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Airborne Gamma-Ray Spectrometer and Magnetometer Survey

Ashton Quadrangle
(Idaho, Montana, Wyoming)

[redacted]

Final Report
Volume I

Prepared For The Department Of Energy
Grand Junction, Colorado 81501
Under
Bendix Field Engineering Corporation
Grand Junction Operations, Grand Junction, Colorado
Subcontract No. 78-179-L
Project No. 40-78-4131
May 1979

by
Aero Service Division
Western Geophysical Company of America
Houston, Texas 77001

Litton AERO SERVICE

AIRBORNE GAMMA-RAY SPECTROMETER

AND

MAGNETOMETER SURVEY

ASHTON QUADRANGLE
(Idaho, Montana, Wyoming)

FINAL REPORT

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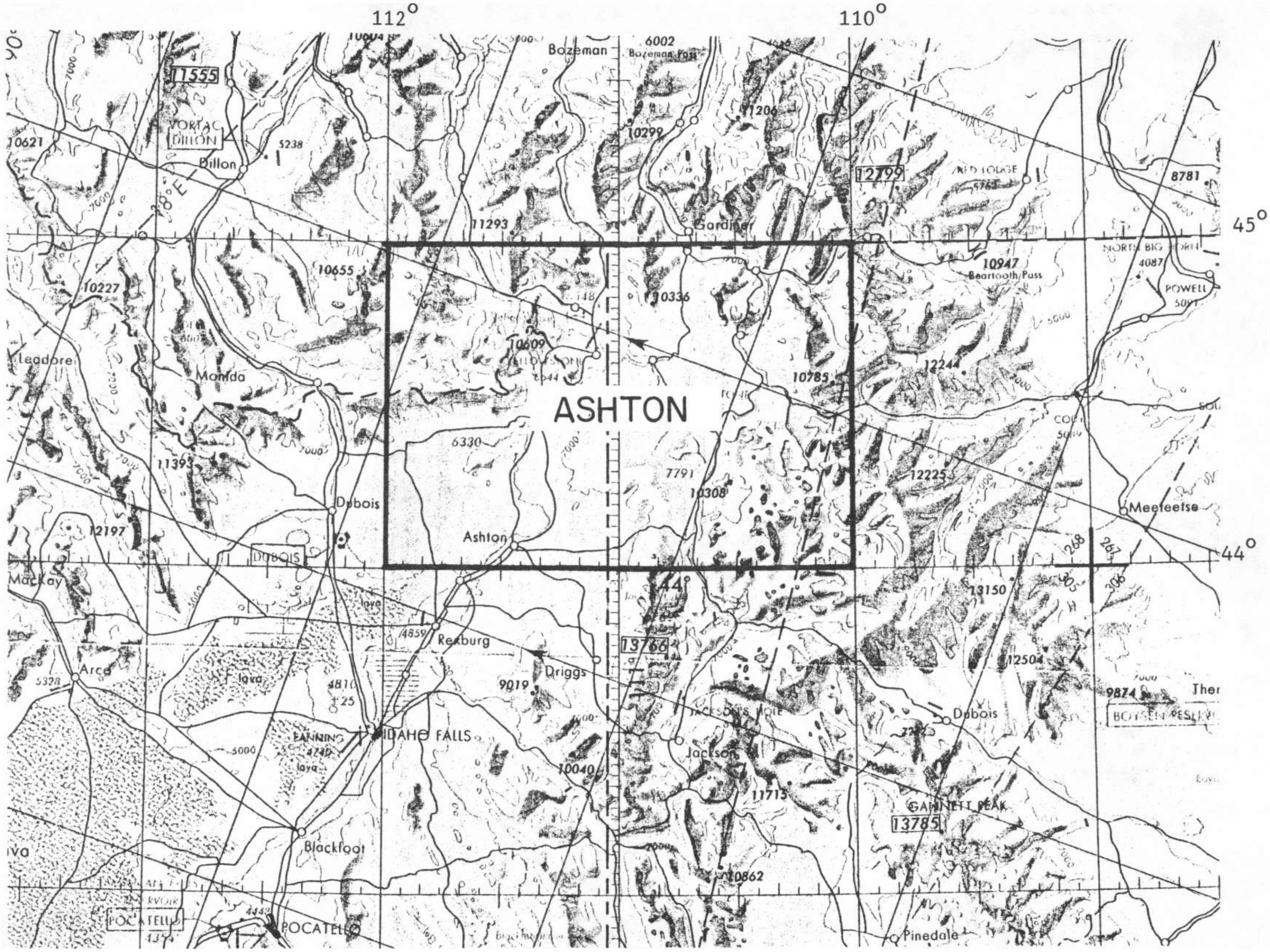

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INTRODUCTION

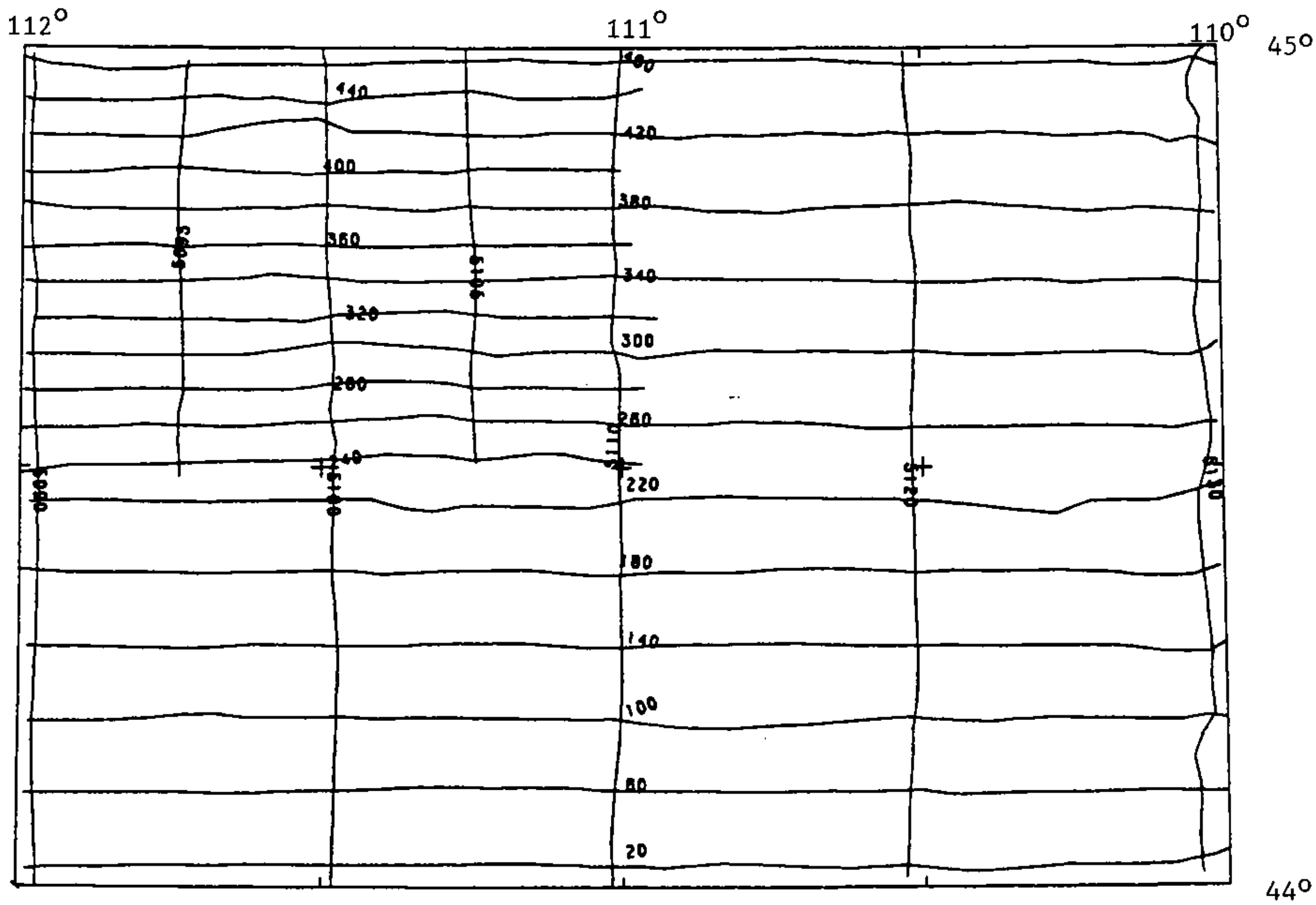
Between August 11 and August 27, 1978 Aero Service Division Western Geophysical Company of America conducted a high sensitivity airborne gamma-ray spectrometer and magnetometer survey over the 2° x 1° NTMS quadrangle of Ashton. The survey area includes parts of northwestern Wyoming, east central Idaho and southwestern Montana. The eastern half of the map area covers most of Yellowstone National Park. Line spacing was generally 6 miles for traverses (E-W) and 24 miles for tie lines (N-S), except in the northwest quadrant of the map area where traverses were spaced three miles apart and tie lines were flown every 12 miles.

The survey was flown with a Sikorsky S-58T helicopter, registration N 95423, owned and operated by Carson Helicopters, Inc. A total of 1899 line miles of geophysical data was acquired.

The study was carried out on behalf of the Department of Energy, under Bendix Field Engineering Corporation subcontract No. 78-179-L, project No. 40-78-4131, as part of the "Aerial Radiometric and Magnetic Reconnaissance Survey Program", designed to map the regional distribution of the natural radioelements for the principal rock units of the United States in support of the National Uranium Resource Evaluation (NURE) program.

The data were reduced and compiled in accordance with the technical specifications of the contract as stated in BFEC 1200-B and BFEC 1250-A. The parameters used in the processing of the radiometric data have been substantiated in a previously submitted calibration report of the Sikorsky installed airborne gamma-ray spectrometer system.

FIGURE 2



FINAL FLIGHT PATH MAP

ASHTON QUADRANGLE

SCALE 1:1,000,000

DATA ACQUISITION

Aircraft

The survey was carried out using a Sikorsky S-58T helicopter, registration N 94523, owned and operated by Carson Helicopters, Inc., Perkasie, Pennsylvania. The flight crew included a pilot (Carson), a navigator (Carson) and an electronic operator (Aero Service). Some of the more pertinent characteristics and specifications of the aircraft are listed below:

TABLE I

Aircraft	-	Sikorsky Model S58T, Registration N 95423
Engine	-	Pratt - Whitney PT 6T Twinpack
Take off power	-	1875 Shaft HP.
Fuel Capacity	-	350 U. S. Gal.
Hourly Fuel Comsumption		100 U. S. Gal.
Range cruise speed	-	300 Miles
Rate of Climb	-	1200 Feet per Min.
Service Ceiling	-	12500 Feet
Maximum Gross Weight	-	13000 Lbs.
Empty Weight	-	7200 Lbs.
Useful Load	-	5800 Lbs.
Pay Load	-	1700 Lbs.

Gamma-Ray Spectrometer System

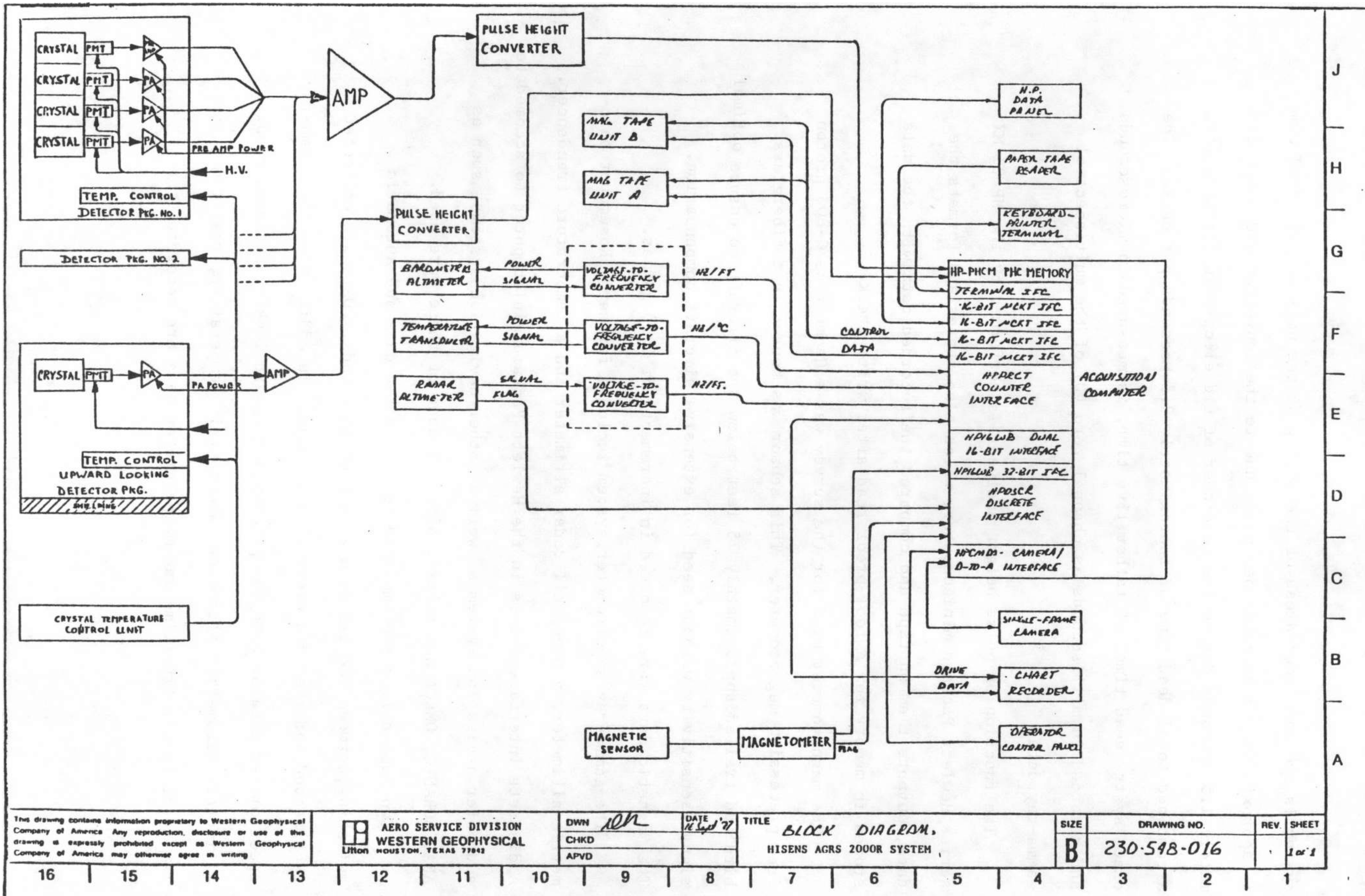
The airborne gamma-ray spectrometer system is shown in block diagrammatic form in figure 2 , page 5 . The detector assembly of the spectrometer consists of a primary detector, sensing data over a 4π solid angle, and an upward looking detector, sensing data over a 2π solid angle only. The primary detector package consists of eight logs of 4" x 4" x 16" of Polyscin, NaI(Tl), each hermetically sealed in a steel container and coupled to a high quality photo-multiplier tube. The sensors are assembled in two slabs of four logs each. Each slab is enclosed in a heated and thermally stabilized container. Total volume of the primary detector is 2048 cubic inches (33560.7 cc).

The upward looking detector consists of a single 4" x 4" x 16" log of Polyscin, also hermetically sealed in a steel container and coupled to a high quality photo-multiplier tube and enclosed within a heated and thermally stabilized container. The upward looking detector is mounted on top of one of the primary detector packages, separated by a 0.75" slab of lead shielding, in order to provide the 85% shielding effect @ 3.000 MeV.

The preamplifiers provide, with the photo-multipliers, virtually the total signal amplification. In order to ensure maximum signal stability, the preamplifiers are enclosed within the thermally stabilized packages.

The combined signal of each detector slab is output into the amplifiers, whose main purpose is summing the incoming pulses and shaping them into a bipolar gaussian form.

The summed and shaped signal from the amplifiers is input into the pulse height converter. This unit performs basically three functions: it determines whether a pulse has been received, it determines its amplitude and it converts the amplitude into a digital number. Since a successive approximation analog to digital converter is used, total dead time of the


CRYSTAL
PMT
PRE AMP
PA
PRE AMP POWER
H.V.
TEMP. CONTROL
DETECTOR PKG. NO. 1
DETECTOR PKG. NO. 2
AMP
PULSE HEIGHT CONVERTER
PULSE HEIGHT CONVERTER
PA POWER
UPWARD LOOKING DETECTOR PKG.
SHIELDING
CRYSTAL TEMPERATURE CONTROL UNIT
BAROMETRIC ALTIMETER
POWER
SIGNAL
TEMPERATURE TRANSDUCER
RADAR ALTIMETER
FLAG
VOLTAGE-TO-FREQUENCY CONVERTER
HZ/FT
HZ/°C
HZ/FT.
MAG TAPE UNIT B
MAG TAPE UNIT A
CONTROL
DATA
H.P. DATA PANEL
PAPER TAPE READER
KEYBOARD-PRINTER TERMINAL
HP-PHCM PHC MEMORY
TERMINAL IFC
16-BIT MCKT IFC
HPPCT COUNTER INTERFACE
HP16WB DUAL 16-BIT INTERFACE
HP16WB 32-BIT IFC
HPDSCR DISCRETE INTERFACE
HPCMDA- CAMERA/ D-TO-A INTERFACE
ACQUISITION COMPUTER
SINGLE-FRAME CAMERA
DRIVE
DATA
CHART RECORDER
OPERATOR CONTROL PANEL
MAGNETIC SENSOR
MAGNETOMETER
FLAG
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AERO SERVICE DIVISION
WESTERN GEOPHYSICAL
Litton HOUSTON, TEXAS 77042
DWN
DATE
CHKD
APVD
TITLE
BLOCK DIAGRAM,
HISENS AGRS 2000R SYSTEM
SIZE B
DRAWING NO. 230-548-016
REV.
SHEET 1 of 1

FIGURE 3

system is the same regardless of the energy of the pulse. This dead time is approximately 8 μseconds per pulse due to the converter and approximately 1.5 μseconds due to the remainder of the electronic circuit, for a combined total dead time of approximately 9.5 μseconds per pulse. The exact system dead time, or rather live time, is measured in microseconds and recorded in milliseconds as channel zero (0) of the multispectral gamma-ray data.

The function of pulse height analyzer is performed by the HP 21 MX series Hewlett Packard minicomputer, which also stores and formats the data, outputs them on tape and compares the recorded data with the data stored in memory for a fool-proof read after write check.

The magnetometer used for the survey was a Geometrics G-803 proton free precession magnetometer. This sensor was housed in a fiberglass bird and trailed approximately 75 feet below the aircraft to ensure optimal signal sensitivity without need for extensive aircraft compensation. The magnetic data were recorded in increments of 0.25 gammas.

The gamma-ray spectrometer system includes further a Rosemount barometric altimeter, a Honeywell radar altimeter and a temperature trandsucer. A discrete interface exists in the Hewlett Packard minicomputer to accomodate a doppler navigation system as well as other navigation systems, such as ANA, LORAN-C, OMEGA and others, although none of these were used.

Two tape drives are employed to record the data and automatic switching between the two occurs as each tape ends. Data are collected each second and recorded every five seconds. In addition to the gamma-ray spectrometer data of both the primary and upward looking systems, radar altimeter, barometric altimeter, atmospheric temperature, real time, gamma-ray spectrometer live time and magnetometer data are recorded.

Additional ancillary equipment carried aboard the helicopter include a cathode ray tube display, a 6-channel heat sensitive analog recorder and a 35mm frame camera, triggered by the data controller at a preselected interval.

PRODUCTION SUMMARY

The 2°x 1° NTMS quadrangle of Ashton (Idaho, Montana and Wyoming) was surveyed as part of a survey contract covering the quadrangles of Cody (Wyoming), Ashton (Idaho, Montana, Wyoming), Dubois (Idaho, Montana), Durango (Colorado) and Cortez (Colorado, Utah). The flying of the Ashton quadrangle commenced on August 11, 1978 and was completed on August 27, 1978. During these 17 days a total of (1899) line miles of geophysical data was acquired in 17 survey flights. Three and a half days were lost due to bad weather or moisture conditions. One day was lost due to equipment repair while an engine change took six days. The actual geophysical coverage was obtained in six and one half days of production flying.

During field operations a fuel truck was used to allow refueling stops within the survey area. Table II, page 9 , gives a complete production summary of the Ashton quadrangle survey.

The specified flight altitude for the survey area was 400 feet above terrain. Fig. 3 shows a histogram of the terrain clearance of the aircraft as recorded by the radar altimeter. The groundspeed of the aircraft is depicted in graphic form in the histogram of fig. 4.

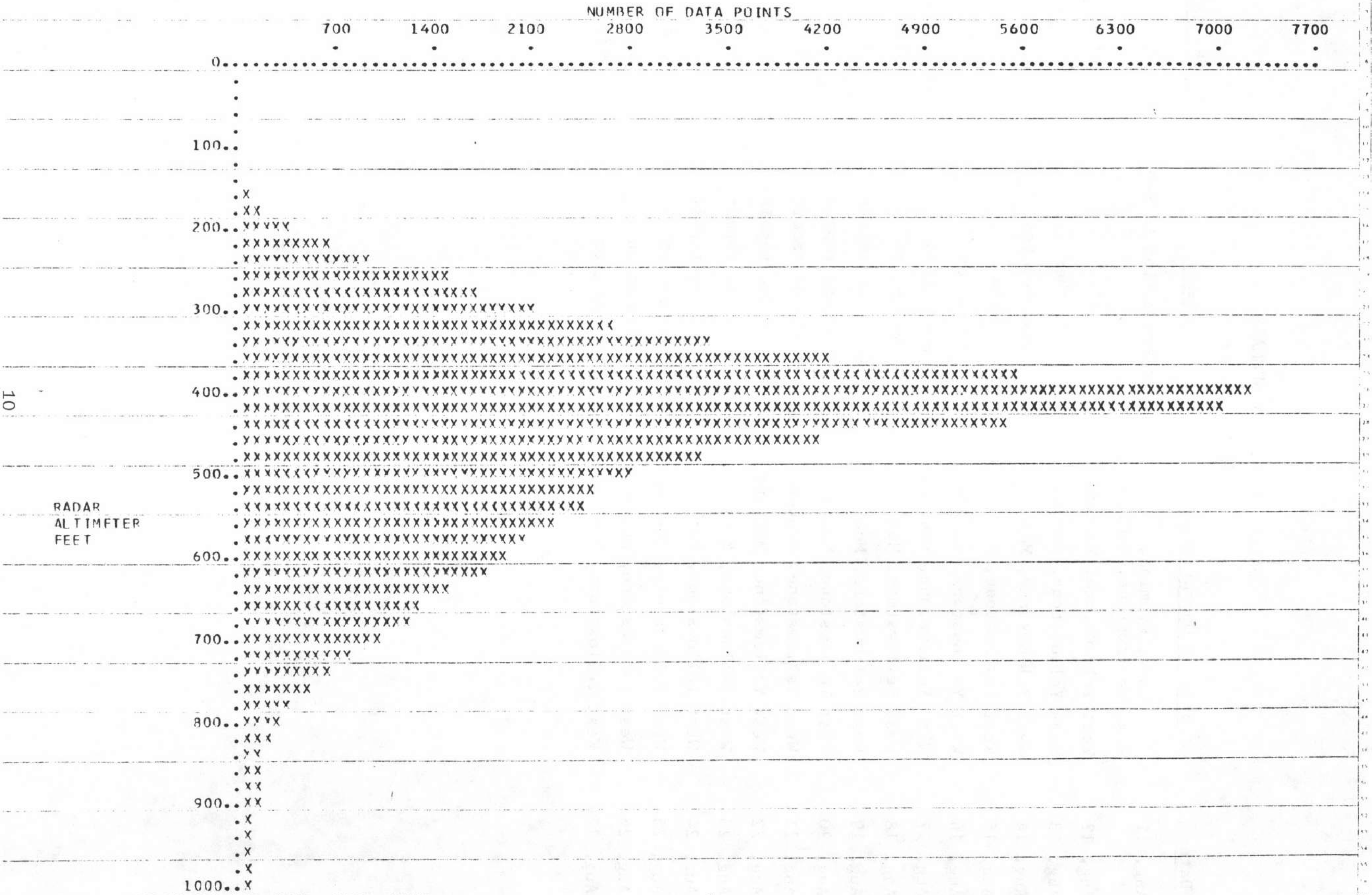
DAILY PRODUCTION SUMMARY
TABLE II

Date	Base of Operations	Comments	Flight No.
Aug. 11	Cody, Wyoming, West Yellowstone, Montana	Start Production Ashton	48
Aug. 12	West Yellowstone, Montana	Rain	49
Aug. 13	West Yellowstone, Montana	Weather	
Aug. 14	West Yellowstone, Montana	Radar Repair	
Aug. 15	West Yellowstone, Montana	Rain	
Aug. 16	West Yellowstone, Montana	Weather	
Aug. 17	West Yellowstone, Montana	Production	55,56,57,58
Aug. 18	West Yellowstone, Montana	Production	59,60
Aug. 19	West Yellowstone, Montana	A/C engine repair	
Aug. 20	West Yellowstone, Montana	A/C engine repair	
Aug. 21	West Yellowstone, Montana	A/C engine repair	
Aug. 22	West Yellowstone, Montana	A/C engine repair	
Aug. 23	West Yellowstone, Montana	A/C engine repair	
Aug. 24	West Yellowstone, Montana	A/C engine repair	
Aug. 25	West Yellowstone, Montana	Production	61,62,63
Aug. 26	West Yellowstone, Montana	Production	64,65
Aug. 27	West Yellowstone, Montana	Production	66,67,68,69

