Coeur Alaska Inc.

Kensington Gold Project

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Table of Contents

1.0 Introduction 6
2.0 Methods 6
2.1 Monitoring Currently Active 6
2.2 Monitoring Currently Suspended 7
2.3 Changes during 2011 Monitoring 7
3.1 Plan QC 8
3.1.1 Precision- Field Blind Duplicate Comparison 8
3.1.2 Accuracy 9
3.1.3 Representativeness 9
3.1.4 Comparability 10
3.1.5 Completeness 10
3.2 Detection 10
3.3 Outlier(s) 12
4.0 General Major Chemistry 12
5.0 Summary Statistics 12
6.0 Watersheds 13
6.1 Receiving Waters- Johnson Creek 13
6.1.1 Major Chemistry 13
6.1.2 Trace Chemistry 14
6.2 Receiving Waters - Slate Creek 15
6.2.1 Major Chemistry 16
6.2.2 Trace Chemistry 17
6.3 Receiving Waters- Sherman Creek 22
6.3.1 Major Chemistry 22
6.3.2 Trace Chemistry 24
6.4 Receiving Waters- Ophir Creek 26
6.4.1 Major Chemistry 26
6.4.2 Trace Chemistry 27
7.0 Discharges 28
7.1 Outfall 001 28
7.1.1 Major Chemistry 28
7.1.2 Trace Chemistry 29
7.1.3 Whole Effluent Toxicity Testing 30
7.2 Outfall 002 31
7.2.1 Major Chemistry 31
7.2.2 Trace Chemistry 32
7.2.3 Whole Effluent Toxicity Testing 33
7.3 Outfall 003 33

List of Tables

Table 1 Non-Detect Parameters at Sherman, Slate and Johnson Creek Stations

Table 2 Non-Detect Parameters at Ophir Creek and Outfall 001 Stations

Table 3 Station JS2 2011 Water Quality Data Summary Statistics

Table 4 Station JS5 2011 Water Quality Data Summary Statistics

Table 5 Station JS4 2011 Water Quality Data Summary Statistics

Table 6 Station MLA 2011 Water Quality Data Summary Statistics

Table 7 Station SMP-5 2011 Water Quality Data Summary Statistics

Table 8 Station SLB 2011 Water Quality Data Summary Statistics

Table 9 Station SLC 2011 Water Quality Data Summary Statistics

Table 10 Station SH109 2011 Water Quality Data Summary Statistics

Table 11 Station SH113 2011 Water Quality Data Summary Statistics

Table 12 Station SH105 2011 Water Quality Data Summary Statistics

Table 13 Station SH111 2011 Water Quality Data Summary Statistics

Table 14 Station SH103 2011 Water Quality Data Summary Statistics

Table 15 Outfall 001 Effluent 2011 Water Quality Data Summary Statistics

Table 16 Outfall 002 Effluent 2011 Water Quality Data Summary Statistics

Table 17 Applicable Alaska Water Quality Standards

List of Figures

Figure 1 Project Area Map

Figure 2 Outfall Locations

Figure 3 Water Treatment Facility Outfall Sites

Figure 4 Sherman Creek Monitoring Sites

Figure 5 Slate and Johnson Creek Monitoring Sites

Figure 6a Johnson Creek Monitoring Results 2011, Field Parameters

Figure 6b Johnson Creek Monitoring Results 2011, Major Chemistry

Figure 6c Johnson Creek Monitoring Results 2011, Trace Chemistry

Figure 7a Slate Creek Monitoring Results 2011, Field Parameters

Figure 7b Slate Creek Monitoring Results 2011, Major Chemistry

Figure 7c Slate Creek Monitoring Results 2011, Trace Chemistry

Figure 8a Sherman Creek Monitoring Results 2011, Field Parameters

Figure 8b Sherman Creek Monitoring Results 2011, Major Chemistry

Figure 8c Sherman Creek Monitoring Results 2011, Trace Chemistry

Figure 9a Ophir Creek Monitoring Results 2011, Field Parameters

Figure 9b Ophir Creek Monitoring Results 2011, Major Chemistry

Figure 9c Ophir Creek Monitoring Results 2011, Trace Chemistry

Figure 10a Outfall 001 Effluent Monitoring Results 2011, Field Parameters

Figure 10b Outfall 001 Effluent Monitoring Results 2011, Major Chemistry

Figure 10c Outfall 001 Effluent Monitoring Results 2011, Trace Chemistry

Figure 10d Outfall 001 Effluent Monitoring Results 2011, Other Parameters

Figure 11a Outfall 002 Effluent Monitoring Results 2011, Field Parameters

Figure 11b Outfall 002 Effluent Monitoring Results 2011, Major Chemistry

Figure 11c Outfall 002 Effluent Monitoring Results 2011, Trace Chemistry

Figure 11d Outfall 002 Effluent Monitoring Results 2011, Other Parameters

List of Appendices

APPENDIX A – Duplicate Comparison

APPENDIX B – Variance Reports

1.0 Introduction

This volume of the Annual Water Quality Monitoring Summary report contains the results of water quality monitoring conducted in 2011 in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES Permit No. AK-005057-1) Permit and effective September 1st the Alaska Pollutant Discharge Elimination System (APDES Permit No. AK0050571) for the Kensington Gold Project, near Juneau, Alaska. A graphical presentation of water quality data collected at both outfalls and receiving water monitoring stations, along with tabular summary statistics is included in this summary report.

2.0 Methods

Monitoring of water quality at Outfall 001 (treated mine discharge) and Outfall 002 (treated tails pond water) occurred during 2011 as required by the NPDES and APDES permit. Outfall 003 (Kensington Camp domestic waste water discharge) was not discharging during 2011; therefore no monitoring occurred at this site. In addition to outfall sampling, monitoring was conducted at four receiving water streams (Johnson, Slate, Sherman and Ophir Creeks) for ambient upstream and downstream water quality. The following list describes the sampling activities at these outfalls and receiving water stations:

2.1 Monitoring Currently Active

- Continuous monitoring of flow and pH at Outfall 001 effluent; daily samples from the influent (through August) and effluent of Outfall 001 for total suspended solids (TSS) analysis; weekly water sampling at Outfall 001 influent (through August) and effluent for analysis of field, general and trace parameters; quarterly sampling of the effluent for TDS anions and cations; monthly sampling of the effluent for whole effluent toxicity testing.
- Continuous monitoring of flow and pH at Outfall 002 effluent along with; daily samples from the effluent of Outfall 002 for total suspended solids (TSS) analysis; weekly water sampling at Outfall 002 effluent for analysis of field, general and trace parameters; monthly sampling of the effluent for whole effluent toxicity testing. Monthly receiving water field,

general and trace parameters from stations MLA, SMP-5 (effective Sept.1st) SLB, SLC on Slate Creek; stations SH113 (twice monthly effective Sept. 1st), SH105, SH109 on Sherman; stations JS2, JS4, JS5 on Johnson Creek.

- Stations SH111 and SH103 on OphirCreek were sampled under a new schedule as of June 2009 according to the Residual Disposal Management Plan for the Mine Water Treatment Plant, which states that samples be collected from these sites only in the months of May, July, September and November. Beginning in September, under the new APDES permit SH111 and SH103 were sampled monthly, unless weather or avalanche conditions did not permit.

2.2 Monitoring Currently Suspended

- Weekly monitoring of flow, pH, TSS, biochemical oxygen demand (BOD 5 day test) and fecal coliform at Outfall 003 (effluent from the Kensington domestic waste water treatment plant); quarterly monitoring of Outfall 003 influent for BOD and TSS. Outfall 003 no longer exists and was removed from the new APDES permit; therefore sampling will no longer occur.

