

MMG Resources Inc.

Lupin Gold Mine Environmental Effects Monitoring – Cycle 3 Interpretative Report

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Project Number:

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Date:

May 5th, 2011

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May 5th, 2011

Andrew Mitchell
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Dear Mr. Mitchell:

Project No: 60147160

Regarding: Lupin Gold Mine Environmental Effects Monitoring Cycle 3 Interpretative Report

AECOM is pleased to submit the Lupin Gold Mine Environmental Effects Monitoring Cycle 3 Interpretative Report for MMG Resources Inc. The report provides the required information and biological details as per Environment Canada's accepted Study Design for the mine. If you have any questions or concerns please feel free to contact the undersigned at 250-475-6366.

Sincerely,
AECOM Canada Ltd.



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EXECUTIVE SUMMARY

1. Overview

Minerals and Metals Group Inc. (MMG) owns the Lupin Gold Mine in western Nunavut, near the shore of Contwoyto Lake. Under the *Metal Mining Effluent Regulations* (MMER), which is enabled under the authority of the Federal *Fisheries Act*, MMG has completed a series of Environmental Effects Monitoring (EEM) studies for the Lupin Mine. An EEM Cycle 1 report was submitted to Environment Canada in 2006, based on 2005 field work, and an EEM Cycle 2 report was submitted to Environment Canada in 2009, based on 2008 field work. This report has been prepared by AECOM on behalf of MMG to satisfy ongoing requirements under the MMER. In particular, AECOM completed a Cycle 3 EEM report, which is the subject of this interpretative report.

The main conclusions of this report are as follows:

- Observations from the Cycle 2 report indicate that fork length and body weight of YOY grayling were statistically different between the Exposure Area and the Reference Area, which triggered the Cycle 3 study to be moved up one year and the move to an Investigation of Cause modality rather than continual monitoring.
- The postulation provided was that there may be some difference in the physical conditions between the two habitats that have caused these differences rather than the effects of the effluent discharge because the effect was seen in non-discharge years.
- The Cycle 3 study was designed to test the temperature theory as well as provide a literature review examining the potential effects of water chemistry, specifically metals. Metal concentrations observed in the Exposure Area water quality data are too low to have been the cause of the differences in fork length and YOY body mass observed.
- The primary theory was a difference in water temperature between the two study areas. This theory was refuted in the 2010 study – the Exposure Area was found to be warmer by 1.0 -1.5 degrees Celsius during the summer months.
- The fact that the regressions fit to the fish condition data did not intercept the origin indicates the differences may be due to the extrapolation of a linear fit when a curvilinear fit was more appropriate for the data set and for extrapolating to hatch size.
- The most likely explanation of the effect is a variance in recruitment date between the Exposure Area and the Reference Area as evidenced by there being no variance in condition and by the fact that the variance in fork length and body mass does not persist in to the 1+ and 2+ age cohorts. Differences in recruitment could have been caused by differences in the timing of spawning grounds accessibility. These differences may have occurred based on localized differences in spring thaw rates (i.e. related to stream morphology, depth, width, etc) and spawning area entrance limitations (i.e. ice jams).
- The variance in fork length and body mass in YOY grayling is not likely attributable to the effect of effluent discharge, therefore the site should resume the normal intervals for EEM monitoring studies.

Per prior communications with Environment Canada and MMER requirements, a subsequent EEM study interpretative report must be provided within 24 months from the submission date of this EEM report.

2. Background

The purpose of an EEM biological study is assess the aquatic ecological effects of effluent release from active metals mines to receiving waters frequented by fish. The overall objective of this Cycle 3 (Investigation of Cause: IOC) study was to further examine possible differences in the growth and/or condition of resident fish populations between the effluent Exposure Area associated with the Lupin Mine periodic discharge from the tailings containment area (TCA) and local reference areas, and to further evaluate alternative hypotheses for the observed differences between the exposure and reference areas, if any. Field data for the Cycle 3 program were collected in the summer of 2010 and are discussed within this Interpretative Report.

The monitoring program is based on a study design wherein selected biological and chemical indicator variables are compared between the direct effluent receiving environment and equivalent samples collected from reference areas. In contrast to the Cycle 1 and 2 EEM studies, comparison is made between the Exposure Area and two rather than one reference areas. The first of these reference areas was the same that had been previously used in the Cycle 1 and Cycle 2 studies. The second reference area was chosen based on the absence of ponds in the area, which was determined to be more similar to the Exposure Area.

The effluent receiving environment, the "Exposure Area", is the Seep Creek system composed of small ponds and tributaries eventually discharging to Outer Sun Bay in the West Arm area of Contwoyto Lake. Reference Area 1 is the Fingers Creek system also composed of small ponds and tributaries. Reference Area 1 is located southeast of the tailings area and drains into the central region of Contwoyto Lake. Reference Area 2 was selected from the surrounding area due to the absence of ponded water, which is similar to the layout of the exposure area. This was hypothesised to be more representative of the exposure area both in Arctic grayling habitat and temperature. Reference Area 2 is an unnamed system located southeast of the tailings area and drains into the northern part of South Bay on Contwoyto Lake.

3. Biological Field Program

Based on the results from the report of the Cycle 2 report, it was determined that there were few if any appreciable effects on the benthic communities between the Exposure Area and reference sites. Therefore, benthos was eliminated from the Cycle 3 study.

Water quality samples were collected in the Exposure and Reference areas. Sampling locations were based on those locations used in the Cycle 1 and 2 studies. For the Cycle 3 study, an additional reference area was added. None of the results from the Reference Area 1 or 2 samples exceeded the CCME guidelines. For the Exposure Area samples (SCP1, SCP1-rep, SNP925-20 and SCD1), all exceeded the guidelines for copper, iron and nickel while only sample SCD1 exceeded the guideline for zinc. All samples had undetectable concentrations of TSS, alkalinity, carbonate, hydroxide, nitrite and cyanide. Many samples had undetectable concentrations of bicarbonate, chloride, fluoride, ammonia, nitrate and total phosphorus. In addition, concentrations of TOC and DOC were very low in all samples.

Sediment samples, along with supporting field chemistry measurements, were collected from each of the study areas. Sediment concentration of arsenic, cobalt, copper, molybdenum, nickel, strontium and zinc were significantly higher in the exposure area in comparison with the reference areas. Many of the other metal parameters did not differ significantly between the areas but concentrations were higher in the Exposure Area as compared to the reference areas. Similarly many of the sediment concentrations did not differ between the two reference areas; however, Reference Area 2 generally had higher concentrations of metals/metalloids.

Based on the lessons learned in Cycle 1 and Cycle 2, electrofishing was used as the only fishing method in the Cycle 3 field program as it was the most effective and efficient from previous years. Electrofishing was conducted

around the edges of ponds and in the creeks of the exposure area and each of the reference areas, starting downstream and moving upstream. In total, 308 fish representing three species were captured in the Exposure Area, 161 fish representing six species were captured in Reference Area 1 and 301 fish representing seven species were captured in Reference Area 2.

4. Results

The effluent discharge history of the Lupin Mine from the TCA is an important factor for further evaluation of aquatic ecological effects in the receiving environment. In particular, it is important to note that the Cycle 1 study was completed in 2005 just after the cessation of annual discharge of treated effluent from the Tailings Containment Area (TCA), while the Cycle 2 study (2008) was completed following three years without any effluent discharge. A discharge did occur in 2009, but not in 2010.

Water quality in the Exposure Area in August, 2010, reflected the historical discharge of treated mine effluent, in that total Al, As, Cd, Cu, Ni, and Zn concentrations exceeded their respective Canadian water quality guideline for freshwater life protection in one or more of the water samples collected. This was dissimilar to the Reference Area samples. Inorganic substances that were significantly elevated in Exposure Area sediments in comparison with Reference Areas 1 and 2 include As, Co, Cu, Mo, Ni, Sr, and Zn.

Of the contaminants of potential concern identified in water or sediment samples from the Lupin Mine Exposure Area, only arsenic was significantly elevated in the whole body tissues of sub-adult Arctic grayling collected from the Exposure Area in comparison with the two reference areas. There was a statistically significant difference between areas in the grayling tissue cobalt concentration; however, the highest average tissue concentration was observed in fish collected from Reference Area 2.

This Cycle 3 EEM study for the Lupin Mine TCA discharge was catalyzed in particular by observations from Cycle 1 and Cycle 2 MMR EEM studies that early life stages of Arctic grayling collected from the effluent Exposure Area exhibited a smaller average body mass and fork length than fish from the Reference Area 1 (Fingers Lake drainage). The 1+ age class of Arctic grayling was the focus of the Cycle 1 (2005) study, while young-of-the-year (0+) grayling were the focus of the Cycle 2 (2008) study.

The average fish size (based on weight or length) in early life stages of Arctic grayling was lower in the fish collected from the Exposure Area in this and previously completed EEM studies; however, it is important to note that no statistically significant differences have been observed in the condition of 0+ and 1+ age class Arctic grayling between the Exposure Area and Reference Area 1, based on an analysis of covariance of body weight on fork length.

A summary of the major findings with regard to Arctic grayling health in the Exposure Area is as follows:

- This Cycle 3 study indicates that YoY Arctic grayling experience significantly higher water temperatures during the summer in the Exposure Area compared to Reference Area 1, by 1.0 to 1.5 °C on average over the seven week summertime measurement period. This is in contrast to the prior hypothesis that the Fingers Lake Reference Area 1 exhibits greater comparative temperatures and thus more rapid growth of age-0+ and subsequent juvenile grayling life stages. The hypothesis that differences between sites in juvenile grayling length or weight are proportional to differences in average temperature or degree days, therefore, is rejected.
- Furthermore, the Cycle 3 field observations suggest that YoY Arctic grayling experience greater average flow velocity in the the Exposure Area compared to Reference Area 1.

- On average, the YoY (0+) and/or 1+ age class Arctic grayling from the Exposure Area were shorter and lighter than the YoY Arctic grayling from Reference Area 1 (Cycle 1, 2, and 3).
- In August of 2010, there was not a statistically significant difference between the length or weight of the 1+ grayling between the Exposure Area and Reference Area 1, in spite of the noted difference for the 0+ cohort. There appears to be a convergence in the size of grayling from the different areas through their first year after swim-up. This further suggests that the 0+ differences might be attributable to differences in timing of spawning, hatching and swim-up between the two small watershed: A difference of several days to a few weeks in the hatching time on spawning grounds in the two areas would account for the differences in size of 0+ fish based on field observations in August, about one month after hatching from the eggs.
- Statistical analysis (ANCOVA) of the condition for the YoY Arctic grayling from the Exposure Area indicated that the slopes of the regression lines for each population (Exposure Area and Reference Area 1) were not significantly different and the Y-intercepts of the ANCOVA was significantly higher in the Reference Area 1. Therefore, the relationships between length and weight (condition) of the two populations were similar (i.e., they did not differ significantly between the Exposure Area and Reference Area 1).

5. Conclusions

Conclusions from the Cycle 2 report suggested that lower length and weight for YoY or 1+ age class Arctic grayling may be attributable to factors such as water temperature, food availability, competition, and predation. The results of Cycle 3 indicate that the hypothesis regarding lower water temperatures in the Exposure Area having an effect on the growth of YoY Arctic grayling is not supported.

Based on the results of the Cycle 1 and Cycle 2 studies, it is concluded that the benthic invertebrate community in the Exposure Area and Reference Area 1 are substantially similar with regard to numerical abundance as well as species richness and diversity. Some statistically significant differences in various diversity indices were observed in 2005. In 2008, different indicator variables were observed to be statistically significantly different between areas, while other were not. Given the similar average numerical abundance between the two areas, we speculate that the standing stock biomass between the Exposure Area and reference areas would be sufficiently similar to impact the growth of sub-adult Arctic char in the Exposure Area.

Within-season variation in the timing of recruitment between the Exposure Area and Reference Area 1 Arctic grayling populations may be the reason for the statistically significant differences in size (length and weight) of 0+ age class fish observed for both the 2008 and 2010 YoY studies. The spawning window for Arctic grayling occurs immediately post ice out. The area surrounding the Lupin Mine is relatively flat and is dominated by low lying vegetation which should limit potential differences in the spawning window of each study watersheds. Specific influences were not quantified in Cycle 3, however we speculate that a later spawning time and or hatch time in the Exposure Area could have resulted in the differences observed during in season sampling of YoY Arctic grayling. A difference of several days to a few weeks in the hatching time on spawning grounds in the two areas would account for the differences in size of 0+ fish based on field observations in August, about one month after hatching from the eggs.

During the design of the Cycle 3 study for the Lupin Mine, the TAP recommended the conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. This analysis was strengthened

considerably by the availability of recent studies of inorganic element toxicity to early life stages of Arctic grayling (Buhl and Hamilton, 1990; Buhl and Hamilton, 1991), conducted to evaluate possible adverse influences of placer mining activities in Alaskan fluvial systems (especially headwater systems). The results of this analysis indicate that the concentrations of all inorganic elements with the possible exception of copper in water samples collected from the Exposure Area in 2010 are far lower than documented thresholds of effects concentrations for sensitive life stages of salmonid species, including Arctic grayling. Copper was observed in water samples in 2010 at concentrations in the range of 3.5 to 6.0 µg/L. This is in the range that small steelhead fry (*Salmo gairdneri*) have been observed to exhibit mortality (pH 5.7: 96h LC50 of 4.2 µg/L; pH 7.0: 96h LC50 of 2.8 µg/L). In addition, Buhl and Hamilton (1990) observed in Arctic grayling juveniles a copper LC50 in the range of 2.6 to 9.6 µg/L. Alevins were reportedly less sensitive than juveniles, with observed copper LC50s in the range from 24 to 131 µg/L. Spear and Pierce (1979) suggest that adverse effects on growth of freshwater fish would occur at similar or perhaps higher ranges of copper than mortality; i.e. at waterborne concentrations in soft water in the range from 10 to 100 µg/L.

It cannot be precluded that copper exposures in the water are having an effect on juvenile recruitment, through enhanced mortality of early life stages or decreased growth and indirect longer term survival. Nonetheless, the available scientific knowledge suggests that effects if any would be very subtle and hard to detect in field populations, even in the absence of acclimatization or adaptation.

Table of Acronyms and Units

ANCOVA	Analysis of covariance	α	Alpha
ANOVA	Analysis of variance	β	Beta
AO	Authorizing Officer	$\mu\text{g/L}$	micrograms per litre
BCI	Bray-Curtis Index	μm	micrometres
BIC	Benthic Invertebrate Community	$\mu\text{S/cm}$	microSeimens per centimetre
CPUE	Catch-per-unit-effort	$^{\circ}\text{C}$	degrees Celsius
CWQG	Canadian Water Quality Guidelines	Bq/L	Becquerels per litre
DO	Dissolved oxygen	cm	centimetres
EBM	Echo Bay Mines	g	grams
EC	Environment Canada	h	hours
EEM	Environmental Effects Monitoring	ha	hectares
ALS	ALS Laboratory Group	Hz	hertz
FDP	Final Discharge Point	km	kilometres
GPS	Global Positioning System	km^2	square kilometres
ISQG	Interim Sediment Quality Guidelines	L	litre
Kinross	Kinross Gold Corporation	m/s	metres per second
MDL	Method Detection Limit	m^2	square metres
MMER	Metal mining effluent regulations	m^3	cubic metres
QA/QC	Quality assurance / quality control	m^3/d	cubic metres/day
NWB	Nunavut water board	mg/kg	milligrams per kilogram
SD	Standard deviation	mg/L	milligrams per litre
SDI	Simpson's diversity index	mm	millimetres
SE	Standard error	ms	milliseconds
SNP	Surveillance Network Point	NTU	Nephelometric Turbidity Units
TAP	Technical Advisory Panel	s	seconds
TCA	Tailings containment area	V	volts
TGD	Technical guidance document		
TOC	Total organic carbon		
TSS	Total suspended solids		
UTM	Universal Transverse Mercator		

Table of Contents

Statement of Qualifications and Limitations

Letter of Transmittal

Distribution List

Executive Summary

Table of Acronyms and Units

	page
1. Introduction	1
1.1 Summary of Previous EEM Studies.....	1
1.1.1 Cycle 1 Study.....	1
1.1.2 Cycle 2 Study.....	3
1.2 Cycle 3 Study Objectives	7
1.3 Approach and Study Design.....	8
1.3.1 EEM Cycle 3 (Investigation of Cause) Study Design.....	8
1.3.2 Study Design Component.....	9
1.3.2.1 Hypothesis: Thermal Influences	9
1.3.2.1.1 Water Temperature.....	9
1.3.2.1.2 Fish Survey	9
1.3.2.2 Water Quality.....	10
1.3.2.3 Sediment Sampling.....	10
1.4 Report Structure	11
2. Study Area and Setting.....	12
2.1 Mine History.....	12
2.1.1 Mine Setting	12
2.1.2 Tailings	12
2.1.3 Activities Since Cycle 2 Interpretive Report.....	12
2.1.4 2009 Effluent Release	13
2.1.4.1 Overview of Effluent Release	13
2.1.4.1 Sampling Methodology	13
2.1.4.2 Field QA/QC	13
2.1.4.3 Laboratory QA/QC.....	14
2.1.4.4 Sampling Results and Discussion	14
Figure 2-5 Zinc Concentration in Water Samples (2009 Effluent Release).....	19
2.1.5 Climate.....	22
2.1.6 Geology and Topography	22
2.1.7 Vegetation.....	22
2.1.8 Hydrology.....	22
2.2 Historical Water Quality Monitoring and Effluent Plume Study	23
2.2.1 Historical Water Quality	23
2.2.2 Historical Effluent Plume Study.....	24
2.3 Exposure and Reference Areas	25
2.3.1 Exposure Area	25
2.3.2 Reference Area 1	25
2.3.3 Reference Area 2	25
3. Ecological Context.....	26

4.	Methods	27
4.1	Water Quality.....	27
4.1.1	Study Design.....	27
4.1.2	Methods	27
4.1.2.1	QA/QC.....	31
4.1.2.2	Statistical Analysis	31
4.2	Sediment Quality	32
4.2.1	Study Design.....	32
4.2.2	Field Methods	32
4.2.2.1	Statistical Analysis	32
4.3	Fish Survey	36
4.3.1	Study Design.....	36
4.3.2	Field Methods	36
4.3.2.1	Fish Capture.....	36
4.3.2.2	Field Laboratory Analyses.....	36
4.3.2.3	Statistical Analysis	40
5.	Effluent and Water Quality Results.....	41
5.1	Effluent Characterization.....	41
5.2	Water Quality.....	41
5.2.1	Discussion and Comparison to Cycles 1 and 2	42
6.	Sediment Results	45
6.1	Statistical Analysis	45
6.2	Sediment Quality	45
7.	Fish Survey	48
7.1	Fish Habitat Characteristics	48
7.2	Fish Capture Data.....	49
7.3	Supporting Environmental Variables	50
7.3.1	Stream Temperature Data.....	51
7.4	Fish Health	53
7.4.1	General Health	53
7.4.2	Summary Statistics (All Ages).....	53
7.4.3	Summary Statistics for Young-of-Year (0+) Grayling	57
7.4.4	YOY Fork Length and Body Mass.....	58
7.4.5	60	
7.4.6	Fish Condition	60
8.	Discussion.....	68
8.1	Growth of Juvenile Grayling in the Lupin Mine Exposure Area.....	68
8.2	Comparison of Water Chemistry with Literature-derived Threshold Values for Freshwater Fish	71
8.2.1	Comparison of Water Chemistry with Literature-derived Threshold Values for Arctic Grayling	76
8.2.2	Overall Interpretations	78
9.	References	80

List of Figures

Figure 1-1: Exposure and Reference Study Areas for the Lupin Cycle 3 IOC EEM Program	5
Figure 1-2: Lupin Mine Tailings Containment Area	6
Figure 2-1 Arsenic Concentration in Water Samples (2009 Effluent Release)	15
Figure 2-2 Cadmium Concentration in Water Samples (2009 Effluent Release)	16
Figure 2-3 Copper Concentration in Water Samples (2009 Effluent Release)	17
Figure 2-4 Nickel Concentration in Water Samples (2009 Effluent Release)	18
Figure 2-5 Zinc Concentration in Water Samples (2009 Effluent Release)	19
Figure 2-6 Sampling Locations for 2009 Effluent Release Period.....	21
Figure 4-1: Field Chemistry, Water Quality Stations and Temperature Loggers in the Exposure Area	28
Figure 4-2: Field Chemistry, Water Quality Stations and Temperature Loggers in Reference Area 1.....	29
Figure 4-3: Field Chemistry, Water Quality Stations and Temperature Loggers in Reference Area 2.....	30
Figure 4-4: Sediment Sampling Stations in the Exposure Area	33
Figure 4-5: Sediment Sampling Stations in Reference Area 1.....	34
Figure 4-6: Sediment Sampling Stations in Reference Area 2.....	35
Figure 4-7: Fish Sampling Stations in the Exposure Area	37
Figure 4-8: Fish Sampling Stations in Reference Area 1.....	38
Figure 4-9: Fish Sampling Stations in Reference Area 2.....	39
Figure 7-1: Stream Data Logger Results for the Exposure and References Areas	52
Figure 7-2: Fork Length Frequency Distribution for Arctic Grayling (all ages) from Each Survey Area (2010)	54
Figure 7-3: Weight Frequency Distribution for Arctic Grayling (all ages) from Each Survey Area (2010)	55
Figure 7-4: Frequency Distribution of Arctic Grayling Age Categories (2010)	56
Figure 7-5: Fork Length Frequency Distribution for YoY (0+) Arctic Grayling from the Exposure Area and Reference Area 1 (2010)	58
Figure 7-6: Weight Frequency Distribution for YoY (0+) Arctic Grayling from the Exposure Area and Reference Area 1 (2010)	59
Figure 7-7: Relationship of 2010 Young of the Year (0+) Arctic Grayling Total Weight to Fork Length (Condition)	61
Figure 7-8: Relationship of Total Weight to Fork Length (Condition) for all 2010 Arctic Grayling Age Classes	62
Figure 7-9: Comparison of the Total Weight to Fork Length (Condition) Relationship for both the 2008 and 2010 YoY Arctic Grayling Sampling Seasons.	63
Figure 7-10: Linear Comparison of the Total Weight to Fork Length (Condition) Relationship of the 2008 and 2010 YoY (0+) Arctic Grayling.	64
Figure 7-11: Curvilinear Comparison of the Total Weight to Fork Length (Condition) Relationship of the 2008 and 2010 YoY (0+) Arctic Grayling.	65
Figure 7-12: Linear and Curvilinear Regressions of all Reference and Exposure Area Fish Collected and Aged in 2008 and 2010.	66
Figure 8-1: Thresholds and ranges of Cu ($\mu\text{g/L}$) associated with various sublethal effects in freshwater fish (from Spear and Pierce, 1979). The data are for low hardness waters that are relatively free of complexing agents.	74

List of Tables

Table 2-1 Water Quality Sampling Stations for 2009 Effluent Discharge– Lupin Mine Site	13
Table 2-2 Comparison of Maximum Grab and Maximum Monthly Concentrations Collected During the Effluent Release Period Compared to MMER Maximum Authorised Concentrations	20
Table 2-3: Summary of Water Quality Monitoring Downstream of Lupin Mine Effluent Discharge Location (SNP 925-20)	24
Table 4-1: Summary of Sampling Effort	27
Table 5-1: Total Annual Discharge Volumes from Lupin Mine TCA (SNP 925-10) 1994 to 2010	41
Table 5-2: Summary of Water Quality Results from Cycle 3 Compared to Cycle 1 and 2 for the Exposure Area	43
Table 5-3: Summary of Water Quality Results from Cycle 3 Compared to Cycle 1 and 2 for the Reference Areas	44
Table 6-1: Summary of Sediment Textural Characteristics	45
Table 6-2: Summary of Statistical Analysis on Sediment Quality Results from Cycle 3	46
Table 7-1: 2010 Lupin EEM Fish Catch Summary and CPUE	50
Table 7-2: Summary of Statistical Analyses of Metals Concentration in Arctic Grayling Tissue from Cycle 3	51
Table 7-3: Stream Data Logger Results for the Exposure and References Areas	51
Table 7-4: Summary Statistics for Arctic Grayling (all ages)	53
Table 7-5: Summary Statistics for Arctic Grayling (YoY)	57
Table 7-6: Results of the Statistical Analysis (ANCOVA) for Arctic Grayling Condition (Covariation of Body Weight on Fork Length) Between the Exposure Area and Reference Area 1	60
Table 8-1: Comparison of maximum observed concentration in water sample from Exposure Area to hardness-specific water quality guidelines, per CCME guidance	71
Table 8-2: Toxicological thresholds for chronic effects on Young-of-Year (YOY) Arctic Grayling (<i>Thymallus arcticus</i>)	77
Table 8-3: Toxicological Thresholds of Sub-adult Arctic Grayling for Arsenite, Cadmium, Mercury and Nickel (adapted from Buhl and Hamilton, 1991)	78

Appendices

Appendix A.	Water Quality – Field and Lab Data
Appendix B.	Sediment Quality – Lab Data
Appendix C.	Fish Survey Data – Field and Lab Data
Appendix D.	Lupin Cycle 3 EEM Program Field Work Plan and Correspondence with the Technical Advisory Panel
Appendix E.	Lupin Cycle 3 EEM Program Laboratory Results
Appendix F.	Lupin Cycle 3 EEM Program Laboratory Results

1. Introduction

The *Metal Mining Effluent Regulation* (MMER) came into effect on June 6, 2002 and is enabled under the Federal *Fisheries Act*. The MMER requires that operating metal mines in Canada carry out Environmental Effects Monitoring (EEM) programs. Under this regulation, metal mines may deposit or discharge effluent containing cyanide, metals, radium-226 and suspended solids to the aquatic environment, but at concentrations that are not acutely lethal to fish. EEM programs are carried out to provide information on the integrity of biological community within the receiving environment. The EEM program was designed as a series of 3-year monitoring and interpretation cycles. The requirements of the current cycle are dependent upon the findings of the previous cycle.

The EEM programs must be implemented in accordance with the MMER, and the generic and specific requirements of the studies are outlined in the documents listed below:

- *Metal Mining Effluent Regulation* (SOR/2002-222) of the *Fisheries Act*
- Metal Mining Guidance Document for Aquatic Environmental Effects (EEM/2002)
- Guidance for Determining Follow-up Actions when Effects Have Been Identified in Environmental Effects Monitoring (EEM) (Environment Canada, 2000)
- Revised Technical Guidance on How to Conduct Effluent Plume Delineation Studies (Environment Canada, 2003)

Metal mining EEM programs are the responsibility of both the mine owner and government. The owner is responsible for completing the pre-design study and to propose subsequent cycles of the EEM program. The government is responsible for providing guidance, review and acceptance of study designs, review of reports and review of recommendations for further action.

Environment Canada is responsible for administering certain aspects of the *Fisheries Act* and is responsible for ensuring that EEM programs are undertaken as required. Environment Canada is one member of the Technical Advisory Panel (TAP). The study design and reports are reviewed by the TAP and communication between the mining company and the TAP is managed through Environment Canada. Lupin Gold Mine, which is owned by MMG Resources Inc. (MMG), is subject to MMER. Additional details of mine operating history, aqueous discharges to waters frequented by fish, and the environmental setting are provided in Section 2 of this report.

1.1 Summary of Previous EEM Studies

1.1.1 Cycle 1 Study

A Cycle 1 EEM study was conducted for the Lupin Mine in August 2005 and the report was submitted to Environment Canada (EC) in 2006 (Golder 2006a, b). The exposure and reference areas were determined through a literature and study design submitted to EC for prior approval. The study design was based on a control (reference)/impact study design. The Cycle 1 study substantially defined the area of aquatic environment that was chemically or physically influenced by treated effluent that is periodically discharged from the tailings containment area (TCA).

A single final effluent discharge point has been previously defined for the Lupin Mine. The expected area of influence of discharge, over Dam 1A and Dam 2 and along "Seep Creek" and its tributary into Inner Sun Bay and then Outer Sun Bay of Contwoyto Lake, was defined through a combination of environmental sampling and plume delineation modeling. The model was used to predict that, under worst-case scenarios, 1% plume concentrations can extend for approximately 1,600 m into Outer Sun Bay. The exposure area, therefore, is formally defined as the Seep Creek drainage system, including various shallow channels and ponds, Inner Sun Bay, and Outer Sun Bay within

approximately 1.5 km from the Inner Sun Bay outlet. There is minimal potential for dilution of effluent from the discharge point along Seep Creek prior to discharge into Inner Sun Bay, given the small size of the watershed and limited volume inputs from areas not affected by mining activities.

Various biological and chemical characteristics of the Lupin Mine exposure area were compared to a similar reference area. The Fingers Creek drainage system, to the immediate southeast of the minesite, was investigated as a potentially suitable reference area. As noted in the Cycle 1 and 2 interpretive reports, the channels and small ponds within the Fingers Creek system are slightly deeper on average than the reference area.

In 2005, the exposure area water samples exhibited a slightly depressed pH in the range of 5.8 to 6.1. Metals/metalloids in water samples from the exposure area observed at concentrations greater than their respective Canadian (CCME, 2007) water quality guidelines for freshwater life protection included especially aluminum, arsenic, cadmium, lead, nickel, and zinc. These substances have not been observed to be appreciably elevated in reference area samples.

Under MMER, there is a requirement to conduct sublethal toxicity testing on final effluent, using the juvenile fish (fathead minnow), sensitive pelagic invertebrate (*Ceriodaphnia dubia*), algal species (*Pseudokirchneriella*) and aquatic plants (*Lemna* sp.). The following conclusions were made from the 2005 toxicity testing program (Golder 2006a):

- Undiluted effluent was not acutely toxic to fish. In addition, sublethal effects on growth were not observed;
- Undiluted effluent was not acutely toxic to invertebrates; however, reproductive impairment was observed at 4.1% to 15% effluent concentration range;
- Undiluted effluent affected the growth of algae; 17% to 27% of diluted effluent inhibited algae growth; and
- Undiluted effluent was toxic to plants; growth was inhibited at 10% to 51% effluent and reproductive impairment was observed at <6.1% to 7.8% effluent.

Based on the effluent plume modeling and the toxicity test results, it was predicted that aquatic ecological effects associated with mine effluent discharge might be observed at effluent concentrations as low as 6%. Based on this, the predicted potential zone of effects from effluent extended from the narrows between Inner and Outer Sun Bay, and under worst-case conditions the zone of effects might extend to Outer Sun Bay.

These predictions were further tested through the analysis of field populations of benthic infaunal invertebrates, based on five sample locations for each of the two areas (Exposure, Reference). The Benthic Invertebrate Community (BIC) survey data indicated the following:

- There were no statistically significant differences between the Exposure Area samples and Fingers Creek Reference Area samples for invertebrate density, family richness or the Bray-Curtis Index (BCI); and
- There was a significant difference between the areas in Simpson's diversity and evenness.

Fish habitat observed in the study area include permanent and intermittent streams which connected larger bodies of water ranging in size from medium-sized lakes over 2 m deep (Fingers Lake), small shallow ponds less than 1 m deep (Seep Creek Ponds) to a very large lake (Contwoyto Lake). The substrate types range from sand to cobble and large boulders, which provided in-stream cover for adults. The Cycle 1 study of resident fish provided information on the relative composition and abundance within the Exposure Area and Fingers Creek Reference Area. In general, the most commonly encountered and most abundant species in both areas were Arctic grayling (*Thymallus arcticus*) and ninespine stickleback (*Pungitius pungitius*). During the Cycle 1 work, 86 Arctic grayling and 99 ninespine

stickleback were captured in the exposure area while 52 grayling and one stickleback were captured in the reference area.

The Cycle 1 fish study focused on juvenile (age 1+) Arctic grayling as the target species. Arctic grayling are common to both the exposure and reference areas of the Lupin Mine EEM biological monitoring studies. This species also is commonly fished and consumed by local residents and mine personnel. Age determinations for the captured Arctic grayling indicated that 34 fish were young-of-year (YOY: 0+), 51 were age 1+ and one was age 2+ in the exposure area. In the reference area 8 fish were age 0+, 31 were age 1+ and 6 were age 2+. The general health of Arctic grayling, based on visual analysis, was similar between the reference and the exposure areas.

The major results from the Cycle 1 study on Arctic grayling were as follows:

- Age 1+ Arctic grayling were significantly (31%) heavier and (7%) longer, on average, in the Reference Area than in the Exposure Area.
- Condition was 7.5% greater in the reference fish than in the Exposure Area fish.
- Liver weight to carcass weight was not statistically different between the two areas.
- The supporting variable of liver weight to fork length was 9.5% lower in the Exposure Area than in the Reference Area fish.

This suggests that historical discharges of mine effluent have negatively affected Arctic grayling weight and length of 1+ fish, but not of condition *per se*, since the slope of the weight-length relationship (ANCOVA) was not significantly different between the Reference Area and Exposure Area samples.

1.1.2 Cycle 2 Study

The Cycle 2 EEM study was conducted in August 2008 and the report was submitted to EC in 2009 (AECOM 2009). The study was conducted three years after the last effluent discharge period. Best attempts were made to use the same sampling stations in the exposure area as those that were used in the Cycle 1 study. The Fingers Lake and Fingers Creek areas were designated as the reference area.

Effluent samples were not collected for sublethal toxicity testing for the Cycle 2 study, since no discharge occurred from the TCA since prior to the time the Cycle 1 study was completed.

For all mining-related substances the observed concentrations in water samples collected in 2008 from both the exposure and reference areas were below Canadian (CCME, 2007) guidelines for protection of freshwater life.

The Benthic Invertebrate Community (BIC) assessment conducted during the Cycle 1 study was repeated for the Cycle 2 study, using the previously used sample locations and methods. The Cycle 2 BIC assessment results are as follows:

- There were no statistically significant differences between the Exposure Area samples and Fingers Creek Reference Area samples for invertebrate density, total taxon richness, family richness, Simpson's Diversity, or Simpson's Evenness.
- The Bray-Curtis Index was significantly higher in the Exposure Area in comparison with the Reference Area.

The Cycle 2 fish study focused in juvenile (age 1+) Arctic grayling and adult ninespine stickleback. Fish were collected from the Exposure (Seep Creek system) and Reference (Fingers Creek system) areas at similar locations

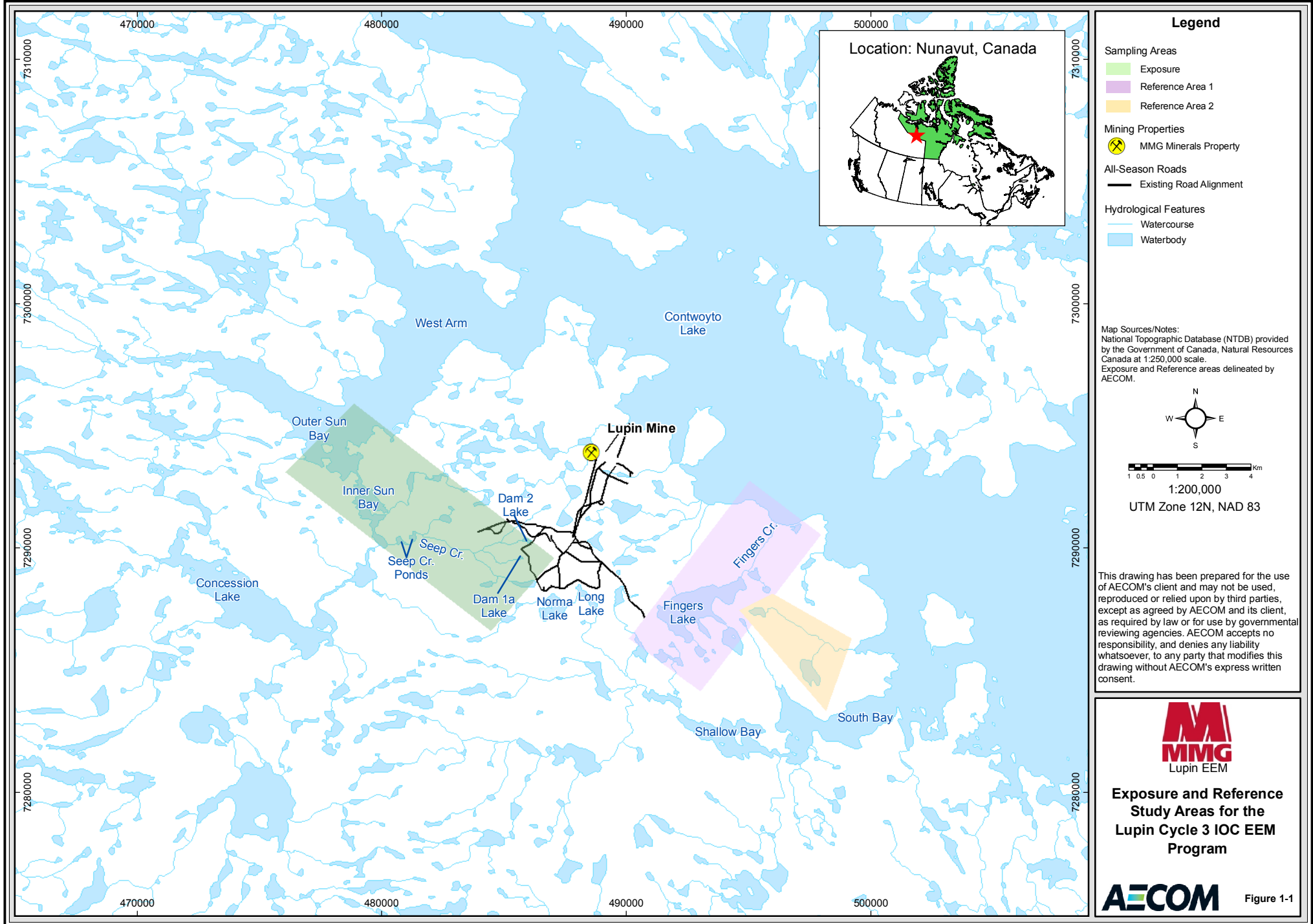
to those used in the Cycle 1 study (Golder 2006a). Based on Environment Canada (EC) recommendations, both juvenile Arctic grayling and ninespine stickleback were selected as primary sentinel target species for a lethal sampling program. The Cycle 2 study also attempted to further assess spatial differences in and implications of copper accumulation in Arctic grayling livers; however, due to the small fish size an insufficient mass of liver tissue was collected for laboratory analysis. As an alternative, muscle tissue samples taken from Arctic grayling in both areas were submitted for lab analysis of copper concentration

Based primarily on the use of electrofishing, 112 Arctic grayling and 130 ninespine stickleback were captured from the Exposure Area while in the Reference Area the numbers of fish caught were 40 and 96, respectively. All of the fish captured were immature and length-frequency distribution for Arctic grayling indicated that three distinct size classes were captured during the survey. The subsequent age determination indicated that 50% of juvenile Arctic grayling captured in the exposure area were young-of-year (YoY: 0+), only 17% were age 1+ fish, 31% were age 2+ fish and 2% were age 3+ fish. In the reference area, 77% of juveniles were young-of-year, 10% were age 1+, 17 % were age 2+ fish and there were no age 3+ fish captured. Due to the difficulty in catching adequate number of age 1+ Arctic grayling, individuals from all age groups were collected, and the analysis focuses on the 0+ as opposed to 1+ age class. A total of 109 fish from the exposure area and 39 fish from the reference area were used during the lethal sampling program.

External and internal examinations revealed no major abnormalities however two specimens from the exposure and three from the reference areas had slightly pale livers. Analysis of stomach content from larger specimens of Arctic grayling indicated that diet was mainly made up of insects and to a lesser extent juvenile ninespine stickleback.

The major results from the Cycle 2 study on juvenile Arctic grayling and ninespine stickleback were as follows:

- Average fork length and average body weight of 0+ Arctic grayling was significantly higher in the Reference Area than the Exposure Area. The 0+ grayling were on average 44% heavier and 16% longer in the Reference Area in comparison with the Exposure Area.
- An ANCOVA of weight (as the independent variable) versus fork length (as the dependent variable) was completed to assess spatial differences in condition of 0+ grayling. Condition differed between areas but the slope of the relationship was the same in both areas. Condition was 18% higher in the reference over the exposure area.
- There was no significant difference in the relationship of liver weight to carcass weight for young-of-year Arctic grayling by area.
- Body weight and length of ninespine stickleback in the exposure area were significantly heavier and longer, respectively, than reference area individuals. The slope of the length to weight relationship, however, did not differ significantly between areas.
- The ratio of liver weight to total length was statistically significantly different between areas for ninespine stickleback (for a given length, livers were heavier from exposure area versus individuals from the reference area).



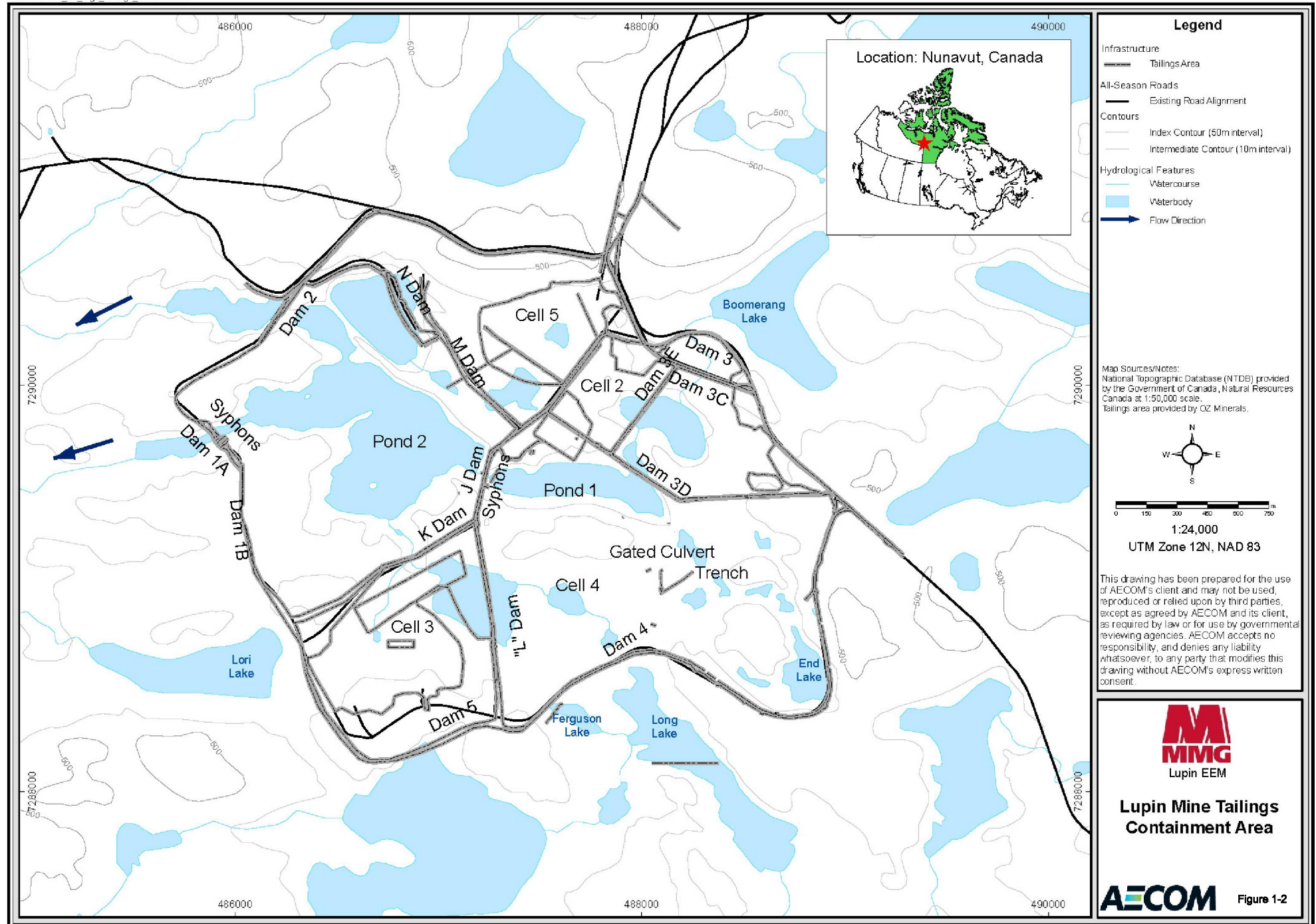
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Exposure and Reference Study Areas for the Lupin Cycle 3 IOC EEM Program



Figure 1-1



1.2 Cycle 3 Study Objectives

The major intent of Cycle 3 work program was to further assess whether differences in habitat between the Exposure Area and Reference Area may be the major cause of differences in length and weight of fish in the reference area as compared to the exposure area. The Cycle 3 Investigation of Cause (IOC) EEM study design was submitted to Environment Canada (EC) in February 2010. The study design was reviewed by the TAP and comments were provided back to MMG. MMG contracted AECOM to provide technical guidance, complete the field program and complete the Cycle 3 Interpretative EEM reporting.

Two hypotheses were initially advanced to explain the observed spatial differences in both Cycle 1 and 2 between the size and condition of juvenile Arctic grayling. This is discussed further in Section 1.3, below. The first hypothesis related to differences in temperature regime between the two areas (Figure 1-1). The second hypothesis was that there is a difference in the abundance and/or quality of forage items, especially benthic invertebrates, for the juvenile fish.

The major components evaluated for the Cycle 3 study were as follows:

- Water Quality
- Sediment Quality
- Supporting Environmental Variables
- Fish Condition
- Expectations for effects to juvenile Arctic grayling and other resident fish species based on the current state of scientific/toxicological knowledge

The last of these components is based on comments received from the TAP on the initial Cycle 3 study design, dated April 29, 2010 (see Appendix D of this report). In particular, the TAP wrote –

- “4. The facility is recommended to add a study on the potential effect of trace metals in the exposure area on grayling condition. In Phases 1 and 2, trace metal concentrations were shown to be elevated in the exposure area relative to the reference area. In some cases, trace metal concentrations in the exposure area exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for sediment and water quality (CCME 2007). Elsewhere, high trace metal concentrations in the aquatic environment have been associated with decreased condition and other physiological responses in fish (e.g., Woodward et al. 1995; Eastwood and Couture, 2002).*
- 6. The recommended approach for the trace metal study is to conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. The TAP also recommends a comparison of current trace metal concentrations in fish, water, and sediment samples from exposure and reference sites. Please include a description of field and laboratory methods, and a statistical approach to compare trace metal concentrations between exposure and reference sites.”*

The proposed assessment of the benthic invertebrate community, and evaluation of effects hypotheses related to juvenile fish food availability, was removed from the initial Cycle 3 study design at the request of the TAP, who wrote:

- “2. The facility is recommended to proceed with Hypothesis 1 to assess differences in temperature between exposure and two reference sites, provided they focus on grayling condition as an endpoint, and specify the statistical approach that will be used to test the hypothesis.*
- 3. The facility is recommended to remove Hypothesis 2 from the study design. The hypothesis is based on the assumption that grayling in the exposure and reference systems feed preferentially on specific invertebrate*

taxa (Chironomidae and Simuliidae), and that their growth rates are correlated with the availability of these prey items. In addition, previous results from Phase 2 contradict the hypothesis, where grayling condition was lower in the exposure area despite high densities of chironomids."

1.3 Approach and Study Design

There are three phases that comprise the Cycle 3 EEM studies:

- Phase 1. Study Design
- Phase 2. Study Design Implementation
- Phase 3. Interpretation and Report Preparation

This report provides the data and interpretation of the Cycle 3 EEM program to complete the third phase in the above outline. Phase 1 was completed with the approval of the Cycle 3 EEM study design, as per the letter from Ms. Cheryl Baraniecki dated August 3, 2010 and is described in detail below. Documents related to the approval of the study design are provided in Appendices A and B.

1.3.1 EEM Cycle 3 (Investigation of Cause) Study Design

For the Lupin Mine Cycle 3 EEM IOC, a fish survey is required to assess the difference in fish age and length observed in Cycle 2 between Age-0+ Arctic grayling in the Exposure Area and Fingers Creek Reference Area. A review of the primary literature suggests that Arctic grayling are among the most sensitive local species to mining-related ecosystem perturbations that influence juvenile survival. If juvenile survival of Arctic grayling decreases, it can jeopardize the viability of the population (Buzby and Deegan, 2004; Vélez-Espino *et al.* 2006).

Other studies have demonstrated that the growth and survival of 0+ Arctic grayling are strongly dependent on temperature. For example, growth of juvenile Arctic grayling increases with mean water temperature (Deegan *et al.* 1999; Dion and Hughes, 2004; Luecke and MacKinnon, 2006) and a similar pattern of temperature-dependent growth was observed in the closely related European grayling (*Thymallus thymallus*), particularly for the age-0+ cohort in streams (e.g., Mallet *et al.* 1999). It has also been observed that the selection of spawning areas by adult Arctic grayling can lead to the exposure of eggs to cold or warm water, resulting in reduced or enhanced larval Arctic grayling growth rates, respectively (e.g., Luecke and MacKinnon, 2006). Section 3 in this report provides a more detailed discussion of the physiological ecology of Arctic grayling.

Arctic grayling tend to show fidelity to summer feeding grounds (Northcote, 1995). Buzby and Deegan (2004) analyzed 17 years of mark-recapture data to estimate annual survivorship rates of Arctic grayling in the Kuparak River, Alaska. Grayling that spent the summertime in more productive, fertilized zones of experimentally manipulated stream reaches had consistently higher growth rates. In spite of this, none of the observed population parameters, including growth, condition factor, or mean fish size explained appreciable amounts of the observed variance in annual survival rates. An evaluation of interannual or longer term survivorship among Arctic grayling subpopulations in the vicinity of the mine was beyond the scope of the Cycle 3 IOC study, owing to the length of time and resources required to properly conduct such studies. Instead, the focus was on an evaluation of differences in thermal regime through the summertime, open water period between the Lupin Mine TCA Exposure Area and the Fingers Lake Reference area, in comparison with estimates of juvenile growth, including length, weight and condition.

It was hypothesized that the growth rates of age-0+ Arctic grayling will differ between areas with more lentic conditions (i.e. with a major portion of the available habitat occurring in ponds with longer water residence time) as opposed to more lotic conditions (i.e., streams with continuously running water). This, in turn, relates to the thermal

regime in these two different types of habitat. A formally stated hypothesis related to potential differences in juvenile growth and conditions is as follows:

- Water temperature for streams with abundant pond habitat will be higher through the growing season, and result in higher growth rates of age-0 Arctic grayling compared with streams with few or no ponds.

1.3.2 Study Design Component

1.3.2.1 Hypothesis: Thermal Influences

1.3.2.1.1 Water Temperature

It is postulated that Fingers Lake, in the Reference Area, provides thermal warming and thus more rapid growth of age-0+ and subsequent juvenile grayling life stages. The Exposure Area lacks significant lake or ponded water areas between the TCA outlet areas and Inner Sun Bay. Water temperatures, therefore, should be colder and thus result in a reduction of grayling age-0+ growth in comparison with the Cycle 1 and 2 Reference Area.

Water temperature typically co-varies with a large number of other variables, including water depth, substrate type, and food availability (as either pelagic/drift invertebrate or benthos). Therefore, a second Reference Area was developed, in a local area that exhibits a relative absence of ponded water (i.e., a hydrological regime intended to be more similar to the Exposure Area). This may also provide insight into a regional variation that may exist in age-0 Arctic grayling growth and survival rates (e.g., Deegan *et al.* 1999). To examine water temperature variations, digital logging thermometers (i.e., Hobo Tidbit loggers) were placed strategically in the field in the Reference, Exposure, and Alternative Reference Areas (see Section 4: Methods for greater detail).

To capture freshet, temperature loggers were placed in early July 2010. It is recognized that this is earlier than the period equal to 6 months after the submission of the Study Design, as required by the MMER. However, this placement is required to fully capture and represent the seasonal variation in water temperature across habitats near Lupin Mine, and to test the thermal hypothesis. No samples other than temperature related to the EEM program were collected.

1.3.2.1.2 Fish Survey

Based on the previous EEM studies, it was proposed to conduct a non-lethal fish survey to determine if the differences observed in the previous two cycles are still evident between the Reference and Exposure Areas. This strategy will allow for analyses to test for correlation between growth and temperature. Data from all three cycles will be used in the analyses. The survey was designed to sample and collect no more than 100 age-0+ Arctic grayling from the Reference and Exposure Areas used in the previous EEM studies.

Since it is hypothesized that the Reference Area from the previous studies may not be the most appropriate system to use (based on the presence of large lake providing increased water temperatures and therefore possible higher temperature-dependent growth rates for age-0 arctic grayling), it was proposed to assess the potential of a more suitable reference stream (i.e. minimal surface area resulting from ponding waters). Reference Area 2 and 3 (identified in Figure 1-1) were surveyed for the presence of Arctic grayling. It was proposed that only one of these would be used for further investigation. A target collection of 100 age-0+ Arctic grayling was desired from each of the Reference (existing), Exposure, and Alternative Reference (new) sampling areas to provide a non-lethal sampling program. Ideally, the sampling will occur in mid to late August. Fish survey endpoint measurements for statistical analysis include:

- Length (total, mm);
- Total body weight;

Any deviations from the submitted Fish Survey as a result of unforeseen timing of sampling or environmental conditions were discussed with MMG Resources and Environment Canada (EC) prior to any modifications, as directed by the MMER. It was proposed, for example, that if for any reason, the fish survey cannot capture 100 fish from an area, the final number of fish captured will be recorded. The focus of this study is age-0+ Arctic grayling. We used the results of the previous EEM cycles to confirm that the ages of the fish used in this study are actually within the age-0+ cohort. Given results of the previous cycles, lethal sampling and collection of fish tissue for copper analysis was not recommended.

A detailed habitat characteristic for Reference, Exposure and Alternative Reference Areas is in Section 2.

1.3.2.2 Water Quality

As outlined in the TGD (EC 2002), water quality sampling is to be completed in areas of biological sampling. Water quality samples were collected at the same location as those for benthos, prior to the collection of the required sediment samples. Parameters measured at each area included the following:

• TSS/TDS	• Nitrate	• Calcium	• Potassium
• Conductivity	• Nitrite	• Chromium	• Selenium
• Total Hardness	• Total phosphorus	• Cobalt	• Silver
• pH	• Total cyanide	• Copper	• Sodium
• Alkalinity	• DOC/TOC	• Iron	• Strontium
• Bicarbonate	• Aluminum	• Lead	• Thallium
• Carbonate	• Antimony	• Lithium	• Tin
• Chloride	• Arsenic	• Magnesium	• Titanium
• Fluoride	• Barium	• Manganese	• Uranium
• Hydroxide	• Bismuth	• Mercury	• Vanadium
• Sulphate	• Boron	• Molybdenum	• Zinc
• Ammonia	• Cadmium	• Nickel	• Radium 226

1.3.2.3 Sediment Sampling

Sediments were collected from the Reference, Exposure, and Alternative Reference benthic stations, as recommended in the TGD. Sediment samples will be collected and classified according to the Wentworth Grain-Size Classification. Sediments were analyzed for the following:

• Calcium Carbonate	• Barium	• Lead	• Thallium
• Inorganic Carbon	• Beryllium	• Mercury	• Tin
• Total Carbon	• Cesium	• Molybdenum	• Uranium
• TOC	• Chromium	• Nickel	• Vanadium
• Aluminum	• Cobalt	• Selenium	• Zinc
• Antimony	• Copper	• Silver	
• Arsenic	• Iron	• Strontium	

Phase 2 was completed with the implementation of the fish survey, sediment quality survey and water quality survey.

1.4 Report Structure

Following the introduction, this report is separated into seven main sections (Sections 2 to 8). A description of the sections and report structure is as follows:

Section 2 reviews the study area and setting.

Section 3 discusses the ecological context of the study.

Section 4 presents the study methods.

Section 5 presents the program design and results of the water quality study.

Section 6 presents the program design and results of the sediment survey.

Section 7 presents the program design and results of the fish surveys.

Section 8 discusses Cycle 3 EEM program results, and provides conclusions and recommendations.

2. Study Area and Setting

2.1 Mine History

2.1.1 Mine Setting

The Lupin Mine is located on the west shore of Contwoyto Lake, Nunavut, approximately 300 km south-east of Kugluktuk and 80 km south of the Arctic Circle (65°46' N, 111°15' W) (Figure 1-1).

Mine construction started in August 1980 and was completed in March 1982. The mine was operated continuously from 1982 to 1998 when operations were suspended and the mine went into care and maintenance status. Production resumed in April 2000, but in 2003 the mine went back into care and maintenance following a merger between Echo Bay Mines and Kinross. Operations were started again in 2004 but the mine once again went into care and maintenance in February 2005. In February of 2007, the Lupin Mine was sold to Wolfden Resources Inc. of Thunder Bay, Ontario. A holding company, Lupin Mines Inc., was created as a wholly owned subsidiary of Wolfden Resources Inc. to receive the Lupin assets and it is that company that is the legal owner of the property. In May 2007, Wolfden was acquired by Zinifex Limited of Melbourne Australia and ownership of Lupin Mines Inc. was transferred to Zinifex. In 2008, Zinifex Ltd. and Oxiana Ltd., both of Melbourne Australia merged to form OZ Minerals Ltd. with headquarters in Melbourne. Again, the ownership of Lupin Mines Inc. was transferred to the merged company. In 2009 the Canadian assets of Oz Minerals were sold to China Minmetals Inc. of Beijing, China. Minerals and Metals Group Ltd. was set up in Australia to receive the OZ Minerals assets. Minerals and Metals Group Ltd. is a wholly owned, privately held subsidiary of China Minmetals Inc. In Canada, the operating company for Minerals and Metals Group Ltd. is MMG Resources Canada Inc., which is the sole shareholder of Lupin Mines Inc., which in turn remains the legal owner of the Lupin Mine.

Lupin mine included underground mining and production systems and an ore handling system. Mining and processing equipment was designed to manage up to 2,300 tonnes per day. Materials and supplies were brought into Lupin by air transport and winter road transport while labour was brought in by air transport. Lupin is a self-contained facility with power generation and sewage facilities. The tailings containment area (TCA) is located approximately 7 km south of the mine (Figure 1-2).

2.1.2 Tailings

As reported by Golder (2006a), effluent discharge began in September 1985. Discharge from the TCA was scheduled to occur between July and September. Effluent is discharged from the TCA into Dam Lake and eventually reaches Contwoyto Lake via Seep Creek, Seep Creek Lake, unnamed creek, unnamed lake and Inner Sun Bay of Contwoyto Lake (Figure 1-1, and Figure 1-2).

2.1.3 Activities Since Cycle 2 Interpretive Report

An overview of mine operations, including management of mine water and tailings was provided in the Cycle 1 report (Golder 2006a,b). Some changes to the site have occurred since 2006.

Reclamation activities in the TCA during 2005 saw a major portion of Cell 5 and another portion of Cell 3 covered by a minimum of 1.0 m of esker gravel. The work was carried out between June 23 and September 28, 2005, with a total area covered of approximately 383,001 m².

Approximately 250,000 m² of exposed tailings remain to be covered. This work was scheduled to be completed during the summer of 2006; however, due to the premature shutdown of the 2006 winter road, Lupin did not receive enough fuel to carry out the program as scheduled.

In 2008, as part of the preparation for discharge from the TCA, 76,000 kg of lime was spread on Pond 2. The lime was dispersed over the ice surface and then covered with snow to prevent wind from blowing it around. Effluent was not released in 2008.

In 2009, approximately 3 million cubic litres of effluent was released from tailings pond 2 after effluent was tested for toxicity and passed (A. Mitchell, Lupin Mine, pers. comm.). In spring 2010, ponds 1 and 2 were treated with lime. The mine planned to transfer the treated effluent to pond 2, and subsequently release a small volume after July 15, 2010. Based on volume considerations, there was no necessity to release effluent in 2010, and for this and other reasons, no discharge occurred in 2010.

No further activities have been carried out to date and the mine site remains in care and maintenance.

2.1.4 2009 Effluent Release

2.1.4.1 Overview of Effluent Release

Analytical data from the effluent discharge was taken from July 13 to October 20, 2009. The location of the final discharge point from which samples were collected for effluent characterization is LUP-10. The effluent was released at a rate of approximately 70,000 m³/d throughout the discharge period.

2.1.4.1 Sampling Methodology

Water quality was monitored at approximately one week intervals between August 16 and October 20, 2009 at several locations in the exposure area downstream of the final discharge point (LUP-10). Table X lists and describes each monitoring station. Monitoring stations are identified on Figure 2-6.

Table 2-1 Water Quality Sampling Stations for 2009 Effluent Discharge– Lupin Mine Site

Sample Station	Location	Coordinates
LUP-10	Pond #2 discharge at Dam 1A. Sample point at siphon discharge	65°43'43.8"N 111°18'23.3"W
LUP-20	West end of Seep Creek before discharge into Unnamed Lake	65°43'57.52"N 111°25'42.87"W
LUP-21	North end of Concession Creek before discharge into Unnamed Lake	65°43'52.41"N 111°26'42.8"W
LUP-22	Inner Sun Bay near the centre of the bay	65°44'51.71"N 111°27'36.72"W
LUP-24	Inner Sun Bay near the narrows	65°45'33.89"N 111°27'37.75"W
LUP-25	Outer Sun Bay (outside bay at discharge into the main body of Contwoyto Lake)	65°45'41.34"N 111°28'38.72"W

2.1.4.2 Field QA/QC

All samples collected in the field were collected and containerized in new, lab supplied and sealed sample containers, ensuring that potential cross contamination of samples (between sample containers) was eliminated.

Field Blanks and Field Duplicates were collected during the field sampling rounds. Field Blank samples consisted of laboratory supplied de-ionized water being transferred to sample containers in the field to allow for the testing of any potential anomalous contaminants effecting analytical results (in field effect) and field duplicates consisted of a sample composite being split between two sample (container) sets and sent to the laboratory for analysis. This allows for the comparison of separate analytical results of the same sample for the purpose of in lab anomalies.

2.1.4.3 Laboratory QA/QC

All water samples collected as part of the TCA Discharge Procedure and submitted to certified laboratory for analysis (effluent characterization, toxicity and water quality) were collected following the sample collection methodology outlined in the Environment Canada guideline document, Guidance Document for the Sampling and Analysis of Metal Mining Effluent, and the sample collection methodology outlined in Section 6.3 of the Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring. Laboratory analytical methodologies, as well as method detection limits for the methodology used are outlined in the laboratory analytical certificates and results, included in Appendix E.

2.1.4.4 Sampling Results and Discussion

Sampling locations area shown in Figure 2-6. Graphical representations of trends in metal concentrations are shown in Figures 2-1 to 2-5. The locations discussed here include the effluent release point (LUP-10), the Exposure Area (LUP-20) and the receiving water body, Contwoyto Lake (LUP- 22, 24, and 25). Table 2-2 shows the monthly average and maximum sampling concentrations in comparison to the maximum concentrations allowed under the MMER. No samples collected during the 2009 effluent release period exceeded either the maximum monthly mean concentrations or the maximum authorised concentrations in a grab sample.

The arsenic concentration of the effluent discharge from Lupin Mine in 2009 increased over the course of the discharge period but was consistently below the MMER guidelines for a single sample set at 1.0 mg/L. The majority of the effluent samples were greater than the CCME standard for aqueous arsenic set at 0.005 mg/L. However, the downgradient samples collected from Seep Creek and Contwoyto Lake were all below the CCME standard over the entire sampling period.

The cadmium concentration of the effluent discharge from Lupin Mine in 2009 was generally constant over the course of the discharge period except for a few spikes that occurred in September. No MMER exists for cadmium. The majority of the effluent samples and downgradient water samples in Seep Creek and Contwoyto Lake were greater than the CCME standard for aqueous cadmium set at 0.000017 mg/L.

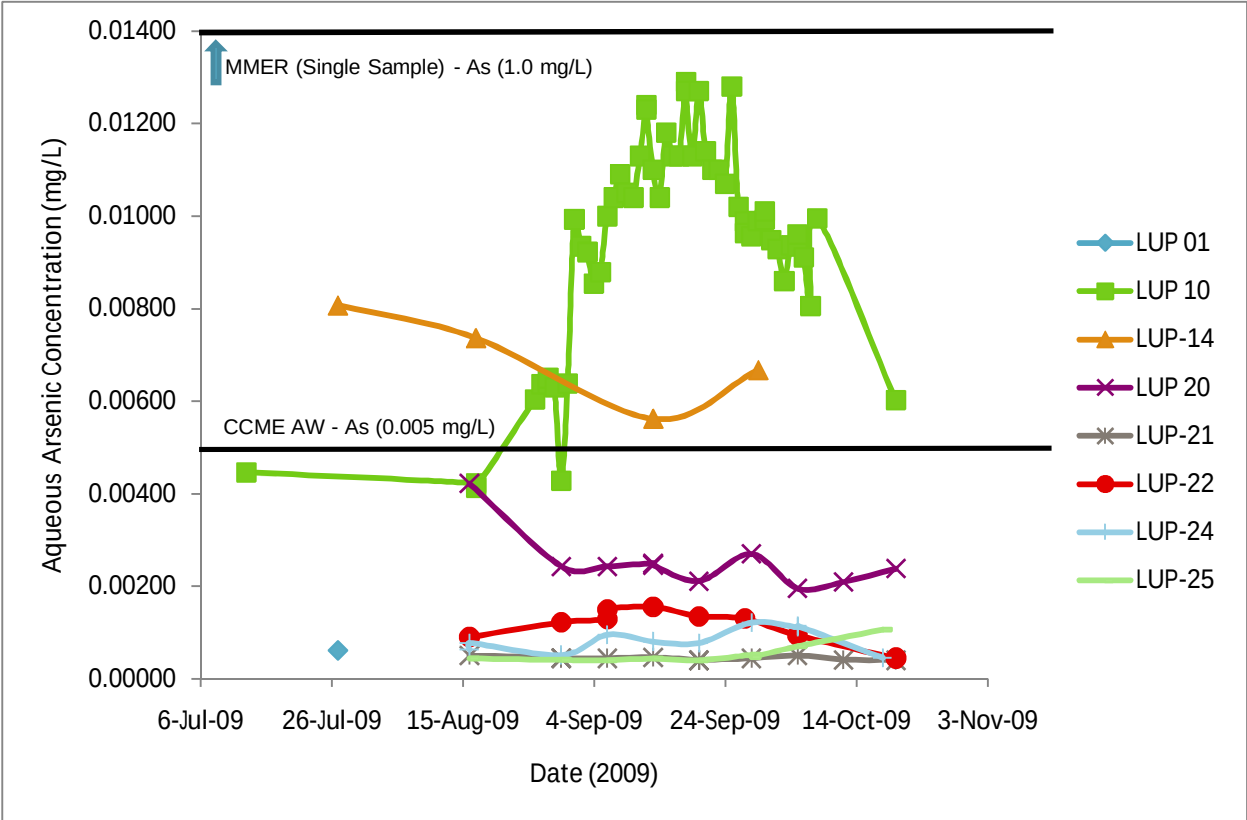


Figure 2-1 Arsenic Concentration in Water Samples (2009 Effluent Release)

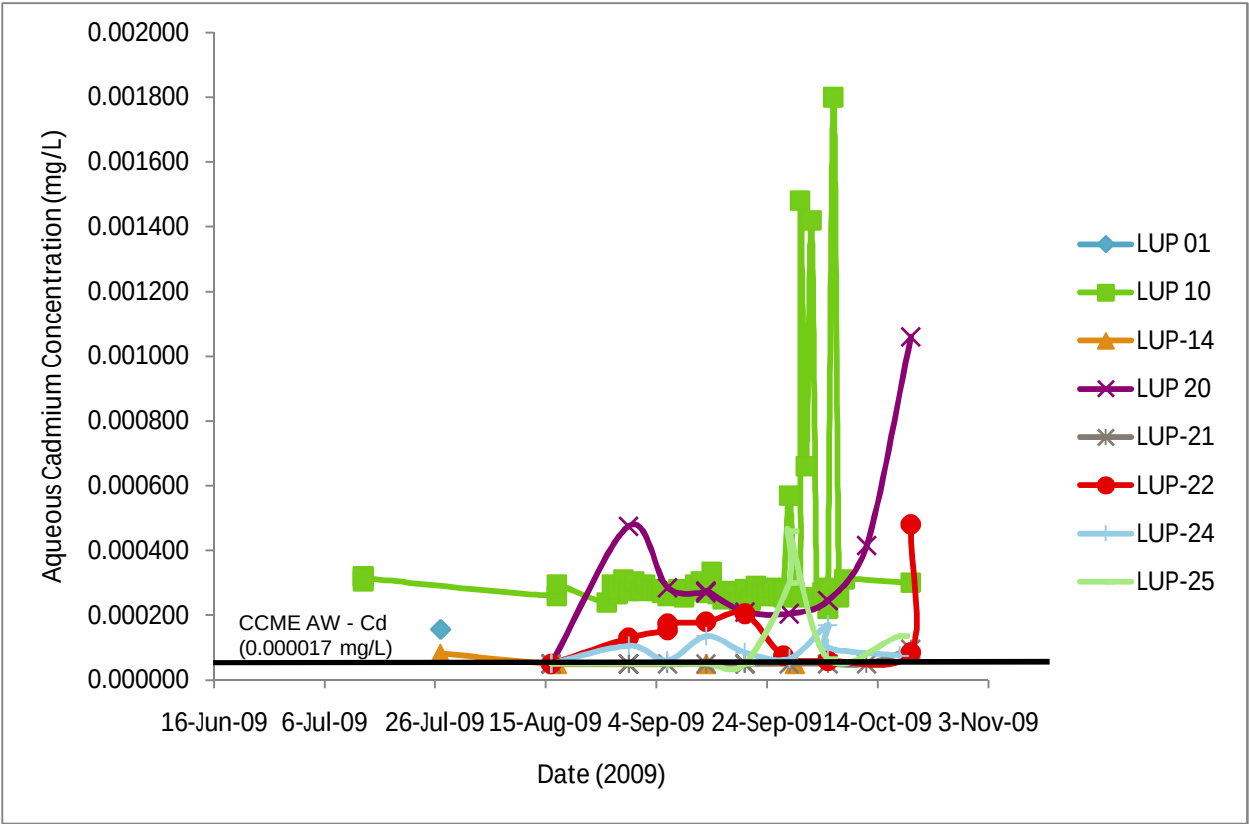


Figure 2-2 Cadmium Concentration in Water Samples (2009 Effluent Release)

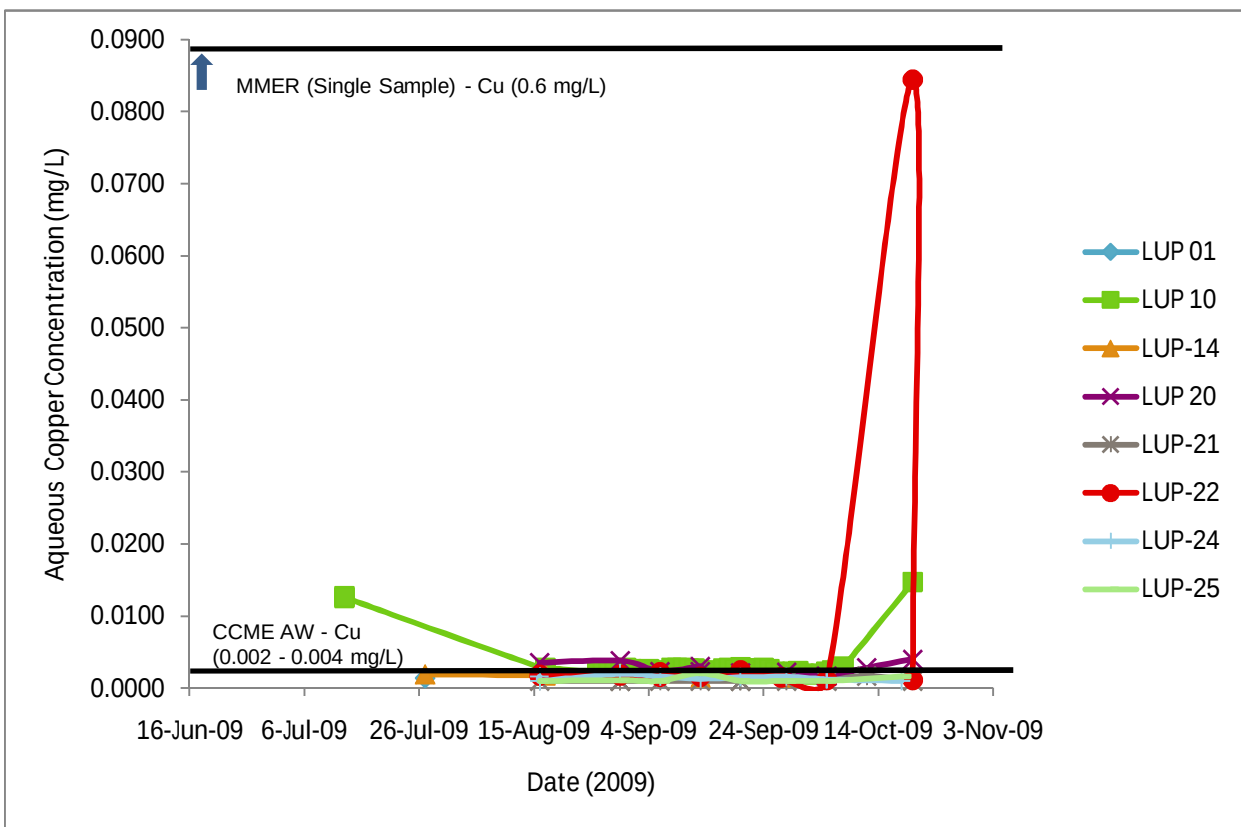


Figure 2-3 Copper Concentration in Water Samples (2009 Effluent Release)

The copper concentration of the effluent discharge from Lupin Mine in 2009 was generally constant over the course of the discharge period except for one spike that occurred in October and was consistently below the MMER guideline for a single sample set at 0.6 mg/L. The majority of the effluent samples and downgradient water samples in Seep Creek were greater than the CCME standard range (hardness dependent) for aqueous cadmium set at 0.002 to 0.004 mg/L. However, the concentrations were generally below the CCME standard for samples collected in Contwoyto Lake.

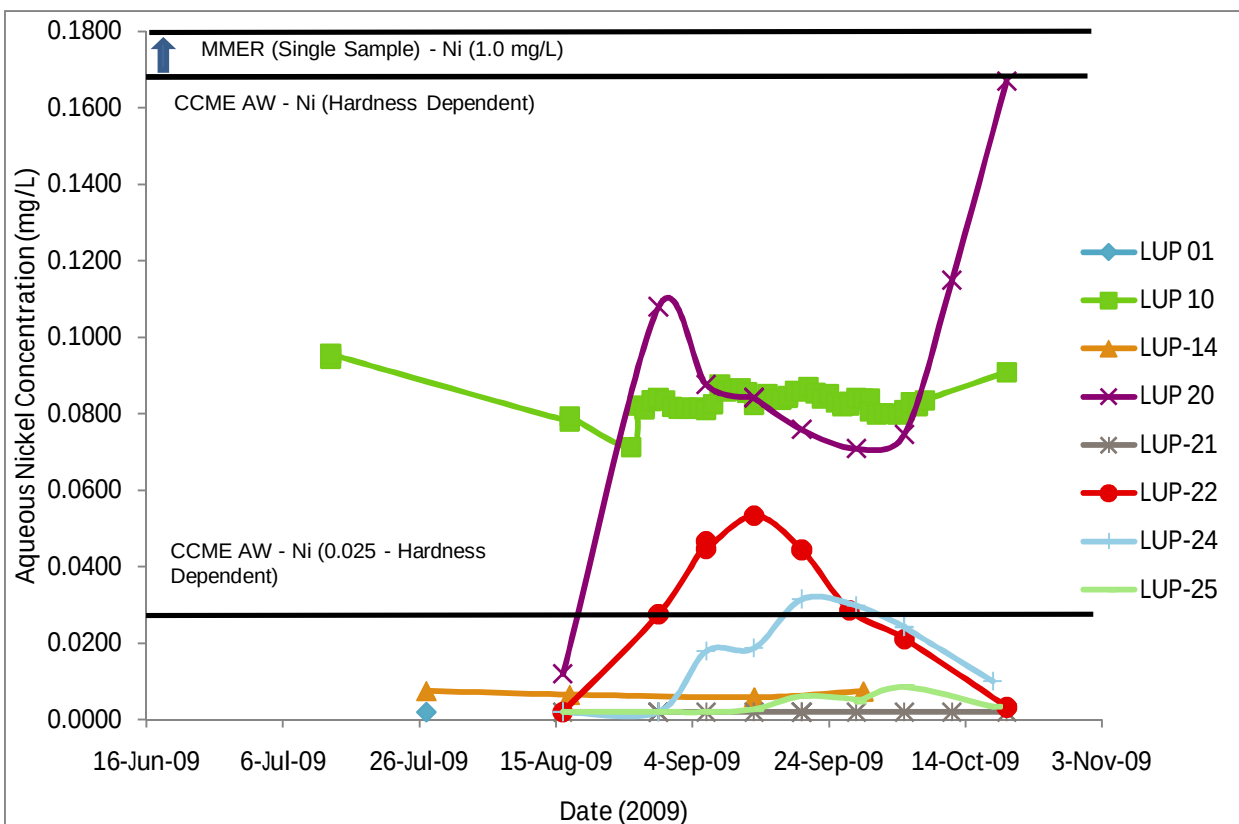


Figure 2-4 Nickel Concentration in Water Samples (2009 Effluent Release)

The nickel concentration of the effluent discharge from Lupin Mine in 2009 was generally constant over the course of the discharge period and was consistently below the MMER guideline for a single sample set at 1.0 mg/L. The majority of the effluent samples and downgradient water samples in Seep Creek were greater than the CCME standard range (hardness dependent) for aqueous nickel set at 0.025 to 0.15 mg/L. In this case the majority of the effluent samples (LUP-10) have a hardness of less than 50 mg/L and therefore are compared to 0.025 mg/L which means they were above the standard. Samples collected from Seep Creek (LUP-20) generally increased over the course of the sampling period including higher concentrations than the actual effluent near the end of the sampling period (October, 2009). The majority of the Seep Creek samples have a hardness of greater than 100 mg/L and therefore are compared to 0.01 mg/L which means they were below the standard, except for the last two samples collected in October had higher concentrations and higher hardness which still placed them below the CCME standard. The majority of the sampling locations in Contwoyto Lake increased until mid September and then declined over rest of the effluent release period. Based on the hardness level of each sample none of the nickel concentrations recorded in Contwoyto Lake in mid September were greater than the CCME standard for nickel. Late season shifts in aqueous metals concentrations contrary to effluent release trends in Contwoyto Lake could be the result of lake mixing caused by fall winds and temperature change.

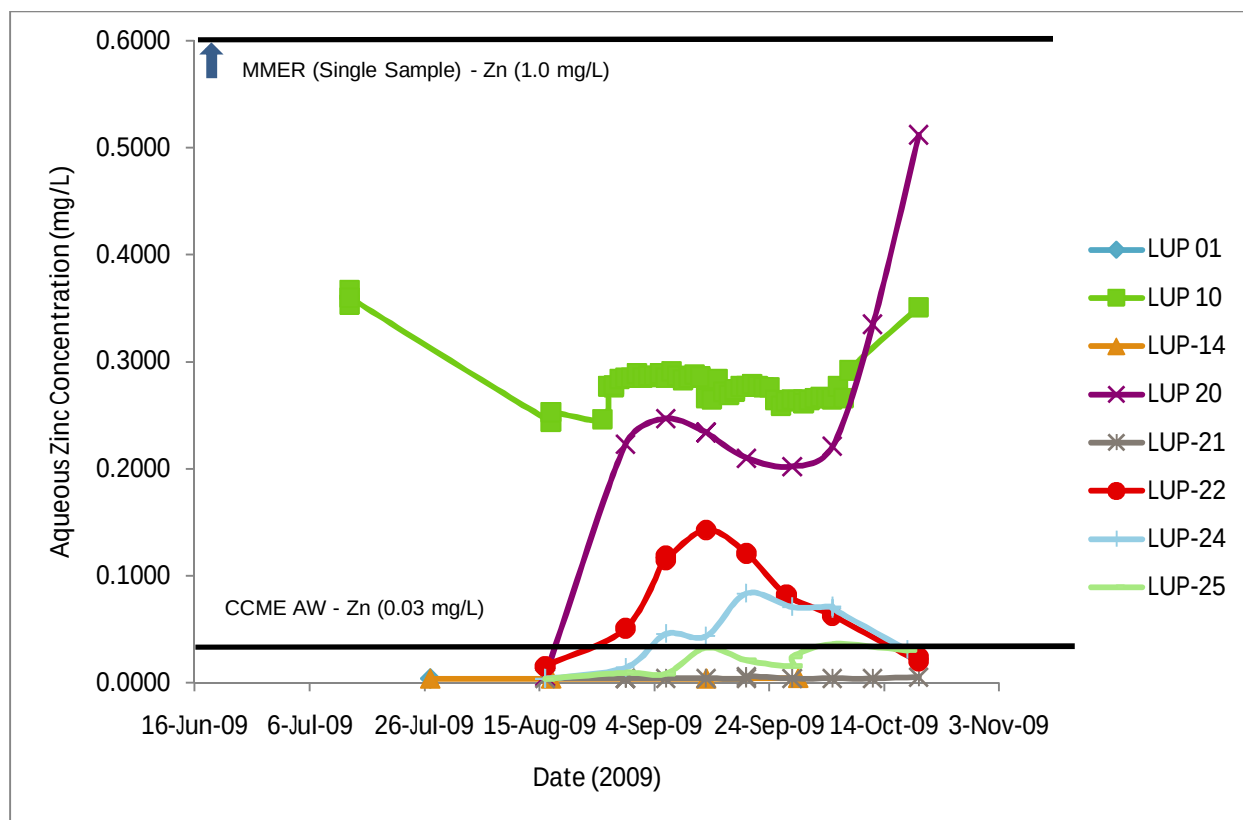


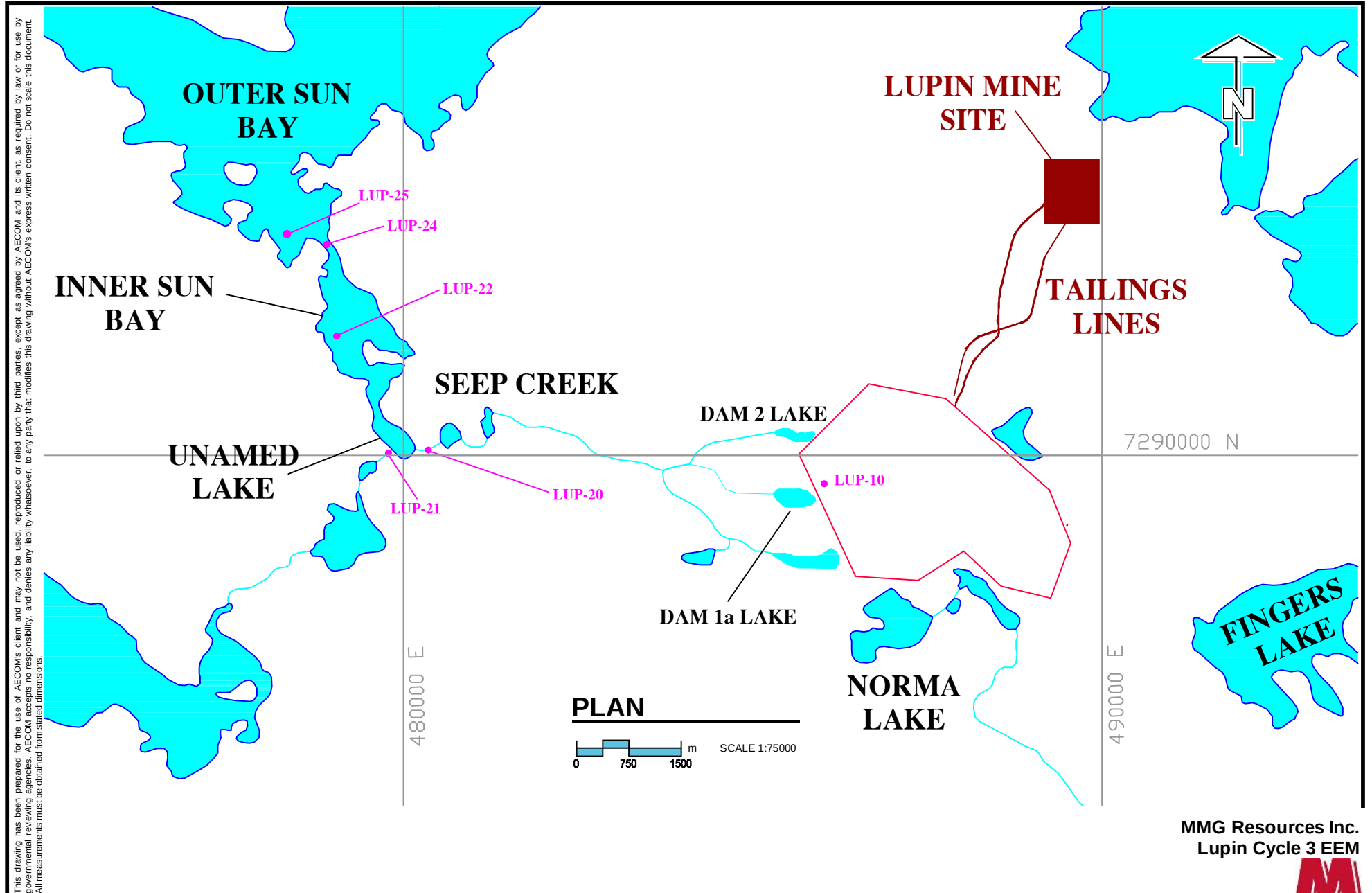
Figure 2-5 Zinc Concentration in Water Samples (2009 Effluent Release)

The zinc concentration of the effluent discharge from Lupin Mine in 2009 was generally constant over the course of the discharge period and were consistently below the MMER guideline for a single sample set at 1.0 mg/L. The majority of the effluent samples and downgradient water samples in Seep Creek were greater than the CCME standard for aqueous zinc set at 0.03 mg/L. Samples collected from Seep Creek generally increased over the course of the sampling period including higher concentrations than the actual effluent near the end of the sampling period (October, 2009). The majority of the sampling locations in Contwoyto Lake increased until mid September and then declined over rest of the effluent release period. A few of the samples highest nickel concentrations recorded in Contwoyto Lake in mid September were greater than the CCME standard for nickel. Late season shifts in aqueous metals concentrations contrary to effluent release trends in Contwoyto Lake could be the result of lake mixing caused by fall winds and temperature change.

Table 2-2 Comparison of Maximum Grab and Maximum Monthly Concentrations Collected During the 2009 Effluent Release Period Compared to MMR Maximum Authorised Concentrations

	Monthly Average (mg/L) – LUP-10				Monthly Average (mg/L) – LUP-20			Monthly Average (mg/L) – LUP-22			Maximum Authorized Monthly Mean Concentration (mg/L) (MMER)	Maximum Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L) (MMER)
	July.	Aug.	Sept.	Oct.	Jul.	Aug.	Sept.	Aug.	Sept.	Oct.			
Arsenic	0.0039	0.0058	0.0107	0.0089	0.0033	0.0024	0.0021	0.0011	0.0014	0.0006	0.5	0.013	1.0
Copper	0.0126	0.0026	0.0025	0.0035	0.0037	0.0024	0.0028	0.0018	0.0019	0.0289	0.3	0.084	0.6
Cyanide	0.0030	0.0020	0.0020	0.0023	0.0020	0.0020	0.0035	0.0020	0.0020	0.0020	1.0	0.005	2.0
Lead	0.0003	0.0002	0.0001	0.0002	0.0003	0.0001	0.0001	0.0004	0.0002	0.0001	0.2	0.004	0.4
Nickel	0.0952	0.0809	0.0838	0.0820	0.0600	0.0806	0.1189	0.0148	0.0435	0.0092	0.5	0.167	1.0
Zinc	0.3600	0.2730	0.2766	0.2780	0.1145	0.2254	0.3560	0.0334	0.1160	0.0357	0.5	0.512	1.0
Total Suspended Solids	3.0	3.1	3.4	3.0	3.0	3.2	3.0	3.0	3.0	3.0	15	8.0	30
Ra-226 (Bq/L)	0.005 Bq/L	N/A	0.02 Bq/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.37 Bq/L	0.02 Bq/L	1.11 Bq/L

	Monthly Average (mg/L) – LUP-24			Monthly Average (mg/L) – LUP-25			Maximum Authorized Monthly Mean Concentration (mg/L) (MMER)	Maximum Concentration (mg/L)	Maximum Authorized Concentration in a Grab Sample (mg/L) (MMER)
	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.			
Arsenic	0.0006	0.0009	0.0009	0.0004	0.0004	0.0009	0.5	0.013	1.0
Copper	0.0015	0.0015	0.0011	0.0011	0.0012	0.0013	0.3	0.084	0.6
Cyanide	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	1.0	0.005	2.0
Lead	0.0015	0.0002	0.0001	0.0002	0.0003	0.0011	0.2	0.004	0.4
Nickel	0.0020	0.0267	0.0195	0.0020	0.0042	0.0060	0.5	0.167	1.0
Zinc	0.0075	0.0660	0.0572	0.0068	0.0207	0.0335	0.5	0.512	1.0
Total Suspended Solids	3.0	3.3	3.0	5.5	3	4	15	8.0	30
Ra-226 (Bq/L)	N/A	0.005	N/A	N/A	N/A	N/A	0.37 Bq/L	0.02 Bq/L	1.11 Bq/L



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Lupin Cycle 3 EEM



2.2 Environmental Setting

2.2.1 Climate

Climate in this region is semi-arid subarctic with a mean daily temperature of -11.1°C and average annual precipitation of 299 mm (Canadian Climate Normals 1961-2000). Average temperature in May through September is 4.6°C and the heaviest precipitation occurs in June through September (Canadian Climate Normals 1961-2000). Snowfall can occur in any month but the heaviest snowfalls generally occur in October with an average annual snowfall of 138.1 cm (Canadian Climate Normals 1961-2000). The study area is subject to frequent strong winds from the northwest (Beak Consultants Ltd. and Mary Collins Consultants Ltd. 1980; Geocon Ltd. 1980).

2.2.2 Geology and Topography

The bedrock in the vicinity of the Lupin Mine is archaic in age including supracrustal rocks of the Yellowknife supergroup of the Slave province of the Canadian shield. Rock types occurring in the vicinity of the mine include ultramafic, mafic, intermediate and felsic volcanic rocks, intrusive rocks and siliciclastic rocks and ironstones. The gold mineralization at the mine is hosted primarily by the ironstones. This region contains intrusive igneous material such as granite (Natural Resources Canada 2003). In the vicinity of the mine, terrain is low and undulating ranging between 450 and 530 m elevation. There are numerous shallow lakes and streams throughout the area (Gartner Lee Limited 2008a, b).

2.2.3 Vegetation

Lupin Mine is located in the subarctic tundra vegetation zone. This is an area characterized by continuous permafrost and "barren ground" vegetation including moss, lichens, heather and dwarf shrub communities in the well-drained areas and grasses and sedges in the wet areas adjacent to waterbodies. Dwarf shrubs, up to 1 m high, occur adjacent to some waterbodies (RCPL and RL&L 1985).

2.2.4 Hydrology

Contwoyto Lake is the major waterbody in the study area with a surface area of approximately 959 km² and a drainage area of approximately 8,000 km² (Roberge *et al.* 1986). Contwoyto Lake has two outflows. The main outflow to the north, drains to the Burnside River and ultimately to Bathurst Inlet; the smaller outflow to the south, drains to the Contwoyto River and into Back River (Rescan 2002). The main basin of Contwoyto Lake is to the east and south of the mine (Figure 1). To the north of the mine, West Arm extends to the west terminating in a narrow bay (Outer and Inner Sun Bay). This area is west of the mine and ultimately receives mine waste after it has travelled through small lakes and streams.

Seep Creek, a small stream approximately 6.5 km in length, flows westerly from the mine area into Inner Sun Bay (Figure 1-1, 1-2). Seep Creek watershed contains three lakes (Dam 2 Lake, Dam 1A Lake and Unnamed Lake), three headwater streams, two ponds (Seep Creek Ponds 1 and 2) and two embayment areas (Inner and Outer Sun Bay).

- Dam 2 Lake is a small lake, 7 m maximum depth, bordered to the north by a gravel pit and on the east by the TCA

- Dam 1A Lake is a shallow lake (< 1 m) south of Dam 2 Lake; water from the TCA discharges into this lake
- Dam 2 Lake and Dam 1A Lake are drained by tributaries that join to form Seep Creek
- Unnamed Lake is south of Dam 1A Lake
- A tributary from Unnamed Lake joins Seep Creek approximately 400 m downstream of the Dam 2 Lake and Dam 1A Lake tributary confluence

2.3 Historical Water Quality Monitoring and Effluent Plume Study

2.3.1 Historical Water Quality

One final effluent discharge monitoring point occurs at the mine, as identified by Kinross to Environment Canada. This station is identified as Surveillance Network Point (SNP) 925-10. In the Cycle 1 report, water quality results collected from this location were summarized (Golder 2006a). There were no samples collected from this location as part of the EEM program, so the table has not been reproduced. To summarize, several metals and other substances were routinely measured. Routine measurements - including pH, conductivity, total suspended solids (TSS) and metals including arsenic - remained at consistent concentrations and less than the *Authorized Limits of Deleterious Substances*, as defined in Schedule 4 of the MMER.

Conductivity has historically been measured at various sampling points in the exposure area. Field conductivity at the mouth of Seep Creek was recorded at 519 $\mu\text{S}/\text{cm}$ (SNP 925-20) while at the mouth of Concession Creek (creek that drains Concession Lake before it enters Seep Creek watershed) it was recorded at 11 $\mu\text{S}/\text{cm}$.

For the 2010 Cycle 3 program, only one water quality sample was collected from SNP 925-20. These results are compared qualitatively to the historical records. The historical records were provided in the Cycle 1 and Cycle 2 report and are reproduced here for comparison to the 2010 results (Table 2-1). Conductivity, hardness and pH were lower in 2008 and 2010 in comparison with 2000 to 2005. TSS, cyanide and total lead were undetectable in the 2010 sample. Ammonia was much lower in the 2010 sample as compared to historic samples. The total copper concentration has not changed appreciably since 2000. While total nickel concentration has decreased, hardness has also decreased and the concentration measured in 2010 was above the CCME guideline for protection of aquatic life. Total zinc has decreased since 2000.

Table 2-3: Summary of Water Quality Monitoring Downstream of Lupin Mine Effluent Discharge Location (SNP 925-20)

			2000 ^b	2002 ^b	2005 ^b	2008	2010
Parameter	Units	CCME Aquatic Life ^a	Mean	Mean	Mean	Sept '08	Aug '10
pH	pH unit	6.5-9.0	6.03	6.48	5.7	5.6	6.86
Conductivity	uS/cm		887	748	519	65.8	67.3
Hardness	mg/L		231	199	135	24	22.9
TSS	mg/L		0.53	0.93	<2	<3	<3.0
Alkalinity	mg/L		<5	7.4	<5	<5	6.2
Cyanide	mg/L	0.005	0.007^c	0.015	0.016	<0.002	<0.0020
Ammonia	mg/L	0.019	2.72	0.72	0.64	<0.005	0.0086
Arsenic	mg/L	0.005	0.0024	0.0036	0.0032	0.00186	0.00672
Cadmium	mg/L	0.000017	<0.0006	0.00017	0.00017	0.00006	0.000014
Copper	mg/L	0.002-0.004	0.005	0.004	0.005	0.0052	0.00427
Lead	mg/L	0.001-0.007	<0.002	0.0002	0.0001	<0.00005	<0.000050
Nickel	mg/L	0.025-0.15	0.115	0.0755	0.0762	0.0426	0.0175
Zinc	mg/L	0.03	0.228	0.146	0.159	0.0392	0.00823

Notes: a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007;

b) Golder, 2006a;

c) Values higher than CCME WQG_{AL} are shown in italics and bold (as well as values with a pH < 6.5)

2.3.2 Historical Effluent Plume Study

The MMER requires an estimate of effluent concentration at 250 m downstream from the final discharge point (FDP) and a description of effluent mixing within the environment to a concentration of 1%. When effluent is being released, it is common to use field conductivity measurements as a way to measure effluent concentration.

At Lupin Mine, 250 m downstream of the FDP is within Dam 1A Lake. In 2005, field conductivity measured from the effluent was 847 µS/cm and the lab measured conductivity from the sample in Dam 1A Lake was 738 µS/cm. Base flows in Seep Creek are very low and it has been estimated that up to 90% of the flow is due to effluent discharge (RL&L and DFO 1991). Based on the conductivity of the sample from 250 m downstream of the FDP, the water in the receiving system was comprised of 87% effluent.

A mixing and dispersion model was developed by Golder (2004) to describe the movement and concentration of effluent from the FDP to Outer Sun Bay. The model predicted that the 1% effluent limit would extend 850 to 1200 m from the mouth of the narrows in Outer Sun Bay.

The dispersion model was initially developed using data from 2000 and 2002 but results were updated with data from 2005 (Golder 2006b). Runoff conditions were lower in 2005 than originally modelled. When these conditions were included and the model was re-analyzed, the 1% dispersion limit extended to 1630 m beyond station SNP 925-25. The 2005 results from the sample at SNP 925-25 were considered consistent with the model.

2.4 Exposure and Reference Areas

2.4.1 Exposure Area

Seep Creek, Seep Creek Ponds and Sun Bay were designated as the Exposure Area (Golder 2006a). Best attempts were made to use the same sampling stations in the exposure area in the Cycle 3 study as were used in the Cycle 1 and Cycle 2 study based on data provided in the Cycle 2 report. The aquatic habitat in the Exposure Area, downstream of the TCA, is referenced as the Seep Creek watershed. Lakes Dam 2, Dam 1A and unnamed are west of the TCA. Dam 1A Lake receives effluent from the FDP. Dam 1A Lake is drained by Seep Creek. The creek that drains Dam 1A Lake joins with the creek that drains Dam 2 Lake (Seep Creek). Seep Creek flows for approximately 2.5 km before it enters two ponds (Seep Creek Pond 2 and Seep Creek Pond 1). Seep Creek is a well defined channel, 1 to 4 m wide with substrate dominated by boulders (RCPL and RL&L 1985). Seep Creek Ponds 1 and 2 are shallow (less than 1.5 m).

Historically, Lake trout, Arctic grayling, Arctic cisco (*Coregonus autumnalis*), round whitefish (*Prosopium cylindraceum*), ninespine stickleback and slimy sculpin (*Cottus cognatus*) have been documented in Seep Creek (RCPL and RL&L 1985). Fish use this stream for spawning, feeding and juvenile rearing in the early part of the open water season (RL&L and DFO 1991).

2.4.2 Reference Area 1

Fingers Lake and Fingers Creek was designated as Reference Area 1. The Fingers Lake watershed is located east of the mine. Like the Seep Creek watershed, the Fingers Lake watershed also has a connection to Contwoyto Lake. Fingers Creek flows for approximately 3 km between Fingers Lake and Contwoyto Lake. Fingers Creek is between 1 to 3 m wide with substrate dominated by silt, boulders and cobble in the upper reaches, cobble gravel and silt in the middle reaches and cobble and boulders in the lower reaches. Habitat varied between shallow flat in the upper reaches and shallow run in the lower reaches.

Fingers Lake has a maximum depth of 6 m and a surface area of 3.7 km². Lake trout (*Salvelinus namaycush*) and Arctic char (*Salvelinus alpinus*) have been captured in Fingers Lake (Moore 1978) and prior to the Cycle 1 EEM study, fish capture data for Fingers Creek had not been previously collected.

2.4.3 Reference Area 2

A second reference area was included in the Cycle 3 study to better understand availability of fish habitat in the vicinity of the exposure area. Reference Area 2 is southeast of reference area 1 but the two areas are not hydrologically connected. Reference area 2, like area 1, drains to Contwoyto Lake but unlike area 1, it has two small ponds in the drainage area as opposed to one large pond. The creek flows for about 3 km between the upper pond and Contwoyto Lake. The creek is about 1 to 2 m wide with a substrate dominated by boulders and fines.

3. Ecological Context

The appropriate design of an EEM program and interpretation of results requires a good understanding of the physiological ecology and life history of the resident aquatic species of interest (Barrett and Munkittrick, 2010; Gray *et al.*, 2002). Arctic grayling were chosen as the species of the fish survey on recommendation from Environment Canada (EC). A brief synopsis of the ecology of this species is provided below, based in part on summaries provided by Scott and Crossman (1979) and Northcote (1995; 2000). Additional ecological studies that are directly relevant to the interpretation of this Cycle 3 study are also discussed in Section 8 (Conclusions and Recommendations).

The Arctic grayling (*T. arcticus*) is a freshwater fish in the family Salmonidae and subfamily Thymallinae. The Arctic grayling is a strikingly coloured fish; the back is purple to blue-black or blue-grey with sides of a pinkish iridescence having a number of V-shaped or diamond shaped spots. The head is olive-green with a mauve iridescence. The Arctic grayling is distinguished from the similar grayling (e.g. the European grayling *Thymallus thymallus*) by the absence of dorsal and anal spines and by the presence of a larger number of soft rays in the fins. There is a dark midlateral band between the pectoral and pelvic fins. The adult Arctic grayling can grow to a maximum recorded length of 76 cm and a maximum recorded weight of 3.8 kg; while the average length is 30-38 cm and the average weight is 0.5-1.5 kg. (Scott and Crossman, 1979).

The Arctic grayling has a holarctic distribution occurring in northern freshwater drainages from Hudson Bay west to the Pacific Ocean, north to the Bering Sea to the Kara and Ob rivers of North Eurasia and south into Asia to northern Mongolia. Grayling prefer cold waters of mid-sized to large rivers and lakes. They are omnivorous fish, with the most important food items comprising of crustaceans, insects and insect larvae. Adult grayling can become piscivorous, feeding on smaller fish, the young of year grayling feed on zooplankton and insect larvae. (Scott and Crossman, 1979)

Grayling are spring spawners and move into spawning areas during ice break-up, which can vary over their subarctic habitat, from April to June. As the ice breaks up in the small streams, the adults migrate from larger rivers and lakes to small gravel or rock bottomed tributaries. Graylings have been found to spawn in habitats ranging from small shallow stream, to large rivers and lakes with substrates ranging from fines and gravels to cobbles and boulders. (Scott & Crossman 1979).

Hatching time is temperature driven and therefore is very site-specific. Hatching in northwestern Canada has been found to occur from 16 to 18 days after fertilization at 9 °C. The relationship between temperature and hatching is suspected to be curvilinear; however, there have been no carefully controlled studies to confirm this. The newly emergent grayling fry can range from 8 to 15 mm in length at hatch and spend 8 days absorbing their yolk, but begin to take food at 3 days after hatching. The fry feed predominantly on benthic invertebrates, with terrestrial insect becoming a larger part of their diet as they become older. The fry remain in the stream near the spawning area for several weeks, and then move out into deeper and faster moving water. Growth is fast in the first year, with the young of the year in Nueltin Lake, NWT measuring 64mm in length by late August (Harper, 1964). Growth in subsequent years varies by latitude and temperature, with slower growth occurring at more northern latitudes. (Northcote, 1995)

Both male and female grayling can reach sexual maturity at 4 years, but the majority of spawners are 6-9 years of age. Once spawners have reached sexual maturity they can spawn every year. (Scott & Crossman 1979). The maximum reported longevity varies between populations, but ages up to 13+ years have been documented for some higher latitude populations (DeCicco, 2002).

4. Methods

4.1 Water Quality

Water quality samples were collected in the exposure and reference areas as part of the Cycle 1 (2005) and Cycle 2 (2008) programs and again in the Cycle 3 field program (Figures 4-1, 4-2 and 4-3). Sample collection and results from the Cycle 3 program are presented below. The Cycle 3 field program was completed between August 18 and 29, 2010. Water temperature loggers were installed on July 7, 2010, but no field data other than field measurements at the logger sites were collected at that time.

4.1.1 Study Design

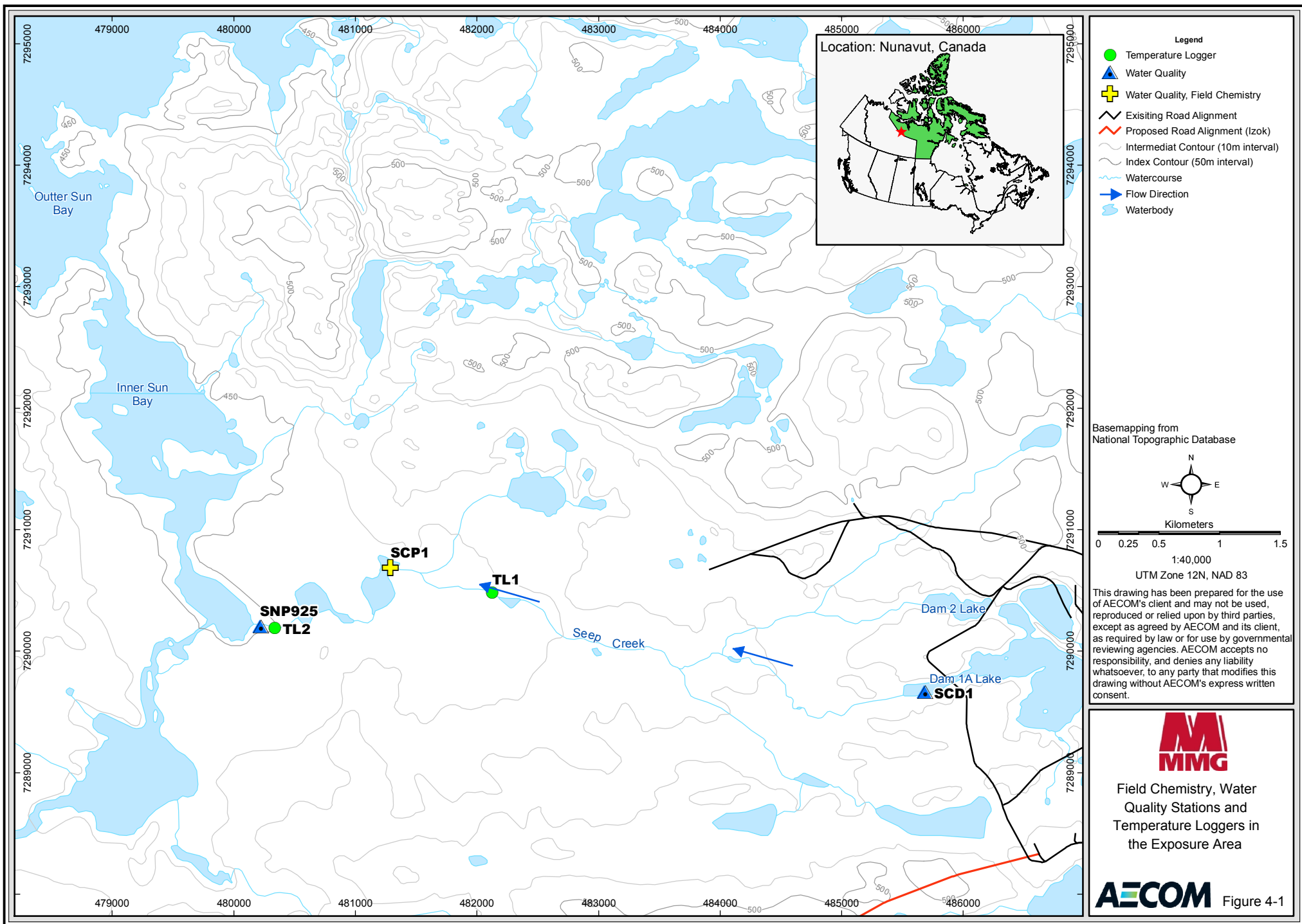
Sampling locations were based on those locations used in the Cycle 1 and 2 studies. For the Cycle 3 study, an additional reference area was added. Water quality samples were collected from each area to characterize water quality for the entire area. Grab water samples were collected but analyzed separately. Field data was also collected to characterize physical conditions during sample collection. The general sampling effort for the entire August field program is summarized in Table 4-1.

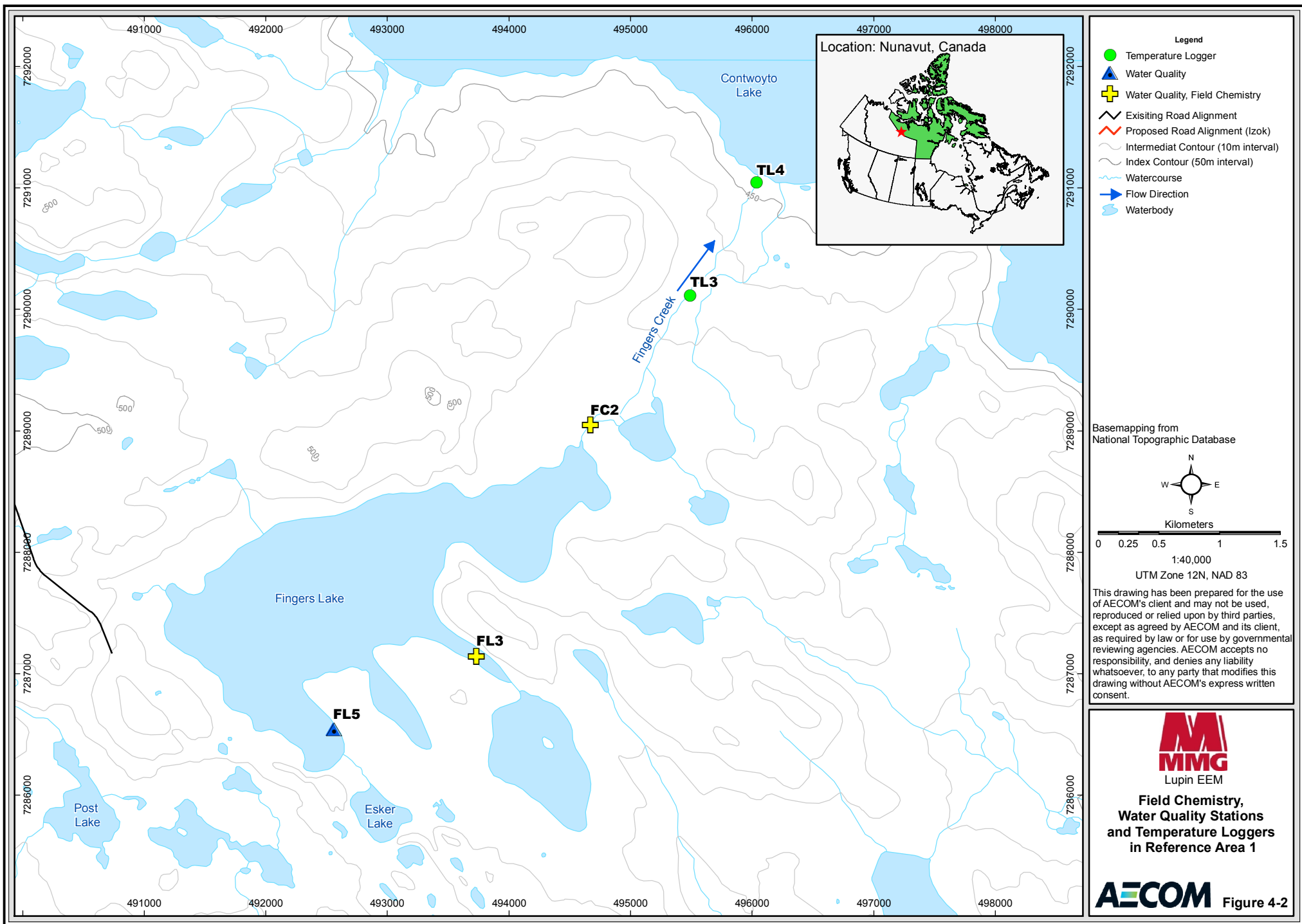
Table 4-1: Summary of Sampling Effort

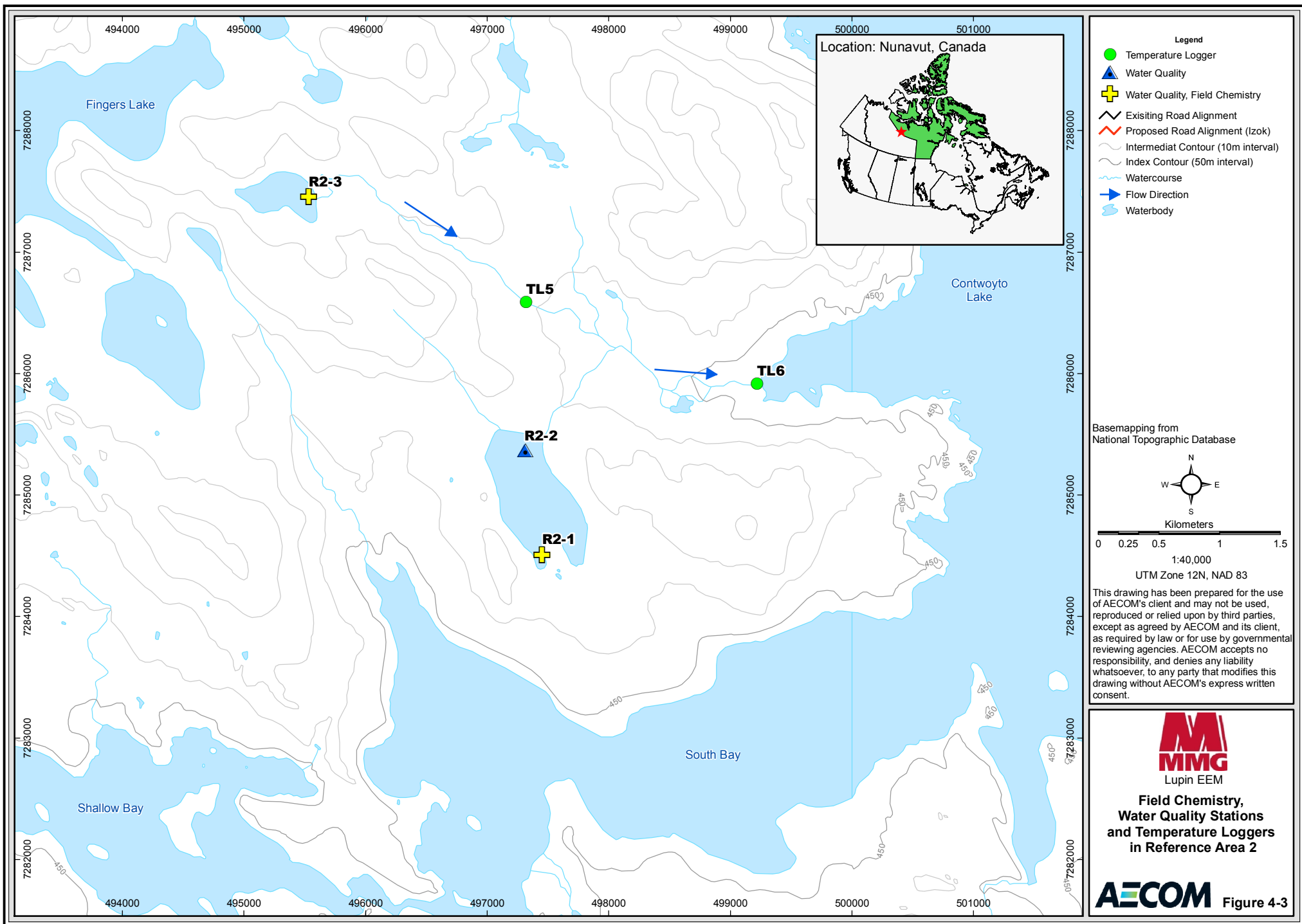
Area	Site	Zone	Easting	Northing	Field Chemistry	WQ	SQ	Fish
Exposure	SCD1	12W	485695	7289659		yes		
	SCP1	12W	481289	7290694	yes	yes+rep	yes	yes
	SCP2	12W	481065	7290479			yes	yes
	SCP3	12W	480953	7290309			yes	yes
	SCP4	12W	480747	7290395			yes	yes
	SCP5	12W	480594	7290521	yes		yes	yes
	SNP925	12W	480216	7290212		yes		yes
Reference 1	FC2	12W	494671	7289051	yes	yes		yes
	FL1	12W	492274	7286480		yes	yes	
	FL2	12W	493858	7287207			yes	
	FL3	12W	493717	7287001	yes	yes	yes	
	FL4	12W	492970	7286781			yes	
	FL5	12W	492552	7286547			yes	
Reference 2	R2-Creek	12W	497213	7286679				yes
	R2-1	12W	497453	7284512	yes	yes	yes	
	R2-2	12W	497305	7285367		yes	yes	
	R2-3	12W	495529	7287452	yes	yes	yes	
	R2-4	12W	497648	7284697			yes	
	R2-5	12W	494949	7287511			yes	

4.1.2 Methods

At each station *in situ* measurements were collected for pH, temperature (°C), conductivity (µS/cm), turbidity (NTU) and dissolved oxygen (mg/L). The meters were calibrated each day. Sampling coordinates were recorded with a hand-held GPS unit. Site conditions were noted and all information was recorded in a field log book.







Water samples for lab analysis were collected directly into the lab supplied bottles. Sampling followed recognized sampling protocol, including methods outlined in MMER technical guidance document (TGD) (Environment Canada 2002) and appropriate measures were taken to avoid sample contamination. Bottles were placed approximately 0.2 – 0.5 m below the water surface at each sampling location and allowing the bottle to fill. Pre-measured preservatives provided by the laboratory were used for the appropriate samples. Samples collected for total organic carbon were preserved with hydrochloric acid, and samples collected for metals (total and dissolved) were preserved with nitric acid, and samples collected for nutrients (ammonia, nitrite, etc.) were preserved with sulphuric acid.

After sampling was completed, a chain of custody form was filled out. The samples were packed into coolers and shipped to the ALS Laboratory in Yellowknife, on the next available plane leaving camp. Samples were analyzed for:

- general chemistry including total suspended solids, alkalinity and major ions,
- cyanide,
- radium-226,
- total and dissolved organic carbon,
- nutrients including ammonia, nitrate, nitrite and total phosphorus, and
- total and dissolved metals.

4.1.2.1 QA/QC

Quality assurance/quality control protocols are a necessary component to any environmental sampling program. For this study, field blanks, trip blanks and field replicates were used. The blanks are used to detect potential sample contamination during collection, shipping and analysis. Trip and field blanks are sample bottles filled with distilled water and analyzed for the same suite of parameters as the test samples. These are used to test for possible contamination of water samples. The trip blank bottles are filled at the lab with distilled water, and travel with all the sample bottles to the field and back again. The trip blank is used to test if any contamination is introduced into the samples through handling and transportation. Field blank bottles are filled with distilled water at one of the sampling stations following the same protocols as sample collection. The field blank is used to assess contamination introduced to the sample as a result of handling and processing samples in the field. When a parameter in either the field or trip blank is detectable, further consideration is given, whereby the concentration is compared to the analytical detection limit of the particular parameter. When the value is less than the practical quantification limit (PQL), it is not considered further. The PQL is five times the Method Detection Limit (MDL) and is defined as the minimum concentration that can be measured within specified limits of precision and accuracy. Constituents with results below the PQL mean that the constituent being analyzed is not present in a sufficient amount to be reliably quantified.

4.1.2.2 Statistical Analysis

SPSS version 17.0 (SPSS Inc., Chicago, IL) was used to conduct statistical analysis at a confidence level of 95% ($\alpha = 0.05$). Data were tested for homogeneity of variance using Levene's test and normality using the Shapiro-Wilk test. Significant differences in water chemistry and physical parameters were determined using a one-way ANOVA and Tukey's test (when appropriate). Non normal data sets were analysed using the non parametric Kruskal-Wallis and Tukey's test (where appropriate). Water temperature records were collected for approximately 7 weeks from July 7th to August 27th 2010 using in situ data loggers. Differences in the water temperature records collected from the Exposure Area, Reference Area 1 and Reference Area 2 were analysed using the Friedman repeated measures ANOVA based on ranks and Tukey's test.

4.2 Sediment Quality

4.2.1 Study Design

Sediment samples, along with supporting field chemistry measurements, were collected from each of the study area. There were five sampling stations in the Exposure Area (Figure 4-4), five sampling stations in Reference Area 1 (Figure 4-5) and five sampling stations in Reference Area 2 (Figure 4-6). Sediment samples were collected and analyzed for total organic carbon and total metals content in order to correlate with similar measurements in the tissues of fish as well as water quality samples. The field program was completed between August 18 and August 29.

