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National Uranium Resource Evaluation

**Airborne Gamma-Ray Spectrometer
And Magnetometer Survey
Chico Quadrangle, California**

Final Report - Volume I

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

April 1981

PREPARED FOR U.S. DEPARTMENT OF ENERGY
Assistant Secretary for Resource Applications
Grand Junction Office, Colorado

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AIRBORNE GAMMA-RAY SPECTROMETER
AND
MAGNETOMETER SURVEY

CHICO QUADRANGLE
CALIFORNIA

FINAL REPORT
VOLUME I

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AERO SERVICE DIVISION
WESTERN GEOPHYSICAL COMPANY
OF AMERICA
HOUSTON, TEXAS

MAY, 1981

PREPARED FOR THE U. S. DEPARTMENT OF ENERGY
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Figure 1
CHICO QUADRANGLE
INDEX MAP

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INTRODUCTION

During the months of August, September, and October of 1980, Aero Service Division Western Geophysical Company of America conducted an airborne high sensitivity gamma-ray spectrometer and magnetometer survey over ten (10) areas over northern California and southwestern Oregon. These include the 2° x 1° NTMS quadrangles of Roseburg, Medford, Weed, Alturas, Redding, Susanville, Ukiah, and Chico along with the 1° x 2° areas of the Coos Bay quadrangle and the Crescent City/Eureka areas combined. This report discusses the results obtained over the Chico, California, map area.

Traverse lines were flown in an east-west direction at a line spacing of three. Tie lines were flown north-south approximately twelve miles apart. A total of 16,880.5 line miles of geophysical data were acquired, compiled, and interpreted during the survey, of which 3026.4 line miles are in this quadrangle.

This report is a result of work performed under Bendix Field Engineering Corporation Subcontract No. 80-460, Project No. IG0205, as part of the National Uranium Resources Evaluation. NURE is a program of the U. S. Department of Energy's Grand Junction, Colorado, office to acquire and compile geologic and other information with which to assess the magnitude and distribution of uranium resources and to determine areas favorable for the occurrence of uranium in the United States.

The data were reduced and compiled in accordance with the technical specifications of the contract as stated in BFEC 1200-C 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 S-58T installed airborne gamma-ray spectrometer system.

AERO SERVICE
HOUSTON, TEXAS 77001

..... FILM IDENTIFIED TRAVERSE/TIE LINE INTERSECTION
..... FILM IDENTIFIED GROUND CONTROL
..... INDEX FIDUCIAL (100 FIDUCIAL INTERVALS)
FLYNN 1980

FLIGHT PATH
CHICO
NJ 10-3
DOE/NURE

FIGURE 2
9/10

DATA ACQUISITION

Aircraft

The survey was conducted using a Sikorsky S-58T helicopter, registration N94523, owned and operated by Carson Helicopters, Inc., Perkasio, Pennsylvania. The flight crew consisted of a pilot (Carson), a navigator (Aero), and an electronics system operator (Aero). Some of the more pertinent characteristics and specifications of the aircraft are listed below:

T A B L E I

Aircraft Specifications and Characteristics

Aircraft	Sikorsky Model S-58T, Registration N94523
Engine	Pratt - Whitney PT 6T Twinpack
Take off power	1875 Shaft HP.
Fuel Capacity	350 U. S. Gal.
Hourly Fuel Consumption	100 U. S. Gal.
Range at Cruise Speed	350 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 survey was conducted using Aero Service's HISENS A(irborne) G(amma)-R(ay) S(pectrometer) 2000 R system shown in block diagrammatic form in Figure 3, page 12.

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 12

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LITTON HOUSTON TEXAS

DWN	DATE	TITLE
CHKD		

BLOCK DIAGRAM
HISENS AGRS 2000R SYSTEM

SIZE	DRAWING NO	REV	SHEET
B			

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 three slabs of four logs each. Each slab is enclosed in a heated and thermally stabilized container. Total volume of the primary detector is 3072 cubic inches (50.34 liters).

The upward looking detector consists of two 4" x 4" x 16" logs of Polyscin®, each hermetically sealed in a steel container and coupled to a high quality photo-multiplier tube and enclosed within separate heated and thermally stabilized containers. Each of the upward looking detectors 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 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 system is the same regardless of the energy of the pulse. This dead time is approximately 8 μ seconds per pulse due to the converter and approximately 1.5 μ seconds due to the remainder of the electronic circuit, for a combined total dead time of approximately 9.5 μ seconds 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 gamma-ray spectrometer system includes further a Rosemount barometric

altimeter, a Honeywell radar altimeter and a temperature transducer. A discrete interface exists in the Hewlett Packard minicomputer to accommodate 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 includes a cathode ray tube display, a 6-channel heat sensitive analog recorder and a 35mm camera, triggered by the data controller at a preselected interval.

Magnetometer

The magnetic sensor used for the survey was a Varian V-85 proton free-precession magnetometer. This sensor was housed in a fiberglass bird and trailed approximately 100' below the aircraft to ensure optimal signal sensitivity without need for extensive aircraft compensation. The magnetic data were recorded in increments of 0.01 gammas, with a sensitivity of 0.1 gammas.

PRODUCTION SUMMARY

The 2° x 1° NTMS quadrangle of Chico, California, was surveyed as part of a subcontract covering ten (10) areas located over northern California and southwestern Oregon. These include the 2° x 1° quadrangles of Roseburg, Medford, Weed, Alturas, Redding, Susanville, Ukiah, and Chico along with the 1° x 2° areas of the Coos Bay quadrangle and the Crescent City/Eureka areas combined. The subcontract covered the flying of a total of 16,880.5 line miles, of which 3026.4 miles are in the Chico quadrangle.

Four main bases of operations were used during the survey. Eugene, Oregon, located just north of the Roseburg quadrangle, was used from the commencement of operations through Flight 27 on August 22, 1980. Medford, Oregon, in the Medford quadrangle, was then used up through Flight 86 on September 19th. The aircraft and crew then moved to Redding, California, for operations through Flight 130 on October 2, 1980. The final base of operations was located at Yuba City, California, in the Chico quadrangle. Throughout the survey, extensive use was made of both a fuel truck and smaller, secondary airstrips for remote refueling stops, thus extending the helicopter's effective production range.

The first production flight was made on August 11, 1980. A total of 143 flights were made with the last flight being completed on October 9, 1980. Production flights were not possible for twenty of the sixty-one days the aircraft and crew were on site. One day was used to complete the high altitude calibration flight, ten days were lost to inclement weather conditions, six days were lost to aircraft maintenance, one day to electronic maintenance, and two days to the illness of the AGRS system operator. Many of these nonproduction days were used to complete the three moves to new operations bases. A complete summary of daily operations is given in Table II, pages 16, 17 and 18.

Total flying time was 253.2 hours for an average production rate of 66.7 miles per hour. An average of 118.1 miles were acquired per production flight and 411.7 miles were acquired each production day. When computed over the total number of days on site, data acquisition averaged 276.7 miles per day.

Flight line directions and spacing for the Chico quadrangle were east-west traverse lines three miles apart and north-south tie lines flown at twelve mile intervals. The nominal terrain clearance for the survey was 400

T A B L E II
Daily Production Summary

<u>DATE</u>	<u>BASE</u>	<u>ACTIVITY</u>	<u>FLIGHT NO.</u>
08/09/80	Eugene, Oregon	Ferry to Eugene, Ore.	
08/10/80	Eugene, Oregon	High altitude test	
08/11/80	Eugene, Oregon	Production	11, 12
08/12/80	Eugene, Oregon	Weather	
08/13/80	Eugene, Oregon	Weather	
08/14/80	Eugene, Oregon	Production	13, 14
08/15/80	Eugene, Oregon	Abort - helicopter	15
08/16/80	Eugene, Oregon	Helicopter maintenance	
08/17/80	Eugene, Oregon	Helicopter maintenance	
08/18/80	Eugene, Oregon	Helicopter maintenance	
08/19/80	Eugene, Oregon	Helicopter maintenance	
08/20/80	Eugene, Oregon	Production	16, 17, 18, 19
08/21/80	Eugene, Oregon	Production	20, 21, 22
08/22/80	Eugene, Oregon	Production	23, 24, 25, 26, 27
08/23/80	Medford, Oregon	Weather	
08/24/80	Medford, Oregon	Production	28, 29, 30, 31
08/25/80	Medford, Oregon	Production	32, 33, 34, 35, 36
08/26/80	Medford, Oregon	Production	37, 38, 39
08/27/80	Medford, Oregon	Weather	
08/28/80	Medford, Oregon	Production	40
08/29/80	Medford, Oregon	Production	41, 42, 43, 44, 45
08/30/80	Medford, Oregon	Production	46
08/31/80	Medford, Oregon	Abort-cloud cover	47
09/01/80	Medford, Oregon	Production	48, 49, 50
09/02/80	Medford, Oregon	Weather	
09/03/80	Medford, Oregon	Production	51, 52, 53
09/04/80	Medford, Oregon	Production	54, 55, 56
09/05/80	Medford, Oregon	Weather	
09/06/80	Medford, Oregon	Production	57, 58, 59, 60

Daily Production Summary

<u>DATE</u>	<u>BASE</u>	<u>ACTIVITY</u>	<u>FLIGHT NO.</u>
09/07/80	Medford, Oregon	Production then high winds	61, 62
09/08/80	Medford, Oregon	Magnetometer failure then production	63, 64, 65
09/09/80	Medford, Oregon	Helicopter maintenance	
09/10/80	Medford, Oregon	Production	66, 67
09/11/80	Medford, Oregon	Production	68, 69, 70, 71, 72
09/12/80	Medford, Oregon	Weather	
09/13/80	Medford, Oregon	Weather	
09/14/80	Medford, Oregon	Clouds and fog, then production	73, 74, 75, 76, 77
09/15/80	Medford, Oregon	Production	78, 79, 80, 81, 82
09/16/80	Medford, Oregon	Production	83, 84, 85
09/17/80	Medford, Oregon	Production	86
09/18/80	Redding, California	Weather	
09/19/80	Redding, California	Production	87, 88
09/20/80	Redding, California	Production	89
09/21/80	Redding, California	Production	90, 91, 92, 93, 94
09/22/80	Redding, California	Production	95, 96, 97, 98
09/23/80	Redding, California	Production	99, 100, 101, 102
09/24/80	Redding, California	Production	103, 104, 105, 106
09/25/80	Redding, California	Production	107, 108, 109, 110, 111
09/26/80	Redding, California	Production	112, 113, 114, 115
09/27/80	Redding, California	Production	116, 117, 118, 119
09/28/80	Redding, California	Production	120, 121
09/29/80	Redding, California	Production	122, 123, 124, 125
09/30/80	Redding, California	Production	126
10/01/80	Redding, California	Production	127, 128, 129, 130
10/02/80	Redding, California	Operator sick	
10/03/80	Yuba, California	Operator sick	
10/04/80	Yuba, California	Production	131, 132, 133, 134
10/05/80	Yuba, California	Production	135, 136, 137, 138
10/06/80	Yuba, California	Production	139, 140, 141, 142, 143

Daily Production Summary

<u>DATE</u>	<u>BASE</u>	<u>ACTIVITY</u>	<u>FLIGHT NO.</u>
10/07/80	Yuba, California	Production	144, 145, 146, 147
10/08/80	Yuba, California	Production	148, 149, 150, 151
10/09/80	Yuba, California	Production	152, 153

feet. Figure 4 shows a histogram of the terrain clearance of the helicopter as recorded by the radar altimeter. The histogram takes into account all final samples in this quadrangle. The mean terrain clearance, as observed, is approximately 400 feet. The ground speed of the aircraft, as determined from the distances between samples based on their final X-Y positions, is depicted in graphic form in the histogram of Figure 5, page 21.

AERO SERVICE
QUAD OFFICE

TERRAIN CLEARANCE HISTOGRAM
JOB 627

NUMBER OF DATA POINTS

1400 2800 4200 5600 7000 8400 9800 11200 12600 14000 15400

1000..
POINTS GREATER THAN 1000 FEET

Figure 4

AERC SERVICE
QUAC CHICC

GROUND SPEED
JOB 627

HISTOGRAM

NUMBER OF DATA POINTS

1500 3800 5700 7600 9500 11400 13300 15200 17100 19000 20900

21/22

Figure 5

MILES
PER
HOUR

DATA REDUCTION

The data reduction process as used in the processing of the airborne gamma-ray spectrometer and magnetometer data obtained within the Department of Energy (DOE) National Uranium Resource Evaluation (NURE) program is shown in flow chart form in Figure 6, page 24.

Upon arrival in the Houston office, the digital data are edited and a back-up tape is generally produced. The EDIT 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 specification. The EDIT further sums a preselected number of spectral records at the beginning and end of each survey line and fits a gaussian curve to diagnostic photopeaks, such as the Tl^{208} peak at 2614.5 KeV and the K^{40} peak at 1460 KeV for low altitude lines and the annihilation peak at 511 KeV and the K^{40} peak at 1460 KeV for high altitude lines. The position of these photopeaks is determined with an accuracy of better than 0.1 of a channel and is used to determine the exact position of the energy windows with regard to channel numbers. At the same time the calculated standard deviations of the fitted gaussian curves serve to obtain the system resolution at the photopeaks used. Note that the 2π system resolutions as determined at the K^{40} photopeak proved to exceed the 8% specification throughout much of the survey. This was most likely due to a small crack in one of the two 2π crystals. However, this condition proved not to adversely affect the acquisition or reduction of the radiometric data and it was decided, after consultation with BFEC, not to replace the crystal in the interest of expediting the completion of the survey. The window count rates are normalized for live time and are calculated as follows:

K	:	1362 KeV - 1566 KeV (Channel 114 → 130, @ 12 KeV/Channel)
U	:	1662 KeV - 1866 KeV (Channel 139 → 155, @ 12 KeV/Channel)
T	:	2406 KeV - 2826 KeV (Channel 201 → 235, @ 12 KeV/Channel)
T.C.	:	390 KeV - 2982 KeV (Channel 33 → 248, @ 12 KeV/Channel)
Cosmic	:	3054 KeV - 6000 KeV (Channel 255)
$U_{2\pi}$	:	1662 KeV - 1866 KeV (Channel 139 → 155, @ 12 KeV/Channel)

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 acquired over the Pacific Ocean, offshore California.

Potassium Background	=	50.04 counts per second
Uranium Background	=	8.21 counts per second
Thorium Background	=	7.26 counts per second
Total Count Background	=	286.06 counts per second
2 π Bismuth Background	=	0.81 counts per second

Potassium Cosmic factor	=	0.250	c.p.s. per count 4 π cosmic
Uranium Cosmic factor	=	0.202	c.p.s./cps 4 π cosmic
Thorium Cosmic factor	=	0.278	c.p.s./cps 4 π cosmic
Total Count Cosmic factor	=	4.438	c.p.s./cps 4 π cosmic
2 π Bismuth Cosmic factor	=	0.0505	c.p.s./cps 4 π 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.

$$\begin{aligned}T/U &= \tau = 0.08 \\U/T &= \alpha = 0.30 + 0.02 + 0.000076H \\K/T &= \beta = 0.37 \\K/U &= \gamma = 0.90\end{aligned}$$

The 2 π and 4 π uranium window count rates are related through the geometric or equivalency factor. For the present system, installed in the Sikorsky S-58T, this factor, $f = 5.1$. 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 a linear terrain clearance function as follows:

$$\text{shine-through/shine-around} = (0.067 - 2.6 \times 10^{-5}H) (U_{4\pi} + 0.30T_{4\pi})$$

The shine-through/shine-around corrected Blair Count rate is then:

$$U_{2\pi c} = \frac{U_{2\pi} - (U_{4\pi} + 0.30T) (0.067 - 2.6 \times 10^{-5}H)}{1 - 5.1 (0.067 - 2.6 \times 10^{-5}H)}$$

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 35 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 $U_{4\pi}/U_{2\pi} = 5.1$, for Total Count/ $U_{2\pi}$ it is 73.5.

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:

$$\begin{aligned}\mu_K &= 2.67 \times 10^{-3} \text{ per foot} \\ \mu_U &= 2.52 \times 10^{-3} \text{ per foot} \\ \mu_T &= 2.11 \times 10^{-3} \text{ per foot} \\ \mu_{TC} &= 2.16 \times 10^{-3} \text{ per foot}\end{aligned}$$

The formula used for the altitude normalization is:

$$N_{400} = N_H \cdot e^{-\mu(400 - \frac{273}{273+t} \cdot \frac{P}{29.92} \cdot H)}$$

Where N_{400} , N_H are respectively the count rates at 400 feet and at 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 adequacy 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 ≤ 2.33 (Sum Corrections)^{1/2}: data inadequate
 2.33 (Sum Corrections)^{1/2} < Count Rate $\leq 2.71 + 4.65$ (Sum Corrections)^{1/2}:
 data marginal
 Count Rate > $2.71 + 4.65$ (Sum Corrections)^{1/2}: 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 quadrangle only. The REGROUP program then eliminates all duplicate line segments, inserts reflight segments where required, orders the remaining line segments and renumbers the fiducials of these segments such that the resulting line is directionally consistent with location sequential sample numbers. The renumbered fiducials increase from west to east for traverse lines and south to north for tie lines. A listing relating the renumbered fiducials to the original fiducial numbers as recorded in flight is

included in this volume as Appendix N and can also be found in the back of Volume II. This listing gives both the line number as it appears on all final data and the line number as recorded in flight. Similarly, the start and end fiducials of each final line and/or line segment shown on the flight path base map are given along with the corresponding start and end fiducials as recorded in flight. When correlated with the final fiducial numbers, the original fiducials will increase sequentially for lines flown west to east or south to north and decrease for lines flown in the opposite directions.

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 the 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

General

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, flight path maps, and computer printer maps.

The histograms and the multiparameter profiles are presented with the anomaly maps and flight path map in a separate bound volume. Complete data listings of both the reduced single record and the reduced averaged record data are found in the back of this report. The format of the printout of the microfiches and the format of the data files delivered on magnetic tape are in accordance with the specifications of the BFEC 1200-C and are described in appendices F through L of this report.

Radiometric Multiple-Parameter Stacked Profiles

The radiometric profiles have been prepared at the horizontal scales of 1:250,000 and 1:500,000 on an automated flatbed plotter. Displayed are from top to bottom: total magnetic intensity, IGRF removed, in gammas; radar altimeter, in feet; ratio of eT concentration in ppm/potassium concentration in %; ratio of eU/K; eU/eT ratio, atmospheric radon (BIAC) in counts per second, equivalenced to the 4π count rate; apparent concentration of terrestrial eT in ppm, apparent concentration of terrestrial eU in ppm; apparent concentration of potassium in %; "Total Count" count rate. 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 profile, every 10 records near the bottom.

The flight path and the geologic formations overflown along the line are shown on the bottom of both the radiometric and magnetic multiple-parameter stacked profiles below the lower fiducial markers. Six tiers of formation identifiers along with short markers on the flight line are used to indicate changes along the profile with the base of the identifier letters aligned with the corresponding marker. The first identifier found on the westernmost end of the profile applies to the start of the line and this formation continues until the next marker is encountered. Subsequent changes to the geology are

similarly indicated along the profile.

Magnetic and Ancillary Parameter Stacked Profiles

The magnetic profiles have also been plotted at scales of 1:250,000 and 1:500,000 on an automated flatbed plotter. The plotting sequence of the profiles is, from top to bottom: barometric pressure at aircraft altitude in mm Hg; atmospheric ambient temperature in degrees Celsius, terrain clearance in feet; magnetic variations at base station, in gammas; total magnetic intensity, IGRF removed, plotted at 50 gammas per scale division. Fiducial markers are again plotted every 200 records along the top of the profiles, every 10 records near the bottom.

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 has generally been done in 100 groups per full scale, although in some cases more groups may 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 lognormal distribution curves the standard deviation is given in terms of the parameter value (K , eU , eT , eU/K , eU/eT and eT/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 case of lognormal distribution curves the standard deviation is thus a multiplication factor.

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

Anomaly Maps

The anomaly maps have been prepared at scales of 1:250,000 and 1:500,000

on an automated flatbed plotter. 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.

Computer Printer Maps

Computer printer plots are produced for the total field and the six radiometric channels. Upper and lower limits were chosen based on the minimum and maximum values of the gridded data. Ten intervals are represented by the contour values 0 to 9. A minus (-) or a plus (+) sign represents those values less than the lower limit or those values higher than the upper limit.

The interval for each integer contour is further divided into two groups. For those values less than .5, the contour is printed; e.g. for values 4.0 to 4.5, the value 4 is printed, while values of 4.6 through 4.9 are left blank.

GEOLOGY

General

The Chico quadrangle is located in northern California and includes the area between 39° to 40° north latitude and 120° to 122° west longitude. The quadrangle covers portions of four distinct geographic provinces. On the western side of the quadrangle is the northwest-southeast trending Great Valley of California. The Great Valley Province lies between the Coast Range and Sierra Nevada provinces. The eastern border is formed by the west sloping Sierran bedrock surface which continues westward beneath the alluvium and older sediments. Elevation in the valley is a roughly mean sea level and principle drainage is to the south by way of the Sacramento River.

To the north, the Great Valley is adjoined by a small southern extension of the Cascade Range. This range is comprised of a chain of volcanic cones, which in the area of the Chico quadrangle, are evidenced by a predominance of extrusive flows and pyroclastic material. The Cascade Province extends northward into Oregon and Washington.

A small northwestern section of the quadrangle includes part of the Basin-Range Province. This block faulted region of roughly parallel ridges and troughs lies wholly within the Great Basin and is a distinct product of the Nevadan Orogeny. Lakes and playas, both common features, contribute to the interior drainage of the area.

The Sierra Nevada Province lies to the south and comprises most of the area in the Chico quadrangle. The Sierra Nevada is a singular, tilted fault block of great magnitude, nearly 400 miles long, which is expressed by high, rugged, multiple scarp faces on the eastern front, contrasted by its gentle western slope (dipping approximately 2°), which disappears under the sediments of the Great Valley. There are deep river-cut canyons down the western slope, which have been modified by glacial sculpturing. A high crestline marks the eastern escarpment.

The Geologic Map of California, Chico Sheet, was used in this survey for the correlation of surface geology with the radiometric data collected.

Stratigraphy

Sediments of the Great Valley Province within the Chico quadrangle

consist mostly of stream channel deposits and fan deposits. Pyroclastic rocks, assorted marine and nonmarine sediments as well as mafic flows and metavolcanics occur to a lesser extent throughout the province. Rocks of the Cascade Range are predominantly volcanic with associated pyroclastic sediments. A diverse collection of rock types comprise the Sierra Nevada Province including marine and nonmarine sediments, plutonic rocks of varying composition, a large percentage of volcanic flows and dikes and associated metavolcanic sediments. Quaternary fluvial and glacial deposits are also present to a significant degree.

Lake, fluvial and terrace deposits along with granitic and metavolcanic rocks comprise the majority of rock types in the Basin-Ranges. A unit-by-unit description of the rocks occurring in the Chico quadrangle will follow, beginning with oldest.

Mississippian Marine Sedimentary and Metasedimentary Rocks (CM)

The marine sediments and metasediments of Mississippian age are comprised of metamorphosed shale, chert, mudstone and sandstone which are often characterized by conglomeratic or tuffaceous beds. Metavolcanic flows of undifferentiated type occur locally throughout the area.

Permian Volcanic Rocks (Pmv)

A variety of Permian age volcanic rocks occur in the area. They generally consist of augite-andesite, metabreccia, metatuff, keratophyre porphyry sills or flows and diabase and amphibolitic rocks. This section is further characterized by locally interbedded carbonates.

Paleozoic Metavolcanic Rocks (Pv)

The Paleozoic metavolcanics of the area include metakeratophyre, metamorphosed tuff, augite-andesite breccia with locally occurring undifferentiated volcanic sills and flows.

Paleozoic Marine Sedimentary and Metasedimentary Rocks (P)

Interbedded phyllite, argillite, slate, quartzite, metagraywacke, metachert and chlorite or hornblend schists comprise the Paleozoic marine sediments. Also occurring very locally are beds of crystalline limestone and dolomite (ls).

Pre-Cenozoic Granitic and Metamorphic Rocks (gr-m)

These pre-Cenozoic rocks are comprised of largely undifferentiated migmatized metavolcanics and metasediments which are cut locally by injection gneiss.

Pre-Cretaceous Metavolcanic Rocks (mv)

The pre-Cretaceous metavolcanics in the area consist of massive amphibolite, chlorite schist and tuffaceous schist which are locally cut by metamorphosed diabase dikes. Occurring more rarely are beds of metachert, argillite and limestone.

Pre-Cretaceous Metamorphic Rocks, Undifferentiated (m)

The undifferentiated metamorphic rocks of pre-Cretaceous age consist of chert, metaquartzite, locally graphitic and micaceous phyllites and schists. Also occurring more rarely are beds of dolomite and marble (ls).

Jurassic and/or Triassic Metavolcanic Rocks (JTv)

These metavolcanic rocks include metadacites and meta-andesites which occur as sills and flows. Also occurring are volcanic breccias and locally fossiliferous tuff. In the Chico quadrangle, the metavolcanics are comprised of amphibolites, metabasalt and rhyolite, quartz and hornblende porphyries.

