ENVIRONMENTAL BASELINE REPORT
2008 BASELINE WATER STUDY

on the

CATFACE COPPER PROPERTY

Tenure Nos. 201393, 201398, 201429, 201445, 345339

Alberni Mining Division

NTS: 92E/01E, 92E08E, 92F/04W, 92F/05W

BCGS Map Sheets: 092E030, 092F021

Latitude: 49° 15.6′ N; Longitude 125° 59.3′ W

UTM (NAD 83 – Zone 10): 5 460 300 N; 283 200 E

Owner / Operator: Catface Copper Mines Limited – 100%

Author: Jim Chapman, P.Geo.

September 4, 2009

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SECTION A: REPORT

INTRODUCTION:

The Catface Property is a large copper-molybdenum porphyry style deposit located on the west coast of Vancouver Island, British Columbia. The property is owned by Catface Copper Mines Limited (the "Company"), a company 97.38% owned by Selkirk Metals Corp. of Vancouver, BC. Falconbridge Limited (now Xstrata Canada Corporation) discovered the mineral deposit in 1960 and completed several phases of surface and underground work on the property up until 1990 when they ceased all operations in British Columbia. This report documents the continuing environmental baseline work that was undertaken by Knight Pièsold Ltd. on behalf of the Company in July 2008. The work was intended to supplement the information collected during the 1989 and 2004 water quality programs and consisted of additional baseline water quality and benthic invertebrate monitoring at five sites. The results of the program now provide a general comparison of the water quality conditions over time within the area of previous exploration and the general project area. The results to date indicate that acid rock drainage (ARD) has not occurred within the areas investigated and that there appears to be little potential for ARD generation in the future at the Catface Property.

PROPERTY:

The Catface Copper Property is owned 100% by Catface Copper Mines Limited, a private company owned 97.38% by Selkirk Metals Corp. Catface Copper Mines Limited is the registered owner of the mineral tenures comprising the Catface Property. Xstrata Canada Corporation (formerly Falconbridge Limited) holds a right to "back in" to a 50.1% working interest in the Catface project at the time of a production decision by paying to Selkirk Metals Corp. 150% of Selkirk's aggregate expenditures on Catface, or alternatively, Xstrata may revert to a 9% Net Proceeds of Production royalty.

The property is located 13 km north-northwest of Tofino, BC in the Catface Range of Vancouver Island and consists of 138 mineral tenures (1 mining lease of 15 units; 130 legacy claims / 130 units; 7 cell claims / 14 cells) totaling 159 units and covering a gross area of 3,797.28 ha (Figure 2). Mining Lease 345339 covers 252.0 ha in the core area of the property and was issued on September 25, 1996 for a 30 year term expiring on September 25, 2026. A rental of $10.00/ha or $2,520.00 is payable annually.

The details of the mineral tenures that comprise the Property are set out in Section D of this report. The "good to" dates shown are based on the Statement of Work filed on May 29, 2009 as Event #4285111 and assume that the work contained in this report will be accepted for assessment purposes.

0 75 150 300

kilometres

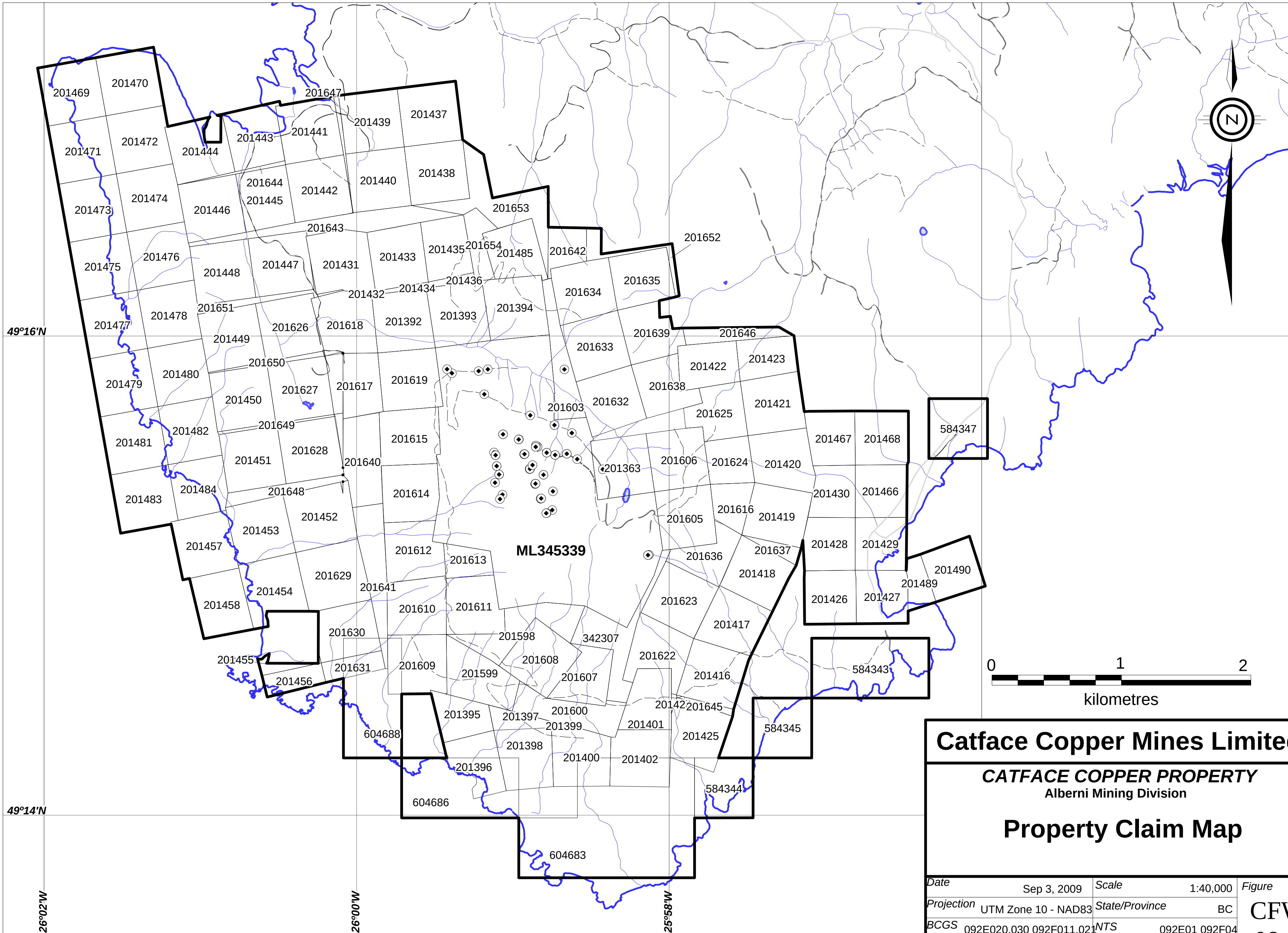
Catface Copper Mines Limited

CATFACE COPPER PROPERTY

Alberni Mining Division

General Location Plan

Date Aug 9, 2009	*Scale* 1:8,000,000		*Figure*	CFW 08-1
Projection UTM Zone 10 - NAD83	*State/Province* BC			
BCGS 092E020,030 092F011,021	*NTS* 092E01 092F04			
Author JC	*File* CAT_LocMapAss09			



Catface Copper Mines Limited

CATFACE COPPER PROPERTY

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Property Claim Map

Date	Sep 3, 2009	*Scale*	1:40,000	*Figure*
Projection	UTM Zone 10 - NAD83	*State/Province*	BC	CFW 08-2
BCGS	092E020,030 092F011,021	*NTS*	092E01 092F04	
Author	MJD	*File*	Cat_ClaimAss09	

LOCATION AND ACCESS:

The Catface Copper property is centered on Catface Mountain, on the western edge of the Catface Peninsula, west coast of Vancouver Island, southwestern British Columbia (Figures CFW-08-1 to 3). The property is located at the corner of four NTS map sheets 92E/01, 92E/08, 92F/04 and 92F/05, and the BCGS map sheets are 092E030 and 092F021. The property is centered at approximately 49° 15.6' North latitude and 125° 59.3' West longitude (UTM NAD 83, Zone 10, coordinates 283 200 E., 5 460 300 N). The town of Tofino is approximately 13 km south-southeast of the property.

Access to the Catface Peninsula is possible by boat, fixed-wing aircraft or helicopter. A ferry or boat is required to move vehicles and equipment from Tofino across Bedwell Sound to the Catface Peninsula. The barge and boat docking facilities are in good order at Hecate Bay on the east side of the property, as there continues to be some logging and shake/shingle activity on the Catface Peninsula and in the Cypre River area. A short gravel airstrip near the Hecate Bay dock facilities could accommodate wheeled plane access with a limited amount of upgrading, while floatplanes can land in the relatively protected confines of Hecate Bay itself. A 10 km logging road extends from Hecate Bay into the central portion of the property, however much of the road system has been deactivated and will require upgrading before vehicular access is possible.

CLIMATE, TOPOGRAPHY AND VEGETATION:

The climate of the region is classified as West Coast Marine, with mild but wet winter seasons and cool drier summers. Mean annual precipitation is 3,235 mm as rain, and 536 mm of snow. The annual temperature range varies from –15.0°C to 32.8°C, with a mean of 9.0°C (Knight Piésold, 2004). Temperatures are moderated by the proximity of the ocean so that prolonged periods of freezing weather are unusual.

The heavy rainfall that is common in this area can deliver large volumes of water over short periods of time, much of which is intercepted by the forest canopy. The remainder normally runs off rapidly through the soil. Hydrologic data has been collected for Bawden Creek (also referred to in earlier references as Irishman Creek), which runs through the centre of the property. This data indicates that the flow can be highly variable, with the mean annual high flows in December and low flows in July – August.

The Catface property is located in the Clayoquot Sound region of western Vancouver Island. This area is dominated by the Estevan Coastal Plain, a gently undulating terrain that has been broken into numerous islands and peninsulas by inlets and channels. Steep highly dissected rocky hills are formed by outliers of the Westcoast intrusive complex which forms the Vancouver Island Mountains. The Catface Peninsula is a heavily treed peninsula 4 to 8 km wide. Recently significant areas of forest land have been harvested within the property boundaries and nearby areas. The Catface Range contains two subdued mountain tops, the South Peak with an elevation of 880 m and the North Peak with an elevation of 960 m. Property elevations range from sea level (0 m) to 960 m at the North Peak.

Catface Mountain is covered in a typical assemblage of west coast second growth vegetation consisting of thick stands of western hemlock, red cedar, Douglas fir and white pine. There is a thick undergrowth of salal and salmonberry throughout the area.

HISTORY:

The earliest mention of exploration work on the Catface Peninsula is from the 1898 Annual Report of the Minister of Mines of British Columbia which reported the collaring of a 6 m adit into a highly fractured and altered shear zone containing copper staining.

In 1960 Gerald Davis and 2 partners climbed to the base of a copper stained cliff, visible from the sea, and sampled oxidized copper material from a fault zone. Sampling later that year located fresher material and recognized extensive copper and molybdenum mineralization, prompting Falconbridge to stake the first claims.

The claims were explored by Falconbridge between 1960 and 1969 through prospecting, mapping, geophysical surveys, soil and rock geochemistry and 11,777 m (38,628 ft) of surface diamond drilling. The success of this work led to the decision to collar an adit in 1970, which was ultimately driven 857 m (2,811 ft) into the Cliff Zone. Underground diamond drilling commenced in 1971 and totaled 7,212 m (23,655 ft).

Subsequent work programs included extensive metallurgical testing by Lakefield Research, and also test work at the Tasu Mine facility operated by Falconbridge. An in house resource estimate and pit design study was completed out in 1972. This data was rechecked by Sumitomo in 1973 when they conducted additional bench tests on the ore.

In 1989 the project was reactivated as a result of more favourable metal prices and the advantageous location of the deposit. All the old data was re-evaluated to assess the likelihood of locating additional resources in the area. A limited drill program tested outlying IP anomalies peripheral to the Cliff Zone mineralization. At this time available core was re-assayed to determine the precious metal content of the ore. The adit was reopened and re-sampled at 10 ft intervals along the entire length.

A diamond drilling program was conducted in 2008 that saw the completion of 2,383 m in eight holes, six in the Cliff Zone and two in the Hecate Bay Zone. The 2008 program was designed to further delineate the historically defined Cliff Zone mineralization and expand the Hecate Bay Mineralized Zone, two of the four porphyry copper zones known within the Catface Copper Porphyry Project. Additionally, the 2008 diamond drilling program served to confirm the historic grade data for the Cliff Zone deposit and to provide fresh samples of the Catface copper porphyry mineralization for use in economic, metallurgical and environmental testing. The assay results from the 2008 program have confirmed the copper grades from previous exploration and have expanded the higher grade bornite bearing core zone.

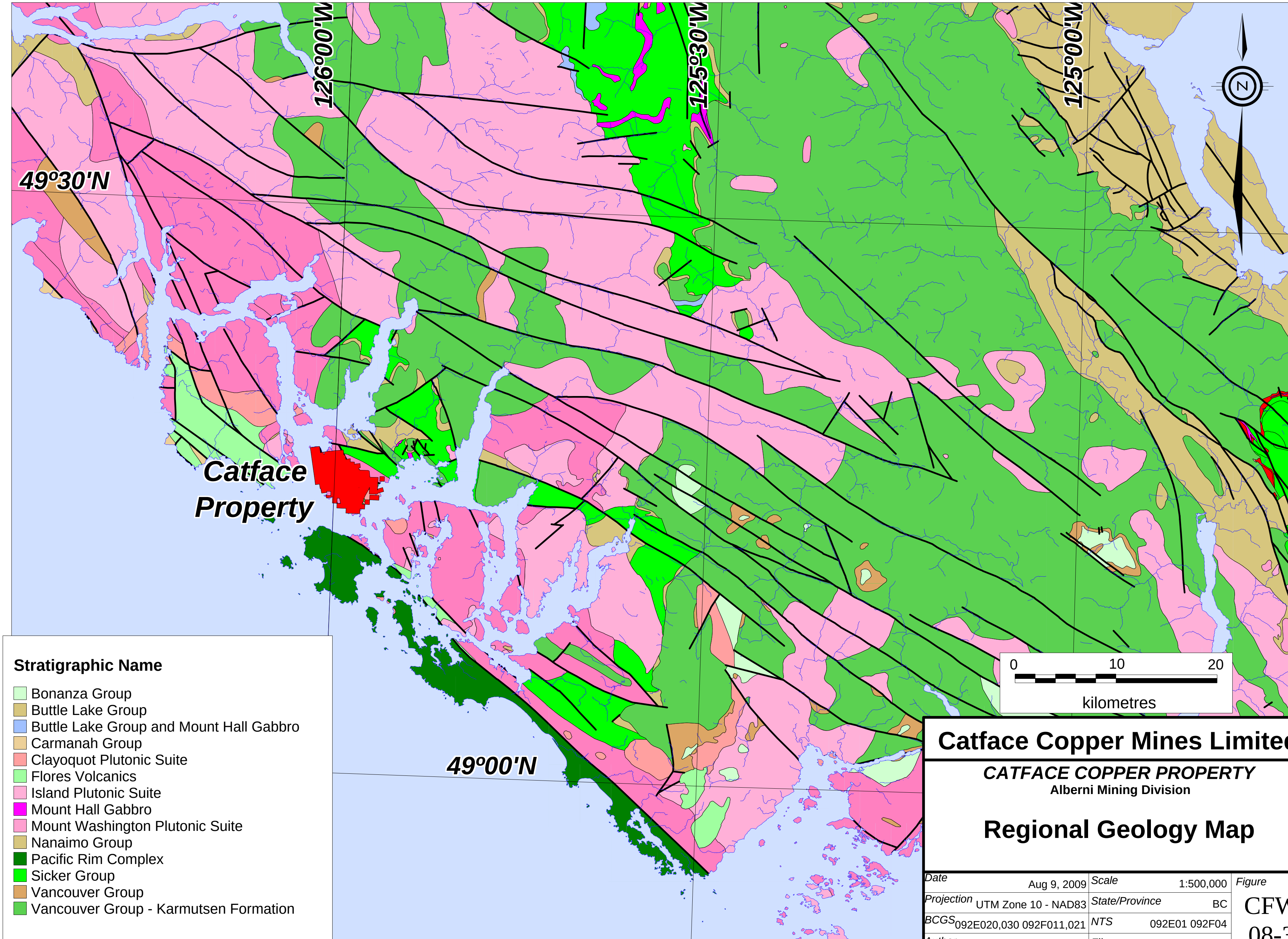
REGIONAL GEOLOGY:

The Catface copper-molybdenum porphyry deposit is hosted within volcanic rocks of the Upper Permian Sicker or Vancouver Group (dominantly Karmutsen volcanics) and Eocene porphyritic intrusives. The volcanic suite consists of basalts, andesitic flows, tuff breccias and agglomeratic rocks that are locally weakly hornfelsed near the intrusive contacts. These lithologies are in fault contact with diorites of the Westcoast Complex (Figure 3). All of the older units were intruded by Jurassic age quartz monzonite sills and dykes. The entire assemblage was subsequently intruded by several phases of the Tertiary Tofino Intrusive Suite (Catface Intrusions), which consist of porphyritic quartz diorite/granodiorite stocks (McDougall, 1976 Muller, 1981; and Nilsson, 2001).

The Catface deposit is atypical of most calc-alkalic porphyry deposits in BC in that it lacks a pyritic halo or a distinct phyllic alteration envelope. Quartz stockworks are poorly developed and there is little evidence of base metal zonation outside of the copper zone.

The following discussion is taken from McDougall (1976) as it summarizes the regional setting of the deposit:

> "*The Catface regional setting is that of a cupola of quartz diorite emplaced in and capped by volcanic rocks. The cupola is genetically related to a large elongate Tertiary intrusion that is sparingly exposed. The emplacement of this pluton was guided by intersections of regional and local faults and by contacts which guided earlier and smaller quartz monzonite intrusions. Mineralization affects both the upper portion of the cupola, which consists largely of dyke like*



Catface Copper Mines Limited

CATFACE COPPER PROPERTY

Alberni Mining Division

Regional Geology Map

Date Aug 9, 2009	*Scale* 1:500,000	*Figure*
Projection UTM Zone 10 - NAD83	*State/Province* BC	CFW
BCGS 092E020,030 092F011,021	*NTS* 092E01 092F04	08-3
Author MJD	*File* Cat_RegGeoAss09	

porphyritic bodies and porphyry dykes, and the invaded host rocks, which consist of Paleozoic and possibly Triassic volcanic sequences intruded by the quartz monzonite of undetermined age"

"Fracturing of the host rocks occurred, particularly at higher levels, related to intrusive-induced doming as well as local faulting. Micro-shattering of rock forming minerals was extensive. Hydrothermal alteration, although not intense, was widespread, with processes such as silicification influencing rock competency. The mineralizing process, which occurred after all the rocks were emplaced and major structures developed, was controlled by fault and fracture systems."

"Mineral zoning, probably caused by sulphur and iron availability, resulted in the central annular pyrite-free bornite-chalcopyrite zone, which approximately coincides with a siliceous one, and an outer pyrite-pyrrhotite-chalcopyrite zone."

PROPERTY GEOLOGY:

The geology of the Catface Deposit has been detailed in papers by J.J. McDougall and is discussed in Porphyry Deposits of the Cordillera - CIM Special Volume 15 and Special Volume 46. Relevant geological information from these papers has been included in the descriptions below.

The geologic setting of the Catface deposit is a cupola of quartz diorite emplaced in, and capped by volcanic rocks. The cupola is genetically related to a large Tertiary intrusion that is elongate in a northwesterly direction. Intersections of regional and local faults provided the controls on the emplacement of this pluton, and the smaller quartz monzonite intrusions which preceded it. Mineralization is distributed through the upper portion of the cupola and the invaded country rocks. The upper levels of the cupola consist of dyke like porphyry bodies. The country rocks are Paleozoic and possibly Tertiary volcanic sequences, which had been previously intruded by the quartz monzonite bodies of undetermined age.

Some blocks of the volcanic rocks have been assimilated by both the monzonite and the quartz diorite, but most can still be recognized, with the origin of the blocks being the roof and walls of the original magma chamber. Intrusion and collapse breccias formed at various times within the enclosing rocks. Fracturing of the country rocks was extensive and related to doming as well as local faulting. The mineralizing event occurred after all rocks were emplaced and major structures developed, and was controlled by fault and fracture systems.