4.2.2 Field Methods

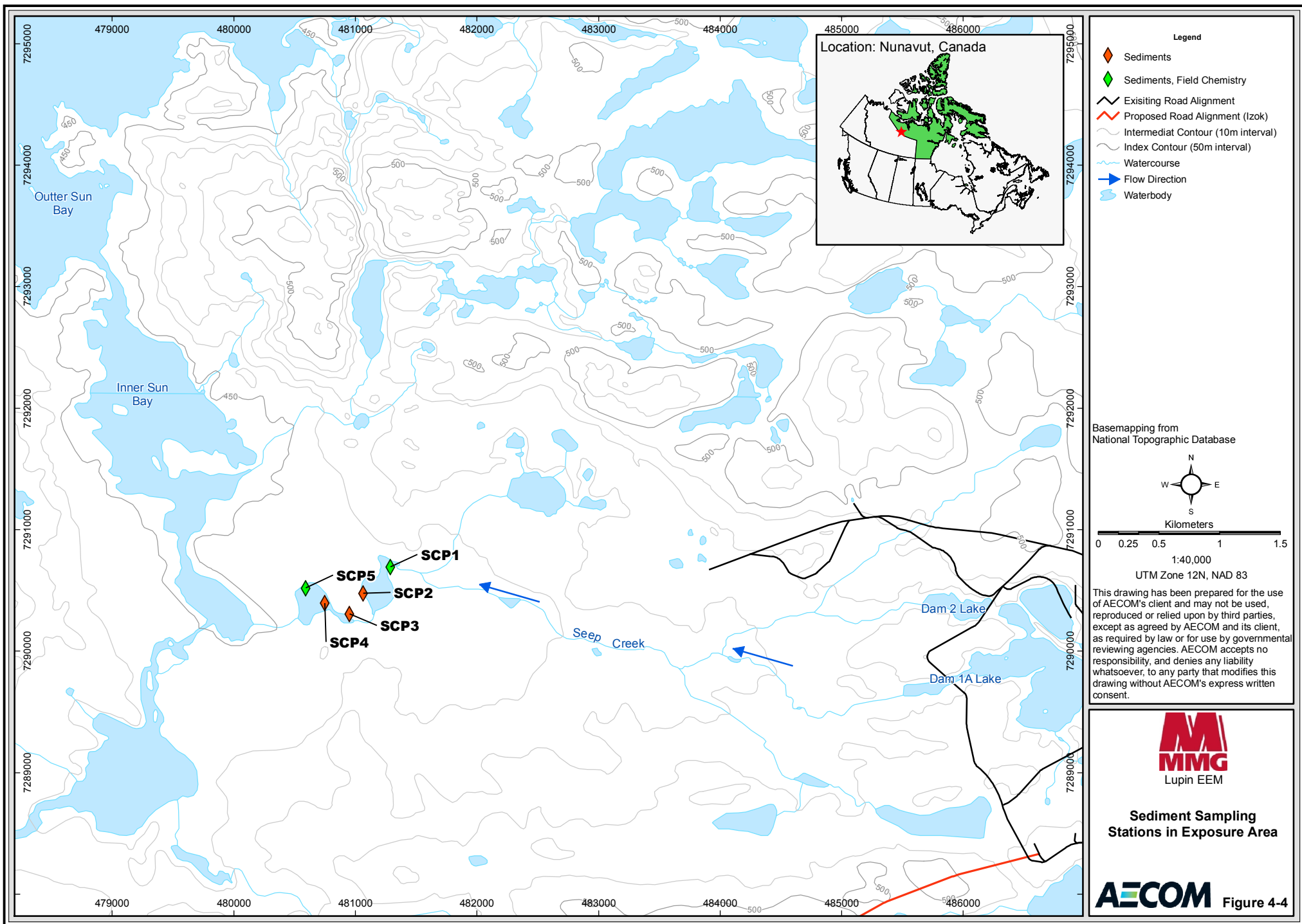
At each station, at least five replicate samples were collected and combined into a composite sample for the site. Dependant on the conditions and bottom composition (particularly cobble and rocky bottoms), some sites used more than five grabs to make up the composite sample. If a sub-sample was obtained that was intact and showed layering of sediments, a plastic spoon was used to remove the top 3 cm of the sub-sample to be used in the composite sample. All samples were collected using an Eckman grab. Supporting environmental data was taken at a few of the sites that were determined to be representative of the sample area.

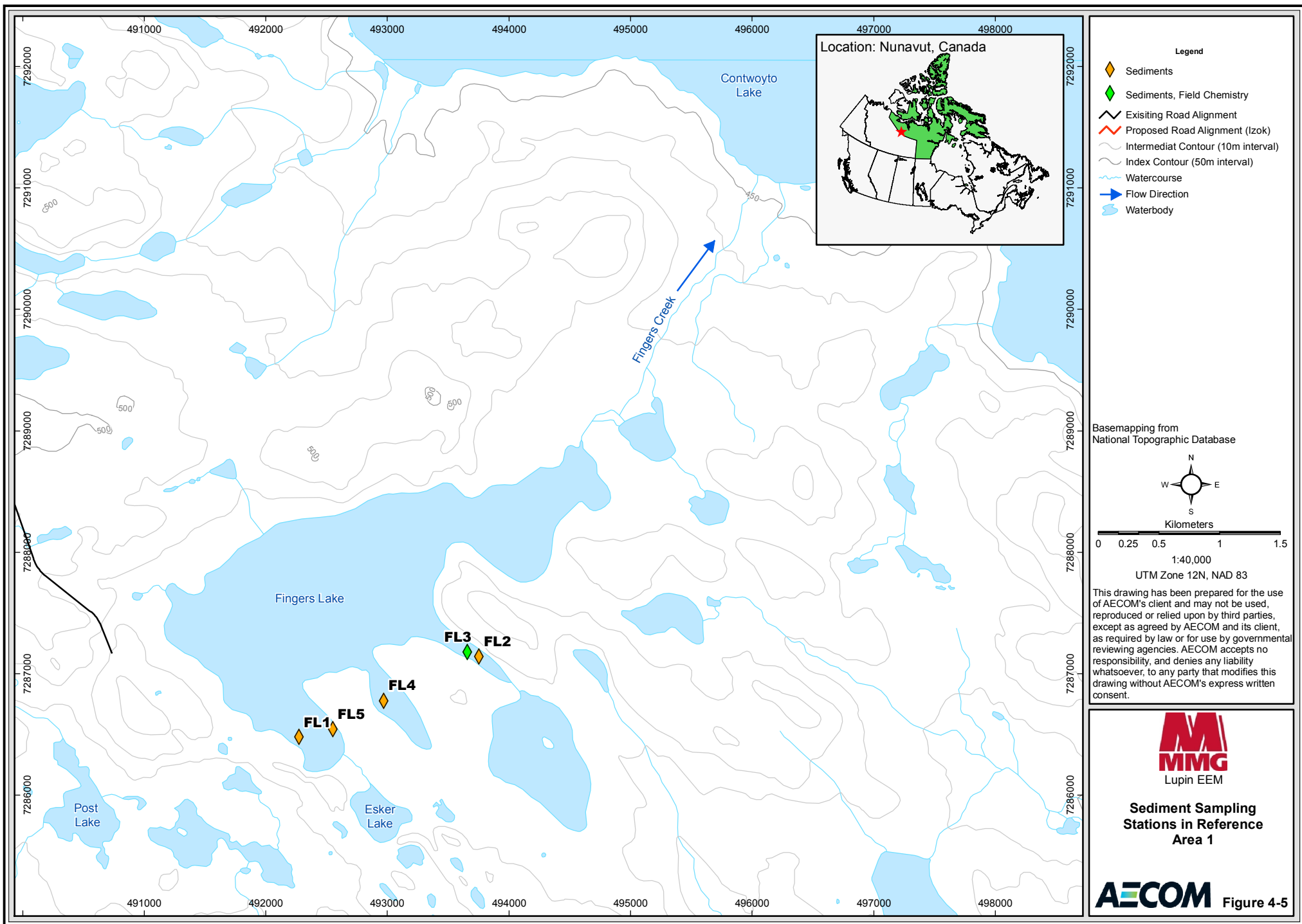
Composite samples were drained of as much water as was possible, and stored in lab-provided plastic, sealable bags. After sampling was completed, a chain of custody form was filled out. In total, five composite samples were taken from the exposure area, five from reference area 1 and five from reference area 2, and were submitted for laboratory analysis. The samples were packed into coolers and shipped to ALS Laboratory in Yellowknife, NWT. Samples were analyzed for:

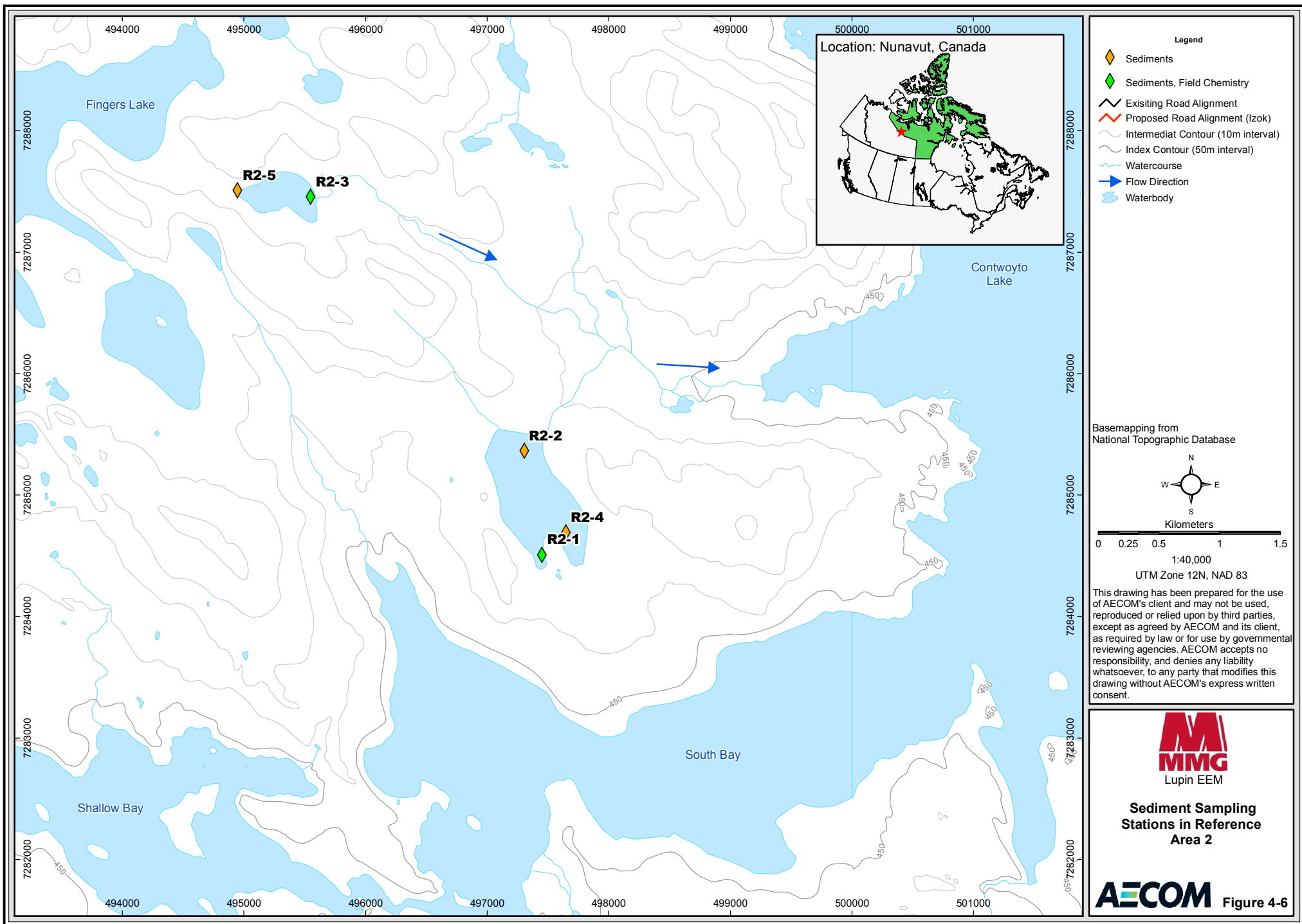
- Particle size
 - o Course sand and gravel (> 2mm)
 - o Sand (0.2 mm to 2.0 mm)
 - o Silt (0.2 mm to 0.063 mm)
 - o Clay (<0.004 mm)
- Total Organic Carbon
- Total metals

4.2.2.1 Statistical Analysis

SPSS version 17.0 (SPSS Inc., Chicago, IL) was used to conduct statistical analysis at a confidence level of 95% ($\alpha = 0.05$). Data were tested for homogeneity of variance using Levene's test and normality using the Shapiro-Wilk test. Differences in sediment chemistry, total carbon, total organic carbon, inorganic carbon, and calcium carbonate were determined using a one-way ANOVA and Tukey's test (when appropriate). Non normal data sets were analysed using the non parametric Kruskal-Wallis and Tukey's test (where appropriate).







4.3 Fish Survey

4.3.1 Study Design

The purpose of the survey was to determine if differences in habitat may be causing differences in length and weight of fish in the reference areas as compared to the exposure area. A second reference area was added from the Cycle 2 sampling program based on the layout being similar to the exposure area. This similarity would allow for a more accurate comparison of the two areas, and to more accurately analyse the effects of the effluent on fish populations. The field program was completed between August 18th and 29th, 2011. Fish were collected from the Exposure Area (Seep Creek system), Reference Area 1 (Fingers Creek system) and Reference Area 2 (unnamed system to the southeast of the Fingers Creek system) in areas that were similar to the Cycle 1 and Cycle 2 studies. Based on the results of the Cycle 2 study and the recommendations of Environment Canada (EC), juvenile Arctic grayling were selected as the primary sentinel target species for a non-lethal sampling program.

The preliminary study design was to attempt to capture 100 Age-0+ Arctic grayling fish from each area. During the sampling program, fewer than 100 Arctic grayling per area were captured along with several hundred of other species. All fish that were captured were measured and weighted. Ten of the age-0+ Arctic grayling, and an additional 10 from other age classes from each area were sacrificed for aging structures. The carcasses of these fish were also submitted for metal analysis. The metals that were tested for include aluminum, arsenic, cobalt, copper, nickel and zinc. Fish survey sampling locations for the exposure and reference areas are listed in Appendix C, Table C-1, and are mapped in Figures 4-7, 4-8, and 4-9.

4.3.2 Field Methods

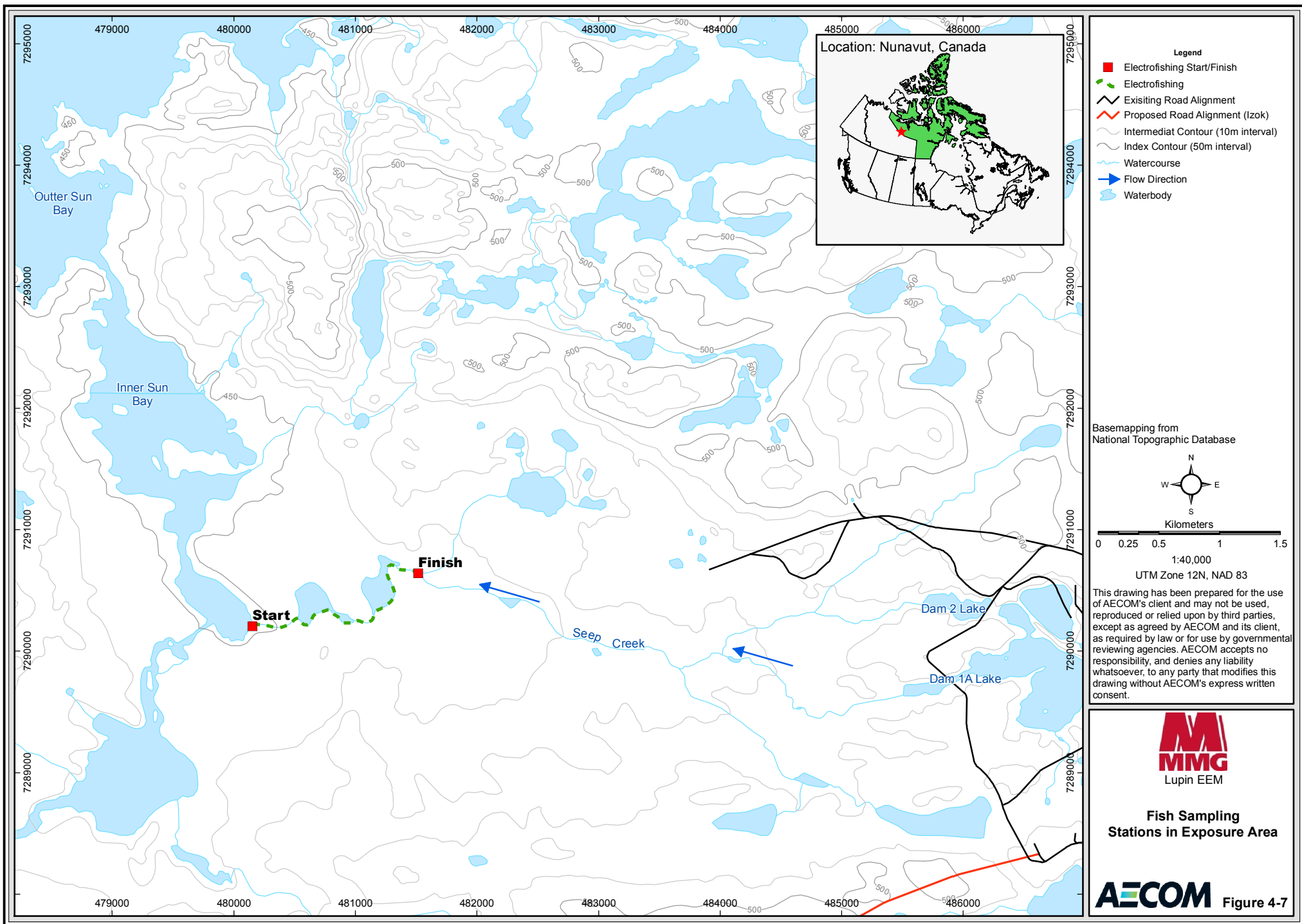
4.3.2.1 Fish Capture

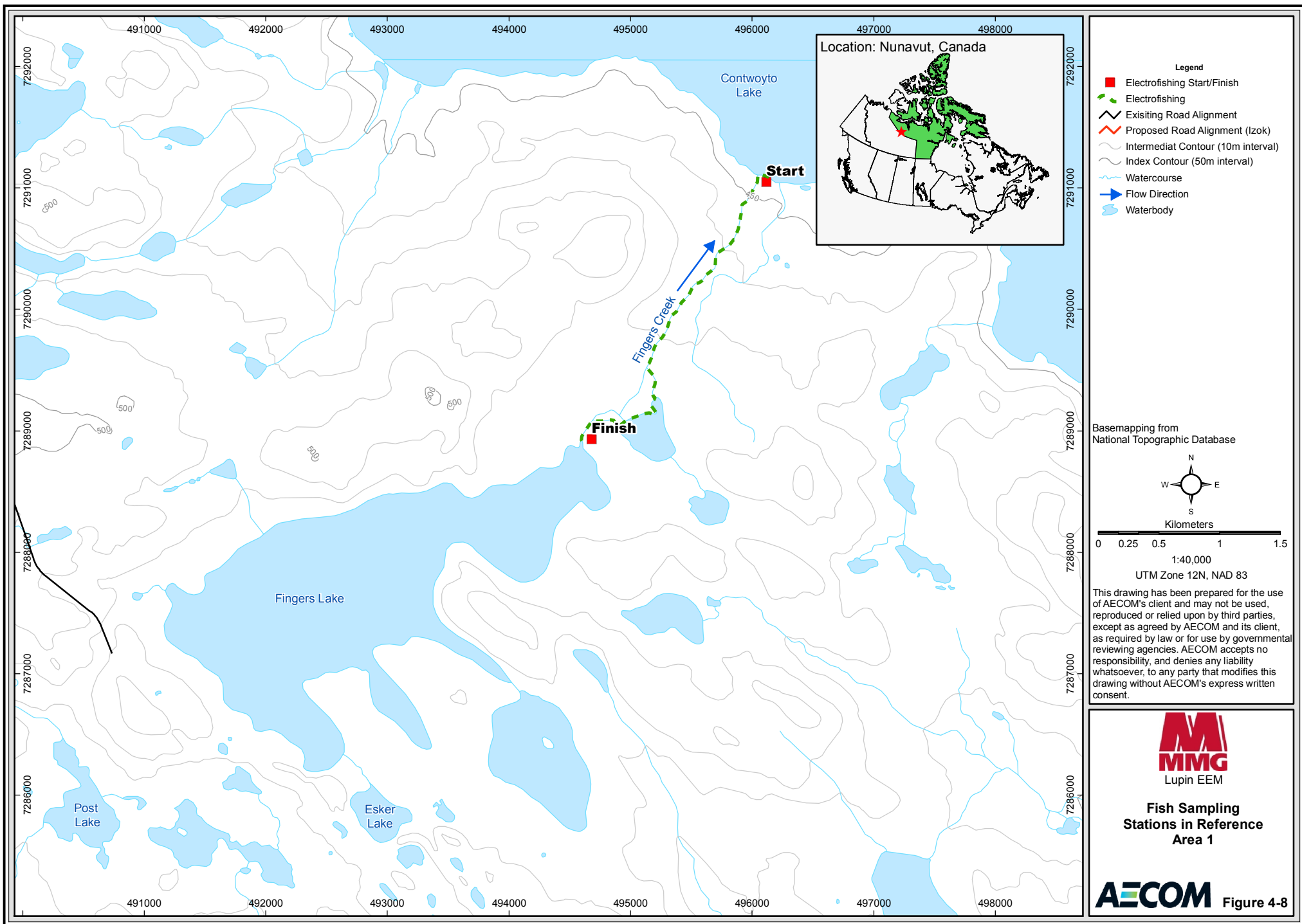
Based on the lessons learned in Cycle 1 and Cycle 2, electrofishing with a Smith-Root LR-24 Backpack Electrofisher, was used as the only fishing method in the Cycle 3 field program as it was the most effective and efficient from previous years. Electrofishing was conducted around the edges of ponds and in the creeks of the exposure area and each of the reference areas, starting downstream and moving upstream. Start and end coordinates were recorded for each survey section along with the total effort in seconds, voltage, frequency and duty cycle settings.

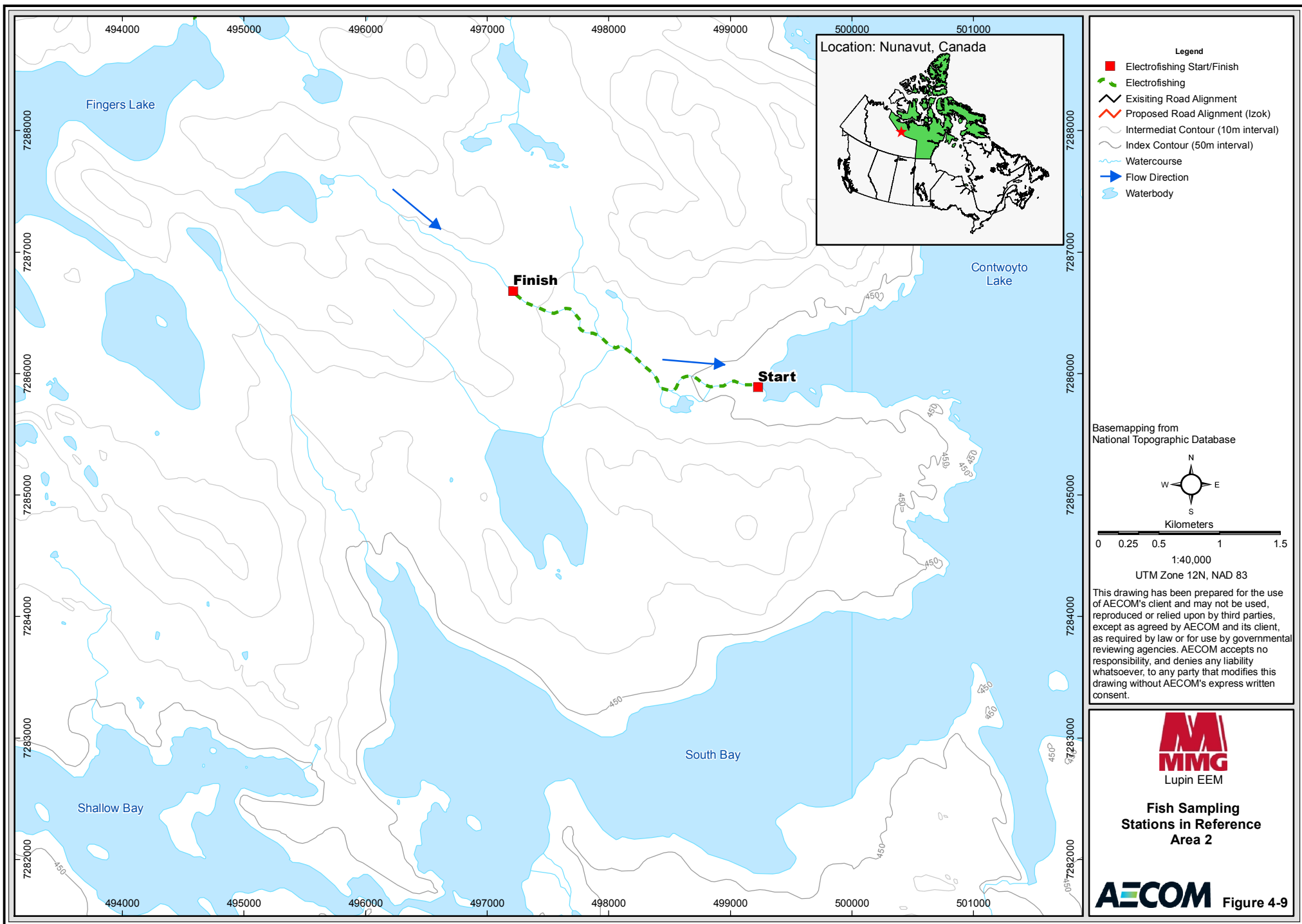
All fish that were captured were weighed and measured, and released into similar waters that they were captured from. A habitat assessment with supporting environmental data was taken from each of the study areas. Data recorded included water depth, water velocity, water temperature and field water chemistry (pH, conductivity, dissolved oxygen and turbidity). All measurements were recorded on waterproof paper forms.

4.3.2.2 Field Laboratory Analyses

All fish that were captured were weighted and measured shortly after they were captured (Appendix C, Tables C-2, C-3 and C-4). Fish troughs were used for length measurements to within 1 mm. Fish weights were measured using an Ohaus Adventurer Pro AV-53 balance (accuracy 0.001 g). This scale only read up to 50 g, and so heavier body weights were measured with an Acculab VI-200 balance (accuracy 0.01 g). All measurements were recorded on waterproof, standardize data forms.







The Arctic Grayling that were selected for the removal of aging structures were processed in the field after the rest of the fish had been released back into the watercourse. Attempts were made to place these fish far enough away that they were not likely to be recaptured. Aging structures (otoliths) were collected from the selected Arctic grayling and were placed into individually labelled and sealed envelopes. At the completion of the field program, they were sent to North Shore Environmental Ltd. in Thunder Bay, Ontario, for age determination (Appendix C Table C-5).

Those Arctic grayling that were selected for aging structures were also submitted for metals analysis. The heads were removed and the carcass kept frozen until the field program was completed. These carcasses were then organized into approximately 10 gram composite samples. A minimum of 10 grams of fish tissue was required by the lab for analysis of metal concentration in the tissue. Eleven composite samples were submitted for the exposure area, nine composite samples for Reference Area 1 and nine composite samples for Reference Area 2. A chain of custody form was filled out, and all fish tissue samples were submitted to ALS Laboratory Group in Edmonton, Alberta for metals analysis. The metals that were tested included aluminum, arsenic, cobalt, copper, nickel and zinc. These samples were prepared using EPA 200.3 method and the analysis was performed using EPA 6020 standards.

4.3.2.3 Statistical Analysis

SPSS version 17.0 (SPSS Inc., Chicago, IL) was used to conduct statistical analysis at a confidence level of 95% ($\alpha = 0.05$). Data were tested for homogeneity of variance using Levene's test and normality using the Shapiro-Wilkes test. Differences in fish body weights were compared between reference and exposure areas using analysis of covariance (ANCOVA) using length as a covariate. Potential differences between metals accumulation by the different age groups in the Exposure Area and the Reference Areas were evaluated using a t-test. Significant differences in metals concentration in all age classes of arctic grayling tissue were determined using an analysis of variance (ANOVA) and Tukey's test (where appropriate). Non normal data sets were analysed using the non-parametric Kruskal-Wallis and Dunns test (where appropriate).

5. Effluent and Water Quality Results

The following section provides a brief description of the effluent and water quality monitoring programs initiated as a result of the MMER.

5.1 Effluent Characterization

Samples for effluent characterization have been collected in the TCA at station SNP 925-10. Effluent was released from the TCA at various periods from 1994 to 2010 (Table 5-1). Effluent was not released during the 2010 field program.

Table 5-1: Total Annual Discharge Volumes from Lupin Mine TCA (SNP 925-10) 1994 to 2010

Year	Annual Total (m ³)	Discharge Period
1994	863,868	July 15 - 29
1995	938,715	July 15 – August 2
1996	1,139,233	July 15 – August 7
1997	2,892,289	July 15 – September 1
1998	0	n/a
1999	0	n/a
2000	2,701,360	July 15 – September 2
2001	0	n/a
2002	3,102,895	July 15 – September 7
2003	0	n/a
2004	0	n/a
2005	1,682,135	July 15 – August 11
2006	0	n/a
2007	0	n/a
2008	0	n/a
2009	2,897,461	July 25 th – Oct 7th
2010	0	n/a

Samples for effluent characterization were collected in 2000, 2002 and 2005 and constituents listed in Schedule 4 of MMER were analyzed. Up to 2005, none of the constituents exceeded the authorized limits. Samples for effluent characterization were not collected in 2010, as there was no effluent discharge (Table 3-1).

5.2 Water Quality

Water quality samples were collected in the exposure and reference areas as part of the Cycle 1 (2005) and Cycle 2 (2008) programs and again in the Cycle 3 field program (Figures 4-1, 4-2 and 4-3). Results from the Cycle 3 program are presented below. The Cycle 3 field program was completed between August 18 and 29, 2010. Water temperature loggers were installed on July 7, 2010, but no field data other than field measurements at the logger sites were collected at that time.

Sampling locations, sampling dates and field chemistry are provided in Appendix A, Tables A-1 and A-2. Water temperature, pH, conductivity and DO were measured at every station when water quality samples were collected (Appendix A, Table A-2). Grab water samples for laboratory analyses were collected from three locations in the Exposure Area (SCD1, SCP1, SNP925) (Table 4-2; Figure 4-1), from three locations in Reference Area 1 (FC2, FL3, FL5) (Figure 4-2) and from these locations in Reference Area 2 (R2-1, R2-2, R2-3) (Figure 4-3). The intent of collecting these samples was to characterize water quality in each of the three areas. It was decided to have samples analyzed separately rather than as a composite sample to represent the study areas. Complete lab water quality data and detection limits are provided in Appendix A, Tables A-3 and A-4.

Results were compared to the Canadian water quality guidelines for protection of freshwater life (CCME 2007). None of the results from the reference area samples exceeded the CCME guidelines. For the exposure area samples (SCP1, SCP1-rep, SNP925-20 and SCD1), all exceeded the guidelines for copper, iron and nickel while only sample SCD1 exceeded the guideline for zinc. All samples had undetectable concentrations of TSS, alkalinity, carbonate, hydroxide, nitrite and cyanide. Many samples had undetectable concentrations of bicarbonate, chloride, fluoride, ammonia, nitrate and total phosphorus. In addition, concentrations of TOC and DOC were very low in all samples.

Total and dissolved metals were analyzed to low-level detection limits in samples SCP1 and SCP1-rep and were analyzed to ultra-low level detection limits in all other samples.

5.2.1 Discussion and Comparison to Cycles 1 and 2

The Seep Creek drainage system is the direct receiving environment of Lupin mine effluent. The ponds and channels that make up the exposure area are shallow. The Fingers Creek drainage system was selected as an appropriate reference monitoring area for Cycles 1, 2 and 3 and was designated as Reference Area 1 in Cycle 3. The ponds and creeks that make up this system are slightly deeper than the exposure area. This was observed in Cycle 1 and Cycle 2. Based on the data collected in Cycle 3, average depth in the creeks of the exposure area are very similar to depth in the creek of reference area 1. For Cycle 3, a second reference area was added and was designated as Reference Area 2.

Conductivity was variable but high in the exposure area but very low in both reference areas (Table 5-2 and 5-3). Conductivity was highest in Dam 1A Lake (SCD1) and decreased through Seep Creek and into Seep Creek Ponds. In 2010, conductivity was higher in SCD1 as compared to previous years but was generally lower in Seep Creek Pond in 2010 as compared to previous years. Water hardness followed a similar pattern. Nitrogen was lower in SCD1 in 2010 but higher in Pond 1 as compared to previous years. TP and TOC concentrations have been similar in all 3 monitoring cycles.

In the exposure area samples, the only metals that exceeded the guidelines were cadmium, copper, iron, nickel and zinc (Table 5-2). All other metals were less than the guidelines. Cadmium, copper and nickel have exceeded the guidelines in all samples from all three cycles. Zinc concentration in SCD1 from Cycle 3 was still above the guideline. In SCD1, aluminum, cadmium, copper, lead, nickel and zinc have decreased from Cycle 1 through Cycle 3, while arsenic remained about the same, even increased slightly. In SCP1, aluminum, cadmium, nickel and zinc decreased from Cycle 1 through Cycle 3, while arsenic, copper and lead remained about the same.

Conductivity, hardness, pH, ammonia and phosphorus concentrations were similar across all reference area samples. Conductivity and hardness were lower in the reference areas as compared to the exposure area. Nutrients were generally lower in the reference area samples than in the exposure area samples. Finally, none of the metals from the reference area samples exceeded the guidelines.

Notable increases between 2008 and 2010 at SCD1 and SCP1 occurred for pH (SCD1 and SCP1), TOC (SCD1 and SCP1), conductivity (SCD1 only), nitrate (SCP1 only), and total arsenic (SCD1 and SCP1). Conversely, notable decreases were observed for conductivity and hardness (SCP1 only); ammonia, nitrate and total lead (SCD1 only), and total aluminum, total cadmium, total copper, total nickel, and total zinc (SCD1 and SCP1).

Table 5-2: Summary of Water Quality Results from Cycle 3 Compared to Cycle 1 and 2 for the Exposure Area

			Lupin Mine Tailings Containment Area (Dam 1A Lake Area)				Seep Creek				
Parameter	Units	CCME Aquatic Life	Dam 1A (2005)	SCD1 (2008)	SCD1 (2010)	% Change (SCD1)	SCP1 (2008)	SCP1 (2010)	% Change (SCP1)	Seep Creek Ponds 1&2(2005)	SCP5 (2008)
Physical Tests											
pH	pH unit	6.5-9.0	5.8	4.9	6.89	+16.9%	5.5	6.7	+9.8%	6.1	5.6
Conductivity	µS/cm		738	175	217	+10.7%	76.8	71.6	-3.5%	141	65.4
Hardness	mg/L		186	63	68.3	+4.0%	29	24.2	-9.0%	37	24
Alkalinity	mg/L		<5	<5	<5	--	<5	<5	--	<5	<5
Nutrients											
Ammonia	mg/L	0.019	0.51	0.014	0.0086	-23.9%	<0.005	0.0101	--	<0.05	<0.005
Nitrate	mg/L	13	5.7	0.15	0.0125	-84.6%	0.016	0.0647	+60.3%	0.4	<0.006
TP	mg/L		<0.02	0.005	0.0036	-16.3%	0.004	0.0036	-5.3%	<0.02	0.004
TOC	mg/L		2	4	5.2	+13.0%	4	6.6	+24.5%	6	6
Total Metals											
Aluminum	mg/L	0.1	0.11	0.461	0.031	-87.4%	0.151	0.074	-34.2%	0.0724	0.151
Arsenic	mg/L	0.005	0.0068	0.00377	0.00816	+36.8%	0.00165	0.00406	+42.2%	0.00293	0.00194
Cadmium	mg/L	0.000017	0.000411	0.000336	0.000065	-67.6%	0.000082	0.000023	-56.2%	0.0000913	0.000066
Copper	mg/L	0.002-0.004	0.0131	0.0197	0.00597	-53.5%	0.0037	0.0035	-2.8%	0.00653	0.0038
Lead	mg/L	0.001	0.00115	0.00013	0.000062	-35.4%	<0.00005	<0.0001	--	0.00139	<0.00005
Nickel	mg/L	0.025	0.133	0.17	0.0354	-65.5%	0.0537	0.0255	-35.6%	0.0284	0.0433
Zinc	mg/L	0.03	0.314	0.19	0.0507	-57.9%	0.0455	0.013	-55.6%	0.0404	0.0405

Note: Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007.
Concentrations that exceed the guidelines are in bold.

Overall, all of the water quality parameters from 2008, and 2010 from both Reference Area 1 (Fingers Creek and Fingers Lake) and Reference Area 2 were below the CCME water quality guidelines for the protection of aquatic life (Table 5-3). Likewise, all of the water quality parameters collected in 2005, except for pH from Fingers Creek, were below the CCME guidelines. The percentage changes between samples collected in 2008 and 2010 at FL5 and FC2 indicate considerable natural variability in physical parameters, nutrients and total metals concentrations. Most notably, a small increase in arsenic concentration identified at both FL5 and FC2.

Table 5-3: Summary of Water Quality Results from Cycle 3 Compared to Cycle 1 and 2 for the Reference Areas

			Fingers Lake – Reference Area 1					Fingers Creek – Reference Area 1				Reference Area 2
Parameter	Units	CCME Aquatic Life	Fingers Lake (2005)	FL1 (2008)	FL5 (2008)	FL5 (2010)	% Change (FL5)	Fingers Creek (2005)	FC2 (2008)	FC2 (2010)	% Change (FC2)	Reference Area 2 -Av (2010)
Physical Tests												
pH	pH unit	6.5-9.0	6.5	6.6	6.6	6.75	+1.1%	6.3	6.6	6.92	+2.4%	6.62
Conductivity	uS/cm		14.8	12.2	13.1	11.7	-5.6%	15.3	13.2	3.2	-61.0%	12.2
Hardness	mg/L		5	4	5	4	-11.1%	7	7	5.8	-9.4%	4.27
Alkalinity	mg/L		<5	<5	<5	<5	--	<5	<5	<5	--	<5
Nutrients												
Ammonia	mg/L	0.019	<0.05	<0.005	<0.005	<0.005	--	<0.05	<0.005	<0.005	--	0.006
Nitrate	mg/L	13	0.1	<0.006	0.007	<0.006	--	0.1	<0.006	<0.006	--	<0.006
TP	mg/L		0.02	0.008	0.008	0.0185	+39.6%	<0.02	0.005	0.0016	-51.5%	0.0177
TOC	mg/L		3	3	3	3.2	+3.2%	3	3	3.4	+6.3%	4.2
Total Metals												
Aluminum	mg/L	0.1	0.0164	0.0162	0.0158	0.0374	+40.6%	0.0103	0.0192	0.0171	-5.8%	0.0198
Arsenic	mg/L	0.005	0.00207	0.00133	0.00143	0.00167	+7.7%	0.00121	0.00121	0.00175	+18.2%	0.000700
Cadmium	mg/L	0.000017	0.0000089	<0.000017	<0.000017	<0.00005	--	<0.000002	<0.000017	<0.00005	--	<0.00005
Copper	mg/L	0.002-	0.000562	<0.0006	<0.0006	<0.0006	--	0.00039	<0.0006	<0.0006	--	0.0016
Lead	mg/L	0.001	0.000279	<0.00005	<0.00005	<0.00005	--	0.000013	<0.00005	<0.00005	--	0.000063
Nickel	mg/L	0.025	0.000394	0.00044	0.00059	0.000526	-5.7%	0.000339	0.00065	0.00065	+0.0%	0.00364
Zinc	mg/L	0.03	0.00216	<0.0008	<0.0008	<0.0008	--	0.00167	<0.0008	<0.0008	--	0.0095

Note: Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007. Concentrations that exceed the guidelines are in bold.

Water Quality Highlights:

- Metals concentrations in water samples collected from both of the reference areas in 2008, and 2010 were below the CCME water quality guidelines for the protection of aquatic life.
- The percentage changes between samples collected in 2008 and 2010 at FL5 and FC2 indicate considerable natural variability in physical parameters, nutrients and total metals concentrations. Most notably, a small increase in arsenic concentration identified at both FL5 and FC2.
- Notable increases in water quality parameters and metals concentrations in the Exposure Area between 2008 and 2010 occurred for pH (SCD1 and SCP1), TOC (SCD1 and SCP1), conductivity (SCD1 only), nitrate (SPC1 only), and total arsenic (SCD1 and SCP1). Conversely, notable decreases were observed for conductivity and hardness (SCP1 only); ammonia, nitrate and total lead (SCD1 only), and total aluminum, total cadmium, total copper, total nickel, and total zinc (SCD1 and SCP1).

6. Sediment Results

Samples for sediment quality along with physical measurements of the habitat were collected from the five locations chosen during Cycle 2. Analytical results are in Appendix B, Table B-1.

6.1 Statistical Analysis

Summary statistics were run for all of the parameters that were tested for in the sediment samples. The results of the statistical analysis are shown in Table 6-2.

6.2 Sediment Quality

Sediment sample texture was predominantly sandy in both of the reference areas and more silty sand in the Exposure Area. There was a significantly greater proportion of clay in the exposure area samples than in the reference area samples, although the relative percent composition of clay particles in each area was less than 5% of the entire sample. No other statistical differences were identified (Table 6-1).

Table 6-1: Summary of Sediment Textural Characteristics

Parameter	Units	Exposure Area Mean	Reference Area 1 Mean	Reference Area 2 Mean	p-value
Sand	%	53.8	80.0	79.4	<i>n.s.</i>
Silt	%	42.0	17.6	18.6	<i>n.s.</i>
Clay	%	4.2*	2.4	2.5	0.04
Fragments > 2mm	%	2.30	1.33	1.73	<i>n.s.</i>

Statistically significant comparisons ($p < 0.05$) are in bold font.

Sediment concentration of arsenic, cobalt, copper, molybdenum, nickel, strontium and zinc were significantly higher in the exposure area in comparison with the reference areas. Many of the other metal parameters did not differ significantly between the areas but concentrations were higher in the exposure area as compared to the reference areas. Similarly many of the sediment concentrations did not differ between the two reference areas; however, Reference Area 2 generally had higher concentrations of metals/metalloids.

Table 6-2: Summary of Statistical Analysis on Sediment Quality Results from Cycle 3

Parameters	Units (dw)	Exposure		Reference Area 1		Reference Area 2		ANOVA Results			
		# Samples	Mean	# Samples	Mean	# Samples	Mean	Significant Difference Detected	Normality	Test Conducted	(p-value)
CaCO ₃ Equivalent	%	5	0.80	5	0.80	5	0.94	No	Failed	Kruskal-Wallis	0.37
Inorganic Carbon	%	5	0.10	5	0.10	5	0.11	No	Failed	Kruskal-Wallis	0.37
Total Carbon by Combustion	%	5	2.32	5	1.34	5	1.76	No	Failed	Kruskal-Wallis	0.16
Total Organic Carbon	%	5	2.30	5	1.33	5	1.73	No	Failed	Kruskal-Wallis	0.18
Aluminum (Al)	mg/kg	5	8930	5	4820	5	6010	No	Failed	Kruskal-Wallis	0.09
Antimony (Sb)	mg/kg	5	0.20	5	0.20	5	0.20	No	Failed	Kruskal-Wallis	1.00
Arsenic (As)	mg/kg	5	92.7	5	12.0	5	7.60	Yes	Passed	ANOVA and Tukeys Test	0.01
Barium (Ba)	mg/kg	5	51.4	5	34.9	5	40.1	No	Passed	P - ANOVA	0.18
Beryllium (Be)	mg/kg	5	1.00	5	1.00	5	1.00	No	Failed	Kruskal-Wallis	1.00
Cadmium (Cd)	mg/kg	5	0.50	5	0.50	5	0.50	No	Failed	Kruskal-Wallis	1.00
Chromium (Cr)	mg/kg	5	43.8	5	19.2	5	29.5	No	Passed	P - ANOVA	0.11
Cobalt (Co)	mg/kg	5	49.8	5	5.88	5	6.92	Yes	Failed	Kruskal-Wallis and Tukeys Test	0.01
Copper (Cu)	mg/kg	5	33.3	5	11.4	5	16.5	Yes	Failed	Kruskal-Wallis and Tukeys Test	0.04
Iron (Fe)	mg/kg	5	18100	5	8370	5	11200	No	Failed	Kruskal-Wallis	0.06
Lead (Pb)	mg/kg	5	5.00	5	5.00	5	5.00	No	Failed	Kruskal-Wallis	1.00
Mercury (Hg)	mg/kg	5	0.05	5	0.05	5	0.05	No	Failed	Kruskal-Wallis	1.00
Molybdenum (Mo)	mg/kg	5	1.74	5	1.00	5	1.14	Yes	Failed	Kruskal-Wallis and Tukeys Test	0.03
Nickel (Ni)	mg/kg	5	67.7	5	14.96	5	29.3	Yes	Passed	ANOVA and Tukeys Test	0.01
Selenium (Se)	mg/kg	5	0.50	5	0.50	5	0.50	No	Failed	Kruskal-Wallis	1.00
Silver (Ag)	mg/kg	5	1.00	5	1.00	5	1.00	No	Failed	Kruskal-Wallis	1.00
Strontium (Sr)	mg/kg	5	10.2	5	4.92	5	5.72	Yes	Passed	ANOVA and Tukeys Test	0.03
Thallium (Tl)	mg/kg	5	0.50	5	0.50	5	0.50	No	Failed	Kruskal-Wallis	1.00
Tin (Sn)	mg/kg	5	5.00	5	5.00	5	5.00	No	Failed	Kruskal-Wallis	1.00
Uranium (U)	mg/kg	5	2.00	5	2.00	5	2.00	No	Failed	Kruskal-Wallis	1.00
Vanadium (V)	mg/kg	5	27.0	5	16.6	5	18.80	No	Failed	Kruskal-Wallis	0.08
Zinc (Zn)	mg/kg	5	85.4	5	24.8	5	37.2	Yes	Passed	ANOVA and Tukeys Test	<0.001

Statistically significant comparisons (p<0.05) in bold font.

Sediment Quality Highlights:

- Reference Area 1 and 2 sediment predominantly sandy and was more silty with significantly more clay in the Exposure Area.
- Sediment concentration of arsenic, cobalt, copper, molybdenum, nickel, strontium and zinc were significantly higher in the exposure area in comparison with the reference areas.
- Many of the other metal parameters did not differ significantly between the areas but concentrations were higher in the exposure area as compared to the reference areas.
- The majority of the sediment concentrations did not differ between the two reference areas; however, Reference Area 2 generally had higher concentrations of metals/metalloids.

7. Fish Survey

7.1 Fish Habitat Characteristics

The fish habitats found in the study area include permanent and intermittent streams which connected larger bodies of water ranging in size from medium-sized lakes over 2 m deep (Fingers Lake), small shallow ponds less than 1 m deep (Seep Creek Ponds) to a very large lake (Contwoyto Lake). The Exposure Area consisted of Seep Creek and its tributaries, which originated in Dam 1A Lake immediately below the tailings pond discharge area and terminated at Inner Sun Bay. The drainage consisted of a number of shallow lakes and ponds that drain into Seep Creek.

A habitat assessment was completed on August 27, 2010 along a 1 km section of Seep Creek in an area that was determined by the field crew to be representative of the watercourse as a whole. Depth, width and velocity measurements were taken every 200 m, and water chemistry measurements were taken at the end of the 1 km section. Seep Creek flows in an irregular pattern, is routinely confined, and contains infrequent side bars and islands. The average channel width was observed to be 5.0 m (range of 2.49 m to 10.4 m) and the average wetted width was 4.7 m (range of 2.49 m to 8.86 m). The average water depth was 0.4 m (range 0.26 to 0.58 m) and the average velocity was 2.9 m/s (range 1.45 m/s to 6.07 m/s). The calculated average flow velocity for the Exposure Area was approximately 3 m³/s, assuming a rectangular channel cross-section. There was a single velocity measurement of 0.05 m/s taken at a depth of 0.08 m. This measurement was left out of the average velocity calculation. One residual pool was measured as having a depth of 0.42 m. The dominant substrate material present was boulders and the subdominant substrate was cobbles. The banks were composed of fine sediments and gravels and were vertical and sloped in shape. Instream cover was provided by abundant boulders, trace undercut banks, trace deep pools and moderate amounts of instream, submerged vascular vegetation. Habitat consisted of riffles, class 3 runs (<0.5 m in depth) and class 3 flats (<0.5 m in depth). Several water chemistry measurements were taken, including; dissolved oxygen (11.4 mg/L), conductivity (59 µs/cm), pH (8.95), temperature (7.5° C) and turbidity (2.13 NTU).

Reference Area 1 consists of Fingers Lake which drains by the way of Fingers Creek into Contwoyto Lake. Two shallow ponds also empty into Fingers Creek via three intermittent creeks, along with significant amounts of overland flow. A habitat assessment was completed on August 20, 2010 along a 1.4 km section of Fingers Creek in an area that was determined by the field crew to be representative of the watercourse as a whole. Depth, width and velocity measurements were taken every 200 m, and water chemistry measurements were taken at the end of the 1.4 km section. Fingers Creek was observed to flow in an irregular pattern, was occasionally confined, and contained occasional islands. The average channel and wetted widths were both 1.6 m (range 0.50 m to 2.44 m). The average water depth was 0.3 m (range 0.23 to 0.42 m) and the average velocity was 1.5 m/s (range 0.50 m/s to 3.60 m/s). The average flow velocity was estimated to be approximately 0.7 m³/s, which is more than three-fold less than estimated for the Exposure Area. There was a single velocity measurement of 0.00 m/s taken at a depth of 0.23 m. This measurement was left out of the average velocity calculation as the meter was malfunctioning when it was taken. Several residual pool depths were taken, with an average depth of 0.5 m (range 0.44 m to 0.59 m). The dominant substrate material present was boulders and the subdominant substrates were cobbles and fine sediments. The banks were composed of fine sediments and organics and were vertical and sloped in shape. Instream cover was provided by abundant boulders, trace undercut banks, trace deep pools and moderate amounts of instream, submerged vascular vegetation, algae and mosses. Habitat consisted of riffles, class 3 runs (<0.5 m in depth) and class 3 flats (<0.5 m in depth). Several water chemistry measurements were taken, including; conductivity (6 µs/cm), pH (7.5) and temperature (5.8°C).

Reference Area 2 consists of an unnamed creek that originates in a small pond in to the south of Fingers Lake, and flows into Contwoyto Lake. The drainage was selected based on the lack of ponds found along the length of the creek. A habitat assessment was done on August 22, 2010 along a 1 km section of the unnamed creek in an area

that was determined by the field crew to be representative of the watercourse as a whole. Depth, width and velocity measurements were taken every 200 m, and water chemistry measurements were taken at the end of the 1 km section. The unnamed creek was observed to flow in an irregular pattern, was occasionally confined, and contained occasional islands. There were also several flooded sections. The average channel and wetted widths were both 1.7 m (range 1.30 m to 1.93 m). The average water depth was 0.3 m (range 0.21 to 0.45 m) and the average velocity was 2.9 m/s (range 1.00 m/s to 6.32 m/s). Several residual pool depths were taken, with an average depth of 0.8 m (range 0.55 m to 1.15 m). The dominant substrate material present was fine sediments and the subdominant substrate was boulders. The banks were composed of fine sediments and were vertical in shape. Instream cover was provided by abundant instream, submerged vascular vegetation, trace deep pools and moderate amounts of boulders. Habitat consisted of riffles, class 3 runs (<0.5 m in depth), class 3 pools (<0.5 m in depth) and class 2 pools (0.5 m to 1.0 m in depth). Several water chemistry measurements were taken, including; dissolved oxygen (10.2 mg/L), conductivity (10 µs/cm), pH (7.2), temperature (8.3C) and turbidity (1.03 NTU).

Based on the habitat assessments, all three of the areas would have good quality rearing habitat, due to sufficient cover, water depth and water flow. The Exposure Area and Reference Area 1 would have good spawning habitat, due to the presence of appropriate substrates of boulders, cobbles and gravel. Reference Area 2 would have poor to moderate spawning habitat, due to the dominant substrate being fine sediments. Reference Area 1 and two would be moderate to good overwintering habitat, due to the presence of deep pools. Although the exposure area had occasional deep pools, it would only be classified as poor to moderate overwintering habitat. A summary of these findings can be found in Appendix C, Table C-6.

7.2 Fish Capture Data

Sampling of the creeks and ponds was conducted by backpack electrofishing. In total, 308 fish representing three species were captured in the Exposure Area (Appendix C Table C-2), 161 fish representing six species were captured in Reference Area 1 (Appendix C Table C-3) and 301 fish representing seven species were captured in Reference Area 2 (Appendix C Table C-4). Table 7-1 shows that the same amount of effort was needed to catch fish in the Exposure Area and Reference Area 2. It also indicates that it was much more difficult to catch fish in Reference Area 1.

Capture results for the sentinel target species indicate that 30 Arctic grayling were captured in the Exposure Area, 25 were caught in Reference Area 1 and 33 were captured in Reference Area 2. Approximately the same amount of effort was used in the Exposure Area and Reference Area 2 (10,328 seconds and 10,373 seconds, respectively) and approximately 50% more effort was needed in Reference Area 1 (15,968 seconds). The raw data are included in Appendix C, Table C-1. Age distribution based on otolith aging and size class distribution data is discussed in Section 7.1.4.1.

Table 7-1: 2010 Lupin EEM Fish Catch Summary and CPUE

Fish Species	Exposure Area	Reference Area 1	Reference Area 2
Ninespine Stickleback (NSSB)	193	16	158
Arctic Grayling (ARGR)	28	25	33
Burbot (BURB)	2	30	4
Slimy Sculpin (SLSC)	0	73	66
Round Whitefish (RNWH)	0	2	7
Lake Trout (LKTR)	0	15	22
Arctic Char (ARCH)	0	0	11
Total	223	161	301
Effort (hours)	2:52:20	4:25:45	2:52:45
CPUE (fish/hour)	78	36	104

7.3 Supporting Environmental Variables

The supporting environmental variables collected from the Exposure Area and the two reference areas included seven weeks of stream temperature data (July-August, 2010), morphometric indicators of fish condition, and metals concentrations in Arctic grayling tissue. Based on capture results, fish tissue samples were analysed for ages 0+, 1+, and 2+ in the Exposure Area (n=3, 6, and 1, respectively), ages 0+ and 1+ in Reference Area 1 (n=2 and 5 respectively), and just the 2+ age class in Reference Area 2 (n=9). Analytical results for metals concentration in fish tissue samples taken from Arctic grayling are provided in Appendix C, Tables C-7.

We evaluated evidence of potential differences between metals accumulation by the different age groups in the Exposure Area and the reference areas using a t-test. No statistically significant differences were detected between age cohorts within an area (i.e. $p > 0.05$ for all comparisons); therefore, all age groups were pooled to compare between areas, using an analysis of variance (ANOVA). Table 7-2 provides a summary of the statistical analysis conducted on metals concentrations in fish tissue between sampling areas. Significantly greater fish tissue concentrations were observed in juvenile Arctic grayling for arsenic ($p < 0.006$) and cobalt ($p < 0.001$) between the Exposure Area and Reference Area 1. Despite elevated concentrations of aluminum, copper, nickel, and zinc in water and or sediment, no statistically significant differences were observed between the Exposure Area and reference areas for these metals. Potential implications of the metals concentrations in fish tissue and potential effects thresholds for Arctic grayling are discussed in Section 8 of this report.

Table 7-2: Summary of Statistical Analyses of Metals Concentration in Arctic Grayling Tissue from Cycle 3

Parameters	Units (dw)	Exposure		Reference Area 1		Reference Area 2		ANOVA Results		
		# Samples	Mean	# of Samples	Mean	# of Samples	Mean	Significant Difference	Test Conducted	(p-value)
% Moisture	%	11	76.6	9	75.64	9	77.32	No	ANOVA and Tukeys Test	0.120
Aluminum (Al)	mg/kg	11	3.50	9	2.10	9	3.80	No	Kruskal-Wallis	0.110
Arsenic (As)	mg/kg	11	0.31	9	0.09	9	0.10	Yes	Kruskal-Wallis and Dunns	0.006
Cobalt (Co)	mg/kg	11	0.16	9	0.08	9	0.22	Yes	Kruskal-Wallis and Dunns	0.001
Copper (Cu)	mg/kg	11	0.72	9	0.75	9	0.65	No	ANOVA	0.105
Nickel (Ni)	mg/kg	11	0.28	9	0.24	9	0.29	No	Kruskal-Wallis	0.141
Zinc (Zn)	mg/kg	11	19.3	9	17.31	9	16.70	No	Kruskal-Wallis	0.168

Statistically significant comparisons ($p < 0.05$) are in bold font.

7.3.1 Stream Temperature Data

To investigate the impacts of potential differences between stream temperature on Arctic grayling growth and survival, six (6) temperature data loggers were installed in early July 2011. Each logger was set to record water temperature every 30 minutes, and collected approximately 7 weeks of *in situ* temperature data. The average weekly temperatures at each logging station are presented in Table 7-3 and are graphically presented in Figure 7.1.

Table 7-3: Stream Data Logger Results for the Exposure and References Areas

	Reference Area 1 (downstream)	Reference Area 1 (upstream)	Reference Area 2 (downstream)	Reference Area 2 (upstream)	Exposure Area (downstream)	Exposure Area (upstream)
Mean	12.8	13.1	13.1	13.3	14.3	13.6
Median:	12.8	12.9	13.1	13.4	14.4	13.8
Mode:	12.9	12.5	12.9	13.9	14.2	15.2
Maximum:	23.1	24.2	21.5	21.8	22.4	20.8
Minimum:	4.9	5.0	5.8	5.7	6.2	6.5
Std Dev:	3.9	4.1	3.5	3.7	3.5	3.1

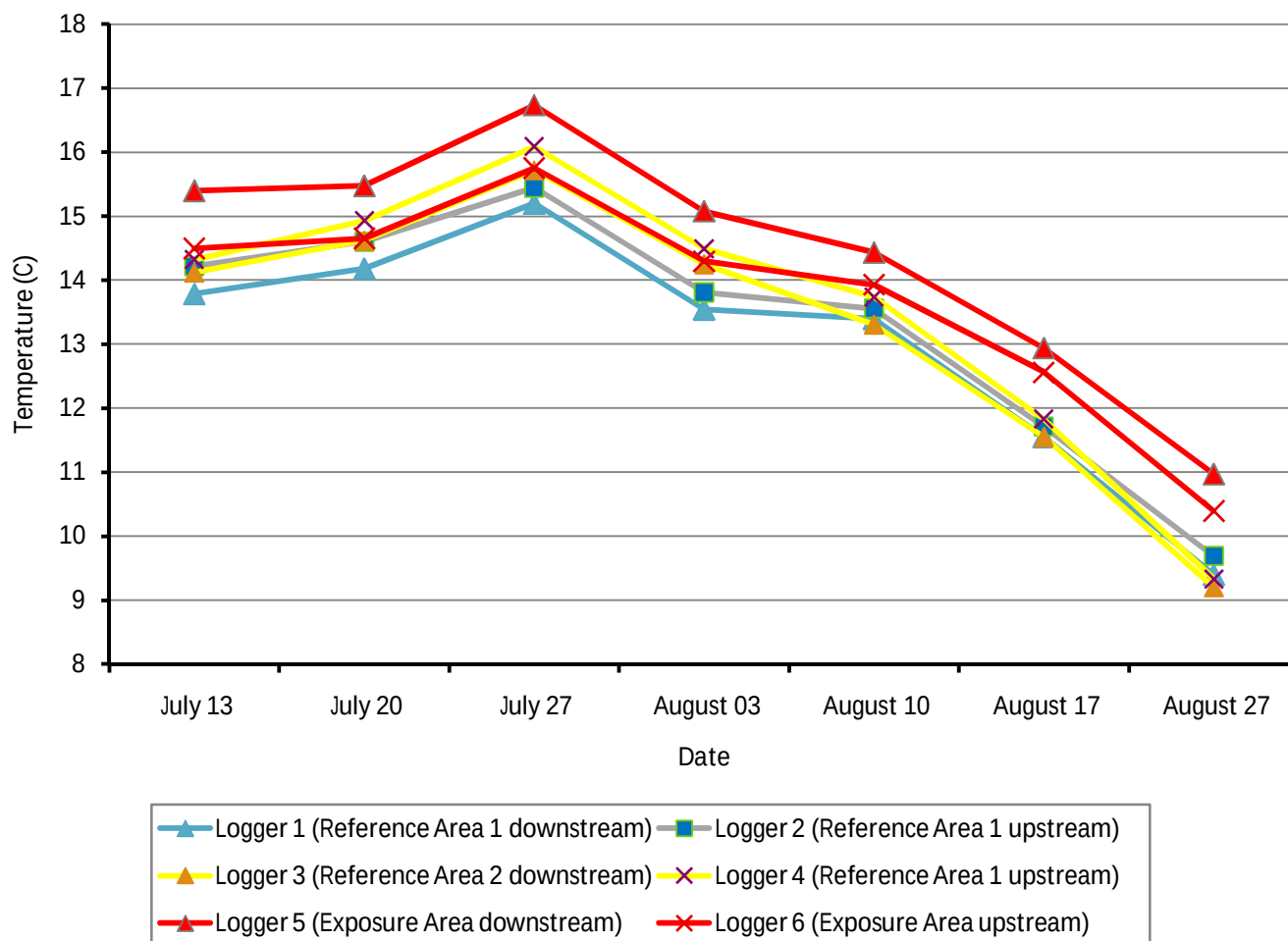


Figure 7-1: Stream Data Logger Results for the Exposure and References Areas

Differences in stream temperatures were determined by comparing the temperature profiles recorded by each data logger (n=2441) using an ANOVA with repeated measures. Stream temperatures were significantly greater in the Exposure Area compared to both Reference Area 1 ($p<0.05$) and Reference Area 2 ($p<0.05$). Within the Exposure Area the downstream location was significantly warmer than the upstream location ($p<0.05$). Between the reference areas, the upstream location in Reference Area 2 had significantly greater temperatures than both of the locations within Reference Area 1. No other statistically significant comparisons were identified.

The observed pattern of temperature differences between the Exposure Area and Reference Area 1 were in contrast to the hypothesis that the Reference Area 1 habitat was generally warmer than the Exposure Area.

Supporting Variable Highlights:

- Despite elevated concentrations of several metals in juvenile Arctic grayling tissue only arsenic and cobalt were significantly greater between the Exposure Area and Reference Area 1.
- Stream temperatures were significantly greater in the Exposure Area compared to both Reference Area 1 and Reference Area 2 which was in contrast to the hypothesis set forth in Cycle 3.

7.4 Fish Health

7.4.1 General Health

A total of 29 fish from the Exposure Area, 25 fish from Reference Area 1, and 33 fish from Reference Area 2 were collected for lethal sampling and associated experimental observations. External examinations revealed no major abnormalities (Appendix C; Table C-2 to C-4).

7.4.2 Summary Statistics (All Ages)

All of the fish captured were immature and length-frequency distribution for Arctic grayling indicated that three distinct size classes were captured during the survey of the three areas (Figure 7-4). The subsequent age determination was targeted at young-of-year (YoY) (0+) Arctic grayling and indicated that 67% of juveniles were YoY, 29% were age 1+, and 5 % were age 2+ fish (Figure 7.4). In Reference Area 1, 50% of juveniles were YoY, 50% were age 1+, 9 % were age 2+ fish (Figure 7.4). In Reference Area 2, 100% of juveniles were age 2+ fish (Figure 19). No age 3+ fish captured from any of the three survey areas. Summary statistics for all age classes were calculated for fork length, and weight for both the Exposure Area and reference areas (Table 7-4; Figures 7-2, 7-3, and 7-4). The detailed results of the age determinations for Arctic grayling are listed in Appendix C Table C-Y.

Table 7-4: Summary Statistics for Arctic Grayling (all ages)

Location	Variable	n	Median	Mean	SD	SE	Minimum	Maximum
Exposure	Fork Length(mm)	29	7.9	6.4	3.2	0.6	5.3	19
	Total weight (g)		7.7	2.4	15	2.7	1.3	78
Reference Area 1	Fork Length(mm)	25	9.4	7.2	3.0	0.6	5.8	15
	Total weight (g)		12	3.7	10	2.0	2.1	31
Reference Area 2	Fork Length(mm)	33	18	17	3.1	0.5	13	25
	Total weight (g)		70	56	49	8.5	22	218

Note: SD-Standard Deviation, SE-Standard Error

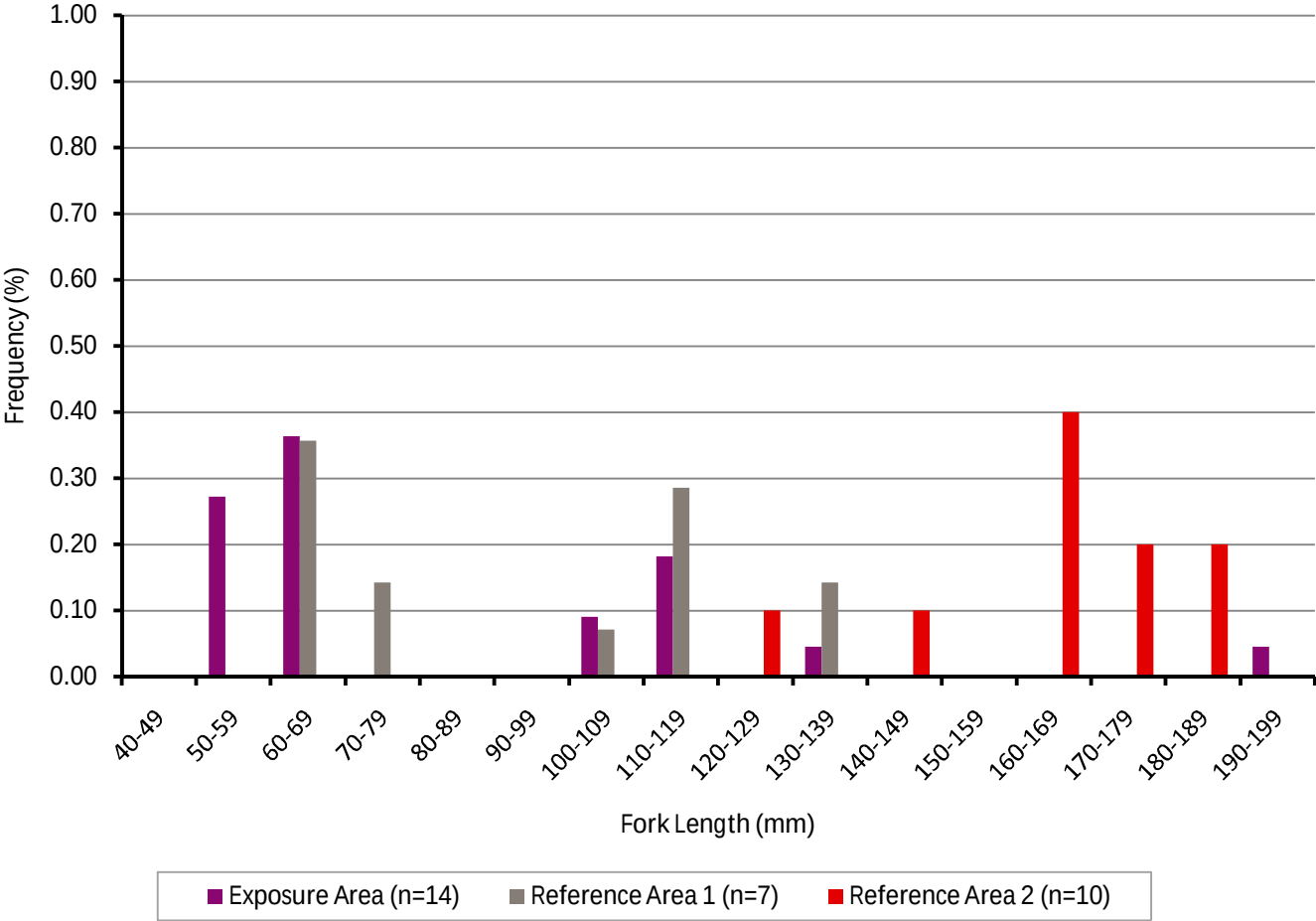


Figure 7-2: Fork Length Frequency Distribution for Arctic Grayling (all ages) from Each Survey Area (2010)

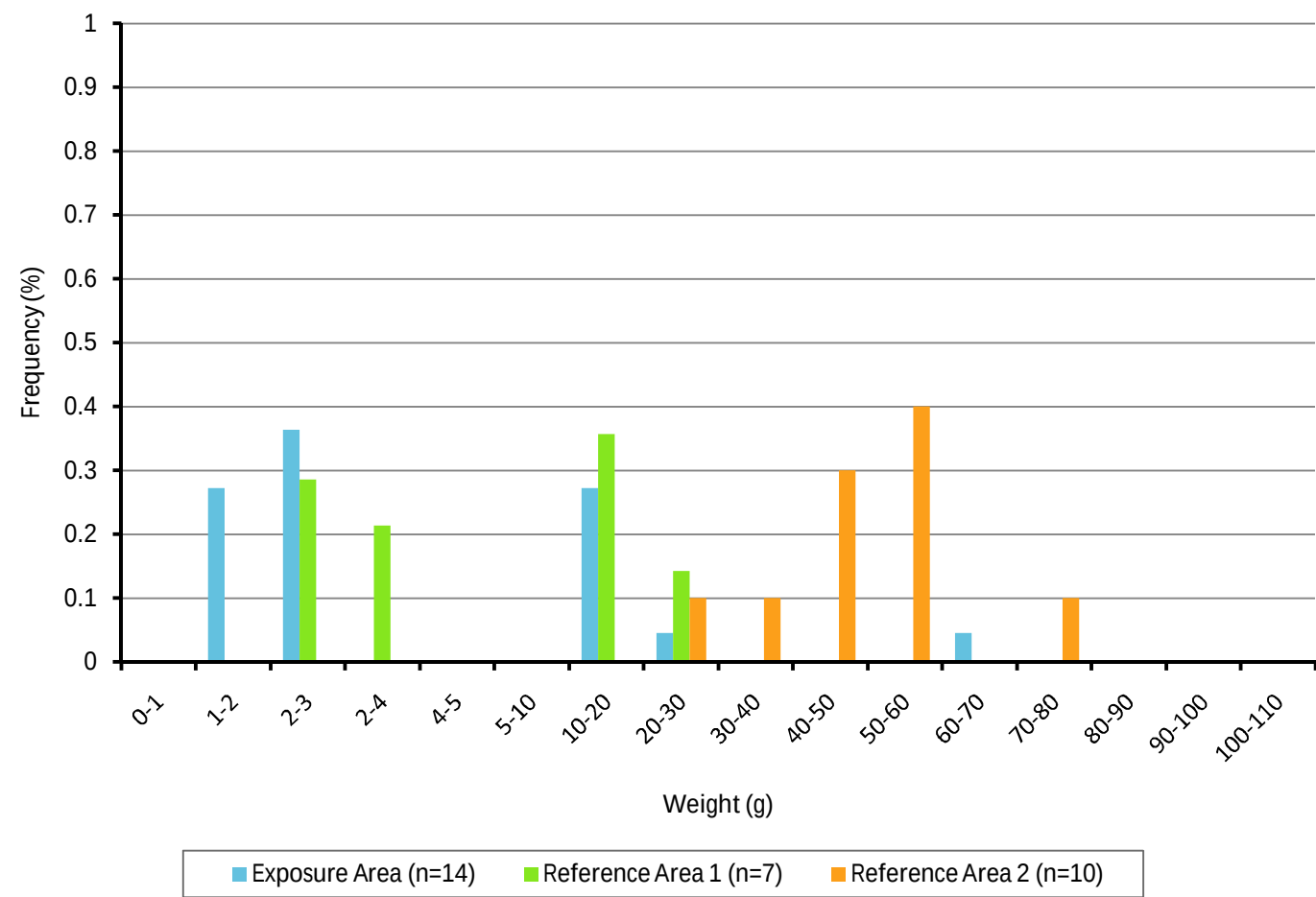


Figure 7-3: Weight Frequency Distribution for Arctic Grayling (all ages) from Each Survey Area (2010)

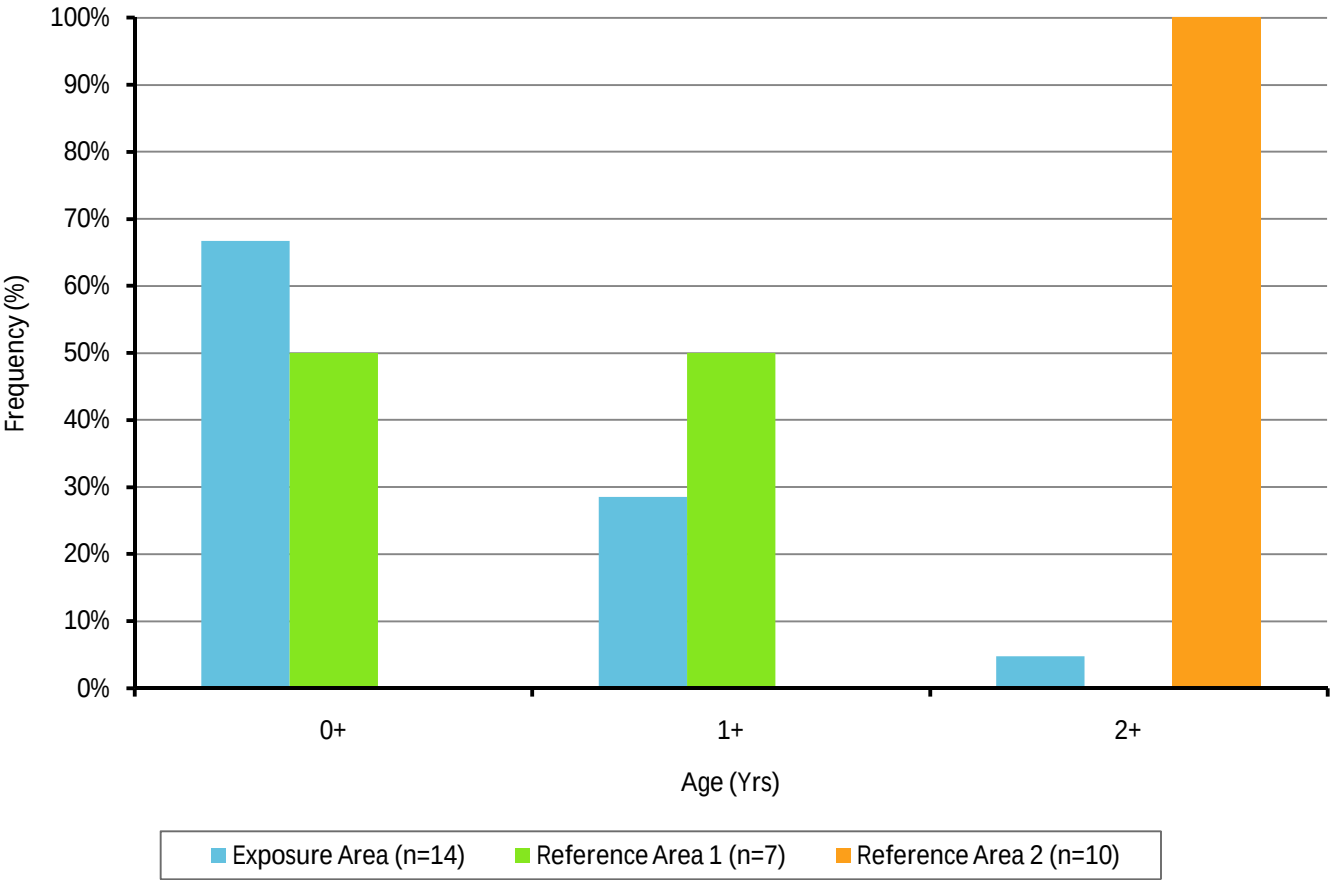


Figure 7-4: Frequency Distribution of Arctic Grayling Age Categories (2010)

7.4.3 Summary Statistics for Young-of-Year (0+) Grayling

Summary statistics for young-of-year (YoY) Arctic grayling which were used in the subsequent analyses are listed in Table 7-5. The results of the statistical analysis of the effect and supporting variables for YoY Arctic grayling are outlined in the subsequent section along with the results of the tissue analysis for metals concentration for Arctic grayling.

Table 7-5: Summary Statistics for Arctic Grayling (YoY)

Location	Variable	n	Median	Mean	SD	SE	Minimum	Maximum
Exposure Area	Fork Length(mm)	14	2.2	2.1	0.50	0.13	1.3	2.9
	Total weight (g)	14	6.2	6.3	0.40	0.10	5.5	6.7
Reference Area 1	Fork Length(mm)	7	3.0	2.9	0.35	0.13	2.5	3.6
	Total weight (g)	7	6.8	6.8	0.30	0.12	6.2	7.1
Reference Area 2	Fork Length(mm)	0	-	-	-	-	-	-
	Total weight (g)	0	-	-	-	-	-	-

Note: SD-Standard Deviation, SE-Standard Error

7.4.4 YOY Fork Length and Body Mass

The fork length-frequency and total weight-frequency distributions for YoY (0+) fish are presented in Figures 7-5 and 7-6, respectively. The supporting variables of total body weight and length of young-of-year Arctic grayling were statistically different between Exposure and Reference Areas (t-test, $p=0.002$ for both weight and length). The 0+ fish in the reference area weighed 30% more and were 9% longer than individuals in the Exposure Area.

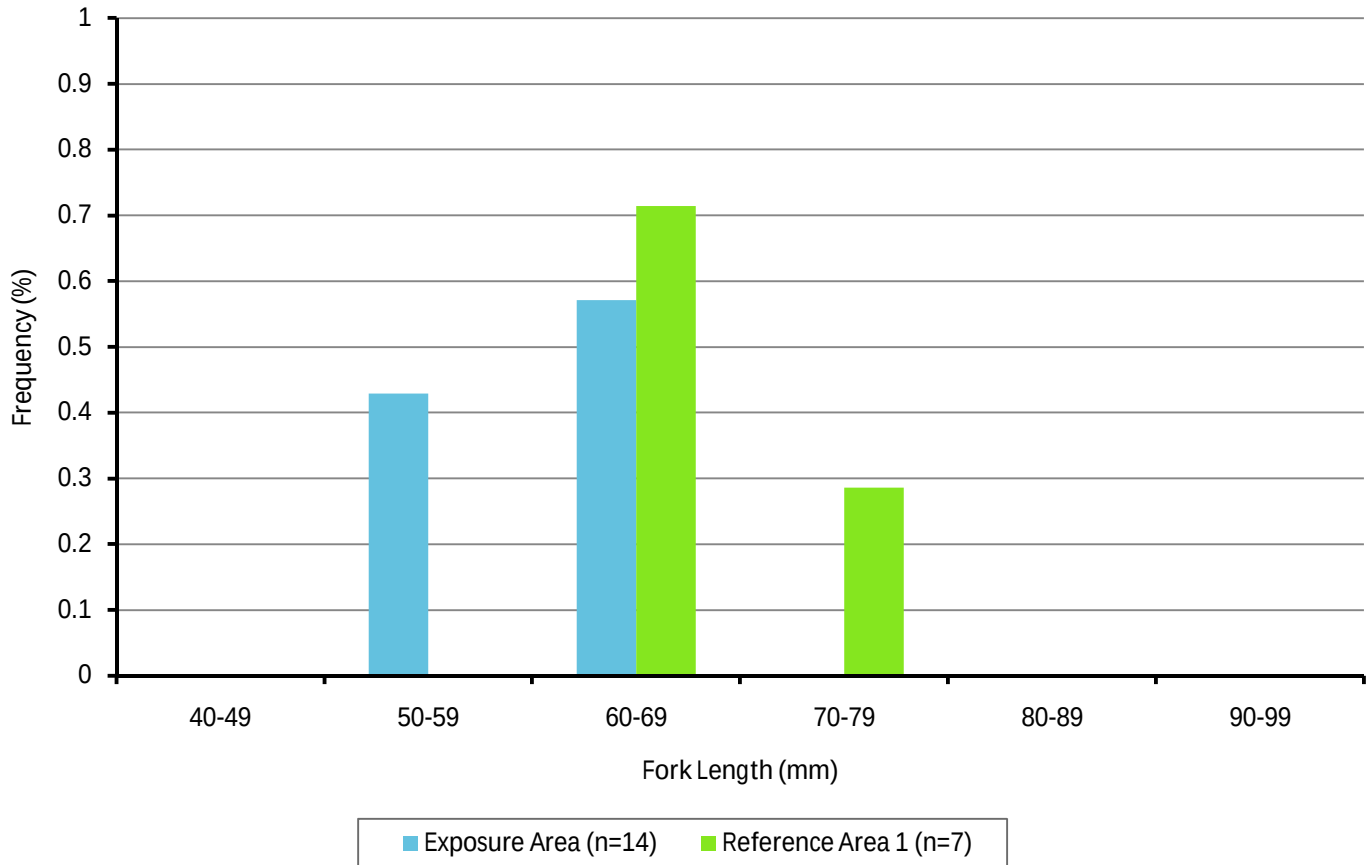


Figure 7-5: Fork Length Frequency Distribution for YoY (0+) Arctic Grayling from the Exposure Area and Reference Area 1 (2010)

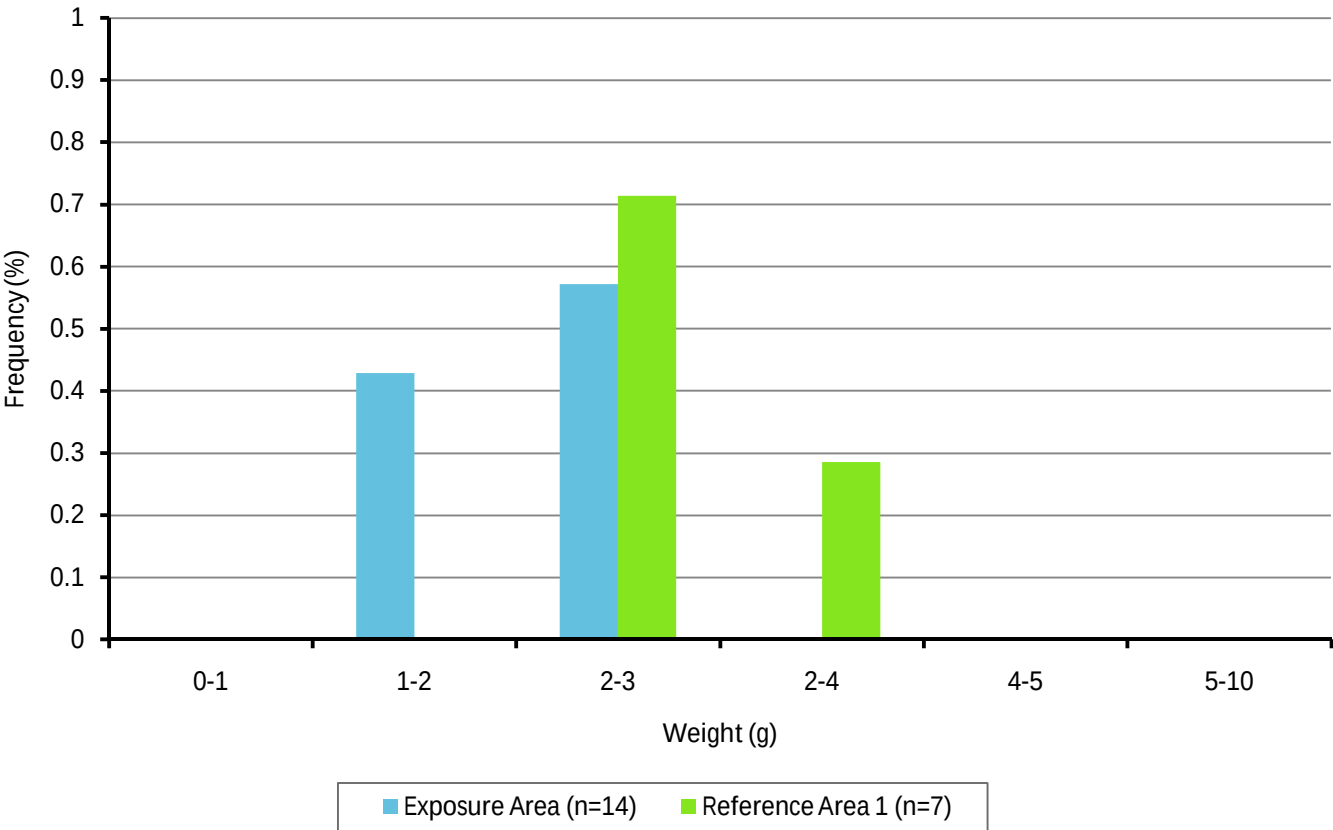


Figure 7-6: Weight Frequency Distribution for YoY (0+) Arctic Grayling from the Exposure Area and Reference Area 1 (2010)

7.4.6 Fish Condition

The effect endpoint of condition for young-of-year Arctic grayling as determined by comparing the fork length-total weight relationship statistically compared between the exposure and reference areas (Figure 7-7). No YoY Arctic grayling were collected from Reference Area 2 and therefore the YoY analysis only included Exposure Area and Reference Area 1 fish. Based on the results of the analysis of covariance analysis (ANCOVA: Table 7-6), no statistically significant difference in the particulars of the weight-length relationship was observed between sites. The interaction term was not significant indicating that the slopes were similar between the two areas, however the intercept was significantly higher in the reference area. This indicates that the condition of 0+ grayling (as opposed to length or weight) could not be statistically distinguished between the two major areas.

Table 7-6: Results of the Statistical Analysis (ANCOVA) for Arctic Grayling Condition (Covariation of Body Weight on Fork Length) Between the Exposure Area and Reference Area 1.

Data Set	Age Class	Interaction (p-value)	Significant Difference Between Areas	Intercept (p-value)	Intercepts significantly different	Direction of Difference
2010	YoY (0+)	0.359	No	< 0.001	Yes	Reference > Exposure
2008 & 2010	YoY (0+)	0.168	No	< 0.001	Yes	Reference > Exposure
2010	1+	0.112	No	< 0.001	Yes	Reference > Exposure

The linear length-weight relationships for the 2010 0+ grayling were described by the following equations:

Reference Area 1: Total weight (g) = $0.0945 \times \text{Fork length (mm)} - 3.44$; $r^2=0.92$

Exposure Area: Total weight (g) = $0.116 \times \text{Fork length (mm)} - 4.99$; $r^2=0.87$

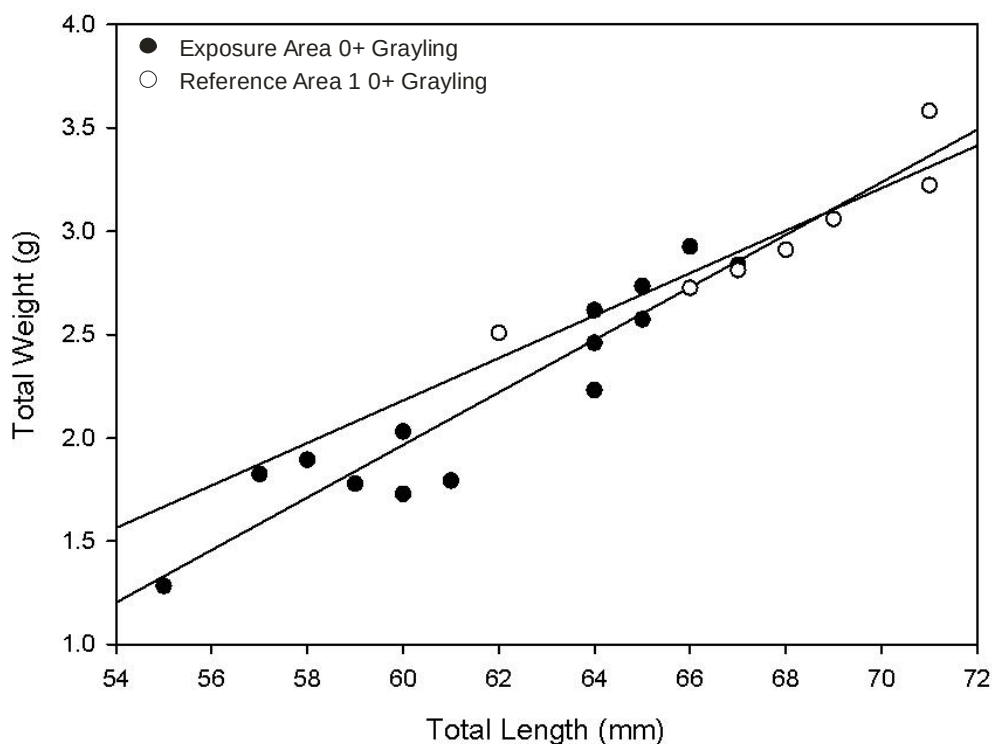


Figure 7-7: Relationship of 2010 Young of the Year (0+) Arctic Grayling Total Weight to Fork Length (Condition)

In addition to YoY (0+) Arctic grayling, weight to fork length relationships were compared for age 1+ and 2+ Arctic grayling collected in 2010. Linear least-square estimates of the weight-length relationships are shown below.

2010 age 1+ Arctic grayling

Reference Area 1: Total weight (g) = $0.4403 \times \text{Fork length (mm)} - 36.0430$; $r^2=0.96$

Exposure Area: Total weight (g) = $0.5163 \times \text{Fork length (mm)} - 41.8910$; $r^2=0.97$

2010 age 2+ Arctic grayling

Reference Area 1 only : Total weight (g) = $0.7583 \times \text{Fork length (mm)} - 75.876$; $r^2=0.91$

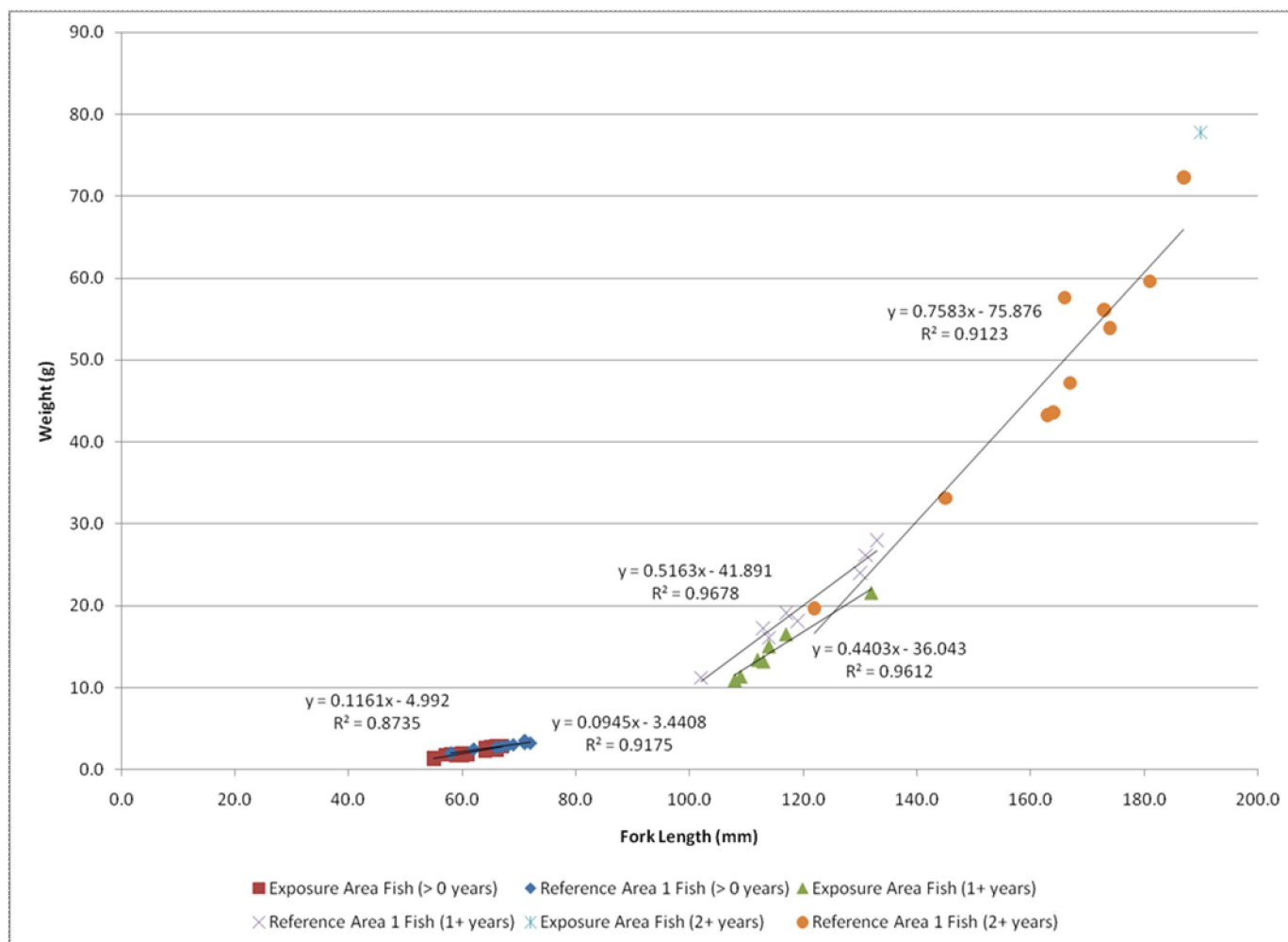


Figure 7-8: Relationship of Total Weight to Fork Length (Condition) for all 2010 Arctic Grayling Age Classes

The slope of the weight-length relationship clearly increases with age through the first (0+), second (1+), and third (2+) year of development.

Statistical analysis of differences in the 1+ age between the Exposure Area and Reference Area 1 were analysed using an ANCOVA. For the 1+ aged Arctic grayling the interaction term was not significant, indicating that the slopes (particulars of dependence of weight on fork length) were similar between the two areas; however, the intercept was significantly higher in the reference area.

An important observation is that both the lengths and weights of age 1+ Arctic grayling strongly overlap for the Exposure Area and Reference Area collections. There were no statistically significant differences between the two major collection areas in either weight or length as supporting effects endpoints. This is in contrast to observations for the 0+ fish.

The body condition effect endpoint for YoY (0+) Arctic grayling as determined by comparing the fork length-total weight relationship was further compared between the 2008 and 2010 collections for both the Exposure Areas and Reference Area 1 (Figure 7-9). Each age class from each season are shown independently with their respective linear length-weight relationship. In each comparison (using an ANCOVA), the interaction terms were not significant ($p > 0.05$) indicating that the slopes were similar, however the intercepts were significantly different between each group ($p < 0.001$).

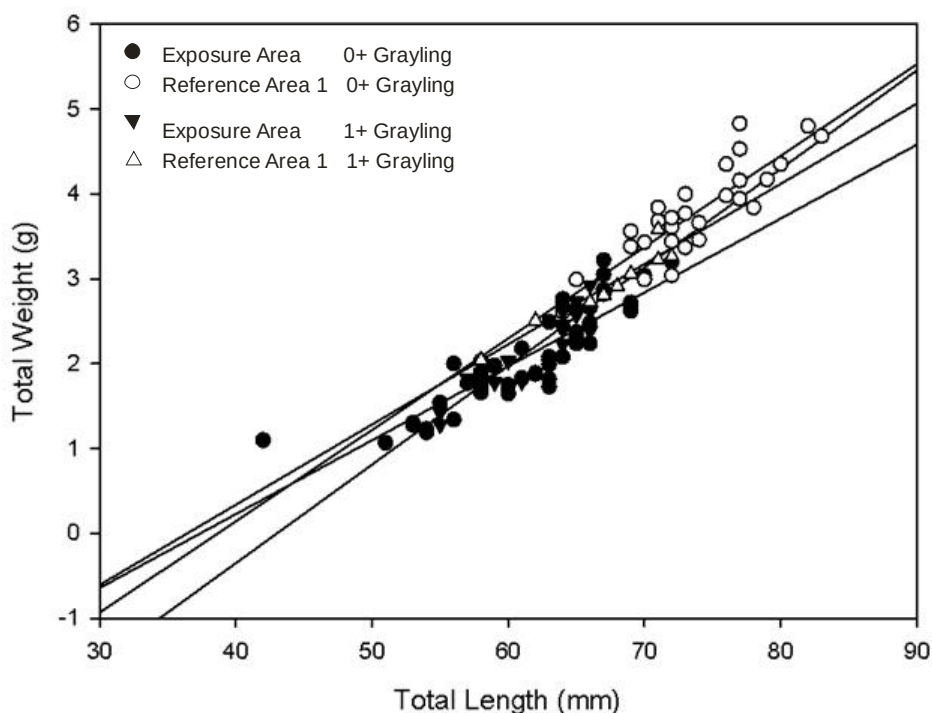


Figure 7-9: Comparison of the Total Weight to Fork Length (Condition) Relationship for both the 2008 and 2010 YoY Arctic Grayling Sampling Seasons.

The linear length-weight relationships were described by the following equations:

2008 YoY (0+) Arctic grayling:

Reference Area 1: Total weight (g) = $0.1077 \times \text{Fork length (mm)} - 4.1607$; $r^2=0.75$

Exposure Area: Total weight (g) = $0.0871 \times \text{Fork length (mm)} - 3.2529$; $r^2=0.79$

2010 YoY Arctic grayling:

Reference Area 1: Total weight (g) = $0.0945 \times \text{Fork length (mm)} - 3.4408$; $r^2=0.92$

Exposure Area: Total weight (g) = $0.1161 \times \text{Fork length (mm)} - 4.992$; $r^2=0.87$

Comparisons of a linear (Figure 7-10) and a curvilinear regression fit (Figure 7-11) applied to the Arctic grayling captured in the Exposure Area and Reference Area in 2008 and 2010 data indicate that, for both the 2008 and 2010 collections - the curvilinear relationship has a slightly higher co-efficient of determination (r^2) (i.e., 0.85 and 0.83 for 2008 and 2010, respectively) than the linear r^2 value (0.83 and 0.80, respectively). Similarly, when comparing all of the Reference and Exposure Area fish together as one data set, the curvilinear relationship (r^2) between fork length and weight was slightly (1%) higher than the linear relationship shown in Figures 7-12 (0.902 and 0.895, respectively).

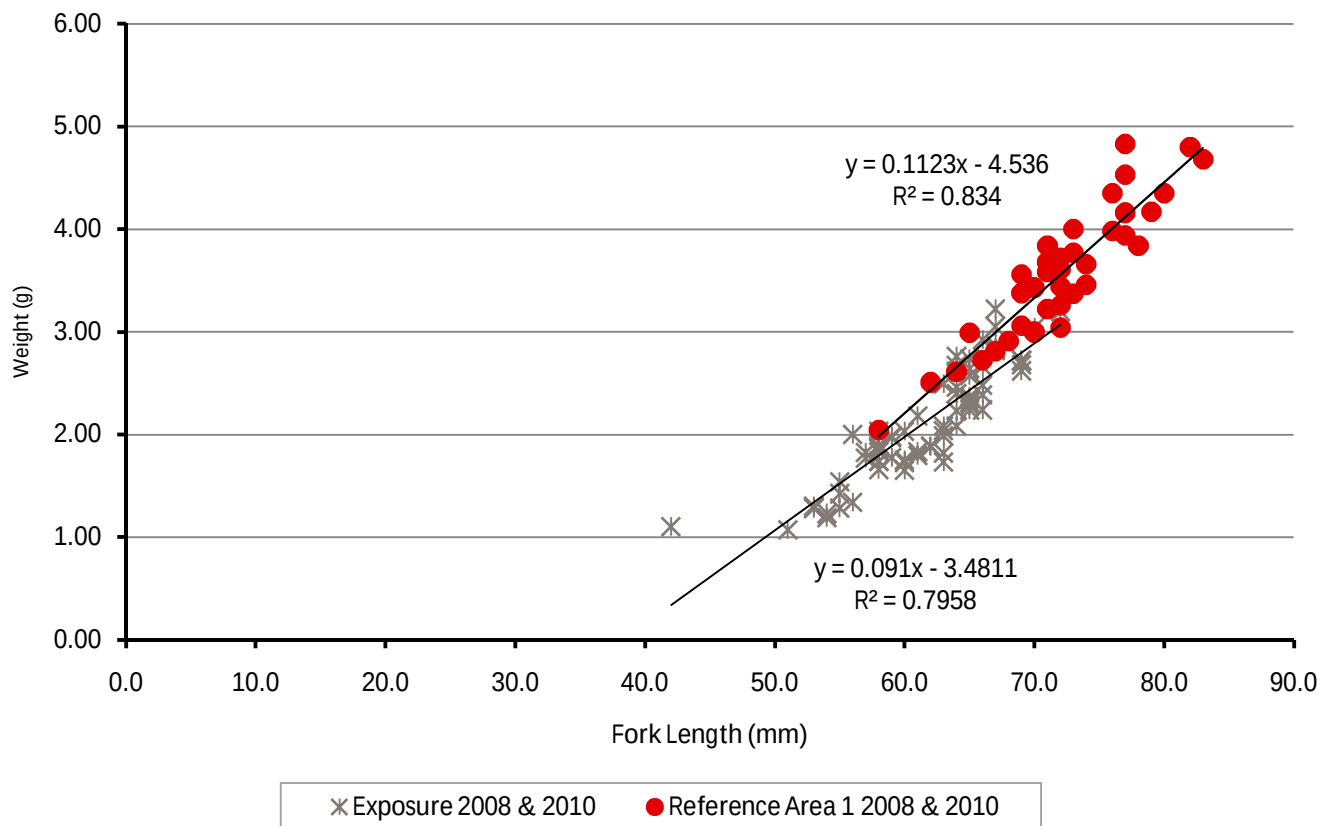


Figure 7-10: Linear Comparison of the Total Weight to Fork Length (Condition) Relationship of the 2008 and 2010 YoY (0+) Arctic Grayling.

Linear Regression: Total weight (g) = 0.117 x Fork length (mm) – 5.0202, $r^2=0.895$

Curvilinear Regression: Total weight (g) = 0.122 e^{0.0461x} Fork length (mm) – 4.9920, $r^2=0.902$

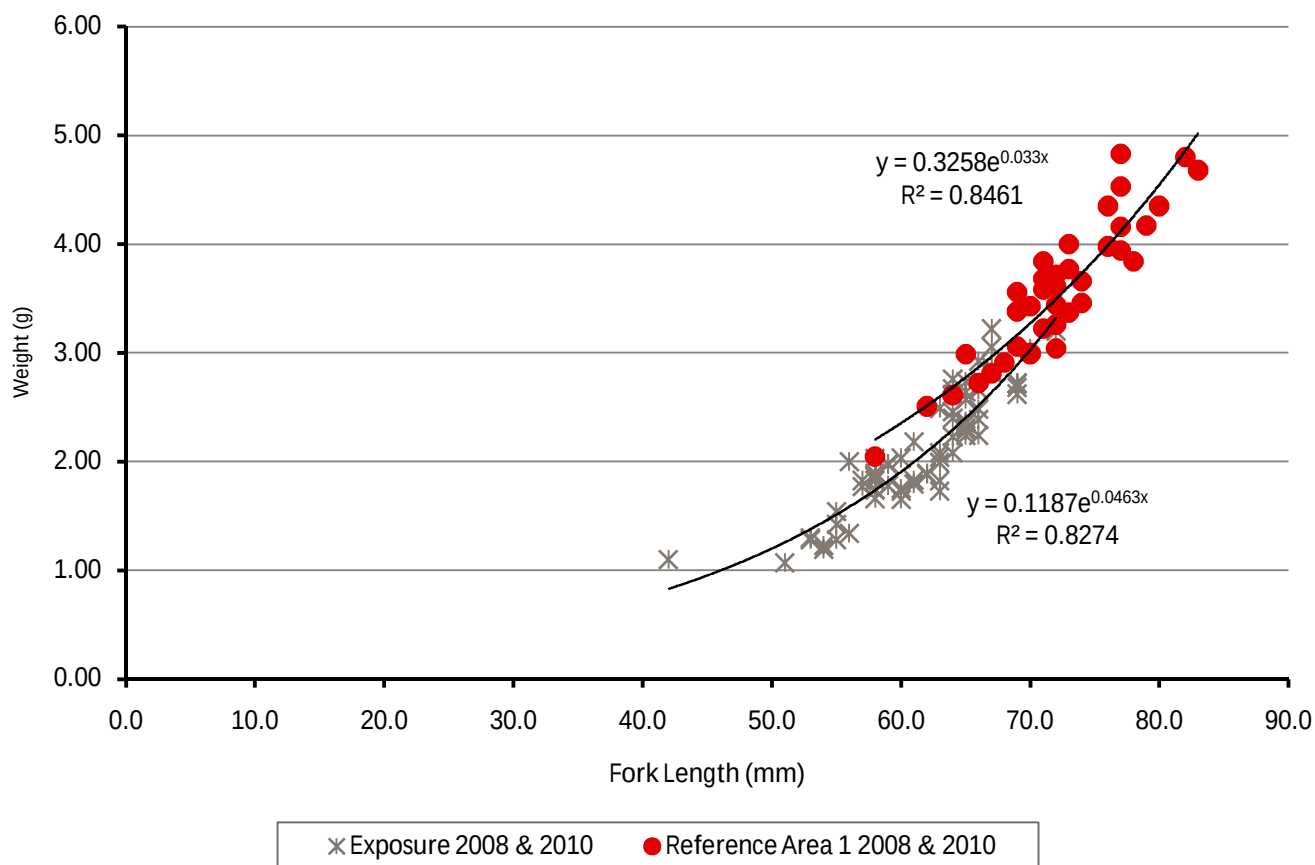


Figure 7-11: Curvilinear Comparison of the Total Weight to Fork Length (Condition) Relationship of the 2008 and 2010 YoY (0+) Arctic Grayling.

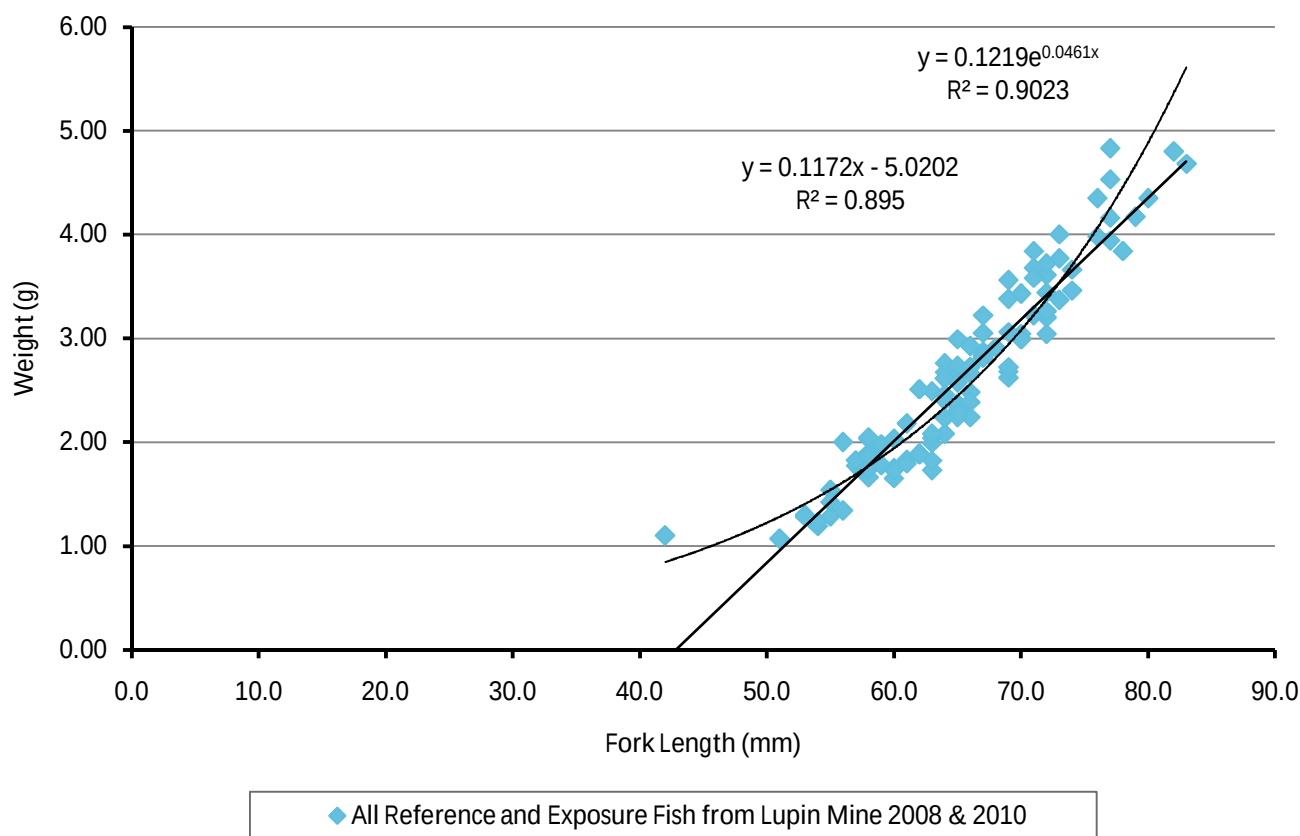


Figure 7-12: Linear and Curvilinear Regressions of all Reference and Exposure Area Fish Collected and Aged in 2008 and 2010.

Overall, the data analysis for fish collections indicates the following:

- There has been a consistently observed, statistically significant difference over the Cycle 2 (2008) and Cycle 3 (2010) EEM studies in the average fork length and wet weight of YOY (0+) Arctic grayling between the Lupin Mine Exposure Area and Reference Area 1. Exposure Area 0+ grayling have tended to be smaller in both length and weight during the August collection period than 0+ fish collected from Reference Area 1.
- For the 2010 fish samples, no statistically significant difference was observed in the average fork length or wet weight of 1+ as opposed to the 0+ age class fish. Between-site differences in age-specific average weight or length do not persist over the first year of development (between 0+ and 1+ cohorts).
- Based on the outcomes of the analysis of covariance (ANCOVA) of 0+ grayling wet body weight on fork length, there was no statistically significant difference in the condition (i.e., weight-length ratio) of 0+ grayling between the Exposure Area and Reference Area 1 for either 2008 or 2010.
- Analysis of covariance results for 0+ grayling, as above, have consistently shown a statistically significant difference in the y-intercepts between the two areas, in both 2008 and 2010. The y-intercept value

effectively represents the weight-length ratio at age 0, prior to emergence from the egg. The condition at or prior to emergence would not be influenced by local environmental conditions, since mature adults (4+ age group and older) are expected to move into the Exposure Area only immediately prior to spawning, and their bioenergetics and reproductive development/health (and that of fertilized eggs) are more likely to be influenced by conditions in deeper waters, beyond the influence of mine effluent. There is no plausible ecophysiological explanation for an observed statistically significant difference in embryo condition prior to emergence or swim-up. Rather, the significant differences in the y-intercepts between sites in the ANCOVA models are best explained as numerical model artefacts. In particular, the fact that the average length of 0+ grayling differs between sites, coupled with the fact that weight-length relationships would not be expected to scale linearly over the first few weeks to months of growth, would tend to result in differences in the predicted y-intercept for a least-squares linear fit based simply on site differences in leverage.

- Taking into account body weight-fork length relationships for juvenile Arctic grayling across both collection years (2008, 2010), age classes present (0+, 1+, 2+) and areas (Exposure Area, Reference Area 1), the data are consistent with a global curvilinear fit as illustrated in Figure 7-13, and as further described by the following relationship:

$$\text{Whole body wet wet (g)} = 0.122 \times e^{[0.0461 \times \text{fork length}]}; \quad r^2 = 90.2\%$$

8. Discussion

The effluent discharge history of the Lupin Mine from the TCA is an important factor for further evaluation of aquatic ecological effects in the receiving environment. In particular, it is important to note that the Cycle 1 study was completed in 2005 just after the cessation of annual discharge of treated effluent from the TCA (Table 5-1), while the Cycle 2 study (2008) was completed following three years without any effluent discharge. A discharge did occur in 2009, but not in 2010. Overall, the volume of treated effluent discharged to the Seep Creek ecosystem since 1998 has averaged approximately 0.80 million m³/annum, with active discharges having occurred in 2000, 2002, 2005 and 2009. In comparison the average annual discharge in the four years prior to 1998 was approximately 1.5 million m³/annum.

Water quality in the Exposure Area in August, 2010, reflected the historical discharge of treated mine effluent, in that total Al, As, Cd, Cu, Ni, and Zn concentrations (Table 5-2) exceeded their respective Canadian water quality guideline for freshwater life protection in one or more of the water samples collected. This was dissimilar to the Reference Area samples (Table 5-3). Inorganic substances that were significantly elevated in Exposure Area sediments in comparison with Reference Areas 1 and 2 include As, Co, Cu, Mo, Ni, Sr, and Zn (Table 6-2).

Of the contaminants of potential concern identified in water or sediment samples from the Lupin Mine Exposure Area, only arsenic was significantly elevated in the whole body tissues of sub-adult Arctic grayling collected from the Exposure Area in comparison with the two reference areas. There was a statistically significant difference between areas in the grayling tissue cobalt concentration; however, the highest average tissue concentration was observed in fish collected from Reference Area 2.

8.1 Growth of Juvenile Grayling in the Lupin Mine Exposure Area

This Cycle 3 EEM study for the Lupin Mine TCA discharge was catalyzed by an observation from Cycle 1 and Cycle 2 MMR EEM studies that early life stages of Arctic grayling collected from the effluent Exposure Area exhibited a smaller average body mass and fork length than fish from the Reference Area 1 (Fingers Lake drainage). The 1+ age class of Arctic grayling was the focus of the Cycle 1 (2005) study, while young-of-the-year (0+) grayling were the focus of the Cycle 2 (2008) study.

The average fish size (based on weight or length) in early life stages of Arctic grayling was lower in the fish collected from the Exposure Area in this and previously completed EEM studies; however, it is important to note that no statistically significant differences have been observed in the condition of 0+ and 1+ age class Arctic grayling between the Exposure Area and Reference Area 1, based on an analysis of covariance of body weight on fork length.

A summary of the major findings with regard to Arctic grayling health in the Exposure Area is as follows:

- This Cycle 3 study indicates that YoY Arctic grayling experience significantly higher water temperatures during the summer in the Exposure Area compared to Reference Area 1, by 1.0 to 1.5 °C on average over the seven week summertime measurement period. This is in contrast to the prior hypothesis that the Fingers Lake Reference Area 1 exhibits greater comparative temperatures and thus more rapid growth of age-0+ and subsequent juvenile grayling life stages. The hypothesis that differences between sites in juvenile grayling length or weight are proportional to differences in average temperature or degree days, therefore, is rejected.
- Furthermore, the Cycle 3 field observations suggest that YoY Arctic grayling experience greater average flow velocity in the Exposure Area compared to Reference Area 1.

- On average, the YoY (0+) and/or 1+ age class Arctic grayling from the Exposure Area were shorter and lighter than the YoY Arctic grayling from Reference Area 1 (Cycle 1, 2, and 3).
- In August of 2010, there was not a statistically significant difference between the length or weight of the 1+ grayling between the Exposure Area and Reference Area 1, in spite of the noted difference for the 0+ cohort. There appears to be a convergence in the size of grayling from the different areas through their first year after swim-up. This further suggests that the 0+ differences might be attributable to differences in timing of spawning, hatching and swim-up between the two small watershed: A difference of several days to a few weeks in the hatching time on spawning grounds in the two areas would account for the differences in size of 0+ fish based on field observations in August, about one month after hatching from the eggs.
- Statistical analysis (ANCOVA) of the condition for the YoY Arctic grayling from the Exposure Area indicated that the slopes of the regression lines for each population (Exposure Area and Reference Area 1) were not significantly different and the Y-intercepts of the ANCOVA was significantly higher in the Reference Area 1. Therefore, the relationships between length and weight (condition) of the two populations were similar (i.e., they did not differ significantly between the Exposure Area and Reference Area 1).

Conclusions from the Cycle 2 report suggested that lower length and weight for YoY or 1+ age class Arctic grayling may be attributable to factors such as water temperature, food availability, competition, and predation. The results of Cycle 3 indicate that the hypothesis regarding lower water temperatures in the Exposure Area having an effect on the growth of YoY Arctic grayling is not supported (Figure 7-1).

Impacts on the YoY Arctic grayling population caused by competition and predation in the Exposure Area and Reference Area 1 are stream dependent and site specific information was not collected as part of Cycle 3. Food availability analysis conducted during Cycle 2 indicated that the benthic invertebrate community in the Exposure Area exhibited significantly lower Simpson indices of diversity and evenness. However, these differences were not significant and the proposed correlation between growth and the availability of specific taxa (Chironomidae) was not supported by the Cycle 2 results (high densities of chironomids found in the Exposure Area). The statistically significant benthic community metrics were not consistent between the Cycle 1 and Cycle 2 studies, and overall it was concluded that the benthic invertebrate community in the Exposure Area and Reference Area 1 are substantially similar with regard to numerical abundance as well as species richness and diversity. Given the similar average numerical abundance between the two areas, it is unlikely that the standing stock biomass would be different enough to impact the growth of sub-adult Arctic char in the Exposure Area.

Juvenile Arctic grayling have been observed to occupy different positions within a stream based on size and distance from the river mouth (Baccante, 2010). Hughes and Reynolds (1994) indicated that Arctic grayling in upstream stream reaches are, on average, larger than those downstream. This work supported work conducted by Tack (1980) that indicated that downstream areas are generally colonised by young grayling that gradually move upstream as they get larger and older. Tack (1980) speculated that this behaviour would provide larger fish with a feeding advantage primarily because fish with the upstream position would have first access to drifting prey items such as floating insects. This and allied studies support the importance of drift prey items for Arctic grayling foraging, as opposed to benthic invertebrates. Fish position within the streams surveyed may have influenced the results of the morphometrics analysed in this study. It should be noted that the fish sampling was conducted over comparable distances (approximately 1.5 km) within their respective watersheds. However, Reference Area 1 was sampled along the entire section of Fingers Creek from Contwoyto Lake to Fingers Lake (headwaters of the Fingers Watershed), whereas the Exposure Area was surveyed along the lowest portion of Seep Creek beginning at the mouth of Seep Creek (discharge point into Inner Sun Bay).

The studies by Hughes (1992), Hughes and Reynolds (1994), Hughes (1999) and Baccante (2010) show increases in mean fork length with distance from the mouth of rivers for primarily riverine populations of Arctic grayling, which include all age/size classes, as well as fish that spend their entire life in the riverine environment. The Contyowto Lake and Seep Creek Arctic grayling populations, however, are predominantly lacustrine (lake-dwelling populations), the life history of which departs from most of the populations that have been the subject of published scientific studies (e.g. Clark, 1992; Deleray and Kaya, 1992; Deegan *et al.* 1999; Buzby and Deegan, 2000, 2004; DeCicco, 2002; Jones and Tonn, 2004; Deegan *et al.* 2005; Clarke *et al.* 2007). Jones *et al.* (2003) completed a study of the feeding preferences of young-of-the-year Arctic grayling in lake outlet streams from the Barrenlands of the Northwest Territories.

In the Lupin Mine Exposure Area, it is assumed that gravid adults (spawners) move into Outer Sun Bay and then into Inner Sun Bay in the spring near the time of break-up, and that the adults move up Seep Creek to optimal (and sub-optimal) spawning areas at the earliest opportunity, depending on annual variations in ice melt and associated limitations imposed by channel morphology and depth for the movement from deeper water to more shallow areas in the system. After spawning, hatching, and swim-up, the 0+ age class will forage in shallow lower velocity areas of the creeks, ponds and side-channels (in part to limit predation). Prior to freeze-up, the 0+ fish must migrate to deeper waters to survive the winter. The over-wintering habitat of sub-adult Arctic char (or other fish species found in the Exposure Area) has not been identified to date, but survivorship in this habitat may be at least as critical to overall continued population recruitment as growth and survivorship while occupying summer-time foraging areas. We speculate that 0+ Arctic grayling would move into Inner Sun Bay for over-wintering. Juvenile and adult arctic grayling show considerable fidelity and tend to return to the same summer-time foraging areas as occupied previously (Buzby and Deegan, 2004). For the Lupin Mine EEM study area, therefore, it is speculated that 1+ and 2+ age classes re-enter the Exposure Area and equivalent habitats in the reference areas in the summer-time open water period. After reaching 2+ years of age, fish probably remain in deeper waters to forage, having grown large enough to limit risks of predation by other fish species present under summer-time conditions.

Differences in recruitment could have been caused by differences in the timing of spawning grounds accessibility. These differences may have occurred based on localized differences in spring thaw rates (i.e. related to stream morphology, depth, width, etc) and spawning area entrance limitations (i.e. ice jams).

Based on the ANCOVA analyses presented in Section 7, the linear models adequately describe growth over the growing season. However, graphical comparisons of the weight-length relationship in YoY Arctic grayling indicated that a curvilinear relationship provided a better approximation of the growth of Exposure and Reference Area 1 grayling collected in 2008 and 2010 (Figures 7-10 and 11) as well as for all YoY grayling collected in 2008 and 2010 (Figures 7-12 and 13). The results shown in Figure 7-8 show that despite the size differences in YoY Arctic grayling the slopes of the 1+ Arctic grayling also did not differ significantly. Therefore the differences detected in average length and weight between the Exposure Area and Reference Area 1 populations do not appear to be diverging in subsequent age classes.

