W.A. No. 15W

NAME Geol Rpt

SUBJECT

Vowell Ck Placers

82KNE007-07
PROPERTY FILE
003696

M28-1506

HAZEN RESEARCH, INC.

4601 INDIANA STREET
GOLDEN, COLORADO • 80401
TELEPHONE 303/279-4547

February 10, 1970

Mr. J. M. Black, P. Eng.
Dillingham Corporation Canada Ltd.
1500 West Georgia Street
Vancouver 5, Canada

Re: HRI Project 580 - Examination of Placer Samples from British Columbia, Canada

Dear Mr. Black:

Refering to your letter of February 6, regarding the omission of the results for columbium on page 4 of the attachment dated February 3, please add the following:

	Percent of Element				
Element	20-24'	24-28'	28-32'	32-36'	36-40'
Columbium	0.090	0.069	0.056	0.043	0.090

Thank you for bringing this oversight to our attention.

Sincerely,

Roland Schmidt

Roland Schmidt
Mineralogist

RS:brt

cc: Mr. E. H. Lindsey

Results from 11 concentrates Vowell Creek

No.	Sample	Scintillometer Reading	Coast Eldridge U_3O_8	Coast Eldridge U	Hazen
1	VF3 4-8	145	.004	.003	.015
2	VH2 52-56	175	.004	.003	.006
3	VG2 36-40	195	.004	.003	.003
4	VF3 44-48	250	.007	.006	.009
5	VG2 32-56	260	.008	.007	.008
6	VF3 60-64	295	.009	.008	.009
7	VF3 64-48	310	.009	.008	.015
8	VH2 12-16	335	.010	.008	.013
9	VD1 4-8	470	.012	.010	.011
10	VD1 12-16	615	.015	.013	.018
11	VE2 28-32	660	.025	.021	.026
	Arithmetic Average		.008%		.012%

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May 28, 1970

Mr. E. H. Lindsey
2015 Center Street
Berkeley, California 94704

Re: HRI Project 761

Dear Mr. Lindsey:

Attached are the results of the separation test work performed on the No. 2 Composite of Vowell Creek gravel samples. During the course of this work most of the minerals were identified with the exception of a possible titano-columbate which was only tentatively identified.

This mineral deserves further study since it apparently contains much of the columbium, uranium and significant amounts of the rare earths. There is strong evidence that the rutile is columbium bearing also, but the quantitative determination of the amount present would require analysis of a pure rutile concentrate. From the literature it is known that such rutile can contain up to 32% Cb_2O_5.

Sincerely yours,

Roland Schmidt

Roland Schmidt
Mineralogist

RS:brt

attachment

cc: Dr. J. Black, w/att.
R. W. Jenkins, w/att.

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Investigation of Separation Methods to Recover Values from B.C. Placer Deposit

An investigation was made to determine if values contained in Vowell Creek gravel samples could be recovered by physical beneficiation methods. In accordance with Mr. Black's letter dated April 15, 1970, two composites were made from several holes and footage intervals as shown in Table 1.

For the investigation a 1 kg portion of Composite No. 2 was separated into relatively pure mineral fractions by a combination of gravity, low and high intensity magnetic separations, and flotation. The resulting products were examined microscopically and analyzed by X-ray fluorescence spectroscopy. From this work the following conclusions may be drawn.

A. By means of laboratory scale physical beneficiation methods, it was possible to produce relatively high grade mineral concentrates including:

Apatite
Magnetite
Titanite
Ilmenite
Zircon

Other more impure fractions produced were:

Rutile
Allanite
Monazite
A Titano-columbate (tentatively identified)

B. X-ray analyses of these concentrates showed:

1. Columbium was concentrated up to 12%. The metal apparently occurs as Cb-bearing rutile and as an unidentified metamict titano-columbate.

2. Uranium and thorium were concentrated up to 4.5% and 7.6%, respectively. Uranium and some of the thorium apparently occur also in the titano-columbate. The bulk of the thorium is probably associated with monazite.

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3. The majority of the rare earths and yttrium occurs in allanite, monazite and probably the titano-columbate. Concentrations of 5.7% La and 11. % Ce with lesser amounts of the other rare earths have been obtained in a monazite + titano-columbate product.

4. About 2% apatite occur in the composite feed sample. Analyses of a pure concentrate of this apatite revealed the presence of about 1% combined rare earths and 0.45% yttrium.

The results of the investigation are summarized in the following tables.

Table 1

Samples Used to Prepare Composites No. 1 and 2

Composite No. 1

VC H1	12'-16'
VD' H1	32'-36'
VE H1	12'-16'
VF H1	32'-36'
VF H2	24'-28'
VF H2	60'-64'
VF H3	4'-8'
VF H3	36'-40'
VF H3	64'-68'
VF H4	4'-8'
VF H4	12'-16'

Sample VH'H2 (12'-16') is missing and was not included in composite.

