# ARIS SUMMARY SHEET

D rict Geo	logist, Kamloops		Off Confidential: 90.05.2	9
ASSESSMENT R	EPORT 18808 N	AINING DIVISION: L	illooet	
PROPERTY:	Hurley			
LOCATION:	LAT 50 26 00	LONG 122 18 00		
	UTM 10 5586827	549716		
	NTS 092J08W			
CLAIM(S):	Duf 2			
OPERATOR(S):	Bauer, K.			
AUTHOR(S):	Murphy, J.D.			
<b>REPORT YEAR:</b>	1989, 24 Pages			
COMMODITIES				
SEARCHED FOR	: Silver,Copper			
<b>KEYWORDS:</b>		ormation,Bridge Ri	ver Group, Tuffs, Quartz Veins	S
	Tetrahedrite			
WORK				
DONE: Geo	ological			
GEO	DL 300.0 ha			
MINFILE:	092JSE			

### GEOLOGICAL REPORT

#### on the

DUF 1 & 2 MINERAL CLAIMS

Record Numbers 4074 & 4075

DUFFEY LAKE, B. C.

LILLOOET MINING DIVISION

NTS 92J/8W

Lat. 50°26'-N 122°18'-W 

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for

Karl Bauer

Owner

by

Jay D. Murphy

Consulting Geological Engineer

1989-04-05



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#### INTRODUCTION

The subject property is located approximately 40 km straight line distance southwest of Lillooel and too kilometres north of the east end of Duffey Lake (Plate No. 1 and Plate No. 2). The property is easily accessible from the Coast by Highway 99 and the Pemberton-Duffey Lake road, and from the Interior via Highways 97 and 12 to Lillooet. From here the gravel surface Pemberton-Duffey Lake road is followed for about 40 km southwest to the "Hurley Silver Mine" access road. This is a disused logging road in fair condition that swings north over Cayoosh Creek, then climbs in a series of switchbacks for about 5 km to the old workings on the Hurley Vein around the 2000m elevation. The access road crosses an avalanche track about a kilometre from the showing area, and from this point four wheel drive capabilities are necessary.

The property consists of two mineral claims, DUF 1 and 2, staked under the four post system. The claims are contiguous, contain nine units each, and define a rectangular area three km east-west by one and a half kilometres north-south (Plate No. 2). The DUF claims overstake two claims held by Mr. Bob Hurley and staked under the old two post system, the dimensions of each claim being 1500 ft. by 1500 ft. Total area covered by the DUF claims is therefore reduced to approximately 408 hectares from a nominal 450 Ha.

The property is situated on the eastern flank of the Coast Range mountains in an area of extremely rugged topography and high relief. Elevations vary from 1110m at Duffey Lake, to over 2250m at the local height of land covered by the DUF Claims, in a horizontal distance of 2000m. Alpine areas are characterized by cirques and knife edge ridges separating broad, U shaped valleys.

The valleys and steep hillsides are well forested up to the 2000m level. Above this elevation is practically barren of tree growth, except for a few stunted specimens of no commercial value.

Rock exposures are scarce except for steep rock bluffs and knife edge ridges representing local heights of land. Steep hillsides are mainly scree covered. Large valleys are extensively covered by glacial debris.

The DUF claim area is well drained by several small, unnamed mountain streams draining east to Cayoosh Creek, and by Common Johnny and Halymore Creeks running northwest into the Anderson Lake drainage.



The claims area has a short snow free period. During property visits in early July and mid November, the cirque in which the showing occurs was found extensively snow covered.

The DUF 1 and 2 mineral claims are held by Karl Bauer, Kamloops, B.C., and are in good standing until the expiration date of 1989-07-29.

#### SUMMARY AND CONCLUSIONS

The DUF claims are favourably located with respect to geology and structure. Known mineralization has economic potential, and there are possibilities of locating additional, similar material, elsewhere on the property.

More surface prospecting is warranted.

The Hurley Vein requires additional development work to determine the feasibility of an economic mining operation.

There is a good possibility that a profitable, small scale mining operation can be developed.

#### RECOMMENDATIONS

1. During the snow free period, starting early August, surface rock exposures within the DUF claim group, and surrounding area, should be carefully prospected. Particular attention should be directed to the area above Road 'C' (Plate No. 3) where high grade silver float was found.

2. Drill at least two percussion drill holes at flat angles to prove the Hurley Vein extends at least 30m down dip from surface to the elevation of the proposed adit (Plate No. 3). Drill cuttings from vein intersections should be collected for assay.

