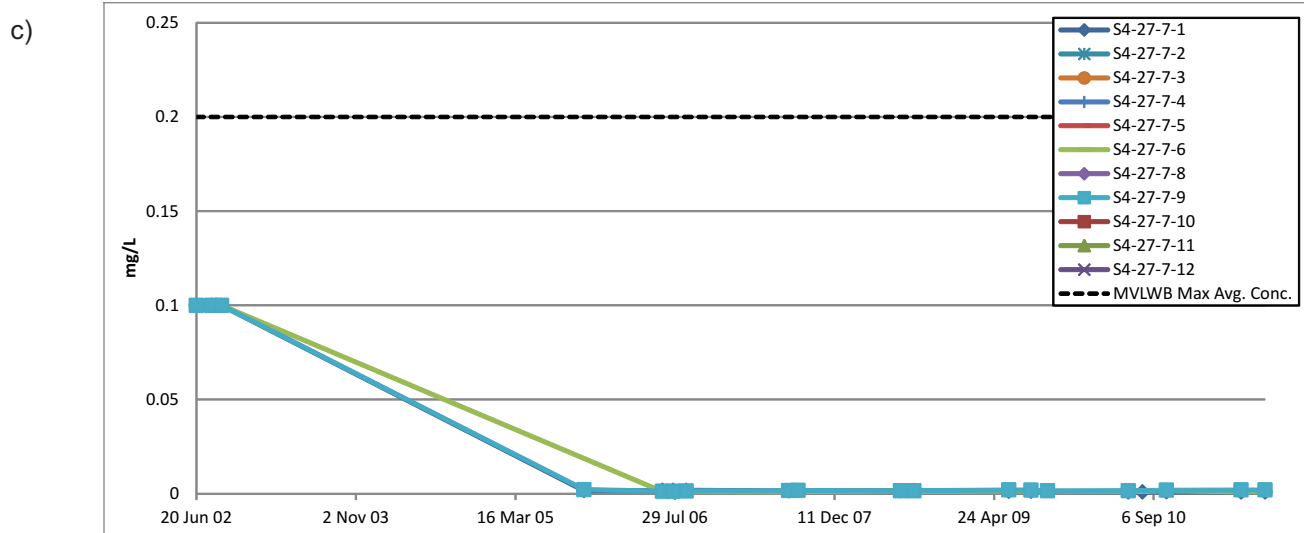
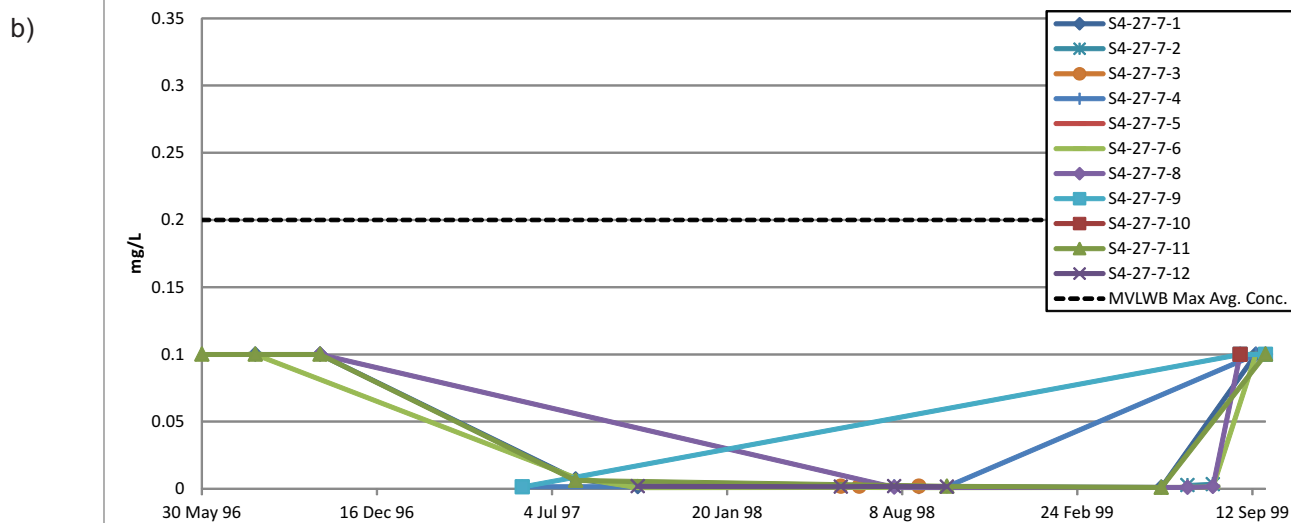
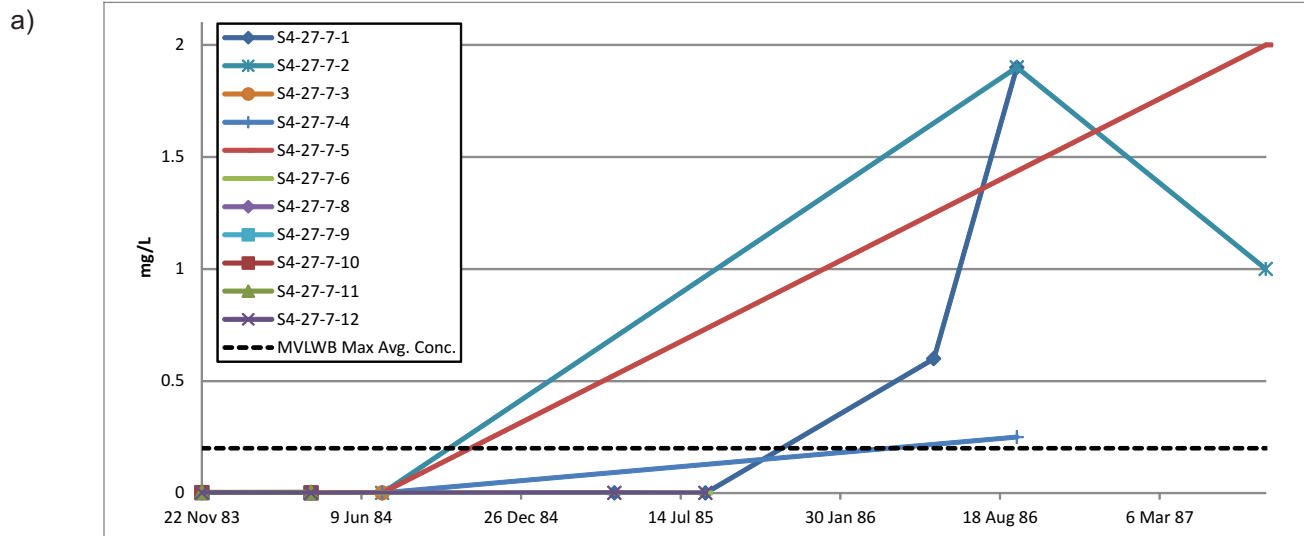
Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-7-4	30/07/1998	0.0017	<0.01	<0.001	<0.05	<0.001	0.006	5
S4-27-7-4	28/09/1998	0.0016	<0.01	<0.001	<0.05	<0.001	0.006	6
S4-27-7-4	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.007	<3
S4-27-7-5	22/11/1983	0.0024	<0.0001	<0.0005	0.0033	0.0031	0.013	<5
S4-27-7-5	05/07/1984	0.001	<0.0001	0.0007	<0.0001	<0.001	0.011	<5
S4-27-7-5	17/07/1987	2	<0.5	<1	<1	<1	<1	2
S4-27-7-6	22/11/1983	0.0012	<0.0001	<0.0005	0.0038	0.0037	<0.01	<5
S4-27-7-6	05/07/1984	<0.001	<0.0001	0.0013	<0.0001	<0.001	0.012	<5
S4-27-7-6	21/01/1985			0.001			0.005	
S4-27-7-6	25/03/1985			0.001			0.005	
S4-27-7-6	22/04/1985	<0.001	<0.0001	0.0008	<0.0001	<0.01	0.021	<5
S4-27-7-6	27/05/1985			0.001			0.005	
S4-27-7-6	12/08/1985			<0.001			<0.005	22.8
S4-27-7-6	14/08/1985	<0.001	<0.0001	0.0005		<0.01	<0.015	<5
S4-27-7-6	24/09/1985			0.001			0.002	
S4-27-7-6	30/06/1986			0.003			0.028	
S4-27-7-6	18/09/1986			0.001			0.005	
S4-27-7-6	24/11/1986			0.02			0.06	
S4-27-7-6	24/06/1991			0.02			0.02	
S4-27-7-6	04/11/1991			0.01			0.2	
S4-27-7-6	30/07/1996	<0.2	<0.01	<0.001	<0.05	<0.02	0.006	1
S4-27-7-6	31/07/1997	0.0082	<0.01	<0.001	<0.05	<0.002	0.008	2
S4-27-7-6	10/10/1997	0.0009	<0.01	<0.001	<0.05	<0.001	0.006	3
S4-27-7-6	30/05/1998	0.001	<0.01	<0.001	<0.05	<0.001	0.01	4
S4-27-7-6	20/06/1998	0.0011	<0.01	<0.001	<0.05	<0.001	0.011	1
S4-27-7-6	27/08/1998	0.0009	<0.01	0.008	<0.05	<0.001	<0.005	2
S4-27-7-6	30/06/1999	0.0011	<0.01	<0.001	<0.05	<0.001	<0.005	<3
S4-27-7-6	29/07/1999	0.0015	<0.01	<0.002	<0.05	0.003	<0.005	<3
S4-27-7-6	16/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-7-6	20/06/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.009	8
S4-27-7-6	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.007	<3
S4-27-7-6	06/09/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.006	28
S4-27-7-6	20/06/2006	0.00111	0.000201	0.00032	<0.00005	0.00052	0.0033	<3
S4-27-7-6	23/07/2006	0.00117	0.00022	0.00046	<0.00005	0.00056	0.005	<3
S4-27-7-6	02/09/2006	0.00116	0.000081	<0.0001	<0.00005	<0.0005	0.002	<3
S4-27-7-6	20/07/2007	0.00108	<0.00005	0.0145	0.000114	0.00067	0.0041	<3
S4-27-7-6	19/08/2007	0.00115	0.000096	0.0002	<0.00005	0.00061	0.0023	16
S4-27-7-6	05/07/2008	0.00146	0.00012	0.00049		0.00064	0.0062	<3
S4-27-7-6	16/08/2008	0.00129	<0.00005	<0.0001	0.00005	0.00056	0.0053	7.7
S4-27-7-6	09/06/2009	0.00135	<0.00005	0.00049	0.000361	<0.0005	0.0129	6.2
S4-27-7-6	18/08/2009	0.00138	<0.00005	0.00026	<0.00005	0.00077	0.0027	<3
S4-27-7-6	09/10/2009	0.00144	<0.0001	<0.0002	<0.0001	<0.001	<0.002	<3
S4-27-7-6	19/06/2010	0.00129	<0.00005	0.00021	0.000077	0.00081	0.0032	6

Table 10: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-7, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-7-6	02/08/2010	0.00127	<0.00005	0.00028	<0.00005	0.0008	<0.001	<3
S4-27-7-6	16/10/2010	0.00165	<0.00005	<0.0005	0.000062	0.00065	<0.003	<3
S4-27-7-6	07/06/2011	0.001	<0.000025	<0.002	<0.001	0.005	0.011	<2
S4-27-7-6	21/08/2011	0.001	<0.000025	<0.002	<0.001	0.004	0.005	<1
S4-27-7-7	23/03/1987			0.02			0.04	
S4-27-7-7	13/06/1987						0.02	
S4-27-7-7	02/09/1987						0.02	
S4-27-7-8	22/11/1983	0.0018	<0.0001	<0.0005	0.004	0.0026	0.013	<5
S4-27-7-8	07/04/1984	<0.001	<0.0001	0.0008	<0.0001	<0.001	<0.01	<5
S4-27-7-8	12/10/1996	<0.2	<0.01	0.001	<0.05	<0.02	0.035	6
S4-27-7-8	30/07/1998	0.0011	<0.01	<0.001	<0.05	0.001	0.017	<1
S4-27-7-8	30/06/1999	0.001	<0.01	<0.001	<0.05	<0.001	0.01	5
S4-27-7-8	29/07/1999	0.0016	<0.01	<0.002	<0.05	<0.001	0.01	<3
S4-27-7-8	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.008	<3
S4-27-7-8	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-7-9	22/11/1983	0.0017	<0.0001	<0.0005	0.0035	0.0017	<0.01	<5
S4-27-7-9	07/04/1984	<0.001	<0.0001	0.001	<0.0001	<0.001	0.013	<5
S4-27-7-9	27/03/1986			0.008			0.024	
S4-27-7-9	31/05/1997	0.0014	<0.01	0.002	<0.05	0.001	0.029	30
S4-27-7-9	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.02	22
S4-27-7-9	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.01	12
S4-27-7-9	20/06/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.01	5
S4-27-7-9	07/08/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.023	128
S4-27-7-9	07/09/2002	<0.2	<0.01	<0.01	<0.05	<0.05	0.006	24
S4-27-7-9	17/10/2005	0.0022	0.000163	0.00109	0.000154	<0.0005	0.0052	3.1
S4-27-7-9	20/06/2006	0.00137	0.000256	0.00033	<0.00005	<0.0005	0.0048	18.7
S4-27-7-9	23/07/2006	0.00136	0.000167	0.00029	<0.00005	<0.0005	0.0107	<3
S4-27-7-9	02/09/2006	0.0015	0.000059	0.00028	0.000077	<0.0005	0.0024	<3
S4-27-7-9	20/07/2007	0.00168	0.00005	0.00119	0.000086	<0.0005	0.0026	5.8
S4-27-7-9	19/08/2007	0.00175	0.000061	<0.0001	<0.00005	<0.0005	<0.001	34.7
S4-27-7-9	05/07/2008	0.00156	0.000334	0.00086	0.000445	0.00097	0.0104	3.9
S4-27-7-9	16/08/2008	0.00161	<0.00005	0.00011	<0.00005	<0.0005	0.0035	3
S4-27-7-9	09/06/2009	0.00202	<0.00005	0.00021	0.000078	<0.0005	<0.002	4.2
S4-27-7-9	18/08/2009	0.00197	<0.00005	0.00011	<0.00005	<0.0005	<0.001	4.2
S4-27-7-9	09/10/2009	0.00152	<0.00005	<0.0001	<0.00005	<0.0005	0.0013	3.3
S4-27-7-9	19/06/2010	0.00162	<0.00005	0.00049	0.000315	0.00094	0.0049	39.5
S4-27-7-9	16/10/2010	0.0019	<0.00005	<0.0005	0.000054	<0.0005	<0.003	3.7
S4-27-7-9	07/06/2011	0.002	0.000025	<0.002	<0.001	0.005	0.008	4
S4-27-7-9	21/08/2011	0.002	<0.000025	<0.002	<0.001	0.003	0.003	3
S4-27-7-10	22/11/1983	0.0013	<0.0001	<0.0005	0.0034	0.0026	<0.01	<5
S4-27-7-10	07/04/1984	<0.001	<0.0001	0.001	<0.0001	<0.001	0.012	<5
S4-27-7-10	29/08/1999	<0.2	<0.01	<0.01	<0.05	<0.05	0.012	15
S4-27-7-11	22/11/1983	0.0035	<0.0001	0.0053	0.0017	0.0081	0.018	23

Table 10: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-7, 1980s – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-7-11	07/04/1984	0.0038	<0.0001	0.0023	0.0025	0.006	0.011	140
S4-27-7-11	23/03/1987			0.02				
S4-27-7-11	02/09/1987			0.02				
S4-27-7-11	20/02/1996			0.002				
S4-27-7-11	30/05/1996	<0.2	<0.01	0.002	<0.05	<0.02	0.008	<1
S4-27-7-11	30/07/1996	<0.2	<0.01	0.002	<0.05	<0.02	0.01	8
S4-27-7-11	12/10/1996	<0.2	<0.01	<0.001	<0.05	<0.02	0.006	6
S4-27-7-11	31/07/1997	0.0062	<0.01	<0.001	<0.05	<0.002	<0.005	13
S4-27-7-11	28/09/1998	0.0018	<0.01	<0.001	<0.05	<0.001	<0.005	7
S4-27-7-11	31/05/1999	0.001	<0.01	0.002	<0.05	<0.001	0.005	5
S4-27-7-11	27/09/1999	<0.2	<0.01	<0.01	<0.05	<0.05	<0.005	<3
S4-27-7-12	22/11/1983	0.0015	<0.0001	<0.0005	0.0015	0.0048	<0.01	<5
S4-27-7-12	07/04/1984	<0.001	<0.0001	0.0009	<0.0001	<0.001	0.01	<5
S4-27-7-12	21/01/1985			0.092			0.022	
S4-27-7-12	25/03/1985			0.11			0.012	
S4-27-7-12	22/04/1985	0.0011	<0.0001	0.0593	0.00207	<0.01	0.031	<5
S4-27-7-12	27/05/1985			0.006			0.005	
S4-27-7-12	12/08/1985			<0.001			<0.005	<1
S4-27-7-12	14/08/1985	<0.001	0.0002	0.0007		<0.01	<0.015	<5
S4-27-7-12	24/09/1985			0.005			0.007	
S4-27-7-12	27/03/1986						0.064	
S4-27-7-12	30/06/1986			0.013			0.72	
S4-27-7-12	18/09/1986			0.004			0.2	
S4-27-7-12	24/11/1986			0.8			5.10	
S4-27-7-12	23/03/1987						0.04	
S4-27-7-12	13/06/1987						0.02	
S4-27-7-12	02/09/1987						0.02	
S4-27-7-12	30/10/1987						0.04	
S4-27-7-12	27/04/1991						0.06	
S4-27-7-12	24/06/1991			0.02			0.02	
S4-27-7-12	04/11/1991			0.04			0.28	
S4-27-7-12	10/10/1997	0.0018	<0.01	0.001	<0.05	<0.001	0.009	11
S4-27-7-12	30/05/1998	0.0015	<0.01	0.001	<0.05	0.002	0.016	3
S4-27-7-12	30/07/1998	0.0018	<0.01	0.004	<0.05	<0.001	0.038	<1
S4-27-7-12	28/09/1998	0.0015	<0.01	0.002	<0.05	<0.001	0.015	3



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CLIENT



A TETRA TECH COMPANY

CANTUNG MINE

Total Arsenic Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present

PROJECT NO.
Y22101275.001

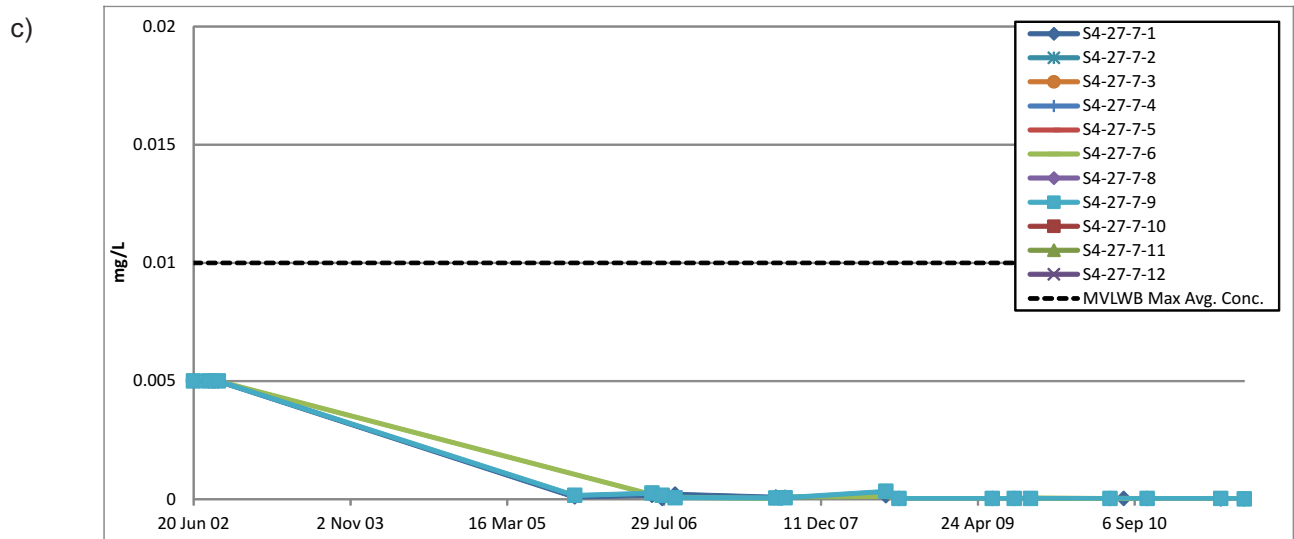
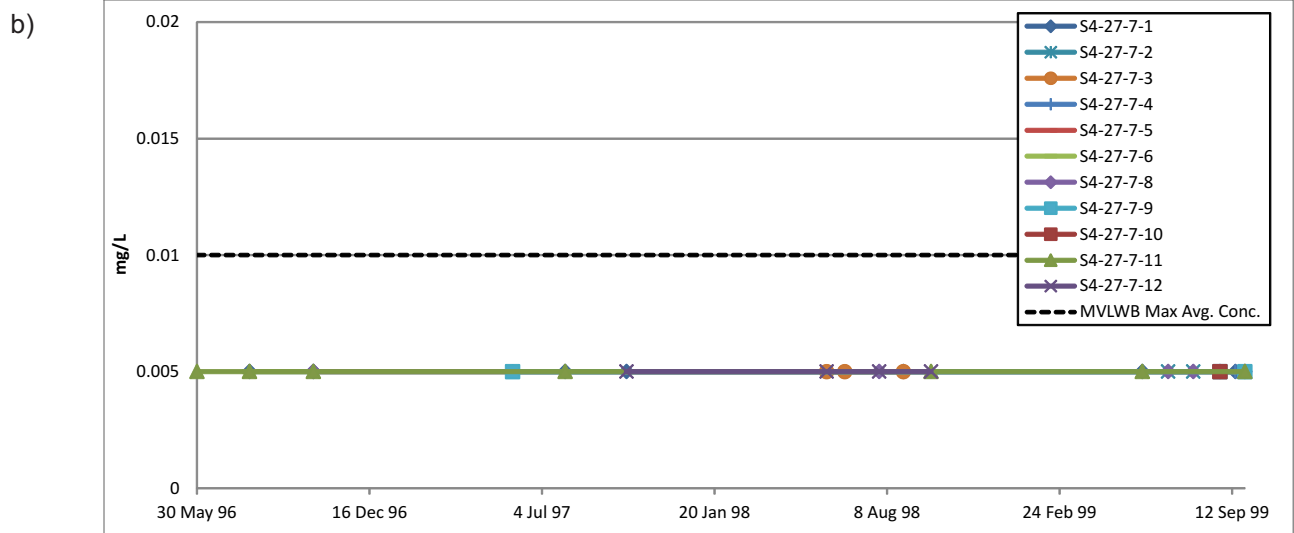
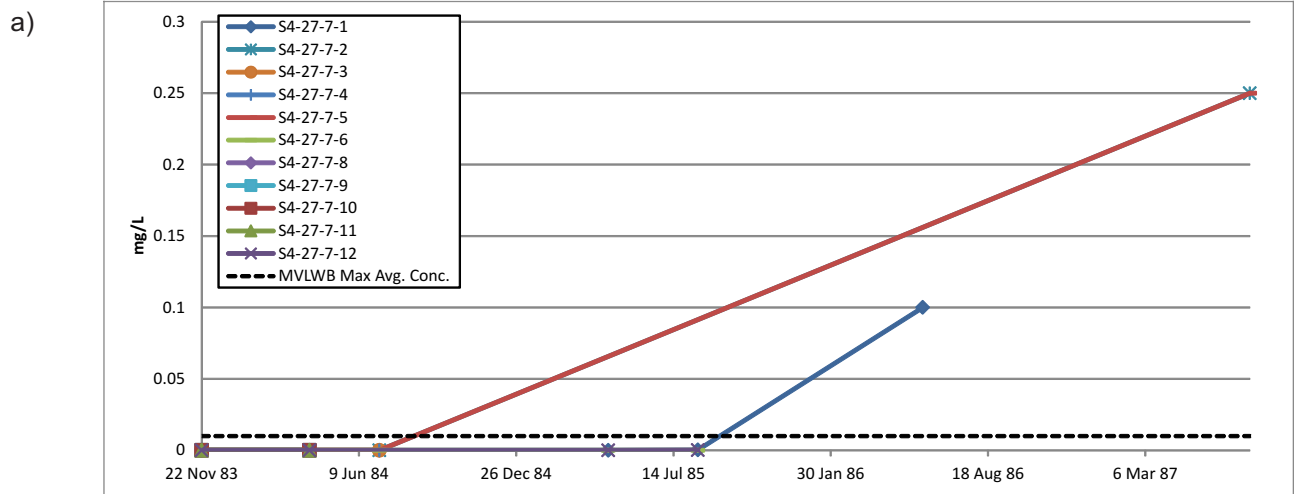
OFFICE
EBA-VANC

DWN MEZ
CKD SH
APVD SH
REV 0

DATE
May 9, 2012

Figure 25

STATUS
ISSUED FOR USE



Q:\Vancouver\Graphics\ENVIRONMENTAL\Y221\Y22101275_Cantung\Y22101275_001_Figure26.cdr

CLIENT



CANTUNG MINE

Total Cadmium Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present



PROJECT NO.
Y22101275.001

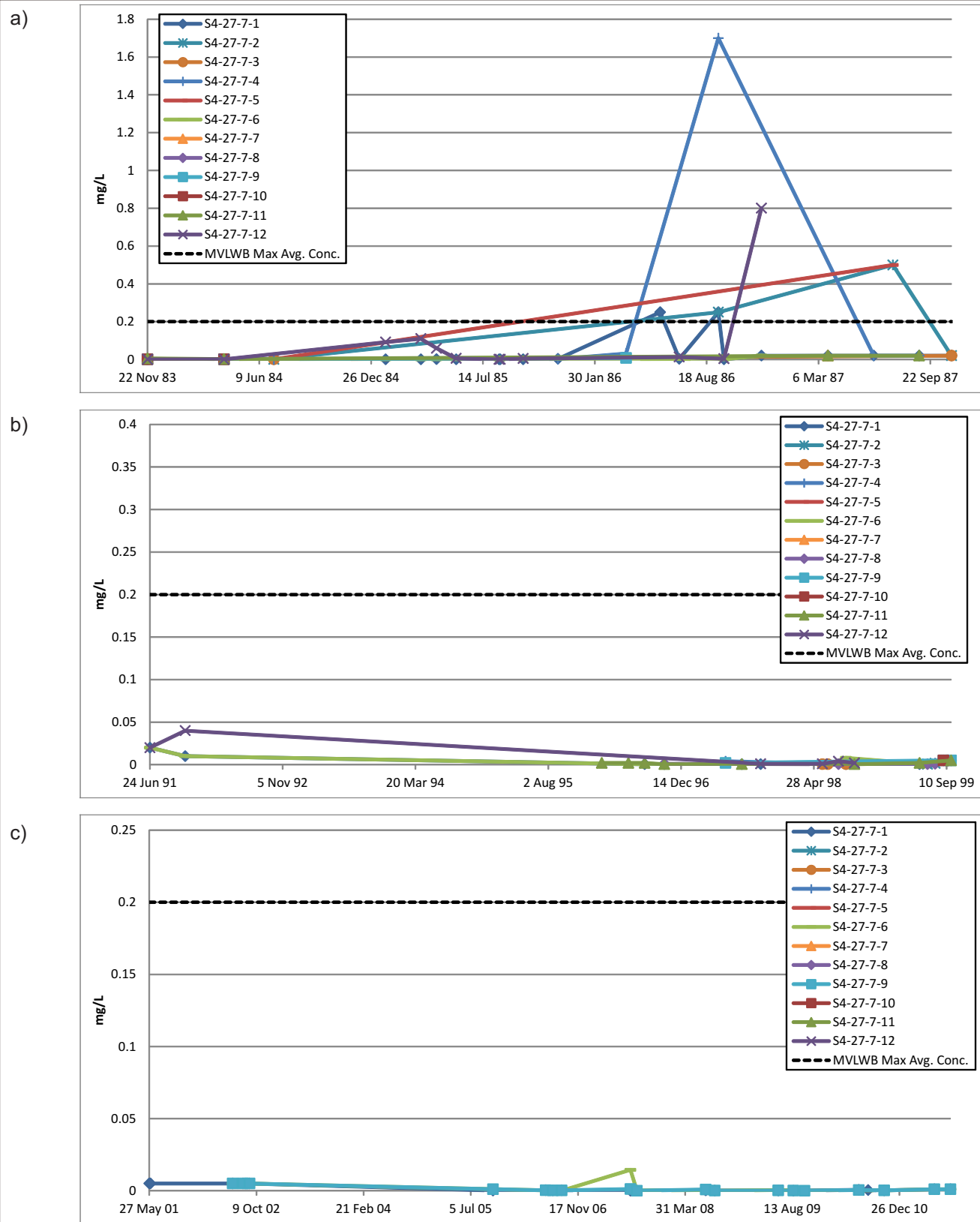
DWN CKD APVD REV
MEZ SH SH 0

OFFICE
EBA-VANC

DATE
May 9, 2012

Figure 26

STATUS
ISSUED FOR USE



CLIENT



CANTUNG MINE

**Total Copper Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present**



A TETRA TECH COMPANY

PROJECT NO.
Y22101275.001

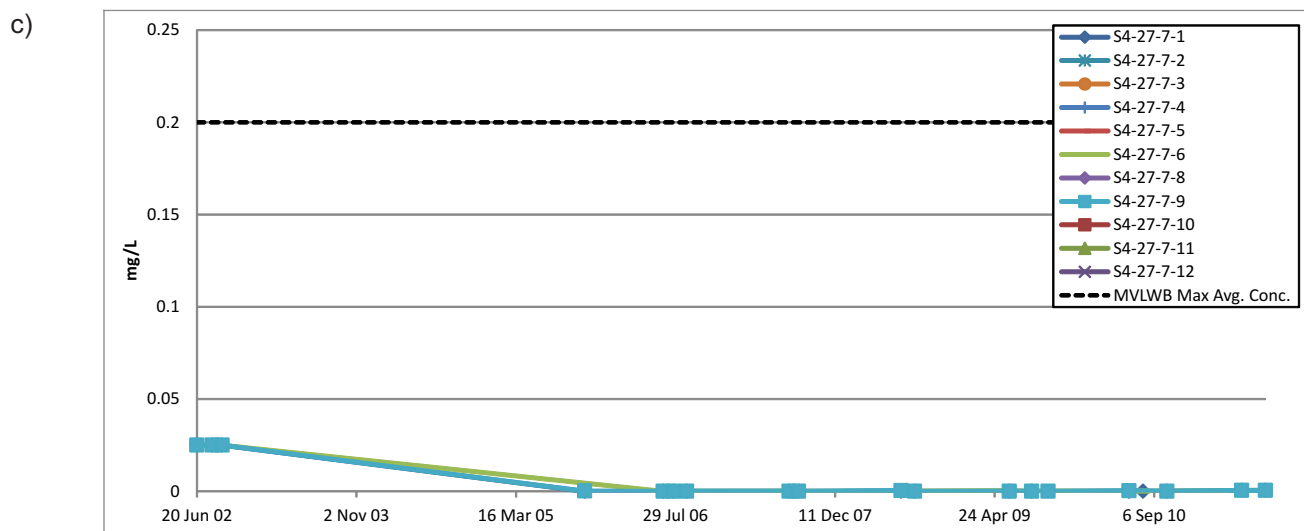
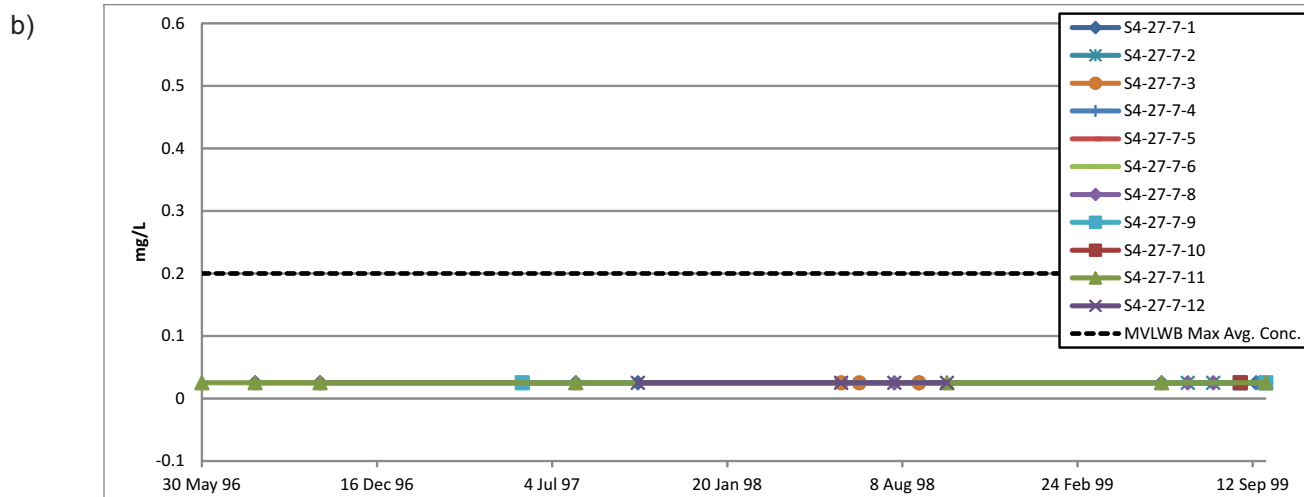
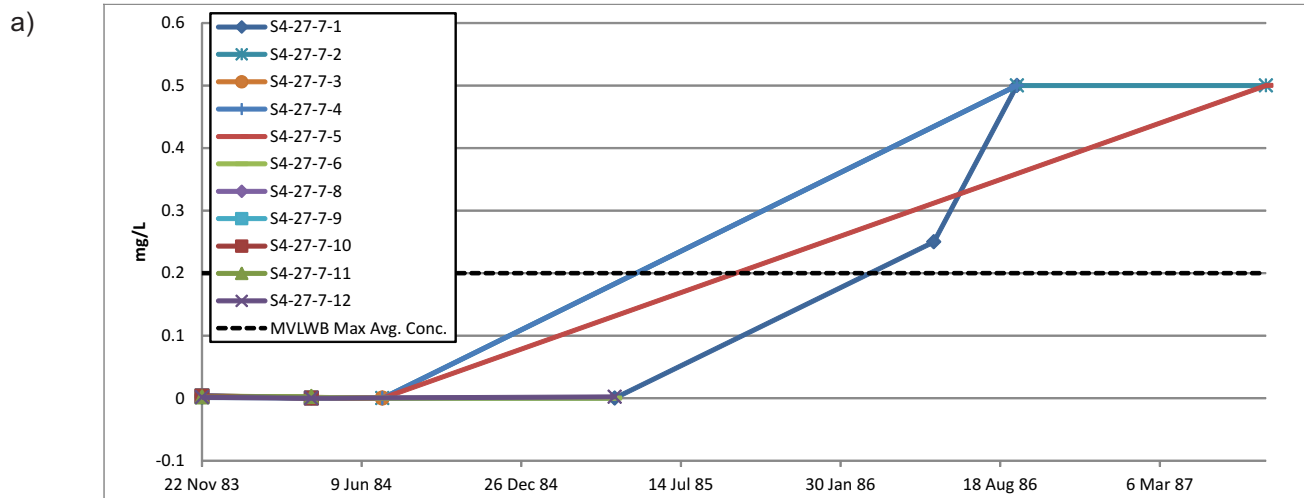
OFFICE
EBA-VANC

DWN CKD APVD REV
MEZ SH SH 0

DATE
May 9, 2012

Figure 27

STATUS
ISSUED FOR USE



CLIENT



CANTUNG MINE

Total Lead Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present



PROJECT NO.
Y22101275.001

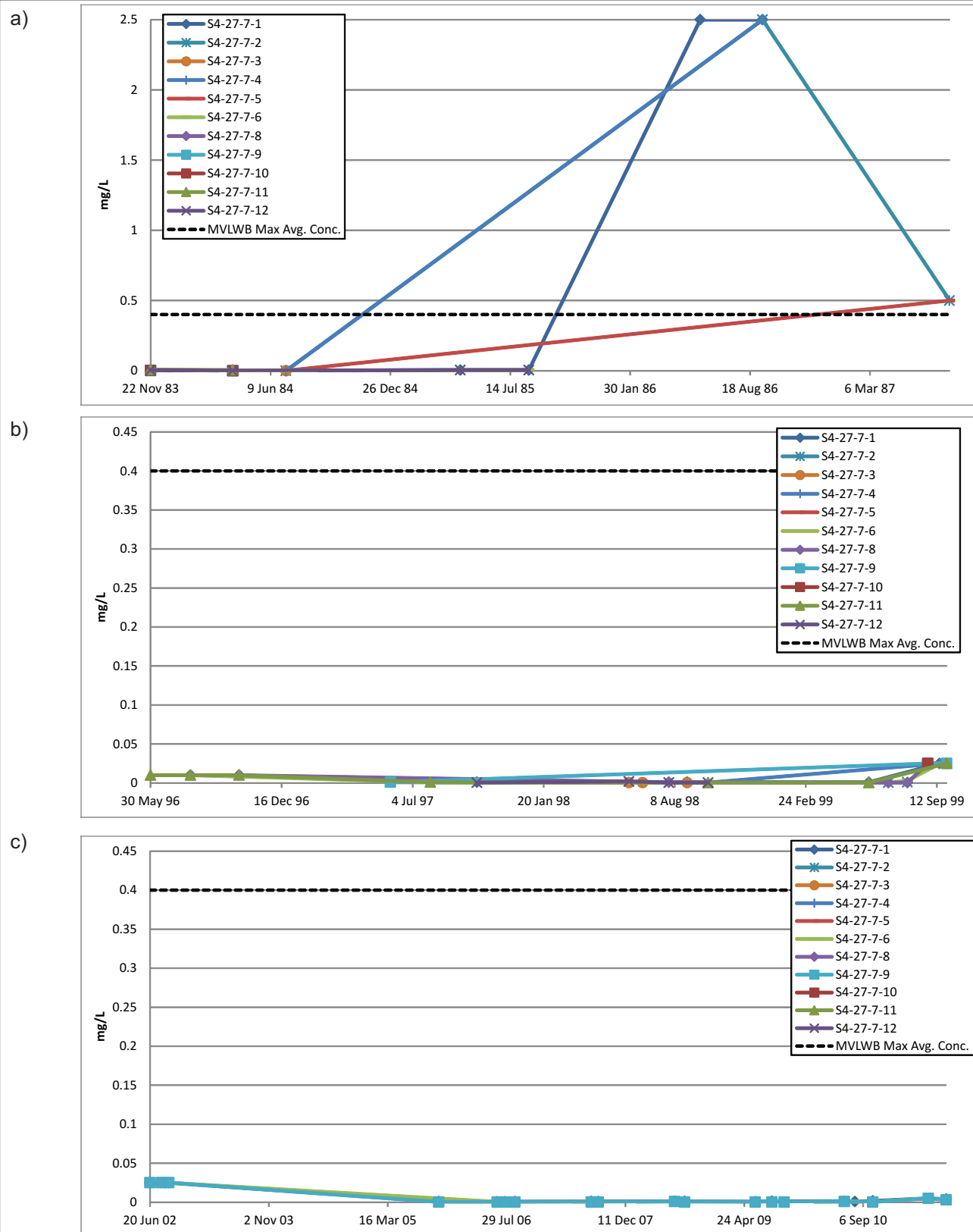
DWN CKD APVD
MEZ SH SH

Figure 28

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EBA-VANC

DATE
May 9, 2012

STATUS
ISSUED FOR USE



CLIENT



CANTUNG MINE

**Total Nickel Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present**

STATUS
ISSUED FOR USE



A TETRA TECH COMPANY

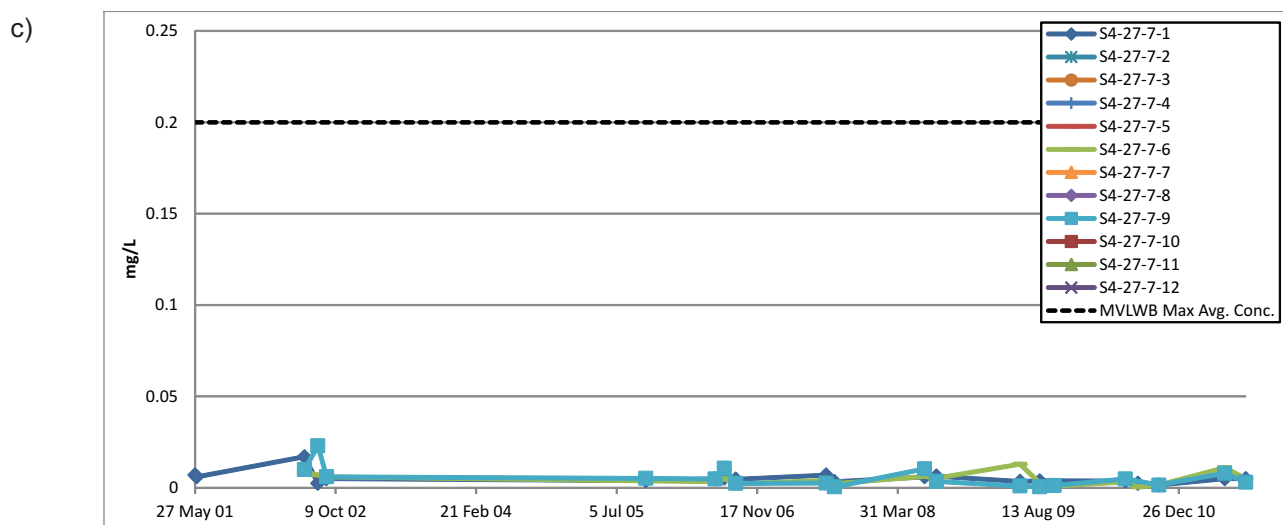
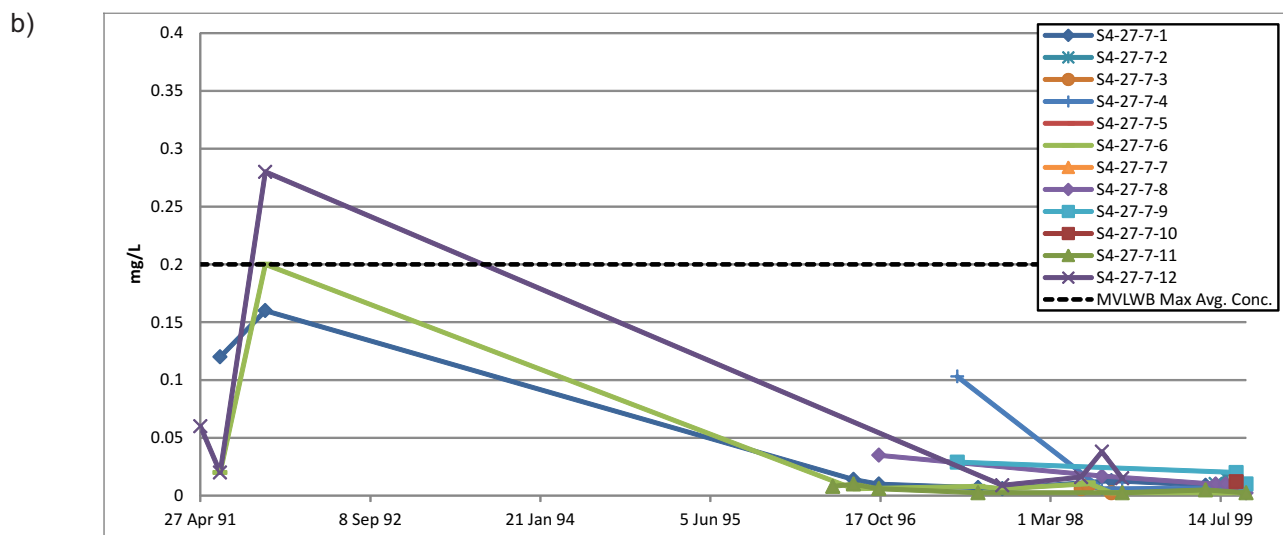
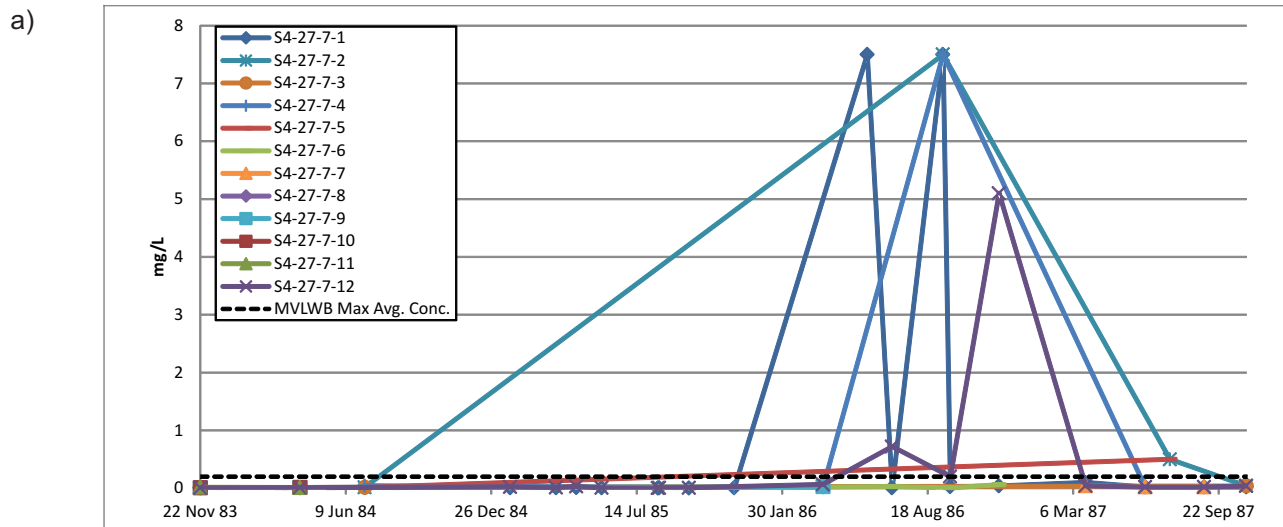
PROJECT NO.
Y22101275.001

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EBA-VANC

DWN CKD APVD REV
MEZ SH SH 0

DATE
May 9, 2012

Figure 29



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CLIENT



CANTUNG MINE

Total Zinc Concentrations (mg/L) in
Groundwater, Station S4-27-7,
1980s – Present



PROJECT NO.
Y22101275.001

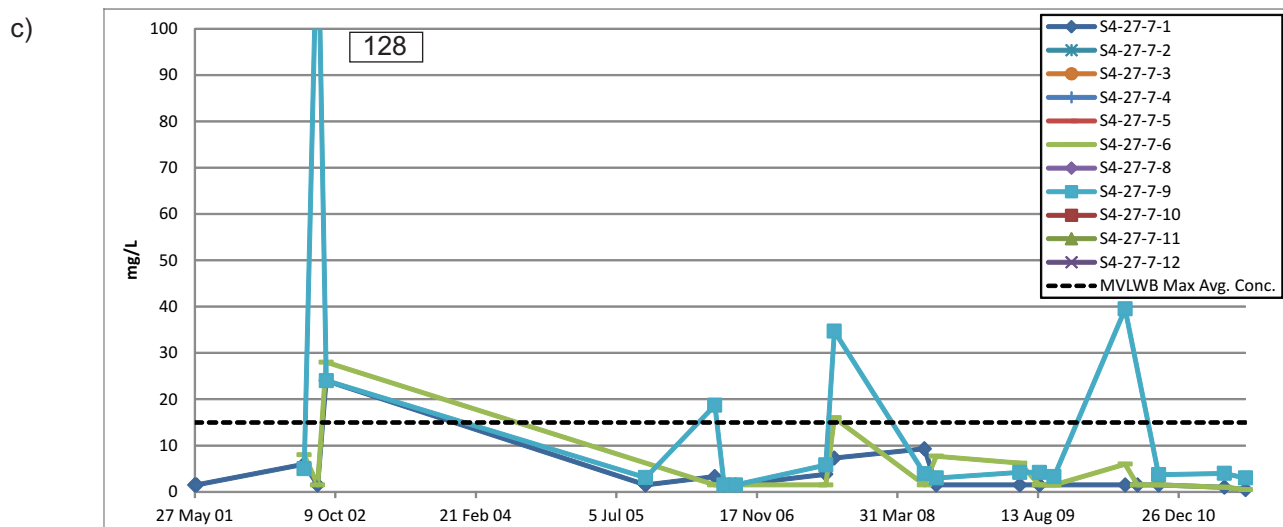
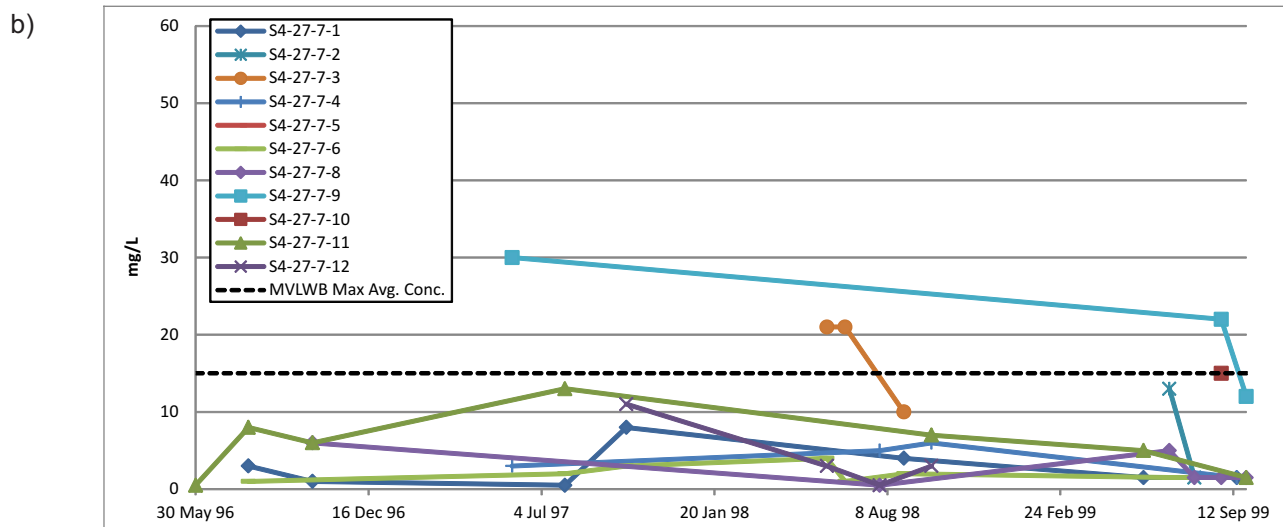
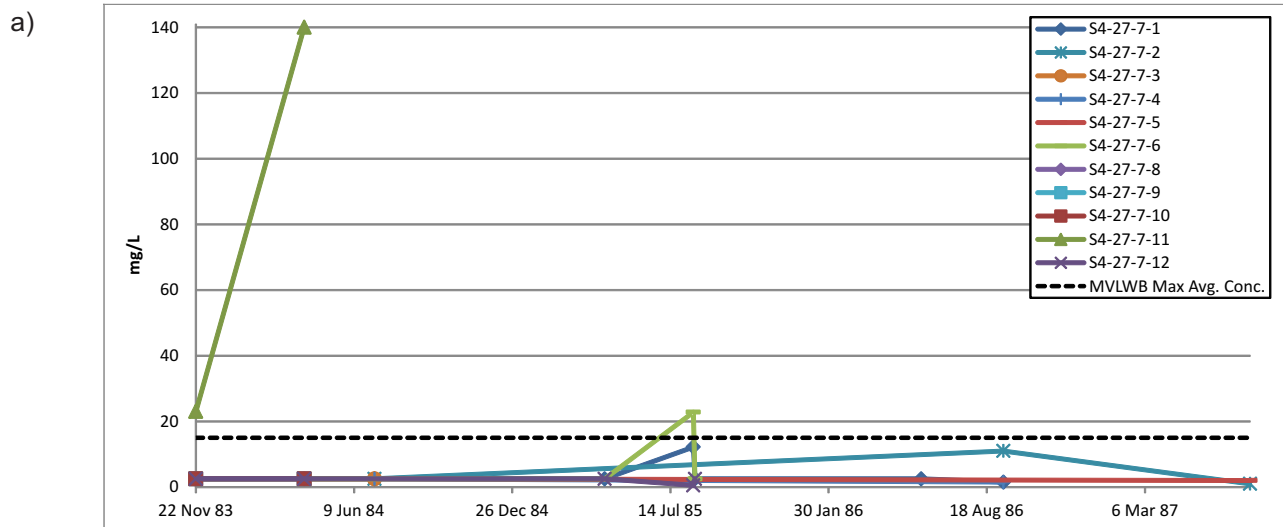
DWN CKD APVD REV
MEZ JB JB 1

OFFICE
EBA-VANC

DATE
January 10, 2013

Figure 30

STATUS
ISSUED FOR USE



CLIENT



CANTUNG MINE

Total Suspended Solids Concentrations
(mg/L) in Groundwater, Station S4-27-7,
1980s – Present

PROJECT NO.
Y22101275.001

OFFICE
EBA-VANC

DWN CKD APVD
MEZ SH SH

DATE
May 9, 2012

Figure 31

STATUS
ISSUED FOR USE

5.2.4 Groundwater Station S4-28-1

Groundwater monitoring Station S4-28-1 was established in 1983 as a pumping well to demonstrate the feasibility of the pumping well contingency system. In 2003 this groundwater station was designated as a MMER Final Discharge Point for the ex-filtrated Cantung Mine tailings water. This station is located down-gradient of TP3 beside the road to the airstrip, which parallels the Flat River. It has also been referred to as MW-6 and pumping well PW1.

