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U, Th, AND K ANALYSES OF SELECTED PLUTONIC ROCKS FROM WEST-CENTRAL ALASKA

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Introduction

Numerous samples of plutonic rocks collected during reconnaissance mapping in western Alaska have been analyzed for K, U, and Th. The U and Th content of the plutonic rocks from the southeastern Seward Peninsula have been discussed in a separate report (Miller and Bunker, 1975); because of the current interest in U and Th, the analyses of the remaining samples are given in this report.

The analyzed samples (table 1) were selected from a group of samples originally collected for general petrologic studies. The samples are grab samples and are considered to be generally representative of the particular unit from which they were collected. References to pertinent reports that describe the geology and petrology of the sampled units are given in Table 1.

Analyses were by gamma-ray spectrometry, and the basic operational procedures and calibration techniques have been described by Bunker and Bush (1966, 1967). Uranium concentrations are determined indirectly by measuring the radium daughter products to obtain radium equivalent uranium (RaeU) values. Radium equivalent uranium is the amount of uranium, assuming radioactive equilibrium, required to support the amount of daughter products that emit the radioactivity measured in a sample. Although thorium is also measured from daughter products, disequilibrium is improbable because of short half-lives; therefore, the concentrations are considered to be a direct measurement of parent thorium. Potassium is determined from its K^{40} constituent, which is proportional to the total potassium. The coefficients of variation for the accuracy of the data included in this report are about 3 percent for uranium and thorium and 1 percent for potassium when compared to standards analyzed by isotope dilution and flame photometer methods.

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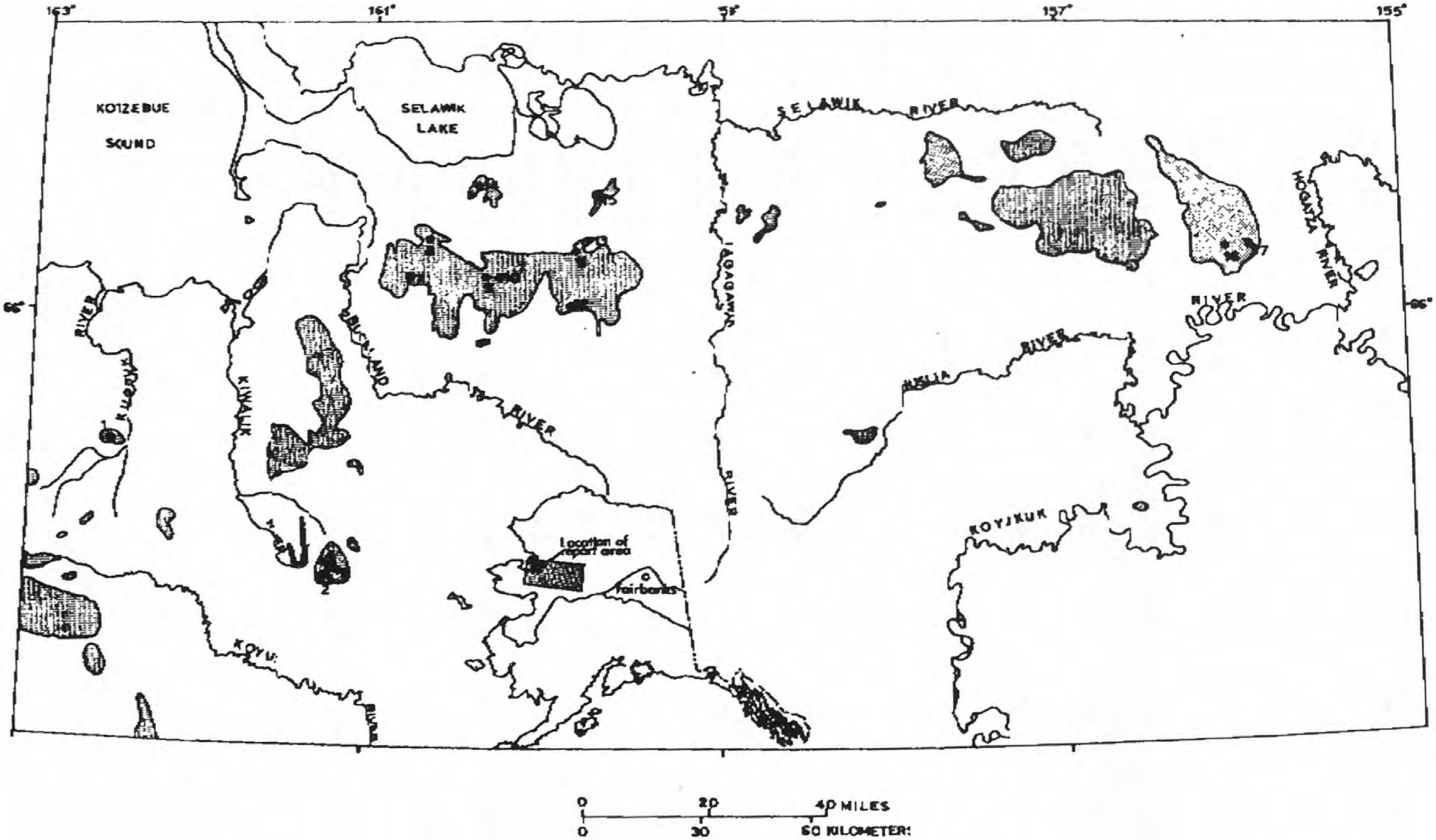

Figure 1. Map showing location of analyzed samples. Shaded areas denote plutons.

