



Energy, Mines and  
Resources Canada

Énergie, Mines et  
Ressources Canada

Geological Survey  
of Canada

Commission géologique  
du Canada

802337

601 Booth Street  
Ottawa, Ontario  
K1A 0E8

5 March 1992

P.J. McGuigan  
Cambria Geological Ltd.  
1531 West Pender Street  
Vancouver, B.C.  
V6G 2T1

Dear Paul:

Enclosed is the lithochemical data for Torbrit (ddh #NS90-22) and North Star (surface and underground samples) that I said that I would send. You can note that the totals for many of the barite-rich samples are not near 100%. Many of these samples are being re-analyzed by other methods. I also would not pay too close attention to the preliminary classification plots as volatile contents and degree of alteration have not been taken into consideration.

I look forward to receiving copies of the map and drill logs. I would like to stay in touch on Granduc and other properties.

Best regards.

Sincerely,

*Rod*

R.V. Kirkham

RVK/lo

Encl.

*Paul McGuigan July 3/90*  
*12 000 ddh June 14/90*  
*program 25 000*  
*Should be complete*  
*by July 28/90*  
*within feet target FW*  
*within 50 1500 2000*  
*Northstar barite in situ + breccia*  
*Dolle Varden down 500 ruby*  
*siliceous extal. 1500 away*  
*- some chl. alt. thin no alt.*  
*- FW 2 mag. susceptible*

Canada



1842-1992  
Geological Survey of Canada  
150 Years of Service to the Nation

1842-1992  
Commission géologique du Canada  
Au service de la nation depuis 150 ans

Kitsault, B.C.  
\* to be repeated

GEOLOGICAL SURVEY OF CANADA  
MINERAL RESOURCES DIVISION  
ANALYTICAL CHEMISTRY SECTION

\*\*\*\*\*  
\* REPORT OF ANALYSIS \*  
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DATE: 19-NOV-91  
REPORT NO. 15-91  
SUBMITTED BY: I.R. JONASSON  
PROJECT NO. 740081  
METHOD: WDS-17 + ICP-MJ1 , ICP-TR1 , Ag & Pb by AA.  
FeO , H2O(t) , CO2 , C , S(t) and LOI by chemical methods.

ESTIMATE OF VALIDITY OF RESULTS

ELEMENT	+/-	( ABSOLUTE	+	RELATIVE )
SiO2	+/-	( 0.4 %	+	1% OF CONC. )
TiO2		0.02	+	" "
Al2O3		0.4	+	" "
Fe2O3(t)		0.1	+	" "
MnO		0.01	+	2% "
MgO		0.1	+	1% "
CaO		0.1	+	" "
Na2O		0.5	+	" "
K2O		0.05	+	" "
FeO		0.2	+	5% OF CONC.
H2O(t)		0.1	+	5% OF CONC.
CO2		0.1	+	3% OF CONC.
P2O5		0.02	+	1% OF CONC.
S(t)		0.04	+	5% OF CONC.
Ba	+/-	( 20 PPM	+	10% OF CONC. )
Be	+/-	( 0.5 PPM	+	5% OF CONC. )
Co	+/-	( 5 PPM	+	5% OF CONC. )
Cr	+/-	( 10 PPM	+	5% OF CONC. )
Cu	+/-	( 10 PPM	+	5% OF CONC. )
La	+/-	( 10 PPM	+	5% OF CONC. )
Nb	+/-	( 30 PPM	+	10% OF CONC. )
Ni	+/-	( 10 PPM	+	5% OF CONC. )
Pb	+/-	( 20 PPM	+	10% OF CONC. )
Rb	+/-	( 20 PPM	+	2% OF CONC. )
Sc	+/-	( 0.5 PPM	+	5% OF CONC. )
Sr	+/-	( 20 PPM	+	10% OF CONC. )
V	+/-	( 5 PPM	+	5% OF CONC. )
Y	+/-	( 5 PPM	+	5% OF CONC. )
Yb	+/-	( 0.5 PPM	+	5% OF CONC. )
Zn	+/-	( 5 PPM	+	5% OF CONC. )
Zr	+/-	( 20 PPM	+	10% OF CONC. )

I am,  
Same high  
totals? Problems?  
- Jones.