FIGURE 4

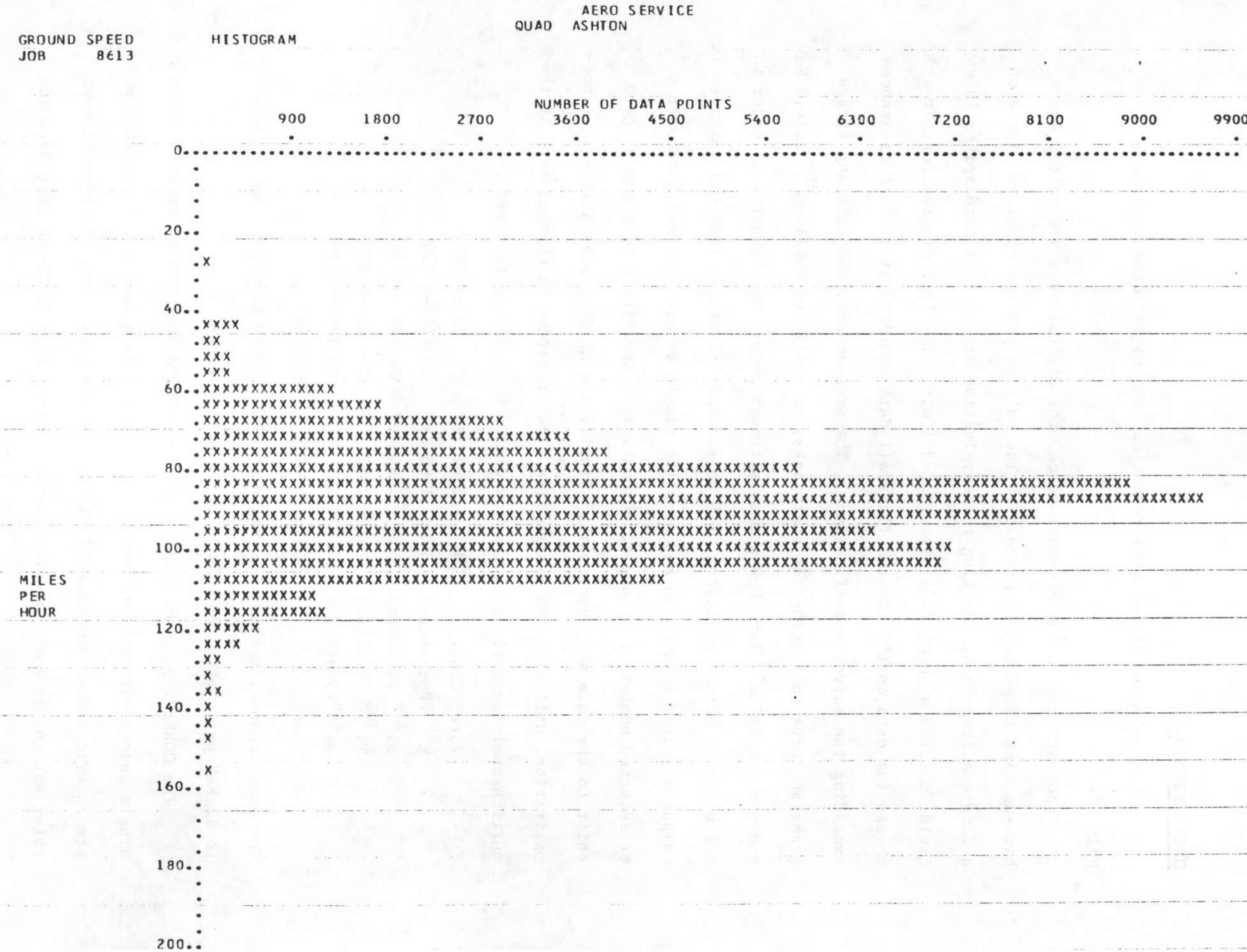
AERO SERVICE
QUAD ASHTON

TERRAIN CLEARANCE HISTOGRAM
JOB 8613



1309 POINTS GREATER THAN 1000 FEET

FIGURE 5


AERO SERVICE
QUAD ASHTON
GROUND SPEED
HISTOGRAM
JOB 8613
NUMBER OF DATA POINTS
900
1800
2700
3600
4500
5400
6300
7200
8100
9000
9900
0
20
40
60
80
100
120
140
160
180
200
MILES
PER
HOUR

DATA REDUCTION

A flow diagram of the data reduction process is found in fig. 6 , page 13.

Upon arrival in the Houston office, the digital data are edited and a back-up tape is generally prepared. The editing process consists partly of a data quality check, enabling the elimination of single record spikes in any field, outside a specified, preselected limit. The EDIT program further checks for data continuity and flags all data acquired at terrain clearances exceeding the survey specifications. The program sums the data and fits a guassian curve to a number of photopeaks, normally the thallium^{208} 2614.5 KeV and the potassium^{40} 1460 KeV peaks, although others may be used, in order to define their actual positions with an accuracy of better than 0.1 channel; it computes system resolution and sums the single record spectral data over a preselected number of channels. automatically applying a zero and/or gain shift to the data when necessary. Finally the EDIT applies a live time normalization, utilizing the system live time, recorded in channel zero of the multichannel spectral data. Window widths used are as follows:

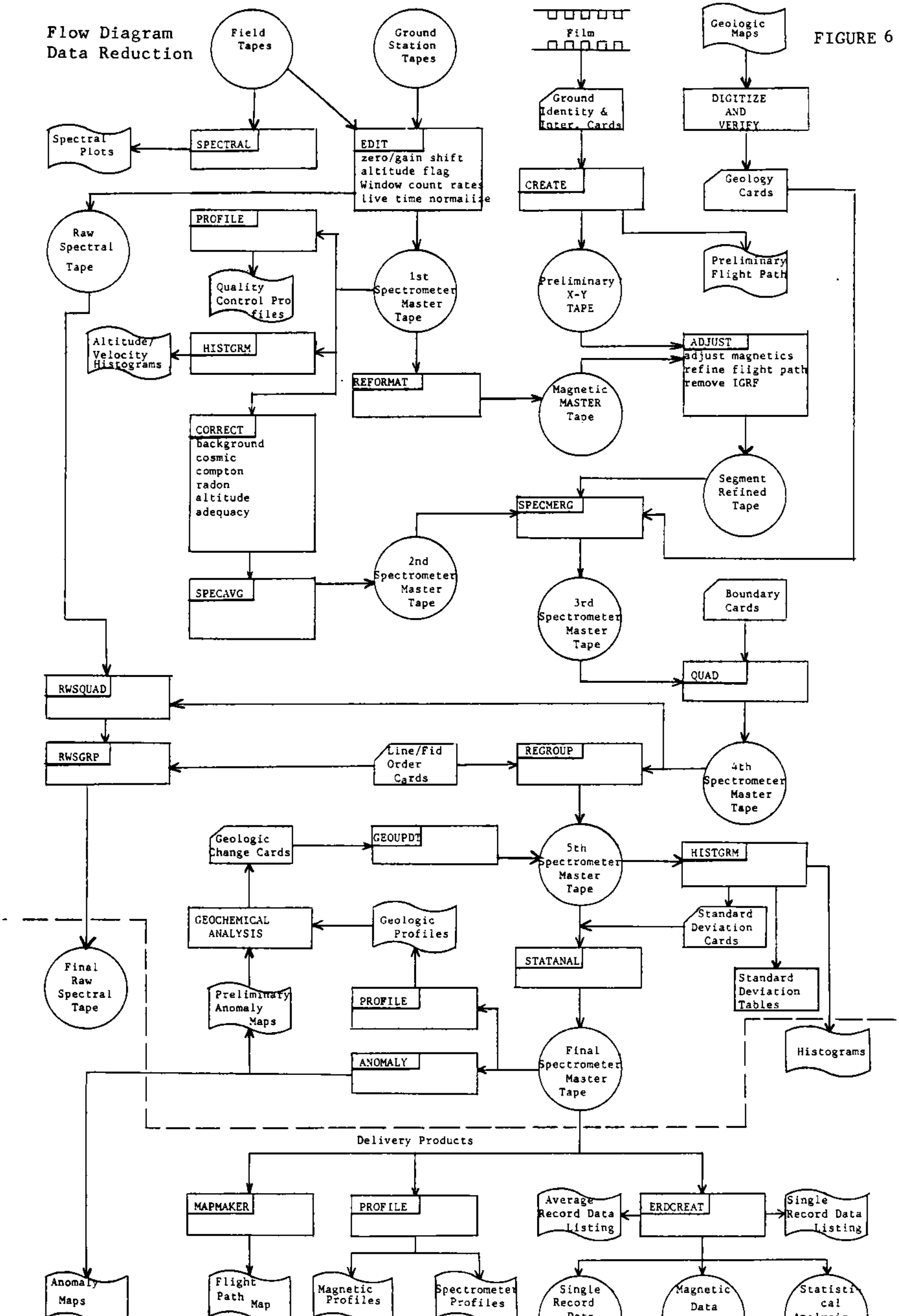
Total Count	390 - 2982 KeV	Ch 33 -+ 248
K^{40} (Potassium)	1362 - 1566 KeV	Ch 114 -+ 130
Bi^{214} (Uranium)	1662 - 1866 KeV	Ch 139 -+ 155
Tl^{208} (Thorium)	2402 - 2862 KeV	Ch 201 -+ 235
Bi^{214}(2π)(Radon)	1662 - 1866 KeV	Ch 139 -+ 155
Cosmic	3054 - 6000 KeV	Ch 255

The above channel numbers are valid only if system gain corresponds exactly to 12 KeV per channel and there is no zero shift.

The CORRECT program applies the background and cosmic corrections to the single record window count rates corrects the data for Compton scatter and atmospheric radon, and normalizes the terrain clearance. Background count rates and cosmic factors were determined from high altitude test data ac-

Flow Diagram
Data Reduction

FIGURE 6



quired over the Atlantic Ocean, near Atlantic City and over Buffalo Bill Reservoir, near Cody, Wyoming as follows:

Potassium Background	=	21.4 counts per second
Uranium Background	=	6.1 counts per second
Thorium Background	=	5.25 counts per second
Total Count Background	=	188.3 counts per second
2π Bismuth Background	=	0.40 counts per second

Potassium cosmic factor	=	0.195 c.p.s. per count 4π cosmic
Uranium Cosmic factor	=	0.15 c.p.s./cps 4π cosmic
Thorium Cosmic factor	=	2.15 c.p.s./cps 4π cosmic
Total Count Cosmic factor	=	3.28 c.p.s./cps 4π cosmic
2π Bismuth Cosmic factor	=	0.031 c.p.s./cps 4π cosmic

The Compton scatter functions were determined from data obtained over the Grand Junction test pads, using the radiometric analysis of the bulk sample with natural water content.

$T/U = \tau = 0.081$

$U/T = \alpha = 0.304\ (1+0.02 + 0.000076H)$

$K/T = \beta = 0.375$

$K/U = \gamma = 0.904$

The 2π and 4π uranium window count rates are related through the geometric or equivalency factor. For the present system, installed in the Sikorsky S-58T helicopter, this factor, f, = 6.0. Part of the terrestrial radiation of energy higher than 1662 KeV - the lower threshold of the uranium window - is detected in the uranium window of the upward looking detector, due to incomplete shielding, skyshine and shine-around. This shine-through/shine-around effect is assumed to be a function of both the intensity of the terrestrial uranium and thorium radiation and of the aircraft terrain clearance. From multi-altitude data acquired over the Lake Mead Dynamic Test Range the shine-through/shine-around effect was determined for each altitude level. The data provided a best fit for an exponential terrain clearance function as follows:

$$\text{shine-through/shine-around} = 0.06\ (U_{4\pi} + 0.304T4\ )e^{-6.2x10^{-4}H}$$

The shine-through/shine-around corrected Biair Count rate is then

$$U_{2\pi c} = U_{2\pi} - \frac{(U_{4\pi} + 0.304T)\ 0.06\ x\ e^{-6.2x10^{-4}H}}{(1-6.0\ x\ 0.06\ x\ e^{-6.2\ x\ 10^{-4}H})}$$

The shine-through/shine-around correction is applied to the $U_{2\pi}$ count rate at each single record. The single record $U_{2\pi}$ count rates are then averaged over 65 records to make them statistically compatible with the data of the primary system. The atmospheric radon correction is applied to both the $U_{4\pi}$ and the Total Count count rates. The equivalency factor for the $U_{4\pi}/U_{2\pi} = 6$, for Total Count/$U_{2\pi}$ it is 60.

Within the CORRECT program the data are normalized to a common datum of 400 feet terrain clearance. An exponential formula is used, based on an air column reduced to a standard temperature and pressure of 0°C and 760mm Hg. (32°F and 29.92"Hg). The air absorption coefficients used are those derived from the multiple altitude flight over the Lake Mead Dynamic Test Range for thorium, potassium and Total Count. The air absorption factor for uranium is obtained by straight interpolation between the potassium and thorium air absorption factors. Their values are respectively:

$\mu_K = 2.70 \times 10^{-3}$ per foot

$\mu_U = 2.52 \times 10^{-3}$ per foot

$\mu_T = 2.04 \times 10^{-3}$ per foot

$\mu_{TC} = 2.18 \times 10^{-3}$ per foot

The formula used for the altitude normalization is:

$N_{400} = N_{H}.\ e^{-\mu(400 - \frac{273}{273+t} \circ \frac{P}{29.92} \cdot H)}$. Where N_{400}, N_H are respectively the count rates @ 400 feet and @ altitude H, μ is air absorption factor, t is temperature in degrees Celsius and P is barometric pressure in inches Hg.

The last operation in the CORRECT program is the determination of statistical adequacy of the data. The criteria for adequcy of the data are based on the work of Lloyd A. Currie (op.cit.). A critical level is recognized, below which all observations made fail to detect a signal, i.e. 95% of all measurements fall within the "normal"distribution of "noise". The detection level is similarly defined as the level above which 95% of the measurements made fall within the normal Poisson distribution of "signal". Currie's critical level has been adopted as the count rate level below which data are inadequate. Data with count rates above the critical level but below the detection level are considered marginal. Above the detection level data are considered adequate. For the single record data the formulas are then:

Count Rate $\leq 2.33 \sqrt{\text{Sum corrections}}$: data inadequate

$2.33 \sqrt{\text{Sum corrections}} <$ Count Rate $\leq 2.71 + 4.6 \sqrt{\text{Sum corrections}}$: data marginal

Count Rate $> 2.71 + 4.65 \sqrt{\text{Sum corrections}}$: data adequate.

No ratios have been calculated involving inadequate data in either numerator or denominator. Ratios have been calculated when the data in the numerator are marginal, provided the data in the denominator are adequate.

The thorium, uranium and potassium data are subsequently averaged over 9 records in the SPECAVG program. The output is a spectrometer master tape containing both averaged and single record data.

Parallel with the radiometric data reduction process, the magnetic data are edited and processed. Using the recovered film intersections and the established ground identities, preliminary flight paths are prepared. The flight path is refined in the magnetic adjustment program until an accurate final flight path has been obtained. The reduced spectrometer data are then merged with the final X-Y position of the data points, the reduced magnetic data and the digitized geology, and a master tape is produced with data that pertain to each $2^{o} \times 1^{o}$ NTMS quadrangle only. The REGROUP program then eliminates all duplicate line segments, orders the remaining line segments and renumbers the fiducials on the flight lines.

The following processing steps are STATANAL and HISTGRM. HISTGRM groups the radiometric data by geological cell units, determines the distribution of the data as normal or lognormal, calculates the mean (for normally distributed data) or the mode (for lognormal distributions) as well as the standard deviations. The results from HISTGRM are used in the STATANAL program, which calculates the signed standard deviation from the mean for each averaged sample for each of the six radiometric parameters. Its output is the Final Spectrometer Master Tape, from which tha anomaly maps, the statistical analysis tape, the averaged record and single record reduced data tapes and listings, the flight path maps and the radiometric and magnetic profiles are produced.

DATA PRESENTATION

The final data are presented in four different forms: on magnetic tape; on microfiche; in graphic form as profiles and histograms; and in map form as anomaly maps and flight path maps.

The histograms and the multiparameter profiles are presented with the anomaly maps and the flight path map in a separate bound volume. Complete data listings of both the reduced single record and the reduced averaged record data on microfiche are found in the back of this report. The format of the print-out of the microfiches and the format of the magnetic tapes is described in appendices H through L.

Radiometric Multiple-Parameter Stacked Profiles

The radiometric profiles have been prepared at a horizontal scale of 1:250,000 and photographically reduced to a scale of 1:500,000. Displayed are from top to bottom: total magnetic intensity, I.G.R.F. removed, in gammas; radar altimeter in feet; thorium/potassium count rate ratio; uranium/potassium ratio; uranium/thorium ratio; atmospheric radon (BIAC) in counts equivalenced to the 4 uranium count rate; thorium window count rate (c.p.s.); uranium count rate; potassium count rate; total count rate; flight path, superimposed on the corresponding strip of the geologic map. Flags are indicated, where needed, below the base line of the corresponding parameter. A short flag indicates marginal data, including terrain clearances between 700 and 1000 feet, while a long flag indicates inadequate data. Fiducial markers are plotted every 200 records along the top of the radiometric profiles and every 10 samples along the bottom.

Magnetic and Ancillary Parameter Stacked Profiles

The magnetic profiles have also been plotted at a scale of 1:250,000 and have been reduced photographically to a scale of 1:500,000. The plotting sequence for the magnetic profiles is, from top to bottom: barometric pressure in inches Hg; temperature in degrees Celsius; radar altitude in feet, magnetic variations at base station in gammas; total magnetic intensity, I.G.R.F. removed, in gammas; flight path superimposed on the corresponding strip of the geologic map. Fiducial markers are plotted every 200 samples (seconds) along the top of the profiles, every 10 records along the bottom. There are a few line segments where magnetic data are not present due to problems with acquisition in the field.

Histograms

Histograms have been prepared for the six radiometric parameters for each geologic cell unit of the NTMS quadrangle area. The horizontal scale of the plots is constant for each of the parameters. Frequency grouping is generally done in 100 groups per full horizontal scale, although in some cases more groups have been used for better definition. In all cases the vertical scale was normalized to the number of samples observed in the group with the highest sample frequency. For each histogram the frequency distribution type (normal or lognormal) is listed, as well as the mean (or mode, in case of lognormal distribution) and the signed standard deviations. Note that for both the normal and the lognormal distribution curves, the standard deviation is given in terms of the parameter value (K, U, T, U/K, U/T, T/K). The actual standard deviation is obtained by subtracting the mean parameter value from the +1 standard deviation figure, in case of a normal distribution, by dividing the mode value into the +1 standard deviation figure in case of a lognormal distribution. In the case of lognormal distribution curves the standard deviation is thus a multiplication factor.

Each histogram further lists the total number of samples in the geological unit and the number of statistically adequate/marginal data samples in each parameter plot.

Anomaly Maps

The anomaly maps have been prepared at a scale of 1:250,000 and have been photographically reduced to 1:500,000. The fiducial numbers along the flight lines match those of the corresponding profiles. Positive signed deviations of the mean are indicated by a plus sign to the north or west of the flight lines, while negative signed deviations are indicated by a minus, plotted to the south or east of the line. The number of pluses or minuses corresponds with the levels of standard deviation from the mean. To avoid crowding, standard deviation signs are calculated and plotted for every fifth sample only.

GEOLOGY

Introduction

The geology of the Ashton quadrangle was compiled by IntraSearch for the U. S. Department of Energy from published and unpublished geological maps prepared by federal and state agencies. The Ashton quadrangle includes the area between 44° and 45° North latitude and 110° and 112° West longitude. The main topographic features of the quadrangle and surrounding areas are shown on figure 7, below.

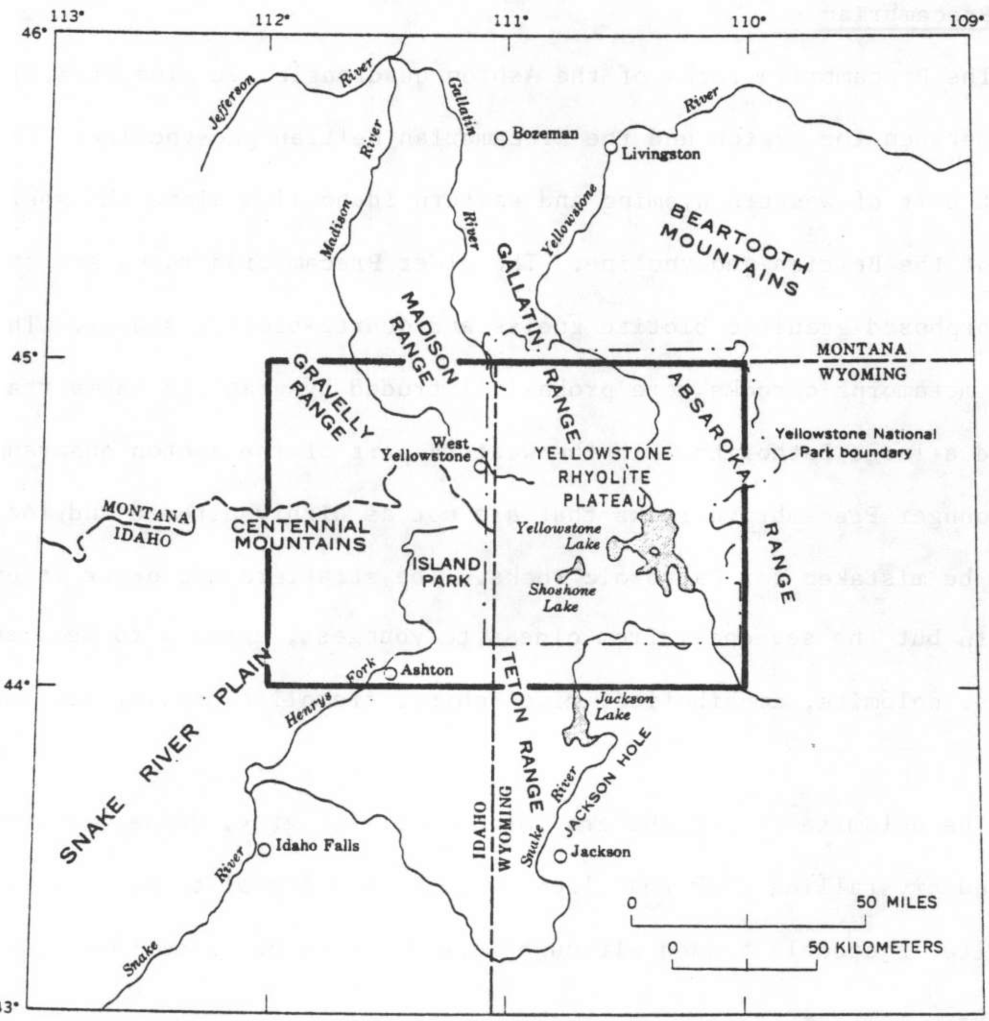


FIGURE 7

Main Topographic and Structural Features of Ashton Quad

Stratigraphy

Rocks exposed in the Ashton quadrangle range in age from early Precambrian through Recent. The rocks of the Precambrian include representatives of the Belt Series as well as the granites of the craton. Rocks of every Paleozoic and Mesozoic system except the Silurian are represented in the area. The Tertiary and Quaternary are represented by thick sequences of extrusive and intrusive rocks. A description of these rocks, beginning with the oldest, is contained in the following paragraphs.

Precambrian

The Precambrian rocks of the Ashton quadrangle lie along the hingeline between the craton and the Precambrian Beltian geosyncline. The thrust belt of western Wyoming and eastern Idaho lies along the shelf area of the Beltian geosyncline. The older Precambrian rocks are strongly metamorphosed granitic biotite gneiss and quartz-biotite schist. These older metamorphic rocks were probably intruded by granitic magma that formed a large batholith. In the western part of the Ashton quadrangle are younger Precambrian rocks that are not as highly altered and locally could be mistaken for Paleozoic rocks. The stratigraphic order is uncertain but the sequence, from oldest to youngest, appears to be granite gneiss, dolomite, amphibolite, mica schist, tremolite marble, and quartzite.

The dolomite is a light gray or dark bluish gray, dense medium-grained crystalline rock that locally becomes a tremolite marble. The dolomite is crudely bedded although locally it ranges from thin to thick bedded.

A sequence that includes metagranodiorite, amphibolite, mica schist, granite gneiss, and other metamorphic variations of these rocks is mapped in the area. The amphibolite is rich in hornblende and the thin laminae range from dark gray to black. In nearby areas the rocks similar to the amphibolite have been described as a hornblende gneiss. The mica schist is banded or crenulate and ranges in color from reddish brown to gray and dark greenish gray. In some places, thin bands of garnetiferous mica schist are interleaved with thin bedded amphibolite.

The tremolite marble is extremely resistant, medium bedded to massive, and forms prominent topographic ridges. It ranges in color from light gray to gray and is composed almost wholly of radiating needles and interwoven masses of bladed tremolite crystals. These rocks have been described as limesilicate gneiss of tremolite calcite with crenulated quartz bands, and bedded marble.

