

## **Appendix C**

### **General Information Forms**

## GENERAL INFORMATION FORM

### GENERAL

Region/Station: 06 Forest Number: \_\_\_\_\_ District No.: \_\_\_\_\_  
Congressional District: 02

Project Name: Bluebird and Blackjack  
Mines  
Project Type: Site Inspection  
Regional Priority: NA  
5<sup>th</sup> Level HUC: NA 4<sup>th</sup> = 17070202 N.F.  
John Day

Single Site:      Multiple Site: x  
List all site names in multiple sites: Bluebird and Blackjack Mines

### ENVIRONMENT

Watershed Name: Granite Creek  
Regional Watershed Priority: 02  
Watershed size: ~120 mi.<sup>2</sup>  
Size of disturbed area (acres): ~4  
Nearest surface water source: Clear Creek  
Miles of stream impacted by site: ~1  
303d listed impaired surface water Yes x No       
If 303d listed impaired, what are the water quality limited contaminants? Temperature

Is the site affecting a Wild and Scenic river Yes      No x  
Describe potential for a catastrophic failure if not addressed: \_\_\_\_\_

Beneficial uses downstream: Recreation, salmonid habitat and passage  
Nearest critical sensitive area: Wetlands, anadromous fish migration route  
Distance sensitive area is from site: On site  
Sensitive species: redband trout, westslope cutthroat trout, sculpin, olive-sided flycatcher (identified in Grant County)  
T&E species: bull trout, steelhead (identified in Grant County)  
Is the soil environment conducive to contaminant movement Yes x No       
Activities in the watershed that also contribute to environmental damage (logging, roads, dredging, grazing, etc.): Roads, mining, limited logging

Would a removal action have a noticeable positive impact on or reduce the potential future risk of damaged resources Yes x No       
Other critical information relating to the environment: \_\_\_\_\_

## HUMAN HEALTH AND SAFETY

|                                           | Within 200 ft of the Site | Within 4 mi of the Site | Within 15 mi of the Site |
|-------------------------------------------|---------------------------|-------------------------|--------------------------|
| Year round population based on residences | 0                         | ~50                     | NA                       |
| Seasonal population based on residences   | 0                         | ~50                     | NA                       |
| Water wells                               | 0                         | 0                       | NA                       |
| Surface water intakes                     | 0                         | 0                       | 0                        |

Recreational activities within 200 ft of the site:

Swimming

Recreational activities that occur within 15 mi of the site:

Hiking, camping, fishing, hunting

Established recreational sites within 200 ft of the site:

Informal swimming hole on Clear Creek

Established recreational sites within 15 mi of the site:

Campgrounds, trails

Depth to groundwater (ft):

NA

Beneficial uses downstream:

Habitat, recreation

Physical hazards:

Settling ponds, debris, steep slopes

| Hazard                                     |     |
|--------------------------------------------|-----|
| Dangerous Highwall                         | No  |
| Subsidence                                 | No  |
| Vertical Opening/Shaft                     | No  |
| Dangerous Impoundment                      | No  |
| Dangerous Pile and Embankment              | No  |
| Dangerous Slide                            | No  |
| Hazardous Equipment or Unstable Structures | No  |
| Hazardous Explosive Gases                  | No  |
| Hazardous Water Body/Ponds                 | Yes |
| Solid Waste                                | No  |
| Horizontal Opening/Adit                    | Yes |

Other critical information relating to health and safety: \_\_\_\_\_

## MIXED OWNERSHIP INFORMATION

% of the site on NFS land 100  
 (managed by NFS): \_\_\_\_\_  
 % of the watershed on NFS land ~85  
 (managed by NFS): \_\_\_\_\_

## POTENTIAL CONTAMINATION

|                                                                             | Yes | No |
|-----------------------------------------------------------------------------|-----|----|
| <b>Surface Water Indicators</b>                                             |     |    |
| High turbidity in surface water                                             |     | X  |
| Active erosion into surface water                                           | X   |    |
| Staining or precipitate/sediments                                           | X   |    |
| Aquatic kills                                                               | X   |    |
| Visible plume                                                               | X   |    |
| Discharges to surface water sources (i.e., adit drainage or leachate)       | X   |    |
| Noticeable decline in aquatic population (compared to upstream of the site) |     | X  |
| Surface water void of life in the area of the mine site                     |     | X  |
| Site located in the floodplain/wetland                                      | X   |    |
| <b>Failing or Inadequate Design</b>                                         |     |    |
| Oversteepened slopes                                                        | X   |    |
| Unlined ponds                                                               | X   |    |
| Inadequate landfill design or dumps                                         |     | X  |
| Unstable retainment structure                                               |     | X  |
| <b>Past Practices</b>                                                       |     |    |
| Uncontrolled landfill/dump                                                  |     | X  |
| Improper disposal                                                           | X   |    |
| Chemical/wastes were stored onsite in drums/tanks, etc.                     | X   |    |
| Past practices at site used hazardous materials                             | X   |    |
| <b>Other Indicators</b>                                                     |     |    |
| Stressed vegetation                                                         | X   |    |
| Dead vegetation or lack of vegetation                                       | X   |    |
| Animal kills                                                                |     | X  |
| Visual contaminants                                                         | X   |    |
| Heavily stained soils/salts present                                         | X   |    |

Other critical potential contaminant information: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## ANALYTICAL/DOCUMENTED CONTAMINATION

| Media      | Distance | Location          | Rate of Discharge/Volume (gpm or cy) | Contaminant                                                       | Exceedance | Background |
|------------|----------|-------------------|--------------------------------------|-------------------------------------------------------------------|------------|------------|
| Water      | On site  | Blackjack Adit    | NA                                   | Ba, Fe, Pb, Mn, Hg, Ni, Zn, pH                                    | Various    | Various    |
|            | On site  | Bluebird Adit     | NA                                   | Ba, Co, Fe, Ma, Hg, Ni, Zn, pH                                    | Various    | Various    |
|            | Variable | Blackjack Streams | NA                                   | Ar, ArV, Ba, Pb, Hg, DO                                           | Various    | Various    |
|            | Variable | Bluebird Streams  | NA                                   | ArV, Ba, Hg, TDS                                                  | Various    | Various    |
|            | On site  | Blackjack Pond    | NA                                   | Al, Ba, Cd, Co, Cu, Fe, Pb, Ma, Hg, Ni, Se, Zn, pH, DO            | Various    | Various    |
|            | On site  | Bluebird Pond     | NA                                   | Al, ArV, Ba, Co, Fe, Pb, Ma, Hg, Ni, Se, Zn, pH, DO               | Various    | Various    |
| Sediment   | On site  | Blackjack Adit    | NA                                   | An, Ar, Cd, Cu, Hg, Ni, Zn                                        | Various    | Various    |
|            | Variable | Blackjack Streams | NA                                   | An, Ar, Cd, Cr, Cu, Ma, Hg, Ni, Ag, Zn                            | Various    | Various    |
|            | Variable | Bluebird Streams  | NA                                   | An, Ar, Cd, Cr, Cu, Hg, Ni                                        | Various    | Various    |
|            | On site  | Blackjack Pond    | NA                                   | An, Ar, Cd, Cr, Cu, Ma, Hg, Ni, Zn                                | Various    | Various    |
|            | On site  | Bluebird Pond     | NA                                   | An, Ar, Cd, Cu, Ma, Ni, Zn                                        | Various    | Various    |
| Soil/Waste | On site  | On site Blackjack | NA                                   | Al, An, Ar, Ba, Be, Cr, Co, Cu, Fe, Pb, Ma, Hg, Ni, Se, Tl, V, Zn | Various    | Various    |
|            | On site  | On site Bluebird  | NA                                   | Al, An, Ar, Ba, Be, Cr, Co, Cu, Fe, Pb, Ma, Hg, Ni, Se, Tl, V, Zn | Various    | Various    |

## ADDITIONAL STUDIES

Biological studies that show a decrease in the number and lower species diversity downstream of the site:

Yes \_\_\_\_\_ No   x  

Increased mortality in nesting wildlife:

Yes \_\_\_\_\_ No   x  

Other critical contaminant information:

## **Appendix D**

### **Copies of Supporting Information**

# OREGON NATURAL HERITAGE INFORMATION CENTER

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*Institute for Natural Resources*



OREGON STATE UNIVERSITY  
1322 SE Morrison Street  
Portland, Oregon 97214-2423

September 15, 2003

Jeryl Kolb  
EA Engineering, Science, and Technology  
12011 Bellevue-Redmond Road, Suite 200  
Bellevue, WA 98005

Dear Mr. Kolb:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Ajax, Blackjack, and Monumental Mine sites in Township 8 South, Range 35.5 East, Section 22; Township 9 South, Range 35 East, Section 14; and Township 9 South, Range 36 East, Section 18, W.M., respectively.

Six (6) records were noted within a two-mile radius of your project and are included on the enclosed computer printout. A key to the fields is also included.

Please remember that the lack of rare element information from a given area does not mean that there are no significant elements there, only that there is no information known to us from the site. To assure that there are no important elements present, you should inventory the site, at the appropriate season.

Please note that at this time ORNHIC does not have comprehensive computerized records available for all anadromous fish in Oregon. I have listed below the species that may be present within the waterways contained in the project area. I have also included their listing by the National Marine Fisheries Service (NMFS). For more information on anadromous fish you may wish to contact NMFS at: 525 NE Oregon Street; Portland, Oregon 97232-2737. Please also note that the U.S. Fish and Wildlife Service now has jurisdiction over coastal cutthroat trout.

Steelhead (Middle Columbia River)

*Oncorhynchus mykiss*

Threatened

This data is confidential and for the specific purposes of your project and is **not to be distributed**.

If you need additional information or have any questions, please do not hesitate to contact me.

Sincerely,



Cliff Alton  
Conservation Information Assistant

encl.: invoice (H-091503-CWA1)  
computer printout and data key

# OREGON NATURAL HERITAGE INFORMATION CENTER

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*Institute for Natural Resources*



Invoice Number: H-091503-CWA1  
Index: RNR105

OREGON STATE UNIVERSITY  
1322 SE Morrison Street  
Portland, Oregon 97214-2423

## **INVOICE**

TO: EA Engineering, Science, and Technology  
12011 Bellevue-Redmond Road, Suite 200  
Bellevue, WA 98005

ATTN: Accounts Payable

DATE: September 15, 2003

RE: Data system search for rare, threatened and endangered plants and animals in the vicinity of Township 8 South, Range 35.5 East, Section 22; Township 9 South, Range 35 East, Section 14; and Township 9 South, Range 36 East, Section 18, W.M. Requested by Jeryl Kolb for the Ajax, Blackjack, and Monumental Mine sites.

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For services and products:

|                                        |          |
|----------------------------------------|----------|
| Computer records (6 @ \$0.50/record)   | \$ 3.00  |
| Computer fee (flat rate)               | \$ 20.00 |
| Staff time (1.25 hours @ \$50.00/hour) | \$ 62.50 |

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|                   |                 |
|-------------------|-----------------|
| <b>TOTAL DUE:</b> | <b>\$ 85.50</b> |
|-------------------|-----------------|

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Please make checks payable to: **Oregon Natural Heritage Information Center**

Please include invoice number at top of page with payment.

Terms: **Net 30**

NAME: RANA LUTEIVENTRIS  
COMMON NAME: COLUMBIA SPOTTED FROG  
EO-CODE: AAABH01290\*024 LAST OBS: 1996-06-20 FED STATUS: (PS)  
COUNTY(s): GRANT FIRST OBS: 1996-06-20 STATE STATUS: SU  
QUAD NAMES: GRANITE LAT: 444915N ORNHP TRACK: Y  
PHYSIOGRAPHIC PROV: BM LONG: 1182434W PRECISION: M  
T-R-S: 008S035E 34 QUADCODE: 4411874 MINELEV (Feet): 4720  
T-R-S COMMENTS: RANGE=35.5E  
EO-RANK/COMM: :  
DIRECTIONS: BOULDER CREEK DRAINAGE. OFF FS RD 73 TO 73/011. TURBID MINING POND AND ADJACENT WET MEADOW.  
DESCRIPTION: DREDGE POND, WET MEADOW AND STREAM.  
EO-DATA: 1996: 5+ ADULTS AND 13 LARVAE PRESENT.  
EOTYPE:  
COMMENTS: OBSERVER: ALISON KUEHL, USFS AND CHRISTOPHER PEARL, U OF O. HANLON-ABEITA SITES #051, 170.  
ANNUAL OBSERVATION:  
OWNER: FEDERAL  
MANAGED AREA: BAKER RANGER DISTRICT  
WALLOWA-WHITMAN NATIONAL FOREST  
MANAGE COMM:  
PROT COMM:  
BEST SOURCE: MARLA HANLON-ABEITA, DANCING CRANES BIOTECHNICAL SERVICES, LA GRANDE.

NAME: ONCORHYNCHUS CLARKI LEWISI  
COMMON NAME: WESTSLOPE CUTTHROAT TROUT  
EO-CODE: AFCHA02088\*023 LAST OBS: 1993 FED STATUS: SOC  
COUNTY(s): GRANT FIRST OBS: STATE STATUS: SV  
QUAD NAMES: GRANITE LAT: ORNHP TRACK: Y  
OLIVE LAKE  
VINEGAR HILL  
PHYSIOGRAPHIC PROV: BM LONG: PRECISION:  
T-R-S: 009S035E QUADCODE: 4411874 MINELEV (Feet):  
4411875  
4411865  
T-R-S COMMENTS:  
EO-RANK/COMM: :  
DIRECTIONS: LIGHTNING CREEK. TRIBUTARY OF THE NORTH FORK JOHN DAY RIVER VIA CLEAR CREEK AND GRANITE CREEK.  
DESCRIPTION:  
EO-DATA: 1993; ODFW R&E CREWS COLLECTED AN UNSPECIFIED # OF CUTTHROAT TROUT FROM LIGHTNING CREEK AND DRY CREEK, A TRIBUTARY.  
EOTYPE: YEAR-ROUND - fish  
COMMENTS:  
ANNUAL OBSERVATION:  
OWNER: FEDERAL  
MANAGED AREA: NORTH FORK JOHN DAY RANGER DISTRICT  
UMATILLA NATIONAL FOREST  
MANAGE COMM:  
PROT COMM:  
BEST SOURCE: JONES, KIM. ODFW FISHERIES RESEARCH BIOLOGIST, PROJECT COORDINATOR FOR AQUATIC INVENTORIES, CORVALLIS, OR.

NAME: ONCORHYNCHUS MYKISS POP 28  
COMMON NAME: STEELHEAD - MIDDLE COLUMBIA RIVER SUMMER RUN  
EO-CODE: AFCHA02133\*113 LAST OBS: 1999-PRE FED STATUS: LT  
COUNTY(s): GRANT FIRST OBS: STATE STATUS: SV  
MORROW  
UMATILLA  
WHEELER  
QUAD NAMES: BOURNE LAT: ORNHP TRACK: Y  
ANTHONY LAKES  
CRAWFISH LAKE  
TROUT MEADOWS

SILVER BUTTE  
OLIVE LAKE  
KELSAY BUTTE  
THE COCKSCOMB  
UKIAH SE  
BRIDGE CREEK  
DALE

DEERHORN CREEK  
MEADOW BROOK SUMMIT  
RITTER  
SLICKEAR MOUNTAIN  
JOHNNY CAKE MOUNTAIN  
MONUMENT  
BOLOGNA BASIN  
KIMBERLY  
GRANITE MEADOWS  
SULLIVAN GULCH  
LEHMAN SPRINGS  
OWENS BUTTE  
UKIAH  
SUGARBOWL CREEK  
MATLOCK PRAIRIE  
ARBUCKLE MOUNTAIN  
TOWER MOUNTAIN  
PEARSON RIDGE  
THOMPSON FLAT  
LAKE PENLAND  
MADISON BUTTE  
BIG ROCK FLAT  
CHAPIN CREEK  
WHITETAIL BUTTE  
TURNER MOUNTAIN  
STEET MOUNTAIN  
MILLER FLAT  
COURTHOUSE ROCK  
HAMILTON  
FOX  
LONG CREEK  
JOHNSON SADDLE  
BELSHAW MEADOWS  
DONALDSON CREEK  
SHEEP RIDGE  
MOUNT IRELAND  
GRANITE  
DESOLATION BUTTE  
SHARP RIDGE  
BOULDER BUTTE  
VINEGAR HILL  
GREENHORN

PHYSIOGRAPHIC PROV:  
T-R-S:

LONG:  
QUADCODE: 4411872  
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PRECISION: M  
MINELEV (Feet):

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T-R-S COMMENTS:

EO-RANK/COMM: :

DIRECTIONS: N. FK. JOHN DAY RIVER & TRIBUTARIES

DESCRIPTION:

EO-DATA: SUMMER RUN; ODFW DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE.

EOTYPE: SPAWNING & REARING - fish

COMMENTS: DISTRIBUTION INFORMATION USED IN THIS EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 1999. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY ODFW'S DISTRICT FISHERIES BIOLOGIST; THE PRESENCE OF STEELHEAD IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING PRESENT.

ANNUAL OBSERVATION:

OWNER:

MANAGED AREA:

MANAGE COMM:

PROT COMM:

BEST SOURCE: 2000 ODFW GEOGRAPHIC RESOURCES DATA; UNTERWEGNER, TIM.

NAME: SALVELINUS CONFLUENTUS POP 2

COMMON NAME: BULL TROUT (COLUMBIA RIVER POPULATION)

EO-CODE: AFCHA05023\*058

LAST OBS: 1992

FED STATUS: LT

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COUNTY(s): GRANT

FIRST OBS:

STATE STATUS: SC

UMATILLA

QUAD NAMES: BOURNE

LAT:

ORNHP TRACK: Y

ANTHONY LAKES

MOUNT IRELAND

CRAWFISH LAKE

TROUT MEADOWS

SILVER BUTTE

OLIVE LAKE

KELSAY BUTTE

THE COCKSCOMB

UKIAH SE

BRIDGE CREEK

VINEGAR HILL

BOULDER BUTTE

DESOLATION BUTTE

SHARP RIDGE

DALE

DEERHORN CREEK

MEADOW BROOK SUMMIT

RITTER

SLICKEAR MOUNTAIN

JOHNNY CAKE MOUNTAIN

MONUMENT

BOLOGNA BASIN

| KIMBERLY            |          | LONG:     | PRECISION:      |
|---------------------|----------|-----------|-----------------|
| PHYSIOGRAPHIC PROV: | BM       | QUADCODE: | MINELEV (Feet): |
| T-R-S:              | 006S031E | 4411872   |                 |
|                     | 007S031E | 4411882   |                 |
|                     | 007S032E | 4411873   |                 |
|                     | 006S032E | 4411883   |                 |
|                     | 007S033E | 4411884   |                 |
|                     | 008S033E | 4411885   |                 |
|                     | 009S033E | 4411875   |                 |
|                     | 006S034E | 4411886   |                 |
|                     | 007S034E | 4411887   |                 |
|                     | 008S034E | 4511817   |                 |
|                     | 009S034E | 4511818   |                 |
|                     | 007S035E | 4411865   |                 |
|                     | 008S035E | 4411866   |                 |
|                     | 009S035E | 4411876   |                 |
|                     | 007S036E | 4411877   |                 |
|                     | 008S036E | 4411888   |                 |
|                     |          | 4511911   |                 |
|                     |          | 4411981   |                 |
|                     |          | 4411982   |                 |
|                     |          | 4411983   |                 |
|                     |          | 4411984   |                 |
|                     |          | 4411974   |                 |
|                     |          | 4411975   |                 |
|                     |          | 4411976   |                 |

T-R-S COMMENTS:

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EO-RANK/COMM: E :

DIRECTIONS: N. FK. JOHN DAY RIVER & TRIBUTARIES

DESCRIPTION:

EO-DATA: 1992-10-09; USFS CREWS SURVEYED S. FK. DESOLATION CR. FROM THE MOUTH UPSTREAM TO THE UPPER LIMIT OF FISH DISTRIBUTION ABOVE THE MEADOW EAST OF THE PORTLAND MINE. 3 SEPARATE POPULATIONS WERE FOUND ISOLATED BY FALLS (AT SUMMER & FALL FLOWS). THE FIRST FALLS WERE 1.0 MILES UPSTREAM FROM RD. 45 & THE SECOND WAS 0.5 MILES BELOW THE UPPER MEADOW. 25 SPECIMENS WERE OBSERVED IN THE FIRST REACH, 8 WERE OBSERVED BETWEEN THE 2 FALLS & 16 WERE OBSERVED ABOVE THE UPPER FALLS. THE LOWEST REACH ALSO CONTAINED BROOK TROUT. 1991; IN THE SPRING, OSP TROOPER J. WILLIAMS CHECKED A 22" ANGLER CAUGHT BULL TROUT NEAR THE MOUTH OF CAMAS CR. (RM 57). 1991; ODFW AIP CREWS COLLECTED 1 SPECIMEN > 6" IN BIG CREEK. ESTIMATED MILES OF BULL TROUT DISTRIBUTION WAS 1.0. IN WINAM CREEK, 1 SPECIMEN < 6" WAS COLLECTED FROM .028 MILES ELECTROSHOCKED. ESTIMATED DISTRIBUTION WAS 1.0 MILES. NO CUTTHROAT WERE FOUND IN EITHER CREEK SURVEYED. 1991; ODFW AIP CREWS COLLECTED 3 SPECIMENS FROM S. FK. TRAIL CREEK. ESTIMATED DISTRIBUTION WAS 3.25 MILES. 1991; ODFW AIP CREWS COLLECTED AN UNSPECIFIED # OF FISH FROM 4.25 MILES OF BALDY CREEK. LOWER DISTRIBUTION WAS T7S, R36E, S33 SW. UPPER DISTRIBUTION WAS T8S, R36E, S8 SE. 1991; ODFW AIP CREWS COLLECTED 21 SPECIMENS < 6" AND 15 > 6" BY ELECTROSHOCKING 0.198 MILES OF AN ESTIMATED 12.75 MILES OF BULL TROUT DISTRIBUTION IN THE UPPER NORTH FORK JOHN DAY ABOVE GUTTRIDGE. 1990; ODFW AIP CREWS COLLECTED 6 SPECIMENS, 3 < 6" AND 3 > 6" FROM CRANE CREEK. TOTAL ESTIMATED DISTRIBUTION WITHIN CRANE CREEK WAS 1.25 MILES. BROOK & REDBAND TROUT WERE DOCUMENTED. 1990-02-08; AN ESTIMATED 295 BULL TROUT WERE KILLED BY THE NORTH FORK JOHN DAY CHEMICAL SPILL BETWEEN THE MOUTH OF CAMAS CR. (RM 57) & THE MOUTH OF STONY CR. (RM 45). 1983-03; E. CLAIRE (ODFW) CAUGHT 2 BULL TROUT 15 & 17 INCHES BETWEEN STONY CR. (RM 45) & WRIGHT CANYON (RM 39). 1980-05; E. CLAIRE (ODFW) & S. SASSER (OSP) CHECKED 2 ANGLER CAUGHT BULL TROUT APPROX 1 & 19 INCHES ON THE UPPER N. FK. JOHN DAY RIVER NEAR ORIENTAL CR. (RM 73) ODFW BULL TROUT DISTRIBUTION MAPS USED TO CREATE THE 1:24,000 COVERAGE.

