

ABBREVIATED PRELIMINARY ASSESSMENT

Copper City Millsite and Miners Ridge Workings



Cover Photo: Remains of mill at Copper City

Okanogan-Wenatchee National Forest
Naches Ranger District
Yakima County, WA

February, 2005

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EXECUTIVE SUMMARY

The Forest Service performed an Abbreviated Preliminary Assessment for the Copper City Millsite and Miners Ridge workings (Site) to determine the need for further site characterization. The Site is located approximately 30 miles west of Naches, WA within the Deep Creek drainage. Deep Creek flows into Bumping Lake 5 miles downstream from the Site. Bumping Lake is a reservoir impounded by an earthen dam on its northeast side for the purposes of water storage for irrigation and flood control. Deep Creek and Bumping Lake are known to contain Bull Trout/Dolly Varden populations, a threatened species under the Endangered Species Act. The Site falls on National Forest System lands managed and administered by the Naches Ranger District of the Okanogan-Wenatchee National Forest. Mines that fed the mill are scattered along Miners Ridge on moderate to very steep side-slopes at elevations of 4,100 above mean sea level (MSL) at the mill to the top of Miners ridge at 5,600 feet above MSL. Mines in the area include the New Find, Pasco, Sunset, Clara-Red Bird, and 17th of Ireland. The Copper City Millsite, Sunset, Clara-Red Bird and 17th of Ireland were located and sampled. The New Find workings above the millsite could not be located and the Pasco mine was not visited as part of this investigation due to time constraints.

A Niton XRF unit was used for In Situ field screening of material on the mill foundation and in the waste rock dumps for any potential contaminants. Water and sediment samples above and below the millsite were collected and analyzed by Washington Department of Ecology personnel in June and October, 1997 during high and low flow conditions respectively (Rayforth and others, 2000).

Arsenic, and to a lesser degree chromium, concentrations in material at the Copper City Millsite and from waste rock dumps at the Clara-Red Bird and 17th of Ireland mines exceeded both Washington's Model Toxics Control Act (MTCA) Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties. Arsenic, chromium, copper, nickel, and selenium commonly exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. Three samples for manganese, one for lead, and one for zinc were also above standards protective to ecological receptors. However, exceedence of ecological receptor values does not necessarily trigger cleanup actions.

In June and October, 1997, Washington Department of Ecology personnel collected water quality samples along an un-named tributary of Deep Creek, above and below the Copper City Millsite, and one sample was collected from Deep Creek just above the confluence with Bumping Lake (Rayforth and others, 2000). The samples along the un-named tributary were taken both above and below the old Copper City mill which has collapsed into the drainage. Water sampling revealed substantial increases in iron, zinc, arsenic, copper, and lead below the collapsed mill. Copper concentrations below the collapsed mill exceeded the state's acute aquatic standard for surface waters. However, metals concentrations in Deep Creek just above Bumping Lake were similar to those above the mill.

Stream sediment samples were co-located with the water samples described above. Metals concentrations for iron, manganese, zinc, copper, arsenic, lead, mercury, and silver show a substantial increase below the mill along the un-named drainage at Copper City (Rayforth and others, 2000). However, copper, arsenic, and silver were the only metals to exceed freshwater sediment quality guidelines (Rayforth and others, 2000). In comparing metals concentrations between the sample upstream of the mill and the sample along Deep Creek at Bumping Lake, most metals concentrations were the same or decreased with the exception of iron, copper, and lead. At the Deep Creek sample, no metals exceeded freshwater sediment quality guidelines.

Based on the analytical results for soil, sediment, and water samples; proximity of the Site to threatened populations of Bull Trout/Dolly Varden in Deep Creek and Bumping Lake; accessibility of the Site to the public; and EPA's APA Checklist (Appendix A), it is recommended that a Site Inspection (SI) be

performed for the entire Site, most importantly at the Copper City Millsite and 17th of Ireland mine. However, given the analytical results at the Sunset mine, limited volume and location of waste rock materials at the Clara-Red Bird, and site specific conditions at both mines (e.g. absence of mine effluent discharge, located on sideslopes well above perennial/intermittent streams), a Site Inspection for the Sunset and Clara-Red Bird mines could be deferred until a later date when regional priorities and budget constraints allow.

1.0 INTRODUCTION

An Abbreviated Preliminary Assessment (APA) was performed by the US Forest Service in accordance with the EPA “Guidance for Performing Preliminary Assessments Under CERCLA”, EPA “Improving Site Assessment: Abbreviated Preliminary Assessments” of 1999, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the National Contingency Plan as outlined in 40 CFR Parts 300.410(c)(1)(i-v).

The purpose of this assessment was to determine whether or not there is a potential for a release of contaminants to the environment and/or to human health. The purpose of an APA is to determine whether further site characterization is warranted. A Niton XRF 700 Series was utilized to help in the preliminary screening of this Site.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

The Site is located approximately 30 miles west of Naches, WA within the Deep Creek drainage. Deep Creek flows into Bumping Lake 5 miles downstream from the Sites. Bumping Lake is a reservoir impounded by an earthen dam on it’s northeast side for the purposes of water storage for irrigation and flood control. Deep Creek and Bumping Lake are known to contain Bull Trout/Dolly Varden populations, a threatened species under the Endangered Species Act. The Site falls on National Forest System lands managed and administered by the Naches Ranger District of the Okanogan-Wenatchee National Forest.

Location information:

Legal:	Willamette Meridian, T 15 N, R11 E, Sec 13
	Willamette Meridian, T 15 N, R 12 E, Sec 8, 17, 20
Lat./Long.:	Copper City Mill/New Find N 46° 46’ 7.8” W121° 20’ 59.3”
	Pasco N 46° 46’ 53” W121° 21’ 00”
	Sunset N 46° 47’ 24” W 121° 21’ 48.3”
	Clara/Red Bird N 46° 47’ 32.6” W 121° 21’ 48.8”
	17 th of Ireland-Lake Adit N 46° 48’ 23” W121° 20’ 51”
	17 th of Ireland-Ridge Adit N 46° 48’ 14.4” W 121° 21’ 7.9”
USGS quadrangle:	Bumping Lake

The Site was extensively explored and developed by the Copper Mining Company which located 42 claims in the area in 1906. Development and production in the area focused around five mineralized shear zones within quartz monzonite/granodiorite cut by rhyodacite dikes. The most significant mineralized zone is explored at the Clara-Red Bird Mine by adits at three different levels and several surface workings. Total development in the area is estimated at over 1,000 ft. of underground workings (Hunting, 1956). The primary mineralization in the area occurs in mineralized shear zones cutting quartz monzonite and granidiorite host rock. Primary ore minerals were chalcopyrite, scheelite, molybdenite; gangue minerals include pyrite, arsenopyrite, quartz, calcite, and tourmaline (Derkey and others, 1990). Commodities produced included gold, silver, copper and tungsten (Derkey and others, 1990).

