

## **MACKENO (#81)**

### **(NO MINFILE)**

#### **1. LOCATION AND ACCESS**

The site is accessible along a gravel road stemming off of the main highway approximately 2 km north west of Keno City. The gravel road enters the south portion of the millsite (Figure 1) from the east and the north portion is accessible via one of two access points from the south portion of the site. The tailings area is not accessible by vehicle but can be visited through the primary forest from the millsite or by walking east along the lakeshore from the Galkeno mine site (Figure 2). Mackeno is at 63°54'57"N and 135°19'28"W and an approximate elevation of 870 m above sea level. UTM co ordinates are 7087675.770m N 484083.054m E.

#### **2. SITE PHYSIOGRAPHY**

The site is located on the east and north east shore of Christal Lake (photo 81-1). The site slopes gradually to the west and south west down to the lake. The millsite itself consists of two adjacent cleared areas separated by a steep embankment approximately 3 m high running east-west (photo 81-2) and the tailings area, approximately 200 m to the north of the main site through a primary forest. South and south west of the millsite, much of the property is forested with considerable areas of second growth willow saplings. Further south, the forest is dominated by mature spruce forest and the area is relatively flat, sloping down towards Christal Lake to the west.

The tailings area abuts directly on the lakeshore, with some tailings noted in the lake (photos 81-3 & 81-4). A portion of the tailings also forms a fan at the mouth of Christal Creek at the north end of the site (photo 81-5). The site slopes gradually down to the lakeshore to the west. East and south of the tailings area is a mature spruce forest. A seasonal creek flows through the forest, entering the lake immediately south of the tailings area (photos 81-1 & 81-6).

#### **3. GEOLOGY AND MINERALIZATION**

The millsite is underlain by thin-bedded quartzite & phyllite, cut by narrow, weakly mineralized veins. Some of the bulldozing at the site may have been to expose these veins.

The tailings are medium sand size and smaller, with quartz, siderite and pyrite easily identified with a hand lens. Pyrite commonly constitutes about 10% of the tailings, with sulphide sulphur assaying between 3 and 19%. The carbonate content is relatively low, therefore the NP/AP ratios are very low. Metal contents are generally very high. The ore milled was not mined at the site, but was hauled from the Galkeno and Bellekeno mines (Minfile).

#### 4. SITE HISTORY

Milling began in the spring of 1952 at the site, with most of the ore from the Galkeno mine, and about 10% from the Bellekeno mine. From the spring of 1952 until at least July 1954 the tailings were deposited directly into Christal Creek (McLaren & Lucas, 1954). The mill produced an average of about 55 tonnes per day of tailings during this period, which would indicate a total of over 40,000 tonnes deposited here. About 2700 to 4500 tonnes were deposited in an undammed pile beside the lake (United Keno Hill Mines Limited, 1996). Additional tailings are thought to have been deposited into the lake. Total production is roughly estimated at about 102,000 tonnes milled (Yukon Minfile).

#### 5. MINE DEVELOPMENT

The site was essentially used to mill ore and dispose of the resulting tailings. Development was limited to small trenches and a small test pit at the south end of the site.

##### 5.1 Mine Openings and Excavations

###### Open Pits (photo 81-7)

One small test pit was found near the millsite.

Location: See attached site location map. Test pit is situated south east of the millsite in second growth willow forest.

Dimensions (L x W x H): 1.5 m x 1.5 m x 1.5 m.

Supports: Wooden timber-lined shaft.

Condition: Timbers are rotten, site is revegetated.

Accessibility: Easy access by foot, but low risk to public due to shallow depth.

###### Trenches (photo 81-8)

Exploration trenches are present to the south of the millsite. They cut overburden for the most part.

Location: See attached site location map. Trenches are located immediately south of old truck weigh scale.

Dimensions (L x W x H): 35 m x 5 m x 3 m.

Condition: Fairly stable; partially revegetated.

Accessibility: Easy access by vehicle from the adjacent highway.



## 5.2 Waste Rock Disposal Areas

Very minor volumes of waste rock were noted at the site. The site has been extensively disturbed, however, most of the disturbances are associated with millsite not mining.

## 5.3 Tailings Impoundments

### Tailings Dam

Tailings are present in a pile on the lakeshore, however no dam was built to contain the tailings. A beaver dam now serves the purpose of impounding the tailings along the lakeshore between two islands. The dam should not be considered permanent but appears to have been in place for a number of years allowing a small wetlands area to form between the dam and the on-shore tailings.