The curvilinear relationships shown in Figures 7-11 and 7-12 indicate that a curvilinear growth trajectory does a better job of representing both populations over the growing season. This would be consistent with observations by various researchers that condition increases through the growing season. The length-weight ratio would not be expected to be consistent through the season and across different age classes. A survival advantage is conferred on fish that have higher energetic reserves immediately prior to freeze-up.

Within-season variation in the timing of recruitment between the Exposure Area and Reference Area 1 Arctic grayling populations may be the reason for the statistically significant differences in size (length and weight) of 0+ age class fish observed for both the 2008 and 2010 YoY studies. The spawning window for Arctic grayling occurs

immediately post ice out. The area surrounding the Lupin Mine is relatively flat and is dominated by low lying vegetation which should equalise the influence of external factors on the timing of ice out and thus potential differences in the spawning window of each study watersheds. However, watershed specific factors such as stream depth and morphology may have a more significant influence on the timing of ice out and therefore the timing of the return of gravid adults. Specific potential influences were not quantified in Cycle 3; however, we speculate that a later spawning time and or hatch time in the Exposure Area would have resulted in the differences observed during in season sampling of YoY Arctic grayling. Extrapolation of the summer water temperatures recorded during 2010 would not accurately represent the late winter and early spring conditions of these survey areas. Coad *et al.* (2005) recommended sampling for Arctic grayling - used as a sentinel fish species in pulp and paper and metal mining environmental effects monitoring fish population surveys - should be conducted in late fall (as late as possible before ice cover).

Therefore a more accurate comparison of Arctic grayling size between the Exposure Area and Reference Area 1 would require later sampling times than were conducted in Cycles 2 and 3. A preferred approach for assessing growth variability in sub-adult populations would be to conduct sampling on at least two dates through the summer-time open period, for the purpose of directly estimating average increase in biomass per day in the nursery areas.

8.2 Comparison of Water Chemistry with Literature-derived Threshold Values for Freshwater Fish

The 2010 water chemistry data were screened against the Canadian water quality guidelines for freshwater life protection, taking into account the influence of hardness or pH on toxicological thresholds where relevant. The pH of water samples collected in 2010 from the Lupin Exposure Area ranged from 6.69 to 6.89, which was similar to the reference areas. The Exposure Area hardness differed from that of the reference areas, however, with a range of 22.9 to 68.3 mg/L as CaCO₃ equivalents in the Exposure Area samples at a range of 3.2 to 5.8 mg/L in the reference areas.

Assuming a hardness of 23 mg/L (the lowest end of the documented range), site-specific water quality guidelines can be calculated based on methods prescribed by CCME, as follows:

Table 8-1: Comparison of maximum observed concentration in water sample from Exposure Area to hardness-specific water quality guidelines, per CCME guidance

Substance	Equation for calculating CCME WQ based on water hardness	Result (µg/L)		Highest Observed Value – Exposure Area (2010)
		(hardness = 23 mg/L)	Hardness = 3.2 mg/L)	
aluminum	= 5 µg/L if pH < 6.5; = 100 µg/L if pH ≥ 6.5	100	100	112
cadmium	$= 10^{\{0.86[\log(\text{hardness})] - 3.2\}}$ µg/L	0.0094	0.0017	0.065
copper	$= e^{0.8545[\ln(\text{hardness})] - 1.465}$ x 0.2 µg/L	2	2	6.0
lead	$= e^{1.273[\ln(\text{hardness})] - 4.7055}$ µg/L	1	1	0.10
nickel	$= e^{0.76[\ln(\text{hardness})] + 1.06}$ µg/L	31	25	35.4

At a pH of 7.0 and temperature of 10°C, the Canadian water quality guideline for total ammonia is 10.3 mg/L NH₃. In comparison, the observed range in water samples collected in 2010 from the Exposure Area was 0.009 to 0.014

mg/L – approximately three orders of magnitude lower than the guideline. No aquatic toxicity would be expected from the observed ammonia levels, therefore.

Substances measured in surface water from the exposure area in 2010 that exceeded the generic or hardness-specific water quality guidelines for freshwater life protection included the following:

- aluminum
- arsenic
- **cadmium**
- **copper**
- **iron**
- mercury (one replicate of one sample only)
- nickel
- zinc (one sample only)

The substances that exceeded their respective WQG by more than two-fold in more than two samples are shown in bold. These are the primary candidates for any possible sub-acute toxicity (based on effects other than mortality). This in turn is based on the fact that the CCME water quality guidelines for freshwater life protection tend to be based on preventing effects to all species including aquatic animals that are often more sensitive to metals/metalloids in water when available in a freely available, ionized form.

Cadmium:

The CWQG_{FL} for cadmium was re-visited in 1999. While the interim water quality guideline (freshwater life protection) for cadmium was set at 0.017 µg/L, this is based on (i) a 16 day LOEL for the waterflea *Daphnia magna* of **0.17 µg/L**, coupled with (ii) a 10-fold safety factor. In comparison, finfish appear to be less sensitive to cadmium. According to CCME (1999a) –

“Data on the acute toxicity of cadmium to freshwater fish were available for 23 species (Environment Canada 1994). Salmonids appear to be the most sensitive family of fish. Cusimano et al. (1986) reported 96- and 168-h LC50s of <0.5 µg L⁻¹ for rainbow trout (*Oncorhynchus mykiss*) fry exposed to cadmium. A number of other studies on rainbow trout, chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisutch*) also reported acute lethal toxicity (10–50%) after exposures to cadmium levels that ranged from 0.8 to 1.4 µg×L⁻¹ (Chapman 1978; Finlayson and Verrue 1982; Spehar and Carlson 1984; Buhl and Hamilton 1991). Chronically exposed fish demonstrated toxic effects at concentrations similar to those used in acute tests. In a 46-d study, significant reductions in body weight (11%) and fork length (6%) in Atlantic salmon (*Salmo salar*) alevins were evident at cadmium concentrations of 0.47 µg×L⁻¹ (Rombough and Garside 1982). A 12.5% reduction in survival was reported for the striped bass (*Morone saxatilis*) following a 12-d exposure to cadmium levels of 0.5 µg×L⁻¹ (Wright et al. 1985). Steelhead (*O. mykiss*) parr were also relatively sensitive, exhibiting 200-h LC50 and LC10 values of 0.9 and 0.7 µg×L⁻¹, respectively (Chapman 1978). Spehar et al. (1978) exposed American flagfish (*Jordanella floridae*) for 30 d to cadmium levels of 8.5 µg ×L⁻¹ and found a 19% reduction in survival. Japanese medaka (*Oryzias latipes*) suffered 25% mortality following an 18-d exposure to cadmium levels of 7 µg×L⁻¹ (Canton and Slooff 1982).”

Perhaps the most relevant set of test results to the Lupin Phase III EEM is the 46-d exposure of Atlantic salmon alevins, with an effects size of 11% for body weight and 6% for fork length when exposure to **0.47 µg/L Cd**. This is approximately one order of magnitude greater than the maximum observed water column concentration in the Exposure Area in 2010.

Copper:

The Canadian Council of Ministers of the Environment does not have a WQG development fact sheet available online (<http://ceqg-rcqe.ccme.ca/>) for copper. Nonetheless, the province of British Columbia has developed Approved Water Quality Criteria for Copper (1987)

(<http://www.env.gov.bc.ca/wat/wq/BCguidelines/copper/copper.html> accessed online 02 May, 2011) based on substantially the same information used in the development of the copper Canadian water quality guideline for freshwater life protection. The BC water quality criterion is set at 2 µg/L for water bodies with low hardness (<50 mg/L as CaCO₃) and 4 µg/L when water hardness is greater than 50 mg/L. This is intended as a 30-day average. Aquatic toxicity data used in the derivation of the BC water quality criteria and Canadian water quality guideline for freshwater life protection are provided in the Technical Appendix available at <http://www.env.gov.bc.ca/wat/wq/BCguidelines/copper/coppertech.pdf> (accessed online 02 May, 2011). Effects on freshwater fish are reviewed in Section 5.5.1 of the Technical Appendix. The document states:

“A search of the literature indicated that small steelhead (*Salmo gairdneri*) fry (1 to 6 g) were the most sensitive fish species tested to date⁶⁸. LC50 values were calculated for 96 and 168 h exposure periods to copper in soft water (10 mg/L CaCO₃) at pH 4.7, 5.7, and 7.0. Fish were acclimated to test pH for eight days prior to testing. The 96 h LC50's for copper at the three pH levels were 66.0, 4.2 and 2.8 µg/L, respectively. The 168 h LC50's were similar to the 96 h values. Interestingly, the fish were most tolerant at the lowest pH. Chinook salmon (*Oncorhynchus tshawytsca*) fry were also found to have a low tolerance to copper, with a 96 h LC50 of 10 µg/L when tested in soft water (13 mg/L CaCO₃) at pH 7.2¹⁸². Based on the acute toxicity/hardness relationship, Spear and Pierce (1979) have developed formulae for predicting the toxicity (LC50's) for copper to certain taxonomic groups of fishes. For example, the LC50s' for coho and chinook salmon range from 10 µg/L in soft water to 125 µg/L in hard water according to the equation:

$LC50 \text{ (mg/L Cu)} = 0.0014 H^{0.79} \text{ (mg/L CaCO}_3\text{)}$, where H represents water hardness.

The development of this formula incorporated exposure periods ranging from 24 hours to 21 days. Similar equations have been developed for the order Perciformes (perch-like fish), the order Cypriniformes (minnow-like fishes), and other salmonid species.”

The range of copper concentrations at which different non-lethal responses in freshwater fish have been observed was reviewed by Spear and Pierce (1979). The following figure is reproduced in Figure 8-1.

The available studies suggest that the lower threshold for effects on growth would be similar or perhaps slightly higher than the lower threshold for sub-chronic to chronic mortality in juvenile forms of freshwater salmonids.

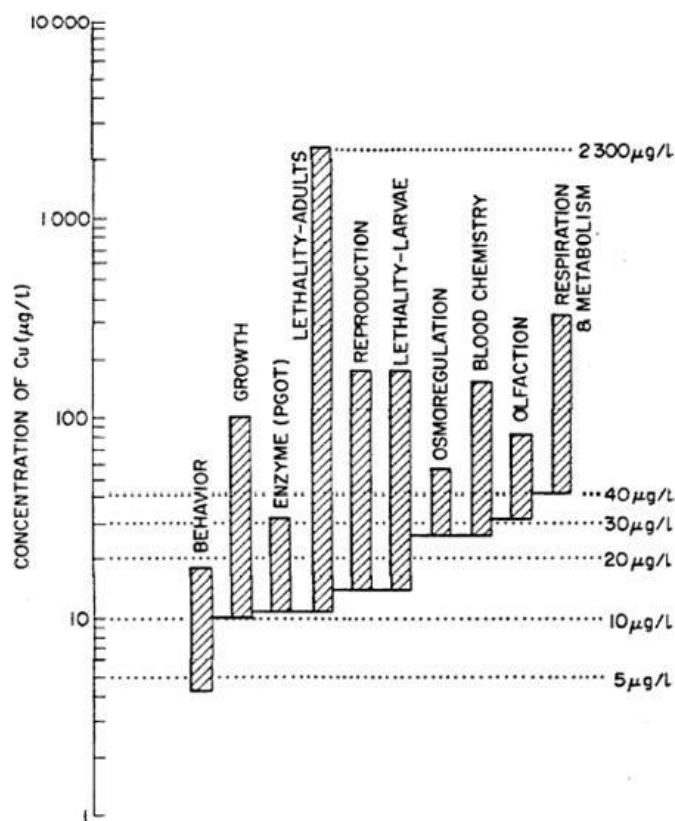


Figure 8-1: Thresholds and ranges of Cu (µg/L) associated with various sublethal effects in freshwater fish (from Spear and Pierce, 1979). The data are for low hardness waters that are relatively free of complexing agents.

Iron:

The Canadian Council of Ministers of the Environment does not have a WQG development fact sheet available online (<http://ceqg-rcqe.ccme.ca/>) for iron. Nonetheless, the province of British Columbia has developed Approved Water Quality Criteria for Iron (2008) (http://www.env.gov.bc.ca/wat/wq/BCguidelines/iron/iron_overview.pdf; accessed online 02 May, 2011) based on substantially the same information used in the development of the copper Canadian water quality guideline for freshwater life protection. According to this document, "To protect freshwater aquatic life guideline for iron is 1 mg/L for total iron and 0.35 mg/L for dissolved iron."

In 2010, the concentrations of total (not dissolved iron) measured in the Lupin mine exposure area were as follows:

- SCP-1: 0.382 mg/L
- SCF-1 0.463 mg/L
- SNP 925-20: 0.760 mg/L
- SCD-1: 0.157 mg/L

All results were lower than 1 mg/L total iron, as referenced above.

According to the BC Water Quality Criterion for Iron – Technical Appendix:

"The life stage of fish exposed to iron is very important in terms of long-term impact. In a number of studies, different life stages of three species of fish (fathead minnow, coho salmon and brook trout) were examined for sensitivity to lime-neutralized iron hydroxide. The safe upper limit of lime-neutralized iron in suspension for survival, growth, and reproduction of the fathead minnow was between 0.29 and 1.87 mg/L iron and the initial deleterious effect occurred during the egg incubation stage (Smith *et al.* 1973). For coho, the safe upper limit lay between 0.97 and 1.27 mg/L (lime-neutralized suspended) iron, with initial deleterious effect occurring during the early alevin development stage (Smith and Sykora 1976). Finally, the safe upper limit for brook trout was between 7.5 and 12.5 11 mg/L (lime-neutralized suspended) iron, with deleterious effects occurring during the juvenile development stage (Sykora *et al.* 1972a, 1972b, 1975 cited in Smith and Sykora 1976). Highly sensitive fish appear to be affected by lime-neutralized iron hydroxide suspensions earlier in their life history than species of lower sensitivity (Smith and Sykora 1976)."

and

"Smith and Sykora (1976) exposed brook trout and coho salmon at various concentrations (12, 6, 3, 1.5 and 0.75 mg/L) of lime-neutralized suspended iron. They found that none of the concentrations had an effect on the hatching success of brook trout or coho salmon. Also, brook trout alevin survival and size at 30, 60 and 90 days post-hatch did not change in response to an increase in lime-neutralized suspended iron concentration (Sykora *et al.* 1975). However, Sykora *et al.* (1972a) found that brook trout had retarded growth at 12 mg/L suspended iron and higher, and fish exposed to levels exceeding 6 mg/L were more susceptible to injury and disease. At 50 mg/L suspended iron, viability of brook trout eggs was greatly reduced (Sykora *et al.* 1972a). Coho salmon alevin survival at 30, 60, and 90 days post-hatch was similar in the 3, 1.5 and 0.75 mg/L suspended iron and control solutions, but declined sharply in 6 and 12 mg/L suspended iron water. They suggest that the safe upper limit for prolonged exposure of coho salmon egg and alevin stages may lie between 0.75 and 1.5 mg/L suspended iron."

In light of this information, it is unlikely that the observed total iron concentrations observed in surface water in July 2010 would result in altered growth or development after the swim-up stage.

8.2.1 Comparison of Water Chemistry with Literature-derived Threshold Values for Arctic Grayling

A few key research studies (Buhl and Hamilton, 1990; Buhl and Hamilton, 1991) have directly evaluated the sensitivity of early life stages of Arctic grayling to metals/metalloids and other aspects of water quality. These studies were motivated by concerns about the effects of placer mining in Alaska and the Yukon. Waste materials from placer mining, and especially the washing process, is typically discharged to settling ponds above the wetted stream channel. The decanted effluent is then discharged; however, the discharge typically contains elevated levels of fine suspended particulates (e.g. measurable as increased turbidity) and trace inorganics in dissolved and fine particulate form. Placer mines are often located in headstream valleys which are important spawning and nursery grounds for grayling.

Table 8-2, below, is reproduced from Buhl and Hamilton (1990). The data are based on laboratory-based toxicity tests using hatchery stock. Eggs were hatched in a vertical flow incubator, and fry were subsequently exposed in fiberglass troughs. Juveniles were exposed in circular tanks. Mean and range (in parentheses) for hardness were 41.3 (40.0-43.0) mg/L and for alkalinity 30.9 (30.0-32.0) mg/L (both as CaCO₃). The pH ranged from 7.1 to 8.0 and the mean conductivity was 158 (range, 143-179) µmhos/cm at 25°C.

As will be noted from Table 8-3, threshold of effect concentrations for arsenic, lead and zinc were much higher than observed in surface water samples from the Lupin mine Exposure Area. Conversely, the lowest 96h LC50 for copper was 2.58 µg/L (for 0.34 g fry from an Alaskan hatchery).

Juvenile Arctic grayling were much more sensitive to copper than juvenile coho (*Oncorhynchus kisutch*: minimum LC50 of 15.1 µg/L) or rainbow trout (*Oncorhynchus mykiss*: minimum LC50 of 13.8 µg/L). For grayling, there was a difference in sensitivity in different years (eggs hatched and tested in 1985 vs 1986 vs 1987). The observed LC50 by year for grayling juveniles was as follows:

- 1985: 2.6 µg/L
- 1986: 30.0 µg/L
- 1987: 49.3 µg/L

Arctic grayling juveniles were observed to be more sensitive than the other two species tested for arsenic and zinc as well.

Table 8-2: Toxicological thresholds for chronic effects on Young-of-Year (YOY) Arctic Grayling (*Thymallus arcticus*)

Substance of Concern	Species	Lifestage	Benchmark	Value (µg/L) Mean (95% UCLM)	Reference
Arsenic (as arsenate)	Arctic Grayling	fry [AK] ^a	96 h LC ₅₀	5020 (3510-7170)	[1]
		0.20 g ww [AK]		4760 (3830-5920)	[1]
		0.34 g ww [AK]		5500 (4050-7470)	[1]
		alevin [MT] ^b		102000 (75000-141000)	[1]
		0.85 g ww [MT]		47700 (35000-65000)	[1]
		alevin [MT]		197000 (145000-267000)	[1]
		0.97 g ww [MT]		32500 (25300-41600)	[1]
		1.85 g ww [MT]		30900 (21900-43600)	[1]
Copper	Arctic Grayling	fry [AK]	96 h LC ₅₀	9.6 (6.9 – 13.3)	[1]
		0.20 g ww [AK]		2.70 (1.87 – 3.90)	[1]
		0.34 g ww [AK]		2.58 (1.73 – 3.84)	[1]
		alevin [MT] ^b		67.5 (48.6 – 93.7)	[1]
		alevin [MT]		23.9 (20.1 – 28.4)	[1]
		0.85 g ww [MT]		30.0 (20.2 – 44.6)	[1]
		alevin [MT]		131 (110-155)	[1]
		0.85 g ww [MT]		49.3 (40.3-60.3)	[1]
Lead		fry [AK]	96 h LC ₅₀	12000 (9200-15600)	[1]
		0.34 g ww [AK]		<320	[1]
		alevin [MT]		>36000	[1]
		0.85 g ww [MT]		<1700	[1]
		alevin [MT]		>36000	[1]
		0.97 g ww [MT]		<1000	[1]
Zinc		fry [AK]	96 h LC ₅₀	315 (234-424)	[1]
		0.20 g ww [AK]		142 (114-178)	[1]
		0.34 g ww [AK]		112 (83-150)	[1]
		alevin [MT]		1580 (900-2770) ^c	[1]
		0.85 g ww [MT]		166 (127-217)	[1]
		alevin [MT]		2920 (2510-3400)	[1]
		0.97 g ww [MT]		168 (143-197)	[1]
		1.85 g ww [MT]		168 (96-295)	

References: [1] Buhl, K.J. and S. J. Hamilton, 1990. *Comparative toxicity of inorganic contaminants released by placer mining to early life stages of salmonids*. Ecotox. Environ. Safety 20: 325-342.

Notes: [a]: stock sourced from Alaska hatchery
 [b] : stock sourced from Montana hatchery
 [c]: only 50% mortality observed in highest test conc.

Buhl and Hamilton (1990) further demonstrated that testing with mixtures of arsenate, copper, lead and zinc did not appreciably alter copper toxicity thresholds.

When these four metals/metalloids were added to test water at concentrations approximating ratios in effluent from placer operations, it was concluded that copper accounted for greater than 97% of the summed toxicity units.

Buhl and Hamilton (1991) reported on the toxicity to juvenile life stages of Arctic grayling of nine metals/metalloids in addition to the four reported in their 1990 paper, including arsenite, cadmium, hexavalent chromium, gold, mercury, nickel, selenate, selenite, and silver. Of these, arsenic, cadmium, mercury and nickel are relevant to the interpretation of the Lupin Cycle 3 data, since these were observed in surface water samples at concentrations exceeding Canadian water quality guidelines for freshwater life protection. A summary of the Buhl and Hamilton (1991) toxicity data for grayling are provided below.

Table 8-3: Toxicological Thresholds of Sub-adult Arctic Grayling for Arsenite, Cadmium, Mercury and Nickel
(adapted from Buhl and Hamilton, 1991)

Substance	Alevin		Juvenile		Lupin Exposure Area 2010 Range
	96 h LC50	95% Confidence Range	96 h LC50	95% Confidence Range	
Arsenite	27700	23500-32700	13700	11600-16100	4.1-8.2
Cadmium	6.1	4.7-7.8	4.0	1.5-9.7	0.014-0.060
Mercury	124	106-146	218	186-256	<0.020-0.073
Nickel	8200	5600-12000	8700	6700-11400	18-35

8.2.2 Overall Interpretations

It is concluded from the ecotoxicological thresholds presented above that the majority of the inorganics measured in surface water samples from the Lupin Mine Exposure Area were far below threshold concentrations beyond which adverse effects to juvenile Arctic grayling might be expected. The exception to this was total copper, which occurred in water samples in 2010 at concentrations in the range of 3.5 to 6.0 µg/L.

This is in the range that small steelhead fry (*Salmo gairdneri*) have been observed to exhibit mortality (pH 5.7: 96h LC50 of 4.2 µg/L; pH 7.0: 96h LC50 of 2.8 µg/L). In addition, Buhl and Hamilton (1990) observed in Arctic grayling juveniles a copper LC50 in the range of 2.6 to 9.6 µg/L. Alevins were reportedly less sensitive than juveniles, with observed copper LC50s in the range from 24 to 131 µg/L.

Spear and Pierce (1979) suggest that adverse effects on growth of freshwater fish would occur at similar or perhaps higher ranges of copper than mortality; i.e. at waterborne concentrations in soft water in the range from 10 to 100 µg/L.

The actual 2010 water sample data for the Lupin Mine Exposure Area is shown below:

- SCP-1: 3.5 µg/L
- SCF-1: 5.3 µg/L
- SNP 925-20: 4.3 µg/L
- SCD-1: 6.0 µg/L

It cannot be precluded that copper exposures in the water are having an effect on juvenile recruitment, through enhanced mortality of early life stages or decreased growth and indirect longer term survival. Nonetheless, the available scientific knowledge suggests that effects if any would be very subtle and hard to detect in field populations, even in the absence of acclimatization or adaptation.

Toxicological thresholds are compared above to observed concentrations of copper and other inorganic substances in water column samples collected in July 2010. Prior to swim-up, developing eggs would be exposed to interstitial water contained within sediments in spawning areas. It is possible that sediment interstitial water in the Exposure Area would exhibit higher concentrations of mining-related inorganic substances than the overlying surface waters. For preferred spawning habitat, however, the degree of porosity of pea-sized gravels and high rates of diffusive and advective exchange with overlying water would suggest a substantial similarity between interstitial water and overlying water concentrations. Interstitial waters in the creek bed have the potential to exhibit higher concentrations of inorganic elements than overlying waters in areas affected by sorption to sediments from historical effluent discharge and in increasingly finer sediments. Such sediments, however, would comprise less favourable spawning habitat from a number of perspectives, including especially oxygen availability and degree of exposure to metabolites associated with early diagenesis of streambed sediments, including ammonia and sulfide. Furthermore, high concentrations of copper or other inorganic substances in sediment interstitial water would likely have the primary effect of decreasing hatching success and the viability of swim-up fry.

The fact that 0+ Arctic grayling are relatively abundant in the Exposure Area suggests that interstitial water quality is having a very minor if any on effect recruitment to the swim-up stage.

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Appendix A

Water Quality – Field and Lab Data

Table A-1. Field Data collected during installation of temperature loggers

07-Jul-10 Zone 12W

Logger #	Name	Waterbody	Time	E	N	Location Description	Temp (°C)	pH	DO (mg/L)	Conductivity (micro-S/cm)	Width (m)	Depth (m)	Velocity (m/s)	Photos
9765603	TL6	Ref Crt#2	8:30 AM	0499300 E	7285661 N	~30m u/s of mouth; on CUB	8	7	11.1	2.5	0.8	0.44	0.3	303-311
9765607	TL5	Ref Crt#2	9:10 AM	0497305 E	7286445 N	b/w two low spots	10.5	7.5	8.9	8	1.3	0.24	0.2	312-313
		Ref Crt#1 (Fingers Creek)												
9765608	TL4	Ref Crt#1	9:40 AM	0496103 E	7290874 N	~20-25 m u/s of mouth	10.5	7.3	10.6	4	1.4	1.45	0.33	314-328
9765610	TL3	Ref Crt#1	10:15 AM	0495665 E	7290042 N	~400 m u/s of mouth	10	7	10.2	5	1.95	0.65	0.33	329-330
9765611	TL2	Seep Creek	10:50 AM	0480323 E	7289985 N	d/s	13.1	6.7	10.1	48	3	0.27	0.33	333-336
9765612	TL1	Seep Creek	11:15 AM	0482157 E	7290265 N	u/s above second pond	13.2	6.62	10.2	61	2.5	0.4	0.2	338-339
9722569		Ref Crt#5	11:50 AM	0480307 E	7291329 N	creek north of Seep Creek	12.1	6.9	10.4	3	1.2	0.45	0.33	340-341

Table A-2. Field Data Collected During Sampling Program

Site	Date	Zone	Easting	Northing	Depth (m)	Air Temp (Celsius)	Temp (Celsius)	D.O (mg/L)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Method in Use	Comments
SCD1	40417	12W	465695	7289659		2	-	-	-	-	-	Water	
SCP1	40413	12W	461289	7290694		13	12	10.5	8.24	61	6.37	Water, Sediments	Exposure Area - Pond 1, Replicate SCF1
SCP2	40413	12W	461065	7290479		13	-	-	-	-	-	Sediments	
SCP3	40413	12W	460953	7290309		13	-	-	-	-	-	Sediments	
SCP4	40413	12W	460747	7290395		13	-	-	-	-	-	Sediments	
SCP5	40413	12W	460594	7290521		13	13.8	9.1	8.4	60	7.33	Sediments	Exposure Area - Pond 2
SNP925	40417	12W	460216	7290212		2	-	-	-	-	-	Water	
FC	40408	12W	496044	7290859		10	5.8	-	7.5	6	-	Habitat Assessment	The assessment and the sample were taken from the same creek on different days
FC2	40417	12W	494671	7289051		2	-	-	-	-	-	Water	
FL1	40411	12W	492274	7286480		11	-	-	-	-	-	Water, Sediments	
FL2	40411	12W	493658	7287207		11	-	-	-	-	-	Sediments	
FL3	40411	12W	493717	7287001		11	10.8	10.3	8.13	5	1.78	Water, Sediments	
FL4	40411	12W	492970	7286781		11	-	-	-	-	-	Sediments	
FL5	40411	12W	492552	7286547		11	-	-	-	-	-	Sediments	
R2-1	40416	12W	497453	7284512		10	12.8	9.7	8.11	11	1.07	Water, Sediments	Reference Area 2 - Pond 2
R2-2	40416	12W	497305	7285367		10	-	-	-	-	-	Water, Sediments	
R2-3	40416	12W	495558	7287668		10	10.5	10.2	8.69	5	1.55	Water, Sediments	Reference Area 2 - Pond 1
R2-4	40416	12W	497648	7284697		10	-	-	-	-	-	Sediments	
R2-5	40416	12W	494949	7287511		10	-	-	-	-	-	Sediments	

Table A-3. Water Quality Lab Results

Sample ID	Units	CONE Aquatic Life	Reference Area 1					Reference Area 2										
			FL3	FL5	FC2	R2-1	R2-2	R2-3	23-AUG-10	27-AUG-10	27-AUG-10	26-AUG-10	26-AUG-10	26-AUG-10				
Date Sampled			23-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	27-AUG-10	26-AUG-10	26-AUG-10	26-AUG-10
Time Sampled			08:30	10:00	10:30	11:00	11:00	11:00	11:30	10:30	09:00	09:30	10:30	10:30	12:30	12:30	12:30	12:30
ALS Sample ID			L923781-1	L923725-2	L923725-2	L923725-3	L923725-3	L923725-3	L923262-1	L923262-2	L923725-1	L923358-1	L923358-2	L923358-3	L923358-3	L923358-3	L923358-3	L923358-3
Matrix			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests																		
Total Suspended Solids	mg/L		<5.0	<5.0	<5.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Conductivity (EC)	uS/cm		71.8	67.3	217	68.3	68.3	68.3	11.5	11.7	13.2	10.8	10.2	10.2	10.2	15.9	15.9	15.9
Hardness (as CaCO3)	mg/L		24.2	22.9	4.0	6.78	6.89	6.89	4.0	4.0	5.8	4.2	6.2	6.2	6.2	5.4	5.4	5.4
pH		6.5-9.0	6.69	6.76	6.86	6.89	6.89	6.89	6.78	6.75	6.92	6.46	6.74	6.74	6.74	6.67	6.67	6.67
TDS (Calculated)	mg/L		36.0	36.6	37.1	36.6	36.6	36.6	4.2	4.1	5.1	3.7	3.3	3.3	3.3	6.8	6.8	6.8
Major Ions																		
Alkalinity, Total (as CaCO3)	mg/L		<5.0	6.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bicarbonate (HCO3)	mg/L		5.2	5.5	7.6	<5.0	<5.0	<5.0	5.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbonate (CO3)	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloride (Cl)	mg/L		1.12	1.15	11.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L		0.054	0.068	0.129	0.068	0.129	0.129	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Hydroxide (OH)	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ion Balance	%		Low EC	Low EC	105	Low EC	105	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC	Low EC
Sulfate (SO4)	mg/L		23.7	24.3	20.8	24.3	24.3	24.3	24.9	24.9	24.9	1.90	1.94	1.94	1.94	4.58	4.58	4.58
Nutrients																		
Ammonia-N	mg/L	0.019	0.0101	0.0141	0.0086	0.0086	0.0086	0.0086	<0.0050	<0.0050	<0.0050	<0.0050	0.0079	0.0079	0.0079	<0.0050	<0.0050	<0.0050
Nitrate+Nitrite-N	mg/L		0.0647	<0.0060	<0.0060	0.0125	0.0125	0.0125	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Nitrate-N	mg/L	13	0.0647	0.0357	<0.0060	0.0125	0.0125	0.0125	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Nitrite-N	mg/L	0.06	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus, Total	mg/L		0.0036	0.0033	0.0027	0.0036	0.0036	0.0036	<0.0010	0.0185	0.0176	0.0046	0.0038	0.0038	0.0038	0.0048	0.0048	0.0048
Cyanides																		
Cyanide, Total	mg/L	0.005	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Organic / Inorganic Carbon																		
Dissolved Organic Carbon	mg/L		6.4	10.4	5.1	5.1	5.1	5.1	3.1	3.7	3.1	4.1	4.3	4.3	4.4	4.4	4.4	4.4
Total Organic Carbon	mg/L		6.6	10.7	5.2	5.2	5.2	5.2	3.3	3.2	3.4	4.2	4.1	4.1	4.4	4.4	4.4	4.4
Total Metals (Undigested)																		
Aluminum (Al)-Total	mg/L	0.005-0.1*	0.074	0.112	0.0684	0.0310	0.0310	0.0310	0.0133	0.0374	0.0171	0.0162	0.0165	0.0165	0.0288	0.0288	0.0288	0.0288
Antimony (Sb)-Total	mg/L		<0.0040	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Arsenic (As)-Total	mg/L	0.005	0.00406	0.00544	0.00672	0.00616	0.00616	0.00616	0.00171	0.00175	0.00175	0.000704	0.000683	0.000683	0.000683	0.000683	0.000683	0.000683
Barium (Ba)-Total	mg/L		0.00845	0.00631	0.00631	0.00880	0.00880	0.00880	0.00153	0.00168	0.00168	0.00162	0.00149	0.00149	0.00237	0.00237	0.00237	0.00237
Beryllium (Be)-Total	mg/L		<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Total	mg/L		<0.0020	<0.0020	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Boron (B)-Total	mg/L		<0.020	0.0053	0.0053	0.0188	0.0188	0.0188	0.0025	0.0028	0.0022	0.0031	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029
Cadmium (Cd)-Total	mg/L	0.000017*	0.000023	<0.00020	<0.00050	0.000065	0.000065	0.000065	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cadmium (Cd)-Total	mg/L		0.000014	0.000014	0.000014	0.000060	0.000060	0.000060	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Calcium (Ca)-Total	mg/L		5.34	4.89	5.37	17.1	17.1	17.1	0.856	0.781	0.955	0.777	0.757	0.757	1.24	1.24	1.24	1.24
Chromium (Cr)-Total	mg/L	0.001	<0.00080	0.000388	0.000388	0.000653	0.000653	0.000653	0.000069	0.000130	0.00079	0.000065	<0.000060	<0.000060	0.000063	0.000063	0.000063	0.000063
Cobalt (Co)-Total	mg/L		0.00281	0.00301	0.00120	0.00352	0.00352	0.00352	<0.00010	<0.00010	0.00016	0.00016	0.00016	0.00016	0.00020	0.00020	0.00020	0.00020
Copper (Cu)-Total	mg/L	0.002-0.004*	0.0035	0.00653	0.00427	0.00597	0.00597	0.00597	<0.00060	<0.00060	<0.00060	0.00088	0.00093	0.00093	0.00300	0.00300	0.00300	0.00300
Iron (Fe)-Total	mg/L	0.3	0.382	0.663	0.760	0.157	0.157	0.157	0.0384	0.0449	0.0842	0.0769	0.0689	0.0689	0.0689	0.0689	0.0689	0.0689
Lead (Pb)-Total	mg/L	0.001-0.007*	<0.0010	0.00010	<0.00050	0.00062	0.00062	0.00062	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000080	0.000080	0.000080	0.000080
Lithium (Li)-Total	mg/L			0.00526	0.00631	0.00631	0.00631	0.00631	0.00100	0.00115	0.00120	0.00125	0.00122	0.00122	0.00160	0.00160	0.00160	0.00160
Magnesium (Mg)-Total	mg/L		2.59	2.34	2.39	4.80	4.80	4.80	0.547	0.539	0.600	0.449	0.446	0.446	0.705	0.705	0.705	0.705
Manganese (Mn)-Total	mg/L		0.0360	0.0356	0.0226	0.0800	0.0800	0.0800	0.00352	0.00352	0.0116	0.00311	0.00311	0.00311	0.00311	0.00311	0.00311	0.00311
Mercury (Hg)-Total	mg/L	0.000026	<0.000020	0.000073	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum (Mo)-Total	mg/L	0.073	0.00010	0.00014	0.000162	0.000115	0.000115	0.000115	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Nickel (Ni)-Total	mg/L	0.025-0.15*	0.0255	0.0259	0.0175	0.0254	0.0254	0.0254	0.00504	0.00526	0.00650	0.00177	0.00183	0.00183	0.00723	0.00723	0.00723	0.00723
Nickel (Ni)-Total	mg/L		0.13	0.37	0.550	1.93	1.93	1.93	0.386	0.410	0.435	0.408	0.403	0.403	0.425	0.425	0.425	0.425
Potassium (K)-Total	mg/L	0.001	<0.0040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Selenium (Se)-Total	mg/L		<0.0040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silver (Ag)-Total	mg/L	0.0001	<0.0040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium (Na)-Total	mg/L		2.3	2.2	2.72	13.6	13.6	13.6	0.474	0.443	0.474	0.480	0.480	0.480	0.843	0.843	0.843	0.843
Strontium (Sr)-Total	mg/L		0.0266	0.0266	0.0283	0.0797	0.0797	0.0797	0.00472	0.00476	0.00563	0.00456	0.00456	0.00456	0.00724	0.00724	0.00724	0.00724
Thallium (Tl)-Total	mg/L		<0.0010	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Tin (Sn)-Total	mg/L		<0.0040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L		<0.0050	<0.0050	0.00070	0.00013	0.00013	0.00013	0.00034	0.00090	0.00025	0.00016	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017
Uranium (U)-Total	mg/L		<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Sample ID	Units	CCME Aquatic Life	Reference Area 1			Reference Area 2		
			FL3	FL5	FC2	R2-1	R2-2	R2-3
Sample ID	Units	CCME Aquatic Life						
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	0.054	0.0610	0.0907	0.00754	0.0196	0.00971	0.0177
Antimony (Sb)-Dissolved	mg/L	<0.00040	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Arsenic (As)-Dissolved	mg/L	0.00363	0.00160	0.00169	0.00152	0.000723	0.000669	0.000686
Barium (Ba)-Dissolved	mg/L	0.00844	0.00831	0.00876	0.00178	0.00164	0.00147	0.00231
Beryllium (Be)-Dissolved	mg/L	<0.0050	<0.0050	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Dissolved	mg/L	<0.00050	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Boron (B)-Dissolved	mg/L	0.0060	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066
Calcium (Ca)-Dissolved	mg/L	<0.0010	<0.0001	0.0033	0.0036	0.0036	<0.00050	<0.00050
Cadmium (Cd)-Dissolved	mg/L	0.00025	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060
Chromium (Cr)-Dissolved	mg/L	0.00040	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Cobalt (Co)-Dissolved	mg/L	0.00246	0.00344	0.00344	0.00010	0.00011	0.00010	0.00015
Copper (Cu)-Dissolved	mg/L	0.00321	0.00327	0.00327	<0.00060	0.00066	0.00066	0.00066
Iron (Fe)-Dissolved	mg/L	0.00321	0.00327	0.00327	0.00327	0.00327	0.00327	0.00327
Lead (Pb)-Dissolved	mg/L	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Dissolved	mg/L	2.57	0.00536	0.00536	0.00703	0.00721	0.00721	0.00721
Magnesium (Mg)-Dissolved	mg/L	2.57	0.00536	0.00536	0.00703	0.00721	0.00721	0.00721
Manganese (Mn)-Dissolved	mg/L	0.00774	0.00774	0.00774	0.00774	0.00774	0.00774	0.00774
Mercury (Hg)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum (Mo)-Dissolved	mg/L	0.00251	0.00247	0.00247	<0.00060	<0.00060	<0.00060	<0.00060
Nickel (Ni)-Dissolved	mg/L	0.49	0.42	0.42	0.00474	0.00474	0.00474	0.00474
Potassium (K)-Dissolved	mg/L	<0.00040	<0.00040	<0.00040	0.388	0.388	0.388	0.388
Selenium (Se)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Silver (Ag)-Dissolved	mg/L	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Sodium (Na)-Dissolved	mg/L	2.3	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Strontium (Sr)-Dissolved	mg/L	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Thallium (Tl)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Tin (Sn)-Dissolved	mg/L	<0.00020	0.00047	0.00047	0.00047	0.00047	0.00047	0.00047
Titanium (Ti)-Dissolved	mg/L	0.00057	0.00057	0.00057	0.00057	0.00057	0.00057	0.00057
Uranium (U)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Vanadium (V)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Zinc (Zn)-Dissolved	mg/L	0.0164	0.0169	0.0169	0.00237	0.00237	0.00237	0.00237
85			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
220Rn(Radium)-226	Bq/L							

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007
 Al b) 0.005mg/L at pH < 6.5, [Ca2+] < 4 mg/L, DOC < 2 mg/L, 0.1 mg/L at pH ≥ 6.5, [Ca2+] ≥ 4 mg/L, DOC ≥ 2 mg/L
 Cd c) Hardness based guideline = 10^{-6.5} (mg/L hardness)^{1.2}
 Cu d) 0.002 mg/L at [CaCO3] = 0 - 120 mg/L, 0.004 mg/L at [CaCO3] = 120 - 180 mg/L, 0.007 mg/L at [CaCO3] > 180 mg/L
 Pb e) 0.001 mg/L at [CaCO3] = 0 - 60 mg/L, 0.005 mg/L at [CaCO3] = 60 - 120 mg/L, 0.010 mg/L at [CaCO3] = 120 - 180 mg/L, 0.015 mg/L at [CaCO3] > 180 mg/L
 Ni f) 0.025 mg/L at [CaCO3] = 0 - 60 mg/L, 0.065 mg/L at [CaCO3] = 60 - 120 mg/L, 0.110 mg/L at [CaCO3] = 120 - 180 mg/L, 0.150 mg/L at [CaCO3] > 180 mg/L

Results results exceed CCME Aquatic Life Guidelines

Table A-4. Water Quality Detection Limits

	Units		Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits	Detection Limits
Sample ID		CCME Aquatic Life	SCP-1	SCP-1-rep	SNP 925	SCD-1	FL3	FL5	FC2	R2-1	R2-2	R2-3	FB	TB
Date Sampled														
Time Sampled														
ALS Sample ID														
Matrix														
Physical Tests														
Total Suspended Solids	mg/L	6.5-9.0							3.0					
Conductivity (EC)	uS/cm								0.20					
Hardness (as CaCO3)	mg/L													
pH	pH								0.10					
TDS (Calculated)	mg/L													
Major Ions														
Alkalinity, Total (as CaCO3)	mg/L								5.0					
Bicarbonate (HCO3)	mg/L								5.0					
Carbonate (CO3)	mg/L								5.0					
Chloride (Cl)	mg/L								0.50					
Fluoride (F)	mg/L								0.050					
Hydroxide (OH)	mg/L								5.0					
Ion Balance	%													
Sulfate (SO4)	mg/L								0.050					
Nutrients														
Ammonia-N	mg/L	0.019							0.0050					
Nitrate+Nitrite-N	mg/L								0.0060					
Nitrate-N	mg/L	13							0.0060					
Nitrite-N	mg/L	0.06							0.0020					
Phosphorus, Total	mg/L								0.0010					
Cyanides														
Cyanide, Total	mg/L	0.005							0.0020					
Organic / Inorganic Carbon														
Dissolved Organic Carbon	mg/L								1.0					
Total Organic Carbon	mg/L								1.0					
Total Metals (Undigested)			Low-Level						Ultra-low level					
Aluminum (Al)-Total	mg/L	0.005-0.1 ^b	0.020						0.00030					
Antimony (Sb)-Total	mg/L		0.00040						0.00030					
Arsenic (As)-Total	mg/L	0.005	0.00040						0.00030					
Barium (Ba)-Total	mg/L		0.00020						0.00050					
Beryllium (Be)-Total	mg/L		0.0010						0.00020					
Bismuth (Bi)-Total	mg/L		0.00020						0.00030					
Boron (B)-Total	mg/L		0.020						0.0010					
Cadmium (Cd)-Total	mg/L	0.000017 ^c	0.00020						0.00050					
Cadmium (Cd)-Total	mg/L		-						0.00010					
Calcium (Ca)-Total	mg/L		0.50						0.020					
Chromium (Cr)-Total	mg/L	0.001	0.00080						0.00060					
Cobalt (Co)-Total	mg/L		0.00020						0.00010					
Copper (Cu)-Total	mg/L	0.002-0.004 ^d	0.0010						0.00060					
Iron (Fe)-Total	mg/L	0.3	0.010						0.0050					
Lead (Pb)-Total	mg/L	0.001-0.007 ^e	0.00010						0.00050					
Lithium (Li)-Total	mg/L		0.10						0.00010					
Magnesium (Mg)-Total	mg/L		0.0020						0.0040					
Manganese (Mn)-Total	mg/L		0.000020						0.00010					
Mercury (Hg)-Total	mg/L	0.000026	-						0.000020					
Molybdenum (Mo)-Total	mg/L	0.073	0.00010						0.00060					
Nickel (Ni)-Total	mg/L	0.025-0.15 ^f	0.00020						0.00060					
Potassium (K)-Total	mg/L		0.10						0.020					
Selenium (Se)-Total	mg/L	0.001	0.00040						0.00010					
Silver (Ag)-Total	mg/L	0.0001	0.00040						0.00010					
Sodium (Na)-Total	mg/L		1.0						0.0050					
Strontium (Sr)-Total	mg/L		0.00020						0.00010					
Thallium (Tl)-Total	mg/L		0.00010						0.00030					
Tin (Sn)-Total	mg/L		0.00040						0.00010					
Titanium (Ti)-Total	mg/L		0.0050						0.00010					
Uranium (U)-Total	mg/L		0.00010						0.00050					
Vanadium (V)-Total	mg/L		0.00050						0.00050					
Zinc (Zn)-Total	mg/L	0.03	0.0040						0.00080					
Dissolved Metals			Low-Level						Ultra-low level					
Aluminum (Al)-Dissolved	mg/L		0.010			0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Antimony (Sb)-Dissolved	mg/L		0.00040			0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Arsenic (As)-Dissolved	mg/L		0.00040			0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Barium (Ba)-Dissolved	mg/L		0.00010			0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Beryllium (Be)-Dissolved	mg/L		0.00050			0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Bismuth (Bi)-Dissolved	mg/L		0.00050			0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Boron (B)-Dissolved	mg/L		0.0020			0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Cadmium (Cd)-Dissolved	mg/L		0.000010			0.000050	0.000050	0.000050	0.000010	0.000010	0.000050	0.000050	0.000050	0.000050
Calcium (Ca)-Dissolved	mg/L		0.50			0.50	0.020	0.020	0.50	0.50	0.020	0.50	0.50	0.020
Chromium (Cr)-Dissolved	mg/L		0.00040			0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060
Cobalt (Co)-Dissolved	mg/L		0.00010			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Copper (Cu)-Dissolved	mg/L		0.00060			0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060
Iron (Fe)-Dissolved	mg/L		-			0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Lead (Pb)-Dissolved	mg/L		0.00010			0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Lithium (Li)-Dissolved	mg/L		-			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Magnesium (Mg)-Dissolved	mg/L		0.10			0.10	0.0040	0.0040	0.0040	0.10	0.10	0.10	0.0040	0.10
Manganese (Mn)-Dissolved	mg/L		-			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Mercury (Hg)-Dissolved	mg/L		0.000020			0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020
Molybdenum (Mo)-Dissolved	mg/L		0.00010			0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060
Nickel (Ni)-Dissolved	mg/L		0.00010			0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060	0.00060
Potassium (K)-Dissolved	mg/L		0.10			0.020	0.020	0.10	0.020	0.020	0.10	0.10	0.10	0.020
Selenium (Se)-Dissolved	mg/L		0.00040			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Silver (Ag)-Dissolved	mg/L		0.00020			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Sodium (Na)-Dissolved	mg/L		1.0			0.0050	1.0	1.0	0.0050	1.0	1.0	1.0	0.0050	0.0050
Strontium (Sr)-Dissolved	mg/L		0.00010			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Thallium (Tl)-Dissolved	mg/L		0.000050			0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030	0.00030
Tin (Sn)-Dissolved	mg/L		0.00020			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Titanium (Ti)-Dissolved	mg/L		0.00030			0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Uranium (U)-Dissolved	mg/L		0.00010			0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Vanadium (V)-Dissolved	mg/L		0.000225			0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050	0.000050
Zinc (Zn)-Dissolved	mg/L		0.00025			0.00080	0.00080	0.00080	0.00080	0.00080	0.00080	0.00080	0.00080	0.00080
85														
220&(blank)&Radium-226	Bq/L								0.01					

Table A-5. Water Quality Lab Results - QA/QC

			Exposure Area						
Sample ID	Units	CCME Aquatic Life	DL	SCP1	SCP1-rep	RPD (%)	DL	FB- FIELD BLANK	TB- TRIP BLANK
Date Sampled				23-AUG-10	23-AUG-10			23-AUG-10	23-AUG-10
Time Sampled				09:30	10:00			11:00	11:00
ALS Sample ID				L923781-1	L923781-2			L923781-3	L923781-4
Matrix				Water	Water			Water	Water
Physical Tests									
Total Suspended Solids	mg/L		3.0	<3.0	<3.0			<3.0	<3.0
Conductivity (EC)	uS/cm		0.20	71.6	71.5	0.14%		0.92	0.81
Hardness (as CaCO ₃)	mg/L		-	24.2	25.0	3.25%		<1.0	<1.0
pH	pH	6.5-9.0	0.10	6.69	6.76	1.04%		6.20	5.82
TDS (Calculated)	mg/L		-	36.0	36.6	1.65%		<1.0	<1.0
Major Ions									
Alkalinity, Total (as CaCO ₃)	mg/L		5.0	<5.0	<5.0			<5.0	<5.0
Bicarbonate (HCO ₃)	mg/L		5.0	5.2	5.5	5.61%		<5.0	<5.0
Carbonate (CO ₃)	mg/L		5.0	<5.0	<5.0			<5.0	<5.0
Chloride (Cl)	mg/L		0.50	1.12	1.15	2.64%		<0.50	<0.50
Fluoride (F)	mg/L		0.050	0.054	0.057	5.41%		<0.050	<0.050
Hydroxide (OH)	mg/L		5.0	<5.0	<5.0			<5.0	<5.0
Ion Balance	%		-	Low EC	Low EC			Low TDS	Low TDS
Sulfate (SO ₄)	mg/L		0.050	23.7	24.3	2.50%		<0.050	<0.050
Nutrients									
Ammonia-N	mg/L	0.019	0.0050	0.0101	0.0141	33.06%		<0.0050	<0.0050
Nitrate+Nitrite-N	mg/L		0.0060	0.0647	0.0357	57.77%		<0.0060	<0.0060
Nitrate-N	mg/L	13	0.0060	0.0647	0.0357	57.77%		<0.0060	<0.0060
Nitrite-N	mg/L	0.06	0.0020	<0.0020	<0.0020			<0.0020	<0.0020
Phosphorus, Total	mg/L		0.0010	0.0036	0.0033	8.70%		<0.0010	<0.0010
Cyanides									
Cyanide, Total	mg/L	0.005	0.0020	<0.0020	<0.0020			<0.0020	<0.0020
Organic / Inorganic Carbon									
Dissolved Organic Carbon	mg/L		1.0	6.4	6.3	1.57%		<1.0	<1.0
Total Organic Carbon	mg/L		1.0	6.6	6.5	1.53%		<1.0	<1.0
Total Metals (Undigested)									
Aluminum (Al)-Total	mg/L	0.005-0.1 ^b	Low-Level	0.074	0.112	40.86%	0.00030	0.00032	<0.00030
Antimony (Sb)-Total	mg/L		0.00040	<0.00040	<0.00040		0.000030	<0.000030	<0.000030
Arsenic (As)-Total	mg/L	0.005	0.00040	0.00406	0.00544	29.05%	0.000030	<0.000030	<0.000030
Barium (Ba)-Total	mg/L		0.00020	0.00845	0.00884	4.51%	0.000050	0.000071	<0.000050
Beryllium (Be)-Total	mg/L		0.0010	<0.0010	<0.0010		0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L		0.00020	<0.00020	<0.00020		0.000030	<0.000030	<0.000030
Boron (B)-Total	mg/L		0.020	<0.020	<0.020		0.0010	0.0025	0.0021
Cadmium (Cd)-Total	mg/L	0.000017 ^c	0.00020	0.000023	<0.00020		0.000050	<0.000050	<0.000050
Cadmium (Cd)-Total	mg/L						0.000010	<0.000010	<0.000010
Calcium (Ca)-Total	mg/L		0.50	5.34	4.89	8.80%	0.020	0.022	<0.020
Chromium (Cr)-Total	mg/L	0.001	0.00080	<0.00080	<0.00080		0.000060	<0.000060	<0.000060
Cobalt (Co)-Total	mg/L		0.00020	0.00261	0.00301	14.23%	0.00010	<0.00010	<0.00010
Copper (Cu)-Total	mg/L	0.002-0.004 ^d	0.0010	0.0035	0.0053	40.91%	0.00060	<0.00060	<0.00060
Iron (Fe)-Total	mg/L	0.3	0.010	0.382	0.463	19.17%	0.0050	<0.0050	<0.0050
Lead (Pb)-Total	mg/L	0.001-0.007 ^e	0.00010	<0.00010	0.00010		0.000050	<0.000050	<0.000050
Lithium (Li)-Total	mg/L		0.10				0.00010	0.00049	0.00045
Magnesium (Mg)-Total	mg/L		0.0020	2.59	2.34	10.14%	0.0040	<0.0040	<0.0040
Manganese (Mn)-Total	mg/L		0.000020	0.0360	0.0356	1.12%	0.00010	<0.00010	<0.00010
Mercury (Hg)-Total	mg/L	0.000026	-	<0.000020	0.000073		0.000020	<0.000020	<0.000020
Molybdenum (Mo)-Total	mg/L	0.073	0.00010	0.00010	0.00014	33.33%	0.000060	<0.000060	<0.000060
Nickel (Ni)-Total	mg/L	0.025-0.15 ^f	0.00020	0.0255	0.0258	1.17%	0.000060	<0.000060	<0.000060
Potassium (K)-Total	mg/L		0.10	0.13	0.37	96.00%	0.020	<0.020	<0.020
Selenium (Se)-Total	mg/L	0.001	0.00040	<0.00040	<0.00040		0.00010	<0.00010	<0.00010
Silver (Ag)-Total	mg/L	0.0001	0.00040	<0.00040	<0.00040		0.00010	<0.00010	<0.00010
Sodium (Na)-Total	mg/L		1.0	2.3	2.2	4.44%	0.0050	0.0742	<0.0050
Strontium (Sr)-Total	mg/L		0.00020	0.0266	0.0265	0.38%	0.00010	<0.00010	<0.00010
Thallium (Tl)-Total	mg/L		0.00010	<0.00010	<0.00010		0.000030	<0.000030	<0.000030
Tin (Sn)-Total	mg/L		0.00040	<0.00040	<0.00040		0.00010	0.00850	<0.00010
Titanium (Ti)-Total	mg/L		0.0050	<0.0050	<0.0050		0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L		0.00010	<0.00010	<0.00010		0.000050	<0.000050	<0.000050
Vanadium (V)-Total	mg/L		0.00050	<0.00050	<0.00050		0.000050	<0.000050	<0.000050
Zinc (Zn)-Total	mg/L	0.03	0.0040	0.0130	0.0136	4.51%	0.00080	<0.00080	<0.00080
Dissolved Metals									
Aluminum (Al)-Dissolved	mg/L		0.010	0.054	0.054	0.00%	0.00030	0.00212	<0.00030
Antimony (Sb)-Dissolved	mg/L		0.00040	<0.00040	<0.00040		0.000030	<0.000030	<0.000030
Arsenic (As)-Dissolved	mg/L		0.00040	0.00363	0.00364	0.28%	0.000030	0.000055	<0.000030
Barium (Ba)-Dissolved	mg/L		0.00010	0.00844	0.00831	1.55%	0.000050	0.000159	<0.000050
Beryllium (Be)-Dissolved	mg/L		0.00050	<0.00050	<0.00050		0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved	mg/L		0.000050	<0.000050	<0.000050		0.000030	<0.000030	<0.000030
Boron (B)-Dissolved	mg/L		0.0020	0.0060	0.0056	6.90%	0.0010	0.0023	0.0022
Cadmium (Cd)-Dissolved	mg/L		0.000010	<0.000010	0.000025		0.000050	<0.000010	<0.000010
Calcium (Ca)-Dissolved	mg/L		0.50	5.44	5.59	2.72%	0.020	<0.50	<0.50
Chromium (Cr)-Dissolved	mg/L		0.00040	<0.00040	<0.00040		0.000060	<0.000060	<0.000060
Cobalt (Co)-Dissolved	mg/L		0.00010	0.00246	0.00245	0.41%	0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved	mg/L		0.00060	0.00321	0.00323	0.62%	0.00060	<0.00060	<0.00060
Iron (Fe)-Dissolved	mg/L		-	-	-		0.0050	<0.0050	<0.0050
Lead (Pb)-Dissolved	mg/L		0.00010	<0.00010	<0.00010		0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved	mg/L		-	-	-		0.00010	0.00044	0.00048
Magnesium (Mg)-Dissolved	mg/L		0.10	2.57	2.67	3.82%	0.0040	<0.10	<0.0040
Manganese (Mn)-Dissolved	mg/L		-	-	-		0.00010	0.00036	<0.00010
Mercury (Hg)-Dissolved	mg/L		0.000020	<0.000020	<0.000020		0.000020	<0.000020	<0.000020
Molybdenum (Mo)-Dissolved	mg/L		0.00010	<0.00010	<0.00010		0.000060	<0.000060	<0.000060
Nickel (Ni)-Dissolved	mg/L		0.00010	0.0251	0.0247	1.61%	0.000060	0.000248	<0.000060
Potassium (K)-Dissolved	mg/L		0.10	0.49	0.42	15.38%	0.10	<0.020	<0.10
Selenium (Se)-Dissolved	mg/L		0.00040	<0.00040	<0.00040		0.00010	<0.00010	<0.00010
Silver (Ag)-Dissolved	mg/L		0.00020	<0.00020	<0.00020		0.00010	<0.00010	<0.00010
Sodium (Na)-Dissolved	mg/L		1.0	2.3	2.3	0.00%	0.0050	<1.0	<1.0
Strontium (Sr)-Dissolved	mg/L		0.00010	0.0264	0.0265	0.38%	0.00010	0.00024	<0.00010
Thallium (Tl)-Dissolved	mg/L		0.000050	<0.000050	<0.000050		0.000030	<0.000030	<0.000030
Tin (Sn)-Dissolved	mg/L		0.00020	<0.00020	0.00047		0.00010	0.00843	<0.00010
Titanium (Ti)-Dissolved	mg/L		0.00010	0.00057	0.00061	6.78%	0.00010	0.00013	<0.00010
Uranium (U)-Dissolved	mg/L		0.00010	<0.00010	<0.00010		0.000050	<0.000050	<0.000050
Vanadium (V)-Dissolved	mg/L		0.000225	<0.00010	<0.00010		0.000050	<0.000050	<0.000050
Zinc (Zn)-Dissolved	mg/L		0.00025	0.0164	0.0169	3.00%	0.00080	<0.00080	<0.00080
BS									
220&(blank)&Radium-226	Bq/L		0.01	<0.01	<0.01		0.01	<0.01	<0.01

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007

Al b) 0.005mg/L at pH < 6.5, [Ca²⁺] < 4 mg/L, DOC < 2 mg/L: 0.1 mg/L at pH ≥ 6.5, [Ca²⁺] ≥ 4 mg/L, DOC ≥ 2 mg/LCd c) Hardness based guideline = 10^{(0.96(log(hardness)-3.2))}Cu d) 0.002 mg/L at [CaCO₃] = 0 - 120 mg/L; 0.003 mg/L at [CaCO₃] = 120 - 180 mg/L; 0.004 mg/L at [CaCO₃] > 180 mg/LPb e) 0.001 mg/L at [CaCO₃] = 0 - 60 mg/L; 0.002 mg/L at [CaCO₃] = 60 - 120 mg/L; 0.004 mg/L at [CaCO₃] = 120 - 180 mg/L; 0.007 mg/L at [CaCO₃] > 180 mg/LNi f) 0.025 mg/L at [CaCO₃] = 0 - 60 mg/L; 0.065 mg/L at [CaCO₃] = 60 - 120 mg/L; 0.110 mg/L at [CaCO₃] = 120 - 180 mg/L; 0.150 mg/L at [CaCO₃] > 180 mg/L

italics results exceed CCME Aquatic Life Guidelines

Appendix B

Sediment Quality – Lab Data

Table B-1. Sediment Quality Lab Results

Sample ID	Units	ISQG ^a	PEL ^b	Detection Limits	Reference Area 1										Reference Area 2					
					23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	21-AUG-10	FL1	FL2	FL3	FL4	FL5	R2-1	R2-2	R2-3	R2-4
Date Sampled					23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	23-AUG-10	21-AUG-10	21-AUG-10	21-AUG-10	21-AUG-10	21-AUG-10	21-AUG-10	26-AUG-10	26-AUG-10	26-AUG-10	26-AUG-10
Time Sampled					10:30	11:30	11:30	12:30	12:30	13:30	13:30	16:00	12:30	12:00	14:30	15:30	10:00	11:00	11:30	14:00
ALS Sample ID					L923781-5	L923781-6	L923781-7	L923781-8	L923781-9	L923781-10	L923781-11	L923781-12	L923781-13	L923781-14	L923781-15	L923781-16	L923781-17	L923781-18	L923781-19	L923781-20
Matrix					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Particle Size																				
% Sand	%			1.0	71.6	78.0	84.0	25.8	9.4	85.8	83.4	57.2	85.6	88.0	84.4	62.4	95.8	62.4	84.4	61.8
% Silt	%			1.0	23.2	16.4	12.6	72.4	85.4	12.2	15.0	38.6	11.8	10.2	33.2	3.0	33.2	13.4	36.2	7.0
% Clay	%			1.0	5.2	5.6	3.4	1.8	5.2	2.0	1.6	4.2	2.6	1.8	4.4	1.2	1.2	2.2	2.0	<1.0
Fragments > 2mm	%			1.0	<1.0	17.0	<1.0	<1.0	2.1	<1.0	<1.0	<1.0	<1.0	<1.0	6.7	<1.0	1.5	18.6	12.1	<1.0
Organic / Inorganic Carbon																				
CaCO3 Equivalent	%			0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	1.51	<0.80	<0.80
Inorganic Carbon	%			0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.13	<0.10	<0.10
Total Carbon by Combustion	%			0.1	3.7	2.5	0.6	1.5	3.3	0.4	0.5	5.0	0.4	0.4	0.4	0.5	6.2	0.5	1.2	0.4
Total Organic Carbon	%			0.10	3.68	2.45	0.62	1.49	3.28	0.38	0.54	4.96	0.35	0.44	0.35	0.44	6.04	0.52	1.21	0.39
Metals																				
Aluminum (Al)	mg/kg			50	6490	7220	5150	11000	14800	4170	4350	7890	3800	3800	3800	3890	4630	11800	3670	5480
Antimony (Sb)	mg/kg			0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic (As)	mg/kg		17.0	0.20	146	196	35.1	36.0	50.6	11.2	17.1	24.7	7.06	5.89	7.06	5.89	6.96	17.8	4.42	2.66
Barium (Ba)	mg/kg			5.0	42.2	65.3	31.9	52.0	65.8	32.1	35.8	47.8	30.8	27.9	30.8	27.9	36.8	64.9	20.5	43.4
Beryllium (Be)	mg/kg			1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium (Cd)	mg/kg	0.6	3.5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	mg/kg	37.3	90.0	0.50	26.6	36.9	23.7	57.1	74.6	17.7	17.9	29.1	15.5	15.9	15.5	15.9	20.3	59.4	13.7	35.1
Cobalt (Co)	mg/kg			1.0	44.7	143	19.4	16.9	25.2	5.5	4.9	9.2	5.1	4.7	5.1	4.7	4.5	13.3	4.7	5.3
Copper (Cu)	mg/kg	35.7	197.0	2.0	46.8	46.8	19.2	22.3	31.2	8.3	6.8	27.1	7.7	6.9	7.7	6.9	3.7	46.3	9.6	13.8
Iron (Fe)	mg/kg			200	16200	22700	9360	17500	22600	7550	7280	13300	6380	7340	6380	7340	8040	27100	5990	7280
Lead (Pb)	mg/kg	35.0	91.3	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Mercury (Hg)	mg/kg	0.17	0.486	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum (Mo)	mg/kg			1.0	1.8	3.4	<1.0	1.1	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.7	<1.0	<1.0
Nickel (Ni)	mg/kg			2.0	87.8	109	32.5	47.4	62.0	12.0	11.4	27.9	12.8	10.7	12.8	10.7	14.8	65.1	16.7	26.9
Selenium (Se)	mg/kg			0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver (Ag)	mg/kg			1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Strontium (Sr)	mg/kg			1.0	9.7	14.6	6.0	9.2	11.5	3.5	4.6	9.6	3.7	3.2	3.7	3.2	2.5	10.7	4.2	6.5
Thallium (Tl)	mg/kg			0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tin (Sn)	mg/kg			5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Uranium (U)	mg/kg			2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vanadium (V)	mg/kg			1.0	20.6	21.4	17.8	33.2	42.2	14.8	15.2	26.8	13.2	13.1	13.2	13.1	16.5	36.5	9.8	17.4
Zinc (Zn)	mg/kg	123	315	10	121	113	47	65	81	18	20	50	18	18	18	18	45	68	16	30

a) Interim Sediment Quality Guidelines, Canadian sediment quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2002

a) Probable Effects Levels, Canadian sediment quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2002

Italics results exceed ISQG
Italics results exceed PEL

Appendix C

Fish Survey Data – Field and Lab Data

Table C-1: Lupin 2010 Catch and Effort Summary Data for Electrofishing by Area

Area	Waypoint	NAD 83	Eastings	Northing	Section Survey	Date	Length (m)	# Seconds	NSSB	BURB	ARGR	SLSC	RNWH	LKTR	ARCH
Exposure	44	12W	480153	7290206		27-Aug-10	100	926	22	1	2				
	45	12W	480265	7290206	44-45	27-Aug-10	100	886	21						
	46	12W	480353	7290187	45-46	27-Aug-10	100	612	5		3				
	47	12W	480411	7290180	46-47	27-Aug-10	60	612	5						
	48	12W	480500	7290231	47-48	28-Aug-10	100	1138	41	1	1				
	49	12W	480592	7290200	48-49	28-Aug-10	100	585	2	2	4				
	50	12W	480787	7290351	49-50	28-Aug-10	100	1046	5						
	51	12W	480787	7290346	50-51	28-Aug-10	255	1250	20		8				
	52	12W	480998	7290224	51-52	29-Aug-10	120	1240	11	4	4				
	53	12W	481181	7290326	52-53	29-Aug-10	110	839	17		2				
	54	12W	481220	7290333	53-54	29-Aug-10	50	521	6		1				
	55	12W	481344	7290684	54-55										
	56	12W	481425	7290662	55-56	29-Aug-10	100	731	43	1	3				
	57	12W	481515	7290642	56-57	29-Aug-10		554	83	2	2				
TOTAL									10328	183	2	28	0	0	0
Reference Area 1	1	12W	496119	7291050											
	2	12W	496044	7290963	1-2	18-Aug-10	126	1012			1	13	1	4	
	3	12W	495985	7290851	2-3	18-Aug-10	120	889				1		1	
	4	12W	495957	7290730	3-4	18-Aug-10	125	525							
	5	12W	495926	7290569	4-5	18-Aug-10	165	1109			2		1		
	6	12W	495804	7290465	5-6	18-Aug-10	165	968			2			1	
	7	12W	495748	7290313	6-7	18-Aug-10	200	796							
	8	12W	495643	7290199	7-8	18-Aug-10	160	984		2		2			
	9	12W	495473	7290116	8-9	18-Aug-10	125	854				4		2	
	10	12W	495473	7290026	9-10	19-Aug-10	120	576			2	2		2	
	11	12W	495407	7289929	10-11	19-Aug-10	120	635	2		2	3		3	
	12	12W	495376	7289828	11-12	19-Aug-10	120	567		2					
	13	12W	495272	7289689	12-13	19-Aug-10	175	877		1	1	6			
	14	12W	495236	7289562	13-14	19-Aug-10	150	789		4	1	3			
	15	12W	495766	7289447	14-15	19-Aug-10	150	839		4	2			1	
	16	12W	495143	7289319	15-16	19-Aug-10	150	790		2	2	3			
TOTAL									15968	16	30	25	73	2	15
Reference Area 2	26	12W	499230	7285387											
	27	12W	499092	7285908	26-27	22-Aug-10	155	966	4			8			
	28	12W	498967	7285912	27-28	22-Aug-10	150	779	7	1	2	12	1	2	
	29	12W	498813	7285879	28-29	22-Aug-10	150	797	17	2	3	5		2	
	30	12W	498721	7285941	29-30	22-Aug-10	130	664	5		7	2	1	3	
	31	12W	498613	7285964	30-31	22-Aug-10	140	500	3		5	1			
	32	12W	498485	7285886	31-32	22-Aug-10	150	651	6		3	8	1	1	
	33	12W	498487	7285891	32-33	24-Aug-10	150	630	3		3	5			1
	34	12W	498289	7286105	33-34	24-Aug-10	175	866	30		2	7	1		
	35	12W	498295	7286095	34-35	24-Aug-10	150	966	26		3	7		3	1
	36	12W	498080	7286116	35-36	24-Aug-10	100	476	5			8			
	37	12W	498030	7286190	36-37	24-Aug-10	100	872	4		1	1			6
	38	12W	497958	7286260	37-38	25-Aug-10	100	286	4		1		1	1	
	39	12W	497840	7286314	38-39	25-Aug-10	130	576	11		1	1		2	1
	40	12W	497722	7286340	39-40	25-Aug-10	135	446	6				2	2	
	41														
	42	12W	497260	7286620	41-42	25-Aug-10	140	572	20		1	1		3	1
TOTAL									10373	159	4	33	66	7	22

Table C-2: Fish Morphometric Data from the Lupin 2010 EEM Exposure Area

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
27-Aug-10	-	E001	NSSB	2.667	7.7	44-45	-	ok
27-Aug-10	-	E002	BURB	0.959	5.1	44-45	-	ok
27-Aug-10	-	E003	NSSB	0.212	3.4	44-45	-	ok
27-Aug-10	-	E004	NSSB	0.255	3.6	44-45	-	ok
27-Aug-10	-	E005	NSSB	0.162	3.0	44-45	-	ok
27-Aug-10	-	E006	NSSB	0.577	4.6	44-45	-	ok
27-Aug-10	-	E007	NSSB	0.362	4.1	44-45	-	ok
27-Aug-10	-	E008	NSSB	0.408	4.1	44-45	-	ok
27-Aug-10	-	E009	NSSB	0.200	3.5	44-45	-	ok
27-Aug-10	-	E010	NSSB	0.197	3.5	44-45	-	ok
27-Aug-10	-	E011	NSSB	0.260	3.6	44-45	-	ok
27-Aug-10	-	E012	NSSB	0.278	3.8	44-45	-	ok
27-Aug-10	-	E013	NSSB	0.187	3.2	44-45	-	ok
27-Aug-10	-	E014	NSSB	0.245	3.5	44-45	-	ok
27-Aug-10	-	E015	NSSB	0.285	3.8	44-45	-	ok
27-Aug-10	-	E016	NSSB	0.148	3.1	44-45	-	ok
27-Aug-10	-	E017	NSSB	0.169	2.9	44-45	-	ok
27-Aug-10	-	E018	NSSB	0.233	3.4	44-45	-	ok
27-Aug-10	-	E019	NSSB	0.154	2.9	44-45	-	ok
27-Aug-10	-	E020	NSSB	0.090	2.5	44-45	-	ok
27-Aug-10	-	E021	NSSB	0.377	4.0	44-45	-	ok
27-Aug-10	-	E022	NSSB	0.117	3.6	44-45	-	ok
27-Aug-10	-	E023	NSSB	0.163	3.2	44-45	-	ok
27-Aug-10	SW	E024	ARGR	21.554	13.2	44-45	ot	ok
27-Aug-10	SW	E025	ARGR	10.958	10.8	44-45	ot	ok
27-Aug-10	-	E026	NSSB	0.311	4.2	45-46	-	ok
27-Aug-10	-	E027	NSSB	0.228	3.8	45-46	-	ok
27-Aug-10	-	E028	NSSB	0.208	3.4	45-46	-	ok
27-Aug-10	-	E029	NSSB	0.120	2.8	45-46	-	ok
27-Aug-10	-	E030	NSSB	0.208	3.4	45-46	-	ok
27-Aug-10	-	E031	NSSB	0.468	4.3	45-46	-	ok
27-Aug-10	-	E032	NSSB	0.399	3.8	45-46	-	ok
27-Aug-10	-	E033	NSSB	0.292	3.4	45-46	-	ok
27-Aug-10	-	E034	NSSB	0.282	3.7	45-46	-	ok
27-Aug-10	-	E035	NSSB	0.198	3.2	45-46	-	ok
27-Aug-10	-	E036	NSSB	0.333	3.6	45-46	-	ok
27-Aug-10	-	E037	NSSB	0.407	3.9	45-46	-	ok
27-Aug-10	-	E038	NSSB	0.363	4.0	45-46	-	ok
27-Aug-10	-	E039	NSSB	0.430	4.1	45-46	-	ok
27-Aug-10	-	E040	NSSB	0.213	3.5	45-46	-	ok
27-Aug-10	-	E041	NSSB	0.621	4.6	45-46	-	ok
27-Aug-10	-	E042	NSSB	0.320	3.9	45-46	-	ok
27-Aug-10	-	E043	NSSB	0.275	3.9	45-46	-	ok
27-Aug-10	-	E044	NSSB	0.378	4.3	45-46	-	ok
27-Aug-10	-	E045	NSSB	0.369	3.9	45-46	-	ok
27-Aug-10	-	E046	NSSB	0.251	3.1	45-46	-	ok
27-Aug-10	-	E047	NSSB	0.313	3.9	46-47	-	ok
27-Aug-10	-	E048	NSSB	0.286	3.9	46-47	-	ok
27-Aug-10	-	E049	NSSB	0.239	3.5	46-47	-	ok
27-Aug-10	-	E050	NSSB	0.287	3.9	46-47	-	ok
27-Aug-10	-	E051	NSSB	0.189	3.4	46-47	-	ok
27-Aug-10	SW	E052	ARGR	15.056	11.4	46-47	ot	missing scales from caudal area, possible b
27-Aug-10	SW	E053	ARGR	13.238	11.3	46-47	ot	ok
27-Aug-10	SW	E054	ARGR	2.734	6.5	46-47	ot	ok
28-Aug-10	-	E055	NSSB	0.198	2.9	47-48	-	ok
28-Aug-10	-	E056	NSSB	0.237	3.5	47-48	-	ok
28-Aug-10	-	E057	NSSB	0.248	3.6	47-48	-	ok
28-Aug-10	-	E058	NSSB	0.303	3.7	47-48	-	ok
28-Aug-10	-	E059	NSSB	0.235	3.6	47-48	-	ok
28-Aug-10	-	E060	NSSB	0.106	2.7	47-48	-	ok

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
28-Aug-10	-	E061	NSSB	0.278	3.9	47-48	-	ok
28-Aug-10	-	E062	NSSB	0.230	3.7	47-48	-	ok
28-Aug-10	-	E063	NSSB	0.192	3.1	47-48	-	ok
28-Aug-10	-	E064	NSSB	0.113	2.4	47-48	-	ok
28-Aug-10	-	E065	NSSB	0.169	3.1	47-48	-	ok
28-Aug-10	-	E066	NSSB	0.141	2.7	47-48	-	ok
28-Aug-10	-	E067	NSSB	0.309	3.8	47-48	-	ok
28-Aug-10	-	E068	NSSB	0.337	3.8	47-48	-	ok
28-Aug-10	-	E069	NSSB	0.306	3.9	47-48	-	ok
28-Aug-10	-	E070	NSSB	0.282	3.7	48-49	-	ok
28-Aug-10	-	E071	NSSB	0.148	2.8	48-49	-	ok
28-Aug-10	SW	E072	ARGR	2.618	6.4	48-49	ot	ok
28-Aug-10	SW	E073	ARGR	2.925	6.6	48-49	ot	ok
28-Aug-10	SW	E074	ARGR	2.836	6.7	48-49	ot	ok
28-Aug-10	SW	E075	ARGR	1.283	5.5	48-49	ot	ok
28-Aug-10	-	E076	NSSB	0.275	3.7	49-50	-	ok
28-Aug-10	-	E077	NSSB	0.249	3.4	49-50	-	ok
28-Aug-10	-	E078	NSSB	0.160	2.3	49-50	-	ok
28-Aug-10	-	E079	NSSB	0.262	3.1	49-50	-	ok
28-Aug-10	-	E080	NSSB	0.101	2.5	49-50	-	ok
28-Aug-10	-	E081	NSSB	0.150	3.0	50-51	-	ok
28-Aug-10	-	E082	NSSB	0.267	3.5	50-51	-	ok
28-Aug-10	-	E083	NSSB	0.333	4.0	50-51	-	ok
28-Aug-10	-	E084	NSSB	0.131	2.6	50-51	-	ok
28-Aug-10	-	E085	NSSB	0.228	3.5	50-51	-	ok
28-Aug-10	-	E086	NSSB	0.272	3.5	50-51	-	ok
28-Aug-10	-	E087	NSSB	0.184	2.6	50-51	-	ok
28-Aug-10	-	E088	NSSB	0.576	5.1	50-51	-	ok
28-Aug-10	-	E089	NSSB	0.179	3.1	50-51	-	ok
28-Aug-10	-	E090	NSSB	0.243	2.9	50-51	-	ok
28-Aug-10	SW	E091	ARGR	2.573	6.5	50-51	ot	ok
28-Aug-10	SW	E092	ARGR	2.230	6.4	50-51	ot	ok
28-Aug-10	SW	E093	ARGR	1.894	5.8	50-51	ot	ok
28-Aug-10	SW	E094	ARGR	2.421	6.7	50-51	-	ok, could not retrieve otolith
28-Aug-10	SW	E095	ARGR	2.459	6.4	50-51	ot	ok
28-Aug-10	SW	E096	ARGR	1.825	5.7	50-51	ot	ok
28-Aug-10	SW	E097	ARGR	1.368	5.3	50-51	-	ok, could not retrieve otolith
28-Aug-10	SW	E098	ARGR	2.031	6.0	50-51	ot	ok
29-Aug-10	-	E099	NSSB	0.414	4.1	51-52	-	ok
29-Aug-10	TH	E100	ARGR	77.800	19.0	51-52	ot	ok
29-Aug-10	TH	E101	ARGR	13.429	11.2	51-52	ot	ok
29-Aug-10	SW	E102	ARGR	16.524	11.7	51-52	ot	ok
29-Aug-10	-	E103	NSSB	0.326	3.9	51-52	-	ok
29-Aug-10	-	E104	NSSB	0.252	3.7	51-52	-	ok
29-Aug-10	-	E105	NSSB	0.252	3.8	51-52	-	ok
29-Aug-10	-	E106	NSSB	0.106	2.7	51-52	-	ok
29-Aug-10	-	E107	NSSB	0.188	3.1	51-52	-	ok
29-Aug-10	-	E108	NSSB	0.184	3.2	51-52	-	ok
29-Aug-10	-	E109	NSSB	0.265	3.7	51-52	-	ok

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
29-Aug-10	-	E110	NSSB	0.220	3.4	51-52	-	ok
29-Aug-10	-	E111	NSSB	0.307	3.8	51-52	-	ok
29-Aug-10	-	E112	NSSB	0.637	4.8	51-52	-	ok
29-Aug-10	SW	E113	ARGR	1.729	6.0	51-52	-	ok
29-Aug-10	SW	E114	ARGR	1.778	5.9	52-53	-	ok
29-Aug-10	SW	E115	ARGR	1.669	6.0	52-53	-	ok, could not retrieve otolith
29-Aug-10	-	E116	NSSB	0.221	3.5	52-53	-	ok
29-Aug-10	-	E117	NSSB	0.221	3.5	52-53	-	ok
29-Aug-10	-	E118	NSSB	0.553	4.8	52-53	-	ok
29-Aug-10	-	E119	NSSB	0.306	3.9	52-53	-	ok
29-Aug-10	-	E120	NSSB	0.178	3.1	52-53	-	ok
29-Aug-10	-	E121	NSSB	0.200	3.4	52-53	-	ok
29-Aug-10	-	E122	NSSB	0.183	3.3	52-53	-	ok
29-Aug-10	-	E123	NSSB	0.459	4.5	52-53	-	ok
29-Aug-10	-	E124	NSSB	0.173	3.2	52-53	-	ok
29-Aug-10	-	E125	NSSB	0.155	3.0	52-53	-	ok
29-Aug-10	-	E126	NSSB	0.267	3.8	52-53	-	ok
29-Aug-10	-	E127	NSSB	0.287	4.0	52-53	-	ok
29-Aug-10	-	E128	NSSB	0.163	3.1	52-53	-	ok
29-Aug-10	-	E129	NSSB	0.166	3.3	52-53	-	ok
29-Aug-10	-	E130	NSSB	0.291	3.8	52-53	-	ok
29-Aug-10	-	E131	NSSB	0.275	3.6	52-53	-	ok
29-Aug-10	-	E132	NSSB	0.196	3.5	52-53	-	ok
29-Aug-10	-	E133	NSSB	0.277	3.7	52-53	-	ok
29-Aug-10	SW	E134	ARGR	1.793	6.1	53-54	ot	ok
29-Aug-10	-	E135	NSSB	0.368	4.1	53-54	-	ok
29-Aug-10	-	E136	NSSB	0.383	4.2	53-54	-	ok
29-Aug-10	-	E137	NSSB	0.097	2.6	53-54	-	ok
29-Aug-10	-	E138	NSSB	0.318	3.9	53-54	-	ok
29-Aug-10	-	E139	NSSB	0.472	4.4	53-54	-	ok
29-Aug-10	-	E140	NSSB	0.272	3.9	53-54	-	ok
29-Aug-10	-	E141	BURB	10.243	11.1	55-56	-	ok
29-Aug-10	-	E142	NSSB	0.246	3.6	55-56	-	ok
29-Aug-10	-	E143	NSSB	0.205	2.9	55-56	-	ok
29-Aug-10	-	E144	NSSB	0.331	3.5	55-56	-	ok
29-Aug-10	-	E145	NSSB	0.258	3.9	55-56	-	ok
29-Aug-10	-	E146	NSSB	0.380	4.2	55-56	-	ok
29-Aug-10	-	E147	NSSB	0.382	3.8	55-56	-	ok
29-Aug-10	-	E148	NSSB	0.294	3.5	55-56	-	ok
29-Aug-10	-	E149	NSSB	0.414	3.6	55-56	-	ok
29-Aug-10	-	E150	NSSB	0.478	3.9	55-56	-	ok
29-Aug-10	-	E151	NSSB	0.347	3.9	55-56	-	ok
29-Aug-10	SW	E152	ARGR	2.385	6.6	55-56	ot	ok
29-Aug-10	SW	E153	ARGR	1.866	5.8	55-56	ot	ok
29-Aug-10	SW	E154	ARGR	1.423	5.5	55-56	ot	ok
29-Aug-10	SW	E155	ARGR	2.400	6.4	56-57	ot	ok
29-Aug-10	SW	E156	ARGR	11.390	10.9	56-57	ot	ok
29-Aug-10	-	E157	NSSB	2.404	6.1	56-57	-	ok
29-Aug-10	-	E158	NSSB	0.479	4.1	56-57	-	ok
29-Aug-10	-	E159	NSSB	0.522	4.4	56-57	-	ok
29-Aug-10	-	E160	NSSB	0.423	3.6	56-57	-	ok
29-Aug-10	-	E161	NSSB	0.600	4.2	56-57	-	ok
29-Aug-10	-	E162	NSSB	0.569	4.6	56-57	-	ok
29-Aug-10	-	E163	NSSB	0.601	4.3	56-57	-	ok
29-Aug-10	-	E164	NSSB	0.248	2.9	56-57	-	ok
29-Aug-10	-	E165	NSSB	0.621	3.9	56-57	-	ok
29-Aug-10	-	E166	NSSB	0.652	4.2	56-57	-	ok
29-Aug-10	-	E167	NSSB	1.038	4.7	56-57	-	ok

Note:

a) ot = otolith

Table C-3: Fish Morphometric Data from the Lupin 2010 EEM Reference Area One

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
18-Aug-10	-	R1-001	SLSC	2.210	6.5	1-2	-	ok
18-Aug-10	-	R1-002	SLSC	1.425	5.5	1-2	-	ok
18-Aug-10	-	R1-003	SLSC	2.625	7.1	1-2	-	ok
18-Aug-10	-	R1-004	SLSC	1.529	5.8	1-2	-	ok
18-Aug-10	-	R1-005	SLSC	1.599	6.0	1-2	-	ok
18-Aug-10	-	R1-006	SLSC	3.010	7.4	1-2	-	ok
18-Aug-10	-	R1-007	SLSC	3.272	7.1	1-2	-	ok
18-Aug-10	-	R1-008	SLSC	2.613	7.1	1-2	-	ok
18-Aug-10	-	R1-009	SLSC	0.939	5.1	1-2	-	ok
18-Aug-10	-	R1-010	SLSC	5.201	8.5	1-2	-	ok
18-Aug-10	-	R1-011	SLSC	3.245	7.4	1-2	-	ok
18-Aug-10	-	R1-012	SLSC	1.214	5.4	1-2	-	ok
18-Aug-10	-	R1-013	SLSC	1.589	5.8	1-2	-	ok
18-Aug-10	-	R1-014	RNWH	3.242	7.7	1-2	-	ok
18-Aug-10	-	R1-015	LKTR	5.514	8.1	1-2	-	ok
18-Aug-10	SW	R1-016	ARGR	2.910	6.8	1-2	ot	ok
18-Aug-10	-	R1-017	LKTR	2.770	6.6	1-2	-	ok
18-Aug-10	-	R1-018	LKTR	2.138	6.6	1-2	-	ok
18-Aug-10	-	R1-019	LKTR	2.902	6.6	1-2	-	ok
18-Aug-10	-	R1-020	SLSC	4.058	7.7	2-3	-	ok
18-Aug-10	-	R1-021	LKTR	12.688	10.2	2-3	-	ok
18-Aug-10						3-4		
18-Aug-10	-	R1-022	RNWH	8.630	10.0	4-5	-	ok
18-Aug-10	SW	R1-023	ARGR	11.205	10.2	4-5	ot	ok
18-Aug-10	SW	R1-024	ARGR	17.239	11.3	4-5	ot	ok
18-Aug-10	-	R1-025	SLSC	2.537	6.6	5-6	-	ok
18-Aug-10	-	R1-026-01	LKTR	19.125	11.7	5-6	-	ok
18-Aug-10	-	R1-026-02	LKTR	12.444	10.3	6-7	-	ok
18-Aug-10	TH	R1-027	ARGR	3.222	7.1	6-7	-	ok
18-Aug-10	SW	R1-028	ARGR	26.182	13.1	6-7	ot	ok
18-Aug-10	-	R1-029	BURB	0.908	5.2	7-8	-	ok
18-Aug-10	-	R1-030	BURB	0.765	5.0	7-8	-	ok
18-Aug-10	-	R1-031	LKTR	-	18.3	8-9	-	ok, wieght not recorded
18-Aug-10	-	R1-032	LKTR	12.690	10.4	8-9	-	ok
18-Aug-10	-	R1-033	SLSC	4.323	7.7	8-9	-	ok
18-Aug-10	-	R1-034	SLSC	1.842	6.1	8-9	-	ok
18-Aug-10	-	R1-035	SLSC	2.274	6.3	8-9	-	ok
18-Aug-10	-	R1-036	SLSC	1.820	5.9	8-9	-	ok
18-Aug-10	-	R1-037	LKTR	16.334	11.1	9-10	-	ok
18-Aug-10	-	R1-038	LKTR	20.334	12.0	9-10	-	ok
18-Aug-10	-	R1-039	SLSC	3.228	7.2	9-10	-	ok
18-Aug-10	-	R1-040	SLSC	3.362	7.4	9-10	-	ok
18-Aug-10	TH	R1-041	ARGR	28.001	13.3	9-10	ot	ok
18-Aug-10	SW	R1-042	ARGR	18.123	11.9	9-10	ot	ok
19-Aug-10	-	R1-043	LKTR	26.694	13.3	10-11	-	ok
19-Aug-10	-	R1-044	LKTR	26.615	13.2	10-11	-	ok
19-Aug-10	-	R1-045	SLSC	1.770	6.0	10-11	-	ok
19-Aug-10	-	R1-046	SLSC	2.039	6.0	10-11	-	ok
19-Aug-10	-	R1-047	SLSC	3.022	6.6	10-11	-	ok
19-Aug-10	-	R1-048	LKTR	0.835	4.4	10-11	-	ok
19-Aug-10	-	R1-049	NSSB	0.253	3.7	10-11	-	ok
19-Aug-10	-	R1-050	NSSB	0.292	3.5	10-11	-	ok
19-Aug-10	TH	R1-051	ARGR	24.004	13.0	10-11	ot	ok
19-Aug-10	SW	R1-052	ARGR	19.130	11.7	10-11	ot	ok

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
19-Aug-10	-	R1-053	SLSC	2.668	6.7	11-12	-	ok
19-Aug-10	-	R1-054	SLSC	3.164	7.0	11-12	-	ok
19-Aug-10	-	R1-055	BURB	1.223	5.9	11-12	-	ok
19-Aug-10	-	R1-056	BURB	1.134	5.6	11-12	-	ok
19-Aug-10	-	R1-057	BURB	1.859	6.4	12-13	-	ok
19-Aug-10	-	R1-058	SLSC	1.750	5.8	12-13	-	ok
19-Aug-10	-	R1-059	SLSC	3.162	6.9	12-13	-	ok
19-Aug-10	-	R1-060	SLSC	1.667	5.7	12-13	-	ok
19-Aug-10	-	R1-061	SLSC	1.897	6.1	12-13	-	ok
19-Aug-10	-	R1-062	SLSC	2.504	6.5	12-13	-	ok
19-Aug-10	-	R1-063	SLSC	0.561	4.2	12-13	-	ok
19-Aug-10	SW	R1-064	ARGR	2.811	6.7	12-13	ot	ok
19-Aug-10	-	R1-065	SLSC	3.586	7.5	13-14	-	ok
19-Aug-10	-	R1-066	SLSC	3.212	7.1	13-14	-	ok
19-Aug-10	-	R1-067	SLSC	1.479	5.8	13-14	-	ok
19-Aug-10	-	R1-068	BURB	1.387	6.0	13-14	-	ok
19-Aug-10	-	R1-069	BURB	0.672	4.8	13-14	-	ok
19-Aug-10	-	R1-070	BURB	1.333	6.1	13-14	-	ok
19-Aug-10	-	R1-071	BURB	1.088	5.5	13-14	-	ok
19-Aug-10	SW	R1-072	ARGR	2.725	6.6	13-14	ot	ok
19-Aug-10	-	R1-073	LKTR	34.243	15.9	14-15	-	ok
19-Aug-10	-	R1-074	BURB	1.251	5.8	14-15	-	ok
19-Aug-10	-	R1-075	BURB	1.323	5.8	14-15	-	ok
19-Aug-10	-	R1-076	BURB	1.476	6.1	14-15	-	ok
19-Aug-10	-	R1-077	BURB	1.203	5.6	14-15	-	ok
19-Aug-10	SW	R1-078	ARGR	3.059	6.9	14-15	ot	ok
19-Aug-10	TH	R1-079	ARGR	16.096	11.4	14-15	ot	ok
19-Aug-10	-	R1-080	SLSC	1.821	6.0	15-16	-	ok
19-Aug-10	-	R1-081	SLSC	7.043	8.7	15-16	-	ok
19-Aug-10	-	R1-082	SLSC	1.944	6.2	15-16	-	ok
19-Aug-10	-	R1-083	BURB	1.619	6.1	15-16	-	ok
19-Aug-10	-	R1-084	BURB	1.458	6.2	15-16	-	ok
19-Aug-10	SW	R1-085	ARGR	3.581	7.1	15-16	ot	ok
19-Aug-10	SW	R1-086	ARGR	3.261	7.2	15-16	ot	ok
19-Aug-10	-	R1-087	SLSC	1.759	6.2	16-18	-	ok
19-Aug-10	-	R1-088	SLSC	2.288	6.4	16-18	-	ok
19-Aug-10	-	R1-089	SLSC	0.404	3.8	16-18	-	ok
19-Aug-10	-	R1-090	SLSC	2.581	6.5	16-18	-	ok
19-Aug-10	-	R1-091	SLSC	0.540	4.3	16-18	-	ok
19-Aug-10	-	R1-092	SLSC	7.910	8.7	16-18	-	ok
19-Aug-10	-	R1-093	SLSC	1.104	4.9	16-18	-	ok
19-Aug-10	-	R1-094	SLSC	1.793	5.9	16-18	-	ok
19-Aug-10	-	R1-095	SLSC	4.622	7.7	16-18	-	ok
19-Aug-10	-	R1-096	SLSC	1.778	6.1	16-18	-	ok
19-Aug-10	-	R1-097	SLSC	2.855	7.0	16-18	-	ok
19-Aug-10	-	R1-098	SLSC	1.010	5.2	16-18	-	ok
19-Aug-10	-	R1-099	SLSC	0.574	4.5	16-18	-	ok
19-Aug-10	-	R1-100	SLSC	0.498	4.1	16-18	-	ok
19-Aug-10	-	R1-101	SLSC	0.416	3.6	16-18	-	ok
19-Aug-10	-	R1-102	SLSC	0.581	4.2	16-18	-	ok
19-Aug-10	-	R1-103	SLSC	0.464	3.8	16-18	-	ok
19-Aug-10	-	R1-104	NSSB	0.465	4.4	16-18	-	ok
19-Aug-10	-	R1-105	BURB	1.964	6.6	16-18	-	ok
19-Aug-10	-	R1-106	BURB	0.938	4.9	16-18	-	ok
19-Aug-10	-	R1-107	BURB	0.863	5.0	16-18	-	ok
19-Aug-10	-	R1-108	BURB	0.623	4.5	16-18	-	ok
19-Aug-10	-	R1-109	BURB	0.445	3.7	16-18	-	ok

Day Collected	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
19-Aug-10	SW	R1-110	ARGR	2.046	5.8	16-18	ot	ok
19-Aug-10	SW	R1-111	ARGR	2.508	6.2	16-18	ot	ok
19-Aug-10	SW	R1-112	ARGR	19.702	12.2	16-18	ot	ok
20-Aug-10	-	R1-113	ARGR	30.762	14.6	18-19	-	ok - no otolith taken
20-Aug-10	-	R1-114	NSSB	0.189	3.3	18-19	-	ok
20-Aug-10	-	R1-115	NSSB	0.282	3.6	18-19	-	ok
20-Aug-10	-	R1-116	NSSB	0.188	3.6	18-19	-	ok
20-Aug-10	-	R1-117	SLSC	0.559	4.1	18-19	-	ok
20-Aug-10	-	R1-118	SLSC	0.808	4.8	18-19	-	ok
20-Aug-10	-	R1-119	SLSC	1.691	6.1	18-19	-	ok
20-Aug-10	-	R1-120	NSSB	0.219	3.1	18-19	-	ok
20-Aug-10	-	R1-121	NSSB	0.148	2.7	18-19	-	ok
20-Aug-10	-	R1-122	BURB	1.452	6.4	19-20	-	ok
20-Aug-10	-	R1-123	ARGR	2.369	6.1	19-20	-	ok
20-Aug-10	-	R1-124	ARGR	3.676	7.1	19-20	-	ok
20-Aug-10	-	R1-125	SLSC	0.514	4.1	19-20	-	ok
20-Aug-10	-	R1-126	SLSC	1.296	5.3	19-20	-	ok
20-Aug-10	-	R1-127	ARGR	2.601	6.4	19-20	-	ok
20-Aug-10	-	R1-128	BURB	1.306	6.1	19-20	-	ok
20-Aug-10	-	R1-129	SLSC	0.861	4.5	19-20	-	ok
20-Aug-10	-	R1-130	BURB	1.003	5.4	19-20	-	ok
20-Aug-10	-	R1-131	BURB	1.105	5.5	19-20	-	ok
20-Aug-10	-	R1-132	BURB	0.716	5.0	19-20	-	ok
20-Aug-10	-	R1-133	NSSB	0.109	2.6	19-20	-	ok
20-Aug-10	-	R1-134	SLSC	0.403	3.9	19-20	-	ok
20-Aug-10	-	R1-135	SLSC	0.061	1.8	19-20	-	ok
20-Aug-10	-	R1-136	ARGR	23.272	12.5	20-21	-	ok
20-Aug-10	-	R1-137	ARGR	22.271	12.0	20-21	-	ok
20-Aug-10	-	R1-138	ARGR	3.564	7.2	20-21	-	ok
20-Aug-10	-	R1-139	BURB	1.225	5.9	20-21	-	one eye bloody and swollen
20-Aug-10	-	R1-140	SLSC	2.734	6.6	20-21	-	ok
20-Aug-10	-	R1-141	SLSC	5.940	8.0	20-21	-	ok
20-Aug-10	-	R1-142	SLSC	0.648	4.4	20-21	-	ok
20-Aug-10	-	R1-143	BURB	1.486	6.2	20-21	-	ok
20-Aug-10	-	R1-144	SLSC	5.756	8.6	20-21	-	ok
20-Aug-10	-	R1-145	SLSC	2.311	6.6	20-21	-	ok
20-Aug-10	-	R1-146	BURB	1.339	6.0	20-21	-	ok
20-Aug-10	-	R1-147	NSSB	0.273	3.6	20-21	-	ok
20-Aug-10	-	R1-148	NSSB	0.204	3.5	20-21	-	ok
20-Aug-10	-	R1-149	NSSB	0.124	2.7	20-21	-	ok
20-Aug-10	-	R1-150	BURB	1.481	5.1	20-21	-	ok
20-Aug-10	-	R1-151	SLSC	2.997	6.5	20-21	-	ok
20-Aug-10	-	R1-152	SLSC	4.503	7.7	20-21	-	ok
20-Aug-10	-	R1-153	NSSB	0.165	3.2	20-21	-	ok
20-Aug-10	-	R1-154	SLSC	0.897	4.8	20-21	-	ok
20-Aug-10	-	R1-155	NSSB	0.180	3.2	20-21	-	ok
20-Aug-10	-	R1-156	BURB	1.293	5.8	20-21	-	ok
20-Aug-10	-	R1-157	NSSB	0.166	3.3	20-21	-	ok
20-Aug-10	-	R1-158	NSSB	0.214	3.5	20-21	-	ok

Note:

a) ot = otolith

Table C-4: Fish Morphometric Data from the Lupin 2010 EEM Reference Area Two

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
22-Aug-10	-	R2-001	NSSB	1.320	5.8	26-27	-	ok
22-Aug-10	-	R2-002	NSSB	0.222	3.4	26-27	-	ok
22-Aug-10	-	R2-003	NSSB	0.239	3.4	26-27	-	ok
22-Aug-10	-	R2-004	SLSC	4.444	8.0	26-27	-	ok
22-Aug-10	-	R2-005	SLSC	3.341	7.3	26-27	-	ok
22-Aug-10	-	R2-006	SLSC	3.885	7.2	26-27	-	ok
22-Aug-10	-	R2-007	SLSC	5.743	8.6	26-27	-	ok
22-Aug-10	-	R2-008	SLSC	1.622	6.1	26-27	-	ok
22-Aug-10	-	R2-009	SLSC	1.205	5.4	26-27	-	ok
22-Aug-10	-	R2-010	SLSC	3.210	7.3	26-27	-	ok
22-Aug-10	-	R2-011	SLSC	1.795	6.0	26-27	-	ok
22-Aug-10	-	R2-012	NSSB	0.121	2.9	26-27	-	ok
22-Aug-10	-	R2-013	RNWH	3.145	7.6	27-28	-	ok
22-Aug-10	-	R2-014	SLSC	2.233	7.1	27-28	-	ok, very skinny tail
22-Aug-10	-	R2-015	LKTR	6.818	8.7	27-28	-	ok
22-Aug-10	-	R2-016	SLSC	3.906	7.1	27-28	-	ok
22-Aug-10	-	R2-017	NSSB	1.306	5.7	27-28	-	ok
22-Aug-10	-	R2-018	SLSC	1.543	5.9	27-28	-	ok
22-Aug-10	-	R2-019	SLSC	2.597	7.0	27-28	-	ok
22-Aug-10	-	R2-020	SLSC	3.802	7.5	27-28	-	ok
22-Aug-10	-	R2-021	NSSB	0.225	3.4	27-28	-	ok
22-Aug-10	-	R2-022	SLSC	3.273	7.3	27-28	-	ok
22-Aug-10	-	R2-023	SLSC	2.954	6.9	27-28	-	ok
22-Aug-10	-	R2-024	SLSC	1.439	5.5	27-28	-	ok
22-Aug-10	-	R2-025	NSSB	1.591	6.7	27-28	-	ok
22-Aug-10	-	R2-026	SLSC	1.971	6.3	27-28	-	ok
22-Aug-10	-	R2-027	NSSB	1.564	6.2	27-28	-	ok
22-Aug-10	-	R2-028	SLSC	1.644	5.7	27-28	-	ok
22-Aug-10	-	R2-029	NSSB	0.381	3.7	27-28	-	ok
22-Aug-10	-	R2-030	SLSC	1.827	6.2	27-28	-	ok
22-Aug-10	-	R2-031	NSSB	0.253	4.1	27-28	-	ok
22-Aug-10	-	R2-032	SLSC	3.507	7.4	27-28	-	ok
22-Aug-10	-	R2-033	NSSB	0.630	4.8	27-28	-	ok
22-Aug-10	-	R2-034	BURB	24.887	16.7	27-28	-	ok
22-Aug-10	-	R2-035	LKTR	58.500	17.4	27-28	-	ok
22-Aug-10	SW	R2-035	ARGR	43.281	16.3	27-28	-	ok
22-Aug-10	SW	R2-036	ARGR	72.300	18.7	27-28	-	ok
22-Aug-10	-	R2-037	LKTR	145.300	22.0	28-29	-	ok
22-Aug-10	-	R2-038	LKTR	~350	30.3	28-29	-	ok, fish was too heavy for scales and too light for spring scale
22-Aug-10	-	R2-039	BURB	203.500	34.7	28-29	-	ok
22-Aug-10	-	R2-040	BURB	272.400	34.1	28-29	-	ok
22-Aug-10	-	R2-041	NSSB	0.207	3.4	28-29	-	ok
22-Aug-10	-	R2-042	NSSB	0.151	2.8	28-29	-	ok
22-Aug-10	-	R2-042	NSSB	0.272	3.6	28-29	-	ok
22-Aug-10	-	R2-043	NSSB	0.238	3.5	28-29	-	ok
22-Aug-10	-	R2-044	NSSB	0.229	3.3	28-29	-	ok
22-Aug-10	-	R2-045	NSSB	0.575	4.5	28-29	-	ok
22-Aug-10	-	R2-046	NSSB	0.219	3.2	28-29	-	ok
22-Aug-10	-	R2-047	NSSB	0.217	3.0	28-29	-	ok
22-Aug-10	-	R2-048	NSSB	0.343	3.9	28-29	-	ok
22-Aug-10	-	R2-049	NSSB	0.662	4.9	28-29	-	ok
22-Aug-10	-	R2-050	NSSB	0.786	5.0	28-29	-	ok

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
22-Aug-10	-	R2-051	NSSB	0.697	4.8	28-29	-	ok
22-Aug-10	-	R2-052	NSSB	1.533	6.0	28-29	-	ok
22-Aug-10	-	R2-053	NSSB	0.379	4.0	28-29	-	ok
22-Aug-10	-	R2-054	NSSB	0.244	3.3	28-29	-	ok
22-Aug-10	-	R2-055	NSSB	0.436	4.0	28-29	-	ok
22-Aug-10	-	R2-056	NSSB	0.444	4.3	28-29	-	ok
22-Aug-10	-	R2-057	SLSC	4.650	7.9	28-29	-	ok
22-Aug-10	-	R2-058	SLSC	1.959	6.3	28-29	-	ok
22-Aug-10	-	R2-059	SLSC	1.670	6.0	28-29	-	ok
22-Aug-10	-	R2-060	SLSC	4.383	7.8	28-29	-	ok
22-Aug-10	-	R2-061	SLSC	2.957	7.2	28-29	-	ok
22-Aug-10	SW	R2-062	ARGR	56.100	17.3	28-29	ot	ok
22-Aug-10	SW	R2-063	ARGR	33.128	14.5	28-29	ot	ok
22-Aug-10	SW	R2-064	ARGR	57.600	16.6	28-29	ot	ok
22-Aug-10	-	R2-065	ARGR	187.400	24.6	29-30	-	ok, large body fish, did not use for tissue sample
22-Aug-10	-	R2-066	LKTR	18.273	12.0	29-30	-	ok
22-Aug-10	-	R2-067	LKTR	18.804	11.7	29-30	-	ok
22-Aug-10	-	R2-068	NSSB	2.105	7.0	29-30	-	ok
22-Aug-10	-	R2-069	ARGR	65.000	18.2	29-30	-	ok
22-Aug-10	-	R2-070	LKTR	17.233	11.6	29-30	-	ok
22-Aug-10	-	R2-071	NSSB	1.700	6.8	29-30	-	ok
22-Aug-10	-	R2-072	SLSC	4.009	7.7	29-30	-	ok
22-Aug-10	-	R2-073	NSSB	1.409	5.8	29-30	-	ok
22-Aug-10	-	R2-074	SLSC	2.148	6.5	29-30	-	ok
22-Aug-10	-	R2-075	ARGR	23.107	13.5	29-30	-	ok, not taken for tissue sample
22-Aug-10	-	R2-076	NSSB	1.170	5.5	29-30	-	ok
22-Aug-10	-	R2-077	NSSB	0.229	3.4	29-30	-	ok
22-Aug-10	SW	R2-078	ARGR	59.600	18.1	29-30	ot	ok
22-Aug-10	SW	R2-079	ARGR	53.900	17.4	29-30	ot	ok
22-Aug-10	-	R2-080	RNWH	65.200	20.0	29-30	-	ok
22-Aug-10	SW	R2-081	ARGR	47.200	16.7	29-30	ot	ok
22-Aug-10	SW	R2-082	ARGR	43.600	16.4	29-30	ot	ok
22-Aug-10	-	R2-083	ARGR	218.500	25.2	30-31	-	ok, not taken for tissue sample
22-Aug-10	-	R2-084	ARGR	178.100	24.4	30-31	-	ok, not taken for tissue sample
22-Aug-10	-	R2-085	ARGR	110.600	21.0	30-31	-	ok, not taken for tissue sample
22-Aug-10	-	R2-086	ARGR	65.500	18.4	30-31	-	ok, not taken for tissue sample
22-Aug-10	-	R2-087	ARGR	46.300	15.5	30-31	-	ok, not taken for tissue sample
22-Aug-10	-	R2-088	NSSB	0.400	4.0	30-31	-	ok
22-Aug-10	-	R2-089	NSSB	0.200	3.7	30-31	-	ok
22-Aug-10	-	R2-090	SLSC	4.400	7.9	30-31	-	ok
22-Aug-10	-	R2-091	NSSB	0.300	3.8	30-31	-	ok
22-Aug-10	-	R2-092	ARGR	50.100	16.3	31-32	-	ok
22-Aug-10	-	R2-093	ARGR	38.642	15.5	31-32	-	ok
22-Aug-10	-	R2-094	ARGR	58.400	17.9	31-32	-	ok
22-Aug-10	-	R2-095	LKTR	40.564	15.8	31-32	-	ok
22-Aug-10	-	R2-096	NSSB	2.159	7.2	31-32	-	ok
22-Aug-10	-	R2-097	NSSB	0.168	3.0	31-32	-	ok
22-Aug-10	-	R2-098	SLSC	3.216	7.1	31-32	-	ok
22-Aug-10	-	R2-099	SLSC	6.020	8.4	31-32	-	ok
22-Aug-10	-	R2-100	SLSC	3.928	7.8	31-32	-	ok
22-Aug-10	-	R2-101	SLSC	5.562	8.2	31-32	-	ok
22-Aug-10	-	R2-102	SLSC	2.454	6.5	31-32	-	ok
22-Aug-10	-	R2-103	NSSB	0.247	3.5	31-32	-	ok
22-Aug-10	-	R2-104	SLSC	3.170	7.1	31-32	-	ok
22-Aug-10	-	R2-105	SLSC	6.281	8.7	31-32	-	ok
22-Aug-10	-	R2-106	RNWH	4.662	7.9	31-32	-	ok

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
22-Aug-10	-	R2-107	SLSC	3.744	7.2	31-32	-	ok
22-Aug-10	-	R2-108	NSSB	0.248	3.7	31-32	-	ok
22-Aug-10	-	R2-109	NSSB	0.216	3.6	31-32	-	ok
22-Aug-10	-	R2-110	NSSB	0.188	3.2	31-32	-	ok
24-Aug-10	-	R2-111	ARGR	56.900	16.7	32-33	-	ok, not taken for tissue sample
24-Aug-10	-	R2-112	ARGR	103.600	20.5	32-33	-	ok, not taken for tissue sample
24-Aug-10	-	R2-113	ARGR	42.271	16.3	32-33	-	ok, not taken for tissue sample
24-Aug-10	-	R2-114	ARCH	9.684	9.6	32-33	-	ok, not taken for tissue sample
24-Aug-10	-	R2-115	SLSC	4.812	7.9	32-33	-	ok
24-Aug-10	-	R2-116	SLSC	2.992	6.9	32-33	-	ok
24-Aug-10	-	R2-117	SLSC	4.440	8.0	32-33	-	ok
24-Aug-10	-	R2-118	SLSC	4.347	7.4	32-33	-	ok
24-Aug-10	-	R2-119	SLSC	2.669	6.6	32-33	-	ok
24-Aug-10	-	R2-120	NSSB	0.223	3.5	32-33	-	ok
24-Aug-10	-	R2-121	NSSB	0.229	3.3	32-33	-	ok
24-Aug-10	-	R2-122	NSSB	0.240	3.3	32-33	-	ok
24-Aug-10	-	R2-123	ARGR	163.500	24.0	33-34	-	ok, not taken for tissue sample
24-Aug-10	-	R2-124	SLSC	8.838	10.1	33-34	-	ok
24-Aug-10	-	R2-125	SLSC	4.980	7.9	33-34	-	ok
24-Aug-10	-	R2-126	NSSB	0.272	3.6	33-34	-	ok
24-Aug-10	-	R2-127	NSSB	0.292	4.5	33-34	-	ok
24-Aug-10	-	R2-128	NSSB	0.201	3.5	33-34	-	ok
24-Aug-10	-	R2-129	NSSB	0.165	3.2	33-34	-	ok
24-Aug-10	-	R2-130	RNWH	3.239	7.9	33-34	-	ok
24-Aug-10	-	R2-131	NSSB	0.292	3.4	33-34	-	ok
24-Aug-10	-	R2-132	NSSB	1.582	6.0	33-34	-	ok
24-Aug-10	-	R2-133	NSSB	0.300	3.4	33-34	-	ok
24-Aug-10	-	R2-134	SLSC	0.653	8.6	33-34	-	ok
24-Aug-10	-	R2-135	SLSC	1.711	6.7	33-34	-	ok
24-Aug-10	-	R2-136	NSSB	0.237	3.6	33-34	-	ok
24-Aug-10	-	R2-137	SLSC	4.128	7.8	33-34	-	ok
24-Aug-10	-	R2-138	ARGR	30.591	15.1	33-34	-	ok, not taken for tissue sample
24-Aug-10	-	R2-139	NSSB	2.506	7.2	33-34	-	ok
24-Aug-10	-	R2-140	NSSB	0.993	5.5	33-34	-	ok
24-Aug-10	-	R2-141	NSSB	0.197	3.4	33-34	-	ok
24-Aug-10	-	R2-142	NSSB	0.200	3.0	33-34	-	ok
24-Aug-10	-	R2-143	NSSB	0.272	3.9	33-34	-	ok
24-Aug-10	-	R2-144	NSSB	0.167	3.4	33-34	-	ok
24-Aug-10	-	R2-145	SLSC	4.378	7.6	33-34	-	ok
24-Aug-10	-	R2-146	NSSB	0.174	3.4	33-34	-	ok
24-Aug-10	-	R2-147	NSSB	0.207	3.4	33-34	-	ok
24-Aug-10	-	R2-148	NSSB	0.175	3.2	33-34	-	ok
24-Aug-10	-	R2-149	NSSB	0.281	3.7	33-34	-	ok
24-Aug-10	-	R2-150	NSSB	0.235	3.6	33-34	-	ok
24-Aug-10	-	R2-151	NSSB	0.086	2.5	33-34	-	ok
24-Aug-10	-	R2-152	SLSC	1.623	6.3	33-34	-	ok
24-Aug-10	-	R2-153	NSSB	0.234	3.3	33-34	-	ok
24-Aug-10	-	R2-154	NSSB	0.198	3.2	33-34	-	ok
24-Aug-10	-	R2-155	NSSB	0.302	4.1	33-34	-	ok
24-Aug-10	-	R2-156	NSSB	0.202	3.2	33-34	-	ok
24-Aug-10	-	R2-157	NSSB	0.207	3.6	33-34	-	ok
24-Aug-10	-	R2-158	NSSB	0.107	3.0	33-34	-	ok
24-Aug-10	-	R2-159	NSSB	0.182	3.4	33-34	-	ok
24-Aug-10	-	R2-160	NSSB	0.194	3.2	33-34	-	ok
24-Aug-10	-	R2-161	NSSB	0.110	2.6	33-34	-	ok
24-Aug-10	-	R2-162	NSSB	0.195	3.6	33-34	-	ok
24-Aug-10	-	R2-163	ARGR	56.100	16.6	34-35	-	ok, not taken for tissue sample

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
24-Aug-10	-	R2-164	ARGR	82.000	18.9	34-35	-	ok, not taken for tissue sample
24-Aug-10	-	R2-165	ARGR	58.000	17.0	34-35	-	ok, not taken for tissue sample
24-Aug-10	-	R2-166	LKTR	115.400	21.4	34-35	-	ok
24-Aug-10	-	R2-167	LKTR	42.013	15.3	34-35	-	ok
24-Aug-10	-	R2-168	ARCH	104.300	21.0	34-35	-	ok
24-Aug-10	-	R2-169	NSSB	0.220	3.4	34-35	-	ok
24-Aug-10	-	R2-170	NSSB	0.210	3.5	34-35	-	ok
24-Aug-10	-	R2-171	NSSB	0.213	3.6	34-35	-	ok
24-Aug-10	-	R2-172	NSSB	0.224	3.8	34-35	-	ok
24-Aug-10	-	R2-173	NSSB	0.212	3.5	34-35	-	ok
24-Aug-10	-	R2-174	NSSB	0.240	3.3	34-35	-	ok
24-Aug-10	-	R2-175	NSSB	1.637	6.5	34-35	-	ok
24-Aug-10	-	R2-176	NSSB	0.322	3.8	34-35	-	ok
24-Aug-10	-	R2-177	NSSB	1.463	6.0	34-35	-	ok
24-Aug-10	-	R2-178	NSSB	0.211	3.4	34-35	-	ok
24-Aug-10	-	R2-179	NSSB	2.013	6.9	34-35	-	ok
24-Aug-10	-	R2-180	NSSB	0.301	3.7	34-35	-	ok
24-Aug-10	-	R2-181	NSSB	0.294	3.6	34-35	-	ok
24-Aug-10	-	R2-182	NSSB	0.333	3.8	34-35	-	ok
24-Aug-10	-	R2-183	NSSB	0.205	3.2	34-35	-	ok
24-Aug-10	-	R2-184	NSSB	0.289	3.7	34-35	-	ok
24-Aug-10	-	R2-185	NSSB	0.193	3.2	34-35	-	ok
24-Aug-10	-	R2-186	NSSB	0.462	4.1	34-35	-	ok
24-Aug-10	-	R2-187	NSSB	0.241	3.6	34-35	-	ok
24-Aug-10	-	R2-188	NSSB	0.264	3.5	34-35	-	ok
24-Aug-10	-	R2-189	NSSB	0.379	4.2	34-35	-	ok
24-Aug-10	-	R2-190	LKTR	8.057	9.3	34-35	-	ok
24-Aug-10	-	R2-191	NSSB	0.222	3.4	34-35	-	ok
24-Aug-10	-	R2-192	NSSB	0.229	3.5	34-35	-	ok
24-Aug-10	-	R2-193	SLSC	3.860	7.3	34-35	-	ok
24-Aug-10	-	R2-194	SLSC	3.698	7.5	34-35	-	ok
24-Aug-10	-	R2-195	SLSC	4.269	7.6	34-35	-	ok
24-Aug-10	-	R2-196	SLSC	2.230	6.3	34-35	-	ok
24-Aug-10	-	R2-197	SLSC	4.400	8.1	34-35	-	ok
24-Aug-10	-	R2-198	NSSB	0.282	3.6	34-35	-	ok
24-Aug-10	-	R2-199	SLSC	6.601	8.7	34-35	-	ok
24-Aug-10	-	R2-200	SLSC	6.506	8.7	34-35	-	ok
24-Aug-10	-	R2-201	NSSB	0.284	3.6	34-35	-	ok
24-Aug-10	-	R2-202	NSSB	0.327	3.7	34-35	-	ok
24-Aug-10	-	R2-203	NSSB	1.757	6.6	35-36	-	ok
24-Aug-10	-	R2-204	SLSC	4.207	7.9	35-36	-	ok
24-Aug-10	-	R2-205	SLSC	3.315	7.2	35-36	-	ok
24-Aug-10	-	R2-206	SLSC	6.043	8.5	35-36	-	ok
24-Aug-10	-	R2-207	SLSC	3.046	6.9	35-36	-	ok
24-Aug-10	-	R2-208	NSSB	0.209	3.4	35-36	-	ok
24-Aug-10	-	R2-209	NSSB	0.232	4.6	35-36	-	ok
24-Aug-10	-	R2-210	SLSC	4.901	7.9	35-36	-	ok
24-Aug-10	-	R2-211	NSSB	1.808	6.8	35-36	-	ok
24-Aug-10	-	R2-212	SLSC	3.997	7.4	35-36	-	ok
24-Aug-10	-	R2-213	SLSC	2.875	6.6	35-36	-	ok
24-Aug-10	-	R2-214	NSSB	0.201	3.5	35-36	-	ok
24-Aug-10	-	R2-215	SLSC	0.134	3.1	35-36	-	ok
24-Aug-10	-	R2-216	ARGR	59.200	18.1	36-37	-	ok
24-Aug-10	-	R2-217	ARCH	18.525	11.9	36-37	-	ok
24-Aug-10	-	R2-218	ARCH	20.941	12.4	36-37	-	ok
24-Aug-10	-	R2-219	ARCH	20.948	12.6	36-37	-	ok
24-Aug-10	-	R2-220	ARCH	17.387	11.8	36-37	-	ok

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Structure ^a	Condition/Comments
24-Aug-10	-	R2-221	ARCH	12.690	10.7	36-37	-	ok
24-Aug-10	-	R2-222	ARCH	7.571	8.8	36-37	-	ok
24-Aug-10	-	R2-223	NSSB	1.758	6.3	36-37	-	ok
24-Aug-10	-	R2-224	SLSC	4.322	7.8	36-37	-	ok
24-Aug-10	-	R2-225	NSSB	0.262	3.7	36-37	-	ok
24-Aug-10	-	R2-226	NSSB	0.366	4.0	36-37	-	ok
24-Aug-10	-	R2-227	NSSB	0.287	3.7	36-37	-	ok
25-Aug-10	-	R2-228	ARGR	42.378	15.7	37-38	-	ok
25-Aug-10	-	R2-229	LKTR	8.430	9.9	37-38	-	ok
25-Aug-10	-	R2-230	RNWH	4.615	8.2	37-38	-	ok
25-Aug-10	-	R2-231	NSSB	1.478	5.9	37-38	-	ok
25-Aug-10	-	R2-232	NSSB	0.225	3.5	37-38	-	ok
25-Aug-10	-	R2-233	NSSB	0.220	3.3	37-38	-	ok
25-Aug-10	-	R2-234	NSSB	0.159	3.0	37-38	-	ok
25-Aug-10	-	R2-235	LKTR	79.000	18.3	38-39	-	ok
25-Aug-10	-	R2-236	ARGR	27.854	14.0	38-39	-	ok
25-Aug-10	-	R2-237	LKTR	44.374	15.4	38-39	-	ok
25-Aug-10	-	R2-238	SLSC	6.118	8.6	38-39	-	ok
25-Aug-10	-	R2-239	ARCH	7.092	8.5	38-39	-	ok
25-Aug-10	-	R2-240	NSSB	0.204	3.4	38-39	-	ok
25-Aug-10	-	R2-241	NSSB	0.177	3.3	38-39	-	ok
25-Aug-10	-	R2-242	NSSB	0.272	3.5	38-39	-	ok
25-Aug-10	-	R2-243	NSSB	0.211	3.3	38-39	-	ok
25-Aug-10	-	R2-244	NSSB	0.242	3.5	38-39	-	ok
25-Aug-10	-	R2-245	NSSB	0.248	3.4	38-39	-	ok
25-Aug-10	-	R2-246	NSSB	0.216	3.1	38-39	-	ok
25-Aug-10	-	R2-247	NSSB	0.273	3.2	38-39	-	ok
25-Aug-10	-	R2-248	NSSB	0.248	3.4	38-39	-	ok
25-Aug-10	-	R2-249	NSSB	0.242	3.4	38-39	-	ok
25-Aug-10	-	R2-250	NSSB	0.225	3.3	38-39	-	ok
25-Aug-10	-	R2-251	RNWH	8.873	10.3	39-40	-	ok
25-Aug-10	-	R2-252	LKTR	14.232	11.2	39-40	-	ok
25-Aug-10	-	R2-253	RNWH	7.544	9.2	39-40	-	ok
25-Aug-10	-	R2-254	LKTR	5.647	7.6	39-40	-	ok
25-Aug-10	-	R2-255	NSSB	0.178	3.4	39-40	-	ok
25-Aug-10	-	R2-256	NSSB	0.201	3.3	39-40	-	ok
25-Aug-10	-	R2-257	NSSB	0.177	3.2	39-40	-	ok
25-Aug-10	-	R2-258	NSSB	0.225	3.5	39-40	-	ok
25-Aug-10	-	R2-259	NSSB	0.186	3.5	39-40	-	ok
25-Aug-10	-	R2-260	NSSB	0.212	3.4	39-40	-	ok
25-Aug-10	-	R2-261	LKTR	63.000	17.8	41-42	-	ok
25-Aug-10	-	R2-262	SLSC	10.401	9.2	41-42	-	ok
25-Aug-10	-	R2-263	ARGR	50.700	16.5	41-42	-	ok
25-Aug-10	-	R2-264	LKTR	24.448	12.8	41-42	-	ok
25-Aug-10	-	R2-265	ARCH	16.364	11.2	41-42	-	ok
25-Aug-10	-	R2-266	LKTR	39.236	15.4	41-42	-	ok
25-Aug-10	-	R2-267	NSSB	0.146	2.9	41-42	-	ok
25-Aug-10	-	R2-268	NSSB	0.184	3.3	41-42	-	ok
25-Aug-10	-	R2-269	NSSB	0.160	3.0	41-42	-	ok
25-Aug-10	-	R2-270	NSSB	0.203	3.4	41-42	-	ok
25-Aug-10	-	R2-271	NSSB	0.265	3.4	41-42	-	ok
25-Aug-10	-	R2-272	NSSB	0.197	3.4	41-42	-	ok
25-Aug-10	-	R2-273	NSSB	0.155	2.8	41-42	-	ok
25-Aug-10	-	R2-274	NSSB	0.113	2.5	41-42	-	ok
25-Aug-10	-	R2-275	NSSB	0.234	3.3	41-42	-	ok
25-Aug-10	-	R2-276	NSSB	0.222	3.2	41-42	-	ok
25-Aug-10	-	R2-277	NSSB	0.265	3.6	41-42	-	ok

Date Sampled	Dissected by:	Fish ID	Species	Total Weight (g)	Fork Length (cm)	Area Taken (WP)	Age Strucure ^a	Condition/Comments
25-Aug-10	-	R2-278	NSSB	0.191	2.8	41-42	-	ok
25-Aug-10	-	R2-279	NSSB	0.166	2.8	41-42	-	ok
25-Aug-10	-	R2-280	NSSB	0.164	3.3	41-42	-	ok
25-Aug-10	-	R2-281	NSSB	0.133	2.9	41-42	-	ok
25-Aug-10	-	R2-282	NSSB	0.188	3.5	41-42	-	ok
25-Aug-10	-	R2-283	NSSB	0.273	3.5	41-42	-	ok
25-Aug-10	-	R2-284	NSSB	0.210	3.2	41-42	-	ok
25-Aug-10	-	R2-285	NSSB	0.259	3.5	41-42	-	ok
25-Aug-10	-	R2-286	NSSB	0.147	2.9	41-42	-	ok
25-Aug-10	-	R2-287	BURB	217.000	32.2	42-43	-	ok
25-Aug-10	-	R2-288	LKTR	109.300	20.6	42-43	-	ok
25-Aug-10	-	R2-289	ARGR	22.208	12.8	42-43	-	ok
25-Aug-10	-	R2-290	ARCH	10.077	9.8	42-43	-	ok
25-Aug-10	-	R2-291	LKTR	19.789	11.9	42-43	-	ok
25-Aug-10	-	R2-292	NSSB	1.605	5.9	42-43	-	ok
25-Aug-10	-	R2-293	LKTR	23.042	12.7	42-43	-	ok
25-Aug-10	-	R2-294	NSSB	0.242	3.5	42-43	-	ok
25-Aug-10	-	R2-295	NSSB	0.193	3.1	42-43	-	ok
25-Aug-10	-	R2-296	NSSB	0.168	3.1	42-43	-	ok
25-Aug-10	-	R2-297	NSSB	0.180	2.8	42-43	-	ok
25-Aug-10	-	R2-298	NSSB	0.204	3.3	42-43	-	ok
25-Aug-10	-	R2-299	NSSB	0.126	2.7	42-43	-	ok

Note:

a) ot = otolith

Table C-5: Arctic Grayling Age Determination (Performed By Northshore Environmental)

Fish ID	Species	Total Weight (g)	Fork Length (cm)	Age Strucure	Age	Confidence
E024	ARGR	21.554	13.2	ot	1	6 to 7
E025	ARGR	10.958	10.8	ot	1	7
E052	ARGR	15.056	11.4	ot	1	7
E053	ARGR	13.238	11.3	ot	1	6 to 7
E054	ARGR	2.734	6.5	ot	0	6
E072	ARGR	2.618	6.4	ot	0	7
E073	ARGR	2.925	6.6	ot	0	7
E074	ARGR	2.836	6.7	ot	0	7
E075	ARGR	1.283	5.5	ot	0	7
E091	ARGR	2.573	6.5	ot	0	7
E092	ARGR	2.230	6.4	ot	0	7
E093	ARGR	1.894	5.8	ot	0	7
E095	ARGR	2.459	6.4	ot	0	6 to 7
E096	ARGR	1.825	5.7	ot	0	7
E098	ARGR	2.031	6.0	ot	0	7
E100	ARGR	77.800	19.0	ot	2	7
E101	ARGR	13.429	11.2	ot	1	7
E102	ARGR	16.524	11.7	ot	1	7
E113	ARGR	1.729	6.0	ot	0	7
E114	ARGR	1.778	5.9	ot	0	7
E134	ARGR	1.793	6.1	ot	0	7
E152	ARGR	2.385	6.6	ot	missing	
E153	ARGR	1.866	5.8	ot	missing	
E154	ARGR	1.423	5.5	ot	missing	
E155	ARGR	2.400	6.4	ot	missing	
E156	ARGR	11.390	10.9	ot	missing	
R1-016	ARGR	2.910	6.8	ot	0	7
R1-023	ARGR	11.205	10.2	ot	1	6 to 7
R1-024	ARGR	17.239	11.3	ot	1	7
R1-027	ARGR	3.222	7.1	ot	0	7
R1-028	ARGR	26.182	13.1	ot	1	7
R1-041	ARGR	28.001	13.3	ot	1	6 to 7
R1-042	ARGR	18.123	11.9	ot	1	6 to 7
R1-051	ARGR	24.004	13.0	ot	missing	
R1-052	ARGR	19.130	11.7	ot	1	7
R1-064	ARGR	2.811	6.7	ot	0	6
R1-072	ARGR	2.725	6.6	ot	0	7
R1-078	ARGR	3.059	6.9	ot	0	7
R1-079	ARGR	16.096	11.4	ot	1	7
R1-085	ARGR	3.581	7.1	ot	0	7
R1-086	ARGR	3.261	7.2	ot	missing	
R1-110	ARGR	2.046	5.8	ot	missing	
R1-111	ARGR	2.508	6.2	ot	0	7
R1-112	ARGR	19.702	12.2	ot	2	6 to 7
R2-035	ARGR	43.281	16.3	ot	2	7
R2-036	ARGR	72.300	18.7	ot	2	6 to 7
R2-062	ARGR	56.100	17.3	ot	2	7
R2-063	ARGR	33.128	14.5	ot	2	7
R2-064	ARGR	57.600	16.6	ot	2	7
R2-078	ARGR	59.600	18.1	ot	2	7
R2-079	ARGR	53.900	17.4	ot	2	7
R2-081	ARGR	47.200	16.7	ot	2	7
R2-082	ARGR	43.600	16.4	ot	2	7

Table C-6: Lupin 2010 Fish Habitat Data

Area	Date Sampled	Cross-section (m)	Channel Width (m)	Wetted Width (m)	Depth (m)	Average Velocity (m/s)	Dissolved Oxygen (mg/L)	Conductivity (μ S/cm)	pH	Temperature (C)	Turbidity (NTU)
Exposure	27-Aug-10	200	3.47	3.47	0.26	2.16	11.4	59	8.95	7.5	2.13
		400	5.03	5.03	0.58	2.89					
		600	10.4	8.86	0.48	4.56					
		800	3.8	3.8	0.26	2.95					
		1000	2.49	2.49	0.52	1.47					
Reference Area 1	20-Aug-10	200	1.16	1.16	0.26	3.6	-	6	7.5	-	1.03
		400	2.44	2.44	0.3	0.5					
		600	1.5	1.5	0.42	0.7					
		800	1.13	1.13	0.38	1.6					
		1000	1.24	1.39	0.36	1.2					
Reference Area 2	22-Aug-10	1200	0.5	0.75	0.23	1.2	10.2	10	7.2	8.3	1.03
		1400	3.16	3.16	0.23	0					
		200	1.3	1.3	0.23	3.65					
		400	1.74	1.74	0.3	6.32					
		600	1.93	1.93	0.29	2.8					
		800	1.92	1.92	0.45	3.2					
		1000	1.55	1.55	0.21	1.7					

Table C-7: Results

Reference Area 1									
	R1-C1 (INCLR1-024)	R1-C2 (INCLR1-041)	R1-C3 (INCLR1-042)	R1-C4 (INCLR1-028)	R1-C5 (INCLR1-023,R1-016)	R1-C6 (INCLR1-052)	R1-C7 (INCLR1-051)	R1-C8 (INCLR1-085,R1-072,R1-079,R1-064,R1-111)	R1-C9 (INCLR1-112,R1-110,R1-078,R1-086)
Sample ID	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10	20-AUG-10
Date Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
Time Sampled									
ALS Sample ID	L926613-18	L926613-17	L926613-13	L926613-12	L926613-16	L926613-11	L926613-15	L926613-14	L926613-10
Matrix	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests									
% Moisture	76.3	75.4	74.7	73.7	77.7	75.3	76.3	75.7	75.7
Metals									
Aluminum (Al)-Total	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.1	<2.0
Arsenic (As)-Total	0.089	0.077	0.071	0.093	0.084	0.060	0.102	0.109	0.095
Cobalt (Co)-Total	0.101	0.070	0.048	0.088	0.118	0.051	0.079	0.067	0.063
Copper (Cu)-Total	0.727	0.706	0.944	0.696	0.913	0.676	0.673	0.717	0.674
Nickel (Ni)-Total	0.237	0.204	0.204	0.225	0.310	0.238	0.312	0.231	0.222
Zinc (Zn)-Total	16.2	14.9	16.8	14.8	25.7	16.0	17.0	17.8	16.6

Table C-7: Results

Reference Area 2										
Sample ID	R2-C1 (INCL R2-035)	R2-C2 (INCL R2-036)	R2-C3 (INCL R2-062)	R2-C4 (INCL R2-063)	R2-C5 (INCL R2-064)	R2-C6 (INCL R2-078)	R2-C7 (INCL R2-079)	R2-C8 (INCL R2-082)	R2-C9 (INCL R2-081)	
Date Sampled	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	25-AUG-10	
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	
ALS Sample ID	L926613-5	L926613-8	L926613-9	L926613-6	L926613-4	L926613-7	L926613-3	L926613-2	L926613-1	
Matrix	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	
Physical Tests										
% Moisture	77.2	77.3	78.0	79.4	77.5	76.7	76.2	75.9	77.7	
Metals										
Aluminum (Al)-Total	<2.0	<2.0	<2.0	2.6	<2.0	2.4	2.1	2.1	9.8	
Arsenic (As)-Total	0.051	0.068	0.074	0.127	0.052	0.105	0.059	0.067	0.284	
Cobalt (Co)-Total	0.083	0.097	0.152	0.333	0.118	0.271	0.099	0.135	0.708	
Copper (Cu)-Total	0.566	0.629	0.592	0.579	0.611	0.698	0.654	0.691	0.806	
Nickel (Ni)-Total	0.194	0.258	0.299	0.293	0.205	0.306	0.295	0.264	0.538	
Zinc (Zn)-Total	14.4	17.4	17.2	17.5	15.9	16.8	16.1	16.4	18.6	

Appendix D

Lupin Cycle 3 EEM Program Field Work Plan and Correspondence with the Technical Advisory Panel

Appendix D – Cycle 3 Study Design Correspondence

- 1. Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report**
- 2. Technical Advisory Panel Review Comments on “Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report”**
- 3. Letter Correspondence: Study Design Addendum for Lupin Cycle 3 Environmental Effects Monitoring Study**
- 4. Letter Correspondence: Study Design Addendum for Lupin Cycle 3 Environmental Effects Monitoring Study**
- 5. Technical Advisory Panel comments on the Study Design Addendum for the Lupin Phase 3 EEM study**

MMG Resources Inc

Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report

Prepared by:

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Project Number:

60147160

Date:

February, 2010

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February 10, 2010

Erik Allen
Regional Environmental Effects Monitoring Coordinator
Environmental Protections Operations Division
Environmental Stewardship Branch
Prairie and Northern Region
Environment Canada
#200, 4999 – 98th Avenue
Edmonton AB T6B 2X3

Dear Mr. Allen:

Project No: 60147160-4.2.1.1

Regarding: Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report

On behalf of MMG Resources Inc (MMG), AECOM is pleased to submit the Site Characterization and Cycle 3 Environmental Effects Monitoring (EEM) Investigation of Cause (IOC) Study Design Report for the Lupin Gold Mine.