3. Contingent on encouragement from 2 above, drive approximately 60m of adit to intersect the Hurley Vein.

4. Mining, if warranted, could be initiated from the adit with no further lateral development required.

# COST ESTIMATES

 $\left( \right)$ 

1.	Prospecting, mapping and sampling, 5 days @ \$400/day		\$2000	
	Mobilization from Kamloops	-	100	
	Assaying		200	
			\$2300	\$ 2300
2.	Upgrade existing access roa	ađ		
	& prepare collar for proposed adit.			
	8 hrs. D-6 Caterpillar ren	tal		
	@ \$120/hr		\$ 960	
ł	Mobilization from Lillooet		300	
	115m percussion drilling			
	@ \$25/m		2875	
	Mobilization from Kamloops		500	
			\$4635	\$ 4635
3.	60m of 2.5m x 2.5m crosscut	t		
	@ \$500/m		\$30000	
	40m of 1.5m x 1.5m ventilat	tion		
	raise @ \$425/m		17000	
	Mobilization from Kamloops		1000	
	Engineering & surveying		2000	
	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		\$50000	\$50000
		Sub T		\$56935
	· · ·	15% C	ontingencies	8540
		TOTAL	COSTS	\$65475
		SAY		\$65000

3

4. Mining costs are discussed in detail under "Economic Considerations".





# SYMBOLS

Road, all vehicle, 4 wheel drive Trail

Stream, permanent, intermittent

Height of land

Regional fault, location approximate

Hurley Vein

Avalanch track

NOTE

Topography from Air Photos BC 7768 - 231 & 232 Geology from G.S.C. Open File 482 by G.J. Woodsworth (1977)

OF



#### HISTORY

No information on the property was found in annual reports by the B.C. Ministry of Mines. Consequently the work history of the area is extremely vague.

According to oral reports, silver mineralization found on the DUF claim group has been known for many years. The main working, a short adit on the Hurley Vein, was probably driven in the early 1900's or possibly earlier. Considerable work was carried out in the early 1960's, consisting mainly of a series of bulldozed roads that appear to have been made primarily to expose bedrock for exploration purposes. Some diamond drilling was probably done as well, but no drill collars were recognized.

#### GEOLOGY

The subject area is located close to the boundary between two major tectonic divisions, the Coast Crystalline Belt and the Intermontane Belt. The property lies near the eastern edge of the Coast Crystalline Belt within 10 km of the boundary with the Intermontane Belt to the east.

The Coast Crystalline Belt consists essentially of Cretaceous granitic intrusives containing scattered remnants (roof pendants) of sedimentary and volcanic rocks of Triassic and older age. The DUF claims lie near the southwest corner of such a roof pendant approximately 20 by 40 km in size, trending northwest and covering part of the adjacent Intermontane Belt. Granitic rocks are exposed a few kilometres to the west and south of the property.

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The boundary between the Coast Crystalline and Intermontane Belt trends north northwest and passes a few kilometres east of the DUF This noted. boundary is defined claims, as previously approximately by the north-northwest trending Fraser Fault and the northwest trending Yalakom Fault system that splays off the main Fraser Fault near the town of Lillooet. A less well defined fault is interpreted to cut through the DUF claims on a northwest trend, extenting from the Fraser Fault south of Lillooet to the Yalakom This unnamed break parallels the Fault north west of Lillooet. Lillooet River Fault about 15 km to the southwest.

The DUF claims area is underlain by two distinct geological units in faulted contact. The Hurley Formation, a predominantly sedimentary unit lies west of the regional fault described above. The older, mainly volcanic Bridge River Group lies east of the fault (Plate No. 2).

Both the Bridge River Group and the Hurley Formation are Triassic in age. Both units are overturned with tops facing west. In the claims area dips are intermediate to the northeast.

The majority of rock outcrops noted during limited geological mapping of the property consist of a non descript, medium grey green, fine grained, weakly bedded rock tentatively indentified as volcanic tuff of intermediate composition. Lack of well defined bedding suggest subaerial deposition. Some outcrops carry up to 10% disseminated, euhedral pyrite. Kaolinisation is widespread. No correlation was made between these features and economic mineralization.

A distinct, dark green mafic volcanic unit was noted at the end of Road 'C' (Plate No. 3) and appears to continue for a considerable distance to the northeast.

A narrow, dike like felsic intrusive occurs along the contact between the tuff and volcanic units, but was not seen elsewhere on the property.