The Catface project contains three known mineralized zones as a result of exploration work completed to date. These are the Cliff Zone, the Irishman Creek Zone and the Hecate Bay Zone. The main deposit is the Cliff Zone situated on the west side of Catface Mountain. Mineralization at the Cliff Zone covers an area of approximately 900 m by 600 m to a depth of 350 m, and consists of disseminated and fracture controlled chalcopyrite, bornite and molybdenite. The mineralization occurs in both the intrusive rocks and the volcanic country rocks. The Cliff zone is a copper – molybdenum porphyry system related to a small mid-Eocene porphyritic quartz diorite to granodiorite intrusive stock that is one of the "*Cliff Intrusions*". The Irishman Creek zone is a smaller but higher grade deposit associated with a series of pipe like breccia zones. The size and style of the Hecate Bay prospect has not yet been determined.

2008 PROGRAM – BASELINE WATER QUALITY SAMPLING

The Company engaged Knight Piésold Consulting in 2008 to conduct its continuing environmental baseline studies on the Catface Copper project. The program was designed as a follow up on the 2004 environmental work previously undertaken by Knight Piésold for Doublestar Resources Ltd., and the 1989 baseline work conducted by Falconbridge. The water quality and benthic invertebrate sampling program was conducted at five sites to assess the general health of the aquatic environment, to determine if seepage from the exploration adit was capable of supporting a healthy invertebrate community and to ascertain whether or not seepage from the adit had developed any signs of acid generation over time. The 2008 work confirmed that the Catface deposit is unlikely to have any significant acid generating characteristics. The complete "2008 Water Quality Summary Report" by Knight Piésold Consulting dated March 19, 2009 is appended in Section B of this report.

One of the samples sites (AD-01) was located on Mining Lease 345339 while the other four sites were located on or immediately adjacent to the located legacy mineral tenures 201393, 201398, 201429 and 201445 (Figure 4 and Figure 4.1 in the Knight Piésold Report). The expenditures from the 2008 program have been equally apportioned to all five sample sites.

CONCLUSIONS:

The results of the 1989, 2004 and 2008 environmental programs are set out in the appended Knight Piésold report and the general conclusions are as follows:

- Waste rock samples analysed had a net negative acid generating capability, meaning that they consumed more acid than they generated and were therefore deemed non-acid generating material.
- Overall water quality at the adit was good – well oxygenated with neutral pH, low sulphates, low to moderate buffering capacity against acidic inputs and low dissolved solids content. Metals concentrations were below the current BC Water Quality Guidelines and/or Canadian Water Quality Guidelines for the Protection of Aquatic Life, except for cadmium (2008), copper (1989,

2004 and 2008) molybdenum and selenium (2004 and 2008). Elevated copper and molybdenum concentrations likely reflect the natural concentrations in the bedrock.

- Water quality on Bawden Creek was good and comparable to water quality at the adit; cadmium, molybdenum and selenium were all below the relevant guideline limits for the protection of aquatic life. The small drainages to the south and west of the Project area had very good water quality and no metal guideline exceedances.
- Benthic invertebrate communities within the sampled areas differed over time in concentration and abundance; however, population density was notably high at the adit, consisting of sensitive organisms; those that thrive in good water conditions, and facultative organisms, which prefer good water quality conditions but can tolerate less pristine conditions and more harsh environments.

The results of the environmental programs carried out to date indicate that ARD has not occurred within the areas investigated. Following past and present trends, there appears to be little potential for ARD generation in future at the Catface Property, under current circumstances.

RECOMMENDATIONS:

The consultants have recommended that future water quality studies should focus on seasonal monitoring in order to establish water quality conditions throughout the year.

Respectfully submitted,

Jim Chapman, P.Geo.

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STATEMENT OF QUALIFICATIONS:

For: Jim Chapman of 2705 West 5th Avenue, Vancouver, B.C. V6K 1T5

I graduated from the University of British Columbia with a Bachelor of Sciences Degree in Geology (1976);

I have been practicing my profession as a geologist in mineral exploration continuously since 1976;

I am a registered member in good standing as a Professional Geoscientist with the Association of Professional Engineers and Geoscientists of British Columbia;

The observations, conclusions and recommendations contained in the report are based on supervision of the described program, field examinations, and the evaluation of results of the exploration program completed by the operator of the property.

Jim Chapman, P.Geo.

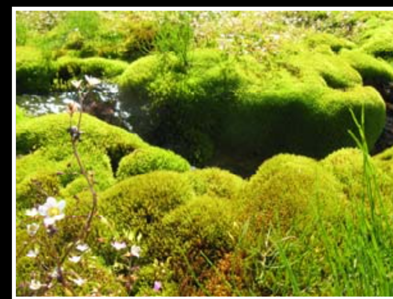
SECTION B: TECHNICAL REPORT

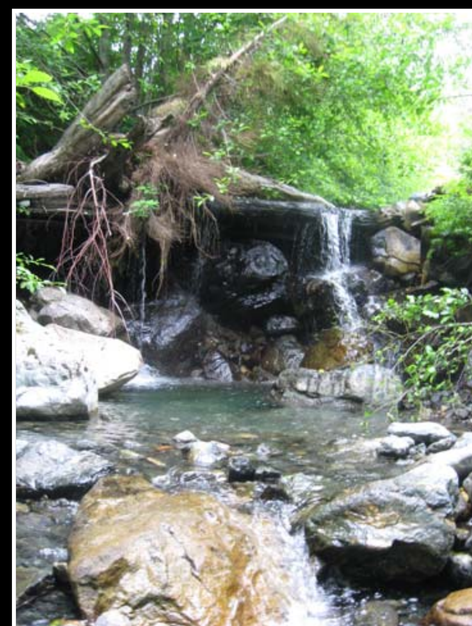
2008 Water Quality Summary Report prepared for Catface Copper Mines Limited by Knight Piésold Ltd.

Report Date: March 19, 2009

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT





PREPARED FOR

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PREPARED BY

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VA102-170/5-1
Revision 0
March 19, 2009

Knight Piésold
CONSULTING

ISO 9001:2000
FS 64925

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
(REF. NO. VA102-170/5-1)

Rev	Description	Date	Approved
0	Issued in Final	March 19, 2009	RGS

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CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
(REF. NO. VA102-170/5-1)

EXECUTIVE SUMMARY

Acid rock drainage (ARD) and metal leaching are significant environmental concerns affecting the mining industry in BC and abroad. When waste rock, tunnel walls or tailings from mining operations are exposed to air and moisture, rates of weathering, oxidation and leaching can accelerate due to the relatively large exposed rock surface areas. If the exposed rock contains sulphide minerals, natural oxidation processes may release acidic compounds that can dissolve in water if the acidity is not neutralized by other minerals within the rock. Acidic conditions can lead to increased metal leaching from the rock since metals tend to mobilize and dissolve more readily in acidic waters associated with ARD. It should be noted however, that several metals including molybdenum, zinc, cadmium, antimony and arsenic dissolve in neutral or alkaline conditions. In dissolved form, metals have an increased capacity for absorption and accumulation in plants and animals, which in turn can lead to the degradation of water quality and aquatic habitat downstream of mining activities.

While ARD is a serious concern at metal mines where there are high concentrations of sulphide minerals and other trace metals, not all mines necessarily generate ARD. Based on the environmental investigations conducted to date, the Catface Copper Mine, located near Tofino, BC, has shown no evidence of ARD generation.

Early exploration activity (1961-1979) at the Catface Property (the Property) included driving an 857 m adit in the side of Catface Mountain and drilling 127 exploration holes, metallurgical testing, geological mapping, geochemical surveys and geophysical tests. The project was reactivated in 1989 to increase the resource and determine the gold content of the copper mineralization. An independent environmental audit of the Catface Property was also conducted in 1989 to assess the baseline or existing water quality at the exposed adit and within the surrounding environment, and to evaluate the potential for ARD generation in the waste rock. In May 2004 and July 2008, Knight Piésold Ltd. conducted additional baseline water quality and benthic macroinvertebrate sampling at the Property to assess the general health of the aquatic environment, to determine if seepage from the exploration adit was capable of supporting a healthy invertebrate community, and to ascertain whether or not seepage from the adit had developed any signs of acid generation over time.

General conclusions of the 1989, 2004, and 2008 environmental programs are as follows:

- Waste rock samples analysed had a net negative acid generating capability, meaning that they consumed more acid than they generated, and were therefore deemed non-acid generating material.
- Overall water quality at the adit was good – well-oxygenated with neutral pH, low sulphates, low to moderate buffering capacity against acidic inputs, and low dissolved solids content. Metals concentrations were below the current BC Water Quality Guidelines and/or the Canadian Water Quality Guidelines for the Protection of Aquatic Life except for cadmium (2008), copper (1989, 2004

and 2008), molybdenum, and selenium (2004 and 2008). Elevated copper and molybdenum concentrations likely reflect the natural mineralization of the area.

- Water quality on Bawden Creek was good and comparable to water quality at the adit; however, cadmium, molybdenum, and selenium were all below the relevant guideline limits for the protection of aquatic life. The small drainages to the south and west of the Project area had very good water quality and no metal guideline exceedances.
- Benthic invertebrate communities within the sampled areas differed over time in terms of composition and abundance; however, population density was notably high at the adit, consisting of sensitive organisms; those that thrive in good water quality conditions, and facultative organisms, which prefer good water quality conditions but can tolerate less pristine conditions or more harsh environments.

The results of the environmental programs to date indicate that ARD has not occurred within the areas investigated. Following past and present trends, there appears to be little potential for ARD generation in the future at the Catface Property, under current circumstances. Future water quality studies should focus on seasonal monitoring in order to establish water quality conditions throughout the year.

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
(REF. NO. VA102-170/5-1)

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FIGURES

PHOTOGRAPHS

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT (REF. NO. VA102-170/5-1)

SECTION 1.0 - INTRODUCTION

The Catface Copper Project (the Project) is located on Catface Mountain, approximately 13 km north of Tofino, BC, within the Catface Range. The Project is 100% owned by Catface Copper Mines Limited, which is 97.4% owned by Selkirk Metals Corp. An inferred resource of over 158 million tonnes of 0.44% copper with by product gold, silver, molybdenum (and potentially rhenium) resources, exists within the Project's Cliff Zone. The property consists of 135 mineral tenures (130 legacy claims, 4 cell claims and 1 mining lease) totalling 150 units and covering a gross area of 3609.5 ha. The general location of the Catface Project is shown on Figure 1.1.

Knight Piésold Ltd. (KPL) was retained by Catface Copper Mines (the Proponent) in 2008 to conduct additional baseline water quality and benthic invertebrate monitoring for the Project. This information is intended to supplement the information collected during the 1989 and 2004 water quality programs and provides a general comparison of water quality conditions over time within the zone of previous exploration and within the general Project area.

SECTION 2.0 - PHYSICAL SETTING

The climate in the Project area is classified as West Coast Marine, and is characterized by mild wet winters and cool, fairly dry summers with onshore Pacific disturbances and coastline topography being the primary influencing factors. The closest meteorological recording station to the Catface Property is in Tofino, where climate data was recorded from January 1971 to December 2000 by Environment Canada. Historical temperature and precipitation data for Tofino are shown on Figure 2.1 and are summarised below.

The average daily temperature at Tofino was highest in August (14.8°C) and lowest in January (4.5°C). The extreme maximum temperature of 32.8°C occurred on July 12, 1961, and the extreme minimum temperature was -15°C on January 20, 1969. Daily maximum and minimum temperatures also occurred in August (18.8°C) and January (1.4°C), respectively. The historical data indicates that temperatures tend to be highest in August and lowest in January.

Average annual precipitation at the Tofino station during the period of record was approximately 3306 mm, 98% of which was rainfall (3257 mm) and just 2% (43 cm) was snowfall. Average monthly precipitation accumulations were highest in November (475 mm) and lowest in July (77 mm). Streamflows are likely lowest in July and highest in November within the Project area.

The claims area covers a topographical high known as the Catface Range between sea level and 962 m. The property is bordered on the north by Bawden Bay, on the west by Millar Channel, on the south by Calmus Passage and on the east by Hecate Bay. The drainage system of the Catface claims area is relatively simple, and includes several perennial and intermittent drainages that flow east, west, and south, directly into the ocean.

The claims area is bisected by two main streams, which originate near the centre of the property and flow northwest and southeast, ultimately discharging to the ocean. Bawden Creek (also known as Irishman Creek) flows northwest to Bawden Bay from a small tarn and saddle area and has a catchment area of approximately 6.1 km^2. A northwest facing horseshoe system of peaks and connecting ridges ranging from 815 m to 963 m encircles the saddle area. A second unnamed stream originates on the southwest side of the saddle area, flows west and discharges into Millar Channel. There are several other small and intermittent creeks on Catface Mountain, which appear to have very small drainage areas and generally drain south into Calmus Passage.

SECTION 3.0 - PREVIOUS STUDIES

In 1989 a baseline water quality program was initiated at the Catface Property as part of an independent environmental audit of the property which also included evaluation of mine drainage and waste rock for Acid Rock Drainage (ARD) potential. The program was conducted by Robert L. Hallam Environmental Management Ltd. on behalf of then-proponent, Falconbridge Nickel Mines Ltd. Water quality monitoring sites were established in 1989 at five separate locations within and surrounding the property to represent conditions at the Exploration Adit (the Adit), Irishman Creek (commonly known as Bawden Creek) near Bawden Bay, and at the mouth of two small unnamed creeks to the south of the property. It should be noted that Bawden Creek in this report is the same as Irishman Creek in previous reports.

The results of the 1989 monitoring program indicated that the Exploration Adit was not likely a source of ARD due to the good water quality of the seepage and the net negative acid-generating potential of samples of exposed waste rock (Hallam, R.L., 1989).

In 2004 KPL was retained by Doublestar Resources Ltd. to provide additional water quality information for the Project and to assess the ARD potential of seepage from the Adit, with a specific focus on assessing whether changes had occurred for the Adit water quality since the 1989 sampling period. During the 2004 site visit, two of the water quality monitoring locations were moved slightly due to access constraints. Benthic invertebrates were also collected in 2004 to determine if seepage from the Adit was capable of supporting a healthy invertebrate community, and to provide a baseline for future studies. Invertebrates are often useful indicators of general water quality. Results of the previous water quality and invertebrates studies are generally discussed and compared with the 2008 information in Sections 4.0 and 5.0, respectively.

There were no notable differences in water quality between 1989 and 2004. The 2004 report stated that "On the basis of water chemistry, principally the neutral pH, residual alkalinity, low sulphate content, extremely low metals concentrations, time allowed for acid generation and the comparative results from the May 1989 analysis, it can be concluded that acid mine drainage has not developed over the past 30 years since the exploration adit was drilled, and is not likely to be a concern in the future" (KPL, 2004).

SECTION 4.0 - WATER QUALITY

4.1 METHODOLOGY

4.1.1 Sample Collection

Water quality samples were collected in July 2008 from four of the five previously established monitoring locations. BAC-03, located in the upper reaches of Bawden Creek, could not be accessed during the 2008 site visit, therefore a sample was collected further downstream in the mid-reaches of the creek (BAC-02). The 2008 site visit occurred in July, when precipitation and therefore streamflow for this area are generally lowest. Since access to the mid-reach location BAC-02 will likely be limited at other times of the year when flows are higher, it is recommended that this site be excluded from future studies and monitoring should continue at BAC-03. Site descriptions and sampling frequencies are summarised for each location are provided in Table 4.1 and monitoring locations are shown on Figure 4.1.

All surface water samples were collected by trained, experienced field staff in accordance the 'Ambient Fresh Water and Effluent Sampling Manual' (RISC, 1997) protocols. Samples were submitted to ALS Environmental in Vancouver, BC for analysis of the following parameters:

- Physical parameters
- Anions and nutrients
- Total cyanide
- Total and dissolved metals, and
- Total organic carbon.

In situ parameters were measured concurrently with the collection of samples using a YSI 556 multiparameter probe which was calibrated prior to the site visit to ensure accuracy of the data collected. Measurements of temperature, conductivity, dissolved oxygen and pH were recorded *in situ* and later transferred to a database.

4.1.2 Data analysis

The data were analysed upon receipt from the laboratory and uploaded into a database along with the *in situ* data. Summary statistics were not generated due to the small number of samples collected to date, however analytical results for surface water samples were compared with current British Columbia Approved and Working Water Quality Guidelines (aquatic life) (BCWQG), and the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life, and any exceedances were highlighted. The applicable criteria for both sets of guidelines are presented in Table 4.2.

4.1.3 Quality Assurance / Quality Control

A strict quality assurance/quality control (QA/QC) program was implemented for the surface water quality program to ensure that representative, high quality data were obtained in a defensible, repeatable manner. Quality assurance was achieved through effective planning and organization and the enforcement of both external and internal quality control measures including adherence to standard methods and protocols for collection of all environmental samples.

The following summarizes the QA/QC procedures and practices followed:

- Project staff are experienced and adequately trained
- Adherence to standard protocols for sample collection, preservation, and documentation
- Employment of ALS Environmental Laboratories, Vancouver, BC - a fully accredited analytical laboratory
- Calibration and maintenance of all field equipment
- Collection of blind duplicate samples and blank samples as necessary, and
- Determination of analytical precision and accuracy through interpretation of duplicate and blank analytical results and comparison with data quality objectives.

4.1.3.1 Quality Control

Quality control is achieved through the collection and analysis of several different types of samples and may include the following:

- **Field Blanks**: Using deionised (analyte-free) water, these samples check for contamination of containers or filters, test the purity of chemical preservatives, and detect other random or systematic errors which may arise during collection, handling, or transportation. Data are considered precise when analytes are below their respective laboratory method detection limits (MDLs). Standard procedures require that field blanks be collected in the field, using the same methodology as ambient water samples and therefore provide information on contamination resulting from handling technique and exposure to the sampling environment. One blank sample was collected in 2004.

- **Blind Duplicates:** These samples provide an estimate of the overall precision associated with the field technique and laboratory analysis. Blind duplicates (the laboratory does not know the identity of the sample location) were collected as close as possible to the same time and location and are intended to be identical. Low variability between duplicate sample concentrations indicates a high degree of precision in the data, whereas high variability may indicate that contamination occurred during sampling/analysis or highly variable environmental conditions. The recommended frequency is 10% of the total number of samples or a minimum of one duplicate sample per sampling event. One blind duplicate sample was collected during each sampling event in 2004 and 2008.

4.1.3.2 Data Quality Objectives

Data Quality Objectives (DQO's) provide a means of assessing precision, accuracy, representativeness, and completeness of data through specification of precision limits, sampling completeness, representativeness of sample locations, and data validity in the initial stages of the monitoring program. DQO's are defined by examining the uncertainty associated with the program's QA/QC information and setting a limit on the maximum allowable introduced variability. This limit reflects the level of confidence in the data and should not be exceeded. In instances where the level is exceeded the suspect data is flagged and may be excluded. A rationale is provided for exclusion of any data from interpretation.

The DQO's defined in MoE's 'Guidelines for Interpreting Water Quality Data' (RISC, 1998b) were adopted for the Catface surface water quality program. These DQO's include the following:

- Replicate (duplicate) samples should have a relative difference of 25% or less for analytical values that are at least five times the MDL – a value exceeding 25% is considered too imprecise, and
- No more than 5% of the parameters in a blank sample should exceed the MDL.

Laboratory analytical precision is also determined by analysis of split samples, method blanks, reference samples and matrix spiked samples. ALS Environmental Laboratories provided detailed results of these analyses along with comparisons to the relevant DQO limits. These reports were reviewed upon receipt.

4.2 SURFACE WATER CHEMISTRY

Variability in baseline surface water quality for the Catface Project may be attributed to one or more of the following:

- Type of water feature (i.e. creeks, ponds, lakes, mine water bodies)
- Local lithology
- Groundwater influences
- Current and historical land use, and
- Hydrological regime – i.e. seasonal fluctuations typically result in elevated concentrations during low flow periods and lower concentrations during higher flows, particularly in smaller watersheds.

The *in situ* and analytical data summary for 2008, including guideline exceedances, is provided in Table 4.3. Water quality summaries for each site, including the 1989 data, are provided in Tables 4.4 through 4.9. The 1989 data were compared to the current guidelines because the criteria applicable at that time are not known. Photos of the monitoring locations are provided in Photos 1 to 15.

Note that parameter concentrations are discussed herein in terms of 'total', 'dissolved' and 'particulate', where the total concentration is the sum of the particulate and dissolved forms. Also note that discussion of any parameter below the laboratory MDL means that this parameter is also below the guideline limits.

4.2.1 Exploration Adit

4.2.1.1 General Chemistry

In situ measurements from July 2008, as shown in Table 4.4, indicate the Adit seepage was well-oxygenated with neutral pH and low in dissolved ions. The pH was neutral during all three sampling events, ranging from 7.16 in May 1989 to 7.78 in July 2008. The seepage is typical of the soft waters (hardness < 60 mg/L) of the Coast Mountains with hardness values of approximately 30 mg/L in each sampling event. Despite the softness of the water, alkalinities remained above 20 mg/L, indicating that the buffering capacity appears to be sufficient for the protection of aquatic life (RISC, 1998).

