FORMO (# 57)
(MINFILE# 105M 018)

1. LOCATION AND ACCESS

The mine site straddles the Highway approximately 7 km east of Elsa. The upper mine site workings are immediately above the highway. The lower site workings are accessible via an extremely overgrown road down to the middle and lower adits approximately 250 m below the Highway. Only foot traffic may access the lower workings. The upper workings are at an elevation of 880 m, middle workings at 850 m and the lower workings are at 820 m. The location is given as 63°56'26"N and 135°22"09"W. UTM co ordinates are 7090442.500m N 481904.984m E.

2. SITE PHYSIOGRAPHY

The site is spread out down the steep lower slope of Galena Hill, above and below the Highway, with waste rock extending to Christal Creek at the bottom of the slope, a vertical drop of approximately 110 m. Site drainage extends directly down this slope into Christal Creek. Waste rock from the middle and lower workings has slumped down the steep slope.

White spruce forest dominates the undisturbed areas immediately surrounding the lower and middle Formo workings. The area below the lower workings is unvegetated and much of the area is slumping. The area below the middle workings is also unvegetated. Much of the access area between the Highway and the workings downslope are choked with heavy alder growth. The upper workings site is unvegetated. Surrounding forest is mature spruce and poplar forest.

3. GEOLOGY AND MINERALIZATION

The Keno Hill-Galena Hill silver-lead ores occur in erratic shoots and lenses lying in vein faults that cut fine-bedded to massive quartzite, intercalcated with greenstone sills and lenses, and various schistose rocks.

The Formo vein are composed of siderite with variable, but small, amounts of quartz, sphalerite, galena and freiberigite. The cubiform galena occurs as clots and clusters rarely more than a few centimeters in size. The vein has been affected by post-mineralization fault movement, as well as intense weathering. Siderite and galena are commonly weathered to limonite and anglesite. The footwall is greenstone and the hangingwall is graphite schist that is highly brecciated within a few meters of the vein.

4. SITE HISTORY

The original workings consisted of short shafts and drifts driven in 1929 to 1931 when 36.3 tonnes of were shipped for milling. 54.4 tonnes of ore were later taken from the site in 1947. A further 1219.2 m of drifting and crosscutting, as well as minor raising and shaft sinking were completed in 1952-53 on three levels.

The working were expanded in 1961, when 13.4 tonnes of ore were produced. Thirteen x-ray holes, at a depth of 205.1 m, were shot into the hill in 1962 and bulldoze trenching was done at the site in 1964. In 1974-75, more trenching and exploration was done at the site. The 2700 level adit was rehabilitated in 1980-81 and the southerly extension of it was explored. 71.7 tonnes of ore was produced from this in 1983.
(Source: Yukon Minfile)

5. MINE DEVELOPMENT

5.1 Mine Openings And Excavations

Former shafts at the upper workings have been destroyed by trenching. Two adits remain at the middle and lower workings. No samples were collected, as Phase III testing (samples FOWR/P301, FOWR/P302, FOWR/P303, FOWR/P304, FOWR/P305, FOWR/P306, FOWR/P307/1, FOWR/P307/2, FOWR/P308) was considered to be adequate.

Middle adit

Adit is covered in a board enclosure.
Location: See map. Adit is 50 m below (north east of) highway.
Dimensions (L x W x H): Approximately 2.5 x 2.5 m.
Supports: The timbered portal is boarded up.
Condition: Good condition.
Accessibility: Adit is partially sealed but entry is possible; site is only accessible from highway via overgrown access road.

Lower adit

Timbered adit is covered in a board enclosure.
Location: See map. Adit is 80 m below (north east of) highway.
Dimensions (L x W x H): Approximately 2.5 x 2.5 m.
Supports: The timbered portal is open but logs are loose and deteriorated.
Condition: Timbers are rotting.

Accessibility: Adit is open but is only accessible from highway via overgrown site access road.

Upper shaft (photo 57-1)

Demolished during upper workings trenching. Only timbers remain at surface of site.

