Fact Sheet

NPDES Permit Number: AK-005057-1
Date: June 21, 2004
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The U.S. Environmental Protection Agency (EPA) Plans to Issue a Wastewater Discharge Permit to:

Coeur Alaska, Inc.'s
Kensington Gold Project

notice of
STATE CERTIFICATION,

and

notice of a
review under the
ALASKA COASTAL MANAGEMENT PROGRAM

EPA Proposes NPDES Permit Issuance.

EPA proposes to issue a National Pollutant Discharge Elimination System (NPDES) Permit to Coeur Alaska, Inc. for the Kensington Gold Project in the Tongass National Forest 45 miles north of Juneau, Alaska. The proposed discharges are to East Fork Slate Creek with on-going, previously permitted discharges to Sherman Creek and Lynn Canal. The draft permit sets conditions on the discharge - or release - of pollutants from various types of operations into waters of the United States.

This Fact Sheet includes:

- the tentative determination of the EPA to issue the permit,
- information on public comment, public hearing, and appeal procedures, and
- a description of proposed permit conditions.

The State of Alaska certification.

EPA has requested that the Alaska Department of Environmental Conservation (ADEC) certify the NPDES permit under section 401 of the Clean Water Act (CWA). A draft certification is included in Appendix C.

Consistency Determination

The State of Alaska, Office of Project Management and Permits (OPMP), intends to review this action for consistency with the approved Alaska Coastal Management Program (ACMP). For more information concerning this review, please contact Ms Sandy Harbanuk at (907) 465-8791.

EPA invites comments on the draft permit.

EPA will consider all substantive comments before issuing a final permit. Public hearings will be held jointly on this permit and related permits required by the State of Alaska in the Sheffield Ballroom of Centennial Hall in Juneau on July 26, 2004 and in the American Bald Eagle Foundation Building in Haines on July 27, 2004. At both hearings, there will be an open house from 4 pm until 6 pm, a project presentation with a question and answer session from 6 pm to 7pm, followed by public testimony from 7 pm until 10 pm. Those wishing to comment on the draft permit may do so in writing by the expiration date of the Public Notice. All comments should include name, address, phone number, a concise statement of basis of comment and relevant facts upon which it is based. All written comments should be addressed to the Office of Water Director at U.S. EPA, Region 10, 1200 Sixth Avenue, OW-130, Seattle, WA 98101; submitted by facsimile to (206) 553-0165; or submitted via e-mail to godsey.cindi@epa.gov

After the Public Notice expires and all substantive comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance. If no comments requesting a change in the draft permit are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If substantive comments are received, EPA will address the comments and issue the permit along with a response to comments. The permit will become effective 30 days after the issuance date, unless the permit is appealed to the Environmental Appeals Board (EAB) within 30 days.

Persons wishing to comment on State Certification should submit written comments by the public notice expiration date to the ADEC, 410 Willoughby, Suite 303, Juneau, Alaska 99801. Questions and comments may be addressed to Mr. Kenwyn George at (907) 465-5313 or kenwyn_george@dec.state.ak.us

For more information on the ACMP consistency review process and the comment deadline, or to submit comments, please contact Ms Sandy Harbanuk at ADNR-OPMP, 302 Gold Street, Suite 202, Juneau, Alaska 99801 or at (907) 465-8791 or sandy_harbanuk@dnr.state.ak.us

Documents are available for review.

The draft NPDES permit and fact sheet can be reviewed at EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday. This material is also available for inspection and copying at the following places in Alaska:

USEPA Alaska Operations Office
Federal Building, Room 537
222 West 7th Avenue
Anchorage, Alaska 99513-7588
Telephone: (800) 781-0983 (in Alaska)

USEPA Alaska Operations Office
709 W. 9th Street, Room 223A, Box 20370
Juneau, Alaska 99802
Telephone: (907) 586-7619

ADEC
Division of Water
Water 410 Willoughby, Suite 303
Juneau, AK 99801
Telephone: (907) 465-5313

The draft permit and fact sheet may also be viewed on the internet at the EPA, Region 10 website. The address is www.epa.gov/r10earth then click on “Water Quality” on the left side of the page, then on “NPDES permits” on the right and chose draft permits in Alaska.

TABLE OF CONTENTS

LIST OF ACRONYMS

AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AWQS	Alaska Water Quality Standard
BAT	Best Available Technology, economically achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD_5	5 day Biochemical Oxygen Demand
BPJ	Best Professional Judgement
BPT	Best Practicable Control Technology, currently available
CFR	Code of Federal Regulations
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DSEIS	Draft Supplemental Environmental Impact Statement
EAB	Environmental Appeals Board
EFH	Essential Fish Habitat
ESA	Endangered Species Act
gpd	gallons per day
gpm	gallons per minute
MCL	Maximum Contaminant Level
MDL	Method Detection Limit or Maximum Daily Limit
mg/L	milligrams per liter
MGD	million gallons per day
ml/L	milliliters per liter
ML	Minimum level
ng/L	nanograms per liter
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NTU	Nephelometric Turbidity Units
OPMP	Office of Project Management and Permitting
POO	Plan of Operations
QAP	Quality Assurance Plan
RO	Reverse Osmosis
ROD	Record of Decision
s.u.	Standard units
SS	Settleable Solids
TSD	Technical Support Document for Water Quality-based Toxics Control
TSS	Total Suspended Solids
U.S.C.	United States Code
ug/L	micrograms per liter
USEPA	Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish & Wildlife Service
WQBEL	Water Quality-based effluent limits

1. Applicant

Coeur Alaska, Inc.
3031 Clinton Drive, Suite 202
Juneau, AK 99801

Facility Contact: Robert Richins

2. Facility Activity

Background

In 1990, the Kensington Venture, a business entity that included Coeur Alaska, Inc., (Coeur) initially proposed to develop the Kensington Gold Project. The joint venture never obtained all necessary approvals to begin the project. In 1995, Coeur became the sole stakeholder. Coeur proposed a revised Plan of Operations (POO) to the US Forest Service (USFS). This plan was amended again in 1996 and eventually approved by the USFS in 1998.

EPA issued a National Pollutant Discharge Elimination System (NPDES) Permit, AK-005057-1, (NPDES permit) to the Kensington Gold Project on May 14, 1998, to address discharges from the historic Kensington 850 portal, through Outfall 001, as well as discharges from the dry tailings facility (DTF) approved with the POO in 1998. After not implementing the 1998 plan, Coeur submitted an amended POO in late 2001. The requirements of the NPDES permit continue to apply to the ongoing discharge of drainage from the Kensington adit through Outfall 001. The most recent POO is currently undergoing the NEPA review process.

This draft NPDES permit is written to control discharges from the Kensington Gold Project, which would result from implementation of the proposed action (Alternative B), as presented in the Kensington Gold Project Draft Supplemental Environmental Impact Statement (DSEIS) (January 2004) and supplemented by additional information provided by the Applicant[1]. This draft permit is being proposed to solicit comments on the appropriate NPDES conditions based on the current permit application submitted by the Applicant. EPA recognizes that the USFS has not yet decided whether to allow the applicant to proceed with the project as described in that permit application, and that the USFS decision is subject to a pending NEPA analysis in which various alternatives are being considered. If another alternative is selected, EPA may require a new application and may issue a revised draft permit for comment. The proposed project would represent a new source under the Clean Water Act so EPA is a cooperating agency in the preparation of the SEIS.

As shown by the figure in Appendix A, the Kensington Gold Project is located approximately 45 miles northwest of Juneau, Alaska, in the Tongass National Forest. The ore body extends from the surface to a depth of approximately 3,000 feet and is irregular in both shape and distribution of gold. After a two-year construction period, mining will be accomplished over a projected period of 10 years (Section 2.3.1 of the DSEIS) using a long hole, open stoping method. Ore will be hauled by truck to the mill site located near the Jualin mining area. After crushing, the ore will be transferred to a grinding circuit. Following grinding,

[1] As discussed in other sections of this Fact Sheet, subsequent to publication of the DSEIS, EPA determined that proposed effluent limits for aluminum and TSS could not be met without additional treatment. The permittee has, therefore, proposed to modify the proposed action (Alternative B) to include a water treatment system and a pipeline diversion of upstream flow around the TSF.

oversized material will be returned to the head of the grinding operation, while undersized material will be separated into coarse and fine materials using centrifugal cyclones. From the cyclones, heavy material will go to a gravity concentrator and light material will go to a conditioning tank that feeds a flotation circuit. Concentrate from the gravity concentrator and the flotation circuit will be dewatered, and approximately 700 tons per week of concentrate will be transported from the site. From 2,000 tons of ore per day, mining and processing will produce approximately 400 tons of waste rock per day and approximately 7.5 million tons of tailings over the lifetime of the proposed project.

As noted above, mine drainage is currently combined with runoff from waste rock piles and other disturbed areas and discharged to Sherman Creek through Outfall 001. Underground workings that produce mine drainage, as well as waste rock, were developed as part of exploration activities and will be expanded as active mining operations are initiated.

Water from mine dewatering operations will continue to be collected, clarified, and filtered underground, if necessary, and then pumped to an above ground mine water treatment facility. For several years after initial permit issuance, mine drainage was treated by sulfide precipitation and filtration prior to being combined with runoff in settling ponds. Precipitation and filtration are no longer used because effluent limitations have consistently been met without these treatment steps. This is likely due, in part, to the low level of activity in the mine; however, when active mining begins, full treatment may be necessary. Although the revised proposal includes access to the workings by tunnels from both the Kensington and Jualin "sides" of the property, all mine drainage will be collected and routed to Outfall 001.

Tailings slurry from the mill will flow through a 3.5 mile pipeline to an impoundment called the tailings storage facility (TSF), which will be formed by the natural lake basin of Lower Slate Lake and a constructed retention embankment at the outlet of the lake. The TSF will be sized to accommodate 4.5 million tons of tailings, while approximately 3.0 million tons of tailings will be used as backfill in the mine. An earth or rock fill berm will be constructed in Mid-lake East Fork Slate Creek above the inflow to the TSF. Collected water will be removed from behind the berm through a 20 inch diversion pipeline. The TSF will receive water from slurry transport of tailings as well as undiverted natural inflows from drainage areas immediately adjacent to the TSF and overflows from the berm. Water will be recycled from the TSF to the mill at a rate of approximately 100 gallons per minute (gpm). The discharge from the TSF (Outfall 002) will be combined with the diverted natural flows and pumped into the East Fork Slate Creek drainage below the TSF.

Receiving waters for Outfalls 001 and 002 are perennial creeks located at the base of Lions Head Mountain in the Kakuhan Range of the Coast Mountains. The Sherman Creek watershed, which flows west from Lions Head Mountain, includes a drainage area of approximately 2,681 acres. Slate Creek flows south/southeast from Lions Head Mountain to the west side of Berners Bay and provides drainage to an area of approximately 2,600 acres.

3. Receiving Waters

Outfall Locations

The permittee proposes to discharge through three outfalls. Outfall 001, which is currently regulated by NPDES Permit No. AK-005057-1, discharges mine water to Sherman Creek, and is located at latitude 58º 52' 04" North and longitude 135º 06'

55” West. Outfall 002 will discharge from the TSF to East Fork Slate Creek at latitude 58º 49’ 58” North and longitude 134º 57’ 58” West. Outfall 003 which was previously permitted by NPDES Permit No. AK-005057-1 is the discharge of treated domestic wastewater to Lynn Canal at latitude 58º 51’ 58” North and longitude 135º 8’ 28” West.

Water Quality Standards

Together, water quality criteria and beneficial uses makeup the water quality standards of the State (AWQS). Uses of receiving waters are defined in the Alaska Administrative Code (AAC) at 18 AAC 70.020(2). For East Fork Slate Creek and Sherman Creek, the State’s designated uses include water supply (drinking, culinary, and food processing; agricultural irrigation and stock watering; aquaculture; and industrial); contact and secondary recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife. At 18 AAC 70.020, the State also establishes water quality criteria for each designated beneficial use. At 18 AAC 70.236(b) site specific criteria for certain parameters are established for Sherman Creek.

Lynn Canal is protected by the AWQS for marine water supply (aquaculture, seafood processing and industrial); water recreation (contact and secondary); growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life. At 18 AAC 70.020, the State also establishes water quality criteria for each designated beneficial use.

In 2003, the State adopted revisions to its AWQS. These revisions were approved by EPA on February 27, 2004. Water quality criteria applicable to Sherman Creek and East Fork Slate Creek are presented in Appendix E of this Fact Sheet.

4. Description of Discharges

Outfall 001

Outfall 001 represents the discharge from settling facilities into Sherman Creek. Inflows to the sediment ponds include treated mine drainage from dewatering operations and runoff from waste rock piles and other disturbed areas in the Sherman Creek drainage. The sediment pond has two cells. Storm water runoff from waste rock and disturbed areas is routed to Cell 1 via a riprap lined spillway, which is sized to handle runoff from a 100-year, 24-hour precipitation event. Cell 1 is designed to hold the average annual sediment yield from a five-year period. Removal of settled solids will occur periodically, when sediment levels reach 2.5 feet below the notched spillway, which separates Cells 1 and 2.

A spillway, notched in the center berm, allows flow from Cell 1 to Cell 2. The rate of flow from Cell 1 to Cell 2 will vary, depending on the amount of inflow from runoff and the level of sediment maintained in Cell 1. Cell 2, which is designed to treat water from mine dewatering operations and high flows from Cell 1, has been conservatively designed to hold settled solids for the life of the mine. Discharge from Cell 2 to Outfall 001 occurs through a perforated decant pipe with a design capacity to handle the 10-year, 24-hour storm event. Greater flows will discharge through the top of the pipe, as well as the perforations, and a spillway will discharge very high flows in excess of the decant pipe’s discharge capacity. If necessary, settled solids will be removed from Cell 2 when levels reach 2.5 feet below the bottom perforations of the decant pipe. Flow controlled flocculant

addition is in place at the sediment pond inlet to enhance removal of suspended solids, if necessary.

