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National Uranium Resource Evaluation

Airborne Gamma-Ray Spectrometer And Magnetometer Survey: Eureka 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

DISCLAIMER

This report is a result of work performed by Aero Service Division Western Geophysical Company of America through a Bendix Field Engineering Corporation Subcontract, as part of the National Uranium Resource 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.

AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY

EUREKA AREA
CALIFORNIA

FINAL REPORT
VOLUME I

AERO SERVICE DIVISION
WESTERN GEOPHYSICAL COMPANY
OF AMERICA
HOUSTON, TEXAS

MAY, 1981

PREPARED FOR THE U. S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY FOR RESOURCE APPLICATIONS
GRAND JUNCTION OFFICE, COLORADO
UNDER CONTRACT NO. DE-AC13-76GJ01664
AND BENDIX FIELD ENGINEERING CORPORATION
SUBCONTRACT NO. 80-460
PROJECT NO. IG0205

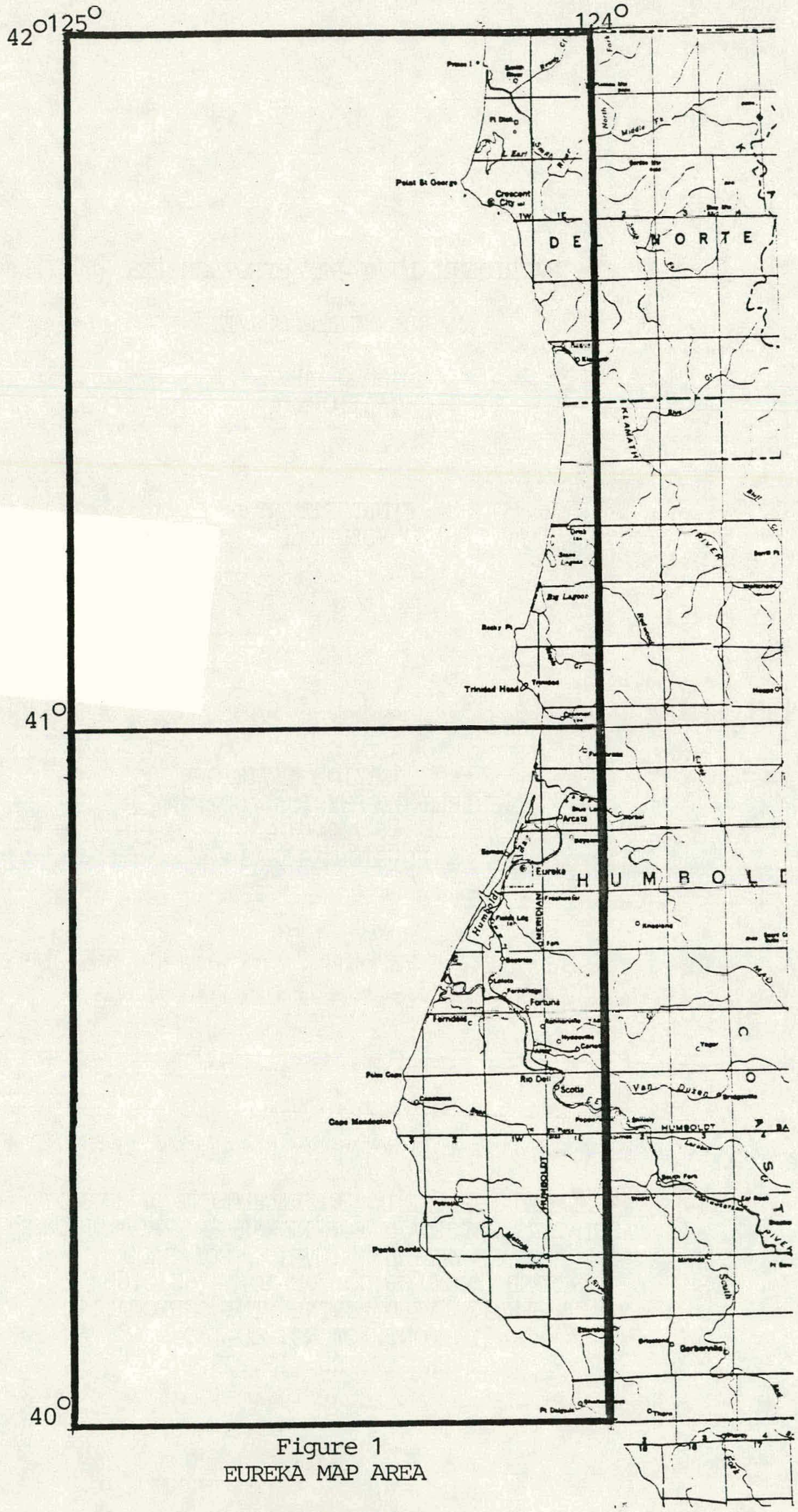

Figure 1
EUREKA MAP AREA

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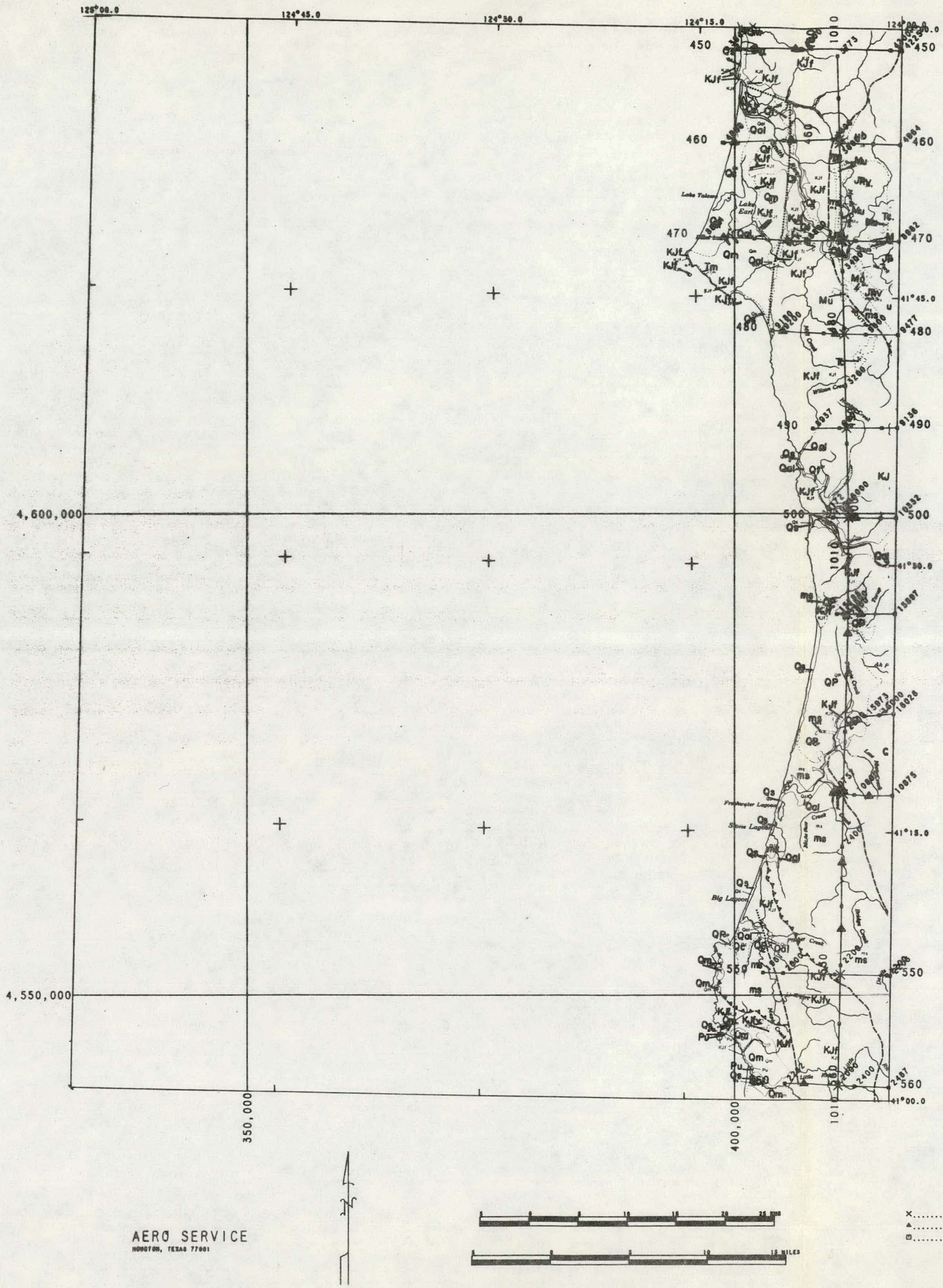
INTRODUCTION

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 Eureka/Crescent City, California, map area.

Traverse lines were flown in an east-west direction at a line spacing of six (6) miles. Tie lines were flown north-south approximately eighteen (18) miles apart. A total of 16,880.5 line miles of geophysical data were acquired, compiled, and interpreted during the survey, of which 349.5 line miles are in this area.

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.

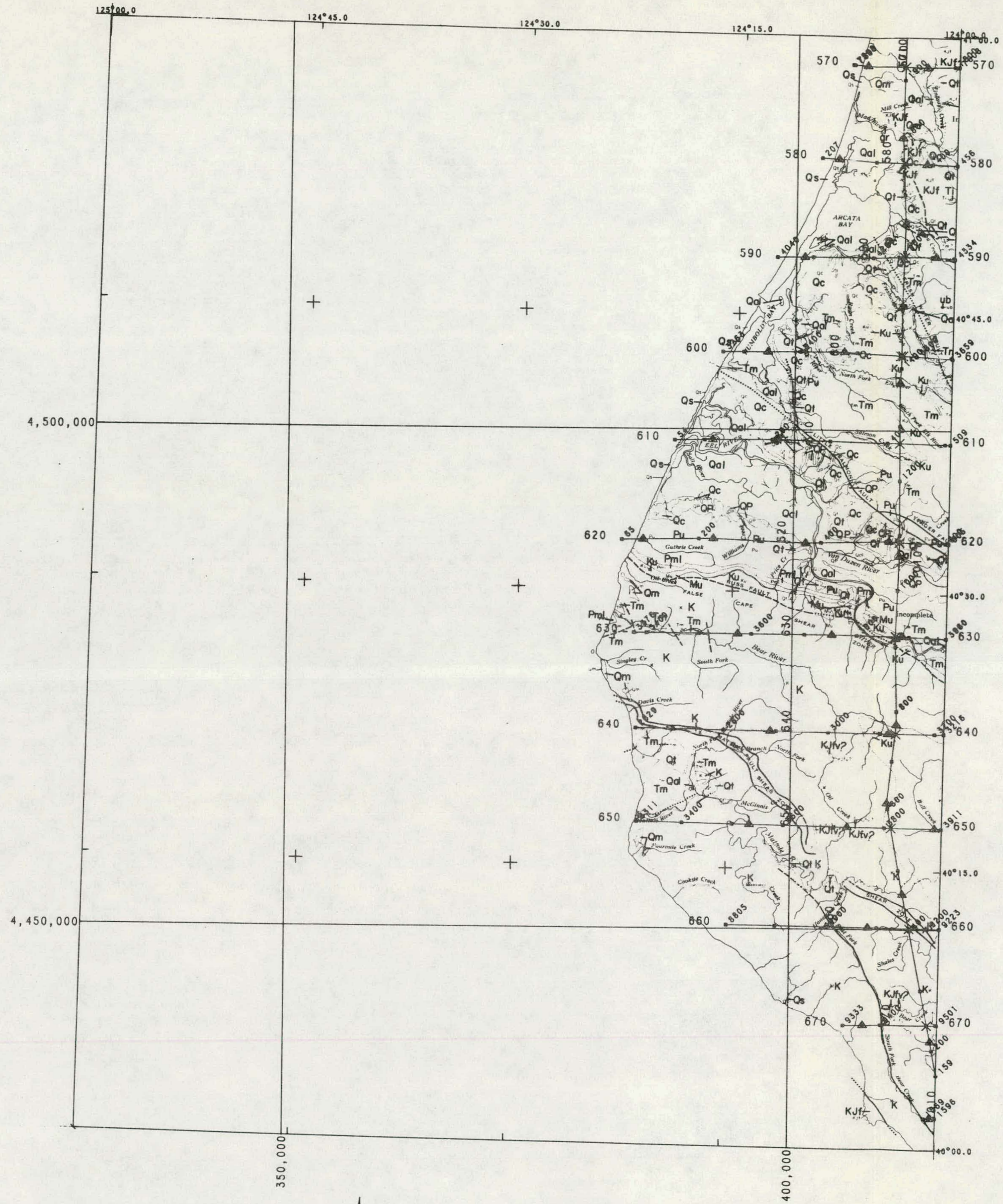


AERO SERVICE
HOUSTON, TEXAS 77001

×.........FILM IDENTIFIED TRAVERSE/TIE LINE INTERSECTION
▲.........FILM IDENTIFIED GROUND CONTROL
⊡.........INDEX FIDUCIAL (100 FIDUCIAL INTERVALS)
FLOWN 1980

FLIGHT PATH
EUREKA NORTH
NK 10-7
DOE/NURE

FIGURE 2-A
9/10



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×.........FILM IDENTIFIED TRAVERSE/TIE LINE INTERSECTION
▲.........FILM IDENTIFIED GROUND CONTROL
□.........INDEX FIDUCIAL (100 FIDUCIAL INTERVALS)
FLOWN 1980

FLIGHT PATH
EUREKA SOUTH
NK 10-10
DOE/NURE

FIGURE 2-B

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DATA ACQUISITION

Aircraft

The survey was conducted using a Sikorsky S-58T helicopter, registration N94523, owned and operated by Carson Helicopters, Inc., Perkasie, 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 14.

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

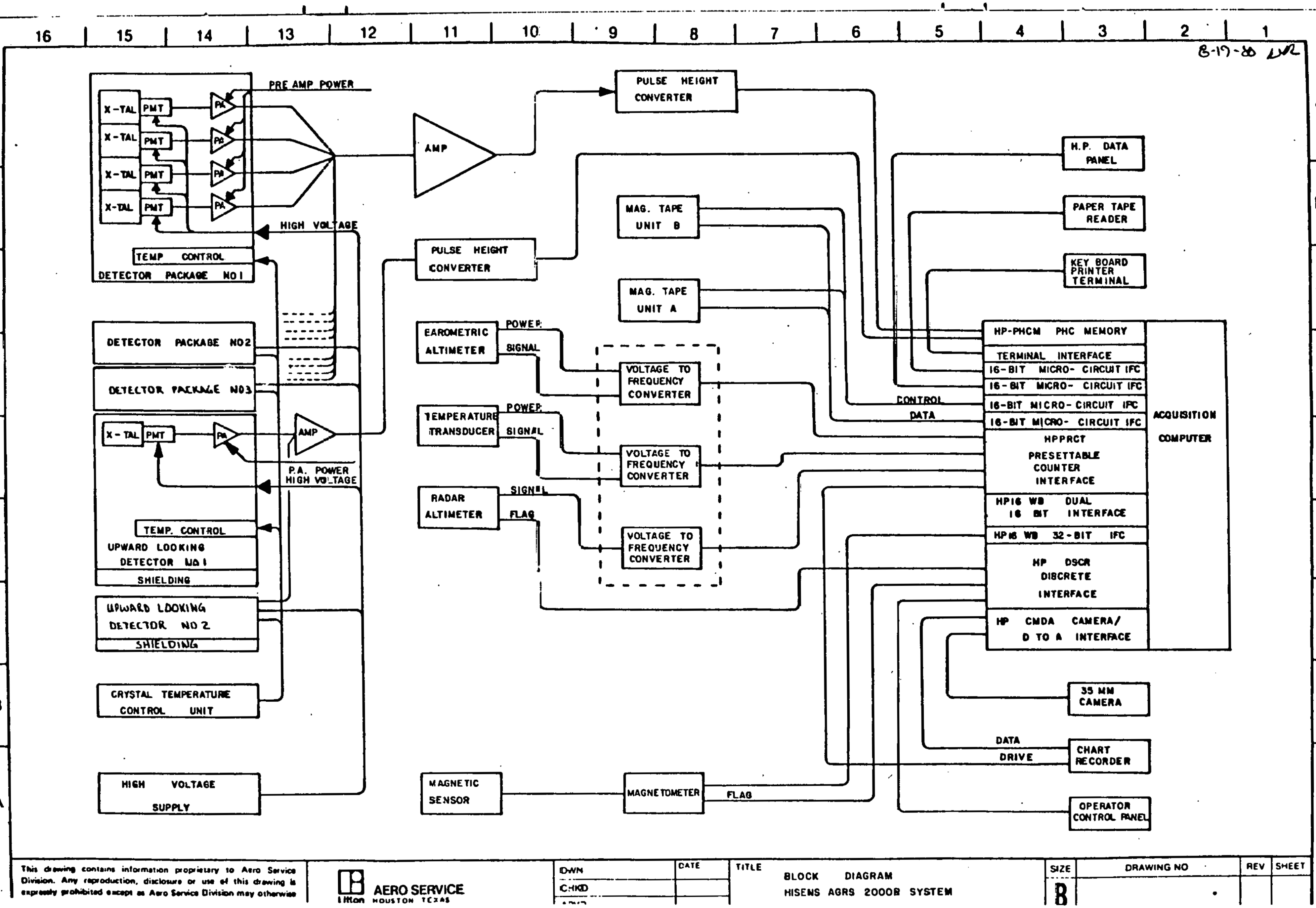
8-19-80
PRE AMP POWER
X-TAL
PMT
PA
AMP
PULSE HEIGHT CONVERTER
HIGH VOLTAGE
TEMP CONTROL
DETECTOR PACKAGE NO 1
DETECTOR PACKAGE NO2
DETECTOR PACKAGE NO3
P.A. POWER
HIGH VOLTAGE
TEMP. CONTROL
UPWARD LOOKING DETECTOR NO 1
SHIELDING
UPWARD LOOKING DETECTOR NO 2
CRYSTAL TEMPERATURE CONTROL UNIT
HIGH VOLTAGE SUPPLY
BAROMETRIC ALTIMETER
POWER
SIGNAL
TEMPERATURE TRANSDUCER
RADAR ALTIMETER
FLAG
VOLTAGE TO FREQUENCY CONVERTER
MAG. TAPE UNIT B
MAG. TAPE UNIT A
MAGNETIC SENSOR
MAGNETOMETER
H.P. DATA PANEL
PAPER TAPE READER
KEY BOARD PRINTER TERMINAL
HP-PHCM PHC MEMORY
TERMINAL INTERFACE
16-BIT MICRO-CIRCUIT IFC
CONTROL
DATA
HPPRCT PRESETTABLE COUNTER INTERFACE
HP16 WB DUAL 16 BIT INTERFACE
HP16 WB 32-BIT IFC
HP DSCR DISCRETE INTERFACE
HP CMDA CAMERA/ D TO A INTERFACE
ACQUISITION COMPUTER
35 MM CAMERA
DRIVE
CHART RECORDER
OPERATOR CONTROL PANEL
This drawing contains information proprietary to Aero Service Division. Any reproduction, disclosure or use of this drawing is expressly prohibited except as Aero Service Division may otherwise
Litton AERO SERVICE HOUSTON TEXAS
DWN
CHKD
DATE
TITLE
BLOCK DIAGRAM
HISENS AGRS 2000B SYSTEM
SIZE
B
DRAWING NO
REV
SHEET