2.3 Changes during 2011 Monitoring

- The new tailings water treatment plant at Slate Creek was commissioned in late 2010 and therefore discharge occurred at Outfall 002 throughout 2011.
- Effective September 1st a renewed APDES permit eliminated influent monitoring at Outfall 001.
- Under the renewed permit additional monitoring for both Slate Creek and Sherman Creek was initiated. Monthly monitoring at site SMP-5 on Slate Creek began in September and twice monthly sampling of site SH113 on Sherman Creek also commenced in September.
- The monitoring frequency for five parameters was reduced from weekly to monthly at

Outfall 001. The five parameters include: arsenic, chromium, mercury, selenium and silver.

3.0 QC Summary

3.1 Plan QC

Coeur Alaska has complied with the approved quality assurance plan for the 2011 water quality data. At least ten percent of all lab reports are reviewed for issues pertinent to the five categories of quality control:

- Precision
- Accuracy
- Comparability
- Representativeness
- Completeness

Based on the results of this review, lab reports, individual samples, or individual parameters within samples may be qualified on a variety of issues as:

- Accepted
- Estimated
- Rejected

No data were rejected from the 2011 dataset, but some parameters within individual samples were flagged as estimated within the database when one or more of the quality controls were not met. During 2008, Coeur implemented the practice of completing the QA/QC review of all data gathered for the NPDES permit on a monthly basis in conjunction with preparation of the monthly Discharge Monitoring Report. This was continued through 2011 to allow for timely resolution of any issues identified during the QA/QC review with the contract laboratory or field personnel.

3.1.1 Precision- Field Blind Duplicate Comparison

Precision is a qualitative measure of the reproducibility of a measurement under a given set of conditions. Precision in the analytical results of laboratory analysis is determined by laboratory quality control measures such as duplicate matrix spikes and sample duplicates. The plan criterion for laboratory precision is a relative percent difference between duplicate samples of less than or equal to 20%. In addition, field blind duplicate sample pairs, which are collected throughout the year, are also used as a quality control for precision in the laboratory results.

Receiving water sample field duplicates are selected and collected on a random basis. The total number of receiving water field duplicates collected during 2011 was 24. Blind duplicates were performed on the receiving water sites in 2011. The relative percent difference (RPD) was calculated for each duplicated parameter. 5% of all duplicated parameter results were greater than 20% RPD and therefore did not pass the precision criteria. This was an improvement over previous years with 9% failure of precision in 2010, 6% in 2009, 7% in 2008 and 12% in 2007. The parameters that most frequently showed greater than 20% difference in 2011 were turbidity and TDS followed by zinc, aluminum, color, mercury, nickel, ammonia, copper and manganese. Turbidity showed more than 20% difference in slightly less than one third of the field blind duplicate samples. No field blind duplicates were collected from either Outfall 001 or Outfall 002. The results of comparisons between duplicate sets are tabulated in **Appendix A.**

3.1.2 Accuracy

Accuracy in the analytical results of laboratory analysis is determined by percent recovery of laboratory quality control measures such as matrix spikes, control samples and method blanks. The criterion for accuracy in most analytical procedures is a percent recovery between 85 and 115 percent. Less than 1 % of all sample results typically fail this criterion and are qualified appropriately in the database. Accuracy in field measurements is controlled and verified by using calibrated instruments. Field meters were calibrated prior to their use during 2011 monitoring.

3.1.3 Representativeness

Representativeness is controlled by sampling plan design, sampling techniques and sample handling procedures.

3.1.4 Comparability

Comparability is maintained by using consistent sampling and analytical methods as well as consistent units of measurement. Colombia Analytical Services located in Kelso, Washington has conducted all NPDES/APDES water quality analyses since March 2008. This has helped maintain comparability within data sets. In addition, the sample and data management process is streamlined.

3.1.5 Completeness

As stated in the quality assurance plan for the Kensington Gold Project, the completeness criterion goal for monitoring data is 90% due to the extreme conditions observed on site. Overall data capture was close to 100% for 2011. Eight field measurements were missed at Ophir Creek, two field missed field parameters at Sherman Creek, and three missed field measurements on Slate Creek. One field parameter was missed at Outfall 002. For all sites where monitoring was physically possible, data collection was very close to 100% complete. Nine water quality samples were missed during 2011 and 10 hours of flow and pH data was not recorded at Outfall 001.

3.2 Detection

The laboratory Practical Quantitation Limit (PQL) remained consistent for each analytical method during all 2011 water quality monitoring. Arsenic was not detected in any samples collected from the receiving water stations on Slate, Sherman, Ophir and Johnson Creeks. Cadmium was detected in four samples for Slate Creek, but remained below the water quality limit. Iron, nickel and ammonia were not detected at Johnson and Ophir Creeks. Silver remained undetected on all creeks with the exception of one sample result at the detection limit on Slate Creek. Lead also remained undetected throughout the year with the exception of one result for the background site on Sherman Creek. Aluminum was present in all Slate Creek samples and exceeded the water quality standard on five occasions, the elevated levels could be attributed to higher background levels. Manganese was present in all Slate Creek samples with the exception of one non-detect result. Manganese was barely detected in background Sherman samples, but was present in all downstream samples. Copper was found periodically at all Sherman Creek sites with

the highest levels at the background station. Zinc was present in one Sherman background sample and downstream on twelve occasions. Aluminum was the only metal detected in all samples collected from Sherman Creek and Ophir Creek stations. Of the six samples from the downstream site on Ophir, three contained copper, one upstream sample contained zinc and five downstream samples contained manganese. Eight other metals were undetected at Ophir sites. Most metals in Johnson Creek samples were either detected in a fraction of samples or none at all. Johnson Creek contained aluminum concentrations throughout the year while all downstream samples contained detectable levels of manganese with the exception of undetectable levels in June at both downstream sites. Copper was detected in January, October and November along with zinc, which was also above the PQL at both downstream sites five months in 2011. The number of undetected metals per site between the three receiving water streams was highest in Ophir Creek, followed by Johnson Creek, then Sherman Creek and lastly Slate Creek.

As expected, sulfate, TDS and hardness parameters were detected in all samples collected from all stations on each of the three receiving water creeks. TDS and conductivity were highest in downstream samples from Slate Creek. TDS and conductivity also showed an increase in downstream samples from Sherman Creek during the winter months. Conductivity was low in upstream Johnson samples but showed some increase downstream. Hardness was lowest in Johnson Creek, followed by Ophir Creek, Sherman Creek and then Slate Creek.

Ultra low detection limits, provided through the use of method 1631, were used to determine mercury concentrations in the receiving waters. Mercury was detected in six samples at Johnson Creek at one at JS-5 and the remaining five at JS-4. At Sherman Creek, mercury was detected twice at SH109 and again was detected in two samples from SH113 and six samples from SH105. All samples collected from Ophir Creek remained below the detection limit with exception of one result at the downstream site in July. In the case of Slate Creek, mercury was detected on most sampling occasions at both upstream and downstream sites. One mercury sample at SMP-5 was above water quality standards in July. Which is thought to be an anomaly as it was well above the other results for SMP-5 in 2011.