REPORT OF ANALYSIS

NAME: I.R. JONASSON

PROJECT: 740081

REQN. NO: 15-91

*Tom bit alk  
bunke (under)*

*1586*

LAB. NO.	41	42	43	44	45	46	47	48
SAMPLE NO:	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1
	42.4	46	48.5	51.6	52.9	54.3	58.6	62.2

SIO2 % :	65.8	80.7	36.4	61.3	23.9	29.9	7.20	16.2
TIO2 % :	0.35	0.04	0.23	0.03	0.00	0.01	0.01	0.00
AL2O3 % :	10.5	1.66	6.64	0.81	0.14	0.40	0.25	0.08
FE2O3t % :	7.30	5.87	6.07	4.05	0.90	9.60	6.59	2.73
FE2O3 % :						<i>(6.7)</i>	<i>4.4</i>	
FEO % :								
MNO % :	0.13	0.04	0.06	0.23	0.08	0.12	0.61	0.18
MGO % :	0.69	0.07	0.37	0.54	0.11	0.30	0.84	0.27
CAO % :	2.98	0.43	1.46	3.47	2.36	2.07	28.6	6.48
WA2O % :	0.10	0.03	0.05	0.04	0.09	0.02	0.07	0.04
K2O % :	3.76	0.45	2.09	0.05	0.01	0.06	0.02	0.0
CO2t % :								
CO2= % :	2.1	0.0	0.8	2.8	1.7	1.6	23.1	5.4
PO5 % :	0.1	1.1	0.0	0.0	0.1	0.0	0.0	0.0
t % :	0.14	0.05	0.11	0.05	0.02	0.05	0.00	0.04
ppm :	4.91	5.89	11.0	6.25	11.0	15.7	9.43	11.9
ppm :	1300	400	210000	110000	300000	270000	170000	340000
ppm :	21	25	14	98	6	33	40	10
ppm :	1.1	0.7	1.1	1.0	0.4	0.6	0.4	0.4
ppm :	23	6	37	20	4	23	2	8
ppm :	5	3	3	3	0	3	0	1
ppm :	33	310	34	420	15	240	26	14
ppm :	21	13	13	9	11	11	11	31
ppm :	0							
ppm :	0	0	0	0	0	0	0	0
ppm :	2800	9700	310	370	190	2700	280	93
ppm :	40							
ppm :	6.0	0.4	5.2	0.5	0.1	0.4	0.7	0.3
ppm :	470	51	1000	560	1900	750	630	1200
ppm :	91	5	62	6	0	0	0	0
ppm :	8	1	11	3	1	2	7	3
ppm :	0.6	0.0	0.7	0.0	0.0	0.0	0.0	0.1
ppm :	3900	19000	1200	4900	460	2000	1700	390
ppm :	36	4	29	2	0	1	1	0
ALS	99.7	99.3	86.1	91.1	70.0	86.9	93.6	76.8

REMARKS:

*Handwritten notes and calculations:*  
 \* 70.0  
 23.5  
 90.0  
 86.9  
 23.5  
 102.6  
 93.6  
 17.8  
 98.6  
 -12 for FeS  
 JK

