Prepared For:

USDA Forest Service
Juneau Ranger District
Tongass National Forest

FINAL
PLAN OF OPERATIONS
for the
KENSINGTON GOLD PROJECT

Prepared By:

COEUR ALASKA, INC.

C O E U R
A L A S K A

May 2005

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Acronyms

4 WD	Four wheel drive
AAC	Alaska Administrative Code
ABA	Acid Base Accounting
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AGP	Acid Generating Potential
ANFO	Ammonium Nitrate/Fuel Oil
ANP	Acid Neutralizing Potential
API	American Petroleum Institute
BMP	Best Management Practices
CBJ	City and Borough of Juneau
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
gpm	gallons per minute
HAZWOPER	Hazardous Waste Operation and Emergency Response
HDPE	High-density Polyethylene
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
ISO	International Organization for Standardization
MIBC	Methyl Butyl Carbinol
MOA	Memorandum of Agreement
MSDS	Material Safety Data Sheets
MSHA	Mine Safety and Health Administration
MWMT	Meteoric Water Mobility Test
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NP:AP	Neutralization Potential to Acidification Potential
NPDES	National Pollution Discharge Elimination System
NRC	National Response Center
OSHA	Occupational Safety and Health Administration
PMF	Probable Maximum Flood
ROD	Record of Decision
SEAPRO	Southeast Alaska Petroleum Resource Organization
SHPO	State Historic Preservation Officer
SRC	Selective Catalytic Reduction
SUVs	Sport Utility Vehicles
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TSF	Tailings Storage Facility
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFS	United States Department of Agriculture Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1. INTRODUCTION

This revised Plan of Operations is being submitted to describe the final configuration and operation of the Kensington Gold Project based on recent analysis conducted by the United States Department of Agriculture Forest Service (USFS) during the development of the Final Supplemental Environmental Impact Statement and consequential Record of Decision (December 2004). This Plan also incorporates a greater level of engineering detail resulting from advanced design work conducted once the layout of the facilities had been finalized during the National Environmental Policy Act (NEPA) review. This plan is submitted in accordance with federal regulations pertaining to mining operations on National Forest lands (36 CFR) as authorized by United States mining laws. The narrative of this plan along with the referenced attachments incorporates the selected alternative and management and mitigation measures as articulated in the Record of Decision (ROD) for the Kensington Final Environmental Impact Statement.

The format for this *Final Plan of Operations – ROD*, is based on the USFS *Training Guide for Reclamation Bond Estimation and Administration, Appendix C – Plans of Operation Information* (April 2004).

1.1 Location and Project Summary

The Kensington Gold Project is located at the southern end of the Kakuhan Range of the coastal mountains in the Tongass National Forest on the small peninsula formed between Lynn Canal and Berners Bay. The mine site is approximately 45 air miles north of Juneau and 35 air miles south of Haines, Alaska. The site is currently accessible by floatplane, helicopter or boat. The project is within the administrative boundary of the City and Borough of Juneau (Figure 1).

Figure 1

General Project Location Map

The recent permitting history for the Kensington Gold Project (Project) underground mine and milling project dates back over 15 years with two previous EIS reviews focused on the Lynn Canal side of the current project configuration. The Project, as previously approved, was never constructed due to a decline in the value of the commodity. To address the economics of the Project, Coeur Alaska, Inc. (Coeur) re-defined and submitted an Amended Plan of Operations (November 2001) to the USFS which combined two contiguous private land packages that Coeur controls (Kensington and Jualin), with federal and state land. The purpose was to make certain changes to the 1998 approved Plan of Operations regarding access, tailings disposal, and support facilities to improve efficiency, reduce the area of surface disturbance, and improve worker safety. A major change to the Project was that access would be via Berners Bay. This change to the location of the Project's facilities and the development of a dock in Berners Bay greatly improved reliable access to the Project, which significantly reduced the need for material stockpiling and improved the safety aspects by eliminating transportation of employees solely by helicopter. A reduction in the surface disturbance was realized by eliminating the need for a new large personnel camp and the elimination of a dry tailing facility in favor of subaqueous disposal of tailings behind a rock-filled dam at Lower Slate Lake. Reclamation of the tailings lake includes flooding the equivalent acreage of productive natural soil that currently exists in Lower Slate Lake for the recolonization of vegetation and benthic organisms. Studies have indicated that recolonization of the flotation (low metal content) tailings may eventually contribute a greater aerial extent of habitat than what currently exists in Lower Slate Lake.

The proposed mill site and underground mine portal area are now planned for development near the historic Indiana minesite, with the administration complex located within the boundaries of the historic Upper Jualin minesite. Both locations are accessed from the existing Jualin access road which links Slate Creek Cove with these patented land holdings. The existing Kensington portal, located between Ophir and Sherman Creeks at the western base of Lions Head Mountain at the 800-foot level, will be used for initial development resulting in an expansion to the existing

waste rock dump at that location. The Kensington portal area will also be the site for the management and active chemical treatment of the underground mine drainage.

The Kensington Gold Project will employ approximately 225 people to operate the mine and process facilities.

During approximately 18 months of facility construction activities, Coeur and construction contractors will employ between 300 and 400 people. At the curtailment of operations, an estimated workforce of approximately 50 people will be used to salvage equipment and dismantle project facilities for removal from the project site.

1.2 Project Owner/Operator

The Kensington Gold Project is 100% owned and operated by Coeur Alaska, Inc. (a subsidiary of Coeur d'Alene Mines Corporation). Administrative information for Kensington Gold Project is presented below:

Owner/Operator:

Coeur Alaska, Inc.

3031 Clinton Dr., Suite 202

Juneau, AK 99801

(907) 789-1591

Designated Official:

Timothy D. Arnold

Vice President and General Manager

Coeur Alaska, Inc.

(907) 789-1591

1.3 Land Status

The Kensington Gold Project comprises two contiguous land groups; the Kensington and Jualin properties. The Kensington property consists of 51 patented lode claims (Table 1-1) covering approximately 760 acres, 369 federal unpatented lode claims (Table 1-3) covering approximately 5,100 acres, and seven State of Alaska unpatented lode claims (Table 1-6) covering approximately 110 acres. The Federal and State claims, as well as the patented lode claims, provide Coeur with the necessary rights to mine and process ore from Kensington.

The Kensington deposit (including the Horrible Vein) is secured by patented lode claims. Forty-nine of these are held through an agreement with the Kensington Trust. The other two patented claims are held through an option to purchase with no royalties.

The Jualin Property consists of 21 patented lode claims (Table 1-2) covering approximately 360 acres, 463 federal unpatented lode claims (Tables 1-4 and 1-5) covering approximately 7,810 acres, and 15 State of Alaska unpatented lode claims (Table 1-7) covering approximately 260 acres. Coeur holds the Jualin property through a mining lease with Hyak Mining Company, a local firm, based in Juneau, Alaska.

The claims controlled by Coeur, as part of the Kensington Gold Project, are located in all or part of the following sections:

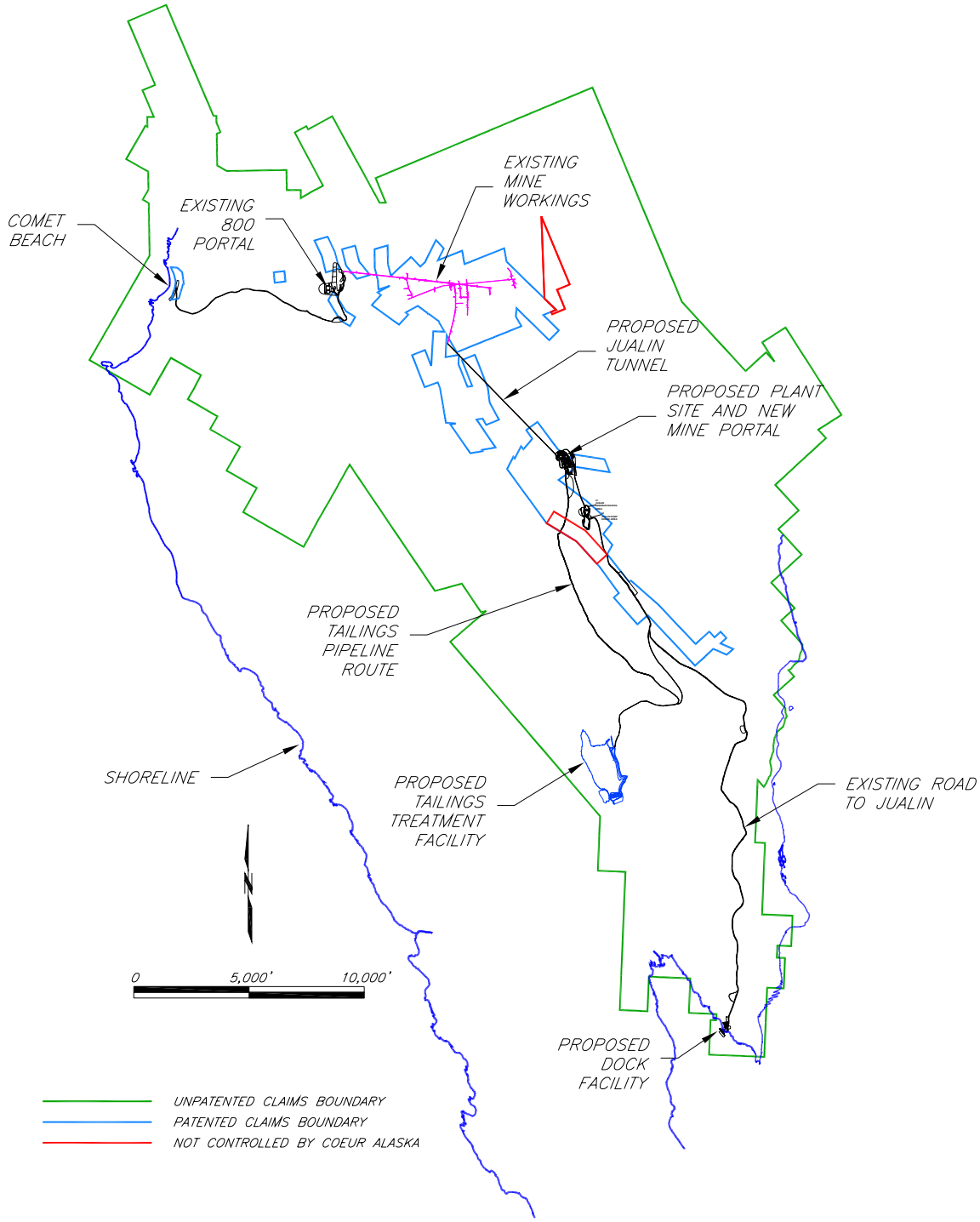
T36S, R62E Copper River Meridian, Sections 26, 27, 28, 29, 30, 31, 32, 33, 34, 35

T35S, R62E Copper River Meridian, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 35, 36

T34S, R62E Copper River Meridian, Sections 1, 2

Figure 2 shows the extent of claims controlled by Coeur Alaska in relation to the existing and proposed mine development. This figure also shows existing underground workings centered around the targeted, economic mineralization, the location of Kensington camp at Comet Beach, proposed plant site and tailings deposition locations, and existing roads for access to underground workings and to the proposed plant site.

Figure 2
Claim Boundaries Map



1.4 Other Permits and Approvals

In addition to the approval of this final Plan of Operations by the USFS for the Kensington Gold Project, there are a number of federal, state, and local regulatory permits, licenses, and governmental approvals which are required. The following is a summary of those major approvals identified for developing the project. Additional approvals may be required prior to and during project construction and operation. Copies of the key permits will be included in Appendix 3 to this Plan of Operations if not otherwise stipulated.

- A Section 402 National Pollution Discharge Elimination System (NPDES) Permit is required for point source discharges to water of the United States under the Clean Water Act (CWA). The Environmental Protection Agency (EPA) administers the NPDES permit program in Alaska.
- As part of the NPDES permitting process, Storm Water Pollution Prevention and Best Management Practices (BMP) plans are required for construction and operation of the mine
- Section 404 of the CWA establishes a permit program administered by the Army Corps of Engineers to regulate the discharge of dredge or fill material into waters of the United States including wetlands.
- The issuance of either of the above permits (Section 402 and Section 40), requires state certification under Section 401 of CWA that the permit issuance will not cause violations of state water quality standards.
- Approval of a reclamation bond amount is required pursuant to 36 CFR 228.8 (g) which involves a third-party reclamation cost estimate to be provided. The Reclamation Cost Estimate for the Kensington Gold Project is included in this Final Plan of Operations as Appendix 1.
- USFS compliance with provisions of the National Historic Preservation Act of 1966, and related regulations, executive orders and polices were

designed to identify and mitigate impact to significant cultural resources. An MOA between the USFS, Coeur Alaska, and the State Historic Preservation Officer has been established. This document has been attached as Appendix 2 to this plan.

- The State of Alaska Department of Environmental Conservation regulates solid waste and addresses tailings, development rock, domestic waste, recyclable waste and other material management and disposal. A solid waste permit has been issued for the Kensington Gold Project and will be used for the management of wastes associated with this industrial facility. The tailings storage facility will be certified as a solid waste facility by ADEC.
- A permit to construct and operate a source of potential air pollution from the Alaska Department of Environmental Conservation pursuant to state and federal clean air laws and regulations.
- The State of Alaska Department of Natural Resources (ADNR) issues Leases for activities that occur on tide and submerged lands, and will issue a land use authorization for use of the Jualin Mine Road, RS2477.
- Water Use Authorizations as regulated and controlled by ADNR for both surface and groundwater systems. or other body of water.
- Fish habitat permits are issued for activities that occur along or in a stream
- A dam safety permit is required by ADNR.
- An allowable use permit issued by the City and Borough of Juneau (CBJ), based on a comprehensive staff review of the mining project proposed within the Borough boundaries.
- The CBJ will also require building permits for the administration and process facilities at the project.

The company will conduct routine environmental and permitting audits of the Kensington Project as part of its corporate environmental management system program. The project's reclamation plan and cost estimates will be reviewed and updated every three (3 years) by the state and USFS. In addition, the State along with USFS will conduct formal audits of the project's environmental and permitting program every six (6 years).

Document Control

As described later in this document, the USFS may approve changes in the Plan as requested by the Company as result of planned changes to the project. The USFS may direct that changes be made to the Plan as the result of unanticipated changes detected through project monitoring programs.

Each section of the Plan of Operations will be dated. A revision sheet will be kept on the inside front cover to ensure that the reader knows the date of the last revision. There will be two official copies of the Plan of Operations: one at the Environmental Office at the minesite, and the other at the USFS office. It will be the responsibility of the Environmental Manager to update these two documents as needed.

Table 1-1
Kensington Patented Claims List

NAME OF CLAIM	U.S. PATENT NO.	M.S. NUMBER
HARVARD LODE (HARTFORD)	24661	
OPHIR LODE	24265	37-A
OPHIR MILLSITE	24265	37-B
BEAR LODE	24324	38-A
SAVAGE LODE	24324	39
BEAR NO.2 MILLSITE	24324	38-B
ELMIRA LODE	25362 (M.C. 47)	42
NORTHERN BELLE LODE	25362 (M.C. 47)	43
YELLOW JACKET LODE	25362 (M.C. 47)	44
KENSINGTON LODE	25362 (M.C. 47)	45
EUREKA LODE	25362 (M.C. 47)	46
ESMERALDA LODE	24662	47-A
EXCELSIOR LODE	24662	48
NORTWEST LODE	24662	49
ESMERALDA MILLSITE	24662	47-B
NORTHERN LIGHT LODE	36096	380
NORTHERN LIGHT EXT. #1 LODE	36096	380
NORTHERN LIGHT EXT. #2 LODE	36096	380
SEWARD LODE	24660	40-A
SEWARD NO. 2 LODE	24660	41
CUMERLAND (CUMBERLAND) LODE	24660	50-A
COMET LODE	24660	51
THOMAS LODE	24660	52-A
POOR RICHARD LODE	24660	53
COMET EXTENSION LODE	24660	54-A
SNOWFLAKE LODE	24660	55
LAST CHANCE LODE	24660	56
BANNER LODE	24660	57
ECLIPSE LODE	24660	58
SEWARD MILLSITE	24660	40-B
CUMERLAND (CUMBERLAND) MILLSITE	24660	50-B
THOMAS MILLSITE	24660	52-B
COMET EXTENSION MILLSITE	24660	54-B
PLUCKY GIRL FRAC. LODE	1116607	2018
PLUCKY BOY FRAC. LODE (LUCKY BOY)	1116607	2018
ARNOLD LODE	1116607	2018
STANLEY LODE	1117017	2015
BEE LODE	1117017	2015
LIONS PAW #1 LODE	1117017	2015
LIONS PAW #2 LODE	1117017	2015
LIONS PAW #3 LODE	1117017	2015
LIONS PAW #4 LODE	1117017	2015
LIONS TAIL LODE	1117017	2015
BAT LODE	1117017	2015
LIONS PAW LODE	1117017	2015
OLGA #1 LODE	1117017	2015
OLGA #2 LODE	1117017	2015
OLGA #3 LODE	1117017	2015
OLGA #4 LODE	1117017	2015
MEXICAN LODE	26398	61
HORRIBLE	MINERAL CERTIFICATE 54	60

All claims in Table 1-1 are part of the Kensington Trust except the Mexican Lode and the Horrible.

Table 1-2
Jualin Patented Claims List

NAME OF CLAIM	U.S. PATENT NO.	M. S. NUMBER
BANSHEE LODE	65	261
COVER LODE	65	264
GRACE R. LODE	64	676
HARD SCRABBLE LODE	28	578
HUMMING BIRD LODE	64	676
INDEPENDENCE LODE	28	578
INDOMITABLE LODE	64	676
JEAN BURKE LODE	28	578
LAST CHANCE LODE	28	578
LUCKY CHANCE LODE	28	578
MINERVA LODE	65	266
MYSTERY LODE	64	676
MYSTERY LODE MILLSITE	994389	1496
OPHIR LODE	28	578
PERHAPS LODE	64	676
ROSE LODE	28	578
ROVER LODE	28	578
TRIXIE LODE	28	578
UNDINE LODE	65	265
UNDINE ET AL MILLSITE	96	762
VICTOR LODE	64	676
WONDER LODE	28	578

Note that Kensington and Jualin patented claims have mineral surveys.

Table 1-3
Kensington Federal Unpatented Claims List

Claim Name	BLM Serial No.	Claim Name	BLM Serial No.
BIG SEVEN NO. 1	AA-44961	COMET #7	AA-61399
BIG SEVEN NO. 2	AA-44962	COMET #8	AA-61400
BIG SEVEN NO. 3	AA-65035	COMET #9	AA-61401
BIG SEVEN NO. 4	AA-65036	COMET #10	AA-61402
BIG SEVEN NO. 5	AA-46186	COMET #11	AA-61403
BIG SEVEN NO. 6	AA-46187	COMET #12	AA-61404
BIG SEVEN NO. 7	AA-46188	COMET #13	AA-61405
BIG SEVEN NO. 8	AA-46189	COMET #14	AA-61406
BIG SEVEN NO. 9	AA-46190	COMET #15	AA-61407
BIG SEVEN NO. 10	AA-46191	COMET #16	AA-61408
BIG SEVEN NO. 11	AA-46192	COMET #17	AA-61409
BIG SEVEN NO. 12	AA-46193	COMET #18	AA-61410
BIG SEVEN NO. 13	AA-46194	COMET #19	AA-61411
BIG SEVEN NO. 14	AA-46195	COMET #20	AA-61412
BIG SEVEN NO. 15	AA-46196	COMET #21	AA-61413
BIG SEVEN NO. 16	AA-46197	COMET #22	AA-61414
BIG SEVEN NO. 17	AA-50980	COMET #23	AA-61415
BIG SEVEN NO. 18	AA-50981	COMET #24	AA-61416
BIG SEVEN NO. 19	AA-50982	COMET #25	AA-61417
BIG SEVEN NO. 20	AA-50983	COMET #26	AA-61418
BIG SEVEN NO. 21	AA-50984	COMET #27	AA-61419
BIG SEVEN NO. 22	AA-50985	COMET #28	AA-61420
BIG SEVEN NO. 23	AA-50986	COMET #29	AA-61421
BIG SEVEN NO. 24	AA-50987	COMET #30	AA-61422
BIG SEVEN NO. 25	AA-50988	COMET #31	AA-61423
BIG SEVEN NO. 26	AA-50989	COMET #32	AA-61424
BIG SEVEN NO. 27	AA-50990	COMET #33	AA-61425
BIG SEVEN NO. 28	AA-50991	COMET #34	AA-61426
BIG SEVEN NO. 29	AA-50992	COMET #35	AA-61427
BIG SEVEN NO. 30	AA-50993	COMET #36	AA-61428
BIG SEVEN NO. 31	AA-50994	COMET #37	AA-61429
BIG SEVEN NO. 32	AA-50995	COMET #38	AA-61430
BIG SEVEN NO. 33	AA-50996	COMET #39	AA-61431
BIG SEVEN NO. 34	AA-50997	COMET #40	AA-61432
BIG SEVEN NO. 35	AA-50998	COMET #41	AA-61433
BIG SEVEN NO. 36	AA-50999	COMET #42	AA-61434
BIG SEVEN NO. 37	AA-51000	COMET #43	AA-61435
BIG SEVEN NO. 38	AA-51001	COMET #44	AA-61436
BIG SEVEN NO. 39	AA-51002	COMET #45	AA-61437
BIG SEVEN NO. 40	AA-51003	COMET #46	AA-61438
BIG SEVEN NO. 41	AA-51004	COMET #47	AA-61439
BIG SEVEN NO. 42	AA-51005	COMET #48	AA-61440
BIG SEVEN NO. 43	AA-51006	COMET #49	AA-61441
BIG SEVEN NO. 44	AA-51007	COMET #50	AA-61442
BIG SEVEN NO. 45	AA-51008	COMET #51	AA-61443
BIG SEVEN FRACTION 1	AA-44958	COMET #52	AA-61444
BIG SEVEN FRACTION 2	AA-44959	COMET #53	AA-61445
BIG SEVEN FRACTION 3	AA-44960	COMET #54	AA-61446
COMET #1	AA-61393	COMET #55	AA-61447
COMET #2	AA-61394	COMET #56	AA-61448
COMET #3	AA-61395	COMET #57	AA-61449
COMET #4	AA-61396	COMET #58	AA-61450
COMET #5	AA-61397	COMET #59	AA-61451
COMET #6	AA-61398	COMET #60	AA-61452

Table 1-3 (Continued)

Claim Name	BLM Serial No.	Claim Name	BLM Serial No.
COMET #61	AA-61453	COMET #115	AA-61507
COMET #62	AA-61454	COMET #116	AA-61508
COMET #63	AA-61455	COMET #117	AA-61509
COMET #64	AA-61456	COMET #118	AA-61510
COMET #65	AA-61457	COMET #119	AA-61511
COMET #66	AA-61458	COMET #182	AA-64364
COMET #67	AA-61459	COMET #183	AA-64365
COMET #68	AA-61460	COMET #184	AA-64366
COMET #69	AA-61461	COMET #185	AA-64367
COMET #70	AA-61462	COMET #186	AA-64368
COMET #71	AA-61463	COMET #187	AA-64369
COMET #72	AA-61464	COMET #188	AA-64370
COMET #73	AA-61465	COMET #189	AA-64371
COMET #74	AA-61466	COMET #190	AA-64372
COMET #75	AA-61467	COMET #191	AA-64373
COMET #76	AA-61468	COMET #192	AA-64374
COMET #77	AA-61469	COMET #193	AA-64375
COMET #78	AA-61470	COMET #194	AA-64376
COMET #79	AA-61471	COMET #195	AA-64377
COMET #80	AA-61472	COMET #196	AA-64378
COMET #81	AA-61473	COMET #197	AA-64379
COMET #82	AA-61474	COMET #198	AA-64380
COMET #83	AA-61475	COMET #199	AA-64381
COMET #84	AA-61476	COMET #200	AA-64382
COMET #85	AA-61477	COMET #201	AA-64383
COMET #86	AA-61478	COMET #202	AA-64384
COMET #87	AA-61479	COMET #203	AA-64385
COMET #88	AA-61480	COMET #204	AA-64386
COMET #89	AA-61481	COMET #205	AA-64387
COMET #90	AA-61482	COMET #211	AA-64393
COMET #91	AA-61483	COMET #212	AA-64394
COMET #92	AA-61484	COMET #213	AA-64395
COMET #93	AA-61485	COMET #214	AA-64396
COMET #94	AA-61486	COMET #215	AA-64397
COMET #95	AA-61487	COMET #216	AA-64398
COMET #96	AA-61488	COMET #217	AA-64399
COMET #97	AA-61489	COMET #218	AA-64400
COMET #98	AA-61490	COMET #219	AA-64401
COMET #99	AA-61491	COMET #220	AA-64402
COMET #100	AA-61492	COMET #221	AA-64403
COMET #101	AA-61493	COMET #222	AA-64404
COMET #102	AA-61494	COMET #223	AA-64405
COMET #103	AA-61495	COMET #250	AA-71812
COMET #104	AA-61496	COMET #251	AA-71813
COMET #105	AA-61497	COMET #252	AA-71814
COMET #106	AA-61498	COMET #253	AA-71815
COMET #107	AA-61499	COMET #254	AA-71816
COMET #108	AA-61500	COMET #255	AA-71817
COMET #109	AA-61501	COMET #256	AA-71818
COMET #110	AA-61502	COMET #257	AA-71819
COMET #111	AA-61503	COMET #258	AA-71820
COMET #112	AA-61504	COMET #259	AA-71821
COMET #113	AA-61505	COMET #260	AA-71822
COMET #114	AA-61506	COMET #261	AA-71823