3.3 Outlier(s)

A variance analysis was conducted on each monthly set of monitoring data. Variance analysis reports compare sample results to historical results for the same parameters at the same sampling stations. Those results that exceeded the threshold level of two standard deviations are listed in the table for the appropriate month in **Appendix B.** Other field measurements or analytical results were identified as potential outliers by data time series plots. Outliers are identified by large variance from the mean, although the frequency of high manganese concentrations began to increase the average. Parameters, which occasionally varied widely from the average included copper, aluminum, iron, manganese ammonia, nitrate, sulfate, TSS, TDS, conductivity and dissolved oxygen.

4.0 General Major Chemistry

Area waters generally:

- Have peak water temperature in August or September
- Are at or near oxygen saturation
- Have mildly basic pH
- Seasonal fluctuation of conductivity with peak
- Contain low levels of sulfate
- Are generally soft (in most cases <100ppm hardness)
- Have low concentrations of dissolved metals

5.0 Summary Statistics

Summary statistics were calculated for all parameters at each discharge and receiving water station. The calculations include the minimum, maximum, arithmetic mean and standard deviations for each monitoring station contained in the 2011 data set. The results are presented in Tables 4 through 15. Also included in the summary tables are the total number of samples collected, total number of non-detect results and the percentage of non-detects.

6.0 Watersheds

Upstream/downstream receiving water monitoring stations are present on Johnson, Slate, Ophir and Sherman Creeks. A comparison of the chemistry between these station pairs is discussed below. Tables 1 and 2 contain the monitoring parameters that remained undetected for the entire year at each station.

6.1 Receiving Waters- Johnson Creek

Monitoring Sites

- JS2- Johnson Creek upstream of disturbance
- JS5- Johnson Creek downstream of mill process area and Bridge 2
- JS4- Johnson Creek downstream of Bridge 1

6.1.1 Major Chemistry

Water quality monitoring on Johnson Creek was intended to identify potential impacts from mill facility construction and operation. The water sampling sites are somewhat confusingly labeled since JS-5 lies downstream of Bridge 2, which is in between JS-2 (background, upstream site) and JS-4 (downstream of Bridge 1). Water quality at Johnson Creek shows some seasonal trends for temperature, TDS, nitrate, pH, and sulfate. Some elevation of conductivity, turbidity, TDS, sulfate, hardness, and color is also seen from upstream to downstream, particularly in winter months (Figures 6a, 6b). Upstream temperature was higher than downstream sites in December January, February and March. The highest temperature was recorded at JS-5 in July (7.7°C) and lowest again at JS-5 in February (0.2°C). Nitrate was present at similar concentrations at all sites, with highest concentrations during April. The pH tended to be higher at the middle site, JS-5, except for October and November. There was some elevation of pH (over 8 s.u.) at JS-5 from July through September. JS-4 had lower pH in May and June.

Sulfate showed fairly consistent increases downstream through the year with both downstream sites being higher in winter and lower in summer. The highest sulfate level was 9.75

mg/L at JS-5 in October. Dissolved oxygen was very similar at all sites throughout 2011 except for JS-2 appearing much lower in December and JS-4 much higher during the same month. Conductivity measurements were consistently higher downstream throughout 2011. Values ranged from around 31umhos/com to 145umhos/cm. Turbidity was less than 3NTU at all sites throughout the year. Turbidity was 0.35 NTU at JS-2 and 2.37 NTU at JS-5 in January showing slight elevation in turbidity downstream.

Total dissolved solids consistently increased from upstream to downstream with the highest result of 79 mg/L in April at JS-4. Hardness showed consistent increases downstream during 2011. Hardness did not vary much throughout the year at JS-2, with a low of 12.7mg/L in July and high of 23.9mg/L in April. The downstream sites were markedly higher in winter, with JS-5 ranging from 17 to 45 mg/L from January to March. JS-4 was slightly higher at 40 to 59mg/L during winter months. All sites were less than 30mg/L from May through August. Color was not detected only twice at JS-2 during 2011. Color was detected at JS-5 in January, February, April, September, October, November and December and at JS-4 in January and February, and again in September through December. The highest color recorded was 30cu in October at JS-4.

Ammonia mostly remained undetected at all Johnson Creek sites throughout 2011. Chloride was not detected at JS-4 in 2011 and present at JS-5 through the winter months, excluding February. Chloride was detected three times at JS-2 in January, March and April. TSS was detected only once throughout 2011 on Johnson Creek, October had a result at the detection level at JS-2.

6.1.2 Trace Chemistry

The majority of dissolved metals (8 out of 13) tested at Johnson Creek were not detected at any sites at any time of the year. These included arsenic, cadmium, chromium, iron, lead, nickel, selenium and silver. Concentrations of aluminum were higher at downstream sites (JS-4 and JS-5) than the upstream site (JS-2) throughout 2011, although all values were within water quality standards (Figure 6c). The highest aluminum level recorded in Johnson Creek in 2011 was 43.54ug/L at JS-4 in January. Manganese was also elevated at JS-4 in January (12.4ug/L), March (5.2ug/L), and December (5.7ug/L) while levels never exceeded 3.5ug/L at JS-2.

Copper was not detected at JS-2 in 2011; it was present on four occasions at the two

downstream sites (JS-4, JS-5) with the highest result being 1.5 ug/L at JS-4 in January, which is still below the hardness-based WQS. Dissolved mercury remained undetected at JS-2 throughout the year, while the two downstream sites showed a total of five detectable results – the highest of 0.0019 ug/L at JS-4 in January. Dissolved zinc was detected at all Johnson Creek sites periodically through 2011. Zinc followed typical trends of higher concentrations during the winter/early spring months with slightly higher levels at downstream sites. The highest zinc result was 13.1 ug/L at JS-4 in March

Comparison with 2006 to 2010 data shows that Johnson Creek pH was slightly higher than previous years at JS-2 and JS-5 in summer, approaching 8.5 s.u. Turbidity in 2011 was similar to previous years where occasional peaks around 2.5 NTU were observed. Total suspended solids demonstrated slightly lower levels than previous years. Mercury was detected on five occasions in 2011, three times in 2010, twice in 2009 and once in 2008, whereas 2006 and 2007 showed much more frequent occurrences of mercury. Manganese levels showed some elevation at JS-4 in 2011, but levels did not get as high as they were in 2006 when they exceeded 70ug/L on three occasions. Copper was not detected from 2006 to 2009, but did appear in November 2010 and again in four instances in 2011 with the highest result of 1.5 ug/L at JS-4 which was still below the hardness-based limit of 4.3ug/L. Nickel has not been detected in Johnson Creek since September of 2007.

Nitrate levels showed a similar pattern to previous years, with concentrations trending higher in late spring. Sulfate levels also showed a similar pattern to previous years, being lowest in June and July and increasing in August. Ammonia was not detected throughout 2011 at all sites. Ammonia was detected twice at very low levels in 2010 and was previously detected at the end of 2006 and 2007 and in January 2008.

6.2 Receiving Waters - Slate Creek

Monitoring Sites

- MLA- Middle Lake Slate Creek upstream of disturbance
- SMP-5 (Site #5) – Downstream of the tailings impoundment dam
- SLB – East Fork Slate Creek upstream of confluence with West Fork Slate

Creek

- SLC- Slate Creek downstream of confluence with West Fork Slate Creek

6.2.1 Major Chemistry

Water quality monitoring on Slate Creek in 2011 was intended to identify potential impacts from the Tailings Treatment Facility (TTF). Figures 7a through 7b are graphical presentations of analytical results gathered throughout the year. Compared to the other streams, Slate Creek was the warmest, most likely due to the presence of lakes in the system that warm up in summer due to their large surface area. Only Upper Slate Lake contributes to this warming affect now as Lower Slate Lake is bypassed by a diversion pipe. MLA is the sampling site upstream of the tailings treatment area, SMP-5 is approximately 200 meters downstream of the tailings impoundment dam. SLB is approximately 1.6 kilometers downstream of the tailings treatment area and SLC is a further 10m downstream and receives water from both east and west forks of Slate Creek. Temperatures on Slate Creek appeared warmer in summer 2011 than the previous year as the highest temperature recorded at MLA was 15.3°C, whereas 12.3°C was recorded here in 2010; however 18.2 °C was recorded in 2009. The time of day that the grab samples are taken might affect the maximum temperature recorded since there can be a large diurnal temperature range.