Figure 3

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

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

The 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 spectometer 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 Eureka, California, area 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 349.5 miles are in the Eureka area.

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 18, 19 and 20.

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 Eureka area were east-west traverse lines 6 miles apart and north-south tie lines flown at 18 mile intervals. The nominal terrain clearance for the survey was 400 feet.

TABLE II

Daily Production Summary

DATE	BASE	ACTIVITY	FLIGHT NO.
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

DATE	BASE	ACTIVITY	FLIGHT NO.
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

DATE	BASE	ACTIVITY	FLIGHT NO.
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

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 420 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 23.

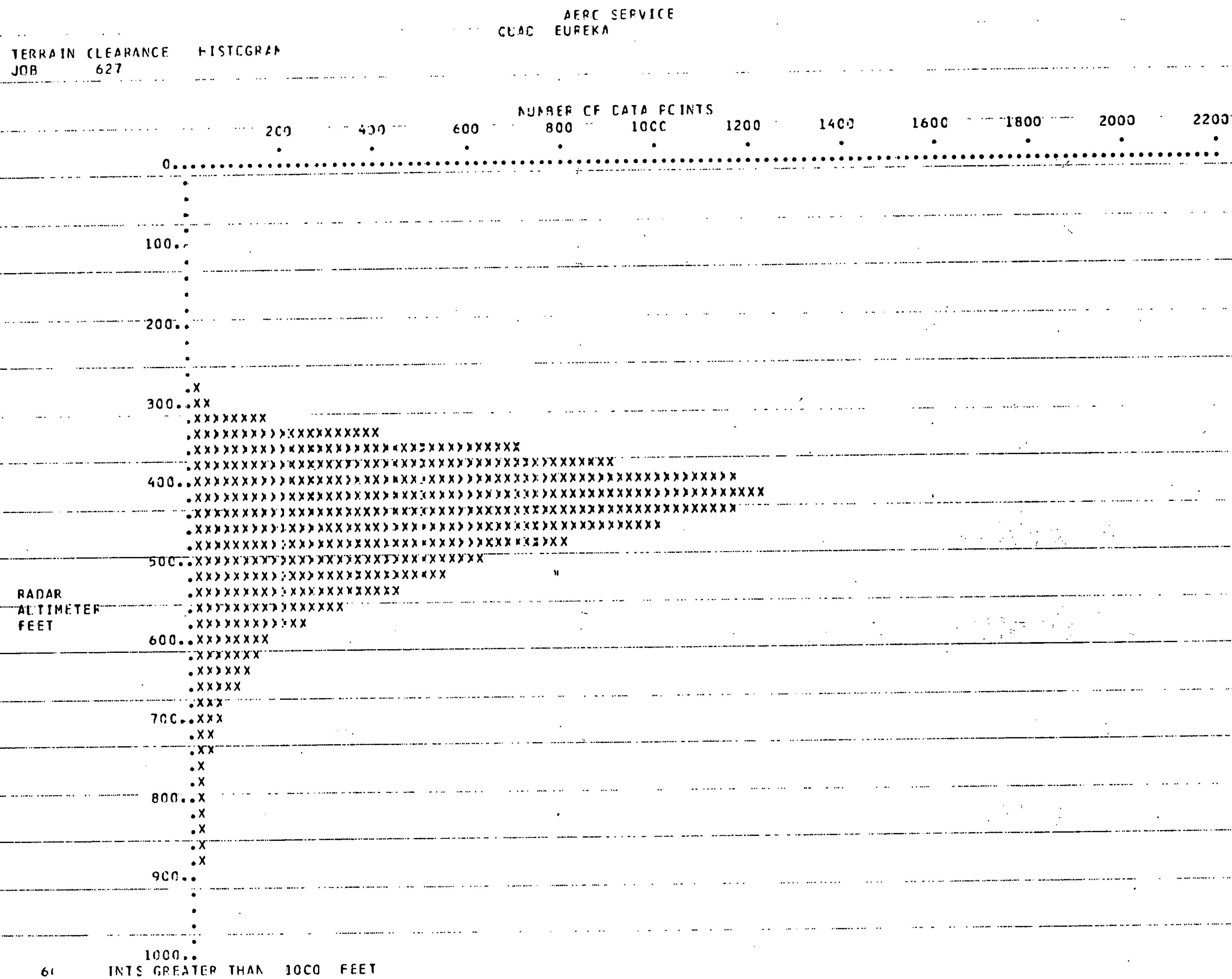
AERO SERVICE
QUAD EUREKA
TERRAIN CLEARANCE HISTOGRAM
JOB 627
NUMBER OF DATA POINTS
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
0
100
200
300
400
500
600
700
800
900
1000
RADAR
ALTIMETER
FEET
INTS GREATER THAN 1000 FEET

Figure 4

AERO SERVICE
QUAD EUREKA

GROUND SPEED HISTOGRAM
JOB 627

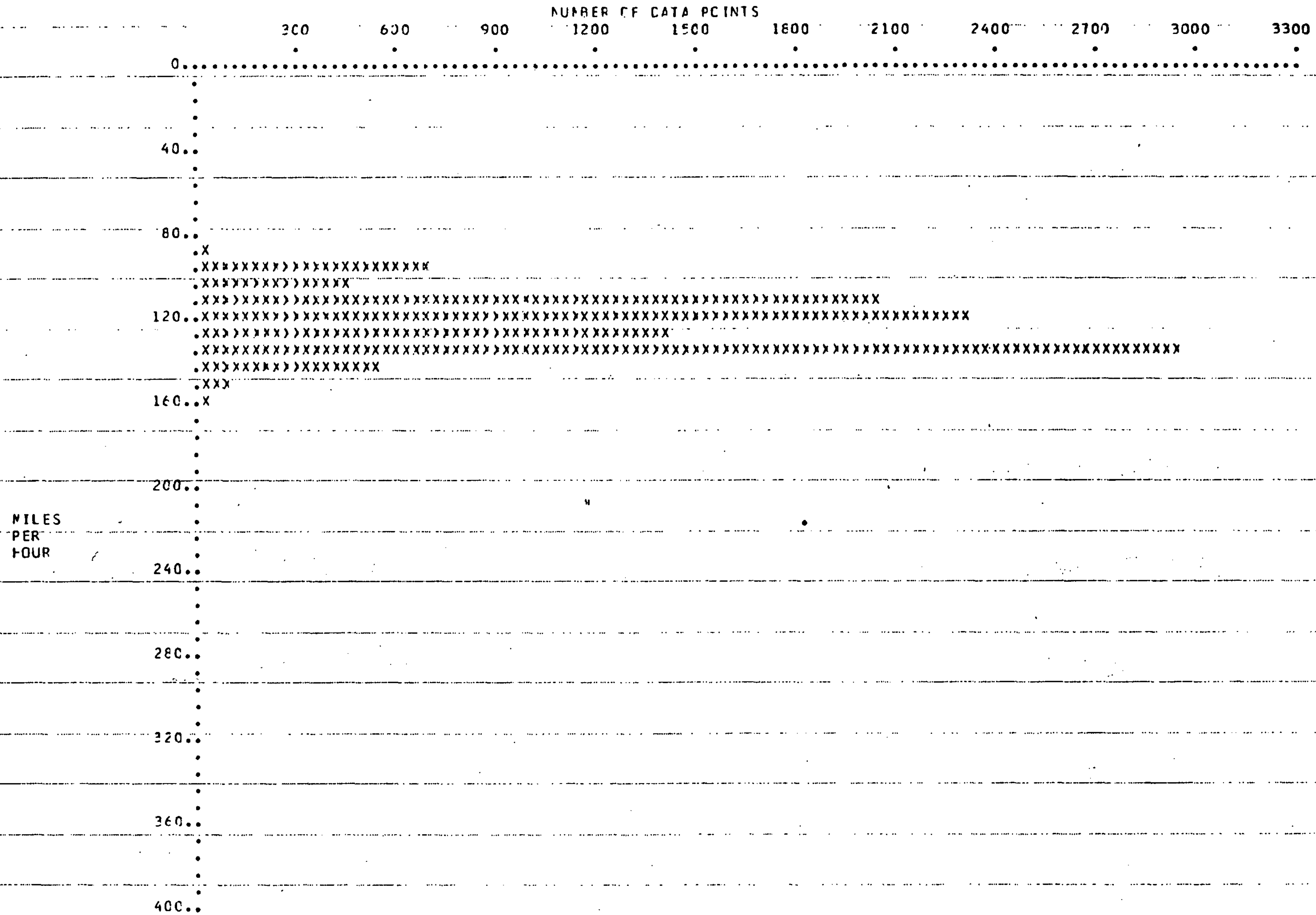

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Figure 5

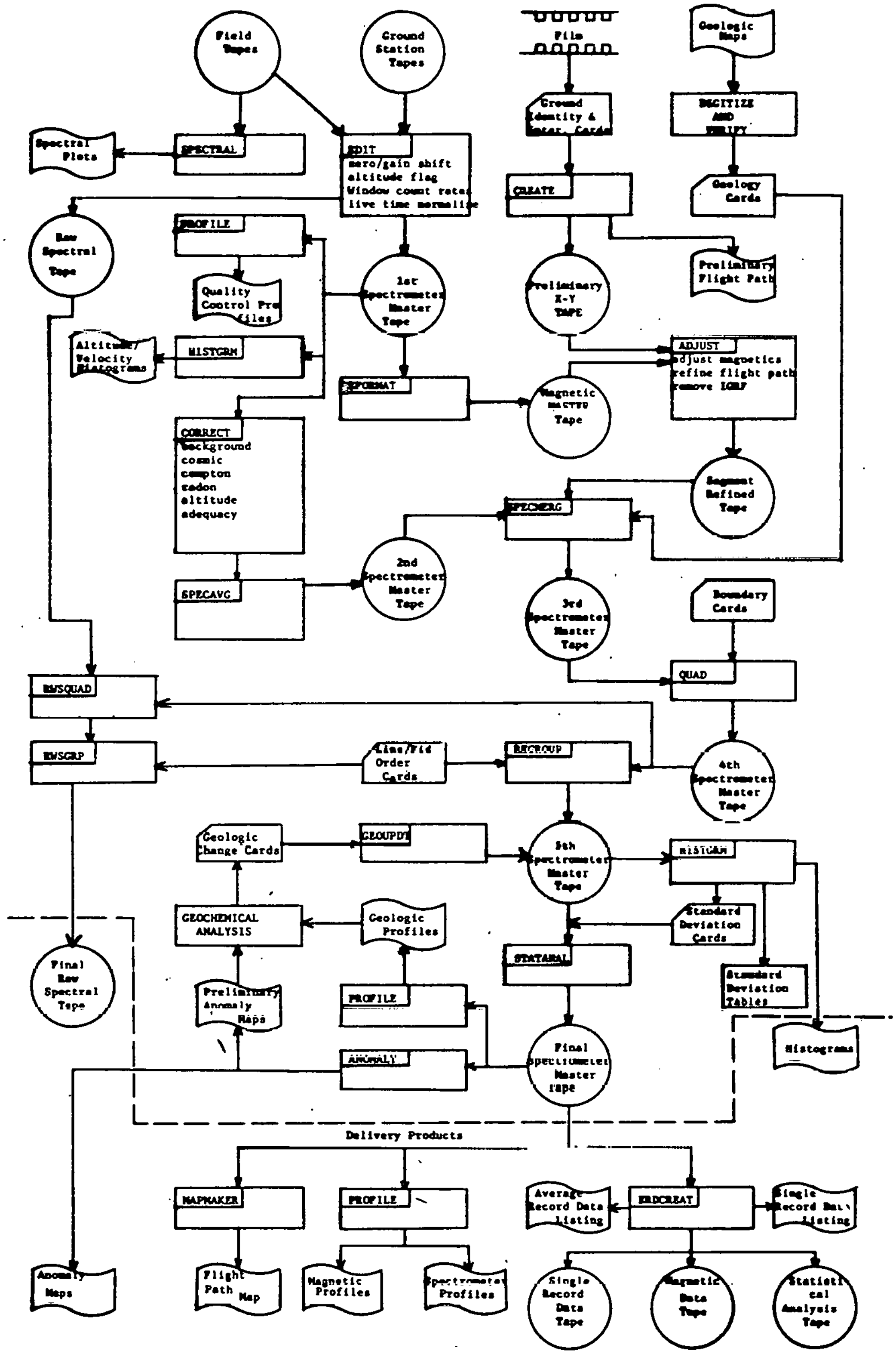
DATA REDUCTION

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 26.

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



Field Tapes
Ground Station Tapes
Film
Geologic Maps
Spectral Plots
SPECTRAL
EDIT
zero/gain shift
altitude flag
Window count rates
live time normalize
Ground Identity & Enter. Cards
DIGITIZE AND VERIFY
CREATE
Geology Cards
Raw Spectral Tape
PROFILE
Quality Control Profiles
1st Spectrometer Master Tape
Preliminary X-Y TAPE
Preliminary Flight Path
Altitude/Velocity Histograms
HISTGRM
ADJUST
adjust magnetics
refine flight path
remove IGRF
REFORMAT
Magnetic Master Tape
CORRECT
background
cosmic
compton
radon
altitude
adequacy
Segment Refined Tape
SPECMERG
SPECAVG
2nd Spectrometer Master Tape
3rd Spectrometer Master Tape
Boundary Cards
QUAD
RWSQUAD
RWSGRP
Line/Fid Order Cards
REGROUP
4th Spectrometer Master Tape
Geologic Change Cards
GEOUPDT
5th Spectrometer Master Tape
HISTGRM
GEOCHEMICAL ANALYSIS
Geologic Profiles
Standard Deviation Cards
STATANAL
Standard Deviation Tables
Final Raw Spectral Tape
Preliminary Anomaly Maps
PROFILE
Final Spectrometer Master Tape
Histograms
ANOMALY
Delivery Products
MAPMAKER
PROFILE
Average Record Data Listing
ERDCREAT
Single Record Data Listing
Anomaly Maps
Flight Path Map
Magnetic Profiles
Spectrometer Profiles
Single Record Data Tape
Magnetic Data Tape
Statistical Analysis Tape

Figure 6

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
2π Bismuth Background	=	0.81	counts per second

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

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

$$T/U = \tau = 0.08$$
$$U/T = \alpha = 0.30 + 0.02 + 0.000076H$$
$$K/T = \beta = 0.37$$
$$K/U = \gamma = 0.90$$

The 2π and 4π uranium window count rates are related through the geometric or equivalency factor. For the present system, installed in the Sikorsky S-58T, 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 Biair 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:

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

The formula used for the altitude normalization is:

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

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 $\leq$ 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 Eureka survey area is located on the northern California coast and occupies the area between 40° to 42° north latitude and 124° to 125° west longitude. All rivers and streams flow west into the Pacific Ocean. Estuaries, lagoons and barrier beaches are typical of the coastal area where generally narrow flat Quaternary topography escalates radically into steep and rugged mountainous terrain.