REPORT OF ANALYSIS

NAME: I.R. JONASSON

PROJECT: 740081

REQN. NO: 15-91

LAB. NO.	50	51	52	53	54	55	56	
SAMPLE NO:	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	NS9022-1	
	65	68	70	73.5	74.4	76	78	
SIO2 % :	14.2	35.5	0.50	19.9	67.5	28.8	61.7	54.8
TIO2 % :	0.00	0.02	0.02	0.00	0.51	0.23	0.66	0.60
AL2O3 % :	0.07	0.59	0.20	0.11	14.8	6.43	17.9	17.1
FE2O3t % :	0.44	2.61	1.00	0.13	4.90	2.72	6.00	5.30
FE2O3 % :			0.1				4.2	1.3
FEO % :			0.8				1.2	3.6
MNO % :	0.16	0.06	0.88	0.02	0.06	0.11	0.02	0.29
MGO % :	0.97	0.23	0.43	0.02	0.81	0.51	0.88	3.21
CAO % :	3.09	1.39	52.1	0.91	0.70	1.43	0.54	4.64
NA2O % :	0.04	0.11	0.00	0.05	0.00	0.04	0.10	0.40
K2O % :	0.01	0.14	0.0	0.02	4.75	1.92	5.57	6.17
H2Ot % :			0.4					3.8
CO2t % :								
CO2= % :	3.7	1.2	43.1	0.5	0.0	0.8	0.0	3.3
C % :	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0
P2O5 % :	0.02	0.01	0.02	0.05	0.26	0.14	0.32	0.23
St % :	12.2	10.7	0.28	11.7	2.42	9.48	3.36	0.26
	50.5	20.9		29.2				
Ba ppm :	370000	300000	12000	370000	7400	290000	9900	3800
Ag ppm :	2	20	2	44	18	78	7	3
Be ppm :	0.5	0.7	0.6	0.4	1.0	0.8	1.3	2.0
Co ppm :	4	11	0	8	18	12	41	24
Cr ppm :	0	1	0	1	5	2	6	20
Cu ppm :	7	54	0	33	29	150	55	37
La ppm :	14	11	10	26	23	10	19	24
Nb ppm :			0		0		0	0
Ni ppm :	0	0	0	0	0	0	0	0
Pb ppm :	51	380	56	2300	170	190	240	110
Rb ppm :			12		140		140	180
Sc ppm :	0.2	0.5	3.8	0.0	11	4.0	7.1	19
Sr ppm :	2500	1500	1100	3300	160	1800	260	220
V ppm :	0	5	3	0	130	59	130	130
Y ppm :	1	1	13	0	11	5	14	16
Yb ppm :	0.1	0.0	0.3	0.0	1.0	0.4	1.4	1.4
Zn ppm :	100	2100	0	310	130	2200	370	120
Zr ppm :	0	2	120	0	41	26	49	73

TOTALS 71.5 82.4 99.9 70.3 97.6 81.6 98.2 100.2

COMMENTS: \* 94.3 \* 92.1 \* 99.2 \* 101.8

REPORT OF ANALYSIS

NAME: I. R. JONASSON

PROJECT: 740081

REQN. NO: 15-91

LAB. NO.	57	58	59	60	61	62
SAMPLE NO:	NS9022-1 85.7	NS9022-1 88.8	NS9022-1 92	15-91-60 #9	16-90-61 #30	15-91-62 #16
SiO <sub>2</sub> % :	67.9	54.2	49.2	88.8	53.6	30.4
TiO <sub>2</sub> % :	0.59	0.35	0.47	0.17	0.24	0.01
Al <sub>2</sub> O <sub>3</sub> % :	16.0	11.2	14.7	5.60	14.1	0.41
Fe <sub>2</sub> O <sub>3</sub> t % :	5.20	2.90	14.0	1.50	4.10	9.60
Fe <sub>2</sub> O <sub>3</sub> % :				0.4		5.72 2.0
FEO % :				1.0		
MNO % :	0.04	0.27	0.20	0.01	0.29	0.13
MGO % :	0.83	0.48	1.95	0.52	1.24	0.30
CAO % :	0.48	11.8	3.35	0.08	9.05	2.08
NA <sub>2</sub> O % :	0.00	0.80	0.11	0.40	1.50	0.02
K <sub>2</sub> O % :	5.11	3.26	4.51	1.87	3.18	0.08
H <sub>2</sub> Ot % :				1.1		
CO <sub>2</sub> t % :						
CO <sub>2</sub> = % :	0.0	9.3	2.3	0.0	7.8	1.7
C % :	0.0	0.0	0.0	0.1	0.0	0.0
P <sub>2</sub> O <sub>5</sub> % :	0.24	0.19	0.33	0.07	0.10	0.04
St % :	1.04	1.86	9.60	0.00	2.84	15.7 - 13.7 34.2
Ba ppm :	4200	1400	5100 <sup>0.57</sup>	1900	5400 <sup>0.60</sup>	270000 <sup>3015</sup>
Ag ppm :	4	5	4	3	39	35
Be ppm :	1.4	0.7	1.1	0.5	1.6	0.7
Co ppm :	30	15	31	4	34	24
Cr ppm :	6	6	7	4	3	4
Cu ppm :	260	50	41	4	110	250
La ppm :	21	24	25	21	27	11
Nb ppm :	0	0	0	0	0	0
Ni ppm :	0	0	0	0	0	0
Pb ppm :	53	1000	150	190	1600	2800
Rb ppm :	160	59		52	94	
Sc ppm :	13	7.9	10	3.3	3.1	0.3
Sr ppm :	89	480	130	29	1100 · 13	790
V ppm :	180	62	140	37	23	0
Y ppm :	11	14	9	4	11	2
Yb ppm :	1.2	1.5	0.2	0.4	1.2	0.0
Zn ppm :	270	1600	290	190	6200	2100
Zr ppm :	46	42	55	28	85	0
TOTALS	98.0	97.1	101.2	100.3	99.5	87.5 18.5 105.0 3.0 133.0 ✓