Some increase of, DO and chloride was evident from upstream to downstream when compared to last year's results (Figures 7a, 7b). pH exhibited a slightly lower trend than last year with the highest result of 8.29 at SLB, compared to 2010's result of 8.48 at the same site. MLA had lower pH throughout the year, with the lowest result of 7.22 in August. Dissolved oxygen measured at Slate Creek stations showed a seasonal trend similar to those of the other receiving water streams in being slightly higher in winter months. MLA had lower DO measurements than the downstream sites with the exception of SLB in March. Dissolved oxygen measurements at SLB and SLC were often similar except for March when SLB was lower than SLC and conversely so in November. The lowest DO was observed at MLA in July at 7mg/L. Dissolved oxygen increases as temperature decreases and is likely to be lower in the lake (near MLA) than downstream where several cascades help to mix oxygen into the water. Chloride results in Slate Creek samples were higher than results from Johnson Creek throughout the year, but still well

within water quality standards. Chloride was highest at SMP-5 (17.5 mg/L) with MLA typically being around 2mg/L and SMP-5 between 4 and 17.5 mg/L.

Conductivity was also higher at all sites in Slate Creek than Johnson Creek and was highest at SLB in March (717umho/cm). Background conductivity was 131umhos/cm at this time. Site SLC was 501umho/cm at the same time. During the rest of the year, conductivity had a large range from 37 to 676umho/cm at all sites. Sulfate showed a similar pattern with all sites ranging from non-detect levels in August to 250 mg/L in February. Sulfate at MLA remained less than 3.5mg/L throughout the year. During 2011 turbidity was low at all sites, MLA being the lowest (usually less than 1 NTU) and the highest result of 1.91 NTU at SMP-5 in July. Ammonia was detected at low levels at MLA in October and SMP-5, SLB and SLC typically ranged from .10 to .90 mg/L through the year. Nitrate was detected once at MLA in 2011, but was detected at low levels in most samples downstream through the year. Generally nitrate results for Slate Creek were higher than the three other creeks, but all results were below the water quality standard.

Hardness demonstrated a marked increase at all downstream sites when compared to 2010. Generally downstream hardness was above 100mg/l with spikes reaching 300 mg/l, whereas the previous year downstream hardness was typically near 50 mg/l with spikes less than 140 mg/L. Hardness was the lowest at the background site (MLA) with results ranging from 30 to 70 mg/l. TDS remained similar at sites MLA and SLC throughout most of the year with mild a spike (179 mg/L) experienced at MLA. However SLB and SMP-5 showed higher levels of TDS than MLA and SLC throughout the year with the exception of SLB in August with a result less than 50 mg/L. TSS was below detection limits at all four stations for most of 2011 except for July when SMP-5 had 5mg/L and MLA had 4mg/L. Color appeared to decrease from upstream to downstream, and was lowest at all sites during lower flows in the summer (15 to 25cu). Some color is attributable to tannins in the water associated with vegetation die-off in the lakes. The West Fork has no lakes so would be expected to have less color and have a dilution effect on SLC. The highest level reached was 150cu in August at SLB, diluted to 100cu at SLC.

6.2.2 Trace Chemistry

Trace metals not detected in Slate Creek during 2011 were arsenic, chromium, lead and selenium. All four sampling stations on Slate Creek showed increases in summer for aluminum, iron and mercury. Manganese was higher in spring and fall with the highest result of 334 ug/L at SMP-5 (Figure 7c). Aluminum tended to be higher at the background site MLA reaching 145ug/L in August. This resulted in elevated aluminum downstream at stations SLB and SLC which produced results over the water quality standard. Again in September higher levels of aluminum occurred at station SMP-5 (102 ug/L), this again may be attributed to naturally elevated levels of aluminum as the background site experienced 98.5 ug/L. SLC had the lowest aluminum levels throughout the year, although all sites were low in summer. This may be attributed to dilution from West Fork Slate Creek.

Cadmium was not detected at MLA or SLC at any time during 2011. The WQS for cadmium for SMP-5, SLB and SLC varied with hardness from 0.12ug/L to 0.60ug/L. Cadmium levels were all within the water quality standards for 2011. SLB reached 0.1mg/L in March and April, which did not exceed the WQS and cadmium was not detected after April at SLB. Cadmium was not detected at SMP-5 in August and September with results of 0.2 and 0.1 respectively.

Copper was not detected at MLA, but was present at low level periodically through the year at SMP-5, SLB and SLC. The highest copper level was 3.1ug/L at SMP-5 in October which was below the hardness-based limit of 15 ug/L. Iron levels trended similarly among all the sites. The lowest levels among all sites occurred midsummer. SLC showed slightly elevated levels of iron in March (0.15mg/L) All samples throughout 2011were below the iron WQS of 1mg/L.

Elevated levels of manganese were observed at SMP-5 in March (334ug/L), August (114ug/L), October (154ug/L), November (140)ug/L, and December (169ug/L).

Nickel was not detected at MLA during any month, nor was it detected at SLB and SLC from May through September. The highest concentrations occurred at SMP-5 in March yielding a copper result of 3.9 ug/L. Zinc was present at MLA in April and September. Zinc was detected in all samples throughout the year at SLB. SMP-5 yielded the highest zinc result reaching 12 ug/L in July, but below the WQS of 250 ug/L. Slightly elevated zinc levels were observed at SLB from February through April with a maximum of 8.0 ug/L in April. SLC showed elevated zinc levels in

March and April, but levels were around half those at SLB. Mercury was detected at very low levels in the majority of samples collected from all Slate Creek monitoring stations. There was a wide range in values of mercury between sites. An elevated mercury result occurred at station SMP-5 (.0654 ug/L) which exceeded the WQS, this is presumed to be an outlier as all other results for SMP-5 are well below that for 2011.

A comparison of Slate Creek data with previous years shows that pH was slightly higher at MLA and SLB in 2011, but still within the 6.5 to 8.5 s.u. threshold. Sulfate was relatively low at all Slate Creek sites through 2006 and up to June 2007, remaining below 5mg/L. Sulfate increased at SLB and SLC from August 2007 to February 2008 and showed a peak of 16mg/L at SLB in April 2008. Levels dropped again in May 2008, but again increased to around 15mg/L in September 2008 with another peak in September 2009. Sulfate levels approached 17mg/L in March 2010, but the greatest increase was seen in December 2010 when sulfate reached 85mg/L. 2011 again showed an increase in sulfate levels for all stations except MLA. The highest sulfate levels occurred at stations SMP-5 and SLB with respective values of 255 and 252 mg/L. Nitrate was present at low levels (<0.2mg/L) during 2006 and occasionally in 2007 and early 2008. It was not detected between April 2008 and February 2009 but appeared again at all sites from March to June 2009 (around 0.35mg/L). This contrasted with 2010 when no nitrate was detected at MLA and only very low levels were present at SLB in March and May (<0.1mg/L) followed by an increase at SLB in December (0.36mg/L). Similar to 2010, in 2011 MLA did not have detectable levels of nitrate with the exception of one result in May of 0.055 mg/L. As for the remaining sites nitrate demonstrated a slight upward trend in February and March, then again in July and August with the highest value of 1.46 mg/L at SLB.