#### MINERALIZATION AND VEINING

The main showing, herein referred to as the Hurley Vein, occurs in the steep south headwall of a well defined cirque opening to the northeast. Here a strong fissure quartz vein outcrops, striking N-63°-W and dipping south into the mountainside at 44°. An old working exposes the structure for a strike length of 10m. The vein is up to a metre wide and consists of massive white quartz with disseminated tetrahedrite mineralization. No other sulphide minerals were noted. A bulk sample of vein material, taken by previous workers, assayed 20.9 ounces per ton silver (Appendix No. 1).

A similar vein .5m wide was noted in the hanging wall about 3m above the Hurley Vein. This parallel structure was sampled and found barren of economic mineralization.

Apart from the main Hurley Vein, three separate quartz structures varying from .13m to 1.3m in width were noted and sampled. Samples were assayed geochemically for gold and silver but no anomalous values were found. (Appendix No. 2).



A small piece of mineralized quartz float was found on Road 'C' more than 150m northeast of the Hurley Vein (Plate No. 3). This sample assayed 47.0 oz./ton silver and .83% copper with negligible gold values (Appendix No. 3). The source of the tetrahedrite bearing float has not been located.

#### FIELDWORK

The writer made a preliminary examination of the property on 1988-07-03, mainly for the purpose of orientation. The area was still heavily snow covered. Little geology was seen apart from the Hurley Vein workings. During the period 1988-09-22 to 25 inclusive the writer camped on the DUF claims at the 2000m elevation. The area had already received fresh snow and more than 30 cm fell during the examination period.

The main roads and trails were mapped by hip chain and compass methods to provide control for preliminary geological mapping and sampling. Most geological mapping was confined to roads because of snow conditions. Location posts for the Sun 1 and 2 claims were located and tied in to determine the position of this ground relative to the Hurley Vein. Results were field plotted on a scale of 1:5000 (Plate No. 3).

#### MILL TESTS

Representative samples from the Hurley Vein were tested by Kamloops Research and Assay Laboratories to determine recoverability of economic minerals. Sample material was found amenable to standard flotation methods, yielding a high grade silver-copper-leadantimony concentrate with a recovery rate exceeding 90% for copper and silver. Details of flotation tests are given in Appendix No. 4.

A heavy media test was also conducted on Hurley Vein material. It was found that, after crushing, 70% of the material can be floated off as waste, with the remaining 30% containing practically all the economic minerals. A liquid medium having a specific gravity of 2.6 was used in this test. Results are detailed in Appendix No. 5.

#### DISCUSSION OF RESULTS

Very limited geological mapping on the property seems to agree fairly well with government maps and confirms, in a general way, that the subject claims are underlain by volcanic rocks of the Bridge River group. The area of the interpreted regional fault and adjacent Hurley Formation sediments was not examined, consequently, no evidence was seen to confirm the location of these features. A number of quartz structures occur on the DUF Claims, but only the Hurley Vein carries economic mineralization.

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#### ECONOMIC CONSIDERATIONS

The most negative aspect of the property is the high altitude, resulting in a very short snow free period from early August to late October.

Road access is good, but the 5 km from Duffey Lake road to the showing is slow going, and can take up to an hour in slippery conditions.

The presence of arsenic and antimony in the ore will cause smelting problems unless these elements can be eliminated from the concentrate.

On the positive side, there is abundant potable water close at hand. There are no habitations or commercial developments within the DUF claims to conflict with mining.

The simplicity of the ore should permit high recovery rates at low cost. The possibility of reducing run of mine ore by 70% through heavy media methods is considered a significant asset. Since the ore is nearly free of non economic sulphides, and the economic sulphides (tetrahedrite-tennantite) will be removed as concentrate, mine waste and mill tailings should be environmentally acceptable.

The Hurley Vein may be suitable for a private mining operation on a small scale. The structure appears regular in strike and dip, approximates the suggested minimum mining width of one metre, and appears not to be affect by faulting. The vein dip is sufficiently high to allow muck to run freely on the footwall.

In calculating the anticipated cash flow from such an operation, the following assumptions were made:

(1) The Hurley Vein averages 20 ounces of silver and 1% copper per short ten.

(2) The vein will be mined at an average rate of 150 short tons per week.

(3) Mill recovery for silver and copper will average 90%.

(4) Metal values are \$7.00 per troy ounce of silver and \$1.00 per pound of copper.

For a one week period the calculations for gross value of metals produced are as follows:

Short tons milled = 150

Silver recovered =  $150 \times 20 \times .9 = 2700$  ounces

Copper recovered =  $150 \times 20 \times .9 = 2700$  pounds

Silver value = 2700 x \$7 = \$18900

Copper value = 2700 x \$1 = \_\_\_\_2700

Total value concentrate \$21600

Assuming a three month operating period, it should be possible to produce at least \$250,000 worth of metal in a season.