Dissolved solids at the Adit ranged from 46.6 mg/L (May 2004) to 58.2 mg/L (May 1989); these values are also typical of BC coastal streams which generally have TDS concentrations below 75 mg/L (RISC, 1998). Turbidity and total suspended solids (TSS) concentrations were low to non-detect in all three sampling events indicating that there was little or no suspended particulate matter in the seepage at the time of sampling.

Anions, including bromide, chloride and fluoride, were all within normal ranges for natural freshwater systems and sulphates were approximately 7 mg/L in all three Adit samples; well below the 100 mg/L BCWQG guideline limit.

Nutrients were all very low, remaining below their respective BCWQG and CCME guideline limits. Of the nitrogen-based nutrients, neither ammonia nor nitrite were detected in any samples. In BC, natural surface waters generally have less than 0.3 mg/L nitrate (RISC, 1998); the Adit samples were typically an order of magnitude lower than this. Phosphorous-based nutrients were present in very low concentrations (<0.01 mg/L), therefore the Adit seepage is considered to be oligotrophic in nature.

4.2.1.2 Cyanide

Cyanide occurs naturally in a variety of environments but typically at very low concentrations in surface water. While there are defined guidelines for certain forms of cyanide there are currently no guidelines for ‘total’ cyanide. Cyanide was not detected in any Exploration Adit samples.

4.2.1.3 Metals

Seepage from the Adit generally had higher total and dissolved metals concentrations than the other watercourses sampled in July 2008. A few metals exceeded their applicable guideline limits including cadmium, copper, molybdenum and selenium and these were predominantly in dissolved form.

Cadmium is a naturally occurring element in the earth’s crust which may be released to surface waters at very low concentrations via weathering and erosion. Another potential source of cadmium is the mining of ores which may have naturally elevated cadmium concentrations.

Cadmium toxicity decreases with increasing water hardness. Cadmium exceeded both the BCWQG and CCME limits for the protection of aquatic life in 2008 but was below the detection limit in 1989 and 2004; however, the 2008 concentration for this parameter is lower than the 2004 and 1989 MDLs, suggesting that cadmium may have been present in previous samples, though not detected by analytical techniques at that time.

Copper is typically found at very low concentrations in surface waters; <0.020 mg/L for total copper and 0.005 mg/L for dissolved copper (Moore 1990). Similar to cadmium, copper toxicity decreases with increasing water hardness, therefore the guideline limits for copper are hardness-dependent. Water hardness at the Adit in July 2008 was quite low (27.4 mg/L) and the total copper concentration was 0.0885 mg/L. This is an order of magnitude higher than the BCWQG and CCME criteria and represents all potentially toxic forms of copper including dissolved (bioavailable) and complexed forms and the fraction sorbed to sediments. Total copper concentrations were highest in 1989 (0.16 mg/L), decreased slightly in 2004 (0.104 mg/L) and were lowest in 2008 (0.0885 mg/L) with all three samples exceeding the BCWQG and CCME guideline limits.

Molybdenum is an essential plant and animal macronutrient typically found in natural surface waters at concentrations less than 0.01 mg/L (RISC, 1998). Anthropogenic sources may include process effluents and fossil fuel burning. Molybdenum accumulates in plant tissue but not in animal tissue therefore it is generally considered to be a low toxicity element except in environments used for foraging purposes (RISC, 1998). The molybdenum concentration in 2008 was 0.0873 mg/L; which exceeds the CCME limit (0.073 mg/L) but is well below the 2 mg/L BCWQG limit. The 2004 sample also exceeded the CCME guideline for this parameter. Molybdenum concentrations fluctuated somewhat between the three sampling events (0.07 mg/L in 1989, 0.101 mg/L in 2004 and 0.0873 mg/L in 2008).

Selenium is an essential trace nutrient but can be toxic to plants and animals at higher concentrations. The concentration of selenium varies widely in natural streams but is typically lower than 0.001 mg/L (BCWQG, 2006). The concentration of dissolved selenium at the Adit in 2008 was 0.0016 mg/L, which exceeded the CCME limit (0.001 mg/L) but not the BCWQG limit (0.002 mg/L). The 2004 concentration was almost twice this concentration (0.002 mg/L) while the 1989 concentration was below the MDL (<0.0005 mg/L).

A few other metals were detected at very low concentrations in the 2008 Adit samples including manganese, silver, and aluminum; however, these were all below their applicable guideline limits. Arsenic, iron, strontium, uranium, and zinc were present in very low concentrations in previous Adit samples but were not detected in 2008.

4.2.2 Bawden Creek

4.2.2.1 General Chemistry

Surface water monitoring on Bawden Creek has occurred at three separate locations including the lower reaches (BAC-01) in 1989, 2004 and 2008; mid-reaches (BAC-02) in 2008, and the upper reaches (BAC-03) in 1989 and 2004. Dissolved oxygen levels on Bawden Creek were generally lower at BAC-01, likely due to slower flows, milder gradients and more detritus. pH was also slightly acidic at this location, likely due to more anoxic conditions in the drier months. All other samples at this site, and the other Bawden Creek monitoring locations, were well-oxygenated with neutral pH, low turbidity and low dissolved solids. Sulphates were below 5 mg/L in each sample; well below the 100 mg/L BCWQG limit. Nitrogen and phosphorous-based nutrients were low to non-detect in the upper reaches and generally increased downstream; however, they were all below their respective guideline limits.

4.2.2.2 Cyanide

Total cyanide was not detected above the MDL in any 1989 or 2008 Bawden Creek samples; however, a lower MDL was employed in 2004 and trace concentrations of total cyanide were observed at each location during this sampling event. As mentioned previously, there are currently no guidelines with which to compare the total cyanide concentrations.

4.2.2.3 Metals

Metals including aluminum, copper, iron, and molybdenum were detected in trace concentrations in several Bawden Creek samples; however, copper was the only parameter to exceed the guidelines at each location. Copper exceeded one or more guideline limits at BAC-01 in 1989, 2004 and 2008; BAC-02 in 2008, and BAC-03 in 1989 and 2004. Aluminum and iron were also above their respective guideline limits at BAC-01 in 2008 but not in any other samples; perhaps due to the concentrating effect of low flow conditions at this time.

4.2.3 Unnamed Creeks

4.2.3.1 General Chemistry

Two small unnamed creeks lie south and west of the Project; UNC-01 (previously Site #2) is a small intermittent creek draining into the Calmus Passage on the southern slopes of Catface Mountain. UNC-02 (previously Site #5) is located south of the Project area, adjacent to the barge landing area. Samples were collected from both of these locations in 1989, 2004, and 2008. It should be noted that the 2008 UNC-02 sample had to be collected approximately 60 m upstream of the original location due to dry conditions.

At the time of sampling, both creeks were well-oxygenated with neutral pH and low dissolved and suspended solids. The buffering capacity at UNC-02 remained relatively consistent over time (~10 mg/L) indicative of moderate sensitivity to acidic inputs. UNC-01 tended to have slightly higher alkalinities (between 7-15 mg/L); however these are also moderately buffered waters. Sulphate levels were very low at both locations (<5 mg/L), as were the other anions analysed, including chloride and fluoride. Nutrient concentrations were likewise very low at both locations during all three sampling events with no guideline exceedances observed.

4.2.3.2 Cyanide

Total cyanide was not detected in either creek except during the 2004 sampling event where very low concentrations were detected at both locations.

4.2.3.3 Metals

There were no metals guideline exceedances in these two small creeks in 1989, 2004, or 2008 samples. Aluminum, copper, iron, and molybdenum were the most frequently observed metals but they were present only in trace concentrations and did not exceed their respective guideline limits, and therefore were not considered to be significant. When detected, copper approached the 0.002 mg/L CCME limit (for hardness <120 mg/L) but never exceeded this value at either location.

4.2.3.4 QA/QC Results

Analytical and field precision is determined by assessing how closely the analytical results met the data quality objectives.

Low variability between duplicate samples indicates that it is unlikely that contamination during collection or analysis has occurred. The RISC guidelines (RISC, 1998b) state as a rule of thumb that if there is a relative difference of 25% between duplicate samples (when they are at least five times greater than the MDL) then data is considered imprecise. Blind duplicate samples were taken at UNC-02 during May 2004 and July 2008. For samples from this site, blind duplicate samples were compared with the field samples and the RPDs were not greater than 25% for any parameter. The duplicate analysis results are summarized in Table 4.10.

When no more than 5% of the parameters in a blank sample are detected, it is unlikely that contamination has occurred during collection or analysis. A field blank sample was taken in May 2004, and no parameters in this sample exceeded their respective MDLs. The blank sample analysis results are provided in Table 4.11.

SECTION 5.0 - BENTHIC INVERTEBRATES

5.1 BACKGROUND

Benthic invertebrates are organisms without backbones inhabiting the surface of bedforms or within bottom sediments, organic debris and aquatic plants in aquatic systems. These animals play a critical role in the food chain, feeding on algae and bacteria and in turn being eaten by fish and other vertebrates. Benthic invertebrates are a diverse group composed of the larval forms of insects, organisms that spend their entire lives in the aquatic environment, and others who move between moist terrestrial environments and aquatic environments (EPA 2009).

Benthic invertebrate populations fluctuate with physical and chemical changes in their environment, making them good indicators of environmental health. They often live for more than one year, and have limited mobility, forcing them to remain in degrading environments. There are a great number of different species that vary in their tolerance to amount and type of pollution. These characteristics, coupled with the fact that these animals are easily collected and easily identified in the laboratory make them very suitable as environmental indicators (EPA 2009).

The objectives of the benthic invertebrate sampling program are to characterize the benthic communities within the Catface Property, and to determine the overall health of these communities, particularly at the Exploration Adit.

5.2 METHODOLOGY

Benthic invertebrate sampling was initiated at two sites during May 2004, using a modified Hess sampler measuring 17” high, 14” in diameter, with 250 μm mesh, enclosing an area of 0.1 m^2. These sites were sampled a second time during July 2008 using a Surber sampler with a 0.3 m by 0.3 m metal frame base and 250 μm mesh net, enclosing an area of 0.1 m^2.

Unless otherwise stated, at each site there were three replicate samples collected and preserved into separate jars, with each replicate sample consisting of five subsamples. The five subsamples were composited into a single sample bottle.

The replicate stations within the sample sites had relatively consistent substratum composition and the distance between the replicate stations was approximately equal to at least three times the bankfull width.

Benthic invertebrate monitoring was conducted at the 2004 locations to facilitate comparisons over time. The first was immediately downstream of the Adit at water quality site AD-01. The substrate here was predominantly gravel and cobble, and banks were covered in thick moss and flowering vegetation during 2004 and 2008. Seepage from the adit was the primary water source of the small flowing stream, and water was cold and clear. During 2008, only two replicate samples were taken at this site, because low flows and steep terrain limited the available area for sampling.

The other benthic invertebrate monitoring location was located on Bawden Creek near an old logging road (as shown on Figure 4.1). Shortly downstream of this location, the creek flow goes subsurface, possibly due to an old debris flow. In 2008, the Bawden Creek benthic monitoring site had a width of 2.5 m and morphology was predominantly riffle-pool, with cobble substrate. In 2008, the reach was divided into three replicate sites and within each replicate site, five subsamples were collected (where possible) to account for within-site variability. Five subsamples were collected at the first and third replicate sites, and four subsamples were collected at the second replicate site due to substrate limitations.

A buffered formalin solution (37% formaldehyde solution buffered with Borax) was added to the benthic samples in order to preserve the organisms for sorting and identification by a benthic specialist. The ratio of formalin solution to sample water was 1:10. If a relatively large amount of organic material was present in the sample the amount of preservative was increased.

Once the formalin was added to the sample, the bottles were sealed and inverted several times to ensure the formalin was fully mixed. The benthic samples were stored in a safe location until all of the samples were collected and were then shipped to invertebrate taxonomist Lesley Davenport in Victoria, BC, for identification and enumeration.

5.3 ANALYTICAL APPROACH

Efforts were made to include as many taxa as possible in the analysis. The level of classification achieved in the laboratory varied, from species level to order level. During statistical analysis, the family level was chosen as the classification level that would most accurately represent the data. Environment Canada suggests that "family level identification provides sufficient taxonomic resolution to detect community responses to human disturbances" (Environment Canada 2002). During 2008 there were some unidentified organisms within the trichoptera and diptera orders. Organisms that were not identified to the family level were omitted from community indices calculations, the assumption being that all organisms are equally likely to be unidentifiable, so the organisms that could be identified to the family level are an unbiased subsample of the whole sample (Robertson 2009).

Despite the fact that different field samplers were employed in 2004 (Hess) and 2008 (Surber), the area enclosed by the samplers, the mechanism of collection, and the sampling program design was consistent, therefore comparisons over time are considered to be valid. In order to draw comparisons between the 2004 and 2008 data, the 2004 data was statistically reprocessed, grouping all individuals by family as discussed above. This resulted in slightly different community values for the 2004 data than originally reported; however, this did not affect the general results and conclusions drawn from the data as discussed in the "2005 Baseline Environmental Program Report" (KP 2004). Classifications of 'tolerant', 'facultative' and 'sensitive' organisms described in this report are consistent with the classifications in the 2004 summary report.

Several metrics were examined in order to characterize the benthic communities at the two sample sites, following the guidelines provided in Environment Canada (2002). These metrics include invertebrate densities, family proportions, and family richness. In addition, the relative abundance of Ephemeroptera and Chironomidae, the relative abundance of tolerant, facultative, and sensitive taxa, and a series of community indices were calculated in order to quantify the benthic communities in a way that allows for the detection of community responses to future potential impacts of the Catface Project.

The relative abundance of Ephemeroptera and Chironomidae has often used as a potential indicator of metal contamination. Ephemeroptera species are generally sensitive to heavy metal introduction with abundances typically declining in response to increased environmental degradation. Conversely, Chironomidae tend to be more tolerant to environmental degradation and typically increase in abundance in response to increased pollution (Barbour et al 1999).

Invertebrates vary in their tolerance to environmental stressors including degradations in water quality. Organisms within the samples collected were sorted into tolerance categories to determine relative abundances of benthic organisms at each station classified as sensitive, facultative, or tolerant (Lowe 2009). Sensitive fauna are found primarily in unpolluted water, containing little contamination or organic matter. Facultative fauna have the capacity to live under more than one specific set of environmental conditions, thus they may persist in a range of environmental and water quality conditions. Tolerant organisms are those that tend to dominate communities within habitats that have experienced severe degradation. The relative abundance of benthic invertebrates within the three categories acts as an indicator of aquatic health, and will be used in order to monitor the conditions at the two sites over time.

Composition measures consider the make-up of communities and relative contribution of species to the total community. Healthy and stable benthic communities generally have a consistent proportional representation, though individual abundance may vary in magnitude (Barbour et. al 1999). During 2004 the Shannon-Weiner Diversity Index (H), Pilou's Equitability Index (J), and Margalef Richness Index (R) were used to characterize the benthic communities at the two monitoring sites. During 2008 these indices were again employed so that comparisons could be drawn between the two sampling periods. In addition, the Simpson's Diversity Index (D) and the Evenness Index (E) developed by Smith and Wilson were also utilized to characterize the communities, as suggested by Environment Canada (2002). Family richness reflects the diversity of taxa within a community and typically increases with increasing habitat suitability, diversity and water quality.

The Shannon-Weiner Diversity Index (H) measures the difficulty in predicting correctly the taxon (in this case family) of the next individual collected. Large H values indicate greater uncertainty in predicting the next individual, and infer a high diversity. The equitability can be determined from the Shannon-Weiner function by determining the species diversity under conditions of maximum equitability (H_{max}), and then determining the ratio of H to H_{max}. This ratio ranges from 0 to 1, with a value of zero indicating that only a single taxon is present, and values closer to one indicating an evenly distributed population, with the number of individuals spread evenly among all taxons present (Krebs 2001).

The Simpson's Diversity Index (D) quantifies biodiversity by measuring the probability of two individuals in a sample belonging to the same species while accounting for taxonomic richness and abundance patterns. The higher the index (ranges from 0 to 1) the greater the biodiversity and the less likely that two individuals will belong to the same species. Diversity typically decreases with increasing stress (Krebs 2001).

Evenness, often referred to as equitability, measures the similarity of population size of different species, with evenness values closer to 1 indicating that organisms of different species are more similar in quantity. An evenness value of 0 would indicate that only one species is present.

Summaries for benthic invertebrate data collected form the Catface Project during the May 2004 and the July 2008 sampling events are presented in Table 5.1.

5.4 TAXONOMIC OVERVIEW

Several phyla or orders were represented in the 2008 invertebrate studies including mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Trichoptera): all of which inhabit cool, clean streams with high dissolved oxygen content. These orders proliferate in clean environments and are notably sensitive to water quality degradation. True flies (Diptera) were also well represented in the 2008 samples, primarily comprised of Chironomidae. Chironomidae, or true midges as they are commonly called, inhabit a wide variety of environments and many species exhibit a high tolerance to degraded water quality conditions. While these organisms are generally considered to be tolerant, they are classified as facultative this report to be consistent with the 2004 report. Several other invertebrate orders including springtails (Collembola), aphids (Homoptera), flatworms (Platyhelminthes) and ants (Formicidae) made up a very small proportion of the total number of organisms.

Invertebrate density in 2008 was considerably higher at the Adit (7,122 organisms/m^2) compared to the Bawden Creek location (233 organisms/m^2). This is likely due to the abundance of mosses at the Adit which provide viable habitat and additional surface area for colonisation. Conversely, invertebrate densities were lower at the Bawden Creek location due to higher discharges, more bouldery substrate and limited instream vegetation. Invertebrate densities at both sites were higher in 2008 when compared with the 2004 data. This variability may be due to differences in sampling equipment, time of year or inherent natural variability over time.

5.5 COMMUNITY INDICES

5.5.1 Richness

A total of 10 families were collected at the Adit location and 16 families were collected at Bawden Creek in 2008 compared to 13 at the Adit and 12 at Bawden Creek in 2004. The Richness Index measures community wealth based on the ratio of the number of families. In 2008 the Richness Index was moderate at the Adit (R=1.02) and somewhat higher at Bawden Creek (R=2.77) indicating that habitat at the Bawden Creek location has a greater capacity to support more complex ecological systems.

5.5.2 Evenness

Evenness is a reflection of the community balance in a particular aquatic environment. Since the majority of organisms collected at the Adit in 2008 belonged to the Family Chironomidae, the evenness index was quite low (J=0.13 and E=0.11). The evenness index was comparatively higher at Bawden Creek (J=0.70 and E=0.28) and is indicative of a more balanced community structure at this location. Evenness was slightly lower at the Adit in 2008 (0.12) compared to 2004 (0.11). Likewise, evenness decreased from 0.37 in 2004 to 0.28 in 2008 at the Bawden Creek location.

5.5.3 Diversity

Diversity indices provide a measure of community complexity by considering both richness and evenness. Both the Shannon-Weiner and Simpson's Diversity Index decreased at the Adit between 2004 and 2008. The Shannon-Weiner Diversity Index decreased from 0.99 in 2004 to 0.44 in 2008. The Simpson's Diversity Index decreased from 0.34 in 2004 to 0.12 in 2008 meaning that in 2004 there was a 66% probability that two individuals belonged to the same family, while in 2008 there was an 88% probability that two individuals belonged to the same family. Despite the significant increase in abundance over time, a concurrent reduction in community diversity, and hence complexity, is apparent at this location as is evident by the dominance of Chironomidae. As would be expected, the diversity indices indicate greater complexity at the Bawden Creek location with little change observed between the 2004 and 2008 sampling events. The Shannon-Weiner Diversity Index increased slightly, from 2.58 in 2004 to 2.79 in 2008, and the Simpson's Diversity Index remained the same (0.78) during both sampling events. The probability of two individuals belonging to the same species at the Bawden Creek location was therefore quite low (22%) in 2004 and 2008.

5.5.4 Tolerance

Ephemeroptera were almost twice as abundant than the more tolerant Chironomidae at Bawden Creek in 2004 while in 2008 they were almost six times more abundant than Chironomidae; making up 58.41% of the population compared to 10.18% for Chironomidae. As discussed earlier, Ephemeroptera tend to be more sensitive to degraded water quality and therefore the increase in numbers indicates a very healthy aquatic environment at the Bawden Creek location.

In comparison, the facultative invertebrates including Chironomidae made up approximately 94% of the total invertebrate population at the Adit in 2008. The remaining invertebrates (~6%) were classified as sensitive fauna. The proportion of facultative Chironmidae at the Adit was slightly lower in 2004 (~80%); sensitive and tolerant fauna made up 19% and 0.3%, respectively.