Table 1-3 (Continued)

Claim Name	BLM Serial No.	Claim Name	BLM Serial No.
COMET #262	AA-71824	POX 28	AA-61081
COMET #263	AA-71825	POX 29	AA-61082
COMET #264	AA-71826	POX 30	AA-61083
COMET #265	AA-71827	POX 31	AA-61084
COMET #266	AA-71828	POX 32	AA-61085
COMET #267	AA-71829	POX 33	AA-61086
COMET #268	AA-71830	POX 34	AA-61087
COMET #269	AA-71831	POX 35	AA-61088
COMET #270	AA-71832	POX 36	AA-61089
COMET #271	AA-71833	POX 37	AA-61090
COMET #272	AA-71834	POX 38	AA-61091
COMET #273	AA-71805	POX 39	AA-61092
COMET #274	AA-71811	POX 40	AA-61093
COMET #275	AA-71835	POX 41	AA-61094
COMET #300	AA-77283	POX 42	AA-61095
COMET #301	AA-77281	RELOCATED	AA-61683
COMET #302	AA-77282	POX 43	AA-61096
POX 1	AA-61054	POX 44	AA-61097
POX 2	AA-61055	POX 45	AA-61098
POX 3	AA-61056	POX 46	AA-61099
POX 4	AA-61057	KNS #14	AA-42180
POX 5	AA-61058	KNS #15	AA-42181
RELOCATED	AA-61671	KNS #16	AA-42182
POX 6	AA-61059	KNS #17	AA-42183
RELOCATED	AA-61672	KNS #18	AA-42184
POX 7	AA-61060	KNS #19 FRACTION	AA-42185
RELOCATED	AA-61673	KNS #20 FRACTION	AA-42186
POX 8	AA-61061	KNS #21 FRACTION	AA-42187
RELOCATED	AA-61674	KNS #22	AA-42188
POX 9	AA-61062	KNS #23	AA-42189
RELOCATED	AA-61675	KNS #24	AA-42190
POX 10	AA-61063	KNS #25 FRACTION	AA-42191
RELOCATED	AA-61676	KNS #26 FRACTION	AA-42192
POX 11	AA-61064	KNS #27 FRACTION	AA-42193
RELOCATED	AA-61677	KNS #28 FRACTION	AA-42194
POX 12	AA-61065	KNS #29 FRACTION	AA-42195
RELOCATED	AA-61678	KNS #30 FRACTION	AA-42196
POX 13	AA-61066	KNS #31 FRACTION	AA-42197
RELOCATED	AA-61679	KNS #32 FRACTION	AA-42198
POX 14	AA-61067	KNS #33 FRACTION	AA-42199
RELOCATED	AA-61680	KNS #34 FRACTION	AA-42200
POX 15	AA-61068	KNS #35 FRACTION	AA-42201
POX 16	AA-61069	KNS #36 FRACTION	AA-42202
POX 17	AA-61070	KNS #37 FRACTION	AA-42203
POX 18	AA-61071	KNS #38 FRACTION	AA-42204
POX 19	AA-61072	KNS #39 FRACTION	AA-42205
POX 20	AA-61073	KNS #40	AA-42206
POX 21	AA-61074	KNS #41 FRACTION	AA-42207
POX 22	AA-61075	KNS #42 FRACTION	AA-42208
RELOCATED	AA-61681	KNS #43 FRACTION	AA-42209
POX 23	AA-61076	KNS #44	AA-42210
RELOCATED	AA-61682	KNS #45 FRACTION	AA-42211
POX 24	AA-61077	KNS #46 FRACTION	AA-42212
POX 25	AA-61078	KNS #47 FRACTION	AA-42213
POX 26	AA-61079	KNS #48 FRACTION	AA-42214
POX 27	AA-61080	KNS #49 FRACTION	AA-42215

Table 1-3 (Continued)

Claim Name	BLM Serial No.
KNS #50 FRACTION	AA-42216
KNS #51 FRACTION	AA-42217
KNS #52 FRACTION	AA-42218
KNS #53 FRACTION	AA-42219
KNS #54 FRACTION	AA-42220
KNS #55	AA-42221
KNS #56	AA-42222
KNS #57	AA-42223
KNS #58	AA-42224
KNS #59	AA-42225
KNS #60	AA-42226
KNS #61	AA-42227
KNS #62	AA-42228
KNS #63 FRACTION	AA-44071
KNS #64	AA-42230
KNS #64 FRACTION	AA-44072
KNS #65	AA-42231
KNS #66	AA-42232
KNS #67	AA-42233
KNS #68	AA-42234
KNS NO. 71	AA-44948
KNS NO. 72	AA-44949
KNS NO. 73	AA-44950
KNS FRACTION NO. 74	AA-44951
KNS NO. 79	AA-44956
KNS NO. 80	AA-44957
KNS NO. 81 FRACTION	AA-051009
KNS NO. 100 FRACTION	AA-062965
COVER LODE	AA-069981
JOHNSON NO. 1	AA-78931
JOHNSON NO. 2	AA-78932
JOHNSON NO. 3	AA-78933
JOHNSON NO. 4 FRACTION	AA-78934
JOHNSON NO. 5 FRACTION	AA-78935
CONVEN NO. 1	AA-78936
CONVEN NO. 2	AA-78937
CONVEN NO. 3 FRACTION	AA-78938
CONVEN NO. 4 FRACTION	AA-78939
SNOWSLIDE NO. 1	AA-78940
SLATE NO. 1 FRACTION	AA-78941
SLATE NO. 2 FRACTION	AA-78942

Table 1-4
Jualin (Coeur) Federal Unpatented Claims List

CLAIM NAME	BLM SERIAL NO.	CLAIM NAME	BLM SERIAL NO.
MM FRACTION 1	AA 061920	BLOC #1	AA 062971
MM FRACTION 2	AA 061921	BLOC #2	AA 062972
MM FRACTION 3	AA 061922	BLOC #3	AA 062973
MM FRACTION 4	AA 061923	BLOC #4	AA 062974
INDOMITABLE FRACTION	AA 061924	BLOC #5	AA 062975
GREEK BOY #1	AA 060988	BLOC #6	AA 062976
GREEK BOY #2	AA 060989	BLOC #7	AA 062977
GREEK BOY #3	AA 060990	BLOC #8	AA 062978
GREEK BOY #4	AA 060991	BLOC #13	AA 062983
GREEK BOY #5	AA 060992	BLOC #14	AA 062984
GREEK BOY #6	AA 060993	BLOC #15	AA 062985
GREEK BOY #7	AA 060994	BLOC #16	AA 062986
GREEK BOY #8	AA 060995	BLOC #17	AA 062987
E.J. #3	AA 061899	BLOC #18	AA 062988
E.J. #4	AA 061900	BLOC #19	AA 062989
E.J. #5	AA 061901	BLOC #20	AA 062990
E.J. #6	AA 061902	BLOC #25	AA 062995
E.J. #7	AA 061903	BLOC #26	AA 062996
E.J. #8	AA 061904	BLOC #27	AA 062997
E.J. #15	AA 061905	BLOC #28	AA 062998
E.J. #16	AA 061906	BLOC #29	AA 062999
E.J. #17	AA 061907	BLOC #30	AA 063000
E.J. #18	AA 061908	BLOC #31	AA 063001
E.J. #18S	AA 061909	BLOC #32	AA 063002
E.J. #19	AA 061910	BLOC #37	AA 063007
E.J. #20	AA 061911	BLOC #38	AA 063008
E.J. #20S	AA 061912	BLOC #39	AA 063009
E.J. #21	AA 061913	BLOC #40	AA 063010
KY #1	AA 063648	BLOC #41	AA 063011
KY #2	AA 063649	BLOC #42	AA 063012
KY #3	AA 063650	BLOC #43	AA 063013
KY #4	AA 063651	BLOC #44	AA 063014
KY #8	AA 063655	BLOC #49	AA 063019
KY #9	AA 063656	BLOC #50	AA 063020
KY #10	AA 063657	BLOC #51	AA 063021
KY #11	AA 063658	BLOC #52	AA 063022
KY #17	AA 063664	BLOC #53	AA 063023
KY #18	AA 063665	BLOC #54	AA 063024
KY #19	AA 063666	BLOC #55	AA 063025
KY #20	AA 063667	BLOC #56	AA 063026
KY #21	AA 063668	BLOC #61	AA 063031
KY #22	AA 063669	BLOC #62	AA 063032
KY #27	AA 063674	MM #1	AA 061583
KY #28	AA 063675	MM #2	AA 061584
KY #29	AA 063676	MM #3	AA 061585
KY #30	AA 063677	MM #4	AA 061586
KY #37	AA 063684	MM #5	AA 061587
KY #38	AA 063685	MM #6	AA 061588
KY #39	AA 063686	MM #7	AA 061589
KY #40	AA 063687	MM #8	AA 061590
KY #47	AA 063694	MM #9	AA 061591
KY #48	AA 063695	MM #10	AA 061592
KY #49	AA 063696	MM #11	AA 061593
KY #50	AA 063697	MM #12	AA 061594

Table 1-4 (Continued)

CLAIM NAME	BLM SERIAL NO.	CLAIM NAME	BLM SERIAL NO.
MM #13	AA 061595	MM #61	AA 061643
MM #14	AA 061596	MM #62	AA 061644
MM #15	AA 061597	MM #63	AA 061645
MM #16	AA 061598	MM #64	AA 061646
MM #17	AA 061599	MM #65	AA 061647
MM #18	AA 061600	MM #66	AA 061648
MM #19	AA 061601	MM #67	AA 061649
MM #20	AA 061602	MM #68	AA 061650
MM #21	AA 061603	MM #69	AA 061651
MM #22	AA 061604	MM #70	AA 061652
MM #23	AA 061605	MM #71	AA 061653
MM #24	AA 061606	MM #72	AA 061654
MM #25	AA 061607	MM #73	AA 061655
MM #26	AA 061608	MM #74	AA 061656
MM #27	AA 061609	MM #75	AA 061657
MM #28	AA 061610	MM #76	AA 061658
MM #29	AA 061611	MM #77	AA 061659
MM #30	AA 061612	MM #78	AA 061660
MM #31	AA 061613	MM #79	AA 061661
MM #32	AA 061614	MM #80	AA 061662
MM #33	AA 061615	MM #81	AA 061663
MM #34	AA 061616	MM #82	AA 061664
MM #35	AA 061617	SLATE CREEK #3	AA 061801
MM #36	AA 061618	SLATE CREEK #4	AA 061802
MM #37	AA 061619	SLATE CREEK #5	AA 061803
MM #38	AA 061620	SLATE CREEK #6	AA 061804
MM #39	AA 061621	SLATE CREEK #7	AA 061805
MM #40	AA 061622	SLATE CREEK #8	AA 061806
MM #41	AA 061623	SLATE CREEK #9	AA 061807
MM #42	AA 061624	SLATE CREEK #10	AA 061808
MM #43	AA 061625	SLATE CREEK #11	AA 061809
MM #44	AA 061626	SLATE CREEK #12	AA 061810
MM #45	AA 061627	SLATE CREEK #13	AA 061811
MM #46	AA 061628	SLATE CREEK #14	AA 061812
MM #47	AA 061629	SLATE CREEK #18	AA 061813
MM #48	AA 061630	SLATE CREEK #19	AA 061814
MM #49	AA 061631	SLATE CREEK #20	AA 061815
MM #50	AA 061632	SLATE CREEK #21	AA 061816
MM #51	AA 061633	SLATE CREEK #22	AA 061817
MM #52	AA 061634	SLATE CREEK #23	AA 061818
MM #53	AA 061635	SLATE CREEK #24	AA 061819
MM #54	AA 061636	SLATE CREEK #25	AA 061820
MM #55	AA 061637	SLATE CREEK #26	AA 061821
MM #56	AA 061638	SLATE CREEK #27	AA 061822
MM #57	AA 061639	SLATE CREEK #28	AA 061823
MM #58	AA 061640	SLATE CREEK #29	AA 061824
MM #59	AA 061641	SLATE CREEK #30	AA 061825
MM #60	AA 061642	SLATE CREEK #31	AA 061826

Table 1-4 (Continued)

CLAIM NAME	BLM SERIAL NO.	CLAIM NAME	BLM SERIAL NO.
SLATE CREEK #32	AA 061827	MANE 52	AA 071964
SLATE CREEK #33	AA 061828	MANE 53	AA 071965
SLATE CREEK #34	AA 061829	MANE 54	AA 071966
SLATE CREEK #35	AA 061830	MANE 68	AA 071978
SLATE CREEK #36	AA 061831	MANE 69	AA 071979
SLATE CREEK #37	AA 061832	MANE 70	AA 071980
SLATE CREEK #38	AA 061833	MANE 71	AA 071981
SLATE CREEK #42	AA 061837	MANE 72	AA 071982
SLATE CREEK #43	AA 061838	MANE 73	AA 071983
SLATE CREEK #44	AA 061839	MANE 74	AA 071984
SLATE CREEK #45	AA 061840	MANE 98	AA 072002
SLATE CREEK #46	AA 061841	MANE 99	AA 072003
SLATE CREEK #47	AA 061842	MANE 100	AA 072004
SLATE CREEK #48	AA 061843	MANE 101	AA 072005
SLATE CREEK #49	AA 061844	MANE 102	AA 072006
SLATE CREEK #50	AA 061845	MANE 103	AA 072007
SLATE CREEK #51	AA 061846	MANE 104	AA 072008
SLATE CREEK #52	AA 061847	MANE 105	AA 072009
SLATE CREEK #53	AA 061848	MANE 106	AA 072010
SLATE CREEK #63	AA 061849	MANE 107	AA 072011
SLATE CREEK #64	AA 061850	MANE 108	AA 072012
SLATE CREEK #65	AA 061851	MANE 128	AA 072026
SLATE CREEK #68	AA 061854	MANE 129	AA 072027
SLATE CREEK #69	AA 061855	MANE 130	AA 072028
SLATE CREEK #70	AA 061856	MANE 131	AA 072029
SLATE CREEK #82	AA 061859	MANE 132	AA 072030
SLATE CREEK #83	AA 061860	MANE 133	AA 072031
SLATE CREEK #84	AA 061861	MANE 134	AA 072032
SLATE CREEK #85	AA 061862	MANE 135	AA 072033
SLATE CREEK #86	AA 061863	MANE 136	AA 072034
SLATE CREEK #87	AA 061864	MANE 137	AA 072035
SLATE CREEK #88	AA 061865	MANE 138	AA 072036
SLATE CREEK #89	AA 061866	MANE 139	AA 072037
SLATE CREEK #90	AA 061867	MANE 140	AA 072038
SLATE CREEK #94	AA 061869	MANE 141	AA 072039
SLATE CREEK #95	AA 061870	MANE 142	AA 072040
SLATE CREEK #96	AA 061871	MANE 143	AA 072041
SLATE CREEK #97	AA 061872	MANE 144	AA 072042
MANE 8	AA 071931	MANE 158	AA 072050
MANE 9	AA 071932	MANE 159	AA 072051
MANE 10	AA 071933	MANE 160	AA 072052
MANE 11	AA 071934	MANE 161	AA 072053
MANE 12	AA 071935	MANE 162	AA 072054
MANE 28	AA 071943	MANE 163	AA 072055
MANE 29	AA 071944	MANE 164	AA 072056
MANE 30	AA 071945	MANE 165	AA 072057
MANE 31	AA 071946	MANE 166	AA 072058
MANE 32	AA 071947	MANE 167	AA 072059
MANE 33	AA 071948	MANE 168	AA 072060
MANE 34	AA 071949	MANE 169	AA 072061
MANE 35	AA 071950	MANE 170	AA 072062
MANE 48	AA 071960	MANE 171	AA 072063
MANE 49	AA 071961	MANE 172	AA 072064
MANE 50	AA 071962	MANE 173	AA 072065
MANE 51	AA 071963	MANE 174	AA 072066

Table 1-5
Jualin (Hyak) Federal Unpatented Claims List

CLAIM NAME	BLM SERIAL NO.	CLAIM NAME	BLM SERIAL NO.
		Cinque	AA 045015
		Deuze	AA 045016
		Neuf	AA 045017
		Deux	AA 045018
		Une Fraction	AA 045019
Maria A Lode	AA 043684	Une	AA 045020
Maria B Lode	AA 043685	Contact No. 8	AA 045021
Maria C Lode	AA 043686	Contact No. 7	AA 045022
Thomas Fraction No. 6 Lode	AA 043687	Contact No. 6	AA 045023
Maria J Lode	AA 043688	Contact No. 11	AA 045024
Maria K Lode	AA 043689	Contact 111	AA 045025
Maria L Lode	AA 043690	Contact 1111	AA 045026
Maria Y Lode	AA 043691	Contact 1113	AA 045027
Maria Z Lode	AA 043692	Contact 1112	AA 045028
Contact No. 1	AA 043693	Contact 113	AA 045029
Contact No. 2 Lode	AA 043694	Contact 112	AA 045030
Contact No. 3 Lode	AA 043695	Contact No. 18	AA 045031
Contact No. 4	AA 043696	Contact No. 17	AA 045032
Contact No. 5 Lode	AA 043697	Contact No. 16	AA 045033
Thomas No. 8 Lode	AA 043698	Contact No. 15	AA 045034
Thomas No. 1 Lode	AA 043887	Contact No. 14	AA 045035
Thomas No. 2 Lode	AA 043888	Contact No. 13	AA 045036
Thomas No. 3 Lode	AA 043889	Contact No. 12	AA 045037
Thomas No. 4	AA 043890	Martha Extension	AA 045668
Thomas No. 5	AA 043891	Brownie	AA 045669
Thomas No. 6 Lode	AA 043892	Sewanee	AA 045670
Thomas No. 7 Lode	AA 043893	Drake Esquire	AA 045671
Thomas Fraction	AA 043894	Maria G Extension	AA 045672
Thomas Millsite	AA 043895	Mr. Cheney	AA 045673
Maria D Lode	AA 043896	Pretty Patti Fraction	AA 045674
Maria E Lode	AA 043897	Mr. Frost Fraction	AA 045675
Maria F Lode	AA 043898	Contact 118 Fraction	AA 045676
Maria G Lode	AA 043899	Contact 1114	AA 045677
Maria H Lode	AA 043900	Contact 114	AA 045678
Maria I Lode	AA 043901	Contact 115	AA 045679
Maria F Extension	AA 043902	Contact 1115	AA 045680
Martha	AA 043903	Contact 1116	AA 045681
Poncin	AA 043904	Contact 116	AA 045682
Sue Dean	AA 045000	Contact 117	AA 045683
COONJOHN	AA 045002	Contact 1117	AA 045684
Sally	AA 045003	Contact 1118 Fraction	AA 045685
Christina	AA 045004	Jana	AA 045686
Stacey Fraction	AA 045005	Denise	AA 045687
Margen Fraction	AA 045006	Monica	AA 045688
Kristen	AA 045007	Carolyn	AA 045689
Robert 3	AA 045009	Shannon	AA 045690
Robert Fraction No. 2	AA 045010	Lisa	AA 045692
Robert 4	AA 045011	Robinson	AA 045693
Leo Stewart Fraction	AA 045014	Drake	AA 045694

Table 1-5 (Continued)

CLAIM NAME	BLM SERIAL NO.	CLAIM NAME	BLM SERIAL NO.
Frost	AA 045695	DZ-17	AA 054419
Wiley Fraction	AA 045696	DZ-18	AA 054420
Annie Fraction	AA 045697	DZ-19	AA 054421
Sara	AA 045698	DZ-20	AA 054422
Kathryn	AA 045699	DZ-21	AA 054423
Annie Fraction 2	AA 045700	DZ-22	AA 054424
Sandy Anne Fraction	AA 045701	DZ-23	AA 054425
Sara Fraction	AA 045702	DZ-24	AA 054426
Kathryn Fraction	AA 045703	ZACH 1	AA 77798
Robert 1	AA 050215	ZACH 2	AA 77799
Robert 2	AA 050216	ZACH 3	AA 77800
Robert Fraction	AA 050217	ZACH 4	AA 77801
DZ-1	AA 054403	ZACH 5	AA 77802
DZ-2	AA 054404	ZACH 6	AA 77803
DZ-3	AA 054405	ZACH 7	AA 77804
DZ-4	AA 054406	ZACH 8	AA 77805
DZ-5	AA 054407	ZACH 9	AA 77806
DZ-6	AA 054408	ZACH 10	AA 77807
DZ-7	AA 054409	ZACH 11	AA 77808
DZ-8	AA 054410	ZACH 12	AA 77809
DZ-9	AA 054411	ZACH 13	AA 77810
DZ-10	AA 054412	ZACH 14	AA 77811
DZ-11	AA 054413	LAKE 1	AA 77812
DZ-12	AA 054414	LAKE 2	AA 77813
DZ-13	AA 054415	LAKE 3	AA 77814
DZ-14	AA 054416	LAKE 4	AA 77815
DZ-15	AA 054417	LAKE 5	AA 77816
DZ-16	AA 054418	LAKE 6	AA 77817

Table 1-6
Kensington State of Alaska Unpatented Claims List

Claim Name	Number
KNS 65 FRACTION	ADL 337383
KNS 66 FRACTION	ADL 337384
KNS 67 FRACTION	ADL 337385
KNS 68 FRACTION	ADL 337386
KNS 69 FRACTION	ADL 337387
KNS 70 FRACTION	ADL 337388
ELLEN	ADL 514549

Table 1-7
Jualin State of Alaska Unpatented Claims List

Claim Name	Number
Lucky Chance	ADL 349102
Hyak No. 1 Amended	ADL 309740
Hyak No. 2 Amended	ADL 309741
Hyak No. 3 Amended	ADL 309742
Hyak No. 4	ADL 323364
Hyak No. 5	ADL 323365
Hyak No. 6	ADL 323366
Hyak No. 7	ADL 323367
Hyak No. 8	ADL 323368
Hyak No. 9	ADL 503245
Hyak No. 10	ADL 503246
Hyak No. 10A	ADL 503247
Hyak No. 11	ADL 503248
Hyak No. 1A	ADL 509891
Hyak No. 1B	ADL 509892
Casey 12	ADL 563240

2. SITE CONDITIONS

2.1 Climate

The climate at the Kensington Gold Project site is similar to that of Juneau. It is a maritime climate without large diurnal and seasonal temperature variations. Temperature extremes are limited in this temperate oceanic climate because onshore winds carry the cool, maritime air inland.

Meteorological data collected at the Kensington project site and at the Jualin Mine from October 1995 through October 1997 provide information on the climate at the location of the proposed activities (Earthworks, 2002a). At each monitoring site, instrumentation (to measure wind speed, wind direction, temperature, and precipitation) was mounted on a 10-meter tower in a forest clearing near areas where proposed Kensington mining activities would occur. The temperatures at the Kensington and Jualin sites demonstrate the maritime effects: they are reasonably uniform and lack large daily variations.

The Kensington and Jualin sites had similar temperature ranges during the 2-year monitoring period. The average annual temperature was 39.0 degrees Fahrenheit (°F) for the Kensington site and 38.8 °F for the Jualin site. Winter temperatures generally ranged from lows of 20 to 30 °F to highs near 40 °F. Summer high temperatures were near 60 °F, while the lows were typically around 55 °F. The maximum recorded temperature during the period was 82 °F, and the minimum recorded temperature was minus 8.9 °F (TRC, 1998a, 1998b).

Eldred Rock weather station has operated over a long period (1941, and 1943 to 1973). It is the closest National Weather Service-certified weather station to the Kensington site (approximately 6 miles north). The average annual temperature for the Eldred Rock weather station was 41.4 °F. The lowest temperature recorded was –20 °F.

Rainfall is heavy and frequent at the Kensington site. Precipitation occurs at least 180 days per year. Limited precipitation data collected at on-site monitoring stations showed annual precipitation rates between 63 and 81 inches.

Based on on-site measurements, the wettest month of the year is September, which received an average monthly rainfall of 10.8 inches during the collection period. The driest month is April, which received an average of 2.3 inches. An examination of long-term precipitation data from Eldred Rock indicates that on 29 days per year precipitation amounts exceeded 0.5 inch per day, on 52 days rainfall exceeds 0.25 inch per day, and on 106 days rainfall exceeds 0.1 inch per day. Based on measurements, at least 1.0 inch of snow falls approximately 48 days per year.