Open Pits

The upper workings are large trenches that resemble pits. Information on this site has been placed in the "Trenches" section. No pits were identified at the Formo site.

Trenches (photos 57-2 & 57-3)

A series of trenches with one trench running north-south and approximately three trenches running perpendicular off of the main trench form the upper workings.
Location: Upper workings immediately south of the highway.
Dimensions (L x W x H): North-south trench approx. 80 m x 15 m x 5 m (max.); perpendicular trenches approx. 70 m x 10 m x 10 m (max.).
Condition: Minor revegetation of the trenches, particularly at the bottom; staining at bottom of main trench appears to be result of seasonal ponding water (none at time of site visit); material sloughing off trench walls at a number of locations.
Accessibility: Immediately adjacent to highway.

5.2 Waste Rock Disposal Areas

Waste rock piles were adequately described in the Phase III report as indicated in the following table.

Table 1

Sample No.	Field pH	FieldConductivity	Summary of ABA test Results
FOWR/P301	7.0	260µS/cm	NP:AP=6.4 Low potential for acid generation
FOWR/P302	7.6	180µS/cm	NP:AP=0.5 Potentially acid generating
FOWR/303	6.4	-	NP:AP=1.2 Potentially acid generating
FOWR/P304	-	210µS/cm	NP:AP=0.2 Potentially acid generating
FOWR/P305	-	-	NP:AP=2.3 Potentially acid generating
FOWR/P306	-	-	NP:AP=<0.1 Acid generating
FOWR/307/1	-	-	NP:AP=<0.1 Acid generating
FOWR/307/2	-	-	NP:AP=<0.1 Potentially acid generating
FOWR/P308	-	-	NP:AP=0.75 Acid generating

Waste rock pile – Upper workings (photos 57-2 & 57-3)

Over 6900 m^3 of rock was removed from upper workings site and the waste rock was deposited on either side of the adjacent to the trenches.

Location: See map. Upper workings directly adjacent to highway.

Dimensions (L x W x H): Two piles; approximately 30 m and 60 m x 12 m (max.) x 7 m (max.).

Samples: Waste rock pile was adequately sampled in Phase II/III reports. The waste rock samples were submitted for ABA tests as part of the Phase III assessment (results in Table 1).

Waste rock pile – Middle workings

Approximately 1000 m^3 of rock was removed from the middle workings site and the waste rock was mostly deposited below the adit.

Location: See map.

Dimensions (L x W x H): 100 m x 30 x approximately 1 to 2 m deep.

Samples: Waste rock pile was adequately sampled in Phase II report. The waste rock samples were submitted to lab for analysis (results Table 1).

Waste rock piles (2) – Lower workings (photos 57-4 & 57-5)

An area of disturbance of approximately 6000 m^2 was noted at the lower workings site and the waste rock was deposited below the adit.

Location: See map.

Dimensions (L x W x H): 50 m x 250 m x approximately 1 to 3 m deep.

Samples: Waste rock pile was adequately sampled in Phase II report. The waste rock samples were submitted to lab for analysis (Table 1).

5.3 Tailings Impoundments

None observed.

5.4 Minesite Water Treatment

None observed.

6. MINE SITE INFRASTRUCTURE

6.1 Buildings

Five buildings were identified at the site. A large core shack was identified at the upper workings, a shack and adit enclosure were noted at the lower workings and a wood cabin was identified near the middle workings. A multi-bay outhouse was also noted immediately downhill from the upper workings.

Building 57A – Core Shack (photo 57-6)

Large open wood plank building used for storage of cores. Raised wood platform for core storage.

Location: South of the upper workings accessible via a waste rock constructed access road to the top of the site.
Dimensions (L x W x H): 11 m x 6 m x 5 m.
Construction: Wood frame with wood plank siding; some fibreglass insulation; tarpaper interior mostly removed.
Paint: None.
Asbestos: Asbestos tar paper cladding.
Non-Hazardous contents: Core samples; wood debris including pallets; empty barrels.
Foundation: None.
Hazardous contents: None.
Surrounding area: Minor debris including metal siding and wood pallets in forested area surrounding building.