SECTION 6.0 - SUMMARY

6.1 WATER QUALITY

Overall, surface water samples were well-oxygenated, nutrient-poor, and pH-neutral with low dissolved and suspended solids concentrations and low to moderate buffering capacity against acidic inputs. Total and dissolved metal concentrations were frequently above the laboratory analytical method detection limits (MDLs) and aluminum, cadmium, copper, iron, molybdenum, and selenium exceeded either the CCME or the BCWQG criteria for the protection of freshwater aquatic life in one or more samples during one or more sampling events.

Of the *in situ* parameters, pH was slightly below the CCME and BCWQG lower threshold value of 6.5 at site BAC-01 during July 2008. All other pH measurements were within the CCME and BCWQG guideline limits. Water temperatures were between 9.7°C and 11.1°C.

Dissolved oxygen (DO) is necessary for respiration in most aquatic organisms and affects nutrient availability. DO is therefore often used as a measure of the potential productivity in aquatic ecosystems. All surface water samples with the exception of the 2008 BAC-01 sample were well-oxygenated with concentrations ranging from 6.72 mg/L to 12.3 mg/L. The highest dissolved oxygen concentrations were observed at AD-01, where DO is likely derived through photosynthetic production by mosses and vascular plants present within the seepage stream.

Dissolved ions were low at all monitoring locations, as was evident in the low conductivity values observed. AD-01 consistently had the highest conductivity values but these values were still fairly low and within normal ranges for BC coastal streams.

Several nutrients were analysed including nitrate, nitrite, phosphate and its derivatives and overall concentrations were low, indicating an oligotrophic system.

Samples were analysed for total (dissolved plus particulate) and dissolved concentrations for several metals. The metals frequently observed above their respective MDLs were aluminum, copper, iron, manganese, molybdenum, and occasionally strontium. Arsenic, cadmium, selenium, total silver, uranium, and zinc were detected at AD-01 at least one time since sampling was initiated, and cobalt and total nickel were observed at BAC-01 at least once since sampling was initiated.

No exceedances of the applicable guideline limits have been observed at UNC-01 or UNC-02; although, total and dissolved copper concentrations at UNC-01 were both at the current CCME limit (0.002 mg/L) in May 1989.

Total and dissolved copper concentrations exceeded the CCME and BCWQG criteria at AD-01 during all sampling periods and at BAC-03 in 1989 and 2004. BAC-03 was not sampled in 2008 due to access constraints; BAC-02, located downstream of BAC-03, was sampled instead during this sampling event. Total and dissolved copper exceeded the CCME guidelines at this location. Dissolved copper at BAC-01 exceeded the CCME guideline limits in May 2004 only.

In 2004, total and dissolved molybdenum, and selenium exceeded one or more of the applicable guideline limits at AD-01. In 2008 these parameters were detected only above the CCME limits at the site. In 2008 total and dissolved cadmium were also in exceedance of both the BCWQG and CCME limits at AD-01.

6.2 BENTHIC INVERTEBRATES

Richness, evenness, and diversity are consistently higher at the Bawden Creek location compared to the Adit. Though mossy vegetation at the Adit provides increased available area for colonisation, the homogeneity of this habitat is reflected in the relatively low richness, evenness, and diversity. Upstream inputs likely contribute more to the Bawden Creek communities compared to the Adit, which is an isolated headwater system near the top of Catface Mountain. The Bawden Creek location is wider, lower gradient environment and supports a more heterogenous and diverse benthic invertebrate community.

A thick blanket of moss extends from the Adit entrance approximately 20 m down the steep slope at the Adit; providing a relatively large surface area for invertebrate colonisation compared to the relatively mild gradient, coarser substrate environment at Bawden Creek. Although the invertebrate density at the Adit was much higher than that at Bawden Creek, the overall diversity was considerably lower; evident by the dominance of Chironomidae.

Ephemeroptera are sensitive to heavy metals, whereas Chironomidae have been shown to be much more resistant. The ratio of Ephemeroptera to Chironomidae decreased from 0.21 to 0.04 at the Adit from 2004 to 2008, and increased from 1.7 to 5.8 at Bawden Creek. The proliferation and dominance of Chironomidae suggests that water quality is likely not sufficient to support invertebrates that are sensitive to aquatic pollutants. Elevated metals concentrations in the Adit seepage are likely responsible for the dominance of Chironomidae at this location.

SECTION 7.0 - REFERENCES

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SECTION 8.0 - CERTIFICATION

This report was prepared, reviewed and approved by the undersigned.

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TABLE 4.1

CATFACE COPPER MINES LTD.
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2008 WATER QUALITY SUMMARY REPORT
MONITORING LOCATIONS

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Site ID	Previous Site ID	Site Description	GPS Coordinates				Samples Collected	Sampling Events		
			Easting	Northing	Latitude	Longitude		May 1989	May 2004	July 2008
WATER QUALITY MONITORING LOCATIONS										
AD-01	Site #1	Seepage from Exploration Adit (high gradient)	282993	5460799	49° 15' 41"	125° 58' 57"	3	✓	✓	✓
BAC-01	Site #4	Bawden (Irishman) Creek - lower reach near old logging road (low gradient)	717387	5462301	49° 16' 29"	126° 0' 40"	3	✓	✓	✓
BAC-02	new	Bawden (Irishman) Creek - mid-reach below waterfall (moderate gradient)	282371	5461391	49° 15' 59"	125° 59' 29"	1	-	-	✓
BAC-03	Site #3	Bawden (Irishman) Creek - upper reach above Adit discharge (moderate gradient)	283497	5460807	49° 15' 42"	125° 58' 33"	2	✓	✓	-
UNC-01	Site #2	Unnamed Creek #1 - small drainage near mouth (low gradient)	283005	5457705	49° 14' 1"	125° 58' 51"	3	✓	✓	✓
UNC-02	Site #5	Unnamed Creek #2 - small intermittent drainage near barge landing (moderate gradient)	285816	5459609	49° 15' 6"	125° 56' 36"	3	✓	✓	✓
BENTHIC INVERTEBRATE MONITORING LOCATIONS										
AD-B	Site #1	Seepage from Exploration Adit (high gradient)	282993	5460799	49° 15' 41"	125° 58' 57"	2	-	✓	✓
BAC-B	Site #6	Bawden Creek - lower reach (moderate gradient)	281791	5461557	49° 16' 4"	125° 59' 59"	2	-	✓	✓

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NOTE:

1. COORDINATES PROVIDED IN LAT/LONG AND UTM NAD83 ZONE 10, EXCEPT BAC-01 (ZONE 9).

0	02MAR'09	ISSUED WITH REPORT VA102-107/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.2

CATFACE COPPER MINES LTD.
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2008 WATER QUALITY SUMMARY REPORT
BCWQG and CCME FRESHWATER AQUATIC LIFE GUIDELINES

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PARAMETERS	Guideline Limits for the Protection of Aquatic Life	
	BCWQG (maximum)	**CCME**
Physical Parameters		
pH	6.5-9.0	6.5-9.0
Total Suspended Solids (mg/L)	depends on background	25 mg/L above background
Dissolved Anions		
Chloride (mg/L)	600	
Fluoride (mg/L)	0.2 or 0.3 (c)	
Sulphate (mg/L)	100	
Nutrients		
Ammonia (mg/L)	0.6-28.3 (d,e)	0.05-184.8 (d,e)
Nitrate (mg/L)	200	13
Nitrite (mg/L)	0.06-0.6 (f)	0.06
Cyanides		
Weak Acid Dissociable Cyanide	0.01	
Free cyanide		0.005
Total and Dissolved Metals		
Aluminum	0.005-0.1 (d, dissolved only)	0.005-0.1 (d)
Antimony - total	**0.02**	
Arsenic	0.005	0.005
Barium	**5**	
Beryllium	**0.053**	
Boron	1.2	
Cadmium	**$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (c)**	$10^{(0.86*(\log(Hardness))-3.2)}/1000$
Cobalt	0.11	
Copper	(0.094*(Hardness)+2)/1000 (c)	0.002-0.004
Iron	0.3	0.3
Lead	$e^{(1.273*\ln(Hardness)-1.460)}/1000^5$ (c)	0.001-0.007
Mangangese	(0.01102*Hardness)+0.54	
Mercury	0.0001	0.000026
Molybdenum	2	0.073
Nickel	**0.025-0.150 (c)**	0.025-0.150
Selenium	0.002	0.001
Silver	0.0001-0.003 (c)	0.0001
Thallium	**0.0003**	0.0008
Uranium	**0.3**	
Vanadium	**0.006**	
Zinc	33+0.75(hardness-90)/1000 (c)	0.03

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NOTES:

a. BCWQG: BRITISH COLUMBIA WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE IN FRESH WATER (AUGUST 2006).

b. CCME: CANADIAN ENVIRONMENTAL QUALITY GUIDELINES - CANADIAN COUNCIL OF MINISTERS FOR THE ENVIRONMENT - GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE IN FRESH WATER (DECEMBER 2006).

c. HARNDESS DEPENDENT

d. pH DEPENDENT

e. TEMPERATURE DEPENDENT

f. DEPENDS ON CHLORIDE CONCENTRATION

g. **BOLD** VALUES ARE BC "WORKING" GUIDELINE LIMITS AND HAVE NOT YET BEEN APPROVED.

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.3

CATFACE COPPER MINES LTD.
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2008 WATER QUALITY SUMMARY REPORT
2008 SURFACE WATER CHEMISTRY

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Site ID	AD-01	BAC-01	BAC-02	UNC-01	UNC-02	BCWQG [b]	CCME [c]
Date Sampled	July 14, 2008	July 14, 2008	July 17, 2008	July 14, 2008	July 14, 2008		
Time Sampled	4:30 PM	1:00 PM	3:45 PM	12:30 PM	2:00 PM		
In Situ Parameters							
Conductivity (In Situ) (uS/cm)	54	18	37	43	36		
Dissolved Oxygen (In Situ) (%)	98	60.4	93.6	103	94.5		
Dissolved Oxygen (In Situ)	12.3	6.72	10.6	11.7	10.4		
pH (In Situ)	7.25	**6.42**	7.64	7.32	6.53	6.5 to 9	6.5 to 9
Redox Potential (In Situ) (mV)	-41.8	-	-76.9	-45.5	-3.4		
Specific Conductivity (In Situ) (uS/cm)	86	24	52	60	49		
Temperature (In Situ) (°C)	9.72	10.6	9.73	9.7	11.1		
Physical Tests							
Color (TCU)	<5	19.4	<5	6.9	5.1		
Hardness	27.4	11	17.5	14.4	12		
pH	7.78	7.28	7.65	7.57	7.37	6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	76.6	37.2	52.1	55	42.4		
Total Alkalinity (as CaCO3)	24.9	11.2	15.3	12.6	10.1		
Total Dissolved Solids	55	33	35	34	28		
Total Suspended Solids	<3	6.3	<3	<3	<3		
Dissolved Anions							
Bromide	<0.05	<0.05	<0.05	<0.05	<0.05		
Chloride	3.02	3.42	3.27	5.61	3.98	600	
Fluoride	<0.02	<0.02	<0.02	<0.02	<0.02	0.2 to 0.3 [g]	
Sulphate	6.66	0.52	2.93	3.59	2.7	100	
Nutrients							
Ammonia (as N)	<0.02	0.053	<0.02	0.023	0.021	0.681 to 28.3 [h,i]	0.0536 to 185 [h,i]
Nitrate (as N)	0.0247	0.0293	0.0437	0.0518	0.0514	200	13
Nitrite (as N)	<0.001	<0.001	<0.001	<0.001	<0.001	0.06 to 0.6 [j]	0.06
Orthophosphate (as P)	0.0088	<0.001	0.0029	0.0014	0.0015		
Phosphorus (Total) (as P)	0.0082	0.0082	0.0035	0.004	0.0049		
Total Nitrogen	<0.05	0.126	<0.05	<0.05	<0.05		
Cyanide							
Cyanide (Total)	<0.005	<0.005	<0.005	<0.005	<0.005		
Dissolved Metals							
Aluminum (Dissolved)	<0.005	**0.11**	0.0186	0.037	0.0319	0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ [k]	0.005 to 0.1 [k]
Antimony (Dissolved)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Arsenic (Dissolved)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005	0.005
Barium (Dissolved)	<0.02	<0.02	<0.02	<0.02	<0.02	5	
Beryllium (Dissolved)	<0.001	<0.001	<0.001	<0.001	<0.001	0.0053	
Boron (Dissolved)	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	
Cadmium (Dissolved)	**0.000047**	<0.000017	<0.000017	<0.000017	<0.000017	$10^{(0.86*(log(Hardness))-3.2)}/1000$ [g]	$10^{(0.86*(log(Hardness))-3.2)}/1000$ [g]
Calcium (Dissolved)	8.78	3.22	5.26	4.09	3.41		
Chromium (Dissolved)	<0.001	<0.001	<0.001	<0.001	<0.001		
Cobalt (Dissolved)	<0.0003	0.00084	<0.0003	<0.0003	<0.0003	0.11	
Copper (Dissolved)	**0.0893**	**0.0083**	**0.003**	<0.001	<0.001	(0.094*(Hardness)+2)/1000 [g]	0.002 to 0.004 [g]
Iron (Dissolved)	<0.03	**0.778**	<0.03	0.041	<0.03	0.35	0.3
Lead (Dissolved)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ [g]	0.001 to 0.007 [g]
Lithium (Dissolved)	<0.005	<0.005	<0.005	<0.005	<0.005		
Magnesium (Dissolved)	1.32	0.72	1.06	1.03	0.85		
Manganese (Dissolved)	0.00043	0.0268	<0.0003	0.00102	<0.0003	(0.01102*Hardness)+0.54 [g]	
Mercury (Dissolved)	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.0001	0.000026
Molybdenum (Dissolved)	**0.0873**	<0.001	0.0105	0.0016	<0.001	2	0.073
Nickel (Dissolved)	<0.001	<0.001	<0.001	<0.001	<0.001	0.025 to 0.150 [g]	0.025 to 0.15 [g]
Potassium (Dissolved)	<2	<2	<2	<2	<2		
Selenium (Dissolved)	**0.0016**	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Silver (Dissolved)	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.0001 to 0.003 [g]	0.0001
Sodium (Dissolved)	3.4	2.8	3.1	4.5	3.1		
Thallium (Dissolved)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0008
Tin (Dissolved)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Titanium (Dissolved)	<0.01	<0.01	<0.01	<0.01	<0.01		
Uranium (Dissolved)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Vanadium (Dissolved)	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	
Zinc (Dissolved)	0.0051	<0.005	<0.005	<0.005	<0.005	(33+0.75*(Hardness-90))/1000 to 0.033 [g]	0.03
Total Metals							
Aluminum (Total)	0.0132	**0.135**	0.0228	0.0528	0.0791		0.005 to 0.1 [k]
Antimony (Total)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Arsenic (Total)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005	0.005
Barium (Total)	<0.02	<0.02	<0.02	<0.02	<0.02	5	
Beryllium (Total)	<0.001	<0.001	<0.001	<0.001	<0.001	0.0053	
Boron (Total)	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	
Cadmium (Total)	**0.000041**	<0.000017	<0.000017	<0.000017	<0.000017	$10^{(0.86*(log(Hardness))-3.2)}/1000$ [g]	$10^{(0.86*(log(Hardness))-3.2)}/1000$ [g]
Calcium (Total)	8.89	3.23	5.29	4.13	3.37		
Chromium (Total)	<0.001	<0.001	<0.001	<0.001	<0.001		
Cobalt (Total)	<0.0003	0.00083	<0.0003	<0.0003	<0.0003	0.11	
Copper (Total)	**0.0885**	**0.0097**	**0.0032**	<0.001	0.0014	(0.094*(Hardness)+2)/1000 [g]	0.002 to 0.004 [g]
Iron (Total)	<0.03	**1.26**	<0.03	0.067	<0.03	1	0.3
Lead (Total)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ [g]	0.001 to 0.007 [g]
Lithium (Total)	<0.005	<0.005	<0.005	<0.005	<0.005		
Magnesium (Total)	1.33	0.73	1.06	1.03	0.83		
Manganese (Total)	0.00042	0.027	<0.0003	0.0022	0.00066	(0.01102*Hardness)+0.54 [g]	
Mercury (Total)	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.0001	0.000026
Molybdenum (Total)	**0.0855**	<0.001	0.0105	0.0016	<0.001	2	0.073
Nickel (Total)	<0.001	<0.001	<0.001	<0.001	<0.001	0.025 to 0.150 [g]	0.025 to 0.15 [g]
Potassium (Total)	<2	<2	<2	<2	<2		
Selenium (Total)	**0.0016**	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Silver (Total)	0.000021	<0.00002	<0.00002	<0.00002	<0.00002	0.0001 to 0.003 [g]	0.0001
Sodium (Total)	3.5	2.8	3.1	4.5	3		
Thallium (Total)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0008
Tin (Total)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Titanium (Total)	<0.01	<0.01	<0.01	<0.01	<0.01		
Uranium (Total)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Vanadium (Total)	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	
Zinc (Total)	<0.005	<0.005	<0.005	<0.005	<0.005	(33+0.75*(Hardness-90))/1000 to 0.033 [g]	0.03
Organics							
Total Organic Carbon	<0.5	4.07	0.84	1.59	1.42		

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NOTES:
(a) Units are mg/L, unless otherwise stated.
(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).
(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).
(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.
(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.
(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.
(g) Hardness dependent
(h) pH (In Situ) dependent
(i) Temperature (In Situ) dependent
(j) Chloride dependent
(k) pH dependent

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB

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TABLE 4.4

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
AD-01 SURFACE WATER CHEMISTRY