Beds of quartzite, which occur as discrete stratigraphic units or light-gray lenses in darker metamorphic rocks, appear to be the youngest of the Precambrian metamorphic rocks. The quartzite weathers dark gray but on fresh surfaces is light gray or bluish gray. It consists mainly of quartz with some muscovite grains that are aligned to give the rock a crudely banded appearance.

The Precambrian metamorphic rocks in the Ashton quadrangle appear to be as much as 30,000 feet thick and in nearby areas the thickness of the Precambrian is reported to be more than 40,000 feet. A distinct angular unconformity marks the contact between the metamorphic rocks and the overlying Flathead sandstone of Middle Cambrian age.

Cambrian

The Flathead sandstone is the basal Cambrian formation of the Ashton quadrangle. The Flathead is a brown, thin- to thick-bedded crossbedded, coarse grained, quartzose sandstone that is locally conglomeratic. It forms persistent rounded ledges or broad benches from which the softer strata have been removed. This persistent near-shore sandstone facies was laid down by an eastward advancing Middle Cambrian sea with the resulting transgression of time lines by the unit. The offshore facies of the Flathead sandstone is the overlying Wolsey shale, Meagher limestone, and Park shale, an example of overlap facies development.

The Wolsey shale is transitional between the underlying Flathead sandstone and the overlying Meagher limestone. The Wolsey can be divided into a basal part that contains intercalated brown sandstone beds similar to the Flathead sandstone, a middle part of greenish-gray shaly siltstone and sandstone beds rich in glauconite which typifies the Wolsey, and an upper part that contains intercalated gray thin dense crystalline limestone beds characteristic of the overlying Meagher limestone.

The Meagher limestone is thin bedded, dense, light gray to brownish gray, crystalline and generally forms steep slopes or cliffs.

Overlying the Meagher limestone is the Park shale. The Park shale is greenish-gray to grayish-red, even bedded, fissile and weathers to gentle slopes. A few gray dense crystalline limestone beds composed of fossil fragments, oolites and quartz sand grains are intercalated with the shale.

The Pilgrim limestone consists of yellowish-gray even- and thin-bedded mottled dolomitic limestone. Mud-pebble conglomerate beds are common and the formation contains wide-spread glauconite, both as disseminated grains and as thin seams and lenses. The Pilgrim limestone is probably Late Cambrian.

The Late Cambrian Snowy Range formation consists of light-brown even-bedded thin- to medium-bedded mottled dolomitic limestone and contains many mud-pebble conglomerate beds and much glauconite.

Ordovician

The Upper Ordovician Bighorn dolomite is normally light gray, buff, tan or white, medium- to coarse-grained dolomite or limestone, characterized by rough, knobby weathered surfaces that form massive cliffs.

Devonian

The Jefferson formation is of Upper Devonian age. It consists of light-brown to light-olive-gray, thin- to thick-bedded, dense, medium to coarsely saccharoidal dolomite. Chert is widespread in the Jefferson formation as scattered fragments and thin, discontinuous lenses. The Jefferson contains a few limestone beds but is chiefly dolomitic. The formation is commonly bituminous.

The Three Forks formation is mainly Upper Devonian in age but the upper part of the formation may be in part Mississippian. The Three Forks consists of yellow, greenish-gray, and dark gray dolomitic siltstone and silty dolomite, and black fissile shale. Some thin sandstones and limestones are present at some locations. Platy dolomites and limestones containing rounded and frosted sand grains are common. The section is fairly thin bedded and partings of thin green shales are present throughout. The rocks generally form a gentle slope, partly covered by talus and with a heavy vegetation cover at lower elevations.

Mississippian

The Madison group is of Upper and Lower Mississippian age. It consists of massive, blue-gray limestone with some dolomitic sections. The upper third of the Madison is thicker bedded and more massive than the lower two-thirds in the Ashton quadrangle. Chert nodules are common in the upper part of the section. The lower part of the Madison may include some rocks of Devonian age and the upper part may include rocks of Pennsylvanian age.

Pennsylvanian-Mississippian

The Amsden formation of Pennsylvanian and Upper Mississippian age overlies the Madison limestone. The lower part of the Amsden is a red siltstone or sandstone of Upper Mississippian age. The Amsden consists of red shale containing gray dolomite and limestone beds with some chert and hematite nodules. The rocks of the Amsden are characterized by red color, variable thickness and composition, and differences in age from one area to another. The Amsden is transitional with the overlying Quadrant sandstone or Tensleep sandstone of the eastern part of the Ashton quadrangle.

The Quadrant sandstone is yellow to light-brown, thin- to medium-bedded, moderately crossbedded and fine grained. A few thin stringers of dolomite may be present in the lower part of the formation. The Quadrant sandstone is the equivalent of the Tensleep sandstone of the Cody quadrangle.

Permian

For years the term Phosphoria formation was used for a sequence of marine phosphorite beds over a large part of Montana, Idaho, Wyoming, Utah and Nevada. In the mid-fifties, a new plan of nomenclature, based chiefly on lithology, was adopted. The name "Phosphoria" was restricted to the marine black shale, phosphorite, and bedded chert sequence. The name "Shedhorn sandstone" was introduced by Cressman and Swanson for the Permian rocks exposed in and near Yellowstone National Park, the area included in the Ashton quadrangle.

As mapped in the Ashton quadrangle, the Shedhorn sandstone consists of dark gray chert-rich sandstone, sandy dolomite and interbedded dark-gray fissile shale.

The Phosphoria formation consists of phosphatic shale, bedded chert, carbonate beds and sandstone. The lower part of the sequence interfingers with the Shedhorn sandstone. The carbonate beds are probably correlatives of the Park City formation of the Cody quadrangle.

The Phosphoria phosphatic beds are nearly all uraniferous. The beds composed of pellets and oolites are generally more uraniferous than the beds of organic remains. The highly weathered phosphate beds contain less uranium than their unweathered equivalents.

Triassic

The Dinwoody formation is of Lower Triassic age and consists of a lower unit of interbedded calcareous shaly siltstone and dark gray fissile shale and an upper unit consisting chiefly of brown to gray limestone and calcareous siltstone. The Dinwoody was probably deposited in a regressive shallow water sea.

The Chugwater formation consists of red shale and siltstone of Lower Triassic age. The Chugwater is generally mapped to the east of the Ashton quadrangle. In the Ashton quadrangle and to the west, the Chugwater is divided into a lower unit, the Woodside formation consisting of reddish brown sandstone and shaly siltstone, and an upper unit, the Thaynes formation consisting of light brown siltstone and limestone.

Jurassic

The Ellis group of Middle and Late Jurassic age consists of, in ascending order, the Sawtooth formation, the Rierdon formation, and the Swift formation.

The Sawtooth formation consists of light gray to yellowish brown calcareous claystone beds interbedded with light gray thin dense nodular limestone beds. The Sawtooth is Middle Jurassic in age.

The Rierdon formation of Upper Jurassic age consists of light gray limestone that locally alters to calcareous claystone or fissile calcareous shale.

The Swift formation of Upper Jurassic age, is an olive gray to brown, sandy, oolitic, thin- to thick-bedded, crossbedded limestone containing many shell fragments and chert grains.

Of the Ellis group, the Sundance formation is equivalent to the Rierdon formation and Swift formation. The Gypsum Spring formation is equivalent to the Sawtooth formation and consists of shale, limestone, dolomite and anhydrite.

The Morrison formation is of Upper Jurassic age. The Morrison consists of variegated claystones and shales, non-marine sandstones, and conglomerate. The Morrison formation is an important producer of uranium in the western United States.

CRETACEOUS

The Cloverly formation consists of gray to purple clay underlain by buff to gray cross-bedded sandstone with some coal. Correlation of the Lower Cretaceous rocks has long been an issue among the geologists working in the Rocky Mountain region with the "Dakota group" and any attempts to clarify the issue here would only serve to add to the confusion.

The Kootenai formation of Early Cretaceous age consists of interbedded sandstone, shale, and conglomerate. At the base of the Kootenai is a light gray, thick bedded to massive, crossbedded conglomeratic sandstone. The middle unit consists chiefly of grayish-red to greenish-gray claystone with a few beds of light-brown fine-grained sandstone. The upper unit of the Kootenai consists of two thin limestone beds separated by claystone.

The Early Cretaceous Thermopolis shale consists of dark shale, gray to buff siltstone and lenticular sandstone beds. The lower sandstone member is light brown thin-bedded to massive flaggy crossbedded and fine-grained. The upper part of the formation consists of dark gray to black, thin bedded, fissile, soft shale with some intercalated siltstone beds.

The Aspen formation and its correlative, the Mowry formation, are of Early Cretaceous age. This sequence of rocks consists of hard, dark gray, fissile shale containing fish scales and siliceous beds. Some bentonite beds are present locally.

The Frontier formation is of Upper Cretaceous age. It is a thick sequence of gray shale and sandstone containing many coal seams throughout the section. The shale is generally blue-gray and calcareous while the sandstone is thin to thick bedded, calcareous and fine to medium grained.

The Cody shale of Upper Cretaceous age consists mainly of dark shale with some gray salt and pepper sandstone. At the type locality near Cody, Wyoming, to the east of the Ashton quadrangle, the Cody consists of gray and dark shale with one bed of sandstone near the base and several thin fossiliferous sandstones near the top. The Cody is equivalent to the dark gray Carlile shale and the overlying Niobrara formation which consists chiefly of calcareous shale or siltstone.

The Bacon Ridge sandstone consists of massive to crossbedded buff and gray salt and pepper sandstone with minor amounts of shale and thin coal beds. The Bacon Ridge is Upper Cretaceous in age.

The Upper Cretaceous Telegraph Creek formation consists of yellow sandy shale with thin beds of concretionary sandstone in the upper half.

The Eagle sandstone varies from brown lignitic sandstone to a white, friable, massive sandstone. It is of Upper Cretaceous age.

The Everts formation is of Upper Cretaceous age and consists of a shallow-water sequence of sandstone and shale.

The Landslide Creek formation is of Upper Cretaceous age and consists of a series of interbedded sandstone and shale that is probably of continental origin.

The Harebell formation is a thick sequence of olive-drab to gray sandstone, conglomerate, claystone, and shale of continental origin. The Harebell is the youngest Upper Cretaceous formation mapped in the Ashton quadrangle.

Tertiary

During and following the Laramide orogeny, a series of Paleocene rocks was deposited locally that included sandstone, shale, and coal underlain by limestone-cobble conglomerates.

The volcanic sequence of the Ashton quadrangle area consists of rhyolites and basalts representing three main volcanic cycles. Each cycle included the eruption over the area of hugh ash-flow sheets and the formation of large areas of collapse caldera. Accompaning each cycle was the eruption of both precaldera and postcaldera rhyolitic lava flows and marginal basaltic lavas. These volcanic sheets and flows are intercalated with locally derived sediments.

During the Pleistocene the area was glaciated at least three times and glacial debris is widespread.

Recent deposits including alluvium, colluvium, silt, sand, and gravel are present along and near the major drainage arteries and tributaries. Fan and terrace deposits are preserved locally. Windblown sand is present, especially in the western part of the quadrangle. Landslide debris is widespread due to the continuing tectonic activity of the area.

Structure

The location of the Ashton quadrangle is in an area where several structural provinces come together. The area contains structural and stratigraphic elements from both the Beltian geosyncline and the stable shelf of the North American craton, due in part to its position along the "hinge-line" between these major structural elements.

The thick sequence of Precambrian sediments shows the effect of the extreme deformation of the rocks by the intense tectonic activity of this period. The Paleozoic and most of the Mesozoic was a relatively quiet period. Toward the end of the Cretaceous, a period of tectonic activity began with the formation of the Cretaceous Thrust Belt. This period of deformation is probably still going on.

The folds and faults of the Ashton quadrangle and the intense volcanic activity in the area are influenced by and are probably a result of the tectonic deformation of the structural provinces in the surrounding areas.

INTERPRETATION

General

The airborne gamma-ray spectrometer survey is conducted in support of the Department of Energy's National Uranium Resource Evaluation (NURE) program. The primary purpose of the survey is regional resource evaluation as opposed to local anomaly identifications. The interpretation of the radiometric data is directed towards determining zones of possible depletion of uranium which may have served as possible uranium sources, outlining areas of regional enrichment in uranium and indicating the geological formations which are most likely to be mineralized within a possible uranium province.

The areas of possible uranium depletion/enrichment are outlined with the aid of anomaly maps, which have been previously described. Enrichment or depletion of uranium on a regional scale is assumed to have taken place if the U/T and U/K ratio values remain higher/lower than at least one standard deviation above/below the mean for a distance of at least a mile, provided the K, U and T count rates are at the same time not less than one standard deviation below the mean. One mile equals approximately 35 samples.

The probability of a geologic formation to be mineralized by a given element may be estimated from the dispersion of the geochemical distribution of that element within the formation (Brinck). The narrower the distribution curve (i.e. the smaller the ratio of the standard deviation over the mean) the less the likelihood that an extremely high concentration of that element exists within that formation. Obviously, the opposite holds true as well.

The decision of both the "favorability" of a formation and of the presence of a regional geochemical anomaly is influenced to a large extent by the choice of the geological cell units used in the correlation of the radiometric and geologic data.

The radiometric parameters used in the present report are count rates in counts per second and ratios. The count rates of the helicopter system were calibrated at the Lake Mead Dynamic Test Range against sources of known concentrations of potassium, uranium and thorium. The sensitivities of the A.G.R.S. system are as follows:

Radioelement	Count Rate	Concentration
Potassium	73.6 cps	1%K
Uranium	8.1 cps	1ppm eU
Thorium	5.0 cps	1ppm eT

Geochemical Analysis

A large number of the formations sampled showed complex geochemical distribution curves. An attempt was made to find out whet er individual peaks of t e count rate histograms could be correlated with particular zones or facies of the geological units sampled. To this end the count rates under a particular peak were assigned specific standard deviation signs and numbers and anomaly maps were generated. In quite a number of cases separation of the individual peaks could be achieved and in various cases the peaks could be ascribed to different zones of the geological unit sampled. Because of lack of control due to the wide line spacing of the survey no changes were made on the geologic map, prepared by IntraSearch.

It appears that almost all the potassium count rates below 70 c.p.s. (counts per second) of the Q histograms are related to the Quaternary surface deposits to the south of Yellowstone Lake. The potassium count rates above 168 c.p.s. appear to be associated mainly with the deposits to the south and east of Hebgen Lake. Similar associations appear to hold true for the upper and lower peaks of the thorium histogram of Q.

The very low thorium and potasssium count rates of QAL appear to be related to alluvial areas near water. Multiple peaking can be observed on all three count rate histograms of QF (fan deposits). Again, the high count rates are observed mainly in the vicinity of Hebgen Lake, where also the high Q count rates are found. No pattern could be distinguished in the distribution of the remainder of the count rates of QF. The thorium and potassium histograms of QLF (Quaternary terrace and fan deposits) both show a small peak with relatively low count rates. These low values appear to correlate with the southern most part of the Qtf outcrop on traverse 360. The high potassium count rates of QLF appear to fall in a continuous zone within the formation mapped and may well have stratigraphic significance. The potassium distribution curve of QLS (landslides) displays prominent double peaking, which is not present on the thorium histogram. In general, the smaller, isolated areas of Qls tend to have the lower count rates as do the topographically lower parts of the larger Qls areas. The topographically higher parts of the large Qls outcrops generally display the higher potassium count rates.

The high peaks of the potassium and thorium histograms of QG (glacial deposits) again correspond to the samples observed near Hebgen Lake. The lower count rates have an apparent random distribution. The well defined low peaks of both the thorium and the potassium histograms of QH (hot spring deposits) find their source mainly from the deposits overflown on traverse 260.

A multiple potassium count rate distribution is also noted for QTV. It appears that data observed over the traverses 240 and 300 give high K count rates, while the Qtv series overlying the Precambrian quartzites at the east flank of the Madison Range have very low potassium count rates of less than 80 c.p.s.

The t orium distribution curve of TV shows a prominent low count rate peak and a broad high count rate zone. No corresponding low or high count rate peak can be distinguished on the uranium or potassium histograms and no explanation can be given for the low peak. The complex appearance of the K, U and Th histograms of TV is undoubtedly due to the inclusion of many rocks of different composition in the formation.

Only 11 samples were obtained over Tie. They have been combined with Ti (TI). All Tie samples had count rates that corresponded to the lower peak of the Th and K histograms of TI. Each single outcrop of Ti sampled appears to have a relatively homogeneous concentration of K and eTh, and it may be that two different Tertiary intrusive rocks are present, the one with a higher K and Th concentration (more acidic?), the other with a lower concentration (more basic?).

The shape of the histograms of the Tertiary basalts appears influenced more by the presence of some light cover or the degree of weathering than by geochemical differences in the formation. Both the potassium samples above 148 c.p.s. and below 84 c.p.s. have a completely random distribution on the pseudoanomaly map. The complex shape of the count rate histograms of TS (Sepulcher formation) is undoubtedly due to the inclusion of many different rock types in the geologic unit. The potassium histogram of KB (Bacon Ridge formation) displays double peaking. The higher count rate peak appears to correlate with data sampled over the younger part of the formation, while the older part appears to ave a low potassium count rate. No such geochemical relation appears to exist for the thorium.

It is possible that the higher potassium peak of KC (Cody shale), which correlates with data sampled on tie line 5120, corresponds to a facies of the shales slightly different from the formation sampled on traverse 20, where lower count rates were obtained.

The ragged appearance of the potassium, uranium and thorium histograms of KA is probably due to variations in facies within the Aspen formation. The multiple peaks of the potassium distribution curve of K (undivided Upper Cretaceous) must also be attributed to the many lithological differences of the rocks grouped together in this map unit. No explanation could be obtained from the anomaly map for the double peaks of the potassium (and thorium) histograms of units KCU and KMT.

The potassium count rates of less than 50 c.p.s. which form a single separate peak of the distribution of KK (Koutenai formation) were all recorded to the north of Hebgen Lake. The geologic map unit KJclm includes both Lower Cretaceous and Upper Jurassic series which may explain the complex nature of the count rate histograms. The complex appearance of, in particular, the potassium distribution curve of JME must also be ascribed to the inclusion of more than one single formation or facies in the map unit. Similar arguments may explain the complex histograms of RTW, PP, PMS, PPMQ, PMQ, PMU, DT, MDM, MDO and C. The Park shale (PC) displays prominent double peaking on the thorium histogram, and similar but less well defined double peaking on the potassium distribution curve. However, the pseudoanomaly map shows no clear cut zoning of positive and negative anomalies. Only 55 samples were recorded over CPR, which nontheless shows well defined double peaking of the potassium and uranium histograms. The low K count rates were all observed on traverse 420, while the high potassium count rates were obtained over traverse 460. Both CM and CU have complex count rate histograms, which must be attributed to the inhomogeneous character of these map units. The small peaks of high t orium and potassium count rates of PCQ correlate with radiometric samples recorded over Precambrian quartzites directly overlying Precambrian granites.

The high potassium count rate peak of PCU, and probably the high thorium count rate peak as well, correlates with three continuous zones of radiometric samples obtained in the Madison Range. It is possible that these zones represent a specific lithology within the map unit.

From the study of the uranium histograms of the geologic units digitized in the Ashton quadrangle it appears that the most favorable formations are the Quaternary surficial deposits (Q), with a normal uranium distribution and a mean count rate of 21.68$\pm$ 11.50 c.p.s., the Precambrian granites (p-Cg) also with a normal U distribution and a mean count rate of 15.32$\pm$ 7.48 c.p.s., the Tertiary volcanics, (Tv), with a normal uranium distribution and a mean count rate of 20.40 $\pm$ 9.50 c.p.s. and the Quaternary fan deposits (Qf) with a lognormal uranium distribution and a mean U value of 12.48 x/÷ 1.78. The formation with the most uranium anomalies, the

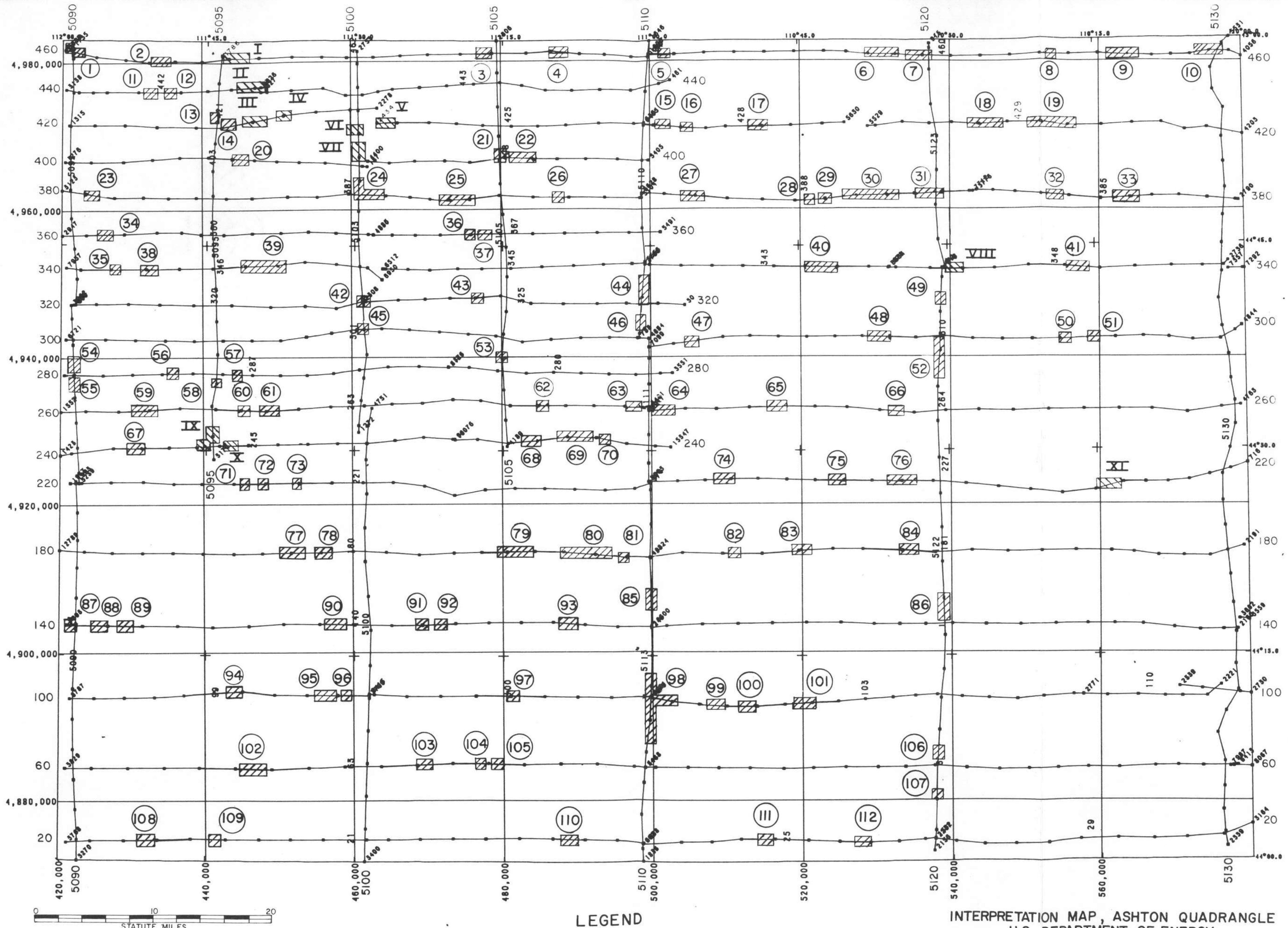
Quaternary volcanics (Qv), is not considered favorable, on the basis of its uranium distribution curve. The mean uranium count rate of 28.35 $\pm$ 7.75 is quite high, but the standard deviation is quite small in proportion to the mean value. It must also be stressted that the four formations indicated as favorable comprise rocks of rather heterogeneous composition and their uranium histograms do not lend themselves to accurate favorability determinations.

Anomaly Map Interpretation

An extremely large number of anomalies was detected in the Ashton map sheets, using the criteria outlined in the general interpretation section. To a large extent this is due to the often very low count rates of thorium and potassium observed over many formations. Most of the 112 uranium anomalies outlined cannot be recognized on the radiometric profiles. They consist only of a series of positive U/T ratio anomalies or U/K anomalies, without any corresponding U anomalies. In an area of low radiometric background, such as the Ashton quadrangle, these minimal anomalies are not believed to have any physical meaning and are not discussed in the interpretation report. They are, of course mentioned in the anomaly lists, appended to this report.

The most interesting uranium anomalies are 2, 4, 11, 12, 35, 60 and 61, all of which are recognizable on the radiometric profiles. Since there are no radioactive occurrences reported from the area, none of the anomalies is considered of cultural origin.

Zone 2 consists of very high U/T and U/K ratio anomalies, coincident with relatively high uranium responses. The potassium and thorium count rates over the zone are rather low, however. The zone falls in an area mapped as Phosphoria formation, overlying undifferentiated deposits of Upper Mississippian and Lower Pennsylvanian age (PMqa). Similar very strong U/T and U/K anomalies are observed with anomalous zone 4, which also coincides with good uranium anomalies. Again, the thorium and potassium count rates



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LEGEND

3 URANIUM ANOMALY NO. 3

II THORIUM ANOMALY NO. 2

INTERPRETATION MAP, ASHTON QUADRANGLE
U.S. DEPARTMENT OF ENERGY

are very low, often less than one standard deviation below the mean. The zone is associated with undifferentiated deposits of Lower Permian, Pennsylvanian and Upper Mississippian age (PIPMs), overlying the Lower Mississippian Madison group (Mm).

