ZIRCON SURVEY - REPORT NO. 2

EHB Project No. 25

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by Edwin H. Bentzen III

INTRODUCTION

Since July 1967, Mr. J. Philip Neal has been collecting and testing samples as a part of a State-wide feldspar evaluation. In one step of the evaluation procedure iron-bearing or iron-stained minerals are separated as a single flotation product. Most of the zircon in the original samples is concentrated in these iron-mineral froth products.

One hundred and four iron-mineral froth products were previously examined and reported in MRL Project Report 69-36-P, "Zircon Survey," October 1969. Since October 1969, an additional 76 samples were collected and processed by Mr. Neal. This report contains the results of the examination of these latest samples to determine approximate zircon contents.

OBJECTIVE

Using long-wave and short-wave ultraviolet lights, the presence or absence of zircon in iron mineral float products supplied by Mr. J. P. Neal was determined.

PROCEDURE

Sample Description

The samples tested were iron-mineral float products produced during feldspar evaluation testing. For a complete and detailed description of each sample and its location refer to Mr. J. Philip Neal's report,"North Carolina Feldspar Evaluation - Report No. 4," Dec. 1972 Progress Report No. 72-23-P.

Equipment

A 15-inch Raytech Model TLS 218, made by Raytech Industries Inc., Stafford Spring, Conn., was loaned to the Minerals Research Laboratory by the Colburn Mineral Museum. This is a combination long-wave, short-wave ultraviolet light.

Sample Testing

Standard reference samples, containing 0.1, 0.5, 1.0, 5.0 and 10% zircon, were prepared by mixing pure zircon and pure feldspar in the desired ratios by weight. Each iron-mineral froth product was compared with this set of reference samples, under the ultraviolet light, in order to estimate the zircon content of the froth products. These estimates were made by comparing the number of fluorescent grains, principally zircon, in the samples.

Results

The tabulated results are shown in the accompanying tables. Table I lists the 6 samples that contain between 1 and 5% zircon; Table II lists the 14 samples that contain between 0.5 and 1% zircon; Table III lists the 25 samples that contain from 0.1 to 0.5% zircon; Table IV list the 31 samples that contain less than 0.1% zircon.

The 9 samples that were judged to have the highest zircon contents in the previous study, MRL Report 69-36-P, were also tested using this new method of estimating zircon content. The results of this work are shown in Table V, "Zircon Content of the Best Samples from Zircon Report No. 1."

Table VI, "Head Samples Containing Appreciable Zircon," is a refined listing of the most significant head samples.

DISCUSSION

One hundred and eighty samples have been tested during the North Carolina Feldspar Evaluation Program. Of these only 15 samples appear to have more than 0.1% zircon in the head feed.

Although the number of samples investigated is not small, it does not seem large enough to develop any discernible relationships or trends.

With the completion of the North Carolina Feldspar Evaluation Program, no great number of samples can be expected in the near future. However, numerous and varied samples routinely come to the Minerals Research Laboratory. These samples can also be inspected for zircon content.

For a detailed description of each feldspar sample and its location, refer to Reports 1, 2, 3 and 4 on "Evaluation of North Carolina Feldspar Ores," by Mr. J. P. Neal. These reports also explain the terms "Field Number," and "NCFE Rating" which are used in this report.

The value "Calculated Percent Zircon Range of Head Feed" was arrived at by multiplying the zircon content range by the percent iron-mineral float product in the head feed.

CONCLUSIONS

1) In this latest study, 76 samples were examined to determine zircon content.

2) In the previous study (Report No. 1), 104 samples were examined to determine their zircon content.

3) Of the 180 Samples investigated only 15 appear to contain more than 0.1% zircon in the head feed.

4) None of the samples appear to contain as much as 1.0% zircon in the head feed.

5) Although no new NCFE samples can be expected, the opportunity to examine other samples for zircon should not be overlooked.

6) The samples examined under the NCFE program do not seem attractive as possible sources of zircon, even as by-products.

Table I

Iron-Float Products Containing Between 1.0 and 5.0% Zircon

Lab Number	Field Number	NCFE Rating	Iron-Mnrl. F.P. as % of H.F.*	Calc.% Zircon Range of H.F.*	County
3552-B	FG 94 B	227	4.2	0.042 - 0.210	Henderson
3533	FG 104	300	3.1	0.031 - 0.155	Gaston
3553	FG 116	100	2.9	0.029 - 0.145	Buncombe
3807	FG 137	360	6.8	0.068 - 0.340	Madison
3894	FG 146	288	2.9	0.029 - 0.145	Avery
3920	8	785	0.3	0.003 - 0.015	Cleveland

