GJBX-204 '80

National Uranium Resource Evaluation

AERIAL GAMMA RAY AND MAGNETIC SURVEY
RUSSELLVILLE QUADRANGLE
ARKANSAS

FINAL REPORT

EG&G GEOMETRICS
Sunnyvale, California 94086

September 1980

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 EG&G geoMetrics 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.

AERIAL GAMMA RAY AND MAGNETIC SURVEY
MISSISSIPPI AND FLORIDA AIRBORNE SURVEY
RUSSELLVILLE QUADRANGLE
ARKANSAS

FINAL REPORT

Prepared by
EG&G geoMetrics
Sunnyvale, California

September 1980

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. 80-426-L

ABSTRACT

The Russellville quadrangle in north central Arkansas overlies thick Paleozoic sediments of the Arkoma Basin. These Paleozoics dominate surface exposure except where covered by Quaternary alluvial materials.

Examination of available literature shows no known uranium deposits (or occurrences) within the quadrangle.

Eighty-eight (88) groups of uranium samples were defined as anomalies and discussed briefly in this report. None were considered significant, and most appeared to be of cultural origin.

Magnetic data show character that suggest structural and/or lithologic complexity, but imply relatively deep-seated sources.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

General

The Russellville quadrangle covers a 7,800 square mile region in northern central Arkansas (see Figure 1).

The geologic base map used was compiled by Martel Laboratories in 1980. Geologic map unit descriptions, found in Appendix C, were taken directly from the accompanying map legend. Supplementary geologic information was taken from Fairbridge (ed.) 1975, and Cohee and others (1962). Cultural and physiographic information was taken from the 1:250,000 scale Russellville topographic map (1954 version).

Radiometric and magnetic data for the Russellville quadrangle were acquired in May and July of 1980, and processed in August. A detailed summary of data acquisition, processing, interpretation, and presentation methods is contained in Appendix A. Appendix B contains a flight summary for the Fort Smith quadrangle.

Physiography

The region covered by the Russellville quadrangle contains portions of the Ozark Plateau (the Boston Mountains area) and the Ouachita Mountains. This rugged terrain lies in the Southern Midwestern Physiographic Province. The area is drained primarily by the Arkansas River (or its tributaries) which flows east to southeast in the southern half of the quadrangle. The northeastern quadrant lies within the watershed of the White River, which flows southeasterly across the extreme northeastern corner of the quadrangle. The region is dominated by steep topography, though the areas adjacent to the Arkansas River are relatively flat lying. Elevations range from 300 feet, where the Arkansas River flows southward off the quadrangle, to over 2,500 feet in the Boston and the Ouachita Mountains.

The area is rather sparsely populated. The largest town in the quadrangle is Russellville, with a population of nearly 12,000. Interstate 40 crosses through Russellville, and interconnects most major towns of the quadrangle.

GEOLOGY

Structure

The area covered by the Russellville quadrangle overlies the central portion of the Arkoma Basin, which contains Paleozoic sediments that increase in thickness from approximately 500 feet along the northern border, to over 10,000 feet along the southern border. Paleozoic sediments to the south are so disturbed by the Ouachita Tectonic Zone that sediment thicknesses are difficult to estimate (see Figure 2).

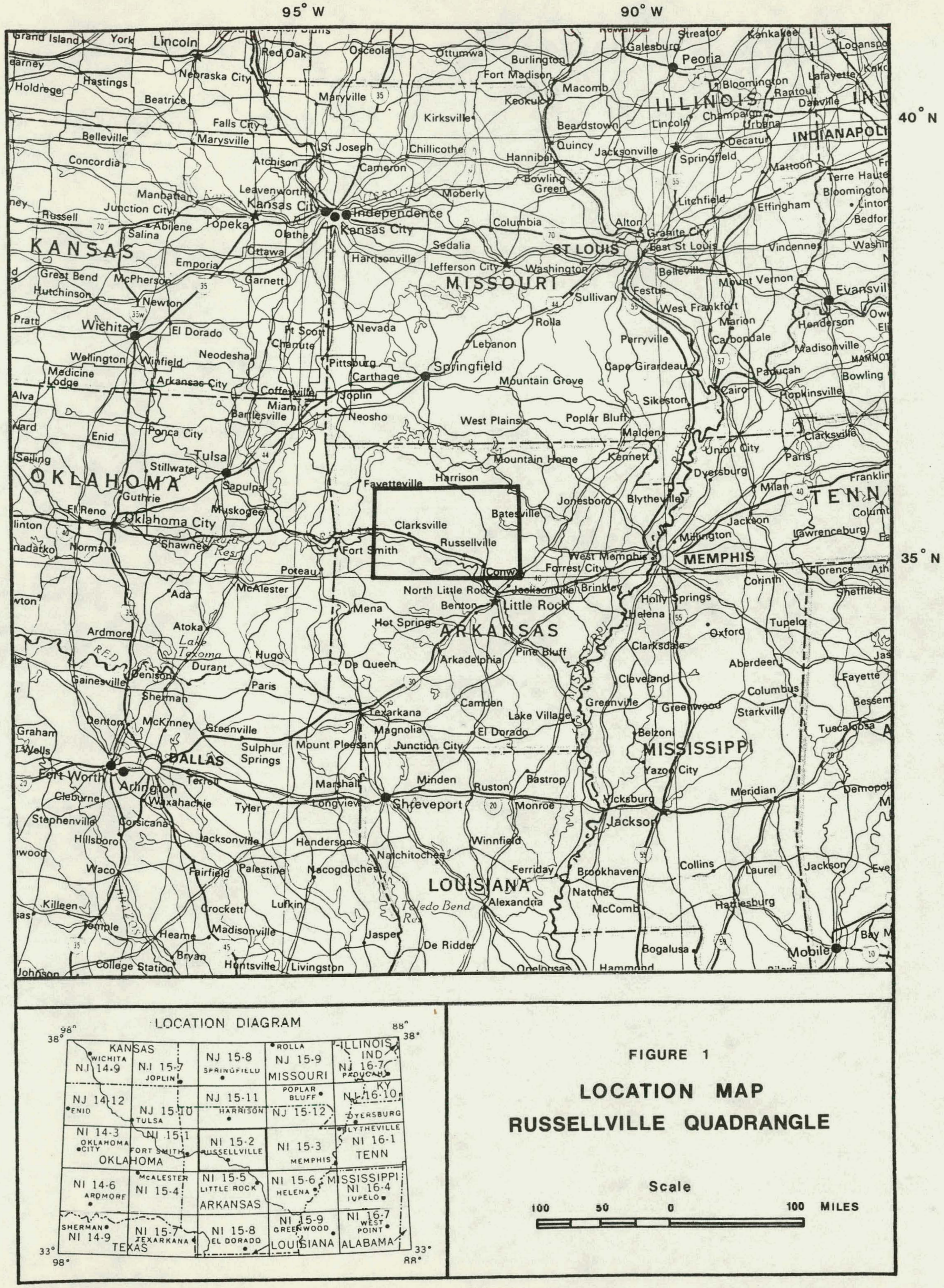


FIGURE 1
LOCATION MAP
RUSSELLVILLE QUADRANGLE

Faults of undefined displacement strike roughly east-west through the quadrangle as mapped. Though displacement in the Paleozoic section appears severe, overlying Quaternary sediments show no displacement.

Surface Geology

As mapped by Martel Laboratories, the surficial geology of the Russellville quadrangle is dominated by Paleozoic carbonates and sandstones. The northern border region contains exposures of Ordovician through Mississippian limestones, dolomites, sandstones, and shales. The balance of the quadrangle area contains exposures of Pennsylvanian sediments representative of a variety of depositional environments (primarily limestones and sandstones). Altogether the Paleozoic section covers 95 percent of the quadrangle as mapped.

The remaining 5 percent is mapped as Quaternary surficial debris. Recent alluvium and Pleistocene terrace deposits are exposed alongside the trace of the Arkansas River.