Zone 11 also consists of very strong U/T and U/K anomalies. The zone does not have much support on the uranium anomaly map where the values are normal or barely anomalous. Again the thorium and potassium count rates are appreciably lower than the mean of the underlying formationsKk - Kootenai formation - , JME - Morrison formation and Ellis group undivided - and Rtwd - Triassic undivided.

Anomalous zone 12 stands out on the U/T and U/K traces of the radiometric profile of traverse 440. The uranium response of the zone is approximately normal, while the thorium and potassium responses are well below the mean. Additional interest is lent to this anomaly by its association with the Phosphoria formation, which with the Madison group and deposits of Upper Mississippian and Pennsylvanian age underlies anomaly 12.

The rather narrow zone 35 combines strong U/T, U/K and U anomalies. The zone, which is easily recognized on the radiometric profile of traverse 340, is underlain by undifferentiated Triassic sediments (Rtwd) and Quaternary alluvium (Qal).

Both zones 60 and 61 are located on traverse 260. Zone 60 is relatively narrow and consists of strong anomalies on the U/K, U/T and U anomaly maps. Thorium and potassium responses appear normal over the anomalies. The zone 60 is underlain by undifferentiated Upper Mississippian, Pennsylvanian and Permian sediments (PIPMq and IPMqa) and by the Triassic Dinwoody formation (Rd). The somewhat broader zone 61 also has strong U/T, U/K and U anomalies, with normal count rates of both K and T over the zone. The geologic formations underlying anomaly 61 are the Madison group (Mm) and deposits of Upper

Mississippian and Pennsylvanian age (PMqa).

A number of other anomalies not readily identified on the radiometric profiles merit further discussion on the basis of their simultaneous good responses on all three parameter anomaly maps of U/K, U/T and U. The are zones 1, 3, 6, 15, 18, 27, 28, 31, 32, 41, 46, 48, 65, 72, 74, 77, 83, 100, 102 and 109.

Anomaly 1 is located in the northwest corner of the map area. It consists of good U/K, U/T and U anomalies underlain by Quaternary alluvium (Qal) and Cretaceous Thermopolis shale through Frontier formation, undivided (Kfts). Zone 3 consists of strong U/T and good U anomalies. The strong U/K anomalies observed may be mainly due to the low potassium count rates recorded. The zone is underlain by rocks of the Colorado group (Kfts and Kcu).

Aspen and Younger Cretaceous formations (ku), Tertiary andesites (Ta) and Quaternary deposits (Q) underly the good U/K, U/T and U anomaly 6, on traverse 460. Anomaly 15 combines good U/T and U/K responses with only fair U anomalies. The zone is located in an area mapped as Quaternary volcanics (Qv) and surface deposits (Q). Zone 18 consists of U/K, U/T and U anomalies with amplitudes as high as +3 (plus three) standard deviation. The zone falls on traverse 420 in an area mapped as Tertiary andesites (Ta), quaternary volcanics (Qv) and surficial deposits (Q). Anomaly 27 is a broad zone of good positive U/K values. Only in the western two thirds of the zone, good U/T and U anomalies are observed as well. The anomaly falls in an area mapped as Precambrian granites (p€g), tertiary andesites and basalts (Tab) and Quaternary surface deposits (Q). Anomaly 28 comprises a narrow zone of good U/K, U/T and U anomalies underlain by Quaternary surficial deposits (Q) and volcanics (Qv). Recent volcanics (Qv) also underly the anomaly 29 which combines strong anomalies on all three U/K, U/T and U anomaly maps.

The anomaly amplitudes of zone 31 are higher in the western part, where the anomaly is underlain by Quaternary volcanics (Qv), than in the eastern part where Tertiary andesites (Ta) are mapped.

Quaternary volcanics (Qv) also underly zone 32, which consists of good U/K, U/T and U anomalies, with amplitudes generally of + 2 standard deviations and over. Anomaly 41 consists of good U/K, U/T and U responses. It is located in an area of intense faulting. The underlying formations are mapped as Quaternary basalt (Qb) and undifferentiated volcanics (Qv). The broad zone 46 is underlain by Quaternary fan deposits (Qf). The anomaly probably corresponds to the large tail of the uranium histogram of this formation, which is considered favorable for possible uranium enrichment.

Strong U/K anomalies are noted over the entire zone 48, which in the western three quarters has also good support on the U/T and U anomaly maps. The zone is underlain by Quaternary volcanics (Qv). The same formation underlies the broad zone 65, which consists of strong U/K, U/T and U anomalies of plus two (+ 2) standard deviations and higher. Good U/K anomalies are noted over the western half of zone 72, which elsewhere consists mainly of positive U/T and U anomalies. The zone is apparently underlain by Quaternary alluvial deposits (Qal). It is possible that the U anomalies correspond to the small side peak of the uranium histogram of the Qal; this side peak occurs just above the plus two standard deviation value of the histogram. Anomaly 74 is underlain by Quaternary volcanics. It consists of coincident good positive anomalies on the U/K, U/T and U anomaly maps. Good to excellent correlation exists on the U/K and U anomaly maps for anomaly 77. The zone, which falls in an area mapped as Quaternary basalts (Qb) and undifferentiated volcanics (Qv) has only a fair expression on the U/T anomaly map.

Zone 83 consists of good U/K anomalies over its entire width. Only in the western half has the zone also good expression on the U/T and U anomaly maps. The zone is underlain by Quaternary volcanics (Qv) except in the extreme eastern part, where Recent surficial deposits (Q) excepts mapped. Zone 99 is made up chiefly of anomalous U/T responses, in the western half of the zone coinciding with good U/K and U anomalies. The anomaly is underlain by Quaternary volcanics. The good U/K, U/T and U anomaly 100 consists of responses of up to three standard deviations above the mean on all three parameter maps. The zone is located on traverse 100 in an area mapped as Quaternary volcanics.

Both anomalous zones 102 and 109 are underlain by Quaternary basalts (Qb) and windblown sands (Qe). Zone 102 is made up of good U/T and U anomalies with, in the eastern two thirds, excellent correlation with the U/K anomaly map. Zone 109 consists of coincident good U/K, U/T and U anomalies over its entire width.

A total of eleven thorium enriched - possibly uranium depleted - anomalies have been outlined. Of these, zone I, II, III and IV fall in an area underlain by undifferentiated Precambrian rocks (p-Cu) and Tertiary volcanics (Tv). They all show strong negative U/T anomalies accompanied by positive U anomalies. This may be due to thorium enrichment, similar to the Lemhi Pass area in Idaho/Montana or may possibly be an indication of uranium depletion. If the zone of negative U/T anomalies is indeed due to uranium depletion, the strong uranium zones 2, 11 and 12 would certainly merit further investigation.

Zones V, VII, IX, X and XI consist of mostly negative U/T responses with normal U count rates. Positive uranium anomalies are observed over the thorium anomalies VI and VIII. No outstanding uranium anomalies are detected near these latter two zones. Good uranium anomalies do occur, however, near thorium zones IX and X.

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A P P E N D I X   A

Geologic Legend: Ashton Quadrangle

G E O L O G I C   L E G E N D

A S H T O N

Aero Symbol	Map Symbol	
Q	= Q	: undivided surficial deposits
QS	= Qs	: colluvium, silt, sand, gravel
QA	= Qal	: alluvium
QF	= Qf	: fan deposits
QLF	= Qtf	: terrace and fan deposits
QE	= Qe	: windblown sand
QLS	= Qls	: landslides
QG	= Qg	: glacial deposits
QH	= Qh	: hot spring deposits
QV	= Qv;Qi	: volcanics; rhyolite domes
QB	= Qb	: basalts
QT	= QTb	: Quaternary/Tertiary basalts
QTV	= QTv	: Quaternary/Tertiary volcanics
TV	= Tv	: Tertiary volcanics
TI	= Ti;Tie	: intrusives; intrusives and extrusives
TB	= Tb	: basalt
TA	= Ta	: andesite
TAB	= Tab	: andesite-basalt undifferentiated
TS	= Ts	: Sepulcher formation
TBB	= Tbb	: Black Butte gravel
TC	= Tc	: limestone-cobble conglomerate
TP	= Tp	: Paleocene undivided
KH	= Kh	: Harebell formation
KB	= Kb	: Bacon Ridge formation
KC	= Kc	: Cody shale
KF	= Kf	: Frontier formation
KA	= Ka	: Aspen formation
K	= Ku	: Cretaceous undivided (Aspen and Younger)
KM	= Km	: Mowry formation
KCU	= Kcu	: Colorado group undivided (Kc and Kfts)

Aero Symbol	Map Symbol	
KMT	= Kmts	: Mowry shale and Thermopolis shale, undivided
KFT	= Kfts	: Thermopolis shale through Frontier formation, undivided
KK	= Kk	: Kootenai formation
KMK	= Kmk	: Kootenai formation, Thermopolis shale and Mowry shale, undivided
KT	= Ktsk	: Thermopolis shale and Kootenai formation, undivided
KJ	= KJclm	: Cretaceous Cloverly formation and Jurassic Morrisson formation, undivided
JME	= Jme	: Morrisson formation and Ellis group, undivided
Js	= Jsg	: Gypsum Spring formation
JTR	= JRu	: Jurassic and Upper Triassic deposits, undivided
RC	= Rc	: Chugwater formation
RD	= Rd;Rwd	: Dinwoody formation; Dinwoody formation and Woodside formation, undivided
RTW	= Rt;Rtwd	: Thaynes formation; Dinwoody, Woodside and Thaynes formation, undivided
PP	= Pp	: Phosphoria formation
PMS	= Ps;PℙMs	: Shedhorn s.s.; Upper Mississippian, Pennsylvanian and Permian Shedhorn s.s., undivided
PPMQ	= PℙMq;PℙMt	: Upper Mississippian; Pennsylvanian and Permian deposits, undivided
PMQ	= ℙMta;ℙMqa	: Upper Mississippian and Pennsylvanian deposits, undivided
PMA	= ℙMa	: Upper Mississippian Amsden formation
PMU	= ℙMu	: Mississippian and Pennsylvanian deposits, undivided
MM	= Mm	: Lower Mississippian Madison group
MDT	= MDtj	: Lower Mississippian/Upper Devonian Three Forks formation and Jefferson formation, undivided
MDM	= MDmd	: Madison group and Three Forks formation, undivided

Aero Symbol	Map Symbol	
MDO	= MDOu	: Ordovician, Devonian and Lower and Middle Mississippian, undivided
D	= Dj	: Upper Devonian Jefferson formation
DO	= DO-Cu	: Cambrian, Ordovician and Devonian deposits, undivided
OC	= O-Cbp	: Ordovician and Upper Cambrian deposits, undivided
OCU	= O-Cu	: Cambrian and Ordovican deposits, undivided
C	= -Cs	: Cambrian Snowy Range formation
CP	= -Cp	: Park shale
CPF	= -Cpf	: Flathead ss., Wolsey sh., Meagher l.s., undivided
CU	= -Cu	: Cambrian deposits, undivided
PCQ	= p-Cq	: Precambrian quartzite
PCT	= p-Ct	: tremolite marble
PCG	= p-Cg	: gneiss and schists
PCD	= p-Cd	: dolomite
PCU	= p-Cu	: undivided

APPENDIX B

List of Geologic Units by Anomaly: Ashton Quadrangle

A S H T O N

List of Geologic Units by Anomaly

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCIRPTION
1	Kfts Qal	t -460	1050	U/K, U/T and U anomaly
2	IPMqa Pp	t -460	1350	Strong U/K, U/T and U anomaly, clearly visible on profile, in area of thrust faulting. T & K response is low.
3	Kcu Ktsk	t -460	2480	Relatively strong U/T anomaly, with good U correlation K count rate very low in this area.
4	PIPMs Mm	t -460	2740	Strong U/K, U/T and U anomaly in area of overturned folds. T anomalies in area are negative.
5	Q	t -460	3150	U/T, U/K anomaly, without U support.
6	Ku Q Ta	t -460	3925	Good U/T, U/K and U anomaly.
7	p€q Qb Ta Q	t -460	4075	U/T and U anomaly in area of low K count rate.
8	Q p€q	t -460	4510	Weak U/T anomaly with some U and no U/K support, on west flank fault.
9	Q Tab	t -460	4850	U/T anomaly, in center coinciding with U/K anomaly. No U support.
10	Q MDOu Ti	t -460	5200	U/T anomaly with some U support.
11	Kk JMe TRwtd	t -440	3530	Strong U/T and U/K anomaly on profile, no U support very low to low K and T response.
12	Mm IPMqa Pp	t -440	3570	Strong U/T and U/K anomaly on profile, little U support; low to very low K & T response

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
13	pЄu Tb	tl-5095	2950	U/T anomaly with no correlation on U or U/K maps.
14	pЄu	t -420	1825	U/K anomaly in area of high T response; no U support.
15	Q Qv	t -420	3250	Combined U/K and U/T anomaly with fair U support.
16	Mm Q	t -420	3325	Small U/T and U anomaly, low K count rate
17	Q Mm	t -420	3650	Mostly U/T anomaly, some U support at west side.
18	Qv Q Ta	t -420	4400	Good U/K, U/T and U anomaly.
19	Q Ta Qv	t -420	4600	Very broad U/T anomaly with good U/K and U correlation in eastern half.
20	pЄu	t -400	800	U/T anomaly with some U support, west of zone of high radiometric response.
21	Mm	t -400	1760	U/K anomaly with some U support.
22	Mm PIPMs T̄Rwtd Qg	t -400	1850	U/K anomaly only, no U or U/T support.
23	Kfts	t -380	3225	U/T and U anomaly, low K count rate.
24	Qtf Qal	t -380	4150	U/K anomaly only, with no U or U/T support
25	Qtf	t -380	4500	Broad U/K and U anomaly, no U/T support.
26	Mm Qls Qv	t -380	4875	Weak U/K anomaly, no U/T or U support
27	pЄg Q Tab	t -380	5275	U/T anomaly, with, in western two thirds, good U and U/K support.
28	Q Qv	t -380	5620	Small U/K, U/T and U anomaly.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
29	Qv	t -380	5680	Combined U/K, U/T and U anomaly.
30	Qv	t -380	5825	Very broad U/T anomaly; in eastern 2/3 good U/K and U support.
31	Qv Ta	t -380	6050	Good U/K, U/T and U anomaly, especially in the western part, in Qv.
32	Qv	t -380	6525	Good U/K, U/T and U anomaly.
33	Ta Tv	t -380	6750	U/K anomalous zone with fair support on U anomaly map.
34	Kk Tv	t -360	1980	U/T anomaly with good expression on U anomaly map; zone flanks fault system.
35	TRwtd Qal	t -340	7120	Small, strong U/K, U/T and U anomaly on profile may relate to same fault system as 34.
36	p€g	t -360	3325	Weak U/K anomaly; no support on U or U/T anomaly maps.
37	p€g	t -360	3375	Weak U/K anomaly adjacent to 36; no U or U/T support.
38	Tv	t -340	7225	Weak U/K anomaly without U or U/T support.
39	Tv	t -340	7600	Broad, weak U/K anomaly; in eastern half good U and U/T support.
40	Qv Q	t -340	9500	U/T anomaly with, in eastern two thirds, good U and U/K support.
41	Qv Qb	t -340	10250	Good U/T, U/K and U anomaly in area of intense faulting.
42	p€g	t -320	870	Weak U/K anomaly with no U or U/T support.
43	PMqa Ps	t -320	1300	U/T anomaly with fair U support.
44	Q Qf	tl-5110	2500	Broad U/K, U/T and U anomaly in area of relatively high radiometric response.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
45	p€d p€g	t -300	5600	Rather weak, small U/T and U/K anomaly, with some U response.
46	Qf	tl-5110	2420	Broad U/T, U/K and U anomaly adjacent to 44.
47	Qv	t -300	6900	U/T and U anomaly with no U/K support.
48	Qv	t -300	7600	U/K anomaly, with, in western three quarters, good U/T and U support.
49	Qv	tl-5120	2070	Weak U/T anomaly in area of low K response.
50	Qv	t -300	8250	Weak U/K anomaly with some U and no U/T support.
51	Q	t -300	8350	Weak U/T anomaly, with, in eastern half, good U/K support.
52	Q	tl-5120	1900	Elongate, weak U/K anomaly, with, in northern half good U/T support.
53	Tv	tl-5105	3120	Small, weak U/T anomaly, with no U or U/K support.
54	Qal	tl-5090	3750	Combined U/T and U/K anomaly with no U support.
55	Tv	tl-5090	3675	Weak U/T anomaly, with no support on U anomaly map and low K response.
56	Qls Tv	t -280	7225	Small U/T and U/K anomaly with little U expression.
57	Qal	t -280	7450	Weak U/T anomaly in area of low K response.
58	Mm MDtj O€u p€g	tl-5095	2080	U/T and U anomaly with very low K response.
59	Tv Qal	t -260	1800	Broad zone of anomalous U/T, U/K and U response.
60	T̄Rd PIPMq IPMqa	t -260	2110	Narrow, strong U/T, U/K and U anomaly on profile.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
61	PMqa Mm	t -260	2200	Fairly strong U/K, U/T and U anomaly on profile.
62	Qv	t -260	3110	Weak, small U/T anomaly, with no positive U expression.
63	Qv Q	t -260	3425	Small U/K, U/T anomaly with some U support.
64	Qv	t -260	3500	Broad U/K, U/T anomaly with some U support in center.
65	Qv	t -260	3850	Broad U/K, U/T, U anomaly, with amplitudes of +2T and higher.
66	Qv	t -260	4225	U/T and U/K anomaly with little U support.
67	Tv	t -240	300	Weak U/K anomaly, with little support on U and U/T maps.
68	Qv	t -240	1700	U/T anomaly with in eastern half, good U/K and U support.
69	QV	t -240	1825	Broad U/T and U/K anomaly with no U support.
70	Qv	t -240	1920	Small, weak U/T anomaly adjacent to 69.
71	Qal	t -220	600	Small U/T anomaly with no U support in area of low K response.
72	Qal	t -220	660	U/T, U anomaly, with in western half good U/K support.
73	Qls	t -220	760	Small U/K anomaly with good U support in area of low T response.
74	Qv	t -220	2250	Good U/K, U/T, U anomaly.
75	Q Qv	t -220	2625	Zone of U/K and U/T anomalies with fair support on U map.
76	Q	t -220	2850	Broad zone of U/T anomalies, with, in eastern two thirds, good U and U/K support.
77	Ql Qv	t -180	11600	Zone of U/K anomalies with good to excellent U correlation.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
78	Qv	t -180	11700	U/K anomaly with good U support and some U/T expression.
79	Qv Ql	t -180	12350	U/K, U/T anomaly with some U support, located near east rim of Henrys Fork Caldera
80	Qv	t -180	12600	Very broad U/K anomaly with fair U support and in center good U/T expression.
81	Qv	t -180	12700	Weak, small U/K anomaly with no U or U/T response.
82	Qv Q	t -180	1300	Small U/T, U/K anomaly with some U support.
83	Qv Q	t -180	13200	U/K anomaly, with, in western half, good U and U/T support.
84	Q	t -180	13500	Weak U/K anomaly, with no expression on U or U/T maps.
85	Qv	tl-5110	1500	Weak, mostly U/K anomaly with some U/T and U support.
86	Qh Q	tl-5120	1200	Broad U/K and U/T anomaly with only little U support.
87	Ql	t -140	8900	U/K and U/T anomaly with some U expression, in area of cinder cones.
88	Ql	t -140	8975	U/K, U/T anomaly with no U support, in area of cinder cones.
89	Qb	t -140	9050	U/K, U/T anomaly with some U support, in area of cinder cones.
90	Qb	t -140	9650	U/K anomaly, with in east & west side some U/T and U support.
91	Qb Qi	t -140	9900	U/K, U/T, U anomaly in center of Island Park Caldera
92	Qb	t -140	9960	U/K, U/T, U anomaly adjacent to 91.
93	Qv	t -140	10350	U/K, U/T anomaly with in center some U support.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
94	Qb	t -100	8350	U/K, U/T anomaly in area of generally low radiometric response.
95	Qb	t -100	8640	U/K anomaly in area of low radiometric response.
96	Qb	t -100	8710	Small U/K anomaly in area of low radiometric response.
97	Qv	t -100	9200	U/K, U/T anomaly with no U support.
98	Q Qv Qb	tl-5110	1150	Broad and elongate zone of U/K and U/T anomalies with U support in southern and eastern parts.
99	Qv	t -100	9850	U/T anomaly with, in western half, good U and U/T support.
100	Qv	t -100	9960	Good U/K, U/T, U anomaly.
101	Qv	t -100	10150	Broad U/K and U/T anomaly with, in center, good U support.
102	Qb Qc	t - 60	4350	U/T, U anomaly with, over eastern two thirds, good U/K response.
103	Qv	t - 60	4825	Weak U/T anomaly with no support on U or U/K maps.
104	Qg Qv	t - 60	4970	Small, weak U/T anomaly, with some expression on U/K map.
105	Qg	t - 60	5010	Small U/T anomaly with some U/K support, in area of generally low radiometric response.
106	Q Kb	tl-5120	775	U/T anomaly with some U/K expression in the north and U support in the south.
107	Q	tl-5120	650	Small U/T and U/K anomaly with normal U response.
108	Qb QTv	t - 20	2230	U/K anomaly in area of very low thorium response; fair U support.
109	Qe Qb	t - 20	2430	U/K, U/T and U anomaly, adjacent to zone of generally high radiometric response.

ANOMALY	FORMATIONS	LOCATION t-traverse tl-tie line	FID.	BRIEF DESCRIPTION
110	Qg Qb	t - 20	4150	Weak U/T anomaly with no U support in area of very low thorium response.
111	pꞒu Ꞓu	t - 20	4150	Weak U/T anomaly in area of of low potassium count rate.
112	Kb Kc Kf	t - 20	4450	Small U/K and U anomaly with good U/T correlation.
		Thorium Anomalies		
I	Tb pꞒu Tv	t -460	1660	Zone of negative U/T anomalies with high T response; falls in line with II and III along contact between pꞒu and Tv.
II	pꞒu Tv	t -440	3900	Zone of strong thorium anomalies in area of positive U anomalies; falls in line with I and III.
III	pꞒu	t -420	1900	Zone of strong thorium anomalies and negative U/T anomalies, in area of positive U response.
IV	Tv	t -420	2000	Zone of negative U/T anomalies, correlates with positive U anomalies.
V	pꞒg	t -420	2300	Zone of negative U/T anomalies.
VI	pꞒg	tl-5100	5780	Zone of negative U/T anomalies and normal to positive U response.
VII	pꞒg Qtf	tl-5100	5700	Zone of negative U/T anomalies.
VIII				
VIII	Qv Q	t -340	9900	Zone of negative U/T anomalies and normal to positive U response.
IX	Kk	tl-5095	1975	Zone of negative U/T anomalies.
X	Jme	t -240	650	Zone of negative U/T anomalies.
XI	Q Qv	t -220	3500	Zone of negative U/T anomalies.