Portions of two different geomorphic provinces are included within the boundaries of the map area. The southern half of the area includes part of the system of longitudinal ridges and valleys of the Northern Coast Ranges. These structurally controlled features trend generally N35°W and rise sharply from the terraced and wave-cut Pacific Coast. The irregular and knobby topography is proned to landsliding, a typical trait of Franciscan Formation rocks.

To the north, the topography becomes even more complex and rugged as described by the high, prominent peaks and ridges of the Klamath Mountains Province. This area seems more closely related to the Sierra Nevada than to the Coast Ranges with hard pre-Cretaceous rocks exposed throughout the province by deep cutting rivers and streams.

The geologic map of the area used here is a compilation of Weed and Redding sheets of the Geologic Map of California as published by the California Division of Mines and Geology.

Stratigraphy

Rocks of the Northern Coast Ranges Province are comprised for the most part of undivided upper Cretaceous marine sediments southwest of the Fresh Water Fault. The late Mesozoic Franciscan volcanics and metavolcanics and pre-Cretaceous metasediments are most common northeast of the fault. Upper Miocene to Pleistocene marine and nonmarine sediments and Quaternary fluvial and dune deposits are found in the estuarian areas and valleys that were submerged during a higher sea level. A minor Tertiary intrusive body is located east of Arcata Bay.

Hard pre-Cretaceous metasediments and Jura-Triassic metavolcanics cut by

Mesozoic ultrabasic plutons comprise the bulk of the rocks in the Klamath Mountain Province east of the South Fork Mountain Fault. Younger Franciscan Formation rocks crop out west of the fault. Pleistocene marine deposits occur in the vicinity of Crescent City. Younger nonmarine and Recent fluvial and dune deposits accumulate along the coast. Brief unit descriptions for Eureka stratigraphy follow, beginning with the oldest units.

Pre-Cretaceous Metasedimentary Rocks (ms)

The pre-Cretaceous metasediments are comprised typically of mica- and quartz-rich phyllites and schists, metamorphic chert, quartzite and slate.

Jurassic and/or Triassic Metavolcanic Rocks (JTRv)

These metavolcanic rocks include metadacites and meta-andesites which occur as sills and flows. Also occurring are volcanic breccias and locally fossiliferous tuff.

Mesozoic Ultrabasic Intrusives (ub)

The ultrabasic intrusives of Mesozoic age which occur in the area are largely serpentinized peridotite, pyroxenite and dunite. Talc schist and soapstone occur only locally.

Franciscan Volcanic and Metavolcanic Rocks (KJfv)

The volcanic and metavolcanic rocks of the Franciscan Formation are composed predominantly of diabase, basalt, and agglomerate.

Franciscan Formation (KJf)

Rocks of the Franciscan Formation are comprised of massive graywacke and minor amounts of platy, dark-gray shale, thin-bedded chert, some greenstone and glaucophane schist.

Upper Cretaceous Marine Sedimentary Rocks (Ku)

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

Undivided Cretaceous Marine Sedimentary Rocks (K)

The undivided marine units include interbedded sandstone, graywacke, shale and conglomerate.

Tertiary Intrusive Rocks (Ti)

Intrusives include rhyolite plugs, andesitic breccias along with basaltic dikes and plugs.

Tertiary Marine Sedimentary Rocks (Tm)

Locally fossiliferous mudstone, shale and sandstone comprise the Tertiary marine sediments. They are further characterized by local sand lenses and conglomerate thin beds.

Tertiary Nonmarine Sedimentary Rocks, Undivided (Tc)

These undivided sediments are characterized by a predominant composition of auriferous gravels locally interbedded with sandstone and conglomerate.

Upper Miocene Marine Sedimentary Rocks (Mu)

The upper Miocene marine sediments are comprised of thick locally diatomaceous mudstone with basal layers of sandstone and conglomerate.

Middle and/or Lower Pliocene Marine Sedimentary Rocks (Pml)

Mudstones, sandstones and siltstone comprise the middle and/or lower marine sediments and are locally glauconitic in the southern half of the area.

Upper Pliocene Marine Sedimentary Rocks (Pu)

The upper Pliocene marine sedments consist chiefly of interbedded sandstone, mudstone and siltstone with locally conglomeratic beds. Rocks along the coast in the Eureka area are typically very fossiliferous.

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 fanglomerates, deltaic sandstones, siltstones, gravel and clay. Deposits may include intercolated volcanic ash or debris in the southern part of the area.

Pleistocene Marine and Marine Terrace Deposits (Qm)

The Pleistocene marine terrace deposits are predominantly comprised of alternating facies of sands and clays.

Quaternary Nonmarine Terrace Deposits (Qt)

The Quaternary nonmarine terraces include river, stream and lake terrace deposits, along with some fanglomerates, deltaic and slopewash deposits.

Recent Alluvium (Qal)

Alluvial silt to coarse gravels occur in the Great Valley and are often associated with fan, terrace or local lacustrine deposits. Recent alluvium in the northern portion of the area may also include zones of local glacial outwash.

Recent Dune and Coast Sand (Qs)

Well sorted dune sand and older eolian sand occur along the coastal areas of the Eureka area.

Structure

Being of very narrow land mass, the Eureka area contains only small portions of large major structures of the Northern California area.

One of the most notable structural features of the Eureka area, though exposed only to a very limited extent, is the San Andreas Fault which touches land in the southern part of the map area on Point Delgada. To the north the direction changes from almost north-south, to more northwesterly, paralleling the coastline until it moves out into the Pacific near Cooskie Mountain. From that point the San Andreas merges with the Mendocino Fault zone which trends east-west along the submarine Gorda Escarpment and Mendocino Canyon.

All thrust faults, including the Grogan Fault, Del Norte Fault and the Coast Range Thrust, are downthrown on the west and overridden from the east. Offshore faults in the northern half of the Eureka map area are oriented in a generally north-south direction, while the faults to the south more closely follow the onshore structural trends.

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:

Radioelement	Count Rate	Concentration
Potassium	105.71	1%K
Uranium	12.05	1ppm eU
Thorium	7.32	1ppm eT

Geochemical Analysis

The geologic map of the Eureka area distinguishes 20 geologic units, 18 of which were sampled in this survey. Distribution histograms were prepared over each unit sampled for the K, U and T parameters and their ratios. Due to significantly low numbers of samples, data for units KJFV and MU were combined with geologically similar units, KJF and TM respectively for statistical purposes. No changes were made on the geologic map. The zones of unknown or inaccurate geology, unit UNK, account for only 34 samples, too few for any reliable analysis.

Narrow, somewhat erratic distribution curves centered about very low mean values were generated for all parameters over unit QS, dune and coast sand. Unit QAL, the alluvial deposits, produced broader distribution curves over moderate mean values for each radiometric parameter. The alluvial deposits which occupy many of the steep valleys include at least two varying lithotypes. The double-peaking in the potassium histogram reflects this heterogeneity of the composition.

With a relatively low number of samples (114), the Quaternary nonmarine terrace deposits, QT, display a scattered multipeaking distribution of all parameters, testifying to the probable diverse composition of the sediments. The marine terrace deposits, QM, however, appear to have a relatively uniform composition and produce much cleaner distribution curves centered about very low mean values at 0.2% K, 0.6 ppm eU and 2.8 ppm eT.

The bimodal lognormal distribution of the K parameter in unit QP, the largely undifferentiated nonmarine sediments, shows the variety of composition of these predominantly fluvial deposits. The conglomerates in the section are the probable cause of the nonuniformity of the distribution curve. All parameters are recorded at extremely low mean values over the unit.

The upper Pliocene marine sediments, PU, produce relatively clean, narrow distribution curves about moderately low mean concentrations. The slight spread in the peak region of the K histogram is an expression of the varying amounts of felsic members in the unit.

Three relatively narrow, clean lognormal distribution curves were generated for unit TM, the Tertiary marine sediments. The higher concentration sample values creating the lognormal distributions probably relate to weakly anomalous readings taken along traverse 600 near fiducial 3530.

Unit K, comprised by the widespread, undivided Cretaceous marine sediments, with 2636 samples produced broad-based normal distribution curves over moderate mean values for all parameters. The very narrow and clean ratio curves reveal the uniform and similar dispersion of the radiometric elements throughout the unit.

A diversity of composition is the probable cause of the multipeaking K, U and T histograms of the undifferentiated marine sediments of unit KU. Samples under the two higher percentage peaks of the potassium histogram relate to outcrops along the Eel River where it is crossed by traverse 630. Samples under the lower percentage peak are probably associated with deposits along such waterways as the South Fork and Elk rivers and are more similar in their potassium response to unit KJF, the Franciscan Formation.

The 2555 samples collected over the Franciscan Formation produce very clean distribution curves for K, U and T around low mean concentrations at 0.5%, 0.9 ppm and 3.4 ppm respectively. The Mesozoic ultrabasic intrusions, UB, and the Jura-Triassic metavolcanics, JTRV, produced similarly narrow and very low radiometric responses for the K, U and T parameters at 0.1%, 0.3 ppm and 0.9 ppm and 0.1%, 0.4ppm and 0.8 ppm respectively.

A total of 13 uranium anomalies and 2 thorium anomalies are defined on the interpretation map. The unit with the most uranium anomalies is KJF with 7 anomalies. The unit with the most anomalies per thousand samples is again unit KJF with 2.74 anomalies, followed by QAL with 2.51, TM with 2.49 and unit K with 1.52 anomalies per thousand samples.

Computer Printer and Anomaly Map Analysis

Computer printer maps of the total magnetic intensity and of the six radiometric parameters at a scale of 1:500,000 have been prepared in addition to the radiometric anomaly maps of the area. The grid spacing of the pseudo-countour maps is 2117 by 1270 meters. As a result only the broader features

TABLE III

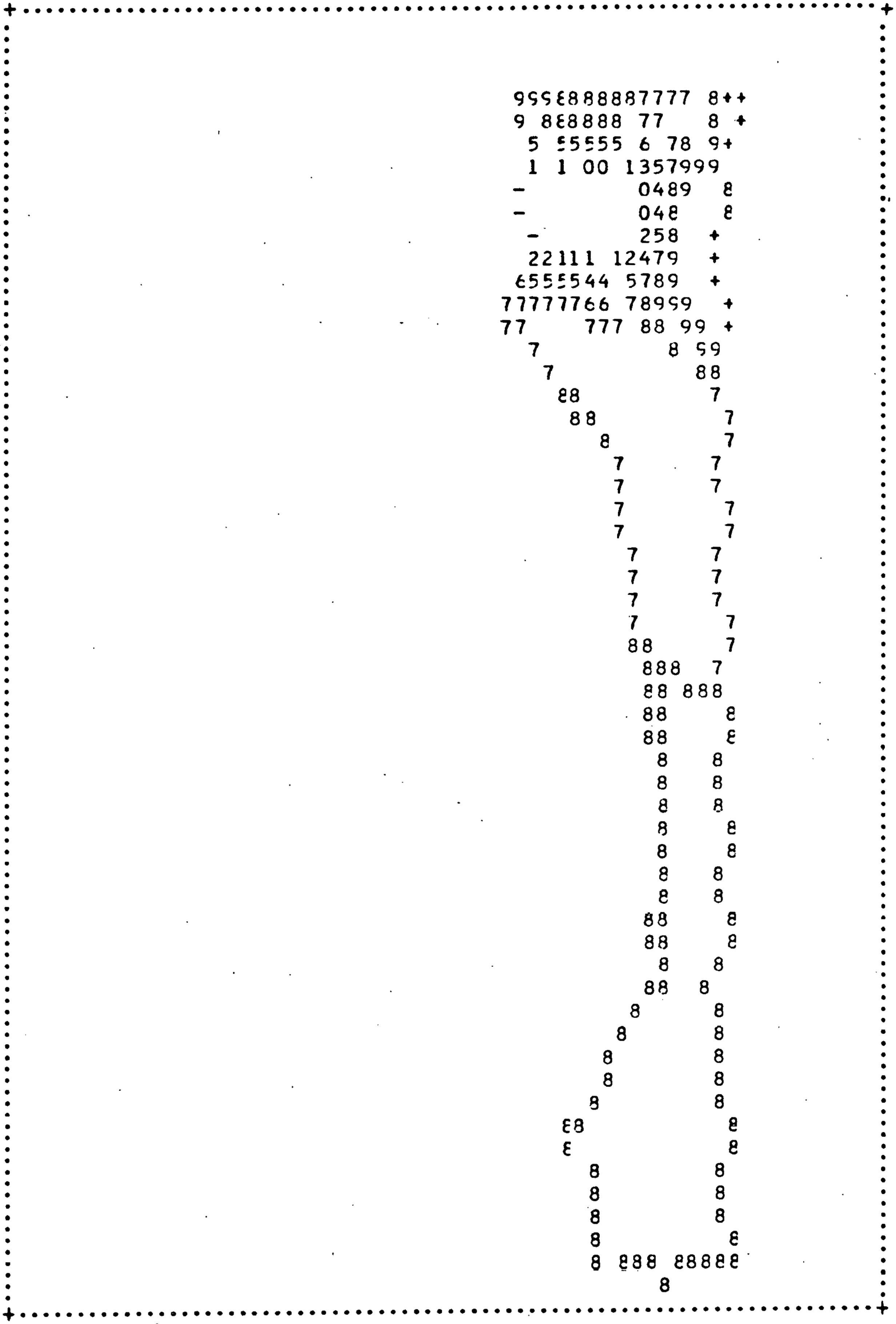
LEGEND TO TOTAL FIELD MAP (GAMMA)

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		51700.0
0	51700.0	51860.0
1	51860.0	52020.0
2	52020.0	52180.0
3	52180.0	52340.0
4	52340.0	52500.0
5	52500.0	52660.0
6	52660.0	52820.0
7	52820.0	52980.0
8	52980.0	53140.0
9	53140.0	53300.0
+	53300.0	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA NORTH