Uranium

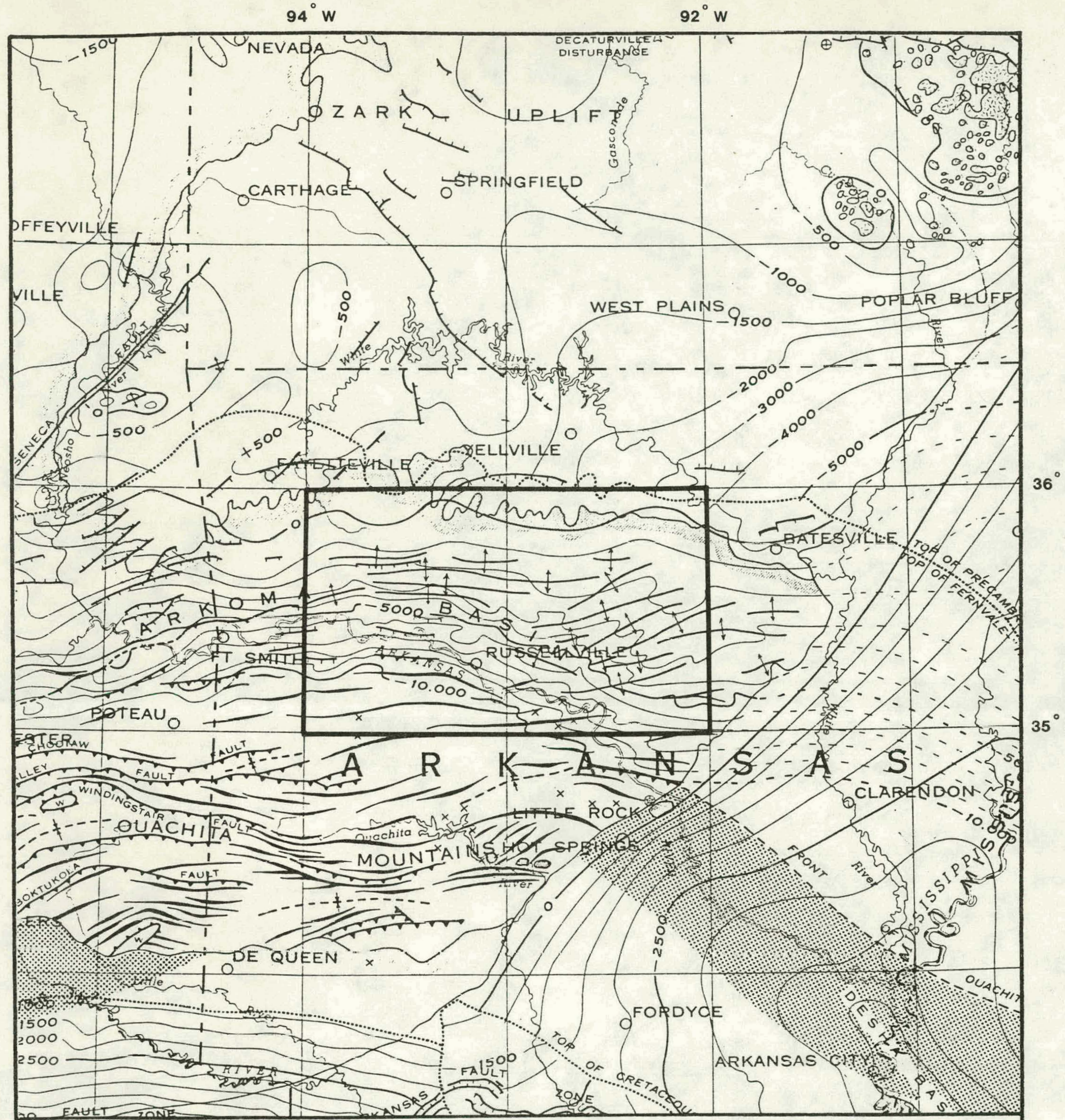
According to available literative sources, there are no known uranium deposits within the Russellville quadrangle.

INTERPRETATION OF GEOPHYSICAL DATA

Radiometric Data

A total of 88 groups of uranium (Bi214) samples meet the minimum statistical requirements, set forth in the data interpretation section of Appendix A, used to define anomalies. These are displayed, along with all other anomalous samples and pertinent data, on Figure 3. The anomalies are summarized in a table in Appendix G. The potassium, uranium, thorium, and ratio pseudo-contour maps, which reflect radiometric responses for the entire quadrangle, are found in Appendix H. Discussion of the abundances of potassium, uranium, and thorium are in terms of apparent equivalent percent and apparent equivalent ppm. These equivalent units are derived from scaling of counts per second data by the sensitivities calculated for the detection system. They do not directly correspond to real geochemical data.

The apparent concentration of the three radioactive elements are uniformly low over most of the Russellville quadrangle. The average uranium concentration is 1.9 ppmeU. The average potassium and thorium concentrations are 0.5 percent and 6.0 ppmeT respectively. Highest average uranium concentrations are found in map unit QT (Pleistocene terrace deposits) at 2.5 ppmeU. The highest peak uranium concentration is 4.5 ppmeU in map unit PAL (Pennsylvanian - lower Atoka Formation). Highest average thorium is contained in map unit PJ (Pennsylvanian



After
USGS and AAPG
Tectonic Map of the United States
by
Cohee and others (1962)

FIGURE 2
TECTONIC STRUCTURE MAP
RUSSELLVILLE QUADRANGLE

Scale 1:2,500,000
25 0 25 50 75 MILES

Jackfork Sandstone) at 7.5 ppmeT, but map unit QAL (Recent alluvium) contains the highest peak thorium concentration at 12.3 ppmeT. Map unit QAL also contains the highest average and peak potassium concentrations at 1.2 and 1.9 percent respectively. The difference in potassium concentrations between the Quaternary alluvial deposits and the surrounding Paleozoic sediments is the most striking contrast in the radiometric data for the Russellville quadrangle, and shows clearly on the potassium pseudo-contour map. The high potassium essentially follows the trace of the Arkansas River, which suggests that the source region for the alluvium is at least in part off the quadrangle.

Anomalies are scattered throughout the quadrangle and have peak uranium concentrtions of 2.4 to 4.5 ppmeU. All are associated with cultural features of some sort (roads, railroads, pipelines, etc.). None appear to have any geologic significance. The strong correlation of the anomalies with cultural activity, coupled with the extremely low uranium concentration levels, suggest that none of the anomalies depicted in this report should be considered as reflecting signficant uranium concentrations in bedrock units.

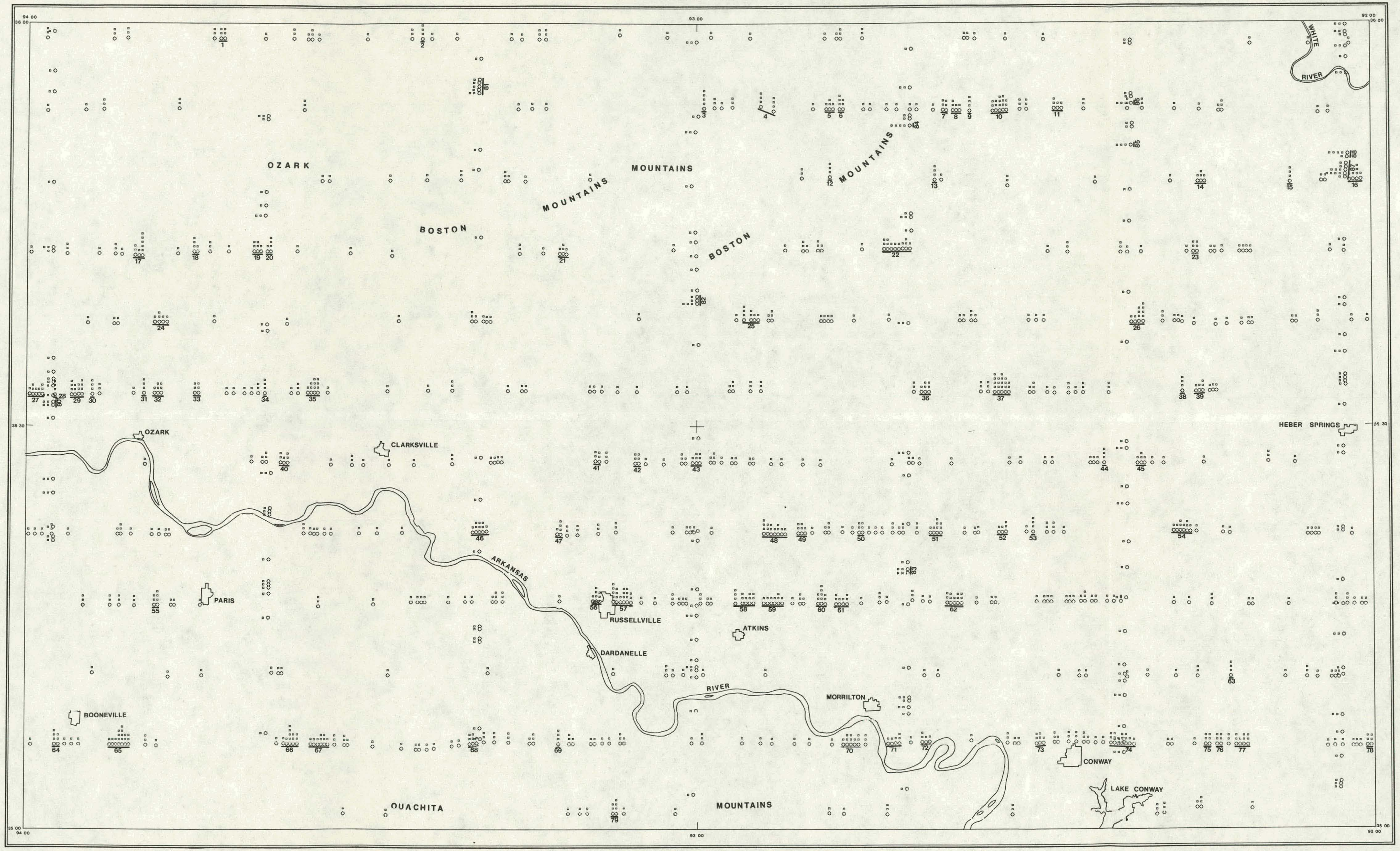
Magnetic Data

The magnetic field pseudo-contour map appears in Appendix H.

The Russellville quadrangle contains a relatively thick Paleozoic sequence that has, in some areas, been subjected to extreme deformation and fault displacement.

Magnetic data are dominated by extremely low gradients, but the wavelengths are relatively short. In some areas isolated bodies as well as some east-west linear features are suggested, any of which could be lithologic and/or structural in origin. It is possible that the mapped surface faults displace portions of the apparent magnetic basement. In general sources appear to be deep.

