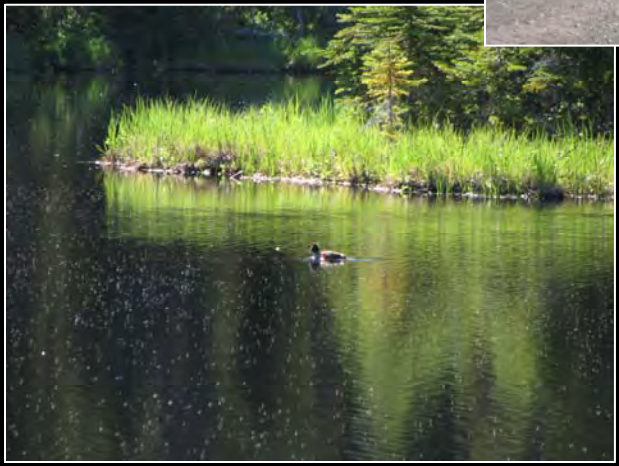
COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ENGINEERING HYDROMETEOROLOGY REPORT



PREPARED FOR

Copper Fox Metals Inc.
Suite 501 - 510 Burrard Street
Vancouver, BC V6C 3A8

PREPARED BY

Knight Piésold Ltd.
Suite 1400 – 750 West Pender Street
Vancouver, BC V6C 2T8

VA101-329/5-3
Rev 1
July 15, 2010

Knight Piésold
CONSULTING

ISO 9001, ISO 14001
OHSAS 18001

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ENGINEERING HYDROMETEOROLOGY REPORT
(REF. NO. VA101-329/5-3)

Rev	Description	Date	Approved
0	Issued in Final	April 20, 2010	KJB
1	Revision of Mean Annual Precipitation Estimate	July 15, 2010	KJB

Knight Piésold Ltd.

Suite 1400
750 West Pender Street
Vancouver, British Columbia Canada V6C 2T8
Telephone: (604) 685-0543
Facsimile: (604) 685-0147
www.knightpiesold.com

Knight Piésold
CONSULTING

Knight Piésold
CONSULTING

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ENGINEERING HYDROMETEOROLOGY REPORT
(REF. NO. VA101-329/5-3)

EXECUTIVE SUMMARY

The Schaft Creek project comprises a large porphyry copper-gold-molybdenum-silver deposit, located approximately 60 km southwest of Telegraph Creek and some 1,050 km north of Vancouver, in the Iskut-Stikine region of northwestern British Columbia. This report presents meteorological and hydrological data collected at the project site since October 2005. In addition, these data, in conjunction with long-term regional data, are used to provide estimates of long-term hydrometeorological parameters for the project site as input to engineering design and water balance modelling.

It should be noted that the meteorological parameter estimates presented in this report are for the Schaft Creek Saddle climate station, situated at elevation 977 m, as this station has the most complete data record of the three project climate stations. An orographic factor was estimated for the project area to relate the long-term precipitation estimate at the Saddle station to other elevations.

The key findings of this study are:

- The mean annual temperature for the project area is estimated to be 1.2 °C, with minimum and maximum monthly temperatures of -8.2 °C and 12.3 °C occurring in January and August, respectively.
- The mean annual wind speed is approximately 2.5 m/s, with gusts reaching 6 m/s. The dominant measured wind direction is from the south.
- The mean annual relative humidity is approximately 72%.
- The mean annual potential evapotranspiration for the project site is estimated to be 433 mm.
- The mean annual precipitation for the project area is estimated to be 850 mm, with 30% falling as rain and 70% falling as snow. ▲R1
- The mean annual streamflow for the project area site is highly variable as a result of the range in watershed characteristics within the project area. Mean annual unit runoff in Schaft Creek, downstream of the proposed waste dump location, is 46 l/s/km^2. Mean annual unit runoff from the Skeeter Lake valley, for the northern and southern outlet creeks, is 28 l/s/km^2 and 21 l/s/km^2, respectively.
- The greatest monthly streamflow variability at the project site, as a percentage of the monthly mean, typically occurs in April and in October and November, as a result of variations in freshet timing and in storm event precipitation phase and magnitude.
- The annual hydrograph typically has a unimodal shape, with high flows resulting from snowmelt in the spring and summer freshet period, mid flows maintained by glacier melt and rainfall throughout the late summer and early fall, and low flows throughout the winter.
- Return period peak flows and 7-day low flows were estimated for Schaft Creek and the northern and southern Skeeter Lake valley systems. 200- year peak flows were 915 m^3/s, 119 m^3/s and 228 m^3/s, respectively. 10-year 7-day low flows were estimated to be 0.10 m^3/s, 0.02 m^3/s and 0.05 m^3/s, respectively.

- An orographic factor of an 8% increase in mean annual precipitation per 100 m of elevation gain was estimated for the project area. ▲R1
- The effective runoff coefficient for non-glaciated areas is estimated to be approximately 0.75. ▲R1
- Climate change has not been considered explicitly in the hydrometeorological estimates, and appropriate allowances should be made where necessary.

Knight Piésold CONSULTING

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ENGINEERING HYDROMETEOROLOGY REPORT
(REF. NO. VA101-329/5-3)

TABLE OF CONTENTS

PAGE

Knight Piésold CONSULTING

TABLES

FIGURES

Knight Piésold
CONSULTING

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ENGINEERING HYDROMETEOROLOGY REPORT
(REF. NO. VA101-329/5-3)

SECTION 1.0 - INTRODUCTION

1.1 PROJECT DESCRIPTION

The Schaft Creek project is located on the eastern edge of the Boundary Range of the Coast Mountains, a high rugged mountain range in northwestern British Columbia (Figure 1.1). The area is characterised by steep sided mountains and deeply entrenched, broad U-shaped valleys that trend north-south. Active glaciers are common throughout the project area. Ground elevations in the region typically range from around 700 m to 900 m on the valley floors, rising steeply to in excess of 2,500 m at the mountain peaks.

The project site is bounded to the east by the northerly flowing Mess Creek and to the west by Hickman and Schaft Creeks, which also flow northwards and merge with Mess Creek downstream of the project area. Mess Creek continues northwards and discharges to the Stikine River some 60 km to the north near Telegraph Creek. The topography immediately north of the deposit is dominated by Mount LaCasse, which rises to an elevation of more than 2,000 m. Mount Edziza Provincial Park, an area of recent extensive lava flows, is located approximately 20 km to the east of the project.

The climate of the project area is characterized as transitional, between coastal and interior conditions. On the coast, annual precipitation is very high, often exceeding 3000 mm in the Coast Mountains, while temperatures are relatively mild due to the moderating effect of the Pacific Ocean. The climate of the interior is continental, characterized by warm short summers, cold winters and an annual precipitation typically between 400 mm and 800 mm.

Streamflow in the region is typically highest through June and July due to melting of the winter snowpack, and in August in heavily glaciated watersheds due to glacial melt. Peak instantaneous flows commonly occur during the freshet period on larger rivers, but they may also occur in late summer or early autumn due to intense rain or rain on snow events on smaller streams. Flows decrease throughout the winter and minimum flows typically occur in March or early April. Most streams maintain some flow year-round.

The climate and hydrology at the Schaft Creek site have been assessed based on both short-term site data and longer-term regional data.

1.2 PREVIOUS STUDIES

Rescan produced a series of meteorology baseline summary reports (Rescan 2007, 2008, 2010) describing the ongoing data collection program at the project site. These reports summarize the site and regional information for temperature, precipitation, wind, snowpack, and solar radiation, and include estimates of the mean annual precipitation (MAP) for the project site. The MAP was estimated by a number of different methods and it was concluded that a value of 1047 mm should be adopted for the project area at elevation 853 m (Rescan, 2010).

SECTION 2.0 - CLIMATE AND METEOROLOGICAL DATA

2.1 PROJECT SITE STATIONS

Climate data have been collected in the Schaft Creek project area since October 2005, and began with the installation of the Saddle station, located on the saddle landform south of Mount LaCasse at an elevation of 977 m. Two additional climate stations were installed in August 2006: the Mount LaCasse and Schaft Creek Camp stations. The station installed on Mount LaCasse is near the proposed tailings storage facility, but at a much higher elevation of 1440 m. The Schaft Creek Camp station is near the proposed open pit at an elevation of 853 m. The project site climate station locations are presented on Figure 2.1. The climate stations were installed and are maintained by Rescan. The meteorological data presented in this report are based on the values reported by Rescan (2007, 2008, 2010).

Meteorological data for the project site stations are available up to the end of September 2009; however, regular maintenance was not conducted on the stations during the 2008 to 2009 period. Therefore, these data are considered to be of low quality and were not used in the analyses, but are presented in this report for completeness.

The instruments installed at the Saddle and Mount LaCasse stations were supplied by Campbell Scientific Inc., and collect the following meteorological parameters:

- Two minute wind speed, wind direction and standard deviation of wind direction
- Hourly average wind speed, wind direction, and standard deviation of wind direction
- Hourly average relative humidity
- Total precipitation (tipping bucket) for the last hours
- Hourly average global solar radiation
- Average snow depth, and
- Average solar radiation.

At midnight each day, these instruments also record maximum and minimum air temperature, maximum wind speed, and total precipitation. In addition, GEONOR Model T-200B all-season precipitation gauges are being used to measure total precipitation and snow-water-equivalent (SWE) at these two climate stations. Snow depth is measured by a Campbell Scientific Model SR50 ultrasonic sensor.

The Schaft Creek Camp station is a RainWise Inc. station that records the following data at 10-minute intervals:

- Air temperature
- Relative humidity
- Dew point temperature
- Wind speed, wind direction, and maximum wind direction
- Solar radiation, and daily accumulation of solar energy, and
- Rainfall (tipping bucket) and snow depth.

2.2 REGIONAL STATIONS

A number of climate stations operated by the Meteorological Service of Canada (MSC) are located in the general project region, as shown on Figure 2.2. General station characteristics are summarised in Table 2.1. The majority of these stations were discontinued and have very few years of complete record. Of these stations, Unuk River Eskay Creek (Unuk) has the most complete dataset that is concurrent with the project site data collection program. Data from the Schaft Creek station, which was located approximately 2 km from the project area, are considered to be the most representative of conditions at the project site; however, this station was discontinued in 1974 and has only one year of complete record.

2.3 TEMPERATURE

Mean monthly temperature values for relevant regional stations are summarised in Table 2.2. The sites range in elevation from 7 m to 887 m. Mean monthly temperatures are typically warmest in July, with mean monthly temperatures above 10°C at all stations. The coldest month is January with regional monthly mean temperatures ranging from -3°C to -18°C.

The regional station with the most comparable temperature data concurrent with the project site data is Unuk. This station is located 84 km southeast of the project site, as shown on Figure 2.2, at an elevation of 887 m.

The long-term mean temperature at the project site was estimated by correlating 16 months of concurrent site temperature data with the Unuk station data using standard linear regression analysis. The two datasets shown in Table 2.3 exhibit a high degree of correlation and have a coefficient of determination (R^2) of 0.94. A nine year synthetic record was prepared for the Saddle station by applying the regression equation to the long-term record at Unuk. The mean annual temperature for the synthetic Saddle station record is 1.2°C and the mean monthly values are summarised in Table 2.3.

2.4 WIND SPEED AND DIRECTION

Wind speed and direction were measured on-site at the Saddle, Mount LaCasse and Schaft Creek Camp stations. The data measured at the Saddle and Mount LaCasse stations are summarised in Table 2.4. Data measured at the Schaft Creek Camp station were not included in this report, as there are limited wind data available due to recurring sensor malfunction.

The mean monthly wind speeds at the Saddle station are quite uniform throughout the year, averaging approximately 2.5 m/s, and varying from 1.8 m/s in February to 2.9 m/s in August and December. The highest daily gust speed recorded was 6.92 m/s in March 2007. The dominant measured wind direction is from the south.

The mean monthly wind speeds at the Mount LaCasse station vary from 3.0 m/s in June to 5.9 m/s in December for the limited period of record available. No reliable data are available for the months of July to September due to a sensor malfunction caused by a lightning strike (Rescan, 2008). The highest daily recorded gust speed is 13.26 m/s in December 2006. The dominant measured wind direction is from the south.

2.5 RELATIVE HUMIDITY

Relative humidity was measured at the Saddle and Mount LaCasse stations. The data, which are summarised in Table 2.5, indicate that the highest monthly average relative humidity values of 82% to 86% generally occur in the fall and early winter period of October to January, and that the lowest values of 57% to 65% generally occur in the spring and summer period of April to August.

2.6 EVAPOTRANSPIRATION

There is a lot of uncertainity associated with the potential evapotranspiration (PET) estimates for the project site due to the lack of site-specific and regional measured data. Therefore, two empirical relationships for PET, Hargreaves and Penman-Monteith, were used to estimate the mean monthly values for the project site based on the Saddle station climate data.

The Hargreaves equation uses mean, minimum and maximum daily temperature values, as well as the site latitude to estimate PET. The Penman-Monteith method is a physical parameter based equation. If the required input data are available, it is generally recommended as the most appropriate method (Maidment, 1993; Raes, 2009). The required input data for the Penman-Monteith method are daily minimum and maximum temperatures, daily average relative humidity, daily average wind speed, and daily average solar radiation. For the Saddle station, daily values for all input parameters are available from October 2005 to September 2009.

The mean monthly PET estimates based on the Hargreaves and Penman-Monteith methods are summarised in Table 2.6. The mean annual estimates of 420 mm and 446 mm are in line with the regional estimates for the project area of 400-500 mm, as presented in the *Manual of Operational Hydrology in British Columbia* (Coulson, 1991) and shown on Figure 2.3, which shows the mean annual lake evaporation isolines from the Hydrological Altas of Canada produced by Natural Resources Canada. The base map is based on regional evaporation data for the 10-year period from 1957-1966. The mean monthly and annual PET values for the Saddle station were taken from the average of the two methods, resulting in an annual PET value of 433 mm for an elevation of 977 m. Potential evapotranspiration values generally provide reasonable estimates of lake evaporation rates, and therefore the long-term values in Table 2.6 are assumed to be appropriate for estimating evaporation from lakes and ponds in the project site. The *Manual of Operational Hydrology in British Columbia* suggests a 10% decrease in annual evaporation for every 350 m rise in elevation to extrapolate the mean annual PET to other locations within the project area (Coulson, 1991).

2.7 PRECIPITATION ▲R1

2.7.1 General

Mean monthly rainfall, snowfall and total precipitation values for the most relevant regional stations are summarised in Table 2.7. Precipitation decreases in an easterly direction away from the coast. Precipitation is typically the highest during the months of October and December, and the lowest during the spring months of April through June. Precipitation consistently falls as snow from November to

March, and as rain in June to September. There are often mixed rain and snow conditions in the shoulder months of April, May, and October.

Total precipitation for the project site is recorded at the Saddle and Mount LaCasse stations using GEONOR total precipitation gauges. Rainfall data are also recorded at all these stations and the Schaft Creek Camp station using tipping bucket precipitation gauges. Comparison of the 2006-2007 rainfall data at the Saddle station, using both methods, yields similar results for the months of June to September, giving confidence to rainfall values (Rescan, 2008). The Mount LaCasse and Schaft Creek Camp station precipitation/rainfall records have large data gaps due to lack of maintenance and sensor malfunction; these data are considered unreliable and are not used in the analysis. The Mount LaCasse data are only presented for completeness.

2.7.2 Measured Precipitation Data

The measured precipitation records for the Saddle and Mount LaCasse stations are summarised in Table 2.8. A direct comparison of the concurrent datasets in Table 2.8 indicates that monthly precipitation values are generally higher at the Saddle station, which is inconsistent with orographic patterns and the considerably higher elevation of the Mount LaCasse station. Orographic enhancement of precipitation is most likely to occur with precipitation that is delivered by frontal storm systems. These are the predominant storm systems that occur throughout the fall and winter months, when freezing temperatures and very high winds also occur. These conditions make it very difficult (next to impossible) to accurately measure precipitation, so it is very likely that only a portion of the actual precipitation is being measured at the Mount LaCasse station, and to a lesser extent the Saddle station. The relative catch efficiency of snowfall is typically lower than for rainfall, given that snow has a slower fall rate than rain and is therefore more affected by wind around the precipitation gauge (Smith, 2007). The GEONOR gauges with wind shields have relative catch efficiencies for rainfall and snowfall in the order of 90% and 36%, respectively, for average wind speeds exceeding 5 m/s (Smith, 2007). Both Mount LaCasse and Saddle have been installed with Alter wind shields, but observations indicate that the shields are only partially effective. Further complicating the situation is that Saddle is much more sheltered from the wind than Mount LaCasse (Rescan 2008), so the catch efficiencies of the two gauges are likely quite different.

Given the uncertainity in precipitation catch efficiency, it was necessary to derive an alternate means of estimating the mean annual precipitation (MAP) for the Schaft Creek project area. A preliminary site wide water balance has been developed to assess the baseline surface and groundwater flow patterns in the area (Knight Piésold, 2010). Part of the model calibration process was to translate inputs of regional long-term precipitation into corresponding flow values recorded in the project area. The monthly data set was based on regional climate station data from Unuk correlated to the Saddle data. Missing precipitation values from the Unuk dataset were in-filled based on precipitation measured at Dease Lake. The hydrologic inputs were adjusted until best fits were reached between calculated streamflow values and reliable measured streamflow values. Estimated long-term monthly precipitation values for the winter months (December-April) were adjusted by a multiplier of 1.25 to obtain this goodness of fit, thereby indicating that the original long-term MAP (800 mm) estimated for the Saddle station is too low. Therefore, the measured monthly winter values at Saddle were increased by a factor of 1.25 to account for the winter catch efficiency of the precipitation gauge.

2.7.3 Mean Annual Precipitation

The three regional stations with precipitation data concurrent with the historical MSC Schaft Creek station and the current Saddle station are Unuk, Dease Lake and Stewart A. The concurrent months of precipitation for the short-term MSC Schaft Creek data and adjusted Saddle data were compared to the concurrent long-term regional precipitation records at Unuk on a monthly basis. Unuk was chosen for the comparison, as it is closest the project site and at a similar elevation. The results of the monthly comparison indicate that the project site has approximately 25% of Unuk's precipitation during the summer months (May to October) and 45% of Unuk's precipitation in the winter months (November to April). This is to be expected given the decreasing trend of precipitation moving inland from the coast. These factors were applied to the long-term record at Unuk to develop a synthetic long-term monthly precipitation series for the Saddle station. The MAP for the Saddle station was estimated to be 850 mm for an elevation of 977 m. Figure 2.4 shows the annual precipitation isoline map as produced by Natural Resources Canada, based on the long-term regional records for the 30-year period from 1941-1970. The relevant regional stations and the Schaft Creek project site are shown for comparison. According to this figure the MAP for the project site should be in the order of 1000 mm; however, the density of regional stations in this mountainous region is too coarse for isoline interpolation and the isoline plot does not accurately reflect the localized variability of precipitation. Nonetheless, it suggests that the MAP is likely higher than 800 mm, as previously estimated.

It should be noted that this estimate is for the Saddle climate station location at elevation 977 m, and that adjustments would need to be applied to extrapolate the MAP to other locations in the project area. A discussion of orographic factors for the project area is included in Section 4.0.

2.7.4 Monthly Precipitation Distribution

The monthly precipitation distributions for four relevant regional stations are summarised in Table 2.7. The MSC stations at Schaft Creek and Unuk have similar distributions, with approximately 37% rainfall and 63% snowfall on an annual basis. These two stations are the closest in proximity to the project area and are similar in elevation to the Saddle station.

A comparison of the rainfall and total precipitation values measured at the Saddle station for the 2006-2007 period indicates that precipitation generally falls as rain from June to September. Snowfall accounts for the precipitation recorded in November to April, with a mixture of rain and snow in the shoulder months of May and October. A similar pattern is evident at the Schaft Creek and Unuk regional stations; however, the project site would be expected to have more snowfall given its higher elevation, and therefore the snowfall proportion was estimated to be 70%. The estimated long-term monthly precipitation distribution at the Saddle station is based on the patterns in the regional and site data; the need to maintain an average annual 70% rain, 30% snow split; the site temperature estimates and the understanding that temperatures below -2 $^{\circ}$C consistently produce snow while those above 2°C consistently produce rain; and the patterns indicated by the synthetic long-term monthly precipitation series produced from the Unuk data. This distribution is presented in Table 2.9.

2.7.5 Snowmelt

Snow survey data were collected at two locations within the project area during 2006 and 2007: Skeeter Lake Valley (SSCW1, elevation 854 m) and Schaft Camp High Elevation (SSCW2, elevation 1436 m). The maximum snow-water-equivalent (SWE) values at SSCW1 in 2006 and 2007 were 295 mm and 594 mm, respectively. The SWE values at SSCW2 in 2006 and 2007 were 593 mm and 1071 mm, respectively (Rescan, 2008). The larger snow depths in 2007 compared to 2006 are consistent with SWE values reported by Environment Canada for two nearby regional snow survey stations, Kinaskin Lake (4D11P, elevation 1020 m) and Iskut (4D02, elevation 931 m). The limited snow survey data collected on-site are inadequate to estimate a representative snowmelt pattern for the project site; therefore regional snowpack data were used in the analysis.

A snowmelt distribution was estimated based on the regional long-term snowpack melt values recorded at Kinaskin Lake and Iskut. Kinaskin Lake has average daily SWE data from 1991 to 2009, which were recorded using an automated snow pillow (ASP). Iskut has monthly SWE data from 1974 to 2010, which are recorded manually at the end of the month, typically from February to June. The percentage of snowmelt occurring in each month was determined for each year of record, and a general pattern of snowmelt occurring in April, May and June was observed for both stations. It should be noted that data from years with irregular melt patterns, such as extended interim melt followed by accumulation periods during the winter months, were not used to estimate the long-term average monthly snowmelt pattern.