The permittee estimates the rate of mine dewatering to generally range from 1.33 and 2.45 cfs with a maximum of 4.90 cfs. All of this flow will be collected in sumps within the mine where initial settling will occur. Mine drainage will be pumped to the mine water treatment system for metals precipitation and filtration. Settled solids will be added to tailings that are backfilled into the mine. Most filtered mine water will be discharged to Cell 2 of the sediment pond, with a portion possibly being used as makeup water for mill operations. Filter backwash will be recycled to the underground mine water treatment system.

Table 4-1 presents the projected quality of mine drainage to be discharged during active mining.

Table 4-1
Projected Treated Mine Water Quality

Parameter	Units	Treated Mine Drainage
Aluminum	µg/L	<71.2
Ammonia	mg/L	<2[b]
Arsenic	ug/L	1.7
Cadmium	ug/L	ND (0.2)
Chromium	ug/L	ND (10)
Copper	ug/L	3.9[c]
Iron	mg/L	278[d]
Lead	ug/L	1[d]
Mercury	ug/L	ND (<0.05)
Nickel	ug/L	ND (<10)
Nitrate	ug/L	<10[b]
pH	s.u.	6.8 - 8.3
Selenium	ug/L	ND (<5)
Silver	ug/L	0.1[d]
Sulfate	ug/L	445
TDS	mg/L	<800
Zinc	ug/L	10
TSS	mg/L	<20

a - Based on theoretical hydroxide solubility at pH 6 - 6.5
b - Values assume continued implementation of the explosives BMP Plan
c - Based on theoretical hydroxide solubility at pH 8.5
d - Value assumes removal of the metal through adsorption and/or co-precipitation

Table 4-2 presents Outfall 001 water quality reported under the current permit from May 1998 through November 2003.

Table 4-2
Outfall 001 Discharge Water Quality 1998-2003

Parameter	Units	Minimum Result	Maximum Result
Aluminum (total)	ug/L	8.68	40.5
Ammonia	mg/L	< 0.05	0.69
Arsenic (total/dissolved)	ug/L	< 0.5/< 0.5	3/3.1
Cadmium (total/dissolved)	ug/L	< 0.10/< 0.10	< 0.20/< 0.20
Chromium (total/dissolved)	ug/L	<0.2/< 0.2	4.78/6.81

Table 4-2
Outfall 001 Discharge Water Quality 1998-2003

Parameter	Units	Minimum Result	Maximum Result
Copper (total/dissolved)	ug/L	< 2.0/< 2.0	8.5[1]/2.17
Iron (total)	ug/L	0.084	77
Lead (total/dissolved)	ug/L	< 1.0/< 1.0	1.64[2]/3.11
Mercury (total)	ug/L	< 0.16	< 0.20
Nickel (total/dissolved)	ug/L	< 5.0/< 5.0	< 10.0/< 10.0
Nitrate	ug/L	< 0.050	0.213
Selenium (total/dissolved)	ug/L	< 2.5/< 2.5	< 15.0/< 15.0
Silver (total/dissolved)	ug/L	< 0.10/< 0.10	< 0.10/< 0.10
Sulfate	mg/L	97	218
TDS	mg/L	180	540
Zinc (total/dissolved)	ug/L	< 2.0/< 2.0	12/8.15
pH	s.u.	7.4	8.4
TSS	mg/L	< 4.0	19
Hardness	mg/L	169	305

1 - Only 4 of 338 analyses for total copper had detected values. The other three detected values were 2.4, 3.1, and 3.3 ug/L.
2 - Only 1 of 337 analyses for total lead had a detected value. The other detected value was 1.03 ug/L.

Between 1987 and 1995, mine water flow ranged from 0.16 to 1.71 cfs, with a mean flow of 0.85 cfs (USFS, 1997). From May 1998 to November 2003, Outfall 001 flow rates ranged from 0.11 cfs to 0.79 cfs. Outfall 001 flows will vary depending on the volume of inflows from storm events and discharges from the mine water treatment plant. During dry weather, treated mine water will be the principle component of discharges from Outfall 001. During minor rainfall events, discharges from Outfall 001 will be a mixture of storm water runoff and treated mine drainage, and during major precipitation events, storm water runoff will dominate discharges from Outfall 001.

Testing of waste rock shows no acid generation potential and little or no metals leaching. This is confirmed by ongoing monitoring of the current discharge from Outfall 001 where no exceedances of permit limits have occurred.

Outfall 002

Outfall 002 will discharge water from the TSF to East Fork Slate Creek. The natural lake basin of Lower Slate Lake and a constructed retention embankment at the outlet of the lake will form the TSF. The TSF will be sized to accommodate 4.5 million tons of tailings - 60 percent of the tailings generated by the mining operation. The remaining 40 percent (3 million tons) of tailings will be used to backfill the mine. TSF inflows include tailings slurry from mill operations, precipitation that falls onto the lake, and storm water runoff from upland areas adjacent to the TSF. The upstream flow in East Fork Slate Creek will be collected and transferred into a 20 inch diversion pipeline.

Tailings slurry will flow by gravity from the mill to the TSF in a 3.5-mile pipeline. The pipeline will be double walled high-density polyethylene (HDPE) and/or steel. Flow sensors with automatic shutdown mechanisms will be used to detect blockages or breaks in the system. The tailings slurry will be discharged into the TSF through perforations in a submerged portion of the tailings delivery pipeline. The pipeline will be operated so that a portion of the perforated segment is always above the

bottom of the TSF, allowing the tailings to flow freely from the pipe. The pipeline will be raised regularly to prevent the tailings level within the TSF from blocking all the perforations. The perforations will be large in comparison to the diameter of the pipe to prevent the tailings from clogging the pipeline.

The average slurry throughput to the TSF is projected to be 354 gpm with an average solids content of 55 percent by weight (i.e., the water component of the slurry will be approximately 247 gpm). A portion of the slurry water will be entrained in the tailings and will be unavailable for recycle. The permittee proposes to recycle an average of 100 gpm out of the TSF back to the mill.

Table 4-3 presents anticipated untreated, water quality in the TSF, based on water quality modeling using @Risk, a Monte Carlo simulation program. From user-defined probability distributions of input variables, such a program randomly selects input values for calculation. After repeating input selection and calculation over hundreds of model iterations, a probabilistic distribution of possible outcomes is generated; i.e., the likelihood of particular outcomes is determined. EPA completed one thousand iterations of the model in order to project untreated TSF water quality. A detailed discussion of the TSF modeling is presented in Appendix G to this Fact Sheet.

Table 4-3
Projected Untreated TSF Water Quality

Parameter	Units	Projected TSF Discharge		
		Minimum	Mean	Maximum
Aluminum	ug/L	see below	see below	see below
Ammonia	mg/L	0.128	0.57	0.7
Arsenic	ug/L	0.59	0.82	0.9
Cadmium	ug/L	0.0056	0.025	0.031
Chromium	ug/L	0.94	2.0	2.3
Copper	ug/L	0.68	1.7	1.9
Iron	ug/L	400	760	900
Lead	ug/L	0.12	0.55	0.67
Mercury	ug/L	0.002	0.01	0.01
Nickel	ug/L	0.97	1.8	2.1
Nitrate	ug/L	<10[a]	<10[a]	<10[a]
pH	s.u.	6.5 – 8.5		
Selenium	ug/L	0.13	0.59	0.71
Silver	ug/L	0.02	0.02	0.02
Sulfate	ug/L	24	98	118
TSS	mg/L	see below	see below	see below
TDS	mg/L	114	218	246
Zinc	ug/L	2.8	11	13

a - Values assume continued implementation of the explosives BMP Plan

An important factor in the model is the volume of water available to mix with process water in the TSF. The volume of water available for mixing corresponds to precipitation. In each model run, precipitation is a variable; i.e., the model randomly selects a monthly precipitation value from the projected precipitation distribution at the site. In one thousand runs, it is expected that the “typical” and extreme wet and dry conditions will be represented. Other hydrologic inputs

(evaporation, snow melt, etc.) were incorporated into the values as deterministic values.

Discharge chemistry is also a function of process (tailings) water character and the background chemistry of Lower Slate Lake. The tailings chemistry input is based on sampling and analysis of decant water associated with rougher tailings generated during pilot milling tests performed in 1996 and 1998. The data represent total constituent results for each sample and the tests are considered representative of the full-scale milling operations. Lower Slate Lake background data represent the highest detected concentrations for each parameter from sampling and analysis performed in East Fork Slate Creek during 2000-2001.

Aluminum was not included in the modeling analysis. As discussed in Appendix D, when the tailings water is mixed in the lake, the pH will be reduced to natural levels of 7 - 8 standard units and excess aluminum will precipitate and settle. As a result, aluminum levels in the TSF prior to treatment are expected to be consistent with background water quality levels in the lake.

TSS was also not included in the modeling analysis because the TSS levels in the TSF are not only a function of mixing with natural inflows but also settling. As discussed above, the modeling results presented in Tetra Tech 2004 show that TSS levels of 660 mg/L or higher may be observed in the TSF without flocculant addition. Flocculation is generally a proven method to enhance settling. Its specific performance, however, at the TSF cannot be determined without additional tailings for site-specific testing of flocculants.

The permittee initially proposed to discharge effluent via Outfall 002 without treatment other than best management practices (BMPs) to enhance settling. As discussed in Tetra Tech 2004, TSS modeling shows that the proposed TSS limits may not be achievable without additional treatment. In addition, background levels of aluminum in East Fork Slate Creek and Lower Slate Lake occasionally exceed the proposed permit limits. As a result, the permittee amended its NPDES permit application to incorporate a contingency treatment system into the TSF design. As currently planned, a reverse osmosis (RO) treatment system would reduce levels of both aluminum and TSS to below permit limits and provide additional removal of other pollutants. A schematic for a RO system is show in Appendix B.

Operationally, water will be decanted and pumped from the pond to the treatment plant. The design capacity of the system would be 1100 gallons per minute (gpm), which is adequate to treat the maximum projected inflows into the TSF without exceeding the TSF capacity. The permittee has indicated that it will continue to pursue additional studies and approaches to address TSS, aluminum and, as appropriate, other pollutants, including:

1. The permittee may request a site-specific criteria for aluminum that is consistent with 18 AAC 70.235 and based on the actual effects of aluminum on species found in the Slate Creek drainage. As appropriate, EPA would re-open the permit to revise the permit limits to reflect any site-specific criteria that was adopted by the State of Alaska and approved by EPA.

2. When additional tailings material becomes available, the permittee may conduct settling tests, including potential use of flocculants and BMPs, to demonstrate that adequate settling would occur in the lake to meet permit limits for TSS without the need for additional treatment.

3. The permittee may evaluate treatment options other than RO for TSS and/or aluminum removal. These could include, but may not be limited to, activated carbon/filtration or metals precipitation.

EPA believes that prior to issuing a final permit, the record should contain information supporting a reasonable conclusion that it is both technically and economically feasible for Coeur to meet the effluent limits for discharges from Lower Slate Lake. To date, Coeur has provided technical information about several potential treatment methodologies, discussed above, which suggests that there is at least one technically feasible treatment method. However, while Coeur has provided cost estimates for various treatment methods, it has not yet provided information concerning the financial feasibility, given project economics, of implementing a technically feasible treatment method. Coeur has committed to providing that information during the public comment period.

The treated water quality that will be discharged through Outfall 002 is discussed in Section 5 below.

Besides establishing the geochemical character of the tailings, the 1996 and 1998 analyses showed that due to 90 to 98 percent removal of sulfide through flotation, tailings will have a total sulfur concentration of approximately 0.3 percent, and therefore, acid generation is not expected to occur in the TSF.

The permittee will manage the TSF to maintain a minimum pond volume of at least 600 acre feet. The TSF, including the pipeline diversion, will be actively managed to maintain State of Alaska minimum stream flow requirements and mirror historic fluctuations in the East Fork Slate Creek hydrograph downstream of the TSF.

Outfall 003

The discharge of treated domestic wastewater for the Kensington Mine camp was previously permitted for use during exploration, construction and production. The current project anticipates the use of the camp through exploration and construction. No permanent camp is proposed to remain at the site during the operation phase of the project. EPA proposes to include the same limitations as in the previous permit based on the State of Alaska's Wastewater Disposal regulations in 18 AAC 72, the WQS in 18 AAC 70 and the § 401 Certification. The average daily flow for the plant during construction is estimated at 30,000 gpd (20.8 gpm) based on sizing to accommodate 300 people. Outfall 003 will discharge to Lynn Canal.

Table 4-4 presents DMR data for Outfall 003 from April 1998 through 2000.

Table 4-4
Outfall 003 Discharge Water Quality 1998-2000[1]

Parameter	Units	Average Result	Maximum Result
BOD	mg/L	2.4	19
pH	s.u.	6 (min)	7.9 (max)
TSS	mg/L	8.3	61
Fecal Coliform	#/100 ml	563	540,000[2]

1 - The plant ceased discharging in 2000.
2 - 4 of 110 samples in 1998 and 1999 exceeded the daily maximum permit limit.

Stormwater Discharges (Previous Outfalls 004, 005, and 006)

The previous NPDES Permit authorized three storm water outfalls: 004, 005, and 006. Outfalls 004 and 006 address discharges from borrow areas and Outfall 005 refers collectively to discharges from multiple culverts along the Sherman Creek access road. The permittee has not re-applied for permit coverage for these outfalls. The permittee will apply instead for coverage of all storm water discharges associated with industrial activity under EPA Multi-sector General Permit AKR-05-0000 (MSGP).

5. Permit Requirements

Applicable Laws and Regulations

The Clean Water Act requires effluent limits for a particular pollutant to be the more stringent of either technology-based effluent limits or water quality-based limits. A technology-based effluent limit requires a minimum level of treatment for industrial point sources based on currently available treatment technologies. A water quality-based effluent limit is designed to ensure that water quality standards for a particular water body are being met. Appendices D, E and F contain additional information on deriving water quality-based effluent limits for the Kensington Gold project.

Effluent Limitations

Outfall 001 - Sherman Creek

Proposed effluent limitations for discharges to Sherman Creek through Outfall 001 are summarized in Tables 5-1 and 5-2, below.