This study design report summarizes the general physical environment, hydrology, anthropogenic influences, aquatic resources and previous EEM study results associated with the Lupin Gold Mine site. This report also includes two proposed hypotheses to investigate the cause for the observed differences in Arctic grayling endpoints detected in both Cycle 1 and 2.

If you have any questions, or require further information on the report, please do not hesitate to contact Colleen via email or phone at 780-486-7041.

Sincerely,
AECOM Canada Ltd.



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AECOM Signatures

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Table of Contents

Statement of Qualifications and Limitations

Letter of Transmittal

Distribution List

	page
1. Introduction	1
2. Site Characterization	2
2.1 Mine History	2
2.1.1 Mine Setting - Andrew	2
2.1.2 Tailings	2
2.1.3 Activities since Cycle 2 Interpretative Report	2
2.2 Climate	3
2.3 Geology and Topography	3
2.4 Vegetation	3
2.5 Hydrology	3
2.6 Aquatic Resources	4
2.6.1 Water Quality	4
2.6.2 Exposure Area	7
2.6.3 Reference Area	8
2.7 Previous EEM Studies	8
2.7.1 Cycle 1 EEM	8
2.7.2 Cycle 2 EEM	8
2.7.3 Comparison of Cycle 1 and Cycle 2 EEM Studies	9
3. Effluent Mixing in the Exposure Area	10
3.1 Historical Effluent Characteristics	10
4. Cycle 3 EEM IOC Study Design	11
4.1 EEM IOC Study Design	11
4.2 Study Design Component	11
4.2.1 Hypothesis #1 Thermal Influences	11
4.2.1.1 Water Temperature	11
4.2.1.2 Fish Survey	12
4.2.2 Hypothesis #2 Benthic Community Structure	15
4.2.3 Water Quality	18
4.2.4 Sediment Sampling	18
5. References	19

List of Figures

Figure 1. Exposure and Reference Study Areas for the Lupin EEM Cycle 3 Study 5

Figure 2. Lupin Mine Tailings Containment Area 6

Figure 3. Temperature Loggers and Fish Sampling in the Exposure Area..... 13

Figure 4. Temperature Loggers and Fish Sampling in the Reference Area and Alternate Reference Area 14

Figure 5. Benthic and Sediment Sampling Stations in the Exposure Area 16

Figure 6. Benthic and Sediment Sampling Stations in the Reference Area..... 17

List of Tables

Table 1. Summary of Water Quality Monitoring Downstream of Lupin Mine Effluent Discharge Location
(SNP 925-20) 7

Table 2. Total Annual Discharge Volumes from Lupin Mine TCA (SNP 925-10), 1994 to 2009 10

1. Introduction

AECOM Canada Ltd. (AECOM) was retained by MMG Resources Inc (MMG) to update the current Site Characterization Report and complete the Cycle 3 Environmental Effects Monitoring (EEM) Investigation of Cause (IOC) Study Design Report for their Lupin Gold Mine. Under the Metal Mining Effluent Regulations (MMER), Schedule 5, Section 9, mines are required to submit a Site Characterization Report along with the Study Design for the current EEM study. The Site Characterization Report summarizes the general physical environment, hydrology, anthropogenic influences, aquatic resources, environmental protection measures employed along with any existing federal and/or provincial regulations in respect to the mine's effluent discharge. This Cycle 3 EEM IOC Study Design Report presents three proposed hypotheses to resolve the cause(s) of different length and weight measurements observed in Arctic grayling (*Thymallus arcticus*) young-of-year, between the Exposure and Reference Areas, in the Cycle 1 and 2 studies. This study design is consistent with the Metal Mining Technical Guidance Document (TGD) and other insights from Environment Canada (EC 2002).

2. Site Characterization

Site characterization has been provided for the Lupin mine site in the Cycle 1 study design (Golder 2004) and in the Cycle 1 (Golder 2006a,b) and Cycle 2 (AECOM 2009) Interpretative Reports. This report contains an update of information on site activity and details since the Cycle 2 Interpretative Report.

2.1 Mine History

2.1.1 Mine Setting - Andrew

The Lupin Mine is located on the west shore of Contwoyto Lake, Nunavut, approximately 300 km south-east of Kugluktuk and 80 km south of the Arctic Circle (65°46' N, 111°15' W) (Figure 1).

Mine construction started in August 1980 and was completed in March 1982. The mine was operated continuously from 1982 to 1998 when operations were suspended and the mine went into care and maintenance status. Production resumed in April 2000 but in 2003 the mine went back into care and maintenance following a merger between Echo Bay Mine and Kinross. Operations were started again in 2004 but the mine once again went into care and maintenance in February 2005. In February of 2007, the Lupin Mine was sold to Wolfden Resources Inc. of Thunder Bay, Ontario. A holding company, Lupin Mines Inc. was created as a wholly owned subsidiary of Wolfden Resources Inc. to receive the Lupin assets and it is that company that is the legal owner of the property. In May 2007, Wolfden was acquired by Zinifex Limited of Melbourne Australia and ownership of Lupin Mines Inc. was transferred to Zinifex. In 2008, Zinifex Ltd. and Oxiana Ltd., both of Melbourne Australia merged to form OZ Minerals Ltd. with headquarters in Melbourne. Again, the ownership of Lupin Mines Inc. was transferred to the merged company. In 2009 the Canadian assets of Oz Minerals were sold to China Minmetals Inc. of Beijing, China. Minerals and Metals Group Ltd. was set up in Australia to receive the OZ Minerals assets. Minerals and Metals Group Ltd. is a wholly owned, privately held subsidiary of China Minmetals Inc. In Canada, the operating company for Minerals and Metals Group Ltd. is MMG Resources Canada Inc., which is the sole shareholder of Lupin Mines Inc., which in turn remains the legal owner of the Lupin Mine.

Lupin Mine included underground mining and production systems and an ore handling system. Mining and processing equipment was designed to manage up to 2,300 tonnes per day. Materials and supplies were brought into Lupin by air transport and winter road transport while labour was brought in by air transport. Lupin is a self-contained facility with power generation and sewage facilities. The tailings containment area (TCA) is located approximately 7 km south of the mine (Figure 2).

2.1.2 Tailings

As reported by Golder (2006a), effluent discharge began in September 1985. Discharge from the TCA was scheduled to occur between July and September. Effluent is discharged from the TCA into Dam Lake and eventually reaches Contwoyto Lake via Seep Creek, Seep Creek Lake, unnamed creek, unnamed lake and Inner Sun Bay of Contwoyto Lake (Figure 1).

2.1.3 Activities since Cycle 2 Interpretative Report

An overview of mine operations, including management of mine water and tailings was provided in the Cycle 1 report (Golder 2006a,b). Some changes to the site have occurred since 2006.

Reclamation activities in the TCA during 2005 saw a major portion of Cell 5 and another portion of Cell 3 covered by a minimum of 1.0 m of esker gravel. The work was carried out between June 23 and September 28, 2005, with a total area covered of approximately 383,001 m².

Approximately 250,000 m² of exposed tailings remain to be covered. This work was scheduled to be completed during the summer of 2006; however, due to the premature shutdown of the 2006 winter road, Lupin did not receive enough fuel to carry out the program as scheduled.

In 2008, as part of the preparation for discharge from the TCA, 76,000 kg of lime was spread on Pond 2. The lime was dispersed over the ice surface and then covered with snow to prevent wind from blowing it around. Effluent was not released in 2008.

In 2009, approximately 3 million cubic litres of effluent was released from tailings pond 2 after effluent was tested for toxicity and passed (A. Mitchell, Lupin Mine, pers. comm.). In spring 2010, ponds 1 and 2 will be treated with lime, treated effluent will be transferred to pond 2 and a small volume will be released after July 15, 2010. After 2010, small releases will be scheduled either every year or every second year.

No further activities have been carried out to date and the mine site remains in care and maintenance.

2.2 Climate

Climate in this region is semi-arid subarctic with a mean daily temperature of -11.1°C and average annual precipitation of 299 mm (Canadian Climate Normals 1961-2000). Average temperature in May through September is 4.6°C and the heaviest precipitation occurs in June through September (Canadian Climate Normals 1961-2000). Snowfall can occur in any month but the heaviest snowfalls generally occur in October with an average annual snowfall of 138.1 cm (Canadian Climate Normals 1961-2000). The study area is subject to frequent strong winds from the northwest (Beak Consultants Ltd. and Mary Collins Consultants Ltd. 1980; Geocon Ltd. 1980).

2.3 Geology and Topography

The bedrock in the vicinity of the Lupin Mine is archaic in age including supracrustal rocks of the Yellowknife supergroup of the Slave province of the Canadian shield. Rock types occurring in the vicinity of the mine include ultramafic, mafic, intermediate and felsic volcanic rocks, intrusive rocks and siliciclastic rocks and ironstones. The gold mineralization at the mine is hosted primarily by the ironstones. This region contains intrusive igneous material such as granite (Natural Resources Canada 2003). In the vicinity of the mine, terrain is low and undulating ranging between 450 and 530 m elevation. There are numerous shallow lakes and streams throughout the area (Gartner Lee Limited 2008a, b).

2.4 Vegetation

Lupin Mine is located in the subarctic tundra vegetation zone. This is an area characterized by continuous permafrost and "barren ground" vegetation including moss, lichens, heather and dwarf shrub communities in the well-drained areas, and grasses and sedges in the wet areas adjacent to waterbodies. Dwarf shrubs, up to 1 m high, occur adjacent to some waterbodies (RCPL and RL&L 1985).

2.5 Hydrology

Contwoyto Lake is the major waterbody in the study area with a surface area of approximately 959 km² and a drainage area of approximately 8,000 km² (Roberge *et al.* 1986). Contwoyto Lake has two outflows. The main outflow to the north, drains to the Burnside River and ultimately to Bathurst Inlet; the smaller outflow to the south, drains to the Contwoyto River and into Back River (Rescan 2002). The main basin of Contwoyto Lake is to the east and south of the mine (Figure 1). To the north of the mine, West Arm extends to the west terminating in a narrow bay (Outer and Inner Sun Bay). This area is west of the mine and ultimately receives mine waste after it has travelled through small lakes and streams.

Seep Creek, a small stream approximately 6.5 km in length, flows westerly from the mine area into Inner Sun Bay (Figure 1). Seep Creek watershed contains three lakes (Dam 2 Lake, Dam 1A Lake and Unnamed Lake), three headwater streams, two ponds (Seep Creek Ponds 1 and 2) and two embayment areas (Inner and Outer Sun Bay).

- Dam 2 Lake is a small lake, 7 m maximum depth, bordered to the north by a gravel pit and on the east by the TCA
- Dam 1A Lake is a shallow lake (< 1 m) south of Dam 2 Lake; water from the TCA discharges into this lake
- Dam 2 Lake and Dam 1A Lake are drained by tributaries that join to form Seep Creek
- Unnamed Lake is south of Dam 1A Lake

A tributary from Unnamed Lake joins Seep Creek approximately 400 m downstream of the Dam 2 Lake and Dam 1A Lake tributary confluence

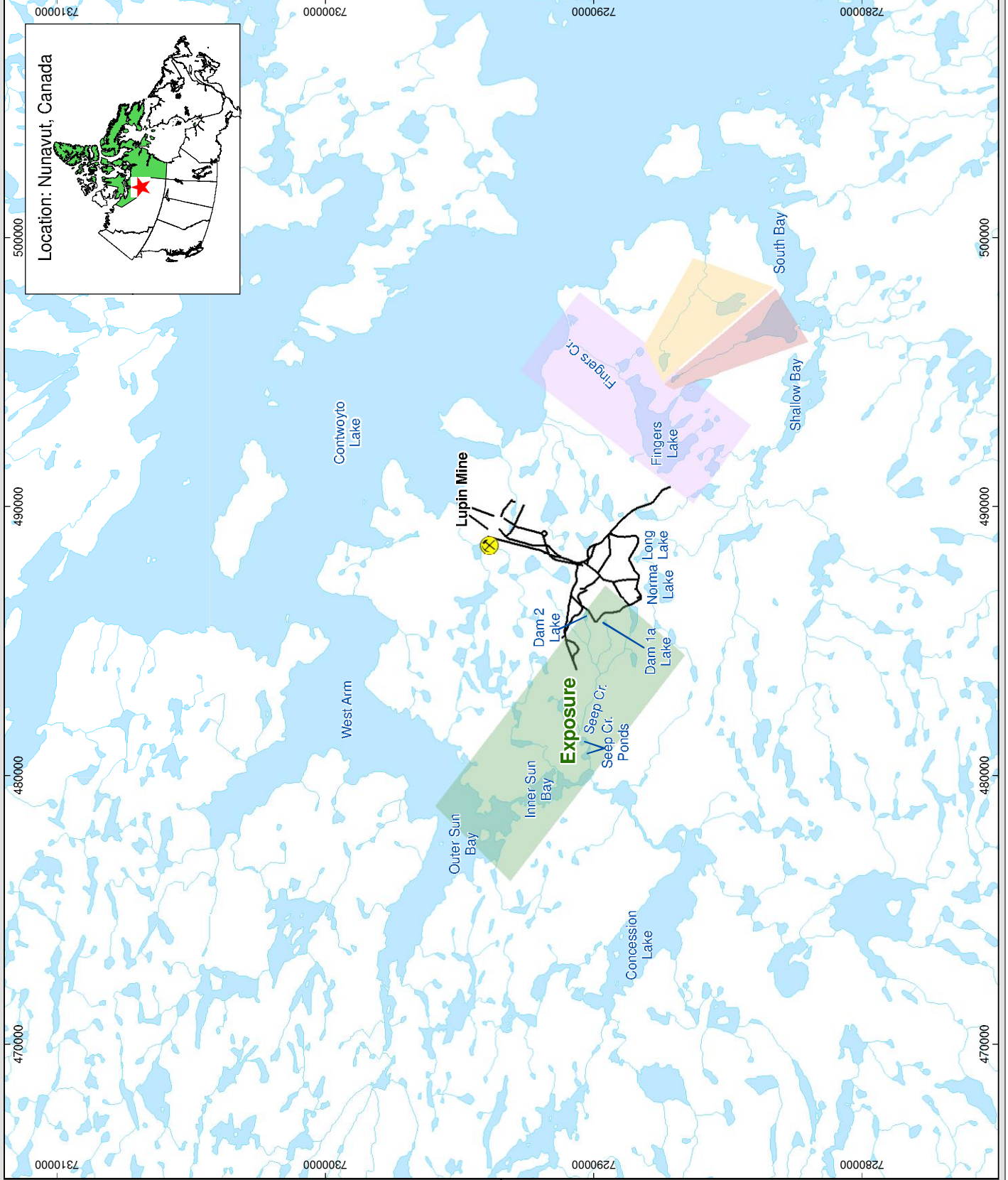
2.6 Aquatic Resources

2.6.1 Water Quality

One final effluent discharge monitoring point was identified by Kinross to Environment Canada. This station is identified as Surveillance Network Point (SNP) 925-10. In the Cycle 1 report, water quality results collected from this location were summarized (Golder 2006a). There were no samples collected from this location as part of the Cycle 2 EEM program. Routine parameters including pH, conductivity, total suspended solids (TSS) and metals, including arsenic, remained at consistent concentrations from 2000 to 2005 and less than the maximum concentrations of identified MMER deleterious substances.

Conductivity has historically been measured at various sampling points in the Exposure Area. Field conductivity at the mouth of Seep Creek was recorded at 519 $\mu\text{S}/\text{cm}$ (SNP 925-20) while at the mouth of Concession Creek (creek that drains Concession Lake before it enters Seep Creek watershed), conductivity was recorded at 11 $\mu\text{S}/\text{cm}$.

For Cycle 2 program, only one water quality sample was collected from SNP 925-20. Conductivity, hardness and pH were lower in 2008 as compared to 2000 to 2005 monitoring period. In addition, TSS and alkalinity, total cyanide, ammonia-nitrogen and total lead were non-detectable in the 2008 sample and total arsenic, cadmium, nickel and zinc were lower in 2008 than other years (Table 1). Concentration of total copper in 2008 was similar to previous years even though there was no effluent discharge in 2008.



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**Exposure and Reference
Study Areas for the
Lupin Cycle 3 IOC EEM
Program**

05 February 2010

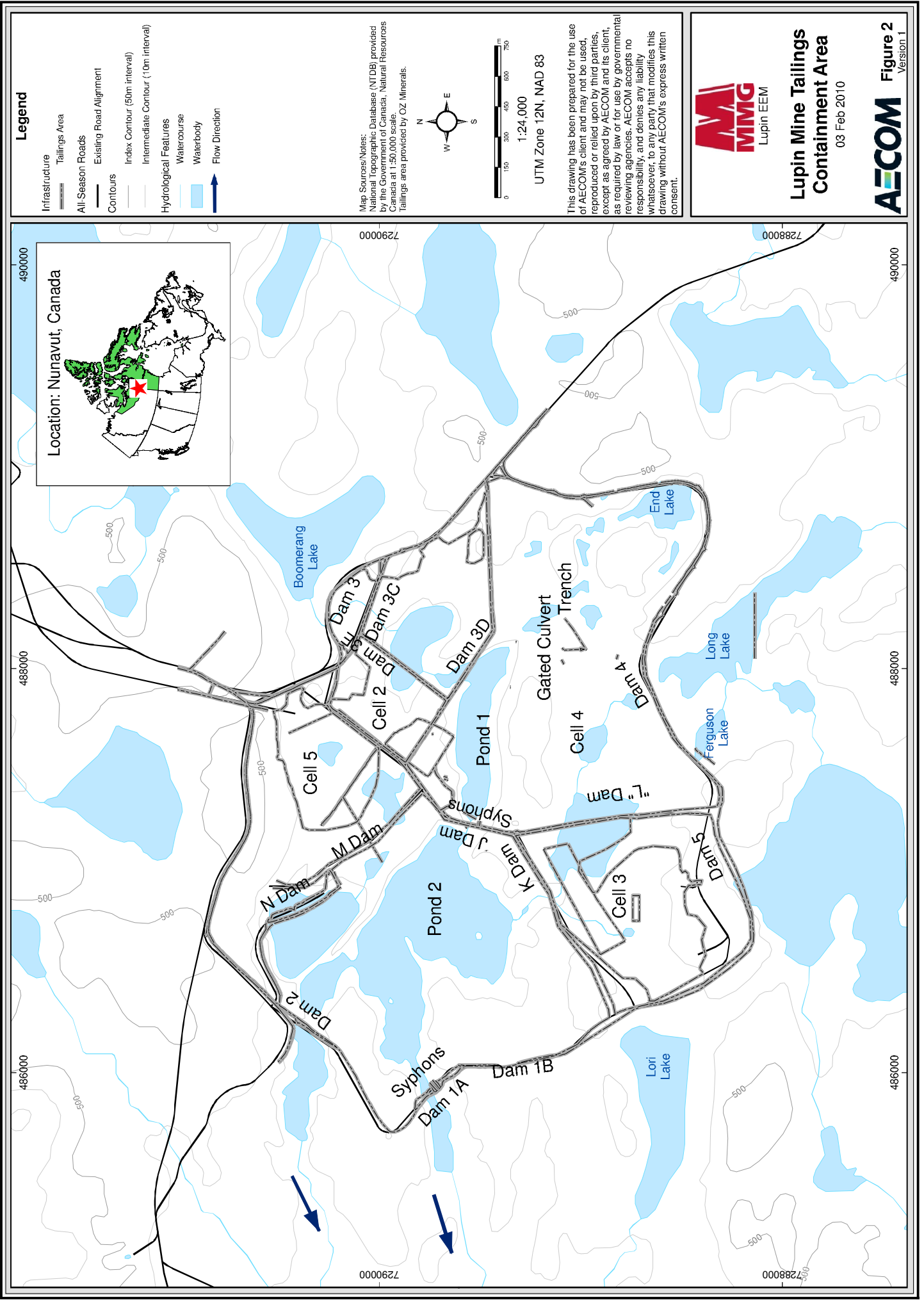


Table 1. Summary of Water Quality Monitoring Downstream of Lupin Mine Effluent Discharge Location (SNP 925-20)

Parameter	Units	CCME Aquatic Life ^a	2000	2002	2005	2008
			Mean SD ^b	Mean SD ^b	Mean SD ^b	Sept
pH (units)	pH unit	6.5-9.0	6.03	6.48	5.7	5.6
			0.25	0.15	0.45	
Conductivity (µS/cm)	uS/cm		887	748	519	65.8
			37	114	279	
Hardness (as CaCO ₃)	mg/L		231	199	135	24
			9.1	34.3	75.4	
Total Suspended Solids	mg/L		0.53	0.93	<2	<3
			0.17	0.73	0	
Total Alkalinity (as CaCO ₃)	mg/L		<5	7.4	<5	<5
			0	9.2	0	
Total Cyanide	mg/L	0.005	0.007	0.015	0.016	<0.002
			0.004	0.014	0.008	
Ammonia-Nitrogen	mg/L	0.019	2.72	0.72	0.64	<0.005
			0.48	0.31	0.47	
Total Arsenic	mg/L	0.005	0.0024	0.0036	0.0032	0.00186
			0.0006	0.0006	0.0013	
Total Cadmium	mg/L	0.000017	<0.0006	0.00017	0.00017	0.00006
			0	0.00003	0.00010	
Total Copper	mg/L	0.002-0.004	0.005	0.004	0.005	0.0052
			0.002	0.002	0.002	
Total Lead	mg/L	0.001-0.00 ^d	<0.002	0.0002	0.0001	<0.00005
			0	0.0002	0.0001	
Total Nickel	mg/L	0.025-0.15	0.115	0.0755	0.0762	0.0426
			0.009	0.0084	0.0411	
Total Zinc	mg/L	0.03	0.228	0.146	0.159	0.0392
			0.026	0.017	0.091	

Note: a – Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2007; b – Golder, 2006a

2.6.2 Exposure Area

Seep Creek, Seep Creek Ponds, and Sun Bay were designated as the Exposure Area (Golder 2006a). Best attempts were made to use the same sampling stations in the Exposure Area in the Cycle 2 study, consistent with the Cycle 1 study design and other data provided in the Cycle 1 report. The aquatic habitat in the Exposure Area, downstream of the TCA, is referenced as the Seep Creek watershed. Lakes Dam 2, Dam 1A and unnamed are west of the TCA. Dam 1A Lake receives effluent from the final discharge point (FDP). Dam 1A Lake is drained by Seep Creek. Seep Creek joins with the creek that drains Dam 2 Lake. At this point, Seep Creek flows for approximately 2.5 km before it enters two ponds (Seep Creek Pond 2 and Seep Creek Pond 1). Seep Creek is a well defined channel, 1 to 4 m wide with substrate dominated by boulders (RCPL and RL&L 1985). Seep Creek Ponds 1 and 2 are shallow (less than 1.5 m).

Historically, Lake trout (*Salvelinus namaycush*), Arctic grayling (*Thymallus arcticus*), Arctic cisco (*Coregonus autumnalis*), round whitefish (*Prosopium cylindraceum*), ninespine stickleback (*Pungitius pungitius*) and slimy sculpin (*Cottus cognatus*) have been documented in Seep Creek (RCPL and RL&L 1985). Fish use this stream for spawning, feeding and juvenile rearing in the early part of the open water season (RL&L and DFO 1991).

2.6.3 Reference Area

Fingers Lake and Fingers Creek was designated as the Reference Area. The Fingers Lake watershed is located east of the mine. Like the Seep Creek watershed, the Fingers Lake watershed also has a connection to Contwoyto Lake. Fingers Creek flows for approximately 3 km between Fingers Lake and Contwoyto Lake. Fingers Creek is between 1 to 3 m wide with substrate dominated by silt, boulders and cobble in the upper reaches, cobble gravel and silt in the middle reaches and cobble and boulders in the lower reaches. Habitat varied between shallow flat in the upper reaches and shallow run in the lower reaches.

Fingers Lake has a maximum depth of 6 m and a surface area of 3.7 km². Lake trout and Arctic char (*Salvelinus alpinus*) have been captured in Fingers Lake (Moore 1978) and prior to the Cycle 1 EEM study, fish capture data for Fingers Creek had not been previously collected.

2.7 Previous EEM Studies

2.7.1 Cycle 1 EEM

The Cycle 1 EEM study was conducted in August 2005 and the report was submitted to EC in 2006 (Golder 2006a, b). The Exposure and Reference Areas were determined through a literature and study design submitted to EC (Golder 2004). The study design was based on a control/impact study design. The Cycle 1 study investigated the defined Exposure and Reference Areas and completed a plume delineation model. Plume delineation modelling indicated that, under worst-case scenarios, 1% plume concentrations can extend for approximately 1,600 m into Outer Sun Bay. Based on the Benthic Invertebrate Community (BIC) survey data, mine effluent significantly affected patterns of benthic community diversity and evenness within the aquatic receiving environment. Mine effluent did not significantly affect invertebrate density, family richness or the Bray-Curtis Index (BCI). The fish study focused on juvenile (age 1) Arctic grayling as the target species. Arctic grayling are common to both the Exposure and Reference Areas of the Lupin Mine EEM biological monitoring studies. This species is also commonly fished and consumed by local residents and mine personnel. The state of general health of Arctic grayling was similar between the Reference and the Exposure Areas. However, in the Reference Area, Arctic grayling were heavier, longer and in better condition than in the Exposure Area. Laboratory assessments determined that mine effluent did not have sublethal or acute effects on various test species. The results of the Cycle 1 EEM monitoring program indicated invertebrates and fish were impacted by mine effluent, based on the BIC and reference fish population attributes.

2.7.2 Cycle 2 EEM

The Cycle 2 EEM study was conducted in August and September 2008 and the report was submitted to EC in 2009 (AECOM 2009). The field program was designed to collect samples for water quality, sediment quality, fish (non-lethal and lethal sampling), and invertebrates during discharge of mine effluent. Effluent was scheduled to be released but due to malfunctioning equipment at the outfall and low pH of the effluent, it was not released in 2008. In any event, the completion of the field study was still required and was conducted, as proposed.

Field and lab water quality differed between the Exposure and Reference Areas: pH was lower and conductivity, hardness, magnesium, sodium, TOC, DOC, aluminum, boron, cadmium, chromium, cobalt, copper, iron, manganese and zinc were higher in the Exposure Area as compared to the Reference Area. Sediment grain size was similar between areas except for clay; there was more clay in exposure sediments as compared to reference sediments (3% and 1.8%, respectively). Sediment quality was significantly different for some parameters including arsenic, cobalt, copper, nickel and zinc which were higher in exposure as compared to reference sediments.

Mean invertebrate density was higher in the Exposure Area as compared to the Reference Area but the difference was not statistically significant.

Young-of-the-year (Age-0) Arctic grayling were lighter and shorter within the Exposure Area as compared to the Reference Area. The ratio of liver weight to fork length differed significantly by area (for a given fork length, livers were lighter in the Exposure Area as compared to the Reference Area). Body weight and length of ninespine stickleback in the Exposure Area were significantly heavier and longer, respectively, than Reference Area individuals. The ratio of liver weight to total length was statistically significantly different by area (for a given length, livers were heavier from Exposure Area versus individuals from the Reference Area).

2.7.3 Comparison of Cycle 1 and Cycle 2 EEM Studies

From Cycle 1 to Cycle 2 there was no consistency in Exposure versus Reference Area water quality. Sediment quality differences were similar for Cycle 1 and 2. Since there was no effluent release between Cycle 1 and 2, these variations in sediment and water quality parameters of the receiving environment suggest that the environment could be recovering but historical impacts may influence ecological recovery for some time.

In Cycle 1, there were more benthic invertebrates within the Reference Area as compared to the Exposure Area while in Cycle 2 there were more invertebrates in the Exposure Area as compared to the Reference Area. The average density of benthic invertebrates in the Reference Area was similar in both Cycle 1 and 2 but the average density of invertebrates in the Exposure Area was higher in Cycle 2 as compared to Cycle 1. There is some evidence that the benthic invertebrate community within the Exposure Area is recovering as a result of no effluent discharge, but without existing data on pre-disturbance conditions in the Exposure Area, interpretations remain uncertain.

Arctic grayling in the Exposure Area were shorter and lighter than in the Reference Area in both cycles while ninespine stickleback (Cycle 2 only), were heavier and longer in the Exposure Area than in the Reference Area.

3. Effluent Mixing in the Exposure Area

The MMER requires an estimate of effluent concentration at 250 m downstream from FDP and a description of effluent mixing within the environment to a concentration of 1%. When effluent is being released, it is common to use field conductivity measurements as a way to measure effluent concentration.

At Lupin Mine, 250 m downstream of the FDP is within Dam 1A Lake. In 2005, field conductivity measured from the effluent was 847 $\mu\text{S}/\text{cm}$ and the lab measured conductivity from the sample in Dam 1A Lake was 738 $\mu\text{S}/\text{cm}$. Base flows in Seep Creek are very low and it has been estimated that up to 90% of the flow is due to effluent discharge (RL&L and DFO 1991). Based on the conductivity of the sample from 250 m downstream of the FDP, the water in the receiving system was comprised of 87% effluent.

A mixing and dispersion model was developed by Golder (2004) to describe the movement and concentration of effluent from the FDP to Outer Sun Bay. The model predicted that the 1% effluent limit would extend 850 to 1200 m from the mouth of the narrows in Outer Sun Bay.

The dispersion model was initially developed using data from 2000 and 2002 but results were updated with data from 2005 (Golder 2006b). Runoff conditions were lower in 2005 than originally modelled. When these conditions were included and the model was re-analyzed, the 1% dispersion limit extended to 1630 m beyond station SNP 925-25. The 2005 results from the sample at SNP 925-25 were considered consistent with the model.

3.1 Historical Effluent Characteristics

Samples for effluent characterization have been collected in the TCA at station SNP 925-10. Effluent was released from the TCA at various periods from 1994 to 2005 (Table 2). Effluent was not released between 2005 and 2009.

Table 2. Total Annual Discharge Volumes from Lupin Mine TCA (SNP 925-10), 1994 to 2009

Year	Annual Total (m^3)	Discharge Period
1994	863,868	July 15 - 29
1995	938,715	July 15 – August 2
1996	1,139,233	July 15 – August 7
1997	2,892,289	July 15 – September 1
1998	0	n/a
1999	0	n/a
2000	2,701,360	July 15 – September 2
2001	0	n/a
2002	3,102,895	July 15 – September 7
2003	0	n/a
2004	0	n/a
2005	1,682,135	July 15 – August 11
2006	0	n/a
2007	0	n/a
2008	0	n/a
2009	2,897,461	July 25 th – Oct 7th

Samples for effluent characterization were collected in 2000, 2002 and 2005. Constituents listed in Schedule 4 of MMER have been sampled. Up to 2005, none of the constituents exceeded the authorized limits. Samples for effluent characterization were not collected in 2008, as there was no effluent discharge (Table 2).

4. Cycle 3 EEM IOC Study Design

4.1 EEM IOC Study Design

For the Lupin Mine Cycle 3 EEM IOC study, a biological monitoring program is required to assess the difference in growth that has been observed between Age-0 Arctic Grayling in one exposure stream and one reference stream. A review of the primary literature identified that Arctic grayling populations are most sensitive to perturbations that influence juvenile survival. Specifically, if juvenile survival of Arctic grayling decreases, it can jeopardize the viability of populations (Buzby and Deegan, 2004; Vélez-Espino et al. 2006). Other studies have demonstrated that age-0 Arctic grayling growth and survival are strongly dependent on temperature and availability of benthic invertebrates. For example, growth of juvenile Arctic grayling increases with mean water temperature (Deegan et al. 1999; Dion and Hughes, 2004; Luecke and MacKinnon, 2006) and a similar pattern of temperature-dependent growth was observed in the closely related European grayling (*T. thymallus*), particularly for the age-0 cohort in streams (e.g., Mallet et al. 1999). In addition, growth of age-0 Arctic grayling was positively correlated with greater proportions of invertebrates such as Chironomidae (i.e., chironimids) and Simuliidae (i.e., black flies) in the diet (e.g., Jones et al. 2003). It has also been observed that the selection of spawning areas by adult Arctic grayling can lead to the exposure of eggs to cold or warm water, resulting in reduced or enhanced larval Arctic grayling growth rates, respectively (e.g., Luecke and Mackinnon, 2006). These observations identify the potential to test three discrete hypotheses to explain the growth rates of age-0 Arctic grayling between streams with and without ponds. Need to identify here the basic study design.

The proposed hypotheses to test for growth differences in Arctic grayling between Exposure and Reference Areas are:

1. Water temperature for streams with ponds will be higher through the growing season, and result in higher growth rates of age-0 Arctic grayling compared with streams with no ponds;
2. The landscape features of streams with ponds results in greater numbers of Chironomidae available to age-0 Arctic grayling resulting in higher growth rates compared with streams with no ponds; and
3. The spawning locations (i.e. water flow rates, available substrate, water depth, etc.) selected by adult Arctic grayling differ between streams with ponds and streams that lack ponds. This different selection by Arctic grayling in streams with ponds results in egg incubation times that are dependent on water temperature. Similarly, the water temperature experienced by early age-0 Arctic grayling will also differ between the streams with and without ponds. This hypothesis cannot be completed due to the time constraints resulting from the submission/approval dates required under the EEM.

4.2 Study Design Component

4.2.1 Hypothesis #1 Thermal Influences

4.2.1.1 Water Temperature

It is believed that Fingers Lake, in the Reference Area, provides thermal warming and thus better habitat for age-0 grayling growth. Since the Exposure Area lacks significant lake or ponded water, temperatures should be colder and thus influence age-0 growth. These habitat features, as represented by differing rates of warming and greater thermal holding capacity of ponded water compared with flowing water, indicate why Exposure Arctic grayling are smaller than the Reference Area age-0 fish. Due to the potential that the previously used Reference Area may not be the most appropriate for comparison to the Exposure Area due to differences in ponded water, an Alternative Reference Area will be selected based on the absence of ponded water and the presence of age-0 arctic grayling.

This may also provide insight into a regional variation that may exist in age-0 arctic grayling growth and survival rates (e.g., Deegan *et al.* 1999). To examine water temperature variations, digital logging thermometers (i.e., Hobo Tidbit loggers) will be placed strategically in the field in the Reference, Exposure, and Alternative Reference Areas. The three stream logging temperature locations for each area will include:

- Discharge into the main lake (Contwoyto Lake);
- Midway location between origin and the main lake;
- Origin; and/or,
- Pond stream interface (if present);

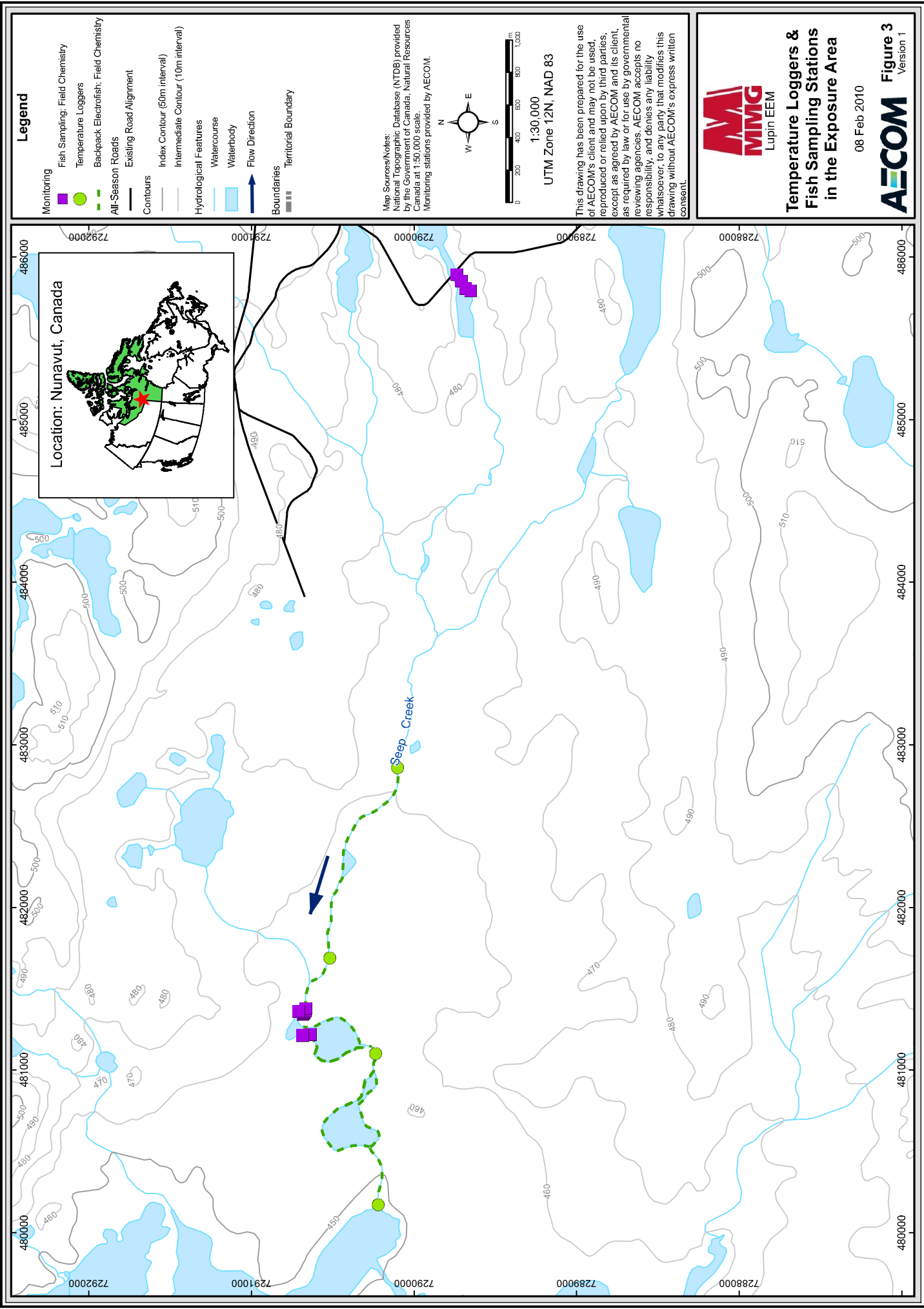
To capture freshet, temperature loggers will be placed in early July 2010 (Figure 3 and 4). It is recognized that this is earlier than the period equal to 6 months after the submission of the Study Design, as required by the MMER. However, this placement is required to fully capture and represent the seasonal variation in water temperature across habitats near Lupin Mine, and to test the thermal hypothesis. No samples other than temperature related to the EEM program will be collected at this time.

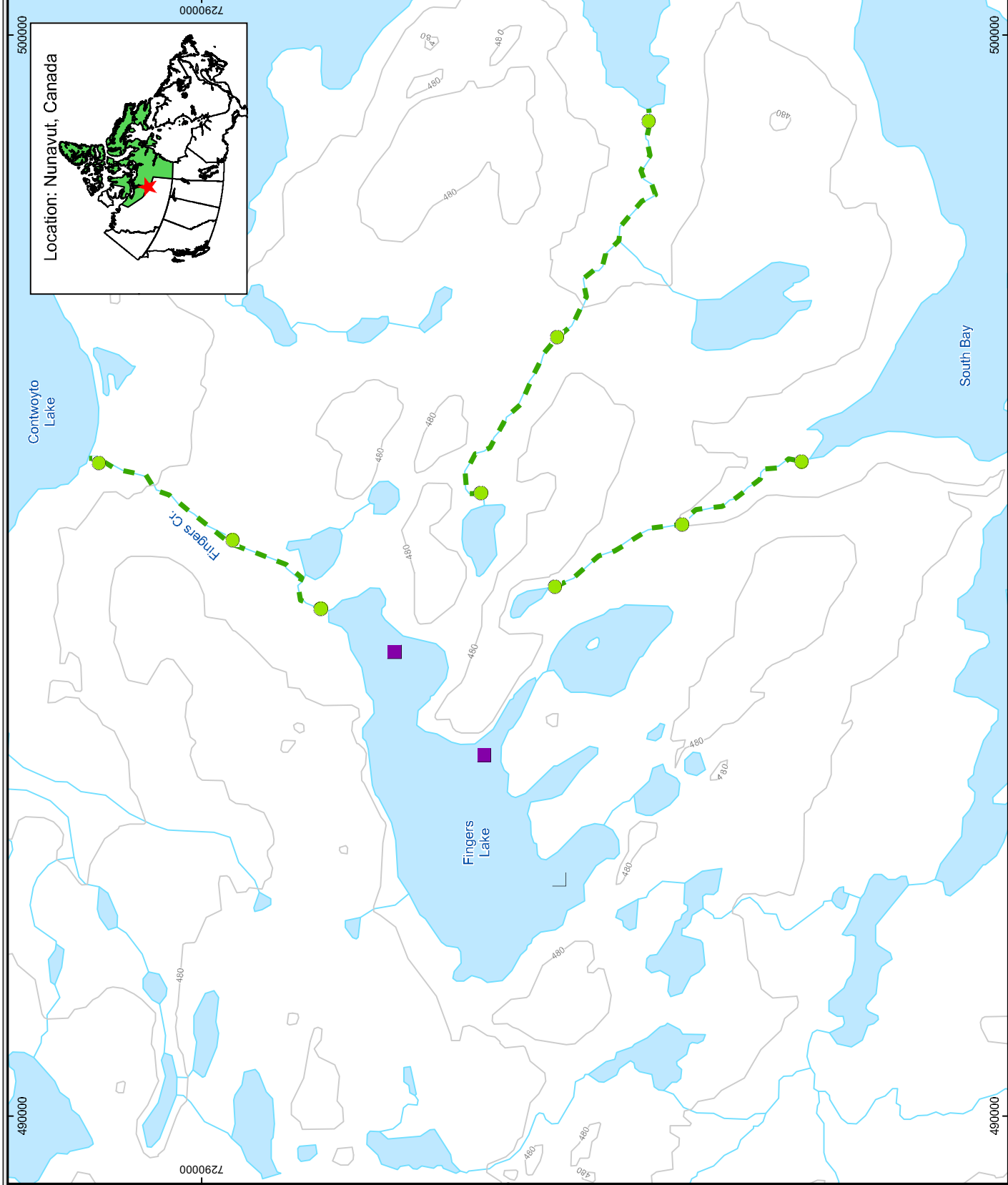
4.2.1.2 Fish Survey

Based on the previous EEM studies, it is proposed to conduct a non lethal fish survey to determine if the differences observed in the previous two cycles are still evident between the Reference and Exposure Areas (Figure 3 and 4). This strategy will allow for analyses to test for correlation between growth and temperature. Data from all three cycles will be used in the analyses. The survey will need to sample and collect no more than 100 age-0 Arctic grayling from the Reference and Exposure Areas used in the previous EEM studies. Since it is hypothesized that the Reference Area from the previous studies may not be the most appropriate system to use (based on the presence of large lake providing increased water temperatures and therefore possible higher temperature-dependent growth rates for age-0 arctic grayling), it is proposed to assess the potential of a more suitable reference stream (i.e. minimal surface area resulting from ponding waters). Reference Areas 2 and 3 (identified in Figure 1) will be surveyed for the presence of Arctic grayling and only one will be used for further investigation. Minnow traps (1.0 cm mesh size) and elector shocking (where safely feasible) will be used to capture fish. A target collection of 100 age-0 Arctic grayling will be needed from each of the Reference (existing), Exposure, and Alternative Reference (new) sampling areas to provide a non-lethal sampling program. Ideally, the sampling will occur in mid to late August. A catch per unit effort for each gear type will be recorded. Fish survey endpoint measurements for statistical analysis will include:

- Length (total, mm);
- Total body weight;

If, for any reason, deviations from the submitted Fish Survey need to be modified as a result of timing of sampling or environmental conditions, consultation with MMG Resources and Environment Canada (EC) will occur prior to any modifications, as directed by the MMER. If, for any reason, the fish survey cannot capture 100 fish from an area, the final number of fish captured will be recorded. The focus of this study is age-0 Arctic grayling. We will use the results of the previous EEM cycles to confirm the ages of the fish used in this study are actually within the age-0 cohort. Given results of the previous cycles, lethal sampling and collection of fish tissue for copper analysis is not recommended.





Legend

Monitoring

Fish Sampling

Temperature Loggers

Backpack Electrofish; Field Chemistry

Hydrological Features

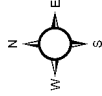
Watercourse

Waterbody

Contours

Intermediate Contours

Map Sources/Notes:
National Topographic Database (NTDB) provided by the Government of Canada, Natural Resources Canada at 1:250,000 scale.
Exposure and Reference areas delineated by AECOM.



0.3 0.6 0.9 1.2
Km

1:50,000

UTM Zone 12N, NAD 83

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**Temperature Loggers & Fish
Sampling Stations in the
Reference Area and
Alternate Reference Area**

08 February 2010

AECOM **Figure 4**
Version 1

Detailed habitat characteristics for Reference, Exposure and Alternative Reference Areas will be included in the Cycle 3 Interpretative Report.

QA/QC procedures for the fish survey will follow those outlined within the TGD (EC 2002).

Fish survey to be complete during August 2010.

4.2.2 Hypothesis #2 Benthic Community Structure

As indicated in Section 4.1, the density of Chironomidae and Simuliidae may influence the growth of age-0 Arctic grayling, therefore a benthic community assessment at the Reference, Exposure, and Alternative Reference Areas will be completed and will focus on the densities of Chironomidae. We will focus only on Chironomidae density, as Simuliidae was not identified as a significant benthic taxon in the past EEM studies.

A traditional benthic community survey will be completed. For each study area (Exposure, Reference and Alternate Reference), five sampling stations will be established (Figure 5 and 6). For the Exposure and Reference Areas, the same sampling stations used in the first two EEM programs will again be used. For the Alternate Reference, five new sampling stations will be determined while in the field. Water depth and water flow need to be consistent between sampling stations so these will be measured before the sample is collected. At each sampling station, five replicate samples will be collected (depth between 0.75 and 1.0 m) and combined into one composite sample for the site. Each replicate sample will be collected using a Petit Ponar dredge (6" x 6" x 6"). For each sampling station, the sampling areas will equal 0.116 m². Samples will be sieved (sieve size 243 µm), and preserved with buffered formalin. Samples will be stored in lab-grade glass jars, packed into coolers and shipped to Cordillera Consulting Inc in Summerland, British Columbia (same taxonomist used for Cycle 2).

Supporting environmental data including water depth, water flow, water temperature, field water chemistry (pH, conductivity, dissolved oxygen), lab water quality (Section 4.2.3) will be measured before samples are collected.

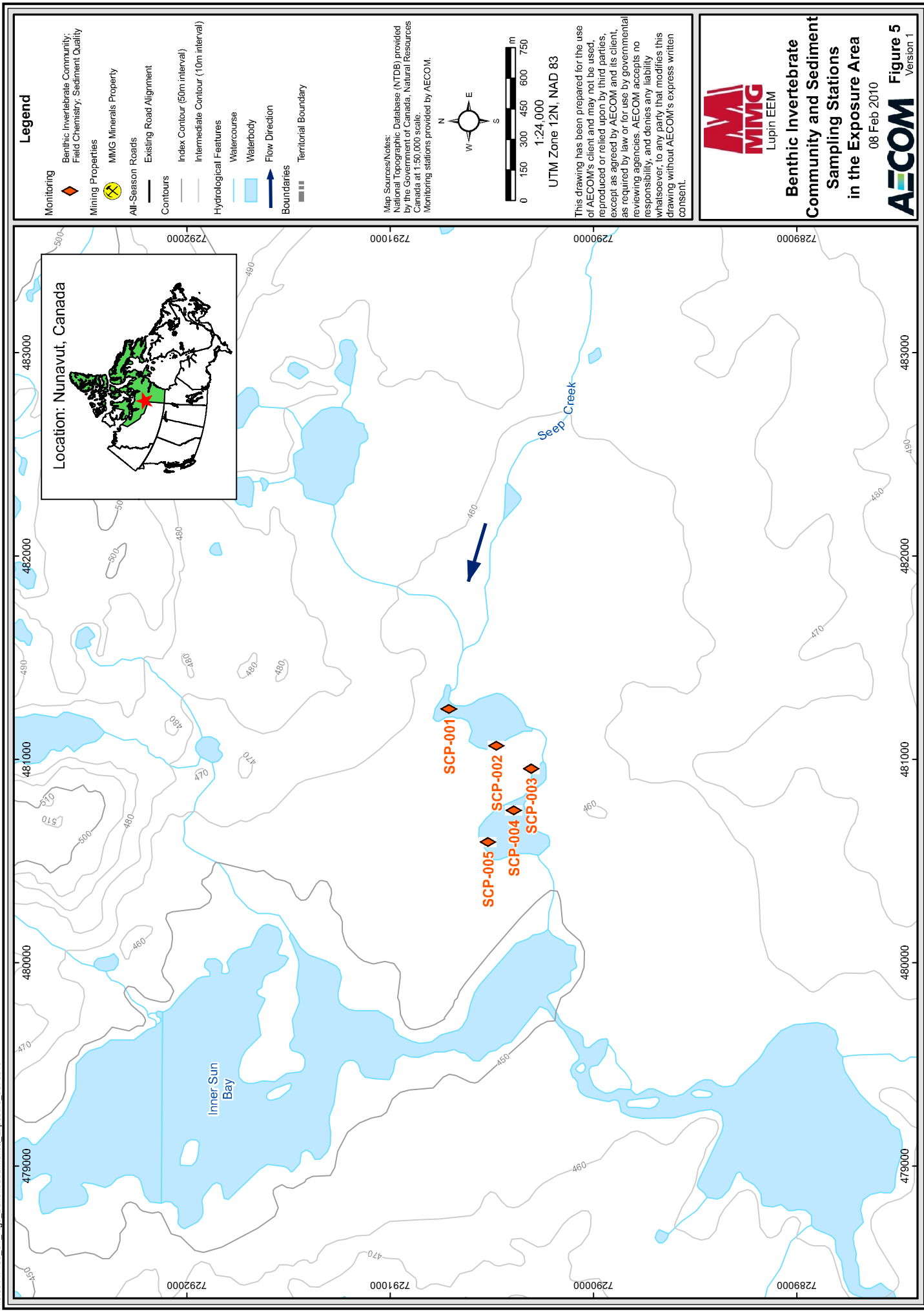
Varied analyses will be used to correlate benthic invertebrate densities with observed growth rates of Arctic grayling from the Reference, Exposure and Alternative Reference Areas. These analyses will also include separate consideration of the Chironomidae density in conjunction with growth rates. Any observed relationships with benthic invertebrate densities or Chironomidae density will be used to explain patterns with growth for the Exposure and both Reference Areas. We hypothesize that higher densities of Chironomidae will be correlated positively with growth (and body condition).

Detailed habitat characteristics for the Control Impact designs for the Reference, Exposure and Alternative Reference Areas are outlined in the Site Characterization Section, and will be supplemented with site-specific attributes described above. Proposed Cycle 3 Sampling locations are identified in Figures 5 and 6.

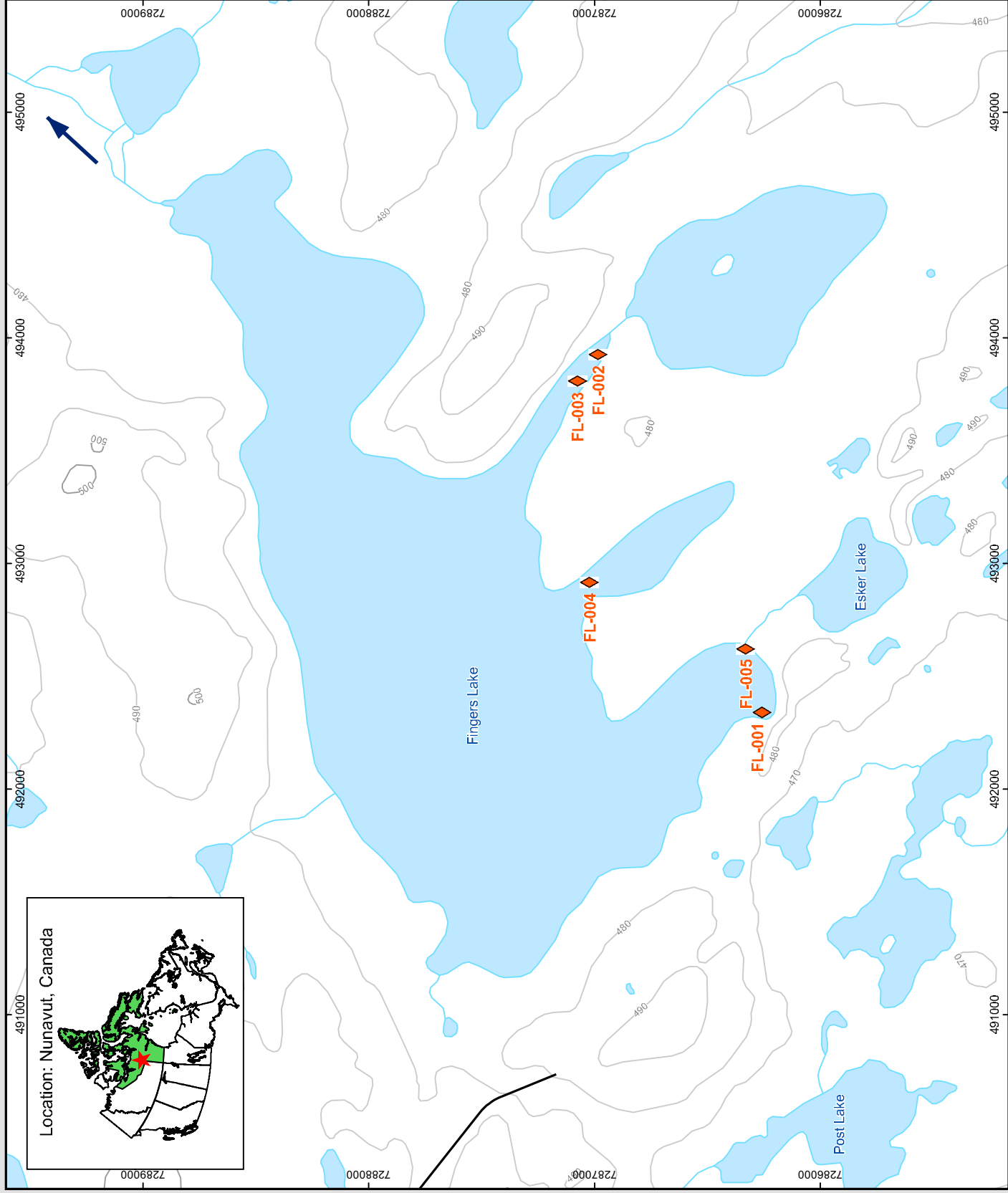
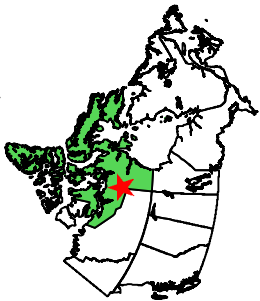
Final endpoints for statistical analysis from the benthic community analysis will include:

- Total invertebrate density*;
- Density of Chironomidae; and,
- Density of Simuliidae (if observed in the 2010 benthic invertebrate surveys)

* used to statistically test for effluent effect on benthic community



Location: Nunavut, Canada



Legend

Monitoring

- Benthic Invertebrate Community; Field Chemistry; Sediment Quality

Mining Properties

- MMG Minerals Property

All-Season Roads

- Existing Road Alignment

Contours

- Index Contour (50m interval)
- Intermediate Contour (10m interval)

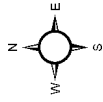
Hydrological Features

- Watercourse
- Waterbody
- Flow Direction

Boundaries

- Territorial Boundary

Map Sources/Notes:
National Topographic Database (NTDB) provided by the Government of Canada, Natural Resources Canada at 1:50,000 scale.
Monitoring stations provided by AECOM.



0 150 300 450 600 750 m

1:24,000
UTM Zone 12N, NAD 83

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**Benthic Invertebrate
Community and Sediment
Quality Sampling Stations
in the Reference Area**

08 Feb 2010

AECOM **Figure 6**
Version 1

4.2.3 Water Quality

As outlined in the TGD (EC 2002), water quality sampling is to be completed in areas of biological sampling. Water quality sampling will take place at the same location of the benthic sampling, prior to the collection of the required sediment samples. Parameters to be measured at each area:

- Arsenic
- Lead
- Zinc
- Total cyanide
- pH
- Cadmium
- Mercury
- Ammonia
- Alkalinity
- Dissolved oxygen
- DOC/TOC
- Phosphorus
- Nitrite
- Copper
- Nickel
- Radium 226
- TSS
- Aluminum
- Iron
- Molybdenum
- Nitrate
- Total Hardness
- Temperature

4.2.4 Sediment Sampling

Sediments will be collected and analyzed for particle size and total organic carbon (TOC) from the Reference, Exposure, and Alternative Reference benthic stations, as recommended in the TGD. Sediment samples will be collected and classified according to the Wentworth Classification.

5. References

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Technical Advisory Panel Review Comments on “Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report”

General comments

1. Overall the report was clearly written and well organized. The inclusion of detailed site maps was greatly appreciated.
2. The facility is recommended to proceed with Hypothesis 1 to assess differences in temperature between exposure and two reference sites, provided they focus on grayling condition as an endpoint, and specify the statistical approach that will be used to test the hypothesis.
3. The facility is recommended to remove Hypothesis 2 from the study design. The hypothesis is based on the assumption that grayling in the exposure and reference systems feed preferentially on specific invertebrate taxa (Chironomidae and Simuliidae), and that their growth rates are correlated with the availability of these prey items. In addition, previous results from Phase 2 contradict the hypothesis, where grayling condition was lower in the exposure area despite high densities of chironomids.
4. The facility is recommended to add a study on the potential effect of trace metals in the exposure area on grayling condition. In Phases 1 and 2, trace metal concentrations were shown to be elevated in the exposure area relative to the reference area. In some cases, trace metal concentrations in the exposure area exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for sediment and water quality (CCME 2007). Elsewhere, high trace metal concentrations in the aquatic environment have been associated with decreased condition and other physiological responses in fish (e.g., Woodward et al. 1995; Eastwood and Couture, 2002).
5. The recommended approach for the trace metal study is to conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. The TAP also recommends a comparison of current trace metal concentrations in fish, water, and sediment samples from exposure and reference sites. Please include a description of field and laboratory methods, and a statistical approach to compare trace metal concentrations between exposure and reference sites.

Previous EEM Studies

6. p. 8. The report states that the effluent had no sublethal or acute effects on test biota; please note that sublethal effects on zooplankton, algae, and a plant species were reported in Phase 1.
7. p. 8. In the summary of the Phase 2 study, it is reported that mean invertebrate density was higher in the exposure area but that the difference was not statistically significant. Please note that the invertebrate density was >2 standard deviations higher in the exposure area, and that the *p*-value determined for that comparison was significant at 0.085, since α was set at 0.1.

8. p. 9. Note that the Phase 2 study found effects on condition in both arctic grayling and ninespine stickleback.

Historical Effluent Characteristics

9. p.10. Table 2 shows effluent discharge data from 1994 to 2009, however the report indicates on p. 2 that effluent discharge began in 1985. Are these earlier discharge data available?

EEM IOC Study design

10. p. 11. The report states that the Investigation of Cause (IOC) study is required to assess the difference in *growth* observed in Age-0 grayling between exposure and reference areas. Note that the IOC study was triggered on grayling condition (weight-at-length). Although condition is related to growth, it is not considered a measure of growth rate, but rather an indicator of energy storage. Please ensure that the proposed hypotheses will address the effect on grayling condition.

Hypothesis 1. Thermal influences

11. p. 12. At what interval will the temperature data loggers record the temperature? Please describe how the data from each area will be integrated, and which metric will be used (e.g., overall average temperature, # of degree days etc.).
12. p. 12. Describe the QA/QC procedures for the temperature data loggers. Will the loggers be checked periodically to ensure that they are functioning properly?
13. p. 12. Will temperature be compared between reference and exposure areas? If so, please describe the statistical test that will be used.
14. p. 12. The facility proposes to test for a correlation between growth in grayling and water temperature. A correlation test does not seem appropriate given that there are only 3 sites. Please describe the statistical approach that will be used to test Hypothesis 1. Also, please confirm that condition will be tested as a fish endpoint.
15. p. 12. The study design proposes a non-lethal survey focused on age-0 grayling, which will be distinguished from other age classes using size class distributions from previous studies. What specific size range will be considered age-0? Will the facility collect ageing structures from a subset of fish to confirm the age of the size range that was sampled?
16. p. 12. Please state the precision of the length and weight measurements for the fish survey (e.g., ± 1 mm, ± 0.01 g?).
17. p. 12. The report states that 'fish survey endpoint measurements for statistical analysis' will include length and total body weight. Please describe in specific terms how condition and growth endpoints will be calculated.
18. p. 12. Please describe how the fish survey will be conducted to avoid recapture of released fish.
19. p. 12. The alternate reference sites appear to have small headwater ponds, raising concerns that they may be ephemeral. Is there any historical information to suggest that these streams will still be flowing during the sampling period (i.e., late Aug.) and that grayling will be present? Are there any other potential reference sites with larger headwater ponds?

20. p. 13. On Figure 3, several fish sampling stations are indicated for Dam1a, adjacent to the Tailings Area. Since exposure to effluent will be greater here than at downstream locations, will the data from these fish be analyzed as a subset, or pooled with the data from the other exposure sites?
21. p. 15. The report states that the fish survey will be completed during August 2010. Please indicate in more specific terms when the proposed field program (fish, sediment, water quality) will be conducted.

Water quality and sediment sampling

22. p. 18. Please describe the method that will be used to collect sediment quality samples.
23. p. 18. Please describe QA/QC procedures for water and sediment sampling and data analysis.

Minor comments and errata

- p. 3. The report indicates that '3 million cubic litres' of effluent were discharged in 2009- please note that this should be cubic *metres*.
- p. 10. The report states that effluent was not released between 2005 and 2009, however Table 2 indicates that effluent was not discharged from 2006 to 2008.
- p. 12. Please ensure that each fish is assessed for external condition (i.e., lesions, tumours, parasites).
- p. 12. If using multiple fish sampling techniques (e.g., electrofishing and minnow traps), please ensure that the methods are used in a consistent manner across all reference and exposure areas to prevent size selection.
- p. 12. Please calculate the mean, median, SD, SE, min. and max. for all fish, water quality and sediment quality measurements.

References

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June 21, 2010

Erik Allen
Regional Environmental Effects Monitoring Coordinator
Prairie and Northern Region
Environment Canada
#200, 4999-98 Avenue
Edmonton, AB T6B 2X3

Dear Mr. Allen:

Project No: 60147160

Regarding: Study Design Addendum for Lupin Cycle 3 Environmental Effects Monitoring Study

On April 29, 2010, the Technical Advisory Panel (TAP) for the Lupin Gold Mine provided comments on the Site Characterization and Cycle 3 Environmental Effects Monitoring (EEM) Investigation of Cause (IOC) study design report. The responses to the comments are provided in this letter that will form an addendum to the February 2010 study design report.

MMG Resources Ltd. (MMG) has retained AECOM to provide environmental services and assist MMG in the execution and completion of the Cycle 2 EEM study at Lupin. Response to comments provided by the TAP on the study design have been prepared by AECOM with assistance from MMG. The comments provided by the TAP are in italics followed by our response, in regular font, to address the comment.

We trust that the following material meets your requirements. If you have any questions or concerns please don't hesitate to call Colleen Prather at 780-486-7041 for clarification

Sincerely,
AECOM Canada Ltd.



Colleen Prather, Ph.D., P.Biol.
Aquatic Scientist
colleen.prather@aecom.com

CP:
cc:
Richard Carson, AECOM
Andrew Mitchell, MMG Resources Inc.

General comments

1. *Overall the report was clearly written and well organized. The inclusion of detailed site maps was greatly appreciated.*

The comment is appreciated.

2. *The facility is recommended to proceed with Hypothesis 1 to assess differences in temperature between exposure and two reference sites, provided they focus on grayling condition as an endpoint, and specify the statistical approach that will be used to test the hypothesis.*

The focus of the 2010 field program will be to collect data to test Hypothesis 1 *“Water temperature for streams with ponds will be higher through the growing season, and result in higher growth rates of age-0 Arctic grayling compared with streams with no ponds”*

Appropriate statistics will be selected to measure for significant differences between areas. If two reference areas are used then statistics will be selected to compare the exposure area to each of the reference areas but also to compare each of the reference areas.

For water quality, sediment quality, supporting environmental variables and fish survey data, basic descriptive statistics including mean, median, standard deviation (SD), standard error (SE), minimum and maximum will be calculated. Depending upon the comparison tested, either t-test or ANOVA will be used to compare the areas. Non-parametric statistics will be used as required by the data. To compare the condition (length to weight ratio) of Arctic grayling between areas, linear regression and ANCOVA will be used to compare the slope of the relationship.

Statistical methods will follow the procedures outlined in the current EEM Technical Guidance Document (EC 2002).

3. *The facility is recommended to remove Hypothesis 2 from the study design. The hypothesis is based on the assumption that grayling in the exposure and reference systems feed preferentially on specific invertebrate taxa (Chironomidae and Simuliidae), and that their growth rates are correlated with the availability of these prey items. In addition, previous results from Phase 2 contradict the hypothesis, where grayling condition was lower in the exposure area despite high densities of chironomids.*

It is acknowledged that testing of this hypothesis will be removed from the study design. The collection and analysis of invertebrate community structure will also be removed from the Cycle 3 study design.

4. *The facility is recommended to add a study on the potential effect of trace metals in the exposure area on grayling condition. In Phases 1 and 2, trace metal concentrations were shown to be elevated in the exposure area relative to the reference area. In some cases, trace metal concentrations in the exposure area exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for sediment and water quality (CCME 2007). Elsewhere, high trace metal concentrations in the aquatic environment have been*

associated with decreased condition and other physiological responses in fish (e.g., Woodward et al. 1995; Eastwood and Couture, 2002).

A desktop, literature review study on the relationships between trace metal concentrations in water, sediment and tissue of Arctic grayling will be investigated. In particular, the focus will be on those sediment quality parameters that were significantly higher in the exposure area versus the reference area (arsenic, cobalt, copper, nickel and zinc).

5. *The recommended approach for the trace metal study is to conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. The TAP also recommends a comparison of current trace metal concentrations in fish, water, and sediment samples from exposure and reference sites. Please include a description of field and laboratory methods, and a statistical approach to compare trace metal concentrations between exposure and reference sites.*

A desktop study will be conducted to investigate whether exposure to trace metal concentrations in the early life stages of fish could cause a difference in the condition of Arctic grayling in particular but in other fish in general. Results of this study will be included in the Cycle 3 report.

Previous EEM Studies

6. *p. 8. The report states that the effluent had no sublethal or acute effects on test biota; please note that sublethal effects on zooplankton, algae, and a plant species were reported in Phase 1.*

Effluent release from this facility has not been on a regular cycle. Treated effluent was released during the Cycle 1 study but not during the Cycle 2 study thus effluent was not collected and tested for toxicity. It is noted that the Cycle 1 study observed sublethal effects on zooplankton, algae and a plant species. The statement of no effect of effluent on test biota will be revised in the Cycle 3 report.

7. *p. 8. In the summary of the Phase 2 study, it is reported that mean invertebrate density was higher in the exposure area but that the difference was not statistically significant. Please note that the invertebrate density was >2 standard deviations higher in the exposure area, and that the p-value determined for that comparison was significant at 0.085, since α was set at 0.1.*

This comment is noted however the inter-sample variability is quite high and additional calculations suggest that a larger sample size would be required to detect statistical differences at power of 0.9. In addition the opposite trend was noted from the Cycle 1 study (i.e., density was higher in the reference area as compared to the exposure area).

8. p. 9. Note that the Phase 2 study found effects on condition in both arctic grayling and ninespine stickleback.

This error is noted. It should state that condition of both Arctic grayling and Ninespine stickleback differed significantly between areas and that for both species, individuals of a given length weighed more in the reference area as compared to the exposure area.

Historical Effluent Characteristics

9. p. 10. Table 2 shows effluent discharge data from 1994 to 2009, however the report indicates on p. 2 that effluent discharge began in 1985. Are these earlier discharge data available?

Data from 1994 to 2009 was made available for preparation of this study and the previous two reports. A search of the historical records will be necessary to find data and information on treated effluent discharges between 1985 and 1993. This request will be submitted and if the data are available Table 2 from this study design will be updated for the Cycle 3 report.

EEM IOC Study design

10. p. 11. The report states that the Investigation of Cause (IOC) study is required to assess the difference in growth observed in Age-0 grayling between exposure and reference areas. Note that the IOC study was triggered on grayling condition (weight-at-length). Although condition is related to growth, it is not considered a measure of growth rate, but rather an indicator of energy storage. Please ensure that the proposed hypotheses will address the effect on grayling condition.

The comment is noted. The IOC will focus on determining causes for differences in condition of Arctic grayling between the exposure and reference areas.

Hypothesis 1. Thermal influences

11. p. 12. At what interval will the temperature data loggers record the temperature? Please describe how the data from each area will be integrated, and which metric will be used (e.g., overall average temperature, # of degree days etc.).

Data loggers will be set to record water temperature every half hour. Data for each station will be kept independent unless it is reasonable to combine data from different stations. It is proposed to calculate statistics for daily average temperature, overall average temperature, cumulative degree days and frequency of data in different temperature categories.

12. p. 12. Describe the QA/QC procedures for the temperature data loggers. Will the loggers be checked periodically to ensure that they are functioning properly?

It is proposed to install the data loggers in early July (approximately July 5 to 6). Data loggers will be installed on day 1 and then checked on day 2 to make sure they are functioning. Data loggers will be removed at the end of the field survey in August (approximately August 28 to 29). Lupin is a remote site and staff may not always be on site. If possible, it is recommended that someone working at Lupin for another project checks the data loggers every 7 to 14 days.

- 13.** *p. 12. Will temperature be compared between reference and exposure areas? If so, please describe the statistical test that will be used.*

The purpose is to determine whether temperature is a factor that could significantly influence condition of Arctic grayling. It is proposed to compare temperature between areas but also as a factor that may influence condition. Basic statistics such as t-test or ANOVA will be used to compare the temperature metric between exposure-reference areas and between exposure-reference A-reference B areas.

- 14.** *p. 12. The facility proposes to test for a correlation between growth in grayling and water temperature. A correlation test does not seem appropriate given that there are only 3 sites. Please describe the statistical approach that will be used to test Hypothesis 1. Also, please confirm that condition will be tested as a fish endpoint.*

Condition will be tested as an endpoint using the standard EEM approach of linear regression and ANCOVA. ANOVA will be used to test for differences in the various statistics of water temperature between areas.

- 15.** *p. 12. The study design proposes a non-lethal survey focused on age-0 grayling, which will be distinguished from other age classes using size class distributions from previous studies. What specific size range will be considered age-0? Will the facility collect ageing structures from a subset of fish to confirm the age of the size range that was sampled?*

A non-lethal sampling program is the desired approach. Based on the aging structure collected in the last study it appears there is a clear distinction between age class and size range. There were two distinct outliers in age class 1 (exposure area fish) and age class 2 (reference area fish). The upper end of age class 2 (reference area fish) overlaps slightly with the lower end of age class 3 (exposure area fish). To ensure correlation between 2008 and 2010 data, a subset of fish will be sacrificed for the collection of aging structures. A subset of fish (n=10) from each area in the age 0 size class range will be selected for the collection of aging structures.

Results of the age determination from the cycle 2 study are as follows:

Age Class	Number of Fish (excluding outlier)	Fork Length Range (cm) (excluding outlier)	Number of Outliers (Length)
0	84	4.2 – 8.3	0
1	22	9.9 – 13.3	1 (6.7)
2	38	15.4 – 19	1 (13.9)
3	2	18.8 – 22	0

- 16.** *p. 12. Please state the precision of the length and weight measurements for the fish survey (e.g., ± 1 mm, ± 0.01 g?).*

The length measurement precision will be ± 1 mm the weight measurement precision will be ± 0.01 g.

- 17. p. 12.** *The report states that 'fish survey endpoint measurements for statistical analysis' will include length and total body weight. Please describe in specific terms how condition and growth endpoints will be calculated.*

As fish are captured during the fishing survey they will be placed into a bucket. Fish will be kept in the bucket for no longer than 30 minutes before being weighed, measured and released back to the stream. Fish troughs will be used for length measurements to within 1 mm, while whole body weights will be measured with an Acculab VI-200 balance (accuracy 0.01 g). All measurements will be recorded on standardized data forms.

Condition will be calculated as the relationship between fork length and body weight.

- 18. p. 12.** *Please describe how the fish survey will be conducted to avoid recapture of released fish.*

Fishing will be conducting in an upstream direction. As fish as caught they will be retained in a bucket. Periodically, fishing will cease and measurements of fish size and external condition will be noted. After measurements are taken, fish will be released at a location approximately 100 m downstream. This will minimize the potential to recapture previously surveyed fish.

- 19. p. 12.** *The alternate reference sites appear to have small headwater ponds, raising concerns that they may be ephemeral. Is there any historical information to suggest that these streams will still be flowing during the sampling period (i.e., late Aug.) and that grayling will be present? Are there any other potential reference sites with larger headwater ponds?*

The comment is noted. At this point there is no available data on other potential reference areas and a new reference area will need to be selected while on-site in early July. The intention of an alternative reference area is to find one that is not significantly dominated by a large pond. In addition, the new reference area should be close to the study area to minimize geochemical differences between areas.

- 20. p. 13.** *On Figure 3, several fish sampling stations are indicated for Dam1a, adjacent to the Tailings Area. Since exposure to effluent will be greater here than at downstream locations, will the data from these fish be analyzed as a subset, or pooled with the data from the other exposure sites?*

For the previous two EEM programs, fish from throughout the exposure area have been pooled and used to determine statistical differences between areas. For the Cycle 3 study it is proposed to pool the data in a similar manner however, field data will be recorded such that data subsets can be compared. In addition, field notes from the Cycle 2 study will be reviewed to determine if subsets of data can be extracted and compared.

21. p. 15. *The report states that the fish survey will be completed during August 2010. Please indicate in more specific terms when the proposed field program (fish, sediment, water quality) will be conducted.*

The field program is scheduled for August 16 to 30, 2010. The reference areas will be sampled first for fish, water and sediments followed by the exposure area.

Water quality and sediment sampling

22. p. 18. *Please describe the method that will be used to collect sediment quality samples.*

It is proposed to use an Ekman or Petit Ponar dredge to collect composite sediment samples. Three grabs will be collected at each location and combined to form a single composite sample representative of the sampling station. In the 2008 field program, it was attempted to use a core sampler tube to collect the sediment samples but the substrate composition was too sandy and samples would not stay in the tubes. All samples from 2008 were collected using a dredge sampler.

23. p. 18. *Please describe QA/QC procedures for water and sediment sampling and data analysis.*

We will follow standard QA/QC procedures for sample collection, data entry and data analysis. Nitrile gloves will be used during sample collection. Sample containers will be labelled immediately before sample collection and the inside of the bottles/jars will not be touched. One water and one sediment field replicate will be collected. These will be submitted as blind samples to the lab. Once back in the office data recorded on field sheets will be entered into spreadsheets or field memos. A check of at least 10% of the entries will be checked for accuracy. Standard procedures will be followed for data analysis including using data from the final checked spreadsheets, recording data analysis steps taken and repeating the data analysis steps. Statistics will be calculated using a statistics software package such as Statistica or Systat.

Minor comments and errata

- p. 3. *The report indicates that '3 million cubic litres' of effluent were discharged in 2009- please note that this should be cubic metres.*

The error is noted and the correction has been made.

- p. 10. *The report states that effluent was not released between 2005 and 2009, however Table 2 indicates that effluent was not discharged from 2006 to 2008.*

The error is noted and the correction has been made. Effluent was released in 2005 and not in 2006.

- p. 12. *Please ensure that each fish is assessed for external condition (i.e., lesions, tumours, parasites).*

The omission is noted and has been added to the study design. Comments on external condition will be noted on field data sheets.

p. 12. If using multiple fish sampling techniques (e.g., electrofishing and minnow traps), please ensure that the methods are used in a consistent manner across all reference and exposure areas to prevent size selection.

It is the intention of this field program to use all fish sampling methods equally in all areas. Effort, in terms of hours, will be recorded for each sampling method. As was done for the Cycle 2 report, total fishing effort by species will be calculated for the Cycle 3 report.

p. 12. Please calculate the mean, median, SD, SE, min. and max. for all fish, water quality and sediment quality measurements.

Basic descriptive statistics including mean, median, SD, SE, min and max will be calculated for water quality, sediment quality and fish survey results. Comparisons will be made between areas.

References

- CCME. 2007. Canadian Environmental Quality Guidelines. Update 7.1. Canadian Council of Ministers of the Environment. <http://ceqg-rcqe.ccme.ca/>.
- Eastwood, S. and Couture, P. 2002. Seasonal variations in condition and liver metal concentrations of yellow perch (*Perca flavescens*) from a metal-contaminated environment. *Aquatic Toxicology*. 58: 43-56.
- Woodward, D.F., Farag, A.M., Bergman, H.L., DeLonay, A.J., Little, E.E., Smith, C.E., and Barrows, F.T. 1995. Metals-contaminated benthic invertebrates in the Clark Fork River, Montana: effects on age-0 brown trout and rainbow trout. *Canadian Journal of Fisheries and Aquatic Sciences*. 52: 1994-2004.

July 27, 2010

Erik Allen
Regional Environmental Effects Monitoring Coordinator
Prairie and Northern Region
Environment Canada
#200, 4999-98 Avenue
Edmonton, AB T6B 2X3

Dear Mr. Allen:

Project No: 60147160

Regarding: Study Design Addendum for Lupin Cycle 3 Environmental Effects Monitoring Study

On July 26, 2010, the Technical Advisory Panel (TAP) for the Lupin Gold Mine provided comments on the Site Characterization and Cycle 3 Environmental Effects Monitoring (EEM) Investigation of Cause (IOC) study design report addendum issued June 21, 2010. Additional information was requested on comments 4, 5, 15, 21, 22 and 23 from the April 29, 2010 TAP list of comments. Additional information to address these 6 comments are provided in this letter that will form an addendum to the February 2010 study design report and the addendum issued in June.

MMG Resources Ltd. (MMG) has retained AECOM to provide environmental services and assist MMG in the execution and completion of the Cycle 2 EEM study at Lupin. Response to comments provided by the TAP on the study design have been prepared by AECOM with assistance from MMG. The comments provided by the TAP are in italics followed by our response, in regular font, to address the comment. The initial response provided in June is provided followed by additional information to address outstanding concerns.

We trust that the following material meets your requirements. If you have any questions or concerns please don't hesitate to call Colleen Prather at 780-486-7041 for clarification

Sincerely,
AECOM Canada Ltd.



Colleen Prather, Ph.D., P.Biol.
Aquatic Scientist
colleen.prather@aecom.com

cc:
Richard Carson, AECOM
Andrew Mitchell, MMG Resources Inc.

4. *The facility is recommended to add a study on the potential effect of trace metals in the exposure area on grayling condition. In Phases 1 and 2, trace metal concentrations were shown to be elevated in the exposure area relative to the reference area. In some cases, trace metal concentrations in the exposure area exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for sediment and water quality (CCME 2007). Elsewhere, high trace metal concentrations in the aquatic environment have been associated with decreased condition and other physiological responses in fish (e.g., Woodward et al. 1995; Eastwood and Couture, 2002).*

Initial Response:

A desktop, literature review study on the relationships between trace metal concentrations in water, sediment and tissue of Arctic grayling will be investigated. In particular, the focus will be on those sediment quality parameters that were significantly higher in the exposure area versus the reference area (arsenic, cobalt, copper, nickel and zinc).

Additional Comment:

The TAP recommends expanding the literature review beyond Arctic grayling since there may be a limited number of studies on this fish species in the literature.

This comment is noted and the literature review will be conducted on Arctic grayling but other fish species to understand the potential effects on fish development of exposure to trace metals.

5. *The recommended approach for the trace metal study is to conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. The TAP also recommends a comparison of current trace metal concentrations in fish, water, and sediment samples from exposure and reference sites. Please include a description of field and laboratory methods, and a statistical approach to compare trace metal concentrations between exposure and reference sites.*

Initial Response:

A desktop study will be conducted to investigate whether exposure to trace metal concentrations in the early life stages of fish could cause a difference in the condition of Arctic grayling in particular but in other fish in general. Results of this study will be included in the Cycle 3 report.

Additional Comment:

The TAP recommends that the Phase 3 study design include the analysis of trace metal concentrations in Arctic grayling.

The comment is noted. Based on the pre-design and Cycle 1 report it was determined that copper was the metal parameter of concern. For the Cycle 1 study, livers were taken from the fish (Arctic grayling), combined to form a composite sample (due to small size and weight of individual livers) and analyzed for copper concentration. Whole fish samples were also retained but were not analyzed. In Cycle 2, it was again observed that the livers were very small and only whole fish (heads removed) were submitted for analysis. Concentration of copper in whole fish tissue did not differ significantly between areas.

The initial intention of the Cycle 3 program was to design a non-lethal sampling program. Recommendations were made by the TAP to include analysis of aging structures so that physical growth measurements of fish from Cycle 3 can be compared more directly to those obtained in Cycle 2. As a result of this it was decided to collect scales and otoliths as aging structures. It was decided to sacrifice a subset of fish from each area for collection of otoliths (maximum of 20 per area). Since a maximum of 20 fish per area will be sacrificed for collection of otoliths these same fish can be used for analysis of copper concentration of whole fish samples (heads removed). Based on the results of the Cycle 1 study it is known that between 11 and 19 fish livers are required by the lab. Due to the requirement of a large number of livers to make up one sample, it is suggested to analyze whole fish samples.

For this study, 10 Arctic grayling young-of-the-year fish (whole fish, heads removed) from each of the three areas will be submitted for analysis of copper concentration. It is proposed to submit fish with similar length and weight measurements.

15. p. 12. The study design proposes a non-lethal survey focused on age-0 grayling, which will be distinguished from other age classes using size class distributions from previous studies. What specific size range will be considered age-0? Will the facility collect ageing structures from a subset of fish to confirm the age of the size range that was sampled?

Initial Response:

A non-lethal sampling program is the desired approach. Based on the aging structure collected in the last study it appears there is a clear distinction between age class and size range. There were two distinct outliers in age class 1 (exposure area fish) and age class 2 (reference area fish). The upper end of age class 2 (reference area fish) overlaps slightly with the lower end of age class 3 (exposure area fish). To ensure correlation between 2008 and 2010 data, a subset of fish will be sacrificed for the collection of aging structures. A subset of fish (n=10) from each area in the age 0 size class range will be selected for the collection of aging structures.

Results of the age determination from the cycle 2 study are as follows:

Age Class	Number of Fish (excluding outlier)	Fork Length Range (cm) (excluding outlier)	Number of Outliers (Length)
0	84	4.2 – 8.3	0
1	22	9.9 – 13.3	1 (6.7)
2	38	15.4 – 19	1 (13.9)
3	2	18.8 – 22	0

Additional Comment:

Please specify which ageing structures will be collected. The TAP also recommends collecting scales from older fish to provide additional ageing information.

In the Cycle 2 study, both scales and otoliths were collected and submitted for ageing analysis. It is recognized that young-of-the-year fish may not have scales developed for ageing analysis. It is proposed to collect primarily otoliths but also scales for ageing structures. As stated in the study design, at least 100 fish will be surveyed for non-lethal parameters but a subset will be sacrificed for collection of ageing structures and now for analysis of copper concentration in whole fish tissue samples. From each sampling area, it is the intention to retain at least 10 fish in the age class 0 fork length range (4.2 to 8.3 cm) and then another 10 fish in the other 3 size classes for collection of ageing structures. All sacrificed fish will be retained but only those in the class 0 length range will be submitted for analysis of copper in the tissue. The other fish will be retained and archived and analyzed if necessary.

21. p. 15. *The report states that the fish survey will be completed during August 2010. Please indicate in more specific terms when the proposed field program (fish, sediment, water quality) will be conducted.*

Initial Response:

The field program is scheduled for August 16 to 30, 2010. The reference areas will be sampled first for fish, water and sediments followed by the exposure area.

Additional Comment:

Please confirm that the facility intends to measure metal concentrations in sediment samples.

To clarify, it is the intention to submit sediment samples for the same parameters analyzed in the Cycle 2 study. Each sediment sample will be submitted for analysis of:

- Physical parameters (grain size)
- Total Organic Carbon
- Total Metals

22. p. 18. *Please describe the method that will be used to collect sediment quality samples.*

Initial Response:

It is proposed to use an Ekman or Petit Ponar dredge to collect composite sediment samples. Three grabs will be collected at each location and combined to form a single composite sample representative of the sampling station. In the 2008 field program, it was attempted to use a core sampler tube to collect the sediment samples but the substrate composition was too sandy and samples would not stay in the tubes. All samples from 2008 were collected using a dredge sampler.

Additional Comment:

The TAP recommends that the facility identify an alternative sediment sampling method to ensure that the sediment samples are collected at a consistent depth.

In the Cycle 2 study, two sampling methods were used: a 63 mm core sampler and a Petit Ponar. The core sampler did not work because the sediment samples would not stay in the tube. So sediment samples were obtained with the Petit Ponar.

In the Cycle 2 program, sediments were collected in water depth of 0.5 to 0.9 m (exposure area) and 0.7 to 1.2 m (reference area). The focus of the Cycle 3 program will be to sample sediments from water depth between 0.5 to 1 m in depth. If the main concern of the TAP is water depth, then it will be confirmed before sediment samples are taken. In addition, we will investigate other sediment sampling methods and have two different types of sampling equipment on site.

23. p. 18. Please describe QA/QC procedures for water and sediment sampling and data analysis.

Initial Response:

We will follow standard QA/QC procedures for sample collection, data entry and data analysis. Nitrile gloves will be used during sample collection. Sample containers will be labelled immediately before sample collection and the inside of the bottles/jars will not be touched. One water and one sediment field replicate will be collected. These will be submitted as blind samples to the lab. Once back in the office data recorded on field sheets will be entered into spreadsheets or field memos. A check of at least 10% of the entries will be checked for accuracy. Standard procedures will be followed for data analysis including using data from the final checked spreadsheets, recording data analysis steps taken and repeating the data analysis steps. Statistics will be calculated using a statistics software package such as Statistica or Systat.

Additional Comment:

Please note that the Metal Mining EEM Technical Guidance Document also recommends the collection of field and trip blanks for QA/QC purposes.

The comment is noted. It is AECOM practice to collect QA/QC samples at a minimum of 10% of test samples. For this program, both a field and trip blank QA/QC sample will be collected.

Technical Advisory Panel comments on the Study Design Addendum for the Lupin Phase 3 EEM study

Thank you for your response to the Technical Advisory Panel (TAP) review comments on the Phase 3 EEM study design for Lupin mine. The TAP has reviewed the study design addendum, and would like the facility to further address the following comments:

Comment #4. The TAP appreciates that the facility has proposed to conduct a literature review study on the relationships between trace metals in water, sediment and tissue of Arctic grayling, with a focus on sediment quality parameters that were significantly higher in the exposure area vs. the reference area. **The TAP recommends expanding the literature review beyond Arctic grayling, since there may be a limited number of studies on this fish species in the literature.**

Comment #5. The facility has proposed to conduct a desktop study to investigate whether exposure to trace metals in early life stages of fish could cause a difference in condition of Arctic grayling. The TAP had recommended trace metal analysis of fish tissue, water, and sediment as part of the current study. Analysis of metal concentrations in fish tissue would serve to establish the bioavailability of trace metals in the exposure and reference areas, and allow for a comparison to threshold metal concentrations reported in the literature. The TAP is concerned that the proposed study design will not assess metal exposure in grayling, and will not provide the information necessary to determine if metal concentrations are sufficient to cause effects. **The TAP recommends that the Phase 3 study design include the analysis of trace metal concentrations in Arctic grayling.**

Comment #15. The TAP appreciates that the facility has proposed to collect a subset of Age 0 fish for ageing structures for each area. Possible ageing structures for grayling include scales (non-lethal), sagittal otoliths (lethal) and pectoral fin rays (non-lethal), however note that scale formation may not occur in Age-0 fish. **Please specify which ageing structures will be collected. The TAP also recommends collecting scales from older fish to provide additional ageing information.**

Comment #21. The facility has provided a schedule for the fish, water, and sediment sampling. **Please confirm that the facility intends to measure metal concentrations in sediment samples.**

Comment #22. Regarding the collection of sediment samples, the facility reports that previous attempts to use a sediment corer on site have been unsuccessful. The TAP is concerned that the use of an Ekman or Petit Ponar dredge will make it difficult to quantify the depth of the sediment samples, and to ensure consistency among sites. An approach used at other sites where corers are not feasible is to sub-sample the top few centimetres of the dredged sample. **The TAP recommends that the facility identify an alternative sediment sampling method to ensure that the sediment samples are collected at a consistent depth.**

Comment #23. The facility has proposed to collect field replicates for water samples. **Please note that the Metal Mining EEM Technical Guidance Document also recommends the collection of field and trip blanks for QA/QC purposes.**

Prairie & Northern
Environmental Protection Operations
Environment Canada
Room 200, 4999-98th Avenue NW
Edmonton, AB T6B 2X3

August 3, 2010

File: 7834-3-37/M111-1

Andrew Mitchell
Development Manager
Minerals and Metals Group Resources Inc.
200-1159 Alloy Drive
Thunder Bay, ON
P7B 6M8

Dear Mr. Mitchell:

Subject: Metal Mining Effluent Regulations – Evaluation of Phase 3 Environmental Effects Monitoring (EEM) Study Design – Lupin Mine, Nunavut

This letter is to advise you that the Phase 3 EEM Study Design for Lupin Mine has been evaluated and meets the requirements specified in Schedule 5 of the Metal Mining Effluent Regulations (MMER) for environmental effects monitoring studies. The evaluation of this proposed study is based on the Technical Advisory Panel's (TAP) review of the Minerals and Metals Group Resources Inc. Study Design entitled '*Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report*', submitted February 10, 2010, the addendum to the Study Design entitled, '*Study Design Addendum for Lupin Cycle 3 Environmental Effects Monitoring Study*', received June 21, 2010, and subsequent email correspondence (Colleen Prather to Erik Allen and Andrew Mitchell, copied to Richard Carson, July 27, 2010; and Colleen Prather to Erik Allen, copied to Andrew Mitchell and Tiffany Hnatiuk, July 29, 2010).

It is my understanding that the facility will remain in contact with the TAP during field work, and that the TAP will be consulted on field decisions such as sentinel species selection, sample sizes, and study areas.

If you have any questions please do not hesitate to contact the EEM Coordinator for this facility, Erik Allen (Email: erik.allen@ec.gc.ca, Tel: 780-951-8750, Fax: 780-495-2444).

Sincerely,

Cheryl Baraniecki
MMER Authorization Officer

cc:

Erik Allen
Margaret Fairbairn
Paula Siwik

Environment Canada, Edmonton
Environment Canada, Edmonton
Environment Canada, Edmonton

Chris Baron
Dionne Filiatrault
David Hohnstein
Ian Parsons
Anne Wilson
Chad Harden

Fisheries and Oceans Canada, Winnipeg
Nunavut Water Board, Gjoa Haven
Nunavut Water Board, Edmonton
Indian and Northern Affairs Canada, Iqaluit
Environment Canada, Yellowknife
Environment Canada, Yellowknife

Appendix E

Lupin Cycle 3 EEM Program Laboratory Results



AECOM CANADA LTD.
ATTN: COLLEEN PRATHER
17007 107 AVE NW
EDMONTON AB T5S 1G3
Phone: 780-486-7000

Date Received: 23-AUG-10
Report Date: 12-NOV-10 14:01 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L923262
Project P.O. #: NOT SUBMITTED
Job Reference: 60147160
Legal Site Desc:
C of C Numbers: 10-062781

Comments: ADDITIONAL 12-NOV-10 11:36
ADDITIONAL 12-NOV-10 11:36

12-NOV-10: Revised for the addition of Sr, Fe, Al for the sediments

Maureen Olinek
Senior Account Manager

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ALS CANADA LIMITED Part of the ALS Group A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-1	FL3 (REF AREA#1,SURFACE WATER)						
Sampled By: TH/SW on 21-AUG-10 @ 11:30							
Matrix: WATER							
Ultra-Low Metals - Dissolved							
Diss. Metals in Water by ICPMS (Ultra)							
Aluminum (Al)-Dissolved	0.00610		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved	0.00150		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved	0.00165		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved	0.0030		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved	0.880		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved	<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved	0.00097		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved	0.520		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved	0.00259		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved	0.000476		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved	0.388		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved	0.441		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved	0.00494		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved	0.00012		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved	0.00110		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)							
Iron (Fe)-Dissolved	0.0220		0.0050	mg/L		31-AUG-10	R1454830
Ultra-Low Metals							
Fe in Water by ICPOES (Undigested)							
Iron (Fe)-Total	0.0384		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)							
Aluminum (Al)-Total	0.0133		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total	0.00171		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total	0.00153		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total	<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total	0.0025		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total	0.856		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total	0.000069		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00100		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	0.547		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	0.00436		0.00010	mg/L		21-SEP-10	R1474628

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-1 FL3 (REF AREA#1,SURFACE WATER)								
Sampled By: TH/SW on 21-AUG-10 @ 11:30								
Matrix: WATER								
pH, Conductivity and Total Alkalinity								
Carbonate (CO3)		<5.0		5.0	mg/L		24-AUG-10	R1447827
Hydroxide (OH)		<5.0		5.0	mg/L		24-AUG-10	R1447827
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		24-AUG-10	R1447827
L923262-2 FL5 (REF AREA#1,SURFACE WATER)								
Sampled By: TH/SW on 21-AUG-10 @ 10:30								
Matrix: WATER								
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		0.00907		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		0.00159		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		0.00152		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0033		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		0.836		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		0.00197		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00103		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		0.528		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		0.00135		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		0.000474		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		0.401		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		0.569	RRVAP	0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		0.00464		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		0.00028		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		0.00034		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		0.0410		0.0050	mg/L		31-AUG-10	R1454830
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		0.0449		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		0.0374		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		0.00167		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total		0.00168		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total		0.0028		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-2 FL5 (REF AREA#1,SURFACE WATER)								
Sampled By: TH/SW on 21-AUG-10 @ 10:30								
Matrix: WATER								
Metals in Water by ICPMS (Undigested)								
Calcium (Ca)-Total		0.781		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total		0.000130		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total		<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total		0.00115		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total		0.539		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total		0.00352		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total		0.000526		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total		0.410		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total		0.443		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total		0.00476		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total		0.00090		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total		0.000106		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total		<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters								
Ammonia-N		<0.0050		0.0050	mg/L		01-SEP-10	R1455811
Cyanide, Total		<0.0020		0.0020	mg/L	30-AUG-10	30-AUG-10	R1454125
Cadmium (Cd)-Dissolved		<0.00001		0.000010	mg/L		21-SEP-10	R1474628
Dissolved Organic Carbon		3.7		1.0	mg/L		08-SEP-10	R1460765
Mercury (Hg)-Total		<0.000020		0.000020	mg/L		17-SEP-10	R1470116
Mercury (Hg)-Dissolved		<0.000020		0.000020	mg/L		17-SEP-10	R1470116
Phosphorus, Total		0.0185		0.0010	mg/L		20-SEP-10	R1471865
Radium-226		See Attached					09-SEP-10	R1461591
Cadmium (Cd)-Total		<0.000010		0.000010	mg/L		17-SEP-10	R1470773
Total Organic Carbon		3.2		1.0	mg/L		08-SEP-10	R1460765
Total Suspended Solids		<3.0		3.0	mg/L		25-AUG-10	R1449362
Routine Water Analysis - Low Level								
Chloride by IC								
Chloride (Cl)		<0.50		0.50	mg/L		25-AUG-10	R1449889
Diss. Metals in Water by ICPOES (Low)								
Calcium (Ca)-Dissolved		0.81		0.50	mg/L		31-AUG-10	R1454830
Magnesium (Mg)-Dissolved		0.48		0.10	mg/L		31-AUG-10	R1454830
Potassium (K)-Dissolved		0.32		0.10	mg/L		31-AUG-10	R1454830
Sodium (Na)-Dissolved		<1.0		1.0	mg/L		31-AUG-10	R1454830
Fluoride by IC								
Fluoride (F)		<0.050		0.050	mg/L		25-AUG-10	R1449889
Ion Balance Calculation								
Ion Balance		Low EC			%		01-SEP-10	
TDS (Calculated)		4.1			mg/L		01-SEP-10	
Hardness (as CaCO3)		4.0			mg/L		01-SEP-10	
Nitrate+Nitrite-N								
Nitrate+Nitrite-N		<0.0060		0.0060	mg/L		24-AUG-10	R1449025
Nitrate-N								
Nitrate-N		<0.0060		0.0060	mg/L		24-AUG-10	R1449025

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-2	FL5 (REF AREA#1,SURFACE WATER)							
Sampled By: TH/SW on 21-AUG-10 @ 10:30								
Matrix: WATER								
Nitrite-N		<0.0020		0.0020	mg/L		24-AUG-10	R1449025
Sulfate by IC (Low Level)								
Sulfate (SO4)		2.49		0.050	mg/L		25-AUG-10	R1449889
pH, Conductivity and Total Alkalinity								
pH		6.75		0.10	pH		24-AUG-10	R1447827
Conductivity (EC)		11.7		0.20	uS/cm		24-AUG-10	R1447827
Bicarbonate (HCO3)		<5.0		5.0	mg/L		24-AUG-10	R1447827
Carbonate (CO3)		<5.0		5.0	mg/L		24-AUG-10	R1447827
Hydroxide (OH)		<5.0		5.0	mg/L		24-AUG-10	R1447827
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		24-AUG-10	R1447827
L923262-3	FL1 (REF AREA #1, SEDIMENT)							
Sampled By: TH/SW on 21-AUG-10 @ 16:00								
Matrix: SEDIMENT								
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	27-AUG-10	27-AUG-10	R1451909
Total Organic Carbon		0.38		0.10	%	27-AUG-10	27-AUG-10	R1451909
CaCO3 Equivalent		<0.80		0.80	%	27-AUG-10	27-AUG-10	R1451909
Total Carbon by combustion method								
Total Carbon by Combustion		0.4		0.1	%	27-AUG-10	27-AUG-10	R1452047
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	31-AUG-10	01-SEP-10	R1456352
Metals in Soil by ICPMS								
Aluminum (Al)		4170		50	mg/kg		01-SEP-10	R1456305
Antimony (Sb)		<0.20		0.20	mg/kg		01-SEP-10	R1456305
Arsenic (As)		11.2		0.20	mg/kg		01-SEP-10	R1456305
Barium (Ba)		32.1		5.0	mg/kg		01-SEP-10	R1456305
Beryllium (Be)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Cadmium (Cd)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Chromium (Cr)		17.7		0.50	mg/kg		01-SEP-10	R1456305
Cobalt (Co)		5.5		1.0	mg/kg		01-SEP-10	R1456305
Copper (Cu)		8.3		2.0	mg/kg		01-SEP-10	R1456305
Iron (Fe)		7550		200	mg/kg		01-SEP-10	R1456305
Lead (Pb)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Molybdenum (Mo)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Nickel (Ni)		12.0		2.0	mg/kg		01-SEP-10	R1456305
Selenium (Se)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Silver (Ag)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Strontium (Sr)		3.5		1.0	mg/kg		01-SEP-10	R1456305
Thallium (Tl)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Tin (Sn)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Uranium (U)		<2.0		2.0	mg/kg		01-SEP-10	R1456305
Vanadium (V)		14.6		1.0	mg/kg		01-SEP-10	R1456305
Zinc (Zn)		18		10	mg/kg		01-SEP-10	R1456305
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		27-AUG-10	R1451744
Particle Size								
% Sand		85.8		1.0	%		09-SEP-10	R1462061
% Silt		12.2		1.0	%		09-SEP-10	R1462061
% Clay		2.0		1.0	%		09-SEP-10	R1462061

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-3	FL1 (REF AREA #1, SEDIMENT)							
Sampled By:	TH/SW on 21-AUG-10 @ 16:00							
Matrix:	SEDIMENT							
Particle Size								
Texture		Sand / Loamy sand					09-SEP-10	R1462061
L923262-4	FL2 (REF AREA #1, SEDIMENT)							
Sampled By:	TH/SW on 21-AUG-10 @ 12:30							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	27-AUG-10	27-AUG-10	R1451909
Total Organic Carbon		0.54		0.10	%	27-AUG-10	27-AUG-10	R1451909
CaCO3 Equivalent		<0.80		0.80	%	27-AUG-10	27-AUG-10	R1451909
Total Carbon by combustion method								
Total Carbon by Combustion		0.5		0.1	%	27-AUG-10	27-AUG-10	R1452047
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	31-AUG-10	01-SEP-10	R1456352
Metals in Soil by ICPMS								
Aluminum (Al)		4350		50	mg/kg		01-SEP-10	R1456305
Antimony (Sb)		<0.20		0.20	mg/kg		01-SEP-10	R1456305
Arsenic (As)		11.1		0.20	mg/kg		01-SEP-10	R1456305
Barium (Ba)		35.8		5.0	mg/kg		01-SEP-10	R1456305
Beryllium (Be)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Cadmium (Cd)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Chromium (Cr)		17.9		0.50	mg/kg		01-SEP-10	R1456305
Cobalt (Co)		4.9		1.0	mg/kg		01-SEP-10	R1456305
Copper (Cu)		6.8		2.0	mg/kg		01-SEP-10	R1456305
Iron (Fe)		7280		200	mg/kg		01-SEP-10	R1456305
Lead (Pb)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Molybdenum (Mo)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Nickel (Ni)		11.4		2.0	mg/kg		01-SEP-10	R1456305
Selenium (Se)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Silver (Ag)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Strontium (Sr)		4.6		1.0	mg/kg		01-SEP-10	R1456305
Thallium (Tl)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Tin (Sn)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Uranium (U)		<2.0		2.0	mg/kg		01-SEP-10	R1456305
Vanadium (V)		15.2		1.0	mg/kg		01-SEP-10	R1456305
Zinc (Zn)		20		10	mg/kg		01-SEP-10	R1456305
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		27-AUG-10	R1451744
Particle Size								
% Sand		83.4		1.0	%		09-SEP-10	R1462061
% Silt		15.0		1.0	%		09-SEP-10	R1462061
% Clay		1.6		1.0	%		09-SEP-10	R1462061
Texture		Loamy sand					09-SEP-10	R1462061
L923262-5	FL3 (REF AREA #1, SEDIMENT)							
Sampled By:	TH/SW on 21-AUG-10 @ 12:00							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	27-AUG-10	27-AUG-10	R1451909
Total Organic Carbon		4.96		0.10	%	27-AUG-10	27-AUG-10	R1451909

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-5 FL3 (REF AREA #1, SEDIMENT) Sampled By: TH/SW on 21-AUG-10 @ 12:00 Matrix: SEDIMENT Inorganic and Organic Carbon CaCO3 Equivalent	<0.80		0.80	%	27-AUG-10	27-AUG-10	R1451909
Total Carbon by combustion method Total Carbon by Combustion	5.0		0.1	%	27-AUG-10	27-AUG-10	R1452047
Metals in Soil by ICPMS (CCME) Mercury in Soil by CVAAS Mercury (Hg)	<0.050		0.050	mg/kg	31-AUG-10	01-SEP-10	R1456352
Metals in Soil by ICPMS Aluminum (Al)	7890		50	mg/kg		01-SEP-10	R1456305
Antimony (Sb)	<0.20		0.20	mg/kg		01-SEP-10	R1456305
Arsenic (As)	24.7		0.20	mg/kg		01-SEP-10	R1456305
Barium (Ba)	47.8		5.0	mg/kg		01-SEP-10	R1456305
Beryllium (Be)	<1.0		1.0	mg/kg		01-SEP-10	R1456305
Cadmium (Cd)	<0.50		0.50	mg/kg		01-SEP-10	R1456305
Chromium (Cr)	29.1		0.50	mg/kg		01-SEP-10	R1456305
Cobalt (Co)	9.2		1.0	mg/kg		01-SEP-10	R1456305
Copper (Cu)	27.1		2.0	mg/kg		01-SEP-10	R1456305
Iron (Fe)	13300		200	mg/kg		01-SEP-10	R1456305
Lead (Pb)	<5.0		5.0	mg/kg		01-SEP-10	R1456305
Molybdenum (Mo)	<1.0		1.0	mg/kg		01-SEP-10	R1456305
Nickel (Ni)	27.9		2.0	mg/kg		01-SEP-10	R1456305
Selenium (Se)	<0.50		0.50	mg/kg		01-SEP-10	R1456305
Silver (Ag)	<1.0		1.0	mg/kg		01-SEP-10	R1456305
Strontium (Sr)	9.6		1.0	mg/kg		01-SEP-10	R1456305
Thallium (Tl)	<0.50		0.50	mg/kg		01-SEP-10	R1456305
Tin (Sn)	<5.0		5.0	mg/kg		01-SEP-10	R1456305
Uranium (U)	<2.0		2.0	mg/kg		01-SEP-10	R1456305
Vanadium (V)	26.8		1.0	mg/kg		01-SEP-10	R1456305
Zinc (Zn)	50		10	mg/kg		01-SEP-10	R1456305
Miscellaneous Parameters Fragments > 2mm	<1.0		1.0	%		27-AUG-10	R1451744
Particle Size % Sand	57.2		1.0	%		09-SEP-10	R1462061
% Silt	38.6		1.0	%		09-SEP-10	R1462061
% Clay	4.2		1.0	%		09-SEP-10	R1462061
Texture	Sandy loam					09-SEP-10	R1462061
L923262-6 FL4 (REF AREA #1, SEDIMENT) Sampled By: TH/SW on 21-AUG-10 @ 14:30 Matrix: SEDIMENT Total Organic Carbon -Inorg & Total C Inorganic and Organic Carbon Inorganic Carbon	<0.10		0.10	%	27-AUG-10	27-AUG-10	R1451909
Total Organic Carbon	0.35		0.10	%	27-AUG-10	27-AUG-10	R1451909
CaCO3 Equivalent	<0.80		0.80	%	27-AUG-10	27-AUG-10	R1451909
Total Carbon by combustion method Total Carbon by Combustion	0.4		0.1	%	27-AUG-10	27-AUG-10	R1452047
Metals in Soil by ICPMS (CCME) Mercury in Soil by CVAAS Mercury (Hg)	<0.050		0.050	mg/kg	31-AUG-10	01-SEP-10	R1456352
Metals in Soil by ICPMS Aluminum (Al)	3800		50	mg/kg		01-SEP-10	R1456305
Antimony (Sb)	<0.20		0.20	mg/kg		01-SEP-10	R1456305

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-6	FL4 (REF AREA #1, SEDIMENT)							
Sampled By: TH/SW on 21-AUG-10 @ 14:30								
Matrix: SEDIMENT								
Metals in Soil by ICPMS								
Arsenic (As)		7.06		0.20	mg/kg		01-SEP-10	R1456305
Barium (Ba)		30.8		5.0	mg/kg		01-SEP-10	R1456305
Beryllium (Be)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Cadmium (Cd)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Chromium (Cr)		15.5		0.50	mg/kg		01-SEP-10	R1456305
Cobalt (Co)		5.1		1.0	mg/kg		01-SEP-10	R1456305
Copper (Cu)		7.7		2.0	mg/kg		01-SEP-10	R1456305
Iron (Fe)		6380		200	mg/kg		01-SEP-10	R1456305
Lead (Pb)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Molybdenum (Mo)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Nickel (Ni)		12.8		2.0	mg/kg		01-SEP-10	R1456305
Selenium (Se)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Silver (Ag)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Strontium (Sr)		3.7		1.0	mg/kg		01-SEP-10	R1456305
Thallium (Tl)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Tin (Sn)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Uranium (U)		<2.0		2.0	mg/kg		01-SEP-10	R1456305
Vanadium (V)		13.2		1.0	mg/kg		01-SEP-10	R1456305
Zinc (Zn)		18		10	mg/kg		01-SEP-10	R1456305
Miscellaneous Parameters								
Fragments > 2mm		6.7		1.0	%		27-AUG-10	R1451744
Particle Size								
% Sand		85.6		1.0	%		09-SEP-10	R1462061
% Silt		11.8		1.0	%		09-SEP-10	R1462061
% Clay		2.6		1.0	%		09-SEP-10	R1462061
Texture		Loamy sand					09-SEP-10	R1462061
L923262-7	FL5 (REF AREA #1, SEDIMENT)							
Sampled By: TH/SW on 21-AUG-10 @ 15:30								
Matrix: SEDIMENT								
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	27-AUG-10	27-AUG-10	R1451909
Total Organic Carbon		0.44		0.10	%	27-AUG-10	27-AUG-10	R1451909
CaCO3 Equivalent		<0.80		0.80	%	27-AUG-10	27-AUG-10	R1451909
Total Carbon by combustion method								
Total Carbon by Combustion		0.4		0.1	%	27-AUG-10	27-AUG-10	R1452047
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	31-AUG-10	01-SEP-10	R1456352
Metals in Soil by ICPMS								
Aluminum (Al)		3890		50	mg/kg		01-SEP-10	R1456305
Antimony (Sb)		<0.20		0.20	mg/kg		01-SEP-10	R1456305
Arsenic (As)		5.89		0.20	mg/kg		01-SEP-10	R1456305
Barium (Ba)		27.9		5.0	mg/kg		01-SEP-10	R1456305
Beryllium (Be)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Cadmium (Cd)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Chromium (Cr)		15.9		0.50	mg/kg		01-SEP-10	R1456305
Cobalt (Co)		4.7		1.0	mg/kg		01-SEP-10	R1456305
Copper (Cu)		6.9		2.0	mg/kg		01-SEP-10	R1456305
Iron (Fe)		7340		200	mg/kg		01-SEP-10	R1456305
Lead (Pb)		<5.0		5.0	mg/kg		01-SEP-10	R1456305

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923262-7 FL5 (REF AREA #1, SEDIMENT)								
Sampled By: TH/SW on 21-AUG-10 @ 15:30								
Matrix: SEDIMENT								
Metals in Soil by ICPMS								
Molybdenum (Mo)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Nickel (Ni)		10.7		2.0	mg/kg		01-SEP-10	R1456305
Selenium (Se)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Silver (Ag)		<1.0		1.0	mg/kg		01-SEP-10	R1456305
Strontium (Sr)		3.2		1.0	mg/kg		01-SEP-10	R1456305
Thallium (Tl)		<0.50		0.50	mg/kg		01-SEP-10	R1456305
Tin (Sn)		<5.0		5.0	mg/kg		01-SEP-10	R1456305
Uranium (U)		<2.0		2.0	mg/kg		01-SEP-10	R1456305
Vanadium (V)		13.1		1.0	mg/kg		01-SEP-10	R1456305
Zinc (Zn)		18		10	mg/kg		01-SEP-10	R1456305
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		27-AUG-10	R1451744
Particle Size								
% Sand		88.0		1.0	%		09-SEP-10	R1462061
% Silt		10.2		1.0	%		09-SEP-10	R1462061
% Clay		1.8		1.0	%		09-SEP-10	R1462061
Texture		Sand					09-SEP-10	R1462061

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	L923262-1, -2
Matrix Spike	Chloride (Cl)	MS-B	L923262-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L923262-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L923262-1, -2

Sample Parameter Qualifier Key:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRVAP	Reported Result Verified by Alternate Process

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-ED	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO₂ loss is proportional to the carbonate content of the soil.