The average snowpack melt pattern at Kinaskin Lake, situated at an elevation of 1020 m and located approximately 50 km northeast of the project, is as follows: 15% in April, 80% in May and 5% in June. At Iskut, at an elevation of 931 m and located approximately 76 km northeast of the project, the snowmelt pattern is 20% in April, 75% in May and 5% in June. The snowmelt pattern at the project site is assumed to be similar to those observed at the regional stations. Therefore, an average snowmelt pattern for the project site is estimated to be 15% in April, 80% in May and 5% in June. This melt pattern is consistent with the mean monthly streamflow pattern developed for the lower elevation, less glaciated watershed of Skeeter Creek, as presented in Section 3.0. However a later melt pattern, with the majority of the streamflow occurring in July to August, is evident in the Schaft Creek basin due to the influence of glacial melt and the higher mean basin elevation.

2.8 SUBLIMATION

During freezing months, water is removed from the catchment by sublimation, which is defined as the direct phase change of water from solid to a vapour (Schulz and de Jong, 2004), and detailed investigations suggest that it can form a significant proportion of a water balance. Recent research studies in northern regions of North America indicate that sublimation is typically equivalent to approximately 20% to 40% of the annual snowfall. At a study catchment in the low Arctic of northwestern Canada, Pomeroy et. al. (1997) estimated that 19.5% of annual snowfall sublimated from blowing snow, and Schulz and de Jong (2004) reported results from studies where it was found that up to 40% of annual snowfall in Canada sublimates. Given that snowfall accounts for approximately 70% of the annual precipitation for the project area, sublimation correspondingly could represent approximately 15% to 30% of the annual precipitation. However, given the uncertainty associated with sublimation rates and lack of site-specific and regional measured data, a reasonable sublimation rate cannot be estimated for the project area. It was assumed that the water loss due to sublimation is accounted for in the effective runoff coefficients estimated for the project area, as discussed in Section 4.0.

2.9 PROBABLE MAXIMUM 24 HOUR RAINFALL

Return period precipitation values are presented in the form of intensity-duration-frequency (IDF) values in Table 2.10. These values were largely generated from data in the Rainfall Frequency Atlas for Canada (RFAC) (Environment Canada, 1985). However, it was noted that the Atlas specifies a lower standard deviation for the 24-hour events than for the 12-hour events, which is inconsistent with generally accepted rainfall patterns in BC and the Yukon, and which would result in the convergence of the 12-hour and 24-hour precipitation estimates at the higher return periods. Consequently, the maximum daily precipitation datasets for Unuk, Dease Lake and Stewart A were reviewed, and it was found that they indicate a slightly higher variability for the daily precipitation than does the Atlas. Specifically, they indicate that the coefficient of variation (standard deviation/mean) is equal to approximately 0.42, which when applied to the 24 hr mean of 30 mm, results in a standard deviation estimate of 13 mm, which is equal to the 12 hour value recommended by the Atlas. Correspondingly, a standard deviation of 13 mm was adopted for both the 12-hour and 24-hour design storm analyses.

Examples of extreme precipitation events for the project area are 70 mm, 85 mm and 117 mm, for the 24-hour 10, 25 and 200 year storm events, respectively. The IDF values include an allowance for orographic influences and can be applied over the entire project area without additional adjustment.

SECTION 3.0 - HYDROLOGY DATA

3.1 PROJECT SITE STATIONS

Streamflow data were recorded between 2006 and 2008 at nine hydrologic monitoring stations within the Schaft Creek and Mess Creek watersheds. The monitored watersheds are shown on Figure 2.1, and their watershed characteristics are summarized in Table 3.1. Assessment of the hydrologic data collected at these stations has revealed that several locations are subject to changing channel control sections. Stations have also been identified as having difficult discharge measurement conditions. In an effort to facilitate the analysis and minimize the use of questionable data, streamflow records were only developed for those stations deemed to have the best and most complete datasets: SC-2, SK-1 and SK-2. Monitoring station SC-2 was installed on May 27, 2006 on Schaft Creek downstream of the proposed open pit and waste dump locations, and at the upstream end of a short bedrock canyon. Streamflow stations located upstream of this location include HC-1, SC-1, SCTR-1 and SCTR-3. Monitoring stations SK-1 (Start Creek) and SK-2 (Skeeter Creek) were installed on May 29, 2006 and May 28, 2006, respectively, on the northern and southern outlets of Skeeter Valley. The proposed tailings storage facility is located within the SK-2 watershed. Water levels were recorded at 15 minute intervals at each station using submerged pressure transducers. The period of record spans the open water season that typically occurs from approximately May to October. The sensors were removed each year prior to freeze-up and re-installed the next spring. Manual measurements continued throughout the winter period on an approximately monthly time interval in an effort to monitor baseflow conditions. Hydrologic monitoring was discontinued at the end of 2008.

3.2 REGIONAL STATIONS

Regional streamflow stations operated by the Water Survey of Canada (WSC) Branch of Environment Canada are shown on Figure 2.2. The station details are summarised in Table 3.2. The stations vary greatly in watershed size, characteristics and location with respect to the project location. Only the Surprise Creek, Iskut River – Johnson, and Stikine River - Telegraph monitoring stations are currently active. Surprise Creek is the smallest of the actively monitored regional watersheds, and at 165 km southeast of the project site, it is located the furthest afield. The Iskut River - Johnson and Stikine River - Telegraph stations are located on very large regional systems, with drainage areas that are orders of magnitude larger than the project watersheds. However, both stations are located within 80 km of the project and their watersheds encompass areas that are even closer. Consequently, it is expected that parts of these systems experience very similar meteorological conditions to the project site.

A common period of 1974-1993, excluding 1979, was selected to facilitate direct comparison of the flow patterns of the regional stations, as presented on Figure 3.1. These systems all demonstrate unimodal hydrographs. The highest mean monthly flows occur during the spring and summer snowmelt and glacier melt periods; sustained precipitation driven streamflows generally occur from late September through October, and low flows occur throughout the cold winter months of November through April. The Stikine River, the largest of the regional systems, exhibits a relatively small mean monthly runoff peak that typically occurs in June. The next largest system, the Iskut River, exhibits greater runoff volumes than the Stikine and a peak monthly discharge that typically occurs one month later in July. The smaller regional systems experience a range in freshet peak flow timing between June and August. They also exhibit a wide range in peak summer and mean annual unit runoff. The difference in the magnitude of the mean annual and peak summer unit runoff values largely results from strong precipitation gradients in the region. Areas on the leeward side of the Coast Mountains receive much less precipitation than do areas on the windward, and runoff varies accordingly. Furthermore, the presence or absence of melting glaciers contributes to the runoff variability, as does basin elevation and aspect. The two regional gauged watersheds that likely experience the most similar hydrologic conditions to the project watersheds are Forrest Kerr Creek and More Creek, due to their relatively small size and proximity to the project, as shown on Figure 2.2.

The project watersheds vary in percent glaciated area, median watershed elevation, aspect and precipitation in ways similar to the smaller regional stations. Therefore, the project watershed hydrographs likely exhibit variations similar to those of the regional stations, depending upon the watershed characteristics for each system. The physics of glacier dynamics indicate that precipitation, median basin elevation, and basin aspect should represent dominant controls on percent glaciated area in the regional watersheds. Variations in unit runoff between watersheds may also be strongly controlled by these variables. Therefore, percent glaciation is expected to be correlated with mean annual unit runoff, considering that they are both largely dependent on the same factors (precipitation, elevation, aspect). This relationship is expressed graphically on Figure 3.2., which indicates that percent glaciated area and mean annual unit runoff are correlated in the region, as suggested by the strong coefficient of variation (R^2) value of 0.95. The best-fit trendline suggests that the mean annual unit runoff (MAUR) is approximately equal to 41 $l/s/km^2$ in an unglaciated watershed in the region, while a completely glaciated watershed should have a MAUR of approximately 113 $l/s/km^2$.

3.3 PROJECT AREA STREAMFLOW

3.3.1 Measured Streamflow Records

Rating curves were developed for stations SC-2, SK-1 and SK-2 to convert the continuous water level records into streamflow records. These curves were developed using the stage-discharge measurements recorded at each station during the 2006-2008 open flow seasons. The curves are presented on Figures 3.3, 3.4 and 3.5 for the three stations. Three curves were fit to the data for stations SC-2 and SK-1, one for each monitoring year. This was necessitated by winter removal of the pressure sensors, and the subsequent installation of the sensors the following year at different elevations. The rating curves were fit to the data based upon the assumption that the channel had not changed shape from the previous year. Therefore, the same curve shape should apply to each year of data. Only one rating curve was required at SK-2, as the sensor was replaced at the same elevation each spring. The rating curves were applied to the water level records to produce open water streamflow records for each station. Continuous mean daily streamflow records were subsequently generated by linearly interpolating between the manually measured winter discharge measurements recorded at each station. This interpolation assumes that no periods of rising flow occur during the winter months, and that all streamflow is a result of groundwater discharge. This is a reasonable assumption in the vicinity of Schaft Creek, given the typically continuous sub-zero temperatures experienced throughout the winter months. Mean monthly discharge values were then generated for each station from these continuous streamflow records. The results are listed in Tables 3.3, 3.4 and 3.5, and presented graphically in Figures 3.6, 3.7 and 3.8.

All three hydrologic monitoring stations exhibit unimodal annual hydrographs similar to the regional stations. The timing of the peak flows, however, varied between years and between watersheds. Freshet flows peaked in May and June at SK-2, and June and July at SK-1. SK-1 also experienced relatively high flows during May. The timing of these flows is typical of lower elevation watersheds. The higher elevation watershed of SC-2 produced peak freshet flows in July and August, with relatively low flows persisting through May, and sustained flows through September. All three stations experienced a delay in peak freshet runoff in 2008, as a result of a colder than normal early summer in the region. The SC-2 hydrograph is more similar to the hydrographs displayed by the regional stations, whose basins have median elevations and glaciated areas more similar to the drainage of SC-2, than to either of the drainages for SK-1 and SK-2.

3.3.2 Synthetic Monthly Flow Series

Long-term monthly discharge series are typically required to model streamflow conditions over the life of the project. For Schaft Creek, this was accomplished by correlating the SC-2 streamflow record with the concurrent streamflow record on the Iskut River at Johnson, due to the unavailability of concurrent data for the two closest WSC stations at Forrest Kerr and More Creeks. The correlation was accomplished using a ranked linear regression approach conducted on a monthly basis.

Good agreement between measured and synthetic daily hydrographs and flow duration curves for SC-2, presented on Figures 3.9 and 3.10, respectively, suggests that the correlation was successful. Comparison of the daily flow series produced coefficient of variation (R^2) and Nash Sutcliff (E) values of 0.87, respectively. The good correlation is likely a result of the similar watershed characteristics and close proximity between the Iskut River and Schaft Creek, despite the large discrepancy in watershed size. The results of the correlation provide long-term synthetic monthly streamflow values for the open water months of May through October, and are presented in Table 3.3. Long-term mean monthly streamflow values were estimated for the winter months of November through April at SC-2 by assessing the ratio of concurrent short-term (2006-2008) to long-term (1965-2008) flows in the Iskut River. The concurrent and long-term values for these months, as presented in Table 3.3, are quite similar. Assuming this relationship is valid in Schaft Creek, the monthly flow ratios were applied to the SC-2 2006-2008 mean monthly discharge values to generate long-term estimates for November through April streamflow. These values are also included in Table 3.3. The long-term synthetic mean annual discharge for SC-2, as presented in Table 3.3, is 10.4 m^3/s, which equates to a mean annual unit runoff of 46 $l/s/km^2$.

A regional correlation of daily streamflow, on a monthly basis, could not be developed for stations SK-1 and SK-2, as these stations are too dissimilar to the regional stations. However, it can be assumed that streamflow at SK-1 and SK-2 should have a better correlation to regional streamflow at longer timescales. This improved correlation is expected as the regional climate tends to have a stronger influence on relative runoff at longer time scales, rather than site and event specific differences that have stronger effects at shorter time scales. Concurrent (2006-2008) and long-term mean monthly unit runoff values are presented on Tables 3.4 and 3.5 for the Iskut River at Johnson. As stated previously, the values suggest that the 2006-2008 streamflow period was very similar in terms of mean annual unit runoff to the long-term record. It is therefore assumed that the 2006-2008 period was also similar to the long-term mean in the Skeeter Creek and Start Creek watersheds. Consequently, the measured mean monthly discharge values were selected as representative of long-term values in these watersheds. Data for SK-1 suggest that the long-term synthetic mean annual discharge is 0.45 m^3/s, which equates to a mean annual unit runoff of 28 $l/s/km^2$, while the long-term mean annual discharge at SK-2 is estimated to be 0.82 m^3/s, which equates to a mean annual unit runoff of 21 $l/s/km^2$.

The SC-2, SK-1 and SK-2 synthetic long-term mean monthly discharge values were compared to the regional values on Figure 3.11. The records all exhibit unimodal hydrographs with variable timing of peak flows. The SC-2 hydrograph shape is very similar to the Forrest Kerr hydrograph, except it has a lower magnitude. The SC-2 hydrograph shape reflects the basin's northerly aspect, moderate glacial cover, and high monitoring station elevation, while the magnitude reflects the basin's relatively dry interior climate. The SK-1 and SK-2 watersheds exhibit even less runoff than at SC-2 and an early freshet, a result of their lower mean watershed elevations and smaller glaciated areas. The long-term hydrograph shapes for each location seem reasonable, given the physical characteristics of the watersheds and the meteorological regime in the area.

The mean annual unit runoff values at SC-2, SK-1 and SK-2 all lie well below the regional glaciated area/unit runoff trend presented on Figure 3.2. However, they lie upon a best fit line which is nearly parallel to the regional relationship. This shift in trend reflects the drier climate in the Project area, in comparison with the regional stations. Mean annual unit runoffs were estimated for sub-catchments within Schaft Creek above SC-2, based upon comparison of manually measured discharge measurements, and they agree remarkably well with the Project area trend. Therefore, mean annual unit runoff can be estimated for watersheds within the Project area using this trend, as was done to derive the estimated mean annual unit runoff values in Table 3.1. Hydrograph shape should then be estimated by applying the SC-2, SK-1 or SK-2 hydrograph shape to the watershed. The SK-2 hydrograph should be applied for watersheds with 1%-4% glaciation; the SK-1 hydrograph should be applied to watersheds with 5%-15% glaciation, and the SC-2 hydrograph should be applied to watersheds with 16%-50% glaciation. Low flows in the Project area exhibit very little variation with changes in mean annual unit runoff, as is evident on Figure 3.11. Therefore, when estimating flows in a project watershed, the magnitude of mean monthly unit runoff should be adjusted by the ratio of the monthly mean to the annual mean discharge, for the appropriate (SC-2, SK-1 or SK-2) template hydrograph shape, in the months of May through November only.

For example, suppose that one were to estimate the hydrology for a watershed with 27% glaciation, located within the Schaft Creek watershed. From the trend equation presented in Figure 3.2, the watershed should have a mean annual unit runoff of approximately 40 $l/s/km^2$. The percent glaciation also dictates that the SC-2 hydrograph should apply to this watershed. The mean monthly unit runoff values would then be adjusted by multiplying the SC-2 mean monthly to mean annual discharge ratios by the estimated mean annual unit runoff of 40 $l/s/km^2$. For example, the ratio of the mean June unit runoff to the mean annual unit runoff at SC-2 is 1.96. The mean June unit runoff in the study watershed would then be 1.96 x 40, or 78 $l/s/km^2$. It should be noted that by not adjusting the winter unit runoffs, the resultant mean annual unit runoff may not be exactly what is read off of Figure 3.2, however it should not vary more than 1-2 $l/s/km^2$, which is well within the uncertainty of the estimate.

3.4 WET AND DRY MONTHLY FLOWS

Wet and dry 10-year return period mean monthly flows were calculated for More Creek and Forrest Kerr Creek as proxies for project site conditions. The results are presented in Table 3.6 and on Figure 3.12 as percentages of mean monthly discharge. Values were estimated for each month using the distribution fitting application provided in Palisade Decision Tools @RISK statistical software program. Only distributions commonly applied to hydrologic data, like the extreme value distribution or log-Pearson distribution, were used in the analysis. Percent variations between the 10-year return period dry and wet mean monthly unit runoff values are lowest during the summer months of June through August, when streamflow is consistently high as a result of snowmelt and glacial melt. In October and November the phase of precipitation (snow or rain) has a significant influence on streamflow, resulting in the largest percent variations in streamflow. April also experiences an increase in variability as a result of annual fluctuations in the timing of the freshet. The 10-year dry and wet monthly discharge values, as a percentage of the monthly mean, for SC-2, are also presented on Figure 3.12 and in Table 3.6. These values were calculated using the open water season long-term synthetic streamflow series. All three data sets show a close match in both magnitude and variability of the monthly flows. Mean monthly percentage values were calculated for the 10-year wet and 10-year dry return period discharges, and are provided in Table 3.6. These means should be applied to mean monthly discharge values to estimate 10-year wet and 10-year dry return period discharge values in other watersheds within the Project area.

3.5 7-DAY LOW FLOWS

Annual low flows in the project region typically occur in January, February or March, as colder temperatures result in precipitation falling as snow, while groundwater inflow to the channels gradually diminishes. The project lies within hydrologic subzone ‘s’, as presented in Obedkoff (2001). The subzones were delineated by regions with similar hydrologic conditions. Low flow values for the project site were estimated from regional scaling curves developed by Obedkoff for subzone ‘s’. These curves were developed by plotting the 7-day average minimum daily discharge for a 10-year recurrence interval for each hydrologic system in the hydrologic zone, against its corresponding drainage area. Two curves are plotted, essentially delineating an upper and lower bound on low flows in the region. To estimate low flows in the project watersheds, a parallel curve was drawn through the Forest Kerr Creek value, as shown on Figure 3.13. The 10-year return period value was calculated using the interpolated line, as suggested by Obedkoff’s low flow estimation procedure. The Forrest Kerr Creek value was used in the analysis because it represents the more conservative value of the two most representative regional stations. The 10-year return period 7-day low flow values for SC-2, SK-1 and SK-2 are summarized in Table 3.7. Figure 3.13 can be used to provide reasonable estimates of low flow values for any creek in the project area.

The results were compared against measured values collected at the monitoring stations to help validate these estimate, as shown in Table 3.7. The measured values suggest that the regional values are reasonable for stations SK-1 and SK-2. However, the regional analysis appears to overestimate low flows at SC-2. This overestimation may be the result of a high conductivity gravel deposit upstream of the SC-2 station. The deposit may be transmitting a proportionately larger volume of streamflow than is typically observed at the regional monitoring locations. Therefore, flow measured within the channel may be underestimated at low flows. The comparison of regional and measured streamflow at SK-1 and SK-2 suggests that the estimated 10-year 7-day low flow is very similar in magnitude to the 2008 minimum manually measured discharge. Therefore, until further data become available, the 2008 minimum manually measured discharge at SC-2 will be selected as the 10-year 7-day low flow discharge.

3.6 PEAK FLOW ANALYSIS

Peak instantaneous flows in the project region occur as a result of spring or summer temperature driven snowmelt or glacial melt, large, intense rainfall events that commonly occur in the fall, or a combination of rain and melt. Peak annual flows most commonly occur between June and October, although they may occasionally occur outside of this period. Peak flow values for the project watersheds were estimated by a similar process as the 7-day low flow estimates. 10-year return period peak instantaneous discharge values were generated using a peak flow envelope curve standardized by drainage area and developed for hydrologic zone ‘s’ by Obedkoff (2001). The curve is presented in Figure 3.14. These 10-year return period values were then adjusted using a scaling curve developed by Obedkoff for More Creek to estimate the mean, 5-year, 20-year, 50-year, 100-year and 200-year return period discharges for the project watersheds, as summarized in Table 3.8. The More Creek scaling curve was selected for this analysis from the available regional curves because of More Creek’s similarity to the creeks in the project area, and because it produced the most conservative (high) discharge estimates of all the relevant regional curves. The values estimated were increased by 15% to allow for the potential effects of climate change throughout the life of the project.

For validation, the results were compared to the maximum discharge value in the 44 year long-term synthetic daily streamflow series for SC-2. To facilitate the comparison, this daily value was converted to an equivalent instantaneous value according to the ratio between annual peak daily and instantaneous streamflow in the measured SC-2 record. The resulting value was then increased by the 15% climate change factor and then compared to the values in Table 3.8. The value ranks between the 20 year and 50 year return period values estimated from the regional analysis, which lends support to the regional estimates.

SECTION 4.0 - WATER BALANCE MODELLING INPUTS

4.1 GENERAL

This section defines additional hydrometeorological parameters required for engineering design and water balance modelling. These parameters help to quantify the climatic variability, as well as the orographic effects and runoff coefficients appropriate for the project area.

4.2 PRECIPITATION

4.2.1 Orographic Effect

It is necessary to define an orographic factor for the project site to relate the long-term precipitation at the Saddle station to other elevations in the project area. The data collected at Mount LaCasse do not conclusively demonstrate an orographic effect, due to the limited concurrent data available for the two sites and the high winds at the Mount LaCasse site that substantially affect the catch efficiency of the gauge. The Schaft Creek camp station does not collect winter precipitation data and has insufficient data to compare with the Saddle station. The only regional station with concurrent data to Saddle station is Unuk, but it is over 80 km from the project site and not applicable for determining an orographic effect for the project area. Therefore, based on experience with similar regional watersheds, it was assumed that an orographic factor of 8% provides a reasonable estimate for the project area. The orographic factor represents the percent change in precipitation per 100 m increase in elevation.

