



Base from USGS 1:250,000 topo series:
Bradfield Canal, 1955, ALASKA-CANADA.

LOCATIONS OF GAMMA-RAY READING SITES

Introduction

Gamma-ray intensity readings were made at 620 sites throughout the central portion of the Bradfield Canal quadrangle was conducted during the summer of 1979. This sheet contains the data collected and a map showing the locations of sites where readings were made. The accompanying text is showing the distribution of relatively high gamma-ray intensity readings.

The study area is underlain by a variety of calc-alkaline granitic plutons, and medium- and high-grade schists and gneisses characteristic of the Coast Plutonic Complex. The rugged, mountainous terrain consists of steep peaks to 2100 m elevation and steep-walled canyons carved by rivers and still-active alluvial fans. Because of current and recent glaciation and rapid stream erosion, many rock outcrops and much stream-sediment is little affected by chemical weathering. High levels of precipitation (all year-round).

At the time each reading was made, the site was classified as rock, stream, or vegetation. The dominant type of ground surface close to the detector. Sites vary in the type and amount of cover material and the amount of gamma-ray absorption occurring in that cover material. Essentially all gamma radiation is absorbed by a layer of rock about 30 cm thick, or soil about 45 to 80 cm thick, or about 100 cm of water. This means that readings at rock outcrop sites are influenced by rock only to a depth of about 30 cm. Radiation from unconsolidated sediment may reflect the bedrock under that site if the sediment cover is thin or if the sediment is locally derived. Most gravel sites are stream beds where the sediment depth exceeds 50 cm and thus the sediment constitutes the only significant contributing factor influencing the reading. The majority of these streams in which bedrocks are exposed are short and the sediment is derived from an area extending no more than 1 to 2 m upstream. Vegetated sites have cover usually consisting of dense moss, lichen, and heather mats, or are thick, swampy mucks composed mainly of living and decaying plant material. These areas often are nearly water-saturated and, depending on thickness, may effectively absorb gamma radiation from underlying sediment or rock. Snow absorbs gamma rays more effectively as its water content (density) increases. Thin snow cover is reported to act as a radon gas trap in some cases, increasing gamma-ray intensity. This effect was not noted in the study area. Gamma-ray readings for snow-covered areas are conspicuously lower than those from other site types.

Readings of gamma radiation intensity were made at most helicopter landing sites during the course of geologic mapping and stream-sediment sampling of the area. After landing at a site, the station number, instrument scale range, radiation reading, and site type (see below) were recorded, usually by the helicopter pilot (Rossiter). The first reading for each site was made at the helicopter landing site in our base camp, a flat area of dense, tall grass in the center of the E. L. Rusk river valley (site number 1). Repeated readings at this site provided a crude check for long-term instrumental variation.

Data

Data for 620 sites, plus 22 readings made at the base station, are contained in the data table. A sequence number, from 1 to 666, indicates the order in which readings were made. The data, including base station readings, are listed chronologically to permit inspection for instrumental drift or other time-dependent variation. Four sequence numbers (159, 233, 433, and 547) have no data and are omitted from the table. Two readings (sequence numbers 58 and 59) were made while recouping stations first visited during 1978. Data for these two sites are included in the table but they lie outside the area of the map in this report and are not plotted.

The 7-character station numbers correspond to those used to identify collection locations for geochemically analyzed samples (Koch and others, 1980a,b,c, Koch, O'Leary, and Ristoli, 1980). For base station readings, the station number is replaced in the table by a date composed of numbers indicating the year, month, and day on which that reading was made. Latitude and longitude coordinates are given in degrees, minutes, and seconds. Quadrangle designations refer to the 1:63,000 scale quadrangles.

Gamma radiation intensity readings are listed exactly as recorded in the field. All measurements were made with the scintillation range selector set at 0.1 Mc. The meter was not checked or calibrated with a radiation source of known intensity but, as estimated from repeated base station readings, appears insignificant. The data were not corrected for diurnal variations, weather fluctuations, or atmospheric radon or cosmic radiation effects but probably have little influence on most readings (see section on snow and ice on sheet 2).

Histograms of the readings (see sheet 2) have a markedly unimodal, sawtooth character, with adjacent bars commonly being significantly different in height. This pattern resulted from the way values were read and recorded. The scintillation range selector scale is marked only with even numbered divisions (.02, .04, .06, etc.). In the field, people tend to record the number nearest the scale division, and those not so recorded, is insignificant compared to the total range of values and the effects of other sources of variation.