Print Jan/09/2009 15:33:58

Date Sampled / Time Sampled	MDL	4-May-89 / -	May 18, 2004 / 11:45 AM	July 14, 2008 / 4:30 PM	Samples Collected	Samples below MDL	BCWQG (b)	CCME (c)
In Situ Parameters								
Conductivity (In Situ) (uS/cm)	---			54				
Dissolved Oxygen (In Situ) (%)	---			98				
Dissolved Oxygen (In Situ)	---			12.3				
pH (In Situ)	---			7.25			6.5 to 9	6.5 to 9
Redox Potential (In Situ) (mV)	---			-41.8				
Specific Conductivity (In Situ) (uS/cm)	---			86				
Temperature (In Situ) (°C)	---			9.72				
Physical Tests								
Color (TCU)	5			<5	1	1		
Hardness	0.54-0.7	28.1	29.8	27.4	3			
pH	0.01	7.16	7.67	7.78	3		6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	2	76	81.6	76.6	3			
Total Alkalinity (as CaCO3)	1-2	27.3	26.9	24.9	3			
Total Dissolved Solids	1-10	58.2	46.6	55	3			
Total Suspended Solids	3	1.3	<3	<3	3	2		
Turbidity (NTU)	0.1	<1.0	<0.1		2	2		
Dissolved Anions								
Bromide	0.05			<0.05	1	1		
Chloride	0.5	2.5	2.93	3.02	3		600	
Fluoride	0.02		<0.02	<0.02	2	2	0.2 to 0.3 (g)	
Sulphate	0.5-1	7.1	7.2	6.66	3		100	
Nutrients								
Ammonia (as N)	0.005-0.02	<0.005	<0.005	<0.02	3	3	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	0.005	0.06	0.0222	0.0247	3		200	13
Nitrite (as N)	0.001	<0.001	<0.001	<0.001	3	3	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)	0.001		0.0067	0.0088	2			
Phosphorus (Dissolved) (as P)	0.002	0.006	0.0067		2			
Phosphorus (Total) (as P)	0.002		0.0068	0.0082	2			
Total Nitrogen	0.05			<0.05	1	1		
Cyanide								
Cyanide (Total)	0.001-0.005	<0.005	<0.001	<0.005	3	3		
Dissolved Metals								
Aluminum (Dissolved)	0.005	<0.0005	0.026	<0.005	3	2	0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	0.0002-0.0005	<0.0001	<0.0002	<0.0005	3	3		
Arsenic (Dissolved)	0.0002-0.0005	0.0003	0.00054	<0.0005	3	1	0.005	0.005
Barium (Dissolved)	0.01-0.02	<0.010	<0.01	<0.02	3	3	5	
Beryllium (Dissolved)	0.001-0.005		<0.005	<0.001	2	2	0.0053	
Bismuth (Dissolved)	0.2		<0.2		1	1		
Boron (Dissolved)	0.1		<0.1	<0.1	2	2	1.2	
Cadmium (Dissolved)	0.000017-0.0002	<0.0002	<0.0002	**0.000047**	3	2	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)	0.05-0.1	9.08	9.68	8.78	3			
Chromium (Dissolved)	0.001		<0.001	<0.001	2	2		
Cobalt (Dissolved)	0.0003-0.001		<0.001	<0.0003	2	2	0.11	
Copper (Dissolved)	0.001-0.01	**0.13**	**0.092**	**0.0893**	3		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	0.03	<0.03	<0.03	<0.03	3	3	0.35	0.3
Lead (Dissolved)	0.0005-0.001	<0.001	<0.001	<0.0005	3	3	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Dissolved)	0.005			<0.005	1	1		
Magnesium (Dissolved)	0.1	1.29	1.38	1.32	3			
Manganese (Dissolved)	0.0003-0.005		<0.005	0.00043	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Dissolved)	0.00002			<0.00002	1	1	0.0001	0.000026
Molybdenum (Dissolved)	0.001	0.07	**0.101**	**0.0873**	3		2	0.073
Nickel (Dissolved)	0.001	<0.001	<0.001	<0.001	3	3	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)	0.05-2	0.8	1.03	<2	3	1		
Selenium (Dissolved)	0.0005-0.001	<0.0005	**0.00208**	**0.0016**	3	1	0.002	0.001
Silicon (Dissolved)	0.05		8.16		1			
Silver (Dissolved)	0.00002-0.0001	<0.0001	<0.0001	<0.00002	3	3	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)	0.05-2	3.21	3.79	3.4	3			
Strontium (Dissolved)	0.005		0.0314		1			
Thallium (Dissolved)	0.0002			<0.0002	1	1	0.0003	0.0008
Tin (Dissolved)	0.0005			<0.0005	1	1		
Titanium (Dissolved)	0.01		<0.01	<0.01	2	2		
Uranium (Dissolved)	0.00001-0.0002		0.000164	<0.0002	2	1		
Vanadium (Dissolved)	0.001-0.03		<0.03	<0.001	2	2	0.006	
Zinc (Dissolved)	0.005	0.006	0.0072	0.0051	3		(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals								
Aluminum (Total)	0.005	0.091	<0.005	0.0132	3	1		0.005 to 0.1 (k)
Antimony (Total)	0.0002-0.0005	<0.0001	<0.0002	<0.0005	3	3		
Arsenic (Total)	0.0002-0.0005	0.0003	0.00053	<0.0005	3	1	0.005	0.005
Barium (Total)	0.01-0.02	<0.010	<0.01	<0.02	3	3	5	
Beryllium (Total)	0.001-0.005		<0.005	<0.001	2	2	0.0053	
Bismuth (Total)	0.2		<0.2		1	1		
Boron (Total)	0.1		<0.1	<0.1	2	2	1.2	
Cadmium (Total)	0.000017-0.0002	<0.0002	<0.0002	**0.000041**	3	2	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)	0.05-0.1		9.64	8.89	2			
Chromium (Total)	0.001		<0.001	<0.001	2	2		
Cobalt (Total)	0.0003-0.001		<0.001	<0.0003	2	2	0.11	
Copper (Total)	0.001-0.01	**0.16**	**0.104**	**0.0885**	3		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	0.03	0.06	<0.03	<0.03	3	2	1	0.3
Lead (Total)	0.0005-0.001	<0.001	<0.001	<0.0005	3	3	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Total)	0.005			<0.005	1	1		
Magnesium (Total)	0.1		1.39	1.33	2			
Manganese (Total)	0.0003-0.005		<0.005	0.00042	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)	0.00001-0.00002	<0.00005	<0.00001	<0.00002	3	3	0.0001	0.000026
Molybdenum (Total)	0.001	0.07	**0.102**	**0.0855**	3		2	0.073
Nickel (Total)	0.001	<0.001	<0.001	<0.001	3	3	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Total)	2			<2	1	1		
Selenium (Total)	0.0005-0.001	<0.0005	**0.00228**	**0.0016**	3	1	0.002	0.001
Silicon (Total)	0.05		8.12		1			
Silver (Total)	0.00002-0.0001	<0.0001	<0.0001	0.000021	3	2	0.0001 to 0.003 (g)	0.0001
Sodium (Total)	2			3.5	1			
Strontium (Total)	0.005		0.0324		1			
Thallium (Total)	0.0002			<0.0002	1	1	0.0003	0.0008
Tin (Total)	0.0005			<0.0005	1	1		
Titanium (Total)	0.01		<0.01	<0.01	2	2		
Uranium (Total)	0.00001-0.0002		0.000164	<0.0002	2	1		
Vanadium (Total)	0.001-0.03		<0.03	<0.001	2	2	0.006	
Zinc (Total)	0.005	0.006	0.0053	<0.005	3	1	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Organics								
Total Organic Carbon	0.5			<0.5	1	1		

M:\1\02\00170\05\A\Data\Report-1 tables and figs\[Tables and Figures.xls]T4.4_AD-01

NOTES:

(a) Units are mg/L, unless stated otherwise.
(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).
(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).
(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.
(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.
(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.
(g) Hardness dependent
(h) pH (In Situ) dependent
(i) Temperature (In Situ) dependent
(j) Chloride dependent
(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.5

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
BAC-01 SURFACE WATER CHEMISTRY

Print Jan/09/2009 15:33:58

Date Sampled Time Sampled	May 4, 1989 -	May 18, 2004 11:00 AM	July 14, 2008 1:00 PM	Samples Collected	Samples below MDL	BCWQG (b)	CCME (c)
In Situ Parameters							
Conductivity (In Situ) (uS/cm)			18				
Dissolved Oxygen (In Situ) (%)			60.4				
Dissolved Oxygen (In Situ)			6.72				
pH (In Situ)			**6.42**			6.5 to 9	6.5 to 9
Specific Conductivity (In Situ) (uS/cm)			24				
Temperature (In Situ) (°C)			10.6				
Physical Tests							
Color (TCU)			19.4	1			
Hardness	12.3	12.3	11	3			
pH	6.99	7.31	7.28	3		6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	43.2	41.7	37.2	3			
Total Alkalinity (as CaCO3)	12.6	10.5	11.2	3			
Total Dissolved Solids	29.5	22.1	33	3			
Total Suspended Solids	3.3	<3	6.3	3	1		
Turbidity (NTU)	<1.0	0.2		2	1		
Dissolved Anions							
Bromide			<0.05	1	1		
Chloride	3.3	3.61	3.42	3		600	
Fluoride		<0.02	<0.02	2	2	0.2 to 0.3 (g)	
Sulphate	1.9	2.3	0.52	3		100	
Nutrients							
Ammonia (as N)	0.005	0.005	0.053	2	1	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	0.06	0.0624	0.0293	2		200	13
Nitrite (as N)	<0.001	<0.001	<0.001	2	2	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)		<0.001	<0.001	2	2		
Phosphorus (Dissolved) (as P)	0.001	<0.002		1	1		
Phosphorus (Total) (as P)		<0.002	0.0082	2	1		
Total Nitrogen			0.126	1			
Cyanide							
Cyanide (Total)	<0.005	0.0012	<0.005	2	1		
Dissolved Metals							
Aluminum (Dissolved)	0.045	0.021	**0.11**	2		0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	<0.0001	<0.0002	<0.0005	2	2		
Arsenic (Dissolved)	<0.0001	<0.0002	<0.0005	2	2	0.005	0.005
Barium (Dissolved)	<0.010	<0.01	<0.02	2	2	5	
Beryllium (Dissolved)		<0.005	<0.001	2	2	0.0053	
Bismuth (Dissolved)		<0.2		1	1		
Boron (Dissolved)		<0.1	<0.1	2	2	1.2	
Cadmium (Dissolved)	<0.0002	<0.0002	<0.000017	2	2	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)		3.63	3.22	2			
Chromium (Dissolved)		<0.001	<0.001	2	2		
Cobalt (Dissolved)		<0.001	0.00084	2	1	0.11	
Copper (Dissolved)	**0.004**	**0.0025**	**0.0083**	2		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	<0.03	0.05	**0.778**	2		0.35	0.3
Lead (Dissolved)	<0.001	<0.001	<0.0005	2	2	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Dissolved)			<0.005	1	1		
Magnesium (Dissolved)		0.77	0.72	2			
Manganese (Dissolved)		<0.005	0.0268	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Dissolved)			<0.00002	1	1	0.0001	0.000026
Molybdenum (Dissolved)	0.003	0.0031	<0.001	2	1	2	0.073
Nickel (Dissolved)	<0.001	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)		0.266	<2	2	1		
Selenium (Dissolved)	<0.0005	<0.0005	<0.001	2	2	0.002	0.001
Silicon (Dissolved)		3.65		1			
Silver (Dissolved)	<0.0001	<0.0001	<0.00002	2	2	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)		2.86	2.8	2			
Strontium (Dissolved)		0.0159		1			
Thallium (Dissolved)			<0.0002	1	1	0.0003	0.0008
Tin (Dissolved)			<0.0005	1	1		
Titanium (Dissolved)		<0.01	<0.01	2	2		
Uranium (Dissolved)		<0.00001	<0.0002	2	2		
Vanadium (Dissolved)		<0.03	<0.001	2	2	0.006	
Zinc (Dissolved)	<0.005	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals							
Aluminum (Total)	0.068	0.024	**0.135**	2			0.005 to 0.1 (k)
Antimony (Total)	<0.0001	<0.0002	<0.0005	2	2		
Arsenic (Total)	<0.0001	<0.0002	<0.0005	2	2	0.005	0.005
Barium (Total)	<0.010	<0.01	<0.02	2	2	5	
Beryllium (Total)		<0.005	<0.001	2	2	0.0053	
Bismuth (Total)		<0.2		1	1		
Boron (Total)		<0.1	<0.1	2	2	1.2	
Cadmium (Total)	<0.0002	<0.0002	<0.000017	2	2	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)		3.65	3.23	2			
Chromium (Total)		<0.001	<0.001	2	2		
Cobalt (Total)		<0.001	0.00083	2	1	0.11	
Copper (Total)	**0.004**	0.0019	**0.0097**	2		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	0.08	0.074	**1.26**	2		1	0.3
Lead (Total)	<0.001	<0.001	<0.0005	2	2	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Total)			<0.005	1	1		
Magnesium (Total)		0.72	0.73	2			
Manganese (Total)		<0.005	0.027	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)	<0.00005	<0.00001	<0.00002	2	2	0.0001	0.000026
Molybdenum (Total)	0.003	0.0031	<0.001	2	1	2	0.073
Nickel (Total)	0.001	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Total)			<2	1	1		
Selenium (Total)	<0.0005	<0.0005	<0.001	2	2	0.002	0.001
Silicon (Total)		3.68		1			
Silver (Total)	<0.0001	<0.0001	<0.00002	2	2	0.0001 to 0.003 (g)	0.0001
Sodium (Total)			2.8	1			
Strontium (Total)		0.0159		1			
Thallium (Total)			<0.0002	1	1	0.0003	0.0008
Tin (Total)			<0.0005	1	1		
Titanium (Total)		<0.01	<0.01	2	2		
Uranium (Total)		<0.00001	<0.0002	2	2		
Vanadium (Total)		<0.03	<0.001	2	2	0.006	
Zinc (Total)	<0.005	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Organics							
Total Organic Carbon			4.07	1			

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NOTES:
(a) Units are mg/L, unless otherwise stated.
(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).
(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).
(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.
(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.
(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.
(g) Hardness dependent
(h) pH (In Situ) dependent
(i) Temperature (In Situ) dependent
(j) Chloride dependent
(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.6

CATFACE COPPER MINES LTD.
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2008 WATER QUALITY SUMMARY REPORT
BAC-02 SURFACE WATER CHEMISTRY

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Date Sampled / Time Sampled	July 17, 2008 3:45 PM	Samples Collected	Samples below MDL	BCWQG (b)	CCME (c)
In Situ Parameters					
Conductivity (In Situ) (uS/cm)	37				
Dissolved Oxygen (In Situ) (%)	93.6				
Dissolved Oxygen (In Situ)	10.6				
pH (In Situ)	7.64			6.5 to 9	6.5 to 9
Redox Potential (In Situ) (mV)	-76.9				
Specific Conductivity (In Situ) (uS/cm)	52				
Temperature (In Situ) (°C)	9.73				
Physical Tests					
Color (TCU)	<5	1	1		
Hardness	17.5	1			
pH	7.65	1		6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	52.1	1			
Total Alkalinity (as CaCO3)	15.3	1			
Total Dissolved Solids	35	1			
Total Suspended Solids	<3	1	1		
Dissolved Anions					
Bromide	<0.05	1	1		
Chloride	3.27	1		600	
Fluoride	<0.02	1	1	0.2 to 0.3 (g)	
Sulphate	2.93	1		100	
Nutrients					
Ammonia (as N)	<0.02	1	1	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	0.0437	1		200	13
Nitrite (as N)	<0.001	1	1	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)	0.0029	1			
Phosphorus (Total) (as P)	0.0035	1			
Total Nitrogen	<0.05	1	1		
Cyanide					
Cyanide (Total)	<0.005	1	1		
Dissolved Metals					
Aluminum (Dissolved)	0.0186	1		0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	<0.0005	1	1		
Arsenic (Dissolved)	<0.0005	1	1	0.005	0.005
Barium (Dissolved)	<0.02	1	1	5	
Beryllium (Dissolved)	<0.001	1	1	0.0053	
Boron (Dissolved)	<0.1	1	1	1.2	
Cadmium (Dissolved)	<0.000017	1	1	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)	5.26	1			
Chromium (Dissolved)	<0.001	1	1		
Cobalt (Dissolved)	<0.0003	1	1	0.11	
Copper (Dissolved)	**0.003**	1		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	<0.03	1	1	0.35	0.3
Lead (Dissolved)	<0.0005	1	1	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Dissolved)	<0.005	1	1		
Magnesium (Dissolved)	1.06	1			
Manganese (Dissolved)	<0.0003	1	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Dissolved)	<0.00002	1	1	0.0001	0.000026
Molybdenum (Dissolved)	0.0105	1		2	0.073
Nickel (Dissolved)	<0.001	1	1	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)	<2	1	1		
Selenium (Dissolved)	<0.001	1	1	0.002	0.001
Silver (Dissolved)	<0.00002	1	1	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)	3.1	1			
Thallium (Dissolved)	<0.0002	1	1	0.0003	0.0008
Tin (Dissolved)	<0.0005	1	1		
Titanium (Dissolved)	<0.01	1	1		
Uranium (Dissolved)	<0.0002	1	1		
Vanadium (Dissolved)	<0.001	1	1	0.006	
Zinc (Dissolved)	<0.005	1	1	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals					
Aluminum (Total)	0.0228	1			0.005 to 0.1 (k)
Antimony (Total)	<0.0005	1	1		
Arsenic (Total)	<0.0005	1	1	0.005	0.005
Barium (Total)	<0.02	1	1	5	
Beryllium (Total)	<0.001	1	1	0.0053	
Boron (Total)	<0.1	1	1	1.2	
Cadmium (Total)	<0.000017	1	1	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)	5.29	1			
Chromium (Total)	<0.001	1	1		
Cobalt (Total)	<0.0003	1	1	0.11	
Copper (Total)	**0.0032**	1		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	<0.03	1	1	1	0.3
Lead (Total)	<0.0005	1	1	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Total)	<0.005	1	1		
Magnesium (Total)	1.06	1			
Manganese (Total)	<0.0003	1	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)	<0.00002	1	1	0.0001	0.000026
Molybdenum (Total)	0.0105	1		2	0.073
Nickel (Total)	<0.001	1	1	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Total)	<2	1	1		
Selenium (Total)	<0.001	1	1	0.002	0.001
Silver (Total)	<0.00002	1	1	0.0001 to 0.003 (g)	0.0001
Sodium (Total)	3.1	1			
Thallium (Total)	<0.0002	1	1	0.0003	0.0008
Tin (Total)	<0.0005	1	1		
Titanium (Total)	<0.01	1	1		
Uranium (Total)	<0.0002	1	1		
Vanadium (Total)	<0.001	1	1	0.006	
Zinc (Total)	<0.005	1	1	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Organics					
Total Organic Carbon	0.84	1			

M:\1\02\00170\05\A\Data\Report-1 tables and figs\[Tables and Figures.xls]T4.6_BAC-02

NOTES:

(a) Units are mg/L, unless otherwise stated.
(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).
(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).
(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.
(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.
(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.
(g) Hardness dependent
(h) pH (In Situ) dependent
(i) Temperature (In Situ) dependent
(j) Chloride dependent
(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 4.7

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
BAC-03 SURFACE WATER CHEMISTRY

Print Jan/09/2009 15:33:58

Date Sampled Time Sampled	May 4, 1989 -	May 18, 2004 2:00 PM	Samples Collected	Samples below MDL	BCWQG [b]	CCME [c]
Physical Tests						
Hardness	11.1	14				
pH	7.05	7.43			6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	39.4	43.5				
Total Alkalinity (as CaCO3)	11.6	13				
Total Dissolved Solids	27.1	23.9				
Total Suspended Solids	5.3	<3				
Turbidity (NTU)	<1.0	0.19				
Dissolved Anions						
Chloride	2.9	3.23	2		600	
Fluoride		<0.02	1	1	0.2 to 0.3 (g)	
Sulphate	1.9	2.1	2		100	
Nutrients						
Ammonia (as N)	<0.005	<0.005	2	2	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	<0.005	0.0511	2	1	200	13
Nitrite (as N)	<0.001	<0.001	2	2	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)		<0.001	1	1		
Phosphorus (Dissolved) (as P)	0.001	<0.002	2	1		
Phosphorus (Total) (as P)		<0.002	1	1		
Cyanide						
Cyanide (Total)	<0.005	0.001	2	1		
Dissolved Metals						
Aluminum (Dissolved)	0.052	0.0222	2		0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	<0.0001	<0.0002	2	2		
Arsenic (Dissolved)	<0.0001	<0.0002	2	2	0.005	0.005
Barium (Dissolved)	<0.010	<0.01	2	2	5	
Beryllium (Dissolved)		<0.005	1	1	0.0053	
Bismuth (Dissolved)		<0.2	1	1		
Boron (Dissolved)		<0.1	1	1	1.2	
Cadmium (Dissolved)	<0.0002	<0.0002	2	2	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)	3.13	4.11	1			
Chromium (Dissolved)		<0.001	1	1		
Cobalt (Dissolved)		<0.001	1	1	0.11	
Copper (Dissolved)	**0.005**	**0.0045**	2		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	<0.03	<0.03	2	2	0.35	0.3
Lead (Dissolved)	<0.001	<0.001	2	2	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Magnesium (Dissolved)	0.78	0.9	1			
Manganese (Dissolved)		<0.005	1	1	(0.01102*Hardness)+0.54 (g)	
Molybdenum (Dissolved)	0.005	0.0073	2		2	0.073
Nickel (Dissolved)	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)	0.27	0.348	2			
Selenium (Dissolved)	<0.0005	<0.0005	2	2	0.002	0.001
Silicon (Dissolved)		5.08	1			
Silver (Dissolved)	<0.0001	<0.0001	2	2	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)	2.55	3.02	1			
Strontium (Dissolved)		0.0189	1			
Titanium (Dissolved)		<0.01	1	1		
Uranium (Dissolved)		<0.00001	1	1		
Vanadium (Dissolved)		<0.03	1	1	0.006	
Zinc (Dissolved)	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals						
Aluminum (Total)	**0.14**	0.0305	2			0.005 to 0.1 (k)
Antimony (Total)	<0.0001	<0.0002	2	2		
Arsenic (Total)	<0.0001	<0.0002	2	2	0.005	0.005
Barium (Total)	<0.010	<0.01	2	2	5	
Beryllium (Total)		<0.005	1	1	0.0053	
Bismuth (Total)		<0.2	1	1		
Boron (Total)		<0.1	1	1	1.2	
Cadmium (Total)	<0.0002	<0.0002	2	2	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)		3.89	1			
Chromium (Total)		<0.001	1	1		
Cobalt (Total)		<0.001	1	1	0.11	
Copper (Total)	**0.005**	**0.0035**	2		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	<0.03	0.037	2	1	1	0.3
Lead (Total)	<0.001	<0.001	2	2	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Magnesium (Total)		0.91	1			
Manganese (Total)		<0.005	1	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)		<0.00001	1	1	0.0001	0.000026
Molybdenum (Total)	0.005	0.0064	2		2	0.073
Nickel (Total)	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Selenium (Total)	<0.0005	<0.0005	2	2	0.002	0.001
Silicon (Total)		4.85	1			
Silver (Total)	<0.0001	<0.0001	2	2	0.0001 to 0.003 (g)	0.0001
Strontium (Total)		0.018	1			
Titanium (Total)		<0.01	1	1		
Uranium (Total)		<0.00001	1	1		
Vanadium (Total)		<0.03	1	1	0.006	
Zinc (Total)	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03

M:\1\02\00170\05\A\Data\Report-1 tables and figs\[Tables and Figures.xls]T4.7_BAC-03

NOTES:

(a) Units are mg/L, unless otherwise stated.

(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).

(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).

(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.

(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.

(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.