4.2.2 Coefficient of Variation

The year-to-year variability of precipitation in the project area is quantified by the coefficient of variation (Cv) values derived from regional data. The Cv values are required as input for stochastic water balance modelling. The Cv values for precipitation at the Schaft Creek project were estimated based on the Unuk precipitation record for the 10 complete years of record. The monthly Cv values are summarised in Table 4.1.

4.3 TEMPERATURE

Similar to precipitation, the year-to-year variability of temperature was quantified by the coefficient of variation for water balance modelling. The monthly values were derived from the regional station at Unuk and are summarised in Table 4.1.

4.4 EFFECTIVE RUNOFF COEFFICIENTS ▲R1

Due to the large variation in regional watersheds, percent glaciated area, median watershed elevation, and aspect of the regional watersheds the effective runoff coefficient for the project area is based on site-specific data. An effective runoff coefficient was estimated for the hydrometric station in Skeeter Creek (SK-2), as this watershed contains the proposed TSF, which requires this input for engineering design. Runoff coefficients in the Schaft Creek watershed were not estimated due to the large percentage of glacier at higher elevations. The presence of glaciers makes it difficult to accurately estimate an effective runoff coefficient based on the ratio of precipitation to runoff, as glacier melt contributes most of the runoff in the late summer months. Conversely, the Skeeter Creek watershed has 1% glacial cover, and therefore, there is a more direct relationship between precipitation and measured runoff.

Effective runoff coefficients were calculated as the ratio of annual unit area runoff to annual precipitation and include water losses due to sublimation. There is only one complete year of hydrologic record available, October 2006 to September 2007, and recognizing that runoff coefficients can be quite variable from year-to-year, the results presented have considerable uncertainty associated with them. The annual runoff coefficient value for the SK-2 gauging station, based on the measured year of record, was computed to be 0.84, as presented in Table 4.2. In an attempt to validate this estimate, it was compared to the effective runoff coefficient calculated on the basis of the estimated long-term runoff and precipitation values summarized in Table 4.2. The synthetic long-term values produce a lower value of 0.74, which is believed to be reasonably representative of site conditions based on experience with similar regional watersheds. Given that the runoff estimates for water balance modelling will be for lower elevation areas that tend to have lower precipitation, proportionally higher evapotranspiration losses, and no glacier coverage, the estimated effective runoff coefficient for non-glaciated areas in the project area is 0.75.

SECTION 5.0 - CONCLUSIONS

The key findings of this study are summarized below. All the meteorological results are presented for the Saddle climate station location, and minor adjustments would need to be applied to make them appropriate for other locations in the project area.

The key findings of this study are:

- The mean annual temperature for the project area is estimated to be 1.2 °C, with minimum and maximum monthly temperatures of -8.2 °C and 12.3 °C occurring in January and August, respectively.
- The mean annual wind speed is approximately 2.5 m/s, with gusts reaching 6 m/s. The dominant measured wind direction is from the south.
- The mean annual relative humidity is approximately 72%.
- The mean annual potential evapotranspiration for the project site is estimated to be 433 mm.
- The mean annual precipitation for the project area is estimated to be 850 mm, with 30% falling as rain and 70% falling as snow. ▲R1
- The mean annual streamflow for the project area site is highly variable as a result of the range in watershed characteristics within the project area. Mean annual unit runoff in Schaft Creek, downstream of the proposed waste dump location, is 46 $l/s/km^2$. Mean annual unit runoff from the Skeeter Lake valley, for the northern and southern outlet creeks, is 28 $l/s/km^2$ and 21 $l/s/km^2$, respectively.
- The greatest monthly streamflow variability at the project site, as a percentage of the monthly mean, typically occurs in April and in October and November, as a result of variations in freshet timing and in storm event precipitation phase and magnitude.
- The annual hydrograph typically has a unimodal shape, with high flows resulting from snowmelt in the spring and summer freshet period, mid flows maintained by glacier melt and rainfall throughout the late summer and early fall, and low flows throughout the winter.
- Return period peak flows and 7-day low flows were estimated for Schaft Creek and the northern and southern Skeeter Lake valley systems. 200- year peak flows were 915 m^3/s, 119 m^3/s and 228 m^3/s, respectively. 10-year 7-day low flows were estimated to be 0.10 m^3/s, 0.02 m^3/s and 0.05 m^3/s, respectively.
- An orographic factor of an 8% increase in mean annual precipitation per 100 m of elevation gain was estimated for the project area. ▲R1
- The effective runoff coefficient for non-glaciated areas is estimated to be approximately 0.75. ▲R1
- Climate change has not been considered explicitly in the hydrometeorological estimates, and appropriate allowances should be made where necessary.

SECTION 6.0 - REFERENCES

Coulson, C.H. (1991). *Manual of Operational Hydrology in British Columbia.* Ministry of Environment, Water Management Division, Hydrology Section. February 1991.

Knight Piésold (2010). Schaft Creek Project: Description and Status of Site Wide Water Balance. (Ref No. VA10-00873) May 17, 2010.

Maidment, D.R. (1993). *Handbook of Hydrology*. McGraw-Hill Inc, Washington, DC, USA

Ponce, M. P. (1989). *Engineering Hydrology – Principles and Practices.* Prentice-Hall Inc., New Jersey, USA

Pomeroy J., Hedstrom N. and Parviainen J (2007). *The snow mass balance of Wolf Creek, Yukon: Effects of snow sublimation and redistribution*, National Hydrology Research Centre, Environment Canada.

Raes, D. (2009). *The ETo Calculator, Reference Manual, Version 3.1, January 2009.* FAO United Nations, Rome, Italy.

Rescan Tahltan Environmental Group (2007). *Schaft Creek Project 2006 - Meteorology Baseline Report, March 2007.*

Rescan Tahltan Environmental Group (2008). *Schaft Creek Project: 2007 Meteorology Baseline Report, February 2008.*

Rescan Tahltan Environmental Group (2009). *Schaft Creek Project: 2008 and 2009 Meteorology and Air Quality Baseline Report, Feburary 2010.*

Shulz O. and de Jong C. (2004). *Snowmelt and sublimation: field experiments and modelling in the High Atlas Mountains of Morocco*, Hydrology and Earth System Science, 8(6), 1076 – 1089, 2004.

Smith, C. D. (2007). *Correcting the Wind Bias in Snowfall Measurements Made with a Geonor T-200B Precipitation Gauge and Alter Wind Shield.* American Meteorological Society: 14th Symposium on Meteorological Observation and Instrumentation, January 15, 2007, San Antonio, Texas.

SECTION 7.0 - CERTIFICATION

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

Prepared:

Erin Rainey, E.I.T.
Staff Engineer

Kyle Terry, B.Sc.
Water Resource Scientist

Reviewed:

Jaime Cathcart, Ph.D., P.Eng.
Specialist Hydrotechnical Engineer

Approved:

Ken Brouwer, P.Eng.
Managing Director

Knight Piésold
CONSULTING

TABLE 2.1

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SUMMARY OF REGIONAL CLIMATE STATIONS

Print Apr/21/10 7:57:55

Station Name	Station ID	Total Years of Record	Complete Years of Record	Start Year	End Year	Latitude	Longitude	Elevation (m)	Mean Annual Precipitation (mm)	Approximate Distance from Mine Pit (km)
Schaft Creek	1207126	6	1	1969	1974	57° 21' N	131° 0' W	914	788	2
Galore Creek	1203046	4	1	1966	1973	57° 7.2' N	131° 27' W	789	2457	40
Kinaskan Lake	1204215	12	3	1966	1977	57° 31.8' N	130° 12' W	815	528	50
Telegraph Creek	1208040	38	11	1942	1979	57° 54' N	131° 10.2' W	183	336	60
Todagin Ranch	1208202	20	15	1973	1992	57° 36' N	130° 4.2' W	899	419	61
Bob Quinn	1200R0A	1	0	1974	1974	56° 58.8' N	130° 15' W	579	N/A	61
Bob Quinn AGS	1200R0J	18	12	1977	1994	56° 58.2' N	130° 15' W	610	616	63
Bob Quinn Lake 2	120090J	1	0	1991	1991	56° 58.2' N	130° 15' W	610	N/A	63
Telegraph Creek 2	1208041	22	6	1979	2000	57° 54' N	131° 19.8' W	250	369	63
Lost Lake	120DP19	1	0	1991	1991	56° 43.2' N	131° 13.2' W	90	N/A	74
Bronson Creek	1201086	11	3	1989	1999	56° 40.2' N	131° 6' W	107	1661	78
Iskut	1203670	1	0	1973	1973	57° 49.2' N	129° 58.2' W	884	N/A	79
Eddontenajon	1202638	1	0	1972	1972	57° 49.8' N	129° 58.8' W	884	N/A	79
Iskut Ranch	1203672	19	6	1976	1994	57° 52.2' N	130° 1.2' W	854	435	80
Iskut River (AUT)	120C6PK	8	0	1995*	2002	56° 43.8' N	131° 40.2' W	15	N/A	82
Johnny Mountain	120CPNA	5	2	1988	1992	56° 37.8' N	131° 4.8' W	1075	2560	82
Unuk River Eskay Creek	1078L3D	19	10	1989	2007	56° 39' N	130° 27' W	887	2084	86
Brucejack Lake	1071092	3	0	1988	1990	56° 28.2' N	130° 10.2' W	1372	N/A	112
Dease Lake (AUT)	119BLM0	18	0	1993	2010	58° 25.8' N	130° 1.8' W	802	N/A	131
Dease Lake	1192340	64	56	1944	2010	58° 25.8' N	130° 0.6' W	807	420	131
Stewart A	1067742	34	31	1974	2007	55° 56.4' N	129° 59.4' W	7	1867	170

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\AES\[AES Regional Summary.xls]Summary Table

NOTES:

1. CLIMATE DATA AVAILABLE FROM ENVIRONMENT CANADA.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	31MAR'10	ISSUED WITH REPORT 101-329/5-3	MH	ER	KJB

Knight Piésold CONSULTING

TABLE 2.2

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SUMMARY OF REGIONAL TEMPERATURE DATA

Print Apr/16/10 9:27

Meteorological Station	Elevation (m)	Period of Record	Temperature (°C)												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Schaft Creek (1207126)	914	1969-1974	-17.1	-10.9	-4.9	-0.2	5.1	9.5	11.7	11.0	6.8	1.1	-9.3	-14.9	-1.0
Unuk River Eskay Creek (1078L3D)	887	1989-2007	-8.2	-6.2	-4.1	0.5	4.1	8.1	10.4	10.4	5.9	0.7	-4.9	-6.7	0.8
Dease Lake (1192340)	807	1944-2010	-17.9	-12.7	-6.6	0.5	6.4	10.8	12.7	11.6	7.3	1.2	-8.6	-15.2	-0.9
Stewart A (1067742)	7	1974-2007	-3.3	-1.3	1.7	6.0	10.5	13.8	15.0	14.4	11.0	6.3	0.6	-2.2	6.0

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[Temperature_20100317.xls]Table regional temp

NOTES:

1. MONTHLY TEMPERATURE DATA AVAILABLE FROM ENVIRONMENT CANADA.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	FR	JGC	KJB

Knight Piésold
CONSULTING

TABLE 2.3

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

LONG-TERM ESTIMATED MONTHLY TEMPERATURE

Print Apr/16/10 9:27

Meteorological Station	Elevation (m)	Temperature (°C)												
		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Saddle	977	2005											-3.5	-4.7	
		2006	-7.5	-7.5	-8.1	0.3	4.7	10.6	12.5	9.8	7.2	2.2	-14.4	-3.1	0.6
		2007	-6.3	-9.7	-7.1	0.1	4.9	9.5	11.7	11.4	6.7	0.4	-4.9	-10.0	0.6
		2008	-9.7	-7.8	-3.4	-1.0	6.6	7.9	10.3	11.1	7.8	0.7	-3.5	-13.2	0.5
		2009	-8.3	-8.9	-6.9	0.7	5.4	11.1	15.7	12.1	7.1				
		Average	-7.9	-8.5	-6.4	0.0	5.4	9.7	12.6	11.1	7.2	1.1	-6.6	-7.7	0.8
Unuk River Eskay Creek	887	2005	-9.4	-6.4	-2.5	2.0	6.7	10.0	10.1	11.9	5.9	0.2	-3.8	-5.3	1.6
		2006	-6.2	-7.5	-6.8	-0.9	3.0	8.3	10.7	8.4	6.5	0.6	-12.0	-5.6	-0.1
		2007	-6.9	-7.2											
		Average	-7.5	-7.1	-4.7	0.5	4.9	9.2	10.4	10.1	6.2	0.4	-7.9	-5.5	0.8
Saddle	**977**	**Long-term est.**	**-8.2**	**-6.7**	**-4.9**	**0.5**	**4.7**	**9.7**	**12.0**	**12.3**	**6.7**	**1.5**	**-5.4**	**-7.4**	**1.2**

NOTES:
1. THE LONG-TERM TEMPERATURE VALUES WERE ESTIMATED FROM A REGRESSION ANALYSIS WITH CONCURRENT SADDLE AND UNUK DATA.
2. THE 2008-2009 SADDLE TEMPERATURE DATA WAS NOT USED IN THE REGRESSIONAL ANALYSIS AND IS SUMMARISED FOR INFORMATION PURPOSES ONLY.

0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 2.4

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

MEASURED WIND SPEED AT THE SADDLE STATION

Print Jul/15/10 12:58

Meteorological Station	Wind Speed (m/s)													
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Saddle (elevation 977 m)	2005											3.0	2.3	
	2006	2.1	2.2	1.8	2.9	2.5	2.8	2.7	2.9	2.8	3.0	1.0	3.5	2.5
	2007	3.1	1.3	2.5	2.6	2.6	2.1	2.6	-	-	2.4	2.0	-	2.4
	2008	*0.6*	*1.9*	*1.7*	*1.8*	*1.8*	*1.7*	*2.3*	*1.8*	*2.5*	*3.0*	*1.7*	*1.2*	
	2009	*2.5*	*1.5*	*1.7*	*1.4*	*1.4*	*2.0*	*1.4*	*1.8*	*1.9*	-	-	-	
	Average	2.6	1.8	2.2	2.7	2.5	2.5	2.6	2.9	2.8	2.7	2.0	2.9	2.5
Mount LaCasse (elevation 1440 m)	2006										4.1	3.7	6.9	
	2007	3.1	3.7	5.5	5.3	4.5	3.0	-	-	-	4.9	4.4	4.8	
	2008	*4.9*	*5.4*	*4.9*	*5.5*	*4.6*	*4.4*	*4.6*	*4.1*	*4.2*	*5.8*	*5.3*	*4.7*	
	2009	*5.5*	*4.1*	*4.7*	*4.4*	*3.5*	*3.8*	*3.5*	*4.2*	*5.4*	-	-	-	
	Average	3.1	3.7	5.5	5.3	4.5	3.0	-	-	-	4.5	4.1	5.9	

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[Wind speed_dir_20100321.xls]Table wind speed

NOTES:

1. GAPS IN THE DATA RECORD ARE DUE TO SENSOR MALFUNCTION (RESCAN, 2008).
2. MEASURED WIND SPEEDS IN 2008-2009 ARE NOT RELIABLE DUE TO LACK OF SENSOR MAINTENANCE. THIS DATA WAS NOT INCLUDED IN THE AVERAGE MONTHLY VALUES FOR EACH SITE; IT IS PRESENTED FOR INFORMATION PURPOSES ONLY.

0	21MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 2.5

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

MEASURED RELATIVE HUMIDITY AT THE PROJECT SITE

Print Jul/15/10 12:49

Meteorological Station	Relative Humidity (%)													
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Saddle (elevation 977 m)	2005											85	88	
	2006	90	72	74	68	67	56	60	67	72	75	86	88	73
	2007	88	87	80	67	57	62	64	65	71	84	83	84	74
	2008	83	78	-	60	59	57	62	69	67	80	88	82	71
	2009	73	79	74	60	55	52	52	62	76	-	-	-	
	Average	83	79	76	64	60	57	60	66	72	80	86	84	72
Mount LaCasse (elevation 1440 m)	2006										81	84	91	
	2007	90	85	85	76	67	71	-	-	-	88	81	79	
	2008	81	83	77	70	66	67	72	76	76	88	88	75	77
	2009	74	73	78	68	63	60	59	72	82	-	-	-	
	Average	82	80	80	71	65	66	65	74	79	86	84	82	76

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[Rel humidity_20100321.xls]Table rel hum

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	21MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB

Knight Piésold CONSULTING

TABLE 2.6

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

LONG-TERM ESTIMATED MEAN ANNUAL POTENTIAL EVAPOTRANSIRATION

Print Apr/21/10 7:59

Meteorological Station	Method	Potential Evapotranspiration (mm)													
		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Saddle (elevation 977 m)	Hargreaves	2005											3	2	
		2006	0	1	10	32	62	95	94	64	36	16	0	1	412
		2007	1	2	5	35	65	88	86	77	37	12	1	0	410
		2008	1	3	7	34	75	82	86	70	38	12	2	1	409
		2009	3	0	2	39	72	93	117	72	36				
		Average	1	2	6	35	69	89	96	71	37	13	1	1	420
	Penman-Monteith	2005											10	6	
		2006	4	10	19	46	71	107	104	76	42	25	2	6	510
		2007	5	5	18	47	82	91	91	74	34	14	6	0	468
		2008	3	10	27	52	80	65	65	36	15	13	7	1	373
		2009	4	5	25	55	80	80	56	62	33				
		Average	4	7	22	50	78	86	79	62	31	17	6	3	446
	Est. long-term		**3**	**5**	**14**	**43**	**73**	**88**	**87**	**66**	**34**	**15**	**4**	**2**	**433**

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[PET_20100321.xls]Table 2.6

NOTES:

1. POTENTIAL EVAPOTRANSPIRATION VALUES WERE ASSUMED TO BE EQUIVALENT TO LAKE EVAPORATION VALUES FOR THE PROJECT SITE.

0	21MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 2.7

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

REGIONAL LONG-TERM PRECIPITATION DISTRIBUTIONS

Print Jul/15/10 12:44

Precipitation Station	Years of Record	Elevation (m)	Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Schaft Creek	1969-1974	914	rain (mm)	4.2	1.3	0.0	0.0	11.2	26.1	27.1	42.1	64.5	79.9	1.6	0.0	258
			% precip.	0.6%	0.2%	0.0%	0.0%	1.5%	3.6%	3.7%	5.8%	8.9%	11.0%	0.2%	0.0%	36%
			snow (mm)	82.7	67.9	59.2	29.0	0.7	0.0	0.0	0.0	2.4	47.8	82.0	94.3	466
			% precip.	11.4%	9.4%	8.2%	4.0%	0.1%	0.0%	0.0%	0.0%	0.3%	6.6%	11.3%	13.0%	64%
			precip.(mm)	86.9	69.1	59.2	29.0	11.9	26.1	27.1	42.1	66.9	127.6	83.6	94.3	724
			% precip.	12.0%	9.6%	8.2%	4.0%	1.6%	3.6%	3.7%	5.8%	9.2%	17.6%	11.6%	13.0%	100%
Unuk River Eskay Creek	1989-2006	887	rain (mm)	6.5	4.7	2.3	19.4	72.5	67.6	82.1	142.4	208.5	143.6	18.5	1.2	769
			% precip.	0.3%	0.2%	0.1%	1.0%	3.6%	3.3%	4.0%	7.0%	10.2%	7.1%	0.9%	0.1%	38%
			snow (mm)	246.3	202.5	162.9	73.7	20.2	0.1	0.0	0.0	6.4	99.0	195.4	260.6	1267
			% precip.	12.1%	9.9%	8.0%	3.6%	1.0%	0.0%	0.0%	0.0%	0.3%	4.9%	9.6%	12.8%	62%
			precip.(mm)	252.8	207.2	165.1	93.1	92.7	67.6	82.1	142.4	214.9	242.5	213.9	261.8	2036
			% precip.	12.4%	10.2%	8.1%	4.6%	4.6%	3.3%	4.0%	7.0%	10.6%	11.9%	10.5%	12.9%	100%
Dease Lake	1944-2006	807	rain (mm)	0.5	0.1	0.6	2.4	22.5	44.2	60.9	55.2	45.9	17.9	2.3	0.6	253
			% precip.	0.1%	0.0%	0.1%	0.5%	4.9%	9.7%	13.3%	12.1%	10.1%	3.9%	0.5%	0.1%	55%
			snow (mm)	38.7	28.1	25.1	12.0	4.7	0.3	0.5	0.1	1.7	18.4	36.4	37.5	204
			% precip.	8.5%	6.2%	5.5%	2.6%	1.0%	0.1%	0.1%	0.0%	0.4%	4.0%	8.0%	8.2%	45%
			precip.(mm)	39.1	28.2	25.7	14.4	27.3	44.5	61.4	55.2	47.6	36.3	38.7	38.1	457
			% precip.	8.6%	6.2%	5.6%	3.2%	6.0%	9.7%	13.4%	12.1%	10.4%	8.0%	8.5%	8.3%	100%
Stewart A	1974-2007	7	rain (mm)	76.7	55.5	78.4	69.8	71.8	65.5	72.3	115.2	210.1	278.0	130.8	86.6	1311
			% precip.	4.1%	2.9%	4.1%	3.7%	3.8%	3.5%	3.8%	6.1%	11.1%	14.7%	6.9%	4.6%	69%
			snow (mm)	161.7	89.2	40.8	15.0	0.4	0.0	0.0	0.1	0.0	9.6	107.2	156.7	581
			% precip.	8.5%	4.7%	2.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	5.7%	8.3%	31%
			precip.(mm)	238.4	144.7	119.1	84.9	72.2	65.5	72.3	115.3	210.1	287.6	237.9	243.3	1891
			% precip.	12.6%	7.7%	6.3%	4.5%	3.8%	3.5%	3.8%	6.1%	11.1%	15.2%	12.6%	12.9%	100%

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[MAP Validation_20100707.xls]Table 2.7

NOTES:

1. MONTHLY VALUES WERE ESTIMATED BASED ON THE AVERAGE OF ALL MONTHS OF DATA AVAILABLE.

1	15JUL'10	UPDATED DATA	ER	JGC	KJB
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 2.8

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

MEASURED PRECIPITATION DATA

Print Jul/15/10 12:45

Meteorological Station	Elevation (m)	Measured Precipitation (mm)													
		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Saddle	977	2005											136	111	
		2006	155	20	30	48	40	14	28	29	124	77	250	99	914
		2007	4	86	143	69	18	38	36	33	60	184	31	76	778
		2008	*28*	*36*	*27*	*33*	*41*	*13*	*19*	*93*	*21*	-	-	-	
		2009	-	-	-	-	-	-	-	-	*78*	-	-	-	
		Average	80	53	87	59	29	26	32	31	92	131	139	95	852
Mount LaCasse	1440	2006										61	104	103	
		2007	-	58	99	26	18	73	-	-	-	100	28	21	
		2008	*17*	*31*	*17*	*16*	*226*	*248*	*12*	*61*	*16*	*33*	*67*	*18*	
		2009	*39*	*20*	*22*	*6*	*13*	*3*	*4*	*5*	*0*	-	-	-	

Meteorological Station	Elevation (m)	Adjusted Precipitation (mm)													
		Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Saddle	977	2005											136	139	
		2006	194	25	38	60	40	14	28	29	124	77	250	124	1002
		2007	5	108	179	86	18	38	36	33	60	184	31	95	873
		Average	99	66	108	73	29	26	32	31	92	131	139	119	946

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[MAP Validation_20100707.xls]Table 2.8

NOTES:

1. THE SADDLE PRECIPITATION DATA WAS ADJUSTED BY A MULITPLIER OF 1.25 FOR THE WINTER PRECIPITATION (OCT-APR) TO ACCOUNT FOR THE CATCH EFFICIENCY OF THE TOTAL PRECIPITATION GAUGE. THESE MONTHLY VALUES WERE USED IN THE DETERMINATION OF THE LONG-TERM MEAN ANNUAL PRECIPITATION.
2. THE 2008-2009 PRECIPITATION DATA COLLECTED AT THE SADDLE STATION WERE NOT USED IN THE ANALYSIS, BUT ARE SHOWN ONLY FOR INFORMATION PURPOSES.
3. THE PRECIPITATION DATA COLLECTED AT THE MOUNT LACASSE STATION WERE NOT USED IN THE ANALYSIS, BUT ARE SHOWN ONLY FOR INFORMATION PURPOSES.