EOTYPE: YEAR-ROUND - fish

COMMENTS: USFS S. FK. DESOLATION CREEK DATA PROVIDED TO E. CLAIRE (ODFW) & USED FOR ODFW'S JOHN DAY BULL TROUT POPULATION SUMMARY REPORT. S. FK. DESOLATION CREEK POPULATION OF BULL TROUT IS CONSIDERED TO BE SEASONALLY CONNECTED TO OTHER POPULATIONS IN THE UPPER NORTH FORK JOHN DAY RIVER. DISTRIBUTION INFORMATION USED IN THE EOR WAS DERIVED FROM ODFW GEOGRAPHIC RESOURCES DATA PRODUCED AND DISTRIBUTED IN 2001. THE ODFW BULL TROUT DISTRIBUTION WAS BASED ON SUMMER/FALL PRESENCE. WINTER DISTRIBUTION COULD VARY SIGNIFICANTLY. UNLESS SPECIFIC DATA EXISTS IN THE DATA FIELD, THE INFORMATION PRESENTED IN THIS EOR REPRESENTS THE "BEST PROFESSIONAL JUDGMENT" BY STATE, FEDERAL AND TRIBAL FISHERY BIOLOGISTS; THE PRESENCE OF BULL TROUT IN DESCRIBED AREAS SHOULD BE CONSIDERED UNDOCUMENTED BUT AS HAVING A POTENTIAL OF BEING

PRESENT.

ANNUAL OBSERVATION:

OWNER: PUBLIC + PRIVATE  
MANAGED AREA: NORTH FORK JOHN DAY WILDERNESS AREA  
NORTH FORK JOHN DAY RANGER DISTRICT  
UMATILLA NATIONAL FOREST  
MANAGE COMM:  
PROT COMM:  
BEST SOURCE: 2001 ODFW GEOGRAPHIC RESOURCES DATA.

NAME: CAREX CONCINNA  
COMMON NAME: LOW NORTHERN SEDGE  
EO-CODE: PMCYP03300\*005  
COUNTY(S): GRANT  
QUAD NAMES: MOUNT IRELAND  
PHYSIOGRAPHIC PROV: BM  
T-R-S: 009S036E 16  
T-R-S COMMENTS: NW4  
EO-RANK/COMM: :  
DIRECTIONS: LOCATED IN A MEADOW ALONG CHANNEL CREEK. SITE IS 300 YDS DOWNSTREAM FROM A PROJECT (JOSEPHSON NOTES).  
UNCLEAR IF IT IS A MINING PROJECT OR A ROAD USE PERMIT.  
DESCRIPTION: WET MEADOW/MARSH HABITAT. CONCAVE MICROTOP, BASIN LANDFORM, LOCATED IN A MEADOW ALONG CHANNEL CREEK.  
EO-DATA: 1 PLANT, POSSIBLY MORE.  
EOTYPE:  
COMMENTS: THIS SITE WAS FOUND BY DAN LEAVELL IN THE SUMMER OF 1990. HE SENT OFF A SPECIMEN TO DR. KEN CHAMBERS AT OSU, WHO IDENTIFIED IT AS CAREX CONCINNA. THE LOCATION IS THE BEST ESTIMATE (AS OPPOSED TO THE BUFFALO GULCH SITE THAT HAS BEEN SPECULATED TO BE WHERE IT WAS COLLECTED FROM). DAN L. TRIED TO RELOCATE THE SITE IN THE SUMMER OF 1991, WITH NO LUCK. THE AREA NEEDS TO BE CAREFULLY RESURVEYED TO FIND AND BETTER

LAST OBS: 1990  
FIRST OBS: 1990  
LAT: 444659N  
LONG: 1181834W  
QUADCODE: 4411873

FED STATUS:  
STATE STATUS:  
ORNHP TRACK: Y  
PRECISION: M  
MINELEV (Feet): 5360

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DOCUMENT THE SITE. MAPPED IN GIS TO NW4 OF SECTION 16, BUT THIS IS JUST A GUESS.

ANNUAL OBSERVATION:

OWNER: FEDERAL  
MANAGED AREA: BAKER RANGER DISTRICT  
WALLOWA-WHITMAN NATIONAL FOREST  
MANAGE COMM:  
PROT COMM:  
BEST SOURCE: LEAVELL, DAN; KOOTENAI NF (1994)

NAME: CAREX PRATICOLA  
COMMON NAME: MEADOW SEDGE  
EO-CODE: PMCYP03B20\*012  
COUNTY(S): GRANT  
QUAD NAMES: MOUNT IRELAND  
PHYSIOGRAPHIC PROV: BM  
T-R-S: 009S036E 28  
T-R-S COMMENTS:  
EO-RANK/COMM: :  
DIRECTIONS: BULL RUN CREEK.  
DESCRIPTION: FLAT SLOPE, GRAVELLY LOAM SOIL, DRY GRASS MEADOW, DENSITY IN TENTHS =.20. NO USE BY LIVESTOCK; DRY SITES (OPENINGS); COMMON WITH CAREX SPP, JUNCUS PARRYI.  
EO-DATA: HERBARIUM COLLECTION.  
EOTYPE:  
COMMENTS: HERBARIUM COLLECTION INFORMATION COMPILED BY CAREX WORKING GROUP. PORTER COLLECTION HOUSED AT "FS5", NOT SURE WHAT THIS IS.

LAST OBS: 1940-07-25  
FIRST OBS: 1940-07-25  
LAT: 444517N  
LONG: 1181848W  
QUADCODE: 4411873

FED STATUS:  
STATE STATUS:  
ORNHP TRACK: Y  
PRECISION: M  
MINELEV (Feet): 5200

ANNUAL OBSERVATION:

OWNER:  
MANAGED AREA:  
MANAGE COMM:  
PROT COMM:  
BEST SOURCE: PORTER HERBARIUM COLLECTION

6 Records listed.

# KEY TO PRINTOUT

**NAME AND COMMON NAME:** The scientific and common name of the species.

**EO-CODE** (element occurrence code): Unique Heritage Program code for this occurrence. The first 10 characters are the code for the species, and the last 3 are the occurrence number.

**COUNTY(S):** County name(s)

**QUAD NAMES:** Name of the USGS 7.5' topographic quadrangle map(s) where the record is mapped.

**PHYSIOGRAPHIC PROVINCE:** Code for physiographic province.

**BM** = Ochoco, Blue and Wallowa Mts.

**BR** = Basin and Range

**CR** = Coast Range

**CB** = Columbia Basin

**EC** = East slope of the Cascades

**KM** = Klamath Mountains

**SP** = Snake River Plains

**WC** = West slope and crest of the Cascades

**WV** = Willamette Valley

**T-R-S:** Township, Range and Section, with township first, range second and section third (a space appears between range and section). 004S029E 32 = Township 4S, Range 29E, Section 32. Fractional townships and ranges are further defined in the T-R COMMENTS field.

**T-R-S COMMENTS:** Comments relating to township, range or section(s), e.g. SE4NE4 or SENE=SE ¼ of the NE ¼.

**LASTOBS:** Last reported sighting date, in the form YYYY-MM-DD

**FIRSTOBS:** First reported sighting date for this occurrence in the form YYYY-MM-DD

**LAT:** latitude, North - in the form DDMMSS **LONG:** longitude, West - in the form DDDMMSS

**QUADCODE:** Heritage Program code for the USGS 7.5' topo map.

**FEDERAL STATUS:**

U.S. Fish and Wildlife Service or National Marine Fisheries Service status:

**LE** = listed endangered

**LT** = listed threatened

**SOC** = species of concern

**PE** = proposed endangered

**PT** = proposed threatened

**C** = candidate for listing with enough data available for listing

**STATE STATUS:**

For animals, Oregon Department of Fish and Wildlife status:

**LE**=listed endangered

**PE**=proposed endangered

**PT**=proposed threatened

**SC** or **C**=sensitive-critical

**SV** or **V**=sensitive-vulnerable

**SP** or **P**=sensitive peripheral or naturally rare

**SU** or **U**=sensitive-undetermined

For plants, Oregon Department of Agriculture status:

**LE**=listed endangered

**LT**=listed threatened

**C**=candidate

**ORNHP EOTRACK:** We currently obtain locational information for only those elements marked with Y(es). Those species marked with N(o) or W(atch) have incomplete data since we do not currently actively track them.

**PRECISION:** Second (S) = exact location; Minute (M) = location known to nearest 1.5 miles; General (G) = location known to nearest 5 miles.

**MINELEV:** Minimum elevation, in feet (-1111=not determined).

**EO-RANK/COMM:** Relative quality of this occurrence (A=best site, B=good population or site, C=fair or small population, D=marginal or destroyed occurrence)

**DIRECTIONS:** Site name and direction to site

**DESCRIPTION:** Habitat information, e.g. aspect, slope, soils, associated species, community type, etc.

**EO-DATA:** Species and population biology - numbers, age, nesting success, vigor, phenology, disease, etc.

**EOTYPE:** For animals, type of occurrence (e.g. roost, nest, etc.)

**COMMENTS:** Miscellaneous comments

**ANNUAL OBSERVATIONS:** Summary of yearly observations

**OWNER:** federal, state, private, etc.

**MANAGED AREA:** BLM district, USFS Forest, Private Preserve, etc.

**MANAGE COMM:** Comments on how the site is managed.

**PROT COMM** (Protection Comments): Comments regarding protectibility and threats.

**BEST SOURCE:** Best source of information for this occurrence.

## **Appendix E**

### **Detailed Wetlands Description**

## Appendix E – Detailed Wetlands Assessment

A wetland assessment was performed by a field biologist at both mine sites during the SI investigation. Wetland information was obtained by comparing information on the National Wetlands Inventory (NWI) maps to observations recorded in the field, and then verifying these using wetland definitions in 40 CFR 230.3 (CERCLA definition). This definition states that wetlands are *those areas that are inundated or saturated by surface or ground water at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions*. The primary difference between this definition and the NWI definition is the requirement to support a prevalence of rooted emergent hydrophytes. Areas that under normal circumstances do not support hydrophytes could be mapped under the NWI system, but would not meet the definition according to 40 CFR 230.3.

In verifying field and NWI information against the CERCLA definition, a matrix comparing the two systems was used (USEPA 1992). This table lists the NWI categories of wetland and deep-water habitats and indicates which ones would also meet the CERCLA definition. An archetypal NWI mapped wetland that also meets the CERCLA definition has the designation PEMB, or PSSB. This means the wetland is palustrine, with emergent or scrub-shrub vegetation, and is saturated enough for the vegetation to be hydrophytic. A wetland designated R3UBH means upper perennial riverine, with an unconsolidated bottom and in a permanently saturated condition. This type of habitat usually does not have the emergent vegetation required for the CERCLA definition of a wetland.

The National Wetlands Inventory (NWI) Database 7.5 minute topographic map for the Granite quadrangle (NWI 1994) was examined to compare with characterization of the onsite wetlands. Due to the road construction and restoration activities in 1999, there have been extensive changes to the stream channel and several ponds have been excavated out of the dredge tailings. Since these ponds were constructed after the completion of the 1994 NWI map, the wetlands could not be compared to the classification on the map. The 1994 NWI maps also indicate areas at both mine sites as having large dredge mining waste piles, much of which has been removed and re-graded. Some rock piles are still visible below Bluebird Mine (Photo 21).

The changes in Clear Creek since the 1994 NWI map was developed are significant. Most important is the open nature of the creek between the Bluebird and Blackjack Mines. The 1994 NWI map identifies that portion of the creek as an *intermittent stream* (R4SBF). It is assumed that it was given this designation because of the dredge tailings, which likely covered over the creek. As an intermittent stream, the creek could not have allowed the upstream migration of the large chinook salmon observed just below Blackjack Mine during the SI. The stream is now perennially flowing in this area (designated as R3UBH). As discussed above, these riverine wetlands do not meet the CERCLA definition of a wetland unless the vegetation present is hydrophytic.

There are a large number of palustrine wetland ponds across from the Bluebird Mine, on the west side of the road and Clear Creek. AMD from the Bluebird Mine drains into the uppermost pond via a discharge pipe that runs underneath the creek and road. Classification of these ponds was difficult because they are located on private property. These ponds appear to be recently excavated and they lack any scrub-shrub development. Considering they contained water during the driest portion of the year, they can be considered permanently flooded and likely classified as

*Palustrine Unconsolidated Bottom, Permanently Flooded, Excavated (PUBHx; Photo 30).* These ponds are identified as wetlands on the NWI map as follows:

PABHx - *Palustrine Aquatic Bed Permanent Flooded, Excavated*  
PSSC<sub>x</sub> - *Palustrine Scrub Shrub Seasonally Flooded, Excavated*  
PUBHx - *Palustrine Unconsolidated Bottom, Permanent Flooded, Excavated.*  
PEMC<sub>x</sub> - *Palustrine Emergent Vegetation, Seasonally Flooded, Excavated.*  
PEMF - *Palustrine Emergent Vegetation, Semi-Permanently Flooded*  
PSSA - *Palustrine Scrub-Shrub Temporarily Flooded*

It is not clear whether these ponds are hydraulically connected to Clear Creek. The drainage from the Bluebird Mine was piped upstream before it crosses under the creek and discharges into the ponds (Photo 28). There also was some input from the Red Boy Mine drainage at the head of the ponds (Photo 31). These ponds are much larger than those on the 1994 NWI map. One of the ponds drains through a culvert (near sample station BLUE-16) east under the road and infiltrates into the ground. The flow through this culvert at the time of the SI was approximately 0.5 gal per minute.

Because of the recent establishment of settling ponds, their classification is not clear. They may be rapidly changing as submerged and rooted vascular vegetation becomes established. There also may be water quality issues that are preventing the establishment of some vegetation. Until a more detailed study of the water quality for these sites, as well as the sediment structure, is available it is difficult to provide a classification. This is a critical issue because the *Palustrine Aquatic Bed* classification does not meet the CERCLA definition, the *Palustrine Unconsolidated Bottom* possibly meets the definition, while the *Palustrine Emergent* and *Palustrine Scrub-Shrub* both meet the definition.

The flow from the lower adit at the Blackjack Mine discharges into a small (less than 1 acre) scrub-shrub wetland with alder (primarily *Alnus incana*). Its origin was not determined, so it could be classified as *Palustrine Scrub-Shrub Permanently Flooded* (PSSH, either *diked* [h] or *excavated* [x]). The flow from the upper adit at the Blackjack Mine discharges through a pipeline into a narrow excavated settling pond (similar to a ditch), not shown on the NWI map. This settling pond is considered a *Palustrine, Unconsolidated Bottom, Permanently-Flooded, Excavated* wetland (PUBH<sub>x</sub>).

The settling pond flows into a larger side channel which is located further downstream on the eastern side of the creek. This channel is supplemented with flow from Clear Creek where the creek filters through the dredge tailings under the road. This channel was also not shown on the NWI map. Since it is of recent origin (Visconty 2003), it is difficult to determine if the flow from Clear Creek is permanent and if these areas are permanently flooded. The classification of the side channel with its current flow should be considered as either *Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded* (R3UBH) or, in some areas, *Riverine, Upper Perennial, Unconsolidated shore, Vegetated* (R3US5).

The side channel has abundant lush in-stream vegetation in comparison to Clear Creek. An aquatic buttercup (*Ranunculus aquatilis*) was observed, as well as at least three species of grasses and sedges along the shoreline of the channel. There is much vegetation along the edge of the channel, which could soon be considered *scrub-shrub* wetland (Photo 50), especially considering the amount of planting that occurred near the sites in 1999.

USEPA 1992. Hazard Ranking System Guidance Manual. Office of Solid Waste and Emergency Response. EPA540-R-92-026, OSWER Directive 9345.1-07. November.

## **Appendix F**

### **Aquatic Survey Results Summary Tables**

Table F-1. Number and Relative Abundance of Taxa Collected from Riffle Habitat near Bluebird and Blackjack Mines, 21 and 23 July 2003

| Taxa                          | BLAC-ST-BMR-01 |      | BLAC-ST-BMR-02 |       | BLAC-ST-BMR-03 |       | BLAC-ST-BMR-04 |      | BLAC-ST-BMR-42 |       | BLUE-ST-BMR-05 |      | BLUE-ST-BMR-06 |      | BLUE-ST-BMR-07 |      | BLUE-ST-BMR-08 |      |
|-------------------------------|----------------|------|----------------|-------|----------------|-------|----------------|------|----------------|-------|----------------|------|----------------|------|----------------|------|----------------|------|
|                               | No.            | %    | No.            | %     | No.            | %     | No.            | %    | No.            | %     | No.            | %    | No.            | %    | No.            | %    | No.            | %    |
| Turbellaria                   | 38             | 1.71 | 34             | 0.58  | 26             | 0.71  | 26             | 0.68 | 55             | 3.14  | 89             | 2.75 | 107            | 5.48 | 16             | 1.16 | 38             | 1.82 |
| Lumbriculidae                 | --             | --   | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | 4              | 0.29 | 7              | 0.34 |
| Tubificidae                   | 69             | 3.10 | 171            | 2.90  | 51             | 1.40  | 13             | 0.34 | 6              | 0.34  | 167            | 5.16 | 13             | 0.67 | 12             | 0.87 | 97             | 4.65 |
| Ostracoda                     | --             | --   | --             | --    | --             | --    | --             | --   | --             | --    | 11             | 0.34 | --             | --   | --             | --   | --             | --   |
| Pacifastacus                  | 2              | 0.09 | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Hydracarina                   | 31             | 1.39 | 69             | 1.17  | --             | --    | --             | --   | 6              | 0.34  | 11             | 0.34 | --             | --   | 4              | 0.29 | 15             | 0.72 |
| Ameletus                      | 46             | 2.07 | --             | --    | 16             | 0.44  | 1              | 0.03 | 6              | 0.34  | 1              | 0.03 | 13             | 0.67 | 18             | 1.30 | 7              | 0.34 |
| Acentrella                    | --             | --   | --             | --    | --             | --    | 297            | 7.79 | 12             | 0.68  | 44             | 1.36 | 7              | 0.36 | --             | --   | --             | --   |
| Baetis tricaudatus            | 62             | 2.79 | 449            | 7.61  | 505            | 13.85 | 207            | 5.43 | 18             | 1.03  | 213            | 6.58 | 68             | 3.48 | 55             | 3.99 | 99             | 4.74 |
| Diphetor hageni               | 8              | 0.36 | 68             | 1.15  | 26             | 0.71  | 27             | 0.71 | 223            | 12.72 | 23             | 0.71 | 20             | 1.02 | 12             | 0.87 | --             | --   |
| Centropitulum                 | --             | --   | --             | --    | 13             | 0.36  | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Heptageniidae                 | 86             | 3.87 | 85             | 1.44  | 128            | 3.51  | 194            | 5.09 | 6              | 0.34  | 33             | 1.02 | 73             | 3.74 | 68             | 4.93 | --             | --   |
| Epeorus (Iron)                | 62             | 2.79 | 258            | 4.37  | 168            | 4.61  | 68             | 1.78 | 51             | 2.91  | 114            | 3.52 | 67             | 3.43 | 20             | 1.45 | 61             | 2.92 |
| Paraleptophlebia              | 8              | 0.36 | 17             | 0.29  | 66             | 1.81  | --             | --   | 37             | 2.11  | 33             | 1.02 | 46             | 2.36 | 8              | 0.58 | --             | --   |
| Serratella teresa             | --             | --   | 19             | 0.32  | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | 13             | 0.94 | 49             | 2.35 |
| Serratella tibialis           | 93             | 4.18 | 766            | 12.98 | 158            | 4.33  | 284            | 7.45 | 74             | 4.22  | 179            | 5.53 | 178            | 9.12 | 90             | 6.52 | 167            | 8.00 |
| Drunella flavilinea           | 1              | 0.04 | 51             | 0.86  | 2              | 0.05  | 14             | 0.37 | 2              | 0.11  | 2              | 0.06 | 3              | 0.15 | 4              | 0.29 | --             | --   |
| Drunella spinifera            | --             | --   | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | 52             | 2.49 |
| Timpanoga hecuba              | --             | --   | --             | --    | 40             | 1.10  | --             | --   | --             | --    | 11             | 0.34 | 14             | 0.72 | 16             | 1.16 | --             | --   |
| Attenella margarita           | 54             | 2.43 | 69             | 1.17  | 38             | 1.04  | 26             | 0.68 | --             | --    | 22             | 0.68 | --             | --   | --             | --   | --             | --   |
| Zapada cinctipes              | --             | --   | --             | --    | --             | --    | --             | --   | 60             | 3.42  | --             | --   | --             | --   | --             | --   | --             | --   |
| Pteronarcys californica       | 9              | 0.40 | 35             | 0.59  | --             | --    | 13             | 0.34 | --             | --    | 45             | 1.39 | 7              | 0.36 | --             | --   | 8              | 0.38 |
| Calineuria californica        | 8              | 0.36 | 18             | 0.30  | 40             | 1.10  | 117            | 3.07 | 6              | 0.34  | --             | --   | 42             | 2.15 | 39             | 2.83 | 1              | 0.05 |
| Claassenia sabulosa           | --             | --   | 1              | 0.02  | 1              | 0.03  | 13             | 0.34 | 1              | 0.06  | --             | --   | 3              | 0.15 | 2              | 0.14 | 24             | 1.15 |
| Doroneuria baumanni           | --             | --   | --             | --    | 1              | 0.03  | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Hesperoperla pacifica         | 47             | 2.11 | 108            | 1.83  | 13             | 0.36  | --             | --   | --             | --    | 33             | 1.02 | --             | --   | --             | --   | 7              | 0.34 |
| Sweltsa                       | 46             | 2.07 | 17             | 0.29  | 13             | 0.36  | 26             | 0.68 | 36             | 2.05  | 22             | 0.68 | 33             | 1.69 | 28             | 2.03 | 46             | 2.20 |
| Dolophilodes                  | --             | --   | 1              | 0.02  | --             | --    | --             | --   | 139            | 7.93  | 23             | 0.71 | 8              | 0.41 | 5              | 0.36 | 30             | 1.44 |
| Polycentropus                 | 1              | 0.04 | --             | --    | 2              | 0.05  | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | 7              | 0.34 |
| Hydropsyche                   | 102            | 4.59 | 276            | 4.68  | 117            | 3.21  | 118            | 3.10 | 21             | 1.20  | 124            | 3.83 | 122            | 6.25 | 73             | 5.29 | 18             | 0.86 |
| Hydropsyche occidentalis      | --             | --   | 17             | 0.29  | 1              | 0.03  | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | 119            | 5.70 |
| Parapsyche almota             | --             | --   | --             | --    | --             | --    | --             | --   | 1              | 0.06  | --             | --   | --             | --   | --             | --   | --             | --   |
| Rhyacophila                   | --             | --   | --             | --    | --             | --    | --             | --   | 6              | 0.34  | --             | --   | --             | --   | --             | --   | 7              | 0.34 |
| Rhyacophila alberta grp.      | --             | --   | --             | --    | --             | --    | --             | --   | 1              | 0.06  | --             | --   | --             | --   | --             | --   | --             | --   |
| Rhyacophila brunnea grp.      | 8              | 0.36 | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Rhyacophila coloradensis grp. | --             | --   | --             | --    | 1              | 0.03  | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Glossosoma                    | --             | --   | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | 8              | 0.41 | 11             | 0.80 | 7              | 0.34 |
| Hydroptilidae                 | --             | --   | --             | --    | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | 8              | 0.38 |
| Hydroptila                    | --             | --   | 34             | 0.58  | --             | --    | --             | --   | --             | --    | --             | --   | --             | --   | --             | --   | --             | --   |
| Stactobiella                  | 15             | 0.67 | 137            | 2.32  | 27             | 0.74  | 13             | 0.34 | --             | --    | 11             | 0.34 | 13             | 0.67 | 8              | 0.58 | --             | --   |
| Brachycentrus americanus      | 24             | 1.08 | 53             | 0.90  | 26             | 0.71  | 13             | 0.34 | 36             | 2.05  | 44             | 1.36 | 23             | 1.18 | --             | --   | 2              | 0.10 |
| Micrasema                     | 23             | 1.03 | 153            | 2.59  | --             | --    | 13             | 0.34 | --             | --    | --             | --   | 34             | 1.74 | 16             | 1.16 | 67             | 3.21 |
| Neophylax                     | 2              | 0.09 | 3              | 0.05  | --             | --    | 13             | 0.34 | --             | --    | --             | --   | 3              | 0.15 | 3              | 0.22 | 10             | 0.48 |
| Onocosmoecus                  | --             | --   | --             | --    | --             | --    | --             | --   | 1              | 0.06  | --             | --   | --             | --   | --             | --   | --             | --   |
| Dicosmoecus gilvipes          | 18             | 0.81 | 1              | 0.02  | 2              | 0.05  | 4              | 0.10 | 1              | 0.06  | 15             | 0.46 | --             | --   | --             | --   | --             | --   |
| Psychoglypha                  | --             | --   | --             | --    | 13             | 0.36  | --             | --   | --             | --    | --             | --   | 7              | 0.36 | --             | --   | --             | --   |