Figures 32 to 34 and Table 11 present all of the available groundwater quality data for Station S4-28-1 for the period of record. As noted in Table 11 and the associated figures, since August 2003, when this station was designated as a MMER final discharge point, up to the present time, the concentrations of total metals in S4-28-1 groundwater from this well have consistently remained below the current MVLWB MAC and MMER groundwater quality parameters, with only one exception. The exception was recorded in May 2006, when a single isolated reading of 0.287 mg/l of total zinc was registered. This value is slightly above the MVLWB MAC of 0.2 mg/l, but still well below the MMER limit of 0.5 mg/l.

TSS values recorded at Station S4-28-1 were elevated above regulatory limits for periods of time in May and June 2006, coincident with spring freshet, with the highest TSS reading being a value of 29.2 mg/l recorded in June 2006. In addition two isolated elevated TSS values of 29.7 and 31.3 mg/l were recorded in March 2007 and 2009, respectively. Since that time, TSS values at Station S4-28-1 have consistently remained below 3 mg/l.

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1								
S4-28-1	12/08/2003	<0.0005	<0.01	0.01	<0.06	<0.05	0.062	9
S4-28-1	20/08/2003	0.0005	<0.01	<0.01	<0.05	<0.05	0.057	19
S4-28-1	26/08/2003	0.0006	<0.01	<0.01	<0.05	<0.05	0.035	14
S4-28-1	28/09/2003	<0.002	<0.01	<0.01	<0.05	<0.05	0.022	7
S4-28-1	06/10/2003	<0.2	<0.01	<0.01	<0.05	<0.05	0.0242	4
S4-28-1	14/10/2003	<0.2	<0.01	<0.01	<0.05	<0.05	0.0259	8.6
S4-28-1	21/10/2003	<0.002	<0.01	<0.01	<0.05	<0.05	0.0099	5
S4-28-1	28/10/2003	<0.003	<0.01	<0.01	<0.05	<0.05	0.0111	4.8
S4-28-1	17/07/2005	0.00087	<0.00005	<0.0001	0.000275	0.00178	0.0063	<3
S4-28-1	14/08/2005	<0.0001	0.000243	0.00051	0.000109	<0.0005	0.0044	8.9
S4-28-1	17/10/2005	<0.0002	<0.0001	<0.0002	<0.0001	<0.001	<0.002	3.7
S4-28-1	21/11/2005	<0.0001	0.000096	<0.0001	<0.00005	<0.0005	0.0021	<3
S4-28-1	08/01/2006	<0.0001	<0.00005	<0.0001	<0.00005	<0.0005	0.0014	22.6
S4-28-1	29/01/2006	<0.0001	<0.00005	<0.0001	0.000139	<0.0005	0.0119	7
S4-28-1	05/02/2006	0.00013	<0.00005	<0.003	0.000361	0.00088	0.0089	15.8
S4-28-1	13/02/2006	0.0002	<0.00005	<0.004	0.000328	0.00113	0.0067	19.4
S4-28-1	19/02/2006	<0.0001	<0.00005	<0.002	0.000099	<0.0005	<0.006	8.3
S4-28-1	01/03/2006	<0.0002	<0.0001	0.00147	0.00032	<0.001	0.0078	26.8
S4-28-1	05/03/2006	<0.0002	0.00016	0.00069	0.00011	0.0018	0.0052	14

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	15/03/2006	0.00025	0.0004	0.0009	0.00018	0.0033	0.0148	8.2
S4-28-1	19/03/2006	0.00027	0.00055	<0.0002	0.00012	0.0052	0.0128	6.2
S4-28-1	29/03/2006	0.00031	0.00058	0.00405	0.00071	0.0049	0.0157	14.8
S4-28-1	02/04/2006	0.00037	0.000432	<0.0005	<0.00005	0.00439	0.0106	<3
S4-28-1	09/04/2006	0.00026	0.00051	<0.0002	<0.0001	0.0054	0.0124	3.3
S4-28-1	19/04/2006	0.00039	0.00056	0.00551	0.00169	0.0058	0.0354	14.8
S4-28-1	23/04/2006	0.00023	0.00042	0.00106	0.00023	0.004	0.0173	4.8
S4-28-1	30/04/2006	0.00029	0.00045	0.00098	0.00028	0.0046	0.0149	7.7
S4-28-1	07/05/2006	<0.0002	0.00045	<0.0002	<0.0001	0.0024	0.0134	6.4
S4-28-1	21/05/2006	0.00037	0.00057	0.00141	0.00046	0.0045	0.0178	21.3
S4-28-1	28/05/2006	0.00064	0.00091	0.0103	0.00237	0.008	0.287	10.5
S4-28-1	07/06/2006	0.00027	0.00057	0.00196	0.00061	0.0074	0.0304	29.2
S4-28-1	20/06/2006	0.00011	0.000312	0.00119	0.000176	0.00389	0.0103	14.7
S4-28-1	09/07/2006	0.00065	0.00056	0.0005	<0.0001	0.0082	0.0162	<3
S4-28-1	15/07/2006	0.00022	0.00065	0.00032	<0.0001	0.0068	0.0197	5.8
S4-28-1	23/07/2006	0.0002	0.00069	0.00028	0.0001	0.0061	0.014	3
S4-28-1	20/08/2006	0.00022	0.00074	<0.0002	<0.0001	0.0066	0.0166	<3
S4-28-1	27/08/2006	0.00021	0.00051	0.0009	0.00028	0.0054	0.0171	11.5
S4-28-1	02/09/2006	0.00024	0.00076	0.00059	0.00019	0.0064	0.0209	<3
S4-28-1	09/09/2006	0.0002	0.00054	0.00022	<0.0001	0.0056	0.0131	5.8
S4-28-1	30/09/2006	0.00068	0.00065	0.00047	0.00012	0.0064	0.0195	4.7
S4-28-1	13/10/2006	0.00028	0.000529	<0.002	<0.00005	0.00556	0.0123	<3
S4-28-1	05/11/2006	0.00026	0.000456	<0.004	0.000341	0.00325	0.0132	12
S4-28-1	11/11/2006	<0.0002	0.00047	0.00096	<0.0001	<0.001	0.0144	11.8
S4-28-1	16/11/2006	<0.0002	0.00061	0.00188	0.00012	<0.001	0.0074	15.3
S4-28-1	25/11/2006	0.00033	0.000052	0.00073	0.000068	<0.0005	0.0028	10.7
S4-28-1	02/12/2006	0.00015	<0.00005	<0.002	0.000505	<0.0005	0.0019	14.2
S4-28-1	09/12/2006	<0.0001	0.000185	0.00073	0.000143	<0.0005	0.0063	18
S4-28-1	16/12/2006	0.00032	0.00052	0.0033	0.0006	0.0027	0.0166	24.8
S4-28-1	19/12/2006	<0.0002	0.00027	0.00203	0.00028	<0.001	0.0109	15.6
S4-28-1	26/12/2006	<0.0002	0.00018	0.00077	<0.0001	<0.001	0.0058	14.9
S4-28-1	02/01/2007	<0.0002	0.00014	0.00041	<0.0001	<0.001	0.0045	15
S4-28-1	07/01/2007	<0.0002	0.00027	0.00111	0.00035	0.0014	0.0209	20.3
S4-28-1	14/01/2007	<0.0001	0.000132	0.00295	0.000264	<0.0005	0.0089	18
S4-28-1	21/01/2007	<0.0002	0.00011	0.00233	0.00031	<0.001	0.0083	22
S4-28-1	28/01/2007	<0.0002	<0.0001	0.00181	0.0002	<0.001	0.0053	26.2
S4-28-1	04/02/2007	<0.0002	<0.0001	0.00053	<0.0001	<0.001	0.0036	15.8
S4-28-1	11/02/2007	<0.0002	0.00037	<0.0002	<0.0001	<0.001	0.0178	18.7
S4-28-1	18/02/2007	<0.0002	<0.0001	0.00113	<0.0001	<0.001	0.0039	20.9
S4-28-1	25/02/2007	0.0001	<0.00005	<0.002	0.0002	<0.0005	0.0052	27
S4-28-1	04/03/2007	0.00026	<0.0001	0.0053	0.00023	0.002	0.0054	29.7
S4-28-1	11/03/2007	<0.0002	<0.0001	0.00129	0.00021	<0.001	0.0053	23.6
S4-28-1	18/03/2007	0.00014	0.000196	0.00189	0.000381	0.00099	0.0222	19

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	25/03/2007	<0.0001	0.000445	<0.002	0.000074	<0.0005	0.0201	20.7
S4-28-1	01/04/2007	<0.0001	0.000103	<0.0008	0.000054	<0.0005	0.0154	16.5
S4-28-1	07/04/2007	<0.0002	0.00035	0.00027	<0.0001	<0.001	0.0205	12.7
S4-28-1	13/04/2007	0.00026	0.00049	0.00022	<0.0001	0.0052	0.0142	<3
S4-28-1	15/04/2007	0.00036	0.0004	<0.0002	<0.0001	0.0067	0.0142	<3
S4-28-1	22/04/2007	0.00037	0.00041	0.0002	<0.0001	0.007	0.0157	<3
S4-28-1	29/04/2007	0.0002	0.00047	<0.0002	<0.0001	0.0036	0.0142	4.5
S4-28-1	06/05/2007	0.00041	0.00111	0.00169	0.00035	0.0114	0.0462	13.1
S4-28-1	13/05/2007	0.00036	0.0002	0.00036	<0.0001	0.0013	0.0105	12.3
S4-28-1	20/05/2007	<0.0002	0.00034	0.00036	<0.0001	0.0014	0.0146	9
S4-28-1	27/05/2007	0.00018	0.000172	<0.0001	<0.00005	0.00297	0.0045	<3
S4-28-1	03/06/2007	0.00042	0.00051	<0.0002	<0.0001	0.008	0.0136	<3
S4-28-1	10/06/2007	0.00033	0.00057	0.00028	<0.0001	0.0089	0.015	<3
S4-28-1	11/06/2007	0.00109	<0.00005	0.00173	0.000305	0.00285	0.0043	9.7
S4-28-1	17/06/2007	0.00035	0.00074	<0.0002	<0.0001	0.0095	0.0182	<3
S4-28-1	24/06/2007	0.00032	0.00046	0.00031	<0.0001	0.0076	0.0135	<3
S4-28-1	01/07/2007	0.00033	0.00047	<0.0002	<0.0001	0.0073	0.0133	<3
S4-28-1	08/07/2007	0.00029	0.00051	<0.0002	<0.0001	0.008	0.013	<3
S4-28-1	15/07/2007	0.00032	0.00059	0.00077	<0.0001	0.0089	0.0153	<3
S4-28-1	16/07/2007	0.00033	0.00053	0.00021	<0.0001	0.0081	0.0148	<3
S4-28-1	22/07/2007	0.00029	0.00066	<0.0002	<0.0001	0.0069	0.0159	5.7
S4-28-1	29/07/2007	0.00031	0.00064	0.00023	<0.0001	0.0081	0.0156	<3
S4-28-1	05/08/2007	0.00029	0.00059	<0.0002	<0.0001	0.0082	0.0129	<3
S4-28-1	12/08/2007	0.00031	0.00062	<0.0002	<0.0001	0.0088	0.0153	<3
S4-28-1	19/08/2007	0.0003	0.00055	<0.0002	<0.0001	0.0082	0.014	<3
S4-28-1	26/08/2007	0.0003	0.00065	0.00048	0.0001	0.0086	0.0186	
S4-28-1	02/09/2007	0.00029	0.00048	0.00023	<0.0001	0.0078	0.0137	<3
S4-28-1	09/09/2007	0.00036	0.00047	0.00298	0.00074	0.0044	0.0244	25.5
S4-28-1	16/09/2007	0.0004	0.00062	0.00333	<0.0001	0.0082	0.0181	3.5
S4-28-1	23/09/2007	0.00026	0.00051	<0.0002	<0.0001	0.0064	0.0139	3.3
S4-28-1	30/09/2007	0.00025	0.000659	<0.002	<0.00005	0.00692	0.0149	3.6
S4-28-1	07/10/2007	0.00022	0.00056	<0.0003	<0.0001	0.0065	0.016	<3
S4-28-1	14/10/2007	<0.0002	0.00077	<0.0018	<0.0001	0.0062	0.0187	<3
S4-28-1	21/10/2007	<0.0002	0.00064	0.00021	<0.0001	0.0021	0.0178	7.7
S4-28-1	28/10/2007	0.00032	0.00061	<0.0012	<0.0001	0.0098	0.0167	<3
S4-28-1	04/11/2007	0.00034	0.00066	<0.0002	<0.0001	0.009	0.017	<3
S4-28-1	11/11/2007	0.00089	0.00068	0.00067	<0.00025	0.008	0.0184	<3
S4-28-1	18/11/2007	0.00025	0.00075	0.00065	<0.0001	0.008	0.0178	<3
S4-28-1	25/11/2007	0.00108	0.00054	<0.0003	<0.0001	0.008	0.0161	<3
S4-28-1	02/12/2007	0.00032	0.00042	0.00053	<0.0001	0.0085	0.0142	<3
S4-28-1	09/12/2007	0.00026	0.00056	<0.0002	<0.0001	0.007	0.0135	<3
S4-28-1	16/12/2007	<0.0002	0.00063	0.0003	<0.0001	0.0074	0.0178	<3
S4-28-1	23/12/2007	0.00032	0.00057	0.00044	<0.0001	0.0077	0.0152	<3

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	30/12/2007	0.0003	0.0005	<0.0002	0.00011	0.007	0.0127	3.4
S4-28-1	06/01/2008	0.00032	0.00049	0.00024	<0.0001	0.0069	0.0134	<3
S4-28-1	13/01/2008	0.00031	0.00045	0.00072	<0.0001	0.0083	0.0137	<3
S4-28-1	20/01/2008	0.00035	0.00047	<0.0002	<0.0001	0.0072	0.0138	<3
S4-28-1	27/01/2008	0.00033	0.00056	0.00073	<0.0001	0.0068	0.0143	<3
S4-28-1	03/02/2008	0.00035	0.00047	0.00052	0.00015	0.0074	0.0125	<3
S4-28-1	10/02/2008	0.00033	0.00052	0.00091	<0.0001	0.0213	0.0125	<3
S4-28-1	17/02/2008	0.00029	0.00064	<0.0002	<0.0001	0.0107	0.0138	<3
S4-28-1	24/02/2008	0.0003	0.0007	<0.0002	<0.0001	0.0107	0.0182	<3
S4-28-1	02/03/2008	0.00027	0.00061	<0.0002	<0.0001	0.0102	0.0176	3.3
S4-28-1	09/03/2008	0.00028	0.00076	0.001	0.00036	0.011	0.022	<3
S4-28-1	16/03/2008	0.00024	0.00069	<0.0004	<0.0001	0.0097	0.0217	<3
S4-28-1	23/03/2008	0.00024	0.00058	0.00024	<0.0001	0.0099	0.023	<3
S4-28-1	30/03/2008	0.00027	0.00066	0.00044	<0.0001	0.0093	0.0234	<3
S4-28-1	06/04/2008	0.00025	0.00069	0.00025	<0.0001	0.0091	0.0242	<3
S4-28-1	13/04/2008	0.0003	0.00076	0.00032	<0.0001	0.0089	0.0254	<3
S4-28-1	20/04/2008	0.00031	0.00089	0.00062	<0.0001	0.0099	0.0267	<3
S4-28-1	27/04/2008	0.00043	0.00149	0.00101	0.00015	0.0113	0.0395	4.7
S4-28-1	04/05/2008	0.00024	0.00083	0.00039	<0.0001	0.0086	0.0241	<3
S4-28-1	11/05/2008	0.00028	0.00098	0.00036	<0.0001	0.008	0.0244	<3
S4-28-1	18/05/2008	0.00024	0.00103	0.00026	<0.0001	0.0079	0.0258	<3
S4-28-1	25/05/2008	0.00027	0.00101	<0.0002	<0.0001	0.0084	0.0194	<3
S4-28-1	01/06/2008	0.00026	0.00102	0.00029	<0.0001	0.0078	0.022	<3
S4-28-1	08/06/2008	0.00097	0.00087	0.00088	0.00069	0.0394	0.0187	<3
S4-28-1	15/06/2008	0.00043	0.00083	0.00035	<0.0001	0.0087	0.0201	<3
S4-28-1	17/06/2008	0.00031	0.0006	<0.0002	<0.0001	0.0075	0.0178	<3
S4-28-1	22/06/2008	0.00038	0.00061	0.00059	<0.0001	0.0084	0.0182	<3
S4-28-1	29/06/2008	0.00037	0.00075	<0.0002	<0.0001	0.0074	0.0148	<3
S4-28-1	06/07/2008	0.00048	0.00068	0.0003	<0.0001	0.009	0.0173	<3
S4-28-1	13/07/2008	0.00055	0.00073	<0.0002	<0.0001	0.0083	0.0158	<3
S4-28-1	20/07/2008	0.0005	0.00064	0.00024	<0.0001	0.008	0.0166	<3
S4-28-1	27/07/2008	0.00052	0.00057	<0.0002	<0.0001	0.0083	0.017	<3
S4-28-1	03/08/2008	0.00047	0.00058	0.00025	<0.0001	0.0073	0.0159	<3
S4-28-1	10/08/2008	0.00066	0.0005	0.0003	<0.0001	0.0084	0.0148	<3
S4-28-1	17/08/2008	0.00062	0.00057	<0.0002	<0.0001	0.0089	0.0176	3
S4-28-1	24/08/2008	0.00046	0.0006	0.00042	<0.0001	0.0077	0.013	<3
S4-28-1	31/08/2008	0.00051	0.00054	<0.0002	<0.0001	0.0073	0.0133	<3
S4-28-1	07/09/2008	0.00057	0.00047	0.00144	<0.0001	0.0109	0.0136	<3
S4-28-1	14/09/2008	0.00058	0.00048	0.00031	<0.0001	0.0088	0.0154	<3
S4-28-1	21/09/2008	0.00056	0.0005	0.00024	<0.0001	0.0091	0.0186	<3
S4-28-1	28/09/2008	0.00047	0.0003	<0.0002	<0.0001	0.0081	0.0137	<3
S4-28-1	05/10/2008	0.0006	0.00026	<0.0002	<0.0001	0.0079	0.0123	<3
S4-28-1	12/10/2008	0.00044	0.00026	<0.0002	<0.0001	0.0085	0.0122	<3

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	19/10/2008	0.00054	0.00023	<0.0012	<0.0001	0.0084	0.0182	<3
S4-28-1	26/10/2008	0.00043	0.00024	<0.0002	<0.0001	0.0088	0.0137	<3
S4-28-1	02/11/2008	0.00041	0.00022	<0.004	<0.0001	0.0088	0.0153	<3
S4-28-1	09/11/2008	0.00037	0.00022	0.00031	<0.0001	0.0083	0.0162	<3
S4-28-1	16/11/2008	0.00039	0.00025	0.00022	<0.0001	0.0091	0.0146	<3
S4-28-1	23/11/2008	0.0003	0.00024	<0.0002	<0.0001	0.0081	0.014	<3
S4-28-1	30/11/2008	0.00189	0.00022	0.00046	<0.0001	0.009	0.0132	<3
S4-28-1	07/12/2008	0.00044	0.00028	<0.0002	<0.0001	0.009	0.0157	3.8
S4-28-1	14/12/2008	0.0004	0.00023	<0.0002	<0.0001	0.0085	0.0121	<3
S4-28-1	21/12/2008	0.00023	0.00021	0.00225	0.00017	0.006	0.0129	9.7
S4-28-1	28/12/2008	0.00028	0.00038	0.00022	0.00023	0.0081	0.0163	3.1
S4-28-1	04/01/2009	0.00031	0.00034	<0.0002	<0.0001	0.0072	0.0147	<3
S4-28-1	11/01/2009	0.00029	0.00032	<0.004	<0.0001	0.0077	0.0136	3.3
S4-28-1	18/01/2009	0.00028	0.00033	0.0013	0.00022	0.0087	0.0164	5.8
S4-28-1	25/01/2009	0.00032	0.00035	<0.0002	0.00067	0.0095	0.0147	5.3
S4-28-1	01/02/2009	0.00027	0.00032	0.00147	<0.0001	0.0066	0.0127	<3
S4-28-1	08/02/2009	0.00025	0.00036	0.00041	<0.0001	0.0058	0.0147	6.4
S4-28-1	15/02/2009	0.00042	0.00025	<0.0016	<0.0001	0.0078	0.0123	<3
S4-28-1	22/02/2009	0.00032	0.00028	<0.0002	<0.0001	0.0076	0.013	<3
S4-28-1	01/03/2009	0.00032	0.00043	<0.0002	<0.0001	0.0095	0.0169	<3
S4-28-1	08/03/2009	0.00034	0.0003	<0.0002	<0.0001	0.0081	0.0149	<3
S4-28-1	15/03/2009	0.00027	0.00038	0.0012	<0.0001	0.0071	0.0157	<3
S4-28-1	22/03/2009	0.00027	0.00022	0.00102	<0.0001	0.0065	0.0103	31.3
S4-28-1	29/03/2009	0.00035	0.00022	<0.0002	<0.0001	0.0079	0.0105	<3
S4-28-1	05/04/2009	0.00031	0.00023	0.00125	<0.0001	0.0083	0.0107	<3
S4-28-1	12/04/2009	0.00031	0.0004	<0.0012	<0.0001	0.0087	0.0149	<3
S4-28-1	19/04/2009	0.00034	0.00029	<0.0018	<0.0001	0.0082	0.013	<3
S4-28-1	26/04/2009	0.0003	<0.0003	0.0016	<0.0001	0.0078	0.0132	<3
S4-28-1	03/05/2009	0.00035	0.00027	<0.0018	<0.0001	0.0088	0.0114	<3
S4-28-1	10/05/2009	0.00035	0.00026	<0.003	<0.0001	0.0084	0.0127	<3
S4-28-1	17/05/2009	0.00031	0.00025	<0.003	<0.0001	0.0075	0.0126	3.3
S4-28-1	24/05/2009	0.00029	0.00029	<0.0002	<0.0001	0.0082	0.0117	<3
S4-28-1	31/05/2009	0.00035	0.00047	<0.0002	<0.0001	0.01	0.0162	<3
S4-28-1	07/06/2009	0.00038	0.00039	<0.0002	<0.0001	0.0097	0.0118	<3
S4-28-1	14/06/2009	0.00032	0.00032	<0.0002	<0.0001	0.0098	0.0124	<3
S4-28-1	21/06/2009	0.00031	0.00034	<0.0002	<0.0001	0.0088	0.0105	<3
S4-28-1	28/06/2009	0.00033	0.0004	0.00024	<0.0001	0.0085	0.0104	<3
S4-28-1	05/07/2009	0.00029	0.00041	<0.0002	<0.0001	0.0088	0.0131	<3
S4-28-1	12/07/2009	0.00495	0.00042	<0.0002	<0.0001	0.0091	0.013	<3
S4-28-1	19/07/2009	0.00029	0.00046	<0.0002	<0.0001	0.0088	0.0137	<3
S4-28-1	26/07/2009	<0.0005	0.00034	<0.0005	<0.00025	0.0085	0.0132	<3
S4-28-1	02/08/2009	0.00028	0.00026	<0.0002	<0.0001	0.0084	0.012	<3
S4-28-1	09/08/2009	0.00032	0.00032	<0.0002	<0.0001	0.0085	0.0128	4

Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	16/08/2009	0.00031	0.00038	<0.0014	<0.0001	0.0084	0.0122	<3
S4-28-1	23/08/2009	0.00025	0.00045	<0.0016	<0.0001	0.0087	0.0131	<3
S4-28-1	30/08/2009	0.00056	0.00048	<0.0005	<0.00025	0.0107	0.0144	<3
S4-28-1	06/09/2009	0.00027	0.0004	<0.004	<0.0001	0.008	0.0176	<3
S4-28-1	13/09/2009	0.00029	0.00032	<0.0002	<0.0001	0.0084	0.0109	<3
S4-28-1	20/09/2009	0.00031	0.00033	<0.0016	<0.0001	0.0079	0.0134	<3
S4-28-1	27/09/2009	0.00028	0.00033	<0.0015	<0.0001	0.0078	0.0107	<3
S4-28-1	04/10/2009	0.00032	0.00047	<0.0007	<0.0001	0.0078	0.0101	<3
S4-28-1	11/10/2009	<0.0005	0.0005	<0.0005	<0.00025	0.009	0.0143	<3
S4-28-1	18/10/2009	0.0003	0.00049	<0.002	<0.0001	0.0079	0.0146	<3
S4-28-1	25/10/2009	0.00029	0.00034	<0.0002	<0.0001	0.0075	0.0107	<3
S4-28-1	01/11/2009	0.00022	0.00047	<0.0002	<0.0001	0.0077	0.014	<3
S4-28-1	08/11/2009	0.00024	0.00047	<0.002	<0.0001	0.0079	0.0161	5.1
S4-28-1	15/11/2009	0.00026	0.00049	<0.0002	<0.0001	0.0083	0.0157	<3
S4-28-1	22/11/2009	0.0003	0.00037	<0.0014	<0.0001	0.0079	0.0142	<3
S4-28-1	29/11/2009	0.00037	0.0005	<0.0024	<0.0001	0.0079	0.0161	<3
S4-28-1	06/12/2009	0.00023	0.00045	<0.0012	<0.0001	0.0075	0.0122	<3
S4-28-1	13/12/2009	0.00022	0.00043	<0.0012	<0.0001	0.0066	0.0131	<3
S4-28-1	20/12/2009	<0.0002	0.00041	<0.0002	<0.0001	0.0062	0.0137	3.9
S4-28-1	27/12/2009	0.00026	0.0004	<0.0002	<0.0001	0.0061	0.0115	3
S4-28-1	03/01/2010	0.00028	0.00032	0.0117	0.00051	0.0074	0.011	<3
S4-28-1	10/01/2010	0.00022	0.00041	<0.0002	<0.0001	0.0065	0.0131	<3
S4-28-1	17/01/2010	<0.0002	0.00042	<0.004	<0.0001	0.0065	0.0134	3.3
S4-28-1	24/01/2010	0.0003	0.00027	<0.002	<0.0001	0.0064	0.0097	<3
S4-28-1	31/01/2010	0.0003	0.00034	<0.002	<0.0001	0.0068	0.0121	3.8
S4-28-1	07/03/2010	0.00032	0.00031	<0.0014	<0.0001	0.0068	0.0112	<3
S4-28-1	14/03/2010	0.00035	0.00031	<0.0012	<0.0001	0.0068	0.0107	<3
S4-28-1	21/03/2010	0.00032	0.00028	<0.002	<0.0001	0.0066	0.0095	<3
S4-28-1	28/03/2010	0.00025	0.00029	0.00032	<0.0001	0.0048	0.011	5.8
S4-28-1	02/05/2010	0.00038	0.0001	<0.0016	<0.0001	0.0056	0.0091	4
S4-28-1	09/05/2010	0.0004	<0.0001	<0.001	<0.0001	0.0042	0.0058	6.5
S4-28-1	16/05/2010	0.00035	<0.0001	<0.0015	<0.0001	0.0053	0.005	3.4
S4-28-1	23/05/2010	0.00037	<0.0001	<0.0002	<0.0001	0.0033	<0.002	<3
S4-28-1	30/05/2010	0.00029	<0.0001	<0.002	<0.0001	0.0037	0.0044	4.9
S4-28-1	06/06/2010	0.00037	0.00014	<0.0002	<0.0001	0.0056	0.0065	<3
S4-28-1	13/06/2010	0.00027	0.00014	<0.0002	<0.0001	0.0059	0.0067	<3
S4-28-1	20/06/2010	<0.0002	0.00016	<0.0016	<0.0001	0.006	0.0061	<3
S4-28-1	27/06/2010	0.00021	0.00019	<0.0002	<0.0001	0.0053	0.0056	3.3
S4-28-1	04/07/2010	0.00026	0.0002	<0.0016	<0.0001	0.0057	0.0063	<3
S4-28-1	11/07/2010	0.00045	0.0002	<0.0002	<0.0001	0.0066	0.0071	<3
S4-28-1	18/07/2010	0.00026	0.00021	<0.0008	<0.0001	0.0075	0.009	<3
S4-28-1	25/07/2010	0.00025	0.000185	<0.003	<0.00005	0.00546	0.0055	<3
S4-28-1	01/08/2010	0.0002	0.0001	0.004	0.0001	0.001	0.002	3

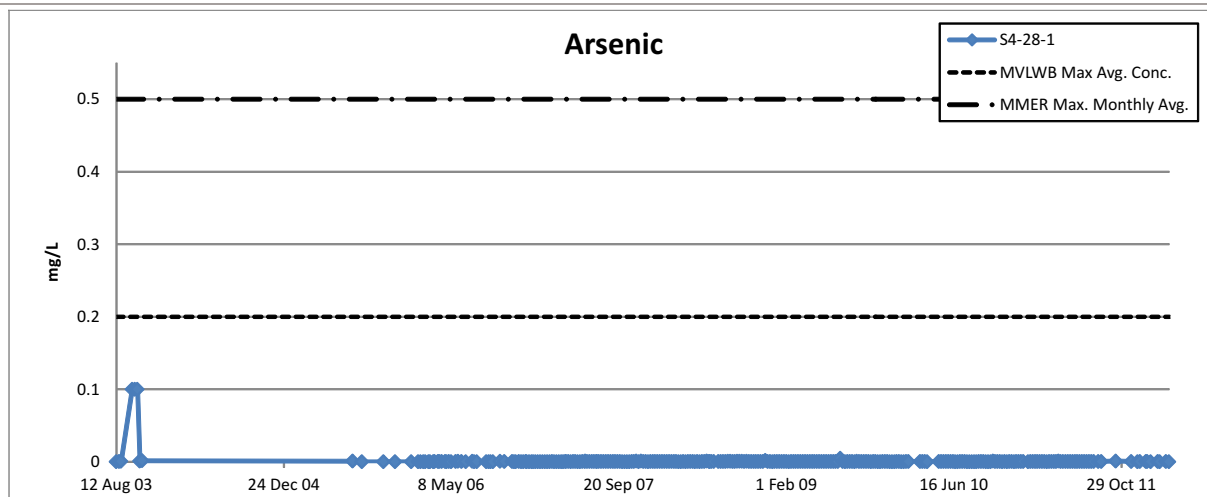
Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	08/08/2010	<0.0002	0.00026	<0.0008	<0.0001	0.0064	0.0087	<3
S4-28-1	15/08/2010	<0.0002	0.00026	<0.0004	<0.0001	0.0061	0.0093	<3
S4-28-1	22/08/2010	<0.0002	0.00029	<0.0008	<0.0001	0.0064	0.0095	<3
S4-28-1	29/08/2010	0.00034	0.0002	<0.0012	<0.0001	0.0063	0.0066	<3
S4-28-1	05/09/2010	0.00034	0.00023	<0.0012	<0.0001	0.0076	0.0069	<3
S4-28-1	12/09/2010	0.00028	0.00027	<0.0014	<0.0001	0.0068	0.007	<3
S4-28-1	19/09/2010	0.00021	0.00027	<0.003	<0.0001	0.0067	0.011	4
S4-28-1	26/09/2010	<0.0002	0.00029	<0.001	<0.0001	0.0067	0.0109	<3
S4-28-1	03/10/2010	0.00024	0.00028	<0.0012	<0.0001	0.0065	0.0097	<3
S4-28-1	10/10/2010	0.00085	0.00024	<0.003	<0.0001	0.0061	<0.006	<3
S4-28-1	17/10/2010	0.00029	0.00031	<0.001	<0.0001	0.0084	0.0088	<3
S4-28-1	24/10/2010	0.00029	0.00027	<0.001	<0.0001	0.0081	0.0082	<3
S4-28-1	31/10/2010	0.00029	0.00032	<0.004	<0.0001	0.0093	0.0085	3
S4-28-1	07/11/2010	<0.0002	0.00042	0.0017	<0.0001	0.0083	0.014	<3
S4-28-1	14/11/2010	0.00028	0.00034	<0.003	<0.0001	0.0088	0.0096	<3
S4-28-1	21/11/2010	0.00023	0.00033	<0.004	<0.0001	0.0088	0.0154	<3
S4-28-1	28/11/2010	0.00026	0.00028	<0.003	<0.0001	0.0075	0.007	<3
S4-28-1	05/12/2010	0.00029	0.00035	<0.001	<0.0001	0.0084	0.0087	<3
S4-28-1	12/12/2010	0.0002	0.00043	<0.001	<0.0001	0.0083	0.013	<3
S4-28-1	19/12/2010	0.0003	0.00034	<0.0012	<0.0001	0.0089	0.0112	<3
S4-28-1	26/12/2010	0.00028	0.00042	<0.001	<0.0001	0.0086	0.0134	4.7
S4-28-1	02/01/2011	0.00028	0.00026	<0.0016	<0.0001	0.0072	0.0069	<3
S4-28-1	09/01/2011	0.00027	0.00027	<0.001	<0.0001	0.0072	0.0069	<3
S4-28-1	16/01/2011							<3
S4-28-1	23/01/2011	0.00025	0.00032	<0.001	<0.0001	0.0076	0.0101	<3
S4-28-1	30/01/2011	0.00027	0.00031	<0.001	<0.0001	0.0079	0.0108	<3
S4-28-1	06/02/2011	0.00028	0.00033	<0.001	<0.0001	0.0079	0.0102	<3
S4-28-1	13/02/2011	0.00027	0.00025	<0.001	<0.0001	0.007	0.0075	<3
S4-28-1	20/02/2011	0.00028	0.00025	<0.001	<0.0001	0.0068	0.0072	<3
S4-28-1	27/02/2011	0.00028	0.00029	<0.001	<0.0001	0.0073	0.0102	<3
S4-28-1	06/03/2011	0.00028	0.00033	<0.001	<0.0001	0.007	0.0099	<3
S4-28-1	13/03/2011	0.0003	0.00031	<0.001	<0.0001	0.0063	0.0097	<3
S4-28-1	20/03/2011	0.00023	0.00031	<0.001	<0.0001	0.007	0.0098	<3
S4-28-1	27/03/2011	0.00028	0.00024	<0.001	<0.0001	0.0065	0.009	<3
S4-28-1	03/04/2011	<0.001	0.00034	0.002	<0.001	0.011	0.012	<1
S4-28-1	10/04/2011	<0.001	0.00023	0.003	<0.001	0.012	0.013	3
S4-28-1	17/04/2011	<0.001	0.000034	<0.002	<0.001	0.009	<0.003	<1
S4-28-1	24/04/2011	0.001	0.000304	0.003	<0.001	0.009	0.013	3
S4-28-1	30/04/2011	<0.001	0.000348	0.01	<0.001	0.009	0.022	3
S4-28-1	07/05/2011	<0.001	0.000277	0.002	<0.001	0.008	0.008	2
S4-28-1	15/05/2011	<0.001	0.000266	0.003	<0.001	0.008	0.03	<1
S4-28-1	22/05/2011	<0.001	0.000578	<0.002	<0.001	0.008	0.036	1
S4-28-1	29/05/2011	<0.001	0.000272	<0.002	<0.001	0.008	0.028	1

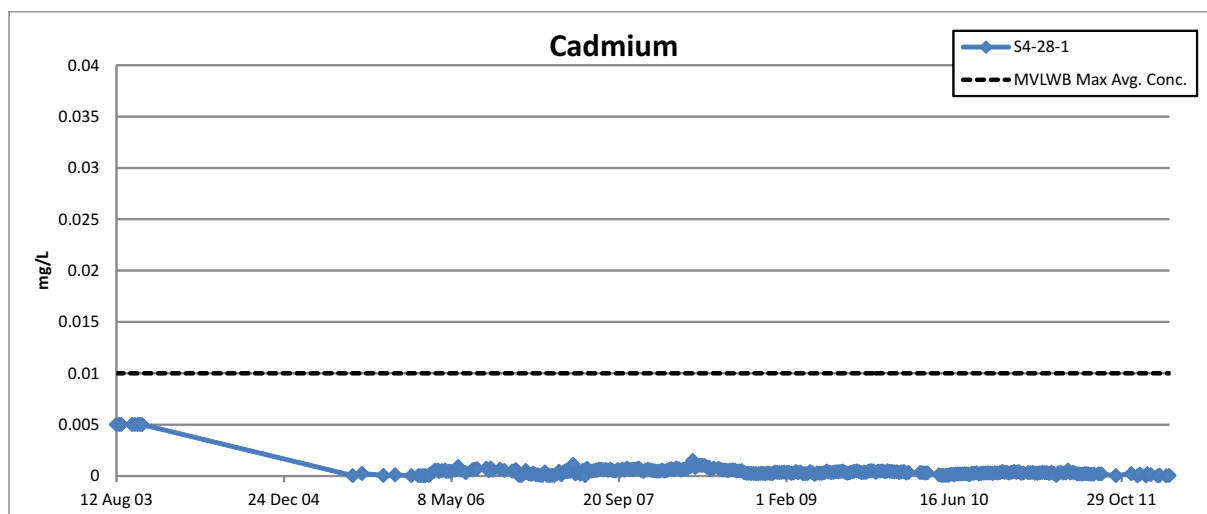
Table 11: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-28-1, 2003 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-28-1	05/06/2011	<0.001	0.000336	<0.002	<0.001	0.008	0.013	1
S4-28-1	12/06/2011	<0.001	0.000296	<0.002	<0.001	0.009	0.012	3
S4-28-1	19/06/2011	<0.001	0.000183	0.002	<0.001	0.008	0.008	<1
S4-28-1	26/06/2011	<0.001	0.000196	0.004	<0.001	0.008	0.01	1
S4-28-1	03/07/2011	<0.001	0.000175	0.002	<0.001	0.01	0.011	<1
S4-28-1	10/07/2011	<0.001	0.000205	0.002	<0.001	0.009	0.016	<1
S4-28-1	17/07/2011	<0.001	0.000218	0.003	<0.001	0.011	0.086	2
S4-28-1	24/07/2011	<0.001	0.000199	<0.002	<0.001	0.008	0.014	5
S4-28-1	31/07/2011	<0.001	0.000156	0.003	<0.001	0.008	0.015	1
S4-28-1	07/08/2011	<0.001	0.000171	0.002	<0.001	0.008	0.012	<1
S4-28-1	21/08/2011	<0.001	0.000198	<0.002	<0.001	0.01	0.035	1
S4-28-1	30/08/2011	<0.001	0.000185	0.002	<0.001	0.012	0.015	<1
S4-28-1	12/10/2011	0.001	0.000025	0.002	0.001	0.003	0.003	1
S4-28-1	27/11/2011	<0.001	0.000214	0.004	<0.001	0.014	0.016	<1
S4-28-1	16/12/2011	0.00005	0.00001	0.001	0.00001	0.001	0.001	1
S4-28-1	23/12/2011	0.00027	0.00016	<0.001	0.00002	0.006	0.01	<1
S4-28-1	10/01/2012	0.0005	0.00001	0.001	0.00001	0.001	0.001	1
S4-28-1	14/01/2012	<0.001	0.000208	<0.002	<0.001	0.016	0.015	<1
S4-28-1	24/01/2012	<0.0005	0.00013	0.001	0.00002	0.007	0.011	3
S4-28-1	14/02/2012	0.0005	0.00001	0.001	0.00001	0.001	0.001	1
S4-28-1	20/02/2012	<0.0005	0.00006	<0.001	<0.00001	0.006	0.009	6
S4-28-1	10/03/2012	0.0005	0.00001	0.001	0.00001	0.001	0.001	1
S4-28-1	19/03/2012	<0.0005	0.00005	<0.001	<0.00001	0.006	0.008	<1

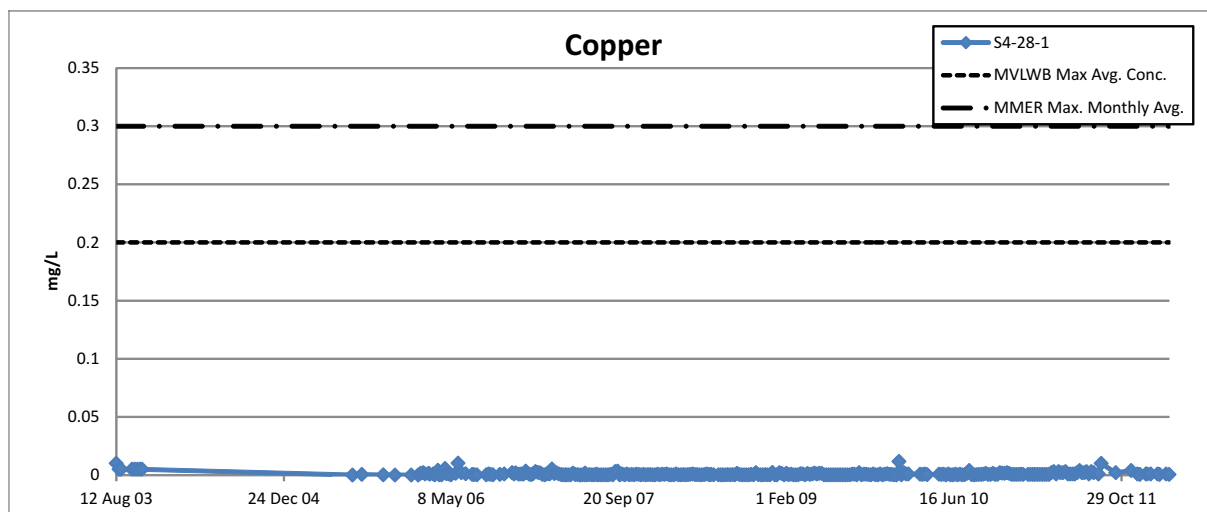
a)



b)



c)



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CLIENT



CANTUNG MINE

**Total Arsenic, Cadmium, and Copper
Concentrations (mg/L) in Groundwater,
Station S4-28-1, 2003 – Present**



PROJECT NO.
Y22101275.001

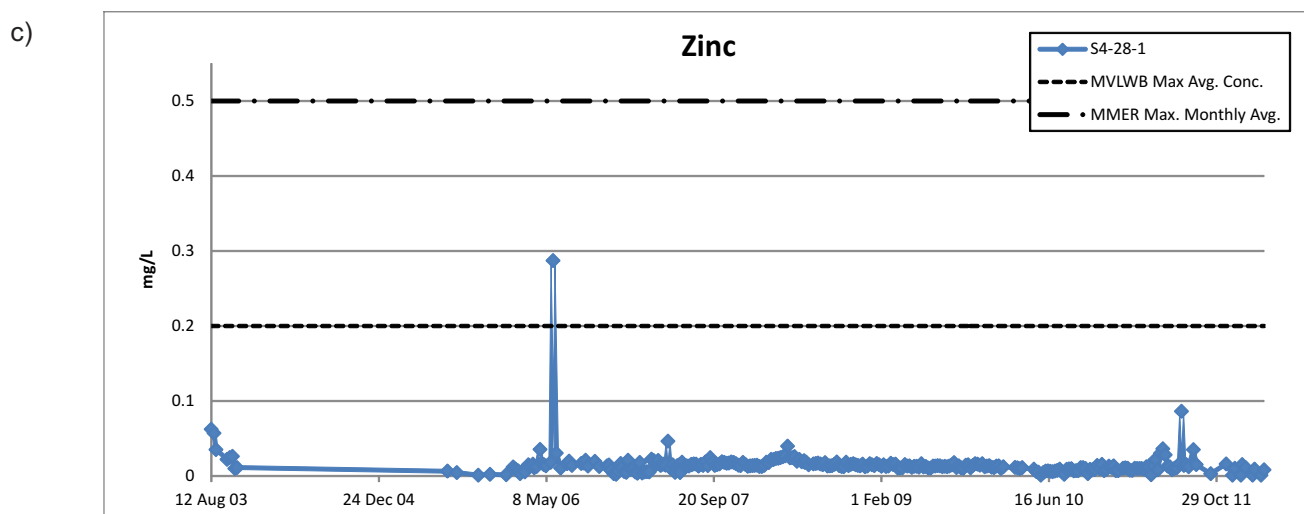
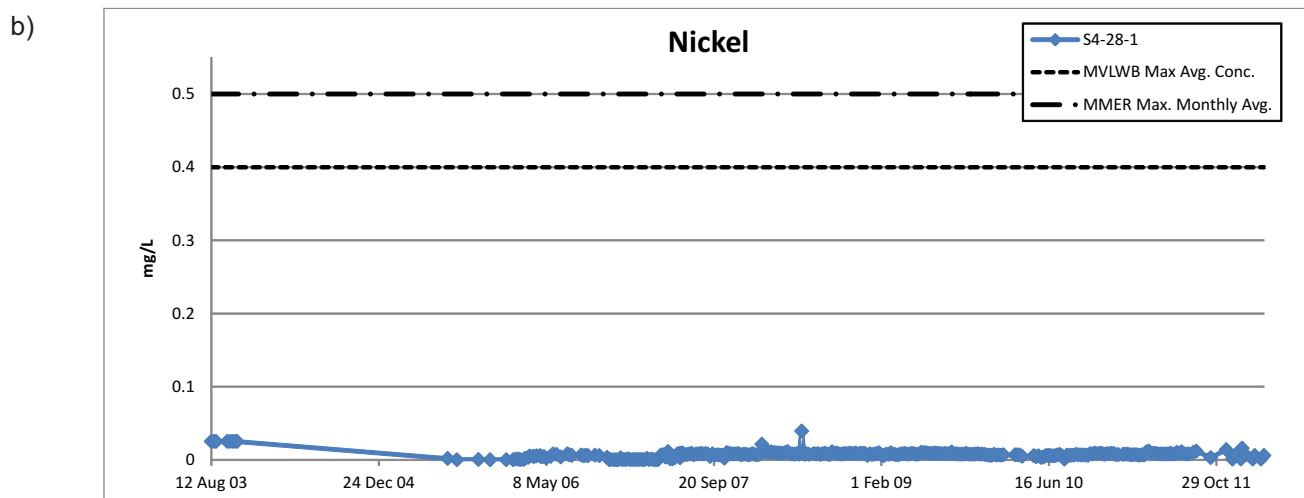
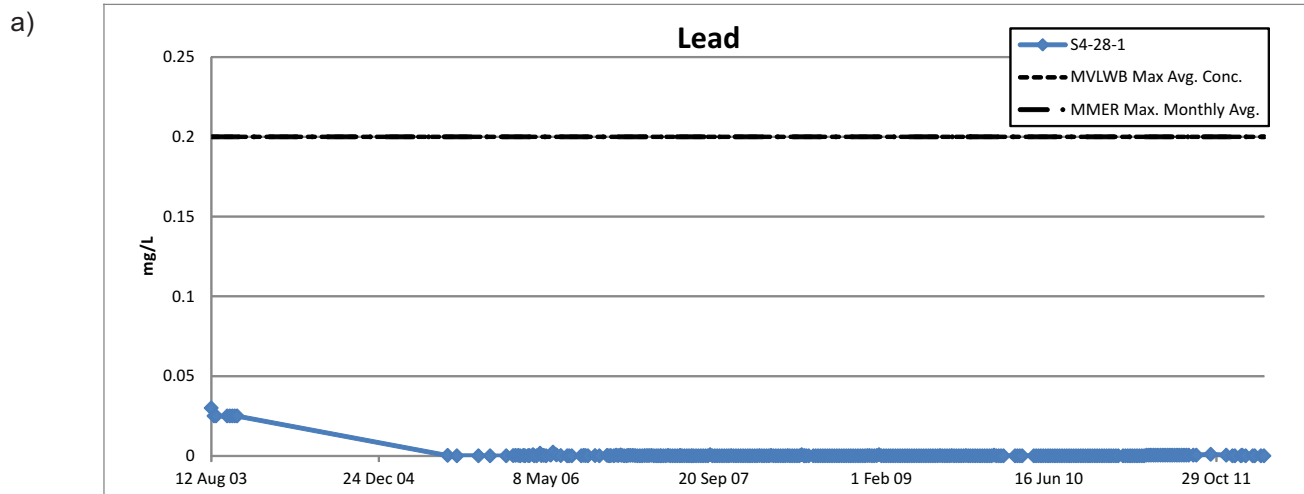
DWN MEZ CKD SH APVD SH REV 0