RUSSELLVILLE



URANIUM ANOMALY/ INTERPRETATION MAP

RUSSELLVILLE QUADRANGLE

U.S. DEPARTMENT OF ENERGY

APPROXIMATE SCALE 1:500,000

EXPLANATION

□ – CITY OR TOWN

– URANIUM SAMPLE MEETING FOLLOWING CRITERIA:

(1) $1.0 \le U \le \infty$

(2) $-1.0 \le T \le \infty$

(3) $1.0 \le U/T \le \infty$

IN STANDARD DEVIATION UNITS.
EACH SQUARE REPRESENTS 1 STANDARD DEVIATION.

– URANIUM ANOMALY:

A SINGLE SAMPLE OF 3 OR MORE STANDARD DEVIATIONS OR GROUP OF ADJOINING SAMPLES WHICH TOGETHER TOTAL 4 OR MORE STANDARD DEVIATIONS, $4.0 \le \text{sum} \le \infty$, WITH AT LEAST ONE SAMPLE OF 2 OR MORE STANDARD DEVIATIONS.

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

Figure 3 - Uranium Anomaly/Interpretation Map - Russellville Quadrangle

BIBLIOGRAPHY

Antoine, J. W., Martin, R. G., Jr., Pyle, T. G., and Bryant, W.R., 1974, Continental Margins of the Gulf of Mexico: in The Geology of Continental Margins, Burke, C. A., and Drake, C. L., (eds.), p. 683-694.

Butler, A. P., Jr., Finch, W. I., and Twenhofel, E. S., 1962, Epigenetic Uranium Deposits in the United States: U.S. Geological Survey Mineral Resources Map MR-21, scale 1:3,000,000.

Martel Laboratories, 1980, Geology of the Russellville Quadrangle: scale 1:250,000.

Reid, W. M., and Boyer, R. E., 1975, United States - Gulf Coast Province: in The Encyclopedia of World Regional Geology Part 1; R. W. Fairbridge, editor.

Schnabel, R. W., 1955, The Uranium Deposits of the United States: U.S. Geological Survey Mineral Resources Appraisals Map MR2, scale 1:5,000,000.

United States Geological Survey and American Association of Petroleum Geologists, 1962, Tectonic Map of the United States: scale 1:2,500,000.

APPENDIX A – Data Acquisition, Processing, and Interpretation Methods

INTRODUCTION

General

Under the U.S. Department of Energy's (DoE), National Uranium Resource Evaluation (NURE) Program, geoMetrics, Inc., conducted a high sensitivity airborne radiometric and magnetic survey. The data collection and processing were conducted under requirements set forth in Bendix Field Engineering Corporation specification 1200-C, dated February, 1979. The objectives of the (DoE)/NURE program, of which this project is a small part, may be summarized as follows:

> "To develop 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." (DoE)

As an integral part of the DoE/NURE Program, the National Airborne Radiometric Program is designed to provide cost effective, semiquantitative reconnaissance radio element distribution information to aid in the assessment of regional distribution of uraniferous materials within the United States.

All Airborne data collected by geoMetrics during the course of this project were done so utilizing a Beechcraft B65 Queen Air Airplane (U.S. Registry No. N827Q). The Queen Air used 3584 cubic inches of NaI crystal and a high sensitivity proton magnetometer (0.25 gamma).

Each report contains a detailed geologic summary, interpretation report, reduced scale copies of all maps and profiles, histograms, and statistical tables for each quadrangle contained within the project. In addition, each report contains an appendix detailing the survey description, specifications, data collection and processing methods, and interpretation methods.

All data processing, statistical analyses, and interpretation were performed at the geoMetrics computer facility, Sunnyvale, California. After processing, the corrected data were statistically evaluated to define those areas which were radiometrically anomalous relative to other areas within each computer map unit. Standard deviation maps and radiometric and magnetic profile data were first evaluated individually and then integrated into a final interpretation map for each NTMS quadrangle.

Corrected profiles of all radiometric variables (total count, potassium, uranium, thorium, uranium/thorium, uranium/potassium, and thorium potassium, ratios), magnetic data, radar altimeter data, barometric altimeter data, air temperature, and airborne bismuth contributions are presented as profiles in this report. Single record and averaged data are presented on microfiche in report. These data are given at 1.0 second sample intervals, corrected for Compton Scatter, referenced to 400 foot mean terrain clearance as Standard Temperature and Pressure and corrected for atmospheric bismuth. Digital magnetic tapes are available containing raw spectral data, single record data, magnetic data, and statistical analysis results.

OPERATIONS

PRODUCTION SUMMARY

For the forty three quadrangles a total of 63,748 line miles, excluding reflights and overlaps and missing data, were flown by the Queen Air. The production summary presented below and the detailed daily production in Appendix B describes a portion of the total project.

Prior to the start of the survey operations, the airplane was calibrated at the DoE test pads and Dynamic Test Range in April, 1980. Requirements for system calibrations are listed in the 1250-A specifications from BFEC.

Throughout the course of the overall project, the average ground speed maintained by the Queen Air was 140 mph.

Nearly 100% of the data collected were within the specification limits of 200-700 feet. Several deviations over short distances were required to meet military regulations, FAA safety requirements, and to ensure that livestock were not endangered due to low flying aircraft. A sample altitude statistical distribution is shown in Figure I.

DATA COLLECTION PROCEDURES

Operating Parameters/Sampling Procedures

This survey was conducted using data collection parameters summarized below:

1. Data sampling was performed by a time-base system using 1.0 second sample intervals. All sensor data with analog output were digitally sampled at each scan based upon the clock timing rate of 1.0 seconds. The data so collected are the instantaneous values of the altimeter, temperature, pressure, and magnetometer parameters determined at the time of the data scan, but represent a count time of 1.0 seconds for the gamma ray spectrometer data.

2. The airplane's objective ground speed was 140 mph and was not exceeded unless dictated by safety.

3. The airplane's downward looking crystal volume was 3,072 cubic inches providing an objective V/V (crystal volume in cubic inches divided by ground speed in miles per hour) of 22.0 at 140 m.p.h.

4. The upward looking crystal volume was 512 cubic inches.

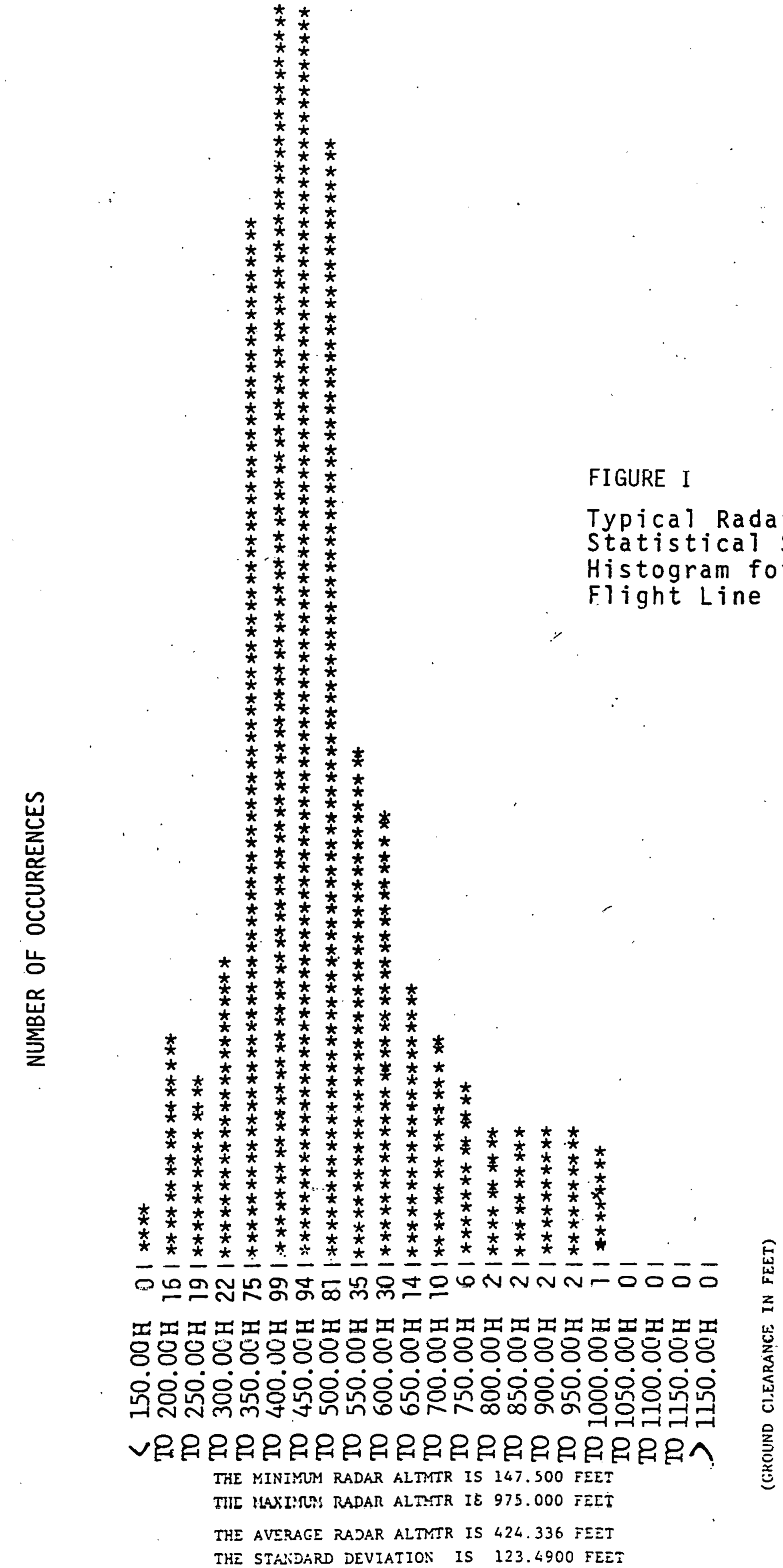


FIGURE I

Typical Radar Altimeter Statistical Summary Histogram for Single Flight Line

Navigation/Flight Path Recovery

For all of the quadrangles, profiles were flown east-west at 6 mile (9.6 km) spacing. North-south tie lines were flown at 18 mile (28.8 km) spacing.