Precipitation, including snow, increases significantly from sea level to the top of Lions Head Mountain at 5,500 feet. Based on the long-term precipitation data for Eldred Rock, the following average annual precipitation values correspond to elevation: sea level = 47 inches; 800 feet = 58 inches; 5,000 feet = 200 inches (Knight Piésold, 1996). Table 2 presents the collected monthly distribution of precipitation at the 800-foot elevation from historic values collected at the Eldred Rock weather station. Approximately 40 percent of annual precipitation falls during September, October, and November. The 24-hour probable maximum precipitation event at the site is 17.26 inches (Forest Service, 1997a). Average annual evaporation at the site is approximately 17 inches, most of which occurs from April through September (Knight Piésold, 1990).

The long-term wind flow patterns are significantly different between the Kensington monitoring site and the Jualin monitoring site. Winds blow predominantly from the east through southeast at the Kensington site and from the north through northeast at the Jualin site. This difference in wind direction can be attributed to drainage flows at the two sites. Winds tend to follow the Sherman Creek canyon axis at the Kensington site, with only rare occasions of cross-canyon airflow because the wind is channeled up and down the valley. The winds at the Jualin site are channeled along the Johnson Creek drainage. Down-valley wind flow dominates at both sites because of the air density differences that develop between the top and bottom of each valley.

Table 2

Average Monthly Precipitation at 800-Foot Elevation for the Project Area

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Precipitation (inches)	4.1	4.8	3.3	2.6	3.0	2.2	3.1	4.5	7.5	11.0	6.8	5.4	58.3
Percentage of Annual	6.9	8.3	5.7	4.5	5.2	3.8	5.3	7.8	12.8	18.9	11.7	9.2	100.0

Note: Precipitation data were estimated by increasing values from Eldred Rock Station (1941; 1943–1973) by 25 percent to account for orographic effects.

Source: Forest Service, 1997a.

The project site is characterized by relatively low average wind speeds. The average wind speed is 4.3 miles per hour at the Kensington site and 2.2 miles per hour at the Jualin site. High-wind episodes are unusual at either site. The low wind speeds are caused, in part, by the sheltering effect of the trees.

2.2 Geology

The Kensington gold deposit occurs within a structurally sheared portion of the regionally metamorphosed Jualin Diorite stock. It has features typical of many mesothermal gold-quartz deposits, including a simple deposit mineralogy, an apparent absence of chemical zonation, low sulfide content, and low abundances of most metals (Figure 3).

The 1992 FEIS provides a description of the geology in the Sherman Creek valley applicable to the Kensington side of the operation. This valley was formed by glaciers that deposited dense, silty clay tills, ranging from a thin layer to over 180 feet in thickness, over bedrock. In some areas, relatively clean alluvial sands and gravels overlie the till.

Geologic mapping and a geophysical seismic refraction survey conducted in 2002 in the vicinity of the tailings storage facility on the Jualin side show that slate bedrock is at or near (less than 1 foot) ground surface, with a surface material of moss and organics

known as muskeg (Knight Piésold, 2002). The bedrock is heavily fractured on the surface (upper 12 to 20 inches), steeply dipping and striking north-south. Glacial deposits of till and glacio-fluvial sand and gravel likely constitute some of the terraces that form Upper and Lower Slate lakes (Knight Piésold, 2002). Overall, the regionally extensive nature of the glaciation suggests that the geology in the Johnson and Slate creek drainages is similar to that of the Sherman Creek Valley.

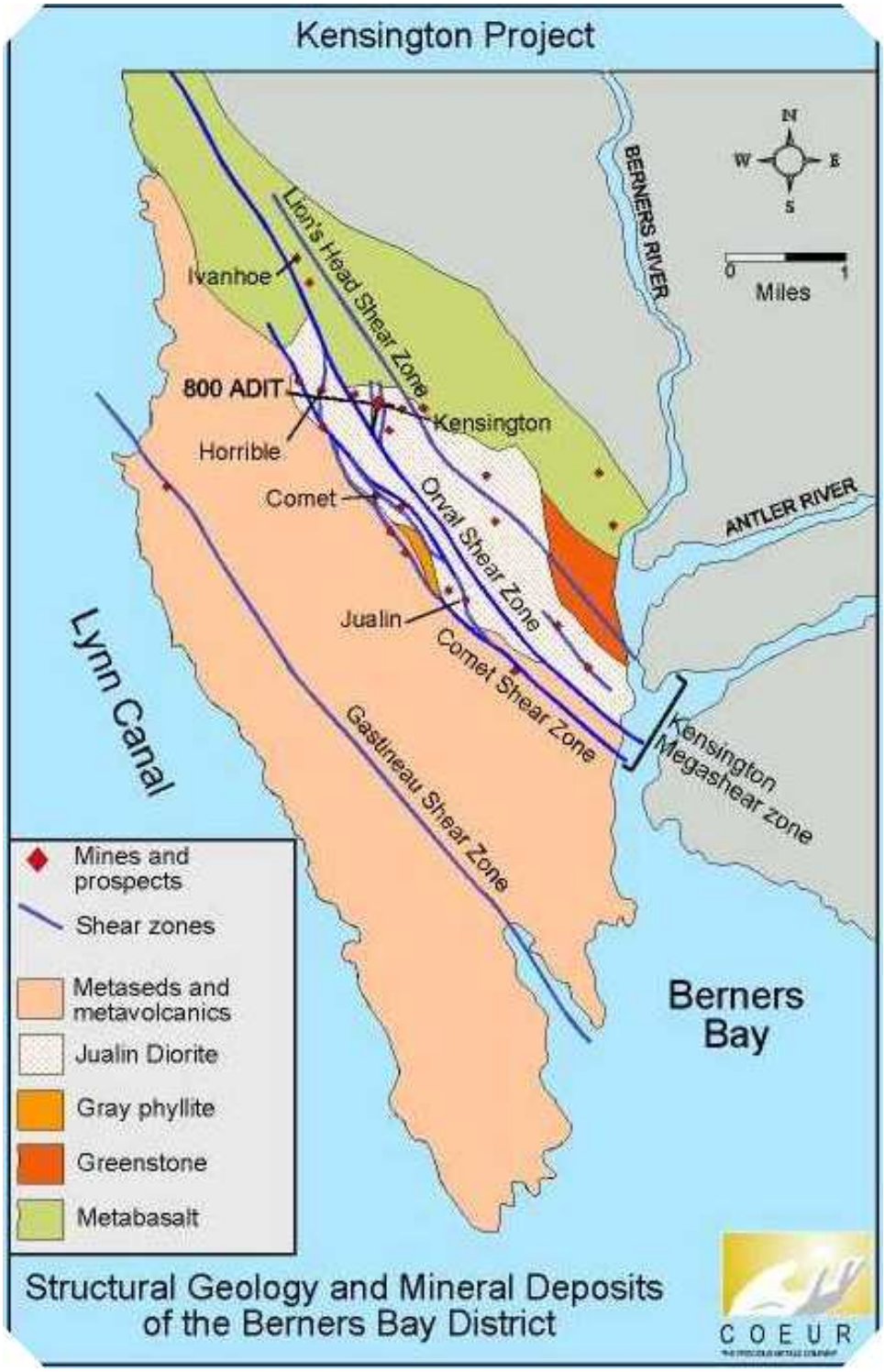
Mineralization occurs within a north-trending, east-dipping zone of discontinuous, en echelon (parallel) veins and vein swarms. The veins are composed primarily of quartz. Pyrite is virtually the only sulfide mineral, with trace amounts of chalcopyrite. Gold occurs in the mineral calaverite ($AuTe_2$) and native gold, in pyrite inclusions and along microfractures. Trace amounts of other tellurite minerals, petzite, coloradoite, and altaite, have been detected (Coeur, 1996).

Seismicity

Several seismicity studies for the Kensington Project area have been conducted in recent years. SRK Inc. and Woodward-Clyde Consultants carried out a regional seismicity study for Echo Bay Alaska Inc. for the A-J Project, located near Juneau. In addition, Geometrix Consultants Incorporated conducted a fault study of the Kensington Project area. The results of these studies were extended by Knight Piésold to assess the seismic design criteria for the previously proposed Sherman Creek tailings storage facility, located approximately 3 miles from the Slate Creek Lakes site. The findings of these studies have been reviewed and incorporated into the present study prepared for the proposed Slate Creek Lake Dam. Recent seismic hazard information for Southeast Alaska provided by the United States Geological Survey (USGS) has also been incorporated into this study.

Figure 3

General Geology of the Berners Bay District



Ore Characteristics

The majority of sulfides are contained within the ore zone (SRK, 1996b); pyrite concentrations in the surrounding waste rock range from zero to less than 1 percent, increasing with proximity to the ore body (Apel, 1994). Gold content is directly related to the volume of pyrite (Forest Service, 1992, 1997a) because it occurs almost exclusively as very fine grains (< 50 microns) along pyrite grain boundaries (EBE Inc., 1990).

The 1997 FSEIS concluded that ore material does not pose a significant risk of acid rock drainage or metal release based on ore characterization studies. These studies include static acid-base accounting (ABA) tests, whole rock trace metals analyses, kinetic humidity cell tests, a meteoric water mobility test (MWMT), and a toxicity characteristic leaching procedure (TCLP), which are described and summarized by SAIC (1997), SRK (1996b), and Geochemica Inc. and Kensington Venture (1994).

The ratio of neutralization potential to acidification potential (NP:AP) was used to predict the risk of acid rock drainage. Material with an NP:AP ratio greater than 3 poses little risk of acidification, while material with an NP:AP ratio less than 1 can potentially produce acid. Ratios between 1 and 3 are inconclusive (BLM, 1996).

Geochemica Inc. and Kensington Venture (1994) determined the NP:AP ratio of 591 ore samples collected from 39 drill holes. These determinations were even somewhat conservative because potential acidity was calculated from total sulfur rather than just sulfide sulfur. On the basis of a length-weighted average of the samples from each drill hole, 1 of 39 drill holes had an NP:AP ratio less than 3 (Geochemica Inc. and Kensington Venture, 1994). SAIC (1997) evaluated the NP:AP data on an individual (non-weighted average) sample basis, excluding data from 10 of 591 samples for which only partial data were collected. On an individual basis, 39 percent had an NP:AP greater than 10, while 21.8 percent had an NP:AP between 1 and 3 and 8.1 percent had an NP:AP of less than 1. The remaining 31.1 percent of samples had NP:AP ratios between 3 and 8. The individual drill core samples had a mean sulfur content of 1.30 percent (range from 0.01 to 22.0 percent), while length-weighted samples had a mean sulfur content of 1.27 percent (range

from 0.4 to 30.8 percent). A summary of the acid neutralizing potential of the ore and development (waste) rock is shown in Figure 4.

The low acidification potential of over 90 percent of the ore tested is also supported by consistently neutral pH values measured in mine water drainage (Earthworks, 2003; SAIC, 1997) and in leachate collected during humidity cell testing of a bulk ore sample considered to have above-average (1.94 percent) sulfur content (SRK, 1996b).

Waste Characteristics

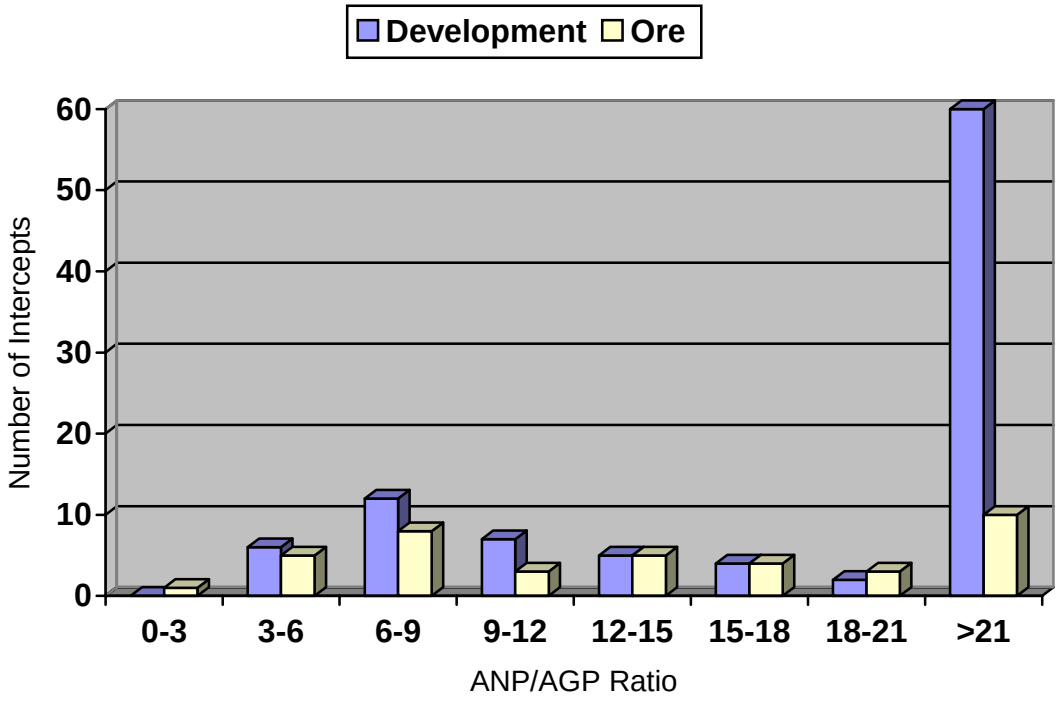
Waste rock from the Kensington deposit is primarily slightly altered to unaltered diorite, although minor amounts (less than 5 percent) of metabasalt might also be mined (SAIC, 1997). Methods and results of acid-base accounting on 94 development rock samples were originally reported by Geochemica Inc. and Kensington Venture (1994) and are summarized in Figure 4 which shows a strong neutralizing potential for all of the samples collected. A summary of these and the other tests is given by SRK (1996b) and SAIC (1997).

SAIC (1997) compiled ABA results for 108 samples originally reported by Geochemica Inc. and Kensington Venture (1994) and SRK (1996b). Seventy-five samples were representative of waste rock in the expected development area (Group 1A and 1B samples), while the remainder represented waste rock from nearby areas outside the expected development area (Group 2 samples). All samples had NP:AP values exceeding 3, and 42 of the 75 Group 1 samples had NP:AP values greater than 50, indicating minimal potential to generate acid rock drainage.

No evidence of acidic drainage or adverse impacts on the environment have been observed due to weathering of historical (up to 80 years old) waste rock piles present in the district (Geochemica Inc. and Kensington Venture, 1994). Runoff from the existing Kensington mine development rock pile monitoring has shown consistently neutral pH.

Figure 4

Distribution of Acid Neutralizing



Distribution of Acid Neutralizing Potential vs. Acid Generating Potential
of 94 Development Rock and 39 Ore Sample Analyses

Tailings Characteristics

Acid-base accounting tests showed the tailing solids to be net-neutralizing. As sulfide is removed from the tailings during processing, this material is more strongly neutralizing than waste rock produced during project operations (SRK, 1996b). Montgomery Watson (1996b) determined the total sulfur content to be 0.04 percent, corresponding to an NP:AP of 83, while SRK (1996b) measured a total sulfur content of 0.02 percent, corresponding to an NP:AP of 166. As is the case for ore and waste rock characterization, potential acidity was conservatively determined based on total sulfur, rather than sulfide sulfur, concentration.

2.3 Air

The air quality in the vicinity of the Kensington Gold Project site is good, with air pollutant concentrations well below ambient standards. The nearest stationary air pollution sources, other than those at the Kensington site, are 35 miles away at Haines. The absence of nearby air pollution sources, along with abundant rainfall, suggests that existing background pollutant concentrations at the Kensington site are low. On rare occasions, elevated PM_{10} concentrations are present in the project area when wood smoke or smoke from fires is carried south from the Yukon by northerly winds (Guay, 2003, personal communication).

No air pollutant monitoring data sets are available from the Kensington site or in the immediate vicinity. However, air pollutant background data were measured in the general area of the project site and are adequate to characterize the airshed where the Kensington project is located (ADEC, 2003). These background data are given in Table 3. All background pollutant concentrations are below national and Alaska Ambient Air Quality Standards. The lack of existing sources of air pollutant emissions in the area and the low representative background concentrations indicate that the area is in compliance with the NAAQS. USEPA has designated the geographic region either "attainment" or "unclassifiable" for all criteria pollutants (18 AAC 50.015). This means that the region meets the ambient air quality standard for each pollutant or there are insufficient data to make a determination. Any area that does not meet the ambient air quality standard for a given pollutant is designated "non-attainment" by USEPA.

Table 3

Background Pollutant Concentrations

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)[a]
Nitrogen oxides	Annual	3
Sulfur dioxide	3-hour	9.8
	24-hour	7.2
	Annual	2.6
Particulate matter less than 10 microns in diameter (PM_{10})	24-hour	7.9
	Annual	1.8

[a] Micrograms per cubic meter.

2.4 Water

Surface Water Resources

The three watersheds that occur within the Kensington Gold Project area are: Sherman Creek (Figure 5), Slate Creek (Figure 6), and Johnson Creek (Figure 7). The three primary creeks are perennial and terminate at tidewater in Lynn Canal (Sherman Creek) and Berners Bay (Johnson and Slate creeks). The following facilities will be located within these drainage basins:

- Sherman Creek: The Kensington 800 – Level Mine Portal (access to underground) and the water treatment plant to treat the underground mine drainage.
- Slate Creek: Tailings Storage Facility with associated ancillary facilities including the diversion dam and pipeline, the slurry and reclaim pipelines, and access roads.
- Johnson Creek: The Jualin 1000 Foot Level Portal (access to underground) Kensington access tunnel, slurry and reclaim lines, access roads, surface water supply, mill and office complex.