Table F-1 (cont.)

| Taxa                        | BLAC-RE-BMR-01 |        | BLAC-ST-BMR-02 |        | BLAC-ST-BMR-03 |        | BLAC-ST-BMR-04 |        | BLAC-ST-BMR-42 |        | BLUE-ST-BMR-05 |        | BLUE-ST-BMR-06 |        | BLUE-ST-BMR-07 |        | BLUE-ST-BMR-08 |        |
|-----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
|                             | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      |
| Apatania                    | 8              | 0.36   | --             | --     | 13             | 0.36   | --             | --     | 18             | 1.03   | --             | --     | 40             | 2.05   | 32             | 2.32   | --             | --     |
| Lepidostoma                 | 109            | 4.90   | 360            | 6.10   | 258            | 7.08   | 373            | 9.79   | --             | --     | 134            | 4.14   | 133            | 6.81   | 226            | 16.38  | 89             | 4.26   |
| Oreodytes                   | 2              | 0.09   | 1              | 0.02   | --             | --     | --             | --     | --             | --     | 23             | 0.71   | --             | --     | --             | --     | 1              | 0.05   |
| Brychius                    | --             | --     | --             | --     | --             | --     | --             | --     | 6              | 0.34   | 1              | 0.03   | --             | --     | --             | --     | --             | --     |
| Cleptelmis ornata           | --             | --     | 20             | 0.34   | 13             | 0.36   | 1              | 0.03   | --             | --     | --             | --     | 34             | 1.74   | 1              | 0.07   | 135            | 6.47   |
| Dubiraphia                  | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | 1              | 0.05   |
| Heterlimnius koebelei       | 1              | 0.04   | 19             | 0.32   | 13             | 0.36   | 1              | 0.03   | 48             | 2.74   | 12             | 0.37   | 7              | 0.36   | 9              | 0.65   | --             | --     |
| Microcyloepus pusillus      | --             | --     | --             | --     | 13             | 0.36   | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     |
| Narpus concolor             | 23             | 1.03   | 18             | 0.30   | --             | --     | --             | --     | 13             | 0.74   | 12             | 0.37   | --             | --     | 5              | 0.36   | 1              | 0.05   |
| Optioservus quadrimaculatus | 179            | 8.05   | 255            | 4.32   | 90             | 2.47   | 259            | 6.80   | 158            | 9.01   | 146            | 4.51   | 106            | 5.43   | 60             | 4.35   | 60             | 2.87   |
| Optioservus divergens       | --             | --     | 1              | 0.02   | 26             | 0.71   | 1              | 0.03   | --             | --     | 22             | 0.68   | --             | --     | 9              | 0.65   | --             | --     |
| Zaitzevia parvula           | 419            | 18.84  | 650            | 11.01  | 452            | 12.40  | 916            | 24.04  | 170            | 9.70   | 659            | 20.35  | 126            | 6.45   | 156            | 11.30  | 150            | 7.18   |
| Blepharicera                | 2              | 0.09   | --             | --     | --             | --     | --             | --     | --             | --     | 23             | 0.71   | --             | --     | --             | --     | 1              | 0.05   |
| Pentaneurini                | 15             | 0.67   | --             | --     | 38             | 1.04   | 13             | 0.34   | 6              | 0.34   | 33             | 1.02   | 33             | 1.69   | 8              | 0.58   | 7              | 0.34   |
| Diaesinae                   | 69             | 3.10   | 136            | 2.30   | 51             | 1.40   | 13             | 0.34   | 12             | 0.68   | 78             | 2.41   | 26             | 1.33   | 32             | 2.32   | 22             | 1.05   |
| Orthoclaadiinae             | 170            | 7.64   | 918            | 15.55  | 283            | 7.76   | 232            | 6.09   | 252            | 14.38  | 447            | 13.80  | 224            | 11.48  | 124            | 8.99   | 215            | 10.30  |
| Chironomini                 | 38             | 1.71   | 34             | 0.58   | 77             | 2.11   | 64             | 1.68   | 6              | 0.34   | 78             | 2.41   | 79             | 4.05   | 44             | 3.19   | 67             | 3.21   |
| Tanytarsini                 | 54             | 2.43   | 17             | 0.29   | 154            | 4.22   | 51             | 1.34   | 12             | 0.68   | 89             | 2.75   | 13             | 0.67   | 24             | 1.74   | 7              | 0.34   |
| Maruina                     | 8              | 0.36   | 18             | 0.30   | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     |
| Simulium                    | 162            | 7.28   | 374            | 6.34   | 579            | 15.88  | 270            | 7.08   | 150            | 8.56   | 56             | 1.73   | 73             | 3.74   | 56             | 4.06   | 118            | 5.65   |
| Antocha                     | 54             | 2.43   | 52             | 0.88   | 26             | 0.71   | 52             | 1.36   | 72             | 4.11   | 100            | 3.09   | 73             | 3.74   | 36             | 2.61   | 179            | 8.57   |
| Dicranota                   | --             | --     | --             | --     | --             | --     | --             | --     | 6              | 0.34   | --             | --     | --             | --     | --             | --     | --             | --     |
| Hexatoma                    | 1              | 0.04   | --             | --     | 1              | 0.03   | 27             | 0.71   | 1              | 0.06   | --             | --     | 7              | 0.36   | --             | --     | 15             | 0.72   |
| Atherix                     | 47             | 2.11   | 102            | 1.73   | 64             | 1.76   | 38             | 1.00   | --             | --     | 33             | 1.02   | 66             | 3.38   | 32             | 2.32   | 67             | 3.21   |
| Silvius                     | --             | --     | 17             | 0.29   | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     |
| Pisidium                    | --             | --     | --             | --     | --             | --     | --             | --     | 18             | 1.03   | 11             | 0.34   | --             | --     | 1              | 0.07   | --             | --     |
| Margaritifera falcata       | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | 11             | 0.34   | --             | --     | --             | --     | --             | --     |
| Total                       | 2224           | 100.00 | 5902           | 100.00 | 3645           | 100.00 | 3811           | 100.00 | 1753           | 100.00 | 3238           | 100.00 | 1952           | 100.00 | 1380           | 100.00 | 2088           | 100.00 |

Table F-1A. Number and Relative Abundance of Taxa Collected from Riffle Habitat  
Near Bluebird and Blackjac Mines After the Blackjac Spill, 9 August 2003

| Taxa                        | BLAC-ST-BMR-1A |        | BLAC-ST-BMR-2A |        | BLAC-ST-BMR-3A |        | BLUE-ST-BMR-5A |        |
|-----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
|                             | No.            | %      | No.            | %      | No.            | %      | No.            | %      |
| Turbellaria                 | 14             | 0.68   | 14             | 1.21   | --             | --     | 17             | 1.27   |
| Lumbriculidae               | --             | --     | 1              | 0.09   | 1              | 0.14   | --             | --     |
| Tubificidae                 | 54             | 2.64   | 41             | 3.55   | 4              | 0.55   | 63             | 4.69   |
| Hydracarina                 | 88             | 4.30   | 28             | 2.42   | 4              | 0.55   | --             | --     |
| Ameletus                    | --             | --     | --             | --     | 2              | 0.27   | --             | --     |
| Acentrella                  | 61             | 2.98   | --             | --     | 11             | 1.50   | 61             | 4.54   |
| Baetis tricaudatus          | 231            | 11.28  | 45             | 3.89   | 39             | 5.33   | 34             | 2.53   |
| Dipheter hageni             | 49             | 2.39   | --             | --     | 2              | 0.27   | --             | --     |
| Heptageniidae               | 131            | 6.40   | 8              | 0.69   | 18             | 2.46   | 23             | 1.71   |
| Epeorus (Iron)              | 32             | 1.56   | 1              | 0.09   | 3              | 0.41   | 8              | 0.60   |
| Paraleptophlebia            | 14             | 0.68   | 4              | 0.35   | 16             | 2.19   | 4              | 0.30   |
| Serratella tibialis         | 51             | 2.49   | 71             | 6.14   | 22             | 3.01   | 31             | 2.31   |
| Drunella flavilinea         | 14             | 0.68   | --             | --     | --             | --     | --             | --     |
| Drunella spinifera          | 20             | 0.98   | 50             | 4.33   | 14             | 1.91   | 9              | 0.67   |
| Timpanoga hecuba            | --             | --     | 4              | 0.35   | 3              | 0.41   | --             | --     |
| Attenella margarita         | 7              | 0.34   | --             | --     | 16             | 2.19   | --             | --     |
| Zapada cinctipes            | 55             | 2.69   | 13             | 1.12   | 5              | 0.68   | 9              | 0.67   |
| Pteronarcys californica     | --             | --     | 6              | 0.52   | 3              | 0.41   | 6              | 0.45   |
| Pteronarcys dorsata         | 1              | 0.05   | --             | --     | --             | --     | --             | --     |
| Calineuria californica      | 7              | 0.34   | 7              | 0.61   | 9              | 1.23   | 5              | 0.37   |
| Claassenia sabulosa         | 14             | 0.68   | 5              | 0.43   | --             | --     | 2              | 0.15   |
| Hesperoperla pacifica       | 31             | 1.51   | 19             | 1.64   | 2              | 0.27   | 26             | 1.94   |
| Sweltsa                     | 49             | 2.39   | 12             | 1.04   | 18             | 2.46   | 30             | 2.23   |
| Dolophilodes                | --             | --     | --             | --     | --             | --     | 8              | 0.60   |
| Cheumatopsyche              | 7              | 0.34   | --             | --     | --             | --     | --             | --     |
| Hydropsyche                 | 49             | 2.39   | 81             | 7.01   | 37             | 5.05   | 55             | 4.10   |
| Rhyacophila                 | 14             | 0.68   | --             | --     | 2              | 0.27   | 17             | 1.27   |
| Glossosoma                  | --             | --     | 4              | 0.35   | --             | --     | --             | --     |
| Stactobiella                | 20             | 0.98   | 4              | 0.35   | --             | --     | --             | --     |
| Brachycentrus americanus    | 36             | 1.76   | 7              | 0.61   | 3              | 0.41   | 4              | 0.30   |
| Micrasema                   | 29             | 1.42   | 70             | 6.06   | --             | --     | 4              | 0.30   |
| Neophylax                   | --             | --     | 1              | 0.09   | --             | --     | 1              | 0.07   |
| Dicosmoecus gilvipes        | 1              | 0.05   | 1              | 0.09   | --             | --     | 2              | 0.15   |
| Psychoglypha                | --             | --     | 1              | 0.09   | 2              | 0.27   | 1              | 0.07   |
| Apatania                    | --             | --     | 17             | 1.47   | 9              | 1.23   | 5              | 0.37   |
| Lepidostoma                 | 43             | 2.10   | 96             | 8.30   | 92             | 12.57  | 51             | 3.80   |
| Oreodytes                   | --             | --     | 4              | 0.35   | 1              | 0.14   | 4              | 0.30   |
| Cleptelmis ornata           | 20             | 0.98   | 12             | 1.04   | 4              | 0.55   | 4              | 0.30   |
| Heterlimnius koebelei       | 8              | 0.39   | 8              | 0.69   | --             | --     | 8              | 0.60   |
| Microcylloepus pusillus     | --             | --     | 4              | 0.35   | --             | --     | --             | --     |
| Narpus concolor             | 9              | 0.44   | --             | --     | 2              | 0.27   | 4              | 0.30   |
| Optioservus quadrimaculatus | 29             | 1.42   | 32             | 2.77   | 42             | 5.74   | 97             | 7.22   |
| Optioservus divergens       | --             | --     | --             | --     | --             | --     | 8              | 0.60   |
| Zaitzevia parvula           | 170            | 8.30   | 172            | 14.88  | 176            | 24.04  | 136            | 10.13  |
| Blepharicera                | --             | --     | --             | --     | --             | --     | 8              | 0.60   |
| Pentaneurini                | 14             | 0.68   | 16             | 1.38   | 4              | 0.55   | 8              | 0.60   |
| Diamesinae                  | 20             | 0.98   | 8              | 0.69   | 11             | 1.50   | 218            | 16.23  |
| Orthocladiinae              | 232            | 11.33  | 132            | 11.42  | 40             | 5.46   | 185            | 13.78  |
| Chironomini                 | 14             | 0.68   | 29             | 2.51   | 27             | 3.69   | --             | --     |
| Tanytarsini                 | 101            | 4.93   | 32             | 2.77   | 32             | 4.37   | 29             | 2.16   |
| Dixa                        | 27             | 1.32   | --             | --     | --             | --     | --             | --     |
| Simulium                    | 213            | 10.41  | 53             | 4.58   | 30             | 4.10   | 55             | 4.10   |
| Antocha                     | 23             | 1.12   | 17             | 1.47   | 5              | 0.68   | 73             | 5.44   |
| Hexatoma                    | 1              | 0.05   | 4              | 0.35   | --             | --     | 4              | 0.30   |
| Atherix                     | 44             | 2.15   | 22             | 1.90   | 19             | 2.60   | 22             | 1.64   |
| Silvius                     | --             | --     | --             | --     | 2              | 0.27   | --             | --     |
| Pisidium                    | --             | --     | --             | --     | --             | --     | 4              | 0.30   |
| Total                       | 2047           | 100.00 | 1156           | 100.00 | 732            | 100.00 | 1343           | 100.00 |

Table F-2. Number and Relative Abundance of Taxa Collected from Pool Habitat near Bluebird and Blackjack Mines, 21 and 23 July 2003

| Taxa                     | BLAC-ST-BMP-01 |       | BLAC-ST-BMP-02 |      | BLAC-ST-BMP-03 |       | BLAC-ST-BMP-04 |       | BLUE-ST-BMP-05 |       | BLUE-ST-BMP-06 |       | BLUE-ST-BMP-07 |       | BLUE-ST-BMP-08 |       |
|--------------------------|----------------|-------|----------------|------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                          | No.            | %     | No.            | %    | No.            | %     | No.            | %     | No.            | %     | No.            | %     | No.            | %     | No.            | %     |
| Turbellaria              | --             | --    | 6              | 0.66 | 11             | 0.70  | --             | --    | 5              | 0.35  | 4              | 0.34  | 11             | 0.97  | --             | --    |
| Lumbriculidae            | --             | --    | --             | --   | --             | --    | --             | --    | --             | --    | 8              | 0.68  | 11             | 0.97  | 3              | 0.31  |
| Tubificidae              | 79             | 4.31  | 34             | 3.74 | 65             | 4.16  | 108            | 7.97  | 214            | 15.10 | 12             | 1.03  | 4              | 0.35  | 40             | 4.10  |
| Helobdella stagnalis     | --             | --    | --             | --   | --             | --    | --             | --    | 1              | 0.07  | --             | --    | --             | --    | --             | --    |
| Hydracarina              | 6              | 0.33  | 15             | 1.65 | 11             | 0.70  | 1              | 0.07  | 10             | 0.71  | 4              | 0.34  | 4              | 0.35  | 18             | 1.85  |
| Ameletus                 | 6              | 0.33  | 49             | 5.39 | 18             | 1.15  | 10             | 0.74  | 35             | 2.47  | 62             | 5.30  | 11             | 0.97  | 43             | 4.41  |
| Acentrella               | --             | --    | --             | --   | --             | --    | --             | --    | --             | --    | --             | --    | 4              | 0.35  | --             | --    |
| Baetis tricaudatus       | --             | --    | 9              | 0.99 | 5              | 0.32  | 10             | 0.74  | 5              | 0.35  | 8              | 0.68  | --             | --    | --             | --    |
| Diphetor hageni          | --             | --    | 6              | 0.66 | --             | --    | --             | --    | 1              | 0.07  | 1              | 0.09  | 5              | 0.44  | --             | --    |
| Centropilum              | 120            | 6.55  | 9              | 0.99 | 79             | 5.06  | 88             | 6.49  | 29             | 2.05  | 12             | 1.03  | 22             | 1.95  | --             | --    |
| Heptageniidae            | 24             | 1.31  | 25             | 2.75 | 16             | 1.02  | 20             | 1.48  | 34             | 2.40  | 32             | 2.74  | 23             | 2.03  | 46             | 4.72  |
| Epeorus (Iron)           | --             | --    | 9              | 0.99 | --             | --    | 1              | 0.07  | --             | --    | --             | --    | --             | --    | 26             | 2.67  |
| Paraleptophlebia         | 120            | 6.55  | 68             | 7.48 | 239            | 15.31 | 152            | 11.22 | 195            | 13.76 | 56             | 4.79  | 26             | 2.30  | 35             | 3.59  |
| Serratella tibialis      | 6              | 0.33  | 6              | 0.66 | --             | --    | 13             | 0.96  | 1              | 0.07  | 12             | 1.03  | 9              | 0.80  | 7              | 0.72  |
| Drunella flavilinea      | --             | --    | --             | --   | --             | --    | --             | --    | --             | --    | --             | --    | 11             | 0.97  | --             | --    |
| Timpanoga hecuba         | 43             | 2.35  | 3              | 0.33 | 47             | 3.01  | 5              | 0.37  | 65             | 4.59  | 12             | 1.03  | 24             | 2.12  | --             | --    |
| Attenella margarita      | --             | --    | 22             | 2.42 | --             | --    | 20             | 1.48  | 14             | 0.99  | 4              | 0.34  | 22             | 1.95  | 18             | 1.85  |
| Cordulegaster dorsalis   | --             | --    | --             | --   | --             | --    | --             | --    | 2              | 0.14  | --             | --    | --             | --    | --             | --    |
| Ophiogomphus             | --             | --    | --             | --   | 1              | 0.06  | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    |
| Pteronarcys californica  | --             | --    | --             | --   | --             | --    | 1              | 0.07  | --             | --    | --             | --    | --             | --    | --             | --    |
| Perlidae                 | --             | --    | --             | --   | --             | --    | --             | --    | --             | --    | 64             | 5.47  | --             | --    | --             | --    |
| Calineuria californica   | 6              | 0.33  | --             | --   | 11             | 0.70  | 5              | 0.37  | 29             | 2.05  | 5              | 0.43  | 18             | 1.59  | --             | --    |
| Claassenia sabulosa      | --             | --    | --             | --   | --             | --    | 5              | 0.37  | --             | --    | --             | --    | --             | --    | --             | --    |
| Hesperoperla pacifica    | --             | --    | 3              | 0.33 | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    | 8              | 0.82  |
| Sweltsa                  | 48             | 2.62  | 37             | 4.07 | 40             | 2.56  | 34             | 2.51  | 12             | 0.85  | 52             | 4.44  | 81             | 7.16  | 38             | 3.90  |
| Corixidae                | --             | --    | --             | --   | --             | --    | --             | --    | 10             | 0.71  | --             | --    | --             | --    | --             | --    |
| Sialis                   | 2              | 0.11  | --             | --   | 5              | 0.32  | 1              | 0.07  | --             | --    | --             | --    | --             | --    | --             | --    |
| Polycentropus            | --             | --    | --             | --   | 11             | 0.70  | 7              | 0.52  | 1              | 0.07  | 1              | 0.09  | --             | --    | 2              | 0.21  |
| Glossosoma               | --             | --    | --             | --   | --             | --    | --             | --    | 1              | 0.07  | --             | --    | --             | --    | --             | --    |
| Hydroptila               | 6              | 0.33  | 9              | 0.99 | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    |
| Stactobiella             | 12             | 0.66  | 12             | 1.32 | 5              | 0.32  | --             | --    | 1              | 0.07  | --             | --    | --             | --    | 7              | 0.72  |
| Brachycentrus americanus | --             | --    | 1              | 0.11 | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    |
| Amphicosmoecus canax     | --             | --    | 4              | 0.44 | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    | --             | --    |
| Neophylax                | --             | --    | --             | --   | --             | --    | --             | --    | 5              | 0.35  | --             | --    | 1              | 0.09  | 9              | 0.92  |
| Dicosmoecus gilvipes     | 6              | 0.33  | --             | --   | --             | --    | 6              | 0.44  | 14             | 0.99  | --             | --    | --             | --    | --             | --    |
| Psychoglypha             | 84             | 4.59  | 28             | 3.08 | 159            | 10.19 | 1              | 0.07  | 75             | 5.29  | --             | --    | 4              | 0.35  | 3              | 0.31  |
| Apatania                 | 48             | 2.62  | 15             | 1.65 | --             | --    | 44             | 3.25  | 19             | 1.34  | 108            | 9.23  | 33             | 2.92  | 31             | 3.18  |
| Lepidostoma              | 236            | 12.88 | 80             | 8.80 | 135            | 8.65  | 194            | 14.32 | 55             | 3.88  | 140            | 11.97 | 231            | 20.42 | 164            | 16.82 |
| Oecetis disjuncta        | --             | --    | --             | --   | --             | --    | --             | --    | 5              | 0.35  | --             | --    | --             | --    | --             | --    |
| Hydrovatus               | --             | --    | --             | --   | --             | --    | 11             | 0.81  | --             | --    | --             | --    | --             | --    | --             | --    |
| Oreodytes                | 30             | 1.64  | 75             | 8.25 | 53             | 3.40  | 26             | 1.92  | 22             | 1.55  | 1              | 0.09  | 7              | 0.62  | 3              | 0.31  |