Composite No. 2

VC H1	28'-32'
VE H2	20'-24'
VE H2	32'-36'
VE H3	24'-28'
VF H2	28'-32'
VF H2	40'-44'
VF H2	68'-72'
VF H3	8'-12'
VF H3	20'-24'

Sample VH' H2 (52'-56') is missing and was not included in composite.

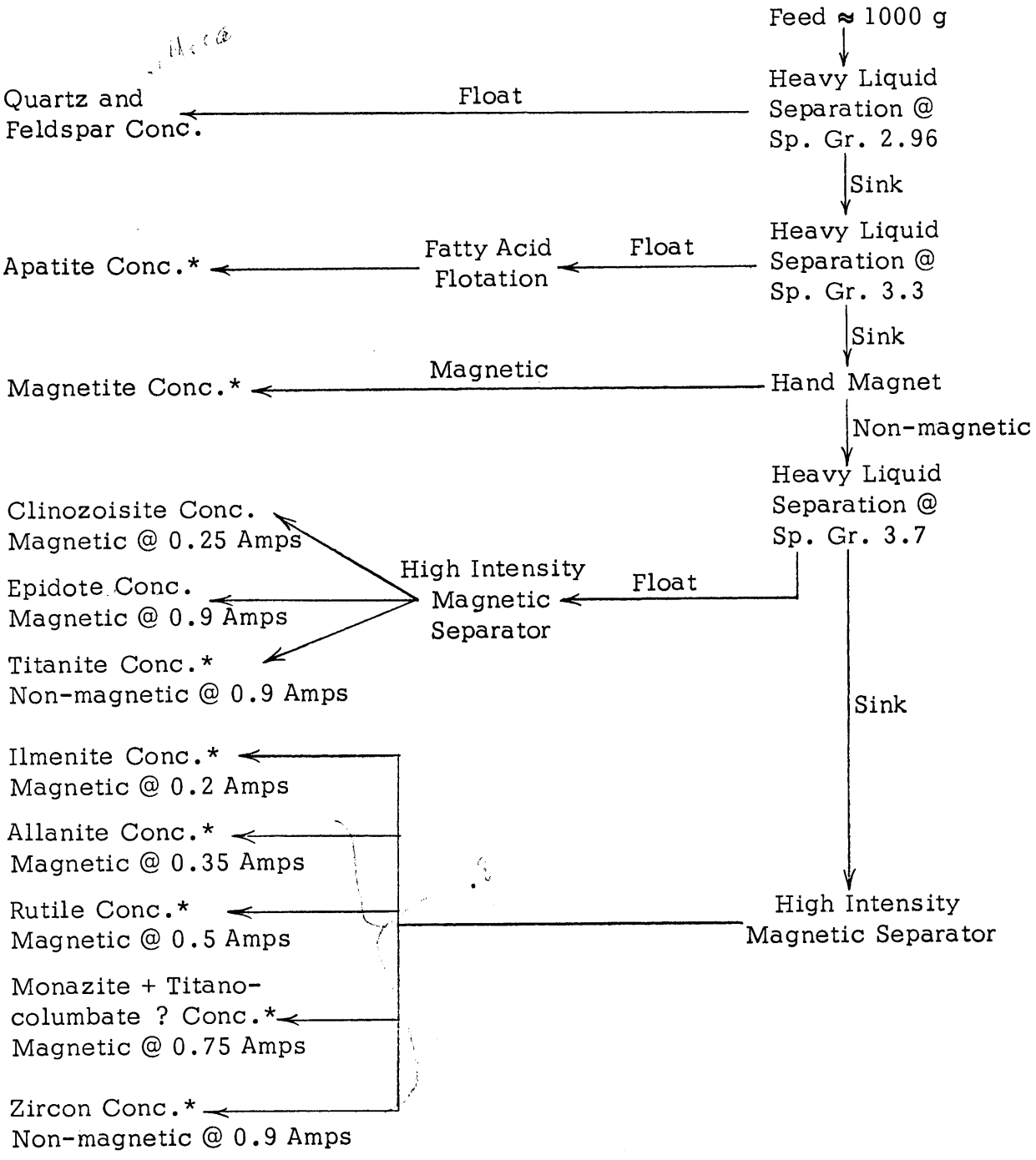
Table 2

Mineral Composition of Composite No. 2

Mineral	Calculated Mineral Content - Feed %	Calculated Mineral Content - Sink Product (Sp. Gr. >3.3) %
Quartz and Feldspar	91.4	-
Magnetite	4.3	62.5
Apatite	0.4	2.3
Ilmenite	0.7	10.1
Allanite	0.2	2.2
Zircon	0.2	3.5
Epidote	0.2	2.4
Garnet	0.01	0.2
Titanite	0.1	1.9
Micas	1.6	0.1
Clinozoisite	0.02	0.3
Rutile	0.2	3.1
Hematite	0.7	9.9
Titano-columbate	0.06	1.0
Monazite	0.04	0.6
Goethite	-	0.01

The above percentages should be regarded as approximations. The manner by which they were determined was as follows: The separation products were weighed and the composition and purity of each was estimated microscopically. These data were then used to calculate the content in grams of the individual minerals occurring in each product. These were then totaled and the percentages determined.