APPENDIX C

List of Anomalies by Geologic Unit: Ashton Quadrangle

ASHTON
List of Anomalies by Geologic Unit

Formation Formation	No. of Samples	No. of U Anomalies	No. of Th. Anomalies
Q	9,946	27	2
Qs	57		
Qal	3,619	8	
Qf	1,190	2	
Qtf	670	2	1
Qe	584	2	
Qls	320	3	
Qg	1,352	4	
Qh	163	1	
Qv	17,831	41	2
Qi	27	1	
Ql	6,461	18	
QTb	311		
QTv	422	1	
Tv	5,606	9	3
Ti,Tie	166	1	
Tl	761	1	1
Ta	6,245	6	
Tab	1,076	2	
Ts	160		
Tbb	99		
Tc	21		
Tp	507		
Kh	409		
Kb	176	2	
Kc	191	1	
Kf	88	1	
Ka	327		
Ku	174	1	
Km	245		
Kcu	177	1	
Kmts	94		
Kfts	2,221	2	
Kk	520	2	1
Kmk	72		
Ktsk	221	1	
KJclm	166		
Jme	377	1	1
Jsg	67		
JTRu	82		
TRc	68		
TRd,TRwd	280	1	
TRt,TRtwd	719	3	

List of Anomalies by Geologic Unit

Formation	No. of Samples	No. of U Anomalies	No. of Th. Anomalies
Pp	136	2	
Ps	18	1	
PIPMs	399	2	
PIPMq, PIPMt	101	1	
IPMta, IPMqa	409	5	
IPMa	18		
IPMu	86		
Mm	1,307	8	
MDtj	238	1	
MDmd	77		
MDOu	119	1	
Dj	6		
DO-Ꞓu	31		
O-Ꞓbp	22		
O-Ꞓu	27	1	
Ꞓs	106		
Ꞓp	129		
Ꞓpf	55		
Ꞓmf	155		
Ꞓu	402	1	
pꞒq	368	1	
pꞒt	42		
pꞒg	3,840	7	3
pꞒd	434	1	
pꞒu	1,591	4	3

A P P E N D I X D

Mean Value by Geologic Unit: Ashton Quadrangle

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 440

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	35.88	14.82	83.12	0.430	0.196	0.451	QLF	61.25	16.51	176.51	0.271	0.095	0.353
QA	55.78	25.24	132.93	0.462	0.207	0.439	QG	52.76	15.59	124.24	0.293	0.125	0.425
KK	35.28	17.31	73.64	0.486	0.256	0.537	PCG	36.12	12.44	78.70	0.341	0.163	0.462
JME	32.48	15.73	68.64	0.492	0.261	0.511	KCU	36.69	17.56	49.69	0.479	0.358	0.744
RTW	29.66	15.11	60.80	0.562	0.288	0.506	KT	34.43	13.19	49.19	0.374	0.263	0.709
PP	30.50	15.11	85.78	0.714	0.339	0.406	PMS	17.36	19.67	29.85	1.206	0.741	0.619
PMQ	18.00	21.83	28.00	1.207	0.778	0.641	PCD	17.50	18.50	32.50	1.036	0.567	0.546
MM	13.77	10.43	23.83	0.682	0.379	0.574	Q	40.73	16.14	95.75	0.413	0.181	0.430
MDT	28.36	11.33	99.05	0.498	0.122	0.295	CP	32.20	10.64	102.34	0.361	0.112	0.316
CU	25.90	16.91	61.90	0.806	0.346	0.437	C	28.31	14.44	85.52	0.555	0.183	0.335
PCU	56.37	15.93	132.66	0.331	0.133	0.416	D	41.67	12.83	90.33	0.314	0.144	0.459
TV	84.28	26.02	189.04	0.311	0.139	0.446	QV	46.66	17.52	111.34	0.383	0.163	0.425
TS	26.04	10.69	63.42	0.419	0.175	0.413							

LINE 60

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QB	37.48	16.85	91.12	0.457	0.190	0.420	KMT	48.87	19.56	102.79	0.401	0.189	0.479
QE	35.41	18.15	101.90	0.515	0.179	0.350	KB	25.45	12.76	70.93	0.505	0.185	0.371
QA	51.19	19.70	120.91	0.402	0.172	0.430	KC	28.29	12.00	84.14	0.427	0.144	0.337
QV	55.94	24.48	138.46	0.450	0.185	0.410	KH	33.95	14.92	81.14	0.443	0.186	0.420
QG	36.95	17.05	86.33	0.450	0.194	0.441	TA	24.74	7.86	63.02	0.330	0.130	0.395
Q	35.80	13.89	87.09	0.384	0.158	0.417	TI	22.64	7.09	54.36	0.308	0.129	0.418
KJ	48.12	20.97	110.07	0.438	0.196	0.450	MDM	25.53	10.76	54.65	0.421	0.198	0.470

LINE 100

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QB	41.36	17.77	100.13	0.432	0.178	0.413	JS	36.19	17.31	92.63	0.475	0.186	0.391
QA	37.26	18.42	76.58	0.514	0.257	0.497	KB	31.65	13.88	74.58	0.445	0.190	0.429
QV	66.55	30.21	143.78	0.456	0.211	0.463	KH	32.98	14.11	75.93	0.444	0.190	0.436
QG	51.86	23.41	108.73	0.454	0.216	0.477	KC	27.00	11.05	65.77	0.408	0.166	0.418
Q	36.68	16.09	85.92	0.425	0.180	0.423	KF	33.88	17.02	77.25	0.503	0.220	0.438
PPMQ	31.50	19.43	57.79	0.618	0.336	0.545	TA	25.66	8.13	74.84	0.319	0.111	0.353
MM	22.19	11.39	59.68	0.516	0.210	0.394	TV	25.92	9.00	77.33	0.354	0.125	0.344

LINE 140

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QB	43.72	20.56	99.04	0.476	0.209	0.442	Q	34.21	14.14	88.40	0.406	0.155	0.385
QV	65.91	29.45	142.13	0.450	0.209	0.466	W	6.26	4.77	15.33	0.696	0.438	0.573
TA	22.88	9.83	62.59	0.443	0.160	0.367							

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 340

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	41.02	15.23	92.78	0.381	0.166	0.441	OC	28.57	8.89	73.82	0.311	0.120	0.394
QA	37.27	22.27	94.63	0.584	0.227	0.396	MDT	25.27	7.18	55.36	0.279	0.138	0.462
RTW	42.55	33.27	114.82	0.785	0.288	0.370	MM	16.51	5.46	28.47	0.351	0.230	0.679
PP	46.46	24.00	90.46	0.541	0.289	0.525	PMQ	13.47	3.94	18.76	0.294	0.211	0.770
TV	65.43	23.46	127.26	0.362	0.187	0.516	QV	74.12	32.53	162.97	0.438	0.201	0.461
PCG	28.71	11.91	57.20	0.402	0.202	0.531	W	46.73	16.73	85.27	0.347	0.209	0.606
PCD	30.12	11.02	56.39	0.352	0.203	0.616	QH	54.00	33.25	112.50	0.613	0.296	0.482
Q	79.32	30.92	167.42	0.394	0.186	0.476	QG	56.20	27.00	97.60	0.483	0.281	0.583
QF	66.38	24.99	150.34	0.357	0.159	0.449	QB	67.16	36.18	156.47	0.526	0.239	0.437
PCQ	27.25	9.85	54.44	0.359	0.182	0.504	TA	39.12	16.53	116.67	0.426	0.144	0.341
CM	17.36	7.19	32.14	0.418	0.224	0.565	TAB	26.90	13.18	91.61	0.470	0.140	0.289

LINE 5100

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QV	59.53	23.85	146.65	0.410	0.168	0.411	QG	23.67	9.44	39.56	0.393	0.235	0.600
QB	48.79	21.07	109.24	0.434	0.196	0.451	CU	21.62	6.77	53.54	0.342	0.195	0.532
QA	41.37	17.10	113.36	0.414	0.155	0.375	PMQ	41.63	17.25	194.00	0.418	0.089	0.214
W	10.00	7.00	25.20	0.343	0.165	0.544	PCG	53.63	13.87	125.65	0.295	0.122	0.430
QLS	46.79	18.15	109.17	0.390	0.167	0.433	QF	39.06	10.88	78.56	0.290	0.144	0.497
TV	45.75	16.19	130.50	0.357	0.130	0.368	PCQ	29.31	10.51	80.49	0.364	0.132	0.370
PMU	22.69	12.81	68.65	0.568	0.201	0.352	PCD	36.60	13.76	86.51	0.379	0.158	0.430
Q	28.16	8.43	59.41	0.302	0.147	0.481	PCU	54.71	18.63	122.44	0.321	0.144	0.454
QLF	69.48	23.25	164.62	0.335	0.143	0.423							

LINE 420

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	43.00	19.77	92.60	0.466	0.216	0.466	PCQ	37.17	13.07	82.83	0.384	0.167	0.444
TB	33.74	12.52	92.52	0.349	0.126	0.376	PCG	58.99	18.70	102.84	0.393	0.199	0.551
TA	31.80	15.83	102.58	0.519	0.154	0.305	JME	26.42	12.89	65.30	0.494	0.216	0.425
RTW	21.69	12.39	41.88	0.597	0.374	0.615	KK	25.31	13.74	40.44	0.550	0.373	0.660
PP	22.88	13.94	47.44	0.641	0.343	0.516	KT	37.23	17.05	55.60	0.461	0.313	0.677
PMO	14.93	12.73	32.87	0.864	0.395	0.458	PMS	17.89	21.17	23.14	1.178	0.876	0.800
MM	25.42	15.41	53.98	0.643	0.340	0.514	PCT	23.45	11.90	78.69	0.508	0.153	0.317
MDT	16.33	5.89	33.44	0.362	0.175	0.486	PCD	30.51	11.35	55.79	0.379	0.210	0.571
CU	17.10	11.08	41.34	0.659	0.284	0.421	CPF	29.53	17.09	52.13	0.635	0.363	0.573
PCU	39.63	16.99	87.51	0.443	0.209	0.466	Q	39.71	20.10	113.11	0.533	0.195	0.362
TV	70.96	19.33	152.07	0.303	0.131	0.459	CO	39.13	15.32	83.97	0.387	0.180	0.469
QA	65.00	13.05	146.55	0.201	0.089	0.444	QV	60.60	29.55	144.21	0.480	0.201	0.422
QLF	60.15	16.79	149.66	0.280	0.112	0.402	QB	44.15	22.25	104.97	0.508	0.216	0.429
QG	50.45	14.89	113.34	0.291	0.129	0.454	TAB	25.84	13.48	93.37	0.528	0.145	0.278

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 20

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QT	34.11	18.01	101.58	0.533	0.179	0.336	PCU	17.91	13.21	41.65	0.749	0.325	0.435
QE	32.78	15.50	97.00	0.473	0.159	0.339	RC	29.15	16.16	62.91	0.574	0.285	0.480
QB	49.98	23.57	122.53	0.477	0.195	0.410	QA	39.20	19.41	91.50	0.495	0.211	0.430
QTV	43.90	25.08	109.04	0.568	0.230	0.403	KB	36.78	18.22	80.33	0.502	0.229	0.457
QV	44.47	20.42	102.41	0.460	0.202	0.441	KC	33.93	16.50	69.76	0.488	0.238	0.501
QG	45.58	21.76	105.91	0.481	0.210	0.437	KM	28.98	12.39	58.80	0.433	0.213	0.497
KF	31.00	18.11	82.04	0.558	0.210	0.380	TP	28.38	14.43	72.43	0.519	0.204	0.395
PMQ	32.00	19.83	85.00	0.625	0.239	0.380	KH	37.80	16.27	92.67	0.445	0.178	0.406
MDM	28.40	11.28	55.12	0.409	0.225	0.531	TA	27.24	13.01	75.11	0.470	0.172	0.366
CU	20.56	13.76	36.52	0.682	0.391	0.572	TV	30.49	17.82	97.80	0.593	0.185	0.312
Q	28.92	14.83	94.92	0.527	0.158	0.305							

LINE 180

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
TV	81.25	32.27	191.88	0.387	0.164	0.418	QV	72.68	33.88	145.92	0.465	0.232	0.501
QA	67.58	30.49	142.26	0.458	0.212	0.467	Q	43.66	17.90	102.58	0.408	0.177	0.428
QB	41.26	17.27	100.05	0.426	0.174	0.411	W	11.82	8.36	36.73	0.483	0.254	0.573
TA	24.91	8.38	78.74	0.346	0.112	0.325							

LINE 220

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QA	57.57	25.40	133.78	0.452	0.194	0.432	QG	65.00	28.57	138.09	0.442	0.208	0.472
TV	54.55	20.63	149.61	0.370	0.132	0.355	QH	56.58	23.91	122.05	0.444	0.205	0.464
KA	61.55	25.86	147.32	0.421	0.176	0.421	W	6.88	4.97	9.71	0.591	0.300	0.698
QV	72.34	32.29	158.47	0.442	0.205	0.464	QS	4.82	0.0	0.0	0.0	0.0	0.0
QLS	47.70	18.09	105.83	0.384	0.172	0.452	TA	29.02	7.96	106.37	0.277	0.076	0.273
Q	63.80	26.79	139.94	0.409	0.188	0.451	TI	42.57	13.57	139.43	0.317	0.098	0.306

LINE 240

UNIT	THOR	URN	POT	U/TH	U/K	TH/K	UNIT	THOR	URN	POT	U/TH	U/K	TH/K
TV	57.97	23.56	133.91	0.406	0.177	0.437	RTW	27.75	14.63	88.38	0.530	0.166	0.314
KA	50.77	24.75	109.05	0.482	0.225	0.462	QTV	65.85	22.69	137.29	0.349	0.167	0.481
QA	64.78	28.39	141.98	0.435	0.197	0.451	QV	62.13	26.57	136.71	0.431	0.197	0.456
JTR	37.23	17.77	75.23	0.478	0.236	0.497	PMA	23.56	20.28	51.83	0.863	0.394	0.453
KK	36.06	12.72	77.68	0.371	0.177	0.475	Q	68.71	29.00	142.71	0.423	0.203	0.482
JME	35.82	16.42	88.48	0.491	0.191	0.398	QF	65.25	30.19	142.19	0.462	0.213	0.461

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 260

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
TV	45.15	18.45	130.10	0.404	0.137	0.340
KA	28.49	13.78	69.19	0.503	0.213	0.420
QA	42.94	18.54	90.67	0.426	0.214	0.505
PPMQ	32.04	19.12	85.88	0.587	0.217	0.368
RD	34.40	17.90	98.91	0.522	0.186	0.356
PMQ	21.15	20.39	40.20	0.998	0.556	0.582
MM	30.25	22.64	55.96	0.968	0.475	0.561
QTV	50.42	22.30	116.89	0.457	0.200	0.439
PP	32.92	15.77	115.38	0.478	0.141	0.290
RTW	35.14	13.43	138.29	0.385	0.097	0.253

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
PCU	38.88	18.00	125.00	0.475	0.145	0.312
OCU	30.88	17.50	131.75	0.574	0.135	0.235
Q	54.31	24.32	122.29	0.438	0.196	0.453
MDT	28.00	14.17	87.83	0.515	0.164	0.319
PMU	27.45	13.30	86.35	0.493	0.161	0.325
QV	70.44	30.67	153.40	0.437	0.203	0.463
QH	22.44	12.96	44.49	0.613	0.330	0.554
QS	83.83	36.57	182.88	0.436	0.201	0.460
W	6.09	5.00	6.71	0.641	0.569	0.774
TA	32.09	11.44	105.63	0.366	0.108	0.301

LINE 280

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
O	50.27	19.30	123.48	0.389	0.157	0.403
QA	29.17	13.51	80.17	0.515	0.184	0.361
QF	35.63	17.16	91.68	0.492	0.198	0.404
TB	32.29	15.57	121.10	0.531	0.131	0.277
TV	36.07	16.01	106.98	0.452	0.159	0.361
QLS	35.16	15.16	93.87	0.436	0.161	0.373
PCG	27.34	11.92	75.30	0.438	0.158	0.367
QTV	50.76	18.61	122.47	0.375	0.155	0.415
RD	45.50	16.75	116.75	0.369	0.143	0.390

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
OCU	32.55	10.55	74.00	0.326	0.144	0.441
MDT	32.25	11.13	70.50	0.345	0.158	0.460
MM	37.76	15.83	81.02	0.430	0.204	0.473
PCD	20.63	8.38	41.75	0.399	0.197	0.500
QG	30.39	11.25	99.14	0.387	0.116	0.312
PCQ	22.90	6.20	57.50	0.274	0.108	0.396
QV	63.75	26.21	143.74	0.414	0.183	0.445
PMS	45.37	18.81	116.81	0.418	0.162	0.389

LINE 300

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QA	18.39	10.03	43.35	0.472	0.234	0.513
QF	41.60	17.54	110.04	0.418	0.163	0.393
W	4.18	3.49	10.11	0.519	0.363	0.678
Q	63.00	26.11	145.13	0.412	0.177	0.431
PCD	42.23	15.01	91.63	0.387	0.170	0.458
QTV	62.90	19.19	141.09	0.314	0.138	0.445
PCG	40.59	14.60	97.68	0.354	0.147	0.415
PCQ	36.73	13.36	77.22	0.373	0.170	0.465

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QV	69.56	30.03	155.25	0.437	0.197	0.451
QG	26.24	8.82	93.47	0.298	0.099	0.378
CM	65.22	26.78	132.22	0.411	0.203	0.493
PMS	10.43	11.14	23.14	1.101	0.480	0.452
RTW	30.16	14.16	105.05	0.467	0.135	0.289
TV	36.51	13.53	108.54	0.371	0.128	0.348
TA	29.48	12.77	90.13	0.448	0.142	0.334
TAB	43.60	13.10	124.10	0.300	0.105	0.352

LINE 320

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	34.33	12.00	104.11	0.352	0.116	0.330
QA	40.51	15.81	96.01	0.393	0.161	0.415
TV	80.87	26.77	174.66	0.337	0.154	0.460
QE	34.03	16.38	89.91	0.488	0.184	0.379
PCG	42.83	16.70	92.36	0.406	0.186	0.463
PCD	33.11	10.53	65.31	0.328	0.165	0.502
QV	69.09	24.29	145.99	0.358	0.170	0.479
QB	77.50	22.67	161.33	0.292	0.141	0.482

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QF	70.03	26.58	147.86	0.377	0.183	0.485
CM	45.42	17.66	107.67	0.405	0.169	0.423
MDT	41.57	17.14	90.86	0.416	0.190	0.458
MM	54.43	19.14	122.49	0.354	0.155	0.440
Q	93.38	39.15	198.33	0.418	0.197	0.470
PMQ	34.45	19.66	68.26	0.700	0.370	0.509
PMS	30.22	28.28	52.17	1.100	0.674	0.599

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 360

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	57.62	27.44	122.61	0.485	0.226	0.469
KK	42.58	22.77	95.17	0.540	0.248	0.458
TV	59.30	25.54	153.10	0.367	0.167	0.455
RTW	59.48	24.89	152.96	0.440	0.166	0.383
PP	46.14	16.95	121.77	0.384	0.152	0.392
PMQ	28.65	16.13	60.30	0.630	0.299	0.490
MM	35.63	16.78	77.96	0.508	0.228	0.457
MDT	52.71	24.82	111.88	0.485	0.240	0.489
QV	56.21	23.32	111.93	0.418	0.210	0.503

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
CU	31.46	13.84	76.68	0.441	0.185	0.416
PCU	43.07	14.98	164.50	0.363	0.094	0.274
W	8.58	4.22	15.73	0.498	0.296	0.649
QLF	27.50	7.52	67.86	0.275	0.110	0.403
PCG	39.29	16.94	72.68	0.429	0.248	0.578
QG	72.50	29.56	150.76	0.408	0.197	0.483
Q	88.70	33.40	187.31	0.379	0.179	0.474
QA	61.63	25.88	129.00	0.418	0.200	0.480

LINE 380

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	47.52	20.83	95.12	0.445	0.221	0.501
KK	33.95	19.00	93.55	0.562	0.228	0.406
JME	31.86	14.79	75.93	0.469	0.196	0.419
RTW	32.63	13.02	82.68	0.402	0.158	0.400
TV	58.17	21.65	135.51	0.396	0.159	0.414
TB	30.75	13.11	96.31	0.443	0.154	0.337
PP	32.50	16.80	98.50	0.514	0.191	0.373
PMQ	26.24	14.50	72.24	0.565	0.204	0.369
PCU	29.85	14.32	84.02	0.481	0.172	0.360
QLF	60.29	22.96	129.66	0.388	0.179	0.464
PCG	41.33	18.76	84.40	0.459	0.232	0.497
W	9.28	6.61	15.45	0.415	0.331	0.846

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QA	56.84	22.89	118.05	0.572	0.282	0.513
QV	71.34	33.54	159.37	0.469	0.209	0.448
CP	42.53	19.13	109.03	0.451	0.181	0.400
QF	41.33	17.94	116.39	0.435	0.154	0.357
MDT	22.00	13.65	49.47	0.625	0.276	0.445
MM	20.97	13.06	41.42	0.626	0.316	0.506
QLS	38.00	24.25	88.00	0.638	0.279	0.437
TS	64.84	31.78	147.57	0.493	0.215	0.436
TAB	28.21	13.49	95.82	0.483	0.144	0.298
Q	51.02	22.00	135.71	0.451	0.163	0.376
TI	40.58	17.00	156.06	0.427	0.109	0.260
TA	35.36	16.03	100.50	0.463	0.161	0.350

LINE 400

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	46.41	19.36	101.70	0.420	0.191	0.457
TBR	37.69	13.99	83.25	0.374	0.172	0.457
PMO	38.71	13.86	90.52	0.358	0.153	0.428
MM	23.84	14.48	50.12	0.652	0.385	0.557
TA	32.74	12.59	83.81	0.370	0.149	0.401
MDT	33.80	8.93	89.93	0.263	0.099	0.377
CU	41.90	16.38	110.95	0.387	0.146	0.383
PCU	57.17	24.30	122.25	0.440	0.203	0.462
TV	73.35	24.49	161.57	0.337	0.153	0.457
Q	42.43	13.18	79.39	0.311	0.168	0.538

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QLF	72.64	25.21	155.43	0.349	0.163	0.469
QA	41.76	17.56	86.66	0.455	0.240	0.521
PCG	39.52	13.17	82.15	0.348	0.177	0.527
W	15.78	4.44	22.00	0.283	0.209	0.730
RTW	30.62	15.33	59.54	0.574	0.301	0.519
PMS	18.02	14.32	28.93	0.855	0.586	0.669
QG	35.64	13.93	69.21	0.405	0.208	0.516
QV	53.42	20.96	112.04	0.396	0.194	0.490
TB	46.38	17.63	88.13	0.385	0.202	0.525

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 460

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KFT	41.32	18.76	85.54	0.434	0.213	0.497
QA	68.74	24.60	179.84	0.370	0.143	0.385
TB	47.94	16.27	116.17	0.359	0.140	0.404
PP	3C.81	16.45	69.87	0.583	0.248	0.441
TC	45.67	7.43	98.67	0.161	0.075	0.463
PMQ	27.85	17.37	55.69	0.763	0.438	0.537
Q	46.12	22.43	129.27	0.505	0.180	0.360
MM	21.24	12.C6	49.34	0.592	0.282	0.461
PCU	82.13	23.77	191.16	0.288	0.124	0.431
TV	7C.23	28.48	183.47	0.416	0.158	0.384
QLF	61.71	17.55	181.55	C.286	0.099	0.344
PCG	59.65	2C.32	177.81	0.353	0.117	0.342
RTW	31.03	12.39	66.45	C.392	0.187	0.479
JME	38.29	18.04	89.55	C.465	0.199	0.428
KK	55.27	21.93	132.90	C.400	0.166	0.416

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
KCU	29.C1	14.89	51.95	0.521	0.299	0.572
KT	27.54	14.57	49.28	0.538	0.316	0.584
QS	17.75	12.50	35.75	0.705	0.348	0.495
PMS	23.24	21.C6	39.6C	1.010	0.748	0.676
TI	26.92	9.47	88.27	C.380	0.132	0.329
C	26.75	10.38	81.69	0.385	0.128	0.329
QV	62.84	22.69	139.07	0.366	0.169	0.463
TS	34.61	11.C9	85.78	0.330	0.133	0.404
KMK	43.06	19.29	1C3.60	0.457	0.194	0.421
K	41.73	22.41	114.55	0.548	0.198	0.365
TA	41.85	20.76	126.09	0.485	0.161	0.335
QB	50.CO	31.07	167.20	0.630	0.187	0.299
TAB	29.17	13.29	99.52	0.464	0.131	0.289
CPF	41.40	16.70	126.8C	0.404	0.131	0.326
MDO	19.14	1C.01	55.38	0.527	0.182	0.355

LINE 5090

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QT	38.84	17.64	107.32	0.458	0.165	0.362
QB	42.02	17.89	109.38	C.430	0.164	0.385
TV	61.92	24.27	142.59	0.404	0.173	0.431

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QA	37.14	17.C3	92.48	0.478	0.190	0.398
KA	51.49	22.56	1C8.58	0.448	0.206	0.466
KFT	48.89	19.16	112.07	0.395	0.173	0.439

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LINE 5095

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
JTF	34.12	16.37	76.92	0.479	0.219	0.458
KK	43.48	16.54	100.89	0.398	0.169	0.429
JMF	33.17	11.57	91.57	0.357	0.130	0.362
RTW	3C.7C	9.C0	103.10	0.296	0.088	0.298
RD	32.18	13.32	115.57	0.421	0.117	0.278
PPMQ	27.58	15.32	72.16	0.552	0.248	0.453
MM	26.24	19.29	64.29	0.743	0.301	0.408
MDT	21.18	12.61	63.30	0.619	0.221	0.343
QCU	21.88	19.75	60.00	0.902	0.332	0.365

UNIT	THOR	URN	PCT	U/TH	U/K	TH/K
PCG	25.13	13.27	79.33	0.530	0.170	0.319
QA	8.27	4.88	20.46	0.361	0.285	0.562
W	3.56	3.33	4.18	0.C	0.0	0.0
Q	19.24	8.29	53.10	0.390	0.140	0.377
QE	32.92	11.30	84.39	0.349	0.135	0.391
TV	54.49	2C.70	123.66	0.376	0.162	0.433
PCU	37.9C	13.90	105.04	0.383	0.149	0.389
CU	30.CO	10.31	77.59	0.362	0.141	0.392
TB	41.42	12.90	100.18	0.302	0.124	0.412

LINE 5105

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QV	55.15	22.77	134.66	0.433	0.186	0.433
QF	64.04	29.42	146.19	0.462	0.203	0.439
QA	44.69	16.81	102.07	0.392	0.187	0.472
TV	38.67	16.37	151.54	0.450	0.116	0.288
QG	44.00	17.33	123.00	C.391	0.142	0.362
K	47.25	14.75	93.92	0.307	0.154	0.503
W	3.99	4.41	10.28	0.478	0.179	0.623
CP	26.23	9.C0	75.92	0.345	0.120	0.349

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
C	22.38	7.75	60.63	0.348	0.128	0.372
MCT	18.CO	3.CO	37.17	0.173	0.084	0.487
MM	19.68	15.73	41.16	0.822	0.464	0.546
PMS	20.74	14.51	37.1C	0.720	0.422	0.576
RTW	27.53	14.94	73.53	0.547	0.222	0.402
JME	38.27	17.C0	87.41	0.460	0.206	0.450
KK	27.73	14.C2	50.11	0.512	0.3C3	0.587
KT	31.37	15.67	56.25	0.526	0.295	0.563