U.S. Bureau of Mines data indicate that 5 tons containing 34 ounces per ton (opt) silver and 1,486 lbs. of copper were shipped in 1917; 150 tons containing 1 opt gold, 99 opt. silver, and 4, 347 lbs copper were shipped in 1938; 650 lbs of concentrate containing 62.4% tungsten trioxide were shipped in 1940; and 5 tons containing 48 opt silver and 2,000 lbs copper were shipped in 1942 (Van Noy and others, 1983).

The only known mill in the area was the Copper City Mill at the Copper City townsite near the New Find workings.

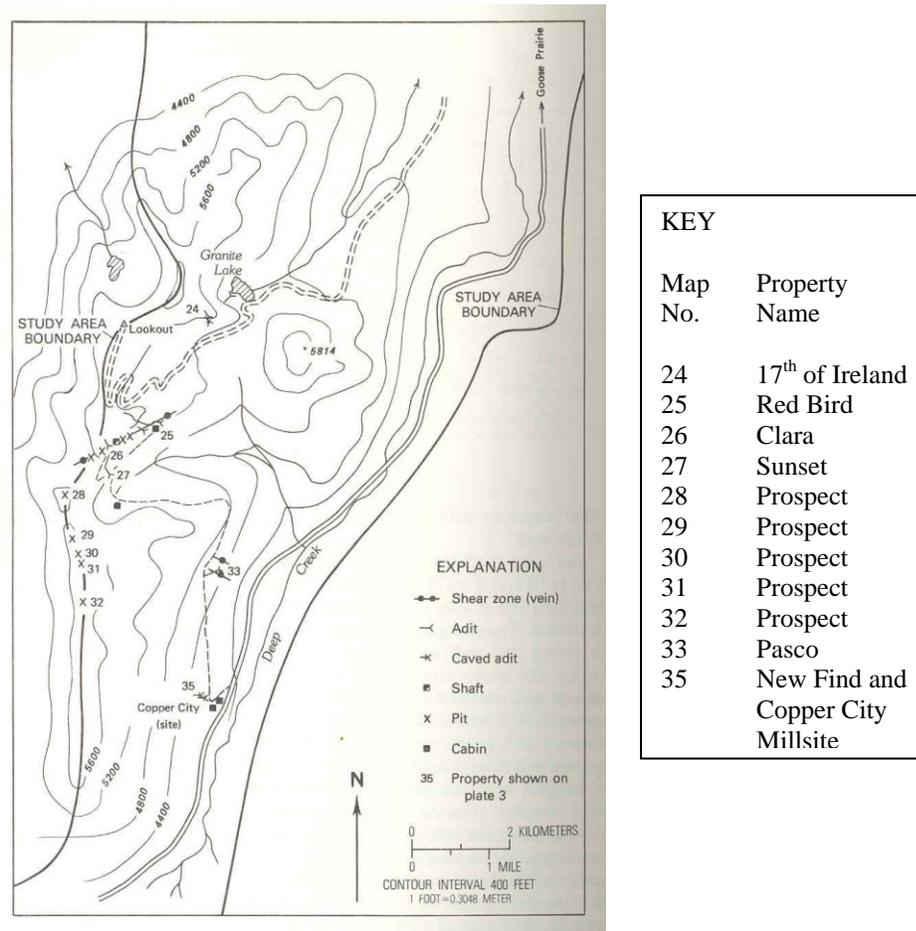


Figure 1. Map of mines and prospects along Deep Creek and Miners Ridge (from Van Noy and others, 1983)

Access to the Site can be accomplished by proceeding northwest on State Highway 410 from Naches, WA for approximately 25 miles to the junction with Forest Service Road 1800. Proceed southwest on Forest Service Road 1800 for 10 miles to the Bumping Lake Reservoir. Forest Service road 1808 along Deep Creek leads to the Copper City Millsite and the old mine road (not passable with vehicle) that leads to the Pasco, Sunset, and Clara-Red Bird Mines. Forest Service Road 1809 along Granite Creek accesses the 17th of Ireland mine and the top of Miners Ridge, from which the Sunset and Clara-Red Bird mines can be accessed by foot.

Mining claims in the area have been staked in the past but at present, the Site is inactive and unclaimed (BLM LR2000 database, accessed 1/18/2005).

3.0 SITE SAMPLING AND TEST RESULTS

Soil Samples

A Niton XRF, XL-722S was used to assess the material on and within the mill foundation and from waste rock dumps at the mines for potential contamination. In Situ testing was performed on the Site per EPA

Method 6200. Surface soils were removed to approximately 4 to 6 inches below grade in order to get below highly oxidized surface layers. Rocks, debris and other deleterious materials were removed. In total, fourteen samples were analyzed at the Site using the Niton XRF. The analytical results from this effort are provided in Appendix B and summarized below. It is important to note that detection limits for certain elements were higher than the cleanup goals or standards to which they were compared (Appendix B). As a result, there may be additional exceedences of cleanup goals or standards not detectable using this reconnaissance analytical technique.

Four soil samples were taken at the Copper City Millsite from the foundation of the mill (Figure 1; Appendix B, Tables 1-4). Arsenic concentrations in four samples and chromium in two samples exceeded both Washington's Model Toxics Control Act (MTCA) Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties. Arsenic (4 samples), copper (4 samples), chromium (2 samples), molybdenum (2 samples), nickel (2 samples), selenium (2 samples), and zinc (1 sample) exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. However, exceedence of ecological receptor values does not necessarily trigger cleanup actions. An un-named tributary of Deep Creek flows over and through the mill foundation. No evidence of a tailings impoundment was discovered at the Site. In all likelihood, any tailings were discharged to Deep Creek.

Two waste rock samples were acquired from the waste rock dump of the Sunset mine (Figure 1; Appendix B, Page B-5 to B-6). Neither sample revealed definitive exceedences of MTCA cleanup levels protective of both human health and terrestrial ecologic receptors or EPA Region IX Preliminary Remediation Goals (PRGs). However, exceedences may exist in that some analyte detection limits were above the aforementioned cleanup levels (see Appendix B, Tables 5 and 6). The Sunset portal is partially collapsed and there was no evidence of mine effluent discharge. Waste rock material at the Sunset mine is estimated at 250 yds³.