Locations of sites where scintillation readings were made are indicated by dots on the location map. The base station location is labeled number 1. The outline of each 1:63,000 scale quadrangle is indicated, along with its quadrangle designation (e.g., 5E, etc.).

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Factors Affecting Gamma-Ray Readings

Cosmic rays probably exerted little influence on measurements made in this study because the detector was close to the ground while measurements were being made. Other atmospheric sources of gamma rays (nearly none) were probably homogenized by the strong breezes common to this mountainous region, and flushed from the air by frequent rain. During the 74 days between the first and last days on which gamma-ray measurements were made, only 9 days of no appreciable rain during the day, with a maximum of 3 such days on 7/1, 7/2, and 7/3.

Gamma-ray readings for snow-covered areas are conspicuously lower than those from other site types.

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Gamma-Ray Readings

Longitude	Quad	Reading	Site Type	Sequence	Station	Latitude	Longitude	Quad	Reading	Site Type	Sequence	Station	Latitude
131 05 45	A4	0.18	Snow or ice	217	78-0557	56 13 17	130 53 44	A3	0.25	Sand or Gravel	434	78-0091	56 13 19
131 05 45	A4	0.07	Snow or ice	218	78-0557	56 13 18	130 53 44	A3	0.25	Sand or Gravel	435	78-0091	56 13 19
131 06 07	A4	0.05	Snow or ice	219	78-0557	56 13 18	130 53 49	B3	0.24	Sand or Gravel	436	78-0092	56 13 19
131 06 07	A4	0.05	Snow or ice	220	78-0557	56 13 19	130 53 49	B3	0.24	Sand or Gravel	437	78-0092	56 13 19
131 05 38	A4	0.06	Rock	221	78-0551	56 17 11	130 54 03	B3	0.25	Sand or Gravel	438	78-0093	56 15 24
131 06 19	A4	0.05	Snow or ice	222	78-0557	56 17 10	130 54 15	B3	0.28	Sand or Gravel	439	78-7-10	56 05 37
131 06 19	A4	0.05	Snow or ice	223	78-0517	56 17 11	130 54 15	B3	0.28	Sand or Gravel	440	78-0093	56 07 13
131 06 23	A4	0.04	Snow or ice	224	78-0518	56 12 45	130 50 49	A3	0.10	Sand or Gravel	441	78-0093	56 07 13
131 06 23	A4	0.04	Snow or ice	225	78-0518	56 12 45	130 50 49	A3	0.10	Sand or Gravel	442	78-0093	56 07 13
131 06 23	A4	0.04	Snow or ice	226	78-0520	56 05 12	131 01 42	A4	0.20	Sand or Gravel	443	78-0093	56 03 40
131 06 19	A4	0.03	Snow or ice	227	78-1403	56 05 12	131 01 42	A4	0.20	Sand or Gravel	444	78-0093	56 03 40
131 05 48	A4	0.07	Snow or ice	228	78-0527	56 12 22	130 47 13	A3	0.18	Vegetation	445	78-0093	56 04 49
131 05 48	A4	0.07	Snow or ice	229	78-0527	56 12 22	130 47 13	A3	0.18	Vegetation	446	78-0093	56 04 49
131 05 48	A4	0.06	Snow or ice	230	78-0527	56 12 22	130 47 13	A3	0.18	Vegetation	447	78-0093	56 04 49
131 05 31	A4	0.08	Snow or ice	231	78-0527	56 12 22	130 47 13	A3	0.18	Vegetation	448	78-0093	56 04 49
131 11 41	A3	0.12	Snow or ice	232	78-0039	56 11 35	130 39 19	A2	0.13	Rock	449	78-0061	56 06 48
131 11 41	A3	0.03	Snow or ice	233	78-0043	56 11 35	130 39 52	A2	0.10	Rock	450	78-0084	56 06 48
131 11 05	A3	0.06	Snow or ice	234	78-0028	56 11 35	130 39 52	A2	0.10	Vegetation	451	78-0084	56 06 48
131 11 05	A3	0.06	Snow or ice	235	78-0044	56 11 35	130 39 52	A2	0.10	Vegetation	452	78-0084	56 06 48
131 11 37	A3	0.10	Snow or ice	236	78-0044	56 11 35	130 39 52	A2	0.10	Vegetation	453	78-0084	56 06 48
131 09 59	A4	0.06	Snow or ice	237	78-0029	56 12 34	130 37 55	A2	0.17	Rock	454	78-0063	56 05 40
131 09 59	A4	0.06	Snow or ice	238	78-0042	56 12 34	130 37 55	A2	0.17	Rock	455	78-0063	56 05 40
131 11 09	A4	0.14	Vegetation	239	78-0042	56 12 34	130 37 55	A2	0.17	Rock	456	78-0063	56 05 40
131 08 55	A4	0.08	Snow or ice	240	78-0042	56 12 34	130 37 55	A2	0.17	Rock	457	78-0063	56 05 40
131 08 55	A4	0.08	Snow or ice	241	78-0030	56 15 12	130 40 45	A3	0.18	Vegetation	458	78-0086	56 01 10
131 08 55	A4	0.08	Snow or ice	242	78-0030	56 15 12	130 40 45	A3	0.18	Vegetation	459	78-0086	56 01 10
131 08 55	A4	0.08	Snow or ice	243	78-0030	56 15 12	130 40 45	A3	0.18	Vegetation	460	78-0086	56 01 10
131 08 55	A4	0.08	Snow or ice	244	78-0047	56 09 53	130 32 33	A3	0.08	Vegetation	461	78-0087	56 01 10
131 08 55	A4	0.08	Snow or ice	245	78-0032	56 12 35	130 40 42	A3	0.15	Vegetation	462	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	246	78-0048	56 12 35	130 40 42	A3	0.15	Vegetation	463	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	247	78-0045	56 12 35	130 40 42	A3	0.15	Vegetation	464	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	248	78-0045	56 12 35	130 40 42	A3	0.15	Vegetation	465	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	249	78-0045	56 12 35	130 40 42	A3	0.15	Vegetation	466	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	250	78-0045	56 12 35	130 40 42	A3	0.15	Vegetation	467	78-0094	56 01 10
131 08 55	A4	0.08	Snow or ice	251	78-0049	56 12 35	130 40 42	A3	0.15	Vegetation	468	78-0098	56 03 40
131 12 00	A4	0.24	Vegetation	252	78-0046	56 12 35	130 40 42	A3	0.15	Vegetation	469	78-0098	56 03 40
131 11 01	A4	0.25	Sand or Gravel	253	78-0034	56 09 08	130 51 54	A3	0.08	Vegetation	470	78-0068	56 04 37
131 08 30	A4	0.40	Sand or Gravel	254	78-0047	56 09 08	130 51 54	A3	0.08	Vegetation	471	78-0068	56 04 37
131 09 53	A4	0.40	Sand or Gravel	255	78-0046	56 09 08	130 51 54	A3	0.08	Vegetation	472	78-0068	56 04 37
131 09 53	A4	0.40	Sand or Gravel	256	78-0046	56 09 08	130 51 54	A3	0.08	Vegetation	473	78-0068	56 04 37