MEAN VALUE BY GEOLOGIC MAP UNIT

ASHTON QUAD

LINE 5110

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
QV	73.95	31.46	167.91	0.431	0.191	0.444
QB	37.52	18.26	84.90	0.485	0.218	0.450
QG	49.07	25.34	116.98	0.563	0.229	0.412
QA	57.38	28.35	131.09	0.488	0.221	0.459
Q	61.67	31.08	141.60	0.502	0.228	0.449
QF	108.95	53.87	257.70	0.492	0.208	0.423
TS	56.63	22.68	155.30	0.407	0.147	0.366
TB	76.92	30.97	183.32	0.412	0.172	0.420

LINE 5120

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
TP	28.73	14.25	77.44	0.500	0.186	0.376
KM	25.91	14.15	62.55	0.560	0.232	0.415
KC	27.65	14.94	35.74	0.546	0.177	0.328
Q	48.69	24.40	117.95	0.503	0.207	0.413
KB	25.93	15.34	69.20	0.592	0.230	0.383
KH	32.79	17.64	90.36	0.537	0.195	0.363
KF	35.62	15.46	97.77	0.431	0.158	0.366
KMT	40.74	19.16	86.48	0.478	0.223	0.472
KJ	38.00	17.63	68.53	0.477	0.264	0.557
JS	34.33	17.04	95.88	0.500	0.181	0.360
QH	48.13	30.81	103.38	0.644	0.305	0.469
QV	60.96	26.30	128.10	0.432	0.205	0.476
W	4.94	4.68	27.87	0.697	0.342	0.578
TA	33.83	14.29	104.04	0.445	0.140	0.322
TB	36.59	11.43	133.39	0.311	0.086	0.273
PCG	43.15	17.92	114.02	0.420	0.164	0.383

LINE 5130

UNIT	THOR	URN	POT	U/TH	U/K	TH/K
TA	29.95	10.70	84.34	0.370	0.129	0.361
Q	27.00	10.93	72.+8	0.407	0.153	0.378
TV	32.61	14.56	106.28	0.471	0.144	0.311
TAB	27.06	8.95	78.85	0.335	0.113	0.344
QV	52.91	18.27	128.56	0.344	0.144	0.412
TI	18.67	6.40	61.04	0.360	0.108	0.305
MDU	10.93	5.14	29.50	0.490	0.178	0.392
C	14.50	7.00	40.43	0.489	0.195	0.395

APPENDIX E

Standard Deviation Tables: Ashton Quadrangle

ASHTON QUAD

FORMATION Q

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	9800	26.91	LOGNORMAL	6.02	9.92	16.34	44.32	73.00	120.23
URANIUM	9623	21.43	NORMAL	-13.10	-1.59	9.92	32.94	44.45	55.96
POTASSIUM	9803	119.69	NORMAL	-46.79	8.70	64.20	175.18	230.67	286.17
U/K	9623	0.17	NORMAL	0.01	0.06	0.11	0.22	0.27	0.33
U/TH	9623	0.41	NORMAL	0.06	0.18	0.30	0.53	0.65	0.76
TH/K	9788	0.40	NORMAL	0.16	0.24	0.32	0.48	0.56	0.64

FORMATION QS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	57	62.46	NORMAL	-58.37	-18.09	22.18	102.73	143.00	183.28
URANIUM	46	33.48	NORMAL	26.12	28.57	31.03	35.93	38.38	40.83
POTASSIUM	46	167.22	NORMAL	128.79	141.60	154.41	180.03	192.83	205.64
U/K	46	0.20	NORMAL	0.13	0.15	0.18	0.22	0.25	0.27
U/TH	46	0.43	NORMAL	0.28	0.33	0.38	0.48	0.53	0.58
TH/K	46	0.45	NORMAL	0.34	0.38	0.41	0.48	0.52	0.55

FORMATION QA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	3616	32.99	LOGNORMAL	9.53	14.42	21.81	49.90	75.47	114.15
URANIUM	3465	17.35	LOGNORMAL	5.53	8.10	11.85	25.39	37.15	54.38
POTASSIUM	3535	105.54	NORMAL	-49.63	2.10	53.82	157.26	208.99	260.71
U/K	3407	0.18	NORMAL	0.03	0.08	0.13	0.23	0.28	0.34
U/TH	3427	0.42	NORMAL	0.11	0.21	0.31	0.52	0.63	0.73
TH/K	3442	0.43	NORMAL	0.21	0.28	0.35	0.50	0.57	0.65

FORMATION QF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1190	39.39	LOGNORMAL	11.97	17.81	26.48	58.60	87.16	129.64
URANIUM	1188	12.48	LOGNORMAL	2.24	3.97	7.04	22.11	39.20	69.49
POTASSIUM	1184	109.85	LOGNORMAL	41.50	57.40	79.41	151.95	210.20	290.77
U/K	1183	0.17	NORMAL	0.03	0.08	0.12	0.22	0.26	0.31
U/TH	1183	0.41	NORMAL	0.10	0.20	0.31	0.51	0.61	0.72
TH/K	1183	0.41	NORMAL	0.21	0.28	0.34	0.48	0.54	0.61

ASHTON QUAD

FORMATICN QLF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	670	59.93	NORMAL	27.70	38.44	49.18	70.67	81.42	92.16
URANIUM	670	19.15	NORMAL	1.37	7.30	13.23	25.08	31.01	36.94
POTASSIUM	670	146.33	NORMAL	44.87	78.69	112.51	180.16	213.98	247.80
U/K	670	0.12	NORMAL	-0.01	0.03	0.08	0.17	0.21	0.26
U/TH	670	0.30	NORMAL	0.07	0.15	0.22	0.37	0.45	0.53
TH/K	670	0.40	NORMAL	0.20	0.27	0.34	0.47	0.54	0.61

FORMATION QE

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	584	32.51	NORMAL	23.55	26.54	29.53	35.50	38.49	41.47
URANIUM	584	15.05	NORMAL	0.99	5.67	10.36	19.73	24.42	29.10
POTASSIUM	584	93.46	NORMAL	61.74	72.31	82.88	104.03	114.61	125.18
U/K	584	0.15	NORMAL	0.02	0.06	0.11	0.20	0.24	0.29
U/TH	584	0.44	NORMAL	0.02	0.16	0.30	0.58	0.72	0.86
TH/K	584	0.34	NORMAL	0.23	0.27	0.30	0.38	0.42	0.46

FORMATICN QLS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	320	43.39	NORMAL	15.18	24.58	33.99	52.80	62.20	71.61
URANIUM	320	16.60	NORMAL	4.55	8.57	12.58	20.62	24.64	28.66
POTASSIUM	320	101.51	NORMAL	54.53	70.19	85.85	117.17	132.83	148.50
U/K	320	0.16	NORMAL	0.06	0.09	0.12	0.19	0.22	0.25
U/TH	320	0.37	NORMAL	0.13	0.21	0.29	0.45	0.53	0.61
TH/K	320	0.42	NORMAL	0.26	0.32	0.37	0.47	0.52	0.57

FORMATION QG

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1341	46.16	NORMAL	1.78	16.58	31.37	60.96	75.75	90.54
URANIUM	1336	20.15	NORMAL	-0.86	6.14	13.15	27.15	34.15	41.15
POTASSIUM	1338	107.38	NORMAL	15.76	46.30	76.84	137.92	168.46	199.00
U/K	1333	0.18	NORMAL	0.03	0.08	0.13	0.23	0.28	0.33
U/TH	1333	0.42	NORMAL	0.11	0.21	0.31	0.52	0.62	0.72
TH/K	1336	0.42	NORMAL	0.24	0.30	0.36	0.49	0.55	0.61

ASHTON QUAD

FORMATION QH

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	163	36.23	NORMAL	-41.19	-15.38	10.42	62.04	87.85	113.66
URANIUM	147	18.70	NORMAL	-10.13	-0.52	9.09	28.31	37.92	47.54
POTASSIUM	163	76.56	NORMAL	-108.48	-46.80	14.88	138.25	199.93	261.61
U/K	139	0.18	LOGNORMAL	0.03	0.05	0.10	0.33	0.60	1.12
U/TH	145	0.38	LOGNORMAL	0.06	0.11	0.20	0.71	1.31	2.44
TH/K	155	0.45	LOGNORMAL	0.20	0.26	0.35	0.59	0.78	1.02

FORMATION QV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	17851	65.45	NORMAL	21.64	36.24	50.84	80.05	94.65	109.26
URANIUM	17832	28.34	NORMAL	5.11	12.85	20.60	36.08	43.83	51.57
POTASSIUM	17851	145.35	NORMAL	53.57	84.16	114.76	175.95	206.54	237.14
U/K	17831	0.19	NORMAL	0.06	0.10	0.14	0.23	0.27	0.31
U/TH	17832	0.41	NORMAL	0.18	0.25	0.33	0.49	0.57	0.65
TH/K	17845	0.44	NORMAL	0.30	0.35	0.39	0.49	0.53	0.58

FORMATION QB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	6410	41.75	NORMAL	15.88	24.51	33.13	50.38	59.00	67.62
URANIUM	6404	18.43	NORMAL	3.19	8.27	13.35	23.51	28.59	33.67
POTASSIUM	6409	101.06	NORMAL	46.34	64.58	82.82	119.30	137.55	155.79
U/K	6402	0.17	NORMAL	0.05	0.09	0.13	0.21	0.26	0.30
U/TH	6402	0.42	NORMAL	0.14	0.23	0.33	0.52	0.61	0.71
TH/K	6407	0.41	NORMAL	0.26	0.31	0.36	0.45	0.50	0.55

FORMATION QT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	311	33.87	LOGNORMAL	22.99	26.16	29.77	38.54	43.86	49.91
URANIUM	311	16.75	NORMAL	4.80	8.79	12.77	20.73	24.71	28.69
POTASSIUM	311	103.16	NORMAL	84.16	90.49	96.83	109.50	115.83	122.17
U/K	311	0.15	NORMAL	0.04	0.08	0.11	0.19	0.23	0.27
U/TH	311	0.45	NORMAL	0.11	0.22	0.34	0.57	0.68	0.79
TH/K	311	0.34	NORMAL	0.21	0.26	0.30	0.38	0.42	0.46

ASHTON QUAD

FORMATION QTV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	422	57.14	NORMAL	9.83	25.60	41.37	72.91	88.68	104.44
URANIUM	422	20.68	NORMAL	6.01	10.90	15.79	25.57	30.46	35.35
POTASSIUM	422	127.61	NORMAL	50.88	76.46	102.04	153.19	178.76	204.34
U/K	422	0.16	NORMAL	0.03	0.07	0.12	0.20	0.24	0.28
U/TH	422	0.36	NORMAL	0.04	0.15	0.25	0.46	0.56	0.67
TH/K	422	0.44	NORMAL	0.27	0.32	0.38	0.49	0.55	0.61

FORMATION TV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	5587	55.56	NORMAL	-22.41	3.58	29.57	81.55	107.55	133.54
URANIUM	5564	20.52	NORMAL	-7.26	2.00	11.26	29.78	39.04	48.30
POTASSIUM	5589	136.46	NORMAL	-3.08	43.43	89.95	182.98	229.49	276.01
U/K	5564	0.14	NORMAL	-0.00	0.05	0.09	0.19	0.24	0.28
U/TH	5564	0.36	NORMAL	0.07	0.17	0.26	0.45	0.55	0.64
TH/K	5585	0.40	NORMAL	0.10	0.20	0.30	0.49	0.59	0.69

FORMATION TI

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	160	27.51	NORMAL	-7.56	4.13	15.82	39.20	50.90	62.59
URANIUM	143	4.81	LOGNORMAL	1.01	1.70	2.86	8.10	13.64	22.97
POTASSIUM	160	96.25	NORMAL	-49.19	-0.71	47.77	144.73	193.21	241.69
U/K	143	0.10	NORMAL	-0.01	0.03	0.07	0.14	0.18	0.22
U/TH	143	0.32	LOGNORMAL	0.12	0.17	0.23	0.44	0.61	0.84
TH/K	159	0.30	NORMAL	0.09	0.16	0.23	0.37	0.44	0.51

FORMATION TB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	760	34.97	LOGNORMAL	11.76	16.91	24.32	50.30	72.33	104.03
URANIUM	760	10.54	LOGNORMAL	2.74	4.30	6.73	16.51	25.86	40.51
POTASSIUM	760	117.57	NORMAL	11.49	46.85	82.21	152.94	188.30	223.66
U/K	760	0.12	NORMAL	-0.00	0.04	0.08	0.16	0.21	0.25
U/TH	760	0.33	NORMAL	0.04	0.14	0.23	0.43	0.53	0.62
TH/K	760	0.37	NORMAL	0.10	0.19	0.28	0.46	0.55	0.64

ASHTON QUAD

FORMATION TA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	5960	28.38	NORMAL	4.88	12.71	20.55	36.21	44.05	51.88
URANIUM	5660	9.34	LOGNORMAL	2.25	3.61	5.81	15.02	24.15	38.82
POTASSIUM	5971	70.22	LOGNORMAL	23.15	33.52	48.51	101.65	147.14	212.98
U/K	5653	0.12	NORMAL	-0.03	0.02	0.07	0.17	0.22	0.27
U/TH	5643	0.37	NORMAL	-0.08	0.07	0.22	0.52	0.67	0.82
TH/K	5936	0.33	NORMAL	0.11	0.19	0.26	0.40	0.47	0.55

FORMATION TAB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1060	23.67	LOGNORMAL	7.71	11.21	16.29	34.39	49.98	72.62
URANIUM	995	10.76	NORMAL	-2.93	1.63	6.20	15.33	19.89	24.46
POTASSIUM	1060	80.87	LOGNORMAL	35.13	46.39	61.25	106.78	140.99	186.16
U/K	995	0.11	NORMAL	-0.03	0.02	0.07	0.16	0.21	0.26
U/TH	995	0.40	NORMAL	-0.10	0.06	0.23	0.56	0.73	0.89
TH/K	1059	0.30	NORMAL	0.11	0.17	0.23	0.36	0.42	0.48

FORMATION TS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	159	48.79	NORMAL	-4.64	13.17	30.98	66.60	84.41	102.22
URANIUM	159	20.16	NORMAL	-3.66	4.28	12.22	28.11	36.05	43.99
POTASSIUM	159	125.99	NORMAL	-12.24	33.84	79.91	172.06	218.14	264.21
U/K	159	0.15	NORMAL	0.03	0.07	0.11	0.19	0.23	0.27
U/TH	159	0.39	NORMAL	0.08	0.18	0.28	0.49	0.59	0.69
TH/K	159	0.38	NORMAL	0.24	0.28	0.33	0.43	0.48	0.52

FORMATION TBB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	99	31.63	LOGNORMAL	14.34	18.67	24.30	41.16	53.58	69.74
URANIUM	99	11.00	LOGNORMAL	4.04	5.64	7.88	15.36	21.44	29.94
POTASSIUM	99	80.69	NORMAL	27.49	45.22	62.95	98.42	116.15	133.89
U/K	99	0.12	LOGNORMAL	0.04	0.06	0.08	0.16	0.23	0.32
U/TH	99	0.34	NORMAL	0.08	0.17	0.26	0.43	0.52	0.60
TH/K	99	0.44	NORMAL	0.26	0.32	0.38	0.50	0.57	0.63

ASHTON \ QUAD

FORMATION TC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	21	44.29	NORMAL	32.98	36.75	40.52	48.05	51.82	55.59
URANIUM	21	6.43	NORMAL	-1.74	0.98	3.71	9.15	11.87	14.60
POTASSIUM	21	96.38	NORMAL	72.51	80.47	88.42	104.34	112.29	120.25
U/K	21	0.06	NORMAL	-0.01	0.01	0.04	0.09	0.11	0.13
U/TH	21	0.13	NORMAL	-0.04	0.02	0.08	0.19	0.25	0.31
TH/K	21	0.45	NORMAL	0.38	0.41	0.43	0.47	0.49	0.51

FORMATION TP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	507	26.96	NORMAL	11.74	16.82	21.89	32.04	37.11	42.18
URANIUM	507	13.41	NORMAL	2.79	6.33	9.87	16.95	20.49	24.03
POTASSIUM	507	70.54	NORMAL	26.12	40.93	55.73	85.35	100.15	114.96
U/K	507	0.19	NORMAL	0.02	0.07	0.13	0.24	0.30	0.36
U/TH	507	0.49	NORMAL	0.07	0.21	0.35	0.63	0.77	0.91
TH/K	507	0.38	NORMAL	0.23	0.28	0.33	0.43	0.48	0.53

FORMATION KH

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	409	32.27	NORMAL	10.95	18.06	25.16	39.37	46.48	53.58
URANIUM	409	13.82	NORMAL	4.59	7.67	10.75	16.90	19.98	23.06
POTASSIUM	409	77.88	NORMAL	26.83	43.85	60.86	94.89	111.91	128.92
U/K	409	0.17	NORMAL	0.05	0.09	0.13	0.21	0.25	0.29
U/TH	409	0.42	NORMAL	0.13	0.22	0.32	0.51	0.61	0.71
TH/K	409	0.41	NORMAL	0.29	0.33	0.37	0.45	0.49	0.53

FORMATION KB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	176	26.36	NORMAL	7.87	14.03	20.20	32.53	38.69	44.86
URANIUM	176	13.24	NORMAL	2.80	6.28	9.76	16.72	20.20	23.68
POTASSIUM	176	69.27	NORMAL	19.98	36.41	52.84	85.70	102.13	118.56
U/K	176	0.19	NORMAL	0.03	0.08	0.14	0.24	0.29	0.35
U/TH	176	0.49	NORMAL	0.15	0.26	0.38	0.60	0.71	0.82
TH/K	176	0.38	NORMAL	0.18	0.25	0.31	0.45	0.51	0.58

ASHTON QUAD

FORMATICN KC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	191	27.44	NORMAL	12.90	17.75	22.60	32.29	37.14	41.99
URANIUM	191	13.31	NORMAL	3.44	6.73	10.02	16.60	19.89	23.17
POTASSIUM	191	74.60	NORMAL	27.11	42.94	58.77	90.43	106.26	122.08
U/K	191	0.17	NORMAL	0.02	0.07	0.12	0.22	0.27	0.32
U/TH	191	0.47	NORMAL	0.18	0.27	0.37	0.56	0.66	0.76
TH/K	191	0.38	NORMAL	0.08	0.18	0.28	0.47	0.57	0.67

FORMATION KF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	88	31.73	NORMAL	17.68	22.37	27.05	36.41	41.09	45.77
URANIUM	88	16.12	NORMAL	0.06	5.42	10.77	21.48	26.83	32.19
POTASSIUM	88	79.18	NORMAL	35.22	49.87	64.53	93.84	108.49	123.14
U/K	88	0.19	NORMAL	0.03	0.08	0.14	0.25	0.30	0.36
U/TH	88	0.48	NORMAL	0.15	0.26	0.37	0.59	0.70	0.81
TH/K	88	0.39	NORMAL	0.24	0.29	0.34	0.45	0.50	0.55

FORMATION KA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	327	34.80	LOGNCRMAL	12.41	17.50	24.68	49.07	69.20	97.58
URANIUM	327	13.65	LCGNCRMAL	4.27	6.29	9.27	20.10	29.59	43.58
POTASSIUM	327	96.39	NORMAL	5.67	35.91	66.15	126.63	156.87	187.11
U/K	327	0.17	LOGNORMAL	0.07	0.09	0.13	0.24	0.33	0.45
U/TH	327	0.44	NORMAL	0.15	0.25	0.34	0.54	0.63	0.73
TH/K	327	0.43	NORMAL	0.25	0.31	0.37	0.49	0.56	0.62

FORMATICN K

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	140	40.71	NCRMAL	20.28	27.09	33.90	47.52	54.33	61.14
URANIUM	137	20.74	NORMAL	3.92	9.53	15.13	26.34	31.95	37.55
POTASSIUM	139	110.33	NORMAL	46.39	67.70	89.02	131.64	152.96	174.27
U/K	137	0.18	NORMAL	0.04	0.09	0.13	0.22	0.27	0.32
U/TH	137	0.50	NORMAL	0.03	0.19	0.34	0.65	0.81	0.96
TH/K	138	0.36	NORMAL	0.24	0.28	0.32	0.40	0.44	0.48

ASHTON QUAD

FORMATION KM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	245	26.54	NORMAL	14.62	18.59	22.57	30.51	34.48	38.45
URANIUM	245	11.92	NORMAL	2.30	5.51	8.71	15.13	18.34	21.55
POTASSIUM	245	57.45	NORMAL	31.31	40.03	48.74	66.17	74.88	83.59
U/K	245	0.20	NORMAL	0.05	0.10	0.15	0.26	0.31	0.36
U/TH	245	0.44	NORMAL	0.08	0.20	0.32	0.56	0.68	0.80
TH/K	245	0.46	NORMAL	0.26	0.33	0.39	0.52	0.59	0.65

FORMATION KCU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	177	29.81	NORMAL	3.84	12.50	21.15	38.46	47.12	55.78
URANIUM	177	14.71	NORMAL	-4.41	1.96	8.33	21.08	27.45	33.83
POTASSIUM	177	41.94	LOGNORMAL	15.29	21.40	29.96	58.72	82.20	115.08
U/K	177	0.26	LOGNORMAL	0.09	0.13	0.19	0.37	0.53	0.76
U/TH	177	0.48	NORMAL	0.05	0.19	0.33	0.62	0.77	0.91
TH/K	177	0.61	NORMAL	0.26	0.37	0.49	0.73	0.85	0.96

FORMATION KMT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	94	44.72	NORMAL	25.42	31.86	38.29	51.16	57.59	64.02
URANIUM	94	18.43	NORMAL	7.06	10.85	14.64	22.21	26.00	29.79
POTASSIUM	94	94.98	NORMAL	52.86	66.90	80.94	109.02	123.06	137.10
U/K	94	0.19	NORMAL	0.07	0.11	0.15	0.23	0.26	0.30
U/TH	94	0.40	NORMAL	0.05	0.16	0.28	0.51	0.63	0.75
TH/K	94	0.46	NORMAL	0.30	0.36	0.41	0.51	0.57	0.62

FORMATION KFT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	2219	43.74	NORMAL	13.03	23.27	33.50	53.98	64.22	74.45
URANIUM	2219	17.80	NORMAL	2.04	7.29	12.55	23.06	28.31	33.57
POTASSIUM	2219	97.56	NORMAL	38.94	58.48	78.02	117.11	136.65	156.19
U/K	2219	0.18	NORMAL	0.02	0.07	0.13	0.23	0.28	0.33
U/TH	2219	0.39	NORMAL	0.10	0.20	0.29	0.49	0.58	0.68
TH/K	2219	0.44	NORMAL	0.23	0.30	0.37	0.51	0.58	0.65

ASHTON QUAD

FORMATION KK

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	520	29.42	LOGNORMAL	12.79	16.88	22.29	38.83	51.26	67.66
URANIUM	520	12.43	LOGNORMAL	4.50	6.31	8.86	17.44	24.46	34.32
POTASSIUM	520	71.42	NORMAL	-39.04	-2.22	34.60	108.23	145.05	181.87
U/K	520	0.17	LOGNORMAL	0.04	0.06	0.10	0.27	0.44	0.71
U/TH	520	0.44	NORMAL	0.06	0.19	0.32	0.57	0.70	0.82
TH/K	520	0.45	LOGNORMAL	0.19	0.25	0.33	0.60	0.80	1.07

FORMATION KMK

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	72	41.56	NORMAL	24.57	30.23	35.89	47.22	52.88	58.54
URANIUM	72	18.29	NORMAL	4.06	8.80	13.55	23.04	27.78	32.52
POTASSIUM	72	90.67	LOGNORMAL	55.61	65.45	77.04	106.71	125.59	147.81
U/K	72	0.18	NORMAL	0.03	0.08	0.13	0.23	0.28	0.32
U/TH	72	0.43	NORMAL	0.04	0.17	0.30	0.56	0.69	0.82
TH/K	72	0.41	NORMAL	0.25	0.30	0.36	0.46	0.51	0.56

FORMATION KT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	221	31.18	NORMAL	10.20	17.19	24.18	38.17	45.16	52.16
URANIUM	221	14.61	NORMAL	5.50	8.53	11.57	17.64	20.68	23.72
POTASSIUM	221	50.59	NORMAL	15.21	27.00	38.80	62.38	74.17	85.97
U/K	221	0.29	NORMAL	0.03	0.12	0.20	0.38	0.46	0.55
U/TH	221	0.46	NORMAL	0.12	0.24	0.35	0.58	0.69	0.80
TH/K	221	0.61	NORMAL	0.23	0.36	0.48	0.74	0.86	0.99

FORMATION KJ

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	166	41.12	LOGNORMAL	20.68	26.01	32.70	51.72	65.04	81.78
URANIUM	166	17.27	LOGNORMAL	7.87	10.23	13.29	22.44	29.16	37.89
POTASSIUM	166	91.00	LOGNORMAL	39.22	51.92	68.74	120.47	159.49	211.14
U/K	166	0.19	NORMAL	0.07	0.11	0.15	0.23	0.27	0.31
U/TH	166	0.41	NORMAL	0.18	0.26	0.33	0.49	0.57	0.64
TH/K	166	0.45	NORMAL	0.20	0.29	0.37	0.53	0.61	0.69