During most of 2011, conductivity typically ranged from around 100 to 180umho/cm at MLA and SLC. However, at SLB higher levels occurred January through August ranging from 276umho/cm to slightly over 700 umho/cm, then again higher levels of conductivity occurred in October through December.. The highest conductivity in Slate Creek was recorded in March 2011 at 717 uhmos/cm. TDS typically fluctuated from 60 to 80mg/L among all Slate Creek sites in 2006, increasing slightly in August 2007 when MLA reached 100mg/L, SLB reached 110mg/L and SLC registered 710mg/L. MLA showed a peak of 180mg/L in November 2007, while

downstream sites remained less than 100mg/L. TDS levels were mostly 60 to 100mg/L during 2008 with SLB reaching 129 in September 2008. TDS remained relatively stable in 2009 fluctuating between 30 and 85mg/L at all sites. This continued into 2010 until SLB increased to 114mg/L in July, 146mg/L in October and 225mg/L in December. TDS in 2011 showed similar trending with conductivity with the highest level in March at SLB (474 mg/L) and SMP-5 exhibited a similar pattern.

In 2006, color was very similar at MLA and SLB remaining around 40cu through the first part of the year then increasing in October to 120cu at MLA and 130cu at SLC. MLA tended to show the highest color in 2007, 2008, and 2009 with color reaching a maximum of 210cu in September 2007. The highest color level for 2009 was 125cu in November at SLB. Color was lower in 2010 decreasing to 15cu in June and only reaching 80cu in November. 2011 demonstrated an increase with summer levels at all sites ranging from 15 -150cu.

Cadmium was not consistently detected at SLB until August 2007, reaching a peak in April 2008 (1.9ug/L). The water quality standard for cadmium was exceeded on five occasions in 2009, but levels were lower than 2008. Cadmium was just above the WQS in March 2010 and has not been detected June through December during 2010. Cadmium showed a drop in 2011 with no results over the WQS. Copper has never been detected at MLA, and was first detected downstream at SLB in September 2006 (2ug/L). Low levels (1ug/L) were present on three occasions in 2007, then slightly higher levels (4ug/L) in October and November 2007 and again in April and September 2008. These levels came close to the hardness-based WQS, but did not exceed it. Copper did, however, exceed water quality standards in September 2009 when it reached 14.2ug/L at SLB. Copper was detected at low level during the first part of 2010, but has not been detected after May during 2010. Copper in 2011 continued a downward trend with all results below the WQS and the highest result occurring at SMP-5 (3.1 ug/L) in October. Iron levels were highest at MLA from January to April 2006 and March/April 2007, but were exceeded by SLB in July-December 2006 (peak of 0.43mg/L in July 2006), September-October 2007 and September 2008 (0.45mg/L). Iron levels were lower in 2009 and 2010, peaking at 0.252mg/L at MLA in November 2009 and 0.247mg/L at SLB in May 2010. In 2011 iron trended similarly among the sites with all results under 0.2 mg/L, which is under WQS of 1mg/L.

Aluminum has occasionally been present in background samples at concentrations exceeding the WQS of 87ug/L, but rarely the permit limit of 143ug/L eg. January 2006 (99ug/L), October 2007 (90ug/L), April 2008 (106ug/L), October 2008 (89ug/L) and December 2008 (90ug/L), April 2010 (101ug/L), November 2010 (95ug/L), December 2010 (214ug/L). Levels downstream at SLB have also exceeded the WQS as follows: October 2006 (119ug/L), October 2007 (124ug/L,) April 2008 (134ug/L), September 2008 (145ug/L), December 2008 (90ug/L), January 2010 (92ug/L) and April 2010 (101ug/L). The background level was frequently responsible for the high aluminum recorded downstream. Aluminum at MLA was 82ug/L in February 2010, but this did not exceed the WQS. Aluminum levels at SLB and SLC were much lower than MLA in December 2010. Again in 2011, aluminum continued to be present in higher concentrations which is thought to have resulted in increased downstream results during summer and early fall.

Mercury had a peak of almost 0.01ug/L at SLB in 2008, but only reached 0.003ug/L at SLB and 0.005ug/L at SLC in 2009. 2010 levels were similar to 2009, but only reached a maximum of 0.0026ug/L at MLA and SLB. During 2011 mercury levels were similar to 2010 except for one result at SMP-5 (0.0654 ug/L) in July which is thought to be an anomaly as it was well above all other results for SMP-5 in 2011 Zinc was not detected during the first part of 2006, appearing at low level in both background and downstream sites in fall 2006.. Zinc levels at SLB increased in May 2007 and exceeded the WQS in March 2008 (81.2ug/L), April 2008 (180ug/L), October 2008 (72.7ug/L), January 2009 (58.3ug/L), but values were much lower throughout the rest of 2009 and 2010, only reaching 13.7ug/L in April 2010. Zinc continued a downward trend in 2011 with a peak value of 12.0 ug/L in August.

Nickel was present at SLB and SLC at low level during 2006, increased in August 2007 and peaked in April 2008, but remained less than 5ug/L in 2009 and less than 2ug/L in 2010. Nickel marked a slight increase during 2011 with a peak value of 4.4 ug/L in October. Manganese was not detected at downstream sites during the first part of 2006, but showed elevated levels at SLB in September 2006 (90ug/L). Background manganese was above the WQS at this time (56ug/L) and again in December 2006, March, April, August, November and December 2007, November 2008 and October 2009. SLB exceeded the WQS for manganese in October and

November 2007, March, April, October, November, December 2008, January and May 2009, and January, March, May and December 2010. The highest level recorded was 228ug/L in March 2010. As with previous years, 2011 demonstrated an increase in manganese concentrations with a peak value of 334 ug/L in March.

6.3 Receiving Waters- Sherman Creek

Monitoring Sites

- SH109- Upper Sherman Creek upstream of disturbance
- SH113- Sherman Creek downstream of Outfall 001
- SH105- Sherman Creek downstream at mouth of creek

6.3.1 Major Chemistry

Water monitoring on Sherman Creek was intended to help identify any potential impacts from underground mine activities as all drainage from the mine flows to the Sherman Creek drainage (Figures 8a, 8b). Temperature was typically highest at SH113 just downstream from the 001 effluent and coolest at SH105 at the mouth of Sherman Creek. The difference between these two sites was greatest in March (SH113 was 2.0°C higher). There was little difference in temperature between these sites in April through June and then again in September and October. Dissolved oxygen was similar at upstream and downstream sites throughout the year except for February and July when SH113 was lower and September when it was higher, perhaps due to changes in flow. Measurements of DO tended to be slightly lower in summer as water temperature increased and DO was higher in winter as temperatures decreased. Measurements of pH appeared to decrease from upstream to downstream except for February through April where SH105 dipped when compared to the two upstream sites. This again occurred in July where SH105 dropped to 6.78 .

The highest pH was 8.08 at SH109 in July. Monitoring station SH105 had the greatest range in pH values of all the Sherman Creek sites.

Conductivity was highest at site SH113 (middle site) and lowest at SH109 (upper site) throughout the year, except for June and November when SH113 was conversely lower in conductivity. All three sites showed lowest conductivity in June. Turbidity was less than 2.0 NTU throughout the year at all sites. Turbidity was 1.52 NTU at SH113 in April, which accounts for the highest value in 2011. Total dissolved solids tended to increase from upstream to downstream and were higher during winter months. TDS was highest at SH113 (206mg/L) in February and lowest at SH105 (<10mg/L) in October.

