FLAME & MOTH (#18)
(MINFILE# 105M 14)

1. LOCATION AND ACCESS

The main open pit area of the site is accessible from Keno City on the north side of Duncan Creek Road directly west of the Town and adjacent landfill (Figure 1). The north trench area of the site is accessed via a short bulldozed track stemming from the north end of the main pit area (Figure 2). The site is also directly south east of Christal Lake. Flame & Moth is at 63°54"30.4"N and 135°19'36.2"W and an approximate elevation of 900 m above sea level. UTM co ordinates are 7086852.994m N 483967.092m E.

2. SITE PHYSIOGRAPHY

The site is immediately west of Keno City and the main solid waste dump site. The area slopes gently towards Christal Lake approximately 750 m to the northwest (photo 18-1). Surrounding properties are heavily forested with typical subalpine features although most of the vegetation has been removed from this site. Drainage from the main pit is to the west and drainage from the trench is to the north west. Surface runoff from both areas is eventually into Christal Lake.

3. GEOLOGY AND MINERALIZATION

This site is underlain by Keno Hill Quartzite, medium to thick-bedded. The quartzite has minor beds of carbonaceous phyllite and lenticular bodies of greenstone. No greenstone was observed in the field. The mine is developed on a quartz-siderite vein mineralized with pyrite, pyrrhotite, arsenopyrite, sphalerite, galena and chalcopyrite. The vein material is significantly oxidized near surface, producing orange, yellow, brown and white secondary minerals. There is little true outcrop at the site, but there are areas where overburden has been bulldozed away to expose a rubbly subcrop.

4. SITE HISTORY

The site was initially developed in 1923. In the 1950's an inclined shaft was sunk to a depth of 31m, and there was 43 m of lateral drifting on the 75' level. Percussion drilling was conducted in the 1960's. Open pit mining was initiated on site shortly before the operation was closed. A total of 1,442 tonnes of ore was produced. The outline of the open pit is not readily apparent. One diamond drill site was observed at the southeast end of the disturbed area.

Open pit development has produced four lobes of waste rock. The two northwestern lobes are dominantly barren overburden. The northeastern lobe, site of sample 02, is composed of mixed mineralized material and overburden. The southern lobe, site of sample 03, is dominated by barren quartzite (Minfile).

A small clearing, shaft and trench in overburden is present about 100 m to the north of the main site. This site appears to be a placer mine, as a small sluice and jig are present, and no bedrock is exposed. The activity here appears to be from the 1980's or 1990's.

5. MINE DEVELOPMENT

5.1 Mine Openings And Excavations

No shafts or underground workings were observed. Any developments are thought to have been destroyed by open pit mining.

Shaft (not observed)

31m inclined shaft, 43m of drifting on the 75' level.

Location: Uncertain.
Dimensions (L x W x H): Unknown.
Supports: Unknown.
Condition: Filled; stable.
Accessibility: Not accessible.

Open Pits (photo 18-2)

Open pit mining was in progress when the operation was closed, however very little ore was produced. There are no benches cut into the rock. The boundaries of the mineralized area and pit outline are not clear.

Location: See map. The disturbed area includes considerable trenching, and is thought to extend to the southwest well beyond the open pit.
Dimensions (L x W x H): Irregularly shaped with max. length 160 m x max. width 90 m x max. depth 5 m.
Condition: The site is fairly level, and appears to be stable. Some dump slopes are steep but of minimum height.
Accessibility: Easy access from Keno City via the Duncan Creek Road.

Trenches (photo 18-3)

Trench is a long thin bulldozed pit, aligned in an east-west orientation. More development has occurred at the east end of the trench where placer mining appears to have occurred in the recent past. Only a small amount of bedrock is exposed.

Location: 250 m north of the main open pit and approximately 750 m south west of Christal Lake.
Dimensions (L x W x H): 45 m x 5 m x max. 3.5 m.
Condition: The site is level and drainage slopes towards the west end of the site. Slopes appear stable.
Accessibility: The area is accessible by a bulldozed track stemming from the open pit area to the south.