X3= 430000.0
Y3=4655669.0



X1= 350000.0
Y1=4535000.0

Figure 7-A

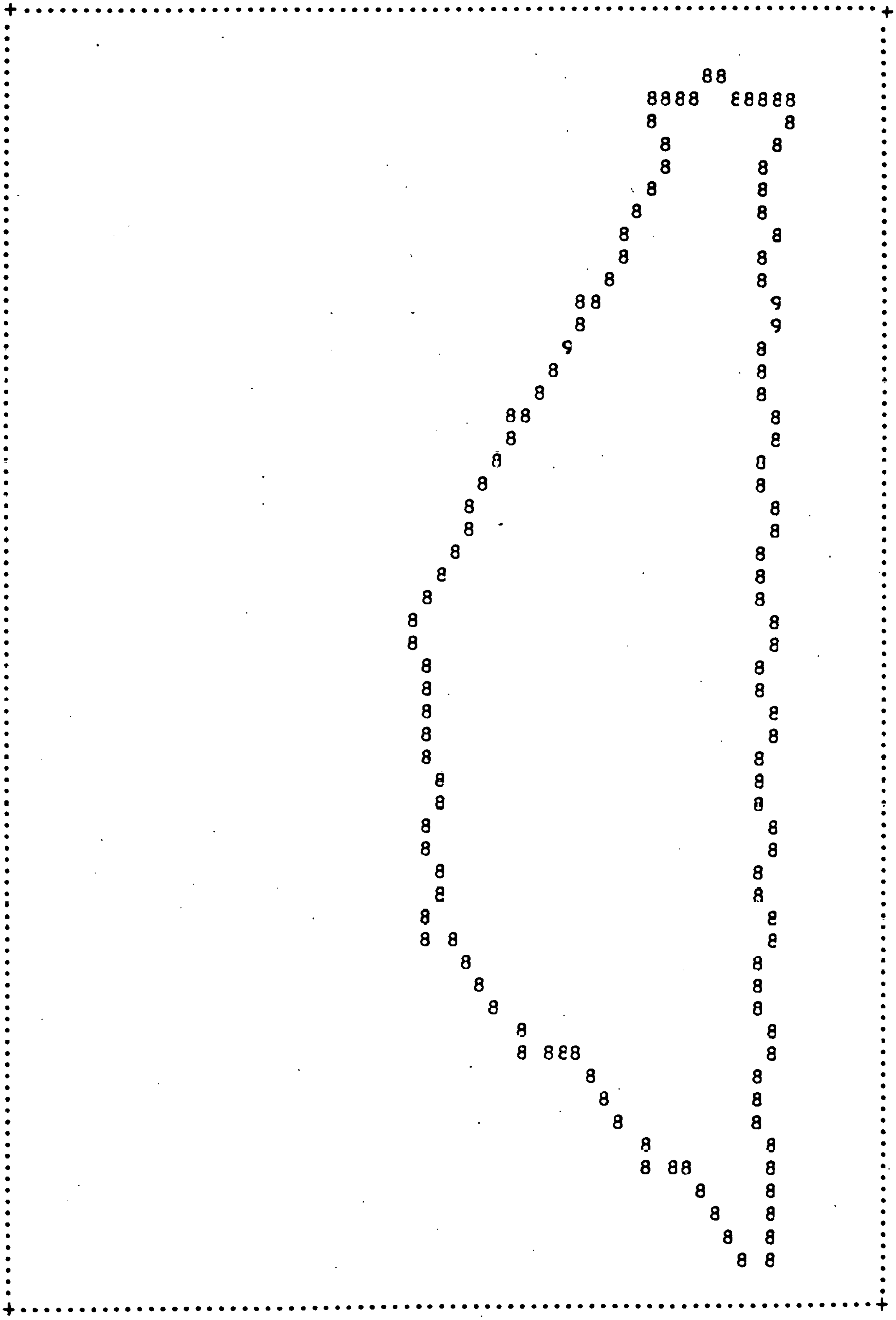
TOTAL FIELD

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0



X1= 350000.0
Y1=4425000.0

X2= 430000.0
Y2=4425000.0

Figure 7-B
TOTAL FIELD

TABLE IV

LEGEND TO POTASSIUM AVERAGE MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		0.12
0	0.12	0.23
1	0.23	0.34
2	0.34	0.45
3	0.45	0.56
4	0.56	0.67
5	0.67	0.78
6	0.78	0.89
7	0.89	1.00
8	1.00	1.11
9	1.11	1.22
+	1.22	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA NORTH

X3= 430000.0
Y3=4655669.0

```
 -365554442 4442--
 -25 5  4 33 4320-
  245 54   33321-
  14  54  3 2 10
 -1345 4 3 210  -
 -13 44 3 210   -
  023 33 21 0   -
  012 22 1 0    -
 1  1   1 0     -
11   1 1 0     0-
11   1 1  C00000-
  0 C 1 11111110
   - 01 22222221
    - 12 3333332
     -12 3   4433
       12 3 4  43
        1234   4
        0344  55
        0345  5 5
        0245   55
         134 4 5
         02 3 44
         -012 34
         - 0123 5
         - 0123 5
          -01234
          0 1245
          01 3455
          0 12455
           0 234
           0 1 2
           -0  1
           0   00
           0   0 0
           1   0
           21  1
          8421 11
          85211 1
           421 2
          432 2
         33  2 2
        ?      3
       1  2    3
       01 2   34
      0 1 2 22 4
    - 01 2 2  234
    - 012332 2 34
      0123332  3
      01233    2
      -1233    2
      -1343 2 2 1
      -14432 22 1
           1
```

X1= 350000.0
Y1=4535000.0

X2= 430000.0
Y2=4535000.0

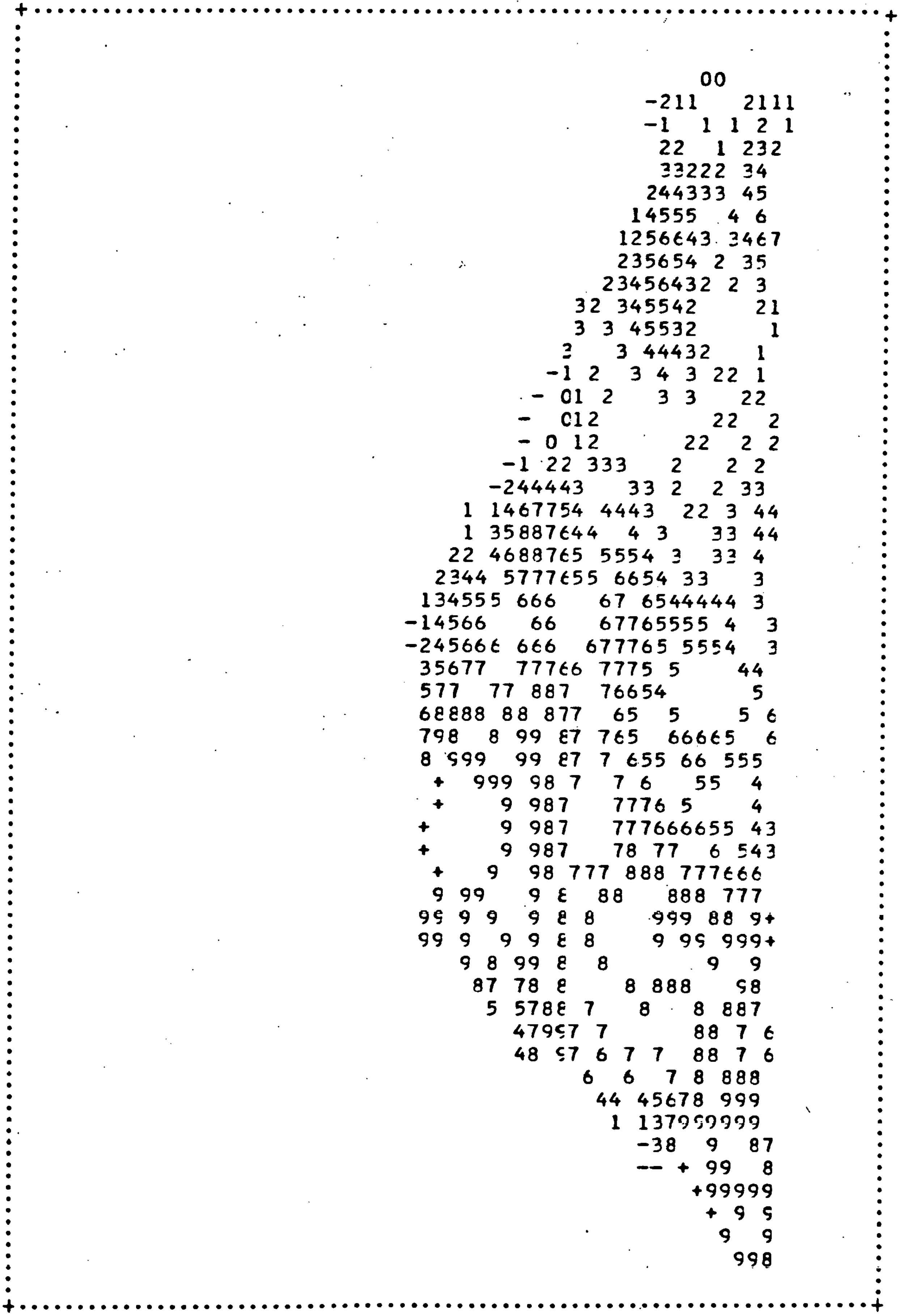
Figure 8-A

POTASSIUM AVERAGE

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0



X1= 350000.0
Y1=4425000.0

Figure 8-B
POTASSIUM AVERAGE

X2= 430000.0
Y2=4425000.0

TABLE V

LEGEND TO URANIUM AVERAGE MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		0.20
0	0.20	0.37
1	0.37	0.54
2	0.54	0.71
3	0.71	0.88
4	0.88	1.05
5	1.05	1.22
6	1.22	1.39
7	1.39	1.56
8	1.56	1.73
9	1.73	1.90
+	1.90	

```
                    456 88665 864321
                    45 67 76 6 64321
                     3456 666665321
                     1345 5 5543 1
                    -0124  5 4210 -
                    - 12344 3210  -
                     -C1233 210   -
                    10 1 2 21 0   -
                   21    122 1  00-
                  12 1   12 2 1110 -
                  122    12   222 1 -
                     111 233333210
                      22 344444331
                       3 4 555541
                         3 55 5 5430
                           555 5 530
                            5  5675
                            555 787
                            45 6789+
                            45 5789+
                             4 4688
                             2 3568
                             0 1357
                             - 12467
                             - 02367
                              -0135
                              0 124
                              2  132
                              2  122
                              1  12
                              0   1
                              0   0
                              -11   0
                              -1 1 0
                              01 10
                              322 1
                             553 2 2
                             553  22
                              4   2
                             33  2
                            2  3333
                           1 23   4
                         0 1244444
                         -0134 4 5
                        1 123 33 5
                      121 1 22 2 45
                      12 1  22  245
                        2  23 22 3
                         3 3 333 2
                         5433 4431
                         643 35531-
                         642 37630-
                             3
```

X1= 350000.0
Y1=4535000.0

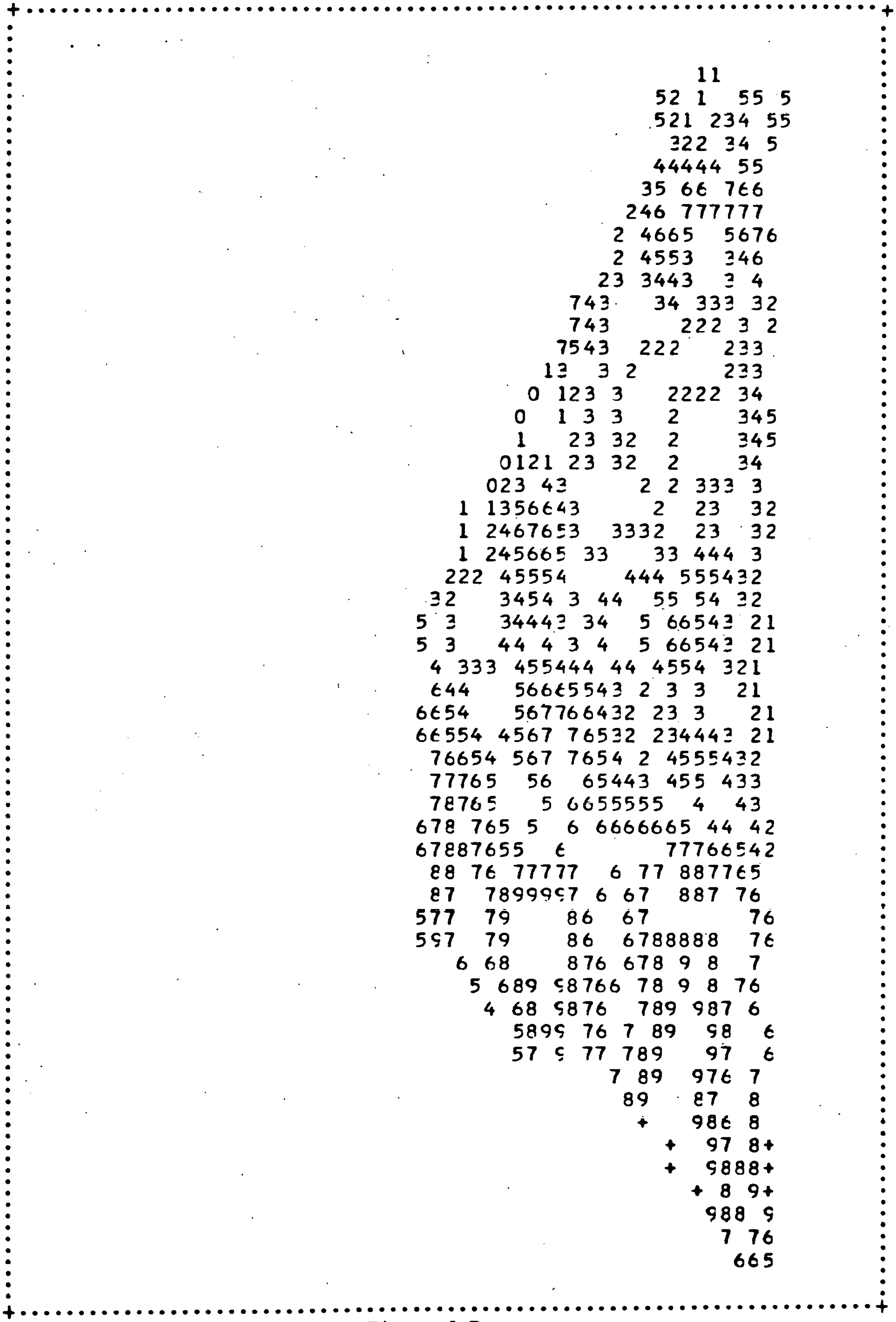
Figure 9-A
URANIUM AVERAGE

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0



X1= 350000.0
Y1=4425000.0

Figure 9-B
URANIUM AVERAGE

X2= 430000.0
Y2=4425000.0

TABLE VI

LEGEND TO THORIUM AVERAGE MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
–		0.90
0	0.90	1.35
1	1.35	1.80
2	1.80	2.25
3	2.25	2.70
4	2.70	3.15
5	3.15	3.60
6	3.60	4.05
7	4.05	4.50
8	4.50	4.95
9	4.95	5.40
+	5.40	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA NORTH

X3= 430000.0
Y3=4655669.0

```
                    457777 87 6774--
                    4567 777 6 6530-
                     5 6 66 7 6542-
                    14 5 5 6654321
                   -0234 4 5 421 0-
                   -023    33 20   -
                    02 3 3 2 10   -
                    012 3 2 10    -
                   0 1 2 2 1  0   -
                  1  1 2 21    0  -
                  11  12 2 1  1 0 -
                     0  12 22222211
                       - 0134 544332
                        - 1346665554
                         -13456 666 6
                           23456   66
                            135 6777
                            03567 88
                            -357 88 8
                            -2567 8 8
                             14567 8
                             02346 7
                             -013456
                             - 0235 5
                             - 0235 5
                              -02356
                              -02467
                              -024676
                              -013576
                               01345
                               -0133
                               -01 1
                               -1 1 0
                               0111 0
                               1   1
                               2   2
                              642 234
                              65 2 44
                               533 5
                               5444
                              4555 6
                             345   6
                            2345 666
                            2345 6 7
                          2 34  567
                         22  34   566
                         2  34    566
                          1234    56
                          0234     5
                          -234   4 4
                          -245 44   3
                          -2554 4 333
                               1
```