ASHTON QUAD

FORMATICN JME

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	377	26.90	LCGNCRMAL	11.01	14.83	19.97	36.24	48.81	65.76
URANIUM	377	13.62	LCGNCRMAL	5.49	7.44	10.06	18.43	24.94	33.76
POTASSIUM	377	76.93	NORMAL	8.67	31.42	54.18	99.69	122.44	145.20
U/K	377	0.20	NORMAL	0.04	0.09	0.14	0.25	0.31	0.36
U/TH	377	0.44	NORMAL	0.08	0.20	0.32	0.57	0.69	0.81
TH/K	377	0.43	NORMAL	0.23	0.30	0.36	0.49	0.56	0.63

FORMATION JS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	67	33.22	NORMAL	19.63	24.16	28.69	37.76	42.29	46.82
URANIUM	67	16.10	NORMAL	10.42	12.31	14.21	18.00	19.90	21.79
POTASSIUM	67	92.66	NORMAL	52.18	65.67	79.16	106.15	119.64	133.14
U/K	67	0.17	NORMAL	0.10	0.12	0.15	0.19	0.21	0.23
U/TH	67	0.46	NCRMAL	0.32	0.37	0.42	0.51	0.56	0.60
TH/K	67	0.35	NORMAL	0.26	0.29	0.32	0.38	0.42	0.45

FORMATICN JTR

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	82	33.71	NORMAL	24.71	27.71	30.71	36.71	39.70	42.70
URANIUM	82	15.88	NORMAL	1.76	6.47	11.17	20.58	25.29	29.99
POTASSIUM	82	74.00	NORMAL	27.85	43.23	58.62	89.38	104.77	120.15
U/K	82	0.21	NORMAL	0.04	0.10	0.15	0.27	0.32	0.38
U/TH	82	0.45	NORMAL	0.05	0.18	0.32	0.58	0.71	0.85
TH/K	82	0.46	NORMAL	0.16	0.26	0.36	0.56	0.67	0.77

FORMATICN RC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	68	23.08	LCGNCRMAL	11.62	14.61	18.36	29.01	36.46	45.82
URANIUM	68	15.16	NORMAL	0.83	5.60	10.38	19.94	24.72	29.50
POTASSIUM	68	60.35	NORMAL	-14.53	10.43	35.39	85.31	110.27	135.23
U/K	68	0.27	NORMAL	-0.12	0.01	0.14	0.40	0.53	0.66
U/TH	68	0.54	NORMAL	0.06	0.22	0.38	0.71	0.87	1.03
TH/K	68	0.46	NORMAL	0.22	0.30	0.38	0.55	0.63	0.71

ASHTON QUAD

FORMATION FD

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	280	33.24	NORMAL	15.49	21.40	27.32	39.15	45.07	50.99
URANIUM	280	16.11	NORMAL	2.32	6.92	11.51	20.71	25.30	29.90
POTASSIUM	280	100.03	NORMAL	54.12	69.42	84.73	115.33	130.63	145.94
U/K	280	0.16	NORMAL	0.01	0.06	0.11	0.21	0.25	0.30
U/TH	280	0.47	NORMAL	0.09	0.21	0.34	0.59	0.72	0.85
TH/K	280	0.29	LOGNORMAL	0.14	0.18	0.23	0.36	0.46	0.58

FORMATION RTW

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	719	29.38	NORMAL	1.36	10.70	20.04	38.72	48.06	57.41
URANIUM	704	13.99	NORMAL	-1.48	3.68	8.84	19.15	24.31	29.47
POTASSIUM	719	55.14	LOGNORMAL	14.33	22.45	35.19	86.42	135.44	212.26
U/K	704	0.16	LOGNORMAL	0.03	0.05	0.09	0.30	0.55	1.02
U/TH	704	0.49	NORMAL	-0.04	0.14	0.31	0.67	0.84	1.02
TH/K	719	0.47	NORMAL	0.16	0.26	0.37	0.57	0.68	0.78

FORMATION PP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	136	27.75	LOGNORMAL	12.85	16.61	21.47	35.87	46.36	59.93
URANIUM	136	16.46	NORMAL	0.16	5.60	11.03	21.90	27.33	32.76
POTASSIUM	136	85.00	NORMAL	-27.60	9.93	47.47	122.53	160.07	197.60
U/K	136	0.20	LOGNORMAL	0.04	0.07	0.12	0.32	0.53	0.88
U/TH	136	0.52	NORMAL	-0.24	0.01	0.27	0.77	1.03	1.28
TH/K	136	0.39	LOGNORMAL	0.23	0.27	0.33	0.47	0.56	0.68

FORMATION PMS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	404	17.95	LOGNORMAL	5.66	8.31	12.22	26.38	38.76	56.95
URANIUM	400	17.86	NORMAL	-1.66	4.85	11.36	24.37	30.88	37.39
POTASSIUM	397	22.44	LOGNORMAL	4.08	7.20	12.71	39.62	69.94	123.48
U/K	385	0.16	LOGNORMAL	0.01	0.03	0.07	0.36	0.83	1.93
U/TH	393	0.93	NORMAL	-0.55	-0.06	0.44	1.43	1.93	2.42
TH/K	387	0.61	NORMAL	0.06	0.24	0.43	0.79	0.98	1.16

ASHTON QUAD

FORMATION PPMQ

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	101	27.74	NORMAL	-3.59	6.85	17.30	38.19	48.63	59.08
URANIUM	101	15.83	NORMAL	-5.55	1.58	8.70	22.96	30.09	37.22
POTASSIUM	101	71.25	NORMAL	-49.02	-8.93	31.16	111.34	151.43	191.52
U/K	101	0.24	NORMAL	-0.03	0.06	0.15	0.33	0.42	0.51
U/TH	101	0.54	NORMAL	0.20	0.31	0.43	0.65	0.77	0.88
TH/K	101	0.33	LOGNORMAL	0.14	0.19	0.25	0.44	0.57	0.76

FORMATION PMQ

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	409	19.36	LOGNORMAL	4.75	7.58	12.12	30.93	49.41	78.94
URANIUM	396	10.84	LOGNORMAL	2.98	4.58	7.04	16.68	25.66	39.49
POTASSIUM	409	28.75	LOGNORMAL	3.86	7.54	14.73	56.12	109.56	213.87
U/K	393	0.17	LOGNORMAL	0.03	0.05	0.09	0.32	0.60	1.13
U/TH	396	0.39	LOGNORMAL	0.08	0.13	0.23	0.66	1.13	1.92
TH/K	406	0.41	LOGNORMAL	0.15	0.21	0.29	0.58	0.83	1.17

FORMATION PMA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	18	22.11	NORMAL	13.41	16.31	19.21	25.01	27.91	30.81
URANIUM	18	19.28	NORMAL	3.35	8.66	13.97	24.59	29.90	35.21
POTASSIUM	18	49.56	NORMAL	37.59	41.58	45.57	53.54	57.53	61.52
U/K	18	0.38	NORMAL	0.05	0.16	0.27	0.49	0.59	0.70
U/TH	18	0.83	NORMAL	0.32	0.49	0.66	1.00	1.17	1.34
TH/K	18	0.44	NORMAL	0.32	0.36	0.40	0.48	0.52	0.56

FORMATION PMU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	86	24.56	NORMAL	10.13	14.94	19.75	29.37	34.18	38.98
URANIUM	86	12.15	NORMAL	5.43	7.67	9.91	14.39	16.63	18.87
POTASSIUM	86	78.51	NORMAL	10.05	32.87	55.69	101.33	124.15	146.97
U/K	86	0.16	NORMAL	0.03	0.07	0.11	0.20	0.24	0.29
U/TH	86	0.49	NORMAL	0.23	0.32	0.40	0.57	0.65	0.74
TH/K	86	0.32	NORMAL	0.16	0.21	0.26	0.37	0.42	0.48

ASHTON QUAD

FORMATION MM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1225	22.68	NORMAL	-1.43	6.61	14.64	30.72	38.76	46.80
URANIUM	1211	13.09	NORMAL	-2.31	2.82	7.96	18.23	23.37	28.50
POTASSIUM	1203	27.76	LOGNORMAL	4.85	8.68	15.52	49.66	88.82	158.87
U/K	1153	0.15	LOGNORMAL	0.02	0.03	0.07	0.33	0.71	1.51
U/TH	1186	0.39	LOGNORMAL	0.08	0.14	0.23	0.65	1.11	1.87
TH/K	1161	0.50	NORMAL	0.08	0.22	0.36	0.64	0.78	0.92

FORMATION MDT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	238	26.53	NORMAL	-1.45	7.88	17.20	35.85	45.18	54.51
URANIUM	227	9.07	LOGNORMAL	2.85	4.19	6.16	13.34	19.62	28.85
POTASSIUM	238	46.40	LOGNORMAL	13.49	20.36	30.74	70.04	105.72	159.59
U/K	221	0.09	LOGNORMAL	0.01	0.03	0.05	0.18	0.33	0.63
U/TH	227	0.28	LOGNORMAL	0.04	0.08	0.15	0.55	1.05	2.04
TH/K	231	0.37	NORMAL	0.04	0.15	0.26	0.48	0.58	0.69

FORMATION MDM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	77	26.26	NORMAL	4.58	11.81	19.03	33.48	40.71	47.94
URANIUM	77	9.44	LOGNORMAL	4.27	5.56	7.25	12.31	16.04	20.90
POTASSIUM	77	52.47	NORMAL	8.06	22.86	37.66	67.27	82.07	96.88
U/K	77	0.15	LOGNORMAL	0.05	0.07	0.11	0.22	0.32	0.46
U/TH	77	0.38	NORMAL	-0.00	0.12	0.25	0.51	0.64	0.76
TH/K	77	0.50	NORMAL	0.24	0.33	0.41	0.59	0.68	0.77

FORMATION MDO

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	99	16.48	NORMAL	2.67	7.27	11.88	21.09	25.70	30.30
URANIUM	93	8.28	NORMAL	-5.08	-0.62	3.83	12.73	17.18	21.64
POTASSIUM	99	49.21	NORMAL	-2.22	14.92	32.07	66.36	83.50	100.65
U/K	93	0.17	NORMAL	-0.02	0.04	0.11	0.23	0.29	0.35
U/TH	93	0.49	NORMAL	-0.04	0.14	0.31	0.67	0.84	1.02
TH/K	99	0.34	NORMAL	0.11	0.19	0.27	0.42	0.50	0.58

ASHTON QUAD

FORMATICN D

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	6	40.00	NORMAL	32.28	34.86	37.43	42.57	45.14	47.72
URANIUM	6	11.83	NORMAL	7.19	8.74	10.29	13.38	14.93	16.48
POTASSIUM	6	87.33	NORMAL	62.76	70.95	79.14	95.52	103.72	111.91
U/K	6	0.13	NORMAL	0.08	0.10	0.12	0.15	0.17	0.19
U/TH	6	0.27	NORMAL	0.17	0.21	0.24	0.31	0.34	0.38
TH/K	6	0.45	NORMAL	0.39	0.41	0.43	0.46	0.48	0.50

FORMATICN DO

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	31	37.74	NORMAL	24.48	28.90	33.32	42.16	46.58	51.00
URANIUM	31	14.32	NORMAL	2.14	6.20	10.26	18.38	22.44	26.50
POTASSIUM	31	81.29	NORMAL	47.93	59.05	70.17	92.41	103.53	114.65
U/K	31	0.16	NORMAL	0.06	0.09	0.13	0.20	0.23	0.27
U/TH	31	0.36	NORMAL	0.11	0.19	0.27	0.44	0.52	0.60
TH/K	31	0.45	NORMAL	0.36	0.39	0.42	0.49	0.52	0.55

FORMATION OC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	21	27.24	NORMAL	17.24	20.57	23.90	30.57	33.91	37.24
URANIUM	19	7.89	NCRMAL	0.04	2.66	5.28	10.51	13.13	15.75
POTASSIUM	22	71.45	NCRMAL	23.91	39.76	55.61	87.30	103.15	119.00
U/K	19	0.10	NORMAL	0.00	0.04	0.07	0.13	0.17	0.20
U/TH	19	0.28	NORMAL	-0.06	0.06	0.17	0.39	0.51	0.62
TH/K	21	0.34	LOGNCRMAL	0.19	0.23	0.28	0.40	0.48	0.58

FORMATION OCU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	27	27.26	NORMAL	9.13	15.18	21.22	33.30	39.34	45.38
URANIUM	27	14.33	NORMAL	0.30	4.98	9.65	19.01	23.69	28.37
POTASSIUM	27	60.00	LCGNCRMAL	25.73	34.12	45.24	79.57	105.52	139.93
U/K	27	0.13	LOGNORMAL	0.03	0.05	0.08	0.20	0.31	0.48
U/TH	27	0.54	NORMAL	-0.35	-0.06	0.24	0.83	1.13	1.43
TH/K	27	0.34	NORMAL	0.03	0.13	0.24	0.44	0.55	0.65

ASHTON QUAD

FORMATION C

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	99	25.49	NORMAL	-4.79	5.30	15.40	35.59	45.69	55.78
URANIUM	96	12.12	NORMAL	0.36	4.28	8.20	16.05	19.97	23.89
POTASSIUM	102	77.25	NORMAL	-11.33	18.20	47.73	106.78	136.31	165.84
U/K	96	0.16	NORMAL	-0.02	0.04	0.10	0.22	0.27	0.33
U/TH	96	0.33	LOGNORMAL	0.12	0.17	0.23	0.46	0.64	0.90
TH/K	99	0.32	NORMAL	0.19	0.24	0.28	0.37	0.41	0.46

FORMATION CP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	129	32.59	NORMAL	-2.27	9.35	20.97	44.21	55.83	67.45
URANIUM	129	9.57	LOGNORMAL	3.67	5.05	6.96	13.17	18.13	24.94
POTASSIUM	129	98.82	NORMAL	-6.55	28.57	63.70	133.95	169.07	204.20
U/K	129	0.11	NORMAL	-0.01	0.03	0.07	0.16	0.20	0.24
U/TH	129	0.35	NORMAL	0.02	0.13	0.24	0.46	0.57	0.69
TH/K	129	0.32	NORMAL	0.17	0.22	0.27	0.37	0.43	0.48

FORMATION CPF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	55	30.29	NORMAL	2.68	11.88	21.09	39.49	48.70	57.90
URANIUM	55	16.02	NORMAL	-0.69	4.88	10.45	21.59	27.15	32.72
POTASSIUM	55	42.33	LOGNORMAL	13.21	19.47	28.71	62.42	92.04	135.71
U/K	55	0.31	NORMAL	-0.26	-0.07	0.12	0.49	0.68	0.87
U/TH	55	0.56	NORMAL	-0.34	-0.04	0.26	0.86	1.16	1.46
TH/K	55	0.51	NORMAL	0.06	0.21	0.36	0.66	0.82	0.97

FORMATION CM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	155	12.88	LOGNORMAL	2.37	4.17	7.33	22.64	39.78	69.92
URANIUM	139	13.18	NORMAL	-10.39	-2.53	5.32	21.04	28.89	36.75
POTASSIUM	155	72.49	NORMAL	-92.24	-37.33	17.58	127.40	182.31	237.22
U/K	139	0.18	NORMAL	-0.01	0.05	0.12	0.24	0.30	0.36
U/TH	139	0.38	NORMAL	0.08	0.18	0.28	0.48	0.58	0.68
TH/K	153	0.48	NORMAL	0.14	0.25	0.36	0.59	0.70	0.81

ASHTON QUAD

FORMATION CU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	398	26.62	NORMAL	-6.07	4.83	15.72	37.52	48.42	59.32
URANIUM	393	11.56	NORMAL	-2.17	2.41	6.99	16.14	20.72	25.30
POTASSIUM	398	66.92	NORMAL	-21.97	7.66	37.29	96.55	126.19	155.82
U/K	389	0.14	LOGNORMAL	0.02	0.03	0.07	0.28	0.59	1.21
U/TH	391	0.46	NORMAL	-0.05	0.12	0.29	0.63	0.80	0.96
TH/K	392	0.41	NORMAL	0.09	0.20	0.31	0.52	0.62	0.73

FORMATION PCQ

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	368	25.54	LOGNORMAL	9.10	12.83	18.10	36.02	50.82	71.68
URANIUM	368	10.66	NORMAL	-1.91	2.28	6.47	14.85	19.04	23.23
POTASSIUM	368	46.03	LOGNORMAL	16.17	22.92	32.48	65.24	92.46	131.04
U/K	368	0.15	NORMAL	-0.00	0.05	0.10	0.20	0.25	0.31
U/TH	368	0.34	NORMAL	0.04	0.14	0.24	0.44	0.54	0.64
TH/K	368	0.44	NORMAL	0.21	0.29	0.37	0.52	0.60	0.68

FORMATION PCT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	42	21.95	NORMAL	15.66	17.76	19.85	24.05	26.15	28.24
URANIUM	42	10.90	NORMAL	-0.93	3.02	6.96	14.85	18.79	22.74
POTASSIUM	42	76.19	NORMAL	10.43	32.35	54.27	98.11	120.03	141.95
U/K	42	0.14	NORMAL	0.07	0.09	0.11	0.16	0.18	0.20
U/TH	42	0.47	NORMAL	0.03	0.18	0.32	0.62	0.76	0.91
TH/K	42	0.26	LOGNORMAL	0.15	0.18	0.22	0.31	0.38	0.46

FORMATION PCG

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	3462	38.87	LOGNORMAL	10.60	16.35	25.21	59.94	92.42	142.51
URANIUM	3352	15.35	NORMAL	-7.23	0.30	7.82	22.88	30.41	37.93
POTASSIUM	3459	72.64	LOGNORMAL	20.45	31.20	47.61	110.83	169.10	258.01
U/K	3340	0.16	NORMAL	-0.08	-0.00	0.08	0.24	0.32	0.40
U/TH	3350	0.35	NORMAL	-0.08	0.06	0.21	0.49	0.63	0.78
TH/K	3433	0.45	NORMAL	0.07	0.19	0.32	0.58	0.71	0.84

ASHTON QUAD

FORMATICN PCD

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	434	34.11	NORMAL	1.73	12.52	23.31	44.90	55.69	66.49
URANIUM	427	11.95	NORMAL	-0.05	3.95	7.95	15.95	19.95	23.96
POTASSIUM	434	72.71	NORMAL	-8.04	18.88	45.79	99.62	126.54	153.45
U/K	427	0.16	NORMAL	0.04	0.08	0.12	0.21	0.25	0.29
U/TH	427	C.35	NORMAL	0.04	0.14	0.24	0.45	0.56	0.66
TH/K	434	0.48	NORMAL	0.15	0.26	0.37	0.59	0.70	0.81

FORMATICN PCU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1577	22.95	LCGNCRMAL	5.50	8.85	14.25	36.96	59.5C	95.81
URANIUM	1572	13.65	LOGNORMAL	4.78	6.78	9.62	19.37	27.48	38.99
POTASSIUM	1577	112.91	NCRMAL	-52.52	2.62	57.77	168.05	223.20	278.34
U/K	1572	0.15	NORMAL	-0.04	0.03	0.09	0.21	0.27	0.33
U/TH	1572	0.37	NORMAL	0.03	0.15	0.26	0.49	0.60	0.72
TH/K	1575	0.39	NCRMAL	0.13	0.22	0.30	0.48	0.56	0.65

FORMATICN W

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
THORIUM	1365	3.40	LOGNORMAL	0.13	0.39	1.15	10.01	29.48	86.82
URANIUM	625	2.88	LOGNORMAL	0.23	0.53	1.24	6.70	15.57	36.19
POTASSIUM	448	3.09	LOGNORMAL	0.06	0.21	0.81	11.77	44.90	171.22
U/K	161	0.18	LOGNORMAL	0.01	0.03	0.08	0.40	0.93	2.12
U/TH	283	0.38	LOGNORMAL	0.07	0.13	0.22	0.66	1.14	1.98
TH/K	213	0.49	LOGNORMAL	0.16	0.23	0.34	0.71	1.03	1.49

APPENDIX F

Single Record Data Listing Format: Ashton Quadrangle

SINGLE RECORD DATA LISTING FORMAT

Appendix F

REC NO.	LAT	LON	RESID MAG GAMMA	TERR CL FEET	FLG	GEOL UNIT	COSM CPS	ATM U CPS	TOTAL COUNT CPS	FLG	TH CPS	FLG	U CPS	FLG	K CPS	FLG	U/TH	U/K	TH/K	TEMP °C.	BARO PRES IN.Hg
1344	36.0006	-115.9364	51924	422		C1	32	0	2064		41		52		105		1.257	0.499	0.397	34.6	26.9
1345	36.0012	-115.9365	51924	422		Q1	39	0	2077		44		24		175		0.554	0.141	0.255	34.6	26.9
1346	36.0018	-115.9365	51924	421		Q1	29	0	2083		41		39		158		0.966	0.252	0.260	34.6	26.9
1347	36.0023	-115.9366	51924	419		C1	42	0	2096		44		30		157		0.680	0.194	0.282	34.6	26.9
1348	36.0030	-115.9366	51924	417		C1	46	0	2012		43		36		145		0.843	0.255	0.302	34.6	26.9
1349	36.0035	-115.9367	51924	414		Q1	42	0	2098		28		49		122		1.736	0.407	0.235	34.6	26.9
1350	36.0040	-115.9368	51924	411		C1	40	1	2113		47		31		170		0.665	0.178	0.268	34.6	26.9
1351	36.0047	-115.9368	51925	409		Q1	46	1	2105		41		38		135		0.925	0.282	0.305	34.6	26.9
1352	36.0052	-115.9369	51925	409		Q1	54	2	2039		36		45		138		1.232	0.325	0.264	34.6	26.9
1353	36.0058	-115.9369	51925	409		C1	36	3	2111		45		35		159		0.788	0.224	0.284	34.7	26.9
1354	36.0064	-115.9370	51925	409		Q1	54	3	1958		35		13		186		0.381	0.072	0.190	34.7	26.9
1355	36.0069	-115.9371	51925	409		Q1	49	4	2070		32		27		162		0.826	0.167	0.202	34.7	26.9
1356	36.0076	-115.9371	51925	409		Q1	34	5	2095		51		24		142		0.482	0.174	0.361	34.7	26.9
1357	36.0081	-115.9372	51924	408		Q1	32	6	2049		33		37		143		1.110	0.261	0.235	34.7	26.9
1358	36.0087	-115.9372	51924	405		Q1	27	7	2092		51		30		149		0.605	0.206	0.341	34.7	26.9
1359	36.0093	-115.9373	51924	401		Q1	46	7	2051		45		28		168		0.626	0.169	0.269	34.7	26.9
1360	36.0099	-115.9374	51924	396		C1	28	8	2040		35		34		144		0.958	0.236	0.246	34.7	26.9
1361	36.0105	-115.9374	51924	388		C1	46	8	1955		40		39		124		0.985	0.319	0.324	34.7	26.9
1362	36.0111	-115.9375	51924	381		Q1	48	8	1970		30		21		183		0.688	0.115	0.167	34.7	26.9
1363	36.0116	-115.9375	51924	373		Q1	40	9	1966		25		37		189		1.494	0.198	0.132	34.8	26.9
1364	36.0123	-115.9376	51924	366		C1	40	9	1941		47		15		165		0.331	0.094	0.285	34.8	26.9
1365	36.0128	-115.9376	51924	359		Q1	34	9	2030		43		34		179		0.789	0.193	0.245	34.8	26.9
1366	36.0134	-115.9377	51924	353		Q1	46	9	1956		41		16		180		0.397	0.092	0.231	34.8	26.9
1367	36.0140	-115.9377	51924	348		Q1	43	9	1921		33		21		189		0.650	0.113	0.175	34.8	26.9
1368	36.0146	-115.9378	51924	346		C1	50	9	2004		50		23		169		0.470	0.140	0.297	34.8	26.9
1369	36.0151	-115.9378	51924	346		Q1	57	9	1865		49		14		191		0.295	0.076	0.259	34.9	26.9
1370	36.0157	-115.9379	51923	349		Q1	41	10	1983		44		15		180		0.342	0.085	0.248	34.9	26.9
1371	36.0163	-115.9379	51923	353		C1	39	11	1911		35		29		167		0.819	0.176	0.214	35.0	26.9
1372	36.0169	-115.9380	51923	360		C1	41	11	1862		39		33		157		0.843	0.211	0.250	35.0	26.9
1373	36.0175	-115.9380	51923	365		Q1	33	12	1967		33		20		186		0.614	0.110	0.179	35.0	26.9
1374	36.0180	-115.9381	51923	373		C1	33	12	2030		39		27		176		0.716	0.158	0.221	35.1	26.9
1375	36.0186	-115.9382	51923	380		Q1	52	11	1840		44		30		140		0.678	0.216	0.319	35.2	26.9
1376	36.0192	-115.9382	51923	389		C1	44	11	1903		46		33		153		0.713	0.218	0.305	35.1	26.9
1377	36.0197	-115.9383	51922	399		C1	34	11	1836		36		10		169		0.291	0.062	0.213	35.1	26.9
1378	36.0204	-115.9383	51922	409		Q1	48	10	1695		40		16		147		0.402	0.112	0.278	35.1	26.9
1379	36.0209	-115.9384	51922	419		Q1	36	11	1689		21		21		150		0.959	0.140	0.146	35.1	26.9
1380	36.0215	-115.9385	51922	429		Q1	42	12	1618		32		17		149		0.539	0.119	0.221	35.1	26.9
1381	36.0221	-115.9385	51922	437		Q1	50	12	1506		55		7	MAR	111		0.129	0.065	0.501	35.1	26.9
1382	36.0226	-115.9386	51922	444		Q1	36	13	1552		43		18		106		0.429	0.174	0.405	35.1	26.9
1383	36.0233	-115.9386	51922	450		Q1	49	13	1505		11		33		86		3.054	0.392	0.128	35.1	26.9
1384	36.0238	-115.9387	51922	453		Q1	38	13	1563		34		17		114		0.516	0.153	0.297	35.1	26.8
1385	36.0244	-115.9388	51922	450		Q1	52	13	1454		24		15		115		0.650	0.139	0.214	35.1	26.8
1386	36.0250	-115.9388	51923	446		C1	45	13	1407		40		31		109		0.779	0.280	0.369	35.0	26.8
1387	36.0255	-115.9389	51923	441		Q1	36	13	1421		28		28		104		1.011	0.275	0.272	35.0	26.8
1388	36.0262	-115.9389	51923	436		Q1	40	13	1420		25		21		132		0.870	0.167	0.192	35.0	26.9
1389	36.0267	-115.9390	51923	431		Q1	46	13	1360		25		25		114		1.028	0.227	0.221	35.0	26.9
1390	36.0272	-115.9391	51923	426		Q1	51	13	1489		26		26		142		1.019	0.189	0.186	35.0	26.9
1391	36.0279	-115.9391	51923	421		C1	50	13	1557		36		17		140		0.480	0.126	0.262	34.9	26.9
1392	36.0284	-115.9392	51923	418		Q1	52	13	1566		40		19		126		0.474	0.152	0.321	34.9	26.9
1393	36.0290	-115.9391	51922	415		Q1	45	14	1613		39		12		156		0.315	0.080	0.254	34.9	26.9
1394	36.0296	-115.9393	51922	415		C1	43	14	1547		43		16		134		0.387	0.124	0.321	34.9	26.9
1395	36.0301	-115.9394	51922	418		C1	44	14	1467		25		7	MAR	142		0.281	0.050	0.179	34.9	26.9