COMMENTS:



## ANALYTICAL CHEMISTRY SECTION

NAME: I.R. JONASSON

LAB. NO.

17

18

SAMPLE NO: KQ-90-13

89-11-31

1B

.4

SIO2	% :	47.1	46.5
TIO2	% :	0.53	0.85
AL2O3	% :	14.7	18.6
FE2O3t	% :	8.60	11.0
FE2O3	% :	1.6	6.3
FEO	% :	6.3	4.2
MNO	% :	0.32	0.21
MGO	% :	4.14	7.72
CAO	% :	6.80	4.79
NA2O	% :	0.10	2.20
K2O	% :	3.25	3.42
-----			
H2Ot	% :	3.8	5.1
CO2t	% :		
CO2=	% :	7.5	0.2
C	% :	0.1	0.1
P2O5	% :	0.33	0.29
St	% :	0.52	0.00
-----			
Ba	ppm :	20000	2000
Ag	ppm :	0	0
Be	ppm :	1.1	0.7
Co	ppm :	15	30
Cr	ppm :	5	13
Cu	ppm :	5	10
La	ppm :	28	22
Nb	ppm :	0	0
Ni	ppm :	0	11
Pb	ppm :	13	15
Rb	ppm :	100	62
Sc	ppm :	11	25
Sr	ppm :	910	1000
V	ppm :	120	270
Y	ppm :	16	16
Yb	ppm :	1.3	1.1
Zn	ppm :	170	90
Zr	ppm :	23	10
-----			
TOTALS		99.1	100.8

COMMENTS:

REPORT OF ANALYSIS

NAME: I.R. JONASSON

PROJECT: 740081

REQN. NO: 016-91

*S. of Discovery  
ask this person  
Quartz  
lake  
Zircon sample*

*Salt to  
Em. →*

*Hydrolyzed  
or silicified  
sample?*

*FW vol. to Northstar (vein)*

LAB. NO. 9 10 11 12 13 14 15 16  
SAMPLE NO: KQ-90-11 KQ-90-12 KQ-90-12 KQ-90-12 KQ-90-12 KQ-90-12 KQ-90-12 KQ-90-12  
6E 7 8 9A 9B 9C 9D 9E