Water quality criteria for some metals, and effluent limits derived from those criteria, are hardness dependent (i.e., the toxicity of some metals increases with decreasing hardness). During dry weather conditions, flow in Sherman Creek below the outfall is expected to be dominated by the discharge, which is expected to have high hardness levels (> 200 mg/L). During wet weather conditions, natural flows may dominate Sherman Creek with hardness levels of 50 - 100 mg/L. Consistent with the previous permit, tiered permit limits have been established for hardness dependent pollutants. At the time of sampling, the permittee must collect a downstream sample to determine which limits apply to that specific sample.

Table 5-1
Tiered Effluent Limitations for Outfall 001
to Sherman Creek

Pollutant	Units	MDL at Varying Receiving Water Hardness (mg/L CaCO3)			AML at Varying Receiving Water Hardness (mg/L CaCO3)		
		50 - 100	100 - 200	> 200	50 - 100	100 - 200	> 200
Cadmium	ug/L	0.3	0.5	0.7	0.2	0.3	0.4
Copper	ug/L	7.2	14	27	3.6	7.0	13
Lead	ug/L	2.2	5.3	13	1.0	2.6	6.4
Nickel	ug/L	48	85	154	24	43	77
Silver	ug/L	1.2	4.1	13	0.6	2.1	6.7
Zinc	ug/L	67	120	216	33	60	108

Table 5-2
Effluent Limitations for Outfall 001
to Sherman Creek

Pollutant	Units	MDL	AML
TSS	mg/L	30	20
TDS	mg/L	1000	1000
Sulfate	mg/L	200	200
pH	s.u.	6.5 to 8.5	
Nitrate	mg/L as N	20	10
Ammonia	mg/L as N	4.0	2.0
Turbidity	NTU	May not exceed 5 NTUs above natural conditions.	
Chronic Toxicity	TUc	1.6	1.1
Aluminum	ug/L	143	71
Arsenic	ug/L	100	50
Chromium VI	ug/L	16	8
Iron	ug/L	1700	800
Mercury	ug/L	0.02	0.01
Selenium	ug/L	8.1	4.0

Outfall 002 – East Fork Slate Creek

Proposed effluent limitations for discharges to East Fork Slate Creek through Outfall 002 are summarized in Table 5-3, below. Because the downstream conditions in East Fork Slate Creek below the TSF will be dominated by natural drainage flow, which has low hardness, the limits for hardness dependant metals are fixed, based on a receiving water hardness of 25 mg/L.

Table 5-3
Effluent Limitations for Outfall 002
to East Fork Slate Creek

Pollutant	Units	MDL	AML
TSS	mg/L	30	20
TDS	mg/L	500	500
Sulfate	mg/L	250	250
pH	s.u.	6.5 to 8.5	
Nitrate	mg/L N	20	10
Ammonia	mg/L N	3.5	1.7
Chronic Toxicity	TUc	1.6	1.1
Aluminum	ug/L	143	71
Arsenic	ug/L	100	50
Cadmium	ug/L	0.2	0.1
Chromium VI	ug/L	16	8.0
Copper	ug/L	3.7	1.9
Iron	mg/L	1.7	0.8
Lead	ug/L	0.9	0.5
Mercury	ug/L	0.10	0.05
Nickel	ug/L	26	13
Selenium	ug/L	8.1	4.0
Silver	ug/L	0.4	0.2
Zinc	ug/L	37	18

Outfall 003 – Lynn Canal

Proposed effluent limitations for discharges to Lynn Canal through Outfall 003 are summarized in Table 5-4, below. These limits are unchanged from the previous

permit. The fecal coliform limits are based on the previously approved mixing zone which has been tentatively re-authorized by ADEC (See Appendix C).

TABLE 5-4
Effluent Limitations for Outfall 003
to Lynn Canal

Parameter	Units	Effluent Limitations		
		Maximum Daily	Average Monthly	Weekly Average
Flow	gpd	60,000	30,000	—
Biochemical Oxygen Demand (BOD_5)	mg/L	60	30	45
Total Suspended Solids (TSS)	mg/L	60	30	45
Fecal Coliform	#/100 ml	150,000	100,000	—
pH	s.u.	Within the range of 6.5 - 8.5		

Reasonable Potential Analysis

Effluent limitations must be included for all pollutants addressed by effluent guidelines. In determining which other pollutants, will require water quality-based effluent limitations (WQBELs), EPA typically determines the reasonable potential of the discharge to exceed or cause an exceedance of applicable water quality criteria.

For Outfall 001, there is little or no water quality data representative of full-scale mining operations. EPA has determined that the existing mine water treatment system will ensure compliance with applicable water quality criteria, except for aluminum. An additional pH adjustment stage in the treatment process may be needed to reduce effluent pH to the range of 6 - 7 standard units to achieve better aluminum removal and meet discharge limitations. Because of a lack of data, however, EPA has further determined that it is important to retain WQBELs for all pollutants included in the previous permit as well as aluminum. In addition, limits have been added for arsenic, iron, and sulfate since these pollutants are expected at concentrations in the discharge approaching the water quality criteria.

For Outfall 002, EPA anticipates that pollutant levels will be below applicable water quality criteria. The predicted water quality, however, is based on limited analysis of tailings slurry and background water quality. EPA, therefore, has determined that it is appropriate to establish limits for all of the same pollutants addressed at Outfall 001.

Projected Discharge Chemistry versus Effluent Limitations

Tables 5-5 and 5-6 show projected effluent chemistry versus discharge limitations at Outfalls 001 and 002, respectively. For Outfall 002, the projected discharge chemistry for most pollutants is based on the modeled untreated water quality as shown in Table 4-3. Evaluation of treatment performance is not necessary because the untreated quality is below the expected permit limits except for TSS, aluminum, and lead with anticipated iron levels approaching the effluent limits. For TSS, settling in the TSF will be enhanced, as appropriate, by polymers and other BMPs that will remove larger particles while RO will further remove particles as

small as 0.001-0.0001 microns. This will ensure compliance with the TSS permit limits. RO has been shown to remove 95 percent of the aluminum and 96-98 percent of the lead from influent wastestreams. Similarly, the RO system would also provide the minimal iron removal potentially required to meet the effluent limits. Note that in tailings samples iron and lead are found primarily in solid rather than dissolved form, i.e., the high degree of solids removal provided by RO further ensures compliance the effluent limitations. As a result, the levels of these pollutants in the discharge from Outfall 002 should be well below the permit limits.

Table 5-5
Projected Discharge Chemistry versus Effluent Limitations
Outfall 001
[actual data from the outfall (non-operational) can be found in Table 4-2]

Parameter	Units	Discharge Chemistry[1]	MDL	AML
pH	s.u.	6.8 – 8.3	6.5 – 8.5	
TSS	mg/L	< 20	30	20
TDS	mg/L	< 800	500	500
Sulfate	mg/L	445	200	200
Total Ammonia	mg/L N	< 2	1.8	1.3
Nitrate	mg/L N	< 10	20	10
Chronic Toxicity	TU_C	-	1.6	1.1
Aluminum	ug/L	< 71	143	71
Arsenic	ug/L	1.7	100	50
Cadmium[2]	ug/L	< 0.2	0.3	0.2
	ug/L		0.5	0.3
	ug/L		0.7	0.4
Chromium VI	ug/L	< 10	16	8
Copper[2]	ug/L	3.9	7.2	3.6
	ug/L		14	7
	ug/L		27	13
Iron	ug/L	278	1,700	800
Lead[2]	ug/L	1	2.2	1.0
	ug/L		5.3	2.6
	ug/L		13	6.4
Mercury	ug/L	< 0.05	0.02	0.01
Nickel[2]	ug/L	< 10	48	24
	ug/L		85	43
	ug/L		154	77
Selenium	ug/L	< 5	8.1	4.0
Silver[2]	ug/L	0.1	1.2	0.6
	ug/L		4.1	2.1
	ug/L		13	6.7
Zinc[2]	ug/L	10	67	33
	ug/L		120	60
	ug/L		216	108

1 Final Supplemental Environmental Impact Statement for the Kensington Gold Project, 1998.
2 Three sets of limitations are based, in descending order, on receiving water hardness levels of 50 - 100 mg/L as$CaCO_3$, 100 - 200 mg/L as $CaCO_3$, and greater than 200 mg/L as $CaCO_3$.

Table 5-6 Projected Discharge Chemistry versus Effluent Limitations Outfall 002				
Parameter	Units	Discharge Chemistry (mean/max)	MDL	AML
pH	s.u.	6.8 – 8.3	6.5 – 8.5	
TSS	mg/L	< 20	30	20
TDS	mg/L	218 / 246	1000	1,000
Sulfate	mg/L	98 / 118	250	250
Total Ammonia	mg/L N	0.57 / 0.7	1.5	1.1
Nitrate	mg/L N	< 10 / < 10	20	10
Chronic Toxicity	TUc	-	1.0	1.0
Aluminum	ug/L	<71	143	71
Arsenic	ug/L	0.82 / 0.9	100	50
Cadmium	ug/L	0.025 / 0.031	0.2	0.1
Chromium VI	ug/L	2.0 / 2.3	16	8
Copper	ug/L	1.7 / 1.9	3.7	1.9
Iron	ug/L	<800	1,700	800
Lead	ug/L	<0.5	0.9	0.5
Mercury	ug/L	0.01 / 0.01	0.02	0.01
Nickel	ug/L	1.8 / 2.1	26	13
Selenium	ug/L	0.59 / 0.71	8.1	4.0
Silver	ug/L	0.02 / 0.02	0.4	0.2
Zinc	ug/L	11 / 13	37	18

6. Monitoring Requirements

Under Section 308 of the Act and 40 CFR 122.44(i), EPA must require a discharger to conduct monitoring whenever necessary to determine compliance with effluent limitations, assist in the development of effluent limitations, and assess the quality of receiving waters. The proposed permit contains both effluent and receiving water (ambient) monitoring requirements.

A. Quality Assurance Plan (QAP)

Prior to initiating sampling, the Permittee shall prepare a QAP for monitoring and analysis which includes: sampling locations, a brief description of the stream morphology at each sample location, sample collection and handling procedures, sample transport and chain-of-custody procedures, laboratory analysis, quality assurance/quality control protocols, and data submission schedules. The QAP shall provide this information for all of the required monitoring described herein.

B. Outfall Monitoring

To assure compliance with the effluent limitations set forth in this permit, the Permittee will be required to monitor the discharges from Outfalls 001, 002, and 003 on a routine basis. Tables 6-1, 6-2, and 6-3 present the required monitoring parameters, frequencies, and sample types.

TABLE 6-1
Monitoring Requirements
Outfall 001(During Active Mining Operations)
and Outfall 002

Effluent Parameters	Units	Monitoring Requirement		
		Sampling Frequency[1]	Sample Location[2]	Sample Type
Aluminum[3]	ug/L	Weekly	I/E	24-hour composite
Arsenic[3]	ug/L	Weekly	I / E	24-hour Composite
Cadmium[3]	ug/L	Weekly	I / E	24-hour Composite
Hexavalent Chromium[3]	ug/L	—	I / E	Grab
Chromium, Total	ug/L	Weekly	I/E	24-hour Composite
Copper[3]	ug/L	Weekly	I / E	24-hour Composite
Iron[3]	ug/L	Weekly	I / E	24-hour composite
Lead[3]	ug/L	Weekly	I / E	24-hour Composite
Manganese	ug/L	Weekly	I/E	24-hour Composite
Mercury[4]	ug/L	Weekly	I / E	24-hour Composite
Nickel[3]	ug/L	Weekly	I / E	24-hour Composite
Selenium[3]	ug/L	Weekly	I / E	24-hour Composite
Silver[3]	ug/L	Weekly	I / E	24-hour Composite
Zinc[3]	ug/L	Weekly	I / E	24-hour Composite
Whole Effluent Toxicity, Chronic[5]	TU_c	Monthly	E	24-hour Composite
Nitrate	mg/L	Weekly	E	Grab
Ammonia, Total	mg/L	Weekly	E	Grab
Total Suspended Solids	mg/L	Daily	I / E	24-hour Composite
Total Dissolved Solids	mg/L	Weekly	E	24-hour Composite
Sulfates	mg/L	Quarterly	E	Grab
TDS anions/cations	mg/L	Quarterly	E	Grab
pH[6]	s.u.	Continuous	E	Recorder
Temperature	ºC	Weekly	E	Grab
Turbidity[7]	NTU	Weekly	E/instream	Recorder
Flow[8]	MGD	Continuous	I / E	Recorder
Hardness[9]	mg/L	Weekly	Instream	Grab

1 Weekly sampling shall occur on the same day of each week, unless the Permittee can document that sampling could not be performed due to extreme conditions. In such cases, a detailed explanation of the reason sampling could not be performed shall be prepared and kept with the analytical results for that day.
2 Mine drainage from the adit (prior to treatment), treated mine drainage, and final 001 discharge shall be monitored for the parameters labeled "I/E" (influent/effluent) in this column. The Permittee shall collect influent and effluent samples on the same day. **Influent monitoring does not apply to Outfall 002.**
3 The Permittee shall conduct analysis for total recoverable and dissolved metals.
4 Mercury shall be analyzed as total.
5 Chronic toxic units (See Definitions).
6 The Permittee shall monitor the total time outside the range for the month, the length of each excursion and the number of pH excursions outside the range of 6.5 to 8.5 Standard Units (s.u.). The Permittee shall report the total time outside the range for the month as well as the number of individual excursions which exceed 60 minutes.
7 The background level for turbidity shall be measured at a point upstream of the discharge point in the diversion around the TSF.
8 The Permittee shall monitor the final effluent flows and treated mine drainage flow.
9 The Permittee shall sample the receiving water hardness downstream of the discharge from Outfall 001.

The above monitoring requirements are consistent with the previous permit requirements with additional parameters that are newly limited in the draft permit. For Outfall 001, the permittee shall initiate the above monitoring when it begins activities related to full-scale development of the

active mining operations. Prior to then or during periods of extended shut down (after a 6 month closure period when the monitoring of Table 6-1 would still be applicable), the monitoring requirements in Table 6-2 will apply. These requirements represent significantly reduced monitoring frequencies from the previous permit. During the extended care and maintenance period over the past 4 years (with little or no additional mine development), monitoring data show consistent compliance with effluent limits such that reduced monitoring frequencies are warranted.