1	15JUL'10	UPDATED DATA	ER	JGC	KJB
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 2.9

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

LONG-TERM MONTHLY PRECIPITATION DISTRIBUTION

Print Jul/15/10 12:39

Precipitation Station	Elevation (m)	Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Saddle	977	rain (mm)	0	0	18	26	22	20	23	36	50	43	17	0	253
		% precip.	0.0%	0.0%	2.1%	3.0%	2.6%	2.3%	2.7%	4.2%	5.9%	5.0%	2.0%	0.0%	30%
		snow (mm)	149	115	72	28	0	0	1	0	0	17	79	136	597
		% precip.	17.5%	13.5%	8.5%	3.3%	0.0%	0.0%	0.1%	0.0%	0.0%	2.0%	9.3%	16.0%	70%
		precip.(mm)	149	115	90	53	22	20	24	36	51	59	96	136	850
		% precip.	17.5%	13.5%	10.6%	6.3%	2.6%	2.3%	2.8%	4.2%	5.9%	7.0%	11.3%	16.0%	100%

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[MAP Validation_20100707.xls]Table 2.9

NOTES:

1. THE LONG-TERM MAP FOR THE PROJECT SITE WAS ESTIMATED BY ADJUSTING THE REGIONAL PRECIPITATION DATA AT UNUK BY A SEASONAL FACTOR OF 0.45 FOR THE WINTER MONTHS (OCT-APR) OF 0.45 AND 0.25 FOR THE SUMMER MONTHS (MAY-SEP).

1	15JUL'10	UPDATED DATA	ER	JGC	KJB
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 2.10

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

ESTIMATED PROJECT SITE RAINFALL INTENSITY DURATION FREQUENCY VALUES

Print: 7/15/10 12:46

Annual Rainfall Extremes (mm)

Duration	Mean	St Dev
5 min	3.0	1.0
10 min	4.0	1.0
15 min	6.0	1.0
30 min	8.0	2.0
1 hr	10.0	4.0
2 hr	18.0	4.0
6 hr	20.0	6.0
12 hr	22.0	13.0
24 hr	30.0	13.0

Frequency Factors for PMP

Duration	K_{PMP}
1 hr	16.96
6 hr	17.22
24 hr	17.77

Gumbel Frequency Factors

Return Period	2	5	10	15	20	25	50	100	200	1000
K_T	-0.1640	0.719	1.305	1.635	1.866	2.044	2.592	3.137	3.679	4.936

Return Period Rainfall Amounts (mm)

Duration	2 yrs	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	50 yrs	100 yrs	200 yrs	1000 yrs	PMP
5 min	3	4	4	5	5	5	6	6	7	8	
10 min	4	5	5	6	6	6	7	7	8	9	
15 min	6	7	7	8	8	8	9	9	10	11	
30 min	8	9	11	11	12	12	13	14	15	18	
1 hr	9	13	15	17	17	18	20	23	25	30	78
2 hr	17	21	23	25	25	26	28	31	33	38	
6 hr	19	24	28	30	31	32	36	39	42	50	123
12 hr	30	47	58	65	69	73	84	94	105	129	
24 hr	**42**	**59**	**70**	**62**	**81**	**85**	**96**	**106**	**117**	**141**	**392**

Rainfall Intensity (mm/hr)

Duration	2 yrs	5 yrs	10 yrs	15 yrs	20 yrs	25 yrs	50 yrs	100 yrs	200 yrs	1000 yrs	PMP
5 min	34	45	52	56	58	61	67	74	80	95	
10 min	23	28	32	34	35	36	40	43	46	54	
15 min	23	27	29	31	31	32	34	37	39	44	
30 min	15	19	21	23	23	24	26	29	31	36	
1 hr	9	13	15	17	17	18	20	23	25	30	78
2 hr	9	10	12	12	13	13	14	15	16	19	
6 hr	3.2	4.1	4.6	5.0	5.2	5.4	5.9	6.5	7.0	8.3	21
12 hr	2.5	3.9	4.9	5.4	5.8	6.1	7.0	7.8	8.7	10.8	
24 hr	**1.7**	**2.5**	**2.9**	**2.6**	**3.4**	**3.5**	**4.0**	**4.4**	**4.9**	**5.9**	**16**

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[24 hr rainfall_20100419.xls]Table_IDF

NOTES:

1. MEAN ANNUAL 24 HOUR EXTREME RAINFALL AND STANDARD DEVIATION WERE ESTIMATED USING THE RAINFALL FREQUENCY ATLAS OF CANADA.
2. DURATIONS OF 12 HOURS OR MORE WERE INCREASED BY A FACTOR OF 1.5 TO ACCOUNT FOR OROGRAPHIC EFFECTS.
3. RETURN PERIOD RAINFALL AMOUNTS COMPUTED ASSUMING A GUMBEL TYPE DISTRIBUTION.

1	15JUL'10	UPDATED DATA	ER	JGC	KJB
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 3.1

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SUMMARY OF SITE HYDROLOGIC MONITORING STATIONS

Station Name	Watershed	Installation Year	Easting	Northing	Drainage Area (km^2)	Median Elevation (m)	Glaciation (% Watershed Area)	MAUR Esimated from Regional %Glaciation/MAUR Scaling ($l/s/km^2$)
HC-1	Schaft Creek	2006	378,544.80	6,357,841.94	87.9	1620	31%	44
SC-1	Schaft Creek	2006	375,361.11	6,356,708.76	60.1	1870	65%	68
SC-2	Schaft Creek	2006	375,738.84	6,367,123.21	227	1330	35%	46
SCTR-1	Schaft Creek	2006	379,030.45	6,359,622.65	4.48	1060	0%	21
SCTR-2	Schaft Creek	2007	375,469.03	6,368,688.08	75.2	1571	37%	48
SCTR-3	Schaft Creek	2007	376,440.33	6,362,752.38	7.73	1856	46%	54
SK-1	Mess Creek	2006	383,671.09	6,363,238.03	16.1	1220	8%	27
SK-2	Schaft Creek	2006	381,566.62	6,374,947.55	38.3	1090	1%	22
MESS-1	Mess Creek	2006	384,372.58	6,355,953.30	214	1370	13%	30

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\[Site Summary.xls]Summary Table

NOTES:

1. THE ESTIMATED UNIT RUNOFF VALUES WERE DERIVED USING A PERCENT GLACIATION CORRELATION WITH MEAN ANNUAL UNIT RUNOFF.

0	12JAN'10	ISSUED WITH REPORT VA101-329/5-3	MH	KT	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 3.2

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SUMMARY OF REGIONAL WATER SURVEY OF CANADA STATIONS

Print Apr/21/10 9:30:02

AES Station Name	Station ID	Total Years of Record	Complete Years of Record	Start Year	End Year	Latitude	Longitude	Drainage Area (km^2)	Mean Annual Discharge (m^3/s)	Equivalent Average Annual Unit Runoff ($l/s/km^2$)	Median Watershed Elevation (m)	Percent Glaciation	Approximate Distance from Mine Pit (km)
Surprise Creek	08DA005	42	40	1967	2008	56° 6' 35" N	129° 28' 33" W	218	15.5	71.0	1280	36%	165
Bear River	08DC006	33	31	1967	1999	56° 2' 24" N	129° 55' 30" W	350	25.2	71.9	1290	47%	160
Forrest Kerr Creek	08CG006	23	20	1972	1994	56° 54' 56" N	130° 43' 15" W	311	28.4	91.2	1360	69%	50
Iskut River - Johnson	08CG001	50	44	1959	2008	56° 44' 20" N	131° 40' 25" W	9350	454.6	48.6	1260	-	80
Iskut River - Snippaker	08CG004	29	26	1966	1995	56° 41' 55" N	130° 52' 23" W	7230	287.2	39.7	1310	-	70
More Creek	08CG005	24	19	1972	1995	57° 2' 27" N	130° 24' 5" W	844	49.5	58.6	1360	27%	50
Stikine River - Butterfly	08CF001	25	23	1971	1995	57° 29' 10" N	131° 45' 0" W	36000	656.3	18.2	1370	-	50
Unuk River	08DD001	33	29	1960	1996	56° 21' 5" N	130° 41' 30" W	1480	104.7	70.7	1180	-	110
Stikine River - Telegraph	08CE001	55	44	1954	2008	57° 54' 3" N	131° 9' 16" W	29000	409.9	14.1	1380	2%	65

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\WSC\[WSC Regional Summary.xls]Summary Table

NOTES:

1. THE ISKUT RIVER, STIKINE RIVER AND UNUK RIVER ALL CONTAIN LARGE PORTIONS OF GLACIATED AREA, HOWEVER THE EXACT AMOUNT WAS NOT DETERMINED.
2. THE VALUES PRESENTED ABOVE WERE EITHER PROVIDED BY THE WATER SURVEY OF CANADA, WERE CALCULATED FROM DATA PROVIDED BY THE WATER SURVEY OF CANADA, OR WERE DETERMINED FROM PROVINCIAL BASEMAPS IN GIS.

0	12JAN'10	ISSUED WITH REPORT VA101-329/5-3	MH	KT	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 3.3

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SC-2 HYDROLOGY STATION MEASURED MEAN MONTHLY DISCHARGE

Print Apr/21/10 9:17:09

Year	Discharge (m^3/s)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
2006					5.6	26.9	38.8	23.3	23.6	7.4	2.8	1.3	
2007	1.0	1.0	0.8	1.2	6.5	31.3	47.5	29.4	15.9	4.9	2.4	1.0	11.93
2008	0.7	0.4	0.2	0.8	8.8	14.1	28.4	34.8	13.6	6.8	2.1		9.31
Average	0.87	0.67	0.55	0.98	6.97	24.10	38.24	29.15	17.69	6.37	2.43	1.13	10.76
Unit Runoff ($l/s/km^2$)	3.8	2.9	2.4	4.3	30.6	105.9	168.1	128.1	77.8	28.0	10.7	5.0	47
2006-2008 Average Regional Unit Runoff ($l/s/km^2$)	8.6	7.1	6.0	12.7	58.2	123.3	142.5	97.3	71.4	41.7	16.8	10.2	50
Long-Term Average Regional Unit Runoff ($l/s/km^2$)	8.4	7.3	7.4	14.8	53.2	109.8	123.1	101.2	71.9	48.9	22.5	11.9	48

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\Streamflow Data\SC-2\[SC-2 Streamflow Record_KT_Feb19'10.xls]Table

NOTES:

1. ORANGE HIGHLIGHTED VALUES WERE CALCULATED BY INTERPOLATION BETWEEN DISCRETE POINT MEASUREMENTS, AS WATER WAS NOT MONITORED CONTINUOUSLY DURING THE WINTER.
2. GREEN HIGHLIGHTED VALUES WERE EXTRAPOLATED FROM THE SC-2 LONG-TERM SYNTHETIC STREAMFLOW SERIES.
3. REGIONAL VALUES ARE FROM THE WATER SURVEY OF CANADA MONITORING STATION ON THE ISKUT RIVER AT JOHNSON (08CG001).

0	17MAR'10	ISSUED WITH REPORT 101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 3.4

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SK-1 HYDROLOGY STATION MEASURED MEAN MONTHLY DISCHARGE

Print Apr/21/10 9:19:58

Year	Discharge (m^3/s)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
2006						1.54	1.30	0.62	0.47	0.31	0.14	0.12	
2007	0.10	0.07	0.04	0.10	0.99	2.20	1.98	0.67	0.15	0.06	0.09	0.04	0.55
2008	0.03	0.02	0.02	0.05	0.84	0.76	0.95	0.66	0.21	0.16	0.10		0.32
Average	0.06	0.04	0.03	0.08	0.91	1.50	1.41	0.65	0.28	0.18	0.11	0.08	0.44
Unit Runoff ($l/s/km^2$)	3.9	2.6	1.9	4.7	56.6	93.0	87.7	40.2	17.2	11.0	6.9	4.9	28
2006-2008 Average Regional Unit Runoff ($l/s/km^2$)	8.6	7.1	6.0	12.7	58.2	123.3	142.5	97.3	71.4	41.7	16.8	10.2	50
Long-Term Average Regional Unit Runoff ($l/s/km^2$)	8.4	7.3	7.4	14.8	53.2	109.8	123.1	101.2	71.9	48.9	22.5	11.9	48

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\Streamflow Data\SK-1\[SK-1 Streamflow Record_KT_Feb23'10.xls]Table

NOTES:

1. HIGHLIGHTED VALUES WERE CALCULATED BY INTERPOLATION BETWEEN DISCRETE POINT MEASUREMENTS, AS WATER WAS NOT MONITORED CONTINUOUSLY DURING THE WINTER.
2. REGIONAL VALUES ARE FROM THE WATER SURVEY OF CANADA MONITORING STATION ON THE ISKUT RIVER AT JOHNSON (08CG001).

0	17MAR'10	ISSUED WITH REPORT 101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 3.5

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SK-2 HYDROLOGY STATION MEASURED MEAN MONTHLY DISCHARGE

Print Apr/21/10 9:23:35

Year	Discharge (m^3/s)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
2006						2.46	1.14	0.74	0.55	0.45	0.36	0.34	
2007	0.32	0.25	0.24	0.43	2.12	4.52	2.38	1.31	0.71	0.58	0.39	0.15	1.13
2008	0.10	0.07	0.06	0.20	1.44	1.44	1.27	0.93	0.58	0.61	0.49		0.61
Average	0.21	0.16	0.15	0.31	1.78	2.81	1.60	0.99	0.61	0.55	0.41	0.24	0.82
Unit Runoff ($l/s/km^2$)	5.5	4.2	3.9	8.1	46.4	73.3	41.7	26.0	16.0	14.3	10.8	6.3	21
2006-2008 Average Regional Unit Runoff ($l/s/km^2$)	8.6	7.1	6.0	12.7	58.2	123.3	142.5	97.3	71.4	41.7	16.8	10.2	50
Long-Term Average Regional Unit Runoff ($l/s/km^2$)	8.4	7.3	7.4	14.8	53.2	109.8	123.1	101.2	71.9	48.9	22.5	11.9	48

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\Streamflow Data\SK-2\[SK-2 Streamflow Record_KT_Feb27'10.xls]Table

NOTES:

1. HIGHLIGHTED VALUES WERE CALCULATED BY INTERPOLATION BETWEEN DISCRETE POINT MEASUREMENTS, AS WATER WAS NOT MONITORED CONTINUOUSLY DURING THE WINTER.
2. REGIONAL VALUES ARE FROM THE WATER SURVEY OF CANADA MONITORING STATION ON THE ISKUT RIVER AT JOHNSON (08CG001).

0	17MAR'10	ISSUED WITH REPORT 101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 3.6

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

SC-2 HYDROLOGIC MONITORING STATION
LONG-TERM SYNTHETIC MEAN MONTHLY DISCHARGE SERIES

Print Apr/21/10 9:05:50

Year	Mean Monthly Discharge (m^3/s)												
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1	0.9	0.7	0.7	1.1	3.4	12.3	34.9	34.6	11.7	2.5	3.3	1.3	8.9
2	0.9	0.7	0.7	1.1	3.0	16.1	36.3	27.4	18.7	7.2	3.3	1.3	9.7
3	0.9	0.7	0.7	1.1	4.2	33.2	25.8	40.5	30.1	10.9	3.3	1.3	12.7
4	0.9	0.7	0.7	1.1	5.3	12.4	36.3	24.2	20.1	4.4	3.3	1.3	9.2
5	0.9	0.7	0.7	1.1	5.4	35.5	25.6	22.0	15.4	4.9	3.3	1.3	9.7
6	0.9	0.7	0.7	1.1	3.0	22.3	27.3	32.1	14.3	8.1	3.3	1.3	9.6
7	0.9	0.7	0.7	1.1	2.9	22.4	35.5	40.8	15.8	7.3	3.3	1.3	11.1
8	0.9	0.7	0.7	1.1	5.2	21.2	38.3	38.0	14.5	11.3	3.3	1.3	11.4
9	0.9	0.7	0.7	1.1	4.2	15.6	29.8	30.2	16.9	2.5	3.3	1.3	8.9
10	0.9	0.7	0.7	1.1	3.1	8.5	22.7	31.0	21.9	37.2	3.3	1.3	11.0
11	0.9	0.7	0.7	1.1	3.4	12.4	40.1	21.6	12.0	4.8	3.3	1.3	8.5
12	0.9	0.7	0.7	1.1	3.2	14.6	33.6	36.8	18.3	9.5	3.3	1.3	10.3
13	0.9	0.7	0.7	1.1	3.2	16.5	29.9	40.8	10.5	5.8	3.3	1.3	9.6
14	0.9	0.7	0.7	1.1	2.9	15.6	25.9	30.9	9.3	19.9	3.3	1.3	9.4
15	0.9	0.7	0.7	1.1	4.6	15.6	34.8	31.1	18.5	14.6	3.3	1.3	10.6
16	0.9	0.7	0.7	1.1	5.2	24.4	29.4	26.8	13.9	28.5	3.3	1.3	11.3
17	0.9	0.7	0.7	1.1	8.5	17.0	33.5	37.2	36.1	8.1	3.3	1.3	12.4
18	0.9	0.7	0.7	1.1	2.9	25.4	31.3	24.5	16.9	12.0	3.3	1.3	10.1
19	0.9	0.7	0.7	1.1	6.1	21.3	27.3	29.4	14.1	3.0	3.3	1.3	9.1
20	0.9	0.7	0.7	1.1	3.0	12.1	26.6	31.9	8.5	6.4	3.3	1.3	8.0
21	0.9	0.7	0.7	1.1	5.5	15.2	41.0	27.4	13.1	2.7	3.3	1.3	9.4
22	0.9	0.7	0.7	1.1	3.6	17.0	36.2	26.4	11.3	28.4	3.3	1.3	10.9
23	0.9	0.7	0.7	1.1	4.4	15.2	39.5	22.4	22.3	18.0	3.3	1.3	10.8
24	0.9	0.7	0.7	1.1	5.1	16.9	26.7	32.9	19.5	9.7	3.3	1.3	9.9
25	0.9	0.7	0.7	1.1	6.8	24.1	35.6	36.5	19.1	8.2	3.3	1.3	11.5
26	0.9	0.7	0.7	1.1	7.4	29.4	36.7	39.0	19.8	5.2	3.3	1.3	12.1
27	0.9	0.7	0.7	1.1	7.7	25.9	32.1	34.4	24.9	18.5	3.3	1.3	12.6
28	0.9	0.7	0.7	1.1	6.4	30.5	39.3	25.4	16.0	5.7	3.3	1.3	10.9
29	0.9	0.7	0.7	1.1	16.6	23.5	30.5	27.1	14.2	18.4	3.3	1.3	11.5
30	0.9	0.7	0.7	1.1	5.9	17.2	32.3	35.5	32.7	8.6	3.3	1.3	11.7
31	0.9	0.7	0.7	1.1	9.3	17.5	27.9	22.0	21.6	2.9	3.3	1.3	9.1
32	0.9	0.7	0.7	1.1	3.3	16.6	27.8	25.6	11.8	5.1	3.3	1.3	8.2
33	0.9	0.7	0.7	1.1	8.0	23.1	32.1	30.1	22.6	5.1	3.3	1.3	10.7
34	0.9	0.7	0.7	1.1	11.1	24.5	28.4	28.2	14.3	6.9	3.3	1.3	10.1
35	0.9	0.7	0.7	1.1	5.8	22.6	31.5	31.9	16.7	10.8	3.3	1.3	10.6
36	0.9	0.7	0.7	1.1	3.0	17.5	37.0	32.6	22.8	6.4	3.3	1.3	10.6
37	0.9	0.7	0.7	1.1	2.9	17.3	31.6	29.9	19.5	2.9	3.3	1.3	9.3
38	0.9	0.7	0.7	1.1	5.8	24.2	27.8	39.4	18.7	5.8	3.3	1.3	10.8
39	0.9	0.7	0.7	1.1	5.1	19.5	33.1	23.4	21.9	15.2	3.3	1.3	10.5
40	0.9	0.7	0.7	1.1	8.2	31.3	35.4	31.2	15.5	10.9	3.3	1.3	11.7
41	0.9	0.7	0.7	1.1	11.5	23.2	29.4	33.5	15.5	4.7	3.3	1.3	10.5
42	0.9	0.7	0.7	1.1	5.6	26.3	35.0	23.0	24.2	7.4	3.3	1.3	10.8
43	0.9	0.7	0.7	1.1	6.5	31.5	51.6	29.5	15.9	4.9	3.3	1.3	12.3
44	0.9	0.7	0.7	1.1	10.1	14.4	28.0	34.9	12.9	7.3	3.3	1.3	9.6
Average	0.9	0.7	0.7	1.1	5.6	20.4	32.5	30.8	17.8	9.7	3.3	1.3	10.4
Min	-	-	-	-	2.9	8.5	22.7	21.6	8.5	2.5	-	-	8.0
Max	-	-	-	-	16.6	35.5	51.6	40.8	36.1	37.2	-	-	12.7

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\Streamflow Data\SC-2\[SC-2 Regression_KT_Feb23'10.xls]Table

NOTES:

1. MAY THROUGH OCTOBER VALUES WERE DERIVED BY RANKED LINEAR REGRESSION WITH THE REGIONAL STREAMFLOW RECORD COLLECTED BY WSC ON THE ISKUT RIVER AT JOHNSON.
2. NOVEMBER THROUGH APRIL VALUES ARE ESTIMATES OF THE LONG-TERM MEAN MONTHLY DISCHARGE, ALSO DERIVED FROM THE ISKUT RIVER RECORD, AND THEREFORE ONLY ONE VALUE IS AVAILABLE FOR EACH MONTH.