Reference:

Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-LECO-SK Soil Total Carbon by combustion method SSSA (1996) P. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 °C in the presence of oxygen. Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen. This mixture of N₂, CO₂, and H₂O is then passed through an absorber column containing magnesium perchlorate to remove water. N₂ and CO₂ gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference:

Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 973-974 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-ORG-ED	Water	Total Organic Carbon	APHA 5310 B-Instrumental
CD-D-CCME-FAL-MS-ED	Water	Diss. Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CD-T-CCME-FAL-MS-ED	Water	Total Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CL-IC-ED	Water	Chloride by IC	APHA 4110 B-ION CHROMATOGRAPHY
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

F-IC-ED	Water	Fluoride by IC	APHA 4110 B-ION CHROMATOGRAPHY
FE-D-NP-U-ICP-ED	Water	Dissolved Fe in Water by ICPOES (Ultra)	APHA 3120 B-ICP-OES

Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.

FE-T-NP-U-ICP-ED	Water	Fe in Water by ICPOES (Undigested)	APHA 3120 B-ICP-OES

Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine non-turbid acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
requested on samples submitted for this test to aid with interpretation of results.			
HG-200.2-CVAA-ED	Soil	Mercury in Soil by CVAAS	EPA 200.2/245.1
Test method is based on US EPA Method 200.2 "Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements", and meets all requirements of BC CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC MOE, June 26, 2001. Soil is dried at <60°C and digested with nitric and hydrochloric acids, prior to analysis for mercury by cold vapour atomic absorption.			
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved	EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)	EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-200.2-MS-ED	Soil	Metals in Soil by ICPMS	EPA 200.2/6020A
MET-D-L-ICP-ED	Water	Diss. Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES
MET-D-NP-U-MS-ED	Water	Diss. Metals in Water by ICPMS (Ultra)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
MET-T-NP-U-MS-ED	Water	Metals in Water by ICPMS (Undigested)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine, non-turbid, acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
N2N3-LOW-ED	Water	Nitrate+Nitrite-N	APHA 4500 NO3E-Colorimetry
NH4-LOW-ED	Water	Ammonia-N Low Level	APHA 4500 NH3F-Colorimetry
NO2-LOW-ED	Water	Nitrite-N	APHA 4500 NO2B-Colorimetry
NO3-LOW-ED	Water	Nitrate-N	APHA 4500 NO3H-Colorimetry
P-TOTAL-LOW-ED	Water	Phosphorus, Total- Low Level	APHA 4500 P B,E-Auto-Colorimetry
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
PSA-1-ED	Soil	Particle Size	CSSS 47.3 - Hydrometer
PSA-COARSE_FRAGS-ED	Soil	Fragments >2mm (Cobbles and Stones)	CSSS 47.4
RAD-RA226-BE	Water	Radium 226 (Becquerel)	MODIFIED EPA.903.0
SO4-L-IC-ED	Water	Sulfate by IC (Low Level)	APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA
SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA
BE	Bequerel Laboratories Inc. - Mississauga, Ontario, Canada

Chain of Custody Numbers:

10-062781

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 1 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED		Water						
Batch	R1460765							
WG1163372-10 CVS								
Dissolved Organic Carbon			122		%		70-130	09-SEP-10
WG1163372-19 CVS								
Dissolved Organic Carbon			111		%		80-160	10-SEP-10
WG1163372-26 CVS								
Dissolved Organic Carbon			116		%		80-160	13-SEP-10
WG1163372-3 CVS								
Dissolved Organic Carbon			126		%		80-160	08-SEP-10
WG1163372-34 CVS								
Dissolved Organic Carbon			125		%		80-160	14-SEP-10
WG1163372-20 DUP		L928299-4						
Dissolved Organic Carbon		19.0	19.8		mg/L	3.9	20	10-SEP-10
WG1163372-22 DUP		L928299-24						
Dissolved Organic Carbon		25.1	24.5		mg/L	2.5	20	10-SEP-10
WG1163372-1 LCS								
Dissolved Organic Carbon			97		%		80-120	08-SEP-10
WG1163372-18 LCS								
Dissolved Organic Carbon			92		%		80-120	10-SEP-10
WG1163372-25 LCS								
Dissolved Organic Carbon			95		%		80-120	13-SEP-10
WG1163372-33 LCS								
Dissolved Organic Carbon			91		%		80-120	14-SEP-10
WG1163372-9 LCS								
Dissolved Organic Carbon			95		%		70-130	09-SEP-10
WG1163372-17 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	10-SEP-10
WG1163372-2 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	08-SEP-10
WG1163372-24 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	13-SEP-10
WG1163372-32 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	14-SEP-10
WG1163372-8 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	09-SEP-10
WG1163372-21 MS		L928299-5						
Dissolved Organic Carbon			N/A	MS-B	%		-	10-SEP-10
WG1163372-23 MS		L928299-25						
Dissolved Organic Carbon			N/A	MS-B	%		-	10-SEP-10



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 2 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch	R1460765							
WG1163372-10 CVS								
Total Organic Carbon			122		%		70-130	10-SEP-10
WG1163372-19 CVS								
Total Organic Carbon			111		%		80-160	10-SEP-10
WG1163372-26 CVS								
Total Organic Carbon			116		%		80-160	13-SEP-10
WG1163372-3 CVS								
Total Organic Carbon			126		%		80-160	09-SEP-10
WG1163372-34 CVS								
Total Organic Carbon			125		%		80-160	15-SEP-10
WG1163372-11 DUP		L928730-1						
Total Organic Carbon		11.0	11.2		mg/L	1.4	20	09-SEP-10
WG1163372-13 DUP		L926789-4						
Total Organic Carbon		19.9	19.3		mg/L	3.1	20	09-SEP-10
WG1163372-15 DUP		L926789-14						
Total Organic Carbon		16.0	15.6		mg/L	2.7	20	10-SEP-10
WG1163372-27 DUP		L929253-6						
Total Organic Carbon		5.3	5.3		mg/L	0.095	20	13-SEP-10
WG1163372-29 DUP		L929268-9						
Total Organic Carbon		5.2	5.1		mg/L	1.5	20	13-SEP-10
WG1163372-31 DUP		L930271-1						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	14-SEP-10
WG1163372-4 DUP		L927530-9						
Total Organic Carbon		5.3	5.3		mg/L	1.8	20	08-SEP-10
WG1163372-6 DUP		L927883-7						
Total Organic Carbon		28.3	28.5		mg/L	0.74	20	08-SEP-10
WG1163372-1 LCS								
Total Organic Carbon			97		%		80-120	08-SEP-10
WG1163372-18 LCS								
Total Organic Carbon			92		%		80-120	10-SEP-10
WG1163372-25 LCS								
Total Organic Carbon			95		%		80-120	13-SEP-10
WG1163372-33 LCS								
Total Organic Carbon			91		%		80-120	15-SEP-10
WG1163372-9 LCS								
Total Organic Carbon			95		%		70-130	10-SEP-10
WG1163372-17 MB								
Total Organic Carbon			<1.0		mg/L		1	10-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch R1460765								
WG1163372-2	MB							
Total Organic Carbon			<1.0		mg/L		1	08-SEP-10
WG1163372-24	MB							
Total Organic Carbon			<1.0		mg/L		1	13-SEP-10
WG1163372-32	MB							
Total Organic Carbon			<1.0		mg/L		1	14-SEP-10
WG1163372-8	MB							
Total Organic Carbon			<1.0		mg/L		1	09-SEP-10
WG1163372-12	MS	L928730-1						
Total Organic Carbon			N/A	MS-B	%		-	09-SEP-10
WG1163372-14	MS	L926789-4						
Total Organic Carbon			N/A	MS-B	%		-	09-SEP-10
WG1163372-16	MS	L926789-14						
Total Organic Carbon			N/A	MS-B	%		-	10-SEP-10
WG1163372-28	MS	L929253-6						
Total Organic Carbon			92		%		70-130	13-SEP-10
WG1163372-30	MS	L929268-9						
Total Organic Carbon			88		%		70-130	13-SEP-10
WG1163372-5	MS	L927530-9						
Total Organic Carbon			93		%		70-130	08-SEP-10
WG1163372-7	MS	L927883-7						
Total Organic Carbon			N/A	MS-B	%		-	08-SEP-10
CD-D-CCME-FAL-MS-ED		Water						
Batch R1474628								
WG1170506-1	MB							
Cadmium (Cd)-Dissolved			<0.00001		mg/L		0.00001	21-SEP-10
CD-T-CCME-FAL-MS-ED		Water						
Batch R1470773								
WG1168918-2	LCS							
Cadmium (Cd)-Total			101		%		80-120	17-SEP-10
WG1168918-1	MB							
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	17-SEP-10
Batch R1472084								
WG1168962-1	MB							
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	20-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 4 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-ED		Water						
Batch	R1449889							
WG1156076-11	DUP	L924331-1						
Chloride (Cl)		155	155		mg/L	0.063	20	25-AUG-10
WG1156076-3	DUP	L922913-8						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	25-AUG-10
WG1156076-5	DUP	L923785-15						
Chloride (Cl)		15.8	15.8		mg/L	0.050	20	25-AUG-10
WG1156076-9	DUP	L917893-13						
Chloride (Cl)		103	102		mg/L	0.048	20	26-AUG-10
WG1156076-2	LCS							
Chloride (Cl)			110		%		85-115	25-AUG-10
WG1156076-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	25-AUG-10
WG1156076-10	MS	L917893-13						
Chloride (Cl)			N/A	MS-B	%		-	26-AUG-10
WG1156076-12	MS	L924331-1						
Chloride (Cl)			N/A	MS-B	%		-	25-AUG-10
WG1156076-4	MS	L922913-8						
Chloride (Cl)			109		%		75-125	25-AUG-10
WG1156076-6	MS	L923785-15						
Chloride (Cl)			107		%		75-125	25-AUG-10
CN-TOT-WT		Water						
Batch	R1454125							
WG1158854-4	CVS							
Cyanide, Total			100		%		85-115	30-AUG-10
WG1158854-3	LCS							
Cyanide, Total			111		%		80-120	30-AUG-10
WG1158854-1	MB							
Cyanide, Total			<0.0020		mg/L		0.002	30-AUG-10
F-IC-ED		Water						
Batch	R1449889							
WG1156076-3	DUP	L922913-8						
Fluoride (F)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-AUG-10
WG1156076-2	LCS							
Fluoride (F)			108		%		85-115	25-AUG-10
WG1156076-1	MB							
Fluoride (F)			<0.050		mg/L		0.05	25-AUG-10
WG1156076-4	MS	L922913-8						
Fluoride (F)			110		%		75-125	25-AUG-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 5 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE-D-NP-U-ICP-ED		Water						
Batch	R1454830							
WG1159199-2	CRM	EU-H-3_OPTWATER						
WG1159199-1	MB							
Iron (Fe)-Dissolved			<0.0050		mg/L		0.005	31-AUG-10
FE-T-NP-U-ICP-ED		Water						
Batch	R1473907							
WG1170911-2	DUP	L929483-6						
Iron (Fe)-Total		0.0103	0.0073	J	mg/L	0.0029	0.01	22-SEP-10
WG1170911-1	MB							
Iron (Fe)-Total			<0.0050		mg/L		0.005	22-SEP-10
HG-D-L-CVAA-ED		Water						
Batch	R1470116							
WG1168657-8	DUP	L928365-2						
Mercury (Hg)-Dissolved		<0.020	<0.000020	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1168657-2	LCS							
Mercury (Hg)-Dissolved			96		%		80-120	17-SEP-10
WG1168657-3	LCSD	WG1168657-2						
Mercury (Hg)-Dissolved		96	97		%	1.1	20	17-SEP-10
WG1168657-1	MB							
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	17-SEP-10
WG1168657-9	MS	L928365-2						
Mercury (Hg)-Dissolved			108		%		70-130	17-SEP-10
HG-T-L-CVAA-ED		Water						
Batch	R1470116							
WG1168657-2	LCS							
Mercury (Hg)-Total			96		%		80-120	17-SEP-10
WG1168657-3	LCSD	WG1168657-2						
Mercury (Hg)-Total		96	97		%	1.1	20	17-SEP-10
WG1168657-1	MB							
Mercury (Hg)-Total			<0.000020		mg/L		0.00002	17-SEP-10
MET-D-L-ICP-ED		Water						
Batch	R1454830							
WG1159199-2	CRM	EU-H-3_OPTWATER						
WG1159199-11	DUP	L921144-16						
Calcium (Ca)-Dissolved		N/A	20.4		mg/L	1.6	20	31-AUG-10
Magnesium (Mg)-Dissolved		N/A	7.05		mg/L	1.9	20	31-AUG-10
Potassium (K)-Dissolved		N/A	9.73		mg/L	3.2	20	31-AUG-10
Sodium (Na)-Dissolved		N/A	23.5		mg/L	3.0	20	31-AUG-10



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 6 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-ICP-ED		Water						
Batch	R1454830							
WG1159199-5	DUP	L922498-4						
Calcium (Ca)-Dissolved		18.4	17.6		mg/L	4.6	20	31-AUG-10
Magnesium (Mg)-Dissolved		7.07	6.89		mg/L	2.6	20	31-AUG-10
Potassium (K)-Dissolved		2.20	2.23		mg/L	1.2	20	31-AUG-10
Sodium (Na)-Dissolved		34.6	32.6		mg/L	5.9	20	31-AUG-10
WG1159199-1	MB							
Calcium (Ca)-Dissolved			<0.20		mg/L		0.2	31-AUG-10
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	31-AUG-10
Potassium (K)-Dissolved			<0.10		mg/L		0.1	31-AUG-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	31-AUG-10
WG1159199-12	MS	L921144-16						
Calcium (Ca)-Dissolved			113		%		70-130	31-AUG-10
Magnesium (Mg)-Dissolved			110		%		70-130	31-AUG-10
Potassium (K)-Dissolved			109		%		70-130	31-AUG-10
Sodium (Na)-Dissolved			113		%		70-130	31-AUG-10
WG1159199-6	MS	L922498-4						
Calcium (Ca)-Dissolved			106		%		70-130	31-AUG-10
Magnesium (Mg)-Dissolved			101		%		70-130	31-AUG-10
Potassium (K)-Dissolved			94		%		70-130	31-AUG-10
Sodium (Na)-Dissolved			102		%		70-130	31-AUG-10
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2	CRM	1643E_WATER						
Aluminum (Al)-Dissolved			108		%		80-120	21-SEP-10
Antimony (Sb)-Dissolved			97		%		80-120	21-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	21-SEP-10
Barium (Ba)-Dissolved			104		%		80-120	21-SEP-10
Beryllium (Be)-Dissolved			103		%		80-120	21-SEP-10
Bismuth (Bi)-Dissolved			103		%		80-120	21-SEP-10
Boron (B)-Dissolved			95		%		80-120	21-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
Calcium (Ca)-Dissolved			96		%		80-120	21-SEP-10
Chromium (Cr)-Dissolved			104		%		80-120	21-SEP-10
Cobalt (Co)-Dissolved			97		%		80-120	21-SEP-10
Copper (Cu)-Dissolved			104		%		80-120	21-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 7 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Lead (Pb)-Dissolved			98		%		80-120	21-SEP-10
Lithium (Li)-Dissolved			115		%		80-120	21-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	21-SEP-10
Manganese (Mn)-Dissolved			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Dissolved			98		%		80-120	21-SEP-10
Nickel (Ni)-Dissolved			103		%		80-120	21-SEP-10
Potassium (K)-Dissolved			95		%		80-120	21-SEP-10
Selenium (Se)-Dissolved			106		%		80-120	21-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	21-SEP-10
Strontium (Sr)-Dissolved			104		%		80-120	21-SEP-10
Thallium (Tl)-Dissolved			100		%		80-120	21-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	21-SEP-10
Zinc (Zn)-Dissolved			110		%		80-120	21-SEP-10
WG1170506-1 MB								
Aluminum (Al)-Dissolved			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Dissolved			<0.0010		mg/L		0.001	21-SEP-10
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Chromium (Cr)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Copper (Cu)-Dissolved			<0.00060		mg/L		0.0006	21-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Lithium (Li)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Magnesium (Mg)-Dissolved			<0.0040		mg/L		0.004	21-SEP-10
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Nickel (Ni)-Dissolved			<0.00006		mg/L		0.00006	21-SEP-10
Potassium (K)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 8 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-1 MB								
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Sodium (Na)-Dissolved			<0.0050		mg/L		0.005	21-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Thallium (Tl)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Titanium (Ti)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Uranium (U)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Vanadium (V)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Zinc (Zn)-Dissolved			<0.00080		mg/L		0.0008	21-SEP-10
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Aluminum (Al)-Total			108		%		80-120	21-SEP-10
Antimony (Sb)-Total			97		%		80-120	21-SEP-10
Arsenic (As)-Total			102		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			106		%		80-120	21-SEP-10
Bismuth (Bi)-Total			103		%		80-120	21-SEP-10
Boron (B)-Total			95		%		80-120	21-SEP-10
Cadmium (Cd)-Total			105		%		80-120	21-SEP-10
Calcium (Ca)-Total			96		%		80-120	21-SEP-10
Chromium (Cr)-Total			104		%		80-120	21-SEP-10
Cobalt (Co)-Total			97		%		80-120	21-SEP-10
Copper (Cu)-Total			104		%		80-120	21-SEP-10
Lead (Pb)-Total			98		%		80-120	21-SEP-10
Lithium (Li)-Total			115		%		80-120	21-SEP-10
Magnesium (Mg)-Total			104		%		80-120	21-SEP-10
Manganese (Mn)-Total			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			98		%		80-120	21-SEP-10
Nickel (Ni)-Total			103		%		80-120	21-SEP-10
Potassium (K)-Total			95		%		80-120	21-SEP-10
Selenium (Se)-Total			106		%		80-120	21-SEP-10
Silver (Ag)-Total			101		%		80-120	21-SEP-10
Sodium (Na)-Total			104		%		80-120	

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 9 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Sodium (Na)-Total			104		%		80-120	21-SEP-10
Strontium (Sr)-Total			104		%		80-120	21-SEP-10
Thallium (Tl)-Total			100		%		80-120	21-SEP-10
Vanadium (V)-Total			101		%		80-120	21-SEP-10
Zinc (Zn)-Total			110		%		80-120	21-SEP-10
WG1170506-3 DUP		L929483-1						
Aluminum (Al)-Total		0.00074	0.00044	J	mg/L	0.00030	0.0006	21-SEP-10
Antimony (Sb)-Total		0.000072	0.000071		mg/L	0.90	20	21-SEP-10
Arsenic (As)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Barium (Ba)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Bismuth (Bi)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		0.0047	0.0045		mg/L	4.9	20	21-SEP-10
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Calcium (Ca)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Copper (Cu)-Total		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	21-SEP-10
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Lithium (Li)-Total		0.00015	0.00020	J	mg/L	0.00005	0.0002	21-SEP-10
Magnesium (Mg)-Total		N/A	<0.0040	RPD-NA	mg/L	N/A	20	21-SEP-10
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Nickel (Ni)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Potassium (K)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Selenium (Se)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Sodium (Na)-Total		N/A	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Thallium (Tl)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Tin (Sn)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Titanium (Ti)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Uranium (U)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 14 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-L-IC-ED		Water						
Batch	R1449889							
WG1156076-2	LCS							
Sulfate (SO4)			111		%		85-115	25-AUG-10
WG1156076-1	MB							
Sulfate (SO4)			<0.050		mg/L		0.05	25-AUG-10
SOLIDS-TOTSUS-ED		Water						
Batch	R1449362							
WG1155777-3	DUP	L923267-3						
Total Suspended Solids		16.0	16.0		mg/L	0.0	20	25-AUG-10
WG1155777-2	LCS							
Total Suspended Solids			94		%		85-115	25-AUG-10
WG1155777-1	MB							
Total Suspended Solids			<3.0		mg/L		3	25-AUG-10
C-INORG-ORG-SK		Soil						
Batch	R1451909							
WG1156268-1	DUP	L922894-14						
Inorganic Carbon		0.14	0.13		%	7.9	30	27-AUG-10
CaCO3 Equivalent		2.03	1.95		%	4.0	25	27-AUG-10
WG1156268-2	IRM	0.4%IC						
Inorganic Carbon			0.43		%		0.28-0.52	27-AUG-10
CaCO3 Equivalent			3.82		%		2.33-4.33	27-AUG-10
WG1156268-3	MB							
Inorganic Carbon			<0.10		%		0.1	27-AUG-10
CaCO3 Equivalent			<0.80		%		0.8	27-AUG-10
C-TOT-LECO-SK		Soil						
Batch	R1452047							
WG1156240-1	DUP	L922894-18						
Total Carbon by Combustion		42.4	41.3		%	2.6	10	27-AUG-10
WG1156240-2	IRM	2004_SOIL						
Total Carbon by Combustion			1.4		%		1.1-1.7	27-AUG-10
WG1156240-3	MB							
Total Carbon by Combustion			<0.1		%		0.1	27-AUG-10
HG-200.2-CVAA-ED		Soil						
Batch	R1456352							
WG1159634-3	CRM	TILL-1_SOIL						
Mercury (Hg)			105		%		80-120	01-SEP-10
WG1159634-4	CRM	PACS-2_SOIL						
Mercury (Hg)			102		%		80-120	01-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 15 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-ED		Soil						
Batch	R1456352							
WG1159634-5	DUP	L923262-5						
Mercury (Hg)		<0.050	<0.050	RPD-NA	mg/kg	N/A	20	01-SEP-10
WG1159634-6	DUP	L924684-6						
Mercury (Hg)		<0.050	0.050	RPD-NA	mg/kg	N/A	20	01-SEP-10
WG1159634-1	MB							
Mercury (Hg)			<0.050		mg/kg		0.05	01-SEP-10
WG1159634-2	MB							
Mercury (Hg)			<0.050		mg/kg		0.05	01-SEP-10
MET-200.2-MS-ED		Soil						
Batch	R1456305							
WG1159634-3	CRM	TILL-1_SOIL						
Aluminum (Al)			83		%		60-140	01-SEP-10
Antimony (Sb)			99		%		80-120	01-SEP-10
Arsenic (As)			98		%		80-120	01-SEP-10
Barium (Ba)			98		%		60-140	01-SEP-10
Chromium (Cr)			99		%		80-120	01-SEP-10
Cobalt (Co)			103		%		80-120	01-SEP-10
Copper (Cu)			100		%		80-120	01-SEP-10
Iron (Fe)			89		%		80-120	01-SEP-10
Lead (Pb)			94		%		80-120	01-SEP-10
Nickel (Ni)			100		%		80-120	01-SEP-10
Strontium (Sr)			99		%		60-140	01-SEP-10
Vanadium (V)			98		%		80-120	01-SEP-10
Zinc (Zn)			97		%		80-120	01-SEP-10
WG1159634-4	CRM	PACS-2_SOIL						
Aluminum (Al)			86		%		60-140	01-SEP-10
Antimony (Sb)			113		%		80-120	01-SEP-10
Arsenic (As)			101		%		80-120	01-SEP-10
Barium (Ba)			98		%		60-140	01-SEP-10
Cadmium (Cd)			113		%		60-140	01-SEP-10
Chromium (Cr)			99		%		80-120	01-SEP-10
Cobalt (Co)			102		%		80-120	01-SEP-10
Copper (Cu)			96		%		80-120	01-SEP-10
Iron (Fe)			96		%		80-120	01-SEP-10
Lead (Pb)			103		%		80-120	01-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 16 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1456305							
WG1159634-4	CRM	PACS-2_SOIL						
Molybdenum (Mo)			107		%		80-120	01-SEP-10
Nickel (Ni)			100		%		80-120	01-SEP-10
Strontium (Sr)			100		%		60-140	01-SEP-10
Tin (Sn)			109		%		80-120	01-SEP-10
Vanadium (V)			99		%		80-120	01-SEP-10
Zinc (Zn)			100		%		80-120	01-SEP-10
WG1159634-5	DUP	L923262-5						
Aluminum (Al)		7890	7900		mg/kg	0.18	50	01-SEP-10
Antimony (Sb)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	01-SEP-10
Arsenic (As)		24.7	25.6		mg/kg	3.3	30	01-SEP-10
Barium (Ba)		47.8	48.2		mg/kg	0.75	50	01-SEP-10
Beryllium (Be)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	01-SEP-10
Cadmium (Cd)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	01-SEP-10
Chromium (Cr)		29.1	29.2		mg/kg	0.34	30	01-SEP-10
Cobalt (Co)		9.2	9.3		mg/kg	0.35	30	01-SEP-10
Copper (Cu)		27.1	27.3		mg/kg	0.60	30	01-SEP-10
Iron (Fe)		13300	13300		mg/kg	0.47	30	01-SEP-10
Lead (Pb)		<5.0	<5.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Nickel (Ni)		27.9	27.0		mg/kg	3.2	30	01-SEP-10
Selenium (Se)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	01-SEP-10
Silver (Ag)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Strontium (Sr)		9.6	9.5		mg/kg	0.43	50	01-SEP-10
Thallium (Tl)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	01-SEP-10
Tin (Sn)		<5.0	<5.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Uranium (U)		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	01-SEP-10
Vanadium (V)		26.8	26.7		mg/kg	0.22	30	01-SEP-10
Zinc (Zn)		50	51		mg/kg	1.3	30	01-SEP-10
WG1159634-6	DUP	L924684-6						
Aluminum (Al)		10200	9250		mg/kg	9.5	50	01-SEP-10
Antimony (Sb)		0.49	0.47		mg/kg	3.8	30	01-SEP-10
Arsenic (As)		4.32	4.27		mg/kg	1.2	30	01-SEP-10
Barium (Ba)		227	222		mg/kg	2.2	50	01-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 17 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1456305							
WG1159634-6	DUP	L924684-6						
Beryllium (Be)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	01-SEP-10
Cadmium (Cd)		0.82	0.83		mg/kg	1.2	30	01-SEP-10
Chromium (Cr)		14.2	13.2		mg/kg	7.6	30	01-SEP-10
Cobalt (Co)		8.7	8.4		mg/kg	3.7	30	01-SEP-10
Copper (Cu)		23.6	23.5		mg/kg	0.57	30	01-SEP-10
Iron (Fe)		17000	16400		mg/kg	3.6	30	01-SEP-10
Lead (Pb)		14.4	14.2		mg/kg	1.2	50	01-SEP-10
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Nickel (Ni)		24.5	23.6		mg/kg	3.5	30	01-SEP-10
Selenium (Se)		1.10	1.08		mg/kg	2.5	30	01-SEP-10
Silver (Ag)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Strontium (Sr)		105	102		mg/kg	2.2	50	01-SEP-10
Thallium (Tl)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	01-SEP-10
Tin (Sn)		<5.0	<5.0	RPD-NA	mg/kg	N/A	50	01-SEP-10
Uranium (U)		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	01-SEP-10
Vanadium (V)		30.2	27.6		mg/kg	9.1	30	01-SEP-10
Zinc (Zn)		121	117		mg/kg	3.6	30	01-SEP-10
WG1159634-1	MB							
Aluminum (Al)			<50		mg/kg		50	01-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	01-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	01-SEP-10
Barium (Ba)			<5.0		mg/kg		5	01-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	01-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	01-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	01-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	01-SEP-10
Copper (Cu)			<2.0		mg/kg		2	01-SEP-10
Iron (Fe)			<200		mg/kg		200	01-SEP-10
Lead (Pb)			<5.0		mg/kg		5	01-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	01-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	01-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	01-SEP-10
Silver (Ag)			<1.0		mg/kg		1	01-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 18 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch R1456305								
WG1159634-1 MB								
Strontium (Sr)			<1.0		mg/kg		1	01-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	01-SEP-10
Tin (Sn)			<5.0		mg/kg		5	01-SEP-10
Uranium (U)			<2.0		mg/kg		2	01-SEP-10
Vanadium (V)			<1.0		mg/kg		1	01-SEP-10
Zinc (Zn)			<10		mg/kg		10	01-SEP-10
WG1159634-2 MB								
Aluminum (Al)			<50		mg/kg		50	01-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	01-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	01-SEP-10
Barium (Ba)			<5.0		mg/kg		5	01-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	01-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	01-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	01-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	01-SEP-10
Copper (Cu)			<2.0		mg/kg		2	01-SEP-10
Iron (Fe)			<200		mg/kg		200	01-SEP-10
Lead (Pb)			<5.0		mg/kg		5	01-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	01-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	01-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	01-SEP-10
Silver (Ag)			<1.0		mg/kg		1	01-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	01-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	01-SEP-10
Tin (Sn)			<5.0		mg/kg		5	01-SEP-10
Uranium (U)			<2.0		mg/kg		2	01-SEP-10
Vanadium (V)			<1.0		mg/kg		1	01-SEP-10
Zinc (Zn)			<10		mg/kg		10	01-SEP-10
PSA-1-ED		Soil						
Batch R1462061								
WG1163536-2 DUP		L923262-7						
% Sand		88.0	87.8		%	0.23	10	09-SEP-10
% Silt		10.2	10.4		%	1.9	9.8	09-SEP-10
% Clay		1.8	1.8		%	0.0	10	09-SEP-10



Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 19 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-1-ED	Soil							
Batch	R1462061							
WG1163536-1	MB							
% Sand			<1.0		%		1	09-SEP-10
% Silt			<1.0		%		1	09-SEP-10
% Clay			<1.0		%		1	09-SEP-10

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 20 of 21

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L923262

Report Date: 12-NOV-10

Page 21 of 21

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate+Nitrite-N	1	21-AUG-10 11:30	24-AUG-10 00:00	48	60	hours	EHTR
	2	21-AUG-10 10:30	24-AUG-10 00:00	48	61	hours	EHTR
Nitrate-N	1	21-AUG-10 11:30	24-AUG-10 00:00	48	60	hours	EHTR
	2	21-AUG-10 10:30	24-AUG-10 00:00	48	61	hours	EHTR
Nitrite-N	1	21-AUG-10 11:30	24-AUG-10 00:00	48	60	hours	EHTR
	2	21-AUG-10 10:30	24-AUG-10 00:00	48	61	hours	EHTR
Phosphorus, Total- Low Level	1	21-AUG-10 11:30	20-SEP-10 00:00	28	30	days	EHT
	2	21-AUG-10 10:30	20-SEP-10 00:00	28	30	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L923262 were received on 23-AUG-10 15:34.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ANALYSIS REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01096.0

Date: 08-Sep-2010

ALS Laboratory Group
Environmental Div.
9936-67th Avenue
Edmonton, AB, T6P 0P5

Phone: (780) 413-8441
FAX: (780) 437-2680

Client Ref.P.O:L923262

attn: Christine Potts

2 water samples Sampled: 21-Aug-2010 Received: 25-Aug-2010 Page 1 of 1

<u>Results of Analysis</u>					
Sample	Test	Result	Units	Date	Method
L923262-1 FL3 (REF AREA#1, SURFACE WATER	Ra-226	< 0.01	Bq/l	02-Sep-2010	ALPHA
L923262-2 FL5 (REF AREA#1, SURFACE WATER	Ra-226	< 0.01	Bq/l	02-Sep-2010	ALPHA

Methods: ALPHA BQ-RAD-ALPHA alpha-particle spectrometry

Units: Bq/l Becquerels per litre

These results relate only to the samples analysed and only to the items tested.

08-Sep-2010 approved by: _____
Steven Simpson
Quality Manager

This test report shall not be reproduced, except in full, without written approval of Becquerel Laboratories Inc.



QUALITY REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01096.0

Date: 08-Sep-2010

Standard	Analyte	<u>Standards</u>		Result	Expected Result
		Units			
RA226.32	Ra-226	Bq/l	0.91		1.00

Analyte	<u>Blanks</u>		Result
	Units		
Ra-226	Bq/l	<	0.01

Analyte	Units	<u>Duplicates</u>		Duplicate	
		Result			
Ra-226	Bq/l	<	0.01	<	0.01

Analyte	<u>Spikes</u>		% Recovery
Ra-226			81



Report To		Report Format / Distribution		Service Requested: (Rush subject to availability)													
Company: AECOM		Standard: ☒ Other (specify):		☒ Regular (Standard Turnaround Times))													
Contact: Colleen Prather		Select: PDF ☒ Excel ☒ Digital Fax		Priority, Date Req'd: (Surcharges apply)													
Address: 17007-107 Ave., Edmonton, AB		Email 1: colleen.prather@aecom.com		Emergency (1 Business Day) - 100% Surcharge													
TSS 1G3		Email 2: tiffany.hnatiuk@aecom.com		For Emergency < 1 Day, ASAP or Weekend - Contact ALS													
Phone: (780) 486-7000 Fax: (780) 486-7070				Analysis Request													
Invoice To Same as Report? (circle) Yes or No (if No, provide details)		Client / Project Information		(Indicate Filtered or Preserved, F/P)													
Copy of Invoice with Report? (circle) Yes or No		Job #: 60147160		F/P	p	F/P	p	p	F/P								
Company:		PO / AFE:		DOC	TOC	Dissolved metals	Total metals	Cyanide	Low Nutrients	RA 226	Low Routine	TSS	Particle size	TOC	Total Metals	Number of Containers	
Contact:		LSD:															
Address:		Quote #: Q25816															
Phone:																	
Fax:																	
Lab Work Order # (lab use only) L923262		ALS contact: Sean Whitaker		Sampler: TH/SW													
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type													
FL 3	(Ref. area #1, surface water)	21 Aug 10	11:30	water	X	X	X	X	X	X	X	X	X			9	
FL 5	(Ref. area #1, surface water)	21 Aug 10	10:30	water	X	X	X	X	X	X	X	X	X			9	
FL 1	(Ref. area #1, sediment)	21 Aug 10	16:00	sediment										X	X	1	
FL 2	(Ref. area #1, sediment)	21 Aug 10	12:30	sediment										X	X	1	
FL 3	(Ref. area #1, sediment)	21 Aug 10	12:00	sediment										X	X	1	
FL 4	(Ref. area #1, sediment)	21 Aug 10	14:30	sediment										X	X	1	
FL 5	(Ref. area #1, sediment)	21 Aug 10	15:30	sediment										X	X	1	
Special Instructions / Regulations / Hazardous Details																	
Attn: Sean Whitaker																	
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																	
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.																	
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)									
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:							
Tiffany Hnatiuk	22 Aug 10	08:00	[Signature]	22 Aug 10	1 PM	NA °C				Yes / No ? If Yes add SIF							



AECOM CANADA LTD.
ATTN: COLLEEN PRATHER
17007 107 AVE NW
EDMONTON AB T5S 1G3
Phone: 780-486-7015

Date Received: 24-AUG-10
Report Date: 04-OCT-10 11:33 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L923781
Project P.O. #: NOT SUBMITTED
Job Reference: 60147160
Legal Site Desc:
C of C Numbers: 062778

Maureen Olinek
Senior Account Manager

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ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LIMITED Part of the ALS Group A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-1 SCP1- EXPOSURE AREA SURFACE WATER								
Sampled By: TH/SW on 23-AUG-10 @ 09:30								
Matrix: WATER								
Dissolved Metals								
Diss. Metals in Water by ICPMS (Low)								
Aluminum (Al)-Dissolved		0.054		0.010	mg/L		01-OCT-10	R1485147
Antimony (Sb)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Arsenic (As)-Dissolved		0.00363		0.00040	mg/L		01-OCT-10	R1485147
Barium (Ba)-Dissolved		0.00844		0.00010	mg/L		01-OCT-10	R1485147
Beryllium (Be)-Dissolved		<0.00050		0.00050	mg/L		01-OCT-10	R1485147
Bismuth (Bi)-Dissolved		<0.000050		0.000050	mg/L		01-OCT-10	R1485147
Boron (B)-Dissolved		0.0060		0.0020	mg/L		01-OCT-10	R1485147
Cadmium (Cd)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Chromium (Cr)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Cobalt (Co)-Dissolved		0.00246		0.00010	mg/L		01-OCT-10	R1485147
Copper (Cu)-Dissolved		0.00321		0.00060	mg/L		01-OCT-10	R1485147
Lead (Pb)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Molybdenum (Mo)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Nickel (Ni)-Dissolved		0.0251		0.00010	mg/L		01-OCT-10	R1485147
Selenium (Se)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Silver (Ag)-Dissolved		<0.00020		0.00020	mg/L		01-OCT-10	R1485147
Strontium (Sr)-Dissolved		0.0264		0.00010	mg/L		01-OCT-10	R1485147
Thallium (Tl)-Dissolved		<0.000050		0.000050	mg/L		01-OCT-10	R1485147
Tin (Sn)-Dissolved		<0.00020		0.00020	mg/L		01-OCT-10	R1485147
Titanium (Ti)-Dissolved		0.00057		0.00030	mg/L		01-OCT-10	R1485147
Uranium (U)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Vanadium (V)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Zinc (Zn)-Dissolved		0.0164		0.0010	mg/L		01-OCT-10	R1485147
Total Metals								
Total Metals in Water by ICPMS (Low)								
Aluminum (Al)-Total		0.074		0.020	mg/L		21-SEP-10	R1472084
Antimony (Sb)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Arsenic (As)-Total		0.00406		0.00040	mg/L		21-SEP-10	R1472084
Barium (Ba)-Total		0.00845		0.00020	mg/L		21-SEP-10	R1472084
Beryllium (Be)-Total		<0.0010		0.0010	mg/L		21-SEP-10	R1472084
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1472084
Boron (B)-Total		<0.020		0.020	mg/L		21-SEP-10	R1472084
Cadmium (Cd)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1472084
Chromium (Cr)-Total		<0.00080		0.00080	mg/L		21-SEP-10	R1472084
Cobalt (Co)-Total		0.00261		0.00020	mg/L		21-SEP-10	R1472084
Copper (Cu)-Total		0.0035		0.0010	mg/L		21-SEP-10	R1472084
Lead (Pb)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1472084
Molybdenum (Mo)-Total		0.00010		0.00010	mg/L		21-SEP-10	R1472084
Nickel (Ni)-Total		0.0255		0.00020	mg/L		21-SEP-10	R1472084
Selenium (Se)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Silver (Ag)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Strontium (Sr)-Total		0.0266		0.00020	mg/L		21-SEP-10	R1472084
Thallium (Tl)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1472084
Tin (Sn)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Titanium (Ti)-Total		<0.0050		0.0050	mg/L		21-SEP-10	R1472084
Uranium (U)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1472084
Vanadium (V)-Total		<0.00050		0.00050	mg/L		21-SEP-10	R1472084
Zinc (Zn)-Total		0.0130		0.0040	mg/L		21-SEP-10	R1472084
Total Metals in Water by ICPOES (Low)								
Calcium (Ca)-Total		5.34		0.50	mg/L		01-OCT-10	R1485205
Iron (Fe)-Total		0.382		0.010	mg/L		01-OCT-10	R1485205

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-1 SCP1- EXPOSURE AREA SURFACE WATER								
Sampled By: TH/SW on 23-AUG-10 @ 09:30								
Matrix: WATER								
Total Metals in Water by ICPOES (Low)								
Magnesium (Mg)-Total		2.59		0.10	mg/L		01-OCT-10	R1485205
Manganese (Mn)-Total		0.0360		0.0020	mg/L		01-OCT-10	R1485205
Potassium (K)-Total		0.13		0.10	mg/L		01-OCT-10	R1485205
Sodium (Na)-Total		2.3		1.0	mg/L		01-OCT-10	R1485205
Miscellaneous Parameters								
Ammonia-N		0.0101		0.0050	mg/L		01-SEP-10	R1455811
Cyanide, Total		<0.0020		0.0020	mg/L	09-SEP-10	09-SEP-10	R1461729
Cadmium (Cd)-Dissolved		0.000026		0.000010	mg/L		01-OCT-10	R1485147
Dissolved Organic Carbon		6.4		1.0	mg/L		17-SEP-10	R1467022
Mercury (Hg)-Total		<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Mercury (Hg)-Dissolved		<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Phosphorus, Total		0.0036		0.0010	mg/L		21-SEP-10	R1473265
Radium-226		See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total		0.000023		0.000010	mg/L		21-SEP-10	R1472084
Total Organic Carbon		6.6		1.0	mg/L		17-SEP-10	R1467022
Total Suspended Solids		<3.0		3.0	mg/L		27-AUG-10	R1451704
Routine Water Analysis - Low Level								
Chloride by IC								
Chloride (Cl)		1.12		0.50	mg/L		26-AUG-10	R1449889
Diss. Metals in Water by ICPOES (Low)								
Calcium (Ca)-Dissolved		5.44		0.50	mg/L		20-SEP-10	R1472095
Magnesium (Mg)-Dissolved		2.57		0.10	mg/L		20-SEP-10	R1472095
Potassium (K)-Dissolved		0.49		0.10	mg/L		20-SEP-10	R1472095
Sodium (Na)-Dissolved		2.3		1.0	mg/L		20-SEP-10	R1472095
Fluoride by IC								
Fluoride (F)		0.054		0.050	mg/L		26-AUG-10	R1449889
Ion Balance Calculation								
Ion Balance		Low EC			%		21-SEP-10	
TDS (Calculated)		36.0			mg/L		21-SEP-10	
Hardness (as CaCO3)		24.2			mg/L		21-SEP-10	
Nitrate+Nitrite-N								
Nitrate+Nitrite-N		0.0647		0.0060	mg/L		26-AUG-10	R1451272
Nitrate-N								
Nitrate-N		0.0647		0.0060	mg/L		26-AUG-10	R1451272
Nitrite-N								
Nitrite-N		<0.0020		0.0020	mg/L		26-AUG-10	R1451272
Sulfate by IC (Low Level)								
Sulfate (SO4)		23.7		0.050	mg/L		26-AUG-10	R1449889
pH, Conductivity and Total Alkalinity								
pH		6.69		0.10	pH		26-AUG-10	R1450345
Conductivity (EC)		71.6		0.20	uS/cm		26-AUG-10	R1450345
Bicarbonate (HCO3)		5.2		5.0	mg/L		26-AUG-10	R1450345
Carbonate (CO3)		<5.0		5.0	mg/L		26-AUG-10	R1450345
Hydroxide (OH)		<5.0		5.0	mg/L		26-AUG-10	R1450345
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		26-AUG-10	R1450345
L923781-2 SCF1- EXPOSURE AREA SURFACE WATER								
Sampled By: TH/SW on 23-AUG-10 @ 10:00								
Matrix: WATER								
Dissolved Metals								
Diss. Metals in Water by ICPMS (Low)								

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-2 SCF1- EXPOSURE AREA SURFACE WATER								
Sampled By: TH/SW on 23-AUG-10 @ 10:00								
Matrix: WATER								
Diss. Metals in Water by ICPMS (Low)								
Aluminum (Al)-Dissolved		0.054		0.010	mg/L		01-OCT-10	R1485147
Antimony (Sb)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Arsenic (As)-Dissolved		0.00364		0.00040	mg/L		01-OCT-10	R1485147
Barium (Ba)-Dissolved		0.00831		0.00010	mg/L		01-OCT-10	R1485147
Beryllium (Be)-Dissolved		<0.00050		0.00050	mg/L		01-OCT-10	R1485147
Bismuth (Bi)-Dissolved		<0.000050		0.000050	mg/L		01-OCT-10	R1485147
Boron (B)-Dissolved		0.0056		0.0020	mg/L		01-OCT-10	R1485147
Cadmium (Cd)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Chromium (Cr)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Cobalt (Co)-Dissolved		0.00245		0.00010	mg/L		01-OCT-10	R1485147
Copper (Cu)-Dissolved		0.00323		0.00060	mg/L		01-OCT-10	R1485147
Lead (Pb)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Molybdenum (Mo)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Nickel (Ni)-Dissolved		0.0247		0.00010	mg/L		01-OCT-10	R1485147
Selenium (Se)-Dissolved		<0.00040		0.00040	mg/L		01-OCT-10	R1485147
Silver (Ag)-Dissolved		<0.00020		0.00020	mg/L		01-OCT-10	R1485147
Strontium (Sr)-Dissolved		0.0265		0.00010	mg/L		01-OCT-10	R1485147
Thallium (Tl)-Dissolved		<0.000050		0.000050	mg/L		01-OCT-10	R1485147
Tin (Sn)-Dissolved		0.00047		0.00020	mg/L		01-OCT-10	R1485147
Titanium (Ti)-Dissolved		0.00061		0.00030	mg/L		01-OCT-10	R1485147
Uranium (U)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Vanadium (V)-Dissolved		<0.00010		0.00010	mg/L		01-OCT-10	R1485147
Zinc (Zn)-Dissolved		0.0169		0.0010	mg/L		01-OCT-10	R1485147
Total Metals								
Total Metals in Water by ICPMS (Low)								
Aluminum (Al)-Total		0.112		0.020	mg/L		21-SEP-10	R1472084
Antimony (Sb)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Arsenic (As)-Total		0.00544		0.00040	mg/L		21-SEP-10	R1472084
Barium (Ba)-Total		0.00884		0.00020	mg/L		21-SEP-10	R1472084
Beryllium (Be)-Total		<0.0010		0.0010	mg/L		21-SEP-10	R1472084
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1472084
Boron (B)-Total		<0.020		0.020	mg/L		21-SEP-10	R1472084
Cadmium (Cd)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1472084
Chromium (Cr)-Total		<0.00080		0.00080	mg/L		21-SEP-10	R1472084
Cobalt (Co)-Total		0.00301		0.00020	mg/L		21-SEP-10	R1472084
Copper (Cu)-Total		0.0053		0.0010	mg/L		21-SEP-10	R1472084
Lead (Pb)-Total		0.00010		0.00010	mg/L		21-SEP-10	R1472084
Molybdenum (Mo)-Total		0.00014		0.00010	mg/L		21-SEP-10	R1472084
Nickel (Ni)-Total		0.0258		0.00020	mg/L		21-SEP-10	R1472084
Selenium (Se)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Silver (Ag)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Strontium (Sr)-Total		0.0265		0.00020	mg/L		21-SEP-10	R1472084
Thallium (Tl)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1472084
Tin (Sn)-Total		<0.00040		0.00040	mg/L		21-SEP-10	R1472084
Titanium (Ti)-Total		<0.0050		0.0050	mg/L		21-SEP-10	R1472084
Uranium (U)-Total		<0.00010		0.00010	mg/L		21-SEP-10	R1472084
Vanadium (V)-Total		<0.00050		0.00050	mg/L		21-SEP-10	R1472084
Zinc (Zn)-Total		0.0136		0.0040	mg/L		21-SEP-10	R1472084
Total Metals in Water by ICPOES (Low)								
Calcium (Ca)-Total		4.89		0.50	mg/L		01-OCT-10	R1485205
Iron (Fe)-Total		0.463		0.010	mg/L		01-OCT-10	R1485205

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-2 SCF1- EXPOSURE AREA SURFACE WATER								
Sampled By: TH/SW on 23-AUG-10 @ 10:00								
Matrix: WATER								
Total Metals in Water by ICPOES (Low)								
Magnesium (Mg)-Total		2.34		0.10	mg/L		01-OCT-10	R1485205
Manganese (Mn)-Total		0.0356		0.0020	mg/L		01-OCT-10	R1485205
Potassium (K)-Total		0.37		0.10	mg/L		01-OCT-10	R1485205
Sodium (Na)-Total		2.2		1.0	mg/L		01-OCT-10	R1485205
Miscellaneous Parameters								
Ammonia-N		0.0141		0.0050	mg/L	09-SEP-10	01-SEP-10	R1455811
Cyanide, Total		<0.0020		0.0020	mg/L		09-SEP-10	R1461729
Cadmium (Cd)-Dissolved		0.000025		0.000010	mg/L		01-OCT-10	R1485147
Dissolved Organic Carbon		6.3		1.0	mg/L		17-SEP-10	R1467022
Mercury (Hg)-Total		0.000073		0.000020	mg/L		21-SEP-10	R1473467
Mercury (Hg)-Dissolved		<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Phosphorus, Total		0.0033		0.0010	mg/L		21-SEP-10	R1473265
Radium-226		See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total		0.000023		0.000010	mg/L		21-SEP-10	R1472084
Total Organic Carbon		6.5		1.0	mg/L		17-SEP-10	R1467022
Total Suspended Solids		<3.0		3.0	mg/L		27-AUG-10	R1451704
Routine Water Analysis - Low Level								
Chloride by IC								
Chloride (Cl)		1.15		0.50	mg/L		26-AUG-10	R1449889
Diss. Metals in Water by ICPOES (Low)								
Calcium (Ca)-Dissolved		5.59		0.50	mg/L		20-SEP-10	R1472095
Magnesium (Mg)-Dissolved		2.67		0.10	mg/L		20-SEP-10	R1472095
Potassium (K)-Dissolved		0.42		0.10	mg/L		20-SEP-10	R1472095
Sodium (Na)-Dissolved		2.3		1.0	mg/L		20-SEP-10	R1472095
Fluoride by IC								
Fluoride (F)		0.057		0.050	mg/L		26-AUG-10	R1449889
Ion Balance Calculation								
Ion Balance		Low EC			%		21-SEP-10	
TDS (Calculated)		36.6			mg/L		21-SEP-10	
Hardness (as CaCO3)		25.0			mg/L		21-SEP-10	
Nitrate+Nitrite-N								
Nitrate+Nitrite-N		0.0357		0.0060	mg/L		26-AUG-10	R1451272
Nitrate-N								
Nitrate-N		0.0357		0.0060	mg/L		26-AUG-10	R1451272
Nitrite-N								
Nitrite-N		<0.0020		0.0020	mg/L		26-AUG-10	R1451272
Sulfate by IC (Low Level)								
Sulfate (SO4)		24.3		0.050	mg/L		26-AUG-10	R1449889
pH, Conductivity and Total Alkalinity								
pH		6.76		0.10	pH		26-AUG-10	R1450345
Conductivity (EC)		71.5		0.20	uS/cm		26-AUG-10	R1450345
Bicarbonate (HCO3)		5.5		5.0	mg/L		26-AUG-10	R1450345
Carbonate (CO3)		<5.0		5.0	mg/L		26-AUG-10	R1450345
Hydroxide (OH)		<5.0		5.0	mg/L		26-AUG-10	R1450345
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		26-AUG-10	R1450345
L923781-3 FB- FIELD BLANK								
Sampled By: TH/SW on 23-AUG-10 @ 11:00								
Matrix: WATER								
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-3 FB- FIELD BLANK							
Sampled By: TH/SW on 23-AUG-10 @ 11:00							
Matrix: WATER							
Diss. Metals in Water by ICPMS (Ultra)							
Aluminum (Al)-Dissolved	0.00212	RRV	0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved	0.000055	RRV	0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved	0.000159	RRV	0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved	<0.00020	RRV	0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved	0.0023	RRV	0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved	0.072	RRV	0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved	<0.000060	RRV	0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved	<0.00060	RRV	0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved	0.00044	RRV	0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved	0.0224	RRV	0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved	0.00036	RRV	0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved	<0.000060	RRV	0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved	0.000248	RRV	0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved	<0.020	RRV	0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved	0.0973	RRV	0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved	0.00024	RRV	0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved	0.00843	RRV	0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved	0.00013	RRV	0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved	<0.00080	RRV	0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)							
Iron (Fe)-Dissolved	<0.0050		0.0050	mg/L		20-SEP-10	R1472095
Ultra-Low Metals							
Fe in Water by ICPOES (Undigested)							
Iron (Fe)-Total	<0.0050		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)							
Aluminum (Al)-Total	0.00032	RRV	0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total	0.000071	RRV	0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total	<0.00020	RRV	0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total	0.0025	RRV	0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total	0.022	RRV	0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total	<0.000060	RRV	0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	<0.00060	RRV	0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00049	RRV	0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	<0.0040	RRV	0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	<0.000060	RRV	0.000060	mg/L		21-SEP-10	R1474628

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-3 FB- FIELD BLANK Sampled By: TH/SW on 23-AUG-10 @ 11:00 Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Nickel (Ni)-Total	<0.000060	RRV	0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	<0.020	RRV	0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	0.0742	RRV	0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030	RRV	0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	0.00850	RRV	0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	<0.00010	RRV	0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050	RRV	0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	<0.00080	RRV	0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	<0.0050		0.0050	mg/L		01-SEP-10	R1455811
Cyanide, Total	<0.0020		0.0020	mg/L	09-SEP-10	09-SEP-10	R1461729
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L		21-SEP-10	R1478372
Dissolved Organic Carbon	<1.0		1.0	mg/L		17-SEP-10	R1467022
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Phosphorus, Total	<0.0010		0.0010	mg/L		21-SEP-10	R1473265
Radium-226	See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L		21-SEP-10	R1472084
Total Organic Carbon	<1.0		1.0	mg/L		17-SEP-10	R1467022
Total Suspended Solids	<3.0		3.0	mg/L		27-AUG-10	R1451704
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		26-AUG-10	R1449889
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	<0.50		0.50	mg/L		20-SEP-10	R1472095
Magnesium (Mg)-Dissolved	<0.10		0.10	mg/L		20-SEP-10	R1472095
Potassium (K)-Dissolved	<0.10		0.10	mg/L		20-SEP-10	R1472095
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		20-SEP-10	R1472095
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		26-AUG-10	R1449889
Ion Balance Calculation							
Ion Balance	Low TDS			%		21-SEP-10	
TDS (Calculated)	<1.0			mg/L		21-SEP-10	
Hardness (as CaCO3)	<1.0			mg/L		21-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		26-AUG-10	R1451272
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		26-AUG-10	R1451272
Nitrite-N							
Nitrite-N	<0.0020		0.0020	mg/L		26-AUG-10	R1451272
Sulfate by IC (Low Level)							
Sulfate (SO4)	<0.050		0.050	mg/L		30-AUG-10	R1453429
pH, Conductivity and Total Alkalinity							
pH	6.20		0.10	pH		26-AUG-10	R1450345
Conductivity (EC)	0.92		0.20	uS/cm		26-AUG-10	R1450345
Bicarbonate (HCO3)	<5.0		5.0	mg/L		26-AUG-10	R1450345
Carbonate (CO3)	<5.0		5.0	mg/L		26-AUG-10	R1450345

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-3	FB- FIELD BLANK							
Sampled By:	TH/SW on 23-AUG-10 @ 11:00							
Matrix:	WATER							
pH, Conductivity and Total Alkalinity								
Hydroxide (OH)		<5.0		5.0	mg/L		26-AUG-10	R1450345
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		26-AUG-10	R1450345
L923781-4	TB- TRIP BLANK							
Sampled By:	TH/SW on 23-AUG-10 @ 11:00							
Matrix:	WATER							
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		<0.00030		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0022	RRV	0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		<0.020		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00048		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		<0.0040		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		<0.020		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		<0.0050		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		<0.0050		0.0050	mg/L		20-SEP-10	R1472095
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		<0.0050		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		<0.00030		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total								

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-4 TB- TRIP BLANK							
Sampled By: TH/SW on 23-AUG-10 @ 11:00							
Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Chromium (Cr)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00045		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	<0.0040		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	<0.020		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	<0.0050		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	<0.0050		0.0050	mg/L		01-SEP-10	R1455811
Cyanide, Total	<0.0020		0.0020	mg/L	09-SEP-10	09-SEP-10	R1461729
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L		21-SEP-10	R1478372
Dissolved Organic Carbon	<1.0		1.0	mg/L		17-SEP-10	R1467022
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		21-SEP-10	R1473467
Phosphorus, Total	<0.0010		0.0010	mg/L		21-SEP-10	R1473265
Radium-226	See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L		21-SEP-10	R1472084
Total Organic Carbon	<1.0		1.0	mg/L		17-SEP-10	R1467022
Total Suspended Solids	<3.0		3.0	mg/L		27-AUG-10	R1451704
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		26-AUG-10	R1449889
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	<0.50		0.50	mg/L		20-SEP-10	R1472095
Magnesium (Mg)-Dissolved	<0.10		0.10	mg/L		20-SEP-10	R1472095
Potassium (K)-Dissolved	<0.10		0.10	mg/L		20-SEP-10	R1472095
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		20-SEP-10	R1472095
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		26-AUG-10	R1449889
Ion Balance Calculation							
Ion Balance	Low TDS			%		21-SEP-10	
TDS (Calculated)	<1.0			mg/L		21-SEP-10	
Hardness (as CaCO3)	<1.0			mg/L		21-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		26-AUG-10	R1451272
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		26-AUG-10	R1451272
Nitrite-N							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-4 TB- TRIP BLANK Sampled By: TH/SW on 23-AUG-10 @ 11:00 Matrix: WATER							
Nitrite-N Nitrite-N	<0.0020		0.0020	mg/L		26-AUG-10	R1451272
Sulfate by IC (Low Level) Sulfate (SO4)	<0.050		0.050	mg/L		30-AUG-10	R1453429
pH, Conductivity and Total Alkalinity pH	5.82		0.10	pH		26-AUG-10	R1450345
Conductivity (EC)	0.81		0.20	uS/cm		26-AUG-10	R1450345
Bicarbonate (HCO3)	<5.0		5.0	mg/L		26-AUG-10	R1450345
Carbonate (CO3)	<5.0		5.0	mg/L		26-AUG-10	R1450345
Hydroxide (OH)	<5.0		5.0	mg/L		26-AUG-10	R1450345
Alkalinity, Total (as CaCO3)	<5.0		5.0	mg/L		26-AUG-10	R1450345
L923781-5 SCP1- EXPOSURE AREA SEDIMENT Sampled By: TH/SW on 23-AUG-10 @ 10:30 Matrix: SEDIMENT							
Total Organic Carbon -Inorg & Total C Inorganic and Organic Carbon Inorganic Carbon	<0.10		0.10	%	08-SEP-10	08-SEP-10	R1460907
Total Organic Carbon	3.68		0.10	%	08-SEP-10	08-SEP-10	R1460907
CaCO3 Equivalent	<0.80		0.80	%	08-SEP-10	08-SEP-10	R1460907
Total Carbon by combustion method Total Carbon by Combustion	3.7		0.1	%	02-SEP-10	02-SEP-10	R1460903
Metals in Soil by ICPMS (CCME) Mercury in Soil by CVAAS Mercury (Hg)	<0.050		0.050	mg/kg	20-SEP-10	22-SEP-10	R1474765
Metals in Soil by ICPMS Aluminum (Al)	6490		50	mg/kg		24-SEP-10	R1474744
Antimony (Sb)	<0.20		0.20	mg/kg		24-SEP-10	R1474744
Arsenic (As)	146		0.20	mg/kg		24-SEP-10	R1474744
Barium (Ba)	42.2		5.0	mg/kg		24-SEP-10	R1474744
Beryllium (Be)	<1.0		1.0	mg/kg		24-SEP-10	R1474744
Cadmium (Cd)	<0.50		0.50	mg/kg		24-SEP-10	R1474744
Chromium (Cr)	26.6		0.50	mg/kg		24-SEP-10	R1474744
Cobalt (Co)	44.7		1.0	mg/kg		24-SEP-10	R1474744
Copper (Cu)	46.8		2.0	mg/kg		24-SEP-10	R1474744
Iron (Fe)	16200		200	mg/kg		24-SEP-10	R1474744
Lead (Pb)	<5.0		5.0	mg/kg		24-SEP-10	R1474744
Molybdenum (Mo)	1.8		1.0	mg/kg		24-SEP-10	R1474744
Nickel (Ni)	87.8		2.0	mg/kg		24-SEP-10	R1474744
Selenium (Se)	<0.50		0.50	mg/kg		24-SEP-10	R1474744
Silver (Ag)	<1.0		1.0	mg/kg		24-SEP-10	R1474744
Strontium (Sr)	9.7		1.0	mg/kg		24-SEP-10	R1474744
Thallium (Tl)	<0.50		0.50	mg/kg		24-SEP-10	R1474744
Tin (Sn)	<5.0		5.0	mg/kg		24-SEP-10	R1474744
Uranium (U)	<2.0		2.0	mg/kg		24-SEP-10	R1474744
Vanadium (V)	20.6		1.0	mg/kg		24-SEP-10	R1474744
Zinc (Zn)	121		10	mg/kg		24-SEP-10	R1474744
Miscellaneous Parameters Fragments > 2mm	<1.0		1.0	%		07-SEP-10	R1459954
Particle Size % Sand	71.6		1.0	%		09-SEP-10	R1462061
% Silt	23.2		1.0	%		09-SEP-10	R1462061
% Clay	5.2		1.0	%		09-SEP-10	R1462061

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-5	SCP1- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 10:30							
Matrix:	SEDIMENT							
Particle Size								
Texture		Sandy loam					09-SEP-10	R1462061
L923781-6	SCP2- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 11:30							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	08-SEP-10	08-SEP-10	R1460907
Total Organic Carbon		2.45		0.10	%	08-SEP-10	08-SEP-10	R1460907
CaCO3 Equivalent		<0.80		0.80	%	08-SEP-10	08-SEP-10	R1460907
Total Carbon by combustion method								
Total Carbon by Combustion		2.5		0.1	%	02-SEP-10	02-SEP-10	R1460903
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	20-SEP-10	22-SEP-10	R1474765
Metals in Soil by ICPMS								
Aluminum (Al)		7220		50	mg/kg		24-SEP-10	R1474744
Antimony (Sb)		<0.20		0.20	mg/kg		24-SEP-10	R1474744
Arsenic (As)		196		0.20	mg/kg		24-SEP-10	R1474744
Barium (Ba)		65.3		5.0	mg/kg		24-SEP-10	R1474744
Beryllium (Be)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Cadmium (Cd)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Chromium (Cr)		36.9		0.50	mg/kg		24-SEP-10	R1474744
Cobalt (Co)		143		1.0	mg/kg		24-SEP-10	R1474744
Copper (Cu)		46.8		2.0	mg/kg		24-SEP-10	R1474744
Iron (Fe)		23700		200	mg/kg		24-SEP-10	R1474744
Lead (Pb)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Molybdenum (Mo)		3.4		1.0	mg/kg		24-SEP-10	R1474744
Nickel (Ni)		109		2.0	mg/kg		24-SEP-10	R1474744
Selenium (Se)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Silver (Ag)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Strontium (Sr)		14.6		1.0	mg/kg		24-SEP-10	R1474744
Thallium (Tl)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Tin (Sn)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Uranium (U)		<2.0		2.0	mg/kg		24-SEP-10	R1474744
Vanadium (V)		21.4		1.0	mg/kg		24-SEP-10	R1474744
Zinc (Zn)		113		10	mg/kg		24-SEP-10	R1474744
Miscellaneous Parameters								
Fragments > 2mm		17.0		1.0	%		07-SEP-10	R1459954
Particle Size								
% Sand		78.0		1.0	%		09-SEP-10	R1462061
% Silt		16.4		1.0	%		09-SEP-10	R1462061
% Clay		5.6		1.0	%		09-SEP-10	R1462061
Texture		Loamy sand					09-SEP-10	R1462061
L923781-7	SCP3- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 12:30							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	08-SEP-10	08-SEP-10	R1460907
Total Organic Carbon		0.62		0.10	%	08-SEP-10	08-SEP-10	R1460907
CaCO3 Equivalent		<0.80		0.80	%	08-SEP-10	08-SEP-10	R1460907

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-7	SCP3- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 12:30							
Matrix:	SEDIMENT							
Total Carbon by combustion method								
Total Carbon by Combustion		0.6		0.1	%	02-SEP-10	02-SEP-10	R1460903
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	20-SEP-10	22-SEP-10	R1474765
Metals in Soil by ICPMS								
Aluminum (Al)		5150		50	mg/kg		24-SEP-10	R1474744
Antimony (Sb)		<0.20		0.20	mg/kg		24-SEP-10	R1474744
Arsenic (As)		35.1		0.20	mg/kg		24-SEP-10	R1474744
Barium (Ba)		31.9		5.0	mg/kg		24-SEP-10	R1474744
Beryllium (Be)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Cadmium (Cd)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Chromium (Cr)		23.7		0.50	mg/kg		24-SEP-10	R1474744
Cobalt (Co)		19.4		1.0	mg/kg		24-SEP-10	R1474744
Copper (Cu)		19.2		2.0	mg/kg		24-SEP-10	R1474744
Iron (Fe)		9360		200	mg/kg		24-SEP-10	R1474744
Lead (Pb)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Molybdenum (Mo)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Nickel (Ni)		32.5		2.0	mg/kg		24-SEP-10	R1474744
Selenium (Se)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Silver (Ag)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Strontium (Sr)		6.0		1.0	mg/kg		24-SEP-10	R1474744
Thallium (Tl)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Tin (Sn)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Uranium (U)		<2.0		2.0	mg/kg		24-SEP-10	R1474744
Vanadium (V)		17.8		1.0	mg/kg		24-SEP-10	R1474744
Zinc (Zn)		47		10	mg/kg		24-SEP-10	R1474744
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		07-SEP-10	R1459954
Particle Size								
% Sand		84.0		1.0	%		09-SEP-10	R1462061
% Silt		12.6		1.0	%		09-SEP-10	R1462061
% Clay		3.4		1.0	%		09-SEP-10	R1462061
Texture		Loamy sand					09-SEP-10	R1462061
L923781-8	SCP4- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 13:30							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	08-SEP-10	08-SEP-10	R1460907
Total Organic Carbon		1.49		0.10	%	08-SEP-10	08-SEP-10	R1460907
CaCO3 Equivalent		<0.80		0.80	%	08-SEP-10	08-SEP-10	R1460907
Total Carbon by combustion method								
Total Carbon by Combustion		1.5		0.1	%	02-SEP-10	02-SEP-10	R1460903
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	20-SEP-10	22-SEP-10	R1474765
Metals in Soil by ICPMS								
Aluminum (Al)		11000		50	mg/kg		24-SEP-10	R1474744
Antimony (Sb)		<0.20		0.20	mg/kg		24-SEP-10	R1474744
Arsenic (As)		36.0		0.20	mg/kg		24-SEP-10	R1474744
Barium (Ba)		52.0		5.0	mg/kg		24-SEP-10	R1474744

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-8	SCP4- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 13:30							
Matrix:	SEDIMENT							
Metals in Soil by ICPMS								
Beryllium (Be)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Cadmium (Cd)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Chromium (Cr)		57.1		0.50	mg/kg		24-SEP-10	R1474744
Cobalt (Co)		16.9		1.0	mg/kg		24-SEP-10	R1474744
Copper (Cu)		22.3		2.0	mg/kg		24-SEP-10	R1474744
Iron (Fe)		17500		200	mg/kg		24-SEP-10	R1474744
Lead (Pb)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Molybdenum (Mo)		1.1		1.0	mg/kg		24-SEP-10	R1474744
Nickel (Ni)		47.4		2.0	mg/kg		24-SEP-10	R1474744
Selenium (Se)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Silver (Ag)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Strontium (Sr)		9.2		1.0	mg/kg		24-SEP-10	R1474744
Thallium (Tl)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Tin (Sn)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Uranium (U)		<2.0		2.0	mg/kg		24-SEP-10	R1474744
Vanadium (V)		33.2		1.0	mg/kg		24-SEP-10	R1474744
Zinc (Zn)		65		10	mg/kg		24-SEP-10	R1474744
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		07-SEP-10	R1459954
Particle Size								
% Sand		25.8		1.0	%		09-SEP-10	R1462061
% Silt		72.4		1.0	%		09-SEP-10	R1462061
% Clay		1.8		1.0	%		09-SEP-10	R1462061
Texture		Silt loam					09-SEP-10	R1462061
L923781-9	SCP5- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 15:00							
Matrix:	SEDIMENT							
Total Organic Carbon -Inorg & Total C								
Inorganic and Organic Carbon								
Inorganic Carbon		<0.10		0.10	%	08-SEP-10	08-SEP-10	R1460907
Total Organic Carbon		3.28		0.10	%	08-SEP-10	08-SEP-10	R1460907
CaCO3 Equivalent		<0.80		0.80	%	08-SEP-10	08-SEP-10	R1460907
Total Carbon by combustion method								
Total Carbon by Combustion		3.3		0.1	%	02-SEP-10	02-SEP-10	R1460903
Metals in Soil by ICPMS (CCME)								
Mercury in Soil by CVAAS								
Mercury (Hg)		<0.050		0.050	mg/kg	20-SEP-10	22-SEP-10	R1474765
Metals in Soil by ICPMS								
Aluminum (Al)		14800		50	mg/kg		24-SEP-10	R1474744
Antimony (Sb)		<0.20		0.20	mg/kg		24-SEP-10	R1474744
Arsenic (As)		50.6		0.20	mg/kg		24-SEP-10	R1474744
Barium (Ba)		65.8		5.0	mg/kg		24-SEP-10	R1474744
Beryllium (Be)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Cadmium (Cd)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Chromium (Cr)		74.6		0.50	mg/kg		24-SEP-10	R1474744
Cobalt (Co)		25.2		1.0	mg/kg		24-SEP-10	R1474744
Copper (Cu)		31.2		2.0	mg/kg		24-SEP-10	R1474744
Iron (Fe)		23600		200	mg/kg		24-SEP-10	R1474744
Lead (Pb)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Molybdenum (Mo)		1.4		1.0	mg/kg		24-SEP-10	R1474744
Nickel (Ni)		62.0		2.0	mg/kg		24-SEP-10	R1474744

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L923781-9	SCP5- EXPOSURE AREA SEDIMENT							
Sampled By:	TH/SW on 23-AUG-10 @ 15:00							
Matrix:	SEDIMENT							
Metals in Soil by ICPMS								
Selenium (Se)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Silver (Ag)		<1.0		1.0	mg/kg		24-SEP-10	R1474744
Strontium (Sr)		11.5		1.0	mg/kg		24-SEP-10	R1474744
Thallium (Tl)		<0.50		0.50	mg/kg		24-SEP-10	R1474744
Tin (Sn)		<5.0		5.0	mg/kg		24-SEP-10	R1474744
Uranium (U)		<2.0		2.0	mg/kg		24-SEP-10	R1474744
Vanadium (V)		42.2		1.0	mg/kg		24-SEP-10	R1474744
Zinc (Zn)		81		10	mg/kg		24-SEP-10	R1474744
Miscellaneous Parameters								
Fragments > 2mm		2.1		1.0	%		07-SEP-10	R1459954
Particle Size								
% Sand		9.4		1.0	%		09-SEP-10	R1462061
% Silt		85.4		1.0	%		09-SEP-10	R1462061
% Clay		5.2		1.0	%		09-SEP-10	R1462061
Texture		Silt					09-SEP-10	R1462061

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Chloride (Cl)	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Total Organic Carbon	MS-B	L923781-1, -2, -3, -4
Matrix Spike	Dissolved Organic Carbon	MS-B	L923781-1, -2, -3, -4

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L923781-1	SCP1- EXPOSURE AREA SI	SP	TOC - Sample was Preserved at the laboratory
L923781-2	SCF1- EXPOSURE AREA SI	SP	TOC - Sample was Preserved at the laboratory

Sample Parameter Qualifier Key:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-ED	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-LECO-SK Soil Total Carbon by combustion method SSSA (1996) P. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 °C in the presence of oxygen. Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen. This mixture of N2, CO2, and H2O is then passed through an absorber column containing magnesium perchlorate to remove water. N2 and CO2 gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 973-974 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-ORG-ED	Water	Total Organic Carbon	APHA 5310 B-Instrumental
CD-D-CCME-FAL-MS-ED	Water	Diss. Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CD-T-CCME-FAL-MS-ED	Water	Total Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CL-IC-ED	Water	Chloride by IC	APHA 4110 B-ION CHROMATOGRAPHY
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
F-IC-ED	Water	Fluoride by IC	APHA 4110 B-ION CHROMATOGRAPHY
FE-D-NP-U-ICP-ED	Water	Dissolved Fe in Water by ICPOES (Ultra)	APHA 3120 B-ICP-OES

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
FE-T-NP-U-ICP-ED	Water	Fe in Water by ICPOES (Undigested)	APHA 3120 B-ICP-OES
Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine non-turbid acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
HG-200.2-CVAA-ED	Soil	Mercury in Soil by CVAAS	EPA 200.2/245.1
Test method is based on US EPA Method 200.2 "Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements", and meets all requirements of BC CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC MOE, June 26, 2001. Soil is dried at <60°C and digested with nitric and hydrochloric acids, prior to analysis for mercury by cold vapour atomic absorption.			
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved	EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)	EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-200.2-MS-ED	Soil	Metals in Soil by ICPMS	EPA 200.2/6020A
MET-D-L-ICP-ED	Water	Diss. Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES
MET-D-L-MS-ED	Water	Diss. Metals in Water by ICPMS (Low)	SW 846 - 6020-ICPMS
MET-D-NP-U-MS-ED	Water	Diss. Metals in Water by ICPMS (Ultra)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
MET-T-L-ICP-ED	Water	Total Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES
MET-T-L-MS-ED	Water	Total Metals in Water by ICPMS (Low)	SW 846 - 6020-ICPMS
MET-T-NP-U-MS-ED	Water	Metals in Water by ICPMS (Undigested)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine, non-turbid, acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
N2N3-LOW-ED	Water	Nitrate+Nitrite-N	APHA 4500 NO3E-Colorimetry
NH4-LOW-ED	Water	Ammonia-N Low Level	APHA 4500 NH3F-Colorimetry
NO2-LOW-ED	Water	Nitrite-N	APHA 4500 NO2B-Colorimetry
NO3-LOW-ED	Water	Nitrate-N	APHA 4500 NO3H-Colorimetry
P-TOTAL-LOW-ED	Water	Phosphorus, Total- Low Level	APHA 4500 P B,E-Auto-Colorimetry
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
PSA-1-ED	Soil	Particle Size	CSSS 47.3 - Hydrometer
PSA-COARSE_FRAGS-ED	Soil	Fragments >2mm (Cobbles and Stones)	CSSS 47.4
RAD-RA226-BE	Water	Radium 226 (Becquerel)	MODIFIED EPA.903.0
SO4-L-IC-ED	Water	Sulfate by IC (Low Level)	APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ED		ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA	
SK		ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA	
WT		ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA	
BE		Bequerel Laboratories Inc. - Mississauga, Ontario, Canada	

Chain of Custody Numbers:

062778

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg ww - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 1 of 27

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED		Water						
Batch	R1467022							
WG1167341-10	CVS							
Dissolved Organic Carbon			120		%		80-160	16-SEP-10
WG1167341-25	CVS							
Dissolved Organic Carbon			96		%		80-160	18-SEP-10
WG1167341-3	CVS							
Dissolved Organic Carbon			126		%		80-160	15-SEP-10
WG1167341-32	CVS							
Dissolved Organic Carbon			102		%		80-160	20-SEP-10
WG1167341-41	CVS							
Dissolved Organic Carbon			118		%		80-160	21-SEP-10
WG1167341-1	LCS							
Dissolved Organic Carbon			96		%		80-120	15-SEP-10
WG1167341-16	LCS							
Dissolved Organic Carbon			107		%		80-120	17-SEP-10
WG1167341-24	LCS							
Dissolved Organic Carbon			105		%		80-120	18-SEP-10
WG1167341-31	LCS							
Dissolved Organic Carbon			95		%		80-120	20-SEP-10
WG1167341-40	LCS							
Dissolved Organic Carbon			104		%		80-120	21-SEP-10
WG1167341-9	LCS							
Dissolved Organic Carbon			109		%		80-120	16-SEP-10
WG1167341-15	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	17-SEP-10
WG1167341-2	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	15-SEP-10
WG1167341-23	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	18-SEP-10
WG1167341-30	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	20-SEP-10
WG1167341-39	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	21-SEP-10
WG1167341-8	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	16-SEP-10
WG1167341-29	MS	L931796-1						
Dissolved Organic Carbon			94		%		70-130	18-SEP-10
WG1167341-36	MS	L930050-9						
Dissolved Organic Carbon			N/A	MS-B	%		-	21-SEP-10
WG1167341-43	MS	L930050-52						

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 2 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED								
Water								
Batch	R1467022							
WG1167341-43 MS		L930050-52						
Dissolved Organic Carbon			103		%		70-130	21-SEP-10
C-TOT-ORG-ED								
Water								
Batch	R1467022							
WG1167341-10 CVS								
Total Organic Carbon			120		%		80-160	17-SEP-10
WG1167341-25 CVS								
Total Organic Carbon			96		%		80-160	20-SEP-10
WG1167341-3 CVS								
Total Organic Carbon			126		%		80-160	16-SEP-10
WG1167341-32 CVS								
Total Organic Carbon			102		%		80-160	20-SEP-10
WG1167341-41 CVS								
Total Organic Carbon			118		%		80-160	21-SEP-10
WG1167341-19 DUP		L923781-4						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	17-SEP-10
WG1167341-1 LCS								
Total Organic Carbon			96		%		80-120	15-SEP-10
WG1167341-16 LCS								
Total Organic Carbon			107		%		80-120	17-SEP-10
WG1167341-24 LCS								
Total Organic Carbon			105		%		80-120	20-SEP-10
WG1167341-31 LCS								
Total Organic Carbon			95		%		80-120	20-SEP-10
WG1167341-40 LCS								
Total Organic Carbon			104		%		80-120	21-SEP-10
WG1167341-9 LCS								
Total Organic Carbon			109		%		80-120	17-SEP-10
WG1167341-15 MB								
Total Organic Carbon			<1.0		mg/L		1	17-SEP-10
WG1167341-2 MB								
Total Organic Carbon			<1.0		mg/L		1	15-SEP-10
WG1167341-23 MB								
Total Organic Carbon			<1.0		mg/L		1	18-SEP-10
WG1167341-30 MB								
Total Organic Carbon			<1.0		mg/L		1	20-SEP-10
WG1167341-39 MB								
Total Organic Carbon			<1.0		mg/L		1	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 3 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch R1467022								
WG1167341-8 MB								
Total Organic Carbon			<1.0		mg/L		1	16-SEP-10
WG1167341-12 MS		L927580-1						
Total Organic Carbon			84		%		70-130	16-SEP-10
WG1167341-14 MS		L930820-9						
Total Organic Carbon			N/A	MS-B	%		-	16-SEP-10
WG1167341-18 MS		L928383-5						
Total Organic Carbon			N/A	MS-B	%		-	17-SEP-10
WG1167341-20 MS		L923781-4						
Total Organic Carbon			104		%		70-130	17-SEP-10
WG1167341-22 MS		L928611-4						
Total Organic Carbon			107		%		70-130	18-SEP-10
WG1167341-27 MS		L931645-1						
Total Organic Carbon			N/A	MS-B	%		-	18-SEP-10
WG1167341-34 MS		L930003-6						
Total Organic Carbon			96		%		70-130	20-SEP-10
WG1167341-38 MS		L929222-1						
Total Organic Carbon			N/A	MS-B	%		-	20-SEP-10
WG1167341-5 MS		L926789-30						
Total Organic Carbon			N/A	MS-B	%		-	15-SEP-10
WG1167341-7 MS		L926789-41						
Total Organic Carbon			N/A	MS-B	%		-	15-SEP-10
CD-D-CCME-FAL-MS-ED		Water						
Batch R1478372								
WG1173819-2 CRM		1643E_WATER						
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
WG1173819-1 MB								
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-10
Batch R1485147								
WG1176990-2 CRM		1643E_WATER						
Cadmium (Cd)-Dissolved			102		%		80-120	01-OCT-10
WG1176990-1 MB								
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	01-OCT-10
CD-T-CCME-FAL-MS-ED		Water						
Batch R1472084								
WG1170318-5 DUP		L923781-1						
Cadmium (Cd)-Total		0.000023	0.000022		mg/L	4.4	20	21-SEP-10
WG1170318-3 LCS								



Page 4 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CD-T-CCME-FAL-MS-ED		Water						
Batch	R1472084							
WG1170318-3	LCS							
Cadmium (Cd)-Total			101		%		80-120	21-SEP-10
WG1170318-4	LCS							
Cadmium (Cd)-Total			101		%		80-120	21-SEP-10
WG1170032-1	MB							
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	21-SEP-10
WG1170318-1	MB							
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	21-SEP-10
WG1170318-2	MB							
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	21-SEP-10
WG1170318-6	MS	L923781-1						
Cadmium (Cd)-Total			103		%		70-130	21-SEP-10
CL-IC-ED		Water						
Batch	R1449889							
WG1156076-2	LCS							
Chloride (Cl)			110		%		85-115	25-AUG-10
WG1156076-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	25-AUG-10
WG1156076-10	MS	L917893-13						
Chloride (Cl)			N/A	MS-B	%		-	26-AUG-10
WG1156076-12	MS	L924331-1						
Chloride (Cl)			N/A	MS-B	%		-	25-AUG-10
WG1156076-4	MS	L922913-8						
Chloride (Cl)			109		%		75-125	25-AUG-10
WG1156076-6	MS	L923785-15						
Chloride (Cl)			107		%		75-125	25-AUG-10
CN-TOT-WT		Water						
Batch	R1461729							
WG1163721-4	CVS							
Cyanide, Total			90		%		85-115	09-SEP-10
WG1163721-3	LCS							
Cyanide, Total			97		%		80-120	09-SEP-10
WG1163721-1	MB							
Cyanide, Total			<0.0020		mg/L		0.002	09-SEP-10
F-IC-ED		Water						

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 5 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-ED								
Water								
Batch	R1449889							
WG1156076-2	LCS							
Fluoride (F)			108		%		85-115	25-AUG-10
WG1156076-1	MB							
Fluoride (F)			<0.050		mg/L		0.05	25-AUG-10
WG1156076-4	MS	L922913-8						
Fluoride (F)			110		%		75-125	25-AUG-10
FE-D-NP-U-ICP-ED								
Water								
Batch	R1472095							
WG1169731-2	CRM	EU-H-3_OPTWATER						
WG1169731-11	DUP	L923781-4						
Iron (Fe)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-SEP-10
WG1169731-9	DUP	L923781-3						
Iron (Fe)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-SEP-10
WG1169731-1	MB							
Iron (Fe)-Dissolved			0.0053		mg/L		0.005	20-SEP-10
WG1169731-10	MS	L923781-3						
Iron (Fe)-Dissolved			105		%		70-130	20-SEP-10
WG1169731-12	MS	L923781-4						
Iron (Fe)-Dissolved			106		%		70-130	20-SEP-10
FE-T-NP-U-ICP-ED								
Water								
Batch	R1473907							
WG1170911-1	MB							
Iron (Fe)-Total			<0.0050		mg/L		0.005	22-SEP-10
HG-D-L-CVAA-ED								
Water								
Batch	R1473467							
WG1170544-4	DUP	L923781-3						
Mercury (Hg)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	21-SEP-10
WG1170544-2	LCS							
Mercury (Hg)-Dissolved			99		%		80-120	21-SEP-10
WG1170544-3	LCSD	WG1170544-2						
Mercury (Hg)-Dissolved		99	97		%	2.4	20	21-SEP-10
WG1170544-1	MB							
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	21-SEP-10
WG1170544-5	MS	L923781-3						
Mercury (Hg)-Dissolved			114		%		70-130	21-SEP-10
WG1170544-7	MS	L929483-5						
Mercury (Hg)-Dissolved			106		%		70-130	22-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 6 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED		Water						
Batch	R1473467							
WG1170544-2 LCS								
Mercury (Hg)-Total			99		%		80-120	21-SEP-10
WG1170544-3 LCSD		WG1170544-2						
Mercury (Hg)-Total		99	97		%	2.4	20	21-SEP-10
WG1170544-1 MB								
Mercury (Hg)-Total			<0.000020		mg/L		0.00002	21-SEP-10
MET-D-L-ICP-ED		Water						
Batch	R1472095							
WG1169731-2 CRM		EU-H-3_OPTWATER						
WG1169731-11 DUP		L923781-4						
Calcium (Ca)-Dissolved		<0.50	<0.20	RPD-NA	mg/L	N/A	20	20-SEP-10
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-SEP-10
Potassium (K)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-SEP-10
Sodium (Na)-Dissolved		<1.0	<0.50	RPD-NA	mg/L	N/A	20	20-SEP-10
WG1169731-9 DUP		L923781-3						
Calcium (Ca)-Dissolved		<0.50	<0.20	RPD-NA	mg/L	N/A	20	20-SEP-10
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-SEP-10
Potassium (K)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-SEP-10
Sodium (Na)-Dissolved		<1.0	<0.50	RPD-NA	mg/L	N/A	20	20-SEP-10
WG1169731-1 MB								
Calcium (Ca)-Dissolved			<0.20		mg/L		0.2	20-SEP-10
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	20-SEP-10
Potassium (K)-Dissolved			<0.1		mg/L		0.1	20-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	20-SEP-10
WG1169731-10 MS		L923781-3						
Calcium (Ca)-Dissolved			98		%		70-130	20-SEP-10
Magnesium (Mg)-Dissolved			101		%		70-130	20-SEP-10
Potassium (K)-Dissolved			95		%		70-130	20-SEP-10
Sodium (Na)-Dissolved			99		%		70-130	20-SEP-10
WG1169731-12 MS		L923781-4						
Calcium (Ca)-Dissolved			100		%		70-130	20-SEP-10
Magnesium (Mg)-Dissolved			101		%		70-130	20-SEP-10
Potassium (K)-Dissolved			97		%		70-130	20-SEP-10
Sodium (Na)-Dissolved			101		%		70-130	20-SEP-10
WG1169731-14 MS		L930832-6						
Calcium (Ca)-Dissolved			89		%		70-130	20-SEP-10
Magnesium (Mg)-Dissolved			91		%		70-130	20-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 7 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-ICP-ED								
Water								
Batch	R1472095							
WG1169731-14 MS		L930832-6						
Potassium (K)-Dissolved			81		%		70-130	20-SEP-10
Sodium (Na)-Dissolved			88		%		70-130	20-SEP-10
MET-D-L-MS-ED								
Water								
Batch	R1485147							
WG1176990-2 CRM		1643E_WATER						
Aluminum (Al)-Dissolved			103		%		80-120	01-OCT-10
Antimony (Sb)-Dissolved			97		%		80-120	01-OCT-10
Arsenic (As)-Dissolved			96		%		80-120	01-OCT-10
Barium (Ba)-Dissolved			95		%		80-120	01-OCT-10
Beryllium (Be)-Dissolved			89		%		80-120	01-OCT-10
Bismuth (Bi)-Dissolved			95		%		80-120	01-OCT-10
Boron (B)-Dissolved			99		%		80-120	01-OCT-10
Cadmium (Cd)-Dissolved			102		%		80-120	01-OCT-10
Chromium (Cr)-Dissolved			98		%		80-120	01-OCT-10
Cobalt (Co)-Dissolved			103		%		80-120	01-OCT-10
Copper (Cu)-Dissolved			98		%		80-120	01-OCT-10
Lead (Pb)-Dissolved			97		%		80-120	01-OCT-10
Molybdenum (Mo)-Dissolved			103		%		80-120	01-OCT-10
Nickel (Ni)-Dissolved			100		%		80-120	01-OCT-10
Selenium (Se)-Dissolved			93		%		80-120	01-OCT-10
Strontium (Sr)-Dissolved			97		%		80-120	01-OCT-10
Thallium (Tl)-Dissolved			103		%		80-120	01-OCT-10
Vanadium (V)-Dissolved			99		%		80-120	01-OCT-10
Zinc (Zn)-Dissolved			97		%		80-120	01-OCT-10
WG1176990-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	01-OCT-10
Antimony (Sb)-Dissolved			<0.00040		mg/L		0.0004	01-OCT-10
Arsenic (As)-Dissolved			<0.00040		mg/L		0.0004	01-OCT-10
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Beryllium (Be)-Dissolved			<0.00050		mg/L		0.0005	01-OCT-10
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	01-OCT-10
Boron (B)-Dissolved			<0.0020		mg/L		0.002	01-OCT-10
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	01-OCT-10
Chromium (Cr)-Dissolved			<0.00040		mg/L		0.0004	01-OCT-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 8 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-MS-ED		Water						
Batch	R1485147							
WG1176990-1	MB							
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Copper (Cu)-Dissolved			<0.00060		mg/L		0.0006	01-OCT-10
Lead (Pb)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Molybdenum (Mo)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Nickel (Ni)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Selenium (Se)-Dissolved			<0.00040		mg/L		0.0004	01-OCT-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Thallium (Tl)-Dissolved			<0.000050		mg/L		0.00005	01-OCT-10
Tin (Sn)-Dissolved			<0.00020		mg/L		0.0002	01-OCT-10
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	01-OCT-10
Uranium (U)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Vanadium (V)-Dissolved			<0.00010		mg/L		0.0001	01-OCT-10
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	01-OCT-10
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2	CRM	1643E_WATER						
Aluminum (Al)-Dissolved			108		%		80-120	21-SEP-10
Antimony (Sb)-Dissolved			97		%		80-120	21-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	21-SEP-10
Barium (Ba)-Dissolved			104		%		80-120	21-SEP-10
Beryllium (Be)-Dissolved			103		%		80-120	21-SEP-10
Bismuth (Bi)-Dissolved			103		%		80-120	21-SEP-10
Boron (B)-Dissolved			95		%		80-120	21-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
Calcium (Ca)-Dissolved			96		%		80-120	21-SEP-10
Chromium (Cr)-Dissolved			104		%		80-120	21-SEP-10
Cobalt (Co)-Dissolved			97		%		80-120	21-SEP-10
Copper (Cu)-Dissolved			104		%		80-120	21-SEP-10
Lead (Pb)-Dissolved			98		%		80-120	21-SEP-10
Lithium (Li)-Dissolved			115		%		80-120	21-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	21-SEP-10
Manganese (Mn)-Dissolved			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Dissolved			98		%		80-120	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 9 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Nickel (Ni)-Dissolved			103		%		80-120	21-SEP-10
Potassium (K)-Dissolved			95		%		80-120	21-SEP-10
Selenium (Se)-Dissolved			106		%		80-120	21-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	21-SEP-10
Strontium (Sr)-Dissolved			104		%		80-120	21-SEP-10
Thallium (Tl)-Dissolved			100		%		80-120	21-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	21-SEP-10
Zinc (Zn)-Dissolved			110		%		80-120	21-SEP-10
WG1170506-1 MB								
Aluminum (Al)-Dissolved			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Dissolved			<0.0010		mg/L		0.001	21-SEP-10
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Chromium (Cr)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Copper (Cu)-Dissolved			<0.00060		mg/L		0.0006	21-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Lithium (Li)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Magnesium (Mg)-Dissolved			<0.0040		mg/L		0.004	21-SEP-10
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Nickel (Ni)-Dissolved			<0.00006		mg/L		0.00006	21-SEP-10
Potassium (K)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Sodium (Na)-Dissolved			<0.0050		mg/L		0.005	21-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Thallium (Tl)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 10 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-1 MB								
Titanium (Ti)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Uranium (U)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Vanadium (V)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Zinc (Zn)-Dissolved			<0.00080		mg/L		0.0008	21-SEP-10
MET-T-L-ICP-ED		Water						
Batch	R1485205							
WG1170318-5 DUP		L923781-1						
Calcium (Ca)-Total		5.34	4.94		mg/L	7.9	20	01-OCT-10
Iron (Fe)-Total		0.382	0.350		mg/L	8.9	20	01-OCT-10
Magnesium (Mg)-Total		2.59	2.38		mg/L	8.2	20	01-OCT-10
Manganese (Mn)-Total		0.0360	0.0332		mg/L	8.1	20	01-OCT-10
Potassium (K)-Total		0.13	0.13		mg/L	0.0	20	01-OCT-10
Sodium (Na)-Total		2.3	2.1		mg/L	7.7	20	01-OCT-10
WG1170318-1 MB								
Calcium (Ca)-Total			<0.50		mg/L		0.5	01-OCT-10
Iron (Fe)-Total			<0.010		mg/L		0.01	01-OCT-10
Magnesium (Mg)-Total			<0.10		mg/L		0.1	01-OCT-10
Manganese (Mn)-Total			<0.0020		mg/L		0.002	01-OCT-10
Potassium (K)-Total			<0.10		mg/L		0.1	01-OCT-10
Sodium (Na)-Total			<1.0		mg/L		1	01-OCT-10
WG1170318-6 MS		L923781-1						
Calcium (Ca)-Total			89		%		70-130	01-OCT-10
Iron (Fe)-Total			85		%		70-130	01-OCT-10
Magnesium (Mg)-Total			89		%		70-130	01-OCT-10
Manganese (Mn)-Total			89		%		70-130	01-OCT-10
Potassium (K)-Total			90		%		70-130	01-OCT-10
Sodium (Na)-Total			85		%		70-130	01-OCT-10
MET-T-L-MS-ED		Water						
Batch	R1472084							
WG1170318-5 DUP		L923781-1						
Aluminum (Al)-Total		0.074	0.074		mg/L	0.49	20	21-SEP-10
Antimony (Sb)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	21-SEP-10
Arsenic (As)-Total		0.00406	0.00403		mg/L	0.62	20	21-SEP-10
Barium (Ba)-Total		0.00845	0.00828		mg/L	2.0	20	21-SEP-10
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 11 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED		Water						
Batch	R1472084							
WG1170318-5	DUP	L923781-1						
Bismuth (Bi)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		<0.020	0.0058		mg/L	3.4	20	21-SEP-10
Cadmium (Cd)-Total		<0.00020	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.00080	<0.00080	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		0.00261	0.00261		mg/L	0.038	20	21-SEP-10
Copper (Cu)-Total		0.0035	0.0036		mg/L	1.6	20	21-SEP-10
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		0.00010	0.00010		mg/L	0.0	20	21-SEP-10
Nickel (Ni)-Total		0.0255	0.0252		mg/L	0.84	20	21-SEP-10
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	21-SEP-10
Silver (Ag)-Total		<0.00040	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		0.0266	0.0268		mg/L	0.63	20	21-SEP-10
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Tin (Sn)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	21-SEP-10
Titanium (Ti)-Total		<0.0050	0.00094		mg/L	5.7	20	21-SEP-10
Uranium (U)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	21-SEP-10
Zinc (Zn)-Total		0.0130	0.0129		mg/L	0.65	20	21-SEP-10
WG1170318-3	LCS							
Aluminum (Al)-Total			105		%		80-120	21-SEP-10
Antimony (Sb)-Total			104		%		80-120	21-SEP-10
Arsenic (As)-Total			98		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			105		%		80-120	21-SEP-10
Bismuth (Bi)-Total			104		%		80-120	21-SEP-10
Boron (B)-Total			98		%		80-120	21-SEP-10
Cadmium (Cd)-Total			101		%		80-120	21-SEP-10
Chromium (Cr)-Total			106		%		80-120	21-SEP-10
Cobalt (Co)-Total			105		%		80-120	21-SEP-10
Copper (Cu)-Total			96		%		80-120	21-SEP-10
Lead (Pb)-Total			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			113		%		80-120	21-SEP-10
Nickel (Ni)-Total			99		%		80-120	21-SEP-10
Selenium (Se)-Total			92		%		80-120	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 12 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED		Water						
Batch	R1472084							
WG1170318-3	LCS							
Silver (Ag)-Total			102		%		80-120	21-SEP-10
Strontium (Sr)-Total			103		%		80-120	21-SEP-10
Thallium (Tl)-Total			106		%		80-120	21-SEP-10
Tin (Sn)-Total			106		%		80-120	21-SEP-10
Titanium (Ti)-Total			110		%		80-120	21-SEP-10
Uranium (U)-Total			115		%		80-120	21-SEP-10
Vanadium (V)-Total			104		%		80-120	21-SEP-10
Zinc (Zn)-Total			84		%		80-120	21-SEP-10
WG1170318-4	LCS							
Aluminum (Al)-Total			106		%		80-120	21-SEP-10
Antimony (Sb)-Total			104		%		80-120	21-SEP-10
Arsenic (As)-Total			99		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			103		%		80-120	21-SEP-10
Bismuth (Bi)-Total			104		%		80-120	21-SEP-10
Boron (B)-Total			101		%		80-120	21-SEP-10
Cadmium (Cd)-Total			101		%		80-120	21-SEP-10
Chromium (Cr)-Total			107		%		80-120	21-SEP-10
Cobalt (Co)-Total			105		%		80-120	21-SEP-10
Copper (Cu)-Total			97		%		80-120	21-SEP-10
Lead (Pb)-Total			103		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			114		%		80-120	21-SEP-10
Nickel (Ni)-Total			98		%		80-120	21-SEP-10
Selenium (Se)-Total			93		%		80-120	21-SEP-10
Silver (Ag)-Total			103		%		80-120	21-SEP-10
Strontium (Sr)-Total			102		%		80-120	21-SEP-10
Thallium (Tl)-Total			107		%		80-120	21-SEP-10
Tin (Sn)-Total			108		%		80-120	21-SEP-10
Titanium (Ti)-Total			111		%		80-120	21-SEP-10
Uranium (U)-Total			116		%		80-120	21-SEP-10
Vanadium (V)-Total			106		%		80-120	21-SEP-10
Zinc (Zn)-Total			84		%		80-120	21-SEP-10
WG1170032-1	MB							
Aluminum (Al)-Total			<0.010		mg/L		0.01	21-SEP-10
Antimony (Sb)-Total			<0.00040		mg/L		0.0004	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 13 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED		Water						
Batch	R1472084							
WG1170032-1 MB								
Arsenic (As)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Barium (Ba)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Beryllium (Be)-Total			<0.0010		mg/L		0.001	21-SEP-10
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Boron (B)-Total			<0.0040		mg/L		0.004	21-SEP-10
Cadmium (Cd)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Chromium (Cr)-Total			<0.00080		mg/L		0.0008	21-SEP-10
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Copper (Cu)-Total			<0.0010		mg/L		0.001	21-SEP-10
Lead (Pb)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Nickel (Ni)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Selenium (Se)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Tin (Sn)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Titanium (Ti)-Total			<0.00060		mg/L		0.0006	21-SEP-10
Uranium (U)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-SEP-10
Zinc (Zn)-Total			<0.0040		mg/L		0.004	21-SEP-10
WG1170318-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	21-SEP-10
Antimony (Sb)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Arsenic (As)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Barium (Ba)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Beryllium (Be)-Total			<0.0010		mg/L		0.001	21-SEP-10
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Boron (B)-Total			<0.0040		mg/L		0.004	21-SEP-10
Cadmium (Cd)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Chromium (Cr)-Total			<0.00080		mg/L		0.0008	21-SEP-10
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Copper (Cu)-Total			<0.0010		mg/L		0.001	21-SEP-10
Lead (Pb)-Total			<0.00010		mg/L		0.0001	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 14 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED	Water							
Batch	R1472084							
WG1170318-1 MB								
Molybdenum (Mo)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Nickel (Ni)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Selenium (Se)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Tin (Sn)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Titanium (Ti)-Total			<0.00060		mg/L		0.0006	21-SEP-10
Uranium (U)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-SEP-10
Zinc (Zn)-Total			<0.0040		mg/L		0.004	21-SEP-10
WG1170318-2 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	21-SEP-10
Antimony (Sb)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Arsenic (As)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Barium (Ba)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Beryllium (Be)-Total			<0.0010		mg/L		0.001	21-SEP-10
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Boron (B)-Total			<0.0040		mg/L		0.004	21-SEP-10
Cadmium (Cd)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Chromium (Cr)-Total			<0.00080		mg/L		0.0008	21-SEP-10
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Copper (Cu)-Total			<0.0010		mg/L		0.001	21-SEP-10
Lead (Pb)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Nickel (Ni)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Selenium (Se)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Tin (Sn)-Total			<0.00040		mg/L		0.0004	21-SEP-10
Titanium (Ti)-Total			<0.00060		mg/L		0.0006	21-SEP-10
Uranium (U)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 15 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED								
Water								
Batch	R1472084							
WG1170318-2 MB								
Zinc (Zn)-Total			<0.0040		mg/L		0.004	21-SEP-10
WG1170032-3 MS		L930832-4						
Aluminum (Al)-Total			107		%		70-130	21-SEP-10
Antimony (Sb)-Total			104		%		70-130	21-SEP-10
Arsenic (As)-Total			101		%		70-130	21-SEP-10
Barium (Ba)-Total			103		%		70-130	21-SEP-10
Beryllium (Be)-Total			105		%		70-130	21-SEP-10
Bismuth (Bi)-Total			105		%		70-130	21-SEP-10
Boron (B)-Total			102		%		70-130	21-SEP-10
Cadmium (Cd)-Total			103		%		70-130	21-SEP-10
Chromium (Cr)-Total			102		%		70-130	21-SEP-10
Cobalt (Co)-Total			97		%		70-130	21-SEP-10
Copper (Cu)-Total			94		%		70-130	21-SEP-10
Lead (Pb)-Total			105		%		70-130	21-SEP-10
Molybdenum (Mo)-Total			105		%		70-130	21-SEP-10
Nickel (Ni)-Total			96		%		70-130	21-SEP-10
Selenium (Se)-Total			104		%		70-130	21-SEP-10
Silver (Ag)-Total			102		%		70-130	21-SEP-10
Strontium (Sr)-Total			97		%		70-130	21-SEP-10
Thallium (Tl)-Total			107		%		70-130	21-SEP-10
Tin (Sn)-Total			104		%		70-130	21-SEP-10
Titanium (Ti)-Total			104		%		70-130	21-SEP-10
Uranium (U)-Total			101		%		70-130	21-SEP-10
Vanadium (V)-Total			104		%		70-130	21-SEP-10
Zinc (Zn)-Total			90		%		70-130	21-SEP-10
WG1170318-6 MS		L923781-1						
Aluminum (Al)-Total			104		%		70-130	21-SEP-10
Antimony (Sb)-Total			103		%		70-130	21-SEP-10
Arsenic (As)-Total			99		%		70-130	21-SEP-10
Barium (Ba)-Total			105		%		70-130	21-SEP-10
Beryllium (Be)-Total			107		%		70-130	21-SEP-10
Bismuth (Bi)-Total			109		%		70-130	21-SEP-10
Boron (B)-Total			99		%		70-130	21-SEP-10
Cadmium (Cd)-Total			103		%		70-130	21-SEP-10
Chromium (Cr)-Total			102		%		70-130	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 16 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-ED								
Water								
Batch	R1472084							
WG1170318-6 MS		L923781-1						
Cobalt (Co)-Total			101		%		70-130	21-SEP-10
Copper (Cu)-Total			96		%		70-130	21-SEP-10
Lead (Pb)-Total			108		%		70-130	21-SEP-10
Molybdenum (Mo)-Total			105		%		70-130	21-SEP-10
Nickel (Ni)-Total			96		%		70-130	21-SEP-10
Selenium (Se)-Total			96		%		70-130	21-SEP-10
Silver (Ag)-Total			103		%		70-130	21-SEP-10
Strontium (Sr)-Total			101		%		70-130	21-SEP-10
Thallium (Tl)-Total			110		%		70-130	21-SEP-10
Tin (Sn)-Total			104		%		70-130	21-SEP-10
Titanium (Ti)-Total			106		%		70-130	21-SEP-10
Uranium (U)-Total			107		%		70-130	21-SEP-10
Vanadium (V)-Total			104		%		70-130	21-SEP-10
Zinc (Zn)-Total			89		%		70-130	21-SEP-10
MET-T-NP-U-MS-ED								
Water								
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Aluminum (Al)-Total			108		%		80-120	21-SEP-10
Antimony (Sb)-Total			97		%		80-120	21-SEP-10
Arsenic (As)-Total			102		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			106		%		80-120	21-SEP-10
Bismuth (Bi)-Total			103		%		80-120	21-SEP-10
Boron (B)-Total			95		%		80-120	21-SEP-10
Cadmium (Cd)-Total			105		%		80-120	21-SEP-10
Calcium (Ca)-Total			96		%		80-120	21-SEP-10
Chromium (Cr)-Total			104		%		80-120	21-SEP-10
Cobalt (Co)-Total			97		%		80-120	21-SEP-10
Copper (Cu)-Total			104		%		80-120	21-SEP-10
Lead (Pb)-Total			98		%		80-120	21-SEP-10
Lithium (Li)-Total			115		%		80-120	21-SEP-10
Magnesium (Mg)-Total			104		%		80-120	21-SEP-10
Manganese (Mn)-Total			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			98		%		80-120	21-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 17 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Nickel (Ni)-Total			103		%		80-120	21-SEP-10
Potassium (K)-Total			95		%		80-120	21-SEP-10
Selenium (Se)-Total			106		%		80-120	21-SEP-10
Silver (Ag)-Total			101		%		80-120	21-SEP-10
Sodium (Na)-Total			104		%		80-120	21-SEP-10
Strontium (Sr)-Total			104		%		80-120	21-SEP-10
Thallium (Tl)-Total			100		%		80-120	21-SEP-10
Vanadium (V)-Total			101		%		80-120	21-SEP-10
Zinc (Zn)-Total			110		%		80-120	21-SEP-10
WG1170506-1 MB								
Aluminum (Al)-Total			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Total			<0.0010		mg/L		0.001	21-SEP-10
Cadmium (Cd)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Calcium (Ca)-Total			<0.020		mg/L		0.02	21-SEP-10
Chromium (Cr)-Total			<0.000060		mg/L		0.00006	21-SEP-10
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Copper (Cu)-Total			<0.00060		mg/L		0.0006	21-SEP-10
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Lithium (Li)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Magnesium (Mg)-Total			<0.0040		mg/L		0.004	21-SEP-10
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Total			<0.000060		mg/L		0.00006	21-SEP-10
Nickel (Ni)-Total			<0.00006		mg/L		0.00006	21-SEP-10
Potassium (K)-Total			<0.020		mg/L		0.02	21-SEP-10
Selenium (Se)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Silver (Ag)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Sodium (Na)-Total			<0.0050		mg/L		0.005	21-SEP-10
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	21-SEP-10
Thallium (Tl)-Total			<0.000030		mg/L		0.00003	21-SEP-10



Workorder: L923781

Page 18 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
MET-T-NP-U-MS-ED		Water							
Batch	R1474628								
WG1170506-1	MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	21-SEP-10	
Titanium (Ti)-Total			<0.00010		mg/L		0.0001	21-SEP-10	
Uranium (U)-Total			<0.000050		mg/L		0.00005	21-SEP-10	
Vanadium (V)-Total			<0.000050		mg/L		0.00005	21-SEP-10	
Zinc (Zn)-Total			<0.00080		mg/L		0.0008	21-SEP-10	
N2N3-LOW-ED		Water							
Batch	R1451272								
WG1157309-3	LCS								
Nitrate+Nitrite-N			101		%		85-115	26-AUG-10	
WG1157309-2	MB								
Nitrate+Nitrite-N			<0.0060		mg/L		0.006	26-AUG-10	
WG1157309-10	MS	L923438-32							
Nitrate+Nitrite-N			108		%		73-121	26-AUG-10	
WG1157309-5	MS	L924138-12							
Nitrate+Nitrite-N			99		%		73-121	26-AUG-10	
WG1157309-7	MS	L924137-17							
Nitrate+Nitrite-N			99		%		73-121	26-AUG-10	
NH4-LOW-ED		Water							
Batch	R1455811								
WG1160124-10	DUP	L923781-2							
Ammonia-N			0.0141	0.0124	J	mg/L	0.0017	0.01	01-SEP-10
WG1160124-2	LCS								
Ammonia-N			111		%		85-115	01-SEP-10	
WG1160124-3	LCS								
Ammonia-N			102		%		85-115	01-SEP-10	
WG1160124-1	MB								
Ammonia-N			<0.0050		mg/L		0.005	01-SEP-10	
WG1160124-5	MS	L923571-1							
Ammonia-N			102		%		75-122	01-SEP-10	
WG1160124-7	MS	L924137-13							
Ammonia-N			100		%		75-122	01-SEP-10	
WG1160124-9	MS	L923685-5							
Ammonia-N			102		%		75-122	01-SEP-10	
NO2-LOW-ED		Water							

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 19 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-LOW-ED								
Batch R1451272								
WG1157309-3	LCS							
Nitrite-N			101		%		85-115	26-AUG-10
WG1157309-2	MB							
Nitrite-N			<0.0020		mg/L		0.002	26-AUG-10
WG1157309-5	MS	L924138-12						
Nitrite-N			98		%		78-122	26-AUG-10
WG1157309-7	MS	L924137-17						
Nitrite-N			94		%		78-122	26-AUG-10
P-TOTAL-LOW-ED								
Batch R1473265								
WG1169749-3	LCS							
Phosphorus, Total			100		%		80-120	21-SEP-10
WG1169749-2	MB							
Phosphorus, Total			<0.0010		mg/L		0.001	21-SEP-10
WG1169749-5	MS	L928818-2						
Phosphorus, Total			100		%		70-130	21-SEP-10
WG1169749-7	MS	L929483-1						
Phosphorus, Total			100		%		70-130	21-SEP-10
PH/EC/ALK-ED								
Batch R1450345								
WG1156452-2	LCS							
Conductivity (EC)			100		%		90-110	26-AUG-10
WG1156452-3	LCS							
pH			7.02		pH		6.9-7.1	26-AUG-10
WG1156452-4	LCS							
Alkalinity, Total (as CaCO3)			98		%		85-115	26-AUG-10
WG1156452-5	LCS							
Conductivity (EC)			99		%		90-110	26-AUG-10
WG1156452-1	MB							
Bicarbonate (HCO3)			<5.0		mg/L		5	26-AUG-10
Carbonate (CO3)			<5.0		mg/L		5	26-AUG-10
Hydroxide (OH)			<5.0		mg/L		5	26-AUG-10
Alkalinity, Total (as CaCO3)			<5.0		mg/L		5	26-AUG-10
SO4-L-IC-ED								
Batch R1449889								
WG1156076-2	LCS							
Sulfate (SO4)			111		%		85-115	25-AUG-10
WG1156076-1	MB							

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 20 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-L-IC-ED								
Water								
Batch	R1449889							
WG1156076-1	MB							
Sulfate (SO4)			<0.050		mg/L		0.05	25-AUG-10
Batch	R1453429							
WG1158350-2	LCS							
Sulfate (SO4)			104		%		85-115	30-AUG-10
WG1158350-1	MB							
Sulfate (SO4)			<0.050		mg/L		0.05	30-AUG-10
SOLIDS-TOTSUS-ED								
Water								
Batch	R1451704							
WG1157214-5	DUP	L923781-1						
Total Suspended Solids		<3.0	<3.0	RPD-NA	mg/L	N/A	20	27-AUG-10
WG1157214-2	LCS							
Total Suspended Solids			98		%		85-115	27-AUG-10
WG1157214-3	LCS							
Total Suspended Solids			98		%		85-115	27-AUG-10
WG1157214-1	MB							
Total Suspended Solids			<3.0		mg/L		3	27-AUG-10
C-INORG-ORG-SK								
Soil								
Batch	R1460907							
WG1159689-2	IRM	0.4%IC						
Inorganic Carbon			0.39		%		0.28-0.52	08-SEP-10
CaCO3 Equivalent			3.15		%		2.33-4.33	08-SEP-10
WG1159689-3	MB							
Inorganic Carbon			<0.10		%		0.1	08-SEP-10
CaCO3 Equivalent			<0.80		%		0.8	08-SEP-10
C-TOT-LECO-SK								
Soil								
Batch	R1460903							
WG1159687-2	IRM	2004_SOIL						
Total Carbon by Combustion			1.5		%		1.1-1.7	02-SEP-10
WG1159687-3	MB							
Total Carbon by Combustion			<0.1		%		0.1	02-SEP-10
HG-200.2-CVAA-ED								
Soil								
Batch	R1474765							
WG1170034-4	CRM	TILL-1_SOIL						
Mercury (Hg)			118		%		80-120	22-SEP-10
WG1170034-5	CRM	PACS-2_SOIL						

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 21 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-ED		Soil						
Batch	R1474765							
WG1170034-5	CRM	PACS-2_SOIL						
Mercury (Hg)			116		%		80-120	23-SEP-10
WG1170034-6	CRM	2702_SOIL						
Mercury (Hg)			90		%		70-100	22-SEP-10
WG1170034-1	MB							
Mercury (Hg)			<0.050		mg/kg		0.05	22-SEP-10
WG1170034-2	MB							
Mercury (Hg)			<0.050		mg/kg		0.05	22-SEP-10
WG1170034-3	MB							
Mercury (Hg)			<0.050		mg/kg		0.05	22-SEP-10
MET-200.2-MS-ED		Soil						
Batch	R1474744							
WG1170034-4	CRM	TILL-1_SOIL						
Aluminum (Al)			91		%		60-140	24-SEP-10
Antimony (Sb)			96		%		80-120	24-SEP-10
Arsenic (As)			95		%		80-120	24-SEP-10
Barium (Ba)			100		%		60-140	24-SEP-10
Chromium (Cr)			100		%		80-120	24-SEP-10
Cobalt (Co)			104		%		80-120	24-SEP-10
Copper (Cu)			100		%		80-120	24-SEP-10
Iron (Fe)			92		%		80-120	24-SEP-10
Lead (Pb)			92		%		80-120	24-SEP-10
Nickel (Ni)			101		%		80-120	24-SEP-10
Strontium (Sr)			97		%		60-140	24-SEP-10
Vanadium (V)			99		%		80-120	24-SEP-10
Zinc (Zn)			82		%		80-120	24-SEP-10
WG1170034-5	CRM	PACS-2_SOIL						
Aluminum (Al)			94		%		60-140	24-SEP-10
Antimony (Sb)			115		%		80-120	24-SEP-10
Arsenic (As)			101		%		80-120	24-SEP-10
Barium (Ba)			94		%		60-140	24-SEP-10
Cadmium (Cd)			105		%		60-140	24-SEP-10
Chromium (Cr)			102		%		80-120	24-SEP-10
Cobalt (Co)			106		%		80-120	24-SEP-10
Copper (Cu)			98		%		80-120	24-SEP-10
Iron (Fe)			99		%		80-120	24-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 22 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1474744							
WG1170034-5	CRM	PACS-2_SOIL						
Lead (Pb)			100		%		80-120	24-SEP-10
Molybdenum (Mo)			117		%		80-120	24-SEP-10
Nickel (Ni)			103		%		80-120	24-SEP-10
Strontium (Sr)			101		%		60-140	24-SEP-10
Tin (Sn)			115		%		80-120	24-SEP-10
Vanadium (V)			104		%		80-120	24-SEP-10
Zinc (Zn)			84		%		80-120	24-SEP-10
WG1170034-6	CRM	2702_SOIL						
Aluminum (Al)			94		%		60-140	24-SEP-10
Arsenic (As)			91		%		80-120	24-SEP-10
Barium (Ba)			103		%		80-120	24-SEP-10
Chromium (Cr)			104		%		80-120	24-SEP-10
Cobalt (Co)			108		%		80-120	24-SEP-10
Copper (Cu)			101		%		80-120	24-SEP-10
Iron (Fe)			108		%		80-120	24-SEP-10
Lead (Pb)			97		%		80-120	24-SEP-10
Molybdenum (Mo)			90		%		80-120	24-SEP-10
Nickel (Ni)			115		%		80-120	24-SEP-10
Strontium (Sr)			98		%		60-140	24-SEP-10
Tin (Sn)			94		%		80-120	24-SEP-10
Vanadium (V)			98		%		80-120	24-SEP-10
WG1170034-1	MB							
Aluminum (Al)			<50		mg/kg		50	24-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	24-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	24-SEP-10
Barium (Ba)			<5.0		mg/kg		5	24-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	24-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	24-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	24-SEP-10
Copper (Cu)			<2.0		mg/kg		2	24-SEP-10
Iron (Fe)			<200		mg/kg		200	24-SEP-10
Lead (Pb)			<5.0		mg/kg		5	24-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	24-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	24-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 23 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1474744							
WG1170034-1	MB							
Selenium (Se)			<0.50		mg/kg		0.5	24-SEP-10
Silver (Ag)			<1.0		mg/kg		1	24-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	24-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	24-SEP-10
Tin (Sn)			<5.0		mg/kg		5	24-SEP-10
Uranium (U)			<2.0		mg/kg		2	24-SEP-10
Vanadium (V)			<1.0		mg/kg		1	24-SEP-10
Zinc (Zn)			<10		mg/kg		10	24-SEP-10
WG1170034-2	MB							
Aluminum (Al)			<50		mg/kg		50	24-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	24-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	24-SEP-10
Barium (Ba)			<5.0		mg/kg		5	24-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	24-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	24-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	24-SEP-10
Copper (Cu)			<2.0		mg/kg		2	24-SEP-10
Iron (Fe)			<200		mg/kg		200	24-SEP-10
Lead (Pb)			<5.0		mg/kg		5	24-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	24-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	24-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	24-SEP-10
Silver (Ag)			<1.0		mg/kg		1	24-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	24-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	24-SEP-10
Tin (Sn)			<5.0		mg/kg		5	24-SEP-10
Uranium (U)			<2.0		mg/kg		2	24-SEP-10
Vanadium (V)			<1.0		mg/kg		1	24-SEP-10
Zinc (Zn)			<10		mg/kg		10	24-SEP-10
WG1170034-3	MB							
Aluminum (Al)			<50		mg/kg		50	24-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	24-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	24-SEP-10
Barium (Ba)			<5.0		mg/kg		5	24-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 24 of 27

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch R1474744								
WG1170034-3 MB								
Beryllium (Be)			<1.0		mg/kg		1	24-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	24-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	24-SEP-10
Copper (Cu)			<2.0		mg/kg		2	24-SEP-10
Iron (Fe)			<200		mg/kg		200	24-SEP-10
Lead (Pb)			<5.0		mg/kg		5	24-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	24-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	24-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	24-SEP-10
Silver (Ag)			<1.0		mg/kg		1	24-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	24-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	24-SEP-10
Tin (Sn)			<5.0		mg/kg		5	24-SEP-10
Uranium (U)			<2.0		mg/kg		2	24-SEP-10
Vanadium (V)			<1.0		mg/kg		1	24-SEP-10
Zinc (Zn)			<10		mg/kg		10	24-SEP-10
PSA-1-ED		Soil						
Batch R1462061								
WG1163536-1 MB								
% Sand			<1.0		%		1	09-SEP-10
% Silt			<1.0		%		1	09-SEP-10
% Clay			<1.0		%		1	09-SEP-10

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 25 of 27

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 26 of 27

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate+Nitrite-N	1	23-AUG-10 09:30	26-AUG-10 00:00	48	62	hours	EHTL
	2	23-AUG-10 10:00	26-AUG-10 00:00	48	62	hours	EHTL
	3	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
	4	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
Nitrate-N	1	23-AUG-10 09:30	26-AUG-10 00:00	48	62	hours	EHTL
	2	23-AUG-10 10:00	26-AUG-10 00:00	48	62	hours	EHTL
	3	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
	4	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
Nitrite-N	1	23-AUG-10 09:30	26-AUG-10 00:00	48	62	hours	EHTL
	2	23-AUG-10 10:00	26-AUG-10 00:00	48	62	hours	EHTL
	3	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
	4	23-AUG-10 11:00	26-AUG-10 00:00	48	61	hours	EHTL
Phosphorus, Total- Low Level	1	23-AUG-10 09:30	21-SEP-10 00:00	28	29	days	EHT
	2	23-AUG-10 10:00	21-SEP-10 00:00	28	29	days	EHT
	3	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT
	4	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT
Cyanides							
Cyanide, Total	1	23-AUG-10 09:30	09-SEP-10 13:14	14	17	days	EHT
	2	23-AUG-10 10:00	09-SEP-10 13:15	14	17	days	EHT
	3	23-AUG-10 11:00	09-SEP-10 13:16	14	17	days	EHT
	4	23-AUG-10 11:00	09-SEP-10 13:17	14	17	days	EHT
Organic / Inorganic Carbon							
Inorganic and Organic Carbon	5	23-AUG-10 10:30	08-SEP-10 00:00	14	16	days	EHT
	6	23-AUG-10 11:30	08-SEP-10 00:00	14	16	days	EHT
	7	23-AUG-10 12:30	08-SEP-10 00:00	14	15	days	EHT
	8	23-AUG-10 13:30	08-SEP-10 00:00	14	15	days	EHT
	9	23-AUG-10 15:00	08-SEP-10 00:00	14	15	days	EHT
Metals							
Mercury in Soil by CVAAS	5	23-AUG-10 10:30	22-SEP-10 00:00	28	30	days	EHT
	6	23-AUG-10 11:30	22-SEP-10 00:00	28	30	days	EHT
	7	23-AUG-10 12:30	22-SEP-10 00:00	28	29	days	EHT
	8	23-AUG-10 13:30	22-SEP-10 00:00	28	29	days	EHT
	9	23-AUG-10 15:00	22-SEP-10 00:00	28	29	days	EHT
Total Metals							
Mercury (Hg)	1	23-AUG-10 09:30	21-SEP-10 00:00	28	29	days	EHT
	2	23-AUG-10 10:00	21-SEP-10 00:00	28	29	days	EHT
	3	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT
	4	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT
Dissolved Metals							
Mercury (Hg) - Dissolved	1	23-AUG-10 09:30	21-SEP-10 00:00	28	29	days	EHT
	2	23-AUG-10 10:00	21-SEP-10 00:00	28	29	days	EHT
	3	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT
	4	23-AUG-10 11:00	21-SEP-10 00:00	28	29	days	EHT

Legend & Qualifier Definitions:

Quality Control Report

Workorder: L923781

Report Date: 04-OCT-10

Page 27 of 27

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L923781 were received on 24-AUG-10 16:59.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ANALYSIS REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01112.0

Date: 10-Sep-2010

ALS Laboratory Group
Environmental Div.
9936-67th Avenue
Edmonton, AB, T6P 0P5

Phone: (780) 413-8441
FAX: (780) 437-2680

Client Ref. L923781

attn: Christine Potts

4 water samples Sampled: 23-Aug-2010 Received: 27-Aug-2010 Page 1 of 1

<u>Results of Analysis</u>					
Sample	Test	Result	Units	Date	Method
SCP1- EXPOSURE AREA SURFACE WATER	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
SCF1- EXPOSURE AREA SURFACE WATER	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
FB- FIELD BLANK	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
TB- TRIP BLANK	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA

Methods: ALPHA BQ-RAD-ALPHA alpha-particle spectrometry

Units: Bq/l Becquerels per litre

These results relate only to the samples analysed and only to the items tested.