Figure 5

Sherman Creek Drainage

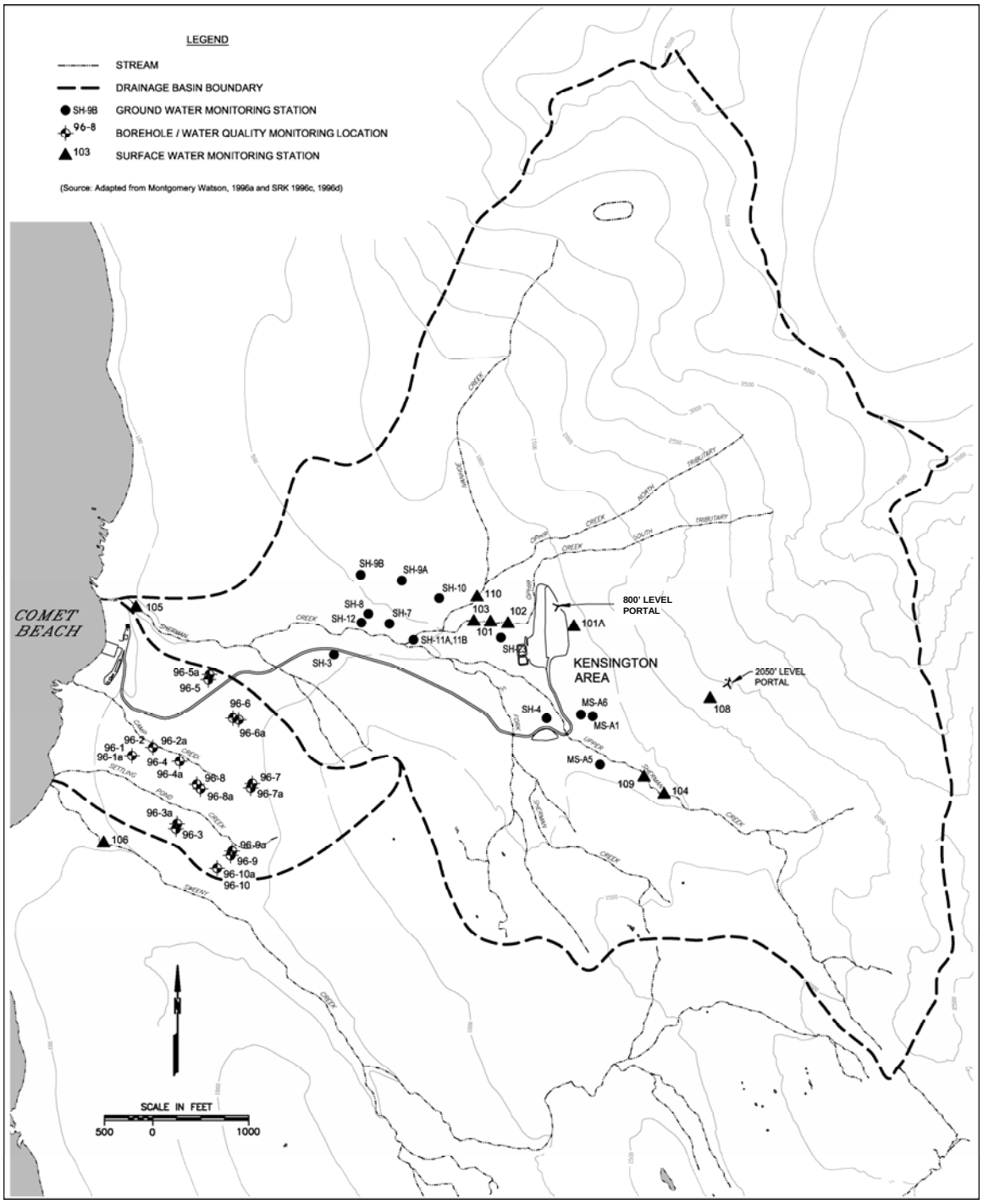


Figure 6

Slate Creek Drainage

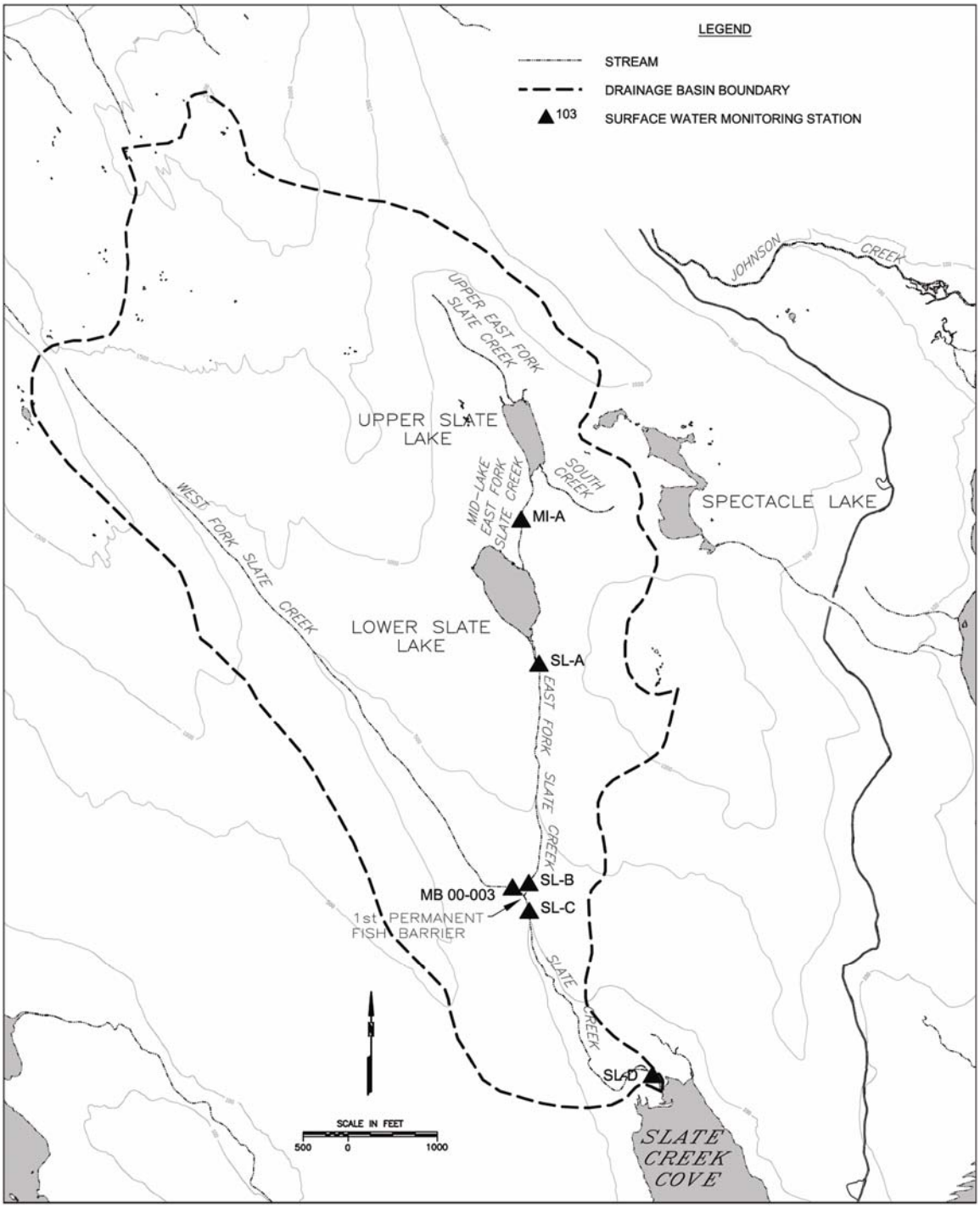
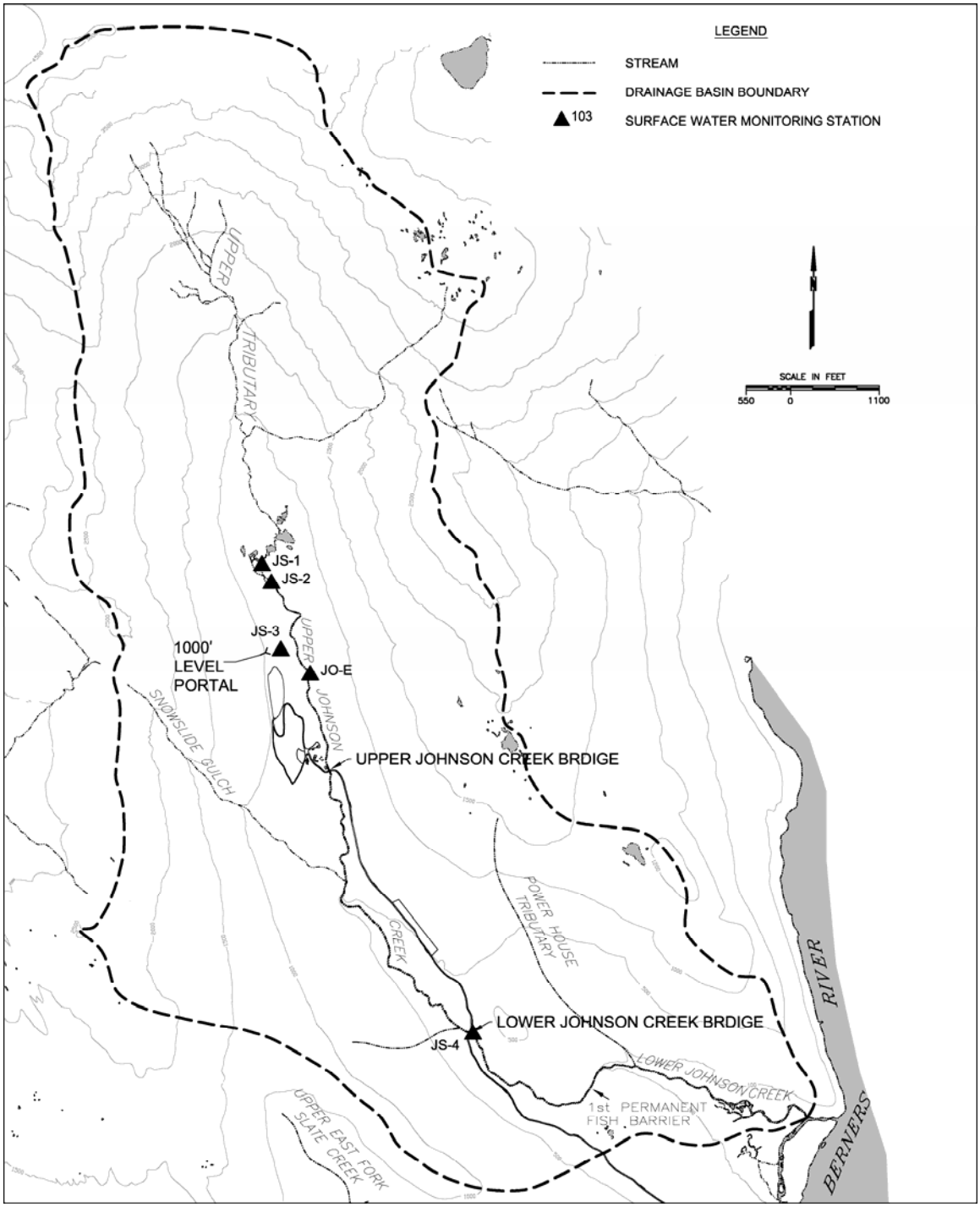


Figure 7

Johnson Creek Drainage



Sherman Creek (Figure 5) flows west from Lions Head Mountain to Lynn Canal at Comet Beach. This watershed has a drainage area of 2,681 acres, and its elevation ranges from sea level to approximately 5,500 feet. The four principal tributaries of Sherman Creek, from north to south, are Ivanhoe Creek, Ophir Creek, Upper Sherman Creek, and South Fork Sherman Creek. These subbasins are characterized by high channel densities or numerous, unnamed intermittent channels that join to form Lower Sherman Creek. The upper portions of these drainages typically are above timberline, with steep, actively eroding bedrock slopes affected by avalanches and rockslides. Channel gradients are lower, and vegetation covers most of the lower portions of the Sherman Creek watershed. The streambed in Sherman Creek and its tributaries are composed primarily of cobbles and boulders.

Mine water flows from the 800-foot level adit into the treatment system and then discharged via NPDES outfall 001 to South Fork Ophir Creek. From 1987 through 1995, the mine water flow ranged from 0.16 to 1.71 cubic feet per second (cfs), with a mean flow of 0.85 cfs (Forest Service, 1997a).

Measurements of flow in Lower Sherman Creek near its mouth in 1987 through 1995 ranged from 2.3 to 105 cfs (SAIC, 1997). Based on a regression equation developed for the Forest Service, average annual flow for the mouth of Sherman Creek is calculated at 43 cfs, and the 20-year, 7-day low flow is 1.53 cfs (Forest Service, 1992). The following storm flows were calculated by the Forest Service (1992) for the mouth of Sherman Creek: 25-year, 24-hour storm = 1,025 cfs; 100-year, 24-hour storm = 1,656 cfs; and probable maximum precipitation (PMP) event = 2,491 cfs. A long-term record of flow measurements has not been established for Sherman Creek. Therefore, SAIC (1997) used a regional analysis procedure to estimate monthly and annual flow variations. Table 4 shows the estimated average monthly flows for Lower Sherman Creek derived from the regional analysis.

Table 4
Estimated Average Monthly Stream Flow for Sherman Creek at Mouth (in cfs)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Stream flow	9.1	8.4	9.4	15.8	44.0	45.1	30.9	31.6	34.9	36.7	21.4	10.2	NA
Percentage of annual	3.1	2.7	3.3	5.2	15.0	14.8	10.5	10.8	11.6	12.5	7.1	3.4	100.0

Notes: Sherman Creek flow distribution calculated as an average of seven regional stations and historical Sherman Creek data.

cfs = cubic feet per second. NA = not applicable.

Source: SAIC, 1997.

Slate Creek (Figure 6) drains south-southeast to Slate Creek Cove on the west side of Berners Bay. This watershed has a total drainage area of 2,600 acres (4.06 square miles) and ranges in elevation from sea level to approximately 2,500 feet. Two tributaries compose Slate Creek: West Fork Slate Creek (1,179 acres) and East Fork Slate Creek (832 acres). The middle reach of East Fork Slate Creek drains through two small lakes: Upper Slate Lake (elevation 740 feet) and Lower Slate Lake (elevation 650 feet). The proposed TSF will be located in Lower Slate Lake. The east and west forks of Slate Creek merge approximately 4,000 feet downstream of the lower lake.

Upper Slate Lake covers a surface area of approximately 12 acres. The lake is about 1,200 feet long and has an average width of about 430 feet. Lower Slate Lake, with a surface area of approximately 20 acres, is nearly 1,600 feet long and has an average width of about 600 feet. The maximum depth of Upper Slate Lake is approximately 43 feet; the maximum depth of Lower Slate Lake is approximately 51 feet. The two lakes are on a relatively flat, south-facing terrace in the middle portion of the East Fork Slate Creek watershed.

Based on a regression equation developed for the Forest Service, average annual flow near the mouth of Slate Creek is about 34 cfs (Forest Service, 1992). Instantaneous flow measurements made in 2000 and 2001 by HDR Alaska, Inc., (2001, 2003) for Slate Creek near its mouth (SL00-D) and at the outlet of Lower Slate Lake (SL00-A) are presented in Table 5.

Konopacky Environmental (1995) also measured flow along Slate Creek in mid-July 1994 with the following results: Slate Creek near mouth = 2.47 cfs (July 16, 1994); East Fork Slate Creek above confluence with West Fork Slate Creek = 1.30 cfs (July 17, 1994); and East Fork Slate Creek above Lower Slate Lake = 1.26 cfs (July 17, 1994).

Table 5
Flow Measurements for Slate Creek and East Fork Slate Creek in 2000 and 2001

Station Location	6/29/00	7/12/00	8/23/00	9/13/00	10/11/00	11/29/00	12/13/00
Slate Creek near mouth (SL-D)	13.40	3.60	22.05	15.40	51.80	10.60	6.60
Slate Creek below confluence of East and West forks (SL-C)	NM	3.62	22.65	14.18	44.61	NM	NM
East Fork Slate Creek above confluence with West Fork (SL-B)	NM	1.48	9.17	4.59	22.04	NM	NM
East Fork Slate Creek at lower lake outlet (SL-A)	6.00	1.47	7.30	4.80	16.80	3.50	4.40
	1/24/01	**6/6/01**	**7/25/01**	**8/29/01**	**9/26/01**	**10/17/01**	---
Slate Creek near mouth (SL-D)	19.36	13.31	23.83	17.86	23.42	22.15	---
Slate Creek below confluence of East and West forks (SL-C)	17.19	10.23	15.96	14.21	17.74	14.24	---
East Fork Slate Creek above confluence with West Fork (SL-B)	8.79	4.50	3.85	4.25	7.24	7.52	---
East Fork Slate Creek at lower lake outlet (SL-A)	4.54	4.41	3.00	NM	7.31	6.36	---

Note: All flow measurements in cubic feet per second (cfs). NM = not measured.

Source: Earthworks, 2003b; HDR Alaska, Inc., 2001.

Low flow (20-year, 7-day recurrence interval) calculated for the mouth of Slate Creek using a regression equation developed for the Forest Service is 0.62 cfs (Forest Service, 1992). The following storm flows were calculated by the Forest Service (Forest Service, 1992) for the mouth of Slate Creek: 25-year, 24-hour storm = 173 cfs; 100-year, 24-hour storm = 355 cfs; and the PMP event = 1,584 cfs. Table 6 shows the estimated average monthly flows for East Fork Slate Creek and West Slate Creek derived from the same regional analysis previously discussed for Sherman Creek.

Approximately 0.5 mile of the proposed access road and tailings pipeline between the Jualin Mine Site and proposed tailings impoundment at Lower Slate Creek Lake would

extend into a small drainage basin that contains Spectacle Lake. Water draining from the basin flows east to Berners Bay between Slate Creek and Johnson Creek.

Table 6
Estimated Average Monthly Stream Flow for Slate Creek (in cfs)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
East Fork Slate Creek at confluence	3.0	3.8	3.1	4.9	9.0	7.6	5.1	6.0	9.1	10.2	6.8	3.8
West Slate Creek at confluence	2.6	3.5	2.9	5.9	12.2	10.4	6.4	7.5	11.1	11.9	7.6	3.5

Note: Slate Creek flow distribution calculated as an average of seven regional stations. cfs = cubic feet per second.

Source: Earthworks, 2003b.

Johnson Creek (Figure 7) drains south-southeast from Lions Head Mountain to the ocean at Berners Bay. The total drainage area for this watershed is approximately 3,610 acres (5.64 square miles), ranging in elevation from sea level to 5,500 feet (Konopacky, 1995). One small tributary channel, known as Snowslide Gulch, joins Johnson Creek about 0.5 mile below the historic Jualin Mine site. Power House tributary flows into Johnson Creek from the north nearly 1 mile upstream from the creek's mouth.

From June 2000 through September 2001, several flow measurements were obtained in Johnson Creek near the Jualin Mine site (Table 7). The monitoring station (J000-E) is at an elevation of about 650 feet, approximately 2.5 miles upstream from the mouth at Berners Bay. The drainage area above this station is about 1,600 acres (2.5 square miles). Instantaneous flow measurements ranged from 33 to 42 cfs for June through September 2000, declining to approximately 8 to 14 cfs from November 2000 through January 2001 (HDR Alaska, Inc., 2001, 2003). In June, July, and September 2001, Johnson Creek flow was in the range of 31 to 97 cfs. Flow measurements by Konopacky Environmental (1996b) in mid-July 1995 were 92 cfs for lower Johnson Creek and 54 cfs for upper Johnson Creek.

Table 7
Flow Measurements for Johnson Creek in 2000 and 2001

Flow (in cfs) at Johnson Creek Next to Jualin Mine (J0-E)					
6/30/00	7/12/00	8/23/00	9/13/00	11/29/00	12/13/00
33.10	34.90	41.50	40.00	11.70	13.90
1/24/01	6/6/01	7/25/01	9/26/01		
7.61	49.15	96.95	31.78		

Source: HDR Alaska, Inc., 2001, 2003.

Groundwater Resources

Groundwater studies were initiated in 1988, and most information was collected through 1995. This section summarizes key groundwater information from the documents listed above, as well as more recent information obtained since 1997.

Groundwater flow in the project area generally follows topography, moving from the higher mountains down to the valley bottoms and eventually to the ocean. Recharge to the groundwater system is primarily from direct infiltration of precipitation and snowmelt. Most streams gain flow from the upper to lower reaches; therefore, the streams are not a major source of groundwater recharge. The rate of groundwater recharge at the project site is estimated at 15 to 20 percent of annual precipitation (SAIC, 1997).

Underground Mine Area

Groundwater flow encountered during underground exploration activities at the Kensington Mine (beneath the Sherman Creek and Johnson Creek watersheds) has been variable, ranging from about 100 to 400 gpm, or 0.22 to 0.9 cfs (SAIC, 1997). Approximately 1,800 gpm (4.0 cfs) is estimated for average initial groundwater flow into the production-scale underground mine workings (SAIC, 1997).

Most groundwater enters the underground workings along a fracture system that trends northwest-southeast. Variations in flow are due to changes in hydraulic head and permeability or hydraulic conductivity of the fracture zone in three dimensions, as well as monthly variations in precipitation and infiltration. Typically, groundwater flow is highest in mine workings for a short time after they are initially opened, after which water in

storage is drained and flow rates decrease to a more constant rate based on recharge in the surrounding area. Based on water pressure measured in borings inside the Kensington Mine in 1996, the maximum water table in bedrock was estimated at an elevation of approximately 1,700 feet.

Sherman Creek Area

A total of 14 groundwater monitoring wells or piezometers were installed in the Sherman Creek drainage as part of previous baseline studies. In addition, 19 wells or piezometers were installed in the proposed DTF area.

The Sherman Creek watershed typically is composed of peat and organic soil that overlies sandy glacial till and bedrock. Alluvial sand and gravel deposits are also present along drainage channels and some terraces. The DTF site associated with Alternative A is on a terrace where the unconsolidated soil and alluvial deposits are up to 30 feet thick. The underlying glacial till is up to 200 feet thick in places, overlying bedrock of phyllite and slate (Forest Service, 1997a).

Perched groundwater typically is present at the contact between alluvium and underlying glacial till, and regional groundwater is present in the bedrock. The depth to groundwater in these areas typically is less than 20 feet, including artesian conditions; however, some measurements show groundwater 30 to 55 feet below ground surface (Forest Service, 1997a). Hydraulic conductivity measured in the major hydrogeologic units of glacial till and bedrock is approximately 10^{-6} and 10^{-5} centimeters per second, respectively, but it varies considerably in bedrock near fracture/fault zones (SAIC, 1997). Natural groundwater gradients range from 0.06 to 0.20 foot per foot (SAIC, 1997). Most groundwater in the project area likely flows through preferential pathways in the glacial till (gravel/sand lenses) and bedrock (fractures/faults).

Lower Slate Lake

No specific groundwater information is available for the area surrounding Lower Slate Lake. Geologic mapping and a geophysical seismic refraction survey conducted in 2002 in the vicinity of the proposed impoundment embankment show that slate bedrock is at or near (< 1 foot) ground surface, with a surface material of moss and organics (muskeg)

(Knight Piésold, 2002). The bedrock is heavily fractured on the surface (upper 12 to 20 inches), steeply dipping and striking north-south. Glacial deposits of till and glacio-fluvial sand/gravel likely compose some of the terraces forming Upper and Lower Slate lakes (Knight Piésold, 2002). The Slate lakes might provide some recharge for groundwater flow that travels down the watershed to the ocean, primarily through secondary openings in the bedrock; however, the surficial organic deposits and glacial till would likely have low permeability.

2.5 Soils, Vegetation and Wetlands

Soils

The following discussion is based on the information presented in the 1992 FEIS, a report by IME (1991a), and soil mapping data collected by the Forest Service. Soils form slowly, influenced by parent material, climate, vegetation, topography, and time. In Southeast Alaska glaciation and climate are the largest influences in soil development. Recent glaciation has reduced the period of time during which soil formation processes have had to work, resulting in the presence of "young" soils throughout the area. Glacial movement scraped some surfaces down to bedrock, and receding glaciers left behind pockets of glacial till material. Both conditions occur within the study area. The cool, wet climate enhances the growth of vegetation, which serves as a source of organic material. Because of the temperature and moisture levels, organic materials decompose slowly, resulting in many areas where organic materials greatly exceed the mineral content of the soil. Muskegs are a typical example where the soil resource primarily consists of organic material.

The size distribution of particles within a soil determines its texture, which can range from larger sand particles to very fine particles of clay. ABR (2000c) noted that upland soils in the vicinity of the Jualin Mine were moderately well-drained thin silt or sandy soils spread over bedrock or glacial till. Soils in the vicinity of the Kensington Mine were also described as thin and silty, overlaying silty or clayey glacial tills (IME, 1991a).

Wetland soils tended to be thick, consisting of organic material or silty loams (IME, 1991a).

Soil productivity and erodibility are important properties that need to be considered in assessing potential impacts on the soil resource. *Productivity* refers to a combination of texture, nutrient levels, and drainage, reflected in the vigor of vegetation supported by a particular soil. Therefore, the most productive soils are those that support the largest volume of timber. Within the study area, the most productive soils are those that have better drainage and produce high volumes of Sitka spruce. *Erodibility* refers to the tendency of a soil to be worn away by water, wind, or ice. The erodibility of a soil is important in terms of assessing how the soil reacts to disturbances. Generally, the soils in the area have a relatively low susceptibility to erosion, particularly the poorly drained soils common to muskegs, emergent wetlands, and evergreen forest/scrub wetlands (IME, 1991a). The extent of vegetation cover and high organic content also combine to reduce erosion potential. The soils tend to be shallow and show a low susceptibility to induced sediment production. They range from well-drained to poorly drained, depending somewhat on topographic conditions.

The Forest Service performed soil surveys in the study area using methods established by the U.S. Department of Agriculture's Soil Conservation Service (now the Natural Resources Conservation Service) (Forest Service, 1990). The mapping effort identified 47 soil mapping units within the area, representing 30 soil types. The Forest Service provided the results of the soil survey in the form of a digital map (Forest Service, 2002c). Soils on the Kensington side of the study area were investigated as part of the extensive geotechnical work conducted in support of the 1992 FEIS (IME, 1991a). There is a mixture of soil types within the study area: slightly less than 70 percent of the soils are considered mineral soils, and the remainder are classified as organic soil types. Table 8 summarizes some of the key characteristics of the dominant soil types in the study area.

Table 8
Characteristics of Major Soil Types Within the Project Area

Soil Type	Mineral or Organic	Drainage Class	Permeability Class	Depth	Plant Associations
Cryosaprists and Histic Cryaquents	Organic	Very poorly drained	Moderately rapid	Shallow to deep	Tufted Club Rush/Bog Kalima; Mixed Conifer/Blueberry/Deer Cabbage
Cryohemists Typic Cryaquod Association	Organic	Very poorly drained	Moderately slow to moderately rapid	Very deep	Tufted Club Rush/Bog Kalima; Mixed Conifer/Blueberry/Skunk Cabbage; Mixed Conifer/Blueberry/Deer Cabbage
Humic Cryorthods	Mineral with well-developed organic layer	Moderately well to well drained	Rapid	Moderately deep to very deep	Western Hemlock/Blueberry-Shield Fern; Western Hemlock/Blueberry-Devil's Club (Most productive hemlock stands on Tongass)
Lithic Cryosaprist and Lithic Cryaquod Soils	Organic	Very poorly drained	Moderately slow to moderately rapid	Shallow	Mountain Hemlock/Blueberry Mertens Cassiope; Alpine Shrubland/Emergent Muskeg
Entic Cryumbrept McGilvery and Rock Outcrop Soils	Mineral	Moderately well drained	Moderately rapid	Shallow	Alder/Salmonberry; Alder/Lady Fern; Western Hemlock/Blueberry-Devil's Club
Cryaquents Sandy/Skeletal Association	Mineral	Poorly to somewhat poorly drained	Moderately rapid	Very deep	Alkali Grass-Sand Spurry; Bluejoint/Mixed Forb (Occur at saltwater boundary)
Cryorthods Cryofluvents Complex	Mineral	Somewhat poorly to well drained	Moderately rapid	Very deep	Sitka Spruce/Blueberry-Devil's Club; Sitka Spruce/Blueberry; Sitka Spruce/Alder
Typic Cryaquods Humic Cryorthods Association	Mineral	Poorly to somewhat poorly drained	Moderately rapid	Moderately deep to very deep	Western Hemlock/Blueberry; Western Hemlock/Blueberry-Devil's Club

Source: IME, 1991.

Vegetation

Coastal rain forest forms the predominant vegetation type in the study area and throughout Southeast Alaska. The forest within the study area consists primarily of western hemlock (*Tsuga heterophylla*) and mountain hemlock (*T. mertensiana*) as sole dominants or intermixed with Sitka spruce (*Picea sitchensis*) to form the overstory. A mixture of shrubs and herbaceous species form the understory. The species present in the understory reflect a number of factors, including the slope, aspect, soil type, soil moisture, and degree of canopy cover.

Western hemlock, mountain hemlock, and Sitka spruce communities in the study area range from low-volume, open-canopy woodlands to closed-canopy, medium-volume forests. Western hemlock occurs at lower elevations, and mountain hemlock occurs at higher elevations. Sitka spruce grows interspersed with both, occurring more frequently along the edges of avalanche chutes, drainages, and beaches. Within the study area, Sitka spruce occurs along with hemlock on the slopes east of Slate Creek Cove, along Sherman Creek, and near the Jualin and Kensington mine sites. Shrub layer plant species include Alaska blueberry (*Vaccinium alaskaense*), devil's club (*Oplopanax horridum*), rusty menziesia (*Menziesia ferruginea*), and salmonberry (*Rubus spectabilis*). Herbaceous species include five-leaf bramble (*R. pedatus*), bunchberry (*Cornus canadensis*), deerberry (*Maianthemum dilatatum*), fern-leaf goldenthread (*Coptis asplenifolia*), deer fern (*Blechnum spicant*), and spinulose shield fern (*Dryopteris austriaca*).

Many of the coniferous forests in Southeast Alaska have been described as being near climax and late-successional. This is true within the study area as well, although logging associated with the past mining activities has affected the successional stage of portions of vegetation in the Sherman, Johnson, and Slate creek drainages.

The Forest Service maintains a list of sensitive plants in the Alaska Region. The list dated May 31, 2002, identifies 12 species known or suspected to occur in the Juneau Ranger District. These species are *Aphragmus eschscholtzianus* (Eschscholtz's little nightmare), *Arnica lessingii* subspecies *norbergii* (Norberg arnica), *Botrychium tunux* (moon wort fern), *Botrychium yaaxudakeit* (moon wort fern), *Carex lenticularis* var. *dolia* (goose-grass sedge), *Hymenophyllum wrightii* (Wright filmy fern), *Isoetes truncata* (truncate quillwort), *Ligisticum calderi* (Calder lovage), *Papaver alboroseum* (pale poppy), *Poa laxiflora* (loose-flowered bluegrass), *Puccinellia kamtschatica* (Kamchatka alkali grass), and *Romanzoffia unalaschcensis* (Unalaska mist-maid).

A survey of Lower Slate Lake conducted in October 2002 specifically for *Isoetes truncata* failed to locate the species (Icy Strait Environmental Services, 2002). A sensitive species survey conducted in July 2003 focused on the other 11 species known or expected to occur in the Juneau Ranger District. None of the species on the list were identified during the survey (ENSR, 2003).

Wetlands

The USFWS produces the National Wetlands Inventory, which contains information about the characteristics, extent, and status of wetlands in the United States. The National Wetlands Inventory uses the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979) as the basis for mapping and characterizing wetlands and can be applied to wetlands throughout the country. Using National Wetland Inventory nomenclature, four systems of wetlands occur within the project area: estuarine (estuary and shoreline), riverine (stream), lacustrine (lake), and palustrine (ABR, 2000c; Cowardin et al., 1979). The palustrine wetland system consists of nontidal areas dominated by trees, shrubs, and emergent vegetation. Palustrine wetlands within the study area include emergent, scrub-shrub, and forested types. Over 70 percent of the wetlands in the study area are forested, and nearly half of those occur as wetlands intermixed with uplands.