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May 8, 2012

Figure 32

STATUS
ISSUED FOR USE



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CLIENT



CANTUNG MINE

**Total Lead, Nickel, and Zinc
Concentrations (mg/L) in Groundwater,
Station S4-28-1, 2003 – Present**



PROJECT NO.
Y22101275.001

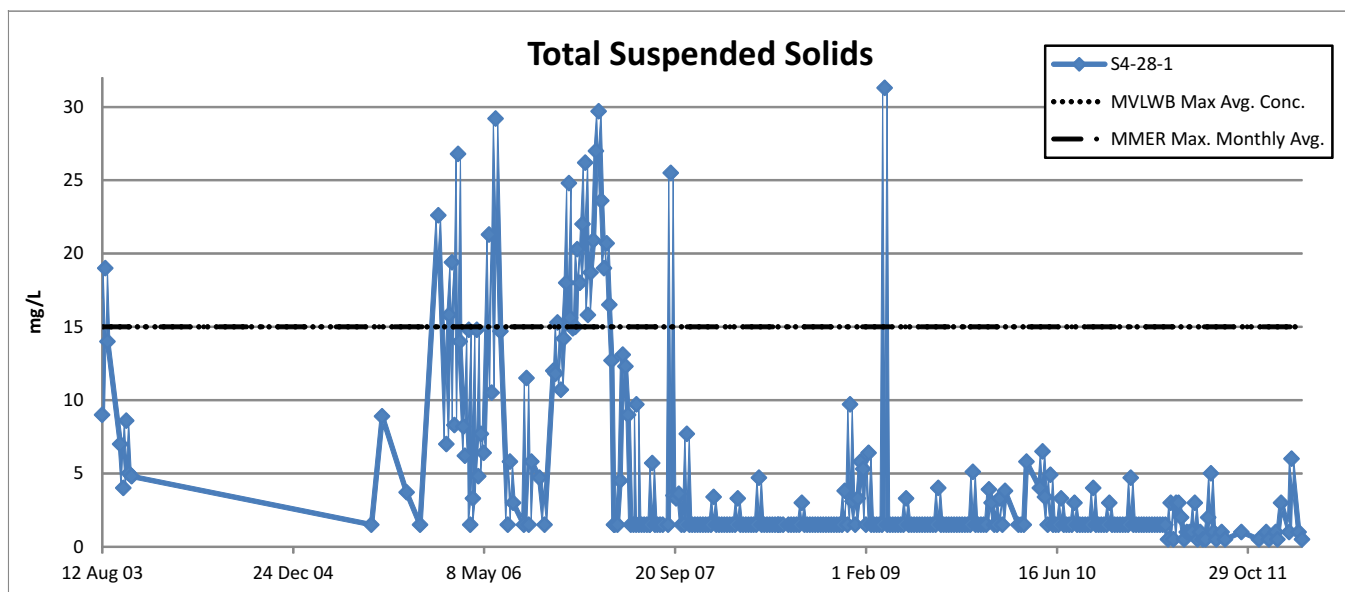
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Figure 33

STATUS
ISSUED FOR USE



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CLIENT



CANTUNG MINE

**Total Suspended Solids Concentrations
(mg/L) in Groundwater,
Station S4-28-1, 2003 – Present**



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CKD SH
APVD SH
REV 0

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Figure 34

STATUS
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5.2.5 Groundwater Station S4-27-17

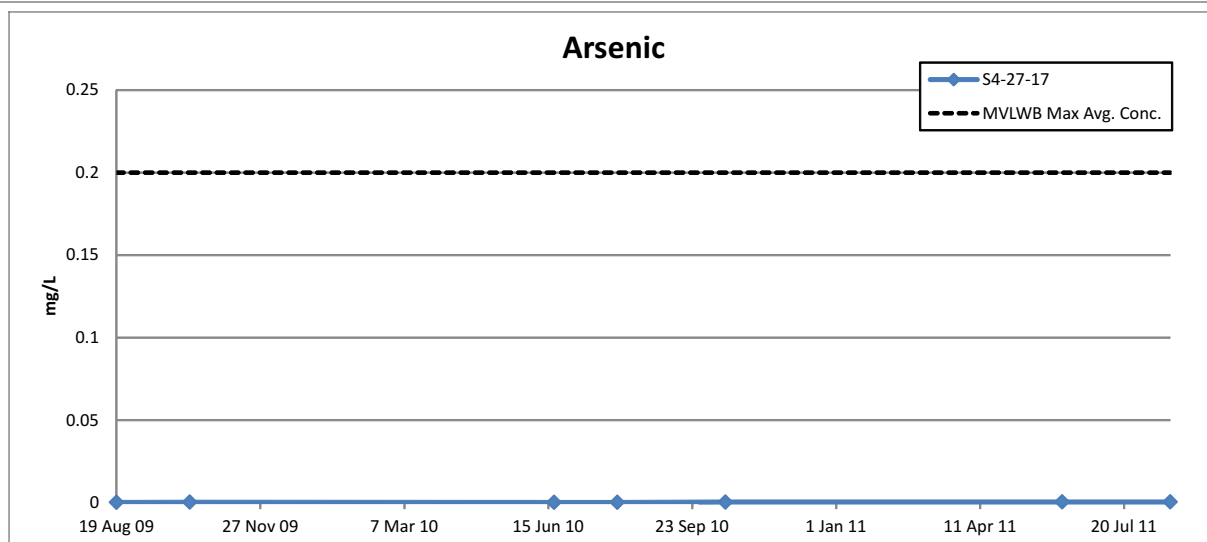
Groundwater monitoring Station S4-27-17 was established in August 2009 to serve as a background groundwater quality station for the entire Cantung Mine Project area. This station was located up-gradient and to the northwest of the freshwater pump house.

Table 12 and Figures 35 to 37 present the available groundwater quality data for Station S4-27-17, for the relatively short period of record. As noted in Table 12 and the associated figures, since August 2009, when this station was established as the background station, the concentrations of total metals and TSS in S4-27-17 groundwater from this well have consistently remained below the current MVLWB MAC groundwater quality parameters, with the exception of one slightly elevated TSS value of 23.7 mg/l recorded in October 2010.

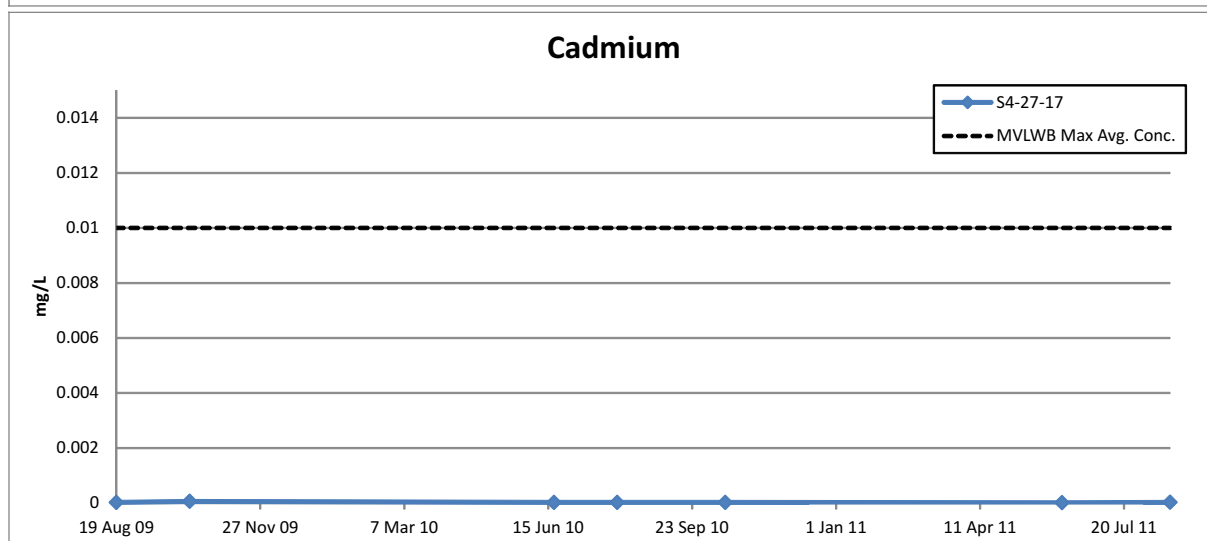
Table 12: Concentrations of Selected Water Licence Parameters Groundwater at Station S4-27-17, 2009 – Present

Station	Date Sampled	Arsenic (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Nickel (mg/l)	Zinc (mg/l)	TSS (mg/l)
S4-27-17								
S4-27-17	19/08/2009	0.00022	<0.00005	0.00047	<0.00005	<0.0005	0.001	10.2
S4-27-17	09/10/2009	0.00034	0.000061	0.00095	0.000161	<0.0005	0.0048	14.7
S4-27-17	19/06/2010	0.00022	<0.00005	0.00043	0.000062	<0.0005	0.001	4.8
S4-27-17	02/08/2010	0.00019	<0.00005	0.00042	<0.00005	<0.0005	<0.001	3.8
S4-27-17	16/10/2010	0.00043	<0.00005	0.00111	0.00015	0.00063	<0.003	23.7
S4-27-17	07/06/2011	<0.001	<0.000025	0.003	<0.001	<0.003	0.008	<1
S4-27-17	21/08/2011	<0.001	0.000028	<0.002	<0.001	<0.003	0.005	1

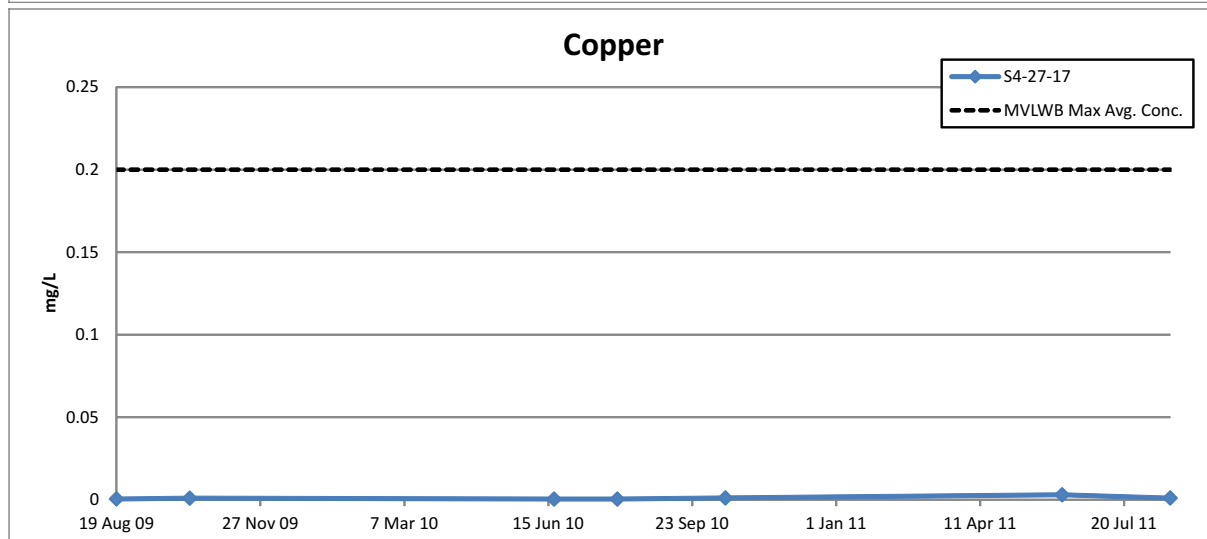
a)



b)



c)



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CLIENT

**CANTUNG MINE**

**Total Arsenic, Cadmium, and Copper
Concentrations (mg/L) in Groundwater,
Station S4-27-17, 2009 – Present**



PROJECT NO.
Y22101275.001

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MEZ SH SH 0

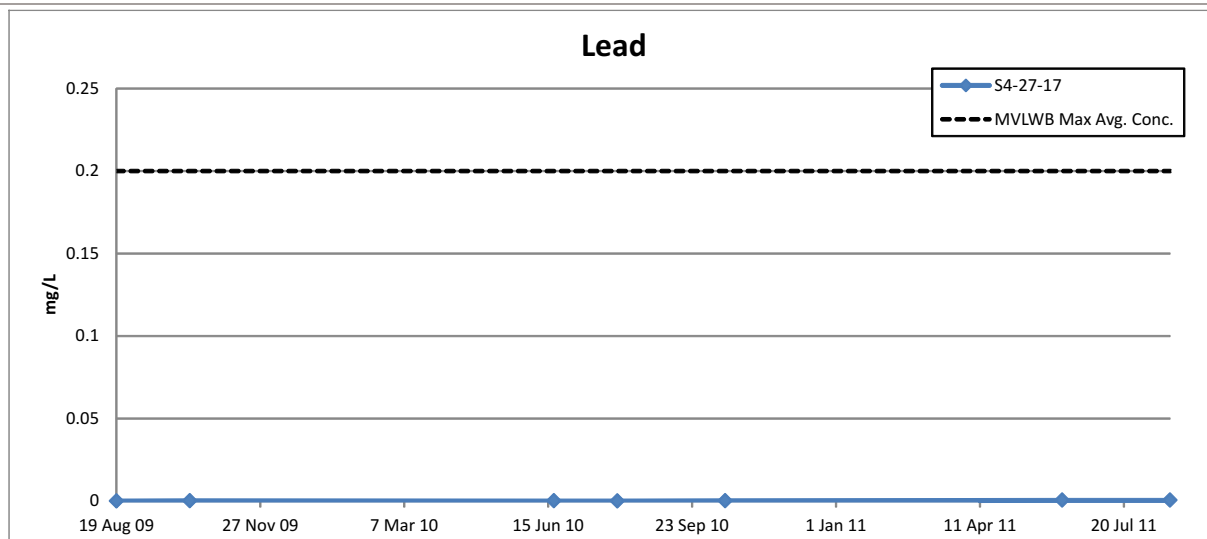
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May 8, 2012

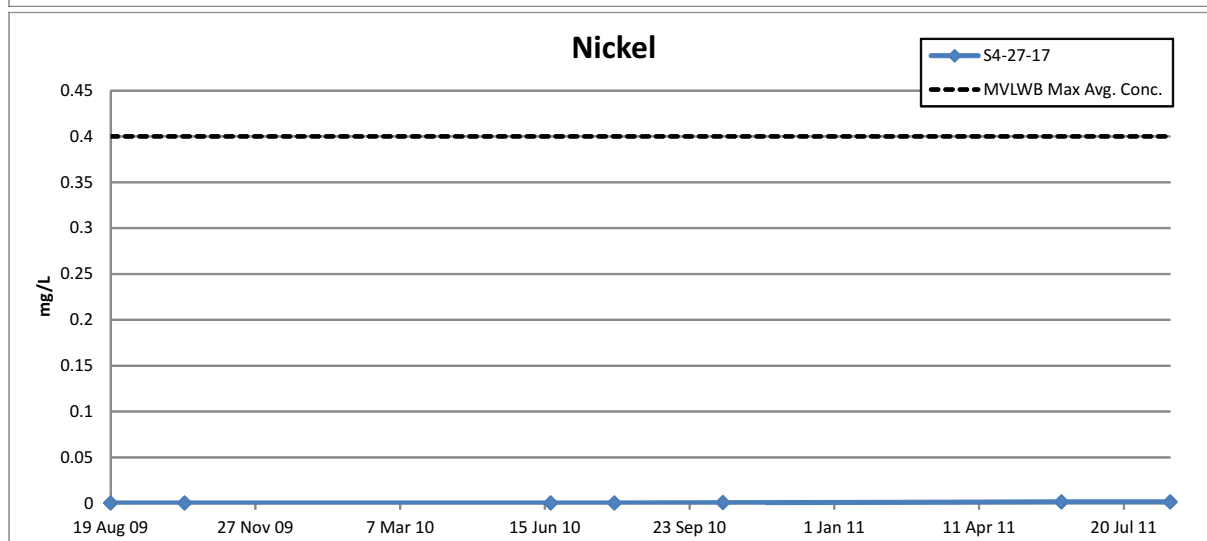
Figure 35

STATUS
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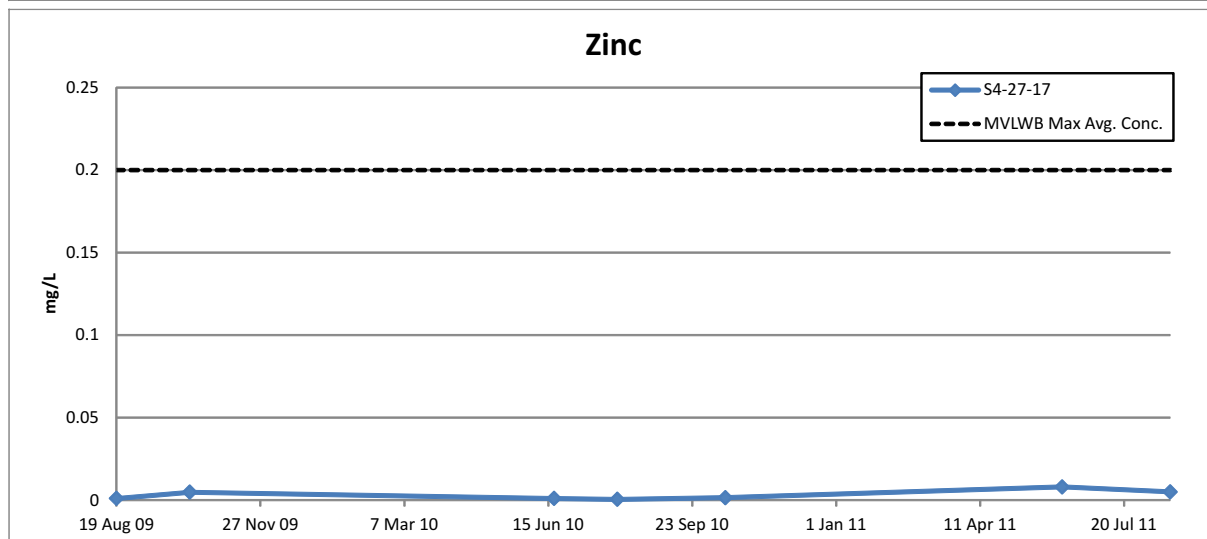
a)



b)



c)



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CLIENT

**CANTUNG MINE**

**Total Lead, Nickel, and Zinc
Concentrations (mg/L) in Groundwater,
Station S4-27-17, 2009 – Present**



PROJECT NO.
Y22101275.001

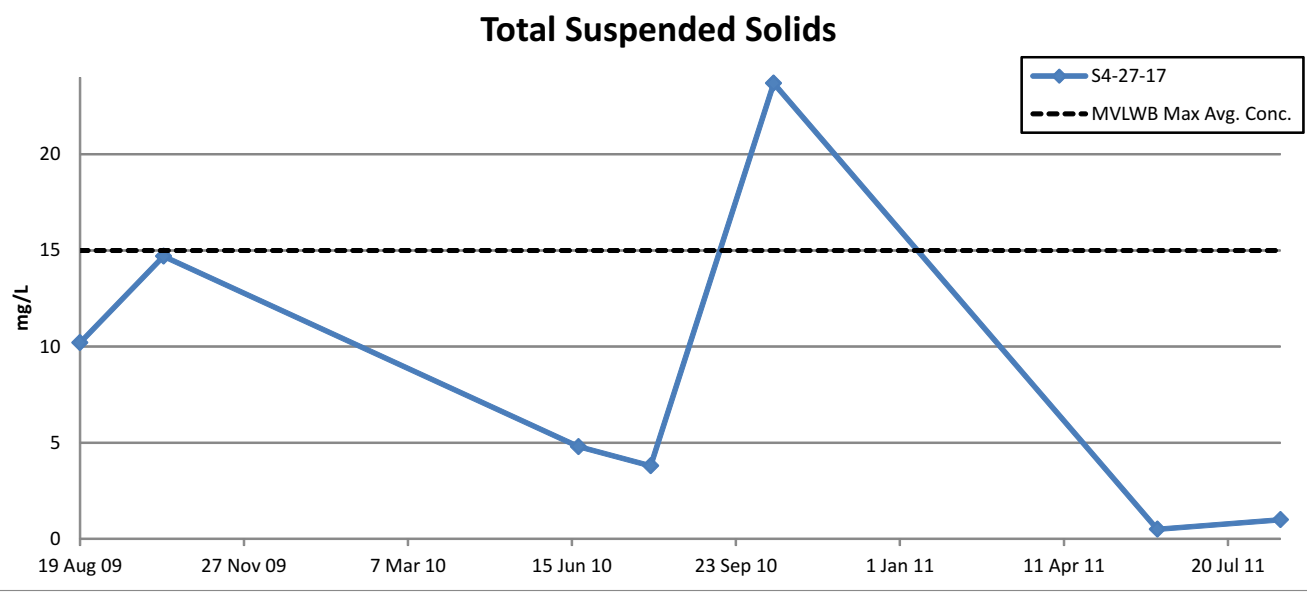
DWN	CKD	APVD	REV
MEZ	SH	SH	0

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DATE
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Figure 36

STATUS
ISSUED FOR USE



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5.3 Summary of Groundwater Quality

For purposes of this report, the assessment of groundwater quality parameters focussed on the key parameters traditionally specified in the water licence and the Metal Mining Effluent Regulations. On this basis, the parameters examined and discussed in more detail have included arsenic, cadmium, copper, lead, nickel, zinc and total suspended solids.

To facilitate the presentation of historic and more recent data extending for the period of record from the early 1980s to present, all of the data were treated as being valid, with the general understanding that minimum detection limits (MDL) have decreased as analysis methods have evolved. For data manipulation purposes, where sample values were clearly reported as less than the detection limit, half the value of the detection limit was used for computations and graphics production. In circumstances where it was not possible to determine what the detection limit was (particularly for some of the more historic data), the reported values were used.

Due to the large number of groundwater sampling sites monitored at the Cantung Mine site, NATCL and EBA determined that in the interests of time and efficiency, the assessment historical and current groundwater quality would be focussed on a more limited number of key SNP groundwater sampling stations. In particular the stations that were selected for further analysis were:

- S4-27-1/16 East (down-gradient) of TP2 on the Flat River floodplain, also referred to as MW1-1;
- S4-27-5/13 South (down-gradient) of TP3 west of airstrip north end;
- S4-27-7 East (down-gradient) of TP4 on the Flat River floodplain, also referred to as BH 43;
- S4-28-1 East (down-gradient) of TP3 near airstrip road/groundwater, also referred to as MW-6 and pumping well PW1(designated as MMR FDP); and
- S4-27-17 Northwest of freshwater pump house (background station).

5.3.1 Metals

The assessment of the available historical and more recent groundwater quality data set has determined that in general, the concentrations of total metals in the groundwater stations examined at all piezometer depths, with very few exceptions were consistently at or below the current MVLWB MAC groundwater quality parameters for the period of record from 1982 to the present.

Isolated occurrences of elevated total metal levels in groundwater were typically recorded in the mid-1980s, shortly before and after the then Canada Tungsten Mine closed down for an extended shutdown period. However, as previously indicated, some of these elevated values were due to the high detection limits employed at the time by the laboratory.

During the 1990s, when the mine was closed, the concentrations of total metals in the groundwater stations assessed were consistently at or below the current MVLWB MAC groundwater quality parameters with few exceptions.

During the period 2000 to present, the concentrations of total metals in the groundwater at groundwater monitoring stations assessed were consistently at or below the current MVLWB MAC groundwater quality

parameters and the MMER requirements, with a few minor exceptions, particularly for total copper and zinc.

5.3.2 Total Suspended Solids

Total suspended solids (TSS) values in groundwater, however, have exceeded the current MVLWB MAC criterion (15 mg/l) at a number of groundwater SNP sites for varying periods of time during the entire period of record.

The single highest value recorded for TSS (10,000 mg/l) reported in the groundwater over the period of record assessed by DIAND (1985-1999) was registered at Station 4-27-7 P12 (located below the toe of TP4 at 0-1.3 m) on November 24, 1986, several months after the mine had shut down its operations (DIAND 2001). This elevated TSS value corresponds with the single highest reading of total zinc reported for the same piezometer on the same day.

Other particularly elevated groundwater TSS results reported during the extended period of record reviewed by DIAND included:

- 1,250 mg/l TSS at Station 4-27-9 (located below the toe of TP2 at 0 -8.1 m) on October 11, 1999;
- 1,490 mg/l TSS at Station 4-27-4 P7 (located near the Flat River below TP4/TP3 at 2 m) on June 30, 1999;
- 620 mg/l TSS at Station 4-27-1 P10 (located directly adjacent to 4-27-9 at 9 m) on August 12, 1985; and
- 427 mg/l TSS at Station 4-27-5 P6 (located between TP3 and the airstrip) on June 30, 1986.

However, no clear trends for TSS in the groundwater were noted by DIAND (2001). This conclusion is quite consistent with the available mine data presented in this report for this period of time.

Notably elevated TSS values in the 1990s at S4-27-1 were primarily limited to Piezometer 10, which consistently reported higher TSS during the period May 1996 to October 1997 in the range of 123 to 184 mg/l, when the mine was in an extended period of closure.

During the period 2003 to 2008, TSS values in the groundwater at S4-27-1 Piezometer 10 remained elevated above the current MAC value of 15 mg/l, ranging from 44.3 to 235 mg/l. Since being replaced by S4-27-16 in August 2009, TSS values have continued to be elevated above the MAC value for TSS, ranging from 32-96.5 mg/l. However it should be noted that these elevated TSS values were within the range of TSS values recorded at S4-27-1 during the period of record for this station, including the 1990s, when the mine was in an extended closure period.

Notably elevated TSS values at S4-27-5 in the 1990s were primarily limited to Piezometer 13, which reported higher TSS in May, July and October 1996, with recorded TSS values of 51, 53 and 310 mg/l, respectively, and TSS values of 45 and 80 mg/l in October 1997 at Piezometers 1 and 8. Since 2000, with the exception of one TSS value of 691 mg/l recorded at Piezometer 3 on September 9, 2002, all TSS values at this station have remained well below the current MAC criterion.

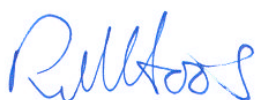
TSS values at stations S4-27-7, S4-28-1 and S4-27-17 have generally remained below the MVLWB MAC criterion with isolated, occasional minor exceedences.

6.0 CLOSURE

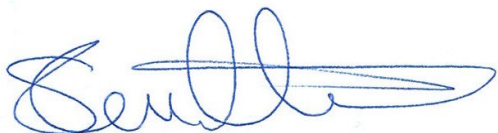
We trust that this Historical Data and Interpretation Report of Water Quality at the Cantung Mine, which was prepared consistent with Item F12 in MVLWB Water Licence MW2002L2-0019 will meet your present requirements. If you have any questions or comments, please contact the undersigned.

Sincerely,
EBA Engineering Consultants Ltd.

Prepared by:



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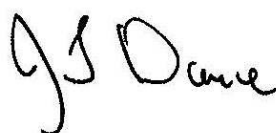


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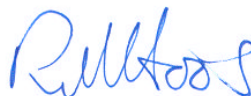


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APPENDIX A

EBA'S GEO-ENVIRONMENTAL REPORT - GENERAL CONDITIONS

GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

CANTUNG MINE COMPLIANCE REPORT (DIAND 2001)

Cantung Mine
Compliance Report

August 2001

Department of Indian Affairs and Northern Development

Water Resources Division

Water Science and Technology

Jared Smith
Co-op Student
University of Manitoba

Cantung Mine Compliance Report

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Cantung Mine Compliance Report

1.0 Introduction

The Cantung Mine is located in the Northwest Territories along the Yukon-NWT border. It is located at a Latitude of 51° 57' N, and a Longitude of 128° 16' W. The tungsten mine commenced its operations in 1962 and was shutdown on May 18th, 1986 due to a labor dispute. The mine was closed indefinitely in August 1986 due to depressed market conditions, and remains in care and maintenance. North American Tungsten Corporation Inc., the current owner of the Cantung Mine, plans to reopen the mine by the end of 2001.
(<http://www.westpac.bc.ca/natung/index.html>)

Cantung has kept its Class 1 water license valid since its closing in 1986 to ensure a quick restart of operations. The current license was issued in September, 1995 and it expires September 29, 2002.

According to the Surveillance Network Program (SNP), Cantung is required to monitor the water quality at several surveillance stations including groundwater surveillance wells. Data obtained at the SNP stations must meet the water quality requirements as set out in the license where applicable. Water input and output volumes must be recorded at other surveillance stations.

This report will evaluate Cantung's compliance to its water license when it was in production and while it was in a post-production state up to the present.

2.0 Background

2.1 SNP Sampling Stations - Locations

The Cantung mine site contains several sampling locations that are regulated and two that are monitored. The regulated station's water quality parameters must meet the maximum average concentrations (MAC) as set in the water license. If the concentration of a parameter is outside the MAC Cantung is in non-compliance. The parameters at monitored stations are not required to meet the license limit, but they are required to be included in reports to the water board.

The following stations are regulated at Cantung:

0004-9 Discharge of oil/water separator at Meter 628 to Sardine Creek
-when mine was in operation only

0004-12 Discharge from conveyor gallery

0004-13 Discharge from “E” Zone

Piezometers located in groundwater monitoring wells 0004-27-1 to 0004-27-9
-see water license in Appendix A for more detail

0004-30 Mill tailings at confluence of two mill waste pipelines at the drop box
-when mine was in operation only

When mill is in operation water inputs at Station 0004-1 from the Flat River must be recorded.

The following stations are monitored at Cantung:

0004-5 Flat River at bridge downstream of airstrip

0004-29 Flat River, 3km upstream of pump house
(NWT Water Board, 1995)

2.2 SNP Sampling Stations -Sampling Requirements; Parameters and Frequency

Site 0004-9 Discharge of oil/water separator at Meter 628 to Sardine Creek

Not currently part of SNP, however data shows that when the mine was in production the following parameters were analyzed for on a weekly basis.

pH	Temperature
Total Cyanide	Total Copper
Total Zinc	Oil and Grease
Conductivity	

Site 00004-12 & Site 0004-13 -Discharge from conveyor gallery, Discharge from “E” Zone, analyze for:

pH	Temperature
Conductivity	Total Copper
Total Zinc	Oil and Grease
Total Suspended Solids	

Required to be sampled once monthly between April and October and one time during the winter period.

Piezometers located in groundwater monitoring wells 0004-27-1 to 0004-27-9, analyze for:

pH	Temperature
----	-------------

Conductivity
Total Zinc

Total Copper
Total Suspended Solids

Required to be sampled late May, July, and October for stations 0004-27-1 to 0004-27-9. Station number 004-27-6 also required to be sampled in August. One or more peizometers are required to be sampled at each station (see Appendix A, Cantung's water license for details).

0004-30 Mill tailings at confluence of two mill waste pipelines at the drop box

Not currently part of SNP, however data shows that when the mine was in production the following parameters were analyzed for on a weekly basis.

pH
Total Cyanide
Total Zinc

Temperature
Total Copper
Total Nickel

0004-5 & 0004-29 -Flat River at bridge downstream of airstrip, Flat River, 3km upstream of pump house, analyze for:

pH
Conductivity
Total Zinc

Temperature
Total Copper

Required to be sampled once monthly between April and October and one time during the winter period.
(NWT Water Board, 1995)

2.3 Effluent Quality Requirements

The following water quality requirements must be met at stations 4-9, 4-12, and 4-13:

Parameter	Maximum Average Concentration	Maximum Concentration Of Any Grab Sample
Total Arsenic	0.50 mg/L	1.00 mg/L
Total Copper	0.10 mg/L	0.20 mg/L
Total Lead	0.10 mg/L	0.20 mg/L
Total Nickel	0.20 mg/L	0.40 mg/L
Total Zinc	0.10 mg/L	0.20 mg/L
Oil and Grease	5.0 mg/L	10.0 mg/L
Total Suspended Solids	25.0 mg/L	50.0 mg/L
Un-ionized Ammonia	0.20 mg/L	0.40 mg/L
pH	6.0 – 9.5	

(NWT Water Board, 1995)

The following water quality requirements apply to the ground water monitoring wells 4-27-1 to 4-27-9:

Parameter	Maximum Concentration Of Any Grab Sample
Total Arsenic	1.00 mg/L
Total Cadmium	0.01 mg/L
Total Copper	0.20 mg/L
Total Lead	0.20 mg/L
Total Nickel	0.40 mg/L
Total Zinc	0.20 mg/L
Total Suspended Solids	50.0 mg/L
Un-ionized Ammonia	0.40 mg/L

(NWT Water Board, 1995)

The following effluent quality requirements must be met at Station Number 4-30:

Parameter	Maximum Average Concentration	Maximum Concentration Of Any Grab Sample
Dissolved Arsenic	0.50 mg/L	1.00 mg/L
Dissolved Cadmium	0.005 mg/L	0.10 mg/L
Dissolved Copper	0.10 mg/L	0.20 mg/L
Dissolved Lead	0.10 mg/L	0.20 mg/L
Dissolved Nickel	0.20 mg/L	0.40 mg/L
Dissolved Zinc	0.10 mg/L	0.20 mg/L
Un-ionized Ammonia	0.20 mg/L	0.40 mg/L

(NWT Water Board, 1995)

2.4 SNP Flow Measurement Requirements

The monthly quantity of water withdrawn from the Flat River at Station Number 4-1 shall be recorded in cubic meters.

3.0 SNP Data Results

Some SNP data was available for Cantung since the late seventies. Complete yearly data was available from the early eighties. Data was for the most part complete although some samples were missing mostly because of weather difficulties and the samples were frozen. Since there was approximately twenty years of complete data, it could not all be analyzed. Therefore only several years of data were selected and it was analyzed. The years selected were 1985 (year of full production), 1986 (half a year of production, half shutdown), 1987 (one

year after shutdown), 1991 (five years after shutdown), 1996 (ten years after shutdown), and 1999 (the most recent data). The selected data was tabled and is included in Appendices G-O. To further reduce the amount of data for analysis the data was graphed by sampling station, but only if at least one value was above the license limit for a particular parameter at that station. See graphs in Appendices B-F.

3.1 Station 0004-9

Sampling at this station was only done when the mine was in operation. The Surveillance Network program sets a MAC for the following parameters that were commonly measured at this site pH, total zinc, total copper, and oil and grease. Total cyanide, conductivity, and temperature were also commonly analyzed at this site however these parameters are not regulated.

3.1.1 pH

The pH of the discharged water is required to fall between 6 and 9.5 according to the water license. Five times in the data the pH of the discharge has been recorded at over 9.5, the highest value was 10.4 reached on Sept. 11/1986. The lowest pH value of 6.2 was recorded on Aug. 15/1986.

3.1.2 Total Zinc

The limit of 0.20 mg/L for zinc was exceeded three times, Sept. 9/1985, May 23/1986, and August 7/1986. The values were 0.72, 0.94, and 0.34 respectively.

3.1.3 Total Copper

The limit of 0.20 mg/L for copper was exceeded five times over the selected time periods. The limit was exceeded on Mar. 22/1985, Sept. 6/1985, Nov. 22/1985, Feb. 7/1986, and Apr. 10/1986. The values were 0.56, 0.82, 0.40, 0.68, and 4.60 mg/L respectively.

3.1.4 Oil and Grease

The oil and grease limit of 10 mg/L was exceeded several times in the data. The highest value was 76 mg/L on November 26/1985.

3.2 Station 0004-12 & 0004-13

Samples at 4-12 and 4-13 have only been taken since the mine has ceased operation. The Surveillance Network program sets a MAC for the following parameters that are regulated at these sites pH, total zinc, total copper, oil and grease, and total suspended solids. Conductivity, and temperature were also commonly analyzed at these sites however these parameters are not regulated.

3.2.1 pH

The pH of the discharged water is required to fall between 6 and 9.5 according to the water license. In the data we used at station 4-12 the pH exceeded the upper limit once and reached a value of 9.6 on Oct. 3/1986; however it never lowered below the limit during this time period. All the values at station 4-13 were within the license limit.

3.2.2 Total Zinc

The MAC for zinc is 0.20 mg/L for stations 4-12 and 4-13. All values at stations 4-12 and 4-13 are under the license limit.

3.2.3 Total Copper

The total copper license limit is also 0.20 mg/L. In the data no values exceeded the license limit at stations 4-12 or 4-13.

3.2.4 Oil and Grease

The maximum allowable concentration of oil and grease in any grab sample is 10 mg/L. Only once did a water sample from 4-12 exceed the license limit, this occurred where a sample measured 181 mg/L on May 30/1996. No oil and grease values at 4-13 exceeded the license limit.

3.2.5 Total Suspended Solids

The license limit for TSS at stations 4-12 to 4-13 is 50 mg/L. None of the values at stations 4-12 or 4-13 exceeded the license limit.

3.3 Piezometers in Groundwater Wells 0004-27-1 to 0004-27-9

In each of the groundwater wells 4-27-1 to 4-27-8 three piezometers are to be sampled on each sampling date. At 4-27-9 one piezometer is to be sampled. Due to problems with the piezometers such as their tubes being frozen or a blockage, numerous piezometers have been sampled at one time or another throughout the last several years. To be exact the data in this report lists 66 different piezometers that were sampled at least once. To simplify the results, the piezometers will be discussed on a very general basis throughout this report, see Appendices G-M for information on individual piezometers. The Surveillance Network program sets a MAC for the following parameters that are regulated at these sites total zinc, total copper, and total suspended solids. Conductivity, temperature, and pH were also to be recorded at these sites, however these parameters are not regulated.

3.3.1 Total Zinc

The MAC for total zinc in the piezometers is 0.2 mg/L. In total 14 piezometers had at least one sample over the license limit throughout the sampling period. Wells 1, 4, and 5 all had three or more piezometers with excursions over the limit.

3.3.2 Total Copper

The limit as set out in the water license for total copper is 0.20 mg/L. Only two piezometers had levels of copper that exceeded the license limit 4-27-7 P12, and 4-27-9 BH53.

3.3.3 Total Suspended Solids

Total suspended solids in the water samples taken from the piezometers are required to be under the license limit of 50 mg/L. In total 42 out of the 66 piezometers sampled in the data have at least one excursion over this license limit. In particular Stations 4-27-4 and 4-27-5 both have nine piezometers with at least one sample over the license limit.

3.4 Station 0004-30

Sampling at this station was only done when the mine was in operation. The Surveillance Network program sets a MAC for the following parameters that were commonly measured at this site dissolved zinc, dissolved copper, and dissolved nickel. Total cyanide, temperature, and pH were also commonly analyzed at this site however these parameters are not regulated.

3.4.1 Dissolved Zinc

The MAC for dissolved zinc is 0.20 mg/L. None of the samples in the data exceeded this limit.

3.4.2 Dissolved Copper

The limit set out in the water license for dissolved copper is 0.20 mg/L. No values at 4-30 exceeded this limit.

3.4.3 Dissolved Nickel

The license limit for dissolved nickel is 0.40 mg/L. The data showed no excursions above this limit in the sampling period.

3.5 Flow Measurements

When in operation Cantung withdrew water from the Flat River for use in the mill. Water withdrawn from the Flat River is required to be recorded at station number 4-1. According to the water license Cantung cannot consume more than 45,000 cubic meters of freshwater a week. Monthly and yearly totals of the Cantung's water consumption are included in Appendix O. At no time did Cantung exceed its water consumption limit.

4.0 Discussion

4.1 Station 0004-9

The following parameters were commonly measured at this site while the mine was in operation: pH, total zinc, total copper, and oil and grease. Total cyanide, conductivity, and temperature were also commonly analyzed at this site, however these parameters are not regulated. Data for all parameters was submitted regularly while the mine was in operation.

No pH values fell below 6, however a few values rose above 9.5, with the highest value of 10.4 recorded on Sept. 11/1986. The Flat River appears to be naturally alkaline and this could be the cause of elevated pH values at this site.

Three total zinc values were above the license limit and five total copper values exceeded the license limit. These excursions appear to be random and have little relation to oil and grease values.

Oil and Grease values from this station were exceeded 11 times in 1985 and 1986. This shows some problems with the efficiency of the oil/water separator.

4.2 Station 0004-12 & 0004-13

These two sampling stations have been regulated since shortly after the mine ceased operations. The following parameters are regulated at these sites: pH, total zinc, total copper, oil and grease, and total suspended solids. Conductivity, and temperature were also commonly analyzed at these sites, however these parameters are not regulated. Most data was provided to us from these sites with a few exceptions. However most of the exceptions occurred at site 4-13 when the flow was frozen in the winter.

All pH values with the exception of one remained within the range specified in the water license. Most samples appear to have a pH of approximately 8.

There are no compliance issues present at 4-12 and 4-13 for total zinc, total copper, or oil and grease. Zinc and copper had no values over the license limit and oil and grease had only one value over the limit in our data.

4.3 Piezometers in Groundwater Wells 0004-27-1 to 0004-27-9

Due to freezing and blockage many different piezometers have been tested in the groundwater wells over the years. Which makes identifying trends in individual piezometers difficult. The following parameters are regulated at these groundwater wells: total zinc, total copper, and total suspended solids (TSS). Conductivity, temperature, and pH were also to be recorded at these sites however these parameters are not regulated. Although the data provided to us was spotty because of the vast number of piezometers sampled in the wells, the information was provided as per the water license.

There is some concern however with the ground water monitoring wells. As mentioned earlier in this data set 42 out of 66 piezometers in the ground water monitoring wells have had at least one value exceed the license limit for TSS. Also 14 piezometers had excursions over the limit for total zinc, and three piezometers exceeded the license limit for total copper. This could indicate seepage of mine tailings into the groundwater and propose a compliance issue.

4.4 Station 0004-30

This station monitored the mine tailings as they were deposited into the drop box while the mine was in operation. The following parameters were measured at this site: dissolved zinc, dissolved copper, and dissolved nickel. Total cyanide, temperature, and pH were also commonly analyzed at this site however these parameters are not regulated. All data from this station was provided very regularly during the period of analysis for this study.

All values for dissolved zinc, dissolved copper, and dissolved nickel fell below the license limit. No compliance issues are present. Although not regulated, the average pH values were between 9 and 10.

4.5 Flow Measurements

Cantung was well within its limit for the use of fresh water during its operation. No compliance issues are present.

5.0 Summary

Cantung has satisfactorily complied with most of the requirements of its Surveillance Network Program as outlined in its water license. It has done a good job in providing the data from the sampling stations. However there have been some compliance problems at sampling stations regarding water quality.

Following is some recommendations that could help in ensuring Cantung fulfills its obligations for the Surveillance Network Program in the future:

- 1) The discharge from the oil/water separator has several excursions over the license limit for multiple parameters. Additional monitoring and/or mitigation should be done at this site if the mine resumes operation to ensure no further infractions of the license limits shall occur.
- 2) Additional research should be conducted on the groundwater wells and the water samples being taken from them to determine: a) if the wells are in good physical condition, b) if the elevated TSS and total zinc levels are caused by seepage from the tailings pond or if the elevated levels are caused by another problem.
- 3) If the condition of the groundwater wells, or seepage from the tailings ponds is determined to be the cause of the elevated levels of the parameters, immediate action should be taken to rectify the situation.

6.0 References

NWT Water Board, 1995. Cantung Water License.

Westpac Management Corporation 2001. North American Tungsten. [Online].
Available: <http://www.westpac.bc.ca/natung/index.html> Accessed: August
20, 2001.

Appendix A
Cantung Water License

Minister of Indian Affairs
and Northern Development



Ministre des Affaires
indiennes et du Nord canadien

Ottawa, Canada K1A 0H4

INDIAN AND NORTHERN
AFFAIRS — CANADA
N.W.T. REGION

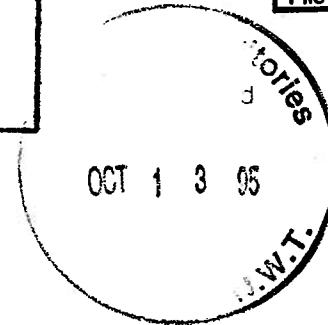
OCT 13 1995

WATER RESOURCES
DIVISION
YELLOWKNIFE, NT

CCF	
BOARD	
G.W.	
E.A.	
W. REC	
File -	

OCT - 6 1995

Mr. Gordon Wray
Chairman
Northwest Territories Water Board
Precambrian Building
P.O. Box 1500
YELLOWKNIFE NT X1A 2R3



Dear Mr. Wray:

I am pleased to forward the enclosed Licence N3L2-0004 for
Canada Tungsten Inc.'s Cantung Mine.

I have approved this licence as recommended by the Board.

A screening of this project, pursuant to the *Environmental Assessment and Review Process Guidelines Order*, has now been completed, and I am satisfied that any potentially adverse environmental and related socio-economic effects that may be caused by this project are insignificant or mitigable with known technology.

Thank you for your co-operation.

Yours truly,

Ronald A. Irwin, P.C., M.P.

Encl.

Canada

NORTHWEST
TERRITORIES
WATER BOARD

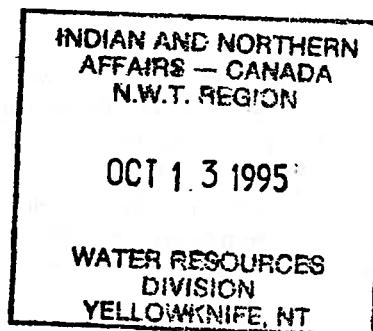


ALTA
SOLAR

WATER REGISTER NO: N3L2-0004

October 13, 1995

Mr. David Libby, P. Eng.
Vice-President, Mining Operations
Canada Tungsten Mining Corporation
#1 Adelaide Street East
Suite 2501
TORONTO, ON M5C 2V9



Dear Mr. Libby:

RE: ISSUANCE OF AN "A" TYPE LICENCE - WATER REGISTER NO: N3L2-0004

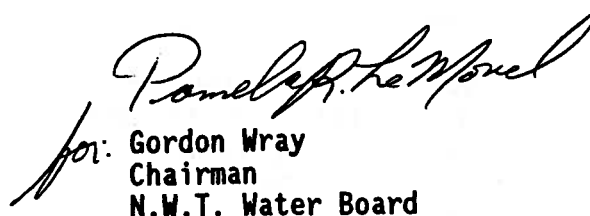
Attached is a duplicate of Licence No. N3L2-0004 granted to Canada Tungsten Mining Corporation by the Northwest Territories Water Board, and approved by the Minister of Indian Affairs and Northern Development in accordance with the Northwest Territories Waters Act. The other original of this Licence has been filed with the Department of Indian Affairs and Northern Development in Yellowknife, Northwest Territories.

Also attached are general procedures for the administration of licences in the Northwest Territories. I request that you review these and address any questions to the Board's office.

In conclusion, please be advised that this letter with attached procedures, all inspection reports, and correspondence related thereto are part of the public Water Register, and are intended to keep all interested parties informed of the manner in which the Licence requirements are being met. All Water Register material will be considered when the Licence comes up for renewal or amendment.

The full cooperation of Canada Tungsten Mining Corporation is anticipated.