Production costs per ton of ore treated are estimated as follows: Shrinkage stoping \$20

Milling	\$10
50% Contingencies	\$15

Total Production Costs \$45

Based on ore grade and recovery rates previously discussed, each ton of ore in place contains \$144 in recoverable metals. For an operating period of 12 weeks at 150 tons per week, the calculated operating profit would be 1800 tons x (\$144 - 45) = \$178,200

Deducting exploration and development costs as given under "Cost Estimates" yields a first season profit of (178,200 - 650 00) = \$113,200

Transportation and smelting costs for concentrate have not been included in these calculations.

# STATEMENT OF COSTS

The following expenses were incurred on the DUF 1 and 2 mineral claims. Fieldwork was done during the period 1988-09-22 to 25. Report preparation was completed between 1989-01-22 and 1989-04-03.

All work was done by Jay D. Murphy, P. Eng.

## CONSULTING

4 days fieldwork @ \$350/day 12.25 hrs. report preparation @ \$40/hr. 19.25 hrs. drafting @ \$30/hr Total Consulting	\$1400.00 490.00 577.50 \$2467.50	\$2467.50
TRANSPORTATION		
4 days 4x4 rental @ \$25/day 446 km @ \$.20/km Total Transportation	\$ 100.00 89.20 \$ 189.20	\$ 189.20
FOOD & LODGING		
4 days @ \$25/day		\$ 100.00

\$ 100.00

\$2829.50

TYPING & REPRODUCTION

12 pages typing @ \$4/page	\$ 48.00	
84 photocopies @ \$.20/copy	16.80	
8 blockline prints @ \$1.00/copy	8.00	
Total Typing & Reproduction	\$ 72.80	\$ 72.80

TOTAL COSTS

#### STATEMENT OF QUALIFICATIONS

- 10 -

I, Jay D. Murphy, hereby certify:

- That I am a Consulting Geological Engineer, resident at 1335 Todd Road, Kamloops, B.C.
- That I am a graduate from the University of Manitoba (1954) with a B.Sc. in Geological Engineering.
- 3. That I have practiced my profession continuously since graduation.
- 4. That I am a member of the Association of Professional Engineers of British Columbia and Ontario.
- 5. That the information contained in this report is based on a personal examination of the subject property.
- 6. That I have no financial interest in the subject property.

Murphy, ng. ESSI OF D. MURPHY BRITISH OLUMB

Member Capadian Test Association		PHONE: (6	RCH & ASS NL CRESCENT KA V2C 5P5 504) 372-2784 TELI TIFICATE OF A	MLOOPS, B.C EX: 048-8320		ORY L	TD.	GEOCI		ASSAYERS ANALYSTS S
TO	Mr. Karl Bauer 103-409 Fortune Dr.,	·					Certific Date	cate No June 19	к 8030 Э, 1987	
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No.	Description	Au	Ag	Cu	
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B.C. Certified Assayer

Kamloops Research & Assay Laboratory Ltd.

**B.C. CERTIFIED ASSAYERS** 

912 - 1 LAVAL CRESCENT — KAMLOOPS, B.C. V2C 5P5 PHONE: (604) 372-2784 — TELEX: 048-8320

July 7, 1987

Mr. Karl Bauer 103-409 Fortune Drive Kamloops, B.C. V2B 2H9

Dear Sir:

The following is a report of flotation tests performed on a sample of ore supplied to the Kamloops Research and Assay Laboratory by Mr. Karl Bauer and discussed by the above with Derek Blundell.

- 14 -

The purpose of the program was to determine the mineral content and to show whether a saleable concentrate could be produced from this material.

A head sample was taken and assayed. From the assays it was ascertained that the mineral content was lead sulphide, copper in the form of azurite (copper carbonate), malachite (copper carbonate), tetrahedrite and possibly tennanite. There were minor amounts of bismuth.

Due to the elevated levels of arsenic and antimony, it was thought that unless a concentrate very high in silver was made from this material, it would be very difficult to sell. The antimony and arsenic are locked in the silver-copper and will automatically report with these elements in the concentrate. Two tests were run, each on 1000 grams of the ore.

The procedures followed in making this concentrate are:

Test #1 - 1000 grams of -8 mesh ore were ground in the laboratory rod mill for 15 minutes at 60% solids and with 51bs/ton of soda ash, .051bs/ton butyl xanthate and .01 lbs/ton of Cyanamid Promoter 242. The ground pulp was transferred to a 2000 gram laboratory flotation cell and the P.H. checked at 9.0. Frother (M.I.B.C.) was added and a concentrate was drawn off for 6 minutes, then .021bs/ton of Cyanamid Promoter 404 was added and the float continued for a further 6 minutes. No cleaning of the bulk rougher concentrate was done on this test. All reagents used were made up at 20% strength by weight.