0	17MAR'10	ISSUED WITH REPORT 101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

TABLE 3.7

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

WET AND DRY 10-YEAR RETURN PERIOD FLOWS AS A PERCENTAGE OF MEAN MONTHLY FLOWS

Print Apr/21/10 9:07:53

Station	Return Period	10-Year Return Period Discharge (l/s/km^2)											
		January	February	March	April	May	June	July	August	September	October	November	December
Forrest Kerr Creek	10 Year Wet % of Mean	146%	138%	146%	165%	149%	136%	128%	120%	140%	188%	174%	145%
	10 Year Dry % of Mean	65%	67%	60%	46%	55%	64%	72%	87%	60%	42%	46%	64%
More Creek	10 Year Wet % of Mean	135%	136%	136%	153%	149%	125%	120%	121%	146%	167%	147%	144%
	10 Year Dry % of Mean	70%	70%	71%	58%	61%	76%	81%	84%	61%	49%	59%	56%
Schaft Creek	10 Year Wet % of Mean					153%	143%	122%	123%	142%	191%		
	10 Year Dry % of Mean					51%	64%	81%	77%	65%	36%		
Average	10 Year Wet % of Mean	141%	137%	141%	159%	150%	135%	123%	121%	142%	182%	161%	144%
	10 Year Dry % of Mean	68%	69%	66%	52%	56%	68%	78%	83%	62%	42%	53%	60%

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\[Wet and Dry Regional_KT_Feb4'10.xls]Sheet2

NOTES:

1. DISCHARGE VALUES WERE DERIVED USING PALISADE DECISION TOOLS @RISK DISTRIBUTION FITTING SOFTWARE.
2. SCHAFT CREEK VALUES WERE DERIVED FROM THE LONG-TERM SYNTHETIC STREAMFLOW SERIES AT SC-2.

0	18MAR'10	ISSUED WITH REPORT VA101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold
CONSULTING

TABLE 3.8

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

10-YEAR RETURN PERIOD 7-DAY LOW FLOWS

Print Apr/21/10 9:08:54

Station Name	Drainage Area (km^2)	2007 Minimum Manually Measured Discharge (m^3/s)	2008 Minimum Manually Measured Discharge (m^3/s)	Mean Annual Minimum Manually Measured Discharge (m^3/s)	10 Year Return Period 7-day Low Flows (m^3/s)
SC-2	227.5	0.78	0.10	0.44	0.44
SK-1	16.1	0.04	0.01	0.03	0.02
SK-2	38.3	0.24	0.04	0.14	0.05

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\[Peak and Low Flows_KT_Feb2'10.xls]Low Summary Table

NOTES:

1. RETURN PERIOD LOW FLOWS WERE DERIVED USING REGIONAL METHODOLOGY PRESENTED IN OBEDKOFF (2001).
2. THE 2008 MINIMUM MANUALLY MEASURED DISCHARGE WAS SELECTED AS THE 10-YEAR RETURN PERIOD 7-DAY LOW FLOW AT SC-2.

0	18MAR'10	ISSUED WITH REPORT VA101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 3.9

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

RETURN PERIOD PEAK INSTANTANEOUS FLOWS

Print Apr/21/10 9:10:25

Station Name	Drainage Area (km^2)	Peak Instantaneous 44 Year Long-Term Synthetic Discharge (m^3/s)	Return Period Peak Instantaneous Discharge Estimates (m^3/s)						
			Mean	5 year	10 year	20 year	50 year	100 year	200 year
SC-2	227.5	489	182	231	298	393	557	712	915
SK-1	16.1	-	24	30	39	51	72	92	119
SK-2	38.3	-	45	57	74	98	139	177	228

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Hydrology Data\[Peak and Low Flows_KT_Feb2'10.xls]Peak Summary Table

NOTES:

1. RETURN PERIOD PEAK FLOWS WERE DERIVED USING REGIONAL METHODOLOGY PRESENTED IN OBEDKOFF (2001).

0	18MAR'10	ISSUED WITH REPORT VA101-329/5-3	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 4.1

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

COEFFICIENT OF VARIATION VALUES FOR WATER BALANCE MODELLING

Location	Parameter	Coefficient of Variation											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project site (elevation 977 m)	Temperature	0.29	0.46	0.48	2.68	0.53	0.26	0.14	0.15	0.23	1.92	0.53	0.41
	Precipitation	0.29	0.51	0.51	0.72	0.53	0.36	0.28	0.47	0.36	0.28	0.40	0.36

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[CV_20100331.xls]Table_CV

NOTES:

1. COFFICIENT OF VARIATION = STANDARD DEVIATION/ MEAN
2. THE COFFICIENT OF VARIATION VALUES WERE BASED ON THE REGIONAL DATA AT UNUK RIVER ESKAY CREEK FOR THE PERIOD FROM 1990-2006 .

0	30MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Knight Piésold CONSULTING

TABLE 4.2

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

EFFECTIVE RUNOFF COEFFICIENTS

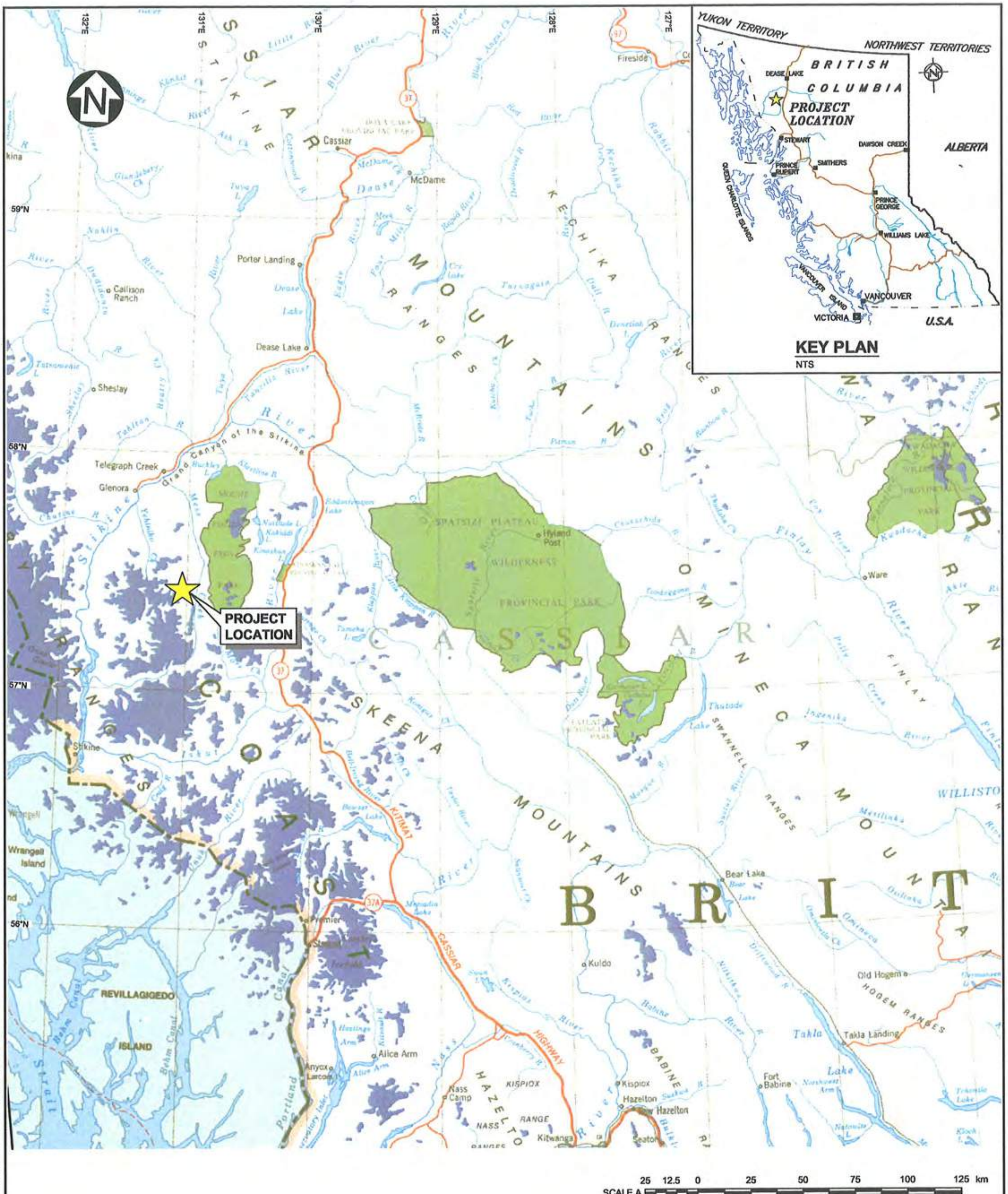
Description	Basin Area (km^2)	Mean Basin Elevation (m)	Measurement period	MAUR (mm)	Nearest Climate Station	Station Elevation (m)	Period of Record	MAP (mm)	Adjusted MAP (mm)	Effective Runoff Coefficient
Skeeter Creek (SK-2)	38.2	1090	October 2006-September 2007	925	Saddle	977	October 2006-September 2007	1013	1100	0.84
			Long-term est.	678			Long-term est.	850	922	0.74

Estimated Effective Runoff Coefficient for Non-Glaciated Areas = 0.75

M:\1\01\00329\05\A\Data\Task 0300 - Engineering Hydrometeorology Study\Meteorology\[MAP Validation_20100707.xls]Table_RC

NOTES:
1. ALL SITE-SPECIFIC VALUES FOR HYROLOGIC YEARS, OCTOBER THROUGH SEPTEMBER.
2. ADJUSTED PRECIPITATION VALUES WERE DERIVED FROM THE MEAN ANNUAL PRECIPITATION VALUE USING AN OROGRAPHIC FACTOR OF 8.0% PER 100 m.

1	15JUL'10	UPDATED DATA	ER	JGC	KJB
0	17MAR'10	ISSUED WITH REPORT VA101-329/5-3	ER	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

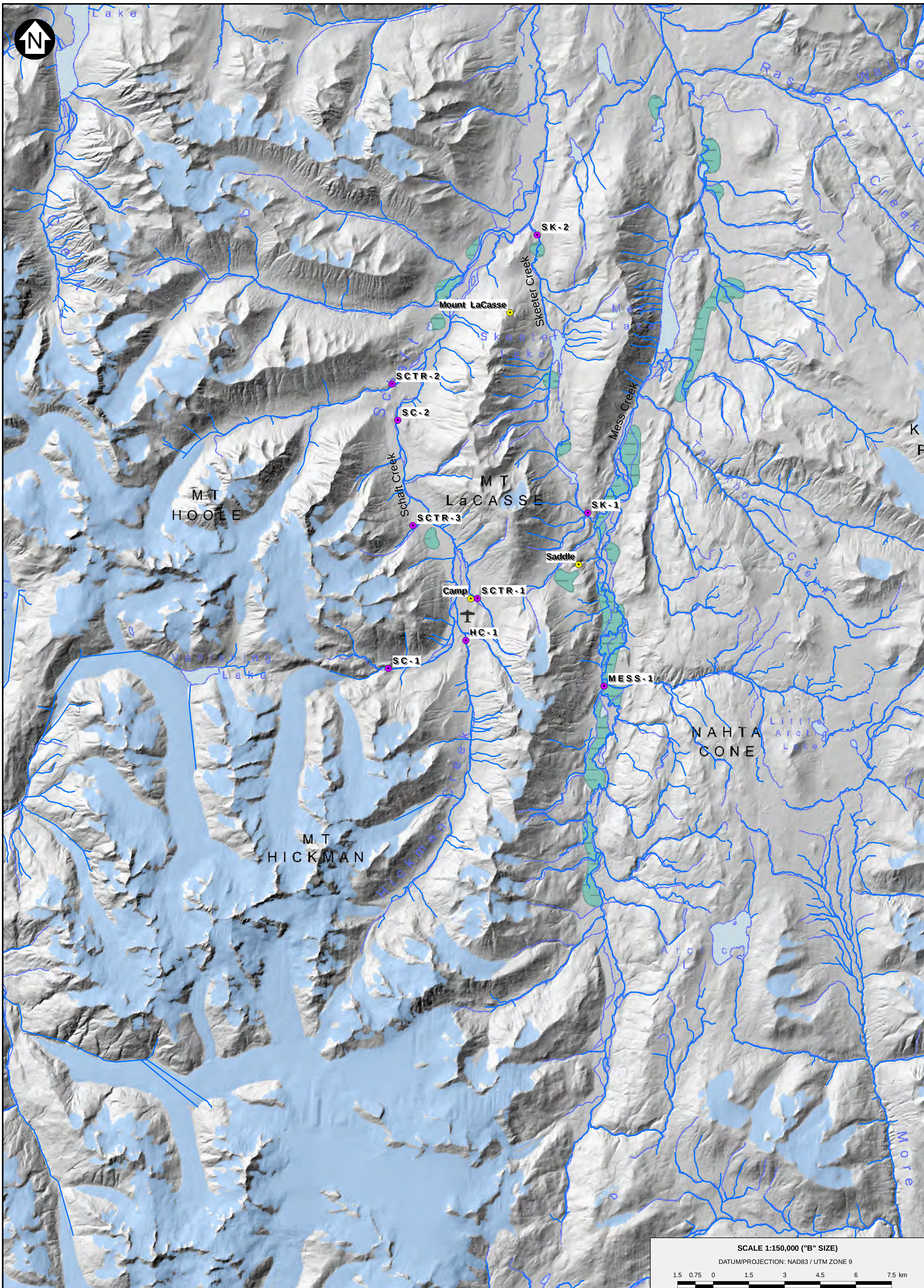
PROJECT LOCATION MAP

Knight Piésold
CONSULTING

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	09FEB'10	ISSUED WITH REPORT	AMM	JY	DF	KJB

P/A NO.	REF NO.	
VA101-329/5	3	
FIGURE 1.1		REV 0

SAVED: M:\1\01\00329\05\A\Acad\Figs\A05_r0 , 4/6/2010 1:35:20 PM PRINTED: 4/6/2010 1:35:46 PM, Layout1, JYANG
XREF FILE(S): IMAGE FILE(S): Entire Area



LEGEND

- HYDROMETRIC STATION
- PROJECT CLIMATE STATION
- STREAM LINE

VANCOUVER B.C. SAVED: M:\1\01\00329\05\A\GIS\ArcView\figures\Figure_2.1_r0.mxd; Apr 21, 2010 9:05:46 AM ksmith

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	26MAR'10	ISSUED WITH REPORT	AMD	AMD	KT	KJB

COPPER FOX METALS INC.

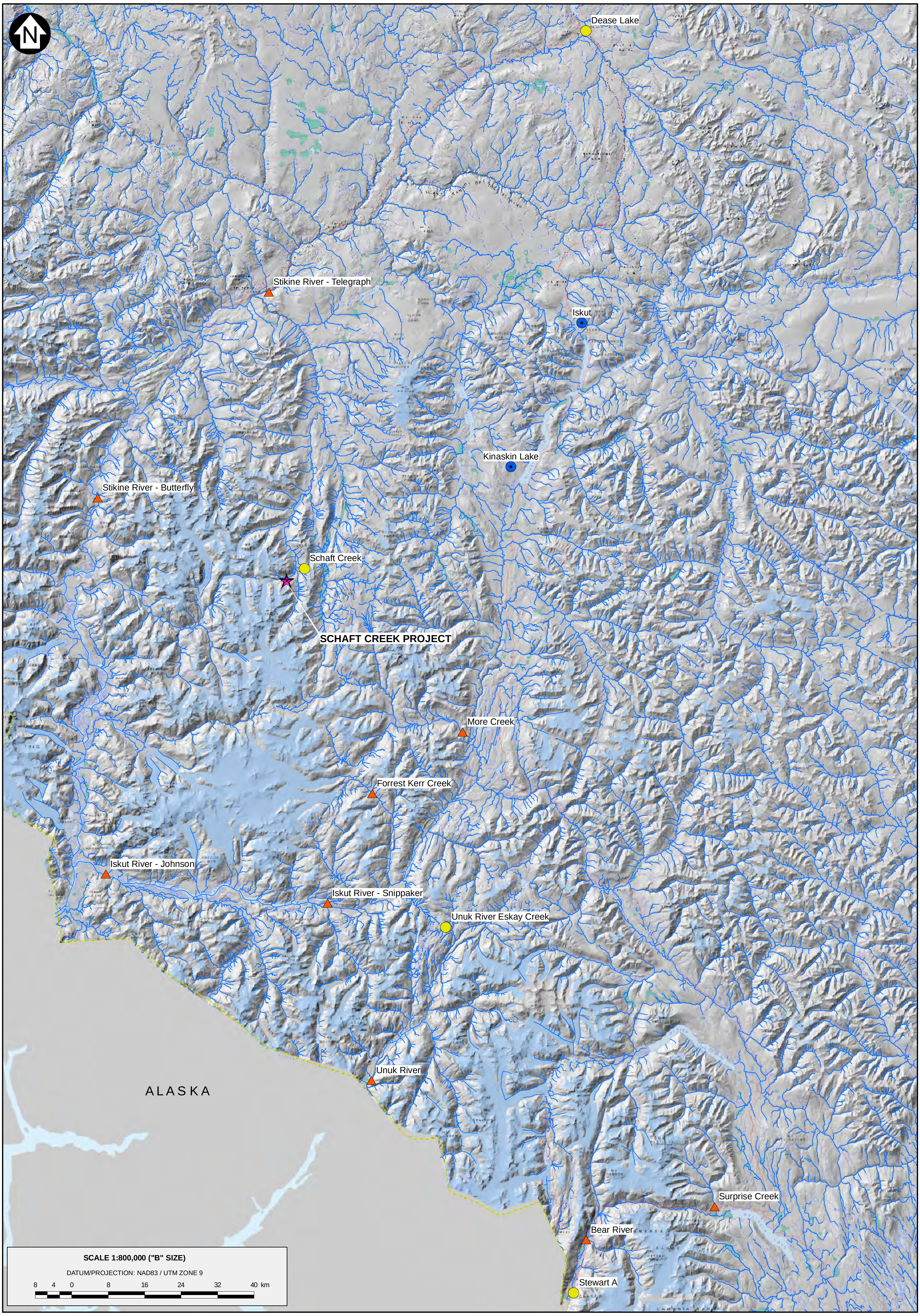
SCHAFT CREEK PROJECT

PROJECT SITE CLIMATE AND STREAMFLOW STATIONS

Knight Piésold CONSULTING

P/A NO. VA101-329/5 | REF NO. 3

FIGURE 2.1 | REV 0



SAVED: M:\1\01\00329\05\A\GIS\ArcView\figures\Figure_2.2_r0.mxd; Apr 21, 2010 9:13:37 AM ksmith

VANCOUVER B.C.