	6E	7	8	9A	9B	9C	9D	9E
SIO2 % :	67.4	71.0	60.1	49.4	48.9	50.8	49.8	56.5
TIO2 % :	0.70	0.10	0.64	0.78	0.67	0.73	0.57	0.59
AL2O3 % :	14.2	11.2	16.6	19.3	17.3	17.9	16.5	16.5
FE2O3t % :	6.20	0.90	7.70	10.9	9.30	9.40	8.60	7.10
FE2O3 % :	0.0	0.1	5.4	8.2	7.2	4.3	5.0	4.9
FEO % :	5.7	0.7	2.1	2.4	1.9	4.6	3.2	2.0
MNO % :	0.13	0.19	0.09	0.19	0.39	0.16	0.34	0.20
MGO % :	3.07	0.48	1.44	4.34	3.47	4.14	1.97	1.61
CAO % :	0.06	4.33	2.43	1.94	4.44	5.05	4.75	4.06
NA2O % :	2.00	3.30	3.10	3.30	2.60	3.70	3.10	3.30
K2O % :	1.90	3.37	3.09	5.66	6.43	2.76	5.40	4.75
CO2t % :	4.0	0.7	2.6	3.6	2.7	3.3	2.0	2.2
CO2= % :	0.0	3.8	1.9	0.8	3.5	2.2	4.7	3.0
SO3 % :	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1
SO5 % :	0.11	0.03	0.26	0.34	0.33	0.33	0.29	0.31
SO6 % :	0.63	0.00	0.00	0.01	0.00	0.00	0.26	0.01
Ca ppm :	990	1300	550	2200	2500	2200	11000	1700
Mg ppm :	0	0	0	0	0	0	0	0
Fe ppm :	1.0	1.2	1.1	1.6	1.1	1.4	0.7	1.2
Al ppm :	15	3	15	30	23	22	16	18
Ti ppm :	130	1	7	13	7	12	7	11
Mn ppm :	41	7	1	3	0	11	1	11
Na ppm :	24	26	24	31	28	29	23	26
K ppm :	9	0	6	0	0	0	0	0
Si ppm :	99	0	0	0	0	7	0	0
Ca ppm :	15	10	6	33	32	28	20	29
Mg ppm :	57	92	110	170	170	72	130	140
Fe ppm :	18	1.1	15	23	16	17	13	14
Al ppm :	170	1100	700	280	760	690	660	450
Si ppm :	160	3	100	240	190	200	150	140
Ca ppm :	16	9	9	14	14	16	11	11
Mg ppm :	1.5	1.3	1.1	1.1	1.2	1.4	1.0	0.9
Fe ppm :	58	12	53	190	300	160	290	230
Al ppm :	100	68	69	45	45	43	37	49
TOTALS	100.7	99.7	100.0	100.7	100.3	100.4	99.2	100.2

COMMENTS:





66

NS9022  
8m

silicate chem

192m

ore chem  
silicate chem

ist  
e  
re.

21.7	"
27.5	"
43.7	"
57.2	"
77.5	"
83.3	"
94.6	"
114.7	"
122.1	"
138.4	"
139.2	"
142.4	barite (sulph. ore) chem
146	"
148.5	"
151.6	"
152.9	"
154.3	"
158.6	"
162.2	"
165	"
168	"
170	"
173.5	"
174.4	"
176	"
178	"
180.5 m	"
185.7	"
188.8	"

193.1	"
196.2	"
197.5	"
203.5	"
208.9	"
227.5	"
237	"
245.2	"
251	"
265.9	"
272.5	"
280.8	"
286.5	"

