GJBX-5(77)

AERIAL GAMMA-RAY AND MAGNETIC SURVEY OF THE BETHEL AND YUKON AREAS, ALASKA

FINAL REPORT

VOLUME 1

Prepared by

TEXAS INSTRUMENTS INCORPORATED
Dallas, Texas

December 1976

WORK PERFORMED UNDER
BENDIX FIELD ENGINEERING CORPORATION
GRAND JUNCTION OPERATIONS, GRAND JUNCTION, COLORADO
Subcontract No. 76-009-L and Bendix Contract EY-76-C-13-1664

PREPARED FOR THE
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
Grand Junction Office,
Grand Junction, Colorado 81501

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ABSTRACT

Results of an ERDA-sponsored, high-sensitivity, airborne gamma-ray spectrometer and magnetometer survey of 23 NTMS, 1:250,000 scale quadrangles in Alaska, carried out under Bendix Field Engineering Corporation Subcontract 76-009-L are discussed. The objective of the survey was to define those areas showing surface indications of a generally higher uranium content (uraniferous provinces) where detailed exploration for uranium would most likely be successful. A DC-3 aircraft, equipped with a gamma-ray spectrometer using nine large-volume NaI detectors, two 400 channel analyzers, and ancillary geophysical and electronic equipment was employed.

Gamma-ray spectrometric data were processed to correct for variations in atmospheric and flight conditions, and statistically evaluated to remove the effects of geologic variations and shielding due to water-saturated surface materials such as tundra cover.

Evaluation of gamma-ray anomalies resulted in the definition of 142 preferred anomalies showing uranium enrichment over the median values for the geologic map units involved and over the median eU/eTh* and eU/K ratios for those units. Of these, 102 suggest possibilities for stratiform deposits and the remainder appear to indicate potential vein deposits.

Study of the median values for the gamma-ray parameters as a function of the frequency of occurrence of preferred uranium anomalies showed that the northern area surveyed (Yukon Province) has about 87-percent of the preferred anomalies and shows consistently higher median eU, eTh, and K values and lower median eU/eTH values in all comparable geologic map units than does the southern area surveyed (Bethel Province). The relatively lower median eU/eTh values associated with high eU, eU/eTh and eU/K anomalies suggest that portions of the uranium have been removed from the "average" rocks present and concentrated in selective areas to form potential uranium ore deposits. This confirms the concept that airborne gamma-ray spectrometer data can be used to identify uraniferous provinces, and suggests that the median data from other areas be examined for similar consistencies.

The plutons of the Kokrines Hills, Ray Mountains and Hodzana Highland are indicated to have strongly uranium-enriched zones which show apparent genetic relationships to anomalous uranium enrichments in the associated sediments, suggesting this as a test area to further evaluate the potential for both economic vein-type and stratiform uranium accumulations in Alaska.

*eU, eTh—equivalent uranium measured by bismuth-214, equivalent thorium measured by thallium-208.

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SECTION I
INTRODUCTION

A. GENERAL

1. Objectives

Major objectives of the National Uranium Resource Evaluation (NURE) program of the Energy Research and Development Administration (ERDA) are to develop an authoritative, comprehensive assessment of the nation's uranium resources and to provide industry with data and technology useful for the timely discovery and exploitation of uranium ores (ERDA, 1976). A primary objective of this survey is to supply information on the uranium potential of certain generally unexplored regions of Alaska and to point out areas for further exploration by industry. It is a reconnaissance program that was designed to seek potential uraniferous provinces by covering less than 2-percent of the surface in detail, relying on the concept that regional uranium enrichment defines uraniferous provinces (Darnley, 1973). Darnley (1972) observed that districts containing uranium deposits in Canada are generally characterized over tens or hundreds of square miles by above-average radioactivity relative to their surroundings. Also, uranium is concentrated preferentially over the other naturally occurring radioelements, thorium and potassium, in anomalously radioactive areas considered more favorable for potentially economic uranium deposits. This is supported by other investigators who have pointed out that known uranium deposits tend to be concentrated in areas characterized by generally higher uranium contents in:

Ground waters (Scott and Barker, 1958)

Igneous rocks (Everhart, 1958)

Possible Precambrian source areas for stratiform deposits (Malan, 1972).

This, in turn, leads to the concept that new uranium deposits will be found more frequently in such areas than in regions where the uranium content in associated soils, rocks, and ground waters is comparatively low (Brinck, 1974).

The highly sensitive airborne gamma-ray spectrometer quantitatively measures relative amounts of uranium in surface rocks and soils. Statistical treatment of these data in terms of individual geologic units provides a means of searching for areas with anomalously high uranium content within each unit. Thus, reconnaissance gamma-ray spectrometer surveys over broad regions allow the uraniferous provinces to be defined so that more detailed prospecting methods can be applied to the most promising areas.

In describing the Canadian Federal-Provincial Uranium Reconnaissance Program (an effort similar to the NURE program), Darnley, et al., (1975) summarized the regional approach:

> The program rests upon the concept that most uranium deposits occur within, *or marginal to,* regions of the crust containing higher than average amounts of uranium. . . . uranium may be found to be weakly concentrated in granitic rocks, especially those late in the orgenic cycle. It may be found concentrated in high-temperature pegmatites or lower-temperature vein deposits. These are all components of a primary source area which through erosion and redistribution can provide the material to form secondary deposits in any suitable

> adjacent geochemical trap. The reconnaissance program is designed primarily to identify all zones of primary enrichment within the country, and secondly, to indicate, if possible, the limits of areas where secondary processes have operated. The primary source areas are undoubtedly the easier targets to find, but it is important and logical that we should begin at the beginning and find these before going on to find the more difficult secondary targets, since our present knowledge of even the gross distribution of uranium in the country is far from complete. It is important not to dismiss anomalous areas as simply being low-grade igneous rocks of no economic importance. Such areas may have considerable potential as source areas, and geological knowledge must be brought into play to determine where the eroded material from these source areas has been deposited. It is the first objective of the Uranium Reconnaissance Program to delineate as rapidly as possible the major areas of uranium enrichment in Canada. There is reason to believe that there are more of these than are generally known at the present time.

These comments apply equally well to Alaska and summarize the concepts behind this survey.

Major areas of uranium enrichment can be recognized either by abnormally high and relatively uniform uranium contents as reflected in the median or average content of the igneous or metamorphic geologic or geochemical potential source units (Everhart, 1958; Malan, 1972) or they may be characterized by a grouping of small uranium-enriched areas which may indicate groupings of potential vein or stratiform deposits derived from the primary source. In this survey we have sought to identify both characteristics in the statistical treatment of the airborne gamma-ray spectrometer data.

2. Approach

This survey consisted of airborne gamma-ray spectrometer and magnetometer data collection over 23 NTMS 1:250,000 scale quadrangles in Alaska (as illustrated in Figures 1-1, 1-2 and 1-3, the flight line index maps*), and the processing and interpretation of the gamma-ray spectrometer data necessary to indicate potential new uranium prospecting areas. The program was conducted for the Grand Junction Office of the Energy Research and Development Administration under Bendix Field Engineering Corporation Subcontract No. 76-009-L dated 15 April 1976.

All data were digitally collected and processed and presented in the form of computer listings and stacked profiles. Published geologic quadrangle maps, where available, and specially-produced geologic maps (see Subsection V.A.1.) were used as geological source data in a statistical analysis of the gamma-ray data. This analysis provided a quantitative measure of the anomalousness of each record value. Results of the statistical analysis are presented in the form of computer listings and anomaly maps printed in composite form with the geologic maps. Record location maps also are presented as composites with the geologic maps.

All map sheets conform to the names, scale, and sheet layout of the NTMS 1:250,000 scale, topographic map series.

B. GEOLOGY AND URANIUM DEPOSITS

1. General Sources of Information

The following paragraphs provide a basic introduction to prospecting for uranium in this region and furnish information sources relative to the surveyed area. Uranium may be found as

*Uranium occurrences shown in these figures are discussed in Section V by quadrangle.

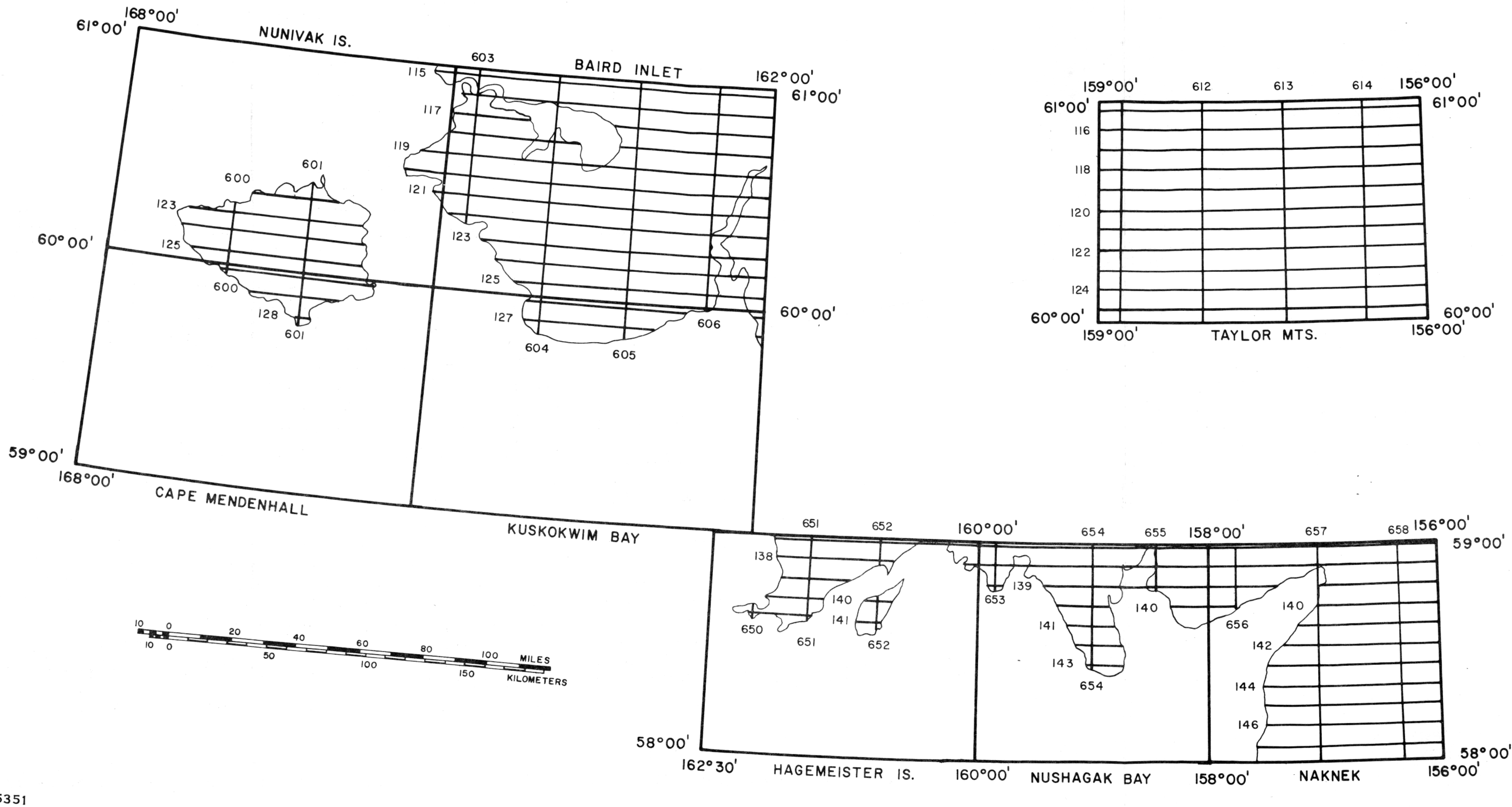

Figure 1-1. Flight-Line Index for South Part of Bethel Area

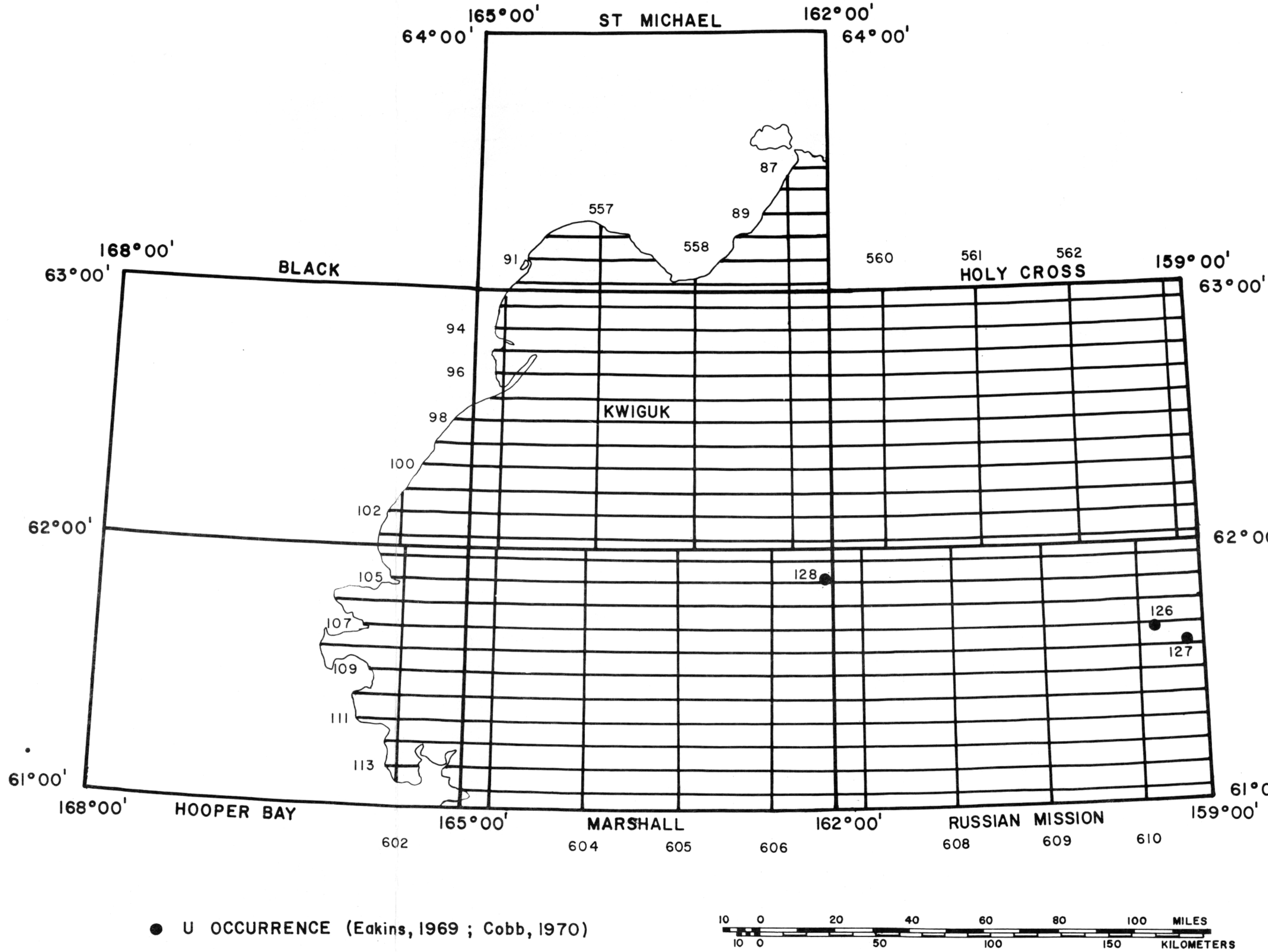

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Figure 1-2. Flight-Line Index for North Part of Bethel Area

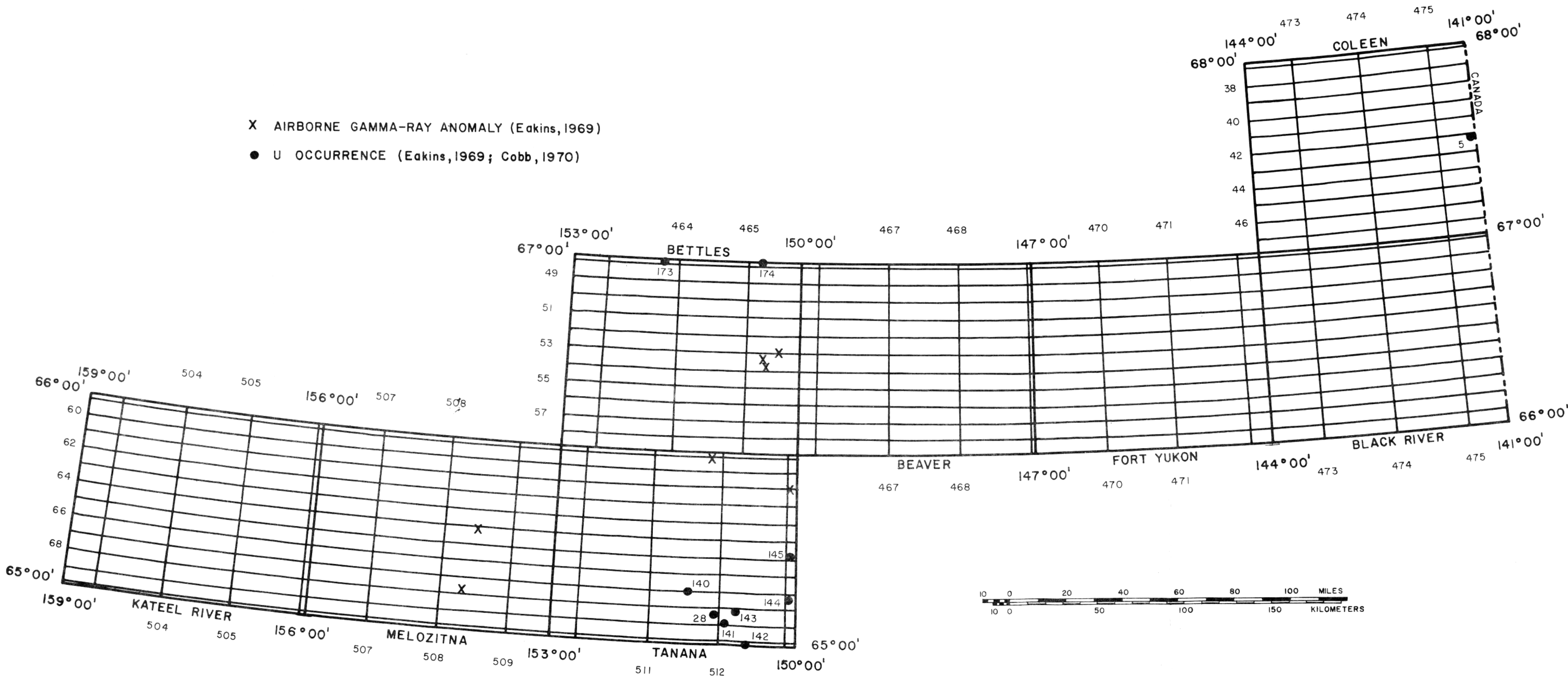

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Figure 1-3. Flight-Line Index for Yukon Area primary deposits in veins, or as epigenetic deposits in sedimentary rocks. Although the veins may provide the highest ore grades, about 95-percent of the United States production and reserves are accounted for in sedimentary rocks (Grutt, 1972), principally sandstone.

Finch (1967) presents an excellent overall summary of the geology of epigenetic uranium deposits in sandstone. Grutt (1972) and Fisher (1974) provide lists of criteria for prospecting for sandstone deposits and summarize the principal United States producing districts. Adler (1974) reviews the concepts of uranium ore formation in the sandstone deposits.

Dean (1960) provides a selected annotated bibliography of the geology of uranium-bearing vein deposits, and the USGS (1963) presents a series of papers discussing the geology, mineralogy, structure, age, and alteration of these types of deposits. Rich et al. (1975) provide a critical review of published data bearing on all aspects of uranium-bearing vein deposits.

Recent general references on uranium geology and prospecting include ERDA (1976), IAEA (1970, 1973, 1974) and Bowie, et al. (1972). The Grand Junction Office of the United States Energy Research and Development Administration may be contacted for further general information and answers to specific questions on prospecting and mining.

2. Uranium Geology in Alaska

Eakins (1975) has summarized the literature pertaining to the uranium potential of Alaska with emphasis on sedimentary rocks in structural basins; Forbes (1975) presents a 1:1,000,000 scale map of the felsic rocks in Alaska along with a compilation of analytical data. The locations of known radioactive mineral occurrences are shown by Cobb (1970) and Eakins (1969) presents a summary of radioactivity investigations in Alaska.

The only known production from Alaska was derived from a mine on Bokan Mountain, Prince of Wales Island in the southeastern part of the state. It is in a sodic peralkaline granite stock and consists of veinlets, pods and disseminations of uranium and thorium minerals (ERDA, 1976).

The uranium vein deposit potential of Alaska has been summarized as follows (ERDA, 1976):

> Potential resources were estimated for Alaska only in the Bokan Mountain granite . . . Elsewhere in Alaska, alkalic silicic plutons of Mesozoic and Tertiary age and their aureoles, veins, and dikes may be favorable. The late silicic differentiates of alkalic magmas may contain deposits similar to those in the Bokan Mountain granite. Primary uranium-bearing minerals in igneous rocks of the region contain appreciable thorium, which could be a coproduct.

Potential felsic, igneous, vein deposit hosts in this survey occur in twelve of the quadrangles surveyed. Of these, the large plutons in Melozitna, Tanana, Bettles and Beaver quadrangles are particularly promising (see Section V).

The potential for stratiform deposits has been summarized as follows (ERDA, 1976):

> Many of the sedimentary basins in Alaska have characteristics similar to the uranium-bearing basins in the conterminous United States. The probability of uranium deposits in these basins is enhanced because the sources of the basin sediments include uraniferous rocks such as alkalic and silicic plutons and volcanics. The nonmarine Mesozoic and Tertiary clastic strata in these basins have stratigraphic and lithologic characteristics similar to rocks in ore-bearing areas of the western United States. The Upper Cretaceous and Eocene formations ... are probably the most favorable. However, depths to mineralized zones may be excessive because many of the favorable beds dip more steeply than their counterparts in the conterminous United States. Redistribution of uranium by ground water may have been impeded by permafrost and shallow water tables, thereby reducing the likelihood of ore formation.

In this survey area, the following basins were sampled:

Basin	Quadrangle
Yukon Flats	Black River Ft. Yukon Beaver
Lower Tanana Basin	Tanana Melozitna
Galena Basin	Melozitna Kateel River
Innoko Basin	Holy Cross
Holitna Basin	Taylor Mountains
Bethel Basin	Hooper Bay Kwiguk Holy Cross Marshall Russian Mission Nunivak Island Baird Inlet Cape Mendenhall Kuskokwim Bay
Nushagak Lowlands Bristol Bay Region	Hagemeister Island Nushagak Bay Naknek

C. ACKNOWLEDGEMENT

Texas Instruments acknowledges the valuable and timely assistance of Helen Beikman and the Library of the United States Geological Survey, Menlo Park, California, in furnishing information and making available geologic maps of portions of the survey area.

SECTION II
DATA ACQUISITION

A. EQUIPMENT

1. Aircraft

A standard Douglas DC-3 aircraft, Figure 2-1, was used to provide sufficient size, range, carrying capacity, and safety margin required for this project. In addition to its standard equipment, the aircraft was fitted with a Bendix automatic pilot and a Global Navigation Systems GNS–500A VLF system to assist in maintaining straight flight paths.

2. Gamma-Ray Spectrometer

The principle of the gamma-ray spectroscopy system is based on measurement of the amplitude spectrum of light created on the capture of incident gamma-rays by thallium-activated sodium-iodide crystals. Sodium-iodide crystal detectors must be sufficiently large for absorption of these incident gamma-ray photons. Several of these crystal detectors are connected in parallel to provide a spectral counting rate that is sufficiently large to allow adequate statistical measurements within the very short measurement periods dictated by an airborne detection system.

Figure 2-1. DC-3 Geophysical Survey Aircraft

Gamma-ray spectrometer surveying involves quantitative measurement of natural gamma radiation of thorium, uranium, and potassium occurring at or near the earth's surface. Thorium and uranium are assumed to be in equilibrium with their respective radiation decay products, thallium-208 and bismuth-214. These two decay products and potassium-40 give pronounced peaks, respectively, at 2.615, 1.76, and 1.46 MeV in the gamma-ray spectra of naturally occurring radiation and afford the means of measuring the distribution of their source elements—thorium, uranium, and potassium.

A typical gamma-ray spectrum as measured in the field consists of discrete photoelectron peaks modified by Compton scattering and other effects due to naturally occurring radioactive elements, as well as, by cosmic radiation and radiation emanating from radionuclides which are present in the atmosphere. All of these masking effects can be identified and removed by routine field measurements and data-reduction methods.

Figure 2-2 is a block diagram of the fixed-wing airborne gamma-ray spectrometer system used by Texas Instruments. Eight crystal detectors, each 11.5 inches in diameter and 4 inches thick, emit light pulses upon capture of gamma-ray photons with light amplitude being proportional to photon energy. The light pulses are detected by photomultiplier tubes which output proportional electrical signals. These signals are then amplified and passed to the multichannel analyzer, which assigns the amplitude of each pulse to one of 400 energy channels. By this sequence, the variable energies of the gamma-ray photons are linearly recorded according to the 400 predetermined energy bands (see Figure 3-2). At the end of each counting period (1.8 seconds), data stored in the analyzer memory, together with other data such as average radar altimeter reading, air pressure, air temperature, magnetometer reading, line number, day-of-year, time-of-day, etc., are recorded digitally on magnetic tape.

An additional crystal and photomultiplier tube assembly has been incorporated into the system with a separate multichannel analyzer and data-storage unit. This additional crystal, shielded from gamma rays originating below the aircraft by 3 inches of lead, is used to measure the radioactivity due to bismuth-214 in the atmosphere. The counting period for this auxiliary unit is set to be 50 times greater than that of the main assembly in order to achieve comparable counting statistics. The data are recorded on the same magnetic tape unit.

Each of the nine crystals is protected from thermal or mechanical shock and from thermal-induced gain shifts by the combination of thick polymeric insulation and automatically controlled internal heaters.

System control is maintained by the Data Acquisition Control unit. This unit sequences all operations during each counting period and acquires data from the various sensors and spectrometers for inclusion on magnetic tape. It digitally samples the output of the radar altimeter continuously during the counting period for a measurement of average terrain clearance. Locational information acquired from an onboard navigation system computer are recorded with the spectrometer data, and a 35-mm tracking camera is triggered at the midpoint of the counting period.

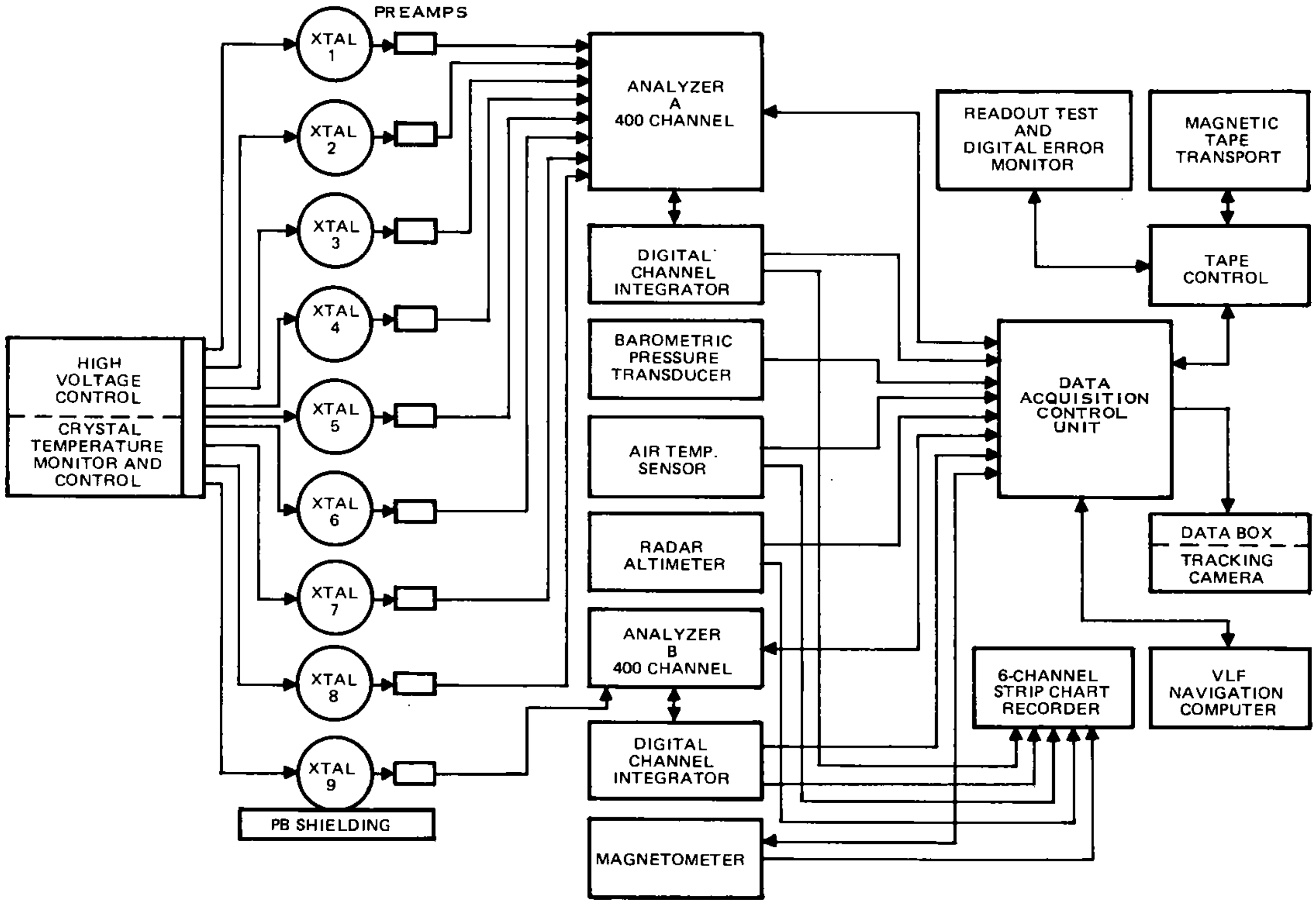

Figure 2-2. Gamma-Ray Spectrometer System Block Diagram

The following describes the several units making up the Texas Instruments gamma-ray system:

Unit	Function
Data Acquisition Control Unit	Controls the sequence of operations during a sample period and acquires all data for inclusion on magnetic tape.
Analyzer A	Receives and analyzes signals generated by the light pulses at the photomultiplier tubes on the unshielded crystals.
Analyzer B	Receives and analyzes signals generated in the shielded detector by radiation emitted by airborne radionuclides.
Digital Channel Integrator	Sums the counts obtained in any selected portions of either analyzer memory. Summed counts are displayed on panel meters as well as on the stripchart recorder.
Readout/Test and Error Monitor	This unit contains two sections: a CRT for display of the contents of analyzer A, and a system monitoring panel. During flight line operations, this unit checks for possible system malfunctions. Following flight operations, it can be used to examine data stored on the magnetic tape.
Magnetic Tape Control	Formats the data and controls the magnetic tape transport for both writing and reading of data.
Magnetic Tape Transport	Records all data in seven-track, even-parity, BCD form with unformatted NRZI encoding. The tapes are compatible with transports on large computers used for data processing.
Pressure Transducer	Measures ambient barometric pressure during each gamma-ray measurement interval using an absolute magnetic reluctance sensor.
Air Temperature Sensor	Measures flight level air temperature during each gamma-ray interval using a conductivity-measuring thermometer.
Radar Altimeter	Measures aircraft terrain clearance. The output from the altimeter is continuously averaged during each gamma-ray measurement interval.
Tracking Camera	35-mm framing camera equipped with wide-angle lens used for recording the flight path image. The camera is triggered at the midpoint of each gamma-ray measurement interval. Seven-segment lamps in an attached data box expose the current record number on each film frame.
VLF Navigation System	GNS 500-A system measures aircraft position relative to worldwide network of VLF and Omega stations. Data on ground speed, latitude, and longitude are obtained from the navigation computer for inclusion on magnetic tape.
Strip Chart Recorder	Six channel analog recorder for real-time display of raw uranium counts from both spectrometers, magnetic field reading (two scales), average terrain clearance, and air temperature. Fiducial marks indicate each readout of either analyzer.
Crystal Temperature Monitor/Control	Displays and automatically controls the temperature of each detector package.
High Voltage Control	Provides the capability for matching the gain of each photomultiplier tube in each detector.

3. Airborne Magnetometer

An airborne proton magnetometer was used to collect total magnetic field data. The magnetometer sensor was towed at the end of a 100-foot cable. Digital output of the magnetometer was recorded on magnetic tape with the other collected data, and an analog output was recorded at two scales on a multichannel analog stripchart recorder.

B. PROCEDURES

1. Airborne

Flight operations were conducted during the period May through August 1976. Airports at King Salmon, Bethel, and Fairbanks were bases of operation. Appendix A contains a summary of the data-collection schedule. Data were collected along parallel, east-west flight lines spaced 6.25 miles apart and north-south flight lines spaced approximately 25 miles apart. Figures 1-1 through 1-3 are flight line index maps which show the areas covered during the survey.

An Automatic pilot, a VLF navigation system, and a prepared set of topographic maps were used to maintain correct aircraft heading. At the same time, a second copy of the topographic maps was marked manually by the flight-path spotter to record the aircraft position. This navigation technique allowed immediate detection of off-line flying which was corrected by breaking off the flight line and picking it up again with sufficient overlap to maintain continuity of data. The tracking camera provided a photographic record of the aircraft's location at the center of each recording interval.

Required terrain clearance was maintained by the pilot by his observing the radar altimeter indicator on the control panel. Flight path and terrain clearance were maintained within contract specifications except where local flight regulations or considerations of flight safety dictated deviations.

Nominal aircraft altitude above the terrain, aircraft speed, and data sampling time were 400-feet, 150 mph and 1.817 seconds, respectively. This survey configuration yielded an approximate 400-foot strip of terrain along the flight path being sampled with each record.

During flight, the equipment operator monitored system performance by observing several digital displays incorporated into the collection system, as well as, by CRT and analog recorder displays. When any actual or potential malfunction in any component's operation was detected, the flight line was immediately broken off until the problem was eliminated or its impact determined to be negligible. At the beginning and end of each flight line the gain of each detector was checked and adjusted as necessary.

In order to minimize variations caused by variable ground moisture and equipment drift, a ground test line was established near each base of operation. This line was flown under survey flight configuration at the beginning and end of each flight whenever possible. The primary requirement was that the raw data be reproducible to within 20-percent from flight to flight. An additional test line was flown over a large body of water. The significance of this is discussed in Section III.A.6.

2. Ground Procedures

Before each flight, each detector was calibrated and an appropriate gain set using standard radioactive sources. A reproducibility check was also performed prior to each take off with the aircraft positioned over a marked spot on the apron at each base of operation. At the conclusion of each data-collection flight, a data quality check was made by inspecting the airborne analog records and by field processing a test strip from each roll of 35 mm tracking film. The latter check was made to ensure proper operation of the flight-path tracking camera. Flight lines or portions of flight lines that contained data failing to meet contract specifications were scheduled for reflights.

Detailed daily records of survey progress were kept and, at convenient intervals, flight magnetic tapes and films were dispatched to the data processing center at Dallas, Texas, for quality checks as additional methods to ensure consistent data quality.

SECTION III

DATA REDUCTION AND ANALYSIS

A. GAMMA-RAY DATA REDUCTION PROCEDURES

1. General

Figure 3-1 shows the major steps of the data processing sequence. Gamma-ray data reduction consists of two main stages:

Stage I—Program TIGRRED. Raw data on the field tapes are edited and the edited data transferred to direct-access-disk intermediate storage. Two passes are made of the data stored on the disk. The first pass makes an energy-to-channel calibration for the pulse-height analyzer outputs for both the shielded and unshielded recording systems. The second pass reduces the data by carrying out various corrections for spectral unfolding, live-time normalization, terrain clearance, and atmospheric radiation. The output is in the form of intermediate magnetic tape with on-line printer listings for monitoring purposes.

Stage II—Programs GAMMIT and SORTLL. Flight-line navigation data are merged with the digital records, any required additional data corrections are made, all data are sorted into individual NTMS quads, the data are resampled and averaged, and the data transferred to final data tapes.

2. Channel-Energy Calibration

Despite calibration at the beginning of each flight, the correspondence of channel-number to energy-level must be checked throughout the recording process. Slight variations in high-voltage supply, photomultiplier response, or amplifier gain can be corrected in this way, thereby increasing the system's overall resolution. In addition, because this process depends on the shape of the recorded spectra, any major changes in spectral shape due to instrument failures or any other cause can be quickly and automatically detected. The channel calibration procedure for both shielded and unshielded detector systems consists of the following steps:

Sum sufficient individual spectra in order to obtain well-defined photoenergy peaks

Determine the exact channel location of the 2.615 MeV and 1.460 MeV photoenergy peaks

Calculate the zero-energy channel position and the energy per channel to obtain the required precise channel-energy calibration.

3. Matrix-Reduction Correction

Each field spectrum is assumed to be a composite formed by summation of the spectra of decay products of naturally occurring potassium, uranium, and thorium, together with cosmic radiation (Figure 3-2). The quantitative separation (or unfolding) of the sum of the different gamma-radiation sources is performed using matrix reduction methods. The matrix, which is used to multiply the vector formed by the field-recorded spectra, was obtained by inverting the normalized matrix of standard calibration spectra for each of the major contributing sources. Because the standard calibration spectra were obtained using airborne measurements with the current operations system and crystals, and because the technique is normalized to 400 feet above the terrain, there is no need to identify separately and correct for effects such as Compton scattering and backscattering in the crystals, crystal geometries, and spectral deformation caused by differential attenuation in the atmosphere between the ground and recording system. The basic assumptions, therefore, are:

- The field spectrum and standard spectra must be taken in the same experimental geometry
- The field and standard spectra must be identically energy-calibrated
- Any gamma-emitting isotope in the field spectrum that is not represented by a standard must be present in relatively small quantities.

4. Live-Time Normalization

The actual time during which the gamma-ray detection system is not processing a gamma-ray pulse (and, therefore, is able to accept a gamma-ray pulse from any detector) is termed "live-time". This variable is strongly dependent on the counting rate, implying that the spectra recorded (and parts thereof) are reduced in proportion to the ratio of live-time to total record time. The live-time for each spectrum in each analyzer is measured by summing pulses from a clock gated on the arrival of a gamma-ray pulse at the analyzer. This sum is stored as channel zero and is used to normalize each net sum to 1 second of live-time.

5. Cosmic-Radiation Correction

The volume of the crystal detectors employed in the Texas Instruments gamma-ray spectrometer system is such that the cosmic radiation has a measurable effect on the observed radiation; therefore, a correction for this was made.

During recording of spectra from unshielded detectors, channels 201 through 400 of the pulse-height analyzer are automatically summed in the pulse-height analyzer and recorded as a tag word. For the shielded detector records, the summation of energy channels 201 through 400 is carried out during data processing. These values give a direct measure of incident cosmic radiation since no naturally occurring terrestrial sources emit significant gamma radiation in this energy range (3.0 to 6.0 MeV). With the standard shape of the cosmic radiation spectrum included in the reduction matrix, the effects of this radiation on the lower energy photopeaks are removed.

6. Onboard Background Radiation Corrections

Despite measures to eliminate all radioactive sources within the aircraft, residual or background radiation always exists. It is measured by recording spectra from the individual detectors when the aircraft is flown over large bodies of fresh water which are deep enough to absorb all terrestrial gamma rays. These measurements are made at an altitude sufficiently high for airborne radiation sources to be negligible. After correction of cosmic radiation and live-time normalization, the residual spectra, thus measured in the survey area, were subtracted from all subsequent spectral counts.

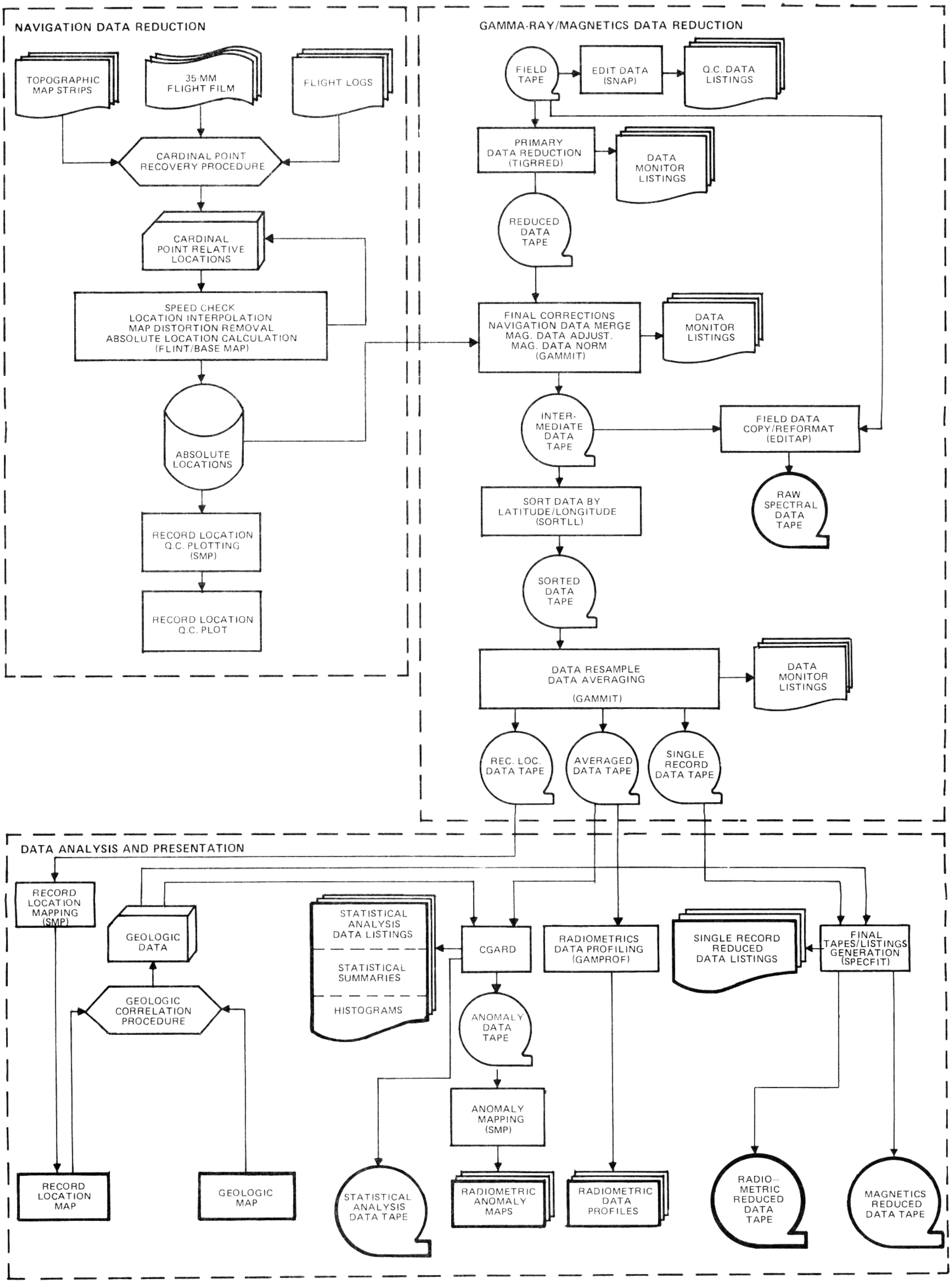

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Figure 3-1. Data Processing Sequence

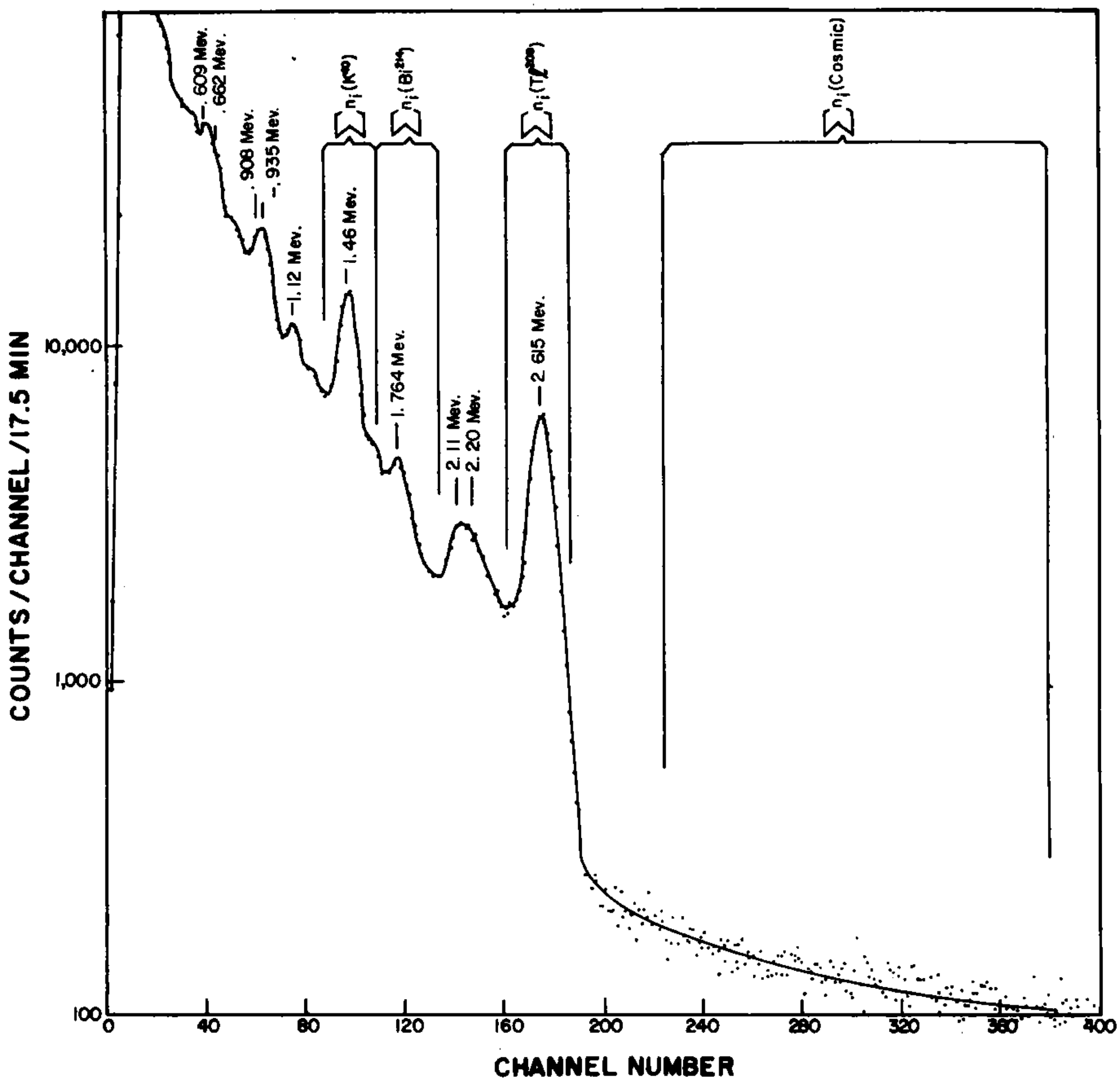

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Figure 3-2. Airborne Gamma-Ray Spectrum

7. Terrain-Clearance Correction

To eliminate observed variations in counting rate as the distance between the aircraft and ground changes, all radiometric counts are normalized to a constant 400-foot vertical terrain clearance at standard temperature and pressure. This normalization is achieved using a function of average terrain clearance, air temperature, air pressure, and empirically determined total attenuation coefficients for the respective energy windows.

8. Atmospheric-Radiation Correction

Radon-222 gas, with a half-life of 3.8 days, escapes from the ground into the atmosphere in significant amounts and decays to gamma-emitting bismuth-214. The bismuth-214 radionuclides present in the atmosphere contribute a significant and variable portion of the bismuth-214 counts measured by the airborne system. Atmospheric conditions, air turbulence, and air temperature inversion layers affect the distribution of radon, and consequently of bismuth-214, in the atmosphere. Failure to account for bismuth-214 radiation coming from airborne radionuclides could result in almost meaningless uranium estimations.

A similar gaseous decay product, radon-220 in the thorium radioactive decay series, has a half-life of only 54.5 seconds and, therefore, is not considered significant in the measurement of thorium distribution by detection of thallium-208.

During the survey, radiation due to atmospheric bismuth-214 is measured by the shielded-detector spectra. These "upward-looking" spectra are calibrated and reduced in the same manner as the normal spectra, except for attenuation due to ground clearance, which is omitted. Under the assumption that atmospheric bismuth-214 is homogeneously distributed in the atmosphere surrounding the aircraft, the normalized bismuth-214 counts obtained from the shielded detectors then afford a correction factor which is subtracted from the final bismuth-214 count obtained from the unshielded detectors.

9. Statistical-Adequacy Test

As a result of the above corrections and normalizations, reduced counting rate values for uranium (eU), thorium (eTh), potassium (K), and gross (0.4 to 3.0 MeV) plus the ratios eU/eTh, eU/K, and eTh/K are obtained. However, since some samples are collected over water-saturated ground, some over areas with low radioelement content, and some at high terrain clearance, the measured counting rates may be so low that the reduced data are statistically meaningless. In order to eliminate such data, an analysis of the statistical adequacy of each eU, eTh, and K value is made using the ideas presented by Currie (1968). As applied here, a statistic is calculated for each eU, eTh, and K value which defines whether the value equals or exceeds a particular probability threshold (cutoff level). This statistic consists of the ratio of the cutoff level in counts per second (cps) to the observed net counting rate in cps. As taken from Currie (1968), the cutoff levels are defined on the basis of the observed background. Since the observed background in each energy window (onboard radioactivity, airborne radioactivity, and scattering from other sources) varies from record to record, the cutoff level for this statistic must be calculated on a record-by-record basis. Calculating the statistic in this manner (as a ratio analogous to a noise-to-signal ratio) allows the statistic to be recalculated for the averaged records to take into account the improved noise-to-signal ratio obtained by averaging (Subsection III.A.11). Taking the detection level cutoff as the limit, any values falling below this limit are excluded from the subsequent anomaly analysis procedure (Subsection III.C).

10. Spatial Resampling

During data collection, ground speed of the survey craft will vary both with wind velocity and direction and with ascents and descents in rugged terrain. Since the variables measured in the survey (i.e., counting rates) are essentially time-dependent phenomena, sampling is properly accomplished using the 1.817-second fixed-time intervals. However, such sampling combined with variable aircraft speed causes the sample spacing to vary from the nominal 400-feet in "accordion" fashion both along lines and from line to line. This effect is removed by resampling the data digitally to a constant 400-foot distance between center positions of records. Because of the nature of gamma-ray data, with their inherent high noise and superimposed discontinuities at rock type boundaries accurate resampling is achieved by linear interpolations based on the spatial positions of the centers of the data collection intervals. Since the sampling time and aircraft speed allows very nearly 400-foot sample intervals, very little decimation of the data occurs; thus, antialias filtering is not necessary. However, because of this resampling, original data identifications become meaningless and the records are necessarily renumbered following resampling. The new numbering sequence is then used for all data displays, listings, and tapes, except for the edit field data tapes.

11. Averaging

For subsequent anomaly analysis and radiometric stacked-profile presentations, the following averages are calculated for successive groups of samples: eTh, eU, K, eU/K, eU/eTh, eTh/K, gross counting rates and average terrain clearance after averaging. The averages are for groups of five successive records centered around every third record. The averaging operation thus produces a cross between a running average and a block average. Averages are centered about records whose identification numbers are multiples of three. A residual total magnetic field value is also included in each averaged record. This value is not derived from averaging but rather is the value from the centroid record.

To provide additional noise suppression for data of marginal quality, the following procedures were followed in the averaging:

Include in the averages data collected at altitudes in excess of the 1000-foot terrain clearance limit and retest for excessive average terrain clearance.

Include observed values of negative counting rates in the averaging.

Include record values regardless of whether they pass the statistical adequacy test and recalculate the Currie statistic after the averaging.

Reject any records of poor quality not included in the above. Calculate the average eU/eTh, eU/K, and eTh/K values from the average eU, eTh, and K values, and not from the average of the single record ratios.

Each of these procedures can be shown to individually enhance the data and to allow more records with marginal signal-to-noise ratios to pass the statistical adequacy test.

B. NAVIGATION DATA PROCESSING

The procedure for navigation data processing is shown in the block diagram of the data processing sequence (Figure 3-1). In this, the combined information available from the navigator's topographic map strips, the flight logs, and especially the flight-tracking film are used to recover precisely the center points of gamma-ray data collection intervals spaced approximately every 2 to 4 miles. The intermediate locations are determined by automatic interpolation. Wherever possible, every line intersection position is recovered by this same method. The recovered points (designated as cardinal points) are posted on composites of the topographic map strips. The recovered positions are digitized by means of an X-Y coordinate digitizer. The digitized cardinal point locations are then edited for proper position and identification. A proprietary computer program, BASEMAP, is used to correct for map sheet distortion and to convert the X-Y cardinal locations to latitude and longitude. The output of this procedure is used both for mapping purposes and for merging with the gamma-ray data.

C. DATA ANALYSIS PROCEDURES

A statistical analysis of the averaged data is performed by means of a software package, Computerized Geological Analysis of Radioactivity Data (CGARD), developed by Texas Instruments. This software package statistically relates gamma-ray data to surface geological map units, calculates estimates of the statistical parameters for the distribution of each element and ratio in each map unit sampled, and determines the statistical significance of each value relative to all other samples of that particular map unit.

The objective of this data analysis procedure is to provide an evaluation of gamma-ray data by identifying variations in record values that are caused by geochemical differences between map units, identifying record values that are statistically significant relative to other samples of the map unit in which they occur, and calculating the magnitude (significance) of the deviation of such records from the mean.

The basis for the statistical analysis is all geologically comparable data collected within one geologic cell, which is defined in terms of uniformity of geologic mapping (Subsection V.A.2). Of the 23 NTMS quadrangles included in this survey, 12 constitute individual geologic cells. However, the St. Michael, Black, Kwiguk, Hooper Bay, and Marshall quadrangles constitute a single geologic cell: the Nunivak Island, Baird Inlet, Cape Mendenhall, and Kuskokwim Bay quadrangles form another single geologic cell; and the Nushagak Bay and Naknek quadrangles are joined into one geologic cell. Within each geologic cell the data from relatively wet and better-drained land areas of each geologic rock type are separately analyzed. In both the data listings and tapes a prime symbol (′) following the rock type name indicates the data as coming from a poorly-drained wet area, e.g., QAL vs. QAL′ (see also Subsection V.A.1.b).

The procedure for analyzing data within each geologic cell consists of the following steps:

Record-location maps with wetter and better-drained areas indicated are superimposed on the geologic maps for each NTMS quadrangle. Tabulations are prepared relating individual average centroids to geologic map units.

These tabulations, in thoroughly edited card form, are used as the input to the search/sort function of CGARD to separate the data according to geologic map unit and to provide the necessary preliminary calculations. Only error-free data passing the statistical adequacy test (Subsection III.A.9) are used in this analysis, which accounts for differing numbers of samples of eU, eTh, and K and their ratios for the same map unit. Data collected over dry land, wet land, and open water are analyzed separately.

Based on these calculations, the distributions of data within each geologic map unit are tested for normality/lognormality using a modified chi-squared statistical test.

Applying the relevant statistics as determined by the chi-squared test, means and variances of each of the six gamma-ray parameters* are calculated for each geologic map unit.

Histograms of the data distribution for each parameter in each geological map unit in each geologic cell are generated (see Subsection IV.D) and provided in paper print form. Statistical summaries of the results of the chi-squared test, the distribution medians, and the limits of standard deviations (1, 2, and 3 standard deviations above and below the mean) are compiled and provided in Appendix C. For parameters with normally distributed data, the median is approximately equal to the mean. For lognormally distributed data, the linear median may be quite different from the linear mean. Although the mean (in the logarithmic domain) was used in calculating statistical significance of lognormally distributed data, medians of the data are included in Appendix C as a measure of the central tendency. The median is considered a more efficient estimator than the mean for the purpose of gross lithologic/geochemical comparisons.

Each of the six gamma-ray parameters for each averaged record are then analyzed with respect to the statistics for that parameter and map unit. This analysis consists of calculating the significance factor (number of standard deviations above or below the mean) and preparation of anomaly maps with the results of this analysis (see Subsection IV.C).

All data for a given NTMS quadrangle are then stored on magnetic tape. The data on this tape consist of a summary of the means, standard deviations, number of samples, and distribution type for each geologic map unit sampled together with a record-by-record compilation of averaged record counting rates and statistical significances (see Subsection IV.F.5).

D. MAGNETOMETER DATA PROCESSING

In the data collection process, one magnetometer record is obtained coincident with each gamma-ray sample. The reduction of the magnetometer data proceeds through three sequential stages: editing and correction, line-tieing, and normal International Geomagnetic Reference Field (IGRF) magnetic-field removal.

*1. eU	4. eU/eTh
2. eTh	5. eU/K
3. K	6. eTh/K

Following reduction of the data on the field tapes, the magnetometer data are edited and corrected for spikes, recording errors, etc., as necessary.

The data are edited at flight-line intersections, and mismatches determined using a proprietary computer program, BISTATS, for the statistical analysis of all data at line intersections. Since the actual locations at flight-line intersections are determined from the flight tracking film directly wherever possible, mismatches caused by improper positioning of data locations are minimized. The mismatches in total field and residual field values are corrected by line biasing with linear adjustments. This procedure reduces the data to a common datum and removes most of the effects caused by uncompensated diurnal changes, position uncertainties at the intersections, and small changes in magnetic field intensity caused by differences in altitude at intersections.

The corrected and adjusted data are then normalized by removal of the nearest-month IGRF calculated on a multiple degree grid and interpolated to individual airborne magnetic record locations.

The residual magnetic field, after all corrections, adjustments, and normalization, is then used for all stacked profiles, data listings, and data tapes, except for the edit field tapes.

SECTION IV

DATA PRESENTATION

A. RADIOMETRIC STACKED PROFILES

Stacked profiles were prepared at a horizontal scale of 1:250,000 for the following averaged parameters (from top to bottom): eTh/K, eU/K, eU/eTh, Gross, K, eTh, eU, atmospheric U daughter contribution (UAIR), average terrain clearance, and residual total magnetic field. Record positions with identification numbers at regular intervals are posted along the base of the profiles. A geologic strip map with posted record locations annotated at regular intervals appears at the top of the stacked profiles. The geologic maps have minimum planimetry and when they are used, it is suggested that they be supplemented by copies of the published geologic and topographic maps.

Each stacked profile contains all averaged data collected on one flight line within a specific NTMS quadrangle. The name of the quadrangle and flight line number together with other information are shown in the legend for each stacked profile. The altitude trace is flagged with a small vertical tick at the location of any records collected at an average terrain clearance of 200 feet or less or at 700 feet or greater. Breaks in data collection because of aircraft turn-arounds or other causes are indicated as such at the base. The vertical scaling of each trace is based on an examination of flight line "histograms" of the data generated prior to plotting of profiles. Therefore, when comparing profiles, changing vertical scales must be taken into account. Wild statistical fluctuations of the data are not accommodated by the vertical scaling but, to prevent vertical compression of the scale, certain traces are allowed to plot above their maxima for large positive anomalies.

The stacked profiles at a reduced scale of 1:500,000 are included in Volume 2 of this report.

B. RECORD LOCATION MAPS

For each NTMS quadrangle included in the survey area, a positional map was prepared on which the location of the averaged record centroids are posted and annotated at regular intervals. The scale of these maps, generated on a UTM projection, is 1:250,000. These maps are composited with the geological base maps (see Subsection V.A.2) for final presentation. Flight-line numbers are indicated at regular intervals.

The record location maps at a reduced scale of 1:500,000 are included in Volume 2 of this report.

C. GAMMA-RAY ANOMALY MAPS

For each NTMS quadrangle included in the survey area, a set of six gamma-ray anomaly maps was prepared on which the position of the averaged record centroids are posted and annotated in such a manner that the statistical significance of the data is indicated. The six maps correspond to the statistical significances for the six gamma-ray parameters. These six maps for each NTMS quadrangle have identical symbology. An open circle is posted at the location of every averaged record collected at an average altitude of less than 1000 feet, considered statistically valid (Subsection III.A), and not collected over open water. Thus, a comparison of the record location map and the anomaly maps for a quadrangle reveals the absence of some sample location symbols from some anomaly maps. The missing symbols, either single or in groups, are at the locations of data considered invalid for one of the reasons stated. On East-West (E-W) flight lines, data values having positive deviations from the appropriate mean (positive significance factors) are annotated to the north of the data location. Values on E-W flight lines having negative significance factors are annotated to the south of the data location. For North-South (N-S) flight lines, positive values are annotated to the east and negative values are annotated to the west. The annotations consist of one, two, or three symbols to signify that the point value falls 1 to 2, 2 to 3, or 3 and greater standard deviations away from the appropriate mean. Positive annotation uses the symbol "+" and negative annotation uses the symbol "<" as viewed along the flight line.

The scale of these maps generated on a UTM projection is 1:250,000. These maps are composited with the geological base maps (see Subsection V.A.2) for final presentation. The geologic maps have minimum planimetry and when they are used, it is suggested that they be supplemented by copies of the published geologic and topographic maps. Flight-line numbers are indicated at regular intervals.

The anomaly maps at a reduced scale of 1:500,000 are included in Volume 2 of this report.

D. HISTOGRAMS

Bar-graph displays are plotted for the counting rate distribution of data for each of the six gamma-ray parameters (averaged values for eU, eTh, K, eU/eTh, eU/K, and eTh/K) in each geological map unit in each geologic cell. Histograms for all six gamma-ray parameters in a geological map unit are on a single page. Information is included on the distribution type; the median value; the absolute values at 1, 2, and 3 standard deviations above and below the mean; and the number of samples included in the data for each parameter. The histograms are included in Volume 2 of this report.

E. COMPUTER DATA LISTINGS

Single-record and averaged-record data listings are prepared in microfiche form for each NTMS quadrangle surveyed and are contained in Appendix D of this volume. Within each quadrangle, the data are arranged by flight line and contain, as heading information on each page, the contractor's name (Texas Instruments), the name of the survey, the name of the NTMS quadrangle, the flight-line number, and the day of year on which the data were collected. Microfiche internal indexing is by day of year and flight-line number.

1. Single-Record Reduced-Data Listings

An example of the single record data listings is shown in Figure 4-1. The following is an explanation of the column headings.

Heading	Description
SEQ	Sequence number of the record within the quadrangle
ID	Record identification number
QUAL	Quality control identification—a value of 0 indicates a normal record, 4* identifies data collected at less than 200 feet or between 700 and 1,000 feet average terrain clearance and −4* indicates data collected at more than 1,000 feet average terrain clearance
TOD	Collection time of day, recorded as hours, minutes and seconds (HHMMSS)
ALT	Average terrain clearance in feet
LAT	Latitude of the ground location. Number is read as DD.DDDD where D symbolizes degrees.
LONG	Longitude of the ground location. Number is read as DDD. DDDD, where D symbolizes degrees
MAG	Residual total magnetic field value in gammas
RK.UNIT	Surface geologic map unit under the aircraft
U, TH, K	Reduced counting rates for the three elements, equivalent uranium, equivalent thorium, and potassium, in counts per second
U/TH, U/K, TH/K	Unitless ratios of the three elemental counting rates
GROSS	Integral counting rate in the gamma-ray energy interval of 0.4 to 3.0 MeV, in counts per second
COS	Cosmic counting rate in counts per second
UAIR	Airborne uranium daughter counting rate in counts per second

*Usually indicating rough terrain.

FLIGHT LINE 48, DAY 194 AGS, ALASKA TEXAS INSTRU, MAY-AUG '76 BLACK RIVER PAGE NO. 1

TAGS					LOCATION		REDUCED DATA											
SEQ	ID	QUAL	TOD	ALT	LAT	LONG	MAG	RK.UNIT	U	TH	K	U/TH	U/K	TH/K	GROSS	COS	UAIR
1	151	0	103514	499	66.9820	143.6803	59	(WATER)	0.	2.	15.	0.0	0.0	0.144	160.	36.	7.
2	152	0	103516	496	66.9819	143.6774	60	(WATER)	9.	5.	5.	1.750	1.674	0.957	238.	36.	7.
3	153	0	103517	498	66.9819	143.6746	61	(WATER)	16.	11.	35.	1.386	0.446	0.322	640.	34.	7.
4	154	0	103519	505	66.9819	143.6717	60	(WATER)	15.	22.	64.	0.666	0.228	0.343	876.	45.	7.
5	155	0	103521	514	66.9819	143.6689	60	QT'	14.	23.	69.	0.601	0.199	0.331	912.	45.	7.
6	156	0	103523	516	66.9819	143.6660	61	QT'	13.	7.	28.	1.998	0.481	0.241	609.	44.	7.
7	157	0	103525	516	66.9819	143.6632	62	QT'	9.	5.	11.	1.875	0.838	0.447	301.	34.	7.
8	158	0	103526	514	66.9819	143.6603	61	QT'	0.	9.	15.	0.0	0.0	0.637	209.	36.	7.
9	159	0	103528	509	66.9819	143.6575	61	QT'	0.	3.	38.	0.0	0.0	0.087	313.	33.	7.
10	160	0	103530	507	66.9818	143.6546	62	QT'	10.	16.	56.	0.626	0.181	0.289	752.	38.	7.
11	161	0	103532	510	66.9818	143.6518	62	QT'	17.	38.	95.	0.447	0.178	0.398	1304.	46.	7.
12	162	0	103534	487	66.9818	143.6490	63	QT'	43.	41.	116.	1.048	0.374	0.357	1578.	28.	7.
13	163	0	103536	490	66.9818	143.6461	63	QT'	27.	58.	139.	0.463	0.194	0.419	1740.	35.	7.
14	164	0	103537	483	66.9818	143.6433	62	QT'	38.	53.	108.	0.708	0.350	0.495	1668.	45.	7.
15	165	0	103539	501	66.9818	143.6404	63	QT'	32.	48.	90.	0.662	0.356	0.538	1486.	42.	7.
16	166	0	103541	518	66.9818	143.6376	62	QT'	22.	42.	139.	0.511	0.156	0.306	1405.	38.	7.
17	167	0	103543	525	66.9818	143.6347	61	QT'	24.	36.	91.	0.670	0.267	0.399	1380.	37.	7.
18	168	0	103545	541	66.9817	143.6319	61	QT'	26.	45.	91.	0.587	0.287	0.489	1411.	30.	7.
19	169	0	103546	543	66.9817	143.6290	62	QT'	27.	41.	100.	0.671	0.274	0.408	1351.	43.	7.
20	170	0	103548	551	66.9817	143.6262	60	QT	17.	27.	127.	0.643	0.135	0.210	1272.	41.	7.
21	171	0	103550	545	66.9817	143.6233	60	QT	19.	28.	97.	0.664	0.194	0.291	1253.	40.	7.
22	172	0	103552	549	66.9817	143.6205	61	QT	24.	33.	88.	0.709	0.269	0.380	1227.	38.	7.
23	173	0	103554	543	66.9817	143.6177	60	QT	33.	34.	59.	0.968	0.554	0.573	1183.	36.	7.
24	174	0	103556	533	66.9817	143.6148	60	QT	25.	36.	55.	0.683	0.450	0.660	1147.	37.	7.
25	175	0	103557	517	66.9817	143.6120	60	QT	17.	42.	78.	0.399	0.215	0.538	1211.	39.	7.
26	176	0	103559	505	66.9817	143.6092	60	PCS	24.	41.	58.	0.586	0.416	0.710	1246.	43.	7.
27	177	0	103601	501	66.9817	143.6064	59	PCS	15.	38.	109.	0.397	0.137	0.345	1304.	41.	7.
28	178	0	103603	503	66.9817	143.6036	59	PCS	19.	45.	94.	0.435	0.207	0.475	1348.	38.	7.
29	179	0	103605	499	66.9817	143.6008	59	PCS	19.	43.	113.	0.448	0.172	0.384	1466.	43.	7.
30	180	0	103608	485	66.9817	143.5980	59	PCS	29.	45.	105.	0.658	0.281	0.427	1481.	35.	7.
31	181	0	103610	473	66.9817	143.5952	59	PCS	26.	50.	91.	0.511	0.283	0.554	1489.	37.	7.
32	182	0	103612	468	66.9817	143.5924	59	PCS	32.	43.	99.	0.741	0.325	0.439	1462.	41.	7.
33	183	0	103614	457	66.9817	143.5896	59	PCS	36.	40.	104.	0.902	0.344	0.381	1492.	41.	7.
34	184	0	103616	461	66.9817	143.5868	59	PCS	25.	46.	109.	0.546	0.232	0.425	1503.	37.	7.
35	185	0	103617	463	66.9817	143.5840	60	PCS	63.	37.	59.	1.702	1.059	0.622	1529.	40.	7.
36	186	0	103619	461	66.9817	143.5812	59	PCS	23.	41.	96.	0.559	0.242	0.432	1496.	39.	7.
37	187	0	103621	449	66.9817	143.5784	59	PCS	22.	51.	100.	0.439	0.224	0.510	1606.	48.	7.
38	188	0	103623	443	66.9817	143.5756	58	PCS	27.	65.	111.	0.410	0.238	0.580	1722.	44.	7.
39	189	0	103625	438	66.9817	143.5728	58	PCS	34.	58.	120.	0.586	0.282	0.482	1785.	37.	7.
40	190	0	103627	442	66.9818	143.5700	60	PCS	28.	54.	131.	0.531	0.218	0.410	1797.	31.	7.
41	191	0	103630	456	66.9818	143.5672	62	PCS	37.	48.	108.	0.775	0.346	0.446	1698.	33.	7.
42	192	0	103632	471	66.9818	143.5644	63	PCS	36.	46.	116.	0.778	0.308	0.395	1727.	37.	7.
43	193	0	103634	482	66.9818	143.5616	64	PCS	28.	53.	122.	0.530	0.233	0.439	1747.	40.	7.
44	194	0	103636	489	66.9818	143.5588	64	PCS	26.	52.	122.	0.508	0.216	0.425	1723.	44.	7.
45	195	0	103637	494	66.9818	143.5560	63	PCS	36.	56.	120.	0.644	0.302	0.469	1752.	36.	7.
46	196	0	103639	509	66.9818	143.5531	62	PCS	25.	57.	130.	0.443	0.193	0.436	1769.	38.	7.
47	197	0	103641	518	66.9818	143.5503	62	PCS	34.	48.	133.	0.695	0.253	0.364	1718.	39.	7.
48	198	0	103643	529	66.9818	143.5475	62	PCS	27.	51.	108.	0.530	0.250	0.471	1671.	38.	7.
49	199	0	103645	539	66.9818	143.5447	63	PCS	26.	50.	142.	0.519	0.181	0.349	1652.	34.	7.
50	200	0	103647	543	66.9818	143.5419	65	PCS	28.	56.	154.	0.503	0.182	0.362	1757.	41.	7.
51	201	0	103648	547	66.9818	143.5391	65	PCS	29.	56.	144.	0.528	0.205	0.388	1778.	44.	7.
52	202	0	103652	543	66.9818	143.5364	64	PCS	40.	52.	117.	0.776	0.345	0.445	1802.	44.	7.
53	203	0	103654	530	66.9818	143.5335	64	PCS	38.	49.	110.	0.777	0.343	0.442	1782.	44.	7.