LEGEND

- WSC SREAMFLOW STATION
- MSC CLIMATE STATION
- SNOW SURVEY STATION
- STREAM LINE

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
0	26MAR'10	ISSUED WITH REPORT	AMD	AMD	KT	KJB

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

REGIONAL CLIMATE AND STREAMFLOW STATIONS

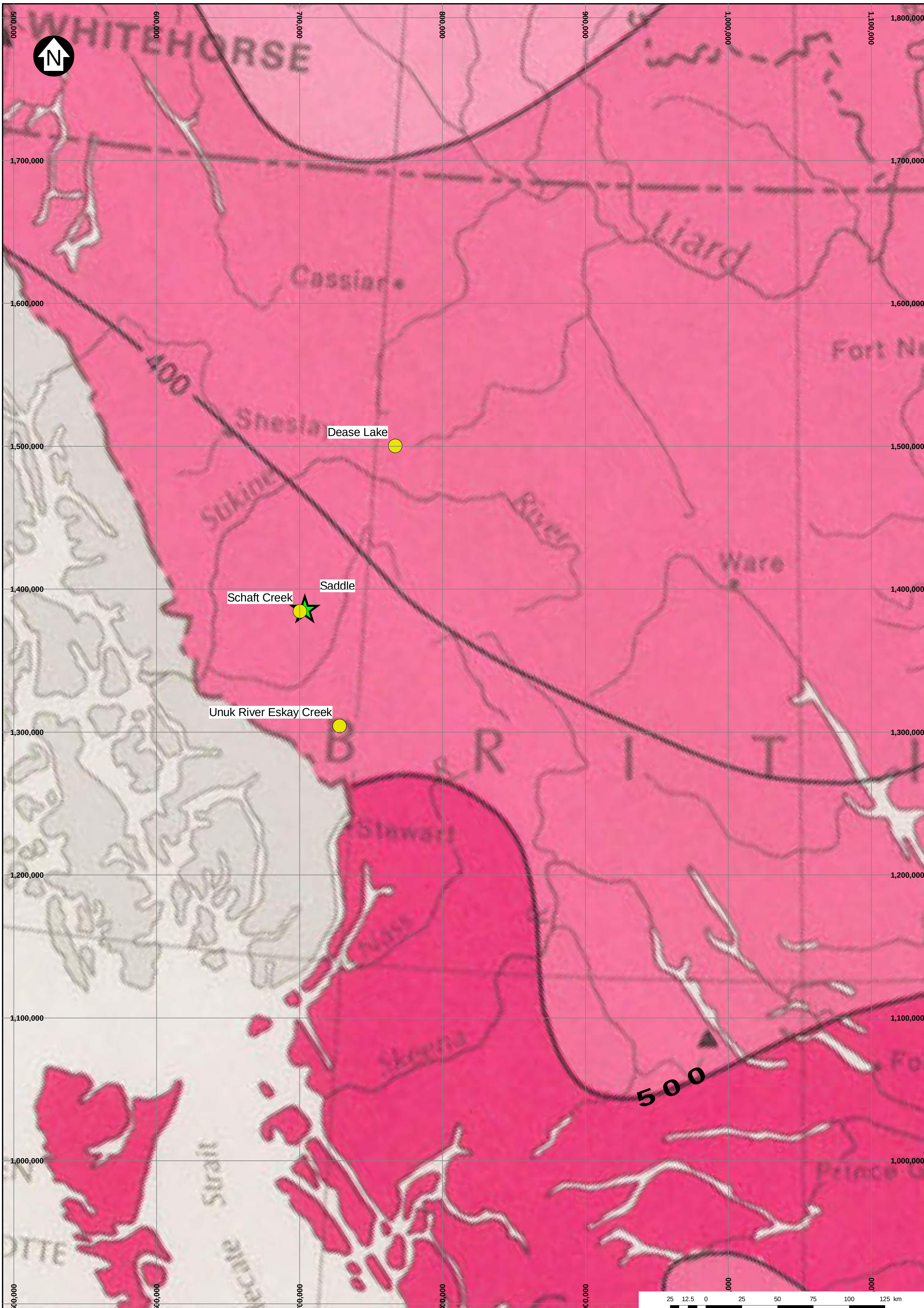
Knight Piésold CONSULTING

P/A NO. VA101-329/5

REF NO. 3

FIGURE 2.2

REV 0



LEGEND:

- MSC CLIMATE STATION
- PROJECT CLIMATE STATION LOCATION

NOTES:

1. BASE MAP: NATURAL RESOURCES CANADA HYDROLOGICAL ATLAS MEAN ANNUAL LAKE EVAPORATION. VALUES ARE IN MILLIMETRES AND BASED ON 10-YEAR PERIOD 1957-1966.
2. CO-ORDINATE GRID IS IN METRES. DATUM IS NAD83 PROJECTION IS BC ALBERS.
3. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:2,500,000 FOR 11X17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

REGIONAL MEAN ANNUAL LAKE EVAPORATION

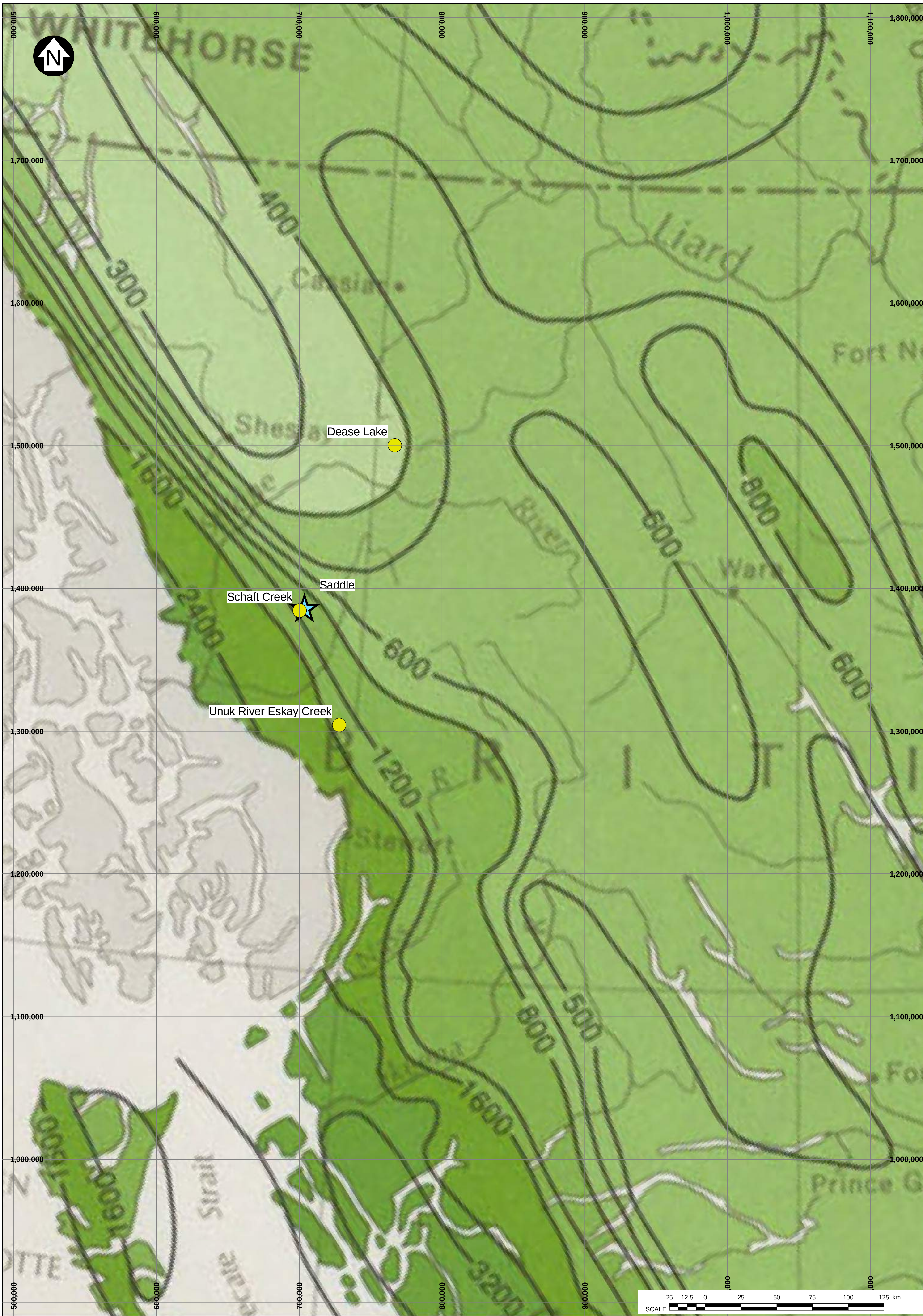
Knight Piésold CONSULTING

P/A NO.	REF NO.
VA101-329/5	3

FIGURE 2.3 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	11JUN'10	ISSUED WITH REPORT	KS	KS	ER	KJB

SAVED: M:\1\01\00329\05\A\GIS\ArcView\figures\Report_3\SchaftCr_MeanAnnualLakeEvaporation_R0.mxd, Jul 15, 2010 11:38:47 AM ksmith



LEGEND:

- MSC CLIMATE STATION
- PROJECT CLIMATE STATION LOCATION

NOTES:

1. BASE MAP: NATURAL RESOURCES CANADA HYDROLOGICAL ATLAS MEAN ANNUAL PRECIPITATION. VALUES ARE IN MILLIMETRES AND BASED ON 30-YEAR PERIOD 1941-1970.

2. CO-ORDINATE GRID IS IN METRES. DATUM IS NAD83 PROJECTION IS BC ALBERS.

3. THIS FIGURE IS PRODUCED AT A NOMINAL SCALE OF 1:2,500,000 FOR 11X17 (TABLOID) PAPER. ACTUAL SCALE MAY DIFFER ACCORDING TO CHANGES IN PRINTER SETTINGS OR PRINTED PAPER SIZE.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	11JUN'10	ISSUED WITH REPORT	KS	KS	ER	KJB

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

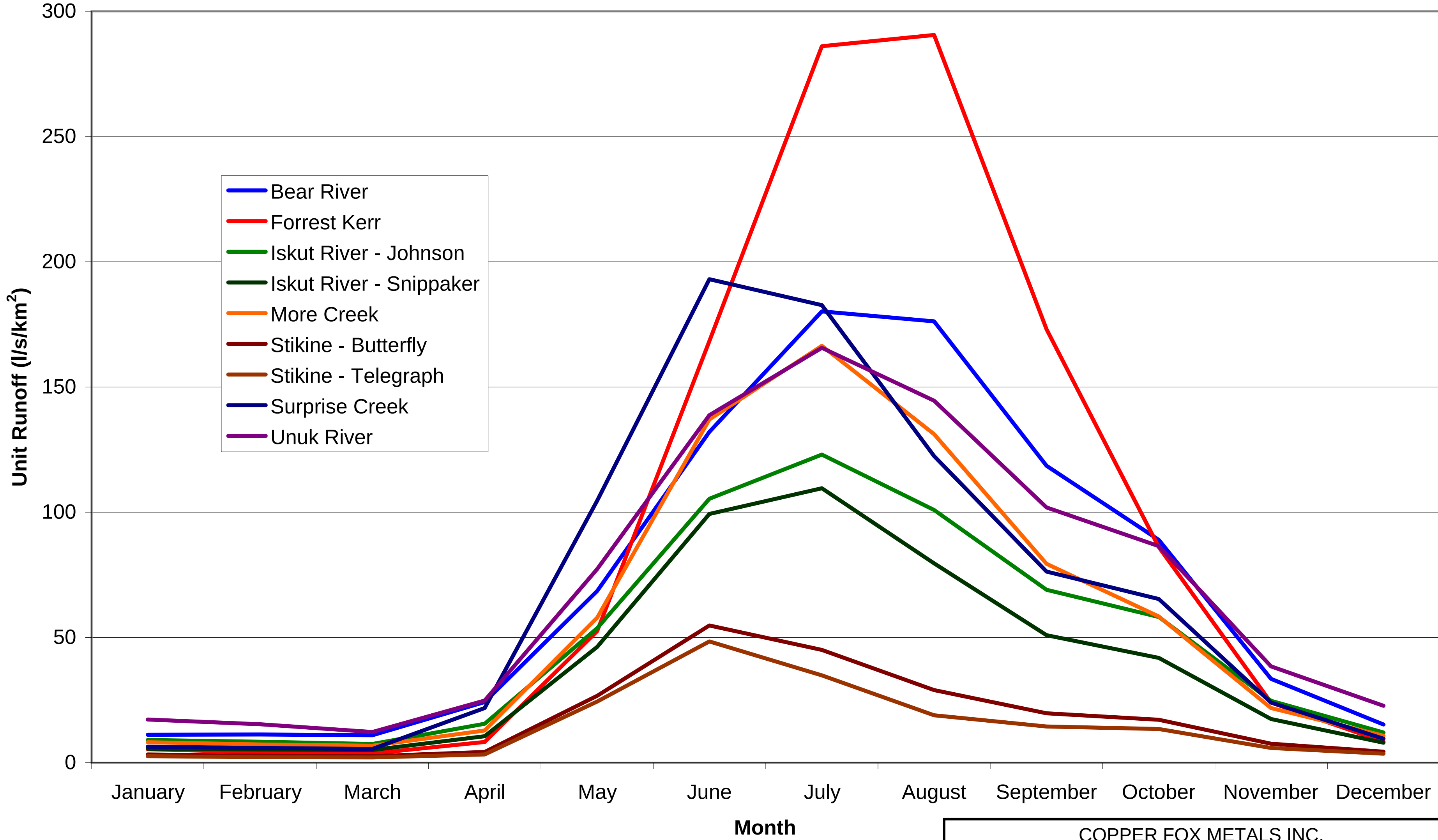
REGIONAL MEAN ANNUAL PRECIPITATION

Knight Piésold CONSULTING

P/A NO. VA101-329/5 | REF NO. 3

FIGURE 2.4 | REV 0

SAVED: M:\1\01\00329\05\A\GIS\ArcView\figures\Report_3\SchaftCr_MeanAnnualPrecipitation_R0.mxd; Jul 15, 2010 11:37:21 AM ksmith



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

REGIONAL STREAMFLOW HYDROGRAPHS

Knight Piésold CONSULTING

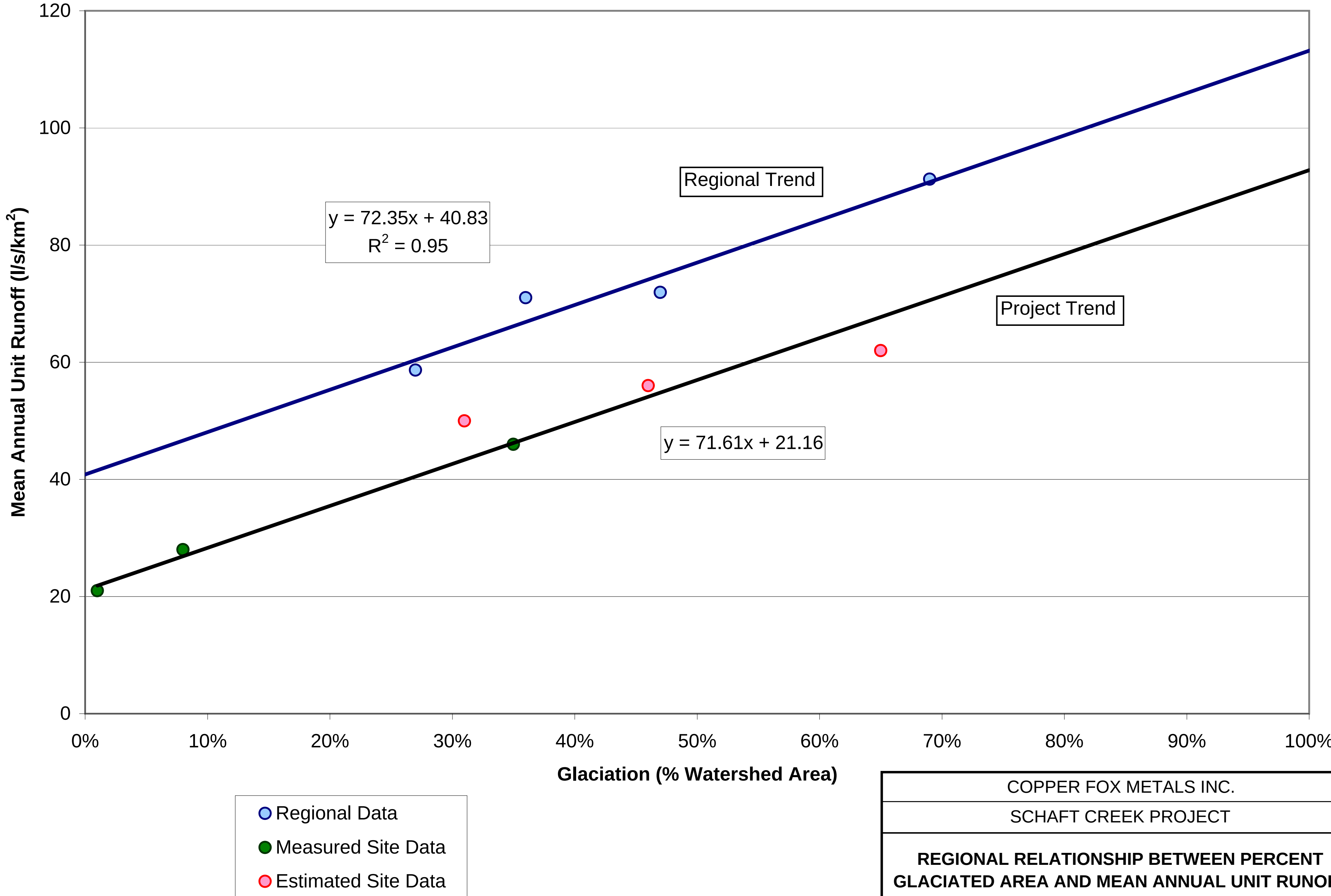
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.1

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

REGIONAL RELATIONSHIP BETWEEN PERCENT GLACIATED AREA AND MEAN ANNUAL UNIT RUNOFF

Knight Piésold CONSULTING

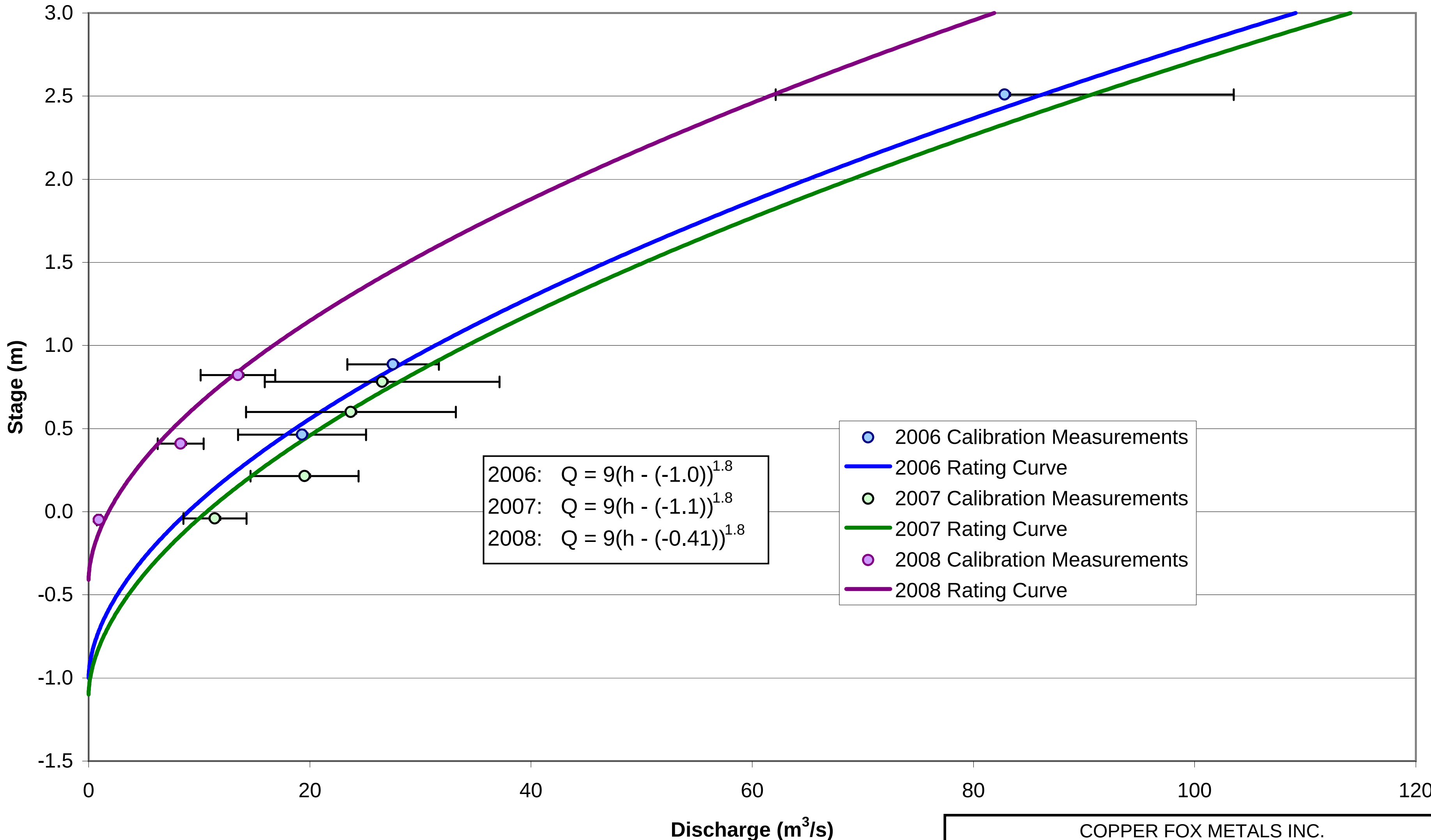
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.2