Jan-8/92

① Kitsault Lithochemical Plots

Symbol

Kit Property Number

▲

KQ-90-115 A to 15D

△

KQ-90-127, 128

+

#89-11-31.4 to 309.1m

\*

#89-11-375 to 420.1m

✓

②

Torbrit Property

▲

#NS9022-8.8 to 139.2m

\*

#NS9022-193.1 to 286.5m

✓

③

Northstar Property

▲

KQ-90-131B

\*

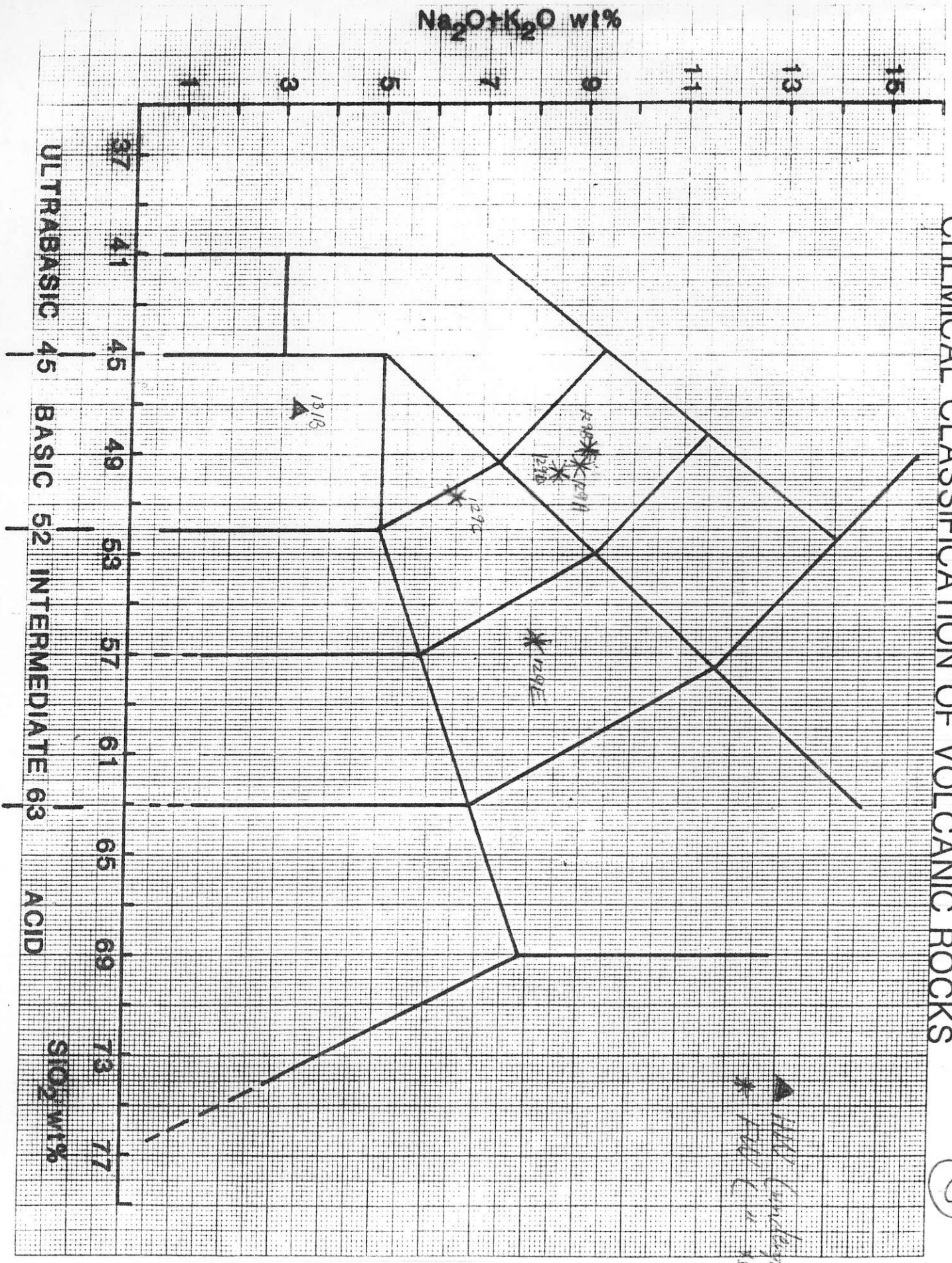