Three waste rock dumps at the Clara-Red Bird workings were sampled and analyzed (Figure 1; Appendix B, Tables 7-9). Arsenic (all three samples) and chromium (1 sample) concentrations exceeded MTCA Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties. Arsenic (3 samples), copper (3 samples), chromium (2 samples), lead (2 samples), selenium (2 samples), and nickel (1 sample) exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. The Clara-Red Bird workings include at least 6 prospect pits and three adits/declines located on very steep sideslopes near the top of Miners Ridge (Figure 1). There was no evidence of discharge from any of the portals. Waste rock dumps associated with the adits/declines were all less than 50 yds³; dumps at the prospect pits were less than 10 yds³. All waste rock dumps are located on very steep rock/talus slopes.

Waste rock dumps associated with two adits were sampled at the 17th of Ireland prospect in the vicinity of Granite Lake (Figure 1). Two samples at the Granite Lake adit indicated arsenic concentrations in both samples as well as chromium and nickel in one sample exceeded MTCA Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties (Appendix B, Tables 10-11). Arsenic (2 samples), chromium (1 sample), nickel (1 sample), and molybdenum (1 sample) exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. The Granite Lake adit is collapsed with some evidence of very limited seasonal discharge. The waste rock dump is less than 20 yds³ but extends into Granite Lake. At the Ridge adit, one large waste rock dump was sampled at three different locations (Appendix B, Tables 12-14). Arsenic was the only metal to exceed MTCA Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties for all three samples. Arsenic (3 samples), chromium (1 sample), and nickel (1 sample) exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. The Ridge adit is also collapsed and has no evidence of mine

discharge. Waste dump volume is estimated at 300 yds³ and is vegetated with 20-30 feet high pine and fir trees. The ridge adit is located on a steep side-slope above Forest Service road 1809 and is inaccessible other than by foot.

Water Samples

Water quality samples were collected at 2 sites along an un-named tributary of Deep Creek near the abandoned mining camp of Copper City and one sample was collected from Deep Creek just above the confluence with Bumping Lake during June and October of 1997 by Washington Department of Ecology personnel (Rayforth and others, 2000). The samples at Copper City were taken both above and below an old mill that had collapsed into the drainage (Appendix B). Water sampling revealed substantial increases in iron, zinc, arsenic, copper, and lead below the collapsed mill (Appendix B). The copper concentration below the collapsed mill exceeded the state's acute aquatic standard for surface water (Appendix B). However, metals concentrations in Deep Creek just above Bumping Lake were similar to those above the mill (Rayforth and others, 2000). Individual mines were not sampled as part of the study.

Field parameters for surface waters in and around the millsite were obtained using a Horiba U-22 during fieldwork in July, 2004. The results are summarized below:

Table 1. Surface water field parameters at the Copper City Millsite.

Location	pH	Conductivity (µS/cm)	Turbidity (Ntu)	Dissolved Oxygen (mg/L)	Temperature (°C)	Total Dissolved Solids (µg/L)	Oxidation-Reduction Potential (mV)
Background above mill #1	6.7	9	110	11.01	11.2	.06	61
Background above mill #2	6.4	8	190	12.25	9.7	.05	80
Drainage on mill foundation	6.5	8	110	10.76	15.4	.05	66
Seep on mill foundation	6.4	8	57	10.17	14.7	.05	57
Drainage exiting mill	6.3	9	68	10.16	14.2	.06	41
Drainage downstream mill	6.5	8	82	12.52	10.5	.05	86

Sediment Samples

Sediment samples were co-located with the water samples described above. Metals concentrations for iron, manganese, zinc, copper, arsenic, lead, mercury, and silver show a substantial increase below the millsite along the un-named tributary at Copper City (Appendix C; Rayforth and others, 2000). However, Copper, arsenic, and silver were the only metals to exceed freshwater sediment quality guidelines (Appendix C; Rayforth and others, 2000). In comparing metals concentrations between the sample upstream of the mill and the sample along Deep Creek at Bumping Lake, most metals concentrations

were the same or decreased with the exception of iron, copper, and lead (Appendix C). At the Deep Creek sample, no metals exceeded freshwater sediment quality guidelines.

4.0 SUMMARY

Arsenic, and to a lesser degree chromium, concentrations in material at the Copper City Millsite and from waste rock dumps at the Clara-Red Bird and 17th of Ireland mines exceeded both Washington's Model Toxics Control Act (MTCA) Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties. Arsenic, chromium, copper, nickel, and selenium commonly exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. Three samples for manganese, one for lead, and one for zinc were also above standards protective to ecological receptors. However, exceedence of ecological receptor values does not necessarily trigger cleanup actions.

In June and October, 1997, Washington Department of Ecology personnel collected water quality samples along an un-named tributary of Deep Creek, above and below the Copper City Millsite, and one sample was collected from Deep Creek just above the confluence with Bumping Lake (Rayforth and others, 2000). The samples along the un-named tributary were taken both above and below the old mill which has collapsed into the stream. Water sampling revealed substantial increases in iron, zinc, arsenic, copper, and lead below the collapsed mill. Copper concentrations below the collapsed mill exceeded the state's acute aquatic standard for surface waters. However, metals concentrations in Deep Creek just above Bumping Lake were similar to those above the mill. Deep Creek and Bumping Lake are known to contain Bull Trout/Dolly Varden populations, a threatened species under the Endangered Species Act.

Stream sediment samples were co-located with the water samples described above. Metals concentrations for iron, manganese, zinc, copper, arsenic, lead, mercury, and silver show a substantial increase below the mill along the un-named tributary at Copper City (Rayforth and others, 2000). However, copper, arsenic, and silver were the only metals to exceed freshwater sediment quality guidelines (Rayforth and others, 2000). In comparing metals concentrations between the sample upstream of the mill and the sample along Deep Creek at Bumping Lake, most metals concentrations were the same or decreased with the exception of iron, copper, and lead. At the Deep Creek sample, no metals exceeded freshwater sediment quality guidelines.

5.0 RECOMMENDATION

Based on the analytical results for soil, sediment, and water samples; proximity to known populations of threatened Bull Trout/Dolly Varden in Deep Creek and Bumping Lake; accessibility of the Site to the public; and EPA's APA Checklist (Appendix A); it is recommended that a Site Inspection (SI) be performed for the entire Site, most importantly at the Copper City Millsite and 17th of Ireland mine. However, given the analytical results at the Sunset mine, limited volume and location of waste rock materials at the Clara-Red Bird, and site specific conditions at both mines (e.g. absence of mine effluent discharge, located on sideslopes well above perennial/intermittent streams), a Site Inspection for the Sunset and Clara-Red Bird mines could be deferred until a later date when regional priorities and budget constraints allow.