5.2 Waste Rock Disposal Areas

Waste rock piles (photo 18-4 & 18-5)

General Description: Open pit development has produced four lobes of waste rock. The two northwestern lobes are dominantly barren overburden (photo 18-4). The northeastern lobe, site of sample 02, is composed of mixed mineralized material and overburden (photo 18-5). The southern lobe, site of sample 03, is dominated by barren quartzite. The waste rock dumps are partially revegetated, except near well-mineralized areas. Vegetation is well established where there is fine-grained material or moisture traps. There is no apparent drainage at the site, as it is dominated by well-drained gravel. Oxidation related staining of the waste rock is apparent at the northeastern lobe of waste.

Location: See map. Waste rock was identified throughout the site in varying sized piles.
Dimensions: Not applicable.
Samples: Six rock samples were field tested for paste pH and conductivity, and two were sent for analysis. Sample 06, considered to be representative of near-surface mineralized rock, was repeated in the field as a duplicate, sample 07. Sample 03 was considered to be representative of un-mineralized waste rock. See Attachment B for laboratory and field test results. Note that the lab renumbered samples 06 and 07 to 01 and 02, respectively.

5.3 Tailings Impoundments

No tailings impoundments were observed at the site.

5.4 Minesite Water Treatment

No wastewater treatment facilities were observed on site.

6. MINE SITE INFRASTRUCTURE

6.1 Buildings

No buildings are present at the site.

6.2 Fuel Storage

The few drums present at the site were all empty. No fuel storage was noted at the site.

6.3 Rail and Trestle

No rails or trestles were noted at the site.

6.4 Milling and Processing Infrastructure

No milling or processing infrastructure was present at the site.

6.5 Electrical Equipment

No electrical equipment was present at the site.

7. SOLID WASTE DUMPS

No solid waste dumps were present at the site.

8. POTENTIAL CONTAMINANTS OF CONCERN

No potential contaminants of concern were observed at the site.

9. WATER QUALITY

There was evidence that water had ponded in the north trench in the recent past, however, it was dry during the site visit. The north trench area drains northwest towards Christal Lake, a distance of approximately 750 m (photo 18-1). Surface runoff from the site enters a pond immediately north west of the site (photo 18-6), which discharges into a small creek flowing into Christal Lake. A water sample (18-WQ-Str-CD-01) and duplicate (18-WQ-Str-CD-02) were collected from the pond. Laboratory and field analyses are provided in Attachment B.

10. RECLAMATION

No reclamation has been attempted at either the open pit or trench areas. Portions of the pit, particularly near the northeast and southwest corners have been re-colonized by willow saplings. The remainder of the site is essentially unvegetated.

11. OTHER SOURCES OF INFORMATION AND DATA

No other sources of information and data were identified.

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.

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

Table B1. 1999 Water Quality Results, Flaming Moth Site

Sample Number		Detection Limit	Units	18-WQ-StrCD-01 - Sept 18/99	StrCD-02 - Sept 18/99
Site Description					
pH (field)		N/A	pH	7.3	-
Conductivity (field)		N/A	uS/cm	65	-
Total Alkalinity		5	mg CaCO3/L	246	246
Chloride		0.25	mg/L	0.4	<0.25
Chloride		0.5	mg/L	na	na
Electrical Conductivity		0.01	µS/cm	580	570
Hardness (CaCO3 equiv)		5	mg/L	321	319
Nitrate-N		0.05	mg/L	0.05	<0.05
Nitrate-N		0.1	mg/L	na	na
Nitrite-N		0.003	mg/L	0.003	<0.003
pH		0.01	pH	7.43	7.41
Sulphate		1	mg/L	53	53
Total Dissolved Solids		5	mg/L	369	362
ICP-USN Total Metals Scan in Water					
	Aluminum	0.0008	mg/L	0.0118	0.0136
	Antimony	0.005	mg/L	<0.005	<0.005
	Arsenic	0.01	mg/L	<0.01	<0.01
	Barium	0.00004	mg/L	0.0895	0.0891
	Beryllium	0.00001	mg/L	<0.00001	<0.00001
	Bismuth	0.0004	mg/L	<0.0004	<0.0004
	Boron	0.002	mg/L	<0.002	<0.002
	Cadmium	0.00001	mg/L	0.00012	0.00009
	Calcium	0.002	mg/L	84.3	83.7
	Chromium	0.00006	mg/L	0.00011	0.00021
	Cobalt	0.00003	mg/L	0.00017	0.00023
	Copper	0.00003	mg/L	0.00269	0.00406
	Iron	0.00001	mg/L	0.273	0.291
	Lead	0.0003	mg/L	0.0004	0.0006
	Lithium	0.001	mg/L	0.003	0.003
	Magnesium	0.0005	mg/L	20.9	21
	Manganese	0.00002	mg/L	0.169	0.162
	Mercury	0.0001	mg/L	<0.0001	<0.0001
	Molybdenum	0.00007	mg/L	0.0002	0.00025
	Nickel	0.00001	mg/L	0.0007	0.0009
	Phosphorus	0.03	mg/L	0.03	<0.03
	Potassium	0.4	mg/L	1.1	1.1
	Selenium	0.004	mg/L	<0.004	<0.004
	Silicon	0.004	mg/L	2.1	2.08
	Silver	0.00005	mg/L	<0.00005	<0.00005
	Sodium	0.4	mg/L	1.2	1.2
	Strontium	0.00002	mg/L	0.16	0.16
	Sulphur	0.008	mg/L	18	18
	Thallium	0.001	mg/L	<0.001	<0.001
	Titanium	0.00002	mg/L	0.00032	0.00035
	Vanadium	0.00003	mg/L	<0.00003	<0.00003
	Zinc	0.0002	mg/L	0.0073	0.0093
Total Arsenic by Hydride AA					
	Arsenic	0.0002	mg/L	0.0018	0.0021
Total Selenium by Hydride AA					
	Selenium	0.0001	mg/L	<0.0001	<0.0001