Table 1. Radioactivity parameters of selected plutonic rocks from west-central Alaska.

MAP NO.	FIELD NO.	LOCATION	U (ppm)	Th (ppm)	K (pct)	HEAT CONTENT (µcal/gm yr)	Th/U	$\mathrm{U}/\mathrm{K}\times10^{-4}$	$\mathrm{Th}/\mathrm{K}\times10^{-4}$	SAMPLE DESCRIPTION
1	68AMm324	65°41.9'N 162°35.7'W	7.28	36.21	2.93	13.35	4.97	2.48	12.36	Granodiorite; medium-grained, leucocratic, hornblende-biotite. Kugruk pluton, Bendeleben quadrangle (Sainsbury, 1974).
2	69AMm59	65°24.3'N 161°16.7'W	16.36	58.11	6.16	25.23	3.55	2.66	9.43	Pseudoleucite porphyry. Nepheline syenite zone, southwestern part of Granite Mountain pluton, Candle quadrangle, (Miller, 1971; 1972).
3	69AMm28	65°24.1'N 161°16.5'W	9.49	39.16	5.37	16.21	4.13	1.77	7.29	Foyaite. Nepheline syenite zone, southwestern part of Granite Mountain pluton, Candle quadrangle (Miller, 1971; 1972).
4	68AMm391A	65°27.2'N 161°15.4'W	5.29	10.84	5.46	7.50	2.05	0.97	1.99	Garnet syenite. Garnet syenite zone, western Granite Mountain pluton, Candle quadrangle (Miller, 1971; 1972).
5	69AMm24	65°25.8'N 161°15.4'W	5.50	24.30	4.69	10.14	4.42	1.17	5.18	Monzonite. Monzonite zone, central Granite Mountain pluton, Candle quadrangle (Miller, 1971; 1972).
6	69AMm30A	65°25.4'N 161°08.9'W	4.24	21.71	2.99	8.24	5.12	1.42	7.26	Quartz monzonite. Quartz monzonite zone, eastern Granite Mountain pluton (Miller, 1972).
7	67AMm413	66°06.8'N 160°47.3'W	9.68	32.97	4.46	14.86	3.41	2.17	7.39	Porphyritic quartz monzonite. Western Selawik Hills pluton, Selawik quadrangle (Miller, 1971).
8	66AMm146	66°12.1'N 160°39.3'W	6.77	42.98	4.38	14.72	6.35	1.55	9.81	Foyaite. Probable dike cutting monzonite-syenite zone of northwestern Selawik Hills pluton, Selawik quadrangle (Miller, 1971)
9	66AMm162	66°06.7'N 160°21.3'W	7.74	45.42	6.54	16.50	5.87	1.18	6.94	Monzonite; gneissic, hornblende-pyroxene, medium-grained. Monzonite-syenite zone, north-central Selawik Hills pluton, Selawik quadrangle (Miller, 1971).
10	66AMm163B	66°06.7'N 160°16.3'W	19.63	66.16	5.08	28.93	3.37	3.86	13.02	Monzonite; coarse-grained, trachytoid, hornblende-rich. Monzonite-syenite zone, north-central Selawik Hills quadrangle (Miller, 1971).
11	66APa117	66°09.7'N 159°49'W	3.05	21.56	4.82	7.84	7.07	0.63	4.47	Quartz monzonite, fine-grained, massive. Eastern Selawik Hills pluton, Selawik quadrangle (Miller, 1971).
12	67AMm410	66°02.2'N 159°50.3'W	2.49	9.65	3.20	4.61	3.88	0.78	3.02	Malignite. Hunt alkaline complex. Selawik quadrangle (Miller, 1971; 1972).
13	66AMm110E2	66°11.2'N 159°49.2'W	5.82	22.07	6.16	10.33	3.79	0.94	3.58	Malignite. Hunt alkaline complex. Selawik quadrangle (Miller, 1971; 1972)
14	66AMm120A2	66°19.9'N 160°23.7'W	10.87	20.67	13.83	15.80	1.90	0.79	1.49	Juvite. Selawik Lake alkaline complex. Selawik quadrangle (Miller, 1971; 1972).
15	67AMm360	66°18.5'N 159°43.5'W	31.20	177.83	5.04	59.70	5.70	6.19	35.28	Pulaskite; fluorite-bearing, possibly a dike. Inland Lake alkaline complex, Selawik quadrangle (Miller, 1971; 1972).
16	67AMm136	66°10.9'N 156°02.5'W	6.94	25.56	3.01	10.99	3.68	2.31	8.49	Granodiorite; medium-grained, biotite. Biotite granodiorite zone, south-central Zane Hills pluton, Shungnak quadrangle (Miller, 1971).
17	67AMm151	66°11.2'N 155°51.9'W	12.42	123.92	5.07	35.22	9.98	2.45	24.44	Monzonite; coarse-grained, porphyritic and trachytoid. Marginal monzonite-syenite unit, east-central Zane Hills pluton, Hughes quadrangle (Miller and Ferrians, 1968; Miller, 1971). Unit locally contains minor amounts of uraninite, thorite, and betafite (M.H. Staatz, personal communication, 1975)

Analyses were done by C. M. Bunker and C. A. Bush.

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