X1= 350000.0
Y1=4535000.0

Figure 10-A

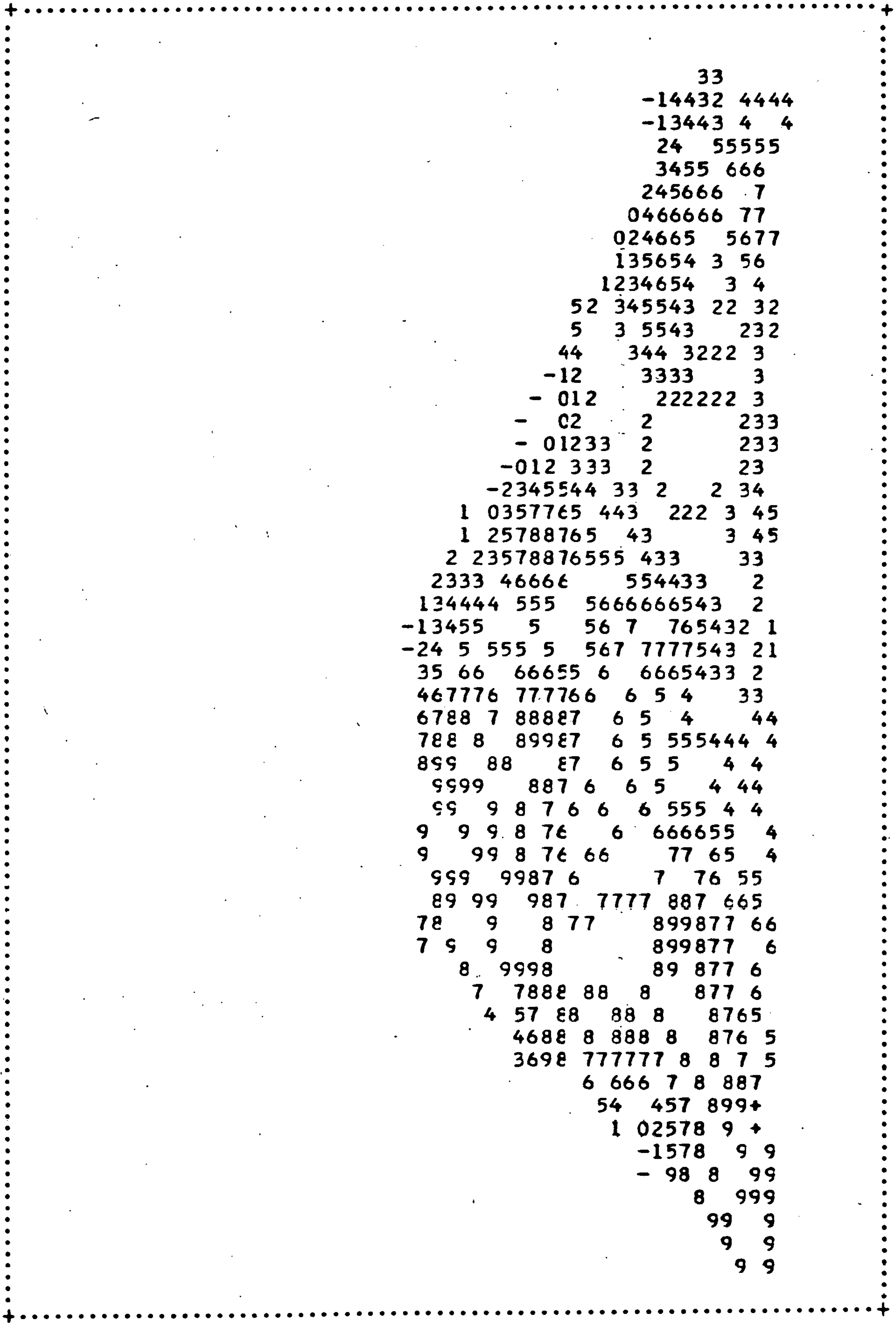
THORIUM AVERAGE

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0



X1= 350000.0
Y1=4425000.0

X2= 430000.0
Y2=4425000.0

Figure 10-B

THORIUM AVERAGE

TABLE VII

LEGEND TO URANIUM/POTASSIUM RATIO MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		0.90
0	0.90	1.15
1	1.15	1.40
2	1.40	1.65
3	1.65	1.90
4	1.90	2.15
5	2.15	2.40
6	2.40	2.65
7	2.65	2.90
8	2.90	3.15
9	3.15	3.40
+	3.40	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA NORTH

X3= 430000.0
Y3=4655669.0

```
  013 576 7 75 8+
  012456 6 77 69+
   013456  7 77+
   -C235  6899+
   -C124 5679  +
   -C1245  689 +
   -C12455  689+
  422 34654 5798
 4653 35775 4695
15764 358864 6754
169643 69975 6754
   65 4588766 72
    4 3577766662
     0256665 542
      1376 55432-
        6 5 4 31-
         44    3
         3 33  5
         2 2 3457
         22 2 467
           2 346
           3 346
           2 357
           2 3475
           4 3465
           4 3 5
           22  2
           321  0
           421  0
           421 0
           2210
           22 11
           12210
           02 10
           13220
           46541
          0688633
          0598633
           27742
           2553
          3 4432
         5 55553
        4 5 6653
        234555 4
       3 3 44443
     + 322 33   3
     + 321 123  3
       3 22 34 3
       633 4564
       74 46884
       84 37 952
       8410 + 42
           8
```

X1= 350000.0
Y1=4535000.0

Figure 11-A

URANIUM/POTASSIUM RATIO

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA   SOUTH

X3= 430000.0
Y3=4545669.0

```
                    88
                 33 57 8+++
                 3  68888 +
                  347887 9
                 34689863
                3 5699963
               4 34578872
              53   356 532
              4 22 3 4 43
             932  3 455 4
           7 831  256776 6
           79630 01467 7 6
          577530 0 235665
         5 555310  1 3456
        74 455421 22 3456
       66 3 4 42  333 4578
       653  3 32  3 44 568
      4543    22 23455  5
     123    22    34554 3
   21   2  2 11    2443 20
   2     2 21  1   2343210
   1 1      1  1 23455431
  10  1   1 1  1 24555421
 1000 1  1 11  1 34 43 20
210  01  1   1  134 32 10-
210  01 1       1233 2 10-
 10   01 1111  0 12 2 10-
 100  0 1 221 0  01  1 0-
2100   012  21    011  0 -
2100   012  21    01 1 0 -
 10 0  012  210  01222110
 11  0 0 12 21100 2333221
 111 0  0 12 2 11 2     2
011 1 0 0 12 2   2      20
011 1  0 1 2 2   2333   20
 1111  11 2 2 1  2 3 33 2
 11  1 2 332 1 1  2   221
011  12 44431   1   22  10
020  12344431   1222 2  10
   0 123444321 1 2   2  1
    1 233  3211 2333 2  1
     233 3332222 33 32  2
       33   33    3444322 2
       4 3  33  3 4 432 22
              2 3 44321 2
               2 33321  1
                233321  2
                  3 321 24
                  343 22 4
                    3 22 3
                     2   2
                      1 11
                       1 0
```

X1= 350000.0
Y1=4425000.0

Figure 11-B

X2= 430000.0
Y2=4425000.0

URANIUM/POTASSIUM RATIO

TABLE VIII

LEGEND TO URANIUM/THORIUM RATIO MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
–		0.180
0	0.180	0.215
1	0.215	0.250
2	0.250	0.285
3	0.285	0.320
4	0.320	0.355
5	0.355	0.390
6	0.390	0.425
7	0.425	0.460
8	0.460	0.495
9	0.495	0.530
+	0.530	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA   NORTH

X3= 430000.0
Y3=4655669.0

```
  332 554 5 64 7+
  3  455 4 55 47+
   2 4 5     4 5
   023455   43 3
   -1245555543210
   -12456 5 431 0
   -124665 4 321
  522 3576555433
 7742 2578777654
38742 257888876 7
39 42 257877776 7
   4  34776 6654
    3 2465 4  42
     01554  4431
      13754  320-
        65 33 21-
         43 ?  ?
         332 2 4
         232 2357
         232  357
           2  36
           2  36
           1 136
           2 1367
           2 1257
           0  23
           0  11
           21  0-
           4210 -
           3210-
           22110
           221 1
           222  1
           02 2 1
           13331
           46641
          2676410
          25653 0
           2431=
           1210
          1 110-
         1 1  10
        0 1222 1
        -02  2 1
       0 12 22 1
     95 1 111   3
     9511    1  3
       1 1 222 1
       422 3 42
       63  3564
       74  3674-
       741 5795-
           +
```

X1= 350000.0
Y1=4535000.0

Figure 12-A

URANIUM/THORIUM RATIO

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0

```
                    00
                 70 0136555
                 71 1234 55
                  1 1 23 4
                 42 22 32
                543 44443
               75 4 5 654
              9654    4 4 4
              754 43   34
             +743 343 4 3
           7+ 83 0245655 3
           8  71  035666 3
          29  72  0123453
         6 79 621 12 3454
        85 578632 455 665
       8743 5653 4788777 7
       863  3543 4788 77 7
      5653  23  3 6787 64
     34 43   2 3  4666654
   32 3  32 1 23  3 5 5430
   3  3 3 21  2 33 3565430
   2   33 21  12345798852
  21 23 3 2 11 23469 9853
 2111 3  32  22 3 5677653
421  134432 2     3 4  432
421  124 3 2  2222 3 4 432
 21   23 3   2 1 1233  31
 311  123 33321  02333321
4211   12344320  02 32 10-
4321   1234 420  023332 1-
 3221  1234 4310 13565431
 33 21 1234 4321 24566542
 333211  24 54433 4444443
123 32   34554 4444    440
123 32  234554   555555540
 333  2 3455 444  56666 5
 43    3567643 34  56 6 5
243 2 3468864  344  4  5 5
2532 23578864  34 44   5 5
   3 34567764  345 5555 5
    3 4566654  3455  5 55
     46665 5 3 345 6 5  6
       6 654  3 456 6 5 55
       6 654 3  5677654 55
              34567764  4
               5678753  3
                7898642 3
                  + 853 36
                  + 9654 6
                    9654 5
                     543 4
                      2222
                       210
```

X1= 350000.0
Y1=4425000.0

Figure 12-B

URANIUM/THORIUM RATIO

X2= 430000.0
Y2=4425000.0

TABLE IX

LEGEND TO THORIUM/POTASSIUM RATIO MAP

CONTOUR VALUE	LOWER LIMIT	UPPER LIMIT
-		3.65
0	3.65	4.35
1	4.35	5.05
2	5.05	5.75
3	5.75	6.45
4	6.45	7.15
5	7.15	7.85
6	7.85	8.55
7	8.55	9.25
8	9.25	9.95
9	9.95	10.65
+	10.65	

X4= 350000.0
Y4=4655669.0

EUREKA, CALIFORNIA   NORTH

X3= 430000.0
Y3=4655669.0

```
  -023 5555 54444
  -023 45 66 55 4
   0123456   776
   1 1 2345689+
  31    123469  +
  311 1 2 358  +
   22 2 33 47  +
  24333 44 46799
 1355555554 5675
1246 7666 5 66532
1 36666 6   6 532
   66  6 6666 53
    4 4 56 6 543
     23 4676 5 4
      3 45 65   4
        345     4
         4 4   4
         3  4 43
         3 34 543
         2  4 543
          234 53
          234 54
          234554
          24 5542
          355 542
           76654
           55543
          -24 432
          -2443 2
           343 2
           3 32
           23 33
           23 44
           234 4
           44 55
           345 6
          -2456 7
          -2456 7
           356 7
           4676
          567876
         6788876
        677 8 75
        6   7765
       66 678875
     +8 5 5799853
     +8 5  698753
       54  47 76
       54  46  6
       5  456  7
       4  5676 67
       43  795 77
           3
```