Sincerely,


for: Gordon Wray
Chairman
N.W.T. Water Board

Attachments (2)

P.O. Box 1500, Yellowknife, N.W.T., X1A 2R3, 9th Floor, Precambrian Building
Phone: (403) 920-8191 Fax: (403) 873-9572

**GENERAL PROCEDURES FOR THE ADMINISTRATION OF LICENCES
ISSUED UNDER THE NORTHWEST TERRITORIES WATERS ACT
IN THE NORTHWEST TERRITORIES**

1. At the time of issuance, a copy of the Licence is placed on the Water Register in the Office of the Northwest Territories Water Board in Yellowknife, and is then available to the public.
2. To enforce the terms and conditions of the Licence, the Minister of Indian Affairs and Northern Development has appointed Inspectors in accordance with Section 35(1) of the Northwest Territories Waters Act. The Inspectors coordinate their activities with officials of the Water Resources Division of the Department of Indian Affairs and Northern Development. The Inspector responsible for Licence No. N3L2-0004 is located in the Fort Simpson District Office.
3. To keep the Water Board and members of the public informed of the Licensee's conformity to Licence conditions, the Inspectors prepare reports which detail observations on how each item in the Licence has been met. These reports are forwarded to the Licensee with a covering letter indicating what action, if any, should be taken. The inspection reports and covering letters are placed on the public Water Register, as are any responses received from the Licensee pertaining to the inspection reports. It is therefore of prime importance that you react in all areas of concern regarding all inspection reports so that these concerns may be clarified.
4. If the renewal of Licence No. N3L2-0004 is contemplated it is the responsibility of the Licensee to apply to the Water Board for renewal of the Licence. The past performance of the Licensee, new documentation and information, and points raised during a public hearing, if required, will be used to determine the terms and conditions of any Licence renewal. Please note that if the Licence expires and another has not been issued, then water and waste disposal must cease, or Canada Tungsten Mining Corporation would be in contravention of the Northwest Territories Waters Act. It is suggested that an application for renewal of Licence No. N3L2-0004 be made at least one year in advance of the Licence expiry date.
5. If, for some reason, Licence No. N3L2-0004 requires amendment, then a public hearing may be required. You are reminded that applications for amendments should be submitted as soon as possible to provide the Water Board with ample time to go through the amendment process. The process may take up to six (6) months or more depending on the scope of the amendment requested.

The Surveillance Network Program annexed to the Licence can be modified at the discretion of the Board and does not require a public hearing. A request for any proposed change to the Surveillance Network Program should be forwarded to the Board in writing, including a rationale for the change.

6. Specific clauses of your Licence make reference to the Board, Analyst or Inspector. The contact person, address, phone and fax number of each is:

BOARD: Executive Assistant
Northwest Territories Water Board
Box 1500
YELLOWKNIFE, NT X1A 2R3

Phone No: (403) 920-8191
Fax No: (403) 873-9572

ANALYST: Analyst
Water Laboratory
Northern Affairs Program
Department of Indian Affairs
and Northern Development
Box 1500
4601 - 52nd Avenue
YELLOWKNIFE, NT X1A 2R3

Phone No: (403) 920-8129
Fax No: (403) 873-9300

INSPECTOR: Inspector
Fort Simpson District Office
Northern Affairs Program
Department of Indian Affairs
and Northern Development
P.O. Box 150
FORT SIMPSON, NT X0E 0N0

Phone No: (403) 695-2627
Fax No: (403) 695-2615

7. Your Licence requires a security deposit be submitted. The contact person, address, phone and fax number of the individual administering security deposits is:

Administrative Supervisor
Regulatory Approvals Section
Water Resources Division
Northern Affairs Program
Indian and Northern Affairs Canada
Box 1500
YELLOWKNIFE, NT X1A 2R3

Phone No: (403) 920-8247
Fax No: (403) 873-9318

NORTHWEST TERRITORIES WATER BOARD

Pursuant to the Northwest Territories Waters Act and Regulations the Northwest Territories Water Board, hereinafter referred to as the Board, hereby grants to

CANADA TUNGSTEN MINING CORPORATION
(Licensee)
of SUITE 2501, 1 ADELAIDE STREET EAST
TORONTO, ONTARIO M5C 2V9
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water subject to the restrictions and conditions contained in the Northwest Territories Waters Act and Regulations made thereunder and subject to and in accordance with the conditions specified in this Licence.

Licence Number	<u>N3L2-0004 (RENEWAL)</u>
Licence Type	<u>"A"</u>
Water Management Area	<u>NORTHWEST TERRITORIES 03</u>
Location	<u>TUNGSTEN, NORTHWEST TERRITORIES</u>
Purpose	<u>WATER USE AND WASTE DISPOSAL</u>
Description	<u>FOR A MINING AND MILLING UNDERTAKING AND ASSOCIATED USES</u>
Quantity of Water Not to be Exceeded	<u>SEE LICENCE, PART C</u>
Effective Date of Licence	<u>SEPTEMBER 30, 1995</u>
Expiry Date of Licence	<u>SEPTEMBER 29, 2002</u>

This Licence issued and recorded at Yellowknife includes and is subject to the annexed conditions.

NORTHWEST TERRITORIES WATER BOARD

Pamela R. LeWone
Witness

[Signature]
Chairman

APPROVED BY
[Signature]
Minister of Indian Affairs
and Northern Development

PART A: SCOPE AND DEFINITIONS

1. Scope

- a) This Licence entitles Canada Tungsten Mining Corporation to use water and dispose of waste for a mining and milling undertaking, and associated uses at Tungsten, Northwest Territories (Latitude 61°57'N. and Longitude 128°16'W.);
- b) This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposit of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the Northwest Territories Waters Act, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and
- c) Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of applicable Federal, Territorial or Municipal legislation.

2. Definitions:

In this Licence: N3L2-0004

"**Act**" means the Northwest Territories Waters Act;

"**Analyst**" means an Analyst designated by the Minister under Section 35(1) of the Northwest Territories Waters Act;

"**Board**" means the Northwest Territories Water Board established under Section 10 of the Northwest Territories Waters Act;

"**Inspector**" means an Inspector designated by the Minister under Section 35(1) of the Northwest Territories Waters Act;

"**Licensee**" means the holder of this Licence;

"**Minister**" means the Minister of Indian Affairs and Northern Development;

"**Regulations**" means Regulations proclaimed pursuant to Section 33 of the Northwest Territories Waters Act;

"**Waste**" means waste as defined by Section 2 of the Northwest Territories Waters Act;

"Average Concentration" means the discrete average of four consecutive analytical results, or if less than four analytical results, the discrete average of the analytical results collected during a batch decant, and as submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Filtered Sample" means any sample that has been passed through a filter having a mesh size of 0.45 microns or equivalent;

"Minewater" means groundwater or any water used in mining which is pumped or flows out of any underground workings or open pit;

"Sewage" means all toilet wastes and greywater;

"Tailings" means material rejected from the mill after the recoverable valuable minerals have been extracted; and

"Tailings Containment Area" comprises the following engineered structures designed to contain Tailings: Tailings Pond #1, Tailings Pond #2, Tailings Pond #3, Tailings Pond #4, and Tailings Pond #5 (proposed).

PART B: GENERAL CONDITIONS

1. The water use fee shall be paid annually in advance.
2. The Licensee shall have posted and maintain a security deposit:
 - a) in the amount of Three Hundred and Fifty Thousand (\$350,000.00) Dollars pursuant to Section 17(1) of the Act and Section 12 of the Regulations during the long term shutdown; and
 - b) prior to re-start of mill operations, in the amount of Nine Hundred Thousand (\$900,000.00) Dollars pursuant to Section 17(1) of the Act and Section 12 of the Regulations. This amount shall be the aggregate sum of the Three Hundred and Fifty Thousand (\$350,000.00) Dollars referred to in Part B, Item 2(a), and the additional sum of Five Hundred and Fifty Thousand (\$550,000.00) Dollars.

The security deposit for both the long term shutdown and the operational phase shall be maintained until such time as it is fully or in part refunded by the Minister pursuant to Section 17 of the Act. This clause shall survive the expiry of this Licence or renewals thereof.

3. The Licensee shall file an Annual Report with the Board not later than March 31st of the year following the calendar year reported which shall contain the following information:
 - a) the monthly and annual quantity in cubic metres of water pumped from the Flat River;
 - b) the monthly and annual quantity in cubic metres of the solid and liquid fractions discharged to the Tailings Containment Area;

- c) the monthly and annual quantity in cubic metres of the solid and liquid fractions discharged to the underground;
 - d) the monthly and annual quantity in cubic metres of Sewage discharged to the Tailings Containment Area;
 - e) the monthly and annual quantity in cubic metres of Minewater discharged;
 - f) tabular summaries of all data generated under the "Surveillance Network Program";
 - g) a detailed record of major maintenance work carried out on the water supply and the waste disposal systems and all associated structures;
 - h) revisions to the Contingency Plan as referred to in Part F;
 - i) revisions to the Abandonment and Restoration Plan as referred to in Part G;
 - j) a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - k) a list of any unauthorized discharges; and
 - l) any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.
4. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to conditions of this Licence.
5. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.
6. Meters, devices or other such methods used for measuring the volumes of waters used and waste discharged shall be installed, operated and maintained to the satisfaction of an Inspector.
7. The Licensee shall maintain, to the satisfaction of an Inspector, the necessary signs to identify the stations of the "Surveillance Network Program".
8. The Licensee shall notify the Board at least six (6) months prior to re-start of mill operations.
9. The Licensee shall ensure a copy of this Licence is maintained at the site of operation at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall, prior to re-start of mill operations, submit to the Board an investigative report outlining the feasibility of recycling water throughout the operation.
2. The Licensee shall obtain all water for mining, milling, domestic, and associated uses from the Flat River.
3. The weekly quantity of water withdrawn from the Flat River shall not exceed 45,000 cubic metres.
4. Notwithstanding Part C, Item 3, the Licensee shall not withdraw from the Flat River any quantity of water that will reduce the flow in the Flat River to less than 0.127 cubic metres per second immediately downstream of the water intake.
5. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall maximize the use of cooling water from the powerhouse and Minewater within the mill circuit. Cooling water and Minewater which is not utilized in the mill may be discharged to Sardine Creek at Station Numbers 4-9, 4-12 and 4-13. This discharge shall not exceed the following effluent quality requirements:

PARAMETER	MAXIMUM AVERAGE CONCENTRATION	MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE
Total Arsenic	0.50 mg/L	1.00 mg/L
Total Copper	0.10 mg/L	0.20 mg/L
Total Lead	0.10 mg/L	0.20 mg/L
Total Nickel	0.20 mg/L	0.40 mg/L
Total Zinc	0.10 mg/L	0.20 mg/L
Oil and Grease	5.0 mg/L	10.0 mg/L
Total Suspended Solids	25.0 mg/L	50.0 mg/L
Un-ionized Ammonia	0.20 mg/L	0.40 mg/L

The discharge shall have a pH of between 6.0 and 9.5.

2. The Licensee shall at least six (6) months prior to any proposed construction of Tailings Pond #5, submit to the Board for approval new designs, drawings, and an implementation schedule for the construction of the impoundment. These designs may require liners for this pond to prevent groundwater seepage, should such be required by the Board.
3. The Licensee shall at least six (6) months prior to re-start of mill operations submit to the Board for approval the following:
 - a) a report that describes conditions of the groundwater monitoring wells and groundwater pumping wells including required remediation to be undertaken to bring them up to present day standards; and
 - b) should an effluent treatment plant be required by the Board, designs, drawings, and an implementation schedule for the construction of such a plant, including proposed methods of treatment to ensure that effluent discharged from the Tailings Containment Area meets the limits set out in Part D, Item 1.
4. Prior to construction of any external dams, dykes or structures intended to contain, withhold, divert or retain water or Waste, other than as contemplated in the Contingency Plan, the Licensee shall submit to the Board for approval design drawings stamped by a qualified geotechnical engineer registered in the Northwest Territories.
5. Construction of designed structures referred to in Part D, Item 4 shall be carried out as approved by the Board.
6. As-built drawings of the dams, dykes or structures referred to in Part D, Item 5 shall be stamped by a qualified geotechnical engineer registered in the Northwest Territories and submitted to the Board within ninety (90) days of completion of the facility(ies).
7. All Tailings shall either be deposited in the Tailings Containment Area or shall be deposited underground.
8. All Sewage shall be discharged to the Tailings Containment Area.
9. The Tailings Containment Area shall be constructed, operated and maintained to engineering standards such that:
 - a) the solids fraction of the Tailings deposited therein shall be permanently contained within the Tailings Containment Area;
 - b) a freeboard limit of 1.0 metre shall be maintained at all times in the Tailings Ponds, or as recommended by a qualified geotechnical engineer and as approved by the Board;
 - c) erosion of constructed facilities is addressed immediately;

- d) during milling operations, a daily inspection of the dams, Tailings line(s) and catchment basin(s), shall be carried out and records of these inspections shall be kept for review upon the request of an Inspector; and
 - e) an inspection of the Tailings Containment Area shall be carried out annually during the summer season by a qualified geotechnical engineer registered in the Northwest Territories. The engineer's report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the engineer's recommendations.
10. All mill waste and Minewater discharged to the Tailings Containment Area shall not exceed the following effluent quality requirements on a Filtered Sample at Station Number 4-30:

PARAMETER	MAXIMUM AVERAGE CONCENTRATION	MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE
Dissolved Arsenic	0.50 mg/L	1.00 mg/L
Dissolved Cadmium	0.005 mg/L	0.01 mg/L
Dissolved Copper	0.10 mg/L	0.20 mg/L
Dissolved Lead	0.10 mg/L	0.20 mg/L
Dissolved Nickel	0.20 mg/L	0.40 mg/L
Dissolved Zinc	0.10 mg/L	0.20 mg/L
Un-ionized Ammonia	0.20 mg/L	0.40 mg/L

11. The Licensee shall install and maintain groundwater monitoring wells and groundwater pumping wells as approved by the Board and as contemplated in Part D, Item 3(a).
12. The water quality at Station Numbers 4-27-1 to 4-27-9 inclusive shall not exceed the following effluent quality requirements:

PARAMETER	MAXIMUM CONCENTRATION OF ANY GRAB SAMPLE
Total Arsenic	1.00 mg/L
Total Cadmium	0.01 mg/L
Total Copper	0.20 mg/L
Total Lead	0.20 mg/L
Total Nickel	0.40 mg/L
Total Zinc	0.20 mg/L
Total Suspended Solids	50.0 mg/L
Un-ionized Ammonia	0.40 mg/L

13. If, during the period of this Licence, the concentration of any sample collected at Station Numbers 4-27-1 to 4-27-9 inclusive exceeds the requirements as specified in Part C, Item 12 the Licensee shall:
 - a) implement the Contingency Plan for Groundwater Pumping specified in Part F, Item 2;
 - b) notify an Inspector immediately of the implementation of the Contingency Plan for Groundwater Pumping; and
 - c) file a report with the Board not later than thirty (30) days after implementation of the Contingency Plan for Groundwater Pumping, outlining the action taken to prevent groundwater that exceeds the requirements specified in Part D, Item 12, from reaching the Flat River.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modifications to the water supply and waste disposal facilities provided that such modifications are consistent with the terms of this Licence and the following requirements are met:
 - a) the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to the beginning of the modifications;
 - b) such modifications do not place the Licensee in contravention of either the Licence or the Act;
 - c) the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d) the Board has not rejected the proposed modifications.
2. Modifications, for which all of the conditions referred to in Part E, Item 1 have not been met, may be carried out only with written consent from the Board.
3. The Licensee shall provide to the Board, as-built plans and drawings of the modifications referred to in Part E, Item 1 within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. The Licensee shall by March 31, 1996 submit to the Board for approval a revised Contingency Plan in accordance with the Board's "Guidelines for Contingency Planning, January 1987". The Plan should outline the scenario for Long Term Shutdown.

2. The Licensee shall at least six (6) months prior to re-start of mill operations submit to the Board for approval a Contingency Plan in accordance with the Board's "Guidelines for Contingency Planning, January 1987". The Plan should outline the scenario for full production status. In addition to conforming with the Guidelines, the Plan shall also include a Groundwater Pumping Contingency Plan.

The Groundwater Pumping Contingency Plan shall describe in detail, action to be taken if the water quality at Station Numbers 4-27-1 to 4-27-9 inclusive exceeds the requirements specified in Part D, Item 12.

3. The Licensee shall revise the Plans referred to in Part F, Items 1 and 2 if not approved. The revised Plans shall be re-submitted to the Board for approval within three (3) months of receiving notification of the Board's decision.
4. The Licensee shall review the Contingency Plans annually and modify the Plans as necessary to reflect changes in operation and technology. Any proposed modifications shall be submitted to the Board for approval.
5. If, during the period of this Licence an unauthorized discharge of Waste occurs, or an unauthorized discharge is foreseeable, the Licensee shall:
 - a) employ the appropriate Contingency Plan;
 - b) report the incident immediately via the 24 Hour Spill Line (403) 920 8130; and
 - c) submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall by March 31, 1997 submit to the Board for approval an updated "Interim" Abandonment and Restoration Plan in accordance with the Board's "Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories, September 1990." The Plan should reflect two scenarios; Long Term Shutdown, and Final Abandonment.
2. The Licensee shall revise the Plan referred to in Part G, Item 1 if not approved. The revised Plan shall be submitted to the Board for approval within six (6) months of receiving notification of the Board's decision.
3. The Licensee shall review the Abandonment and Restoration Plan annually and shall modify the Plan as necessary to reflect changes in operation, technology, and results of reclamation and/or other studies. The proposed modifications shall be submitted to the Board for approval.

4. The Licensee shall complete the abandonment and restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.
5. Notwithstanding the time schedule referred to in the Abandonment and Restoration Plan, the Licensee shall endeavour to carry out progressive restoration of areas which are abandoned prior to closure of operations.
6. Compliance with the Abandonment and Restoration Plan specified in this Licence does not limit the legal liability of the Licensee, other than liability arising from provisions of the Act and its Regulations.

NORTHWEST TERRITORIES WATER BOARD

Pamela R. LeMoine
Witness

Gordon [Signature]
Chairman

NORTHWEST TERRITORIES WATER BOARD

LICENSEE:	CANADA TUNGSTEN MINING CORPORATION LIMITED
LICENCE NUMBER:	N3L2-0004
EFFECTIVE DATE OF LICENCE RENEWAL:	SEPTEMBER 30, 1995
EFFECTIVE DATE OF AMENDED SURVEILLANCE NETWORK PROGRAM:	SEPTEMBER 30, 1995

SURVEILLANCE NETWORK PROGRAM

A. Location of Sampling Stations

<u>Station Number</u>	<u>Description</u>
4-1	Flat River at the mine and mill freshwater intake, located in the pumphouse. ✓
4-5	Flat River at bridge downstream of airstrip. ✓
4-6	Decant from Tailings Pond No. 3 to Tailings Pond No. 4. ✓
4-9	Discharge of oil/water separator at Meter 628 to Sardine Creek. ✓
4-10	Any point between Tailings Pond No. 3 and Tailings Pond No. 4 where seepage is visible. ✓
4-11	Tailings discharge pipe at point of discharge to Tailings Pond No. 3.
4-12	Discharge from conveyor gallery. ✓
4-13	Discharge from "E" Zone. ✓

4-20	Drainage culvert from natural pond adjacent to the S.E. corner of Tailings Pond No. 3. ✓
4-21	Water Survey of Canada stream gauge located on Flat River. ✓
4-27-1	Groundwater monitoring well, MW-1. ✓
4-27-2	Groundwater monitoring well, MW-2. ✓
4-27-3	Groundwater monitoring well, MW-3. ✓
4-27-4	Groundwater monitoring well, MW-5. ✓
4-27-5	Groundwater monitoring well, MW-6. ✓
4-27-6	Groundwater monitoring well, BH-42. ✓
4-27-7	Groundwater monitoring well, BH-43. ✓
4-27-8	Groundwater monitoring well, BH-44. ✓
4-27-9	Groundwater monitoring well, BH-53. ✓
4-28-1	Groundwater pumping well, PW-1. ✓
4-28-2	Groundwater pumping well, PW-2. ✓
4-29	Flat River, 3 kilometres upstream of pumphouse. ✓
4-30	Mill tailings at confluence of two mill waste pipelines at the drop box. ✓
4-31	Sardine Creek upstream of oil/water separator. ✓
4-32	Sardine Creek downstream of oil/water separator. ✓

B. Sampling and Analysis Requirements

1. Water shall be sampled monthly during the period April to October and one time during the winter period, at Station Numbers 4-5 and 4-29, and analyzed for the following parameters:

Total Copper
Total Zinc

The pH, conductivity and temperature shall be recorded at the time of sampling.

2. Effluent shall be sampled monthly during the period April to October and one time during the winter period, at Station Numbers 4-12 and 4-13, and analyzed for the following parameters:

Total Copper	Total Zinc
Total Suspended Solids	Oil and Grease

The pH, conductivity and temperature shall be recorded at the time of sampling.

3. Groundwater shall be sampled three (3) times per year (late May, July and October) at Station Numbers 4-27-1 to 4-27-9, at the piezometers listed in the following table. Groundwater shall also be sampled at Station Number 4-27-6 in August. All samples shall be analyzed for the following parameters:

Total Zinc	Total Suspended Solids
Total Copper	

The pH, conductivity and temperature shall be recorded at the time of sampling.

If groundwater samples cannot be collected at the piezometer nearest the surface, a sample shall be collected at the first piezometer that yields groundwater. The piezometric head and number shall be recorded.

If the concentration of any regulated parameter is above Licence limits in any groundwater well, as determined from October sampling and analysis, then that well shall be sampled and the water analyzed as above in January.

Surveillance Station Number	Piezometers to be Sampled		
4-27-1	MW1-10,	MW1-6,	MW1-1,
4-27-2	MW2-7,	MW2-4,	MW2-1,
4-27-3	MW3-10,	MW3-6,	MW3-1,
4-27-4	MW5-9,	MW5-5,	MW5-1,
4-27-5	MW6-13,	MW6-8,	MW6-1,
4-27-6	BH42-3,	BH42-2,	BH42-1,
4-27-7	BH43-12	BH43-6,	BH43-1,
4-27-8	BH44-4,	BH44-2,	BH44-1,
4-27-9	BH53		

Location References:

Report to Canada Tungsten Mining Corporation Limited on Hydrogeological Investigation, Summer 1982, Golder Associates, January 1983, Report 822-1063.

Summary Report, Waste Management System, Tungsten, N.W.T., Sigma Resources Consultants Ltd., Golder Associates Ltd., June 1981, Report SRCZ 3259.

4. All sampling, sample preservation and analysis shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by an Analyst.
5. All analysis shall be performed in a laboratory approved by an Analyst.
6. The Licensee shall by December 15, 1995, submit to an Analyst for approval, a quality assurance/quality control plan which includes both field and laboratory requirements.
7. The plan referred to in Part B, Item 6 shall be implemented as approved by an Analyst.

C. Flow Measurement Requirements

1. The monthly quantity of water in cubic metres withdrawn from Station Number 4-1 shall be recorded.

D. Reports

1. Unless otherwise requested by the Board, the Licensee shall submit to the Board all of the data and information required by the "Surveillance Network Program" in the Licensee's annual report, which is due no later than March 31st of the year following the calendar year being reported.

NORTHWEST TERRITORIES WATER BOARD

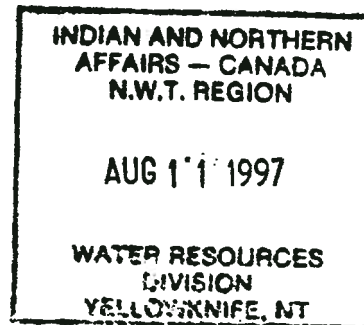
Pamela R. Lettmore
Witness

Gordon Shaw
Chairman



July 17, 1997

David J. Libby, P.Eng,
Vice President, Mining Operations
Aur Resources Inc.
1 Adelaide Street East, Suite 2501
TORONTO, ON M5C 2V9



Dear Mr. Libby:

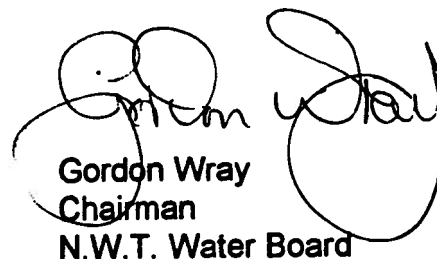
RE: AMENDED "SURVEILLANCE NETWORK PROGRAM"

The Northwest Territories Water Board has reviewed your letter of June 27, 1997 requesting an amendment of the reporting requirements in Part B of the Surveillance Network Program.

The Board hereby approves this request. Please find attached an amended Surveillance Network Program which states that the water sampling period in Part B, items 1 and 2 are amended to "May to October".

If you require further assistance, please contact this office. If your inquiry is of a technical nature, please contact Mr. Brian Collins at (403) 669-2657 or Mr. David Milburn at (403) 669-2650 of the Water Resources Division.

Sincerely,


Gordon Wray
Chairman
N.W.T. Water Board

Attach.

NORTHWEST TERRITORIES WATER BOARD
LICENCE AMENDMENT

LICENSEE: CANADA TUNGSTEN MINING CORPORATION LIMITED
LICENCE NUMBER: N3L2-0004
EFFECTIVE DATE: July 17, 1997

Pursuant to the Northwest Territories Waters Act the Northwest Territories Water Board hereby grants the following Licence Amendment.

1. PART B of SNP, Item 1 and 2 is hereby rescinded and replaced with:

1. Water shall be sampled monthly during the period May to October and one time during the winter period, at Station Numbers 4-5 and 4-29, and analyzed for the for the following parameters:

Total Copper

Total Zinc

The pH, conductivity and temperature shall be recorded at the time of sampling.

2. Effluent shall be sampled monthly during the period May to October and one time during the winter period, at Station Numbers 4-12 and 4-13, and analyzed for the following parameters:

Total Copper

Total Zinc

Total Suspended Solids

Oil and Grease

The pH, conductivity and temperature shall be recorded at the time of sampling.

This Licence Amendment issued and recorded at Yellowknife, Northwest Territories on July 17, 1997.

NORTHWEST TERRITORIES WATER BOARD

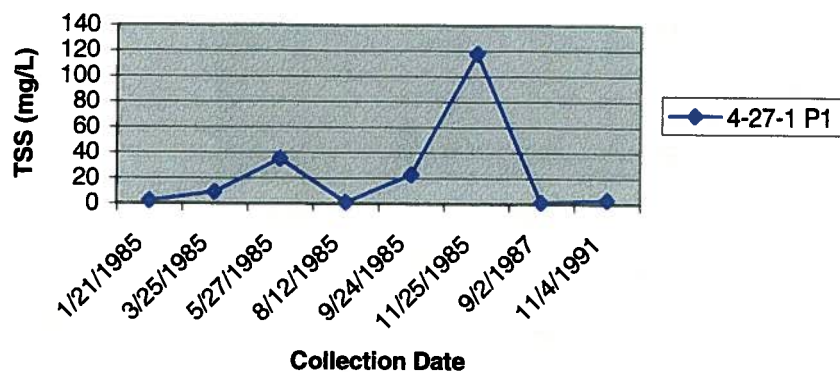

Witness


Chairman

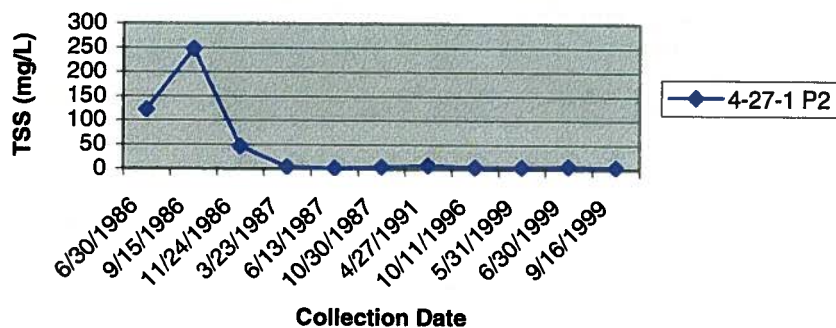
Appendix B

Graphs of Total Suspended Solids SNP Data

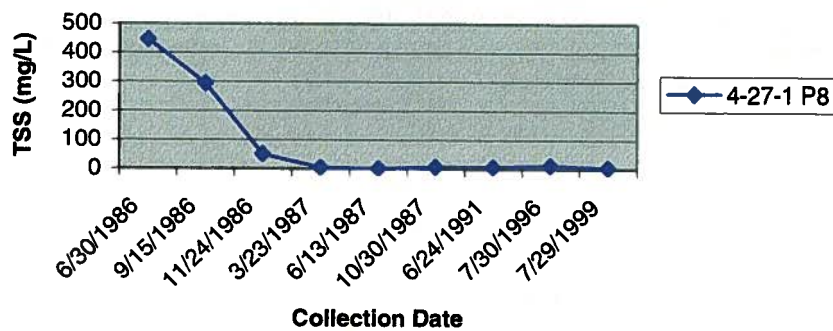
**Sampling Station 4-27-1 P1
Total Suspended Solids**



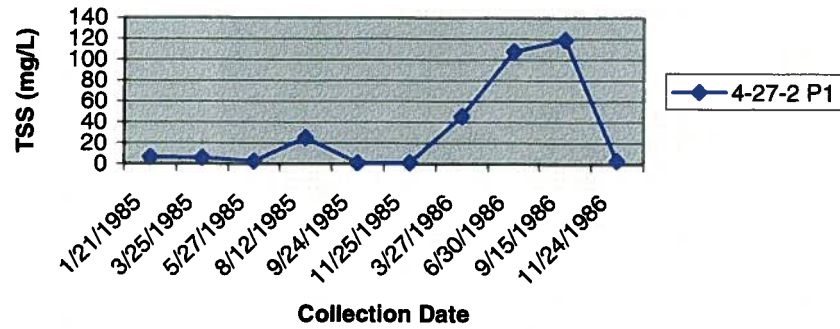
**Sampling Station 4-27-1 P2
Total Suspended Solids**



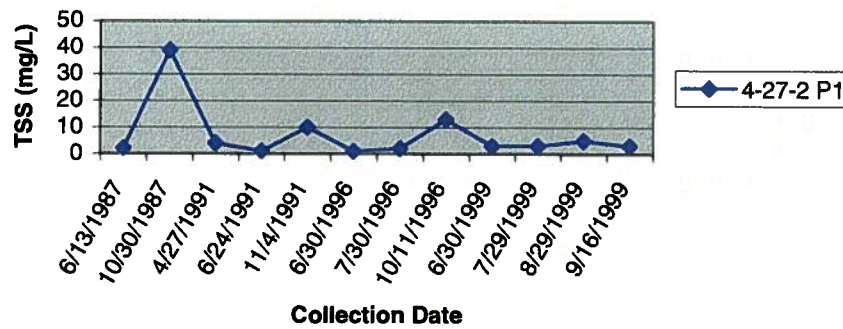
**Sampling Station 4-27-1 P8
Total Suspended Solids**



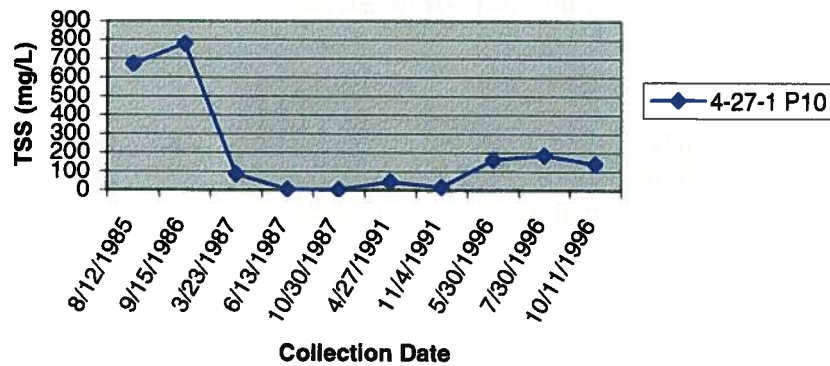
Sampling Station 4-27-2 P1
Total Suspended Solids #1



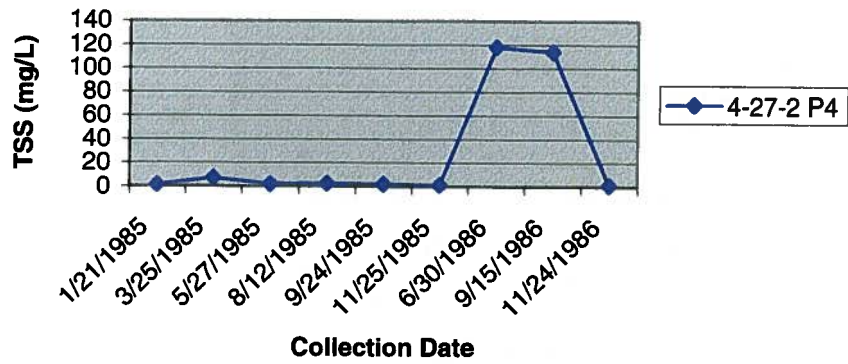
Sampling Station 4-27-2 P1
Total Suspended Solids #2



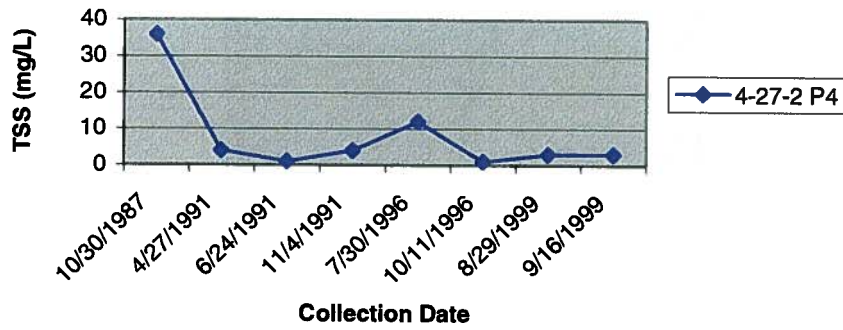
Sampling Station 4-27-1 P10
Total Suspended Solids



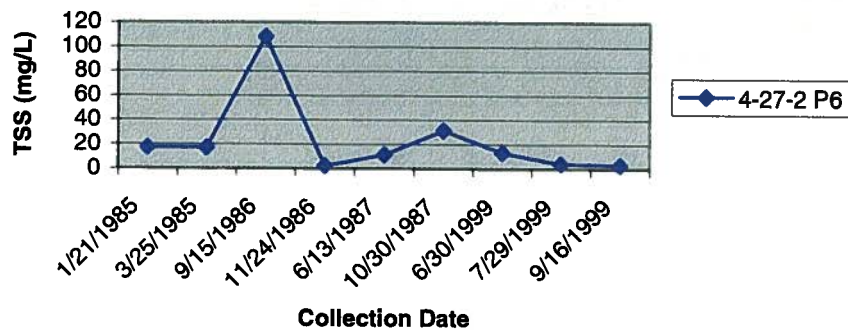
**Sampling Station 4-27-2 P4
Total Suspended Solids #1**

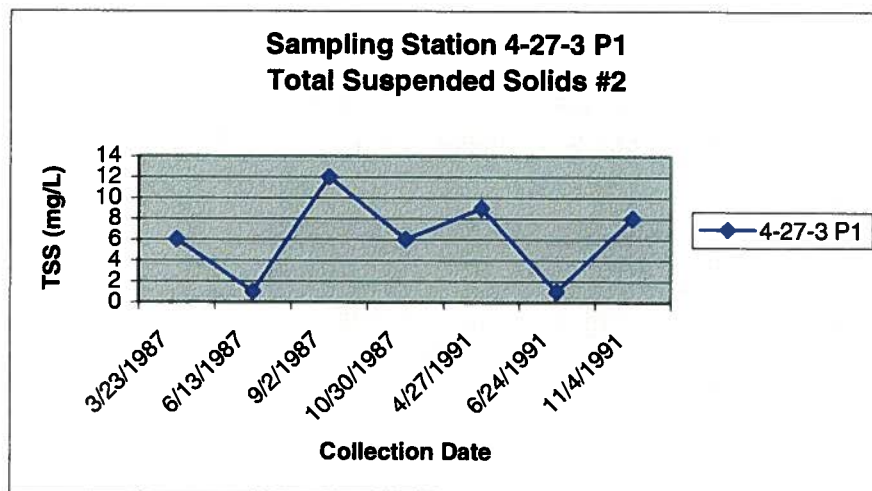
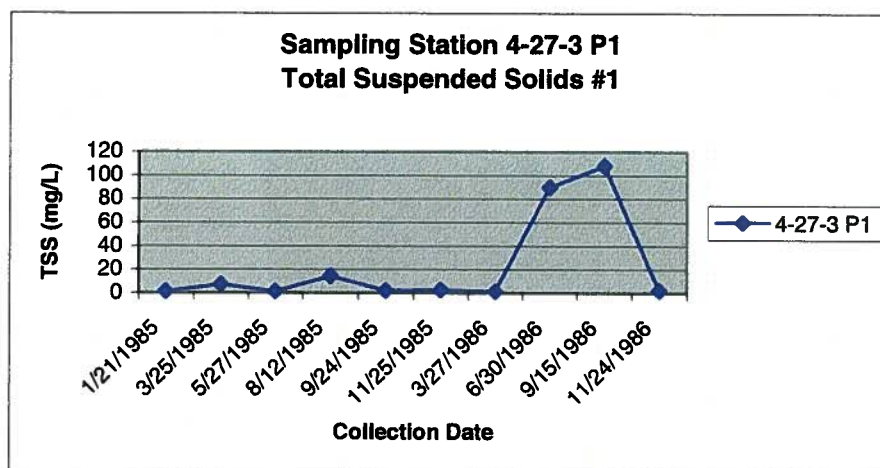
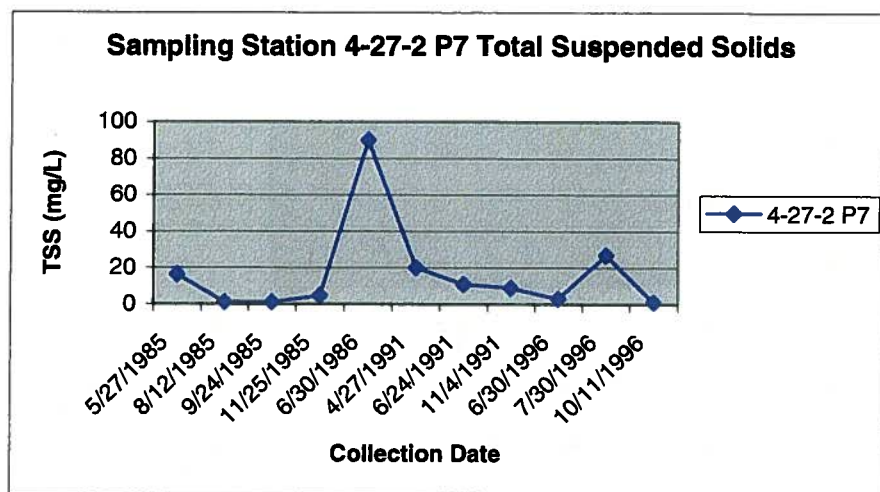


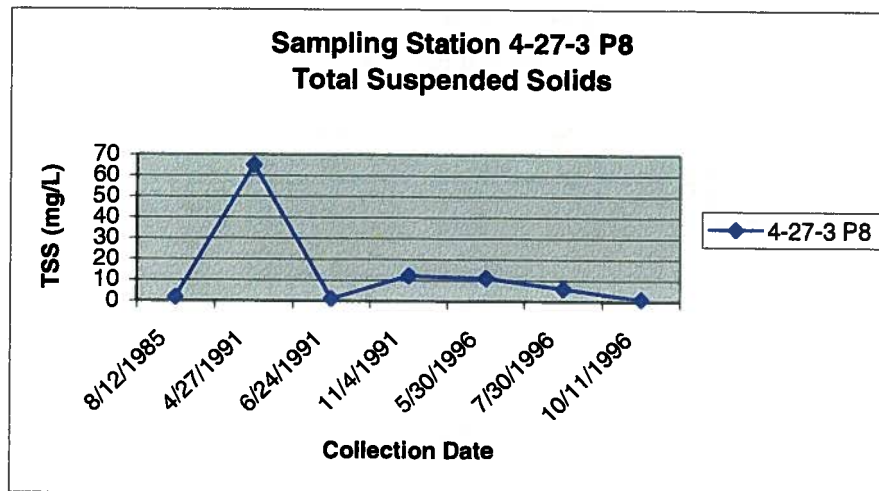
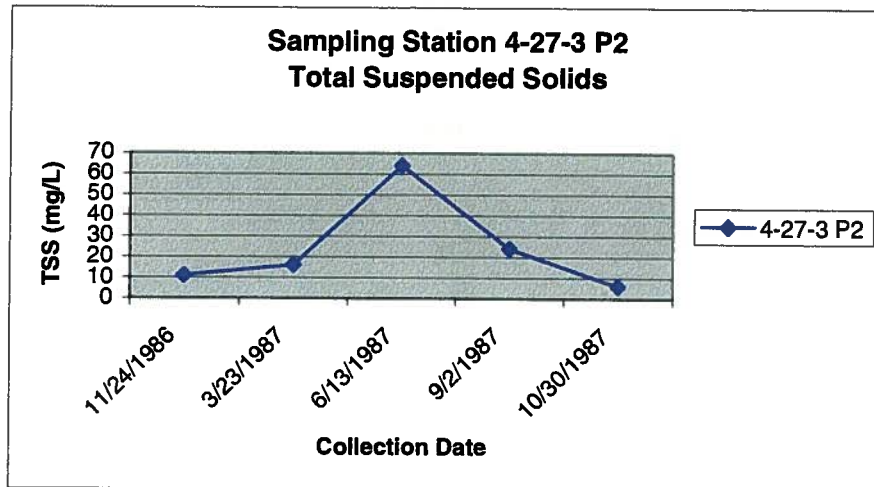
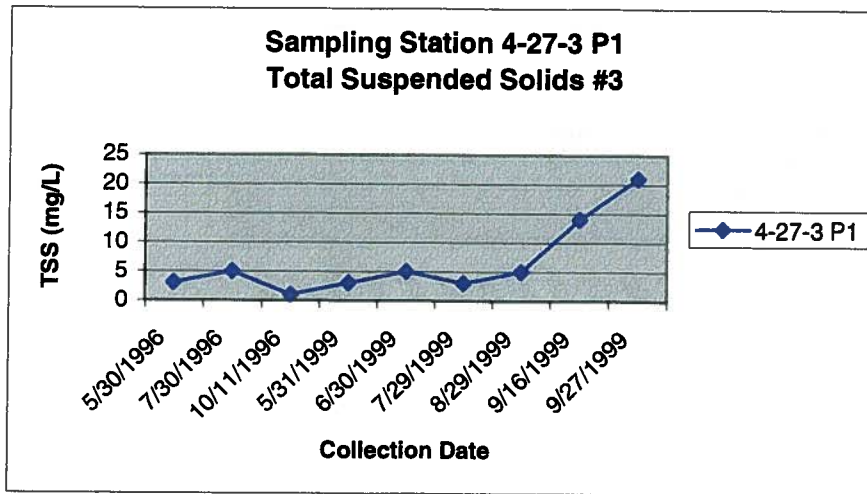
**Sampling Station 4-27-2 P4
Total Suspended Solids #2**

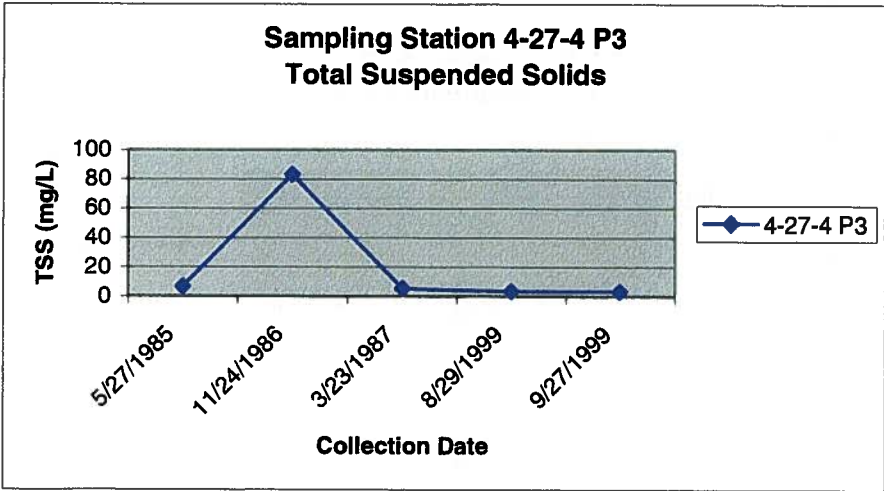
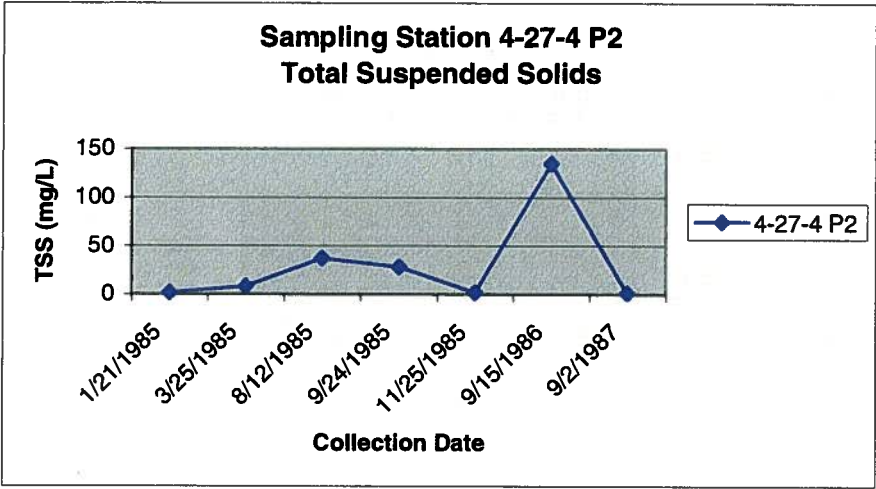
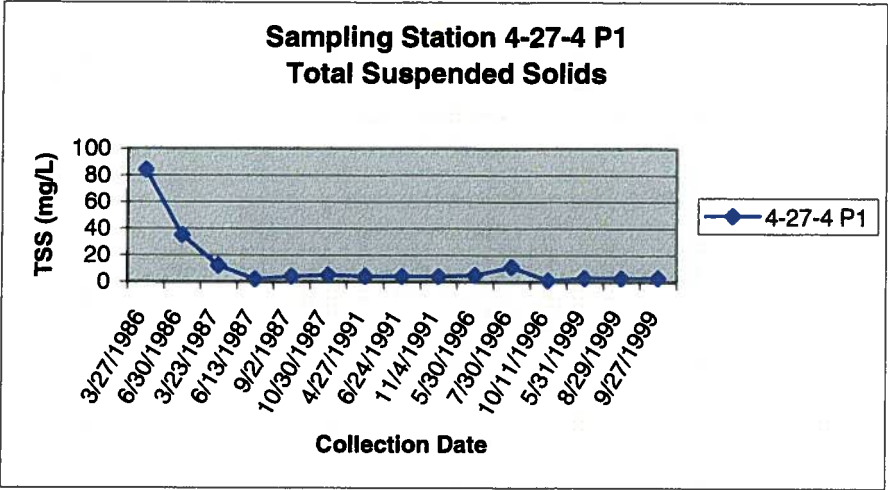


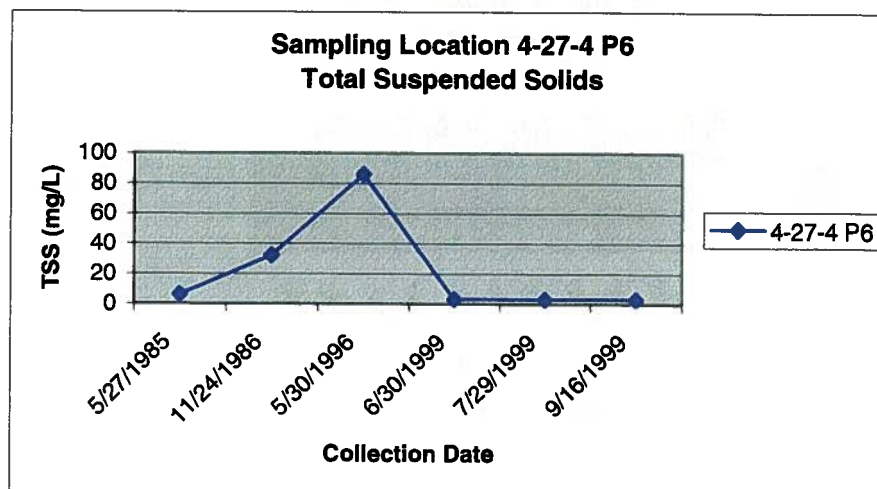
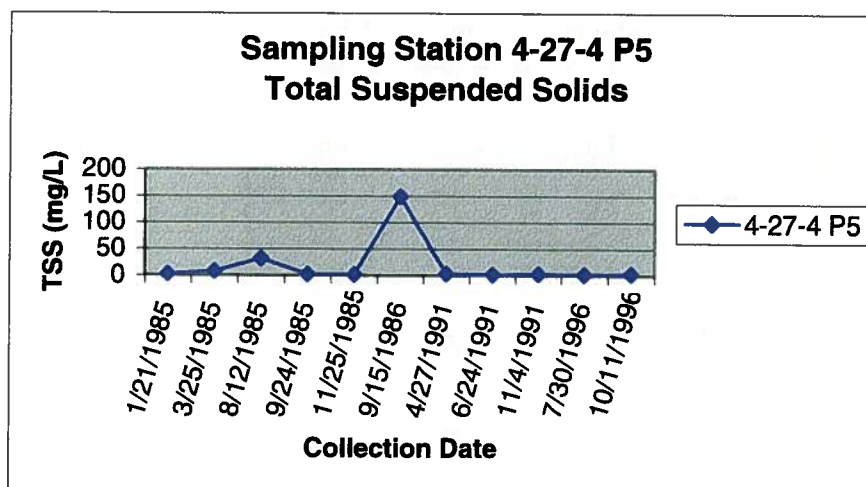
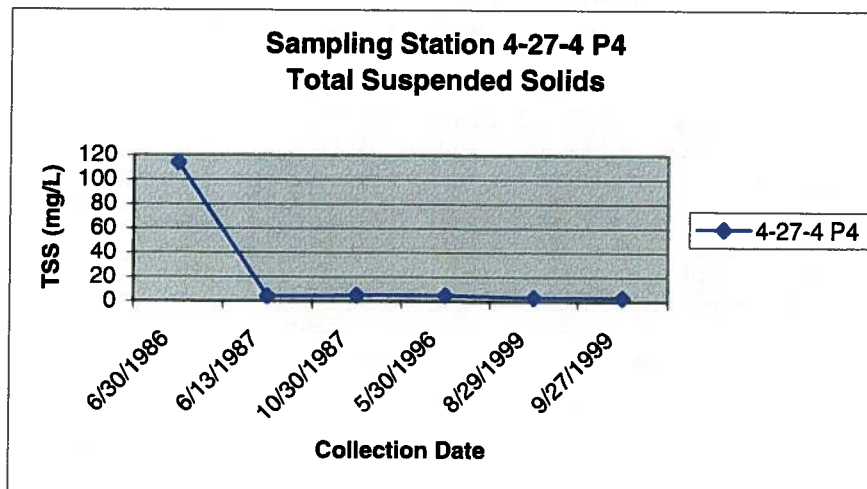
**Sampling Station 4-27-2 P6
Total Suspended Solids**