Building 57B – Wood Shack

Small wood shed possibly formerly used for storage.
Location: Immediately adjacent to lower workings.
Dimensions (L x W x H): 5 m x 4 m x 4 m.
Construction: Wood frame with wood plank exterior.
Paint: None.
Asbestos: None.
Non-Hazardous contents: Small quantity of steel tubing.
Foundation: None.
Hazardous contents: None.
Surrounding area: Waste rock and small amount of debris including three empty barrels.

Building 57C – Adit Enclosure

Small wood shed enclosing lower adit.
Location: At lower adit.
Dimensions (L x W x H): 5 m x 3 m x 3 m.
Construction: Wood plank and frame.
Paint: None.
Asbestos: None.
Non-Hazardous contents: None.

Foundation: None.
Hazardous contents: None.
Surrounding area: Wood and metal debris including empty barrels strewn around the site and down the slope; also large waste rock pile below the adit.

Building 57D – Wood Cabin

Accommodation quarters for personnel at site with associated porch. Building was formerly electrified.
Dimensions (L x W x H): 7 m x 5.5 m x 8 m.
Location: East of middle workings area in location overgrown with second growth forest.
Construction: Wood frame with plywood interior, wood plank exterior, plywood roof and asphalt shingles.
Paint: None.
Asbestos: None identified.
Non-Hazardous contents: Metal water tank.
Foundation: None.
Hazardous contents: None.
Surrounding area: Wood debris.

Building 57E – Multi-bay Outhouse

Six seat single room outhouse.
Location: Immediately below (north of) highway on access road to middle and lower workings.
Dimensions (L x W x H): 4 m x 3 m x 4 m.
Construction: Wood frame with wood plank floor over dirt crawlspace.
Paint: None.
Asbestos: None.
Non-Hazardous contents: None.
Foundation: None.
Hazardous contents: None.
Surrounding area: Three empty pails and one empty barrel; second growth alder forest

6.2 Fuel Storage

There is currently no fuel in storage at the site. All barrels at the site were empty.

6.3 Rail and Trestle

Middle workings

Location: Extending from middle adit.

Fabrication: Metal rails.

Amount of materials: Two 16 m lengths.

Condition: Rails are in satisfactory condition and remain in place.

Lower workings

Location: Extending from lower adit.

Fabrication: Metal rails.

Amount of material: Two 7 m lengths.

Condition: Rails are in poor condition but remain in place.

6.4 Milling and Processing Infrastructure

There is no milling or processing infrastructure present at this site.

6.5 Electrical Equipment

No electrical equipment was identified at the site.

7. SOLID WASTE DUMPS

No solid waste dumps were identified at the site.

8. POTENTIAL CONTAMINANTS OF CONCERN

No potential contaminants of concern were observed at the site.

9. WATER QUALITY

Water quality samples were collected during the previous Phase II and III assessments. Water samples were also collected during this (1999) assessment. The Phase II water sampling program included four surface water samples (Christal Cr. upgradient, downgradient of lower workings and downgradient of middle workings and creek trib. downstream of waste rock dump). The Phase III water sampling program included three sampling events (19 August, 1997; 18 October, 1997; 23 April 1998) at each of the locations identified during the Phase II program with the exception of the sample collected from the Christal Creek tributary. Two seep samples were also collected during the August sampling episode at the lower tailings waste rock dump, one near the bottom and the other approximately 35 m upslope.

The water sample downgradient of the lower workings waste rock dump, as well as the seep sample collected from near the bottom of the rock toe were repeated during the 1999 assessment. Results of these previous episodes are detailed in Attachment C.

Three water quality samples were collected:

1. 57-WQ-StrCD-01 (Christal Creek, approximately 10 m downstream of lower workings waste rock pile toe);
2. 57-WQ-SCD-01 (approximately 7 m above toe of lower workings waste rock pile).

10. RECLAMATION

Reclamation at the site has included removal of all rail and trestle and stockpiling at the base of the site as well as storage of two ore cars. High-grade ore barrels have also been stacked at the barrel storage site. The site itself does not appear to have been reclaimed and the portal is open.