X1= 350000.0
Y1=4535000.0

Figure 13-A

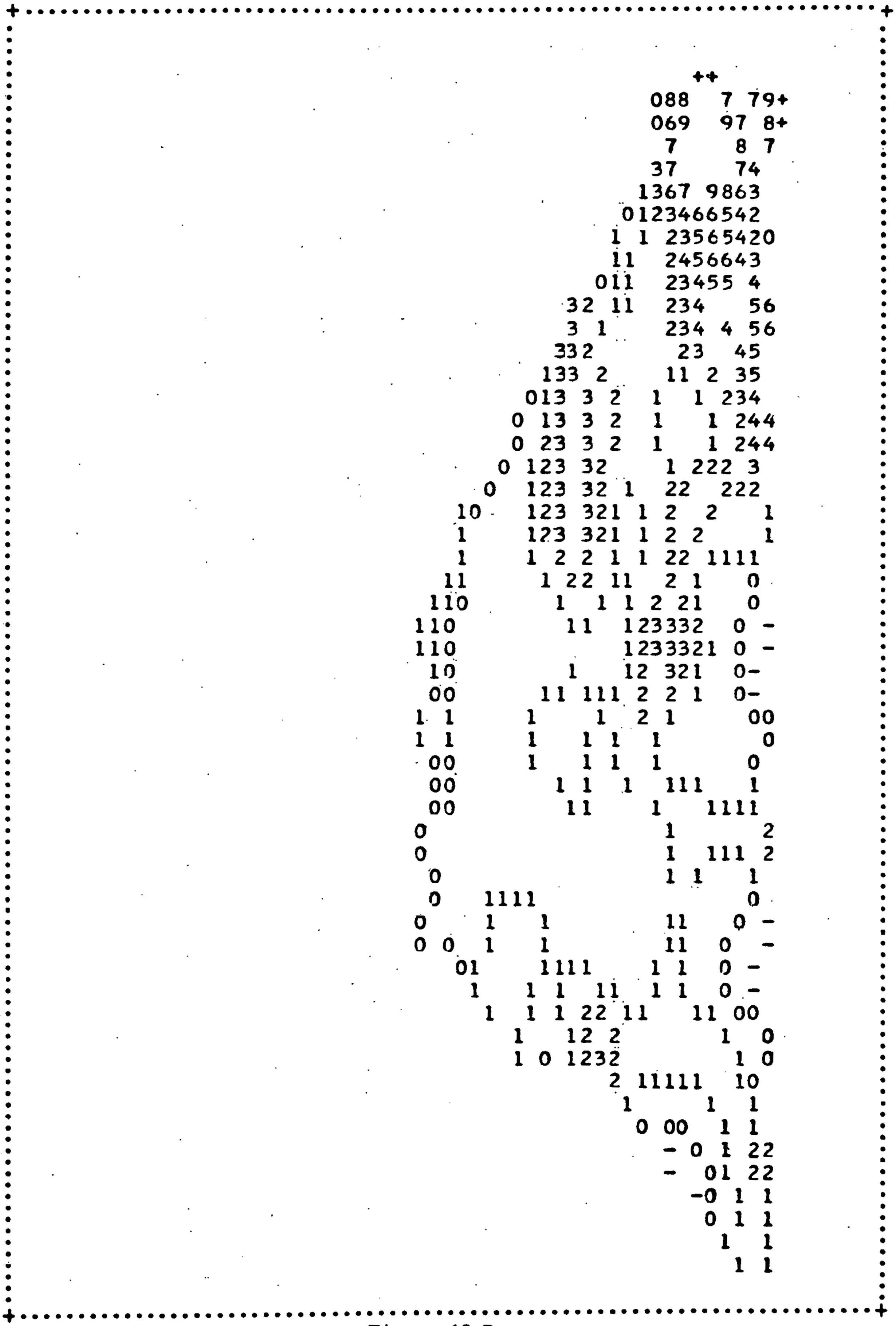
THORIUM/POTASSIUM RATIO

X2= 430000.0
Y2=4535000.0

X4= 350000.0
Y4=4545669.0

EUREKA, CALIFORNIA SOUTH

X3= 430000.0
Y3=4545669.0

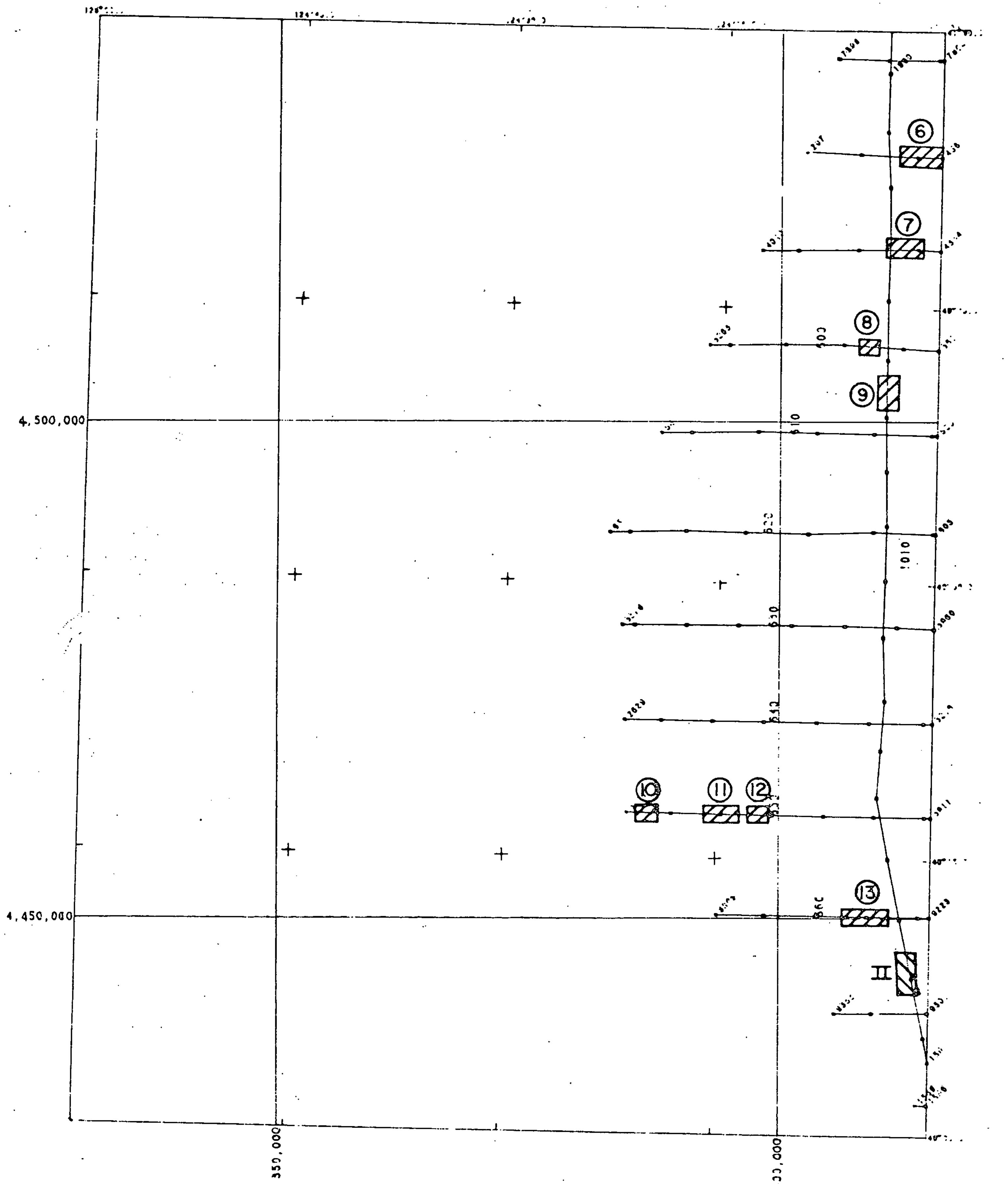


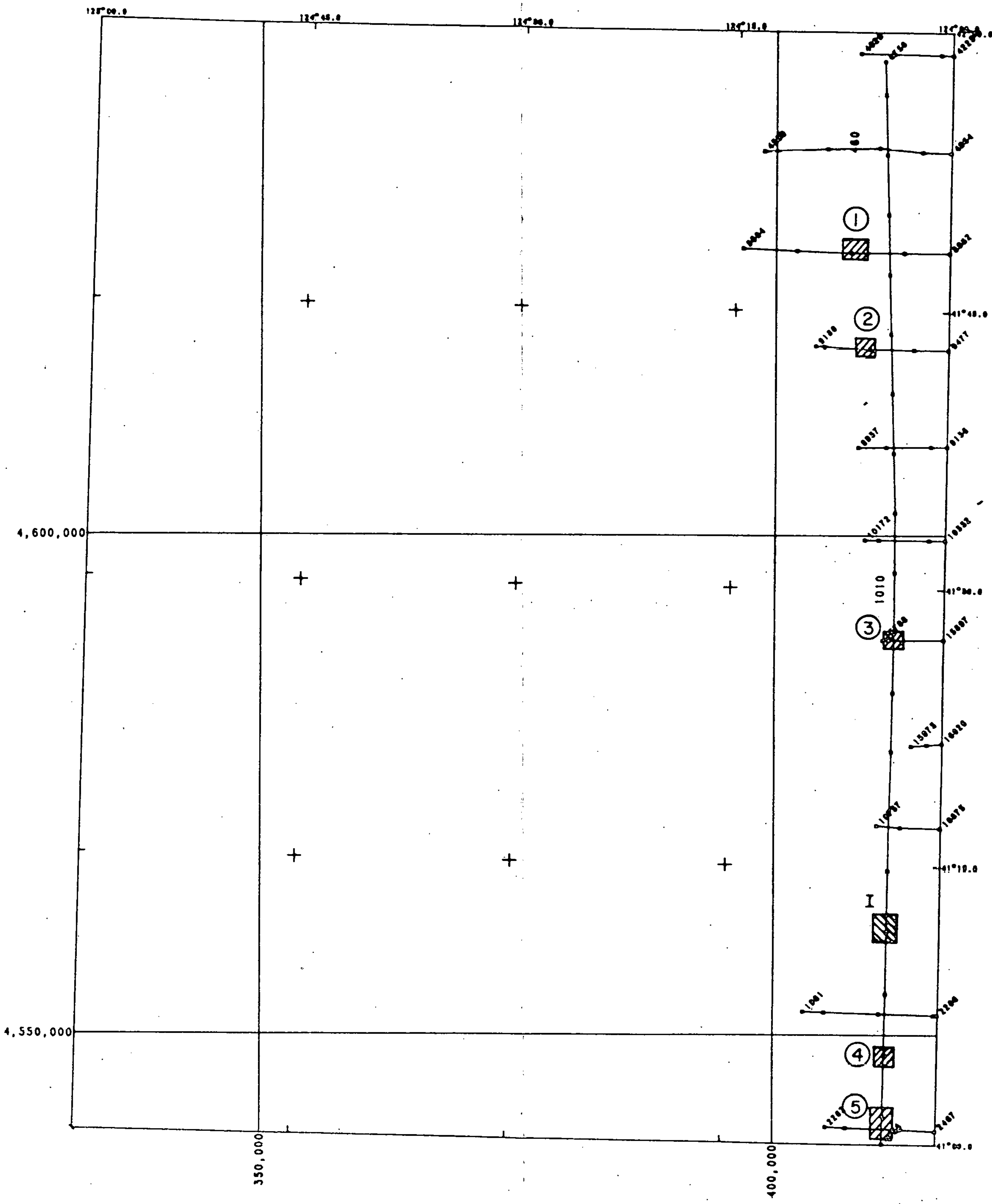
X1= 350000.0
Y1=4425000.0

X2= 430000.0
Y2=4425000.0

Figure 13-B

THORIUM/POTASSIUM RATIO





0 10 20
STATUTE MILES

AERO SERVICE

INTERPRETATION MAP
EUREKA, SOUTH
U.S. DEPARTMENT OF ENERGY

LEGEND

③ ▨ URANIUM ANOMALY NO. 3
III ▧ THORIUM ANOMALY NO. 3

INTERPRETATION MAP
EUREKA, NORTH
U.S. DEPARTMENT OF ENERGY

Figure 14

can be seen on these maps and narrow events are normally not noticeable.

The magnetic map of the Eureka area displays a broad featureless magnetic signature over all but the northernmost part of the area where an approximately 2600 gamma anomaly delineates the extent of thrusting of Jura-Triassic volcanics over Franciscan sediments. The average total intensity of the area is 52,500 gammas.

The radiometric maps reveal a very close association between the distributions of potassium, uranium and thorium with the greatest concentrations being located in the southern third of the map area. With apparent concentrations of 1.2%, 1.9 ppm and 5.4 ppm for the K, U and T parameters, these zones match very well in location with anomalies which have been defined south of the Mattole Fault Shear Zone in the vicinity of the Mattole River over predominantly undifferentiated Cretaceous marine sediments. Other undivided Cretaceous rocks as well as rocks of the Franciscan Formation display higher than average radiometric response in the central and northern areas of the map reaching levels of 0.89%, 1.22 ppm and 4.00 ppm for K, U and T respectively.

Based on the information on interpretation in the general interpretation section, a total of 13 uranium anomalies and two thorium anomalies are designated on the interpretation map. Most are only weakly anomalous having ratio support in only one of the U/K or U/T parameters, with the other being anomalous due to low expression in the potassium or thorium channels. These anomalies are felt to be described adequately in the anomaly list in Appendix B and will not be discussed further here.

Uranium anomalies 10, 11 and 12 which occur on traverse 650 merit extra comments, however. Occurring along part of the Mattole River over unit K, the undivided Cretaceous marine sediments, the three uranium anomalies represent uranium concentrations approaching 2.0 ppm, with reliable ratio support. Each one is expressed very well on the radiometric profiles. Any further investigation should include a closer look at these areas.

The two thorium anomalies are weak and occur in areas of normal or only slightly below normal uranium response and are adequately described in Appendix B.

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APPENDIX A

Geologic Legend

GEOLOGIC LEGEND

Aero Symbol	Map Symbol	Unit Description
QS	Qs	Recent dune and coast sand
QAL	Qal	Recent alluvium
QT	Qt	Quaternary nonmarine terrace deposits
QM	Qm	Pleistocene marine and marine terrace deposits
QC	Qc	Pleistocene nonmarine sedimentary deposits
QP	QP	Pliocene-Pleistocene nonmarine sedimentary deposits
PU	Pu	Upper Pliocene marine sedimentary rocks
——	Pml	Middle and/or Lower Pliocene marine sedimentary rocks
TC	Tc	Tertiary nonmarine sedimentary rocks
TM	Tm & Mu	Tertiary marine sedimentary rocks Upper Miocene marine sedimentary rocks
——	Ti	Tertiary intrusive rocks
K	K	Undivided Cretaceous marine sedimentary rocks
KU	Ku	Upper Cretaceous marine sedimentary rocks
KJF	KJf & KJfv	Franciscan Formation Franciscan volcanic and metavolcanic rocks
UB	ub	Mesozoic ultrabasic intrusives
JTRV	JTRv	Jurassic and/or Triassic metavolcanic rocks
MS	ms	Pre-Cretaceous metasedimentary rocks
UNK	——	Incomplete or uncertain geology
W		Water

APPENDIX B

List of Geologic Units by Anomaly

List of Geologic Units by Anomaly

(Uranium Anomalies)

Anomaly	Geologic Unit	t-traverse tl-tie line	Fiducial	Brief Description
1	KJF	t-470	8800	very narrow, moderate U/T anomaly in area of normal response
2	KJF	t-480	9280	narrow, weak to moderate U/T and weak U/K anomalies in area of weak U response
3	KJF MS	t-510	16810	very narrow, weak to moderate U/T anomaly with some U/K support recognizable on profiles in area of normal U expression
4	KJF	tl-1010	5110	very narrow, weak U/K anomaly with some U/T support in area of normal U response
5	KJF	tl-1010	4953-5000	weak U/T and U/K anomalies in area of normal U response with some very weak ratio support on intersecting traverse
6	KJF QT QAL	t-580	350-456	weak to moderate U and weak U/K anomalies with weak zone in middle but otherwise good expression on profiles and support over same geologic units at intersection of tl-1010
7	KJF QC	t-590	4250-4310	weak to moderate U/T and U/K anomalies recognizable on profiles
8	TM	t-600	3530	very narrow, weak to moderate U/T anomaly and weak U and U/K anomalies

Anomaly	Geologic Unit	t-traverse tl-tie line	Fiducial	Brief Description
9	KU TM	tl-1010	1320-1380	weak U and U/K anomalies
10	K QAL	t-650	3340	narrow, moderate U and U/T anomalies and weak to moderate U/K anomaly, all recognizable on profiles
11	K	t-650	3470-3530	moderate U and U/K anomalies and weak to moderate U/T anomaly, all with very good expression on profiles
12	K	t-650	3570	narrow, moderate to good U and weak to moderate U/T and U/K anomalies with good expression on profiles
13	K	t-660	9040-9150	weak to moderate U/T and U/K anomalies and weak U anomaly
		(Thorium Anomalies)		
I	MS	tl-1010	5290-5330	very weak T anomaly with some T/K support in area of normal U response
II	K	tl-1010	280-350	weak T and T/K anomalies in area of low U response

APPENDIX C

List of Anomalies by Geologic Unit

List of Anomalies by Geologic Unit

Geologic Unit	No. of Samples	No. of U Anomalies	No. of Th Anomalies
QS	126	-	-
QAL	828	2	-
QT	114	1	-
QM	388	1	-
QC	403	1	-
QP	460	-	-
PU	339	-	-
TC	4	-	-
TM	858	2	-
K	2547	4	1
KU	593	1	-
KJF	2580	7	-
UB	334	-	-
JTRV	95	-	-
MS	593	1	1
UNK	34	-	-

APPENDIX D

Mean Radiometric Values by Geologic Unit

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 450

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.03	0.08	0.73	0.0	0.0	0.0
QM	0.24	0.83	13.85	0.207	0.828	4.021

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
KJF	0.34	1.22	11.34	0.241	1.714	7.052
UB	0.17	0.87	6.56	0.365	2.369	6.413

LINE 460

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.06	0.0	1.94	0.0	0.0	3.309
QS	0.16	0.0	8.19	0.0	0.0	4.620
QAL	0.23	0.76	11.60	0.216	0.996	4.489
UB	0.08	0.38	2.86	0.236	2.005	6.020

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CT	0.32	1.10	16.92	0.229	1.008	4.396
KJF	0.19	0.92	7.42	0.327	1.984	6.152
MS	0.25	0.75	8.58	0.192	1.338	6.860

LINE 470

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.04	0.45	1.67	0.565	3.061	4.869
QS	0.09	0.64	4.47	0.483	2.130	4.560
QM	0.16	0.47	4.09	0.232	1.894	9.405
QAL	0.12	0.25	4.78	0.134	0.715	5.642
QT	0.24	0.52	7.00	0.138	1.100	7.757

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
KJF	0.10	0.71	2.98	0.423	3.099	7.549
MS	0.08	0.44	2.09	0.358	2.395	7.352
UB	0.07	0.28	1.21	0.0	0.0	8.866
JTRV	0.07	0.44	1.99	0.381	2.796	7.036
TM	0.07	0.22	1.85	0.227	1.950	8.513

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LINE 480

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.01	0.0	0.71	0.0	0.0	0.0
QS	0.02	0.0	1.58	0.0	0.0	0.0
TC	0.23	1.21	7.09	0.337	2.572	7.617

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CM	0.11	0.0	4.99	0.0	0.0	5.414
KJF	0.27	1.07	8.88	0.270	1.941	7.306

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 490

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
KJF	0.31	0.98	11.36	0.215	1.340	6.386
KJF	0.31	0.98	11.36	0.215	1.340	6.386
KJF	0.31	0.98	11.36	0.215	1.340	6.386

LINE 500

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.03	0.29	0.96	0.0	0.0	0.0
QS	0.0	0.0	0.48	0.0	0.0	0.0
KJF	0.25	0.95	8.38	0.251	1.784	7.101
QT	0.08	0.25	2.57	0.215	1.088	6.285
CAL	0.14	0.45	5.50	0.224	1.186	6.419

LINE 510

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.11	0.0	7.51	0.0	0.0	3.552
KJF	0.22	0.67	8.01	0.308	1.866	6.425
MS	0.08	0.75	2.46	0.596	4.792	8.147
CP	0.13	0.46	4.17	0.233	1.545	7.067

LINE 520

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QP	0.08	0.32	2.39	0.217	0.0	0.0
KJF	0.04	0.0	0.0	0.0	0.0	0.0

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 530

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QAL	0.31	1.31	16.01	0.281	1.273	4.512
KJF	0.18	0.55	4.79	0.203	1.794	8.841
MS	0.13	0.73	5.12	0.399	2.678	6.543

LINE 550

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
KJF	0.19	0.69	5.70	0.243	1.870	8.841
QM	0.0	0.0	2.22	0.0	0.0	0.0
MS	0.17	0.70	5.49	0.268	1.873	7.528
CC	0.13	0.85	2.67	0.436	4.279	11.281

LINE 560

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.03	0.0	0.95	0.0	0.0	0.0
QS	0.14	0.86	5.05	0.398	2.648	6.007
QM	0.21	0.56	8.26	0.173	1.051	6.027
CAL	0.29	0.87	14.19	0.197	1.075	5.049
KJF	0.21	0.89	6.68	0.305	2.599	7.911

LINE 570

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.04	0.0	0.95	0.0	0.0	0.0
QS	0.13	0.62	4.32	0.244	1.679	6.921
QM	0.23	0.91	5.86	0.260	2.260	10.007
KJF	0.21	0.86	4.93	0.278	2.767	10.356
CAL	0.22	0.43	5.78	0.131	1.158	8.848
CT	0.20	0.55	5.28	0.176	1.569	8.982

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 580

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.10	0.59	6.15	0.366	1.588	4.358
QS	0.16	0.99	8.50	0.412	1.824	4.430
QAL	0.35	1.63	16.69	0.307	1.492	4.887

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CC	0.19	0.93	5.03	0.326	2.912	9.368
KJF	0.28	1.37	7.05	0.324	3.073	9.562
CT	0.36	2.42	14.21	0.437	2.604	5.993

LINE 590

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.07	0.72	3.03	0.250	1.490	5.653
QS	0.22	1.45	7.53	0.573	3.550	6.621
KJF	0.15	0.86	4.82	0.372	2.624	7.243

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
QAL	0.22	0.86	11.54	0.258	1.235	4.684
CC	0.18	0.76	6.54	0.295	2.340	7.046

LINE 600

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.04	0.32	2.08	0.336	1.651	4.294
QS	0.15	0.68	7.37	0.293	1.411	4.827
QAL	0.21	1.40	11.82	0.407	1.677	4.231
QT	0.18	0.80	9.19	0.289	1.315	4.613

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CC	0.16	0.60	5.76	0.293	1.935	6.654
TM	0.12	0.64	5.92	0.367	1.733	4.914
KU	0.12	0.35	8.08	0.198	0.678	3.409
KJF	0.17	0.69	5.36	0.273	1.917	7.176

LINE 610

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.13	0.63	6.66	0.275	1.205	4.411
QAL	0.34	1.45	15.70	0.273	1.223	4.421
QC	0.26	0.86	10.46	0.221	1.383	6.299

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
GP	0.23	0.71	10.20	0.213	1.111	5.265
TM	0.16	0.67	7.51	0.296	1.456	5.188
KU	0.16	0.76	7.94	0.324	1.509	4.855