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SC-2 RATING CURVE

Knight Piésold CONSULTING

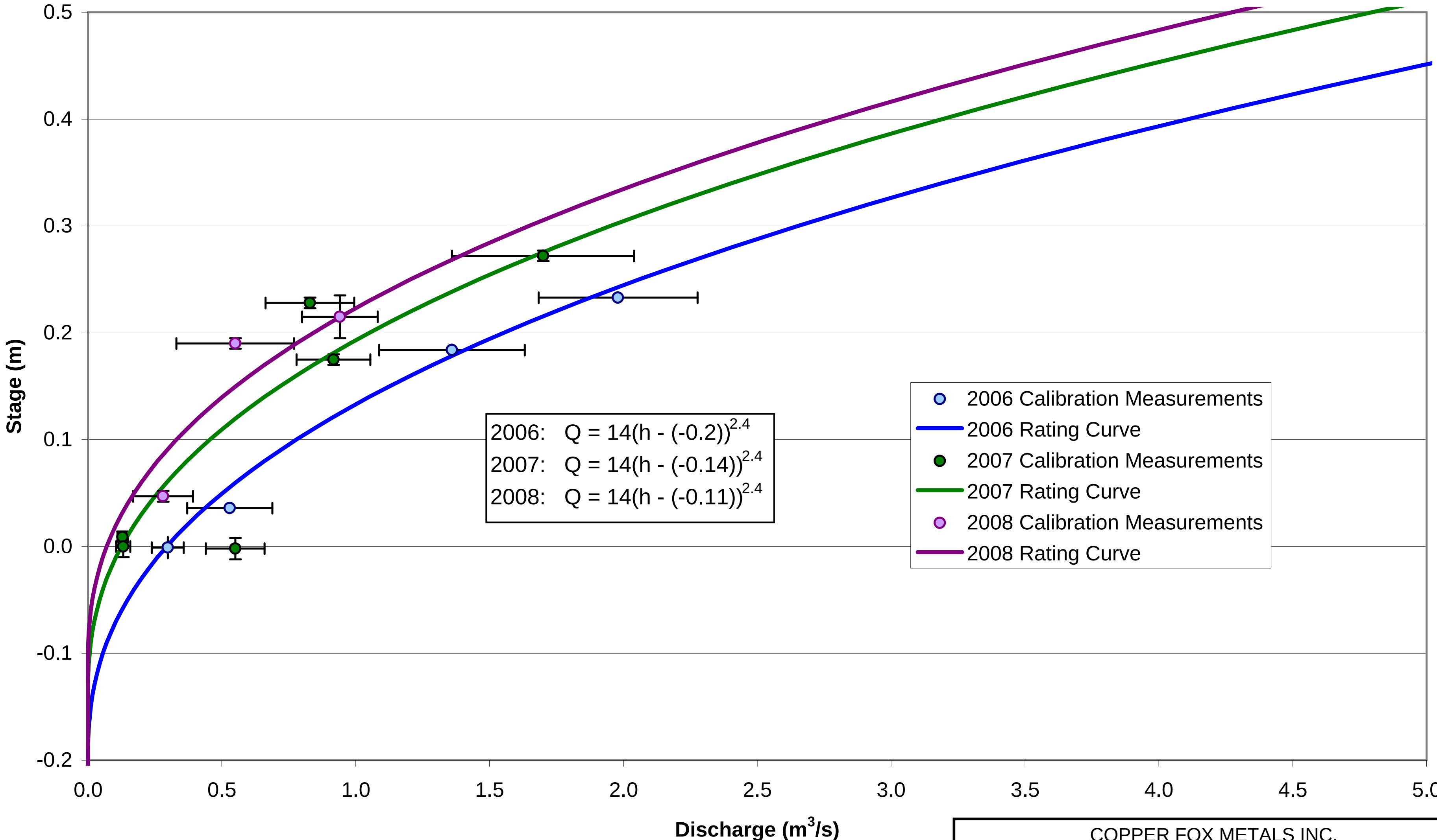
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.3

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

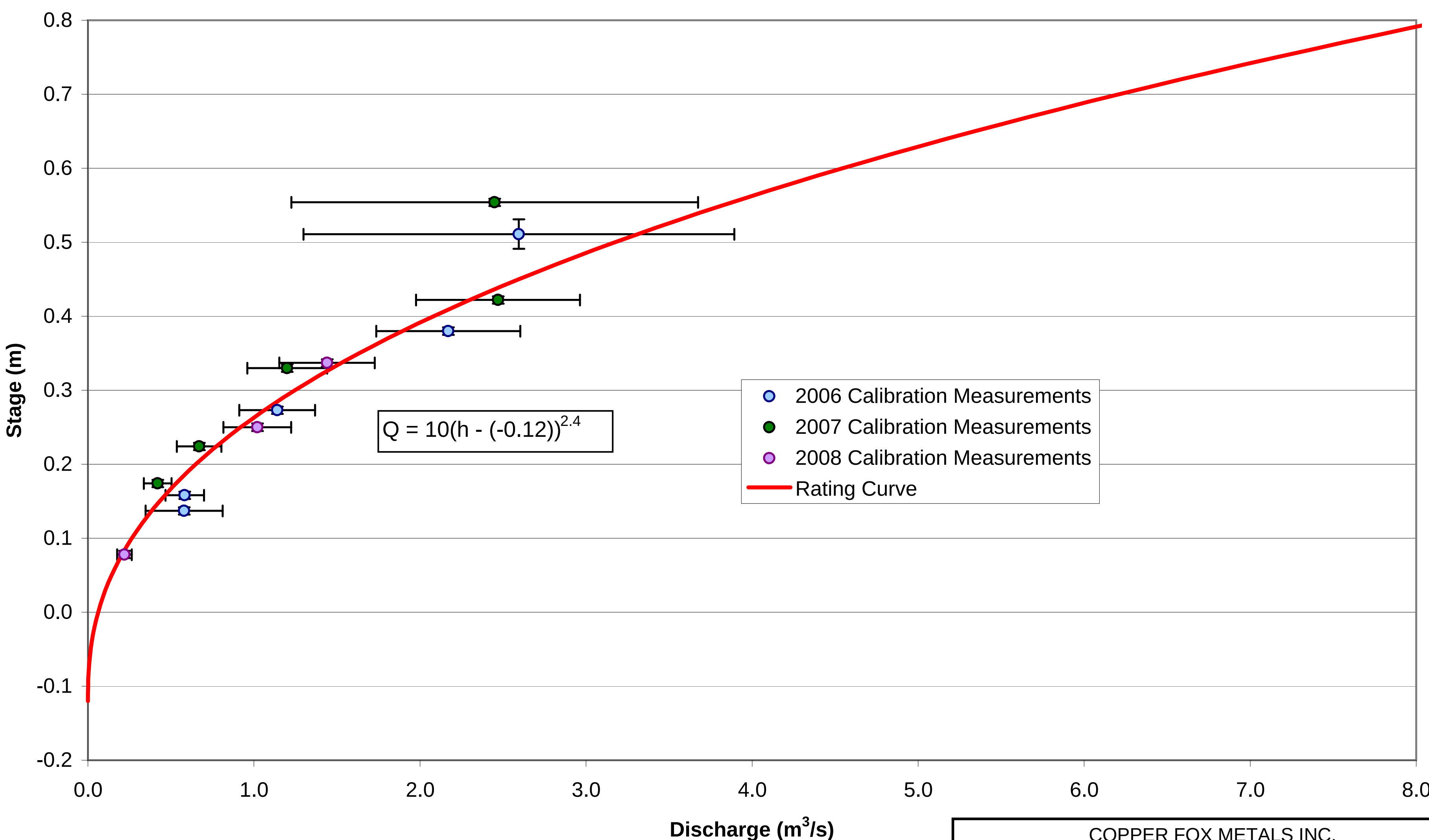
COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SK-1 RATING CURVES

Knight Piésold CONSULTING

P/A NO. VA101-329/5	REF. NO. 3	
FIGURE 3.4		REV 0



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SK-2 RATING CURVE

Knight Piésold CONSULTING

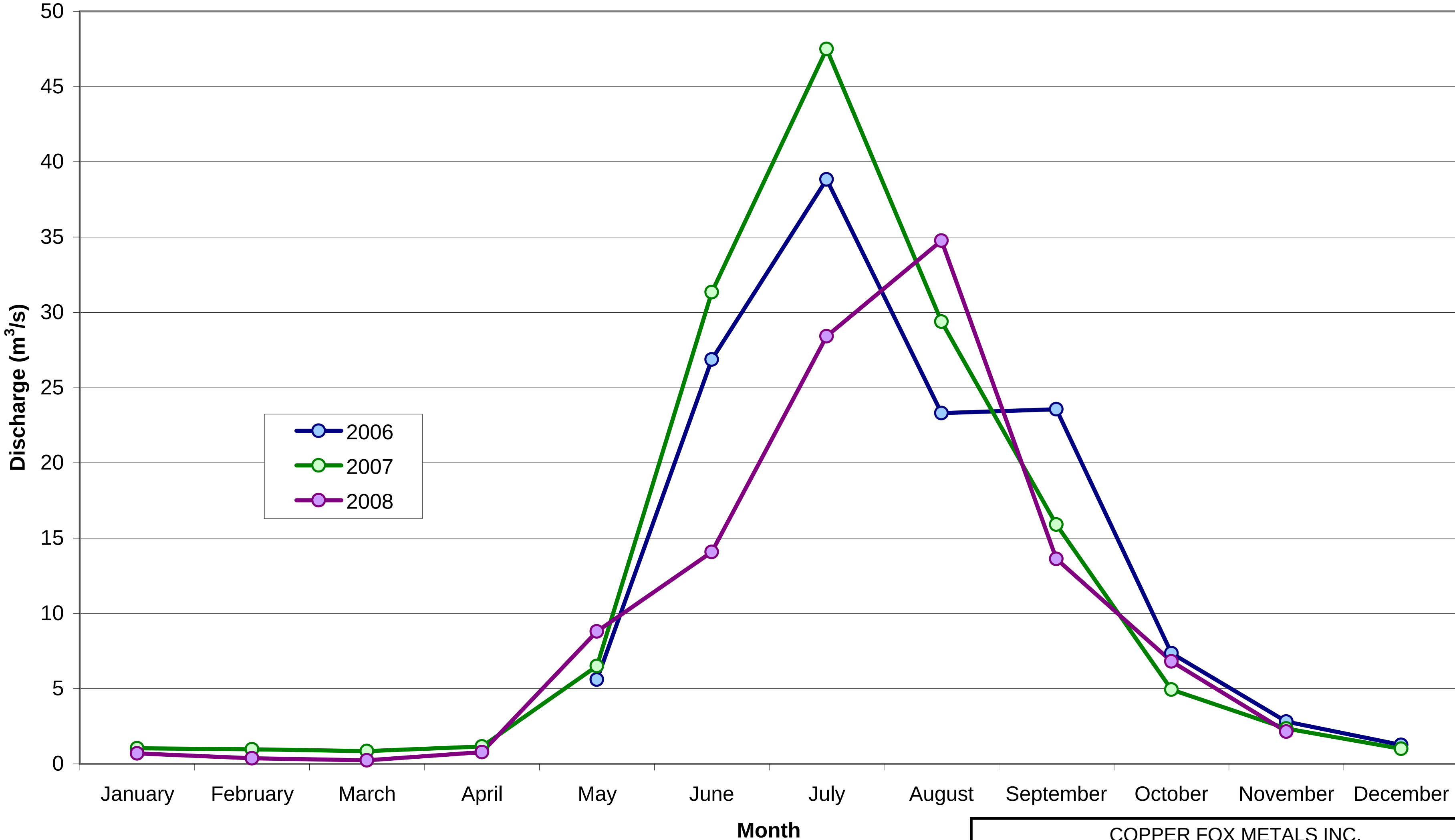
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.5

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

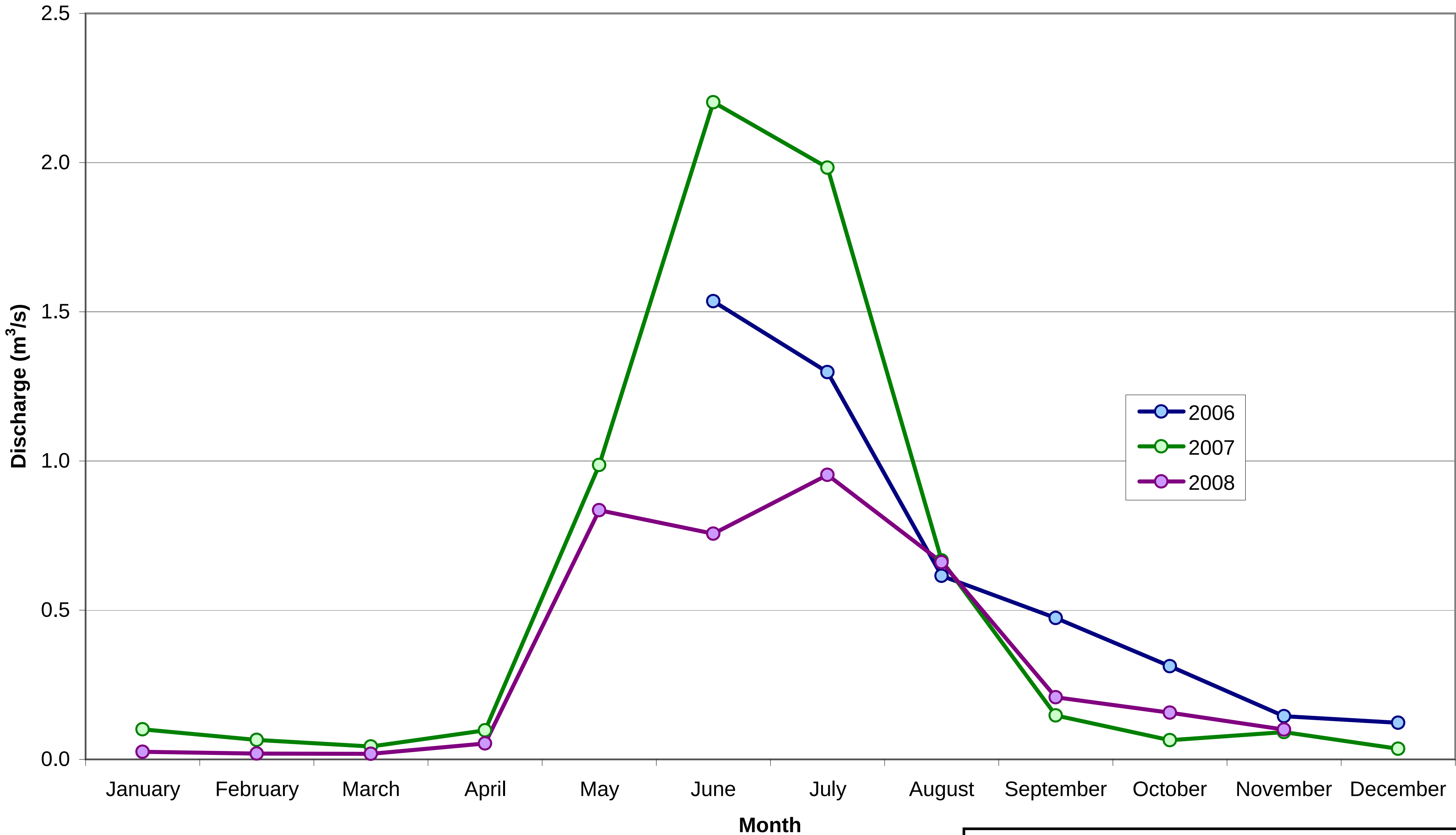
SC-2 MEASURED MEAN MONTHY HYDROGRAPHS

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-329/5	3

FIGURE 3.6 REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SK-1 MEASURED MEAN MONTHLY HYDROGRAPHS

Knight Piésold CONSULTING

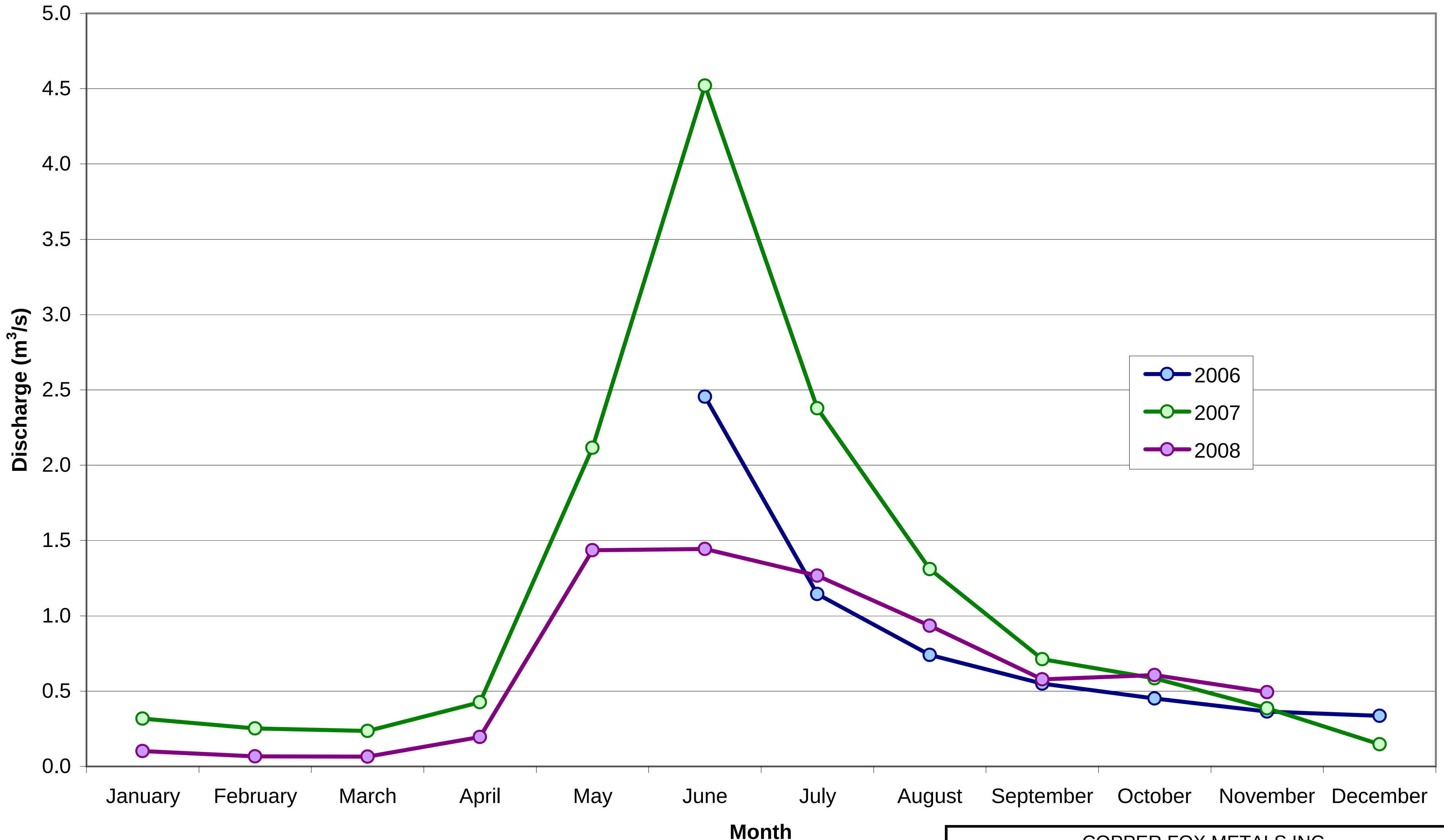
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.7

REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SK-2 MEASURED MEAN MONTHLY HYDROGRAPHS

Knight Piésold CONSULTING

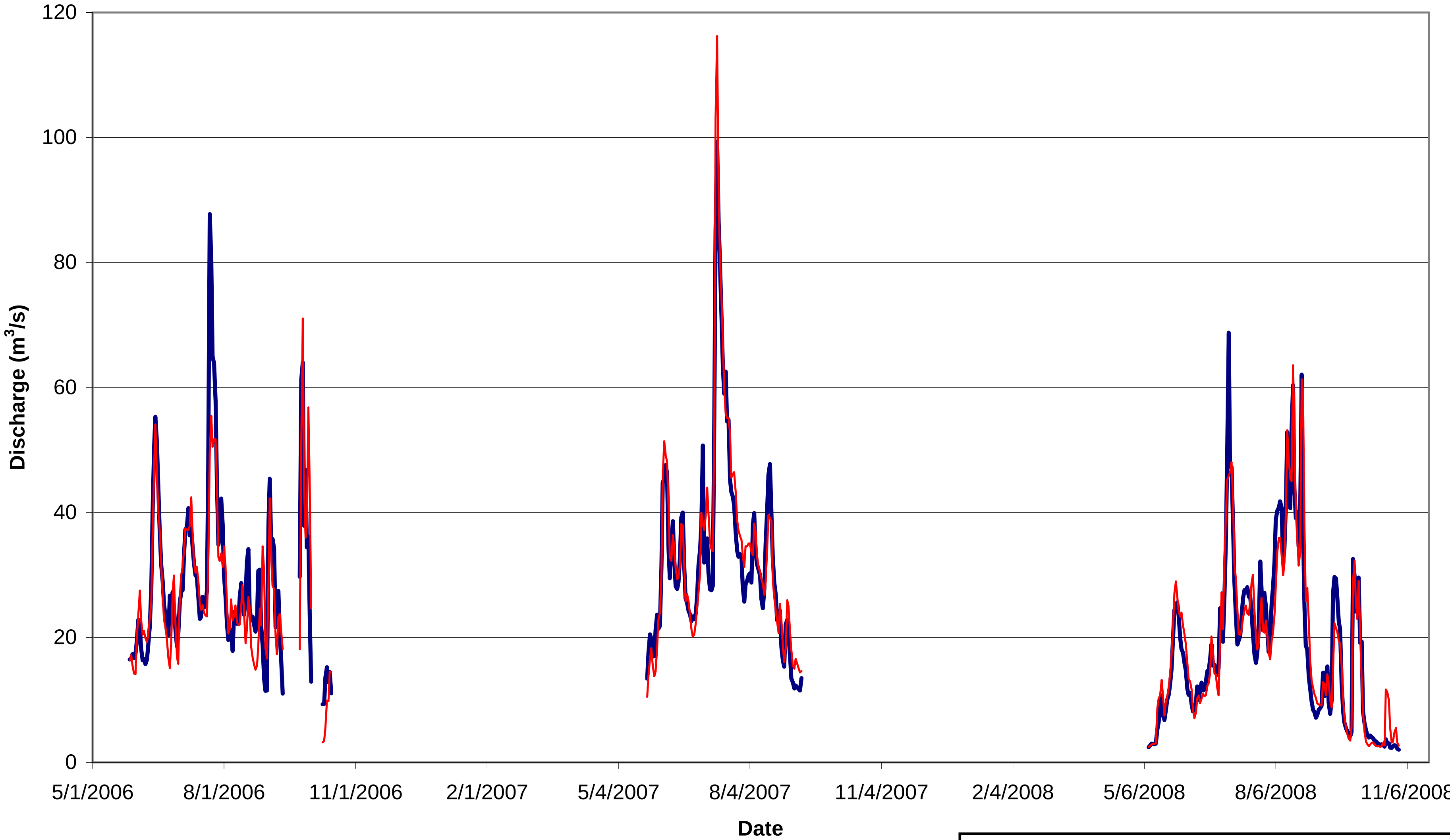
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.8