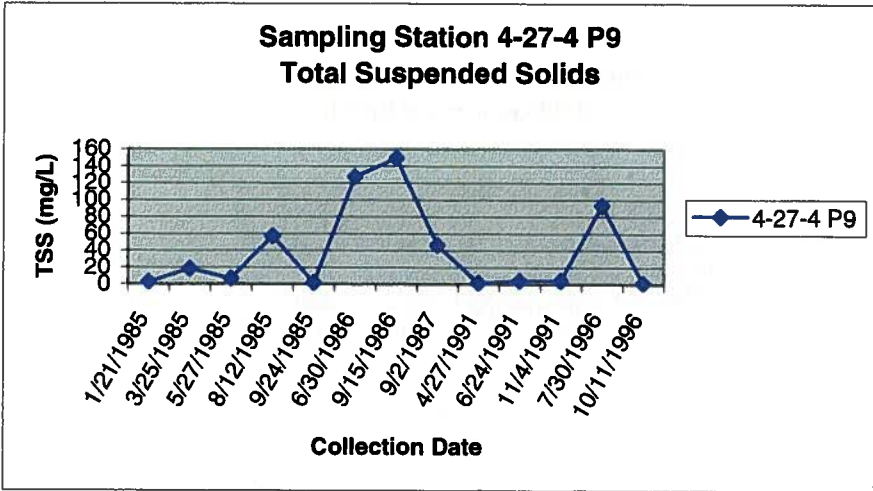
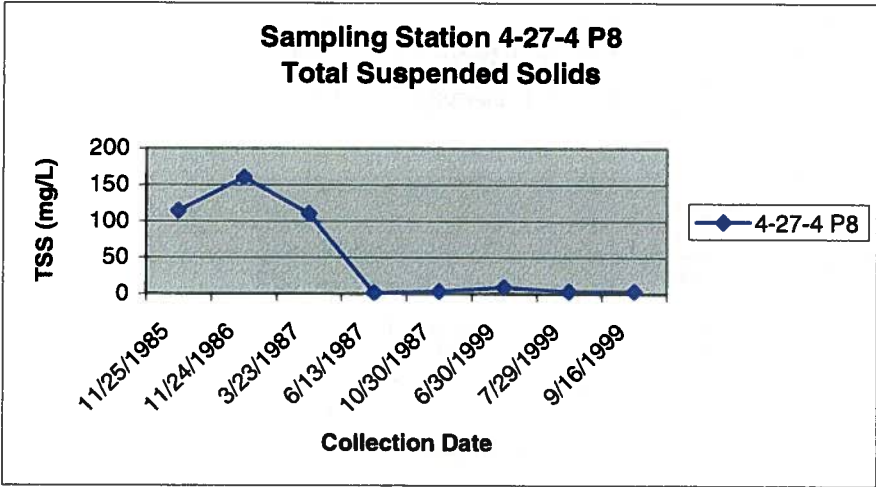
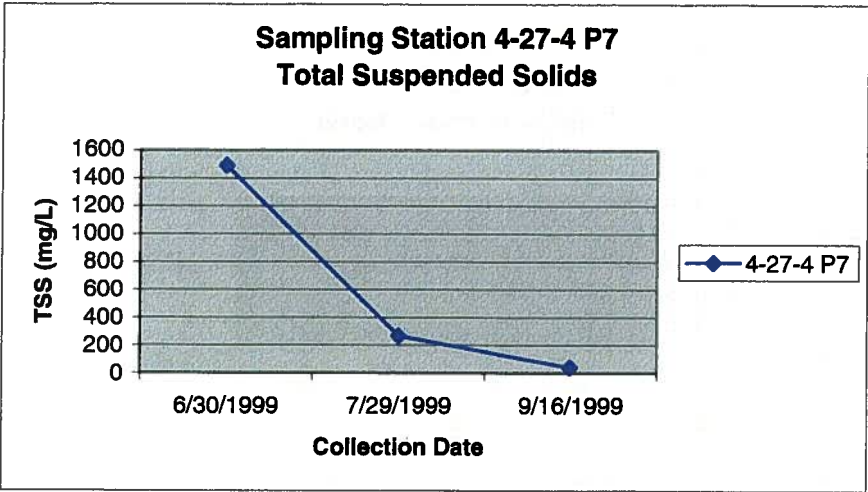




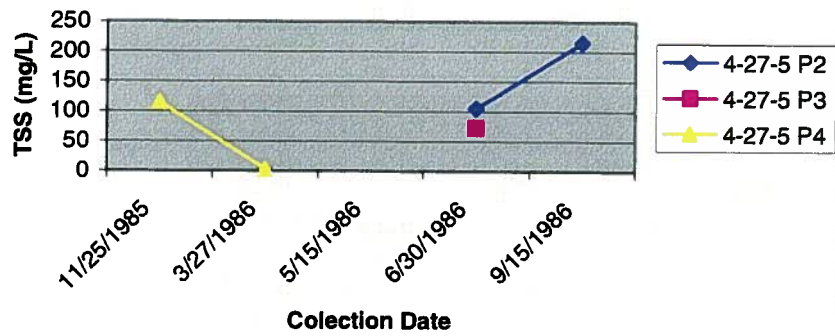




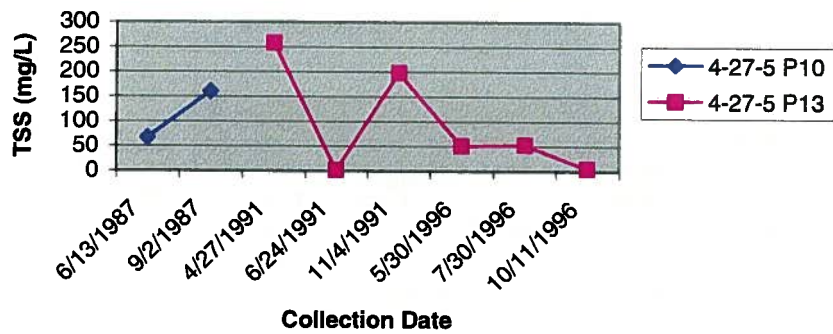




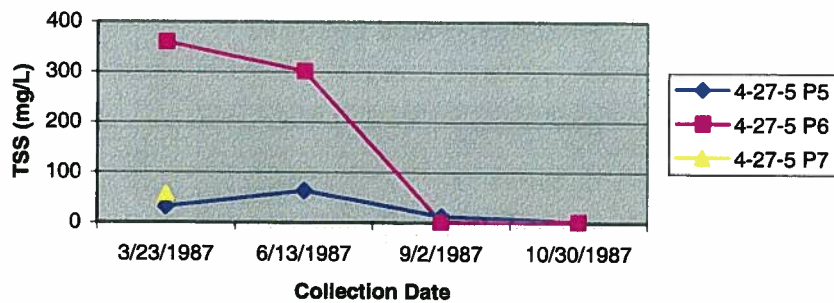
**Sampling Stations 4-27-5 P2, 4-27-5 P3,
& 4-27-5 P5 Total Suspended Solids**



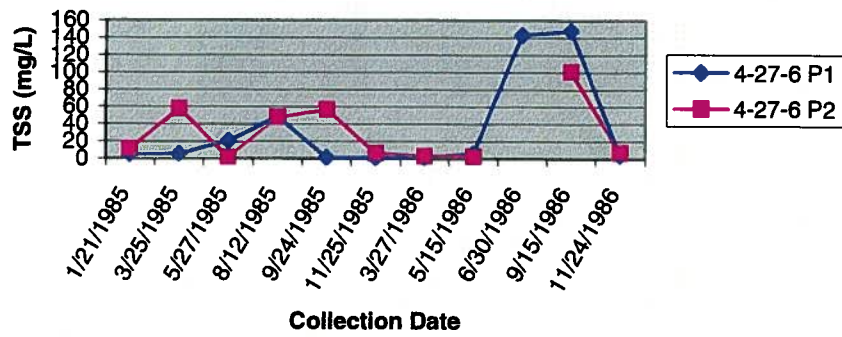
**Sampling Stations 4-27-5 P10 & 4-27-5 P13
Total Suspended Solids**



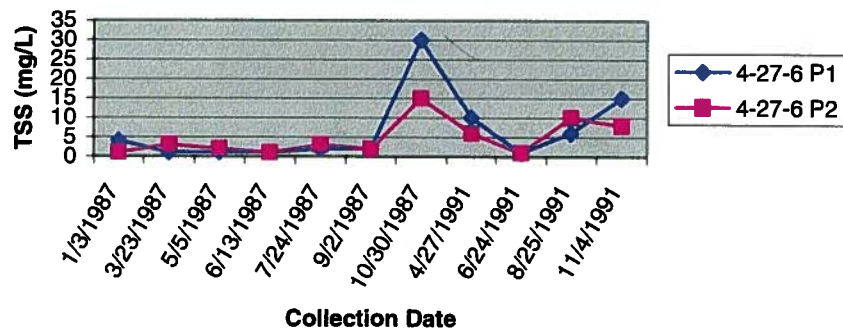
**Sampling Station 4-27-5 P5, 4-27-5 P6,
& 4-27-5 P7 Total Suspended Solids**



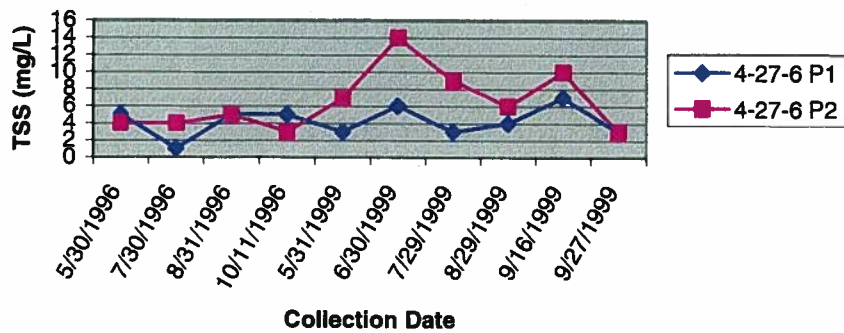
**Sampling Station 4-27-6 P1 & 4-27-6 P2
Total Suspended Solids #1**

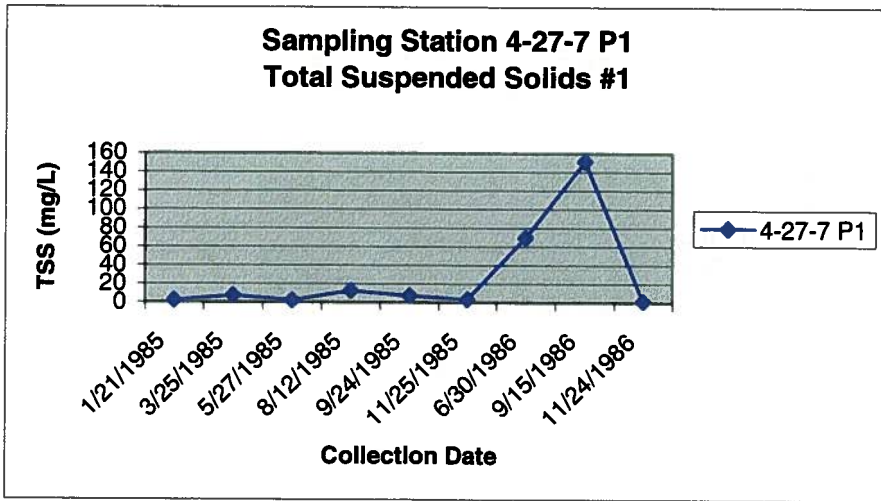
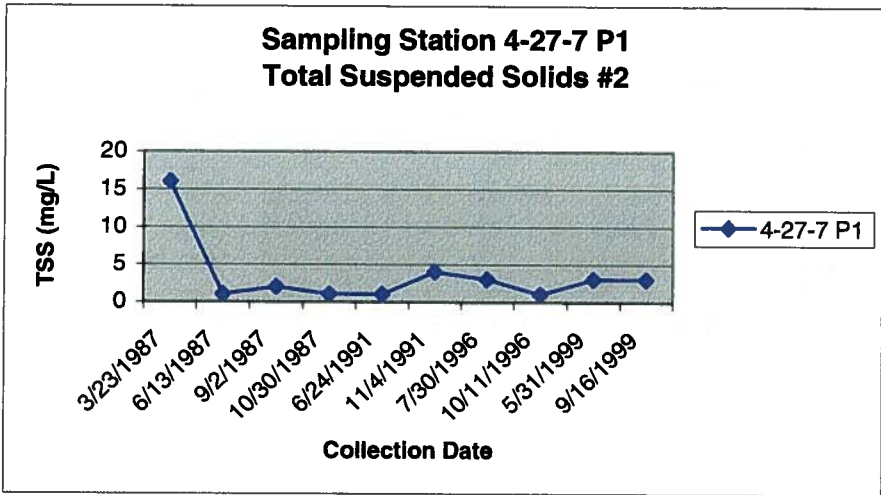
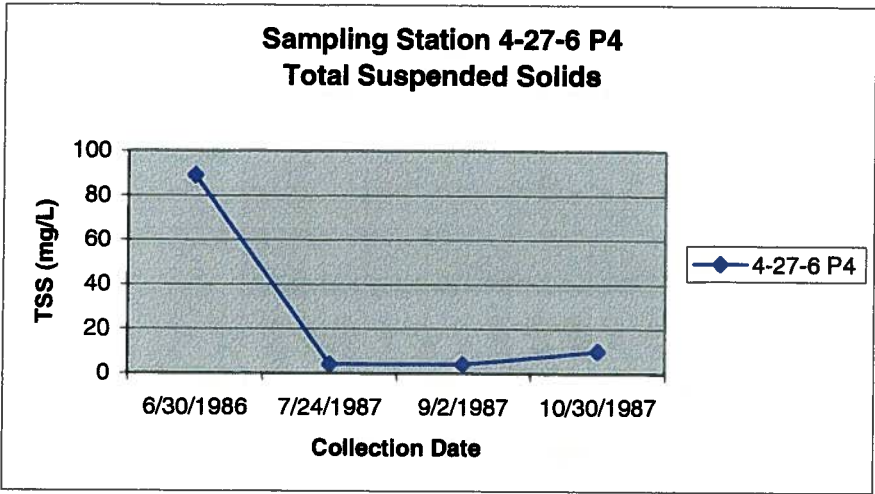


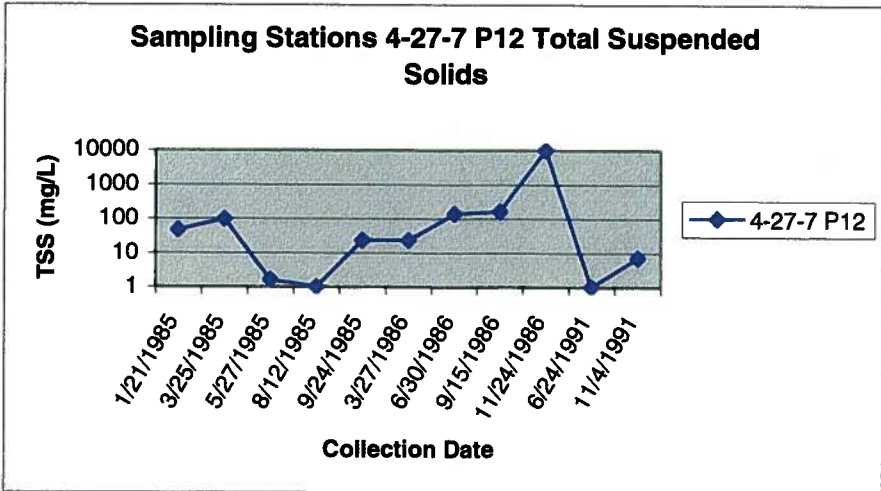
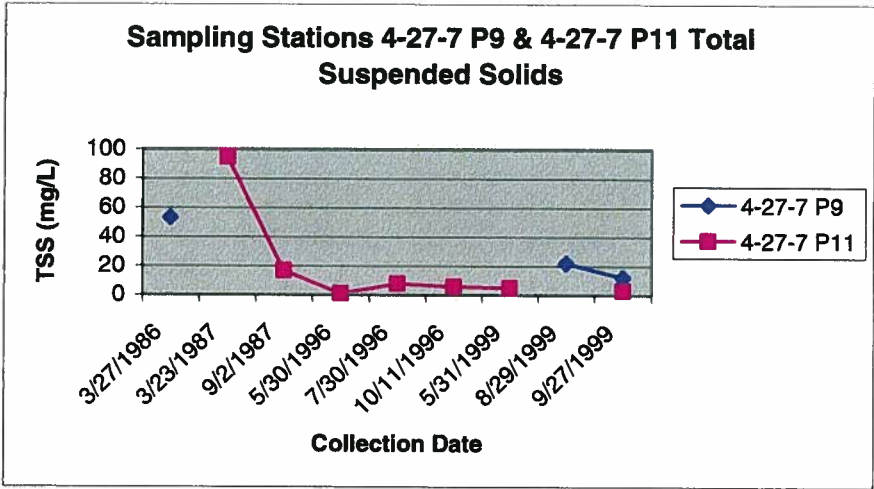
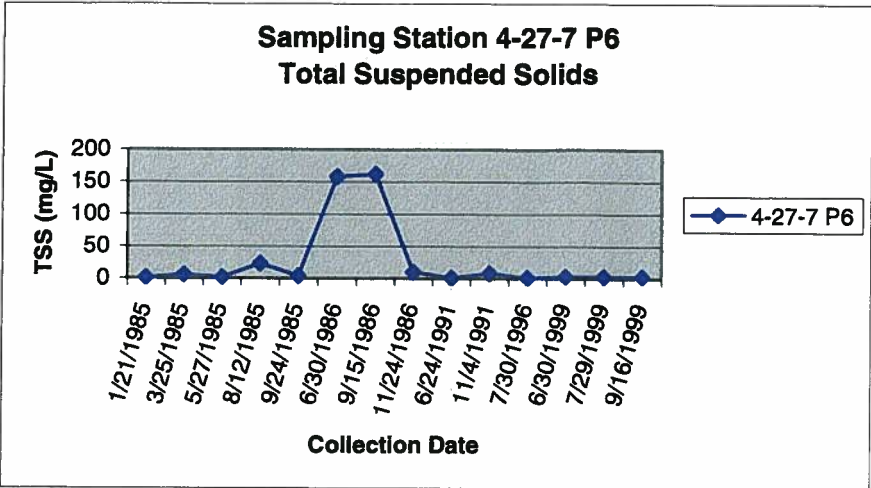
**Sampling Stations 4-27-6 P1 & 4-27-6 P2
Total Suspended Solids #2**

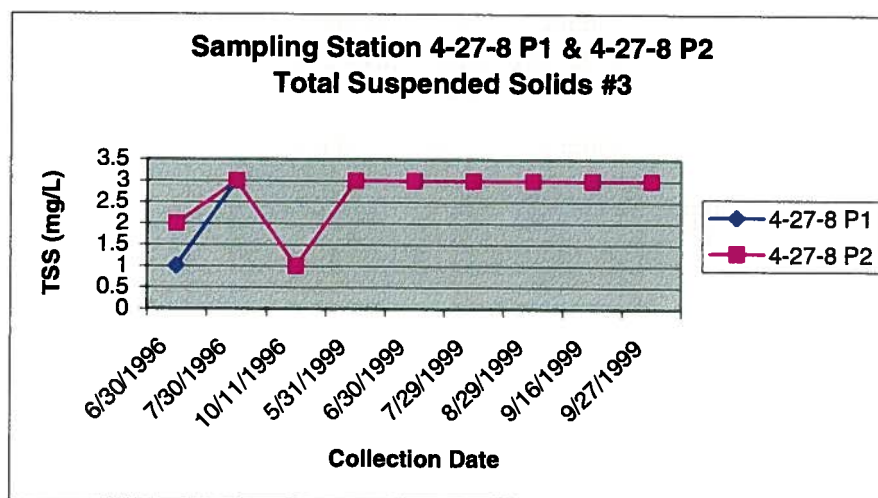
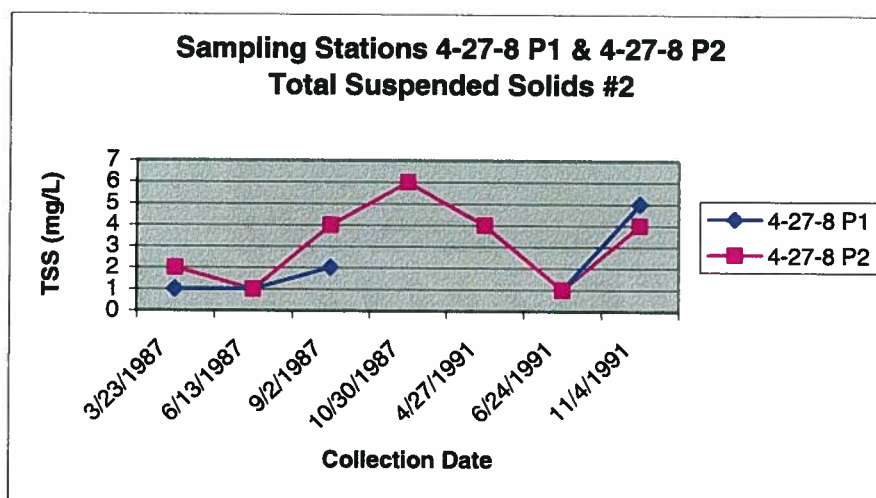
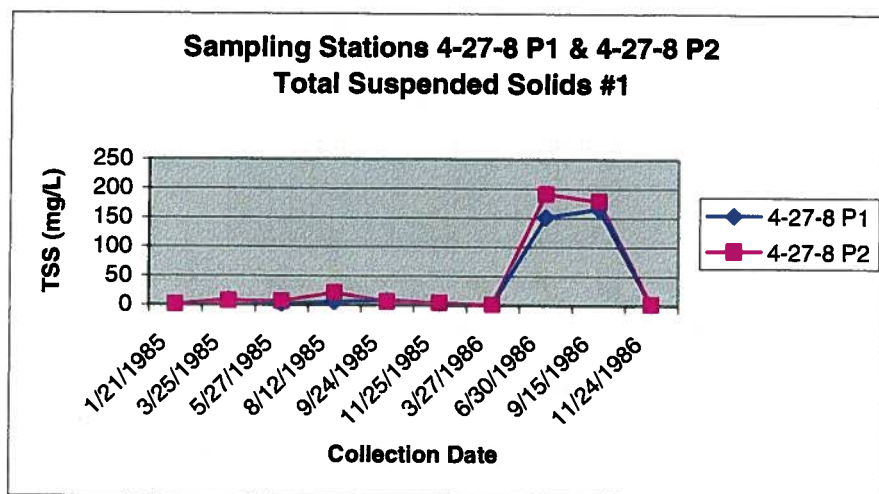


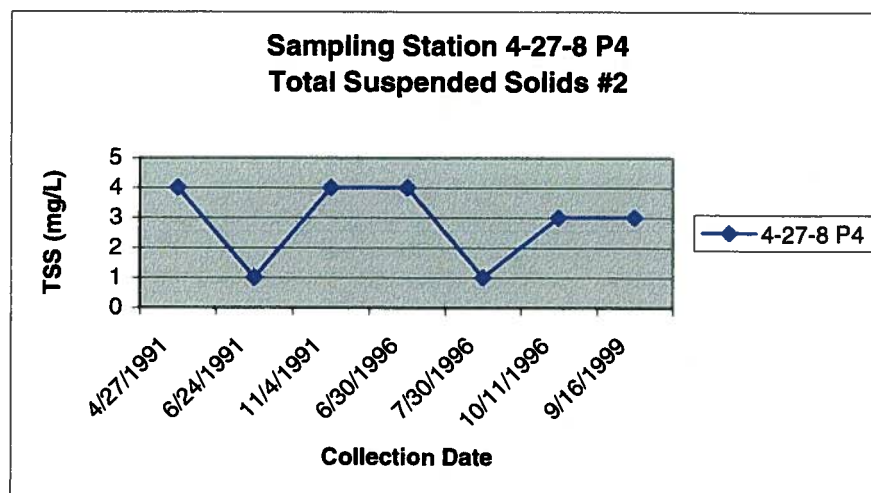
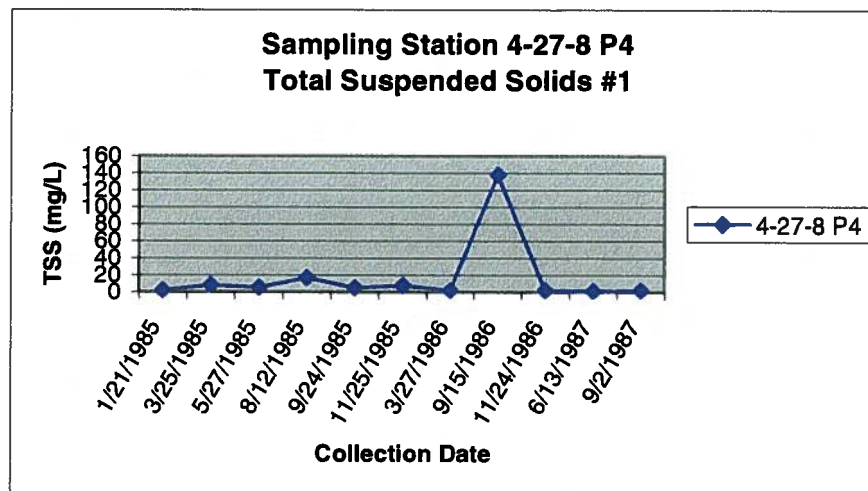
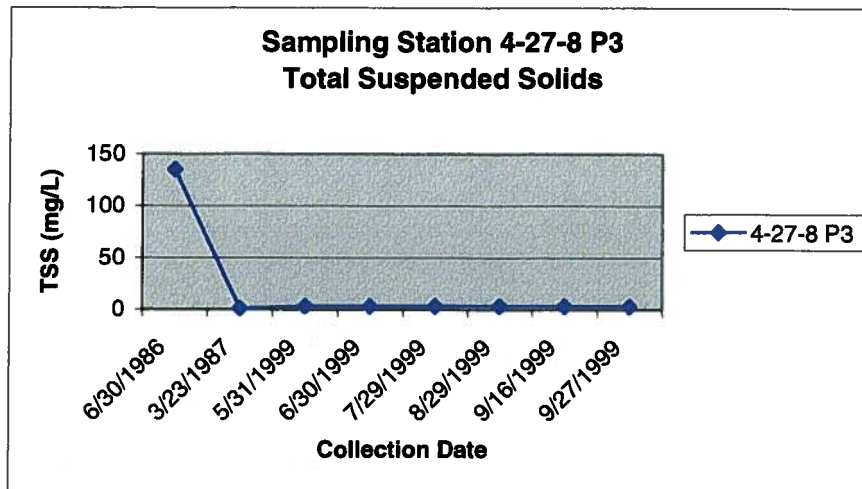
**Sampling Stations 4-27-6 P1 & 4-27-6 P2
Total Suspended Solids #3**



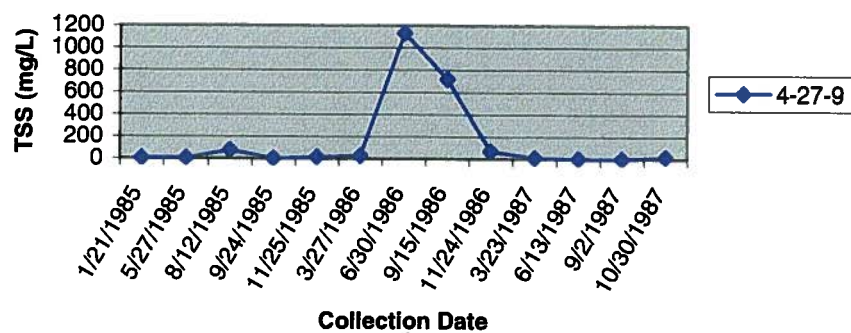




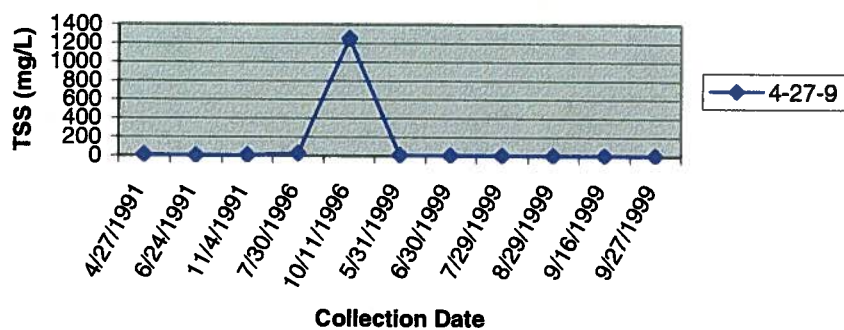




Sampling Station 4-27-9
Total Suspended Solids #1

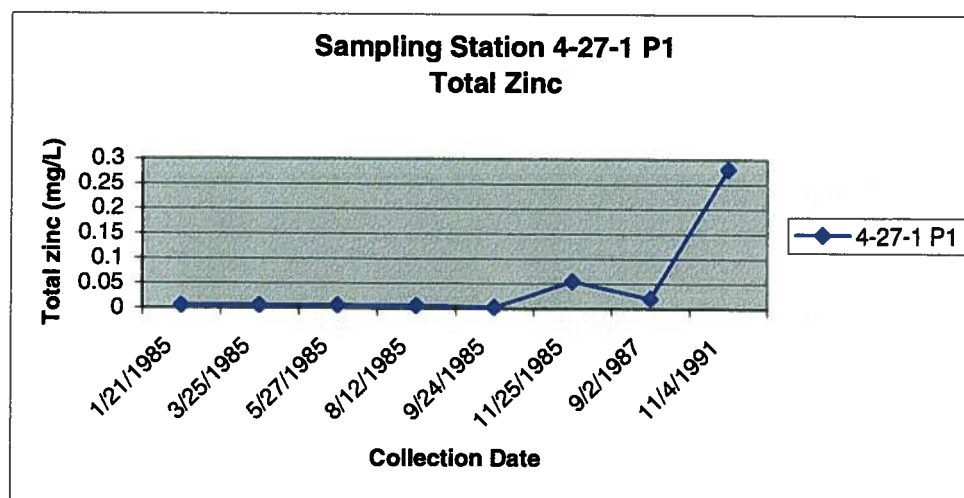
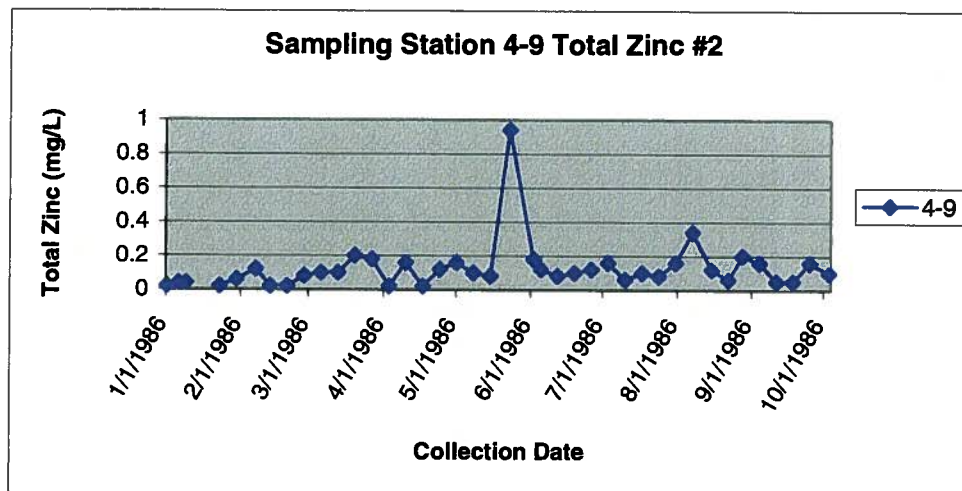
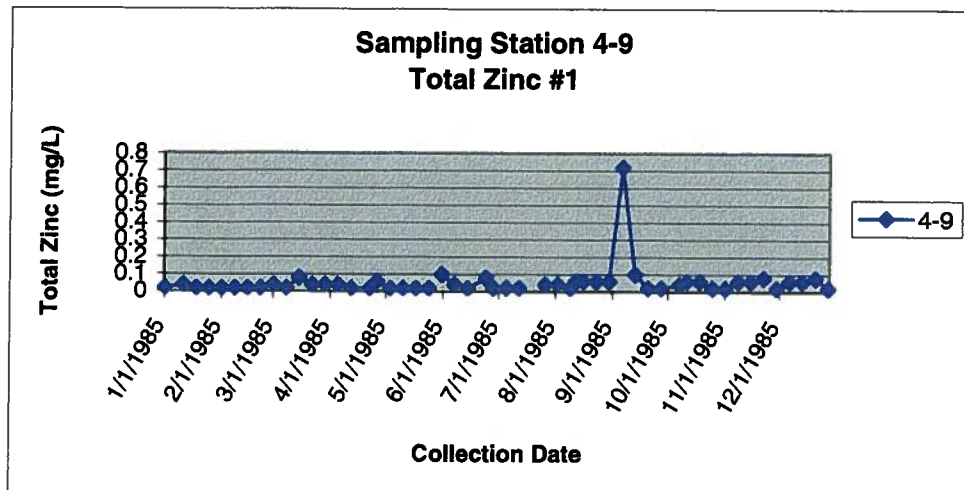


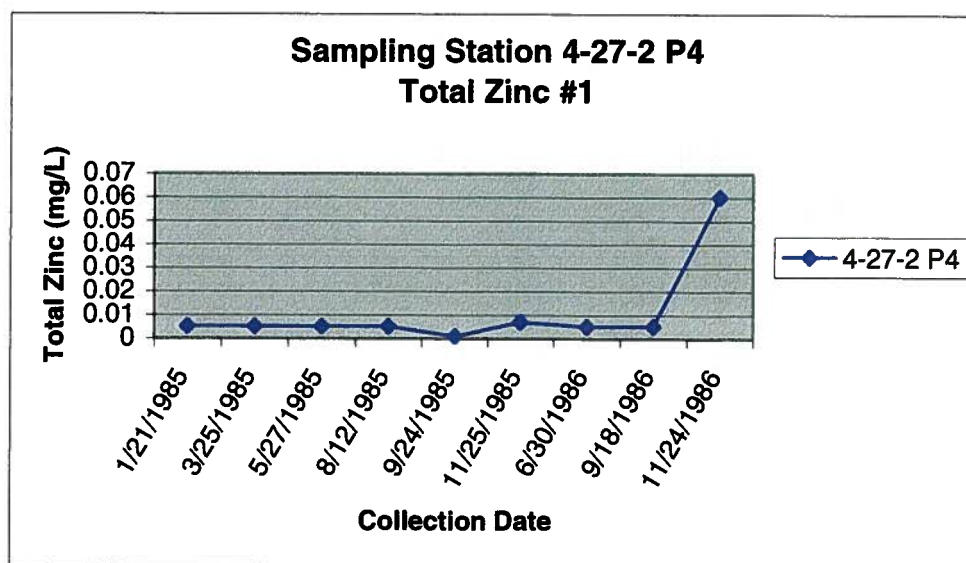
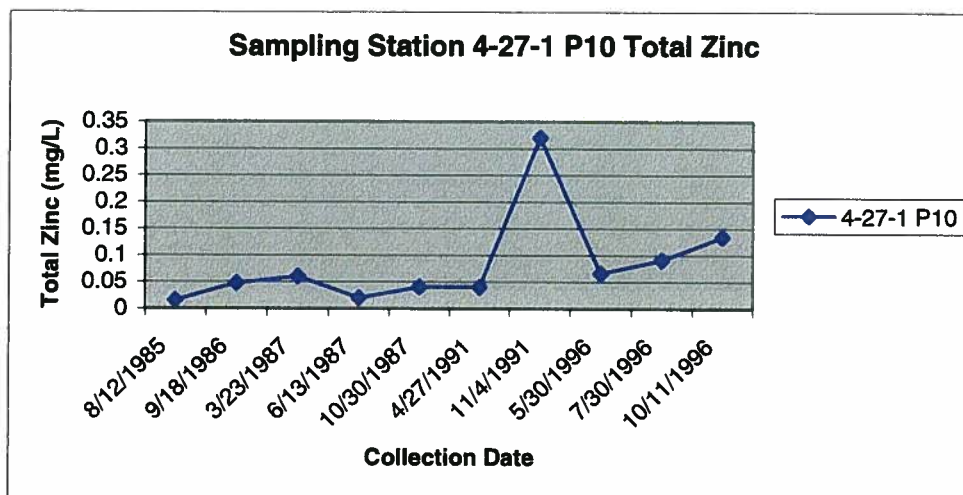
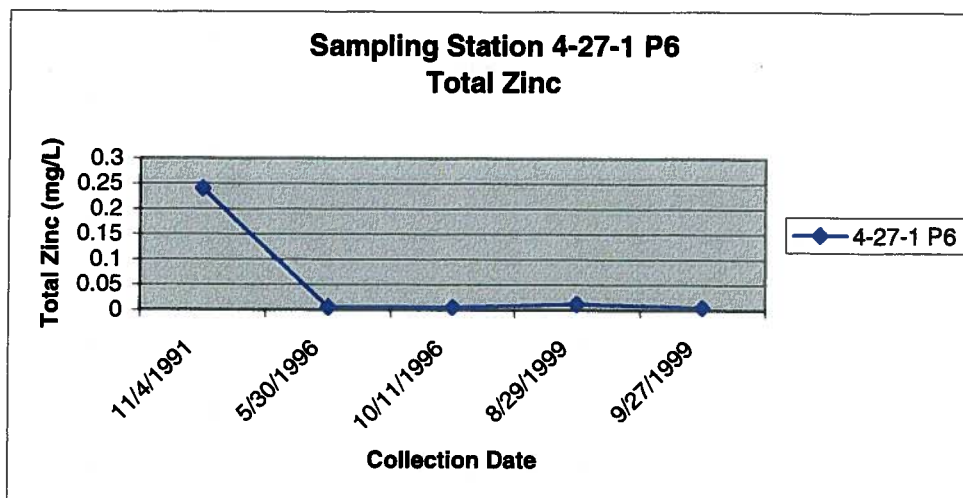
Sampling Station 4-27-9
Total Suspended Solids #2

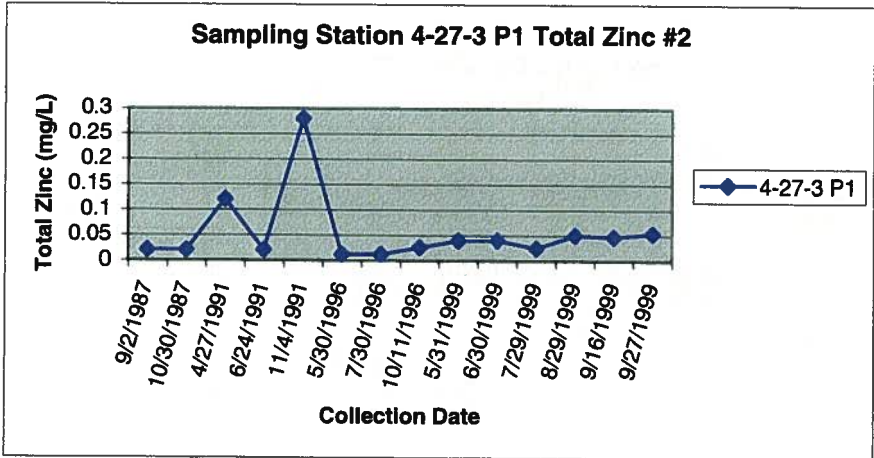
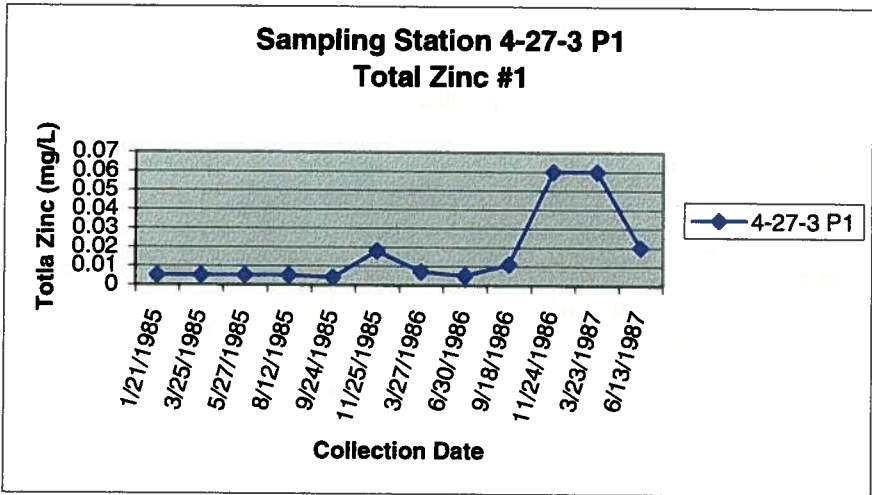
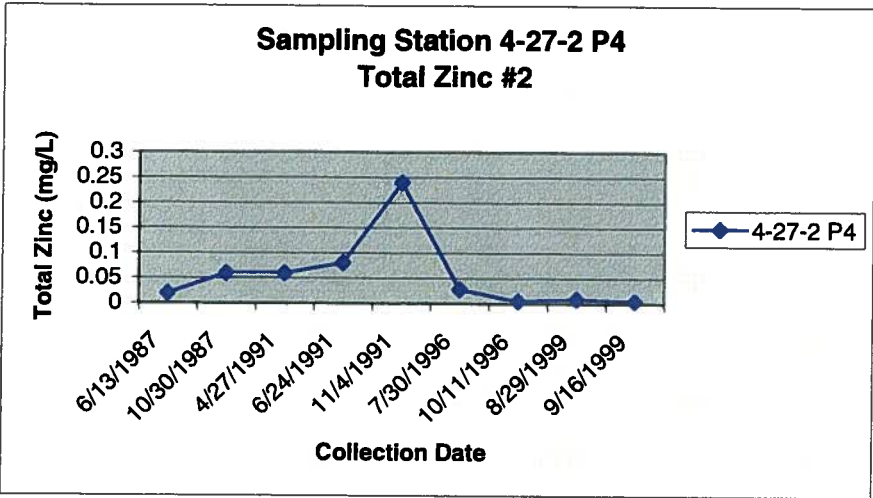


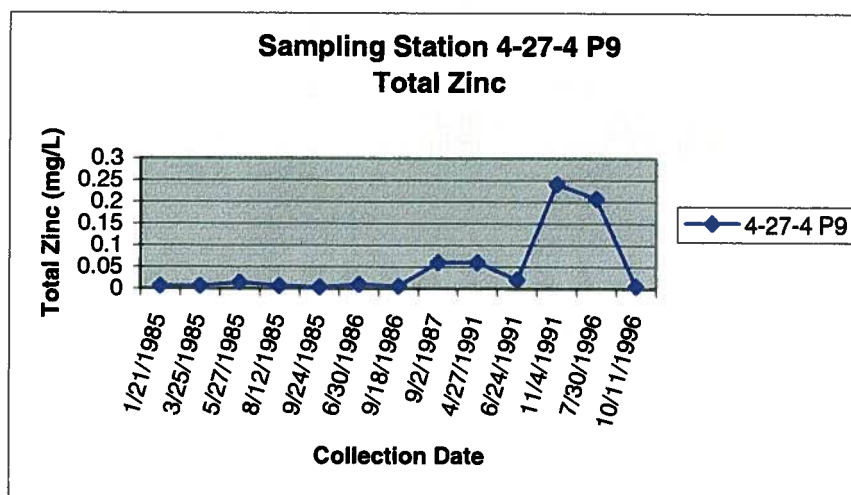
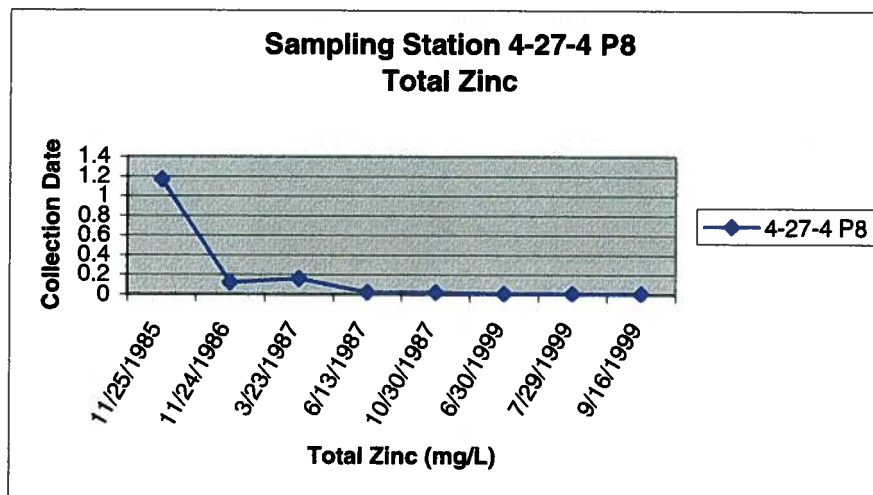
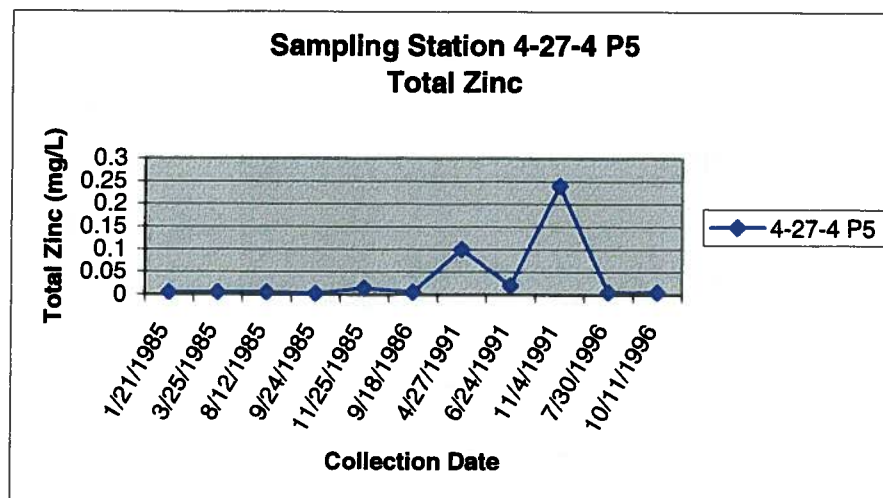
Appendix C