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 620

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
W	0.11	0.87	7.94	0.193	0.939	5.082
PU	0.24	0.83	12.36	0.234	1.063	4.557
QAL	0.31	1.17	15.81	0.247	1.081	4.358
CP	0.20	0.77	9.51	0.281	1.485	5.217
CT	0.31	1.24	10.55	0.260	1.806	6.927
KU	0.12	0.55	8.48	0.295	0.973	3.323

LINE 630

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.30	1.08	15.50	0.236	1.075	4.632
KU	0.20	0.83	11.13	0.285	1.147	4.891
TM	0.31	1.12	16.97	0.235	0.991	4.263

LINE 640

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
TM	0.39	1.35	19.13	0.220	1.062	4.816
KU	0.29	1.38	14.16	0.307	1.481	4.787
K	0.32	1.27	17.33	0.264	1.162	4.419

LINE 650

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.37	1.63	13.85	0.285	1.299	4.553
QAL	0.40	3.24	20.97	0.531	2.374	4.469
KJF	0.20	0.75	10.83	0.248	1.055	4.273
KU	0.33	1.43	17.98	0.278	1.194	4.358

MEAN VALUE BY GEOLOGIC MAP UNIT

EUREKA QUAD

LINE 660

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.35	1.71	17.47	0.329	1.532	4.718
K	0.35	1.71	17.47	0.329	1.532	4.718

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.35	1.71	17.47	0.329	1.532	4.718

LINE 670

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.33	1.74	17.46	0.313	1.380	4.465
K	0.33	1.74	17.46	0.313	1.380	4.465

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.33	1.74	17.46	0.313	1.380	4.465

LINE 680

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.27	1.29	12.91	0.252	1.214	5.057
K	0.27	1.29	12.91	0.252	1.214	5.057

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.27	1.29	12.91	0.252	1.214	5.057

LINE 1010

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
K	0.34	1.26	15.99	0.255	1.235	4.976
KU	0.29	1.36	14.50	0.306	1.471	4.789
QAL	0.27	1.04	12.59	0.255	1.315	5.294
TM	0.15	0.77	6.72	0.326	1.724	5.364
UNK	0.21	0.75	10.24	0.243	1.136	4.688
PU	0.23	0.71	11.68	0.254	1.181	4.653
QP	0.11	0.53	4.52	0.287	1.726	6.139
JTRV	0.04	0.48	0.0	0.0	0.0	0.0

UNIT	E THOR	E URN	POT PCT	U/TH	U/K	TH/K
CT	0.16	0.62	5.82	0.271	1.470	6.114
KJF	0.22	0.91	7.30	0.274	2.142	7.772
CC	0.17	0.72	5.00	0.260	2.126	8.784
CM	0.20	0.71	3.55	0.242	3.218	13.435
MS	0.21	0.91	6.82	0.277	2.098	7.833
W	0.22	0.49	10.99	0.143	0.681	4.682
UB	0.07	0.33	2.56	0.234	1.304	6.237

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APPENDIX E

Standard Deviation Table

EUREKA QUAD

FORMATION QAL

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	787	3.98	NORMAL	-0.23	1.17	2.58	5.38	6.78	8.18
E URANIUM	732	1.07	NORMAL	-0.42	0.08	0.57	1.56	2.06	2.56
POTASSIUM	795	0.87	NORMAL	-0.17	0.18	0.52	1.22	1.56	1.91
EU/K	727	1.15	NORMAL	-0.14	0.29	0.72	1.59	2.02	2.45
EU/ETH	731	0.25	NORMAL	-0.00	0.08	0.16	0.33	0.42	0.50
ETH/K	727	4.49	NORMAL	2.09	2.89	3.69	5.29	6.09	6.89

FORMATION QT

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	114	3.61	NORMAL	-1.10	0.47	2.04	5.18	6.75	8.32
E URANIUM	107	1.00	NORMAL	-0.45	0.03	0.51	1.48	1.96	2.44
POTASSIUM	114	0.58	NORMAL	-0.19	0.07	0.33	0.84	1.09	1.35
EU/K	99	1.56	NORMAL	-0.33	0.30	0.93	2.19	2.82	3.45
EU/ETH	106	0.25	NORMAL	0.03	0.10	0.18	0.33	0.40	0.47
ETH/K	99	6.12	NORMAL	1.85	3.28	4.70	7.54	8.96	10.39

FORMATION QC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	446	2.54	NORMAL	0.00	0.85	1.70	3.39	4.24	5.08
E URANIUM	382	0.69	NORMAL	-0.03	0.21	0.45	0.93	1.17	1.41
POTASSIUM	446	0.24	LOGNORMAL	0.05	0.08	0.14	0.40	0.68	1.14
EU/K	372	0.83	LOGNORMAL	0.09	0.19	0.40	1.73	3.60	7.46
EU/ETH	382	0.22	LOGNORMAL	0.06	0.09	0.14	0.34	0.53	0.83
ETH/K	372	5.45	LOGNORMAL	1.97	2.76	3.88	7.66	10.76	15.12

FORMATION QM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	385	2.78	NORMAL	0.47	1.24	2.01	3.55	4.31	5.08
E URANIUM	309	0.64	NORMAL	-0.33	-0.01	0.31	0.96	1.28	1.60
POTASSIUM	386	0.24	LOGNORMAL	0.04	0.08	0.14	0.42	0.75	1.32
EU/K	289	1.49	LOGNORMAL	0.32	0.53	0.89	2.50	4.18	7.00
EU/ETH	307	0.23	NORMAL	-0.04	0.05	0.14	0.31	0.40	0.49
ETH/K	289	10.76	NORMAL	-4.30	0.73	5.76	15.81	20.83	25.86

EUREKA QUAD

FORMATION QS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	123	1.89	NORMAL	-0.90	0.03	0.96	2.81	3.74	4.67
E URANIUM	95	0.78	NORMAL	-0.29	0.07	0.43	1.14	1.49	1.85
POTASSIUM	130	0.38	NORMAL	-0.14	0.03	0.20	0.55	0.72	0.89
EU/K	95	1.56	LOGNORMAL	0.28	0.50	0.88	2.77	4.89	8.64
EU/ETH	88	0.38	LOGNORMAL	0.10	0.15	0.24	0.61	0.97	1.55
ETH/K	93	4.79	NORMAL	0.59	1.99	3.39	6.20	7.60	9.00

FORMATION QP

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	448	1.31	LOGNORMAL	0.35	0.54	0.84	2.05	3.19	4.96
E URANIUM	287	0.50	NORMAL	-0.30	-0.03	0.23	0.77	1.03	1.30
POTASSIUM	441	0.18	LOGNORMAL	0.03	0.06	0.10	0.33	0.61	1.10
EU/K	266	1.07	LOGNORMAL	0.25	0.40	0.66	1.74	2.83	4.60
EU/ETH	279	0.18	LOGNORMAL	0.05	0.07	0.11	0.27	0.43	0.67
ETH/K	266	5.15	LOGNORMAL	2.33	3.03	3.95	6.71	8.74	11.39

FORMATION PU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	339	3.36	NORMAL	1.05	1.82	2.59	4.13	4.90	5.67
E URANIUM	333	0.74	NORMAL	0.06	0.29	0.51	0.96	1.19	1.41
POTASSIUM	339	0.78	NORMAL	0.15	0.36	0.57	0.99	1.20	1.41
EU/K	333	0.96	NORMAL	-0.10	0.25	0.60	1.31	1.66	2.01
EU/ETH	333	0.22	NORMAL	0.01	0.08	0.15	0.29	0.36	0.43
ETH/K	333	4.18	NORMAL	2.01	2.73	3.46	4.90	5.62	6.34

FORMATION TC

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	4	3.24	NORMAL	2.69	2.87	3.06	3.42	3.60	3.79
E URANIUM	4	1.12	NORMAL	0.95	1.01	1.07	1.18	1.24	1.29
POTASSIUM	4	0.44	NORMAL	0.35	0.38	0.41	0.47	0.49	0.52
EU/K	4	2.45	NORMAL	1.95	2.12	2.28	2.61	2.78	2.94
EU/ETH	4	0.33	NORMAL	0.27	0.29	0.31	0.35	0.36	0.38
ETH/K	4	7.18	NORMAL	6.12	6.47	6.82	7.53	7.88	8.23

EUREKA QUAD

FORMATION TM

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	802	1.87	LOGNORMAL	0.48	0.75	1.19	2.94	4.62	7.26
E URANIUM	676	0.52	LOGNORMAL	0.14	0.22	0.34	0.79	1.22	1.88
POTASSIUM	802	0.34	LOGNORMAL	0.07	0.12	0.21	0.57	0.95	1.58
EU/K	676	1.16	LOGNORMAL	0.34	0.51	0.77	1.76	2.66	4.03
EU/ETH	675	0.26	LOGNORMAL	0.09	0.12	0.18	0.37	0.53	0.76
ETH/K	676	4.75	NORMAL	1.60	2.65	3.70	5.80	6.85	7.90

FORMATION JTRV

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	95	0.83	NORMAL	-0.17	0.16	0.50	1.17	1.51	1.84
E URANIUM	73	0.36	NORMAL	-0.31	-0.09	0.14	0.59	0.81	1.03
POTASSIUM	90	0.11	NORMAL	-0.04	0.01	0.06	0.16	0.21	0.26
EU/K	36	1.68	LOGNORMAL	0.39	0.64	1.04	2.74	4.44	7.21
EU/ETH	64	0.37	NORMAL	-0.32	-0.09	0.14	0.59	0.82	1.05
ETH/K	36	7.21	NORMAL	-0.10	2.34	4.77	9.65	12.08	14.52

FORMATION K

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	2621	4.85	NORMAL	1.45	2.59	3.72	5.99	7.12	8.25
E URANIUM	2569	1.31	NORMAL	-0.24	0.27	0.79	1.83	2.35	2.87
POTASSIUM	2619	1.09	NORMAL	0.34	0.59	0.84	1.34	1.59	1.84
EU/K	2565	1.14	NORMAL	-0.14	0.29	0.71	1.57	1.99	2.42
EU/ETH	2563	0.26	NORMAL	-0.02	0.07	0.16	0.35	0.45	0.54
ETH/K	2565	4.29	NORMAL	2.11	2.84	3.56	5.01	5.74	6.46

FORMATION KU

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	591	3.85	NORMAL	-0.54	0.92	2.39	5.31	6.78	8.24
E URANIUM	585	1.15	NORMAL	-0.53	0.03	0.59	1.70	2.26	2.82
POTASSIUM	591	0.88	NORMAL	-0.16	0.19	0.53	1.22	1.57	1.91
EU/K	585	1.26	NORMAL	0.02	0.43	0.85	1.68	2.09	2.50
EU/ETH	585	0.29	NORMAL	0.05	0.13	0.21	0.36	0.44	0.52
ETH/K	585	4.26	NORMAL	1.99	2.75	3.50	5.02	5.77	6.53

EUREKA QUAD

FORMATION KJF

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	2497	3.39	NORMAL	-0.76	0.62	2.00	4.77	6.16	7.54
E URANIUM	2283	0.87	NORMAL	-0.38	0.03	0.45	1.29	1.70	2.12
POTASSIUM	2496	0.49	NORMAL	-0.25	-0.00	0.24	0.74	0.98	1.23
EU/K	2236	1.40	LOGNORMAL	0.28	0.48	0.82	2.38	4.05	6.91
EU/ETH	2269	0.26	NORMAL	-0.08	0.03	0.14	0.37	0.49	0.60
ETH/K	2236	7.18	NORMAL	1.64	3.49	5.33	9.03	10.88	12.73

FORMATION MS

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	590	2.73	NORMAL	-1.16	0.14	1.44	4.03	5.33	6.63
E URANIUM	533	0.76	NORMAL	-0.39	-0.01	0.37	1.14	1.52	1.90
POTASSIUM	584	0.39	NORMAL	-0.20	-0.00	0.19	0.59	0.78	0.98
EU/K	491	1.56	LOGNORMAL	0.34	0.57	0.95	2.63	4.37	7.28
EU/ETH	517	0.27	NORMAL	-0.10	0.02	0.15	0.40	0.52	0.65
ETH/K	488	7.30	NORMAL	0.53	2.79	5.04	9.56	11.82	14.07

FORMATION UB

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	324	0.92	NORMAL	-0.46	-0.00	0.46	1.38	1.84	2.30
E URANIUM	157	0.34	NORMAL	-0.34	-0.12	0.11	0.56	0.79	1.02
POTASSIUM	239	0.07	LOGNORMAL	0.01	0.01	0.03	0.15	0.33	0.74
EU/K	84	1.37	LOGNORMAL	0.35	0.55	0.87	2.17	3.44	5.44
EU/ETH	92	0.24	NORMAL	-0.08	0.03	0.13	0.35	0.46	0.57
ETH/K	84	5.20	NORMAL	1.67	3.18	4.69	7.71	9.22	10.73

FORMATION UNK

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	34	2.91	NORMAL	1.31	1.84	2.38	3.44	3.97	4.51
E URANIUM	34	0.67	NORMAL	0.09	0.28	0.48	0.86	1.05	1.25
POTASSIUM	34	0.65	NORMAL	0.30	0.42	0.53	0.76	0.88	0.99
EU/K	34	1.02	NORMAL	0.27	0.52	0.77	1.27	1.52	1.77
EU/ETH	34	0.23	NORMAL	0.05	0.11	0.17	0.29	0.34	0.40
ETH/K	34	4.29	NORMAL	3.30	3.63	3.96	4.62	4.96	5.29

EUREKA CUAD

FORMATION W

DATA	SAMPLES	MEAN		-3	-2	-1	+1	+2	+3
E THORIUM	190	0.41	LOGNORMAL	0.03	0.08	0.18	0.95	2.19	5.03
E URANIUM	129	0.29	LOGNORMAL	0.06	0.10	0.17	0.48	0.79	1.32
POTASSIUM	181	0.06	LOGNORMAL	0.00	0.01	0.02	0.16	0.42	1.11
EU/K	80	0.84	LOGNORMAL	0.18	0.30	0.50	1.42	2.38	3.99
EU/ETH	72	0.27	NORMAL	-0.12	0.01	0.14	0.40	0.53	0.66
ETH/K	79	4.23	NORMAL	1.68	2.53	3.38	5.08	5.93	6.78

APPENDIX F

Format, Single Record Data Listing

REC NO.	LAT	LONG	RESID MAG GAMMA	TERR CL FEET	FLG	GEOL UNIT	COSM CPS	ATM U CPS	TOTAL COUNT CPS	FLG	ETH PPM	FLG	EU PPM	FLG	K PCT	FLG	EU/ETH	EU/K	ETH/K	TEMP CELCIUS	BARO 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	-160.9166	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	NAD	-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	NAD	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	NAD	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	663		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		0.6	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	55303	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	55303	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	55303	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		0.5	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	5.9	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

APPENDIX G

Format, Average Record Data Listing

RECORD NUMBER	LATITUDE	LONGITUDE	RESID TOTAL FIELD GAMMA	GEOL UNIT	COSM CPS	ATM. URAN CPS	TOTAL COUNT CPS	ETH PPM	FLG	STD DEV	EU PPM	FLG	STD DEV	POT PCT	FLG	STD DEV	EU ETH RATIO	STD DEV	EU POTA RATIO	STD DEV	ETH POTA RATIO	STD DEV
5238	64.0098	-160.7455	55285	W	33	-6	980	3.7		1	1.9		2	0.7		1	0.5	0	2.8	0	5.2	0
5239	64.0098	-160.7444	55283	KS	43	-6	952	3.7		0	1.9		0	0.7		0	0.5	1	2.9	0	5.3	0
5240	64.0098	-160.7434	55285	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	55288	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	55285	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	55285	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	-160.7289	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	55283	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	55284	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	55284	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	55284	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	790	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

```
                        Character Number
1234567890123456789012345678901234567890123456789012345678901234567890123456789012

02 0978  (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)

SINGLE RECORD REDUCED DATA TAPE

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

ITEM     FORMAT    DESCRIPTION
1        A40       QUADRANGLE NAME AS PROJECT IDENTIFICATION
2        A20       NAME OF SUBCONTRACTOR
3        I4        APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
4        I1        NUMBER OF AERIAL SYSTEMS USED TO COLLECT DATA FOR
                   THIS QUADRANGLE
5        I1        AERIAL SYSTEM IDENTIFICATION CODE FOR FIRST SYSTEM
6        A20       AIRCRAFT IDENTIFICATION BY TYPE AND FAA NUMBER FOR
                   FIRST SYSTEM
7        F6.1      NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO
                   TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE
                   IN CPS PER PERCENT K FOR FIRST SYSTEM
8        F6.1      NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO
                   TERRESTRIAL URANIUM (BI-214) TO ONE DECIMAL PLACE
                   IN CPS PER PPM EQUIVALENT U
9        F6.1      NOMINAL ALTITUDE SYSTEM SENSITIVITY RELATIVE TO
                   TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE
                   IN CPS PER PPM EQUIVALENT TH
10       I6        BLANK FIELD (999999)
11       F6.3      4PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL
                   PLACES IN SECONDS FOR FIRST SYSTEM
12       F6.3      2PI-SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL
                   PLACES IN SECONDS FOR FIRST SYSTEM
13       I3        NUMBER OF CHANNELS (0-3 MEV) IN 4 PI SYSTEM FOR FIRST
                   AERIAL SYSTEM
14       I3        NUMBER OF CHANNELS (0-3 MEV) IN 2 PI SYSTEM FOR FIRST
                   AERIAL SYSTEM
15-24    (SAME)    REPEAT OF ITEMS 5-14 FOR SECOND AERIAL SYSTEM
 *        *                          *
 *        *                          *
 *        *                          *
85-94    (SAME)    REPEAT OF ITEMS 5-14 FOR NINTH AERIAL SYSTEM
95       I3        NUMBER OF FLIGHT LINES ON THIS TAPE
96       I4        FIRST FLIGHT LINE NUMBER ON THIS TAPE
97       I6        FIRST RECORD NUMBER OF FIRST FLIGHT LINE
98       I3        JULIAN DATE (DAY OF YEAR) FIRST FLIGHT-LINE DATA WAS
                   COLLECTED
99-101   I4,6, &3  REPEAT OF ITEMS 96-98 FOR SECOND FLIGHT LINE ON THIS
                   TAPE
 *        *                          *
 *        *                          *
390-392  I4,6, &3  REPEAT OF ITEMS 96-98 FOR 99TH FLIGHT LINE ON THIS
                   TAPE
```