APPENDIX G

Averaged Record Data Listing Format: Ashton Quadrangle

AVERAGED RECORD DATA LISTINGS FORMAT

RECORD NUMBER	LATITUDE	LONGITUDE	RESID TOTAL FIELD GAMMA	GEOL UNIT	COSM CPS	ATM. URAN CPS	TOTAL COUNT CPS	THO CPS	FLG	STD DEV	URN CPS	FLG	STD DEV	POT CPS	FLG	STD DEV	URAN THOR RATIO	STD DEV	URAN POTA RATIO	STD DEV	THOR PCTA RATIO	STD DEV
1344	36.0006	-115.9364	51924	01	32	0	2064	43		1	40		2	152		1	0.908	0	0.259	0	0.286	0
1345	36.0012	-115.9365	51924	01	39	0	2077	43		1	38		2	155		1	0.873	0	0.244	0	0.280	0
1346	36.0018	-115.9365	51924	01	29	0	2083	43		1	37		2	149		1	0.855	0	0.249	0	0.292	0
1347	36.0023	-115.9366	51924	01	42	0	2096	41		1	36		2	152		1	0.897	0	0.240	0	0.268	0
1348	36.0030	-115.9366	51924	01	46	0	2012	41		1	38		2	153		1	0.918	0	0.248	0	0.271	0
1349	36.0035	-115.9367	51924	01	42	0	2098	41		1	37		2	148		1	0.910	0	0.254	0	0.279	0
1350	36.0040	-115.9368	51924	01	40	1	2113	40		1	40		2	144		1	1.018	0	0.280	0	0.276	0
1351	36.0047	-115.9368	51925	01	46	1	2105	40		1	40		2	147		1	1.005	0	0.273	0	0.272	0
1352	36.0052	-115.9369	51925	01	54	2	2039	41		1	33		2	160		1	0.794	0	0.206	0	0.259	0
1353	36.0058	-115.9369	51925	01	36	3	2111	38		1	32		2	156		1	0.833	0	0.204	0	0.245	-1
1354	36.0064	-115.9370	51925	01	54	3	1958	40		1	29		2	158		1	0.725	0	0.185	0	0.255	-1
1355	36.0069	-115.9371	51925	01	49	4	2070	40		1	28		2	159		1	0.690	0	0.174	0	0.250	-1
1356	36.0076	-115.9371	51925	01	34	5	2095	41		1	27		2	157		1	0.653	0	0.170	0	0.261	0
1357	36.0081	-115.9372	51924	01	32	6	2049	43		1	30		2	153		1	0.692	0	0.194	0	0.280	0
1358	36.0087	-115.9372	51924	01	27	7	2092	43		1	31		2	150		1	0.715	0	0.208	0	0.290	0
1359	36.0093	-115.9373	51924	01	46	7	2051	41		1	34		2	146		1	0.828	0	0.233	0	0.282	0
1360	36.0099	-115.9374	51924	01	28	8	2040	41		1	31		2	154		1	0.759	0	0.200	0	0.263	0
1361	36.0105	-115.9374	51924	01	46	8	1955	35		1	32		2	162		1	0.910	0	0.199	0	0.218	-1
1362	36.0111	-115.9375	51924	01	48	8	1970	36		1	30		2	162		1	0.827	0	0.183	0	0.222	-1
1363	36.0116	-115.9375	51924	01	40	9	1966	37		1	30		2	169		1	0.792	0	0.176	0	0.222	-1
1364	36.0123	-115.9376	51924	01	40	9	1941	38		1	25		2	180		1	0.664	0	0.140	0	0.210	-1
1365	36.0128	-115.9376	51924	01	34	9	2030	38		1	25		2	181		1	0.660	0	0.139	0	0.211	-1
1366	36.0134	-115.9377	51924	01	46	9	1956	43		1	22		2	177		1	0.517	0	0.127	0	0.245	-1
1367	36.0140	-115.9377	51924	01	43	9	1921	44		1	22		2	182		1	0.508	0	0.122	0	0.240	-1
1368	36.0146	-115.9378	51924	01	50	9	2004	44		1	18		2	182		1	0.417	0	0.100	0	0.241	-1
1369	36.0151	-115.9378	51924	01	57	9	1865	43		1	21		2	180		1	0.409	0	0.116	0	0.238	-1
1370	36.0157	-115.9379	51923	01	41	10	1983	44		1	23		2	173		1	0.527	0	0.134	0	0.254	-1
1371	36.0163	-115.9379	51923	01	39	11	1911	41		1	23		2	177		1	0.557	0	0.128	0	0.230	-1
1372	36.0169	-115.9380	51923	01	41	11	1862	39		1	25		2	174		1	0.657	0	0.145	0	0.221	-1
1373	36.0175	-115.9380	51923	01	33	12	1967	39		1	28		2	166		1	0.735	0	0.171	0	0.232	-1
1374	36.0180	-115.9381	51923	01	33	12	2030	41		1	29		2	163		1	0.715	0	0.179	0	0.250	-1
1375	36.0186	-115.9382	51923	01	52	11	1840	40		1	25		2	165		1	0.612	0	0.148	0	0.242	-1
1376	36.0192	-115.9382	51923	01	44	11	1903	42		1	24		2	157		1	0.571	0	0.151	0	0.264	0
1377	36.0197	-115.9383	51922	01	34	11	1836	38		1	22		2	152		1	0.585	0	0.147	0	0.250	-1
1378	36.0204	-115.9383	51922	01	48	10	1695	36		1	20		2	154		1	0.553	0	0.129	0	0.232	-1
1379	36.0209	-115.9384	51922	01	36	11	1689	38		1	15		2	146		1	0.388	0	0.100	0	0.258	0
1380	36.0215	-115.9385	51922	01	42	12	1618	39		1	16		2	133		1	0.415	0	0.122	0	0.293	0
1381	36.0221	-115.9385	51922	01	50	12	1506	33		1	20		2	121		1	0.597	0	0.163	0	0.273	0
1382	36.0226	-115.9386	51922	01	36	13	1552	35		1	19		2	114		1	0.537	0	0.167	0	0.311	0
1383	36.0233	-115.9386	51922	01	49	13	1505	34		1	19		2	107		1	0.552	0	0.174	0	0.315	0
1384	36.0238	-115.9387	51922	01	38	13	1563	31		1	23		2	106		1	0.768	0	0.221	0	0.288	0
1385	36.0244	-115.9388	51922	01	52	13	1454	28		1	26		2	106		1	0.921	0	0.240	0	0.261	0
1386	36.0250	-115.9388	51923	01	45	13	1407	31		1	23		2	115		1	0.758	0	0.201	0	0.266	0
1387	36.0255	-115.9389	51923	01	36	13	1421	29		1	25		2	115		1	0.861	0	0.216	0	0.250	-1
1388	36.0262	-115.9389	51923	01	40	13	1420	29		1	27		2	121		1	0.925	0	0.224	0	0.242	-1
1389	36.0267	-115.9390	51923	01	46	13	1360	28		1	24		2	127		1	0.853	0	0.192	0	0.225	-1
1390	36.0272	-115.9391	51923	01	51	13	1489	31		1	22		2	131		1	0.725	0	0.171	0	0.236	-1
1391	36.0279	-115.9391	51923	01	50	13	1557	34		1	20		2	136		1	0.607	0	0.151	0	0.249	-1
1392	36.0284	-115.9392	51923	01	52	13	1566	37		1	19		2	140		1	0.497	0	0.133	0	0.267	0
1393	36.0290	-115.9391	51922	01	45	14	1613	37		1	15		2	140		1	0.395	0	0.105	0	0.266	0
1394	36.0296	-115.9393	51922	01	43	14	1547	34		1	15		2	138		1	0.427	0	0.107	0	0.249	-1
1395	36.0301	-115.9394	51922	01	44	14	1467	30		1	17		2	141		1	0.550	0	0.117	0	0.213	-1

G1

APPENDIX H

DOE Single Record Reduced Data Tape Format:
Ashton Quadrangle

DOE SINGLE RECORD REDUCED DATA TAPE

Tape is 9-Track, 800 BPI, EBCDIC Format.

1st Record is REEL HEADER record which is 4000 bytes long.

REEL HEADER contains:

BYTES	DESP.	NO. CHAR.	TYPE
1 - 4	'SRRD'-Tape ID Code	4	Alpha
5 - 44	Project ID	40	Alpha
45 - 56	Subcontractor	12	Alpha
57 - 58	Year of Survey	2	Integer
59 - 62	Data Record Length	4	Integer
63 - 67	Data Block Size	5	Integer
68 - 70	Number of lines on Tape	3	Integer
71-75, 76 - 80...3996-4000	Flight Line Numbers	5 each	Integer

Data Records are blocked as per Record Length and Block Size above.

Each line consists of one line header record and several data records.

LINE HEADER contains:

BYTES	DESP.	NO. CHAR.	TYPE
1 - 4	'LINE'-Record Type ID Code	4	Alpha
5 - 9	Line Number	5	Integer
10 - 14	First Fid (Sample) on Line	5	Integer
15 - 19	Last Fid on Line	5	Integer
20 - 24	Date Flown (Julian YYDDD)	5	Integer
25 - 104	Blank	5	Integer

Tape contains 1 Record for each Fid (Sample) on the line.

FID RECORD contains:

BYTES	DESP.	NO. CHAR.		TYPE
1 - 4	'FID' - Record Type ID Code	4		Alpha
5 - 9	Fid Number	5		Integer
10 - 18	Latitude (degrees)	9	(F9.4)	Real
19 - 27	Longitude (degrees)	9	(F9.4)	Real
28 - 32	Residual Total Field (gammas)	5		Integer
33 - 37	Radar Altimeter (feet)	5		Integer
38 - 41	Surface Geology	4		Alpha
42 - 46	Quality Flags	5		Integer
47 - 50	Cosmic (cps)	4		Integer
51 - 54	Atmospheric Bi-214 correction(cps)	4		Integer
55 - 59	Total Count (cps)	5		Integer
60 - 63	Thorium (cps)	4		Integer
64 - 67	Uranium (cps)	4		Integer
68 - 71	Potassium (cps)	4		Integer
72 - 78	Uranium/Thorium Ratio	7	(F7.3)	Real
79 - 85	Uranium/Potassium Ratio	7	(F7.3)	Real
86 - 92	Thorium/Potassium Ratio	7	(F7.3)	Real
93 - 98	Temperature (degrees Celcius)	6	(F6.1)	Real
99 - 104	Barometric Pressure (in Hg.)	6	(F6.1)	Real

APPENDIX I

DOE Raw Spectral Data Tape Format: Ashton Quadrangle

DOE RAW SPECTRAL DATA TAPE

Tape is 9-Track, 800 BPI, EBCDIC Format.

1st Record is REEL HEADER record which is 4000 bytes long.

REEL HEADER contains:

BYTES	DESP.	NO. CHAR.	TYPE
1 - 4	'RAWS' - Tape ID Code	4	Alpha
5 - 44	Project ID	40	Alpha
45 - 56	Subcontractor	12	Alpha
57 - 58	Year of Survey	2	Integer
59 - 62	Data Record Length	4	Integer
63 - 67	Data Block Size	5	Integer
68 - 70	Number of Lines on Tape	3	Integer
71-75, 76 - 80...3996-4000	Flight Line Numbers	5 each	Integer

Data Records are blocked as per Record Length and Block Size above.
Each line consists of one line header record and several data records.

LINE HEADER contains:

BYTES	DESP.	NO. CHAR.		TYPE
1 - 4	'LINE'- Record Type ID Code	4		Alpha
5 - 9	Line Number	5		Integer
10 - 14	First Fid (Sample) on Line	5		Integer
15 - 19	Last Fid on Line	5		Integer
20 - 24	Sample Period 4 π (seconds)	5	(F5.3)	Real
25 - 29	Sample Period 2 π (seconds)	5	(F5.3)	Real
30 - 34	Date Flown (Julian YYDDD)	5		Integer
35 - 1580	Blank			

Tape contains 1 Record for each Fid (Sample) on the line.

FID RECORD contains:

BYTES	DESP.	NO. CHAR.	TYPE
1 - 4	'FID'-Record Type ID Code	4	Alpha
5 - 9	Fid Number	5	Integer
10 - 13	Velocity (MPH)	4	Integer
14 - 22	Latitude (degrees)	9	(F9.4) Real
23 - 31	Longitude (degrees)	9	(F9.4) Real
32 - 37	Time of day (HHMMSS)	6	Integer
38 - 42	Total Field (gammas)	5	Integer
43 - 47	Radar Altimeter (feet)	5	Integer
48 - 53	Barometric Pressure (in. Hg.)	6	(F6.3) Real
54 - 57	Temperature (degrees Celcius)	4	(F4.1) Real
58 - 62	Quality Flags	5	Integer
63 - 812	Raw Counts - 4 π Detector	3 per channel	Integer
813 - 817	Dead Time - 4 π (seconds)	5	(F5.3) Real
818 - 1567	Raw Counts - 2 π Detector	3 per channel	Integer
1568 - 1572	Dead Time - 2 π (seconds)	5	(F5.3) Real
1573 - 1576	Cosmic - 4 π (counts)	4	Integer
1577 - 1580	Cosmic - 2 π (counts)	4	Integer

A P P E N D I X   K

DOE Statistical Analysis Data Tape Format: Ashton Quadrangle

DOE STATISTICAL ANALYSIS DATA TAPE

TAPE IS 9-TRACK, 800 BPI, EBCDIC FORMAT.
FIRST RECORD IS REEL HEADER RECORD WHICH IS 20000 BYTES LONG.

REEL HEADER CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'STAN'-TAPE ID CODE	4	ALPHA
5-44	PROJECT ID	40	ALPHA
45-56	SUBCONTRACTOR	12	ALPHA
57-58	YEAR OF SURVEY	2	INTEGER
59-62	DATA RECORD LENGTH IN BYTES	4	INTEGER
63-67	DATA BLOCK SIZE IN BYTES	5	INTEGER
68-70	NUMBER OF LINES ON TAPE	3	INTEGER
71-75...996-1000	FLIGHT LINE NUMBERS	5 EACH	INTEGER
1001-20000	GEOLOGY FORMATION DATA	236 BYTES	PER FM.
1001-1004	GEOLOGY FORMATION	4	ALPHA
1005-1010	THORIUM MEAN VALUE (cps)	6	(F6.1) REAL
1011-1016	-3 STANDARD DEVIATION	6	(F6.1) REAL
1017-1022	-2 S. D.	6	(F6.1) REAL
1023-1028	-1 S. D.	6	(F6.1) REAL
1029-1034	+1 S. D.	6	(F6.1) REAL
1035-1040	+2 S. D.	6	(F6.1) REAL
1041-1046	+3 S. D.	6	(F6.1) REAL
1047-1052	URANIUM MEAN VALUE (cps)	6	(F6.1) REAL
1053-1058	-3 S. D.	6	(F6.1) REAL
1059-1064	-2 S. D.	6	(F6.1) REAL
1065-1070	-1 S. D.	6	(F6.1) REAL
1071-1076	+1 S. D.	6	(F6.1) REAL
1077-1082	+2 S. D.	6	(F6.1) REAL
1083-1088	+3 S. D.	6	(F6.1) REAL
1089-1094	POTASSIUM MEAN VALUE (cps)	6	(F6.1) REAL
1095-1100	-3 S. D.	6	(F6.1) REAL
1101-1106	-2 S. D.	6	(F6.1) REAL
1107-1112	-1 S. D.	6	(F6.1) REAL
1113-1118	+1 S. D.	6	(F6.1) REAL
1119-1124	+2 S. D.	6	(F6.1) REAL
1125-1130	+3 S. D.	6	(F6.1) REAL
1131-1135	URANIUM/POTASSIUM MEAN VALUE (cps)	5	(F5.2) REAL
1136-1140	-3 S. D.	5	(F5.2) REAL
1141-1145	-2 S. D.	5	(F5.2) REAL
1146-1150	-1 S. D.	5	(F5.2) REAL
1151-1155	+1 S. D.	5	(F5.2) REAL
1156-1160	+2 S. D.	5	(F5.2) REAL
1161-1165	+3 S. D.	5	(F5.2) REAL

1166-1170	URANIUM/THORIUM MEAN VALUE (cps)	5	(F5.2)REAL
1171-1175	-3 S. D.	5	(F5.2)REAL
1176-1180	-2 S. D.	5	(F5.2)REAL
1181-1185	-1 S. D.	5	(F5.2)REAL
1186-1190	+1 S. D.	5	(F5.2)REAL
1191-1195	+2 S. D.	5	(F5.2)REAL
1196-1200	+3 S. D.	5	(F5.2)REAL
1201-1205	THORIUM/POTASSIUM MEAN VALUE (cps)	5	(F5.2)REAL
1206-1210	-3 S. D.	5	(F5.2)REAL
1211-1215	-2 S. D.	5	(F5.2)REAL
1216-1220	-1 S. D.	5	(F5.2)REAL
1221-1225	+1 S. D.	5	(F5.2)REAL
1226-1230	+2 S. D.	5	(F5.2)REAL
1231-1235	+3 S. D.	5	(F5.2)REAL
1236	BLANK	1	ALPHA

REPEAT FOR UP TO 80 GEOLOGY FORMATIONS

LINE HEADER CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'LINE'	4	ALPHA
5-9	LINE NUMBER	5	INTEGER
10-14	FIRST FID (SAMPLE) ON LINE	5	INTEGER
15-19	LAST FID ON LINE	5	INTEGER
20-24	DATE FLOWN JULIAN (YYDDD)	5	INTEGER
25-92	BLANK		

TAPE CONTAINS 1 RECORD FOR EACH FID ON THE LINE.

FID RECORD CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'FID' - RECORD TYPE ID CODE	4	ALPHA
5-9	FID NUMBER	5	INTEGER
10-18	LATITUDE F(9.4) Degrees	9	REAL
19-27	LONGITUDE F(9.4) Degrees	9	REAL
28-32	RESIDUAL TOTAL FIELD Gammas	5	INTEGER
33-36	SURFACE GEOLOGY	4	ALPHA
37-41	QUALITY FLAGS	5	INTEGER
42-46	TOTAL COUNT cps	5	INTEGER
47-50	ATMOSPHERIC URANIUM Correction cps	4	INTEGER
51-54	THORIUM cps	4	INTEGER
55-58	URANIUM cps	4	INTEGER
59-62	POTASSIUM cps	4	INTEGER
63-64	THORIUM STANDARD DEVIATION	2	INTEGER
65-66	URANIUM STANDARD DEVIATION	2	INTEGER
67-68	POTASSIUM STANDARD DEVIATION	2	INTEGER
69-74	URANIUM/THORIUM RATIO F(6.3)	6	REAL
75-76	URANIUM/THORIUM STANDARD DEVIATION	2	INTEGER
77-82	URANIUM/POTASSIUM RATIO F(6.3)	6	REAL
83-84	URANIUM/POTASSIUM STANDARD DEVIATION	2	INTEGER
85-90	THORIUM/POTASSIUM RATIO F(6.3)	6	REAL
91-92	THORIUM/POTASSIUM STANDARD DEVIATION	2	INTEGER

A P P E N D I X   L

DOE Magnetic Data Tape Format: Ashton Quadrangle

DOE MAGNETIC DATA TAPE

TAPE IS 9-TRACK, 800 BPI, EBCDIC FORMAT.
FIRST RECORD IS REEL HEADER RECORD WHICH IS 4000 BYTES LONG.

REEL HEADER CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'MAGN' - TAPE ID CODE	4	ALPHA
5-44	PROJECT ID	40	ALPHA
45-56	SUBCONTRACTOR	12	ALPHA
57-58	YEAR OF SURVEY	2	INTEGER
59-62	DATA RECORD LENGTH BYTES	4	INTEGER
63-67	DATA BLOCK SIZE BYTES	5	INTEGER
68-70	NUMBER OF LINES ON TAPE	3	INTEGER
71-75,...3996-4000	FLIGHT LINE NUMBERS	5 EACH	INTEGER

LINE HEADER CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'LINE' - RECORD TYPE ID CODE	4	ALPHA
5-9	LINE NUMBER	5	INTEGER
10-14	FIRST FID ON LINE	5	INTEGER
15-19	LAST FID ON LINE	5	INTEGER
20-24	DATE FLOWN JULIAN (YYDDD)	5	INTEGER
25-60	BLANK		

DATA RECORD CONTAINS

BYTES	DESCRIPTION	NO. CHAR.	TYPE
1-4	'FID' - RECORD TYPE ID	4	ALPHA
5-9	FID NUMBER	5	INTEGER
10-18	LATITUDE F(9.4) Degrees	9	REAL
19-27	LONGITUDE F(9.4) Degrees	9	REAL
28-33	TIME HHMMSS	6	INTEGER
34-37	TERRAIN CLEARANCE feet	4	INTEGER
38-41	BAROMETRIC PRESSURE F(4.1) in. Hg.	4	REAL
42-45	GEOLOGY UNIT	4	ALPHA
46-50	TOTAL MAGNETIC FIELD INTENSITY Gamma	5	INTEGER
51-55	RESIDUAL TOTAL MAGNETIC INTENSITY Gamma	5	INTEGER
56-60	DIURNAL MAGNETIC INTENSITY Gamma	5	INTEGER

APPENDIX M

Reduced Calibration and Test Line Data: Ashton Quadrangle

REDUCED CALIBRATION AND TEST LINE DATA

DATE	FLIGHT	RES. THOR. .583	RES. THOR. 2615	LOW PRE ALT.	LOW PRE T.C.	LOW PRE 2π	LOW POST ALT.	LOW POST T.C.	LOW POST 2π
08/10/78	45	9.1	5.7	460	2400	21.0	425	2500	35.5
08/11/78	47	9.0	5.7	480	2300	31	380	3300	38
08/11/78	48	9.0	5.7	480	2300	31	380	3300	38
08/12/78	49	8.7	5.7	520	3400	37			
08/12/78	50	8.7	5.7	520	3400	37			
08/13/78	51	8.9	6.1	680	3250	29	600	3500	36
08/15/78	52	8.9	6.0	575	3200	27			
08/15/78	53	8.9	6.0	575	3200	27			
08/15/78	54	NO PRODUCTION							
08/18/78	55	8.8	5.7	460	3000	24	470	2900	27
08/18/78	56	8.8	5.7	460	3000	24	470	2900	27
08/18/78	57	8.8	5.7	460	3000	24	470	2900	27
08/18/78	58	8.8	5.7	460	3000	24	470	2900	27
08/19/78	59	8.7	5.7	510	3000	26.5	465	2750	31
08/19/78	60	8.7	5.7	510	3000	26.5	465	2750	31
08/25/78	61	9.0	6.2	460	2850	25	450	3200	30
08/25/78	62	9.0	6.2	460	2850	25	450	3200	30
08/25/78	63	9.0	6.2	460	2850	25	450	3200	30
08/26/78	64	8.9	6.0	350	3300	32	380	3600	38
08/26/78	65	8.9	6.0	350	3300	32	380	3600	38
08/27/78	66	8.8	6.0	400	3200	25	350	3750	30
08/27/78	67	8.8	6.0	400	3200	25	350	3750	30
08/27/78	68	8.8	6.0	400	3200	25	350	3750	30
08/27/78	69	8.8	6.0	400	3200	25	350	3750	30
08/29/78	70	NO PRODUCTION							
09/21/78	126	9.0	5.9	400	2400	23	390	2200	30
09/21/78	121	9.0	5.9	400	2400	23	390	2200	30
09/21/78	122	9.0	5.9	400	2400	23	390	2200	30