10-Sep-2010 approved by: _____
Steven Simpson
Quality Manager

This test report shall not be reproduced, except in full, without written approval of Becquerel Laboratories Inc.



QUALITY REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01112.0

Date: 10-Sep-2010

Standard	Analyte	<u>Standards</u>		Result	Expected Result
		Units			
RA226.33	Ra-226	Bq/l		0.97	1.00

Analyte	<u>Blanks</u>	
	Units	Result
Ra-226	Bq/l	< 0.01

Analyte	Units	<u>Duplicates</u>	
		Result	Duplicate
Ra-226	Bq/l	< 0.01	< 0.01

Analyte	<u>Spikes</u>	
		% Recovery
Ra-226		85



Report To		Report Format / Distribution				Service Requested: (Rush subject to availability)			
Company: AECOM		Standard: ☒	Other (specify):	☒	Regular (Standard Turnaround Times)				(Surcharges apply)
Contact: Colleen Prather		Select: PDF ☒	Excel ☒	Digital ☒	Priority, Date Req'd:				
Address: 17007-107 Ave., Edmonton, AB		Email 1: colleen.prather@aecom.com			Emergency (1 Business Day) - 100% Surcharge				
Phone: (780) 486-7000 Fax: (780) 486-1010		Email 2: tiffany.hnatuk@aecom.com			For Emergency < 1 Day, ASAP or Weekend - Contact ALS				
Invoice To: Same as Report? (circle) Yes ☒ or No		Client / Project Information			Analysis Request				
Company: Copy of Invoice with Report? (circle) Yes ☒ or No		Job #: 60147160			(Indicate Filtered or Preserved, F/P)				
Contact:		PO / A/E:			F/P	F/P	F/P	F/P	
Address:		LSD:			F/P	F/P	F/P	F/P	
Phone:		Quote #: Q25816			F/P	F/P	F/P	F/P	
Fax:		ALS Sean Whitaker			F/P	F/P	F/P	F/P	
Lab Work Order # (lab use only)	1923781	Contact:	Sample: TH/Sw		F/P	F/P	F/P	F/P	
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type					
	SCP1 - exposure area surface water	23-Aug-10	9:30	water	X	X	X	X	9
	SCF1 - exposure area surface water	23-Aug-10	10:00	water	X	X	X	X	9
	FB - exposure area field blank	23-Aug-10	11:00	water	X	X	X	X	9
	TB - trip blank	23-Aug-10	—	water	X	X	X	X	9
	SCP1 - exposure area sediment	23-Aug-10	10:30	sediment					
	SCP2 - exposure area sediment	23-Aug-10	11:30	sediment					
	SCP3 - exposure area sediment	23-Aug-10	12:30	sediment					
	SCP4 - exposure area sediment	23-Aug-10	13:30	sediment					
	SCP5 - exposure area sediment	23-Aug-10	15:00	sediment					
Special Instructions / Regulations / Hazardous Details									
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.									
SHIPMENT RELEASE (client use)					SHIPMENT VERIFICATION (lab use only)				
Released by: Tiffany Hnatuk	Date: 24-Aug-10	Time: 8:00	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.									



AECOM CANADA LTD.
ATTN: COLLEEN PRATHER
17007 107 AVE NW
EDMONTON AB T5S 1G3
Phone: 780-486-7015

Date Received: 27-AUG-10
Report Date: 12-NOV-10 14:02 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L925358
Project P.O. #: NOT SUBMITTED
Job Reference: 60147160
Legal Site Desc:
C of C Numbers: 10-062779

Comments: ADDITIONAL 12-NOV-10 11:38
ADDITIONAL 12-NOV-10 11:38

12-NOV-10: Revised for the addition of Sr, Fe, Al for the sediments

Maureen Olinek
Senior Account Manager

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ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LIMITED Part of the ALS Group A Campbell Brothers Limited Company

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-1	R2-1 (REF#2,SURFACE WATER)							
Sampled By:	TH/SW on 26-AUG-10 @ 09:30							
Matrix:	WATER							
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		0.0196		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		0.000723		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		0.00164		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0035		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		0.886		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		0.000086		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		0.00011		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		0.00095		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00120		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		0.458		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		0.00383		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		0.00189		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		0.403		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		0.495		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		0.00464		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		0.00032	RRV	0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		0.00046	RRV	0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		0.00187		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		0.0660		0.0050	mg/L		02-SEP-10	R1457426
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		0.0709		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		0.0162		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		0.000704		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total		0.00162		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total		0.0031		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total		0.777		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total		0.000065		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total		0.00011		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total		0.00088		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total		0.						

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-1 R2-1 (REF#2,SURFACE WATER) Sampled By: TH/SW on 26-AUG-10 @ 09:30 Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Molybdenum (Mo)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.00177		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	0.408		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	0.480		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.00456		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	0.00016		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	<0.0050		0.0050	mg/L		17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L	25-SEP-10	25-SEP-10	R1478020
Dissolved Organic Carbon	4.1		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Phosphorus, Total	0.0046		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Total Organic Carbon	4.2		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		31-AUG-10	R1454396
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		30-AUG-10	R1453429
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	0.85		0.50	mg/L		02-SEP-10	R1457426
Magnesium (Mg)-Dissolved	0.50		0.10	mg/L		02-SEP-10	R1457426
Potassium (K)-Dissolved	0.47		0.10	mg/L		02-SEP-10	R1457426
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		02-SEP-10	R1457426
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		30-AUG-10	R1453429
Ion Balance Calculation							
Ion Balance	Low EC			%		07-SEP-10	
TDS (Calculated)	3.7			mg/L		07-SEP-10	
Hardness (as CaCO3)	4.2			mg/L		07-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrite-N							
Nitrite-N	<0.0020		0.0020	mg/L		30-AUG-10	R1454568
Sulfate by IC (Low Level)							
Sulfate (SO4)	1.90		0.050	mg/L		30-AUG-10	R1453429
pH, Conductivity and Total Alkalinity							
pH	6.46		0.10	pH		30-AUG-10	R1453131
Conductivity (EC)	10.6		0.20	uS/cm		30-AUG-10	R1453131
Bicarbonate (HCO3)	<5.0		5.0	mg/L		30-AUG-10	R1453131
Carbonate (CO3)	<5.0		5.0	mg/L		30-AUG-10	R1453131
Hydroxide (OH)	<5.0		5.0	mg/L		30-AUG-10	R1453131

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-1	R2-1 (REF#2,SURFACE WATER)							
Sampled By: TH/SW on 26-AUG-10 @ 09:30								
Matrix: WATER								
pH, Conductivity and Total Alkalinity Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		30-AUG-10	R1453131
L925358-2	R2-2 (REF#2,SURFACE WATER)							
Sampled By: TH/SW on 26-AUG-10 @ 10:30								
Matrix: WATER								
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		0.00871		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		0.000659		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		0.00147		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0035		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		0.746		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		0.00101		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00121		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		0.439		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		0.00139		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		0.00191		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		0.424		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		0.515		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		0.00442		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		0.00508	RRV	0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		0.00241	RRV	0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		0.0052		0.0050	mg/L		02-SEP-10	R1457426
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		0.0689		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		0.0165		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		0.000683		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total		0.00149		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total		0.0029		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total		0.757		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total		<0.000060		0.000060	mg/L		21-SEP-10	R1474628

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-2 R2-2 (REF#2,SURFACE WATER)							
Sampled By: TH/SW on 26-AUG-10 @ 10:30							
Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Cobalt (Co)-Total	0.00010		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	0.00093		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00122		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	0.446		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	0.00329		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.00193		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	0.403		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	0.480		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.00440		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	0.00017		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	0.0079		0.0050	mg/L		17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L	25-SEP-10	25-SEP-10	R1478020
Dissolved Organic Carbon	4.3		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Phosphorus, Total	0.0038		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Total Organic Carbon	4.1		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		31-AUG-10	R1454396
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		30-AUG-10	R1453429
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	0.59		0.50	mg/L		02-SEP-10	R1457426
Magnesium (Mg)-Dissolved	0.41		0.10	mg/L		02-SEP-10	R1457426
Potassium (K)-Dissolved	0.35		0.10	mg/L		02-SEP-10	R1457426
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		02-SEP-10	R1457426
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		30-AUG-10	R1453429
Ion Balance Calculation							
Ion Balance	Low EC			%		07-SEP-10	
TDS (Calculated)	3.3			mg/L		07-SEP-10	
Hardness (as CaCO3)	3.2			mg/L		07-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrite-N							
Nitrite-N	<0.0020		0.0020	mg/L		30-AUG-10	R1454568
Sulfate by IC (Low Level)							
Sulfate (SO4)	1.94		0.050	mg/L		30-AUG-10	R1453429

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-2	R2-2 (REF#2,SURFACE WATER)							
Sampled By: TH/SW on 26-AUG-10 @ 10:30								
Matrix: WATER								
pH, Conductivity and Total Alkalinity								
pH		6.74		0.10	pH		30-AUG-10	R1453131
Conductivity (EC)		10.2		0.20	uS/cm		30-AUG-10	R1453131
Bicarbonate (HCO3)		<5.0		5.0	mg/L		30-AUG-10	R1453131
Carbonate (CO3)		<5.0		5.0	mg/L		30-AUG-10	R1453131
Hydroxide (OH)		<5.0		5.0	mg/L		30-AUG-10	R1453131
Alkalinity, Total (as CaCO3)		<5.0		5.0	mg/L		30-AUG-10	R1453131
L925358-3	R2-3 (REF#2,SURFACE WATER)							
Sampled By: TH/SW on 26-AUG-10 @ 12:30								
Matrix: WATER								
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		0.0177		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		0.000685		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		0.00231		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0026		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		1.29		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		0.000068		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		0.00015		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		0.00282		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00164		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		0.702		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		0.00215		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		0.00716		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		0.429		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		0.646		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		0.00718		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		0.00014		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		0.00142		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		0.0285		0.0050	mg/L		02-SEP-10	R1457426
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		0.0989		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		0.0268		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		0.000698		0.000030	mg/L		21-SEP-10	R1474628</

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-3	R2-3 (REF#2,SURFACE WATER)						
Sampled By:	TH/SW on 26-AUG-10 @ 12:30						
Matrix:	WATER						
Metals in Water by ICPMS (Undigested)							
Bismuth (Bi)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total	0.0023		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total	1.24		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total	0.000063		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	0.00020		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	0.00300		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	0.000090		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00160		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	0.705		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	0.00311		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.00723		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	0.425		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	0.643		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.00724		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	0.00124		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	<0.0050		0.0050	mg/L	25-SEP-10	17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L		25-SEP-10	R1478020
Dissolved Organic Carbon	4.4		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		14-SEP-10	R1465604
Phosphorus, Total	0.0448		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Total Organic Carbon	4.4		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		31-AUG-10	R1454396
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		30-AUG-10	R1453429
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	1.06		0.50	mg/L		02-SEP-10	R1457426
Magnesium (Mg)-Dissolved	0.66		0.10	mg/L		02-SEP-10	R1457426
Potassium (K)-Dissolved	0.47		0.10	mg/L		02-SEP-10	R1457426
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		02-SEP-10	R1457426
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		30-AUG-10	R1453429
Ion Balance Calculation							
Ion Balance	Low EC			%		07-SEP-10	
TDS (Calculated)	6.8			mg/L		07-SEP-10	
Hardness (as CaCO3)	5.4			mg/L		07-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrate-N							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-3R2-3 (REF#2,SURFACE WATER) Sampled By: TH/SW on 26-AUG-10 @ 12:30 Matrix: WATER							
Nitrate-N Nitrate-N	<0.0060		0.0060	mg/L		30-AUG-10	R1454568
Nitrite-N Nitrite-N	<0.0020		0.0020	mg/L		30-AUG-10	R1454568
Sulfate by IC (Low Level) Sulfate (SO4)	4.58		0.050	mg/L		30-AUG-10	R1453429
pH, Conductivity and Total Alkalinity pH	6.67		0.10	pH		30-AUG-10	R1453131
Conductivity (EC)	15.9		0.20	uS/cm		30-AUG-10	R1453131
Bicarbonate (HCO3)	<5.0		5.0	mg/L		30-AUG-10	R1453131
Carbonate (CO3)	<5.0		5.0	mg/L		30-AUG-10	R1453131
Hydroxide (OH)	<5.0		5.0	mg/L		30-AUG-10	R1453131
Alkalinity, Total (as CaCO3)	<5.0		5.0	mg/L		30-AUG-10	R1453131
L925358-4R2-1 (REF#2, SEDIMENT) Sampled By: TH/SW on 26-AUG-10 @ 10:00 Matrix: SEDIMENT							
Total Organic Carbon -Inorg & Total C Inorganic and Organic Carbon							
Inorganic Carbon	<0.10		0.10	%	01-SEP-10	01-SEP-10	R1457493
Total Organic Carbon	0.51		0.10	%	01-SEP-10	01-SEP-10	R1457493
CaCO3 Equivalent	<0.80		0.80	%	01-SEP-10	01-SEP-10	R1457493
Total Carbon by combustion method Total Carbon by Combustion	0.5		0.1	%	01-SEP-10	01-SEP-10	R1457490
Metals in Soil by ICPMS (CCME) Mercury in Soil by CVAAS							
Mercury (Hg)	<0.050		0.050	mg/kg	03-SEP-10	07-SEP-10	R1460304
Metals in Soil by ICPMS							
Aluminum (Al)	4630		50	mg/kg		07-SEP-10	R1460123
Antimony (Sb)	<0.20		0.20	mg/kg		07-SEP-10	R1460123
Arsenic (As)	6.96		0.20	mg/kg		07-SEP-10	R1460123
Barium (Ba)	36.8		5.0	mg/kg		07-SEP-10	R1460123
Beryllium (Be)	<1.0		1.0	mg/kg		07-SEP-10	R1460123
Cadmium (Cd)	<0.50		0.50	mg/kg		07-SEP-10	R1460123
Chromium (Cr)	20.3		0.50	mg/kg		07-SEP-10	R1460123
Cobalt (Co)	4.5		1.0	mg/kg		07-SEP-10	R1460123
Copper (Cu)	3.7		2.0	mg/kg		07-SEP-10	R1460123
Iron (Fe)	8040		200	mg/kg		07-SEP-10	R1460123
Lead (Pb)	<5.0		5.0	mg/kg		07-SEP-10	R1460123
Molybdenum (Mo)	<1.0		1.0	mg/kg		07-SEP-10	R1460123
Nickel (Ni)	14.8		2.0	mg/kg		07-SEP-10	R1460123
Selenium (Se)	<0.50		0.50	mg/kg		07-SEP-10	R1460123
Silver (Ag)	<1.0		1.0	mg/kg		07-SEP-10	R1460123
Strontium (Sr)	2.5		1.0	mg/kg		07-SEP-10	R1460123
Thallium (Tl)	<0.50		0.50	mg/kg		07-SEP-10	R1460123
Tin (Sn)	<5.0		5.0	mg/kg		07-SEP-10	R1460123
Uranium (U)	<2.0		2.0	mg/kg		07-SEP-10	R1460123
Vanadium (V)	16.5		1.0	mg/kg		07-SEP-10	R1460123
Zinc (Zn)	45		10	mg/kg		07-SEP-10	R1460123
Miscellaneous Parameters							
Fragments > 2mm	1.5		1.0	%		07-SEP-10	R1459954
Particle Size % Sand	95.8		1.0	%		25-SEP-10	R1477942

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925358-8	R2-5 (REF#2, SEDIMENT)							
Sampled By:	TH/SW on 26-AUG-10 @ 15:00							
Matrix:	SEDIMENT							
Metals in Soil by ICPMS								
Copper (Cu)		10.2		2.0	mg/kg		07-SEP-10	R1460123
Iron (Fe)		7750		200	mg/kg		07-SEP-10	R1460123
Lead (Pb)		<5.0		5.0	mg/kg		07-SEP-10	R1460123
Molybdenum (Mo)		<1.0		1.0	mg/kg		07-SEP-10	R1460123
Nickel (Ni)		23.2		2.0	mg/kg		07-SEP-10	R1460123
Selenium (Se)		<0.50		0.50	mg/kg		07-SEP-10	R1460123
Silver (Ag)		<1.0		1.0	mg/kg		07-SEP-10	R1460123
Strontium (Sr)		4.7		1.0	mg/kg		07-SEP-10	R1460123
Thallium (Tl)		<0.50		0.50	mg/kg		07-SEP-10	R1460123
Tin (Sn)		<5.0		5.0	mg/kg		07-SEP-10	R1460123
Uranium (U)		<2.0		2.0	mg/kg		07-SEP-10	R1460123
Vanadium (V)		13.8		1.0	mg/kg		07-SEP-10	R1460123
Zinc (Zn)		27		10	mg/kg		07-SEP-10	R1460123
Miscellaneous Parameters								
Fragments > 2mm		<1.0		1.0	%		07-SEP-10	R1459954
Particle Size								
% Sand		92.6		1.0	%		25-SEP-10	R1477942
% Silt		7.0		1.0	%		25-SEP-10	R1477942
% Clay		<1.0		1.0	%		25-SEP-10	R1477942
Texture		Sand					25-SEP-10	R1477942

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)	DUP-H	L925358-4, -5, -6, -7, -8
Matrix Spike	Dissolved Organic Carbon	MS-B	L925358-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L925358-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L925358-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L925358-1, -2, -3

Sample Parameter Qualifier Key:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-ED	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO₂ loss is proportional to the carbonate content of the soil.

Reference:

Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-LECO-SK Soil Total Carbon by combustion method SSSA (1996) P. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 °C in the presence of oxygen. Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen. This mixture of N₂, CO₂, and H₂O is then passed through an absorber column containing magnesium perchlorate to remove water. N₂ and CO₂ gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference:

Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 973-974 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-ORG-ED	Water	Total Organic Carbon	APHA 5310 B-Instrumental
CL-IC-ED	Water	Chloride by IC	APHA 4110 B-ION CHROMATOGRAPHY
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

F-IC-ED	Water	Fluoride by IC	APHA 4110 B-ION CHROMATOGRAPHY
FE-D-NP-U-ICP-ED	Water	Dissolved Fe in Water by ICPOES (Ultra)	APHA 3120 B-ICP-OES

Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.

FE-T-NP-U-ICP-ED	Water	Fe in Water by ICPOES (Undigested)	APHA 3120 B-ICP-OES

Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine non-turbid acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.

HG-200.2-CVAA-ED	Soil	Mercury in Soil by CVAAS	EPA 200.2/245.1

Test method is based on US EPA Method 200.2 "Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements", and meets all requirements of BC CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC MOE, June 26, 2001. Soil is dried at <60°C and digested with nitric and hydrochloric acids, prior to analysis for mercury by cold vapour atomic absorption.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved	EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)	EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-200.2-MS-ED	Soil	Metals in Soil by ICPMS	EPA 200.2/6020A
MET-D-L-ICP-ED	Water	Diss. Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES
MET-D-NP-U-MS-ED	Water	Diss. Metals in Water by ICPMS (Ultra)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
MET-T-NP-U-MS-ED	Water	Metals in Water by ICPMS (Undigested)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine, non-turbid, acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
N2N3-LOW-ED	Water	Nitrate+Nitrite-N	APHA 4500 NO3E-Colorimetry
NH4-LOW-ED	Water	Ammonia-N Low Level	APHA 4500 NH3F-Colorimetry
NO2-LOW-ED	Water	Nitrite-N	APHA 4500 NO2B-Colorimetry
NO3-LOW-ED	Water	Nitrate-N	APHA 4500 NO3H-Colorimetry
P-TOTAL-LOW-ED	Water	Phosphorus, Total- Low Level	APHA 4500 P B,E-Auto-Colorimetry
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320
PSA-1-ED	Soil	Particle Size	CSSS 47.3 - Hydrometer
PSA-COARSE_FRAGS-ED	Soil	Fragments >2mm (Cobbles and Stones)	CSSS 47.4
RAD-RA226-BE	Water	Radium 226 (Becquerel)	MODIFIED EPA.903.0
SO4-L-IC-ED	Water	Sulfate by IC (Low Level)	APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA
SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA
BE	Becquerel Laboratories Inc. - Mississauga, Ontario, Canada

Chain of Custody Numbers:

10-062779

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED		Water						
Batch	R1474506							
WG1171436-12	CVS							
Dissolved Organic Carbon			138		%		80-160	23-SEP-10
WG1171436-29	CVS							
Dissolved Organic Carbon			111		%		80-160	28-SEP-10
WG1171436-3	CVS							
Dissolved Organic Carbon			123		%		80-160	22-SEP-10
WG1171436-35	CVS							
Dissolved Organic Carbon			119		%		80-160	29-SEP-10
WG1171436-19	DUP	L935981-5						
Dissolved Organic Carbon			11.0	12.3	mg/L	11	20	26-SEP-10
WG1171436-32	DUP	L934312-1						
Dissolved Organic Carbon			3.7	3.3	mg/L	12	20	28-SEP-10
WG1171436-8	DUP	L927771-7						
Dissolved Organic Carbon			2.3	2.3	mg/L	0.64	20	22-SEP-10
WG1171436-11	LCS							
Dissolved Organic Carbon			97		%		80-120	23-SEP-10
WG1171436-2	LCS							
Dissolved Organic Carbon			95		%		80-120	22-SEP-10
WG1171436-28	LCS							
Dissolved Organic Carbon			90		%		80-120	27-SEP-10
WG1171436-34	LCS							
Dissolved Organic Carbon			92		%		80-120	28-SEP-10
WG1171436-1	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	22-SEP-10
WG1171436-10	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	23-SEP-10
WG1171436-27	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	27-SEP-10
WG1171436-33	MB							
Dissolved Organic Carbon			<1.0		mg/L		1	28-SEP-10
WG1171436-20	MS	L935981-5						
Dissolved Organic Carbon			N/A	MS-B	%		-	26-SEP-10
WG1171436-9	MS	L927771-8						
Dissolved Organic Carbon			99		%		70-130	22-SEP-10
C-TOT-ORG-ED		Water						



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 2 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch	R1474506							
WG1171436-12 CVS								
Total Organic Carbon			138		%		80-160	24-SEP-10
WG1171436-29 CVS								
Total Organic Carbon			111		%		80-160	28-SEP-10
WG1171436-3 CVS								
Total Organic Carbon			123		%		80-160	22-SEP-10
WG1171436-35 CVS								
Total Organic Carbon			119		%		80-160	29-SEP-10
WG1171436-13 DUP		L931048-5						
Total Organic Carbon		3.2	3.1		mg/L	4.5	20	23-SEP-10
WG1171436-15 DUP		L931273-1						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	23-SEP-10
WG1171436-17 DUP		L933880-7						
Total Organic Carbon		9.8	9.2		mg/L	6.5	20	23-SEP-10
WG1171436-21 DUP		L931474-2						
Total Organic Carbon		2.8	2.9		mg/L	1.4	20	24-SEP-10
WG1171436-23 DUP		L934144-1						
Total Organic Carbon		12.2	12.0		mg/L	2.1	20	24-SEP-10
WG1171436-25 DUP		L936024-3						
Total Organic Carbon		53.6	53.5		mg/L	0.22	20	27-SEP-10
WG1171436-30 DUP		L932732-10						
Total Organic Carbon		4.2	3.3	J	mg/L	0.9	2	27-SEP-10
WG1171436-36 DUP		L935704-1						
Total Organic Carbon		58.3	59.5		mg/L	2.0	20	28-SEP-10
WG1171436-38 DUP		L932857-5						
Total Organic Carbon		1.1	<1.0	RPD-NA	mg/L	N/A	20	28-SEP-10
WG1171436-4 DUP		L930275-1						
Total Organic Carbon		3.5	3.5		mg/L	2.7	20	22-SEP-10
WG1171436-6 DUP		L933983-3						
Total Organic Carbon		3.6	3.6		mg/L	0.55	20	23-SEP-10
WG1171436-11 LCS								
Total Organic Carbon			97		%		80-120	23-SEP-10
WG1171436-2 LCS								
Total Organic Carbon			95		%		80-120	22-SEP-10
WG1171436-28 LCS								
Total Organic Carbon			90		%		80-120	28-SEP-10
WG1171436-34 LCS								
Total Organic Carbon			92		%		80-120	29-SEP-10



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 3 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch	R1474506							
WG1171436-1 MB								
Total Organic Carbon			<1.0		mg/L		1	22-SEP-10
WG1171436-10 MB								
Total Organic Carbon			<1.0		mg/L		1	23-SEP-10
WG1171436-27 MB								
Total Organic Carbon			<1.0		mg/L		1	27-SEP-10
WG1171436-33 MB								
Total Organic Carbon			<1.0		mg/L		1	28-SEP-10
WG1171436-14 MS		L931048-5						
Total Organic Carbon			88		%		70-130	23-SEP-10
WG1171436-16 MS		L931273-1						
Total Organic Carbon			104		%		70-130	23-SEP-10
WG1171436-18 MS		L933880-7						
Total Organic Carbon			92		%		70-130	23-SEP-10
WG1171436-22 MS		L931474-2						
Total Organic Carbon			91		%		70-130	24-SEP-10
WG1171436-24 MS		L934144-1						
Total Organic Carbon			N/A	MS-B	%		-	24-SEP-10
WG1171436-26 MS		L936024-3						
Total Organic Carbon			N/A	MS-B	%		-	27-SEP-10
WG1171436-31 MS		L932732-10						
Total Organic Carbon			83		%		70-130	27-SEP-10
WG1171436-37 MS		L935704-1						
Total Organic Carbon			N/A	MS-B	%		-	28-SEP-10
WG1171436-39 MS		L932857-5						
Total Organic Carbon			98		%		70-130	28-SEP-10
WG1171436-5 MS		L930275-1						
Total Organic Carbon			92		%		70-130	22-SEP-10
WG1171436-7 MS		L933983-3						
Total Organic Carbon			95		%		70-130	23-SEP-10
CL-IC-ED		Water						
Batch	R1453429							
WG1158350-6 DUP		L925576-2						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-AUG-10
WG1158350-2 LCS								
Chloride (Cl)			103		%		85-115	30-AUG-10
WG1158350-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	30-AUG-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
CL-IC-ED		Water							
Batch	R1453429								
WG1158350-7	MS	L925576-2	108		%		75-125	30-AUG-10	
Chloride (Cl)									
CN-TOT-WT		Water							
Batch	R1478020								
WG1173394-4	CVS		100		%		85-115	25-SEP-10	
Cyanide, Total									
WG1173394-3	LCS		110		%		80-120	25-SEP-10	
Cyanide, Total									
WG1173394-1	MB		<0.0020		mg/L		0.002	25-SEP-10	
Cyanide, Total									
F-IC-ED		Water							
Batch	R1453429								
WG1158350-2	LCS		103		%		85-115	30-AUG-10	
Fluoride (F)									
WG1158350-1	MB		<0.050		mg/L		0.05	30-AUG-10	
Fluoride (F)									
FE-D-NP-U-ICP-ED		Water							
Batch	R1457426								
WG1160677-2	CRM	EU-H-3_OPTWATER							
WG1160677-3	DUP	L925358-2	0.0052	0.0053	mg/L	3.5	20	02-SEP-10	
Iron (Fe)-Dissolved									
WG1160677-5	DUP	L925358-3	0.0285	0.0287	mg/L	0.71	20	02-SEP-10	
Iron (Fe)-Dissolved									
WG1160677-1	MB		<0.0050		mg/L		0.005	02-SEP-10	
Iron (Fe)-Dissolved									
WG1160677-4	MS	L925358-2	101		%		70-130	02-SEP-10	
Iron (Fe)-Dissolved									
WG1160677-6	MS	L925358-3	87		%		70-130	02-SEP-10	
Iron (Fe)-Dissolved									
FE-T-NP-U-ICP-ED		Water							
Batch	R1473907								
WG1170911-2	DUP	L929483-6	0.0103	0.0073	J	mg/L	0.0029	0.01	22-SEP-10
Iron (Fe)-Total									
WG1170911-1	MB		<0.0050		mg/L		0.005	22-SEP-10	
Iron (Fe)-Total									
HG-D-L-CVAA-ED		Water							

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 5 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-L-CVAA-ED		Water						
Batch	R1465604							
WG1166484-4	DUP	L854114-49						
Mercury (Hg)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	14-SEP-10
WG1166484-8	DUP	L927176-1						
Mercury (Hg)-Dissolved		<0.020	<0.000020	RPD-NA	mg/L	N/A	20	14-SEP-10
WG1166484-2	LCS							
Mercury (Hg)-Dissolved			95		%		80-120	14-SEP-10
WG1166484-3	LCSD	WG1166484-2						
Mercury (Hg)-Dissolved		95	85		%	11	20	14-SEP-10
WG1166484-1	MB							
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	14-SEP-10
WG1166484-5	MS	L854114-49						
Mercury (Hg)-Dissolved			111		%		70-130	14-SEP-10
WG1166484-9	MS	L927176-1						
Mercury (Hg)-Dissolved			104		%		70-130	14-SEP-10
HG-T-L-CVAA-ED		Water						
Batch	R1465604							
WG1166484-2	LCS							
Mercury (Hg)-Total			95		%		80-120	14-SEP-10
WG1166484-3	LCSD	WG1166484-2						
Mercury (Hg)-Total		95	85		%	11	20	14-SEP-10
WG1166484-1	MB							
Mercury (Hg)-Total			<0.000020		mg/L		0.00002	14-SEP-10
MET-D-L-ICP-ED		Water						
Batch	R1457426							
WG1160677-2	CRM	EU-H-3_OPTWATER						
WG1160677-3	DUP	L925358-2						
Calcium (Ca)-Dissolved		0.59	0.65		mg/L	9.7	20	02-SEP-10
Magnesium (Mg)-Dissolved		0.41	0.44		mg/L	8.6	20	02-SEP-10
Potassium (K)-Dissolved		0.35	0.52	J	mg/L	0.16	0.2	02-SEP-10
Sodium (Na)-Dissolved		<1.0	<0.50	RPD-NA	mg/L	N/A	20	02-SEP-10
WG1160677-5	DUP	L925358-3						
Calcium (Ca)-Dissolved		1.06	1.09		mg/L	2.6	20	02-SEP-10
Magnesium (Mg)-Dissolved		0.66	0.67		mg/L	1.3	20	02-SEP-10
Potassium (K)-Dissolved		0.47	0.47		mg/L	0.43	20	02-SEP-10
Sodium (Na)-Dissolved		<1.0	0.59		mg/L	3.3	20	02-SEP-10
WG1160677-1	MB							
Calcium (Ca)-Dissolved			<0.20		mg/L		0.2	02-SEP-10



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 6 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-ICP-ED		Water						
Batch	R1457426							
WG1160677-1 MB								
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	02-SEP-10
Potassium (K)-Dissolved			<0.10		mg/L		0.1	02-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	02-SEP-10
WG1160677-4 MS		L925358-2						
Calcium (Ca)-Dissolved			103		%		70-130	02-SEP-10
Magnesium (Mg)-Dissolved			104		%		70-130	02-SEP-10
Potassium (K)-Dissolved			99		%		70-130	02-SEP-10
Sodium (Na)-Dissolved			103		%		70-130	02-SEP-10
WG1160677-6 MS		L925358-3						
Calcium (Ca)-Dissolved			90		%		70-130	02-SEP-10
Magnesium (Mg)-Dissolved			91		%		70-130	02-SEP-10
Potassium (K)-Dissolved			84		%		70-130	02-SEP-10
Sodium (Na)-Dissolved			86		%		70-130	02-SEP-10
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Aluminum (Al)-Dissolved			108		%		80-120	21-SEP-10
Antimony (Sb)-Dissolved			97		%		80-120	21-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	21-SEP-10
Barium (Ba)-Dissolved			104		%		80-120	21-SEP-10
Beryllium (Be)-Dissolved			103		%		80-120	21-SEP-10
Bismuth (Bi)-Dissolved			103		%		80-120	21-SEP-10
Boron (B)-Dissolved			95		%		80-120	21-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
Calcium (Ca)-Dissolved			96		%		80-120	21-SEP-10
Chromium (Cr)-Dissolved			104		%		80-120	21-SEP-10
Cobalt (Co)-Dissolved			97		%		80-120	21-SEP-10
Copper (Cu)-Dissolved			104		%		80-120	21-SEP-10
Lead (Pb)-Dissolved			98		%		80-120	21-SEP-10
Lithium (Li)-Dissolved			115		%		80-120	21-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	21-SEP-10
Manganese (Mn)-Dissolved			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Dissolved			98		%		80-120	21-SEP-10
Nickel (Ni)-Dissolved			103		%		80-120	21-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 7 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Potassium (K)-Dissolved			95		%		80-120	21-SEP-10
Selenium (Se)-Dissolved			106		%		80-120	21-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	21-SEP-10
Strontium (Sr)-Dissolved			104		%		80-120	21-SEP-10
Thallium (Tl)-Dissolved			100		%		80-120	21-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	21-SEP-10
Zinc (Zn)-Dissolved			110		%		80-120	21-SEP-10
WG1170506-1 MB								
Aluminum (Al)-Dissolved			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Dissolved			<0.0010		mg/L		0.001	21-SEP-10
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Chromium (Cr)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Copper (Cu)-Dissolved			<0.00060		mg/L		0.0006	21-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Lithium (Li)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Magnesium (Mg)-Dissolved			<0.0040		mg/L		0.004	21-SEP-10
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Nickel (Ni)-Dissolved			<0.00006		mg/L		0.00006	21-SEP-10
Potassium (K)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Sodium (Na)-Dissolved			<0.0050		mg/L		0.005	21-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Thallium (Tl)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Titanium (Ti)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 8 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-1 MB								
Uranium (U)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Vanadium (V)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Zinc (Zn)-Dissolved			<0.00080		mg/L		0.0008	21-SEP-10
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Aluminum (Al)-Total			108		%		80-120	21-SEP-10
Antimony (Sb)-Total			97		%		80-120	21-SEP-10
Arsenic (As)-Total			102		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			106		%		80-120	21-SEP-10
Bismuth (Bi)-Total			103		%		80-120	21-SEP-10
Boron (B)-Total			95		%		80-120	21-SEP-10
Cadmium (Cd)-Total			105		%		80-120	21-SEP-10
Calcium (Ca)-Total			96		%		80-120	21-SEP-10
Chromium (Cr)-Total			104		%		80-120	21-SEP-10
Cobalt (Co)-Total			97		%		80-120	21-SEP-10
Copper (Cu)-Total			104		%		80-120	21-SEP-10
Lead (Pb)-Total			98		%		80-120	21-SEP-10
Lithium (Li)-Total			115		%		80-120	21-SEP-10
Magnesium (Mg)-Total			104		%		80-120	21-SEP-10
Manganese (Mn)-Total			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			98		%		80-120	21-SEP-10
Nickel (Ni)-Total			103		%		80-120	21-SEP-10
Potassium (K)-Total			95		%		80-120	21-SEP-10
Selenium (Se)-Total			106		%		80-120	21-SEP-10
Silver (Ag)-Total			101		%		80-120	21-SEP-10
Sodium (Na)-Total			104		%		80-120	21-SEP-10
Strontium (Sr)-Total			104		%		80-120	21-SEP-10
Thallium (Tl)-Total			100		%		80-120	21-SEP-10
Vanadium (V)-Total			101		%		80-120	21-SEP-10
Zinc (Zn)-Total			110		%		80-120	21-SEP-10
WG1170506-3 DUP		L929483-1						
Aluminum (Al)-Total		0.00074	0.00044	J	mg/L	0.00030	0.0006	21-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 9 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-3	DUP	L929483-1						
Antimony (Sb)-Total		0.000072	0.000071		mg/L	0.90	20	21-SEP-10
Arsenic (As)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Barium (Ba)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Bismuth (Bi)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		0.0047	0.0045		mg/L	4.9	20	21-SEP-10
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Calcium (Ca)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Copper (Cu)-Total		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	21-SEP-10
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Lithium (Li)-Total		0.00015	0.00020	J	mg/L	0.00005	0.0002	21-SEP-10
Magnesium (Mg)-Total		N/A	<0.0040	RPD-NA	mg/L	N/A	20	21-SEP-10
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Nickel (Ni)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Potassium (K)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Selenium (Se)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Sodium (Na)-Total		N/A	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Thallium (Tl)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Tin (Sn)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Titanium (Ti)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Uranium (U)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Vanadium (V)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Zinc (Zn)-Total		<0.00080	<0.00080	RPD-NA	mg/L	N/A	20	21-SEP-10
WG1170506-4	DUP	L930275-8						
Aluminum (Al)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	21-SEP-10
Antimony (Sb)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Arsenic (As)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Barium (Ba)-Total		<0.000050	0.000056	RPD-NA	mg/L	N/A	20	21-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 10 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-4	DUP	L930275-8						
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Bismuth (Bi)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		0.0023	0.0024		mg/L	1.1	20	21-SEP-10
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Calcium (Ca)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Copper (Cu)-Total		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	21-SEP-10
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Lithium (Li)-Total		0.00045	0.00046		mg/L	1.7	20	21-SEP-10
Magnesium (Mg)-Total		N/A	<0.0040	RPD-NA	mg/L	N/A	20	21-SEP-10
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Nickel (Ni)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Potassium (K)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Selenium (Se)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Sodium (Na)-Total		N/A	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Thallium (Tl)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Tin (Sn)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Titanium (Ti)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Uranium (U)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Vanadium (V)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Zinc (Zn)-Total		<0.00080	<0.00080	RPD-NA	mg/L	N/A	20	21-SEP-10
WG1170506-1	MB							
Aluminum (Al)-Total			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Total			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Total			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Total			<0.0010		mg/L		0.001	21-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 14 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R1453131							
WG1158254-2	LCS							
Conductivity (EC)			100		%		90-110	30-AUG-10
WG1158254-3	LCS							
pH			7.00		pH		6.9-7.1	30-AUG-10
WG1158254-4	LCS							
Alkalinity, Total (as CaCO ₃)			97		%		85-115	30-AUG-10
WG1158254-5	LCS							
Conductivity (EC)			97		%		90-110	30-AUG-10
WG1158254-1	MB							
Bicarbonate (HCO ₃)			<5.0		mg/L		5	30-AUG-10
Carbonate (CO ₃)			<5.0		mg/L		5	30-AUG-10
Hydroxide (OH)			<5.0		mg/L		5	30-AUG-10
Alkalinity, Total (as CaCO ₃)			<5.0		mg/L		5	30-AUG-10
SO4-L-IC-ED		Water						
Batch	R1453429							
WG1158350-2	LCS							
Sulfate (SO ₄)			104		%		85-115	30-AUG-10
WG1158350-1	MB							
Sulfate (SO ₄)			<0.050		mg/L		0.05	30-AUG-10
SOLIDS-TOTSUS-ED		Water						
Batch	R1454396							
WG1159064-3	DUP	L912809-13						
Total Suspended Solids		8.0	7.0		mg/L	13	20	31-AUG-10
WG1159064-2	LCS							
Total Suspended Solids			104		%		85-115	31-AUG-10
WG1159064-1	MB							
Total Suspended Solids			<3.0		mg/L		3	31-AUG-10
C-INORG-ORG-SK		Soil						
Batch	R1457493							
WG1159690-1	DUP	L925358-5						
Inorganic Carbon		0.13	0.10		%	19	30	01-SEP-10
CaCO ₃ Equivalent		1.51	1.32		%	13	25	01-SEP-10
WG1159690-2	IRM	0.4%IC						
Inorganic Carbon			0.39		%		0.28-0.52	01-SEP-10
CaCO ₃ Equivalent			3.54		%		2.33-4.33	01-SEP-10
WG1159690-3	MB							
Inorganic Carbon			<0.10		%		0.1	01-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 15 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK		Soil						
Batch	R1457493							
WG1159690-3 MB								
CaCO3 Equivalent			<0.80		%		0.8	01-SEP-10
C-TOT-LECO-SK		Soil						
Batch	R1457490							
WG1159688-1 DUP		L925358-5						
Total Carbon by Combustion		6.2	6.2		%	0.15	10	01-SEP-10
WG1159688-2 IRM		2004_SOIL						
Total Carbon by Combustion			1.4		%		1.1-1.7	01-SEP-10
WG1159688-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	01-SEP-10
HG-200.2-CVAA-ED		Soil						
Batch	R1460304							
WG1161323-3 CRM		TILL-1_SOIL						
Mercury (Hg)			96		%		80-120	07-SEP-10
WG1161323-4 CRM		PACS-2_SOIL						
Mercury (Hg)			99		%		80-120	07-SEP-10
WG1161323-6 DUP		L926074-6						
Mercury (Hg)		0.059	0.068		mg/kg	15	20	07-SEP-10
WG1161323-7 DUP		L926915-1						
Mercury (Hg)		<0.050	<0.050	RPD-NA	mg/kg	N/A	20	07-SEP-10
WG1161323-1 MB								
Mercury (Hg)			<0.050		mg/kg		0.05	07-SEP-10
WG1161323-2 MB								
Mercury (Hg)			<0.050		mg/kg		0.05	07-SEP-10
MET-200.2-MS-ED		Soil						
Batch	R1460123							
WG1161323-3 CRM		TILL-1_SOIL						
Aluminum (Al)			92		%		60-140	07-SEP-10
Antimony (Sb)			98		%		80-120	07-SEP-10
Arsenic (As)			99		%		80-120	07-SEP-10
Barium (Ba)			103		%		60-140	07-SEP-10
Chromium (Cr)			107		%		80-120	07-SEP-10
Cobalt (Co)			105		%		80-120	07-SEP-10
Copper (Cu)			103		%		80-120	07-SEP-10
Iron (Fe)			100		%		80-120	07-SEP-10
Lead (Pb)			94		%		80-120	



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 16 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1460123							
WG1161323-3	CRM	TILL-1_SOIL						
Lead (Pb)			94		%		80-120	07-SEP-10
Nickel (Ni)			105		%		80-120	07-SEP-10
Strontium (Sr)			99		%		60-140	07-SEP-10
Vanadium (V)			104		%		80-120	07-SEP-10
Zinc (Zn)			94		%		80-120	07-SEP-10
WG1161323-4	CRM	PACS-2_SOIL						
Aluminum (Al)			93		%		60-140	07-SEP-10
Antimony (Sb)			114		%		80-120	07-SEP-10
Arsenic (As)			99		%		80-120	07-SEP-10
Barium (Ba)			98		%		60-140	07-SEP-10
Cadmium (Cd)			108		%		60-140	07-SEP-10
Chromium (Cr)			107		%		80-120	07-SEP-10
Cobalt (Co)			101		%		80-120	07-SEP-10
Copper (Cu)			94		%		80-120	07-SEP-10
Iron (Fe)			107		%		80-120	07-SEP-10
Lead (Pb)			101		%		80-120	07-SEP-10
Molybdenum (Mo)			109		%		80-120	07-SEP-10
Nickel (Ni)			98		%		80-120	07-SEP-10
Strontium (Sr)			98		%		60-140	07-SEP-10
Tin (Sn)			115		%		80-120	07-SEP-10
Vanadium (V)			109		%		80-120	07-SEP-10
Zinc (Zn)			91		%		80-120	07-SEP-10
WG1161323-6	DUP	L926074-6						
Aluminum (Al)		11200	11300		mg/kg	0.41	50	07-SEP-10
Antimony (Sb)		0.85	0.35	DUP-H	mg/kg	0.51	0.4	07-SEP-10
Arsenic (As)		11.2	12.3		mg/kg	9.0	30	07-SEP-10
Barium (Ba)		289	268		mg/kg	7.8	50	07-SEP-10
Beryllium (Be)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	07-SEP-10
Cadmium (Cd)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	07-SEP-10
Chromium (Cr)		25.3	25.2		mg/kg	0.44	30	07-SEP-10
Cobalt (Co)		14.0	14.5		mg/kg	3.7	30	07-SEP-10
Copper (Cu)		25.5	26.8		mg/kg	5.0	30	07-SEP-10
Iron (Fe)		36700	38300		mg/kg	4.4	30	07-SEP-10
Lead (Pb)		16.4	17.3		mg/kg			07-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 17 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1460123							
WG1161323-6	DUP	L926074-6						
Lead (Pb)		16.4	17.3		mg/kg	5.2	50	07-SEP-10
Molybdenum (Mo)		<1.0	1.1	RPD-NA	mg/kg	N/A	50	07-SEP-10
Nickel (Ni)		35.9	36.9		mg/kg	2.9	30	07-SEP-10
Selenium (Se)		0.85	0.90		mg/kg	5.8	30	07-SEP-10
Silver (Ag)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	07-SEP-10
Strontium (Sr)		40.6	39.2		mg/kg	3.5	50	07-SEP-10
Thallium (Tl)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	07-SEP-10
Tin (Sn)		<5.0	<5.0	RPD-NA	mg/kg	N/A	50	07-SEP-10
Uranium (U)		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	07-SEP-10
Vanadium (V)		33.0	33.3		mg/kg	1.1	30	07-SEP-10
Zinc (Zn)		96	99		mg/kg	2.4	30	07-SEP-10
WG1161323-7	DUP	L926915-1						
Aluminum (Al)		6320	6170		mg/kg	2.3	50	07-SEP-10
Antimony (Sb)		0.40	0.37		mg/kg	6.8	30	07-SEP-10
Arsenic (As)		6.29	5.73		mg/kg	9.3	30	07-SEP-10
Barium (Ba)		169	168		mg/kg	0.49	50	07-SEP-10
Beryllium (Be)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	07-SEP-10
Cadmium (Cd)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	07-SEP-10
Chromium (Cr)		16.5	16.1		mg/kg	2.4	30	07-SEP-10
Cobalt (Co)		8.4	7.7		mg/kg	8.8	30	07-SEP-10
Copper (Cu)		15.5	14.8		mg/kg	4.8	30	07-SEP-10
Iron (Fe)		17400	16800		mg/kg	3.8	30	07-SEP-10
Lead (Pb)		7.4	7.1		mg/kg	4.9	50	07-SEP-10
Molybdenum (Mo)		1.2	1.1		mg/kg	7.7	50	07-SEP-10
Nickel (Ni)		23.7	21.9		mg/kg	7.8	30	07-SEP-10
Selenium (Se)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	07-SEP-10
Silver (Ag)		<1.0	<1.0	RPD-NA	mg/kg	N/A	50	07-SEP-10
Strontium (Sr)		42.3	37.9		mg/kg	11	50	07-SEP-10
Thallium (Tl)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	07-SEP-10
Tin (Sn)		<5.0	<5.0	RPD-NA	mg/kg	N/A	50	07-SEP-10
Uranium (U)		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	07-SEP-10
Vanadium (V)		20.0	19.9		mg/kg	0.28	30	07-SEP-10
Zinc (Zn)		45	44		mg/kg	2.1	30	07-SEP-10



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 18 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED		Soil						
Batch	R1460123							
WG1161323-1	MB							
Aluminum (Al)			<50		mg/kg		50	07-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	07-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	07-SEP-10
Barium (Ba)			<5.0		mg/kg		5	07-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	07-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	07-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	07-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	07-SEP-10
Copper (Cu)			<2.0		mg/kg		2	07-SEP-10
Iron (Fe)			<200		mg/kg		200	07-SEP-10
Lead (Pb)			<5.0		mg/kg		5	07-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	07-SEP-10
Nickel (Ni)			<2.0		mg/kg		2	07-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	07-SEP-10
Silver (Ag)			<1.0		mg/kg		1	07-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	07-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	07-SEP-10
Tin (Sn)			<5.0		mg/kg		5	07-SEP-10
Uranium (U)			<2.0		mg/kg		2	07-SEP-10
Vanadium (V)			<1.0		mg/kg		1	07-SEP-10
Zinc (Zn)			<10		mg/kg		10	07-SEP-10
WG1161323-2	MB							
Aluminum (Al)			<50		mg/kg		50	07-SEP-10
Antimony (Sb)			<0.20		mg/kg		0.2	07-SEP-10
Arsenic (As)			<0.20		mg/kg		0.2	07-SEP-10
Barium (Ba)			<5.0		mg/kg		5	07-SEP-10
Beryllium (Be)			<1.0		mg/kg		1	07-SEP-10
Cadmium (Cd)			<0.50		mg/kg		0.5	07-SEP-10
Chromium (Cr)			<0.50		mg/kg		0.5	07-SEP-10
Cobalt (Co)			<1.0		mg/kg		1	07-SEP-10
Copper (Cu)			<2.0		mg/kg		2	07-SEP-10
Iron (Fe)			<200		mg/kg		200	07-SEP-10
Lead (Pb)			<5.0		mg/kg		5	07-SEP-10
Molybdenum (Mo)			<1.0		mg/kg		1	07-SEP-10



Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 19 of 21

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED								
Soil								
Batch R1460123								
WG1161323-2 MB								
Nickel (Ni)			<2.0		mg/kg		2	07-SEP-10
Selenium (Se)			<0.50		mg/kg		0.5	07-SEP-10
Silver (Ag)			<1.0		mg/kg		1	07-SEP-10
Strontium (Sr)			<1.0		mg/kg		1	07-SEP-10
Thallium (Tl)			<0.50		mg/kg		0.5	07-SEP-10
Tin (Sn)			<5.0		mg/kg		5	07-SEP-10
Uranium (U)			<2.0		mg/kg		2	07-SEP-10
Vanadium (V)			<1.0		mg/kg		1	07-SEP-10
Zinc (Zn)			<10		mg/kg		10	07-SEP-10
PSA-1-ED								
Soil								
Batch R1477942								
WG1173152-1 DUP								
		L923229-26						
% Sand		40.4	41.0		%	1.5	10	25-SEP-10
% Silt		30.8	30.6		%	0.65	9.8	25-SEP-10
% Clay		28.8	28.4		%	1.4	10	25-SEP-10
WG1173152-2 MB								
% Sand			<1.0		%		1	25-SEP-10
% Silt			<1.0		%		1	25-SEP-10
% Clay			<1.0		%		1	25-SEP-10

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 20 of 21

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L925358

Report Date: 12-NOV-10

Page 21 of 21

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate+Nitrite-N	1	26-AUG-10 09:30	30-AUG-10 00:00	48	86	hours	EHTL
	2	26-AUG-10 10:30	30-AUG-10 00:00	48	85	hours	EHTL
	3	26-AUG-10 12:30	30-AUG-10 00:00	48	84	hours	EHTL
Nitrate-N	1	26-AUG-10 09:30	30-AUG-10 00:00	48	86	hours	EHTL
	2	26-AUG-10 10:30	30-AUG-10 00:00	48	85	hours	EHTL
	3	26-AUG-10 12:30	30-AUG-10 00:00	48	84	hours	EHTL
Nitrite-N	1	26-AUG-10 09:30	30-AUG-10 00:00	48	86	hours	EHTL
	2	26-AUG-10 10:30	30-AUG-10 00:00	48	85	hours	EHTL
	3	26-AUG-10 12:30	30-AUG-10 00:00	48	84	hours	EHTL
Phosphorus, Total- Low Level	1	26-AUG-10 09:30	27-SEP-10 00:00	28	32	days	EHT
	2	26-AUG-10 10:30	27-SEP-10 00:00	28	32	days	EHT
	3	26-AUG-10 12:30	27-SEP-10 00:00	28	31	days	EHT
Cyanides							
Cyanide, Total	1	26-AUG-10 09:30	25-SEP-10 12:22	14	30	days	EHT
	2	26-AUG-10 10:30	25-SEP-10 12:23	14	30	days	EHT
	3	26-AUG-10 12:30	25-SEP-10 12:24	14	30	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).

Notes*:
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L925358 were received on 27-AUG-10 13:49.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ANALYSIS REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01123.0

Date: 10-Sep-2010

ALS Laboratory Group
Environmental Div.
9936-67th Avenue
Edmonton, AB, T6P 0P5

Phone: (780) 413-8441
FAX: (780) 437-2680

Client Ref.L925358

attn: Christine Potts

3 water samples Sampled: 26-Aug-2010 Received: 31-Aug-2010 Page 1 of 1

<u>Results of Analysis</u>					
Sample	Test	Result	Units	Date	Method
L925358-1 R2-1 (Ref#2, Surface Water)	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
L925358-2 R2-2 (Ref#2, Surface Water)	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
L925358-3 R2-3 (Ref#2, Surface Water)	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA

Methods: ALPHA BQ-RAD-ALPHA alpha-particle spectrometry MDL 0.01 Bq/l

Units: Bq/l Becquerels per litre

These results relate only to the samples analysed and only to the items tested.
These results have not been corrected for blanks

10-Sep-2010 approved by: _____
Steven Simpson
Quality Manager

This test report shall not be reproduced, except in full, without written approval of Becquerel Laboratories Inc.



QUALITY REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01123.0

Date: 10-Sep-2010

Standard	Analyte	<u>Standards</u>		Result	Expected Result
		Units			
RA226.33	Ra-226	Bq/l		0.97	1.00

Analyte	<u>Blanks</u>	
	Units	Result
Ra-226	Bq/l	< 0.01

Analyte	Units	<u>Duplicates</u>	
		Result	Duplicate
Ra-226	Bq/l	< 0.01	< 0.01

Analyte	<u>Spikes</u>	
		% Recovery
Ra-226		85



Report To

Company: AECOM

Contact: Colleen Prather

Address: 17007-107 Ave, Edmonton, AB

Phone: (780) 486-7000 Fax: (780) 486-7070

Invoice To Same as Report ? (circle) Yes or No (if No, provide details)

Copy of Invoice with Report? (circle) Yes or No

Company:

Contact:

Address:

Phone:

Lab Work Order # (lab use only)

Sample #

Sample Identification
(This description will appear on the report)

Date

Time

Sample Type

Analysis Request

Number of Containers

Service Requested: (Rush subject to availability)

Standard: X Other (specify):

Select: PDF X Excel X Digital Fax

Email 1: colleen.prather@aecom.com

Email 2: tiffany.hnatyuk@aecom.com

Client / Project Information

Job #: 60147160

PO / A/E:

LSD:

Quote #: Q25816

ALS Sean Whitaker

Contact:

Sampler: TH/SW

SHIPMENT RELEASE (client use)

SHIPMENT RECEPTION (lab use only)

SHIPMENT VERIFICATION (lab use only)

Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
Tiffany Hnatyuk	27 Aug 10	8:30	MS	27 Aug 10	11:45	°C				Yes / No ? If Yes add SIF

Attn: Sean Whitaker

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

Special Instructions / Regulations / Hazardous Details



AECOM CANADA LTD.
ATTN: COLLEEN PRATHER
17007 107 AVE NW
EDMONTON AB T5S 1G3
Phone: 780-486-7015

Date Received: 30-AUG-10
Report Date: 28-SEP-10 13:37 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L925725
Project P.O. #: NOT SUBMITTED
Job Reference: 60147160
Legal Site Desc:
C of C Numbers: 10-062780

Maureen Olinek
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311
ALS CANADA LIMITED Part of the ALS Group A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925725-1 FC2-REF#1,SURFACE WATER								
Sampled By: TH/SW on 27-AUG-10 @ 09:00								
Matrix: WATER								
Ultra-Low Metals - Dissolved								
Diss. Metals in Water by ICPMS (Ultra)								
Aluminum (Al)-Dissolved		0.00754		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Dissolved		0.00152		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Dissolved		0.00178		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Dissolved		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Dissolved		0.0026		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Dissolved		1.09		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Dissolved		0.00013		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Dissolved		<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Dissolved		0.00121		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Dissolved		0.595		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Dissolved		0.00998		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Dissolved		<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Dissolved		0.000699		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Dissolved		0.427		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Dissolved		0.474		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Dissolved		0.00559		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Dissolved		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Dissolved		<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Dissolved		0.00012		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Dissolved		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Dissolved		<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Dissolved Fe in Water by ICPOES (Ultra)								
Iron (Fe)-Dissolved		0.0390		0.0050	mg/L		24-SEP-10	R1477327
Ultra-Low Metals								
Fe in Water by ICPOES (Undigested)								
Iron (Fe)-Total		0.0942		0.0050	mg/L		22-SEP-10	R1473907
Metals in Water by ICPMS (Undigested)								
Aluminum (Al)-Total		0.0171		0.00030	mg/L		21-SEP-10	R1474628
Antimony (Sb)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total		0.00175		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total		0.00190		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total		<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total		<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total		0.0022		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total		0.955		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total		0.000079		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total		0.00016		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total		<0.00060		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total		<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total		0.00120		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total		0.600		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total		0.0116		0.00010	mg/L		21-SEP-10	R1474628

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925725-1 FC2-REF#1,SURFACE WATER							
Sampled By: TH/SW on 27-AUG-10 @ 09:00							
Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Molybdenum (Mo)-Total	<0.000060		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.000650		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	0.435		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	0.474		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.00563		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	0.00025		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	<0.00080		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	<0.0050		0.0050	mg/L		17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L	25-SEP-10	25-SEP-10	R1478020
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L		21-SEP-10	R1478372
Dissolved Organic Carbon	3.1		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Phosphorus, Total	0.0016		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L		23-SEP-10	R1475536
Total Organic Carbon	3.4		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		01-SEP-10	R1455904
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	<0.50		0.50	mg/L		31-AUG-10	R1455185
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	1.22		0.50	mg/L		24-SEP-10	R1477327
Magnesium (Mg)-Dissolved	0.68		0.10	mg/L		24-SEP-10	R1477327
Potassium (K)-Dissolved	0.68		0.10	mg/L		24-SEP-10	R1477327
Sodium (Na)-Dissolved	<1.0		1.0	mg/L		24-SEP-10	R1477327
Fluoride by IC							
Fluoride (F)	<0.050		0.050	mg/L		31-AUG-10	R1455185
Ion Balance Calculation							
Ion Balance	Low EC			%		25-SEP-10	
TDS (Calculated)	5.1			mg/L		25-SEP-10	
Hardness (as CaCO3)	5.8			mg/L		25-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		31-AUG-10	R1455924
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		31-AUG-10	R1455924
Nitrite-N							
Nitrite-N	<0.0020		0.0020	mg/L		31-AUG-10	R1455924
Sulfate by IC (Low Level)							
Sulfate (SO4)	2.49		0.050	mg/L		31-AUG-10	R1455185
pH, Conductivity and Total Alkalinity							
pH	6.92		0.10	pH		31-AUG-10	R1454286
Conductivity (EC)	13.2		0.20	uS/cm		31-AUG-10	R1454286
Bicarbonate (HCO3)	<5.0		5.0	mg/L		31-AUG-10	R1454286

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925725-2 SNP 925-20-EXP AREA, SURFACE WATER							
Sampled By: TH/SW on 27-AUG-10 @ 10:30							
Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Calcium (Ca)-Total	5.37		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total	0.000388		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	0.00120		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	0.00427		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00526		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	2.39		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	0.0226		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	0.000162		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.0175		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	0.550		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	2.72		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.0283		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	0.00070		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	0.000303		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	0.00823		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	0.0086		0.0050	mg/L		17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L	25-SEP-10	25-SEP-10	R1478020
Cadmium (Cd)-Dissolved	0.000080		0.000010	mg/L		21-SEP-10	R1478372
Dissolved Organic Carbon	10.4		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Phosphorus, Total	0.0027		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total	0.000014		0.000010	mg/L		23-SEP-10	R1475536
Total Organic Carbon	10.7		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		01-SEP-10	R1455904
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	1.50		0.50	mg/L		31-AUG-10	R1455185
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	5.39		0.50	mg/L		24-SEP-10	R1477327
Magnesium (Mg)-Dissolved	2.29		0.10	mg/L		24-SEP-10	R1477327
Potassium (K)-Dissolved	0.76		0.10	mg/L		24-SEP-10	R1477327
Sodium (Na)-Dissolved	2.6		1.0	mg/L		24-SEP-10	R1477327
Fluoride by IC							
Fluoride (F)	0.066		0.050	mg/L		31-AUG-10	R1455185
Ion Balance Calculation							
Ion Balance	Low EC			%		25-SEP-10	
TDS (Calculated)	37.1			mg/L		25-SEP-10	
Hardness (as CaCO3)	22.9			mg/L		25-SEP-10	
Nitrate+Nitrite-N							
Nitrate+Nitrite-N	<0.0060		0.0060	mg/L		31-AUG-10	R1455924
Nitrate-N							
Nitrate-N	<0.0060		0.0060	mg/L		31-AUG-10	R1455924

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L925725-3 SCD1-EXP. AREA, SURFACE WATER Sampled By: TH/SW on 27-AUG-10 @ 11:00 Matrix: WATER							
Metals in Water by ICPMS (Undigested)							
Antimony (Sb)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Arsenic (As)-Total	0.00816		0.000030	mg/L		21-SEP-10	R1474628
Barium (Ba)-Total	0.00880		0.000050	mg/L		21-SEP-10	R1474628
Beryllium (Be)-Total	<0.00020		0.00020	mg/L		21-SEP-10	R1474628
Bismuth (Bi)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Boron (B)-Total	0.0198		0.0010	mg/L		21-SEP-10	R1474628
Cadmium (Cd)-Total	0.000065		0.000050	mg/L		21-SEP-10	R1474628
Calcium (Ca)-Total	17.1		0.020	mg/L		21-SEP-10	R1474628
Chromium (Cr)-Total	0.000063		0.000060	mg/L		21-SEP-10	R1474628
Cobalt (Co)-Total	0.00352		0.00010	mg/L		21-SEP-10	R1474628
Copper (Cu)-Total	0.00597		0.00060	mg/L		21-SEP-10	R1474628
Lead (Pb)-Total	0.000062		0.000050	mg/L		21-SEP-10	R1474628
Lithium (Li)-Total	0.00931		0.00010	mg/L		21-SEP-10	R1474628
Magnesium (Mg)-Total	4.80		0.0040	mg/L		21-SEP-10	R1474628
Manganese (Mn)-Total	0.0800		0.00010	mg/L		21-SEP-10	R1474628
Molybdenum (Mo)-Total	0.000115		0.000060	mg/L		21-SEP-10	R1474628
Nickel (Ni)-Total	0.0354		0.000060	mg/L		21-SEP-10	R1474628
Potassium (K)-Total	1.93		0.020	mg/L		21-SEP-10	R1474628
Selenium (Se)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Silver (Ag)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Sodium (Na)-Total	13.6		0.0050	mg/L		21-SEP-10	R1474628
Strontium (Sr)-Total	0.0797		0.00010	mg/L		21-SEP-10	R1474628
Thallium (Tl)-Total	<0.000030		0.000030	mg/L		21-SEP-10	R1474628
Tin (Sn)-Total	<0.00010		0.00010	mg/L		21-SEP-10	R1474628
Titanium (Ti)-Total	0.00013		0.00010	mg/L		21-SEP-10	R1474628
Uranium (U)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Vanadium (V)-Total	<0.000050		0.000050	mg/L		21-SEP-10	R1474628
Zinc (Zn)-Total	0.0507		0.00080	mg/L		21-SEP-10	R1474628
Miscellaneous Parameters							
Ammonia-N	0.0086		0.0050	mg/L		17-SEP-10	R1470676
Cyanide, Total	<0.0020		0.0020	mg/L	25-SEP-10	25-SEP-10	R1478020
Cadmium (Cd)-Dissolved	0.000070		0.000010	mg/L		21-SEP-10	R1478372
Dissolved Organic Carbon	5.1		1.0	mg/L		22-SEP-10	R1474506
Mercury (Hg)-Total	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Mercury (Hg)-Dissolved	<0.000020		0.000020	mg/L		23-SEP-10	R1476092
Phosphorus, Total	0.0036		0.0010	mg/L		27-SEP-10	R1479153
Radium-226	See Attached					10-SEP-10	R1464651
Cadmium (Cd)-Total	0.000060		0.000010	mg/L		23-SEP-10	R1475536
Total Organic Carbon	5.2		1.0	mg/L		22-SEP-10	R1474506
Total Suspended Solids	<3.0		3.0	mg/L		01-SEP-10	R1455904
Routine Water Analysis - Low Level							
Chloride by IC							
Chloride (Cl)	11.0		0.50	mg/L		31-AUG-10	R1455185
Diss. Metals in Water by ICPOES (Low)							
Calcium (Ca)-Dissolved	18.9		0.50	mg/L		23-SEP-10	R1476096
Magnesium (Mg)-Dissolved	5.12		0.10	mg/L		23-SEP-10	R1476096
Potassium (K)-Dissolved	1.96		0.10	mg/L		23-SEP-10	R1476096
Sodium (Na)-Dissolved	15.3		1.0	mg/L		23-SEP-10	R1476096
Fluoride by IC							
Fluoride (F)	0.129		0.050	mg/L		31-AUG-10	R1455185
Ion Balance Calculation							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	L925725-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L925725-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L925725-1, -2, -3

Sample Parameter Qualifier Key:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-ED	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-TOT-ORG-ED	Water	Total Organic Carbon	APHA 5310 B-Instrumental
CD-D-CCME-FAL-MS-ED	Water	Diss. Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CD-T-CCME-FAL-MS-ED	Water	Total Cd in Water by ICPMS (CCME - FAL)	APHA 3125-ICP-MS
CL-IC-ED	Water	Chloride by IC	APHA 4110 B-ION CHROMATOGRAPHY
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
F-IC-ED	Water	Fluoride by IC	APHA 4110 B-ION CHROMATOGRAPHY
FE-D-NP-U-ICP-ED	Water	Dissolved Fe in Water by ICPOES (Ultra)	APHA 3120 B-ICP-OES
Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
FE-T-NP-U-ICP-ED	Water	Fe in Water by ICPOES (Undigested)	APHA 3120 B-ICP-OES
Ultra trace iron in water is analyzed by ICPOES, based on US EPA Method 6010C (Feb 2007). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine non-turbid acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
HG-D-L-CVAA-ED	Water	Mercury (Hg) - Dissolved	EPA 245.7 / EPA 245.1
HG-T-L-CVAA-ED	Water	Mercury (Hg)	EPA 245.7 / EPA 245.1
IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-L-ICP-ED	Water	Diss. Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES
MET-D-NP-U-MS-ED	Water	Diss. Metals in Water by ICPMS (Ultra)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). This procedure is intended for pristine field-filtered acid-preserved water samples. ALS recommends that filtration blanks be submitted for this test to aid with interpretation of results.			
MET-T-NP-U-MS-ED	Water	Metals in Water by ICPMS (Undigested)	APHA 3125-ICP-MS
Ultra trace metals in water are analyzed by ICPMS, based on US EPA Method 6020A (Jan 1998). The detection limits provided can only be met for undigested samples. This procedure is intended for pristine, non-turbid, acid-preserved water samples, where sample turbidity is < 1 NTU. Where turbidity exceeds 1 NTU, results may be biased low compared to true Total Metals concentrations. ALS recommends that turbidity analysis be requested on samples submitted for this test to aid with interpretation of results.			
N2N3-LOW-ED	Water	Nitrate+Nitrite-N	APHA 4500 NO3E-Colorimetry
NH4-LOW-ED	Water	Ammonia-N Low Level	APHA 4500 NH3F-Colorimetry
NO2-LOW-ED	Water	Nitrite-N	APHA 4500 NO2B-Colorimetry
NO3-LOW-ED	Water	Nitrate-N	APHA 4500 NO3H-Colorimetry
P-TOTAL-LOW-ED	Water	Phosphorus, Total- Low Level	APHA 4500 P B,E-Auto-Colorimetry
PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
RAD-RA226-BE	Water	Radium 226 (Becquerel)	MODIFIED EPA.903.0
SO4-L-IC-ED	Water	Sulfate by IC (Low Level)	APHA 4110 B-ION CHROMATOGRAPHY
SOLIDS-TOTSUS-ED	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA
BE	Becquerel Laboratories Inc. - Mississauga, Ontario, Canada

Chain of Custody Numbers:

10-062780

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 1 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-ED		Water						
Batch	R1474506							
WG1171436-12 CVS								
Dissolved Organic Carbon			138		%		80-160	23-SEP-10
WG1171436-29 CVS								
Dissolved Organic Carbon			111		%		80-160	28-SEP-10
WG1171436-3 CVS								
Dissolved Organic Carbon			123		%		80-160	22-SEP-10
WG1171436-19 DUP		L935981-5						
Dissolved Organic Carbon		11.0	12.3		mg/L	11	20	26-SEP-10
WG1171436-32 DUP		L934312-1						
Dissolved Organic Carbon		3.7	3.3		mg/L	12	20	28-SEP-10
WG1171436-8 DUP		L927771-7						
Dissolved Organic Carbon		2.3	2.3		mg/L	0.64	20	22-SEP-10
WG1171436-11 LCS								
Dissolved Organic Carbon			97		%		80-120	23-SEP-10
WG1171436-2 LCS								
Dissolved Organic Carbon			95		%		80-120	22-SEP-10
WG1171436-28 LCS								
Dissolved Organic Carbon			90		%		80-120	27-SEP-10
WG1171436-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	22-SEP-10
WG1171436-10 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	23-SEP-10
WG1171436-27 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	27-SEP-10
WG1171436-20 MS		L935981-5						
Dissolved Organic Carbon			N/A	MS-B	%		-	26-SEP-10
WG1171436-9 MS		L927771-8						
Dissolved Organic Carbon			99		%		70-130	22-SEP-10
C-TOT-ORG-ED		Water						
Batch	R1474506							
WG1171436-12 CVS								
Total Organic Carbon			138		%		80-160	24-SEP-10
WG1171436-29 CVS								
Total Organic Carbon			111		%		80-160	28-SEP-10
WG1171436-3 CVS								
Total Organic Carbon			123		%		80-160	22-SEP-10
WG1171436-13 DUP		L931048-5						
Total Organic Carbon		3.2	3.1		mg/L	4.5	20	23-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 2 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED		Water						
Batch	R1474506							
WG1171436-15 DUP		L931273-1						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	23-SEP-10
WG1171436-17 DUP		L933880-7						
Total Organic Carbon		9.8	9.2		mg/L	6.5	20	23-SEP-10
WG1171436-21 DUP		L931474-2						
Total Organic Carbon		2.8	2.9		mg/L	1.4	20	24-SEP-10
WG1171436-23 DUP		L934144-1						
Total Organic Carbon		12.2	12.0		mg/L	2.1	20	24-SEP-10
WG1171436-25 DUP		L936024-3						
Total Organic Carbon		53.6	53.5		mg/L	0.22	20	27-SEP-10
WG1171436-30 DUP		L932732-10						
Total Organic Carbon		4.2	3.3	J	mg/L	0.9	2	27-SEP-10
WG1171436-4 DUP		L930275-1						
Total Organic Carbon		3.5	3.5		mg/L	2.7	20	22-SEP-10
WG1171436-6 DUP		L933983-3						
Total Organic Carbon		3.6	3.6		mg/L	0.55	20	23-SEP-10
WG1171436-11 LCS								
Total Organic Carbon			97		%		80-120	23-SEP-10
WG1171436-2 LCS								
Total Organic Carbon			95		%		80-120	22-SEP-10
WG1171436-28 LCS								
Total Organic Carbon			90		%		80-120	28-SEP-10
WG1171436-1 MB								
Total Organic Carbon			<1.0		mg/L		1	22-SEP-10
WG1171436-10 MB								
Total Organic Carbon			<1.0		mg/L		1	23-SEP-10
WG1171436-27 MB								
Total Organic Carbon			<1.0		mg/L		1	27-SEP-10
WG1171436-14 MS		L931048-5						
Total Organic Carbon			88		%		70-130	23-SEP-10
WG1171436-16 MS		L931273-1						
Total Organic Carbon			104		%		70-130	23-SEP-10
WG1171436-18 MS		L933880-7						
Total Organic Carbon			92		%		70-130	23-SEP-10
WG1171436-22 MS		L931474-2						
Total Organic Carbon			91		%		70-130	24-SEP-10
WG1171436-24 MS		L934144-1						
Total Organic Carbon			N/A	MS-B	%		-	24-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 3 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-ED								
Water								
Batch	R1474506							
WG1171436-26 MS		L936024-3						
Total Organic Carbon			N/A	MS-B	%		-	27-SEP-10
WG1171436-31 MS		L932732-10						
Total Organic Carbon			83		%		70-130	27-SEP-10
WG1171436-5 MS		L930275-1						
Total Organic Carbon			92		%		70-130	22-SEP-10
WG1171436-7 MS		L933983-3						
Total Organic Carbon			95		%		70-130	23-SEP-10
CD-D-CCME-FAL-MS-ED								
Water								
Batch	R1478372							
WG1173819-2 CRM		1643E_WATER						
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
WG1173819-1 MB								
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-10
CD-T-CCME-FAL-MS-ED								
Water								
Batch	R1475536							
WG1171922-1 MB								
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	23-SEP-10
CL-IC-ED								
Water								
Batch	R1455185							
WG1159047-2 LCS								
Chloride (Cl)			104		%		85-115	31-AUG-10
WG1159047-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	31-AUG-10
CN-TOT-WT								
Water								
Batch	R1478020							
WG1173394-4 CVS								
Cyanide, Total			100		%		85-115	25-SEP-10
WG1173394-3 LCS								
Cyanide, Total			110		%		80-120	25-SEP-10
WG1173394-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	25-SEP-10
F-IC-ED								
Water								



Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 4 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-ED	Water							
Batch R1455185								
WG1159047-2 LCS								
Fluoride (F)			105		%		85-115	31-AUG-10
WG1159047-1 MB								
Fluoride (F)			<0.050		mg/L		0.05	31-AUG-10
FE-D-NP-U-ICP-ED	Water							
Batch R1476096								
WG1172166-2 CRM		EU-H-3_OPTWATER						
WG1172166-1 MB								
Iron (Fe)-Dissolved			<0.0050		mg/L		0.005	23-SEP-10
Batch R1477327								
WG1172717-2 CRM		EU-H-3_OPTWATER						
WG1172717-1 MB								
Iron (Fe)-Dissolved			<0.0050		mg/L		0.005	24-SEP-10
FE-T-NP-U-ICP-ED	Water							
Batch R1473907								
WG1170911-2 DUP		L929483-6						
Iron (Fe)-Total		0.0103	0.0073	J	mg/L	0.0029	0.01	22-SEP-10
WG1170911-1 MB								
Iron (Fe)-Total			<0.0050		mg/L		0.005	22-SEP-10
HG-D-L-CVAA-ED	Water							
Batch R1476092								
WG1172018-2 LCS								
Mercury (Hg)-Dissolved			92		%		80-120	23-SEP-10
WG1172018-3 LCSD		WG1172018-2						
Mercury (Hg)-Dissolved		92	92		%	0.087	20	23-SEP-10
WG1172018-1 MB								
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	23-SEP-10
HG-T-L-CVAA-ED	Water							
Batch R1476092								
WG1172018-10 DUP		L930275-5						
Mercury (Hg)-Total		<0.020	<0.000020	RPD-NA	mg/L	N/A	20	23-SEP-10
WG1172018-2 LCS								
Mercury (Hg)-Total			92		%		80-120	23-SEP-10
WG1172018-3 LCSD		WG1172018-2						
Mercury (Hg)-Total		92	92		%	0.087	20	23-SEP-10
WG1172018-1 MB								
Mercury (Hg)-Total			<0.000020		mg/L		0.00002	23-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 5 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-L-CVAA-ED		Water						
Batch	R1476092							
WG1172018-11 MS		L930275-5						
Mercury (Hg)-Total			106		%		70-130	23-SEP-10
MET-D-L-ICP-ED		Water						
Batch	R1476096							
WG1172166-2 CRM		EU-H-3_OPTWATER						
WG1172166-1 MB								
Calcium (Ca)-Dissolved			<0.20		mg/L		0.2	23-SEP-10
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	23-SEP-10
Potassium (K)-Dissolved			<0.10		mg/L		0.1	23-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	23-SEP-10
Batch	R1477327							
WG1172717-2 CRM		EU-H-3_OPTWATER						
WG1172717-3 DUP		L931048-14						
Calcium (Ca)-Dissolved		1.80	1.73		mg/L	4.1	20	24-SEP-10
Magnesium (Mg)-Dissolved		1.06	1.05		mg/L	1.2	20	24-SEP-10
Potassium (K)-Dissolved		1.06	1.04		mg/L	2.1	20	24-SEP-10
Sodium (Na)-Dissolved		2.0	1.84		mg/L	5.9	20	24-SEP-10
WG1172717-1 MB								
Calcium (Ca)-Dissolved			<0.20		mg/L		0.2	24-SEP-10
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	24-SEP-10
Potassium (K)-Dissolved			0.15		mg/L		0.1	24-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	24-SEP-10
WG1172717-4 MS		L931048-14						
Calcium (Ca)-Dissolved			101		%		70-130	24-SEP-10
Magnesium (Mg)-Dissolved			96		%		70-130	24-SEP-10
Potassium (K)-Dissolved			84		%		70-130	24-SEP-10
Sodium (Na)-Dissolved			93		%		70-130	24-SEP-10
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Aluminum (Al)-Dissolved			108		%		80-120	21-SEP-10
Antimony (Sb)-Dissolved			97		%		80-120	21-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	21-SEP-10
Barium (Ba)-Dissolved			104		%		80-120	21-SEP-10
Beryllium (Be)-Dissolved			103		%		80-120	21-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 6 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Bismuth (Bi)-Dissolved			103		%		80-120	21-SEP-10
Boron (B)-Dissolved			95		%		80-120	21-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	21-SEP-10
Calcium (Ca)-Dissolved			96		%		80-120	21-SEP-10
Chromium (Cr)-Dissolved			104		%		80-120	21-SEP-10
Cobalt (Co)-Dissolved			97		%		80-120	21-SEP-10
Copper (Cu)-Dissolved			104		%		80-120	21-SEP-10
Lead (Pb)-Dissolved			98		%		80-120	21-SEP-10
Lithium (Li)-Dissolved			115		%		80-120	21-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	21-SEP-10
Manganese (Mn)-Dissolved			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Dissolved			98		%		80-120	21-SEP-10
Nickel (Ni)-Dissolved			103		%		80-120	21-SEP-10
Potassium (K)-Dissolved			95		%		80-120	21-SEP-10
Selenium (Se)-Dissolved			106		%		80-120	21-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	21-SEP-10
Strontium (Sr)-Dissolved			104		%		80-120	21-SEP-10
Thallium (Tl)-Dissolved			100		%		80-120	21-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	21-SEP-10
Zinc (Zn)-Dissolved			110		%		80-120	21-SEP-10
WG1170506-1 MB								
Aluminum (Al)-Dissolved			<0.00030		mg/L		0.0003	21-SEP-10
Antimony (Sb)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Arsenic (As)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Beryllium (Be)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-10
Bismuth (Bi)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Boron (B)-Dissolved			<0.0010		mg/L		0.001	21-SEP-10
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Chromium (Cr)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Copper (Cu)-Dissolved			<0.00060		mg/L		0.0006	21-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 7 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-1	MB							
Lithium (Li)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Magnesium (Mg)-Dissolved			<0.0040		mg/L		0.004	21-SEP-10
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Molybdenum (Mo)-Dissolved			<0.000060		mg/L		0.00006	21-SEP-10
Nickel (Ni)-Dissolved			<0.00006		mg/L		0.00006	21-SEP-10
Potassium (K)-Dissolved			<0.020		mg/L		0.02	21-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Sodium (Na)-Dissolved			<0.0050		mg/L		0.005	21-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Thallium (Tl)-Dissolved			<0.000030		mg/L		0.00003	21-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Titanium (Ti)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-10
Uranium (U)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Vanadium (V)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-10
Zinc (Zn)-Dissolved			<0.00080		mg/L		0.0008	21-SEP-10
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2	CRM	1643E_WATER						
Aluminum (Al)-Total			108		%		80-120	21-SEP-10
Antimony (Sb)-Total			97		%		80-120	21-SEP-10
Arsenic (As)-Total			102		%		80-120	21-SEP-10
Barium (Ba)-Total			104		%		80-120	21-SEP-10
Beryllium (Be)-Total			106		%		80-120	21-SEP-10
Bismuth (Bi)-Total			103		%		80-120	21-SEP-10
Boron (B)-Total			95		%		80-120	21-SEP-10
Cadmium (Cd)-Total			105		%		80-120	21-SEP-10
Calcium (Ca)-Total			96		%		80-120	21-SEP-10
Chromium (Cr)-Total			104		%		80-120	21-SEP-10
Cobalt (Co)-Total			97		%		80-120	21-SEP-10
Copper (Cu)-Total			104		%		80-120	21-SEP-10
Lead (Pb)-Total			98		%		80-120	21-SEP-10
Lithium (Li)-Total			115		%		80-120	21-SEP-10
Magnesium (Mg)-Total			104		%		80-120	21-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 8 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-2 CRM		1643E_WATER						
Magnesium (Mg)-Total			104		%		80-120	21-SEP-10
Manganese (Mn)-Total			102		%		80-120	21-SEP-10
Molybdenum (Mo)-Total			98		%		80-120	21-SEP-10
Nickel (Ni)-Total			103		%		80-120	21-SEP-10
Potassium (K)-Total			95		%		80-120	21-SEP-10
Selenium (Se)-Total			106		%		80-120	21-SEP-10
Silver (Ag)-Total			101		%		80-120	21-SEP-10
Sodium (Na)-Total			104		%		80-120	21-SEP-10
Strontium (Sr)-Total			104		%		80-120	21-SEP-10
Thallium (Tl)-Total			100		%		80-120	21-SEP-10
Vanadium (V)-Total			101		%		80-120	21-SEP-10
Zinc (Zn)-Total			110		%		80-120	21-SEP-10
WG1170506-3 DUP		L929483-1						
Aluminum (Al)-Total		0.00074	0.00044	J	mg/L	0.00030	0.0006	21-SEP-10
Antimony (Sb)-Total		0.000072	0.000071		mg/L	0.90	20	21-SEP-10
Arsenic (As)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Barium (Ba)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Bismuth (Bi)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		0.0047	0.0045		mg/L	4.9	20	21-SEP-10
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Calcium (Ca)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Copper (Cu)-Total		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	21-SEP-10
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Lithium (Li)-Total		0.00015	0.00020	J	mg/L	0.00005	0.0002	21-SEP-10
Magnesium (Mg)-Total		N/A	<0.0040	RPD-NA	mg/L	N/A	20	21-SEP-10
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Nickel (Ni)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Potassium (K)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Selenium (Se)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 9 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED		Water						
Batch	R1474628							
WG1170506-3 DUP		L929483-1						
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Sodium (Na)-Total		N/A	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Thallium (Tl)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Tin (Sn)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Titanium (Ti)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Uranium (U)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Vanadium (V)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Zinc (Zn)-Total		<0.00080	<0.00080	RPD-NA	mg/L	N/A	20	21-SEP-10
WG1170506-4 DUP		L930275-8						
Aluminum (Al)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	21-SEP-10
Antimony (Sb)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Arsenic (As)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Barium (Ba)-Total		<0.000050	0.000056	RPD-NA	mg/L	N/A	20	21-SEP-10
Beryllium (Be)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-SEP-10
Bismuth (Bi)-Total		<0.000030	<0.000030	RPD-NA	mg/L	N/A	20	21-SEP-10
Boron (B)-Total		0.0023	0.0024		mg/L	1.1	20	21-SEP-10
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Calcium (Ca)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Chromium (Cr)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Copper (Cu)-Total		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	21-SEP-10
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-10
Lithium (Li)-Total		0.00045	0.00046		mg/L	1.7	20	21-SEP-10
Magnesium (Mg)-Total		N/A	<0.0040	RPD-NA	mg/L	N/A	20	21-SEP-10
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Molybdenum (Mo)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Nickel (Ni)-Total		<0.000060	<0.000060	RPD-NA	mg/L	N/A	20	21-SEP-10
Potassium (K)-Total		N/A	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-10
Selenium (Se)-Total		N/A	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Silver (Ag)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10
Sodium (Na)-Total		N/A	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-10
Strontium (Sr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 11 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-NP-U-MS-ED	Water							
Batch R1474628								
WG1170506-1 MB								
Uranium (U)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Vanadium (V)-Total			<0.000050		mg/L		0.00005	21-SEP-10
Zinc (Zn)-Total			<0.00080		mg/L		0.0008	21-SEP-10
N2N3-LOW-ED	Water							
Batch R1455924								
WG1160048-4 DUP		L926122-2						
Nitrate+Nitrite-N		1.95	1.95		mg/L	0.23	20	31-AUG-10
WG1160048-3 LCS								
Nitrate+Nitrite-N			100		%		85-115	31-AUG-10
WG1160048-2 MB								
Nitrate+Nitrite-N			<0.0060		mg/L		0.006	31-AUG-10
WG1160048-5 MS		L926122-2						
Nitrate+Nitrite-N			99		%		73-121	31-AUG-10
NH4-LOW-ED	Water							
Batch R1470676								
WG1168804-11 DUP		L929851-5						
Ammonia-N		0.0210	0.0206		mg/L	1.9	10	17-SEP-10
WG1168804-13 DUP		L930476-5						
Ammonia-N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	10	17-SEP-10
WG1168804-5 DUP		L928051-1						
Ammonia-N		0.0181	0.0191		mg/L	5.4	10	17-SEP-10
WG1168804-7 DUP		L928445-8						
Ammonia-N		0.0650	0.0659		mg/L	1.4	10	17-SEP-10
WG1168804-9 DUP		L928818-5						
Ammonia-N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	10	17-SEP-10
WG1168804-3 LCS								
Ammonia-N			99		%		85-115	17-SEP-10
WG1168804-4 LCS								
Ammonia-N			97		%		85-115	17-SEP-10
WG1168804-2 MB								
Ammonia-N			<0.0050		mg/L		0.005	17-SEP-10
WG1168804-10 MS		L928818-15						
Ammonia-N			97		%		75-122	17-SEP-10
WG1168804-12 MS		L929852-5						
Ammonia-N			99		%		75-122	17-SEP-10
WG1168804-6 MS		L928158-28						

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 12 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3

Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH4-LOW-ED		Water						
Batch	R1470676							
WG1168804-6	MS	L928158-28						
Ammonia-N			101		%		75-122	17-SEP-10
WG1168804-8	MS	L928445-18						
Ammonia-N			88		%		75-122	17-SEP-10
NO2-LOW-ED		Water						
Batch	R1455924							
WG1160048-4	DUP	L926122-2						
Nitrite-N		0.0510	0.0511		mg/L	0.20	9.1	31-AUG-10
WG1160048-3	LCS							
Nitrite-N			102		%		85-115	31-AUG-10
WG1160048-2	MB							
Nitrite-N			<0.0020		mg/L		0.002	31-AUG-10
WG1160048-5	MS	L926122-2						
Nitrite-N			103		%		78-122	31-AUG-10
P-TOTAL-LOW-ED		Water						
Batch	R1479153							
WG1172246-4	DUP	L930275-1						
Phosphorus, Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	9.7	27-SEP-10
WG1172246-6	DUP	L931048-1						
Phosphorus, Total		0.0023	0.0022		mg/L	4.4	9.7	27-SEP-10
WG1172246-3	LCS							
Phosphorus, Total			101		%		80-120	27-SEP-10
WG1172246-2	MB							
Phosphorus, Total			<0.0010		mg/L		0.001	27-SEP-10
WG1172246-5	MS	L930275-1						
Phosphorus, Total			99		%		70-130	27-SEP-10
WG1172246-7	MS	L931048-1						
Phosphorus, Total			101		%		70-130	27-SEP-10
PH/EC/ALK-ED		Water						
Batch	R1454286							
WG1159010-6	DUP	L925910-1						
pH		7.65	7.67	J	pH	0.02	0.2	31-AUG-10
Conductivity (EC)		1580	1580		uS/cm	0.062	10	31-AUG-10
Bicarbonate (HCO3)		1110	1100		mg/L	0.66	25	31-AUG-10
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	31-AUG-10
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	31-AUG-10
Alkalinity, Total (as CaCO3)		907	901		mg/L	0.66	6.5	31-AUG-10



Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 13 of 15

Client: AECOM CANADA LTD.
17007 107 AVE NW
EDMONTON AB T5S 1G3
Contact: COLLEEN PRATHER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED		Water						
Batch	R1454286							
WG1159010-2	LCS							
Conductivity (EC)			99		%		90-110	31-AUG-10
WG1159010-3	LCS							
pH			7.04		pH		6.9-7.1	31-AUG-10
WG1159010-4	LCS							
Alkalinity, Total (as CaCO ₃)			98		%		85-115	31-AUG-10
WG1159010-5	LCS							
Conductivity (EC)			95		%		90-110	31-AUG-10
WG1159010-1	MB							
Bicarbonate (HCO ₃)			<5.0		mg/L		5	31-AUG-10
Carbonate (CO ₃)			<5.0		mg/L		5	31-AUG-10
Hydroxide (OH)			<5.0		mg/L		5	31-AUG-10
Alkalinity, Total (as CaCO ₃)			<5.0		mg/L		5	31-AUG-10
SO4-L-IC-ED		Water						
Batch	R1455185							
WG1159047-2	LCS							
Sulfate (SO ₄)			106		%		85-115	31-AUG-10
WG1159047-1	MB							
Sulfate (SO ₄)			<0.050		mg/L		0.05	31-AUG-10
SOLIDS-TOTSUS-ED		Water						
Batch	R1455904							
WG1159772-3	DUP	L926024-1						
Total Suspended Solids		4.0	4.0		mg/L	0.0	20	01-SEP-10
WG1159772-2	LCS							
Total Suspended Solids			98		%		85-115	01-SEP-10
WG1159772-1	MB							
Total Suspended Solids			<3.0		mg/L		3	01-SEP-10

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 14 of 15

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L925725

Report Date: 28-SEP-10

Page 15 of 15

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate+Nitrite-N	1	27-AUG-10 09:00	31-AUG-10 00:00	48	87	hours	EHTR
	2	27-AUG-10 10:30	31-AUG-10 00:00	48	85	hours	EHTR
	3	27-AUG-10 11:00	31-AUG-10 00:00	48	85	hours	EHTR
Nitrate-N	1	27-AUG-10 09:00	31-AUG-10 00:00	48	87	hours	EHTR
	2	27-AUG-10 10:30	31-AUG-10 00:00	48	85	hours	EHTR
	3	27-AUG-10 11:00	31-AUG-10 00:00	48	85	hours	EHTR
Nitrite-N	1	27-AUG-10 09:00	31-AUG-10 00:00	48	87	hours	EHTR
	2	27-AUG-10 10:30	31-AUG-10 00:00	48	85	hours	EHTR
	3	27-AUG-10 11:00	31-AUG-10 00:00	48	85	hours	EHTR
Phosphorus, Total- Low Level	1	27-AUG-10 09:00	27-SEP-10 00:00	28	31	days	EHT
	2	27-AUG-10 10:30	27-SEP-10 00:00	28	31	days	EHT
	3	27-AUG-10 11:00	27-SEP-10 00:00	28	31	days	EHT
Cyanides							
Cyanide, Total	1	27-AUG-10 09:00	25-SEP-10 12:25	14	29	days	EHT
	2	27-AUG-10 10:30	25-SEP-10 12:26	14	29	days	EHT
	3	27-AUG-10 11:00	25-SEP-10 12:27	14	29	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).

Notes*:
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L925725 were received on 30-AUG-10 10:32.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ANALYSIS REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01136.0

Date: 10-Sep-2010

ALS Laboratory Group
Environmental Div.
9936-67th Avenue
Edmonton, AB, T6P 0P5

Phone: (780) 413-8441
FAX: (780) 437-2680

Client Ref. L925725

attn: Christine Potts

3 water samples Sampled: 27-Aug-2010 Received: 01-Sep-2010 Page 1 of 1

<u>Results of Analysis</u>					
Sample	Test	Result	Units	Date	Method
L925725-1 FC2- Ref#1 Surface Water	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
L925725-2 SNP 925-20-EXP Area, Surface Water	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA
L925725-3 SCD1- EXP. AREA, Surface Water	Ra-226	< 0.01	Bq/l	09-Sep-2010	ALPHA

Methods: ALPHA BQ-RAD-ALPHA alpha-particle spectrometry MDL 0.01 Bq/l

Units: Bq/l Becquerels per litre

These results relate only to the samples analysed and only to the items tested.
These results have not been corrected for blanks

10-Sep-2010 approved by: _____
Steven Simpson
Quality Manager

This test report shall not be reproduced, except in full, without written approval of Becquerel Laboratories Inc.



QUALITY REPORT

Becquerel Laboratories Inc.
6790 Kitimat Rd., Unit 4
Mississauga, Ontario
Canada, L5N 5L9

Phone: (905) 826-3080
FAX: (905) 826-4151

Batch: T10-01136.0
Date: 10-Sep-2010

Standard	Analyte	<u>Standards</u>		Result	Expected Result
		Units			
RA226.33	Ra-226	Bq/l		0.97	1.00

Analyte	<u>Blanks</u>		Result
	Units		
Ra-226	Bq/l	<	0.01

Analyte	Units	<u>Duplicates</u>		Duplicate
		Result		
Ra-226	Bq/l	< 0.01	<	0.01

Analyte	<u>Spikes</u>		% Recovery
Ra-226			85

[illegible]

Appendix F

Lupin Cycle 3 EEM Temperature Logger Raw Data

07-Jul-10

08-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
07/07/2010 8:48	7.995												
07/07/2010 9:18	8.742	07/07/2010 9:20	10.712										
07/07/2010 9:48	9.589	07/07/2010 9:50	11.078	07/07/2010 9:51	10.389								
07/07/2010 10:18	10.585	07/07/2010 10:20	12.245	07/07/2010 10:21	11.127	07/07/2010 10:22	11.856						
07/07/2010 10:48	11.613	07/07/2010 10:50	13.882	07/07/2010 10:51	12.025	07/07/2010 10:52	12.63	07/07/2010 10:53	13.57				
07/07/2010 11:18	12.678	07/07/2010 11:20	15.031	07/07/2010 11:21	12.703	07/07/2010 11:22	13.305	07/07/2010 11:23	13.858	07/07/2010 11:23	13.137		
07/07/2010 11:48	12.738	07/07/2010 11:50	16.225	07/07/2010 11:51	13.401	07/07/2010 11:52	13.93	07/07/2010 11:53	14.649	07/07/2010 11:53	13.425		
07/07/2010 12:18	14.745	07/07/2010 12:20	16.606	07/07/2010 12:21	13.978	07/07/2010 12:22	14.577	07/07/2010 12:23	15.36	07/07/2010 12:23	13.978	07/07/2010 12:03	12.63
07/07/2010 12:48	15.557	07/07/2010 12:50	17.582	07/07/2010 12:51	14.601	07/07/2010 12:52	15.27	07/07/2010 12:53	16.106	07/07/2010 12:53	14.481	07/07/2010 12:33	13.209
07/07/2010 13:18	16.392	07/07/2010 13:20	18.604	07/07/2010 13:21	15.366	07/07/2010 13:22	16.108	07/07/2010 13:23	16.725	07/07/2010 13:23	14.984	07/07/2010 13:03	13.738
07/07/2010 13:48	17.32	07/07/2010 13:50	19.579	07/07/2010 13:51	16.082	07/07/2010 13:52	16.82	07/07/2010 13:53	17.296	07/07/2010 13:53	15.557	07/07/2010 13:33	14.146
07/07/2010 14:18	18.981	07/07/2010 14:20	20.246	07/07/2010 14:21	16.773	07/07/2010 14:22	17.498	07/07/2010 14:23	17.463	07/07/2010 14:23	15.915	07/07/2010 14:03	14.266
07/07/2010 14:48	18.675	07/07/2010 14:50	20.746	07/07/2010 14:51	17.391	07/07/2010 14:52	17.915	07/07/2010 14:53	17.415	07/07/2010 14:53	16.153	07/07/2010 14:33	14.17
07/07/2010 15:18	19.127	07/07/2010 15:20	21.032	07/07/2010 15:21	17.891	07/07/2010 15:22	18.39	07/07/2010 15:23	18.01	07/07/2010 15:23	16.701	07/07/2010 15:03	14.816
07/07/2010 15:48	19.175	07/07/2010 15:50	20.507	07/07/2010 15:51	18.033	07/07/2010 15:52	18.414	07/07/2010 15:53	18.58	07/07/2010 15:53	17.177	07/07/2010 15:33	15.366
07/07/2010 16:18	19.966	07/07/2010 16:20	19.605	07/07/2010 16:21	17.986	07/07/2010 16:22	18.195	07/07/2010 16:23	19.151	07/07/2010 16:23	17.562	07/07/2010 16:03	15.151
07/07/2010 16:48	18.628	07/07/2010 16:50	19.46	07/07/2010 16:51	18.01	07/07/2010 16:52	17.966	07/07/2010 16:53	19.222	07/07/2010 16:53	17.891	07/07/2010 16:33	15.704
07/07/2010 17:18	19.985	07/07/2010 17:20	20.507	07/07/2010 17:21	18.247	07/07/2010 17:22	18.2	07/07/2010 17:23	18.628	07/07/2010 17:23	17.629	07/07/2010 17:03	15.39
07/07/2010 17:48	19.032	07/07/2010 17:50	20.031	07/07/2010 17:51	18.081	07/07/2010 17:52	18.152	07/07/2010 17:53	18.224	07/07/2010 17:53	17.225	07/07/2010 17:33	15.223
07/07/2010 18:18	18.675	07/07/2010 18:20	19.008	07/07/2010 18:21	17.819	07/07/2010 18:22	17.796	07/07/2010 18:23	17.748	07/07/2010 18:23	16.701	07/07/2010 18:03	14.816
07/07/2010 18:48	18.081	07/07/2010 18:50	18.343	07/07/2010 18:51	17.51	07/07/2010 18:52	17.344	07/07/2010 18:53	17.415	07/07/2010 18:53	16.606	07/07/2010 18:33	14.505
07/07/2010 19:18	17.582	07/07/2010 19:20	17.677	07/07/2010 19:21	17.13	07/07/2010 19:22	16.844	07/07/2010 19:23	17.177	07/07/2010 19:23	16.606	07/07/2010 19:03	14.194
07/07/2010 19:48	17.011	07/07/2010 19:50	16.963	07/07/2010 19:51	16.558	07/07/2010 19:52	16.249	07/07/2010 19:53	16.868	07/07/2010 19:53	16.487	07/07/2010 19:33	13.906
07/07/2010 20:18	16.463	07/07/2010 20:20	16.246	07/07/2010 20:21	16.139	07/07/2010 20:22	15.748	07/07/2010 20:23	16.175	07/07/2010 20:23	16.534	07/07/2010 20:03	13.81
07/07/2010 20:48	16.01	07/07/2010 20:50	15.891	07/07/2010 20:51	15.724	07/07/2010 20:52	15.39	07/07/2010 20:53	16.654	07/07/2010 20:53	16.32	07/07/2010 20:33	13.642
07/07/2010 21:18	15.605	07/07/2010 21:20	15.485	07/07/2010 21:21	15.366	07/07/2010 21:22	15.079	07/07/2010 21:23	16.439	07/07/2010 21:23	15.939	07/07/2010 21:03	13.473
07/07/2010 21:48	15.223	07/07/2010 21:50	15.095	07/07/2010 21:51	14.984	07/07/2010 21:52	14.749	07/07/2010 21:53	16.225	07/07/2010 21:53	15.461	07/07/2010 21:33	13.353
07/07/2010 22:18	14.768	07/07/2010 22:20	14.529	07/07/2010 22:21	14.601	07/07/2010 22:22	14.365	07/07/2010 22:23	15.986	07/07/2010 22:23	14.96	07/07/2010 22:03	13.137
07/07/2010 22:48	14.265	07/07/2010 22:50	13.978	07/07/2010 22:51	14.143	07/07/2010 22:52	13.978	07/07/2010 22:53	15.748	07/07/2010 22:53	14.648	07/07/2010 22:33	12.871
07/07/2010 23:18	13.786	07/07/2010 23:20	13.473	07/07/2010 23:21	13.81	07/07/2010 23:22	13.594	07/07/2010 23:23	15.509	07/07/2010 23:23	14.457	07/07/2010 23:03	12.703
07/07/2010 23:48	13.305	07/07/2010 23:50	12.992	07/07/2010 23:51	13.449	07/07/2010 23:52	13.23	07/07/2010 23:53	15.223	07/07/2010 23:53	14.127	07/07/2010 23:33	12.495
08/07/2010 0:18	12.895	08/07/2010 0:20	12.568	08/07/2010 0:21	13.086	08/07/2010 0:22	12.895	08/07/2010 0:23	14.481	08/07/2010 0:23	13.811	08/07/2010 0:03	12.245
08/07/2010 0:48	12.461	08/07/2010 0:50	12.122	08/07/2010 0:51	12.777	08/07/2010 0:52	12.514	08/07/2010 0:53	14.481	08/07/2010 0:53	13.594	08/07/2010 0:33	11.953
08/07/2010 1:18	12.025	08/07/2010 1:20	11.565	08/07/2010 1:21	12.34	08/07/2010 1:22	12.147	08/07/2010 1:23	14.146	08/07/2010 1:23	13.497	08/07/2010 1:03	11.613
08/07/2010 1:48	11.54	08/07/2010 1:50	11.029	08/07/2010 1:51	11.977	08/07/2010 1:52	11.783	08/07/2010 1:53	13.954	08/07/2010 1:53	13.425	08/07/2010 1:33	11.321
08/07/2010 2:18	11.175	08/07/2010 2:20	10.781	08/07/2010 2:21	11.686	08/07/2010 2:22	11.54	08/07/2010 2:23	13.834	08/07/2010 2:23	13.291	08/07/2010 2:03	11.127
08/07/2010 2:48	10.827	08/07/2010 2:50	10.541	08/07/2010 2:51	11.443	08/07/2010 2:52	11.301	08/07/2010 2:53	13.968	08/07/2010 2:53	13.468	08/07/2010 2:33	10.84
08/07/2010 3:18	10.59	08/07/2010 3:20	10.271	08/07/2010 3:21	11.2	08/07/2010 3:22	11.127	08/07/2010 3:23	13.209	08/07/2010 3:23	12.63	08/07/2010 3:03	10.618
08/07/2010 3:48	10.32	08/07/2010 3:50	10.001	08/07/2010 3:51	11.005	08/07/2010 3:52	10.956	08/07/2010 3:53	12.92	08/07/2010 3:53	12.389	08/07/2010 3:33	10.638
08/07/2010 4:18	10.051	08/07/2010 4:20	9.657	08/07/2010 4:21	10.761	08/07/2010 4:22	10.736	08/07/2010 4:23	12.703	08/07/2010 4:23	12.147	08/07/2010 4:03	10.492
08/07/2010 4:48	9.78	08/07/2010 4:50	9.312	08/07/2010 4:51	10.565	08/07/2010 4:52	10.516	08/07/2010 4:53	12.485	08/07/2010 4:53	11.929	08/07/2010 4:33	10.345
08/07/2010 5:18	9.534	08/07/2010 5:20	9.114	08/07/2010 5:21	10.394	08/07/2010 5:22	10.369	08/07/2010 5:23	12.389	08/07/2010 5:23	11.807	08/07/2010 5:03	10.247
08/07/2010 5:48	9.312	08/07/2010 5:50	8.941	08/07/2010 5:51	10.247	08/07/2010 5:52	10.271	08/07/2010 5:53	12.437	08/07/2010 5:53	11.783	08/07/2010 5:33	10.222
08/07/2010 6:18	9.238	08/07/2010 6:20	8.964	08/07/2010 6:21	10.222	08/07/2010 6:22	10.271	08/07/2010 6:23	12.559	08/07/2010 6:23	11.807	08/07/2010 6:03	10.247
08/07/2010 6:48	9.287	08/07/2010 6:50	9.213	08/07/2010 6:51	10.271	08/07/2010 6:52	10.369	08/07/2010 6:53	12.63	08/07/2010 6:53	11.953	08/07/2010 6:33	10.369
08/07/2010 7:18	9.435	08/07/2010 7:20	9.583	08/07/2010 7:21	10.394	08/07/2010 7:22	10.565	08/07/2010 7:23	12.944	08/07/2010 7:23	12.147	08/07/2010 7:03	10.614
08/07/2010 7:48	9.682	08/07/2010 7:50	10.075	08/07/2010 7:51	10.59	08/07/2010 7:52	10.81	08/07/2010 7:53	13.353	08/07/2010 7:53	12.485	08/07/2010 7:33	11.078
08/07/2010 8:18	10.075	08/07/2010 8:20	10.687	08/07/2010 8:21	10.932	08/07/2010 8:22	11.224	08/07/2010 8:23	13.618	08/07/2010 8:23	12.509	08/07/2010 8:03	11.175
08/07/2010 8:48	10.614	08/07/2010 8:50	11.758	08/07/2010 8:51	11.297	08/07/2010 8:52	11.686	08/07/2010 8:53	14.002	08/07/2010 8:53	12.847	08/07/2010 8:33	11.759
08/07/2010 9:18	11.273	08/07/2010 9:20	12.558	08/07/2010 9:21	11.734	08/07/2010 9:22	12.219	08/07/2010 9:23	14.457	08/07/2010 9:23	13.088	08/07/2010 9:03	11.759
08/07/2010 9:48	11.856	08/07/2010 9:50	13.04	08/07/2010 9:51	12.147	08/07/2010 9:52	12.703	08/07/2010 9:53	14.529	08/07/2010 9:53	13.112	08/07/2010 9:33	11.88
08/07/2010 10:18	12.292	08/07/2010 10:20	13.377	08/07/2010 10:21	12.534	08/07/2010 10:22	13.117	08/07/2010 10:23	14.601	08/07/2010 10:23	13.305	08/07/2010 10:03	12.098
08/07/2010 10:48	12.727	08/07/2010 10:50	14.002	08/07/2010 10:51	13.223	08/07/2010 10:52	13.69	08/07/2010 10:53	15.175	08/07/2010 10:53	13.858	08/07/2010 10:33	12.678
08/07/2010 11:18	13.209	08/07/2010 11:20	14.481	08/07/2010 11:21	13.858	08/07/2010 11:22	14.409	08/07/2010 11:23	16.106	08/07/2010 11:23	14.505	08/07/2010 11:03	13.305
08/07/2010 11:48	13.858	08/07/2010 11:50	15.867	08/07/2010 11:51	14.553	08/07/2010 11:52	14.984	08/07/2010 11:53	17.082	08/07/2010 11:53	14.888	08/07/2010 11:33	13.738
08/07/2010 12:18	14.816	08/07/2010 12:20	17.177	08/07/2010 12:21	15.079	08/07/2010 12:22	1						

09-Jul-10

Date and Time	Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
09/07/2010 0:18	10.956	09/07/2010 0:20	10.394	09/07/2010 0:21	12.025	09/07/2010 0:22	11.889	09/07/2010 0:23	13.209	09/07/2010 0:23	12.509	09/07/2010 0:03	11.321	
09/07/2010 0:48	10.418	09/07/2010 0:50	9.903	09/07/2010 0:51	11.565	09/07/2010 0:52	11.492	09/07/2010 0:53	12.871	09/07/2010 0:53	12.195	09/07/2010 0:33	11.078	
09/07/2010 1:18	9.622	09/07/2010 1:20	9.46	09/07/2010 1:21	11.175	09/07/2010 1:22	11.727	09/07/2010 1:23	12.559	09/07/2010 1:23	11.789	09/07/2010 1:03	9.756	
09/07/2010 1:48	9.534	09/07/2010 1:50	9.064	09/07/2010 1:51	10.834	09/07/2010 1:52	10.834	09/07/2010 1:53	12.195	09/07/2010 1:53	11.467	09/07/2010 1:33	10.541	
09/07/2010 2:18	9.163	09/07/2010 2:20	8.717	09/07/2010 2:21	10.565	09/07/2010 2:22	10.565	09/07/2010 2:23	11.929	09/07/2010 2:23	11.175	09/07/2010 2:03	10.222	
09/07/2010 2:48	8.817	09/07/2010 2:50	8.394	09/07/2010 2:51	10.271	09/07/2010 2:52	10.296	09/07/2010 2:53	11.613	09/07/2010 2:53	10.907	09/07/2010 2:33	9.952	
09/07/2010 3:18	8.494	09/07/2010 3:20	8.071	09/07/2010 3:21	10.031	09/07/2010 3:22	10.025	09/07/2010 3:23	11.346	09/07/2010 3:23	10.459	09/07/2010 3:03	9.166	
09/07/2010 3:48	8.17	09/07/2010 3:50	7.795	09/07/2010 3:51	9.731	09/07/2010 3:52	9.78	09/07/2010 3:53	11.005	09/07/2010 3:53	10.32	09/07/2010 3:33	9.509	
09/07/2010 4:18	7.87	09/07/2010 4:20	7.419	09/07/2010 4:21	9.485	09/07/2010 4:22	9.534	09/07/2010 4:23	10.712	09/07/2010 4:23	10.075	09/07/2010 4:03	9.312	
09/07/2010 4:48	7.594	09/07/2010 4:50	7.217	09/07/2010 4:51	9.262	09/07/2010 4:52	9.336	09/07/2010 4:53	10.467	09/07/2010 4:53	9.952	09/07/2010 4:33	9.114	
09/07/2010 5:18	7.343	09/07/2010 5:20	7.015	09/07/2010 5:21	8.964	09/07/2010 5:22	9.114	09/07/2010 5:23	10.247	09/07/2010 5:23	9.731	09/07/2010 5:03	8.965	
09/07/2010 5:48	7.142	09/07/2010 5:50	6.813	09/07/2010 5:51	8.841	09/07/2010 5:52	8.941	09/07/2010 5:53	10.11	09/07/2010 5:53	9.632	09/07/2010 5:33	8.866	
09/07/2010 6:18	6.965	09/07/2010 6:20	6.687	09/07/2010 6:21	8.668	09/07/2010 6:22	8.792	09/07/2010 6:23	9.903	09/07/2010 6:23	9.386	09/07/2010 6:03	8.767	
09/07/2010 6:48	6.788	09/07/2010 6:50	6.535	09/07/2010 6:51	8.519	09/07/2010 6:52	8.618	09/07/2010 6:53	9.805	09/07/2010 6:53	9.312	09/07/2010 6:33	8.767	
09/07/2010 7:18	6.636	09/07/2010 7:20	6.406	09/07/2010 7:21	8.369	09/07/2010 7:22	8.494	09/07/2010 7:23	9.657	09/07/2010 7:23	9.213	09/07/2010 7:03	8.742	
09/07/2010 7:48	6.56	09/07/2010 7:50	6.357	09/07/2010 7:51	8.27	09/07/2010 7:52	8.394	09/07/2010 7:53	9.312	09/07/2010 7:53	9.015	09/07/2010 7:33	8.618	
09/07/2010 8:18	6.535	09/07/2010 8:20	6.408	09/07/2010 8:21	8.195	09/07/2010 8:22	8.344	09/07/2010 8:23	9.114	09/07/2010 8:23	8.841	09/07/2010 8:03	8.568	
09/07/2010 8:48	6.585	09/07/2010 8:50	6.535	09/07/2010 8:51	8.195	09/07/2010 8:52	8.394	09/07/2010 8:53	9.04	09/07/2010 8:53	8.668	09/07/2010 8:33	8.494	
09/07/2010 9:18	6.661	09/07/2010 9:20	6.687	09/07/2010 9:21	8.27	09/07/2010 9:22	8.419	09/07/2010 9:23	8.965	09/07/2010 9:23	8.618	09/07/2010 9:03	8.499	
09/07/2010 9:48	6.884	09/07/2010 9:50	6.965	09/07/2010 9:51	8.265	09/07/2010 9:52	8.543	09/07/2010 9:53	8.941	09/07/2010 9:53	8.618	09/07/2010 9:33	8.469	
09/07/2010 10:18	7.066	09/07/2010 10:20	7.242	09/07/2010 10:21	8.394	09/07/2010 10:22	8.668	09/07/2010 10:23	9.163	09/07/2010 10:23	8.668	09/07/2010 10:03	8.817	
09/07/2010 10:48	7.343	09/07/2010 10:50	7.72	09/07/2010 10:51	8.598	09/07/2010 10:52	8.866	09/07/2010 10:53	9.243	09/07/2010 10:53	8.767	09/07/2010 10:33	8.866	
09/07/2010 11:18	7.67	09/07/2010 11:20	8.22	09/07/2010 11:21	8.841	09/07/2010 11:22	9.188	09/07/2010 11:23	9.41	09/07/2010 11:23	8.965	09/07/2010 11:03	9.114	
09/07/2010 11:48	8.195	09/07/2010 11:50	9.213	09/07/2010 11:51	9.287	09/07/2010 11:52	9.731	09/07/2010 11:53	10.026	09/07/2010 11:53	9.583	09/07/2010 11:33	9.756	
09/07/2010 12:18	8.841	09/07/2010 12:20	9.977	09/07/2010 12:21	9.78	09/07/2010 12:22	10.32	09/07/2010 12:23	10.247	09/07/2010 12:23	9.884	09/07/2010 12:03	10.149	
09/07/2010 12:48	9.41	09/07/2010 12:50	10.467	09/07/2010 12:51	10.222	09/07/2010 12:52	10.786	09/07/2010 12:53	10.814	09/07/2010 12:53	10.124	09/07/2010 12:33	10.541	
09/07/2010 13:18	10.075	09/07/2010 13:20	11.029	09/07/2010 13:21	10.736	09/07/2010 13:22	11.273	09/07/2010 13:23	11.029	09/07/2010 13:23	10.462	09/07/2010 13:03	10.952	
09/07/2010 13:48	10.785	09/07/2010 13:50	11.759	09/07/2010 13:51	11.248	09/07/2010 13:52	11.734	09/07/2010 13:53	11.273	09/07/2010 13:53	10.736	09/07/2010 13:33	11.053	
09/07/2010 14:18	11.394	09/07/2010 14:20	12.389	09/07/2010 14:21	11.734	09/07/2010 14:22	12.292	09/07/2010 14:23	11.807	09/07/2010 14:23	11.248	09/07/2010 14:03	11.613	
09/07/2010 14:48	11.662	09/07/2010 14:50	12.389	09/07/2010 14:51	11.977	09/07/2010 14:52	12.461	09/07/2010 14:53	12.219	09/07/2010 14:53	11.613	09/07/2010 14:33	11.486	
09/07/2010 15:18	11.71	09/07/2010 15:20	12.243	09/07/2010 15:21	12.147	09/07/2010 15:22	12.485	09/07/2010 15:23	12.534	09/07/2010 15:23	11.889	09/07/2010 15:03	12.288	
09/07/2010 15:48	12.098	09/07/2010 15:50	13.088	09/07/2010 15:51	12.437	09/07/2010 15:52	12.727	09/07/2010 15:53	12.582	09/07/2010 15:53	12.005	09/07/2010 15:33	12.316	
09/07/2010 16:18	12.485	09/07/2010 16:20	13.497	09/07/2010 16:21	12.654	09/07/2010 16:22	12.962	09/07/2010 16:23	12.799	09/07/2010 16:23	12.243	09/07/2010 16:03	12.485	
09/07/2010 16:48	12.92	09/07/2010 16:50	14.218	09/07/2010 16:51	13.04	09/07/2010 16:52	13.461	09/07/2010 16:53	13.299	09/07/2010 16:53	12.584	09/07/2010 16:33	12.847	
09/07/2010 17:18	13.401	09/07/2010 17:20	14.649	09/07/2010 17:21	13.377	09/07/2010 17:22	13.762	09/07/2010 17:23	13.546	09/07/2010 17:23	12.871	09/07/2010 17:03	13.064	
09/07/2010 17:48	13.714	09/07/2010 17:50	14.84	09/07/2010 17:51	13.642	09/07/2010 17:52	13.978	09/07/2010 17:53	13.762	09/07/2010 17:53	13.112	09/07/2010 17:33	13.257	
09/07/2010 18:18	13.882	09/07/2010 18:20	14.888	09/07/2010 18:21	13.81	09/07/2010 18:22	14.098	09/07/2010 18:23	13.83	09/07/2010 18:23	13.257	09/07/2010 18:03	13.377	
09/07/2010 18:48	13.905	09/07/2010 18:50	14.697	09/07/2010 18:51	13.862	09/07/2010 18:52	14.098	09/07/2010 18:53	13.577	09/07/2010 18:53	13.377	09/07/2010 18:33	13.064	
09/07/2010 19:18	13.81	09/07/2010 19:20	14.505	09/07/2010 19:21	13.858	09/07/2010 19:22	13.954	09/07/2010 19:23	14.026	09/07/2010 19:23	13.353	09/07/2010 19:03	12.992	
09/07/2010 19:48	13.618	09/07/2010 19:50	14.122	09/07/2010 19:51	13.738	09/07/2010 19:52	13.738	09/07/2010 19:53	13.905	09/07/2010 19:53	13.233	09/07/2010 19:33	12.847	
09/07/2010 20:18	13.329	09/07/2010 20:20	13.758	09/07/2010 20:21	13.546	09/07/2010 20:22	13.473	09/07/2010 20:23	13.714	09/07/2010 20:23	13.064	09/07/2010 20:03	12.654	
09/07/2010 20:48	13.016	09/07/2010 20:50	13.305	09/07/2010 20:51	13.291	09/07/2010 20:52	13.195	09/07/2010 20:53	13.502	09/07/2010 20:53	12.799	09/07/2010 20:33	12.413	
09/07/2010 21:18	12.63	09/07/2010 21:20	12.775	09/07/2010 21:21	12.968	09/07/2010 21:22	12.847	09/07/2010 21:23	13.305	09/07/2010 21:23	12.582	09/07/2010 21:03	12.088	
09/07/2010 21:48	12.268	09/07/2010 21:50	12.364	09/07/2010 21:51	12.678	09/07/2010 21:52	12.509	09/07/2010 21:53	13.137	09/07/2010 21:53	12.461	09/07/2010 21:33	11.807	
09/07/2010 22:18	11.89	09/07/2010 22:20	11.929	09/07/2010 22:21	12.34	09/07/2010 22:22	12.147	09/07/2010 22:23	12.984	09/07/2010 22:23	12.258	09/07/2010 22:03	11.492	
09/07/2010 22:48	11.441	09/07/2010 22:50	11.419	09/07/2010 22:51	11.853	09/07/2010 22:52	11.783	09/07/2010 22:53	12.853	09/07/2010 22:53	12.16	09/07/2010 22:33	11.294	
09/07/2010 23:18	10.98	09/07/2010 23:20	10.907	09/07/2010 23:21	11.589	09/07/2010 23:22	11.419	09/07/2010 23:23	12.654	09/07/2010 23:23	11.904	09/07/2010 23:03	11.005	
09/07/2010 23:48	10.492	09/07/2010 23:50	10.394	09/07/2010 23:51	11.2	09/07/2010 23:52	11.029	09/07/2010 23:53	12.534	09/07/2010 23:53	11.71	09/07/2010 23:33	10.785	
09/07/2010 0:18	9.622	09/07/2010 0:20	9.46	09/07/2010 0:21	11.175	09/07/2010 0:22	11.727	09/07/2010 0:23	12.559	09/07/2010 0:23	11.789	09/07/2010 0:03	9.756	
09/07/2010 0:48	9.485	09/07/2010 0:50	9.41	09/07/2010 0:51	10.492	09/07/2010 0:52	10.32	09/07/2010 0:53	12.001	09/07/2010 0:53	11.321	09/07/2010 0:33	10.345	
09/07/2010 1:18	9.064	09/07/2010 1:20	8.99	09/07/2010 1:21	10.149	09/07/2010 1:22	10.026	09/07/2010 1:23	11.734	09/07/2010 1:23	11.151	09/07/2010 1:03	10.149	
09/07/2010 1:48	8.693	09/07/2010 1:50	8.593	09/07/2010 1:51	9.854	09/07/2010 1:52	9.78	09/07/2010 1:53	11.467	09/07/2010 1:53	10.98	09/07/2010 1:33	9.977	
09/07/2010 2:18	8.04	09/07/2010 2:20	8.27	09/07/2010 2:21	9.608	09/07/2010 2:22	9.558	09/07/2010 2:23	11.273	09/07/2010 2:23	10.834	09/07/2010 2:03	9.854	
09/														