Line Number / Character Number

123456789012345678901234567890123456789012345678901234567890123456789012

FORMAT FOR SINGLE RECORD REDUCED DATA RECORD (THIRD THRU LAST BLOCK)

ITEM	FORMAT	DESCRIPTION
1	I1	AERIAL SYSTEM INDENTIFICATION CODE
2	I4	FLIGHT LINE NUMBER
3	I6	RECORD IDENTIFICATION NUMBER
4	I6	GMT TIME OF DAY (HHMMSS)
5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
8	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
9	A8	SURFACE GEOLOGIC MAP UNIT CODE
10	I4	QUALITY FLAG CODES
11	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE IN PERCENT K
12	F4.1	UNCERTAINTY IN TERRESTRIAL POTASSIUM TO ONE DECIMAL PLACE IN PERCENT K
13	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL URANIUM (BI-214) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
14	F4.1	UNCERTAINTY IN TERRESTRIAL URANIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
15	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
16	F4.1	UNCERTAINTY IN TERRESTRIAL THORIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
17	F6.1	URANIUM-TO-THORIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
18	F6.1	URANIUM-TO-POSTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K
19	F6.1	THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
20	F8.1	GROSS GAMMA (0.4-3.0 MEV) COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
21	F6.1	UNCERTAINTY IN GROSS GAMMA COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
22	F5.1	ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
23	F4.1	UNCERTAINTY IN ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
24	F4.1	OUTSIDE AIR TEMPERATURE TO ONE DECIMAL PLACE IN DEGREES CELSIUS
25	F5.1	OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG

APPENDIX I

Format, DOE RAW SPECTRAL DATA TAPE

DOE RAW SPECTRAL DATA TAPE

Line Number — Character number
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012

01 0978 (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)

RAW SPECTRAL DATA TAPE

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK ON TAPE)

ITEM	FORMAT	DESCRIPTION
1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION
2	A20	NAME OF SUBCONTRACTOR
3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
4	I1	AERIAL SYSTEM IDENTIFICATION CODE
5	A20	AIRCRAFT IDENTIFICATION BY TYPE AND FAA NUMBER
6	I3	BFEC CALIBRATION REPORT NUMBER
7	F6.3	4PI SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL PLACES IN SECONDS
8	F6.3	2PI SYSTEM DATA COLLECTION INTERVAL TO THREE DECIMAL PLACES IN SECONDS
9	I3	NUMBER OF CHANNELS (0-3 MEV) FOR 4PI SYSTEM
10	I3	NUMBER OF CHANNELS (0-3 MEV) FOR 2PI SYSTEM
11	I3	NUMBER OF FLIGHT LINES ON THIS TAPE
12	I4	FIRST FLIGHT LINE NUMBER ON THIS TAPE
13	I6	FIRST RECORD NUMBER OF FIRST FLIGHT LINE
14	I3	JULIAN DATE (DAY OF YEAR) FIRST FLIGHT LINE WAS COLLECTED
15-17	I4,6 &3	REPEAT OF ITEMS 12-14 FOR SECOND FLIGHT LINE ON THIS TAPE
*	*	*
*	*	*
*	*	*
306-308	I4,6 &3	REPEAT OF ITEMS 12-14 FOR 99TH FLIGHT LINE ON THIS TAPE

FORMAT FOR RAW SPECTRAL DATA RECORD (THIRD THRU LAST BLOCK ON TAPE)

ITEM	FORMAT	DESCRIPTION
1	I1	AERIAL SYSTEM IDENTIFICATION CODE
2	I4	FLIGHT LINE NUMBER
3	I6	RECORD IDENTIFICATION NUMBER
4	I6	GMT TIME OF DAY (HHMMSS)
5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
7	F6.2	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
8	F7.1	TOTAL MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
9	A8	SURFACE GEOLOGIC MAP UNIT CODE
10	I4	QUALITY FLAG CODES
11	F4.1	OUTSIDE AIR TEMPERATURE TO ONE DECIMAL PLACE IN DEGREES CELSIUS
12	F5.1	OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG
13	F5.3	LIVE TIME COUNTING PERIOD TO THREE DECIMAL PLACES IN SECONDS

Line Number	Character Number 1234567890123456789012345678901234567890123456789012345678901234567890		
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

APPENDIX J

Format, DOE STATISTICAL ANALYSIS DATA TAPE

DOE STATISTICAL ANALYSIS DATA TAPE

```
 Line                       Character Number
Number 123456789012345678901234567890123456789012345678901234567890123456789012

  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 Number — Character Number 1234567890123456789012345678901234567890123456789012345678901234567890123456789012

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

ITEM	FORMAT	DESCRIPTION
1	I1	AERIAL SYSTEM IDENTIFICATION CODE
2	I4	FLIGHT LINE NUMBER
3	I6	RECORD IDENTIFICATION NUMBER
4	I6	GMT TIME OF DAY (HHMMSS)
5	F.84	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
8	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
9	A8	SURFACE GEOLOGIC MAP UNIT CODE
10	I5	QUALITY FLAG CODES
11	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE IN PERCENT K
12	F4.1	UNCERTAINTY IN TERRESTRIAL POTASSIUM TO ONE DECIMAL PLACE IN PERCENT K
13	F5.1	POTASSIUM STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
14	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL URANIUM (BI-214) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
15	F4.1	UNCERTAINTY IN TERRESTRIAL URANIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
16	F5.1	URANIUM STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
17	F6.1	AVERAGED CONCENTRATION OF TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
18	F4.1	UNCERTAINTY IN TERRESTRIAL THORIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
19	F5.1	THORIUM STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
20	F8.1	GROSS GAMMA (0.4-3.0 MEV) COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
21	F6.1	UNCERTAINTY IN GROSS GAMMA COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
22	F5.1	ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
23	F4.1	UNCERTAINTY IN ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
24	F6.1	AVERAGED URANIUM-TO-THORIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
25	F5.1	URANIIUM-TO-THORIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
26	F6.1	AVERAGED URANIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K
27	F5.1	URANIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
28	F6.1	AVERAGE THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
29	F5.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED

APPENDIX K

Format, DOE STATISTICAL ANALYSIS SUMMARY DATA TAPE

DOE STATISTICAL ANALYSIS SUMMARY DATA TAPE

Character Number
1234567890123456789012345678901234567890123456789012345678901234567890l2

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

STATISTICAL ANALYSIS SUMMARY TAPE (OR FILE)

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

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

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

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

Line Number	Character Number 123456789012345678901234567890123456789012345678901234567890123456789012		
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

APPENDIX L

Format, DOE MAGNETIC DATA TAPE

DOE MAGNETIC DATA TAPE FORMAT

Line Number — Character Number
1234567890123456789012345678901234567890123456789012345678901234567890123456789012

04 0978 (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)

MAGNETIC DATA TAPE

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

ITEM	FORMAT	DESCRIPTION
1	A40	QUADRANGLE NAME AS PROJECT IDENTIFICATION
2	A20	NAME OF SUBCONTRACTOR
3	I4	APPROXIMATE DATE OF SURVEY (MONTH, YEAR)
4	I3	NUMBER OF FLIGHT LINES ON THIS TAPE
5	I4	FIRST FLIGHT LINE OF THIS TAPE
6	I6	FIRST RECORD NUMBER OF FIRST FLIGHT LINE
7	I3	JULIAN DATE (DAY OF YEAR) FIRST FLIGHT LINE DATA WAS COLLECTED
8	F8.4	LATITUDE OF GROUND BASE STATION TO FOUR DECIMAL PLACES IN DEGREES FOR FIRST FLIGHT LINE
9	F8.4	LONGITUDE OF GROUND BASE STATION TO FOUR DECIMAL PLACES IN DEGREES FOR FIRST FLIGHT LINE
10-14	(SAME)	REPEAT OF ITEMS 5-9 FOR SECOND FLIGHT LINE ON THIS TAPE
*	*	*
*	*	*
x	x	x
495-499	(SAME)	REPEAT OF ITEMS 5-9 FOR 99TH FLIGHT LINE ON THIS TAPE

FORMAT FOR MAGNETIC DATA RECORD (THIRD THRU LAST BLOCK)

ITEM	FORMAT	DESCRIPTION
1	I1	AERIAL SYSTEM IDENTIFICATION CODE
2	I4	FLIGHT LINE NUMBER
3	I6	RECORD IDENTIFICATION NUMBER
4	I6	GMT TIME OF DAY (HHMMSS)
5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
8	F5.1	OUTSIDE AIR PRESSURE TO ONE DECIMAL PLACE IN MMHG
9	A8	SURFACE GEOLOGIC MAP UNIT CODE
10	F7.1	TOTAL MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
11	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
12	F7.1	DIURNAL MAGNETIC INTENSITY VARIATION TO ONE DECIMAL PLACE IN GAMMAS
13	F7.1	MAGNETIC DEPTH-TO-BASEMENT TO ONE DECIMAL PLACE IN METERS (IF REQUIRED)

APPENDIX M

Reduced Calibration and Test Line Data

Reduced Calibration and Test Line Data

Date	Flight	Res. Thor. 583	Res. Thor. 2615	Low Preflight Alt.	Low Preflight T.C.	Low Preflight 2π	Low Postflight Alt.	Low Postflight T.C.	Low Postflight 2π
09/06/80	58	6.2%	9.0%	400'	1250	11	400'	1250	11
09/07/80	61	6.0%	8.8%	400'	1225	10	400'	1225	9
09/19/80	87	6.2%	8.6%	400'	1175	9	400'	1150	9
09/19/80	88	6.2%	8.6%	400'	1175	9	400'	1150	9
09/21/80	92	6.4%	8.6%	400'	1225	7	400'	N/A	7
09/21/80	93	6.4%	8.6%	400'	1225	7	400'	N/A	7
09/22/80	96	6.3%	8.5%	400'	1150	7	No Test		
09/22/80	97	6.3%	8.5%	400'	1150	7	No Test		
09/23/80	99	5.5%	8.5%	400'	1175	8	400'	1150	7
09/23/80	100	5.5%	8.5%	400'	1175	8	400'	1150	7
09/23/80	101	5.5%	8.5%	400'	1175	8	400'	1150	7
09/23/80	102	5.5%	8.5%	400'	1175	8	400'	1150	7
09/24/80	103	5.4%	8.4%	400'	1150	9	400'	1150	7
09/24/80	104	5.4%	8.4%	400'	1150	9	400'	1150	7

N/A = NOT AVAILABLE

A P P E N D I X N

Renumbered to Original Fiducial Correlations

EUREKA MAP AREA

LINE 450 FLOWN AS LINE 451
MAP FIDUCIALS 3849 TO 4225 CORRESPOND TO ORIGINAL FIDUCIALS 4225 TO 3849

LINE 460 FLOWN AS LINE 461
MAP FIDUCIALS 4599 TO 3601 CORRESPOND TO ORIGINAL FIDUCIALS 3601 TO 4599

LINE 470 FLOWN S LINE 471
MAP FIDUCIALS 8604 TO 8982 CORRESPOND TO ORIGINAL FIDUCIALS 8982 TO 8604

LINE 480 FLOWN AS LINE 481
MAP FIDUCIALS 9180 TO 9477 CORRESPOND TO ORIGINAL FIDUCIALS 9477 TO 9180

LINE 490 FLOWN AS LINE 491
MAP FIDUCIALS 8937 TO 9136 CORRESPOND TO ORIGINAL FIDUCIALS 9136 TO 8937

LINE 500 FLOWN AS LINE 501
MAP FIDUCIALS 10172 TO 10332 CORRESPOND TO ORIGINAL FIDUCIALS 10332 TO 10172

LINE 510 FLOWN AS LINE 511
MAP FIDUCIALS 15788 TO 15897 CORRESPOND TO ORIGINAL FIDUCIALS 15897 TO 15788

LINE 520 FLOWN AS LINE 521
MAP FIDUCIALS 15973 TO 16026 CORRESPOND TO ORIGINAL FIDUCIALS 16026 TO 15973

LINE 530 FLOWN AS LINE 531
MAP FIDUCIALS 10757 TO 10875 CORRESPOND TO ORIGINAL FIDUCIALS 10875 TO 10757

LINE 550 FLOWN AS LINE 551
MAP FIDUCIALS 1961 TO 2206 CORRESPOND TO ORIGINAL FIDUCIALS 2206 TO 1961

LINE 560 FLOWN AS LINE 561
MAP FIDUCIALS 2262 TO 2467 CORRESPOND TO ORIGINAL FIDUCIALS 2467 TO 2262

LINE 570 FLOWN AS LINE 571
MAP FIDUCIALS 7598 TO 7808 CORRESPOND TO ORIGINAL FIDUCIALS 7808 TO 7598

LINE 580 FLOWN AS LINE 581
MAP FIDUCIALS 207 TO 456 CORRESPOND TO ORIGINAL FIDUCIALS 456 TO 207

LINE 590 FLOWN AS LINE 591
MAP FIDUCIALS 4040 TO 4334 CORRESPOND TO ORIGINAL FIDUCIALS 4334 TO 4040

LINE 600 FLOWN AS LINE 601
MAP FIDUCIALS 3263 TO 3659 CORRESPOND TO ORIGINAL FIDUCIALS 3659 TO 3263

LINE 610 FLOWN AS LINE 610
MAP FIDUCIALS 54 TO 509 CORRESPOND TO ORIGINAL FIDUCIALS 509 TO 54

LINE 620 FLOWN AS LINE 621
MAP FIDUCIALS 65 TO 605 CORRESPOND TO ORIGINAL FIDUCIALS 605 TO 65

EUREKA MAP AREA

LINE 630 FLOWN AS LINE 631
MAP FIDUCIALS 3376 TO 3960 CORRESPOND TO ORIGINAL FIDUCIALS 3960 TO 3376

LINE 640 FLOWN AS LINE 642
MAP FIDUCIALS 2629 TO 3216 CORRESPOND TO ORIGINAL FIDUCIALS 3216 TO 2629

LINE 650 FLOWN AS LINE 651
MAP FIDUCIALS 3311 TO 3911 CORRESPOND TO ORIGINAL FIDUCIALS 3911 TO 3311

LINE 660 FLOWN AS LINE 660
MAP FIDUCIALS 8805 TO 9223 CORRESPOND TO ORIGINAL FIDUCIALS 9223 TO 8805

LINE 670 FLOWN AS LINE 670
MAP FIDUCIALS 9333 TO 9501 CORRESPOND TO ORIGINAL FIDUCIALS 9501 TO 9333

LINE 680 FLOWN AS LINE 680
MAP FIDUCIALS 1569 TO 1596 CORRESPOND TO ORIGINAL FIDUCIALS 1596 TO 1569

LINE 1010 FLOWN AS LINE 1014 AND 1015 AND 1016
MAP FIDUCIALS 159 TO 1422 CORRESPOND TO ORIGINAL FIDUCIALS 1422 TO 159
MAP FIDUCIALS 1423 TO 1825 CORRESPOND TO ORIGINAL FIDUCIALS 505 TO 102
MAP FIDUCIALS 1826 TO 3772 CORRESPOND TO ORIGINAL FIDUCIALS 6899 TO 4953