(g) Hardness dependent

(h) pH (In Situ) dependent

(i) Temperature (In Situ) dependent

(j) Chloride dependent

(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 4.8

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
UNC-01 SURFACE WATER CHEMISTRY

Print Jan/09/2009 16:38:34

Date Sampled / Time Sampled	May 4, 1989 / -	May 18, 2004 / 10:15 AM	July 14, 2008 / 12:30 PM	Samples Collected	Samples below MDL	BCWQG (b)	CCME (c)
In Situ Parameters							
Conductivity (In Situ) (uS/cm)			43				
Dissolved Oxygen (In Situ) (%)			103				
Dissolved Oxygen (In Situ)			11.7				
pH (In Situ)			7.32			6.5 to 9	6.5 to 9
Redox Potential (In Situ) (mV)			-45.5				
Specific Conductivity (In Situ) (uS/cm)			60				
Temperature (In Situ) (°C)			9.7				
Physical Tests							
Color (TCU)			6.9	1			
Hardness	6.93	17.6	14.4	3			
pH	6.75	7.47	7.57	3		6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	34.8	58.8	55	3			
Total Alkalinity (as CaCO3)	7.6	14.8	12.6	3			
Total Dissolved Solids	19.7	32.7	34	3			
Total Suspended Solids	2	<3	<3	3	2		
Turbidity (NTU)	<1.0	0.18		2			
Dissolved Anions							
Bromide			<0.05	1	1		
Chloride	3.7	5.27	5.61	3		600	
Fluoride		<0.02	<0.02	2	2	0.2 to 0.3 (g)	
Sulphate	<1.0	4.2	3.59	3	1	100	
Nutrients							
Ammonia (as N)	0.017	<0.005	0.023	3	1	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	0.03	0.0518	0.0518	3		200	13
Nitrite (as N)	<0.001	<0.001	<0.001	3	3	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)		<0.001	0.0014	2	1		
Phosphorus (Dissolved) (as P)	<0.001	<0.002		2	2		
Phosphorus (Total) (as P)		<0.002	0.004	2	1		
Total Nitrogen			<0.05	1	1		
Cyanide							
Cyanide (Total)	<0.005	0.0016	<0.005	3	2		
Dissolved Metals							
Aluminum (Dissolved)	0.05	0.0341	0.037	3		0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	<0.0001	<0.0002	<0.0005	3	3		
Arsenic (Dissolved)	<0.0001	<0.0002	<0.0005	3	3	0.005	0.005
Barium (Dissolved)	<0.010	<0.01	<0.02	3	3	5	
Beryllium (Dissolved)		<0.005	<0.001	2	2	0.0053	
Bismuth (Dissolved)		<0.2		1	1		
Boron (Dissolved)		<0.1	<0.1	2	2	1.2	
Cadmium (Dissolved)	<0.0002	<0.0002	<0.000017	3	3	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)	1.73	5.22	4.09	3			
Chromium (Dissolved)		<0.001	<0.001	2	2		
Cobalt (Dissolved)		<0.001	<0.0003	2	2	0.11	
Copper (Dissolved)	0.002	0.0019	<0.001	3	1	(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	<0.03	0.037	0.041	3	1	0.35	0.3
Lead (Dissolved)	<0.001	<0.001	<0.0005	3	3	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Dissolved)			<0.005	1	1		
Magnesium (Dissolved)	0.62	1.11	1.03	3			
Manganese (Dissolved)		<0.005	0.00102	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Dissolved)			<0.00002	1	1	0.0001	0.000026
Molybdenum (Dissolved)	<0.001	0.0022	0.0016	3	1	2	0.073
Nickel (Dissolved)	<0.001	<0.001	<0.001	3	3	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)	0.23	0.338	<2	3	1		
Selenium (Dissolved)	<0.0005	<0.0005	<0.001	3	3	0.002	0.001
Silicon (Dissolved)		4.17		1			
Silver (Dissolved)	<0.0001	<0.0001	<0.00002	3	3	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)	2.83	4.38	4.5	2			
Strontium (Dissolved)		0.0171		1			
Thallium (Dissolved)			<0.0002	1	1	0.0003	0.0008
Tin (Dissolved)			<0.0005	1	1		
Titanium (Dissolved)		<0.01	<0.01	2	2		
Uranium (Dissolved)		<0.00001	<0.0002	2	2		
Vanadium (Dissolved)		<0.03	<0.001	2	2	0.006	
Zinc (Dissolved)	<0.005	<0.005	<0.005	3	3	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals							
Aluminum (Total)	0.055	0.038	0.0528	3			0.005 to 0.1 (k)
Antimony (Total)	<0.0001	<0.0002	<0.0005	3	3		
Arsenic (Total)	<0.0001	<0.0002	<0.0005	3	3	0.005	0.005
Barium (Total)	<0.010	<0.01	<0.02	3	3	5	
Beryllium (Total)		<0.005	<0.001	2	2	0.0053	
Bismuth (Total)		<0.2		1	1		
Boron (Total)		<0.1	<0.1	2	2	1.2	
Cadmium (Total)	<0.0002	<0.0002	<0.000017	3	3	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(\log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)		5.18	4.13	2			
Chromium (Total)		<0.001	<0.001	2	2		
Cobalt (Total)		<0.001	<0.0003	2	2	0.11	
Copper (Total)	0.002	<0.001	<0.001	3	2	(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	<0.03	0.05	0.067	3	1	1	0.3
Lead (Total)	<0.001	<0.001	<0.0005	3	3	0.003 to $e^{(1.273*\ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Total)			<0.005	1	1		
Magnesium (Total)		1.14	1.03	2			
Manganese (Total)		<0.005	0.0022	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)	<0.00005	<0.00001	<0.00002	3	3	0.0001	0.000026
Molybdenum (Total)	0.001	0.0024	0.0016	3		2	0.073
Nickel (Total)	<0.001	<0.001	<0.001	3	3	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Total)			<2	1	1		
Selenium (Total)	<0.0005	<0.0005	<0.001	3	3	0.002	0.001
Silicon (Total)		4.12		1			
Silver (Total)	<0.0001	<0.0001	<0.00002	3	3	0.0001 to 0.003 (g)	0.0001
Sodium (Total)			4.5	1			
Strontium (Total)		0.018		1			
Thallium (Total)			<0.0002	1	1	0.0003	0.0008
Tin (Total)			<0.0005	1	1		
Titanium (Total)		<0.01	<0.01	2	2		
Uranium (Total)		<0.00001	<0.0002	2	2		
Vanadium (Total)		<0.03	<0.001	2	2	0.006	
Zinc (Total)	<0.005	<0.005	<0.005	3	3	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Organics							
Total Organic Carbon			1.59	1			

M:\1\02\00170\05\A\Data\Report-1 tables and figs\[Tables and Figures.xls]T4.8_UNC-01

NOTES:
(a) Units are mg/L, unless otherwise stated.
(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).
(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).
(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.
(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.
(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.
(g) Hardness dependent
(h) pH (In Situ) dependent
(i) Temperature (In Situ) dependent
(j) Chloride dependent
(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 4.9

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
UNC-02 SURFACE WATER CHEMISTRY

Print Jan/09/2009 16:38:34

Date Sampled	May 4, 1989	May 18, 2004	July 14, 2008	Samples Collected	Samples below MDL	BCWQG [b]	CCME [c]
Time Sampled	-	9:00 AM	2:00 PM				
In Situ Parameters							
Conductivity (In Situ) (uS/cm)			36				
Dissolved Oxygen (In Situ) (%)			94.5				
Dissolved Oxygen (In Situ)			10.4				
pH (In Situ)			6.53			6.5 to 9	6.5 to 9
Redox Potential (In Situ) (mV)			-3.4				
Specific Conductivity (In Situ) (uS/cm)			49				
Temperature (In Situ) (°C)			11.1				
Physical Tests							
Color (TCU)			5.1	1			
Hardness	11.4	12.6	12	2			
pH	7.14	7.25	7.37	2		6.5 to 9	6.5 to 9
Specific Conductivity (uS/cm)	40.6	45	42.4	2			
Total Alkalinity (as CaCO3)	10.5	10.3	10.1	2			
Total Dissolved Solids	27.4	23.9	28	2			
Total Suspended Solids	2	<3	<3	2	2		
Turbidity (NTU)	40.6	0.21		1			
Dissolved Anions							
Bromide			<0.05	1	1		
Chloride	3.4	3.97	3.98	2		600	
Fluoride		<0.02	<0.02	2	2	0.2 to 0.3 (g)	
Sulphate	2.4	3.1	2.7	2		100	
Nutrients							
Ammonia (as N)	<0.005	<0.005	0.021	2	1	0.681 to 28.3 (h,i)	0.0536 to 185 (h,i)
Nitrate (as N)	0.02	0.0667	0.0514	2		200	13
Nitrite (as N)	<0.001	<0.001	<0.001	2	2	0.06 to 0.6 (j)	0.06
Orthophosphate (as P)		<0.001	0.0015	2	1		
Phosphorus (Dissolved) (as P)	<0.001	<0.002		1	1		
Phosphorus (Total) (as P)		<0.002	0.0049	2	1		
Total Nitrogen			<0.05	1	1		
Cyanide							
Cyanide (Total)	<0.005	0.001	<0.005	2	2		
Dissolved Metals							
Aluminum (Dissolved)	0.046	0.0271	0.0319	2		0.1 to $e^{(1.209-2.426*pH+0.286*pH(2))}$ (k)	0.005 to 0.1 (k)
Antimony (Dissolved)	<0.0001	<0.0002	<0.0005	2	2		
Arsenic (Dissolved)	<0.0001	<0.0002	<0.0005	2	2	0.005	0.005
Barium (Dissolved)	<0.010	<0.01	<0.02	2	2	5	
Beryllium (Dissolved)		<0.005	<0.001	2	2	0.0053	
Bismuth (Dissolved)		<0.2		1	1		
Boron (Dissolved)		<0.1	<0.1	2	2	1.2	
Cadmium (Dissolved)	<0.0002	<0.0002	<0.000017	2	2	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Dissolved)		3.59	3.41	2			
Chromium (Dissolved)		<0.001	<0.001	2	2		
Cobalt (Dissolved)		<0.001	<0.0003	2	2	0.11	
Copper (Dissolved)	<0.001	0.0019	<0.001	2	1	(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Dissolved)	<0.03	<0.03	<0.03	2	2	0.35	0.3
Lead (Dissolved)	<0.001	<0.001	<0.0005	2	2	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Dissolved)			<0.005	1	1		
Magnesium (Dissolved)		0.87	0.85	2			
Manganese (Dissolved)		<0.005	<0.0003	2	2	(0.01102*Hardness)+0.54 (g)	
Mercury (Dissolved)	<0.00005		<0.00002	1	1	0.0001	0.000026
Molybdenum (Dissolved)	<0.001	<0.001	<0.001	2	2	2	0.073
Nickel (Dissolved)	<0.001	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Dissolved)		0.344	<2	2	1		
Selenium (Dissolved)	<0.0005	<0.0005	<0.001	2	2	0.002	0.001
Silicon (Dissolved)		4.9		1			
Silver (Dissolved)	<0.0001	<0.0001	<0.00002	2	2	0.0001 to 0.003 (g)	0.0001
Sodium (Dissolved)		3.3	3.1	2			
Strontium (Dissolved)		0.0195		1			
Thallium (Dissolved)			<0.0002	1	1	0.0003	0.0008
Tin (Dissolved)			<0.0005	1	1		
Titanium (Dissolved)		<0.01	<0.01	2	2		
Uranium (Dissolved)		<0.00001	<0.0002	2	2		
Vanadium (Dissolved)		<0.03	<0.001	2	2	0.006	
Zinc (Dissolved)	<0.005	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Total Metals							
Aluminum (Total)	0.049	0.0362	0.0791	2			0.005 to 0.1 (k)
Antimony (Total)	<0.0001	<0.0002	<0.0005	2	2		
Arsenic (Total)	<0.0001	<0.0002	<0.0005	2	2	0.005	0.005
Barium (Total)	<0.010	<0.01	<0.02	2	2	5	
Beryllium (Total)		<0.005	<0.001	2	2	0.0053	
Bismuth (Total)		<0.2		1	1		
Boron (Total)		<0.1	<0.1	2	2	1.2	
Cadmium (Total)	<0.0002	<0.0002	<0.000017	2	2	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)	$10^{(0.86*(log(Hardness))-3.2)}/1000$ (g)
Calcium (Total)		3.6	3.37	2			
Chromium (Total)		<0.001	<0.001	2	2		
Cobalt (Total)		<0.001	<0.0003	2	2	0.11	
Copper (Total)	<0.001	0.0016	0.0014	2		(0.094*(Hardness)+2)/1000 (g)	0.002 to 0.004 (g)
Iron (Total)	<0.03	<0.03	<0.03	2	2	1	0.3
Lead (Total)	<0.001	<0.001	<0.0005	2	2	0.003 to $e^{(1.273*ln(Hardness)-1.460)}/1000$ (g)	0.001 to 0.007 (g)
Lithium (Total)			<0.005	1	1		
Magnesium (Total)		0.89	0.83	2			
Manganese (Total)		<0.005	0.00066	2	1	(0.01102*Hardness)+0.54 (g)	
Mercury (Total)	<0.00005	<0.00001	<0.00002	2	2	0.0001	0.000026
Molybdenum (Total)	<0.001	<0.001	<0.001	2	2	2	0.073
Nickel (Total)	<0.001	<0.001	<0.001	2	2	0.025 to 0.150 (g)	0.025 to 0.15 (g)
Potassium (Total)			<2	1	1		
Selenium (Total)	<0.0005	<0.0005	<0.001	2	2	0.002	0.001
Silicon (Total)		4.82		1			
Silver (Total)	<0.0001	<0.0001	<0.00002	2	2	0.0001 to 0.003 (g)	0.0001
Sodium (Total)			3	1			
Strontium (Total)		0.0196		1			
Thallium (Total)			<0.0002	1	1	0.0003	0.0008
Tin (Total)			<0.0005	1	1		
Titanium (Total)		<0.01	<0.01	2	2		
Uranium (Total)		<0.00001	<0.0002	2	2		
Vanadium (Total)		<0.03	<0.001	2	2	0.006	
Zinc (Total)	<0.005	<0.005	<0.005	2	2	(33+0.75*(Hardness-90))/1000 to 0.033 (g)	0.03
Organics							
Total Organic Carbon			1.42	1			

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NOTES:

(a) Units are mg/L, unless otherwise stated.

(b) BCWQG - BCWQG: Aquatic Life: Fresh - British Columbia Water Quality Guidelines for aquatic life in fresh water. (August 2006).

(c) CCME - CCME: Aquatic Life: Fresh - Canadian Environmental Guidelines for aquatic life in fresh water. (December 2006).

(d) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh limits.

(e) **BOLD** indicates the value exceeds the CCME: Aquatic Life: Fresh limits.

(f) **BOLD** indicates the value exceeds the BCWQG: Aquatic Life: Fresh and CCME: Aquatic Life: Fresh limits.

(g) Hardness dependent

(h) pH (In Situ) dependent

(i) Temperature (In Situ) dependent

(j) Chloride dependent

(k) pH dependent

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.10

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY
QA/QC DUPLICATE SAMPLE RESULTS

Print Jan/12/2009 09:38:01

Site Date Sampled	MDL 18-May-04	UNC-02 18-May-04	Duplicate 18-May-04	RPD (%)	MDL 14-Jul-08	UNC-02 14-Jul-08	Duplicate 14-Jul-08	RPD (%)
Physical Tests								
Color (TCU)					5	5.1	5.2	
Hardness	0.54	12.6	12.6	0.00%	0.7	12	12.1	0.83%
pH	0.01	7.25	7.34	1.23%	0.01	7.37	7.37	0.00%
Specific Conductivity (uS/cm)	2	45	46.5	3.28%	2	42.4	42.5	0.24%
Total Alkalinity (as CaCO3)	1	10.3	10.2	0.98%	2	10.1	10.1	0.00%
Total Dissolved Solids	1	23.9	24	0.42%	10	28	29	
Total Suspended Solids	3	<3	<3		3	<3	<3	
Turbidity (NTU)	0.1	0.21	0.45					
Dissolved Anions								
Bromide					0.05	<0.05	<0.05	
Chloride	0.5	3.97	4.09	2.98%	0.5	3.98	4	0.50%
Fluoride	0.02	<0.02	<0.02		0.02	<0.02	<0.02	
Sulphate	1	3.1	3.1		0.5	2.7	2.71	0.37%
Nutrients								
Ammonia (as N)	0.005	<0.005	<0.005		0.02	0.021	<0.02	
Nitrate (as N)	0.005	0.0667	0.069	3.39%	0.005	0.0514	0.0535	4.00%
Nitrite (as N)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Orthophosphate (as P)	0.001	<0.001	<0.001		0.001	0.0015	0.0011	
Phosphorus (Dissolved) (as P)	0.002	<0.002	<0.002					
Phosphorus (Total) (as P)	0.002	<0.002	<0.002		0.002	0.0049	0.0035	
Total Nitrogen					0.05	<0.05	<0.05	
Cyanide								
Cyanide (Total)	0.001	0.001	0.0018		0.005	<0.005	<0.005	
Dissolved Metals								
Aluminum (Dissolved)	0.005	0.0271	0.0276	1.83%	0.005	0.0319	0.0336	5.19%
Antimony (Dissolved)	0.0002	<0.0002	<0.0002		0.0005	<0.0005	<0.0005	
Arsenic (Dissolved)	0.0002	<0.0002	<0.0002		0.0005	<0.0005	<0.0005	
Barium (Dissolved)	0.01	<0.01	<0.01		0.02	<0.02	<0.02	
Beryllium (Dissolved)	0.005	<0.005	<0.005		0.001	<0.001	<0.001	
Bismuth (Dissolved)	0.2	<0.2	<0.2					
Boron (Dissolved)	0.1	<0.1	<0.1		0.1	<0.1	<0.1	
Cadmium (Dissolved)	0.0002	<0.0002	<0.0002		0.000017	<0.000017	<0.000017	
Calcium (Dissolved)	0.05	3.59	3.5	2.54%	0.1	3.41	3.44	0.88%
Chromium (Dissolved)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Cobalt (Dissolved)	0.001	<0.001	<0.001		0.0003	<0.0003	<0.0003	
Copper (Dissolved)	0.001	0.0019	0.0024		0.001	<0.001	<0.001	
Iron (Dissolved)	0.03	<0.03	<0.03		0.03	<0.03	<0.03	
Lead (Dissolved)	0.001	<0.001	<0.001		0.0005	<0.0005	<0.0005	
Lithium (Dissolved)					0.005	<0.005	<0.005	
Magnesium (Dissolved)	0.1	0.87	0.94	7.73%	0.1	0.85	0.85	0.00%
Manganese (Dissolved)	0.006	<0.005	<0.006		0.0003	<0.0003	<0.0003	
Mercury (Dissolved)					0.00002	<0.00002	<0.00002	
Molybdenum (Dissolved)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Nickel (Dissolved)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Potassium (Dissolved)	0.05	0.344	0.353	2.58%	2	<2	<2	
Selenium (Dissolved)	0.0005	<0.0005	<0.0005		0.001	<0.001	<0.001	
Silicon (Dissolved)	0.05	4.9	4.88	0.41%				
Silver (Dissolved)	0.0001	<0.0001	<0.0001		0.00002	<0.00002	<0.00002	
Sodium (Dissolved)	0.05	3.3	3.3	0.00%	2	3.1	3.1	
Strontium (Dissolved)	0.005	0.0195	0.0186					
Thallium (Dissolved)					0.0002	<0.0002	<0.0002	
Tin (Dissolved)					0.0005	<0.0005	<0.0005	
Titanium (Dissolved)	0.01	<0.01	<0.01		0.01	<0.01	<0.01	
Uranium (Dissolved)	0.00001	<0.00001	<0.00001		0.0002	<0.0002	<0.0002	
Vanadium (Dissolved)	0.03	<0.03	<0.03		0.001	<0.001	<0.001	
Zinc (Dissolved)	0.005	<0.005	<0.005		0.005	<0.005	<0.005	
Total Metals								
Aluminum (Total)	0.005	0.0362	0.0387	6.68%	0.005	0.0791	0.0691	13.50%
Antimony (Total)	0.0002	<0.0002	<0.0002		0.0005	<0.0005	<0.0005	
Arsenic (Total)	0.0002	<0.0002	<0.0002		0.0005	<0.0005	<0.0005	
Barium (Total)	0.01	<0.01	<0.01		0.02	<0.02	<0.02	
Beryllium (Total)	0.005	<0.005	<0.005		0.001	<0.001	<0.001	
Bismuth (Total)	0.2	<0.2	<0.2					
Boron (Total)	0.1	<0.1	<0.1		0.1	<0.1	<0.1	
Cadmium (Total)	0.0002	<0.0002	<0.0002		0.000017	<0.000017	<0.000017	
Calcium (Total)	0.05	3.6	3.5	2.82%	0.1	3.37	3.44	2.06%
Chromium (Total)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Cobalt (Total)	0.001	<0.001	<0.001		0.0003	<0.0003	<0.0003	
Copper (Total)	0.001	0.0016	0.001		0.001	0.0014	0.0013	
Iron (Total)	0.03	<0.03	<0.03		0.03	<0.03	<0.03	
Lead (Total)	0.001	<0.001	<0.001		0.0005	<0.0005	<0.0005	
Lithium (Total)					0.005	<0.005	<0.005	
Magnesium (Total)	0.1	0.89	0.84	5.78%	0.1	0.83	0.85	2.38%
Manganese (Total)	0.006	<0.005	<0.006		0.0003	0.00066	0.00052	
Mercury (Total)	0.00001	<0.00001	<0.00001		0.00002	<0.00002	<0.00002	
Molybdenum (Total)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Nickel (Total)	0.001	<0.001	<0.001		0.001	<0.001	<0.001	
Potassium (Total)					2	<2	<2	
Selenium (Total)	0.0005	<0.0005	<0.0005		0.001	<0.001	<0.001	
Silicon (Total)	0.05	4.82	4.73	1.88%				
Silver (Total)	0.0001	<0.0001	<0.0001		0.00002	<0.00002	0.00002	
Sodium (Total)					2	3	3.1	
Strontium (Total)	0.005	0.0196	0.0195					
Thallium (Total)					0.0002	<0.0002	<0.0002	
Tin (Total)					0.0005	<0.0005	<0.0005	
Titanium (Total)	0.01	<0.01	<0.01		0.01	<0.01	<0.01	
Uranium (Total)	0.00001	<0.00001	<0.00001		0.0002	<0.0002	<0.0002	
Vanadium (Total)	0.03	<0.03	<0.03		0.001	<0.001	<0.001	
Zinc (Total)	0.005	<0.005	<0.005		0.005	<0.005	<0.005	
Organics								
Total Organic Carbon					0.5	1.42	1.33	

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NOTES:

(a) Units are mg/L, unless otherwise stated.