TABLE 6-2
Monitoring Requirements for Outfall 001
(During Non-Mining Periods)

Effluent Parameters	Units	Monitoring Requirements	
		Sample Frequency	Sample Type
Aluminum[1]	ug/L	Monthly	Grab
Arsenic[1]	ug/L	Quarterly	Grab
Cadmium[1]	ug/L	Quarterly	Grab
Total Chromium	ug/L	Quarterly	Grab
Copper[1]	ug/L	Monthly	Grab
Iron[1]	ug/L	Quarterly	Grab
Lead[1]	ug/L	Quarterly	Grab
Mercury[2]	ug/L	Quarterly	Grab
Nickel[1]	ug/L	Quarterly	Grab
Selenium[1]	ug/L	Quarterly	Grab
Silver[1]	ug/L	Quarterly	Grab
Zinc[1]	ug/L	Quarterly	Grab
WET, Chronic[3]	TU_c	Annually	24-hour Comp.
TDS anions/cations	mg/L	Annually	Grab
Sulfate	mg/L	Quarterly	Grab
Nitrate	mg/L	Quarterly	Grab
Ammonia, Total	mg/L	Quarterly	Grab
TSS	mg/L	Daily	Grab
TDS	mg/L	Quarterly	Grab
pH[4]	s.u.	Quarterly	Grab
Temperature	ºC	Quarterly	Grab
Flow	MGD	Continuous	Recorder
Hardness[5]	mg/L	Quarterly (Instream)	Grab

1 The permittee shall conduct analysis for total recoverable and dissolved metals.
2 Mercury shall be analyzed as total.
3 Chronic toxic units (See Definitions).
4 The Permittee shall monitor the number of pH excursions outside the range of 6.5 to 8.5 s.u..
5 The Permittee shall sample the receiving water hardness downstream of the discharge.

Monitoring requirements for Outfall 003 are shown in Table 6-3 and are slightly changed from the previous permit.

TABLE 6-3 Monitoring Requirements for Outfall 003			
Effluent Parameters	Units	Monitoring Requirements	
		Sample Frequency	Sample Type
BOD_5	mg/L	Weekly	Grab
TSS	mg/L	Weekly	Grab
Fecal Coliform	#/100 mL	Weekly	Grab
Flow	gpd	Daily	Estimate or Measure
pH	s.u.	Weekly	Grab

The proposed permit also requires that percent removal for BOD and TSS be calculated on a quarterly basis. This would entail measuring the influent as well as the effluent for these parameters.

B. Receiving Water (Ambient) Monitoring

The previous permit required the permittee to conduct ambient monitoring in Sherman Creek. The draft permit continues this monitoring and provides for additional monitoring in Slate Creek and Johnson Creek.

Water Column Monitoring

The draft permit proposes requirements for monthly water column monitoring at locations in Sherman Creek, Slate Creek, and Johnson Creek. The Sherman Creek and Slate Creek monitoring will provide data to assess the characteristics of the receiving stream below the discharges. Monitoring in Johnson Creek will be used to determine whether the process area is affecting conditions in the creek. Water column monitoring will consist of analyzing samples for each of the parameters identified in Table 6-4. The monitoring shall be included in a report and submitted along with the DMR for the month in which samples are taken and all results must be included in the Annual Water Quality Monitoring Summary. Water column monitoring shall be performed: (1) in Sherman Creek immediately below 001, and at existing monitoring stations 105 and 109, (2) in East Slate Creek at the inlet to the TSF diversion (or within the diversion pipeline prior to mixing with Outfall 002) and at SL-B upstream of the confluence with West Fork Slate Creek, (3) in Slate Creek at SL-C downstream of the confluence of East and West Forks of Slate Creek and (4) in Johnson Creek, at points immediately above and below the process area.

TABLE 6-4 Water Column Monitoring	
Effluent Parameters	Monitoring Frequency
Aluminum (ug/L)	Monthly
Arsenic (ug/L)	Monthly
Cadmium (ug/L)	Monthly
Color	Monthly
Hexavalent Chromium (ug/L)	Monthly
Copper (ug/L)	Monthly
Iron (ug/L)	Monthly
Lead (ug/L)	Monthly
Manganese	Monthly
Mercury (ug/L)	Monthly
Nickel (ug/L)	Monthly
Selenium (ug/L)	Monthly
Silver (ug/L)	Monthly

TABLE 6-4 Water Column Monitoring	
Zinc (ug/L)	Monthly
Nitrate (mg/l)	Monthly
Ammonia, Total (mg/l)	Monthly
Total Dissolved Solids, (mg/l)	Monthly
Total Suspended Solids, (mg/l)	Monthly
Turbidity (NTU)	Monthly
Sulfates (mg/L)	Monthly
Chlorides (mg/L)	Monthly
Dissolved Oxygen (mg/L)	Weekly
Conductivity (umhos/cm)	Weekly
Temperature (deg C)	Weekly
pH (s.u.)	Weekly
Hardness (mg/l)[1]	Weekly
1 As required to establish hardness-based water quality-based effluent limitations, hardness must also be monitoring weekly at an instream location immediately below the discharge from Outfall 001.	

Sediment Monitoring

The draft permit requires annual sediment monitoring and biological testing to assess the effect of mine effluent on sediments within the receiving streams. The deposition of contaminants in sediments can result in the sediments being toxic to aquatic life and wildlife. As required by the current permit, sampling is required in Sherman Creek at a location immediately downstream of Outfall 001 and at another location below the fish barrier. Additional sampling is required at a location below Outfall 002 in East Fork Slate Creek and in lower Slate Creek below the fish barrier. Sediment sampling is also required at a location in upper Johnson Creek immediately below the process area. At the Sherman Creek locations, the permittee is required to begin annual monitoring when active mining operations begin. At the Slate Creek locations, baseline sampling shall occur prior to initial placement of tailings in the TSF. At the Johnson Creek location, baseline sampling shall occur prior to initiating process facility construction. Annual monitoring shall occur thereafter. Results shall be included in the Annual Water Quality Monitoring Summary submitted to EPA by March 1st of each year for activities occurring in the previous year. This report shall include relevant quality assurance/control data.

Previous studies have indicated that sediment is often minimal, if present at all, within the receiving streams; therefore, the permittee will be allowed some flexibility in the selection of suitable sampling locations. The permittee shall collect enough sediment from each location to conduct all of the required chemical and biological testing. Sediment samples will consist of the upper two centimeters of sediment and the minimum depth of the sampler penetration shall be four centimeters.

The parameters specified in Table 6-5 shall be monitored for at each location using the listed analytical protocol (or equivalent) for each sediment sample.

TABLE 6-5
Sediment Monitoring Parameters and Analytical Methods

Parameter	Preparation Method	Analysis Method	Sediment MDL[1]
Aluminum (mg/kg)	PSEP[2]		
Arsenic (mg/kg)	PSEP[2]	GFAA[3]	2.5
Cadmium (mg/kg)	PSEP[2]	GFAA[3]	0.3
Chromium (mg/kg)	PSEP[2]		
Copper (mg/kg)	PSEP[2]	ICP[4]	15.0
Lead (mg/kg)	PSEP[2]	ICP[4]	0.5
Mercury (mg/kg)	7471[5]	7471[5]	0.02
Nickel (mg/kg)	PSEP[2]	ICP[4]	2.5
Selenium (mg/kg)	PSEP[2]		
Silver (mg/kg)	PSEP[2]	GFAA[3]	0.2
Zinc (mg/kg)	PSEP[2]	ICP[4]	15.0
Acute Toxicity	see below	see below	NA
Total Solids (%)	-----	PSEP[1], pg 17	0.1
Total Volatile Solids (%)	-----	PSEP[1], pg 20	0.1
Total Organic Carbon (%)	-----	PSEP[1,6], pg 23	0.1
Total Sulfides (mg/kg)	-----	PSEP[1], pg 32	0.1
Grain Size	-----	Modified ASTM with Hydrometer	NA

1 Dry weight basis
2 Recommended Protocols for Measuring Selected Environmental Variables, in Puget Sound Estuary Program, EPA 910/9-86-157, as updated by Washington Department of Ecology; Subsection: Metals in Puget Sound Water, Sediment, and Tissue Samples
3 Graphite Furnace Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986
4 Inductively Coupled Plasma Emission Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986
5 Mercury Digestion and Cold Vapor Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986 The Permittee shall sample the receiving water hardness downstream of the discharge.
6 Recommended Methods fro Measuring TOC in Sediments, Kathryn Brandon-Cook Clarification Paper, Puget Sound Dredged Disposal Authority Annual Review, May, 1993.

Sediment samples will undergo acute toxicity testing to assess the relative toxicity of the sediment to representative aquatic life. The draft permit requires the following bioassays:

Test Method 100.1: Hyallella azteca 10-day survival test for sediments
Test Method 100.2: Chirmonous tentans 10-day survival test for sediments

Test methods, QA/QC, data recording, data analysis and calculations, and reporting shall be in accordance with Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, EPA/600/R-94/024.

Both Hyallella azteca and Chirmonous tentans are representative species for their respective classes of aquatic life.

Biological Testing and Monitoring of Aquatic Resources

Benthic Invertebrates

Benthic invertebrates shall be monitored using methods and locations established in baseline surveys in Sherman and Sweeny creeks. Sweeny Creek data will provide baseline data for benthic invertebrates. Two sample reaches in both Sherman and Sweeny creeks shall be sampled as identified in Konopacky (1992). In Slate and Johnson Creeks, the permittee shall define reaches to be sampled that are representative of potential impacts from Outfall 002 and the process area, respectively. Each reach will be delineated for all possible sampling sites (those areas containing stream substrate with particles >20 cm along the long axis). Every third of fourth sampling site shall be sampled until a total of 6 samples is obtained.

Samples shall be collected using a 0.093 m^2 Surber sampler with a 300-micron mesh collection net. Collected samples will be placed in labeled plastic containers and preserved with 70 percent ethyl alcohol. Samples will be enumerated and identified to the generic level. Data will be reported for density per unit area and the Shannon Diversity and Evenness indices calculated for each sample.

Sampling shall be conducted once during the construction period and annually thereafter.

Resident Fish

Population Status. Abundance and condition of Dolly Varden char in Sherman, Slate, and Johnson creeks will be monitored using annual snorkel observations or electrofishing techniques comparable to those employed in previous baseline studies conducted by Konopacky Environmental and Kline Environmental Research. Surveys will be conducted in: upper, middle, and lower Sherman Creek; East Fork Slate Creek and lower Slate Creek; and Johnson Creek from immediately above the process area to the mouth at Berners Bay. These surveys will focus on fish greater than 50 mm. Data to be derived from these surveys include: 1) population estimates by species, habitat type, and stratum, and (2) condition factor by stratum.

Data will be collected so that statistical comparisons can be made with previous baseline data. Estimates will be made of the variability of the data, including minimum detectable differences between samples as well as the precision of the 95^{th} percentile confidence interval.

Tissue Analysis. The concentrations of aluminum, arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc in tissues of Dolly Varden char from, (1) the Sherman Creek drainage at sites used in the baseline survey by Konopacky (1996), (2) the Slate Creek drainage at a site above and below the TSF, and (3) the Johnson Creek drainage above and below the process area, shall be measured annually. Fish shall be collected in mid-July using non-destructive methods to avoid injuring fish not retained for analysis.

Each fish retained shall be measured for total length and weighed for wet weight prior to tissue preparation. The fish shall then be dried and re-weighed for a dry weight measurement. The fish sample shall be prepared following EPA Method 200.2, where 0.3 g of dry tissue and 5 ml of nitric acid are heated to 85^oC for four hours, cooled, and diluted to a volume of 22 ml. Levels of the elements shall be determined by Inductively Coupled Plasma/Mass spectrometer (ICP-MS).

Anadromous Fish

Abundance of Spawning Salmon and Survival of Embryos. Annual surveys of spawning salmon in Sherman, Slate, and Johnson creeks shall be conducted to assess the size of the escapement. Surveys shall consist of weekly stream counts throughout the spawning season documenting the distribution of salmon within the surveyed areas.

Outmigrating juvenile pink salmon from the Sherman, Slate, and Johnson creek drainages will be sampled during the spring following each year of adult counts. Quantitative methods, such as a screw trap or inclined plane trap will be used to estimate the relationship between adult escapement and fry protection.

Quality of Spawning Substrate. The quality of spawning substrate used by pink salmon shall be monitored to detect possible changes caused by potential introduction of fine sediments into lower Sherman, Slate, and Johnson Creeks. Sediment samples shall be collected in July prior to spawning activity. Four replicate samples shall be collected from 2 locations in each creek using a McNeil-type sampler. The geometric mean particle size will be calculated for each sample.

Aquatic Vegetation

Annual visual surveys of aquatic vegetation in Sherman, Slate, and Johnson creeks shall be conducted during summer months. Evidence of algal mats, vegetation die-off, and/or other visible impacts shall be included in the Annual Water Quality Summary Report.

C. Analytical Detection Levels

The following table presents the methods, method detection levels, and minimum levels (MLs) for metals analyses for Outfalls 001 and 002 and water column monitoring for metals. Most Methods included in the list have MLs at or below the proposed permit limits and use of these methods should ensure consistency over the period of analysis.

Table 6.3
Methods Table

Parameter	Lowest limit/target	Method[1,2]	Method Detection Limit (MDL)	Minimum Level (ML)
Aluminum	71	200.7	20	50
		200.8 (scan)	1.0	3.2
		200.8 (sims)	1.7	5.4
Arsenic	50	200.7	8	20
		200.8 (scan)	1.4	4.5
		200.8 (sims)	0.4	1.3
		200.9	0.5	1.6
Cadmium	0.1	200.8 (sims)	0.03	0.1
Copper	1.9	200.8 (scan)	0.5	1.6
		200.8 (sims)	0.2	0.6
Chromium, Total	11	200.7	4.0	10
		200.8 (scan)	0.9	2.9

Table 6.3 Methods Table				
Parameter	Lowest limit/target	Method[1,2]	Method Detection Limit (MDL)	Minimum Level (ML)
		200.8 (sims)	0.08	0.25
		200.9	0.1	0.3
Chromium VI	8	218.4	8	10
Iron		200.7	30	100
Lead	0.5	200.8 (sims)	0.05	0.16
Manganese	50	200.7	1	10
		200.8 (scan)	0.1	2.9
		200.8 (sims)	0.02	0.25
		200.9	0.3	0.3
Mercury	0.01	1631	0.2 ng/L	0.5 ng/L
Nickel	13	200.8 (scan)	0.5	1.6
		200.8 (sims)	0.06	0.19
		200.9	0.6	1.9
Selenium	4.1	200.9	0.6	1.9
Silver	0.2	200.8 (sims)	0.005	0.016
Zinc	18	200.7	2	5
		200.8 (scan)	1.8	5.7
		200.8 (sims)	0.1	0.3

1 - There may also be methods for individual parameters that measure to the necessary levels. Any method approved in 40 CFR 136 may be utilized.