131 09 53	A4	0.40	Sand or Gravel	257	78-0046	56 09 08	130 51 54	A3	0.08	Vegetation	474	78-0068	56 04 37
131 07 13	A3	0.07	Vegetation	258	78-0035	56 09 24	130 45 45	A3	0.13	Vegetation	475	78-0067	56 03 10
131 07 13	A3	0.08	Vegetation	259	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	476	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	260	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	477	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	261	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	478	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	262	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	479	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	263	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	480	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	264	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	481	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	265	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	482	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	266	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	483	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	267	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	484	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	268	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	485	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	269	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	486	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	270	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	487	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	271	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	488	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	272	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	489	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	273	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	490	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	274	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	491	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	275	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	492	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	276	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	493	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	277	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	494	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	278	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	495	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	279	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	496	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	280	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	497	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	281	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	498	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	282	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	499	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	283	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	500	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	284	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	501	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	285	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	502	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	286	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	503	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	287	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	504	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	288	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	505	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	289	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	506	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	290	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	507	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	291	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	508	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	292	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	509	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	293	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	510	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	294	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	511	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	295	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	512	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	296	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	513	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	297	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	514	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	298	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	515	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	299	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	516	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	300	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	517	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	301	78-0051	56 09 24	130 45 45	A3	0.13	Vegetation	518	78-0098	56 03 10
131 07 13	A3	0.08	Vegetation	302	7								