11. OTHER SOURCES OF INFORMATION AND DATA

This site was previously assessed under contract to PWGSC and both Phase II and III reports were produced as part of the previous assessment. No major changes were identified since that time.

12. REFERENCES AND PERSONAL COMMUNICATIONS

Public Works and Government Services Canada. February 1997. Phase II Environmental Site Assessmentof the Formo Abandoned Mine Site.

Public Works and Government Services Canada. June 1998. Phase III Site Assessment, Formo Mine Site.

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, Formo Site

Sample Number		Detection Limit	Units	57 - WQ - StrCD-01	57 - WQ - SCD-01	Formo Seep 1	Formo Seep 2	Formo Seep 3
Site Description								
pH (field)		0.01	pH	7.8	7			
Conductivity (field)		0.01	µS/cm	680	2630			
Total Alkalinity		5	mg CaCO3/L	129	39	26	12	10
Chloride		0.1	mg/L	0.41	na	0.6	1.1	1.1
Chloride		1	mg/L	na	<1	na	na	na
Chloride		2.5	mg/L	na	na	na	na	na
Electrical Conductivity		0.01	µS/cm	670	2900	2800	72	71
Hardness (CaCO3 equiv)		5	mg/L	365	1880	1380	40.7	40.6
Nitrate-N		0.05	mg/L	<0.05	2.6	3.52	1.06	0.61
Nitrate-N		0.2	mg/L	na	na	na	na	na
Nitrate-N		0.5	mg/L	na	na	na	na	na
Nitrite-N		0.003	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003
Nitrite-N		0.02	mg/L	na	na	na	na	na
pH		0.01	pH	7.92	6.29	6.86	6.47	6.64
Sulphate		1	mg/L	220	2030	1890	10.8	11.3
Total Dissolved Solids		5	mg/L	470	3200	2910	105	101
ICP-USN Total Metals Scan in Water								
	Aluminum	0.0008	mg/L	0.12	0.034	1.16	0.157	0.132
	Antimony	0.005	mg/L	<0.005	<0.005	0.009	<0.005	<0.005
	Arsenic	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
	Barium	0.00004	mg/L	0.0575	0.00821	0.0378	0.0181	0.0173
	Beryllium	0.00001	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
	Bismuth	0.0004	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
	Boron	0.002	mg/L	<0.002	<0.002	0.006	<0.002	<0.002
	Cadmium	0.00001	mg/L	0.00408	1.25	1.25	0.00019	0.00016
	Calcium	0.002	mg/L	103	418	411	10.6	10.7
	Chromium	0.00006	mg/L	0.00014	<0.00006	0.00141	<0.00006	<0.00006
	Cobalt	0.00003	mg/L	0.00029	0.00728	0.00847	<0.00003	<0.00003
	Copper	0.00003	mg/L	0.00086	0.0024	0.00841	0.00424	0.00382
	Iron	0.00001	mg/L	0.479	0.055	3.03	0.29	0.27
	Lead	0.0003	mg/L	0.0024	<0.0003	0.0909	<0.0003	<0.0003
	Lithium	0.001	mg/L	0.006	0.051	0.056	<0.001	<0.001
	Magnesium	0.0005	mg/L	18.9	167	166	2.83	2.84
	Manganese	0.00002	mg/L	0.202	3.41	3.16	0.00416	0.0029
	Mercury	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	0.00007	mg/L	0.00039	<0.00007	<0.00007	<0.00007	<0.00007
	Nickel	0.00001	mg/L	<0.00001	0.1	0.103	0.0024	0.002
	Phosphorus	0.03	mg/L	<0.03	<0.03	0.09	<0.03	<0.03
	Potassium	0.4	mg/L	<0.4	2.3	2.9	<0.4	<0.4
	Selenium	0.004	mg/L	<0.004	0.019	0.015	<0.004	<0.004
	Silicon	0.004	mg/L	2.62	3.47	4.51	1.61	1.58
	Silver	0.00005	mg/L	<0.00005	0.00024	0.00112	<0.00005	<0.00005
	Sodium	0.004	mg/L	1.2	2.5	2.5	<0.4	<0.4
	Strontium	0.00002	mg/L	0.207	0.61	0.596	0.0187	0.0181
	Sulphur	0.008	mg/L	71.2	665	620	4.06	3.99
	Thallium	0.001	mg/L	<0.001	0.004	0.002	<0.001	<0.001
	Titanium	0.00002	mg/L	0.00319	<0.00002	0.0313	0.00087	0.00041
	Vanadium	0.00003	mg/L	0.00014	<0.00003	0.00244	<0.00003	<0.00003
	Zinc	0.0002	mg/L	0.445	25.6	26.3	0.011	0.0114
Total Arsenic by Hydride AA								
	Arsenic	0.0002	mg/L	<0.0002	<0.0002	0.0066	0.0014	0.0017
Total Selenium by Hydride AA								
	Selenium	0.0001	mg/L	0.0001	<0.0001	0.0011	0.0004	0.0004