Navigation was accomplished using visual navigation techniques. Flight lines were drawn on 1:250,000 quadrangles and the pilot/navigator utilized these maps to provide visual navigation features.

Simultaneously, a 35 mm tracking camera was used to record actual flight position. This camera's fiducial numbering system was directly synchronized to the digital recording system such that a one-to-one correlation between position and data could be made. Upon completion of a data collection flight, the 35 mm film was processed and actual flight path positions located on the appropriate scale map sheets.

Infield System Calibration

Due to the complex nature of both the system and the required data interpretation, much emphasis was placed on infield calibration of the data collection system. The objective of this calibration was to ensure continuous high quality of the data collected. The daily calibration procedures used are summarized below:

A. Pre Flight

1. Use cesium sources (same positioning on crystals every day), peak each Photomultiplier tube/crystal using the digital split-window detector of the GR-800. Then using thallium sources, repeat the tuning of the individual crystals.

2. Run full cesium spectrum on analog recorder for both down and up looking crystals. Calculate the cesium resolution (see sample in Figure II). Run spectrum out past the K40 peak on down crystals for evaluation of system tuning.

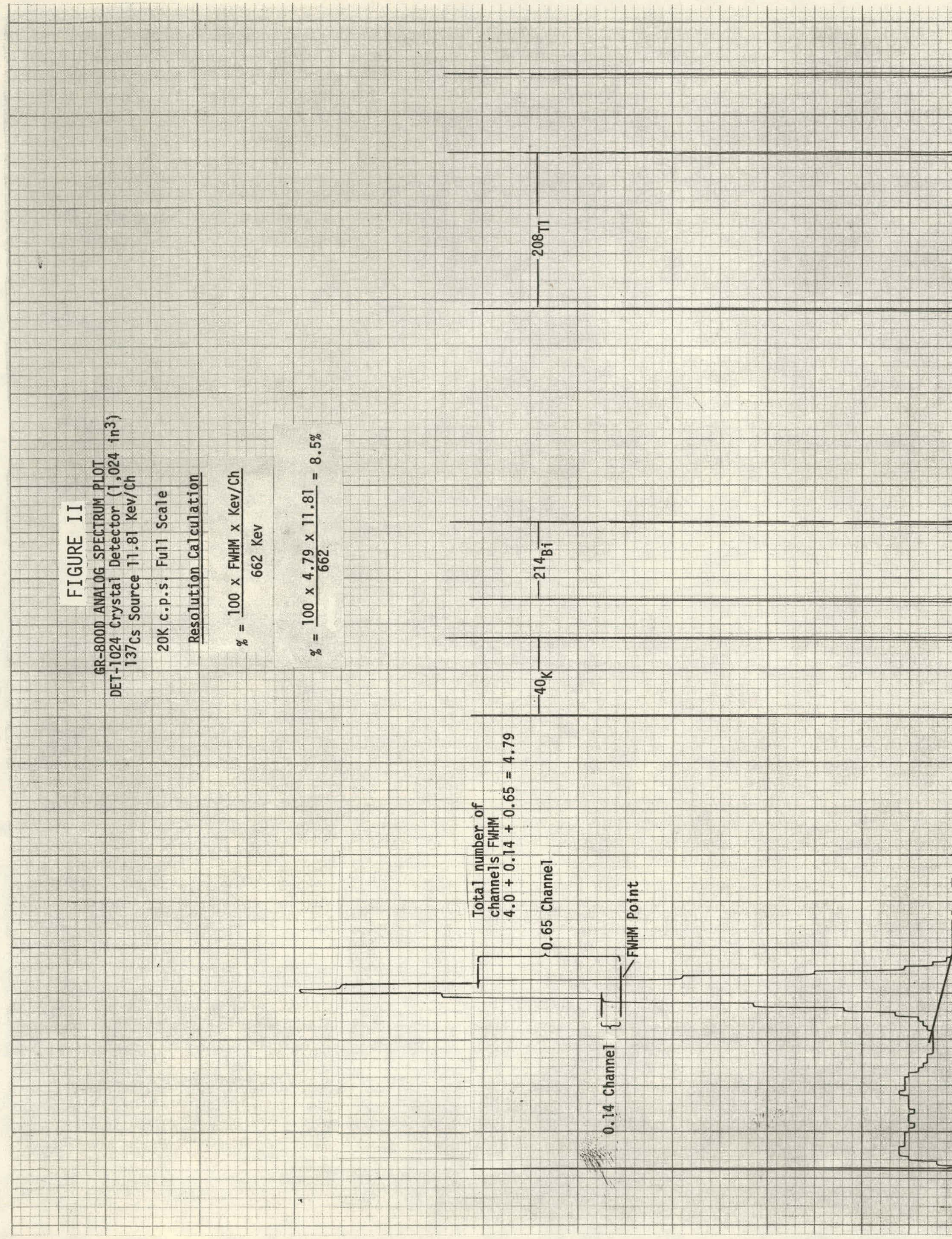
3. Finally run a full thorium analog spectrum of the down crystals and check for centering of K40 and T1208 peaks in spectrum.

4. Repeat 1-3 until system is within contract specifications.

B. During Flight

1. Fly test line at survey altitude (400 ft), for approximately five miles, prior to production data collection (record both analog and digital).

2. Prior to production data collection, the above data are evaluated to ensure +20% limits on total count compared to average of all test flights from that base of operations.



3. During production data collection, monitor radon analog data for unusual increases. Visually correlate these with temperature and barometric pressure.

4. Upon completion of production data collection, refly test line at survey altitude (400 ft). Record both analog and digital.

C. Post Flight

1. Verify test line total count within 20% of average for all test lines at that base of operations.

2. Using cesium sources (same position as pre-flight), run full cesium spectrum for both down and up crystals (allow it to record through the K40 peak in the down crystals). Repeat the procedure using thallium sources and examine the Tl208 window.

3. Calculate the resolution of down and up crystal pack.

4. Determine shift, if any, in Tl208 peak position.

Field Digital Data Verification

At the completion of each flight, the raw digital data tapes were checked for data quality and completeness on geoMetrics' G-725. The G-725 system is a totally portable mini computer (and peripherals) consisting of; an Interdata 516, two 9 track tape drives, a CRT, a line printer, and two floppy discs. Any digital problems encountered were immediately evaluated by the electronics operator and data man, thus assuring optimum data quality. In addition, histogram information for each measured variable was generated. Thus a summary display of altitude, etc., is available for immediate evaluation.

DATA COLLECTION SYSTEM

AIRCRAFT

The aircraft used for this survey was a Beechcraft Queen Air Model 65, U.S. Registry Number N827Q. This aircraft, being a medium twin engine aircraft, possesses overall performance and safety features which makes it ideal for low level, fixed-winged airborne geophysical survey work within areas of up to moderatly rough topographic relief. It can carry the adequate payload at the necessary lower constant airspeeds and still maintain a wide envelope of safety, all while operating economically. Performance data for the Queen Air Model 65 in its present survey configuration are give below:

Maximum Aircraft Gross Weight	7,700 lbs.
Aircraft Empty (dry)	4,640 lbs.
Max. useful load including fuel	3,060 lbs.

Geophysical Package	1,110 lbs.
Navigation Eqpt. & Extra Avionics	125 lbs.
Main Fuel Tanks	528 lbs.
Aux. Fuel Tanks	864 lbs.
Pilot	175 lbs.
Electronics Operator	175 lbs.
Total	2,977 lbs.

Minimum Control Speed	95 MPH *IAS at	Gross Weight
Safe Single Engine Speed	105 MPH IAS at	Gross Weight
Rate of climb both engines	1,300 *FPM at	Gross Weight
Rate of climb single engine	210 FPM at	Gross Weight

*IAS = Indicated Air Speed *FPM = Feet Per Minute

Avgas consumption = 36 U.S. gallons [216 lbs] per hour [at 75% power]
Endurance at 36 gallons [216 lbs.] per hour 75% power = 6 hrs. 6 mins.
Range of cruise at 75% power with 45 min. reserve = 1,200 miles

Cruise configuration stalling speed at Gross Weight [7700 lbs] at 0° Bank = 80 MPH IAS at 45° Bank = 95 MPH IAS

Electronics

The major components of the airborne data collection system are summarized below (shown schematically in Figure III):

1. Gamma Ray Spectrometer, geoMetrics GR-800, utilizing a dual 256 channel capability to provide spectral data in the 0.4 to 3.0 MeV range for both the downward looking and the upward looking crystal packages and coverage in the 3.0 to 6.0 MeV range for cosmic background.