Location: Beaver dam is located between two islands approximately 20 m off-shore to the west of tailings area.

Dimensions (L x W x H): Approximately 30 m x 1 m x 1 m.

Surface composition: Beaver dam; wood and vegetative matter.

### Tailings Ponds (photo 81-4)

Tailings were deposited in a depression near the lakeshore, and overflowed into the lake. A wetland (sedge) area has formed between the tailings and the lake. A small portion of the impounded area immediately off-shore remains unvegetated.

Location: See map in Figure 2. Located at north end of Christal Lake immediately adjacent to effluent into Christal Creek. Delineated by beaver dam between two islands to the west, however, tailings are also probably present under sediments in the lake and creek.

Area (L x W x Depth): 80 m x 40 m x 2m.

Oxidation: Discoloration (orange) of tailings (on surface and at depth).

Slope of tailings: Less than 5° towards lake.

Locations and area of saturated tailings: The surface of most of the tailings are dry, but become saturated near the lake and at depth. The clay rich tailings at depth in the auger hole are saturated.

Breakthroughs: No breakthroughs were noted, however, the beaver dam is not an engineered structure and some tailings probably escape the impoundment area. As well, the dam is not a permanent structure but appears to have been present for some time.

Decant structures and piping: No decant structures were observed.

Pump house: Small wood frame structure straddling small unnamed creek (photo 81-9); used to pump both tailings and water to adjacent tailings area.

Piping between tailings pumphouse and pond: 4 and 6 inch; approximately 150 m in length; still in place through wooded area running directly along ground and through pumphouse (photo 81-6).

Samples: The main pile was tested by auger to a depth of 200 cm. Gravel was intersected at 195 cm. Tailings data and laboratory and field sample analysis data are provided in Attachment B.

#### 5.4 Minesite Water Treatment

No water treatment facilities were observed.

### 6. MINE SITE INFRASTRUCTURE

#### 6.1 Buildings

Building 81A- Pumphouse (photo 81-9)

Pumphouse consists of a small deteriorated wood building positioned over a small creek.

Location: Approximately 80 m north of millsite and 50 m south of tailings area. Pumphouse has been constructed over a small unnamed creek along the pipeline (photo 81-6).

Dimensions (L x W x H): 2 m x 2.5 m x 1.5 m.

Construction: Wood frame with asphalt roofing and asbestos tarpaper siding.

Paint: None.

Asbestos: Asbestos-impregnated tarpaper was present on the building exterior and was not sampled. Asbestos wallboard is present on the interior walls. Asbestos is considered non-friable in both of these forms.

Non-hazardous contents: None.

Foundation: None.

Hazardous contents: None.

Pipeline in description passes through building from millsite to tailings area to the north.

Building 81B – Weigh Scale (photo 81-10)

All that remains of the scale is concrete foundation and scale well.

Location: South end of millsite adjacent to test trench.

Dimensions (L x W x H): 10 m x 7 m.

Construction: Concrete foundation well covered with timbers.

Paint: None.

Asbestos: None.

Non-hazardous contents: None (scale removed).

Foundation: Concrete.

Hazardous contents: None.

### Building 81C – Shack (photo 81-11)

Demolished shack probably used for living quarters.

Location: South west of millsite in area of second growth willow forest.

Dimensions (L x W x H): Approximately 3 m x 2 m x 3 m (demolished).

Construction: Wood frame; demolished.

Paint: None.

Asbestos: None.

Non-hazardous contents: None.

Foundation: None.

Hazardous contents: None.

## 6.2 Fuel Storage

All barrels noted at the site were empty. No fuel is currently stored at this site.

## 6.3 Rail and Trestle

No rail or trestle is present at the site.

## 6.4 Milling and Processing Infrastructure

Mill facility: The mill has been removed or buried onsite since it discontinued use in 1954. Evidence of the former mill facility are indicated by the weigh scale at the south end of the site as well as a large volume of assorted debris on the surface and partially buried throughout the site. A concrete foundation was noted protruding from the north end of the upper millsite. A cogged wheel (debris from former heavy equipment) was also noted protruding from the northwest corner of the site.

Grizzly: None remaining at surface.

Assay lab: None remaining at surface.

Core storage: None remaining at surface.

Samples: Due to the fact that almost all the previous infrastructure at the site has either been removed or buried, no samples were collected from this location.

## 6.5 Electrical Equipment

No electrical equipment was noted during the site visit, however, a large volume of debris is believed to have been buried at the site.