2 - Method 200.8 has not been included in 40 CFR 136 but has been proposed for inclusion. The permittee may request the use of this method through the Alternate Test Procedures (ATP) process outlined in 40 CFR 136.4.

The limit for Cr VI is less than the ML for the method. The permit contains language stating that the ML is considered the compliance level in the permit. Since there are approved or approvable methods for all other parameters whose MLs are at or below the effluent limitations, the permit does not include language concerning the use of MLs as compliance levels for any others.

7. Best Management Practices

Section 304(e) of the CWA requires EPA to include conditions in the NPDES permit that require the Permittee to develop a BMP Plan. The BMP Plan will be used to control the discharge of toxics or hazardous pollutants by way of spillage or leaks, sludge or waste disposal, and drainage from raw material storage. Any applicable storm water requirements already included in the Storm Water Pollution Prevention Plan may be incorporated into the BMP Plan by reference.

The intent of the BMP Plan is to recognize the hazardous nature of various substances used and produced by the facility and the way such substances may be accidentally dispersed. The BMP Plan should incorporate elements of pollution

prevention as set forth in the Pollution Prevention Act of 1990, 42 U.S.C. 13101. The BMP Plan must be amended whenever there is a change in the facility or in the operation of the facility that materially increases the potential for an increased discharge of pollutants.

8. Additional Permit Provisions

Sections II, III, and IV of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

9. Other Legal Requirements

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to request a consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) regarding potential effects an action may have on listed endangered species. EPA obtained a list of threatened and endangered species from the DSEIS. EPA does not expect the discharges from this facility which comply with the requirements of the permit to adversely effect endangered species in the area of the project.

As part of the NEPA process, a biological assessment/biological evaluation (BA/BE) is being prepared and will be submitted to both NMFS and USFWS. EPA will provide NMFS and USFWS with copies of the draft permit and fact sheet during the public comment period. Any comments received from NMFS and USFWS on the relevant section of the BA/BE and this permit regarding endangered species will be considered prior to final issuance of this permit.

Essential Fish Habitat

Section 305(b) of the Magnuson-Stevens Act [16 USC 1855(b)] requires federal agencies to consult with NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated Essential Fish Habitat (EFH) as defined by the Act. The EFH regulations define an adverse effect as any impact that reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

EPA has determined that issuance of this permit is not likely to have an adverse effect on EFH in the vicinity of the discharge. Effluent limitations have been incorporated into the draft permit based on criteria considered to be protective of overall water quality in Slate and Sherman Creeks and Lynn Canal.

State Certification

Section 401 of the Clean Water Act requires EPA to seek state certification before issuing a final permit. As a result of the certification, the state may require more stringent permit conditions to ensure that the permit complies with AWQS. The certification may also require additional monitoring requirements and authorize a mixing zone. A draft 401 Certification is included as Appendix C.

Permit Expiration

This permit will expire five years from the effective date of the permit. Permits may be administratively extended under 40 CFR 122.6 if all requirements of this regulation are met.

10. References

a. 2002 Re-application package with amendments provided on October 15, 2003, March 4, 2004, March 16, 2004 and June 4, 2004.

b. Draft Supplemental Environmental Impact Statement for the Kensington Gold Project dated January 2004.

c. 1998 NPDES permit with fact sheet and response to comments.

d. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, EPA/600/R-94/024.

e. NPDES Permit Writer's Manual. EPA, Office of Water, Office of Wastewater Management, Permits Division. Washington, DC. 20460; EPA-833-B-96-003, December 1996, 220pp.

f. EPA 1991. *Technical Support Document for Water Quality-based Toxics Control*. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, DC., March 1991. EPA/505/2-90-001.

g. EPA, 1996b. *The Metals Translator: Guidance for Calculation a Total Recoverable Permit Limit from a Dissolved Criterion.* EPA 823-B-96-007, June 1996.

h. 18 AAC 70, the Alaska Department of Environmental Conservation's Water Quality Standards including the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (2003)

i. 18 AAC 72, the Alaska Department of Environmental Conservation's regulations for Wastewater Disposal.

j. http://www.nemi.gov for information related to the EPA methods 330.3 and 330.4 for chlorine.

k. 40 CFR 122 - EPA administered permit programs: the National Pollutant Discharge Elimination System.

l. 40 CFR 136 - Guidelines establishing test procedures for the analysis of pollutants

m. The *Guidelines Establishing Test Procedures for the Analysis of Pollutants; Whole Effluent Toxicity Test Methods; Final Rule* 67 FR 69952 published on November 19, 2002.

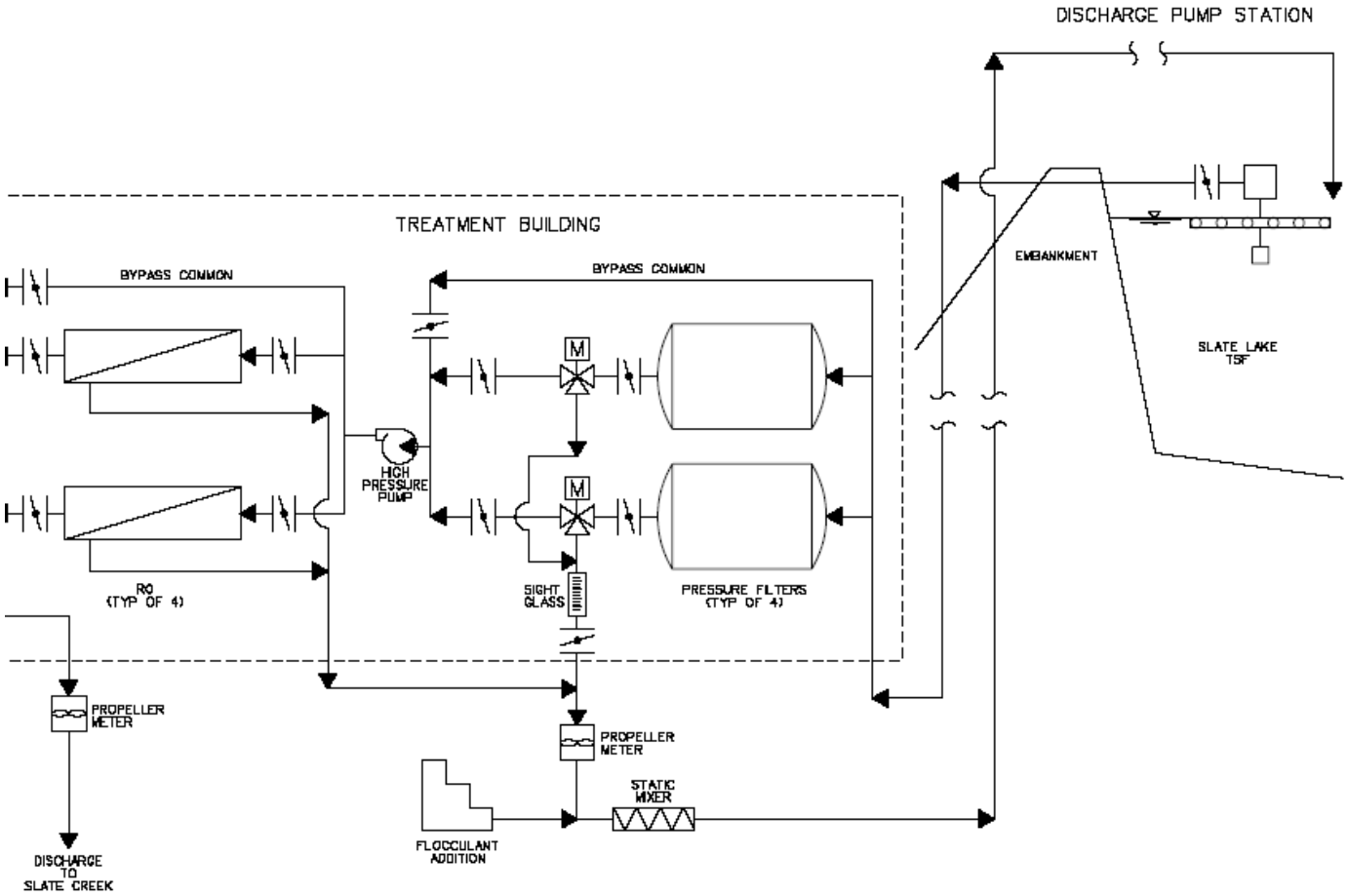
n. EPA 1993. Guidance Manual for Developing Best Management Practices (BMP). Office of Water. October 1993. EPA 833-B-93-004.

o. Memorandum on Clean Water Act Regulation of Mine Tailings from Diane Regas, Director, Office of Wetlands, Oceans and Watersheds; James A. Hanlon, Director, Office of Wastewater Management; and Geoffrey H. Grubbs, Director, Office of Science and Technology to Randy Smith, Director, Office of Water, Region 10, dated May 17, 2004 (Regas Memo).

p. Tetra Tech, 2004. Memorandum from John Hamrich and Ron Rimelman, Tetra Tech, to Distribution regarding Model Results for Lower Slate Lake, May 18, 2004.

Appendix A - Facility Location

Appendix B - Reverse Osmosis Treatment System Schematic



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Appendix C - Draft 401 Certification by the State of Alaska

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR
610 University Avenue
Fairbanks, AK 99709-3643
PHONE: (907) 451-2360
FAX: (907) 451-2187
http://www.state.ak.us/dec

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER
WASTEWATER DISCHARGE PROGRAM

August ----, 2004 File # 1533.62.001

Robert Richins
Project Director
Coeur Alaska, Inc.
3031 Clinton Rd., Suite 202
Juneau, AK 99801

RE: ADEC 401 Certification of NPDES Permit No. AK-005057-1

Dear Mr. Richins;

In accordance with Section 401 of the Clean Water Act and provisions of the Alaska Water Quality Standards (18 AAC 70), the Dept. of Environmental Conservation is issuing the enclosed Certificate of Reasonable Assurance for the NPDES permit for discharges of wastewater from the Kensington Gold Project located in the Tongass National Forest 45 miles north of Juneau, Alaska.

This certification replaces that dated January 27, 1998 for the same permit number.

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195- 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Director, Division of Water, 410 Willoughby Ave., Juneau, Alaska 99801, within 15 days after receiving the permit decision. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 30 days after the permit decision. If a hearing is not requested within 30 days, the right to appeal is waived.

Please be advised that, pursuant to 18 AAC 15.120(c), the certification of this NPDES permit constitutes the permit required under AS 46.03.100. 18 AAC 15.120(c) also states, "Any rights or privileges inuring to the benefit of EPA in the NPDES permit, including any right to enter, inspect, sample, and have access to records, also inure to the benefit of the department. Any reports or other information filed with EPA in accordance with the NPDES permit must be contemporaneously filed with the department."

Sincerely,

DRAFT
William D. McGee
Technical Engineer

Enclosures: Certificate of Reasonable Assurance
ADEC Response to Comments on the Draft 401 Certification of NPDES AK-005057-1

CC:

Luke Boles, ADEC/Fairbanks
Cindi Godsey, EPA Reg. X/Anchorage
Hahn Gold, EPA Reg. X/Seattle
Jim Vohden, ADNR/Fairbanks
Ed Fogels, ADNR/Anchorage
Stan Foo, ADNR/Anchorage
Kenwyn George, ADEC/Juneau
Mac McLean, ADNR, OHMP/Fairbanks
USDA Forest Service

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CERTIFICATE OF REASONABLE ASSURANCE

A Certificate of Reasonable Assurance, as required by Section 401 of the Clean Water Act, has been requested by Coeur Alaska, Inc. for the discharge of treated domestic wastewater and treated non-domestic wastewater from the Kensington Mine.

The facility is located in the Tongass National Forest 45 miles north of Juneau, Alaska, and proposed to discharge pollutants to Sherman Creek, East Fork Slate Creek, and Lynn Canal.

Public notice of the application for this certification was made in accordance with 18 AAC 15.140.

Water Quality Certification is required for the proposed activity, because the activity will be authorized by an Environmental Protection Agency permit identified as NPDES Permit No. AK-005057-1 and a discharge will result from the activity.

This NPDES permit certification covers wastewater disposal from the following discharges:

Outfall 001 – Discharge of mine water to Sherman Creek and is located at Latitude 58° 52' 04" N, Longitude 135° 06' 55" W.

Outfall 002 – Discharge from the Tailings Storage Facility (TSF) to East Fork Slate Creek and is located at Latitude 58° 49' 58" N, Longitude 134° 57' 58" W. [Note: this is a change in the previous location of Outfall 002 to Camp Creek in the existing permit.]

Outfall 003 – Discharge of treated domestic wastewater to Lynn Canal and is located at Latitude 58° 51' 58" N, Longitude 135° 08' 28" W.

After review of the public comments received in response to the public notice, the Alaska Department of Environmental Conservation certifies that there is reasonable assurance that the activities and the resulting discharges are in compliance with the requirements of Section 401 of the Clean Water Act, which includes the Alaska Water Quality Standards, 18 AAC 70, provided that the terms and conditions of this certification are adhered to.

The Department has reviewed the applicant's proposal to collect data and request a future modification to permit limits for discharges of tailings effluent water based upon site specific criteria established under 18 AAC 70.235 of the State's Water Quality regulations. This certification ensures protection of water quality based upon limits derived from existing Water Quality Standards. Any future modification to the permit will only occur after the necessary data review, public notice, approval of Site Specific Criteria for this creek and regulation changes.