(b) **Bold Red** indicates the RPD (Relative Percent Difference) exceeds the 25% data quality objective for analytical values greater than 5 times the MDL.

(c) For analytes > 25% RPD, the greatest precision we can attain is to provide mean + standard deviation (or range of values).

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 4.11

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
QA/QC BLANK SAMPLE RESULTS

Print Jan/12/2009 09:50:30

Sample ID Date Sampled	ALS Travel Blank 18-May-04
Physical Tests	
Hardness	<0.54
pH	5.51
Specific Conductivity (uS/cm)	<2
Total Alkalinity (as CaCO3)	<1
Total Dissolved Solids	<1
Total Suspended Solids	<3
Turbidity (NTU)	<0.1
Dissolved Anions	
Chloride	<0.5
Fluoride	<0.02
Sulphate	<1
Nutrients	
Ammonia (as N)	<0.005
Nitrate (as N)	<0.005
Nitrite (as N)	<0.001
Orthophosphate (as P)	<0.001
Phosphorus (Dissolved) (as P)	<0.002
Phosphorus (Total) (as P)	<0.002
Total Metals	
Aluminum (Total)	<0.005
Antimony (Total)	<0.0002
Arsenic (Total)	<0.0002
Barium (Total)	<0.01
Beryllium (Total)	<0.005
Bismuth (Total)	<0.2
Boron (Total)	<0.1
Cadmium (Total)	<0.0002
Calcium (Total)	<0.05
Chromium (Total)	<0.001
Cobalt (Total)	<0.001
Copper (Total)	<0.001
Iron (Total)	<0.03
Lead (Total)	<0.001
Magnesium (Total)	<0.1
Manganese (Total)	<0.005
Mercury (Total)	<0.00001
Molybdenum (Total)	<0.001
Nickel (Total)	<0.001
Selenium (Total)	<0.0005
Silicon (Total)	<0.05
Silver (Total)	<0.0001
Strontium (Total)	<0.005
Titanium (Total)	<0.01
Uranium (Total)	<0.00001
Vanadium (Total)	<0.03
Zinc (Total)	<0.005
Percent of sample > MDL	**0.00%**

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NOTES:

(a) Units are mg/L, unless otherwise stated.

(b) **Bold Red** indicates the result exceeds the MDL for that analyte.

(c) MDL exceedance calculation does not include pH.

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

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TABLE 5.1

CATFACE COPPER MINES LTD.
CATFACE COPPER PROJECT

2008 WATER QUALITY SUMMARY REPORT
BENTHIC MACROINVERTEBRATE INDICES

Print Jan/12/2009 09:50:30

	Adit		Bawden Creek	
	2004	2008	2004	2008
Samples per Station	3	2	3	3
Organisms per m^2	1,238	7,126	154	233
Families per Station	13	10	12	16
TOLERANCE CATEGORIES				
%Sensitive Fauna	18.74	5.30	65.60	72.57
% of Faculative Fauna	80.96	94.70	34.40	27.43
% of Tolerant Fauna	0.30	0.00	0.00	0.00
SPECIES COMPOSITION				
% Ephemeroptera	16.75	4.36	48.00	58.41
% Chironomids	79.56	93.70	28.00	10.18
COMMUNITY INDICES				
Richness Index (R)	1.74	1.02	2.28	2.77
Pilou's Equitability Index (J)	0.27	0.13	0.72	0.70
Evenness Index (E)	0.12	0.11	0.37	0.28
Shannon-Weiner Diversity Index (H)	0.99	0.44	2.58	2.79
H_{max}	3.70	3.32	3.58	4.00
Simpson's Diversity Index (D)	0.34	0.12	0.78	0.78

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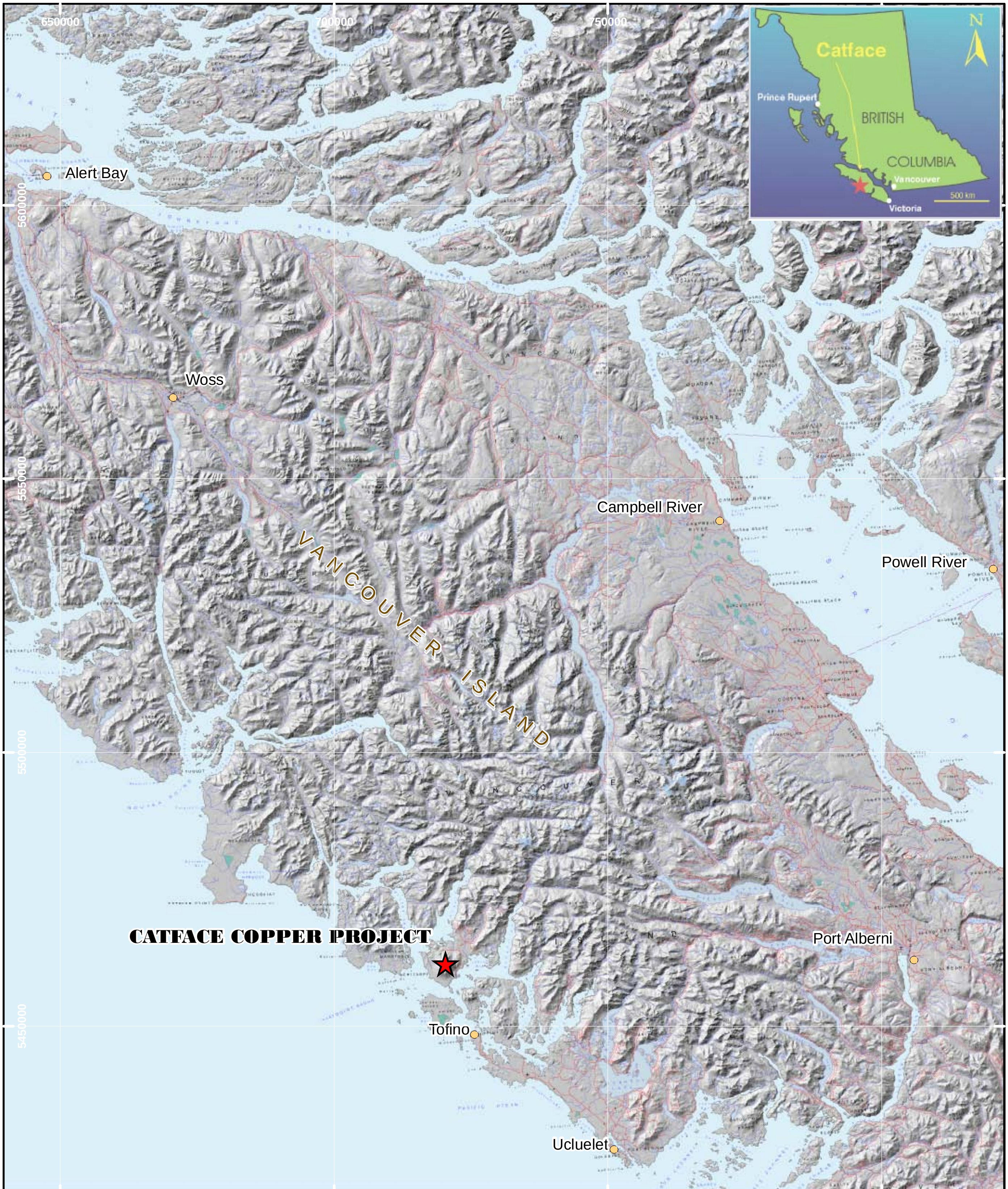
0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	KEF	SCE	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



N W E S

0 5 10 20 30 40 50

Kilometers

Background images source: BC TRIM raster
Inset image source: Catface Copper Mines Ltd.
Projection: UTM NAD 83 Zone 9 and 10

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	RP	SCE	RCB

CATFACE COPPER MINES LTD.

CATFACE COPPER PROJECT

PROJECT LOCATION MAP

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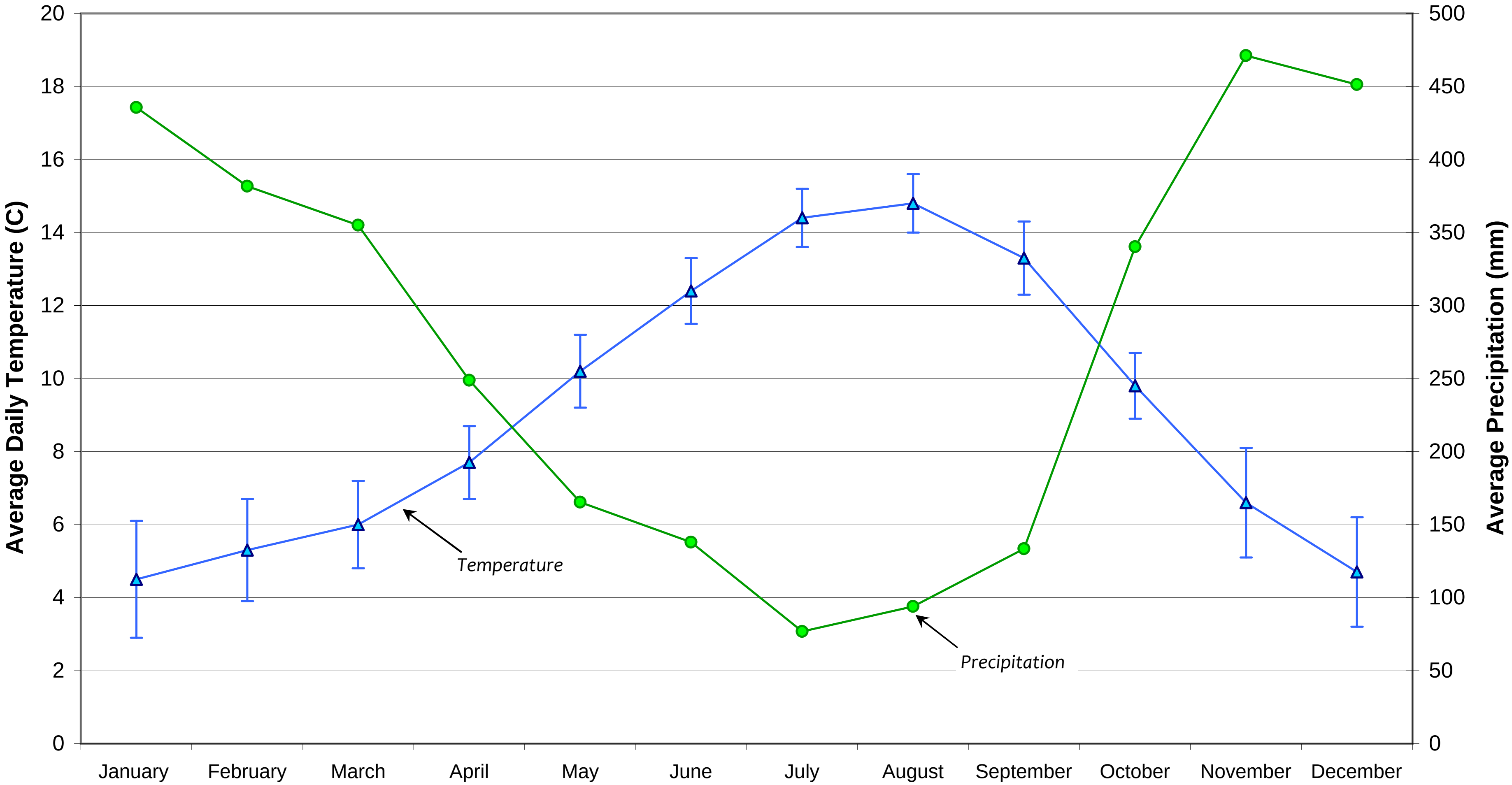
Project/Assignment No	Ref. No	
VA102-170/5	1	
FIGURE 1.1		Rev. 0

VANCOUVER B.C. ArcView File: M:\1\02\00170\05\A\GIS\ArcView\figures\Figure 1.1_r0.mxd 09Dec'08 RP



NOTES:

1. Source: Canadian Climate Normals 1971 - 2000 for Tofino Station (Climate ID: 1038205); elevation 24.40 m

0	02MAR'09	ISSUED WITH REPORT VA102-170/5-1	RP	JEM	RCB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

CATFACE COPPER MINES LTD.

CATFACE COPPER PROJECT

TOFINO CLIMATE DATA

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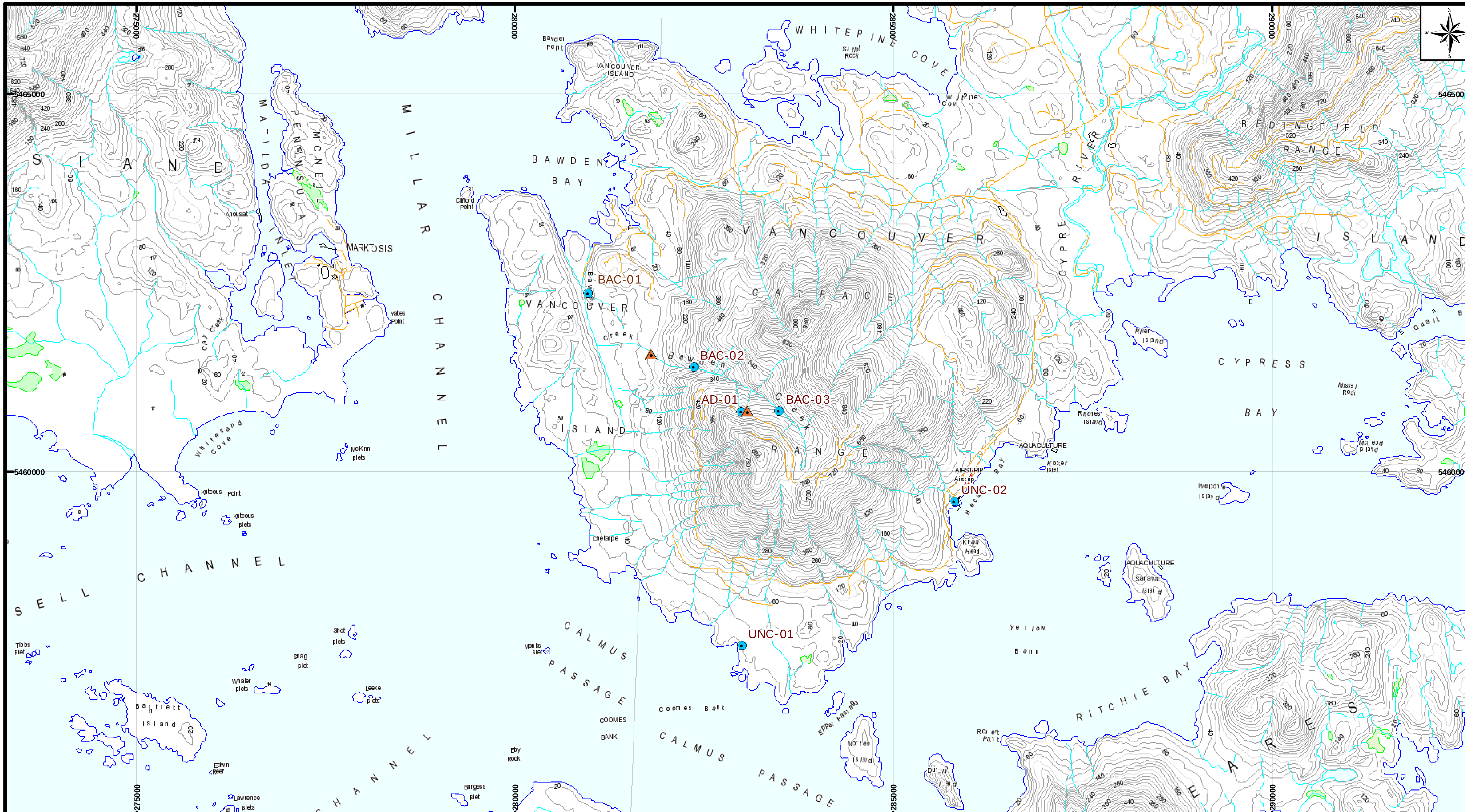
P/A NO. VA102-170/5	REF NO. 1	
FIGURE 2.1		REV 0



LEGEND

Water Quality Monitoring Locations

Benthic Invertebrate Monitoring Locations

500 0 500 1,000 1,500 2,000 2,500 Meters

1:50,000

REV.	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
A	19JAN09	ISSUED WITH REPORT	RP	RP	SCE	RCB

CATFACE COPPER MINES LTD.