As part of this inspection, a thorough study of the area to determine the extent of contamination is warranted as well as sampling water from pore spaces of the stream gravels immediately above and below the Site. Sampling of the benthic macroinvertebrates are also required. In addition to testing water samples from the pore spaces of the gravels for the presence of metallic elements, water parameters such as pH, conductivity, turbidity, dissolved oxygen, temperature, total dissolved solids, hardness, and oxygen reduction potential are required. The area should be sampled to determine the presence of waste material

and tailings, and if present, the potential waste piles and tailings should be sampled at depth and a determination of volumes should be calculated. Acid base accounting (ABA) and assessment of leaching potential are required for waste rock and tailings. Sediment samples are to be collected from transects of the stream and preferably at depth and analyzed for total as well as for available metals. Surface water samples are also required for analyses of both total and dissolved metal concentrations in Deep Creek as well as in any other seeps and/or tributaries that may be present in the vicinity of the Site.

Abandoned or inactive mine workings should be closed to limit potential liability associated with the general public recreating at the Site.

REFERENCES

- Derkey, R.E., Joseph, N.L., and Lasmanis, R., 1990, Metal mines of Washington-preliminary report: Washington Department of Natural Resources, Division of Geology and Earth Resources Open File Report 90-18. 577 p.
- Hunting, M.T., 1943, Inventory of mineral properties in Chelan County, Washington: Washington Department of Conservation and Development, Division of Geology Report of Investigations No. 9, 63 p.
- Van Noy, R.M., Zilka, N.T., and Simmons, G.C., 1983, Mines, prospects, and mineralized areas, and geochemistry of the Cougar Lakes-Mount Aix study area, Yakima and Lewis Counties, Washington, *in* Simmons, G.C., Van Noy, R.M., and Zilka, N.T., Mineral Resources of the Cougar Lakes-Mount Aix study area, Yakima and Lewis Counties, Washington: U.S. Geological Survey Bulletin 1504, 81 p.

Appendix A

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

This checklist can be used to help the site investigator determine if an Abbreviated Preliminary Assessment (APA) is warranted. This checklist should document the rationale for the decision on whether further steps in the site assessment process are required under CERCLA. Use additional sheets, if necessary.

Checklist Preparer: Greg Graham, Geologist February 9, 2004
 (Name/Title) (Date)
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Site Name: Copper City Millsite and Miners Ridge Workings

Previous Names (if any): New Find, Pasco, Clara, Red Bird, Bird, Sunset, 17th of Ireland

Site Location: South of the Bumping Lake Reservoir approximately 30 miles east of Naches, WA

Legal Description: Willamette Meridian, T 15 N, R11 E, Sec 13
 Willamette Meridian, T 15 N, R 12 E, Sec 8, 17, 20

Describe the release (or potential release) and its probable nature: Arsenic, and to a lesser degree chromium, concentrations in material at the Copper City Millsite and from waste rock dumps at the Clara-Red Bird and 17th of Ireland mines exceeded both Washington's Model Toxics Control Act (MTCA) Method A cleanup levels and/or EPA Region IX Preliminary Remediation Goals (PRGs) for industrial properties. Arsenic, chromium, copper, nickel, and selenium commonly exceeded soil concentrations established under MTCA to be protective of terrestrial ecological receptors at most sites. Water quality sampling, along an un-named tributary that flows over and through the mill, indicates substantial increases in iron, zinc, arsenic, copper, and lead below the collapsed mill. Copper concentrations below the collapsed mill exceeded the state's acute aquatic standard for surface waters. Stream sediment metals concentrations for iron, manganese, zinc, copper, arsenic, lead, mercury, and silver show a substantial increase below the mill along the un-named tributary at Copper City. However, copper, arsenic, and silver were the only metals to exceed freshwater sediment quality guidelines. In comparing metals concentrations between the sample upstream of the mill and the sample along Deep Creek at Bumping Lake, most metals concentrations were the same or decreased with the exception of iron, copper, and lead.

Part 1 - Superfund Eligibility Evaluation

If All answers are "no" go on to Part 2, otherwise proceed to Part 3	YES	NO
1. Is the site currently in CERCLIS or an "alias" of another site?		X
2. Is the site being addressed by some other remedial program (Federal, State, or Tribal)?		X
3. Are the hazardous substances potentially released at the site regulated under a statutory exclusion (i.e., petroleum, natural gas, natural gas liquids, synthetic gas usable for fuel, normal application of fertilizer, release located in a workplace, naturally occurring, or regulated by the NRC, UMTRCA, or OSHA)?		X
4. Are the hazardous substances potentially released at the site excluded by policy considerations (i.e., deferred to RCRA corrective action)?		X
5. Is there sufficient documentation to demonstrate that no potential for a release that could cause adverse environmental or human health impacts exist (i.e., comprehensive remedial investigation equivalent data showing no release above ARAR's, completed removal action, documentation showing that no hazardous substance release have occurred, or an EPA approved risk assessment completed)?		X

Part 2 - Initial Site Evaluation

For Part 2, if information is not available to make a “yes” or “no” response, further investigation may be needed. In these cases, determine whether an APA is appropriate. Exhibit 1 parallels the questions in Part 2. Use Exhibit 1 to make decisions in Part 3.

If the answer is “no” to any questions 1, 2, or 3, proceed directly to Part 3.	YES	NO
1. Does the site have a release or a potential to release?	X	
2. Does the site have uncontained sources containing CERCLA eligible substances?	X	
3. Does the site have documented on-site, adjacent, or nearby targets?	X	

If the answers to questions 1, 2, and 3 above were all “yes” then answer the questions below before proceeding to Part 3.	YES	NO
4. Does documentation indicate that a target (i.e., drinking water wells, drinking surface water intakes, etc.) has been exposed to a hazardous substance released from the site?	X	
5. Is there an apparent release at the site with no documentation of exposed targets, but there are targets on site or immediately adjacent to the site?		X
6. Is there an apparent release and no documented on-site targets or targets immediately adjacent to the site, but there are nearby targets (i.e., targets within 1 mile)?		X
7. Is there no indication of a hazardous substance release, and there are uncontained sources containing CERCLA hazardous substances, but there is a potential to release with targets present on site or in proximity to the site?		X

Notes:

The target at this Site is a sensitive environment. Deep Creek and Bumping Lake are known to contain Bull Trout/Dolly Varden populations, a threatened species under the Endangered Species Act. The area is also proposed by U.S. Fish and Wildlife Service as critical habitat for Bull Trout/Dolly Varden. The nearest wells and/or surface water intakes are 5-6 miles downstream from the Site at campgrounds on Bumping Lake and downstream of the lake and dam.