## 7. SOLID WASTE DUMPS

No solid waste dumps were noted at the site, however, most of the site has been extensively disturbed and it is believed that a large volume of debris has been buried at the former millsite.

Debris noted on the site surface was characterized as follows:

Location & access: Throughout site (photo 81-12 & 81-13).

Dimensions (L x W x H): Not applicable.

Drainage: Site is directly adjacent to the east shore of Christal Lake.

General composition: Non-friable asbestos wallboard; approximately 10 empty barrels; large volume of wood (timber and other) and metal debris; large cogged wheel; loader bucket; lengths of various sizes of pipe (>100 m); and victaulic piping lengths (<20 m).

Impacted vegetation: Site is essentially devegetated, however, this may be partially due to surface disturbances throughout the property and a general lack of organic soils throughout.

% covered: Difficult to determine. Wastes noted throughout site but particularly notable near edge of bulldozed surfaces and at near west side of property where less cover material is available.

Sampling: No samples were collected to determine impacts from this site. Christal Lake and Creek are the main downstream receptors. These water bodies were sampled and data is included in Section 9.

## **8.0 POTENTIAL CONTAMINANTS OF CONCERN**

### **8.1 Out-of-Service Transformers**

No transformers were identified at the site.

### **8.2 Metals and Hydrocarbons in Soil**

Six very small surface stains with a total area of approximately 1 m<sup>3</sup> were noted immediately north of the weigh scale foundation. Stains may be the result of waste oil leakage and had a faint hydrocarbon odour. Staining was not present below 0.10 m below grade. This portion of the site is a considerable distance from the nearest water body and no samples were collected.

### **8.3 Liquid Hazardous Materials**

No liquid hazardous materials were identified at the site.

### **8.4 Solid Hazardous Materials**

No solid hazardous materials were identified at the site.

## 9. WATER QUALITY

An unnamed creek flows from the east into Christal Lake, approximately 80 m south of the Christal Creek effluent through the forested area between the millsite and tailings (photos 81-1 & 81-6). The creek was sampled (81-WQ-Str-CD-04) upstream of the pumphouse. Christal Lake and Christal Creek (photo 81-3) are immediately downstream of the site and both were sampled adjacent to the tailings area. A water sample (81-WQ-Str-CD-02) was collected from the lake immediately west of the beaver dam enclosing the tailings pond. Another water sample (81-WQ-Str-CD-03) was collected from Christal Creek immediately downstream of the small tailings fan where tailings were reportedly pumped directly into the creek.

A tailings pond has formed immediately west of the main tailings area where the tailings have entered Christal Lake (photo 81-4). The outer edge of the pond has been contained by a (temporary) beaver dam, however, water in the tailings pond is obviously hydraulically connected to the lake. A single water sample (81-WQ-Str-CD-01) was collected from this location.

Laboratory sample analysis and field data is provided in Attachment B.

## 10. RECLAMATION

There has been extensive reclamation of the former mill facility. The concrete foundation of the former truck weigh scale and another partially uncovered unidentified concrete foundation are the only structures remaining at the millsite. It appears that most of the equipment and infrastructure was either removed or buried at the site. This is supported by the large amount of small debris either strewn throughout the site or protruding from the surface. Most of the site remains unvegetated and will probably remain as such for the foreseeable future since there has been no attempt to either seed or spread topsoil over the site.

There has been no attempt to reclaim the old tailings site. The pumphouse and associated pipeline are present within the wooded area. The onshore tailings remain uncovered and unvegetated.

## 11. OTHER INFORMATION AND DATA

Mill chemicals used in 1954 by MacKeno include: NaCN, Soda Ash, ZnSO<sub>4</sub>, Z-5 Xanthate, Dow Froth, "A-31", Cresylic Acid, "208", CuSO<sub>4</sub>, Z-9 Xanthate.

## 12. REFERENCES AND PERSONAL COMMUNICATIONS

United Keno Hill Mines Limited. 1996. *United Keno Hill Mines Limited – Site Characterization*. Report No. UKH/96/01, prepared by Access Mining Consultants Limited.