Methods Used to Separate Minerals of Composite No. 2



* Mineral fractions which have been analyzed by X-ray fluorescence as shown in Table 3.

Figure 1

Table 3

X-ray Fluorescence Scans of Mineral Concentrates

Element	Apatite	Magnetite	Titanite	Ilmenite	Allanite	Rutile	Monazite + Titano-columbate ?	Zircon
Cu	0.006	-	-	-	0.010	-	0.018	0.032
Zn	0.008	0.11	0.029	0.058	0.046	0.018	0.037	0.036
Tl	-	-	0.074	-	0.18	0.13	0.13	0.12
Sn	-	0.011	0.070	0.020	0.043	0.18	0.064	-
Pb	0.044	-	0.083	-	0.12	0.24	0.16	0.12
Fe	0.13	62.	2.1	24.	11.	4.2	1.6	1.5
Ni	-	-	-	-	0.011	-	-	0.008
Rb	-	-	-	-	-	0.27	0.32	-
Sr	0.062	-	0.045	-	0.028	0.023	0.018	0.060
Ti	- -	3.7	5.6	15.	7.3	11.	4.3	1.0
Zr	0.080	0.27	0.41	0.26	0.29	0.64	1.4	40.
Hf	-	-	-	-	-	-	-	0.41
Th	-	0.18	0.24	0.10	1.1	3.1	7.6	1.9
Cb	-	0.12 ?	1.2	0.87	1.4	12.	8.8	-
Ta	-	-	0.38	-	0.21	1.2	1.1	-
Cr	-	0.041	-	0.014	-	-	-	0.004
Mo	-	-	-	-	-	-	-	0.037
W	-	-	-	-	-	-	-	0.36
U	-	0.053	0.16	-	0.23	3.1	4.5	1.6
Mn	0.13	0.28	0.097	2.3	1.3	0.095	0.043	0.032
La	0.22	-	0.86	0.19	6.0	2.9	5.7	-
Ce	0.51	-	1.2	0.44	7.7	5.6	11.0	-
Pr	-	-	0.14	-	0.72	0.43	1.1	-
Nd	0.22	-	0.45	0.037	1.3	1.3	2.2	-
Sm	-	-	0.098	-	-	0.25	0.39	-
Gd	0.10	-	0.17	-	0.10	0.58	0.82	-
Dy	-	-	0.11	-	-	0.24	0.29	-
Er	-	-	0.094	-	-	0.30	0.23	-
Yb	-	-	0.079	-	-	0.079	0.11	-
Y	0.45	0.061	0.66	0.061	0.26	1.8	2.7	0.61

Microscopic Estimates

98%	Apatite	85%	Magnetite	80%	Titanite	85%	Ilmenite	50%	Allanite	70%	Rutile	20%	Titano-columbate	80%	Zircon
2%	Feldspar, Biotite	7%	Hematite		Epidote, Clinozoisite, Garnet, Rutile, Apatite, Vesuvianite, Zircon	10%	Hematite	40%	Ilmenite	15%	Titano-columbate	40%	Monazite	10%	Slag ?
		3%	Ilmenite				Monazite, Rutile, Titanite, Garnet		Garnet, Titanite, Mica, Goethite, Rutile, Monazite	7%	Allanite	40%	Rutile	8%	Apatite
		5%	Zircon, Apatite	20%		5%		10%		2%	Epidote			2%	Titano-columbate, Feldspar, Titanite
										2%	Monazite				
										4%	Titanite				

Hazen Research, Inc.

Assay Results

E. Lindsey

J. Black

November 17, 1969

The $U_3 O_8$ results from Coast Eldridge have been received. We will get the $Cb_2 O_5$ results next week.

I have reduced them to U for comparison with Hazen's and have plotted both against total count.

The total count curve is closely parallel to the Coast Eldridge curve and indicates that, even though the total count results in part also from K & Th radiation, it is a good indication of the U content.

A comparison of Hazen's earlier results, x-ray fluorescence vs fluorimetric, showed that the x-ray results were higher than the fluorimetric. The same relationship appears here with Hazen's curve above the C. E. curve.

With the exception of Hazen's #1 there is a rough parallelism for the three curves. This means that the semi-quantitative x-ray results are useable if used for an average for possibly 10 or more samples and if they are reduced by about 1/3.

JB:ah
Encl.