Accredited By: CANADIAN ASSOCIATION FOR ENVIRONMENTALANALYTICAL LABORATORIES (CAEAL)

na = not available

For specific tests registered with the Association

Table 2 Formo Waste Rock Sample ABA and ICP Results

Parameter	Unit	Sample No. FOWR-								
		P301	P302	P303	P304	P305	P306	P307/1	P307/2	P308
Field Cond	uS/cm	260	180	na	210	na	na	na	na	na
Field Paste pH		7.00	7.60	6.40	na	na	na	na	na	na
Lab Paste pH		7.82	7.79	7.49	7.36	7.52	3.87	3.12	5.46	4.02
Total Sulfur	%	1.04	8.44	2.25	4.79	1.79	4.18	6.55	4.61	4.02
Sulfate	%	0.24	0.20	0.38	0.54	0.85	2.59	1.74	1.67	2.36
AP		25.00	257.50	58.44	132.81	29.38	49.69	150.31	91.88	51.88
NP		161.00	127.00	68.75	29.00	68.25	-24.78	-14.25	4.28	38.94
NET NP		136.00	-130.50	10.31	-103.81	38.88	-74.47	-164.56	-87.59	-12.94
NP/AP		6.44	0.49	1.18	0.22	2.32	<0.1	<0.1	<0.1	0.75
Aluminum	%	1.02	0.35	0.56	0.73	0.68	0.38	0.47	1.34	0.63
Antimony	ppm	3	155	71	169	6	36	77	85	140
Arsenic	ppm	125	5165	180	3148	253	651	833	582	603
Barium	ppm	34	22	54	38	29	38	23	39	35
Beryllium	ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	ppm	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	ppm	<0.1	>100	>100	>100	<0.1	<0.1	55.3	>100	<0.1
Calcium	%	6.00	4.95	2.50	2.93	3.27	2.64	1.26	1.98	1.97
Chromium	ppm	86	83	76	81	88	90	71	111	79
Cobalt	ppm	11	15	15	17	12	5	10	15	8
Copper	ppm	25	130	150	129	25	29	166	123	107
Gallium	ppm	<1	<1	<1	<1	<1	<1	<1	<1	<1
Iron	%	3.37	7.99	3.79	5.82	3.46	4.55	9.46	6.24	6.35
Lead	ppm	1426	>10000	>10000	>10000	1039	>10000	9900	>10000	>10000
Lithium	ppm	17	4	6	10	11	5	7	23	9
Magnesium	%	1.48	0.68	0.79	1.04	0.96	0.21	0.30	1.24	0.50
Manganese	ppm	2432	2064	3277	3487	1321	122	206	536	310
Molybdenum	ppm	13	20	21	21	16	15	23	22	18
Nickel	ppm	42	42	45	61	38	16	29	54	29
Potassium	%	0.10	0.10	0.11	0.11	0.10	0.12	0.09	0.10	0.11
Phosphate	ppm	1080	1090	1510	1180	1330	590	790	630	530
Silver	ppm	12.7	>200	154.6	>200	11.3	103.8	133.7	151.3	>200
Sodium	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	ppm	113	26	42	43	43	11	6	28	19
Tin	ppm	3	6	4	5	2	3	6	6	5
Titanium	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tungsten	ppm	2	19	56	27	3	2	20	51	4
Vanadium	ppm	27.8	3.4	8.2	20.8	9.8	10.3	10.3	38.4	18.8
Zinc	ppm	1435	>10000	>10000	>10000	1144	505	>10000	>10000	3448