Estuarine wetlands include the tidal marsh and sandy intertidal shoreline at the north end of Slate Creek Cove. Rocky intertidal shorelines constitute most of the remaining shoreline on the east and west shores of Slate Creek Cove. The area surrounding Comet Beach is also considered a rocky intertidal shoreline. The waters of Slate Creek Cove are identified as subtidal estuary.

Lacustrine (open-water) wetlands apply to Lower Slate Lake and Spectacle Lake. Upper Slate Lake is considered a palustrine aquatic bed because of its size. Palustrine aquatic bed wetlands are ponds or areas within ponds and lakes dominated by plants growing on or below the surface of the water. The small pond between Spectacle Lake and Upper Slate Lake is also a palustrine aquatic bed. Riverine wetlands (streams) within the project area include Sherman Creek, Ophir Creek, Slate Creek, and Johnson Creek. Combined, these wetlands constitute approximately 97.6 acres within the study area.

Palustrine emergent wetlands are dominated by herbaceous (non-woody) vegetation. Within the study area, this wetland type is concentrated in the vicinity of Spectacle Lake and supports tufted clubrush (*Trichophorum caespitosum),* sedges *(Carex)*, and bluejoint reedgrass as the dominant species. Palustrine emergent wetlands are also located at the

northern ends of Upper and Lower Slate lakes. Approximately 130 acres of palustrine emergent vegetation occurs within the study area, including some of the disturbance near the existing Kensington facilities and Jualin camp.

Palustrine scrub-shrub wetlands are dominated by woody vegetation less than 20 feet tall (Cowardin et al., 1979). Almost 140 acres of scrub-shrub wetland types occur in the vicinity of Spectacle Lake, Upper and Lower Slate lakes, the terrace area, and west of Ivanhoe Creek. These wetlands are dominated by Alaska blueberry, crowberry, rusty menziesia, and deer cabbage (*Fauria crista-galli)* within the project area.

Palustrine forested wetlands are the single most common wetlands within the study area (1,134 acres). These wetlands are dominated by mountain hemlock, western hemlock, fern-leaf goldenthread, and Alaska blueberry. Forested wetlands occur throughout the area and include evergreen forests and complexes consisting of upland forests with 25 percent wetland inclusions as discussed above. The forest complexes contain upland soils and hydric soils under saturated conditions (ABR, 2000c). Hydrophytic species occur throughout the complexes although the hydrologic conditions required for jurisdictional wetland delineation, like the soils component, are limited in distribution in this wetland type (ABR, 2000c).

3. PROJECT CONDITIONS

This Final Plan of Operations consists of the initial proposed project in the Amended Plan of Operations (November 2001) combined with developments from the multi-agency NEPA review, stakeholder comments, and the Record of Decision for the Project. Aspects of the final plan have been modified as needed to reflect the alternatives, mitigation, monitoring, and reclamation requirements developed during the permitting process (Drawing 3).

The land to be affected by the Project includes approximately 194 acres of the total land available within the project area, as listed in Table 9. The project includes a mineralized deposit to be mined by underground methods, waste rock disposal sites, and conventional milling using froth floatation. These project components will be interconnected by service roads and the main access road from Slate Cove. A marine terminal will also be constructed at Slate Cove for employee ferry, barging of concentrates and delivery of goods and materials to the site.

3.1 Mining

Mine production is based on year round operations and delivering a maximum of 730,000 tons of ore per year to the process facility. Up to 600,000 tons of waste will be brought to surface and stored within a waste rock dump during the estimated 10-year project life. Maximizing the disposal of waste underground is an overall cost benefit to the Project.

Table 9
Project Surface Disturbance

Parcel #**	Description	Existing	Proposed	Total
1	Kensington Comet Beach Camp	3.2	0.0	3.2
2	Kensington Road	7.2	0.9	8.1
3	Kensington Borrow Source	1.2	0.3	1.5
4	Kensington Development Rock Storage	9.2	5.1	14.3
5	Kensington Water Treatment Plant/Ponds	1.7	2.6	4.3
6	Kensington Snow/Topsoil Stockpile Area	0.0	2.1	2.1
7	Kensington 2050 Level Portal Waste Rock Dump	1.5	0.0	1.5
8	Jualin Process Area	0.0	12.9	12.9
9	Jualin Process Area Development Rock Storage	0.0	4.3	4.3
10	Jualin Process Area Treatment Pond	0.0	1.5	1.5
11	Jualin Process Area Snow/Topsoil Stockpile Area	0.0	0.3	0.3
12	Jualin Pumphouse Area	0.0	0.1	0.1
13	Jualin Acess Road	27.6	6.2	33.8
14	Jualin Laydown Area #1	0.4	0.0	0.4
15	Julain Laydown Area #2	0.0	3.5	3.5
16	Jualin Laydown Area #3	0.8	0.0	0.8
17	Jualin Administration Area	2.5	0.0	2.5
18	Jualin Borrow Source #1	1.3	0.7	2.0
19	Jualin Borrow Source #2	0.7	0.6	1.3
20	Jualin Borrow Source #3	1.2	2.4	3.6
21	Jualin Borrow Source #4	0.0	0.7	0.7
22	Tailings Facility Access Road & Pipeline	0.0	7.4	7.4
23	Tailings Pipeline Access Road	0.0	2.6	2.6
24	Tailings Lake	0.0	39.9	39.9
25	Tailings Lake Margin Working Area	0.0	17.9	17.9
26	Tailings Dam Borrow Source	0.0	4.6	4.6
27	Tailings Pipeline & Access Road	0.0	10.1	10.1
28	Tailings Dam Plunge Pool Area	0.0	6.8	6.8
29	Slate Creek Cove Marine Terminal	0.0	1.9	1.9
30	Slate Creek Cove Snow/Topsoil Stockpile Area	0.0	0.2	0.2
TOTAL		**58.5**	**135.6**	**194.1**

** parcel numbers are indexed on each Drawing located in the map pockets of this Plan

The underground mine plan for the Kensington Gold Project has seen changes to the main point of access on private lands and modifications to the mining method to enable the selection of a higher grade ore at a reduced mining rate. Additional underground mining methods may be developed and employed as required to safely and economically extract ore zones further defined during mining and exploration. Regardless of the mining methods employed, approved crown pillar design criteria will be maintained as mitigation

against potential surface subsidence. Long-term stability will be provided by support pillars and backfill comprised of either of tailings and/or development rock. Cycloned tailings will be placed underground as a paste backfilled slurry, and process water will be collected and returned to the mill as makeup water.

Most of the stopes are oriented longitudinally, with the principal dimension running along strike. These stopes will be 100-150 feet along strike, 150 feet high and extend the full width of the ore zone. Other stopes will be oriented transversely across the strike of the deposit and will be 80 feet wide, 150 feet high and their length will be set by the thickness of the ore zone. Mining methods dictate stope dimension and will vary throughout the mine.

The main access into the mine will be through a new tunnel near the old Indiana workings. The new portal near the old Indiana site will be established at about the 1,000 foot elevation. This tunnel will be constructed as part of the underground development program and will be used as the primary mine access during mining. It also provides underground access for the exploration of other potential deposits in the resource area. This tunnel will be developed from both the Kensington workings, through the existing 800 Portal with waste rock transported to the current development rock area on the Kensington side, and from the Jualin side with development rock being stockpiled immediately adjacent to, and within, the north side of the process bench.

Mine development will involve the following:

- Drilling;
- Blasting;
- Mucking (removal of the rock) and haulage; and
- Ground support (if necessary).

To advance the horizontal mine drifts during the development and operational periods, an underground drilling machine known as a jumbo will be utilized to drill a pattern of blastholes on the face of the development heading. Once the appropriate area has been

drilled, the holes will be loaded with explosives and shot. The resultant broken development rock will be hauled directly to the waste passes and either dumped in an empty stope, if available during the operational period, or placed in the development rock stockpile on the surface.

Mine levels will be developed either in the footwall parallel to the ore zones or within the ore zones at a maximum of 150 foot vertical intervals during the course of the mining operation. A draw point will then be driven to the ore zone on the bottom horizon of each mining block from the footwall drift.

Drilling will then be completed on the mining block, and the material in the stope will be broken through blasting. Once broken, the ore will flow by gravity to the draw point where it will be extracted by front-end loaders, and dumped down ore passes leading to a truck loadout for delivery to the Jualin process bench near the mill facility. Coeur will use development rock and cycloned tailings to fill mined out stopes. In addition to providing for underground tailings management, this will allow Coeur to use the dewatered and drained sands as a working surface to extract ore.

Numerous raises will be constructed within the mine between levels to provide for ventilation and the vertical movement of ore and development rock. A ramp will also be constructed upward from the 850 working level to the 2200 level, and downward to the lowest level planned to be mined in the later years of mining.

As all mining activity is underground, the only part of the mining operation visible from the surface will be the two recent adits and the historic 2050 Level adit. There will only be these three adits (Kensington - 800 foot level, Jualin - 1,000 foot level, and the Kensington - 2050 foot level) to provide ventilation and access to the mine.

Blasting will generally be conducted daily. Generally, ammonium nitrate/fuel oil (ANFO), emulsion, slurry or similar explosives will be used at the Kensington Gold Project. Mine water will be collected and pumped to the surface for treatment in the existing mine water treatment plant and discharged to Sherman Creek. As a mitigation measure to minimize the potential for contamination of mine water from blasting

residuals, Coeur has been required under the NPDES program to develop a BMP plan for mine water management and explosives use.

Based on rock mechanic studies conducted at the Kensington site, ore and waste material is very competent and will require minimal mechanical support. Ground control or support will involve a variety of techniques including rock and cable bolting, and backfilling to maximize ore recovery.

There will also be other miscellaneous underground excavations required that were included in the original approved proposal. These include the following:

- Underground shop
- Explosive magazines
- Cement rock fill/paste backfill plant
- Lunchroom facilities
- Refuge stations
- Initial sediment control sumps for mine drainage
- Minor excavations for sanitary facilities, detonator magazines, daily fuel storage, compressor room, transformer room, water storage excavations, etc.

An underground shop consisting of a series of repair bays, a warehouse area, an office, and day storage for fuels and lubricants will be constructed. Fuels and lubricants will be kept from mingling with mine water by use of good housekeeping and secondary containment.

The following underground equipment will be present at Kensington:

- Two drill jumbos
- One bench drill
- Four haul trucks
- One explosives truck

- Two utility scissor lifts
- One bolting jumbo
- One dozer
- One grader
- One lube truck
- One mechanic truck
- Four 8 yard scoops
- Two 3.5 yard scoops
- Six boss buggies
- Two engineering and geology buggies

Magazines capable of storing explosives will be maintained underground. A magazine will be initially excavated near active drilling levels and will be relocated as mining progresses.

Mine ventilation will use fans to augment airflow underground and will be installed as required in order to ventilate the stopes, development headings, the mine shop, and other areas of the mine. Portable fans will be moved throughout the mine to meet ventilation requirements.

Development Rock Storage

The project will produce approximately 400 tons of underground waste development rock each day. This will result in approximately 1.5 million tons of waste being generated during the projected life of the project. Development rock will be backfilled into the underground workings or hauled to the surface for placement in the development rock storage facility at the Kensington 800 portal site. A 31.5 acre area was identified in the EIS for this facility, however, initial plans will involve construction over a 14.3 acre area. An additional capacity to store approximately 500,000 tons of development waste rock will be created on 4.8 acres in the vicinity of the process area at Jualin.

3.2 Milling Processing

The processing facility for the Kensington Gold Project is a gold flotation recovery circuit. The major components of the process circuit include crushing, grinding, gravity separation, flotation, thickening, and filtering.

The flotation process produces a concentrate enriched in gold and sulfide metals associated with the mineralized zones. The concentrate will be thickened and filtered to produce a product that can be placed into sealed containers and shipped off site to recover the gold.

In the flotation process, gold bearing minerals are extracted or separated from the barren rock material known as tailings. The disposal of tails from the flotation circuit will be either by subaqueous placement in the tailings storage facility located at Lower Slate Lake, or by underground backfill. The following sections describe ore processing operations in greater detail.

Ore Handling

Ore mined from the levels above the main tunnel will be transported to an ore pass system which leads to the underground truck loadout hopper at approximately the 850 working level. The mine ore will be discharged from the orepass by a feeder into haulage trucks for transportation to the process bench located on the surface at Jualin. The ore will be dumped into the primary crusher equipped with a grizzly to screen oversized material. Oversized material, which will be minimized by careful blasting, will be broken using a pneumatic rock breaker. Excess mine ore production will be stored near the hopper and fed to the crushing circuit by a front end loader to maintain the process while the mine is down.

Dust at the hopper will be minimized by the use of water sprays to prevent dust.

Crushing Circuit

Crushed ore from the mine will be fed on a controlled basis using a feeder to meter the ore onto the conveyor feeding the ball mill. The ball mill will be in closed circuit with a vibrating screen. Oversized material from the screen will be collected and conveyed to the feed end of the ball mill for further grinding. Undersized ore from the vibrating screen will be pumped to a secondary regrind mill operating in closed circuit with a cluster of cyclone classifiers. Discharge from the ball mill and the undersize screen will be combined to feed a cluster of cyclones to produce an overflow product finer than approximately 100 mesh. The cyclone underflow will be split with 25% going to a gravity concentrator for coarse gold recovery and the lighter minerals returning to the cyclone feed sump for reprocessing. The rest of the underflow will be returned to the ball mill for further grinding.

The cyclone overflow in the form of a 29 percent solids slurry will flow by gravity to a slurry conditioning tank equipped with a variable speed pump controlled by the tank level. The conditioned slurry will then be pumped to the flotation circuit.

The crushing and grinding plant will be located at the surface near the old Indiana site and will be close to the adit at an elevation of approximately 1,000 feet. The grinding process is performed as a slurried (wet) process, which results in the total elimination of total suspended particulate (TSP) and PM-10 emissions. Spills will be recovered in the floor sump within the building and returned to the process stream by vertical sump pumps.

Flotation Process

The flotation process involves separating the gold bearing minerals from the barren rock by froth flotation. Chemical collectors and frothing agents will be added to the grinding circuit and flotation conditioner tank. After approximately 10 minutes of conditioning the slurry will be pumped to a series of flotation cells.

Air will be introduced into the flotation cells to produce bubbles, which are enhanced by the addition of frothing agents. Activated by the collector, an air bubble attaches to the gold bearing mineral which then "floats" to the surface of the flotation cell, where it is

collected. The primary flotation concentrate will be further upgraded with cleaner flotation to produce a high-grade gold bearing concentrate.

The final flotation concentrate will be dewatered for shipping to an off-site processing facility. Water from concentrate dewatering will be recycled to milling operations. To achieve dewatering, the slurry will be thickened to approximately 50 percent solids by a concentrate thickener. The underflow from the thickener will be pumped to an agitated filter feed tank where the slurry will be mixed prior to dewatering. Dewatering of the concentrate will be accomplished by filtration, with the filtrate recirculated into the milling circuit. The resultant concentrate cake will contain approximately 10 percent moisture. The cake will be transported by truck in sealed marine transport containers to a storage pad adjacent to the marine terminal. On average, 700 tons of concentrate will be produced weekly and shipped off-site in 8'x 8'x 20' containers, as barges arrive. Up to 5 containers per day will be required to handle the production. Concentrate shipping will occur on a regular basis (every 7-10 days) and will be scheduled with incoming material deliveries when possible.

The barren rock, which has been separated from the gold-bearing ore during the flotation process, will be either placed underground or in the Lower Slate Lake tailings storage facility. To achieve this, the cyclone overflow or the complete tailings stream will be pumped to the tailings thickener for dewatering. The solids will settle in the thickener to approximately 50 percent solids. When needed to support mining activities, tailings will be cycloned to provide sand for underground backfill with the finer fractions sent to the wet tailings impoundment. Thickener overflow (process water) will return to the mill process. Otherwise the tailings, after thickening, will be sent to the Lower Slate Lake tailings storage facility. The flotation cells, sumps, concentrate thickener and pumps will be housed in the steel framed grinding building. The building will have a concrete floor with curbs and floor sumps to contain any process solutions. The mill water tank will be located at the mill site.

Reagent Use and Handling

Reagents will be stored at the process area, laydown area, and Slate Creek Cove marine facility according to applicable MSHA laws and regulations.

All supplies will be packaged in easily handled forms. Typically, drummed and bagged reagents will be packaged on pallets, and handled at the marine facility with a forklift and flatbed truck.

The reagents and materials, as listed in Table 10, will be used:

Table 10

Processing Chemical and Reagent Use (Mill)

Milling Process	Reagent or Material	Storage Containers	Approximate Daily Use (tons)
Grinding	Steel Balls	10 ton steel bins	4-5
Flotation	Potassium Amyl Xanthate	50 gal drum	0.5
	MIBC (Frother)	50 gal drum	0.2
	Flocculant	1 ton Flo-bin	0.1
	Scale Inhibitor	50 gal drum	0.05

The grinding circuit will require steel grinding balls which will be shipped in bulk quantities to Seattle (the supply port) by tractor-trailer trucks. These bins will be loaded onto a barge in Seattle, transported to the Slate Creek marine facility, and off loaded. The steel balls will be contained within steel bins, which will be returned empty on a containerized trailer to the supplier for reuse.

Potassium amyl xanthate (xanthate) is a collector used in the flotation process. Collectors are substances that attach to mineral particles during flotation. Collectors such as xanthate undergo natural decomposition and break down into non-toxic products including carbon dioxide and calcium sulfate. Xanthate will be received in steel drums. These drums will be recycled and reused. Frothers, such as methyl butyl carbinol (MIBC), are organic

compounds used to float mineral particles during ore recovery. Flocculants are generally complex, organic compounds commonly used in milling. They are used in the thickening stage of flotation and in concentrate filtration. Scale inhibitors are water-conditioning reagents used to prevent the buildup of scale in tanks and pipelines.

The concrete floor in the process building will be sloped to sumps so that any spillage can be recovered and returned to the process by sump pumps. The two flotation reagents are prepared and stored in the preparation area, which is adjacent to the flotation area. Reagents are delivered by metering pumps having extremely low flow rates, generally less than 2 gpm. Any spillage of reagent in the flotation area is likely to be extremely small and easily recovered by the sump pump system for return to the circuit.

Coeur may use a variety of commercial products as collectors, frothers, flocculants, and scale inhibitors. At the site, Coeur will maintain material safety data sheets (MSDS) for all chemicals being used at the site. All chemicals will be transported, handled, stored, and used in accordance with manufacturer's specification and any applicable regulatory requirements.

Tailings Delivery Pipeline

The thickened tailings will flow from the thickeners to an agitative tank and then pumped through a combination of double-walled high-density polyethylene and steel pipeline that originates at the process area and follows along the tailings line road to the Slate Creek tailings facility for subaqueous disposal (Drawing 2). The six-inch internal diameter pipeline will be double-walled and constructed of high-density polyethylene (HDPE) and/or steel pipe as required based on internal pipe pressure. Flow sensors will be used to detect any blockages or breaks with automatic shutdown mechanisms if pressure loss is detected. The tailings pipeline will be constructed so that it is a gravity feed line initiating near the 1000 foot elevation at the Jualin millsite and terminating at the Lower Slate Lake site at an initial elevation of 650 feet. The tails line will cross Snowslide gulch which will require regular inspections and special avalanche identification and recovery training for minesite personnel. The tails decant reclaim line will follow the tails line back from the TSF to the process mill.

Tailings Storage Facility

The Tailings Storage Facility (TSF) makes use of the storage provide by the existing basin within Lower Slate Lake and additional capacity provided by the construction of the Lower Slate Lake Tailings Dam. The dam is located at the outlet of the lake in a natural bedrock constriction. The TSF is designed to receive tailings from the processing plant for the project. The tailings will be discharged at a maximum throughput of 2000 tons per day. A preliminary design (cross-section) of the embankment is shown in Figure 8.

The principal objectives for TSF are to store tailings solids, control water collected in the facility and develop an efficient and economic design that satisfies the objectives for maintaining a high level of environmental protection. The principal requirements of the design are as follows:

- Storage of the tailings solids in an engineered facility.
- Control, collection and removal of surface runoff and seepage water from the facility in a safe and environmentally acceptable manner.
- The inclusion of monitoring features to ensure that the performance goals are achieved.

The Lower Slate Lake Tailings Dam will be constructed as approved through the State of Alaska Department of Natural Resources Dam Safety Permit program. The preliminary design is proposed as a Geosynthetic and Concrete Face Rockfill Dam to be built in phases. Preliminary design plans call for the Stage I crest to be built to an elevation of 690. The Stage II crest will be constructed to an elevation of 715; and the final crest height will be constructed at the 740 elevation (Figure 8). Detailed designs for each phase will be reviewed and approved by the State Engineer under the Dam Safety Permit program.

The conceptual design of the dam is described in the following:

- An upstream low permeability face that will be constructed using geosynthetic and concrete materials. This low permeability face will be extended down to fresh bedrock and connected to a concrete plinth.

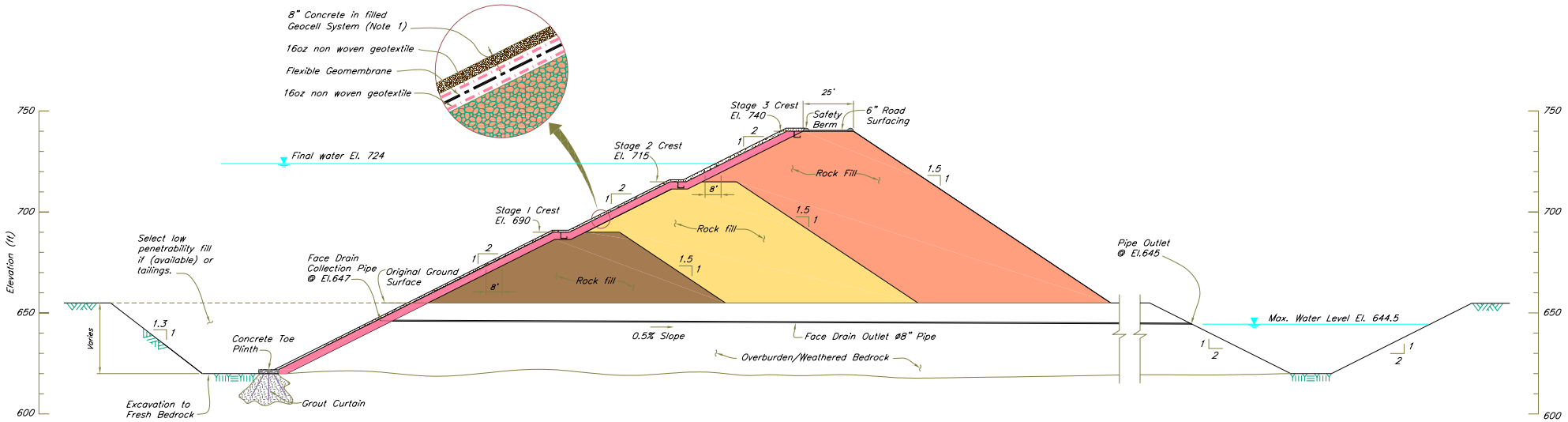


Figure 8 – TSF Embankment Cross-Section Preliminary Design (looking East)

- A concrete plinth along the upstream toe of the geomembrane with a grout curtain to minimize seepage flows beneath the dam. The grout curtain will include primary, secondary and tertiary grout holes with the depths of the holes based on the permeability of the bedrock.
- A permeable face drain immediately downstream of the geomembrane to control seepage. This zone will be constructed from processed sand and gravel.
- The bulk of the dam fill will be rockfill excavated from the right abutment of the dam or from the development rock from the underground mine.
- A foundation drainage system over the low-lying areas adjacent to the riverbed will be included to intercept seepage that will be encountered during preparation of the dam footprint area. The foundation drain will control the water level within the foundation area during operation and after closure.
- A cofferdam upstream of the dam that will be used to contain the 10-year flood event.

A spillway will be located at the crest of the dam to control overtopping of the facility during operations should extreme storm events occur. Flows will be routed through this structure and back into the streambed. The spillway will be excavated to bedrock to provide protection from the potential for erosion.

A 25-foot wide access road is planned for the crest of the dam to provide access to the west abutment and the seepage collection and recycle pond. The face drain and foundation seepage collection will be routed into a seepage collection recycle pond and pumpback system that will be constructed at the downstream toe of the final dam.

A seepage collection pond equipped with pump-back pumps will be located near the toe of the TSF to collect any seepage emanating for the abutment slopes and the creek bottom. A grout curtain will be installed at the base of the impoundment to limit seepage. Also, once tailings are placed adjacent to the embankment, seepage rates should be

reduced. Seepage will be evaluated as part of the freshwater quality monitoring program, and dependent on quality, will be released to Slate Creek or returned to the TSF.

Plan views of the TSF at Stage 3 and at closure are shown in Figure 9. These designs are preliminary and are subject to ongoing review under the state's dam safety program, as well as the ongoing evaluation of field conditions.