**Table B1. Tailings Field Data**

Location	Sample ID	paste pH	Description
main pile, 0-40cm	81_T_TPBM_01	6.8	grey-brown, sandy
main pile, 40-80cm	81_T_TPBM_02	6.4	grey-brown, sandy
main pile, 80-120cm	81_T_TPBM_03	6.0	yellow-brown, silty
main pile, 120-160cm	81_T_TPBM_04	5.4	yellow-brown, silty
main pile, 160-195cm	81_T_TPBM_05	5.5	stiff, grey clay w/ pyrite @170cm, gravel/till at 195cm
wetland	81_T_TPBM_06	7.1	saturated pyrite-rich mud
creek, 10-90cm deep	81_T_TPBM_07	7.0	saturated clay-silt-sand, dark grey, pyrite-rich; top 2 cm rusty.

**Table B2. 1999 Mackeno Water Quality Results**

Sample Number	Detection Limit	Units	81-StrCD-01 - Mackeno Tailings	81-StrCD-02 - Mackeno Tailings	81-StrCD-03 - Mackeno Tailings	81-StrCD-04 - Mackeno Tailings
pH (field)	N/A	pH	6.1	7.7	6.9	7.1
Conductivity (field)	0.01	µS/cm	1550	570	740	430
pH (Lab)	0.01	pH	6.52	7.57	7.63	7.56
Conductivity (Lab)	0.01	µS/cm	2300	800	850	630
Total Alkalinity	5	mg CaCO <sub>3</sub> /L	86	118	103	117
Chloride	0.25	mg/L	na	0.46	na	na
Chloride	0.5	mg/L	<0.5	na	0.51	0.66
Hardness (CaCO <sub>3</sub> equiv)	5	mg/L	973	443	435	326
Nitrate-N	0.05	mg/L	na	0.07	0.28	0.27
Nitrate-N	0.1	mg/L	<0.1	na	na	na
Nitrite-N	0.003	mg/L	0.003	<0.003	<0.003	<0.003
Sulphate	1	mg/L	1440	293	360	210
Total Dissolved Solids	5	mg/L	2370	587	651	453
Analysis by ICP-USN						
Aluminum	0.0008	mg/L	<0.0008	0.0418	0.0612	0.0112
Antimony	0.005	mg/L	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01	mg/L	0.26	<0.01	0.02	<0.01
Barium	0.00004	mg/L	0.0136	0.0639	0.0649	0.114
Beryllium	0.00001	mg/L	<0.00001	<0.00001	<0.00001	<0.00001
Bismuth	0.0004	mg/L	<0.0004	<0.0004	<0.0004	<0.0004
Boron	0.002	mg/L	0.038	<0.002	<0.002	<0.002
Cadmium	0.00001	mg/L	0.925	0.00273	0.00894	0.00062
Calcium	0.002	mg/L	274	135	132	101
Chromium	0.00006	mg/L	0.00957	0.00031	<0.00006	0.00022
Cobalt	0.00003	mg/L	0.0547	0.00043	0.00466	<0.00003
Copper	0.00003	mg/L	0.00166	0.0022	0.00263	0.00141
Iron	0.00001	mg/L	18.3	0.431	0.779	0.048
Lead	0.0003	mg/L	0.0737	0.014	0.0814	<0.0003



Sample Number	Detection Limit	Units	81-StrCD-01 - Mackeno Tailings	81-StrCD-02 - Mackeno Tailings	81-StrCD-03 - Mackeno Tailings	81-StrCD-04 - Mackeno Tailings
Lithium	0.001	mg/L	0.023	0.012	0.01	0.004
Magnesium	0.0005	mg/L	64.8	21.7	20.6	20.2
Manganese	0.00002	mg/L	6.45	0.458	4.02	0.0104
Mercury	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.00007	mg/L	<0.00007	0.00033	0.00029	0.00014
Nickel	0.00001	mg/L	0.128	0.004	0.0133	0.0017
Phosphorus	0.03	mg/L	<0.03	0.04	<0.03	<0.03
Potassium	0.4	mg/L	1.6	<0.4	0.4	<0.4
Selenium	0.004	mg/L	0.042	<0.004	0.006	<0.004
Silicon	0.004	mg/L	6.82	1.88	2.31	3.43
Silver	0.00005	mg/L	0.014	0.00017	0.00086	<0.00005
Sodium	0.004	mg/L	4.2	1.5	1.5	1.4
Strontium	0.00002	mg/L	0.467	0.21	0.233	0.173
Sulphur	0.008	mg/L	478	98.7	111	66.7
Thallium	0.001	mg/L	0.167	<0.001	0.006	<0.001
Titanium	0.00002	mg/L	<0.00002	0.00123	0.00152	0.00059
Vanadium	0.00003	mg/L	<0.00003	<0.00003	<0.00003	<0.00003
Zinc	0.0002	mg/L	25.4	0.182	6	0.029
Total Arsenic by Hydride AA						
Arsenic	0.0002	mg/L	0.234	0.0043	0.0139	0.001
Total Selenium by Hydride AA						
Selenium	0.0001	mg/L	<0.0001	0.0001	0.0007	<0.0001