AP = Acid Potential in tonnes $CaCO_3$ equivalent per 100 tonnes of material

NP = Neutralization Potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material

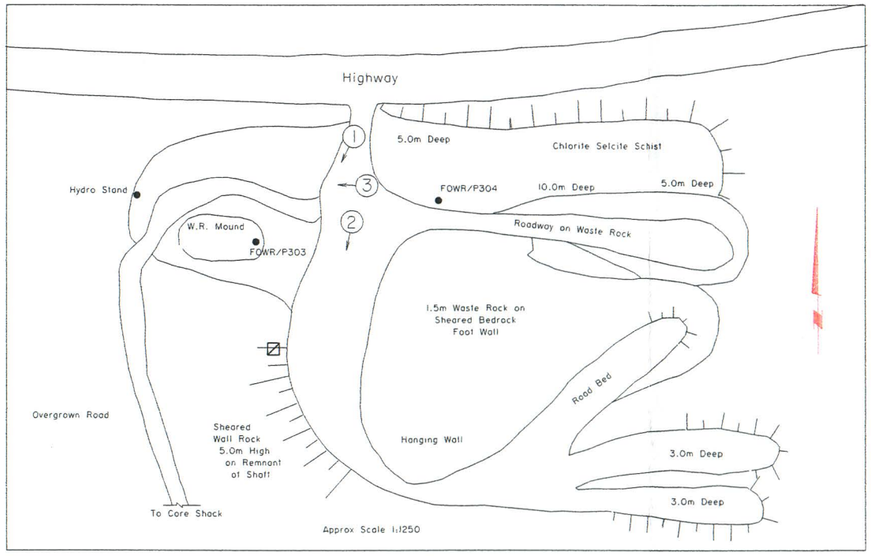
Net NP = Net Neutralization Potential = tonnes $CaCO_3$ equivalent per 1000 tonnes of material