Table 1 shows the assays, weights and distribution of the various components in the ore.

## Test No. 1

Assay Distribution

PRODUCT	Weight	Assays %							Distribution %						
$\cap$	*	Ag*	Cu	Pb	Fe	As	Bi	Sb	Ag	Cu .	P5	Fe	As	81	Sb
Concentrate Tails	14.8 85.2	549.60 1.6	9.00 0.12	0.32	4.8 0.33	1.81 0.05	0.20 L.01	5,52 0,11	98.3 1.7	92.8 7.2	65.9 34.1	71.6 28.4	86.2 13.8	100.0	89.7 10.3
						•					-	-			
								1 <u>8</u> 1 - 1 - 1							

L means "less than"

\* ozs/ten

Because visual results of test 175-1 were encouraging, a second test was performed with subsequent cleaning, one time, of the bulk rougher concentrate.

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Test #2 - Grinding was again performed in the laboratory rod mill on 1000 grams of -8 mesh ore and in the presence of 51bs. per ton of sodium carbonate, butyl xanthate .06 1bs/ton. Grind time on this test was for 16 minutes as the #1 test seemed slightly coarse. The pulp was transferred to the 2000 gram flotation cell, P.H. checked at 9.5, and flotation started, adding M.I.B.C. frother as required. At 9 minutes .021bs/ton Cyanamid 3477 and .021bs/ton of Cyanamid Promoter 404 were added and the float was allowed to finish after a total of 15 minutes.

The bulk rougher concentrate was transferred to the 750 gram flotation cell and flotation continued for 3 minutes. In practice, the tailing from this unit would be returned to the bulk flotation.

Table 2 shows the assays, weights and distributions of various elements, including iron, which is a critical element for the smelter. It is not a problem in this product. Mercury in the concentrate was 90ppm.

#### Test No. 2

# Assay Distribution

	Weight	Assays %							Distribution 🗶							
	%	Ag	Cu	РЬ	Fe	As	Bi	Sb	Ag	Cù	РЬ	Fe	As	Bi	Sp	
Concentrate	6.78	1135.6	17.90	8.20	4.54	3.36	.24	10.60	94.9	92.0	74.5	43.2	79.3	85.1	87.5	
Cleaner Tail	7.10	48.1	1.00	1.23	2.90	0.35	0.04	0.72	4.2	5.4	11.7	28.3	8.7	. 14.9	6.2	
Tail	86.12	.82	0.04	0.12	0.24	0.04	L.01	0.06	0.9	2.6	13.8	28.4	12.0	0.0	5.3	

L means "less than"

Test 175-2 produced a high grade silver concentrate with a high copper and medium lead content. The extremely high silver could make this product attractive to the smelter even though both arsenic and antimony units are much higher than they usually allow. As is indicated in the product, assay and distribution sheets, no difficulty will be encountered in treating this particular ore.

Yours sincerely,

Jule A Studely

R.G. Blundell.

RGB/cb

LABORATORY LTD.

B.C. CERTIFIED ASSAYERS

912 - 1 LAVAL CRESCENT — KAMLOOPS, B.C. V2C 5P5 PHONE: (604) 372-2784 — FAX 372-1112

Nov. 22, 1988

Karl Bauer 103 - 409 Fortune Drive. Kamloops, B.C. V2B 2H9

Dear Karl;

RE: File KM 175

Following are the results of the heavy media test which you requested we perform on a sample of ore submitted by you.

- 18 -

The ore was crushed to minus 3/8" and a specific gravity analysis was run to determine the density at which to perform the test. Following this analysis the liquid density was adjusted to 2.6 S.G. to allow the waste to float.

The separation test was then completed and the float was removed from the surface of the liquid, washed thoroughly, dried and assayed. After removal of the liquid from the sink product, it was washed thoroughly, dried and assayed.

The float assayed 0.65 ounces per ton of silver and the sink assayed 67.9 ounces per ton of silver. The float, which represented approximately 70% of the material, would be discarded leaving the sink (30% of the material) to be transported from the minesite.

Should a higher grade sink product be desired, the density of the heavy media could be increased which would cause the middling to float. The decision would have to be made whether a higher silver loss resulting in a smaller higher grade concentrate is more desirable.

Yours truly,

ABlunder

R.G. Blundell