Figure 4-1. Example of Single-Record Reduced Data Listings

2. Averaged-Record (Statistical Analysis) Listings

An example of the statistical analysis data listings is shown in Figure 4-2. The following is an explanation of the column headings in the data listings:

Heading	Description
ID	Record identification number
QUAL	Quality control identification–a value of 0 indicates a normal record, 4 identifies data collected at less than 200 feet or between 700 and 1,000 feet average terrain clearance and –4 indicates data collected at more 1,000 feet average terrain clearance. Data with –4 quality are not included in the statistical analysis and thus have no name listed under the heading of RK.UNIT.
ALT	Average terrain clearance in feet over the interval of the multiple record average.
MAG	Residual total magnetic field value in gammas at the centroid of the averaging interval. Value is not obtained by averaging.
LAT	Latitude of the ground location of the center record in the multiple record average. Number is read as DDMMSS.S, where D symbolizes degrees, M symbolizes minutes, S symbolizes seconds, and the decimal is understood.
LONG	Longitude of the ground location of the center record in the multiple record average. Number is read as DDDMMSS.S, where D, M, and S have the same meanings as for LAT.
RK.UNIT	Surface geologic map unit under the aircraft for the majority of the interval covered by the multiple record average. This is left blank if QUAL = –4.
U,TH,K	Equivalent uranium, equivalent thorium, and potassium counting rates and statistical significances–absolute, corrected counting rates for the three elements averaged over the multiple record averaging interval. Counting units are in counts per second. The symbol following each counting rate (blank, one, two, or three plus or minus signs) indicates the statistical significance of the counting rate value as being within one standard deviation, one to two standard deviations, two to three standard deviations, or greater than three standard deviations above or below the mean for this geologic rock unit. The symbol N.A. indicates that the value was not acceptable (i.e., did not pass detection limit test). The statistical significance of data collected over water is not determined.
U/K, U/TH, TH/K	Unitless ratios of the multiple record average values for the three elements. The symbol following each ratio value has the same meaning as that described for the three elements.
GROSS	Multiple record average of the integral counting rate in the gamma-ray energy interval of 0.4 and 3.0 MeV, in counts per second.

TAGS							VALUES (CPS) AND STATISTICAL SIGNIFICANCE						
ID	QUAL	ALT	MAG	LAT	LONG	RK. UNIT	U	TH	K	U/K	U/TH	TH/K	GROSS
153	0	502	61	6658550	14340285	(WATER)	10.	13.	38.	0.266	0.792	0.336	565.
156	0	513	61	6656548	14339577	QT'	10. -	13. -	37. -	0.267	0.757 +	0.353	581.
159	0	511	61	6658548	14339270	QT'	6. N.A.	14. -	43. -	0.141 N.A.	0.422 N.A.	0.334	576.
162	0	495	63	6658546	14338563	QT'	27.	41.	103.	0.263	0.653	0.403	1408.
165	0	503	63	6658544	14338256	QT'	29.	48.	113.	0.252	0.598	0.421	1536.
168	0	535	61	6658543	14337547	QT'	23.	38.	110.	0.213	0.612	0.348	1364.
171	0	546	60	6658543	14337240	QT	24.	33.	94.	0.254	0.735	0.346	1257.
174	0	529	60	6658540	14336533	QT	24.	37.	68. -	0.361 +	0.653	0.553 +	1203.
177	0	505	59	6658540	14336230	PCS	19.	42.	90.	0.210	0.454 -	0.462	1315.
180	0	485	59	6658543	14335529	PCS	25.	45.	100.	0.252	0.557	0.452	1449.
183	0	464	59	6658543	14335227	PCS	36. +	43.	92.	0.393 +	0.839 +	0.469	1495.
186	0	455	59	6658543	14334524	PCS	32. +	48.	95.	0.336	0.666	0.505 +	1571.
189	0	445	58	6658543	14334221	PCS	30.	55. +	114.	0.261	0.540	0.483	1722.
192	0	468	63	6658544	14333520	PCS	31. +	51.	120.	0.261	0.618	0.423	1739.
195	0	498	63	6658544	14333217	PCS	30.	53.	125.	0.239	0.561	0.425	1742.
198	0	527	62	6658544	14332510	PCS	28.	52.	133.	0.209	0.534	0.392	1713.
201	0	540	65	6658546	14332209	PCS	32. +	52.	133.	0.242	0.616	0.393	1754.
204	0	522	61	6658546	14331506	PCS	27.	52.	126.	0.214	0.512	0.417	1689.
207	0	511	61	6658546	14331201	PCS	21.	46.	133.	0.155 -	0.450 -	0.345 -	1560.
210	0	505	61	6658546	14330498	PCS	28.	49.	120.	0.237	0.582	0.406	1555.
213	0	514	60	6658548	14330197	PCS	24.	42.	92.	0.256	0.555	0.461	1294.
216	0	504	63	6658548	14329494	QAL'	29. +	37.	133. +	0.216	0.779 +	0.277 -	1529.
219	0	482	64	6658548	14329191	QAL'	29. +	41.	137. +	0.212	0.706	0.300 -	1621.
222	0	489	63	6658548	14328488	QAL'	16.	29.	83.	0.194	0.554	0.351	998.
225	0	488	62	6658550	14328188	QAL'	19.	33.	95.	0.196	0.569	0.344	1143.
228	0	479	63	6658548	14327484	QAL'	34. ++	51. +	142. +	0.237	0.662	0.359	1766.
231	0	486	64	6658548	14327182	QAL'	34. ++	51. +	154. +	0.223	0.676	0.330	1831.
234	0	484	64	6658546	14326481	QAL'	31. ++	51. +	147. +	0.212	0.615	0.345	1739.
237	0	454	63	6658546	14326178	QAL'	22.	40.	116.	0.190	0.555	0.342	1397.
240	0	449	62	6658544	14325475	QAL'	14.	29.	76.	0.182	0.485	0.375	1037.
243	0	463	63	6658544	14325174	QAL'	18.	30.	65.	0.274	0.596	0.459 +	1032.
246	0	478	64	6658543	14324471	QAL'	22.	29.	69.	0.317 +	0.748	0.424	1052.
249	0	489	65	6658543	14324168	QAL'	23.	27.	80.	0.287 +	0.844 +	0.340	1101.
252	0	490	64	6658540	14323467	QAL'	24. +	32.	87.	0.280	0.767 +	0.365	1189.
255	0	498	61	6658540	14323164	QAL'	15.	24.	72.	0.206	0.615	0.334	912.
258	0	497	62	6658538	14322461	QAL'	9. N.A.	18. -	111.	0.079 N.A.	0.490 N.A.	0.161 ---	931.
261	0	463	62	6658530	14322160	QAL'	20.	35.	148. +	0.135	0.564	0.240 --	1486.
264	0	447	64	6658521	14321459	QAL'	20.	34.	98.	0.209	0.607	0.344	1240.
2[illegible]	0	472	62	6656511	14321156	QAL'	12.	26.	61.	0.199	0.462	0.432	888.
2[illegible]	0	475	65	6658511	14320457	QAL'	9. -	21.	55.	0.165	0.438	0.377	771.
2[illegible]	0	473	63	6658517	14320154	QAL'	13.	22.	65.	0.195	0.589	0.332	845.
2[illegible]	0	464	64	6658521	14319453	QAL'	14.	21.	48.	0.294 +	0.671	0.438	746.
279	0	470	62	6658524	14319152	QAL'	9. N.A.	23.	50.	0.170 N.A.	0.382 N.A.	0.447 +	735.
282	0	481	64	6658529	14318451	QAL'	5. N.A.	22.	57.	0.080 N.A.	0.211 N.A.	0.382	728.
285	0	483	63	6658534	14318148	QAL'	10.	18. -	54.	0.180	0.533	0.337	739.
288	0	477	64	6658538	14317447	QAL'	27. +	21.	69.	0.393 +	1.280 ++	0.307	1075.
291	0	468	63	6658544	14317146	QAL'	23.	22.	86.	0.262	1.033 +	0.254 --	1117.
294	0	479	62	6658548	14316444	QTS'	16.	18.	70.	0.225 +	0.850 +	0.265	942.
297	0	495	63	6658552	14316143	QTS'	14.	16. -	65. -	0.209	0.832 +	0.251 -	854.
300	0	501	62	6658556	14315440	QTS'	15.	24.	85.	0.174 -	0.608	0.287	1033.
303	0	494	63	6658560	14315141	QTS'	19. +	33. +	93. +	0.208	0.591	0.352 +	1194.

Figure 4-2. Example of Averaged Record (Statistical Analysis) Data Listings

F. DATA TAPES

1. General

Four types of data tapes are generated for each NTMS quadrangle surveyed. These are the edit field data tape, the single record reduced data tape, the magnetic data tape and the geologic analysis data tape. They are recorded in nine track, 800 bpi, EBCDIC, fully IBM-compatible form on ½-inch magnetic tape. Each tape consists of all data for one NTMS quadrangle on a single file with the data arranged internally by flight line. The data for each flight line are continuous in direction. Data obviated by subsequent reflights are deleted and the reflight data substituted. Data collected beyond the survey boundaries do not appear on any tapes. Each data tape begins with a header, recorded using a format of 20A4, which contains the following information: the name and date of the survey, the contractor's name (Texas Instruments), and the name of the NTMS quadrangle.

Table 4-1 lists the 23 NTMS quadrangles in the survey area and the flight-line numbers in order that they appear on each of the four types of data tapes.

TABLE 4-1. SURVEYED QUADRANGLES AND FLIGHT-LINE NUMBERS

NTMS Quadrangle	Flight-Line Number
St. Michael	559, 87, 88, 89, 90, 91, 92, 557, 558
Black	602, 103, 98, 99, 100, 101, 102
Kwiguk	559, 556, 103, 557, 93, 94, 95, 96, 97, 558, 98, 99, 100, 101, 102
Holy Cross	103, 102, 563, 93, 94, 95, 560, 562, 96, 97, 98, 100, 101, 561, 99
Hooper Bay	113, 104, 107, 111, 110, 109, 108, 112, 602, 106, 105
Marshall	114, 113, 606, 104, 107, 111, 110, 109, 108, 112, 106, 105, 603, 604, 605
Russian Mission	114, 113, 104, 107, 108, 111, 110, 610, 109, 112, 106, 105, 607, 609, 608
Nunivak Island	119, 601, 600, 122, 123, 124, 125, 120, 121, 115, 117, 116, 118
Baird Inlet	117, 118, 606, 125, 124, 123, 122, 120, 121, 115, 116, 605, 604, 119, 603
Cape Mendenhall	601, 128, 127, 600, 126
Kuskokwim Bay	606, 126, 127, 605, 604
Taylor Mountains	115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 611, 125, 614, 613, 612
Hagemeister Island	138, 137, 138, 139, 140, 141, 650, 651, 652, 141, 140
Nushagak Bay	139, 140, 141, 142, 143, 654, 655, 140, 137, 139, 653, 138
Naknek	139, 140, 656, 657, 137, 138, 140, 141, 658, 147, 146, 145, 144, 143, 142
Kateel River	60, 59, 62, 61, 63, 64, 65, 66, 67, 68, 70, 69, 506, 505, 504, 503
Melozitna	60, 59, 62, 61, 63, 64, 65, 66, 67, 68, 70, 69, 508, 507, 509
Tanana	60, 59, 62, 61, 63, 64, 65, 66, 67, 68, 70, 69, 512, 511, 510, 513
Bettles	465, 464, 463, 48, 49, 50, 51, 52, 55, 54, 53, 57, 56, 58
Beaver	48, 467, 466, 49, 50, 51, 52, 54, 53, 55, 56, 58, 57, 468, 469
Fort Yukon	48, 49, 51, 50, 52, 53, 55, 54, 56, 58, 57, 470, 471, 472
Black River	48, 49, 51, 50, 52, 55, 54, 53, 56, 475, 58, 57, 473, 474
Coleen	475, 37, 38, 39, 474, 40, 41, 42, 43, 473, 44, 47, 45, 46

2. Edit Field Data Tapes

The edit field tapes contain the original spectral data prior to any corrections together with a number of supplemental tag words. Each such tape contains one file of data for one NTMS quad. Each record, after the header, contains data in the order listed in Table 4-2.

In words 6, 7, 9, 10, 13, and 14 the decimal is understood. Possible values in word 2 include: 0 for normal records collected between 200 and 700 feet average terrain clearance; 4 for records collected at less than 200 feet or between 700 and 1,000 feet; −4 for records collected at greater than 1,000 feet; −3 or −5 for records with field recording errors. All data are recorded using fixed-length records of 1260 bytes and a block length of 12,600 bytes. Because of the mass of data and low recording density, the edit field tapes for some quadrangles may consist of more than a single tape reel.

3. Single-Record Reduced Data Tape

The single-record data tapes contain all totally reduced gamma-ray, magnetic, and geologic data. Each record, after the header, contains the data listed in Table 4-3.

All data are recorded using fixed-length records of 135 bytes and a block length of 9450 bytes.

4. Magnetic Data Tapes

The magnetic data tapes contain all reduced and adjusted total field magnetic data. Each record after the header contains the data listed in Table 4-4.

The sequence and record numbers on the magnetic data tapes also correspond to those on the single-record reduced data tapes. All data are recorded using fixed-length records of 80 bytes and a block length of 9,600 bytes.

5. Geologic Analysis Data Tapes

The geologic analysis data tapes contain the general statistical data obtained from analysis of the entire geologic cell as well as the individual averaged records within one NTMS quadrangle with their statistical significances. This single-file data tape begins with the standard header which is followed immediately by the general statistical data for each geologic map unit sampled, in the order listed in Table 4-5.

For words 9 through 14 in this table, a value of 0 indicates normal distribution, 1 indicates lognormal distribution, and 9 indicates an assumed lognormal distribution (insufficient samples). Values recorded in words 15 through 26 will be logarithms (base e) if the appropriate indicator in words 9 through 14 indicates a lognormal distribution. To mark the end of the statistics data, the last record is a dummy containing a literal 9999 in words 1 and 2.

After the general statistical data for each geologic map unit, each subsequent record contains data for the multiple record averages, in the order listed in Table 4-6.

TABLE 4-2. EDIT FIELD DATA TAPE CONTENTS

Word	Format	Description
1	I5	Record identification number
2	I2	Data quality number
3	I6	Julian day of year/flight-line number
4	I6	Time of day, recorded as HHMMSS
5	I5	Total magnetic field intensity in gammas
6	I4	Flight level barometric pressure, in tenths of psi
7	I4	Flight level air temperature, in tenths of degree Celsius
8	I4	Average terrain clearance, in feet
9	I6	Latitude, in ten-thousandths of a degree
10	I7	Longitude, in ten-thousandths of a degree
11	I5	Cosmic counting rate, in counts per second (cps)
12	I3	Airborne uranium daughter counting rate, in cps
13	I4	Sample duration, in hundreths of seconds
14	I5	Analyzer live time, in thousandths of seconds
15	I6	Channel 1 from spectrometer, in counts
.	.	.
.	.	.
.	.	.
.	.	.
213	I6	Channel 199 from spectrometer, in counts

TABLE 4-3. SINGLE-RECORD REDUCED DATA TAPE CONTENTS

Word	Format	Description
1	I5	Tape sequence number
2	I4	Record identification number
3	I2	Data quality number
4	I4	Average terrain clearance, in feet
5	I6	Latitude, in ten-thousandths of a degree
6	I7	Longitude, in ten-thousandths of a degree
7	I6	Julian day of year/flight-line number
8	I6	Time of day, recorded as HHMMSS
9	I6	Residual magnetic field intensity in gammas
10	A4	First half of geologic map unit
11	A4	Second half of geologic map unit
12	F9.2	Equivalent uranium counting rate, in counts per second
13	F9.2	Equivalent thorium counting rate, in counts per second
14	F9.2	Potassium counting rate, in counts per second
15	F9.2	eU/eTh counting rate ratio
16	F9.2	eU/K counting rate ratio
17	F9.2	eTh/K counting rate ratio
18	F9.2	Gross counting rate, in counts per second
19	F9.2	Cosmic counting rate, in counts per second
20	F9.2	eUair counting rate, in counts per second

TABLE 4-4. MAGNETIC DATA TAPE CONTENTS

Word	Format	Description
1	I5	Tape sequence number
2	I4	Record identification number
3	I4	Average terrain clearance, in feet
4	I6	Latitude, in ten-thousandths of a degree
5	I7	Longitude, in ten-thousands of a degree
6	I6	Julian day of year/flight-line number
7	I6	Time of day, recorded as HHMMSS
8	F9.2	Aircraft level barometric pressure in psi
9	A4	First half of geologic map unit
10	A4	Second half of geologic map unit
11	I6	Total magnetic field intensity, in gammas
12	I6	Residual total magnetic field intensity, in gammas

TABLE 4-5. GEOLOGIC ANALYSIS DATA TAPE CONTENTS– GENERAL STATISTICS RECORDS

Word	Format	Description
1	A4	First half of geologic rock name
2	A4	Second half of geologic rock name
3	I5	Number of equivalent thorium samples in geologic cell
4	I5	Number of equivalent uranium samples in geologic cell
5	I5	Number of potassium samples in geologic cell
6	I5	Number of eU/K samples in geologic cell
7	I5	Number of eU/eTh samples in geologic cell
8	I5	Number of eTh/K samples in geologic cell
9	I1	Normal/Lognormal indicator for equivalent thorium
10	I1	Normal/Lognormal indicator for equivalent uranium
11	I1	Normal/Lognormal indicator for potassium
12	I1	Normal/Lognormal indicator for eU/K
13	I1	Normal/Lognormal indicator for eU/eTh
14	I1	Normal/Lognormal indicator for eTh/K
15	E11.4	Mean/Mean-Log value for equivalent thorium
16	E11.4	Mean/Mean-Log value for equivalent uranium
17	E11.4	Mean/Mean-Log value for potassium
18	E11.4	Mean/Mean-Log value for eU/K
19	E11.4	Mean/Mean-Log value for eU/eTh
20	E11.4	Mean/Mean-Log value for eTh/K
21	E11.4	SD/SD-Log value for equivalent thorium
22	E11.4	Standard Deviation/Standard Deviation-Log value for equivalent thorium
23	E11.4	Standard Deviation/Standard Deviation-Log value for equivalent uranium
24	E11.4	Standard Deviation/Standard Deviation-Log value for potassium
25	E11.4	Standard Deviation/Standard Deviation-Log value for eU/eTh
26	E11.4	Standard Deviation/Standard Deviation-Log value for eTh/K

**TABLE 4-6. GEOLOGIC ANALYSIS DATA TAPE CONTENTS–
AVERAGED GAMMA-RAY DATA RECORDS**

Word	Format	Description
1	I5	Record identification number
2	I6	Day of year/flight-line number
3	I4	Average terrain clearance, in feet
4	I6	Latitude, in ten-thousandths of a degree
5	I7	Longitude, in ten-thousandths of a degree
6	I6	Residual magnetic field intensity, in gammas
7	A4	First half of geologic map unit name
8	A4	Second half of geologic map unit name
9	F9.2	Gross counting rate, in counts per second
10	F9.2	Equivalent thorium counting rate, in counts per second
11	F9.2	Equivalent uranium counting rate, in counts per second
12	F9.2	Potassium counting rate, in counts per second
13	F9.2	eU/K counting rate ratio
14	F9.2	eU/eTh counting rate ratio
15	F9.2	eTh/K counting rate ratio
16	F7.2	Statistical significance for equivalent thorium
17	F7.2	Statistical significance for equivalent uranium
18	F7.2	Statistical significance for potassium
19	F7.2	Statistical significance for eU/K
20	F7.2	Statistical significance for eU/eTh
21	F7.2	Statistical significance for eTh/K

If any of words 16 through 21 in Table 4-6 equals −999.99, that parameter is undefined and not mapped. The parameter is undefined due to excessive terrain clearance, bad quality of field data, open water under the aircraft, or failure to pass the detection limit test. All data are recorded using fixed-length records of 176 bytes and a block length of 10,560 bytes.

SECTION V

DATA INTERPRETATION

A. GAMMA-RAY DATA INTERPRETATION

1. Introduction

a. General

In order to interpret correctly results of an airborne gamma-ray spectrometer survey, principles and theory of the survey and data processing techniques must be well understood. The preceding sections have provided much of this necessary information. However, some additional specific explanations, especially pertaining to the statistical analysis of the data, are presented to call attention to some of the obvious and not so obvious pitfalls.

The nature of the statistical analysis used in producing the accompanying anomaly maps is such that the extreme values, both high and low, will be pinpointed in each geologic map unit. Since emission and detection of gamma-rays are statistical processes, random high and low extreme values will be obtained in situations with poor counting statistics. Such is the case in areas of great topographic relief where the survey aircraft is forced to maintain high terrain clearance. Cursory examination of topographic maps will outline most such problematic areas, but reference to the terrain clearance data on the stacked profiles will be necessary for detailed analyses. As discussed in Subsection III.A.7, in some areas data collected at extreme terrain clearance (somewhat arbitrarily set at 1,000 feet) were necessarily omitted from the statistical analysis and the anomaly maps. Including such data with their random, meaningless extreme high and low values would have severely biased the total analysis. Reference to the data listings or the stacked profiles is necessary to identify such data.

In general, the significance of extreme values in any geologic map unit also becomes more tenuous as the average content of uranium, thorium, or potassium decreases (with corresponding decreases in the emission rates of their respective gamma rays) and as the number of individual samples of the map unit decreases. This latter situation, which can be determined by reference to the tabulation of the number of samples (Appendix C), prevents adequate definition of the distribution of equivalent uranium (eU), equivalent thorium (eTh), and potassium values.

High equivalent uranium values, in some cases, will be caused by undetected temperature inversions which trap atmospheric radon decay products beneath the aircraft and falsely increase the reduced equivalent uranium values. Although preflight monitoring of the atmospheric conditions and continual measurements of airborne radioactivity are made, localized atmospheric conditions can prevent the mixing of radon necessary for proper correction. High measured eU values associated with topographic lows may be the result from such conditions, although none of the larger anomalies in this survey area appear to be of this type.

The success of the CGARD statistical analysis at delineating anomalous values depends to a large degree on the ability to precisely define the distributions of the data in statistical terms. Ideally, only data from one geochemical unit (as opposed to lithologic or mapping unit) should be grouped together for analysis, and the proper distribution type (normal, lognormal, etc.) should be selected.

A special problem is caused by the areas of snow, water cover, and water-saturated surface materials. Where a particular formation is partly water-saturated and partly well-drained, a bimodal histogram may result, with one mean value near zero and another near the normal mean value for the formation if it were dry. If most of the formation is water-saturated, the statistical analysis will result in a falsely low mean and falsely high standard deviation and may obscure possibly meaningful broad low anomalies. Only the "tips" of the highest anomalies may be defined on the significance factor maps. Another effect may be the definition as anomalous of any particularly dry portions of the formation even though they may contain only normal amounts of uranium, thorium, and potassium. In this survey, the geologic map units were separated into "water saturated" and "better drained" portions for separate statistical processing in an attempt to minimize this problem (see Subsection V.A.1.b).

Quaternary deposits in general and stream and glacial deposits in particular present another situation requiring special attention. Since the geochemistry of these deposits is controlled in large part by provenance, uranium, thorium, and potassium concentrations occurring in these deposits may reflect the higher or lower content of these elements in distant source materials. On the other hand, concentrations in Quaternary deposits which are accompanied by concentrations in adjoining rocks may be considered as meaningful as any enriched zones which traverse rock-type boundaries.

Since the terms "anomaly" and "anomalous values" do not have universally accepted meanings, their present usage warrants explanation. Symbols on the accompanying anomaly maps are simply indications of the statistical significance of the data at those points, relative to all other sample values in the same geologic map unit. In turn, the statistical significance (or significance factor) is a measure of the degree of certainty of particular values above or below the mean value for that particular geologic map unit. As the significance factor increases in a positive or negative sense, the certainty that the value is different from the mean increases. In practical terms, this implies that the computed value is relatively unusual. At some level of significance, this unusualness of the value may be arbitrarily declared anomalous. The approach of Hawkes and Webb (1962), perhaps the one in the widest use, is to declare values deviating at least two standard deviations from the mean (i.e., absolute values of significance factors greater than or equal to two) as anomalous. Another approach and the one used here is that an anomaly consists of a spatial association of either statistically high values or statistically low values. In addition to avoiding a conflict with the dictionary meaning of the term anomaly (i.e., deviation in excess of normal variation), the use of a spatial association is more fitting with the regional exploration concept adopted for this survey. The terms "statistically high" and "statistically low" will be applied to individual values deviating more than one standard deviation from the mean.

Some individual values may be occasionally geologically misclassified, resulting in the assignment of an incorrect statistical significance. In rare instances this could result in a grouping of points which might be falsely interpreted as an anomaly. The relative importance of this problem is inversely dependent on the accuracy and completeness of the geologic mapping.

False equivalent uranium anomalies caused by extreme terrain clearances, geologic misclassification, or a mixture of water-saturated and well-drained surface materials all have a general common characteristic which may be used to identify them; i.e., their potassium and equivalent thorium values will probably be falsely anomalous also. Therefore, anomalies where there are similar positive or negative significance factors for all three elements should be viewed with suspicion. A legitimate mapped positive equivalent uranium anomaly in most instances should be associated with an area enriched in uranium relative to thorium and potassium.

The following analysis attempts to relate the major features of the equivalent uranium data to the geology and known uranium occurrences in the survey area. Follow-up studies could apply similar approaches to the equivalent thorium and potassium data as well as to their ratios to gain a broader understanding of their regional distribution and relationships to the mapped equivalent uranium anomalies.

b. Geologic Mapping and Water Shielding Estimation

Suitable 1:250,000 scale published or open-file geologic maps are available for quadrangles listed in Table 5-1.

TABLE 5-1. PUBLISHED OR OPEN FILE GEOLOGIC MAPS FOR THE SURVEY AREA AT 1:250,000 SCALE

Quadrangle	Map No.	Reference
Hagemeister Island	I-321	Hoare and Coonrad (1961)
St. Michael	I-682	Hoare and Condon (1971a)
Black	I-469	Hoare and Condon (1966)
Kwiguk	I-469	Hoare and Condon (1966)
Hooper Bay	I-523	Hoare and Condon (1968)
Marshall	I-668	Hoare and Condon (1971b)
Kateel River	I-437	Patton (1966)
Melozitna	I-290	Cass (1959)
Tanana	OF75-337	Chapman et al. (1975)
Beaver	MF-525	Brosge et al. (1973)
Black River	I-601	Brabb (1970)
Bettles	MF-492	Patton and Miller (1973)
Coleen	OF370	Brosge and Reiser (1969)
Russian Mission	I-292	Hoare and Coonrad (1959)

Russian Mission quadrangle is mapped at 1:250,000 scale (Map I-292: Hoare and Coonrad, 1959); however, the base is planimetrically inadequate. This quadrangle, and those for which only 1:1,000,000 scale maps are available, were remapped using LANDSAT imagery and the available planimetrically accurate 1:250,000 scale topographic maps using photogeologic methods. The quadrangles in this group are listed in Table 5-2. The specific approach used is described under each appropriate geologic cell in Subsection V.A.2.

Each mapped geologic unit was classified as "water saturated" or "better drained" on the basis of topographic relief and appearance on LANDSAT imagery. This was done in an attempt to eliminate, or at least minimize, surface-water shielding effects. Without separation, statistical evaluations of the data over better-drained portions of the geologic map unit tend to appear anomalous where a unit (formation) was partially covered with water-saturated surface materials, such as tundra (Texas Instruments, 1975). For this survey the flat vegetation-covered and lake-studded areas were classified as water-saturated (indicated by a primed geologic unit symbol, e.g., Tv′) on the basis that the surface appears to be tundra-covered in contrast to the more rugged areas where bedrock appears to be exposed. The two classes were statistically processed separately in CGARD.

TABLE 5-2. PUBLISHED OR OPEN FILE MAPS USED FOR THE SURVEY AREA AT 1:1,000,000 SCALE

Quadrangle	Map No.	Reference
Holy Cross	MF-611	Beikman (1974)
Taylor Mountains	MF-611	Beikman (1974)
Nushagak Bay	MF-611	Beikman (1974)
Naknek	MF-611	Beikman (1974)
Fort Yukon	MF-789	Beikman and Lathram (1976)

Suitable LANDSAT imagery was available over nearly all the surveyed area. The only portions without cloud-free and snow-free coverage were:

All of Naknek Quadrangle

SE part of Nushagak Bay Quadrangle

East-central part of Bettles Quadrangle

SE part of Tanana Quadrangle

SW corner of Black River Quadrangle

Extreme southern edge of Coleen Quadrangle.

A list of the LANDSAT scenes used in the estimation of water-shielding and in the photogeologic studies is given in Appendix B.

LANDSAT imagery was found to be very helpful in revising the unsuitable geologic maps, and was a valuable adjuunct to the topographic maps in the estimation of water-shielding effects. Examination of the statistical summary data (Appendix C) and the histograms (Volume 2) shows that data in the geologically remapped quadrangles is generally unimodal, indicating relatively good separation of geochemical units. The water-shielded portions of geologic map units (primed) generally show lower median values where a statistically adequate number of records were available, as would be expected. The better drained portions also show "cleaner" histograms (i.e., more unimodal) than did those obtained in the previous Alaska survey where the effects of water-shielding were not taken into account (see Texas Instruments, 1975). As will be seen in Subsection V.A.2, some anomalies are still generated by better exposed or drained portions of the areas classified as water-shielded, but they are fewer in number and more easily identified in data interpretation than was the case in the previous Alaska survey.

c. *Selection of Uranium Anomalies*

(1) Statistical Considerations

The equivalent uranium anomaly maps were examined to identify and outline all individual or groups of statistically high data points on the following basis. If a single statistically high point is considered in terms of multiples of the standard deviation above the mean (i.e.,

TABLE 5-3. PROBABILITY THAT A SINGLE STATISTICALLY HIGH POINT IS CAUSED BY RANDOM DEVIATIONS*

Point Value	Probability
Mean + 1 standard deviation	0.1587 or 1:6.3
Mean + 2 standard deviations	0.0228 or 1:44
Mean + 3 standard deviations	0.0013 or 1:768

*A probability is determined as the area under the standardized normal distribution curve above the indicated value.

significance factor), then the probability that its value was caused by random variation of the background is shown in Table 5-3.

The maximum probability of 1:768 was used to judge the reliability of single points in the data interpretation.

Spatial groupings of statistically high values are less probable than a scattering of the same values over the map unit. If a spatial grouping consists of adjacent statistically high points, the probability (P) that all the points were caused by random fluctuations is:

$$P = P_1 \cdot P_2 \cdot P_3 \ldots P_n$$

where $P_1, P_2, \ldots P_n$ represent the single-point probabilities for n points.

Assuming the same certainty criterion of 1:768, Table 5-4 gives the minimum requirements for all adjacent points in a reliable anomaly. This allows groupings of statistically high or low points more than one standard deviation from the mean to be evaluated. A minimum acceptable significant eU anomaly consists of one data point 3 or more standard deviations above the mean, or two *adjacent* points averaging between 2 and 3 standard deviations above the mean, or three *adjacent* points with 2 between 1 and 2 standard deviations and one between 2 and 3 standard deviations above the mean, or four *adjacent* points all between 1 and 2 standard deviations above the mean as shown in Figure 5-1. These adjacency criteria apply strictly to points distributed uniformly on an even grid spacing. In this survey, with closely spaced sampling on widely spaced flight lines, the adjacency criterion has been relaxed to allow an anomaly to include segments separated by only one record location.

(2) Outlining Anomalies

In outlining or mapping computed anomalies a translucent copy of the record location map for each quadrangle was placed over the corresponding eU anomaly map and all groups of points satisfying the criterion stated above were outlined. Next, the record location film was placed over the eU/eTh ratio map and all satistically high eU/eTh points within each eU anomaly were noted. Then, a similar approach was used to determine all statistically high eU/K, and eTh, and K points within each eU anomaly. The numbers of each kind of statistically high points supporting the eU anomalies were recorded in tabular form to aid in the evaluation of the eU anomalies.

TABLE 5-4. MINIMUM DEVIATION FROM THE MEAN FOR ALL POINTS FOR LIMITING PROBABILITY OF 1:768 (Elkins, 1940)

Number of Points Supporting Anomaly	Minimum Deviation
1	3.0 standard deviations
2	1.8 standard deviations
3	1.2 standard deviations
4	0.9 standard deviation

In some quadrangles with rough terrain it was necessary to exceed the specified terrain clearance limit of 1,000 feet for reasons of flight safety. Data collected

Single-Point Anomaly	Two-Point Anomaly	Three-Point Anomalies a.	b.	c.	Four-Point Anomalies
+					
+	+ +	+	+	+	
+	+ +	+ + +	+ + +	+ + +	+ + + +
o	o o	o o o	o o o	o o o	o o o o

Figure 5-1. Minimum Anomalous Point Values

during these periods was eliminated from the anomaly maps because it is generally statistically uncertain due to low ground-signal-to-background noise ratios. Inspection of the profile data showed several such out of terrain clearance specifications areas where the count rate from the ground was quite high and apparently statistically valid. This led to inspection of all such regions to identify possible overlooked valid anomalies. These possible anomalies were recorded and are shown by brackets on the eU anomaly maps. At high altitudes the eU readings may be increased by relatively more uncompensated atomspheric Bi-214 below the aircraft; however, that effect is minor in Alaska due to the small amounts of atmospheric Bi-214 present compared to the magnitude of the observed anomalies.

d. Evaluation of Anomalies

The translucent eU anomaly maps were then examined in conjunction with the supporting data tables, published topographic maps, and the geologic maps to evaluate each eU anomaly by judging its validity as a potential indication of actual uranium enrichment that deserves further investigation. Each valid or preferred eU anomaly should fulfill the following requirements:

It should be supported by statistically high eU/eTh and eU/K points thus indicating true uranium enrichment.

It should not be suspect of being caused by an atmospheric inversion, i.e., it should not be confined to a topographic low and be accompanied by other anomalies also in topographic lows on the same flight line. (Another criterion of suspect inversion effects is the presence of early morning calm wind conditions as indicated on the flight log.)

It should be associated with geologic formations which would be reasonable hosts for vein or stratiform uranium deposits which might be worked economically. This would include most sedimentary, metamorphic or igneous map units. The presence of black shales along with other lithologies in a given map unit would cast suspicion that the shales caused the anomaly, and, under present economic conditions, would not be workable. The presence of alluvium and high eU, normal eU/eTh (high eTh), and high eU/K could indicate a placer deposit of monazite and/or radioactive "blacks" which also probably would not be economic at present. The presence of continental sandstones or alkaline intrusives, however, would indicate favorable prospects for possible economic uranium recovery.

It should not be suspect of resulting from any cultural cause unrelated to natural radioactivity such as nuclear testing or reactor operations. Neither of these were a factor in this survey.

The final anomaly evaluations are presented in the form of a map and table for each quadrangle. The map shows all uranium anomalies by a numbered rectangular outline with the preferred anomalies shaded in black. The table presents a summary of each anomaly including eU, eTh, eU/eTh and eU/K statistically high points, the flight line number, geologic map unit(s), and comments concerning the evaluation of each anomaly. Preferred anomalies in the tables are indicated by a circle around the anomaly number.

A total of 142 preferred anomalies out of 595 possible eU anomalies are designated and described in Figures 5-2 through 5-22 and Tables 5-5 through 5-39 and are discussed by geologic cell and quadrangle in Sections V.A.2. They are also discussed in terms of uraniferous provinces in Subsection V.C.

2. Geology, Uranium Occurrences, and Anomaly Maps

a. Naknek and Nushagak Bay Geologic Cell

(1) Geology

The Naknek and Nushagak Bay quadrangles are part of the Bristol Bay Tertiary province (Eakins, 1975). The province is also called the Nushagak Basin or Lowlands. The surface is largely covered by Quaternary deposits and many lakes. It is underlain by isolated masses of permafrost.

The mapped geologic units for the Naknek and Nushagak Bay quadrangles were adapted from Beikman (1974) and are listed in Table 5-5. For the Nushagak Bay quadrangle, geologic map unit boundaries were modified from Beikman (1974) using photogeologic techniques of LANDSAT imagery (scene no. 1667-21200, bands 5 and 7) for the northwest part of the map. The remainder of the map and the Naknek quadrangle were not covered by suitable cloud-free imagery and the 1:250,000 scale topographic maps were used to refine the boundaries of Qp (characteristically flat and lake-studded) and MzPz, Th, Tv and Jg (relatively erosion resistant and topographically higher and more rugged). This has resulted in geologic maps which are believed to be much superior to those obtained by a simple 4X enlargement of the 1:1,000,000 scale map by Beikman. A few more prominent geomorphic lineaments on the LANDSAT imagery were added to the geologic map in the northwest part of Nushagak Bay quadrangle and marked as inferred faults.

(2) Uranium Potential

Eakins (1975) states that there have been no investigations for radioactivity reported in the Bristol Bay region, and that the lowlands would be difficult to prospect because of the lack of outcrops and the Quaternary cover. He also indicates that detailed studies and sampling in the areas marginal to the lowlands might suggest favorable locations to drill for possible sedimentary uranium deposits.

Beneath the Quaternary deposits, highly deformed Cretaceous and older rocks (MzPz) are overlain unconformably by several thousand feet of interbedded marine and nonmarine Tertiary sediments containing sandstone and coal beds which might be favorable for uranium deposits. Granitic stocks (Jg) and volcanic materials (Tv and Th) are present which could have been sources for uranium in the sediments, and the granites also might be hosts for uranium vein deposits.

(3) Anomaly Maps

(a) Naknek Quadrangle

None of the map units in this quadrangle shows any particular enrichment of uranium. Even the granitic rocks (Jg) have an exceptionally low median eU values compared with other granitic rocks (see Appendix C). Of nine statistically significant eU anomalies only Anomaly No. 8 (Figure 5-2 and Table 5-6) indicates uranium enrichment over both thorium and potassium and thus is classified as "preferred."

(b) Nushagak Bay

Examination of the statistical summary data (Appendix C) shows that the Tertiary hypabyssal rocks (Th) have nearly twice the mean eU and eTh counting rates as the other geologic units suggesting that they could have been the igneous source for potential uranium deposits. Only one small exposure is present in the northwest corner of the Nushagak Bay sheet, and it is crossed by only one flight line. The small anomaly shown on the west edge of the Th exposure (No. 2 in Figure 5-3 and Table 5-7) shows simultaneous enrichment of eU, eTh and K, indicating that it is probably due to geologic misclassification of a Th exposure as the much less radioactive MzPz.

The other anomaly (No. 1 in Figure 5-3 and Table 5-7) shows an eU enrichment over eTh and K as indicated by the ratio maps, eU/eTh, and eU/K, and may be indicative of a potential uranium deposit.

TABLE 5-5. GEOLOGIC MAP UNITS FOR NAKNEK AND NUSHAGAK BAY QUADRANGLES (after Beikman, 1974)

Map Symbol	Description
Qp	Pleistocene deposits: Alluvial, glacial, dunesand, silt and reworked sand and silt deposits.
Tv	Tertiary volcanic rocks: Basalt and andesite flows, including some rhyolite, trachite and latite with a few tuff, breccia and tuffaceous sandstone beds along west flank of Alaska-Aleutian Range and olivine basalt and andesite flows with some water-laid tuff and interbedded basaltic detritus.
Th	Tertiary hypabyssal rocks: Rhyolite and dacite with some flows and tuff beds.
uJ	Upper Jurassic rocks: Siltstone, sandstone, shale and conglomerate of the Chinitna and Naknek Formations in the Cook Inlet area.
Jg	Jurassic granitic rocks: Quartz diorite and granodiorite of Early and Middle Jurassic age in the Alaska-Aleutian Range batholith
MzPz	Mesozoic and Paleozoic Rocks: Siltstone, chert and mafic volcanic rocks, with lesser amounts of calcareous siltstone, graywacke, conglomerate and limestone of the Gemuk Group of Jurassic age in this cell.
—— - - -	Fault (dashed where inferred)

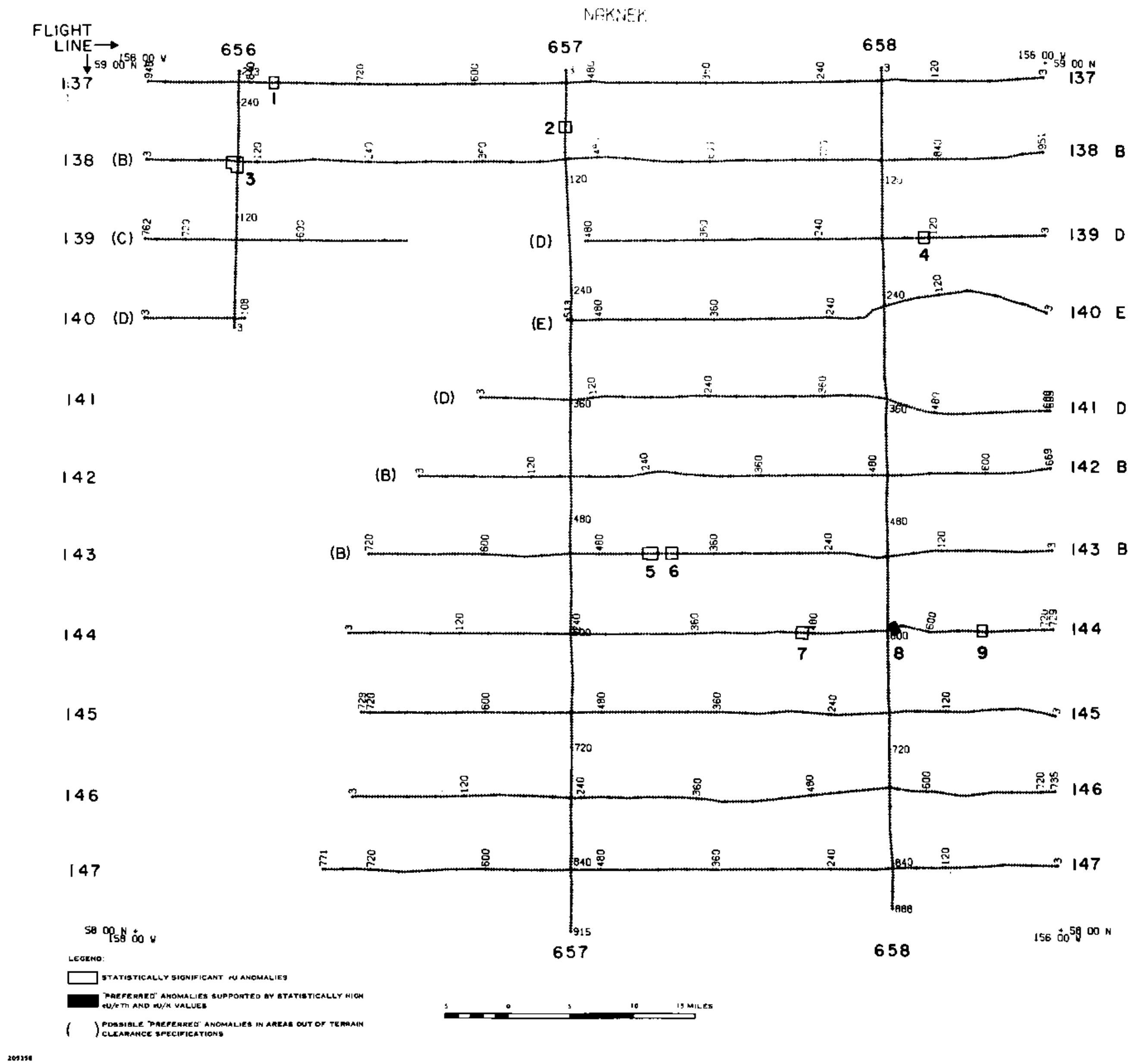


Figure 5-2. Equivalent Uranium Anomaly Map—Naknek Quadrangle

TABLE 5-6. EQUIVALENT URANIUM ANOMALIES–NAKNEK QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	137	Qp	–	2	1	–	1	–	–	2	–	–	1	–	–	Possible geological misclassification
2	657	Qp	–	1	2	–	–	–	–	1	1	–	–	–	–	Possible geological misclassification
3	1388/656	Qp	–	8	–	–	2	–	–	1	–	–	–	–	–	Possible geological misclassification
4	139D	Qp	–	2	1	–	–	–	–	1	–	–	–	–	–	Possible geological misclassification
5	143B	Qp	–	3	2	–	4	1	–	2	–	–	–	–	–	eU + eTh enrichment
6	143B	Qp	–	3	1	–	–	–	–	3	1	–	1	–	–	Slight eU enrichment
7	144	Qp	–	2	2	–	1	1	–	1	1	–	–	–	–	Possible geological misclassification
8	144	Jg	–	1	2	–	–	–	–	2	1	–	1	2	–	Significant eU enrichment
9	144	Qp	–	2	1	–	–	–	–	–	–	–	1	–	–	Possible geological misclassification

* 8 Circled number denotes preferred anomaly.

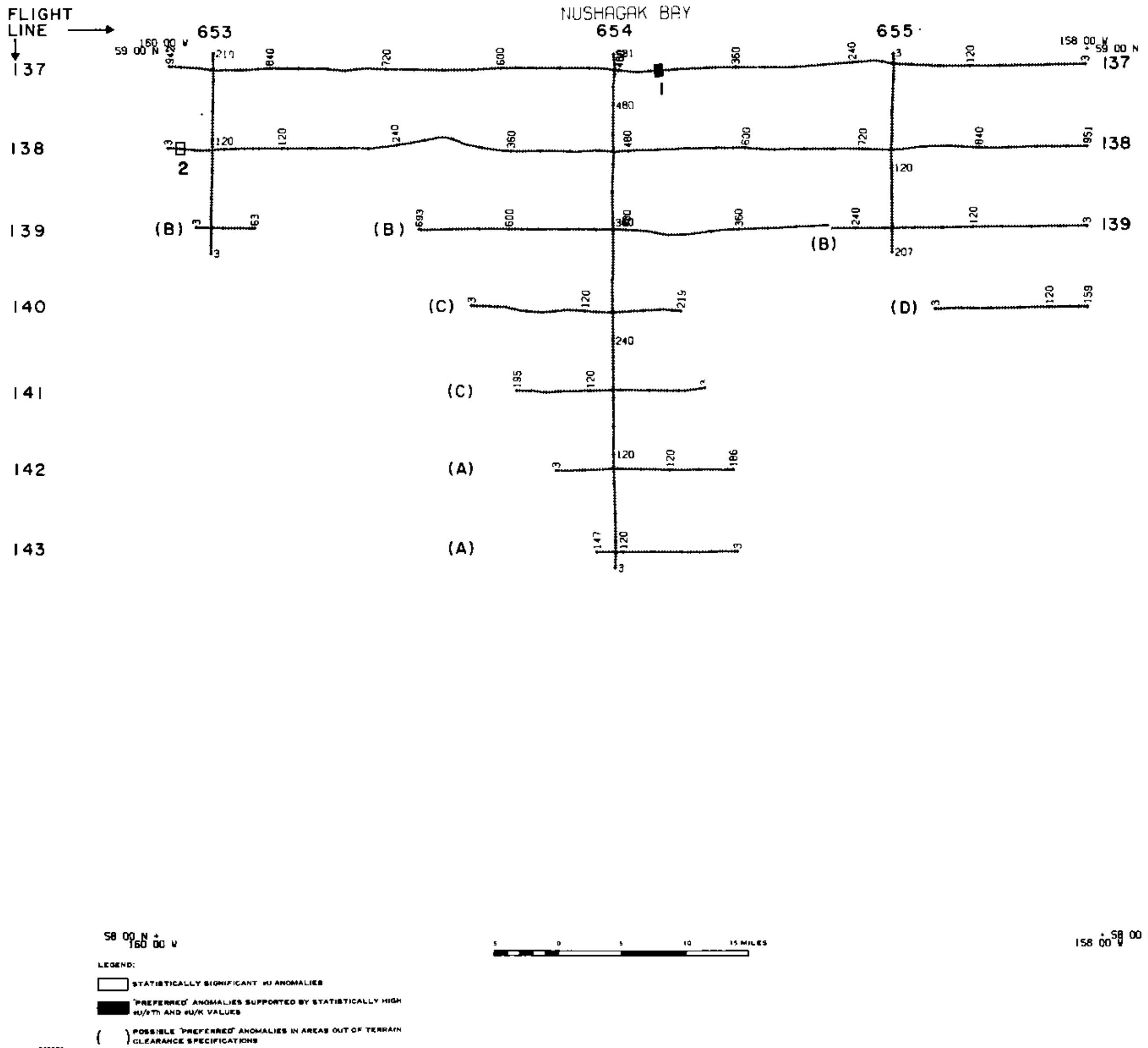


Figure 5-3. Equivalent Uranium Anomaly Map—Nushagak Bay Quadrangle

TABLE 5-7. EQUIVALENT URANIUM ANOMALIES–NUSHAGAK BAY QUADRANGLE

				Number of Points												
				eU			eTh			eU/eTh			eU/K			
Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	+	++	+++	+	++	+++	+	++	+++	+	++	+++	Remarks
1	137	Qp	–	2	1	–	1	–	–	2	1	–	2	–	–	Significant eU enrichment
2	138	Th	–	2	1	–	–	–	1	–	–	–	1	–	–	Possible geological misclassification

* 1 Circled number denotes preferred anomaly.

b. Hagemeister Is. Geologic Cell

(1) Geology

The geology of this cell is discussed by Hoare and Coonrad (1961) and their map at 1:250,000 scale was used as the basis for this cell.

Bedded rocks ranging in age from Paleozoic to Late Cenozoic are exposed in the northern part of the quadrangle. Unconsolidated Quaternary surficial deposits and the waters of many lakes, Kuskokwim Bay and Bristol Bay conceal the bedrock over most of the quadrangle. The map units used in the statistical processing of the airborne gamma-ray data are described in Table 5-8.

(2) Uranium Potential

Some of the mafic intrusive rocks (Tm) may be genetically related to the Tertiary granites and may represent late stage lamprophyric differentiates. Their presence along with rhyolite dikes may indicate the possibility of uranium vein deposits based on observed geologic relationships of known vein deposits (Rich et al., 1975; Bowie, et al., 1972).

TKs and KCg contain volcanics and carbonaceous matter, and could potentially be hosts for stratiform deposits.

Eakins (1975) states that there have been no investigations for radioactivity in this area (see also Subsection V.A.2.a.(2) above).

(3) Anomaly Maps

There are no significant anomalies on the eU significance factor map for Hagemeister Island Quadrangle. The eU/eTh and eU/K maps showed one small significant anomaly on each but in different locations. In summary, no valid indications of uranium enrichment were found. Thus, no anomaly map or table is presented.

TABLE 5-8. GEOLOGIC MAP UNITS FOR HAGEMEISTER ISLAND QUADRANGLE (Hoare and Coonrad, 1961)

Map Symbol	Description
Quaternary Surficial Deposits	
Qf	Flood plain alluvium: Includes some beach deposits.
Qc	Colluvium: Chiefly frost-rived rubble, locally includes stream alluvium, terrace gravels, glacial deposits and windblown silt.
Qd	Glacial drift: Poorly-sorted sand, gravel, and boulders.
Qo	Outwash deposits: Poorly to well-sorted silt, sand, gravel, and some boulders in terraces and outwash fan-plains.
Quaternary or Tertiary Bedded Rocks	
QTb	Basalt: Vesicular basalt flows, horizontal.
Tertiary to Cretaceous Bedded Rocks	
TKv	Volcanic rocks: Black, buff and lavender basalt flows, tuffs, and breccia.
TKs	Interbedded graywacke, pebble grit, conglomerate and carbonaceous mudstone.
Carboniferous to Cretaceous Bedded Rocks	
KCg	Gemuk group: Chiefly massive, altered volcanic rocks, massive to thin-bedded siliceous siltstone and chert with lesser amounts of calcareous siltstone, fine-grained graywacke and limestone. Upper part chiefly fine- and coarse-grained graywacke, siltstone, and conglomerate. Graywacke commonly contains coal blebs. Volcanic breccia and agglomerate common in lower part.
Paleozoic (?) Bedded Rocks	
PALs	Schistose and phyllitic fine-grained rocks: Chiefly calcareous siltstone, limestone, and argillaceous rocks, locally interbedded buff and green shistose tuff and greenstone.
Tertiary Intrusive Igneous Rocks	
Tm	Mafic rocks: Chiefly diabase, basalt, and some biotite lamprophyre; forms dikes and sills.
Tr	Albite rhyolite: Light-gray or buff, fine-grained and porphyritic; forms dikes, sills, and dome-like intrusive bodies.
Tg	Granitic rocks: Includes pink granite, light- to dark-gray diorite, quartz diorite and gabbro; forms intrusive stocks.
Tu	Ultramafic rocks: Black and greenish-black serpentine and serpentinized dunite and peridotite; forms large and small tabular-shaped intrusive bodies.
Pre-Tertiary Intrusive Igneous Rocks	
og	Older granitic rocks: Weakly foliated, light greenish-gray, medium-grained rocks of granitic texture and composition.

c. *Nunivak Is., Baird Inlet, Cape Mendenhall and Kuskokwim Bay Geologic Cell*

(1) Geology

This geologic cell is in the Bethel Basin and, with the exception of a small area of Cretaceous rocks on Nunivak Island, the entire region is covered by unconsolidated quaternary deposits or volcanics ranging in age from Quaternary to Tertiary. The geologic maps of these quadrangles were adapted from Beikman (1974) enlarged from 1:1,000,000 scale to 1:250,000 scale with some geologic unit boundary adjustments using photogeologic methods to fit the more detailed topographic and tonal features on the U.S.G.S. 1:250,000 scale topographic maps and on LANDSAT imagery at 1:250,000 scale [Scenes 1669-21310 (MSS Bands 5 and 7), 1686-21245 (MSS Bands 5 and 7), and 2198-21311 (MSS Bands 5 and 7)].

The geologic units used in the CGARD processing are described in Table 5-9.

(2) Uranium Potential

There are no reported uranium occurrences in this geologic cell (Cobb, 1970; Eakins, 1969).

The only promising exposed rocks are in the small area of Cretaceous laumontitized tuff and tuffaceous sandstone with plant fossils on Nunivak Island. The presumed conditions for the formation of laumontite (Hoare and Condon, 1971a) appear to be quite similar to those generally assumed to be responsible for certain stratiform uranium deposits, and this region may have some potential for economic accumulations of uranium. (See also the description of the St. Michael, Black, Kwiguk, Hooper Bay, and Marshall geologic cell, following.)

(3) Anomaly Maps

(a) Nunivak Is. Quadrangle

There is one statistically significant eU anomaly on this sheet (Figure 5-4 and Table 5-10). It shows slightly high eTh and slightly high eU/eTh and eU/K values also. This probably reflects a more acidic phase in the Quaternary volcanics and indicates a weak uranium enrichment in that area with some possible potential for vein-type deposits.

(b) Baird Inlet Quadrangle

The statistical summary data (Appendix C) indicate that there are no particularly uranium-rich rock types exposed in this quadrangle. The anomaly maps show five statistically significant uranium anomalies (Figure 5-5 and Table 5-11) which are supported by eTh and K anomalies in all cases, and all of them show essentially normal eU/K, eU/eTh and eTh/K values. Thus, there are no indications of eU enrichment over eTh and K. Anomalies 1 and 2 probably represent unmapped acidic phases of the volcanics, and anomalies 3, 4, and 5 appear to be mud or sand bars which are not covered by tundra and appear anomalous due to lack of surface shielding (they also may show some minor placer enrichment of Th).

TABLE 5-9. GEOLOGIC MAP UNITS FOR NUNIVAK ISLAND, BAIRD INLET, CAPE MENDENHALL, AND KUSKOKWIM BAY QUADRANGLES
(after Beikman, 1974)

Map Symbol	Description
Bedded Rocks	
Qh	Holocene deposits: Alluvial, estuarine and beach deposits
Q	Quaternary deposits: Alluvial, dune sand, loess, delta, windblown sand, and reworked silt deposits
Qp	Pleistocene deposits: Alluvial, glacial, dune sand, silt and reworked sand and silt
K	Cretaceous: Includes an unnamed sequence containing laumontitized tuff and tuffaceous sandstone containing plant fossils on Nunivak Island (Hoare and Condon, 1971a)
Volcanic Rocks	
Qv	Quaternary volcanic rocks: Basalt flows, associated cones and craters and pyroclastic rocks
QTv	Quaternary and Tertiary volcanic rocks: Olivine basalt flows with interlayered pyroclastic rocks
Tv	Tertiary volcanic rocks: Basalt and andesite flows

(c) Cape Mendenhall Quadrangle

The Cape Mendenhall uranium anomaly map (Figure 5-6) shows one statistically significant eU anomaly coincident with the Ibkikwit lava bed (Table 5-12). It also shows high eTh and K, as well as normal eU/eTh, eU/K and eTh/K indicating that it probably is either a well-exposed area of lava or an unmapped acidic phase of the volcanics. There is no indication of significant uranium enrichment in this quadrangle.

(d) Kuskokwim Bay Quadrangle

There are no statistically significant uranium anomalies on this sheet, thus, no anomaly map or table is presented.

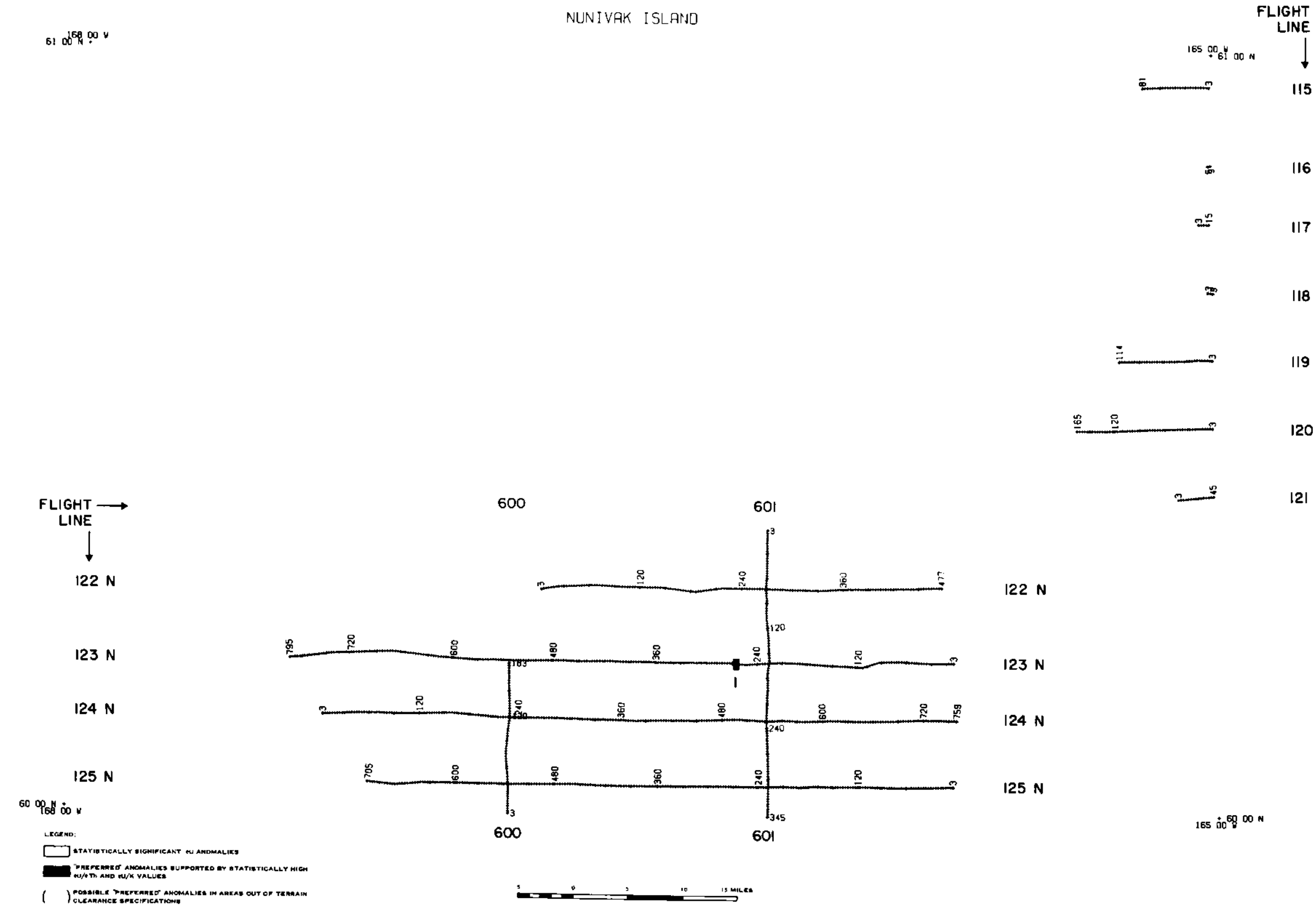


Figure 5-4. Equivalent Uranium Anomaly Map—Nunivak Island Quadrangle

TABLE 5-10. EQUIVALENT URANIUM ANOMALIES–NUNIVAK ISLAND QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points												Remarks
				eU			eTh			eU/eTh			eU/K			
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	123N	Qv	–	–	2	–	2	–	–	2	–	–	1	1	–	Significant eU enrichment

* 1 Circled number denotes preferred anomaly.

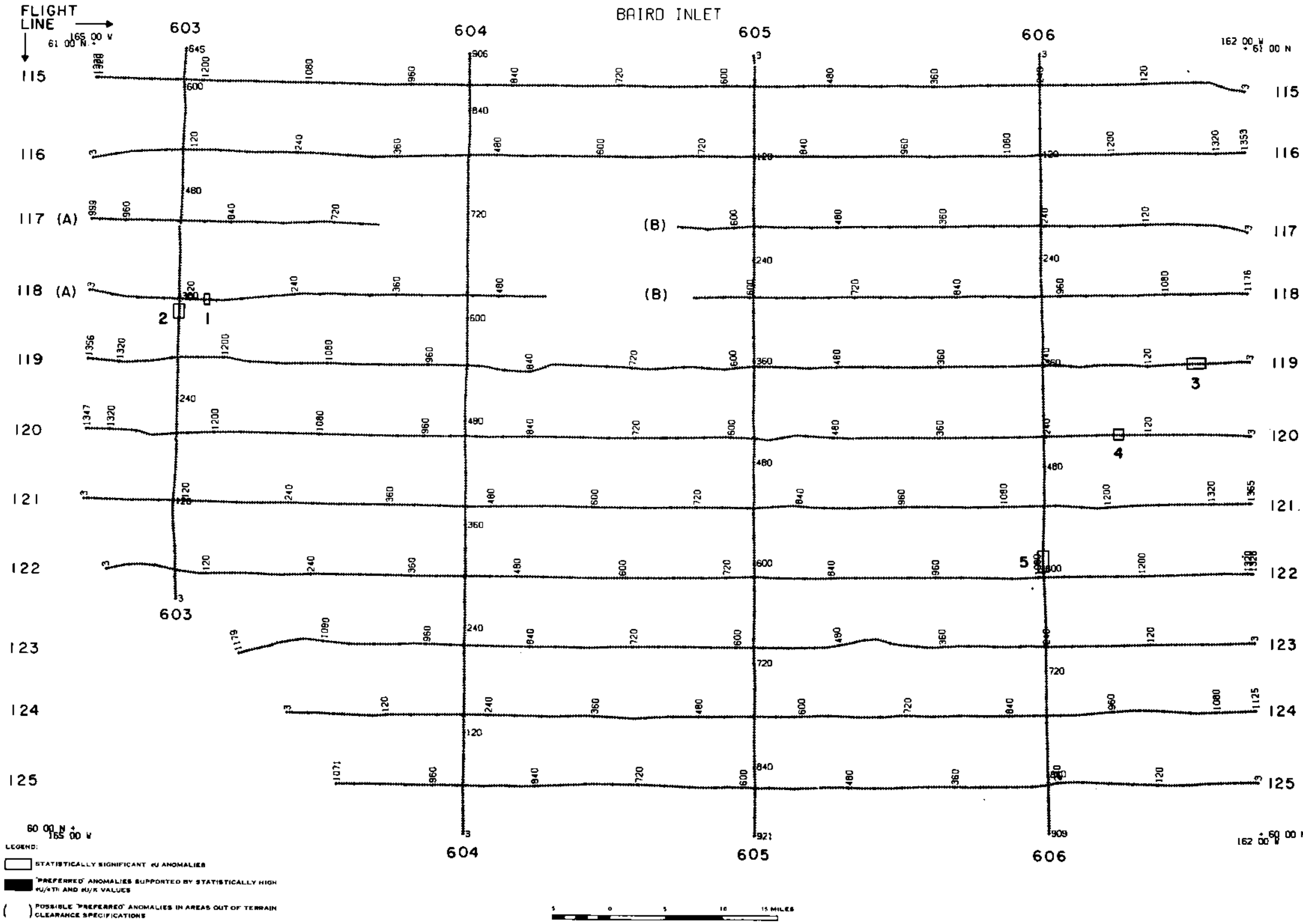


Figure 5-5. Equivalent Uranium Anomaly Map–Baird Inlet Quadrangle

TABLE 5-11. EQUIVALENT URANIUM ANOMALIES–BAIRD INLET QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points												Remarks
				eU			eTh			eU/eTh			eU/K			
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	118	QTv	–	–	2	–	2	–	–	–	–	–	–	–	–	More acidic phase of volcanics
2	603	QTv	–	3	2	–	5	–	–	–	–	–	–	–	–	More acidic phase of volcanics
3	119	Q	–	4	2	–	–	–	7	–	–	–	–	–	–	Probably exposed sandbar
4	120	Q	–	1	1	2	–	1	3	–	–	–	–	–	–	Probably exposed sandbar
5	606	Qh	–	6	1	–	1	8	–	1	–	–	–	–	–	Probably exposed sandbar

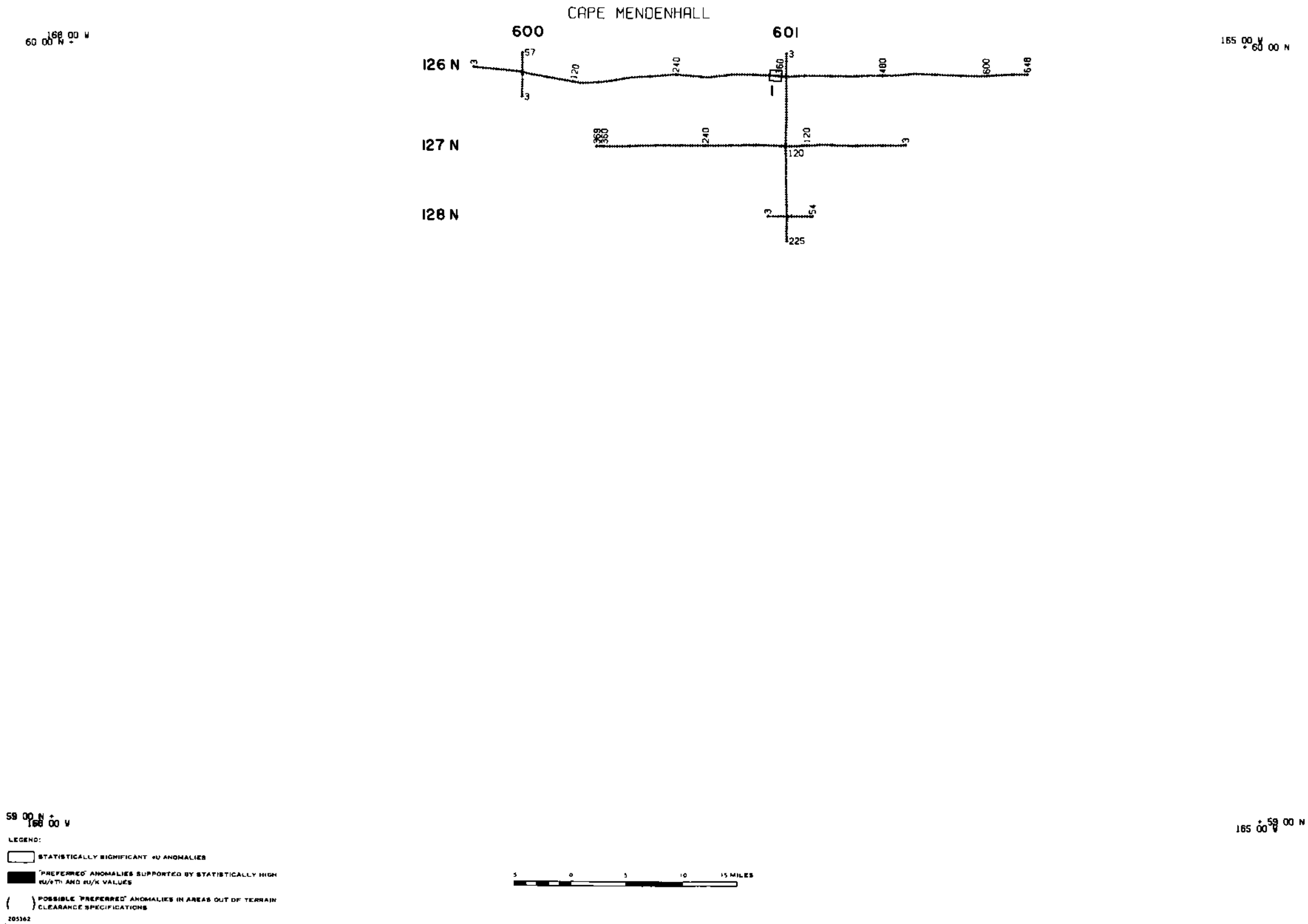


Figure 5-6. Equivalent Uranium Anomaly Map--Cape Mendenhall Quadrangle

TABLE 5-12. EQUIVALENT URANIUM ANOMALIES–CAPE MENDENHALL QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	126N	Qv	–	2	1	2	–	2	3	–	–	–	–	–	–	Probably a well-exposed portion of the Ibkikwit lava bed–may be an acidic phase of the volcanics

d. Russian Mission Geologic Cell

(1) Geology

Hoare and Coonrad (1959) describe the geology of the Russian Mission quadrangle and present a 1:250,000 scale geologic map on an older topographic base which is planimetrically inadequate for the interpretation of airborne gamma-ray data. Therefore, LANDSAT Scene No. 1686-21242, MSS band 7, was used to correct the planimetry of the larger water features and to adjust the published geologic data to the correct planimetry for the assignment of sample locations to geologic units. In remapping, certain units mapped separately by Hoare and Coonrad (1959) were combined because of lithologic and geochemical similarity. Local colluvium and narrow flood plains near stream head-waters were mapped as the bedrock from which it was derived. Subunits of the Kuskokwim group were mapped together as Kk and those of the Gemuk group were mapped as KCg. Reworked silt (Qrs), wind-deposited silt (Qsw), and silt deposits (Qs), were all mapped together as Qs. Table 5-13 shows all the units as mapped and their descriptions.