Table II

Iron-Float Products Containing Between 0.5 and 1.0% Zircon

3555	FG 118	225	1.3	0.006 - 0.013	Buncombe
3613	FG 126	261	6.1	0.031 - 0.061	Haywood
3614	FG 127	196	6.1	0.031 - 0.061	Haywood
3615	FG 128	147	9.0	0.045 - 0.090	Haywood
3736	-	-	6.7	0.034 - 0.067	Halifax
3809	FG 138	203	8.9	0.044 - 0.089	Swain
3810	FG 139	159	18.3	0.092 - 0.183	Swain
3812	FG 141	241	8.2	0.041 - 0.082	Swain
3899	FG 151	372	6.0	0.030 - 0.060	Watauga
4020	F-5 A	206	3.1	0.016 - 0.031	Anson
4021	G-5	266	2.4	0.012 - 0.024	Anson
4022	NC 108	267	2.5	0.012 - 0.025	Anson
4023	NC 109	268	2.3	0.012 - 0.023	Anson
4024	NC 110	249	2.9	0.014 - 0.029	Anson

*H.F. = Head feed

Table III

Iron-Float Products Containing Between 0.1 and 0.5% Zircon

Lab Number	Field Number	NCFE Rating	Iron-Mnrl. F.P. as % of H.F.	Calc. % Zircon Range of H.F.	County
3544	FG 110	44	24.7	0.025 - 0.124	Transylvania
3547	-	296	3.8	0.004 - 0.019	(Germany)
3550	FG 113	32	11.7	0.012 - 0.059	Buncombe
3551	FG 114	32	6.3	0.006 - 0.032	Buncombe
3552	FG 115	240	3.0	0.003 - 0.015	Buncombe
3616	FG 129	223	3.1	0.003 - 0.016	Haywood
3617	FG 130	27	20.7	0.021 - 0.104	Haywood
3620	FG 133	197	5.1	0.005 - 0.026	Madison
3621	FG 134	171	1.2	0.001 - 0.006	Madison
3622	FG 135	43	15.6	0.016 - 0.078	Madison
3623	FG 136	29	18.2	0.018 - 0.091	Madison
3636	-	-	14.4	0.014 - 0.072	Halifax
3737	-	156	4.0	0.004 - 0.020	Halifax
3811	FG 140	224	5.2	0.005 - 0.026	Swain
3813	FG 142	193	8.6	0.009 - 0.043	Swain
3814	FG 143	169	8.2	0.008 - 0.041	Swain
3816	FG 145	193	5.3	0.005 - 0.026	Rutherford
3864	M7 26	297	2.1	0.002 - 0.010	Henderson
3868	1	67	14.9	0.015 - 0.074	Caldwell
3895	FG 147	335	2.2	0.002 - 0.011	Avery
3900	FG 152	207	8.5	0.008 - 0.042	Watauga
3913	4	623	0.9	0.001 - 0.004	Cleveland
3925	C	782	1.8	0.002 - 0.009	Caswell
3926	D	954	0.7	0.001 - 0.004	Caswell
3990	-	345	4.2	0.004 - 0.021	(Colorado)

Table IV

Lab Numbers of Iron-Mineral Float Products Containing Less Than 0.1% Zircon

3618	3639	3643	3815	3897	3915	3919	3927
3619	3640	3644	3866	3911	3916	3921	3928
3637	3641	3735	3867	3912	3917	3923	3989
3638	3642	3738	3896	3914	3918	3924	

Table V

Zircon Content of the Best Samples from Zircon Report No. 1

Lab Number	Field Number	NCFE Rating	Iron F.P. as % of H.F.	% Zircon in Iron F.P.	Calc. % Zircon Range of H.F.	County
1896-A	-	235	13.3	1.0 - 5.0	0.133 - 0.665	Cabarrus
1896-B	-	236	12.8	1.0 - 5.0	0.128 - 0.640	Cabarrus
3209-A	FG 39	164	5.4	1.0 - 5.0	0.054 - 0.270	Henderson
3210	FG 41	236	6.4	1.0 - 5.0	0.065 - 0.325	Henderson
3475	FG 82	280	8.6	1.0 - 5.0	0.086 - 0.430	McDowell
3479	FG 86	134	1.9	0.5 - 1.0	0.019 - 0.095	Buncombe
3483	FG 90	107	0.6	1.0 - 5.0	0.006 - 0.030	Buncombe
3493	FG 92	252	23.6	0.5 - 1.0	0.118 - 0.236	Buncombe
3527	FG 98	192	8.1	1.0 - 5.0	0.081 - 0.405	Gaston

Table VI

Head Samples Containing Appreciable Zircon

Range of Maximum Zircon Content	Laboratory Numbers
0.10 to 0.19%	3533, 3544, 3553, 3617, 3810, & 3894
0.20 to 0.29%	3209-A, 3493, & 3552-B
0.30 to 0.39%	3210 & 3807
0.40 to 0.49%	3475 & 3527
0.50 to 0.59%	-
0.60 to 0.69%	1896-A & 1896-B