2. Crystal Detector, geoMetrics Model DET-3072/512R consisting of 3072 cubic inches in the downward looking configuration and 512 cubic inches appropriately shielded in an upward looking configuration.

3. A geoMetrics Digital Data Acquisition System, Model G-714 with "read-after-write" data verification, recording the following on magnetic tape:

   a. 512 channels of gamma ray spectrometer data

   b. Total magnetic intensity

   c. Fiducial number from data system/camera

   d. Manually inserted information, i.e. date, survey area, and flight line number

   e. Altitude from radar altimeter and barometric altimeter (by analog-to-digital conversion)

   f. Time in days, hours, minutes and seconds

   g. Outside air temperature

4. Magnetometer, geoMetrics Airborne Model G-803, capable of 0.125 gamma sensitivity, but operated at 0.25 gamma sensitivity.

5. Radar Altimeter, Bonzer Model Mark 10 with recording output and display operating over an altitude range of 0 to 2,500 feet.

6. Rosemont Barometric Altimeter with recording output and display.

7. Recording Thermometer for monitoring outside air temperature.

8. Tracking Camera. Automax 35 mm framing camera with wide angle lens and 10 character fiducial/line number display to provide flight path recovery data.

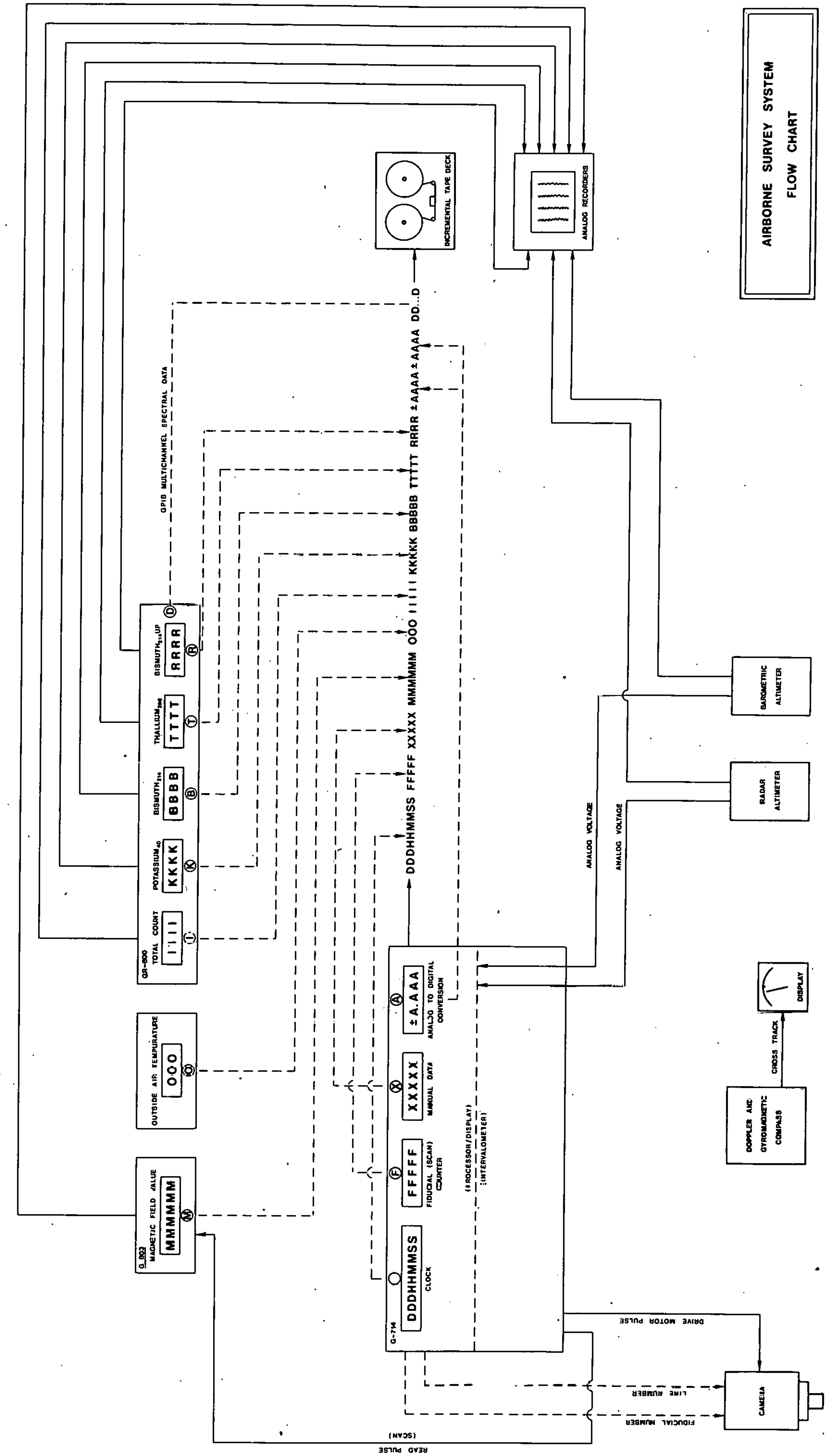


FIGURE III

9. Analog Recorder geoMetrics (MARS 6)to record the following data:

   a. Bi214 using a window about the 1.76 MeV peak from the downward looking system.

   b. Bi air background from the upward looking system.

   c. Magnetometer

   d. Radar Altitude

   e. Total count for downward looking system (0.4 to 3.0 MeV)

   f. Barometric Altitude

   g. Time markers

10. HP 7155 single channel analog recorder during pre and post flight calibrations, this recorder is used to plot a full analog spectra for both the down and up crystal systems via the GR-800. Thus, a hard copy record of the data used for resolution, drift, etc., checks are available at all times. This approach provides instant verification of system parameters (refer to Figure II).

SYSTEM CALIBRATION

AIRCRAFT AND COSMIC BACKGROUND

Full spectral data are collected at five (5) altitudes over water (14,000 feet, 12,000 feet; 10,000 feet; 8,000 feet and 6,000 feet) in an area where the existence of no airborne Bi214 can be assured (off shore over the Pacific Ocean). This results in separate spectra as shown schematically in Figure 10. We define S(12,000) to be the spectra at 12,000 feet from 0.4 MeV to 3.0 MeV with S(8,000) the same spectra at a lower altitude (8,000) and $C_i(h)$ the total count between 3.0 and 6.0 MeV at respective altitudes.[1] Since the aircraft background is constant, the difference between any two altitudes separated sufficiently - typically, 2,000 feet - yields the cosmic spectral curve shape as shown schematically in Figure VI. Thus

$$S(12{,}000) - S(8{,}000) = \Delta S$$

and

$$\Sigma C_{12}(h_i) - \Sigma C_8(h_i) = \Delta C$$

This cosmic spectral curve is scaled back to 12,000 feet as follows:

$$\frac{C_{12}(h_i)}{\Delta C} X \Delta S = \Delta C\ (12{,}000)\ \text{the Cosmic Spectrum (shape and magnitude at 12,000 feet)}$$

The aircraft background is derived as follows:

$$S(12{,}000) - C(12{,}000) = \text{A/C Background}$$

Since data were collected at five altitudes, this procedure was repeated for each combination of altitudes and results averaged. Typical aircraft and cosmic spectra are shown in Figures V, AND VI respectively.

SYSTEM CONSTANTS

System constants were determined by occupation of the DoE Walker Field Test Pads. (See Ward, 1978, and Stromswold, 1978, for complete descriptions of the building and monitoring of the pads). The five test pads contained varying concentrations of K, U, and T as presented by BFEC:

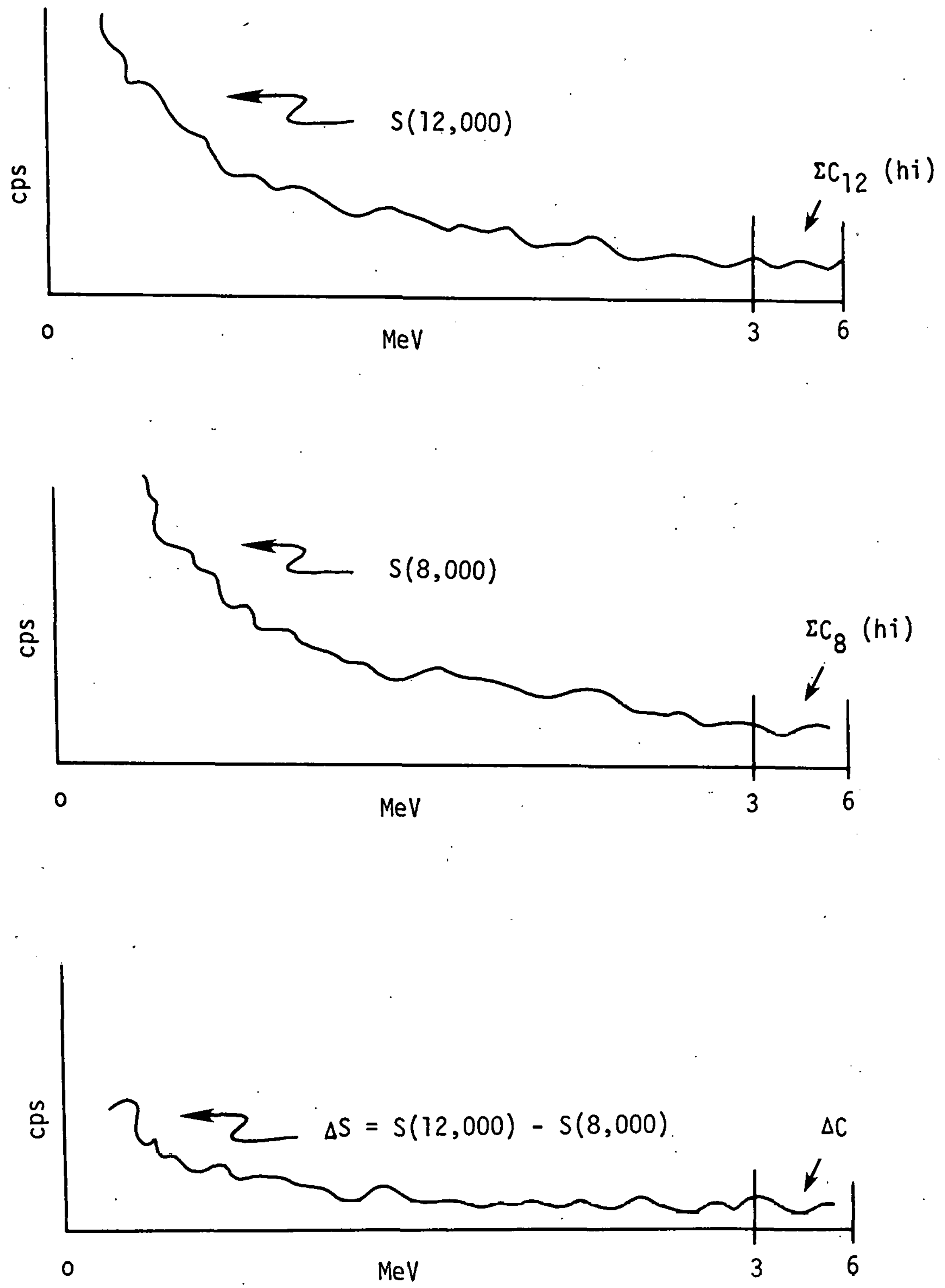


FIGURE IV - Multiple altitude spectra schematic

PAD	K	U	T
Matrix	1.45%	2.19 ppm	6.26 ppm
K	5.14%	5.09 ppm	8.48 ppm
U	2.03%	30.29 ppm	9.19 ppm
T	2.01%	5.14 ppm	45.33 ppm
Mixed	4.11%	20.39 ppm	17.52 ppm

Since the measurements were taken over a relatively short time period (a few hours), it was assumed that the matrix pad measurements contain not only the effects of the matrix pad itself, but also aircraft background (which is a constant), cosmic background (constant over the time period of interest), and all other local background (e.g. BiAir, etc.) effects. (The matrix pad is constructed with only the basic concrete mix without the additional elemental minerals). Thus, by subtracting the matrix pad count rates from the count rates in the four pads, we have eliminated aircraft and cosmic background and BiAir effects for the four pads. The pad concentrations are then modified in a similar fashion by the subtraction of the matrix pad concentrations. The differential concentrations in the pads are given in the table below.

PAD	K	U	T
K-Matrix	3.7%	2.9 ppm	2.2 ppm
U-Matrix	0.6%	28.5 ppm	2.9 ppm
T-Matrix	0.6%	3.0 ppm	39.0 ppm
Mixed-Matrix	2.7%	18.8 ppm	11.3 ppm

Considering the above, we can define a functional relationship between the differential concentrations and the residual count rates which will provide a method of determining the calibration constants for the spectrometer system. These calibration constants are the six (6) stripping coefficients which account for the interactions occuring between the elemental channels in the system (Compton scatter coefficients, etc.).