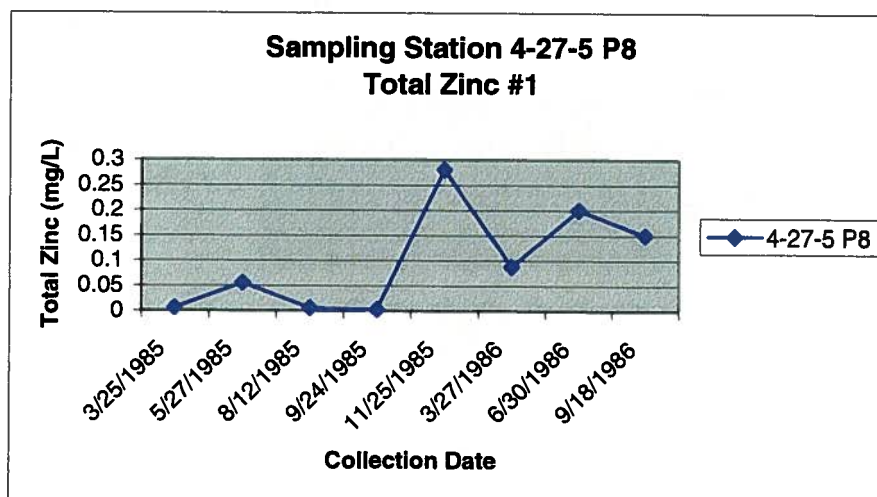
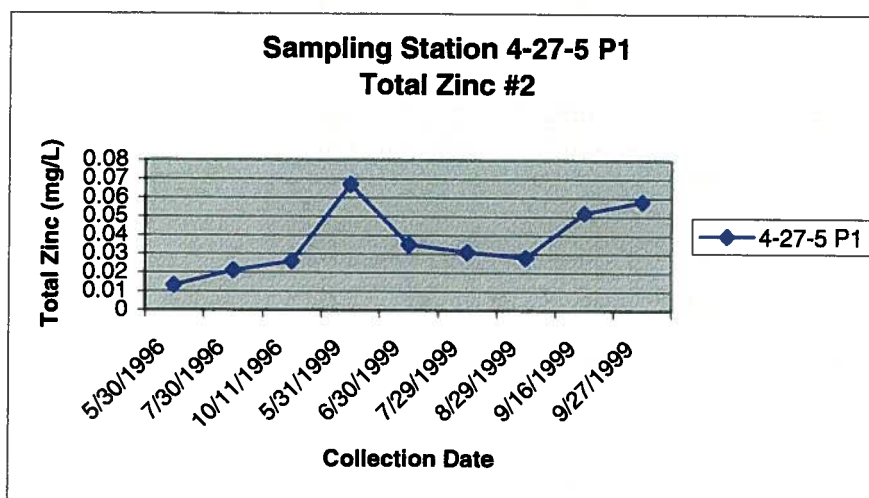
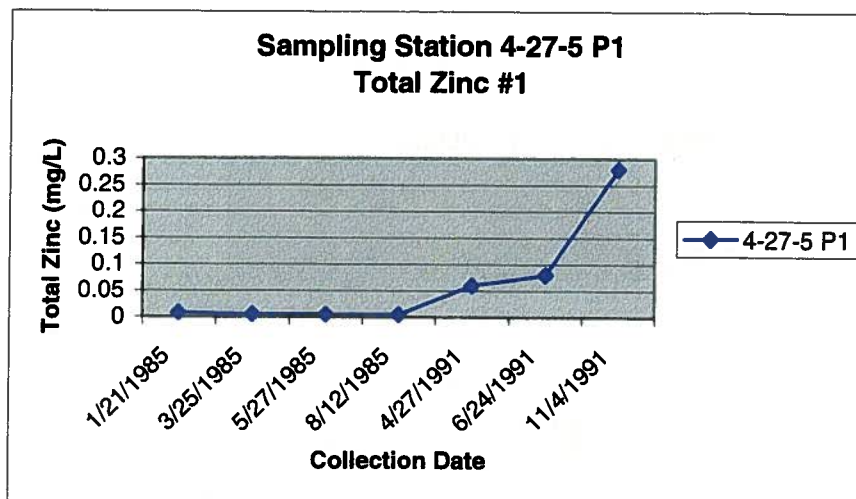
Graphs of Total Zinc SNP Data

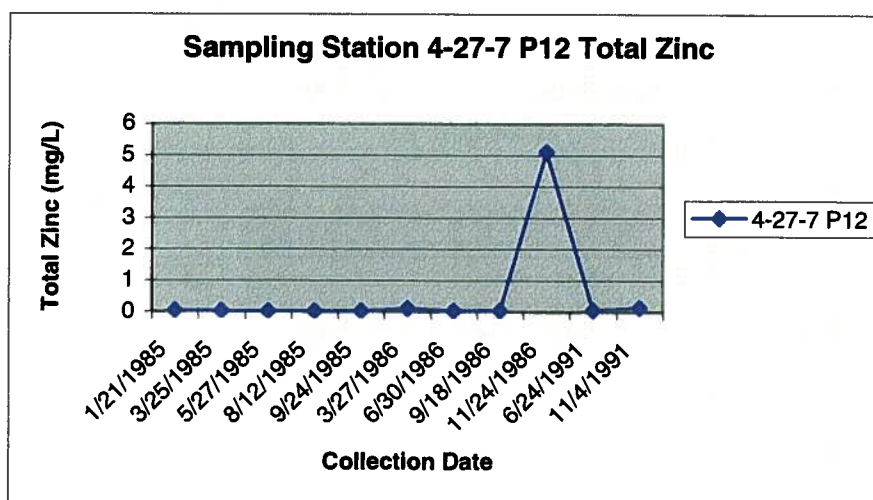
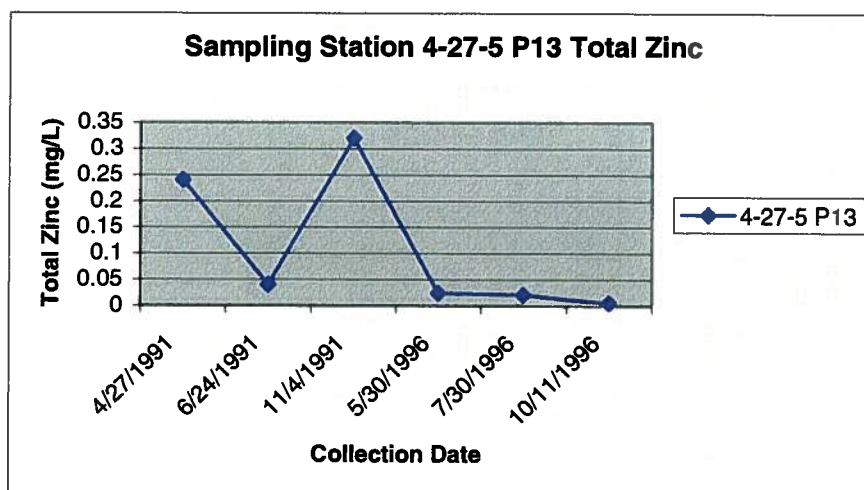
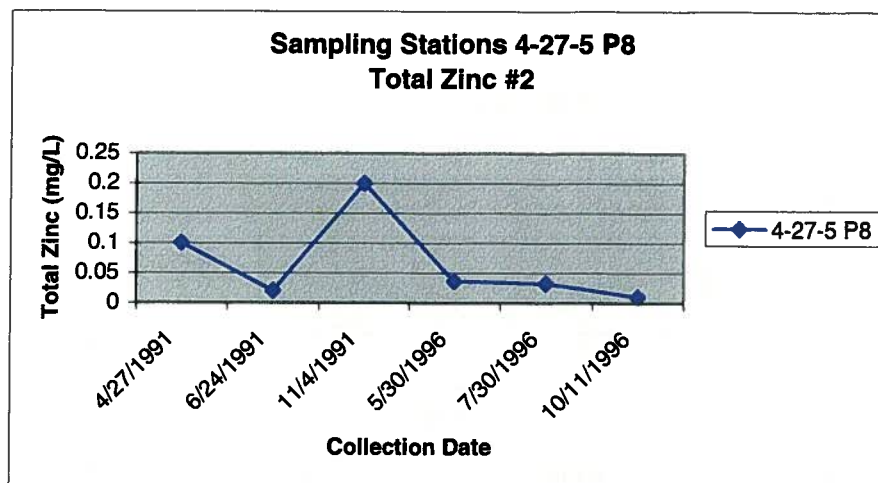




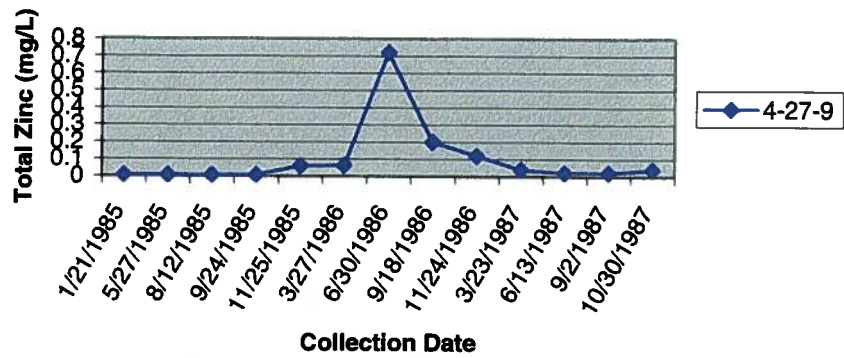




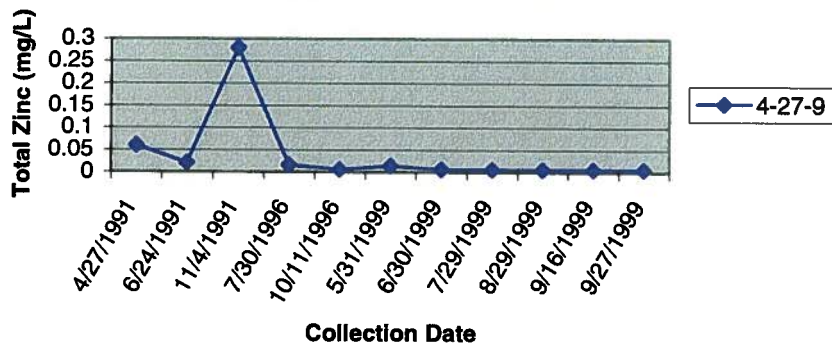




Sampling Station 4-27-9
Total Zinc #1

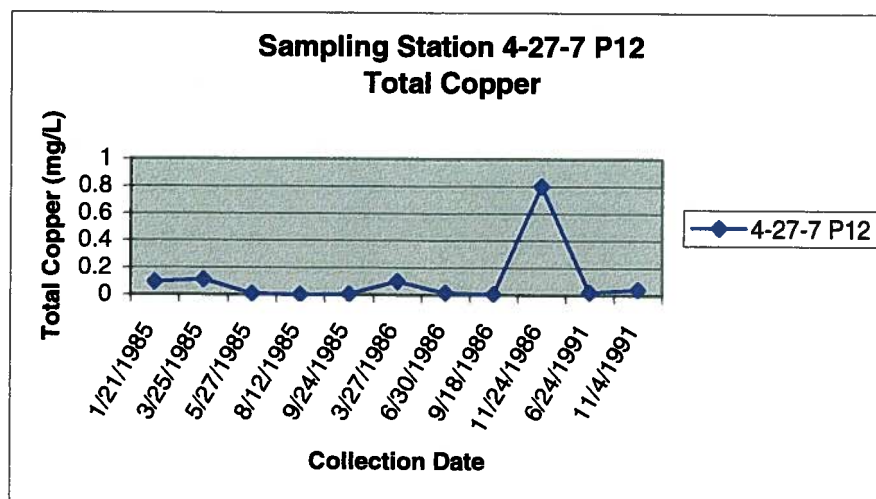
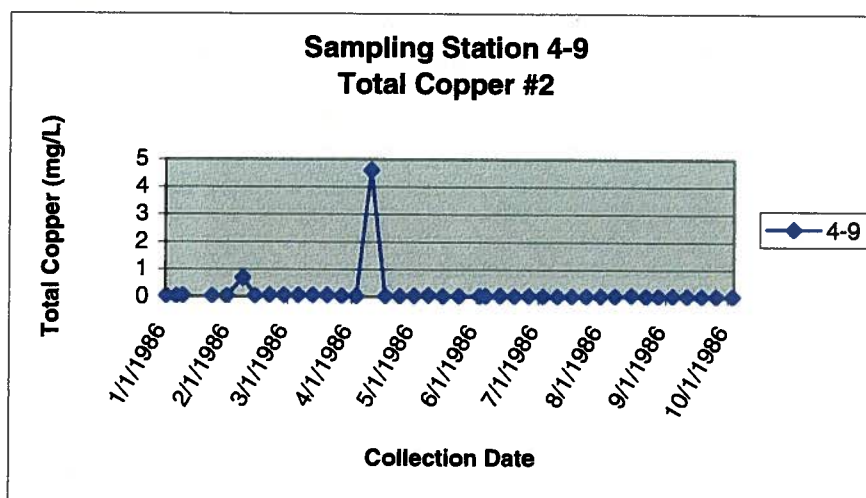
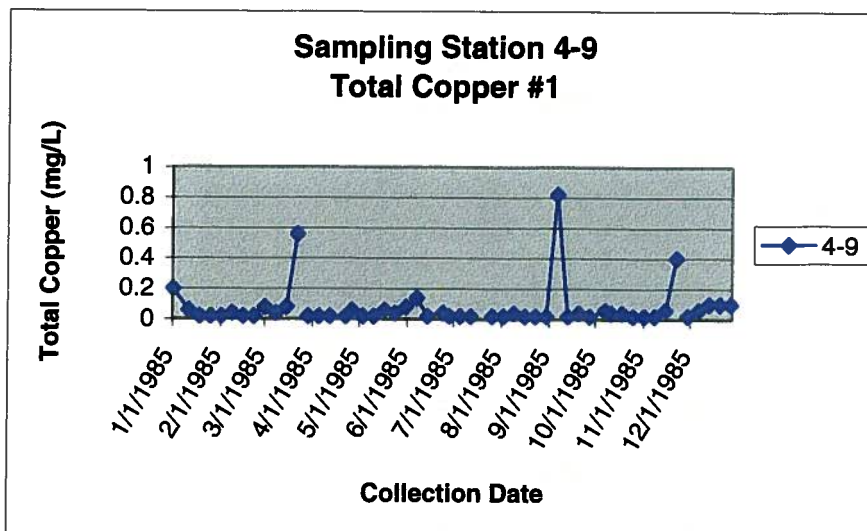


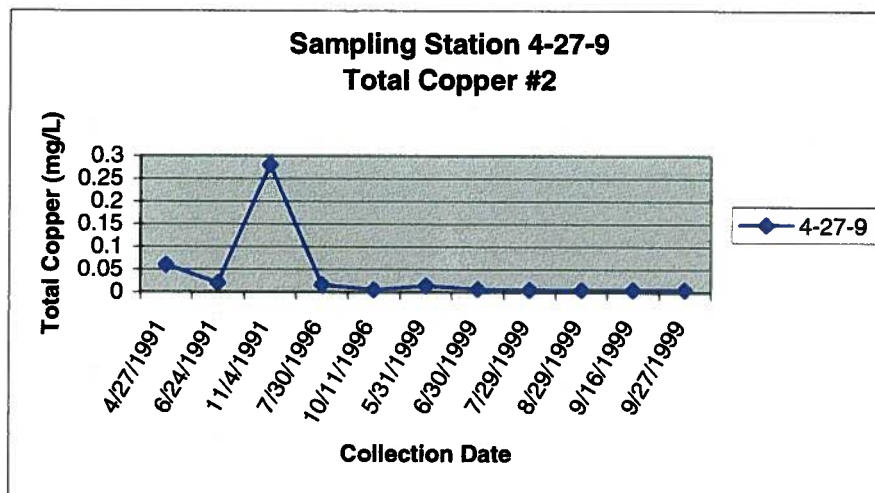
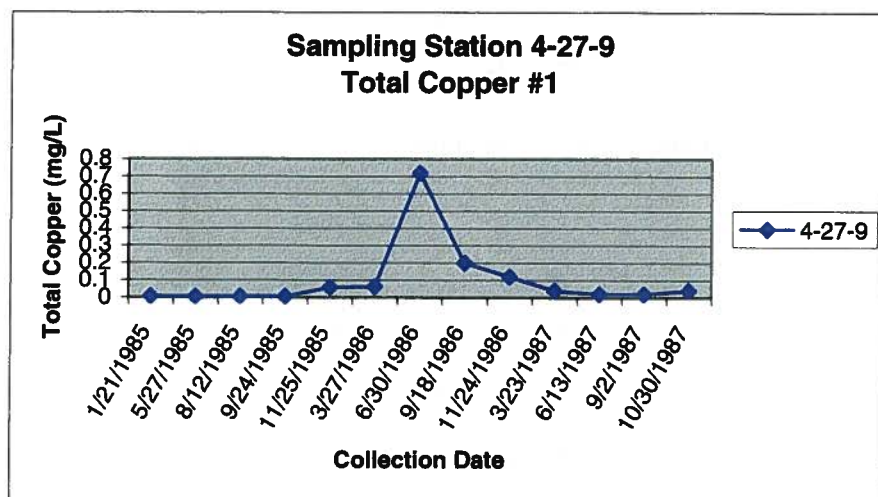
Sampling Station 4-27-9
Total Zinc #2



Appendix D

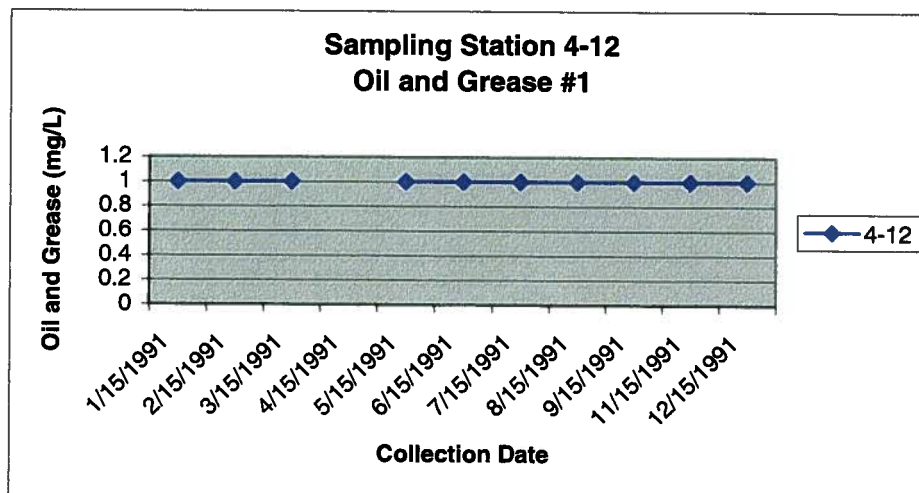
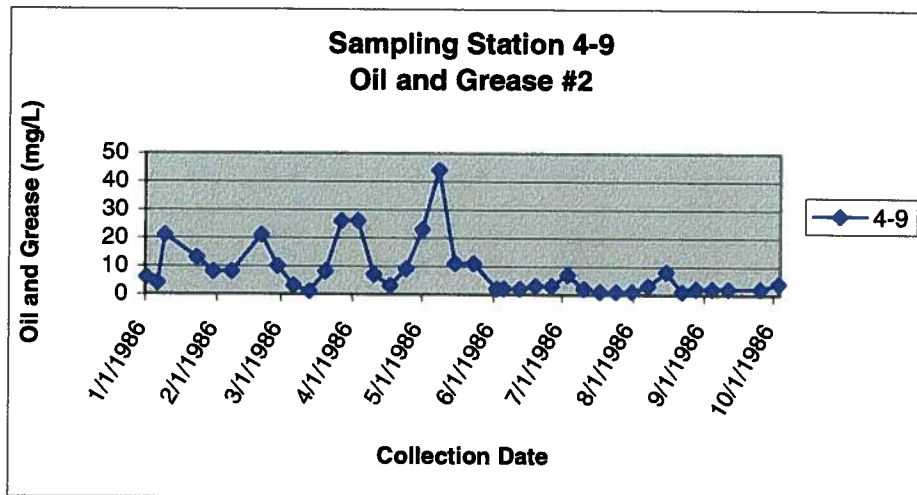
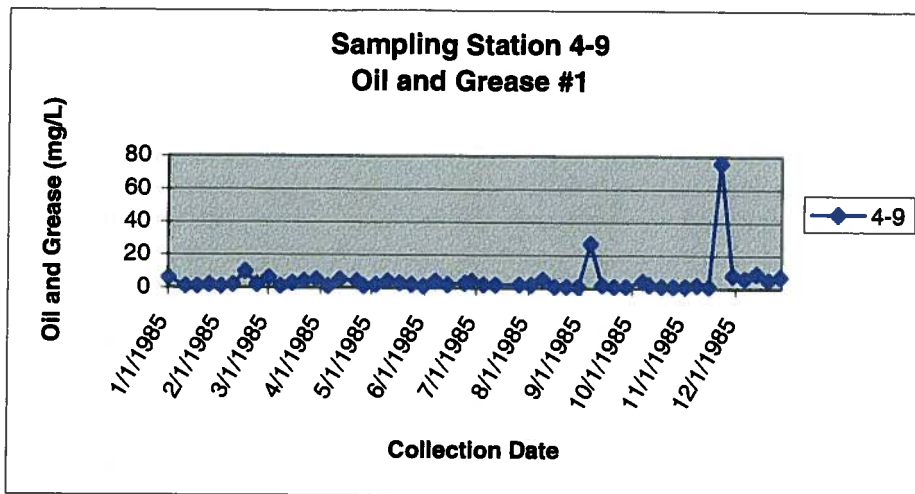
Graphs of Total Copper SNP Data



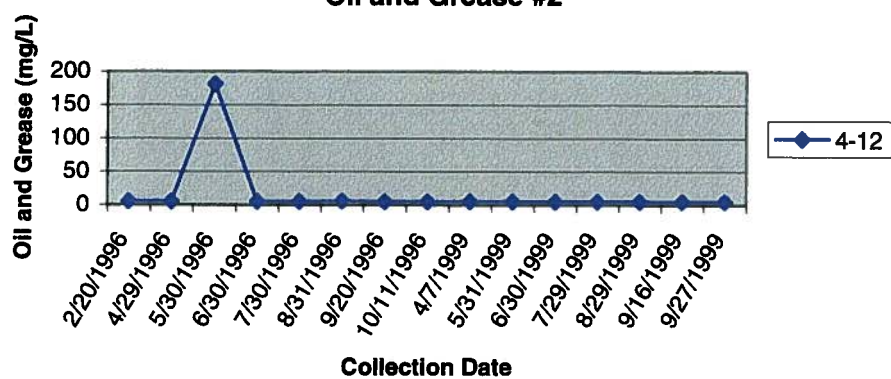


Appendix E

Graphs of Oil and Grease SNP Data

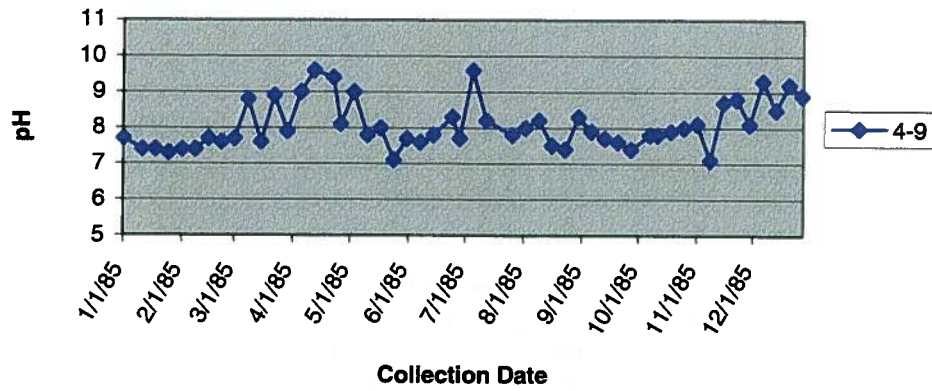


Sampling Station 4-12
Oil and Grease #2

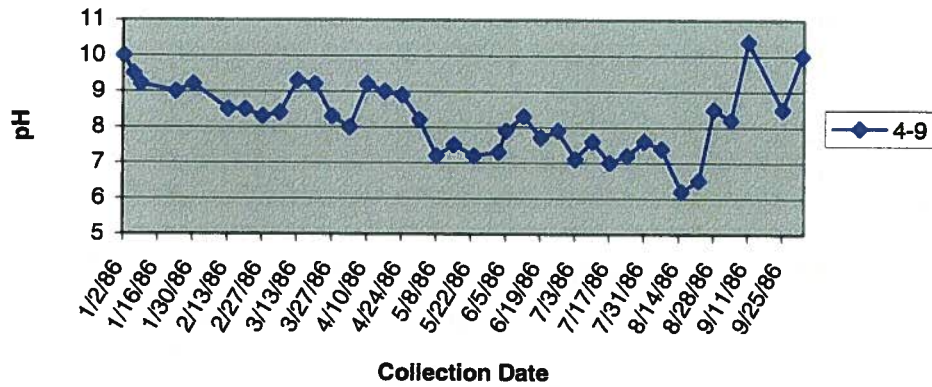


Appendix F
Graphs of pH SNP Data

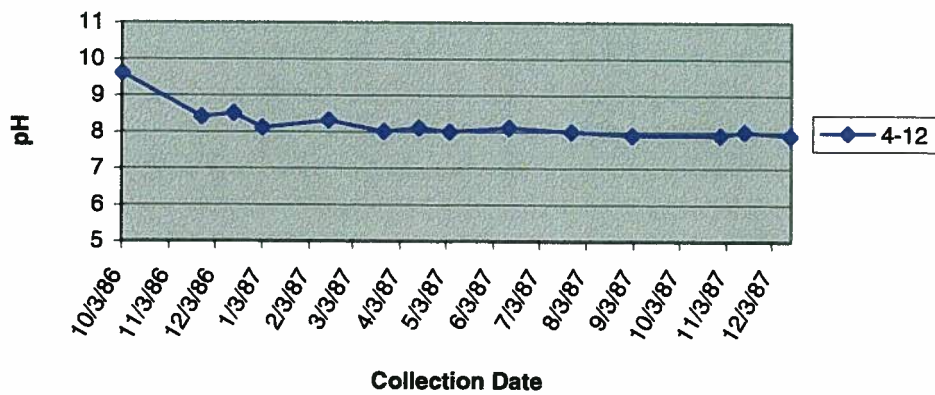
Sampling Station 4-9 pH #1



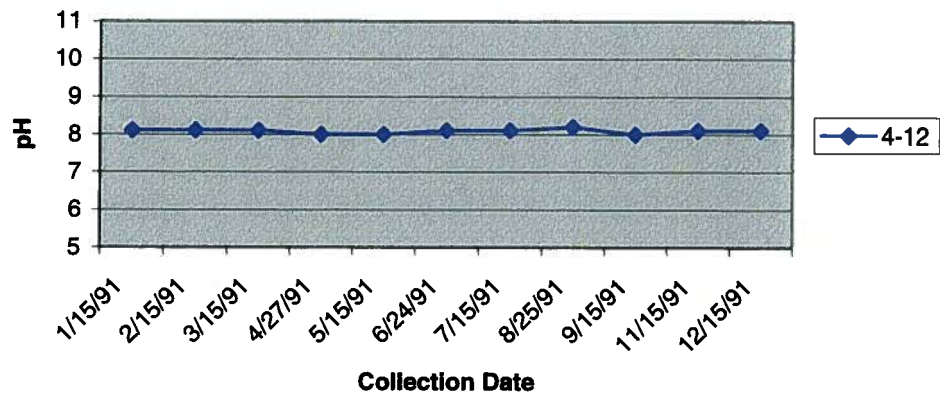
Sampling Station 4-9 pH #2



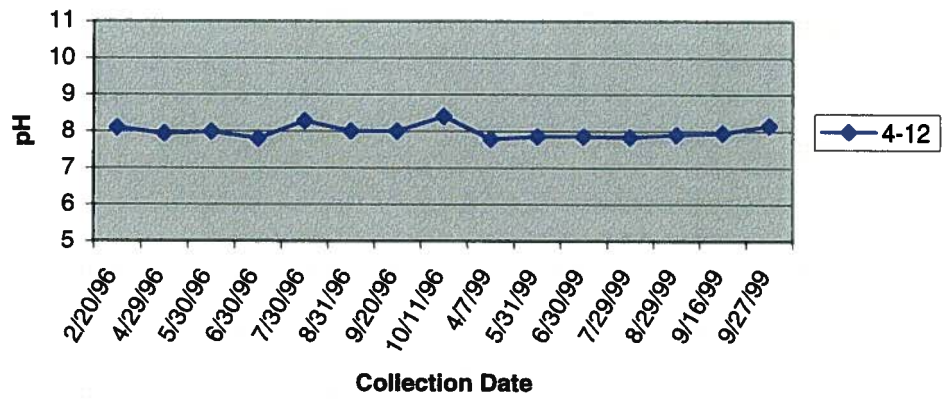
Sampling Station 4-12 pH #1



Sampling Station 4-12 pH #2



Sampling Station 4-12 pH #3



Appendix G

Table of Total Suspended Solids SNP Data

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)							
	Sampling Stations							
	4-5	4-12	4-13	4-29	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4
1/21/1985					2			1.2
3/25/1985					9			7
5/27/1985					35.2			1.2
8/12/1985					1			4
9/24/1985					23			7
11/25/1985					118			
3/27/1986								
5/15/1986								
6/30/1986						122		
9/15/1986						248		
11/24/1986						46		
1/3/1987								
3/23/1987						4		
5/5/1987								
6/13/1987						1		
7/24/1987								
9/2/1987					1			1
10/30/1987						4		
1/15/1991	1	1		1				
2/15/1991	1	1		1				
3/15/1991	1	1		1				
4/27/1991	4	1		2		7		
5/15/1991	4	2						
6/24/1991	5	1	1	7				5
7/15/1991	6	1	1	3				
8/25/1991	7	2	3	5				
9/15/1991	1	1	12	2				
11/4/1991	5	1	2	4	3			
12/15/1991	4	1		1				
2/20/1996	3	1		2				
4/29/1996	2	27		7				
5/30/1996	57	1	1	15				25
6/30/1996	3	1	1	2				
7/30/1996	10	1	1	9				35
8/31/1996	7	5	1	3				
9/20/1996	3	5	1	3				
10/11/1996	2	2	1	4		3		
4/7/1999	3	3						
5/31/1999	3	4	3	6		3		3
6/30/1999	9	3	3	11		5		
7/29/1999	4	3	3	5			3	
8/29/1999	3	3	3	3				3
9/16/1999	7	3	3	3		3	3	4
9/27/1999	3	3	3	3				3

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)					
	Sampling Stations					
	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1
1/21/1985				1.8		6.4
3/25/1985				13		6
5/27/1985				5.6		2.4
8/12/1985				1	870	25.2
9/24/1985				6		1
11/25/1985				1		1.2
3/27/1986						46
5/15/1986						
6/30/1986			446			108
9/15/1986			294		779	119
11/24/1986			50			3
1/3/1987						
3/23/1987			3		84	
5/5/1987						
6/13/1987			1		1	2
7/24/1987						
9/2/1987				1		2
10/30/1987			6		1	39
1/15/1991						
2/15/1991						
3/15/1991						
4/27/1991		7			43	4
5/15/1991						
6/24/1991			5			1
7/15/1991						
8/25/1991						
9/15/1991						
11/4/1991	4				15	10
12/15/1991						
2/20/1996						
4/29/1996						
5/30/1996	16				160	
6/30/1996						1
7/30/1996			11		184	2
8/31/1996						
9/20/1996						
10/11/1996	1				138	13
4/7/1999						
5/31/1999						
6/30/1999						3
7/29/1999			3	3		3
8/29/1999	3	3				5
9/16/1999						3
9/27/1999	3	3				

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)							
	Sampling Stations							
	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P9	4-27-3 P1	4-27-3 P2
1/21/1985		1		16.8			1	
3/25/1985		7		17			7	
5/27/1985		2			16.4		1	
8/12/1985		2.4			1		14	
9/24/1985		2			1		2	
11/25/1985		1			4.8		2.4	
3/27/1986							1	
5/15/1986								
6/30/1986		118			90		90	
9/15/1986		114		108			108	
11/24/1986		1		2			2	11
1/3/1987								
3/23/1987							6	16
5/5/1987								
6/13/1987	3			11			1	64
7/24/1987								
9/2/1987			34			38	12	24
10/30/1987		36		31			8	6
1/15/1991								
2/15/1991								
3/15/1991								
4/27/1991		4			20		9	
5/15/1991								
6/24/1991		1			11		1	
7/15/1991								
8/25/1991								
9/15/1991								
11/4/1991		4			9		8	
12/15/1991								
2/20/1996								
4/29/1996								
5/30/1996							3	
6/30/1996			3		3			
7/30/1996		12			27		5	
8/31/1996								
9/20/1996								
10/11/1996		1			1		1	
4/7/1999								
5/31/1999							3	
6/30/1999			9	13			5	
7/29/1999	7			4			3	
8/29/1999	3	3	3				5	
9/16/1999		3		3			14	
9/27/1999	3		3				21	

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)								
	Sampling Stations								
	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5
1/21/1985						1.2			1.6
3/25/1985			8			8			7
5/27/1985							6.4		
8/12/1985	13.2		18.4	1.6		36.8			31.6
9/24/1985		1				28			2
11/25/1985						1.6			1.2
3/27/1986					84				
5/15/1986									
6/30/1986					35			114	
9/15/1986						135			149
11/24/1986							83		
1/3/1987									
3/23/1987			2		12		5		
5/5/1987									
6/13/1987			1		2			4	
7/24/1987									
9/2/1987			7		4	1			
10/30/1987			9		5			5	
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991			14	65	4				3
5/15/1991									
6/24/1991			1	1	4				2
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991			1	12	4				3
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996			1	11	5			5	
6/30/1996									
7/30/1996			3	6	11				2
8/31/1996									
9/20/1996									
10/11/1996			1	1	1				3
4/7/1999									
5/31/1999					3				
6/30/1999									
7/29/1999									
8/29/1999					3		3	3	
9/16/1999									
9/27/1999					3		3	3	

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)								
	Sampling Stations								
	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5
1/21/1985				2.4	6.4				
3/25/1985				18	7				10
5/27/1985	6			6	1.2				23.2
8/12/1985				56.8	20				90.4
9/24/1985				1					8
11/25/1985			114					115	
3/27/1986								3.2	
5/15/1986									
6/30/1986				127		105	72		
9/15/1986				149		215			
11/24/1986	32		160						
1/3/1987									
3/23/1987			110						31
5/5/1987									
6/13/1987			1						63
7/24/1987									
9/2/1987				46					12
10/30/1987			3						1
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991				1	3				
5/15/1991									
6/24/1991				4	4				
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991				4	7				
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996	86				11				
6/30/1996									
7/30/1996				93	9				
8/31/1996									
9/20/1996									
10/11/1996				1	7				
4/7/1999									
5/31/1999					27				
6/30/1999	3	1490	9		3				
7/29/1999	3	266	3		3				
8/29/1999					3				
9/16/1999	3	39	3		26				
9/27/1999					11				

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
Surveillance Network Program

Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)					
	Sampling Stations					
	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11	4-27-6 P1
1/21/1985						4.8
3/25/1985			74			8
5/27/1985			28			21
8/12/1985			28.8			48.6
9/24/1985			6			1
11/25/1985			383			1
3/27/1986			83.6			1.6
5/15/1986						6.0
6/30/1986			427			143
9/15/1986			212			148
11/24/1986						4
1/3/1987						4
3/23/1987	380	57				1
5/5/1987						1
6/13/1987	302			67		1
7/24/1987						2
9/2/1987	2			160		2
10/30/1987	1				1	30
1/15/1991						
2/15/1991						
3/15/1991						
4/27/1991			19			258
5/15/1991						10
6/24/1991			1			1
7/15/1991						
8/25/1991						6
9/15/1991						
11/4/1991			7			198
12/15/1991						15
2/20/1996						
4/29/1996						
5/30/1996			23			51
6/30/1996						5
7/30/1996			6			53
8/31/1996						1
9/20/1996						5
10/11/1996			1			5
4/7/1999						
5/31/1999						3
6/30/1999						8
7/29/1999						3
8/29/1999						4
9/16/1999						7
9/27/1999						3

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
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Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)								
	Sampling Stations								
	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4	4-27-7 P6	4-27-7 P7
1/21/1985	11.2	1.6		1.6				1.2	
3/25/1985	58	8		7				6	
5/27/1985	2	4.8		1.6				1.4	
8/12/1985	48.2	14		12.2				22.8	
9/24/1985	57	7		7				4	
11/25/1985	6.4	2.4		2.8			4		
3/27/1986	2.8	3.2					8.4		
5/15/1986	2.8	5.2							
6/30/1986		51	89	69				158	
9/15/1986	101			151				162	
11/24/1986	7	7		1				10	
1/3/1987	1	2							
3/23/1987	3	1		18					17
5/5/1987	2	5							
6/13/1987	1	2		1			5		5
7/24/1987	3		4						
9/2/1987	2		4	2					4
10/30/1987	15		10	1	1	1			
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991	6	10							
5/15/1991									
6/24/1991	1	1		1				1	
7/15/1991									
8/25/1991	10	4							
9/15/1991									
11/4/1991	8	9		4				8	
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996	4	12							
6/30/1996									
7/30/1996	4	5		3				1	
8/31/1996	5	3							
9/20/1996									
10/11/1996	3	5		1					
4/7/1999									
5/31/1999	7	10		3					
6/30/1999	14	13						3	
7/29/1999	9	12			13			3	
8/29/1999	8	13			3				
9/16/1999	10	7		3			3	3	
9/27/1999	13	4							

Canadian Tungsten Mining Corporation Ltd. - Licence #N3L2-0004
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Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)						
	Sampling Stations						
	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12	4-27-8 P1	4-27-8 P2
1/21/1985					46	1	1
3/25/1985					96	9	7
5/27/1985					1.6	2	6.8
8/12/1985					1	4.8	21.2
9/24/1985					23	8	6
11/25/1985						3.6	4.4
3/27/1986		53.2			23.2	1	1
5/15/1986							
6/30/1986					137	151	191
9/15/1986					182	168	179
11/24/1986					10000	1	2
1/3/1987							
3/23/1987				95		1	2
5/5/1987							
6/13/1987						1	1
7/24/1987							
9/2/1987				17		2	4
10/30/1987							6
1/15/1991							
2/15/1991							
3/15/1991							
4/27/1991						4	4
5/15/1991							
6/24/1991					1	1	1
7/15/1991							
8/25/1991							
9/15/1991							
11/4/1991					7	5	4
12/15/1991							
2/20/1996							
4/29/1996							
5/30/1996				1			
6/30/1996						1	2
7/30/1996				8		3	3
8/31/1996							
9/20/1996							
10/11/1996	6			6		1	1
4/7/1999							
5/31/1999			12	5		3	3
6/30/1999	5					3	3
7/29/1999	3					3	3
8/29/1999	3	22	15			3	3
9/16/1999							3
9/27/1999	3	12		3		3	3

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Collection Date	TOTAL SUSPENDED SOLIDS (mg/L)				
	Sampling Stations				
	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9, BH53
1/21/1985		2			2
3/25/1985		8			
5/27/1985		5.2			2.4
8/12/1985		16.4			76.4
9/24/1985		5			1
11/25/1985		7.6			13.6
3/27/1986		2			25.2
5/15/1986					
6/30/1986	135				1132
9/15/1986		138			717
11/24/1986		2			70
1/3/1987					
3/23/1987	1				9
5/5/1987					
6/13/1987		1			4
7/24/1987					
9/2/1987		2			1
10/30/1987			44	8	16
1/15/1991					
2/15/1991					
3/15/1991					
4/27/1991		4			6
5/15/1991					
6/24/1991		1			1
7/15/1991					
8/25/1991					
9/15/1991					
11/4/1991		4			2
12/15/1991					
2/20/1996					
4/29/1996					
5/30/1996					
6/30/1996		4			
7/30/1996		1			24
8/31/1996					
9/20/1996					
10/11/1996		3			1250
4/7/1999					
5/31/1999	3				8
6/30/1999	3				3
7/29/1999	3				5
8/29/1999	3				3
9/16/1999	3	3			3
9/27/1999	3				3

Appendix H

Table of Total Zinc SNP Data

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
Surveillance Network Program

Collection Date	TOTAL ZINC (mg/L) Sampling Stations														
	4-5	4-9	4-12	4-13	4-29	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10
1/4/1985		.02													
1/11/1985		.04													
1/18/1985	.02	.02			.02										
1/21/1985						.005				.005				.005	
1/25/1985		.02													
2/1/1985		.02													
2/8/1985		.02													
2/15/1985		.02			.02										
2/22/1985		.02													
3/1/1985		.04													
3/8/1985		.02													
3/15/1985	.04	.08			.04										
3/22/1985		.04													
3/25/1985						.005				.005				.005	
3/29/1985		.04													
4/5/1985		.04													
4/12/1985	.02	.02			.02										
4/22/1985		.02													
4/26/1985		.06													
5/3/1985		.02													
5/10/1985		.02													
5/17/1985	.02	.02			.02										
5/24/1985		.02													
5/27/1985						.005				.005				.005	
5/31/1985		.10													
6/7/1985		.04													
6/14/1985	.02	.02			.02										
6/24/1985		.08													
6/28/1985		.02													
7/5/1985		.02													
7/12/1985	.02	.02			.02										
7/19/1985															
7/26/1985		.04													
8/2/1985		.04													
8/9/1985		.02													
8/12/1985		.06				.005				.005				.05	.015
8/16/1985	.02	.06			.02										
8/23/1985		.06													
8/30/1985		.06													
9/6/1985		.72													
9/13/1985	.02	.10			.02										
9/20/1985		.02													
9/24/1985						.002				.003				.004	
9/27/1985		.02													
10/7/1985		.04													
10/11/1985		.06													
10/18/1985	.02	.06			.02										
10/25/1985		.02													
11/1/1985		.02													
11/8/1985		.06													
11/15/1985	.02	.06			.02										
11/22/1985		.06													
11/25/1985						.054								.005	
11/29/1985		.02													
12/6/1985		.06													
12/13/1985	.02	.06			.02										
12/20/1985		.08													
12/27/1985		.02													
1/2/1986		.02													
1/6/1986		.04													
1/9/1986		.04													
1/16/1986	.04				.02										
1/23/1986		.02													
1/30/1986		.06													
2/7/1986		.12													
2/13/1986	.16	.02			.16										

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Collection Date	TOTAL ZINC (mg/L) Sampling Stations														
	4-5	4-9	4-12	4-13	4-29	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10
2/20/1986		.02													
2/27/1986		.08													
3/6/1986		.10													
3/13/1986	.12	.10			.14										
3/20/1986		.20													
3/27/1986		.18													
4/3/1986		.02													
4/10/1986		.16													
4/17/1986	.14	.02			.14										
4/24/1986		.12													
5/1/1986		.16													
5/8/1986		.10													
5/15/1986	.10	.08			.12										
5/23/1986		.94													
6/2/1986		.18													
6/5/1986		.12													
6/12/1986	.06	.08			.04										
6/19/1986		.10													
6/26/1986		.12													
6/30/1986							.065						.018		
7/3/1986		.16													
7/10/1986		.06													
7/17/1986	.10	.10			.08										
7/24/1986		.08													
7/31/1986		.16													
8/7/1986		.34													
8/15/1986	.18	.12			.14										
8/22/1986		.06													
8/28/1986		.20													
9/4/1986		.16													
9/11/1986		.05													
9/18/1986	.06	.05			.06		.013						.032		.047
9/25/1986		.16													
10/3/1986	.10	.10	.12		.1										
11/24/1986	.02	.02			.14		.14						.12		
12/15/1986	.16	.16			.16										
1/3/1987	.02	.04			.02										
2/15/1987	.02	.02			.02										
3/23/1987	.04	.04			.04		.1						.04		.06
5/5/1987	.06	.02			.02										
6/13/1987	.02	.02			.02		.02						.02		.02
7/24/1987	.04	.02			.04										
9/2/1987	.02	.04			.02	.02			.04					.04	
10/30/1987	.02	.04			.04		.004						.004		.004
11/15/1987	.02	.02			.02										
12/15/1987	.02	.02			.04										
1/15/1991	.12	.12			.08										
2/15/1991	.08	.01			.06										
3/15/1991	.08	.02			.08										
4/27/1991	.12	.04			.1		.02					.02			.08
5/15/1991	.01	.02			.16										
6/24/1991	.04	.02	.02		.02				.02				.04		
7/15/1991	.04	.02	.04		.04										
8/25/1991	.02	.08	.08		.02										
9/15/1991		.02	.04		.02										
11/4/1991	.12	.02	.12		.08	.26					.24				.32
12/15/1991	.08	.08			.08										
2/20/1996	.005	.005			.005										
4/29/1996	.005	.005			.005										
5/30/1996	.011	.009	.022		.005				.038		.005				.066
6/30/1996	.005	.005	.005		.005										
7/30/1996	.005	.005	.005		.009				.035				.017		.001
8/31/1996	.005	.005	.005		.005										
9/20/1996	.005	.005	.005		.005										
10/11/1996	.005	.005	.005		.005		.008				.005				.134
4/7/1999	.005	.005													
5/31/1999	.008	.005	.019		.005		.008		.009						
6/30/1999	.005	.005	.005		.005		.011								
7/29/1999	.005	.006	.005		.005			.005					.005	.008	
8/29/1999	.005	.005	.005		.005				.006	.012	.007				
9/16/1999	.006	.005	.005		.005		.006	.005	.009						
9/27/1999	.005	.005	.005		.005				.005	.005	.014				

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Collection Date	TOTAL ZINC (mg/L)											
	Sampling Stations											
	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5
1/4/1985												
1/11/1985												
1/18/1985												
1/21/1985	.005			.005		.005			.005			
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985	.005			.005		.005			.005			
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985	.005			.005			.01		.005			
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/19/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985	.005			.005			.005		.005		.015	
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985	.002			.001			.005		.004			.043
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/25/1985	.005			.007			.025		.018			
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												

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Collection Date	TOTAL ZINC (mg/L)											
	Sampling Stations											
	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986	.012								.007			
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986												
5/23/1986												
6/2/1986												
6/5/1986												
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986	.005			.005			.005		.005			
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986	.008			.005		.014			.01			
9/25/1986												
10/3/1986												
11/24/1986	.08			.06		.06			.06	.06		
12/15/1986												
1/3/1987												
2/15/1987												
3/23/1987									.06	.06		
5/5/1987												
6/13/1987	.02			.02		.02			.02	.02		
7/24/1987												
9/2/1987		.02			.06			.04	.02	.02		
10/30/1987	.006			.006		.004			.002	.006		
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991	.06			.06			.10		.12			
5/15/1991												
6/24/1991	.04			.08			.04		.02			
7/15/1991												
8/25/1991												
9/15/1991												
11/4/1991	.16			.24			.20		.28			
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996									.012			
6/30/1996	.016				.027		.033					
7/30/1996	.005			.028			.028		.012			
8/31/1996												
9/20/1996												
10/11/1996	.012			.005			.005	.026				
4/7/1999												
5/31/1999									.039			
6/30/1999	.011				.022	.017			.04			
7/29/1999	.018		.011			.015			.025			
8/29/1999	.016		.009	.009	.019				.05			
9/16/1999	.008			.005		.011			.047			
9/27/1999			.005		.019				.054			

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Collection Date	TOTAL ZINC (mg/L)											
	Sampling Stations											
	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1
1/4/1985												
1/11/1985												
1/18/1985												
1/21/1985				.005			.005				.005	.007
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985	.005			.005			.005				.005	.005
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985					.015			.005			.013	.005
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/19/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985	.005	.005		.005			.005				.005	.005
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985				.03			.002				.003	
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/25/1985				.009			.014			1.17		
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												

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Collection Date	TOTAL ZINC (mg/L)											
	Sampling Stations											
	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986			.044									
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986												
5/23/1986												
6/2/1986												
6/5/1986												
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986			.016			.005					.009	
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986				.005			.005				.005	
9/25/1986												
10/3/1986												
11/24/1986					.10			.10		.12		
12/15/1986												
1/3/1987												
2/15/1987												
3/23/1987	.06		.06	.04						.16		
5/5/1987												
6/13/1987	.02		.02			.02				.02		
7/24/1987												
9/2/1987	.04		.06	.04							.06	
10/30/1987	.002		.002			.002				.002		
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991	.06	.10	.06				.10				.06	.06
5/15/1991												
6/24/1991	.04	.08	.02				.02				.02	.08
7/15/1991												
8/25/1991												
9/15/1991												
11/4/1991	.16	.08	.08				.24				.24	.2
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996	.014	.024	.002			.005		.04				.003
6/30/1996												
7/30/1996	.022	.025	.045				.005				.20	.021
8/31/1996												
9/20/1996												
10/11/1996	.011	.018	.015				.0005				.005	.026
4/7/1999												
5/31/1999			.005									.067
6/30/1999								.006	.05	.008		.035
7/29/1999								.005	.01	.005		.031
8/29/1999			.005		.005	.005						.028
9/16/1999								.005	.01	.005		.052
9/27/1999			.009		.005	.005						.058

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	TOTAL ZINC (mg/L)										
	Sampling Stations										
	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-6 P1
1/4/1985											
1/11/1985											
1/18/1985											
1/21/1985											
1/25/1985											.008
2/1/1985											
2/8/1985											
2/15/1985											
2/22/1985											
3/1/1985											
3/8/1985											
3/15/1985											
3/22/1985											
3/25/1985				.005			.005				.005
3/29/1985											
4/5/1985											
4/12/1985											
4/22/1985											
4/26/1985											
5/3/1985											
5/10/1985											
5/17/1985											
5/24/1985											
5/27/1985				.025			.055				.005
5/31/1985											
6/7/1985											
6/14/1985											
6/24/1985											
6/28/1985											
7/5/1985											
7/12/1985											
7/19/1985											
7/26/1985											
8/2/1985											
8/9/1985											
8/12/1985				.029			.005				.005
8/16/1985											
8/23/1985											
8/30/1985											
9/6/1985											
9/13/1985											
9/20/1985											
9/24/1985				.002			.002				.004
9/27/1985											
10/7/1985											
10/11/1985											
10/18/1985											
10/25/1985											
11/1/1985											
11/8/1985											
11/15/1985											
11/22/1985											
11/25/1985			.016				.28				.005
11/29/1985											
12/6/1985											
12/13/1985											
12/20/1985											
12/27/1985											
1/2/1986											
1/6/1986											
1/9/1986											
1/16/1986											
1/23/1986											
1/30/1986											
2/7/1986											
2/13/1986											