Ammonia was detected in sixteen of nineteen samples at SH113, ranging from 0.13mg/L to 1.2 mg/L. Ammonia was present only once at other sites, SH105 was 0.17 mg/L in August. The nitrate level at the upstream site was highest in April at 0.28mg/L and lowest in summer months. Site SH113 showed a highest level in August at 1.94 mg/L while SH105's peak downstream value reached 0.77mg/L in August. All reported measurements were below the WQS of 10mg/L. Sulfate, chloride and hardness tended to be highest at SH113 and lowest at SH109. Sulfate tended to be higher at SH113 than other sites, though less so in April and May. The highest sulfate was found at SH113 in March (59.8mg/L). The lowest sulfate level recorded at SH109 was 3.9 mg/L in October. Sulfate was less than 40mg/L at SH105 throughout the year and less than 10mg/L at SH109. Chloride was detected in most samples throughout 2011. Chloride reached 19mg/L at SH113 in April while SH105 returned a non-detect result during the same time period. These concentrations were well below the water quality standard of 230mg/L. Hardness was relatively high (>75mg/L) at SH113 in January, February, April, August, September and December. Hardness remained below 60mg/L at SH109 and SH105 throughout the year and was lowest in summer months. Hardness levels at SH105 downstream were very similar to the background site SH109 particularly from May through October. The highest hardness values were found at SH113 February through April.

Total suspended solids were not detected at any sites January and February, nor from June to December. TSS was not present at the background site in 2011. SH113 had two detectable levels in April (23.2 mg/L) then again in May (4.8 mg/L). Color generally increased from upstream to downstream when it was detected, with a high of 40cu recorded at SH105 in October.

6.3.2 Trace Chemistry

Trace metals not detected in Sherman Creek during 2010 were arsenic, cadmium, and silver. Aluminum was higher at SH105 near the stream mouth than both SH109 and SH113 for all months except June and August, as this was also the case in 2009 and 2010. This suggests there is some source of aluminum downstream that is not associated with the 001 effluent. Aluminum at SH105 reached 65.2ug/L in October accounting for the highest value in 2011. Peaks were observed at upstream sites during January and October, but were still lower than the downstream SH105 station. Aluminum was low at all sites in summer. Copper was not detected at any sites in February or June. The highest level for copper (4.7 ug/L in August) occurred at the background site in August. This value exceeded the WQS but was not attributed to mining as it was upstream of any activity. Manganese was not detected in most samples from SH109, but present in most samples at SH113, with concentrations reaching 143ug/L in March and 121ug/L in April. Mercury was detected at SH113 on six occasions, January, March, May, August, September and October. SH105 had a highest level of all sites in July with a result of .0041 ug/L. Mercury was detected at SH109 in January and September both results slightly above the detection limit. Nickel was not detected at SH109 nor SH105 and only found at low levels at SH113 two times in March with results of 1.4 and 1.6 ug/L. Zinc was only detected at SH109 at just above the detection level in September. Zinc was found at SH113 in low concentrations on five occasions and eight occasions at SH105. The highest value for Zinc was 4.7 ug/L in May at SH105. Iron was found only on three occasions on Sherman Creek throughout 2011 once at SH113 and twice at SH105 all concentrations were below 0.01 mg/L with the highest being 0.0072 mg/L at SH105 in October.

A comparison with previous data shows that Sherman Creek appeared to have slightly lower pH in the latter half of 2008 than previous years, but remained at normal levels in 2009 and 2010. The pH at the background site SH109 was lower than usual in August 2010. This changed in 2011 with pH values at SH109 ranging between 7.5 and slightly over 8.0 Turbidity appeared lower in 2011 than 2010 , this may be in part due to higher background turbidity in 2010, but 2011 displayed the opposite results with much lower background turbidity. Ammonia was present at a low level in late 2006 and early 2007, spring of 2007 and December 2007, then it remained undetected until June and August 2009 and July-September and December 2010. In 2011 ammonia was present in the majority of the samples from SH113 whereas it remained undetected at all

other sites with the exception of one result in July at SH105. The peak ammonia value was 1.12 mg/L in July at SH113. Chloride appeared to have an increasing trend from July 2007 to March 2008, but was present at much lower levels (less than 4mg/L) from May 2008 and remained below 6mg/L during 2009 and the first half of 2010. Slightly higher chloride levels (8-14mg/L) were observed in August, September and December 2010, but these levels are well below the 230mg/L WQS. Again in 2011 a slight upward trend for chloride was noted in the downstream sites with a peak value of 18.7 mg/L at SH113.

Nickel seems to have declined since July 2007. It was not detected between June 2008 and November 2009 and most of 2010 (only detected in February, September, December at low level). Fewer detections of nickel occurred in 2011 when compared to previous years. Only two samples had nickel results both in March at SH113 and both under 2.0 ug/L. Manganese was low until July 2007, increasing at SH113 at high flow in fall of 2007 and spring and fall of 2008. Manganese levels at SH113 never exceeded 26ug/L in 2009, but in 2010 three samples exceeded 50ug/L. The upward trend of manganese continued in 2011 with slightly more than half the samples at SH113 over 50 ug/L. Iron was detected at SH105 in previous years (twice in 2006 and twice in 2007). Iron was not detected in 2008 and appeared only once at SH113 in 2009 (January) and once in 2010 (November) at low levels. In 2011 Iron was detected three times with all values at or below 0.075 mg/L.

Sulfate, TDS and conductivity tend to follow hardness patterns, peaking at SH113 in February 2008, March 2009, February 2010. The same pattern continued in 2011 with Sulfate, TDS and conductivity peaking in March, with the exception of TDS peaking in February at SH113. Conductivity has typically been higher at SH113 than upstream or downstream sites and this held true though 2011. Conductivity during the historical peak months of January through April was higher in 2011 as compared to previous years during the same period. Sulfate has demonstrated a downward trend since 2008 with a peak value of 82.9mg/L in February as compared to February's peak value in 2010 of 40.7mg/L. Sulfate showed a slight increase during peak months in 2011 but was still lower than historical peaks. The highest value for sulfate was 59.8 mg/L up from last year but lower than previous years. Similarly, TDS has exhibited a downward trend since 2008. TDS in February of 2008 was greater than 200mg/L whereas TDS in

February of 2010 was less than 150mg/L. TDS appeared to take an upward turn from 2010 with increased peak values between 175 and 200 mg/L recorded in 2011. Hardness values increased slightly over last year's values, 2011 had three peak values between 125 and 150 mg/L.

Nitrate has been observed at low levels in Sherman Creek. It showed a slight increase in February, May, October and November 2007 and in February 2008 then remained low until April to June of 2009 when levels were similar to November 2007. Nitrate levels in 2010 appeared slightly lower than 2009. Nitrate levels in 2011 were greater than 2010 levels with peak values between 1.3 and 1.9 mg/L whereas the previous year ranged approximately 1 mg/L less. However, 2011 nitrate levels were still well below the WQS of 10.0 mg/L.