Triassic Marine Sedimentary and Metasedimentary Rocks (T)

The Triassic marine sediments consist of interbedded limestone, sandstone and shale with locally occurring hornfels, quartzite and volcanic conglomerate.

Middle and Lower Jurassic Marine Sedimentary and Metasedimentary Rocks (Jml)

Middle and lower Jurassic marine sediments include argillites, tuffaceous sandstone and shale, along with locally fossiliferous limestone. Slates and metaconglomerates generally comprise the metamorphic rocks.

Upper Jurassic Marine Sedimentary and Metasedimentary Rocks (Ju)

The upper Jurassic marine unit consists largely of shale and slate, phyllite, bedded to massive sandstone and graywacke interbedded with locally fossiliferous tuff.

Mesozoic Ultrabasic Intrusive (ub)

The ultrabasic intrusives consist, for the most part, of peridotite, minor pyroxenite and dunite.

Mesozoic Basic Intrusives (bi)

The Mesozoic basic intrusive rocks consist chiefly of locally schistose hornblende gabbro, amphibolite, and hornfels.

Mesozoic Granitic Rocks (gr)

Granitic rocks of the Mesozoic include varying sized pods and plugs of gabbro, diorite, trondhjemite, granodiorite, tonalite and quartz monzonite.

Upper Cretaceous Marine Sedimentary Rocks (Ku)

The marine sediments of upper Cretaceous age consist of interbedded sandstone, shale and locally massive conglomerate.

Tertiary Volcanic Rocks (Tv)

The volcanics of the Tertiary period in the area are comprised of light colored andesite flows (Tv^a), basaltic flows and plugs (Tv^b), and locally pyroclastic tuffs and breccias (Tv^p). The Ukiah quadrangle Tertiary volcanics are comprised of basalt only.

Tertiary Intrusive Rocks (Ti)

Intrusives include rhyolite plugs (Ti^r), andesitic breccias (Ti^a) along with basaltic dikes and plugs (Ti^b).

Tertiary Lake Deposits (Tl)

The Tertiary lake deposits in the area include argillaceous to arenaceous sandstones with local volcanic ash or tuff.

Tertiary Nonmarine Sedimentary Rocks (Tc)

Nonmarine sediments are characterized by auriferous gravel deposits which are locally interbedded with sandstone and conglomerate.

Eocene Volcanic Rocks (Ev)

Black olivine columnar basalt flows (Ev^b) comprise most of the Eocene volcanics. In the Chico quadrangle however, rhyolite (Ev^r) and andesite (Ev^a) tuff and breccia occur locally, associated with volcanic sandstone and

conglomerate.

Eocene Marine Sedimentary Rocks (E)

In the Chico quadrangle, the Eocene marine sediments occur as glauconitic fossiliferous claystone and shale. In the Ukiah quadrangle, to the west, these sediments consist of fine to medium-grained sandstones which are locally carbonaceous and conglomeratic.

Eocene Nonmarine Sedimentary Rocks (Ec)

Arkosic sandstones, quartzomaceous sandstones, shales and conglomerates comprise the bulk of the Eocene nonmarine sediments. In the Chico and Susanville quadrangles auriferous gravel deposits occur locally. Thin coal veins make up part of the section in the Redding quadrangle, locally.

Oligocene Volcanic Rocks (ϕv)

Throughout the area, Oligocene volcanics are characterized by black weathering pyroxene and hornblende andesite and mudflow breccia which are locally tuffaceous and conglomeratic. Pyroclastic rocks (ϕv^p) are the predominant Oligocene volcanic type in the Chico quadrangle.

Oligocene Marine Sedimentary Rocks (ϕ)

Oligocene marine sediments in the area typically occur as fossiliferous silty shale interbedded with tuffaceous sandstone and conglomerate.

Miocene Volcanic Rocks (Mv)

Rhyolite (Mv^r) and andesite (Mv^a) flows with local thin layers of tuff and obsidian, often associated with pyroclastic (Mv^p) breccias and mudflows, make up the section of Miocene volcanic rocks throughout most of the area.

Pliocene Volcanic Rocks (Pv)

The Pliocene volcanics in the Chico, Susanville and Alturas quadrangles consist of rhyolites (Pv^r), andesites (Pv^a), basaltic flows and breccias (Pv^b), along with pyroclastic tuffs and mudflows (Pv^p). Basalts and tuffs are the prevalent volcanic rock types in the Ukiah quadrangle to the west.

Undivided Pliocene Nonmarine Sedimentary Rocks (Pc)

Undivided nonmarine sediments in this quadrangle are comprised generally of sandstones, siltstones and gravel.

Quaternary and/or Pliocene Cinder Cones (*)

Locally basaltic cinder cones occur in the Susanville and Alturas quadrangles and are associated with volcanic tuffs in their occurrence in the Chico quadrangle.

Pleistocene Volcanic Rocks (Qpv)

Basaltic flows (Qpv^b) and pyroclastic tuffs (Qpv^P) occur throughout the area in all but the Ukiah and Redding quadrangles. The Pleistocene volcanics in the Alturas, Susanville and Weed quadrangles are comprised predominantly of andesites and rhyolites.

Pliocene - Pleistocene Nonmarine Sedimentary Deposits (QP)

Largely undifferentiated lacustrine and fluvial deposits containing local conglomerates and interbedded sandstones and claystone comprise the bulk of the Pliocene - Pleistocene nonmarine sediments in the area.

Pleistocene Nonmarine Sedimentary Deposits (Qc)

Pleistocene nonmarine sediments consist generally of conglomerates, deltaic sandstones, siltstones, gravel and clay. In the Susanville, Chico and Redding quadrangles the sediments also include intercolated volcanic ash or debris.

Quaternary Nonmarine Terrace Deposits (Qt)

The Quaternary nonmarine terraces include river, stream and lake terrace deposits, along with some conglomerates, deltaic and slope wash deposits.

Quaternary Glacial Deposits (Qg)

Terminal and lateral moraines, till and fluvoglacial deposits along with later associated accumulations, such as bog and soil, make up the major Quaternary glacial deposits throughout the area.

Quaternary Lake Deposits (Ql)

The Quaternary lake deposits include sand, silt, ash and local diatomaceous earth in playa-like deposits in scattered basins of interior drainage. This part of the section in the Weed and Redding quadrangles also includes predominant glacial lake deposits.

Recent Basin Deposits in the Great Valley (Qb)

Recent basin deposits in the Great Valley consist of sediments deposited during flood stages of major streams in the area between natural stream levees and fans.

Recent Alluvial Fan Deposits in the Great Valley (Qf)

Alluvial fan deposits ranging in age from Pleistocene to Recent are carried by streams emerging from high lands surrounding the Great Valley.

Recent River and Major Stream Channel Deposits in the Great Valley (Qsc)

Recent deposits of sand, gravel, silt and minor amounts of clay occur along channels, flood plains and natural levees of major streams in the Great Valley area.

Recent Alluvium (Qal)

Alluvial silt to coarse gravel which is locally brecciated or conglomeratic, occurs in the Great Valley and is often associated with fan, terrace or local lacustrine deposits. Recent alluvium in the Weed and Susanville quadrangles also includes areas of local glacial outwash.

Structure

The major faulting trend in the Chico quadrangle is north-northwest by south-southeast and includes the massive shear zone on the southeastern border of the Great Valley. Major faults include the Big Bend Fault, Camel Peak Fault, Dogwood Peak Fault, Rich Bar Fault and the Melones Fault zone which is located near the center of the quadrangle, as well as the Mohawk Valley Fault, Last Chance Fault, Hot Springs Fault, Grizzly Valley Fault and the southern extension of the recently active Honey Lake Fault in the northeastern corner of the sheet.

A thermal spring occurs to the immediate northeast of the Mohawk Valley Fault, and several thermal wells are located in the vicinity of the Hot Springs Fault. Several volcanic cones dot the quadrangle northwest of Lake Tahoe with possibly the most notable, Sutter Buttes, located in the Great Valley, northwest of Yuba City. The eastern portion of the quadrangle is the most tectonically active, with some occurrence of recent faulting north of

Lake Tahoe and in the Sutter Buttes areas. Displacements south of Lake Oroville and west of New Ballards Bar Reservoir have been recorded as recently as 1975.

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 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 concentrations in parts per million of equivalent uranium and equivalent thorium and in percent of potassium and their ratios. The radiometric count rates of the helicopter borne A.G.R.S. (Airborne Gamma-Ray Spectrometer) 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, normalized to 400 feet terrain clearance at standard temperature and pressure are:

<u>Radioelement</u>	<u>Count Rate</u>	<u>Concentration</u>
Potassium	105.25	1%K
Uranium	12.05	1ppm eU
Thorium	7.32	1ppm eT

Geochemical Analysis

A total of forty-six mapped rock units were encountered in the course of the Chico quadrangle survey. In addition, samples were taken over bodies of water, mainly scattered lakes in the Sierra Nevada.

The oldest rocks encountered in the survey are several Paleozoic systems, otherwise undifferentiated as to age. The Paleozoic marine sediments and metasediments (P), widely exposed across the central part of the map sheet in discontinuous outcrop areas, display normal histogram distributions in the uranium and potassium channels, and lognormal in the thorium channel. Dispersion is very great on all three spectral channels and the thorium and potassium curves show incipient secondary peaks. The formation is apparently an assemblage of many lithologic components, with great variation in composition.

Paleozoic metavolcanics (Pv) are present in the central and north central parts of the quadrangle in a few irregularly shaped outcrop areas. Their histogram distributions are lognormal in the thorium and potassium spectral windows, and normal in the uranium window. Dispersion is low, and the mean elemental concentrations are low. The metavolcanics are likely to be primarily mafic in composition. Modest tailing into higher concentrations is observed in the thorium and potassium curves, indicating the presence of a minor amount of comparatively felsic constituents.

Pre-Cretaceous metavolcanic rocks (mv) are present in a few small, irregularly shaped outcrop areas in the central and north central part of the map sheet. The rock unit description indicates that this unit is an undifferentiated system consisting principally of amphibolite along with other metavolcanic components, together with some metasedimentary rocks. The histogram distributions tend to bear this out. All three spectral channels have lognormal distribution, great irregularity, extremely low mean elemental concentrations, and extensive tailing into higher concentrations. The potassium channel displays a broad, irregular secondary peak at approximately

2.1% volumetric, ranging up to 4.0% in perceptible sampling response. Several peaks are observed on the thorium and uranium channels, also, but whether these are generated by contrasting rock facies or inadequate sampling is problematical. The total aspect of the statistical study suggests that the bulk of the rock unit is high in mafic rock minerals and low in siliceous and feldspathic minerals; composition is consistent with amphibolite. However, the prominent tailing into higher concentrations suggests the presence of gradationally increasing felsic composition. The attenuation of the potassium histogram into very high concentrations probably indicates the presence of rocks having appreciable quantities of orthoclase feldspar.

The Jurassic/Triassic metavolcanic rocks (JTv) outcrop extensively in exposures of variable areal extent throughout the quadrangle, with the largest of these exposures in a long, irregular north-south belt in the west central part of the quadrangle, along the foothills of the mountain range. The histogram distributions are lognormal on all three spectral windows. They show low mean elemental concentrations, minimal dispersion, and modest tailing into higher concentrations. The unit is described as a "catch-all" unit including a very wide range of volcanic and metamorphic rock types, possibly including Paleozoic rocks in its main exposure in the mountain foothills. The histogram patterns suggest that the bulk of the formation is mafic in composition, with a minor amount of constituents grading into more felsic composition.

Middle and lower Jurassic sediments and metasediments (Jml) are exposed in the eastern and southeastern part of the quadrangle, west of Lake Tahoe. The histogram distributions are normal in distribution in all spectral channels. They show extreme irregularity throughout their range and broad dispersion in all three curves. The mean elemental concentrations are high. The general aspect of the histogram studies is that of a variegated rock unit including a broad range of compositional constituents. The preponderance of the unit members is felsic in gross composition.

Mesozoic granitic rocks (gr), exposures of the Sierran batholith intrusive into the pre-existing Mesozoic and Paleozoic rocks, are extensively exposed throughout the eastern and central portions of the Chico quadrangle. The histogram distribution patterns are lognormal in all three spectral channels, with extremely broad dispersion patterns. Secondary peaks in higher

elemental concentrations are present on the thorium and uranium channels, and the potassium channel is attenuated to beyond 3.0% K volumetric. The granitic rocks are interpreted as including a wide compositional range, with two main constituents; presumably granodiorite and quartz monzonite contributing to the main peaks and granite to the subsidiary, more felsic, peaks.

Two other intrusive rock types also outcrop in discontinuous north-south belts in the central part of the map sheet, most prominently along the Melones Fault system. They are the Mesozoic basic intrusives (bi) and the Mesozoic ultrabasic intrusives (ub). The former are described as being predominantly gabbros and diorites, and the latter as mainly serpentinized ultrabasic rocks. The histogram distributions of the two rock units are almost identical. Both sets display lognormal distribution in all windows, slight dispersion, and very low mean elemental concentrations. Both sets of histograms suggest mafic compositions, with slight tailing into comparatively felsic facies.

The most widely represented volcanic rock unit on the Chico quadrangle are the Pliocene pyroclastics (Pv^P), which outcrop as erosional remnants in the upland areas of the Sierra Nevada, and in the foothills in the northwestern part of the map sheet. The three histogram spectral windows all have lognormal distribution and slight dispersion. The thorium and potassium windows display small secondary peaks at higher concentrations. The mean elemental concentration, and the concentration values of the main peaks, indicate that the bulk of the Pliocene pyroclastics (Pv^P) are basaltic in composition, with a minor facies of more felsic rocks. Of the differentiated members of the Pliocene volcanic system; andesites, basalts and rhyolites (Pv^a, Pv^b and Pv^r), the andesites and basalts show comparatively low mean elemental concentrations and extreme tailing into higher concentrations. Presumably these represent minor amounts of felsic differentiates. The Pliocene rhyolites (Pv^r) contributed only twenty-four samples, but all of these were in the high concentration ranges consistent with felsic composition.

A large area of Tertiary andesites, (Tv^a), undifferentiated as to epoch, is mapped in the east center in the uplands between Sierra Valley and the Little Truckee River. The histogram curves show normal distribution in the thorium and uranium spectral windows and lognormal distribution in the

potassium window. Dispersion is moderate and the mean elemental concentrations are consistent with andesitic composition. A weakly expressed dual peak is present in the zone of most abundant concentration in the uranium histogram, but whether this represents rock type differentiation or a statistical aberration is problematical.

The basaltic phase of the Tertiary volcanics (Tv^b) displays extremely erratic histogram distribution, lognormal on all three spectral channels. Tailing into higher concentrations is extreme. The mean elemental concentrations are significantly lower than those of the Tertiary andesites (Tv^a), consistent with basaltic composition, but the persistent tailing into higher concentrations suggests the existence of andesitic differentiates.

The Tertiary pyroclastics (Tv^p) are normal in distribution in all three windows. They closely resemble the andesites (Tv^a) in their histogram expression and they are probably andesitic in gross composition.

Of the Miocene volcanics, the most widely exposed are the pyroclastics (Mv^p). They are most prominent in the northeast, in the mountains immediately north of Sierra Valley. Histograms of all three spectral windows are erratic, with lognormal distributions and persistent tailing into higher elemental concentrations. The mean elemental concentrations are fairly low, suggesting basaltic or andesitic composition.

Miocene andesites (Mv^a) show normal uranium and potassium histogram curves and a lognormal thorium curve. Dispersion is slight. The mean elemental concentrations are comparable to those of the Miocene pyroclastics (Mv^p), suggesting similar gross composition. Lengthy tailing indicates the inclusion of minor differentiates of more felsic character.

Oligocene pyroclastics (Op^p) are exposed in a small area east of Marysville, in the southwestern part of the map sheet and in the northeastern part of the map sheet near Portola. The histogram distributions are normal on the uranium and potassium channels and lognormal on the thorium channel. Dispersion is low on all three spectral channels. The mean elemental concentrations are fairly low, suggesting andesitic or basaltic general composition. Multiple peaks are present in all three spectral windows, but they are probably a reflection of inadequate sampling.

Pleistocene basalts (Qpv^b) are exposed in the southeast, in the areas

north and northwest of Lake Tahoe. The histogram curves for this formation are irregular because of the paucity of sampling. All three spectral windows show normal distribution. The potassium curve has unusually broad dispersion. The mean elemental concentrations are relatively high, suggesting that the gross composition of the unit is more felsic than basalt.

Of the sedimentary rocks, the most widely exposed are the Quaternary formations forming a continuous veneer over the Sacramento Valley floor, on the west side of the quadrangle. The Quaternary fan deposits (Qf) are the most prominent of this group. The histogram distributions are normal in the thorium and potassium spectral channels and lognormal in the uranium channel. The mean elemental concentrations are low, suggesting that the fan deposits are derived from mafic rocks in the flanking Sierra Nevada. Dual peaks are present in the thorium and potassium histograms, indicating that two sedimentary facies are present in the fan deposits.

Two other widely distributed alluvial deposits in the Sacramento Valley, Quaternary stream channel deposits (Qsc) and Quaternary basin deposits (Qb), are virtually identical in their statistical display. Both have normal distribution in all three spectral windows, moderate dispersion, and similar mean elemental concentrations. It may be concluded that they have the same composition and source, and the distinction between them is solely their modes of deposition.

Quaternary lake deposits (Ql) form the floor of Sierra Valley, in the northeastern part of the Chico quadrangle, and a few smaller intermontane valleys in the east. Histogram distribution is normal in all three spectral windows. Dispersion is moderate in the uranium and thorium channels and fairly broad in the potassium channel, perhaps suggesting the presence of evaporite beds.

Quaternary glacial deposits (Qg), observed in discontinuous exposures along valleys in the Sierra Nevada, have statistical characteristics similar to the lake deposits (Ql); normal distribution in the uranium and potassium windows, lognormal in the thorium window, with mean concentration values and dispersion almost the same as that of the lake deposits (Ql). Minor tailing in the thorium and uranium histograms reflects the poor sorting of the glacial deposits. The geochemical similarity between the Quaternary lake deposits (Ql) and glacial deposits (Qg) is to be anticipated, as the two formations are

derived from the same sources.

Quaternary alluvium (Qal) is mapped along stream valleys in the mountains in the eastern part of the map sheet. The histogram distributions display extreme irregularity and dispersion in all three spectral channels, with lognormal distribution in the uranium spectral channel and normal distribution in the thorium and potassium channels. A possibility of dual peaks is present in the thorium and potassium curves, but this may be a statistical aberration. The general aspect of the histogram study is that of a widely variant, poorly sorted rock unit; presumably the result of isolated deposits of alluvial material in widely separated valleys, eroded from different source rocks.

Pliocene/Pleistocene nonmarine sediments (QP) are present in the western part of the map sheet along the eastern margin of the Sacramento Valley. The histograms for this formation are normal in all three spectral windows, with relatively slight dispersion and low mean elemental concentrations. The general composition of the Plio-Pleistocene deposits is probably reflective of mafic rock sources.

Pleistocene nonmarine sedimentary deposits (Qc) outcrop in the extreme northwestern corner of the quadrangle, along the eastern edge of the Sacramento Valley. The three histograms are lognormal, and all three show extensive tailing into higher element concentrations and great irregularity. However, the mean elemental concentrations are low. The Pleistocene nonmarine sediments are probably predominantly derived from mafic sources, with significant amounts of more felsic constituents.

Remaining rock units were not sampled sufficiently for reliable statistical analysis.

Computer Printer and Anomaly Map Analysis

Computer generated maps were prepared for the total magnetic intensity, the three diagnostic gamma radiation windows, and their comparative ratios at a scale of 1:500,000 to supplement the 1:250,000 standard deviation anomaly maps. The grid spacing of the 1:500,000 maps is one thousand two hundred seventy meters by two thousand one hundred seventeen meters. This coarseness of sampling precludes the possibility of detailed interpretation.

The total magnetic intensity map displays moderate relief. There is a well developed northwest-southeast trend to the magnetic pattern, which is

TABLE III

LEGEND TO TOTAL FIELD MAP (GAMMA)

<u>CONTOUR VALUE</u>	<u>LOWER LIMIT</u>	<u>UPPER LIMIT</u>
-		51950.0
0	51950.0	52160.0
1	52160.0	52370.0
2	52370.0	52580.0
3	52580.0	52790.0
4	52790.0	53000.0
5	53000.0	53210.0
6	53210.0	53420.0
7	53420.0	53630.0
8	53630.0	53840.0
9	53840.0	54050.0
+	54050.0	

X4= 585000.0

X3= 765000.0

$$Y_4 = 4435669.0$$

Y3= 4435669.0

55	66	44	55	22	44	22	33	235	8874	65	666544	5	655	5763	455
665	44	44	5678++++	93-	012222	333	444444	4	57	85	5	35	579	98887655	5
654	5	5	665	6766	776	54433333	44333	4	433	444433	4	56789	84211	2	3
6655	6666666666	55	4	44	44	45	67	9	975432	1	2	3	4	5	66
6666	5	4	44444	455555	6	7	88752	1	2	3	4	566	6	76554	444
76	6	5	55	4	4	3	4	55	4	458	840	01	2	3	3
66	6	555	5	5	55	44	44	5	444	3	34	5554	457	9630	1
66	6	5	5	5	5	6665	44444444	3	3	4555	444	5789987642	0	12	3
66	6	5	5	5	4	6777754	3	3	4444	5	54	44	479	830	0123
66	65	5	5	4	4567887654	33	44	3	4	555	6	5	4	44	469
66	6	55	5	55	4	45678887653	345544	4	5	555	4	44	5	69	9643
66	66	55	5	5	4	4567998753	456554	4	44	4	5	5	68	754333	444
66	6	5	444	5	5	4	56	7	76544	45665	4	4	4	568	8654
66	6	54	3	45	5	55	5	5	67	88765	4	4	44	566654	3
66	6	5	43	3	455	5	5	5	567888754	4	444	44444	4	4310-	00
66	6	54	3	345	5	4	5	5	4	5	654	44	444444	5430	01
66	6	5	4	33	455	4	4	4	3	3	4	4	4	420	0122
6	7777	6	5	44	4	4	4	4	4	4444444	4	4333333	454	5544444444	5
67	7	6	5	44	4	4	4	4	4	555	4	44444	55	5555	444
67	77	6	5555	4	4	5	4	4	444444	4	4	55	5	4444	4
6	7	666	5	444	444	5	5	4	4444	44	4	5	664	33	4
6666	5	6	5	4	4	55	4	5544	444	4555	678743	3	44	4	5
66	5	5	6	6	5	4	4	4444	56666	4	33	333	4	44	455
66	5	5	6	6	5	4	4	44	33	4	5666653	3	3	33	34
76	55	666666	5	4	4	3	34	555543	345	54	4	55	55	4	567765
7766666	6	5	5	44	3	34	4	3333	3	4565	4	4	55	5	56765
887	6	55	5	4	3	3	4	4	4444444433	4	56653	34	55555	566654	3
9887	6	5	55	4	33	4	4	4	4444444	444	555543	3	4	567654	444
99	87	6	5	4	44	4	554	4	444444	5	5677654	54	333333	44	44
99	87	6	5	4	33	4	5	54	333	4	4	44	5555	5	788755
9998	7	6	55	4	3	3	345	666553	22	3	44	4	5	555	6887
8888	7	66	5	4	3	3	42	356666655432	2	3	4	56787	688754	3	33
77	7	6	5	4	3	3	4	43	4566	555	54432	3	4	5	666

X1= 585000.0

X2= 765000.0

Y1= 4315000.0

Y2= 4315000.0

TABLE IV

LEGEND TO POTASSIUM AVERAGE MAP (PERCENT)

<u>CONTOUR VALUE</u>	<u>LOWER LIMIT</u>	<u>UPPER LIMIT</u>
-		0.10
0	0.10	0.30
1	0.30	0.50
2	0.50	0.70
3	0.70	0.90
4	0.90	1.10
5	1.10	1.30
6	1.30	1.50
7	1.50	1.70
8	1.70	1.90
9	1.90	2.10
+	2.10	

TABLE V

LEGEND TO URANIUM AVERAGE MAP (PPM)

<u>CONTOUR VALUE</u>	<u>LOWER LIMIT</u>	<u>UPPER LIMIT</u>
-		0.40
0	0.40	0.68
1	0.68	0.96
2	0.96	1.24
3	1.24	1.52
4	1.52	1.80
5	1.80	2.08
6	2.08	2.36
7	2.36	2.64
8	2.64	2.92
9	2.92	3.20
+	3.20	

X4= 585000.0

Y4= 4435669.0

X3= 765 000.0

Y3= 4435669.0

[illegible]

X1= 585000.0

Y1= 4215000.0

X2= 765000.0

Y2= 4315000.0

Figure 9

TABLE VI

LEGEND TO THORIUM AVERAGE MAP (PPM)

<u>CONTOUR VALUE</u>	<u>LOWER LIMIT</u>	<u>UPPER LIMIT</u>
-		0.60
0	0.60	1.60
1	1.60	2.60
2	2.60	3.60
3	3.60	4.60
4	4.60	5.60
5	5.60	6.60
6	6.60	7.60
7	7.60	8.60
8	8.60	9.60
9	9.60	10.60
1	10.60	