Water Treatment

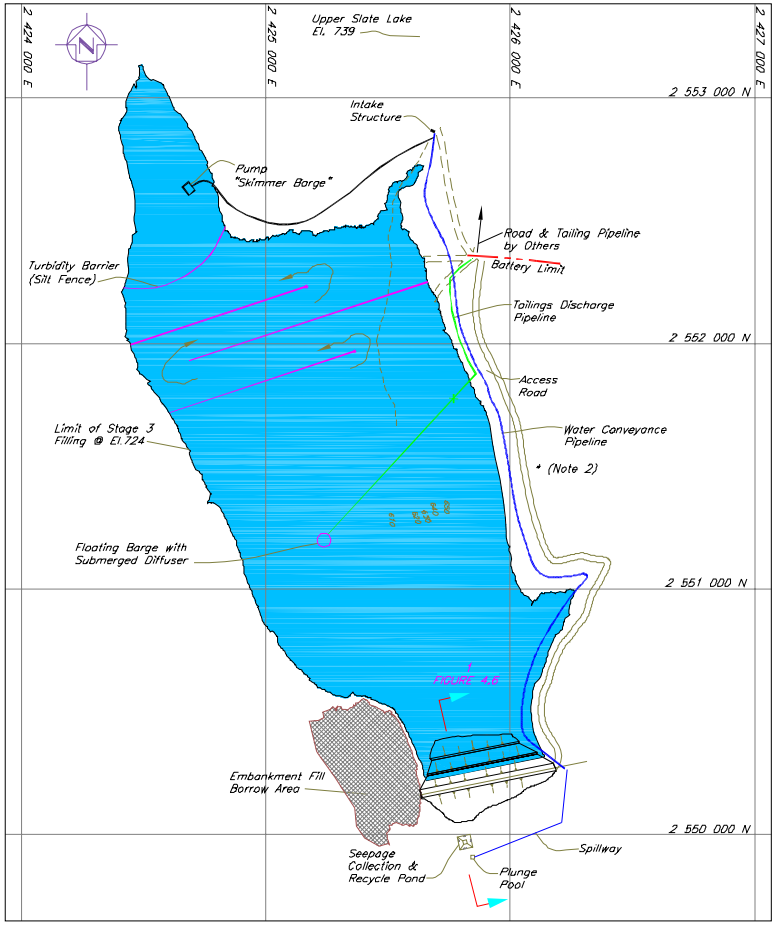
A water treatment plant will be made available at the TSF as a contingency measure based on the resulting water quality, evaluated during the initial operating period of the facility. The plant, as proposed, is a reverse osmosis system capable of treating up to 1400 gallons per minute. Treatment brine generated from the facility will be pumped back to the mill, incorporated in the tailings discharge, submerged and encapsulated with the tailings in the TSF facility. This system will be powered by the proposed generators located at the Process Area.

Backfill

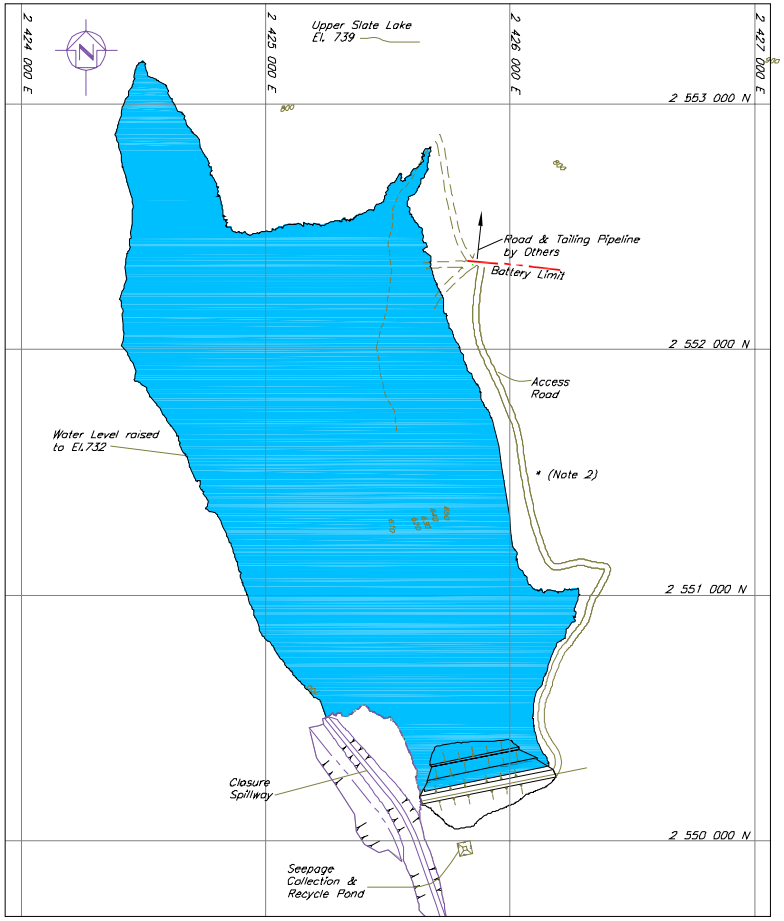
Coeur will pump, or truck, up to 40 percent of the tailings as a coarse sand fraction to underground for backfill. Thickened tailings will be pumped to cyclones for classification with the sand fraction reporting to the underflow for pumping underground through HPDE pipe. The pipeline will extend down the 6,500 foot Jualin tunnel to the working areas requiring backfill. On the surface, the pipeline will be placed in a containment ditch that will provide secondary containment in the unlikely event of ruptures and spills. The return decant water line from the mine to the mill will parallel the tailings line with the same containment measures.

Decant from the backfill program will co-mingle with underground mine drainage and report to the water treatment plant, to be treated, prior to

Backfilling selected open stopes allows for the removal of a greater number of pillars, resulting in increased ore production and a greater cost benefit for the Project, therefore, backfilling in the mine will be optimized to the maximum extent possible.



STAGE 3 DEVELOPMENT



CLOSURE

NOT FOR CONSTRUCTION

Scale 250 0 250 500 750 1000 Feet

LEGENDS:

- HDPE Tailing Discharge Pipe
- HDPE Water Conveyance Pipe
- HDPE Water Conveyance Pipe

NOTES:

1. Spillway chute will be constructed in 3 stages corresponding to each stage of construction.
2. LIDAR information is void at the asterisked and topography is interpolated based on available information.

Figure 9 – Slate Lakes Plan View

3.3 Transportation

Transportation of Mine Personnel

The transportation of hourly employees to the minesite will involve busing from a central location in Juneau, between Mile 6 and Mile 12, to Cascade Point. Mine personnel will transfer from the bus at Cascade Point to a passenger ferry that will carry them across Berners Bay to Slate Creek Cove, where another bus will be waiting to take them along the Jualin access road to the workplace. Based on their responsibilities, salaried management personnel may be required to work part days at the mine and part days at the company office in Juneau, and therefore, may commute to Cascade point.

Three to five round trips per day may be required to transport employees across the bay. A typical operating schedule, which is subject to change, would include an early morning trip, late afternoon/early evening trips and possibly a late night trip. Atypical travel may be required should materials or personnel need to commute across Berners Bay outside of the three trips listed above. It is anticipated to take approximately 15 minutes to cover the approximate 5-mile stretch of water. Sea conditions and the presence of marine mammals will dictate actual trip times.

The transportation of employees across Berners Bay is a significant expense for the Project. The minimization of trips across the Bay is, therefore, a cost benefit for the operation of the Project.

Helicopters or float planes may be used on a limited basis to support exploration activities, emergencies or other specialized mine activities. Helicopter routing is specified in the Allowable Use Permit issued by CBJ (Appendix 3).

During the construction of the Cascade Point dock and other mine facilities, or other temporary conditions, the use of existing docks and other facilities outside of Berners Bay may be employed to ferry mine personnel to and from Slate Creek Cove as well as transport materials.

Transportation of Materials

Barge transportation will be used for providing delivery of supplies to the project site from supply ports in Juneau and Seattle and for the shipment of concentrate from the Project. The Slate Creek Cove marine facility will consist of a ramp and floating platform system constructed of appropriate material to meet operational and environmental needs. The facility is designed for barges having a maximum draft of 19 feet. Unloading will be by a roll-on, roll-off forklift transfer system. Typically, barges 286 feet long by 75 feet wide will be used, although larger barges may be used on occasion. Craft will be berthed at pile-anchored dolphins.

A floating dock will also be installed for personnel transfer from ferry to shore.

Fuel delivery will be via isotainers and will be unloaded in a similar manner to other cargo. Isotainers will be placed at the laydown area above the mean high water in contained storage areas until they are relocated to be used at the process area. The isotainer will be placed inside the containment area and fuel will be pumped into a 5,000-gallon day tank for distribution and use. The containment area will be constructed with sufficient capacity to hold the required quantities for the tank and the isotainer. Isotainers that have not been emptied will be stored at the laydown area, near the Slate Creek Cove marine facility site, where appropriate containment will be provided.

In comparison to the formerly proposed Comet Beach marine transfer facilities, the currently proposed facility at Slate Creek Cove will allow barge transport to be scheduled with much more regularity reducing the amount of diesel fuel storage required at the site. Nonetheless, planned barge deliveries to the marine facilities site can be expected to be governed by weather conditions, and occasions where the barge must either wait in sheltered waters or return to Juneau are also to be expected.

A 150 kW generator, for lighting the Slate Creek Cove Marine Terminal area, and a 500-gallon diesel fuel storage tank will be located within the Jualin Laydown Area #1 (shown as Parcel #14 on Drawing 2d). The generator and fuel storage tank will be situated within a bermed and lined containment area capable of storing greater than 110% of the volume of the largest fuel tank. The lined facility will be equipped with an oil separation and a

dewatering mechanism for the purpose of releasing stormwater that would otherwise displace the emergency storage capacity of the containment facility.

Road Transportation

The existing Kensington road will be used to support initial mine construction and minor operational activities. No significant upgrading of this road is anticipated.

The existing Jualin access road which runs from the marine facilities area at Slate Creek Cove to the historic Upper Jualin millsite, will be maintained as the primary access to the mine. The road will be upgraded as needed to meet construction and operational requirements and extended from the historic Upper Jualin millsite to the proposed mine portal. Upgrades to the road will include widening, berming, re-alignment, and establishing a safe grade for trafficking in winter conditions. The Jualin access road will be maintained as a single lane access road, and should not require any reclamation work at the end of the operational period. A typical road cross section is presented in Figure 10 with the anticipated dimensions for the access roads.

An additional ancillary road connecting the process area with the tails lake area will be required to install, inspect, and maintain the tailings line. This road crosses Snowslide Gulch and would have limited use in the winter months. A short spur road from the main Jualin access road will also be used to access the tailings treatment facility. The exact road locations may vary depending on site conditions as construction occurs.

The main Jualin access road contains two creek crossings. At each location a new bridge will be constructed immediately adjacent to the old bridge at both existing crossings of Johnson Creek. The new bridges will be constructed in accordance with USFS standards and designs will be submitted to the USFS for approval prior to construction. Vehicle traffic on the access roads will be comprised of the following:

- Personnel movement between the terminal and mine
- Fuel distribution
- Borrow material haulage
- Maintenance equipment/vehicles

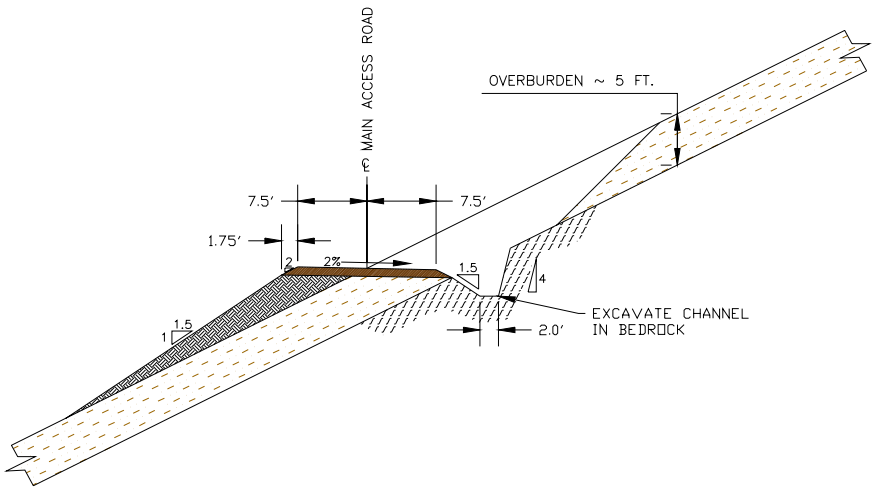
- General mine traffic
- Haulage of supplies to the mine or warehouse
- Concentrate haulage
- Explosives transportation and
- Road maintenance, including watering for dust suppression.

Vehicles using the main road will include semi-tractor/trailers, flatbed trucks, buses, carryalls, half ton and three quarter ton trucks, fuel truck, fire truck, water truck, ambulance, fork lifts, grader, snowplow, explosives vehicle and other vehicles as required to support mine and mill operations.

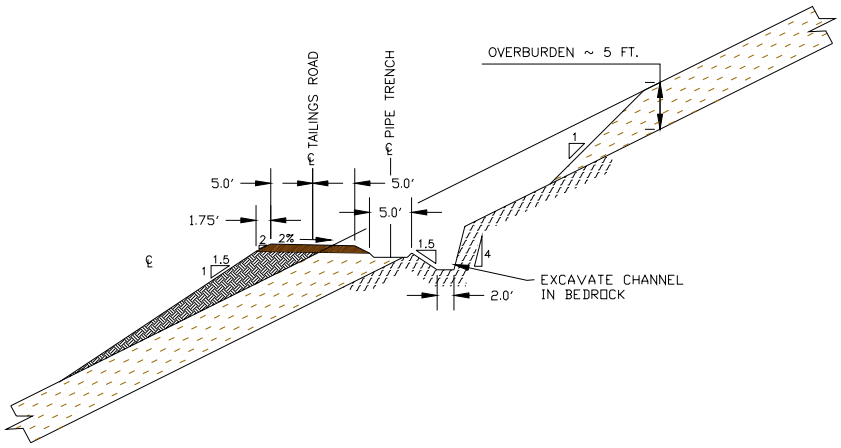
The main access road will provide permanent access to the mine and mill complex and to other ancillary facilities. Topsoil from disturbance areas within the road construction limits will be salvaged where possible. In places where upgrading or new road construction is required, the road subgrade will be formed by cutting and filling the in-situ material and compacting it to form a firm, competent subgrade. Access roads will be surfaced as necessary with competent material placed, compacted, and graded to form a durable surface. Fill material used to construct road embankments will be material excavated from the cut slopes or borrow areas. The material placed to form the final surface of the access roads will be well-graded and will be finished using a grader and compacted as required to form a smooth well-compacted surface which conforms to the typical slopes and dimensions shown on Figure 10.

Figure 10

Typical Road Cross-sections



Typical Main Road Cross Section



Typical Tailings Road Cross Section

Drainage ditches will be improved or constructed adjacent to the access road in all areas where water might be able to against the subgrade or embankment fill. Drainage ditches will be located on the uphill side of the subgrade or embankment fill and culverts will be installed at all low points in the ditch to enable the water to drain away beneath the road in order to avoid saturating the subgrade or embankment fill. Rip-rap or other appropriate material will be used to minimize erosion. Straw bales will be placed in the drainage ditches at select sites and at culvert locations to control sediment. The ditches and sediment control devices will be routinely inspected and cleaned out as required.

Clearing for the road will be the minimum necessary to reduce visibility impacts. In addition, tree buffers will remain wherever possible. Interim reclamation will be performed on cut banks and fill slopes able to support growth medium.

3.4 Power/Utilities

The main power generation for the facility will take place in the power generation building located in the process area. The building will contain six 1.3 MW generation engines. Five of these generators will operate at any given time producing a maximum of 6.5 MW of power generation, with one generator on standby at all times. The five generators are proposed to operate 85% of the time on an annual basis. The generator engines will utilize a low brake specific fuel consumption strategy, and will be fitted with Selective Catalytic Reduction (SRC) or similar best available technology to reduce NOx emissions from these generator engines by approximately 90%.

The SCR system consists of a reactor module and ammonia injection system fitted to the engine exhaust. A catalyst is used which promotes the reaction of NOx and injected ammonia to form harmless nitrogen (N_2) and water. This level of control is not necessary on the smaller, less frequently used generators to comply with the air quality permit for the project.

A 275 kW diesel fired generator engine will operate at the Comet Beach Camp. This engine will utilize a fuel injection timing retard strategy to reduce NOx emissions by

20%. This engine will provide power for the maintenance shop other facilities at this location.

A 150 kW diesel fired generator engine will operated just north of the Slate Creek Cove marine terminal, in the laydown area adjacent to the access road and above the mean high water level. This engine will operate on an as-needed basis, providing intermittent lighting or other power generation as needed at the dock. The generator engine is proposed to operate for a maximum of 2,000 hours per year and will be located within a building to minimize noise levels at the dock.

A 150 kW diesel fired generator engine will operate near the waste water treatment area near the Kensington waste rock disposal area. This engine will operate on an emergency backup basis only. The generator is proposed to operate for a maximum of 100 hours per year.

At this time, Coeur anticipates that most power lines at the site will be underground, including the transmission of power to the tailings treatment facility. In the event that any aboveground power lines are necessary, plans will be provided to the USFS for approval prior to construction that specifically address mitigation of visual impacts, as necessary.

3.5 Water Use and Treatment

Underground Mine Drainage

The mine plan calls for all mine drainage to report to the 800 Level Portal located on the Kensington side of the project. From the portal, mine drainage is piped to a primary settling pond for initial clarification. Water is skimmed off the top and pumped into the water treatment plant for pH adjustment, addition of a coagulant and a flocculant, settling of solids in an inclined plate clarifier, and final filtration through a multi-media pressure filter prior to release through Outfall 001 (EPA-NPDES permit). Currently the mine produces between 225 and 400 gallons per minute, fluctuating seasonally.

Chemicals used at the water treatment plant include: ferric chloride, sodium hydroxide, and organic polymers. Usage rates vary with turbidity and metal content of the inflow.

Material safety data sheets (MSDS) for these chemicals, and all chemicals used on site, will be maintained at the treatment facility for employees working in these areas.

Tailings Storage Facility

Surface runoff and supernatant water will form a permanent water cover over the deposited tailings. The water cover will promote settling of the tailings solids from the supernatant water and improved discharge water quality. A water intake structure and a water conveyance system will be constructed to divert Slate Creek around the TSF (Figure 11). The supernatant discharge has been currently sized to handle flows in the range of 2 to 8 cfs.

Supernatant water will be pumped from a floating barge up to the water conveyance system where it will be mixed with the diverted flow from Upper Slate Lake and then discharged into East Slate Creek. The floating barge will be configured at the end of three sections of a floating dock. Decant water will also be recycled back to the mill as mark-up water.

Any embankment drainage intercepted in the seepage collection and recycle pond, will be selectively pumped back into the facility or discharged to East Slate Creek depending on observed water quality.

Storm surge capacity, corresponding to approximately the 1 in 200 year precipitation event will be accommodated above the minimum water cover of 9 feet in all stages of development. Flows resulting from storms with return periods in excess of 200 years, including the probable maximum flood (PMF) will be safely routed to East Slate Creek via a spillway channel located on the right abutment. Three feet of freeboard will be provided between the spillway invert elevation and the embankment crest elevation.

The treatment of TSF decant will involve the introduction of flocculants to enhance the settling characteristics of the solids in the waste stream. Baffles and silt curtains may also be placed in the tails lake to increase the retention time and enhance the settling of solids prior to uptake by the decant pumps situated on the floating wharf. A water treatment plant will be made available at the TSF to ensure compliance with the NPDES discharge effluent limitations. The plant, as currently proposed, is a reverse osmosis system capable

of treating up to 1400 gallons per minute. Treatment brine generated from the facility will be pumped back to the mill, incorporated in the tailings discharge, submerged and encapsulated with the tailings in the TSF facility.

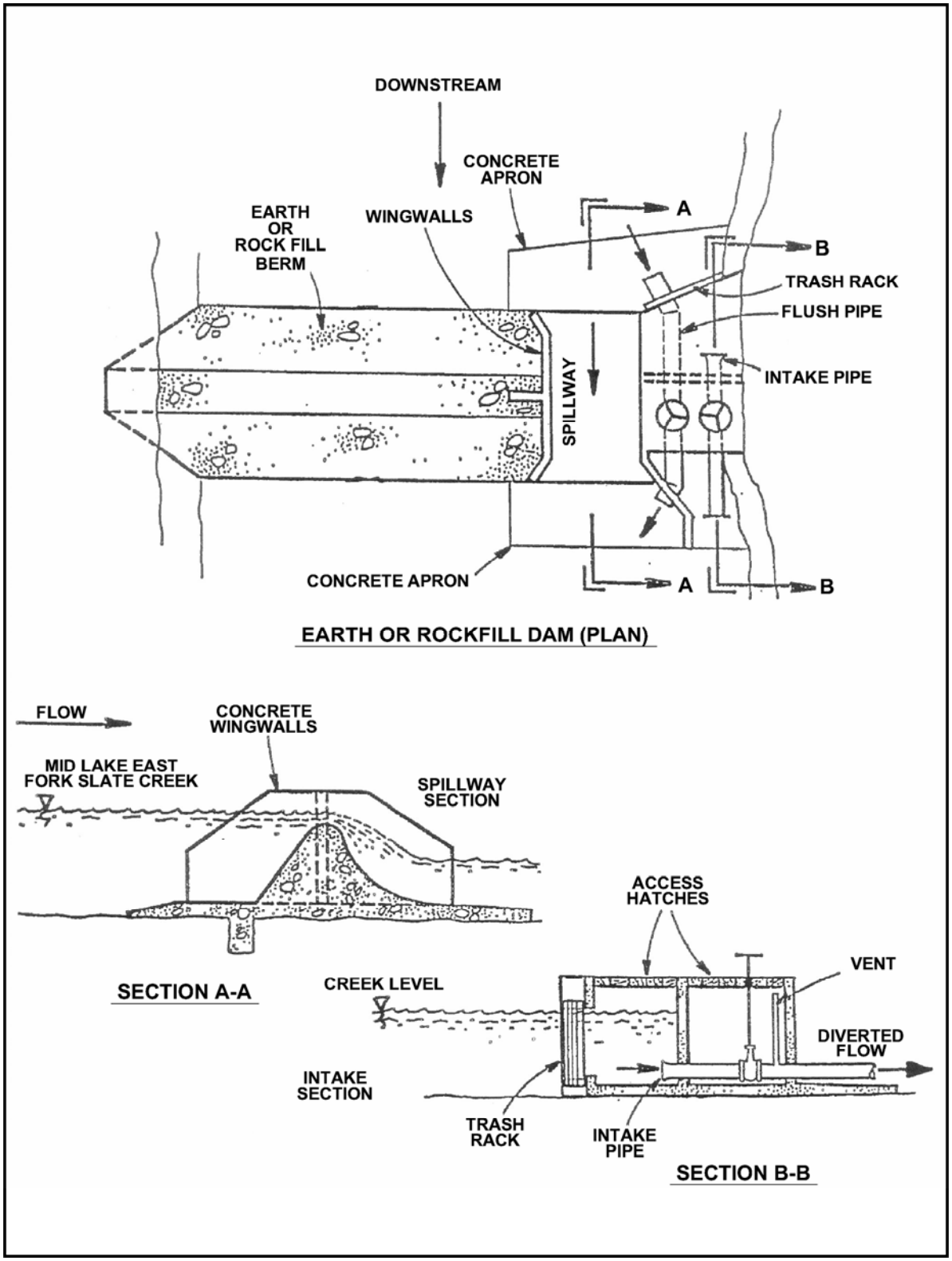
Stormwater Runoff Sediment Control

Runoff from roads and facilities areas will be managed using USFS prescribed BMPs as described in the approved BMP Plan (Appendix 4.g.) to be modified for the amended project and discharge via NPDES-permitted outfalls. Runoff from the construction fill borrow areas will be confined within the pit excavations and allowed to infiltrate into the ground.

Runoff from the process area bench will be captured and routed to a siltation pond designed for the 100-year, 24-hour storm event. A polymer addition system will be available for treating high-flow events. The diversions behind the process bench will be regraded to restore natural drainage, if possible.

Figure 11

Mid Lake Creek Diversion Dam



Jualin Process Area Diversion

A diversion channel will be constructed above the Jualin mine portal and mill/process facilities bench. The channel will be a stormwater diversion constructed to catch surface runoff from the watershed above the mine portal. The diversion will be finished with the invert placed in rock, either as excavated or a riprap channel. The estimated length of the diversion is 0.5 mile. The diversion channel will be designed to route flow from the 100 year, 24 hour storm event.

3.6 Workforce and Schedule

Table 11 provides a project development schedule. The Kensington Gold Project will employ approximately 225 people to operate the mine and process facilities.