11-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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11/07/2010 0:48	12.098	11/07/2010 0:50	11.977	11/07/2010 0:51	12.598	11/07/2010 0:52	12.461	11/07/2010 0:53	14.505	11/07/2010 0:53	13.329	11/07/2010 0:33	11.637
11/07/2010 1:18	11.783	11/07/2010 1:20	11.662	11/07/2010 1:21	12.888	11/07/2010 1:22	12.288	11/07/2010 1:23	14.314	11/07/2010 1:23	13.084	11/07/2010 1:03	11.443
11/07/2010 1:48	11.492	11/07/2010 1:50	11.445	11/07/2010 1:51	12.347	11/07/2010 1:52	12.098	11/07/2010 1:53	14.098	11/07/2010 1:53	12.871	11/07/2010 1:33	11.278
11/07/2010 2:18	11.175	11/07/2010 2:20	11.127	11/07/2010 2:21	11.904	11/07/2010 2:22	11.904	11/07/2010 2:23	13.906	11/07/2010 2:23	12.678	11/07/2010 2:03	11.102
11/07/2010 2:48	10.858	11/07/2010 2:50	10.761	11/07/2010 2:51	11.686	11/07/2010 2:52	11.711	11/07/2010 2:53	13.642	11/07/2010 2:53	12.509	11/07/2010 2:33	10.98
11/07/2010 3:18	10.516	11/07/2010 3:20	10.443	11/07/2010 3:21	11.492	11/07/2010 3:22	11.516	11/07/2010 3:23	13.497	11/07/2010 3:23	12.384	11/07/2010 3:03	10.832
11/07/2010 3:48	10.188	11/07/2010 3:50	10.103	11/07/2010 3:51	11.346	11/07/2010 3:52	11.346	11/07/2010 3:53	13.291	11/07/2010 3:53	12.156	11/07/2010 3:33	10.681
11/07/2010 4:18	9.952	11/07/2010 4:20	10.001	11/07/2010 4:21	11.175	11/07/2010 4:22	11.224	11/07/2010 4:23	13.112	11/07/2010 4:23	12.05	11/07/2010 4:03	10.588
11/07/2010 4:48	9.731	11/07/2010 4:50	9.854	11/07/2010 4:51	11.005	11/07/2010 4:52	11.102	11/07/2010 4:53	13.016	11/07/2010 4:53	11.977	11/07/2010 4:33	10.81
11/07/2010 5:18	9.534	11/07/2010 5:20	9.662	11/07/2010 5:21	10.932	11/07/2010 5:22	11.029	11/07/2010 5:23	12.968	11/07/2010 5:23	11.88	11/07/2010 5:03	10.765
11/07/2010 5:48	9.386	11/07/2010 5:50	9.508	11/07/2010 5:51	10.804	11/07/2010 5:52	10.965	11/07/2010 5:53	12.82	11/07/2010 5:53	11.807	11/07/2010 5:33	10.765
11/07/2010 6:18	9.213	11/07/2010 6:20	9.435	11/07/2010 6:21	10.712	11/07/2010 6:22	10.834	11/07/2010 6:23	12.823	11/07/2010 6:23	11.759	11/07/2010 6:03	10.81
11/07/2010 6:48	9.114	11/07/2010 6:50	9.336	11/07/2010 6:51	10.663	11/07/2010 6:52	10.785	11/07/2010 6:53	12.775	11/07/2010 6:53	11.71	11/07/2010 6:33	10.858
11/07/2010 7:18	9.238	11/07/2010 7:20	9.78	11/07/2010 7:21	10.712	11/07/2010 7:22	10.907	11/07/2010 7:23	12.968	11/07/2010 7:23	11.88	11/07/2010 7:03	10.98
11/07/2010 7:48	9.534	11/07/2010 7:50	10.418	11/07/2010 7:51	10.888	11/07/2010 7:52	11.287	11/07/2010 7:53	13.209	11/07/2010 7:53	12.172	11/07/2010 7:33	11.248
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11/07/2010 12:18	15.915	11/07/2010 12:20	17.796	11/07/2010 12:21	15.485	11/07/2010 12:22	16.225	11/07/2010 12:23	17.486	11/07/2010 12:23	16.413	11/07/2010 12:03	14.98
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11/07/2010 13:18	17.225	11/07/2010 13:20	19.096	11/07/2010 13:21	16.582	11/07/2010 13:22	17.272	11/07/2010 13:23	18.866	11/07/2010 13:23	17.51	11/07/2010 13:03	16.249
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12/07/2010 2:48	12.122	12/07/2010 2:50	12.074	12/07/2010 2:51	12.92	12/07/2010 2:52							

13-Jul-10

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Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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13/07/2010 2:48	14.888	13/07/2010 2:50	14.29	13/07/2010 2:51	15.533	13/07/2010 2:52	15.414	13/07/2010 2:53	17.415	13/07/2010 2:53	16.344	13/07/2010 2:33	14.29
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13/07/2010 12:18	15.294	13/07/2010 12:20	16.201	13/07/2010 12:21	15.127	13/07/2010 12:22	15.891	13/07/2010 12:23	16.32	13/07/2010 12:23	15.968	13/07/2010 12:03	14.649
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13/07/2010 18:18	19.984	13/07/2010 18:20	20.507	13/07/2010 18:21	19.722	13/07/2010 18:22	20.095	13/07/2010 18:23	19.793	13/07/2010 18:23	19.365	13/07/2010 18:03	18.366
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13/07/2010 22:48	15.533	13/07/2010 22:50	14.888	13/07/2010 22:51	16.272	13/07/2010 22:52	16.062	13/07/2010 22:53	16.796	13/07/2010 22:53	16.388	13/07/2010 22:33	15.151
13/07/2010 23:18	14.96	13/07/2010 23:20	14.29	13/07/2010 23:21	15.796	13/07/2010 23:22	15.629	13/07/2010 23:23	16.415	13/07/2010 23:23	15.867	13/07/2010 23:03	14.792
13/07/2010 23:48	14.385	13/07/2010 23:50	13.738	13/07/2010 23:51	15.39	13/07/2010 23:52	15.199	13/07/2010 23:53	16.034	13/07/2010 23:53	15.438	13/07/2010 23:33	14.457
14/07/2010 0:18	14.222	14/07/2010 0:20	13.522	14/07/2010 0:21	14.673	14/07/2010 0:22	14.625	14/07/2010 0:23	16.773	14/07/2010 0:23	15.7	14/07/2010 0:03	13.666
14/07/2010 0:48	13.377	14/07/2010 0:50	12.799	14/07/2010 0:51	14.625	14/07/2010 0:52	14.433	14/07/2010 0:53	15.366	14/07/2010 0:53	14.745	14/07/2010 0:33	13.882
14/07/2010 1:18	12.992	14/07/2010 1:20	12.509	14/07/2010 1:21	14.29	14/07/2010 1:22	14.146	14/07/2010 1:23	15.055	14/07/2010 1:23	14.481	14/07/2010 1:03	13.642
14/07/2010 1:48	12.654	14/07/2010 1:50	12.292	14/07/2010 1:51	14.028	14/07/2010 1:52	13.93	14/07/2010 1:53	14.864	14/07/2010 1:53	14.194	14/07/2010 1:33	13.404
14/07/2010 2:18	12.34	14/07/2010 2:20	12.074	14/07/2010 2:21	13.786	14/07/2010 2:22	13.641	14/07/2010 2:23	14.601	14/07/2010 2:23	13.947	14/07/2010 2:03	13.166
14/07/2010 2:48	12.074	14/07/2010 2:50	11.88	14/07/2010 2:51	13								

15-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
15/07/2010 0:18	16.031	15/07/2010 0:20	16.01	15/07/2010 0:21	16.487	15/07/2010 0:22	16.463	15/07/2010 0:23	16.414	15/07/2010 0:23	17.605	15/07/2010 0:03	15.581
15/07/2010 0:48	16.676	15/07/2010 0:50	16.629	15/07/2010 0:51	16.201	15/07/2010 0:52	16.201	15/07/2010 0:53	18.224	15/07/2010 0:53	17.415	15/07/2010 0:33	15.438
15/07/2010 1:18	15.318	15/07/2010 1:20	15.175	15/07/2010 1:21	15.539	15/07/2010 1:22	15.515	15/07/2010 1:23	17.862	15/07/2010 1:23	17.201	15/07/2010 1:03	15.294
15/07/2010 1:48	15.08	15/07/2010 1:50	14.84	15/07/2010 1:51	15.724	15/07/2010 1:52	15.676	15/07/2010 1:53	17.677	15/07/2010 1:53	16.907	15/07/2010 1:33	15.177
15/07/2010 2:18	14.721	15/07/2010 2:20	14.577	15/07/2010 2:21	15.485	15/07/2010 2:22	15.461	15/07/2010 2:23	17.439	15/07/2010 2:23	16.701	15/07/2010 2:03	14.936
15/07/2010 2:48	14.457	15/07/2010 2:50	14.314	15/07/2010 2:51	15.247	15/07/2010 2:52	15.247	15/07/2010 2:53	17.201	15/07/2010 2:53	16.487	15/07/2010 2:33	14.745
15/07/2010 3:18	14.17	15/07/2010 3:20	14.002	15/07/2010 3:21	15.009	15/07/2010 3:22	15.009	15/07/2010 3:23	16.963	15/07/2010 3:23	16.344	15/07/2010 3:03	14.505
15/07/2010 3:48	13.882	15/07/2010 3:50	13.666	15/07/2010 3:51	14.816	15/07/2010 3:52	14.816	15/07/2010 3:53	16.725	15/07/2010 3:53	16.153	15/07/2010 3:33	14.218
15/07/2010 4:18	13.642	15/07/2010 4:20	13.546	15/07/2010 4:21	14.649	15/07/2010 4:22	14.697	15/07/2010 4:23	16.582	15/07/2010 4:23	15.963	15/07/2010 4:03	13.954
15/07/2010 4:48	13.449	15/07/2010 4:50	13.353	15/07/2010 4:51	14.505	15/07/2010 4:52	14.577	15/07/2010 4:53	16.463	15/07/2010 4:53	15.724	15/07/2010 4:33	13.786
15/07/2010 5:18	13.329	15/07/2010 5:20	13.281	15/07/2010 5:21	14.385	15/07/2010 5:22	14.553	15/07/2010 5:23	16.369	15/07/2010 5:23	15.629	15/07/2010 5:03	13.738
15/07/2010 5:48	13.223	15/07/2010 5:50	13.223	15/07/2010 5:51	14.337	15/07/2010 5:52	14.553	15/07/2010 5:53	16.369	15/07/2010 5:53	15.605	15/07/2010 5:33	13.658
15/07/2010 6:18	13.112	15/07/2010 6:20	13.088	15/07/2010 6:21	14.29	15/07/2010 6:22	14.529	15/07/2010 6:23	16.225	15/07/2010 6:23	15.495	15/07/2010 6:03	13.978
15/07/2010 6:48	13.112	15/07/2010 6:50	13.257	15/07/2010 6:51	14.29	15/07/2010 6:52	14.553	15/07/2010 6:53	16.201	15/07/2010 6:53	15.438	15/07/2010 6:33	14.074
15/07/2010 7:18	13.281	15/07/2010 7:20	13.497	15/07/2010 7:21	14.361	15/07/2010 7:22	14.649	15/07/2010 7:23	16.369	15/07/2010 7:23	15.485	15/07/2010 7:03	14.266
15/07/2010 7:48	13.546	15/07/2010 7:50	13.882	15/07/2010 7:51	14.553	15/07/2010 7:52	14.911	15/07/2010 7:53	16.511	15/07/2010 7:53	15.652	15/07/2010 7:33	14.457
15/07/2010 8:18	13.93	15/07/2010 8:20	14.505	15/07/2010 8:21	14.792	15/07/2010 8:22	15.27	15/07/2010 8:23	16.701	15/07/2010 8:23	15.819	15/07/2010 8:03	14.553
15/07/2010 8:48	14.337	15/07/2010 8:50	14.96	15/07/2010 8:51	15.127	15/07/2010 8:52	15.7	15/07/2010 8:53	16.868	15/07/2010 8:53	15.963	15/07/2010 8:33	14.697
15/07/2010 9:18	14.84	15/07/2010 9:20	15.605	15/07/2010 9:21	15.485	15/07/2010 9:22	16.153	15/07/2010 9:23	17.32	15/07/2010 9:23	16.32	15/07/2010 9:03	15.199
15/07/2010 9:48	15.439	15/07/2010 9:50	16.344	15/07/2010 9:51	15.891	15/07/2010 9:52	16.63	15/07/2010 9:53	17.794	15/07/2010 9:53	16.48	15/07/2010 9:33	15.557
15/07/2010 10:18	16.058	15/07/2010 10:20	17.225	15/07/2010 10:21	16.32	15/07/2010 10:22	17.13	15/07/2010 10:23	18.271	15/07/2010 10:23	17.415	15/07/2010 10:03	16.101
15/07/2010 10:48	16.654	15/07/2010 10:50	17.962	15/07/2010 10:51	16.939	15/07/2010 10:52	17.843	15/07/2010 10:53	18.626	15/07/2010 10:53	17.582	15/07/2010 10:33	16.106
15/07/2010 11:18	17.011	15/07/2010 11:20	18.176	15/07/2010 11:21	17.388	15/07/2010 11:22	18.224	15/07/2010 11:23	18.39	15/07/2010 11:23	17.51	15/07/2010 11:03	16.153
15/07/2010 11:48	17.415	15/07/2010 11:50	18.937	15/07/2010 11:51	17.639	15/07/2010 11:52	18.49	15/07/2010 11:53	18.152	15/07/2010 11:53	17.498	15/07/2010 11:33	16.158
15/07/2010 12:18	17.772	15/07/2010 12:20	19.341	15/07/2010 12:21	18.081	15/07/2010 12:22	18.818	15/07/2010 12:23	18.699	15/07/2010 12:23	17.748	15/07/2010 12:03	16.149
15/07/2010 12:48	18.159	15/07/2010 12:50	19.651	15/07/2010 12:51	18.366	15/07/2010 12:52	19.056	15/07/2010 12:53	19.436	15/07/2010 12:53	18.176	15/07/2010 12:33	16.82
15/07/2010 13:18	18.652	15/07/2010 13:20	19.936	15/07/2010 13:21	18.675	15/07/2010 13:22	19.389	15/07/2010 13:23	19.841	15/07/2010 13:23	18.567	15/07/2010 13:03	17.113
15/07/2010 13:48	19.127	15/07/2010 13:50	20.379	15/07/2010 13:51	19.351	15/07/2010 13:52	19.857	15/07/2010 13:53	20.303	15/07/2010 13:53	18.896	15/07/2010 13:33	17.698
15/07/2010 14:18	19.77	15/07/2010 14:20	21.05	15/07/2010 14:21	19.37	15/07/2010 14:22	19.96	15/07/2010 14:23	20.688	15/07/2010 14:23	19.674	15/07/2010 14:03	18.247
15/07/2010 14:48	20.412	15/07/2010 14:50	21.652	15/07/2010 14:51	19.484	15/07/2010 14:52	20.126	15/07/2010 14:53	21.175	15/07/2010 14:53	20.069	15/07/2010 14:33	18.628
15/07/2010 15:18	20.746	15/07/2010 15:20	21.915	15/07/2010 15:21	19.748	15/07/2010 15:22	20.498	15/07/2010 15:23	21.39	15/07/2010 15:23	20.365	15/07/2010 15:03	18.937
15/07/2010 15:48	20.913	15/07/2010 15:50	21.840	15/07/2010 15:51	19.894	15/07/2010 15:52	20.674	15/07/2010 15:53	21.599	15/07/2010 15:53	20.531	15/07/2010 15:33	19.189
15/07/2010 16:18	21.008	15/07/2010 16:20	21.915	15/07/2010 16:21	20.269	15/07/2010 16:22	20.936	15/07/2010 16:23	22.003	15/07/2010 16:23	20.603	15/07/2010 16:03	19.246
15/07/2010 16:48	21.056	15/07/2010 16:50	21.891	15/07/2010 16:51	20.365	15/07/2010 16:52	20.936	15/07/2010 16:53	21.342	15/07/2010 16:53	20.46	15/07/2010 16:33	19.222
15/07/2010 17:18	20.913	15/07/2010 17:20	21.366	15/07/2010 17:21	20.293	15/07/2010 17:22	20.698	15/07/2010 17:23	20.865	15/07/2010 17:23	20.055	15/07/2010 17:03	18.937
15/07/2010 17:48	20.531	15/07/2010 17:50	20.746	15/07/2010 17:51	20.126	15/07/2010 17:52	20.365	15/07/2010 17:53	20.174	15/07/2010 17:53	19.484	15/07/2010 17:33	18.485
15/07/2010 18:18	20.65	15/07/2010 18:20	20.386	15/07/2010 18:21	19.898	15/07/2010 18:22	20.01	15/07/2010 18:23	19.607	15/07/2010 18:23	18.607	15/07/2010 18:03	18.057
15/07/2010 18:48	19.532	15/07/2010 18:50	19.627	15/07/2010 18:51	19.508	15/07/2010 18:52	19.508	15/07/2010 18:53	18.937	15/07/2010 18:53	18.699	15/07/2010 18:33	17.605
15/07/2010 19:18	18.628	15/07/2010 19:20	17.724	15/07/2010 19:21	17.891	15/07/2010 19:22	17.772	15/07/2010 19:23	18.604	15/07/2010 19:23	18.414	15/07/2010 19:03	17.153
15/07/2010 19:48	17.748	15/07/2010 19:50	17.534	15/07/2010 19:51	17.296	15/07/2010 19:52	16.539	15/07/2010 19:53	16.58	15/07/2010 19:53	18.295	15/07/2010 19:33	16.746
15/07/2010 20:18	16.912	15/07/2010 20:20	16.93	15/07/2010 20:21	16.147	15/07/2010 20:22	16.147	15/07/2010 20:23	16.147	15/07/2010 20:23	18.01	15/07/2010 20:03	16.536
15/07/2010 20:48	16.749	15/07/2010 20:50	16.892	15/07/2010 20:51	16.153	15/07/2010 20:52	16.249	15/07/2010 20:53	18.343	15/07/2010 20:53	17.962	15/07/2010 20:33	16.168
15/07/2010 21:18	16.368	15/07/2010 21:20	16.511	15/07/2010 21:21	15.867	15/07/2010 21:22	16.082	15/07/2010 21:23	18.176	15/07/2010 21:23	17.677	15/07/2010 21:03	15.891
15/07/2010 21:48	15.983	15/07/2010 21:50	16.177	15/07/2010 21:51	15.676	15/07/2010 21:52	15.963	15/07/2010 21:53	18.01	15/07/2010 21:53	17.415	15/07/2010 21:33	15.7
15/07/2010 22:18	15.53	15/07/2010 22:20	15.796	15/07/2010 22:21	15.461	15/07/2010 22:22	15.772	15/07/2010 22:23	17.714	15/07/2010 22:23	17.248	15/07/2010 22:03	15.677
15/07/2010 22:48	15.127	15/07/2010 22:50	15.414	15/07/2010 22:51	15.27	15/07/2010 22:52	15.581	15/07/2010 22:53	17.582	15/07/2010 22:53	16.915	15/07/2010 22:33	15.438
15/07/2010 23:18	14.792	15/07/2010 23:20	15.079	15/07/2010 23:21	15.127	15/07/2010 23:22	15.414	15/07/2010 23:23	17.439	15/07/2010 23:23	16.725	15/07/2010 23:03	15.27
15/07/2010 23:48	14.553	15/07/2010 23:50	14.792	15/07/2010 23:51	15.008	15/07/2010 23:52	15.27	15/07/2010 23:53	17.272	15/07/2010 23:53	16.463	15/07/2010 23:33	15.527
16/07/2010 0:18	14.424	16/07/2010 0:20	14.614	16/07/2010 0:21	14.614	16/07/2010 0:22	14.614	16/07/2010 0:23	17.188	16/07/2010 0:23	17.188	16/07/2010 0:03	15.294
16/07/2010 0:48	14.002	16/07/2010 0:50	14.074	16/07/2010 0:51	14.697	16/07/2010 0:52	14.96	16/07/2010 0:53	16.844	16/07/2010 0:53	16.058	16/07/2010 0:33	14.84
16/07/2010 1:18	13.714	16/07/2010 1:20	13.714	16/07/2010 1:21	14.505	16/07/2010 1:22	14.768	16/07/2010 1:23	16.606	16/07/2010 1:23	15.891	16/07/2010 1:03	14.721
16/07/2010 1:48	13.401	16/07/2010 1:50	13.393	16/07/2010 1:51	14.314	16/07/2010 1:52	14.953	16/07/2010 1:53	16.439	16/07/2010 1:53	15.796	16/07/2010 1:33	14.601
16/07/2010 2:18	13.112	16/07/2010 2:20	12.962	16/07/2010 2:21	14.117	16/07/2010 2:22	14.562	16/07/2010 2:23	16.562	16/07/2010 2:23	15.629	16/07/2010 2:03	14.368
16/07/2010 2:48	12.799	16/07/2010 2:50	12.654	16/07/2010 2:51	14.002	16/							

17-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
17/07/2010 0:18	10.738	17/07/2010 0:20	10.247	17/07/2010 0:21	11.71	17/07/2010 0:23	11.637	17/07/2010 0:23	12.823	17/07/2010 0:23	12.437	17/07/2010 0:03	11.467
17/07/2010 0:48	10.443	17/07/2010 0:50	10.075	17/07/2010 0:51	11.516	17/07/2010 0:52	11.467	17/07/2010 0:53	12.606	17/07/2010 0:53	12.292	17/07/2010 0:33	11.394
17/07/2010 1:18	10.198	17/07/2010 1:20	9.903	17/07/2010 1:21	11.346	17/07/2010 1:22	11.321	17/07/2010 1:23	12.288	17/07/2010 1:23	11.977	17/07/2010 1:03	11.273
17/07/2010 1:48	9.825	17/07/2010 1:50	9.534	17/07/2010 1:51	11.078	17/07/2010 1:52	11.078	17/07/2010 1:53	11.953	17/07/2010 1:53	11.613	17/07/2010 1:33	11.053
17/07/2010 2:18	9.583	17/07/2010 2:20	9.386	17/07/2010 2:21	10.883	17/07/2010 2:22	10.883	17/07/2010 2:23	11.734	17/07/2010 2:23	11.394	17/07/2010 2:03	10.834
17/07/2010 2:48	9.386	17/07/2010 2:50	9.262	17/07/2010 2:51	10.736	17/07/2010 2:52	10.736	17/07/2010 2:53	11.492	17/07/2010 2:53	11.224	17/07/2010 2:33	10.687
17/07/2010 3:18	9.213	17/07/2010 3:20	9.114	17/07/2010 3:21	10.565	17/07/2010 3:22	10.56	17/07/2010 3:23	11.321	17/07/2010 3:23	11.029	17/07/2010 3:03	10.565
17/07/2010 3:48	9.064	17/07/2010 3:50	8.95	17/07/2010 3:51	10.418	17/07/2010 3:52	10.467	17/07/2010 3:53	11.175	17/07/2010 3:53	10.854	17/07/2010 3:33	10.472
17/07/2010 4:18	8.941	17/07/2010 4:20	8.891	17/07/2010 4:21	10.296	17/07/2010 4:22	10.394	17/07/2010 4:23	11.078	17/07/2010 4:23	10.736	17/07/2010 4:03	10.492
17/07/2010 4:48	8.841	17/07/2010 4:50	8.817	17/07/2010 4:51	10.222	17/07/2010 4:52	10.32	17/07/2010 4:53	10.98	17/07/2010 4:53	10.59	17/07/2010 4:33	10.492
17/07/2010 5:18	8.767	17/07/2010 5:20	8.817	17/07/2010 5:21	10.149	17/07/2010 5:22	10.271	17/07/2010 5:23	10.883	17/07/2010 5:23	10.516	17/07/2010 5:03	10.565
17/07/2010 5:48	8.693	17/07/2010 5:50	8.732	17/07/2010 5:51	10.0	17/07/2010 5:52	10.222	17/07/2010 5:53	10.883	17/07/2010 5:53	10.394	17/07/2010 5:33	10.538
17/07/2010 6:18	8.618	17/07/2010 6:20	8.742	17/07/2010 6:21	10.051	17/07/2010 6:22	10.198	17/07/2010 6:23	10.834	17/07/2010 6:23	10.271	17/07/2010 6:03	10.687
17/07/2010 6:48	8.568	17/07/2010 6:50	8.693	17/07/2010 6:51	10.001	17/07/2010 6:52	10.149	17/07/2010 6:53	10.907	17/07/2010 6:53	10.149	17/07/2010 6:33	10.736
17/07/2010 7:18	8.519	17/07/2010 7:20	8.693	17/07/2010 7:21	9.928	17/07/2010 7:22	10.075	17/07/2010 7:23	10.98	17/07/2010 7:23	10.051	17/07/2010 7:03	10.81
17/07/2010 7:48	8.519	17/07/2010 7:50	8.693	17/07/2010 7:51	9.854	17/07/2010 7:52	10.038	17/07/2010 7:53	10.98	17/07/2010 7:53	9.977	17/07/2010 7:33	10.863
17/07/2010 8:18	8.494	17/07/2010 8:20	8.693	17/07/2010 8:21	9.805	17/07/2010 8:22	10.001	17/07/2010 8:23	10.907	17/07/2010 8:23	9.879	17/07/2010 8:03	10.932
17/07/2010 8:48	8.519	17/07/2010 8:50	8.742	17/07/2010 8:51	9.78	17/07/2010 8:52	10.001	17/07/2010 8:53	10.907	17/07/2010 8:53	9.829	17/07/2010 8:33	10.956
17/07/2010 9:18	8.618	17/07/2010 9:20	8.891	17/07/2010 9:21	9.805	17/07/2010 9:22	10.026	17/07/2010 9:23	10.883	17/07/2010 9:23	9.756	17/07/2010 9:03	11.005
17/07/2010 9:48	8.767	17/07/2010 9:50	9.114	17/07/2010 9:51	9.829	17/07/2010 9:52	10.124	17/07/2010 9:53	10.98	17/07/2010 9:53	9.704	17/07/2010 9:33	11.028
17/07/2010 10:18	8.965	17/07/2010 10:20	9.361	17/07/2010 10:21	9.952	17/07/2010 10:22	10.296	17/07/2010 10:23	11.248	17/07/2010 10:23	9.829	17/07/2010 10:03	11.248
17/07/2010 10:48	9.089	17/07/2010 10:50	9.509	17/07/2010 10:51	10.051	17/07/2010 10:52	10.443	17/07/2010 10:53	11.297	17/07/2010 10:53	9.854	17/07/2010 10:33	11.321
17/07/2010 11:18	9.188	17/07/2010 11:20	9.598	17/07/2010 11:21	10.149	17/07/2010 11:22	10.541	17/07/2010 11:23	11.273	17/07/2010 11:23	9.903	17/07/2010 11:03	11.419
17/07/2010 11:48	9.287	17/07/2010 11:50	9.706	17/07/2010 11:51	10.247	17/07/2010 11:52	10.638	17/07/2010 11:53	11.297	17/07/2010 11:53	10.028	17/07/2010 11:33	11.546
17/07/2010 12:18	9.608	17/07/2010 12:20	10.1	17/07/2010 12:21	10.467	17/07/2010 12:22	10.932	17/07/2010 12:23	11.467	17/07/2010 12:23	10.173	17/07/2010 12:03	11.783
17/07/2010 12:48	10.051	17/07/2010 12:50	10.663	17/07/2010 12:51	10.736	17/07/2010 12:52	11.297	17/07/2010 12:53	11.589	17/07/2010 12:53	10.296	17/07/2010 12:33	11.977
17/07/2010 13:18	10.516	17/07/2010 13:20	11.321	17/07/2010 13:21	11.102	17/07/2010 13:22	11.789	17/07/2010 13:23	11.807	17/07/2010 13:23	10.541	17/07/2010 13:03	12.098
17/07/2010 13:48	10.98	17/07/2010 13:50	11.734	17/07/2010 13:51	11.467	17/07/2010 13:52	12.219	17/07/2010 13:53	12.171	17/07/2010 13:53	10.81	17/07/2010 13:33	12.334
17/07/2010 14:18	11.613	17/07/2010 14:20	12.634	17/07/2010 14:21	11.88	17/07/2010 14:22	12.678	17/07/2010 14:23	12.437	17/07/2010 14:23	11.394	17/07/2010 14:03	12.727
17/07/2010 14:48	12.171	17/07/2010 14:50	13.209	17/07/2010 14:51	12.389	17/07/2010 14:52	13.233	17/07/2010 14:53	12.703	17/07/2010 14:53	11.394	17/07/2010 14:33	13.137
17/07/2010 15:18	12.678	17/07/2010 15:20	13.642	17/07/2010 15:21	12.847	17/07/2010 15:22	13.666	17/07/2010 15:23	12.823	17/07/2010 15:23	11.54	17/07/2010 15:03	13.281
17/07/2010 15:48	12.968	17/07/2010 15:50	13.834	17/07/2010 15:51	13.185	17/07/2010 15:52	13.93	17/07/2010 15:53	13.064	17/07/2010 15:53	11.783	17/07/2010 15:33	13.497
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17/07/2010 17:18	13.882	17/07/2010 17:20	14.601	17/07/2010 17:21	13.762	17/07/2010 17:22	14.314	17/07/2010 17:23	13.112	17/07/2010 17:23	12.05	17/07/2010 17:03	13.449
17/07/2010 17:48	14.026	17/07/2010 17:50	14.529	17/07/2010 17:51	13.834	17/07/2010 17:52	14.314	17/07/2010 17:53	13.137	17/07/2010 17:53	12.147	17/07/2010 17:33	13.425
17/07/2010 18:18	14.05	17/07/2010 18:20	14.457	17/07/2010 18:21	13.858	17/07/2010 18:22	14.296	17/07/2010 18:23	13.112	17/07/2010 18:23	12.194	17/07/2010 18:03	13.533
17/07/2010 18:48	13.93	17/07/2010 18:50	14.242	17/07/2010 18:51	13.81	17/07/2010 18:52	14.146	17/07/2010 18:53	13.112	17/07/2010 18:53	12.243	17/07/2010 18:33	13.553
17/07/2010 19:18	13.738	17/07/2010 19:20	13.93	17/07/2010 19:21	13.69	17/07/2010 19:22	13.93	17/07/2010 19:23	13.161	17/07/2010 19:23	12.219	17/07/2010 19:03	13.257
17/07/2010 19:48	13.546	17/07/2010 19:50	13.642	17/07/2010 19:51	13.546	17/07/2010 19:52	13.69	17/07/2010 19:53	13.112	17/07/2010 19:53	12.219	17/07/2010 19:33	13.137
17/07/2010 20:18	13.329	17/07/2010 20:20	13.329	17/07/2010 20:21	13.353	17/07/2010 20:22	13.446	17/07/2010 20:23	13.054	17/07/2010 20:23	12.156	17/07/2010 20:03	12.954
17/07/2010 20:48	13.064	17/07/2010 20:50	12.992	17/07/2010 20:51	13.161	17/07/2010 20:52	13.185	17/07/2010 20:53	12.992	17/07/2010 20:53	12.147	17/07/2010 20:33	12.847
17/07/2010 21:18	12.727	17/07/2010 21:20	12.63	17/07/2010 21:21	12.92	17/07/2010 21:22	12.92	17/07/2010 21:23	12.92	17/07/2010 21:23	12.098	17/07/2010 21:03	12.727
17/07/2010 21:48	12.413	17/07/2010 21:50	12.318	17/07/2010 21:51	12.703	17/07/2010 21:52	12.678	17/07/2010 21:53	12.871	17/07/2010 21:53	12.025	17/07/2010 21:33	12.582
17/07/2010 22:18	12.098	17/07/2010 22:20	12.001	17/07/2010 22:21	12.485	17/07/2010 22:22	12.485	17/07/2010 22:23	12.775	17/07/2010 22:23	11.953	17/07/2010 22:03	12.413
17/07/2010 22:48	11.807	17/07/2010 22:50	11.759	17/07/2010 22:51	12.268	17/07/2010 22:52	12.268	17/07/2010 22:53	12.678	17/07/2010 22:53	11.904	17/07/2010 22:33	12.293
17/07/2010 23:18	11.54	17/07/2010 23:20	11.492	17/07/2010 23:21	12.098	17/07/2010 23:22	12.074	17/07/2010 23:23	12.582	17/07/2010 23:23	11.832	17/07/2010 23:03	12.195
17/07/2010 23:48	11.273	17/07/2010 23:50	11.273	17/07/2010 23:51	11.895	17/07/2010 23:52	11.895	17/07/2010 23:53	12.461	17/07/2010 23:53	11.734	17/07/2010 23:33	12.098
18/07/2010 0:18	11.554	18/07/2010 0:20	11.554	18/07/2010 0:21	11.554	18/07/2010 0:22	11.554	18/07/2010 0:23	11.554	18/07/2010 0:23	11.554	18/07/2010 0:03	11.554
18/07/2010 0:48	10.858	18/07/2010 0:50	10.858	18/07/2010 0:51	11.516	18/07/2010 0:52	11.516	18/07/2010 0:53	12.292	18/07/2010 0:53	11.565	18/07/2010 0:33	11.904
18/07/2010 1:18	10.663	18/07/2010 1:20	10.663	18/07/2010 1:21	11.37	18/07/2010 1:22	11.394	18/07/2010 1:23	12.219	18/07/2010 1:23	11.492	18/07/2010 1:03	11.832
18/07/2010 1:48	10.492	18/07/2010 1:50	10.492	18/07/2010 1:51	11.224	18/07/2010 1:52	11.273	18/07/2010 1:53	12.171	18/07/2010 1:53	11.394	18/07/2010 1:33	11.734
18/07/2010 2:18	10.32	18/07/2010 2:20	10.32	18/07/2010 2:21	11.078	18/07/2010 2:22	11.078	18/07/2010 2:23	12.122	18/07/2010 2:23	11.394	18/07/2010 2:03	11.546
18/07/2010 2:48	10.124	18/07/2010 2:50	10.198	18/07/2010 2:51	11.005	18/07/2010 2:52	11.078	18/07/2010 2:53	12.05				

19-Jul-10

Logger 1 (9765600)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
19/07/2010 0:18	11.37	19/07/2010 0:20	11.7	19/07/2010 0:21	11.904	19/07/2010 0:23	11.88	19/07/2010 0:23	12.654	19/07/2010 0:23	12.534	19/07/2010 0:03	12.074
19/07/2010 0:48	11.102	19/07/2010 0:50	10.98	19/07/2010 0:51	11.71	19/07/2010 0:52	11.734	19/07/2010 0:53	12.558	19/07/2010 0:53	12.364	19/07/2010 0:33	12.001
19/07/2010 1:18	10.883	19/07/2010 1:20	10.785	19/07/2010 1:21	11.569	19/07/2010 1:22	11.589	19/07/2010 1:23	12.413	19/07/2010 1:23	12.122	19/07/2010 1:03	11.856
19/07/2010 1:48	10.687	19/07/2010 1:50	10.565	19/07/2010 1:51	11.415	19/07/2010 1:52	11.487	19/07/2010 1:53	12.218	19/07/2010 1:53	11.954	19/07/2010 1:33	11.619
19/07/2010 2:18	10.467	19/07/2010 2:20	10.394	19/07/2010 2:21	11.273	19/07/2010 2:22	11.346	19/07/2010 2:23	12.05	19/07/2010 2:23	11.71	19/07/2010 2:03	11.565
19/07/2010 2:48	10.271	19/07/2010 2:50	10.198	19/07/2010 2:51	11.151	19/07/2010 2:52	11.224	19/07/2010 2:53	11.929	19/07/2010 2:53	11.565	19/07/2010 2:33	11.394
19/07/2010 3:18	10.051	19/07/2010 3:20	10.026	19/07/2010 3:21	11.005	19/07/2010 3:22	11.078	19/07/2010 3:23	11.807	19/07/2010 3:23	11.273	19/07/2010 3:03	11.248
19/07/2010 3:48	9.825	19/07/2010 3:50	9.825	19/07/2010 3:51	10.883	19/07/2010 3:52	10.952	19/07/2010 3:53	11.607	19/07/2010 3:53	11.078	19/07/2010 3:33	11.107
19/07/2010 4:18	9.558	19/07/2010 4:20	9.583	19/07/2010 4:21	10.736	19/07/2010 4:22	10.785	19/07/2010 4:23	11.54	19/07/2010 4:23	10.858	19/07/2010 4:03	10.98
19/07/2010 4:48	9.312	19/07/2010 4:50	9.287	19/07/2010 4:51	10.541	19/07/2010 4:52	10.541	19/07/2010 4:53	11.467	19/07/2010 4:53	10.638	19/07/2010 4:33	10.883
19/07/2010 5:18	9.114	19/07/2010 5:20	9.015	19/07/2010 5:21	10.369	19/07/2010 5:22	10.369	19/07/2010 5:23	11.419	19/07/2010 5:23	10.467	19/07/2010 5:03	10.81
19/07/2010 5:48	8.965	19/07/2010 5:50	8.985	19/07/2010 5:51	10.222	19/07/2010 5:52	10.247	19/07/2010 5:53	11.419	19/07/2010 5:53	10.296	19/07/2010 5:33	10.765
19/07/2010 6:18	8.891	19/07/2010 6:20	8.891	19/07/2010 6:21	10.124	19/07/2010 6:22	10.173	19/07/2010 6:23	11.394	19/07/2010 6:23	10.247	19/07/2010 6:03	10.834
19/07/2010 6:48	8.891	19/07/2010 6:50	8.965	19/07/2010 6:51	10.1	19/07/2010 6:52	10.198	19/07/2010 6:53	11.467	19/07/2010 6:53	10.247	19/07/2010 6:33	10.907
19/07/2010 7:18	9.015	19/07/2010 7:20	9.163	19/07/2010 7:21	10.124	19/07/2010 7:22	10.32	19/07/2010 7:23	11.589	19/07/2010 7:23	10.32	19/07/2010 7:03	11.053
19/07/2010 7:48	9.238	19/07/2010 7:50	9.509	19/07/2010 7:51	10.271	19/07/2010 7:52	10.541	19/07/2010 7:53	11.807	19/07/2010 7:53	10.369	19/07/2010 7:33	11.312
19/07/2010 8:18	9.583	19/07/2010 8:20	10.001	19/07/2010 8:21	10.452	19/07/2010 8:22	10.858	19/07/2010 8:23	12.098	19/07/2010 8:23	10.614	19/07/2010 8:03	11.71
19/07/2010 8:48	10.051	19/07/2010 8:50	10.638	19/07/2010 8:51	10.761	19/07/2010 8:52	11.248	19/07/2010 8:53	12.292	19/07/2010 8:53	10.785	19/07/2010 8:33	12.001
19/07/2010 9:18	10.59	19/07/2010 9:20	11.394	19/07/2010 9:21	11.029	19/07/2010 9:22	11.637	19/07/2010 9:23	12.678	19/07/2010 9:23	11.127	19/07/2010 9:03	12.388
19/07/2010 9:48	11.271	19/07/2010 9:50	12.218	19/07/2010 9:51	11.483	19/07/2010 9:52	12.218	19/07/2010 9:53	12.982	19/07/2010 9:53	11.394	19/07/2010 9:33	12.829
19/07/2010 10:18	12.025	19/07/2010 10:20	13.088	19/07/2010 10:21	12.001	19/07/2010 10:22	12.823	19/07/2010 10:23	13.426	19/07/2010 10:23	11.763	19/07/2010 10:03	13.401
19/07/2010 10:48	12.823	19/07/2010 10:50	14.05	19/07/2010 10:51	12.606	19/07/2010 10:52	13.522	19/07/2010 10:53	13.858	19/07/2010 10:53	12.195	19/07/2010 10:33	14.002
19/07/2010 11:18	13.666	19/07/2010 11:20	15.079	19/07/2010 11:21	13.257	19/07/2010 11:22	14.266	19/07/2010 11:23	14.314	19/07/2010 11:23	12.678	19/07/2010 11:03	14.601
19/07/2010 11:48	14.571	19/07/2010 11:50	16.153	19/07/2010 11:51	13.906	19/07/2010 11:52	15.031	19/07/2010 11:53	14.84	19/07/2010 11:53	13.088	19/07/2010 11:33	15.176
19/07/2010 12:18	15.509	19/07/2010 12:20	17.249	19/07/2010 12:21	14.625	19/07/2010 12:22	15.843	19/07/2010 12:23	15.247	19/07/2010 12:23	13.642	19/07/2010 12:03	15.7
19/07/2010 12:48	16.439	19/07/2010 12:50	18.295	19/07/2010 12:51	15.366	19/07/2010 12:52	16.63	19/07/2010 12:53	15.867	19/07/2010 12:53	14.146	19/07/2010 12:33	16.344
19/07/2010 13:18	17.368	19/07/2010 13:20	19.246	19/07/2010 13:21	16.058	19/07/2010 13:22	17.381	19/07/2010 13:23	16.368	19/07/2010 13:23	14.529	19/07/2010 13:03	16.892
19/07/2010 13:48	18.176	19/07/2010 13:50	20.079	19/07/2010 13:51	16.773	19/07/2010 13:52	18.259	19/07/2010 13:53	17.077	19/07/2010 13:53	15.079	19/07/2010 13:33	17.272
19/07/2010 14:18	18.951	19/07/2010 14:20	20.841	19/07/2010 14:21	17.463	19/07/2010 14:22	18.771	19/07/2010 14:23	16.558	19/07/2010 14:23	14.588	19/07/2010 14:03	16.859
19/07/2010 14:48	19.651	19/07/2010 14:50	21.485	19/07/2010 14:51	18.081	19/07/2010 14:52	19.341	19/07/2010 14:53	17.13	19/07/2010 14:53	15.891	19/07/2010 14:33	17.439
19/07/2010 15:18	19.936	19/07/2010 15:20	21.366	19/07/2010 15:21	18.628	19/07/2010 15:22	19.817	19/07/2010 15:23	17.558	19/07/2010 15:23	16.382	19/07/2010 15:03	17.748
19/07/2010 15:48	19.793	19/07/2010 15:50	21.246	19/07/2010 15:51	19.08	19/07/2010 15:52	20.127	19/07/2010 15:53	18.033	19/07/2010 15:53	16.596	19/07/2010 15:33	17.586
19/07/2010 16:18	19.936	19/07/2010 16:20	21.724	19/07/2010 16:21	19.415	19/07/2010 16:22	20.388	19/07/2010 16:23	17.938	19/07/2010 16:23	17.011	19/07/2010 16:03	17.843
19/07/2010 16:48	20.222	19/07/2010 16:50	21.939	19/07/2010 16:51	19.674	19/07/2010 16:52	20.507	19/07/2010 16:53	17.796	19/07/2010 16:53	16.915	19/07/2010 16:33	18.081
19/07/2010 17:18	20.388	19/07/2010 17:20	21.939	19/07/2010 17:21	19.841	19/07/2010 17:22	20.507	19/07/2010 17:23	17.796	19/07/2010 17:23	16.963	19/07/2010 17:03	17.677
19/07/2010 17:48	20.412	19/07/2010 17:50	21.843	19/07/2010 17:51	19.865	19/07/2010 17:52	20.388	19/07/2010 17:53	17.653	19/07/2010 17:53	16.882	19/07/2010 17:33	17.177
19/07/2010 18:18	20.293	19/07/2010 18:20	21.505	19/07/2010 18:21	19.77	19/07/2010 18:22	19.944	19/07/2010 18:23	17.582	19/07/2010 18:23	16.892	19/07/2010 18:03	16.929
19/07/2010 18:48	20.103	19/07/2010 18:50	20.531	19/07/2010 18:51	19.508	19/07/2010 18:52	19.698	19/07/2010 18:53	17.677	19/07/2010 18:53	16.888	19/07/2010 18:33	16.701
19/07/2010 19:18	19.793	19/07/2010 19:20	20.293	19/07/2010 19:21	19.246	19/07/2010 19:22	19.389	19/07/2010 19:23	18.01	19/07/2010 19:23	17.011	19/07/2010 19:03	16.892
19/07/2010 19:48	19.436	19/07/2010 19:50	19.841	19/07/2010 19:51	18.985	19/07/2010 19:52	19.032	19/07/2010 19:53	17.886	19/07/2010 19:53	17.058	19/07/2010 19:33	16.987
19/07/2010 20:18	19.275	19/07/2010 20:20	19.318	19/07/2010 20:21	18.675	19/07/2010 20:22	18.852	19/07/2010 20:23	17.658	19/07/2010 20:23	17.058	19/07/2010 20:03	16.929
19/07/2010 20:48	18.461	19/07/2010 20:50	18.699	19/07/2010 20:51	18.295	19/07/2010 20:52	18.224	19/07/2010 20:53	17.748	19/07/2010 20:53	16.963	19/07/2010 20:33	16.773
19/07/2010 21:18	17.938	19/07/2010 21:20	18.057	19/07/2010 21:21	17.938	19/07/2010 21:22	17.796	19/07/2010 21:23	17.558	19/07/2010 21:23	16.892	19/07/2010 21:03	16.582
19/07/2010 21:48	17.415	19/07/2010 21:50	17.486	19/07/2010 21:51	17.558	19/07/2010 21:52	17.381	19/07/2010 21:53	17.381	19/07/2010 21:53	16.749	19/07/2010 21:33	16.368
19/07/2010 22:18	16.915	19/07/2010 22:20	16.892	19/07/2010 22:21	17.153	19/07/2010 22:22	16.938	19/07/2010 22:23	17.113	19/07/2010 22:23	16.696	19/07/2010 22:03	16.182
19/07/2010 22:48	16.368	19/07/2010 22:50	16.296	19/07/2010 22:51	16.725	19/07/2010 22:52	16.511	19/07/2010 22:53	16.82	19/07/2010 22:53	16.439	19/07/2010 22:33	15.853
19/07/2010 23:18	15.796	19/07/2010 23:20	15.652	19/07/2010 23:21	16.296	19/07/2010 23:22	16.058	19/07/2010 23:23	16.534	19/07/2010 23:23	16.296	19/07/2010 23:03	15.557
19/07/2010 23:48	15.247	19/07/2010 23:50	15.031	19/07/2010 23:51	15.891	19/07/2010 23:52	15.653	19/07/2010 23:53	16.201	19/07/2010 23:53	16.082	19/07/2010 23:33	15.294
20/07/2010 0:18	14.481	20/07/2010 0:20	14.481	20/07/2010 0:21	14.481	20/07/2010 0:22	14.481	20/07/2010 0:23	14.481	20/07/2010 0:23	14.481	20/07/2010 0:03	14.481
20/07/2010 0:48	14.194	20/07/2010 0:50	13.93	20/07/2010 0:51	15.103	20/07/2010 0:52	14.888	20/07/2010 0:53	15.629	20/07/2010 0:53	15.7	20/07/2010 0:33	14.616
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20/07/2010 1:48	13.233	20/07/2010 1:50	12.92	20/07/2010 1:51	14.361	20/07/2010 1:52	14.194	20/07/2010 1:53	15.247	20/07/2010 1:53	15.318	20/07/2010 1:33	14.409
20/07/2010 2:18	12.775	20/07/2010 2:20	12.485	20/07/2010 2:21	13.982	20/07/2010 2:22	13.862	20/07/2010 2:23	15.031	20/07/2010 2:23	15.438	20/07/2010 2:03	14.204
20/07/2010 2:48	12.34	20/07/2010 2:50	12.074	20/07/2010 2:51	13.714	20/07/2010 2:							

21-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
21/07/2010 0:18	14.409	21/07/2010 0:20	14.218	21/07/2010 0:21	15.290	21/07/2010 0:23	15.290	21/07/2010 0:23	16.011	21/07/2010 0:23	15.485	21/07/2010 0:03	14.409
21/07/2010 0:48	14.146	21/07/2010 0:50	13.979	21/07/2010 0:51	15.127	21/07/2010 0:52	15.127	21/07/2010 0:53	15.967	21/07/2010 0:53	15.366	21/07/2010 0:33	14.361
21/07/2010 1:18	13.739	21/07/2010 1:20	13.762	21/07/2010 1:21	14.939	21/07/2010 1:22	14.939	21/07/2010 1:23	15.749	21/07/2010 1:23	15.294	21/07/2010 1:03	14.314
21/07/2010 1:48	13.714	21/07/2010 1:50	13.502	21/07/2010 1:51	14.792	21/07/2010 1:52	14.864	21/07/2010 1:53	15.533	21/07/2010 1:53	15.199	21/07/2010 1:33	14.266
21/07/2010 2:18	13.522	21/07/2010 2:20	13.353	21/07/2010 2:21	14.649	21/07/2010 2:22	14.745	21/07/2010 2:23	15.342	21/07/2010 2:23	15.079	21/07/2010 2:03	14.218
21/07/2010 2:48	13.353	21/07/2010 2:50	13.185	21/07/2010 2:51	14.505	21/07/2010 2:52	14.601	21/07/2010 2:53	15.199	21/07/2010 2:53	14.888	21/07/2010 2:33	14.117
21/07/2010 3:18	13.185	21/07/2010 3:20	13.016	21/07/2010 3:21	14.389	21/07/2010 3:22	14.457	21/07/2010 3:23	15.031	21/07/2010 3:23	14.749	21/07/2010 3:03	14.122
21/07/2010 3:48	13.016	21/07/2010 3:50	12.871	21/07/2010 3:51	14.242	21/07/2010 3:52	14.307	21/07/2010 3:53	14.898	21/07/2010 3:53	14.601	21/07/2010 3:33	14.088
21/07/2010 4:18	12.871	21/07/2010 4:20	12.727	21/07/2010 4:21	14.122	21/07/2010 4:22	14.194	21/07/2010 4:23	14.721	21/07/2010 4:23	14.481	21/07/2010 4:03	13.978
21/07/2010 4:48	12.751	21/07/2010 4:50	12.63	21/07/2010 4:51	14.002	21/07/2010 4:52	14.098	21/07/2010 4:53	14.553	21/07/2010 4:53	14.361	21/07/2010 4:33	13.906
21/07/2010 5:18	12.654	21/07/2010 5:20	12.534	21/07/2010 5:21	13.906	21/07/2010 5:22	14.026	21/07/2010 5:23	14.481	21/07/2010 5:23	14.242	21/07/2010 5:03	13.882
21/07/2010 5:48	12.606	21/07/2010 5:50	12.534	21/07/2010 5:51	13.859	21/07/2010 5:52	14.007	21/07/2010 5:53	14.395	21/07/2010 5:53	14.146	21/07/2010 5:33	13.858
21/07/2010 6:18	12.558	21/07/2010 6:20	12.534	21/07/2010 6:21	13.786	21/07/2010 6:22	13.954	21/07/2010 6:23	14.314	21/07/2010 6:23	14.026	21/07/2010 6:03	13.834
21/07/2010 6:48	12.534	21/07/2010 6:50	12.534	21/07/2010 6:51	13.738	21/07/2010 6:52	13.906	21/07/2010 6:53	14.218	21/07/2010 6:53	13.978	21/07/2010 6:33	13.834
21/07/2010 7:18	12.509	21/07/2010 7:20	12.485	21/07/2010 7:21	13.666	21/07/2010 7:22	13.859	21/07/2010 7:23	14.098	21/07/2010 7:23	13.858	21/07/2010 7:03	13.786
21/07/2010 7:48	12.485	21/07/2010 7:50	12.534	21/07/2010 7:51	13.619	21/07/2010 7:52	13.899	21/07/2010 7:53	14.098	21/07/2010 7:53	13.854	21/07/2010 7:33	13.762
21/07/2010 8:18	12.606	21/07/2010 8:20	12.751	21/07/2010 8:21	13.594	21/07/2010 8:22	13.834	21/07/2010 8:23	14.05	21/07/2010 8:23	13.81	21/07/2010 8:03	13.81
21/07/2010 8:48	12.775	21/07/2010 8:50	12.92	21/07/2010 8:51	13.618	21/07/2010 8:52	13.93	21/07/2010 8:53	14.266	21/07/2010 8:53	14.002	21/07/2010 8:33	13.906
21/07/2010 9:18	13.137	21/07/2010 9:20	13.762	21/07/2010 9:21	13.714	21/07/2010 9:22	14.146	21/07/2010 9:23	14.395	21/07/2010 9:23	14.098	21/07/2010 9:03	13.978
21/07/2010 9:48	13.449	21/07/2010 9:50	14.286	21/07/2010 9:51	13.804	21/07/2010 9:52	14.361	21/07/2010 9:53	14.745	21/07/2010 9:53	14.219	21/07/2010 9:33	14.194
21/07/2010 10:18	13.738	21/07/2010 10:20	14.768	21/07/2010 10:21	14.002	21/07/2010 10:22	14.601	21/07/2010 10:23	14.984	21/07/2010 10:23	14.314	21/07/2010 10:03	14.395
21/07/2010 10:48	13.93	21/07/2010 10:50	15.103	21/07/2010 10:51	14.122	21/07/2010 10:52	14.768	21/07/2010 10:53	15.008	21/07/2010 10:53	14.242	21/07/2010 10:33	14.529
21/07/2010 11:18	14.002	21/07/2010 11:20	14.888	21/07/2010 11:21	14.218	21/07/2010 11:22	14.792	21/07/2010 11:23	14.99	21/07/2010 11:23	14.242	21/07/2010 11:03	14.552
21/07/2010 11:48	14.122	21/07/2010 11:50	14.816	21/07/2010 11:51	14.314	21/07/2010 11:52	14.816	21/07/2010 11:53	14.99	21/07/2010 11:53	14.117	21/07/2010 11:33	14.649
21/07/2010 12:18	14.29	21/07/2010 12:20	15.008	21/07/2010 12:21	14.433	21/07/2010 12:22	14.888	21/07/2010 12:23	15.151	21/07/2010 12:23	14.314	21/07/2010 12:03	14.762
21/07/2010 12:48	14.505	21/07/2010 12:50	15.247	21/07/2010 12:51	14.505	21/07/2010 12:52	14.96	21/07/2010 12:53	15.294	21/07/2010 12:53	14.361	21/07/2010 12:33	14.596
21/07/2010 13:18	14.673	21/07/2010 13:20	15.39	21/07/2010 13:21	14.577	21/07/2010 13:22	15.031	21/07/2010 13:23	15.485	21/07/2010 13:23	14.649	21/07/2010 13:03	15.294
21/07/2010 13:48	14.84	21/07/2010 13:50	15.485	21/07/2010 13:51	14.673	21/07/2010 13:52	15.127	21/07/2010 13:53	15.749	21/07/2010 13:53	14.864	21/07/2010 13:33	15.079
21/07/2010 14:18	15.151	21/07/2010 14:20	15.986	21/07/2010 14:21	14.792	21/07/2010 14:22	15.30	21/07/2010 14:23	15.533	21/07/2010 14:23	15.008	21/07/2010 14:03	15.079
21/07/2010 14:48	15.533	21/07/2010 14:50	16.129	21/07/2010 14:51	14.912	21/07/2010 14:52	15.438	21/07/2010 14:53	15.867	21/07/2010 14:53	15.079	21/07/2010 14:33	15.724
21/07/2010 15:18	15.724	21/07/2010 15:20	16.177	21/07/2010 15:21	15.008	21/07/2010 15:22	15.597	21/07/2010 15:23	15.915	21/07/2010 15:23	15.199	21/07/2010 15:03	15.939
21/07/2010 15:48	15.986	21/07/2010 15:50	16.249	21/07/2010 15:51	15.103	21/07/2010 15:52	15.699	21/07/2010 15:53	15.915	21/07/2010 15:53	15.175	21/07/2010 15:33	15.867
21/07/2010 16:18	16.106	21/07/2010 16:20	16.129	21/07/2010 16:21	15.175	21/07/2010 16:22	15.7	21/07/2010 16:23	15.867	21/07/2010 16:23	15.199	21/07/2010 16:03	15.841
21/07/2010 16:48	16.082	21/07/2010 16:50	15.986	21/07/2010 16:51	15.247	21/07/2010 16:52	15.749	21/07/2010 16:53	15.843	21/07/2010 16:53	15.199	21/07/2010 16:33	15.749
21/07/2010 17:18	15.986	21/07/2010 17:20	15.991	21/07/2010 17:21	15.294	21/07/2010 17:22	15.749	21/07/2010 17:23	15.796	21/07/2010 17:23	15.199	21/07/2010 17:03	15.676
21/07/2010 17:48	15.915	21/07/2010 17:50	15.749	21/07/2010 17:51	15.294	21/07/2010 17:52	15.676	21/07/2010 17:53	15.724	21/07/2010 17:53	15.175	21/07/2010 17:33	15.605
21/07/2010 18:18	15.796	21/07/2010 18:20	15.533	21/07/2010 18:21	15.247	21/07/2010 18:22	15.699	21/07/2010 18:23	15.867	21/07/2010 18:23	15.199	21/07/2010 18:03	15.533
21/07/2010 18:48	15.652	21/07/2010 18:50	15.318	21/07/2010 18:51	15.247	21/07/2010 18:52	15.557	21/07/2010 18:53	15.581	21/07/2010 18:53	15.055	21/07/2010 18:33	15.414
21/07/2010 19:18	15.414	21/07/2010 19:20	15.055	21/07/2010 19:21	15.151	21/07/2010 19:22	15.414	21/07/2010 19:23	15.533	21/07/2010 19:23	15.008	21/07/2010 19:03	15.294
21/07/2010 19:48	15.199	21/07/2010 19:50	14.884	21/07/2010 19:51	15.055	21/07/2010 19:52	15.294	21/07/2010 19:53	15.461	21/07/2010 19:53	14.939	21/07/2010 19:33	15.199
21/07/2010 20:18	14.984	21/07/2010 20:20	14.721	21/07/2010 20:21	14.984	21/07/2010 20:22	15.199	21/07/2010 20:23	15.342	21/07/2010 20:23	14.84	21/07/2010 20:03	15.055
21/07/2010 20:48	14.792	21/07/2010 20:50	14.457	21/07/2010 20:51	14.888	21/07/2010 20:52	15.079	21/07/2010 20:53	15.223	21/07/2010 20:53	14.768	21/07/2010 20:33	14.912
21/07/2010 21:18	14.553	21/07/2010 21:20	14.117	21/07/2010 21:21	14.721	21/07/2010 21:22	14.864	21/07/2010 21:23	15.127	21/07/2010 21:23	14.697	21/07/2010 21:03	14.745
21/07/2010 21:48	14.266	21/07/2010 21:50	13.834	21/07/2010 21:51	14.529	21/07/2010 21:52	14.625	21/07/2010 21:53	14.884	21/07/2010 21:53	14.553	21/07/2010 21:33	14.505
21/07/2010 22:18	13.93	21/07/2010 22:20	13.497	21/07/2010 22:21	14.314	21/07/2010 22:22	14.361	21/07/2010 22:23	14.792	21/07/2010 22:23	14.409	21/07/2010 22:03	14.194
21/07/2010 22:48	13.618	21/07/2010 22:50	13.185	21/07/2010 22:51	14.122	21/07/2010 22:52	14.098	21/07/2010 22:53	14.649	21/07/2010 22:53	14.266	21/07/2010 22:33	14.074
21/07/2010 23:18	13.281	21/07/2010 23:20	12.847	21/07/2010 23:21	13.834	21/07/2010 23:22	13.786	21/07/2010 23:23	14.657	21/07/2010 23:23	14.098	21/07/2010 23:03	13.882
21/07/2010 23:48	12.899	21/07/2010 23:50	12.413	21/07/2010 23:51	13.57	21/07/2010 23:52	13.497	21/07/2010 23:53	14.314	21/07/2010 23:53	13.954	21/07/2010 23:33	13.714
22/07/2010 0:18	12.954	22/07/2010 0:20	12.954	22/07/2010 0:21	12.954	22/07/2010 0:22	12.954	22/07/2010 0:23	12.954	22/07/2010 0:23	12.954	22/07/2010 0:03	12.954
22/07/2010 0:48	12.001	22/07/2010 0:50	11.565	22/07/2010 0:51	12.992	22/07/2010 0:52	12.896	22/07/2010 0:53	13.81	22/07/2010 0:53	13.473	22/07/2010 0:33	13.281
22/07/2010 1:18	11.54	22/07/2010 1:20	11.151	22/07/2010 1:21	12.727	22/07/2010 1:22	12.606	22/07/2010 1:23	13.57	22/07/2010 1:23	13.161	22/07/2010 1:03	13.016
22/07/2010 1:48	11.102	22/07/2010 1:50	10.687	22/07/2010 1:51	12.413	22/07/2010 1:52	12.292	22/07/2010 1:53	13.305	22/07/2010 1:53	12.823	22/07/2010 1:33	12.727
22/07/2010 2:18	10.687	22/07/2010 2:20	10.222	22/07/2010 2:21	11.917	22/07/2010 2:22	11.797	22/07/2010 2:23	12.599	22/07/2010 2:23	12.599	22/07/2010 2:03	12.599
22/07/2010 2:48	10.271	22/07/2010 2:50	9.829	22/07/2010 2:51									

23-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
23/07/2010 0:18	13.305	23/07/2010 0:20	13.018	23/07/2010 0:21	13.146	23/07/2010 0:23	13.906	23/07/2010 0:23	15.151	23/07/2010 0:23	14.577	23/07/2010 0:03	13.93
23/07/2010 0:48	12.871	23/07/2010 0:50	12.582	23/07/2010 0:51	13.786	23/07/2010 0:52	13.57	23/07/2010 0:53	14.864	23/07/2010 0:53	14.337	23/07/2010 0:33	13.69
23/07/2010 1:18	12.534	23/07/2010 1:20	12.268	23/07/2010 1:21	13.487	23/07/2010 1:22	13.281	23/07/2010 1:23	14.625	23/07/2010 1:23	14.098	23/07/2010 1:03	13.478
23/07/2010 1:48	12.243	23/07/2010 1:50	12.001	23/07/2010 1:51	13.253	23/07/2010 1:52	13.088	23/07/2010 1:53	14.453	23/07/2010 1:53	13.956	23/07/2010 1:33	13.853
23/07/2010 2:18	11.977	23/07/2010 2:20	11.734	23/07/2010 2:21	13.016	23/07/2010 2:22	12.896	23/07/2010 2:23	14.218	23/07/2010 2:23	13.69	23/07/2010 2:03	13.04
23/07/2010 2:48	11.71	23/07/2010 2:50	11.492	23/07/2010 2:51	12.775	23/07/2010 2:52	12.703	23/07/2010 2:53	13.978	23/07/2010 2:53	13.497	23/07/2010 2:33	12.847
23/07/2010 3:18	11.419	23/07/2010 3:20	11.175	23/07/2010 3:21	12.558	23/07/2010 3:22	12.485	23/07/2010 3:23	13.786	23/07/2010 3:23	13.353	23/07/2010 3:03	12.727
23/07/2010 3:48	11.127	23/07/2010 3:50	10.834	23/07/2010 3:51	12.364	23/07/2010 3:52	12.292	23/07/2010 3:53	13.546	23/07/2010 3:53	13.185	23/07/2010 3:33	12.644
23/07/2010 4:18	10.858	23/07/2010 4:20	10.59	23/07/2010 4:21	12.171	23/07/2010 4:22	12.098	23/07/2010 4:23	13.233	23/07/2010 4:23	13.016	23/07/2010 4:03	12.582
23/07/2010 4:48	10.638	23/07/2010 4:50	10.394	23/07/2010 4:51	12.001	23/07/2010 4:52	11.953	23/07/2010 4:53	13.04	23/07/2010 4:53	12.823	23/07/2010 4:33	12.485
23/07/2010 5:18	10.443	23/07/2010 5:20	10.149	23/07/2010 5:21	11.832	23/07/2010 5:22	11.832	23/07/2010 5:23	12.896	23/07/2010 5:23	12.654	23/07/2010 5:03	12.388
23/07/2010 5:48	10.222	23/07/2010 5:50	9.952	23/07/2010 5:51	11.71	23/07/2010 5:52	11.759	23/07/2010 5:53	12.853	23/07/2010 5:53	12.63	23/07/2010 5:33	12.194
23/07/2010 6:18	10.124	23/07/2010 6:20	9.828	23/07/2010 6:21	11.652	23/07/2010 6:22	11.734	23/07/2010 6:23	12.727	23/07/2010 6:23	12.606	23/07/2010 6:03	12.316
23/07/2010 6:48	10.1	23/07/2010 6:50	10.051	23/07/2010 6:51	11.652	23/07/2010 6:52	11.807	23/07/2010 6:53	12.727	23/07/2010 6:53	12.63	23/07/2010 6:33	12.364
23/07/2010 7:18	10.222	23/07/2010 7:20	10.296	23/07/2010 7:21	11.71	23/07/2010 7:22	11.953	23/07/2010 7:23	12.871	23/07/2010 7:23	12.799	23/07/2010 7:03	12.485
23/07/2010 7:48	10.487	23/07/2010 7:50	10.587	23/07/2010 7:51	11.88	23/07/2010 7:52	12.195	23/07/2010 7:53	13.137	23/07/2010 7:53	12.969	23/07/2010 7:33	12.654
23/07/2010 8:18	10.858	23/07/2010 8:20	11.224	23/07/2010 8:21	12.122	23/07/2010 8:22	12.509	23/07/2010 8:23	13.57	23/07/2010 8:23	13.257	23/07/2010 8:03	12.92
23/07/2010 8:48	11.37	23/07/2010 8:50	11.88	23/07/2010 8:51	12.413	23/07/2010 8:52	12.896	23/07/2010 8:53	13.906	23/07/2010 8:53	13.594	23/07/2010 8:33	13.353
23/07/2010 9:18	11.977	23/07/2010 9:20	12.678	23/07/2010 9:21	12.775	23/07/2010 9:22	13.329	23/07/2010 9:23	14.385	23/07/2010 9:23	14.05	23/07/2010 9:03	13.738
23/07/2010 9:48	12.654	23/07/2010 9:50	13.497	23/07/2010 9:51	13.361	23/07/2010 9:52	13.854	23/07/2010 9:53	14.94	23/07/2010 9:53	14.643	23/07/2010 9:33	14.218
23/07/2010 10:18	13.377	23/07/2010 10:20	14.194	23/07/2010 10:21	13.642	23/07/2010 10:22	14.481	23/07/2010 10:23	15.557	23/07/2010 10:23	14.938	23/07/2010 10:03	14.684
23/07/2010 10:48	14.146	23/07/2010 10:50	15.247	23/07/2010 10:51	14.146	23/07/2010 10:52	15.175	23/07/2010 10:53	16.106	23/07/2010 10:53	15.342	23/07/2010 10:33	15.461
23/07/2010 11:18	14.721	23/07/2010 11:20	15.652	23/07/2010 11:21	14.601	23/07/2010 11:22	15.605	23/07/2010 11:23	16.654	23/07/2010 11:23	15.724	23/07/2010 11:03	16.01
23/07/2010 11:48	15.294	23/07/2010 11:50	15.915	23/07/2010 11:51	14.96	23/07/2010 11:52	15.939	23/07/2010 11:53	16.701	23/07/2010 11:53	16.03	23/07/2010 11:33	15.748
23/07/2010 12:18	15.819	23/07/2010 12:20	16.582	23/07/2010 12:21	15.414	23/07/2010 12:22	16.296	23/07/2010 12:23	17.13	23/07/2010 12:23	16.272	23/07/2010 12:03	16.296
23/07/2010 12:48	16.32	23/07/2010 12:50	16.868	23/07/2010 12:51	15.748	23/07/2010 12:52	16.582	23/07/2010 12:53	17.819	23/07/2010 12:53	16.582	23/07/2010 12:33	16.388
23/07/2010 13:18	17.058	23/07/2010 13:20	17.653	23/07/2010 13:21	16.153	23/07/2010 13:22	17.13	23/07/2010 13:23	18.533	23/07/2010 13:23	17.201	23/07/2010 13:03	17.034
23/07/2010 13:48	17.701	23/07/2010 13:50	18.794	23/07/2010 13:51	16.725	23/07/2010 13:52	17.587	23/07/2010 13:53	19.556	23/07/2010 13:53	17.701	23/07/2010 13:33	17.463
23/07/2010 14:18	18.271	23/07/2010 14:20	19.358	23/07/2010 14:21	17.344	23/07/2010 14:22	18.638	23/07/2010 14:23	20.12	23/07/2010 14:23	18.2	23/07/2010 14:03	17.853
23/07/2010 14:48	18.699	23/07/2010 14:50	20.031	23/07/2010 14:51	17.891	23/07/2010 14:52	19.222	23/07/2010 14:53	20.007	23/07/2010 14:53	18.509	23/07/2010 14:33	18.295
23/07/2010 15:18	19.103	23/07/2010 15:20	20.388	23/07/2010 15:21	18.438	23/07/2010 15:22	19.579	23/07/2010 15:23	20.007	23/07/2010 15:23	18.794	23/07/2010 15:03	18.343
23/07/2010 15:48	19.484	23/07/2010 15:50	20.46	23/07/2010 15:51	18.889	23/07/2010 15:52	19.988	23/07/2010 15:53	19.911	23/07/2010 15:53	18.794	23/07/2010 15:33	18.247
23/07/2010 16:18	19.651	23/07/2010 16:20	20.246	23/07/2010 16:21	19.059	23/07/2010 16:22	19.912	23/07/2010 16:23	19.865	23/07/2010 16:23	18.866	23/07/2010 16:03	18.614
23/07/2010 16:48	19.984	23/07/2010 16:50	20.698	23/07/2010 16:51	19.365	23/07/2010 16:52	20.126	23/07/2010 16:53	20.007	23/07/2010 16:53	18.794	23/07/2010 16:33	18.319
23/07/2010 17:18	20.031	23/07/2010 17:20	20.555	23/07/2010 17:21	19.413	23/07/2010 17:22	20.031	23/07/2010 17:23	20.079	23/07/2010 17:23	18.937	23/07/2010 17:03	18.39
23/07/2010 17:48	19.759	23/07/2010 17:50	20.365	23/07/2010 17:51	19.484	23/07/2010 17:52	20.037	23/07/2010 17:53	19.746	23/07/2010 17:53	18.628	23/07/2010 17:33	18.033
23/07/2010 18:18	19.46	23/07/2010 18:20	19.745	23/07/2010 18:21	19.318	23/07/2010 18:22	19.603	23/07/2010 18:23	19.918	23/07/2010 18:23	18.98	23/07/2010 18:03	17.781
23/07/2010 18:48	19.08	23/07/2010 18:50	19.27	23/07/2010 18:51	19.08	23/07/2010 18:52	19.27	23/07/2010 18:53	19.199	23/07/2010 18:53	18.224	23/07/2010 18:33	17.415
23/07/2010 19:18	18.771	23/07/2010 19:20	18.842	23/07/2010 19:21	18.818	23/07/2010 19:22	18.913	23/07/2010 19:23	18.937	23/07/2010 19:23	17.962	23/07/2010 19:03	17.082
23/07/2010 19:48	18.438	23/07/2010 19:50	18.509	23/07/2010 19:51	18.557	23/07/2010 19:52	18.604	23/07/2010 19:53	18.699	23/07/2010 19:53	17.748	23/07/2010 19:33	16.844
23/07/2010 20:18	18.001	23/07/2010 20:20	17.963	23/07/2010 20:21	18.224	23/07/2010 20:22	18.176	23/07/2010 20:23	18.224	23/07/2010 20:23	17.655	23/07/2010 20:03	16.514
23/07/2010 20:48	17.51	23/07/2010 20:50	17.32	23/07/2010 20:51	17.819	23/07/2010 20:52	17.701	23/07/2010 20:53	17.986	23/07/2010 20:53	17.582	23/07/2010 20:33	16.296
23/07/2010 21:18	16.963	23/07/2010 21:20	16.796	23/07/2010 21:21	17.391	23/07/2010 21:22	17.272	23/07/2010 21:23	17.843	23/07/2010 21:23	17.153	23/07/2010 21:03	15.953
23/07/2010 21:48	16.511	23/07/2010 21:50	16.32	23/07/2010 21:51	17.011	23/07/2010 21:52	16.844	23/07/2010 21:53	17.653	23/07/2010 21:53	16.844	23/07/2010 21:33	15.724
23/07/2010 22:18	16.129	23/07/2010 22:20	15.986	23/07/2010 22:21	16.654	23/07/2010 22:22	16.511	23/07/2010 22:23	17.415	23/07/2010 22:23	16.654	23/07/2010 22:03	15.509
23/07/2010 22:48	15.724	23/07/2010 22:50	15.625	23/07/2010 22:51	16.368	23/07/2010 22:52	16.201	23/07/2010 22:53	17.177	23/07/2010 22:53	16.463	23/07/2010 22:33	15.318
23/07/2010 23:18	15.366	23/07/2010 23:20	15.294	23/07/2010 23:21	16.034	23/07/2010 23:22	15.915	23/07/2010 23:23	16.915	23/07/2010 23:23	16.272	23/07/2010 23:03	15.127
23/07/2010 23:48	14.984	23/07/2010 23:50	14.888	23/07/2010 23:51	15.724	23/07/2010 23:52	15.653	23/07/2010 23:53	16.606	23/07/2010 23:53	15.843	23/07/2010 23:33	14.816
24/07/2010 0:18	14.607	24/07/2010 0:20	14.423	24/07/2010 0:21	14.607	24/07/2010 0:22	14.607	24/07/2010 0:23	14.607	24/07/2010 0:23	14.607	24/07/2010 0:03	14.607
24/07/2010 0:48	14.218	24/07/2010 0:50	14.05	24/07/2010 0:51	15.175	24/07/2010 0:52	15.127	24/07/2010 0:53	16.225	24/07/2010 0:53	15.485	24/07/2010 0:33	14.29
24/07/2010 1:18	13.882	24/07/2010 1:20	13.738	24/07/2010 1:21	14.984	24/07/2010 1:22	14.912	24/07/2010 1:23	16.082	24/07/2010 1:23	15.318	24/07/2010 1:03	14.146
24/07/2010 1:48	13.594	24/07/2010 1:50	13.401	24/07/2010 1:51	14.745	24/07/2010 1:52	14.673	24/07/2010 1:53	15.939	24/07/2010 1:53	15.151	24/07/2010 1:33	14.026
24/07/2010 2:18	13.253	24/07/2010 2:20	13.088	24/07/2010 2:21	14.453	24/07/2010 2:22	14.277	24/07/2010 2:23	15.717	24/07/2010 2:23	14.978	24/07/2010 2:03	13.853
24/07/2010 2:48	12.968	24/07/2010 2:50	12.799	24/07/2010 2:51	14.337	24/07/							

25-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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25/07/2010 0:48	15.724	25/07/2010 0:50	15.438	25/07/2010 0:51	16.654	25/07/2010 0:52	16.701	25/07/2010 0:53	18.105	25/07/2010 0:53	17.034	25/07/2010 0:33	15.772
25/07/2010 1:18	15.438	25/07/2010 1:20	15.103	25/07/2010 1:21	16.415	25/07/2010 1:22	16.463	25/07/2010 1:23	17.815	25/07/2010 1:23	16.868	25/07/2010 1:03	15.629
25/07/2010 1:48	15.381	25/07/2010 1:50	14.768	25/07/2010 1:51	16.201	25/07/2010 1:52	16.256	25/07/2010 1:53	17.774	25/07/2010 1:53	16.776	25/07/2010 1:33	15.504
25/07/2010 2:18	14.864	25/07/2010 2:20	14.481	25/07/2010 2:21	15.963	25/07/2010 2:22	16.01	25/07/2010 2:23	17.51	25/07/2010 2:23	16.558	25/07/2010 2:03	15.39
25/07/2010 2:48	14.601	25/07/2010 2:50	14.194	25/07/2010 2:51	15.724	25/07/2010 2:52	15.772	25/07/2010 2:53	17.32	25/07/2010 2:53	16.344	25/07/2010 2:33	15.27
25/07/2010 3:18	14.337	25/07/2010 3:20	13.882	25/07/2010 3:21	15.509	25/07/2010 3:22	15.581	25/07/2010 3:23	17.177	25/07/2010 3:23	16.201	25/07/2010 3:03	15.151
25/07/2010 3:48	14.074	25/07/2010 3:50	13.594	25/07/2010 3:51	15.308	25/07/2010 3:52	15.39	25/07/2010 3:53	17.001	25/07/2010 3:53	16.062	25/07/2010 3:33	15.018
25/07/2010 4:18	13.858	25/07/2010 4:20	13.401	25/07/2010 4:21	15.127	25/07/2010 4:22	15.223	25/07/2010 4:23	16.868	25/07/2010 4:23	15.939	25/07/2010 4:03	14.864
25/07/2010 4:48	13.666	25/07/2010 4:50	13.161	25/07/2010 4:51	14.96	25/07/2010 4:52	15.055	25/07/2010 4:53	16.749	25/07/2010 4:53	15.819	25/07/2010 4:33	14.816
25/07/2010 5:18	13.473	25/07/2010 5:20	12.968	25/07/2010 5:21	14.782	25/07/2010 5:22	14.896	25/07/2010 5:23	16.558	25/07/2010 5:23	15.7	25/07/2010 5:03	14.816
25/07/2010 5:48	13.281	25/07/2010 5:50	12.847	25/07/2010 5:51	14.607	25/07/2010 5:52	14.74	25/07/2010 5:53	16.415	25/07/2010 5:53	15.629	25/07/2010 5:33	14.762
25/07/2010 6:18	13.233	25/07/2010 6:20	12.896	25/07/2010 6:21	14.649	25/07/2010 6:22	14.854	25/07/2010 6:23	16.344	25/07/2010 6:23	15.605	25/07/2010 6:03	14.816
25/07/2010 6:48	13.209	25/07/2010 6:50	12.944	25/07/2010 6:51	14.649	25/07/2010 6:52	14.912	25/07/2010 6:53	16.296	25/07/2010 6:53	15.581	25/07/2010 6:33	14.792
25/07/2010 7:18	13.186	25/07/2010 7:20	12.92	25/07/2010 7:21	14.649	25/07/2010 7:22	14.884	25/07/2010 7:23	16.272	25/07/2010 7:23	15.533	25/07/2010 7:03	14.746
25/07/2010 7:48	13.305	25/07/2010 7:50	13.161	25/07/2010 7:51	14.721	25/07/2010 7:52	15.107	25/07/2010 7:53	16.226	25/07/2010 7:53	15.509	25/07/2010 7:33	14.816
25/07/2010 8:18	13.522	25/07/2010 8:20	13.473	25/07/2010 8:21	14.864	25/07/2010 8:22	15.342	25/07/2010 8:23	16.415	25/07/2010 8:23	15.7	25/07/2010 8:03	14.936
25/07/2010 8:48	13.978	25/07/2010 8:50	14.242	25/07/2010 8:51	15.055	25/07/2010 8:52	15.676	25/07/2010 8:53	16.654	25/07/2010 8:53	15.843	25/07/2010 8:33	15.223
25/07/2010 9:18	14.337	25/07/2010 9:20	14.953	25/07/2010 9:21	15.366	25/07/2010 9:22	16.062	25/07/2010 9:23	16.987	25/07/2010 9:23	16.129	25/07/2010 9:03	15.461
25/07/2010 9:48	14.529	25/07/2010 9:50	14.768	25/07/2010 9:51	15.599	25/07/2010 9:52	16.271	25/07/2010 9:53	17.201	25/07/2010 9:53	16.271	25/07/2010 9:33	15.796
25/07/2010 10:18	14.84	25/07/2010 10:20	15.175	25/07/2010 10:21	15.7	25/07/2010 10:22	16.487	25/07/2010 10:23	17.153	25/07/2010 10:23	16.32	25/07/2010 10:03	15.939
25/07/2010 10:48	15.533	25/07/2010 10:50	16.487	25/07/2010 10:51	16.129	25/07/2010 10:52	16.892	25/07/2010 10:53	17.582	25/07/2010 10:53	16.773	25/07/2010 10:33	16.392
25/07/2010 11:18	16.177	25/07/2010 11:20	17.177	25/07/2010 11:21	16.463	25/07/2010 11:22	17.296	25/07/2010 11:23	18.061	25/07/2010 11:23	17.177	25/07/2010 11:03	16.796
25/07/2010 11:48	16.89	25/07/2010 11:50	17.724	25/07/2010 11:51	17.011	25/07/2010 11:52	17.962	25/07/2010 11:53	18.587	25/07/2010 11:53	17.589	25/07/2010 11:33	17.119
25/07/2010 12:18	17.344	25/07/2010 12:20	18.295	25/07/2010 12:21	17.582	25/07/2010 12:22	18.58	25/07/2010 12:23	19.937	25/07/2010 12:23	17.962	25/07/2010 12:03	17.486
25/07/2010 12:48	17.867	25/07/2010 12:50	18.842	25/07/2010 12:51	18.01	25/07/2010 12:52	18.985	25/07/2010 12:53	19.103	25/07/2010 12:53	18.01	25/07/2010 12:33	17.605
25/07/2010 13:18	18.319	25/07/2010 13:20	18.985	25/07/2010 13:21	18.271	25/07/2010 13:22	19.199	25/07/2010 13:23	19.222	25/07/2010 13:23	18.081	25/07/2010 13:03	17.843
25/07/2010 13:48	18.961	25/07/2010 13:50	19.698	25/07/2010 13:51	18.604	25/07/2010 13:52	19.598	25/07/2010 13:53	19.46	25/07/2010 13:53	18.296	25/07/2010 13:33	18.075
25/07/2010 14:18	19.380	25/07/2010 14:20	20.079	25/07/2010 14:21	18.801	25/07/2010 14:22	19.888	25/07/2010 14:23	19.746	25/07/2010 14:23	18.366	25/07/2010 14:03	18.271
25/07/2010 14:48	19.722	25/07/2010 14:50	20.388	25/07/2010 14:51	19.199	25/07/2010 14:52	20.103	25/07/2010 14:53	19.912	25/07/2010 14:53	18.485	25/07/2010 14:33	18.39
25/07/2010 15:18	20.103	25/07/2010 15:20	21.127	25/07/2010 15:21	19.595	25/07/2010 15:22	20.498	25/07/2010 15:23	20.46	25/07/2010 15:23	18.794	25/07/2010 15:03	18.818
25/07/2010 15:48	20.484	25/07/2010 15:50	21.819	25/07/2010 15:51	19.955	25/07/2010 15:52	20.793	25/07/2010 15:53	20.555	25/07/2010 15:53	19.341	25/07/2010 15:33	18.676
25/07/2010 16:18	20.674	25/07/2010 16:20	21.7	25/07/2010 16:21	20.103	25/07/2010 16:22	20.984	25/07/2010 16:23	20.889	25/07/2010 16:23	19.464	25/07/2010 16:03	18.723
25/07/2010 16:48	20.579	25/07/2010 16:50	21.39	25/07/2010 16:51	20.198	25/07/2010 16:52	21.008	25/07/2010 16:53	21.079	25/07/2010 16:53	19.603	25/07/2010 16:33	19.151
25/07/2010 17:18	20.269	25/07/2010 17:20	20.793	25/07/2010 17:21	20.222	25/07/2010 17:22	20.841	25/07/2010 17:23	20.889	25/07/2010 17:23	19.674	25/07/2010 17:03	18.842
25/07/2010 17:48	19.841	25/07/2010 17:50	20.103	25/07/2010 17:51	20.055	25/07/2010 17:52	20.436	25/07/2010 17:53	20.531	25/07/2010 17:53	19.319	25/07/2010 17:33	18.557
25/07/2010 18:18	19.415	25/07/2010 18:20	19.532	25/07/2010 18:21	19.817	25/07/2010 18:22	20.007	25/07/2010 18:23	20.065	25/07/2010 18:23	18.508	25/07/2010 18:03	18.271
25/07/2010 18:48	19.885	25/07/2010 18:50	19.985	25/07/2010 18:51	19.555	25/07/2010 18:52	19.579	25/07/2010 18:53	19.889	25/07/2010 18:53	18.989	25/07/2010 18:33	18.057
25/07/2010 19:18	19.533	25/07/2010 19:20	19.414	25/07/2010 19:21	19.199	25/07/2010 19:22	19.199	25/07/2010 19:23	19.722	25/07/2010 19:23	18.224	25/07/2010 19:03	17.819
25/07/2010 19:48	18.033	25/07/2010 19:50	17.589	25/07/2010 19:51	18.866	25/07/2010 19:52	18.794	25/07/2010 19:53	19.532	25/07/2010 19:53	18.152	25/07/2010 19:33	17.51
25/07/2010 20:18	17.534	25/07/2010 20:20	17.153	25/07/2010 20:21	18.436	25/07/2010 20:22	18.319	25/07/2010 20:23	19.294	25/07/2010 20:23	17.589	25/07/2010 20:03	17.201
25/07/2010 20:48	17.153	25/07/2010 20:50	16.844	25/07/2010 20:51	18.081	25/07/2010 20:52	17.986	25/07/2010 20:53	19.103	25/07/2010 20:53	17.748	25/07/2010 20:33	17.011
25/07/2010 21:18	16.82	25/07/2010 21:20	16.511	25/07/2010 21:21	17.748	25/07/2010 21:22	17.701	25/07/2010 21:23	19.032	25/07/2010 21:23	17.629	25/07/2010 21:03	16.82
25/07/2010 21:48	16.534	25/07/2010 21:50	16.225	25/07/2010 21:51	17.415	25/07/2010 21:52	17.463	25/07/2010 21:53	18.866	25/07/2010 21:53	17.486	25/07/2010 21:33	16.654
25/07/2010 22:18	16.177	25/07/2010 22:20	15.901	25/07/2010 22:21	17.066	25/07/2010 22:22	17.201	25/07/2010 22:23	18.676	25/07/2010 22:23	17.426	25/07/2010 22:03	16.919
25/07/2010 22:48	15.867	25/07/2010 22:50	15.557	25/07/2010 22:51	16.749	25/07/2010 22:52	16.796	25/07/2010 22:53	18.509	25/07/2010 22:53	16.939	25/07/2010 22:33	16.368
25/07/2010 23:18	15.605	25/07/2010 23:20	15.318	25/07/2010 23:21	16.487	25/07/2010 23:22	16.534	25/07/2010 23:23	18.366	25/07/2010 23:23	16.82	25/07/2010 23:03	16.201
25/07/2010 23:48	15.39	25/07/2010 23:50	15.103	25/07/2010 23:51	16.201	25/07/2010 23:52	16.33	25/07/2010 23:53	18.176	25/07/2010 23:53	16.677	25/07/2010 23:33	16.062
26/07/2010 0:18	15.188	26/07/2010 0:20	14.988	26/07/2010 0:21	16.01	26/07/2010 0:22	16.058	26/07/2010 0:23	17.486	26/07/2010 0:23	16.533	26/07/2010 0:03	15.819
26/07/2010 0:48	15.008	26/07/2010 0:50	14.673	26/07/2010 0:51	15.676	26/07/2010 0:52	15.915	26/07/2010 0:53	17.796	26/07/2010 0:53	16.296	26/07/2010 0:33	15.796
26/07/2010 1:18	14.745	26/07/2010 1:20	14.385	26/07/2010 1:21	15.438	26/07/2010 1:22	15.676	26/07/2010 1:23	17.51	26/07/2010 1:23	16.133	26/07/2010 1:03	15.629
26/07/2010 1:48	14.457	26/07/2010 1:50	14.122	26/07/2010 1:51	15.223	26/07/2010 1:52	15.461	26/07/2010 1:53	17.177	26/07/2010 1:53	15.843	26/07/2010 1:33	15.478
26/07/2010 2:18	14.242	26/07/2010 2:20	13.89	26/07/2010 2:21	15.021	26/07/2010 2:22	15.27	26/07/2010 2:23	16.916	26/07/2010 2:23	15.629	26/07/2010 2:03	15.304
26/07/2010 2:48	14.026	26/07/2010 2:50	13.738	26/07/2010 2:51	14.864								

27-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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27/07/2010 0:48	13.906	27/07/2010 0:50	13.329	27/07/2010 0:51	15.199	27/07/2010 0:52	14.96	27/07/2010 0:53	16.749	27/07/2010 0:53	16.32	27/07/2010 0:33	15.151
27/07/2010 1:18	13.425	27/07/2010 1:20	12.871	27/07/2010 1:21	14.816	27/07/2010 1:22	14.577	27/07/2010 1:23	16.487	27/07/2010 1:23	16.01	27/07/2010 1:03	14.912
27/07/2010 1:48	12.944	27/07/2010 1:50	12.413	27/07/2010 1:51	14.405	27/07/2010 1:52	14.218	27/07/2010 1:53	16.272	27/07/2010 1:53	15.772	27/07/2010 1:33	14.772
27/07/2010 2:18	12.485	27/07/2010 2:20	11.977	27/07/2010 2:21	14.05	27/07/2010 2:22	13.858	27/07/2010 2:23	16.034	27/07/2010 2:23	15.533	27/07/2010 2:03	14.577
27/07/2010 2:48	12.05	27/07/2010 2:50	11.589	27/07/2010 2:51	13.714	27/07/2010 2:52	13.57	27/07/2010 2:53	15.7	27/07/2010 2:53	15.247	27/07/2010 2:33	14.361
27/07/2010 3:18	11.613	27/07/2010 3:20	11.2	27/07/2010 3:21	13.377	27/07/2010 3:22	13.261	27/07/2010 3:23	15.557	27/07/2010 3:23	14.96	27/07/2010 3:03	14.17
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27/07/2010 4:48	10.482	27/07/2010 4:50	10.222	27/07/2010 4:51	12.558	27/07/2010 4:52	12.534	27/07/2010 4:53	14.864	27/07/2010 4:53	14.194	27/07/2010 4:33	13.738
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27/07/2010 6:18	9.879	27/07/2010 6:20	9.854	27/07/2010 6:21	12.122	27/07/2010 6:22	12.202	27/07/2010 6:23	14.553	27/07/2010 6:23	13.69	27/07/2010 6:03	13.594
27/07/2010 6:48	9.879	27/07/2010 6:50	9.928	27/07/2010 6:51	12.098	27/07/2010 6:52	12.34	27/07/2010 6:53	14.529	27/07/2010 6:53	13.57	27/07/2010 6:33	13.618
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27/07/2010 13:18	17.153	27/07/2010 13:20	18.818	27/07/2010 13:21	17.106	27/07/2010 13:22	18.319	27/07/2010 13:23	17.772	27/07/2010 13:23	15.724	27/07/2010 13:03	17.296
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27/07/2010 21:48	16.582	27/07/2010 21:50	16.582	27/07/2010 21:51	17.296	27/07/2010 21:52	17.296	27/07/2010 21:53	17.415	27/07/2010 21:53	15.772	27/07/2010 21:33	16.272
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27/07/2010 22:48	15.533	27/07/2010 22:50	15.533	27/07/2010 22:51	16.558	27/07/2010 22:52	16.511	27/07/2010 22:53	17.011	27/07/2010 22:53	15.509	27/07/2010 22:33	15.795
27/07/2010 23:18	15.127	27/07/2010 23:20	15.127	27/07/2010 23:21	16.225	27/07/2010 23:22	16.177	27/07/2010 23:23	16.82	27/07/2010 23:23	15.366	27/07/2010 23:03	15.605
27/07/2010 23:48	14.745	27/07/2010 23:50	14.721	27/07/2010 23:51	15.639	27/07/2010 23:52	15.891	27/07/2010 23:53	16.654	27/07/2010 23:53	15.199	27/07/2010 23:33	15.461
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28/07/2010 2:48	12.92	28/07/2010 2:50	12.944	28/07/2010 2:51	14.577	28/07/2010							

29-Jul-10

30-Jul-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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29/07/2010 0:48	14.649	29/07/2010 0:50	14.337	29/07/2010 0:51	16.106	29/07/2010 0:52	15.986	29/07/2010 0:53	18.152	29/07/2010 0:53	16.129	29/07/2010 0:33	16.106
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29/07/2010 2:48	13.305	29/07/2010 2:50	13.209	29/07/2010 2:51	15.079	29/07/2010 2:52	15.103	29/07/2010 2:53	16.915	29/07/2010 2:53	15.27	29/07/2010 2:33	15.294
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29/07/2010 5:18	12.147	29/07/2010 5:20	11.953	29/07/2010 5:21	13.978	29/07/2010 5:22	14.002	29/07/2010 5:23	15.748	29/07/2010 5:23	14.314	29/07/2010 5:03	14.529
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29/07/2010 11:18	15.724	29/07/2010 11:20	16.677	29/07/2010 11:21	16.034	29/07/2010 11:22	16.888	29/07/2010 11:23	17.701	29/07/2010 11:23	16.63	29/07/2010 11:03	16.778
29/07/2010 11:48	16.487	29/07/2010 11:50	17.589	29/07/2010 11:51	16.534	29/07/2010 11:52	17.486	29/07/2010 11:53	18.296	29/07/2010 11:53	17.11	29/07/2010 11:33	17.415
29/07/2010 12:18	17.272	29/07/2010 12:20	18.414	29/07/2010 12:21	17.058	29/07/2010 12:22	18.105	29/07/2010 12:23	18.889	29/07/2010 12:23	17.659	29/07/2010 12:03	17.843
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29/07/2010 14:18	19.817	29/07/2010 14:20	20.777	29/07/2010 14:21	19.807	29/07/2010 14:22	19.912	29/07/2010 14:23	20.336	29/07/2010 14:23	18.296	29/07/2010 14:03	18.715
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29/07/2010 15:18	20.15	29/07/2010 15:20	20.984	29/07/2010 15:21	19.508	29/07/2010 15:22	20.246	29/07/2010 15:23	19.603	29/07/2010 15:23	18.224	29/07/2010 15:03	18.913
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29/07/2010 17:18	20.674	29/07/2010 17:20	21.008	29/07/2010 17:21	20.246	29/07/2010 17:22	20.913	29/07/2010 17:23	20.674	29/07/2010 17:23	19.08	29/07/2010 17:03	19.127
29/07/2010 17:48	20.484	29/07/2010 17:50	20.555	29/07/2010 17:51	20.055	29/07/2010 17:52	20.633	29/07/2010 17:53	20.46	29/07/2010 17:53	18.913	29/07/2010 17:33	19.008
29/07/2010 18:18	20.103	29/07/2010 18:20	20.031	29/07/2010 18:21	19.888	29/07/2010 18:22	20.246	29/07/2010 18:23	20.913	29/07/2010 18:23	18.961	29/07/2010 18:03	18.913
29/07/2010 18:48	19.777	29/07/2010 18:50	19.793	29/07/2010 18:51	19.817	29/07/2010 18:52	20.055	29/07/2010 18:53	20.531	29/07/2010 18:53	19.151	29/07/2010 18:33	18.794
29/07/2010 19:18	19.603	29/07/2010 19:20	19.912	29/07/2010 19:21	19.793	29/07/2010 19:22	20.055	29/07/2010 19:23	20.555	29/07/2010 19:23	19.294	29/07/2010 19:03	18.652
29/07/2010 19:48	19.484	29/07/2010 19:50	19.651	29/07/2010 19:51	19.651	29/07/2010 19:52	19.888	29/07/2010 19:53	20.388	29/07/2010 19:53	19.222	29/07/2010 19:33	18.508
29/07/2010 20:18	19.175	29/07/2010 20:20	19.175	29/07/2010 20:21	19.389	29/07/2010 20:22	19.579	29/07/2010 20:23	20.103	29/07/2010 20:23	19.085	29/07/2010 20:03	18.913
29/07/2010 20:48	18.747	29/07/2010 20:50	18.652	29/07/2010 20:51	19.127	29/07/2010 20:52	19.246	29/07/2010 20:53	19.888	29/07/2010 20:53	18.747	29/07/2010 20:33	18.057
29/07/2010 21:18	18.343	29/07/2010 21:20	18.247	29/07/2010 21:21	18.889	29/07/2010 21:22	18.937	29/07/2010 21:23	19.722	29/07/2010 21:23	18.461	29/07/2010 21:03	17.819
29/07/2010 21:48	17.962	29/07/2010 21:50	17.887	29/07/2010 21:51	18.628	29/07/2010 21:52	18.628	29/07/2010 21:53	19.484	29/07/2010 21:53	18.271	29/07/2010 21:33	17.605
29/07/2010 22:18	17.605	29/07/2010 22:20	17.463	29/07/2010 22:21	18.319	29/07/2010 22:22	18.319	29/07/2010 22:23	19.199	29/07/2010 22:23	18.061	29/07/2010 22:03	17.894
29/07/2010 22:48	17.201	29/07/2010 22:50	16.963	29/07/2010 22:51	18.01	29/07/2010 22:52	17.986	29/07/2010 22:53	18.985	29/07/2010 22:53	17.819	29/07/2010 22:33	17.725
29/07/2010 23:18	16.796	29/07/2010 23:20	16.534	29/07/2010 23:21	17.724	29/07/2010 23:22	17.701	29/07/2010 23:23	18.794	29/07/2010 23:23	17.629	29/07/2010 23:03	17.058
29/07/2010 23:48	16.439	29/07/2010 23:50	16.201	29/07/2010 23:51	17.463	29/07/2010 23:52	17.463	29/07/2010 23:53	18.652	29/07/2010 23:53	17.439	29/07/2010 23:33	16.852
30/07/2010 0:18	16.439	30/07/2010 0:20	16.201	30/07/2010 0:21	17.463	30/07/2010 0:22	17.463	30/07/2010 0:23	18.652	30/07/2010 0:23	17.439	30/07/2010 0:03	16.852
30/07/2010 0:48	15.891	30/07/2010 0:50	15.676	30/07/2010 0:51	17.058	30/07/2010 0:52	17.106	30/07/2010 0:53	18.39	30/07/2010 0:53	17.058	30/07/2010 0:33	16.677
30/07/2010 1:18	15.629	30/07/2010 1:20	15.414	30/07/2010 1:21	16.844	30/07/2010 1:22	16.939	30/07/2010 1:23	18.247	30/07/2010 1:23	16.915	30/07/2010 1:03	16.588
30/07/2010 1:48	15.386	30/07/2010 1:50	15.199	30/07/2010 1:51	16.701	30/07/2010 1:52	16.796	30/07/2010 1:53	18.129	30/07/2010 1:53	16.796	30/07/2010 1:33	16.487
30/07/2010 2:18	15.163	30/07/2010 2:20	14.968	30/07/2010 2:21	16.485	30/07/2010 2:22	16.582	30/07/2010 2:23	17.915	30/07/2010 2:23	16.582	30/07/2010 2:03	16.272
30/07/2010 2:48	14.84	30/07/201											

31-Jul-10

01-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
31/07/2010 0:18	14.601	31/07/2010 0:20	14.218	31/07/2010 0:21	15.724	31/07/2010 0:23	15.605	31/07/2010 0:23	16.344	31/07/2010 0:23	16.082	31/07/2010 0:03	16.082
31/07/2010 0:48	14.337	31/07/2010 0:50	14.002	31/07/2010 0:51	15.509	31/07/2010 0:52	15.39	31/07/2010 0:53	16.177	31/07/2010 0:53	15.891	31/07/2010 0:33	15.939
31/07/2010 1:18	14.122	31/07/2010 1:20	13.834	31/07/2010 1:21	15.294	31/07/2010 1:22	15.223	31/07/2010 1:23	15.986	31/07/2010 1:23	15.7	31/07/2010 1:03	15.840
31/07/2010 1:48	13.882	31/07/2010 1:50	13.618	31/07/2010 1:51	15.079	31/07/2010 1:52	15.071	31/07/2010 1:53	15.7	31/07/2010 1:53	15.485	31/07/2010 1:33	15.724
31/07/2010 2:18	13.57	31/07/2010 2:20	13.305	31/07/2010 2:21	14.84	31/07/2010 2:22	14.816	31/07/2010 2:23	15.485	31/07/2010 2:23	15.27	31/07/2010 2:03	15.581
31/07/2010 2:48	13.281	31/07/2010 2:50	13.137	31/07/2010 2:51	14.649	31/07/2010 2:52	14.601	31/07/2010 2:53	15.247	31/07/2010 2:53	14.984	31/07/2010 2:33	15.438
31/07/2010 3:18	13.016	31/07/2010 3:20	12.775	31/07/2010 3:21	14.409	31/07/2010 3:22	14.337	31/07/2010 3:23	14.96	31/07/2010 3:23	14.745	31/07/2010 3:03	15.294
31/07/2010 3:48	12.703	31/07/2010 3:50	12.457	31/07/2010 3:51	14.17	31/07/2010 3:52	14.074	31/07/2010 3:53	14.697	31/07/2010 3:53	14.555	31/07/2010 3:33	15.107
31/07/2010 4:18	12.389	31/07/2010 4:20	12.171	31/07/2010 4:21	13.93	31/07/2010 4:22	13.81	31/07/2010 4:23	14.505	31/07/2010 4:23	14.337	31/07/2010 4:03	14.984
31/07/2010 4:48	12.122	31/07/2010 4:50	11.904	31/07/2010 4:51	13.69	31/07/2010 4:52	13.57	31/07/2010 4:53	14.337	31/07/2010 4:53	14.17	31/07/2010 4:33	14.864
31/07/2010 5:18	11.88	31/07/2010 5:20	11.71	31/07/2010 5:21	13.449	31/07/2010 5:22	13.353	31/07/2010 5:23	14.146	31/07/2010 5:23	14.026	31/07/2010 5:03	14.745
31/07/2010 5:48	11.686	31/07/2010 5:50	11.565	31/07/2010 5:51	13.297	31/07/2010 5:52	13.206	31/07/2010 5:53	14.026	31/07/2010 5:53	13.906	31/07/2010 5:33	14.546
31/07/2010 6:18	11.565	31/07/2010 6:20	11.589	31/07/2010 6:21	13.233	31/07/2010 6:22	13.233	31/07/2010 6:23	14.026	31/07/2010 6:23	13.882	31/07/2010 6:03	14.601
31/07/2010 6:48	11.565	31/07/2010 6:50	11.759	31/07/2010 6:51	13.261	31/07/2010 6:52	13.353	31/07/2010 6:53	14.05	31/07/2010 6:53	13.93	31/07/2010 6:33	14.601
31/07/2010 7:18	11.637	31/07/2010 7:20	11.977	31/07/2010 7:21	13.261	31/07/2010 7:22	13.425	31/07/2010 7:23	14.122	31/07/2010 7:23	13.93	31/07/2010 7:03	14.625
31/07/2010 7:48	11.734	31/07/2010 7:50	12.147	31/07/2010 7:51	13.395	31/07/2010 7:52	13.497	31/07/2010 7:53	14.146	31/07/2010 7:53	13.99	31/07/2010 7:33	14.697
31/07/2010 8:18	11.88	31/07/2010 8:20	12.364	31/07/2010 8:21	13.329	31/07/2010 8:22	13.594	31/07/2010 8:23	14.194	31/07/2010 8:23	13.93	31/07/2010 8:03	14.768
31/07/2010 8:48	12.025	31/07/2010 8:50	12.582	31/07/2010 8:51	13.377	31/07/2010 8:52	13.69	31/07/2010 8:53	14.242	31/07/2010 8:53	13.906	31/07/2010 8:33	14.792
31/07/2010 9:18	12.147	31/07/2010 9:20	12.703	31/07/2010 9:21	13.425	31/07/2010 9:22	13.762	31/07/2010 9:23	14.29	31/07/2010 9:23	13.954	31/07/2010 9:03	14.816
31/07/2010 9:48	12.364	31/07/2010 9:50	12.996	31/07/2010 9:51	13.497	31/07/2010 9:52	13.804	31/07/2010 9:53	14.385	31/07/2010 9:53	14.06	31/07/2010 9:33	14.96
31/07/2010 10:18	12.63	31/07/2010 10:20	13.161	31/07/2010 10:21	13.618	31/07/2010 10:22	13.954	31/07/2010 10:23	14.577	31/07/2010 10:23	14.098	31/07/2010 10:03	15.031
31/07/2010 10:48	12.871	31/07/2010 10:50	13.449	31/07/2010 10:51	13.738	31/07/2010 10:52	14.098	31/07/2010 10:53	14.577	31/07/2010 10:53	14.098	31/07/2010 10:33	15.031
31/07/2010 11:18	13.186	31/07/2010 11:20	13.906	31/07/2010 11:21	13.882	31/07/2010 11:22	14.314	31/07/2010 11:23	14.577	31/07/2010 11:23	14.146	31/07/2010 11:03	15.094
31/07/2010 11:48	13.497	31/07/2010 11:50	14.337	31/07/2010 11:51	14.026	31/07/2010 11:52	14.484	31/07/2010 11:53	14.984	31/07/2010 11:53	14.389	31/07/2010 11:33	15.294
31/07/2010 12:18	13.69	31/07/2010 12:20	14.361	31/07/2010 12:21	14.146	31/07/2010 12:22	14.601	31/07/2010 12:23	15.008	31/07/2010 12:23	14.509	31/07/2010 12:03	15.414
31/07/2010 12:48	13.978	31/07/2010 12:50	14.601	31/07/2010 12:51	14.314	31/07/2010 12:52	14.768	31/07/2010 12:53	15.175	31/07/2010 12:53	14.697	31/07/2010 12:33	15.605
31/07/2010 13:18	14.266	31/07/2010 13:20	14.864	31/07/2010 13:21	14.457	31/07/2010 13:22	14.984	31/07/2010 13:23	15.461	31/07/2010 13:23	14.816	31/07/2010 13:03	15.676
31/07/2010 13:48	14.481	31/07/2010 13:50	15.006	31/07/2010 13:51	14.768	31/07/2010 13:52	15.318	31/07/2010 13:53	15.929	31/07/2010 13:53	15.49	31/07/2010 13:33	15.840
31/07/2010 14:18	14.697	31/07/2010 14:20	15.247	31/07/2010 14:21	15.318	31/07/2010 14:22	15.772	31/07/2010 14:23	16.344	31/07/2010 14:23	15.984	31/07/2010 14:03	16.082
31/07/2010 14:48	14.816	31/07/2010 14:50	15.318	31/07/2010 14:51	15.366	31/07/2010 14:52	16.034	31/07/2010 14:53	15.939	31/07/2010 14:53	15.939	31/07/2010 14:33	16.153
31/07/2010 15:18	14.984	31/07/2010 15:20	15.533	31/07/2010 15:21	15.557	31/07/2010 15:22	16.177	31/07/2010 15:23	15.939	31/07/2010 15:23	15.438	31/07/2010 15:03	16.249
31/07/2010 15:48	15.127	31/07/2010 15:50	15.581	31/07/2010 15:51	15.629	31/07/2010 15:52	15.989	31/07/2010 15:53	15.891	31/07/2010 15:53	15.414	31/07/2010 15:33	16.106
31/07/2010 16:18	15.247	31/07/2010 16:20	15.7	31/07/2010 16:21	15.7	31/07/2010 16:22	16.201	31/07/2010 16:23	15.897	31/07/2010 16:23	15.599	31/07/2010 16:03	16.225
31/07/2010 16:48	15.414	31/07/2010 16:50	15.891	31/07/2010 16:51	15.819	31/07/2010 16:52	16.296	31/07/2010 16:53	16.059	31/07/2010 16:53	15.652	31/07/2010 16:33	16.296
31/07/2010 17:18	15.605	31/07/2010 17:20	16.177	31/07/2010 17:21	15.939	31/07/2010 17:22	16.392	31/07/2010 17:23	16.272	31/07/2010 17:23	15.724	31/07/2010 17:03	16.392
31/07/2010 17:48	15.772	31/07/2010 17:50	16.153	31/07/2010 17:51	15.963	31/07/2010 17:52	16.415	31/07/2010 17:53	16.415	31/07/2010 17:53	15.939	31/07/2010 17:33	16.511
31/07/2010 18:18	15.840	31/07/2010 18:20	16.392	31/07/2010 18:21	15.939	31/07/2010 18:22	16.392	31/07/2010 18:23	16.463	31/07/2010 18:23	15.891	31/07/2010 18:03	16.586
31/07/2010 18:48	15.748	31/07/2010 18:50	16.106	31/07/2010 18:51	15.915	31/07/2010 18:52	16.296	31/07/2010 18:53	16.344	31/07/2010 18:53	15.796	31/07/2010 18:33	16.511
31/07/2010 19:18	15.581	31/07/2010 19:20	15.891	31/07/2010 19:21	15.891	31/07/2010 19:22	16.201	31/07/2010 19:23	16.272	31/07/2010 19:23	15.748	31/07/2010 19:03	16.463
31/07/2010 19:48	15.461	31/07/2010 19:50	15.7	31/07/2010 19:51	15.843	31/07/2010 19:52	16.062	31/07/2010 19:53	16.177	31/07/2010 19:53	15.629	31/07/2010 19:33	16.366
31/07/2010 20:18	15.318	31/07/2010 20:20	15.533	31/07/2010 20:21	15.748	31/07/2010 20:22	15.963	31/07/2010 20:23	16.034	31/07/2010 20:23	15.49	31/07/2010 20:03	16.249
31/07/2010 20:48	15.151	31/07/2010 20:50	15.318	31/07/2010 20:51	15.652	31/07/2010 20:52	15.819	31/07/2010 20:53	15.891	31/07/2010 20:53	15.581	31/07/2010 20:33	16.106
31/07/2010 21:18	14.936	31/07/2010 21:20	15.079	31/07/2010 21:21	15.509	31/07/2010 21:22	15.652	31/07/2010 21:23	15.748	31/07/2010 21:23	15.533	31/07/2010 21:03	15.963
31/07/2010 21:48	14.697	31/07/2010 21:50	14.792	31/07/2010 21:51	15.342	31/07/2010 21:52	15.414	31/07/2010 21:53	15.655	31/07/2010 21:53	15.414	31/07/2010 21:33	15.819
31/07/2010 22:18	14.409	31/07/2010 22:20	14.453	31/07/2010 22:21	15.151	31/07/2010 22:22	15.175	31/07/2010 22:23	15.438	31/07/2010 22:23	15.151	31/07/2010 22:03	15.676
31/07/2010 22:48	14.146	31/07/2010 22:50	14.17	31/07/2010 22:51	14.984	31/07/2010 22:52	14.96	31/07/2010 22:53	15.294	31/07/2010 22:53	15.055	31/07/2010 22:33	15.533
31/07/2010 23:18	13.834	31/07/2010 23:20	13.858	31/07/2010 23:21	14.792	31/07/2010 23:22	14.721	31/07/2010 23:23	15.127	31/07/2010 23:23	14.816	31/07/2010 23:03	15.366
31/07/2010 23:48	13.57	31/07/2010 23:50	13.473	31/07/2010 23:51	14.601	31/07/2010 23:52	14.529	31/07/2010 23:53	14.936	31/07/2010 23:53	14.601	31/07/2010 23:33	15.199
01/08/2010 0:18	13.25	01/08/2010 0:20	13.25	01/08/2010 0:21	14.257	01/08/2010 0:22	14.257	01/08/2010 0:23	14.697	01/08/2010 0:23	14.389	01/08/2010 0:03	14.912
01/08/2010 0:48	13.112	01/08/2010 0:50	13.112	01/08/2010 0:51	14.266	01/08/2010 0:52	14.194	01/08/2010 0:53	14.697	01/08/2010 0:53	14.389	01/08/2010 0:33	14.912
01/08/2010 1:18	12.92	01/08/2010 1:20	12.968	01/08/2010 1:21	14.098	01/08/2010 1:22	14.05	01/08/2010 1:23	14.577	01/08/2010 1:23	14.242	01/08/2010 1:03	14.816
01/08/2010 1:48	12.727	01/08/2010 1:50	12.775	01/08/2010 1:51	13.954	01/08/2010 1:52	13.93	01/08/2010 1:53	14.467	01/08/2010 1:53	14.074	01/08/2010 1:33	14.697
01/08/2010 2:18	12.509	01/08/2010 2:20	12.509	01/08/2010 2:21	13.786	01/08/2010 2:22	13.69	01/08/2010 2:23	14.314	01/08/2010 2:23	13.882	01/08/2010 2:03	14.697
01/08/2010 2:48	12.318	01/08/2010 2:50	12.457										