(2) Uranium Potential

Uranium occurrences have been reported in the vicinity of the Russian Mountains (Eakins, 1969; Cobb, 1970). These were shown in Figure 1-2. No important deposits are known.

Locality 42 (Cobb, 1970) was described by West (1954): Samples taken from the Russian Mountains ranged from 0.001 to 0.006 percent eU. Heavy mineral fractions (greater than 3.3 specific gravity) contained 0.01 percent eU. Samples included vein materials, granites, basalts, monzonites and talus.

Locality 126 (Eakins, 1969) reported as ground traverses of mafic igneous rock and granites which showed 0.009 mr/hr.

Locality 127 (Eakins, 1969) was described as lodes with As, Cu, Fe_2O_3, Pb, Zn; with minor Ag, Au, and Sn contained traces of uranium in metazeunerite with eU up to 0.006 percent.

Probably the best potential for uranium deposits in this quadrangle lies in vein-type or "porphyry" accumulations related to the Tertiary intrusive rocks which are described by Hoare and Coonrad (1959) as being accompanied by mafic intrusives that may be related genetically to the granitic bodies. If these are late stage differentiates, they may be enriched in uranium and may contain economic concentrations.

The only sediments described as containing materials of a chemically reducing nature are the Quaternary silts of the Bethel Basin. Hoare and Coonrad (1959) describe "organic muck" associated with mammoth remains and nonmarine gastropods near the top of the silt deposits. Somewhat deeper, the silts become more sandy and contain wood fragments. It is probable that permafrost, which is present to depths of about 400 feet, has impeded the circulation of ground waters over much of the period since the sediments were formed, and may have prevented the formation of any shallow stratiform deposits even if a source of uranium were present in the tuffs and igneous rocks of the area.

TABLE 5-13. GEOLOGIC MAP UNITS FOR RUSSIAN MISSION QUADRANGLE
(Hoare and Coonrad, 1959)

Map Symbol	Description
Quaternary Surficial Deposits	
Qf	Flood-plain alluvium: (limited to the major flood plains of the Yukon and Kuskokwim Rivers).
Qc	Colluvium: Chiefly frost-rived rubble, locally includes stream alluvium, terrace gravels, glacial deposits, and wind-blown silt.
Qs	Silt deposits: Includes light- to dark-gray silt and sandy silt, wind-deposited silt, and reworked silt (silt, sandy silt and bog deposits).
Qd	Glacial drift: Poorly sorted sand, gravel and boulders.
Qo	Outwash deposits: Poorly to well sorted silt, sand, gravel and boulders in terraces and outwash fan-plains.
Quaternary-Tertiary Bedded Rocks	
QTb	Basalt: Horizontal vesicular basalt flows.
Tertiary-Cretaceous Bedded Rocks	
TKuv	Volcanic rocks: Probably andesitic lava for the most part, with some interbedded sedimentary rocks, interpreted and mapped by photogeologic methods.
Kk	Kuskokwim group: Massive gray and greenish-gray porphyritic andesite lava flows, flow breccia and agglomerate with some interbedded sedimentary rocks; medium- to dark-gray siltstone and graywacke with interbeds of grit and conglomerate.
Ks	Shaktolik group: Interbedded sandstone, shale, "argillite," grit and conglomerate.
Carboniferous to Cretaceous Bedded Rocks	
KCg	Gemuk group: Mafic lava flows, volcanic breccia, and agglomerate interbedded with siliceous siltstone, chert, graywacke, and a small amount of calcareous conglomerate and limestone. Mafic volcanic rocks altered to gneissoid and schistose rocks in some areas. Light greenish-gray tuff with interbedded siltstone, overlain by volcanic agglomerate, impure limestone, graywacke, and chert.
Tertiary-Intrusive Igneous Rocks	
Tm	Mafic rocks: Medium to coarse-grained, light to dark-gray gabbro and diabase. Occurs as small stock-like bodies, dikes and sills.
Tr	Albite rhyolite: Light- to medium-gray, fine-grained, porphyritic; occurs as small stock or plug-like intrusive bodies.
Tg	Granitic rocks: Medium- to coarse-grained, pink and gray, granitic-textured rocks. Forms stocks chiefly of quartz monzonite, but ranges from granodiorite to granite; minor facies include gabbro, diabase and aplite.
Ti	Intrusive rocks (?): Probably stocks of granitic rocks; interpreted and mapped by photogeologic methods.

(3) Anomaly Maps

There are no eU anomalies on the Russian Mission sheet that show enrichment over both eTh and K (see Figure 5-7 and Table 5-14). All show eTh enrichment, indicating possible placer origin or geologic mapping errors. The statistical summary data (Appendix C) show that the Tertiary intrusives (Ti, Tg and Tm) are all higher in eU and eTh than the other map units, and many of the eU and eTh anomalies are found adjacent to Ti or Tg outcrops and downslope from them where placers would be expected. The high radioactivity associated with Tm suggests that it is lamprophyric in nature and may be a late stage alkalic differentiate of granite. The Ti, Tg and Tm intrusives are sufficiently radioactive to suggest that they may constitute potential uraniferous provinces which may contain undetected vein-type uranium accumulations not intersected by the reconnaissance survey pattern.

Several additional possible valid anomalies are indicated by brackets in Figure 5-7. These are where the terrain clearance was out of specifications over mountainous terrain, but the profiles and data listings indicate consistently high eU counting rates which are probably significant.

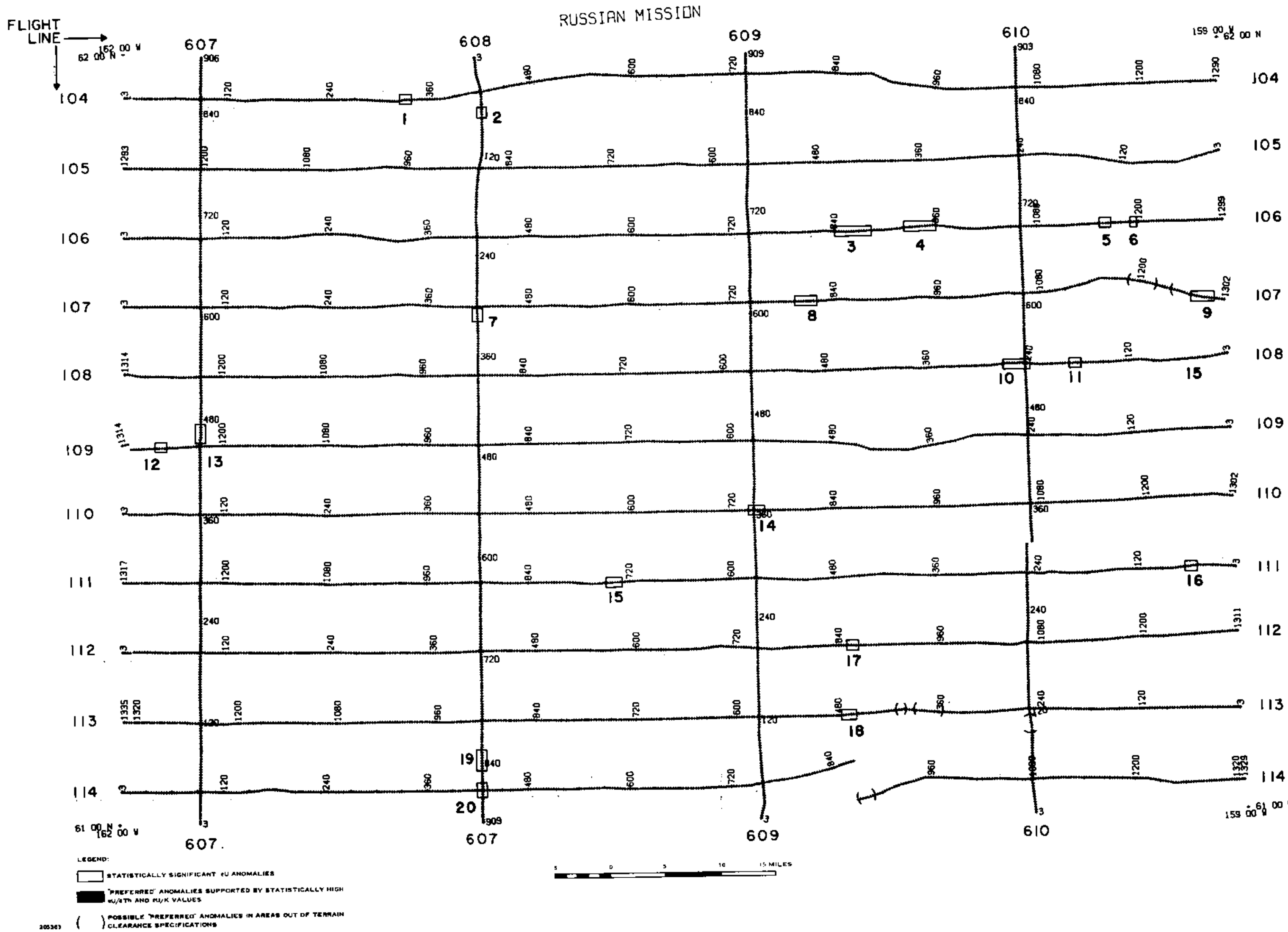


Figure 5-7. Equivalent Uranium Anomaly Map—Russian Mission Quadrangle

TABLE 5-14. EQUIVALENT URANIUM ANOMALIES–RUSSIAN MISSION QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points												Remarks
				eU			eTh			eU/eTh			eU/K			
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	104	Ks	–	2	1	–	–	3	–	–	–	–	–	–	–	Probably Ti mapped as Ks
2	608	KCg	–	1	2	–	1	2	–	1	–	–	–	–	–	Probably Ti mapped as Kg
3	106	KCg	–	10	3	1	9	2	1	2	–	–	5	3	–	Probable placer derived from adjacent Ti
4	106	Ti; KCg	–	8	1	3	6	1	3	1	–	–	4	–	–	Probable placer derived from adjacent Ti
5	106	Kk; Qf	–	4	–	–	1	–	–	1	–	–	1	–	–	Probable placer derived from Tg
6	106	Qo	–	–	1	1	–	2	–	–	–	–	–	–	–	Probable placer derived from Tg
7	608	Qs	–	4	–	–	3	–	–	–	–	–	–	–	–	Probable geological misclassification
8	107	KCg	–	3	2	4	–	3	6	–	–	–	3	2	–	Probable placer from adjacent Ti
9	107	Kk; Tg	Location 42	5	1	1	6	1	–	1	–	–	–	–	–	Probable placer from adjacent Tg
10	108/610	Qf	–	9	5	1	8	2	–	3	2	–	1	–	–	Probable placer on Kuskokwim River
11	108	Qf	–	4	–	–	3	–	–	1	–	–	–	–	–	Probable placer on Kuskokwim River
12	109	Qs	–	2	2	–	–	4	–	–	–	–	–	–	–	May be Ti mapped as Qs
13	607/109	Qs	–	10	2	–	3	8	1	–	–	–	–	–	–	May be Ti mapped as Qs
14	110/610	Qs	–	5	1	–	2	1	–	–	–	–	–	–	–	May be Ti mapped as Qs
15	111	Qf	–	4	2	–	4	–	–	1	–	–	–	–	–	Probable placer on Kuskokwim River
16	111	Qc	–	4	–	–	4	–	–	–	–	–	–	–	–	Probable placer on Kuskokwim River
17	112	Kk	–	4	–	–	–	4	–	–	–	–	–	–	–	Probable placer derived from Ti
18	113	Kk	–	1	4	–	–	1	4	–	–	–	–	–	–	Probable placer derived from Ti
19	608	Qs; Qf	–	5	2	1	4	2	1	–	–	–	–	–	–	Probable placer along Kuskokwim River
20	114/608	Qf	–	6	1	–	2	1	–	–	–	–	–	–	–	Probable placer along Kuskokwim River

e. St. Michael, Black, Kwiguk, Hooper Bay and Marshall Geologic Cell

(1) Geology

Suitable 1:250,000 scale published geologic maps with easily correlatable map units are available for this cell (Hoare and Condon, 1966; 1968; 1971a, and 1971b). Table 5-15 gives descriptions of the geologic map units used in CGARD processing.

Rocks exposed in the St. Michael quadrangle consist of deformed and altered volcanic rocks of probable Jurassic and Early Cretaceous age, a younger group of deformed sedimentary rocks of Cretaceous age, intrusive igneous rocks of Late Cretaceous or early Tertiary age, and a younger group of basalt flows and cones of Quaternary age (Hoare and Condon, 1971a). The rocks are overlain by a variety of unconsolidated surficial deposits.

The rocks of the Kwiguk and Black quadrangles range in age from mid-Jurassic (?) to Quaternary. The bedrock consists of an old group of deformed, dominantly volcanic rocks; a younger group of deformed sedimentary rocks, intrusive igneous rocks; and young undeformed lava flows (Hoare and Condon, 1966). The major structural feature is a northeast trending belt of intensely folded Mesozoic sedimentary rocks cut by two sets of faults. Unconsolidated surficial deposits, largely silt of Quaternary age, cover more than half of the area.

Bedrock exposed in the Hooper Bay quadrangle consists of sandstone and siltstone, granodiorite and basalt (Hoare and Condon, 1968). Much of the area is covered with unconsolidated surficial deposits consisting of mostly silt, fine sand, and admixed woody material.

Rocks exposed in the Marshall quadrangle range in age from Permian and Triassic (?) to Quaternary with more than 95 percent of the area covered by Quaternary unconsolidated surficial deposits and basalt flows and cones (Hoare and Condon, 1971b). Minor Cretaceous igneous intrusions in the northern part of the quadrangle include granitic stocks, and a few rhyodacite, dacite and aplite dikes and sills invading Permian and Triassic (?) metavolcanic and metasedimentary rocks and Cretaceous sandstone.

(2) Uranium Potential

Eakins (1969) reported veins with Au, Fe, Pb, and Mo near the head of Willow Creek close to Marshall showed 0.001 percent eU. This is shown in Figure 1-2 (locality 128). It is near one of the Cretaceous granitic intrusives to which the mineralization may be related genetically. The other igneous intrusives, particularly the large body in the Hooper Bay quadrangle, may have potential for vein type deposits of uranium.

The Cretaceous sandstones (Ks and Kcs) are reported to contain both marine and nonmarine deposits with abundant carbonaceous plant trash (Hoare and Condon, 1966). The laumontitized sandstone (Kls) is thought to be largely or entirely nonmarine with abundant plant trash and volcanic debris. Hoare and Condon (1966) suggest that the laumontite probably was formed diagenetically by the interaction of volcanic glass and alkaline waters either at the time of deposition or shortly thereafter. These conditions appear to offer the possibility that uranium may have been freed from the volcanic glass and might have been concentrated by the reducing action of the carbonaceous trash. Thus, there may be some potential for stratiform deposits in these formations which are found mostly in the Kwiguk and St. Michael quadrangles.

TABLE 5-15. GEOLOGIC MAP UNITS FOR ST. MICHAEL, BLACK, KWIGUK, HOOPER BAY, AND MARSHALL QUADRANGLES (Hoare and Condon, 1966; 1968; 1971a; 1971b)

Map Symbol	Description
Quaternary Surficial Deposits	
Qyf	Young flood-plain deposits: Mostly sand and sandy silt on deltas. Includes gravel and boulders in and near hills and mountains.
Qof	Old flood-plain deposits: Silt, sandy silt and bog deposits.
Qbl	Beach and lagoonal deposits: Mostly silt and sandy silt.
Qyb	Young beach deposits: Marine silt, sandy silt and sand. Forms beaches, spits, bars and islands. Includes young flood-plain and estuarine deposits along streams.
Qob	Old beach deposits: Marine silt and sandy silt forming older beach ridges and intervening swales.
Qe	Estuarine deposits: Silt and sandy silt.
Qoa	Old alluvial deposits: Mostly silt, sandy silt, sand and clay with sand and gravel at depth. Includes terrace and fan gravel and colluvial deposits in and near mountains.
Qw	Wind-blown deposits: Sand and sandy silt.
Qgc	Glacial and colluvial deposits: Sand, gravel, boulders and angular talus blocks. Includes steep recent fans of gravel and boulders.
Quaternary Bedrock	
Qb	Basalt: Horizontal basalt flows and associated volcanic craters. Includes olivine basalt and associated scoria and other pyroclastic rocks.
Qby	Basalt: Younger flows and cones.
Qbo	Basalt: Older flows, cones, maars, tuffs and breccia.
Cretaceous Bedrock	
Ki	Intrusive rhyodacite, dacite, and aplite: Forms mostly dikes and sill-like bodies.
Kg	Granitic rocks: Light gray, medium- to coarse-grained, locally porphyritic, includes granodiorite in Hooper Bay quadrangle.
Ks	Noncalcareous sandstone: Interbedded, fine- to medium-grained, gray, noncalcareous sandstone and siltstone. Includes both marine and nonmarine strata. Biotite-hypersthene hornfels indicated by hatchured overprint.
Kcs	Calcareous sandstone: Mostly fine- to medium-grained, highly calcareous, thin-bedded sandstone interbedded with noncalcareous siltstone with calcareous concretions.
Kls	Laumontitized sandstone: Mottled or spotted medium- to dark-gray laumontitized sandstone interbedded with equal or greater amounts of siltstone and sandstone containing little or no laumontite.
Jurassic (?) and Cretaceous Bedrock	
KJv	Volcanic rocks: Dark gray and green andesitic flows, volcanoclastic rocks and minor interbedded graywacke.

TABLE 5-15. GEOLOGIC MAP UNITS FOR ST. MICHAEL, BLACK, KWIGUK, HOOPER BAY, AND MARSHALL QUADRANGLES
(Hoare and Condon, 1966; 1968; 1971a; 1971b) (Continued)

Map Symbol	Description
Permian and Triassic (?) Bedrock	
TR Pvs	Metavolcanic and metasedimentary rocks: Chiefly gray and green fine- to medium-grained schistose rocks. Hatchured overprint indicates rocks recrystallized to hornfels by contact metamorphism.

(3) Anomaly Maps

(a) St. Michael Quadrangle

Examination of the statistical summary data (Appendix C) reveals no particularly uraniferous rocks in this quadrangle. The uranium anomaly map (Figure 5-8) and Table 5-16 show eight statistically significant eU anomalies. All are simultaneously anomalously high in eTh and K, but show normal eU/K, eU/eTh, and eTh/K values. They must be unmapped facies changes in the host rock, geological misclassification of some unmapped formation or particularly well-drained or well-exposed outcrops. The anomalies in the Cretaceous formations, Kls and Kcs (numbers 4 through 8), may indicate more uraniferous facies which may constitute a weakly uraniferous province, but the lack of eU enrichment over eTh and K in the anomalies is discouraging and leads to the conclusion that there is little potential for uranium deposits in the exposed rocks.

(b) Black Quadrangle

The only statistically significant eU anomaly for this quadrangle (Figure 5-9 and Table 5-17) also shows high eTh and K values with normal eU/eTh, eU/K, and eTh/K values. This indicates unmapped facies changes in the host formation, geological misclassification of some unmapped formation or a particularly well-drained or well-exposed outcrop. There is no indicated enrichment of eU over eTh or K and it is concluded that this quadrangle holds little potential for uranium in the exposed rocks.

(c) Kwiguk Quadrangle

The statistical summary data (Appendix C) show the Cretaceous acidic intrusives (Ki) to have the highest median equivalent uranium content of the rocks exposed in this quadrangle. This may be a potential source or host for uranium vein deposits, particularly in the vicinity of Anomaly No. 29 (Figure 5-10 and Table 5-18), which may represent a particularly late stage differentiate.

Of the other 28 statistically significant uranium anomalies in this quadrangle, only Nos. 2 and 5 appear to show eU enrichment over eTh and potassium, and may be potential stratiform accumulations in Kls or Kcs. All the others are suspect of being due to better exposed (less shielded) outcrops or to unmapped units or facies changes. These anomalies show simultaneously high eU, eTh and K with generally normal eU/eTh, eU/K and eTh/K ratios.

(d) Hooper Bay Quadrangle

The Cretaceous granodiorite, Kg, shows a high mean uranium content compared with the other rocks sampled in this quadrangle. It is the most likely rock type to have any uranium accumulations and it contains the only preferred equivalent uranium anomaly (No. 4) shown in Figure 5-11 and Table 5-19. This is probably an area of late stage differentiates which could have associated uranium vein-type accumulations.

(e) Marshall Quadrangle

None of the rocks sampled in the Marshall quadrangle show unusually high median eU values (see Appendix C).

There are 13 statistically significant uranium anomalies shown on Figure 5-12 and in Table 5-20. None of these show significant enrichment of eU over eTh and K, therefore, there are no preferred anomalies in this quadrangle, and there appears to be little potential for the discovery of economic uranium deposits.

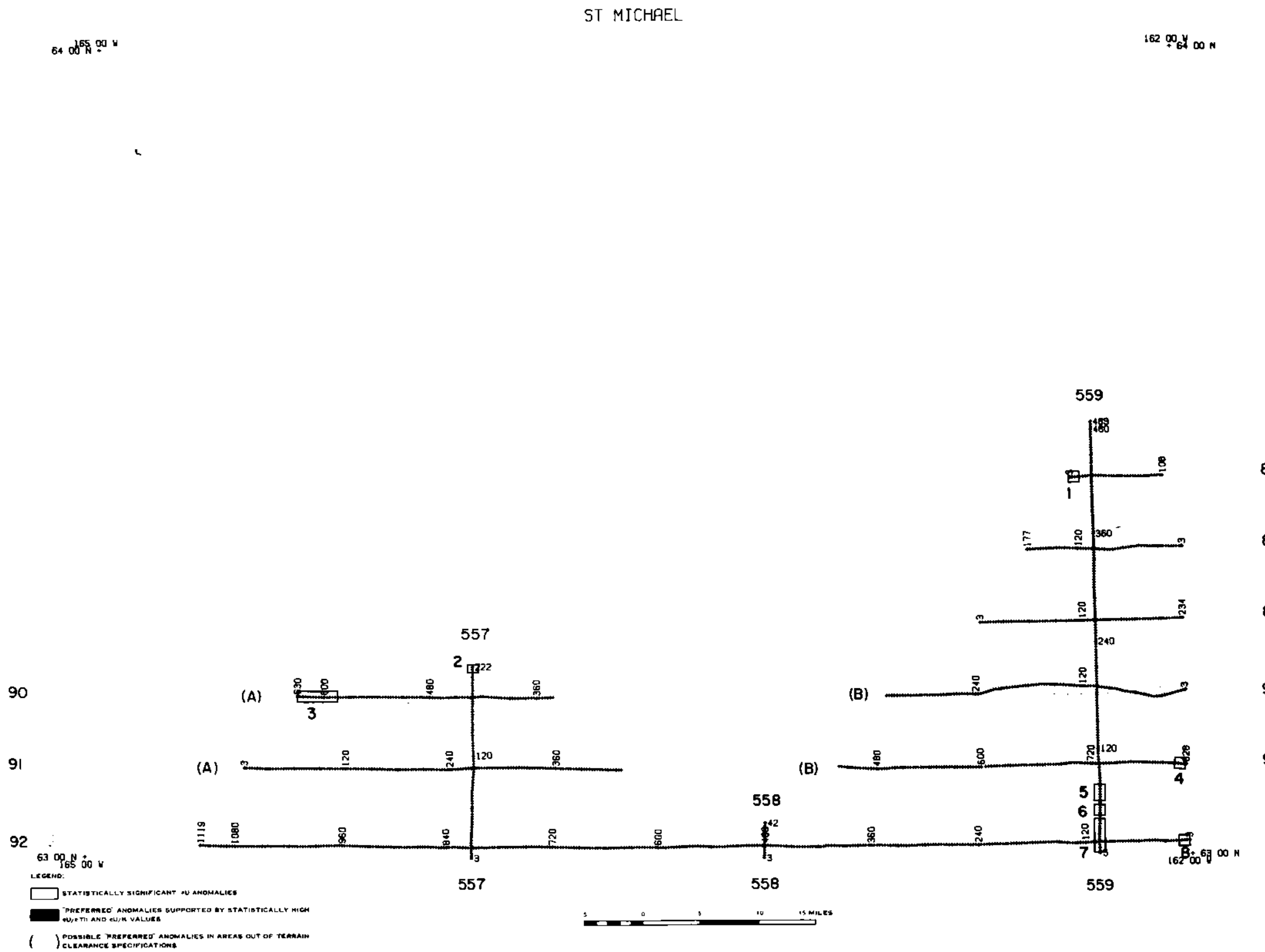


Figure 5-8. Equivalent Uranium Anomaly Map–St. Michael Quadrangle

TABLE 5-16. EQUIVALENT URANIUM ANOMALIES–ST. MICHAEL QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	87	Qbl	–	3	1	–	2	1	1	1	–	–	–	–	–	Better exposed or unmapped unit
2	557	Qyf	–	1	2	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
3	90	Qyf	–	12	1	–	15	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
4	91	Kcs	–	4	–	–	2	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
5	559	Kls	–	6	–	–	4	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
6	559	Kls	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
7	559/92	Kls	–	12	–	–	11	–	–	–	–	–	2	–	–	Better exposed or unmapped unit
8	92	Kcs	–	5	–	–	3	2	–	–	–	–	–	–	–	Better exposed or unmapped unit

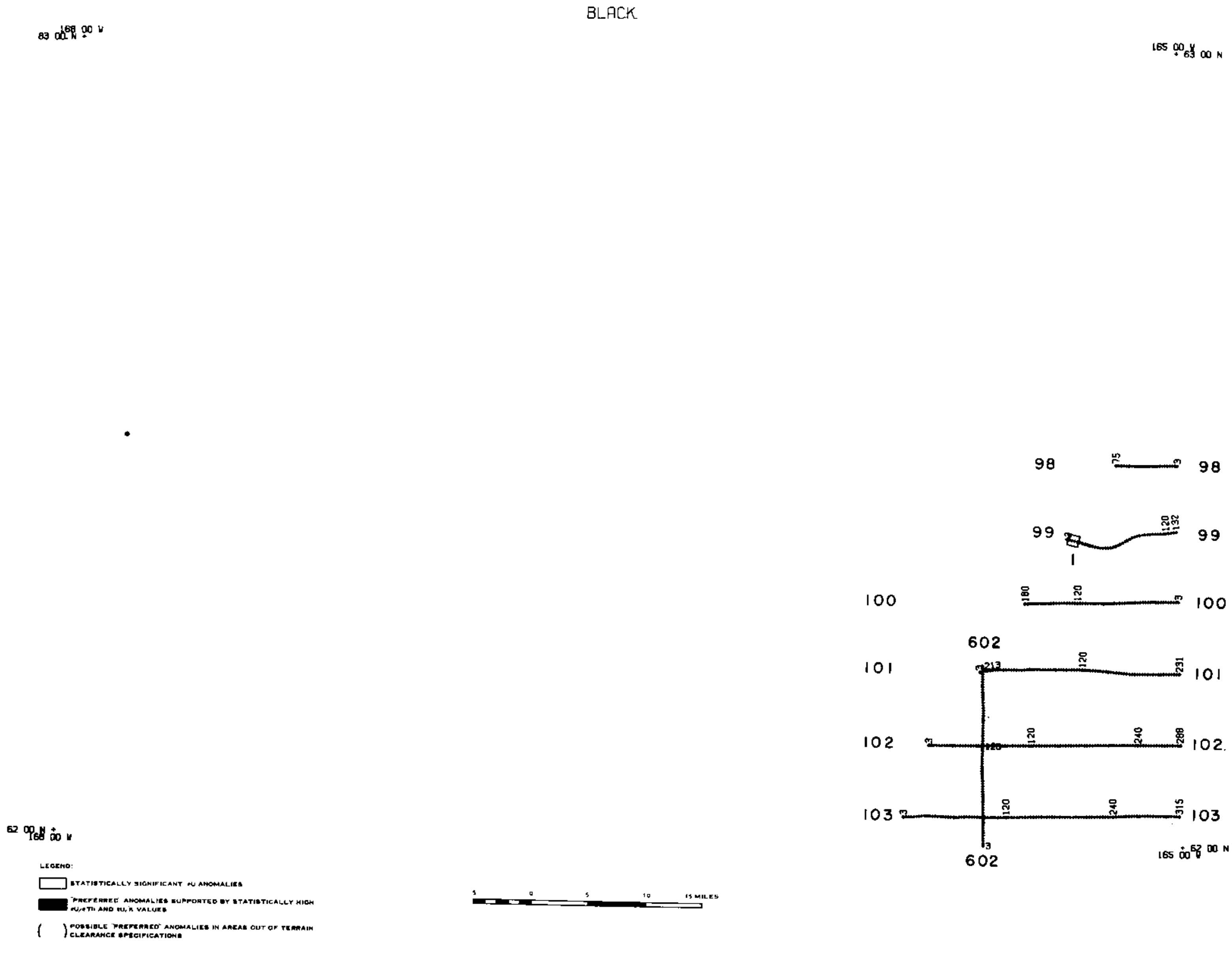


Figure 5-9. Equivalent Uranium Anomaly Map—Black Quadrangle

TABLE 5-17. EQUIVALENT URANIUM ANOMALIES–BLACK QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	99	Qyb	–	5	–	–	5	–	–	–	–	–	–	–	–	Probably a well-exposed sandbar or mud flat

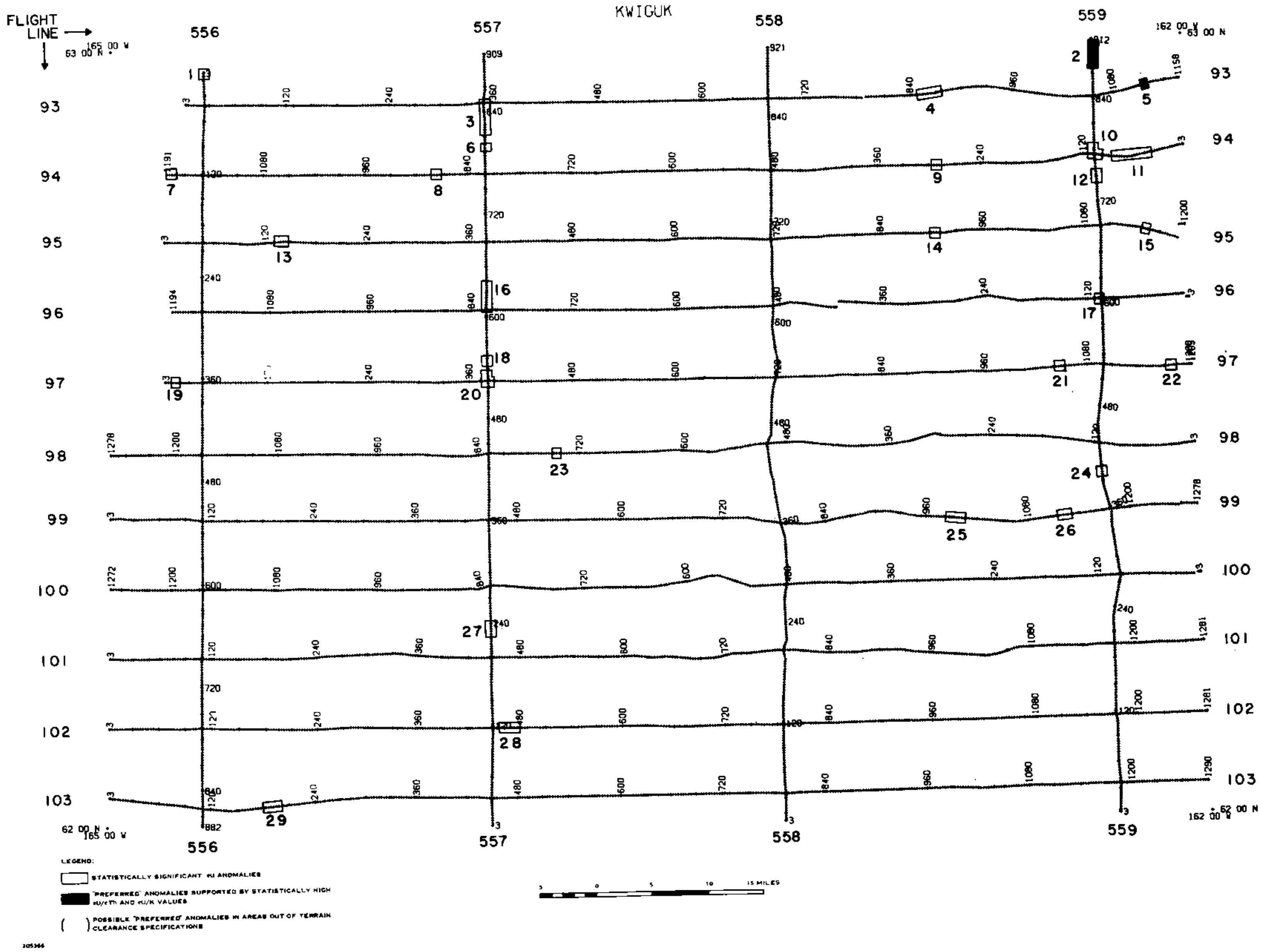


Figure 5-10. Equivalent Uranium Anomaly Map—Kwiguk Quadrangle

TABLE 5-18. EQUIVALENT URANIUM ANOMALIES–KWIGUK QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	556	Qyf	–	4	–	–	4	–	–	–	–	–	–	–	–	Better exposed sandbar on beach
2	559	Kls	–	9	–	–	3	–	–	3	2	–	1	–	–	Possible stratiform uranium deposit
3	557	Qof/Qoa	–	8	6	–	4	11	–	–	–	–	–	–	–	Better exposed sand or mud flat
4	93	Ks	–	10	–	–	9	–	–	–	–	–	–	–	–	Better exposed ridge or unmapped unit
5	93	Kcs	–	2	1	–	–	–	–	3	–	–	1	–	–	Possible stratiform uranium deposit
6	557	Qoa	–	2	1	–	1	2	–	–	–	–	–	–	–	Better exposed sand or mud flat
7	94	Qyf	–	3	1	–	3	–	–	–	–	–	–	–	–	Better exposed sandbar on beach
8	94	Qoa	–	2	2	–	–	–	4	–	–	–	–	–	–	Better exposed sand or mud flat
9	94	Ks	–	4	–	–	2	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
10	559/94	Kcs/Kls	–	9	–	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
11	94	Kcs/Kls	–	10	3	–	7	4	1	3	–	–	1	–	–	Better exposed or unmapped unit
12	559	Kls	–	5	1	–	3	1	–	1	–	–	2	–	–	Better exposed or unmapped unit
13	95	Qyf	–	6	–	–	2	–	–	–	–	–	–	–	–	Better exposed sand or mud flat
14	95	Kls	–	4	1	–	5	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
15	95	Kls	–	1	2	–	1	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
16	557	Qyf	–	7	4	–	11	1	–	–	–	–	–	–	–	Better exposed sand or mud flat
17	559/96	Kls	–	3	2	–	2	3	–	–	–	–	–	–	–	Better exposed or unmapped unit
18	557	Qyf	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed sand or mud flat
19	97	Qyf	–	2	1	–	3	–	–	1	–	–	1	–	–	Better exposed sandbar on beach
20	557/97	Qyf	–	7	–	–	6	–	–	–	–	–	–	–	–	Better exposed sand or mud flat
21	97	Kcs	–	4	–	–	2	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
22	97	Qyf	–	4	–	–	2	–	–	1	–	–	2	–	–	Better exposed or unmapped unit
23	98	Qof	–	2	1	–	2	–	–	–	2	–	–	–	–	Better exposed or unmapped unit
24	559	Ks	–	5	–	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
25	99	Kcs	–	6	1	–	4	2	1	–	–	–	2	–	–	Better exposed or unmapped unit
26	99	Ks	–	5	1	–	6	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
27	557	Qyf	–	6	–	–	6	–	–	–	–	–	–	–	–	Better exposed sand or mud flat
28	557	Qyf	–	7	1	–	6	2	–	–	–	–	–	–	–	Better exposed sand or mud flat
29	103	Ki	–	4	2	–	5	2	–	–	–	–	–	–	–	Better exposed or a late stage differentiate

*2 Circled number denotes preferred anomaly.

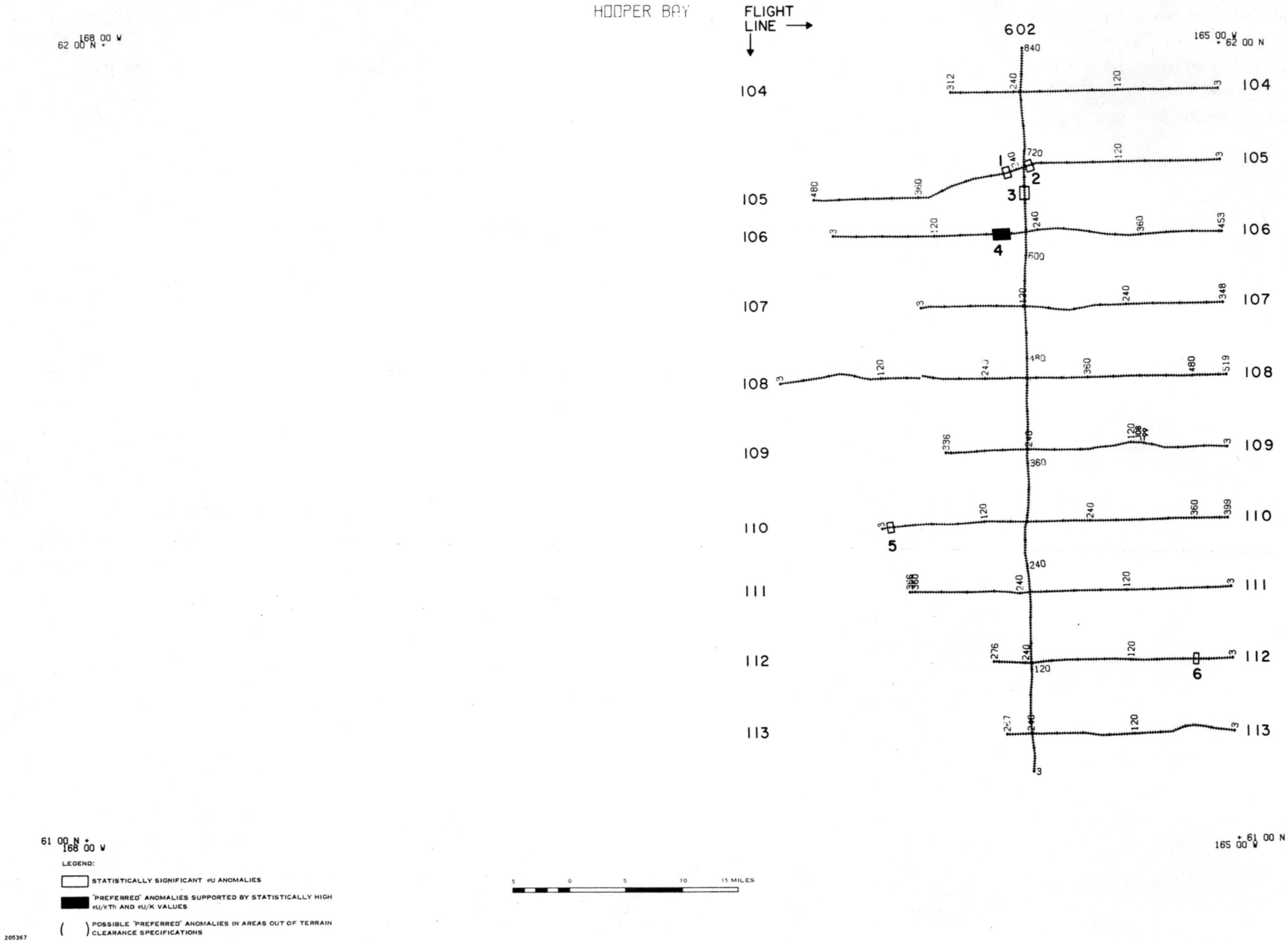


Figure 5-11. Equivalent Uranium Anomaly Map—Hooper Bay Quadrangle

TABLE 5-19. EQUIVALENT URANIUM ANOMALIES–HOOPER BAY QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	105	Kg/Qc	–	1	2	–	4	–	–	–	–	–	–	–	–	Geological misclassification
2	105	Qe	–	2	1	–	1	–	–	1	–	–	–	–	–	Slight eU enrichment
3	602	Kg	–	5	–	–	1	4	–	–	–	–	–	–	–	Better exposed or unmapped facies
4	106	Kg	–	6	–	–	2	1	–	3	–	–	2	–	–	Significant eU enrichment
5	110	Qe	–	–	2	–	2	–	–	–	–	–	–	–	–	Better exposed sandbar or mud flat
6	112	Qe	–	–	1	1	1	–	–	–	–	–	–	–	–	Better exposed sandbar or mud flat

* 4 Circled number denotes preferred anomaly.

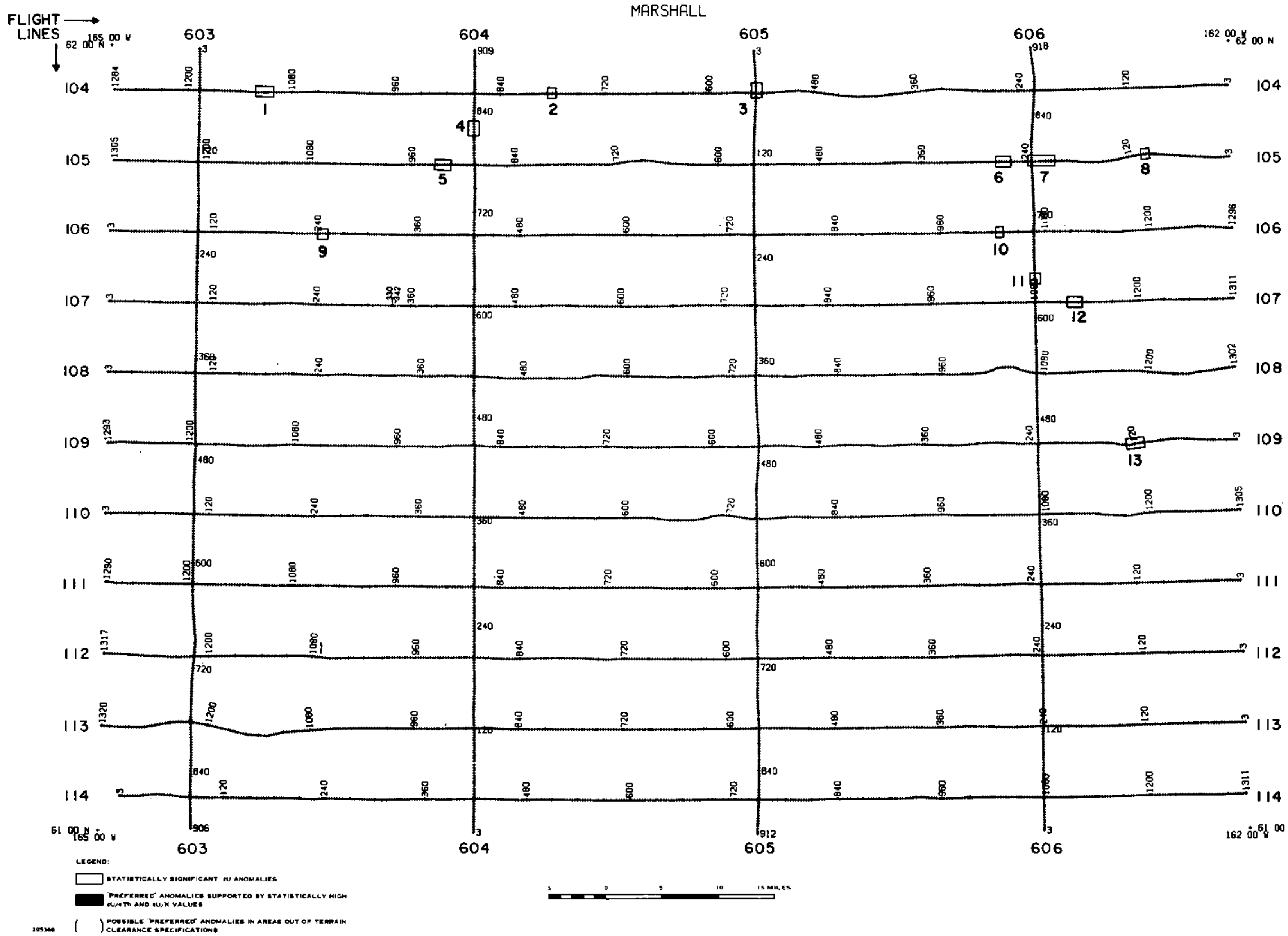


Figure 5-12. Equivalent Uranium Anomaly Map—Marshall Quadrangle

TABLE 5-20. EQUIVALENT URANIUM ANOMALIES–MARSHALL QUADRANGLE

Anom. No.	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	104	Qoa	–	4	3	–	5	1	–	3	1	–	1	–	–	Possible geological misclassification
2	104	Qoa	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
3	104	Qof	–	4	2	–	5	2	–	–	–	–	–	–	–	Possible geological misclassification
4	604	Qof	–	4	1	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
5	105	Qof	–	5	2	–	3	2	–	1	–	–	–	–	–	Better exposed or unmapped unit
6	105	Qof	–	5	–	–	1	5	–	–	–	–	–	–	–	Better exposed or unmapped unit
7	105	Qof/Qyf	–	10	–	–	6	3	–	1	–	–	–	–	–	Better exposed or unmapped unit
8	105	Qyf	–	3	1	–	1	–	–	2	–	–	–	–	–	Slight eU enrichment
9	106	Qof	–	1	2	2	2	1	1	2	–	–	1	–	–	Better exposed or unmapped unit
10	106	Qw	–	2	1	–	2	–	1	–	–	–	–	–	–	Possible geological misclassification
11	606	Qoa/Qw	–	3	1	–	4	–	–	–	–	–	–	–	–	Possible geological misclassification
12	107	Qoa/Qw	–	5	1	–	2	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
13	109	Qw	–	5	2	–	4	–	–	1	–	–	–	–	–	Better exposed or unmapped unit

f. Holy Cross Geologic Cell

(1) Geology

This quadrangle contains the southern portion of the Tertiary Innoko Basin and a small part of an arm of the Bethel Basin. It is crossed by two major faults, the Aniak-Thompson Creek and the Chiroskey. Bedded rocks range in age from Paleozoic to late Cenozoic and include volcanics (mafic and felsic) and sediments of nearly every variety. Intrusive rocks include both Tertiary and Cretaceous granitic varieties. The geologic map units were adapted from Beikman (1974) and are described in Table 5-21. The 1:1,000,000 scale mapped unit boundaries were enlarged to 1:250,000 scale and then refined to fit the more detailed topographic and tonal features found on the 1:250,000 scale U.S.G.S. topographic map and LANDSAT imagery [scenes 1706-21345 (MSS Band 5) and 1038-21304 (MSS Bands 5 and 7) using photogeologic methods].

(2) Uranium Potential

There are no known radioactive occurrences in this quadrangle (Cobb, 1970; Eakins, 1969). The presence of felsic volcanics and granite intrusives is somewhat encouraging as they may be potential sources of uranium either in vein-type deposits or possibly for secondary deposits in coal-bearing rocks that may be present in the Cretaceous sediments (K). Eakins (1975) omitted discussion of this area, implying that his study did not indicate the region to hold any great potential for economic deposits of uranium.

(3) Anomaly Maps

The statistical summary data (Appendix C) shows that the Tertiary and Cretaceous granite rocks (TKg) have the highest mean equivalent uranium content of the igneous rocks and the Cretaceous deposits (K) are the highest of the stratified rocks. None of the preferred anomalies (showing eU enrichment over eTh and K) are associated with TKg or K, thereby casting some doubt on their potential for uranium accumulations (see Figure 5-13 and Table 5-22).

Only 4 of the 30 statistically significant equivalent uranium anomalies are labeled as "preferred" based on simultaneously high eU, eU/eTh and eU/K values. Two, Anomalies 5 and 6, are in TKv, and may represent uranium-enriched late stage phases of the volcanics with possible potential for vein-type deposits. The other two, Anomalies 19 and 27, are in Qh and Qp, respectively, and may be associated with uraniferous lignitic beds in the Quaternary deposits.

TABLE 5-21. GEOLOGIC MAP UNITS FOR HOLY CROSS QUADRANGLE
(After Beikman, 1974)

Map Symbol	Description
Stratified Sedimentary and Volcanic Rocks	
Qh	Holocene deposits: Alluvial and flood-plain deposits.
Q	Quaternary deposits: Alluvial, dune sand, loess, delta, windblown sand and reworked silt deposits.
Qp	Pleistocene deposits: Alluvial, glacial, dune sand, silt, and reworked sand and silt deposits.
K	Cretaceous: Includes an unnamed sequence of volcanic graywacke and mudstone, sandstone with some coal-bearing rocks in upper part (Albian and Cenomanian age in the Yukon-Koyukuk province) and interbedded graywacke and shale of the Kuskokwim group (Albian and Cenomanian age) in the Kuskokwim Mountains.
Kv	Cretaceous volcanic and sedimentary rocks: An andesitic volcanic assemblage composed predominantly at volcaniclastic rocks and subordinate andesite flows and hypabyssal rocks largely of pre-Albian age in the Yukon-Koyukuk province.
uMzV	Upper Mesozoic rocks: Cretaceous and Jurassic volcanic and sedimentary rocks, basaltic and andesitic flows with some interbedded tuffaceous sandstone.
MzPz	Mesozoic and Paleozoic rocks: Siltstone, chert and mafic volcanic rocks, with lesser amounts of calcareous siltstone, graywacke, conglomerate and limestone of the Gemuk Group of Jurassic age.
lPz	Lower Paleozoic rocks: Metasedimentary rocks, consisting chiefly of schist, quartzite, slate and greenstone, and carbonate rocks. May include some rocks of Precambrian age.
Volcanic Rocks	
QTv	Quaternary and Tertiary volcanic rocks: Olivine basalt flows with interlayered pyroclastic rocks.
TKv	Tertiary and Cretaceous volcanic rocks: Andesite and trachyte flows.
TKh	Tertiary and Cretaceous hypabyssal rocks: Rhyolite and dacite.
TKvf	Tertiary and Cretaceous felsic volcanic rocks: May include lava, tuff, tuff breccia, pumice breccia, volcanic conglomerate and tuffaceous sedimentary rocks.
Plutonic and Intrusive Rocks	
TKg	Tertiary and Cretaceous granitic rocks: Granite, diorite and quartz monzonite
Kg	Cretaceous granitic rocks: Includes rocks ranging in composition from granodiorite to granite.

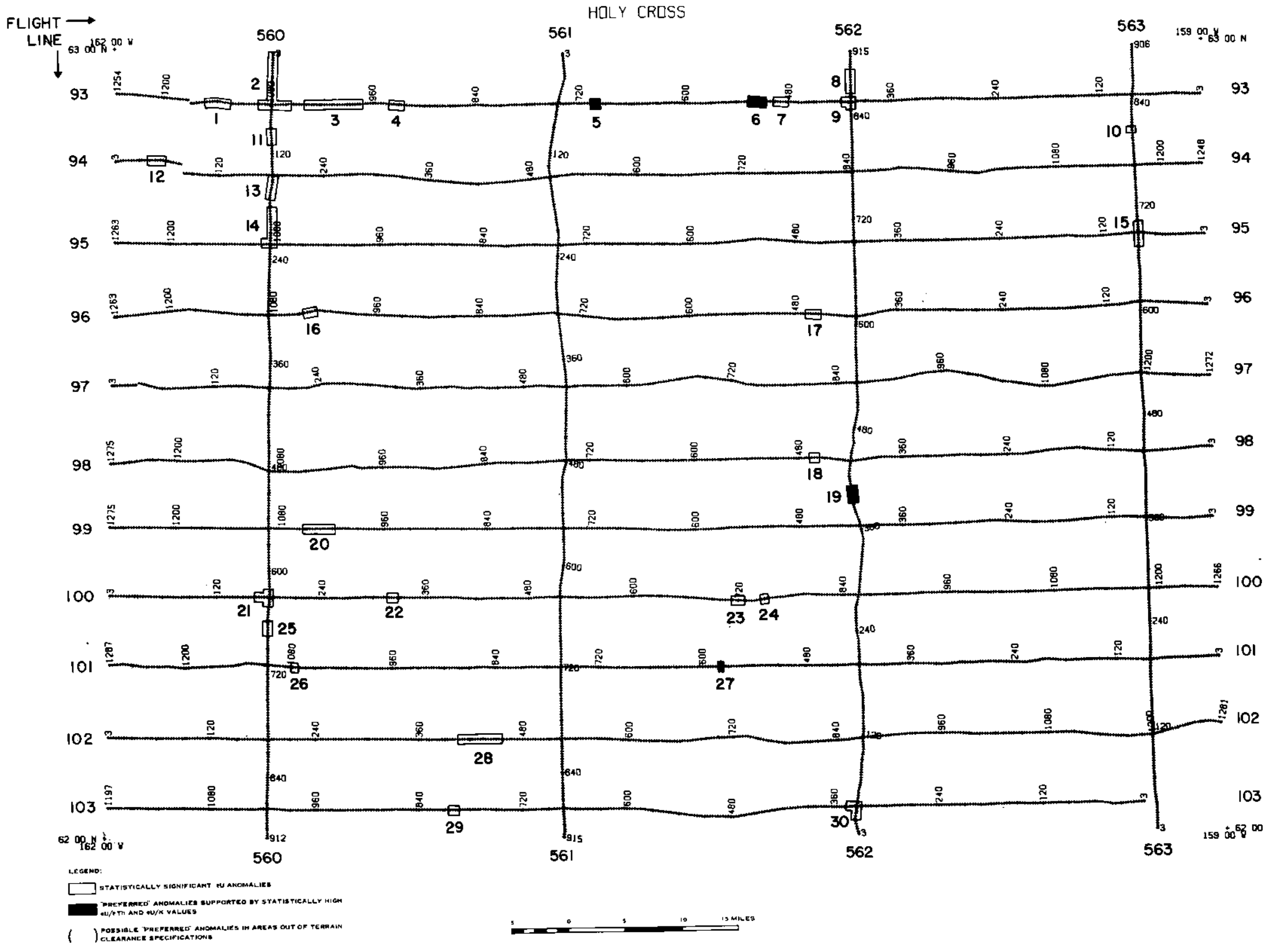


Figure 5-13. Equivalent Uranium Anomaly Map—Holy Cross Quadrangle

TABLE 5-22. EQUIVALENT URANIUM ANOMALIES– HOLY CROSS QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	++	+++	eTh +	++	+++	eU/eTh +	++	+++	eU/K +	++	+++	Remarks
1	93	K	–	9	–	–	5	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
2	560/93	K	–	25	5	–	32	–	–	–	–	–	2	1	–	Better exposed or unmapped unit
3	93	K	–	19	–	–	14	–	–	4	–	–	5	1	–	Better exposed or unmapped unit
4	93	K	–	2	4	–	6	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
5	93	Tkv	–	4	–	–	2	–	–	2	–	–	3	1	–	Significant eU enrichment
6	93	Tkv	–	4	2	1	1	1	1	2	2	–	1	2	1	Significant eU enrichment on west end
7	93	Tkv	–	4	2	–	3	2	–	2	–	–	–	–	–	Better exposed or unmapped unit
8	562	Qh	–	3	7	–	3	7	–	–	–	–	–	–	–	Better exposed or unmapped unit
9	93	Tkv/Qh	–	7	3	–	5	5	–	–	–	–	–	–	–	Better exposed or unmapped unit
10	563	Qp	–	–	2	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
11	560	K	–	5	–	–	6	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
12	94	TKh	–	6	–	–	4	–	–	1	–	–	2	–	–	Slight eU + eTh enrichment
13	560	K	–	8	1	–	5	–	–	1	–	–	2	–	–	Slight eU + eTh enrichment
14	560/95	K	–	14	1	–	15	–	–	–	–	–	6	–	–	Slight eU + eTh enrichment
15	563/95	Tkvf	–	11	1	–	8	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
16	96	Qp	–	1	4	–	3	2	–	1	–	–	2	–	–	Better exposed or unmapped unit
17	96	Qh	–	3	2	–	2	1	–	2	–	–	–	–	–	Slight eU + eTh enrichment
18	98	Qh	–	2	2	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
19	562	Qh	–	3	4	–	5	–	–	5	–	–	2	–	–	Significant eU enrichment
20	99	TKh	–	5	3	5	1	4	6	1	–	–	–	–	–	Better exposed or unmapped unit
21	100/560	Tkv	–	9	3	–	6	2	–	3	–	–	3	–	–	Better exposed or unmapped unit
22	100	Tkv	–	2	2	–	1	1	2	–	–	–	–	–	–	Better exposed or unmapped unit
23	100	Qp	–	5	–	–	–	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
24	100	Qp	–	2	1	–	3	–	–	1	–	–	1	–	–	Slight eU + eTh enrichment
25	560	Tkv	–	6	–	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
26	101	Tkv	–	2	1	–	2	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
27	101	Qp	–	2	1	–	–	–	–	2	–	–	1	–	–	Significant eU enrichment
28	102	uMzv	–	12	4	–	16	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
29	103	uMzv	–	2	2	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
30	103	Qh	–	8	3	–	11	–	–	–	–	–	–	–	–	Better exposed or unmapped unit

* 5 Circled number denotes preferred anomaly.

g. Taylor Mountains Geologic Cell

(1) Geology

The mapped geologic units were adapted from Beikman (1974) and are listed in Table 5-23.

TABLE 5-23. GEOLOGIC MAP UNITS FOR THE TAYLOR MOUNTAINS GEOLOGIC CELL

Map Symbol	Description
Bedded Rocks	
Qh	Holocene deposits: Alluvial deposits
Qp	Pleistocene deposits: Alluvial, glacial, dune sand, silt and reworked sand and silt.
K	Cretaceous: Includes an unnamed sequence of volcanic graywacke and mudstone, sandstone with some coal-bearing rocks in upper part, of Albian and Cenomanian age, in the Uykon-Koyukuk province, and interbedded graywacke and shale of the Kuskokwim Group in the Kuskokwim Mountains.
uMz	Upper Mesozoic rocks: Includes Cretaceous and Jurassic rocks–argillite, shale, sandstone and graywacke; locally includes a considerable amount of tuffaceous material, locally metamorphosed into schist and slate.
MzPz	Mesozoic and Paleozoic rocks: Siltstone, chert and mafic volcanic rocks, with lesser amounts of calcareous siltstone, graywacke; conglomerate and limestone of the Gemuk Group of Jurassic age.
lPz	Lower Paleozoic rocks: Metasedimentary rocks, consisting chiefly of schist, quartzite, slate and greenstone and carbonate rocks; includes limestone and dolomitic limestone of the Holitna Group (Ordovician (?), Silurian and Devonian) in the central Kuskokwim Mountains. Also includes some limestone of Permian age and volcanic rocks in the Lime Hills (just NE of Taylor Mountains quadrangle). May include some rocks of Precambian age.
Volcanic Rocks	
Tv	Tertiary volcanic rocks: Basalt, olivine basalt and andesite flows. May have some water-laid tuff and interbedded basaltic detritus.
Intrusive Rocks	
TKg	Tertiary and Cretaceous granitic rocks: Includes granite, dorite, quartz diorite and quartz monzonite.

The Taylor Mountains quadrangle contains the central and western portions of the Holitna Basin, where the surface rocks are primarily Cretaceous bedded deposits (K), and part of the Kuskokwim Mountains. Other sediments exposed in the area range in age from Quaternary unconsolidated deposits to lower Paleozoic rocks. The quadrangle is crossed by the regional Togiac-Tikchik fault. Intrusive igneous rocks include Tertiary and Cretaceous granitic varieties (TKg).

Beikman (1974) shows the mapped units generalized at 1:1,000,000 scale. This was enlarged to 1:250,000 scale and the unit boundaries refined to fit the more detailed topographic and tonal features found on the USGS 1:250,000 scale topographic map and LANDSAT imagery (scenes 1018-21200, MSS Bands 5 and 7 and 1018-21193, MSS Bands 5 and 7, using photogeologic methods).

(2) Uranium Potential

There are no reported uranium occurrences in this quadrangle (Cobb, 1970; Eakins, 1969).

Forbes (1975) lists the Taylor Mountains quadrangles as containing outcrops of an alkaline biotite granite which may be a potential host for uranium vein-type deposits.

The potential of the Holitna Basin for stratiform deposits is unknown due to lack of geological information. Eakins (1975) indicates that it is likely that the basin contains Tertiary sediments and there may be source areas in the Alaska Range providing possible potential for stratiform deposits. In addition, if the large areas of exposed Cretaceous rocks in the basin contain any of the described sequence of volcanic graywacke, mudstone and sandstone with coal-bearing rocks found in the Yukon-Koyukuk province, there also would provide potential for sandstone-type deposits. The Cretaceous of the Kuskokwim Mountains is described as interbedded graywacke and shale by Beikman (1974) and probably has little potential.

(3) Anomaly Maps

The statistical summary data (Appendix C) shows that the Tertiary or Cretaceous granite rocks show the highest median eU values of the rocks sampled in this quadrangle.

The uranium anomaly map (Figure 5-14) and Table 5-24 show 36 statistically significant anomalies. Only 8 of these show significant enrichment of eU over eTh and K. The remainder can be accounted for as possible geologic misclassifications, somewhat better exposed areas (less shielding), or possible unmapped facies of the mapped geologic units.

Anomalies 14, 15, 17, 22 and 23 in map unit K and Anomaly 1 in MzPz may indicate regions for potential stratiform deposits. Anomaly 3 in IPz may indicate either stratiform or vein-type accumulations. Anomaly 21 in Tkg indicates a potential for vein-type uranium deposits in that region.

An additional possible valid anomaly is indicated by brackets in Figure 5-14. This is where the terrain clearance was out of specifications over mountainous terrain, but the profile and data indicate consistently high eU counting rates which are probably significant.

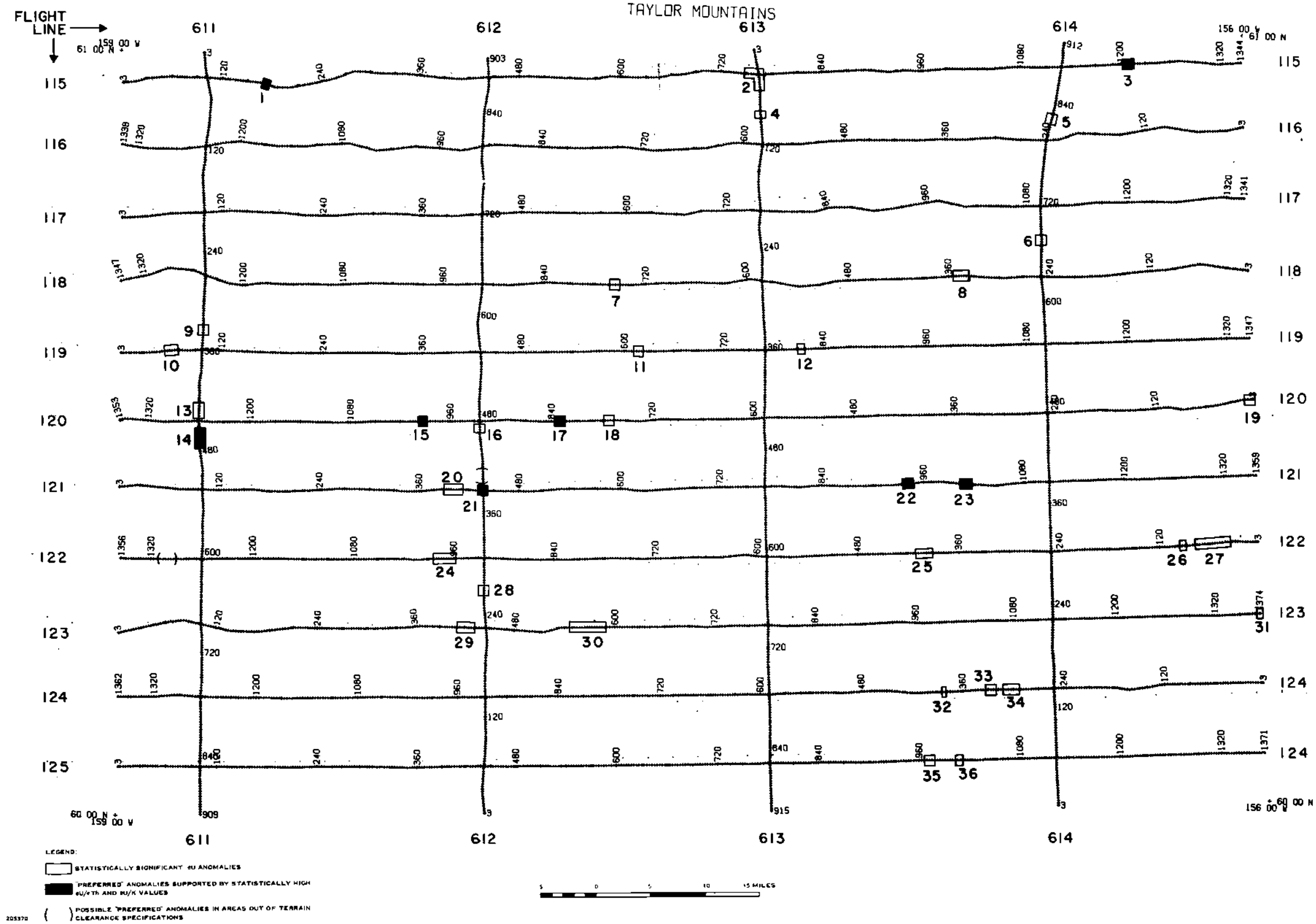


Figure 5-14. Equivalent Uranium Anomaly Map—Taylor Mountains Quadrangle

TABLE 5-24. EQUIVALENT URANIUM ANOMALIES–TAYLOR MOUNTAINS QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points												Remarks
				eU			eTh			eU/eTh			eU/K			
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	115	MzPz	–	2	1	–	–	–	–	2	–	–	2	–	1	Significant eU enrichment
2	115/613	K	–	9	2	–	10	4	–	2	–	–	1	–	–	Better exposed or unmapped unit
3	115	IPz	–	4	–	–	–	–	–	–	1	–	3	–	–	Significant eU enrichment
4	613	K	–	2	1	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
5	614	IPz	–	1	3	–	2	1	–	–	1	–	2	–	–	Possible geological misclassification
6	614	K	–	4	–	–	1	1	–	2	–	–	2	–	–	Slight eU enrichment
7	118	K	–	4	–	–	1	–	–	2	–	–	1	–	–	Slight eU enrichment
8	118	K	–	6	–	–	4	–	–	2	–	–	2	–	–	Slight eU enrichment
9	611	MzPz	–	2	1	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
10	119	MzPz	–	4	1	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
11	119	K	–	4	–	–	1	–	–	1	–	–	1	1	–	Slight eU enrichment
12	119	K	–	1	2	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
13	611	K	–	7	–	–	1	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
14	611	K	–	8	–	–	3	–	–	1	1	–	5	–	–	Significant eU enrichment
15	120	K	–	4	–	–	–	–	–	3	–	1	2	1	–	Significant eU enrichment
16	612	Tkg/K	–	1	2	–	1	–	–	4	–	–	–	–	–	Slight eU enrichment; Possible geological misclassification
17	120	K	–	4	–	–	–	–	–	4	–	–	1	1	–	Significant eU enrichment
18	120	K	–	4	–	–	–	–	–	1	–	–	1	–	–	Slight eU enrichment
19	120	K	–	4	1	–	1	–	–	2	–	–	1	–	–	Slight eU enrichment
20	121	Tkg	–	5	2	–	4	2	–	–	–	–	–	–	–	Better exposed or late stage phase
21	121/612	Tkg	–	6	–	–	–	–	–	5	–	–	5	1	–	Significant eU enrichment
22	121	K	–	4	–	–	–	–	–	3	–	–	2	–	–	Significant eU enrichment
23	121	K	–	4	1	–	1	–	–	3	–	–	4	–	–	Significant eU enrichment
24	122	K	–	2	3	4	1	2	5	1	–	–	–	–	–	Better exposed or unmapped unit
25	122	K	–	6	–	–	1	–	–	4	–	–	1	–	–	Slight eU enrichment
26	122	Qh	–	2	1	–	1	2	–	–	–	–	–	–	–	Better exposed sandbar or mud flat
27	122	Qh/Qp	–	9	2	–	6	1	–	1	1	–	–	–	–	Better exposed sandbar or mud flat
28	612	K	–	4	–	–	–	–	–	1	–	–	1	–	–	Slight eU enrichment
29	123	K	–	5	2	–	2	–	5	–	–	–	–	–	–	Better exposed or unmapped unit
30	123	K	–	5	8	2	1	9	4	–	–	–	–	–	–	Better exposed or unmapped unit
31	123	uMz	–	–	2	–	1	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
32	124	K	–	–	2	–	2	–	–	–	–	–	1	–	–	Possible geological misclassification
33	124	Qp	–	3	2	–	2	1	2	–	–	–	–	–	–	Better exposed or unmapped unit
34	124	Qp	–	3	3	–	3	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
35	125	Qp	–	2	3	–	5	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
36	125	Qp	–	2	1	–	1	1	1	–	–	–	–	–	–	Better exposed or unmapped unit

* 1 Circled number denotes preferred anomaly.

h. Coleen Geologic Cell

(1) Geology

The Coleen quadrangle contains part of the southern foothills of the Brooks Range bordering the northern edge of the Yukon Flats district (Eakins, 1975). It includes the Upper Ramparts of the Porcupine River. This district is tectonically equivalent to the intermontane plateaus that exist between the Pacific Mountain and Rocky Mountain systems of the western contiguous U.S. Rocks exposed in this quadrangle range in age from Quaternary unconsolidated deposits to Lower Paleozoic metasediments.