The Department has reviewed the discharges described above with respect to the antidegradation policy of the Alaska Water Quality Standards and finds the reduction in water quality to be in accordance with the requirements of 18 AAC 70.015, provided that the terms and conditions of this certification are made part of the final NPDES Permit.

Through this certification, in accordance with 18 AAC 15.120 ADOPTION OF NPDES PERMITS, the final NPDES permit will constitute the permit required under AS 46.03.100 Waste Disposal Permit, provided that the terms and conditions of the final certification are made part of the final NPDES Permit. The department is specifying the following permit terms and conditions under authority of AS 46.03.110(d):

Outfall 001 – Discharge of mine water to Sherman Creek

The Department authorizes the Outfall 001 effluent limitations and monitoring frequency for the parameters contained in Table 1 of the Preliminary Final Permit. No mixing zone is authorized.

Dissolved oxygen in the effluent and in Sherman Creek upstream and 500 feet downstream of the discharge shall be recorded weekly during low stream flow periods.

Rationale: Dissolved oxygen is important for the health of aquatic life. Monitoring for dissolved oxygen will show whether mine water is low in DO and whether there is any depression of oxygen in Sherman Creek from the discharge.

Turbidity measurement in the stream is required in Table 1. This measurement is to be made upstream of the discharge.

Rationale: 18 AAC 70.020(b)(12) bases the allowable turbidity in the effluent on the background turbidity value.

The Total Dissolved Solids (TDS) monthly average and daily maximum effluent limits for Sherman Creek is 1000 mg/l. These limits are based on Site Specific Criteria allowed under 18 AAC 70.236. These criteria replace those for aquatic life, aquaculture, and drinking water supply uses in 18 AAC 70.235 and listed in 18 AAC 70.020.

Rationale: The Site Specific Criteria (SSC) for Sherman Creek was Public Noticed, reviewed in depth by the department, and justified in a decision document that was submitted through the Alaska Administrative Procedures Act to the Department of Law, and then submitted to the Office of the Lieutenant Governor as a regulation change. EPA has separately reviewed the SSC to determine that the water of Sherman Creek is fully protected for the designated uses at 1000 mg/l of TDS.

Outfall 002 – Discharge from the Tailings Storage Facility (TSF) to East Fork Slate Creek

The Department authorizes the Outfall 002 effluent limitations and monitoring frequency for the parameters contained in Table 3 of the Preliminary Final Permit. No mixing zone is authorized. Information on constituents and pollutants in tailings water were derived from tests on ore samples. The results of the tests and analyses related to the Tailings Storage Facility are in the USDA Forest Service Supplemental Environmental Impact Statement for the Slate Lake tailings repository proposal from Coeur Alaska, Inc.

Rationale: In accordance with State Regulations 18 AAC 70.240, the Department has authority to designate mixing zones in permits or certifications. In this case, the effluent limits are set to meet the water quality standards and no mixing zone is needed.

Outfall 003 – Discharge of treated domestic wastewater to Lynn Canal

1) The Department authorizes a Mixing Zone (MZ) for Outfall 003 to Lynn Canal for Fecal Coliform Bacteria. The size of the mixing zone is 200 meters (m) wide x 1200 m long (600 m on each side of the outfall pipe). Permit limits to meet water quality standards at the boundary of this mixing zone are 150,000 fc/100 ml daily maximum and 100,000 fc/100 ml monthly average.

Rationale: In accordance with State Regulations 18 AAC 70.240, the Department has authority to designate mixing zones in permits or certifications. This mixing zone will ensure that the most stringent water quality standards for fecal coliform bacteria; 14 FC/100 mL, 30 day average, (not more than 10% of the samples may exceed 40 FC/100 mL), is met at all points outside of the mixing zone.

The Department considered all aspects required in 18 AAC 70.015 (Antidegradation) and 18 AAC 70.240-270 (Mixing Zones) including, but not limited to, the potential risk to human health and ecological resources based on existing monitoring data of Lynn Canal water quality and mixing zone modeling of the predicted effluent quality from the discharge.

The Department finds that the size of the mixing zone authorized for discharge in this certification is appropriate and provides reasonable assurance that existing uses of the Lynn Canal outside of the mixing zone are maintained and fully protected.

During any commercial fishing season Coeur Alaska Inc. shall inform ADEC and local fishing organizations of any upset in the treatment system likely to result in an exceedance of permit limits.

Rationale: Sea water used in roe processing that contains fecal coliform bacteria could cause discoloration of the roe, which could affect marketability. There is no health hazard associated with this discoloration.

2) The Department requires that if chlorine is ever used for disinfection, the daily maximum effluent limitation for chlorine (Cl) shall be 0.02 mg/L at all times from Outfall 003. Since the current MDL for Cl is 0.1 mg/L, the compliance level for Cl is 0.1 mg/L. If used for disinfection, Cl shall be sampled on a weekly basis (the sampling reduction in footnote 2 of Table 3 in the Preliminary Final Permit applies for Cl if used) from Outfall 003.

Rationale: In accordance with State Regulations 18 AAC 15.090, the Department may attach terms and conditions to a permit, variance, or approval, including operating, monitoring, inspection, sampling, access to records and reporting requirements, and the posting of a performance bond or other surety, that it considers necessary to ensure that all applicable criteria will be met.

3) The Department requires that signs be placed along the beach near the mixing zone and outfall line for Outfall 003. The signs must provide the identity and telephone numbers of the discharger; must inform the public that a mixing zone exists, that treated wastewater is being discharged, and that users of the area should exercise caution.

Rationale: In accordance with AS 46.03.110 (d), the department may specify in a permit the terms and conditions under which waste material may be disposed of. The notification requirement is intended to inform the public of the presence of elevated pollutant levels within the mixing zone.

This Certification Expires on August ____, 2009.

DRAFT

_____
William D. McGee
Technical Engineer

Appendix D– Basis for Effluent Limitations - Outfalls 001 and 002

A. Statutory and Regulatory Basis For Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act (CWA) provide the basis for effluent limitations and other conditions in the draft permit. EPA evaluates the discharges with respect to these sections of the CWA and the relevant NPDES regulations to determine which conditions to include in the draft permit.

EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls to see if water quality standards for the receiving waters may still be exceeded. If exceedances could occur, EPA must include Water Quality-based Effluent Limitations (WQBELs) in the permit. The proposed permit limits will reflect whichever requirements (technology-based or water quality-based) limits are more stringent.

B. Technology-Based Evaluation

Section 301(b) of the CWA requires industrial dischargers to meet technology-based effluent guidelines established by EPA, which are enforceable through their incorporation into an NPDES permit. For dischargers in industrial categories for which EPA has not yet issued effluent guidelines, and for types of discharges not covered by an applicable effluent guideline, best professional judgment (BPJ) is used to establish technology-based permit limitations. The 1972 amendments to the CWA established a two-step approach for imposing technology-based controls. In the first phase, industrial dischargers were required to meet a level of pollutant control based on the best practicable control technology currently available (BPT). The second level of pollutant control was based on the best available technology economically achievable (BAT). And in 1977, enactment of Section 301(b)(2)(E) of the CWA allowed the application of best conventional pollutant control technology (BCT) to supplement BPT standards for conventional pollutants with cost effectiveness constraints on incremental technology requirements that exceed BPT. The BPT/BAT/BCT system of standards does not apply to a new source which is defined by EPA as a source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance, which will be applicable to the source. Direct dischargers that are new sources must meet new source performance standards (NSPS), which are based on the best available demonstrated control technology.

At 40 CFR 440, EPA has established technology-based effluent guidelines for the Ore Mining and Dressing Point Source Category. Subpart J of these guidelines, which became effective on December 3, 1982, are applicable to mines that produce gold bearing ores from open-pit or underground operations and to mills that use the froth-flotation process, alone or in conjunction with other processes, for the beneficiation of gold.

At the Kensington Mine, discharge of mine drainage through Outfall 001 to Sherman Creek was previously permitted based on the NSPS. And, discharges to East Fork Slate Creek through Outfall 002 will also be subject to the NSPS of 40 CFR 440. Technology-based NSPS of 40 CFR 440 applicable to mine drainage are presented in Table D-1.

Table D-1 NSPS for Mine Drainage		
Pollutant	Daily Maximum Concentration (mg/L)	Average Monthly Concentration (mg/L)
Copper	0.3	0.15
Zinc	1.5	0.75
Lead	0.6	0.3
Mercury	0.002	0.001
Cadmium	0.1	0.05
pH	6.0 to 9.0	
TSS	30	20

NSPS at 40 CFR 440.104(b) also prohibit the discharge of process wastewaters from mills that use the froth-flotation process for the beneficiation of gold, except in two circumstances.

- If precipitation falling on the treatment facility and on the drainage area contributing surface runoff to the treatment facility exceeds evaporation, an amount equal to the difference between annual precipitation falling on the treatment facility and on the drainage area contributing surface runoff to the treatment facility and evaporation may be discharged, subject to the limitations in Table D-1, above, or

- if contaminants build up in water recycled through the mill to a degree that causes interference with the ore recovery process, and the interference cannot be eliminated through appropriate treatment of the recycled water, a discharge of process water may be allowed by the EPA in an amount necessary to correct the interference problem, after installation of appropriate treatment. Such a discharge would also be subject to the limitations of Table D-1, above.

With the recycle stream and other “losses” such as infiltration, evaporation, and water retained in the tailings, discharges through Outfall 002 at the Kensington Mine are equivalent to the natural flow into the TSF and are subject to the NSPS of Table D-1, meeting the first exception, above.

C. Water Quality-Based Evaluation

Section 301(b)(1)(C) of the CWA and its implementing regulations at 40 CFR 122.44(d) require permits to include limits for all pollutants or parameters which are or may be discharged at a level which will cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality. If WQBELs are necessary, they must be stringent enough to ensure that AWQS are met, and they must be consistent with any available waste load allocation. For pollutants with technology-based limits, EPA must also determine if the technology-based limits will be protective of the corresponding water quality criteria.

EPA must also consider the State’s Antidegradation Policy, described at 18 AAC 70.015, which is designed to ensure that:

- existing water uses and the level of water quality necessary to protect existing uses is maintained and protected,

- if the quality of a water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected, unless a short-term variance

(18 AAC 70.200, a zone of deposit (18 AAC 70.210), a mixing zone (18 AAC 70.240), or such reduction in water quality is authorized by the State, and

- if a high quality water constitutes an outstanding national resource, such as a water of a national or state park or wildlife refuge or a water of exceptional recreational or ecological significance, the quality of that water must be maintained and protected.

To determine appropriate WQBELs, EPA uses the following general approach.

Determine the appropriate water quality criteria,
Develop the wasteload allocations (WLA), and
Establish effluent limitations.

The following sections provide detailed discussion of each step. Appendix F shows the derivation of specific WQBELs for Outfalls 001 and 002.

1. Water Quality Criteria

The first step in developing WQBELs is to determine the applicable water quality criteria, which the State presents in the Alaska Administrative Code at 18 AAC 70. Applicable criteria are based on the beneficial uses of the receiving water; and for East Fork Slate Creek and Sherman Creek those uses are the freshwater use classes (1) (A, B, and C) as established at 18 AAC 70.050 - (A) water supply (drinking, culinary, and food processing; agriculture, including irrigation and stock watering; aquaculture; and industrial), (B) water recreation (contact and secondary), and (C) growth and propagation of fish, shellfish, other aquatic life, and wildlife. To protect all uses, permit limits are established based on the most stringent of the water quality criteria applicable to those uses.

2. Wasteload Allocation (WLA) Development

WLAs must be developed to establish the allowable loadings of each pollutant that may be discharged without causing or contributing to exceedances of AWQS in the receiving waters. WLAs are typically established in three ways

- based on a mixing zone, or
- a total maximum daily load (TMDL), or
- by determining the end-of-pipe WLA that will allow attainment of applicable water quality criteria.

The Permittee has not applied for a mixing zone; and no TMDLs have been developed for East Fork Slate Creek or Sherman Creek. Neither creek is included on the State's current 303(d) list of impaired waters. Therefore, the water quality criteria, applied at the end-of-pipe, will become the WLAs.

3. Permit Limit Derivation

Once the WLA has been developed, EPA applies the statistical permit limit derivation approach described in Chapter 5 of the Technical Support Document for Water Quality-Based Toxics Control (the TSD, EPA/505/2-90-001, 1991) to establish maximum daily and average monthly permit limitations (MDLs and AMLs, respectively). This approach takes into account effluent variability, sampling frequency, AWQS, and the difference

in time frames between the monthly average and the daily maximum limits.

The daily maximum limit is based on the coefficient of variation (CV) of the data and the probability basis, while the monthly average limitation is dependent on these two variables and monitoring frequency. As recommended by the TSD, EPA has used a probability basis of 95 percent for the monthly average limit calculation and 99 percent for the daily maximum limit calculation. EPA has also assumed a CV of 0.6 as recommended by the TSD for both monthly average and daily maximum calculations. For Outfall 001, there are no effluent data for full scale mining operations to establish a discharge-specific CV. Since Outfall 002 has not been constructed, there is no effluent data available for Outfall 002.

D. Reasonable Potential Analysis

WQBELs must be included for all pollutants addressed by effluent guidelines. In determining which other pollutants require WQBELs, EPA typically determines the "reasonable potential" of the discharge to exceed or cause an exceedance of applicable water quality criteria.

For Outfall 001, there is little or no water quality data representative of full-scale mining operations. EPA has determined that the existing mine water treatment system will ensure compliance with applicable water quality criteria, except potentially for aluminum. An additional pH adjustment stage may be needed to reduce effluent pH to the range of 6 – 7 s.u. to achieve better aluminum removal and meet discharge limitations. Because of a lack of data, however, EPA has further determined that it is important to retain WQBELs for all pollutants included in the previous permit as well as for aluminum. In addition, limits have been added for limits have been added for arsenic, iron, and sulfate since these pollutants are expected at concentrations in the discharge approaching the applicable water quality criteria.

For Outfall 002, EPA anticipates that pollutant levels will be below applicable water quality criteria. The predicted water quality, however, is based on limited analysis of tailings slurry. EPA, therefore, has determined that it is appropriate to establish limits for all of the same pollutants addressed at Outfall 001.