THORIUM AVERAGE

X3= 765000.0

Y3= 4435669.0

```

. . . . .
.      11      11      11      88      11      44      11      ++
.      1 1      222      1 1111110 23576 766664332221111 22222211 2344 33332222 2 23457+ 9 8 886
.111 11 11111111111 1 1100000 332 232 33 4321110 1 1 1 234 5 67 654 3 222 2 2 222 3 33 33 22222 23457 9998 7
.11 1 1 1 1 1 1 1 1 1 1 2333 3 4321 00 1 1 2 3 3 456 65543 222 2 2 33 2222 2 2 3 6 +
.21 1 1 1 1 1244433 4 31 0 0 0 1 1 1 2 22 3456 654 3 333 3 2 2 2222222 2 2 358 +
.22 222 1 1 1244 4 4321 0 0 0 1 1 22 2456653 34 5432 2 2 2 2222222 2 23567 89 9+
.11 2 2 1 12444 4 321 000 0 1 1 2 1 124554 333 344442 23 222 3 2 22 3333 444 6 77 89 +
.11 2 2 11 1 234 33 22111 1 2222 1 1234 444433 3332 2 3455432 23 44 5 67899 9999 +
.11 22 2 2 111 233 333 2 21 1 1233 2 10 012456654 333 2 2 3 45655322 3 44 567 9 999 99 +
.11 2 22 2 2 222 1111 2 33 22 111 1233 2 222210 0 1356 65444 33 2 2 3455 43 33 4 4 555 67 9 8 89 +
.11 2 2 2 2 1 1 111 1 1222 2 3333211 1 2345 555443 3 22 2 34443 3 45679 97 79 +
.11 22 2 2 22 1 1 222 1 1 2 3 4443321 234 5 5 433 33 22 33 33 3 444444 5 5 78887 7 +
.11 2 2 22 2 21 1 2 2 1 1 2 3 43 22 2 3 45 6 5 4444 3 33 3 3 33 4 55 4 56 76 69 +
.22 2222 2 322 1 12 3 21 1 2 22 2 34 5 5 444443 2 3 44 3 3 443 2 34 44 44 5 67899
.322 2 22 2 2 2222221 2 333 2 1 1111 111 22 3 4 5 4 32 2344 43 2 3333 4 432 2 3 4 5 665
.33 22 2 11 2 2 2 3455421 1233 3 2 1111 1 1 2 34 55 444 32 1 124 543 23 33 4 43 2 2 3 4 4 5 6665
.33 2 22 1 1 245765311 1 23 44332 11 2222222 1 1 2 34 4 555555321 124 432 3 44 3 22 3 4 4 4 5 6 6
.33 2 2 2 1 1 23565421 123454321 1 2 2 111 1 2 3 3 4 56665421 12456653 33 4 33 3333 3 4 4 45 666 666
.33 2 2 2 1 1 2344321 1345432 11 2 22 1 1 2 33 34 566 5432111 2467654 345443 3 3 3 4 4 4 56 66 6
.33 2 2 2 1111 22222 3 32 1 111 2 33 3222 2 1 1 1 2 3 345666 5 4321 2 345543 345542 2 3 33 4 4 33 45 5 677
.2333 2 2 2 3321 0000 1 2 23 33 222 1 1 1 2 456776 5 4321 2 2 34443 2 3 44 44 3 34 5678
.2333 2 2 222 3333 3210 01 2 3 33 2 1 2 22 34677 7654 321 2 22 23 4 3 3 4444 3 3 45688
.33 3 22 2 2 3 32 0 0 1 2 2 3 3332 22 22 22 2356788875 44432 2 2 2 3 3 33333 44 333 3 45678
.33 3 2 222 3 3 210 01 2222 2 2222 222 2 2 2222 22 356 78865 56664222 2 2 3 444444 44 44 3 34566
.33 3 2 2 3 33 21 0 01 222 1 1 233332 2 22 3333 345 6775 567753 33 2222 3 4 4 44444 4 432 23454
.3333 2 22 3 333 3 21 0 0 1 1 1 1 23 33 22 23 3 3 45 54 456643 3 33333 3 4 4 44 432 2344
.33 22222 3 3 444 3 21 0 000 1 111111 2 22 2 23 3 3 4 3 345543 3 33333 3 3 3 4 4 33 4 43 34677
.33 3 22 344 3 2 1 0 0 1 1 1 2 2222 2 332 2 3 3 3443 3 4 4333333 4443 33 2 3 3 3 4 444 468 +
.3333 3321 12 3 2 1 122211 1 22 33332222 3 443 3456653 4 543 2 466643 2 2 3 33 3 58 +
.33 3 3321 1 2 2 1 12332 1 1 2 3 22 3 44 43 333 468875 455432 2356543 2 333 3 3 3 58 98
.33 3 3 332111 2 2 1 12322 111 11 222 22 23 44 43 3 4678764444 43 2 34 3 3455543 3333 3 3 3 468 86 3
.33 3 33 3 332222 3 2 222111 233 22 22 11 1 2 2344 43 3 33 3578765 4 4 33 3 44433 456665433 3 3 357865 3
.33 3 33 3 44433 33 22221111 22222 1 1 2 344 44 333 3 2 2468864 45 43 3 4566543 3456 654 4443 345543 3
.33 3 33 3 4 3 3 3 2 1 1 111 1 1 22 344 4 32 236876444 5 43 3 4566544 4 5777764444 4 4333 44 333
.33 3 22 3 3 4 33 3 2 1 1 1 111 2 344 44444 332 367876555 5 3 3 4 4 45 678 9875 4 554 3 2
.333 3 2 2 3 3 2 1 1 11 1 2 3 4 55554 443 4578876665 4 333 4 4 455 6 788765 56654 33
.22 33 2 2 3 444 3 2 1 1 1 1 2 34 5 6654 4 43 4677666543 2 2 3 4 4 44 444 456 665 5 566654 32
.22 2 23444 4 3 211 1 11 1 2 3 4 5 5 4 4 3 4554 4 32 2 23 4 444 3 3 4 4 5 55 6654 32
.32 3456665 4 444 3 2 1 1 2 22 3 4 44 3 3 44 4 33333 3 4 3 3 44443 3 4566666 65 45
.33 3456788765 4 4 4 3 2 1 1111 2 1 2 3 4 4 3 3 345554 5777544 543 34566543 567777654 3 468
.33 34567 888876654 444 3 2 111 1 2 1 1 2 3 4 44 3 356777 8 98766653 346 65 4566 7765 444 3 3468
.333 45788887 7765 4 3 2 111 11 1 1111 22 3 4 5 5 44 45689999 88876543332 345 4 4566 55 6 5 432 2
.33 46788 87 7 765 4 33 222 1111 1 1 123333 4 5 55 5 555 4 5789 99 987 887654432 245 4 456665 444 5 431 0
.33 457888 7 7765 444 3 333 2221 1 1 1 234444 44444 4 5 5 567899 9 9876 78876542 245654 4 5 54 3 333321 -
.33 4567 7 7 6544 44 3 3 333333 21 11 11 13455 4 3 3 4 55 5677 8998765 67
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X2= 765000.0

Y2= 4315000.0

TABLE VII

LEGEND TO URANIUM/POTASSIUM RATIO MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		0.80
0	0.80	1.15
1	1.15	1.50
2	1.50	1.85
3	1.85	2.20
4	2.20	2.55
5	2.55	2.90
6	2.90	3.25
7	3.25	3.60
8	3.60	3.95
9	3.95	4.30
+	4.30	

URANIUM/POTASSIUM RATIO

X3= 765000.0

Y3= 4435669.0

[illegible]

X2= 765000.0

Y2= 4315000.0

TABLE VIII

LEGEND TO URANIUM/THORIUM RATIO MAP

<u>CONTOUR VALUE</u>	<u>LOWER LIMIT</u>	<u>UPPER LIMIT</u>
-		0.200
0	0.200	0.245
1	0.245	0.290
2	0.290	0.335
3	0.335	0.380
4	0.380	0.425
5	0.425	0.470
6	0.470	0.515
7	0.515	0.560
8	0.560	0.605
9	0.605	0.650
+	0.650	

X4= 585000.0

X3= 765 000.0

$$Y_4 = 4435669.0$$

Y3= 4435669.0