The geologic map was derived from Brosge and Reiser (1969) and the map units are described in Table 5-25.

(2) Uranium Potential

Two radioactive mineral occurrences are described for the Coleen quadrangle. There were shown in Figure 1-3.

Locality 5 (Cobb, 1970): Radioactive minerals are reported in a stream gravel concentrate in a southeast tributary of the Rapid River which drains an area of Carboniferous granite.

Locality 101 (Eakins, 1969): Silurian shales showed a radioactivity of 0.006 percent eU and highly concentrated stream gravel samples along the Coleen and Porcupine Rivers contained up to 0.052 percent eU.

A relatively large exposure of Carboniferous granite found in the east central part of the quadrangle may have some potential for vein-type uranium deposits.

Eakins (1975) reports the Yukon Flats basin to contain nonmarine sediments of probable Tertiary age including lignitic or coaly materials, and with tuffs or acid volcanics in the sediments or their drainage. These favorable characteristics for potential stratiform uranium deposits are offset by unfavorable aspects, including the large amount of water flowing in the rivers, the small amount of uranium that has been found, and the frozen ground which prevents water from percolating down from the surface. On this basis, there may be some possibility for stratiform deposits of uranium, but the probability does not appear to be high.

(3) Anomaly Maps

The statistical summary data for the geologic units sampled in this survey (Appendix C) show the rhyolite intrusives, rhy, to have the highest median eU value and the granites, Cgr, to have the second highest. Of the sediments, the Jurassic quartzite and shale showed the highest median eU value.

The eU anomaly map (Figure 5-15) and Table 5-26 show 42 statistically significant anomalies, with 8 preferred anomalies showing significant enrichment of eU over eTh and K.

TABLE 5-25. GEOLOGIC MAP UNITS FOR THE COLEEN GEOLOGIC CELL
(from Brosgé and Reiser, 1969)

Map Symbol	Description
Quaternary	
Q	Covered: Alluvium, residual soil, loess, and low river terrace deposits.
Quaternary or Tertiary	
QTg	High Terrace gravel: Quartz-chert pebble gravel, shale chip gravel in clay matrix, minor rhyolitic tuff; petrified wood.
QTv	Volcanic rocks: Vesicular to massive olivine basalt flows.
Tertiary	
Tc	Clay: Pebbly clay, lignite, minor tuff and ironstone.
Jurassic or Cretaceous	
KJs	Sandstone: Gray to yellow, fine- to very fine-grained sandstone, carbonaceous films; minor black fine-grained sandstone, black stiltstone and green chert.
Jurassic	
Jqs	Quartzite and Shale: Dark gray shale and siltstone; dark gray very fine-grained quartzite; sandstone to granular conglomerate. Minor gray and green sandstone.
Jm	Mafic intrusive rocks: Gabbro, basalt and quartz diorite sills; includes some amygdaloidal flows and interbedded limestone-basalt conglomerate.
Jurassic (?)	
Jqss	Quartzite, Shale and Sandstone: Undifferentiated
Jsc	Sandstone and Chert: Red, green, black and white chert; gray to yellow very fine-grained sandstone; red argillite; partly silicified siltstone and shale.
Permian or Jurassic	
JPc	Chert: Green, gray and red chert, argillite and shale; gray chert breccia; minor very fine-grained limonitic sandstone. May in part be silicified dolomite breccia.
JPs	Shale and Siltstone: Gray to black siltstone and silty shale, siltstone nodules; pyritic.
Ps	Siltstone: Gray nodular siltstone and yellow-weathering silty limestone.
Triassic	
TRs	Shublik formation: Black, partly calcareous shale, gray very fine-grained, thick-bedded quartz sandstone, olive gray very fine-grained silty limestone.
Permian (?)	
Psc	Shale and Chert: Gray, red, green, and black chert; argillite and shale, calcareous graywacke; sandy to silty pyritic limestone.
Carboniferous and Permian	
PCl	Limestone: Gray cherty limestone, dark gray shaly limestone and chert, local basal shale and sandstone.

TABLE 5-25. GEOLOGIC MAP UNITS FOR THE COLEEN GEOLOGIC CELL (from Brosgé and Reiser, 1969) (Continued)

Map Symbol	Description
Mississippian	
Ml	Lisburne Group: Gray limestone and dolomite with black chert, locally sandy.
Mk	Kayak Shale: Black shale, black laminated siltstone and chert; orange-weathering crinoidal limestone.
Ms	Siltstone: Black laminated, silicified siltstone; chert; black shaly phosphatic limestone; silicified limestone.
Mss	Sandstone: Coarse-grained conglomeratic quartz sandstone.
Mississippian (?)	
Msq	Shale and Quartzite: Black silty shale and chert; light gray very fine- to fine-grained laminated sandstone.
Devonian or Mississippian	
MDk	Kekiktuk or Kanayut Conglomerate: Quartz-chert pebble conglomerate and sandstone.
Carboniferous	
Css	Sandstone: Yellow coarse-grained conglomeratic, poorly sorted, partly carbonaceous sandstone, fine-grained hematitic sandstone.
Cgr	Granite: Biotite granite and quartz monzonite.
Upper Paleozoic (?)	
rhy	Rhyolite instrusives: Sills peripheral to granite.
Devonian	
Dls	Limestone: Dark gray, fine-grained limestone; minor dark gray dolomite and coarse-grained limestone.
Dd	Dolomite and Limestone: Dark gray fine- to medium-grained dolomite with some black chert; light gray limey dolomite and limestone, yellow and gray very fine-grained laminated dolomite and chert with minor red and green shale and sandstone.
Dk	Kanayut Conglomerate: Light gray to yellow, fine- to medium-grained quartzite and quartz-chert pebble conglomerate; greenish-gray, very fine-grained, thin-bedded sandstone.
Dhf	Hunt Fork shale: Dark gray clayshale, very fine- to fine-grained, thin-bedded sandstone and quartzite.
Ds	Salmontrout Limestone: Dark gray, massive biohermal limestone.
Devonian (?)	
Dl	Limestone: Black, fine-grained, thin-bedded, slaty limestone.
Paleozoic (?)	
Pzsc	Schistose sandstone: Ferruginous, coarse-grained, quartz sandstone and conglomerate.

TABLE 5-25. GEOLOGIC MAP UNITS FOR THE COLEEN GEOLOGIC CELL
(from Brosgé and Reiser, 1969) (Continued)

Map Symbol	Description
Paleozoic (?) (continued)	
Pza	Argillite: Red, green and orange, partly calcareous slate and argillite; thin beds of micaceous limestone and calcareous sandstone.
Pzal	Argillite and Limestone: Gray fine-grained, thin-bedded, ferruginous silty limestone; minor calcareous argillite.
Pzp	Phyllite: Laminated gray and greenish-gray clay and silt phyllite.
Pzd	Dolomite: White very fine to fine-grained dolomite, partly laminated, partly silicified; some gray chert and jasper.
Pzcd	Dolomite: Coarse-grained dolomite, light gray, massive and ruggy.
Pzl	Limestone and Shale: Black silty, calcareous shale and black fine-grained, thin-bedded limestone; brown siltstone; siltstone concretions; nodular cherty dolomite.
Pzs	Shale and Sandstone: Brown-weathering, dark gray, silty, micaceous shale and fine-grained, thin-bedded, pale yellow sandstone.
Lower Paleozoic	
Pzq	Quartzite: Light-gray to pale-orange, fine- to very fine-grained, orthoquartzite, pyritic, partly limonitic, locally micaceous; laminated quartzite. Minor schistose ferruginous siltstone, quartz siltstone, greenish-gray silt shale and olive micaceous shale.
Pzm*	Metamorphic rocks: Semishist and phyllite, dark gray, micaceous, silty, gray to greenish-gray, very fine-grained quartzose.
SO€l	Dolomite and Limestone: Interbedded gray laminated to mottled, limey dolomite; dark gray dolomite with minor black chert, light-gray, coarse-grained dolomite; light- to dark-gray calcilutite.

*This unit is referred to as Pz7 in the tapes and data listings.

Anomalies 14 in the map unit Cgr and 22 in rhy indicate uranium-rich phases of those rock types that may have vein-type uranium deposit potential. Anomaly 21 in Q may reflect alluvium derived from the nearby rhy intrusive. Anomaly 35 in QTv may represent a late stage differentiate of the volcanics which is enriched in U and Th. Anomalies 32, 33, 34 and 37 may indicate areas with stratiform-type uranium deposit potential.

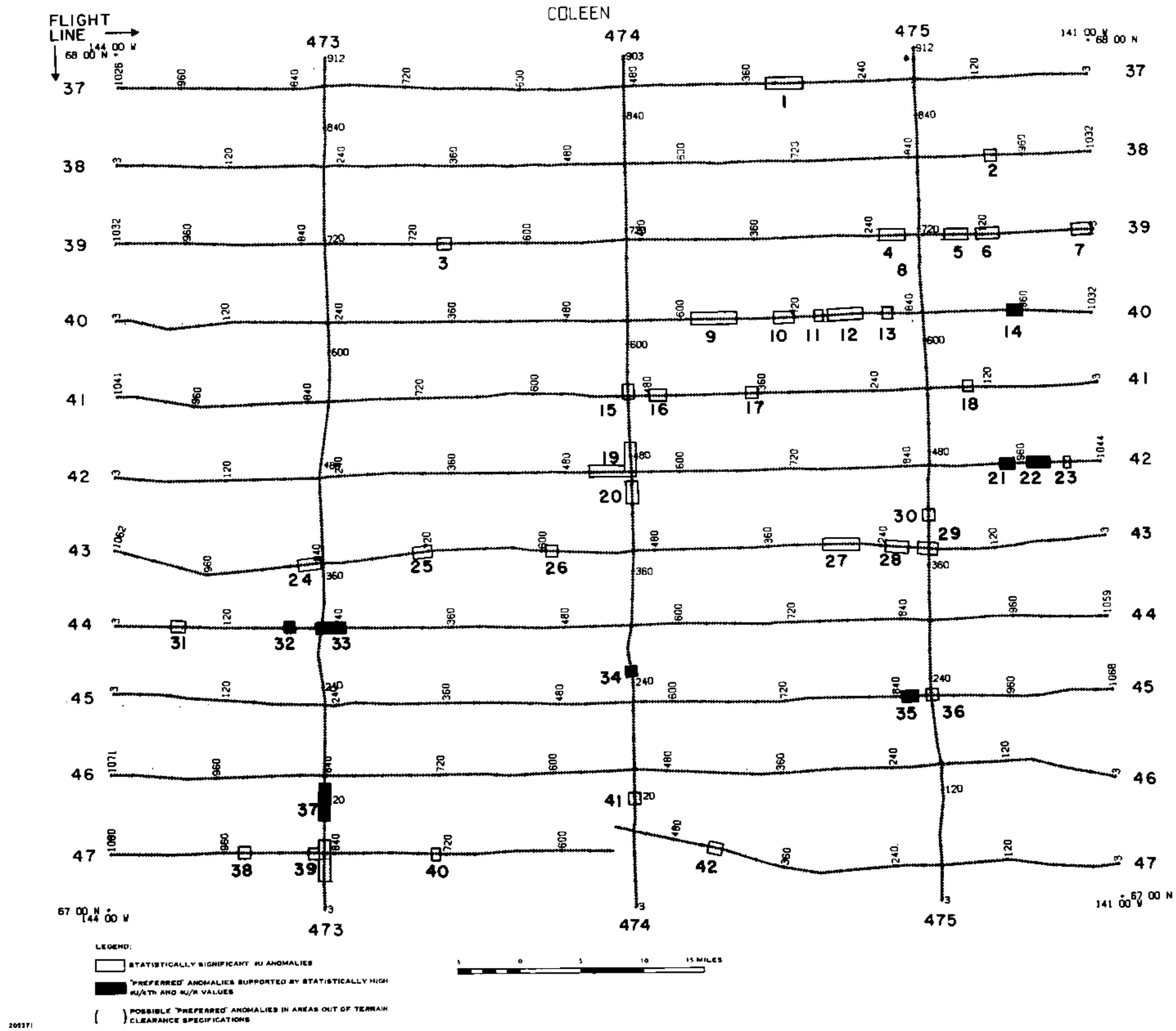


Figure 5-15. Equivalent Uranium Anomaly Map–Coleen Quadrangle

TABLE 5-26. EQUIVALENT URANIUM ANOMALIES–COLEEN QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points												Remarks
				eU			eTh			eU/eTh			eU/K			
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	37	Q	–	11	–	–	7	–	–	–	–	–	1	–	–	eU + eTh enrichment
2	38	Q	–	4	–	–	2	1	1	–	–	–	–	–	–	Better exposed or unmapped unit
3	39	Jm	–	3	2	–	4	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
4	39	Pzm	–	8	–	–	5	–	–	1	–	–	2	–	–	Better exposed or unmapped unit
5	39	Q	–	8	–	–	–	8	–	–	–	–	–	–	–	Better exposed or unmapped unit
6	39	Q	–	5	1	1	2	3	2	–	–	–	–	–	–	Better exposed or unmapped unit
7	39	Q	–	1	5	–	3	2	–	–	1	–	1	–	–	Better exposed or unmapped unit
8	475	Q	–	6	4	–	1	1	1	–	–	–	–	–	–	Better exposed or unmapped unit
9	40	Q/Jgs	–	10	4	–	11	1	–	5	–	–	–	–	–	Better exposed or unmapped unit
10	40	Q	–	5	2	–	5	2	–	1	–	–	–	–	–	Better exposed or unmapped unit
11	40	Q	–	1	1	1	1	2	–	–	–	–	–	1	1	eU + eTh enrichment
12	40	Cgr	–	2	9	1	2	–	8	2	–	–	1	1	–	Late stage differentiate
13	40	Cgr	–	2	1	–	1	2	–	–	–	–	–	–	–	Late stage differentiate
14	40	Cgr	–	6	–	–	–	–	–	4	2	–	2	–	–	Significant eU enrichment
15	41/474	Q	–	5	–	–	4	–	–	1	–	–	–	–	–	eU + eTh enrichment
16	41	Q	–	4	2	–	2	–	–	1	–	–	2	–		Slight eU enrichment
17	41	Q	–	4	–	–	–	–	–	–	–	–	–	–	–	Slight eU enrichment
18	41	Q	–	1	2	–	–	3	–	–	–	–	–	–	–	Better exposed or unmapped unit
19	42/474	Q	–	20	5	–	17	6	–	–	–	–	3	–	–	Better exposed or unmapped unit
20	474	Q	–	5	1	–	5	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
21	42	Q	–	1	–	4	1	3	–	2	2	–	3	–	–	Significant eU enrichment
22	42	rhy	–	5	2	–	4	3	–	5	–	–	4	2	–	Significant eU enrichment
23	42	Q	–	–	2	–	2	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
24	43	Q/Jm	–	4	4	–	5	2	–	2	2	–	1	–	–	Better exposed or unmapped unit
25	43	Q	–	3	2	–	1	1	5	–	–	–	–	–	–	Better exposed or unmapped unit
26	43	Q	–	4	–	–	–	–	–	–	–	–	–	–	–	Slight eU enrichment
27	43	Q/Pzg	–	10	–	–	5	–	–	3	–	–	2	–	–	Slight eU enrichment
28	43	Q	–	5	2	1	2	4	2	–	–	–	–	–	–	Better exposed or unmapped unit
29	43	Q	–	4	2	–	–	–	–	1	–	–	–	–	–	Slight eU enrichment
30	475	Q	–	2	1	1	2	2	–	–	–	–	1	–	–	Better exposed or unmapped unit
31	44	Q	–	5	–	–	3	–	–	–	–	–	1	–	–	eU + eTh enrichment
32	44	Q/Jm	–	4	–	–	–	–	–	3	–	–	3	–	–	Significant eU enrichment
33	474	Q	–	6	4	–	–	–	–	9	–	–	9	–	–	Significant eU enrichment
34	474	Pzd	–	2	1	–	1	–	–	–	1	–	–	1	–	Significant eU enrichment
35	45	QTv	–	3	3	–	3	1	–	3	–	–	3	1	–	Significant eU enrichment
36	45/475	QTv	–	4	–	–	4	–	–	–	–	–	–	–	–	eU + eTh enrichment
37	473	Q/Pzg	–	10	–	–	2	–	–	5	2	–	4	2	–	Significant eU enrichment
38	47	Q	–	2	2	–	–	–	–	2	–	–	1	–	–	Slight eU enrichment
39	47/473	Q	–	13	4	–	8	2	–	2	–	–	6	2	–	eU + eTh enrichment
40	47	Dd/Q	–	2	1	–	2	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
41	474	Tc	–	5	–	–	2	–	–	1	–	–	2	–	–	Slight eU enrichment
42	47	Q	–	3	2	–	3	–	–	1	–	–	–	–	–	eU + eTh enrichment

* 14 Circled number denotes preferred anomaly.

i. Black River Geologic Cell

(1) Geology

This quadrangle includes the eastern part of the Yukon Flats district, a broad Cenozoic basin described by Eakins (1975). It is tectonically equivalent to the intermontane plateaus between the Pacific Mountain and Rocky Mountain systems of the western contiguous U.S. Part of the Porcupine Plateau is located in the eastern portion of the quadrangle.

Exposed rocks range in age from Quaternary surficial deposits to Precambrian (?) sediments and intrusives. Brabb (1970) was used as the geologic map of the quadrangle for CGARD processing. The geologic map units are described in Table 5-27.

(2) Uranium Potential

There are no reported uranium occurrences in this quadrangle (Eakins, 1969; Cobb, 1970).

The Yukon Flats basin west of this quadrangle is known to have nonmarine sediments of probable Tertiary age, with lignitic or coaly materials and with tuffs and acid volcanics in the sediments or in their drainage (Eakins, 1975). These favorable characteristics for potential stratiform uranium deposits are offset by unfavorable aspects, including the large amount of water flowing in the rivers, the small amount of uranium that has been found in the entire region, and the frozen ground that prevents water from percolating down from the surface (Eakins, 1975). On this basis, the stratiform uranium potential of this quadrangle is generally unknown, but probably not high. The generally water-saturated Quaternary cover over most of the Tertiary sediments may effectively shield deposits and prevent their detection by airborne gamma-ray spectrometry.

The few small granitic intrusives in the eastern part of the quadrangle may have some potential for vein-type uranium deposits.

(3) Anomaly Maps

None of the geologic units sampled in this quadrangle showed significantly high eU median values (Appendix C). The small Precambrian (?) granitic intrusive was not sampled (flown over) in this survey.

The eU anomaly map (Figure 5-16) and Table 5-28 show 56 statistically significant anomalies of which 19 are classed as preferred on the basis that they exhibit significant eU enrichment over eTh and K.

Preferred Anomalies 2, 3, 19, 21, 27, 28, 31, 32, 33, 49, 53 and 55 are all associated with Quaternary deposits and may reflect uraniferous peat or lignite accumulations in the Quaternary sediments or possibly uranium-enriched shallow-covered bedrock. Anomalies 4, 12, and 22 are located in limestones and may indicate epigenetic uranium deposits in that rock type. Anomaly 50 in Pq could be caused by a stratiform uranium accumulation, and anomalies 35, 36 and 37 may be due to vein-type deposits in the Precambrian metamorphics or they may indicate unmapped uranium-rich Mesozoic or Paleozoic rock.

TABLE 5-27. GEOLOGIC MAP UNITS FOR THE BLACK RIVER GEOLOGIC CELL
(from Brabb, 1970)

Map Symbol	Description
Bedded Rocks	
Qal	Quaternary surficial deposits: Alluvial sand and gravel.
Qt	Quaternary surficial deposits: River terrace deposits.
Ql	Quaternary surficial deposits: Loess
QTs	Quaternary and Tertiary surficial deposits: Poorly consolidated sand and mud.
Kq	Cretaceous rocks: Massive quartzite
KJs	Cretaceous and Jurassic rocks: Grayish-black shale and argillite. Minor siltstone and quartzite.
Pq	Permian rocks: Massive quartzite and chert pebble conglomerate. May include quartzites of early Paleozoic or Mesozoic age.
PCs	Permian and Carboniferous rocks: Grayish-black shale and argillite and dark-gray limestone. Quartzite and conglomerate occur locally in lower part.
Dl	Devonian rocks: Medium-gray to grayish-black fine- to coarse-grained crinoidal limestone; locally dolomitie.
D€l	Devonian to Cambrian (?) rocks: Mainly massive limestone and dolomite. Minor red and green argillite and black chert. Includes some quartzite along Lower Ramparts of Porcupine River.
Sl	Silurian rocks: Medium-gray to grayish-black fine-grained limestone; locally dolomitic.
€Ol	Ordovician and Cambrian (?) rocks: Light-gray to grayish-black porcellaneous to coarse-grained limestone; locally dolomitic.
p€p	Precambrian rocks: Red, green and black phyllite; black and white banded slate and siltstone; white, brown, and red quartzite; orange-weathering dolomitie and limestone. May include rocks of Paleozoic and Mesozoic age.
Volcanic Rocks	
QTb	Quaternary or Tertiary rocks: Subhorizontal olivine basalt.
Pzv	Paleozoic (?) volcanics: Lithology and age uncertain.
Intrusive Rocks	
p€g	Precambrian granitic rocks: Possibly younger than Precambrian.
p€i	Precambrian basic intrusive rocks.

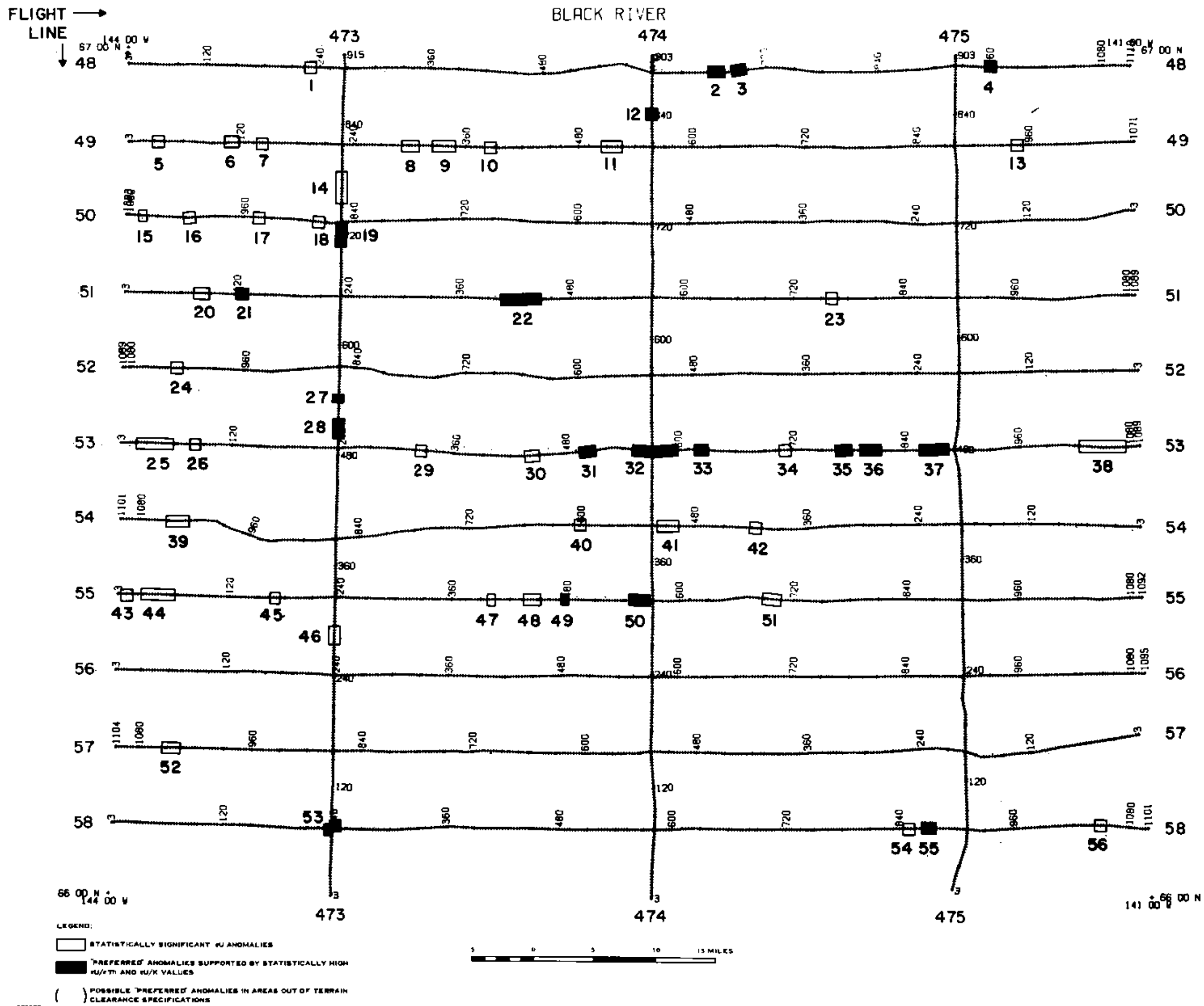


Figure 5-16. Equivalent Uranium Anomaly Map—Black River Quadrangle

TABLE 5-28. EQUIVALENT URANIUM ANOMALIES– BLACK RIVER QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	48	Qal	–	–	3	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
2	48	Ql	–	6	–	–	–	–	–	4	–	–	3	1	–	Significant eU enrichment
3	48	Ql	–	4	1	–	1	–	–	2	–	–	3	–	–	Significant eU enrichment
4	48	Sl	–	2	2	–	–	–	–	2	2	–	2	3	–	Significant eU enrichment
5	49	Qt	–	4	–	–	2	–	–	–	1	–	1	–	–	Slight eU enrichment
6	49	Qal	–	3	2	–	3	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
7	49	Qal	–	–	2	2	3	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
8	49	PCs/Ql	–	4	2	–	5	–	–	–	–	–	1	–	–	Possible geological misclassification
9	49	Pq/DEl/Ql	–	5	2	–	3	4	–	–	–	–	–	–	–	Possible geological misclassification
10	49	Ql	–	2	1	–	2	–	–	–	–	–	–	–	–	Possible geological misclassification
11	49	DEl	–	6	–	–	4	3	–	–	–	–	–	–	–	Possible geological misclassification
12	49	DEl	–	4	–	–	–	–	–	1	2	–	4	–	–	Significant eU enrichment
13	49	PCs	–	3	1	–	–	–	–	–	–	–	–	–	–	Slight eU enrichment
14	473	PCs/Ql	–	7	3	–	6	2	1	–	–	–	–	–	–	Better exposed or unmapped unit
15	50	Qal	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
16	50	Qal	–	3	1	–	3	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
17	50	Qt	–	4	–	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
18	50	Ql	–	3	1	–	2	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
19	473	Ql	–	6	2	–	2	–	–	5	–	–	4	–	–	Significant eU enrichment
20	51	Qt	–	3	1	–	5	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
21	51	Qt	–	3	1	–	–	–	–	3	1	–	3	1	–	Significant eU enrichment
22	51	DEl	–	11	3	–	1	–	–	10	2	–	6	5	–	Significant eU enrichment
23	51	DEl	–	4	–	–	3	–	–	–	–	–	–	–	–	Possible geological misclassification
24	52	Qt	–	4	–	–	2	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
25	53	Qal/Qt	–	6	6	1	8	3	–	3	–	–	–	–	–	Better exposed or unmapped unit
26	53	Qt/Ql	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
27	473	Ql	–	2	1	–	–	–	–	2	2	–	3	–	–	Significant eU enrichment
28	473	Ql	–	3	2	1	3	–	–	3	–	–	4	–	–	Significant eU enrichment
29	53	Ql	–	4	–	–	–	–	–	4	–	–	–	–	–	Slight eU enrichment
30	53	Ql	–	3	1	1	2	–	–	2	1	–	1	–	–	Slight eU enrichment
31	53	KJs/Qal	–	2	3	–	2	–	–	4	–	1	3	2	–	Significant eU enrichment
32	53	Ql	–	10	5	1	3	–	–	9	2	1	5	2	1	Significant eU enrichment
33	53	Ql	–	1	3	–	2	–	–	2	–	–	1	–	–	Significant eU enrichment
34	53	Qal	–	4	–	–	1	–	–	2	–	–	3	–	–	Slight eU enrichment
35	53	pEp	–	5	1	–	–	–	–	4	–	–	2	–	–	Significant eU enrichment
36	53	pEp	–	4	2	–	3	–	–	3	–	–	2	–	–	Significant eU enrichment
37	53	pEp	–	5	3	–	1	–	–	4	–	–	5	–	–	Significant eU enrichment
38	53	pEp/Ql	–	6	9	1	6	6	4	–	–	–	–	–	–	Possible geological misclassification
39	54	Qal	–	5	2	–	3	–	–	2	–	–	2	–	–	Slight eU enrichment
40	54	Ql	–	4	–	–	2	–	–	1	–	–	1	–	–	Slight eU enrichment
41	54	Ql	–	5	1	–	2	–	–	1	–	–	1	–	–	Slight eU enrichment
42	54	DEl/Ql	–	4	–	–	2	–	–	–	–	–	–	–	–	Possible geological misclassification
43	55	Ql	–	4	–	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
44	55	Ql	–	7	3	–	11	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
45	55	Ql	–	1	2	–	–	–	–	2	–	–	1	–	–	Slight eU enrichment
46	473	Ql	–	5	1	–	2	–	–	1	–	–	3	–	–	Slight eU enrichment
47	55	Ql	–	2	1	–	3	–	–	–	–	–	1	–	–	Better exposed or geological misclassification
48	55	Pq	–	5	1	–	6	–	–	2	–	–	1	–	–	Better exposed or geological misclassification
49	55	Ql	–	2	1	–	–	–	–	1	1	–	3	–	–	Significant eU enrichment
50	55	Pq	–	7	–	–	4	–	–	4	–	–	3	–	–	Significant eU enrichment
51	55	Ql	–	4	1	–	4	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
52	57	Ql	–	2	4	–	5	1	–	2	–	–	–	–	–	Better exposed or unmapped unit
53	58/473	Ql	–	6	–	–	–	–	–	1	1	–	2	1	–	Significant eU enrichment
54	58	Ql	–	2	1	–	–	–	–	3	–	–	1	–	–	Slight eU enrichment
55	58	Ql	–	2	2	–	–	–	–	3	1	–	6	1	–	Significant eU enrichment
56	58	pEp	–	4	–	–	–	4	–	–	–	–	–	–	–	Better exposed or unmapped unit

* 2 Circled number denotes preferred anomaly.

j. *Fort Yukon Geologic Cell*

(1) Geology

Fort Yukon quadrangle contains the central part of the Yukon Flats district, a broad Cenozoic basin tectonically equivalent to the intermontane plateaus between the Pacific Mountain and Rocky Mountain systems of the western contiguous United States. The entire quadrangle is covered by Quaternary surficial deposits except for a minor outcropping of volcanic rocks in the southeast corner.

The geologic map was based on Beikman and Lathram (1976) enlarged from 1:1,000,000 scale to 1:250,000 scale with the geologic unit boundaries refined by photogeologic techniques using 1:250,000 scale LANDSAT imagery (scene no. 1661-20432, MSS bands 5 and 7), and the USGS 1:250,000 scale topographic map.

Topographic and tonal details were used to more accurately locate the flood-plain (Qh) boundaries based on meander scars and the unit boundaries of JPv based on its greater relative resistance to erosion. Outwash deposits which are better drained than the other Quaternary surficial deposits are mapped separately as Qo.

The geologic map units are described in Table 5-29.

TABLE 5-29. GEOLOGIC MAP UNITS FOR THE FORT YUKON GEOLOGIC CELL (from Beikman, 1976)

Map Symbol	Description
Qh	Holocene deposits: Alluvial, flood-plain, and low terrace deposits.
Q	Quaternary deposits: Loess, eolian sand, terrace, and alluvial deposits.
Qo	Quaternary deposits: Outwash deposits with generally higher elevations and better drainage than Q or Qh.
JPv	Jurassic, Triassic and Permian volcanic rocks: Igneous complex of mafic volcanic and intrusive rocks.

(2) Uranium Potential

No known radioactive mineral occurrences are reported for this quadrangle by Eakins (1969), Cobb (1970) or Eakins (1975).

Eakins (1975) reports the Yukon Flats basin to contain nonmarine sediments of probable Tertiary age, with lignitic or coaly materials, and with tuffs and acidic volcanics in the sediments or in their drainage. These favorable characteristics for potential stratiform uranium deposits are offset by unfavorable aspects including the large amount of water flowing in the Yukon River, the small amount of uranium that has been found, and the frozen ground that prevents water from percolating down from the surface. On this basis, the stratiform uranium potential is generally unknown, but probably not high. The water-saturated Quaternary cover over most of the Tertiary sediments may effectively shield deposits from detection by airborne gamma-ray spectrometry.

(3) Anomaly Maps

None of the median uranium values (Appendix C) for this quadrangle were high, probably reflecting the extensive tundra cover shielding effects and the almost universal Quaternary surficial deposits. Nevertheless, Figure 5-17 and Table 5-30 show 51 statistically significant eU anomalies with 15 preferred ones showing significant eU enrichment over eTh and K. The remainder of the anomalies are probably due to better exposed or unmapped units, or to possible placer accumulations of uranium and thorium minerals.

The preferred anomalies are all associated with the Quaternary deposits and may represent uraniferous peat or lignite accumulations either in the surficial materials or in unmapped or shallow covered Tertiary deposits. The relatively large number of preferred anomalies here compared with other tundra-shielded areas would seem to justify at least a moderate follow-up effort to determine their cause.

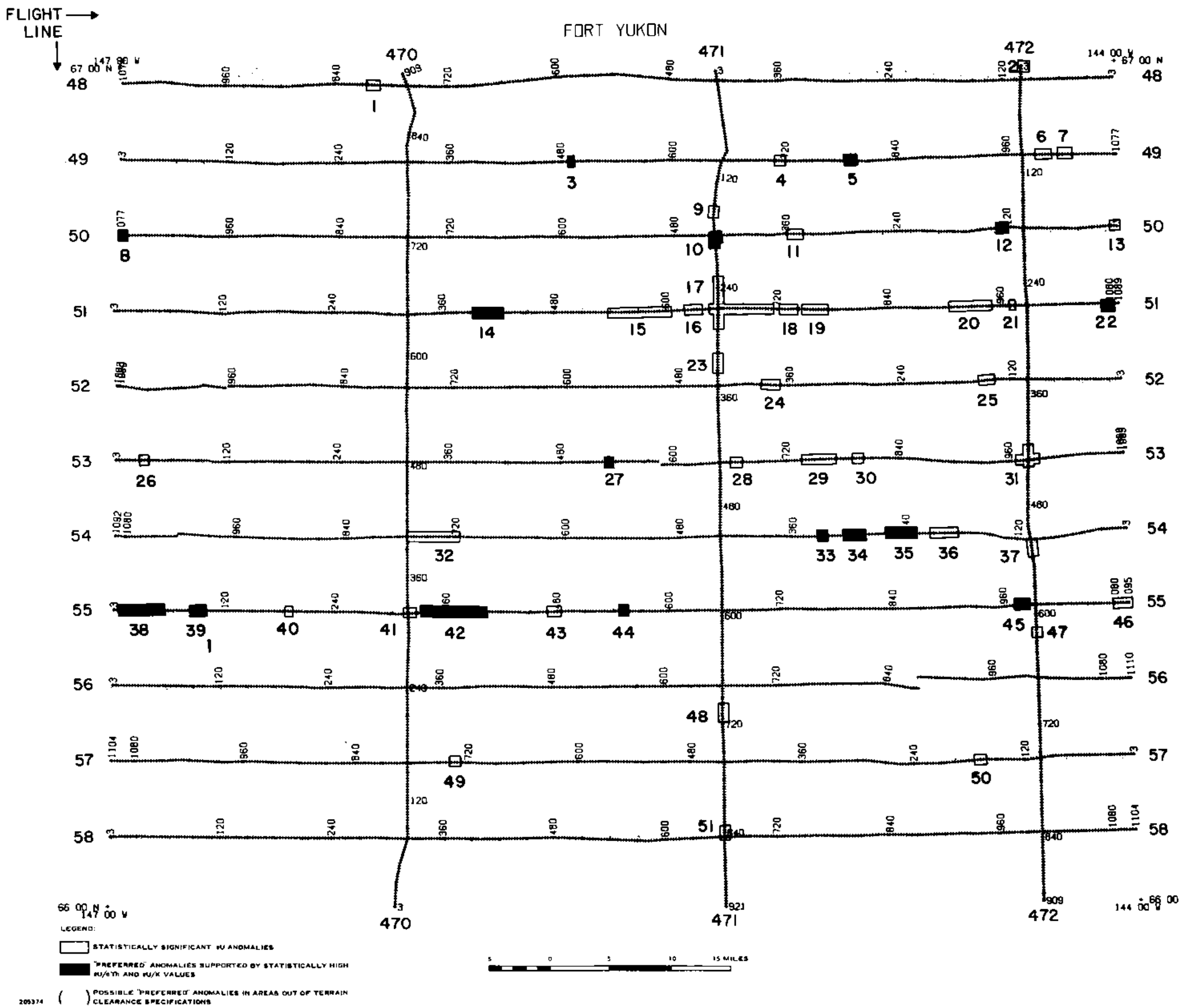


Figure 5-17. Equivalent Uranium Anomaly Map—Fort Yukon Quadrangle

TABLE 5-30. EQUIVALENT URANIUM ANOMALIES–FORT YUKON QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	48	Qo/Q	–	5	–	–	1	3	1	–	–	–	–	–	–	Better exposed or unmapped unit
2	472	Qo	–	1	1	1	1	–	–	2	–	–	1	–	–	Slight eU enrichment
3	49	Q	–	–	2	–	–	–	–	2	–	–	–	–	–	Slight eU enrichment
4	49	Qo	–	4	–	–	1	–	–	2	–	–	1	–	–	Slight eU enrichment
5	49	Qo	–	2	2	–	–	–	–	3	1	–	4	–	–	Significant eU enrichment
6	49	Q	–	5	–	–	3	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
7	49	Q	–	5	–	–	2	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
8	50	Qo	–	–	3	–	–	–	–	2	1	–	2	1	–	Significant eU enrichment
9	471	Qo	–	4	–	–	2	–	–	1	–	–	–	–	–	eU + eTh enrichment
10	50/471	Q	–	9	1	–	2	–	–	5	–	–	4	–	–	Significant eU enrichment
11	50	Qo	–	6	–	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
12	50	Qh	–	4	1	–	–	–	–	3	–	–	3	–	–	Significant eU enrichment
13	50	Qh	–	1	2	–	1	–	–	2	–	–	1	–	–	Slight eU enrichment
14	51	Q/Qh	–	10	–	–	5	–	–	2	–	–	3	–	–	Significant eU enrichment
15	51	Q/Qo	–	9	8	1	17	1	–	1	–	–	1	–	–	Better exposed or unmapped unit
16	51	Qo	–	1	4	2	2	3	2	1	–	–	–	–	–	Better exposed or unmapped unit
17	51/471	Qo/Q	–	23	15	1	14	23	1	1	–	–	–	–	–	Better exposed or unmapped unit
18	51	Qh	–	4	1	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
19	51	Qh	–	6	2	–	6	3	–	–	–	–	1	–	–	Better exposed or unmapped unit
20	51	Qh	–	6	8	1	4	7	–	1	–	–	3	–	–	Better exposed or unmapped unit
21	51	Qh	–	–	2	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
22	51	Qh	–	3	1	–	2	–	–	1	–	–	3	–	–	Significant eU enrichment
23	471	Qh	–	7	–	–	4	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
24	52	Qh	–	7	–	–	3	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
25	52	Qh	–	3	2	–	3	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
26	53	Q	–	1	2	–	3	–	–	–	–	–	2	–	–	Better exposed or unmapped unit
27	53	Qh	–	1	2	–	–	–	–	3	–	–	1	–	–	Significant eU enrichment
28	53	Q	–	4	–	–	–	–	–	2	–	–	–	–	–	Slight eU enrichment
29	53	Q	–	8	2	–	7	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
30	53	Q/Qh	–	3	1	–	1	–	–	–	–	–	2	–	–	Slight eU enrichment
31	53/472	Q/Qo	–	9	3	–	11	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
32	54	Q/Qh	–	11	5	–	10	3	2	1	–	–	1	–	–	Better exposed or unmapped unit
33	54	Q	–	4	–	–	–	–	–	3	1	–	–	–	–	Significant eU enrichment
34	54	Q	–	4	3	–	–	–	–	6	–	–	2	–	–	Significant eU enrichment
35	54	Q	–	5	6	–	3	–	–	7	–	–	4	–	–	Significant eU enrichment
36	54	Q	–	6	4	–	4	–	–	2	–	–	1	–	–	Better exposed or unmapped unit
37	472	Q	–	3	1	–	4	–	–	1	–	–	3	–	–	Better exposed or unmapped unit
38	55	Q	–	13	2	–	1	–	–	9	1	–	8	1	–	Significant eU enrichment
39	55	Q	–	3	2	–	–	–	–	3	–	–	3	–	–	Significant eU enrichment
40	55	Q	–	1	2	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
41	55/470	Q	–	6	–	–	5	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
42	55	Q	–	12	9	1	12	–	–	8	–	–	7	–	–	Significant eU enrichment
43	55	Qh	–	5	–	–	5	–	–	–	–	–	–	–	–	eU + eTh enrichment
44	55	Q	–	2	1	–	–	–	–	3	–	–	1	–	–	Significant eU enrichment
45	55	Q	–	3	1	–	–	–	–	2	–	–	3	–	–	Significant eU enrichment
46	55	Qo	–	6	–	–	7	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
47	472	Q/Qo	–	2	1	–	2	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
48	471	Qh	–	5	1	–	3	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
49	57	Qo	–	4	–	–	2	–	–	1	–	–	–	–	–	eU + eTh enrichment
50	57	Q	–	3	1	–	2	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
51	58/471	Qo	–	4	1	–	1	–	–	1	–	–	1	–	–	Slight eU enrichment

* 5 Circled number denotes preferred anomaly.

k. Beaver Geologic Cell

(1) Geology

This quadrangle includes the western portion of the Yukon Flats district, a broad Cenozoic basin described by Eakins (1975). It is tectonically equivalent to the intermontane plateaus between the Pacific Mountain and Rocky Mountain systems of the western contiguous U.S. The large Kanuti and Hodzana plutons are found in the northwest part of the quadrangle. The geologic map was prepared from Brosge, et al. (1973), and the geologic map units are described in Table 5-31. Exposed rocks range in age from Quaternary surficial deposits to Paleozoic sediments and metasediments.

(2) Uranium Potential

No known radioactive mineral occurrences are reported by Eakins (1969), Cobb (1970), or Eakins (1975).

Eakins (1975) reports the Yukon Flats basin to contain nonmarine sediments of probable Tertiary age, including lignitic or coaly materials, and with tuffs and acidic volcanics in the sediments or in their drainage. These favorable characteristics for potential stratiform uranium deposits are offset by unfavorable aspects including the large amount of water flowing in the Yukon River, the small amount of uranium that has been found, and the frozen ground that prevents water from percolating down from the surface. On this basis, the stratiform uranium potential is generally unknown, but probably not high. The water-saturated Quaternary cover over most of the Tertiary sediments may effectively shield any deposits from detection by airborne gamma-ray spectrometry.

The large granitic plutons may have potential for vein-type accumulations of uranium.

(3) Anomaly Maps

The Cretaceous granitic rocks showed the highest median eU values of any sampled rocks in this quadrangle (see Appendix C).

A total of 63 statistically significant eU anomalies are shown in Figure 5-18 and Table 5-32. Of these, 12 are listed as preferred on the basis that they show significant enrichment of eU over eTh and K.

Anomaly 47 indicates a uranium-enriched phase of Kg which may have potential for vein uranium deposits. Anomaly 61 in map unit Ql which overlies Kg may reflect a concealed uranium-enriched phase of Kg with vein deposit potential. Anomaly 6 may indicate potential for vein deposits in JPv.

Anomalies 38, 42, 45, 51, 57 and 58 are associated with peat-bearing Quaternary deposits along the Yukon Flats and may reflect uraniferous peat accumulations. Anomalies 13, 15 and 17 in QTg, Dg and Dp may indicate potential for other types of stratiform or vein deposits.

TABLE 5-31. GEOLOGIC MAP UNITS FOR THE BEAVER GEOLOGIC CELL
(from Brosge, et al, 1973)

Map Symbol	Description
Surficial Deposits	
Qal	Flood-plain and low terrace alluvium: Well stratified layers and lenses of gray to brown, coarse to fine, well sorted, rounded to subangular gravel, and minor amounts of sand and silt. Locally contains organic matter: peat, sticks and logs. Generally perennially frozen.
Qsm	Solifluction mantle on bedrock: Poorly sorted sand, silt and clay derived from local upslope bedrock sources.
Qs	Eolian sand: Massive well sorted homogeneous gray to tan sand and silty sand.
Qaf	Alluvial fan silt deposits: Well stratified to poorly stratified layers and lenses of gray to brown well sorted silt, sand, and fine gravel. Includes layers and lenses of peat and woody material.
Qf	Fan deposits: Poorly sorted to very poorly sorted, angular to subangular, silty, sandy gravel.
Qat	Alluvial fan and related terrace deposits: Well stratified layers and lenses of well sorted gray to brown, coarse to fine gravel with minor amounts of sand and silt and a few layers and lenses of peat and woody material. Generally perennially frozen.
Qap	Antiplanation Terraces: Flat surfaces formed on bedrock at altitudes of 2,500 to 3,500 feet and mantled with thin veneer of rock rubble.
Ql	Loess: Massive well sorted homogeneous tan to gray silt and sandy silt.
Qt	Till: Poorly sorted silty, sandy, bouldery gravel. Generally perennially frozen.
Qtg	High-level gravel and sand: Stratified gray to blue-gray to rusty-brown, well sorted pebble to boulder gravel and coarse sand.
Bedrock	
Ts	Sedimentary rocks: Yellow and gray, thin-bedded water-lain tuff and siltstone; quartz pebble conglomerate with a soft sandy matrix, and amber-bearing coal in beds as much as 5 feet thick.
TKr	Rhyolite: Gray, brown, pale red and orange porphyritic rhyolite, welded rhyolitic tuff and silicified laminated rhyolitic flows, minor amount of obsidian.
Kg	Granitic rocks: Porphyritic to granular, locally gneissic, quartz monzonite and granite, aplite and a few pegmatite dikes.
Kgc	Contaminated granitic rocks: Dark, fine- to coarse-grained granitic rocks with abundant mafic schlieren.
Jpv	Mafic volcanic and intrusive rocks: Basalt, gabbro, diorite and andesite. Subordinate amounts of chert and minor amounts of sandstone.
Jpc	Chert and argillite: Varicolored bedded chert, dark green siliceous argillite, and black shale and siltstone.

TABLE 5-31. GEOLOGIC MAP UNITS FOR THE BEAVER GEOLOGIC CELL (from Brosge, et al., 1973) (Continued)

Map Symbol	Description
Bedrock (Continued)	
Jpe	Ecologite and amphibolite: Banded dark-green, gray and red ecologite and banded amphibolite.
MzPzg	Greenstone and basic schist: Dark green, coarse grained, slightly to strongly foliated.
Dss	Sandstone and shale: Yellow- and brown-weathering, gray to greenish-gray, fine-grained, thin-bedded, partly calcareous and limonitic quartz arenite and quartz wacke. Includes interbedded dark-gray shale, calcareous mudstone, and sandy ferruginous limestone. Age probably Late Devonian.
Dg	Graywacke: Brown-weathering, gray to olive gray, fine- to medium-grained thin- to medium-bedded quartz chert wacke and lithic wacke; interbedded black shale, siltstone and minor ironstone; probably Devonian.
Dh	Hornfels: Thermally altered gray to black quartzite, spotted siltstone and phyllite; probably Devonian.
Dp	Phyllite: Dark gray to black phyllite and schistose siltstone interbedded with subordinate amounts of quartz wacke and sheared slate- and chert-pebble conglomerate; age probably Devonian.
Pzl	Limestone: Dark gray recrystallized limestone, dark gray crinoidal limestone and light gray dolomitic limestone; age probably Silurian or Devonian.
Pzm	Marble: Gray coarsely crystalline marble, locally interbedded with orange-weathering finely crystalline dolomite.
Pzs	Pelitic schist: Quartz-mica schist, quartzofeldspathic schist, and subordinate quartzite and calcareous quartz-mica schist; presumably Paleozoic in age.
Pzq	Quartzite: Gray quartzite and quartz-mica schist; presumably Paleozoic in age.
Pzqg	Gneiss and quartzite: Light-gray to pale-orange gneissic quartzite, quartz-biotite schist, and quartz-plagioclase gneiss.
Pzc	Calcareous schist: Yellow-weahtering impure marble interlayered with dark-green basic schist.
??	Unmapped area

The scattered distribution of preferred anomalies argues against any coherent uraniferous subprovince in this quadrangle; however, there does appear to be potential for both vein and stratiform deposits.

Several additional possible valid anomalies are indicated by brackets in Figure 5-18. These are where the terrain clearance was out of specifications over mountainous terrain, but the profiles and data listings indicate consistently high eU counting rates that are probably significant.

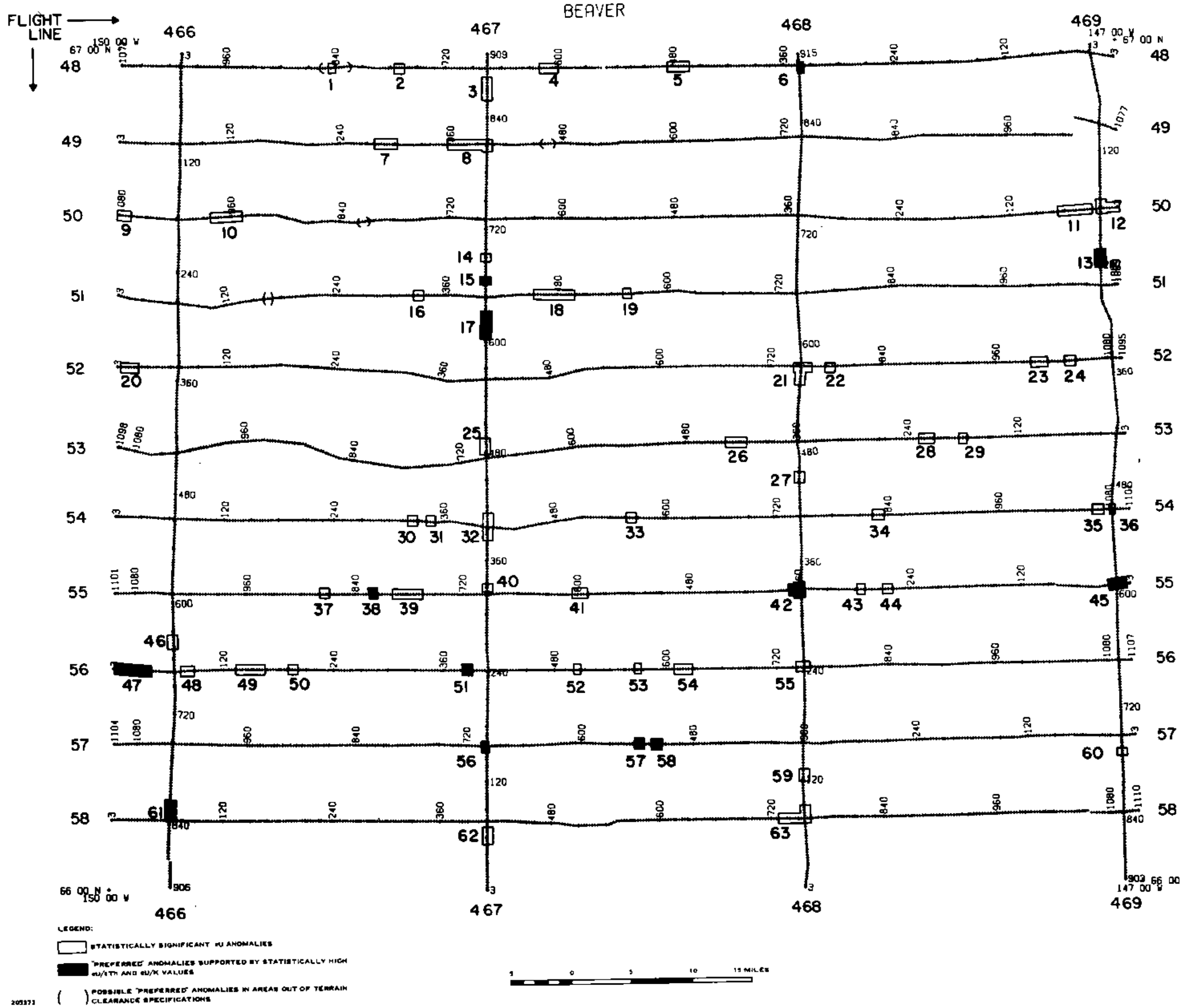


Figure 5-18. Equivalent Uranium Anomaly Map—Beaver Quadrangle

TABLE 5-32. EQUIVALENT URANIUM ANOMALIES– BEAVER QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	48	Kg	–	2	1	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
2	48	Qsm	–	4	–	–	2	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
3	467	Kg	–	3	5	–	8	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
4	48	Kg	–	7	–	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
5	48	Pzs	–	6	1	–	7	–	–	3	–	–	3	–	–	Better exposed or unmapped unit
6	48	JPv	–	1	1	1	–	–	–	–	2	–	3	–	1	Significant eU enrichment
7	49	Kg	–	3	2	3	5	4	–	1	–	–	1	–	–	Better exposed or late stage phase
8	49/467	Pzs	–	8	7	–	7	9	–	6	–	–	2	–	–	Slight eU enrichment
9	50	Pzs	–	5	–	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
10	50	Pzs	–	9	3	–	7	1	–	4	–	–	1	–	–	Better exposed or unmapped unit
11	50	QTg	–	4	5	3	7	5	–	1	–	–	1	–	–	Better exposed or unmapped unit
12	50	QTg	–	6	1	3	8	–	–	1	2	–	2	–	–	Slight eU enrichment
13	469	QTg	–	4	2	–	–	–	–	5	–	–	3	–	–	Significant eU enrichment
14	468	Qf	–	1	2	–	–	2	–	1	–	–	–	–	–	Better exposed or unmapped unit
15	468	Dg	–	2	1	–	–	–	–	–	2	1	2	1	–	Significant eU enrichment
16	51	Dg	–	4	–	–	2	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
17	468	Dg/Dp	–	8	2	–	3	–	–	5	–	–	4	–	–	Significant eU enrichment
18	51	Qal	–	7	5	1	2	10	3	–	–	–	–	–	–	Better exposed or unmapped unit
19	51	Qal/Qat	–	2	1	–	1	–	1	–	–	–	1	–	–	Better exposed or unmapped unit
20	52	Pzs	–	4	3	–	5	1	–	4	–	–	–	–	–	Better exposed or unmapped unit
21	52/468	QTg	–	5	3	3	11	3	–	2	–	–	3	–	–	Better exposed or unmapped unit
22	52	QTg	–	3	1	–	–	–	–	1	–	–	1	–	–	Slight eU enrichment
23	52	QTg	–	5	1	–	6	–	–	–	–	–	1	–	–	eU + eTh enrichment
24	52	QTg	–	4	–	–	–	–	–	1	–	–	2	–	–	Slight eU enrichment
25	467	TKr	–	5	1	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
26	53	Qat	–	5	2	–	4	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
27	468	Qal	–	2	2	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
28	53	Qaf	–	5	1	–	4	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
29	53	QTg	–	1	2	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
30	54	QTg	–	2	–	–	3	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
31	54	QTg	–	2	1	–	–	3	–	–	–	–	–	–	–	Better exposed or unmapped unit
32	467/54	QTg	–	13	–	–	12	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
33	54	QTg	–	4	–	–	1	–	–	–	–	–	2	–	–	Better exposed or unmapped unit
34	54	Qal	–	4	–	–	1	4	–	–	–	–	–	–	–	Better exposed or unmapped unit
35	54	Qal	–	3	1	–	–	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
36	54	Qal	–	2	1	–	–	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
37	55	Ql	–	4	–	–	1	–	–	1	–	–	2	–	–	Slight eU enrichment
38	55	Qaf	–	1	2	–	1	–	–	1	1	–	3	–	–	Significant eU enrichment
39	55	Qaf	–	8	2	–	6	–	–	2	–	–	4	–	–	Slight eU enrichment
40	467	Qaf	–	2	1	–	3	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
41	55	Qaf	–	4	1	1	3	1	–	1	1	–	–	–	–	Better exposed or unmapped unit
42	55/468	Qs/Qat	–	7	1	–	2	1	–	5	–	–	5	–	–	Significant eU enrichment
43	55	Qal	–	2	1	–	2	–	–	–	–	–	–	–	–	eU + eTh enrichment
44	55	Qal	–	3	1	–	2	2	–	–	–	–	1	–	–	eU + eTh enrichment
45	55/469	Qat	–	6	1	–	–	–	–	6	–	–	–	–	–	Significant eU enrichment
46	466	Kg	–	1	4	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
47	56	Kg	–	8	5	1	8	–	–	2	1	–	4	–	–	Significant eU enrichment
48	56	QTg	–	3	1	1	–	–	5	1	–	–	–	–	–	Better exposed or unmapped unit
49	56	Kg/Qaf	–	7	4	–	9	2	–	–	–	–	–	–	–	Better exposed or late stage phase
50	56	Kg/Qaf	–	2	2	–	3	1	–	–	–	–	2	–	–	eU + eTh enrichment
51	56	Qat	–	4	–	–	1	–	–	1	2	–	2	1	–	Significant eU enrichment
52	56	Qat	–	2	1	–	1	–	–	2	–	–	1	–	–	Slight eU enrichment
53	56	Qat	–	1	1	1	3	–	–	–	1	–	1	–	–	Better exposed or unmapped unit
54	56	Qat	–	6	–	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
55	56/468	Qal	–	3	1	1	1	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
56	57/467	Qal	–	4	–	–	5	–	–	1	–	–	2	–	–	Possible geological misclassification
57	57	Qal	–	3	–	1	–	–	–	2	–	–	1	2	–	Significant eU enrichment
58	57	Qal	–	–	1	2	–	–	–	3	–	–	2	–	–	Significant eU enrichment
59	468	Qat	–	4	–	–	–	–	–	–	–	–	–	–	–	Slight eU enrichment
60	469	Ql	–	2	1	–	3	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
61	466	Ql	–	3	2	–	2	–	–	2	1	–	3	1	–	Significant eU enrichment
62	467	Qal	–	4	2	–	1	–	–	3	–	–	–	–	–	Slight eU enrichment
63	58/468	Ql	–	10	2	–	11	2	–	1	–	–	4	–	–	eU + eTh enrichment

* 6 Circled number denotes preferred anomaly.

l. Bettles Geological Cell

(1) Geology

The Bettles quadrangle contains the eastern end of the northern Yukon-Koyukuk province, a Cretaceous and Cenozoic basin, described by Eakins (1975) and including the Kanuti Flats along the upper Koyukuk River. The Kokrines-Hodzana Highlands are found in the southeastern part of the quadrangle where several plutons of Cretaceous granitic rocks are exposed. Patton and Miller (1973) was used as the geologic map for this quadrangle. The mapped units are described in Table 5-33. They range in age from Quaternary surficial deposits to Paleozoic sediments and metasediments.

(2) Uranium Potential

Eakins (1969) reported several airborne gamma-ray anomalies and placer concentrates in this quadrangle that showed traces of radioactivity. The localities were shown in Figure 1-3. The placers are described as follows:

Locality 173 Less than 0.001 percent eU was found in placer concentrates in association with Cu and Pb in the John River near Bettles.

Locality 174 A maximum of 0.027 percent eU was found in placer concentrates with Au, Fe_2O_3 and sulfides; probably due to traces of thorianite; in Gold Bench, Wiseman District, on the south fork of the Koyukuk River.

The northern Yukon-Koyukuk basin is reported by Eakins (1975) to contain Cretaceous nonmarine graywacke and mudstone with tuff and carbonized plant debris as well as conglomeratic coal-bearing units. This suggests some potential for stratiform uranium deposits.

West of the Bettles quadrangle the basin contains an east-west trending series of alkaline igneous plutons described in detail by Eakins (1975) and Forbes (1975). The plutons of the Bettles quadrangle are not specifically described as alkaline but the present survey data indicate probable acidic or alkaline phases which could be favorable for vein-type uranium accumulations.

(3) Anomaly Maps

The early Cretaceous granitic rocks (Kg) have the highest median eU values in the Bettles quadrangle (see Appendix C). Of these, the Sithylemenkat pluton on the southern boundary of the quadrangle shows special enrichment in U, Th, and K, indicating the presence of late stage acidic or alkaline differentiates (see anomalies 48, 49 and 50 in Figure 5-19 and Table 5-34). This region has vein-type uranium deposit potential.

The uranium anomaly map, Figure 5-19, shows a total of 52 statistically significant anomalies of which 22 are preferred anomalies yielding significant eU enrichment over eTh and K.

Anomalies 37 and 51 in map unit Pzs may have potential for vein-type accumulations derived from the nearby Sithylemenkat pluton. Anomalies 21 and 22 in TKv and Anomaly 31 in JPv may indicate either primary eU enrichment or stratiform accumulations in the sediments interbedded with the volcanics. Anomalies 1 and 29 in Kgm could indicate potential for

TABLE 5-33. GEOLOGIC MAP UNITS FOR BETTLES GEOLOGIC CELL (Adapted from Patton and Miller, 1973)

Map Symbol	Description
Q	Surficial deposits: Undifferentiated glacial drift, eolian, and alluvial deposits.
QTb	Basalt: Flat-lying flows of dark vesicular to massive olivine basalt in Ray River drainage basin. Subordinate volcanic conglomerate and breccia composed of locally derived epiclastic debris in a brown glass matrix. Age uncertain but probably late Tertiary or Quaternary.
TKv	Felsic Volcanic rocks: Brown, gray, and light tan porphyritic flows, breccia, conglomerate, and tuff of acidic and intermediate composition. Potassium-argon age of 58 ±1.7 my (early Tertiary) from flow on Kanuti River. Unit appears to grade downward into quartz-pebble conglomerate (Kqc) and probably includes rocks as old as Late Cretaceous.
Kqc	Quartz-Pebble conglomerate: Well-rounded clasts of white quartz, gray quartzite, graywacke, chert, schist, and mafic volcanic and intrusive rocks. Minor sandstone, shale, and thin ash-fall tuff. Occurs along south edge of Brooks Range and west edge of Kokrines-Hodzana Highlands. Gradational contact with igneous pebble-cobble conglomerate (Kic). Abundant plant fossils of Late Cretaceous age in cutbanks along Middle Fork of Koyukuk River near Tramway Bar.
Kic	Igneous Pebble-Cobble conglomerate: Poorly sorted clasts of mafic volcanic and intrusive rocks, chert, and graywacke. Occurs along south edge of Brooks Range and west edge of Kokrines-Hodzana Highland. Appears to grade southward and westward into graywacke and mudstone (Kgm). Bulk of unit believed to be late Early Cretaceous (Albian), but may include beds as young as Late Cretaceous.
Kgm	Volcanic Graywacke and Mudstone: Dark greenish gray, fine- to coarse-grained, poorly sorted graywacke interbedded with dark gray mudstone. Graywacke composed largely of first- and second-cycle volcanic debris of mafic and intermediate composition. Locally includes lenticular masses of mafic igneous pebble-cobble conglomerate. Contains ammonites and pelecypods of late Early Cretaceous (Albian) age.
Kg	Granitic rocks: Coarsely porphyritic biotite quartz monzonite. Subordinate granodiorite, monzonite, and fine-grained quartz porphyry. Potassium-argon age of 106 ±3.0 my (Early Cretaceous) from Sithylemenkat pluton.
Kv	Andesitic Volcanic rocks: Chiefly dark reddish and greenish andestic crystal-bearing lithic tuff and tuff breccia. Subordinate andesitic flows. Probably correlative with andesitic volcanic rocks of earliest Cretaceous (Neocomian) age in adjacent Highes quadrangle. Found only in southwestern part of Bettles quadrangle.
JPv	Mafic Volcanic and Intrusive rocks: Pillow basalt, diabase, and gabbro. Subordinate basaltic and andesitic volcaniclastic rocks, chert, and cherry mudstone. Mafic rocks largely altered to "greenstone" and locally foliated. Foraminifera and brachiopoda of Permian age in carbonate lens in pillow basalt at Heart Mountain Unit may include rocks of Triassic and Jurassic age correlative with potassium-argon dated mafic assemblages in nearby parts of the Brooks Range and Yukon River valley.

TABLE 5-33. GEOLOGIC MAP UNITS FOR BETTLES GEOLOGIC CELL
(Adapted from Patton and Miller, 1973) (Continued)

Map Symbol	Description
JPu	Ultramafic rocks: Serpentinized peridotite and dunite. The close spatial relationship of these rocks with the mafic volcanic and intrusive rocks (JPv) suggests that the two units are approximately the same age.
Pzm	Marble: Small masses of white to light gray coarsely crystalline marble. Altered to calc-silicate hornfels along contacts with Cretaceous granitic rocks. Age uncertain but probably Devonian or late Paleozoic.
Pzp	Phyllite: Dark gray to black phyllite and subordinate fine-grained metagraywacke. Abundant white vein quartz. Age uncertain but probably Devonian or late Paleozoic. Unit includes many small bodies of mafic intrusive rock (JPv?) not differentiated on map.
Pzg	Graywacke: Dark greenish gray fine-grained impure quartzitic sandstone. Age uncertain but probably Devonian or late Paleozoic.
Dcs	Calcareous schist: Light brown weathering calcareous schist interbedded with gray quartz-mica schist and marble. Occurs in southern Brooks Range where it has been assigned a Devonian age.
Pzs	Pelitic schist: Quartz-mica schist, chlorite schist, quartzo-feldspathic schist, and subordinate quartzite. Metamorphic grade ranges from lower greenschist facies to almandine-amphibolite facies. Thermally altered to andalusite-cordierite hornfels and contact schist in broad bands surrounding Cretaceous granitic bodies (Kg). At least in part Paleozoic in age, but may include rocks as old as Precambrian. Unit includes many small bodies of mafic intrusive rock (JPv?) not differentiated on map.
Pzq	Quartzite: Gray massive partzite with subordinate quartz-mica schmist; probably Paleozoic.

stratiform deposits as could Anomalies 12, 13, 18, 34, 35, 36, 43, 44, 45, 46, 47 and 52 in Q. The Q anomalies may also indicate deposits beneath the alluvium. The clustering of Anomalies 34, 35, 36, 43, 44, 45, 46 and 47 in the drainage from the Sithylemenkat pluton suggests that uranium may have been derived from that source and concentrated in particular facies (possibly lignitic) of the Quaternary deposits.