6.4 Receiving Waters- Ophir Creek

Monitoring Sites

- SH111- Ophir Creek upstream of Comet Development Rock Stockpile
- SH103- Ophir Creek downstream of Comet Development Rock Stockpile

6.4.1 Major Chemistry

Water monitoring on Ophir Creek was intended to help identify any potential impacts from mine construction and development activities associated with the Comet Development Rock Stockpile. Figures 9a through 9c are graphical presentations of analytical results gathered throughout 2011. Monitoring station SH111 is often unavailable for sampling during low flow periods and frozen conditions in winter and at times inaccessible due to avalanche danger. Under the previous sampling plan monitoring was only required at SH111 and SH103 once every other month between May and November. Effective September 1st under the new APDES permit monitoring at both sites was increased to monthly, year-round.

As with the other receiving waters, Ophir Creek's monitoring data exhibited many trends in accordance with expected seasonal changes, increasing in summer and decreasing in winter.

DO was very similar at both sites each time measurements were made. Measured conductivity at SH103 has often been the highest of all 11 monitoring sites on the project receiving waters, reaching 650umhos/cm from January to April 2009 and 495umhos/cm in November 2009. No samples were collected during this period in 2010. The highest recorded conductivity in 2010 was 165umhos/cm in November with 161umhos/cm recorded in October. Consistent with previous years, SH103 had a high conductivity result of 558 umhos/cm in December 2011.

Total dissolved solids were present at similar concentrations at both sites in May through October (less than 100mg/L) and increased at SH103 in November reaching a peak in December (394 mg/L). Due to no observable flow samples were not collected at the background site in November or December. Sulfate demonstrated a similar trend with TDS. Samples at both stations May through October displayed sulfate results less than 50 mg/L, whereas a marked increase occurred at SH103 in November and December with a peak result of 223 mg/L in November. Consistent with sulfate and TDS, hardness showed a similar pattern with the concentrations less than 100mg/L at both SH103 and SH111 – May through October, but then increasing to over 200mg/L in November and December samples. In the past chloride tended to be higher in winter than summer and was not detected at all in 2010 May-November samples. In 2011 chloride samples detected in May at both stations and ranging 1.0 and 2.5 mg/L. Chloride was not detected in samples July through October, but was present in samples in November and December – ranging between 3.0 and 4.0 mg/L. Following 2010's trend, nitrate levels were low at both sites through the year with highest levels in November and December, but both results below 2.0 mg/L.

The pH results were slightly lower as in previous years; samples collected at SH103 and SH111 ranged between 7.0 and peak value of 7.53. Last year's pH peak was 7.94. Ammonia was not detected in any Ophir Creek samples in 2011; this was also the case in 2010. Total suspended solids also remained undetected through 2011 at both Ophir Creek sites. Color was not detected at the background site but detected three times at SH103 with a low of 5cu and two peak values of 10cu.

6.4.2 Trace Chemistry

Non-detected metals for both SH111 and SH103 included arsenic, cadmium, chromium,

iron, lead, nickel, selenium and silver. Copper was not in any samples from SH111, but was present in low concentrations in half the samples from SH103. Zinc was present in one sample at SH111 and three samples collected from SH103. The highest zinc sample occurred at SH103 (7.4 ug/L). Manganese was not detected at the background site, but was present in all but one sample from SH103 with values ranging from 1.2 to 3.5 ug/L. Mercury was not found in any background samples but was present in one downstream sample at SH103 with a result of 0.002 ug/L in July.

Similar to 2010, low levels of aluminum were measured in all samples collected at both Ophir Creek sites during 2011 with little difference between the sites. SH111 and SH103 had by far the lowest concentrations of aluminum of all the receiving waters, as was the case in 2008, 2009 and 2010.

7.0 Discharges

7.1 Outfall 001

The Comet water treatment plant (WTP) discharge (Outfall 001) was sampled weekly, resulting in at least four times the data compared to most receiving water stations. This larger group of sample results is a greater opportunity to identify trends (Figures 10a – 10d). Discharge Monitoring Reports containing results of required monitoring were submitted each month during 2011.

7.1.1 Major Chemistry

Dissolved oxygen (DO) in the effluent tended to be higher in winter (12-13mg/L) and lower during the summer season (11-12mg/L), with low levels recorded in January and August (7-8mg/L). DO is typically negatively correlated with temperature, which was seen to increase from less than 5°C from January to early March to around 10°C in late April, reaching a maximum of 13.0°C in mid-May, before declining to 1°C in December. Grab samples from the effluent and background station SH109 are collected weekly in conjunction with the effluent composite samples. The difference between background turbidity and effluent turbidity remained low for most of the year (under the limit of 5 NTU). However, the turbidity standard was exceeded on two occasions, once in April with a background difference of 12.09 NTU and again in late May with a

turbidity limit of 5.27 NTU. Background turbidity reached 9.4 NTU in November during high flow, but effluent turbidity remained less than 2.0 NTU.

pH fluctuated throughout 2011 with two peak values over 8.5 s.u. and one low value less than 6.5 S.U. The period of time the pH was out of the 6.5 to 8.5 s.u. threshold was relatively short. pH readings were in compliance 98.8% in 2011.

Both TDS and sulfate (associated with calcium and magnesium) were well below permit limits in 2011. Throughout the year, major cations (represented by hardness) and anions (represented by sulfate), plus total dissolved solids showed consistent trends with few spikes. TDS ranged 200-400 mg/L for most of the year with the exception of four values between 400 and 600 mg/L from February to April. Effluent sulfate was less than 20 mg/L through the year except for one spike of 67.7 mg/L in mid-September, which was still below the WQS of 200 mg/L. Downstream hardness was mostly 50 to 150mg/L from January to mid-May then spiked to 167 mg/L in late May, then dropped below 110 mg/L for the remainder of the year. The lowest hardness value in 2011 was 34.1 mg/L in late October.

Daily samples were collected for TSS analysis. All samples collected in January contained levels less than 10.0 mg/L. February and March had three spikes in TSS concentrations, resulting in three permit exceedences, all three results ranged between 50.0 and 70.0 mg/L. Then levels dropped until another rise in late April with a result slightly over 20 mg/L. The remainder of the year saw more frequent non-detect results of suspended solids with a total of only 15 samples containing suspended solids. Conversely, in 2010 the first half of the year contained mostly non-detect results and the last half with more detectable results. Only 7 samples had detectable levels in 2009 and all were well below the permit limit.

Both nitrate and ammonia remained below daily maximum permit limitations during the year. In general, ammonia ranged between 0.25 and 2.0 mg/l with only two results greater than 2.0 mg/L. Nitrate was positively correlated with ammonia. Nitrate ranged 0.4 -4.0 mg/L for the majority of the year with only four results greater than 4.0 mg/L.

7.1.2 Trace Chemistry

Arsenic and cadmium were undetected in effluent samples during 2011. Chromium and silver were undetected in 2010 but we found in low concentrations in 2011. Cadmium, copper and

lead were undetected in 2009, but present in 2010. During 2011 silver was only detected in one sample toward the end of the year at low level (0.1ug/L). Copper was present on ten occasions throughout 2011, one of which resulted in a permit exceedence in late May. Lead was present in four samples in 2011 collected in May, July, October and November, the highest result (0.3 ug/L) occurring in July.