ATTACHMENT B: 1999 FLAME AND MOTH WASTE ROCK SAMPLES LABORATORY RESULTS					
Site Number	**Detection Limit**	**Units**	**18_WR_TPBM_01 (On bag -06)**	**18_WR_TPBM_01 (On bag -07)**	**18_WR_TPBM_03**
Sample Desciption			Flame and Moth northwestern waste rock pile	Duplicate of Bag 6	Representative of unmineralized waste rock
Paste pH (field)	N/A	pH	-	-	-
Conductivity (field)	N/A	µS/cm	-	-	-
pH in Saturated Paste					
pH	0.1	pH	3.5	3.6	7
pH in Soil (1:2 water)					
pH	0.01	pH	3.3	3.2	7.3
ICP Semi-Trace Scan					
Aluminum	5	µg/g	10400	12600	25500
Antimony	2	µg/g	70	61	<2
Arsenic	2	µg/g	680	496	63
Barium	0.05	µg/g	322	370	564
Beryllium	0.1	µg/g	<0.1	<0.1	0.5
Bismuth	5	µg/g	40	38	<5
Cadmium	0.1	µg/g	0.9	0.5	0.9
Calcium	5	µg/g	320	240	12200
Chromium	0.5	µg/g	25.6	30.4	37.9
Cobalt	0.1	µg/g	0.6	<0.1	13
Copper	0.5	µg/g	59.7	47.2	59.4
Iron	1	µg/g	110000	92000	37000
Lead	1	µg/g	342	411	28
Lithium	0.5	µg/g	9.2	10.8	19.9
Magnesium	1	µg/g	646	526	6300
Manganese	0.5	µg/g	41.5	36	512
Mercury	0.01	µg/g	0.13	0.13	<0.01
Molybdenum	1	µg/g	4	3	7
Nickel	1	µg/g	2.9	1.7	40
Phosphorus	5	µg/g	599	376	688
Potassium	20	µg/g	4150	4650	5400
Selenium	2	µg/g	<2	<2	<2
Silicon	5	µg/g	346	597	213
Silver	0.5	µg/g	15.1	16.7	<0.5
Sodium	5	µg/g	927	677	1210
Strontium	1	µg/g	19	17	65
Sulphur	10	µg/g	6800	5400	670
Thorium	1	µg/g	<1	<1	<1
Tin	1	µg/g	68	58	2
Titanium	0.2	µg/g	206	141	402
Uranium	5	µg/g	<5	<5	<5
Vanadium	1	µg/g	38	34	63
Zinc	0.5	µg/g	390	338	163
Zirconium	0.1	µg/g	24.6	25	26.3