Several additional possible valid anomalies are indicated by brackets in Figure 5-19. These are where the terrain clearance was out of specifications over mountainous terrain, but the profiles and data listings indicate consistently high eU counting rates that are probably significant.

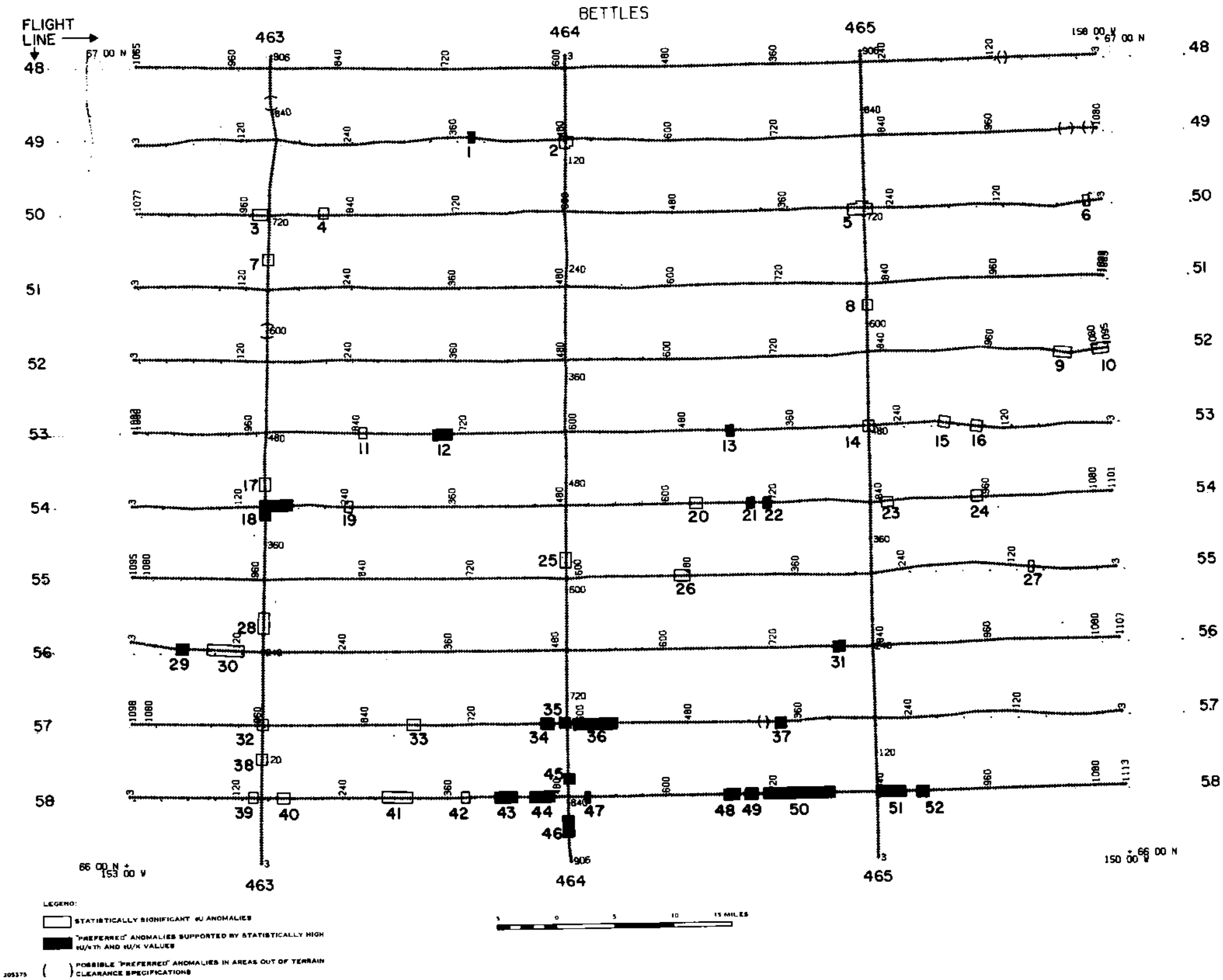


Figure 5-19. Equivalent Uranium Anomaly Map–Bettles Quadrangle

TABLE 5-34. EQUIVALENT URANIUM ANOMALIES—BETTLES QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	++	+++	eTh +	++	+++	eU/eTh +	++	+++	eU/K +	++	+++	Remarks
1	49	Kgm	–	1	2	–	1	–	–	1	1	–	1	1	–	Significant eU enrichment
2	464/49	Q	–	6	–	–	1	–	–	–	–	–	–	–	–	Probable unmapped unit
3	50	Q	–	6	–	–	3	–	–	–	–	–	–	–	–	Probable unmapped unit
4	50	Q	–	4	–	–	1	–	–	1	–	–	2	–	–	Slight eU enrichment
5	50/465	Q	–	3	1	4	4	1	4	–	–	–	2	–	–	Probable geological misclassification
6	50	Pzs	–	–	2	–	2	–	–	–	–	–	–	–	–	Probable unmapped unit
7	463	Q	–	4	–	–	3	–	–	–	–	–	–	–	–	eU + eTh enrichment
8	465	Q	–	1	2	–	1	1	–	2	–	–	2	–	–	Slight eU enrichment
9	52	Pzs	–	5	2	–	7	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
10	52	Pzs	–	4	2	–	5	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
11	53	Q	–	2	1	–	1	–	–	1	–	–	–	–	–	Exposed sandbar or mud flat
12	53	Q	–	4	2	–	1	–	–	5	–	–	2	–	–	Significant eU enrichment
13	53	Q	–	2	1	–	–	–	–	2	–	–	3	–	–	Significant eU enrichment
14	53	Pzp	–	4	–	–	1	1	–	1	–	–	1	–	–	Better exposed or unmapped unit
15	53	Pzs	Airborne Anomalies (Eakins, 1969)	4	–	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
16	53	Pzs	Airborne Anomalies (Eakins, 1969)	1	2	1	3	1	–	1	–	–	–	–	–	Better exposed or unmapped unit
17	463	Q	–	4	1	–	3	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
18	463/54	Q	–	12	2	–	4	–	–	7	–	–	8	–	–	Significant eU enrichment
19	54	Q	–	2	1	–	3	–	–	–	–	–	–	–	–	eU + eTh enrichment
20	54	Tkv/Q	–	2	3	–	4	1	–	–	–	–	–	–	–	Better exposed or geological misclassification
21	54	Tkv	–	1	2	–	–	–	–	1	2	–	2	–	–	Significant eU enrichment
22	54	Tkv	–	1	3	–	–	–	–	4	–	–	4	–	–	Significant eU enrichment
23	54	Jpv	–	3	1	–	2	2	–	3	–	–	3	–	–	Better exposed or unmapped unit
24	54	Kg	–	1	2	1	1	1	1	2	–	–	1	–	–	Probable geological misclassification
25	464	Q	–	3	2	1	2	1	–	3	–	–	–	–	–	Better exposed or unmapped unit
26	55	Tkv	–	4	2	–	3	–	–	2	–	–	2	1	–	Slight eU enrichment (acid phase)
27	55	Pzs	–	–	1	1	1	1	–	–	–	–	1	–	–	Better exposed or unmapped unit
28	463	Kgm/Q	–	7	–	–	3	–	–	–	–	–	4	–	–	Better exposed or geological misclassification
29	56	Kgm/Q	–	1	2	2	3	1	–	2	1	–	1	–	1	Significant eU enrichment
30	56	Kgm/Q	–	10	2	–	11	–	–	3	–	–	3	–	–	Better exposed or geological misclassification
31	56	Jpv	–	5	–	–	1	–	–	2	3	–	4	–	–	Significant eU enrichment
32	57/463	Kgm	–	7	–	–	5	–	–	3	–	–	3	–	–	Better exposed or unmapped unit
33	57	Q	–	4	1	–	2	–	–	4	–	–	–	–	–	Better exposed or unmapped unit
34	57	Q	–	3	–	1	1	–	–	4	–	–	2	–	–	Significant eU enrichment
35	57/464	Q	–	5	1	–	1	–	–	5	–	–	3	1	–	Significant eU enrichment
36	57	Q	–	14	2	–	7	–	–	5	–	–	6	–	–	Significant eU enrichment
37	57	Pzs	–	3	–	1	1	–	–	4	–	–	2	–	–	Significant eU enrichment
38	463	Kgm	–	2	2	–	1	3	–	–	–	–	–	–	–	Better exposed or unmapped unit
39	58	Q	–	2	–	1	1	–	–	–	1	–	1	–	–	Slight eU enrichment
40	58	Kic	–	5	–	–	2	–	–	–	–	–	–	–	–	
41	58	Q	–	9	1	–	10	2	1	1	–	–	1	–	–	eU + eTh enrichment
42	58	Q	–	–	3	–	–	–	3	–	–	–	–	–	–	
43	58	Q	–	7	–	–	1	–	–	–	2	–	2	2	–	Significant eU enrichment
44	58	Q	–	4	5	–	4	–	–	4	1	–	7	–	–	Significant eU enrichment
45	464	Q	–	2	2	–	1	–	–	–	2	–	2	2	–	Significant eU enrichment
46	464	Q	–	4	3	–	–	–	–	3	2	3	5	3	–	Significant eU enrichment
47	58	Q	–	–	2	–	–	–	–	–	2	–	–	1	–	Significant eU enrichment
48	58	Kg	–	6	–	–	4	–	–	1	–	–	5	1	–	Late stage acidic or alkaline phase
49	58	Kg	–	5	–	–	4	–	–	–	–	–	2	–	–	Late stage acidic or alkaline phase
50	58	Kg	–	25	1	–	13	12	–	2	1	–	17	3	–	Late stage acidic or alkaline phase
51	58	Pzs	–	10	1	–	3	–	–	4	–	–	5	1	–	Significant eU enrichment
52	58	Q	–	2	3	–	–	–	–	4	1	–	3	1	–	Significant eU enrichment

* 1 Circled numbers denotes preferred anomaly.

m. Tanana Geologic Cell

(1) Geology

The Tanana quadrangle includes a part of the Kokrines-Hodzana Highlands (the Ray Mountains) and a portion of the lower Tanana basin (Eakins, 1975). A large pluton of Cretaceous granitic rocks forms the core of the Ray Mountains. The lower Tanana basin contains Tertiary nonmarine sediments.

The geologic map of this quadrangle was adapted from Chapman et al. (1975). The geologic map units used for CGARD processing are described in Table 5-35.

(2) Uranium Potential

Several occurrences of radioactive minerals have been reported in this quadrangle (see Figure 1-3).

Locality 140 (Eakins, 1969) Placer deposits on Quartz Creek and Morelack Creek yielded up to 0.015 percent eU associated with gold and Pb-Ag minerals. Cretaceous rocks showed up to 0.003 percent eU. Tertiary conglomerates had up to 0.014 percent eU.

Locality 141 (Eakins, 1969; Cobb, 1970) Highly concentrated placer material containing ellsworthite, eschynite, columbite, monazite and zircon, yielded up to 2.3 percent eU.

Locality 142 (Eakins, 1969; Cobb, 1970) Pb-Ag veins showed an average of 0.003 percent eU near Manley's Hot Springs.

Locality 143 (Eakins, 1969) Placer pebbles reported with 0.21 percent eU (not confirmed).

Locality 144 (Eakins, 1969) Local quartz monzonite shows 0.004 percent eU and placer concentrates range from 0.004 to 0.42 percent eU due to contained monazite.

Locality 145 (Eakins, 1969) Au placers ranged from 0.001 to 0.01 percent eU; probably due to zircon. Lignite bed showed 0.001 percent eU.

Locality 28 Cobb, 1970) Monazite reported in Boulder Creek.

The Ray Mountains pluton may have some potential for vein-type uranium deposits.

Eakins (1975) states that the uranium potential of the Tanana basins is problematical. Nonmarine Tertiary sandstones, volcanic ash and coal are known to be present, but their extent in the subsurface is unknown. Some of the source areas for the Tertiary sediments contain granitic rocks. The very shallow water table (0 to 50 feet) is believed by Eakins to be an unfavorable factor for the formation of stratiform deposits in the lower Tanana basin.

TABLE 5-35. GEOLOGIC MAP UNITS FOR THE TANANA GEOLOGIC CELL (after Chapman, et al., 1975)

Map Symbol	Description
Unconsolidated Deposits	
Q	Quaternary deposits: Recent alluvium; till; fan, bench and terrace deposits; colluvium.
Q1	Quaternary deposits: Loess
Qess	Quaternary deposits: Eolian sand and silt.
Bedrock-Sedimentary and Metamorphic Rocks	
Ts	Tertiary rocks: Sandstone, conglomerate, shale and lignite.
KJcs	Cretaceous and Jurassic (?) rocks: Sandstone, quartzite, conglomerate, siltstone and slaty shale.
Ps	Permian rocks: Slaty shale, siltstone, graywacke, and conglomerate.
Pzcs	Permian or Devonian rocks: Siltstone, slate, phyllite and argillite.
Pzc	Devonian (?) rocks: Calcareous schistose siltstone and sandstone, and some phyllite.
Pzw	Devonian (?) rocks: Quartzwacke.
Pzsr	Devonian (?) rocks: Quartz-mica-garnet schist, with some quartzite schist, calcareous schist, marble and phyllite.
DSt	Devonian and Silurian rocks: Tolovana limestone.
Pzl	Devonian, Silurian or Ordovician rocks: Limestone, dolomite, basaltic greenstone, chert and chloritic schist, with some argillite, phyllite and quartz-mica schist.
Oc	Ordovician rocks: Chert and some slaty shale.
Ꞓal	Ordovician or Cambrian rocks: Maroon and green argillite and slate, with quartzite, grit and some phyllite.
Pzsq	Ordovician or Cambrian rocks: Quartz-mica schist, quartzite phyllite and slate.
Bedrock–Sedimentary, Metamorphic and Igneous Rocks	
Kh	Cretaceous rocks: Hornfels and gneiss.
TR vs	Triassic rocks: Rhyolitic lava and breccia, tuff, chert and shale.
TR Pv	Triassic or Permian rocks: Extrusive and intrusive basaltic and diabasic rocks, tuff, chert, argillite, slate and, rarely, clastic limestone.
Pzvs	Silurian or Ordovician rocks: Foliated basaltic lava, tuff, slaty shale, phyllite and some limestone and chert.
Bedrock–Igneous Rocks	
QTa	Quaternary or Tertiary rocks: Andesitic lava
Tg	Tertiary rocks: Granite
TKv	Tertiary and/or Cretaceous rocks: Felsic volcanics

TABLE 5-35. GEOLOGIC MAP UNITS FOR THE TANANA GEOLOGIC CELL (after Chapman, et al., 1975) (Continued)

Map Symbol	Description
Kg	Cretaceous rocks: Granite
Km	Cretaceous rocks: Gabbro and diorite
Ksp	Cretaceous rocks: Serpentinite with some diabase, gabbro, and mafic volcaniclastic rocks.
??	Unmapped area.

(3) Anomaly Maps

The highest median equivalent uranium content of the rocks sampled in the Tanana quadrangle was found in Tertiary granitic rocks (Tg) northwest of Manley's Hot Springs (Records 249-280, Flight Line 70). No significant equivalent uranium anomalies were found in Tg, but the high median eU content indicates that this rock type may be a late stage acidic or alkaline differentiate, which can be a host or source for uranium vein deposits (see Appendix C).

The next highest median eU content is in the Cretaceous granitic rocks, Kg, and portions of this unit are also interpreted to be a likely host for uranium-bearing veins.

Figure 5-20 and Table 5-36 show 59 statistically significant equivalent uranium anomalies. Twenty-one of these show significant enrichment of eU over eTh and K.

Preferred Anomalies 17, 18, 25, 29, 30 and 37 are associated with map unit Kg and/or Kh and indicate areas with potential for vein-type uranium prospects. Anomalies 46 in TRPv and 20 and 38 in Pzsq also may indicate vein-type accumulations.

Anomalies 21, 22, 31, 42, 45, 52, 53, 54, and 55 are associated with Quanternary deposits which may contain uranium-enriched peat or lignite. Anomalies 43 and 44 coincide with Quartz and Morelack creeks described by Eakins (1969) as having radioactive placer deposits. Anomaly 48 is on Little Boulder Creek which may contain uranium-enriched placers. Cobb (1970) reported a monazite-bearing placer in that general vicinity on Boulder Creek.

Examination of the anomaly maps and profiles for this quadrangle shows that much of the data in the mountains over Kg was out of acceptable terrain clearance; however, the very high counting rates for eU, eTh and K shown on the profiles and in the data listings indicate the presence of several possible valid anomalies in the region where the data was eliminated from the anomaly maps because it was collected above acceptable terrain clearances. All of these possible anomalies and are indicated by brackets in Figure 5-20.

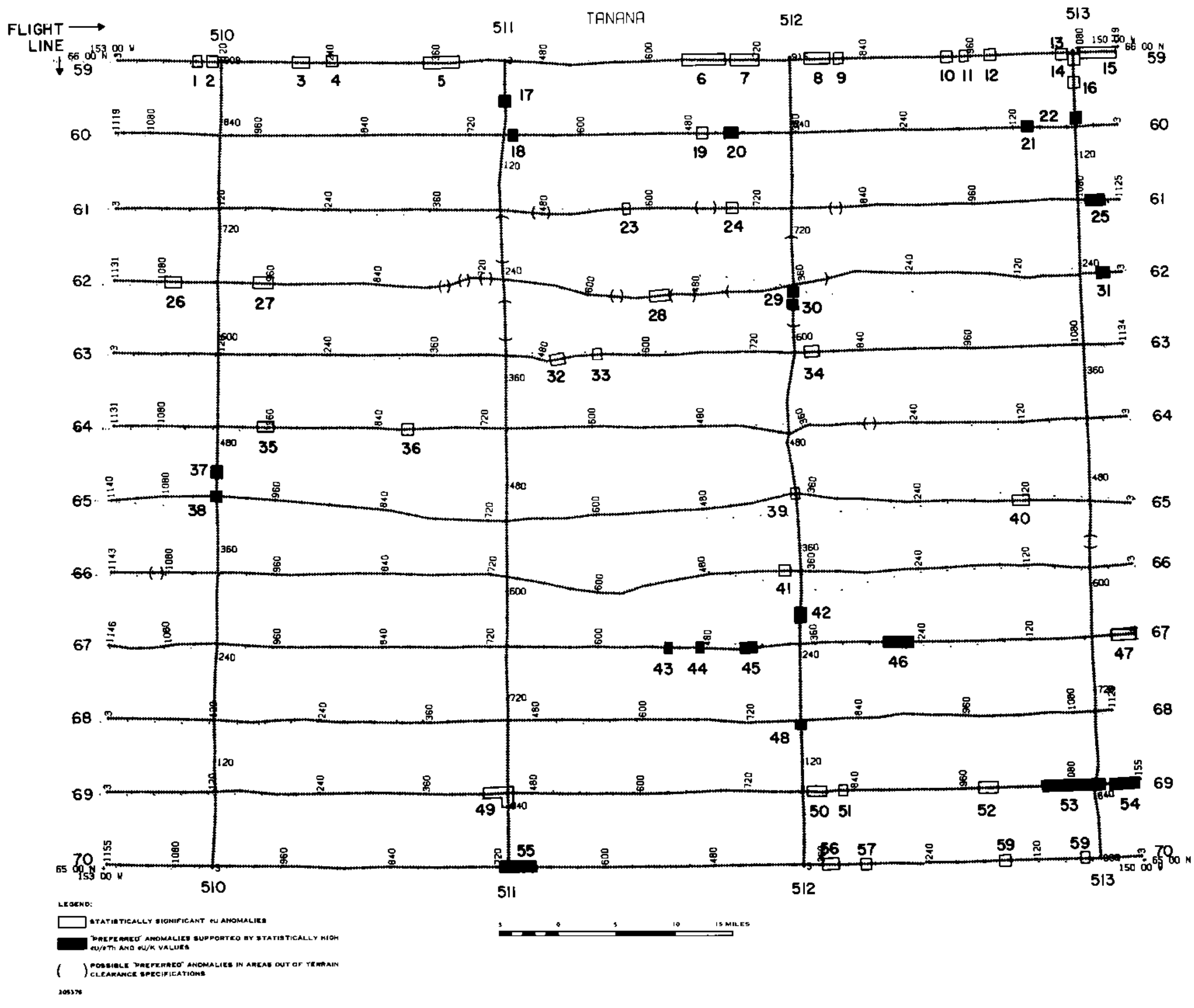


Figure 5-20. Equivalent Uranium Anomaly Map – Tanana Quadrangle

TABLE 5-36. EQUIVALENT URANIUM ANOMALIES–TANANA QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU +	eU ++	eU +++	eTh +	eTh ++	eTh +++	eU/eTh +	eU/eTh ++	eU/eTh +++	eU/K +	eU/K ++	eU/K +++	Remarks
1	59	?	–	2	1	–	2	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
2	59	?	–	3	1	–	1	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
3	59	?	–	4	1	–	3	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
4	59	?	–	4	–	–	2	–	–	2	–	–	1	1	–	Slight eU enrichment
5	59	?	–	11	2	–	13	–	–	–	–	–	2	–	–	eU plus eTh enrichment (placer ?)
6	59	Kg/Q	–	5	2	6	–	4	10	–	–	–	–	–	–	Better exposed or late stage phase
7	59	Kg	Airborne gamma-ray anomalies (Eakins, 1969)	10	–	–	9	–	–	–	–	–	4	–	–	Better exposed or late stage phase
8	59	Kg/Q	–	6	–	2	6	–	2	1	–	–	5	1	–	eU plus eTh enrichment (placer ?)
9	59	Qc/Q	–	2	1	–	1	–	–	1	–	–	–	–	–	Slight eU enrichment
10	59	Q	–	4	–	–	4	–	–	–	–	–	–	–	–	eU plus eTh enrichment (placer)
11	59	Kg	–	–	2	1	–	2	1	–	–	–	–	–	–	Better exposed or unmapped unit
12	59	Kg/Q	–	2	2	–	1	3	–	–	–	–	1	–	–	Better exposed or unmapped unit
13	59	Q	–	2	–	2	3	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
14	513	Q/Ql	–	3	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
15	59	Q/RR	–	6	5	1	13	1	–	1	–	–	–	–	–	Better exposed or unmapped unit
16	513	Ql	–	4	–	–	–	–	–	1	–	–	–	–	–	Slight eU enrichment
17	511	Kg/Kh	–	2	2	–	–	–	–	–	3	1	3	1	–	Significant eU enrichment
18	60	Kg/Kh	–	1	1	1	1	1	–	–	–	–	–	–	–	eU plus eTh enrichment (vein deposit ?)
19	60	Q/Pzsq	–	2	2	–	2	1	–	–	–	–	3	–	–	eU plus eTh enrichment (vein deposit ?)
20	60	Q/Pzsq	–	3	2	–	3	–	–	4	–	–	3	1	–	Significant eU enrichment
21	60	Ql	–	4	–	–	–	–	–	2	–	–	3	–	–	Significant eU enrichment
22	513	Ql	–	4	–	–	–	–	–	4	–	–	2	2	–	Significant eU enrichment
23	61	Pzsq	–	–	–	2	1	1	–	–	–	–	1	–	–	eU plus eTh enrichment (vein deposit ?)
24	61	Kg	–	5	–	–	4	–	–	–	–	–	5	–	–	eU plus eTh enrichment (placer ?)
25	61	Kg/Q	Airborne gamma-ray anomaly (Eakins, 1969)	7	–	–	1	–	–	2	2	1	4	–	–	Significant eU enrichment
26	62	Pzsq ?	–	4	2	–	6	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
27	62	Pzsq	–	6	–	–	1	4	1	–	–	–	–	–	–	Better exposed or unmapped unit
28	62	Kg/Kh	–	7	–	–	7	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
29	512	Kg	–	–	3	–	3	–	–	3	–	–	2	1	–	Significant eU enrichment
30	512	Kg	–	–	2	–	2	–	–	2	–	–	2	–	–	Significant eU enrichment
31	62	Ql	–	2	2	–	–	–	–	1	1	2	2	2	–	Significant eU enrichment
32	63	Pzlc	–	2	2	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
33	63	Pzlc	–	1	1	1	1	2	–	–	–	–	–	–	–	Better exposed or unmapped unit
34	63	Pzsq/Qt	–	2	2	–	4	2	–	–	–	–	–	–	–	eU and eTh enrichment (placer)
35	64	TRPv	–	6	–	–	2	4	–	–	–	–	1	–	–	Better exposed or unmapped unit
36	64	Q	–	4	–	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
37	510	Kh	–	2	2	–	3	–	–	3	–	–	1	3	–	Significant eU enrichment
38	65/510	Pzsq	–	1	2	–	–	–	–	–	2	1	1	2	–	Significant eU enrichment
39	65/512	Pzlc/Pzsq	–	2	1	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
40	65	TRPv	–	2	3	–	–	–	5	–	–	–	–	–	–	Probable geologic misclassification
41	66	Pzsq	–	2	1	1	–	3	–	–	–	–	–	–	–	Better exposed or unmapped facies
42	512	Q	–	5	–	–	–	–	–	2	2	1	2	3	–	Significant eU enrichment
43	67	Pzlc	Loc. 140	–	2	–	–	–	–	2	–	–	1	–	–	Significant eU enrichment
44	67	Ql	Loc 140	2	1	–	–	–	–	–	2	1	–	2	1	Significant eU enrichment
45	67	Ql	–	6	–	–	–	–	–	4	1	–	2	–	–	Significant eU enrichment
46	67	TRPv	–	10	–	–	5	3	–	1	2	–	1	1	–	West end: significant eU enrichment
47	67	Kg/Kh	–	7	1	1	7	1	1	1	–	–	–	1	–	Better exposed or unmapped unit
48	512	Q	Loc. 28	–	2	–	–	–	–	–	1	1	1	–	–	Significant eU enrichment
49	69/511	Qess/Q	–	10	3	–	6	6	1	3	–	–	2	–	–	Better exposed or unmapped unit
50	69	Q	–	6	–	–	7	–	–	1	–	–	4	–	–	eU and eTh enrichment (placer)
51	69	Q	–	2	1	–	3	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
52	69	Pzlc/Q	–	2	2	2	3	–	–	1	2	–	2	–	–	Significant eU enrichment
53	69	Q/Ql	–	19	4	–	5	–	–	6	2	2	7	–	2	Significant eU enrichment
54	69	Ql	–	3	7	–	–	–	–	8	–	–	9	–	–	Significant eU enrichment
55	70	Qess/Q	–	12	1	–	9	3	–	6	1	–	7	–	–	Significant eU and eTh enrichment
56	70	Q	–	5	–	–	2	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
57	70	KJes	–	3	1	–	2	1	–	2	1	–	1	–	–	Better exposed or unmapped unit
58	70	Q	–	4	–	–	1	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
59	70	Ql	–	2	1	–	3	–	–	1	–	–	2	–	–	Slight eU and eTh enrichment

* 17 Circled number denotes preferred anomaly.

n. Melozitna Geologic Cell

(1) Geology

Cass (1959) has described the geology of the Melozitna quadrangle and his map at 1:250,000 scale was used for the CGARD processing. The geologic units are described in Table 5-37.

This quadrangle lies on the southeastern side of the Yukon-Koyukuk Cretaceous basin and includes the Kokrines Hills, which form the southeastern boundary of the basin; the south flank of the Hogatza uplift, a structural high occupying the center of the basin; and a part of the lower Tanana basin on the southeastern edge of the quadrangle.

Rocks exposed here range in age from Quaternary surficial deposits to a Precambrian or Paleozoic metamorphic complex. Granite, monzonite and diorite intrusives are present in considerable amounts in the central and southeastern parts of the quadrangle. These range in age from Quaternary to pre-Cretaceous.

(2) Uranium Potential

Two airborne gamma-ray anomalies were reported by Eakins (1969) and were shown in Figure 1-3.

The presence of Tertiary (?) nonmarine clay, silt, sandstone, conglomerate, and lignite (Cass, 1959) and Cretaceous tuff and coal-bearing sediments (Eakins, 1975) (potential uranium hosts) in the basin and large amounts of pre-Cretaceous granitic intrusives (potential uranium sources) in the Kokrines Hills provides potential for stratiform uranium deposits.

The present survey data indicate that the intrusives have late stage differentiates that could have potential for vein-type deposits.

(3) Anomaly Maps

The highest median uranium contents of rocks found in this quadrangle are associated with pre-Cretaceous acidic intrusive rocks, ir-ira, and the Cretaceous Ungalik conglomerate, Ku, which lies directly on these intrusives and was derived mostly from them in this area (see Appendix C).

Figure 5-21 and Table 5-38 show 40 statistically significant equivalent uranium anomalies. Of these, 11 preferred anomalies show significant eU enrichment over eTh and K, with Anomaly 28 particularly strongly enriched, and with Anomaly 30 particularly high in equivalent uranium.

Anomalies 24, 27, 28, 30, 34, 35, 36, 39 and 40 are geographically and geologically situated so that one may conclude that they are genetically related to the pre-Cretaceous intrusives. Anomalies 24, 27 and 30 are in the intrusive and appear to represent uranium-enriched late stage differentiates with significant potential as sources for hydrothermal uranium mineralizers and/or sources for uranium in erosion products or groundwaters.

Anomaly 28 appears to be a potential stratiform uranium accumulation in the Cretaceous Shaktolik group (Ks). It is located in a small syncline and is topographically lower and in the

TABLE 5-37. GEOLOGIC MAP UNITS FOR THE MELOZITNA GEOLOGIC CELL

Map Symbol	Description
Qal	Quaternary alluvium: Silt, sand, and gravel of stream beds, flood plains and terraces. Locally includes some glacial deposits.
QTsc*	Quaternary(?) and Tertiary(?) clay, silt, sandstone and lignite: Poorly consolidated non-marine sediments exposed at Palisades on south bank of Yukon River between Birches and Kallands.
QTKi	Quaternary, Tertiary(?) and Cretaceous(?) intrusive rocks: Granite and some diorite. Also includes some unmapped dikes of varying composition and texture.
Ks and Ksh	Cretaceous Shaktolik group: Graywacke, shale, grit and conglomerate (Ks). Locally contact metamorphosed to hornfels (Ksh) where intruded by granite.
Ku	Cretaceous Ungalik conglomerate: Conglomerate, grit and some graywacke.
Kk	Cretaceous Koyukuk group: Basalt, basalt porphyry, tuff and agglomerate, generally greenish-gray, rarely grayish-red. Greenish-gray graywacke and conglomerate. Dark gray mudstone. Locally, thin lenses of reddish-weathering, greenish-gray fossiliferous impure limestone;
ir and ira	Pre-Cretaceous intrusive rocks: Includes granite, monzonite and some diorite (ir). Locally altered to augen gneiss and mica schist (ira). Locally contains unmapped younger granitic dikes.
mc	Pre-Cambian or Paleozoic metamorphic complex: Schist, recrystallized limestone, quartzite and greenstone. Associated with younger granitic intrusive rocks.
vr	Volcanic rocks (age unknown): Chiefly basalt and andesite. Rarely rhyolite, tuff, chert, agglomerate and breccia.
?	Unmapped area.

*This unit is referred to as QTCS in the tapes and data listings.

drainage network from anomalies 27 and 30. It is suggested that during the deposition of Ks, the region of Anomalies 27 and 30 served as a source of uraniferous sediments and/or groundwater solutions which may have been trapped in the syncline, and may have been further concentrated to form potential economic deposits.

Anomalies 34, 35, and 36 are in Qal in the vicinity where the nonmarine, lignite-bearing QTsc is exposed along the south bank of the Yukon. It is suggested that these may be due to uraniferous lignites, which could have derived their uranium by erosion or leaching from the nearby intrusives or uraniferous Cretaceous sediments derived from them.

Anomalies 39 and 40 are in the metamorphic rocks intruded by granite, and could be due to vein-type accumulations produced by uranium-rich mineralizers from the intrusives.

If the above genetic hypotheses are correct, this region, and the regions surrounding the nearby acid igneous intrusives, should be considered to be uraniferous subprovinces to be further investigated for potential economic deposits.

Other potential stratiform deposits include Anomalies 9 and 12. Anomaly 24 may have potential for vein-type deposits.

Several additional possible valid anomalies are indicated by brackets in Figure 5-21. These are where the terrain clearance was out of specifications over mountainous terrain, but the profiles and data listings indicate consistently high eU counting rates which are probably significant.

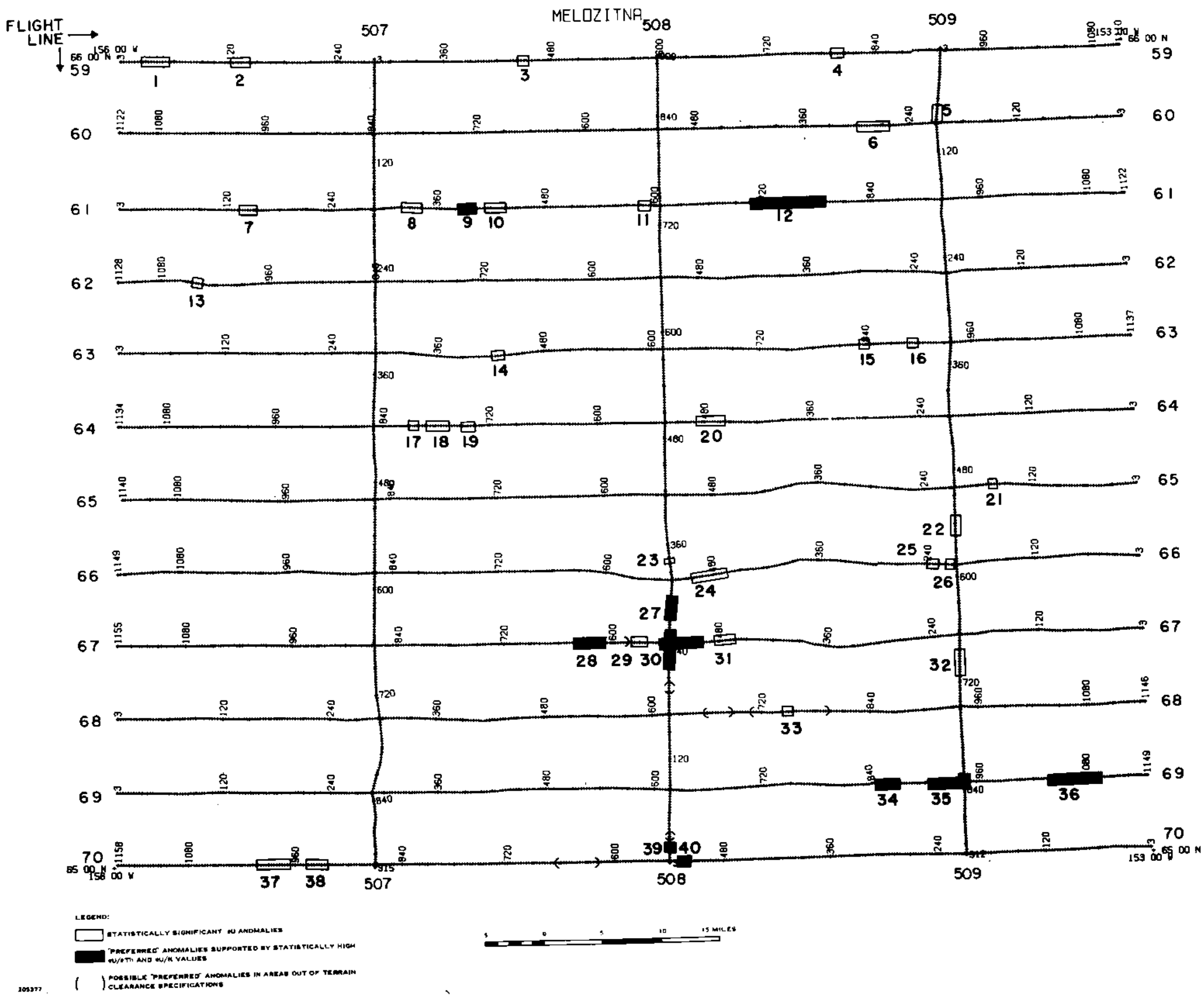


Figure 5-21. Equivalent Uranium Anomaly Map—Melozitna Quadrangle

TABLE 5-38. EQUIVALENT URANIUM ANOMALIES–MELOZITNA QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points: eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	59	Qal	–	6	1	–	7	–	–	–	–	–	–	–	–	Better exposed sand bars around flats
2	59	Qal	–	7	–	–	5	–	–	–	–	–	–	–	–	Better exposed sand bars around flats
3	59	vr/kk	–	2	2	–	1	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
4	59	Ks	–	5	–	–	4	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
5	509	Ks/Qal	–	5	–	–	3	–	–	1	–	–	2	–	–	Slight eU and eTh enrichment (placer ?)
6	60	Ks/Qal	–	2	7	2	7	3	2	–	–	–	–	–	–	Better exposed or unmapped unit
7	61	Qal	–	5	1	1	7	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
8	61	Qal	–	6	2	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
9	61	Kk	–	5	2	–	2	–	–	4	–	–	2	–	–	Significant eU enrichment
10	61	Kk	–	6	1	–	4	1	–	2	–	–	–	–	–	Better exposed or unmapped unit
11	61	Ks?	–	2	1	1	3	–	–	3	–	–	1	–	–	Slight eU enrichment
12	61	Ks	–	9	13	4	7	13	4	5	–	–	14	1	–	Significant eU and eTh enrichment
13	62	Qal	–	3	1	–	–	–	–	2	–	–	3	–	–	Slight eU enrichment
14	63	Ks	–	5	–	–	4	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
15	63	Ks	–	3	1	–	–	2	2	–	–	–	–	–	–	Better exposed or unmapped unit
16	63	Qal	–	1	1	2	–	2	2	–	–	–	–	–	–	Possible geological misclassification
17	64	Ks	–	4	–	–	4	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
18	64	Ks/Qal	–	7	1	–	4	3	–	2	–	–	2	–	–	Better exposed or unmapped unit
19	64	QTKi/Ks	–	5	–	–	2	–	–	3	–	–	3	–	–	Slight eU enrichment
20	64	QTKi	–	4	7	–	1	6	4	–	–	–	2	–	–	Particularly late stage acidic phase
21	65	ir	–	2	1	–	2	1	–	–	–	–	–	–	–	Better exposed or late stage acid phase
22	509	Qal	–	5	1	–	5	2	–	–	–	–	2	–	–	eU and eTh enrichment (placer ?)
23	508	Ks	–	–	2	–	–	1	1	–	–	–	1	–	–	Possible geologic misclassification
24	66	Ku/ir	–	12	–	–	9	–	–	–	–	–	6	4	–	Late stage acid phase of ir
25	66	mc	–	4	–	–	4	–	–	–	–	–	1	–	–	Better exposed or unmapped unit
26	66	mc	–	2	1	–	2	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
27	508	Ku/ir	–	10	–	–	10	–	–	–	–	–	6	–	–	Late stage acid phase of ir
28	67	Ks	–	8	3	–	–	–	–	4	2	5	3	2	4	Very significant eU enrichment
29	67	Qal	–	–	2	4	–	2	4	–	–	–	–	–	–	Better exposed or late phase of ir
30	508/67	ir	–	21	8	–	31	–	–	6	2	–	4	7	–	Late stage eU rich phase of ir
31	67	ir	–	7	–	–	8	–	–	–	–	–	5	–	–	eU and eTh enrichment (placer ?)
32	509	mc	–	2	2	5	2	5	2	–	–	–	–	–	–	Better exposed or unmapped unit
33	68	ir	Airborne Anomaly (Eakins, 1969)	4	–	–	2	2	–	–	–	–	–	–	–	Late stage pegmatite
34	69	Qal	–	–	3	7	3	1	1	6	2	–	7	–	–	Significant eU enrichment Probably in Quaternary lignites
35	69/509	Qal	–	9	3	3	4	–	–	9	–	–	7	–	–	Significant eU enrichment Probably in Quaternary lignites
36	69	Qal	–	11	5	4	–	–	–	16	5	–	15	4	–	Significant eU enrichment Probably in Quaternary lignites
37	70	Ks	–	12	–	–	10	–	–	2	–	–	3	–	–	Better exposed or unmapped unit
38	70	Ks	–	6	1	–	5	2	2	–	–	–	1	–	–	Better exposed or unmapped unit
39	508	mc	–	4	–	–	–	–	–	2	1	–	1	–	–	Significant eU enrichment
40	70	mc	–	5	–	–	–	–	–	2	3	–	4	1	–	Significant eU enrichment

* 9 Circled number denotes preferred anomaly.

o. *Kateel River Geologic Cell*

(1) Geology

The Kateel River quadrangle contains the northern part of the Galena basin (the Koyukuk Flats) which is situated near the center of the Yukon-Koyukuk province where thick Cretaceous and Tertiary terrigeneous volcanic sediments accumulated over earliest Cretaceous marine andesites (Eakins, 1975). Nonmarine Cretaceous sediments include coal beds, shale, siltstone and sandstone. Intrusives include Cretaceous and/or Tertiary granitic rocks. Most of the Galena basin is covered with unconsolidated Quaternary surficial deposits.

The geologic map was derived from Patton (1966) and the geologic units are described in Table 5-39.

(2) Uranium Potential

Eakins (1969) and Cobb (1970) report no radioactivity investigations or radioactive mineral occurrences in this quadrangle or within the remainder of the Galena basin. The water-saturated Quaternary cover of the Koyukuk Flats provides a shield over any potential uranium-bearing sediments in the basin, preventing their detection by airborne gamma-ray spectrometry. Field work and drilling will be necessary to assess their presence and potential. Nonmarine coal-bearing sediments west of the basin may have stratiform uranium potential.

Eakins (1975) speculates that the granitic intrusives may have potential for vein-type deposits, if they have been sufficiently magmatically differentiated.

(3) Anomaly Maps

The statistical summary data (Appendix C) shows the granitic rocks of Roundabout Mountain (TKg) and the Cretaceous nonmarine beds (Kn) to have the highest median eU content of the rocks sampled in this quadrangle; however, none of the medians are unusually high.

A total of 71 statistically significant eU anomalies are shown in Figure 5-22 and Table 5-40. Sixteen of these show significant enrichment of uranium over eTh and K. About seven are associated with Quaternary surficial deposits, some of which contain peat deposits that might have concentrated uranium to some degree, or the apparent enrichment may be due to shallow underlying bedrock. The remaining nine preferred anomalies are associated with Cretaceous sediments where there is some possibility for stratiform uranium deposits, particularly in Kn (Anomaly 44) and Knm (Anomalies 45, 54 and 60) which are classified as containing nonmarine beds (see Table 5-39).

TABLE 5-39. GEOLOGIC MAP UNITS FOR THE KATEEL RIVER GEOLOGIC CELL

Map Symbol	Description
Quaternary	
Qfy	Younger flood-plain deposits: Light gray micaceous silt, sand and gravel along streams that drain bedrock uplands. Locally includes some terrace and fan deposits.
Qna	Nogahabara sand dunes: Active dunes.
Qns	Nogahabara sand dunes: Stabilized dunes.
Qfo	Older flood-plain deposits: Chiefly light-gray and grayish-orange micaceous silt. Locally includes peat, reworked eolian sand and gravel.
Qms	Modified eolian sand deposits: Dark yellowish-orange and light gray fine-to-medium grained eolian sand.
Qhs	High terrace and slope deposits: Light gray and greenish-orange micaceous silt, subordinate lenses of sand and peat.
Quaternary or Tertiary	
QTb	Basalt: Nearly horizontal flows of vesicular olivine basalt.
Cretaceous and/or Tertiary	
TKg	Granitic rocks: Granitic rocks of acidic and intermediate composition. Includes syenite and albite granite.
Cretaceous	
Kn	Nonmarine shale, siltstone and sandstone: Dark-gray to olive-gray micaceous shale and siltstone and light olive-gray to yellowish-orange fine to coarse-grained crossbedded sandstone. Locally includes pyroclastic material and bituminous coal in beds to 6 inches thick.
Km	Marine shale and siltstone: Littoral and offshore marine deposits of dark-gray shale and siltstone interbedded with subordinate dark-greenish-gray fine-grained sandstone in lower part, and light-olive fine to coarse-grained crossbedded sandstone in upper part. Locally includes volcanic conglomerate.
Knm	Undifferentiated rocks: Nonmarine and marine sedimentary rocks.
Kgs	Graywacke sandstone: Chiefly dark greenish-gray to pale-olive tuffaceous and feldspathic fine to very coarse-grained sandstone; subordinate dark-gray mudstone.
Kgm	Mudstone: Chiefly medium to dark-gray mudstone and medium-gray to dark greenish-gray calcareous fine-grained sandstone.
Jurassic and Cretaceous	
KJv	Andesitic volcanic rocks: Chiefly porphyritic pyroxene andesite and trachyandesite flows, andesitic crystal and lithic tuffs and massive andesite breccias, agglormerates and conglomerates.

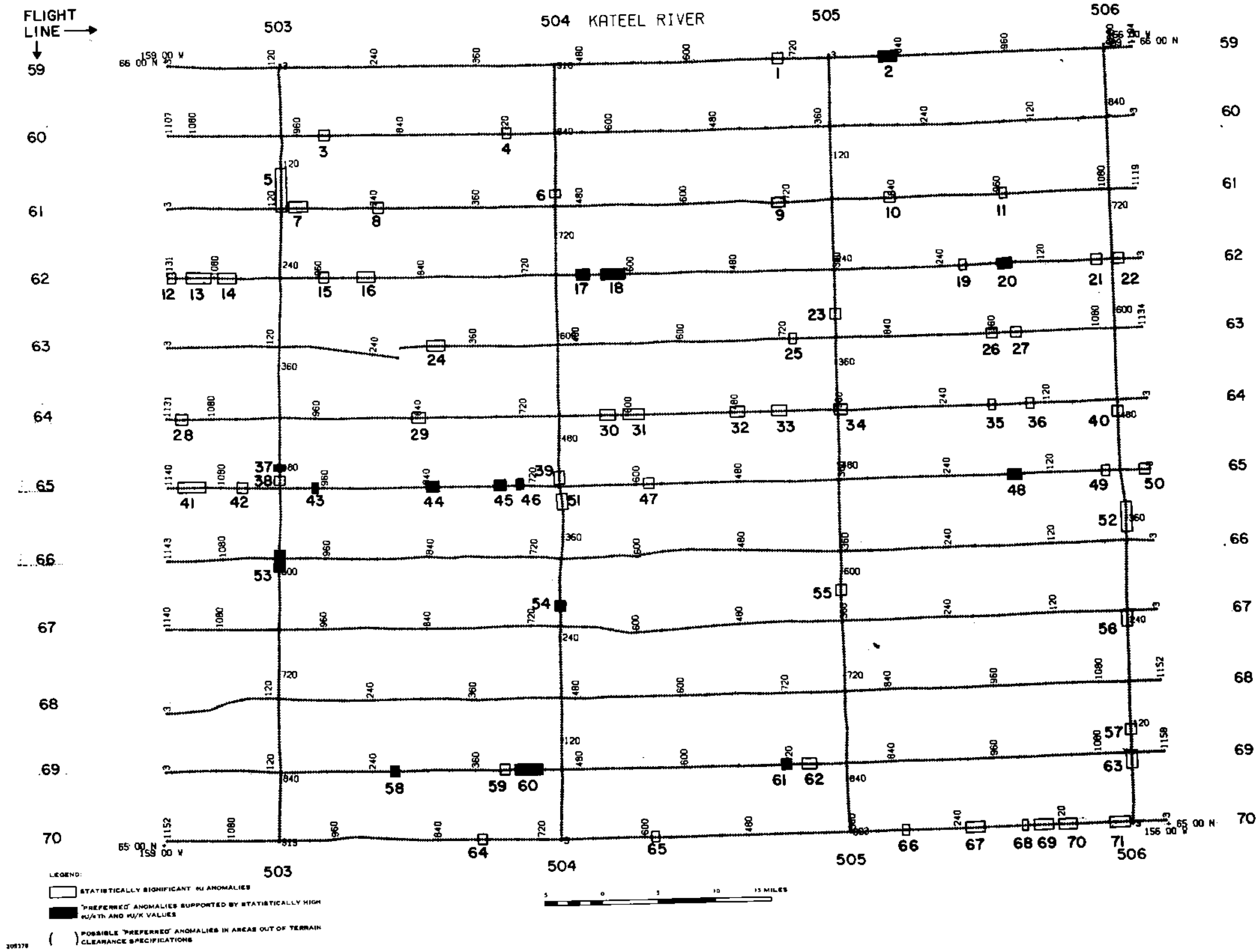


Figure 5-22. Equivalent Uranium Anomaly Map—Kateel River Quadrangle

TABLE 5-40. EQUIVALENT URANIUM ANOMALIES–KATEEL RIVER QUADRANGLE

Anom. No.*	F/L No.	Geol. Fm.	Known Uranium Occurrence	Number of Points eU			eTh			eU/eTh			eU/K			Remarks
				+	++	+++	+	++	+++	+	++	+++	+	++	+++	
1	59	Qhs	–	3	1	–	–	–	–	1	–	–	1	–	–	Slight eU enrichment
2	59	Qfy	–	3	3	1	4	–	–	4	1	–	–	7	–	Significant eU enrichment
3	60	KJv?	–	1	–	3	1	2	1	–	–	–	4	–	–	Better exposed or unmapped unit
4	60	Qhs	–	1	2	–	3	–	–	2	–	–	2	–	–	Slight eU enrichment
5	503	KJv/Qfy	–	15	1	–	14	1	–	–	–	–	4	–	–	Possible geological misclassification
6	504	Qhs	–	1	2	–	3	–	–	1	–	–	1	–	–	Slight eU enrichment
7	61	KJv?	–	7	–	–	8	–	–	–	–	–	–	–	–	Possible geological misclassification
8	61	KJv?	–	5	–	–	4	1	–	–	–	–	–	–	–	Possible geological misclassification
9	61	Qhs	–	5	–	–	2	–	–	1	–	–	–	–	–	Slight eU enrichment
10	61	Qhs	–	3	1	–	1	1	1	–	–	–	–	–	–	eU and eTh enrichment (placer?)
11	61	Qfy	–	2	1	–	3	–	–	–	–	–	–	–	–	eU and eTh enrichment (placer?)
12	62	Kgm	–	2	1	–	3	–	–	–	–	–	–	–	–	eU and eTh enrichment (placer?)
13	62	Kgs	–	4	5	1	2	3	3	–	–	–	7	1	1	Possible geological misclassification
14	62	Kgm	–	4	2	–	3	3	–	1	–	–	1	–	–	eU and eTh enrichment (placer?)
15	62	Km	–	4	–	–	3	–	–	1	–	–	–	–	–	eU and eTh enrichment (placer?)
16	62	KJv	–	–	5	2	3	3	–	–	–	–	2	–	–	eU and eTh enrichment (placer?)
17	62	Qhs	–	3	2	–	1	–	–	3	1	–	2	–	–	Significant eU enrichment (may be detrital KJv in Qhs)
18	62	Qhs/KJv	–	6	2	–	–	–	–	4	–	–	4	–	–	Significant eU enrichment– (may be detrital KJv in Qhs)
19	62	Qfy	–	1	2	–	2	–	–	1	1	–	1	–	–	Slight eU enrichment
20	62	Qfy	–	1	3	2	1	–	–	3	2	1	5	–	–	Significant eU enrichment
21	62	Qms	–	4	1	–	–	–	–	2	–	–	2	–	–	Slight eU enrichment
22	62	Qms	–	4	–	–	2	–	–	1	1	–	1	–	1	Slight eU enrichment
23	505	Qms	–	4	–	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
24	63	Knm	–	3	4	–	4	3	–	–	–	–	3	–	–	Possible geological misclassification
25	63	Qms	–	2	1	–	1	–	–	1	–	–	1	–	–	Slight eU enrichment
26	63	Qfy	–	3	3	–	3	2	–	1	–	–	–	–	–	Better exposed or unmapped unit
27	63	Qfy/Qfo	–	2	2	–	2	–	–	3	1	–	1	–	–	Slight eU enrichment
28	64	Kgm/Qfy	–	3	2	–	2	–	1	1	–	–	4	–	–	Slight eU enrichment
29	64	Kn	–	4	2	–	2	2	1	1	–	–	6	–	–	eU and eTh enrichment (placer?)
30	64	Qms	–	4	2	–	2	–	–	3	–	–	3	–	–	Slight eU enrichment
31	64	Qms	–	7	2	–	4	–	–	1	–	–	4	–	–	Slight eU enrichment
32	64	Qfy	–	5	–	–	6	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
33	64	Qfy	–	6	–	–	5	–	–	–	–	–	–	–	–	Better exposed or unmapped unit
34	64	Qfy	–	5	–	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
35	64	Qms	–	2	1	–	1	1	–	–	–	–	2	–	–	eU and eTh enrichment (placer?)
36	64	Qfy	–	2	1	–	2	–	–	1	1	–	1	–	–	eU and eTh enrichment (placer?)
37	503	Kgm	–	3	1	–	–	–	–	3	1	–	1	–	–	Significant eU enrichment
38	503	Kam	–	1	2	–	2	–	–	1	–	–	1	–	–	Slight eU enrichment
39	504	Qhs	–	2	3	–	3	–	–	4	–	–	3	–	–	eU and eTh enrichment (placer)
40	506	Qfo	–	2	2	–	3	–	–	1	–	–	1	–	–	Better exposed or unmapped unit
41	65	Kgs/Kam	–	9	–	1	3	3	–	4	–	–	7	–	–	Possible geologic misclassification
42	65	Kgs	–	5	–	–	4	–	–	1	1	–	1	–	1	Significant eU enrichment
43	65	Kgm	–	2	1	–	–	–	–	1	1	–	1	–	–	Significant eU enrichment
44	65	Kn	–	4	1	1	2	1	2	–	–	–	2	1	–	Significant eU and eTh enrichment (placer)
45	65	Knm	–	4	–	–	–	–	–	1	3	–	1	2	1	Significant eU enrichment (placer)
46	65	Qhs	–	–	–	2	1	–	–	–	1	1	–	1	–	Significant eU enrichment (placer)
47	65	Qfy	–	4	–	–	2	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
48	65	Oms	–	4	1	–	–	–	–	5	–	–	3	–	–	Significant eU enrichment
49	65	Qfo	–	2	1	–	1	–	–	–	–	–	–	–	–	Slight eU enrichment
50	65	Qhs	–	5	–	–	1	–	–	1	–	–	–	–	–	Slight eU enrichment
51	504	Qhs	–	5	–	–	2	–	–	1	–	–	1	–	–	Slight eU enrichment
52	506	Qhs	–	9	1	–	6	2	–	3	–	–	–	–	–	Better exposed or unmapped unit
53	503/66	Kgm/Kgs	–	5	4	2	5	4	1	5	1	–	5	3	–	Significant eU and Th enrichment
54	504	Qhs/Knm	–	4	–	–	–	–	–	1	2	–	1	1	–	Significant eU enrichment
55	505	Qhs	–	3	1	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
56	506	Qhs	–	6	–	–	5	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
57	506	Qhs	–	4	–	–	2	–	–	2	–	–	–	–	–	Better exposed or unmapped unit
58	69	Km	–	2	1	–	–	–	–	1	1	–	–	1	–	Significant eU enrichment
59	69	Knm	–	2	2	–	1	–	–	2	–	–	2	–	–	Slight eU enrichment
60	69	Knm	–	8	1	–	–	–	–	7	3	–	4	4	1	Significant eU enrichment
61	69	Qhs	–	2	1	1	1	–	–	3	1	1	2	–	–	Significant Eu enrichment
62	69	Qfo	–	5	1	–	3	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
63	506	Qhs	–	2	4	–	5	1	–	2	–	–	–	–	–	Better exposed or unmapped unit
64	70	Knm	–	2	1	–	2	1	–	–	–	–	–	–	–	Better exposed or unmapped unit
65	70	Qfy	–	2	1	–	2	–	–	1	–	–	–	–	–	Better exposed or unmapped unit
66	70	Qhs	–	1	2	–	1	–	–	1	–	–	–	–	–	Slight eU enrichment
67	70	Qhs	–	6	2	–	2	–	–	3	2	–	1	–	–	Possible geologic misclassification
68	70	Qhs	–	2	1	–	–	–	–	1	2	–	2	–	–	Possible geologic misclassification
69	70	Qhs	–	3	4	–	2	–	–	4	1	–	1	–	–	Possible geologic misclassification
70	70	Qhs	–	5	–	–	1	–	–	3	1	–	1	–	–	Possible geologic misclassification
71	70	KJv/Knm Qhs	–	5	2	1	~~1~~	1	–	5	–	–	–	–	–	Possible geologic misclassification

* 2 Circled number denotes preferred anomaly.

B. MAGNETOMETER DATA INTERPRETATION

1. Applications of Magnetic Data

The utility of aeromagnetic data in enhancing results of reconnaissance gamma-ray surveys lies not in any direct relationship, but rather in providing a better understanding of the geology of the region. The magnetic data may be interpreted to map:

Regional tectonic patterns

Lithologic variations in the crystalline basement

Depth to and structural configurations of the crystalline basement surface

Location, depth, and areal extent of plutons, dikes, sills, and volcanic horizons

Major faults in the crystalline basement and fracture zones.

These geologic features are identified by the qualitative recognition of characteristic variations in magnetic patterns, supplemented by the quantitative analysis of individual magnetic anomalies (Domzalshi, 1966; Paterson, 1962; Redford and Sumner, 1964).

The study of magnetic anomalies and the rocks which cause them shows that the anomalies are chiefly caused by the presence of the mineral magnetite which occurs as an accessory mineral in igneous and metamorphic rocks. In general, the greater the amplitude of a magnetic anomaly, the higher the magnetite content of the rock causing the anomaly. It is also likely to have a relatively basic composition. Sedimentary rocks are essentially nonmagnetic except for iron formations. Major rock units can be differentiated on the basis of variations in the frequency, areal extent, shape, orientation, local amplitude, and general intensity level of their corresponding magnetic anomalies. Faults are displayed magnetically by disruptions in magnetic pattern or by persistent gradients or pattern changes over long distances; plugs, dikes, and related igneous intrusions can be detected by the shape and intensity of their magnetic expression. Techniques have been developed for the quantitative analysis of magnetic anomalies with regard to the depth, dimension, shape, and susceptibility contrast of their sources; but these techniques are far more complex than the qualitative assessment of variations in the magnetic pattern. The quantitative analysis of even relatively simple geometric forms representing geologic bodies such as dikes involves complex computations.

Especially pertinent to this survey are the experiences of Zietz and others (Zeitz, et al., 1966; 1969; 1971) in reconnaissance aeromagnetic surveys using flight-line spacings of approximately 5 miles. They were highly successful in delineating differences in the crustal fabric associated with each tectonic unit and in mapping gross basement lithologic units and structural trends. Providing this sort of information is compatible with the concept of regional unranium exploration using airborne gamma-ray spectrometric techniques. Individual profiles flown at relatively constant barometric altitude during portions of the survey can be interpreted in more detail to provide:

Depth-to-basement computations

Qualitative basement lithology

Location of major faults, dikes, etc.

2. Interpretation of the Survey Data

Since the primary purpose of the contracted survey was to collect and analyze airborne gamma-ray spectral data, it was concluded that interpretation of the magnetic data would be excluded and reserved for future efforts.

C. CONCLUSIONS

1. General

The uranium potential of the areas covered by this survey is essentially untested by surface work. There are no known commercial mines to use as test areas for the airborne gamma-ray spectrometer survey. The real value of the anomalies found can be proved only by follow-up detailed prospecting. Table 5-41 summarizes the equivalent uranium anomalies by quadrangle and by potential types of deposits that may be indicated. The southwestern Alaska portion of the survey has been termed the "Bethel Province," and the central Alaska portion, the "Yukon Province."

In terms of the number of preferred eU anomalies per quadrangle, the two provinces differ considerably, with the Yukon Province appearing to be uraniferous and the Bethel Province essentially barren except for the Holy Cross and Taylor Mountains quadrangles, which appear to be intermediate in potential.

2. Defining Uraniferous Provinces by Gamma-Ray Data

The statistical summary data (Appendix C) were examined to determine any systematic differences in eU, eTh, K, eU/eTh, eU/K and eTh/K median values between the Bethel and Yukon provinces. Water-saturated or tundra-covered Quaternary alluvium was chosen as a base for comparison in that the alluvium should represent erosional samples of most of the formations in each quadrangle and in that there are more records available for use in median determination yielding statistically good values. The gamma-ray parameter median values for Quaternary alluvium are shown in Table 5-42 for all quadrangles covered by this survey along with the number of preferred anomalies (i.e., those showing significant eU enrichment over eTh and K) in each quadrangle. It is recognized that those quadrangles with small land areas are not directly comparable to those consisting entirely of land surface when considering the number of preferred anomalies per quadrangle. However, if one "adjusts" the number of preferred anomalies in the partial land-covered quadrangles to make"whole" ones and averages their median gamma-ray parameters, the conclusions are not altered from those reached in the following paragraphs. Examination of Table 5-42 shows some consistent and strong variations between the barren Bethel and apparently uraniferous Yukon Provinces.

In accord with Darnley's (1973) generalization, the eU median values are roughly proportional to the number of preferred anomalies (Figure 5-23). Similarly, the eTh and K medians are also definitely higher in the Yukon Province, lower in the Bethel Province and intermediate for the Holy Cross and Taylor Mountains quadrangles (Figures 5-24 and 5-25).

The eU/eTh median values show a strong inverse relationship to the number of preferred anomalies (Figure 5-26). A weaker inverse relationship is shown by eU/K median values (Figure 5-27), and the eTh/K median values do not appear to be significantly related to the number

TABLE 5-41. SUMMARY OF EQUIVALENT URANIUM ANOMALIES BY QUADRANGLE

Quadrangle	Total Anomalies	Preferred Anomalies		
		Total	Potential Veins	Potential Stratiform Deposits
Bethel Province				
Naknek	9	1	1	–
Nushagak Bay	2	1	–	1
Hagemeister Island	0	0	–	–
Nunivak Island	1	1	1	–
Baird Inlet	5	0	–	–
Cape Mandenhall	1	0	–	–
Kuskokwim Bay	0	0	–	–
Russian Mission	20	0	–	–
St. Michael	8	0	–	–
Black	1	0	–	–
Kwiguk	29	2	–	2
Hooper Bay	6	1	1	–
Marshall	13	0	–	–
Holy Cross	30	4	2	2
Taylor Mountains	36	8	2	6
Yukon Province				
Coleen	42	8	4	4
Black River	56	19	3	16
Ft. Yukon	51	15	–	15
Beaver	63	12	4 (?)	8 (?)
Bettles	52	22	8	14
Tanana	59	21	9	12
Melozitna	40	11	5	6
Kateel River	71	16	–	16
Totals	595	142	40	102

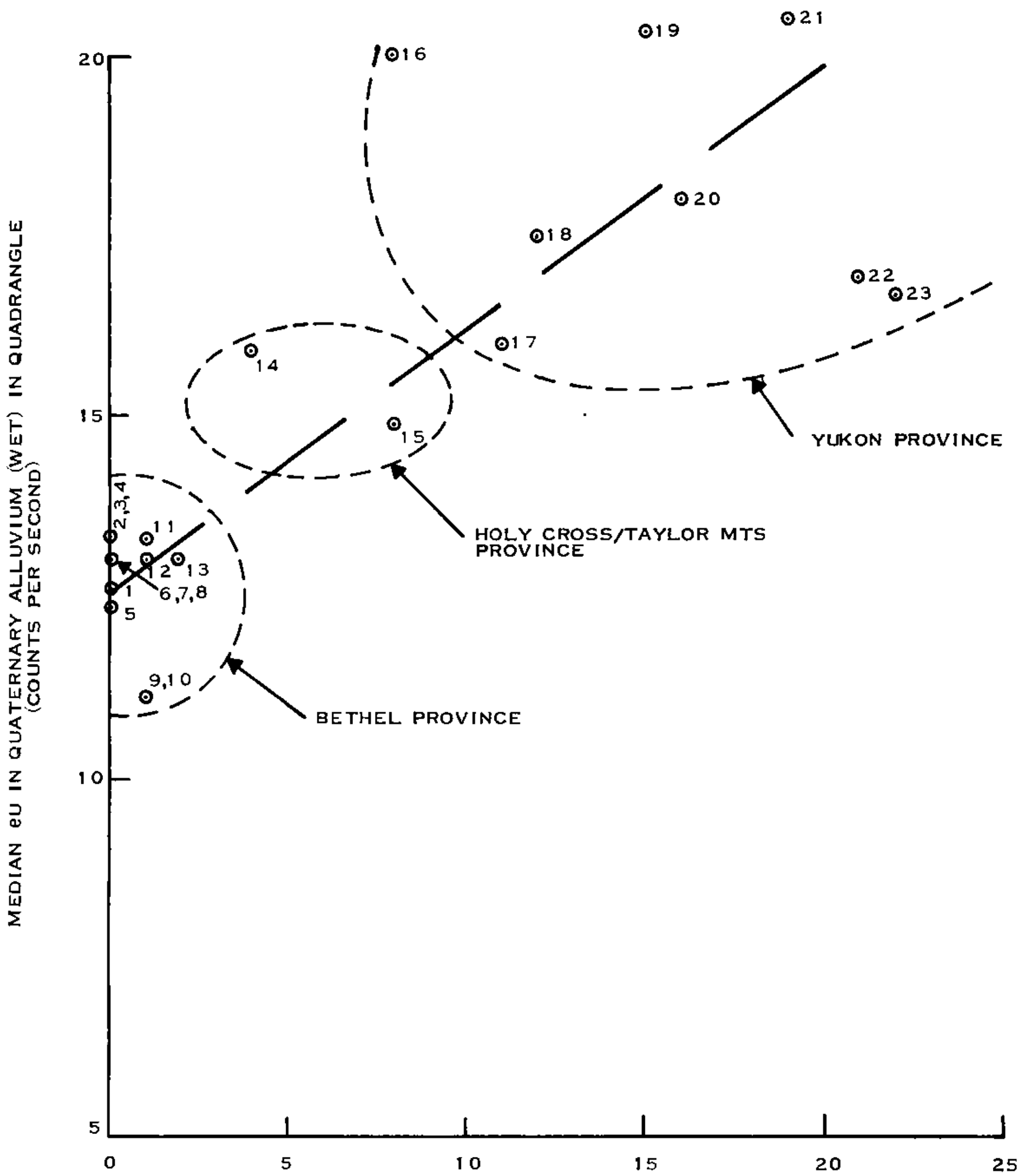
of preferred anomalies in each quadrangle (Figure 5-28), although the Yukon Province shows more high values and the Bethel Province more low ones.

Next, the "better drained" granitic intrusives were examined for those quadrangles that contained a significant number of records over those rock types. Table 5-43 summarizes the median gamma-ray parameter data. For comparison, weighted averages for all the granitic rocks sampled in the Seward-Selawik area (Texas Instruments, 1975) were prepared and are shown at the bottom of Table 5-43. Table 5-43 shows a systematic relationship between the gamma-ray parameters and the number of preferred anomalies, similar to that shown by the Quaternary alluvium values. In addition, the known uraniferous province of the Seward-Selawik area (Eakins, 1975; Texas Instruments, 1975) shows similar average gamma-ray parameters to the Yukon province. Scanning the statistical summary tables for other formations shows that they generally follow the same relationships if allowances are made to compare similar geochemical types.