KQ-90-129A to 129E

✓

NIOSH/USGS ENVIRONMENTAL HEALTH HAZARD - Northstar Property

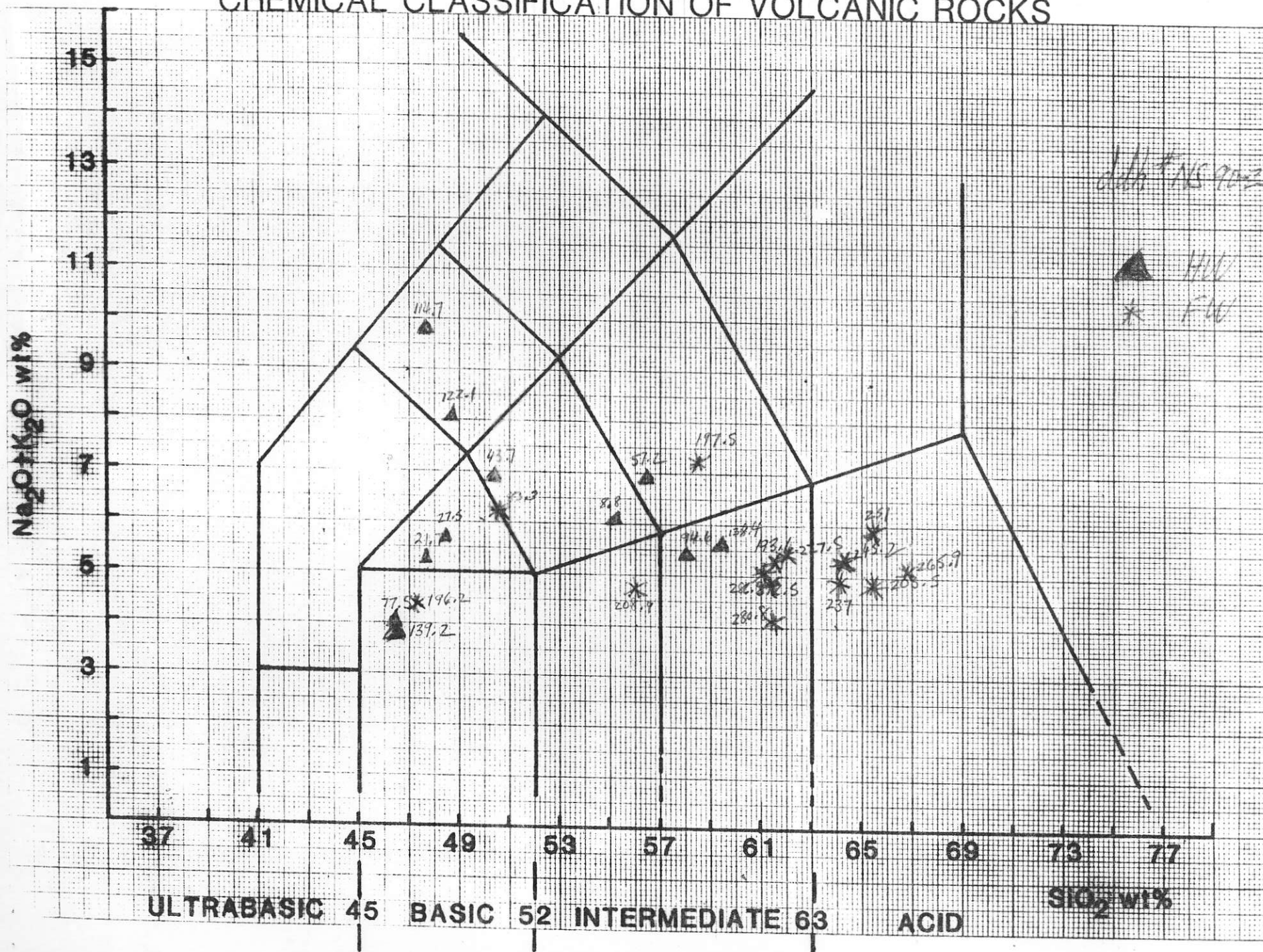
CHEMICAL CLASSIFICATION OF VOLCANIC ROCKS

③





# CHEMICAL CLASSIFICATION OF VOLCANIC ROCKS



# CHEMICAL CLASSIFICATION OF VOLCANIC ROCKS

(after LeBas et al., 1986)