EXHIBIT 1
SITE ASSESSMENT DECISION GUIDELINES FOR A SITE

Exhibit 1 identifies different types of site information and provides some possible recommendations for further site assessment activities based on that information. You will use Exhibit 1 in determining the need for further action at the site, based on the answers to the questions in Part 2. Please use your professional judgment when evaluating a site. Your judgment may be different from the general recommendations for a site given below.

Suspected/Documented Site Conditions		APA	FULL PA	PA/SI	SI
1. There are no releases or potential to release.		Yes	No	No	No
2. No uncontained sources with CERCLA-eligible substances are present on site.		Yes	No	No	No
3. There are no on-site, adjacent, or nearby targets		Yes	No	No	No
4. There is documentation indicating that a target (i.e., drinking water wells, drinking surface water intakes, etc.) has been exposed to a hazardous substance released from the site.	Option 1: APA SI	Yes	No	No	Yes
	Option 2: PA/SI	No	No	Yes	No
5. There is an apparent release at the site with no documentation of exposed targets, but there are targets on site or immediately adjacent to the site.	Option 1: APA SI	Yes	No	No	Yes
	Option 2: PA/SI	No	No	Yes	N/A
6. There is an apparent release and no documented on-site targets and no documented immediately adjacent to the site, but there are nearby targets. Nearby targets are those targets that are located within 1 mile of the site and have a relatively high likelihood of exposure to a hazardous substance migrating from the site.		No	Yes	No	No
7. There is no indication of a hazardous substance release, and there are uncontained sources containing CERCLA hazardous substances, but there is a potential to release with targets present on site or in proximity to the site.		No	Yes	No	No

Part 3 - EPA Site Assessment Decision

When completing Part 3, use Part 2 and Exhibit 1 to select the appropriate decision. For example, if the answer to question 1 in Part 2 was “no,” then an APA may be performed and the “NFRAP” box below should be checked. Additionally, if the answer to question 4 in Part 2 is “yes,” then you have two options (as indicated in Exhibit 1): Option 1 -- conduct an APA and check the “Lower Priority SI” or “Higher Priority SI” box below; or Option 2 -- proceed with a combined PA/SI assessment.