02-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
02/08/2010 0:18	12.195	02/08/2010 0:20	11.925	02/08/2010 0:21	13.305	02/08/2010 0:22	13.112	02/08/2010 0:23	13.016	02/08/2010 0:23	12.992	02/08/2010 0:03	13.83
02/08/2010 0:48	11.686	02/08/2010 0:50	11.224	02/08/2010 0:51	12.896	02/08/2010 0:52	12.654	02/08/2010 0:53	12.509	02/08/2010 0:53	12.582	02/08/2010 0:33	13.618
02/08/2010 1:18	11.551	02/08/2010 1:20	10.585	02/08/2010 1:21	12.437	02/08/2010 1:22	12.122	02/08/2010 1:23	12.074	02/08/2010 1:23	12.147	02/08/2010 1:03	13.305
02/08/2010 1:48	10.536	02/08/2010 1:50	10.051	02/08/2010 1:51	12.001	02/08/2010 1:52	11.662	02/08/2010 1:53	11.686	02/08/2010 1:53	11.783	02/08/2010 1:33	12.882
02/08/2010 2:18	10.247	02/08/2010 2:20	9.682	02/08/2010 2:21	11.662	02/08/2010 2:22	11.248	02/08/2010 2:23	11.321	02/08/2010 2:23	11.516	02/08/2010 2:03	12.703
02/08/2010 2:48	9.829	02/08/2010 2:50	9.238	02/08/2010 2:51	11.346	02/08/2010 2:52	10.883	02/08/2010 2:53	11.029	02/08/2010 2:53	11.12	02/08/2010 2:33	12.389
02/08/2010 3:18	9.435	02/08/2010 3:20	8.916	02/08/2010 3:21	11.029	02/08/2010 3:22	10.638	02/08/2010 3:23	10.81	02/08/2010 3:23	10.932	02/08/2010 3:03	12.171
02/08/2010 3:48	9.095	02/08/2010 3:50	8.742	02/08/2010 3:51	10.736	02/08/2010 3:52	10.394	02/08/2010 3:53	10.638	02/08/2010 3:53	10.854	02/08/2010 3:33	11.978
02/08/2010 4:18	8.767	02/08/2010 4:20	8.394	02/08/2010 4:21	10.443	02/08/2010 4:22	10.124	02/08/2010 4:23	10.541	02/08/2010 4:23	10.614	02/08/2010 4:03	11.807
02/08/2010 4:48	8.419	02/08/2010 4:50	8.095	02/08/2010 4:51	10.149	02/08/2010 4:52	9.879	02/08/2010 4:53	10.222	02/08/2010 4:53	10.32	02/08/2010 4:33	11.662
02/08/2010 5:18	8.17	02/08/2010 5:20	7.92	02/08/2010 5:21	9.903	02/08/2010 5:22	9.682	02/08/2010 5:23	9.805	02/08/2010 5:23	10.051	02/08/2010 5:03	11.467
02/08/2010 5:48	7.97	02/08/2010 5:50	7.65	02/08/2010 5:51	9.756	02/08/2010 5:52	9.534	02/08/2010 5:53	9.534	02/08/2010 5:53	9.756	02/08/2010 5:33	11.248
02/08/2010 6:18	7.82	02/08/2010 6:20	7.72	02/08/2010 6:21	9.583	02/08/2010 6:22	9.361	02/08/2010 6:23	9.361	02/08/2010 6:23	9.509	02/08/2010 6:03	11.053
02/08/2010 6:48	7.67	02/08/2010 6:50	7.594	02/08/2010 6:51	9.386	02/08/2010 6:52	9.188	02/08/2010 6:53	9.114	02/08/2010 6:53	9.262	02/08/2010 6:33	10.858
02/08/2010 7:18	7.569	02/08/2010 7:20	7.494	02/08/2010 7:21	9.213	02/08/2010 7:22	9.064	02/08/2010 7:23	8.941	02/08/2010 7:23	9.064	02/08/2010 7:03	10.736
02/08/2010 7:48	7.494	02/08/2010 7:50	7.469	02/08/2010 7:51	9.089	02/08/2010 7:52	8.995	02/08/2010 7:53	8.941	02/08/2010 7:53	8.994	02/08/2010 7:33	10.638
02/08/2010 8:18	7.444	02/08/2010 8:20	7.494	02/08/2010 8:21	9.015	02/08/2010 8:22	8.891	02/08/2010 8:23	8.767	02/08/2010 8:23	8.817	02/08/2010 8:03	10.614
02/08/2010 8:48	7.444	02/08/2010 8:50	7.544	02/08/2010 8:51	8.965	02/08/2010 8:52	8.916	02/08/2010 8:53	8.668	02/08/2010 8:53	8.767	02/08/2010 8:33	10.663
02/08/2010 9:18	7.444	02/08/2010 9:20	7.619	02/08/2010 9:21	8.916	02/08/2010 9:22	8.891	02/08/2010 9:23	8.618	02/08/2010 9:23	8.668	02/08/2010 9:03	10.59
02/08/2010 9:48	7.494	02/08/2010 9:50	7.695	02/08/2010 9:51	8.916	02/08/2010 9:52	8.916	02/08/2010 9:53	8.643	02/08/2010 9:53	8.717	02/08/2010 9:33	10.638
02/08/2010 10:18	7.82	02/08/2010 10:20	8.145	02/08/2010 10:21	8.99	02/08/2010 10:22	9.04	02/08/2010 10:23	8.916	02/08/2010 10:23	8.99	02/08/2010 10:03	10.736
02/08/2010 10:48	8.095	02/08/2010 10:50	8.543	02/08/2010 10:51	9.064	02/08/2010 10:52	9.163	02/08/2010 10:53	9.435	02/08/2010 10:53	9.361	02/08/2010 10:33	10.907
02/08/2010 11:18	8.319	02/08/2010 11:20	8.618	02/08/2010 11:21	9.139	02/08/2010 11:22	9.287	02/08/2010 11:23	9.682	02/08/2010 11:23	9.361	02/08/2010 11:03	11.053
02/08/2010 11:48	8.543	02/08/2010 11:50	8.866	02/08/2010 11:51	9.312	02/08/2010 11:52	9.46	02/08/2010 11:53	9.509	02/08/2010 11:53	9.287	02/08/2010 11:33	11.029
02/08/2010 12:18	8.767	02/08/2010 12:20	9.089	02/08/2010 12:21	9.41	02/08/2010 12:22	9.558	02/08/2010 12:23	9.386	02/08/2010 12:23	9.287	02/08/2010 12:03	11.078
02/08/2010 12:48	9.015	02/08/2010 12:50	9.336	02/08/2010 12:51	9.485	02/08/2010 12:52	9.657	02/08/2010 12:53	9.287	02/08/2010 12:53	9.312	02/08/2010 12:33	11.053
02/08/2010 13:18	9.163	02/08/2010 13:20	9.534	02/08/2010 13:21	9.583	02/08/2010 13:22	9.756	02/08/2010 13:23	9.534	02/08/2010 13:23	9.509	02/08/2010 13:03	11.297
02/08/2010 13:48	9.386	02/08/2010 13:50	9.706	02/08/2010 13:51	9.756	02/08/2010 13:52	9.934	02/08/2010 13:53	10.222	02/08/2010 13:53	9.979	02/08/2010 13:33	11.37
02/08/2010 14:18	9.657	02/08/2010 14:20	10.173	02/08/2010 14:21	10.075	02/08/2010 14:22	10.256	02/08/2010 14:23	10.785	02/08/2010 14:23	10.189	02/08/2010 14:03	11.686
02/08/2010 14:48	10.222	02/08/2010 14:50	10.663	02/08/2010 14:51	10.443	02/08/2010 14:52	10.663	02/08/2010 14:53	11.102	02/08/2010 14:53	10.418	02/08/2010 14:33	11.783
02/08/2010 15:18	10.761	02/08/2010 15:20	11.394	02/08/2010 15:21	10.687	02/08/2010 15:22	10.966	02/08/2010 15:23	11.419	02/08/2010 15:23	10.965	02/08/2010 15:03	12.025
02/08/2010 15:48	11.151	02/08/2010 15:50	11.779	02/08/2010 15:51	10.761	02/08/2010 15:52	11.078	02/08/2010 15:53	11.977	02/08/2010 15:53	10.81	02/08/2010 15:33	12.485
02/08/2010 16:18	11.297	02/08/2010 16:20	12.001	02/08/2010 16:21	10.889	02/08/2010 16:22	11.37	02/08/2010 16:23	12.185	02/08/2010 16:23	10.965	02/08/2010 16:03	12.485
02/08/2010 16:48	11.37	02/08/2010 16:50	12.05	02/08/2010 16:51	10.932	02/08/2010 16:52	11.467	02/08/2010 16:53	12.098	02/08/2010 16:53	10.98	02/08/2010 16:33	12.63
02/08/2010 17:18	11.467	02/08/2010 17:20	12.243	02/08/2010 17:21	10.98	02/08/2010 17:22	11.516	02/08/2010 17:23	12.292	02/08/2010 17:23	11.12	02/08/2010 17:03	12.871
02/08/2010 17:48	11.492	02/08/2010 17:50	11.977	02/08/2010 17:51	11.029	02/08/2010 17:52	11.516	02/08/2010 17:53	12.289	02/08/2010 17:53	11.321	02/08/2010 17:33	13.137
02/08/2010 18:18	11.416	02/08/2010 18:20	11.686	02/08/2010 18:21	11.063	02/08/2010 18:22	11.419	02/08/2010 18:23	12.001	02/08/2010 18:23	11.773	02/08/2010 18:03	12.982
02/08/2010 18:48	11.321	02/08/2010 18:50	11.492	02/08/2010 18:51	11.029	02/08/2010 18:52	11.321	02/08/2010 18:53	11.71	02/08/2010 18:53	11.102	02/08/2010 18:33	12.92
02/08/2010 19:18	11.175	02/08/2010 19:20	11.224	02/08/2010 19:21	10.98	02/08/2010 19:22	11.175	02/08/2010 19:23	11.516	02/08/2010 19:23	11.029	02/08/2010 19:03	12.727
02/08/2010 19:48	10.98	02/08/2010 19:50	10.932	02/08/2010 19:51	10.883	02/08/2010 19:52	11.005	02/08/2010 19:53	11.287	02/08/2010 19:53	10.907	02/08/2010 19:33	12.509
02/08/2010 20:18	10.785	02/08/2010 20:20	10.687	02/08/2010 20:21	10.761	02/08/2010 20:22	10.884	02/08/2010 20:23	11.177	02/08/2010 20:23	10.785	02/08/2010 20:03	12.34
02/08/2010 20:48	10.59	02/08/2010 20:50	10.467	02/08/2010 20:51	10.663	02/08/2010 20:52	10.663	02/08/2010 20:53	10.932	02/08/2010 20:53	10.687	02/08/2010 20:33	12.147
02/08/2010 21:18	10.369	02/08/2010 21:20	10.247	02/08/2010 21:21	10.595	02/08/2010 21:22	10.541	02/08/2010 21:23	10.712	02/08/2010 21:23	10.541	02/08/2010 21:03	11.977
02/08/2010 21:48	10.173	02/08/2010 21:50	10.026	02/08/2010 21:51	10.443	02/08/2010 21:52	10.394	02/08/2010 21:53	10.467	02/08/2010 21:53	10.389	02/08/2010 21:33	11.783
02/08/2010 22:18	9.908	02/08/2010 22:20	9.706	02/08/2010 22:21	10.173	02/08/2010 22:22	10.173	02/08/2010 22:23	10.189	02/08/2010 22:23	9.979	02/08/2010 22:03	11.613
02/08/2010 22:48	9.608	02/08/2010 22:50	9.336	02/08/2010 22:51	10.051	02/08/2010 22:52	9.908	02/08/2010 22:53	9.952	02/08/2010 22:53	10.389	02/08/2010 22:33	11.418
02/08/2010 23:18	9.262	02/08/2010 23:20	8.965	02/08/2010 23:21	9.854	02/08/2010 23:22	9.632	02/08/2010 23:23	9.706	02/08/2010 23:23	9.706	02/08/2010 23:03	11.224
02/08/2010 23:48	8.916	02/08/2010 23:50	8.643	02/08/2010 23:51	8.643	02/08/2010 23:52	8.336	02/08/2010 23:53	8.509	02/08/2010 23:53	8.558	02/08/2010 23:33	11.025
03/08/2010 0:18	8.34	03/08/2010 0:20	8.145	03/08/2010 0:21	8.295	03/08/2010 0:22	8.295	03/08/2010 0:23	8.295	03/08/2010 0:23	8.295	03/08/2010 0:03	10.858
03/08/2010 0:48	8.27	03/08/2010 0:50	8.145	03/08/2010 0:51	8.213	03/08/2010 0:52	8.767	03/08/2010 0:53	9.287	03/08/2010 0:53	9.312	03/08/2010 0:33	10.638
03/08/2010 1:18	8.02	03/08/2010 1:20	7.945	03/08/2010 1:21	9.015	03/08/2010 1:22	8.568	03/08/2010 1:23	9.213	03/08/2010 1:23	9.213	03/08/2010 1:03	10.492
03/08/2010 1:48	7.82	03/08/2010 1:50	7.82	03/08/2010 1:51	8.817	03/08/2010 1:52	8.419	03/08/2010 1:53	9.163	03/08/2010 1:53	9.188	03/08/2010 1:33	10.418
03/08/2010 2:18	7.645	03/08/2010 2:20	7.645	03/08/2010 2:21	8.295	03/08/2010 2:22	8.295	03/08/2010 2:23	8.295	03/08/2010 2:23	8.295	03/08/2010 2:03	10.418
03/08/2010 2:48	7.519	03/08/2010 2:50	7.619	03/08/2010 2:51	8.494	03/08/2010 2:52	8.245	03/08/2010 2:53	9.089	03/08/2010 2:53	9.139	03/08/2010 2:33	10.32
03/08/2010 3:18	7.444	03/08/2010 3:20</											

04-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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04/08/2010 0:48	7.293	04/08/2010 0:50	6.965	04/08/2010 0:51	8.117	04/08/2010 0:52	7.882	04/08/2010 0:53	8.195	04/08/2010 0:53	8.369	04/08/2010 0:33	9.583
04/08/2010 1:18	7.041	04/08/2010 1:20	6.687	04/08/2010 1:21	7.945	04/08/2010 1:22	7.619	04/08/2010 1:23	8.032	04/08/2010 1:23	8.117	04/08/2010 1:03	9.421
04/08/2010 1:48	6.763	04/08/2010 1:50	6.435	04/08/2010 1:51	7.745	04/08/2010 1:52	7.419	04/08/2010 1:53	7.782	04/08/2010 1:53	7.956	04/08/2010 1:33	9.282
04/08/2010 2:18	6.535	04/08/2010 2:20	6.179	04/08/2010 2:21	7.519	04/08/2010 2:22	7.217	04/08/2010 2:23	7.671	04/08/2010 2:23	7.92	04/08/2010 2:03	9.114
04/08/2010 2:48	6.255	04/08/2010 2:50	5.949	04/08/2010 2:51	7.343	04/08/2010 2:52	7.015	04/08/2010 2:53	7.484	04/08/2010 2:53	7.845	04/08/2010 2:33	8.965
04/08/2010 3:18	6	04/08/2010 3:20	5.693	04/08/2010 3:21	7.142	04/08/2010 3:22	6.813	04/08/2010 3:23	7.318	04/08/2010 3:23	7.67	04/08/2010 3:03	8.817
04/08/2010 3:48	5.745	04/08/2010 3:50	5.514	04/08/2010 3:51	6.94	04/08/2010 3:52	6.636	04/08/2010 3:53	7.192	04/08/2010 3:53	7.569	04/08/2010 3:33	8.712
04/08/2010 4:18	5.539	04/08/2010 4:20	5.257	04/08/2010 4:21	6.763	04/08/2010 4:22	6.458	04/08/2010 4:23	7.116	04/08/2010 4:23	7.544	04/08/2010 4:03	8.618
04/08/2010 4:48	5.36	04/08/2010 4:50	5.128	04/08/2010 4:51	6.611	04/08/2010 4:52	6.306	04/08/2010 4:53	7.041	04/08/2010 4:53	7.469	04/08/2010 4:33	8.543
04/08/2010 5:18	5.231	04/08/2010 5:20	5.076	04/08/2010 5:21	6.484	04/08/2010 5:22	6.179	04/08/2010 5:23	6.965	04/08/2010 5:23	7.419	04/08/2010 5:03	8.469
04/08/2010 5:48	5.154	04/08/2010 5:50	5.102	04/08/2010 5:51	6.406	04/08/2010 5:52	6.128	04/08/2010 5:53	6.889	04/08/2010 5:53	7.393	04/08/2010 5:33	8.018
04/08/2010 6:18	5.102	04/08/2010 6:20	5.205	04/08/2010 6:21	6.357	04/08/2010 6:22	6.128	04/08/2010 6:23	6.839	04/08/2010 6:23	7.393	04/08/2010 6:03	8.394
04/08/2010 6:48	5.154	04/08/2010 6:50	5.308	04/08/2010 6:51	6.306	04/08/2010 6:52	6.179	04/08/2010 6:53	6.813	04/08/2010 6:53	7.393	04/08/2010 6:33	8.419
04/08/2010 7:18	5.231	04/08/2010 7:20	5.539	04/08/2010 7:21	6.306	04/08/2010 7:22	6.23	04/08/2010 7:23	6.914	04/08/2010 7:23	7.419	04/08/2010 7:03	8.444
04/08/2010 7:48	5.334	04/08/2010 7:50	5.693	04/08/2010 7:51	6.321	04/08/2010 7:52	6.321	04/08/2010 7:53	7.167	04/08/2010 7:53	7.646	04/08/2010 7:33	8.919
04/08/2010 8:18	5.591	04/08/2010 8:20	6.23	04/08/2010 8:21	6.433	04/08/2010 8:22	6.509	04/08/2010 8:23	7.469	04/08/2010 8:23	7.945	04/08/2010 8:03	8.941
04/08/2010 8:48	6	04/08/2010 8:50	6.889	04/08/2010 8:51	6.661	04/08/2010 8:52	6.763	04/08/2010 8:53	7.77	04/08/2010 8:53	8.12	04/08/2010 8:33	9.312
04/08/2010 9:18	6.408	04/08/2010 9:20	7.389	04/08/2010 9:21	6.889	04/08/2010 9:22	7.066	04/08/2010 9:23	7.995	04/08/2010 9:23	8.217	04/08/2010 9:03	9.213
04/08/2010 9:48	6.813	04/08/2010 9:50	7.845	04/08/2010 9:51	7.116	04/08/2010 9:52	7.419	04/08/2010 9:53	8.369	04/08/2010 9:53	8.519	04/08/2010 9:33	9.756
04/08/2010 10:18	7.419	04/08/2010 10:20	8.742	04/08/2010 10:21	7.393	04/08/2010 10:22	7.87	04/08/2010 10:23	8.891	04/08/2010 10:23	8.841	04/08/2010 10:03	9.928
04/08/2010 10:48	7.97	04/08/2010 10:50	9.336	04/08/2010 10:51	7.745	04/08/2010 10:52	8.319	04/08/2010 10:53	9.213	04/08/2010 10:53	8.941	04/08/2010 10:33	10.124
04/08/2010 11:18	8.519	04/08/2010 11:20	9.928	04/08/2010 11:21	8.07	04/08/2010 11:22	8.767	04/08/2010 11:23	9.46	04/08/2010 11:23	9.004	04/08/2010 11:03	10.467
04/08/2010 11:48	9.064	04/08/2010 11:50	10.492	04/08/2010 11:51	8.419	04/08/2010 11:52	9.228	04/08/2010 11:53	9.829	04/08/2010 11:53	9.361	04/08/2010 11:33	10.766
04/08/2010 12:18	9.709	04/08/2010 12:20	11.273	04/08/2010 12:21	8.817	04/08/2010 12:22	9.706	04/08/2010 12:23	10.418	04/08/2010 12:23	9.904	04/08/2010 12:03	11.248
04/08/2010 12:48	10.345	04/08/2010 12:50	11.977	04/08/2010 12:51	9.262	04/08/2010 12:52	10.222	04/08/2010 12:53	10.907	04/08/2010 12:53	10.247	04/08/2010 12:33	11.54
04/08/2010 13:18	10.883	04/08/2010 13:20	12.654	04/08/2010 13:21	9.708	04/08/2010 13:22	10.761	04/08/2010 13:23	11.175	04/08/2010 13:23	10.541	04/08/2010 13:03	11.832
04/08/2010 13:48	11.419	04/08/2010 13:50	13.161	04/08/2010 13:51	10.11	04/08/2010 13:52	11.248	04/08/2010 13:53	11.349	04/08/2010 13:53	10.887	04/08/2010 13:33	12.05
04/08/2010 14:18	11.71	04/08/2010 14:20	13.325	04/08/2010 14:21	10.418	04/08/2010 14:22	11.613	04/08/2010 14:23	11.394	04/08/2010 14:23	10.834	04/08/2010 14:03	12.147
04/08/2010 14:48	12.219	04/08/2010 14:50	13.978	04/08/2010 14:51	10.81	04/08/2010 14:52	12.074	04/08/2010 14:53	11.783	04/08/2010 14:53	11.151	04/08/2010 14:33	12.485
04/08/2010 15:18	12.703	04/08/2010 15:20	14.314	04/08/2010 15:21	11.273	04/08/2010 15:22	12.582	04/08/2010 15:23	12.389	04/08/2010 15:23	11.565	04/08/2010 15:03	12.799
04/08/2010 15:48	13.064	04/08/2010 15:50	14.84	04/08/2010 15:51	11.759	04/08/2010 15:52	13.04	04/08/2010 15:53	13.104	04/08/2010 15:53	11.953	04/08/2010 15:33	13.113
04/08/2010 16:18	13.497	04/08/2010 16:20	15.581	04/08/2010 16:21	12.147	04/08/2010 16:22	13.377	04/08/2010 16:23	13.016	04/08/2010 16:23	12.005	04/08/2010 16:03	13.064
04/08/2010 16:48	13.666	04/08/2010 16:50	15.223	04/08/2010 16:51	12.292	04/08/2010 16:52	13.449	04/08/2010 16:53	12.582	04/08/2010 16:53	11.759	04/08/2010 16:33	12.871
04/08/2010 17:18	13.497	04/08/2010 17:20	14.505	04/08/2010 17:21	12.318	04/08/2010 17:22	13.281	04/08/2010 17:23	12.195	04/08/2010 17:23	11.589	04/08/2010 17:03	12.847
04/08/2010 17:48	13.281	04/08/2010 17:50	14.05	04/08/2010 17:51	12.289	04/08/2010 17:52	13.064	04/08/2010 17:53	12.025	04/08/2010 17:53	11.569	04/08/2010 17:33	12.678
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04/08/2010 18:48	13.064	04/08/2010 18:50	13.594	04/08/2010 18:51	12.292	04/08/2010 18:52	12.678	04/08/2010 18:53	11.929	04/08/2010 18:53	11.54	04/08/2010 18:33	12.389
04/08/2010 19:18	12.968	04/08/2010 19:20	13.449	04/08/2010 19:21	12.219	04/08/2010 19:22	12.509	04/08/2010 19:23	11.929	04/08/2010 19:23	11.516	04/08/2010 19:03	12.219
04/08/2010 19:48	12.775	04/08/2010 19:50	13.137	04/08/2010 19:51	12.098	04/08/2010 19:52	12.316	04/08/2010 19:53	11.783	04/08/2010 19:53	11.394	04/08/2010 19:33	12.098
04/08/2010 20:18	12.509	04/08/2010 20:20	12.775	04/08/2010 20:21	11.953	04/08/2010 20:22	12.12	04/08/2010 20:23	11.617	04/08/2010 20:23	11.248	04/08/2010 20:03	11.977
04/08/2010 20:48	12.219	04/08/2010 20:50	12.389	04/08/2010 20:51	11.783	04/08/2010 20:52	11.829	04/08/2010 20:53	11.492	04/08/2010 20:53	11.127	04/08/2010 20:33	11.88
04/08/2010 21:18	11.929	04/08/2010 21:20	12.05	04/08/2010 21:21	11.613	04/08/2010 21:22	11.71	04/08/2010 21:23	11.321	04/08/2010 21:23	11.005	04/08/2010 21:03	11.734
04/08/2010 21:48	11.637	04/08/2010 21:50	11.71	04/08/2010 21:51	11.443	04/08/2010 21:52	11.492	04/08/2010 21:53	11.102	04/08/2010 21:53	10.889	04/08/2010 21:33	11.613
04/08/2010 22:18	11.394	04/08/2010 22:20	11.443	04/08/2010 22:21	11.273	04/08/2010 22:22	11.297	04/08/2010 22:23	10.952	04/08/2010 22:23	10.678	04/08/2010 22:03	11.467
04/08/2010 22:48	11.151	04/08/2010 22:50	11.175	04/08/2010 22:51	11.127	04/08/2010 22:52	11.102	04/08/2010 22:53	10.786	04/08/2010 22:53	10.687	04/08/2010 22:33	11.323
04/08/2010 23:18	10.932	04/08/2010 23:20	10.932	04/08/2010 23:21	10.956	04/08/2010 23:22	10.907	04/08/2010 23:23	10.687	04/08/2010 23:23	10.565	04/08/2010 23:03	11.224
04/08/2010 23:48	10.712	04/08/2010 23:50	10.712	04/08/2010 23:51	10.81	04/08/2010 23:52	10.761	04/08/2010 23:53	10.638	04/08/2010 23:53	10.482	04/08/2010 23:33	11.127
05/08/2010 0:18	10.512	05/08/2010 0:20	10.512	05/08/2010 0:21	10.512	05/08/2010 0:22	10.512	05/08/2010 0:23	10.512	05/08/2010 0:23	10.512	05/08/2010 0:03	10.512
05/08/2010 0:48	10.345	05/08/2010 0:50	10.369	05/08/2010 0:51	10.541	05/08/2010 0:52	10.516	05/08/2010 0:53	10.565	05/08/2010 0:53	10.345	05/08/2010 0:33	10.98
05/08/2010 1:18	10.173	05/08/2010 1:20	10.222	05/08/2010 1:21	10.418	05/08/2010 1:22	10.394	05/08/2010 1:23	10.516	05/08/2010 1:23	10.296	05/08/2010 1:03	10.932
05/08/2010 1:48	10.051	05/08/2010 1:50	10.1	05/08/2010 1:51	10.32	05/08/2010 1:52	10.296	05/08/2010 1:53	10.443	05/08/2010 1:53	10.247	05/08/2010 1:33	10.883
05/08/2010 2:18	9.845	05/08/2010 2:20	10.011	05/08/2010 2:21	10.124	05/08/2010 2:22	10.124	05/08/2010 2:23	10.217	05/08/2010 2:23	10.124	05/08/2010 2:03	10.766
05/08/2010 2:48	9.805	05/08/2010 2:50	9.879	05/08/2010 2:51	10.124	05/08/2010 2:52	10.149	05/08/2010 2:53	10.345	05/08/2010 2:53	10.247	05/08/2010 2:33	10.81
05/08/2010 3:18	9.706	05/08/2010 3:20											

06-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
06/08/2010 0:18	11.580	06/08/2010 0:20	11.151	06/08/2010 0:21	12.05	06/08/2010 0:22	11.662	06/08/2010 0:23	12.485	06/08/2010 0:23	12.413	06/08/2010 0:03	12.074
06/08/2010 0:48	11.127	06/08/2010 0:50	10.712	06/08/2010 0:51	11.71	06/08/2010 0:52	11.287	06/08/2010 0:53	12.219	06/08/2010 0:53	12.074	06/08/2010 0:33	11.832
06/08/2010 1:18	10.712	06/08/2010 1:20	10.296	06/08/2010 1:21	10.296	06/08/2010 1:22	10.832	06/08/2010 1:23	11.977	06/08/2010 1:23	11.807	06/08/2010 1:03	11.613
06/08/2010 1:48	10.32	06/08/2010 1:50	9.929	06/08/2010 1:51	11.078	06/08/2010 1:52	10.614	06/08/2010 1:53	11.734	06/08/2010 1:53	11.588	06/08/2010 1:33	11.434
06/08/2010 2:18	9.952	06/08/2010 2:20	9.583	06/08/2010 2:21	10.785	06/08/2010 2:22	10.32	06/08/2010 2:23	11.516	06/08/2010 2:23	11.394	06/08/2010 2:03	11.224
06/08/2010 2:48	9.608	06/08/2010 2:50	9.238	06/08/2010 2:51	10.467	06/08/2010 2:52	10.026	06/08/2010 2:53	11.346	06/08/2010 2:53	11.151	06/08/2010 2:33	11.029
06/08/2010 3:18	9.287	06/08/2010 3:20	8.919	06/08/2010 3:21	10.173	06/08/2010 3:22	9.78	06/08/2010 3:23	11.127	06/08/2010 3:23	10.907	06/08/2010 3:03	10.858
06/08/2010 3:48	8.995	06/08/2010 3:50	8.618	06/08/2010 3:51	9.903	06/08/2010 3:52	9.524	06/08/2010 3:53	10.956	06/08/2010 3:53	10.712	06/08/2010 3:33	10.682
06/08/2010 4:18	8.643	06/08/2010 4:20	8.319	06/08/2010 4:21	9.657	06/08/2010 4:22	9.312	06/08/2010 4:23	10.785	06/08/2010 4:23	10.516	06/08/2010 4:03	10.541
06/08/2010 4:48	8.344	06/08/2010 4:50	8.045	06/08/2010 4:51	9.41	06/08/2010 4:52	9.114	06/08/2010 4:53	10.614	06/08/2010 4:53	10.345	06/08/2010 4:33	10.394
06/08/2010 5:18	8.096	06/08/2010 5:20	7.82	06/08/2010 5:21	9.188	06/08/2010 5:22	8.941	06/08/2010 5:23	10.482	06/08/2010 5:23	10.149	06/08/2010 5:03	10.296
06/08/2010 5:48	7.82	06/08/2010 5:50	7.67	06/08/2010 5:51	9.015	06/08/2010 5:52	8.817	06/08/2010 5:53	10.394	06/08/2010 5:53	10.001	06/08/2010 5:33	10.188
06/08/2010 6:18	7.82	06/08/2010 6:20	7.619	06/08/2010 6:21	8.916	06/08/2010 6:22	8.767	06/08/2010 6:23	10.345	06/08/2010 6:23	9.854	06/08/2010 6:03	10.149
06/08/2010 6:48	7.795	06/08/2010 6:50	7.67	06/08/2010 6:51	8.841	06/08/2010 6:52	8.767	06/08/2010 6:53	10.467	06/08/2010 6:53	9.805	06/08/2010 6:33	10.124
06/08/2010 7:18	7.87	06/08/2010 7:20	7.87	06/08/2010 7:21	8.841	06/08/2010 7:22	8.817	06/08/2010 7:23	10.736	06/08/2010 7:23	10.026	06/08/2010 7:03	10.247
06/08/2010 7:48	7.87	06/08/2010 7:50	7.87	06/08/2010 7:51	8.916	06/08/2010 7:52	8.995	06/08/2010 7:53	10.956	06/08/2010 7:53	10.149	06/08/2010 7:33	10.345
06/08/2010 8:18	8.319	06/08/2010 8:20	8.643	06/08/2010 8:21	9.054	06/08/2010 8:22	9.163	06/08/2010 8:23	11.127	06/08/2010 8:23	10.394	06/08/2010 8:03	10.565
06/08/2010 8:48	8.668	06/08/2010 8:50	9.163	06/08/2010 8:51	9.287	06/08/2010 8:52	9.46	06/08/2010 8:53	11.492	06/08/2010 8:53	10.683	06/08/2010 8:33	10.785
06/08/2010 9:18	9.139	06/08/2010 9:20	9.805	06/08/2010 9:21	9.558	06/08/2010 9:22	9.805	06/08/2010 9:23	11.832	06/08/2010 9:23	11.102	06/08/2010 9:03	11.346
06/08/2010 9:48	9.682	06/08/2010 9:50	10.467	06/08/2010 9:51	9.879	06/08/2010 9:52	10.286	06/08/2010 9:53	12.219	06/08/2010 9:53	11.566	06/08/2010 9:33	11.807
06/08/2010 10:18	10.32	06/08/2010 10:20	11.346	06/08/2010 10:21	10.271	06/08/2010 10:22	10.81	06/08/2010 10:23	12.799	06/08/2010 10:23	12.001	06/08/2010 10:03	12.195
06/08/2010 10:48	11.078	06/08/2010 10:50	12.243	06/08/2010 10:51	10.712	06/08/2010 10:52	11.37	06/08/2010 10:53	13.522	06/08/2010 10:53	12.534	06/08/2010 10:33	12.654
06/08/2010 11:18	11.904	06/08/2010 11:20	13.209	06/08/2010 11:21	11.224	06/08/2010 11:22	12.025	06/08/2010 11:23	14.218	06/08/2010 11:23	13.185	06/08/2010 11:03	13.112
06/08/2010 11:48	12.727	06/08/2010 11:50	14.146	06/08/2010 11:51	11.734	06/08/2010 11:52	12.703	06/08/2010 11:53	14.912	06/08/2010 11:53	13.742	06/08/2010 11:33	13.668
06/08/2010 12:18	13.546	06/08/2010 12:20	14.936	06/08/2010 12:21	12.258	06/08/2010 12:22	13.401	06/08/2010 12:23	15.557	06/08/2010 12:23	14.433	06/08/2010 12:03	14.146
06/08/2010 12:48	14.218	06/08/2010 12:50	15.772	06/08/2010 12:51	12.799	06/08/2010 12:52	14.098	06/08/2010 12:53	16.201	06/08/2010 12:53	14.984	06/08/2010 12:33	14.625
06/08/2010 13:18	15.103	06/08/2010 13:20	16.582	06/08/2010 13:21	13.377	06/08/2010 13:22	14.782	06/08/2010 13:23	16.82	06/08/2010 13:23	15.533	06/08/2010 13:03	15.103
06/08/2010 13:48	15.915	06/08/2010 13:50	17.439	06/08/2010 13:51	13.954	06/08/2010 13:52	15.485	06/08/2010 13:53	17.391	06/08/2010 13:53	16.082	06/08/2010 13:33	15.652
06/08/2010 14:18	16.701	06/08/2010 14:20	18.175	06/08/2010 14:21	14.503	06/08/2010 14:22	16.104	06/08/2010 14:23	17.894	06/08/2010 14:23	16.534	06/08/2010 14:03	16.177
06/08/2010 14:48	17.32	06/08/2010 14:50	18.723	06/08/2010 14:51	15.079	06/08/2010 14:52	16.677	06/08/2010 14:53	18.319	06/08/2010 14:53	17.082	06/08/2010 14:33	16.558
06/08/2010 15:18	17.891	06/08/2010 15:20	19.151	06/08/2010 15:21	15.533	06/08/2010 15:22	17.13	06/08/2010 15:23	18.699	06/08/2010 15:23	17.51	06/08/2010 15:03	16.939
06/08/2010 15:48	18.39	06/08/2010 15:50	19.508	06/08/2010 15:51	16.071	06/08/2010 15:52	17.598	06/08/2010 15:53	19.845	06/08/2010 15:53	17.819	06/08/2010 15:33	17.248
06/08/2010 16:18	18.699	06/08/2010 16:20	19.627	06/08/2010 16:21	16.388	06/08/2010 16:22	17.843	06/08/2010 16:23	19.108	06/08/2010 16:23	17.988	06/08/2010 16:03	17.381
06/08/2010 16:48	18.937	06/08/2010 16:50	19.532	06/08/2010 16:51	16.63	06/08/2010 16:52	18.01	06/08/2010 16:53	19.246	06/08/2010 16:53	18.2	06/08/2010 16:33	17.653
06/08/2010 17:18	19.08	06/08/2010 17:20	19.555	06/08/2010 17:21	16.888	06/08/2010 17:22	18.105	06/08/2010 17:23	19.27	06/08/2010 17:23	18.224	06/08/2010 17:03	17.805
06/08/2010 17:48	18.985	06/08/2010 17:50	19.222	06/08/2010 17:51	16.987	06/08/2010 17:52	18.081	06/08/2010 17:53	18.913	06/08/2010 17:53	18.033	06/08/2010 17:33	17.415
06/08/2010 18:18	18.699	06/08/2010 18:20	18.629	06/08/2010 18:21	16.963	06/08/2010 18:22	17.861	06/08/2010 18:23	17.772	06/08/2010 18:23	17.772	06/08/2010 18:03	17.158
06/08/2010 18:48	18.414	06/08/2010 18:50	18.2	06/08/2010 18:51	16.844	06/08/2010 18:52	17.605	06/08/2010 18:53	18.176	06/08/2010 18:53	17.524	06/08/2010 18:33	17.133
06/08/2010 19:18	18.105	06/08/2010 19:20	17.891	06/08/2010 19:21	16.725	06/08/2010 19:22	17.368	06/08/2010 19:23	18.057	06/08/2010 19:23	17.391	06/08/2010 19:03	16.677
06/08/2010 19:48	17.891	06/08/2010 19:50	17.582	06/08/2010 19:51	16.606	06/08/2010 19:52	17.153	06/08/2010 19:53	17.843	06/08/2010 19:53	17.201	06/08/2010 19:33	16.438
06/08/2010 20:18	17.582	06/08/2010 20:20	17.271	06/08/2010 20:21	16.388	06/08/2010 20:22	16.939	06/08/2010 20:23	17.598	06/08/2010 20:23	16.852	06/08/2010 20:03	16.153
06/08/2010 20:48	17.249	06/08/2010 20:50	16.796	06/08/2010 20:51	16.272	06/08/2010 20:52	16.654	06/08/2010 20:53	17.344	06/08/2010 20:53	16.582	06/08/2010 20:33	15.619
06/08/2010 21:18	16.844	06/08/2010 21:20	16.344	06/08/2010 21:21	16.034	06/08/2010 21:22	16.368	06/08/2010 21:23	17.082	06/08/2010 21:23	16.392	06/08/2010 21:03	15.925
06/08/2010 21:48	16.415	06/08/2010 21:50	15.843	06/08/2010 21:51	15.796	06/08/2010 21:52	16.082	06/08/2010 21:53	16.725	06/08/2010 21:53	16.177	06/08/2010 21:33	15.342
06/08/2010 22:18	15.985	06/08/2010 22:20	15.366	06/08/2010 22:21	15.533	06/08/2010 22:22	15.746	06/08/2010 22:23	16.398	06/08/2010 22:23	15.658	06/08/2010 22:03	15.058
06/08/2010 22:48	15.557	06/08/2010 22:50	14.936	06/08/2010 22:51	15.247	06/08/2010 22:52	15.414	06/08/2010 22:53	16.082	06/08/2010 22:53	15.39	06/08/2010 22:33	14.792
06/08/2010 23:18	15.151	06/08/2010 23:20	14.457	06/08/2010 23:21	14.984	06/08/2010 23:22	15.055	06/08/2010 23:23	15.772	06/08/2010 23:23	15.055	06/08/2010 23:03	14.529
06/08/2010 23:48	14.745	06/08/2010 23:50	14.074	06/08/2010 23:51	14.687	06/08/2010 23:52	14.745	06/08/2010 23:53	15.485	06/08/2010 23:53	14.745	06/08/2010 23:33	14.256
07/08/2010 0:18	14.745	07/08/2010 0:20	14.074	07/08/2010 0:21	14.687	07/08/2010 0:22	14.745	07/08/2010 0:23	15.485	07/08/2010 0:23	14.745	07/08/2010 0:03	14.256
07/08/2010 0:48	14.098	07/08/2010 0:50	13.497	07/08/2010 0:51	14.218	07/08/2010 0:52	14.194	07/08/2010 0:53	15.103	07/08/2010 0:53	14.314	07/08/2010 0:33	13.81
07/08/2010 1:18	13.81	07/08/2010 1:20	13.257	07/08/2010 1:21	14.002	07/08/2010 1:22	13.978	07/08/2010 1:23	14.912	07/08/2010 1:23	14.17	07/08/2010 1:03	13.642
07/08/2010 1:48	13.546	07/08/2010 1:50	13.016	07/08/2010 1:51	13.788	07/08/2010 1:52	13.762	07/08/2010 1:53	14.721	07/08/2010 1:53	13.978	07/08/2010 1:33	13.497
07/08/2010 2:18	13.257	07/08/2010 2:20	12.643	07/08/2010 2:21	13.584	07/08/2010 2:22	13.57	07/08/2010 2:23	14.591	07/08/2010 2:23	13.796	07/08/2010 2:03	13.257
07/08/2010 2:48	13.088	07/08/2010 2:50	12.678	07/08/2010 2:51	13.401	07/08/2010 2:52	13.401	07/08/2010 2:53	14.29				

08-Aug-10

09-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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08/08/2010 0:48	13.93	08/08/2010 0:50	13.401	08/08/2010 0:51	14.481	08/08/2010 0:52	14.457	08/08/2010 0:53	14.433	08/08/2010 0:53	14.218	08/08/2010 0:33	13.81
08/08/2010 1:18	13.642	08/08/2010 1:20	13.112	08/08/2010 1:21	14.266	08/08/2010 1:22	14.218	08/08/2010 1:23	14.242	08/08/2010 1:23	13.93	08/08/2010 1:03	13.618
08/08/2010 1:48	13.377	08/08/2010 1:50	12.886	08/08/2010 1:51	14.05	08/08/2010 1:52	14.026	08/08/2010 1:53	14.016	08/08/2010 1:53	13.788	08/08/2010 1:33	13.476
08/08/2010 2:18	13.112	08/08/2010 2:20	12.654	08/08/2010 2:21	13.858	08/08/2010 2:22	13.81	08/08/2010 2:23	13.906	08/08/2010 2:23	13.618	08/08/2010 2:03	13.281
08/08/2010 2:48	12.823	08/08/2010 2:50	12.413	08/08/2010 2:51	13.666	08/08/2010 2:52	13.618	08/08/2010 2:53	13.738	08/08/2010 2:53	13.473	08/08/2010 2:33	13.112
08/08/2010 3:18	12.582	08/08/2010 3:20	12.171	08/08/2010 3:21	13.449	08/08/2010 3:22	13.401	08/08/2010 3:23	13.594	08/08/2010 3:23	13.281	08/08/2010 3:03	12.968
08/08/2010 3:48	12.34	08/08/2010 3:50	11.925	08/08/2010 3:51	13.233	08/08/2010 3:52	13.233	08/08/2010 3:53	13.445	08/08/2010 3:53	13.088	08/08/2010 3:33	12.758
08/08/2010 4:18	12.098	08/08/2010 4:20	11.71	08/08/2010 4:21	13.064	08/08/2010 4:22	13.04	08/08/2010 4:23	13.329	08/08/2010 4:23	12.992	08/08/2010 4:03	12.654
08/08/2010 4:48	11.856	08/08/2010 4:50	11.482	08/08/2010 4:51	12.896	08/08/2010 4:52	12.871	08/08/2010 4:53	13.233	08/08/2010 4:53	12.944	08/08/2010 4:33	12.558
08/08/2010 5:18	11.686	08/08/2010 5:20	11.321	08/08/2010 5:21	12.727	08/08/2010 5:22	12.727	08/08/2010 5:23	13.185	08/08/2010 5:23	12.799	08/08/2010 5:03	12.485
08/08/2010 5:48	11.54	08/08/2010 5:50	11.246	08/08/2010 5:51	12.63	08/08/2010 5:52	12.666	08/08/2010 5:53	13.137	08/08/2010 5:53	12.759	08/08/2010 5:33	12.417
08/08/2010 6:18	11.443	08/08/2010 6:20	11.2	08/08/2010 6:21	12.509	08/08/2010 6:22	12.534	08/08/2010 6:23	13.112	08/08/2010 6:23	12.847	08/08/2010 6:03	12.389
08/08/2010 6:48	11.394	08/08/2010 6:50	11.2	08/08/2010 6:51	12.437	08/08/2010 6:52	12.485	08/08/2010 6:53	13.088	08/08/2010 6:53	12.847	08/08/2010 6:33	12.364
08/08/2010 7:18	11.443	08/08/2010 7:20	11.321	08/08/2010 7:21	12.389	08/08/2010 7:22	12.485	08/08/2010 7:23	13.137	08/08/2010 7:23	12.871	08/08/2010 7:03	12.389
08/08/2010 7:48	11.565	08/08/2010 7:50	11.443	08/08/2010 7:51	12.413	08/08/2010 7:52	12.594	08/08/2010 7:53	13.233	08/08/2010 7:53	12.944	08/08/2010 7:33	12.461
08/08/2010 8:18	11.71	08/08/2010 8:20	11.807	08/08/2010 8:21	12.461	08/08/2010 8:22	12.678	08/08/2010 8:23	13.401	08/08/2010 8:23	13.088	08/08/2010 8:03	12.558
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08/08/2010 9:18	12.196	08/08/2010 9:20	12.509	08/08/2010 9:21	12.678	08/08/2010 9:22	13.064	08/08/2010 9:23	14.194	08/08/2010 9:23	13.57	08/08/2010 9:03	13.088
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10-Aug-10

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11-Aug-10

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12-Aug-10

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12/08/2010 2:48	12.896	12/08/2010 2:50	12.775	12/08/2010 2:51	13.786	12/08/2010 2:52	13.786	12/08/2010 2:53	14.649	12/08/2010 2:53	13.978	12/08/2010 2:33	13.594
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12/08/2010 18:48	13.305	12/08/2010 18:50	13.112	12/08/2010 18:51	13.161	12/08/2010 18:52	13.642	12/08/2010 18:53	13.786	12/08/2010 18:53	13.425	12/08/2010 18:33	13.69
12/08/2010 19:18	13.137	12/08/2010 19:20	12.92	12/08/2010 19:21	13.064	12/08/2010 19:22	13.497	12/08/2010 19:23	13.618	12/08/2010 19:23	13.281	12/08/2010 19:03	13.546
12/08/2010 19:48	12.92	12/08/2010 19:50	12.654	12/08/2010 19:51	12.944	12/08/2010 19:52	13.305	12/08/2010 19:53	13.401	12/08/2010 19:53	13.112	12/08/2010 19:33	13.401
12/08/2010 20:18	12.678	12/08/2010 20:20	12.389	12/08/2010 20:21	12.798	12/08/2010 20:22	13.112	12/08/2010 20:23	13.161	12/08/2010 20:23	12.968	12/08/2010 20:03	13.257
12/08/2010 20:48	12.389	12/08/2010 20:50	12.122	12/08/2010 20:51	12.63	12/08/2010 20:52	12.871	12/08/2010 20:53	12.92	12/08/2010 20:53	12.751	12/08/2010 20:33	13.064
12/08/2010 21:18	12.122	12/08/2010 21:20	11.832	12/08/2010 21:21	12.461	12/08/2010 21:22	12.654	12/08/2010 21:23	12.703	12/08/2010 21:23	12.606	12/08/2010 21:03	12.871
12/08/2010 21:48	11.832	12/08/2010 21:50	11.54	12/08/2010 21:51	12.292	12/08/2010 21:52	12.413	12/08/2010 21:53	12.461	12/08/2010 21:53	12.384	12/08/2010 21:33	12.678
12/08/2010 22:18	11.565	12/08/2010 22:20	11.246	12/08/2010 22:21	11.246	12/08/2010 22:22	12.171	12/08/2010 22:23	12.122	12/08/2010 22:23	12.122	12/08/2010 22:03	12.594
12/08/2010 22:48	11.273	12/08/2010 22:50	11.005	12/08/2010 22:51	11.904	12/08/2010 22:52	11.953	12/08/2010 22:53	11.88	12/08/2010 22:53	11.856	12/08/2010 22:33	12.292
12/08/2010 23:18	11.029	12/08/2010 23:20	10.785	12/08/2010 23:21	11.71	12/08/2010 23:22	11.71	12/08/2010 23:23	11.565	12/08/2010 23:23	11.589	12/08/2010 23:03	12.074
12/08/2010 23:48	10.785	12/08/2010 23:50	10.541	12/08/2010 23:51	11.516	12/08/2010 23:52	11.492	12/08/2010 23:53	11.346	12/08/2010 23:53	11.445	12/08/2010 23:33	11.856
13/08/2010 0:18	10.541	13/08/2010 0:20	10.247	13/08/2010 0:21	10.247	13/08/2010 0:22	10.247	13/08/2010 0:23	10.247	13/08/2010 0:23	10.247	13/08/2010 0:03	11.292
13/08/2010 0:48	10.247	13/08/2010 0:50	10.051	13/08/2010 0:51	11.102	13/08/2010 0:52	11.029	13/08/2010 0:53	10.932	13/08/2010 0:53	11.053	13/08/2010 0:33	11.497
13/08/2010 1:18	9.977	13/08/2010 1:20	9.805	13/08/2010 1:21	10.883	13/08/2010 1:22	10.785	13/08/2010 1:23	10.687	13/08/2010 1:23	10.785	13/08/2010 1:03	11.292
13/08/2010 1:48	9.731	13/08/2010 1:50	9.598	13/08/2010 1:51	10.663	13/08/2010 1:52	10.541	13/08/2010 1:53	10.462	13/08/2010 1:53	10.59	13/08/2010 1:33	11.102
13/08/2010 2:18	9.598	13/08/2010 2:20	9.389	13/08/2010 2:21	10.462	13/08/2010 2:22	10.346	13/08/2010 2:23	10.247	13/08/2010 2:23	10.346	13/08/2010 2:03	10.932
13/08/2010 2:48	9.287	13/08/2010 2:50	9.139	13/08/2010 2:51	10.271	13/08/2010							

14-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
14/08/2010 0:18	11.151	14/08/2010 0:20	10.858	14/08/2010 0:21	11.662	14/08/2010 0:22	11.565	14/08/2010 0:23	12.05	14/08/2010 0:23	11.71	14/08/2010 0:03	12.147
14/08/2010 0:48	10.736	14/08/2010 0:50	10.443	14/08/2010 0:51	11.394	14/08/2010 0:52	11.2	14/08/2010 0:53	11.759	14/08/2010 0:53	11.443	14/08/2010 0:33	11.904
14/08/2010 1:18	10.345	14/08/2010 1:20	10.051	14/08/2010 1:21	11.102	14/08/2010 1:22	10.834	14/08/2010 1:23	11.492	14/08/2010 1:23	11.127	14/08/2010 1:03	11.662
14/08/2010 1:48	9.977	14/08/2010 1:50	9.697	14/08/2010 1:51	10.81	14/08/2010 1:52	10.492	14/08/2010 1:53	11.246	14/08/2010 1:53	10.81	14/08/2010 1:33	11.446
14/08/2010 2:18	9.534	14/08/2010 2:20	9.287	14/08/2010 2:21	10.516	14/08/2010 2:22	10.149	14/08/2010 2:23	11.005	14/08/2010 2:23	10.59	14/08/2010 2:03	11.224
14/08/2010 2:48	9.139	14/08/2010 2:50	8.941	14/08/2010 2:51	10.198	14/08/2010 2:52	9.805	14/08/2010 2:53	10.736	14/08/2010 2:53	10.369	14/08/2010 2:33	11.005
14/08/2010 3:18	8.757	14/08/2010 3:20	8.519	14/08/2010 3:21	9.903	14/08/2010 3:22	9.485	14/08/2010 3:23	10.419	14/08/2010 3:23	10.124	14/08/2010 3:03	10.785
14/08/2010 3:48	8.415	14/08/2010 3:50	8.225	14/08/2010 3:51	8.602	14/08/2010 3:52	8.183	14/08/2010 3:53	10.104	14/08/2010 3:53	9.893	14/08/2010 3:33	10.562
14/08/2010 4:18	8.095	14/08/2010 4:20	8.02	14/08/2010 4:21	9.361	14/08/2010 4:22	8.866	14/08/2010 4:23	9.854	14/08/2010 4:23	9.608	14/08/2010 4:03	10.345
14/08/2010 4:48	7.795	14/08/2010 4:50	7.745	14/08/2010 4:51	9.089	14/08/2010 4:52	8.593	14/08/2010 4:53	9.558	14/08/2010 4:53	9.336	14/08/2010 4:33	10.1
14/08/2010 5:18	7.469	14/08/2010 5:20	7.469	14/08/2010 5:21	8.841	14/08/2010 5:22	8.344	14/08/2010 5:23	9.335	14/08/2010 5:23	9.163	14/08/2010 5:03	9.879
14/08/2010 5:48	7.192	14/08/2010 5:50	7.227	14/08/2010 5:51	8.593	14/08/2010 5:52	8.095	14/08/2010 5:53	9.153	14/08/2010 5:53	9.04	14/08/2010 5:33	9.657
14/08/2010 6:18	6.965	14/08/2010 6:20	7.041	14/08/2010 6:21	8.394	14/08/2010 6:22	7.895	14/08/2010 6:23	9.064	14/08/2010 6:23	8.965	14/08/2010 6:03	9.46
14/08/2010 6:48	6.839	14/08/2010 6:50	6.94	14/08/2010 6:51	8.22	14/08/2010 6:52	7.77	14/08/2010 6:53	9.04	14/08/2010 6:53	8.941	14/08/2010 6:33	9.336
14/08/2010 7:18	6.813	14/08/2010 7:20	6.965	14/08/2010 7:21	8.12	14/08/2010 7:22	7.695	14/08/2010 7:23	9.114	14/08/2010 7:23	8.891	14/08/2010 7:03	9.238
14/08/2010 7:48	6.989	14/08/2010 7:50	7.091	14/08/2010 7:51	8.07	14/08/2010 7:52	7.71	14/08/2010 7:53	9.313	14/08/2010 7:53	9.04	14/08/2010 7:33	9.239
14/08/2010 8:18	7.066	14/08/2010 8:20	7.318	14/08/2010 8:21	8.095	14/08/2010 8:22	7.795	14/08/2010 8:23	9.608	14/08/2010 8:23	9.287	14/08/2010 8:03	9.361
14/08/2010 8:48	7.318	14/08/2010 8:50	7.645	14/08/2010 8:51	8.195	14/08/2010 8:52	7.945	14/08/2010 8:53	10.001	14/08/2010 8:53	9.583	14/08/2010 8:33	9.583
14/08/2010 9:18	7.67	14/08/2010 9:20	8.095	14/08/2010 9:21	8.344	14/08/2010 9:22	8.17	14/08/2010 9:23	10.443	14/08/2010 9:23	9.928	14/08/2010 9:03	10.051
14/08/2010 9:48	8.12	14/08/2010 9:50	8.643	14/08/2010 9:51	8.543	14/08/2010 9:52	8.499	14/08/2010 9:53	10.956	14/08/2010 9:53	10.394	14/08/2010 9:33	10.566
14/08/2010 10:18	8.693	14/08/2010 10:20	9.312	14/08/2010 10:21	8.866	14/08/2010 10:22	8.841	14/08/2010 10:23	11.492	14/08/2010 10:23	10.956	14/08/2010 10:03	10.98
14/08/2010 10:48	9.336	14/08/2010 10:50	10.1	14/08/2010 10:51	9.213	14/08/2010 10:52	9.312	14/08/2010 10:53	12.171	14/08/2010 10:53	11.54	14/08/2010 10:33	11.37
14/08/2010 11:18	10.075	14/08/2010 11:20	10.907	14/08/2010 11:21	9.608	14/08/2010 11:22	9.854	14/08/2010 11:23	12.509	14/08/2010 11:23	12.025	14/08/2010 11:03	11.248
14/08/2010 11:48	10.907	14/08/2010 11:50	11.832	14/08/2010 11:51	9.977	14/08/2010 11:52	10.418	14/08/2010 11:53	13.04	14/08/2010 11:53	12.59	14/08/2010 11:33	12.316
14/08/2010 12:18	11.637	14/08/2010 12:20	13.137	14/08/2010 12:21	10.394	14/08/2010 12:22	10.932	14/08/2010 12:23	13.257	14/08/2010 12:23	12.606	14/08/2010 12:03	12.195
14/08/2010 12:48	12.389	14/08/2010 12:50	14.457	14/08/2010 12:51	10.834	14/08/2010 12:52	11.54	14/08/2010 12:53	13.473	14/08/2010 12:53	12.896	14/08/2010 12:33	12.582
14/08/2010 13:18	12.992	14/08/2010 13:20	15.223	14/08/2010 13:21	11.151	14/08/2010 13:22	12.025	14/08/2010 13:23	13.377	14/08/2010 13:23	12.799	14/08/2010 13:03	13.305
14/08/2010 13:48	13.834	14/08/2010 13:50	16.034	14/08/2010 13:51	11.443	14/08/2010 13:52	12.394	14/08/2010 13:53	13.425	14/08/2010 13:53	13.089	14/08/2010 13:33	13.04
14/08/2010 14:18	14.218	14/08/2010 14:20	15.985	14/08/2010 14:21	11.793	14/08/2010 14:22	12.772	14/08/2010 14:23	13.81	14/08/2010 14:23	13.497	14/08/2010 14:03	13.546
14/08/2010 14:48	14.385	14/08/2010 14:50	15.819	14/08/2010 14:51	12.195	14/08/2010 14:52	13.185	14/08/2010 14:53	14.194	14/08/2010 14:53	13.81	14/08/2010 14:33	13.497
14/08/2010 15:18	14.337	14/08/2010 15:20	15.485	14/08/2010 15:21	12.608	14/08/2010 15:22	13.594	14/08/2010 15:23	14.912	14/08/2010 15:23	14.146	14/08/2010 15:03	13.859
14/08/2010 15:48	14.721	14/08/2010 15:50	15.247	14/08/2010 15:51	12.996	14/08/2010 15:52	13.981	14/08/2010 15:53	15.247	14/08/2010 15:53	14.458	14/08/2010 15:33	14.056
14/08/2010 16:18	14.906	14/08/2010 16:20	15.815	14/08/2010 16:21	12.896	14/08/2010 16:22	13.906	14/08/2010 16:23	15.175	14/08/2010 16:23	14.457	14/08/2010 16:03	13.906
14/08/2010 16:48	15.223	14/08/2010 16:50	16.249	14/08/2010 16:51	12.896	14/08/2010 16:52	14.002	14/08/2010 16:53	15.509	14/08/2010 16:53	14.385	14/08/2010 16:33	13.882
14/08/2010 17:18	15.27	14/08/2010 17:20	16.129	14/08/2010 17:21	12.896	14/08/2010 17:22	14.074	14/08/2010 17:23	15.7	14/08/2010 17:23	14.721	14/08/2010 17:03	14.409
14/08/2010 17:48	15.386	14/08/2010 17:50	16.082	14/08/2010 17:51	12.969	14/08/2010 17:52	14.146	14/08/2010 17:53	16.082	14/08/2010 17:53	15.055	14/08/2010 17:33	14.409
14/08/2010 18:18	15.075	14/08/2010 18:20	15.665	14/08/2010 18:21	13.064	14/08/2010 18:22	14.096	14/08/2010 18:23	16.177	14/08/2010 18:23	15.294	14/08/2010 18:03	14.377
14/08/2010 18:48	14.721	14/08/2010 18:50	15.031	14/08/2010 18:51	13.112	14/08/2010 18:52	13.93	14/08/2010 18:53	15.891	14/08/2010 18:53	15.175	14/08/2010 18:33	14.409
14/08/2010 19:18	14.337	14/08/2010 19:20	14.601	14/08/2010 19:21	13.04	14/08/2010 19:22	13.714	14/08/2010 19:23	15.461	14/08/2010 19:23	14.912	14/08/2010 19:03	14.337
14/08/2010 19:48	14.074	14/08/2010 19:50	14.17	14/08/2010 19:51	12.896	14/08/2010 19:52	13.473	14/08/2010 19:53	15.103	14/08/2010 19:53	14.697	14/08/2010 19:33	14.17
14/08/2010 20:18	13.834	14/08/2010 20:20	13.81	14/08/2010 20:21	12.896	14/08/2010 20:22	13.473	14/08/2010 20:23	14.84	14/08/2010 20:23	14.553	14/08/2010 20:03	13.84
14/08/2010 20:48	13.425	14/08/2010 20:50	13.401	14/08/2010 20:51	12.534	14/08/2010 20:52	12.92	14/08/2010 20:53	14.577	14/08/2010 20:53	14.314	14/08/2010 20:33	13.642
14/08/2010 21:18	13.04	14/08/2010 21:20	13.016	14/08/2010 21:21	12.364	14/08/2010 21:22	12.654	14/08/2010 21:23	14.218	14/08/2010 21:23	14.026	14/08/2010 21:03	13.353
14/08/2010 21:48	12.654	14/08/2010 21:50	12.63	14/08/2010 21:51	12.171	14/08/2010 21:52	12.389	14/08/2010 21:53	13.859	14/08/2010 21:53	13.762	14/08/2010 21:33	13.064
14/08/2010 22:18	12.268	14/08/2010 22:20	12.218	14/08/2010 22:21	12.001	14/08/2010 22:22	12.112	14/08/2010 22:23	13.594	14/08/2010 22:23	13.157	14/08/2010 22:03	12.799
14/08/2010 22:48	11.929	14/08/2010 22:50	11.904	14/08/2010 22:51	11.807	14/08/2010 22:52	11.904	14/08/2010 22:53	13.377	14/08/2010 22:53	13.425	14/08/2010 22:33	12.558
14/08/2010 23:18	11.637	14/08/2010 23:20	11.637	14/08/2010 23:21	11.637	14/08/2010 23:22	11.71	14/08/2010 23:23	13.209	14/08/2010 23:23	13.305	14/08/2010 23:03	12.34
14/08/2010 23:48	11.346	14/08/2010 23:50	11.37	14/08/2010 23:51	11.467	14/08/2010 23:52	11.516	14/08/2010 23:53	12.962	14/08/2010 23:53	13.088	14/08/2010 23:33	12.122
15/08/2010 0:18	11.075	15/08/2010 0:20	11.075	15/08/2010 0:21	11.075	15/08/2010 0:22	11.075	15/08/2010 0:23	12.606	15/08/2010 0:23	12.606	15/08/2010 0:03	11.785
15/08/2010 0:48	10.687	15/08/2010 0:50	10.785	15/08/2010 0:51	11.053	15/08/2010 0:52	11.078	15/08/2010 0:53	12.606	15/08/2010 0:53	12.63	15/08/2010 0:33	11.785
15/08/2010 1:18	10.32	15/08/2010 1:20	10.443	15/08/2010 1:21	10.81	15/08/2010 1:22	10.834	15/08/2010 1:23	12.413	15/08/2010 1:23	12.437	15/08/2010 1:03	11.613
15/08/2010 1:48	9.977	15/08/2010 1:50	10.124	15/08/2010 1:51	10.59	15/08/2010 1:52	10.614	15/08/2010 1:53	12.268	15/08/2010 1:53	12.268	15/08/2010 1:33	11.467
15/08/2010 2:18	9.795	15/08/2010 2:20	9.954	15/08/2010 2:21	10.45	15/08/2010 2:22	10.45	15/08/2010 2:23	12.147	15/08/2010 2:23	12.147	15/08/2010 2:03	11.248
15/08/2010 2:48	9.583	15/08/2010 2:50	9.854	15/08/2010 2:51	10.345	15/08/2010 2:52	10.296	15/08/2010 2:53	12.026	15/08/2010 2:53	12.026	15/08/2010 2:33	11.224

16-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
16/08/2010 0:18	10.121	16/08/2010 0:20	9.882	16/08/2010 0:21	11.273	16/08/2010 0:22	11.127	16/08/2010 0:23	11.273	16/08/2010 0:23	11.078	16/08/2010 0:03	11.759
16/08/2010 0:48	9.657	16/08/2010 0:50	9.287	16/08/2010 0:51	10.996	16/08/2010 0:52	10.738	16/08/2010 0:53	10.932	16/08/2010 0:53	10.81	16/08/2010 0:33	11.492
16/08/2010 1:18	9.188	16/08/2010 1:20	8.891	16/08/2010 1:21	10.614	16/08/2010 1:22	10.345	16/08/2010 1:23	10.614	16/08/2010 1:23	10.589	16/08/2010 1:03	11.224
16/08/2010 1:48	8.742	16/08/2010 1:50	8.515	16/08/2010 1:51	10.286	16/08/2010 1:52	10.001	16/08/2010 1:53	10.345	16/08/2010 1:53	10.173	16/08/2010 1:33	10.956
16/08/2010 2:18	8.344	16/08/2010 2:20	8.117	16/08/2010 2:21	10.001	16/08/2010 2:22	9.657	16/08/2010 2:23	10.051	16/08/2010 2:23	9.879	16/08/2010 2:03	10.663
16/08/2010 2:48	7.97	16/08/2010 2:50	7.795	16/08/2010 2:51	9.706	16/08/2010 2:52	9.336	16/08/2010 2:53	9.78	16/08/2010 2:53	9.706	16/08/2010 2:33	10.394
16/08/2010 3:18	7.619	16/08/2010 3:20	7.494	16/08/2010 3:21	9.435	16/08/2010 3:22	9.015	16/08/2010 3:23	9.579	16/08/2010 3:23	9.495	16/08/2010 3:03	10.149
16/08/2010 3:48	7.318	16/08/2010 3:50	7.192	16/08/2010 3:51	9.398	16/08/2010 3:52	8.959	16/08/2010 3:53	9.238	16/08/2010 3:53	9.238	16/08/2010 3:33	9.938
16/08/2010 4:18	6.99	16/08/2010 4:20	6.864	16/08/2010 4:21	8.916	16/08/2010 4:22	8.394	16/08/2010 4:23	9.015	16/08/2010 4:23	8.99	16/08/2010 4:03	9.657
16/08/2010 4:48	6.661	16/08/2010 4:50	6.611	16/08/2010 4:51	8.693	16/08/2010 4:52	8.12	16/08/2010 4:53	8.767	16/08/2010 4:53	8.817	16/08/2010 4:33	9.41
16/08/2010 5:18	6.357	16/08/2010 5:20	6.331	16/08/2010 5:21	8.469	16/08/2010 5:22	7.845	16/08/2010 5:23	8.494	16/08/2010 5:23	8.645	16/08/2010 5:03	9.188
16/08/2010 5:48	6.102	16/08/2010 5:50	6.105	16/08/2010 5:51	8.22	16/08/2010 5:52	7.618	16/08/2010 5:53	8.319	16/08/2010 5:53	8.469	16/08/2010 5:33	9.056
16/08/2010 6:18	5.898	16/08/2010 6:20	5.949	16/08/2010 6:21	8.02	16/08/2010 6:22	7.419	16/08/2010 6:23	8.22	16/08/2010 6:23	8.369	16/08/2010 6:03	8.767
16/08/2010 6:48	5.77	16/08/2010 6:50	5.821	16/08/2010 6:51	7.82	16/08/2010 6:52	7.242	16/08/2010 6:53	8.22	16/08/2010 6:53	8.369	16/08/2010 6:33	8.593
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16/08/2010 10:48	7.995	16/08/2010 10:50	8.717	16/08/2010 10:51	8.369	16/08/2010 10:52	8.145	16/08/2010 10:53	10.858	16/08/2010 10:53	10.369	16/08/2010 10:33	10.345
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16/08/2010 12:48	10.858	16/08/2010 12:50	11.783	16/08/2010 12:51	9.829	16/08/2010 12:52	10.296	16/08/2010 12:53	13.161	16/08/2010 12:53	12.195	16/08/2010 12:33	12.098
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16/08/2010 22:48	10.761	16/08/2010 22:50	10.173	16/08/2010 22:51	10.858	16/08/2010 22:52	10.956	16/08/2010 22:53	11.443	16/08/2010 22:53	11.492	16/08/2010 22:33	11.759
16/08/2010 23:18	10.247	16/08/2010 23:20	9.706	16/08/2010 23:21	10.585	16/08/2010 23:22	10.59	16/08/2010 23:23	11.078	16/08/2010 23:23	11.175	16/08/2010 23:03	11.492
16/08/2010 23:48	9.756	16/08/2010 23:50	9.287	16/08/2010 23:51	10.271	16/08/2010 23:52	10.222	16/08/2010 23:53	10.712	16/08/2010 23:53	10.883	16/08/2010 23:33	11.224
17/08/2010 0:18	8.924	17/08/2010 0:20	8.891	17/08/2010 0:21	9.829	17/08/2010 0:22	9.829	17/08/2010 0:23	10.296	17/08/2010 0:23	10.296	17/08/2010 0:03	10.296
17/08/2010 0:48	8.817	17/08/2010 0:50	8.84	17/08/2010 0:51	9.756	17/08/2010 0:52	9.534	17/08/2010 0:53	10.026	17/08/2010 0:53	10.394	17/08/2010 0:33	10.687
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17/08/2010 1:48	7.945	17/08/2010 1:50	7.77	17/08/2010 1:51	9.262	17/08/2010 1:52	8.886	17/08/2010 1:53	9.46	17/08/2010 1:53	9.864	17/08/2010 1:33	10.173
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17/08/2010 2:48	7.142	17/08/2010 2:50	7.091	17/08/2010 2:51	8.767	17/08/2010 2:52	8.196	17/08/2010 2:53	8.916	17/08/2010 2:53	9.262	17/08/2010 2:33	9.657
17/08/2010 3:18	6.813	17/08/2010 3:											

18-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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18/08/2010 0:48	8.792	18/08/2010 0:50	8.593	18/08/2010 0:51	9.558	18/08/2010 0:52	9.163	18/08/2010 0:53	10.492	18/08/2010 0:53	10.98	18/08/2010 0:33	10.687
18/08/2010 1:18	8.344	18/08/2010 1:20	8.22	18/08/2010 1:21	9.287	18/08/2010 1:22	8.792	18/08/2010 1:23	10.198	18/08/2010 1:23	10.587	18/08/2010 1:03	10.418
18/08/2010 1:48	7.97	18/08/2010 1:50	7.87	18/08/2010 1:51	8.015	18/08/2010 1:52	8.498	18/08/2010 1:53	9.901	18/08/2010 1:53	10.345	18/08/2010 1:33	10.148
18/08/2010 2:18	7.569	18/08/2010 2:20	7.544	18/08/2010 2:21	8.742	18/08/2010 2:22	8.17	18/08/2010 2:23	9.657	18/08/2010 2:23	9.977	18/08/2010 2:03	9.528
18/08/2010 2:48	7.192	18/08/2010 2:50	7.217	18/08/2010 2:51	8.469	18/08/2010 2:52	7.895	18/08/2010 2:53	9.435	18/08/2010 2:53	9.558	18/08/2010 2:33	9.706
18/08/2010 3:18	6.864	18/08/2010 3:20	6.889	18/08/2010 3:21	8.195	18/08/2010 3:22	7.619	18/08/2010 3:23	9.213	18/08/2010 3:23	9.114	18/08/2010 3:03	9.509
18/08/2010 3:48	6.506	18/08/2010 3:50	6.585	18/08/2010 3:51	7.92	18/08/2010 3:52	7.343	18/08/2010 3:53	8.941	18/08/2010 3:53	8.841	18/08/2010 3:33	9.141
18/08/2010 4:18	6.179	18/08/2010 4:20	6.281	18/08/2010 4:21	7.645	18/08/2010 4:22	7.091	18/08/2010 4:23	8.658	18/08/2010 4:23	8.593	18/08/2010 4:03	9.114
18/08/2010 4:48	5.847	18/08/2010 4:50	6	18/08/2010 4:51	7.393	18/08/2010 4:52	6.839	18/08/2010 4:53	8.444	18/08/2010 4:53	8.419	18/08/2010 4:33	8.965
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18/08/2010 5:48	5.257	18/08/2010 5:50	5.539	18/08/2010 5:51	6.94	18/08/2010 5:52	6.408	18/08/2010 5:53	8.01	18/08/2010 5:53	7.97	18/08/2010 5:33	8.618
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18/08/2010 7:48	4.921	18/08/2010 7:50	5.283	18/08/2010 7:51	6.382	18/08/2010 7:52	5.949	18/08/2010 7:53	8.03	18/08/2010 7:53	7.777	18/08/2010 7:33	8.156
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18/08/2010 8:48	5.334	18/08/2010 8:50	5.872	18/08/2010 8:51	6.382	18/08/2010 8:52	6.128	18/08/2010 8:53	8.742	18/08/2010 8:53	8.195	18/08/2010 8:33	8.444
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18/08/2010 9:48	6.153	18/08/2010 9:50	6.94	18/08/2010 9:51	6.914	18/08/2010 9:52	6.595	18/08/2010 9:53	9.718	18/08/2010 9:53	8.99	18/08/2010 9:33	9.41
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18/08/2010 11:18	8.045	18/08/2010 11:20	9.163	18/08/2010 11:21	8.095	18/08/2010 11:22	7.817	18/08/2010 11:23	11.589	18/08/2010 11:23	10.683	18/08/2010 11:03	10.736
18/08/2010 11:48	8.817	18/08/2010 11:50	10.001	18/08/2010 11:51	8.519	18/08/2010 11:52	8.419	18/08/2010 11:53	12.243	18/08/2010 11:53	11.248	18/08/2010 11:33	11.278
18/08/2010 12:18	9.608	18/08/2010 12:20	10.907	18/08/2010 12:21	8.99	18/08/2010 12:22	9.064	18/08/2010 12:23	12.896	18/08/2010 12:23	11.868	18/08/2010 12:03	11.759
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18/08/2010 14:48	13.209	18/08/2010 14:50	14.433	18/08/2010 14:51	11.37	18/08/2010 14:52	12.147	18/08/2010 14:53	15.557	18/08/2010 14:53	14.457	18/08/2010 14:33	13.858
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18/08/2010 15:48	14.194	18/08/2010 15:50	15.223	18/08/2010 15:51	12.147	18/08/2010 15:52	13.064	18/08/2010 15:53	16.908	18/08/2010 15:53	14.918	18/08/2010 15:33	14.361
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18/08/2010 16:48	14.768	18/08/2010 16:50	15.438	18/08/2010 16:51	12.63	18/08/2010 16:52	13.642	18/08/2010 16:53	16.249	18/08/2010 16:53	15.175	18/08/2010 16:33	14.673
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18/08/2010 17:48	14.864	18/08/2010 17:50	15.127	18/08/2010 17:51	12.847	18/08/2010 17:52	13.738	18/08/2010 17:53	16.106	18/08/2010 17:53	15.079	18/08/2010 17:33	14.529
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18/08/2010 21:18	12.461	18/08/2010 21:20	11.904	18/08/2010 21:21	11.71	18/08/2010 21:22	11.953	18/08/2010 21:23	13.449	18/08/2010 21:23	12.823	18/08/2010 21:03	12.871
18/08/2010 21:48	11.929	18/08/2010 21:50	11.346	18/08/2010 21:51	11.419	18/08/2010 21:52	11.565	18/08/2010 21:53	12.962	18/08/2010 21:53	12.389	18/08/2010 21:33	12.558
18/08/2010 22:18	11.346	18/08/2010 22:20	10.785	18/08/2010 22:21	11.078	18/08/2010 22:22	11.161	18/08/2010 22:23	12.509	18/08/2010 22:23	12.12	18/08/2010 22:03	12.148
18/08/2010 22:48	10.785	18/08/2010 22:50	10.173	18/08/2010 22:51	10.712	18/08/2010 22:52	10.761	18/08/2010 22:53	12.05	18/08/2010 22:53	11.662	18/08/2010 22:33	11.929
18/08/2010 23:18	10.271	18/08/2010 23:20	9.682	18/08/2010 23:21	10.389	18/08/2010 23:22	10.394	18/08/2010 23:23	11.613	18/08/2010 23:23	11.321	18/08/2010 23:03	11.613
18/08/2010 23:48	9.805	18/08/2010 23:50	9.238	18/08/2010 23:51	10.026	18/08/2010 23:52	10.051	18/08/2010 23:53	11.273	18/08/2010 23:53	10.856	18/08/2010 23:33	11.297
19/08/2010 0:18	8.941	19/08/2010 0:20	8.64	19/08/2010 0:21	9.72	19/08/2010 0:22	8.71	19/08/2010 0:23	10.629	19/08/2010 0:23	10.629	19/08/2010 0:03	11.323
19/08/2010 0:48	8.891	19/08/2010 0:50	8.469	19/08/2010 0:51	9.435	19/08/2010 0:52	9.41	19/08/2010 0:53	10.565	19/08/2010 0:53	10.32	19/08/2010 0:33	10.761
19/08/2010 1:18	8.494	19/08/2010 1:20	8.095	19/08/2010 1:21	9.188	19/08/2010 1:22	9.089	19/08/2010 1:23	10.247	19/08/2010 1:23	10.001	19/08/2010 1:03	10.492
19/08/2010 1:48	8.12	19/08/2010 1:50	7.745	19/08/2010 1:51	8.916	19/08/2010 1:52	8.792	19/08/2010 1:53	9.928	19/08/2010 1:53	9.731	19/08/2010 1:33	10.247
19/08/2010 2:18	7.745	19/08/2010 2:20	7.419	19/08/2010 2:21	8.693	19/08/2010 2:22	8.498	19/08/2010 2:23	9.657	19/08/2010 2:23	9.448	19/08/2010 2:03	9.608
19/08/2010 2:48	7.419	19/08/2010 2:50	7.115	19/08/2010 2:51	8.444	19/08/2010 2:52	8.17	19/08/2010 2:53	9.312	19/08/2010 2:53	9.188	19/08/2010 2:33	9.805
19/08/2010 3:18	7.066	19/08/2010 3:20	6.813	19/08/2010									

20-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
20/08/2010 0:18	7.393	20/08/2010 0:20	7.441	20/08/2010 0:21	7.895	20/08/2010 0:22	8.045	20/08/2010 0:23	8.469	20/08/2010 0:23	8.819	20/08/2010 0:03	9.064
20/08/2010 0:48	7.217	20/08/2010 0:50	7.242	20/08/2010 0:51	7.777	20/08/2010 0:52	7.899	20/08/2010 0:53	8.369	20/08/2010 0:53	8.195	20/08/2010 0:33	8.99
20/08/2010 1:18	7.941	20/08/2010 1:20	7.091	20/08/2010 1:21	7.645	20/08/2010 1:22	7.745	20/08/2010 1:23	8.245	20/08/2010 1:23	8.507	20/08/2010 1:03	8.891
20/08/2010 1:48	6.886	20/08/2010 1:50	6.965	20/08/2010 1:51	7.569	20/08/2010 1:52	7.594	20/08/2010 1:53	8.11	20/08/2010 1:53	7.87	20/08/2010 1:33	8.112
20/08/2010 2:18	6.763	20/08/2010 2:20	6.839	20/08/2010 2:21	7.444	20/08/2010 2:22	7.469	20/08/2010 2:23	7.995	20/08/2010 2:23	7.895	20/08/2010 2:03	8.693
20/08/2010 2:48	6.636	20/08/2010 2:50	6.737	20/08/2010 2:51	7.343	20/08/2010 2:52	7.343	20/08/2010 2:53	7.92	20/08/2010 2:53	7.795	20/08/2010 2:33	8.593
20/08/2010 3:18	6.535	20/08/2010 3:20	6.636	20/08/2010 3:21	7.242	20/08/2010 3:22	7.242	20/08/2010 3:23	7.845	20/08/2010 3:23	7.745	20/08/2010 3:03	8.519
20/08/2010 3:48	6.406	20/08/2010 3:50	6.56	20/08/2010 3:51	7.067	20/08/2010 3:52	7.067	20/08/2010 3:53	7.77	20/08/2010 3:53	7.72	20/08/2010 3:33	8.477
20/08/2010 4:18	6.331	20/08/2010 4:20	6.484	20/08/2010 4:21	7.066	20/08/2010 4:22	7.066	20/08/2010 4:23	7.72	20/08/2010 4:23	7.67	20/08/2010 4:03	8.369
20/08/2010 4:48	6.255	20/08/2010 4:50	6.408	20/08/2010 4:51	6.99	20/08/2010 4:52	6.99	20/08/2010 4:53	7.645	20/08/2010 4:53	7.594	20/08/2010 4:33	8.319
20/08/2010 5:18	6.179	20/08/2010 5:20	6.337	20/08/2010 5:21	6.914	20/08/2010 5:22	6.914	20/08/2010 5:23	7.569	20/08/2010 5:23	7.544	20/08/2010 5:03	8.245
20/08/2010 5:48	6.102	20/08/2010 5:50	6.261	20/08/2010 5:51	6.864	20/08/2010 5:52	6.864	20/08/2010 5:53	7.494	20/08/2010 5:53	7.494	20/08/2010 5:33	8.196
20/08/2010 6:18	6.051	20/08/2010 6:20	6.23	20/08/2010 6:21	6.788	20/08/2010 6:22	6.788	20/08/2010 6:23	7.469	20/08/2010 6:23	7.444	20/08/2010 6:03	8.145
20/08/2010 6:48	6.051	20/08/2010 6:50	6.23	20/08/2010 6:51	6.737	20/08/2010 6:52	6.763	20/08/2010 6:53	7.469	20/08/2010 6:53	7.419	20/08/2010 6:33	8.12
20/08/2010 7:18	6.051	20/08/2010 7:20	6.255	20/08/2010 7:21	6.712	20/08/2010 7:22	6.737	20/08/2010 7:23	7.469	20/08/2010 7:23	7.419	20/08/2010 7:03	8.12
20/08/2010 7:48	6.102	20/08/2010 7:50	6.331	20/08/2010 7:51	6.737	20/08/2010 7:52	6.763	20/08/2010 7:53	7.519	20/08/2010 7:53	7.569	20/08/2010 7:33	8.095
20/08/2010 8:18	6.179	20/08/2010 8:20	6.458	20/08/2010 8:21	6.763	20/08/2010 8:22	6.788	20/08/2010 8:23	7.569	20/08/2010 8:23	7.419	20/08/2010 8:03	8.12
20/08/2010 8:48	6.306	20/08/2010 8:50	6.535	20/08/2010 8:51	6.813	20/08/2010 8:52	6.839	20/08/2010 8:53	7.695	20/08/2010 8:53	7.519	20/08/2010 8:33	8.22
20/08/2010 9:18	6.458	20/08/2010 9:20	6.788	20/08/2010 9:21	6.914	20/08/2010 9:22	6.965	20/08/2010 9:23	7.845	20/08/2010 9:23	7.645	20/08/2010 9:03	8.319
20/08/2010 9:48	6.636	20/08/2010 9:50	7.066	20/08/2010 9:51	7.061	20/08/2010 9:52	7.099	20/08/2010 9:53	8.095	20/08/2010 9:53	7.83	20/08/2010 9:33	8.469
20/08/2010 10:18	6.788	20/08/2010 10:20	7.192	20/08/2010 10:21	7.187	20/08/2010 10:22	7.192	20/08/2010 10:23	8.344	20/08/2010 10:23	7.97	20/08/2010 10:03	8.543
20/08/2010 10:48	6.914	20/08/2010 10:50	7.343	20/08/2010 10:51	7.293	20/08/2010 10:52	7.318	20/08/2010 10:53	8.568	20/08/2010 10:53	8.195	20/08/2010 10:33	8.717
20/08/2010 11:18	7.142	20/08/2010 11:20	7.519	20/08/2010 11:21	7.444	20/08/2010 11:22	7.469	20/08/2010 11:23	8.792	20/08/2010 11:23	8.394	20/08/2010 11:03	8.941
20/08/2010 11:48	7.444	20/08/2010 11:50	7.845	20/08/2010 11:51	7.619	20/08/2010 11:52	7.67	20/08/2010 11:53	9.064	20/08/2010 11:53	8.599	20/08/2010 11:33	9.015
20/08/2010 12:18	7.82	20/08/2010 12:20	8.22	20/08/2010 12:21	7.795	20/08/2010 12:22	7.895	20/08/2010 12:23	9.435	20/08/2010 12:23	8.941	20/08/2010 12:03	9.336
20/08/2010 12:48	8.22	20/08/2010 12:50	8.668	20/08/2010 12:51	8.02	20/08/2010 12:52	8.145	20/08/2010 12:53	9.731	20/08/2010 12:53	9.213	20/08/2010 12:33	9.583
20/08/2010 13:18	8.568	20/08/2010 13:20	9.015	20/08/2010 13:21	8.27	20/08/2010 13:22	8.419	20/08/2010 13:23	9.952	20/08/2010 13:23	9.41	20/08/2010 13:03	9.756
20/08/2010 13:48	8.817	20/08/2010 13:50	9.312	20/08/2010 13:51	8.519	20/08/2010 13:52	8.717	20/08/2010 13:53	10.375	20/08/2010 13:53	9.509	20/08/2010 13:33	9.952
20/08/2010 14:18	9.015	20/08/2010 14:20	9.509	20/08/2010 14:21	8.717	20/08/2010 14:22	8.964	20/08/2010 14:23	10.1	20/08/2010 14:23	9.594	20/08/2010 14:03	9.713
20/08/2010 14:48	9.262	20/08/2010 14:50	9.608	20/08/2010 14:51	8.916	20/08/2010 14:52	9.163	20/08/2010 14:53	10.11	20/08/2010 14:53	9.509	20/08/2010 14:33	10.149
20/08/2010 15:18	9.386	20/08/2010 15:20	9.706	20/08/2010 15:21	9.04	20/08/2010 15:22	9.312	20/08/2010 15:23	10.1	20/08/2010 15:23	9.558	20/08/2010 15:03	10.247
20/08/2010 15:48	9.485	20/08/2010 15:50	9.811	20/08/2010 15:51	9.163	20/08/2010 15:52	9.411	20/08/2010 15:53	10.375	20/08/2010 15:53	9.558	20/08/2010 15:33	10.271
20/08/2010 16:18	9.583	20/08/2010 16:20	9.911	20/08/2010 16:21	9.386	20/08/2010 16:22	9.633	20/08/2010 16:23	10.075	20/08/2010 16:23	9.668	20/08/2010 16:03	10.075
20/08/2010 16:48	9.632	20/08/2010 16:50	9.706	20/08/2010 16:51	9.213	20/08/2010 16:52	9.558	20/08/2010 16:53	10.001	20/08/2010 16:53	9.583	20/08/2010 16:33	10.198
20/08/2010 17:18	9.657	20/08/2010 17:20	9.682	20/08/2010 17:21	9.238	20/08/2010 17:22	9.558	20/08/2010 17:23	9.854	20/08/2010 17:23	9.509	20/08/2010 17:03	10.1
20/08/2010 17:48	9.608	20/08/2010 17:50	9.608	20/08/2010 17:51	9.262	20/08/2010 17:52	9.583	20/08/2010 17:53	9.756	20/08/2010 17:53	9.435	20/08/2010 17:33	10.052
20/08/2010 18:18	9.534	20/08/2010 18:20	9.465	20/08/2010 18:21	9.213	20/08/2010 18:22	9.534	20/08/2010 18:23	9.662	20/08/2010 18:23	9.465	20/08/2010 18:03	10.002
20/08/2010 18:48	9.435	20/08/2010 18:50	9.312	20/08/2010 18:51	9.163	20/08/2010 18:52	9.46	20/08/2010 18:53	9.608	20/08/2010 18:53	9.336	20/08/2010 18:33	9.979
20/08/2010 19:18	9.336	20/08/2010 19:20	9.213	20/08/2010 19:21	9.114	20/08/2010 19:22	9.41	20/08/2010 19:23	9.608	20/08/2010 19:23	9.336	20/08/2010 19:03	9.854
20/08/2010 19:48	9.238	20/08/2010 19:50	9.139	20/08/2010 19:51	9.04	20/08/2010 19:52	9.312	20/08/2010 19:53	9.558	20/08/2010 19:53	9.312	20/08/2010 19:33	9.78
20/08/2010 20:18	9.085	20/08/2010 20:20	8.959	20/08/2010 20:21	8.819	20/08/2010 20:22	9.085	20/08/2010 20:23	9.213	20/08/2010 20:23	9.015	20/08/2010 20:03	9.713
20/08/2010 20:48	8.916	20/08/2010 20:50	8.792	20/08/2010 20:51	8.666	20/08/2010 20:52	9.009	20/08/2010 20:53	9.312	20/08/2010 20:53	9.114	20/08/2010 20:33	9.608
20/08/2010 21:18	8.668	20/08/2010 21:20	8.494	20/08/2010 21:21	8.742	20/08/2010 21:22	8.941	20/08/2010 21:23	9.064	20/08/2010 21:23	8.894	20/08/2010 21:03	9.509
20/08/2010 21:48	8.344	20/08/2010 21:50	8.12	20/08/2010 21:51	8.568	20/08/2010 21:52	8.767	20/08/2010 21:53	8.767	20/08/2010 21:53	8.643	20/08/2010 21:33	9.148
20/08/2010 22:18	8.01	20/08/2010 22:20	7.72	20/08/2010 22:21	8.344	20/08/2010 22:22	8.519	20/08/2010 22:23	8.594	20/08/2010 22:23	8.465	20/08/2010 22:03	9.015
20/08/2010 22:48	7.745	20/08/2010 22:50	7.419	20/08/2010 22:51	8.12	20/08/2010 22:52	8.27	20/08/2010 22:53	8.419	20/08/2010 22:53	8.394	20/08/2010 22:33	9.015
20/08/2010 23:18	7.519	20/08/2010 23:20	7.293	20/08/2010 23:21	7.895	20/08/2010 23:22	8.07	20/08/2010 23:23	8.195	20/08/2010 23:23	8.245	20/08/2010 23:03	8.841
20/08/2010 23:48	7.293	20/08/2010 23:50	7.142	20/08/2010 23:51	7.72	20/08/2010 23:52	7.87	20/08/2010 23:53	8.02	20/08/2010 23:53	8.07	20/08/2010 23:33	8.668
21/08/2010 0:18	7.69	21/08/2010 0:20	7.965	21/08/2010 0:21	7.67	21/08/2010 0:22	7.757	21/08/2010 0:23	7.792	21/08/2010 0:23	7.745	21/08/2010 0:03	7.444
21/08/2010 0:48	6.889	21/08/2010 0:50	6.788	21/08/2010 0:51	7.393	21/08/2010 0:52	7.494	21/08/2010 0:53	7.569	21/08/2010 0:53	7.745	21/08/2010 0:33	8.369
21/08/2010 1:18	6.661	21/08/2010 1:20	6.611	21/08/2010 1:21	7.268	21/08/2010 1:22	7.318	21/08/2010 1:23	7.343	21/08/2010 1:23	7.519	21/08/2010 1:03	8.195
21/08/2010 1:48	6.498	21/08/2010 1:50	6.433	21/08/2010 1:51	7.116	21/08/2010 1:52	7.142	21/08/2010 1:53	7.116	21/08/2010 1:53	7.393	21/08/2010 1:33	8.02
21/08/2010 2:18	6.255	21/08/2010 2:20	6.204	21/08/2010 2:21	6.715	21/08/2010 2:22	6.765	21/08/2010 2:23	7.218	21/08/2010 2:23	7.116	21/08/2010 2:03	7.691
21/08/2010 2:48	6.102	21/08/2010 2:50	6.304	21/08/2010 2:51	6.889	21/08/2010 2:52	6.864	21/08/2010 2:53	7.015	21/08/2010 2:53	7.318	21/08/2010 2:33	7.745
21/08/2010 3:18	6	21/08/2010 3:20	6.102	21/08/2010 3:21	6.788	21/08/2010 3:22	6.737	21/08/2010 3:23	7.015	21/08/2010 3:23	7.268	21/08/2010 3:03	7.745
21/08/2010 3:48	5.924	21/08/2											

22-Aug-10

23-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
22/08/2010 0:18	7.945	22/08/2010 0:20	7.77	22/08/2010 0:21	8.17	22/08/2010 0:22	8.195	22/08/2010 0:23	8.841	22/08/2010 0:23	9.089	22/08/2010 0:03	9.04
22/08/2010 0:48	7.569	22/08/2010 0:50	7.343	22/08/2010 0:51	7.895	22/08/2010 0:52	7.87	22/08/2010 0:53	8.593	22/08/2010 0:53	8.866	22/08/2010 0:33	8.792
22/08/2010 1:18	7.192	22/08/2010 1:20	7.015	22/08/2010 1:21	7.67	22/08/2010 1:22	7.544	22/08/2010 1:23	8.394	22/08/2010 1:23	8.693	22/08/2010 1:03	8.543
22/08/2010 1:48	6.144	22/08/2010 1:50	6.763	22/08/2010 1:51	7.444	22/08/2010 1:52	7.293	22/08/2010 1:53	8.195	22/08/2010 1:53	8.568	22/08/2010 1:33	8.368
22/08/2010 2:18	6.661	22/08/2010 2:20	6.737	22/08/2010 2:21	7.293	22/08/2010 2:22	7.091	22/08/2010 2:23	8.12	22/08/2010 2:23	8.419	22/08/2010 2:03	8.195
22/08/2010 2:48	6.484	22/08/2010 2:50	6.661	22/08/2010 2:51	7.192	22/08/2010 2:52	6.965	22/08/2010 2:53	7.995	22/08/2010 2:53	8.295	22/08/2010 2:33	8.07
22/08/2010 3:18	6.306	22/08/2010 3:20	6.509	22/08/2010 3:21	7.091	22/08/2010 3:22	6.884	22/08/2010 3:23	7.92	22/08/2010 3:23	8.195	22/08/2010 3:03	7.97
22/08/2010 3:48	6.128	22/08/2010 3:50	6.307	22/08/2010 3:51	6.895	22/08/2010 3:52	6.707	22/08/2010 3:53	7.82	22/08/2010 3:53	8.07	22/08/2010 3:33	7.892
22/08/2010 4:18	5.975	22/08/2010 4:20	6.179	22/08/2010 4:21	6.813	22/08/2010 4:22	6.585	22/08/2010 4:23	7.77	22/08/2010 4:23	7.995	22/08/2010 4:03	7.82
22/08/2010 4:48	5.872	22/08/2010 4:50	6.102	22/08/2010 4:51	6.687	22/08/2010 4:52	6.484	22/08/2010 4:53	7.745	22/08/2010 4:53	7.92	22/08/2010 4:33	7.795
22/08/2010 5:18	5.77	22/08/2010 5:20	6.077	22/08/2010 5:21	6.585	22/08/2010 5:22	6.408	22/08/2010 5:23	7.695	22/08/2010 5:23	7.82	22/08/2010 5:03	7.77
22/08/2010 5:48	5.695	22/08/2010 5:50	6.005	22/08/2010 5:51	6.484	22/08/2010 5:52	6.307	22/08/2010 5:53	7.645	22/08/2010 5:53	7.77	22/08/2010 5:33	7.745
22/08/2010 6:18	5.668	22/08/2010 6:20	5.975	22/08/2010 6:21	6.408	22/08/2010 6:22	6.331	22/08/2010 6:23	7.619	22/08/2010 6:23	7.77	22/08/2010 6:03	7.745
22/08/2010 6:48	5.668	22/08/2010 6:50	5.949	22/08/2010 6:51	6.302	22/08/2010 6:52	6.308	22/08/2010 6:53	7.695	22/08/2010 6:53	7.82	22/08/2010 6:33	7.77
22/08/2010 7:18	5.719	22/08/2010 7:20	6.051	22/08/2010 7:21	6.408	22/08/2010 7:22	6.331	22/08/2010 7:23	7.77	22/08/2010 7:23	7.82	22/08/2010 7:03	7.77
22/08/2010 7:48	5.796	22/08/2010 7:50	6.25	22/08/2010 7:51	6.408	22/08/2010 7:52	6.408	22/08/2010 7:53	7.895	22/08/2010 7:53	7.87	22/08/2010 7:33	7.845
22/08/2010 8:18	5.949	22/08/2010 8:20	6.458	22/08/2010 8:21	6.535	22/08/2010 8:22	6.509	22/08/2010 8:23	8.07	22/08/2010 8:23	7.97	22/08/2010 8:03	7.97
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22/08/2010 10:48	7.845	22/08/2010 10:50	8.99	22/08/2010 10:51	7.77	22/08/2010 10:52	7.695	22/08/2010 10:53	9.756	22/08/2010 10:53	9.213	22/08/2010 10:33	9.114
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22/08/2010 12:48	10.761	22/08/2010 12:50	12.509	22/08/2010 12:51	9.509	22/08/2010 12:52	9.632	22/08/2010 12:53	11.662	22/08/2010 12:53	10.883	22/08/2010 12:33	10.638
22/08/2010 13:18	11.613	22/08/2010 13:20	13.209	22/08/2010 13:21	9.977	22/08/2010 13:22	10.173	22/08/2010 13:23	12.292	22/08/2010 13:23	11.443	22/08/2010 13:03	11.273
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23/08/2010 0:48	9.41	23/08/2010 0:50	8.941	23/08/2010 0:51	9.652	23/08/2010 0:52	9.756	23/08/2010 0:53	10.492	23/08/2010 0:53	10.761	23/08/2010 0:33	9.654
23/08/2010 1:18	8.965	23/08/2010 1:20	8.618	23/08/2010 1:21	9.41	23/08/2010 1:22	9.41	23/08/2010 1:23	10.247	23/08/2010 1:23	10.541	23/08/2010 1:03	9.601
23/08/2010 1:48	8.643	23/08/2010 1:50	8.319	23/08/2010 1:51	9.139	23/08/2010 1:52	9.114	23/08/2010 1:53	10.001	23/08/2010 1:53	10.296	23/08/2010 1:33	9.41
23/08/2010 2:18	8.319	23/08/2010 2:20	8.245	23/08/2010 2:21	8.817	23/08/2010 2:22	8.817	23/08/2010 2:23	9.756	23/08/2010 2:23	10.008	23/08/2010 2:03	9.104
23/08/2010 2:48	7.97	23/08/2010 2:50	7.845	23/08/2010 2:51	8.717	23/08/2010 2:52	8.568	23/08/2010 2:53	9.495	23/08/2010 2:53	9.829	23/08/2010 2:33	9.04
23/08/2010 3:18	7.645	23/08/2010 3:20	7.544										

24-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9725609)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
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24/08/2010 0:48	9.534	24/08/2010 0:50	9.163	24/08/2010 0:51	9.435	24/08/2010 0:52	9.608	24/08/2010 0:53	10.761	24/08/2010 0:53	10.59	24/08/2010 0:33	10.222
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24/08/2010 1:48	8.745	24/08/2010 1:50	8.568	24/08/2010 1:51	9.04	24/08/2010 1:52	9.015	24/08/2010 1:53	10.247	24/08/2010 1:53	10.124	24/08/2010 1:33	9.867
24/08/2010 2:18	8.394	24/08/2010 2:20	8.245	24/08/2010 2:21	8.817	24/08/2010 2:22	8.742	24/08/2010 2:23	9.977	24/08/2010 2:23	9.879	24/08/2010 2:03	9.608
24/08/2010 2:48	8.02	24/08/2010 2:50	7.92	24/08/2010 2:51	8.593	24/08/2010 2:52	8.494	24/08/2010 2:53	9.805	24/08/2010 2:53	9.657	24/08/2010 2:33	9.41
24/08/2010 3:18	7.695	24/08/2010 3:20	7.645	24/08/2010 3:21	8.369	24/08/2010 3:22	8.22	24/08/2010 3:23	9.508	24/08/2010 3:23	9.396	24/08/2010 3:03	9.215
24/08/2010 3:48	7.386	24/08/2010 3:50	7.369	24/08/2010 3:51	8.145	24/08/2010 3:52	7.995	24/08/2010 3:53	9.435	24/08/2010 3:53	9.163	24/08/2010 3:33	8.954
24/08/2010 4:18	7.091	24/08/2010 4:20	7.091	24/08/2010 4:21	7.92	24/08/2010 4:22	7.77	24/08/2010 4:23	9.262	24/08/2010 4:23	8.965	24/08/2010 4:03	8.891
24/08/2010 4:48	6.813	24/08/2010 4:50	6.839	24/08/2010 4:51	7.745	24/08/2010 4:52	7.569	24/08/2010 4:53	9.064	24/08/2010 4:53	8.767	24/08/2010 4:33	8.742
24/08/2010 5:18	6.535	24/08/2010 5:20	6.611	24/08/2010 5:21	7.569	24/08/2010 5:22	7.368	24/08/2010 5:23	8.891	24/08/2010 5:23	8.593	24/08/2010 5:03	8.618
24/08/2010 5:48	6.281	24/08/2010 5:50	6.367	24/08/2010 5:51	7.395	24/08/2010 5:52	7.182	24/08/2010 5:53	8.669	24/08/2010 5:53	8.394	24/08/2010 5:33	8.494
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24/08/2010 7:18	5.949	24/08/2010 7:20	6.204	24/08/2010 7:21	6.99	24/08/2010 7:22	6.788	24/08/2010 7:23	8.643	24/08/2010 7:23	8.27	24/08/2010 7:03	8.27
24/08/2010 7:48	5.677	24/08/2010 7:50	6.509	24/08/2010 7:51	7.015	24/08/2010 7:52	6.763	24/08/2010 7:53	8.941	24/08/2010 7:53	8.344	24/08/2010 7:33	8.177
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24/08/2010 9:18	6.884	24/08/2010 9:20	7.645	24/08/2010 9:21	7.519	24/08/2010 9:22	7.066	24/08/2010 9:23	9.756	24/08/2010 9:23	8.916	24/08/2010 9:03	8.742
24/08/2010 9:48	7.293	24/08/2010 9:50	8.394	24/08/2010 9:51	7.77	24/08/2010 9:52	7.289	24/08/2010 9:53	10.294	24/08/2010 9:53	9.297	24/08/2010 9:33	9.262
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24/08/2010 10:48	8.369	24/08/2010 10:50	9.854	24/08/2010 10:51	8.444	24/08/2010 10:52	7.87	24/08/2010 10:53	11.54	24/08/2010 10:53	10.1	24/08/2010 10:33	10.124
24/08/2010 11:18	9.089	24/08/2010 11:20	10.883	24/08/2010 11:21	8.866	24/08/2010 11:22	8.27	24/08/2010 11:23	12.195	24/08/2010 11:23	10.541	24/08/2010 11:03	10.663
24/08/2010 11:48	9.829	24/08/2010 11:50	11.907	24/08/2010 11:51	9.262	24/08/2010 11:52	8.742	24/08/2010 11:53	12.871	24/08/2010 11:53	11.078	24/08/2010 11:33	11.1
24/08/2010 12:18	10.663	24/08/2010 12:20	12.678	24/08/2010 12:21	9.731	24/08/2010 12:22	9.312	24/08/2010 12:23	13.546	24/08/2010 12:23	11.566	24/08/2010 12:03	11.734
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24/08/2010 22:48	12.147	24/08/2010 22:50	11.321	24/08/2010 22:51	11.467	24/08/2010 22:52	11.832	24/08/2010 22:53	13.137	24/08/2010 22:53	12.389	24/08/2010 22:33	12.34
24/08/2010 23:18	11.71	24/08/2010 23:20	10.907	24/08/2010 23:21	11.2	24/08/2010 23:22	11.443	24/08/2010 23:23	12.799	24/08/2010 23:23	12.098	24/08/2010 23:03	12.074
24/08/2010 23:48	11.297	24/08/2010 23:50	10.541	24/08/2010 23:51	10.955	24/08/2010 23:52	11.102	24/08/2010 23:53	12.485	24/08/2010 23:53	11.785	24/08/2010 23:33	11.832
25/08/2010 0:18	10.18	25/08/2010 0:20	10.18	25/08/2010 0:21	10.18	25/08/2010 0:22	10.18	25/08/2010 0:23	10.18	25/08/2010 0:23	10.18	25/08/2010 0:03	10.18
25/08/2010 0:48	10.492	25/08/2010 0:50	9.854	25/08/2010 0:51	10.418	25/08/2010 0:52	10.443	25/08/2010 0:53	12.001	25/08/2010 0:53	11.151	25/08/2010 0:33	11.394
25/08/2010 1:18	10.1	25/08/2010 1:20	9.534	25/08/2010 1:21	10.198	25/08/2010 1:22	10.149	25/08/2010 1:23	11.783	25/08/2010 1:23	10.761	25/08/2010 1:03	11.175
25/08/2010 1:48	9.796	25/08/2010 1:50	9.238	25/08/2010 1:51	9.977	25/08/2010 1:52	9.903	25/08/2010 1:53	11.54	25/08/2010 1:53	10.516	25/08/2010 1:33	10.98
25/08/2010 2:18	9.435	25/08/2010 2:20	8.966	25/08/2010 2:21	9.597	25/08/2010 2:22	9.498	25/08/2010 2:23	10.771	25/08/2010 2:23	10.271	25/08/2010 2:03	10.07
25/08/2010 2:48	9.114	25/08/2010 2:50	8.648	25/08/2010 2:51	9.534	25/08/2010 2:52	9.336	25/08/2010 2:53	11.053	25/08/2010 2:53	10.053	25/08/2010 2:33	9.816
25/08/2010 3:18	8.841	25/08/2010 3:20											

26-Aug-10

Logger 1 (9765603)		Logger 2 (9765607)		Logger 3 (9765608)		Logger 4 (9765610)		Logger 5 (9765611)		Logger 6 (9765612)		Logger 7 (9722569)	
Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)	Date and Time	Temp (C)
26/08/2010 0:18	10.687	26/08/2010 0:20	9.78	26/08/2010 0:21	10.443	26/08/2010 0:22	10.610	26/08/2010 0:23	11.807	26/08/2010 0:23	11.321	26/08/2010 0:03	11.127
26/08/2010 0:48	10.296	26/08/2010 0:50	9.46	26/08/2010 0:51	10.198	26/08/2010 0:52	10.296	26/08/2010 0:53	11.54	26/08/2010 0:53	10.883	26/08/2010 0:33	10.883
26/08/2010 1:18	9.854	26/08/2010 1:20	9.139	26/08/2010 1:21	9.952	26/08/2010 1:22	10.001	26/08/2010 1:23	11.346	26/08/2010 1:23	10.638	26/08/2010 1:03	10.638
26/08/2010 1:48	9.46	26/08/2010 1:50	8.792	26/08/2010 1:51	8.706	26/08/2010 1:52	8.711	26/08/2010 1:53	11.224	26/08/2010 1:53	10.462	26/08/2010 1:33	10.467
26/08/2010 2:18	9.114	26/08/2010 2:20	8.593	26/08/2010 2:21	9.509	26/08/2010 2:22	9.46	26/08/2010 2:23	11.102	26/08/2010 2:23	10.394	26/08/2010 2:03	10.345
26/08/2010 2:48	8.866	26/08/2010 2:50	8.519	26/08/2010 2:51	9.386	26/08/2010 2:52	9.262	26/08/2010 2:53	10.98	26/08/2010 2:53	10.296	26/08/2010 2:33	10.222
26/08/2010 3:18	8.688	26/08/2010 3:20	8.444	26/08/2010 3:21	9.262	26/08/2010 3:22	9.139	26/08/2010 3:23	10.859	26/08/2010 3:23	10.198	26/08/2010 3:03	10.124
26/08/2010 3:48	8.543	26/08/2010 3:50	8.394	26/08/2010 3:51	9.198	26/08/2010 3:52	9.015	26/08/2010 3:53	10.785	26/08/2010 3:53	10.078	26/08/2010 3:33	10.051
26/08/2010 4:18	8.419	26/08/2010 4:20	8.394	26/08/2010 4:21	9.139	26/08/2010 4:22	8.941	26/08/2010 4:23	10.736	26/08/2010 4:23	9.977	26/08/2010 4:03	10.002
26/08/2010 4:48	8.295	26/08/2010 4:50	8.369	26/08/2010 4:51	9.064	26/08/2010 4:52	8.866	26/08/2010 4:53	10.687	26/08/2010 4:53	9.952	26/08/2010 4:33	9.977
26/08/2010 5:18	8.17	26/08/2010 5:20	8.245	26/08/2010 5:21	8.99	26/08/2010 5:22	8.817	26/08/2010 5:23	10.638	26/08/2010 5:23	9.903	26/08/2010 5:03	9.952
26/08/2010 5:48	8.095	26/08/2010 5:50	8.12	26/08/2010 5:51	8.916	26/08/2010 5:52	8.767	26/08/2010 5:53	10.59	26/08/2010 5:53	9.858	26/08/2010 5:33	9.903
26/08/2010 6:18	8.02	26/08/2010 6:20	7.995	26/08/2010 6:21	8.817	26/08/2010 6:22	8.693	26/08/2010 6:23	10.516	26/08/2010 6:23	9.706	26/08/2010 6:03	9.879
26/08/2010 6:48	7.97	26/08/2010 6:50	7.97	26/08/2010 6:51	8.742	26/08/2010 6:52	8.643	26/08/2010 6:53	10.467	26/08/2010 6:53	9.682	26/08/2010 6:33	9.854
26/08/2010 7:18	7.995	26/08/2010 7:20	8.02	26/08/2010 7:21	8.693	26/08/2010 7:22	8.643	26/08/2010 7:23	10.541	26/08/2010 7:23	9.706	26/08/2010 7:03	9.854
26/08/2010 7:48	8.095	26/08/2010 7:50	8.22	26/08/2010 7:51	8.693	26/08/2010 7:52	8.643	26/08/2010 7:53	10.736	26/08/2010 7:53	9.759	26/08/2010 7:33	9.903
26/08/2010 8:18	8.245	26/08/2010 8:20	8.444	26/08/2010 8:21	8.693	26/08/2010 8:22	8.693	26/08/2010 8:23	10.956	26/08/2010 8:23	9.829	26/08/2010 8:03	10.001
26/08/2010 8:48	8.369	26/08/2010 8:50	8.593	26/08/2010 8:51	8.717	26/08/2010 8:52	8.742	26/08/2010 8:53	11.175	26/08/2010 8:53	9.928	26/08/2010 8:33	10.149
26/08/2010 9:18	8.489	26/08/2010 9:20	8.717	26/08/2010 9:21	8.817	26/08/2010 9:22	8.792	26/08/2010 9:23	11.273	26/08/2010 9:23	10.1	26/08/2010 9:03	10.271
26/08/2010 9:48	8.742	26/08/2010 9:50	9.219	26/08/2010 9:51	8.891	26/08/2010 9:52	8.891	26/08/2010 9:53	11.394	26/08/2010 9:53	10.271	26/08/2010 9:33	10.418
26/08/2010 10:18	8.916	26/08/2010 10:20	9.558	26/08/2010 10:21	9.114	26/08/2010 10:22	9.015	26/08/2010 10:23	11.443	26/08/2010 10:23	10.467	26/08/2010 10:03	10.418
26/08/2010 10:48	9.41	26/08/2010 10:50	10.173	26/08/2010 10:51	9.386	26/08/2010 10:52	9.238	26/08/2010 10:53	11.565	26/08/2010 10:53	10.59	26/08/2010 10:33	10.614
26/08/2010 11:18	9.928	26/08/2010 11:20	10.38	26/08/2010 11:21	9.608	26/08/2010 11:22	9.558	26/08/2010 11:23	11.613	26/08/2010 11:23	10.687	26/08/2010 11:03	10.712
26/08/2010 11:48	10.541	26/08/2010 11:50	11.086	26/08/2010 11:51	9.979	26/08/2010 11:52	10.001	26/08/2010 11:53	11.832	26/08/2010 11:53	11.078	26/08/2010 11:33	11.154
26/08/2010 12:18	11.346	26/08/2010 12:20	12.534	26/08/2010 12:21	10.271	26/08/2010 12:22	10.443	26/08/2010 12:23	12.292	26/08/2010 12:23	11.852	26/08/2010 12:03	11.807
26/08/2010 12:48	11.759	26/08/2010 12:50	12.678	26/08/2010 12:51	10.565	26/08/2010 12:52	10.785	26/08/2010 12:53	12.992	26/08/2010 12:53	12.485	26/08/2010 12:33	12.534
26/08/2010 13:18	12.074	26/08/2010 13:20	12.485	26/08/2010 13:21	10.785	26/08/2010 13:22	11.029	26/08/2010 13:23	13.882	26/08/2010 13:23	12.992	26/08/2010 13:03	12.747
26/08/2010 13:48	12.316	26/08/2010 13:50	12.413	26/08/2010 13:51	10.907	26/08/2010 13:52	11.224	26/08/2010 13:53	14.122	26/08/2010 13:53	13.064	26/08/2010 13:33	12.847
26/08/2010 14:18	12.437	26/08/2010 14:20	12.558	26/08/2010 14:21	10.956	26/08/2010 14:22	11.37	26/08/2010 14:23	14.194	26/08/2010 14:23	13.209	26/08/2010 14:03	13.209
26/08/2010 14:48	12.558	26/08/2010 14:50	12.413	26/08/2010 14:51	10.883	26/08/2010 14:52	11.467	26/08/2010 14:53	14.385	26/08/2010 14:53	13.329	26/08/2010 14:33	13.594
26/08/2010 15:18	12.703	26/08/2010 15:20	12.389	26/08/2010 15:21	10.883	26/08/2010 15:22	11.565	26/08/2010 15:23	14.433	26/08/2010 15:23	13.497	26/08/2010 15:03	13.546
26/08/2010 15:48	12.799	26/08/2010 15:50	12.582	26/08/2010 15:51	10.932	26/08/2010 15:52	11.71	26/08/2010 15:53	14.385	26/08/2010 15:53	13.666	26/08/2010 15:33	13.978
26/08/2010 16:18	12.992	26/08/2010 16:20	12.847	26/08/2010 16:21	11.107	26/08/2010 16:22	11.896	26/08/2010 16:23	14.406	26/08/2010 16:23	13.666	26/08/2010 16:03	13.594
26/08/2010 16:48	13.161	26/08/2010 16:50	13.401	26/08/2010 16:51	11.224	26/08/2010 16:52	12.05	26/08/2010 16:53	14.601	26/08/2010 16:53	13.738	26/08/2010 16:33	14.05
26/08/2010 17:18	13.137	26/08/2010 17:20	13.353	26/08/2010 17:21	11.443	26/08/2010 17:22	12.219	26/08/2010 17:23	14.529	26/08/2010 17:23	13.594	26/08/2010 17:03	13.666
26/08/2010 17:48	13.161	26/08/2010 17:50	13.112	26/08/2010 17:51	11.565	26/08/2010 17:52	12.364	26/08/2010 17:53	14.266	26/08/2010 17:53	13.377	26/08/2010 17:33	13.57
26/08/2010 18:18	13.016	26/08/2010 18:20	12.947	26/08/2010 18:21	11.686	26/08/2010 18:22	12.36	26/08/2010 18:23	14.16	26/08/2010 18:23	13.257	26/08/2010 18:03	13.472
26/08/2010 18:48	12.799	26/08/2010 18:50	12.485	26/08/2010 18:51	11.686	26/08/2010 18:52	12.34	26/08/2010 18:53	13.81	26/08/2010 18:53	13.064	26/08/2010 18:33	13.305
26/08/2010 19:18	12.509	26/08/2010 19:20	12.147	26/08/2010 19:21	11.686	26/08/2010 19:22	12.243	26/08/2010 19:23	13.546	26/08/2010 19:23	12.823	26/08/2010 19:03	13.088
26/08/2010 19:48	12.243	26/08/2010 19:50	11.734	26/08/2010 19:51	11.565	26/08/2010 19:52	12.086	26/08/2010 19:53	13.209	26/08/2010 19:53	12.558	26/08/2010 19:33	12.847
26/08/2010 20:18	11.953	26/08/2010 20:20	11.346	26/08/2010 20:21	11.346	26/08/2010 20:22	11.994	26/08/2010 20:23	12.847	26/08/2010 20:23	12.268	26/08/2010 20:03	12.666
26/08/2010 20:48	11.686	26/08/2010 20:50	11.005	26/08/2010 20:51	11.127	26/08/2010 20:52	11.71	26/08/2010 20:53	12.534	26/08/2010 20:53	11.953	26/08/2010 20:33	12.34
26/08/2010 21:18	11.394	26/08/2010 21:20	10.687	26/08/2010 21:21	10.907	26/08/2010 21:22	11.492	26/08/2010 21:23	12.268	26/08/2010 21:23	11.637	26/08/2010 21:03	12.098
26/08/2010 21:48	11.078	26/08/2010 21:50	10.345	26/08/2010 21:51	10.687	26/08/2010 21:52	11.273	26/08/2010 21:53	12.001	26/08/2010 21:53	11.37	26/08/2010 21:33	11.856
26/08/2010 22:18	10.761	26/08/2010 22:20	10.051	26/08/2010 22:21	10.492	26/08/2010 22:22	11.053	26/08/2010 22:23	11.807	26/08/2010 22:23	11.224	26/08/2010 22:03	11.662
26/08/2010 22:48	10.467	26/08/2010 22:50	9.805	26/08/2010 22:51	10.296	26/08/2010 22:52	10.834	26/08/2010 22:53	11.589	26/08/2010 22:53	11.029	26/08/2010 22:33	11.467
26/08/2010 23:18	10.198	26/08/2010 23:20	9.608	26/08/2010 23:21	10.1	26/08/2010 23:22	10.59	26/08/2010 23:23	11.273	26/08/2010 23:23	10.687	26/08/2010 23:03	11.248
26/08/2010 23:48	9.928	26/08/2010 23:50	9.361	26/08/2010 23:51	9.903	26/08/2010 23:52	10.345	26/08/2010 23:53	10.907	26/08/2010 23:53	10.418	26/08/2010 23:33	10.36
27/08/2010 0:18	9.609	27/08/2010 0:20	9.068	27/08/2010 0:21	8.706	27/08/2010 0:22	10.075	27/08/2010 0:23	10.545	27/08/2010 0:23	10.11	27/08/2010 0:03	10.712
27/08/2010 0:48	9.312	27/08/2010 0:50	8.693	27/08/2010 0:51	9.46	27/08/2010 0:52	9.78	27/08/2010 0:53	10.247	27/08/2010 0:53	9.756	27/08/2010 0:33	10.443
27/08/2010 1:18	9.04	27/08/2010 1:20	8.469	27/08/2010 1:21	9.213	27/08/2010 1:22	9.509	27/08/2010 1:23	9.952	27/08/2010 1:23	9.435	27/08/2010 1:03	10.173
27/08/2010 1:48	8.792	27/08/2010 1:50	8.245	27/08/2010 1:51	9.969	27/08/2010 1:52	9.213	27/08/2010 1:53	9.78	27/08/2010 1:53	9.262	27/08/2010 1:33	9.928
27/08/2010 2:18	8.568	27/08/2010 2:20	8.095	27/08/2010 2:21	8.707	27/08/2010 2:22	8.99	27/08/2010 2:23	9.608	27/08/2010 2:23	9.04	27/08/2010 2:03	9.706
27/08/2010 2:48	8.369	27/08/2010 2:50	7.945	27/08/2010 2:51	8.618	27/08/2010 2:52	8.767	27/08/2010 2:53	9.46	27/08/2010 2:53	8.866	27/08/2010 2:33	9.509
27/08/2010 3:18													

Overall Summary Stats:

Mean:	13.36651565
Median:	13.425
Mode:	13.064
Maximum:	24.213
Minimum:	4.869
Stan Dev:	3.557995525

Overall Summary Stats by Station:

Logger 1	Logger 2	Logger 3	Logger 4	Logger 5	Logger 6	Logger 7
Mean: 12.83447425	Mean: 13.11354553	Mean: 13.05002776	Mean: 13.33061521	Mean: 14.26138675	Mean: 13.55650384	Mean: 13.404999532
Median: 12.775	Median: 12.92	Median: 13.06	Median: 13.449	Median: 14.433	Median: 13.83	Median: 13.932
Mode: 12.92	Mode: 12.534	Mode: 12.896	Mode: 13.93	Mode: 14.194	Mode: 15.199	Mode: 14.218
Maximum: 23.112	Maximum: 24.219	Maximum: 21.485	Maximum: 21.843	Maximum: 22.417	Maximum: 20.843	Maximum: 20.222
Minimum: 4.869	Minimum: 4.973	Minimum: 5.745	Minimum: 5.719	Minimum: 6.179	Minimum: 6.484	Minimum: 7.242
Stan Dev: 3.895010226	Stan Dev: 4.072326258	Stan Dev: 3.50365174	Stan Dev: 3.704722035	Stan Dev: 3.450246701	Stan Dev: 3.144292642	Stan Dev: 2.820952018

Summary Stats by Week:

Logger 1: July 14-20	Logger 2: July 14-20	Logger 3: July 14-20	Logger 4: July 14-20	Logger 5: July 14-20	Logger 6: July 14-20	Logger 7: July 14-20
Mean: 14.01806559	Mean: 14.601125	Mean: 14.61840774	Mean: 14.93067796	Mean: 15.47231845	Mean: 14.65261012	Mean: 14.487392586
Median: 13.606	Median: 13.908	Median: 14.2	Median: 14.505	Median: 15.521	Median: 14.965	Median: 14.397
Mode: 11.273	Mode: 8.693	Mode: 13.69	Mode: 13.93	Mode: 16.369	Mode: 17.629	Mode: 14.603
Maximum: 22.369	Maximum: 24.171	Maximum: 20.889	Maximum: 21.413	Maximum: 22.417	Maximum: 20.843	Maximum: 19.77
Minimum: 6.494	Minimum: 8.693	Minimum: 9.76	Minimum: 10.001	Minimum: 10.834	Minimum: 9.706	Minimum: 10.492
Stan Dev: 3.609484008	Stan Dev: 3.952879318	Stan Dev: 2.976339366	Stan Dev: 3.069601217	Stan Dev: 2.922656205	Stan Dev: 2.838072783	Stan Dev: 2.35766697
Logger 1: July 21-27	Logger 2: July 21-27	Logger 3: July 21-27	Logger 4: July 21-27	Logger 5: July 21-27	Logger 6: July 21-27	Logger 7: July 21-27
Mean: 15.19925559	Mean: 15.4421369	Mean: 15.7194494	Mean: 16.08874405	Mean: 16.73391071	Mean: 15.74953571	Mean: 15.63550258
Median: 14.912	Median: 15.103	Median: 15.262	Median: 15.676	Median: 16.654	Median: 15.652	Median: 15.485
Mode: 15.724	Mode: 12.534	Mode: 14.646	Mode: 14.242	Mode: 14.964	Mode: 15.188	Mode: 14.816
Maximum: 21.461	Maximum: 22.202	Maximum: 20.674	Maximum: 21.319	Maximum: 21.079	Maximum: 19.746	Maximum: 20.007
Minimum: 6.494	Minimum: 8.494	Minimum: 10.492	Minimum: 10.59	Minimum: 12.025	Minimum: 11.029	Minimum: 11.394
Stan Dev: 3.19870669	Stan Dev: 3.42830756	Stan Dev: 2.491577725	Stan Dev: 2.649055236	Stan Dev: 2.17197968	Stan Dev: 1.944416625	Stan Dev: 1.941781222
Logger 1: July 28 - Aug 3	Logger 2: July 28 - Aug 3	Logger 3: July 28 - Aug 3	Logger 4: July 28 - Aug 3	Logger 5: July 28 - Aug 3	Logger 6: July 28 - Aug 3	Logger 7: July 28 - Aug 3
Mean: 13.54192282	Mean: 13.80760714	Mean: 14.25083332	Mean: 14.49397024	Mean: 15.0752976	Mean: 14.29484852	Mean: 14.96628274
Median: 13.186	Median: 13.269	Median: 14.445	Median: 14.649	Median: 15.557	Median: 14.649	Median: 15.211
Mode: 11.566	Mode: 11.75	Mode: 10.69	Mode: 15.262	Mode: 16.344	Mode: 14.509	Mode: 15.438
Maximum: 21.396	Maximum: 22.561	Maximum: 20.889	Maximum: 21.676	Maximum: 22.226	Maximum: 19.603	Maximum: 20.222
Minimum: 6.763	Minimum: 6.433	Minimum: 7.745	Minimum: 7.419	Minimum: 7.82	Minimum: 7.995	Minimum: 9.262
Stan Dev: 3.738531483	Stan Dev: 3.532699985	Stan Dev: 3.468140167	Stan Dev: 3.671374556	Stan Dev: 3.723326732	Stan Dev: 3.199662097	Stan Dev: 2.787825787
Logger 1: August 4-10	Logger 2: August 4-10	Logger 3: August 4-10	Logger 4: August 4-10	Logger 5: August 4-10	Logger 6: August 4-10	Logger 7: August 4-10
Mean: 13.3992613	Mean: 13.55681845	Mean: 13.31049702	Mean: 13.73753869	Mean: 14.43409524	Mean: 13.92626786	Mean: 13.70219643
Median: 13.425	Median: 13.534	Median: 13.546	Median: 13.882	Median: 14.685	Median: 14.17	Median: 13.75
Mode: 13.088	Mode: 11.71	Mode: 13.064	Mode: 13.161	Mode: 14.467	Mode: 14.792	Mode: 13.112
Maximum: 19.176	Maximum: 19.627	Maximum: 17.893	Maximum: 19.098	Maximum: 19.865	Maximum: 19.053	Maximum: 19.129
Minimum: 5.102	Minimum: 5.076	Minimum: 6.306	Minimum: 6.129	Minimum: 6.813	Minimum: 7.393	Minimum: 8.394
Stan Dev: 3.298017225	Stan Dev: 3.33967734	Stan Dev: 2.79323892	Stan Dev: 3.054783544	Stan Dev: 3.063077389	Stan Dev: 2.867603483	Stan Dev: 2.284001505
Logger 1: August 11-17	Logger 2: August 11-17	Logger 3: August 11-17	Logger 4: August 11-17	Logger 5: August 11-17	Logger 6: August 11-17	Logger 7: August 11-17
Mean: 11.5540882	Mean: 11.71079445	Mean: 11.55230893	Mean: 11.829312	Mean: 12.93691153	Mean: 12.5600959	Mean: 12.4512819
Median: 12.025	Median: 12.11	Median: 12.2315	Median: 12.2315	Median: 13.377	Median: 13.1	Median: 12.811
Mode: 12.896	Mode: 12.92	Mode: 12.896	Mode: 12.896	Mode: 14.266	Mode: 13.642	Mode: 13.257
Maximum: 18.842	Maximum: 19.674	Maximum: 17.582	Maximum: 18.723	Maximum: 19.439	Maximum: 17.915	Maximum: 17.344
Minimum: 4.923	Minimum: 5.102	Minimum: 6.789	Minimum: 6.133	Minimum: 7.242	Minimum: 7.645	Minimum: 7.696
Stan Dev: 3.07423707	Stan Dev: 3.162599702	Stan Dev: 2.305779089	Stan Dev: 2.676969726	Stan Dev: 2.552451978	Stan Dev: 2.279150512	Stan Dev: 1.993367915
Logger 1: August 18-27	Logger 2: August 18-27	Logger 3: August 18-27	Logger 4: August 18-27	Logger 5: August 18-27	Logger 6: August 18-27	Logger 7: August 18-27
Mean: 9.400773833	Mean: 9.688925047	Mean: 9.205877506	Mean: 9.331657778	Mean: 10.97278714	Mean: 10.39274501	Mean: 10.48362389
Median: 9.817	Median: 8.96	Median: 8.96	Median: 9.0025	Median: 10.516	Median: 9.977	Median: 10.112
Mode: 9.608	Mode: 6.509	Mode: 7.645	Mode: 7.67	Mode: 10.1	Mode: 9.509	Mode: 8.792
Maximum: 15.963	Maximum: 17.058	Maximum: 13.401	Maximum: 14.337	Maximum: 16.82	Maximum: 15.175	Maximum: 14.721
Minimum: 4.869	Minimum: 4.973	Minimum: 5.745	Minimum: 5.719	Minimum: 6.179	Minimum: 6.484	Minimum: -7.242
Stan Dev: 2.922548471	Stan Dev: 3.118378702	Stan Dev: 1.948183201	Stan Dev: 2.237887018	Stan Dev: 2.616486715	Stan Dev: 2.238103378	Stan Dev: 1.979195461