Table F-2 (cont.)

| Taxa                        | BLAC-ST-BMP-01 |        | BLAC-ST-BMP-02 |        | BLAC-ST-BMP-03 |        | BLAC-ST-BMP-04 |        | BLUE-ST-BMP-05 |        | BLUE-ST-BMP-06 |        | BLUE-ST-BMP-07 |        | BLUE-ST-BMP-08 |        |
|-----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
|                             | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      | No.            | %      |
| Brychius                    | 13             | 0.71   | 3              | 0.33   | 2              | 0.13   | 17             | 1.25   | --             | --     | --             | --     | --             | --     | --             | --     |
| Cleptelmis ornata           | --             | --     | 3              | 0.33   | --             | --     | 30             | 2.21   | --             | --     | --             | --     | --             | --     | --             | --     |
| Heterlimnius koebelei       | --             | --     | --             | --     | --             | --     | --             | --     | 10             | 0.71   | --             | --     | 7              | 0.62   | --             | --     |
| Narpus concolor             | --             | --     | 3              | 0.33   | 39             | 2.50   | 5              | 0.37   | 6              | 0.42   | --             | --     | 1              | 0.09   | 7              | 0.72   |
| Optioservus quadrimaculatus | 217            | 11.84  | 58             | 6.38   | 54             | 3.46   | 83             | 6.13   | 125            | 8.82   | 158            | 13.50  | 66             | 5.84   | 64             | 6.56   |
| Optioservus divergens       | --             | --     | --             | --     | --             | --     | --             | --     | 29             | 2.05   | --             | --     | 11             | 0.97   | --             | --     |
| Zaitzevia parvula           | 282            | 15.39  | 117            | 12.87  | 259            | 16.59  | 236            | 17.42  | 92             | 6.49   | 234            | 20.00  | 197            | 17.42  | 168            | 17.23  |
| Pentaneurini                | 54             | 2.95   | 46             | 5.06   | 81             | 5.19   | 56             | 4.13   | 112            | 7.90   | 20             | 1.71   | 22             | 1.95   | 28             | 2.87   |
| Diamessinae                 | 36             | 1.97   | 6              | 0.66   | 11             | 0.70   | 5              | 0.37   | 19             | 1.34   | 20             | 1.71   | 40             | 3.54   | 18             | 1.85   |
| Orthocladinae               | 60             | 3.28   | 49             | 5.39   | 43             | 2.75   | 30             | 2.21   | 44             | 3.11   | 16             | 1.37   | 70             | 6.19   | 65             | 6.67   |
| Chironomini                 | --             | --     | 22             | 2.42   | 16             | 1.02   | 29             | 2.14   | --             | --     | 8              | 0.68   | 15             | 1.33   | 18             | 1.85   |
| Tanytarsini                 | 240            | 13.10  | 52             | 5.72   | 135            | 8.65   | 78             | 5.76   | 34             | 2.40   | 72             | 6.15   | 88             | 7.78   | 46             | 4.72   |
| Simulium                    | --             | --     | 3              | 0.33   | 5              | 0.32   | --             | --     | --             | --     | --             | --     | --             | --     | 3              | 0.31   |
| Tipulidae                   | --             | --     | --             | --     | --             | --     | --             | --     | --             | --     | 40             | 3.42   | --             | --     | --             | --     |
| Antocha                     | 6              | 0.33   | 3              | 0.33   | 5              | 0.32   | 5              | 0.37   | 10             | 0.71   | --             | --     | 37             | 3.27   | 12             | 1.23   |
| Hexatoma                    | 6              | 0.33   | --             | --     | --             | --     | 6              | 0.44   | --             | --     | --             | --     | 11             | 0.97   | 33             | 3.38   |
| Atherix                     | 18             | 0.98   | --             | --     | --             | --     | 10             | 0.74   | 10             | 0.71   | --             | --     | 4              | 0.35   | 12             | 1.23   |
| Silvius                     | --             | --     | 1              | 0.11   | --             | --     | 1              | 0.07   | 24             | 1.69   | --             | --     | --             | --     | --             | --     |
| Physella                    | --             | --     | 1              | 0.11   | --             | --     | --             | --     | 5              | 0.35   | --             | --     | --             | --     | --             | --     |
| Ferrissia                   | --             | --     | --             | --     | --             | --     | --             | --     | 5              | 0.35   | --             | --     | --             | --     | --             | --     |
| Pisidium                    | 18             | 0.98   | 17             | 1.87   | --             | --     | 1              | 0.07   | 32             | 2.26   | 4              | 0.34   | --             | --     | --             | --     |
| Total                       | 1832           | 100.00 | 909            | 100.00 | 1561           | 100.00 | 1355           | 100.00 | 1417           | 100.00 | 1170           | 100.00 | 1131           | 100.00 | 975            | 100.00 |

Table F-2A. Number and Relative Abundance of Taxa Collected from Pool Habitat  
Near Bluebird and Blackjack Mines After the Mine Breech, 9 August 2003

| Taxa                        | BLAC-ST-BMP-1A |        | BLAC-ST-BMP-2A |        | BLAC-ST-BMP-3A |        | BLUE-ST-BMP-5A |        |
|-----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
|                             | No.            | %      | No.            | %      | No.            | %      | No.            | %      |
| Turbellaria                 | 7              | 0.94   | --             | --     | --             | --     | --             | --     |
| Lumbriculidae               | --             | --     | 3              | 0.41   | --             | --     | --             | --     |
| Tubificidae                 | 8              | 1.08   | 15             | 2.04   | 35             | 6.54   | 36             | 5.17   |
| Ostracoda                   | 3              | 0.40   | --             | --     | --             | --     | --             | --     |
| Hydracarina                 | 17             | 2.29   | 8              | 1.09   | 7              | 1.31   | --             | --     |
| Ameletus                    | --             | --     | 5              | 0.68   | 4              | 0.75   | 5              | 0.72   |
| Baetis tricaudatus          | 2              | 0.27   | --             | --     | 2              | 0.37   | 2              | 0.29   |
| Centroptilum                | 5              | 0.67   | 5              | 0.68   | --             | --     | 7              | 1.01   |
| Heptageniidae               | 2              | 0.27   | --             | --     | 4              | 0.75   | 12             | 1.72   |
| Paraleptophlebia            | 57             | 7.69   | 25             | 3.41   | 57             | 10.65  | 184            | 26.44  |
| Serratella tibialis         | --             | --     | --             | --     | --             | --     | 2              | 0.29   |
| Drunella spinifera          | --             | --     | --             | --     | --             | --     | 7              | 1.01   |
| Timpanoga hecuba            | 6              | 0.81   | 8              | 1.09   | 1              | 0.19   | --             | --     |
| Tricorythodes               | --             | --     | --             | --     | 2              | 0.37   | --             | --     |
| Cordulegaster dorsalis      | --             | --     | 1              | 0.14   | --             | --     | 1              | 0.14   |
| Zapada cinctipes            | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Calineuria californica      | --             | --     | --             | --     | --             | --     | 2              | 0.29   |
| Hesperoperla pacifica       | --             | --     | --             | --     | 2              | 0.37   | 2              | 0.29   |
| Sweltsa                     | 15             | 2.02   | 12             | 1.63   | 15             | 2.80   | 12             | 1.72   |
| Corixidae                   | --             | --     | --             | --     | --             | --     | 24             | 3.45   |
| Polycentropus               | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Hydropsyche                 | 2              | 0.27   | --             | --     | --             | --     | 2              | 0.29   |
| Rhyacophila                 | 5              | 0.67   | --             | --     | --             | --     | --             | --     |
| Hydroptila                  | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Brachycentrus americanus    | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Micrasema                   | --             | --     | --             | --     | 2              | 0.37   | --             | --     |
| Onocosmoecus                | --             | --     | --             | --     | --             | --     | 1              | 0.14   |
| Dicosmoecus gilvipes        | --             | --     | --             | --     | 2              | 0.37   | --             | --     |
| Psychoglypha                | 4              | 0.54   | 2              | 0.27   | 46             | 8.60   | 29             | 4.17   |
| Apatania                    | 3              | 0.40   | 5              | 0.68   | 4              | 0.75   | 5              | 0.72   |
| Lepidostoma                 | 6              | 0.81   | 30             | 4.09   | 24             | 4.49   | 17             | 2.44   |
| Oreodytes                   | 22             | 2.97   | 50             | 6.81   | 15             | 2.80   | 13             | 1.87   |
| Brychius                    | 2              | 0.27   | 8              | 1.09   | 2              | 0.37   | --             | --     |
| Cleptelmis ornata           | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Lara                        | --             | --     | --             | --     | 2              | 0.37   | --             | --     |
| Narpus concolor             | 5              | 0.67   | 2              | 0.27   | 4              | 0.75   | --             | --     |
| Optioservus quadrimaculatus | 10             | 1.35   | 15             | 2.04   | 18             | 3.36   | 7              | 1.01   |
| Zaitzevia parvula           | 49             | 6.61   | 23             | 3.13   | 44             | 8.22   | 22             | 3.16   |
| Tanypodinae                 | --             | --     | --             | --     | --             | --     | 2              | 0.29   |
| Pentaneurini                | 34             | 4.59   | 18             | 2.45   | 35             | 6.54   | 24             | 3.45   |
| Diamesinae                  | 7              | 0.94   | --             | --     | --             | --     | 10             | 1.44   |
| Orthocladiinae              | 57             | 7.69   | 15             | 2.04   | 24             | 4.49   | 46             | 6.61   |
| Chironomini                 | 367            | 49.53  | 453            | 61.72  | 176            | 32.90  | 173            | 24.86  |
| Tanytarsini                 | 32             | 4.32   | 25             | 3.41   | 4              | 0.75   | 44             | 6.32   |
| Simulium                    | 2              | 0.27   | --             | --     | --             | --     | --             | --     |
| Atherix                     | --             | --     | 1              | 0.14   | 2              | 0.37   | 5              | 0.72   |
| Pisidium                    | 2              | 0.27   | 5              | 0.68   | 2              | 0.37   | --             | --     |
| Total                       | 741            | 100.00 | 734            | 100.00 | 535            | 100.00 | 696            | 100.00 |

Table F-3. Summary of Level 3 Metrics and Scores for Macroinvertebrate Sampling Locations  
Near Bluebird and Blackjack Mines, 21 and 23 July 2003

| Serial Number  | Date      | Sample Type | Sample Location | Taxa Richness Score | Mayfly Richness Score | Stonefly Richness Score | Caddisfly Richness Score | Sensitive Taxa Score | Sediment Sensitive Taxa Score | Modified HBI Score | Percent Tolerant Taxa Score | Percent Sediment Tolerant Taxa Score | Percent Dominant (single taxa) Score | Total Score |
|----------------|-----------|-------------|-----------------|---------------------|-----------------------|-------------------------|--------------------------|----------------------|-------------------------------|--------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------|
| BLAC-ST-BMP-01 | 23-Jul-03 | Pool        | 1               | 29                  | 6                     | 2                       | 6                        | 1                    | 0                             | 3.6                | 41.9                        | 5.0                                  | 15.4                                 | 30          |
| BLAC-ST-BMP-02 | 23-Jul-03 | Pool        | 2               | 38                  | 10                    | 2                       | 7                        | 1                    | 0                             | 3.7                | 34.1                        | 4.2                                  | 12.9                                 | 34          |
| BLAC-ST-BMP-03 | 23-Jul-03 | Pool        | 3               | 29                  | 6                     | 2                       | 4                        | 0                    | 0                             | 3.6                | 33.2                        | 4.5                                  | 16.6                                 | 30          |
| BLAC-ST-BMP-04 | 23-Jul-03 | Pool        | 4               | 38                  | 9                     | 4                       | 5                        | 1                    | 0                             | 3.6                | 45.1                        | 8.8                                  | 17.4                                 | 34          |
| BLUE-ST-BMP-05 | 21-Jul-03 | Pool        | 5               | 42                  | 9                     | 2                       | 9                        | 1                    | 1                             | 4.2                | 39.6                        | 16.5                                 | 15.1                                 | 34          |
| BLUE-ST-BMP-06 | 21-Jul-03 | Pool        | 6               | 28                  | 9                     | 2                       | 3                        | 1                    | 0                             | 3.0                | 36.3                        | 5.1                                  | 20.1                                 | 28          |
| BLUE-ST-BMP-07 | 21-Jul-03 | Pool        | 7               | 34                  | 10                    | 2                       | 4                        | 1                    | 0                             | 3.1                | 28.5                        | 5.6                                  | 20.4                                 | 30          |
| BLUE-ST-BMP-08 | 21-Jul-03 | Pool        | 8               | 30                  | 6                     | 2                       | 6                        | 1                    | 0                             | 3.2                | 29.7                        | 9.0                                  | 17.2                                 | 30          |
| BLAC-ST-BMR-01 | 23-Jul-03 | Riffle      | 1               | 43                  | 9                     | 4                       | 10                       | 2                    | 0                             | 3.7                | 36.8                        | 5.6                                  | 18.8                                 | 40          |
| BLAC-ST-BMR-02 | 23-Jul-03 | Riffle      | 2               | 43                  | 9                     | 5                       | 10                       | 1                    | 1                             | 3.6                | 26.2                        | 3.8                                  | 15.6                                 | 40          |
| BLAC-ST-BMR-03 | 23-Jul-03 | Riffle      | 3               | 43                  | 11                    | 5                       | 10                       | 2                    | 0                             | 4.2                | 23.0                        | 2.1                                  | 15.9                                 | 38          |
| BLAC-ST-BMR-04 | 23-Jul-03 | Riffle      | 4               | 36                  | 9                     | 4                       | 7                        | 0                    | 0                             | 3.7                | 35.3                        | 2.4                                  | 24.0                                 | 34          |
| BLAC-ST-BMR-42 | 23-Jul-03 | Riffle      | 42              | 40                  | 9                     | 4                       | 9                        | 3                    | 1                             | 3.9                | 20.6                        | 4.8                                  | 14.4                                 | 42          |
| BLUE-ST-BMR-05 | 21-Jul-03 | Riffle      | 5               | 42                  | 11                    | 3                       | 6                        | 3                    | 1                             | 3.9                | 36.3                        | 8.2                                  | 20.4                                 | 38          |
| BLUE-ST-BMR-06 | 21-Jul-03 | Riffle      | 6               | 39                  | 10                    | 4                       | 10                       | 2                    | 2                             | 3.5                | 23.9                        | 4.8                                  | 11.5                                 | 42          |
| BLUE-ST-BMR-07 | 21-Jul-03 | Riffle      | 7               | 40                  | 10                    | 3                       | 8                        | 2                    | 2                             | 3.3                | 25.1                        | 3.8                                  | 16.4                                 | 40          |
| BLUE-ST-BMR-08 | 21-Jul-03 | Riffle      | 8               | 42                  | 6                     | 5                       | 11                       | 3                    | 2                             | 3.6                | 31.4                        | 14.3                                 | 10.3                                 | 38          |

Notes: While these Level 3 metrics and scores were calculated using ODEQ methods, they are used in this report to compare sites on Clear Creek rather than for comparison to a regional or statewide reference condition.

Table F-3A. Summary of Level 3 Metrics and Scores for Macroinvertebrate Sampling Locations  
After the Blackjack Spill Near Bluebird and Blackjack Mines, 9 August 2003

| Serial Number  | Date     | Sample Type | Sample Location | Taxa Richness Score | Mayfly Richness Score | Stonefly Richness Score | Caddisfly Richness Score | Sensitive Taxa Score | Sediment Sensitive Taxa Score | Modified HBI Score | Percent Tolerant Taxa Score | Percent Sediment Tolerant Taxa Score | Percent Dominant (single taxa) Score | Total Score |
|----------------|----------|-------------|-----------------|---------------------|-----------------------|-------------------------|--------------------------|----------------------|-------------------------------|--------------------|-----------------------------|--------------------------------------|--------------------------------------|-------------|
| BLAC-ST-BMP-1A | 9-Aug-03 | Pool        | 1A              | 32 3                | 5 3                   | 2 1                     | 8 3                      | 1 1                  | 0 1                           | 5.2 1              | 13.8 5                      | 1.1 5                                | 49.5 1                               | 24          |
| BLAC-ST-BMP-2A | 9-Aug-03 | Pool        | 2A              | 23 3                | 4 3                   | 1 1                     | 3 1                      | 1 1                  | 0 1                           | 5.3 1              | 16.3 3                      | 2.5 5                                | 61.7 1                               | 20          |
| BLAC-ST-BMP-3A | 9-Aug-03 | Pool        | 3A              | 27 3                | 6 3                   | 2 1                     | 5 3                      | 1 1                  | 0 1                           | 4.4 3              | 22.1 3                      | 6.9 5                                | 32.9 3                               | 26          |
| BLUE-ST-BMP-5A | 9-Aug-03 | Pool        | 5A              | 28 3                | 7 3                   | 3 3                     | 5 3                      | 2 3                  | 0 1                           | 4.6 3              | 13.2 5                      | 5.2 5                                | 26.4 3                               | 32          |
| BLAC-ST-BMR-1A | 9-Aug-03 | Riffle      | 1A              | 42 5                | 10 5                  | 6 5                     | 8 3                      | 1 1                  | 0 1                           | 4.2 3              | 18.2 3                      | 3.8 5                                | 11.3 5                               | 36          |
| BLAC-ST-BMR-2A | 9-Aug-03 | Riffle      | 2A              | 42 5                | 7 3                   | 6 5                     | 10 5                     | 2 3                  | 1 3                           | 3.6 5              | 31.9 3                      | 5.4 5                                | 14.9 5                               | 42          |
| BLAC-ST-BMR-3A | 9-Aug-03 | Riffle      | 3A              | 39 5                | 11 5                  | 5 3                     | 6 3                      | 2 3                  | 0 1                           | 3.6 5              | 39.1 3                      | 1.4 5                                | 24.0 3                               | 36          |
| BLUE-ST-BMR-5A | 9-Aug-03 | Riffle      | 5A              | 42 5                | 7 3                   | 6 5                     | 10 5                     | 4 3                  | 1 3                           | 3.6 5              | 29.0 3                      | 10.4 3                               | 16.2 5                               | 40          |

Notes: While these Level 3 metrics and scores were calculated using ODEQ methods, they are used in this report to compare sites on Clear Creek rather than for comparison to a regional or statewide reference condition.