Appendix B

NITON XRF ANALYTICAL DATA SUMMARY

Table 1. Analytical results from Copper City Mill, upper tier.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Copper City #1	Total Arsenic	2,739	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	BDL (465)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	131	1,000	750	220
	Mercury	BDL (68)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (645)		1,900	--
	Copper	9,005		41,000	550
	Iron	41,677		100,000	--
	Manganese	BDL (1,050)		19,000	23,500
	Molybdenum	129		5,100	71
	Nickel	BDL (405)		20,000	1,850
	Selenium	34		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	596		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 2. Analytical results from Copper City Mill, 4th tier.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Copper City #2	Total Arsenic	1,190	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	BDL (37)	2	450	36
	Total Chromium	624		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	82	1,000	750	220
	Mercury	BDL (42)	2	310	Inorganic - 9 Organic - .7
	Antimony	BDL (39)		410	--
	Cobalt	BDL (570)		1,900	--
	Copper	2,570		41,000	550
	Iron	37,376		100,000	--
	Manganese	BDL (840)		19,000	23,500
	Molybdenum	62		5,100	71
	Nickel	14,195		20,000	1,850
	Selenium	BDL (17)		5,100	.8
	Silver	BDL (138)		5,100	--
	Tin	BDL (87)		100,000	(275)
	Zinc	349		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 3. Analytical results from Copper City Mill, 3rd Tier.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Copper City #3	Total Arsenic	1,650	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	BDL (450)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	133	1,000	750	220
	Mercury	BDL (58)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (600)		1,900	--
	Copper	2,280		41,000	550
	Iron	28,186		100,000	--
	Manganese	BDL (960)		19,000	23,500
	Molybdenum	48		5,100	71
	Nickel	2,589		20,000	1,850
	Selenium	BDL (24)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	174		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 4. Analytical results from Copper City Mill, 1st Tier.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Copper City #4	Total Arsenic	2,899	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	1,200		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	118	1,000	750	220
	Mercury	BDL (62)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (555)		1,900	--
	Copper	5,258		41,000	550
	Iron	38,784		100,000	--
	Manganese	BDL (915)		19,000	23,500
	Molybdenum	81		5,100	71
	Nickel	1,650		20,000	1,850
	Selenium	28		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	436		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 5. Analytical results from Sunset Waste Rock #1.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Sunset Waste Rock #1	Total Arsenic	BDL (21)	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	BDL (315)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	BDL (22)	1,000	750	220
	Mercury	BDL (24)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (360)		1,900	--
	Copper	BDL (131)		41,000	550
	Iron	11,494		100,000	--
	Manganese	BDL (600)		19,000	23,500
	Molybdenum	23		5,100	71
	Nickel	BDL (270)		20,000	1,850
	Selenium	BDL (13)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	BDL (60)		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 6. Analytical results from Sunset Waste Rock #2.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Sunset Waste Rock #2	Total Arsenic	BDL (13)	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	BDL (34)	2	450	36
	Total Chromium	BDL (180)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	14	1,000	750	220
	Mercury	BDL (14)	2	310	Inorganic - 9 Organic - .7
	Antimony	BDL (45)		410	--
	Cobalt	BDL (240)		1,900	--
	Copper	BDL (65)		41,000	550
	Iron	12,499		100,000	--
	Manganese	BDL (405)		19,000	23,500
	Molybdenum	7.4		5,100	71
	Nickel	BDL (129)		20,000	1,850
	Selenium	BDL (7)		5,100	.8
	Silver	BDL (149)		5,100	--
	Tin	BDL (92)		100,000	(275)
	Zinc	36		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 7. Analytical results from Clara Waste Rock Dump #1.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Clara Waste Rock Dump #1	Total Arsenic	388	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III				20
	Arsenic V				260
	Cadmium	BDL (49)	2	450	36
	Total Chromium	543		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	106	1,000	750	220
	Mercury	BDL (29)	2	310	Inorganic - 9 Organic - .7
	Antimony	BDL (60)		410	--
	Cobalt	BDL (495)		1,900	--
	Copper	1,770		41,000	550
	Iron	34,381		100,000	--
	Manganese	1,140		19,000	23,500
	Molybdenum	40		5,100	71
	Nickel	BDL (240)		20,000	1,850
	Selenium	BDL (12)		5,100	.8
	Silver	BDL (180)		5,100	--
	Tin	BDL (111)		100,000	(275)
	Zinc	297		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 8. Analytical results from Clara Waste Rock Dump #2.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Clara Waste Rock Dump #2	Total Arsenic	1,530	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III				20
	Arsenic V				260
	Cadmium	BDL (39)	2	450	36
	Total Chromium	BDL (390)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	395	1,000	750	220
	Mercury	BDL (45)	2	310	Inorganic - 9 Organic - .7
	Antimony	BDL(48)		410	--
	Cobalt	BDL (555)		1,900	--
	Copper	1,770		41,000	550
	Iron	35,994		100,000	--
	Manganese	BDL (855)		19,000	23,500
	Molybdenum	25		5,100	71
	Nickel	15,194		20,000	1,850
	Selenium	48		5,100	.8
	Silver	BDL (150)		5,100	--
	Tin	BDL (95)		100,000	(275)
	Zinc	219		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 9. Analytical results from Clara Waste Rock Dump #3.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Clara Waste Rock Dump #3	Total Arsenic	1,779	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	428		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	414	1,000	750	220
	Mercury	BDL (46)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (525)		1,900	--
	Copper	2,499		41,000	550
	Iron	43,494		100,000	--
	Manganese	BDL (900)		19,000	23,500
	Molybdenum	15		5,100	71
	Nickel	BDL (255)		20,000	1,850
	Selenium	30		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	466		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 10. Analytical results from 17th of Ireland-Granite Lake adit waste rock dump #1.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
17 th of Ireland, Granite Lake Adit Waste Rock Dump #1	Total Arsenic	111	20	Noncancer – 260 Cancer - 1.6	20 260
	Arsenic III Arsenic V				
	Cadmium	--	2	450	36
	Total Chromium	BDL (210)		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	BDL (16)	1,000	750	220
	Mercury	BDL (18)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (285)		1,900	--
	Copper	BDL (95)		41,000	550
	Iron	12,198		100,000	--
	Manganese	BDL (450)		19,000	23,500
	Molybdenum	26		5,100	71
	Nickel	956		20,000	1,850
	Selenium	BDL (9)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	BDL (44)		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 11. Analytical results from 17th of Ireland-Granite Lake adit waste rock dump #2.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
17 th of Ireland, Granite Lake Adit Waste Rock Dump #2	Total Arsenic	169	20	Noncancer – 260 Cancer - 1.6	20 260
	Arsenic III Arsenic V				
	Cadmium	--	2	450	36
	Total Chromium	657		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	21	1,000	750	220
	Mercury	BDL (23)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (540)		1,900	--
	Copper	BDL (285)		41,000	550
	Iron	21,197		100,000	--
	Manganese	854		19,000	23,500
	Molybdenum	124		5,100	71
	Nickel	27,290		20,000	1,850
	Selenium	BDL (11)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	BDL (106)		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 12. Analytical results from 17th of Ireland-Ridge adit waste rock dump #1.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Ridge Adit Waste Rock Dump #1	Total Arsenic	95	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium Chromium VI Chromium III	BDL (255)	19 2,000	450 64 100,000	135
	Lead	21	1,000	750	220
	Mercury	BDL (21)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (375)		1,900	--
	Copper	BDL (116)		41,000	550
	Iron	19,098		100,000	--
	Manganese	BDL (570)		19,000	23,500
	Molybdenum	69		5,100	71
	Nickel	2,330		20,000	1,850
	Selenium	BDL (10)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	BDL (52)		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 13. Analytical results from 17th of Ireland-Ridge adit waste rock dump #2.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Ridge Adit Waste Rock Dump #2	Total Arsenic	231	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	BDL (40)	2	450	36
	Total Chromium Chromium VI Chromium III	BDL (330)	19 2,000	450 64 100,000	135
	Lead	26	1,000	750	220
	Mercury	BDL (28)	2	310	Inorganic - 9 Organic - .7
	Antimony	BDL (55)		410	--
	Cobalt	BDL (480)		1,900	--
	Copper	BDL (114)		41,000	550
	Iron	28,800		100,000	--
	Manganese	BDL (750)		19,000	23,500
	Molybdenum	30		5,100	71
	Nickel	302		20,000	1,850
	Selenium	BDL (12)		5,100	.8
	Silver	BDL (165)		5,100	--
	Tin	BDL (103)		100,000	(275)
	Zinc	BDL (54)		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Table 14. Analytical results from 17th of Ireland-Ridge adit waste rock dump #3.

SAMPLE	ANALYTE	ANALYTICAL RESULT (mg/kg) ¹	MTCA Method A (mg/kg) ²	EPA REGION IX PRG (mg/kg) ³	SIMPLIFIED ECOLOGICAL EVALUATION (mg/kg) ⁴
Ridge Adit Waste Rock Dump #3	Total Arsenic	238	20	Noncancer – 260 Cancer - 1.6	
	Arsenic III Arsenic V				20 260
	Cadmium	--	2	450	36
	Total Chromium	447		450	135
	Chromium VI		19	64	
	Chromium III		2,000	100,000	
	Lead	23	1,000	750	220
	Mercury	BDL (28)	2	310	Inorganic - 9 Organic - .7
	Antimony	--		410	--
	Cobalt	BDL (495)		1,900	--
	Copper	BDL (114)		41,000	550
	Iron	29,594		100,000	--
	Manganese	BDL (765)		19,000	23,500
	Molybdenum	60		5,100	71
	Nickel	BDL (240)		20,000	1,850
	Selenium	BDL (12)		5,100	.8
	Silver	--		5,100	--
	Tin	--		100,000	(275)
	Zinc	60		100,000	570

¹ BDL-Below Detection Limit; detection limit in mg/kg is indicated in parenthesis (e.g. BDL (450))

² From WAC 173-340-900, Table 745-1, MTCA Method A Cleanup Levels for Industrial Properties.

³ From EPA, Region IX, Preliminary Remediation Goals, 10/1/2002.

⁴ From WAC 173-340-900, Table 749-2, Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure. All concentrations are for industrial/commercial sites; if unavailable, unrestricted land use values denoted with parenthesis () were utilized.