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SC-2 CONCURRENT MEASURED AND SYNTHETIC HYDROGRAPHS

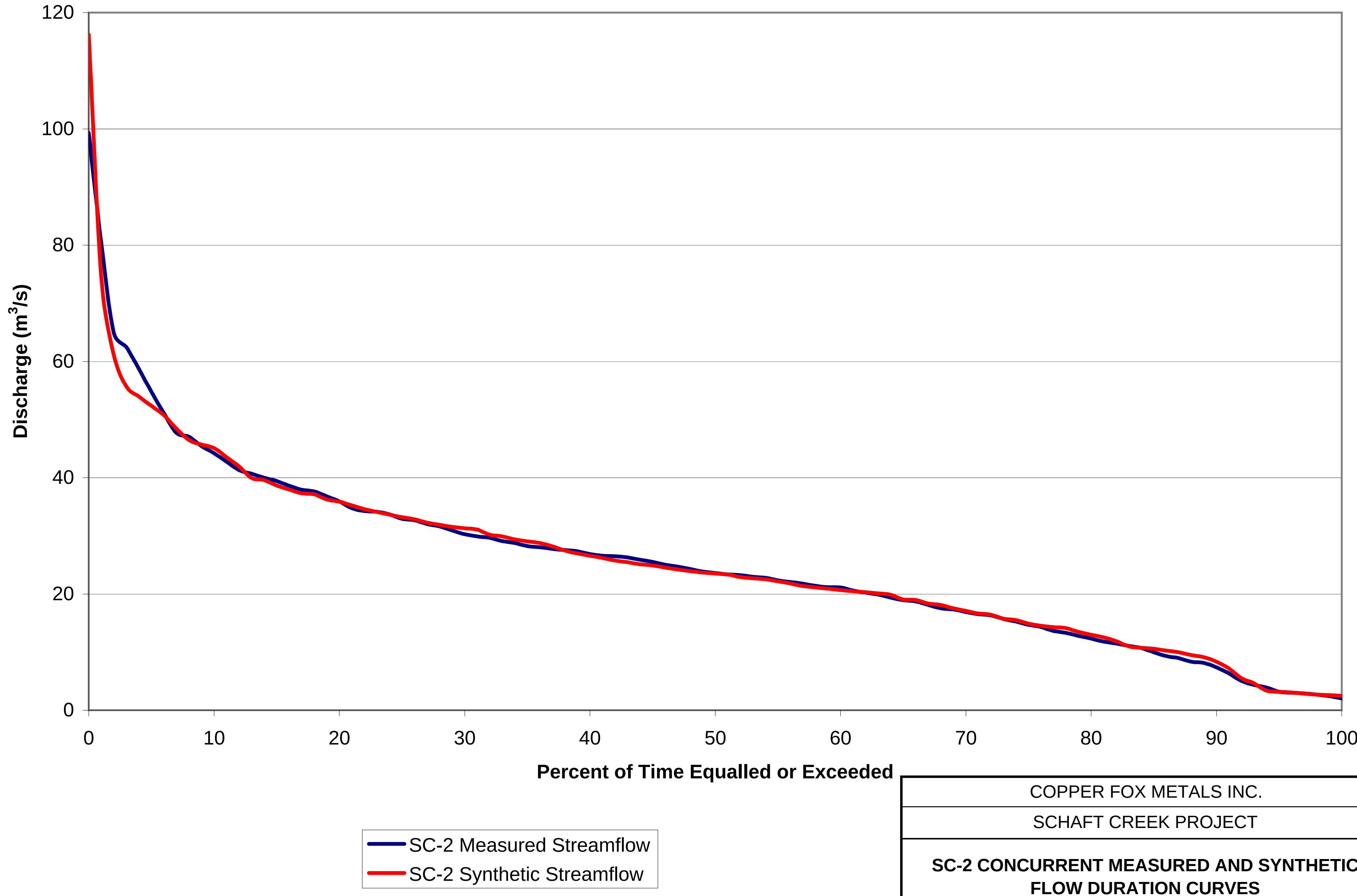
Knight Piésold CONSULTING

P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.9

REV 0



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SC-2 CONCURRENT MEASURED AND SYNTHETIC FLOW DURATION CURVES

Knight Piésold CONSULTING

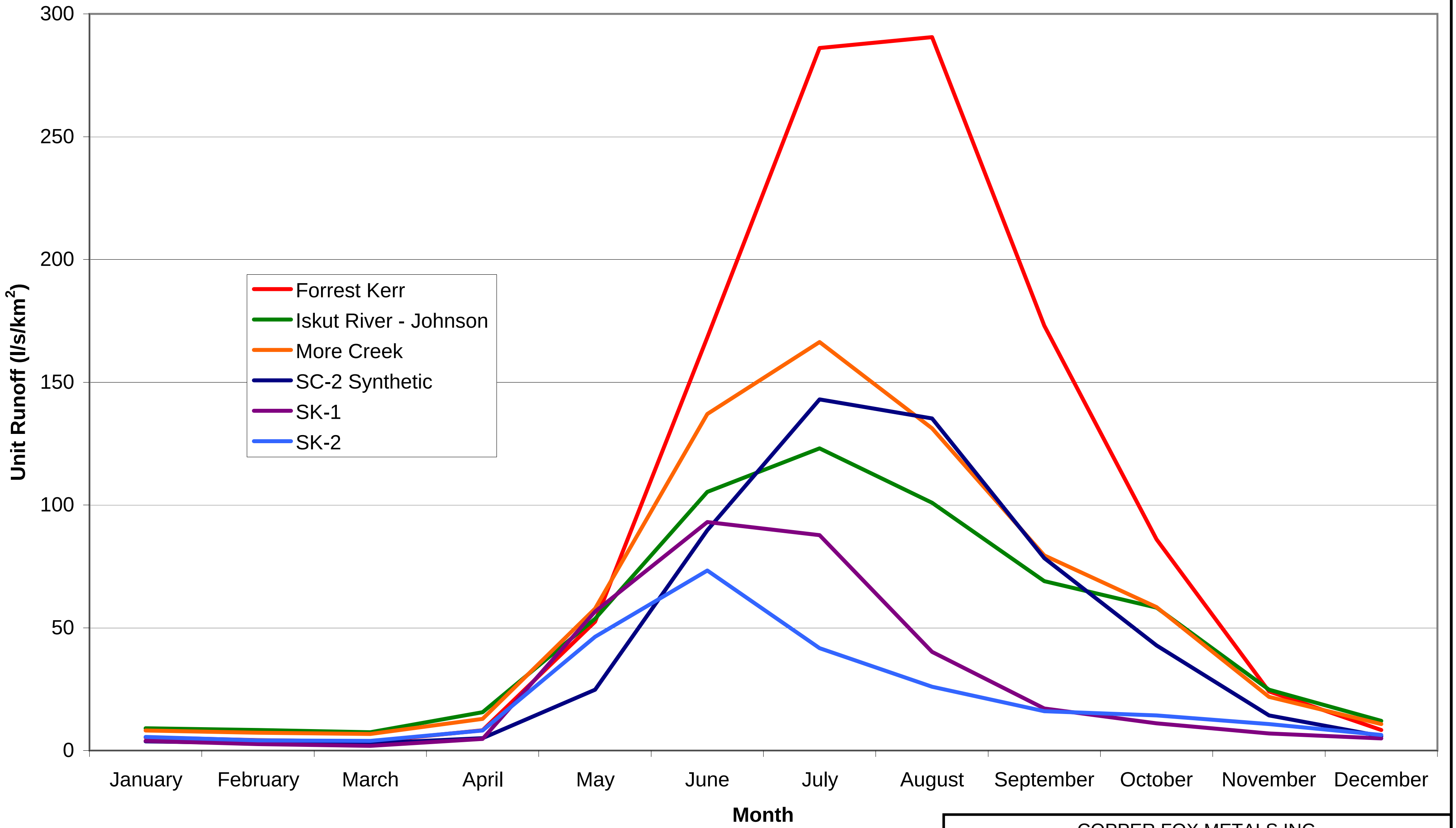
P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.10

REV 0

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

COMPARISON OF SC-2 LONG-TERM SYNTHETIC AND SELECT REGIONAL HYDROGRAPHS

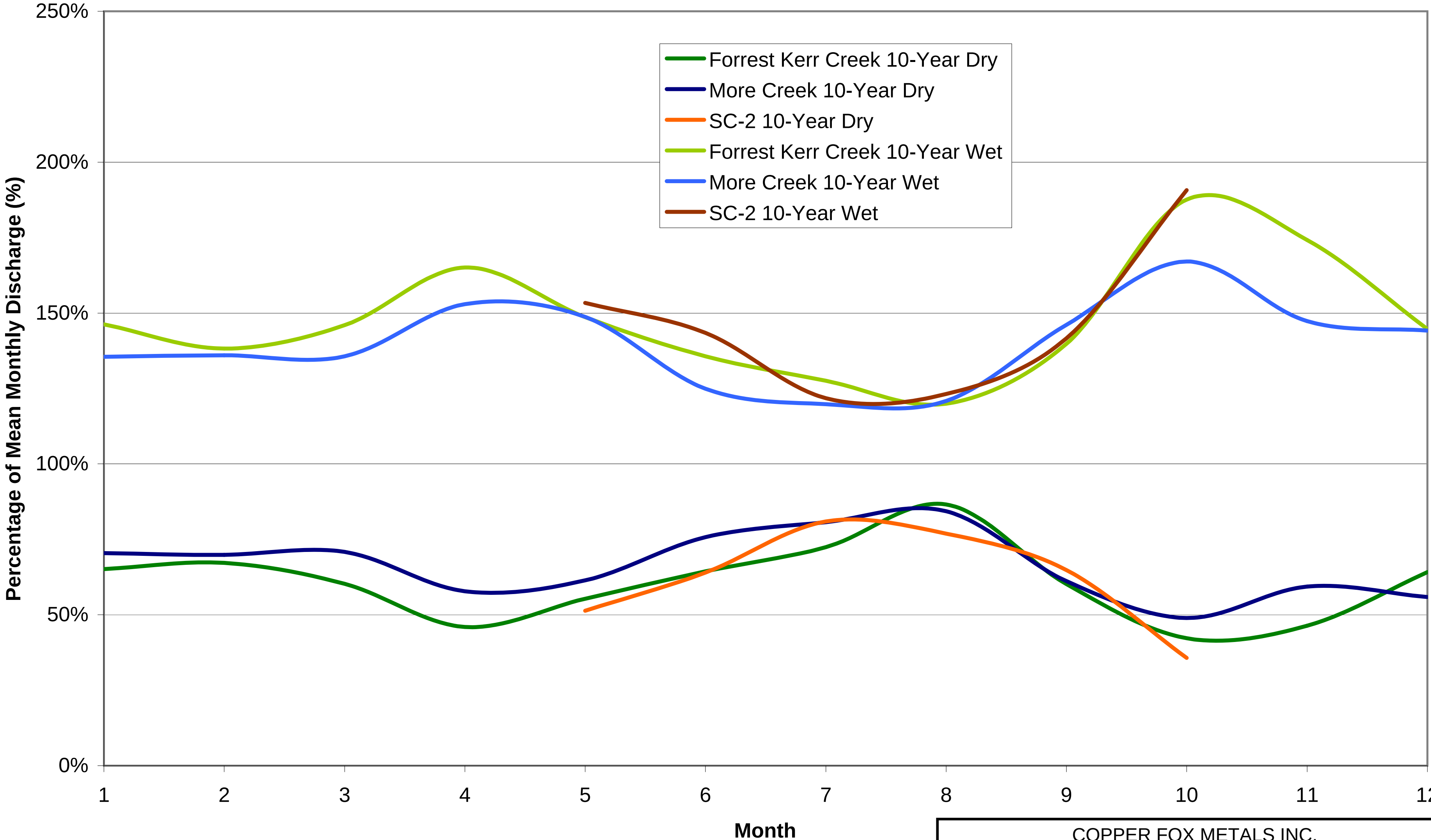
Knight Piésold CONSULTING

P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.11

REV 0



COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

SCHAFT CREEK AND REGIONAL 10-YEAR RETURN PERIOD WET AND DRY MEAN MONTHLY FLOWS AS PERCENTAGES OF MONTHLY MEAN DISCHARGE

Knight Piésold CONSULTING

P/A NO. VA101-329/5

REF. NO. 3

FIGURE 3.12

REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB

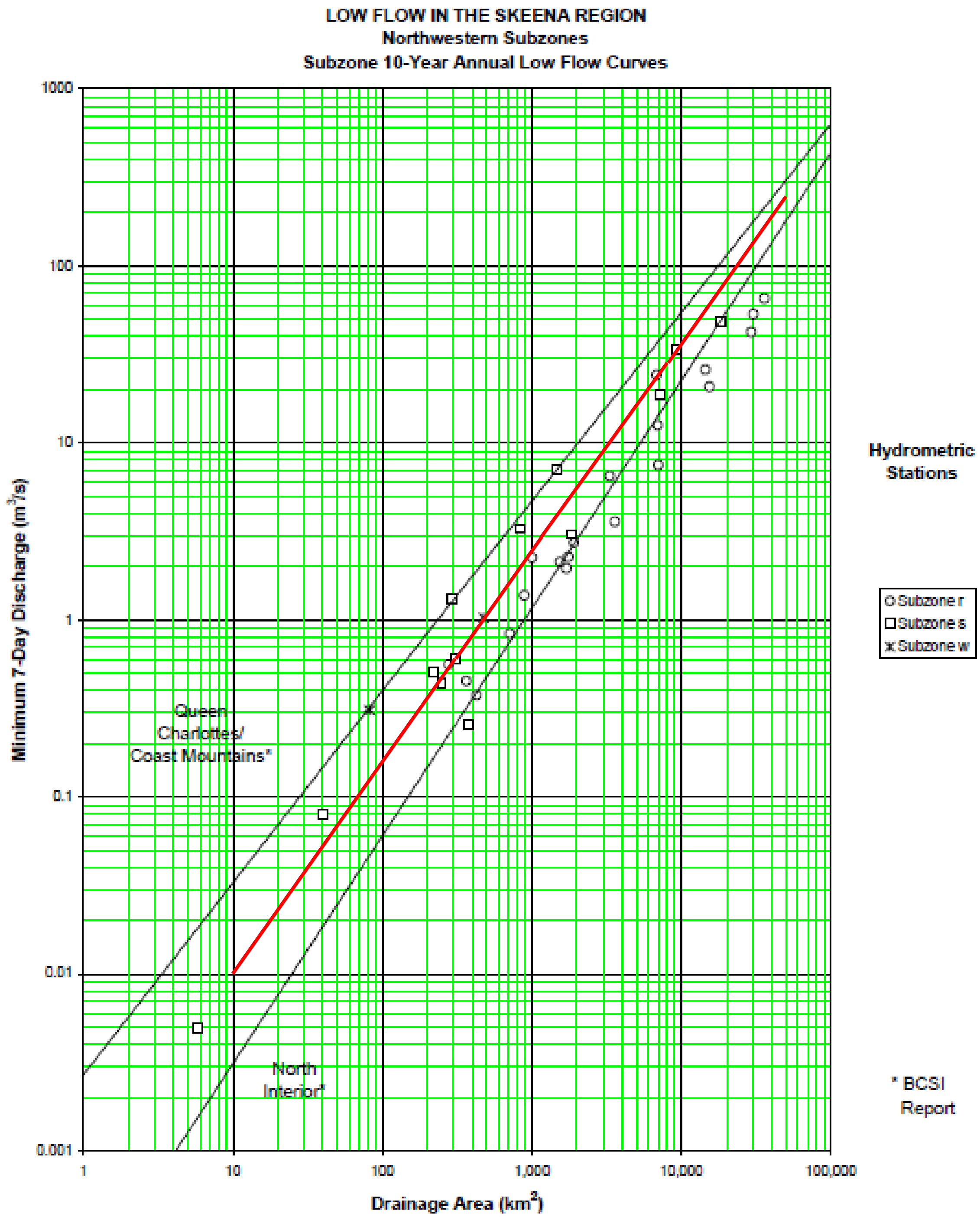


Figure 5 Watershed Annual Low Flow (page 1 of 2)

COPPER FOX METALS INC.
SCHAFT CREEK PROJECT

10-YEAR 7-DAY LOW FLOW ESTIMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.
VA101-329/5	3

FIGURE 3.13 REV 0

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB

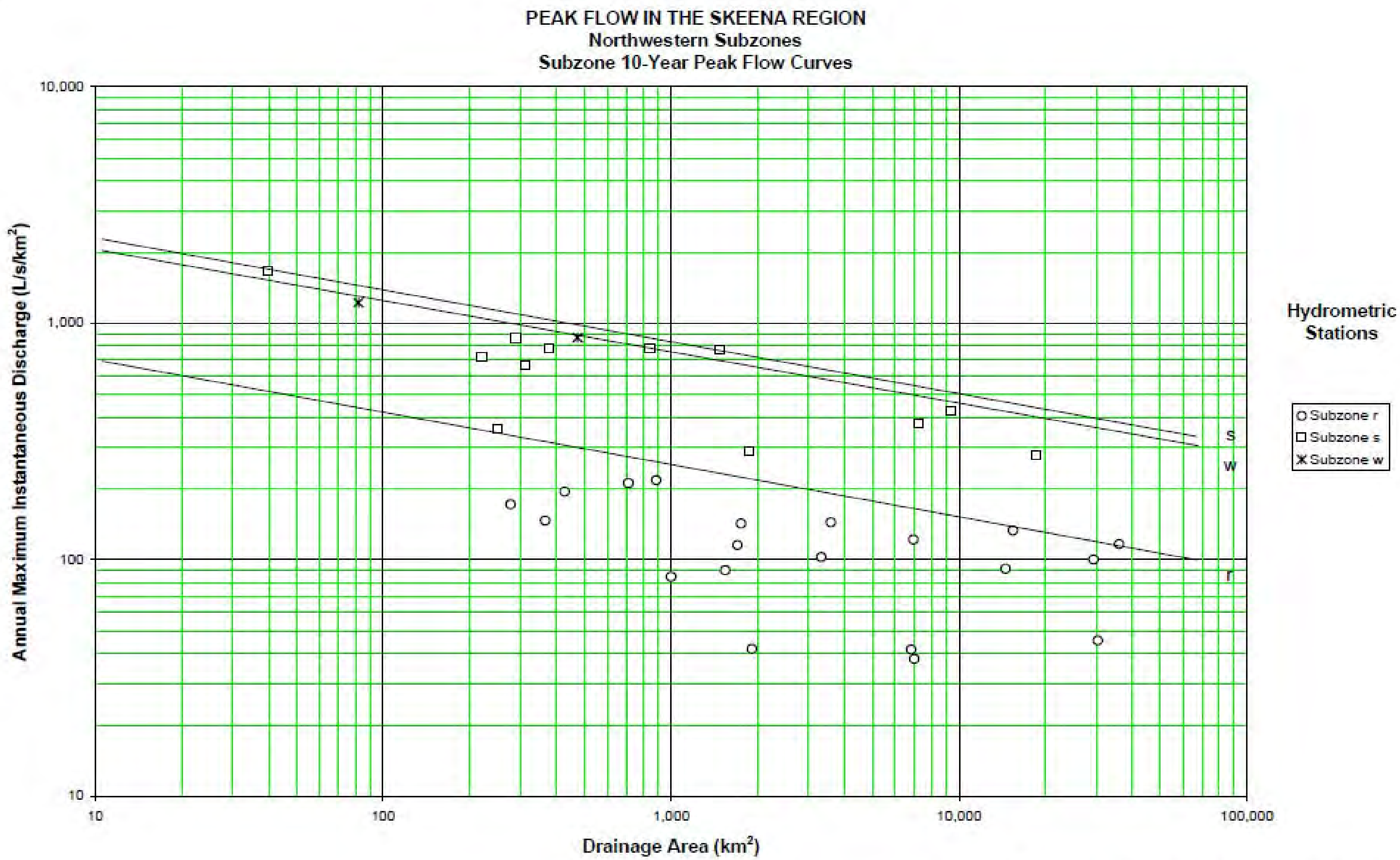


Figure 3 Watershed Peak Flow (page 1 of 2)

0	17MAR'10	ISSUED WITH REPORT	KT	JGC	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

COPPER FOX METALS INC.

SCHAFT CREEK PROJECT

10-YEAR RETURN PERIOD PEAK FLOW ESTIMATION

Knight Piésold CONSULTING

P/A NO.	REF. NO.	
VA101-329/5	3	
FIGURE 3.14		REV 0