TABLE F-4 SUMMARY OF HABITAT ASSESSMENT SCORES  
FOR BLACKJACK AND BLUEBIRD MINES - JULY 2003

| Habitat Parameter                   | Blackjack Mine Stations |     |     |     |     | Bluebird Mine Stations |     |     |     |
|-------------------------------------|-------------------------|-----|-----|-----|-----|------------------------|-----|-----|-----|
|                                     | 01                      | 02  | 03  | 04  | 42  | 05                     | 06  | 07  | 08  |
| Epifaunal substrate/available cover | 19                      | 19  | 19  | 20  | 12  | 17                     | 17  | 20  | 20  |
| Embeddedness                        | 17                      | 14  | 19  | 20  | 11  | 15                     | 20  | 19  | 20  |
| Velocity/depth regime               | 20                      | 16  | 15  | 20  | 15  | 12                     | 20  | 20  | 20  |
| Sediment Deposition                 | 18                      | 13  | 20  | 20  | 6   | 16                     | 19  | 17  | 20  |
| Channel flow status                 | 18                      | 15  | 19  | 17  | 20  | 18                     | 18  | 19  | 18  |
| Channel alteration                  | 20                      | 20  | 20  | 20  | 20  | 20                     | 20  | 20  | 20  |
| Frequency of riffles (or bends)     | 19                      | 20  | 20  | 19  | 16  | 20                     | 20  | 20  | 20  |
| Bank stability                      |                         |     |     |     |     |                        |     |     |     |
| Left bank                           | 9                       | 9   | 7   | 9   | 9   | 5                      | 6   | 8   | 8   |
| Right bank                          | 7                       | 9   | 7   | 8   | 7   | 8                      | 8   | 9   | 5   |
| Vegetative protection               |                         |     |     |     |     |                        |     |     |     |
| Left bank                           | 10                      | 9   | 7   | 10  | 9   | 2                      | 2   | 8   | 8   |
| Right bank                          | 8                       | 9   | 7   | 8   | 8   | 8                      | 8   | 9   | 5   |
| Riparian vegetative zone width      |                         |     |     |     |     |                        |     |     |     |
| Left bank                           | 10                      | 10  | 9   | 10  | 4   | 0                      | 0   | 1   | 8   |
| Right bank                          | 1                       | 6   | 2   | 2   | 10  | 10                     | 9   | 10  | 10  |
| SCORE                               | 176                     | 169 | 171 | 183 | 147 | 151                    | 167 | 180 | 182 |

## **Appendix G**

### **Analytical Data Summary Tables**

Table G-1 Blackjack/Bluebird Surface Water Analytical Results

|                |          |                  | TAL Metals, µg/L |          |         |       |            |         |                 |        |              |        |            |           |           |         |              |           |          |        |          |                |
|----------------|----------|------------------|------------------|----------|---------|-------|------------|---------|-----------------|--------|--------------|--------|------------|-----------|-----------|---------|--------------|-----------|----------|--------|----------|----------------|
|                |          |                  | ALUMINUM         | ANTIMONY | ARSENIC | BARUM | CADMIUM    | CALCIUM | CHROMIUM, TOTAL | COBALT | COPPER       | IRON   | LEAD       | MAGNESIUM | MANGANESE | MERCURY | NICKEL       | POTASSIUM | SELENIUM | SODIUM | VANADIUM | ZINC           |
| Sample No.     |          |                  |                  |          |         |       |            |         |                 |        |              |        |            |           |           |         |              |           |          |        |          |                |
| Adits          | BLAC     | AD-SFW-11        | <23.6U           | <4.7U    | <4.8U   | 27.6B | <0.6U      | 7390    | <1.4U           | 12B    | <2.4U        | 13100  | 1.8B       | 12900     | 2380      | 0.21    | 43.2         | 1460B     | <3.4U    | 2820B  | <2U      | 89.3           |
|                | BLUE     | AD-SFW-19        | 77.8B            | <4.7U    | <4.8U   | 9.3B  | <0.6U      | 4400B   | <1.4U           | 34.8B  | <2.4U        | 7340   | <1.3U      | 11100     | 4790      | 0.23    | 106          | 1340B     | <3.4U    | 3090B  | <2U      | 198            |
| Stream Samples | BLAC     | ST-SFW-01        | <23.6U           | <4.7U    | 4.9B    | 13.5B | <0.6U      | 11400   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 6920      | 1.9B      | <0.1U   | <2.1U        | 991B      | <3.4U    | 2290B  | <2U      | 1.4B           |
|                |          | ST-SFW-01A       | <23.6U           | <4.7U    | <4.8U   | 14.7B | <0.6U      | 12400   | <1.4U           | <2U    | <2.4U        | <33.3U | 1.6B       | 7480      | 3.2B      | <0.1U   | <2.1U        | 1160B     | <3.4U    | 2590B  | <2U      | 3.8B           |
|                |          | ST-SFW-02        | <23.6U           | <4.7U    | <4.8U   | 15.1B | <0.6U      | 12200   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 6930      | 3.2B      | <0.1U   | <2.1U        | 1190B     | <3.4U    | 2400B  | <2U      | 1.5B           |
|                |          | ST-SFW-02A       | <23.6U           | <4.7U    | <4.8U   | 16B   | <0.6U      | 13400   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 7710      | 4.2B      | <0.1U   | <2.1U        | 1220B     | <3.4U    | 2720B  | <2U      | 3.9B           |
|                |          | ST-SFW-03        | 42.6B            | <4.7U    | <4.8U   | 14.9B | <0.6U      | 12100   | <1.4U           | <2U    | <2.4U        | 34.6B  | <1.3U      | 6940      | 3.5B      | <0.1U   | <2.1U        | 1290B     | <3.4U    | 2470B  | <2U      | 1.9B           |
|                |          | ST-SFW-03A       | <23.6U           | <4.7U    | <4.8U   | 15.9B | <0.6U      | 13600   | <1.4U           | <2U    | <2.4U        | <33.3U | 1.6B       | 7830      | 3.9B      | <0.1U   | <2.1U        | 1250B     | <3.4U    | 2780B  | <2U      | 5B             |
|                |          | ST-SFW-04        | 24.9B            | <4.7U    | <4.8U   | 14.6B | <0.6U      | 11700   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 6780      | 2.8B      | <0.1U   | <2.1U        | 1200B     | <3.4U    | 2600B  | <2U      | 1.8B           |
|                |          | ST-SFW-42        | 40.2B            | <4.7U    | <4.8U   | 15.8B | <0.6U      | 12500   | 1.5B            | <2U    | <2.4U        | 58.9B  | <1.3U      | 7190      | 17.3      | <0.1U   | <2.1U        | 1370B     | <3.4U    | 2840B  | <2U      | 3.2B           |
|                | BLUE     | ST-SFW-05        | 20.9B            | 4.7B     | <2.4U   | 14.6B | <0.3U      | 11500   | <0.6U           | <1.8U  | <1.4U        | <16.8U | <1.5U      | 6520      | 11.8B     | <0.1U   | <2U          | 1170B     | <1.7U    | 2660B  | <2.2U    | <5.7U          |
|                |          | ST-SFW-05A       | <23.6U           | <4.7U    | <4.8U   | 17.4B | <0.6U      | 13600   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 7860      | 14.7B     | <0.1U   | <2.1U        | 1310B     | <3.4U    | 2960B  | <2U      | 8.6B           |
|                |          | ST-SFW-06        | 40.3B            | 4B       | <2.4U   | 15B   | <0.3U      | 12000   | <0.6U           | <1.8U  | <1.4U        | 17B    | <1.5U      | 6840      | 9.7B      | <0.1U   | <2U          | 1290B     | <1.7U    | 2740B  | 2.5B     | <5.7U          |
|                |          | ST-SFW-07        | 47.7B            | 4B       | <2.4U   | 14.2B | <0.3U      | 11700   | <0.6U           | <1.8U  | <1.4U        | <16.8U | <1.5U      | 6670      | 8.2B      | <0.1U   | <2U          | 1320B     | <1.7U    | 2730B  | <2.2U    | <5.7U          |
|                |          | ST-SFW-08        | 56.9B            | 4.2B     | <2.4U   | 14.1B | <0.3U      | 11800   | <0.6U           | <1.8U  | <1.4U        | <16.8U | <1.5U      | 6680      | 7.3B      | <0.1U   | <2U          | 1240B     | <1.7U    | 2730B  | 2.4B     | <5.7U          |
|                |          |                  |                  |          |         |       |            |         |                 |        |              |        |            |           |           |         |              |           |          |        |          |                |
| Ponds          | BLAC     | PD-SFW-10        | 211              | <4.7U    | <4.8U   | 33.5B | 2.4B       | 6080    | <1.4U           | 53.7   | 102          | 7710   | <1.3U      | 8070      | 2430      | <0.1U   | 151          | 1310B     | <3.4U    | 3270B  | <2U      | 176            |
|                |          | PD-SFW-15        | 173B             | <4.7U    | <4.8U   | 32.4B | 2.3B       | 5950    | <1.4U           | 53.2   | 114          | 10700  | <1.3U      | 7900      | 2370      | <0.1U   | 147          | 1320B     | 3.8B     | 2760B  | <2U      | 171            |
|                |          | PD-SFW-41        | <23.6U           | <4.7U    | <4.8U   | 17B   | <0.6U      | 11900   | <1.4U           | <2U    | <2.4U        | <33.3U | <1.3U      | 6880      | 1B        | <0.1U   | <2.1U        | 1290B     | <3.4U    | 2810B  | <2U      | 4.2B           |
|                |          | PD-SFW-43        | <23.6U           | <4.7U    | <4.8U   | <5.9U | <0.6U      | 7500    | <1.4U           | <2U    | 2.6B         | 53B    | <1.3U      | 13900     | 188       | 0.2     | <2.1U        | 1460B     | <3.4U    | 2800B  | <2U      | 4.9B           |
|                | BLUE     | PD-SFW-16        | 68.2B            | <4.7U    | <4.8U   | 19.6B | <0.6U      | 27300   | <1.4U           | 30.6B  | 2.9B         | 1310   | <1.3U      | 25500     | 4930      | 0.27    | 126          | 1860B     | 3.4B     | 5780   | <2U      | 192            |
|                |          | PD-SFW-17        | <23.6U           | <4.7U    | <4.8U   | 24.1B | <0.6U      | 13600   | <1.4U           | 4B     | <2.4U        | 41.9B  | <1.3U      | 9050      | 1140      | <0.1U   | 14.9B        | 1420B     | <3.4U    | 3500B  | <2U      | 14.8B          |
|                |          | PD-SFW-18        | 87.2B            | <4.7U    | <4.8U   | 9B    | 0.71B      | 4370B   | <1.4U           | 35B    | <2.4U        | 6740   | 1.4B       | 11100     | 4860      | 0.24    | 108          | 1310B     | <3.4U    | 3270B  | <2U      | 204            |
| Comparison     | Criteria | EPA-Ecological   | 87               | 30       | 150     | 4     | 1.1<br>1.1 | NA      | 86.2<br>86.2    | 23     | 15.9<br>15.9 | 1000   | 1.0<br>1.0 | NA        | 120       | 0.77    | 68.5<br>68.5 | NA        | 5        | NA     | 20       | 137.3<br>137.3 |
|                |          | EPA-Human Health | NA               | 5.6      | 0.018   | 1000  | NA         | NA      | NA              | NA     | 1300         | 300    | NA         | NA        | 50        | NA      | 610          | NA        | 170      | NA     | NA       | 7400           |
|                |          | Oak Ridge PRG    | 87               | 30       | NA      | 4     | 1.1        | NA      | 11              | 23     | 12           | 1000   | 3.2        | NA        | 120       | 1.3     | 160          | NA        | 0.39     | NA     | 20       | 110            |
|                |          | OR-Ecological    | 87               | 1600     | NA      | 4     | 1.2<br>1.2 | 116000  | 100.3<br>100.3  | 23     | 15.9<br>15.9 | 1000   | 1.4<br>1.4 | 82000     | 120       | 0.012   | 68.7<br>68.7 | 53000     | 5        | 680000 | 20       | 139.2<br>139.2 |
|                |          | OR-Human Health  | NA               | 146      | 0.022   | 1000  | 10         | NA      | 50              | NA     | NA           | 300    | 50         | NA        | 50        | 0.144   | 13.4         | NA        | 10       | NA     | NA       | NA             |

Table G-1 Blackjack/Bluebird Surface Water Analytical Results, continued

| Sample No.        |          |                  | Laboratory General Chemistry    |                         |                  |                |                       |                 |                                 |                                    |                          |                                | Field Parameters             |                            |             |                          |                |                       |                                            |                      |                  |  |
|-------------------|----------|------------------|---------------------------------|-------------------------|------------------|----------------|-----------------------|-----------------|---------------------------------|------------------------------------|--------------------------|--------------------------------|------------------------------|----------------------------|-------------|--------------------------|----------------|-----------------------|--------------------------------------------|----------------------|------------------|--|
|                   |          |                  | ALKALINITY, BICARBONATE<br>MG/L | CONDUCTANCE<br>UMHOS/CM | HARDNESS<br>MG/L | PH<br>PH UNITS | REDOX POTENTIAL<br>MV | SULFATE<br>MG/L | SUSPENDED SOLIDS, TOTAL<br>MG/L | SUSPENDED SOLIDS, VOLATILE<br>MG/L | TOTAL ALKALINITY<br>MG/L | TOTAL DISSOLVED SOLIDS<br>MG/L | CHROMIUM, HEXAVALENT<br>MG/L | CURRENT VELOCITY<br>FT/SEC | DEPTH<br>FT | DISSOLVED OXYGEN<br>MG/L | PH<br>PH UNITS | REDOX POTENTIAL<br>MV | SPECIFIC CONDUCTANCE<br>MS/CM <sup>p</sup> | TEMPERATURE<br>DEG C | TURBIDITY<br>NTU |  |
| Adits             | BLAC     | AD-SFW-11        | 35.4                            | 179                     | 128              | 6.6            | 232                   | 67.4            | 21.7                            | <5U                                | 35.4                     | 209                            | 0.01                         | 0.39                       | 0.25        | 6.62                     | 6.03           | 153.3                 | 0.237                                      | 7.89                 | 62.5             |  |
|                   | BLUE     | AD-SFW-19        | 6.8                             | 163                     | 148              | 5.2            | 267                   | 63.3            | 16.3                            | <5U                                | 6.8                      |                                | 0.01                         | 4.01                       | NM          | 6.09                     | 5.45           | 216.5                 | 0.192                                      | 10.4                 | 37.3             |  |
| Stream<br>Samples | BLAC     | ST-SFW-01        | 60                              | 463                     | 108              | 7.8            | 163                   | 6.9             | 1.5                             | <5U                                | 60                       | 90                             | 0.02                         | 2.58                       | 0.40        | 8.05                     | 8.23           | 239.0                 | 0.121                                      | 20.39                | 0.4              |  |
|                   |          | ST-SFW-01A       | 64                              | 113                     | 128              | 7.9            | 166                   | 6.9             | <0.5U                           | <5U                                | 64                       | 102                            | 0.01                         | NM                         | NM          | 8.33                     | 7.75           | 170.0                 | 0.114                                      | 18.50                | 0.66             |  |
|                   |          | ST-SFW-02        | 61.6                            | 112                     | 108              | 7.7            | 180                   | 6.9             | 1.3                             | <5U                                | 61.6                     |                                | 0.01                         | 1.40                       | 0.17        | 9.00                     | 7.41           | 217.4                 | 0.116                                      | 19.45                | 0.5              |  |
|                   |          | ST-SFW-02A       | 64.5                            | 115                     | 148              | 8.2            | 148                   | 6.8             | 0.6                             | <5U                                | 64.5                     | 108                            | 0.00                         | NM                         | NM          | 9.21                     | 8.07           | 165.0                 | 0.118                                      | 19.60                | 0.62             |  |
|                   |          | ST-SFW-03        | 63.9                            | 114                     | 104              | 7.9            | 174                   | 6.9             | 1.2                             | <5U                                | 63.9                     |                                | 0.01                         | 1.58                       | 0.42        | 9.19                     | 8.24           | 135.5                 | 0.116                                      | 20.33                | 0.4              |  |
|                   |          | ST-SFW-03A       | 65.1                            | 115                     | 172              | 8.2            | 140                   | 6.8             | 0.5                             | <5U                                | 65.1                     | 106                            | 0.00                         | NM                         | NM          | 7.79                     | 8.12           | 176.0                 | 0.119                                      | 20.20                | 6.25             |  |
|                   |          | ST-SFW-04        | 59.5                            | 113                     | 104              | 8.4            | 147                   | 6.8             | 1.7                             | <5U                                | 59.5                     |                                | 0.01                         | 1.33                       | 0.17        | 9.13                     | 8.4            | 236.1                 | 0.148                                      | 19.21                | 0.5              |  |
|                   |          | ST-SFW-42        | 59.6                            | 116                     | 84               | 8.3            | 159                   | 8.1             | 1.7                             | <5U                                | 59.6                     |                                | 0.01                         | 0.02                       | 1.00        | 9.90                     | 8.08           | 185.8                 | 0.118                                      | 17.74                | 0.8              |  |
|                   | BLUE     | ST-SFW-05        | 59.2                            | 112                     | 96               | 7.7            | 158                   | 7.8             | 1                               | <5U                                | 59.2                     | 442                            | 0.00                         | 2.31                       | 0.50        | 9.47                     | 8.19           | 167.3                 | 0.12                                       | 18.93                | 0.6              |  |
|                   |          | ST-SFW-05A       | 62.7                            | 119                     | 92               | 7.8            | 138                   | 8.3             | 0.6                             | <5U                                | 62.7                     | 101                            | 0.01                         | NM                         | NM          | 7.60                     | 7.61           | 170.0                 | 0.124                                      | 15.50                | 0.65             |  |
|                   |          | ST-SFW-06        | 59.5                            | 115                     | 96               | 8              | 168                   | <5U             | 2.4                             | <5U                                | 59.5                     | 77                             | 0.00                         | 2.07                       | 0.33        | 9.33                     | 8.24           | 184.4                 | 0.12                                       | 20.32                | 0.5              |  |
|                   |          | ST-SFW-07        | 59.9                            | 116                     | 144              | 8              | 172                   | 8.3             | 1                               | <5U                                | 59.9                     | 74                             | 0.01                         | 2.56                       | 0.21        | 9.41                     | 8.42           | 165.3                 | 0.12                                       | 21.34                | 0.5              |  |
|                   |          | ST-SFW-08        | 58.7                            | 116                     | 100              | 8.2            | 169                   | 8.2             | 1.6                             | <5U                                | 58.7                     | 90                             | 0.01                         | 1.3                        | 0.42        | 8.86                     | 8.38           | 226.9                 | 0.119                                      | 22.01                | 0.7              |  |
|                   |          |                  |                                 |                         |                  |                |                       |                 |                                 |                                    |                          |                                |                              |                            |             |                          |                |                       |                                            |                      |                  |  |
| Ponds             | BLAC     | PD-SFW-10        | 2.8                             | 156                     | 100              | 5.2            | 375                   | 95.4            | 26.2                            | <5U                                | 2.8                      | 146                            | 0.00                         | NM                         | 0.17        | 6.88                     | 6.63           | 182.3                 | 0.181                                      | 11.50                | 77.6             |  |
|                   |          | PD-SFW-15        | 5.5                             | 157                     | 104              | 5.5            | 370                   | 134             | 19                              | <5U                                | 5.5                      | 147                            | 0.00                         | NM                         | 0.50        | 5.48                     | 6.17           | 201.1                 | 0.183                                      | 10.1                 | 32.2             |  |
|                   |          | PD-SFW-41        | 62.4                            | 117                     | 96               | 7.3            | 201                   | 8.2             | 8.3                             | <5U                                | 62.4                     |                                | 0.00                         | NM                         | 1.00        | 7.61                     | 6.26           | 158.0                 | 0.12                                       | 15.74                | 0.8              |  |
|                   |          | PD-SFW-43        | 20.2                            | 170                     | 124              | 6.1            | 228                   | 60.1            | 1.8                             | <5U                                | 20.2                     | 105                            | 0.01                         | NM                         | 0.67        | 6.46                     | 5.94           | 143.6                 | 0.192                                      | 13.34                | 0.6              |  |
|                   | BLUE     | PD-SFW-16        | 1.9                             | 406                     | 284              | 4.8            | 298                   | 193             | 2.1                             | <5U                                | 1.9                      |                                | 0.01                         | NM                         | 1.00        | 4.22                     | 4.8            | 196.0                 | 0.414                                      | 24.14                | 3.6              |  |
|                   |          | PD-SFW-17        | 49.7                            | 140                     | 124              | 6.7            | 233                   | 35.3            | 59                              | 7.5                                | 49.7                     | 98                             | 0.00                         | NM                         | 0.50        | 6.99                     | 6.98           | 166.1                 | 0.152                                      | 18.51                | 162.0            |  |
|                   |          | PD-SFW-18        | 5.4                             | 171                     | 228              | 5.2            | 294                   | 65.9            | 20.3                            | <5U                                | 5.4                      |                                | 0.01                         | NM                         | NM          | 5.53                     | 5.71           | 219.7                 | 0.193                                      | 10.7                 | 28.7             |  |
| Comparison        | Criteria | EPA-Ecological   |                                 |                         | >20              | 6.5-9          |                       |                 |                                 |                                    | NA                       |                                |                              |                            |             | 8                        | 6.5-9          |                       |                                            |                      |                  |  |
|                   |          | EPA-Human Health |                                 |                         | NA               | 5-9            |                       |                 |                                 |                                    | NA                       |                                |                              |                            |             | NA                       | 5-9            |                       |                                            |                      |                  |  |
|                   |          | Oak Ridge PRG    |                                 |                         | NA               | NA             |                       |                 |                                 |                                    | NA                       |                                |                              |                            |             | NA                       | NA             |                       |                                            |                      |                  |  |
|                   |          | OR-Ecological    |                                 |                         | NA               | 6.5-9          |                       |                 |                                 |                                    | NA                       |                                |                              |                            |             | 6-11                     | 6.5-9          |                       |                                            |                      |                  |  |
|                   |          | OR-Human Health  |                                 |                         | NA               | NA             |                       |                 |                                 |                                    | NA                       |                                |                              |                            |             | NA                       | NA             |                       |                                            |                      |                  |  |

**Table G-1 Blackjack/Bluebird Surface Water Analytical Results, continued**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                       |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------|-----------------|-----------|-------------------------------------|--------------------------|-----------------------------|-----------------------------|---------------------------------------|--------------------------------------------------------|--|
| <b>Notes</b> <ul style="list-style-type: none"> <li>- <b>Bold, shaded results indicate concentrations above the lowest applicable comparison criterion.</b></li> <li>- Cyanide (total) was analyzed for but not detected in any sample.</li> <li>- All alkalinity was contributed by bicarbonate: carbonate and hydroxide were not detected in any samples.</li> <li>- The following dissolved metals were analyzed for but not detected in any sample: beryllium, silver and thallium.</li> <li>- There were no comparison criteria for total chromium (Cr); therefore, the most conservative criteria, for Cr 6, were used.</li> <li>- Hardness-based criteria for cadmium, chromium III, copper, lead, nickel, silver, and zinc were calculated based on the mean hardness of 22 Bluebird and Blackjack samples (128 mg/L). These criteria may need to be adjusted for adit and pond samples.</li> </ul> <p> U = Analyte was analyzed for but not detected.<br/> B = Analyte was detected at a concentration between the method detection limit (MDL) and practical quantitation limit (PQL).<br/> NA = Not available.<br/> NM = Not measured.<br/> Empty cells in the table indicate no data. </p> <p> <b>Units:</b> </p> <table> <tr> <td>DEG C = Degrees celcius</td> <td>MV = Millivolts</td> </tr> <tr> <td>FT = Feet</td> <td>NTU = Nephelometric turbidity units</td> </tr> <tr> <td>FT/SEC = Feet per second</td> <td>UG/L = Micrograms per liter</td> </tr> <tr> <td>MG/L = Milligrams per liter</td> <td>UMHOS/CM = Micro MHOS per centimeter'</td> </tr> <tr> <td>MS/CM<sup>3</sup> = Millisiemens per cubic centimeter</td> <td></td> </tr> </table> <p> <b>Comparison Criteria</b> </p> <p> Oregon Ecological - Criteria are the lowest of: <ul style="list-style-type: none"> <li>- ODEQ (2003) Water Quality Criteria, Protection of Aquatic Life, Fresh Chronic Criteria (OAR 340-041-001), or</li> <li>- ODEQ (1998) Guidance for Ecological Risk Assessment, Level II Screening Values for surface water.</li> </ul> </p> <p> EPA Ecological - Criteria are the lowest of: <ul style="list-style-type: none"> <li>- USEPA (2002) recommended ambient water quality criteria for freshwater aquatic organisms, chronic; hardness dependent values are normalized to 128 mg/L, or</li> <li>- USEPA (2002) recommended ambient water quality criteria for freshwater aquatic organisms, Tier II secondary chronic values calculated by Oak Ridge National Laboratory (Suter &amp; Tsao 1996).</li> </ul> </p> <p> Oak Ridge PRGs - Oak Ridge National Laboratory Preliminary Remediation Goals (Efroymson et al 1997).<br/> Oregon Human Health - ODEQ (2003) Water Quality Criteria, Protection of Human Health, Water and Fish Ingestion (OAR-340-041-001).<br/> EPA Human Health - USEPA (2002) recommended ambient water quality criteria for protection of human consumption of fish; hardness dependent values are normalized to 128 mg/L. </p> |                                       | DEG C = Degrees celcius | MV = Millivolts | FT = Feet | NTU = Nephelometric turbidity units | FT/SEC = Feet per second | UG/L = Micrograms per liter | MG/L = Milligrams per liter | UMHOS/CM = Micro MHOS per centimeter' | MS/CM <sup>3</sup> = Millisiemens per cubic centimeter |  |
| DEG C = Degrees celcius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MV = Millivolts                       |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |
| FT = Feet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NTU = Nephelometric turbidity units   |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |
| FT/SEC = Feet per second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | UG/L = Micrograms per liter           |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |
| MG/L = Milligrams per liter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | UMHOS/CM = Micro MHOS per centimeter' |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |
| MS/CM <sup>3</sup> = Millisiemens per cubic centimeter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                       |                         |                 |           |                                     |                          |                             |                             |                                       |                                                        |  |