CATFACE COPPER PROJECT

WATER QUALITY AND BENTHIC INVERTEBRATE MONITORING LOCATIONS

Knight Piésold CONSULTING

Project/Assignment No	Ref. No	Rev.
VA102-170/05	1	0

FIGURE 4.1

VANCOUVER B.C. ArcView File: M:\1\02\00170\05\A\GIS\ArcView\figures\Figure 4.1.mxd January 19, 2009 RP

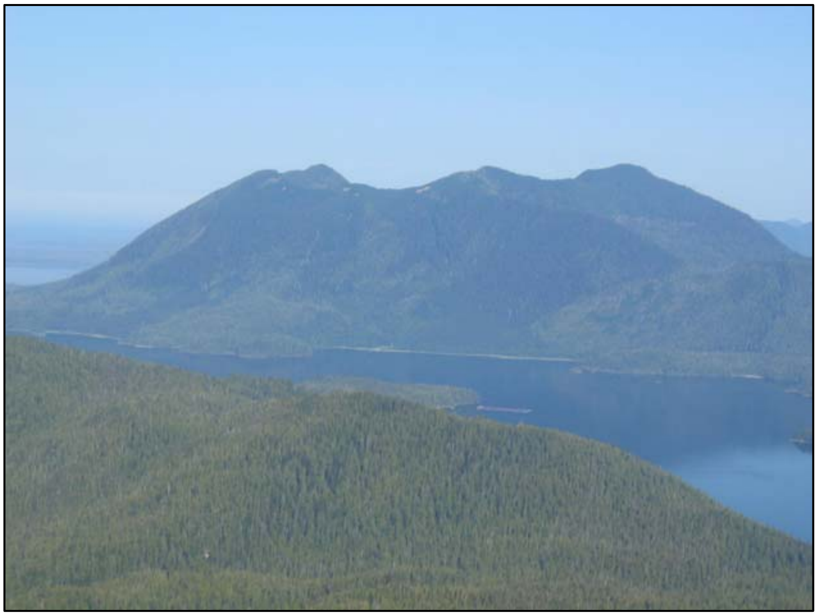


PHOTO #1 – Catface Mountain

PHOTO #2 – Exploration Adit from the air, July 2008

CATFACE COPPER MINES LTD.
CATFACE PROJECT

PHOTO #3 – Seepage from Exploration Adit at AD-01 (previously site #1), July 2008

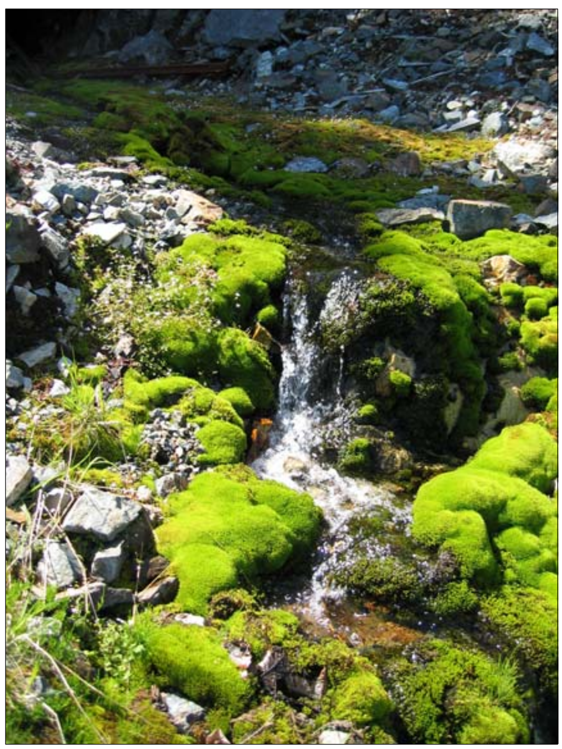


PHOTO #4 – Seepage from Exploration Adit at AD-01, May 2004

CATFACE COPPER MINES LTD.
CATFACE PROJECT

PHOTO #5 – Lower reaches of Bawden Creek at BAC-01 (previously site #4, July 2008

PHOTO #6 – Lower reaches of Bawden Creek at BAC-01, May 2004

CATFACE COPPER MINES LTD.
CATFACE PROJECT

PHOTO #7 – Mid-reaches of Bawden Creek at BAC-02, July 2008

PHOTO #8 – Upper reaches of Bawden Creek at BAC-03 (previously site #3), May 2004

CATFACE COPPER MINES LTD.
CATFACE PROJECT

PHOTO #9 – Unnamed Creek UNC-01 (previously site #2), July 2008

PHOTO #10 – Unnamed Creek UNC-01, May 2004

PHOTO #11 – Unnamed Creek UNC-02 near barge landing (previously site #5), July 2008

PHOTO #12 – Unnamed Creek UNC-02 near barge landing, May 2004

PHOTO #13 – Benthic invertebrate sampling at the Exploration Adit, July 2008

PHOTO #14 – Benthic invertebrate sampling at lower Bawden Creek, July 2008

CATFACE COPPER MINES LTD.
CATFACE PROJECT

PHOTO #15 – Benthic sampling location at lower Bawden Creek. May 2004

SECTION C: EXPENDITURES (Catface 2008 Water Quality Study)

Item	Work Performed	Quantities / Rates	Amount
Technical Services:			
Knight Piésold Ltd.	Additional baseline water quality and benthic invertebrate monitoring on the Catface Property: Field sampling on Jul 14 and 17, 2009. Analysis of 2008 results and earlier sampling in 1989 and 2004. Report preparation		$20,686.82
Transportation:			
West Coast Helicopters: Jul 14 2008	Transport of consultant's field personnel for water sampling	2.3 hours @ $1,894.89	4,358.25
Far West Helicopters: Jul 17 2008	Transport of consultant's field personnel for water sampling	2.1 hours @ $1,164.29	2,445.00
Sub-total			6,803.25
Project Supervision:			
Paul Gray, P.Geo. Project Manager Catface Copper Mines Limited	Project planning, liaison, review of Knight Piésold data and report, preliminary report preparation. Period: Jun 2008 to Mar 2009	5 days @ $450.00	2,250.00
Jim Chapman, P.Geo. Project Consultant	Review of data and report preparation	1.5 days @ $600.00	900.00
Drafting:			
Mike Davies, Moonraker Multimedia	Map preparation	4.0 hours @ $65.00	260.00
Data Compilation:			
Erik Andersen Land Administrator	Data compilation and report preparation	10.0 hours @ $40.00	400.00
Total 2008 Water Quality Study			**$31,300.07**
Expenditures			
No. of Sample Sites			**5**
Cost per Site			**$6,260.01**
Distribution:	**Work on Mining Lease 345339** **Work off Mining Lease:** Tenure 201393 Tenure 201398 (120 m south) Tenure 201429 Tenure 201445	**1 sample site (AD-01)** **4 sample sites** Sample site BAC-02 Sample site UNC-01 Sample site UNC-02 Sample site BAC-01	**$6,260.01** **$25,040.05**

SECTION D: PROPERTY

Mineral Tenure Summary Table

CATFACE PROPERTY - MINERAL TENURES | **Date:** Aug 19 2009

OWNER: Catface Copper Mines Limited **100.0%** **Client No.** **104480** **Tenures** **138**

BACK-IN RIGHT: Xstrata Canada Corporation **50.1%** **Units/Cells** **159**

or ROYALTY: Xstrata Canada Corporation **9.0%** **Net Proceeds of Production** **Area (ha)** **3797.3**

MINING DIVISION: Alberni **LAND DISTRICT:** Clayoquot

LOCATION: in the Catface Range 13 km north-northwest of Tofino, BC

MAP NO. NTS: 92E/01E, 08E; 92F/04W, 05W GEOGRAPHIC COORDINATES: 49° 15.6′ N; 125° 59.3′ W

BCGS: 92E030, 92F021 UTM COORDINATES (NAD 83, ZONE 10): 5 460 300 N; 283 200 E

Tenure Number	Tenure Type	Claim Name	% Held	Map No.	Record Date	Good To Date	Units/Cells	Area (ha)	Work/Rent (Annual)
Mining Lease:									
345339	Mineral	MINING LEASE	100%	092F021	1996/sep/25	2010/sep/25	15	252.0	$2,520.00
Legacy Claims:									
201363	Mineral	CATFACE #8	100%	092F021	1961/may/12	2010/aug/15	1	25.00	$200.00
201392	Mineral	CATFACE #36	100%	092F021	1961/dec/04	2010/aug/15	1	25.0	$200.00
201393	Mineral	CATFACE #38	100%	092F021	1961/dec/04	2010/aug/15	1	25.0	$200.00
201394	Mineral	CATFACE #40	100%	092F021	1961/dec/04	2010/aug/15	1	25.0	$200.00
201395	Mineral	CATFACE #41	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201396	Mineral	CATFACE #42	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201397	Mineral	CATFACE #43	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201398	Mineral	CATFACE #44	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201399	Mineral	CATFACE #45	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201400	Mineral	CATFACE #46	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201401	Mineral	CATFACE #47	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201402	Mineral	CATFACE #48	100%	092F021	1961/dec/14	2010/aug/15	1	25.0	$200.00
201416	Mineral	CATFACE #50	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201417	Mineral	CATFACE #52	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201418	Mineral	CATFACE #53	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201419	Mineral	CATFACE #54	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201420	Mineral	CATFACE #56	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201421	Mineral	CATFACE #58	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201422	Mineral	CATFACE #59	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201423	Mineral	CATFACE #60	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201424	Mineral	CATFACE #61	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201425	Mineral	CATFACE #62	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201426	Mineral	CATFACE #63	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201427	Mineral	CATFACE #64	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00

Tenure Number	Tenure Type	Claim Name	% Held	Map No.	Record Date	Good To Date	Units/Cells	Area (ha)	Work/Rent (Annual)
201428	Mineral	CATFACE #65	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201429	Mineral	CATFACE #66	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201430	Mineral	CATFACE #67	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201431	Mineral	CATFACE #68	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201432	Mineral	CATFACE #69	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201433	Mineral	CATFACE #70	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201434	Mineral	CATFACE #71	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201435	Mineral	CATFACE #72	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201436	Mineral	CATFACE #73	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201437	Mineral	CATFACE #74	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201438	Mineral	CATFACE #75	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201439	Mineral	CATFACE #76	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201440	Mineral	CATFACE #77	100%	092F021	1962/feb/20	2010/aug/15	1	25.0	$200.00
201441	Mineral	CATFACE #78	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201442	Mineral	CATFACE #79	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201443	Mineral	CATFACE #80	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201444	Mineral	CATFACE #81	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201445	Mineral	CATFACE #82	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201446	Mineral	CATFACE #83	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201447	Mineral	CATFACE #84	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201448	Mineral	CATFACE #85	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201449	Mineral	CATFACE #87	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201450	Mineral	CATFACE #89	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201451	Mineral	CATFACE #91	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201452	Mineral	CATFACE #92	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201453	Mineral	CATFACE #93	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201454	Mineral	CATFACE #95	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201455	Mineral	CATFACE #97	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201456	Mineral	CATFACE #99	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201457	Mineral	CATFACE #100	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201458	Mineral	CATFACE #101	100%	092E030	1962/feb/20	2010/aug/15	1	25.0	$200.00
201466	Mineral	CATFACE #102	100%	092F021	1962/apr/05	2010/aug/15	1	25.0	$200.00
201467	Mineral	CATFACE #103	100%	092F021	1962/apr/05	2010/aug/15	1	25.0	$200.00
201468	Mineral	CATFACE #104	100%	092F021	1962/apr/05	2010/aug/15	1	25.0	$200.00
201469	Mineral	CATFACE #105	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201470	Mineral	CATFACE #106	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00

Tenure Number	Tenure Type	Claim Name	% Held	Map No.	Record Date	Good To Date	Units/Cells	Area (ha)	Work/Rent (Annual)
201471	Mineral	CATFACE #107	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201472	Mineral	CATFACE #108	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201473	Mineral	CATFACE #109	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201474	Mineral	CATFACE #110	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201475	Mineral	CATFACE #111	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201476	Mineral	CATFACE #112	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201477	Mineral	CATFACE #113	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201478	Mineral	CATFACE #114	100%	092E030	1962/apr/05	2010/aug/15	1	25.0	$200.00
201479	Mineral	CATFACE #115	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201480	Mineral	CATFACE #116	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201481	Mineral	CATFACE #117	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201482	Mineral	CATFACE #118	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201483	Mineral	CATFACE #119	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201484	Mineral	CATFACE #120	100%	092E030	1962/may/10	2010/aug/15	1	25.0	$200.00
201485	Mineral	CATFACE #123	100%	092F021	1962/may/10	2010/aug/15	1	25.0	$200.00
201489	Mineral	CATFACE #130	100%	092F021	1962/jul/10	2010/aug/15	1	25.0	$200.00
201490	Mineral	CATFACE #131	100%	092F021	1962/jul/10	2010/aug/15	1	25.0	$200.00
201598	Mineral	CATFACE #14 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201599	Mineral	CATFACE #15 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201600	Mineral	CATFACE #16 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201603	Mineral	CATFACE #19 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201605	Mineral	CATFACE #21	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201606	Mineral	CATFACE #22	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201607	Mineral	CATFACE #23	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201608	Mineral	CATFACE #24	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201609	Mineral	CATFACE #25	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201610	Mineral	CATFACE #26	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201611	Mineral	CATFACE #27	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201612	Mineral	CATFACE #28	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201613	Mineral	CATFACE #29	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201614	Mineral	CATFACE #30	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201615	Mineral	CATFACE #31	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201616	Mineral	CATFACE #32 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201617	Mineral	CATFACE #33	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201618	Mineral	CATFACE #34	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201619	Mineral	CATFACE #35	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00

Tenure Number	Tenure Type	Claim Name	% Held	Map No.	Record Date	Good To Date	Units/Cells	Area (ha)	Work/Rent (Annual)
201622	Mineral	CATFACE #49	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201623	Mineral	CATFACE #51	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201624	Mineral	CATFACE #55 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201625	Mineral	CATFACE #57	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201626	Mineral	CATFACE #86	100%	092E030	1970/mar/31	2010/aug/15	1	25.0	$200.00
201627	Mineral	CATFACE #88	100%	092E030	1970/mar/31	2010/aug/15	1	25.0	$200.00
201628	Mineral	CATFACE #90	100%	092E030	1970/mar/31	2010/aug/15	1	25.0	$200.00
201629	Mineral	CATFACE #94	100%	092E030	1970/mar/31	2010/aug/15	1	25.0	$200.00
201630	Mineral	CATFACE #96	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201631	Mineral	CATFACE #98	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201632	Mineral	CATFACE #121	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201633	Mineral	CATFACE #122	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201634	Mineral	CATFACE #124	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201635	Mineral	CATFACE #125	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201636	Mineral	CATFACE #126	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201637	Mineral	CATFACE #127 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201638	Mineral	CATFACE #128	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201639	Mineral	CATFACE #129	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201640	Mineral	CATFACE #132 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201641	Mineral	CATFACE #133 FR.	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201642	Mineral	CATFACE #134	100%	092F021	1970/mar/31	2010/aug/15	1	25.0	$200.00
201643	Mineral	CATFACE #138 FR.	100%	092F021	1970/may/07	2010/aug/15	1	25.0	$200.00
201644	Mineral	CATFACE #139 FR.	100%	092E030	1970/may/07	2010/aug/15	1	25.0	$200.00
201645	Mineral	CATFACE #141 FR.	100%	092F021	1970/may/15	2010/aug/15	1	25.0	$200.00
201646	Mineral	CATFACE #143 FR.	100%	092F021	1970/may/19	2010/aug/15	1	25.0	$200.00
201647	Mineral	CATFACE #145 FR.	100%	092E030	1970/may/19	2010/aug/15	1	25.0	$200.00
201648	Mineral	CATFACE #134 FR.	100%	092E030	1970/may/08	2010/aug/15	1	25.0	$200.00
201649	Mineral	CATFACE #135 FR.	100%	092E030	1970/may/08	2010/aug/15	1	25.0	$200.00
201650	Mineral	CATFACE #136 FR.	100%	092E030	1970/may/08	2010/aug/15	1	25.0	$200.00
201651	Mineral	CATFACE #137 FR.	100%	092E030	1970/may/08	2010/aug/15	1	25.0	$200.00
201652	Mineral	CATFACE #144 FR.	100%	092F021	1970/jun/01	2010/aug/15	1	25.0	$200.00
201653	Mineral	CATFACE #142 FR.	100%	092F021	1970/jun/01	2010/aug/15	1	25.0	$200.00
201654	Mineral	CATFACE #140 FR.	100%	092F021	1970/jun/01	2010/aug/15	1	25.0	$200.00
342307	Mineral	CATFACE MC #149 FR	100%	092F021	1995/nov/29	2010/aug/15	1	25.0	$200.00
Subtotal							130	3,250.00	$26,000.00

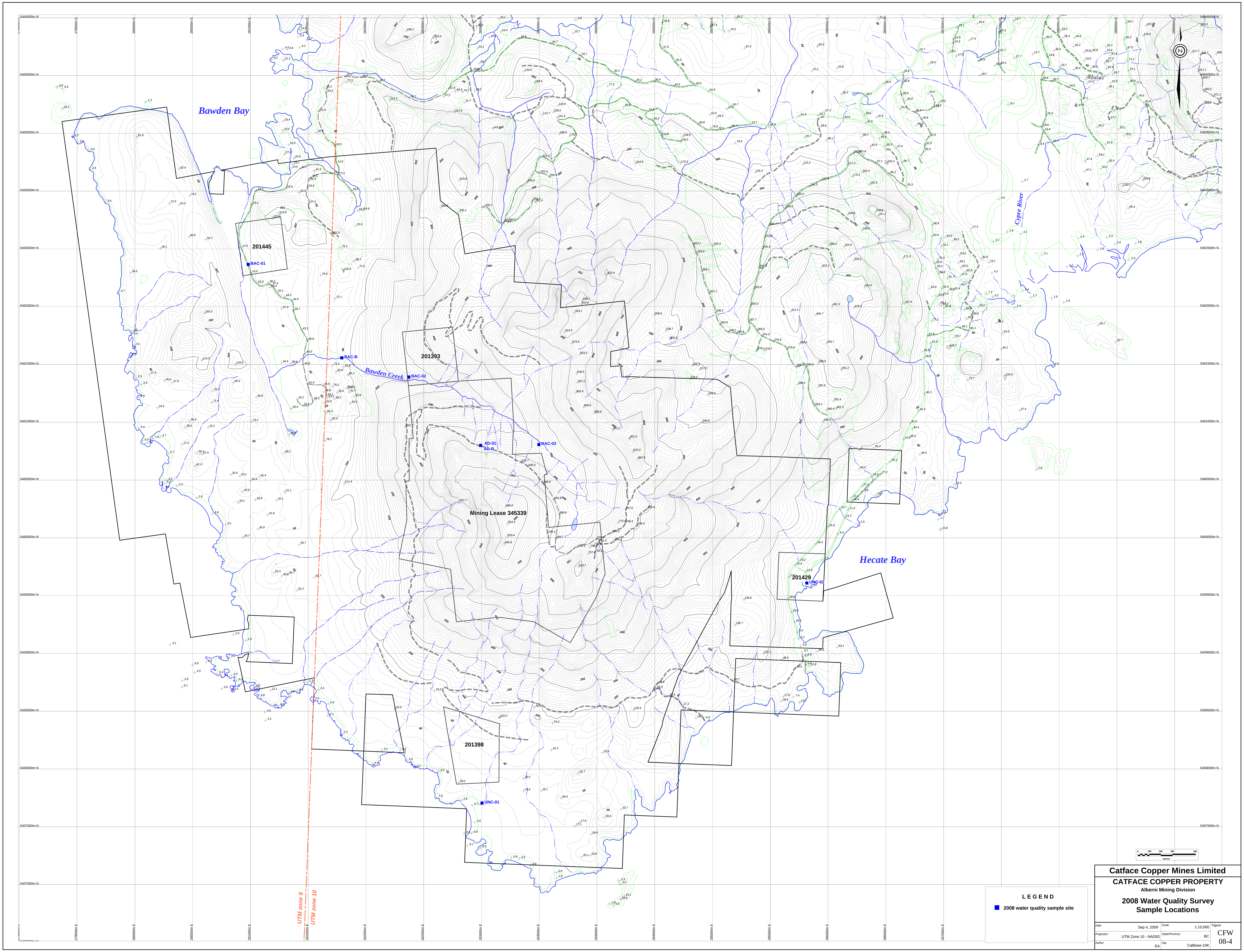
Tenure Number	Tenure Type	Claim Name	% Held	Map No.	Record Date	Good To Date	Units/Cells	Area (ha)	Work/Rent (Annual)
Cell Claims:									
584343	Mineral	CCML01	100%	092F021	2008/may/15	2010/aug/15	2	42.18	$168.72
584344	Mineral	CCML02	100%	092F021	2008/may/15	2010/aug/15	1	21.09	$84.36
584345	Mineral	CCML03	100%	092F021	2008/may/15	2010/aug/15	1	21.09	$84.36
584347	Mineral	CCML04	100%	092F021	2008/may/15	2010/aug/15	1	21.08	$84.32
604683	Mineral	CCML05	100%	092F021	2009/may/19	2010/may/19	5	105.47	$421.88
604686	Mineral	CCML06	100%	092F021	2009/may/19	2010/may/19	2	42.19	$168.76
604688	Mineral	CCML07	100%	092F021	2009/may/19	2010/may/19	2	42.18	$168.72
Subtotal							14	295.28	$1,181.12
TOTAL							**159**	**3,797.28**	**$29,701.12**

2010 Tenure Maintenance Requirements	**Mining Lease Rental**	**$2,520.00**
	Assessment or Cash-in Lieu	**$27,181.12**
	Submission Fees (3545.28 ha @ $0.40/ha)	**$1,418.11**
	Total 2010	**$31,119.23**

Mining Lease 345339: Issued Sept. 25, 1996 for a 30 year term to Sept. 25, 2026. Annual rental of $2,520.00 payable by Sept. 25 of each year.

SECTION E: ILLUSTRATIONS

Plan Number	Title	Scale
CFW-08-1 (after p. 3)	General Location Plan	1:8,000,000
CFW-08-2 (after p. 3)	Property Claim Map	1:40,000
CFW-08-3 (after p.6)	Regional Geology	1:500,000
CFW-08-4 (in pocket)	2008 Water Quality Survey / Sample Locations	1:10,000
In Technical Report		
Figure 1.1	Project Location Map	1:1,000,000
Figure 2.1	Tofino Climate Data	
Figure 4.1	Water Quality and Benthic Invertebrate Monitoring Locations	1:50,000


Bawden Bay
Hecate Bay
Bawden Creek
Cypre River
201445
201393
201429
201398
Mining Lease 345339
BAC-01
BAC-B
BAC-02
AD-01
AD-B
BAC-03
UNC-02
UNC-01
UTM zone 9
UTM zone 10
LEGEND
2008 water quality sample site
Catface Copper Mines Limited
CATFACE COPPER PROPERTY
Alberni Mining Division
2008 Water Quality Survey
Sample Locations
Date Sep 4, 2009
Scale 1:10,000
Projection UTM Zone 10 - NAD83
State/Province BC
Author EA
File CatBase-10K
Figure CFW 08-4