```
.
.
.
.
.      00          --          22          66          00          33          11          55          --
.      333        333        55 3541-- 232 11 2343 456 95 7974 4300- 4531 23321- 2 36630 1 2211 11 00 11 221 23
.33 1 264000 320- 041 200-- 1350 479733 4530- 3+ 62 4 444310 012 3432 3 3 56 7863 6653 21 12332 23331 01 2221 01 21 1 0 01 22 22
.321 12443111 10 1 22 2211 23 565433 3321 28 64 432 111 2467653 2 45689963 3 32 1 1 2 32 343321110 0 0122 2 21 0 11 2 3
.311 0245542 221 34555433 4577531 2 22 36 85 4 3 2222 14687532 245677752 2 2 1 2 343 333321 11 3333 2 3 43222222 2 34
.311 13567642 222 4678874 4 69 8532 247 964 33 2 1356642 2 4 4 432 2 3332222 22 23 455433222 3 3 455554443332 235
.31 34 665432 333 3 45777643 48 853 2 3467 8987665555432 1 23453 12 22 2 3333 433333332 1 13 55 44433 34 55 4 33332 2 4
.222 333322222 2 2 356543 58 75 33 4 543 24566 555 433222 5642 0 1 11 2 33 33 4543 2 11 233 344 33 33333 3 3 3 22 2 23
.22 2110 0 0 01 23443 3577642 2 3466652 24554 33 2 4553 466530 0 12 22 3 4564 3 222 33 2 34 544 32 1 22 22
.22222110 0 110 1 2 332 35643 2 456 64444 4 2 23443 345531 122222222 2 34565 333322 2 2 2344 3 21 1 222 222222222
.01 1 22110 123 444322 2 1 246543 42 3456776654 333333 2222 3453 3455532 1 1 233 4665 332 22 1 2 33 33 2 1 23 43 22 11111
.-0 12 2 33 34 5543 2 21 1 35555553 2 246887764 4444432 244 45 6653210 012 2 45 544 444332 1 1 2 33 2222 34 42 1 0
.111 1233 44433222222 23332 345 5 44 2 2356777654 4 43 3333 3 44444432 1 00 1 2 3455 554 4565 32 11 12 3 33 34432 11111
.3333 3444 554210 01 23 443 245 5342 1 1346787 54 454 3 44443 3 22 22 11111 23 45 554 3 4 4 3221 12 3 3 3 32 2 333
.55443 455554321 1 22 34 42 2345666422 1 236787 5 4 553 34 444321 01 2 222 32222 234 4 33 3 22 345542111 12 33 3 33 34 55
.45 455432 3333333 432 3589875322 4677 666 655542 234 43210 01233333 22 23466 42 233 2 245542 1 1 2 3 4443 43
.4555544 5543 34665543 3 3 35431 258 9864331 245 677 876 43 1 234554321 0 1 23 3 2 1 2478753 2 3 43322 3443 11 0 1 233 2 3 3 44 321
.5689976 6543 47998753 2 3689 73 246897 65420 0245689975431 1 2466532 22 344321 0 02578753 333 333 32 10 0 123 22 2 3 321
.568997 6654 578998643 369 842 45575 54310 24567 7542 1 11 1355432 232 23 2 1 0 01356543 3 4 54432 1 0 12 2 11 2 22 2 33 2
.45554 45 54 55 666643 3567533 4 454332 1 12566542 11 1221 1 33 22 32 1 0 0 0 123 3 33333 22 345 54322 2211 2321 122 2 2 1
.2321 13455 5443 332 1 12 344 4 544321 13478641 0 2343211 344443 34321 0 0 123 45543 11 2 34 43 2332 3332 1 1 1 0
.12 10 0234 4 331 11 11 1245 6 7653 2346531 01356543 34 568763 344321 1 1 234 6786530 01 1 23453 1 34433 44321 2 1 122 1 0
.01 10 0 1233 21 11 11 2222211 25555 687643 34420 1356654 4576 67643 3566532111 1 2346 776410 11 0 23431 123 3 44333332 1 2 2210
.-0 10 2 21 1 22222 333333 489975 5665433 3 22221 2454 2 589854 3 3 568754322 1 1 2 34665421 10 0 122 2 33 3 44432222 33 20
.-- 01 22 2 2 1 2333 2 23 57 874 4443 2 248 973 3320 279 962 2 3567754 331 11 11 13455422210 11 1 2 3 4 443 2 3320
.0- 02 32 2 2 222 2 1 13457 974 45542 1 48 7433 20 2578863 43 3 333 44421 1 11 10 0344333332111 1 2 23 44 4 33 2 2 32-
.210 012 222 1 11 2 22 244 5688865 456752 12 46654 333 22 45 565531 0 2354321 1 1 0 02 3 3 4322 234332 3454 4 22 2 21-
.4320 1 1 1 1 11 123 3454222 33 467753 2 33 2 2 33 43 2 366543 0 013443211 1 0 12 33 2 33333 345543 1 245543 2 1 1 110 -
.322110 1 1 1 1233 345542 134 5665433333 4432 23 432 3 4432 1110 12332111 1 34666532 23 444444432 123454 31 11 0 -
.12 2 11 1 1 1233 3 4665321 1245555 44333 3 4432 23 322 33 21 12332 2 21 0 1 22 3567642 1 23 33 22221 23 43 2 11 21 1 21
.22 1 11 222 11 123333 34555321 23554 33 222 234 433 2 2 2 3 21 23432 333210 012 2 1 12332 1 221 0 1 211 122 22 23322 2332
.22 1 12332 2 1 2211 12 2 234 420 013 3321 00 1 24566642 2 2 2 2344 3 443 1 0 0 1 11 0 01 21 1 2 10 0 122 1 21 12 345443 3332
.21 0 1233 21 0 22210 02 21 0 1221 012 210 02457775433 442 1 2 344 4321 0 0000 111 2333221 2 322100 11 1 2 2345665433 21
.100 012 1110 022 1 123310 01 100 12 210 0356764 23 56532 111 12 3433 321 1 0 01222 3 32 23 3311 0 0 12 2 2 3 554 4 320
.10 0 0 023322 3431 011 123443 210 3576532 234 55321 1 2 33 3 32 1110 0 1 11 23 2 2 44211 0 012 22 2 2 33 44
.31111 0 0234333 32 0
```

X1= 585000.0

X2= 765000.0

Y1= 4215000.0

Y2= 4315000,0

TABLE IX

LEGEND TO THORIUM/POTASSIUM RATIO MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		2.50
0	2.50	3.65
1	3.65	4.80
2	4.80	5.95
3	5.95	7.10
4	7.10	8.25
5	8.25	9.40
6	9.40	10.55
7	10.55	11.70
8	11.70	12.85
9	12.85	14.00
+	14.00	

THORIUM/POTASSIUM RATIO

X3= 765000.0

Y3= 4435669.0

X2= 765000.0

Y2= 4315000.0

0 10 20
STATUTE MILES

AERO SERVICE

LEGEND

- ③ URANIUM ANOMALY NO. 3
- IV THORIUM ANOMALY NO. 4

INTERPRETATION MAP
CHICO QUADRANGLE
U.S. DEPARTMENT OF ENERGY

FIGURE 14

75/76

consistent with the regional geologic strike.

The strongest magnetic anomalies are present in a discontinuous belt trending north-south across the central part of the map sheet. They are correlated with exposures of Mesozoic ultrabasic intrusives (ub). Another very strong positive anomaly is present in the southwest, and it is correlated with the volcanic rocks of Sutter Buttes.

A total of thirty-nine localities where anomalous radiation is present have been delineated. Seven of these are characterized by radiation in the uranium spectral window and the other thirty-two are thorium radiation features, some of which are accompanied by uranium radiation of lesser intensity.

Four of the seven uranium anomalies are located in the northwest, in a large exposure of Mesozoic granitic rocks (gr). They consist of abrupt anomalies, arranged in a line and corresponding in location to the Feather River canyon. Whether the line of uranium anomalies is caused by a uraniferous zone in the granitic massif exposed in the canyon such as a pegmatite, or whether it is the result of improper altitude correction is problematical. The features involved are Anomaly 1, line 690, fiducials 5930-5960; Anomaly 2, line 700, fiducials 3050-3080; Anomaly 3, line 710, fiducials 8100-8130 and Anomaly 5, line 720, fiducials 3690-3720.

A large proportion of the thorium features are present in the southern and central parts of the Chico quadrangle and are attributable to the undifferentiated Paleozoic marine (P) sediments. For the most part, they are irregular increases in thorium radiation and they are likely to be disseminated throughout the rock unit. The exposed Mesozoic granites (gr) in the northeastern corner of the sheet also are interpreted as being enriched in thorium, and to a lesser extent uranium, as is a portion of the Jurassic/Triassic metavolcanics in the south center, south of the towns of Alta Hill and Grass Valley.

Uranium enrichment is noted in the southwestern corner of the map sheet, in the region of Sutter Buttes and the adjacent Sacramento Valley floor.

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A P P E N D I X A

Geologic Legend

GEOLOGIC LEGEND

<u>Aero Symbol</u>	<u>Map Symbol</u>	<u>Unit Description</u>
QAL	Qal	Recent alluvium
QSC	Qsc	Recent river and major stream channel deposits in the Great Valley
QF	Qf	Recent alluvial fan deposits in the Great Valley
QB	Qb	Recent basin deposits in the Great Valley
QL	Ql	Quaternary lake deposits
QG	Qg	Quaternary glacial deposits
QT	Qt	Quaternary nonmarine terrace deposits
QC	Qc	Pleistocene nonmarine sedimentary deposits
—	Qpv	Pleistocene volcanic rocks, including: rhyolite andesite basalt pyroclastic rocks
—	Qpv ^r	
—	Qpv ^a	
QPVB	Qpv ^b	
QPVP	Qpv ^p	
QP	QP	Plio-Pleistocene nonmarine sedimentary deposits
—	*	Quaternary and/or Pliocene cinder cones
PC	Pc	Undivided Pliocene nonmarine sedimentary deposits
—	Pv	Pliocene volcanic rocks, including: rhyolite andesite basalt pyroclastic rocks
PVR	Pv ^r	
PVA	Pv ^a	
PVB	Pv ^b	
PVP	Pv ^p	
—	Mv	Miocene volcanic rocks, including: rhyolite andesite basalt pyroclastic rocks
MVR	Mv ^r	
MVA	Mv ^a	
—	Mv ^b	
MVP	Mv ^p	
O	φ	Oligocene marine sedimentary deposits

<u>Aero Symbol</u>	<u>Map Symbol</u>	<u>Unit Description</u>
—	Øv	Oligocene volcanic rocks, including:
—	Øv ^r	rhyolite
—	Øv ^a	andesite
—	Øv ^b	basalt
OVP	Øv ^p	pyroclastic rocks
EC	Ec	Eocene nonmarine sedimentary deposits
E	E	Eocene marine sedimentary deposits
—	Ev	Eocene volcanic rocks, including:
—	Ev ^r	rhyolite
—	Ev ^a	andesite
EVB	Ev ^b	basalt
EVP	Ev ^p	pyroclastic rocks
TC	Tc	Tertiary nonmarine sedimentary deposits
TL	Tl	Tertiary lake deposits
—	Ti	Tertiary intrusive (hypabyssal) rocks, including:
TIR	Ti ^r	rhyolite
TIA	Ti ^a	andesite
TIB	Ti ^b	basalt
—	Tv	Tertiary volcanic rocks, including:
—	Tv ^r	rhyolite
TVA	Tv ^a	andesite
TVB	Tv ^b	basalt
TVP	Tv ^p	pyroclastic rocks
KU	Ku	Upper Cretaceous marine sedimentary deposits
GR	gr	Mesozoic granitic rocks
BI	bi	Mesozoic basic intrusive rocks
UB	ub	Mesozoic ultrabasic intrusive rocks
JU	Ju	Upper Jurassic marine sedimentary and metasedimentary rocks
JML	Jml	Middle and lower Jurassic marine sedimentary and metasedimentary rocks
—	T	Triassic marine sedimentary and metasedimentary rocks

<u>Aero Symbol</u>	<u>Map Symbol</u>	<u>Unit Description</u>
JTRV	JRv	Jurassic and/or Triassic metavolcanic rocks
M	m	Pre-Cretaceous metamorphic rocks, undifferentiated,
—	ls	limestone or dolomite
MV	mv	Pre-Cretaceous metavolcanic rocks
GRM	gr-m	Pre-Cenozoic granitic and metamorphic rocks
PZ	P	Paleozoic marine sedimentary and metasedimentary rocks,
—	ls	limestone or dolomite
PZV	Pv	Paleozoic metavolcanic rocks
PMV	Pmv	Permian volcanic rocks
—	CM	Mississippian marine sedimentary and metasedimentary rocks
W		Water

A P P E N D I X B

List of Geologic Units by Anomaly

List of Geologic Formations by Anomaly

(Uranium Anomalies)

<u>Anomaly</u>	<u>Formation</u>	<u>Line</u>	<u>Fiducial</u>	<u>Brief Description</u>
1	gr	690	5930-5960	U spike, slight Th, strong U/Th and U/K
2	gr	700	3050-3080	U spike, no Th, strong U/Th and U/K
3	gr	710	8100-8130	U spike, no Th, strong U/Th and U/K
4	ub	720	3200-3310	moderate U spike, smaller Th, modest U/Th
5	gr	720	3690-3720	U spike, slight Th, strong U/Th, small U/K
6	Jkv	4020	1970-1990	abrupt U spike, No Th, strong U/Th and U/K
7	Qg Jml	880	18920-18970	marginal U anomaly, lesser Th, irregular U/Th

(Thorium Anomalies)

I	gr	690	7730-7890	very strong regional Th, lesser U, minor Th/K
II	P	4040	11600-11620	strong Th peak, slight U, no U/Th, U/K, Th/K
III	gr	700	4960-5020	intense regional Th, lesser U, minor Th/K
IV	P	710	9110-9140	strong Th spike, small U, no U/Th, U/K, Th/K
V	gr	710	8990-10080	strong irregular regional Th, smaller U, no U/Th, U/K, Th/K
VI	P	720	4500-4650	irregular regional Th increase, modest U, no U/Th, U/K, Th/K
VII	gr Qal	730	10610-10770	irregular regional Th smaller U, minor regional U/K and Th/K

<u>Anomaly</u>	<u>Formation</u>	<u>Line</u>	<u>Fiducial</u>	<u>Brief Description</u>
VIII	gr Qg Mv ^p Tv ^b	760 4060	6230-6270 6150-6250	strong Th anomaly, smaller U, slight U/K and Th/K
IX	gr Ql Qal Mv ^a	770 770	11530-11620	strong Th anomaly, slightly lower U, no U/Th, U/K, Th/K
X	P	780	11280-11550	irregular regional Th, lesser U, no U/Th, U/K, Th/K
XI	P	790	12470-12570	regional irregular Th, no U, no U/Th, U/K, Th/K
XII	Qal Mv ^p Pv ^p	810	13300-13360	large Th, smaller U, no U/Th, U/K, Th/K
XIII	Pv ^p gr	810	14070-14137	intense Th, smaller U, moderate Th/K
XIV	P	820	16370-16430	strong Th anomaly, slight U, no U/Th, U/K Th/K
XV	Pv ^p gr	820	17500-17560	strong dual Th peaks, lesser U, good Th/K
XVI	J ^{tr} v	4020	1360-1390	isolated Th anomaly, slight U, no U/Th, U/K, Th/K
XVII	P	830	14020-14120	regional Th increase, small U, no U/Th, U/K Th/K
XVIII	gr	830	14500-14560	regional Th increase, small U, no U/Th, U/K Th/K
XIX	gr Qg	830 4070	14710-14790 2900-3090	regional irregular Th, lesser U, slight Th/K
XX	P	4040	10370-10400	moderate Th peak, slight U, no U/Th, U/K, Th/K

<u>Anomaly</u>	<u>Formation</u>	<u>Line</u>	<u>Fiducial</u>	<u>Brief Description</u>
XXI	P	840	15790-16010	discontinuous strong Th lower U, partial Th/K
XXII	Qal Pv ^P Pc Pv ^a Pv ^r	860 4000	4000-4280 2140-2320	regional Th uplift, comparable U, no U/Th, U/K, Th/K
XXIII	P	860	5860-6080	irregular regional Th, no U, no U/Th, U/K, Th/K
XXIV	P Jml Mv ^P	860	6130-6230	strong Th anomaly, small U, no U/Th U/K, Th/K
XXV	P	870	17370-17760	broad irregular regional Th, slight U, no U/Th, U/K, Th/K
XXVI	gr P	880	17590-17690	strong dual Th, small U, slight Th/K
XXVII	Pv ^P P	880	10870-18220	regional irregular Th, slight U, partial U/K and Th/K
XXVIII	Pv ^P P	880	18360-18480	regional irregular Th, slight U, no U/Th, U/K, Th/K
XXIX	Qg	880	18670-18690	Th spike, smaller U, slight Th/K
XXX	P	890	4120-4380	regional Th increase, slight U increase, no U/Th, U/K, Th/K
XXXI	P gr	910 4060	3260-3390 4730-4760	large irregular Th increase, slight irregular U, no U/Th, U/K, Th/K
XXXII	gr Qg	910 4070	3260-3390 2230-2310	large irregular Th, minor U, no U/Th, U/K, Th/K

A P P E N D I X C

List of Anomalies by Geologic Unit

List of Anomalies by Geologic Formation

<u>Aero Symbol</u>	<u>Formation</u>	<u>No. of Samples</u>	<u>No. of U Anomalies</u>	<u>No. of Th Anomalies</u>
QAL	Qal	2275	-	4
QL	Ql	3186	-	1
QG	Qg	2933	1	4
QC	Qc	1426	-	1
QP	QP	1183	-	1
PVR	Pv ^r	24	-	1
PVA	Pv ^a	804	-	1
PVP	Pv ^p	13040	-	6
MVA	Mv ^a	745	-	1
MVP	Mv ^p	1851	-	3
TVB	Tv ^b	500	-	1
GR	gr	13077	4	13
UB	ub	2043	1	-
JML	Jml	887	1	1
JTRV	Jrv	9205	1	1
PZ	P	1652	1	17

ALL OTHER GEOLOGIC UNITS HAVE NO ASSOCIATED ANOMALIES

A P P E N D I X D

Mean Radiometric Values by Geologic Unit

MEAN VALUE BY GEOLOGIC MAP UNIT

CHICE

QUAC

LINE 750

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QC	0.14	0.62	6.14	0.285	1.427	4.948
QF	0.20	0.72	8.48	0.252	1.257	4.888
PVP	0.15	0.66	5.87	0.284	1.868	6.565
PVA	0.12	0.58	2.41	0.360	3.235	9.568
PVB	0.18	0.57	4.93	0.213	1.711	8.139
MV	0.10	0.75	3.15	0.430	2.652	5.655
GR	0.34	1.45	14.60	0.337	1.479	4.524
QG	0.20	1.02	8.12	0.360	1.872	5.340
QAL	0.58	2.34	26.02	0.288	1.321	4.667
TVB	0.22	1.21	12.68	0.373	1.378	3.751

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
PZ	0.37	1.76	14.50	0.334	1.846	5.598
JTRV	0.12	0.70	6.25	0.345	1.420	4.350
UE	0.10	0.38	3.36	0.224	0.953	6.186
CL	0.25	1.02	13.45	0.313	1.271	4.030
W	0.25	1.59	6.00	0.381	3.880	10.230
PZV	0.20	1.17	7.18	0.424	2.674	6.235
PMV	0.14	1.18	6.51	0.580	2.754	4.399
MVP	0.17	0.69	11.39	0.293	0.920	3.199
CVP	0.28	1.35	12.21	0.342	1.554	4.678
MVA	0.17	0.94	10.68	0.374	1.296	3.513

LINE 700

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QC	0.19	0.74	7.23	0.277	1.502	5.464
QF	0.15	0.45	6.56	0.212	0.956	4.925
PVP	0.14	0.64	5.49	0.327	1.945	6.290
PVA	0.19	0.54	2.50	0.204	3.315	16.976
M	0.17	0.35	2.70	0.146	1.858	13.028
MV	0.09	3.49	3.13	0.381	2.320	6.481
GR	0.38	1.63	13.56	0.308	1.792	5.144
PVB	0.23	0.89	6.64	0.280	3.627	12.351
RI	0.04	0.47	2.67	0.438	2.597	3.316
EC	0.18	0.67	7.21	0.265	1.446	5.622
QT	0.93	3.88	36.15	0.290	1.560	5.374

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CG	0.08	0.0	2.65	0.0	0.0	6.305
PZ	0.30	2.12	5.85	0.494	2.943	5.964
JTRV	0.06	0.60	3.83	0.400	2.287	3.298
CL	0.21	0.54	7.67	0.328	2.127	6.595
CAL	0.41	1.94	14.56	0.357	2.033	5.842
PZV	0.23	1.17	7.03	0.362	2.810	7.371
MVP	0.21	0.67	11.01	0.292	1.135	4.013
TIE	0.18	0.40	7.95	0.151	0.717	4.770
CVP	0.19	1.01	8.29	0.404	1.839	4.721
MVA	0.24	1.06	12.59	0.284	1.194	4.278

LINE 710

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QC	0.22	0.95	9.36	0.298	1.411	5.015
QF	0.14	0.64	6.93	0.324	1.326	4.164
PVP	0.17	0.81	5.77	0.341	2.264	6.717
PVA	0.18	0.76	3.53	0.301	3.414	11.848
KU	0.20	1.62	5.34	0.596	2.586	4.455
M	0.13	1.34	6.12	0.748	3.292	4.727
MV	0.14	1.02	4.14	0.516	3.449	8.064
GR	0.35	1.81	14.10	0.352	1.866	4.895
W	0.05	0.45	3.46	0.413	1.684	2.544
QAL	0.20	1.00	9.16	0.411	1.793	4.545
PZ	0.34	1.51	12.51	0.311	1.744	5.541
JTRV	0.27	1.25	10.40	0.322	1.741	5.420

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
UE	0.19	1.07	5.73	0.408	2.890	7.066
CL	0.17	0.88	8.00	0.352	2.027	5.423
PVE	0.23	1.04	5.18	0.316	3.002	9.818
MVP	0.18	0.66	9.14	0.332	1.443	4.355
CVP	0.18	0.93	8.35	0.356	1.641	4.605
PZV	0.21	0.54	10.00	0.314	1.399	4.450
TIA	0.22	0.67	14.01	0.227	0.700	3.270
MVA	0.19	1.18	11.01	0.444	1.552	3.593
TVB	0.14	0.60	7.22	0.348	1.219	3.849
TVP	0.20	0.50	14.02	0.315	0.933	2.978
MVR	0.42	1.69	15.61	0.328	1.830	5.601
TL	0.69	2.12	33.86	0.314	1.324	4.240

LINE 720

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QF	0.15	0.77	5.74	0.358	1.975	5.491
QC	0.24	1.05	9.14	0.315	1.802	5.788
PVP	0.18	0.76	6.84	0.301	1.699	5.753
PVB	0.19	0.59	5.57	0.247	1.571	8.275
PVA	0.17	0.66	3.28	0.267	3.252	12.327
KU	0.26	0.93	12.00	0.261	1.208	4.588
M	0.35	2.25	19.67	0.454	1.627	3.625
MV	0.15	0.95	4.72	0.433	2.658	6.922
GR	0.50	2.19	21.43	0.308	1.467	4.877
TL	0.78	3.04	23.31	0.272	1.546	5.705

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
JTRV	0.18	0.95	7.69	0.420	1.840	4.930
PZ	0.34	1.27	12.98	0.330	1.728	5.401
UE	0.06	0.62	2.82	0.364	2.459	5.697
CAL	0.42	1.74	21.94	0.290	1.180	4.194
CL	0.22	1.12	10.53	0.348	1.538	4.446
MVP	0.27	1.26	13.24	0.386	1.534	4.109
CVP	0.20	1.21	10.34	0.424	1.694	4.038
TIA	0.23	1.02	11.94	0.315	1.220	3.901
TVB	0.12	0.61	10.35	0.347	0.838	2.464

MEAN VALUE BY GEOLOGIC MAP UNIT

CHICCO

QUAD

LINE 730

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QF	0.17	0.71	6.20	0.291	1.601	5.872
QC	0.47	1.80	20.85	0.275	1.316	4.884
PVP	0.17	0.67	7.00	0.369	1.975	5.360
PVA	0.18	0.71	4.55	0.320	2.438	9.250
KU	0.20	0.67	7.99	0.233	1.197	5.281
M	0.19	0.60	5.05	0.225	1.655	8.125
JTRV	0.10	0.64	4.37	0.377	2.395	5.572
UB	0.10	0.54	2.78	0.418	2.989	7.831
GR	0.49	2.40	18.35	0.412	2.174	5.352
PZ	0.30	1.35	12.73	0.331	1.643	5.140
EVB	0.19	1.00	7.64	0.384	2.035	5.224
TL	0.63	2.78	25.91	0.317	1.552	5.002

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
PVB	0.24	1.10	9.98	0.322	1.705	5.362
MV	0.32	1.87	27.32	0.424	1.505	3.507
QAL	0.47	2.31	28.41	0.346	1.347	3.723
PZV	0.21	1.53	7.04	0.506	3.214	6.541
CL	0.31	1.39	21.33	0.318	1.149	3.653
W	0.23	0.71	12.75	0.211	0.797	3.780
CVP	0.15	1.04	9.68	0.389	1.622	4.272
PVP	0.56	2.76	22.73	0.359	1.627	4.627
MVA	0.20	0.89	13.80	0.321	0.929	2.975
TVE	0.15	0.50	14.10	0.223	0.507	2.281
MVR	1.12	5.44	40.37	0.338	1.947	5.783

LINE 740

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QSC	0.28	1.67	13.68	0.425	1.777	4.223
QF	0.16	0.57	6.48	0.408	2.285	5.832
QC	0.34	1.74	25.26	0.385	1.411	3.544
PVP	0.18	0.81	6.94	0.331	1.676	5.410
PVA	0.22	1.23	4.15	0.385	4.338	11.322
QAL	0.29	1.46	15.95	0.364	1.474	4.091
KU	0.21	0.58	8.95	0.191	0.940	4.931
JTRV	0.11	0.66	3.66	0.437	2.977	6.975
W	0.05	0.32	2.46	0.428	1.972	4.522
GR	0.20	1.02	8.57	0.383	1.736	4.602
UB	0.12	1.09	4.07	0.460	3.020	7.402
PZ	0.30	1.24	10.78	0.313	1.788	5.750
EVB	0.12	0.59	6.20	0.343	1.394	3.966

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
PVB	0.22	1.03	8.98	0.352	1.781	5.109