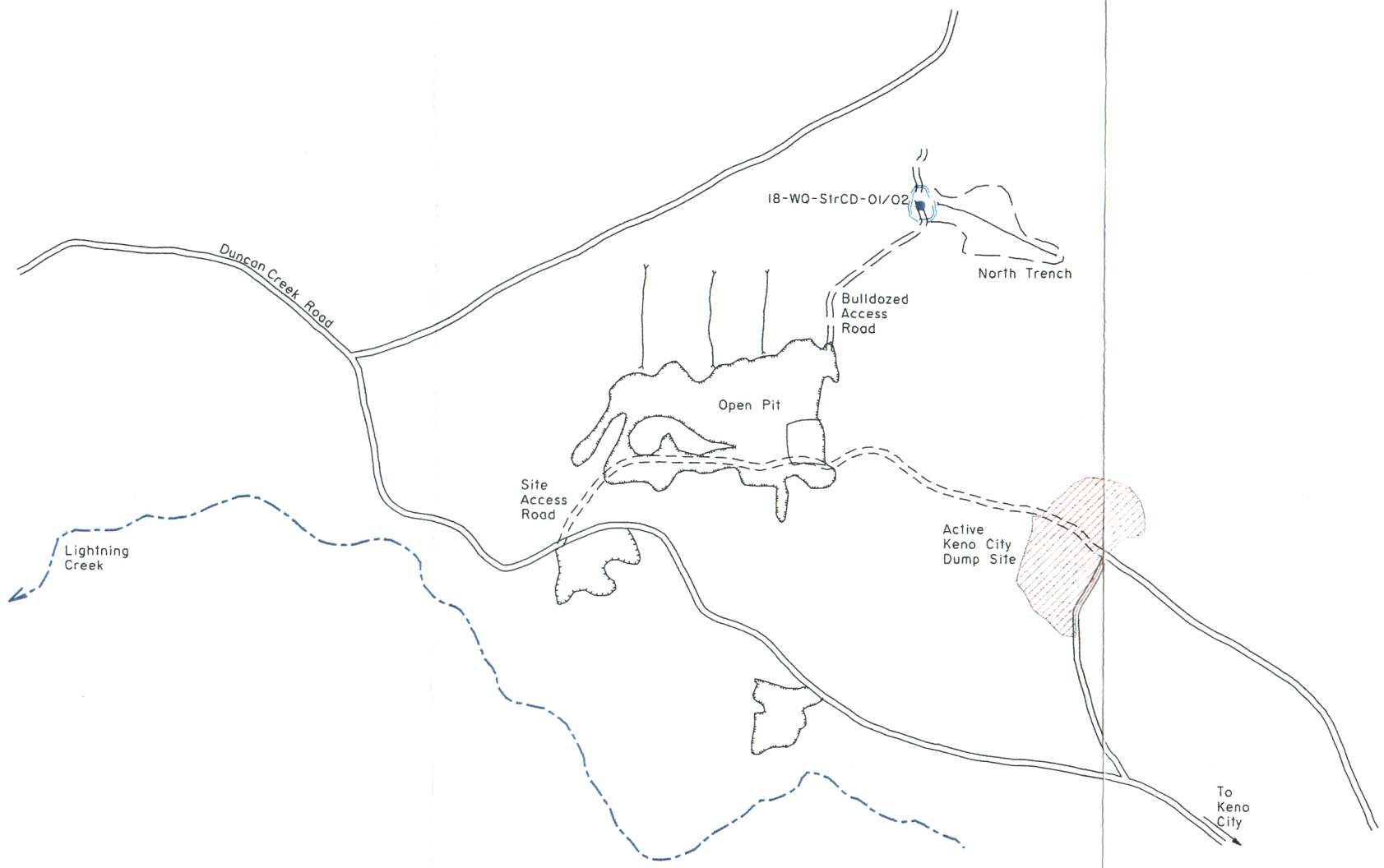
ATTACHMENT 2: 1999 FLAME AND MOTH WASTE ROCK LABORATORY RESULTS
MODIFIED SOBEK METHOD ACID-BASE ACCOUNTING TEST