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	TOTAL ZINC (mg/L)										
	Sampling Stations										
	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-6 P1
2/20/1986											
2/27/1986											
3/6/1986											
3/13/1986											
3/20/1986											
3/27/1986			.005				.087				.005
4/3/1986											
4/10/1986											
4/17/1986											
4/24/1986											
5/1/1986											
5/8/1986											
5/15/1986											.005
5/23/1986											
6/2/1986											
6/5/1986											
6/12/1986											
6/19/1986											
6/26/1986											
6/30/1986	.013	.018					.20				.007
7/3/1986											
7/10/1986											
7/17/1986											
7/24/1986											
7/31/1986											
8/7/1986											
8/15/1986											
8/22/1986											
8/28/1986											
9/4/1986											
9/11/1986											
9/18/1986	.14						.15				.005
9/25/1986											
10/3/1986											
11/24/1986											.04
12/15/1986											.2
1/3/1987											.04
2/15/1987											.02
3/23/1987				.04	.2	.12					.02
5/5/1987											.02
6/13/1987				.02	.12			.02			.02
7/24/1987											.04
9/2/1987				.02	.02			.12			.04
10/30/1987				0.02	0.02				0.02		.04
11/15/1987											
12/15/1987											
1/15/1991											
2/15/1991											
3/15/1991											
4/27/1991							.10			.24	.08
5/15/1991											
6/24/1991							.02			.04	.04
7/15/1991											.08
8/25/1991											
9/15/1991											
11/4/1991							.20			.32	.16
12/15/1991											
2/20/1996											
4/29/1996											
5/30/1996							.036			.024	.13
6/30/1996											
7/30/1996							.032			.021	.038
8/31/1996											.022
9/20/1996											
10/11/1996							.01			.005	.015
4/7/1999											.02
5/31/1999											.023
6/30/1999											.018
7/29/1999											.027
8/29/1999											.037
9/16/1999											.03
9/27/1999											

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	TOTAL ZINC (mg/L) Sampling Stations											
	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10
1/4/1985												
1/11/1985												
1/18/1985												
1/21/1985	.018	.005		.005				.005				
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985	.064	.01		.005				.005				
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985	.025	.013		.005				.005				
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/19/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985	.005	.005		.005				.005				
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985	.038	.003		.004				.002				
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/25/1985	.017	.005		.005			.005					
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	TOTAL ZINC (mg/L)											
	Sampling Stations											
	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986	.005	.006					.016				.024	
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986	.024	.005										
5/23/1986												
6/2/1986												
6/5/1986												
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986	.021		.014	.005				.028				
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986	.005			.024				.005				
9/25/1986												
10/3/1986												
11/24/1986	.08	.04		.04				.06				
12/15/1986												
1/3/1987	.18	.16										
2/15/1987												
3/23/1987	.04	.04		.1					.04			
5/5/1987	.02	.02										
6/13/1987	.02	.02		.02			.02		.02			
7/24/1987	.04			.02								
9/2/1987	.04		.04	.02					.02			
10/30/1987	.004		.004	.002	.004	.004						
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991	.06	.08										
5/15/1991												
6/24/1991	.02	.12		.12				.02				
7/15/1991												
8/25/1991	.04	.04										
9/15/1991												
11/4/1991	.12	.12		.16				.20				
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996	.015	.028										
6/30/1996												
7/30/1996	.019	.012		.014				.006				
8/31/1996	.018	.011										
9/20/1996												
10/11/1996	.008	.007		.009	.035							
4/7/1999												
5/31/1999	.018	.035		.009								.01
6/30/1999	.032	.021						.005		.01		
7/29/1999	.023	.015			.01			.005		.01		
8/29/1999	.023	.013			.016					.008	.02	.012
9/16/1999	.028	.017		.01			.007	.005				
9/27/1999	.022	.011							.005	.009		

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Collection Date	TOTAL ZINC (mg/L)								
	4-27-7 P11	4-27-7 P12	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9, BH53
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985		.022	.005	.01		.005			.005
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985		.012	.005	.005		.005			
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985		.005	.005	.005		.005			.005
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985		.005	.005	.005		.005			.005
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985		.007	.003	.004		.002			.006
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985			.005	.006		.005			.06
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
Surveillance Network Program

Collection Date	TOTAL ZINC (mg/L)								
	Sampling Stations								
	4-27-7 P11	4-27-7 P12	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9, BH53
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986		.095	.005	.011		.018			.064
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986		.018	.005	.019	.019				.72
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		.023	.028	.005		.011			.2
9/25/1986									
10/3/1986									
11/24/1986		5.10	.14	.14		.04			.12
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987	.04		.04	.04	.04				.04
5/5/1987									
6/13/1987			.02	.02	.02				.02
7/24/1987									
9/2/1987	.02		.02	.04		.02			.02
10/30/1987				.04			.04	.04	.04
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991			.12	.06		.12			.08
5/15/1991									
6/24/1991		.04	.02	.02		.02			.02
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991		.12	.08	.20		.16			.28
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996	.008								
6/30/1996			.005	.018		.006			
7/30/1996	.01		.005	.005		.005			.016
8/31/1996									
9/20/1996									
10/11/1996	.006		.005	.005		.009			.005
4/7/1999									
5/31/1999	.005		.008	.005	.005				.014
6/30/1999			.005	.005	.007				.009
7/29/1999			.005	.005	.005				.005
8/29/1999			.005	.005	.005				.005
9/16/1999				.005	.005	.007			.005
9/27/1999	.005		.005	.005	.005				.005

Appendix I

Table of Total Copper SNP Data

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
Surveillance Network Program

Collection Date	TOTAL COPPER (mg/L)											
	Sampling Stations											
	4-5	4-9	4-12	4-13	4-29	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7
1/4/1985		.2										
1/11/1985		.06										
1/18/1985	.02	.02			.02							
1/21/1985						.001				.002		
1/25/1985		.02										
2/1/1985		.02										
2/8/1985		.04										
2/15/1985		.02			.08							
2/22/1985		.02										
3/1/1985		.08										
3/8/1985		.04										
3/15/1985	.02	.08			.02							
3/22/1985		.56										
3/25/1985						.004				.00		
3/29/1985		.02										
4/5/1985		.02										
4/12/1985	.02	.02			.02							
4/22/1985		.02										
4/26/1985		.06										
5/3/1985		.02										
5/10/1985		.02										
5/17/1985	.02	.06			.02							
5/24/1985		.04										
5/27/1985						.001				.001		
5/31/1985		.08										
6/7/1985		.14										
6/14/1985	.02	.02			.02							
6/24/1985		.04										
6/28/1985		.02										
7/5/1985		.02										
7/12/1985	.02	.02			.02							
7/19/1985												
7/26/1985		.02										
8/2/1985		.02										
8/9/1985		.04										
8/12/1985						.001				.001		
8/16/1985	.02	.02			.02							
8/23/1985		.02										
8/30/1985		.02										
9/6/1985		.82										
9/13/1985	.02	.02			.02							
9/20/1985		.04										
9/24/1985						.001				.001		
9/27/1985		.02										
10/7/1985		.06										
10/11/1985		.04										
10/18/1985	.02	.04			.02							
10/25/1985		.02										
11/1/1985		.02										
11/8/1985		.02										
11/15/1985	.02	.06			.12							
11/22/1985		.40										
11/25/1985						.041						
11/29/1985		.02										
12/6/1985		.06										
12/13/1985	.02	.10			.02							
12/20/1985		.10										
12/27/1985		.10										
1/2/1986		.02										
1/6/1986		.02										
1/9/1986		.04										
1/16/1986	.02				.02							
1/23/1986		.02										
1/30/1986		.02										
2/7/1986		.68										
2/13/1986	.02	.04			.04							

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	TOTAL COPPER (mg/L)											
	Sampling Stations											
	4-5	4-9	4-12	4-13	4-29	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7
2/20/1986		.06										
2/27/1986		.06										
3/6/1986		.06										
3/13/1986	.02	.06			.02							
3/20/1986		.06										
3/27/1986		.02										
4/3/1986		.02										
4/10/1986		4.60										
4/17/1986	.04	.02			.02							
4/24/1986		.02										
5/1/1986		.04										
5/8/1986		.06										
5/15/1986	.02	.02			.02							
5/23/1986		.04										
6/2/1986		.04										
6/5/1986		.04										
6/12/1986	.02	.05			.02							
6/19/1986		.02										
6/26/1986		.04										
6/30/1986							.002					
7/3/1986		.02										
7/10/1986		.02										
7/17/1986	.02	.02			.02							
7/24/1986		.02										
7/31/1986		.04										
8/7/1986		.04										
8/15/1986	.02	.06			.02							
8/22/1986		.02										
8/28/1986		.02										
9/4/1986		.04										
9/11/1986		.02										
9/18/1986	.02	.02			.02		.001					
9/25/1986		.02										
10/3/1986	.02	.02	.02		.02							
11/24/1986	.02		.02		.06		.02					
12/15/1986	.02		.02		.02							
1/3/1987	.02		.02		.02							
2/15/1987	.02		.02		.02							
3/23/1987	.02		.02		.02		.06					
4/15/1987	.04		.02		.02							
5/5/1987	.02		.02		.02							
6/13/1987	.02		.02		.02		.02					
7/24/1987	.02		.02		.02							
9/2/1987	.02		.02		.02	.04				.02		
10/30/1987	.02		.02		.02		.02				.02	
11/15/1987	.02		.02		.02							
12/15/1987	.02		.02		.02							
1/15/1991	.02		.08		.08							
2/15/1991	.02		.01		.04							
3/15/1991	.02		.02		.02							
4/27/1991	.05		.04		.05		.02					.02
5/15/1991	.02		.02		.02							
6/24/1991	.02		.02	.02	.02				.02			
7/15/1991	.02		.02	.02	.02							
8/25/1991	.02		.02	.02	.02							
9/15/1991			.02	.02	.02							
11/4/1991	.01		.01	.01	.01	.04					.04	
12/15/1991	.04		.04		.04							
2/20/1996	.001		.001		.001				.006		.001	
4/29/1996	.001		.001		.001							
5/30/1996	.004		.007	.002	.002							
6/30/1996	.001		.001	.001	.001							
7/30/1996	.001		.001	.001	.001				.004			
8/31/1996	.01		.01	.01	.01							
9/20/1996	.001		.001	.001	.001							
10/11/1996	.001		.001	.001	.001		.001				.001	
4/7/1999	.001		.001									
5/31/1999	.001		.002	.002	.001		.001			.001		
6/30/1999	.002		.001	.001	.002		.001					
7/29/1999	.002		.003	.002	.002			.002				
8/29/1999	.01		.01	.01	.01					.01	.01	.01
9/16/1999	.01		.01	.01	.01		.01	.01	.01			
9/27/1999	.01		.01	.01	.01					.01	.01	.01

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Collection Date	TOTAL COPPER Sampling Stations								
	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985		.001		.001			.002		.002
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985		.002		.002			.002		.001
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985		.001		.005			.002		
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985		.001	.008	.002			.002		
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985		.001		.001			.001		
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985		.002		.002			.004		
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	TOTAL COPPER Sampling Stations								
	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986				.006					
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986	.002			.007			.001		
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986	.006		.017	.003			.004		.001
9/25/1986									
10/3/1986									
11/24/1986	.04			.02			.02		.06
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987	.02		.02						
4/15/1987									
5/5/1987									
6/13/1987	.02		.02	.02			.02		.02
7/24/1987									
9/2/1987		.02		.02				.02	
10/30/1987			.02	.02			.02		.02
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991			.04	.04			.02		
5/15/1991									
6/24/1991	.02			.02			.02		
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991			.12	.01			.04		
12/15/1991									
2/20/1996			.022						
4/29/1996									
5/30/1996									
6/30/1996				.005				.002	
7/30/1996	.001		.026	.002			.005		
8/31/1996									
9/20/1996									
10/11/1996			.021	.008			.032		
4/7/1999									
5/31/1999									
6/30/1999				.011				.001	.001
7/29/1999	.002	.002		.018		.001			.002
8/29/1999				.016		.009	.009	.01	
9/16/1999				.009			.005		.01
9/27/1999						.005		.01	

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	TOTAL COPPER (mg/L)								
	Sampling Stations								
Collection Date	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-3 P8	4-27-4 P1
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985			.004						
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985			.005				.002		
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985	.003		.004						
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985	.001		.003		.005		.006	.001	
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985	.003		.003			.001			
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985	.013		.01						
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	TOTAL COPPER (mg/L)							
	Sampling Stations							
	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-4 P1
2/20/1986								
2/27/1986								
3/6/1986								
3/13/1986								
3/20/1986								
3/27/1986			.003					.23
4/3/1986								
4/10/1986								
4/17/1986								
4/24/1986								
5/1/1986								
5/8/1986								
5/15/1986								
5/23/1986								
6/2/1986								
6/5/1986								
6/12/1986								
6/19/1986								
6/26/1986								
6/30/1986	.001		.006					.013
7/3/1986								
7/10/1986								
7/17/1986								
7/24/1986								
7/31/1986								
8/7/1986								
8/15/1986								
8/22/1986								
8/28/1986								
9/4/1986								
9/11/1986								
9/18/1986			.005					
9/25/1986								
10/3/1986								
11/24/1986			.02	.02				
12/15/1986								
1/3/1987								
2/15/1987								
3/23/1987			.02	.02			.02	.02
4/15/1987								
5/5/1987								
6/13/1987			.02	.02			.02	.02
7/24/1987								
9/2/1987		.02	.02	.02			.02	.06
10/30/1987			.02	.02			.02	.02
11/15/1987								
12/15/1987								
1/15/1991								
2/15/1991								
3/15/1991								
4/27/1991	.04		.08				.04	.04
5/15/1991								
6/24/1991	.02		.02				.02	.02
7/15/1991								
8/25/1991								
9/15/1991								
11/4/1991	.04		.04				.01	.04
12/15/1991								
2/20/1996			.005				.003	.003
4/29/1996								.01
5/30/1996								
6/30/1996	.002							
7/30/1996	.004		.002				.003	.003
8/31/1996								
9/20/1996								
10/11/1996	.005		.007				.004	.001
4/7/1999								
5/31/1999			.01					.002
6/30/1999			.009					
7/29/1999			.01					
8/29/1999			.02					.01
9/16/1999			.01					
9/27/1999			.02					.01

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Collection Date	TOTAL COPPER (mg/L)								
	Sampling Stations								
	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985	.003			.001				.001	.002
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985	.005			.001				.002	.001
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985		.009			.001			.002	.001
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985	.006			.001				.001	.001
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985	.025			.001				.001	
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985	.004			.003			.18		
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	TOTAL COPPER (mg/L)								
	Sampling Stations								
	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986									
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986			.002					.001	
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986	.002			.002				.001	
9/25/1986									
10/3/1986									
11/24/1986		.02			.02		.04		
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987	.02						.02		
4/15/1987									
5/5/1987									
6/13/1987			.02				.02		
7/24/1987									
9/2/1987	.02							.02	
10/30/1987			.02				.02		
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991				.04				.04	.03
5/15/1991									
6/24/1991				.02				.02	.02
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991				.08				.04	.04
12/15/1991									
2/20/1996			.003		.004				.007
4/29/1996									
5/30/1996									
6/30/1996									
7/30/1996				.004				.021	.007
8/31/1996									
9/20/1996									
10/11/1996				.001				.001	.004
4/7/1999									
5/31/1999									.03
6/30/1999					.001	.05	.001		.008
7/29/1999					.002	.01	.002		.013
8/29/1999		.01	.01						.02
9/16/1999					.01	.01	.01		.01
9/27/1999		.01	.01						.01

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Collection Date	TOTAL COPPER (mg/L)								
	Sampling Stations								
	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985									
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985				.001			.001		
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985				.003			.011		
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985				.005			.001		
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985				.001			.001		
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985			.011				.042		
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	TOTAL COPPER (mg/L) Sampling Stations								
	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986			.004				.01		
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986	.004	.003					.033		
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986	.036						.04		
9/25/1986									
10/3/1986									
11/24/1986									
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987				.02	.02	.02			
4/15/1987									
5/5/1987									
6/13/1987				.02	.02			.02	
7/24/1987									
9/2/1987				.02	.06			.2	
10/30/1987				.02	.02				.02
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991							.04		
5/15/1991									
6/24/1991							.02		
7/15/1991									
8/25/1991									
9/15/1991									
11/4/1991							.04		
12/15/1991									
2/20/1996							.007		
4/29/1996									
5/30/1996									
6/30/1996									
7/30/1996							.004		
8/31/1996									
9/20/1996									
10/11/1996							.001		
4/7/1999									
5/31/1999									
6/30/1999									
7/29/1999									
8/29/1999									
9/16/1999									
9/27/1999									

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Collection Date	TOTAL COPPER (mg/L) Sampling Stations							
	4-27-5 P13	4-27-6 P1	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3
1/4/1985								
1/11/1985								
1/18/1985								
1/21/1985		.001	.008	.001		.001		
1/25/1985								
2/1/1985								
2/8/1985								
2/15/1985								
2/22/1985								
3/1/1985								
3/8/1985								
3/15/1985								
3/22/1985								
3/25/1985		.001	.015	.002		.001		
3/29/1985								
4/5/1985								
4/12/1985								
4/22/1985								
4/26/1985								
5/3/1985								
5/10/1985								
5/17/1985								
5/24/1985								
5/27/1985		.001	.011	.002		.001		
5/31/1985								
6/7/1985								
6/14/1985								
6/24/1985								
6/28/1985								
7/5/1985								
7/12/1985								
7/19/1985								
7/26/1985								
8/2/1985								
8/9/1985								
8/12/1985		.003	.003	.003		.001		
8/16/1985								
8/23/1985								
8/30/1985								
9/6/1985								
9/13/1985								
9/20/1985								
9/24/1985		.001	.065	.001		.001		
9/27/1985								
10/7/1985								
10/11/1985								
10/18/1985								
10/25/1985								
11/1/1985								
11/8/1985								
11/15/1985								
11/22/1985								
11/25/1985		.001	.007	.002		.003		.002
11/29/1985								
12/6/1985								
12/13/1985								
12/20/1985								
12/27/1985								
1/2/1986								
1/6/1986								
1/9/1986								
1/16/1986								
1/23/1986								
1/30/1986								
2/7/1986								
2/13/1986								

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Collection Date	TOTAL COPPER (mg/L)								
	Sampling Stations								
	4-27-5 P13	4-27-6 P1	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986		.001	.002	.001					.032
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986		.001	.021	.002					
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986				.013	.01	.003			
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		.003	.007			.001			
9/25/1986									
10/3/1986									
11/24/1986		.02	.02	.02		.02			
12/15/1986									
1/3/1987		.02	.02	.02					
2/15/1987									
3/23/1987		.02	.02	.02		.02			
4/15/1987									
5/5/1987		.02	.02	.02					
6/13/1987		.02	.02	.02		.02			.02
7/24/1987		.04	.02		.02				
9/2/1987		.02	.02		.02	.02			
10/30/1987		.02	.02		.02	.02	.02	.02	
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991	.06	.08	.05	.04					
5/15/1991									
6/24/1991	.02	.02	.02	.02		.02			
7/15/1991									
8/25/1991		.02	.02	.02					
9/15/1991									
11/4/1991	.08	.04	.01	.04		.01			
12/15/1991									
2/20/1996	.004	.003	.006	.006					
4/29/1996									
5/30/1996									
6/30/1996									
7/30/1996	.002	.003	.002	.002		.001			
8/31/1996		.01	.01	.01					
9/20/1996									
10/11/1996	.001	.002	.002	.002		.001			
4/7/1999									
5/31/1999		.004	.004	.008		.001			
6/30/1999		.006	.007	.006					
7/29/1999		.008	.007	.006			.001		
8/29/1999		.01	.01	.01			.003		
9/16/1999		.01	.01	.01		.01			.01
9/27/1999		.01	.01	.01					

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Collection Date	TOTAL COPPER (mg/L)						
	Sampling Stations						
	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12
							4-27-8 P1
1/4/1985							
1/11/1985							
1/18/1985							
1/21/1985	.001						.092
1/25/1985							.004
2/1/1985							
2/8/1985							
2/15/1985							
2/22/1985							
3/1/1985							
3/8/1985							
3/15/1985							
3/22/1985							
3/25/1985	.001						.11
3/29/1985							.006
4/5/1985							
4/12/1985							
4/22/1985							
4/26/1985							
5/3/1985							
5/10/1985							
5/17/1985							
5/24/1985							
5/27/1985	.001						.008
5/31/1985							.013
6/7/1985							
6/14/1985							
6/24/1985							
6/28/1985							
7/5/1985							
7/12/1985							
7/19/1985							
7/26/1985							
8/2/1985							
8/9/1985							
8/12/1985	.001						.001
8/16/1985							.004
8/23/1985							
8/30/1985							
9/6/1985							
9/13/1985							
9/20/1985							
9/24/1985	.001						.005
9/27/1985							.005
10/7/1985							
10/11/1985							
10/18/1985							
10/25/1985							
11/1/1985							
11/8/1985							
11/15/1985							
11/22/1985							
11/25/1985							.006
11/29/1985							
12/6/1985							
12/13/1985							
12/20/1985							
12/27/1985							
1/2/1986							
1/6/1986							
1/9/1986							
1/16/1986							
1/23/1986							
1/30/1986							
2/7/1986							
2/13/1986							

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Collection Date	TOTAL COPPER (mg/L)						
	Sampling Stations						
	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-8 P1
2/20/1986							
2/27/1986							
3/6/1986							
3/13/1986							
3/20/1986							
3/27/1986				.008		.1	.002
4/3/1986							
4/10/1986							
4/17/1986							
4/24/1986							
5/1/1986							
5/8/1986							
5/15/1986							
5/23/1986							
6/2/1986							
6/5/1986							
6/12/1986							
6/19/1986							
6/26/1986							
6/30/1986	.003					.013	.004
7/3/1986							
7/10/1986							
7/17/1986							
7/24/1986							
7/31/1986							
8/7/1986							
8/15/1986							
8/22/1986							
8/28/1986							
9/4/1986							
9/11/1986							
9/18/1986	.001					.004	.002
9/25/1986							
10/3/1986							
11/24/1986	.02					.8	.02
12/15/1986							
1/3/1987							
2/15/1987							
3/23/1987		.02				.02	.02
4/15/1987							
5/5/1987							
6/13/1987		.02					.02
7/24/1987							
9/2/1987		.02				.02	.02
10/30/1987							
11/15/1987							
12/15/1987							
1/15/1991							
2/15/1991							
3/15/1991							
4/27/1991							.06
5/15/1991							
6/24/1991	.02					.02	.02
7/15/1991							
8/25/1991							
9/15/1991							
11/4/1991	.01					.04	.01
12/15/1991							
2/20/1996						.002	
4/29/1996							
5/30/1996							
6/30/1996							.002
7/30/1996	.001					.002	.001
8/31/1996							
9/20/1996							
10/11/1996			.001			.001	.001
4/7/1999							
5/31/1999					.01	.002	.00
6/30/1999	.001		.001				.001
7/29/1999	.002		.002				.002
8/29/1999			.01	.02	.012		.01
9/16/1999	.01						
9/27/1999			.01	.009		.01	.01

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Collection Date	TOTAL COPPER (mg/L)				
	Sampling Stations				
	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	7-27-8 P11
					4-27-9. BH53
1/4/1985					
1/11/1985					
1/18/1985					
1/21/1985	.004		.002		.002
1/25/1985					
2/1/1985					
2/8/1985					
2/15/1985					
2/22/1985					
3/1/1985					
3/8/1985					
3/15/1985					
3/22/1985					
3/25/1985	.004		.001		
3/29/1985					
4/5/1985					
4/12/1985					
4/22/1985					
4/26/1985					
5/3/1985					
5/10/1985					
5/17/1985					
5/24/1985					
5/27/1985	.01		.005		.001
5/31/1985					
6/7/1985					
6/14/1985					
6/24/1985					
6/28/1985					
7/5/1985					
7/12/1985					
7/19/1985					
7/26/1985					
8/2/1985					
8/9/1985					
8/12/1985	.003		.001		.001
8/16/1985					
8/23/1985					
8/30/1985					
9/6/1985					
9/13/1985					
9/20/1985					
9/24/1985	.004		.001		.001
9/27/1985					
10/7/1985					
10/11/1985					
10/18/1985					
10/25/1985					
11/1/1985					
11/8/1985					
11/15/1985					
11/22/1985					
11/25/1985	.01		.005		.012
11/29/1985					
12/6/1985					
12/13/1985					
12/20/1985					
12/27/1985					
1/2/1986					
1/6/1986					
1/9/1986					
1/16/1986					
1/23/1986					
1/30/1986					
2/7/1986					
2/13/1986					

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Collection Date	TOTAL COPPER (mg/L)					4-27-9. BH53
	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	7-27-8 P11	
2/20/1986						
2/27/1986						
3/6/1986						
3/13/1986						
3/20/1986						
3/27/1986	.005		.058			.012
4/3/1986						
4/10/1986						
4/17/1986						
4/24/1986						
5/1/1986						
5/8/1986						
5/15/1986						
5/23/1986						
6/2/1986						
6/5/1986						
6/12/1986						
6/19/1986						
6/26/1986						
6/30/1986	.016	.006				.11
7/3/1986						
7/10/1986						
7/17/1986						
7/24/1986						
7/31/1986						
8/7/1986						
8/15/1986						
8/22/1986						
8/28/1986						
9/4/1986						
9/11/1986						
9/18/1986	.01		.01			.028
9/25/1986						
10/3/1986						
11/24/1986	.02		.02			.02
12/15/1986						
1/3/1987						
2/15/1987						
3/23/1987	.02	.02				.02
4/15/1987						
5/5/1987						
6/13/1987	.02		.02			.02
7/24/1987						
9/2/1987	.02		.02			.02
10/30/1987	.02			.02	0.02	.02
11/15/1987						
12/15/1987						
1/15/1991						
2/15/1991						
3/15/1991						
4/27/1991	.04		.04			.04
5/15/1991						
6/24/1991	.02		.02			.02
7/15/1991						
8/25/1991						
9/15/1991						
11/4/1991	.01		.01			.28
12/15/1991						
2/20/1996						
4/29/1996						
5/30/1996						
6/30/1996	.008		.008			
7/30/1996	.001		.001			.003
8/31/1996						
9/20/1996						
10/11/1996	.001		.003			.001
4/7/1999						
5/31/1999	.001	.001				.003
6/30/1999	.001	.001				.001
7/29/1999	.002	.002				.002
8/29/1999	.01	.01				.01
9/16/1999	.01	.01	.01			.01
9/27/1999	.01	.01				.01

Appendix J

Table of Oil and Grease SNP Data

Collection Date	OIL AND GREASE (mg/L)		
	Sampling Stations		
	4-9	4-12	4-13
1/4/1985	6		
1/11/1985	1		
1/18/1985	1		
1/25/1985	2		
2/1/1985	1		
2/8/1985	2		
2/15/1985	10		
2/22/1985	2		
3/1/1985	6		
3/8/1985	1		
3/15/1985	3		
3/22/1985	4		
3/29/1985	5		
4/5/1985	1		
4/12/1985	5		
4/22/1985	4		
4/26/1985	1		
5/3/1985	2		
5/10/1985	4		
5/17/1985	3		
5/24/1985	2		
5/31/1985	1		
6/7/1985	4		
6/14/1985	2		
6/24/1985	3		
6/28/1985	4		
7/5/1985	2		
7/12/1985	2		
7/26/1985	2		
8/2/1985	2		
8/9/1985	5		
8/16/1985	1		
8/23/1985	1		
8/30/1985	1		
9/6/1985	27		
9/13/1985	2		
9/20/1985	1		
9/27/1985	4		
10/7/1985	4		
10/11/1985	2		
10/18/1985	1		
10/25/1985	1		
11/1/1985	1		
11/8/1985	2		
11/15/1985	1		
11/22/1985	76		
11/29/1985	8		
12/6/1985	6		
12/13/1985	9		
12/20/1985	5		
12/27/1985	7		
1/2/1986	6		
1/6/1986	4		
1/9/1986	21		
1/23/1986	13		
1/30/1986	8		
2/7/1986	8		
2/20/1986	21		

OIL AND GREASE (mg/L)			
Sampling Stations			
Collection Date	4-9	4-12	4-13
2/27/1986	10		
3/6/1986	3		
3/13/1986	1		
3/20/1986	8		
3/27/1986	28		
4/3/1986	28		
4/10/1986	7		
4/17/1986	3		
4/24/1986	9		
5/1/1986	23		
5/8/1986	44		
5/15/1986	11		
5/23/1986	11		
6/2/1986	2		
6/5/1986	2		
6/12/1986	2		
6/19/1986	3		
6/26/1986	3		
7/3/1986	7		
7/10/1986	2		
7/17/1986	1		
7/24/1986	1		
7/31/1986	1		
8/7/1986	3		
8/15/1986	8		
8/22/1986	1		
8/28/1986	2		
9/4/1986	2		
9/11/1986	2		
9/25/1986	2		
10/3/1986	4		
1/15/1991		1	
2/15/1991		1	
3/15/1991		1	
4/15/1991			
5/15/1991		1	
6/15/1991		1	1
7/15/1991		1	1
8/15/1991		1	1
9/15/1991		1	1
11/15/1991		1	
12/15/1991		1	
2/20/1996		5	
4/29/1996		5	
5/30/1996		181	5
6/30/1996		5	5
7/30/1996		5	5
8/31/1996		8	5
9/20/1996		5	5
10/11/1996		5	5
4/7/1999		5	5
5/31/1999		5	5
6/30/1999		5	5
7/29/1999		5	5
8/29/1999		5	5
9/16/1999		5	5
9/27/1999		5	5

Appendix K

Table of pH SNP Data

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
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Collection Date	LAB pH Sampling Stations										
	4-5	4-9	4-12	4-13	4-29	4-30	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5
1/4/1985		7.7				8.6					
1/11/1985		7.4				9.1					
1/18/1985	7.5	7.4			7.4	9.0					
1/21/1985							9.00				7.65
1/25/1985		7.3				9.0					
2/1/1985		7.4				9.1					
2/8/1985		7.4				9.2					
2/15/1985		7.7			7.2	8.8					
2/22/1985		7.6				8.9					
3/1/1985		7.7				9.2					
3/8/1985		8.8				9.5					
3/15/1985	7.8	7.6			7.6	9.4					
3/22/1985		8.9				8.9					
3/25/1985							8.15				7.40
3/29/1985		7.9				10.0					
4/5/1985		9.0				9.2					
4/12/1985	8.1	9.6			7.8	9.4					
4/22/1985		9.4				9.7					
4/26/1985		8.1				9.8					
5/3/1985		9.0				9.2					
5/10/1985		7.8				8.1					
5/17/1985	7.8	8.0			7.9	9.3					
5/24/1985		7.1				8.3					
5/27/1985							10.55				7.85
5/31/1985		7.7				9.9					
6/7/1985		7.6				9.4					
6/14/1985	8.3	7.8			7.9	9.2					
6/24/1985		8.3				9.3					
6/28/1985		7.7				9.6					
7/5/1985		9.6				7.6					
7/12/1985	8.0	8.2			8.2	9.5					
7/19/1985						9.5					
7/26/1985		7.8				9.5					
8/2/1985		8.0				9.7					
8/9/1985		8.2				9.5					
8/12/1985							8.85				7.5
8/16/1985	8.2	7.5			8.2	9.6					
8/23/1985		7.4				9.6					
8/30/1985		8.3				9.5					
9/6/1985		7.9				9.6					
9/13/1985	7.6	7.7			7.6	9.5					
9/20/1985		7.6				9.5					
9/24/1985							8.1				7.4
9/27/1985		7.4				9.3					
10/7/1985		7.8				9.5					
10/11/1985		7.8				9.3					
10/18/1985	7.9	7.9			7.8	9.7					
10/25/1985		8.0				8.2					
11/1/1985		8.1				9.8					
11/8/1985		7.1				10.1					
11/15/1985	8.2	8.7			8.6	10.1					
11/22/1985		8.8				9.9					
11/25/1985							8.08				
11/29/1985		8.1				8.6					
12/6/1985		9.3				9.7					
12/13/1985	7.7	8.5			7.7	10.2					
12/20/1985		9.2				9.1					
12/27/1985		8.9				10.5					
1/2/1986		10.0				10.5					
1/6/1986		9.5				10.2					
1/9/1986		9.2				9.9					
1/16/1986	8.3				8.6						
1/23/1986		9.0				9.5					
1/30/1986		9.2				10.4					
2/7/1986											
2/13/1986	7.9	8.5			8.3	9.8					

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Collection Date	LAB pH Sampling Stations											
	4-5	4-9	4-12	4-13	4-29	4-30	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6
2/20/1986		8.5				9.7						
2/27/1986		8.3				9.5						
3/6/1986		8.4				9.6						
3/13/1986	7.7	9.3			9.8	9.3						
3/20/1986		9.2				9.9						
3/27/1986		8.3				10.0						
4/3/1986		8.0				10.0						
4/10/1986		9.2				9.8						
4/17/1986	8.0	9.0			8.0	9.5						
4/24/1986		8.9				10.0						
5/1/1986		8.2				10.0						
5/8/1986		7.2				9.6						
5/15/1986	7.9	7.5			7.9	9.3						
5/23/1986		7.2										
6/2/1986		7.3										
6/5/1986		7.9										
6/12/1986	7.8	8.3			7.9							
6/19/1986		7.7										
6/26/1986		7.9										
6/30/1986							6.3					
7/3/1986		7.1										
7/10/1986		7.6										
7/17/1986	8.7	7.0			8.5							
7/24/1986		7.2										
7/31/1986		7.6										
8/7/1986		7.4										
8/15/1986	8.0	6.2			7.9							
8/22/1986		6.5										
8/28/1986		8.5										
9/4/1986		8.2										
9/11/1986		10.4										
9/18/1986	7.8				7.9			8.7				
9/25/1986		8.5										
10/3/1986	10.1	10.0	9.6		10.1							
11/24/1986	8.4		8.4		8.3			8.2	8.3			
12/15/1986	8.5		8.5		8.2							
1/3/1987	7.9		8.1		7.8							
2/15/1987	8.2		8.3		7.7							
3/23/1987	8.1		8.0		7.7			7.4				
4/15/1987	8.0		8.1		7.9							
5/5/1987	7.8		8.0		7.7							
6/13/1987	8.9		8.1		8.0			7.3				
7/24/1987	7.7		8.0		7.9							
9/2/1987	7.7		7.9		7.7		7.2				7.3	
10/30/1987	7.4		7.9		7.1			7.5				
11/15/1987	8.0		8.0		7.9							
12/15/1987	7.8		7.9		7.9							
1/15/1991	8.1		8.1		8							
2/15/1991	8.1		8.1		8							
3/15/1991	8.8		8.1		7.9							
4/27/1991	8		8		8			7.9		7.9		
5/15/1991	7.9		8		7.6							
6/24/1991	7.8		8.1	8.2	7.9					7.7		
7/15/1991	7.7		8.1	8.2	7.7							
8/25/1991	8		8.2	8.2	8							
9/15/1991	7.8		8	8.1	8							
11/15/1991	7.9		8.1	8.1	7.9		7.4					7.7
12/15/1991	8		8.1		8							
2/20/1996	8.1		8.1		7.65							
4/29/1996	7.79		7.93		7.87							
5/30/1996	7.58		7.98	7.96	7.63					7.51		7.2
6/30/1996	7.79		7.8	7.8	7.77							
7/30/1996	7.76		8.28	8.06	7.76					7.32		
8/31/1996	7.7		8	8.2	7.9							
9/20/1996	7.8		8	8.1	8.1							
10/11/1996	6.3		8.4	8	8.3			7.3				7.2
4/7/1999	7.41		7.78									
5/31/1999	7.73		7.85	7.83	7.73			7.38			7.25	
6/30/1999	7.6		7.85	7.86	7.48			7.05				
7/29/1999	7.65		7.83	7.93	7.59			7.77				
8/29/1999	7.75		7.9	7.99	7.66					7.33		7.46
9/16/1999	7.8		7.95	7.99	7.89			7.43	7.53	7.57		7.8
9/27/1999	8.02		8.15	8.25	8.06						7.9	7.89

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Collection Date	LAB pH Sampling Stations								
	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985			8.15		10.45			7.8	
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985			7.45		8.75			7.90	
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985			7.45		8.55			7.95	
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985			7.45	6.8	8.3			7.9	
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985			7.3		8.2			7.9	
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985			7.42		8.17			8.11	
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	LAB pH Sampling Stations								
	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986					8.1				
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986		6.6			7.9			7.9	
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		8.7		8.0	9.1			8.9	
9/25/1986									
10/3/1986									
11/24/1986					8.2			8.5	
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987		7.4		6.6					
4/15/1987									
5/5/1987									
6/13/1987		7.4		7.3	8.1			8.4	
7/24/1987									
9/2/1987			7.5			7			7
10/30/1987		7.5		7.5	7.9			7.9	
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991				7.9	7.9			7.9	
5/15/1991									
6/24/1991		8.1			8.1			8.1	
7/15/1991									
8/25/1991									
9/15/1991									
11/15/1991				7.3	7.5			7.8	
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996				6.7					
6/30/1996					8.3				7.65
7/30/1996		7.52		6.7	8.19			7.79	
8/31/1996									
9/20/1996									
10/11/1996				6.7	7.8			7.8	
4/7/1999									
5/31/1999									
6/30/1999					7.73				7.75
7/29/1999		7.52	7.41		7.71		8.24		
8/29/1999	7.21						7.67	7.85	7.84
9/16/1999					7.96			7.94	
9/27/1999	8.06				8.08		8.02		8.08

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Collection Date	LAB pH Sampling Stations							
	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6
1/4/1985								
1/11/1985								
1/18/1985								
1/21/1985	7.95			8.50				
1/25/1985								
2/1/1985								
2/8/1985								
2/15/1985								
2/22/1985								
3/1/1985								
3/8/1985								
3/15/1985								
3/22/1985								
3/25/1985	7.95			8.15				8.00
3/29/1985								
4/5/1985								
4/12/1985								
4/22/1985								
4/26/1985								
5/3/1985								
5/10/1985								
5/17/1985								
5/24/1985								
5/27/1985		7.85		8.00				
5/31/1985								
6/7/1985								
6/14/1985								
6/24/1985								
6/28/1985								
7/5/1985								
7/12/1985								
7/19/1985								
7/26/1985								
8/2/1985								
8/9/1985								
8/12/1985		7.8		8.05		7.95		8.0
8/16/1985								7.6
8/23/1985								
8/30/1985								
9/6/1985								
9/13/1985								
9/20/1985								
9/24/1985		7.9		8.3			8.2	
9/27/1985								
10/7/1985								
10/11/1985								
10/18/1985								
10/25/1985								
11/1/1985								
11/8/1985								
11/15/1985								
11/22/1985								
11/25/1985		8.18		8.03				
11/29/1985								
12/6/1985								
12/13/1985								
12/20/1985								
12/27/1985								
1/2/1986								
1/6/1986								
1/9/1986								
1/16/1986								
1/23/1986								
1/30/1986								
2/7/1986								
2/13/1986								

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Collection Date	LAB pH Sampling Stations								
	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-3 P8
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986				8.3					
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986		7.9		7.9					
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986	8.9			8.2					
9/25/1986									
10/3/1986									
11/24/1986	8.8			8.5	8.5				
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987				8	8.1			8.1	
4/15/1987									
5/5/1987									
6/13/1987	8.1			8	7.9			8.1	
7/24/1987									
9/2/1987			7.8	7.7	8				
10/30/1987	7.9			7.9	7.9				
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991		8		7.8				8	7.8
5/15/1991									
6/24/1991		8.2		8				8	8
7/15/1991									
8/25/1991									
9/15/1991									
11/15/1991		7.9		7.8				8	7.9
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996				8.02				7.91	7.8
6/30/1996		7.8							
7/30/1996		8.3		8.06					7.92
8/31/1996									
9/20/1996									
10/11/1996		7.9		7.9				7.9	7.8
4/7/1999									
5/31/1999				7.43					
6/30/1999	7.8			7.56					
7/29/1999	7.74			7.54					
8/29/1999				7.49					
9/16/1999	8.02			7.78					
9/27/1999				7.82					

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Collection Date	LAB pH Sampling Stations								
	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985		7.65			8.00				8.10
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985		7.65			7.85				7.70
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985			7.85			8.45			7.75
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985		7.7			7.95				7.65
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985		7.8			7.8				7.7
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985		8.03			7.98			8.00	
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	LAB pH Sampling Stations								
	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986	10.5								
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986	11.2			8.0					7.8
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		8.3			8.4				8.7
9/25/1986									
10/3/1986									
11/24/1986			8.8			8.5		8.8	
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987	9.3	8.1						8	
4/15/1987									
5/5/1987									
6/13/1987	8.5			7.8				7.9	
7/24/1987									
9/2/1987	8.9	7.9							7.8
10/30/1987	8			7.9				7.9	
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991	8.1				8.1				8.1
5/15/1991									
6/24/1991	8.2				8.1				8.2
7/15/1991									
8/25/1991									
9/15/1991									
11/15/1991	8.1				8				7.9
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996	7.86			7.78		7.74			
6/30/1996									
7/30/1996	7.82				7.95				8.06
8/31/1996									
9/20/1996									
10/11/1996	8.1				7.8				7.7
4/7/1999									
5/31/1999	7.82								
6/30/1999						7.77	7.73	7.76	
7/29/1999						7.77	7	7.92	
8/29/1999	7.9		7.74	7.62					
9/16/1999						7.77	7.91	7.88	
9/27/1999	8.17		8.09	8.14					

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Collection Date	LAB pH Sampling Stations								
	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985	9.15								
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985	8.05				7.85			8.45	
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985	8.00				8.10			8.25	
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985	8.3				8.05			8.2	
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985					8.2			8.1	
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985				8.06				8.23	
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	LAB pH Sampling Stations								
	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986				8.4				8.4	
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986		8.0	7.9					7.9	
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		9.5						8.2	
9/25/1986									
10/3/1986									
11/24/1986									
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987					8	8	8.1		
4/15/1987									
5/5/1987									
6/13/1987					7.8	7.9			8
7/24/1987									
9/2/1987					7.9	7.9			7.9
10/30/1987					7.7	7.7			
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991	7.7							7.8	
5/15/1991									
6/24/1991	7.7							8	
7/15/1991									
8/25/1991									
9/15/1991									
11/15/1991	7.7							7.8	
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996	7.77							7.71	
6/30/1996									
7/30/1996	7.67							7.94	
8/31/1996									
9/20/1996									
10/11/1996	7.8							7.8	
4/7/1999									
5/31/1999	7.28								
6/30/1999	7.4								
7/29/1999	7.09								
8/29/1999	7.51								
9/16/1999	7.62								
9/27/1999	7.66								

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Collection Date	LAB pH Sampling Stations							
	4-27-5 P11	4-27-5 P13	4-27-6 P1	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2
1/4/1985								
1/11/1985								
1/18/1985								
1/21/1985			8.95	8.85	8.50		8.25	
1/25/1985								
2/1/1985								
2/8/1985								
2/15/1985								
2/22/1985								
3/1/1985								
3/8/1985								
3/15/1985								
3/22/1985								
3/25/1985			8.05	8.35	8.05		7.35	
3/29/1985								
4/5/1985								
4/12/1985								
4/22/1985								
4/26/1985								
5/3/1985								
5/10/1985								
5/17/1985								
5/24/1985								
5/27/1985			7.85	8.45	8.00		7.85	
5/31/1985								
6/7/1985								
6/14/1985								
6/24/1985								
6/28/1985								
7/5/1985								
7/12/1985								
7/19/1985								
7/26/1985								
8/2/1985								
8/9/1985								
8/12/1985			8.1	8.5	8.15		7.8	
8/16/1985								
8/23/1985								
8/30/1985								
9/6/1985								
9/13/1985								
9/20/1985								
9/24/1985			7.7	8.5	8.2		7.9	
9/27/1985								
10/7/1985								
10/11/1985								
10/18/1985								
10/25/1985								
11/1/1985								
11/8/1985								
11/15/1985								
11/22/1985								
11/25/1985			8.04	8.31	8.17		8.20	
11/29/1985								
12/6/1985								
12/13/1985								
12/20/1985								
12/27/1985								
1/2/1986								
1/6/1986								
1/9/1986								
1/16/1986								
1/23/1986								
1/30/1986								
2/7/1986								
2/13/1986								

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Collection Date	LAB pH Sampling Stations							
	4-27-5 P11	4-27-5 P13	4-27-6 P1	4-27-6 P2	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2
2/20/1986								
2/27/1986								
3/6/1986								
3/13/1986								
3/20/1986								
3/27/1986			8.3	8.5	8.4			
4/3/1986								
4/10/1986								
4/17/1986								
4/24/1986								
5/1/1986								
5/8/1986								
5/15/1986			7.9	7.7	8.0			
5/23/1986								
6/2/1986								
6/5/1986								
6/12/1986								
6/19/1986								
6/26/1986								
6/30/1986			8.1		7.8	8.1	7.8	
7/3/1986								
7/10/1986								
7/17/1986								
7/24/1986								
7/31/1986								
8/7/1986								
8/15/1986								
8/22/1986								
8/28/1986								
9/4/1986								
9/11/1986								
9/18/1986							8.8	
9/25/1986								
10/3/1986								
11/24/1986			8.4	8.0	8.1		8.3	
12/15/1986								
1/3/1987			8.3	8.5	8.5			
2/15/1987								
3/23/1987			8	8.3	7.9		8.1	
4/15/1987								
5/5/1987			7.9	8.1	7.9			
6/13/1987			8	8.2	8.1		8.1	
7/24/1987			7.8	8.1		8.1		
9/2/1987			7.9	8.1		7.9	8	
10/30/1987	7.8		7.9	7.9		7.9	8	7.9
11/15/1987								
12/15/1987								
1/15/1991								
2/15/1991								
3/15/1991								
4/27/1991		7.6	8	8.1	8.2			
5/15/1991								
6/24/1991		7.8	8.2	8.2	8.1		8.1	
7/15/1991								
8/25/1991			8.1	8.1	8.1			
9/15/1991								
11/15/1991		7.6	7.8	7.8	7.7		7.9	
12/15/1991								
2/20/1996								
4/29/1996								
5/30/1996		7.6	7.84	7.91	7.9			
6/30/1996								
7/30/1996		7.81	7.99	8.14	8.07		8.01	
8/31/1996			7.9	7.9	8			
9/20/1996								
10/11/1996		7.9	7.83	7.85	7.98		7.8	
4/7/1999								
5/31/1999			7.69	7.75	7.24		7.7	
6/30/1999			7.85	7.83	7.81			7.85
7/29/1999			7.71	7.73	7.83			7.85
8/29/1999			7.65	7.81	7.74			
9/16/1999			7.88	7.92	7.96		8.01	
9/27/1999			8.09	7.95	8.08			

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Collection Date	LAB pH Sampling Stations								
	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12	4-27-8 P1
1/4/1985									
1/11/1985									
1/18/1985									
1/21/1985		7.65						8.35	9.75
1/25/1985									
2/1/1985									
2/8/1985									
2/15/1985									
2/22/1985									
3/1/1985									
3/8/1985									
3/15/1985									
3/22/1985									
3/25/1985		7.80						7.85	8.35
3/29/1985									
4/5/1985									
4/12/1985									
4/22/1985									
4/26/1985									
5/3/1985									
5/10/1985									
5/17/1985									
5/24/1985									
5/27/1985		7.65						8.05	7.65
5/31/1985									
6/7/1985									
6/14/1985									
6/24/1985									
6/28/1985									
7/5/1985									
7/12/1985									
7/19/1985									
7/26/1985									
8/2/1985									
8/9/1985									
8/12/1985		7.75						7.9	7.85
8/16/1985									
8/23/1985									
8/30/1985									
9/6/1985									
9/13/1985									
9/20/1985									
9/24/1985		7.8						7.8	7.8
9/27/1985									
10/7/1985									
10/11/1985									
10/18/1985									
10/25/1985									
11/1/1985									
11/8/1985									
11/15/1985									
11/22/1985									
11/25/1985	7.91								8.15
11/29/1985									
12/6/1985									
12/13/1985									
12/20/1985									
12/27/1985									
1/2/1986									
1/6/1986									
1/9/1986									
1/16/1986									
1/23/1986									
1/30/1986									
2/7/1986									
2/13/1986									

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Collection Date	LAB pH Sampling Stations								
	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12	4-27-8 P1
2/20/1986									
2/27/1986									
3/6/1986									
3/13/1986									
3/20/1986									
3/27/1986	8.0				8.0			8.0	8.0
4/3/1986									
4/10/1986									
4/17/1986									
4/24/1986									
5/1/1986									
5/8/1986									
5/15/1986									
5/23/1986									
6/2/1986									
6/5/1986									
6/12/1986									
6/19/1986									
6/26/1986									
6/30/1986		7.8						7.6	7.6
7/3/1986									
7/10/1986									
7/17/1986									
7/24/1986									
7/31/1986									
8/7/1986									
8/15/1986									
8/22/1986									
8/28/1986									
9/4/1986									
9/11/1986									
9/18/1986		8.7						8.9	8.8
9/25/1986									
10/3/1986									
11/24/1986		8.3						8.4	8.3
12/15/1986									
1/3/1987									
2/15/1987									
3/23/1987			8.2				8.1		8
4/15/1987									
5/5/1987									
6/13/1987	8		8.2						7.9
7/24/1987									
9/2/1987			7.9				8		7.9
10/30/1987									
11/15/1987									
12/15/1987									
1/15/1991									
2/15/1991									
3/15/1991									
4/27/1991									8.1
5/15/1991									
6/24/1991		8.2						8.2	8.1
7/15/1991									
8/25/1991									
9/15/1991									
11/15/1991		8						8.1	7.9
12/15/1991									
2/20/1996									
4/29/1996									
5/30/1996							7.82		
6/30/1996									7.89
7/30/1996		8.05					8		8.04
8/31/1996									
9/20/1996									
10/11/1996				7.8			7.8		7.7
4/7/1999									
5/31/1999						7.86	7.81		7.64
6/30/1999		7.82		7.8					7.84
7/29/1999		7.49		7.9					7.85
8/29/1999				7.79	7.79	7.8			7.67
9/16/1999	7.92	7.9							
9/27/1999				8.18	8.15		8.18		8.15