Table G-2 Blackjack/Bluebird Pore Water Analytical Results

|                |           |                | TAL Metals, µg/L |          |        |         |                 |              |        |           |           |                      |              |           |        |          |                |
|----------------|-----------|----------------|------------------|----------|--------|---------|-----------------|--------------|--------|-----------|-----------|----------------------|--------------|-----------|--------|----------|----------------|
|                |           |                | ALUMINUM         | ANTIMONY | BARIUM | CALCIUM | CHROMIUM, TOTAL | COPPER       | IRON   | MAGNESIUM | MANGANESE | MERCURY              | NICKEL       | POTASSIUM | SODIUM | VANADIUM | ZINC           |
| Sample No.     |           |                |                  |          |        |         |                 |              |        |           |           |                      |              |           |        |          |                |
| Stream Samples | BLAC      | ST-PWP-01      | 36.3B            | <4.7U    | 23.3B  | 13500   | <1.4U           | <2.4U        | <33.3U | 7540      | 2.9B      | <0.1U                | <2.1U        | 1560B     | 3420B  | <2U      | 3B             |
|                |           | ST-PWP-01A     | <23.6U           | <4.7U    | 15.7B  | 12400   | <1.4U           | <2.4U        | 50B    | 7310      | 1.1B      | <0.1U                | <2.1U        | 1150B     | 2540B  | <2U      | 4.1B           |
|                |           | ST-PWP-02      | <23.6U           | <4.7U    | 15.2B  | 11900   | <1.4U           | <2.4U        | <33.3U | 6760      | 6.1B      | <0.1U                | <2.1U        | 1220B     | 2810B  | <2U      | 4.3B           |
|                |           | ST-PWP-02A     | <23.6U           | <4.7U    | 16B    | 13000   | 1.4B            | <2.4U        | <33.3U | 7450      | 3.8B      | <0.1U                | 2.7B         | 1200B     | 2850B  | <2U      | 17.6B          |
|                |           | ST-PWP-03      | <23.6U           | <4.7U    | 18.8B  | 11800   | <1.4U           | <2.4U        | <33.3U | 7000      | 2.8B      | <0.1U                | <2.1U        | 1380B     | 2750B  | <2U      | 2.9B           |
|                |           | ST-PWP-03A     | <23.6U           | <4.7U    | 18.1B  | 13000   | <1.4U           | <2.4U        | <33.3U | 7460      | 61.1      | <0.1U                | 2.5B         | 1280B     | 2800B  | <2U      | 4.4B           |
|                |           | ST-PWP-04      | 25.7B            | <4.7U    | 30.6B  | 26700   | <1.4U           | <2.4U        | <33.3U | 14900     | 34.6      | <0.1U                | 8.5B         | 2320B     | 6570   | <2U      | 7B             |
|                |           | ST-PWR-02      | <23.6U           | <4.7U    | 15.5B  | 11400   | <1.4U           | <2.4U        | <33.3U | 6490      | <0.7U     | 0.12B                | <2.1U        | 1300B     | 2580B  | <2U      | 1.9B           |
|                |           | ST-PWR-03      | <23.6U           | <4.7U    | 13.6B  | 11300   | <1.4U           | <2.4U        | <33.3U | 6510      | 0.71B     | <0.1U                | <2.1U        | 1210B     | 2560B  | <2U      | 1.4B           |
|                | ST-PWR-42 | 431            | <4.7U            | 16.1B    | 12100  | 2.4B    | 2.4B            | 399          | 7060   | 19.6      | <0.1U     | 2.5B                 | 1310B        | 2870B     | <2U    | 5.5B     |                |
|                | BLUE      | ST-PWP-05      | 58.9B            | 6.4B     | 18.8B  | 13000   | <0.6U           | <1.4U        | 37.3B  | 7350      | 7.7B      | 0.17B                | <2U          | 1450B     | 2990B  | <2.2U    | <5.7U          |
|                |           | ST-PWP-05A     | <23.6U           | <4.7U    | 18.1B  | 13700   | <1.4U           | <2.4U        | <33.3U | 8000      | 12.1B     | <0.1U                | <2.1U        | 1360B     | 3000B  | <2U      | 4.7B           |
|                |           | ST-PWP-06      | 41.9B            | 4.7B     | 15.4B  | 12200   | <0.6U           | <1.4U        | <16.8U | 6920      | 12.4B     | <0.1U                | <2U          | 1320B     | 2720B  | 3.1B     | <5.7U          |
|                |           | ST-PWP-07      | 55.1B            | <3.8U    | 14B    | 11800   | <0.6U           | <1.4U        | <16.8U | 6740      | 6B        | <0.1U                | <2U          | 1160B     | 2700B  | 2.2B     | <5.7U          |
|                |           | ST-PWP-08      | <23.6U           | <4.7U    | 14.2B  | 11500   | <1.4U           | <2.4U        | <33.3U | 6550      | 9B        | 0.15B                | <2.1U        | 1290B     | 2870B  | <2U      | 1.2B           |
|                |           | ST-PWR-05      | 32.6B            | 4.5B     | 14.6B  | 12100   | <0.6U           | <1.4U        | <16.8U | 6830      | 8.9B      | <0.1U                | <2U          | 1120B     | 2730B  | <2.2U    | <5.7U          |
|                |           | ST-PWR-06      | 52.5B            | 5.6B     | 14.7B  | 11800   | <0.6U           | <1.4U        | <16.8U | 6740      | 11.9B     | <0.1U                | <2U          | 1130B     | 2710B  | <2.2U    | <5.7U          |
|                |           | ST-PWR-07      | 44.8B            | <4.7U    | 13B    | 11600   | <1.4U           | <2.4U        | 49B    | 6680      | 1.9B      | 0.12B                | <2.1U        | 1090B     | 2830B  | <2U      | <1U            |
|                |           | ST-PWR-08      | <23.6U           | <4.7U    | 14.7B  | 11300   | <1.4U           | <2.4U        | <33.3U | 6510      | 3.4B      | 0.16B                | <2.1U        | 1130B     | 2740B  | <2U      | 6.2B           |
| Comparison     | Criteria  | EPA-Ecological | 87               | 30       | 4      | NA      | 88.3<br>88.3    | 16.3<br>16.3 | 1000   | NA        | 120       | 0.77<br>70.2<br>70.2 | 70.2<br>70.2 | NA        | NA     | 20       | 140.6<br>140.6 |
|                |           | Oak Ridge PRG  | 87               | 30       | 4      | NA      | 11              | 12           | 1000   | NA        | 120       | 1.3                  | 160          | NA        | NA     | 20       | 110            |
|                |           | OR-Ecological  | 87               | 1600     | 4      | 116000  | 102.6<br>102.6  | 16.3<br>16.3 | 1000   | 82000     | 120       | 0.012                | 70.4<br>70.4 | 53000     | 680000 | 20       | 142.6<br>142.6 |

Table G-2 Blackjack/Bluebird Pore Water Analytical Results, continued

|                   |          |                | Lab                            | Field Parameters             |                          |                |                       |                                            |                      |                  |
|-------------------|----------|----------------|--------------------------------|------------------------------|--------------------------|----------------|-----------------------|--------------------------------------------|----------------------|------------------|
| Sample No.        |          |                | TOTAL DISSOLVED SOLIDS<br>MG/L | CHROMIUM, HEXAVALENT<br>MG/L | DISSOLVED OXYGEN<br>MG/L | PH<br>PH UNITS | REDOX POTENTIAL<br>MV | SPECIFIC CONDUCTANCE<br>MS/CM <sup>3</sup> | TEMPERATURE<br>DEG C | TURBIDITY<br>NTU |
| Stream<br>Samples | BLAC     | ST-PWP-01      |                                | 0.01                         | 7.20                     | 8.15           | 211.0                 | 0.122                                      | 21.50                | 23.1             |
|                   |          | ST-PWP-01A     | 96                             | 0.01                         | 7.50                     | 7.47           | 163.0                 | 0.116                                      | 18.10                | 3.28             |
|                   |          | ST-PWP-02      |                                | 0.00                         | 8.86                     | 7.98           | 149.2                 | 0.117                                      | 19.96                | 143.0            |
|                   |          | ST-PWP-02A     | 100                            | 0.00                         | 7.60                     | 7.67           | 187.0                 | 0.119                                      | 20.50                | 4.14             |
|                   |          | ST-PWP-03      |                                | 0.01                         | 9.16                     | 7.21           | 157.3                 | 0.251                                      | 20.58                | 134.0            |
|                   |          | ST-PWP-03A     | 109                            | 0.00                         | 6.50                     | 7.27           | 183.0                 | 0.121                                      | 20.50                | 40.8             |
|                   |          | ST-PWP-04      |                                | 0.01                         | 7.93                     | 8.32           | 196.2                 | 0.148                                      | 21.20                | 35.9             |
|                   |          | ST-PWR-42      |                                | 0.03                         | 5.41                     | 7.87           | 187.5                 | 0.119                                      | 18.02                | 34.9             |
|                   | BLUE     | ST-PWP-05      |                                | 0.01                         | 9.52                     | 7.72           | 200.7                 | 0.125                                      | 20.22                | 34.9             |
|                   |          | ST-PWP-05A     | 111                            | 0.00                         | 7.90                     | 7.48           | 180.0                 | 0.125                                      | 17.10                | 5.2              |
|                   |          | ST-PWP-06      |                                | 0.00                         | 8.99                     | 8.11           | 191.1                 | 0.12                                       | 20.32                | 17.9             |
|                   |          | ST-PWP-07      |                                | 0.01                         | 8.95                     | 8.34           | 175.7                 | 0.121                                      | 21.33                | 28.0             |
|                   |          | ST-PWP-08      |                                | 0.00                         | 8.01                     | 8.14           | 242.2                 | 0.124                                      | 22.77                | 72.9             |
| Comparison        | Criteria | EPA-Ecological | NA                             |                              | 8                        | 6.5-9          |                       |                                            |                      |                  |
|                   |          | Oak Ridge PRG  | NA                             |                              | NA                       | NA             |                       |                                            |                      |                  |
|                   |          | OR-Ecological  | 500                            |                              | 6-11                     | 6.5-9          |                       |                                            |                      |                  |

Table G-2 Blackjack/Bluebird Pore Water Analytical Results, continued

**Notes**

- **Bold, shaded results indicate concentrations above the lowest applicable comparison criterion.**
- Cyanide (total) was analyzed for but not detected in any sample.
- The following dissolved metals were analyzed for but not detected in any sample: arsenic, beryllium, cadmium, cobalt, lead, selenium, silver, and thallium.
- There were no comparison criteria for total chromium (Cr); therefore, the most conservative criteria, for Cr 6, were used.
- Hardness-based criteria for cadmium, chromium III, copper, lead, nickel, silver, and zinc were calculated based on the mean hardness of 22 Bluebird and Blackjack samples (128 mg/L). These criteria may need to be adjusted for adit and pond samples.

U = Analyte was analyzed for but not detected.  
B = Analyte was detected at a concentration between the method detection limit (MDL) and practical quantitation limit (PQL).  
NA = Not available.  
Empty cells in the table indicate no data.

**Units:**

|                                                        |                                     |
|--------------------------------------------------------|-------------------------------------|
| DEG C = Degrees celcius                                | MV = Millivolts                     |
| FT/SEC = Feet per second                               | NTU = Nephelometric turbidity units |
| MG/L = Milligrams per liter                            | UG/L = Micrograms per liter         |
| MS/CM <sup>3</sup> = Millisiemens per cubic centimeter |                                     |

**Comparison Criteria**

Oregon Ecological - Criteria are the lowest of:

- ODEQ (2003) Water Quality Criteria, Protection of Aquatic Life, Fresh Chronic Criteria (OAR 340-041-001), or
- ODEQ (1998) Guidance for Ecological Risk Assessment, Level II Screening Values for surface water.

EPA Ecological - Criteria are the lowest of:

- USEPA (2002) recommended ambient water quality criteria for freshwater aquatic organisms, chronic; hardness dependent
- USEPA (2002) recommended ambient water quality criteria for freshwater aquatic organisms, Tier II secondary chronic

Oak Ridge PRGs - Oak Ridge National Laboratory Preliminary Remediation Goals (Efroymson et al 1997).

Table G-3 Blackjack/Bluebird Sediment Analytical Results

|                |           |            | TAL Metals, mg/kg |          |          |         |        |           |         |         |                 |        |        |        |       |           |           |         |        |           |          |        |        |          |          |      |
|----------------|-----------|------------|-------------------|----------|----------|---------|--------|-----------|---------|---------|-----------------|--------|--------|--------|-------|-----------|-----------|---------|--------|-----------|----------|--------|--------|----------|----------|------|
|                |           |            | CYANIDE           | ALUMINUM | ANTIMONY | ARSENIC | BARIUM | BERYLLIUM | CADMIUM | CALCIUM | CHROMIUM, TOTAL | COBALT | COPPER | IRON   | LEAD  | MAGNESIUM | MANGANESE | MERCURY | NICKEL | POTASSIUM | SELENIUM | SILVER | SODIUM | THALLIUM | VANADIUM | ZINC |
| Sample No.     |           |            |                   |          |          |         |        |           |         |         |                 |        |        |        |       |           |           |         |        |           |          |        |        |          |          |      |
| Stream Samples | BLAC      | AD-SSD-11  | <0.5U             | 1720     | 9.7B     | 34      | 227    | 4.2B      | 5.1B    | 1250B   | <1.6U           | 20.9B  | 81.9   | 729000 | 21.8  | 457B      | 982       | 0.57    | 159    | <440U     | <3.8U    | <2.5U  | 690B   | 35.5     | 4.8B     | 2230 |
|                |           | ST-PSD-01  | <0.5U             | 12400    | 2.1B     | 34.7    | 67.5   | 0.33B     | 0.33B   | 3120    | 102             | 20     | 30     | 30000  | 3.3   | 10400     | 543       | <0.019U | 131    | 809       | 0.5B     | <0.27U | 277B   | <0.71U   | 58.5     | 55.4 |
|                |           | ST-PSD-01A | <0.53U            | 8600     | 1.2B     | 17.6    | 60     | 0.34B     | <0.064U | 1600    | 97.3            | 15     | 30.4   | 25200  | 3.1   | 9610      | 676       | 0.018B  | 101    | 516B      | 0.32B    | <0.23U | 72.2B  | 1.4      | 52.5     | 36.9 |
|                |           | ST-PSD-02  | <0.5U             | 17300    | 2.5B     | 52.6    | 102    | 0.4B      | 0.48B   | 4170    | 193             | 32.8   | 37.2   | 36600  | 4.9   | 21500     | 873       | <0.023U | 224    | 904       | 0.68     | <0.3U  | 217B   | <0.77U   | 71.9     | 66.8 |
|                |           | ST-PSD-02A | <0.61U            | 11500    | 1.9B     | 48.6    | 80.1   | 0.43B     | <0.075U | 2510    | 111             | 26.2   | 32.8   | 28200  | 3.8   | 17900     | 798       | 0.044   | 193    | 796       | 0.49B    | <0.27U | 123B   | 1.7      | 50.6     | 54.5 |
|                |           | ST-PSD-03  | <0.5U             | 12000    | 1.4B     | 19.2    | 68.1   | 0.28B     | 0.27B   | 3170    | 122             | 21     | 38.9   | 25900  | 3.2   | 15200     | 638       | 0.026B  | 138    | 937       | <0.4U    | <0.26U | 265B   | <0.68U   | 49.4     | 50.7 |
|                |           | ST-PSD-03A | <0.55U            | 7970     | 1.2B     | 26.7    | 76.8   | 0.28B     | <0.069U | 2130    | 52.2            | 14.9   | 20.9   | 21700  | 2.4   | 8890      | 890       | 0.055   | 98.4   | 506B      | 0.64     | <0.25U | 124B   | 1B       | 32.2     | 35.6 |
|                |           | ST-PSD-04  | <0.5U             | 7930     | 0.75B    | 24.6    | 112    | 0.25B     | 0.39B   | 2700    | 65.7            | 20.8   | 23.8   | 18800  | 3.2   | 6510      | 1620      | <0.022U | 99.8   | 710       | 0.88     | <0.27U | 308B   | <0.7U    | 28.8     | 37.7 |
|                |           | ST-PSD-42  | <0.5U             | 42700    | 5.9B     | 55.7    | 405    | 1.2B      | 4.2     | 6750    | 191             | 85.5   | 323    | 61100  | 11.6  | 18400     | 3090      | 0.35    | 503    | 2650      | 2.9      | 2.6B   | 516B   | <2.5U    | 106      | 556  |
|                |           | ST-RSD-01A | <0.61U            | 6680     | 0.65B    | 13.4    | 58.9   | 0.3B      | 0.21B   | 1690    | 66.1            | 15.1   | 27.8   | 18500  | 3.1   | 5090      | 747       | 0.031B  | 74.3   | 669       | 0.52B    | <0.26U | 88B    | 1.1B     | 29       | 62.3 |
|                |           | ST-RSD-02  | <0.5U             | 16700    | 2.1B     | 54.4    | 106    | 0.38B     | 0.59B   | 4280    | 145             | 34.4   | 49.8   | 41700  | 1.4   | 15100     | 1010      | <0.019U | 172    | 856       | 0.7      | <0.26U | 152B   | 0.86B    | 67.3     | 78.2 |
|                |           | ST-RSD-02A | <0.53U            | 8690     | 0.86B    | 12.4    | 40.5   | 0.27B     | <0.071U | 2730    | 74              | 15.1   | 17.7   | 18500  | 2.2   | 9750      | 409       | <0.019U | 122    | 294B      | 0.32B    | <0.26U | 398B   | 0.9B     | 37.4     | 30.1 |
|                |           | ST-RSD-03A | <0.54U            | 8700     | 1.2B     | 18      | 81.2   | 0.34B     | 0.11B   | 2590    | 88.3            | 15.1   | 41.8   | 23700  | 3.7   | 8750      | 620       | <0.018U | 102    | 719       | <0.2U    | <0.26U | 262B   | 1.2B     | 45.7     | 42.3 |
|                |           | ST-RSD-04  | <0.5U             | 10500    | 1.5B     | 24.2    | 70.3   | 0.26B     | 0.32B   | 2940    | 87              | 18.9   | 27.9   | 21700  | 3.1   | 10900     | 600       | <0.019U | 124    | 833       | 0.8      | <0.27U | 292B   | <0.69U   | 36.7     | 50   |
|                | ST-RSD-42 | <0.5U      | 14300             | 1.3B     | 30.9     | 89.8    | 0.32B  | 0.5B      | 4560    | 105     | 27.2            | 42.6   | 33300  | 3.1    | 20200 | 1090      | <0.023U   | 215     | 888    | <0.45U    | <0.29U   | 532B   | <0.76U | 58.5     | 85.2     |      |
|                | BLUE      | ST-PSD-05  | <0.52U            | 14900    | 1.2B     | 19.4    | 73.1   | 0.36B     | <0.059U | 4180    | 86.1            | 20.7   | 28.8   | 28100  | 3.6   | 11500     | 665       | 0.38    | 111    | 808       | 0.52     | <0.22U | 226B   | 0.93B    | 52.2     | 56.2 |
|                |           | ST-PSD-05A | <0.6U             | 9110     | 1.8B     | 34.3    | 73.5   | 0.48B     | <0.07U  | 2530    | 98.5            | 24.3   | 31.3   | 38900  | 3.7   | 13200     | 1080      | 0.097   | 155    | 646       | 0.58B    | <0.26U | 59.8B  | 2.4      | 49.6     | 68.6 |
|                |           | ST-PSD-06  | <0.61U            | 7730     | <0.52U   | 7.4     | 71.5   | 0.19B     | 0.077B  | 2980    | 20.4            | 14.9   | 40.6   | 10000  | 2     | 2690      | 786       | 0.075   | 92     | 350B      | 0.44B    | <0.24U | 337B   | <0.63U   | 16.4     | 28.8 |
|                |           | ST-PSD-07  | <0.69U            | 11800    | 1B       | 31      | 82.3   | 0.32B     | 0.12B   | 3350    | 55.6            | 14.6   | 26.8   | 20000  | 3.1   | 6500      | 571       | 0.1     | 82.7   | 1310      | 0.69     | 0.33B  | 364B   | <0.62U   | 35.1     | 56.6 |
|                |           | ST-PSD-08  | <0.56U            | 4750     | 0.96B    | 15.3    | 60.6   | 0.39B     | <0.06U  | 1070    | 78              | 24.9   | 51.3   | 57900  | 5.4   | 11100     | 733       | 0.085   | 160    | 530       | 1        | <0.22U | 62.3B  | 2.2      | 57.1     | 56.6 |
| ST-RSD-08      |           | <0.56U     | 12600             | <0.47U   | 3.9      | 64.2    | 0.11B  | <0.06U    | 5890    | 10.7    | 9.5             | 54.1   | 14000  | 1.3    | 4610  | 527       | 0.056     | 51.9    | 1110   | <0.17U    | <0.22U   | 1040   | <0.58U | 10.6     | 59.1     |      |
| Ponds          | BLAC      | PD-SSD-10  | <0.5U             | 15300    | 7.4B     | 136     | 9.1B   | 0.26B     | 1.4B    | <108U   | 31.8            | <1.2U  | 1280   | 531000 | 19.4  | <106U     | 110       | 1.4     | <1.2U  | <233U     | <2U      | <1.3U  | <280U  | 22.3     | 16.2B    | 75.4 |
|                |           | PD-SSD-41  | <0.5U             | 40900    | 2.9B     | 110     | 837    | 1.6B      | 21.2    | 6880    | 144             | 283    | 1080   | 70000  | 11.8  | 15400     | 32600     | 0.25    | 1810   | 2400      | 9        | <0.97U | 463B   | <2.5U    | 110      | 1310 |
|                |           | PD-SSD-43  | <0.5U             | 1440     | <0.64U   | 0.81B   | 12.4B  | 0.15B     | 0.27B   | 999     | 4.4             | 6B     | 49.3   | 4550   | 2.4   | 808       | 492       | 0.069   | 72.9   | 160B      | <0.47U   | <0.3U  | 155B   | <0.78U   | 2.9B     | 60.9 |
|                | BLUE      | PD-SSD-16  | 1.6               | 10600    | 5.8B     | 279     | 688    | 1.6B      | 8.7     | 1680B   | 24.8            | 1480   | 100    | 459000 | 22.1  | 830B      | 178000    | <0.11U  | 1300   | 886B      | 50.3     | <1.6U  | 494B   | <4.2U    | 10.4B    | 1470 |
| Comparison     | Criteria  | ER-L       |                   | NA       | NA       | 8.2     | NA     | NA        | 1.2     | NA      | 81              | NA     | 34     | NA     | 47    | NA        | NA        | 0.15    | 21     | NA        | NA       | 1      | NA     | NA       | NA       | 150  |
|                |           | ER-M       |                   | NA       | NA       | 70      | NA     | NA        | 9.6     | NA      | 370             | NA     | 270    | NA     | 218   | NA        | NA        | 0.71    | 51.6   | NA        | NA       | 3.7    | NA     | NA       | NA       | 410  |
|                |           | OR         |                   | NA       | 3        | NA      | NA     | NA        | 0.6     | NA      | 37              | NA     | 36     | NA     | 35    | NA        | 1100      | 0.2     | 18     | NA        | NA       | 4.5    | NA     | NA       | NA       | 123  |
|                |           | PEL        |                   | NA       | NA       | 41.6    | NA     | NA        | 4.21    | NA      | 160             | NA     | 108    | NA     | 112   | NA        | NA        | 0.696   | 42.8   | NA        | NA       | 1.77   | NA     | NA       | NA       | 271  |
|                |           | TEL        |                   | NA       | NA       | 7.24    | NA     | NA        | 0.676   | NA      | 52.3            | NA     | 18.7   | NA     | 30.2  | NA        | NA        | 0.13    | 15.9   | NA        | NA       | 0.733  | NA     | NA       | NA       | 124  |