Table B3. 1999 Mackeno Tailings Sampling Results

Sample Number	Detection Limit	Units	81_T_TPBM _01 - Tailings	81_T_TPBM _02 - Tailings	81_T_TPBM _03 - Tailings	81_T_TPBM _04 - Tailings	81_T_TPBM _05 - Tailings	81_T_TPBM _06 - Tailings	81_T_TPBM M_07 - Tailings
pH in Saturated Paste									
pH	0.1	pH	5.6	5.7	5.5	5.1	5.3	6.1	6.3
pH in Soil (1:2 water)									
pH	0.01	pH	6.4	6.4	6.3	5.9	6	6.9	7.2
ICP Semi-Trace Scan - Metals in Soil									
Aluminum	5	µg/g	2760	4420	6510	8600	9810	13400	11300
Antimony	2	µg/g	1700	2800	530	350	430	140	140
Arsenic	2	µg/g	3990	14900	3290	2640	2710	1150	2610
Barium	0.05	µg/g	30.9	0.46	121	153	138	280	0.82
Beryllium	0.1	µg/g	<0.1	<0.1	0.3	<0.1	0.2	0.3	0.4
Bismuth	5	µg/g	<5	<5	<5	<5	<5	<5	<5
Cadmium	0.1	µg/g	1030	1960	944	454	516	378	604
Calcium	5	µg/g	1660	1650	1320	1880	2130	4430	3810
Chromium	0.5	µg/g	10.4	11.8	10.1	14.5	18.2	20.4	14.8
Cobalt	0.1	µg/g	10.1	25.6	7	2.4	4.4	6.5	10
Copper	0.5	µg/g	296	675	262	160	202	102	283
Iron	1	µg/g	140000	320000	110000	87000	93000	58000	100000
Lead	1	µg/g	21300	7900	10700	10200	14000	4100	5400
Lithium	0.5	µg/g	2.1	2.4	2.6	3.3	4.9	10.5	4.6
Magnesium	1	µg/g	2310	2380	1830	1120	1830	3790	3470
Manganese	0.5	µg/g	42900	57900	33300	14100	18000	14400	40200
Mercury	0.01	µg/g	0.54	2.52	0.99	0.17	0.02	0.16	0.6
Molybdenum	1	µg/g	5	9	5	5	7	3	6
Nickel	1	µg/g	22.7	43	19.5	12.9	18.4	20.6	24.2
Phosphorus	5	µg/g	113	121	183	232	392	892	219
Potassium	20	µg/g	710	1360	1970	2440	2080	3100	2940
Selenium	2	µg/g	<2	<2	<2	<2	<2	<2	<2
Silicon	5	µg/g	214	100	166	254	419	325	8
Silver	0.5	µg/g	420	48.3	163	140	225	52.4	240
Sodium	5	µg/g	64	137	180	235	478	996	1360

Sample Number	Detection Limit	Units	81_T_TPBM _01 - Tailings	81_T_TPBM _02 - Tailings	81_T_TPBM _03 - Tailings	81_T_TPBM _04 - Tailings	81_T_TPBM _05 - Tailings	81_T_TPBM _06 - Tailings	81_T_TPBM M_07 - Tailings
Strontium	1	µg/g	<1	<1	4	10	11	24	8
Sulphur	10	µg/g	88000	268000	70000	36200	42400	25400	44800
Thorium	1	µg/g	<1	<1	<1	<1	<1	<1	<1
Tin	1	µg/g	10	8	9	9	12	5	3
Titanium	0.2	µg/g	7.2	9.4	14.8	27.2	65.4	373	125
Uranium	5	µg/g	21	<5	10	<5	<5	<5	11
Vanadium	1	µg/g	4	6	9	13	15	34	22
Zinc	0.5	µg/g	66100	115000	56600	27600	28300	22600	33900
Zirconium	0.1	µg/g	6.5	5.9	6.7	5.9	9.8	10.9	11.7