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Collection Date	LAB pH Sampling Stations					
	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9, BH53
1/4/1985						
1/11/1985						
1/18/1985						
1/21/1985	7.70		7.90			7.45
1/25/1985						
2/1/1985						
2/8/1985						
2/15/1985						
2/22/1985						
3/1/1985						
3/8/1985						
3/15/1985						
3/22/1985						
3/25/1985	7.80		7.70			
3/29/1985						
4/5/1985						
4/12/1985						
4/22/1985						
4/26/1985						
5/3/1985						
5/10/1985						
5/17/1985						
5/24/1985						
5/27/1985	7.25		7.95			7.35
5/31/1985						
6/7/1985						
6/14/1985						
6/24/1985						
6/28/1985						
7/5/1985						
7/12/1985						
7/19/1985						
7/26/1985						
8/2/1985						
8/9/1985						
8/12/1985	7.55		7.75			7.2
8/16/1985						
8/23/1985						
8/30/1985						
9/6/1985						
9/13/1985						
9/20/1985						
9/24/1985	7.5		7.6			7.2
9/27/1985						
10/7/1985						
10/11/1985						
10/18/1985						
10/25/1985						
11/1/1985						
11/8/1985						
11/15/1985						
11/22/1985						
11/25/1985	7.95		8.14			7.15
11/29/1985						
12/6/1985						
12/13/1985						
12/20/1985						
12/27/1985						
1/2/1986						
1/6/1986						
1/9/1986						
1/16/1986						
1/23/1986						
1/30/1986						
2/7/1986						
2/13/1986						

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Collection Date	LAB pH Sampling Stations				
	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-9, BH53
2/20/1986					
2/27/1986					
3/6/1986					
3/13/1986					
3/20/1986					
3/27/1986	8.1		8.2		7.9
4/3/1986					
4/10/1986					
4/17/1986					
4/24/1986					
5/1/1986					
5/8/1986					
5/15/1986					
5/23/1986					
6/2/1986					
6/5/1986					
6/12/1986					
6/19/1986					
6/26/1986					
6/30/1986	7.6	7.2			7.2
7/3/1986					
7/10/1986					
7/17/1986					
7/24/1986					
7/31/1986					
8/7/1986					
8/15/1986					
8/22/1986					
8/28/1986					
9/4/1986					
9/11/1986					
9/18/1986	8.6		8.5		8.6
9/25/1986					
10/3/1986					
11/24/1986	8.5		8.2		8.5
12/15/1986					
1/3/1987					
2/15/1987					
3/23/1987	7.8	8.1			7.4
4/15/1987					
5/5/1987					
6/13/1987	7.9		7.9		7.4
7/24/1987					
9/2/1987	7.6		7.8		7.3
10/30/1987	8			7.9	7.9
11/15/1987					
12/15/1987					
1/15/1991					
2/15/1991					
3/15/1991					
4/27/1991	8.1		8.1		7.9
5/15/1991					
6/24/1991	8.2		8.2		8.1
7/15/1991					
8/25/1991					
9/15/1991					
11/15/1991	8		8		7.7
12/15/1991					
2/20/1996					
4/29/1996					
5/30/1996					
6/30/1996	7.77		7.75		
7/30/1996	7.94		7.88		7.91
8/31/1996					
9/20/1996					
10/11/1996	7.6		7.6		7.24
4/7/1999					
5/31/1999	7.51	7.62			7.1
6/30/1999	7.89	7.8			7.38
7/29/1999	7.76	7.72			7.58
8/29/1999	7.6	7.81			7.36
9/16/1999	8	7.86	7.9		7.48
9/27/1999	8.08	8.12			8.1

Appendix L

Table of Conductivity SNP Data

Collection Date	LAB CONDUCTIVITY (uhos/cm)															
	Sampling Stations															
	4-5	4-6	4-12	4-12	4-26	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1
1/4/1985		312														
1/11/1985		298														
1/18/1985	317	286			268											
1/21/1985						250				310				345		280
1/25/1985		290														
2/1/1985		288														
2/8/1985		282														
2/15/1985		297			263											
2/22/1985		272														
3/1/1985		243														
3/8/1985		307														
3/15/1985	333	301			270											
3/22/1985		317														
3/25/1985						355				430				465		280
3/29/1985		314														
4/5/1985		189														
4/12/1985	320	320			270											
4/22/1985		330														
4/26/1985		320														
5/3/1985		320														
5/10/1985		410														
5/17/1985	208	3200			186											
5/24/1985		360														
5/27/1985						305				285				380		175
5/31/1985		5500														
6/7/1985		260														
6/14/1985	160	282			140											
6/24/1985		290														
6/28/1985		250														
7/5/1985		220														
7/12/1985	110	250			110											
7/26/1985		260														
8/2/1985		859														
8/9/1985		310														
8/12/1985						265				380				415	2500	290
8/16/1985	210	240			180											
8/23/1985		300														
8/30/1985		300														
9/6/1985		320														
9/13/1985	250	349			240											
9/20/1985		2300														
9/24/1985						287				360				395		265
9/27/1985		300														
10/7/1985		390														
10/11/1985		300														
10/18/1985		1090														
10/25/1985	310	300			270											
11/1/1985		185														
11/8/1985		330														
11/15/1985	320	370			260											
11/22/1985		400														
11/25/1985						360								460		317
11/29/1985		250														
12/6/1985		290														
12/13/1985	320	4800			270											
12/20/1985		330														
12/27/1985		350														
1/2/1986		430														
1/6/1986		320														
1/9/1986		215														
1/16/1986	330				260											
1/23/1986		310														
1/30/1986		350														
2/7/1986		380														
2/13/1986	250	260			270											
2/20/1986		2800														
2/27/1986		3100														
3/6/1986		870														
3/13/1986	340	270			280											
3/20/1986		370														
3/27/1986		420														900
4/3/1986		320														
4/10/1986		360														
4/17/1986	330	310			270											
4/24/1986		438														
5/1/1986		490														
5/8/1986		570														
5/15/1986	1300	610			1200											
5/23/1986		710														
6/2/1986		810														
6/5/1986		263														

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Collection Date	LAB CONDUCTIVITY (uS/cm)															
	Sampling Stations															
	4-5	4-9	4-12	4-13	4-26	4-27-1 P1	4-27-1 P2	4-27-1 P3	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9	4-27-1 P10	4-27-2 P1
6/12/1986	230	630			220											
6/19/1986		540														
6/26/1986		1050														
6/30/1986							320						550			335
7/3/1986		488														
7/10/1986		546														
7/17/1986	126	645			126											
7/24/1986		420														
7/31/1986		955														
8/7/1986		1620														
8/15/1986	170	600			160											
8/22/1986		530														
8/28/1986		566														
9/4/1986		2400														
9/11/1986	250	710			280											
9/18/1986		670					328						540		138	313
9/25/1986		750														
10/3/1986	140	700	360		120											
11/24/1986	900	380			135		490						400			255
12/15/1986	155	370			135											
1/3/1987	300	650			260											
2/15/1987	325	670			370											
3/22/1987	310	650			280		1100						1100		2100	
4/15/1987	310	630			270											
5/5/1987	270	660			250											
6/13/1987	180	580			160		1100						1100			600
7/24/1987	120	800			120											
9/2/1987	180	510			160	1120				1120				1120		
10/30/1987	220	580			220		1440						1100		1100	400
11/15/1987	280	620			240											
12/15/1987	270	750			900											
1/15/1991	270	613			306											
2/15/1991	327	634			300											
3/15/1991	309	612			324											
4/27/1991	289	642			270		558						536		701	258
5/15/1991	234	584			225											
6/24/1991	155	546	361		150				582				905			272
7/15/1991	139	526	361		146											
8/25/1991	206	536	366		198											
9/15/1991	235	545	358		223											
11/4/1991	314	648	387		298	554					642				2270	282
12/15/1991	322	650			300											
2/20/1996	335	790			328											
4/29/1996	200	82			316											
5/30/1996	185	758	431		214				588		664				5810	
6/30/1996	120	430	230		195											302
7/30/1996	153	696	386		164				648				1050		4260	308
8/31/1996	110	390	210		110											
9/20/1996	160	340	210		180											
10/11/1996	180	390	180		150		350				540				1990	180
4/7/1999	303	799			153											
5/31/1999	271	816	220		243		738			638						
6/30/1999	165	681	369		166		700									338
7/29/1999	160	677	372		151			748					1030	701		338
8/29/1999	198	664	388		190					682	1230	805				348
9/16/1999	236	668	391		225		863	784	703							341
9/27/1999	244	680	393		239					964	1240	1140				

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Collection Date	LAB CONDUCTIVITY (uhos/cm)														
	Sampling Stations														
	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2
1/4/1985															
1/11/1985															
1/18/1985															
1/21/1985			280		260			350							345
1/25/1985															
2/1/1985															
2/8/1985															
2/15/1985															
2/22/1985															
3/1/1985															
3/8/1985															
3/15/1985															
3/22/1985															
3/25/1985			305		270			360				180			365
3/29/1985															
4/5/1985															
4/12/1985															
4/22/1985															
4/26/1985															
5/3/1985															
5/10/1985															
5/17/1985															
5/24/1985															
5/27/1985			295			345		335							
5/31/1985															
6/7/1985															
6/14/1985															
6/24/1985															
6/28/1985															
7/5/1985															
7/12/1985															
7/26/1985															
8/2/1985															
8/9/1985															
8/12/1985			285			315		280		235		275	220		355
8/16/1985															
8/23/1985															
8/30/1985															
9/6/1985															
9/13/1985															
9/20/1985															
9/24/1985			272			280		252			248				338
9/27/1985															
10/7/1985															
10/11/1985															
10/18/1985															
10/25/1985															
11/1/1985															
11/8/1985															
11/15/1985															
11/22/1985															
11/25/1985			355			347		255							255
11/29/1985															
12/6/1985															
12/13/1985															
12/20/1985															
12/27/1985															
1/2/1986															
1/6/1986															
1/9/1986															
1/16/1986															
1/23/1986															
1/30/1986															
2/7/1986															
2/13/1986															
2/20/1986															
2/27/1986															
3/6/1986															
3/13/1986															
3/20/1986															
3/27/1986								485						620	
4/3/1986															
4/10/1986															
4/17/1986															
4/24/1986															
5/1/1986															
5/8/1986															
5/15/1986															
5/23/1986															
6/2/1986															
6/5/1986															

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Collection Date	LAB CONDUCTIVITY (uhos/cm)														
	Sampling Stations														
	4-27-2 P2	4-27-2 P3	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2
6/12/1986															
6/19/1986															
6/26/1986															
6/30/1986			296			360		293						360	
7/3/1986															
7/10/1986															
7/17/1986															
7/24/1986															
7/31/1986															
8/7/1986															
8/15/1986															
8/22/1986															
8/28/1986															
9/4/1986															
9/11/1986															
9/18/1986			228		225			215							257
9/25/1986															
10/3/1986															
11/24/1986			170		145			160	175						
12/15/1986															
1/3/1987															
2/15/1987															
3/23/1987								290	290			400		490	620
4/15/1987															
5/5/1987															
6/13/1987			340		490			270	270			260		540	
7/24/1987															
9/2/1987	160			220			360	290	310			360		460	520
10/30/1987			460		400			320	320			320		500	
11/15/1987															
12/15/1987															
1/15/1991															
2/15/1991															
3/15/1991															
4/27/1991			266			328		218				234	232	515	
5/15/1991															
6/24/1991			278			286		228				242	316	512	
7/15/1991															
8/25/1991															
9/15/1991															
11/4/1991			283			305		251				270	268	543	
12/15/1991															
2/20/1996															
4/29/1996															
5/30/1996								282				292	264	414	
6/30/1996				304		306									
7/30/1996			363			329		285				294	293	494	
8/31/1996															
9/20/1996															
10/11/1996			200			210		160				130	110	268	
4/7/1999															
5/31/1999								180						477	
6/30/1999				302	311			200							
7/29/1999		315			317			200							
8/29/1999		299	301	307				200						469	
9/16/1999			309		318			300							
9/27/1999		311		320				170						472	

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Collection Date	LAB CONDUCTIVITY (uhos/cm)														
	Sampling Stations														
	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8
1/3/1985															
1/11/1985															
1/18/1985															
1/21/1985			410				490	215							
1/25/1985															
2/1/1985															
2/8/1985															
2/15/1985															
2/22/1985															
3/1/1985															
3/8/1985															
3/15/1985															
3/22/1985															
3/25/1985			425				520	280				145			120
3/29/1985															
4/5/1985															
4/12/1985															
4/22/1985															
4/26/1985															
5/3/1985															
5/10/1985															
5/17/1985															
5/24/1985															
5/27/1985	360			465			660	150				140			125
5/31/1985															
6/7/1985															
6/14/1985															
6/24/1985															
6/28/1985															
7/5/1985															
7/12/1985															
7/26/1985															
8/2/1985															
8/9/1985															
8/12/1985			360				560	110				145			240
8/16/1985															
8/23/1985															
8/30/1985															
9/6/1985															
9/13/1985															
9/20/1985															
9/24/1985			472				570					145			232
9/27/1985															
10/7/1985															
10/11/1985															
10/18/1985															
10/25/1985															
11/1/1985															
11/8/1985															
11/15/1985															
11/22/1985															
11/25/1985			600			600					235				283
11/29/1985															
12/6/1985															
12/13/1985															
12/20/1985															
12/27/1985															
1/2/1986															
1/6/1986															
1/9/1986															
1/16/1986															
1/23/1986															
1/30/1986															
2/7/1986															
2/13/1986															
2/20/1986															
2/27/1986															
3/6/1986															
3/13/1986															
3/20/1986															
3/27/1986											230				270
4/3/1986															
4/10/1986															
4/17/1986															
4/24/1986															
5/1/1986															
5/8/1986															
5/15/1986															
5/23/1986															
6/2/1986															
6/5/1986															

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Collection Date	LAB CONDUCTIVITY (uhos/cm)														
	Sampling Stations														
	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P7	4-27-4 P8	4-27-4 P9	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8
6/12/1986															
6/19/1986															
6/26/1986															
6/30/1986		452					475		153	131					183
7/3/1986															
7/10/1986															
7/17/1986															
7/24/1986															
7/31/1986															
8/7/1986															
8/15/1986															
8/22/1986															
8/28/1986															
9/4/1986															
9/11/1986															
9/18/1986			437				471		190						195
9/25/1986															
10/3/1986															
11/24/1986	320			435		380									
12/15/1986															
1/3/1987															
2/15/1987															
3/23/1987						780						290	230	291	
4/15/1987															
5/5/1987															
6/13/1987		730				730						290	260		
7/24/1987															
9/2/1987						720						360	300		
10/30/1987		600				420						290	300		
11/15/1987															
12/15/1987															
1/15/1991															
2/15/1991															
3/15/1991															
4/27/1991			360				309	210							221
5/15/1991															
6/24/1991			420				312	225							233
7/15/1991															
8/25/1991															
9/15/1991															
11/4/1991			415				326	185							261
12/15/1991															
2/20/1996															
4/29/1996															
5/30/1996		396		354				274							261
6/30/1996															
7/30/1996			474				327	236							276
8/31/1996															
9/20/1996															
10/11/1996			340				200	110							110
4/7/1999															
5/31/1999								234							
6/30/1999				389	356	327		249							
7/29/1999				400	363	327		256							
8/29/1999	474	477						271							
9/16/1999				358	340	318		254							
9/27/1999	447	445						287							

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Collection Date	LAB ANALYSIS (uhos/cm)											
	Sampling Stations											
	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4	4-27-7 P6
1/3/1985												
1/11/1985												
1/18/1985												
1/21/1985				250	400	415		360				280
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985				275	390	420		265				280
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985				305	435	455		315				300
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985				270	350	430		360				355
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985				260	328	428		337				32
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/26/1985				330	550	580		327			308	
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986				410	610	600					500	
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986				346	25	378						
5/23/1986												
6/2/1986												
6/5/1986												

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Collection Date	LAB ANALYSIS (uhos/cm)											
	Sampling Stations											
	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-5 P1	4-27-5 P2	4-27-5 P3	4-27-5 P4	4-27-7 P1	4-27-7 P2	4-27-7 P3	4-27-7 P4	4-27-7 P6
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986				395		298	402	358				357
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986				245	158			339				325
9/25/1986												
10/3/1986												
11/24/1986				230	155	380		425				380
12/15/1986												
1/3/1987				420	500	700						
2/15/1987												
3/23/1987				430	510	690		550				
4/15/1987												
5/5/1987				440	540	2200						
6/13/1987	250			430	460	690		540			490	
7/24/1987				400	440		610					
9/2/1987	380			380	410		460	500				
10/30/1987		290		490	500		490	500	640	570		
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991			235	360	370	624						
5/15/1991												
6/24/1991			211	353	372	582		425				444
7/15/1991												
8/25/1991				371	377	618						
9/15/1991												
11/4/1991			211	211	382	434		437				461
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996			226	377	395	634						
6/30/1996												
7/30/1996			231	381	400	621		446				453
8/31/1996				240	190	300						
9/20/1996												
10/11/1996			100	370	402	598		250				
4/7/1999												
5/31/1999				380	394	185		445				
6/30/1999				524	378	388						388
7/29/1999				381	405	600			445			454
8/29/1999				388	409	582			451			
9/16/1999				385	404	584		454			459	440
9/27/1999				387	404	586						

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Collection Date	LAB CONDUCTIVITY (uhos/cm)												
	Sampling Stations												
	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-4 P8	4-27-4 P11	4-27-6 BH53
1/4/1985													
1/11/1985													
1/18/1985													
1/21/1985						190	305	365		415			520
1/25/1985													
2/1/1985													
2/8/1985													
2/15/1985													
2/22/1985													
3/1/1985													
3/8/1985													
3/15/1985													
3/22/1985													
3/25/1985						230	410	405		440			
3/29/1985													
4/5/1985													
4/12/1985													
4/22/1985													
4/26/1985													
5/3/1985													
5/10/1985													
5/17/1985													
5/24/1985													
5/27/1985						290	405	405		465			520
5/31/1985													
6/7/1985													
6/14/1985													
6/24/1985													
6/28/1985													
7/5/1985													
7/12/1985													
7/26/1985													
8/2/1985													
8/9/1985													
8/12/1985						335	215	255		450			730
8/16/1985													
8/23/1985													
8/30/1985													
9/6/1985													
9/13/1985													
9/20/1985													
9/24/1985						332	398	380		472			720
9/27/1985													
10/7/1985													
10/11/1985													
10/18/1985													
10/25/1985													
11/1/1985													
11/8/1985													
11/15/1985													
11/22/1985													
11/25/1985							420	460		600			870
11/29/1985													
12/6/1985													
12/13/1985													
12/20/1985													
12/27/1985													
1/2/1986													
1/6/1986													
1/9/1986													
1/16/1986													
1/23/1986													
1/30/1986													
2/7/1986													
2/13/1986													
2/20/1986													
2/27/1986													
3/6/1986													
3/13/1986													
3/20/1986													
3/27/1986			450			6000	470	450		550			750
4/3/1986													
4/10/1986													
4/17/1986													
4/24/1986													
5/1/1986													
5/8/1986													
5/15/1986													
5/23/1986													
6/2/1986													
6/5/1986													

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Collection Date	LAB CONDUCTIVITY (uhos/cm)												
	Sampling Stations												
	4-27-7 P7	4-27-7 P8	4-27-7 P9	4-27-7 P10	4-27-7 P11	4-27-7 P12	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-4 P6	4-27-4 P11	4-27-6, 6H53
6/12/1986													
6/19/1986													
6/26/1986													
6/30/1986						357	355	400	408				600
7/3/1986													
7/10/1986													
7/17/1986													
7/24/1986													
7/31/1986													
8/7/1986													
8/15/1986													
8/22/1986													
8/28/1986													
9/4/1986													
9/11/1986													
9/18/1986						340	318	370		383			555
9/25/1986													
10/3/1986													
11/24/1986						155	320	380		425			550
12/15/1986													
1/3/1987													
2/15/1987													
3/23/1987	550				600		520	670	550				110
4/15/1987													
5/5/1987													
6/13/1987	530						510	640		720			1100
7/24/1987													
9/2/1987	490				540		510	650		720			1090
10/30/1987								490			500	520	1260
11/15/1987													
12/15/1987													
1/15/1991													
2/15/1991													
3/15/1991													
4/27/1991							396	653		618			782
5/15/1991													
6/24/1991						426	340	495		625			383
7/15/1991													
8/25/1991													
9/15/1991													
11/4/1991						430	408	551		660			737
12/15/1991													
2/20/1996													
4/29/1996													
5/30/1996					441								
6/30/1996							433	621		733			
7/30/1996					451		427	621		390			1230
8/31/1996													
9/20/1996													
10/11/1996		260			260		266	370		440			1250
3/7/1999													
5/31/1999				441	438		419	566	387				710
6/30/1999		320					411	572	399				740
7/29/1999		310					417	572	397				900
8/29/1999		290	290	461			411	567	429				870
9/16/1999								573	455	410			980
9/27/1999		250	260		463		420	585	445				930

Appendix M

Table of Total Cyanide SNP Data

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
Surveillance Network Program

Collection Date	CYANIDE (mg/L)													
	Sampling Stations													
	4-5	4-9	4-12	4-13	4-29	4-30	4-27-1 P1	4-27-1 P2	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9
1/4/1985		.02				.03								
1/11/1985		.02				.02								
1/18/1985	.02	.02			.02	.02								
1/21/1985							.005			.005				.005
1/25/1985		.02				.02								
2/1/1985		.02				.02								
2/8/1985		.02				.03								
2/15/1985		.02			.02	.02								
2/22/1985		.02				.03								
3/1/1985		.02				.03								
3/8/1985		.02				.02								
3/15/1985	.02	.02			.02	.02								
3/22/1985		.02				.04								
3/25/1985							.005			.005				.005
3/29/1985		.02				.02								
4/5/1985		.02				.02								
4/12/1985	.02	.02			.02	.02								
4/22/1985		.02				.02								
4/26/1985		.02				.03								
5/3/1985		.02				.03								
5/10/1985		.02				.03								
5/17/1985	.02	.02			.02	.06								
5/24/1985		.02				.02								
5/27/1985							.005			.005				.005
5/31/1985		.02				.02								
6/7/1985		.02				.02								
6/14/1985	.02	.02			.02	.02								
6/24/1985		.02				.02								
6/28/1985		.02				.02								
7/5/1985		.02				.02								
7/12/1985	.02	.02			.02	.04								
7/26/1985		.02				.1								
8/2/1985		.02				.04								
8/9/1985		.02				.02								
8/12/1985							.005			.005				.005
8/16/1985	.02	.02			.02	.04								
8/23/1985		.02				.02								
8/30/1985		.02				.02								
9/6/1985		.02				.02								
9/13/1985		.02				.02								
9/20/1985	.02	.012			.02	.04								
9/24/1985							.005			.005				.005
9/27/1985		.02				.05								
10/7/1985		.02				.09								
10/11/1985		.02				.04								
10/18/1985	.02	.02			.02	.02								
10/25/1985		.02				.05								
11/1/1985		.02				.02								
11/8/1985		.02				.02								
11/15/1985	.02	.02			.02	.02								
11/22/1985		.02				.02								
11/25/1985							.005							.005
11/29/1985		.02				.02								
12/6/1985		.02				.02								
12/13/1985	.02	.02			.02	.02								
12/20/1985		.02				.02								
12/27/1985		.02				.02								

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Collection Date	CYANIDE (mg/L) Sampling Stations													
	4-5	4-9	4-12	4-13	4-29	4-30	4-27-1 P1	4-27-1 P2	4-27-1 P4	4-27-1 P5	4-27-1 P6	4-27-1 P7	4-27-1 P8	4-27-1 P9
1/2/1986	.02					.02								
1/6/1986	.02					.02								
1/9/1986	.02					.02								
1/16/1986	.02				.02									
1/23/1986	.02					.02								
1/30/1986	.02					.02								
2/7/1986	.02					.02								
2/13/1986	.02	.02			.02	.02								
2/20/1986	.02	.02				.02								
2/27/1986	.02					.02								
3/6/1986	.02	.02				.02								
3/13/1986	.02	.02			.02	.02								
3/20/1986	.02	.02				.02								
3/27/1986	.02	.02				.02								
4/3/1986	.02	.02				.02								
4/10/1986	.02					.02								
4/17/1986	.02	.02			.02	.02								
4/24/1986	.02					.02								
5/1/1986	.02					.03								
5/8/1986	.02	.02				.02								
5/15/1986	.02	.02			.02	.02								
5/23/1986	.02													
6/2/1986	.02													
6/5/1986	.02													
6/12/1986	.02	.02			.02									
6/19/1986	.02													
6/26/1986	.02													
6/30/1986	.02							.005					.005	
7/3/1986	.02													
7/10/1986	.02													
7/17/1986	.02	.02			.02									
7/24/1986	.02													
7/31/1986	.02													
8/7/1986	.02													
8/15/1986	.02	.02			.02									
8/22/1986	.02													
8/28/1986	.02													
9/4/1986	.02													
9/11/1986	.02													
9/18/1986	.02	.02			.02			.005					.005	
9/25/1986	.02	.02												
10/3/1986	.02	.02	.02		.02									
11/24/1986	.02		.02		.02			.02					.02	
12/15/1986	.02		.02		.02									
1/3/1987	.02		.02		.02									
2/15/1987	.02		.02		.02									
3/23/1987	.02		.02		.02			.002					.002	
4/15/1987	.02		.02		.02									
5/5/1987	.02		.02		.02									
6/13/1987	.02		.02		.02			.002					.002	
7/24/1987	.02		.02		.02									
9/2/1987	.02		.02		.02		.02			.002				.002
10/30/1987	.02				.03									
11/15/1987	.02		.03		.02									
12/15/1987	.02		.02		.02									
1/15/1991	.02				.02									
2/15/1991	.005				.005									
3/15/1991	.012				.005									
4/27/1991	.005				.005			.005				.005		
5/15/1991	.01				.011									
6/24/1991	.005				.007				.005				.005	
7/15/1991	.007				.012									
8/25/1991	.005				.005									
9/15/1991	.013				.013									
11/4/1991	.01				.009		.006				.005			
12/15/1991	.016				.04									
2/20/1996	.0005				.0005									
4/29/1996	.0005				.0005									
5/30/1996	.0005				.0005			.0005			.0005			
6/30/1996	.0005				.0005									

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Collection Date	CYANIDE (mg/L) Sampling Stations											
	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5
1/4/1985												
1/11/1985												
1/18/1985												
1/21/1985		.032		.018		.013			.023			
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985		.025		.021		.008			.011			
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985		.007		.025			.005		.043			
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985	.005	.015		.046			.005		.044		.04	
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985		.019		.021			.005		.023			.007
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/25/1985		.017		.022			.005		.045			
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												

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Collection Date	CYANIDE (mg/L) Sampling Stations											
	4-27-1 P10	4-27-2 P1	4-27-2 P2	4-27-2 P4	4-27-2 P5	4-27-2 P6	4-27-2 P7	4-27-2 P8	4-27-3 P1	4-27-3 P2	4-27-3 P3	4-27-3 P5
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986		0.01							0.009			
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986												
5/23/1986												
6/2/1986												
6/5/1986												
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986		.005		.019			.005		.036			
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986	.01	.007		.03		.024			.028			
9/25/1986												
10/3/1986												
11/24/1986		.02		.062		.02			.052	.038		
12/15/1986												
1/3/1987												
2/15/1987												
3/23/1987	0.02								0.03	0.02		
4/15/1987												
5/5/1987												
6/13/1987	0.02	0.02		0.05		0.02			0.05	0.07		
7/24/1987												
9/2/1987			0.02		0.02			0.02	0.03	0.04		
10/30/1987		0.02		0.02		0.03			0.03	0.02		
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991	.005	.005		.012			.012		.01			
5/15/1991												
6/24/1991		.005		.005			.005		.01			
7/15/1991												
8/25/1991												
9/15/1991												
11/4/1991	.005	.005		.01			.005		.024			
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996	0.005								0.005			
6/30/1996		0.019					0.005					

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Collection Date	CYANIDE (mg/L) Sampling Stations											
	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P8	4-27-4 P9	4-27-5 P1	4-27-5 P2
1/4/1985												
1/11/1985												
1/18/1985												
1/21/1985				.008			.005			.01	.005	
1/25/1985												
2/1/1985												
2/8/1985												
2/15/1985												
2/22/1985												
3/1/1985												
3/8/1985												
3/15/1985												
3/22/1985												
3/25/1985	.005			.005			.005			.007	.005	.005
3/29/1985												
4/5/1985												
4/12/1985												
4/22/1985												
4/26/1985												
5/3/1985												
5/10/1985												
5/17/1985												
5/24/1985												
5/27/1985					.005			.005		.006	.005	
5/31/1985												
6/7/1985												
6/14/1985												
6/24/1985												
6/28/1985												
7/5/1985												
7/12/1985												
7/26/1985												
8/2/1985												
8/9/1985												
8/12/1985	.005	.005		.005			.005			.006	.005	
8/16/1985												
8/23/1985												
8/30/1985												
9/6/1985												
9/13/1985												
9/20/1985												
9/24/1985				.005			.005			.007		
9/27/1985												
10/7/1985												
10/11/1985												
10/18/1985												
10/25/1985												
11/1/1985												
11/8/1985												
11/15/1985												
11/22/1985												
11/25/1985				.005			.005		.005			
11/29/1985												
12/6/1985												
12/13/1985												
12/20/1985												
12/27/1985												

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Collection Date	CYANIDE (mg/L) Sampling Stations											
	4-27-3 P6	4-27-3 P8	4-27-4 P1	4-27-4 P2	4-27-4 P3	4-27-4 P4	4-27-4 P5	4-27-4 P6	4-27-4 P8	4-27-4 P9	4-27-5 P1	4-27-5 P2
1/2/1986												
1/6/1986												
1/9/1986												
1/16/1986												
1/23/1986												
1/30/1986												
2/7/1986												
2/13/1986												
2/20/1986												
2/27/1986												
3/6/1986												
3/13/1986												
3/20/1986												
3/27/1986			0.005									
4/3/1986												
4/10/1986												
4/17/1986												
4/24/1986												
5/1/1986												
5/8/1986												
5/15/1986												
5/23/1986												
6/2/1986												
6/5/1986												
6/12/1986												
6/19/1986												
6/26/1986												
6/30/1986			.005			.005				.006		.005
7/3/1986												
7/10/1986												
7/17/1986												
7/24/1986												
7/31/1986												
8/7/1986												
8/15/1986												
8/22/1986												
8/28/1986												
9/4/1986												
9/11/1986												
9/18/1986				.005			.005			.006		.005
9/25/1986												
10/3/1986												
11/24/1986					.02			.02	.02			
12/15/1986												
1/3/1987												
2/15/1987												
3/23/1987	0.02		0.02	0.02					0.02			
4/15/1987												
5/5/1987												
6/13/1987	0.08		0.02			0.02			0.02			
7/24/1987												
9/2/1987	0.02		0.02	0.02						0.02		
10/30/1987	0.03		0.02			0.02			0.02			
11/15/1987												
12/15/1987												
1/15/1991												
2/15/1991												
3/15/1991												
4/27/1991	.005	.005	.005				.005			.005	.005	
5/15/1991												
6/24/1991	.005	.005	.005				.005			.005	.005	
7/15/1991												
8/25/1991												
9/15/1991												
11/4/1991	.005	.02	.025				.025			.02	.026	
12/15/1991												
2/20/1996												
4/29/1996												
5/30/1996	0.005	0.005	0.005			0.005		0.005			0.005	
6/30/1996												

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Collection Date	CYANIDE (mg/L) Sampling Stations										
	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-6 P1	4-27-6 P2
1/4/1985											
1/11/1985											
1/18/1985											
1/21/1985											
1/25/1985										.043	.28
2/1/1985											
2/8/1985											
2/15/1985											
2/22/1985											
3/1/1985											
3/8/1985											
3/15/1985											
3/22/1985											
3/25/1985						.005				.022	.23
3/29/1985											
4/5/1985											
4/12/1985											
4/22/1985											
4/26/1985											
5/3/1985											
5/10/1985											
5/17/1985											
5/24/1985											
5/27/1985			.005			.005				.024	.19
5/31/1985											
6/7/1985											
6/14/1985											
6/24/1985											
6/28/1985											
7/5/1985											
7/12/1985											
7/26/1985											
8/2/1985											
8/9/1985											
8/12/1985			.005			.005				.022	.11
8/16/1985											
8/23/1985											
8/30/1985											
9/6/1985											
9/13/1985											
9/20/1985											
9/24/1985			.005			.005				.034	.22
9/27/1985											
10/7/1985											
10/11/1985											
10/18/1985											
10/25/1985											
11/1/1985											
11/8/1985											
11/15/1985											
11/22/1985											
11/25/1985		.005				.005				.03	.19
11/29/1985											
12/6/1985											
12/13/1985											
12/20/1985											
12/27/1985											

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Collection Date	CYANIDE (mg/L) Sampling Stations										
	4-27-5 P3	4-27-5 P4	4-27-5 P5	4-27-5 P6	4-27-5 P7	4-27-5 P8	4-27-5 P10	4-27-5 P11	4-27-5 P13	4-27-6 P1	4-27-6 P2
1/2/1986											
1/6/1986											
1/9/1986											
1/16/1986											
1/23/1986											
1/30/1986											
2/7/1986											
2/13/1986											
2/20/1986											
2/27/1986											
3/6/1986											
3/13/1986											
3/20/1986											
3/27/1986		0.005				0.005				0.046	0.099
4/3/1986											
4/10/1986											
4/17/1986											
4/24/1986											
5/1/1986											
5/8/1986											
5/15/1986										.077	.099
5/23/1986											
6/2/1986											
6/5/1986											
6/12/1986											
6/19/1986											
6/26/1986											
6/30/1986	.005					.012				.014	
7/3/1986											
7/10/1986											
7/17/1986											
7/24/1986											
7/31/1986											
8/7/1986											
8/15/1986											
8/22/1986											
8/28/1986											
9/4/1986											
9/11/1986											
9/18/1986						.005				.017	.025
9/25/1986											
10/3/1986											
11/24/1986										.02	.084
12/15/1986											
1/3/1987										0.04	0.11
2/15/1987											
3/23/1987			0.02	0.02	0.02					0.024	0.03
4/15/1987											
5/5/1987										0.03	0.08
6/13/1987			0.02	0.02			0.02			0.08	0.04
7/24/1987										0.03	0.08
9/2/1987			0.02	0.05			0.02			0.05	0.1
10/30/1987			0.04	0.02				0.05		0.03	0.02
11/15/1987											
12/15/1987											
1/15/1991											
2/15/1991											
3/15/1991											
4/27/1991						.005			.005	.02	.005
5/15/1991											
6/24/1991						.005			.005	.023	.024
7/15/1991											
8/25/1991										.02	.02
9/15/1991											
11/4/1991						.022			.02	.025	.035
12/15/1991											
2/20/1996											
4/29/1996											
5/30/1996						0.005				0.005	0.005
6/30/1996											

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	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-4 P3	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P9	4-27-7 P11	4-27-7 P12
1/4/1985											
1/11/1985											
1/18/1985											
1/21/1985	.005		.005				.005				.005
1/25/1985											
2/1/1985											
2/8/1985											
2/15/1985											
2/22/1985											
3/1/1985											
3/8/1985											
3/15/1985											
3/22/1985											
3/25/1985	.014		.019				.013				.01
3/29/1985											
4/5/1985											
4/12/1985											
4/22/1985											
4/26/1985											
5/3/1985											
5/10/1985											
5/17/1985											
5/24/1985											
5/27/1985	.007		.02				.012				.02
5/31/1985											
6/7/1985											
6/14/1985											
6/24/1985											
6/28/1985											
7/5/1985											
7/12/1985											
7/26/1985											
8/2/1985											
8/9/1985											
8/12/1985	.012		.022				.014				.017
8/16/1985											
8/23/1985											
8/30/1985											
9/6/1985											
9/13/1985											
9/20/1985											
9/24/1985	.018		.022				.01				.021
9/27/1985											
10/7/1985											
10/11/1985											
10/18/1985											
10/25/1985											
11/1/1985											
11/8/1985											
11/15/1985											
11/22/1985											
11/25/1985	.039		.069			.014					
11/29/1985											
12/6/1985											
12/13/1985											
12/20/1985											
12/27/1985											

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Collection Date	CYANIDE (mg/L) Sampling Stations										
	4-27-6 P3	4-27-6 P4	4-27-7 P1	4-27-7 P2	4-27-4 P3	4-27-7 P4	4-27-7 P6	4-27-7 P7	4-27-7 P9	4-27-7 P11	4-27-7 P12
1/2/1986											
1/6/1986											
1/9/1986											
1/16/1986											
1/23/1986											
1/30/1986											
2/7/1986											
2/13/1986											
2/20/1986											
2/27/1986											
3/6/1986											
3/13/1986											
3/20/1986											
3/27/1986	0.73					0.007			0.005		0.017
4/3/1986											
4/10/1986											
4/17/1986											
4/24/1986											
5/1/1986											
5/8/1986											
5/15/1986	22										
5/23/1986											
6/2/1986											
6/5/1986											
6/12/1986											
6/19/1986											
6/26/1986											
6/30/1986	.03	.036	.01				.007				.006
7/3/1986											
7/10/1986											
7/17/1986											
7/24/1986											
7/31/1986											
8/7/1986											
8/15/1986											
8/22/1986											
8/28/1986											
9/4/1986											
9/11/1986											
9/18/1986			.025				.007				.022
9/25/1986											
10/3/1986											
11/24/1986	.225		.02				.02				.02
12/15/1986											
1/3/1987	0.18										
2/15/1987											
3/23/1987	0.12		0.02					0.02		0.02	
4/15/1987											
5/5/1987	0.1										
6/13/1987	0.11		0.05			0.02		0.02			
7/24/1987		0.1									
9/2/1987		0.06	0.03					0.02		0.02	
10/30/1987		0.02	0.07	0.02	0.02						
11/15/1987											
12/15/1987											
1/15/1991											
2/15/1991											
3/15/1991											
4/27/1991	.05										
5/15/1991											
6/24/1991	.05		.01				.007				.014
7/15/1991											
8/25/1991	.02										
9/15/1991											
11/4/1991	.052		.032				.027				.033
12/15/1991											
2/20/1996											
4/29/1996											
5/30/1996	0.007									0.005	
6/30/1996											

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Collection Date	CYANIDE (mg/L)						
	Sampling Stations						
	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9 BH53
1/4/1985							
1/11/1985							
1/18/1985							
1/21/1985	.005	.005		.005			.005
1/25/1985							
2/1/1985							
2/8/1985							
2/15/1985							
2/22/1985							
3/1/1985							
3/8/1985							
3/15/1985							
3/22/1985							
3/25/1985	.005	.008		.005			
3/29/1985							
4/5/1985							
4/12/1985							
4/22/1985							
4/26/1985							
5/3/1985							
5/10/1985							
5/17/1985							
5/24/1985							
5/27/1985	.005	.005		.005			.005
5/31/1985							
6/7/1985							
6/14/1985							
6/24/1985							
6/28/1985							
7/5/1985							
7/12/1985							
7/26/1985							
8/2/1985							
8/9/1985							
8/12/1985	.006	.014		.005			.005
8/16/1985							
8/23/1985							
8/30/1985							
9/6/1985							
9/13/1985							
9/20/1985							
9/24/1985	.005	.005		.005			.005
9/27/1985							
10/7/1985							
10/11/1985							
10/18/1985							
10/25/1985							
11/1/1985							
11/8/1985							
11/15/1985							
11/22/1985							
11/25/1985	.021	.014		.005			.005
11/29/1985							
12/6/1985							
12/13/1985							
12/20/1985							
12/27/1985							

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Collection Date	CYANIDE (mg/L)						
	Sampling Stations						
	4-27-8 P1	4-27-8 P2	4-27-8 P3	4-27-8 P4	4-27-8 P8	4-27-8 P11	4-27-9, BH53
1/2/1986							
1/6/1986							
1/9/1986							
1/16/1986							
1/23/1986							
1/30/1986							
2/7/1986							
2/13/1986							
2/20/1986							
2/27/1986							
3/6/1986							
3/13/1986							
3/20/1986							
3/27/1986	0.035	0.005		0.005			0.005
4/3/1986							
4/10/1986							
4/17/1986							
4/24/1986							
5/1/1986							
5/8/1986							
5/15/1986							
5/23/1986							
6/2/1986							
6/5/1986							
6/12/1986							
6/19/1986							
6/26/1986							
6/30/1986	.008	.005	.005				.005
7/3/1986							
7/10/1986							
7/17/1986							
7/24/1986							
7/31/1986							
8/7/1986							
8/15/1986							
8/22/1986							
8/28/1986							
9/4/1986							
9/11/1986							
9/18/1986	.038	.005		.005			.005
9/25/1986							
10/3/1986							
11/24/1986	.074	.02		.02			.02
12/15/1986							
1/3/1987							
2/15/1987							
3/23/1987	0.06	0.02	0.02				0.02
4/15/1987							
5/5/1987							
6/13/1987	0.07	0.03		0.02			0.02
7/24/1987							
9/2/1987	0.06	0.02		0.02			0.02
10/30/1987		0.02			0.02	0.02	0.02
11/15/1987							
12/15/1987							
1/15/1991							
2/15/1991							
3/15/1991							
4/27/1991	.018	.02		.012			
5/15/1991							
6/24/1991	.013	.01		.015			.005
7/15/1991							
8/25/1991							
9/15/1991							
11/4/1991	.023	.015		.021			.011
12/15/1991							
2/20/1996							
4/29/1996							
5/30/1996							
6/30/1996	0.005	0.005					0.005

Appendix N

Table of Dissolved Metals SNP Data Station 4-30

Collection Date	DISSOLVED METALS (mg/L)		
	Sampling Station 4-30		
	Dissolved Copper	Dissolved Nickel	Dissolved Zinc
1/4/1985	.04	.02	.02
1/11/1985	.02	.02	.02
1/18/1985	.02	.02	.02
1/25/1985	.02	.02	.02
2/1/1985	.02	.02	.02
2/8/1985	.02	.02	.02
2/15/1985	.02	.02	.02
2/22/1985	.02	.02	.02
3/1/1985	.02	.02	.02
3/8/1985	.02	.02	.02
3/15/1985	.04	.02	.02
3/22/1985	.04	.02	.02
3/29/1985	.02	.04	.02
4/5/1985	.04	.02	.02
4/12/1985	.02	.02	.02
4/22/1985	.02	.02	.02
4/26/1985	.12	.02	.02
5/3/1985	.02	.02	.02
5/10/1985	.02	.02	.02
5/17/1985	.02	.02	.02
5/24/1985	.02	.02	.02
5/31/1985	.02	.02	.02
6/7/1985	.02	.02	.02
6/14/1985	.04	.02	.02
6/24/1985	.02	.02	.02
6/28/1985	.02	.02	.02
7/5/1985	.02	.02	.02
7/12/1985	.02	.02	.02
7/19/1985	.02	.02	.02
7/26/1985	.02	.02	.02
8/2/1985	.02	.02	.02
8/9/1985	.02	.02	.02
8/16/1985	.02	.02	.02
8/23/1985	.02	.2	.02
8/30/1985	.02	.02	.02
9/6/1985	.02	.02	.02
9/13/1985	.02	.02	.02
9/20/1985	.02	.02	.02
9/27/1985	.02	.02	.02
10/7/1985	.02	.02	.02
10/11/1985	.02	.02	.02
10/18/1985	.02	.02	.02
10/25/1985	.02	.02	.02
11/1/1985	.02	.02	.02
11/8/1985	.04	.02	.02
11/15/1985	.02	.02	.02
11/22/1985	.08	.02	.02
11/29/1985	.02	.02	.02
12/6/1985	.12	.02	.02
12/13/1985	.04	.02	.02
12/20/1985	.02	.02	.02
12/27/1985	.02	.02	.02
1/2/1986	.02	.02	.02
1/6/1986	.02	.02	.02
1/9/1986	.02	.02	.02
1/23/1986	.02	.02	.02
1/30/1986	.02	.02	.02
2/7/1986	.02	.02	.02
2/13/1986	.02	.06	.02
2/20/1986	.02	.02	.02
2/27/1986	.02	.02	.02
3/6/1986	.02	.02	.02
3/13/1986	.02	.02	.02
3/20/1986	.02	.02	.02
3/27/1986	.02	.02	.02
4/3/1986	.02	.02	.02
4/10/1986	.02	.02	.02
4/17/1986	.02	.04	.02
4/24/1986	.02	.02	.02
5/1/1986	.03	.02	.02
5/8/1986	.02	.02	.02
5/15/1986	.02	.02	.02

Appendix O

Table of Water Inputs SNP Data Station 4-1

Canadian Tungsten Mining Corporation Ltd. - Licence # N3L2-0004
Surveillance Network Program

Monthly Water Inputs From Flat River M ³		
Month	1985	1986
Jan	105,095	94,407
Feb	97,921	
Mar	91,313	111,987
Apr	80,086	104,932
May	90,408	105,696
June	86,253	88,307
July	84,486	
Aug	82,884	
Sept	86,251	
Oct	98,028	
Nov	61,696	
Dec	93,128	
Total	1,057,549	505,329

Status of plans, reports and studies required under MV2015L2-0003

Part of Licence	Item Required under MV2015L2-0003	Status
B	Annual Water Licence Report	Submitted annually. Most recently submitted in March 2023 .
B	Engagement Work Plan	Submitted in March 2016. No change associated with MV2023L2-0006.
B	Engagement Plan	Submitted in 2020. No change associated with MV2023L2-0006.
E	Final Detailed Construction Plan - Landfarm	Not submitted. Facility has not been constructed.
E	Final Detailed Construction Plan – Solid Waste Disposal Facility	Not submitted. Facility has not been constructed.
E	Tailings Containment Area Cover Design Study	Submitted in 2014. No change associated with MV2023L2-0006.
E	Final Detailed Construction Plan – Dry Stack Tailings Storage Facilities	Not submitted. Facility has not been constructed.
E	Final Detailed Cover Design Plan – TSF4b and TSF7	Not submitted. Facility has not been constructed.
E	Final Detailed Cover Design Plan – TSF6	Not submitted. Facility has not been constructed.
E	Final Detailed Construction Plans – Engineered Structures	Not submitted. No new engineered facilities constructed.
E	As-Built Reports	Not submitted. No new engineered facilities constructed.
F	Modifications – As-Built Reports	Not submitted. No new engineered facilities constructed.
G	Waste Management Plan	Submitted in 2014. No change associated with MV2023L2-0006.
G	Water Management and Mine-site Erosion and Sediment Protection Plan	Submitted in 2014. No change associated with MV2023L2-0006.
G	Flat River Erosion and Sediment Protection Plan	Submitted in 2013. No change associated with MV2023L2-0006.
G	Hydrogeological Groundwater Study Report	Not submitted. No restart of commercial operations planned.
G	Geochemical Risk Assessment Report	Submitted in 2014.

MV2023L2-0006 – North American Tungsten Corporation Ltd. – Response to MVLWB-1

		No change associated with MV2023L2-0006.
G	Geochemical Load Balance Model	Submitted in 2014. No change associated with MV2023L2-0006.
G	Information Gap Analysis Report	Submitted in 2015. No change associated with MV2023L2-0006.
G	Integrated Geochemical Load Balance and Risk Assessment Report	Submitted in 2017. No change associated with MV2023L2-0006.
G	Tailing Containment Area Monitoring Plan	Submitted in 2011. No change associated with MV2023L2-0006.
G	Tailings Storage Facility Cover Design Progress Report	Not submitted. Facility has not been constructed.
G	Historical Data and Interpretation Report	Issued for use in 2013. NATC is unable to locate this document on the public registry, so is appending it to this submission. No change associated with MV2023L2-0006.
G	Research and Monitoring Plan for Dry Stack Tailings Storage Facility TSF4b	Not submitted. Facility has not been constructed.
G	Tailings Processing and Storage Facilities Management and Monitoring Plan	Not submitted. Facility has not been constructed.
G	Groundwater Pumping Contingency Plan	Submitted in 2013. No change associated with MV2023L2-0006.
G	Tailings Containment Area and Dry Stack Tailings Storage Facilities Emergency Preparedness Plan	Submitted in 2022. No change associated with MV2023L2-0006.
G	Wastewater Treatment Facilities Operations, Maintenance and Surveillance Manual	Not submitted. Not restart of facility planned.
G	Flat River Hydrology Plan	Submitted in 2014. No change associated with MV2023L2-0006.
G	Plume Delineation Study Design	Submitted in 2013. No change associated with MV2023L2-0006.

G	Plume Delineation Study Report	Submitted in 2013. No change associated with MV2023L2-0006.
G	Nitrogen Response Plan	Not submitted. No restart of facility planned.
G	Phase II Environmental Site Assessment Report	Superseded by the Phase III Environmental Site Assessment Report, submitted in 2023 . No change associated with MV2023L2-0006.
G	Geotechnical Inspection Report	Submitted annually. Most recently submitted in September 2022 .
G	Dam Safety Review Report	Submitted in 2023. No change associated with MV2023L2-0006.
G	Dry Stack Tailings Storage Facilities Inspection and Review Report	Not submitted. Facility has not been constructed.
H	AEMP Design Plan	Not submitted, deferral request in progress.
H	AEMP Re-evaluation Report	Not submitted. See above re. AEMP Design Plan.
H	AEMP Annual Report	Not submitted. See above re. AEMP Design Plan.
H	AEMP Response Plan – Notification to Board	Not submitted. See above re. AEMP Design Plan.
H	AEMP Response Plan	Not submitted. See above re. AEMP Design Plan.
I	Spill Contingency Plan	Submitted in 2020. No change associated with MV2023L2-0006.
J	Interim Closure and Reclamation Plan	Not submitted, deferral request in progress.
J	Final Closure and Reclamation Plan	Not submitted.