TABLE 5-42. MEDIAN GAMMA-RAY PARAMETERS FOR QUATERNARY ALLUVIUM BY QUADRANGLE

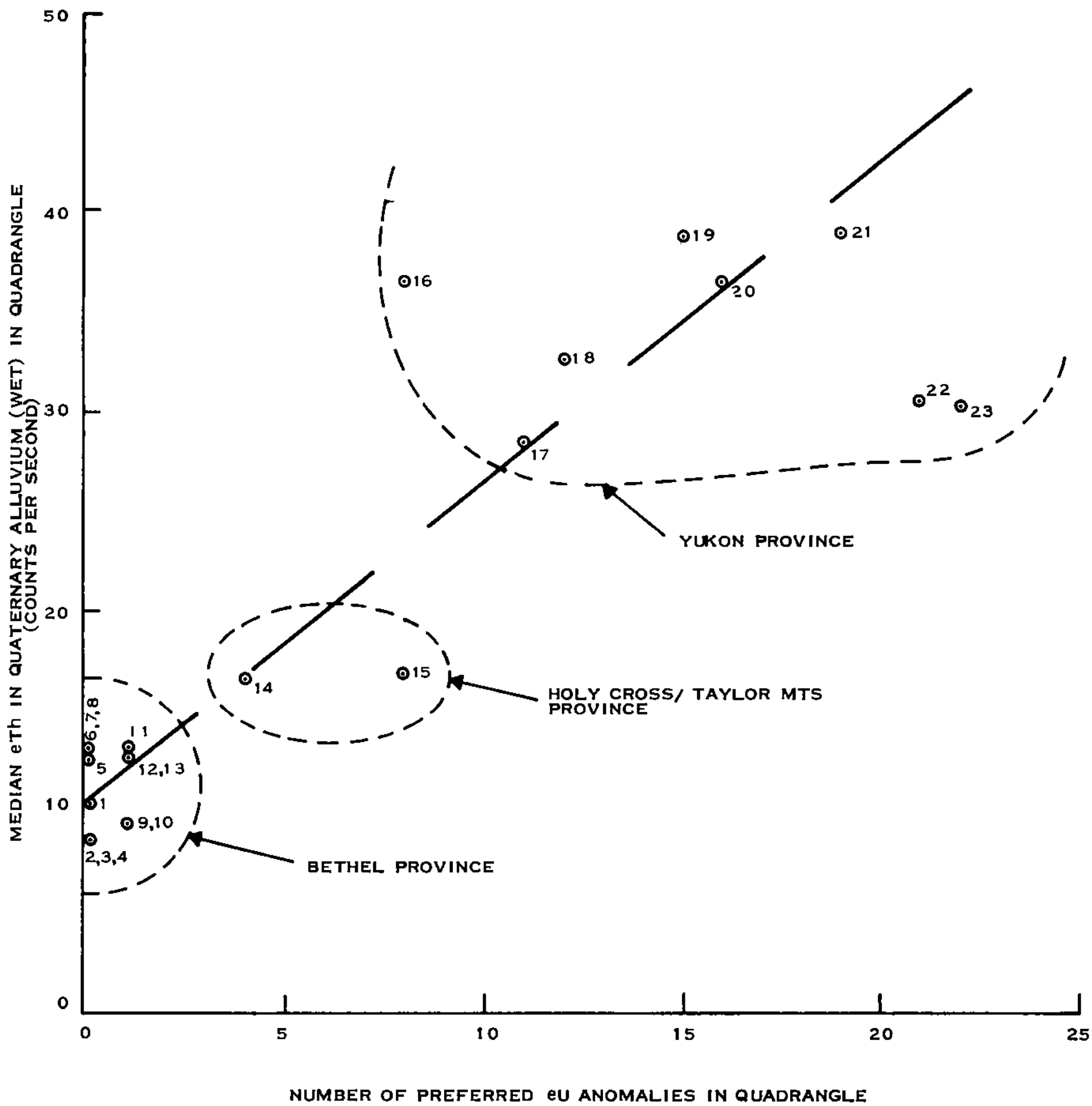
Point Number*	Quadrangle Name	Formation	eU		eTh		K		eU/eTh		eU/K		eTh/K		Number of Preferred Anomalies
			Median Values and Number of Records ( ).												
1	Hagemeister Island	Qd'	12.6	(30)	10.1	(94)	32.6	(162)	1.2	(22)	0.32	(30)	0.25	(94)	0
2	Baird Inlet														0
3	Cape Mendenhall	Q'	13.3	(142)	8.6	(1628)	14.3	(3669)	0.94	(120)	0.32	(140)	0.39	(1619)	0
4	Kuskokim														0
5	Russian Mission	Qs'	12.4	(369)	10.0	(1510)	20.0	(2610)	0.94	(316)	0.32	(365)	0.36	(1507)	0
6	St. Michael														0
7	Black	Qof'	13.0	(846)	11.1	(2775)	20.3	(4279)	0.90	(755)	0.34	(838)	0.39	(2715)	0
8	Marshall														0
9	Naknek	Qp'	11.1	(544)	9.3	(1353)	25.5	(3241)	1.2	(390)	0.25	(539)	0.20	(1352)	1
10	Nushagak Bay														1
11	Nunivak Island	Q'	13.3	(142)	8.6	(1628)	14.3	(3669)	0.94	(120)	0.32	(140)	0.39	(1619)	1
12	Hooper Bay	Qof'	13.0	(846)	11.1	(2775)	20.3	(4279)	0.90	(755)	0.34	(838)	0.39	(2715)	1
13	Kwiguk														2
14	Holy Cross	Qh'	15.8	(524)	16.7	(1096)	39.6	(1298)	0.75	(516)	0.24	(523)	0.34	(1096)	4
15	Taylor Mountains	Qp'	14.8	(574)	17.0	(1150)	59.0	(1418)	0.78	(567)	0.19	(574)	0.26	(1150)	8
16	Coleen	Q'	20.0	(1227)	36.6	(1327)	83.0	(1363)	0.54	(1217)	0.23	(1226)	0.43	(1327)	8
17	Melozitna	Qal'	16.0	(1375)	28.4	(1467)	73.0	(1521)	0.46	(1337)	0.19	(1359)	0.43	(1467)	11
18	Beaver	Qal'	17.5	(677)	32.8	(727)	90.0	(750)	0.50	(674)	0.18	(677)	0.36	(726)	12
19	Ft. Yukon	Q'	20.3	(2061)	38.9	(2167)	108.0	(2210)	0.49	(2054)	0.18	(2059)	0.36	(2167)	15
20	Kateel River	Qfy'	18.0	(769)	36.6	(817)	102.0	(829)	0.49	(766)	0.16	(768)	0.37	(815)	16
21	Black River	Ql'	20.5	(539)	39.0	(628)	97.0	(641)	0.51	(585)	0.20	(588)	0.40	(627)	19
22	Tanana	Q'	16.9	(1061)	30.7	(1098)	74.0	(1127)	0.50	(1039)	0.20	(1055)	0.40	(1098)	21
23	Bettles	Q'	15.7	(1853)	30.3	(1976)	66.0	(2059)	0.52	(1798)	0.21	(1827)	0.45	(1966)	22

*Refers to numbered points on Figures 5-23 through 5-28.



205379

Figure 5-23. Median eU in Quaternary Alluvium By Quadrangle



205380

Figure 5-24. Median eTh in Quaternary Alluvium by Quadrangle

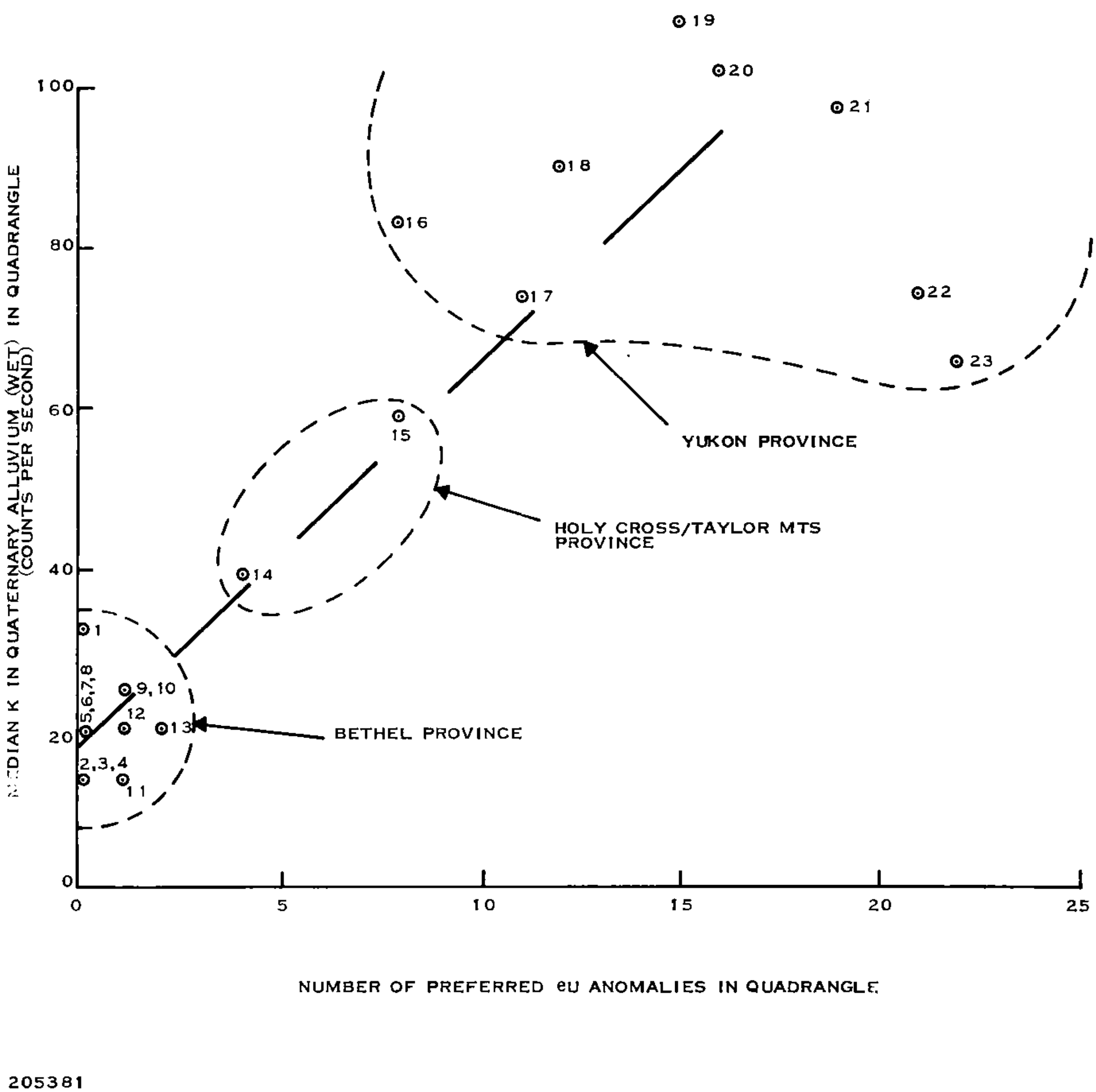
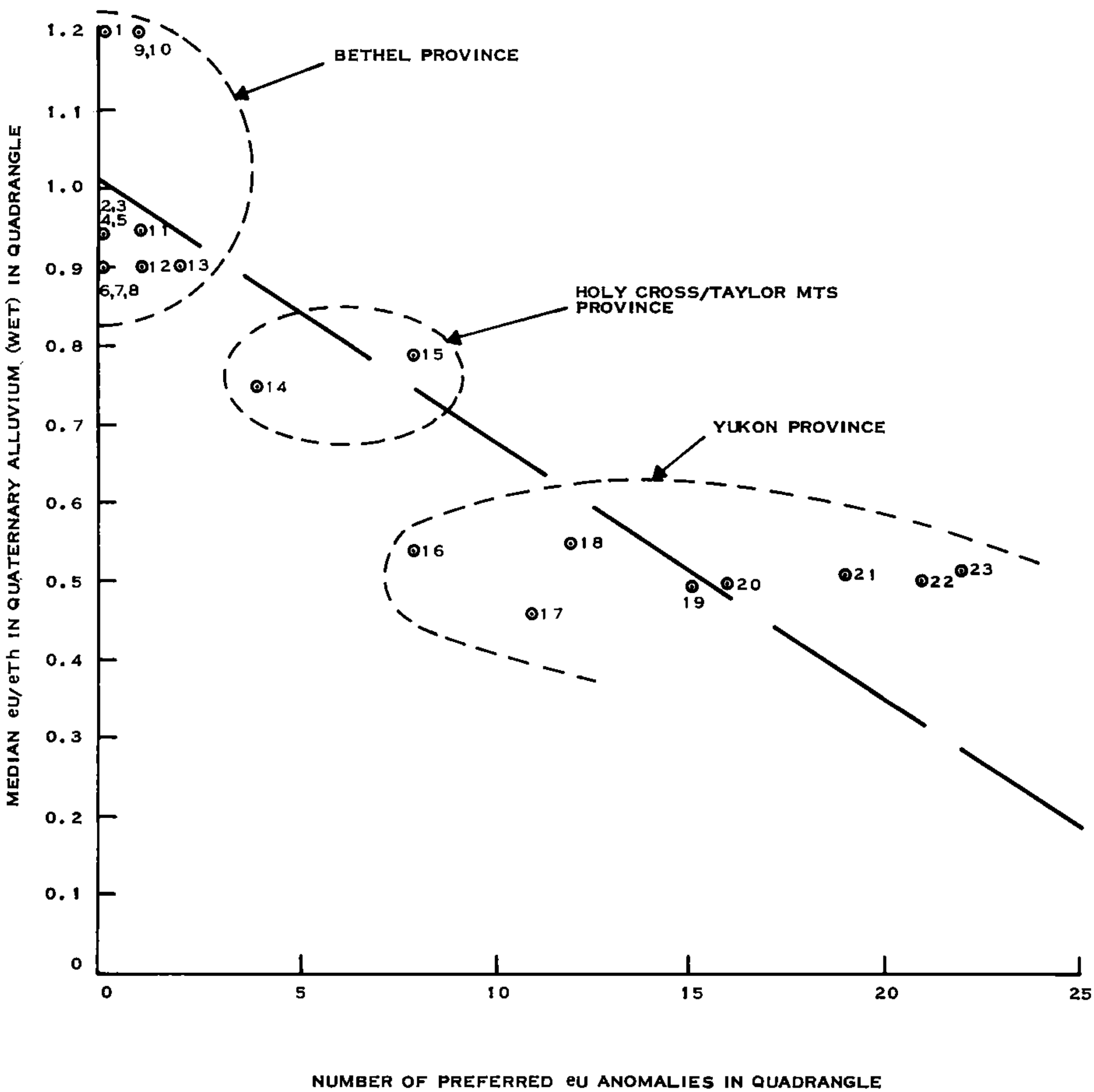


Figure 5-25. Median K in Quaternary Alluvium By Quadrangle



205382

Figure 5-26. Median eU/eTh in Quaternary Alluvium By Quadrangle

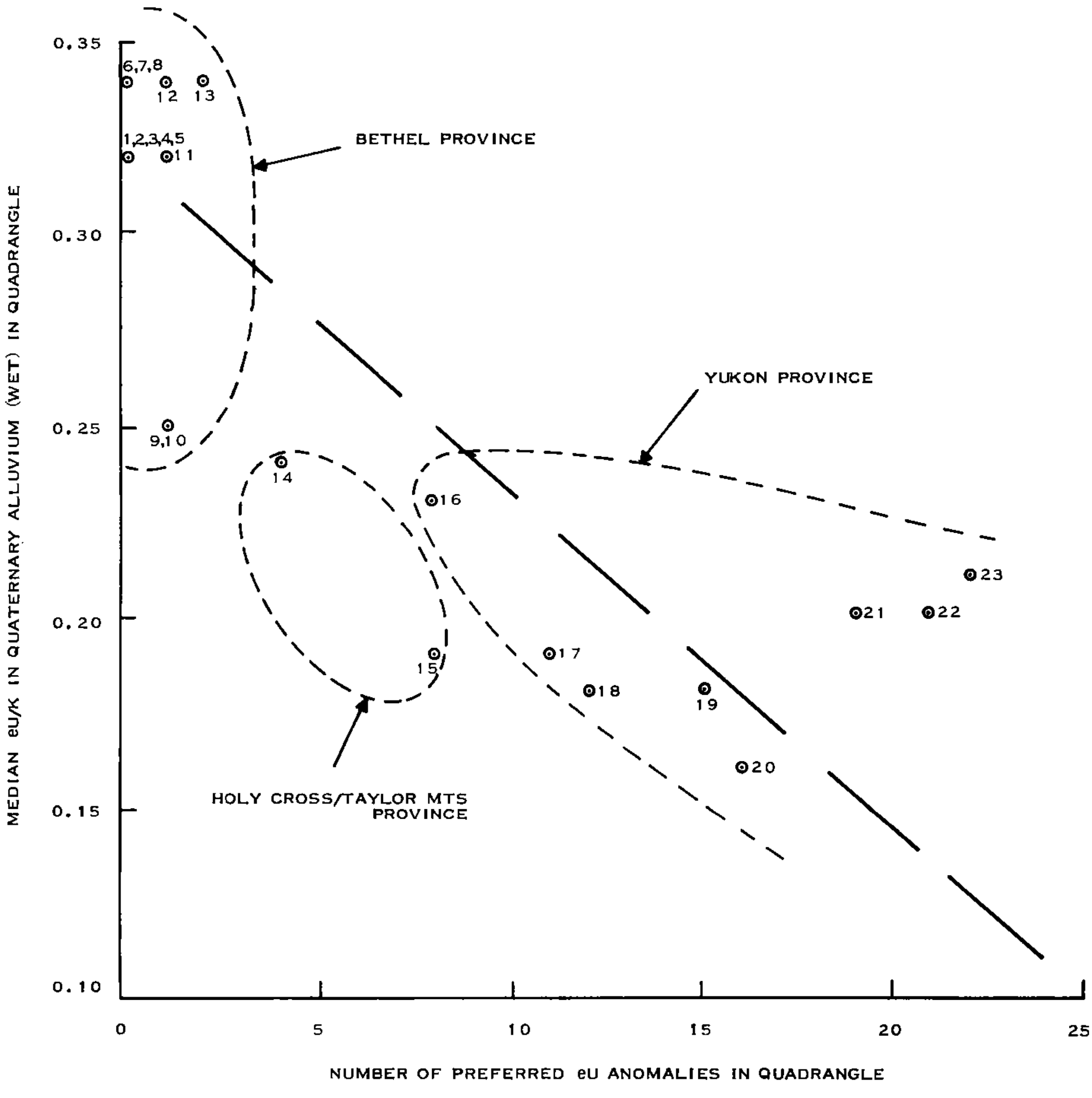


Figure 5-27. Median eU/K in Quaternary Alluvium By Quadrangle

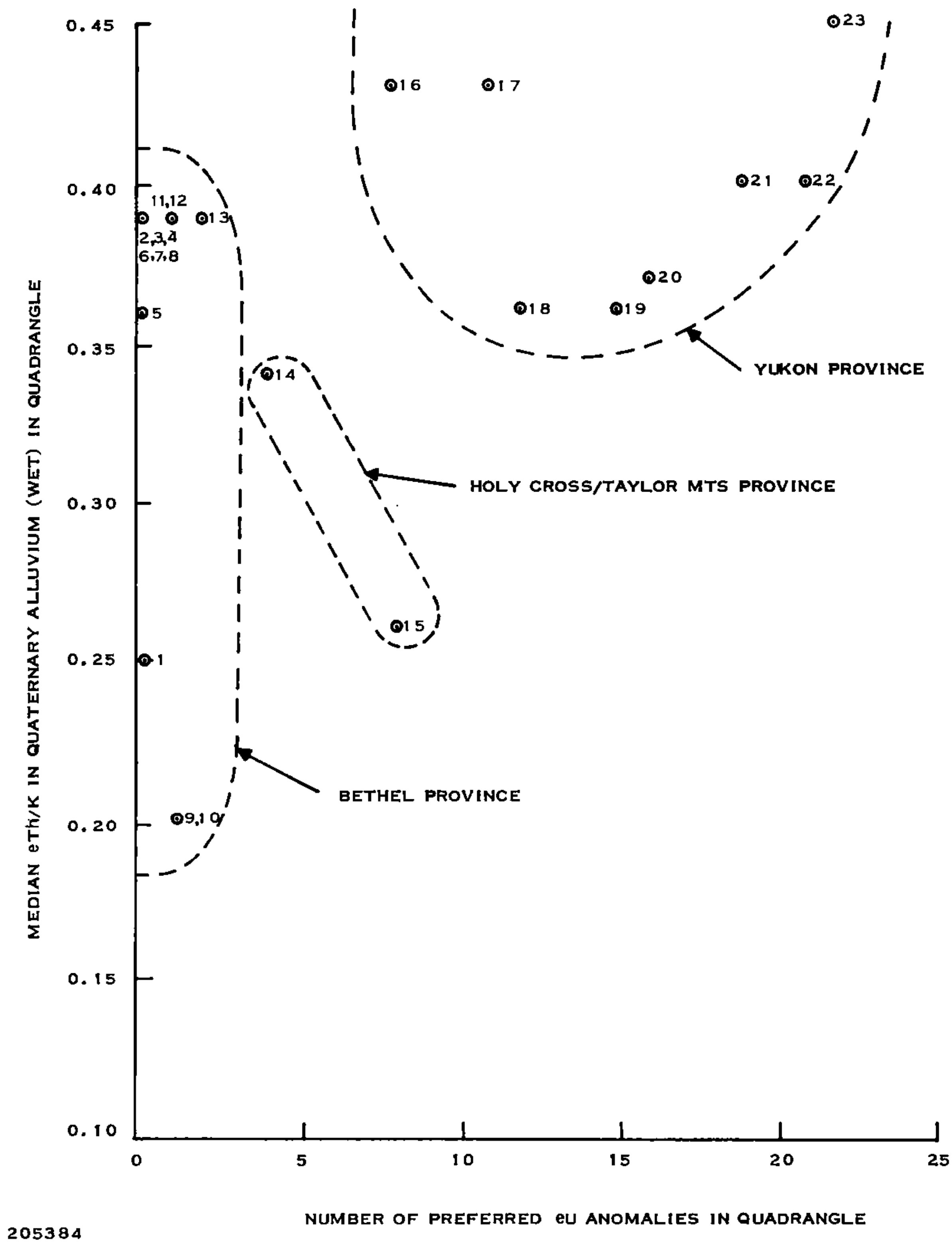


Figure 5-28. Median eTh/K in Quaternary Alluvium By Quadrangle

TABLE 5-43. MEDIAN GAMMA-RAY PARAMETERS FOR GRANITIC INTRUSIVES BY QUADRANGLE

Quadrangle Name	Formation	Median Values and Number of Records: eU	eTh	K	eU/eTh	eU/K	eTh/K	Number of Preferred Anomalies
Hagemeister Island	KCg	12 (52)	9 (121)	32 (275)	1.3 (40)	0.24 (52)	0.20 (121)	0
Russian Mission	KCg	18 (384)	19 (653)	59 (671)	0.84 (380)	0.30 (384)	0.34 (653)	0
Naknek	Jg	12 (59)	10 (131)	56 (151)	1.2 (53)	0.21 (59)	0.18 (131)	1
Hooper Bay	Kg	26 (103)	40 (146)	94 (150)	0.68 (102)	0.23 (103)	0.35 (146)	1
Holy Cross	TKg	55 (48)	41 (70)	96 (74)	0.67 (48)	0.25 (48)	0.38 (70)	4
Taylor Mountains	TKg	35 (70)	42 (89)	141 (96)	0.75 (70)	0.17 (70)	0.23 (89)	8
Melozitna	ir-ira	37 (450)	95 (470)	213 (471)	0.38 (449)	0.17 (450)	0.45 (470)	11
Beaver	Kg	43 (472)	88 (481)	280 (481)	0.44 (472)	0.15 (472)	0.37 (481)	12
Tanana	Kg	42 (390)	111 (402)	290 (402)	0.38 (390)	0.17 (390)	0.44 (402)	22
Bettles	Kg	53 (347)	114 (355)	315 (355)	0.48 (347)	0.19 (347)	0.42 (355)	21
Weighted Average for all granitic intrusives in Seward-Selawik area (Texas Instruments, 1975).	Various	51.5 (903)	93.1 (903)	188 (903)	0.55 (903)	0.26 (903)	0.50 (903)	

3. Uraniferous Province Characteristics

The data show a clear difference between the Bethel and Yukon provinces and apparent similarity between the Yukon Province and Seward-Selawik area. On this basis, it is concluded that the Yukon Province can be classified as a uraniferous province and should be further investigated.

The observed positive correlation of eU, eTh and K median values with the number of preferred eU anomalies, and the inverse relationship of the eU/eTh median values, is in good agreement with Malan (1972) who observed:

> In Precambrian igneous rocks in the western United States, thorium, uranium, potassium, and thorium/uranium ratios all increase systematically from intermediate to silicic phases . . .
>
> The distributions of major uranium deposits in Mesozoic and Cenozoic sandstones of the Cordilleran foreland platform (Mesozoic of the Colorado Plateau) and in basins within the Rocky Mountain foldbelt (Tertiary of Wyoming) are spatially related to patterns of radioelement enrichment in Precambrian rocks. . . . Thus, the Precambrian appears to be the source of the uranium in the major Mesozoic and Cenozoic deposits either through "granite leach" or "tuff leach" or both. Recognition of regional patterns of uranium enrichment in Precambrian rocks, as indicated in this study, should be useful as regional exploration guides.

It is suggested that the data in Alaska indicate that a broader generalization may be in order, i.e., that regional patterns of eU, eTh, K and eTh/eU enrichment in *all* geochemical and age groups of rocks may be useful as regional exploration guides. These observations may be justified in terms of geological and geochemical history of an area according to the following hypothesis:

> One may assume that the general regional distribution patterns of radioelements were established early in the history of the earth (the early Precambrian) and that, through subsequent orogeny, erosion and sedimentation, the radioelements were rearranged locally from older to younger rock units with minor or no regional additions or removals. If this is correct, the observation that all map units in the Yukon and Seward-Selawik areas, regardless of age or type, reflect the same general eU, eTh and K enrichment patterns is explained. The observed increase of the eTh/eU (or depletion of eU/eTh) in those apparent uraniferous provinces may be explained by visualizing a region where local enrichment of uranium in potential ore deposits has depleted the uranium in the source rocks relative to the thorium which is much less easily mobilized. This would lead to a regionally lower eU/eTh and very high eU/eTh values in the very selected areas of deposits. It is further hypothesized that failure of orogenic, erosional or sedimentation processes to selectively concentrate uranium in the Bethel Province may be related to the uranium mineralogy at these lower concentration levels. It has been observed (Stuckless and Ferreira, 1976) that in granites, part of the uranium is refractory, i.e., in the resistate minerals (zircon, sphene, monazite, etc.), and is difficult to leach, whereas part is interstitial (intergranular) and easily leached (labile) and this portion has been proposed as the source for many uranium ore deposits. The observed higher eU/eTh ratios in the Bethel Province could be due to most of the uranium being trapped in the resistate minerals at these low concentration levels and, therefore, relatively unavailable to be concentrated by geological or geochemical processes. On the other hand, the lower eU/eTh ratios in the uraniferous

provinces may reflect a larger percentage of the uranium being interstitial and labile at the higher concentration levels and, therefore, geochemically available for selective concentration in potential ore deposits. This is in agreement with Phair (1952) who observed that a substantial part of the anomalously high uranium content in bostonites is labile, and Brown and Silver (1956) who found that more than 90 percent of the uranium in a relatively low uranium granite (2.74 ppm U) was in the relatively refractory zircon and sphene accessory minerals.

It is suggested that low eU/eTh ratios as determined by airborne gamma-ray spectrometry are potentially a valuable guide in identifying regions where part of the uranium has been removed from the "average" rocks present and concentrated in potentially economic deposits.

4. Uraniferous Provinces in the Survey Areas

The survey data indicate that the regions listed in Table 5-44 should be considered as uraniferous provinces suitable for follow-up prospecting.

The data also indicate minimal uranium potential for the remainder of the region covered, including the Bethel Basin, Southern Nushagak Lowlands, Alaska Peninsula (Naknek quadrangle), Kuskokim Mountains (Russian Mission, Hagemeister Is. quadrangles) and the highland regions of Kwiguk and St. Michael quadrangles.

TABLE 5-44. URANIFEROUS PROVINCES WITHIN THE SURVEY AREA

Province	Subprovince	Quadrangles	Potential Deposits
Yukon	Lower Tanana Basin	Tanana	
		Melozitna	
	Galena Basin	Melozitna	
		Kateel River	Tertiary or Quaternary
	Yukon Flats	Beaver	stratiform deposits
		Ft. Yukon	
		Black River	
	Kokrines Hills	Melozitna	
		Tanana	
	Ray Mountains	Tanana	Veins or "porphyry" deposits in plutons;
	Hodzana Highlands	Bettles	stratiform deposits in Cretaceous sediment
		Beaver	
	West Part	Kateel River	
	Northeast Part	Coleen	
Bethel	Innoko Basin	Holy Cross	Tertiary or Quaternary stratiform deposits
	West Central Part	Holy Cross	Veins in plutons; stratiform in
	North and Central Part	Taylor Mountains	Cretaceous sediments

D. SUGGESTIONS FOR FURTHER WORK

Follow-up uranium prospecting is suggested for all the preferred anomalies, particularly those within the defined uraniferous provinces and subprovinces listed in Table 5-43.

The promising results of this first attempt to use the median gamma-ray parameters to define uraniferous provinces, suggests that this same approach be tried in other areas of Alaska and in the conterminous United States to further evaluate its applicability.

The region including the Kokrines Hills, Ray Mountains and Hodzana Highlands (Melozitna, Tanana, Bettles and Beaver quadrangles) should be studied in more detail to investigate the indicated possible genetic relationships between the anomalously radioactive portions of the granitic plutons and the preferred uranium anomalies in the younger Cretaceous and Quaternary sediments. This region could provide valuable insight into the potential for economic stratiform uranium deposits in Alaska.

Partitioning of each geologic unit according to "water-saturated" and "better drained" portions in the data processing, coupled with the Currie test for statistical accuracy, produced results superior to those obtained in the previous Alaska survey (Texas Instruments, 1975). Some 5 to 10 times as many preferred anomalies per quadrangle were found in the Yukon Province in this survey as were found in the Seward-Selawik area in the previous survey. The statistical summary data for these two regions show them to be closely similar in median geochemical characteristics, and they should have about the same preferred anomaly density. It is recommended that data from the Seward-Selawik area be partitioned according to water saturation, reprocessed using our advanced technique, and reinterpreted by the methods used in this survey. This will make the data results from the two regions directly comparable, and should amplify and better define marginal or missed anomalies in the Seward-Selawik area.

SECTION VI

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APPENDIX A
PRODUCTION SUMMARY

APPENDIX A

PRODUCTION SUMMARY

Operation	Start	Completion
Data Collection	5/11/76	8/4/76
Data Processing	5/24/76	11/26/76
Data Interpretation	9/9/76	12/3/76

Total Flight-Line Miles	**20,157**
Total Field Days	**85**
Production time	37 percent
Mobilization and demobilization time	14 percent
Downtime	49 percent
Total	100 percent

APPENDIX B

SUMMARY OF AVAILABLE AND SUITABLE LANDSAT COVERAGE

APPENDIX B

SUMMARY OF AVAILABLE AND SUITABLE LANDSAT COVERAGE*

Quadrangle	Image ID Number	Limits of Coverage
Naknek		No cloud-free coverage
Nushagak Bay	1667–21200	Northwest corner only
Hagemeister Island	1667–21200	Whole quadrangle
	1686–21251	West half
Taylor Mountains	1018–21200	South part
	1018–21193	North part
Russian Mission	1686–21242	Whole quadrangle; MSS band 7 only
Marshall	1706–21351	Whole quadrangle
St. Michael	1706–21345	East part; MSS band 5 only
	1672–21472	West part
Black	2129–21481	Whole quadrangle; snow cover
	1672–21472	Northeast part
	1672–21475	Southeast part
Kwiguk	1672–21472	West part
	1706–21345	Northeast part; MSS band 5 only
	1706–21351	Southeast part
Hooper Bay	1672–21475	Whole quadrangle
Kateel River	1669–21292	West part
	1037–21240	East part
Melozitna	1037–21240	West part
	1305–21133	East part
Baird Inlet	1706–21351	North part
	2198–21311	South part
	1686–21245	Southeast part
Cape Mendenhall	2198–21311	Northeast corner only
Nunivak Island	2198–21311	East part only
Kuskokwim Bay	1669–21310	Whole quadrangle
	1686–21245	Northeast corner
	2198–21311	North part
Holy Cross	1038–21304	East part
	1706–21345	West part
	1686–21242	South part
Tanana	1305–21133	All but southeast corner
Bettles	1305–21133	South edge
	1037–21234	West edge
	1321–21012	Northeast corner
Beaver	1697–20424	Southeast part
	1321–21012	Northwest part
	1734–20471	South part
	1734–20464	Northeast part
Fort Yukon	1734–20464	West part
	1697–20424	Southwest part
	1661–20432	Almost whole quadrangle

*Results of Geographic Computer Search dated 16 March, 1976, by EROS Data Center, Sioux Falls, S.D. 57198 (phone: (605) 594-6511, ext. 151)

Quadrangle	Image ID Number	Limits of Coverage
Coleen	1030–20430	North part
	1661–20425	West part
Black River	1389–20373	Almost whole quadrangle

APPENDIX C
TITLES FOR STATISTICAL SUMMARY TABLES

APPENDIX C
TITLES FOR STATISTICAL SUMMARY TABLES

Table C-1

Naknek and Nushagak Bay—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QP	LN	LN	N	LN	LN	LN
QP'	LN	LN	LN	LN	LN	LN
TV	LN	N	N	LN	N	LN
TH	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
UJ	(LN)	(LN)	LN	(LN)	(LN)	(LN)
JG	LN	LN	N	LN	LN	LN
JG'	LN	(LN)	LN	(LN)	(LN)	N
MZPZ	LN	LN	LN	LN	N	LN
MZPZ'	(LN)	(LN)	N	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-2
Naknek and Nushagak Bay—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	269.	4.784	6.088	7.748	9.861	12.549	15.970	20.324
QP'	1353.	4.494	5.723	7.287	9.279	11.815	15.045	19.157
TV	70.	5.246	6.476	7.996	9.871	12.186	15.044	18.573
TH	4.	3.214	6.821	14.478	30.730	65.224	138.439	293.838
UJ	20.	6.084	7.042	8.151	9.435	10.921	12.641	14.631
JG	131.	5.350	6.610	8.167	10.091	12.468	15.405	19.034
JG'	30.	3.820	5.597	8.200	12.014	17.601	25.787	37.781
MZPZ	175.	4.701	6.046	7.776	10.001	12.862	16.543	21.276
MZPZ'	17.	5.081	6.652	8.707	11.398	14.920	19.530	25.565

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-3
Naknek and Nushagak Bay—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	93.	6.558	7.839	9.369	11.198	13.383	15.996	19.118
QP'	544.	5.607	7.038	8.835	11.090	13.921	17.475	21.936
TV	37.	6.012	8.393	10.775	13.156	15.538	17.919	20.301
TH	4.	6.264	9.126	13.297	19.374	28.229	41.130	59.927
UJ	7.	8.422	9.638	11.030	12.623	14.446	16.532	18.919
JG	59.	5.729	7.297	9.292	11.834	15.072	19.195	24.445
JG'	9.	5.170	6.845	9.063	12.000	15.888	21.037	27.854
MZPZ	109.	4.548	6.197	8.445	11.508	15.683	21.371	29.123
MZPZ'	11.	7.500	8.857	10.460	12.352	14.587	17.226	20.343

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-4
Naknek and Nushagak Bay—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	432.	-13.185	5.973	25.130	44.287	63.444	82.601	101.758
QP'	3241.	2.582	5.539	11.881	25.487	54.672	117.278	251.574
TV	105.	-8.359	8.888	26.135	43.383	60.630	77.877	95.125
TH	5.	13.089	25.758	50.688	99.748	196.292	386.279	760.149
UJ	28.	17.830	23.652	31.376	41.621	55.213	73.242	97.160
JG	151.	19.283	31.368	43.453	55.537	67.622	79.707	91.792
JG'	35.	16.191	25.499	40.157	63.241	99.595	156.848	247.012
MZPZ	265.	9.334	15.102	24.437	39.540	63.978	103.521	167.504
MZPZ'	36.	-2.781	10.419	23.619	36.818	50.018	63.218	76.417

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-5

Naknek and Nushagak Bay—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	93.	0.061	0.097	0.152	0.240	0.378	0.596	0.939
QP'	539.	0.063	0.099	0.157	0.248	0.392	0.619	0.977
TV	37.	0.107	0.146	0.199	0.270	0.368	0.501	0.682
TH	4.	0.055	0.080	0.116	0.169	0.246	0.358	0.522
UJ	7.	0.138	0.164	0.195	0.232	0.276	0.328	0.390
JG	59.	0.078	0.109	0.151	0.210	0.292	0.406	0.565
JG'	9.	0.044	0.065	0.095	0.139	0.204	0.299	0.438
MZPZ	109.	0.084	0.125	0.185	0.275	0.409	0.608	0.903
MZPZ'	11.	0.130	0.184	0.259	0.365	0.514	0.725	1.021

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-6

Naknek and Nushagak Bay—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	61.	0.461	0.613	0.814	1.080	1.435	1.905	2.530
QP'	390.	0.525	0.687	0.900	1.180	1.546	2.025	2.653
TV	32.	0.506	0.807	1.107	1.407	1.707	2.007	2.307
TH	3.	0.337	0.388	0.447	0.514	0.592	0.681	0.784
UJ	6.	0.783	0.925	1.092	1.289	1.522	1.796	2.121
JG	53.	0.499	0.665	0.887	1.183	1.578	2.104	2.806
JG'	9.	0.334	0.451	0.609	0.824	1.113	1.505	2.034
MZPZ	82.	0.234	0.571	0.908	1.246	1.583	1.920	2.257
MZPZ'	6.	0.545	0.709	0.924	1.204	1.568	2.043	2.661

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QP	269.	0.085	0.113	0.148	0.196	0.258	0.340	0.447
QP'	1352.	0.081	0.109	0.148	0.201	0.272	0.369	0.500
TV	70.	0.103	0.127	0.157	0.194	0.240	0.296	0.365
TH	4.	0.144	0.173	0.208	0.251	0.301	0.363	0.436
UJ	20.	0.110	0.135	0.167	0.205	0.253	0.311	0.383
JG	131.	0.095	0.117	0.144	0.178	0.219	0.270	0.333
JG'	30.	0.088	0.118	0.147	0.177	0.207	0.237	0.267
MZPZ	175.	0.091	0.122	0.164	0.221	0.298	0.402	0.542
MZPZ'	17.	0.135	0.168	0.208	0.257	0.318	0.394	0.489

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-7
Naknek and Nushagak Bay—Statistical Summary—Th/K

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QF	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QF'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QC	LN	(LN)	LN	(LN)	(LN)	LN
QC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QD	LN	LN	N	N	LN	LN
QD'	LN	LN	N	LN	LN	LN
QO	N	(LN)	N	(LN)	(LN)	N
QO'	LN	N	N	LN	LN	N
QTB'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKV	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KCG	LN	LN	LN	LN	LN	LN
KCG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TM	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TG	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TU	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-8
Hagemeister Island—Distribution Types

Table C-9

Hagemeister Island—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	4.	4.422	5.467	6.758	8.354	10.328	12.767	15.783
QF'	13.	4.203	5.278	6.628	8.323	10.452	13.126	16.484
QC	26.	5.562	6.726	8.135	9.838	11.898	14.389	17.401
QC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QD	94.	5.104	6.325	7.838	9.714	12.039	14.919	18.489
QD'	94.	4.638	6.012	7.791	10.097	13.086	16.960	21.981
QO	83.	2.397	5.231	8.064	10.898	13.731	16.565	19.398
QO'	42.	4.785	6.264	8.200	10.734	14.051	18.393	24.078
QTB'	2.	4.126	5.506	7.349	9.807	13.089	17.468	23.312
TKV	12.	5.021	6.639	8.779	11.608	15.348	20.294	26.834
TKV'	1.	10.409	10.409	10.409	10.409	10.409	10.409	10.409
KCG	121.	4.993	6.051	7.334	8.888	10.772	13.055	15.822
KCG'	10.	3.142	4.433	6.253	8.820	12.442	17.551	24.759
TM	1.	7.576	7.576	7.576	7.576	7.576	7.576	7.576
TG	3.	1.836	2.780	4.209	6.371	9.646	14.604	22.109
TU	1.	7.812	7.812	7.812	7.812	7.812	7.812	7.812

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-10
Hagemeister Island—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QF'	4.	7.688	8.607	9.635	10.787	12.076	13.519	15.135
QC	6.	9.899	11.046	12.325	13.754	15.347	17.125	19.109
QC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QD	34.	6.159	7.537	9.222	11.284	13.807	16.894	20.672
QD'	30.	6.896	8.441	10.332	12.647	15.480	18.948	23.193
QO	20.	5.398	6.856	8.708	11.059	14.046	17.839	22.657
QO'	25.	3.197	6.349	9.502	12.654	15.807	18.959	22.112
QTB'	1.	7.563	7.563	7.563	7.563	7.563	7.563	7.563
TKV	9.	6.528	8.251	10.429	13.182	16.662	21.059	26.618
TKV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KCG	52.	5.523	7.067	9.044	11.573	14.810	18.952	24.253
KCG'	4.	7.962	8.784	9.690	10.690	11.794	13.011	14.354
TM	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TG	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TU	3.	8.796	10.015	11.402	12.983	14.782	16.831	19.163

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-11
Hagemeister Island—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	10.	9.947	15.888	25.376	40.530	64.735	103.395	165.142
QF'	18.	7.204	12.783	22.683	40.250	71.421	126.733	224.880
QC	57.	4.773	8.305	14.452	25.147	43.758	76.143	132.494
QC'	6.	3.207	4.734	6.989	10.319	15.235	22.492	33.207
QD	196.	-7.127	7.242	21.612	35.981	50.351	64.720	79.090
QD'	162.	-17.792	-0.968	15.855	32.678	49.502	66.325	83.148
QO	100.	-15.784	0.315	16.413	32.511	48.609	64.707	80.805
QO'	76.	-27.844	-8.368	11.108	30.584	50.059	69.535	89.011
QTB'	5.	3.082	6.228	12.585	25.429	51.384	103.831	209.807
TKV	20.	3.181	7.511	17.740	41.895	98.942	233.669	551.847
TKV'	1.	43.432	43.432	43.432	43.432	43.432	43.432	43.432
KCG	275.	4.671	8.890	16.923	32.211	61.312	116.704	222.139
KCG'	15.	7.744	13.015	21.876	36.768	61.798	103.867	174.576
TM	3.	20.876	25.974	32.317	40.209	50.027	62.244	77.444
TG	8.	1.863	4.134	9.175	20.364	45.198	100.314	222.642
TU	5.	27.108	34.154	43.030	54.214	68.305	86.058	108.426

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-12
Hagemeister Island—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QF'	4.	0.065	0.104	0.167	0.266	0.425	0.680	1.087
QC	6.	0.167	0.237	0.337	0.478	0.679	0.964	1.369
QC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QD	34.	-0.005	0.091	0.187	0.282	0.378	0.474	0.569
QD'	30.	0.068	0.114	0.190	0.318	0.532	0.890	1.489
QO	20.	0.060	0.106	0.187	0.330	0.583	1.030	1.821
QO'	24.	0.098	0.139	0.196	0.278	0.394	0.557	0.789
QTB'	1.	0.137	0.137	0.137	0.137	0.137	0.137	0.137
TKV	9.	0.098	0.118	0.141	0.169	0.202	0.242	0.291
TKV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KCG	52.	0.047	0.080	0.138	0.237	0.407	0.700	1.203
KCG'	4.	0.015	0.039	0.103	0.274	0.728	1.932	5.127
TM	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TG	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TU	3.	0.091	0.126	0.176	0.245	0.341	0.474	0.659

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QF'	4.	0.745	0.920	1.137	1.405	1.736	2.144	2.649
QC	3.	0.953	1.057	1.171	1.297	1.438	1.593	1.766
QC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QD	23.	0.473	0.627	0.831	1.103	1.463	1.940	2.573
QD'	22.	0.535	0.707	0.933	1.233	1.628	2.150	2.840
QO	18.	0.324	0.478	0.704	1.038	1.531	2.257	3.326
QO'	22.	0.423	0.588	0.818	1.138	1.582	2.200	3.060
QTB'	1.	0.629	0.629	0.629	0.629	0.629	0.629	0.629
TKV	8.	0.573	0.713	0.887	1.104	1.373	1.709	2.126
TKV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KCG	40.	0.569	0.755	1.001	1.328	1.761	2.336	3.099
KCG'	3.	1.036	1.156	1.291	1.441	1.608	1.795	2.004
TM	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TG	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TU	1.	1.439	1.439	1.439	1.439	1.439	1.439	1.439

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-13
Hagemeister Island—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	4.	0.035	0.064	0.119	0.222	0.412	0.765	1.421
QF'	13.	0.065	0.091	0.128	0.179	0.251	0.352	0.494
QC	26.	0.085	0.132	0.204	0.316	0.490	0.759	1.176
QC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QD	93.	0.092	0.127	0.176	0.243	0.337	0.466	0.645
QD'	94.	0.103	0.139	0.188	0.254	0.344	0.465	0.629
QO	83.	0.019	0.128	0.236	0.344	0.452	0.560	0.668
QO'	42.	-0.036	0.072	0.180	0.288	0.397	0.505	0.613
QTB'	2.	0.202	0.209	0.215	0.222	0.229	0.237	0.244
TKV	12.	0.083	0.103	0.128	0.159	0.198	0.247	0.308
TKV'	1.	0.240	0.240	0.240	0.240	0.240	0.240	0.240
KCG	121.	0.052	0.082	0.129	0.204	0.323	0.510	0.806
KCG'	10.	0.047	0.076	0.121	0.193	0.309	0.493	0.788
TM	1.	0.205	0.205	0.205	0.205	0.205	0.205	0.205
TG	3.	0.097	0.130	0.175	0.235	0.316	0.424	0.570
TU	1.	0.116	0.116	0.116	0.116	0.116	0.116	0.116

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Table C-14
Hagemeister Island—Statistical Summary—Th/K

Table C-15
Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
Q'	LN	LN	LN	LN	LN	LN
QH'	LN	LN	LN	LN	LN	LN
QV	N	LN	N	LN	LN	LN
QV'	LN	LN	LN	LN	LN	LN
QP'	N	(LN)	LN	(LN)	(LN)	LN
QTV	LN	LN	N	LN	LN	N
QTV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TV	N	LN	N	LN	LN	LN
TV'	LN	(LN)	LN	(LN)	(LN)	N
K	N	(LN)	LN	(LN)	(LN)	LN
K'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-16

Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q'	1628.	3.189	4.437	6.174	8.590	11.953	16.631	23.141
QH'	278.	3.076	4.876	7.729	12.251	19.420	30.782	48.793
QV	760.	-5.467	3.044	11.555	20.065	28.576	37.087	45.598
QV'	363.	3.678	5.693	8.812	13.640	21.112	32.679	50.581
QP'	30.	-0.105	2.711	5.527	8.343	11.159	13.975	16.791
QTV	383.	5.719	8.276	11.977	17.332	25.082	36.298	52.528
QTV'	1.	11.433	11.433	11.433	11.433	11.433	11.433	11.433
TV	229.	-1.706	5.159	12.024	18.889	25.754	32.620	39.485
TV'	38.	4.039	5.850	8.473	12.271	17.774	25.743	37.287
K	30.	1.210	6.538	11.865	17.193	22.520	27.848	33.175
K'	3.	5.058	6.834	9.233	12.474	16.852	22.767	30.759

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q'	142.	4.937	6.867	9.551	13.285	18.478	25.701	35.747
QH'	52.	5.406	7.670	10.880	15.435	21.896	31.063	44.066
QV	283.	7.659	9.664	12.195	15.388	19.417	24.501	30.916
QV'	78.	5.889	7.910	10.625	14.272	19.170	25.750	34.587
QP'	1.	12.333	12.333	12.333	12.333	12.333	12.333	12.333
QTV	125.	6.731	8.669	11.165	14.380	18.521	23.854	30.723
QTV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TV	84.	6.916	8.720	10.993	13.858	17.471	22.026	27.768
TV'	3.	5.911	7.800	10.292	13.581	17.922	23.649	31.207
K	5.	8.491	9.825	11.369	13.155	15.221	17.612	20.379
K'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Table C-18
Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1.	14.369	14.369	14.369	14.369	14.369	14.369	14.369
Q'	3669.	1.747	3.521	7.094	14.295	28.805	58.044	116.961
QH'	418.	2.275	5.028	11.113	24.559	54.274	119.944	265.072
QV	831.	-33.158	-4.471	24.217	52.905	81.592	110.280	138.967
QV'	418.	4.807	9.161	17.459	33.271	63.405	120.833	230.273
QP'	115.	1.395	2.864	5.879	12.067	24.770	50.843	104.360
QTV	402.	-7.675	12.489	32.653	52.817	72.982	93.146	113.310
QTV'	3.	16.153	19.030	22.418	26.410	31.113	36.653	43.180
TV	231.	-22.665	3.561	29.786	56.012	82.237	108.462	134.688
TV'	40.	6.857	11.675	19.877	33.840	57.614	98.089	166.998
K	31.	13.813	21.098	32.225	49.220	75.177	114.823	175.378
K'	3.	19.259	23.697	29.158	35.877	44.145	54.319	66.837

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-19

Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q'	140.	0.064	0.109	0.187	0.320	0.548	0.939	1.608
QH'	52.	0.061	0.097	0.156	0.250	0.401	0.643	1.030
QV	283.	0.090	0.123	0.168	0.230	0.314	0.430	0.589
QV'	78.	0.078	0.115	0.169	0.247	0.363	0.532	0.779
QP'	1.	0.366	0.366	0.366	0.366	0.366	0.366	0.366
QTV	125.	0.097	0.135	0.187	0.259	0.360	0.499	0.693
QTV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TV	84.	0.083	0.118	0.169	0.240	0.341	0.485	0.691
TV'	3.	0.101	0.139	0.190	0.261	0.357	0.489	0.671
K	5.	0.109	0.140	0.180	0.231	0.297	0.382	0.491
K'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-20
Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q'	120.	0.401	0.532	0.707	0.938	1.246	1.654	2.196
QH'	49.	0.296	0.411	0.571	0.794	1.104	1.534	2.133
QV	282.	0.274	0.364	0.482	0.638	0.845	1.120	1.484
QV'	76.	0.245	0.355	0.514	0.744	1.077	1.559	2.257
QP'	1.	1.200	1.200	1.200	1.200	1.200	1.200	1.200
QTV	121.	0.294	0.399	0.542	0.736	1.000	1.357	1.844
QTV'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TV	83.	0.276	0.371	0.501	0.674	0.909	1.225	1.650
TV'	3.	0.339	0.424	0.530	0.663	0.829	1.037	1.297
K	5.	0.424	0.513	0.620	0.749	0.906	1.095	1.324
K'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q'	1619.	0.129	0.186	0.270	0.390	0.565	0.818	1.185
QH'	278.	0.161	0.205	0.262	0.333	0.425	0.541	0.690
QV	760.	0.169	0.218	0.282	0.365	0.473	0.612	0.791
QV'	363.	0.135	0.188	0.262	0.365	0.508	0.706	0.983
QP'	30.	0.065	0.116	0.210	0.378	0.681	1.228	2.212
QTV	383.	0.099	0.184	0.268	0.353	0.438	0.522	0.607
QTV'	1.	0.363	0.363	0.363	0.363	0.363	0.363	0.363
TV	229.	0.156	0.204	0.268	0.351	0.460	0.604	0.792
TV'	38.	0.038	0.147	0.257	0.366	0.475	0.585	0.694
K	30.	0.189	0.225	0.268	0.320	0.382	0.455	0.543
K'	3.	0.259	0.286	0.315	0.348	0.383	0.423	0.466

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Table C-21

Nunivak Island, Baird Inlet, Cape Mendenhall, Kuskokwim Bay—Statistical Summary—Th/K

Table C-22

Russian Mission—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QF	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QF'	LN	LN	N	LN	LN	LN
QC	LN	(LN)	LN	(LN)	(LN)	N
QC'	LN	N	LN	LN	LN	LN
QS	LN	(LN)	N	(LN)	(LN)	N
QS'	LN	LN	LN	LN	LN	LN
QD	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QO	LN	LN	LN	LN	LN	LN
QO'	LN	N	LN	N	LN	LN
QTB	LN	LN	LN	LN	LN	LN
QTB'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKUV	LN	(LN)	N	(LN)	(LN)	LN
TKUV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KK	LN	LN	LN	LN	LN	LN
KK'	LN	LN	LN	LN	N	LN
KS	LN	LN	LN	LN	(LN)	LN
KS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KCG	LN	LN	N	LN	LN	LN
KCG'	LN	LN	LN	LN	LN	N
TM	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TG	LN	LN	LN	N	LN	LN
TI	LN	LN	LN	N	(LN)	N

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N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-23
Russian Mission—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	18.	5.173	7.823	11.830	17.889	27.051	40.906	61.857
QF'	712.	4.088	6.720	11.049	18.165	29.865	49.100	80.724
QC	23.	4.726	6.570	9.135	12.700	17.657	24.549	34.131
QC'	74.	3.027	4.954	8.109	13.272	21.723	35.554	58.192
QS	43.	6.561	9.076	12.556	17.370	24.029	33.241	45.986
QS'	1510.	3.538	5.004	7.077	10.010	14.159	20.026	28.325
QD	5.	7.746	10.527	14.307	19.444	26.426	35.914	48.810
QO	48.	5.301	7.753	11.340	16.587	24.261	35.485	51.903
QO'	48.	4.975	7.282	10.659	15.601	22.835	33.423	48.920
QTB	45.	11.831	14.259	17.184	20.711	24.960	30.082	36.254
QTB'	15.	10.115	12.170	14.643	17.618	21.198	25.506	30.688
TKUV	21.	8.304	10.430	13.101	16.456	20.670	25.963	32.612
TKUV'	15.	4.565	5.800	7.367	9.359	11.889	15.103	19.185
KK	360.	3.816	6.575	11.329	19.520	33.634	57.952	99.852
KK'	91.	3.584	5.288	7.803	11.515	16.992	25.075	37.002
KS	71.	6.637	9.514	13.639	19.551	28.026	40.174	57.589
KS'	3.	12.865	17.260	23.157	31.069	41.683	55.924	75.029
KCG	653.	5.164	7.995	12.377	19.161	29.665	45.925	71.099
KCG'	103.	3.702	5.674	8.696	13.329	20.429	31.311	47.991
TM	3.	33.046	35.797	38.777	42.005	45.501	49.289	53.392
TG	47.	4.969	10.074	20.426	41.415	83.972	170.260	345.214
TI	32.	1.645	5.399	17.721	58.157	190.867	626.409	2055.819

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STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	9.	9.123	11.798	15.258	19.732	25.517	32.999	42.675
QF'	445.	6.650	9.166	12.634	17.415	24.004	33.085	45.603
QC	8.	6.644	8.133	9.956	12.188	14.920	18.265	22.360
QC'	26.	3.582	8.370	13.159	17.948	22.736	27.525	32.314
QS	19.	10.195	12.294	14.826	17.878	21.560	25.999	31.353
QS'	369.	6.083	7.713	9.780	12.401	15.725	19.940	25.284
QD	5.	5.631	8.044	11.491	16.415	23.448	33.496	47.850
QO	39.	6.862	9.404	12.888	17.662	24.205	33.172	45.460
QO'	22.	2.248	7.292	12.336	17.380	22.424	27.467	32.511
QTB	42.	12.256	14.545	17.262	20.485	24.311	28.852	34.241
QTB'	10.	7.855	9.683	11.937	14.715	18.139	22.361	27.565
TKUV	8.	11.271	13.423	15.987	19.039	22.675	27.005	32.162
TKUV'	1.	13.854	13.854	13.854	13.854	13.854	13.854	13.854
KK	185.	6.237	9.154	13.434	19.715	28.933	42.462	62.316
KK'	25.	6.365	8.282	10.776	14.022	18.245	23.739	30.889
KS	21.	7.126	9.799	13.475	18.530	25.480	35.038	48.182
KS'	1.	37.239	37.239	37.239	37.239	37.239	37.239	37.239
KCG	384.	5.444	8.062	11.938	17.678	26.177	38.762	57.398
KCG'	41.	6.004	8.343	11.593	16.109	22.384	31.103	43.219
TM	3.	31.476	32.312	33.170	34.051	34.955	35.883	36.835
TG	31.	7.973	13.558	23.055	39.204	66.665	113.361	192.766
TI	22.	3.846	9.232	22.156	53.175	127.620	306.292	735.107

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Table C-24
Russian Mission—Statistical Summary—U

Table C-25 Russian Mission—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	20.	15.228	24.386	39.053	62.539	100.151	160.382	256.837
QF'	811.	-53.142	-15.221	22.701	60.622	98.543	136.465	174.386
QC	39.	2.619	5.490	11.505	24.113	50.537	105.915	221.978
QC'	98.	2.216	5.308	12.713	30.452	72.941	174.714	418.491
QS	44.	-4.739	14.722	34.184	53.645	73.107	92.568	112.029
QS'	2610.	2.831	5.436	10.436	20.038	38.474	73.870	141.832
QD	5.	27.664	36.322	47.690	62.617	82.214	107.945	141.730
QO	48.	13.049	21.824	36.503	61.053	102.114	170.792	285.659
QO'	72.	0.969	3.006	9.325	28.929	89.753	278.453	863.890
QTB	45.	34.144	40.582	48.235	57.332	68.143	80.994	96.268
QTB'	15.	23.170	28.775	35.736	44.380	55.116	68.448	85.006
TKUV	21.	23.916	32.147	40.378	48.609	56.840	65.071	73.302
TKUV'	19.	9.105	12.443	17.005	23.240	31.760	43.405	59.319
KK	427.	8.036	15.457	29.731	57.184	109.988	211.553	406.902
KK'	133.	5.741	9.513	15.765	26.123	43.289	71.734	118.869
KS	74.	22.965	33.462	48.756	71.041	103.511	150.822	219.758
KS'	6.	21.876	36.514	60.945	101.724	169.788	283.394	473.014
KCG	671.	-21.968	5.241	32.451	59.660	86.870	114.079	141.288
KCG'	124.	4.717	8.891	16.759	31.590	59.548	112.247	211.585
TM	3.	121.925	131.781	142.433	153.947	166.391	179.841	194.379
TG	52.	16.619	33.826	68.850	140.136	285.231	580.555	1181.653
TI	35.	15.965	31.676	62.850	124.702	247.425	490.921	974.048

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STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	9.	0.122	0.154	0.196	0.248	0.314	0.397	0.503
QF'	445.	0.082	0.117	0.167	0.239	0.340	0.485	0.691
QC	8.	0.117	0.153	0.201	0.264	0.346	0.453	0.594
QC'	26.	0.064	0.099	0.154	0.239	0.371	0.576	0.894
QS	19.	0.141	0.179	0.229	0.291	0.371	0.473	0.603
QS'	365.	0.080	0.126	0.200	0.316	0.501	0.794	1.257
QD	5.	0.120	0.155	0.202	0.262	0.341	0.442	0.575
QO	39.	0.103	0.141	0.193	0.265	0.363	0.499	0.684
QO'	22.	0.066	0.120	0.173	0.227	0.281	0.335	0.389
QTB	42.	0.183	0.228	0.285	0.356	0.446	0.557	0.696
QTB'	10.	0.116	0.167	0.239	0.342	0.490	0.703	1.008
TKUV	8.	0.209	0.252	0.304	0.366	0.442	0.533	0.643
TKUV'	1.	0.306	0.306	0.306	0.306	0.306	0.306	0.306
KK	185.	0.077	0.117	0.177	0.268	0.405	0.613	0.927
KK'	25.	0.117	0.163	0.226	0.314	0.436	0.606	0.841
KS	21.	0.071	0.103	0.150	0.218	0.317	0.461	0.670
KS'	1.	0.209	0.209	0.209	0.209	0.209	0.209	0.209
KCG	384.	0.092	0.136	0.201	0.298	0.442	0.655	0.971
KCG'	38.	0.092	0.144	0.224	0.348	0.543	0.845	1.316
TM	3.	0.189	0.199	0.210	0.221	0.233	0.246	0.259
TG	31.	0.005	0.071	0.137	0.203	0.269	0.335	0.402
TI	22.	-0.001	0.121	0.243	0.365	0.487	0.608	0.730

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Table C-26

Russian Mission—Statistical Summary—U/K

Table C-27
Russian Mission—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	7.	0.398	0.508	0.649	0.829	1.059	1.352	1.727
QF'	439.	0.318	0.428	0.575	0.774	1.041	1.399	1.882
QC	8.	0.515	0.620	0.748	0.902	1.087	1.310	1.580
QC'	24.	0.414	0.532	0.683	0.878	1.129	1.450	1.864
QS	19.	0.458	0.568	0.705	0.875	1.085	1.346	1.670
QS'	316.	0.374	0.508	0.691	0.939	1.277	1.736	2.360
QD	5.	0.481	0.580	0.700	0.844	1.018	1.228	1.482
QO	39.	0.504	0.633	0.797	1.002	1.260	1.585	1.994
QO'	22.	0.441	0.555	0.697	0.877	1.103	1.386	1.743
QTB	42.	0.470	0.601	0.770	0.987	1.264	1.618	2.073
QTB'	10.	0.342	0.456	0.608	0.811	1.082	1.443	1.924
TKUV	8.	0.573	0.709	0.877	1.086	1.343	1.662	2.057
TKUV'	1.	0.981	0.981	0.981	0.981	0.981	0.981	0.981
KK	181.	0.301	0.424	0.598	0.843	1.188	1.676	2.363
KK'	24.	0.125	0.408	0.691	0.975	1.258	1.541	1.824
KS	20.	0.368	0.469	0.599	0.764	0.975	1.244	1.587
KS'	1.	0.984	0.984	0.984	0.984	0.984	0.984	0.984
KCG	380.	0.321	0.443	0.611	0.843	1.164	1.607	2.219
KCG'	36.	0.380	0.509	0.682	0.914	1.225	1.642	2.201
TM	3.	0.648	0.698	0.752	0.811	0.873	0.941	1.014
TG	31.	0.254	0.346	0.472	0.643	0.877	1.196	1.631
TI	20.	0.221	0.301	0.412	0.562	0.767	1.047	1.429

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STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QF	18.	0.107	0.148	0.206	0.286	0.397	0.551	0.766
QF'	712.	0.121	0.167	0.230	0.319	0.440	0.608	0.841
QC	21.	0.098	0.177	0.256	0.336	0.415	0.495	0.574
QC'	74.	0.111	0.157	0.223	0.316	0.449	0.637	0.903
QS	43.	0.171	0.229	0.286	0.344	0.401	0.458	0.516
QS'	1507.	0.138	0.190	0.262	0.361	0.498	0.685	0.944
QD	5.	0.225	0.251	0.279	0.311	0.346	0.385	0.428
QO	48.	0.136	0.172	0.216	0.272	0.342	0.430	0.541
QO'	48.	0.127	0.162	0.207	0.266	0.340	0.436	0.558
QTB	45.	0.248	0.281	0.319	0.361	0.409	0.464	0.526
QTB'	15.	0.217	0.266	0.325	0.397	0.485	0.593	0.725
TKUV	21.	0.177	0.220	0.275	0.343	0.428	0.535	0.667
TKUV'	15.	0.180	0.235	0.306	0.399	0.520	0.677	0.883
KK	360.	0.110	0.156	0.220	0.311	0.440	0.621	0.879
KK'	91.	0.178	0.227	0.290	0.370	0.472	0.603	0.770
KS	71.	0.101	0.140	0.195	0.271	0.376	0.522	0.726
KS'	3.	0.156	0.169	0.183	0.198	0.215	0.233	0.252
KCG	653.	0.134	0.184	0.252	0.344	0.471	0.645	0.882
KCG'	102.	0.090	0.183	0.276	0.369	0.462	0.555	0.648
TM	3.	0.222	0.237	0.255	0.273	0.292	0.314	0.336
TG	47.	0.069	0.110	0.175	0.279	0.443	0.706	1.123
TI	32.	-0.333	-0.050	0.232	0.515	0.798	1.080	1.363

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Table C-29A

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QYF	LN	LN	N	LN	LN	LN
QYF'	LN	LN	N	LN	LN	LN
QOF	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QOF'	LN	LN	LN	LN	LN	LN
QBL'	N	LN	N	LN	LN	N
QYB'	LN	LN	LN	LN	LN	LN
QOB'	LN	N	LN	LN	(LN)	LN
QE'	LN	N	N	LN	LN	LN
QOA	LN	LN	LN	LN	LN	LN
QOA'	LN	LN	LN	LN	LN	LN
QW	LN	N	LN	LN	LN	LN
QW'	LN	N	LN	LN	LN	LN
QGC	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QGC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QB	LN	LN	LN	LN	N	N
QB'	LN	LN	LN	LN	LN	LN
QBO	LN	LN	LN	LN	LN	LN
QBO'	LN	(LN)	LN	(LN)	(LN)	LN
KI	LN	(LN)	LN	(LN)	(LN)	LN
KG	N	LN	LN	LN	LN	LN
KG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KS	LN	LN	LN	LN	LN	LN
KS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KCS	N	LN	N	LN	LN	LN
KCS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

Table C-29B

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Distribution Types

KLS	LN	LN	N	LN	LN	LN
KLS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJV	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TRPVS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TRPVS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-30A St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	93.	7.175	10.416	15.120	21.949	31.863	46.254	67.146
QYF'	1306.	4.565	7.187	11.313	17.809	28.035	44.132	69.471
QOF	14.	4.365	6.047	8.379	11.609	16.085	22.286	30.879
QOF'	2725.	3.344	4.996	7.462	11.145	16.648	24.867	37.143
QBL'	91.	5.790	10.716	15.641	20.567	25.492	30.418	35.343
QYB'	120.	4.366	6.531	9.769	14.612	21.856	32.692	48.900
QOB'	110.	3.617	5.225	7.546	10.899	15.742	22.737	32.840
QE'	652.	4.607	6.947	10.474	15.791	23.809	35.897	54.123
QOA	310.	3.780	5.450	7.860	11.334	16.343	23.567	33.983
QOA'	1701.	4.065	5.303	6.918	9.024	11.772	15.356	20.032
QW	183.	4.659	5.882	7.426	9.375	11.836	14.943	18.865
QW'	292.	3.734	5.366	7.712	11.082	15.926	22.887	32.891
QGC	16.	13.194	17.676	23.681	31.725	42.501	56.939	76.281
QGC'	8.	11.953	14.077	16.580	19.527	22.997	27.085	31.899
QB	115.	3.918	5.790	8.557	12.647	18.690	27.622	40.821
QB'	234.	3.779	5.173	7.082	9.695	13.273	18.171	24.877
QBO	130.	5.219	6.725	8.666	11.166	14.387	18.538	23.886
QBO'	48.	5.005	6.451	8.314	10.715	13.809	17.797	22.937
KI	24.	13.617	20.762	31.654	48.262	73.584	112.191	171.053
KG	146.	-26.571	-4.471	17.628	39.727	61.826	83.925	106.024
KG'	3.	16.102	18.714	21.750	25.279	29.380	34.147	39.687
KS	560.	7.733	11.725	17.778	26.957	40.874	61.976	93.974
KS'	9.	4.245	6.254	9.214	13.575	19.999	29.464	43.408
KCS	521.	-1.461	9.410	20.282	31.153	42.024	52.896	63.767
KCS'	6.	3.514	5.471	8.516	13.256	20.635	32.121	50.001

KLS	669.	7.888	11.294	16.171	23.155	33.154	47.471	67.970
KLS'	1.	8.627	8.627	8.627	8.627	8.627	8.627	8.627
KJV	3.	8.492	9.943	11.643	13.634	15.965	18.694	21.890
KJV'	9.	4.694	6.069	7.846	10.144	13.115	16.956	21.922
TRPVS	6.	5.318	6.626	8.255	10.286	12.816	15.968	19.896
TRPVS'	1.	15.864	15.864	15.864	15.864	15.864	15.864	15.864

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Table C-30B

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—Th

Table C-31A

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	48.	6.646	9.325	13.085	18.359	25.760	36.145	50.716
QYF'	803.	6.760	9.118	12.298	16.586	22.370	30.172	40.694
QOF	5.	7.609	9.465	11.775	14.648	18.222	22.668	28.199
QOF'	846.	5.648	7.466	9.869	13.045	17.244	22.795	30.133
QBL'	35.	8.941	10.996	13.523	16.630	20.453	25.153	30.934
QYB'	42.	7.036	9.141	11.876	15.429	20.046	26.044	33.837
QOB'	22.	3.306	6.143	8.981	11.818	14.655	17.493	20.330
QE'	246.	3.193	6.892	10.592	14.291	17.990	21.689	25.388
QOA	79.	5.335	7.237	9.817	13.315	18.061	24.499	33.231
QOA'	309.	5.777	7.235	9.062	11.349	14.214	17.802	22.296
QW	31.	5.406	7.182	8.957	10.732	12.508	14.283	16.058
QW'	119.	3.685	6.807	9.928	13.050	16.172	19.294	22.415
QGC	5.	5.183	8.832	15.047	25.638	43.682	74.425	126.806
QGC'	5.	15.155	18.057	21.515	25.635	30.544	36.393	43.362
QB	45.	7.553	9.004	10.735	12.799	15.260	18.193	21.691
QB'	50.	6.420	7.967	9.885	12.266	15.220	18.885	23.433
QBO	26.	7.603	9.141	10.990	13.213	15.885	19.099	22.962
QBO'	19.	7.490	9.547	12.169	15.510	19.770	25.199	32.118
KI	19.	13.261	17.728	23.699	31.682	42.353	56.618	75.688
KG	103.	6.596	10.436	16.510	26.121	41.326	65.382	103.441
KG'	2.	21.464	22.569	23.730	24.951	26.235	27.585	29.005
KS	391.	9.393	12.508	16.656	22.179	29.534	39.327	52.368
KS'	4.	7.305	9.276	11.779	14.957	18.992	24.116	30.622
KCS	389.	9.557	12.623	16.674	22.025	29.094	38.430	50.763
KCS'	4.	12.786	13.924	15.164	16.514	17.984	19.585	21.329

Table C-31B
St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—U

KLS	432.	7.869	10.548	14.138	18.951	25.401	34.048	45.638
KLS'	1.	14.257	14.257	14.257	14.257	14.257	14.257	14.257
KJV	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KJV'	4.	4.289	6.321	9.317	13.734	20.243	29.837	43.979
TRPVS	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRPVS'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Table C-32A