Table B4. 1999 Mackeno Waste Rock Sampling Results

Sample Number	Detection Limit	Units	1_WR_TPBM _01 - Rock	1_WR_TPBM_0 2 - Rock	1_WR_TPBM_03 - Rock	1_WR_TPBM_04 - Rock
pH in Saturated Paste						
pH	0.1	pH	2.1	2.7	2.5	3.6
pH in Soil (1:2 water)						
pH	0.01	pH	3.1	3.5	3.5	4.2
ICP Semi-Trace Scan - Metals in Soil						
Aluminum	5	µg/g	27800	26000	17900	18900
Antimony	2	µg/g	26	120	39	40
Arsenic	2	µg/g	108	162	252	261
Barium	0.05	µg/g	525	632	496	510
Beryllium	0.1	µg/g	0.8	1	0.6	0.6
Bismuth	5	µg/g	<5	<5	<5	<5
Cadmium	0.1	µg/g	0.6	4.8	2.3	2.3
Calcium	5	µg/g	2250	3930	615	587
Chromium	0.5	µg/g	39.8	37.7	28.3	29.7
Cobalt	0.1	µg/g	2.5	8	1.1	1.2
Copper	0.5	µg/g	64.4	118	55.2	59.2
Iron	1	µg/g	28000	34000	21000	22000
Lead	1	µg/g	2350	5540	2320	2480
Lithium	0.5	µg/g	14.8	9.2	9.8	11.2
Magnesium	1	µg/g	1330	1400	1210	1480
Manganese	0.5	µg/g	173	1770	101	105
Mercury	0.01	µg/g	0.22	0.48	0.25	0.33
Molybdenum	1	µg/g	1	3	3	3
Nickel	1	µg/g	19	30.2	6.6	7.4
Phosphorus	5	µg/g	604	574	670	697
Potassium	20	µg/g	6400	7800	5000	5300
Selenium	2	µg/g	<2	<2	<2	<2
Silicon	5	µg/g	219	351	253	626
Silver	0.5	µg/g	217	352	58.6	57.6
Sodium	5	µg/g	658	751	447	451
Strontium	1	µg/g	67	60	68	69
Sulphur	10	µg/g	10200	18900	3420	3390

Sample Number	Detection Limit	Units	1_WR_TPBM_0 1 - Rock	1_WR_TPBM_0 2 - Rock	1_WR_TPBM_03 - Rock	1_WR_TPBM_04 - Rock
Thorium	1	µg/g	2	3	8	6
Tin	1	µg/g	3	7	5	52.2
Titanium	0.2	µg/g	40.4	58.8	50.1	<0.2
Uranium	5	µg/g	<5	<5	<5	40
Vanadium	1	µg/g	68	49	39	211
Zinc	0.5	µg/g	108	235	223	25.9
Zirconium	0.1	µg/g	17	22.7	24	<0.1

22A\* Building (22A: building site present reference\*)

Indicates Asbestos Material

Collapsed Building

Adit

Collapsed Adit

Shaft

Collapsed/Backfilled Shaft

Mine Rock Dump

Bedrock Open Pit

Trench

Stripped Overburden Stockpile

Stripped / Disturbed Area

Outcrop Boundary

Highway

Road (gravel, 2 wheel drive)

Road (gravel, 4X4 accessible)

Road (inaccessible)

Trail

Culvert

1999 Soil Sample (this study)

Pre 1999 Soil Sample (other sources)

1999 Waste Rock Sample (this study)

Pre 1999 Waste Rock Sample (other sources)

1999 Water Sample

Pre 1999 Water Sample

Tension Cracks

Mass Movement (note: for Forms: Bellekeno)

Groundwater Seep

Surface Water Flow (Stream, Creek, River)

Lake

Settling Pond / Water Treatment Pond

Tailings Dam / Tailings Pond / Mill Tails

Ponded Water / Trench

Barrels

Abandoned Equipment (compressors, ore cars, rails, air and water pipe)

Mine Rails / Trestle

Collapsed Trestle

Solid Waste Disposal Site

Area of Soil Contamination

Transformer Location (number of transformer in brackets)