Appendix C

Water Quality Data

(from Rayforth and others, 2000)

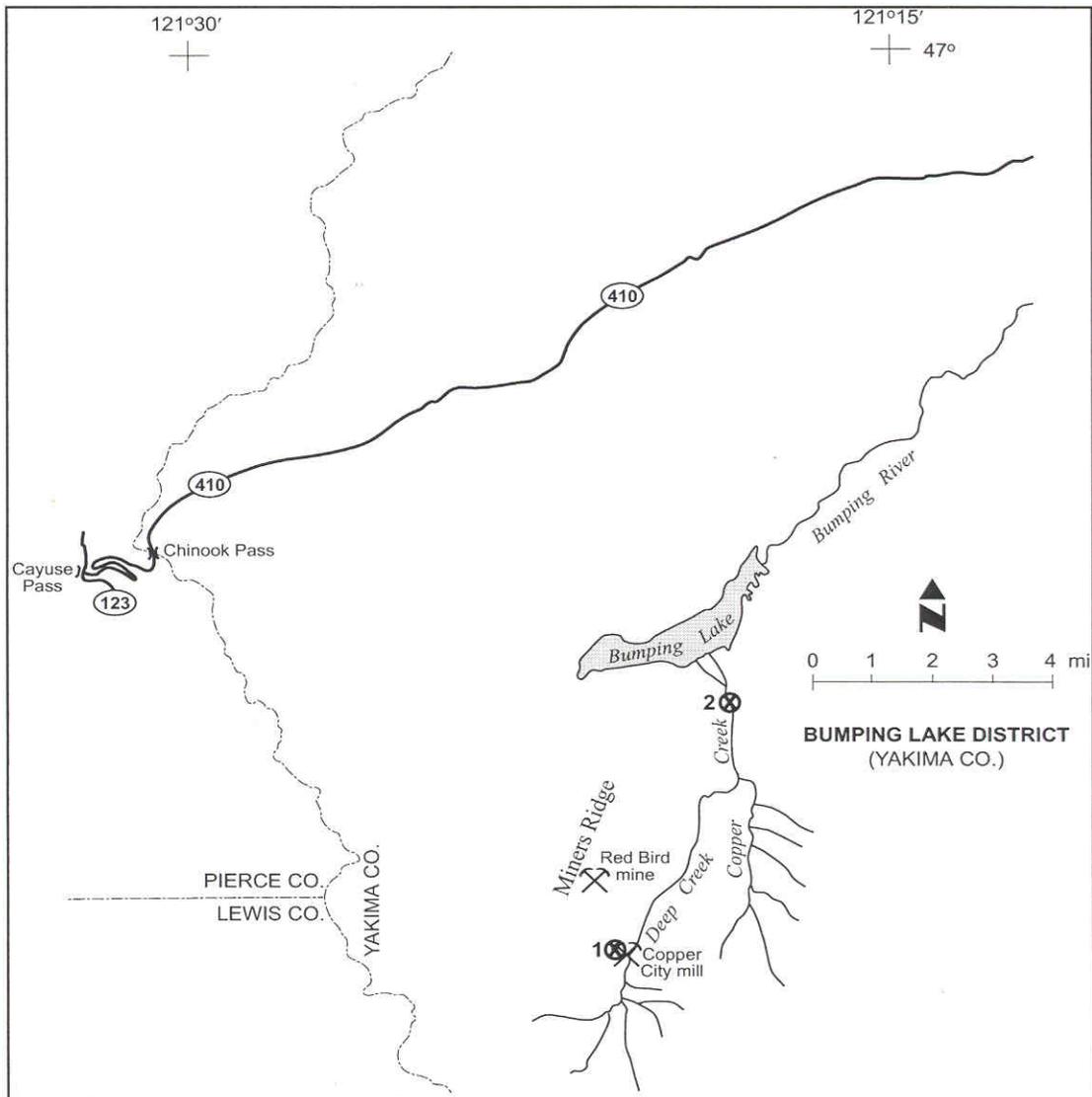


Figure 8. Locations of Water and Sediment Samples Collected in the Copper City Area - Bumping Lake District

Table 26. Field Measurements and General Chemistry Results for Bumping Lake District Water Samples Collected June and October, 1997

Sample Location	Flow (cfs)		Temp. (°C)		pH (units)		Cond. (µmho/cm)	
	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow
Copper City Above	0.25	NM	1.5	3.3	6.16*	7.43	29	77
Copper City Below Mill	0.25	NM	2.2	3.7	6.00*	7.42	37	77
Copper City Below	NM	NM	2.1	4.7	6.82	6.54	35	53

Sample Location	Hardness (mg/L)		Alkalinity (mg/L)		TDS (mg/L)		TSS (mg/L)	
	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow
Copper City Above	12	NA	13	NA	20	NA	1U	NA
Copper City Below Mill	14	NA	15	NA	22	NA	2	NA
Copper City Below	13	NA	13	NA	19	NA	2	NA

Sample Location	Turbidity (NTU)		Sulfate (mg/L)		Cyanide (mg/L)		NO ₃ +NO ₂ (mg/L)	
	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow	High Flow	Low Flow
Copper City Above	0.8J	NA	1.4	NA	0.005U	NA	0.010U	NA
Copper City Below Mill	0.6J	NA	1.7	NA	0.005U	NA	0.010	NA
Copper City Below	0.9J	NA	2.8	NA	0.005U	NA	0.014	NA

*exceeds water quality standard or guideline
 NM = not measured
 NA = not analyzed
 J = estimated value
 U = not detected at or above the reported value

Table 27. Metals Concentrations in Bumping Lake District Water Samples Collected June 1997 (µg/L)

Sample Location	Iron (total recoverable)		Zinc (dissolved)		Arsenic (total recoverable)		Copper (dissolved)	
	High	Low	High	Low	High	Low	High	Low
	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
Copper City Above	10U	NA	0.96	NA	1.6	NA	0.26	NA
Copper City Below Mill	26	NA	3.1	NA	9.6	NA	14*	NA
Copper City Below	18	NA	1.1	NA	1.6	NA	0.29	NA

Sample Location	Lead (dissolved)		Cadmium (dissolved)		Silver (dissolved)		Mercury (total recoverable)	
	High	Low	High	Low	High	Low	High	Low
	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
Copper City Above	0.02U	NA	0.02U	NA	0.04UJ	NA	0.002U	NA
Copper City Below Mill	0.036	NA	0.02U	NA	0.04UJ	NA	0.002U	NA
Copper City Below	0.02U	NA	0.02U	NA	0.04UJ	NA	0.002U	NA

Note: Metals detections highlighted in **BOLD**

*exceeds water quality standard or guideline

NA = not analyzed

U = not detected at or above the reported value

UJ = not detected at or above the reported estimated value

Appendix D

Analytical Results for Sediment Samples

(from Rayforth and others, 2000)

Table 28. Grain Size and Metals Concentrations in Bumping Lake District Sediment Samples Collected October 1997 (mg/Kg, dry)