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	95.	-3.337	18.157	39.651	61.146	82.640	104.134	125.628
QYF'	1493.	-41.186	-9.300	22.585	54.471	86.357	118.242	150.128
QOF	15.	10.993	16.118	23.633	34.652	50.809	74.498	109.232
QOF'	4279.	2.350	4.823	9.900	20.322	41.714	85.626	175.761
QBL'	91.	15.272	32.945	50.618	68.292	85.965	103.638	121.311
QYB'	130.	7.230	13.089	23.695	42.896	77.657	140.586	254.510
QOB'	219.	2.340	4.757	9.668	19.649	39.936	81.169	164.972
QE'	731.	-28.360	-2.166	24.028	50.222	76.416	102.610	128.804
QOA	495.	4.710	7.980	13.519	22.902	38.799	65.730	111.355
QOA'	2744.	4.442	7.153	11.519	18.550	29.872	48.105	77.467
QW	226.	10.380	13.779	18.289	24.277	32.224	42.773	56.776
QW'	348.	5.942	9.977	16.754	28.135	47.244	79.334	133.221
QGC	19.	23.509	37.072	58.463	92.195	145.389	229.276	361.565
QGC'	12.	11.241	16.885	25.363	38.099	57.230	85.968	129.135
QB	126.	7.921	12.870	20.910	33.974	55.200	89.687	145.720
QB'	311.	5.899	9.466	15.190	24.376	39.115	62.766	100.718
QBO	160.	7.695	11.424	16.960	25.178	37.379	55.492	82.383
QBO'	56.	7.009	10.497	15.719	23.541	35.254	52.794	79.063
KI	24.	25.507	46.229	83.788	151.862	275.242	498.862	904.162
KG	150.	12.762	24.845	48.366	94.158	183.303	356.847	694.697
KG'	3.	29.470	38.708	50.842	66.780	87.715	115.212	151.329
KS	572.	16.437	26.896	44.011	72.016	117.842	192.828	315.529
KS'	14.	8.045	12.057	18.072	27.086	40.598	60.849	91.201
KCS	524.	-10.533	23.324	57.181	91.038	124.895	158.752	192.609
KCS'	9.	2.879	5.795	11.661	23.467	47.226	95.039	191.259

Table C-32B

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—K

KLS	676.	-18.254	13.923	46.100	78.277	110.453	142.630	174.807
KLS'	2.	7.282	14.104	27.317	52.909	102.474	198.473	384.406
KJV	7.	9.404	13.150	18.388	25.712	35.955	50.277	70.305
KJV'	11.	11.092	14.589	19.189	25.239	33.196	43.662	57.427
TRPVS	6.	18.234	22.676	28.201	35.071	43.615	54.241	67.456
TRPVS'	1.	38.611	38.611	38.611	38.611	38.611	38.611	38.611

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Table C-33A

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	48.	0.107	0.148	0.207	0.288	0.400	0.557	0.775
QYF'	802.	0.094	0.131	0.183	0.256	0.357	0.500	0.699
QOF	5.	0.139	0.188	0.253	0.341	0.459	0.618	0.832
QOF'	838.	0.086	0.136	0.214	0.339	0.535	0.846	1.336
QBL'	35.	0.098	0.129	0.171	0.226	0.298	0.394	0.521
QYB'	42.	0.068	0.105	0.163	0.252	0.390	0.603	0.932
QOB'	22.	0.052	0.084	0.135	0.216	0.348	0.558	0.897
QE'	246.	0.062	0.096	0.148	0.229	0.354	0.548	0.847
QOA	76.	0.103	0.156	0.237	0.358	0.541	0.819	1.238
QOA'	304.	0.115	0.182	0.286	0.451	0.711	1.120	1.764
QW	31.	0.184	0.240	0.313	0.407	0.531	0.691	0.900
QW'	119.	0.078	0.126	0.204	0.330	0.536	0.869	1.409
QGC	5.	0.073	0.105	0.152	0.218	0.313	0.450	0.647
QGC'	5.	0.141	0.230	0.377	0.618	1.013	1.659	2.718
QB	45.	0.084	0.138	0.226	0.372	0.612	1.007	1.657
QB'	50.	0.091	0.148	0.239	0.387	0.627	1.016	1.645
QBO	26.	0.129	0.196	0.298	0.453	0.688	1.046	1.589
QBO'	19.	0.145	0.234	0.377	0.609	0.984	1.588	2.565
KI	19.	0.065	0.091	0.129	0.182	0.256	0.361	0.509
KG	103.	0.078	0.112	0.161	0.233	0.335	0.483	0.697
KG'	2.	0.243	0.267	0.294	0.323	0.355	0.391	0.429
KS	391.	0.098	0.138	0.193	0.271	0.380	0.533	0.746
KS'	4.	0.211	0.267	0.337	0.427	0.540	0.683	0.863
KCS	389.	0.103	0.137	0.183	0.244	0.326	0.435	0.581
KCS'	4.	0.061	0.116	0.221	0.419	0.795	1.510	2.867

Table C-33B

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—U/K

KLS	431.	0.104	0.137	0.181	0.239	0.315	0.416	0.549
KLS'	1.	0.169	0.169	0.169	0.169	0.169	0.169	0.169
KJV	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KJV'	4.	0.202	0.280	0.388	0.538	0.746	1.033	1.432
TRPVS	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRPVS'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Table C-34A St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	46.	0.346	0.456	0.601	0.791	1.041	1.371	1.805
QYF'	790.	0.350	0.457	0.597	0.780	1.019	1.331	1.740
QOF	4.	0.525	0.644	0.790	0.968	1.187	1.456	1.785
QOF'	755.	0.328	0.460	0.645	0.904	1.267	1.776	2.489
QBL'	35.	0.426	0.518	0.629	0.764	0.929	1.128	1.371
QYB'	41.	0.328	0.451	0.621	0.853	1.173	1.613	2.217
QOB'	19.	0.264	0.371	0.520	0.730	1.025	1.439	2.020
QE'	242.	0.238	0.347	0.505	0.736	1.071	1.560	2.271
QOA	64.	0.413	0.541	0.710	0.932	1.223	1.604	2.105
QOA'	228.	0.441	0.597	0.807	1.092	1.476	1.996	2.700
QW	25.	0.522	0.666	0.851	1.086	1.386	1.769	2.257
QW'	104.	0.324	0.460	0.653	0.926	1.313	1.862	2.642
QGC	5.	0.249	0.346	0.482	0.670	0.933	1.298	1.806
QGC'	3.	0.619	0.805	1.047	1.362	1.772	2.305	2.998
QB	40.	0.196	0.472	0.748	1.023	1.299	1.575	1.851
QB'	39.	0.440	0.591	0.792	1.063	1.425	1.912	2.564
QBO	25.	0.616	0.748	0.908	1.102	1.339	1.625	1.973
QBO'	17.	0.666	0.836	1.050	1.318	1.655	2.078	2.608
KI	19.	0.331	0.399	0.482	0.583	0.704	0.851	1.028
KG	102.	0.246	0.345	0.484	0.679	0.951	1.334	1.871
KG'	2.	0.610	0.710	0.825	0.960	1.116	1.298	1.510
KS	388.	0.344	0.446	0.577	0.747	0.967	1.252	1.622
KS'	4.	0.487	0.608	0.759	0.949	1.185	1.480	1.848
KCS	389.	0.322	0.420	0.547	0.713	0.929	1.211	1.578
KCS'	4.	0.284	0.445	0.697	1.093	1.713	2.686	4.211

KLS	430.	0.366	0.468	0.600	0.767	0.982	1.257	1.609
KLS'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KJV	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KJV'	4.	0.840	1.004	1.201	1.436	1.718	2.054	2.457
TRPVS	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRPVS'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Table C-35A
St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QYF	93.	0.205	0.252	0.311	0.382	0.471	0.580	0.714
QYF'	1306.	0.174	0.217	0.271	0.338	0.423	0.528	0.659
QOF	14.	0.137	0.186	0.253	0.344	0.468	0.637	0.866
QOF'	2715.	0.156	0.211	0.285	0.386	0.522	0.706	0.954
QBL'	91.	0.141	0.197	0.252	0.308	0.364	0.420	0.475
QYB'	120.	0.143	0.186	0.242	0.314	0.409	0.531	0.691
QOB'	109.	0.153	0.199	0.259	0.338	0.440	0.573	0.746
QE'	652.	0.167	0.209	0.261	0.325	0.406	0.507	0.633
QOA	309.	0.160	0.218	0.297	0.406	0.554	0.755	1.031
QOA'	1695.	0.164	0.223	0.302	0.410	0.557	0.756	1.026
QW	183.	0.181	0.230	0.293	0.372	0.473	0.602	0.766
QW'	291.	0.161	0.211	0.275	0.359	0.470	0.613	0.801
QGC	16.	0.147	0.186	0.236	0.299	0.379	0.481	0.610
QGC'	8.	0.130	0.202	0.313	0.486	0.754	1.169	1.813
QB	115.	0.062	0.165	0.267	0.370	0.473	0.576	0.678
QB'	234.	0.135	0.187	0.260	0.360	0.500	0.693	0.962
QBO	129.	0.187	0.243	0.315	0.408	0.530	0.687	0.891
QBO'	48.	0.165	0.229	0.317	0.439	0.608	0.841	1.165
KI	24.	0.161	0.202	0.253	0.318	0.399	0.500	0.627
KG	146.	0.181	0.225	0.278	0.345	0.427	0.530	0.656
KG'	3.	0.203	0.250	0.308	0.379	0.466	0.574	0.706
KS	560.	0.203	0.247	0.301	0.366	0.446	0.544	0.662
KS'	9.	0.251	0.295	0.346	0.406	0.476	0.558	0.655
KCS	521.	0.198	0.238	0.287	0.345	0.415	0.500	0.602
KCS'	6.	0.190	0.249	0.326	0.427	0.560	0.734	0.961

KLS	669.	0.182	0.220	0.265	0.319	0.385	0.465	0.560
KLS'	1.	0.260	0.260	0.260	0.260	0.260	0.260	0.260
KJV	3.	0.314	0.339	0.366	0.395	0.427	0.461	0.497
KJV'	9.	0.251	0.290	0.337	0.390	0.452	0.523	0.606
TRPVS	6.	0.193	0.222	0.255	0.293	0.337	0.388	0.446
TRPVS'	1.	0.411	0.411	0.411	0.411	0.411	0.411	0.411

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Table C-35B

St. Michael, Black, Kwiguk, Hooper Bay, Marshall—Statistical Summary—Th/K

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QH	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QH'	LN	LN	LN	LN	LN	LN
QP	N	LN	N	LN	LN	LN
QP'	LN	LN	LN	LN	LN	LN
K	LN	N	N	LN	LN	LN
KV	N	LN	LN	N	LN	N
KV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
UMZV	LN	LN	N	N	LN	N
UMZV'	LN	LN	N	LN	LN	LN
MZPZ	LN	LN	LN	LN	LN	LN
MZPZ'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QTV	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKV	LN	LN	LN	LN	LN	LN
TKV'	LN	LN	N	LN	LN	LN
TKVF	LN	LN	LN	LN	N	LN
TKH	N	N	N	LN	LN	LN
TKG	LN	N	LN	LN	LN	LN
TKG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-36

Holy Cross—Distribution Types

Table C-37
Holy Cross—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	18.	5.853	7.785	10.355	13.774	18.322	24.371	32.418
QH	10.	9.803	12.135	15.022	18.596	23.020	28.496	35.276
QH'	1096.	4.433	6.906	10.758	16.759	26.108	40.671	63.359
QP	414.	2.771	8.802	14.832	20.863	26.893	32.924	38.954
QP'	434.	3.470	5.456	8.579	13.489	21.211	33.353	52.446
K	904.	4.923	8.924	16.177	29.326	53.162	96.372	174.704
KV	60.	5.574	10.124	14.674	19.223	23.773	28.323	32.872
KV'	2.	12.007	14.974	18.675	23.291	29.047	36.226	45.180
UMZV	358.	8.761	11.783	15.847	21.313	28.664	38.551	51.849
UMZV'	91.	5.774	8.130	11.447	16.118	22.695	31.956	44.995
MZPZ	100.	4.786	7.234	10.932	16.522	24.970	37.738	57.033
MZPZ'	9.	7.442	8.707	10.187	11.919	13.946	16.316	19.090
QTV	15.	6.153	8.354	11.343	15.402	20.913	28.395	38.555
TKV	1092.	7.653	11.289	16.651	24.561	36.228	53.438	78.823
TKV'	59.	6.223	8.837	12.548	17.817	25.299	35.923	51.009
TKVF	314.	3.320	6.636	13.263	26.506	52.974	105.873	211.594
TKH	32.	18.662	30.895	43.128	55.362	67.595	79.828	92.062
TKG	70.	1.622	4.764	13.997	41.125	120.825	354.983	1042.943
TKG'	13.	3.756	5.034	6.747	9.043	12.120	16.243	21.769

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STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	3.	6.718	8.276	10.195	12.559	15.471	19.058	23.477
QH	9.	11.379	12.906	14.639	16.603	18.832	21.359	24.226
QH'	524.	7.084	9.261	12.107	15.827	20.690	27.047	35.358
QP	236.	8.076	10.079	12.579	15.699	19.594	24.454	30.521
QP'	151.	7.800	9.843	12.421	15.675	19.781	24.963	31.502
K	630.	-5.331	5.461	16.253	27.046	37.838	48.630	59.422
KV	30.	8.818	10.578	12.689	15.222	18.261	21.906	26.278
KV'	2.	18.209	18.693	19.189	19.698	20.221	20.758	21.309
UMZV	227.	6.356	8.681	11.857	16.195	22.120	30.212	41.265
UMZV'	43.	7.437	9.382	11.836	14.932	18.838	23.765	29.981
MZPZ	41.	8.006	10.021	12.543	15.700	19.651	24.597	30.787
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QTV	9.	5.897	7.352	9.167	11.431	14.253	17.772	22.159
TKV	786.	6.937	9.652	13.428	18.682	25.992	36.163	50.312
TKV'	28.	7.994	10.163	12.921	16.427	20.885	26.552	33.757
TKVF	207.	6.770	10.053	14.930	22.172	32.926	48.897	72.615
TKH	30.	5.403	14.670	23.937	33.205	42.472	51.739	61.006
TKG	48.	-18.414	6.159	30.732	55.305	79.878	104.451	129.024
TKG'	2.	7.349	8.229	9.213	10.315	11.549	12.931	14.478

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Table C-38
Holy Cross—Statistical Summary—U

Table C-39
Holy Cross—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	18.	11.379	16.681	24.454	35.848	52.552	77.040	112.939
QH	11.	29.906	37.260	46.423	57.840	72.064	89.787	111.867
QH'	1298.	4.217	8.896	18.765	39.582	83.493	176.118	371.500
QP	428.	-1.282	17.784	36.850	55.916	74.982	94.048	113.114
QP'	636.	2.403	5.182	11.175	24.099	51.973	112.087	241.730
K	925.	-60.663	-10.322	40.020	90.361	140.702	191.044	241.385
KV	74.	20.304	29.104	41.718	59.799	85.716	122.866	176.117
KV'	2.	92.816	93.330	93.847	94.367	94.890	95.416	95.944
UMZV	363.	-7.131	18.270	43.671	69.073	94.474	119.876	145.277
UMZV'	99.	-4.813	13.176	31.166	49.156	67.145	85.135	103.124
MZPZ	122.	4.520	9.034	18.054	36.082	72.109	144.108	287.999
MZPZ'	10.	21.650	24.756	28.308	32.370	37.014	42.325	48.398
QTV	15.	16.796	21.938	28.654	37.425	48.882	63.846	83.390
TKV	1103.	16.888	26.199	40.643	63.051	97.812	151.737	235.392
TKV'	81.	-24.928	-3.164	18.599	40.362	62.126	83.889	105.652
TKVF	323.	6.991	15.484	34.295	75.960	168.242	372.636	825.344
TKH	32.	51.793	89.803	127.813	165.823	203.833	241.843	279.853
TKG	74.	2.788	9.068	29.488	95.900	311.875	1014.249	3298.440
TKG'	19.	2.541	4.552	8.155	14.608	26.167	46.874	83.967

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STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	3.	0.164	0.199	0.242	0.294	0.358	0.435	0.529
QH	9.	0.121	0.158	0.206	0.269	0.351	0.458	0.598
QH'	523.	0.088	0.123	0.172	0.241	0.337	0.472	0.661
QP	236.	0.106	0.143	0.194	0.262	0.354	0.479	0.649
QP'	151.	0.100	0.141	0.198	0.278	0.392	0.551	0.776
K	630.	0.107	0.145	0.195	0.262	0.353	0.476	0.641
KV	30.	0.081	0.142	0.204	0.265	0.327	0.388	0.450
KV'	2.	0.197	0.201	0.205	0.209	0.213	0.217	0.222
UMZV	227.	0.041	0.108	0.176	0.244	0.311	0.379	0.447
UMZV'	43.	0.119	0.154	0.201	0.261	0.339	0.440	0.571
MZPZ	41.	0.101	0.135	0.181	0.243	0.325	0.435	0.583
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QTV	9.	0.148	0.191	0.245	0.315	0.405	0.521	0.669
TKV	785.	0.119	0.156	0.205	0.269	0.353	0.464	0.609
TKV'	28.	0.135	0.176	0.229	0.298	0.387	0.504	0.655
TKVF	207.	0.059	0.093	0.147	0.232	0.367	0.581	0.919
TKH	30.	0.084	0.112	0.149	0.198	0.263	0.350	0.464
TKG	48.	0.091	0.127	0.178	0.249	0.349	0.488	0.682
TKG'	2.	0.334	0.373	0.416	0.464	0.519	0.579	0.646

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-40
Holy Cross—Statistical Summary—U/K

Table C-41
Holy Cross—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	3.	0.579	0.667	0.768	0.885	1.019	1.174	1.352
QH	9.	0.502	0.596	0.707	0.840	0.998	1.185	1.407
QH'	516.	0.320	0.425	0.564	0.750	0.996	1.323	1.757
QP	234.	0.353	0.450	0.574	0.731	0.932	1.189	1.516
QP'	149.	0.333	0.444	0.594	0.793	1.059	1.415	1.890
K	628.	0.290	0.390	0.525	0.706	0.950	1.279	1.720
KV	30.	0.349	0.448	0.575	0.739	0.949	1.218	1.564
KV'	2.	0.403	0.516	0.661	0.846	1.083	1.386	1.774
UMZV	227.	0.329	0.430	0.562	0.733	0.958	1.251	1.634
UMZV'	43.	0.360	0.467	0.605	0.784	1.017	1.317	1.707
MZPZ	41.	0.343	0.445	0.578	0.749	0.973	1.262	1.638
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QTV	9.	0.327	0.434	0.577	0.767	1.018	1.353	1.796
TKV	786.	0.335	0.430	0.552	0.708	0.909	1.168	1.499
TKV'	26.	0.393	0.489	0.608	0.757	0.942	1.172	1.459
TKVF	204.	-0.081	0.196	0.473	0.750	1.026	1.303	1.580
TKH	30.	0.268	0.348	0.453	0.588	0.764	0.993	1.291
TKG	48.	0.235	0.334	0.475	0.674	0.958	1.360	1.932
TKG'	2.	0.703	0.863	1.059	1.300	1.596	1.959	2.405

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Table C-42

Holy Cross—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	18.	0.189	0.239	0.303	0.384	0.487	0.618	0.783
QH	10.	0.188	0.223	0.264	0.314	0.372	0.441	0.523
QH'	1096.	0.167	0.212	0.269	0.341	0.432	0.549	0.696
QP	414.	0.194	0.241	0.298	0.369	0.457	0.567	0.702
QP'	433.	0.164	0.219	0.292	0.390	0.520	0.693	0.924
K	904.	0.207	0.252	0.307	0.375	0.457	0.556	0.678
KV	60.	-0.004	0.111	0.226	0.341	0.455	0.570	0.685
KV'	2.	0.125	0.157	0.197	0.247	0.310	0.389	0.488
UMZV	358.	0.124	0.193	0.262	0.332	0.401	0.470	0.539
UMZV'	91.	0.195	0.232	0.276	0.329	0.391	0.465	0.554
MZPZ	100.	0.181	0.229	0.291	0.369	0.468	0.593	0.752
MZPZ'	9.	0.252	0.285	0.323	0.366	0.414	0.469	0.531
QTV	15.	0.265	0.307	0.355	0.412	0.477	0.552	0.639
TKV	1091.	0.212	0.258	0.315	0.384	0.468	0.571	0.696
TKV'	59.	0.193	0.242	0.302	0.378	0.474	0.593	0.742
TKVF	314.	0.187	0.227	0.276	0.335	0.407	0.494	0.600
TKH	32.	0.243	0.271	0.301	0.335	0.372	0.414	0.460
TKG	70.	0.186	0.237	0.302	0.384	0.490	0.625	0.797
TKG'	13.	0.128	0.208	0.338	0.548	0.890	1.446	2.348

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Table C-43
Taylor Mountains—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QH'	N	N	N	LN	LN	LN
QP	N	LN	N	LN	LN	LN
QP'	N	LN	N	LN	LN	LN
TKG	N	N	LN	LN	LN	LN
TKG'	LN	(LN)	LN	(LN)	(LN)	N
K	N	LN	N	LN	LN	LN
K'	N	LN	N	LN	LN	LN
UMZ	LN	LN	LN	LN	N	N
UMZ'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
MZPZ	LN	LN	N	LN	LN	LN
MZPZ'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
LPZ	LN	LN	LN	LN	LN	LN
LPZ'	N	LN	N	N	LN	LN

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-44

Taylor Mountains—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	257.	6.243	10.534	14.825	19.116	23.407	27.698	31.990
QP	360.	-1.285	5.462	12.208	18.955	25.702	32.449	39.195
QP'	1150.	-1.827	4.440	10.706	16.973	23.239	29.505	35.772
TKG	89.	-13.590	4.803	23.197	41.591	59.984	78.378	96.772
TKG'	24.	3.840	5.807	8.782	13.282	20.087	30.378	45.941
K	2639.	2.043	10.269	18.496	26.722	34.948	43.174	51.401
K'	394.	1.893	7.957	14.020	20.083	26.147	32.210	38.273
UMZ	43.	7.294	10.348	14.682	20.829	29.551	41.926	59.482
UMZ'	2.	3.168	5.147	8.362	13.586	22.074	35.864	58.270
MZPZ	309.	7.451	10.569	14.993	21.268	30.169	42.795	60.706
MZPZ'	5.	10.690	12.418	14.426	16.758	19.466	22.613	26.269
LPZ	94.	6.646	8.980	12.134	16.396	22.154	29.935	40.448
LPZ'	68.	2.633	8.724	14.816	20.908	27.000	33.092	39.183

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	141.	2.519	6.885	11.250	15.616	19.981	24.347	28.712
QP	205.	7.029	9.152	11.917	15.516	20.203	26.306	34.252
QP'	574.	6.168	8.249	11.034	14.758	19.739	26.402	35.314
TKG	70.	-0.874	11.161	23.196	35.232	47.267	59.302	71.338
TKG'	11.	3.710	5.410	7.889	11.504	16.775	24.462	35.672
K	1954.	8.446	11.152	14.725	19.443	25.673	33.899	44.761
K'	225.	5.920	8.013	10.845	14.679	19.867	26.889	36.394
UMZ	26.	6.475	8.777	11.898	16.127	21.860	29.631	40.165
UMZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZ	152.	7.196	9.998	13.890	19.299	26.814	37.255	51.761
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LPZ	92.	7.503	10.275	14.070	19.268	26.386	36.133	49.481
LPZ'	42.	8.280	10.296	12.802	15.919	19.795	24.615	30.608

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Table C-45

Taylor Mountains—Statistical Summary—U

Table C-46
Taylor Mountains—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	259.	-5.994	22.611	51.216	79.821	108.426	137.031	165.637
QP	396.	-37.849	-1.058	35.733	72.524	109.315	146.106	182.897
QP'	1418.	-54.120	-16.287	21.545	59.378	97.210	135.043	172.876
TKG	96.	13.545	29.575	64.575	140.994	307.848	672.160	1467.607
TKG'	27.	7.287	13.069	23.440	42.040	75.399	135.229	242.535
K	2723.	-17.869	23.625	65.120	106.614	148.109	189.603	231.098
K'	410.	-11.579	15.019	41.616	68.213	94.810	121.408	148.005
UMZ	43.	32.900	49.738	75.195	113.682	171.867	259.832	392.819
UMZ'	2.	8.054	16.092	32.153	64.245	128.369	256.496	512.505
MZPZ	338.	-4.379	31.308	66.995	102.683	138.370	174.058	209.745
MZPZ'	13.	12.502	19.552	30.579	47.824	74.793	116.972	182.937
LPZ	106.	13.723	19.934	28.955	42.059	61.094	88.743	128.905
LPZ'	68.	1.064	21.373	41.681	61.990	82.298	102.606	122.915

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STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	141.	0.072	0.098	0.133	0.181	0.246	0.335	0.456
QP	205.	0.068	0.096	0.135	0.191	0.270	0.382	0.540
QP'	574.	0.059	0.088	0.130	0.194	0.288	0.427	0.634
TKG	70.	0.074	0.097	0.127	0.167	0.219	0.286	0.375
TKG'	11.	0.098	0.130	0.173	0.230	0.305	0.406	0.540
K	1954.	0.072	0.097	0.130	0.175	0.236	0.318	0.429
K'	225.	0.074	0.104	0.145	0.203	0.285	0.399	0.558
UMZ	26.	0.047	0.065	0.090	0.125	0.173	0.239	0.331
UMZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZ	152.	0.069	0.096	0.133	0.185	0.258	0.358	0.498
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LPZ	90.	0.087	0.153	0.270	0.476	0.839	1.477	2.602
LPZ'	42.	0.088	0.143	0.197	0.252	0.307	0.362	0.417

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Table C-47

Taylor Mountains—Statistical Summary—U/K

Table C-48
Taylor Mountains—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	140.	0.348	0.453	0.589	0.766	0.996	1.296	1.686
QP	205.	0.348	0.457	0.599	0.785	1.030	1.350	1.771
QP'	567.	0.345	0.453	0.595	0.781	1.026	1.348	1.771
TKG	70.	0.380	0.477	0.599	0.751	0.943	1.183	1.484
TKG'	10.	0.361	0.471	0.616	0.804	1.051	1.373	1.793
K	1950.	0.318	0.417	0.547	0.717	0.940	1.232	1.616
K'	224.	0.284	0.386	0.524	0.712	0.967	1.313	1.784
UMZ	26.	0.196	0.368	0.540	0.712	0.885	1.057	1.229
UMZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZ	149.	0.337	0.460	0.627	0.854	1.164	1.586	2.162
MZPZ'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LPZ	78.	0.267	0.440	0.724	1.191	1.960	3.225	5.306
LPZ'	42.	0.351	0.447	0.569	0.724	0.921	1.173	1.493

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STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QH'	257.	0.123	0.155	0.195	0.245	0.308	0.388	0.488
QP	360.	0.110	0.146	0.193	0.257	0.342	0.454	0.603
QP'	1150.	0.103	0.141	0.192	0.262	0.357	0.486	0.662
TKG	89.	0.135	0.161	0.192	0.230	0.274	0.327	0.391
TKG'	24.	0.147	0.189	0.231	0.273	0.315	0.357	0.399
K	2639.	0.130	0.162	0.202	0.252	0.315	0.393	0.491
K'	394.	0.154	0.191	0.236	0.292	0.361	0.447	0.553
UMZ	43.	0.064	0.105	0.146	0.188	0.229	0.270	0.311
UMZ'	2.	0.114	0.140	0.172	0.211	0.260	0.320	0.393
MZPZ	309.	0.093	0.123	0.163	0.215	0.283	0.374	0.494
MZPZ'	5.	0.215	0.232	0.249	0.268	0.289	0.311	0.335
LPZ	94.	0.179	0.230	0.294	0.377	0.483	0.618	0.792
LPZ'	68.	0.193	0.233	0.282	0.342	0.414	0.502	0.608

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Table C-49
Taylor Mountains—Statistical Summary—Th/K

Table C-50A
Coleen—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q	LN	LN	LN	LN	LN	LN
Q'	N	N	N	LN	LN	LN
QTG	LN	N	LN	LN	N	N
QTG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QTV	N	N	LN	LN	LN	LN
QTV'	N	N	N	N	N	LN
TC	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJS	LN	N	LN	N	N	LN
JQS	LN	N	LN	N	LN	LN
JM	LN	N	LN	LN	LN	N
JM'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JQSS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JSC	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JSC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JPC	LN	N	LN	LN	N	LN
JPC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JPS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TRS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TRS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PSC	LN	LN	LN	LN	N	N
PCL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
ML	LN	LN	LN	LN	LN	N
MK'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

MSS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
MSQ	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
MDK	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
CSS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
CGR	LN	LN	N	LN	LN	N
CGR'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
RHY	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
DLS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
DD	LN	LN	LN	LN	LN	N
DD'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
DL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZAL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZP	LN	LN	N	LN	N	LN
PZD	LN	LN	LN	N	LN	N
PZCD	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZL'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZQ	LN	LN	LN	LN	N	LN
PZM	N	N	N	N	LN	N
SOCL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

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N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-50B

Coleen—Distribution Types

Table C-51A
Coleen—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1610.	10.751	16.391	24.991	38.103	58.094	88.573	135.044
Q'	1327.	-6.053	8.164	22.380	36.597	50.813	65.030	79.247
QTG	24.	11.282	16.506	24.150	35.334	51.696	75.636	110.662
QTG'	12.	13.040	17.141	22.532	29.620	38.936	51.183	67.281
QTV	52.	10.810	20.231	29.652	39.073	48.494	57.915	67.336
QTV'	97.	13.820	23.831	33.841	43.852	53.863	63.873	73.884
TC	13.	23.549	27.455	32.008	37.316	43.505	50.719	59.131
TC'	20.	20.523	26.302	33.708	43.200	55.364	70.953	90.932
KJS	23.	17.698	23.562	31.371	41.766	55.607	74.034	98.567
JQS	35.	40.014	51.196	65.503	83.807	107.227	137.191	175.528
JM	299.	10.255	14.004	19.124	26.116	35.663	48.702	66.507
JM'	14.	8.248	13.156	20.987	33.478	53.404	85.189	135.891
JQSS	14.	34.330	43.184	54.320	68.328	85.948	108.112	135.992
JSC	10.	17.116	21.321	26.560	33.085	41.214	51.339	63.953
JSC'	3.	28.883	31.414	34.167	37.161	40.418	43.960	47.813
JPC	61.	8.945	12.860	18.490	26.584	38.221	54.953	79.009
JPC'	1.	50.630	50.630	50.630	50.630	50.630	50.630	50.630
JPS	11.	23.832	28.995	35.276	42.918	52.215	63.526	77.288
PS'	2.	33.636	33.865	34.095	34.326	34.559	34.794	35.030
TRS	4.	32.141	33.123	34.135	35.177	36.252	37.359	38.500
TRS'	1.	20.529	20.529	20.529	20.529	20.529	20.529	20.529
PSC	146.	12.257	16.251	21.547	28.570	37.881	50.226	66.594
PCL	11.	10.848	14.377	19.056	25.257	33.475	44.368	58.806
ML	45.	6.063	9.104	13.671	20.529	30.827	46.292	69.514
MK'	2.	14.802	16.879	19.247	21.948	25.028	28.540	32.545

MSS	4.	31.853	33.926	36.135	38.487	40.993	43.661	46.503
MSQ	1.	35.460	35.460	35.460	35.460	35.460	35.460	35.460
MDK	4.	40.018	44.289	49.014	54.244	60.033	66.438	73.528
CSS'	3.	25.351	28.737	32.575	36.926	41.858	47.448	53.786
CGR	244.	59.677	78.490	103.233	135.776	178.578	234.873	308.915
CGR'	4.	77.343	85.785	95.148	105.534	117.053	129.829	144.001
RHY	10.	28.538	46.894	77.058	126.624	208.072	341.911	561.840
DLS	8.	7.811	10.854	15.083	20.960	29.126	40.473	56.242
DD	40.	6.976	11.183	17.927	28.739	46.070	73.855	118.396
DD'	19.	9.636	12.793	16.985	22.549	29.937	39.744	52.765
DL	5.	7.316	9.423	12.137	15.633	20.136	25.936	33.407
PZAL	1.	54.050	54.050	54.050	54.050	54.050	54.050	54.050
PZP	27.	26.474	40.141	60.862	92.280	139.916	212.142	321.653
PZD	41.	17.200	21.291	26.355	32.623	40.382	49.986	61.875
PZCD	4.	7.867	11.292	16.207	23.263	33.391	47.927	68.792
PZL	3.	24.455	27.666	31.299	35.409	40.058	45.318	51.269
PZL'	3.	30.354	31.974	33.679	35.476	37.368	39.362	41.461
PZS	3.	33.249	38.439	44.439	51.377	59.397	68.669	79.389
PZQ	155.	19.535	25.374	32.958	42.809	55.604	72.224	93.812
PZM	118.	10.854	39.460	68.065	96.671	125.276	153.882	182.488
SOCL	12.	13.337	14.918	16.686	18.663	20.874	23.348	26.115

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Table C-51B
Coleen—Statistical Summary—Th

Table C-52A
Coleen—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1467.	5.679	8.535	12.827	19.278	28.973	43.545	65.446
Q'	1227.	-0.178	6.533	13.244	19.955	26.666	33.377	40.088
QTG	23.	2.950	8.980	15.010	21.040	27.071	33.101	39.131
QTG'	11.	7.129	9.953	13.896	19.401	27.087	37.817	52.798
QTV	51.	7.447	12.167	16.887	21.607	26.327	31.047	35.767
QTV'	86.	1.075	7.341	13.607	19.873	26.139	32.405	38.671
TC	13.	6.666	9.203	12.706	17.541	24.217	33.434	46.159
TC'	19.	9.657	12.554	16.319	21.214	27.576	35.848	46.599
KJS	22.	0.290	8.921	17.552	26.182	34.813	43.444	52.075
JQS	32.	2.541	13.186	23.832	34.478	45.124	55.770	66.416
JM	213.	1.675	6.225	10.776	15.326	19.877	24.427	28.977
JM'	11.	6.706	9.635	13.844	19.890	28.578	41.060	58.993
JQSS	13.	12.062	16.028	21.299	28.304	37.613	49.982	66.420
JSC	10.	10.595	12.912	15.736	19.178	23.372	28.484	34.714
JSC'	3.	21.451	22.609	23.829	25.114	26.469	27.898	29.403
JPC	48.	1.725	6.848	11.971	17.094	22.217	27.340	32.463
JPC'	1.	24.412	24.412	24.412	24.412	24.412	24.412	24.412
JPS	11.	8.120	10.275	13.003	16.454	20.821	26.346	33.339
PS'	2.	9.397	10.852	12.532	14.472	16.713	19.300	22.287
TRS	4.	13.707	14.870	16.132	17.502	18.987	20.599	22.347
TRS'	1.	12.849	12.849	12.849	12.849	12.849	12.849	12.849
PSC	109.	4.201	6.396	9.739	14.828	22.577	34.374	52.336
PCL	11.	11.629	14.033	16.935	20.436	24.660	29.758	35.911
ML	33.	6.071	8.066	10.716	14.237	18.915	25.131	33.388
MK'	2.	3.627	4.779	6.298	8.299	10.936	14.410	18.989

Table C-52B
Coleen—Statistical Summary—U

MSS	3.	3.653	5.732	8.995	14.117	22.153	34.765	54.556
MSQ	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MDK	3.	10.551	12.345	14.444	16.899	19.772	23.133	27.066
CSS'	2.	6.244	8.880	12.628	17.960	25.542	36.326	51.662
CGR	243.	17.837	24.906	34.776	48.557	67.800	94.669	132.185
CGR'	4.	21.374	24.931	29.079	33.917	39.560	46.142	53.819
RHY	10.	8.423	17.370	35.819	73.864	152.317	314.098	647.711
DLS	8.	17.298	20.086	23.324	27.084	31.450	36.519	42.406
DD	34.	6.629	9.549	13.756	19.815	28.544	41.119	59.232
DD'	15.	4.034	6.900	11.802	20.188	34.530	59.063	101.025
DL	5.	10.262	12.041	14.128	16.576	19.449	22.820	26.775
PZAL	1.	27.779	27.779	27.779	27.779	27.779	27.779	27.779
PZP	26.	6.565	12.157	22.512	41.688	77.196	142.948	264.707
PZD	34.	5.153	7.279	10.281	14.521	20.510	28.969	40.916
PZCD	3.	8.567	10.820	13.664	17.256	21.793	27.523	34.758
PZL	3.	8.167	10.565	13.666	17.678	22.867	29.579	38.262
PZL'	3.	5.966	7.783	10.154	13.248	17.284	22.549	29.419
PZS	3.	11.019	15.079	20.636	28.241	38.648	52.890	72.380
PZQ	141.	8.123	11.032	14.984	20.351	27.640	37.540	50.986
PZM	104.	0.258	9.631	19.004	28.377	37.750	47.123	56.496
SOCL	2.	14.250	15.298	16.423	17.631	18.927	20.319	21.813

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Table C-53A
Coleen—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1616.	21.596	34.817	56.130	90.492	145.888	235.197	379.177
Q'	1363.	-26.728	9.920	46.568	83.215	119.863	156.511	193.158
QTG	24.	25.116	37.612	56.326	84.350	126.318	189.167	283.286
QTG'	12.	24.238	36.031	53.561	79.619	118.356	175.939	261.537
QTV	52.	39.796	51.931	67.766	88.430	115.395	150.582	196.498
QTV'	97.	23.954	60.185	96.416	132.647	168.878	205.109	241.341
TC	13.	54.285	62.950	72.998	84.651	98.163	113.832	132.002
TC'	20.	49.599	66.672	89.622	120.472	161.940	217.683	292.614
KJS	23.	34.969	51.124	74.741	109.268	159.746	233.542	341.429
JQS	35.	99.924	129.761	168.505	218.819	284.156	369.001	479.181
JM	301.	30.482	40.792	54.589	73.053	97.761	130.826	175.076
JM'	14.	53.954	67.069	83.372	103.637	128.829	160.144	199.071
JQSS	14.	113.805	142.260	177.829	222.292	277.873	347.350	434.198
JSC	10.	30.858	44.067	62.931	89.870	128.340	183.278	261.734
JSC'	3.	69.484	75.855	82.811	90.406	98.696	107.747	117.627
JPC	61.	25.374	36.481	52.450	75.410	108.419	155.879	224.112
JPC'	1.	169.716	169.716	169.716	169.716	169.716	169.716	169.716
JPS	11.	50.540	63.548	79.903	100.468	126.325	158.838	199.718
PS'	2.	82.472	88.890	95.807	103.262	111.297	119.958	129.292
TRS	4.	68.228	75.235	82.961	91.481	100.876	111.236	122.660
TRS'	1.	52.707	52.707	52.707	52.707	52.707	52.707	52.707
PSC	146.	32.198	43.762	59.478	80.838	109.869	149.325	202.952
PCL	11.	21.583	29.844	41.268	57.065	78.909	109.113	150.879
ML	46.	17.233	25.478	37.670	55.694	82.343	121.743	179.996
MK'	2.	23.881	29.709	36.959	45.979	57.199	71.158	88.524

Table C-53B

Coleen—Statistical Summary—K

MSS	4.	70.706	79.554	89.509	100.709	113.312	127.491	143.444
MSQ	1.	76.719	76.719	76.719	76.719	76.719	76.719	76.719
MDK	4.	116.127	126.895	138.662	151.519	165.569	180.922	197.698
CSS'	3.	38.426	47.168	57.898	71.070	87.238	107.084	131.445
CGR	244.	81.592	174.944	268.297	361.651	455.004	548.357	641.710
CGR'	4.	128.876	171.183	227.377	302.018	401.162	532.852	707.771
RHY	10.	82.191	130.275	206.491	327.296	518.775	822.276	1303.336
DLS	11.	24.095	30.756	39.258	50.111	63.963	81.644	104.214
DD	40.	15.455	25.398	41.737	68.588	112.714	185.226	304.389
DD'	19.	25.008	35.015	49.027	68.645	96.115	134.578	188.431
DL	5.	17.521	24.720	34.876	49.204	69.420	97.941	138.181
PZAL	1.	163.131	163.131	163.131	163.131	163.131	163.131	163.131
PZP	27.	4.075	92.528	180.980	269.433	357.885	446.338	534.790
PZD	41.	37.691	49.075	63.898	83.197	108.326	141.044	183.645
PZCD	4.	8.250	15.110	27.675	50.690	92.842	170.048	311.457
PZL	3.	36.993	50.101	67.853	91.895	124.456	168.555	228.279
PZL'	3.	86.335	97.446	109.987	124.142	140.118	158.151	178.504
PZS	3.	113.372	120.572	128.230	136.374	145.036	154.248	164.044
PZQ	155.	52.315	70.289	94.440	126.888	170.484	229.060	307.762
PZM	118.	20.918	91.906	162.894	233.882	304.870	375.858	446.846
SOCL	16.	17.974	23.107	29.706	38.190	49.097	63.119	81.145

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Table C-54A
Coleen—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1466.	0.060	0.091	0.137	0.207	0.313	0.472	0.711
Q'	1226.	0.081	0.115	0.164	0.234	0.334	0.476	0.679
QTG	23.	0.077	0.113	0.165	0.240	0.352	0.514	0.751
QTG'	11.	0.074	0.106	0.153	0.221	0.318	0.459	0.661
QTV	51.	0.108	0.140	0.181	0.235	0.305	0.395	0.512
QTV'	86.	-0.008	0.047	0.102	0.157	0.212	0.267	0.322
TC	13.	0.100	0.127	0.162	0.207	0.264	0.338	0.431
TC'	19.	0.070	0.095	0.127	0.172	0.231	0.311	0.418
KJS	22.	0.012	0.087	0.162	0.238	0.313	0.388	0.464
JQS	32.	-0.009	0.047	0.104	0.160	0.216	0.273	0.329
JM	213.	0.070	0.098	0.137	0.193	0.270	0.378	0.529
JM'	11.	0.062	0.089	0.127	0.183	0.263	0.377	0.542
JQSS	13.	0.078	0.092	0.108	0.126	0.148	0.174	0.204
JSC	10.	0.049	0.080	0.131	0.213	0.348	0.566	0.923
JSC'	3.	0.187	0.213	0.244	0.278	0.317	0.361	0.412
JPC	48.	0.054	0.084	0.131	0.203	0.316	0.492	0.765
JPC'	1.	0.144	0.144	0.144	0.144	0.144	0.144	0.144
JPS	11.	0.079	0.101	0.129	0.164	0.208	0.265	0.338
PS'	2.	0.073	0.090	0.113	0.140	0.174	0.217	0.270
TRS	4.	0.130	0.148	0.168	0.191	0.218	0.247	0.281
TRS'	1.	0.244	0.244	0.244	0.244	0.244	0.244	0.244
PSC	109.	0.055	0.081	0.118	0.173	0.254	0.372	0.545
PCL	11.	0.111	0.164	0.242	0.358	0.529	0.783	1.158
ML	33.	0.076	0.113	0.171	0.256	0.385	0.579	0.869
MK'	2.	0.152	0.161	0.170	0.180	0.191	0.203	0.215

Table C-54B
Coleen—Statistical Summary—U/K

MSS	3.	0.029	0.049	0.081	0.135	0.224	0.372	0.618
MSQ	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MDK	3.	0.055	0.070	0.089	0.113	0.144	0.184	0.234
CSS'	2.	0.089	0.121	0.165	0.225	0.306	0.417	0.568
CGR	243.	0.047	0.067	0.097	0.139	0.200	0.287	0.412
CGR'	4.	0.042	0.058	0.081	0.112	0.156	0.216	0.299
RHY	10.	0.037	0.067	0.123	0.226	0.413	0.758	1.388
DLS	8.	0.182	0.260	0.372	0.532	0.760	1.088	1.555
DD	34.	0.117	0.155	0.206	0.273	0.362	0.479	0.636
DD'	15.	0.057	0.102	0.180	0.319	0.565	1.001	1.773
DL	5.	0.109	0.159	0.231	0.337	0.491	0.715	1.042
PZAL	1.	0.170	0.170	0.170	0.170	0.170	0.170	0.170
PZP	26.	0.052	0.076	0.112	0.163	0.239	0.350	0.513
PZD	34.	-0.002	0.058	0.118	0.178	0.239	0.299	0.359
PZCD	3.	0.065	0.107	0.175	0.287	0.470	0.770	1.263
PZL	3.	0.061	0.090	0.132	0.192	0.281	0.412	0.602
PZL'	3.	0.034	0.050	0.073	0.107	0.156	0.228	0.334
PZS	3.	0.079	0.109	0.150	0.207	0.286	0.394	0.544
PZQ	141.	0.053	0.076	0.110	0.159	0.229	0.331	0.478
PZM	104.	0.015	0.051	0.086	0.122	0.158	0.193	0.229
SOCL	2.	0.440	0.464	0.490	0.516	0.545	0.574	0.606

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Table C-55A
Coleen—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1465.	0.169	0.242	0.346	0.494	0.706	1.009	1.441
Q'	1217.	0.202	0.280	0.387	0.537	0.744	1.031	1.428
QTG	23.	0.076	0.251	0.427	0.602	0.778	0.953	1.129
QTG'	11.	0.189	0.283	0.423	0.632	0.945	1.414	2.114
QTV	51.	0.286	0.355	0.441	0.548	0.680	0.844	1.048
QTV'	86.	0.071	0.198	0.326	0.453	0.580	0.708	0.835
TC	13.	0.221	0.285	0.366	0.470	0.604	0.776	0.998
TC'	19.	0.272	0.329	0.399	0.483	0.585	0.709	0.859
KJS	22.	0.213	0.344	0.474	0.604	0.734	0.865	0.995
JQS	32.	0.138	0.196	0.276	0.390	0.550	0.777	1.097
JM	212.	0.194	0.271	0.377	0.526	0.733	1.022	1.425
JM'	11.	0.322	0.378	0.443	0.519	0.608	0.713	0.835
JQSS	13.	0.169	0.227	0.304	0.407	0.545	0.731	0.979
JSC	10.	0.203	0.288	0.409	0.580	0.822	1.167	1.656
JSC'	3.	0.449	0.515	0.590	0.676	0.774	0.887	1.017
JPC	48.	-0.012	0.190	0.393	0.595	0.798	1.000	1.203
JPC'	1.	0.482	0.482	0.482	0.482	0.482	0.482	0.482
JPS	11.	0.156	0.210	0.284	0.383	0.518	0.699	0.945
PS'	2.	0.269	0.312	0.363	0.422	0.490	0.569	0.661
TRS	4.	0.399	0.429	0.462	0.498	0.536	0.577	0.621
TRS'	1.	0.626	0.626	0.626	0.626	0.626	0.626	0.626
PSC	109.	0.023	0.188	0.354	0.520	0.685	0.851	1.017
PCL	11.	0.293	0.411	0.577	0.809	1.135	1.593	2.234
ML	32.	0.182	0.283	0.441	0.688	1.072	1.671	2.605
MK'	2.	0.245	0.283	0.327	0.378	0.437	0.505	0.583

Table C-55B Coleen—Statistical Summary—U/Th

MSS	3.	0.096	0.152	0.239	0.377	0.595	0.939	1.481
MSQ	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MDK	3.	0.153	0.195	0.250	0.319	0.408	0.521	0.666
CSS'	2.	0.208	0.271	0.352	0.457	0.594	0.772	1.003
CGR	243.	0.131	0.183	0.256	0.357	0.499	0.696	0.972
CGR'	4.	0.165	0.206	0.258	0.321	0.401	0.500	0.624
RHY	10.	0.132	0.217	0.356	0.583	0.957	1.569	2.573
DLS	6.	0.316	0.493	0.770	1.201	1.874	2.924	4.562
DD	34.	0.256	0.348	0.474	0.645	0.878	1.196	1.628
DD'	15.	0.147	0.275	0.516	0.967	1.812	3.397	6.367
DL	5.	0.428	0.579	0.783	1.060	1.435	1.942	2.628
PZAL	1.	0.514	0.514	0.514	0.514	0.514	0.514	0.514
PZP	26.	0.080	0.210	0.339	0.468	0.597	0.727	0.856
PZD	34.	0.184	0.245	0.325	0.432	0.575	0.764	1.015
PZCD	3.	0.265	0.367	0.509	0.705	0.976	1.353	1.874
PZL	3.	0.240	0.307	0.391	0.499	0.637	0.813	1.037
PZL'	3.	0.148	0.201	0.274	0.373	0.509	0.694	0.945
PZS	3.	0.331	0.392	0.464	0.550	0.651	0.770	0.912
PZQ	141.	0.094	0.224	0.355	0.485	0.616	0.747	0.877
PZM	104.	0.125	0.163	0.213	0.277	0.361	0.470	0.612
SOCL	2.	0.515	0.629	0.769	0.940	1.149	1.405	1.717

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Table C-56A
Coleen—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	1609.	0.229	0.280	0.343	0.419	0.513	0.627	0.768
Q'	1327.	0.243	0.295	0.357	0.433	0.526	0.638	0.773
QTG	24.	0.250	0.307	0.365	0.423	0.481	0.538	0.596
QTG'	12.	0.169	0.220	0.286	0.372	0.484	0.630	0.819
QTV	52.	0.289	0.330	0.377	0.430	0.491	0.560	0.640
QTV'	97.	0.186	0.226	0.275	0.336	0.409	0.498	0.606
TC	13.	0.355	0.382	0.410	0.441	0.474	0.509	0.547
TC'	20.	0.171	0.219	0.280	0.359	0.459	0.587	0.751
KJS	23.	0.206	0.253	0.311	0.382	0.470	0.578	0.711
JQS	35.	0.224	0.268	0.320	0.383	0.458	0.547	0.654
JM	299.	0.125	0.205	0.285	0.365	0.445	0.525	0.605
JM'	14.	0.109	0.157	0.225	0.323	0.464	0.666	0.957
JQSS	14.	0.157	0.197	0.246	0.307	0.384	0.481	0.601
JSC	10.	0.217	0.259	0.309	0.368	0.439	0.523	0.624
JSC'	3.	0.328	0.354	0.381	0.411	0.443	0.478	0.515
JPC	61.	0.179	0.225	0.281	0.353	0.442	0.553	0.693
JPC'	1.	0.298	0.298	0.298	0.298	0.298	0.298	0.298
JPS	11.	0.275	0.318	0.369	0.427	0.495	0.574	0.665
PS'	2.	0.270	0.290	0.310	0.332	0.356	0.382	0.409
TRS	4.	0.294	0.322	0.352	0.385	0.420	0.460	0.502
TRS'	1.	0.389	0.389	0.389	0.389	0.389	0.389	0.389
PSC	146.	0.128	0.206	0.284	0.361	0.439	0.517	0.595
PCL	11.	0.283	0.329	0.381	0.443	0.513	0.596	0.691
ML	45.	0.125	0.209	0.293	0.377	0.461	0.546	0.630
MK'	2.	0.368	0.401	0.438	0.477	0.521	0.568	0.620

MSS	4.	0.245	0.284	0.330	0.382	0.443	0.514	0.596
MSQ	1.	0.462	0.462	0.462	0.462	0.462	0.462	0.462
MDK	4.	0.338	0.345	0.351	0.358	0.365	0.372	0.379
CSS'	3.	0.384	0.425	0.470	0.520	0.574	0.635	0.702
CGR	244.	0.118	0.212	0.306	0.400	0.494	0.588	0.682
CGR'	4.	0.187	0.230	0.284	0.349	0.431	0.531	0.654
RHY	10.	0.257	0.295	0.338	0.387	0.443	0.508	0.582
DLS	8.	0.260	0.306	0.360	0.424	0.498	0.586	0.690
DD	40.	0.130	0.230	0.330	0.430	0.530	0.630	0.730
DD'	19.	0.160	0.204	0.259	0.328	0.417	0.530	0.673
DL	5.	0.219	0.248	0.281	0.318	0.360	0.407	0.461
PZAL	1.	0.331	0.331	0.331	0.331	0.331	0.331	0.331
PZP	27.	0.205	0.248	0.299	0.361	0.435	0.525	0.634
PZD	41.	0.210	0.272	0.335	0.397	0.460	0.522	0.585
PZCD	4.	0.196	0.260	0.345	0.459	0.610	0.811	1.077
PZL	3.	0.220	0.265	0.320	0.385	0.465	0.560	0.676
PZL'	3.	0.209	0.232	0.257	0.286	0.317	0.352	0.391
PZS	3.	0.233	0.273	0.321	0.377	0.442	0.519	0.610
PZQ	155.	0.174	0.217	0.271	0.337	0.421	0.524	0.653
PZM	118.	0.180	0.260	0.340	0.420	0.500	0.580	0.660
SOCL	12.	0.242	0.308	0.391	0.497	0.632	0.803	1.021

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Table C-56B
Coleen—Statistical Summary—Th/K

Table C-57
Black River—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QAL	LN	LN	LN	LN	LN	LN
QAL'	LN	N	N	LN	LN	LN
QT	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QT'	N	N	N	N	N	N
QL	N	N	N	LN	LN	LN
QL'	N	N	N	LN	LN	LN
QTB	LN	LN	LN	N	LN	LN
QTB'	LN	LN	LN	LN	N	N
QTS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KQ	LN	(LN)	N	(LN)	(LN)	LN
KQ'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJS	N	N	LN	N	N	N
PQ	LN	LN	LN	LN	LN	LN
PCS	N	N	LN	LN	LN	N
PCS'	LN	N	N	N	N	LN
DL	LN	LN	LN	LN	LN	N
DCL	LN	LN	LN	LN	LN	LN
DCL'	LN	LN	LN	LN	LN	LN
SL	LN	LN	LN	LN	LN	N
COL	LN	LN	LN	LN	LN	LN
COL'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PCP	LN	N	LN	LN	LN	LN
PCP'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-58
Black River—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	76.	11.072	15.005	20.334	27.557	37.345	50.610	68.587
QAL'	509.	8.565	12.763	19.017	28.336	42.222	62.913	93.744
QT	7.	21.738	25.371	29.612	34.562	40.339	47.082	54.951
QT'	265.	-3.469	10.897	25.263	39.629	53.995	68.361	82.727
QL	1567.	15.046	24.431	33.815	43.200	52.584	61.969	71.353
QL'	628.	0.056	13.046	26.036	39.026	52.016	65.006	77.996
QTB	40.	14.140	18.562	24.366	31.986	41.988	55.117	72.352
QTB'	28.	15.011	20.195	27.169	36.551	49.174	66.155	89.001
QTS'	5.	9.885	13.101	17.364	23.013	30.501	40.425	53.577
KQ	24.	24.501	29.418	35.322	42.410	50.921	61.140	73.409
KQ'	4.	22.431	26.432	31.146	36.701	43.246	50.958	60.046
KJS	57.	16.470	25.666	34.863	44.059	53.256	62.452	71.649
PQ	285.	20.935	25.957	32.184	39.904	49.477	61.346	76.063
PCS	89.	-10.555	5.743	22.040	38.337	54.634	70.931	87.228
PCS'	41.	11.042	15.600	22.041	31.141	43.998	62.163	87.828
DL	97.	8.120	11.067	15.084	20.557	28.017	38.185	52.042
DCL	413.	8.226	12.675	19.530	30.092	46.366	71.443	110.081
DCL'	88.	13.769	19.136	26.595	36.962	51.370	71.394	99.224
SL	50.	7.405	10.505	14.903	21.142	29.992	42.548	60.359
COL	46.	10.233	12.864	16.171	20.329	25.556	32.126	40.386
COL'	3.	17.508	18.989	20.595	22.337	24.226	26.275	28.497
PCP	389.	11.119	17.396	27.218	42.586	66.629	104.247	163.103
PCP'	6.	17.630	21.854	27.089	33.578	41.622	51.592	63.951

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Table C-59

Black River—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	69.	4.200	6.359	9.628	14.578	22.071	33.417	50.595
QAL'	461.	-4.779	2.261	9.301	16.340	23.380	30.420	37.459
QT	7.	6.180	8.784	12.486	17.747	25.225	35.855	50.964
QT'	254.	-3.572	4.486	12.544	20.601	28.659	36.717	44.774
QL	1554.	2.143	8.645	15.148	21.651	28.153	34.656	41.158
QL'	589.	-0.143	6.748	13.639	20.530	27.421	34.312	41.203
QTB	38.	7.838	10.515	14.107	18.926	25.390	34.063	45.699
QTB'	28.	7.477	10.037	13.474	18.087	24.280	32.592	43.751
QTS'	5.	10.148	11.665	13.408	15.412	17.715	20.362	23.405
KQ	20.	7.084	9.835	13.654	18.955	26.315	36.532	50.717
KQ'	4.	3.654	5.391	7.954	11.734	17.311	25.540	37.679
KJS	56.	2.241	9.108	15.974	22.841	29.707	36.574	43.441
PQ	273.	7.193	10.001	13.905	19.333	26.880	37.374	51.964
PCS	90.	-1.296	6.771	14.838	22.905	30.971	39.038	47.105
PCS'	39.	3.629	9.285	14.941	20.597	26.253	31.908	37.564
DL	87.	4.350	6.551	9.866	14.859	22.379	33.704	50.760
DCL	396.	5.716	8.504	12.653	18.825	28.008	41.671	61.999
DCL'	81.	4.714	7.342	11.435	17.811	27.743	43.212	67.306
SL	42.	5.264	7.794	11.541	17.088	25.301	37.462	55.469
COL	39.	5.999	8.304	11.497	15.916	22.035	30.505	42.231
COL'	2.	3.300	5.036	7.686	11.729	17.901	27.320	41.695
PCP	326.	-2.619	6.319	15.256	24.193	33.131	42.068	51.006
PCP'	6.	8.664	10.265	12.161	14.407	17.068	20.220	23.954

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STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	76.	32.260	43.105	57.595	76.958	102.829	137.398	183.587
QAL'	518.	-29.747	8.059	45.864	83.670	121.475	159.281	197.086
QT	7.	44.842	57.008	72.475	92.139	117.136	148.916	189.319
QT'	273.	-17.225	23.783	64.791	105.799	146.806	187.814	228.822
QL	1568.	31.677	56.996	82.315	107.634	132.953	158.272	183.591
QL'	641.	-15.110	22.294	59.697	97.100	134.504	171.907	209.311
QTB	40.	29.489	40.490	55.594	76.332	104.807	143.904	197.585
QTB'	28.	36.428	51.957	74.106	105.698	150.757	215.025	306.690
QTS'	5.	49.550	57.374	66.433	76.922	89.067	103.130	119.414
KQ	24.	31.665	64.955	98.246	131.536	164.826	198.116	231.407
KQ'	4.	41.934	53.777	68.965	88.442	113.419	145.451	186.528
KJS	57.	60.540	76.604	96.930	122.649	155.193	196.372	248.477
PQ	285.	50.246	63.506	80.266	101.449	128.222	162.060	204.829
PCS	90.	17.177	28.949	48.789	82.227	138.580	233.555	393.621
PCS'	43.	-18.673	11.516	41.704	71.892	102.081	132.269	162.458
DL	112.	14.840	21.632	31.534	45.967	67.007	97.677	142.386
DCL	425.	16.166	26.426	43.196	70.609	115.417	188.662	308.389
DCL'	88.	31.690	44.961	63.790	90.503	128.404	182.176	258.467
SL	55.	15.916	23.549	34.844	51.555	76.280	112.865	166.995
COL	49.	21.956	28.405	36.746	47.538	61.498	79.559	102.923
COL'	3.	38.608	42.778	47.399	52.518	58.191	64.477	71.442
PCP	389.	23.988	40.954	69.919	119.369	203.793	347.927	593.999
PCP'	6.	47.146	56.227	67.057	79.974	95.377	113.748	135.657

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Table C-61

Black River—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	69.	0.058	0.086	0.128	0.191	0.283	0.422	0.627
QAL'	458.	0.051	0.078	0.119	0.183	0.282	0.433	0.666
QT	7.	0.045	0.074	0.119	0.193	0.312	0.505	0.817
QT'	254.	-0.031	0.045	0.121	0.197	0.273	0.349	0.425
QL	1553.	0.075	0.103	0.142	0.196	0.271	0.374	0.516
QL'	588.	0.071	0.100	0.142	0.202	0.286	0.406	0.577
QTB	38.	0.058	0.124	0.190	0.257	0.323	0.389	0.456
QTB'	28.	0.053	0.078	0.116	0.171	0.253	0.374	0.553
QTS'	5.	0.148	0.164	0.181	0.200	0.221	0.245	0.270
KQ	20.	0.046	0.067	0.099	0.145	0.213	0.312	0.459
KQ'	4.	0.084	0.098	0.114	0.133	0.155	0.180	0.210
KJS	56.	0.010	0.068	0.126	0.185	0.243	0.301	0.360
PQ	273.	0.068	0.096	0.135	0.190	0.268	0.377	0.530
PCS	90.	0.095	0.133	0.185	0.259	0.362	0.505	0.706
PCS'	39.	0.000	0.103	0.206	0.309	0.412	0.515	0.618
DL	86.	0.086	0.131	0.199	0.304	0.464	0.708	1.081
DCL	394.	0.064	0.102	0.162	0.257	0.409	0.649	1.032
DCL'	81.	0.046	0.074	0.118	0.188	0.301	0.481	0.770
SL	39.	0.059	0.105	0.186	0.329	0.582	1.030	1.823
COL	39.	0.123	0.172	0.242	0.340	0.477	0.670	0.940
COL'	2.	0.042	0.073	0.126	0.216	0.371	0.638	1.098
PCP	326.	0.055	0.082	0.122	0.181	0.269	0.401	0.597
PCP'	6.	0.091	0.114	0.144	0.180	0.226	0.284	0.356

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Table C-62
Black River—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	69.	0.173	0.252	0.368	0.536	0.781	1.139	1.661
QAL'	457.	0.145	0.219	0.332	0.503	0.762	1.155	1.750
QT	7.	0.175	0.251	0.359	0.513	0.735	1.052	1.506
QT'	251.	0.012	0.182	0.352	0.522	0.692	0.862	1.032
QL	1552.	0.188	0.258	0.354	0.487	0.669	0.920	1.265
QL'	585.	0.190	0.263	0.365	0.506	0.702	0.973	1.348
QTB	38.	0.285	0.363	0.463	0.591	0.754	0.962	1.227
QTB'	28.	0.151	0.271	0.392	0.512	0.632	0.752	0.872
QTS'	5.	0.352	0.436	0.540	0.670	0.830	1.028	1.274
KQ	20.	0.181	0.241	0.323	0.431	0.576	0.770	1.029
KQ'	4.	0.161	0.202	0.254	0.320	0.402	0.506	0.636
KJS	56.	0.000	0.176	0.351	0.526	0.702	0.877	1.053
PQ	273.	0.188	0.258	0.354	0.485	0.665	0.912	1.251
PCS	89.	0.278	0.363	0.475	0.621	0.811	1.060	1.385
PCS'	38.	0.043	0.255	0.467	0.679	0.890	1.102	1.314
DL	77.	0.182	0.285	0.448	0.702	1.100	1.725	2.705
DCL	387.	0.162	0.252	0.393	0.611	0.951	1.479	2.301
DCL'	81.	0.128	0.197	0.302	0.463	0.709	1.087	1.667
SL	37.	0.145	0.260	0.466	0.834	1.494	2.675	4.788
COL	38.	0.341	0.454	0.603	0.802	1.067	1.419	1.888
COL'	2.	0.133	0.213	0.341	0.548	0.879	1.410	2.262
PCP	326.	0.192	0.267	0.369	0.512	0.709	0.982	1.361
PCP'	6.	0.207	0.264	0.337	0.429	0.547	0.697	0.889

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-63

Black River—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	76.	0.232	0.268	0.310	0.358	0.414	0.478	0.552
QAL'	509.	0.214	0.256	0.306	0.367	0.439	0.526	0.629
QT	7.	0.184	0.233	0.296	0.375	0.476	0.603	0.764
QT'	265.	0.184	0.246	0.308	0.370	0.432	0.494	0.555
QL	1567.	0.285	0.320	0.359	0.403	0.452	0.508	0.570
QL'	627.	0.250	0.292	0.341	0.399	0.466	0.544	0.636
QTB	40.	0.259	0.304	0.357	0.419	0.492	0.577	0.677
QTB'	28.	0.134	0.208	0.282	0.355	0.429	0.503	0.577
QTS'	5.	0.184	0.217	0.255	0.299	0.352	0.413	0.486
KQ	24.	0.186	0.226	0.275	0.334	0.406	0.493	0.598
KQ'	4.	0.322	0.350	0.381	0.415	0.452	0.492	0.535
KJS	57.	0.209	0.258	0.306	0.355	0.403	0.452	0.500
PQ	285.	0.254	0.294	0.340	0.393	0.455	0.527	0.610
PCS	89.	0.217	0.285	0.354	0.422	0.491	0.559	0.627
PCS'	41.	0.287	0.333	0.385	0.447	0.518	0.600	0.695
DL	97.	0.159	0.254	0.348	0.443	0.538	0.632	0.727
DCL	413.	0.231	0.282	0.343	0.418	0.510	0.621	0.756
DCL'	88.	0.248	0.293	0.346	0.408	0.482	0.570	0.673
SL	49.	0.065	0.180	0.295	0.410	0.524	0.639	0.754
COL	46.	0.237	0.287	0.348	0.422	0.511	0.620	0.751
COL'	3.	0.279	0.321	0.370	0.425	0.489	0.563	0.648
PCP	389.	0.195	0.239	0.292	0.357	0.436	0.533	0.651
PCP'	6.	0.286	0.325	0.370	0.420	0.477	0.542	0.616

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q'	N	N	N	LN	LN	LN
QH'	N	N	N	LN	LN	N
QO	N	N	N	LN	LN	LN
QO'	N	N	LN	LN	LN	LN
JPV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-64
Fort Yukon—Distribution Types

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2167.	-2.516	11.303	25.122	38.942	52.761	66.580	80.400
QH'	1116.	-1.947	12.168	26.282	40.397	54.512	68.627	82.741
QO	98.	18.103	25.320	32.538	39.755	46.972	54.190	61.407
QO'	1153.	-2.121	11.019	24.160	37.300	50.440	63.581	76.721
JPV'	3.	9.584	15.242	24.240	38.550	61.307	97.501	155.060

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-66

Fort Yukon—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2061.	-3.516	4.425	12.366	20.306	28.247	36.188	44.128
QH'	1082.	-1.574	5.646	12.865	20.084	27.304	34.523	41.742
QO	97.	3.512	8.658	13.805	18.951	24.098	29.244	34.390
QO'	1055.	-3.140	4.214	11.568	18.921	26.275	33.629	40.982
JPV'	3.	9.101	12.339	16.729	22.680	30.749	41.688	56.519

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-67
Fort Yukon—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2210.	-21.295	21.965	65.225	108.484	151.744	195.004	238.263
QH'	1130.	-5.859	35.457	76.773	118.089	159.406	200.722	242.038
QO	98.	46.085	63.929	81.773	99.617	117.461	135.305	153.149
QO'	1154.	23.467	36.381	56.403	87.442	135.563	210.167	325.827
JPV'	3.	51.061	67.083	88.132	115.786	152.117	199.848	262.555

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2059.	0.058	0.084	0.121	0.175	0.252	0.364	0.525
QH'	1082.	0.056	0.080	0.114	0.162	0.231	0.329	0.468
QO	97.	0.072	0.098	0.134	0.184	0.253	0.346	0.475
QO'	1055.	0.066	0.094	0.134	0.191	0.272	0.387	0.551
JPV'	3.	0.175	0.182	0.189	0.196	0.203	0.211	0.219

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-68
Fort Yukon—Statistical Summary—U/K

Table C-69
Fort Yukon—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2054.	0.166	0.238	0.342	0.491	0.705	1.012	1.454
QH'	1080.	0.159	0.230	0.333	0.482	0.698	1.010	1.462
QO	97.	0.174	0.241	0.333	0.461	0.639	0.885	1.225
QO'	1055.	0.170	0.241	0.341	0.482	0.682	0.965	1.366
JPV'	3.	0.356	0.421	0.498	0.588	0.696	0.823	0.973

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q'	2167.	0.206	0.248	0.298	0.359	0.431	0.519	0.624
QH'	1116.	0.152	0.215	0.278	0.342	0.405	0.469	0.532
QO	98.	0.298	0.328	0.362	0.399	0.439	0.484	0.534
QO'	1153.	0.246	0.289	0.339	0.398	0.467	0.549	0.644
JPV'	3.	0.180	0.221	0.271	0.333	0.409	0.501	0.615

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-70
Fort Yukon—Statistical Summary—Th/K

Table C-71A
Beaver—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QAL	LN	N	LN	N	N	LN
QAL'	N	N	N	LN	LN	LN
QSM	LN	LN	LN	LN	LN	N
QSM'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QS'	N	N	N	N	N	N
QAF	LN	LN	LN	N	N	LN
QAF'	N	N	N	LN	N	LN
QF	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QF'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QAT	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QAT'	N	N	N	LN	N	LN
QL	N	N	N	N	LN	N
QL'	N	N	N	N	LN	LN
QTG	N	N	LN	N	LN	N
QTG'	LN	N	N	LN	N	LN
TS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKR	LN	N	N	N	LN	N
KG	LN	N	N	LN	N	N
JPV	N	N	LN	LN	LN	N
JPC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
MZPZG	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
DSS	N	LN	LN	LN	N	N
DG	LN	N	N	LN	N	N
DG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
DH	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

DP	LN	LN	LN	LN	LN	LN
PZM	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZS	LN	LN	LN	LN	N	LN
PZQ	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZQG	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZC	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
UNMAPPED	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-71B
Beaver—Distribution Types