Power Line

Power Line Collapsed

Aerial Transmission Towers

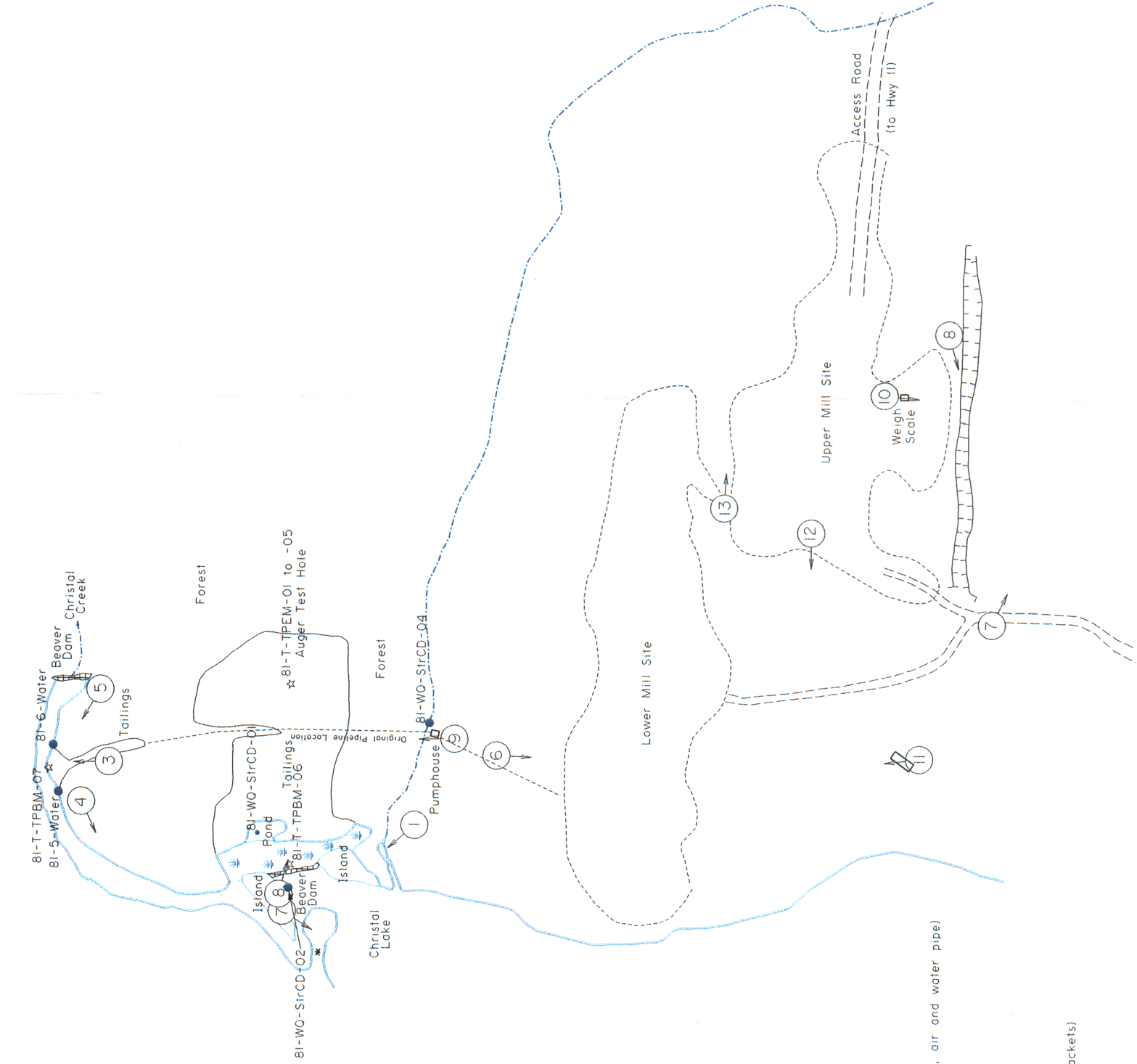
Photo Site (arrow shows view direction)

GPS Survey Location

Former Building Site (Elsa)

1999 Tailings Sample

Wetlands



CAD FILE: SITE81.DGN

### Waste Rock Geological Legend

This legend intended for use as a key to the observed lithological content of the mine dumps and stockpiles of surficial materials investigated. It does not represent regional stratigraphy and no stratigraphic sequence is implied.

Pyrite content as percent; eg. Py 2%. Occurs as an alteration halo adjacent to vein fault structure.

Oxidation: Weak (WO), moderate (MO) and intense (IO).

Quaternary: (5) Undifferentiated, unconsolidated colluvium, glacial till.

#### Veins:

- (4a) Quartz veins;
- (4b) Quartz-pyrite veins;
- (4c) Quartz-siderite • trace galena-sphalerite veins;
- (4d) Siderite-quartz • trace galena-sphalerite veins;
- (4e) Sphide (galena-sphalerite) • quartz-siderite veins.