Sample Location	% Gravel	% Sand	% Silt	% Clay	Fe	Mn	Zn
Copper City Above	58.4	38.6	2.7	0.3	13600	319	90
Copper City Below Mill	61.6	35.4	2.7	0.3	27800	510	224
Copper City Below	47.2	52.0	0.7	0.0	15400	288	65

Sample Location	Cr	Ni	Cu	As	Pb	Hg	Ag
Copper City Above	10	6.4	11	34	5.0	0.02	0.3 U
Copper City Below Mill	7.9	4.5	4640*	2630*	58	0.04	12*
Copper City Below	4.7	4.9	32	16	6.6	0.01	0.3 U

Sample Location	Cd	Se	Be	Sb	Tl
Copper City Above	0.5 U	0.3 U	0.24	3 UJ	0.3 UJ
Copper City Below Mill	0.5 U	0.88	0.42	3 UJ	0.3 UJ
Copper City Below	0.5 U	0.3 U	0.23	3 UJ	0.3 UJ

Note: Metals detections highlighted in **BOLD**

*exceeds sediment quality guideline

U = not detected at or above the reported value

UJ = not detected at or above the reported estimated value

Appendix E

Selected Site Photos



Photo 1. Remains of 5-tier mill from upper tier, un-named tributary left of cribbing flows over and through mill remains, view to the east (photo by G. Graham, 7/26/2004).



Photo 2. View of upper 2 tiers of mill remains, note drainage at right; view to the west (photo by G. Graham 7/26/2004).



Photo 3. View of lower part of mill, note bed staining at base of mill above crib wall where surface water exits the site, view to the west (photo by G. Graham, 7/26/2004).

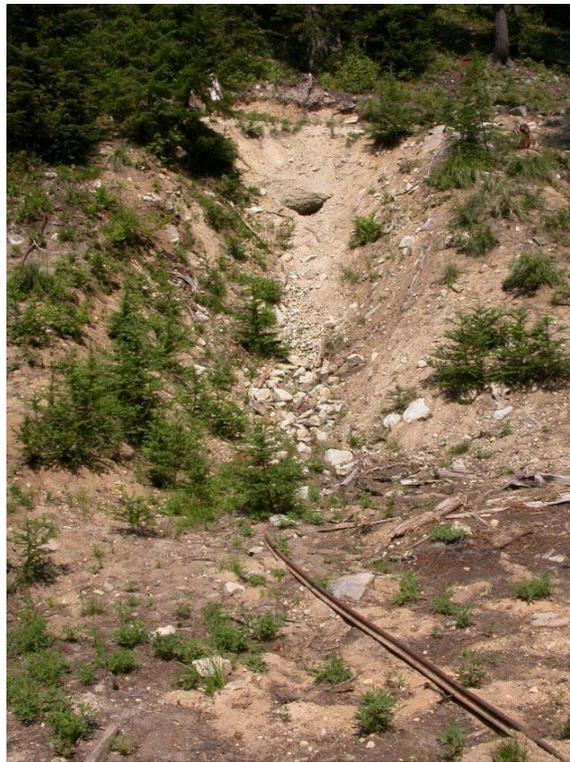


Photo 4. Partially collapsed portal of Sunset adit in colluvium and roadfill; roadcut along road to Clara and Red Bird mines is visible above portal; view to the northwest (photo by G. Graham, 7/26/2004).



Photo 4. Part of waste dump at the Sunset mine adit; view to the north (photo by G. Graham, 7/27/2004).



Photo 5. Typical working, a decline in this case, along mineralized shear zone at Clara-Red Bird mine. All workings are on very steep rock/talus sideslopes near the crest of Miners Ridge; view to the northeast (photo by G. Graham, 7/27/2004).

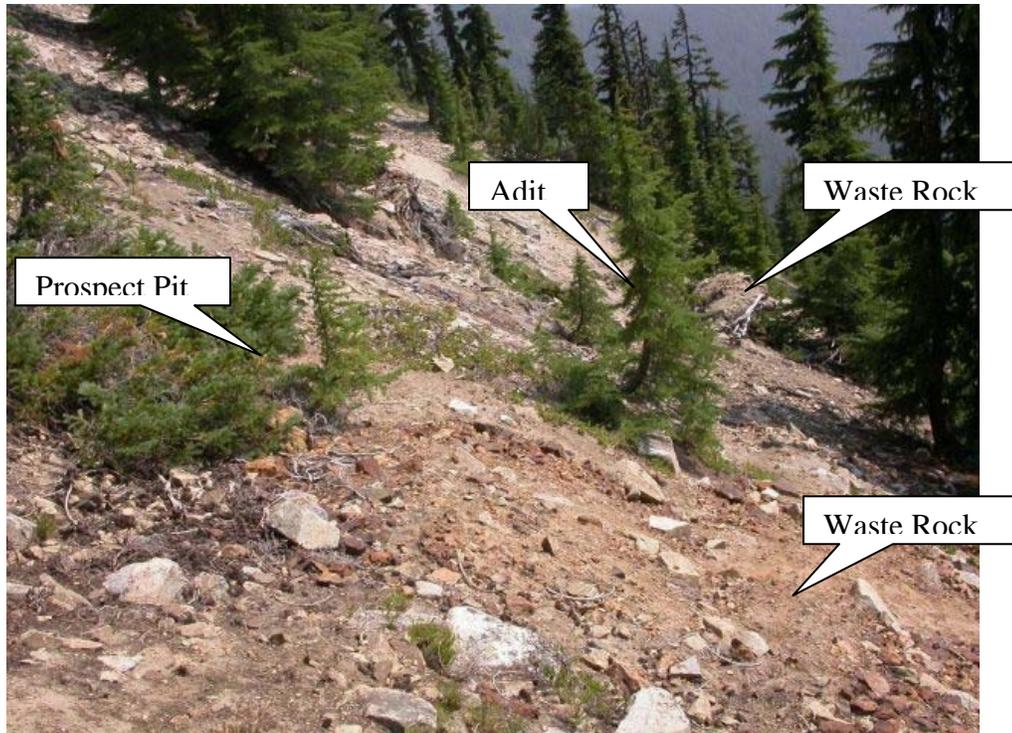


Photo 6. Prospect pit and adit along trend of shear zone at Clara-Red Bird Mine, view to northeast (photo by G. Graham, 7/27/2004).



Photo 7. Small waste rock dump at 17th of Ireland-Granite Lake adit extends into Granite Lake, a popular camping and recreation spot; view to the southeast (photo by G. Graham, 7/27/2004).



Photo 8. Waste rock dump at the collapsed 17th of Ireland-Ridge Adit, view to the northwest (photo by G. Graham, 7/27/2004).