Table C-72A
Beaver—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	13.276	19.174	27.693	39.997	57.767	83.433	120.502
QAL'	727.	-3.883	8.344	20.572	32.800	45.028	57.256	69.484
QSM	140.	15.844	21.647	29.577	40.410	55.213	75.437	103.069
QSM'	8.	20.814	26.741	34.357	44.142	56.713	72.864	93.615
QS'	55.	-4.598	8.551	21.700	34.849	47.998	61.147	74.295
QAF	29.	8.081	14.094	24.581	42.872	74.774	130.415	227.460
QAF'	291.	-8.145	4.901	17.948	30.994	44.041	57.087	70.133
QF	6.	20.826	26.030	32.534	40.663	50.823	63.522	79.393
QF'	17.	25.846	31.343	38.009	46.092	55.895	67.782	82.198
QAT	4.	29.660	32.817	36.309	40.174	44.449	49.180	54.414
QAT'	620.	-5.826	6.748	19.321	31.895	44.469	57.042	69.616
QL	214.	9.842	18.323	26.805	35.286	43.768	52.250	60.731
QL'	49.	3.895	14.805	25.714	36.624	47.533	58.443	69.352
QTG	887.	1.182	13.998	26.815	39.631	52.448	65.265	78.081
QTG'	284.	10.373	15.194	22.255	32.599	47.750	69.943	102.450
TS	8.	26.092	29.047	32.337	35.999	40.076	44.615	49.668
TKR	30.	6.255	12.481	24.902	49.686	99.136	197.802	394.663
KG	481.	18.802	31.456	52.626	88.043	147.297	246.429	412.277
JPV	136.	6.237	15.621	25.004	34.387	43.770	53.154	62.537
JPC'	1.	27.547	27.547	27.547	27.547	27.547	27.547	27.547
MZPZG	12.	17.875	22.770	29.005	36.948	47.066	59.954	76.372
DSS	82.	9.034	22.491	35.949	49.407	62.864	76.322	89.779
DG	149.	14.898	20.431	28.018	38.423	52.692	72.260	99.095
DG'	1.	60.468	60.468	60.468	60.468	60.468	60.468	60.468
DH	5.	36.227	45.581	57.349	72.157	90.788	114.229	143.723

DP	40.	17.795	23.351	30.641	40.206	52.758	69.229	90.841
PZM	13.	17.871	21.860	26.740	32.709	40.011	48.943	59.868
PZS	396.	14.357	22.090	33.988	52.296	80.464	123.805	190.490
PZQ	4.	27.069	30.820	35.090	39.953	45.489	51.792	58.969
PZQG	18.	11.279	15.390	21.000	28.656	39.102	53.355	72.805
PZC	2.	23.902	26.693	29.809	33.289	37.175	41.515	46.362
UNMAPPED	19.	11.033	17.253	26.980	42.189	65.973	103.165	161.324

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Table C-73A

Beaver—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	-1.860	6.031	13.922	21.812	29.703	37.594	45.484
QAL'	677.	-2.828	3.948	10.724	17.501	24.277	31.054	37.830
QSM	135.	5.154	7.931	12.203	18.776	28.890	44.452	68.397
QSM'	8.	10.066	13.569	18.290	24.654	33.233	44.798	60.386
QS'	54.	-4.424	3.032	10.488	17.943	25.399	32.855	40.311
QAF	28.	2.798	5.237	9.804	18.353	34.357	64.316	120.399
QAF'	270.	-6.897	0.392	7.682	14.972	22.261	29.551	36.841
QF	6.	3.995	6.183	9.569	14.809	22.919	35.470	54.894
QF'	17.	9.483	12.952	17.691	24.163	33.003	45.077	61.568
QAT	3.	9.187	11.358	14.040	17.357	21.457	26.525	32.791
QAT'	572.	-4.411	2.840	10.090	17.341	24.592	31.842	39.093
QL	199.	-1.269	5.023	11.315	17.606	23.898	30.190	36.481
QL'	46.	-2.806	3.971	10.749	17.526	24.303	31.081	37.858
QTG	844.	-2.231	4.764	11.759	18.754	25.749	32.744	39.739
QTG'	254.	-3.266	3.014	9.294	15.574	21.854	28.134	34.414
TS	8.	10.848	13.978	18.012	23.209	29.906	38.535	49.654
TKR	29.	-28.935	-9.733	9.470	28.673	47.875	67.078	86.281
KG	472.	-22.134	-0.542	21.050	42.642	64.234	85.827	107.419
JPV	112.	-0.055	5.286	10.627	15.967	21.308	26.648	31.989
JPC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZG	12.	10.291	12.383	14.900	17.928	21.572	25.957	31.233
DSS	82.	4.913	7.445	11.284	17.102	25.919	39.282	59.534
DG	144.	-6.237	1.954	10.146	18.338	26.530	34.721	42.913
DG'	1.	28.525	28.525	28.525	28.525	28.525	28.525	28.525
DH	5.	28.415	30.635	33.029	35.610	38.393	41.393	44.627

DP	39.	8.395	11.181	14.892	19.835	26.418	35.185	46.862
PZM	14.	3.446	5.868	9.995	17.023	28.992	49.379	84.100
PZS	385.	4.309	7.775	14.029	25.315	45.679	82.426	148.734
PZQ	4.	21.454	21.894	22.342	22.801	23.268	23.745	24.232
PZQG	16.	3.131	5.202	8.643	14.359	23.856	39.634	65.847
PZC	2.	9.045	11.317	14.160	17.716	22.166	27.734	34.701
UNMAPPED	20.	3.667	5.888	9.452	15.175	24.362	39.112	62.791

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-74A
Beaver—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	26.331	40.642	62.731	96.825	149.450	230.676	356.048
QAL'	750.	-22.952	14.778	52.509	90.240	127.971	165.702	203.432
QSM	140.	26.580	39.482	58.645	87.109	129.390	192.192	285.476
QSM'	8.	35.375	46.507	61.141	80.381	105.675	138.929	182.647
QS'	58.	-18.165	13.534	45.232	76.931	108.629	140.328	172.027
QAF	29.	18.750	32.380	55.917	96.564	166.757	287.974	497.304
QAF'	309.	-25.440	5.117	35.673	66.230	96.787	127.344	157.901
QF	6.	34.851	45.335	58.974	76.717	99.797	129.820	168.876
QF'	17.	45.811	60.101	78.848	103.444	135.713	178.047	233.586
QAT	4.	49.451	68.267	94.241	130.098	179.598	247.932	342.266
QAT'	634.	-22.743	11.231	45.206	79.180	113.155	147.129	181.103
QL	215.	25.769	44.931	64.093	83.255	102.417	121.579	140.741
QL'	49.	22.653	41.020	59.387	77.753	96.120	114.487	132.853
QTG	887.	27.263	39.857	58.269	85.186	124.537	182.066	266.169
QTG'	285.	-6.564	21.653	49.869	78.085	106.302	134.518	162.735
TS	8.	48.292	57.662	68.850	82.209	98.160	117.205	139.946
TKR	30.	-184.201	-64.943	54.315	173.573	292.832	412.090	531.348
KG	481.	-136.952	2.122	141.196	280.270	419.344	558.417	697.491
JPV	136.	26.623	36.740	50.701	69.969	96.558	133.251	183.889
JPC'	1.	65.661	65.661	65.661	65.661	65.661	65.661	65.661
MZPZG	12.	21.161	33.108	51.802	81.051	126.815	198.419	310.452
DSS	82.	41.708	56.920	77.679	106.009	144.670	197.432	269.437
DG	149.	5.395	33.874	62.354	90.834	119.314	147.794	176.274
DG'	1.	115.106	115.106	115.106	115.106	115.106	115.106	115.106
DH	5.	137.653	150.704	164.993	180.637	197.763	216.514	237.042

DP	40.	34.310	48.236	67.814	95.339	134.035	188.438	264.922
PZM	13.	28.064	40.280	57.814	82.979	119.099	170.942	245.351
PZS	397.	31.826	52.845	87.743	145.690	241.904	401.659	666.917
PZQ	4.	78.013	84.366	91.237	98.666	106.701	115.390	124.787
PZQG	18.	33.377	45.952	63.265	87.100	119.914	165.091	227.289
PZC	2.	87.657	90.852	94.164	97.596	101.153	104.840	108.662
UNMAPPED	20.	22.926	37.613	61.707	101.236	166.086	272.479	447.025

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Table C-74B

Beaver—Statistical Summary—K

Table C-75A

Beaver—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	-0.069	0.032	0.133	0.234	0.335	0.436	0.537
QAL'	676.	0.053	0.079	0.119	0.180	0.271	0.408	0.614
QSM	135.	0.066	0.097	0.144	0.214	0.317	0.471	0.698
QSM'	8.	0.150	0.190	0.242	0.307	0.390	0.495	0.628
QS'	54.	0.036	0.097	0.158	0.220	0.281	0.342	0.404
QAF	28.	0.033	0.088	0.143	0.198	0.253	0.307	0.362
QAF'	269.	0.053	0.082	0.128	0.198	0.306	0.475	0.735
QF	6.	0.049	0.078	0.122	0.193	0.305	0.481	0.759
QF'	17.	0.104	0.136	0.178	0.234	0.306	0.400	0.524
QAT	3.	0.025	0.043	0.072	0.121	0.203	0.342	0.576
QAT'	569.	0.056	0.086	0.131	0.200	0.306	0.467	0.713
QL	199.	0.018	0.081	0.143	0.205	0.268	0.330	0.392
QL'	46.	-0.006	0.069	0.144	0.219	0.294	0.369	0.444
QTG	844.	-0.023	0.056	0.135	0.215	0.294	0.373	0.453
QTG'	254.	0.056	0.085	0.128	0.192	0.289	0.434	0.653
TS	8.	0.105	0.146	0.203	0.282	0.392	0.546	0.759
TKR	29.	0.015	0.065	0.114	0.163	0.213	0.262	0.311
KG	472.	0.040	0.063	0.097	0.151	0.234	0.362	0.562
JPV	112.	0.058	0.089	0.137	0.211	0.325	0.501	0.771
JPC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZG	12.	0.054	0.086	0.138	0.221	0.355	0.570	0.914
DSS	82.	0.047	0.071	0.107	0.161	0.243	0.368	0.555
DG	144.	0.042	0.069	0.114	0.188	0.310	0.511	0.842
DG'	1.	0.248	0.248	0.248	0.248	0.248	0.248	0.248
DH	5.	0.161	0.172	0.184	0.197	0.211	0.226	0.242

DP	39.	0.063	0.093	0.139	0.207	0.307	0.457	0.680
PZM	13.	0.062	0.092	0.136	0.200	0.295	0.435	0.641
PZS	385.	0.052	0.077	0.115	0.172	0.257	0.383	0.572
PZQ	4.	0.174	0.191	0.210	0.231	0.254	0.280	0.307
PZQG	16.	0.024	0.045	0.084	0.158	0.297	0.559	1.052
PZC	2.	0.103	0.125	0.150	0.182	0.219	0.264	0.319
UNMAPPED	20.	0.040	0.063	0.097	0.150	0.232	0.359	0.557

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Table C-75B
Beaver—Statistical Summary—U/K

Table C-76A

Beaver—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	-0.107	0.116	0.339	0.562	0.786	1.009	1.232
QAL'	674.	0.145	0.219	0.332	0.503	0.763	1.156	1.752
QSM	135.	0.157	0.225	0.322	0.462	0.661	0.947	1.356
QSM'	8.	0.319	0.385	0.464	0.559	0.673	0.811	0.977
QS'	54.	0.100	0.238	0.375	0.512	0.649	0.787	0.924
QAF	28.	0.035	0.172	0.309	0.446	0.584	0.721	0.858
QAF'	265.	-0.076	0.109	0.295	0.480	0.666	0.852	1.037
QF	6.	0.126	0.180	0.256	0.364	0.518	0.737	1.049
QF'	17.	0.213	0.287	0.388	0.524	0.708	0.956	1.291
QAT	3.	0.166	0.230	0.318	0.440	0.609	0.843	1.166
QAT'	564.	-0.013	0.172	0.356	0.541	0.725	0.910	1.094
QL	199.	0.173	0.240	0.334	0.464	0.645	0.897	1.247
QL'	46.	0.149	0.213	0.305	0.436	0.624	0.892	1.275
QTG	844.	0.132	0.199	0.298	0.449	0.674	1.013	1.523
QTG'	253.	-0.038	0.129	0.296	0.464	0.631	0.798	0.966
TS	8.	0.241	0.335	0.464	0.645	0.895	1.242	1.725
TKR	29.	0.186	0.247	0.329	0.438	0.584	0.777	1.035
KG	472.	0.023	0.162	0.301	0.441	0.580	0.719	0.858
JPV	112.	0.157	0.221	0.313	0.442	0.624	0.881	1.244
JPC'	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MZPZG	12.	0.245	0.308	0.386	0.485	0.609	0.765	0.960
DSS	82.	-0.025	0.112	0.248	0.385	0.521	0.658	0.794
DG	144.	-0.051	0.116	0.283	0.450	0.618	0.785	0.952
DG'	1.	0.472	0.472	0.472	0.472	0.472	0.472	0.472
DH	5.	0.284	0.342	0.411	0.494	0.593	0.713	0.857

DP	39.	0.163	0.235	0.340	0.490	0.708	1.023	1.477
PZM	13.	0.146	0.221	0.335	0.507	0.768	1.163	1.760
PZS	384.	0.003	0.173	0.342	0.511	0.680	0.849	1.018
PZQ	4.	0.375	0.431	0.496	0.571	0.657	0.755	0.869
PZQG	16.	0.105	0.174	0.288	0.477	0.791	1.309	2.168
PZC	2.	0.195	0.273	0.381	0.532	0.744	1.039	1.452
UNMAPPED	19.	0.114	0.166	0.243	0.354	0.516	0.753	1.097

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Table C-77A

Beaver—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	24.	0.220	0.271	0.335	0.413	0.510	0.629	0.776
QAL'	726.	0.174	0.221	0.281	0.357	0.454	0.577	0.733
QSM	140.	0.207	0.295	0.384	0.472	0.561	0.649	0.737
QSM'	8.	0.431	0.467	0.506	0.549	0.596	0.646	0.700
QS'	55.	0.257	0.315	0.372	0.430	0.487	0.545	0.602
QAF	29.	0.272	0.320	0.377	0.444	0.523	0.615	0.724
QAF'	291.	0.238	0.294	0.362	0.447	0.551	0.679	0.838
QF	6.	0.349	0.401	0.461	0.530	0.609	0.700	0.805
QF'	17.	0.287	0.332	0.385	0.446	0.516	0.597	0.692
QAT	4.	0.127	0.171	0.230	0.309	0.415	0.558	0.749
QAT'	619.	0.222	0.270	0.328	0.399	0.485	0.590	0.717
QL	214.	0.246	0.306	0.365	0.424	0.483	0.542	0.601
QL'	49.	0.250	0.307	0.376	0.461	0.565	0.693	0.850
QTG	887.	0.164	0.259	0.355	0.451	0.547	0.643	0.739
QTG'	284.	0.244	0.298	0.365	0.447	0.546	0.669	0.818
TS	8.	0.240	0.293	0.358	0.438	0.535	0.655	0.800
TKR	30.	0.181	0.242	0.302	0.362	0.423	0.483	0.544
KG	481.	0.129	0.209	0.289	0.370	0.450	0.531	0.611
JPV	136.	0.176	0.278	0.381	0.483	0.586	0.688	0.791
JPC'	1.	0.420	0.420	0.420	0.420	0.420	0.420	0.420
MZPZG	12.	0.179	0.245	0.334	0.456	0.622	0.849	1.159
DSS	82.	0.145	0.250	0.355	0.460	0.565	0.670	0.775
DG	149.	0.168	0.264	0.360	0.456	0.552	0.647	0.743
DG'	1.	0.525	0.525	0.525	0.525	0.525	0.525	0.525
DH	5.	0.263	0.302	0.347	0.399	0.459	0.528	0.608

DP	40.	0.277	0.319	0.367	0.422	0.485	0.558	0.642
PZM	13.	0.202	0.252	0.315	0.394	0.493	0.616	0.770
PZS	396.	0.197	0.240	0.293	0.358	0.437	0.533	0.651
PZQ	4.	0.292	0.326	0.363	0.405	0.451	0.503	0.561
PZQG	18.	0.191	0.229	0.274	0.329	0.395	0.473	0.568
PZC	2.	0.220	0.255	0.295	0.341	0.395	0.457	0.529
UNMAPPED	19.	0.227	0.274	0.330	0.398	0.480	0.578	0.697

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Table C-77B
Beaver—Statistical Summary—Th/K

Table C-78
Bettles—Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q	N	N	LN	LN	LN	N
Q'	N	N	N	LN	N	LN
QTB'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKV	N	N	N	LN	LN	LN
TKV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KQC	LN	LN	LN	LN	LN	N
KQC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KIC	LN	N	N	LN	LN	N
KIC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KGM	LN	N	LN	N	N	N
KGM'	N	N	LN	LN	LN	LN
KG	LN	LN	N	LN	N	LN
KG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KV	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JPV	LN	LN	LN	LN	N	LN
JPV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
JPU	LN	LN	LN	N	N	N
JPU'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZM	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZP	N	N	LN	LN	LN	LN
PZP'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZS	LN	N	LN	LN	LN	LN
PZQ	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-79
Bettles—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	489.	2.743	15.273	27.802	40.332	52.862	65.392	77.922
Q'	1976.	-7.585	5.048	17.681	30.315	42.948	55.581	68.215
QTB'	4.	28.565	32.629	37.270	42.572	48.628	55.546	63.448
TKV	202.	20.168	36.470	52.773	69.075	85.378	101.680	117.983
TKV'	14.	31.698	40.111	50.757	64.230	81.278	102.851	130.150
KQC	33.	19.445	24.528	30.939	39.026	49.226	62.092	78.321
KQC'	10.	24.121	27.370	31.056	35.239	39.985	45.371	51.481
KIC	99.	8.063	12.174	18.382	27.754	41.904	63.270	95.529
KIC'	3.	31.793	34.683	37.836	41.275	45.026	49.119	53.583
KGM	408.	16.257	21.996	29.761	40.268	54.485	73.720	99.746
KGM'	35.	2.574	15.538	28.502	41.465	54.429	67.393	80.357
KG	355.	17.474	32.636	60.956	113.850	212.642	397.158	741.786
KG'	17.	8.078	16.951	35.572	74.647	156.646	328.720	689.818
KV	4.	25.846	33.381	43.113	55.682	71.915	92.880	119.958
KV'	2.	45.880	46.555	47.241	47.936	48.642	49.358	50.085
JPV	201.	4.127	7.490	13.597	24.680	44.799	81.318	147.608
JPV'	9.	12.353	16.177	21.185	27.742	36.330	47.575	62.302
JPU	32.	11.563	14.275	17.623	21.757	26.860	33.161	40.939
JPU'	4.	7.160	10.100	14.246	20.094	28.344	39.980	56.393
PZM	3.	11.780	19.823	33.359	56.137	94.469	158.976	267.530
PZP	145.	6.785	19.383	31.981	44.579	57.177	69.775	82.373
PZP'	9.	26.879	31.817	37.662	44.580	52.770	62.464	73.939
PZS	417.	12.487	18.894	28.588	43.255	65.448	99.026	149.833
PZQ	11.	16.260	19.240	22.767	26.941	31.879	37.723	44.639

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Table C-80

Bettles—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	464.	0.021	7.008	13.995	20.982	27.969	34.957	41.944
Q'	1853.	-8.554	-0.466	7.623	15.712	23.801	31.890	39.978
QTB'	4.	17.459	18.190	18.952	19.746	20.573	21.435	22.333
TKV	199.	1.702	11.656	21.610	31.564	41.518	51.472	61.427
TKV'	14.	10.465	14.318	19.591	26.806	36.677	50.183	68.663
KQC	27.	6.366	9.028	12.805	18.160	25.756	36.529	51.808
KQC'	9.	14.354	17.013	20.165	23.902	28.330	33.579	39.801
KIC	73.	-1.507	5.252	12.011	18.770	25.529	32.288	39.047
KIC'	2.	6.334	7.794	9.591	11.803	14.524	17.872	21.993
KGM	353.	-0.615	6.785	14.185	21.586	28.986	36.386	43.786
KGM'	36.	1.990	8.363	14.736	21.108	27.481	33.854	40.227
KG	347.	6.048	12.463	25.682	52.922	109.057	224.733	463.107
KG'	17.	1.980	4.962	12.431	31.143	78.026	195.485	489.764
KV	4.	9.047	12.690	17.799	24.967	35.020	49.122	68.902
KV'	2.	20.842	23.671	26.885	30.534	34.680	39.387	44.735
JPV	160.	0.404	1.250	3.869	11.982	37.101	114.883	355.736
JPV'	9.	1.313	2.872	6.285	13.752	30.089	65.835	144.049
JPU	31.	1.603	3.503	7.653	16.720	36.528	79.803	174.344
JPU'	4.	5.521	7.760	10.908	15.333	21.553	30.296	42.587
PZM	3.	16.602	22.064	29.323	38.971	51.792	68.833	91.479
PZP	141.	0.240	7.300	14.360	21.420	28.480	35.540	42.600
PZP'	9.	18.900	20.928	23.173	25.659	28.412	31.460	34.835
PZS	392.	-12.330	-0.451	11.429	23.308	35.188	47.068	58.947
PZQ	11.	2.123	3.615	6.158	10.488	17.865	30.429	51.829

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STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	490.	31.997	44.136	60.879	83.974	115.830	159.772	220.383
Q'	2059.	-32.581	0.396	33.374	66.351	99.329	132.306	165.284
QTB'	4.	67.476	74.152	81.488	89.551	98.411	108.147	118.847
TKV	202.	31.059	78.113	125.166	172.220	219.274	266.328	313.381
TKV'	14.	73.738	92.168	115.203	143.995	179.984	224.967	281.192
KQC	33.	30.687	43.083	60.488	84.923	119.229	167.394	235.016
KQC'	10.	44.908	54.486	66.107	80.207	97.313	118.069	143.251
KIC	111.	26.307	47.042	67.777	88.512	109.247	129.982	150.717
KIC'	3.	51.500	62.251	75.246	90.953	109.939	132.888	160.628
KGM	408.	44.322	59.841	80.793	109.081	147.274	198.840	268.460
KGM'	35.	30.825	43.916	62.566	89.137	126.992	180.923	257.758
KG	355.	-158.643	-0.890	156.862	314.614	472.366	630.119	787.871
KG'	17.	20.787	42.392	86.450	176.298	359.526	733.183	1495.186
KV	4.	70.321	84.221	100.867	120.804	144.682	173.279	207.528
KV'	2.	92.322	97.457	102.878	108.600	114.640	121.016	127.746
JPV	228.	11.334	20.082	35.581	63.043	111.700	197.913	350.666
JPV'	9.	26.732	35.247	46.476	61.282	80.804	106.546	140.487
JPU	32.	18.645	25.657	35.307	48.586	66.859	92.005	126.609
JPU'	4.	22.132	26.469	31.657	37.862	45.283	54.158	64.773
PZM	3.	35.407	61.954	108.406	189.686	331.907	580.763	1016.205
PZP	146.	34.046	49.798	72.837	106.535	155.824	227.916	333.361
PZP'	9.	70.914	80.791	92.042	104.860	119.464	136.101	155.056
PZS	418.	32.068	49.615	76.763	118.767	183.755	284.303	439.870
PZQ	11.	43.969	55.022	68.853	86.161	107.819	134.923	168.839

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STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	464.	0.082	0.116	0.164	0.232	0.329	0.467	0.661
Q'	1827.	0.030	0.058	0.109	0.207	0.392	0.742	1.406
QTB'	4.	0.151	0.171	0.194	0.221	0.250	0.284	0.322
TKV	199.	0.072	0.098	0.134	0.181	0.246	0.335	0.454
TKV'	14.	0.095	0.119	0.149	0.186	0.233	0.292	0.366
KQC	27.	0.055	0.086	0.136	0.215	0.339	0.536	0.846
KQC'	9.	0.161	0.196	0.240	0.294	0.359	0.439	0.537
KIC	73.	0.038	0.065	0.110	0.188	0.321	0.547	0.932
KIC'	2.	0.057	0.077	0.105	0.144	0.196	0.266	0.362
KGM	353.	0.006	0.069	0.133	0.196	0.260	0.323	0.387
KGM'	35.	0.101	0.132	0.172	0.225	0.293	0.382	0.498
KG	347.	0.043	0.071	0.118	0.194	0.321	0.530	0.875
KG'	17.	0.057	0.084	0.121	0.177	0.257	0.373	0.543
KV	4.	0.103	0.130	0.164	0.207	0.261	0.329	0.414
KV'	2.	0.226	0.243	0.261	0.281	0.303	0.325	0.350
JPV	159.	0.016	0.035	0.077	0.171	0.380	0.845	1.878
JPV'	9.	0.017	0.041	0.096	0.224	0.525	1.230	2.880
JPU	31.	-0.342	-0.078	0.186	0.449	0.713	0.976	1.240
JPU'	4.	0.167	0.225	0.302	0.405	0.544	0.730	0.979
PZM	3.	0.086	0.115	0.154	0.205	0.275	0.367	0.490
PZP	141.	0.057	0.084	0.125	0.185	0.275	0.407	0.603
PZP'	9.	0.178	0.198	0.220	0.245	0.272	0.303	0.337
PZS	392.	0.042	0.066	0.104	0.164	0.258	0.407	0.641
PZQ	11.	0.034	0.052	0.080	0.122	0.186	0.283	0.432

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Table C-82
Bettles—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	464.	0.192	0.265	0.365	0.503	0.693	0.955	1.317
Q'	1798.	-0.150	0.074	0.298	0.522	0.745	0.969	1.193
QTB'	4.	0.284	0.334	0.394	0.464	0.546	0.643	0.758
TKV	199.	0.192	0.254	0.337	0.447	0.593	0.787	1.044
TKV'	14.	0.190	0.247	0.321	0.417	0.542	0.704	0.914
KQC	27.	0.163	0.231	0.327	0.463	0.656	0.929	1.315
KQC'	9.	0.455	0.518	0.590	0.672	0.766	0.872	0.994
KIC	69.	0.145	0.228	0.357	0.560	0.878	1.376	2.157
KIC'	2.	0.179	0.213	0.253	0.300	0.356	0.423	0.503
KGM	353.	0.029	0.190	0.352	0.513	0.675	0.836	0.997
KGM'	35.	0.244	0.311	0.397	0.507	0.648	0.828	1.057
KG	347.	0.073	0.207	0.341	0.475	0.608	0.742	0.876
KG'	17.	0.175	0.233	0.312	0.417	0.558	0.746	0.997
KV	4.	0.306	0.347	0.395	0.448	0.509	0.579	0.658
KV'	2.	0.416	0.480	0.553	0.637	0.734	0.846	0.975
JPV	156.	-0.429	-0.097	0.235	0.568	0.900	1.232	1.565
JPV'	9.	0.037	0.087	0.208	0.496	1.182	2.819	6.723
JPU	31.	-0.595	-0.078	0.439	0.956	1.474	1.991	2.508
JPU'	4.	0.231	0.344	0.513	0.763	1.136	1.690	2.516
PZM	3.	0.307	0.403	0.529	0.694	0.912	1.197	1.572
PZP	141.	0.158	0.226	0.324	0.463	0.664	0.951	1.362
PZP'	9.	0.342	0.407	0.484	0.576	0.684	0.814	0.967
PZS	391.	0.127	0.194	0.296	0.451	0.688	1.049	1.599
PZQ	11.	0.079	0.135	0.229	0.389	0.661	1.123	1.908

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STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	489.	0.226	0.305	0.385	0.465	0.545	0.625	0.704
Q'	1966.	0.219	0.279	0.355	0.451	0.575	0.731	0.931
QTB'	4.	0.423	0.440	0.457	0.475	0.494	0.514	0.534
TKV	202.	0.266	0.306	0.352	0.406	0.467	0.538	0.619
TKV'	14.	0.348	0.378	0.411	0.446	0.485	0.526	0.572
KQC	33.	0.151	0.257	0.363	0.469	0.575	0.680	0.786
KQC'	10.	0.218	0.276	0.348	0.439	0.555	0.700	0.884
KIC	99.	-0.000	0.111	0.221	0.332	0.443	0.554	0.665
KIC'	3.	0.304	0.347	0.397	0.454	0.519	0.593	0.677
KGM	408.	0.118	0.205	0.292	0.380	0.467	0.554	0.641
KGM'	35.	0.254	0.306	0.368	0.442	0.532	0.640	0.770
KG	355.	0.115	0.177	0.272	0.417	0.639	0.981	1.505
KG'	17.	0.257	0.304	0.359	0.423	0.500	0.590	0.696
KV	4.	0.316	0.358	0.406	0.461	0.523	0.593	0.672
KV'	2.	0.359	0.385	0.412	0.441	0.473	0.506	0.542
JPV	200.	0.138	0.191	0.264	0.366	0.507	0.702	0.972
JPV'	9.	0.360	0.388	0.419	0.453	0.489	0.528	0.570
JPU	32.	0.076	0.206	0.336	0.466	0.596	0.726	0.856
JPU'	4.	0.254	0.325	0.415	0.531	0.679	0.868	1.109
PZM	3.	0.234	0.253	0.274	0.296	0.320	0.346	0.374
PZP	145.	0.244	0.288	0.339	0.399	0.470	0.554	0.652
PZP'	9.	0.322	0.353	0.388	0.425	0.466	0.511	0.561
PZS	417.	0.188	0.235	0.292	0.364	0.453	0.565	0.703
PZQ	11.	0.198	0.230	0.268	0.313	0.364	0.425	0.495

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Table C-85A
Tanana-Distribution Types

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
Q	LN	N	LN	N	N	N
Q'	LN	N	LN	N	N	LN
QL	N	N	N	N	N	N
QL'	N	N	N	LN	LN	LN
QESS'	LN	LN	LN	N	N	LN
TS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TG	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
TKV'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KG	LN	LN	N	LN	LN	LN
KG'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KSP	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KSP'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KH	LN	LN	LN	LN	LN	LN
KH'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJCS	LN	N	N	N	N	LN
KJCS'	LN	N	LN	N	N	N
TRVS	LN	(LN)	LN	(LN)	(LN)	LN
TRPV	LN	LN	LN	LN	LN	LN
TRPV'	LN	N	LN	N	N	LN
PS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZC	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZW	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZSR	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZL	LN	N	LN	LN	N	LN
PZL'	N	N	N	N	N	LN

PZVS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
OC	N	LN	LN	N	N	LN
CAL	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PZSQ	LN	N	LN	LN	N	LN
PZSQ'	LN	LN	LN	LN	LN	LN
UNMAPPED	LN	N	N	N	N	N
UNMAPED'	LN	N	LN	LN	LN	LN

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-85B
Tanana—Distribution Types

Table C-86A
Tanana—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	176.	17.960	22.564	28.348	35.615	44.744	56.214	70.623
Q'	1098.	7.077	11.541	18.821	30.692	50.051	81.622	133.107
QL	122.	9.788	19.558	29.328	39.098	48.867	58.637	68.407
QL'	331.	2.941	13.608	24.274	34.941	45.608	56.274	66.941
QESS'	302.	14.556	18.391	23.236	29.357	37.090	46.861	59.205
TS'	12.	12.550	16.522	21.750	28.634	37.696	49.625	65.330
TG	10.	68.045	79.768	93.511	109.622	128.508	150.648	176.603
TKV'	8.	24.181	31.383	40.731	52.862	68.606	89.040	115.559
KG	402.	16.400	30.988	58.555	110.646	209.075	395.067	746.515
KG'	14.	17.786	34.167	65.633	126.078	242.189	465.234	893.693
KSP	1.	48.210	48.210	48.210	48.210	48.210	48.210	48.210
KSP'	3.	32.154	34.061	36.081	38.220	40.487	42.888	45.431
KH	108.	8.992	17.066	32.388	61.466	116.653	221.387	420.156
KH'	13.	6.008	11.497	22.001	42.100	80.559	154.154	294.981
KJCS	149.	18.970	24.369	31.305	40.215	51.661	66.364	85.252
KJCS'	56.	20.954	26.225	32.822	41.078	51.411	64.343	80.528
TRVS	22.	11.410	18.746	30.800	50.604	83.141	136.598	224.428
TRPV	500.	7.603	11.545	17.532	26.623	40.429	61.394	93.231
TRPV'	33.	8.067	12.453	19.224	29.675	45.809	70.714	109.159
PS	16.	20.445	26.616	34.649	45.106	58.720	76.442	99.513
PZC	14.	19.378	26.372	35.890	48.843	66.471	90.461	123.109
PZW	15.	14.887	20.272	27.604	37.589	51.185	69.700	94.911
PZSR	17.	12.297	16.575	22.340	30.111	40.584	54.700	73.727
PZL	272.	10.175	15.705	24.241	37.417	57.755	89.146	137.601
PZL'	28.	14.019	21.487	28.955	36.423	43.891	51.359	58.827

PZVS	1.	52.450	52.450	52.450	52.450	52.450	52.450	52.450
QC	63.	-1.789	8.556	18.901	29.246	39.590	49.935	60.280
CAL	15.	47.214	50.936	54.950	59.281	63.954	68.995	74.433
PZSQ	544.	13.978	19.827	28.124	39.892	56.585	80.263	113.848
PZSQ'	84.	5.418	10.085	18.773	34.945	65.050	121.087	225.400
UNMAPPED	256.	9.155	14.735	23.716	38.170	61.435	98.880	159.148
UNMAPED'	74.	3.746	8.023	17.183	36.798	78.807	168.771	361.439

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Table C-87A
Tanana—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	171.	-4.853	2.507	9.867	17.226	24.586	31.946	39.305
Q'	1061.	-10.182	-1.170	7.842	16.854	25.865	34.877	43.889
QL	114.	-1.788	5.379	12.545	19.711	26.878	34.044	41.210
QL'	327.	-6.863	1.979	10.820	19.662	28.503	37.345	46.187
QESS'	294.	4.137	6.260	9.471	14.330	21.682	32.805	49.634
TS'	12.	5.828	7.629	9.987	13.073	17.113	22.401	29.323
TG	10.	39.346	46.909	55.926	66.676	79.493	94.773	112.991
TKV'	8.	13.482	17.364	22.363	28.802	37.095	47.775	61.531
KG	390.	4.837	9.976	20.577	42.442	87.540	180.557	372.412
KG'	14.	12.450	19.118	29.359	45.086	69.236	106.322	163.273
KSP	1.	23.280	23.280	23.280	23.280	23.280	23.280	23.280
KSP'	3.	9.857	11.742	13.987	16.661	19.847	23.643	28.163
KH	103.	2.781	5.923	12.611	26.853	57.179	121.753	259.252
KH'	18.	3.572	6.751	12.759	24.116	45.582	86.155	162.841
KJCS	144.	-17.652	-5.592	6.468	18.529	30.589	42.649	54.709
KJCS'	56.	2.113	8.597	15.081	21.565	28.048	34.532	41.016
TRVS	19.	2.472	5.090	10.480	21.576	44.424	91.464	188.315
TRPV	394.	3.415	5.574	9.098	14.848	24.234	39.552	64.553
TRPV'	30.	-11.523	-2.419	6.685	15.789	24.894	33.998	43.102
PS	14.	5.689	9.669	16.433	27.929	47.468	80.675	137.113
PZC	11.	4.594	7.539	12.372	20.305	33.323	54.687	89.749
PZW	14.	4.831	7.648	12.110	19.174	30.359	48.068	76.107
PZSR	13.	4.036	6.732	11.231	18.737	31.258	52.148	86.996
PZL	239.	-4.866	3.962	12.790	21.619	30.447	39.275	48.103
PZL'	28.	-4.330	2.551	9.433	16.314	23.195	30.076	36.957

PZVS	1.	34.627	34.627	34.627	34.627	34.627	34.627	34.627
OC	61.	0.441	1.400	4.442	14.092	44.708	141.841	450.007
CAL	15.	17.775	20.826	24.401	28.591	33.499	39.250	45.989
PZSQ	512.	-5.234	2.744	10.722	18.701	26.678	34.657	42.635
PZSQ'	84.	1.120	2.578	5.931	13.647	31.399	72.243	166.217
UNMAPPED	237.	-9.312	0.045	9.401	18.758	28.115	37.472	46.828
UNMAPED'	71.	-17.382	-5.648	6.086	17.821	29.555	41.290	53.024

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Table C-87B
Tanana—Statistical Summary—U

Table C-88A
Tanana—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	180.	37.628	49.579	65.326	86.075	113.414	149.436	196.900
Q'	1127.	13.713	23.996	41.989	73.474	128.568	224.975	393.672
QL	122.	15.753	43.279	70.805	98.331	125.858	153.384	180.910
QL'	335.	-0.335	29.747	59.829	89.910	119.992	150.073	180.155
QESS'	302.	43.148	54.240	68.183	85.710	107.742	135.439	170.255
TS'	12.	54.044	62.786	72.943	84.742	98.451	114.376	132.878
TG	10.	178.646	209.772	246.322	289.240	339.635	398.811	468.297
TKV'	8.	53.398	67.439	85.172	107.568	135.854	171.577	216.693
KG	402.	-149.336	-2.839	143.659	290.156	436.653	583.151	729.648
KG'	14.	38.242	69.094	124.837	225.549	407.511	736.273	1330.264
KSP	1.	148.323	148.323	148.323	148.323	148.323	148.323	148.323
KSP'	3.	117.272	125.787	134.921	144.718	155.226	166.496	178.586
KH	108.	23.055	43.497	82.065	154.831	292.117	551.135	1039.819
KH'	17.	28.365	41.858	61.769	91.151	134.509	198.493	292.912
KJCS	149.	21.064	60.441	99.818	139.195	178.572	217.949	257.326
KJCS'	56.	67.512	83.139	102.383	126.082	155.266	191.205	235.463
TRVS	22.	28.845	48.543	81.692	137.478	231.358	389.348	655.225
TRPV	538.	20.655	30.901	46.230	69.163	103.472	154.801	231.593
TRPV'	33.	16.478	27.381	45.498	75.602	125.624	208.744	346.860
PS	16.	87.947	109.314	135.870	168.879	209.907	260.902	324.287
PZC	14.	70.322	92.906	122.742	162.161	214.238	283.039	373.935
PZW	15.	44.905	61.994	85.587	118.159	163.126	225.207	310.914
PZSR	17.	30.916	46.810	70.876	107.316	162.489	246.028	372.517
PZL	275.	30.401	46.500	71.125	108.791	166.403	254.526	389.315
PZL'	29.	28.257	51.008	73.758	96.509	119.260	142.011	164.761

PZVS	2.	6.991	17.436	43.486	108.461	270.514	674.696	1682.775
OC	63.	38.699	53.948	75.204	104.836	146.144	203.728	284.000
CAL	15.	101.385	110.981	121.486	132.985	145.572	159.350	174.433
PZSQ	547.	29.181	45.127	69.786	107.921	166.894	258.093	399.126
PZSQ'	84.	13.791	24.586	43.831	78.140	139.306	248.351	442.752
UNMAPPED	264.	-14.722	22.470	59.662	96.854	134.045	171.237	208.429
UNMAPED'	78.	6.940	14.525	30.399	63.625	133.165	278.710	583.332

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Table C-88B

Tanana—Statistical Summary—K

Table C-89A

Tanana—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	171.	-0.147	-0.030	0.087	0.204	0.321	0.438	0.556
Q'	1055.	-0.068	0.023	0.114	0.204	0.295	0.386	0.476
QL	114.	0.011	0.072	0.134	0.196	0.257	0.319	0.380
QL'	327.	0.038	0.066	0.114	0.199	0.346	0.603	1.049
QESS'	294.	0.009	0.065	0.121	0.177	0.233	0.289	0.345
TS'	12.	0.087	0.105	0.127	0.154	0.187	0.226	0.274
TG	10.	0.115	0.145	0.183	0.231	0.290	0.366	0.461
TKV'	8.	0.173	0.200	0.231	0.268	0.310	0.359	0.416
KG	390.	0.038	0.062	0.102	0.168	0.275	0.451	0.741
KG'	14.	0.072	0.101	0.142	0.200	0.281	0.395	0.556
KSP	1.	0.157	0.157	0.157	0.157	0.157	0.157	0.157
KSP'	3.	0.057	0.072	0.091	0.115	0.146	0.184	0.233
KH	103.	0.036	0.060	0.101	0.171	0.288	0.486	0.820
KH'	17.	0.092	0.127	0.176	0.243	0.336	0.465	0.643
KJCS	144.	-0.056	0.006	0.069	0.131	0.194	0.256	0.319
KJCS'	56.	0.019	0.069	0.120	0.171	0.222	0.273	0.324
TRVS	19.	0.038	0.060	0.095	0.149	0.234	0.367	0.577
TRPV	394.	0.056	0.086	0.132	0.204	0.314	0.484	0.746
TRPV'	30.	-0.043	0.036	0.115	0.195	0.274	0.353	0.432
PS	14.	0.051	0.076	0.113	0.167	0.247	0.365	0.540
PZC	11.	0.033	0.051	0.079	0.123	0.191	0.297	0.460
PZW	14.	0.060	0.083	0.116	0.162	0.227	0.317	0.442
PZSR	13.	0.023	0.044	0.084	0.161	0.308	0.589	1.127
PZL	239.	0.035	0.060	0.102	0.175	0.299	0.511	0.875
PZL'	28.	-0.044	0.025	0.095	0.164	0.233	0.303	0.372

PZVS	1.	0.167	0.167	0.167	0.167	0.167	0.167	0.167
OC	61.	-0.080	0.003	0.086	0.169	0.253	0.336	0.419
CAL	15.	0.131	0.154	0.182	0.215	0.254	0.300	0.354
PZSQ	512.	0.025	0.046	0.083	0.152	0.278	0.507	0.927
PZSQ'	84.	0.020	0.041	0.085	0.175	0.361	0.744	1.536
UNMAPPED	235.	-0.120	-0.016	0.088	0.192	0.296	0.400	0.505
UNMAPED'	68.	0.019	0.041	0.087	0.183	0.385	0.812	1.712

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Table C-89B
Tanana—Statistical Summary—U/K

Table C-90A

Tanana—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	170.	-0.117	0.082	0.282	0.481	0.680	0.879	1.079
Q'	1039.	-0.128	0.082	0.292	0.503	0.713	0.923	1.133
QL	114.	0.016	0.174	0.331	0.488	0.646	0.803	0.961
QL'	324.	0.104	0.178	0.304	0.519	0.886	1.512	2.582
QESS'	294.	-0.002	0.172	0.346	0.520	0.694	0.868	1.042
TS'	12.	0.219	0.280	0.357	0.457	0.583	0.745	0.951
TG	10.	0.306	0.385	0.484	0.608	0.765	0.961	1.208
TKV'	8.	0.308	0.372	0.451	0.545	0.659	0.797	0.964
KG	350.	0.129	0.184	0.264	0.378	0.541	0.774	1.108
KG'	14.	0.118	0.171	0.247	0.358	0.517	0.749	1.084
KSP	1.	0.483	0.483	0.483	0.483	0.483	0.483	0.483
KSP'	3.	0.217	0.274	0.346	0.436	0.550	0.694	0.875
KH	103.	0.100	0.163	0.266	0.433	0.705	1.148	1.869
KH'	18.	0.289	0.363	0.456	0.573	0.720	0.905	1.137
KJCS	144.	-0.115	0.068	0.252	0.435	0.619	0.802	0.986
KJCS'	56.	0.105	0.243	0.381	0.519	0.657	0.795	0.933
TRVS	19.	0.117	0.176	0.265	0.399	0.601	0.903	1.359
TRPV	379.	0.155	0.234	0.354	0.535	0.808	1.222	1.847
TRPV'	30.	-0.044	0.132	0.307	0.482	0.657	0.833	1.008
PS	14.	0.235	0.323	0.445	0.613	0.844	1.162	1.600
PZC	11.	0.085	0.143	0.242	0.409	0.690	1.167	1.972
PZW	14.	0.147	0.222	0.336	0.509	0.770	1.166	1.764
PZSR	13.	0.102	0.183	0.326	0.583	1.041	1.859	3.322
PZL	237.	-0.251	0.023	0.297	0.571	0.846	1.120	1.394
PZL'	27.	-0.043	0.125	0.292	0.459	0.626	0.793	0.960

PZVS	1.	0.660	0.660	0.660	0.660	0.660	0.660	0.660
OC	61.	-0.368	-0.027	0.315	0.657	0.998	1.340	1.681
CAL	15.	0.288	0.342	0.406	0.482	0.573	0.680	0.807
PZSQ	510.	-0.177	0.037	0.251	0.465	0.679	0.893	1.106
PZSQ'	84.	0.059	0.111	0.208	0.391	0.734	1.379	2.592
UNMAPPED	232.	-0.113	0.067	0.246	0.426	0.605	0.785	0.964
UNMAPED'	64.	0.103	0.158	0.243	0.375	0.577	0.888	1.367

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Table C-90B
Tanana—Statistical Summary—U/Th

Table C-91A
Tanana—Statistical Summary—Th/K

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
Q	176.	0.203	0.273	0.343	0.413	0.483	0.553	0.623
Q'	1098.	0.204	0.256	0.321	0.403	0.506	0.635	0.796
QL	122.	0.215	0.279	0.343	0.407	0.471	0.534	0.598
QL'	331.	0.234	0.277	0.328	0.388	0.459	0.543	0.642
QESS'	302.	0.217	0.253	0.294	0.343	0.399	0.464	0.541
TS'	12.	0.218	0.252	0.292	0.338	0.391	0.453	0.524
TG	10.	0.321	0.339	0.359	0.379	0.401	0.423	0.447
TKV'	8.	0.338	0.383	0.434	0.491	0.557	0.631	0.715
KG	402.	0.167	0.231	0.320	0.442	0.612	0.847	1.172
KG'	14.	0.337	0.399	0.472	0.559	0.662	0.783	0.927
KSP	1.	0.325	0.325	0.325	0.325	0.325	0.325	0.325
KSP'	3.	0.236	0.245	0.255	0.264	0.274	0.284	0.295
KH	108.	0.219	0.267	0.326	0.397	0.484	0.590	0.720
KH'	17.	0.180	0.241	0.323	0.431	0.577	0.771	1.031
KJCS	149.	0.160	0.198	0.244	0.300	0.370	0.456	0.562
KJCS'	56.	0.184	0.233	0.281	0.329	0.378	0.426	0.474
TRVS	22.	0.261	0.293	0.328	0.368	0.413	0.463	0.519
TRPV	499.	0.175	0.225	0.290	0.374	0.483	0.623	0.803
TRPV'	33.	0.198	0.249	0.313	0.393	0.493	0.618	0.776
PS	16.	0.166	0.195	0.228	0.267	0.313	0.366	0.429
PZC	14.	0.219	0.244	0.271	0.301	0.335	0.372	0.414
PZW	15.	0.179	0.217	0.263	0.318	0.385	0.467	0.566
PZSR	17.	0.127	0.165	0.215	0.281	0.365	0.476	0.620
PZL	272.	0.185	0.227	0.279	0.342	0.420	0.515	0.632
PZL'	28.	0.246	0.280	0.319	0.364	0.414	0.472	0.538

PZVS	1.	0.253	0.253	0.253	0.253	0.253	0.253	0.253
OC	63.	0.136	0.169	0.210	0.261	0.324	0.404	0.502
CAL	15.	0.322	0.359	0.400	0.446	0.497	0.554	0.618
PZSQ	544.	0.201	0.246	0.301	0.368	0.450	0.550	0.673
PZSQ'	84.	0.182	0.246	0.332	0.447	0.603	0.813	1.096
UNMAPPED	255.	0.119	0.225	0.330	0.435	0.540	0.645	0.751
UNMAPED'	73.	0.208	0.286	0.393	0.540	0.743	1.021	1.404

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Table C-91B
Tanana—Statistical Summary—Th/K

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QAL	LN	N	LN	N	N	LN
QAL'	LN	N	N	LN	LN	LN
QTCS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QTKI	LN	LN	LN	LN	N	LN
KS-KSH	LN	LN	LN	LN	LN	N
KS-KSH'	N	N	N	LN	N	LN
KU	LN	LN	LN	N	LN	LN
KU'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KK	N	N	N	LN	LN	N
KK'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
IR-IRA	LN	LN	LN	LN	LN	LN
IR-IRA'	LN	N	N	LN	LN	LN
MC	LN	N	LN	N	N	LN
MC'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
VR	N	N	LN	N	N	N
VR'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
UNMAPPED	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-93
Melozitna—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	376.	9.335	14.648	22.984	36.065	56.590	88.797	139.334
QAL'	1467.	7.049	11.218	17.853	28.412	45.215	71.957	114.515
QTCS'	14.	18.010	21.389	25.402	30.169	35.829	42.552	50.537
QTKI	152.	7.768	14.856	28.414	54.345	103.941	198.797	380.220
KS-KSH	1423.	13.070	19.380	28.737	42.610	63.182	93.684	138.913
KS-KSH'	241.	-5.051	8.417	21.885	35.353	48.821	62.290	75.758
KU	94.	3.051	8.534	23.876	66.795	186.863	522.764	1462.471
KU'	9.	9.092	12.095	16.090	21.405	28.476	37.882	50.396
KK	169.	12.723	24.164	35.604	47.044	58.485	69.925	81.365
KK'	7.	18.580	23.652	30.108	38.327	48.790	62.109	79.063
IR-IRA	470.	6.072	15.175	37.922	94.771	236.840	591.882	1479.156
IR-IRA'	47.	14.407	20.337	28.708	40.525	57.205	80.751	113.988
MC	239.	10.885	16.864	26.128	40.475	62.705	97.145	150.500
MC'	10.	15.668	19.334	23.856	29.437	36.322	44.819	55.303
VR	86.	14.082	24.871	35.661	46.451	57.240	68.030	78.820
VR'	3.	29.009	33.237	38.081	43.631	49.989	57.274	65.621
UNMAPPED	10.	15.517	19.978	25.720	33.114	42.632	54.886	70.663

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STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	358.	-18.186	-5.946	6.295	18.536	30.776	43.017	55.258
QAL'	1375.	-10.268	-1.499	7.270	16.040	24.809	33.578	42.348
QTCS'	14.	8.740	11.778	15.871	21.388	28.821	38.837	52.335
QTKI	149.	3.704	7.144	13.780	26.580	51.268	98.887	190.734
KS-KSH	1385.	3.984	6.818	11.667	19.964	34.163	58.460	100.038
KS-KSH'	224.	-2.428	4.523	11.474	18.425	25.377	32.328	39.279
KU	89.	1.754	4.744	12.829	34.691	93.810	253.677	685.983
KU'	8.	9.543	11.615	14.138	17.208	20.945	25.493	31.029
KK	164.	-0.342	6.238	12.818	19.398	25.978	32.558	39.138
KK'	7.	4.787	7.591	12.038	19.091	30.275	48.011	76.138
IR-IRA	450.	1.769	4.860	13.351	36.675	100.746	276.745	760.211
IR-IRA'	43.	-7.497	1.826	11.148	20.470	29.793	39.115	48.437
MC	230.	-18.850	-6.967	4.917	16.800	28.684	40.567	52.451
MC'	10.	6.074	7.995	10.523	13.850	18.229	23.993	31.579
VR	79.	0.764	7.553	14.341	21.130	27.918	34.707	41.495
VR'	3.	10.755	11.429	12.145	12.906	13.715	14.574	15.487
UNMAPPED	8.	0.513	1.401	3.826	10.447	28.529	77.906	212.747

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STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	376.	18.401	30.286	49.849	82.047	135.043	222.270	365.838
QAL'	1521.	-41.807	-3.669	34.469	72.607	110.745	148.883	187.021
QTCS'	14.	53.501	60.054	67.410	75.668	84.937	95.341	107.020
QTKI	152.	24.817	43.009	74.537	129.178	223.872	387.983	672.396
KS-KSH	1425.	31.911	47.137	69.627	102.849	151.921	224.409	331.482
KS-KSH'	242.	-10.894	18.326	47.546	76.766	105.986	135.206	164.426
KU	97.	11.614	25.461	55.818	122.367	268.260	588.096	1289.262
KU'	9.	16.525	23.145	32.418	45.406	63.597	89.075	124.762
KK	169.	21.618	46.068	70.517	94.966	119.415	143.864	168.313
KK'	7.	45.679	54.047	63.947	75.661	89.522	105.921	125.324
IR-IRA	471.	20.645	44.932	97.790	212.833	463.213	1008.146	2194.146
IR-IRA'	47.	1.233	31.671	62.109	92.547	122.985	153.423	183.861
MC	243.	25.475	41.002	65.992	106.213	170.949	275.141	442.836
MC'	10.	22.625	30.964	42.376	57.994	79.368	108.621	148.654
VR	86.	44.960	58.886	77.125	101.013	132.300	173.278	226.948
VR'	3.	62.134	70.292	79.522	89.963	101.776	115.140	130.258
UNMAPPED	10.	45.887	57.740	72.686	91.502	115.188	145.006	182.542

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STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	357.	-0.080	0.016	0.111	0.207	0.303	0.399	0.495
QAL'	1359.	0.030	0.055	0.104	0.194	0.364	0.680	1.274
QTCS'	14.	0.106	0.147	0.204	0.283	0.393	0.545	0.757
QTKI	149.	0.057	0.087	0.133	0.205	0.315	0.483	0.743
KS-KSH	1380.	0.052	0.081	0.125	0.193	0.297	0.459	0.709
KS-KSH'	224.	0.060	0.093	0.144	0.224	0.346	0.537	0.832
KU	88.	-0.085	0.041	0.167	0.293	0.419	0.545	0.671
KU'	8.	0.098	0.152	0.241	0.382	0.606	0.960	1.522
KK	164.	0.076	0.104	0.143	0.197	0.271	0.373	0.514
KK'	7.	0.080	0.117	0.172	0.252	0.370	0.543	0.796
IR-IRA	450.	0.029	0.052	0.094	0.170	0.308	0.557	1.008
IR-IRA'	43.	0.047	0.076	0.123	0.200	0.325	0.527	0.855
MC	230.	-0.086	-0.011	0.065	0.141	0.217	0.292	0.368
MC'	10.	0.054	0.089	0.146	0.239	0.391	0.641	1.051
VR	79.	-0.016	0.060	0.136	0.212	0.288	0.364	0.441
VR'	3.	0.113	0.123	0.133	0.143	0.155	0.168	0.182
UNMAPPED	8.	0.007	0.017	0.044	0.115	0.296	0.765	1.979

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-97

Melozitna—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	357.	-0.107	0.083	0.274	0.464	0.654	0.844	1.035
QAL'	1337.	0.084	0.148	0.261	0.458	0.805	1.415	2.487
QTCS'	14.	0.231	0.335	0.487	0.709	1.031	1.499	2.180
QTKI	149.	0.002	0.172	0.343	0.513	0.683	0.854	1.024
KS-KSH	1379.	0.148	0.217	0.318	0.465	0.680	0.995	1.455
KS-KSH'	223.	-0.003	0.172	0.347	0.523	0.698	0.873	1.048
KU	88.	0.147	0.221	0.333	0.501	0.754	1.134	1.707
KU'	8.	0.258	0.376	0.548	0.798	1.164	1.697	2.473
KK	164.	0.141	0.199	0.281	0.397	0.561	0.793	1.121
KK'	7.	0.222	0.290	0.380	0.498	0.652	0.854	1.119
IR-IRA	449.	0.091	0.146	0.235	0.379	0.610	0.981	1.580
IR-IRA'	43.	0.094	0.157	0.260	0.433	0.718	1.193	1.981
MC	230.	-0.204	-0.014	0.176	0.366	0.556	0.745	0.935
MC'	10.	0.153	0.223	0.324	0.470	0.684	0.993	1.443
VR	79.	0.033	0.171	0.310	0.449	0.588	0.727	0.866
VR'	3.	0.233	0.252	0.273	0.296	0.320	0.347	0.376
UNMAPPED	8.	0.025	0.057	0.130	0.299	0.687	1.577	3.621

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STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	375.	0.231	0.286	0.354	0.438	0.542	0.671	0.829
QAL'	1467.	0.207	0.265	0.339	0.434	0.556	0.711	0.910
QTCS'	14.	0.264	0.303	0.348	0.399	0.457	0.524	0.601
QTKI	152.	0.182	0.241	0.318	0.421	0.556	0.734	0.970
KS-KSH	1422.	0.143	0.237	0.330	0.424	0.518	0.612	0.706
KS-KSH'	241.	0.296	0.343	0.399	0.463	0.538	0.625	0.726
KU	93.	0.169	0.245	0.357	0.519	0.755	1.098	1.597
KU'	9.	0.292	0.343	0.402	0.471	0.553	0.649	0.761
KK	169.	0.240	0.328	0.417	0.505	0.593	0.681	0.769
KK'	7.	0.344	0.391	0.445	0.507	0.576	0.656	0.746
IR-IRA	470.	0.129	0.195	0.295	0.446	0.674	1.019	1.541
IR-IRA'	47.	0.232	0.292	0.369	0.465	0.586	0.738	0.930
MC	239.	0.191	0.240	0.301	0.377	0.473	0.593	0.743
MC'	10.	0.253	0.319	0.402	0.508	0.640	0.807	1.018
VR	86.	0.158	0.259	0.360	0.460	0.561	0.662	0.762
VR'	3.	0.432	0.449	0.467	0.485	0.504	0.523	0.544
UNMAPPED	10.	0.214	0.255	0.304	0.362	0.431	0.514	0.612

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Table C-98
Melozitna—Statistical Summary—Th/K

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QFY	LN	N	N	N	N	N
QFY'	N	N	N	LN	N	LN
QNS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QFO'	LN	N	LN	N	N	LN
QMS	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
QMS'	N	N	N	LN	LN	LN
QHS	N	N	N	LN	N	LN
QHS'	N	N	N	LN	N	LN
QTB	LN	N	LN	LN	N	LN
TKG	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KN	N	LN	N	LN	LN	LN
KN'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KM	LN	N	LN	N	LN	LN
KM'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KNM	LN	N	N	N	LN	LN
KNM'	N	LN	LN	LN	LN	N
KGS	LN	LN	N	N	N	LN
KGS'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KGM	LN	N	N	LN	N	LN
KGM'	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
KJV	LN	N	LN	LN	N	N
KJV'	LN	LN	LN	N	LN	N

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

Table C-100
Kateel River—Statistical Summary—Th

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	35.	9.785	15.115	23.348	36.066	55.712	86.058	132.935
QFY'	817.	-0.184	12.085	24.355	36.624	48.893	61.162	73.431
QNS'	11.	14.683	17.964	21.979	26.891	32.900	40.253	49.250
QFO'	310.	4.861	7.713	12.239	19.420	30.814	48.893	77.581
QMS	11.	31.426	36.039	41.329	47.396	54.353	62.332	71.482
QMS'	400.	0.936	11.928	22.920	33.912	44.904	55.896	66.888
QHS	242.	10.792	19.239	27.687	36.134	44.581	53.029	61.476
QHS'	1325.	-5.275	4.479	14.233	23.986	33.740	43.494	53.247
QTB	44.	10.426	12.955	16.097	20.001	24.851	30.878	38.367
TKG	2.	32.491	37.619	43.555	50.428	58.386	67.599	78.266
KN	145.	24.577	38.371	52.165	65.959	79.754	93.548	107.342
KN'	5.	25.894	29.547	33.715	38.472	43.900	50.093	57.161
KM	167.	30.602	37.422	45.763	55.962	68.434	83.687	102.338
KM'	2.	45.710	47.054	48.437	49.861	51.326	52.835	54.388
KNM	319.	25.699	31.444	38.472	47.072	57.593	70.466	86.217
KNM'	42.	6.414	18.077	29.740	41.403	53.066	64.729	76.392
KGS	290.	18.942	26.465	36.975	51.661	72.178	100.843	140.894
KGS'	3.	16.962	21.874	28.209	36.379	46.914	60.501	78.023
KGM	581.	24.467	30.259	37.424	46.285	57.244	70.797	87.560
KGM'	8.	18.357	23.687	30.564	39.437	50.886	65.659	84.721
KJV	500.	5.456	9.519	16.605	28.969	50.536	88.161	153.798
KJV'	25.	18.210	23.714	30.881	40.214	52.369	68.197	88.809

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Table C-101
Kateel River—Statistical Summary—U

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	27.	-14.358	-3.170	8.017	19.205	30.393	41.581	52.769
QFY'	769.	-5.110	2.592	10.294	17.996	25.698	33.399	41.101
QNS'	8.	3.304	4.869	7.177	10.578	15.592	22.981	33.872
QFO'	278.	-5.901	0.027	5.955	11.883	17.811	23.739	29.668
QMS	11.	8.052	11.163	15.475	21.452	29.739	41.226	57.151
QMS'	363.	-2.438	3.681	9.800	15.919	22.038	28.157	34.276
QHS	229.	-3.281	3.639	10.559	17.479	24.399	31.319	38.239
QHS'	1111.	-5.934	0.087	6.109	12.130	18.151	24.172	30.193
QTB	42.	-1.559	1.542	4.643	7.744	10.846	13.947	17.048
TKG	2.	7.627	11.652	17.801	27.194	41.545	63.468	96.961
KN	142.	9.217	13.082	18.569	26.357	37.411	53.100	75.370
KN'	5.	3.597	6.064	10.223	17.232	29.048	48.967	82.544
KM	161.	1.322	8.589	15.856	23.124	30.391	37.658	44.925
KM'	1.	16.816	16.816	16.816	16.816	16.816	16.816	16.816
KNM	309.	1.359	7.799	14.239	20.679	27.119	33.559	39.998
KNM'	42.	9.684	12.276	15.560	19.723	25.000	31.689	40.168
KGS	278.	5.909	9.396	14.941	23.759	37.781	60.079	95.536
KGS'	2.	1.019	2.510	6.182	15.228	37.508	92.389	227.569
KGM	549.	-2.078	5.505	13.087	20.670	28.252	35.835	43.417
KGM'	4.	5.488	7.393	9.959	13.416	18.072	24.345	32.794
KJV	423.	-16.719	-4.772	7.176	19.123	31.071	43.018	54.966
KJV'	24.	10.591	13.251	16.580	20.744	25.955	32.474	40.632

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Table C-102

Kateel River—Statistical Summary—K

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	35.	0.044	31.730	63.416	95.102	126.788	158.474	190.160
QFY'	829.	-27.836	15.514	58.865	102.215	145.565	188.916	232.266
QNS'	12.	11.062	19.527	34.468	60.842	107.396	189.571	334.623
QFO'	359.	3.412	7.605	16.949	37.774	84.187	187.625	418.153
QMS	11.	28.174	46.620	77.142	127.648	211.220	349.507	578.332
QMS'	404.	2.136	25.943	49.749	73.555	97.361	121.167	144.973
QHS	242.	12.759	35.109	57.459	79.809	102.159	124.509	146.858
QHS'	1426.	-25.075	-0.023	25.029	50.080	75.132	100.184	125.236
QTB	44.	18.738	28.837	44.380	68.301	105.115	161.770	248.963
TKG	2.	42.895	75.329	132.287	232.313	407.971	716.449	1258.174
KN	145.	50.628	85.904	121.180	156.457	191.733	227.010	262.286
KN'	5.	65.430	75.029	86.035	98.657	113.129	129.725	148.755
KM	167.	61.438	80.331	105.034	137.333	179.565	234.783	306.982
KM'	2.	43.600	57.298	75.300	98.958	130.049	170.908	224.604
KNM	320.	39.335	62.460	85.584	108.709	131.834	154.959	178.084
KNM'	42.	39.655	53.608	72.472	97.973	132.447	179.052	242.056
KGS	290.	23.613	61.545	99.476	137.408	175.340	213.272	251.203
KGS'	3.	76.822	84.324	92.559	101.598	111.520	122.411	134.365
KGM	581.	33.789	62.523	91.258	119.992	148.726	177.460	206.194
KGM'	8.	35.336	48.164	65.651	89.485	121.973	166.255	226.614
KJV	515.	31.107	43.704	61.404	86.271	121.208	170.295	239.261
KJV'	25.	47.708	62.295	81.343	106.215	138.692	181.100	236.474

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Table C-103 Kateel River—Statistical Summary—U/K

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	27.	-0.059	0.023	0.106	0.188	0.270	0.352	0.435
QFY'	768.	0.049	0.074	0.110	0.164	0.245	0.366	0.546
QNS'	8.	0.078	0.095	0.117	0.143	0.176	0.215	0.264
QFO'	265.	-0.141	-0.014	0.113	0.240	0.366	0.493	0.620
QMS	11.	0.039	0.064	0.103	0.168	0.273	0.444	0.722
QMS'	362.	0.066	0.096	0.140	0.205	0.299	0.437	0.639
QHS	229.	0.039	0.068	0.118	0.205	0.356	0.617	1.069
QHS'	1091.	0.035	0.062	0.112	0.200	0.360	0.645	1.157
QTB	42.	0.019	0.034	0.060	0.106	0.186	0.326	0.573
TKG	2.	0.077	0.089	0.102	0.117	0.135	0.155	0.178
KN	142.	0.053	0.078	0.116	0.173	0.257	0.382	0.568
KN'	5.	0.037	0.062	0.104	0.175	0.294	0.494	0.832
KM	161.	0.018	0.067	0.117	0.167	0.217	0.267	0.316
KM'	1.	0.206	0.206	0.206	0.206	0.206	0.206	0.206
KNM	309.	0.022	0.079	0.136	0.192	0.249	0.306	0.362
KNM'	42.	0.073	0.102	0.143	0.201	0.283	0.397	0.559
KGS	278.	-0.016	0.054	0.123	0.192	0.262	0.331	0.400
KGS'	2.	0.014	0.030	0.066	0.146	0.321	0.707	1.559
KGM	549.	0.047	0.072	0.103	0.165	0.250	0.378	0.573
KGM'	4.	0.059	0.080	0.109	0.149	0.203	0.276	0.377
KJV	423.	0.022	0.044	0.087	0.173	0.344	0.684	1.361
KJV'	24.	0.031	0.087	0.144	0.200	0.256	0.313	0.369

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Table C-104
Kateel River—Statistical Summary—U/Th

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	27.	-0.082	0.096	0.274	0.452	0.630	0.808	0.986
QFY'	766.	-0.024	0.146	0.315	0.485	0.655	0.824	0.994
QNS'	8.	0.137	0.195	0.277	0.395	0.562	0.800	1.138
QFO'	254.	-0.123	0.108	0.340	0.571	0.803	1.034	1.265
QMS	11.	0.153	0.220	0.316	0.453	0.649	0.931	1.335
QMS'	361.	0.158	0.224	0.316	0.447	0.632	0.894	1.264
QHS	229.	-0.114	0.090	0.295	0.500	0.704	0.909	1.114
QHS'	1080.	-0.149	0.063	0.276	0.486	0.701	0.913	1.126
QTB	42.	-0.143	0.036	0.216	0.395	0.575	0.754	0.934
TKG	2.	0.235	0.310	0.409	0.539	0.712	0.939	1.239
KN	142.	0.150	0.209	0.293	0.409	0.572	0.800	1.119
KN'	5.	0.080	0.143	0.253	0.448	0.794	1.408	2.496
KM	161.	0.159	0.215	0.290	0.392	0.529	0.714	0.965
KM'	1.	0.330	0.330	0.330	0.330	0.330	0.330	0.330
KNM	308.	0.156	0.216	0.299	0.414	0.574	0.795	1.101
KNM'	42.	0.168	0.242	0.347	0.498	0.714	1.025	1.472
KGS	278.	0.070	0.205	0.341	0.477	0.613	0.749	0.885
KGS'	2.	0.052	0.100	0.194	0.375	0.727	1.407	2.723
KGM	549.	-0.032	0.126	0.285	0.444	0.602	0.761	0.919
KGM'	4.	0.131	0.181	0.251	0.347	0.480	0.664	0.918
KJV	414.	-0.111	0.107	0.325	0.543	0.761	0.979	1.197
KJV'	24.	0.234	0.302	0.390	0.504	0.651	0.842	1.088

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STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QFY	35.	0.162	0.245	0.328	0.411	0.494	0.577	0.660
QFY'	815.	0.195	0.240	0.297	0.366	0.451	0.557	0.687
QNS'	11.	0.182	0.233	0.300	0.385	0.494	0.634	0.814
QFO'	305.	0.184	0.241	0.316	0.415	0.544	0.714	0.937
QMS	11.	0.083	0.137	0.226	0.371	0.611	1.006	1.655
QMS'	400.	0.288	0.336	0.392	0.456	0.532	0.620	0.722
QHS	242.	0.280	0.330	0.389	0.458	0.540	0.636	0.749
QHS'	1315.	0.249	0.306	0.376	0.462	0.568	0.697	0.857
QTB	44.	0.096	0.139	0.202	0.293	0.425	0.617	0.896
TKG	2.	0.062	0.094	0.143	0.217	0.329	0.499	0.757
KN	145.	0.253	0.300	0.357	0.424	0.504	0.599	0.711
KN'	5.	0.308	0.333	0.360	0.390	0.422	0.457	0.494
KM	167.	0.258	0.301	0.350	0.407	0.474	0.553	0.643
KM'	2.	0.204	0.275	0.372	0.504	0.682	0.922	1.247
KNM	319.	0.295	0.338	0.387	0.444	0.508	0.582	0.667
KNM'	42.	0.240	0.296	0.352	0.408	0.465	0.521	0.577
KGS	290.	0.200	0.250	0.313	0.392	0.490	0.613	0.767
KGS'	3.	0.217	0.257	0.303	0.358	0.423	0.499	0.590
KGM	581.	0.247	0.289	0.339	0.398	0.466	0.547	0.641
KGM'	8.	0.266	0.315	0.373	0.441	0.521	0.617	0.729
KJV	499.	-0.059	0.081	0.222	0.362	0.503	0.643	0.784
KJV'	25.	0.116	0.207	0.298	0.388	0.479	0.570	0.660

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

Table C-105
Kateel River—Statistical Summary—Th/K

APPENDIX D
COMPUTER DATA LISTINGS