SAMPLE	SITE DESCRIPTION	PASTE pH	S(T) %	S(SO4) %	AP	NP	NET NP	NP/AP
18_WR_TPBM_01 (On Bag - 06)	Flame and Moth northwestern waste rock pile	4.2	0.25	0.18	2.2	-1.0	-3.2	<0.1
18_WR_TPBM_02 (On Bag - 07)	Duplicate of Bag 6	4.6	0.21	0.16	1.6	-1.5	-3.1	<0.1
18_WR_TPBM_03	Representative of unmineralized waste rock	7.9	0.11	0.05	1.9	54.5	52.6	29.1

AP = ACID POTENTIAL IN TONNES CaCO3 EQUIVALENT PER 1000 TONNES OF MATERIAL.
NP = NEUTRALIZATION POTENTIAL IN TONNES CaCO3 EQUIVALENT PER 1000 TONNES OF MATERIAL.
NET NP = NET NEUTRALIZATION POTENTIAL = TONNES CaCO3 EQUIVALENT PER 1000 TONNES OF MATERIAL.
NOTE: WHEN S(T) AND/OR S(SO4) IS REPORTED AS <0.01, IT IS ASSUMED TO BE ZERO FOR THE AP CALCULATION.
N/D = NO DUPLICATE ASSAY. CALCULATIONS ARE BASED ON ASSAY RESULTS OF THE INITIAL SAMPLE.
RE = REPLICATE.

NOTE - A HIGH LEVEL OF SOLUBLE METALS (ESPECIALLY IRON) WERE OBSERVED IN MANY SAMPLES DURING THE ABA TITRATIONS.
SAMPLES WITH A NEGATIVE NET NP SHOULD BE TESTED FOR MOBILE METALS USING STANDARD SHAKE FLASK EXTRACTION TESTS.

- 22A* Building (22A: building site present reference*) Indicates Asbestos Material
- 22A 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
- 24501-01 1999 Soil Sample (this study)
- Pre 1999 Soil Sample (other sources)
- 25WR04-01 1999 Waste Rock Sample (this study)
- Pre 1999 Waste Rock Sample (other sources)
- WO-12-06 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
- *(6) Transformer Loaction (number of transformer in brackets)
- Power Line
- Power Line Collapsed
- Aerial Transmission Towers
- 5 Photo Site (arrow shows view direction)
- GPS Survey Location
- Former Building Site (Elsa)



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Scale 1:5000

CAD FILE: SITE_1.dgn

Public Works And Government Services Canada
Travaux publics et Services gouvernementaux Canada

Architectural & Engineering Services
Western Region

Drawing title: / Titre du dessin:

Flame and Moth Site #18
Site Assessment
Yukon Territory

designed by: / concu par:		date:
drawn by: / dessine par:	C.S.	Nov./99
approved by: / approuve par:		
revisions:		
project no. / no. du projet: 125-12.01	dwg. no. / dessin no. 1 of 2	