MV	0.21	0.54	9.78	0.300	1.424	4.707
PI	0.26	1.27	14.88	0.374	1.336	3.808
CG	0.38	1.54	14.27	0.253	1.650	5.645
PZV	0.49	1.50	20.16	0.266	1.361	5.154
CL	0.31	1.40	20.00	0.312	1.153	3.822
CVP	0.27	1.34	14.30	0.345	1.358	3.955
PVP	0.28	1.23	19.94	0.303	0.899	2.992
MVA	0.22	1.13	12.07	0.363	1.389	3.864
TIA	0.21	1.14	12.14	0.377	1.388	3.668
TVE	0.24	1.51	12.81	0.430	1.764	4.070
TVP	0.41	1.78	17.75	0.310	1.454	4.712
TL	0.52	1.88	28.27	0.253	0.970	3.860

LINE 750

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QF	0.21	1.07	10.08	0.350	1.566	4.687
QC	0.39	1.86	31.13	0.337	0.969	2.938
PVP	0.18	0.91	6.22	0.352	2.250	6.275
QAL	0.23	1.31	12.66	0.414	1.872	4.566
PVA	0.18	0.63	4.56	0.265	1.555	8.306
PZ	0.35	1.67	14.55	0.362	1.738	4.992
UB	0.25	1.64	10.68	0.566	2.627	5.128
BI	0.12	1.22	3.89	0.716	4.626	6.526
JTRV	0.14	0.91	5.35	0.403	2.741	5.390
GR	0.22	1.20	10.57	0.399	1.788	4.574

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
EVE	0.19	0.77	6.71	0.275	1.719	6.102
EC	0.17	0.0	8.50	0.0	0.0	4.076
MV	0.32	1.61	18.97	0.341	1.338	4.399
CG	0.18	1.10	8.64	0.459	1.896	4.666
PZV	0.23	1.04	10.14	0.258	1.425	4.868
CL	0.29	1.29	14.52	0.305	1.233	4.301
PVP	0.13	0.60	6.03	0.345	1.464	4.306
MVA	0.26	1.43	12.57	0.387	1.652	4.404
TVP	0.35	1.51	16.43	0.306	1.390	4.546
TL	0.50	2.47	27.01	0.347	1.320	3.862

MEAN VALUE BY GEOLOGIC MAP UNIT

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QUAC

LINE 760

UNIT	E THOR	E URN	FOI PCT	U/TH	U/K	TH/K	UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
QSC	0.27	2.12	13.52	0.561	2.306	4.181	EVE	0.22	1.04	5.80	0.385	2.453	6.996
W	0.17	1.55	7.26	0.545	2.616	4.784	MV	0.20	1.58	20.78	0.337	1.245	4.159
QF	0.20	1.35	8.37	0.490	2.568	5.156	UE	0.11	0.81	4.10	0.513	3.150	5.462
PVP	0.21	1.18	7.65	0.435	2.312	5.621	CG	0.31	1.43	12.65	0.353	1.683	5.033
EC	0.16	1.05	6.47	0.425	2.165	5.370	TVE	0.27	1.42	13.98	0.377	1.761	4.542
QAL	0.35	1.60	21.25	0.317	1.101	3.514	CL	0.26	1.05	17.14	0.258	0.897	3.646
PZ	0.36	1.62	14.30	0.362	1.782	5.303	TVA	0.27	0.72	12.04	0.166	0.855	4.662

PZV	0.20	1.26	10.20	0.524	2.052	4.495	MVA	0.25	1.59	21.09	0.320	1.099	3.460
JTRV	0.10	0.74	4.35	0.408	2.422	5.124	TVP	0.32	1.18	21.26	0.257	0.806	3.199
GR	0.24	1.10	12.28	0.333	1.326	4.167	CC	0.47	2.50	54.83	0.370	0.691	1.859
TL	0.45	1.66	29.51	0.260	0.822	3.166							

MEAN VALUE BY GEOLOGIC MAP UNIT

CHICC

QUAC

LINE 770

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.28	1.16	14.61	0.285	1.105	3.957
W	0.24	0.64	12.02	0.180	0.762	4.266
QF	0.18	0.53	8.03	0.371	1.851	5.180
PVP	0.23	0.93	7.53	0.310	1.740	5.754
OAL	0.37	1.46	17.86	0.280	1.246	4.486
KU	0.30	0.68	13.37	0.157	0.731	4.705
QP	0.24	0.69	11.46	0.208	0.901	4.366
EC	0.23	1.06	8.58	0.337	1.799	5.696
EVB	0.26	0.92	8.25	0.254	1.752	6.754
JTRV	0.39	0.59	4.70	0.401	1.880	3.575
PZ	0.33	1.18	11.61	0.259	1.652	6.445
GR	0.21	1.11	13.33	0.356	1.291	3.863
TL	0.54	2.30	42.31	0.300	0.794	2.648

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
PZV	0.13	0.97	5.81	0.355	1.820	5.173
FI	0.21	0.53	4.95	0.160	1.812	10.588
UB	0.18	0.63	5.35	0.224	2.071	9.226
CG	0.15	0.79	6.43	0.381	1.800	4.749
TVE	0.25	0.99	10.37	0.280	1.423	5.084
TIR	0.52	4.07	25.12	0.547	2.338	4.303
MVA	0.68	3.67	26.23	0.379	2.023	5.388
CL	0.24	1.48	12.65	0.390	1.852	4.619
TVA	0.22	0.98	12.52	0.313	1.197	3.795
TVP	0.31	1.30	15.67	0.292	1.191	4.145
PV	0.47	1.82	28.82	0.269	0.917	3.429
CC	0.39	2.23	32.16	0.400	1.006	2.521

LINE 780

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.26	0.92	12.90	0.258	1.106	4.387
W	0.19	1.27	10.96	0.470	1.671	3.575
QF	0.19	0.76	5.55	0.288	2.022	7.401
PVP	0.24	1.00	8.92	0.307	1.627	5.623
QP	0.23	1.17	7.14	0.371	2.572	6.933
EC	0.29	1.34	8.06	0.314	2.504	8.238
EVB	0.29	1.26	9.78	0.304	2.282	8.155
JTRV	0.10	1.05	4.71	0.582	3.113	4.305
GR	0.20	0.98	11.47	0.357	1.583	4.563
PZ	0.35	1.53	11.80	0.333	2.043	6.602
TVP	0.32	1.20	16.40	0.265	1.128	4.320

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
PZV	0.17	0.91	6.35	0.398	2.484	7.174
FI	0.08	0.56	2.68	0.429	3.399	6.726
UB	0.25	1.10	9.46	0.313	1.879	6.584
CPVB	0.25	0.86	9.26	0.243	1.287	5.816
CAL	0.29	1.50	13.14	0.368	1.664	4.570
CG	0.19	1.22	9.08	0.460	2.150	4.445
CPVP	0.16	0.87	7.81	0.402	1.659	4.186
CL	0.26	1.17	11.04	0.299	1.426	5.064
TVA	0.33	1.33	13.82	0.284	1.433	5.249
TVE	0.31	0.87	10.58	0.195	1.182	6.159

LINE 790

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
W	0.22	0.46	12.04	0.154	0.587	3.847
QSC	0.25	0.74	11.41	0.224	1.049	4.811
QF	0.20	0.55	5.83	0.344	2.487	7.395
QP	0.29	0.71	10.24	0.173	1.018	5.976
EC	0.27	1.41	9.73	0.367	2.709	7.750
EVB	0.24	0.56	10.30	0.277	1.323	4.752
JTRV	0.17	1.09	8.94	0.395	2.515	5.716
JU	0.18	0.86	15.45	0.308	0.795	2.462
GR	0.17	1.05	12.34	0.405	1.325	3.376
PZ	0.41	1.64	14.26	0.289	1.810	6.475

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
UB	0.16	1.29	6.89	0.441	2.707	6.254
PVP	0.21	0.82	8.11	0.286	1.669	6.080
PZV	0.18	0.84	4.55	0.352	2.914	8.862
CAL	0.27	1.69	17.68	0.453	1.570	3.420
FI	0.30	2.45	10.82	0.576	3.351	5.883
TVP	0.18	1.21	6.64	0.466	2.645	5.701
CG	0.18	0.85	7.05	0.339	1.782	5.329
TVA	0.25	1.64	14.75	0.325	1.704	5.436
TIR	0.42	1.84	13.41	0.305	2.010	6.624
TVE	0.35	1.54	17.84	0.306	1.225	4.033

LINE ECC

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.23	1.08	9.91	0.332	1.630	5.084
QF	0.23	0.57	7.47	0.311	1.981	6.776
QP	0.26	1.12	10.63	0.293	1.516	5.205
JTRV	0.15	0.94	7.27	0.367	2.340	6.676
GR	0.16	0.80	7.10	0.348	2.490	6.985
W	0.07	0.33	5.78	0.291	0.815	2.624
BI	0.12	0.61	2.87	0.335	2.803	9.247
UB	0.18	0.57	3.82	0.364	4.204	10.816
PZ	0.33	1.22	5.84	0.256	2.222	8.271
PZV	0.15	0.74	4.96	0.374	3.072	8.680

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
EC	0.16	0.78	7.85	0.359	1.491	4.195
PVE	0.31	0.68	8.16	0.158	1.234	7.848
CPVB	0.25	0.51	6.48	0.255	2.040	8.131
PVP	0.24	0.59	8.91	0.285	1.669	5.928
CG	0.24	1.08	12.06	0.297	1.240	4.326
MVP	0.52	1.43	18.55	0.193	1.112	5.768
TVP	0.20	0.87	9.68	0.303	1.290	4.403
TVA	0.33	1.51	12.80	0.341	1.696	5.269
CAL	0.32	1.39	15.24	0.259	1.332	4.494
CL	0.35	1.46	11.81	0.289	1.775	6.227

MEAN VALUE BY GEOLOGIC MAP UNIT

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QUAD

LINE E10

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.25	1.06	12.34	0.285	1.315	4.521
QF	0.22	0.87	6.15	0.278	2.204	8.195
QP	0.20	1.12	7.51	0.388	2.271	5.768
JTRV	0.16	0.85	7.97	0.347	2.375	6.028
GR	0.30	1.31	14.02	0.365	1.660	4.907
BI	0.14	0.73	5.04	0.358	2.149	6.892
PZ	0.38	1.29	13.17	0.223	1.545	6.662
UB	0.21	0.86	5.22	0.287	2.675	9.888
TC	0.27	1.24	4.83	0.322	3.740	11.654
PZV	0.23	1.17	4.66	0.372	4.002	10.750
TL	0.35	0.81	13.36	0.162	0.887	5.500

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
PVP	0.31	1.22	11.11	0.305	1.763	5.898
EC	0.43	1.64	16.77	0.284	1.594	5.517
CPVB	0.40	1.00	9.82	0.172	1.486	8.679
W	0.16	0.56	16.77	0.413	0.931	2.383
JML	0.28	1.72	16.13	0.430	1.559	3.627
CG	0.23	1.23	12.23	0.386	1.470	4.069
QAL	0.54	2.58	19.94	0.346	1.893	5.509
MVP	0.71	3.20	26.46	0.315	1.751	5.586
CL	0.34	1.20	12.69	0.252	1.372	5.639
CC	0.23	0.87	8.04	0.213	1.272	6.028

LINE E20

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.29	1.39	13.54	0.345	1.642	4.552
QF	0.25	0.99	7.95	0.275	2.131	7.371
QP	0.26	1.00	10.58	0.275	1.748	5.837
JTRV	0.18	0.86	5.97	0.330	2.882	8.467
GR	0.27	1.13	13.52	0.279	1.343	4.825
BI	0.21	1.13	5.31	0.351	3.268	9.224
W	0.25	1.00	9.94	0.256	1.302	5.341
PZ	0.39	1.51	12.58	0.297	2.209	7.452
PZV	0.35	1.55	6.42	0.309	3.775	11.911

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
UP	0.17	1.01	8.42	0.476	1.886	4.316
EC	0.26	1.36	5.95	0.372	3.335	9.350
PVP	0.33	1.28	12.12	0.273	1.564	5.748
QAL	0.54	1.51	18.24	0.242	1.498	6.194
CG	0.29	1.16	10.64	0.280	1.621	5.839
JML	0.30	1.23	16.38	0.282	1.093	3.904
CC	0.30	1.42	12.01	0.331	1.745	5.390
TL	0.37	1.06	13.00	0.197	1.162	5.820
CT	0.27	1.80	11.70	0.468	2.251	4.827

LINE E30

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.27	1.01	13.17	0.269	1.158	4.335
QF	0.26	0.92	10.36	0.242	1.374	5.982
QP	0.21	0.77	7.77	0.228	1.392	5.662
JTRV	0.12	0.66	5.78	0.336	1.973	5.722
TC	0.08	0.38	11.16	0.316	0.374	2.512
GR	0.34	1.39	17.03	0.310	1.311	4.354
BI	0.14	0.73	6.13	0.302	2.026	6.530
W	0.24	1.47	14.63	0.433	1.568	3.552
PZ	0.43	1.58	13.50	0.258	1.980	7.666
EC	0.33	1.72	8.45	0.369	3.181	8.626

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
PVP	0.27	1.23	10.71	0.326	2.234	7.040
PZV	0.25	0.85	4.97	0.231	2.481	10.259
UP	0.08	0.19	1.25	0.213	0.0	13.240
CG	0.34	1.27	14.86	0.245	1.192	4.922
JML	0.25	1.08	17.43	0.302	0.905	3.025
TVE	0.24	0.75	12.16	0.235	0.946	4.053
CC	0.36	1.85	15.91	0.362	1.711	4.802
CT	0.23	1.57	16.04	0.343	1.394	4.245
CPVB	0.31	1.54	17.64	0.364	1.299	3.654
PVE	0.28	1.85	22.15	0.335	1.201	3.595

LINE E40

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.23	0.95	12.58	0.291	1.082	3.845
QF	0.17	0.52	6.23	0.167	0.875	6.142
QF	0.27	1.04	11.56	0.261	1.325	5.202
QP	0.22	1.00	7.00	0.331	2.295	7.130
JTRV	0.10	0.64	5.85	0.474	1.990	4.296
BI	0.15	0.59	5.75	0.405	2.218	5.835
GR	0.32	1.43	17.11	0.309	1.293	4.012
TC	0.22	0.41	7.10	0.136	0.610	6.685
W	0.43	1.62	14.25	0.288	1.732	6.276
	0.33	1.26	12.35	0.276	1.572	6.157

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
UP	0.08	0.47	1.40	0.496	4.504	8.199
EC	0.48	1.24	11.35	0.180	1.590	8.848
MVP	0.67	2.26	17.45	0.236	1.885	8.032
CG	0.38	1.41	16.60	0.269	1.242	4.798
W	0.07	0.44	4.26	0.259	0.937	3.373
JML	0.38	2.63	22.92	0.517	1.811	3.496
TVE	0.60	2.46	18.02	0.284	1.967	6.965
CL	0.42	1.66	20.00	0.278	1.199	4.351
QAL	0.25	0.68	15.63	0.195	0.643	3.318
CPVB	0.26	1.16	16.38	0.304	1.021	3.428

MEAN VALUE BY GEOLOGIC MAP UNIT

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QUAD

LINE E50

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QSC	0.26	1.32	12.07	0.358	1.604	4.497
QB	0.19	0.94	7.04	0.318	1.764	5.729
QAL	0.43	2.32	16.67	0.374	1.968	5.314
PVP	0.31	1.18	10.75	0.272	2.101	8.173
QF	0.29	1.22	12.75	0.296	1.397	4.846
QP	0.19	0.59	5.58	0.353	2.727	7.545
JTRV	0.10	0.73	7.13	0.498	1.872	3.568
GR	0.23	0.96	13.14	0.327	1.301	3.867
BI	0.09	0.65	5.44	0.428	1.647	3.706
UE	0.13	0.69	7.22	0.410	1.311	3.638
QC	0.57	2.48	18.93	0.310	1.868	6.082

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
EC	0.33	1.28	8.68	0.270	2.473	8.783
PZ	0.34	1.30	11.70	0.273	1.703	6.285
MVP	0.45	1.68	16.71	0.262	1.551	6.041
CG	0.25	1.24	13.71	0.300	1.324	4.370
W	0.21	0.88	8.81	0.295	1.447	4.906
JML	0.30	1.27	13.89	0.291	1.287	4.418
GRV	0.31	0.93	15.85	0.205	0.825	3.981
EVF	0.56	1.97	19.60	0.245	1.479	6.012
PVA	0.36	1.20	15.72	0.229	1.103	4.843
CPVB	0.35	1.24	18.41	0.213	0.952	4.493

LINE E60

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QSC	0.27	1.87	13.45	0.492	2.038	4.232
QB	0.24	1.77	10.42	0.517	2.505	4.832
QAL	0.48	3.24	19.25	0.485	2.609	5.345
PVP	0.43	2.00	13.05	0.315	2.414	8.325
PC	0.54	4.17	19.09	0.536	3.195	5.955
PVA	0.55	3.41	19.76	0.432	2.462	5.805
E	0.59	4.80	26.28	0.566	2.646	4.735
PVR	0.53	4.38	24.52	0.573	2.582	4.517
QF	0.29	1.70	11.84	0.424	2.265	5.323
QP	0.18	1.19	6.01	0.459	2.940	6.345
JTRV	0.11	0.73	8.41	0.437	1.384	2.915
QL	0.28	1.44	13.37	0.370	1.585	4.330

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.05	1.36	1.30	1.642	0.0	0.0
GR	0.19	1.11	8.70	0.445	2.507	5.662
PI	0.10	0.91	5.17	0.631	2.835	4.048
PZ	0.52	1.79	16.01	0.268	1.958	7.351
UE	0.13	0.85	3.84	0.462	3.293	7.246
MVP	0.73	2.87	21.98	0.285	2.991	9.869
EC	0.36	1.64	7.30	0.322	3.529	11.232
JML	0.45	1.88	20.18	0.297	1.338	4.580
CG	0.42	1.92	17.94	0.323	1.551	4.814
CT	0.59	2.32	16.80	0.273	1.988	7.296
CPVB	0.38	1.14	16.39	0.214	1.027	4.973

LINE E70

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QSC	0.25	1.33	13.55	0.370	1.452	3.905
QB	0.33	1.19	15.27	0.261	1.177	4.504
QAL	0.49	2.17	21.40	0.299	1.441	4.781
PVP	0.38	1.65	14.34	0.316	1.786	6.156
E	0.50	3.59	21.42	0.500	2.423	4.882
KU	0.55	3.31	26.04	0.430	1.812	4.515
PVR	0.62	3.95	24.83	0.445	2.297	5.255
PVA	0.58	3.99	22.95	0.482	2.490	5.257
QF	0.28	1.61	12.58	0.422	1.935	4.707
JTRV	0.20	0.98	8.05	0.410	2.138	5.745
Q	0.17	1.32	8.10	0.568	2.405	4.256

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
OVP	0.25	0.82	9.77	0.226	1.226	5.401
TC	0.21	1.22	10.43	0.407	1.729	4.246
GR	0.37	1.48	17.03	0.331	1.763	5.202
PI	0.09	0.78	2.71	0.596	4.237	7.669
PZ	0.58	1.72	17.87	0.226	1.610	7.185
EC	0.37	1.28	10.86	0.260	2.012	7.443
JML	0.39	2.57	18.93	0.474	2.006	4.440
CG	0.40	1.65	16.72	0.281	1.423	5.012
CPVB	0.38	1.59	11.83	0.298	1.935	6.792
CL	0.59	2.40	16.34	0.282	2.119	7.526
W	0.41	1.34	9.29	0.236	1.760	7.815

LINE E80

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QB	0.27	1.05	14.48	0.272	1.067	3.936
QSC	0.26	1.23	13.30	0.335	1.355	4.082
QAL	0.49	2.99	21.08	0.424	2.008	4.888
PVP	0.39	1.56	12.30	0.317	2.164	7.824
QF	0.32	1.44	14.52	0.317	1.483	4.703
QP	0.34	1.36	9.77	0.288	2.045	7.265
OVP	0.33	1.40	9.56	0.300	2.191	7.311
O	0.33	1.28	11.33	0.274	1.629	6.087
JTRV	0.15	1.00	7.04	0.474	2.059	4.461
GR	0.20	1.12	9.95	0.412	1.567	3.865

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
PI	0.11	0.67	6.31	0.456	2.270	3.816
PZ	0.42	1.49	12.20	0.269	1.992	7.862
UE	0.23	1.37	5.94	0.426	4.256	10.379
MVP	0.33	1.59	10.41	0.343	2.181	6.529
EC	0.41	2.05	13.76	0.344	2.145	6.330
CG	0.35	1.85	14.38	0.387	1.888	5.053
JML	0.35	1.80	16.23	0.336	1.585	4.964
CPVB	0.25	1.43	11.79	0.355	1.754	4.465
CL	0.29	1.86	13.88	0.444	1.951	4.406
W	0.12	1.00	5.46	0.650	2.920	4.324

MEAN VALUE BY GEOLCCIC MAP UNIT

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LINE 850

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K	UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
QB	0.28	1.46	13.63	0.363	1.560	4.277	JU	0.35	1.29	15.49	0.255	1.206	4.721
QSC	0.26	1.30	13.76	0.354	1.439	4.082	EC	0.30	1.03	9.15	0.241	1.626	6.784
QF	0.32	1.34	14.55	0.256	1.370	4.738	PVP	0.30	1.11	8.98	0.273	1.960	8.353
QP	0.27	0.92	9.75	0.223	1.378	6.315	TVP	0.25	1.11	6.65	0.310	2.437	7.910
QVP	0.13	0.60	3.65	0.306	2.324	7.810	CG	0.28	1.20	11.81	0.299	1.480	5.071
JTRV	0.18	1.21	5.55	0.413	1.662	3.805	MVP	0.36	1.28	12.37	0.227	1.342	5.971
GR	0.14	0.73	7.68	0.432	1.523	4.268	CAL	0.42	1.89	17.04	0.312	1.625	5.217
BI	0.17	1.34	9.34	0.381	1.717	4.638	JML	0.34	1.76	16.49	0.345	1.499	4.379
UB	0.23	0.82	4.48	0.250	3.587	13.377	CL	0.21	0.94	10.43	0.331	1.331	4.033
PZ	0.48	1.68	15.52	0.251	1.848	7.440	H	0.08	0.67	5.28	0.575	2.644	4.480

LINE 500

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K	UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
QSC	0.25	1.71	13.37	0.490	1.841	3.847	PZ	0.46	1.73	15.48	0.252	1.910	6.726
QB	0.30	1.66	13.88	0.356	1.789	4.515	JU	0.43	1.71	15.25	0.277	1.645	5.994
QF	0.27	1.72	11.56	0.468	2.311	4.910	PVP	0.22	1.31	10.73	0.253	2.091	7.641
QP	0.24	1.12	9.72	0.375	1.912	5.072	EC	0.41	1.20	6.88	0.205	2.559	12.419
Q	0.18	0.54	7.02	0.201	1.059	5.354	MVP	0.28	1.27	9.95	0.317	2.027	6.461
JTRV	0.14	1.05	10.52	0.457	1.463	3.175	CG	0.34	1.52	15.06	0.306	1.319	4.419
BI	0.25	1.76	10.71	0.410	1.802	5.312	JML	0.21	1.51	16.52	0.341	1.327	3.939
GR	0.47	2.18	20.25	0.308	1.456	4.727	CL	0.29	1.39	11.78	0.350	1.728	4.997
UB	0.26	1.32	6.67	0.437	4.409	13.651	H	0.18	1.19	6.29	0.454	2.289	5.071

LINE 510

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K	UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
QB	0.29	1.08	13.94	0.266	1.128	4.352	MVP	0.61	2.27	15.99	0.262	2.521	9.751
QSC	0.27	1.28	13.30	0.322	1.377	4.263	UB	0.24	1.28	5.03	0.359	4.410	11.927
QF	0.32	1.40	14.98	0.303	1.389	4.537	EC	0.93	1.87	25.92	0.140	1.036	7.437
QT	0.23	1.18	9.02	0.359	1.996	5.362	GR	0.55	1.99	21.27	0.258	1.316	5.233
QP	0.23	0.80	9.62	0.242	1.246	4.916	CAL	0.27	0.83	13.67	0.216	0.899	4.136
JTRV	0.14	0.87	9.05	0.382	1.262	3.455	CG	0.38	1.46	16.65	0.271	1.296	4.841
PZ	0.57	2.27	18.91	0.283	1.775	6.311	JML	0.52	1.84	19.41	0.249	1.383	5.561
JU	0.40	2.20	18.25	0.391	1.756	4.655	PVP	0.48	2.10	15.42	0.319	2.046	6.445
PVP	0.38	1.43	5.51	0.232	2.560	10.201	CL	0.21	1.57	14.55	0.362	1.624	4.492

LINE 4000

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K	UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
QB	0.24	1.26	12.81	0.379	1.443	3.867	PVP	0.34	2.40	12.35	0.371	2.055	5.047
QSC	0.25	1.62	11.44	0.459	2.152	4.975	CF	0.18	0.83	5.53	0.326	2.270	7.018
QAL	0.49	3.18	19.71	0.454	2.360	5.264	CC	0.17	0.86	6.48	0.352	1.965	5.639

MEAN VALUE BY GEOLOGIC MAP UNIT

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LINE 4010

UNIT	E THCR	E URN	FOT PCT	U/TH	U/K	TH/K
QF	0.30	1.27	14.01	0.295	1.359	4.676
QP	0.14	0.73	5.10	0.282	1.753	6.277
QSC	0.17	0.83	7.59	0.352	1.602	4.803
PVP	0.16	0.71	5.75	0.306	1.922	7.041
M	0.19	0.59	7.88	0.222	1.095	5.065

UNIT	E THCR	E URN	PCT PCT	U/TH	U/K	TH/K
PC	0.19	0.66	8.03	0.278	1.339	4.836
KU	0.15	0.66	4.94	0.327	2.153	6.653
CAL	0.17	0.64	8.32	0.275	1.143	4.153
PVA	0.15	0.66	5.87	0.301	1.831	6.123

LINE 4020

UNIT	E THCR	E URN	FOT PCT	U/TH	U/K	TH/K
QSC	0.27	0.65	10.40	0.183	0.833	4.484
QP	0.27	1.17	9.07	0.318	2.055	6.482
QF	0.25	1.19	9.55	0.320	1.720	5.446
JTRV	0.08	0.58	4.93	0.418	1.730	3.657
TC	0.08	0.44	2.72	0.409	2.246	5.851
GR	0.30	1.17	12.35	0.286	1.384	4.952
PVB	0.19	1.00	8.38	0.355	1.706	4.800

UNIT	E THCR	E URN	PCT PCT	U/TH	U/K	TH/K
PI	0.09	0.33	4.32	0.254	1.019	4.241
PZ	0.10	1.46	4.01	0.395	2.293	5.361
UB	0.06	0.65	1.60	0.799	4.381	5.597
PV	0.11	0.81	4.74	0.408	1.905	4.571
CG	0.33	1.53	16.20	0.410	1.725	4.226
CAL	0.46	1.78	18.88	0.274	1.370	5.034

LINE 4030

UNIT	E THCR	E URN	FOT PCT	U/TH	U/K	TH/K
JTRV	0.11	0.69	4.20	0.419	2.617	6.436
GR	0.13	0.91	6.65	0.487	2.381	4.976
BI	0.10	0.70	2.00	0.458	4.190	10.297
PZ	0.14	0.79	5.88	0.439	2.299	6.525

UNIT	E THCR	E URN	PCT PCT	U/TH	U/K	TH/K
UB	0.13	0.88	4.08	0.473	3.622	7.299
EVE	0.12	0.37	6.10	0.205	0.840	4.228
CG	0.12	0.79	5.02	0.503	2.528	4.988
W	0.09	0.19	2.30	0.173	1.007	7.084

LINE 4040

UNIT	E THCR	E URN	FOT PCT	U/TH	U/K	TH/K
PZ	0.31	1.32	11.00	0.319	1.964	6.432
BI	0.27	1.43	14.01	0.365	1.550	4.256
GR	0.25	1.35	9.97	0.391	2.434	5.875
JTRV	0.20	1.18	7.16	0.402	2.545	6.341
PVP	0.24	1.13	4.63	0.311	4.145	12.705
CAL	0.25	0.83	7.78	0.252	1.620	6.635

UNIT	E THCR	E URN	PCT PCT	U/TH	U/K	TH/K
MVP	0.40	1.85	11.88	0.331	2.533	7.314
EC	0.21	1.14	5.67	0.443	2.994	9.062
PZV	0.22	1.18	3.93	0.414	4.787	13.234
UB	0.12	1.07	3.41	0.459	3.255	8.484
EVE	0.10	0.74	3.13	0.311	2.507	8.248

MEAN VALUE BY GEOLOGIC MAP UNIT

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LINE 4050

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
PZ	0.51	1.90	16.75	0.231	1.904	6.862
UB	0.27	1.09	5.07	0.281	3.599	13.952
PVP	0.35	1.40	8.21	0.238	3.042	10.956
TVP	0.30	0.99	4.85	0.231	3.078	13.840
MVP	0.39	2.10	12.21	0.368	2.948	8.612
PZV	0.19	1.29	7.87	0.459	2.603	5.208

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
CPVB	0.26	1.29	4.69	0.350	4.107	11.716
QAL	0.52	1.97	21.92	0.268	1.288	4.873
CL	0.21	1.26	7.14	0.406	2.627	6.338
EC	0.25	1.18	6.63	0.335	2.600	7.742
EVE	0.28	1.54	6.64	0.386	3.360	8.725