On the basis of an ideal situation, one would anticipate that some of these interactions should be negligible. This is not totally the case, since we are dealing with a system which has less than infinite resolving power (i.e. the energies are smeared to some extent).

```
DERIVED AIRCRAFT BACKGROUND SPECTRUM FROM PACIFIC OCEAN DATA

DOWNWARD-LOOKING CRYSTAL SPECTRUM FOR LINE AC BGD, DATED 072577

TC (0-6 MEV)  184.07 TC (0.4-3.0 MEV)  141.17 COSMIC (3-6 MEV)    0.00
U (1.12 MEV)    9.91 K (1.46 MEV)   14.54 U (1.76 MEV)    4.36 T (2.62 MEV)    4.29

CH   0 (0.000 MEV)   0.000 CPS *
CH   1 (0.012 MEV)   0.000 CPS *
CH   2 (0.024 MEV)   0.000 CPS *
CH   3 (0.036 MEV)   0.000 CPS *
CH   4 (0.047 MEV)   0.000 CPS *
CH   5 (0.059 MEV)   0.000 CPS *
CH   6 (0.071 MEV)   0.000 CPS *
CH   7 (0.083 MEV)   0.000 CPS *
CH   8 (0.095 MEV)   0.000 CPS *
CH   9 (0.106 MEV)   0.000 CPS *
CH  10 (0.118 MEV)   0.000 CPS *
CH  11 (0.130 MEV)   0.000 CPS *
CH  12 (0.142 MEV)   0.000 CPS *
CH  13 (0.154 MEV)   0.000 CPS *
CH  14 (0.165 MEV)   0.000 CPS *
CH  15 (0.177 MEV)   0.000 CPS *
CH  16 (0.189 MEV)   0.000 CPS *
CH  17 (0.201 MEV)   0.000 CPS *
CH  18 (0.213 MEV)  -0.025 CPS *
CH  19 (0.225 MEV)  -0.020 CPS *
CH  20 (0.236 MEV)   0.080 CPS *
CH  21 (0.248 MEV)   1.401 CPS *****
CH  22 (0.260 MEV)   3.792 CPS *************
CH  23 (0.272 MEV)   4.280 CPS ***************
CH  24 (0.284 MEV)   4.334 CPS ***************
CH  25 (0.295 MEV)   3.748 CPS *************
CH  26 (0.307 MEV)   3.897 CPS **************
CH  27 (0.319 MEV)   3.818 CPS *************
CH  28 (0.331 MEV)   4.236 CPS ***************
CH  29 (0.343 MEV)   3.433 CPS ************
CH  30 (0.355 MEV)   2.996 CPS ***********
CH  31 (0.366 MEV)   2.559 CPS **********
CH  32 (0.378 MEV)   2.269 CPS *********
CH  33 (0.390 MEV)   2.102 CPS ********
CH  34 (0.402 MEV)   2.081 CPS ******** TOTAL COUNT
CH  35 (0.414 MEV)   2.121 CPS ********
CH  36 (0.426 MEV)   2.114 CPS ********
CH  37 (0.437 MEV)   1.976 CPS ********
CH  38 (0.449 MEV)   2.290 CPS *********
CH  39 (0.461 MEV)   2.188 CPS *********
CH  40 (0.473 MEV)   2.226 CPS *********
CH  41 (0.485 MEV)   1.983 CPS ********
CH  42 (0.496 MEV)   2.185 CPS ********
CH  43 (0.508 MEV)   2.158 CPS ********
CH  44 (0.520 MEV)   2.267 CPS *********
CH  45 (0.532 MEV)   2.217 CPS *********
CH  46 (0.544 MEV)   1.997 CPS ********
CH  47 (0.556 MEV)   2.447 CPS *********
CH  48 (0.567 MEV)   2.540 CPS **********
CH  49 (0.579 MEV)   2.586 CPS **********
CH  50 (0.591 MEV)   2.708 CPS **********
CH  51 (0.603 MEV)   2.481 CPS *********
CH  52 (0.615 MEV)   2.372 CPS *********
CH  53 (0.626 MEV)   1.866 CPS ********
CH  54 (0.638 MEV)   1.682 CPS ******
CH  55 (0.650 MEV)   1.661 CPS ******
CH  56 (0.662 MEV)   1.480 CPS *****
CH  57 (0.674 MEV)   1.474 CPS *****
CH  58 (0.686 MEV)   1.447 CPS *****
CH  59 (0.697 MEV)   1.431 CPS *****
CH  60 (0.709 MEV)   1.476 CPS *****
CH  61 (0.721 MEV)   1.453 CPS *****
CH  62 (0.733 MEV)   1.467 CPS *****
CH  63 (0.745 MEV)   1.579 CPS ******
CH  64 (0.756 MEV)   1.497 CPS *****
CH  65 (0.768 MEV)   1.548 CPS ******
CH  66 (0.780 MEV)   1.421 CPS *****
CH  67 (0.792 MEV)   1.282 CPS *****
CH  68 (0.804 MEV)   1.155 CPS ****
CH  69 (0.816 MEV)   1.246 CPS *****
CH  70 (0.827 MEV)   1.245 CPS *****
CH  71 (0.839 MEV)   1.161 CPS ****
CH  72 (0.851 MEV)   1.253 CPS *****
CH  73 (0.863 MEV)   1.231 CPS *****
CH  74 (0.875 MEV)   1.425 CPS *****
CH  75 (0.887 MEV)   1.452 CPS *****
CH  76 (0.898 MEV)   1.543 CPS ******
CH  77 (0.910 MEV)   1.444 CPS *****
CH  78 (0.922 MEV)   1.364 CPS *****
CH  79 (0.934 MEV)   1.289 CPS *****
CH  80 (0.946 MEV)   1.150 CPS ****
CH  81 (0.957 MEV)   1.144 CPS ****
CH  82 (0.969 MEV)   1.085 CPS ****
CH  83 (0.981 MEV)   1.061 CPS ****
CH  84 (0.993 MEV)   0.941 CPS ****
CH  85 (1.005 MEV)   0.919 CPS ****
CH  86 (1.017 MEV)   0.822 CPS ***
CH  87 (1.028 MEV)   0.816 CPS ***
CH  88 (1.040 MEV)   0.853 CPS ****
CH  89 (1.052 MEV)   0.901 CPS **** BISMUTH 214
CH  90 (1.064 MEV)   0.822 CPS ***
CH  91 (1.076 MEV)   0.867 CPS ****
CH  92 (1.087 MEV)   0.968 CPS ****
CH  93 (1.099 MEV)   0.851 CPS ****
CH  94 (1.111 MEV)   0.905 CPS ****
CH  95 (1.123 MEV)   0.847 CPS ****
CH  96 (1.135 MEV)   0.861 CPS ****
CH  97 (1.147 MEV)   0.800 CPS ***
CH  98 (1.158 MEV)   0.727 CPS ***
CH  99 (1.170 MEV)   0.751 CPS ***
CH 100 (1.182 MEV)   0.607 CPS *** BISMUTH 214
CH 101 (1.194 MEV)   0.663 CPS ***
CH 102 (1.206 MEV)   0.657 CPS ***
CH 103 (1.217 MEV)   0.633 CPS ***
CH 104 (1.229 MEV)   0.719 CPS ***
CH 105 (1.241 MEV)   0.671 CPS ***
CH 106 (1.253 MEV)   0.475 CPS **
CH 107 (1.265 MEV)   0.601 CPS ***
CH 108 (1.277 MEV)   0.661 CPS ***
CH 109 (1.288 MEV)   0.669 CPS ***
CH 110 (1.300 MEV)   0.606 CPS ***
CH 111 (1.312 MEV)   0.630 CPS ***
CH 112 (1.324 MEV)   0.652 CPS ***
CH 113 (1.336 MEV)   0.644 CPS ***
CH 114 (1.347 MEV)   0.652 CPS ***
CH 115 (1.359 MEV)   0.791 CPS ***
CH 116 (1.371 MEV)   0.787 CPS *** POTASSIUM 40
CH 117 (1.383 MEV)   0.834 CPS ****
CH 118 (1.395 MEV)   0.984 CPS ****
CH 119 (1.407 MEV)   1.078 CPS ****
CH 120 (1.418 MEV)   1.124 CPS ****
CH 121 (1.430 MEV)   1.088 CPS ****
CH 122 (1.442 MEV)   1.210 CPS *****
CH 123 (1.454 MEV)   1.231 CPS *****
CH 124 (1.466 MEV)   1.207 CPS *****
CH 125 (1.477 MEV)   0.995 CPS ****
CH 126 (1.489 MEV)   0.967 CPS ****
CH 127 (1.501 MEV)   0.624 CPS ***
CH 128 (1.513 MEV)   0.635 CPS ***
CH 129 (1.525 MEV)   0.512 CPS ***
CH 130 (1.537 MEV)   0.488 CPS **
CH 131 (1.548 MEV)   0.409 CPS **
CH 132 (1.560 MEV)   0.369 CPS ** POTASSIUM 40
CH 133 (1.572 MEV)   0.339 CPS **
CH 134 (1.584 MEV)   0.438 CPS **
CH 135 (1.596 MEV)   0.310 CPS **
CH 136 (1.608 MEV)   0.259 CPS **
CH 137 (1.619 MEV)   0.250 CPS **
CH 138 (1.631 MEV)   0.353 CPS **
CH 139 (1.643 MEV)   0.323 CPS **
CH 140 (1.655 MEV)   0.332 CPS **
CH 141 (1.667 MEV)   0.326 CPS ** BISMUTH 214
CH 142 (1.678 MEV)   0.267 CPS **
CH 143 (1.690 MEV)   0.275 CPS **
CH 144 (1.702 MEV)   0.245 CPS **
CH 145 (1.714 MEV)   0.347 CPS **
CH 146 (1.726 MEV)   0.352 CPS **
CH 147 (1.738 MEV)   0.293 CPS **
CH 148 (1.749 MEV)   0.359 CPS **
CH 149 (1.761 MEV)   0.270 CPS **
CH 150 (1.773 MEV)   0.334 CPS **
CH 151 (1.785 MEV)   0.245 CPS **
CH 152 (1.797 MEV)   0.255 CPS **
CH 153 (1.808 MEV)   0.174 CPS **
CH 154 (1.820 MEV)   0.228 CPS **
CH 155 (1.832 MEV)   0.188 CPS **
CH 156 (1.844 MEV)   0.115 CPS *
CH 157 (1.856 MEV)   0.084 CPS * BISMUTH 214
CH 158 (1.868 MEV)   0.147 CPS *
CH 159 (1.879 MEV)   0.147 CPS *
CH 160 (1.891 MEV)   0.139 CPS *
CH 161 (1.903 MEV)   0.109 CPS *
CH 162 (1.915 MEV)   0.091 CPS *
CH 163 (1.927 MEV)   0.151 CPS *
CH 164 (1.938 MEV)   0.088 CPS *
CH 165 (1.950 MEV)   0.136 CPS *
CH 166 (1.962 MEV)   0.157 CPS *
CH 167 (1.974 MEV)   0.119 CPS *
CH 168 (1.986 MEV)   0.109 CPS *
CH 169 (1.998 MEV)   0.113 CPS *
CH 170 (2.009 MEV)   0.106 CPS *
CH 171 (2.021 MEV)   0.147 CPS *
CH 172 (2.033 MEV)   0.137 CPS *
CH 173 (2.045 MEV)   0.171 CPS **
CH 174 (2.057 MEV)   0.154 CPS *
CH 175 (2.068 MEV)   0.108 CPS *
CH 176 (2.080 MEV)   0.162 CPS *
CH 177 (2.092 MEV)   0.104 CPS *
CH 178 (2.104 MEV)   0.138 CPS *
CH 179 (2.116 MEV)   0.137 CPS *
CH 180 (2.128 MEV)   0.119 CPS *
CH 181 (2.139 MEV)   0.169 CPS **
CH 182 (2.151 MEV)   0.148 CPS *
CH 183 (2.163 MEV)   0.101 CPS *
CH 184 (2.175 MEV)   0.114 CPS *
CH 185 (2.187 MEV)   0.088 CPS *
CH 186 (2.199 MEV)   0.101 CPS *
CH 187 (2.210 MEV)   0.085 CPS *
CH 188 (2.222 MEV)   0.130 CPS *
CH 189 (2.234 MEV)   0.117 CPS *
CH 190 (2.246 MEV)   0.113 CPS *
CH 191 (2.258 MEV)   0.116 CPS *
CH 192 (2.269 MEV)   0.088 CPS *
CH 193 (2.281 MEV)   0.097 CPS *
CH 194 (2.293 MEV)   0.095 CPS *
CH 195 (2.305 MEV)   0.087 CPS *
CH 196 (2.317 MEV)   0.059 CPS *
CH 197 (2.329 MEV)   0.015 CPS *
CH 198 (2.340 MEV)   0.041 CPS *
CH 199 (2.352 MEV)   0.070 CPS *
CH 200 (2.364 MEV)   0.087 CPS *
CH 201 (2.376 MEV)   0.085 CPS *
CH 202 (2.388 MEV)   0.084 CPS *
CH 203 (2.399 MEV)   0.064 CPS *
CH 204 (2.411 MEV)   0.123 CPS * THALLIUM 208
CH 205 (2.423 MEV)   0.076 CPS *
CH 206 (2.435 MEV)   0.116 CPS *
CH 207 (2.447 MEV)   0.147 CPS *
CH 208 (2.459 MEV)   0.108 CPS *
CH 209 (2.470 MEV)   0.120 CPS *
CH 210 (2.482 MEV)   0.092 CPS *
CH 211 (2.494 MEV)   0.127 CPS *
CH 212 (2.506 MEV)   0.169 CPS **
CH 213 (2.518 MEV)   0.206 CPS **
CH 214 (2.529 MEV)   0.262 CPS **
CH 215 (2.541 MEV)   0.184 CPS **
CH 216 (2.553 MEV)   0.206 CPS **
CH 217 (2.565 MEV)   0.195 CPS **
CH 218 (2.577 MEV)   0.173 CPS **
CH 219 (2.589 MEV)   0.201 CPS **
CH 220 (2.600 MEV)   0.329 CPS **
CH 221 (2.612 MEV)   0.232 CPS **
CH 222 (2.624 MEV)   0.187 CPS **
CH 223 (2.636 MEV)   0.171 CPS **
CH 224 (2.648 MEV)   0.177 CPS **
CH 225 (2.660 MEV)   0.089 CPS *
CH 226 (2.671 MEV)   0.122 CPS *
CH 227 (2.683 MEV)   0.124 CPS *
CH 228 (2.695 MEV)   0.131 CPS *
CH 229 (2.707 MEV)   0.090 CPS *
CH 230 (2.719 MEV)   0.027 CPS *
CH 231 (2.730 MEV)   0.012 CPS *
CH 232 (2.742 MEV)  -0.026 CPS *
CH 233 (2.754 MEV)  -0.024 CPS *
CH 234 (2.766 MEV)   0.038 CPS *
CH 235 (2.778 MEV)   0.003 CPS *
CH 236 (2.790 MEV)   0.060 CPS *
CH 237 (2.801 MEV)   0.038 CPS * THALLIUM 208
CH 238 (2.813 MEV)   0.023 CPS *
CH 239 (2.825 MEV)   0.008 CPS *
CH 240 (2.837 MEV)   0.078 CPS *
CH 241 (2.849 MEV)   0.027 CPS *
CH 242 (2.860 MEV)   0.047 CPS *
CH 243 (2.872 MEV)   0.039 CPS *
CH 244 (2.884 MEV)   0.084 CPS *
CH 245 (2.896 MEV)   0.025 CPS *
CH 246 (2.908 MEV)   0.025 CPS *
CH 247 (2.920 MEV)  -0.015 CPS *
CH 248 (2.931 MEV)   0.037 CPS *
CH 249 (2.943 MEV)  -0.005 CPS *
CH 250 (2.955 MEV)   0.042 CPS *
CH 251 (2.967 MEV)   0.002 CPS *
CH 252 (2.979 MEV)  -0.018 CPS *
CH 253 (2.990 MEV)   0.031 CPS *
CH 254 (3.002 MEV)  -0.106 CPS * TOTAL COUNT
CH 255 (3.014 MEV)   0.000 CPS *
```