Table G-3 Blackjack/Bluebird Sediment Analytical Results, continued

|                |            |            | TAL Metals by SPLP, µg/L |          |         |        |           |         |                 |        |        |      |      |           |           |         |        |           |        |          |          |      |
|----------------|------------|------------|--------------------------|----------|---------|--------|-----------|---------|-----------------|--------|--------|------|------|-----------|-----------|---------|--------|-----------|--------|----------|----------|------|
|                |            |            | ALUMINUM                 | ANTIMONY | ARSENIC | BARIUM | BERYLLIUM | CALCIUM | CHROMIUM, TOTAL | COBALT | COPPER | IRON | LEAD | MAGNESIUM | MANGANESE | MERCURY | NICKEL | POTASSIUM | SODIUM | THALLIUM | VANADIUM | ZINC |
| Stream Samples | Sample No. |            |                          |          |         |        |           |         |                 |        |        |      |      |           |           |         |        |           |        |          |          |      |
|                | BLAC       | ST-PSD-01A | 1340                     | <4.7U    | 6.3B    | 68.8B  | <0.2U     | 1320B   | 13              | <2U    | 4.3B   | 2450 | 2.9B | 1660B     | 76.5      | <10U    | 17.3B  | <393U     | 22600  | <5.7U    | 6.2B     | 33.4 |
|                |            | ST-PSD-02A | 3020                     | <4.7U    | 9.5B    | 168B   | 0.23B     | 2070B   | 24.9            | 3.7B   | 8.3B   | 4910 | 3.6  | 3310B     | 149       | <10U    | 36.1B  | <393U     | 12200  | 6B       | 9.7B     | 86.2 |
|                |            | ST-PSD-03A | 910                      | <4.7U    | <4.8U   | 36B    | <0.2U     | 1100B   | 7.8B            | <2U    | 4.8B   | 1660 | 1.5B | 1100B     | 44.1      | <10U    | 10.6B  | <393U     | 6440   | <5.7U    | 3.8B     | 10B  |
|                | BLUE       | ST-PSD-05A | 3010                     | 5.1B     | 6.6B    | 136B   | 0.26B     | 1720B   | 12.5            | <2U    | 7B     | 3530 | 2.9B | 1490B     | 111       | <10U    | 17.9B  | 547B      | 13000  | 6.2B     | 7.4B     | 60.4 |

Table G-3 Blackjack/Bluebird Sediment Analytical Results, continued

|                   |      |            | Lab    | Grain Size, percent     |             |                   |                 |                   |           |           | Clay Minerals, percent |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|-------------------|------|------------|--------|-------------------------|-------------|-------------------|-----------------|-------------------|-----------|-----------|------------------------|----------------|-----------------|---------------|---------------|---------------|--------------------|----------------|-----------------|-----------------|------------------|-------------|---------------|
|                   |      |            |        | TOC LLOYD KHAN<br>MG/KG | GRAVEL<br>% | SAND, COARSE<br>% | SAND, FINE<br>% | SAND, MEDIUM<br>% | SILT<br>% | CLAY<br>% | <4µ WEIGHT%<br>%       | AMPHIBOLE<br>% | ANTIGORITE<br>% | CHLORITE<br>% | ERIONITE<br>% | GOETHITE<br>% | ILLITE & MICA<br>% | KAOLINITE<br>% | K-FELDSPAR<br>% | LAUMONTITE<br>% | PLAGIOCLASE<br>% | QUARTZ<br>% | SMECTITE<br>% |
| Sample No.        |      |            |        |                         |             |                   |                 |                   |           |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
| Adits             | BLAC | AD-SSD-11  | 40700  | 0                       | 0.2         | 1.3               | 0.5             | 64.8              | 33.1      | 14.58     | 0                      | 0              | 0               | 0             | 70.75         | 29.25         | 0                  | 0              | 0               | 0               | 0                | 0           |               |
| Stream<br>Samples | BLAC | ST-PSD-01  | 1490   | 19.4                    | 25.9        | 6                 | 46.2            | 1.5               | 1         | 0.26      | 9.17                   | 13.64          | 9.85            | 0             | 0             | 18.94         | 3.25               | 1.08           | 13.15           | 6.55            | 6.57             | 17.81       |               |
|                   |      | ST-PSD-01A | 442    | 26.2                    | 21.4        | 4.2               | 34.7            | 12.3              | 1.2       | 0.45      | 18.85                  | 11.9           | 7.62            | 0             | 0             | 20.43         | 2.25               | 0              | 10.2            | 7.62            | 3.87             | 17.27       |               |
|                   |      | ST-PSD-02  | 557    | 0                       | 0           | 33.4              | 58.5            | 6.3               | 1.8       | 0.47      | 12.71                  | 10.            | 5.49            | 0             | 0             | 13.8          | 1.73               | 0              | 4.41            | 11.             | 11.47            | 29.39       |               |
|                   |      | ST-PSD-02A | <130U  | 11                      | 2.5         | 11.2              | 67.3            | 6.2               | 1.7       | 0.56      | 10.71                  | 15.42          | 4.36            | 0             | 0             | 9.69          | 2.67               | 0              | 6.85            | 13.45           | 6.5              | 30.36       |               |
|                   |      | ST-PSD-03  | 1330   | 33.1                    | 22          | 7.8               | 32.9            | 2                 | 2.1       | 1.07      | 9.83                   | 10.04          | 5.61            | 0             | 0             | 13.01         | 2.18               | 0.85           | 10.81           | 21.8            | 13.45            | 12.43       |               |
|                   |      | ST-PSD-03A | 578    | 55.2                    | 14.1        | 7.3               | 18.6            | 4                 | 0.7       | 1.2       | 10.36                  | 15.01          | 7.71            | 0             | 0             | 12.82         | 3.1                | 0              | 6.86            | 14.72           | 7.63             | 21.8        |               |
|                   |      | ST-PSD-04  | 697    | 26.4                    | 20.3        | 10                | 38.8            | 3.2               | 1.3       | 1.09      | 10.57                  | 11.78          | 6.76            | 0             | 0             | 10.08         | 2.12               | 0              | 9.69            | 18.13           | 15.49            | 15.38       |               |
|                   |      | ST-PSD-42  | 111800 | 0                       | 0           | 20                | 2.5             | 45.3              | 32.2      | 4.06      | 9.54                   | 0              | 13.16           | 0             | 0             | 6.8           | 11.6               | 0              | 2.15            | 22.21           | 16.13            | 18.42       |               |
|                   |      | ST-RSD-01A | <127U  | 42.7                    | 21.5        | 4.4               | 28.2            | 2.3               | 0.9       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   |      | ST-RSD-02  | 4610   | 36.3                    | 10.1        | 21.4              | 24.4            | 5                 | 2.8       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   |      | ST-RSD-02A | <119U  | 9.2                     | 2.1         | 6.2               | 24.9            | 56.5              | 1.1       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   |      | ST-RSD-03A | <119U  | 47.8                    | 29.8        | 1.2               | 17.9            | 2.9               | 0.4       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   |      | ST-RSD-04  | 4090   | 24.4                    | 24.8        | 11.7              | 35.8            | 2.1               | 1.3       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   |      | ST-RSD-42  | 1310   | 21.8                    | 24.4        | 6.8               | 43.3            | 2.7               | 1.1       |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
|                   | BLUE | ST-PSD-05  | 3530   | 38.3                    | 15.8        | 15.8              | 25.2            | 3.2               | 1.7       | 2.76      | 8.65                   | 6.67           | 4.38            | 0             | 0             | 10.87         | 12.61              | 0              | 5.03            | 19.94           | 8.88             | 22.96       |               |
|                   |      | ST-PSD-05A | <131U  | 25.8                    | 17          | 13.5              | 36.5            | 6.3               | 0.9       | 2.78      | 10.98                  | 13.45          | 6.74            | 0             | 0             | 9.85          | 3.74               | 0              | 6.64            | 10.98           | 6.48             | 31.14       |               |
| ST-PSD-06         |      | <124U      | 30.6   | 27.3                    | 6           | 33.4              | 2.1             | 0.5               | 1.99      | 9.13      | 4.35                   | 8.31           | 0               | 0             | 9.07          | 4.06          | 0                  | 5.47           | 32.48           | 10.04           | 17.08            |             |               |
| ST-PSD-07         |      | 22400      | 38.6   | 21.5                    | 7.2         | 28.5              | 2.7             | 1.6               | 2.59      | 10.14     | 4.9                    | 6.79           | 0               | 0             | 8.15          | 1.76          | 3.68               | 4.86           | 26.64           | 15.82           | 17.27            |             |               |
| ST-PSD-08         |      | 7820       |        |                         |             |                   |                 |                   | 1.33      | 12.79     | 9.68                   | 8.54           | 0               | 0             | 8.97          | 2.7           | 2.92               | 4.79           | 15.59           | 12.43           | 21.59            |             |               |
| ST-RSD-08         |      | 26400      | 30     | 25.8                    | 0.8         | 37.4              | 5.5             | 0.6               |           |           |                        |                |                 |               |               |               |                    |                |                 |                 |                  |             |               |
| Ponds             | BLAC | PD-SSD-10  | 9960   | 0                       | 0.2         | 13.4              | 8.4             | 30.3              | 47.8      | 12.49     | 0                      | 0              | 0               | 0             | 90.01         | 9.99          | 0                  | 0              | 0               | 0               | 0                |             |               |
|                   |      | PD-SSD-41  | 3680   | 0                       | 0           | 5.8               | 1.1             | 64.1              | 29        | 7.91      | 6.87                   | 0              | 18.5            | 21.89         | 0             | 6.65          | 7.56               | 1.91           | 0               | 15.45           | 12.81            | 8.35        |               |
|                   |      | PD-SSD-43  | 32700  | 0                       | 0           | 20                | 15.8            | 44.4              | 19.8      | 10.17     | 15.47                  | 0              | 3.74            | 0             | 0             | 35.74         | 17.65              | 0              | 0               | 0               | 24.34            | 3.06        |               |
|                   | BLUE | PD-SSD-16  | 18100  | 0                       | 0           | 15.6              | 8.1             | 41                | 35.3      | 36.51     | 0                      | 0              | 0               | 0             | 0             | 100.          | 0                  | 0              | 0               | 0               | 0                |             |               |

Table G-3 Blackjack/Bluebird Sediment Analytical Results, continued

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Bold, shaded results indicate concentrations above the lowest applicable comparison criterion.</b></p> <p>U = Analyte was analyzed for but not detected.<br/>B = Analyte was detected at a concentration between the method detection limit (MDL) and practical quantitation limit (PQL).<br/>NA = Not available.<br/>Empty cells in the table indicate no data.</p> <p><b>Units:</b><br/>MG/KG = Milligrams per kilogram<br/>UG/L = Micrograms per liter</p> <p><b>Comparison Criteria</b></p> <ul style="list-style-type: none"><li>- Threshold Effects Level (TEL) and Probable Effects Level (PEL) from USEPA National Sediment Quality Survey, Screening Values for Chemicals Evaluated, <a href="http://www.epa.gov/waterscience/cs/vol1/appdx_d.pdf">http://www.epa.gov/waterscience/cs/vol1/appdx_d.pdf</a>.</li><li>- Effects Range-Low (ER-L) and Effects Range-Medium (ER-M), National Oceanic and Atmospheric Administration (NOAA), from USEPA (1997) National Sediment Quality Survey, Screening Values for Chemicals Evaluated.</li><li>- ODEQ (1998) Guidance for Ecological Risk Assessment, Level II Screening Values for freshwater sediment (there was no criterion for total arsenic; therefore, the most conservative criterion, for arsenic 3, was used).</li></ul> <p>Oak Ridge National Laboratory values are not included; they are compiled from TEL and ER-L values, and USEPA Assessment and Remediation of Contaminated Sediment (ARCS) program values which exceed TELs.</p> <p>Sediment samples analyzed for clay mineralogy were collected in pool habitat only.<br/>The grain size sample jar collected from BLUE-ST-PSD-08 was broken during shipment.</p> |

Table G-4 Blackjack/Bluebird Soil Analytical Results

|            |          |                    | TAL Metals, mg/kg |          |         |        |           |         |         |                      |                 |        |        |        |      |           |           |         |        |           |          |        |        |          |          |        |
|------------|----------|--------------------|-------------------|----------|---------|--------|-----------|---------|---------|----------------------|-----------------|--------|--------|--------|------|-----------|-----------|---------|--------|-----------|----------|--------|--------|----------|----------|--------|
|            |          |                    | ALUMINUM          | ANTIMONY | ARSENIC | BARIUM | BERYLLIUM | CADMIUM | CALCIUM | CHROMIUM, HEXAVALENT | CHROMIUM, TOTAL | COBALT | COPPER | IRON   | LEAD | MAGNESIUM | MANGANESE | MERCURY | NICKEL | POTASSIUM | SELENIUM | SILVER | SODIUM | THALLIUM | VANADIUM | ZINC   |
| Sample No. |          |                    |                   |          |         |        |           |         |         |                      |                 |        |        |        |      |           |           |         |        |           |          |        |        |          |          |        |
| Background | CLEA     | BG-SSS-25(0.5)     | 23100             | 1.2B     | 8.1     | 311    | 0.76      | 0.16B   | 1520    | <2.1U                | 12.5            | 7.3    | 52.6   | 30300  | 8.2  | 1910      | 907       | 0.068   | 21.9   | 1450      | 1.9      | 0.5B   | 299B   | 0.78B    | 33.9     | 55.3   |
|            |          | BG-SSS-26(0.5)     | 27500             | <0.5U    | 4.8     | 430    | 0.94      | 0.16B   | 1880    | <2.1U                | 11.7            | 12.9   | 35.3   | 35300  | 7.3  | 1780      | 1520      | 0.045   | 39.5   | 1110      | 1.3      | 0.53B  | 358B   | 1.5      | 38.5     | 102    |
| On Site    | BLAC     | PD-SSS-44(0.4)     | 1300              | 7.8B     | 21.2    | 12.2B  | <0.034U   | 1.1     | <50.2U  | <3.5U                | 39.6            | 18.3   | 1440   | 459000 | 32   | <50U      | 72.9      | 0.49    | 23.9   | 214B      | 29.7     | 0.92B  | <90.8U | 17.4     | 35.7     | 29.2   |
|            |          | TA-SUS-14(1.5)     | 3190              | 3.4B     | 20.5    | 58     | <0.019U   | 0.48    | 157B    | <2.3U                | 58.4            | 9.6    | 915    | 193000 | 14.6 | 3940      | 81.8      | 0.17    | 34.2   | 471       | 9.7      | 0.44B  | <49.4U | 6.3      | 36.4     | 27.4   |
|            |          | TA-SUS-30(0.75)    | 19300             | 4.6B     | 82.3    | 53     | 0.27B     | 0.21B   | 2750    | <2.8U                | 147             | 20     | 126    | 106000 | 10.3 | 13200     | 330       | 0.75    | 146    | 911       | 4        | 1.3B   | 453B   | 3        | 64.8     | 46     |
|            |          | TA-SUS-31(0.9)     | 18400             | 1.7B     | 24.9    | 61.5   | 0.28B     | 0.21B   | 5290    | <2.0U                | 53.3            | 30.5   | 216    | 46800  | 13.9 | 6040      | 720       | 0.096   | 77.8   | 1080      | 2.7      | 0.5B   | 1150   | 1.8      | 44.8     | 57.8   |
|            |          | WP-SUS-12(1.0)     | 12500             | 0.96B    | 7.9     | 131    | 0.45B     | 0.2B    | 256B    | <2.2U                | 15.6            | 23     | 132    | 47200  | 9.6  | 2350      | 1020      | 0.19    | 33.6   | 1230      | 1.9      | 0.31B  | 118B   | 2.6      | 48.2     | 78.4   |
|            |          | WP-SUS-13(1.5)     | 3080              | 1.3B     | 8.9     | 69.8   | 0.26B     | <0.1U   | <25.5U  | 0.59B                | 3               | 1.9B   | 20.9   | 21800  | 7.3  | 74.3B     | 15.8      | 3.7     | 16.8   | 867       | 1.4      | 0.11B  | <46.2U | 1        | 19.1     | 29     |
|            |          | AD-SSS-19(0.5)     | 7340              | 13.9     | 48.7    | 39.2   | 0.25B     | <0.035U | <26U    | 0.83B                | 18.7            | 21.1   | 99.7   | 370000 | 21.7 | 1470      | 308       | 0.67    | 28     | 1480      | 17.1     | 0.65B  | 151B   | 20.6     | 15.4     | 82.4   |
|            | BLUE     | TA-SSS-23(0.2)     | 3030              | 20.2     | 44.3    | 22.6B  | 0.33B     | <0.043U | <32U    | <3.5U                | 14.6            | 29.2   | 37     | 557000 | 29.1 | 238B      | 260       | 0.25    | 46.9   | 327B      | 25.7     | 0.84B  | <31.4U | 30.9     | 3.8B     | 165    |
|            |          | TA-SSS-27(0.5)     | 16900             | 1.1B     | 7.3     | 271    | 0.54      | 0.09B   | 1580    | <2.2U                | 10.1            | 6.8    | 42.6   | 15300  | 12.9 | 1130      | 499       | 0.062   | 16.5   | 1070      | 1.3      | 0.19B  | 472    | 0.88B    | 19.9     | 46     |
|            |          | TA-SUS-24(1.0)     | 15300             | 0.82B    | 36.8    | 81.2   | 0.52      | 0.099B  | 2910    | <2.3U                | 96.5            | 23.1   | 44.2   | 25300  | 6.4  | 9200      | 1210      | 0.14    | 135    | 820       | 1.6      | 0.78B  | 679    | 1.6      | 45.6     | 93.8   |
|            |          | TA-SUS-32(1.5)     | 19100             | 1.7B     | 12.5    | 130    | 0.63      | 3       | 4040    | 0.76B                | 113             | 31.4   | 54.9   | 49800  | 3.8  | 17500     | 8270      | 0.035   | 221    | 1340      | 3.8      | 0.85B  | 363B   | 6.9      | 93.3     | 138    |
|            |          | TA-SUS-33(2.0)     | 13900             | 1.8B     | 10.5    | 63.8   | 0.51      | 0.35B   | 3360    | <2.1U                | 147             | 20     | 37.3   | 39100  | 4.1  | 14200     | 856       | 0.052   | 135    | 536       | 2.3      | 0.25B  | 275B   | 1.1      | 63.1     | 69.8   |
|            |          | WP-SUS-20(2.5)     | 8260              | 1.7B     | 20.4    | 78.1   | 0.23B     | <0.026U | <19.4U  | <2.1U                | 17.9            | 5.9    | 58.2   | 41200  | 11.3 | 5050      | 230       | 1.2     | 9.5    | 3370      | 2.5      | 0.34B  | 356B   | 2.1      | 24.1     | 51.6   |
|            |          | WP-SUS-21(1.5)     | 3040              | 2.8B     | 86.8    | 64.4   | 0.19B     | <0.023U | 70.7B   | 4.9                  | 8.6             | 3.5B   | 58.1   | 34200  | 15.7 | 1050      | 72.5      | 0.5     | 7.2    | 1920      | 4.1      | 0.68B  | 147B   | 2.1      | 17.5     | 49.6   |
|            |          | WP-SUS-22(1.5)     | 1970              | 2B       | 11.6    | 38.3   | 0.12B     | <0.024U | <18.1U  | <1.9U                | 8.7             | 11.3   | 53.5   | 30200  | 8.3  | 573       | 239       | 0.67    | 21.7   | 1250      | 1.6      | 0.1B   | 141B   | 2.3      | 12.3     | 79.1   |
|            |          | WP-SUS-29(1.0)     | 9460              | 3.1B     | 13      | 64.5   | 0.39B     | <0.028U | 79.8B   | <2.1U                | 19.4            | 6.1    | 95.3   | 36100  | 12.3 | 1260      | 96.5      | 0.32    | 22.5   | 939       | 5.5      | 0.2B   | 237B   | 1.5      | 34.4     | 47.9   |
| Comparison | Criteria | EPA Industrial PRG | 100000            | 410      | 1.6     | 67000  | 1900      | 450     | NA      | 64                   | 450             | 1900   | 41000  | 100000 | 750  | NA        | 19000     | 310     | 20000  | NA        | 5100     | 5100   | NA     | 67       | 7200     | 100000 |
|            |          | EPA-Ecological     | NA                | 21       | 37      | NA     | NA        | 29      | NA      | 330                  | 5               | 32     | 61     | NA     | NA   | NA        | NA        | NA      | NA     | NA        | NA       | NA     | NA     | NA       | NA       | 120    |
|            |          | EPA-Human Health   | NA                | 31       | 0.4     | 5500   | 0.1       | 78      | NA      | 270                  | 270             | NA     | NA     | NA     | 400  | NA        | NA        | NA      | 1600   | NA        | 390      | 390    | NA     | NA       | 550      | 23000  |
|            |          | Oak Ridge          | NA                | 5        | 9.9     | 283    | 10        | 4       | NA      | NA                   | 0.4             | 20     | 60     | NA     | 40.5 | NA        | NA        | 0.00051 | 30     | NA        | 0.21     | 2      | NA     | 1        | 2        | 8.5    |
|            |          | OR-Ecological      | 50                | 5        | 8       | 85     | 10        | 4       | NA      | 410                  | NA              | 20     | 50     | NA     | 16   | NA        | 100       | 0.1     | 30     | NA        | 1        | 2      | NA     | 1        | 2        | 50     |