During approximately 18 months of facility construction activities, Coeur and construction contractors will employ between 300 and 400 people during facility construction activities. At the curtailment of operations, an estimated workforce of approximately 50 people will be used to salvage equipment and dismantle project facilities for removal from the project site. Approximately 50 people will be employed the following spring and summer as necessary to complete surface reclamation activities.

Project start up and commissioning is expected to take 3 months following completion of construction activities. Full production could occur within approximately 3 to 6 months after construction is completed.

Coeur plans on initiating construction or pre-production development of the Kensington project in the 3rd quarter of 2005. The work will initially consist of driving the tunnel from the Kensington to the Jualin side of Lion's Head Mountain. Concurrently, the Slate Creek Cove dock facility, road improvement and extension, and site preparation for the laydown areas, mill facilities and tailings impoundment area will begin from the Jualin side of the mountain. The Jualin Tunnel will be driven from the Jualin side prior to completion of the Kensington tunnel.

Construction and installation of the mine, mill, and ancillary facilities for the site are planned to occur during 2005 and 2006. This will consist of construction of the tailings impoundment, sanitary waste disposal system, explosive magazine, power plant, maintenance shops, office buildings and the metallurgical laboratory facilities.

Table 11
Project Schedule

Activity	Start Date	End Date	Staffing Level
Full Permit Approval	-	July 2005	5
Surface/Underground Construction	July 2005	December 2006	350
Operational Period	January 2007	2016	225
Reclamation Period	2016	2018	50
Post Closure	2018	2118	0*

* services will be provide by contract.

Initial mill start up and testing will occur during the late part of 2006, with estimated full production scheduled for 2007. Mining and mineral processing activities are projected to continue at least 10 years thereafter. Active reclamation is expected to be completed within 2 years. Monitoring of the TSF and reclamation activities will be bonded to continue for 100 years.

This Final Plan of Operations covers the time period of construction, operation and reclamation/closure activities associated with the mining project. If additional ore reserves are found, or other criteria change and impact the overall mine footprint, Coeur will revise the Plan of Operations to reflect any changes to the approved Final Plan of Operations.

3.7 Support Facilities

The following support facilities will be required for the mining operation:

- Mill
- Warehouse
- Maintenance Area

- Administrative Offices
- Miners Change Facility (Dry)
- Infiltration Gallery
- Power Supply
- Metallurgical Laboratory
- Personnel Camps
- Borrow Areas
- Topsoil and Snow Stockpile Areas
- Solid Waste Disposal Facilities

Mill

The Kensington mill facilities will be part of the process area. The plant will be designed to mill and process up to 2,000 tons per day. These facilities will be located adjacent to the 1,000 level portal area (Drawing 2b).

Associated with the actual mill building will be a maintenance shop, warehouse, laboratory, storage yard and various storage bins.

Warehouse

A warehouse will serve as the main supplies distribution center for the mine and ore processing facilities. The warehouse will be located at the process area. It will contain offices for receiving and issuing supplies and secured areas for small parts storage equipped with shelving and racks. This area will be complete with unloading docks, roll up doors and platform levers to allow trucks to be unloaded by forklift or manual hydraulic cart. Supplies arriving by barge will be transferred from the marine facilities storage area or intermediate laydown area compound to the warehouse by service trucks. Supplies will be palletized, where possible, so that forklifts can be used to expedite handling.

A storage yard adjacent to the warehouse will provide outside storage for large items, heavy equipment and bulk materials such as lumber and grinding balls. If necessary, a lean-to cold weather storage shelter may be added to provide covered yard area for materials such as cement and pipe.

Maintenance Shop

A surface maintenance area will be incorporated into the mill building. Repair bays will be sized for the largest items of mobile equipment on-site including dump trucks, bulldozers, road graders and flatbed trucks. The concrete floor will have rail reinforcements to accommodate any tracked vehicles.

The workshop areas adjacent to service bays will provide space for the following:

- Welding shop for equipment and component repair.
- Machine shop equipped with milling machines, shears, rolls, drills, presses, iron workers and special tools.
- Electrical shop for cable and heavy duty electrical repairs plus battery servicing.
- Electronic and instrument shop for radio and component repair and testing.

The maintenance facility will be designed and operated to perform the majority of maintenance required on mobile and fixed equipment utilized in surface operations at the mine. A trained crew of mechanics and electricians will be employed as part of this facility.

Administrative Offices

An administration office will be located near the historic Upper Jualin Camp. There will be offices for mine and mill supervisory staff, maintenance foremen, underground supervisors and warehouse supervisors. Also housed in the administration section of the process area building will be the General Manager, the mine and mill staff, safety and security. Offices for accounting, purchasing, engineering/drafting, computer services, and environmental staff will also be housed in this complex.

Workstation areas will be provided for drafting personnel, geologists, engineers, surveyors, samplers and other miscellaneous technicians. As appropriate, fireproof vaults will be constructed for any accounting and purchasing records along with engineering and surveying drawings and data. Additional space will also be provided for a reception area, conference room, lunch/training room, washrooms, blueprint room, photocopier, communications room, computer station and storage.

Change Facility

A change facility will be located in the process area complex. It will serve all mine, mill and maintenance staff and will be equipped with lockers.

The wash and shower facilities will be sized to handle the shift changes total for all employees using the change facility. Separate space will be provided for both men and women. Additional space in the change facility will be provided with a dispatch area and access to the offices of the mine operating staff.

A first aid room and mine rescue equipment storeroom will be housed in the dry/office area. Both rooms will have outside doors for rapid access to the mine and surrounding plant site areas. An ambulance shelter will also be provided nearby. All medical emergencies will rely on air ambulance support to evacuate personnel to Juneau for treatment. An ambulance will be on-site to provide evacuation from the process area to the marine facilities if weather conditions preclude landing at the process area.

Infiltration Gallery

An infiltration gallery installed in Johnson Creek will be the primary source of fresh water for processing. The infiltration gallery will consist of a perforated pipe in the stream bank. Water will flow from the pipe into a sump from which it will be pumped to a 216,000-gallon fresh water tank. Mill water will only be supplied from Johnson Creek at an estimated demand of 150 gpm. The fresh water demands for domestic use and fire suppression operations will be potentially available from both underground and Johnson Creek.

Power Supply

As described in Section 3.4, the power supply building will be central to the Jualin process area near the mill building, where the majority of the supply is required.

Metallurgical Laboratory

Coeur will maintain a laboratory near the mill complex that will house the assaying and metallurgical sampling and testing facilities, and environmental monitoring necessary to support the operation. An off-site Environmental Protection Agency (EPA) certified laboratory will be used to analyze monitoring samples, as necessary to meet permit requirements. The on-site laboratory will include the following areas:

- Sample receiving room
- Sample preparation room
- Wet laboratory
- Balance and weighing room
- Atomic absorption spectrophotometer (AA room)
- Furnace room
- Sample storage
- Metallurgical laboratory
- Metallurgical storage
- Offices

The laboratory facility will be used to provide assay or grade information which is essential to maintain gold production from the mill.

A wide range of reagent chemicals will be used in the laboratory. All chemical use and storage will be in accordance with manufacturer specifications and any other applicable regulatory requirements. At the site, Coeur will maintain copies of MSDS for all chemicals and reagents used in the laboratory.

Laboratory wastes will be evaluated on a case-by-case basis. Solid wastes that cannot be incinerated or properly disposed in underground areas, will be sent off-site for disposal or recycling as outlined in the ADEC Solid Waste Permit (Appendix 3).

Personnel Camps

In order to accommodate the workers during construction there will be two camps available onsite. A temporary construction-only camp will be assembled in the laydown area, south of the proposed administration building location within the boundaries of the historic Upper Jualin minesite, and the existing Comet Beach camp will be used.

During operations, the existing Comet Beach camp, located on private land, may be used to cover work schedules that require 24-hour coverage. Examples of situations which would require use of the Comet Beach camp include the monitoring of outmigrating juvenile salmon and the ongoing supervision of water and wastewater treatment systems. The existing camp will not be enlarged from its present footprint.

During closure, the existing Comet beach camp and its support facilities will be required to complete the demolition and reclamation activities associated with the final phase of the Project's life.

Borrow Areas

The Kensington project will involve the development of new sand and gravel borrow areas and the use of existing borrow sites which are shown in Drawing 2. Sand and gravel will be used for general fill, facility foundations, plant, warehouse, support facilities, and other construction needs.

Borrow site development will occur as open-pits. The actual configuration of the borrow pits will be determined by material type and quantities and will be restricted to the designated boundaries outlined on Drawing 3 or as amended and approved. The borrow sites will be reclaimed with their development. Reclamation will involve regrading, and placement of growth medium and seeding, unless the area is deemed to be wetland and then it would be reclaimed as open water.

Topsoil and Snow Stockpile Areas

Topsoil from the disturbance at the mining and processing area facilities will be stored in the topsoil piles shown on the drawings. Runoff from these piles will use BMPs. Additional topsoil piles will be located along the access roads and will be described in the final road design plans to be submitted to the Forest Service. Topsoil stockpiles will be graded and seeded, as appropriate, to reduce erosion potential.

Snow stockpiles will be located in and around the mine facility complex, as well as sharing space with the topsoil stockpile locations. Runoff from the piles in the mine area will be managed using BMPs and/or flow to the mine area sediment pond. Snow stockpiles will also be located along the road and other areas where activity will occur on the project. It is expected that sand will be the primary material used to maintain roads during snowy weather. However, the use of chemical melting agents or salt may be used on a limited basis. The BMPs (NPDES and construction) will address snow removal and incorporate Forest Service BMPs 14.20, 14.21, and 14.23 related to snow management.

Solid Waste Disposal Facilities

Non-process refuse will be handled by placing bear proof dumpsters at strategic locations throughout the operation. Dumpsters will be placed at the marine terminal and the process area. Additional dumpsters will be located as required by specific operations.

Dumpsters will be constructed with two separate receptor bins. One side of each dumpster will accept combustible solid waste which will be collected daily, and disposed of in a fenced, bear-proof incinerator. The incinerator will be a commercial unit sized to suit the anticipated load during the construction and operating phases of the project. Ash from the incinerator will be placed underground in dry parts of the mine as permitted by Coeur Alaska's Solid Waste Permit.

The other side of each dumpster will collect non-combustible solid waste. This waste will transported offsite and disposed of in a manner approved by ADEC. Used oil will also be collected separately, and burned at the project site to provide secondary heat in approved used oil heaters, or disposed of by an approved used oil contractor. Other

wastes not mentioned will be handled, stored, and disposed of in accordance with applicable laws and regulations.

Construction and demolition wastes will be salvaged, as appropriate. Some construction and demolition wastes will also be managed in areas of the mine workings according to ADEC Solid Waste Permit requirements.

3.8 Equipment

The mobile fleet proposed for general mine services includes:

- One 2 ton forklift for the truck shop and warehouse
- One 15 ton hydraulic crane
- Two 30 ton sea container load-on/load-off forklifts
- Two 4 WD ¾ ton crew cab pick-ups
- Two 4 WD SUVs (for mine management)
- One sea container tractor hauler, and two trailers
- Unimog utility truck with snow blower
- One water truck
- Two 4 WD busses of 20 person capacity each
- One emergency response vehicle 4 WD
- One 12 H motor grader
- One Case Backhoe
- One Portable Welder
- One Bobcat Front End Loader

This equipment will be fuelled and serviced at the process/maintenance area only. Additional equipment will be provided by the construction contractor for the completion of their individual projects.

3.9 Sanitary Waste

Currently at the Comet Beach Camp, there are two fully permitted systems in use for sewage treatment and disposal. If the camp numbers are less than 10 people, then a leach field is used. If the populations are greater than 10 at the camp, then the aerobic activated sludge plant is required and must be brought online.

On the Jualin side, it is planned that sewage will be collected from the process area complex and distributed to a central treatment system and discharged to a leach field. The leach field will be similar in configuration to that already approved by ADEC on the Kensington side. The facility will be designed to accommodate the staffing levels for the project.

3.10 Hazardous Materials

Hazardous materials that will be part of the mining operation include:

- Diesel
- Aviation Fuel
- Gasoline
- Solvents
- Ferric Chloride
- Sodium Hydroxide
- Potassium Amyl Xanthate
- MIBC

- Flocculants and Polymers
- Lead Nitrate
- Surfactants
- Scale Inhibitors

Diesel fuel will be used for the main generators, several small generators, mobile equipment, and vehicles. Aviation fuel will be available for limited refueling activities for helicopters. Gasoline will make up the smallest component of fuel consumed and will be reserved for small engine type equipment (e.g. chain saws).

Diesel fuel will be delivered by barge in isotainers. Fuel will be offloaded from the barge and transported to the laydown area or the main fuel storage tank at the mine area. Fuel will be pumped or gravity drained from the isotainers into the main fuel storage tank.

During initial mine construction, existing fuel storage facilities will be utilized to support tunnel excavation activities and operate the existing temporary camp at Comet Beach as well as temporary tanks for Jualin construction activities. In addition to the 60,000 gallon capacity at Comet Beach, several smaller tanks are required to operate several units. A generator will be required at the beach to provide power to the maintenance shop and other ancillary facilities. Day tanks will also be located at the incinerator and the temporary workcamp. Day tanks will typically be 500 to 5,000 gallons capacity. Each of these tanks will have secondary containment.

Aviation fuel will be delivered by barge in 5,000-gallon isotainers specially designed to transport fuel. The ISO-containers will be stored in a lined containment area either at the marine terminal or at the laydown yard. Approximately 5,000 gallons of aviation fuel will be stored on-site at any time.

Due to limited use, gasoline will be brought to the site containerized in 55-gallon drums and stored in areas with secondary containment.

The other hazardous materials listed above will be shipped direct, by barge, from Seattle to the project site. Shipping will be done in accordance with U.S. Department of Transportation shipping regulations. Personnel responsible for handling these materials

will be trained and certified as Hazardous Materials Technicians (OSHA 29 CFR 1910.120). Personnel transporting the materials would be trained in emergency procedures and would carry emergency response plans during transport.

3.11 Dust Control

Coeur is required to abate visible dust emission from mine activities and trafficked areas of the project. The mine roads are the most likely source of fugitive dust from the operation. On trafficked areas, Coeur will apply water or a commercially available dust suppression additive as necessary to control fugitive emissions. The application of water to the roadway will only be made during periods in which the temperature remains above freezing, in order to avoid ice-build up on the roadways. The water use authorization for Johnson Creek includes dust suppression.

3.12 Project Documentation

Coeur will provide to the USFS as-built drawings of major project facilities included in the reclamation bond cost estimate within 180 days of construction. This will include: tailings storage facility, marine terminal facilities, tailings pipeline, roadways and water treatment facilities.

4. PROJECT MITIGATION AND MONITORING

Coeur Alaska will implement mitigation measures and monitoring programs to continually evaluate the potential effects of the operation to the surrounding environment. These programs are summarized in the following section. If monitoring shows a change that may cause unforeseen environmental consequences, Coeur will notify the USFS and State of Alaska. The company will first validate initial monitoring results and if confirmed, develop an action response plan for agency approval.

Coeur Alaska will also prepare an annual report that summarizes project operations, environmental monitoring results and trends for review and evaluation by the USFS and other regulatory authorities. Based on the results, the monitoring program and operations will be adjusted as appropriate. The annual report will be provided by February 1. Coeur will also provide a summary table to the USFS outlining planned monitoring activities and schedules for the following year to the USFS. The company will also coordinate an annual public meeting to review operations and monitoring results.

4.1 Stormwater Monitoring

Coeur will conduct routine monitoring during construction of best management practices (BMP's) to control stormwater runoff and potential sediment loading to receiving water bodies as well as fuel management and containment systems. These inspections will be coordinated with the construction contractor. Recommendations for improvements will be documented and monitored for implementation by site environmental staff. During operations stormwater outfalls will also be routinely monitored and water quality samples collected as presented in the freshwater monitoring plan and stormwater pollution prevention plan. This plan will be incorporated into this Plan of Operations and developed once facilities are constructed and detail locations are finalized.

4.2 Geology

Mitigation

Waste rock and development rock, at the Kensington Gold Project will, for the most part, be backfilled within the open stopes of the underground workings for increased ground support and to limit surface disturbance and reclamation requirements for waste rock dumps. Initially during development of the access tunnels, when no open stopes are available, waste rock will be brought to the surface and stockpiled within select areas adjacent to the Jualin process bench and the existing Kensington waste rock stockpile. The prescribed crown pillar thickness (150 foot thickness) will be maintained within the mine, unless further studies, approved by the USFS, suggest that the ground support would allow a thinner crown pillar.

Tailings from the milling operation will be deposited into the TSF in lower Slate Lake.

Monitoring

As discussed in Section 2 acid rock drainage is not anticipated from the waste rock or tailings materials produced by the Kensington project. Coeur will, however, continue to monitor waste rock and tailings during operations on a quarterly basis.

Waste Rock: Waste rock samples will be collected quarterly for the development rock that is brought to the surface during operations. These will be surface samples collected randomly from the waste piles. Two 5 kg grab samples of less than 50 mm material will be collected from the Kensington and Jualin areas each quarter. Samples will be collected from the near surface and mid dump face locations. The samples will be analyzed for Acid Generating Potential (AGP) and Acid Neutralizing Potential (ANP) using the modified Acid Base Accounting (ABA) procedure. The samples will also be analyzed for leachable metals using the Meteoric Water Mobility Procedure. Constituent levels to be measured include: aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, sulfate, and zinc. In addition to these metals the sample will be

analyzed for paste pH, nitrate, ammonia, and total dissolved solids. If monitoring shows a change in waste rock (or tailings characteristics as discussed below) that may cause unforeseen environmental consequences, Coeur will notify the USFS and State of Alaska. Coeur will first validate these results and if confirmed, will then prepare a plan outlining proposed actions to further address these conditions for agency approval.

Tailings: Tailings materials generated by the Kensington project will also be tested on a quarterly basis. A 5 kg quarterly grab sample from the tailings discharge line will be collected and similarly analyzed for modified ABA and metal mobility analysis. Analysis will be for similar metals analyzed in the ecological risk assessment including aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver and zinc. The samples will be digested with nitric acid (USEPA 3050 and then analyzed using ICP-MS (USEPA 6020).

Results of the quarterly waste rock and tailings geochemical testing will be compared against baseline conditions and presented in the annual environmental report submitted to the USFS and the ADNR. Coeur will also present a summary of the volume of tailings and waste rock produced each year and placed in either the TSF or surface waste rock disposal locations.

4.3 Air Quality

Mitigation

Coeur Alaska has submitted an Air Quality Permit application to ADEC which describes selective catalytic reduction to control emissions from the main power generators, the use of water sprays and baghouses on crushing, screening, and transfer points for conveyors. A baghouse will also be used on the cement and lime silos in use at the Project.

The abatement of dust will be accomplished by the application of water or commercially available suppressants and limiting the speed on the haul road to 20 milers per hour.

Water will be applied after the third day of no precipitation, or earlier if required to limit visible dust. This practice will be modified based on below-freezing temperatures and snowmelt conditions in the spring.

Monitoring

Air monitoring will be in strict compliance with the pending ADEC Air Quality Permit located in Appendix 3.

4.4 Freshwater Resources

Mitigation

Coeur's commitment to Best Management Practices and mitigation during the life of the operation, for the protection of freshwater aquatic resources, includes implementing such measures as:

- Provide secondary containment around all fuel storage and transfer points.
- Provide double-walled tailings pipeline from the mill to the TSF
- Provide oil - water separation for runoff collected from the process area.
- Store spill cleanup equipment at Comet Beach, Slate Creek Cove, the process area, along access roads, and at any fueling sites.
- For instream bridge construction work, provide for bypass around construction, install silt fence, and minimize streambed traffic.
- For instream construction work, use fill material that is clean of silt, clays, and organic materials.
- Do not conduct freshwater instream construction work from May 1 through October 31.
- Develop mitigation measures to provide safe and efficient downstream fish passage from above the intake dam (Drawing 2c, Figure 11) to East Fork Slate Creek. This would most likely be accomplished by a bucket and truck method.

- Meet instream flow requirements in all streams; limit intake as necessary; and use mine water and reclaimed tailings water as primary water supply when feasible.
- Develop downstream fish passage past the Mid-Lake Creek intake structure, and take measures to reestablish benthic and fish populations in Lower Slate Lake after closure.
- Develop and implement a reclamation plan to restore Dolly Varden char and other aquatic resources in Lower Slate Lake after closure.
- Design and cost a tailings cover in the reclamation of Lower Slate Lake until such time that tailings are shown to recolonize naturally.

The reclamation proposal and associated cost estimate is listed as Appendix 1 to this document.

Monitoring

Freshwater quality monitoring will be defined by the final NPDES permit for the site, as well as the stormwater water pollution prevention plan (SWPPP), and the USFS freshwater monitoring program. Coeur Alaska is proposing that the requirements of these three plans be unified to avoid duplication see attachment as detailed in Appendix 4b.

An extensive freshwater quality monitoring program is also required as part of the NPDES program including: fish populations, macro-invertebrate, sediment quality, etc. The Quality Assurance Plan is included as Appendix 4.e. to this document which details the exhaustive program.

Coeur will also annually photograph stream habitat types (e.g. riffle, pool, substrate size and vegetation/woody debris at select photo observation points to be located on Sherman, Johnson and Slate Creeks.

Two additional freshwater aquatic resource monitoring programs were also described in the FSEIS and are listed below:

Dolly Varden char Spawning Surveys

Potential Dolly Varden spawning habitat may occur along the eastern shore of Upper Slate Lake. In order to determine the potential for habitat development at the margins of Lower Slate Lake during closure, a biologist will walk along the eastern shore of Upper Slate Lake once per week from mid-July through mid-September to document any suspected redds or spawning behavior. If redds are discovered in Upper Slate Lake, baited minnow traps will be set along the eastern shore and in the north inlet to the lake to gain a better understanding of adult Dolly Varden distribution and use of the lake margins for spawning.

This program will be reviewed in the annual monitoring report with the USFS as well as with the Berners Bay working group to assess the results and potential for modifications and/or need.

Spawning Salmon Escapement Survey

Pink, chum and coho salmon returning to Slate, Johnson and Sherman Creeks to spawn will be counted during weekly surveys from the 3rd week in July to the last week in October each year, encompassing the spawning period for each species. Each stream will have markers placed every 90 feet along the bank. Surveys on Slate and Sherman Creeks will be conducted by a biologist and a trained assistant, one on each bank, walking from mean low water in the intertidal zone, to the falls that act as barriers to fish migration. Counts will include both live salmon and carcasses by species in each 90 foot section of stream. At the end of the survey the 2 counts (one from each bank) will be combined and an average obtained for each 90-foot stream section.

A weekly aerial survey of Johnson Creek will be conducted by 2 personnel in a helicopter flying up the creek. Counts will be made every 90 feet with the aid of markers that can be observed from the air. An average count will be obtained from the results of the two observers. A ground survey may be performed in October to aid observation of coho salmon.

This program will be reviewed in the annual monitoring report with the USFS as well as with the Berners Bay working group to assess the results and potential for modifications and/or need.

4.5 Cultural Resources

A Memorandum of Agreement (MOA) between the operator, the State Historic Preservation Officer (SHPO), and the Forest Supervisor has been signed (Appendix 2). The agreement includes a detailed Mitigation and Monitoring Plan that outlines details regarding mitigation of the adverse effects on historic properties. Mitigation includes making an effort to avoid impacts on significant cultural features when possible and providing an on-site archaeological monitor during mine construction to record historic properties, as well as efforts to complete data recovery through archaeological excavation. Additional mitigation includes an educational training component for employees at the mine during its operation and historic interpretive signs at the mine upon closure. The training component provides for education of project personnel to reduce the potential for secondary effects of increased visitation on cultural resource sites. This training will also address the steps to be followed in the event of inadvertent discovery of cultural resources. The MOA contains stipulations which dictate proposed mitigation, review periods, and reporting requirements. Any revisions to the MOA would have to be approved by the Forest Service Archaeologist and the SHPO.

4.6 Soils, Vegetation, and Wetlands

Mitigation

The following mitigation measures would apply to vegetation during construction and as part of reclamation:

- Plants native to the area and originating near the project area would be used for reclamation to the extent possible.
- Drainage patterns, water quality, and water quantity would be maintained to the extent possible to support aquatic plant populations and habitats.

Reclamation objectives would be met by establishing 75 percent live vegetation cover on reclaimed areas, and that water quality criteria would be met. The reclamation plan would also reflect that growth media would be placed at an average depth of 1 foot over all disturbed areas receiving cover soil. Coeur may request an exemption from this requirement based on site specific conditions or to achieve diversity in the post mining landscape. Such a request will be presented in the final reclamation plan to be submitted two years prior to closure and approved by the USFS and State of Alaska.

No Alaska Region-listed sensitive plant species have been identified on the project site to date. If a listed sensitive plant species were identified at the site, however, the following mitigation measures would be required:

- Coeur will notify the USFS.
- The collection of plants or plant parts would be prohibited except by permit issued by the Forest Supervisor for scientific or educational purposes.
- The area would be closed to off-road vehicle use.