E. Effluent Limitations - Outfalls 001 and 002

Tables D-2 and D-3 provide a summary of the effluent limitations applicable to Outfalls 001 and 002 and proposed in the draft permit. Table D-2 includes the "non-metal" pollutants (except ammonia) while Table D-3 includes limits for ammonia and metals. Following the table is a discussion of the basis for each technology-based or water quality-based effluent limitation in the proposed permit.

Table D-2
Proposed Effluent Limitations
(Non-Metals Except Ammonia)

Parameter	Units	AML	MDL
pH	s.u.	6.5 – 8.5	
TSS	mg/L	20	30
TDS (Outfall 001)	mg/L	1000	1000
TDS (Outfall 002)	mg/L	500	500
Turbidity	NTUs	See Note 1	

Table D-2
Proposed Effluent Limitations
(Non-Metals Except Ammonia)

Parameter	Units	AML	MDL
Sulfate[2] (Outfall 001)	mg/L	200	200
Sulfate (Outfall 002)	mg/L	250	250
Nitrate	mg/L as N	10	20
Chronic Toxicity	TUc	1.1	1.6

1 The turbidity must not be more than 5 NTUs greater than the background levels in samples taken from Sherman Creek (Outfall 001) and the TSF diversion pipeline (Outfall 002) within a reasonable time of effluent sampling.
2 The sulfate limit for Sherman Creek applies only to sulfates associated with magnesium and sodium.

Table D-3
Proposed Water Quality Based Limitations for Metals and Ammonia

Parameter	Receiving Water Hardness (mg/L CaCO3)	Units	Water Quality-based Effluent Limitations (WQBELS)	
			MDL	AML
Aluminum	—	ug/L	143	71
Total Ammonia (Outfall 001)	—	mg/L as N	4.0	2.0
Total Ammonia (Outfall 002)	—	mg/L as N	3.5	1.7
Arsenic	—	ug/L	100	50
Cadmium	25	ug/L	0.2	0.1
	50	ug/L	0.3	0.2
	100	ug/L	0.5	0.3
	200	ug/L	0.7	0.4
Chromium VI	—	ug/L	16	8.0
Copper	25	ug/L	3.7	1.9
	50	ug/L	7.2	3.6
	100	ug/L	14	7.0
	200	ug/L	27	13
Iron	—	mg/L	1.7	0.8
Lead	25	ug/L	0.9	0.5
	50	ug/L	2.2	1.0
	100	ug/L	5.3	2.6
	200	ug/L	13	6.4
Mercury	—	ug/L	0.1	0.05
Nickel	25	ug/L	26	13
	50	ug/L	48	24
	100	ug/L	85	43
	200	ug/L	154	77
Selenium	—	ug/L	8.1	4.0
Silver	25	ug/L	0.4	0.2
	50	ug/L	1.2	0.6
	100	ug/L	4.1	2.1
	200	ug/L	13	6.7
Zinc	25	ug/L	37	18
	50	ug/L	67	33
	100	ug/L	120	60
	200	ug/L	216	108

TSS

At 40 CFR 440, EPA established NSPS for TSS in mine drainage of 30 mg/L (MDL) and 20 mg/L (AML). The limitations for TSS of 40 CFR 440 will therefore be applied to Outfalls 001 and 002. TSS limitations for Outfall 001 are unchanged from the previous permit.

TDS, Sulfate

The AWQS at 18 AAC 70, contains water quality criteria for TDS not to exceed 500 mg/L and sulfate not to exceed 250 mg/L. At 18 AAC 70.235, ADEC has established site-specific criteria for Sherman Creek of TDS not to exceed 1000 mg/L and sulfates not to exceed 200 mg/L . The site-specific sulfate criteria applies only to sulfate associated with sodium and magnesium. The previous permit contained identical limitations for the average monthly limit and the maximum daily limit based on the "not to exceed" provision of the standards. Consistent with the draft 401 certification, this approach is retained in the draft permit. For Outfall 001, the TDS limits are equivalent to the previous permit limits. The previous permit did not include limits for sulfate.

Turbidity

The AWQS prohibit an increase of greater than 5 NTUs in receiving waters above natural conditions, when the natural turbidity is 50 NTUs or less. Because natural turbidity levels in both the Sherman Creek and East Fork Slate Creek drainages are well below 50 NTUs, the draft permit requires that turbidity in the discharges be no greater than 5 NTUs above background. Limits have been included in the permit for Outfalls 001 and 002 because both receive significant storm water flows. The previous permit did not include a turbidity limit for Outfall 001.

Ammonia

The AWQS contain acute and chronic water quality standards for the protection of aquatic life. The criteria upon which the standards are based are contained in the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (2003). These criteria are dependent on pH and temperature of the receiving waters, and whether the receiving waters support salmonids and early life stages of fish. Based on water quality monitoring performed by the Permittee, EPA has used a pH range of 6.0 to 8.0 for lower Sherman Creek, a pH range of 7.1 to 8.1 for East Fork Slate Creek, and temperature ranges not to exceed 14˚C for both Sherman Creek and East Fork Slate Creek. Both creeks support early life stages of fish, salmonids in particular. Although 14˚C may be a higher temperature than what actually occurs in the creeks, water quality criteria are not temperature sensitive until temperatures exceed 14˚C.

Based on the applicable water quality standard for ammonia and using the statistical methodology presented in the TSD, EPA is proposing the limitations in Table D-3 for discharges to Sherman Creek and East Fork Slate Creek through Outfalls 001 and 002. Limitations for Outfall 001 would be more stringent than limitations in the previous permit.

Nitrate

The draft permit includes WQBELs of 20 mg/L (MDL) and 10 mg/L (AML) based on the AWQS, and derived using the statistical methodology presented in the TSD. The nitrate limits for Outfall 001 are unchanged from the previous permit.

pH

At 40 CFR 440, NSPS require pH of discharges from Outfalls 001 and 002 to be within the range of 6.0 and 9.0 s.u. The AWQS limit receiving waters to the pH range of 6.5 to 8.5 s.u. EPA is required to use the more stringent of the two criteria so the AWQS will be used as the end-of-pipe pH limitations, see Table D-2. The pH limit for Outfall 001 is unchanged from the previous permit. The draft permit requires continuous monitoring for pH. The regulations at 40 CFR 401.17 entitled "pH Effluent limitations under continuous monitoring" require that the permittee shall maintain the pH within the range except that excursions from the range are permitted subject to the following limitations:

> The total time during which the pH values are outside the required range shall not exceed 7 hours and 26 minutes in any calendar month; and
>
> No individual excursion from the range of pH values shall exceed 60 minutes.

These provisions have been incorporated into the permit for monitoring and reporting.

Aluminum

The draft permit includes WQBELs for aluminum, derived using the statistical methodology presented in the TSD and based on the AWQS. The draft permit proposes limitations are 143 ug/L (MDL) and 71 ug/L (AML) for aluminum, applied to Outfall 001, to assure protection of applicable water quality criteria for Sherman Creek and Slate Creek. The previous permit did not include aluminum limits.

Ambient aluminum levels in East Fork Slate Creek exceed the statewide criteria. The permittee may pursue a site-specific criteria for aluminum based on studies to determine the actual effects of aluminum on aquatic organisms in the Slate Creek drainage.

Arsenic

For Outfall 001, the draft permit includes WQBELs that are based on applicable AWQS and derived using the statistical methodology presented in the TSD. The applicable AWQS is the human health standard for arsenic. The proposed limitations are 100.5 ug/L (MDL) and 50 ug/L (AML). The previous permit did not include limits for arsenic.

Cadmium

40 CFR 440 Subpart J contains NSPS for cadmium in mine drainage and mill discharges of 100 ug/L (MDL) and 50 ug/L (AML). Based on AWQS, which are hardness dependant, and using the statistical methodology presented in the TSD, the WQBELs found in Table D-3 are also applicable to discharges from Outfalls 001 and 002. Because the WQBELs for cadmium are more stringent than the NSPS, they are included in the draft permit, to assure protection of water quality criteria for East Fork Slate Creek and Sherman Creek. For Outfall 001, the proposed limits are more stringent than those found in the previous permit.

Chromium

WQBELs for hexavalent chromium (Cr VI) of 16 ug/L and 8 ug/L, were derived using the statistical methodology presented in the TSD and based on AWQS. Because of the short holding time for Cr VI (24 hours), the draft permit proposes that it be measured during the next sampling event after sampling results show levels of total chromium in excess of the chronic aquatic life criteria for hexavalent chromium of 11 ug/L. The limits for Outfall 001 are unchanged from the previous permit.

Copper

EPA has established applicable NSPS for copper in mine drainage and mill discharges of 300 ug/L (MDL) and 150 ug/L (AML). Based on AWQS, which are hardness dependant, and using the statistical methodology presented in the TSD, the WQBELs found in Table D-3 are also applicable to discharges from Outfalls 001 and 002. Because the WQBELs for copper are more stringent than the technology-based limitations, they are included in the draft permit, to assure protection of aquatic life in East Fork Slate Creek and Sherman Creek. For Outfall 001, the proposed limits are more stringent than those found in the previous permit because of changes to the AWQS.

Iron

The draft permit includes WQBELs for iron based on AWQS and derived using the statistical methodology presented in the TSD. The proposed limitations of 1.7 mg/L (MDL) and 0.8 mg/L (AML), applied to Outfalls 001 and 002, will assure protection of aquatic life in East Fork Slate Creek and Sherman Creek. The previous permit did not include iron limits.

Lead

EPA has established NSPS for lead in mine drainage of 600 ug/L (MDL) and 300 ug/L (AML). Based on AWQS for lead, which are hardness dependant, and using the statistical methodology presented in the TSD, the WQBELs found in Table D-3 are also applicable to the outfalls. Because the WQBELS for lead are more stringent than the NSPS, they are included in the draft permit. The lead limits for Outfall 001 are unchanged from the previous permit.

Mercury

At 40 CFR 440, the EPA has established NSPS for mercury in mine drainage and mill discharges of 2 ug/L (MDL) and 1 ug/L (AML). Based on AWQS for mercury, and using the statistical methodology presented in the TSD, the WQBELs found in Table D-3 are proposed for mercury. Because the WQBELs for mercury are more stringent than the NSPS, they are included in the draft permit, applicable to Outfalls 001 and 002. The proposed limits for Outfall 001 are unchanged from the previous permit.

Nickel

The draft permit includes the WQBELs for nickel found in Table D-3. These limits are based on AWQS, which are hardness dependent, and derived using the statistical methodology presented in the TSD. For Outfall 001, the limits in the previous permit were based on the human health standard which was not hardness dependent. The previous permit used a more stringent human health criterion but that criterion has been superseded by a new, less-stringent criterion. At low hardness, the aquatic life criteria is as stringent as the previous human

health criterion. As hardness increases, less stringent limits would apply in the proposed permit but the higher limits based on the new criteria would be an allowable exception to the anti-backsliding prohibitions.

Selenium

The draft permit includes WQBELs for selenium, see Table D-3, based on AWQS and are derived using the statistical methodology presented in the TSD. The proposed limitations of 8.1 ug/L (MDL) and 4.0 ug/L (AML), applied to Outfalls 001 and 002, will assure protection of water quality for East Fork Slate Creek and Sherman Creek. For Outfall 001, the limits are unchanged from the previous permit.

Silver

The draft permit includes the WQBELs for this pollutant based on AWQS, which are hardness dependent, and using the statistical methodology presented in the TSD. The proposed limitations, see Table D-3, are applicable to Outfalls 001 and 002 and are derived to protect water quality in East Fork Slate Creek and Sherman Creek. The limits for Outfall 001 are less stringent than the previous permit limits which reflect revisions to the AWQS that were recently approved by EPA. This is an allowable exception to anti-backsliding prohibitions.

Zinc

EPA has established NSPS for zinc (1.5 mg/L - MDL, and 0.75 mg/L - AML), which are applicable to mine drainage and mill discharges. Based on AWQS, which are hardness dependent, and using the statistical methodology presented in the TSD, the WQBELs found in Table D-3 are also applicable to the Kensington Mine. Because the water quality-based limitations for zinc are more stringent than the technology-based standards, they are included in the draft permit and are applicable to Outfalls 001 and 002. The limits for Outfall 001 are less stringent than the previous permit limits which reflect revisions to the AWQS that were recently approved by EPA. This is an allowable exception to anti-backsliding prohibitions.

Whole Effluent Chronic Toxicity

Chronic WET testing is included in the proposed permit on a monthly basis. The testing will occur at Outfalls 001 and 002 so that the full effects of the discharge into Sherman Creek and East Fork Slate Creek will be determined. The effluent limitations for chronic toxicity of 1.1 TU_C average monthly and 1.6 maximum daily (equal to the previous permit levels for Outfall 001) are proposed to apply to Outfalls 001 and 002. To date, chronic toxicity above 1 TUc has not been observed at Outfall 001.

Appendix E - Basis for Effluent Limitations - Outfall 003

A. Statutory and Regulatory Basis For Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the CWA provide the basis for effluent limitations and other conditions in the draft permit. EPA evaluates the discharges with respect to these sections of the CWA and the relevant NPDES regulations to determine which conditions to include in the draft permit.

EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls to see if water quality standards for the receiving waters may still be exceeded. If exceedances could occur, EPA must include WQBELs in the permit. The proposed permit limits will reflect whichever requirements (technology-based or water quality-based) limits are more stringent.

A. Technology-based limitations

The technology-based limitations for Outfall 003 are based on the State of Alaska's Wastewater Disposal Regulations [18 AAC 72] for Secondary Treatment found in 18 AAC 72.040 and 18 AAC 72.990(64). The following parameters are limited:

Biological Oxygen Demand (BOD_5): The regulations for secondary treatment require that BOD meet a 7 day average of 45 mg/L, a 30 day average of 30 mg/L and the arithmetic mean of the values for effluent samples collected in a 24-hour period does not exceed 60 mg/L.

Total Suspended Solids (TSS): The regulations for secondary treatment require that TSS meet a 7 day average of 45 mg/L, a 30 day average of 30 mg/L and the arithmetic mean of the values for effluent samples collected in a 24-hour period does not exceed 60 mg/L.

pH: pH levels be maintained between 6 and 9 standard units.