**Table G-4 Blackjack/Bluebird Soil Analytical Results, continued**

|            |                |                | TAL Metals by SPLP, µg/L |          |         |        |           |         |         |                 |        |        |        |        |           |           |         |        |           |          |        |        |          |          |       |       |
|------------|----------------|----------------|--------------------------|----------|---------|--------|-----------|---------|---------|-----------------|--------|--------|--------|--------|-----------|-----------|---------|--------|-----------|----------|--------|--------|----------|----------|-------|-------|
|            |                |                | ALUMINUM                 | ANTIMONY | ARSENIC | BARIUM | BERYLLIUM | CADMIUM | CALCIUM | CHROMIUM, TOTAL | COBALT | COPPER | IRON   | LEAD   | MAGNESIUM | MANGANESE | MERCURY | NICKEL | POTASSIUM | SELENIUM | SILVER | SODIUM | THALLIUM | VANADIUM | ZINC  |       |
| Background | CLEA           | Sample No.     | BG-SSS-25(0.5)           | 1210     | <3.8U   | <2.4U  | 18.8B     | <0.2U   | <0.3U   | 1170B           | 1.2B   | <1.8U  | 4.5B   | 654    | <1.5U     | 271B      | 48.9    | <10U   | <2U       | 1160B    | 3.5B   | <0.9U  | 7130     | <2.8U    | 2.3B  | <5.7U |
|            |                | BG-SSS-26(0.5) | 1980                     | <3.8U    | <2.4U   | 49.2B  | <0.2U     | <0.3U   | 1070B   | 1.5B            | <1.8U  | 4.8B   | 854    | <1.5U  | 287B      | 31.4      | <10U    | <2U    | 1120B     | 2.1B     | <0.9U  | 6460   | <2.8U    | 2.6B     | <5.7U |       |
| On Site    | BLAC           | PD-SSS-44(0.4) | 58.2B                    | <3.8U    | <2.4U   | <7.3U  | <0.2U     | <0.3U   | 801B    | <0.6U           | <1.8U  | 2.2B   | 114    | 2.1B   | 342B      | 0.96B     | <10U    | <2U    | <250U     | <1.7U    | <0.9U  | 1410B  | <2.8U    | <2.2U    | <5.7U |       |
|            |                | WP-SUS-12(1.0) | 52.4B                    | <3.8U    | <2.4U   | 43.5B  | <0.2U     | <0.3U   | 1060B   | 0.7B            | <1.8U  | 3.3B   | 51.2B  | <1.5U  | 612B      | 88.8      | <10U    | 10B    | 732B      | 2.1B     | <0.9U  | 6690   | <2.8U    | <2.2U    | <5.7U |       |
|            |                | WP-SUS-13(1.5) | 84.8B                    | <3.8U    | <2.4U   | <7.3U  | <0.2U     | <0.3U   | 624B    | 0.63B           | <1.8U  | 3.3B   | 66.7B  | 1.8B   | <182U     | <0.7U     | <10U    | <2U    | 890B      | 1.9B     | <0.9U  | 5810   | <2.8U    | <2.2U    | <5.7U |       |
|            |                | BLUE           | AD-SSS-19(0.5)           | 471      | <3.8U   | <2.4U  | 25.4B     | 0.37B   | 1.2B    | 1510B           | <0.6U  | 8.5B   | 7.4B   | <16.8U | 6.2       | 1160B     | 677     | 14.8B  | 34.3B     | 1850B    | 1.8B   | <0.9U  | 6580     | <2.8U    | <2.2U | 50    |
|            | TA-SSS-27(0.5) |                | 2010                     | 5.1B     | 2.4B    | 30.6B  | 0.37B     | <0.3U   | 1160B   | 1.5B            | <1.8U  | 3.7B   | 1350   | 2.5B   | 227B      | 65.5      | <10U    | <2U    | 2280B     | 3.5B     | <0.9U  | 6410   | <2.8U    | 4.3B     | 7.6B  |       |
|            | TA-SUS-32(1.5) |                | 1610                     | 4.1B     | 8.1B    | 42.5B  | <0.2U     | 0.62B   | 722B    | 14              | <1.8U  | 4.9B   | 2430   | 1.5B   | 901B      | 1690      | <10U    | 25B    | 600B      | 4.5B     | <0.9U  | 7020   | <2.8U    | 7B       | 27.2  |       |
|            | TA-SUS-33(2.0) |                | 1080                     | <3.8U    | <2.4U   | 14.2B  | <0.2U     | <0.3U   | 672B    | 11.8            | 1.8B   | 4.7B   | 5310   | 2.3B   | 824B      | 132       | <10U    | 9B     | <250U     | 2.3B     | <0.9U  | 6670   | <2.8U    | 5.8B     | 7B    |       |
|            | WP-SUS-20(2.5) |                | 33.2B                    | <3.8U    | <2.4U   | 16.2B  | <0.2U     | <0.3U   | 1030B   | 0.73B           | <1.8U  | 1.4B   | <16.8U | <1.5U  | 404B      | 39.9      | <10U    | 2.6B   | 2270B     | <1.7U    | <0.9U  | 8380   | <2.8U    | <2.2U    | 15.2B |       |
|            | WP-SUS-21(1.5) |                | 115B                     | 4.3B     | <2.4U   | 36.7B  | 0.29B     | <0.3U   | 1760B   | 0.79B           | <1.8U  | 5.7B   | <16.8U | <1.5U  | 404B      | 103       | <10U    | 3.4B   | 2740B     | <1.7U    | <0.9U  | 11800  | <2.8U    | <2.2U    | 37.6  |       |
|            | WP-SUS-22(1.5) |                | 261                      | <3.8U    | 5.4B    | 33.3B  | 0.62B     | <0.3U   | 955B    | 0.83B           | <1.8U  | 18.6B  | 296    | 11.8   | 321B      | 84.8      | <10U    | 4B     | 1720B     | 2.8B     | <0.9U  | 6840   | <2.8U    | <2.2U    | 48.4  |       |
|            | WP-SUS-29(1.0) |                | <18.3U                   | <3.8U    | <2.4U   | 32.1B  | <0.2U     | <0.3U   | 970B    | 1.3B            | <1.8U  | <1.4U  | <16.8U | <1.5U  | <182U     | 63.1      | <10U    | 5B     | 673B      | 1.8B     | <0.9U  | 24900  | <2.8U    | <2.2U    | 25.9  |       |

**Table G-4 Blackjack/Bluebird Soil Analytical Results, continued**

|            |      |                 | Organic Compounds                   |                          |                    | Lab            | Acid/Base Accounting    |                                           |                                          |                      |                         |                         |                       |                                                 |
|------------|------|-----------------|-------------------------------------|--------------------------|--------------------|----------------|-------------------------|-------------------------------------------|------------------------------------------|----------------------|-------------------------|-------------------------|-----------------------|-------------------------------------------------|
| Sample No. |      |                 | BIS(2-ETHYLHEXYL)PHTHALATE<br>UG/KG | DICHLOROMETHANE<br>UG/KG | MOTOR OIL<br>MG/KG | PH<br>PH UNITS | FIZZ RATING<br>NO UNITS | MAXIMUM POTENTIAL ACIDITY<br>KG CACO3/TON | NEUTRALIZATION POTENTIAL<br>KG CACO3/TON | PASTE PH<br>PH UNITS | SULFATE SULFUR<br>WT. % | SULFIDE SULFUR<br>WT. % | TOTAL SULFUR<br>WT. % | NET NEUTRALIZATION<br>POTENTIAL<br>KG CACO3/TON |
| Background | CLEA | BG-SSS-25(0.5)  |                                     |                          |                    | 6.5            | none                    | <0.6                                      | -2.8                                     | 5.8                  | <0.01                   | < .02                   | < .02                 | -2.8                                            |
|            |      | BG-SSS-26(0.5)  |                                     |                          |                    | 6.6            | none                    | <0.6                                      | -1.3                                     | 6.1                  | <0.01                   | < .02                   | < .02                 | -1.3                                            |
| On Site    | BLAC | PD-SSS-44(0.4)  |                                     |                          |                    | 5              | none                    | 29.7                                      | -14.5                                    | 4.5                  | 0.18                    | 0.95                    | 1.13                  | -44.2                                           |
|            |      | TA-SUS-14(1.5)  |                                     |                          |                    | 3.9            |                         |                                           |                                          |                      |                         |                         |                       |                                                 |
|            |      | TA-SUS-30(0.75) |                                     |                          |                    | 5.3            |                         |                                           |                                          |                      |                         |                         |                       |                                                 |
|            |      | TA-SUS-31(0.9)  |                                     |                          |                    | 4.7            |                         |                                           |                                          |                      |                         |                         |                       |                                                 |
|            |      | WP-SUS-12(1.0)  |                                     |                          |                    | 4.6            | none                    | 0.0                                       | -2.3                                     | 4.5                  | 0.04                    | 0.00                    | 0.04                  | -2.3                                            |
|            |      | WP-SUS-13(1.5)  |                                     |                          |                    | 4              | none                    | 0.6                                       | -0.8                                     | 4.9                  | 0.01                    | 0.02                    | 0.03                  | -1.4                                            |
|            | BLUE | AD-SSS-19(0.5)  |                                     |                          |                    | 3.7            | none                    | 6.6                                       | -15.8                                    | 3.8                  | 0.49                    | 0.21                    | 0.7                   | -22.4                                           |
|            |      | TA-SSS-23(0.2)  |                                     |                          |                    | 5.4            |                         |                                           |                                          |                      |                         |                         |                       |                                                 |
|            |      | TA-SSS-27(0.5)  |                                     |                          |                    | 6.6            | none                    | <0.6                                      | -2.5                                     | 6.2                  | <0.01                   | < .02                   | < .02                 | -2.5                                            |
|            |      | TA-SUS-24(1.0)  |                                     |                          |                    | 6              |                         |                                           |                                          |                      |                         |                         |                       |                                                 |
|            |      | TA-SUS-32(1.5)  | 66JB1                               | 1.68                     | 35.8J              | 6.5            | none                    | <0.6                                      | 4.3                                      | 6.4                  | <0.01                   | < .02                   | < .02                 | 4.3                                             |
|            |      | TA-SUS-33(2.0)  | 104JB1                              | 1.77                     | <51.7U             | 5.8            | none                    | <0.6                                      | 3.3                                      | 6.4                  | <0.01                   | < .02                   | < .02                 | 3.3                                             |
|            |      | WP-SUS-20(2.5)  |                                     |                          |                    | 3.8            | none                    | 2.5                                       | -2.3                                     | 4.0                  | 0.33                    | 0.08                    | 0.41                  | -4.8                                            |
|            |      | WP-SUS-21(1.5)  |                                     |                          |                    | 3.6            | none                    | 2.5                                       | -3.0                                     | 3.7                  | 0.18                    | 0.08                    | 0.26                  | -5.5                                            |
|            |      | WP-SUS-22(1.5)  |                                     |                          |                    | 3.4            | none                    | 1.6                                       | -3.3                                     | 3.4                  | 0.21                    | 0.05                    | 0.26                  | -4.9                                            |
|            |      | WP-SUS-29(1.0)  |                                     |                          |                    | 4.4            | none                    | 0.6                                       | -2.3                                     | 4.6                  | 0.02                    | 0.02                    | 0.04                  | -2.9                                            |

Table G-4 Blackjack/Bluebird Soil Analytical Results, continued

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p><b>Notes</b></p> <p><b>Bold, shaded results indicate concentrations above the lowest applicable comparison criterion.</b></p> <p>Cyanide (total) was analyzed for but not detected in any sample.</p> <p>U = Analyte was analyzed for but not detected.</p> <p>B = Analyte was detected at a concentration between the method detection limit (MDL) and practical quantitation limit (PQL).</p> <p>BI = Analyte was detected in both the sample and the associated method blank. The sample concentration was not significantly higher (less than ten times) than the method blank concentration.</p> <p>J = Estimated concentration</p> <p>NA = Not available.</p> <p>Empty cells in the table indicate no data.</p> <p><b>Units:</b></p> <p>MG/KG = Milligrams per kilogram</p> <p>UG/KG = Micrograms per kilogram</p> <p>UG/L = Micrograms per liter</p> <p><b>Comparison Criteria</b></p> <ul style="list-style-type: none"><li>- OR Ecological - ODEQ (1998) Guidance for Ecological Risk Assessment, Level II Screening Values - lowest criteria for bird (b), plant (p), invertebrate (i), and mammal (m).</li><li>- EPA Ecological - EPA (2000b) Ecological Soil Screening Levels - Lowest Criteria Indicators for bird (b), plant (p), invertebrate (i), and mammal (m).</li><li>- Oak Ridge National Laboratory, US DOE (Efroymson et al 1997), Preliminary Remediation Goals (PRGs) for protection of plants (p), wildlife (w), or soil invertebrates (s).</li><li>- EPA Human Heath Criteria - Generic Soil Screening Levels (SSLs) for Protection of Human Health EPA (2000a). SSL is for ingestion unless indicated as inhalation of particulates by "ip".</li><li>- EPA Region 9 PRGS for industrial soil (<a href="http://www.epa.gov/region09/waste/sfund/prg/index.htm">http://www.epa.gov/region09/waste/sfund/prg/index.htm</a>).</li></ul> |
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Table G-5 Blackjack/Bluebird Plant Tissue Analytical Results

|            |      |           | TAL Metals and Cyanide, mg/kg |          |        |           |         |         |                 |        |      |        |           |           |         |        |           |          |        |          |      |
|------------|------|-----------|-------------------------------|----------|--------|-----------|---------|---------|-----------------|--------|------|--------|-----------|-----------|---------|--------|-----------|----------|--------|----------|------|
|            |      |           | CYANIDE                       | ALUMINUM | BARIUM | BERYLLIUM | CADMIUM | CALCIUM | CHROMIUM, TOTAL | COPPER | IRON | LEAD   | MAGNESIUM | MANGANESE | MERCURY | NICKEL | POTASSIUM | SELENIUM | SODIUM | VANADIUM | ZINC |
| Sample No. |      |           |                               |          |        |           |         |         |                 |        |      |        |           |           |         |        |           |          |        |          |      |
| Background | CLEA | BG-PLT-25 | <1.2U                         | 189      | 406    | 0.1B      | <0.15U  | 18200   | 0.79B           | 5.2B   | 241  | 0.82   | 4850      | 243       | <0.04U  | <0.51U | 15600     | 1.7      | 364B   | <0.49U   | 17.6 |
|            |      | BG-PLT-26 | <1.2U                         | 150      | 305    | 0.092B    | <0.14U  | 15800   | 0.81B           | 5.2B   | 253  | 1.2    | 4390      | 200       | <0.037U | <0.49U | 17500     | 1.4      | 341B   | 0.51B    | 13.4 |
| On Site    | BLAC | AD-PLT-11 | 2.9                           | 74.4B    | 12.7B  | 0.12B     | <0.23U  | 9080    | 0.76B           | 5.6B   | 521  | 1.4    | 8860      | 179       | <0.058U | 4.3B   | 20200     | 2.3      | 507B   | <0.78U   | 38.8 |
|            |      | WP-PLT-12 | <1.4U                         | 139      | 129    | 0.099B    | <0.16U  | 11300   | 0.69B           | 4.6B   | 266  | 0.68B  | 3350      | 248       | <0.047U | 4.3B   | 18100     | 1.9      | 373B   | <0.54U   | 16.8 |
|            | BLUE | WP-PLT-20 | <1.2U                         | 256      | 308    | 0.08B     | 0.14B   | 14300   | <0.29U          | 4.5B   | 325  | <0.31U | 4320      | 195       | 0.083   | <0.44U | 14000     | 0.99B    | 235B   | 0.81B    | 17.3 |
|            |      | WP-PLT-24 | <1.7U                         | 273      | 72.3   | 0.13B     | <0.18U  | 13000   | 1.8B            | 5.3B   | 431  | 0.99   | 5180      | 75.9      | <0.056U | 4.4B   | 15000     | <1U      | 321B   | 1.2B     | 39.1 |

**Notes**

The following metals were analyzed for but not detected in any sample: antimony, arsenic, cobalt, silver, and thallium.

U = Analyte was analyzed for but not detected.  
B = Analyte was detected at a concentration between the method detection limit (MDL) and practical quantitation limit (PQL).

**Units:**  
MG/KG = Milligrams per kilogram

## **Appendix H**

### **Waste Pile Calculations**

## **WASTE PILE CALCULATIONS – BLUEBIRD MINE AND BLACKJACK MINE SI**

Calculations performed in Land Development Desktop using Grid, Composite Surface, and the Prismoidal methods. Only the prismoidal results are reported, with the other quantities used for quality control. Other methods agree within 2% of prismoidal method.

Waste Pile Calculations as follows:

At Bluebird

Waste pile 1 (Southernmost pile) 2238 cu.yds

Waste pile 2 (Middle ) 350 cu.yds

Waste pile 3 (North) 9 cu.yds

At Blackjack

Waste pile 1 (Southernmost) 68 cu yds \*\*see comments below

Waste pile 2 (Above #1) 9 cu yds

Waste pile 3 (North) 12 cu.yds

Note: The quantity for the large waste pile, (#1) at Blackjack is suspect because of its geometry.

Beau McLendon, PLS  
Anderson-Perry & Associates

**Appendix I**

**Soil Sample Descriptions**

**SOIL SAMPLE DESCRIPTIONS, BLUEBIRD AND BLACKJACK MINE SITES SI**

| <b>Watershed</b> | <b>Mine Site</b> | <b>Sample ID</b>      | <b>Sample Interval</b> | <b>Sample Description</b>                        | <b>Soil Description</b>                                                                                                                        |
|------------------|------------------|-----------------------|------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Clear Creek      | Bluebird         | BLUE-WP-SUS-22 (1.5)  | 1.0 - 1.5              | Lower waste pile                                 | Yellow brown vf-c sand, some f gravel and rock shards to 1.0'; brown f-c sand, some f-c gravel and rock shards with staining on shard surfaces |
| Clear Creek      | Bluebird         | BLUE-TA-SSS-23 (0.2)  | 0 - 0.2                | Sediment in drainage channel                     | Red vf-f sand and silt                                                                                                                         |
| Clear Creek      | Bluebird         | BLUE-WP-SUS-20 (2.5)  | 2.0 - 2.5              | Upper waste pile (south)                         | Tan brown to dark grey f-c sand, some f-c gravel and angular rock fragments                                                                    |
| Clear Creek      | Bluebird         | BLUE-PD-SSS-16 (0.5)  | 0.4 - 0.5              | Settlement pond                                  | Orange to bright orange silt                                                                                                                   |
| Clear Creek      | Bluebird         | BLUE-TA-SSS-27 (0.5)  | 0.4 - 0.5              | Old crusher by upper waste pile                  | Tan vf-f sand, tr m-c sand, f gravel and rock shards (native soil?)                                                                            |
| Clear Creek      | Bluebird         | BLUE-WP-SUS-21 (1.5)  | 1.0 - 1.5              | Upper waste pile (north)                         | Dark grey slightly reddish f-c sand, some f gravel and rock shards                                                                             |
| Clear Creek      | Bluebird         | BLUE-AD-SSS-19 (0.5)  | 0.4 - 0.5              | By adit                                          | Bright orange loamy vf-f sand                                                                                                                  |
| Clear Creek      | Bluebird         | BLUE-TA-SUS-28 (1.0)  | 0.8 - 1.0              | Downhill of upper WP (south)                     | Tan vf-f sand, tr m sand, f gravel                                                                                                             |
| Clear Creek      | Bluebird         | BLUE-TA-SUS-24 (1.0)  | 0.8 - 1.0              | Downhill of lower waste pile                     | Tan grey f sand, little c sand, tr f gravel                                                                                                    |
| Clear Creek      | Bluebird         | BLUE-WP-SUS-29 (1.0)  | 0.8 - 1.0              | Downhill of settlement pond by stream bank       | Tan grey f-c sand, some f-c gravel and rock shards, iron staining upper 2-in                                                                   |
| Clear Creek      | Bluebird         | BLUE-TA-SUS-32 (1.5)  | 1.0 - 1.5              | Black stained soil north of settlement pond      | Black stained f-c sand and f-c gravel with rounded cobbles                                                                                     |
| Clear Creek      | Bluebird         | BLUE-TA-SUS-33 (2.0)  | 1.5 - 2.0              | Red stained soil below balck stained soil        | Red stained f-c sand and f-c gravel with rounded cobbles                                                                                       |
| Clear Creek      | Blackjack        | BLAC-TA-SUS-30 (0.75) | 0.75                   | Downhill of break in berm                        | Interbedded brown, red, orange sandy silt with rounded cobbles at 1.0' (dredge tailings)                                                       |
| Clear Creek      | Blackjack        | BLAC-PD-SSS-10 (0.4)  | 0.1 - 0.4              | Settlement pond                                  | Interbedded bright orange, red orange sandy silt with fine layer of dark material (bituminous?)                                                |
| Clear Creek      | Blackjack        | BLAC-TA-SUS-31 (0.9)  | 0.8 - 0.9              | Downhill of WP at end of blue-gray erosion chute | Orange to grey tan f-c sand, some f-c gravel and cobbles to 0.8'                                                                               |
| Clear Creek      | Blackjack        | BLAC-WP-SUS-13 (1.5)  | 1.0 - 1.5              | Waste pile                                       | Light tan to blue grey f-c gravel and cobbles, some f-c sand                                                                                   |
| Clear Creek      | Blackjack        | BLAC-WP-SUS-12 (1.0)  | 0.8 - 1.0              | Upper adit                                       | Tan orange f-c sand, some f-c gravel                                                                                                           |
| Clear Creek      | Blackjack        | BLAC-TA-SUS-14 (1.5)  | 1.3 - 1.5              | Downhill of WP at end of orange erosion chute    | Orange f-c sand and f-c gravel and rounded cobbles                                                                                             |
| Clear Creek      | Reference        | CLEA-BG-SSS-26 (0.5)  | 0.4 - 0.5              | Reference sample near Blackjack                  | Light tan vf-f sand, tr f gravel                                                                                                               |
| Clear Creek      | Reference        | CLEA-BG-SSS-25 (0.5)  | 0.4 - 0.5              | Reference sample near Bluebird                   | Light tan vf-f sand, tr f gravel                                                                                                               |