Coeur will also prohibit the collection of any plants or plant parts, except by permit issued by the USFS for scientific or educational purposes.

Monitoring

Coeur Alaska has committed to vegetative test plots to be initiated on site immediately following the commencement of operations. Coeur will also conduct observation and

document with photographs reclamation and compliance with USFS visual quality objectives from select photo points once every 5 years for 15 years after reclamation of the project area.

4.7 Wildlife

Mitigation

Measures to be taken by Coeur Alaska to mitigate against the potential impacts to wildlife in the project area include implementing an employee education program in wildlife management and prohibiting employees from hunting, trapping, and harassing wildlife in the project area with disciplinary measures for violating company and Fish and Game regulations. The company will also establish buffer zones around bald eagle and goshawk nests in consultation with the Forest Service, if discovered, and implement a garbage management plan to limit interaction with resident bears. Coeur will also establish revegetation test plots to evaluate the most effective means of reclaiming wildlife habitat after project closure. Wildlife monitoring plans are being developed by specialist agencies within the Alaska state and Federal governments. These plans are presented in Appendix 4.h. of this Plan of Operations.

Monitoring

Eagle and goshawk: During years 1 and 2 of the project, Coeur will conduct monthly observations (May-August) for eagles and goshawks. This will include use of broadcast calls in effort to document potential presence and use of the area by these species. Results will be reported annually to the USFS and USFWS. In addition Coeur will include wildlife awareness training as part of its employee orientation and annual training programs. This program will be coordinated with USFS wildlife biologists.

Coeur will also establish buffer zones around any identified eagle or goshawk nests and implement nesting season timing restrictions for helicopter use or blasting near bald eagle sites.

Slate and Spectacle Lakes: Coeur's environmental staff will conduct routine observations of waterfowl (including geese) and other wildlife use in Upper Slate Lake and Spectacle Lake during operations. Wildlife presence will be documented and included in an annual environmental monitoring report to the USFS. This information will then be incorporated as appropriate into the final reclamation plan. Project disturbance activities will consider potential impacts to observed wildlife in the area. Coeur will also monitor wildlife and water fowl use of the TSF as presented in the TSF monitoring plan in Appendix 4.a. of this Plan of Operations.

Heron and Raptor Nesting: Presently there are no known heron or raptor nests in the project area. Coeur will include in its employee training program information on herons and raptors and document and report observations of these species to the USFS in its annual environmental report.

Mountain Goats: Coeur, in cooperation with the Alaska Department of Fish and Game, will monitor mountain goat use in the vicinity of project activities. This will include an initial pilot program using a number of radio or other collar devices to track use patterns as well as annual observation flights. The monitoring results along with potential affects of the mining project will evaluated on an annual basis in concert with the ADF&G and USFS. The specific program will be finalized with ADF&G and the USFS, prior to initiation of construction activities. If monitoring indicates that the goal population has significantly declined as a direct result of project operations, Coeur will work with the above agencies in developing appropriate reintroduction measures.

4.8 Marine Aquatic Resources

Mitigation

Coeur Alaska has committed to the following mitigation and control measures with respect to activities in the marine environment. Further details are provided in the Transportation Plan located in Appendix 4.c. of this document.

- Prohibit in-water work (pile driving and placement of fill for ramps) during the period March 15 – June 15 (Table 2-6, FSEIS)
- Use galvanized pilings
- Use vibratory hammers to the maximum extent practicable
- Use blocks of wood between the hammer and the piling or an air bubble curtain to attenuate the sound
- Drive piles during periods of reduced current
- Limit dock construction activities when marine mammals are within 1,000 feet
- Place fill, during construction, at low tides
- Ensure that wooden surfaces contacting the water are not painted or otherwise treated with creosote or preservatives with pentachlorophenol
- Use metal grating to the extent practicable for dock surfaces
- Develop and implement the required spill prevention plans and facility response plans, and train a spill response team
- Ready the deployment boom for all fuel transfers taking place at the Comet Beach facility and comply with USCG inspection requirements of the facility
- Use isotainers for diesel fuel delivery at Slate Creek Cove
- Maintain a distance of 100 yards between vessels and humpback whales at all times and other mammals to the extent practicable

- Develop and implement a Route Operational Manual based on ADEC's Geographic Response Strategies
- Limit crew shuttle speeds to 13 knots within Berners Bay during the eulachon run/herring spawning period (typically occurs for 2-3 weeks between April 15 and May 15).
- Optimize marine vessel transportation as practicable during eulachon and herring spawning periods.
- No fueling at Slate Creek cove (except in an emergency situation).
- Limit light use at the Slate Creek Cove marine terminal.

Monitoring

Coeur Alaska has prepared a marine monitoring plan that is included in this Plan of Operations as Appendix 4.d.

4.9 Aesthetics

The following measures will be implemented as mitigation to the potential visual effects at the Kensington Gold Project:

- Locate roads to the extent practicable to minimize visual impacts to recreational users in Berners Bay.
- Use full bench cuts and en-hauled material where slopes are too steep to hold material or where residual trees do not provide enough screen to permit the road to meet visual quality objectives.
- Minimize right-of-way clearing as fill and cut slopes permit.
- Mitigate the effects of sidecast slash within 30 feet of road shoulders by the most appropriate method: (1) end-haul slash to a central approved area or (2) pile slash in areas not visible from visual priority travel routes or use areas. Slash will be

consolidated as much as practical, covered with soil, and shaped into natural contours.

- Apply seed and fertilizer (as necessary) to all disturbed areas to be reclaimed, including cut-and-fill embankments and roadways. Seed mixtures will reflect the vegetation and growth characteristics of Southeast Alaska.
- Locate and design tree plantings where necessary to meet the visual quality objectives.
- Locate and design borrow pits to minimize visual impacts, and retain screen trees where necessary to meet the visual quality objectives.
- Use earth-toned colors on all building exteriors to blend with the surrounding landscape.
- Design structures to repeat forms, lines, and textures that occur frequently in the surrounding landscape.
- Revegetate the external tailings slopes and borrow areas as soon as practicable.
- Direct exterior lighting inward, where possible, to reduce glare and visual impacts.
- Use water to control fugitive dust.

4.10 Mine Safety

Coeur Alaska's safety and loss control program is designed to be a systematic approach toward the elimination of incidents and the reduction of risk to our employees and contractors, the environment, our production process, machinery and equipment, and the quality of our product. The program has been designed to fully comply with or exceed the requirements of federal, state and local government agencies. The Mine Safety and Health Administration (MSHA) is the main federal agency that enforces health and safety regulations at the mine site.

The safety training required by the Mine Safety and Health Act of 1977 specifies a minimum of twenty-four (24) hours of initial safety training covering first aid, hazardous

material handling, ventilation, ground support, use of explosives, etc. for those who work surface jobs and are only exposed to surface mine hazards. Forty (40) hours of initial safety training covering added subjects for those who work underground and are also exposed to mine hazards. MSHA also requires 8 hours of annual refresher training for all employees of the Project.

Hazard training is also conducted for all contractors and visitors who are on site for short periods of time and are not regularly exposed to mine hazard. The initial safety training is followed by task training for all employees and contractors who are expected to perform new tasks and for operating new machinery or mobile equipment. Training to introduce total loss control, spill response, Hazardous Waste Operation and Emergency Response (HAZWOPER) through Southeast Alaska Petroleum Resource Organization (SEAPRO), and training for supervisors also follows the required initial training.

During the initial training periods, aspects of the environmental mitigation programs advanced by Coeur Alaska and agency personnel during the NEPA process will be presented. All environmental policies introduced during the training period will be enforced with disciplinary consequences should the company requirements not be upheld.

4.11 Transportation of Hazardous Materials

The hazardous materials listed in Section 3.10, will be shipped direct, by barge, from Seattle to the project site. Shipping will be done in accordance with U.S. Department of Transportation shipping regulations. Personnel responsible for handling these materials will be trained and certified as Hazardous Materials Technicians (OSHA 29 CFR 1910.120). Personnel transporting the materials would be trained in emergency procedures and would carry emergency response plans during transport.

4.12 Onsite Spill Prevention and Response

Coeur Alaska is required by law to amend and maintain the existing spill response and facility response plans for the Kensington site once construction is completed and as-built

designs can be documented into the design details of the mitigation and response planning. The following text lists the expected measures that will be taken to protect the environment from unexpected releases to the environment:

4.12.1 Storage Vessel Requirements

Tank design, fabrication, and erection shall be in accordance with the applicable portions of the following standards:

- API Standard 650
- American Society of Civil Engineers Standards for Tank Construction
- 1991 Uniform Building Code Guidelines on Tank Construction and Foundations
- 1991 National Fire Protection Association Guidelines
- UL specifications for above-ground self-contained oil storage tanks

In addition all vertical welded tanks shall be designed and constructed for compliance with UBC Seismic Zone 3 and Wind Shear Load Category C (100 mph).

4.12.2 Corrosion Control and Leak Detection

In accordance with API 651 principles, corrosion protection for the tanks will not be warranted. The tanks will not come into contact with any soils and no pathways of conductivity exist between the tank bottoms and potential sources of corrosion.

All single wall tanks will be located within secondary containment structures and impervious 30-oz/square yard polymer coated polyester liners are provided under each containment structure. Each liner is sealed to the interior and exterior surface of each foundation ring wall (for vertical welded tanks), to each concrete slab (for horizontal tanks), and to the containment structure sidewalls. The floor of each containment structure slopes to a collection ditch at one end of the containment.

Vertical welded steel tanks are mounted within the secondary containment structures on concrete ring wall foundations with oiled sand pads supporting the tank floors. The oiled

sand pads are installed on top of impervious liners that are sealed to the inside surface of the ring walls to provide under floor containment. Any tank floor leaks will discharge to the oiled sand pads and then drain to the secondary containment structure via 1" HDPE drainpipes cast into the ring walls.

Horizontal welded steel tanks are mounted within the secondary containment structures on concrete slabs to which the impervious containment liners are sealed.

A release from either vertical or horizontal tanks would be detected visually during daily visual inspections of the secondary containment structures.

4.12.2.1 Overfill Protection

Overfill protection for all tanks will be designed in accordance with API Recommended Practices 2350, Overfill Protection for Petroleum Storage Tanks.

Bulk storage tanks will be equipped with a visual float level gauging system that shows the actual fluid level inside the tanks. The indicators shall be clearly visible and easily read from ground level outside the tank during routine inspections, tank inventory, and fuel transfer operations.

Each bulk tank shall also be equipped with an independent automatic overfill alarm and transfer pump shutdown system, that uses liquid level floats to activate audible alarms and emergency shutdown of internal transfer pumps. A pre-alarm level shall be set at 95% of the working fill height. When fuel level reaches this height a pre-alarm condition shall be initiated during which an audible alarm sounds and an indicator light is energized on the control panel. The pre-alarm light and audible alarm can be reset only by Kensington Gold Project personnel at the control panel. When fuel level reaches working fill height a second float initiates an alarm condition during which a second alarm and light are energized and all facility in-line transfer pumps are shut down. Resetting of this alarm condition shall be possible only after the level in the tank drops below the working fill level.

All double-walled or self-diked tanks shall be equipped with overfill limiter valves set at 95% of tank capacity and shall have locking fill-containment pans fitted to the fill pipes.

4.12.2.2 Secondary Containment

All single wall tanks are located within secondary containment structures and impervious liners are provided under each containment structure. Each liner is sealed to the interior and exterior surface of each foundation ring wall (for vertical welded tanks), to each concrete slab (for horizontal tanks), and to the containment sidewalls. Each secondary containment structure is sized to contain 110% of the capacity of the largest tank retained by the structure.

The floor of each containment structure is sloped to drain toward a collection ditch at one end. Accumulated precipitation will be removed as necessary by site personnel by operating a normally closed and locked drain valve. The valve will be manned at all times while it is open. Only water that is free of any sheen will be discharged from each containment structure. Containment drainage will be discharged to the facility stormwater management system, which is operated in compliance with EPA BMPs.

Truck load-in/load-out facilities are located adjacent to three of the bulk storage areas. Each truck load-in/load-out facility is equipped with a catchment system that drains to an integral containment tank sized to hold the volume of the largest single compartment of the tank truck. The containment tank is visually monitored by Kensington Gold Project personnel during routine operations and manually pumped to the adjacent bulk storage secondary containment structure whenever necessary.

All day tanks located outside of the secondary containment areas will be self-diked steel tanks that provide full secondary containment.

4.12.3 Potential Discharge Risk Analysis

The following materials are considered to be most at risk for release to the environment:

Petroleum Product	**Individual Capacity**	**Material of Construction**	**Potential Type of Failure**	**Secondary Containment**
diesel, gasoline	6,500 gallons	Stainless steel cylinder in metal box	rupture, pierce or overturning	lined, bermed laydown area
gasoline, lubrication oils/greases, hydraulic oils	55 gallons	steel drums	rupture, pierce or overturning	lined, bermed laydown area

Typically, barges 286 feet long by 75 feet wide will be used to import petroleum products to the site. Unloading of materials will be by a roll-on, roll-off forklift transfer system.

4.12.4 Receiving Environment Risk Analysis

There are two receiving environments that are subject to the highest degree of risk for the potential release of hydrocarbons: Johnson Creek and the intertidal zone at the marine terminal facilities.

The transport of petroleum, and other hazardous materials to the minesite must cross two bridges along Johnson Creek. Accidents and potential discharges here will require rapid response and specialized equipment. To address this issue, portable spill containment equipment will be stored and readily available at these two bridge locations. Rapid response equipment will also be cached at the stormwater collection pond located at the toe of the process area, which would accept any contaminated runoff from accidental discharges at this facility.

Spill response equipment will also be readily available at each marine facility to shorten the response time of discharges to the intertidal zone.

4.12.5 Response Strategies and Safety Considerations

This section discusses mitigation measures for the management of hazardous materials, spill prevention, control and countermeasure plans, as currently planned for the Kensington Gold Project. Applicable regulations include the Federal Oil Spill Prevention Regulations (40 CFR Part 112) designed to help prevent spills, and US Department of Transportation regulations that govern oil transport and carriers, the Emergency Planning and Right-to-Know Act (which requires reporting of 'reportable quantities' of hazardous materials, and other applicable requirements. The objectives are:

- Reduce the risk of accidental spills to the environment, and related environmental degradation
- Provide the Kensington Gold Project with the necessary information to properly respond to diesel fuel and chemical spills
- Clearly define line of function responsibilities for a spill event
- Provide a concise response and clean-up program which minimizes environmental impacts

All observers to an accident or spill must first identify the mechanism of failure or accident and the materials involved to ensure that there is no danger by entering the discharge or accident area.

The sequence of events for anyone discovering a spill will be:

1. Determine the origin of the spill and identify the discharge material.
2. Stop the discharge as safely as possible, which includes closing valves, stoping pumps, and transferring fuel out of leaking tanks.
3. Safeguard human life by alerting unnecessary personnel to evacuate, shutting off power in the vicinity or path of a discharge.
4. Attempt for immediate containment if possible, including the use of boom and sorbents, blocking culverts and drains, and excavating trenches to redirect flow.
5. Reporting the spill by contacting one of the four Emergency Response Plan centers at the minesite noting material type and estimated quantity released.

A standard spill response form will be available which outlines the mandatory reporting needs for an accidental spill event. Key reporting requirements are:

- Date, time and physical conditions
- Location
- Occurrence situation
- Appropriate identification (person, vehicle, equipment)
- Nearest dwelling, water body, weather
- Extent of exposure and injuries to humans, the environment, wildlife, and fisheries
- Materials involved, container types
- Containment procedures, documentation
- Disposal procedures, documentation, chain of custody
- Environmental sampling
- Photo-documentation
- Signature of preparer.

Personnel involved in oil spill response activities at the Kensington Gold Project will comply with all applicable worker health and safety laws and regulations. Federal regulations include Mine Safety and Health Administration standards for mandatory health and safety as codified in 30 CFR for mining activities.

4.12.6 Final Notification and Reporting Required By Law

The following agencies must be notified if each of their respective thresholds are breached during a release of a hazardous material or petroleum product to water or land:

National Response Center (NRC): releases to land are not applicable, a sheen on water qualifies for reporting to the NRC.

ADEC: as soon as the person has knowledge of:

a release of a hazardous substance, or

Discharge or release of oil to water, or

Discharge or release, including a cumulative discharge or release, of oil in excess of 55 gallons to land outside an impermeable secondary containment area,; and

Within 48 hours of oil solely to land:

In excess of 10 gallon but less than 55 gallons,

In excess of 55 gallons if into a secondary containment structure

EPA: releases to water are not applicable, releases to land in excess of: 1,000 gallons

USFS: the USFS Project Manager will also be notified.

The contact numbers for these agencies are listed in the plan. Reporting to these agencies is the sole responsibility of the Environmental Manager at the Kensington Gold Project.

4.12.6.1 Spill Response Equipment Stations

To address the risks identified in this document, and as remediation for unexpected spills, it is planned that spill response trailers will be placed at strategic locations along the traveled corridor where discharges of hazardous materials could directly enter the Johnson Creek system. Spill response equipment stations will also be located at each marine facility and at the process area siltation pond which accepts stormwater runoff from that area. Those stations will be equipped with significantly more boom for the marine area.

Spill kits will contain the following minimum equipment: Visqueen bags, silt fence and posts, shovels, life jackets, waders, gloves, rope, buckets, floating oil boom and sorbent pads.

Rapid response caches will be secured with a combination style lock with the code set to "1,2,3,4".

4.13 Transportation

Road Transportation Mitigation

- Dust Control Measures

  The application of water on roadways and exposed stockpiles serves as mitigation for dust control. Enhanced dust control is achieved with the use of surfactants that increase the retention time for applied moisture to the soils. Enforcing a reduced speed limit on the Project's roadways also serves as mitigation for the abatement of dust.

- Soil Erosion Reduction

  Remediation for sediment loading includes bank stabilization with revegetation, the use of BMPs, and primary treatment with settling ponds prior to water flow introduced into culverts.

- Snow Removal and Maintenance

  Unplanned snow removal has the potential to introduce additional sediment loading into the waterways unless disposal areas away from direct discharge areas have been planned and prepared in advance. At the Kensington Gold Project, snow cache areas will be designed into the road system to control snowmelt runoff.

Marine Transportation Impact Mitigation

Consultation with regulatory agencies, special interest groups, and the public has identified several important considerations for the construction and operation of this facility which Coeur Alaska has formally adopted into the *Berners Bay Transportation Policy and Mitigation and Best Management Practices Plan, (September 2004)* (Appendix 4.c.). A key aspect of this plan, with respect to BMPs associated with the risk of fuel spills, is Coeur's commitment to "…build up onsite fuel inventories in advance of the eulachon spawning season to a level which would support operations for a 30-day period, in order to reduce or eliminate mining operation fuel barging during the eulachon

spawning period." In addition fuel supplies required for the operation of the Kensington Gold Project will be delivered via isotainer which reduces risk of fuel handling spills.

4.14 Socioeconomics

Coeur Alaska has committed to maximizing local hire policies for construction and operations. Coeur Alaska is a member of the Berners Bay Consortium, an alliance of the company with three native corporations. The objective of the Consortium is to promote the expertise of the corporations and utilize their local labor pool.

As an example, Coeur is currently working with the Tlingit Haida Central Council, the University of Alaska Vocational Education Department, and the State of Alaska Department of Labor to design and implement a job training and education program for the project. The company is committed to local hire and local purchase within the region of influence, as defined in the FSEIS. This includes, primarily, the City and Borough of Juneau, the Haines Borough, and to a lesser extent other outlying areas.

A pilot job outreach program was previously implemented by Coeur, the Tlingit-Haida Central Council, and the Berners Bay Human Resource Development Council in 1997 to train 30 local residents in mining vocational skills. Assistance and funding was provided by the Alaska Department of Labor. The six-week program graduated 28 workers. This training prototype is currently being re-designed for implementation by Coeur.

The following points are significant economic components of the Kensington Gold Project:

- Annual wage payments - $15-18 MM per year
- Total taxable property associated with mine operations - $43 MM
- Construction jobs – 350 (average)
- Operational jobs – 225 (average)
- Average mine wage - $67,000
- Employment multiplier – 1.75

- Total tax receipts to CBJ and State during operation - $10.1 MM
- Additional property taxes to local government - $1.4 MM annually
- Additional earnings for CBJ - $36.2 MM (reflects a 3% increase)
- Local Native hire policy
- Local Southeast Alaskan hire policy
- Local purchase policy
- Vocational training and education programs

5. PLAN FOR INTERIM SHUTDOWN

An interim or temporary shutdown means the cessation of the mining and processing operations for a period of not more than three years. During this period, interim reclamation would be done to reduce the potential for erosion by stabilizing road cuts and stockpiles and other disturbances that result from exploration, construction, and operational activities. Interim reclamation measures could include seeding, fertilizing, and mulching in accordance with the Forest Service BMPs included in the *Soil and Water Conservation Handbook* (Forest Service, 1996b).

Any water treatment plants operating on the Kensington or Jualin side of the property would be maintained until water quality criteria could be shown to be met without treatment.

All permit requirements would be maintained and reporting would continue during the shutdown period.

A more detailed description of activities for interim shutdown is included in the reclamation plan located in Appendix 1 of this Plan of Operations.

6. RECLAMATION

Coeur Alaska has provided an independent third-party reclamation plan and reclamation plan cost estimate, included in this report as Appendix 1. The following text summarizes the principles of the attached reclamation plan.

The first step in final reclamation would involve the removal and storage of growth media from all areas to be disturbed. Stockpiled growth media would be seeded to reduce the potential for erosion during storage.

Final reclamation would begin at the final stages of mining operations. Facilities located on federal lands not necessary for the reclamation process, including storage tanks and buildings, would be decommissioned and either salvaged or demolished. These materials would be removed from the site. After facilities were removed, concrete pads would be broken into pieces and covered with fill material. Compacted areas (excluding the buried concrete pads) would be ripped, and all areas would be graded to blend with the surrounding natural topography. Buildings located on private lands may remain and are not included in the reclamation plan cost estimate. Roads would remain in place as long as required to conduct monitoring activities. Closure and reclamation of all roads on the Kensington side would include removing culverts, ripping the road surface, and contouring the cut-and-fill slopes to blend with the surrounding terrain to natural conditions. Stream crossings would be returned to their original condition, and bridges and culverts would be removed if they were determined not to be necessary for post-closure access. The access road from Slate Creek Cove to the Jualin Mine site could remain in place under RS 2477. All piers, decking, and pilings would be removed from the Slate Creek Cove marine terminal. The fill would be removed as described in the tidelands lease.

Later stages of final reclamation would include the removal of stormwater diversions and sedimentation basins, removal of the remaining structures and closure of the mine portals with locked gates to prohibit public access but allow for periodic inspection of the underground and the outlet pipe, and the potential thinning of second growth. Drainage

from the Kensington Mine will be routed to a passive wetland system prior to discharge to Sherman Creek. Growth media would be spread over regraded areas to an average depth of 1 foot followed by seeding. The depth of growth media, plant species, and seed mixtures, as well as the use of fertilizer and amendments (e.g., lime or gypsum), would be determined through the use of test plots developed during the life of the operation. Mulch and other BMPs would be used to minimize erosion until vegetation became established. A monitoring program as described in the Reclamation Plan will be implemented to track reclamation success.

The tails access road would remain as long as necessary for maintenance and monitoring of the TSF. Monitoring of the TSF is currently being planned and bonded for 100 years.

The tailings in Lower Slate Lake would be deposited to an elevation of 704 feet with a water cover of at least 9 feet. At closure, the lake level would be raised to an elevation which would create or inundate approximately the same acreage of natural sediment in shallow areas that support plant life and macroinvertebrates as was estimated to be present in Lower Slate Lake before conversion of the lake to a temporary treatment facility. The contingency water treatment system and diversion pipeline would continue to be operated, if needed, until the operator demonstrated that downstream water quality can be protected without the need for treatment. Once this was demonstrated to USEPA, State,, and the Forest Service, the treatment system and pipeline would be removed. A 4-inch (10 cm) tails cover is included in the reclamation plan for the TSF, until Coeur Alaska can demonstrate to the Forest Service, State, and the USACE, through operational monitoring, that the tailings are not toxic. The time required to implement the reclamation plan for the TSF, including establishing the final lake level, would vary depending on upstream flows and precipitation. Coeur Alaska would be required to continue to comply with minimum instream flows established by ADNR, around the TSF, throughout the reclamation period.

The reclamation plan will focus on restoring resident fish populations and would include a large littoral zone, as well as areas deep enough for overwintering. The discharge from the reclaimed lake would occur through a spillway constructed in bedrock. The spillway would be designed to handle runoff conditions and storm events as required by the State

Dam Safety Engineer. A reconstructed channel from the spillway would be designed so that fish would be able to safely move down the system and into East Fork Slate Creek. The project operator would be required to establish a funding mechanism to ensure the stability of the dam in perpetuity. The details of the funding and long-term plan would be established with the dam safety permit from the state. A separate financial assurance would also be established with the USFS and State to ensure the overall site reclamation program was carried out to completion.

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