B) Water Quality-based limitations

The receiving water for this discharge is Lynn Canal which is protected for all uses. The most protective marine criteria have been proposed in the draft permit.

Fecal Coliform: The most protective standard for fecal coliform is for harvesting for consumption of raw mollusks or other raw aquatic life use. The AWQS state, "Based on a 5-tube decimal dilution test, the fecal coliform median MPN may not exceed 14FC/100mL, and not more than 10% of the samples may exceed a fecal coliform median MPN of 43 FC/100mL.

In the previous permit, ADEC authorized a mixing zone for fecal coliform because disinfection was not proposed. The State's draft 401 certification includes the same mixing zone and the proposed limits in the draft permit are unchanged from the previous permit.

Chlorine: Chlorine limits on this discharge will only be applied if chlorine is used for disinfection (this is not currently proposed by the permittee). The maximum daily limit for chlorine has been included

in the State's 401 Certification as 0.02 mg/L with a compliance lever

pH: The most protective limitations are for aquaculture and the growth and propagation of fish, shellfish, other aquatic life and wildlife. This level is 6.5 to 8.5 s.u.

Oil and Grease. Applicable state standards for oil and grease are limited to "shall not cause a film, sheen, or discoloration on the surface or floor of the water body or adjoining shorelines."

Appendix F – Determination Of WQBELS for Outfalls 001 and 002

Step 1. Determine the appropriate criteria

Uses of receiving waters are defined in 18 AAC 70. For East Fork Slate Creek and Sherman Creek the State's designated uses include water supply (drinking, culinary, and food processing; agricultural irrigation and stock watering; aquaculture; and industrial); contact and secondary recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife. The most stringent water quality criteria for toxic pollutants applicable to these uses are summarized in Tables F-1 through F-3, below.

Because effluent limitations for metals must be expressed as total recoverable concentrations [40 CFR 122.45(c)], metals criteria in Tables E-2 and E-3 are expressed as total metal concentrations. And, because the toxicity of certain metals increases with decreasing hardness levels, certain of the aquatic life criteria for metals from 18 AAC 70 (Cd, Cr III, Cu, Pb, Ni, Ag, and Zn) must also be adjusted to account for the hardness level of the receiving water. Here, hardness levels of 25, 50, 100, and 200 mg/L CaCO3 for the receiving waters was used to determine the applicable criteria, where the criteria are hardness dependent. Formulas for deriving hardness dependant criteria are presented in Table III of the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (2003).

Table F-1
Summary of Water Quality Criteria
for Non-toxic Pollutants and Pollutant Characteristics Applicable to Discharges to East Fork Slate Creek and Sherman Creek[1]

Pollutant	Most Stringent Applicable Water Quality Criteria
TDS	TDS may not exceed 500 mg/L in East Fork Slate Creek and 1000 mg/L in Sherman Creek below the discharge of the Kensington Mine adit drainage to tidewater.
Sulfate	Sulfates may not exceed 250 mg/L, although site–specific criteria for Sherman Creek at 18 AAC 70.236(b) limit sulfates associated with magnesium and sodium to 200 mg/L in Sherman Creek.
pH	May not be less than 6.5 or greater than 8.5 and may not vary more than 0.5 pH units from natural conditions
Residues	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines
Sediment	No measurable increase in concentration of settleable solids above natural conditions, as measured by the volumetric Imhoff cone method.
Turbidity	May not exceed 5 nephelometric turbidity units (NTUs) above natural conditions when the natural turbidity is 50 NTU or less
Whole Effluent Toxicity	An effluent may not impart chronic toxicity equal to or greater than 1.0 TUc at the point of discharge
1 - From 18 AAC 70.020(b), except site-specific criteria for Sherman Creek established at 18 AAC 70.236(b) and whole effluent toxicity standards established at 18 AAC 70.030(a).	

Table F-2 Summary of Water Quality Criteria for Toxics in Discharges to East Fork Slate Creek and Sherman Creek[1]	
Pollutant	Most Stringent Applicable Water Quality Criteria
Ammonia	For Sherman Creek, acute and chronic criteria for the protection of aquatic life are 5.62 mg/L and 2.43 mg/L as N, respectively. These criteria are based on a maximum water temperature of 14 ˚C and a maximum pH of 8.0 and the presence of early life stages of salmonids in Sherman Creek. For East Fork Slate Creek, acute and chronic criteria for the protection of aquatic life are 4.64 mg/L and 2.10 mg/L as N, respectively. These criteria are based on a maximum water temperature of 14 ˚C and a maximum pH of 8.1 and the presence of early life stages of salmonids in East Fork Slate Creek.
Nitrite	1 mg/L as N – primary MCL for drinking water
Nitrate	10 mg/L as N – primary MCL for drinking water
Total Nitrite plus Nitrate	10 mg/L as N – primary MCL for drinking water
Aluminum	750 ug/L and 87 ug/L – acute and chronic aquatic life criteria
Arsenic	50 ug/L – primary MCL for drinking water and the standard for agricultural use (stockwater), human health criteria
Cadmium	0.52 ug/L and 0.10 ug/L, 1.1 ug/L and 0.2 ug/L, 2.1 ug/L and 0.3 ug/L, 4.3 ug/L and 0.5 ug/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Chromium III	0.58 mg/L and 0.028 mg/L, 1.0 mg/L and 0.05 mg/L, 1.8 mg/L and 0.09 mg/L, 3.2 mg/L and 0.2 mg/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Chromium VI	16 ug/L and 11 ug/L – acute and chronic aquatic life criteria
Chromium (total)	100 ug/L – the primary MCL for drinking water and the standard for agricultural use (stockwater)
Copper	3.8 ug/L and 2.9 ug/L, 7.3 ug/L and 5.2 ug/L, 14 ug/L and 9.3 ug/L, 27 ug/L and 17 ug/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Iron	1 mg/L - chronic aquatic life criterion
Lead	14 ug/L and 0.54 ug/L, 34 ug/L and 1.3 ug/L, 82 ug/L and 3.2 ug/L, 197 ug/L and 7.7 ug/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Mercury	0.012 ug/L – chronic aquatic life criteria
Nickel	145 ug/L and 16 ug/L, 261 ug/L and 29 ug/L, 469 ug/L and 52 ug/L. 843 ug/L and 94 ug/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Selenium	5 ug/L – chronic aquatic life criteria
Silver	0.37 ug/L, 1.2 ug/L, 4.1 ug/L, and 13.4 ug/L – acute aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
Zinc	37 ug/L, 67 ug/L, 120 ug/L, and 216 ug/L – acute and chronic aquatic life criteria with receiving water hardness of 25, 50, 100, and 200 mg/L CaCO3, respectively
1 From 18 AAC 70.020(b), which incorporates Tables I, II, III, and Columns A and B of Table V of the Alaska Water Quality Criteria Manual (2003)	

Step 2. Calculate the wasteload allocations (WLAs)

A WLA addresses variability in effluent quality and is the single level of receiving water quality necessary to provide protection against long-term or chronic effects. WLAs are calculated using the following mass balance equation where C is the applicable water quality criterion, B is the background or ambient concentration of the pollutant in the receiving water, and D is the available dilution.

$$WLA = C + D [C – B]$$

In the circumstances where no credit is allowed for dilution, as at the two outfalls from the Kensington Mine, D equals zero, and the WLA for each pollutant is set equal to the most stringent applicable water quality criteria, assuring that the discharge will not contribute to an exceedance of that standard.

Step 3. Determine long-term average concentrations (LTAs).

For each WLA based on an aquatic life criterion the acute and chronic, LTAs are calculated using the following equations from the TSD. LTAs are presented in Tables D-3, below.

$$LTA_C = WLA_C \times e [0.5 \sigma_4^2 – z\sigma 4]$$

where, $\sigma_4^2 = \ln [CV^2 / 4 + 1]$
z = 2.326 for the 99th percentile occurrence probability
CV = coefficient of variation (here, because there are no data points representative of full scale mining, the CV is estimated to equal 0.6)

and, $LTA_a = WLA_a \times e [0.5 \sigma^2 – z\sigma]$

where, $\sigma^2 = \ln [CV^2 + 1]$
z = 2.326 for the 99th percentile occurrence probability
CV = 0.6

Table F-3
Determination of LTAs – Proposed Water Quality Criteria

Pollutant	Receiving Water Hardness*	WLA		LTA	
		Acute	Chronic	Acute	Chronic
Aluminum	N/A	750 ug/L	87 ug/L	241	46
Cadmium	25 mg/L	0.52 ug/L	0.1 ug/L	0.17	0.05
	50 mg/L	1.1 ug/L	0.2 ug/L	0.35	0.11
	100 mg/L	2.1 ug/L	0.3 ug/L	0.67	0.16
	200 mg/L	4.3 ug/L	0.5 ug/L	1.4	0.24
Chromium III	25 mg/L	0.58 mg/L	0.028 mg/L	0.19	0.015
	50 mg/L	1.0 mg/L	0.05 mg/L	0.32	0.026
	100 mg/L	1.8 mg/L	0.09 mg/L	0.58	0.047
	200 mg/L	3.2 mg/L	0.15 mg/L	1.02	0.08
Chromium VI	N/A	16 ug/L	11 ug/L	5.1	5.8
Copper	25 mg/L	3.8 ug/L	2.9 ug/L	1.2	1.5
	50 mg/L	7.3 ug/L	5.2 ug/L	2.3	2.7
	100 mg/L	14 ug/L	9.3 ug/L	4.5	4.9
	200 mg/L	27 ug/L	17 ug/L	8.6	8.9
Iron	N/A	-	1.0 mg/L	-	0.53
Lead	25 mg/L	14 ug/L	0.54 ug/L	4.5	0.29
	50 mg/L	34 ug/L	1.3 ug/L	10.9	0.69
	100 mg/L	82 ug/L	3.2 ug/L	26.3	1.7
	200 mg/L	197 ug/L	7.7 ug/L	63.3	4.1
Nickel	25 mg/L	145 ug/L	16 ug/L	46.6	8.44
	50 mg/L	261 ug/L	29 ug/L	83.8	15.3
	100 mg/L	469 ug/L	52 ug/L	150.6	27.4

Table F-3
Determination of LTAs – Proposed Water Quality Criteria

Pollutant	Receiving Water Hardness*	WLA		LTA	
		Acute	Chronic	Acute	Chronic
	200 mg/L	843 ug/L	94 ug/L	271	49.5
Selenium	N/A	-	5 ug/L	-	2.6
Silver	25 mg/L	0.37 ug/L	-	0.12	-
	50 mg/L	1.2 ug/L	-	0.39	-
	100 mg/L	4.1 ug/L	-	1.32	-
	200 mg/L	13.4 ug/L	-	4.3	-
Zinc	25 mg/L	37 ug/L	37ug/L	11.9	19.5
	50 mg/L	67 ug/L	67ug/L	21.5	35.3
	100 mg/L	120 ug/L	120ug/L	38.5	63.3
	200 mg/L	216 ug/L	216ug/L	69.2	114
Ammonia	Sherman Creek	5.62	2.43	1.804	1.282
	East Fork Slate Creek	4.64	2.1	1.49	1.108

* N/A means the parameter is not hardness dependent.

Acute and chronic LTAs are compared, and the most stringent is used to develop the daily maximum and monthly average permit limits.

Step 4. Derive the maximum daily (MDL) and average monthly (AML) permit limits. Using equations from the TSD, the MDL and the AML are calculated as follows.

$MDL = LTA \times e\,[z\sigma - 0.5\,\sigma^2]$

$= LTA \times 3.115$

where, $\sigma^2 = \ln [CV^2 + 1]$
$z = 2.326$ for the 99th percentile probability basis
$CV = 0.6$

and, $AML = LTA \times e\,[z\sigma_n - 0.5\sigma_n{}^2]$

$= LTA \times 1.553$

where, $\sigma_n{}^2 = \ln [CV^2 / n + 1]$
$z = 1.645$ for the 95th percentile probability basis
$CV = 0.6$
n = number of sampling events required per month (here, n is set equal to 4, as recommended by the TSD whenever 4 or fewer samples per month are collected)

When the most stringent water quality criterion is a human health criterion (i.e., arsenic), the AML is set equal to the WLA, and the MDL is calculated by multiplying the WLA times the ratio of the MDL multiplier to the AML multiplier (3.115 / 1.553 = 2.006). MDLs and AMLs are presented in Table F-4.

Table F-4 Determination of WQBELs				
Parameter	Receiving Water Hardness (mg/L CaCO3)	Units	MDL	AML
Aluminum		ug/L	143	71
Arsenic		ug/L	100	50
Cadmium	25	ug/L	0.2	0.1
	50	ug/L	0.3	0.2
	100	ug/L	0.5	0.3
	200	ug/L	0.7	0.4
TDS	Sherman Creek	mg/L	1000	1000
	East Fork Slate Creek	mg/L	500	500
Sulfate	Sherman Creek	mg/L	200	200
	East Fork Slate Creek	mg/L	250	250
Chromium III	25	ug/L	47	23
	50	ug/L	81	40
	100	ug/L	146	73
	200	ug/L	249	124
Chromium VI		ug/L	16	8
Chromium (total)		ug/L	200	100
Copper	25	ug/L	3.7	1.9
	50	ug/L	7.2	3.6
	100	ug/L	14	7
	200	ug/L	27	13
Iron		mg/L	1.7	0.8
Lead	25	ug/L	0.9	0.5
	50	ug/L	2.2	1
	100	ug/L	5.3	2.6
	200	ug/L	13	6.4
Mercury		ug/L	0.1	0.05
Nickel	25	ug/L	26	13
	50	ug/L	48	24
	100	ug/L	85	43
	200	ug/L	154	77
Selenium		ug/L	8.1	4
Silver	25	ug/L	0.4	0.2
	50	ug/L	1.2	0.6
	100	ug/L	4.1	2.1
	200	ug/L	13	6.7
Zinc	25	ug/L	37	18
	50	ug/L	67	33
	100	ug/L	120	60
	200	ug/L	216	108
Ammonia	Sherman Creek	mg/L N	4	2
	East Fork Slate Creek	mg/L N	3.45	1.72
Nitrite		mg/L N	2.01	1
Nitrate		mg/L N	20.1	10
Total NO_2 plus NO_3		mg/L N	20.1	10