Aluminum remained at relatively low concentrations (less than 25ug/L) until May when a value of 57.1 ug/L was recorded, followed by the peak result of 110ug/L in July, before dropping back to less than 35ug/L for the latter half of 2011. Iron showed a similar pattern, levels remained well below 0.5 mg/L until mid-July when the highest value of 1.41 mg/L was recorded. The remainder of the year exhibited iron levels at or below 0.5 mg/L except for a mild increase in November and December. Overall, 2011 showed decreased concentrations of iron as compared to 2010. Mercury concentrations mildly increased in 2011 with more detectable levels than the previous year. However, all results remained at low concentrations with the greatest being .0032 ug/L in July, well below the permit limit of .0200 ug/L. Zinc concentrations varied little throughout the year with all but one result below 10 ug/L. The highest zinc value came in May (53.4 ug/L) but still considerably lower than the hardness-based limit. Nickel concentrations fluctuated throughout the year from 1.3 to 3.8ug/L during the first third of the year and ranged from 1.0 to 3.0ug/L for the remainder of the year, never exceeding the lowest hardness-based limit. The 2011's nickel pattern reflected the previous year's trends. Selenium varied slightly throughout the year mostly ranging from 1-2ug/L and well below the limit of 8.2ug/L which was effective to the end August in 2011 after which selenium no longer had a permit limit.

Manganese fluctuated through 2011 with values ranging from a high of 482 mg/L in March to a low of 13 mg/L in April. Overall, manganese concentrations for the effluent demonstrated a decrease in 2011 when compared to 2010. The average manganese result was 190 ug/L in 2010, but dropped to 157 ug/L for 2011.

Chromium remained undetectable for most of the year. There were seven samples present with chromium ranging from 2.9 to 7.9 ug/L.

7.1.3 Whole Effluent Toxicity Testing

Whole Effluent Toxicity (WET) Tests were conducted monthly on the 24-hour

composite samples collected from Outfall 001 effluent. The following three tests were rotated throughout the year such that each test was conducted once a quarter:

- *Pimephales promelas* (fathead minnow)- static, renewal, larval survival and growth test.
- *Ceriodaphnia dubia* (water flea)- 7-day static, renewal, survival and reproduction test.
- *Selanastrum capricornutum* (green algae)- 4-day static, growth.

All monthly WET tests conducted on 001 discharge water in 2011 were within permit limits.

7.2 Outfall 002

Outfall 002 discharge is from the tailing treatment facility (TTF), which began in early December 2010 after the new water treatment plant was commissioned. 2011 was the first full year of operation for the TTF water treatment plant, therefore data from previous years is not available for comparison. Discharge Monitoring Reports containing results of required monitoring were submitted each month during 2011.

7.2.1 Major Chemistry

pH fluctuated some throughout 2011 at Outfall 002. One recorded value dipped slightly below the 6.5 S.U. threshold (6.42 S.U.), otherwise all values remained in compliance. Flow rate was very consistent from January through August ranging only 1000 – 1100 GPM. September – December saw a permit limit increase (from 1100 to 1500 GPM) for flow, thus average flow increased to 1200 – 1500 GPM through the rest of 2011. Temperature, as expected, trended seasonal through the year. Temperature varied from 2.5°C in February to 17.1°C in July. Background samples for turbidity were collected weekly at MLA in conjunction with the effluent grab samples. The difference between background turbidity and effluent turbidity remained low through the year, with only three noticeable peaks, but all three were under the five NTU limit. Background turbidity reached 7.71 NTU in November, while effluent turbidity remained less than 1.00 NTU.

Sulfate exceeded the permit limit on six occasions in February and March, then remained below the limit for the rest of the year excepct for one result of 262 mg/L in September. Total dissolved solids (TDS) ranged from 319mg/L to 520mg/L. One permit exceedence occurred in March (520 mg/L) otherwise all TDS results remained below the limit of 500mg/L.

Effluent hardness ranged from 181 to 319 mg/L through the year. Under the new permit downstream hardness analysis began in September at site SMP-5. During that four month period hardness fluctuated considerably, values ranged 41.3 to 181 mg/L, the wide range of values may be attributed to varying flow rates at the sample site.

Daily samples were collected for total suspended solids (TSS) through 2011. Only seven samples had detectable amounts of TSS, all seven results were below 11.0 mg/L. Both nitrate and ammonia remained well below daily maximum permit limitations in 2011. As expected the two parameters trended together. Ammonia stayed near 1.0 mg/L for the first half of the year and after July dropped to levels generally below 0.5 mg/L. Following a similar pattern, nitrate was around 1.0 – 1.5 mg/L until July, then dropping to concentrations below 1.0 through the remainder of the year.

7.2.2 Trace Chemistry

Arsenic, cadmium, chromium, lead, selenium and silver were undetected in Outfall 002 effluent samples during 2011. Aluminum was present in all samples at concentrations between 1.7 and 29.0 ug/L and well below the 143ug/L permit limit. Overall, iron concentrations were consistent through the year; three spikes occurred during the latter half of the year, one reaching 1.47 ug/L in December. All iron results remained below the permit limit for the year. Nickel experienced fluctuations all year most results remained below 2.5 ug/L, three values approached 5.0 mg/L in November. All values remained below the WQS, including the hardness-based standard nickel was subject to beginning in September. Overall, zinc was undetectable most of the year, eleven samples total registered a detectable amount of zinc, none of which were greater than 4.5 ug/L. Copper remained below detection limits January to early August after which seven

samples contained low levels - none exceeding 1.3 ug/L. In the first third of 2011 mercury was not detected in effluent samples. After May low-level detections periodically occurred, the highest in November producing a result of 0.0050 ug/L, still well below the permit limit of 0.0200 ug/L.

7.2.3 Whole Effluent Toxicity Testing

Whole Effluent Toxicity (WET) Tests were conducted monthly on the 24-hour composite samples collected from Outfall 002 effluent. The following three tests were rotated throughout the year such that each test was conducted once a quarter:

- *Pimephales promelas* (fathead minnow)- static, renewal, larval survival and growth test.
- *Ceriodaphnia dubia* (water flea)- 7-day static, renewal, survival and reproduction test.
- *Selanastrum capricornutum* (green algae)- 4-day static, growth.

With respect to WET testing, Outfall 002 had one permit exceedence in January of 2011. The Selanastrum capricornutum (green algae) did not pass the growth test requirement. All other WET tests conducted at Outfall 002 throughout the year passed.

7.3 Outfall 003

Outfall 003 is the Comet Beach Camp sewage treatment plant with a marine discharge. The plant was decommissioned at the end of October 2007 as a result of the camp population moving to the Jualin facilities. Since there was no longer any discharge from this outfall, monitoring ceased. In addition to being decommissioned, Outfall 003 is no longer included in the APDES permit for the project, it was mentioned as was still in the previous permit that is no longer current.

COEUR
ALASKA
KENSINGTON GOLD MINE

Kevin Eppers
Environmental Superintendant

March 1, 2012

Alaska Department of Environmental Conservation
Division of Water, Compliance and Enforcement Program
555 Cordova Street
Anchorage, AK 99501

RE: Annual Report; APDES Permit AK 0050571; Kensington Gold Project

To Whom It May Concern:

As per the approved APDES permit Coeur Alaska submits the required annual reporting. Enclosed please find:

- Annual Water Quality Monitoring Summary for 2011, Volume 1: Aquatic Resources; including sediment toxicity testing, resident and anadromous fish surveys, benthic invertebrate surveys and aquatic vegetation surveys.
- Annual Water Quality Monitoring Summary for 2011, Volume 2: Water Quality; including data for Outfall 001 effluent, Outfall 002 effluent and receiving water stations.
- An electronic copy of historical water quality data.

If you have any concerns or comments please feel free to call me at your earliest convenience at (907) 523-3328.

Sincerely,

Kevin Eppers

Kevin Eppers
Environmental Superintendant

Cc: Luke Russell (Coeur)
Ted Deats (ADNR)
Kyle Mosselle (ADNR)
Marti Marshall (USFS)
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CFS 8.1.5 Annual 2010

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