Greenstone: (3) Amphibole-chlorite-plagioclase meliorite or metagabbro.

#### Quartzite:

- (2a) Thick bedded, blocky gray quartzite;
- (2b) Thin bedded, broken, quartzite with carbonaceous phyllite interbeds;
- (2c) Calcareous quartzite.

#### Phyllite:

- (1a) Broken sericite-chlorite phyllite;
- (1b) Carbonaceous phyllite.

	Public Works and Government Services Canada Architectural & Engineering Services Western Region	Travaux publics et Services gouvernementaux Canada Architecture et Services d'ingénierie Région de l'ouest	Designed by: conçu par: drawn by: dessiné par: approved by: approuvé par: révisé par:	C.S.I.B. Nov. 1999
Drawing title:	Makino Site # 81 Site Assessment Yukon Territory			Project no. no. du projet:
				125-12.01
				1 of 1



Photo 81-1: Mouth of unnamed creek at Christal Lake.





Photo 81-2: North slope south millsite area. Note wood debris.



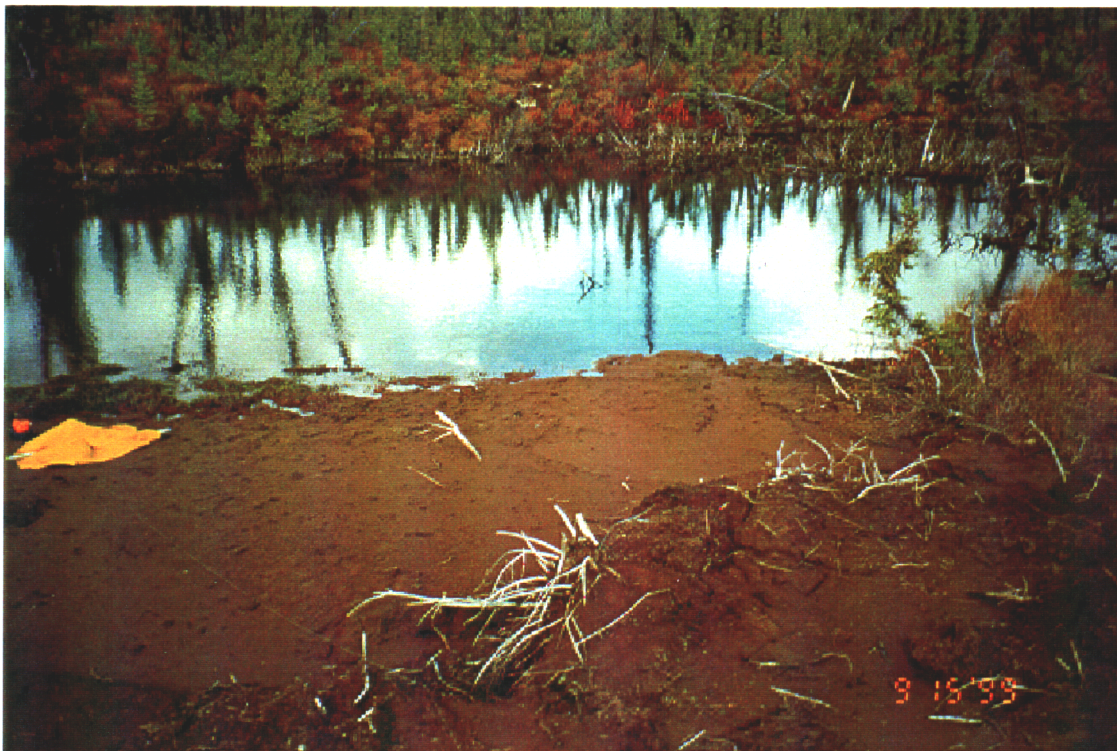


Photo 81-3: Small tailings fan directly on Christal Creek.



Photo 81-4: Upstream from small tailings to near mouth of Christal Creek.





Photo 81-5: Upstream to small tailings fan on Christal Creek.



Photo 81-6: Tailings pipeline in forested area north of millsite.





Photo 81-7: Small timber-lined test pit south west of millsite.



Photo 81-8: Trench directly south of millsite.





Photo 81-9: Tailings pumphouse in forested area north of millsite.



Photo 81-10: Concrete foundation of weigh scale at south end of millsite.





Photo 81-11: Wood debris remaining from former shack south west of millsite.



Photo 81-12: Metal and wood debris at west end of upper millsite area.





Photo 81-13: Concrete foundation protruding from north slope of upper millsite area.