- Building (22A: building site present reference*) 22A* Indicates Asbestos Material
- Collapsed Building 22A
- 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
- 24501-01 1999 Soil Sample (this study)
- Pre 1999 Soil Sample (other sources)
- 25WR04-01 1999 Waste Rock Sample (this study)
- Pre 1999 Waste Rock Sample (other sources)
- WO-12-06 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 / Tressle
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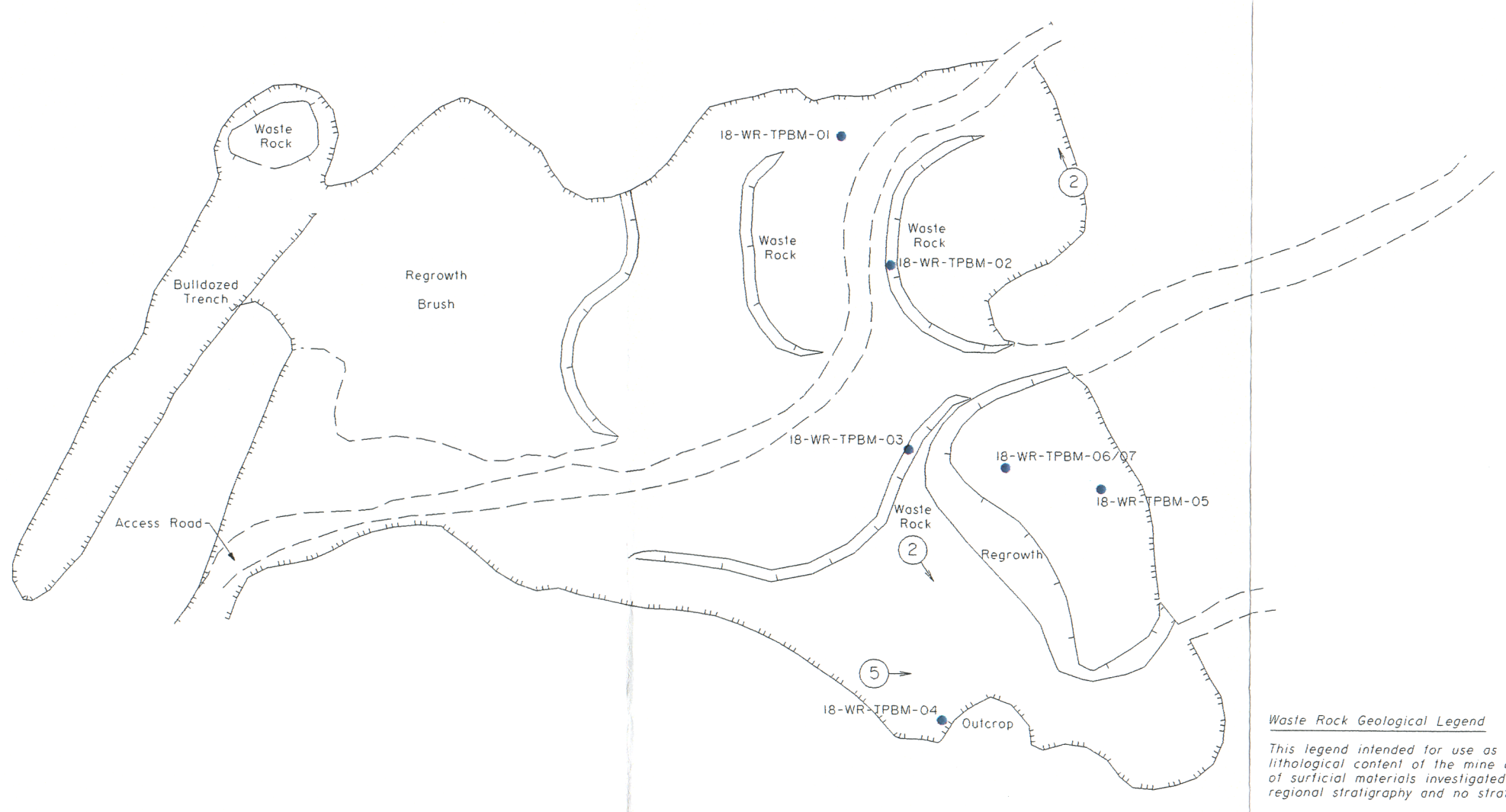
- Solid Waste Disposal Site
- Area of Soil Contamination
- *(6) Transformer Loaction (number of transformer in brackets)
- Power Line
- Power Line Collapsed
- Arial Transmission Towers
- (5) Photo Site (arrow shows view direction)
- GPS Survey Location
- Former Building Site (Elsa)



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 (wOx), moderate (mOx) and intense (iOx).

Quarternary: (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) Suphide (galena-sphalerite) •quartz•siderite veins.

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

Quartzite: (2a) Thick beded, blocky gray quartzite;
(2b) Thin banded, broken, quartzite with carbonaceous phyllite interbeds;
(2c) Calcareous quartzite.

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

0 10 20 30 40

Scale 1:1000

CAD FILE: KEY.DGN

date:

Public Works And Government Services Canada
Travaux publics et Services gouvernementaux Canada

Architectural & Engineering Services
Western Region

designed by:
conçu par:
drawn by: C.S. Nov./99
dessine par:
approved by:
approuve par:
revisions:

Drawing title: Title du dessin:

Flame and Moth Site # 18
Site Assessment
Yukon Territory

project no. / no. du projet: 125-12.01

dwg. no. / dessin no. 2 of 2

Photo 18-1: Forested area and Christal Lake in background north west of site.

Photo 18-2: Waste rock area near north end of main site.

Photo 18-3: Bulldozed trench at second site.

Photo 18-4: Large waste rock pile slope at north end of main site.

Photo 18-5: Leveled area at main site. Note rock outcrop on right side of photo.

Photo 18-6: Creek runoff to north west of trench site.