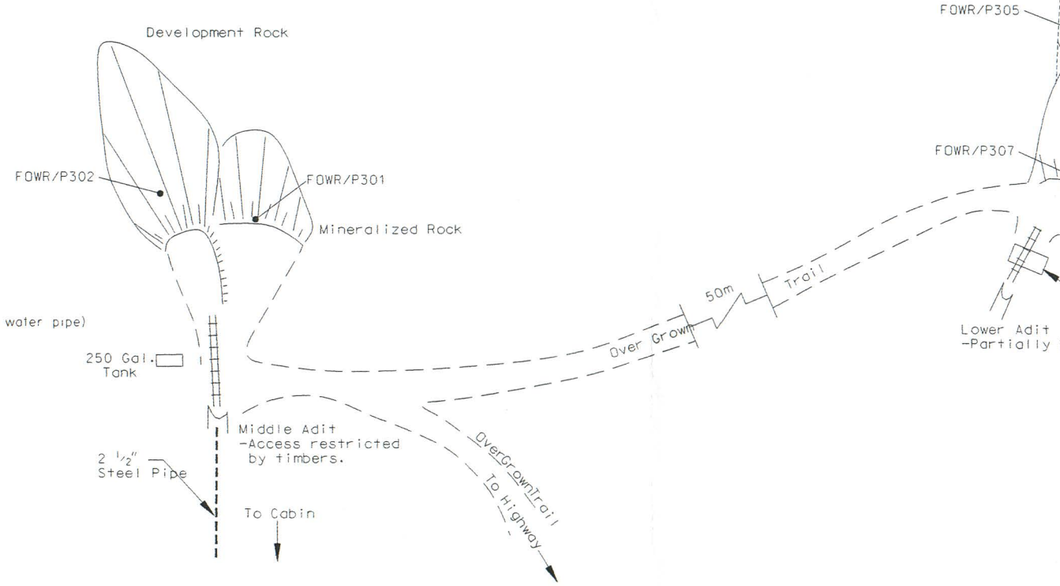
na = no assay / analysis

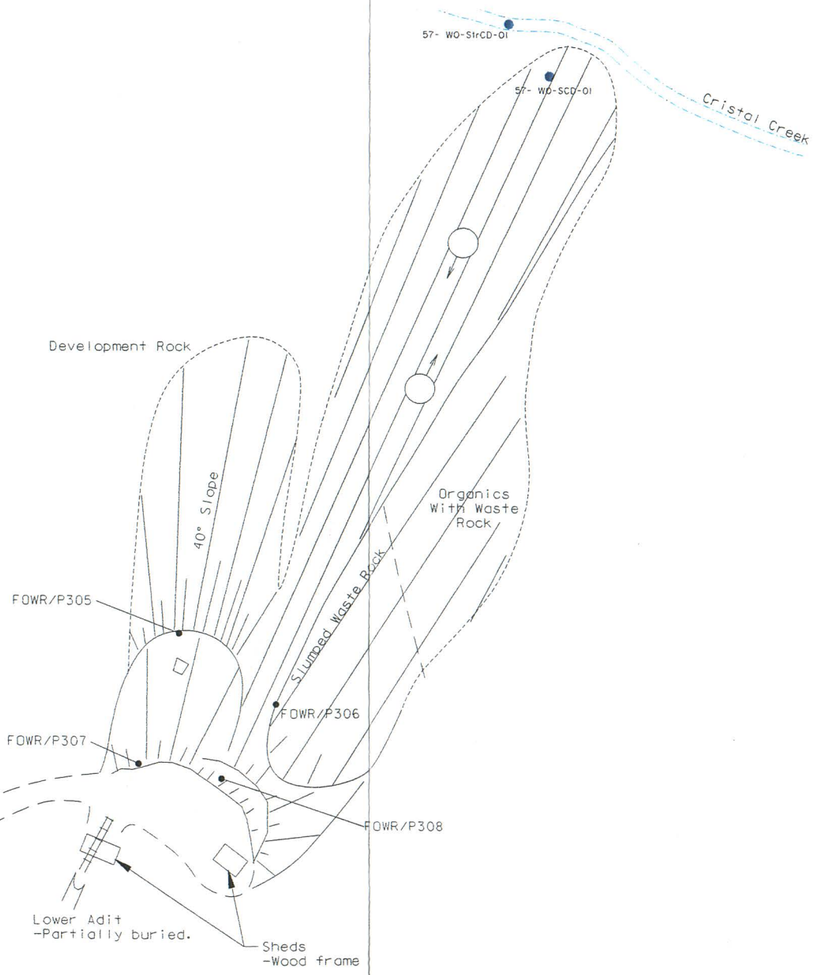
< = lower detection limit

> = upper detection limit

- Building (22A: building site present reference#) Indicates Asbestos Material (22A*)
- 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)
- WQ-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
- Collapsed Tressle
- 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)







0 10 20 30 40

Approx. Scale 1:1000

CAD FILE: Site57.DGN

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

Architectural & Engineering Services
Western Region

Drawing title: / Titre du dessin:

Fromo Mine Site #57
Site Assessment
Yukon Territory

designed by: / concu par:	
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 1

Photo 57-1: Remains of shaft on slope at upper workings.

Photo 57-2: Bottom of slope at upper workings where water has ponded in past.

Photo 57-3: Site road formed in waste rock at upper workings.

Photo 57-4: Waste rock below lower workings. Note extensive vegetation kill zone.

Photo 57-5: Waste rock below lower workings. Note Christal Creek at bottom.

Photo 57-6: Interior of core shack at upper workings.