LINE 4060

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
GR	0.29	1.35	18.89	0.322	1.057	3.365
MVP	0.38	1.82	15.76	0.303	1.457	4.714
PVP	0.30	1.30	10.20	0.306	2.019	6.817
PZ	0.62	2.18	20.71	0.259	1.561	6.302
QG	0.40	1.56	20.51	0.368	1.359	3.857
JML	0.41	1.91	21.08	0.331	1.327	4.068
UB	0.32	1.55	19.61	0.335	1.149	3.427

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
PI	0.21	1.25	19.74	0.442	0.916	2.180
JTRV	0.20	1.22	19.49	0.432	1.017	2.398
TVE	0.73	3.23	25.38	0.305	1.817	6.023
CL	0.29	1.59	13.52	0.385	1.735	4.649
QAL	0.28	1.07	18.48	0.260	0.810	3.174
CVP	0.28	1.20	11.98	0.305	1.446	4.862
EVE	0.27	1.57	13.22	0.402	1.714	4.303

LINE 4070

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
JML	0.47	2.29	21.23	0.346	1.527	4.545
QG	0.34	1.60	14.15	0.366	1.681	4.750
PVP	0.22	1.06	10.80	0.348	1.459	4.331
GR	0.51	2.05	20.52	0.307	1.474	5.005
MVP	0.19	1.06	11.99	0.423	1.313	3.282
W	0.39	1.63	15.36	0.364	1.793	5.060

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
TIA	0.25	1.31	11.00	0.373	1.738	4.653
TVA	0.27	1.37	12.16	0.383	1.640	4.580
CAL	0.28	1.44	15.30	0.352	1.368	3.884
CL	0.24	1.09	16.35	0.317	1.230	3.842
TVE	0.18	1.02	12.78	0.415	1.172	2.940
MVA	0.15	0.70	10.20	0.282	1.083	3.822

LINE 4080

UNIT	E THOR	E URN	FOT PCT	U/TH	U/K	TH/K
W	0.23	1.28	8.78	0.398	2.148	5.689
QL	0.35	1.44	11.37	0.270	1.683	4.187
PVP	0.40	1.57	12.32	0.292	1.839	6.784
QPVE	0.31	1.28	14.60	0.293	1.287	4.542
QAL	0.41	2.24	19.42	0.399	1.923	4.777
QC	0.55	2.52	28.61	0.329	1.508	4.536
GR	0.82	3.48	28.68	0.304	1.790	6.020

UNIT	E THOR	E URN	PCT PCT	U/TH	U/K	TH/K
QT	0.23	1.21	11.83	0.466	2.009	4.215
TL	0.25	1.71	11.65	0.354	1.985	5.088
TVA	0.31	1.35	13.69	0.303	1.413	4.884
TVE	0.44	1.78	18.56	0.277	1.410	5.139
TVP	0.39	1.53	22.22	0.335	1.264	3.934
MV	0.54	2.70	38.95	0.351	1.002	2.883

A P P E N D I X E

Standard Deviation Table

CHICO

QUAD

FORMATION

QAL

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	2256	6.35	NORMAL	-2.14	0.69	3.52	9.19	12.02	14.85
E URANIUM	2222	1.63	LCGNORMAL	0.45	0.69	1.06	2.50	3.85	5.92
POTASSIUM	2223	1.38	NORMAL	-0.22	0.31	0.85	1.92	2.45	2.99
EU/K	2192	1.38	NORMAL	-0.43	0.17	0.78	1.98	2.59	3.19
EU/ETH	2188	0.25	NORMAL	-0.01	0.09	0.15	0.39	0.49	0.58
ETH/K	2192	4.55	NORMAL	1.14	2.28	3.41	5.68	6.82	7.95

FORMATION

QL

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	3181	4.47	NORMAL	0.02	1.51	2.99	5.96	7.44	8.92
E URANIUM	3009	1.20	NORMAL	-0.25	0.24	0.72	1.68	2.16	2.64
POTASSIUM	3169	1.16	NORMAL	-0.66	-0.05	0.55	1.76	2.37	2.97
EU/K	3000	0.77	LCGNORMAL	0.11	0.21	0.41	1.47	2.79	5.31
EU/ETH	2955	0.26	NORMAL	-0.00	0.08	0.17	0.34	0.43	0.52
ETH/K	3000	4.32	NORMAL	-0.57	1.06	2.69	5.95	7.58	9.21

FORMATION

QT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	329	3.40	LCGNORMAL	0.67	1.15	1.98	5.85	10.06	17.31
E URANIUM	306	1.28	LCGNORMAL	0.36	0.55	0.84	1.95	2.98	4.54
POTASSIUM	329	0.57	LCGNORMAL	0.11	0.19	0.33	0.99	1.71	2.94
EU/K	306	1.32	LCGNORMAL	0.39	0.59	0.88	1.97	2.96	4.43
EU/ETH	306	0.25	LCGNORMAL	0.08	0.11	0.17	0.37	0.54	0.81
ETH/K	306	5.10	NORMAL	1.94	3.00	4.05	6.16	7.21	8.27

FORMATION

QB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	642	4.25	NORMAL	2.16	2.85	3.55	4.95	5.65	6.34
E URANIUM	582	1.25	NORMAL	-0.03	0.40	0.82	1.67	2.10	2.53
POTASSIUM	642	0.94	NORMAL	0.43	0.60	0.77	1.12	1.29	1.46
EU/K	582	1.27	NORMAL	-0.35	0.19	0.73	1.81	2.34	2.88
EU/ETH	582	0.25	NORMAL	-0.03	0.08	0.18	0.38	0.49	0.59
ETH/K	582	4.25	NORMAL	2.29	2.96	3.63	4.96	5.63	6.29

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CUAD

FORMATION

QC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1426	2.96	LCGNORMAL	0.51	0.91	1.65	5.33	9.60	17.29
E URANIUM	1358	0.76	LCGNORMAL	0.13	0.24	0.42	1.37	2.46	4.42
POTASSIUM	1426	0.45	LCGNORMAL	0.03	0.08	0.19	1.09	2.63	6.33
EU/K	1358	1.26	NORMAL	-0.51	0.08	0.67	1.84	2.43	3.02
EU/ETH	1358	0.27	NORMAL	0.03	0.11	0.19	0.35	0.42	0.50
ETH/K	1358	4.55	NORMAL	-1.00	0.87	2.73	6.46	8.32	10.19

FORMATION

QF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	8601	3.87	NORMAL	-0.11	1.22	2.55	5.20	6.52	7.85
E URANIUM	8048	0.87	LCGNORMAL	0.20	0.33	0.53	1.41	2.28	3.71
POTASSIUM	8600	0.73	NORMAL	-0.45	-0.05	0.34	1.13	1.52	1.91
EU/K	8023	1.22	LCGNORMAL	0.21	0.38	0.68	2.17	3.89	6.95
EU/ETH	8042	0.27	NORMAL	-0.07	0.04	0.16	0.38	0.50	0.61
ETH/K	8023	4.61	LCGNORMAL	1.32	2.01	3.04	6.99	10.60	16.08

FORMATION

QG

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	2924	3.97	LCGNORMAL	1.14	1.73	2.62	6.01	9.11	13.79
E URANIUM	2860	1.30	NORMAL	-0.38	0.18	0.74	1.86	2.42	2.98
POTASSIUM	2914	1.01	NORMAL	-0.16	0.23	0.62	1.41	1.80	2.19
EU/K	2858	1.26	NORMAL	-0.05	0.38	0.82	1.69	2.13	2.56
EU/ETH	2855	0.27	NORMAL	-0.01	0.08	0.18	0.36	0.45	0.54
ETH/K	2858	4.65	NORMAL	1.03	2.23	3.44	5.86	7.07	8.28

FORMATION

QP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1156	3.56	NORMAL	0.08	1.24	2.40	4.72	5.88	7.04
E URANIUM	1031	0.94	NORMAL	-0.24	0.15	0.55	1.34	1.73	2.13
POTASSIUM	1144	0.61	NORMAL	-0.09	0.15	0.38	0.84	1.08	1.31
EU/K	1012	1.67	NORMAL	-1.04	-0.14	0.76	2.57	3.47	4.38
EU/ETH	1013	0.25	NORMAL	-0.05	0.05	0.15	0.36	0.46	0.56
ETH/K	1012	6.12	NORMAL	1.29	2.90	4.51	7.74	9.35	10.96

CHICO

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FORMATION

QSC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	3673	4.02	NORMAL	1.54	2.37	3.19	4.84	5.67	6.49
E URANIUM	3513	1.22	NORMAL	-0.27	0.23	0.72	1.72	2.21	2.71
POTASSIUM	3673	0.94	NORMAL	0.19	0.44	0.69	1.19	1.44	1.70
EU/K	3513	1.28	NORMAL	-0.34	0.20	0.74	1.81	2.35	2.89
EU/ETH	3513	0.25	NORMAL	-0.05	0.06	0.18	0.41	0.52	0.64
ETH/K	3513	4.21	NORMAL	1.68	2.53	3.37	5.06	5.90	6.74

FORMATION

QPVB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	696	5.06	NORMAL	0.81	2.23	3.64	6.48	7.90	9.32
E URANIUM	694	1.21	NORMAL	-0.25	0.24	0.72	1.70	2.18	2.67
POTASSIUM	696	1.10	NORMAL	-0.13	0.28	0.69	1.51	1.92	2.33
EU/K	694	1.12	NORMAL	-0.24	0.21	0.67	1.57	2.03	2.48
EU/ETH	694	0.23	NORMAL	-0.02	0.07	0.15	0.32	0.40	0.49
ETH/K	694	3.95	LCGNORMAL	1.08	1.67	2.58	6.16	9.52	14.72

FORMATION

QPVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	7	2.44	NORMAL	1.31	1.68	2.06	2.82	3.19	3.57
E URANIUM	7	0.78	NORMAL	0.58	0.65	0.72	0.95	0.92	0.99
POTASSIUM	7	0.56	NORMAL	0.47	0.50	0.52	0.55	0.61	0.64
EU/K	7	1.40	NORMAL	1.00	1.13	1.26	1.53	1.67	1.80
EU/ETH	7	0.32	NORMAL	0.16	0.22	0.28	0.39	0.45	0.50
ETH/K	7	4.10	NORMAL	1.91	2.64	3.37	4.82	5.56	6.29

FORMATION

GR

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	12905	2.37	LCGNORMAL	0.20	0.46	1.05	5.37	12.16	27.56
E URANIUM	12098	0.82	LCGNORMAL	0.13	0.24	0.45	1.52	2.80	5.17
POTASSIUM	12965	0.52	LCGNORMAL	0.08	0.15	0.27	0.97	1.84	3.46
EU/K	11864	1.16	LCGNORMAL	0.17	0.32	0.61	2.19	4.13	7.82
EU/ETH	11716	0.24	LCGNORMAL	0.05	0.09	0.14	0.40	0.66	1.09
ETH/K	11828	4.60	NORMAL	-0.85	0.97	2.78	6.42	8.24	10.05

CHICO

QUAD

FORMATION

GRM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	14	4.92	NORMAL	-0.36	1.40	3.16	6.68	8.44	10.20
E URANIUM	14	0.85	NORMAL	-0.28	0.10	0.47	1.22	1.60	1.98
POTASSIUM	14	1.18	NORMAL	0.67	0.84	1.01	1.35	1.52	1.69
EU/K	14	0.63	NORMAL	-0.07	0.16	0.40	0.86	1.10	1.33
EU/ETH	14	0.16	NORMAL	0.09	0.12	0.14	0.18	0.20	0.22
ETH/K	14	3.93	NORMAL	0.89	1.90	2.91	4.94	5.95	6.96

FORMATION

EVB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	410	3.62	NORMAL	-0.28	1.02	2.32	4.92	6.22	7.52
E URANIUM	382	1.01	NORMAL	-0.28	0.15	0.58	1.42	1.86	2.29
POTASSIUM	405	0.60	NORMAL	-0.16	0.09	0.34	0.85	1.11	1.36
EU/K	382	1.81	NORMAL	-0.56	0.23	1.02	2.60	3.39	4.18
EU/ETH	382	0.22	LEGNORMAL	0.04	0.07	0.12	0.38	0.67	1.19
ETH/K	382	4.73	LEGNORMAL	0.86	1.52	2.68	8.34	14.71	25.96

FORMATION

E

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	29	8.52	NORMAL	4.64	5.94	7.23	9.81	11.11	12.40
E URANIUM	29	3.85	NORMAL	0.91	1.89	2.87	4.83	5.82	6.80
POTASSIUM	29	1.71	NORMAL	0.70	1.04	1.37	2.04	2.38	2.71
EU/K	29	2.18	NORMAL	1.68	1.84	2.00	2.33	2.49	2.65
EU/ETH	29	0.42	NORMAL	0.29	0.34	0.39	0.48	0.52	0.57
ETH/K	29	4.76	NORMAL	2.88	3.51	4.13	5.39	6.01	6.64

FORMATION

EVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	10	9.16	NORMAL	7.12	7.80	8.48	9.84	10.53	11.21
E URANIUM	10	1.85	NORMAL	1.36	1.54	1.71	2.06	2.24	2.41
POTASSIUM	10	1.48	NORMAL	0.86	1.07	1.27	1.68	1.89	2.09
EU/K	10	1.24	NORMAL	0.51	0.75	0.99	1.48	1.72	1.96
EU/ETH	10	0.15	NORMAL	0.10	0.13	0.16	0.22	0.25	0.28
ETH/K	10	5.86	NORMAL	4.46	4.93	5.39	6.33	6.80	7.27

CHICO

CUAD

FORMATION

EC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	620	4.56	NORMAL	-0.68	1.08	2.83	6.34	8.09	9.84
E URANIUM	606	1.26	NORMAL	-0.27	0.24	0.75	1.77	2.28	2.79
POTASSIUM	620	0.61	NORMAL	-0.15	0.10	0.36	0.87	1.12	1.38
EU/K	606	1.65	LEGNORMAL	0.30	0.53	0.94	2.91	5.12	9.02
EU/ETH	606	0.28	NORMAL	0.01	0.10	0.15	0.37	0.46	0.55
ETH/K	606	5.17	LEGNORMAL	0.87	1.58	2.86	9.36	16.95	30.67

FORMATION

M

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	87	2.56	LEGNORMAL	0.80	1.17	1.71	3.67	5.37	7.86
E URANIUM	86	0.47	LEGNORMAL	0.07	0.13	0.24	0.90	1.73	3.32
POTASSIUM	87	0.65	NORMAL	-0.85	-0.34	0.17	1.20	1.72	2.23
EU/K	86	0.99	LEGNORMAL	0.23	0.37	0.61	1.62	2.65	4.31
EU/ETH	86	0.13	LEGNORMAL	0.01	0.03	0.06	0.27	0.57	1.18
ETH/K	86	3.97	LEGNORMAL	1.08	1.67	2.57	6.13	9.45	14.59

FORMATION

MVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1851	2.85	LEGNORMAL	0.41	0.79	1.51	5.52	10.55	20.16
E URANIUM	1780	0.71	LEGNORMAL	0.09	0.18	0.35	1.43	2.88	5.81
POTASSIUM	1851	0.61	LEGNORMAL	0.11	0.20	0.35	1.07	1.88	3.29
EU/K	1780	0.78	LEGNORMAL	0.09	0.19	0.38	1.60	3.27	6.69
EU/ETH	1780	0.26	NORMAL	-0.04	0.06	0.16	0.37	0.47	0.57
ETH/K	1780	3.44	LEGNORMAL	0.38	0.80	1.66	7.13	14.81	30.75

FORMATION

MVR

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	51	5.78	LEGNORMAL	1.68	2.53	3.83	8.72	13.17	19.89
E URANIUM	51	1.46	LEGNORMAL	0.38	0.60	0.93	2.30	3.60	5.65
POTASSIUM	51	1.58	NORMAL	1.15	1.29	1.44	1.72	1.87	2.01
EU/K	51	0.91	LEGNORMAL	0.40	0.53	0.69	1.20	1.58	2.08
EU/ETH	51	0.25	NORMAL	0.16	0.19	0.23	0.30	0.34	0.37
ETH/K	51	3.51	LEGNORMAL	1.84	2.28	2.83	4.36	5.41	6.71

CHICO

CUAD

FORMATION

MVA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	745	2.77	LCGNORMAL	0.64	1.04	1.70	4.52	7.37	12.02
E URANIUM	650	1.03	NORMAL	-0.37	0.09	0.56	1.49	1.96	2.43
POTASSIUM	745	0.86	NORMAL	0.21	0.43	0.66	1.10	1.32	1.54
EU/K	650	1.11	NORMAL	-0.37	0.12	0.62	1.61	2.11	2.60
EU/ETH	650	0.29	NORMAL	-0.06	0.06	0.18	0.41	0.53	0.64
ETH/K	650	3.64	NORMAL	0.69	1.67	2.66	4.62	5.60	6.59

FORMATION

MV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1113	0.92	LCGNORMAL	0.06	0.15	0.38	2.26	5.53	13.55
E URANIUM	935	0.32	LCGNORMAL	0.02	0.06	0.13	0.75	1.77	4.19
POTASSIUM	1121	0.15	LCGNORMAL	0.00	0.02	0.05	0.49	1.55	4.89
EU/K	903	0.81	LCGNORMAL	0.10	0.20	0.41	1.63	3.27	6.55
EU/ETH	869	0.31	NORMAL	-0.03	0.09	0.20	0.42	0.54	0.65
ETH/K	903	2.77	LCGNORMAL	0.45	0.82	1.51	5.07	9.28	17.00

FORMATION

KU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	291	2.33	LCGNORMAL	0.48	0.81	1.37	3.95	6.69	11.35
E URANIUM	266	0.49	LCGNORMAL	0.04	0.09	0.21	1.15	2.73	6.46
POTASSIUM	291	0.39	LCGNORMAL	0.05	0.10	0.20	0.77	1.49	2.90
EU/K	266	1.34	NORMAL	-0.63	0.02	0.68	2.00	2.65	3.31
EU/ETH	266	0.22	LCGNORMAL	0.05	0.08	0.14	0.35	0.55	0.88
ETH/K	266	4.96	NORMAL	1.81	2.86	3.91	6.01	7.06	8.11

FORMATION

JNL

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	887	6.34	NORMAL	-0.41	1.84	4.09	8.59	10.84	13.09
E URANIUM	873	1.90	NORMAL	-0.78	0.11	1.01	2.80	3.69	4.58
POTASSIUM	887	1.42	NORMAL	0.18	0.59	1.01	1.83	2.24	2.65
EU/K	873	1.25	NORMAL	0.04	0.44	0.85	1.66	2.06	2.47
EU/ETH	873	0.25	LCGNORMAL	0.08	0.11	0.17	0.38	0.57	0.86
ETH/K	873	4.24	NORMAL	1.19	2.21	3.23	5.26	6.28	7.30

CHICO

QUAD

FORMATION JU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	203	6.25	NORMAL	3.38	4.33	5.28	7.18	8.13	9.08
E URANIUM	202	1.72	NORMAL	-0.34	0.55	1.13	2.30	2.89	3.47
POTASSIUM	203	1.18	LOGNORMAL	0.59	0.83	0.99	1.42	1.69	2.03
EU/K	202	1.15	LOGNORMAL	0.53	0.69	0.91	1.56	2.05	2.69
EU/ETH	202	0.26	NORMAL	0.03	0.10	0.18	0.34	0.42	0.50
ETH/K	202	4.96	NORMAL	1.41	2.59	3.78	6.15	7.33	8.51

FORMATION JTRV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	8877	1.07	LOGNORMAL	0.13	0.26	0.52	2.18	4.45	9.08
E URANIUM	6492	0.51	LOGNORMAL	0.09	0.16	0.29	0.89	1.56	2.73
POTASSIUM	8803	0.18	LOGNORMAL	0.01	0.03	0.08	0.43	1.03	2.47
EU/K	5826	0.93	LOGNORMAL	0.09	0.20	0.43	1.99	4.28	9.18
EU/ETH	5647	0.26	LOGNORMAL	0.05	0.09	0.15	0.44	0.75	1.28
ETH/K	5777	2.70	LOGNORMAL	0.28	0.59	1.27	5.76	12.28	26.19

FORMATION TC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	56	2.25	NORMAL	-2.35	-0.80	0.74	3.84	5.39	6.93
E URANIUM	47	0.31	LOGNORMAL	0.06	0.10	0.18	0.53	0.92	1.58
POTASSIUM	56	0.51	NORMAL	-0.69	-0.29	0.11	0.91	1.30	1.70
EU/K	42	1.57	NORMAL	-1.31	-0.35	0.61	2.54	3.50	4.46
EU/ETH	45	0.32	NORMAL	0.05	0.14	0.23	0.41	0.50	0.59
ETH/K	42	4.92	NORMAL	-0.89	1.05	2.98	6.85	8.78	10.72

FORMATION TIB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	10	2.81	NORMAL	1.36	1.85	2.33	3.30	3.78	4.26
E URANIUM	9	0.31	NORMAL	-0.16	-0.00	0.16	0.47	0.63	0.79
POTASSIUM	10	0.58	NORMAL	0.26	0.37	0.48	0.69	0.80	0.90
EU/K	9	0.55	NORMAL	0.17	0.30	0.43	0.68	0.80	0.93
EU/ETH	9	0.11	NORMAL	0.02	0.05	0.08	0.15	0.18	0.21
ETH/K	9	4.68	NORMAL	3.28	3.74	4.21	5.15	5.62	6.09

CHICO

CUAD

FORMATION

TIR

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	14	7.74	NORMAL	4.16	5.35	6.55	8.94	10.13	11.32
E URANIUM	14	3.04	NORMAL	-0.52	0.67	1.85	4.22	5.41	6.59
POTASSIUM	14	1.50	NORMAL	0.02	0.51	1.00	1.99	2.48	2.98
EU/K	14	1.90	NORMAL	1.07	1.35	1.62	2.18	2.46	2.74
EU/ETH	14	0.36	NORMAL	0.00	0.12	0.24	0.48	0.60	0.72
ETH/K	14	4.43	LCGNORMAL	2.30	2.86	3.56	5.51	6.86	8.54

FORMATION

TVB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	500	2.70	LCGNORMAL	0.48	0.85	1.52	4.79	8.51	15.12
E URANIUM	457	0.80	LCGNORMAL	0.14	0.25	0.45	1.43	2.55	4.55
POTASSIUM	500	0.82	LCGNORMAL	0.23	0.35	0.54	1.24	1.88	2.84
EU/K	457	1.17	NORMAL	-0.20	0.26	0.72	1.63	2.09	2.55
EU/ETH	457	0.25	NORMAL	0.01	0.10	0.20	0.38	0.47	0.56
ETH/K	457	4.07	NORMAL	-0.75	0.86	2.46	5.68	7.29	8.90

FORMATION

TL

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	415	9.31	NORMAL	0.90	3.70	6.51	12.11	14.92	17.72
E URANIUM	412	2.35	NORMAL	0.00	0.78	1.57	3.14	3.92	4.70
POTASSIUM	417	1.95	NORMAL	0.95	1.28	1.61	2.28	2.61	2.94
EU/K	412	1.15	NORMAL	0.04	0.41	0.78	1.51	1.88	2.25
EU/ETH	412	0.24	NORMAL	0.07	0.12	0.18	0.30	0.36	0.42
ETH/K	412	4.55	NORMAL	1.20	2.32	3.44	5.67	6.79	7.90

FORMATION

TIA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	87	3.42	NORMAL	1.34	2.03	2.73	4.11	4.80	5.49
E URANIUM	83	0.78	NORMAL	-0.16	0.15	0.47	1.09	1.41	1.72
POTASSIUM	87	0.93	LCGNORMAL	0.61	0.70	0.81	1.07	1.23	1.41
EU/K	83	0.78	NORMAL	-0.29	0.07	0.42	1.13	1.48	1.84
EU/ETH	83	0.22	NORMAL	0.02	0.09	0.15	0.29	0.36	0.43
ETH/K	83	3.40	NORMAL	0.64	1.56	2.48	4.32	5.24	6.16

CHICO

CUAD

FORMATION

TVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	647	5.10	NCRMAL	0.95	2.34	3.72	6.48	7.86	9.25
E URANIUM	647	1.26	NCRMAL	-0.13	0.34	0.80	1.72	2.19	2.65
POTASSIUM	647	1.18	NCRMAL	-0.14	0.30	0.74	1.62	2.07	2.51
EU/K	647	1.10	NCRMAL	-0.14	0.27	0.69	1.51	1.92	2.34
EU/ETH	647	0.24	NCRMAL	0.03	0.10	0.17	0.31	0.38	0.45
ETH/K	647	4.52	NCRMAL	1.68	2.63	3.58	5.47	6.41	7.36

FORMATION

TVA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	2060	4.95	NCRMAL	0.13	1.74	3.34	6.56	8.17	9.78
E URANIUM	2043	1.32	NCRMAL	-0.31	0.23	0.78	1.87	2.42	2.96
POTASSIUM	2060	0.90	LCGNORMAL	0.36	0.48	0.66	1.22	1.66	2.26
EU/K	2043	1.29	NCRMAL	-0.08	0.38	0.83	1.74	2.20	2.65
EU/ETH	2043	0.26	NCRMAL	-0.00	0.08	0.17	0.35	0.44	0.53
ETH/K	2043	4.90	NCRMAL	0.94	2.26	3.58	6.23	7.55	8.87

FORMATION

OVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	553	3.09	LCGNORMAL	1.09	1.55	2.19	4.37	6.18	8.73
E URANIUM	548	1.05	NCRMAL	-0.22	0.22	0.65	1.52	1.96	2.39
POTASSIUM	553	0.77	NCRMAL	0.10	0.32	0.55	1.00	1.22	1.45
EU/K	548	1.35	NCRMAL	-0.32	0.25	0.82	1.96	2.53	3.10
EU/ETH	548	0.28	NCRMAL	-0.03	0.08	0.18	0.38	0.49	0.59
ETH/K	548	4.87	NCRMAL	0.91	2.23	3.55	6.19	7.51	8.82

FORMATION

O

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	41	3.64	NCRMAL	1.67	0.10	1.87	5.41	7.18	8.95
E URANIUM	38	1.18	NCRMAL	0.43	0.68	0.93	1.43	1.69	1.94
POTASSIUM	41	0.68	NCRMAL	0.16	0.33	0.50	0.85	1.03	1.20
EU/K	38	1.72	NCRMAL	0.34	0.60	1.16	2.28	2.84	3.40
EU/ETH	38	0.20	LCGNORMAL	0.35	0.08	0.13	0.31	0.49	0.76
ETH/K	38	5.01	NCRMAL	1.05	2.37	3.69	6.34	7.66	8.98

CHICO

CUAD

FORMATION

PVR

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	24	9.89	NORMAL	5.91	7.24	8.56	11.21	12.54	13.87
E URANIUM	24	3.95	NORMAL	1.96	2.62	3.29	4.61	5.27	5.94
POTASSIUM	24	1.86	NORMAL	1.40	1.55	1.71	2.01	2.17	2.32
EU/K	24	2.02	NORMAL	1.25	1.51	1.77	2.28	2.54	2.80
EU/ETH	24	0.38	NORMAL	0.13	0.22	0.30	0.47	0.55	0.64
ETH/K	24	5.04	NORMAL	2.94	3.64	4.34	5.74	6.44	7.14

FORMATION

PC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	37	7.54	NORMAL	-2.03	1.16	4.35	10.73	13.92	17.11
E URANIUM	34	3.58	NORMAL	-0.21	1.05	2.32	4.84	6.11	7.37
POTASSIUM	37	1.24	NORMAL	-0.08	0.36	0.80	1.68	2.12	2.57
EU/K	34	2.56	NORMAL	-0.18	0.73	1.64	3.47	4.38	5.30
EU/ETH	34	0.41	NORMAL	-0.01	0.13	0.27	0.55	0.69	0.82
ETH/K	34	5.75	NORMAL	3.29	4.11	4.93	6.57	7.39	8.20

FORMATION

PMV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	25	2.15	NORMAL	-0.40	0.45	1.30	3.00	3.85	4.69
E URANIUM	25	1.05	NORMAL	-0.81	-0.18	0.46	1.73	2.37	3.00
POTASSIUM	25	0.47	NORMAL	0.19	0.29	0.38	0.56	0.66	0.75
EU/K	25	2.35	NORMAL	-2.43	-0.82	0.79	4.00	5.61	7.22
EU/ETH	21	0.17	LCGNORMAL	0.03	0.05	0.09	0.32	0.62	1.18
ETH/K	25	4.28	NORMAL	1.10	2.16	3.22	5.33	6.39	7.45

FORMATION

PVA

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	804	3.13	NORMAL	0.21	1.18	2.15	4.10	5.07	6.04
E URANIUM	711	0.68	LCGNORMAL	0.10	0.18	0.35	1.30	2.49	4.79
POTASSIUM	804	0.37	NORMAL	-0.07	0.07	0.22	0.52	0.67	0.82
EU/K	685	2.62	NORMAL	-2.04	-0.49	1.06	4.17	5.72	7.28
EU/ETH	711	0.26	NORMAL	-0.09	0.02	0.14	0.37	0.49	0.61
ETH/K	685	5.38	LCGNORMAL	0.87	1.60	2.93	9.85	18.04	33.05

CHICO

CUAD

FORMATION

PVB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	422	3.61	NORMAL	0.48	1.52	2.57	4.66	5.70	6.75
E URANIUM	389	0.90	NORMAL	-0.30	0.10	0.50	1.30	1.70	2.10
POTASSIUM	440	0.50	NORMAL	-0.39	-0.09	0.21	0.80	1.10	1.39
EU/K	376	1.97	NORMAL	-0.84	0.10	1.03	2.91	3.85	4.78
EU/ETH	389	0.22	NORMAL	-0.03	0.06	0.15	0.32	0.41	0.50
ETH/K	376	6.94	LOGNORMAL	2.04	3.07	4.62	10.42	15.66	23.52

FORMATION

PVP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	13036	2.46	LOGNORMAL	0.25	0.54	1.16	5.31	11.38	24.36
E URANIUM	12173	0.94	LOGNORMAL	0.17	0.30	0.53	1.55	2.90	5.09
POTASSIUM	13031	0.45	LOGNORMAL	0.07	0.13	0.24	0.83	1.96	2.92
EU/K	12116	1.32	LOGNORMAL	0.22	0.39	0.72	2.42	4.43	8.11
EU/ETH	12158	0.25	NORMAL	-0.03	0.06	0.16	0.35	0.44	0.54
ETH/K	12116	5.12	LOGNORMAL	0.72	1.38	2.66	9.85	13.94	36.42

FORMATION

PZ

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	11567	4.90	LOGNORMAL	1.23	1.95	3.09	7.78	12.34	19.58
E URANIUM	11306	1.55	NORMAL	-0.47	0.21	0.88	2.22	2.89	3.56
POTASSIUM	11567	1.06	NORMAL	-0.52	0.01	0.53	1.58	2.11	2.63
EU/K	11266	1.26	LOGNORMAL	0.22	0.39	0.70	2.26	4.06	7.28
EU/ETH	11257	0.20	LOGNORMAL	0.04	0.07	0.12	0.34	0.57	0.97
ETH/K	11266	6.58	NORMAL	0.84	2.75	4.67	8.49	10.40	12.32

FORMATION

PZV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1649	2.71	LOGNORMAL	0.74	1.14	1.76	4.17	6.42	9.89
E URANIUM	1573	1.03	NORMAL	-0.49	0.01	0.52	1.53	2.04	2.55
POTASSIUM	1651	0.33	LOGNORMAL	0.07	0.12	0.22	0.66	1.15	2.01
EU/K	1523	1.43	LOGNORMAL	0.24	0.44	0.80	2.68	4.91	8.99
EU/ETH	1551	0.25	LOGNORMAL	0.06	0.10	0.16	0.42	0.68	1.10
ETH/K	1522	5.27	LOGNORMAL	1.02	1.76	3.05	9.12	15.78	27.29

CHICO

QUAD

FORMATION

BI

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1875	0.94	LCGNORMAL	0.10	0.22	0.45	1.94	4.03	8.38
E URANIUM	1514	0.51	LCGNORMAL	0.09	0.17	0.29	0.91	1.60	2.83
POTASSIUM	1809	0.12	LCGNORMAL	0.01	0.02	0.05	0.31	0.76	1.87
EU/K	1212	1.37	LCGNORMAL	0.14	0.30	0.65	2.92	6.21	13.22
EU/ETH	1282	0.28	LCGNORMAL	0.06	0.10	0.17	0.47	0.79	1.32
ETH/K	1200	3.40	LCGNORMAL	0.43	0.86	1.71	6.76	13.45	26.76

FORMATION

UB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	1986	1.10	LCGNORMAL	0.13	0.27	0.54	2.22	4.48	9.04
E URANIUM	1554	0.55	LCGNORMAL	0.09	0.17	0.31	1.00	1.80	3.24
POTASSIUM	1898	0.12	LCGNORMAL	0.01	0.02	0.05	0.29	0.71	1.76
EU/K	1285	1.20	LCGNORMAL	0.13	0.27	0.57	2.53	5.30	11.12
EU/ETH	1382	0.23	LCGNORMAL	0.04	0.07	0.13	0.41	0.72	1.29
ETH/K	1279	4.91	LCGNORMAL	0.71	1.36	2.58	9.34	17.77	33.80

FORMATION

W

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	357	3.20	NORMAL	-3.55	-1.30	0.95	5.45	7.70	9.95
E URANIUM	314	1.02	NORMAL	-0.94	-0.28	0.37	1.67	2.33	2.98
POTASSIUM	356	0.65	NORMAL	-0.67	-0.23	0.21	1.09	1.53	1.97
EU/K	281	1.36	LCGNORMAL	0.39	0.59	0.90	2.07	3.14	4.75
EU/ETH	276	0.30	NORMAL	-0.04	0.07	0.18	0.41	0.52	0.63
ETH/K	280	5.05	NORMAL	-0.07	1.63	3.34	6.76	8.46	10.17

A P P E N D I X F

Format, Single Record Data Listing

REC NO.	LAT	LONG	RESID MAG GAMMA	TERR CL FEET	FLG	GEOL UNIT	CUSH CPS	ATM U CPS	TOTAL COUNT CPS	FLG	ETH PPM	ILG	EU PPM	FLG	K PCT	FLG	LU/ETH	EU/K	ETH/K	TEMP CELCEIUS	BAKU PRES MMHG
5079	64.0086	-160.9197	55305	763	MAR	W	31	1	-12	NAD	-1.1	NAD	-0.5	NAD	0.0	NAD	0.0	0.0	0.0	12.7	746.8
5080	64.0087	-160.9189	55305	751	MAR	W	28	1	36	MAR	0.0	NAD	0.1	NAD	0.1	NAD	0.0	0.0	0.0	12.7	747.1
5081	64.0087	-160.9176	55305	741	MAR	W	26	1	4	NAD	0.2	NAD	0.1	NAD	-0.1	NAD	0.0	0.0	0.0	12.7	747.4
5082	64.0088	-160.9160	55305	730	MAR	W	35	1	-60	NAD	0.0	NAD	0.3	NAD	-0.1	NAD	0.0	0.0	0.0	12.7	747.7
5083	64.0088	-160.9154	55305	722	MAR	W	26	1	-4	NAD	-2.7	NAD	2.3		-0.4	NAD	0.0	0.0	0.0	12.7	748.0
5084	64.0089	-160.9144	55305	712	MAR	W	28	1	-12	NAD	0.5	NAD	-1.7	NAD	0.0	NAD	0.0	0.0	0.0	12.7	748.1
5085	64.0089	-160.9131	55305	702	MAR	W	23	1	37	MAR	0.0	NAD	0.4	NAU	-0.3	NAD	0.0	0.0	0.0	12.7	748.5
5086	64.0090	-160.9121	55305	691		W	22	1	50		0.3	NAD	-0.1	NAD	0.0	NAD	0.0	0.0	0.0	12.7	748.8
5087	64.0091	-160.9109	55305	680		W	23	1	46		0.3	NAU	0.0	NAD	-0.0	NAD	0.0	0.0	0.0	12.7	749.1
5088	64.0092	-160.9099	55305	673		W	17	1	72		0.6	MAR	0.3	NAD	-0.3	NAD	0.0	0.0	0.0	12.8	749.3
5089	64.0092	-160.9087	55305	668		W	20	1	156		-1.6	NAD	0.7	MAR	-0.0	NAD	0.0	0.0	0.0	12.8	749.4
5090	64.0093	-160.9075	55304	666		W	32	1	113		0.0	NAD	0.6	MAR	0.0	NAD	0.0	0.0	0.0	12.8	749.4
5091	64.0093	-160.9064	55304	667		W	30	1	247		-0.2	NAU	0.6	MAR	0.1	NAD	0.0	0.0	0.0	12.8	749.3
5092	64.0094	-160.9052	55304	671		W	29	1	343		0.2	NAD	1.1		0.3		0.0	4.0	0.0	12.8	749.2
5093	64.0094	-160.9042	55304	679		W	23	1	659		2.9		-0.8	NAD	0.8		0.0	0.0	3.5	12.8	748.9
5094	64.0095	-160.9030	55304	683		W	34	0	965		3.2		1.4		0.8		0.5	1.9	4.1	12.9	748.5
5095	64.0096	-160.9017	55305	647		KS	24	0	1208		8.6		0.0	NAD	0.5		0.0	0.0	18.3	12.9	748.1
5096	64.0096	-160.9007	55305	463		KS	12	0	945		2.5		1.7		0.5		0.7	3.5	5.2	12.9	747.8
5097	64.0098	-160.8995	55305	455		KS	20	0	831		3.0		1.5		0.6		0.5	2.8	5.5	12.9	747.6
5098	64.0098	-160.8985	55305	457		KS	22	0	759		2.2		1.4		0.3		0.8	5.1	8.1	12.9	747.1
5099	64.0099	-160.8973	55305	465		KS	29	0	699		1.7		2.0		0.5		1.1	4.4	4.1	12.9	746.5
5100	64.0100	-160.8962	55305	479		KS	28	0	610		0.5	NAD	1.3		0.4		0.0	3.7	0.0	12.9	746.1
5101	64.0100	-160.8950	55305	497		KS	26	0	581		2.2		0.5	MAR	0.3		0.2	1.6	7.0	12.9	746.0
5102	64.0101	-160.8940	55304	518		KS	35	0	512		1.3		-0.2	NAD	0.3		0.0	0.0	4.2	12.9	745.7
5103	64.0101	-160.8928	55304	540		KS	20	0	677		2.1		1.0		0.2		0.5	5.6	11.2	12.8	745.5
5104	64.0102	-160.8918	55304	569		KS	26	0	579		1.7		1.2		0.1	MAR	0.7	12.6	17.6	12.8	745.5
5105	64.0103	-160.8905	55304	608		KS	21	-1	611		3.2		3.1		0.0	NAD	1.0	0.0	0.0	12.8	745.6
5106	64.0103	-160.8895	55304	614		KS	16	-1	551		3.7		0.2	NAD	0.3		0.0	0.0	11.1	12.8	745.5
5107	64.0104	-160.8883	55304	595		KS	37	-1	488		1.6		2.4		0.1	MAR	1.5	18.6	12.5	12.8	745.4
5108	64.0105	-160.8873	55302	575		KS	22	-1	510		0.2	NAD	1.3		0.3		0.0	5.1	0.0	12.8	745.3
5109	64.0106	-160.8860	55304	552		KS	28	-1	437		0.0	NAD	1.0		0.1	MAR	0.0	9.0	0.0	12.8	745.2
5110	64.0107	-160.8848	55305	532		KS	25	-1	405		0.9	NAD	1.1		0.3		0.0	4.0	0.0	12.8	745.1
5111	64.0107	-160.8838	55305	514		KS	25	-1	379		1.0	MAR	-0.1	NAD	0.3		0.0	0.0	3.0	12.8	744.7
5112	64.0108	-160.8826	55305	501		KS	35	-1	325		0.5	MAR	1.4		0.1	MAR	2.5	13.6	5.5	12.8	744.5
5113	64.0108	-160.8816	55305	490		KS	20	-1	411		0.0	NAD	1.1		0.0	NAD	0.0	0.0	0.0	12.8	744.3
5114	64.0109	-160.8803	55305	481		KS	22	-1	417		1.0		1.0		0.1	MAR	1.0	12.7	12.9	12.8	744.3
5115	64.0110	-160.8791	55305	477		KS	28	-1	517		0.8	MAR	1.1		0.3		1.3	4.0	3.1	12.8	744.1
5116	64.0110	-160.8781	55304	479		KS	17	0	616		1.4		0.7		0.5		0.5	1.4	2.8	12.8	744.0
5117	64.0111	-160.8769	55304	486		KS	23	0	623		4.3		0.8		0.6		0.2	1.4	7.0	12.8	743.9
5118	64.0111	-160.8759	55303	493		KS	22	0	607		2.5		1.5		0.1		0.6	10.2	17.5	12.8	744.0
5119	64.0112	-160.8746	55303	500		KS	21	0	693		3.5		0.5	MAR	0.5		0.2	1.1	7.4	12.8	744.2
5120	64.0113	-160.8734	55303	509		KS	22	-1	633		2.2		2.6		0.3		1.2	8.6	7.2	12.8	744.2
5121	64.0113	-160.8724	55302	516		KS	30	-1	636		3.7		0.2	NAD	0.3		0.0	0.0	10.9	12.8	744.5
5122	64.0113	-160.8712	55302	519		KS	25	-2	777		5.1		1.5		0.3		0.3	9.9	20.2	12.8	744.9
5123	64.0113	-160.8701	55302	518		KS	26	-2	658		3.8		0.9		0.4		0.2	2.2	9.0	12.8	745.1
5124	64.0113	-160.8689	55302	517		KS	32	-2	718		0.8	MAR	1.9		0.7		2.1	2.8	1.3	12.8	745.6
5125	64.0113	-160.8677	55302	523		KS	32	-2	763		2.7		2.2		0.2		0.8	13.0	16.0	12.8	746.1
5126	64.0114	-160.8667	55302	541		KS	25	-1	781		3.2		1.3		0.6		0.4	2.4	5.9	12.8	746.4
5127	64.0114	-160.8654	55301	559		KS	26	-1	736		1.1	MAR	2.6		0.3		2.2	8.2	3.8	12.9	746.8
5128	64.0114	-160.8644	55300	574		KS	23	-1	668		3.2		0.2	NAD	0.4		0.0	0.0	7.4	12.9	747.1
5129	64.0114	-160.8632	55300	592		KS	21	0	640		2.4		3.5		-0.0	NAD	1.4	0.0	0.0	12.9	747.3
5130	64.0113	-160.8620	55300	606		KS	14	0	696		1.9		1.9		0.3		1.0	7.1	6.9	12.9	747.3
5131	64.0113	-160.8609	55302	617		KS	27	0	595		1.4		0.7	MAR	0.3		0.5	2.4	4.4	13.0	747.7

SINGLE RECORD DATA

LINE 240 PAGE 1

FINISHED OUTPUTTING LINE 240

LINE 220 FIDS 2935 TO 4865 OUTPUT TO SRRD TAPE

A P P E N D I X G

Format, Average Record Data Listing

RECORD NUMBER	LATITUDE	LONGITUDE	RELTD TOTAL FIELD GAMMA	GENE UNIT	COSM CPS	ATM. MIRAN CPS	TOTAL COUNT CPS	ETH PPM	STD FLG	STD DEV	POT FLG	STD DEV	POT PCT	STD FLG	STD DEV	FU ETH RATIO	STD DEV	FU POTA RATIO	STD DEV	ETH POTA RATIO	STD DEV
5238	64.0098	-160.7455	55295	W	33	-6	990	3.7	1	1.9	2	0.7	1	0.5	0	2.8	0	5.2	0		
5237	64.0098	-160.7444	55293	KS	43	-6	952	3.7	0	1.9	0	0.7	0	0.5	1	2.9	0	5.3	0		
5240	64.0099	-160.7434	55289	KS	27	-5	998	3.7	0	2.1	0	0.7	0	0.6	2	3.1	1	5.3	0		
5241	64.0098	-160.7422	55287	KS	33	-5	1047	3.5	0	2.2	0	0.7	0	0.6	2	3.2	1	5.2	0		
5242	64.0098	-160.7412	55298	KS	31	-5	1083	3.5	0	2.1	0	0.7	0	0.6	2	2.9	0	4.8	0		
5243	64.0097	-160.7399	55287	KS	30	-4	1156	3.7	0	1.9	0	0.7	0	0.5	1	2.7	0	5.0	0		
5244	64.0097	-160.7389	55287	KS	31	-4	1182	4.1	0	1.9	0	0.8	0	0.5	1	2.5	0	5.3	0		
5245	64.0097	-160.7379	55286	KS	26	-4	1245	4.0	0	1.7	0	0.8	0	0.4	0	2.1	0	4.9	0		
5246	64.0096	-160.7366	55285	KS	38	-4	1148	3.8	0	1.6	0	0.8	0	0.4	0	2.1	0	4.8	0		
5247	64.0097	-160.7356	55289	KS	30	-3	1211	3.7	0	1.5	0	0.8	0	0.4	0	1.9	0	4.5	0		
5248	64.0096	-160.7344	55295	KS	30	-3	1076	3.8	0	1.5	0	0.8	0	0.4	0	1.9	0	4.7	0		
5249	64.0096	-160.7334	55284	KS	29	-3	1016	3.7	0	1.3	0	0.8	0	0.4	0	1.6	0	4.6	0		
5250	64.0096	-160.7324	55283	KS	33	-3	975	3.7	0	1.2	0	0.8	0	0.3	0	1.6	0	4.8	0		
5251	64.0095	-160.7311	55283	KS	23	-3	976	3.5	0	1.2	0	0.7	0	0.3	0	1.7	0	5.0	0		
5252	64.0095	-160.7301	55283	KS	30	-3	948	3.7	0	1.1	0	0.7	0	0.3	0	1.6	0	5.1	0		
5253	64.0095	-160.7299	55284	KS	33	-3	921	3.8	0	1.0	-1	0.7	0	0.3	0	1.4	-1	5.2	0		
5254	64.0095	-160.7278	55284	KS	37	-2	803	4.0	0	1.0	-1	0.7	0	0.3	0	1.5	-1	5.6	0		
5255	64.0095	-160.7266	55283	KS	23	-2	954	4.1	0	1.0	-1	0.7	0	0.3	-1	1.4	-1	5.5	0		
5256	64.0094	-160.7256	55293	KS	29	-1	1006	4.3	0	1.0	-1	0.7	0	0.2	-1	1.3	-1	5.8	0		
5257	64.0094	-160.7244	55283	KS	37	-1	1133	4.0	0	1.0	-1	0.7	0	0.2	-1	1.3	-1	5.5	0		
5258	64.0094	-160.7233	55284	KS	23	0	1106	4.1	0	1.0	-1	0.7	0	0.2	-1	1.4	-1	5.9	0		
5259	64.0094	-160.7221	55285	KS	28	0	1034	4.1	0	0.8	-1	0.7	0	0.2	-1	1.2	-1	6.1	0		
5260	64.0094	-160.7211	55284	KS	21	0	963	4.1	0	0.8	-1	0.7	0	0.2	-1	1.3	-1	6.2	0		
5261	64.0093	-160.7199	55294	KS	27	0	840	3.7	0	0.8	-1	0.6	0	0.2	-1	1.3	-1	6.1	0		
5262	64.0093	-160.7188	55294	KS	29	0	718	3.2	0	0.9	-1	0.5	-1	0.3	0	1.7	0	6.0	0		
5263	64.0092	-160.7176	55284	KS	33	0	605	2.5	-1	0.9	-1	0.5	-1	0.4	0	1.8	0	5.2	0		
5264	64.0092	-160.7166	55294	KS	32	0	635	2.1	-1	0.8	-1	0.4	-1	0.4	0	1.9	0	5.2	0		
5265	64.0093	-160.7156	55283	KS	35	0	507	1.7	-1	0.7	-1	0.3	-1	0.4	0	2.2	0	5.3	0		
5266	64.0092	-160.7143	55283	KS	26	-1	521	1.6	-1	0.7	-1	0.3	-1	0.5	1	2.5	0	5.4	0		
5267	64.0092	-160.7133	55283	KS	19	-1	465	1.4	-1	0.8	-1	0.3	-1	0.6	2	2.9	1	5.1	0		
5268	64.0091	-160.7121	55283	W	34	-1	287	1.3	0	0.9	1	0.3	1	0.7	1	3.1	0	4.6	-1		
5269	64.0091	-160.7110	55282	KS	29	-1	398	1.3	-1	1.0	-1	0.3	-1	0.8	3	3.4	1	4.4	0		
5270	64.0092	-160.7100	55282	KS	42	-1	516	1.7	-1	1.1	0	0.3	-1	0.6	2	3.2	1	5.1	0		
5271	64.0092	-160.7090	55283	KS	29	0	716	1.9	-1	1.0	-1	0.4	-1	0.6	2	2.8	0	5.1	0		
5272	64.0092	-160.7078	55283	KS	25	0	781	2.1	-1	1.1	0	0.4	-1	0.5	1	2.9	0	5.2	0		
5273	64.0092	-160.7068	55282	KS	32	0	738	2.4	-1	1.1	0	0.4	-1	0.5	1	2.7	0	6.0	0		
5274	64.0091	-160.7057	55281	KS	25	0	853	2.5	-1	1.1	0	0.4	-1	0.5	1	2.7	0	5.9	0		
5275	64.0091	-160.7047	55282	KS	22	0	796	2.5	-1	1.1	0	0.5	-1	0.4	0	2.4	0	5.8	0		
5276	64.0091	-160.7037	55281	KS	21	0	904	2.9	-1	1.0	-1	0.5	-1	0.4	0	2.2	0	6.1	0		
5277	64.0092	-160.7025	55281	KS	37	1	810	2.9	-1	1.0	-1	0.4	-1	0.4	0	2.3	0	6.5	0		
5278	64.0092	-160.7014	55280	KS	27	2	764	3.0	0	0.9	-1	0.5	-1	0.3	0	1.9	0	6.3	0		
5279	64.0092	-160.7004	55282	KS	31	1	750	2.9	-1	0.9	-1	0.5	-1	0.3	0	2.0	0	6.0	0		
5280	64.0092	-160.6994	55283	KS	33	1	740	2.9	-1	1.0	-1	0.5	-1	0.3	0	2.1	0	6.2	0		
5281	64.0092	-160.6984	55283	KS	32	1	745	3.3	0	0.8	-1	0.5	-1	0.2	-1	1.7	0	7.1	0		
5282	64.0092	-160.6973	55283	KS	36	1	779	3.7	0	0.8	-1	0.5	0	0.2	-1	1.5	-1	6.5	0		
5283	64.0092	-160.6963	55283	KS	31	1	821	3.8	0	0.8	-1	0.6	0	0.2	-1	1.4	-1	6.6	0		
5284	64.0092	-160.6951	55283	KS	31	1	858	3.8	0	1.0	-1	0.6	0	0.3	0	1.8	0	6.5	0		
5285	64.0092	-160.6941	55284	KS	30	1	948	3.7	0	1.2	0	0.6	0	0.3	0	2.0	0	6.0	0		
5286	64.0093	-160.6931	55284	KS	26	0	1054	3.7	0	1.3	0	0.6	0	0.3	0	2.1	0	6.0	0		
5287	64.0093	-160.6920	55282	KS	32	0	963	3.3	0	1.5	0	0.6	0	0.4	0	2.4	0	5.7	0		
5288	64.0093	-160.6910	55281	KS	30	0	1040	3.3	0	1.3	0	0.6	0	0.4	0	2.1	0	5.5	0		
5289	64.0093	-160.6900	55281	KS	25	0	997	3.3	0	1.3	0	0.6	0	0.4	0	2.2	0	5.5	0		
5290	64.0093	-160.6890	55281	KS	32	0	944	3.0	0	1.5	0	0.6	0	0.5	1	2.5	0	5.0	0		

A P P E N D I X H

Format, DOE SINGLE RECORD REDUCED DATA TAPE

DOE SINGLE RECORD REDUCED DATA TAPE

Line	Character Number		
Number	12345678901234567890123456789012345678901234567890123456789012		
1	02 0978	(DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)	
2			
3	SINGLE RECORD REDUCED DATA TAPE		
4			
5	FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)		
6			
7	ITEM	FORMAT	DESCRIPTION
8	1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION
9	2	A20	NAME OF SUBCONTRACTOR
10	3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
11	4	I1	NUMBER OF AERIAL SYSTEMS USED TO COLLECT DATA FOR THIS QUADRANGLE
12			
13	5	I1	AERIAL SYSTEM IDENTIFICATION CODE FOR FIRST SYSTEM
14	6	A20	AIRCRAFT IDENTIFICATION BY TYPE AND FAA NUMBER FOR FIRST SYSTEM
15			
16	7	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE
17			IN CPS PER PERCENT K FOR FIRST SYSTEM
18	8	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO TERRESTRIAL URANIUM (BI-214) TO ONE DECIMAL PLACE
19			IN CPS PER PPM EQUIVALENT U
20	9	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE
21			IN CPS PER PPM EQUIVALENT TH
22			
23			
24			
25	10	I6	BLANK FIELD (999999)
26	11	F6.3	4PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL PLACES IN SECONDS FOR FIRST SYSTEM
27			
28	12	F6.3	2PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL PLACES IN SECONDS FOR FIRST SYSTEM
29			
30	13	I3	NUMBER OF CHANNELS (0-3 MEV) IN 4 PI SYSTEM FOR FIRST AERIAL SYSTEM
31			
32	14	I3	NUMBER OF CHANNELS (0-3 MEV) IN 2 PI SYSTEM FOR FIRST AERIAL SYSTEM
33			
34	15-24	(SAME)	REPEAT OF ITEMS 5-14 FOR SECOND AERIAL SYSTEM
35	*	*	*
36	*	*	*
37	*	*	*
38	85-94	(SAME)	REPEAT OF ITEMS 5-14 FOR NINTH AERIAL SYSTEM
39	95	I3	NUMBER OF FLIGHT LINES ON THIS TAPE
40	96	I4	FIRST FLIGHT LINE NUMBER ON THIS TAPE
41	97	I6	FIRST RECORD NUMBER OF FIRST FLIGHT LINE
42	98	I3	JULIAN DATE (DAY OF YEAR) FIRST FLIGHT-LINE DATA WAS COLLECTED
43			
44	99-101	I4,6, &3	REPEAT OF ITEMS 96-98 FOR SECOND FLIGHT LINE ON THIS TAPE
45			
46	*	*	*
47	*	*	*
48			
49	390-392	I4,6, &3	REPEAT OF ITEMS 96-98 FOR 99TH FLIGHT LINE ON THIS TAPE
50			
51			

Line Character Number
 Number 12345678901234567890123456789012345678901234567890123456789012

Line	ITEM	FORMAT	DESCRIPTION
52			FORMAT FOR SINGLE RECORD REDUCED DATA RECORD (THIRD THRU LAST BLOCK)
53			
54	ITEM	FORMAT	DESCRIPTION
55	1	I1	AERIAL SYSTEM IDENTIFICATION CODE
56	2	I4	FLIGHT LINE NUMBER
57	3	I6	RECORD IDENTIFICATION NUMBER
58	4	I6	GMT TIME OF DAY (HHMMSS)
59	5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
60	6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
61	7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
62	8	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY
63			TO ONE DECIMAL PLACE IN GAMMAS
64	9	A8	SURFACE GEOLOGIC MAP UNIT CODE
65	10	I4	QUALITY FLAG CODES
66	11	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL POTASSIUM
67			(K-40) TO ONE DECIMAL PLACE IN PERCENT K
68	12	F4.1	UNCERTAINTY IN TERRESTRIAL POTASSIUM TO ONE DECIMAL
69			PLACE IN PERCENT K
70	13	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL URANIUM
71			(BI-214) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
72	14	F4.1	UNCERTAINTY IN TERRESTRIAL URANIUM TO ONE DECIMAL
73			PLACE IN PPM EQUIVALENT U
74	15	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL THORIUM
75			(TL-208) TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
76	16	F4.1	UNCERTAINTY IN TERRESTRIAL THORIUM TO ONE DECIMAL
77			PLACE IN PPM EQUIVALENT TH
78	17	F6.1	URANIUM-TO-THORIUM RATIO TO ONE DECIMAL PLACE IN
79			PPM EQUIVALENT U PER PPM EQUIVALENT TH
80	18	F6.1	URANIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN
81			PPM EQUIVALENT U PER PERCENT K
82	19	F6.1	THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN
83			PPM EQUIVALENT TH PER PERCENT K
84	20	F8.1	GROSS GAMMA (0.4-3.0 MEV) COUNT RATE TO ONE DECIMAL
85			PLACE IN COUNTS PER SECOND
86	21	F6.1	UNCERTAINTY IN GROSS GAMMA COUNT RATE TO ONE DECIMAL
87			PLACE IN COUNTS PER SECOND
88	22	F5.1	ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL
89			PLACE IN PPM EQUIVALENT U
90	23	F4.1	UNCERTAINTY IN ATMOSPHERIC BI-214 4PI CORRECTION
91			TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
92	24	F4.1	OUTSIDE AIR TEMPERATURE TO ONE DECIMAL PLACE IN
93			DEGREES CELSIUS
94	25	F5.1	OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG

A P P E N D I X I

Format, DOE RAW SPECTRAL DATA TAPE

DOE RAW SPECTRAL DATA TAPE

Line	Character number
Number	12345678901234567890123456789012345678901234567890123456789012

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1  01 0978  (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)
2
3  RAW SPECTRAL DATA TAPE
4
5  FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK ON TAPE)
6
7  ITEM      FORMAT  DESCRIPTION
8  1         A40     QUADRANGLE NAME AS PROJECT IDENTIFICATION
9  2         A20     NAME OF SUBCONTRACTOR
10 3         I4      APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
11 4         I1      AERIAL SYSTEM IDENTIFICATION CODE
12 5         A20     AIRCRAFT IDENTIFICATION BY TYPE AND FAA NUMBER
13 6         I3      BFEC CALIBRATION REPORT NUMBER
14 7         F6.3    4PI SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL
15                     PLACES IN SECONDS
16 8         F6.3    2PI SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL
17                     PLACES IN SECONDS
18 9         I3      NUMBER OF CHANNELS (0-3 MEV) FOR 4PI SYSTEM
19 10        I3      NUMBER OF CHANNELS (0-3 MEV) FOR 2PI SYSTEM
20 11        I3      NUMBER OF FLIGHT LINES ON THIS TAPE
21 12        I4      FIRST FLIGHT LINE NUMBER ON THIS TAPE
22 13        I6      FIRST RECORD NUMBER OF FIRST FLIGHT LINE
23 14        I3      JULIAN DATE (DAY OF YEAR) FIRST FLIGHT LINE WAS
24                     COLLECTED
25 15-17     I4,6 &3 REPEAT OF ITEMS 12-14 FOR SECOND FLIGHT LINE ON THIS
26                     TAPE
27 *         *              *
28 *         *              *
29 *         *              *
30 306-308   I4,6 &3 REPEAT OF ITEMS 12-14 FOR 99TH FLIGHT LINE ON THIS
31                     TAPE
32
33 FORMAT FOR RAW SPECTRAL DATA RECORD (THIRD THRU LAST BLOCK ON TAPE)
34
35 ITEM      FORMAT  DESCRIPTION
36 1         I1      AERIAL SYSTEM IDENTIFICATION CODE
37 2         I4      FLIGHT LINE NUMBER
38 3         I6      RECORD IDENTIFICATION NUMBER
39 4         I6      GMT TIME OF DAY (HHMMSS)
40 5         F8.4    LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
41 6         F8.4    LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
42 7         F6.2    TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
43 8         F7.1    TOTAL MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE
44                     IN GAMMAS
45 9         A8      SURFACE GEOLOGIC MAP UNIT CODE
46 10        I4      QUALITY FLAG CODES
47 11        F4.1    OUTSIDE AIR TEMPERATURE TO ONE DECIMAL PLACE IN
48                     DEGREES CELSIUS
49 12        F5.1    OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG
50 13        F5.3    LIVE TIME COUNTING PERIOD TO THREE DECIMAL PLACES IN
51                     SECONDS

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Line	Character Number																					
Number	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2
52	14		I4	SUMMED RAW OUTPUT FROM COSMIC CHANNELS (3-6 MEV) IN																		
53				COUNTS																		
54	15		I4	RAW OUTPUT FROM CHANNEL 1 IN COUNTS																		
55	16		I4	RAW OUTPUT FROM CHANNEL 2 IN COUNTS																		
56	*		*	*																		
57	*		*	*																		
58	*		*	*																		
59	270		I4	RAW OUTPUT FROM CHANNEL 256 IN COUNTS																		

A P P E N D I X J

Format, DOE STATISTICAL ANALYSIS DATA TAPE

DOE STATISTICAL ANALYSIS DATA TAPE

Line	Character Number			
Number	12345678901	2345678901	2345678901	23456789012345678901234567890123456789012
1	03	0978	(DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)	
2				
3	STATISTICAL ANALYSIS DATA TAPE			
4				
5	FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)			
6				
7	ITEM	FORMAT	DESCRIPTION	
8	1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION	
9	2	A20	NAME OF SUBCONTRACTOR	
10	3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)	
11	4	I1	NUMBER OF AERIAL SYSTEMS USED TO COLLECT DATA FOR	
12			THIS QUADRANGLE	
13	5	I1	AERIAL SYSTEM IDENTIFICATION CODE FOR FIRST SYSTEM	
14	6	A20	AIRCRAFT IDENTIFICATION BY TYPE AND FAA NUMBER FOR	
15			FIRST SYSTEM	
16	7	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO	
17			TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE	
18			IN CPS PER PERCENT K	
19	8	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO	
20			TERRESTRIAL URANIUM (B1-214) TO ONE DECIMAL PLACE	
21			IN CPS PER PPM EQUIVALENT U	
22	9	F6.1	NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO	
23			TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE	
24			IN CPS PER PPM EQUIVALENT TH	
25	10	I6	BLANK FIELD (999999)	
26	11	F6.3	4PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL	
27			PLACES IN SECONDS FOR FIRST SYSTEM	
28	12	F6.3	2PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL	
29			PLACES IN SECONDS FOR FIRST SYSTEM	
30	13	I3	NUMBER OF CHANNELS (0-3 MEV) IN 4 PI SYSTEM FOR FIRST	
31			AERIAL SYSTEM	
32	14	I3	NUMBER OF CHANNELS (0-30 MEV) IN 2 PI SYSTEM FOR FIRST	
33			AERIAL SYSTEM	
34	15-24	(SAME)	REPEAT OF ITEMS 5-14 FOR AERIAL SYSTEM	
35	*	*	*	
36	*	*	*	
37	*	*	*	
38	85-94	(SAME)	REPEAT OF ITEMS 5-14 FOR NINTH AERIAL SYSTEM	
39	95	I3	NUMBER OF FLIGHT LINES ON THIS TAPE	
40	96	I4	FIRST FLIGHT LINE NUMBER ON THIS TAPE	
41	97	I6	FIRST RECORD NUMBER OF FIRST FLIGHT LINE	
42	98	I3	JULIAN DATE (DAY OF YEAR) FIRST FLIGHT LINE DATA WAS	
43			COLLECTED	
44	99-101	I4,6 &3	REPEAT OF ITEMS 96-98 FOR SECOND FLIGHT LINE ONE THIS	
45			TAPE	
46	*	*	*	
47	*	*	*	
48	*	*	*	
49	390-392	I4,6 &3	REPEAT OF ITEMS 96-98 FOR 99TH FLIGHT LINE ON THIS	
50			TAPE	
51				

Line Character Number
 Number 12345678901234567890123456789012345678901234567890123456789012

Line	ITEM	FORMAT	DESCRIPTION
52			FORMAT FOR STATISTICAL ANALYSIS DATA RECORD (THIRD THRU LAST BLOCK)
53			
54	ITEM	FORMAT	DESCRIPTION
55	1	I1	AERIAL SYSTEM IDENTIFICATION CODE
56	2	I4	FLIGHT LINE NUMBER
57	3	I6	RECORD IDENTIFICATION NUMBER
58	4	I6	GMT TIME OF DAY (HHMMSS)
59	5	F.84	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
60	6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
61	7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
62	8	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY
63			TO ONE DECIMAL PLACE IN GAMMAS
64	9	A8	SURFACE GEOLOGIC MAP UNIT CODE
65	10	I5	QUALITY FLAG CODES
66	11	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL POTASSIUM
67			(K-40) TO ONE DECIMAL PLACE IN PERCENT K
68	12	F4.1	UNCERTAINTY IN TERRESTRIAL POTASSIUM TO ONE DECIMAL
69			PLACE IN PERCENT K
70	13	F5.1	POTASSIUM STANDARD DEVIATION FROM THE MEAN TO ONE
71			DECIMAL PLACE AND ALGEBRAICALLY SIGNED
72	14	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL URANIUM
73			(BI-214) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
74	15	F4.1	UNCERTAINTY IN TERRESTRIAL URANIUM TO ONE DECIMAL
75			PLACE IN PPM EQUIVALENT U
76	16	F5.1	URANIUM STANDARD DEVIATION FROM THE MEAN TO ONE
77			DECIMAL PLACE AND ALGEBRAICALLY SIGNED
78	17	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL THORIUM
79			(TL-208) TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
80	18	F4.1	UNCERTAINTY IN TERRESTRIAL THORIUM TO ONE DECIMAL
81			PLACE IN PPM EQUIVALENT TH
82	19	F5.1	THORIUM STANDARD DEVIATION FROM THE MEAN TO ONE
83			DECIMAL PLACE AND ALGEBRAICALLY SIGNED
84	20	F8.1	GROSS GAMMA (0.4-3.0 MEV) COUNT RATE TO ONE DECIMAL
85			PLACE IN COUNTS PER SECOND
86	21	F6.1	UNCERTAINTY IN GROSS GAMMA COUNT RATE TO ONE DECIMAL
87			PLACE IN COUNTS PER SECOND
88	22	F5.1	ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL
89			PLACE IN PPM EQUIVALENT U
90	23	F4.1	UNCERTAINTY IN ATMOSPHERIC BI-214 4PI CORRECTION
91			TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
92	24	F6.1	AVERAGED URANIUM-TO-THORIUM RATIO TO ONE DECIMAL
93			PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
94	25	F5.1	URANIUM-TO-THORIUM RATIO STANDARD DEVIATION FROM THE
95			MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
96	26	F6.1	AVERAGED URANIUM-TO-POTASSIUM RATIO TO ONE DECIMAL
97			PLACE IN PPM EQUIVALENT U PER PERCENT K
98	27	F5.1	URANIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM
99			THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY
100			SIGNED
101	28	F6.1	AVERAGE THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL
102			PLACE IN PPM EQUIVALENT TH PER PERCENT K
103	29	F5.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM
104			THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY
105			SIGNED

A P P E N D I X K

Format, DOE STATISTICAL ANALYSIS SUMMARY DATA TAPE

DOE STATISTICAL ANALYSIS SUMMARY DATA TAPE

Line Character Number
 Number 12345678901234567890123456789012345678901234567890123456789012

1 05 0978 (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODE)

2

3 STATISTICAL ANALYSIS SUMMARY TAPE (OR FILE)

4

5 FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

6

ITEM	FORMAT	DESCRIPTION
1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION
2	A20	NAME OF SUBCONTRACTOR
3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
4	I6	NUMBER OF GEOLOGIC MAP UNITS USED FOR THIS QUADRANGLE

13

14 FORMAT FOR STATISTICAL ANALYSIS SUMMARY DATA RECORD (THIRD THRU LAST
 15 BLOCK)

16

ITEM	FORMAT	DESCRIPTION
1	A8	SURFACE GEOLOGIC MAP UNIT IDENTIFYING CODE
2	I6	TOTAL RECORDS FOR GEOLOGIC MAP UNIT
3	I6	NUMBER OF POTASSIUM RECORDS COMPUTED FOR GEOLOGIC UNITS
4	F6.1	POTASSIUM CONCENTRATION MEAN TO ONE DECIMAL PLACE IN PERCENT K
5	F6.1	POTASSIUM CONCENTRATION STANDARD DEVIATION TO ONE DECIMAL PLACE IN PERCENT K
6	A3	POTASSIUM CONCENTRATION DISTRIBUTION CODE
7	I6	NUMBER OF URANIUM RECORDS COMPUTED FOR GEOLOGIC UNIT
8	F6.1	URANIUM CONCENTRATION MEAN TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
9	F6.1	URANIUM CONCENTRATION STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
10	A3	URANIUM CONCENTRATION DISTRIBUTION CODE
11	I6	NUMBER OF THORIUM RECORDS COMPUTED FOR GEOLOGIC UNIT
12	F6.1	THORIUM CONCENTRATION MEAN TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
13	F6.1	THORIUM CONCENTRATION STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
14	A3	THORIUM CONCENTRATION DISTRIBUTION CODE
15	I6	NUMBER OF URANIUM-TO-THORIUM RATIO RECORDS COMPUTED FOR GEOLOGIC UNIT
16	F6.1	URANIUM-TO-THORIUM RATIO MEAN TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
17	F6.1	URANIUM-TO-THORIUM RATIO STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
18	A3	URANIUM-TO-THORIUM RATIO DISTRIBUTION CODE
19	I6	NUMBER OF URANIUM-TO-POTASSIUM RATIO RECORDS COMPUTED FOR GEOLOGIC UNIT
20	F6.1	URANIUM-TO-POTASSIUM RATIO MEAN TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K

50

Line	Character Number																					
Number	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2

51	21	F6.1	URANIUM-TO-POTASSIUM RATIO STANDARD DEVIATION TO ONE
52			DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K
53	22	A3	URANIUM-TO-POTASSIUM RATIO DISTRIBUTION CODE
54	23	I6	NUMBER OF THORIUM-TO-POTASSIUM RATIO RECORDS
55			COMPUTED FOR GEOLOGIC UNIT
56	24	F6.1	THORIUM-TO-POTASSIUM RATIO MEAN TO ONE DECIMAL PLACE
57			IN PPM EQUIVALENT TH PER PERCENT K.
58	25	F6.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION TO ONE
59			DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
60	26	A3	THORIUM-TO-POTASSIUM RATIO DISTRIBUTION CODE

A P P E N D I X L

Format, DOE MAGNETIC DATA TAPE

DOE MAGNETIC DATA TAPE FORMAT

Line	Character Number											
Number	12345678901234567890123456789012345678901234567890123456789012											
1	04 0978 (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)											
2												
3	MAGNETIC DATA TAPE											
4												
5	FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)											
6												
7	ITEM	FORMAT	DESCRIPTION									
8	1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION									
9	2	A20	NAME OF SUBCONTRACTOR									
10	3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)									
11	4	I3	NUMBER OF FLIGHT LINES ON THIS TAPE									
12	5	I4	FIRST FLIGHT LINE OF THIS TAPE									
13	6	I6	FIRST RECORD NUMBER OF FIRST FLIGHT LINE									
14	7	I3	JULIAN DATE (DAY OF YEAR) FIRST FLIGHT LINE DATA WAS									
15			COLLECTED									
16	8	F8.4	LATITUDE OF GROUND BASE STATION TO FOUR DECIMAL									
17			PLACES IN DEGREES FOR FIRST FLIGHT LINE									
18	9	F8.4	LONGITUDE OF GROUND BASE STATION TO FOUR DECIMAL									
19			PLACES IN DEGREES FOR FIRST FLIGHT LINE									
20	10-14	(SAME)	REPEAT OF ITEMS 5-9 FOR SECOND FLIGHT LINE ON THIS									
21			TAPE									
22	*	*							*			
23	*	*							*			
24	*	*							*			
25	495-499	(SAME)	REPEAT OF ITEMS 5-9 FOR 99TH FLIGHT LINE ON THIS									
26			TAPE									
27												
28	FORMAT FOR MAGNETIC DATA RECORD (THIRD THRU LAST BLOCK)											
29												
30	ITEM	FORMAT	DESCRIPTION									
31	1	I1	AERIAL SYSTEM IDENTIFICATION CODE									
32	2	I4	FLIGHT LINE NUMBER									
33	3	I6	RECORD IDENTIFICATION NUMBER									
34	4	I6	GMT TIME OF DAY (HHMMSS)									
35	5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES									
36	6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES									
37	7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS									
38	8	F5.1	OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG									
39	9	A8	SURFACE GEOLOGIC MAP UNIT CODE									
40	10	F7.1	TOTAL MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE									
41			IN GAMMAS									
42	11	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY									
43			TO ONE DECIMAL PLACE IN GAMMAS									
44	12	F7.1	DIURNAL MAGNETIC INTENSITY VARIATION TO ONE DECIMAL									
45			PLACE IN GAMMAS									
46	13	F7.1	MAGNETIC DEPTH-TO-BASEMENT TO ONE DECIMAL PLACE									
47			IN METERS (IF REQUIRED)									

A P P E N D I X M

Reduced Calibration and Test Line Data

Reduced Calibration and Test Line Data

<u>Date</u>	<u>Flight</u>	<u>Res. Thor.</u>	<u>Res. Thor.</u>	<u>Low Preflight</u>			<u>Low Postflight</u>		
		<u>583</u>	<u>2615</u>	<u>Alt.</u>	<u>T.C.</u>	<u>2π</u>	<u>Alt.</u>	<u>T.C.</u>	<u>2π</u>
08/11/80	12	6.3%	8.8%	400'	1125	N/A	400'	1145	N/A
08/14/80	13	6.3%	8.8%	400'	1145	N/A	400'	1145	N/A
09/25/80	107	5.2%	8.6%	400'	1200	12	400'	1175	9
09/25/80	110	5.2%	8.6%	400'	1200	12	400'	1175	9
09/25/80	111	5.2%	8.6%	400'	1200	12	400'	1175	9
10/01/80	129	5.6%	8.5%	400'	1175	9	No Test		
10/01/80	130	5.6%	8.5%	400'	1175	9	No Test		
10/04/80	132	5.9%	8.8%	400'	1275	13	400'	1250	13
10/04/80	133	5.9%	8.8%	400'	1275	13	400'	1250	13
10/05/80	135	5.7%	9.2%	400'	1225	13	400'	1250	13
10/05/80	136	5.7%	9.2%	400'	1225	13	400'	1250	13
10/05/80	137	5.7%	9.2%	400'	1225	13	400'	1250	13

<u>Date</u>	<u>Flight</u>	<u>Res. Thor.</u>	<u>Res. Thor.</u>	<u>Low Preflight</u>			<u>Low Postflight</u>		
		<u>583</u>	<u>2615</u>	<u>Alt.</u>	<u>T.C.</u>	<u>2π</u>	<u>Alt.</u>	<u>T.C.</u>	<u>2π</u>
10/05/80	138	5.7%	9.2%	400'	1225	13	400'	1250	13
10/06/80	139	6.0%	8.0%	400'	1275	13	400'	1250	11
10/06/80	140	6.0%	8.0%	400'	1275	13	400'	1250	11
10/06/80	141	6.0%	8.0%	400'	1275	13	400'	1250	11
10/06/80	142	6.0%	8.0%	400'	1275	13	400'	1250	11
10/06/80	143	6.0%	8.0%	400'	1275	13	400'	1250	11
10/07/80	144	6.0%	8.9%	400'	1300	12	400'	1250	10
10/07/80	145	6.0%	8.9%	400'	1300	12	400'	1250	10
10/07/80	146	6.0%	8.9%	400'	1300	12	400'	1250	10
10/07/80	147	6.0%	8.9%	400'	1300	12	400'	1250	10
10/08/80	148	5.5%	8.0%	400'	1225	13	400'	1225	12
10/09/80	152	5.9%	8.3%	400'	1225	13	400'	1250	13
10/09/80	153	5.9%	8.3%	400'	1225	13	400'	1250	13

N/A = NOT AVAILABLE

A P P E N D I X . N

Renumbered to Original Fiducial Correlations

CHICO QUADRANGLE

LINE 690 FLOWN AS LINE 695 AND 696
MAP FIDUCIALS 4743 TO 5275 CORRESPOND TO ORIGINAL FIDUCIALS 5275 TO 4743
MAP FIDUCIALS 5276 TO 7956 CORRESPOND TO ORIGINAL FIDUCIALS 10428 TO 7747

LINE 700 FLOWN AS LINE 700 AND 702
MAP FIDUCIALS 2002 TO 2482 CORRESPOND TO ORIGINAL FIDUCIALS 2482 TO 2002
MAP FIDUCIALS 2483 TO 5216 CORRESPOND TO ORIGINAL FIDUCIALS 4934 TO 7667

LINE 710 FLOWN AS LINE 713 AND 714
MAP FIDUCIALS 7085 TO 7564 CORRESPOND TO ORIGINAL FIDUCIALS 16240 TO 7085
MAP FIDUCIALS 7565 TO 10154 CORRESPOND TO ORIGINAL FIDUCIALS 16250 TO 13661

LINE 720 FLOWN AS LINE 720 AND 721
MAP FIDUCIALS 2751 TO 3215 CORRESPOND TO ORIGINAL FIDUCIALS 3215 TO 13478
MAP FIDUCIALS 3216 TO 6065 CORRESPOND TO ORIGINAL FIDUCIALS 10633 TO 13478

LINE 730 FLOWN AS LINE 730 AND 731
MAP FIDUCIALS 7815 TO 8288 CORRESPOND TO ORIGINAL FIDUCIALS 7815 TO 8288
MAP FIDUCIALS 8289 TO 10857 CORRESPOND TO ORIGINAL FIDUCIALS 21902 TO 19333

LINE 740 FLOWN AS LINE 740 AND 741
MAP FIDUCIALS 3370 TO 3819 CORRESPOND TO ORIGINAL FIDUCIALS 3819 TO 3370
MAP FIDUCIALS 3820 TO 6500 CORRESPOND TO ORIGINAL FIDUCIALS 3370 TO 19185

LINE 750 FLOWN AS LINE 750 AND 751 AND 752
MAP FIDUCIALS 19924 TO 20066 CORRESPOND TO ORIGINAL FIDUCIALS 20066 TO 19924
MAP FIDUCIALS 20067 TO 21554 CORRESPOND TO ORIGINAL FIDUCIALS 1812 TO 3299
MAP FIDUCIALS 21555 TO 23218 CORRESPOND TO ORIGINAL FIDUCIALS 5986 TO 5067

LINE 760 FLOWN AS LINE 760 AND 762 AND 761
MAP FIDUCIALS 3947 TO 4402 CORRESPOND TO ORIGINAL FIDUCIALS 4402 TO 3947
MAP FIDUCIALS 4403 TO 6043 CORRESPOND TO ORIGINAL FIDUCIALS 1673 TO 33
MAP FIDUCIALS 6044 TO 7074 CORRESPOND TO ORIGINAL FIDUCIALS 4693 TO 3662

LINE 770 FLOWN AS LINE 771 AND 772
MAP FIDUCIALS 8861 TO 9320 CORRESPOND TO ORIGINAL FIDUCIALS 9320 TO 8861
MAP FIDUCIALS 9321 TO 12238 CORRESPOND TO ORIGINAL FIDUCIALS 571 TO 3539

LINE 780 FLOWN AS LINE 780 AND 781
MAP FIDUCIALS 9533 TO 10001 CORRESPOND TO ORIGINAL FIDUCIALS 10001 TO 9533
MAP FIDUCIALS 10002 TO 12774 CORRESPOND TO ORIGINAL FIDUCIALS 4330 TO 7103

LINE 790 FLOWN AS LINE 791 AND 792
MAP FIDUCIALS 10495 TO 10945 CORRESPOND TO ORIGINAL FIDUCIALS 10945 TO 10495
MAP FIDUCIALS 10946 TO 13591 CORRESPOND TO ORIGINAL FIDUCIALS 9282 TO 7182

LINE 800 FLOWN AS LINE 800
MAP FIDUCIALS 12703 TO 15646 CORRESPOND TO ORIGINAL FIDUCIALS 15646 TO 12703

LINE 810 FLOWN AS LINE 811 AND 812
MAP FIDUCIALS 11115 TO 11583 CORRESPOND TO ORIGINAL FIDUCIALS 11583 TO 11115
MAP FIDUCIALS 11584 TO 14136 CORRESPOND TO ORIGINAL FIDUCIALS 9941 TO 12494

CHICO QUADRANGLE

LINE 820 FLOWN AS LINE 821

MAP FIDUCIALS 14621 TO 15068 CORRESPOND TO ORIGINAL FIDUCIALS 15068 TO 14621

MAP FIDUCIALS 15069 TO 17610 CORRESPOND TO ORIGINAL FIDUCIALS 15854 TO 18395

LINE 830 FLOWN AS LINE 831 AND 832

MAP FIDUCIALS 12237 TO 12686 CORRESPOND TO ORIGINAL FIDUCIALS 12686 TO 12237

MAP FIDUCIALS 12687 TO 15252 CORRESPOND TO ORIGINAL FIDUCIALS 21157 TO 18592

LINE 840 FLOWN AS LINE 840 AND 842

MAP FIDUCIALS 13933 TO 14377 CORRESPOND TO ORIGINAL FIDUCIALS 14377 TO 13933

MAP FIDUCIALS 14378 TO 17059 CORRESPOND TO ORIGINAL FIDUCIALS 4881 TO 2199

LINE 850 FLOWN AS LINE 851 AND 853 AND 852

MAP FIDUCIALS 12900 TO 13367 CORRESPOND TO ORIGINAL FIDUCIALS 13367 TO 12900

MAP FIDUCIALS 13368 TO 14406 CORRESPOND TO ORIGINAL FIDUCIALS 15308 TO 14269

MAP FIDUCIALS 14407 TO 16026 CORRESPOND TO ORIGINAL FIDUCIALS 190 TO 1807

LINE 860 FLOWN AS LINE 860 AND 861

MAP FIDUCIALS 3874 TO 5424 CORRESPOND TO ORIGINAL FIDUCIALS 5424 TO 3874

MAP FIDUCIALS 5425 TO 7084 CORRESPOND TO ORIGINAL FIDUCIALS 17339 TO 15679

LINE 870 FLOWN AS LINE 870 AND 871 AND 872

MAP FIDUCIALS 15521 TO 16021 CORRESPOND TO ORIGINAL FIDUCIALS 16021 TO 15521

MAP FIDUCIALS 16022 TO 17053 CORRESPOND TO ORIGINAL FIDUCIALS 6585 TO 5554

MAP FIDUCIALS 17054 TO 18532 CORRESPOND TO ORIGINAL FIDUCIALS 14134 TO 15613

LINE 880 FLOWN AS LINE 880 AND 881 AND 882

MAP FIDUCIALS 16219 TO 16692 CORRESPOND TO ORIGINAL FIDUCIALS 16692 TO 16219

MAP FIDUCIALS 16693 TO 17704 CORRESPOND TO ORIGINAL FIDUCIALS 6830 TO 7842

MAP FIDUCIALS 17705 TO 19157 CORRESPOND TO ORIGINAL FIDUCIALS 10811 TO 9359

LINE 890 FLOWN AS LINE 890 AND 891 AND 892

MAP FIDUCIALS 17186 TO 17655 CORRESPOND TO ORIGINAL FIDUCIALS 17655 TO 17186

MAP FIDUCIALS 17656 TO 18736 CORRESPOND TO ORIGINAL FIDUCIALS 702 TO 1783

MAP FIDUCIALS 18737 TO 20163 CORRESPOND TO ORIGINAL FIDUCIALS 14009 TO 12583

LINE 900 FLOWN AS LINE 900 AND 901

MAP FIDUCIALS 2169 TO 3620 CORRESPOND TO ORIGINAL FIDUCIALS 3620 TO 2169

MAP FIDUCIALS 3621 TO 5185 CORRESPOND TO ORIGINAL FIDUCIALS 10959 TO 12524

LINE 910 FLOWN AS LINE 910 AND 911

MAP FIDUCIALS 511 TO 991 CORRESPOND TO ORIGINAL FIDUCIALS 991 TO 511

MAP FIDUCIALS 992 TO 3621 CORRESPOND TO ORIGINAL FIDUCIALS 651 TO 3280

LINE 4000 FLOWN AS LINE 4000 AND 4001

MAP FIDUCIALS 1840 TO 3177 CORRESPOND TO ORIGINAL FIDUCIALS 3177 TO 1840

MAP FIDUCIALS 3178 TO 3736 CORRESPOND TO ORIGINAL FIDUCIALS 91 TO 650

LINE 4010 FLOWN AS LINE 4010 AND 4011

MAP FIDUCIALS 91 TO 878 CORRESPOND TO ORIGINAL FIDUCIALS 878 TO 91

MAP FIDUCIALS 879 TO 1879 CORRESPOND TO ORIGINAL FIDUCIALS 575 TO 1576

CHICO QUADRANGLE

LINE 4020 FLOWN AS LINE 4020
MAP FIDUCIALS 606 TO 2648 CORRESPOND TO ORIGINAL FIDUCIALS 2648 TO 606

LINE 4030 FLOWN AS LINE 4030
MAP FIDUCIALS 12116 TO 14156 CORRESPOND TO ORIGINAL FIDUCIALS 14156 TO 12116

LINE 4040 FLOWN AS LINE 4040
MAP FIDUCIALS 9644 TO 11858 CORRESPOND TO ORIGINAL FIDUCIALS 11858 TO 9644

LINE 4050 FLOWN AS LINE 4050
MAP FIDUCIALS 7341 TO 9506 CORRESPOND TO ORIGINAL FIDUCIALS 9506 TO 7341

LINE 4060 FLOWN AS LINE 4060 AND 4061
MAP FIDUCIALS 4653 TO 5354 CORRESPOND TO ORIGINAL FIDUCIALS 5354 TO 4653
MAP FIDUCIALS 5355 TO 6913 CORRESPOND TO ORIGINAL FIDUCIALS 5480 TO 7039

LINE 4070 FLOWN AS LINE 4070
MAP FIDUCIALS 2125 TO 4460 CORRESPOND TO ORIGINAL FIDUCIALS 4460 TO 2125

LINE 4080 FLOWN AS LINE 4080
MAP FIDUCIALS 233 TO 1909 CORRESPOND TO ORIGINAL FIDUCIALS 1909 TO 233