AIRCRAFT BACKGROUND
ROTARY WING AIRCRAFT
DOWNWARD LOOKING CRYSTAL
2048 CUBIC INCHES
DATE: 25 JULY 1977

FIGURE V

DERIVED COSMIC SPECTRUM FROM PACIFIC OCEAN DATA

DOWNWARD-LOOKING CRYSTAL SPECTRUM FOR LINE COSMIC, DATED 072577

COSMIC SPECTRUM
ROTARY WING AIRCRAFT
DOWNWARD LOOKING CRYSTAL
2048 CUBIC INCHES
DATE: 25 JULY 1977

TC (0-6 MEV) 5275.09 TC (0.4-3.0 MEV) 3245.27 COSMIC (3-6 MEV) 1000.00
U (1.12 MEV) 165.91 K (1.46 MEV) 181.83 U (1.76 MEV) 157.56 T (2.62 MEV) 213.66

CH 0	(0.000 MEV)	0.000	CPS	
CH 1	(0.012 MEV)	0.000	CPS	
CH 2	(0.024 MEV)	0.000	CPS	
CH 3	(0.035 MEV)	0.000	CPS	
CH 4	(0.047 MEV)	0.000	CPS	
CH 5	(0.059 MEV)	0.000	CPS	
CH 6	(0.071 MEV)	0.000	CPS	
CH 7	(0.083 MEV)	0.000	CPS	
CH 8	(0.095 MEV)	0.000	CPS	
CH 9	(0.106 MEV)	0.000	CPS	
CH 10	(0.118 MEV)	0.000	CPS	
CH 11	(0.130 MEV)	0.000	CPS	
CH 12	(0.142 MEV)	0.000	CPS	
CH 13	(0.154 MEV)	0.000	CPS	
CH 14	(0.165 MEV)	0.000	CPS	
CH 15	(0.177 MEV)	0.000	CPS	
CH 16	(0.189 MEV)	0.000	CPS	
CH 17	(0.201 MEV)	0.000	CPS	
CH 18	(0.213 MEV)	1.091	CPS	
CH 19	(0.225 MEV)	1.313	CPS	
CH 20	(0.236 MEV)	2.226	CPS	
CH 21	(0.248 MEV)	26.345	CPS	
CH 22	(0.260 MEV)	89.243	CPS	
CH 23	(0.272 MEV)	100.516	CPS	
CH 24	(0.284 MEV)	103.036	CPS	
CH 25	(0.295 MEV)	94.423	CPS	
CH 26	(0.307 MEV)	88.893	CPS	
CH 27	(0.319 MEV)	85.032	CPS	
CH 28	(0.331 MEV)	80.528	CPS	
CH 29	(0.343 MEV)	78.271	CPS	
CH 30	(0.355 MEV)	72.498	CPS	
CH 31	(0.366 MEV)	74.934	CPS	
CH 32	(0.378 MEV)	65.560	CPS	
CH 33	(0.390 MEV)	65.966	CPS	
CH 34	(0.402 MEV)	63.189	CPS	TOTAL COUNT
CH 35	(0.414 MEV)	62.880	CPS	
CH 36	(0.426 MEV)	64.078	CPS	
CH 37	(0.437 MEV)	67.602	CPS	
CH 38	(0.449 MEV)	69.116	CPS	
CH 39	(0.461 MEV)	76.972	CPS	
CH 40	(0.473 MEV)	84.879	CPS	
CH 41	(0.485 MEV)	96.049	CPS	
CH 42	(0.496 MEV)	94.167	CPS	
CH 43	(0.508 MEV)	86.706	CPS	
CH 44	(0.520 MEV)	68.016	CPS	
CH 45	(0.532 MEV)	48.444	CPS	
CH 46	(0.544 MEV)	40.965	CPS	
CH 47	(0.556 MEV)	30.512	CPS	
CH 48	(0.567 MEV)	33.160	CPS	
CH 49	(0.579 MEV)	31.892	CPS	
CH 50	(0.591 MEV)	25.907	CPS	
CH 51	(0.603 MEV)	30.781	CPS	
CH 52	(0.615 MEV)	27.055	CPS	
CH 53	(0.626 MEV)	27.982	CPS	
CH 54	(0.638 MEV)	25.776	CPS	
CH 55	(0.650 MEV)	22.988	CPS	
CH 56	(0.662 MEV)	27.787	CPS	
CH 57	(0.674 MEV)	25.274	CPS	
CH 58	(0.686 MEV)	25.240	CPS	
CH 59	(0.697 MEV)	23.489	CPS	
CH 60	(0.709 MEV)	24.769	CPS	
CH 61	(0.721 MEV)	22.350	CPS	
CH 62	(0.733 MEV)	22.242	CPS	
CH 63	(0.745 MEV)	22.424	CPS	
CH 64	(0.756 MEV)	22.234	CPS	
CH 65	(0.768 MEV)	20.332	CPS	
CH 66	(0.780 MEV)	18.821	CPS	
CH 67	(0.792 MEV)	20.493	CPS	
CH 68	(0.804 MEV)	19.339	CPS	
CH 69	(0.816 MEV)	19.021	CPS	
CH 70	(0.827 MEV)	17.949	CPS	
CH 71	(0.839 MEV)	20.235	CPS	
CH 72	(0.851 MEV)	17.491	CPS	
CH 73	(0.863 MEV)	18.370	CPS	
CH 74	(0.875 MEV)	16.244	CPS	
CH 75	(0.887 MEV)	16.331	CPS	
CH 76	(0.898 MEV)	17.519	CPS	
CH 77	(0.910 MEV)	16.689	CPS	
CH 78	(0.922 MEV)	17.150	CPS	
CH 79	(0.934 MEV)	19.230	CPS	
CH 80	(0.946 MEV)	17.111	CPS	
CH 81	(0.957 MEV)	16.248	CPS	
CH 82	(0.969 MEV)	14.954	CPS	
CH 83	(0.981 MEV)	17.324	CPS	
CH 84	(0.993 MEV)	16.276	CPS	
CH 85	(1.005 MEV)	14.813	CPS	
CH 86	(1.017 MEV)	15.703	CPS	
CH 87	(1.028 MEV)	13.787	CPS	
CH 88	(1.040 MEV)	16.414	CPS	
CH 89	(1.052 MEV)	13.642	CPS	BISMUTH 214
CH 90	(1.064 MEV)	13.624	CPS	
CH 91	(1.076 MEV)	13.517	CPS	
CH 92	(1.087 MEV)	13.700	CPS	
CH 93	(1.099 MEV)	14.633	CPS	
CH 94	(1.111 MEV)	14.303	CPS	
CH 95	(1.123 MEV)	13.766	CPS	
CH 96	(1.135 MEV)	14.949	CPS	
CH 97	(1.147 MEV)	13.503	CPS	
CH 98	(1.158 MEV)	13.481	CPS	
CH 99	(1.170 MEV)	13.189	CPS	
CH 100	(1.182 MEV)	13.802	CPS	BISMUTH 214
CH 101	(1.194 MEV)	12.965	CPS	
CH 102	(1.206 MEV)	12.538	CPS	
CH 103	(1.217 MEV)	14.001	CPS	
CH 104	(1.229 MEV)	11.346	CPS	
CH 105	(1.241 MEV)	11.113	CPS	
CH 106	(1.253 MEV)	13.669	CPS	
CH 107	(1.265 MEV)	11.910	CPS	
CH 108	(1.277 MEV)	12.345	CPS	
CH 109	(1.288 MEV)	10.738	CPS	
CH 110	(1.300 MEV)	11.444	CPS	
CH 111	(1.312 MEV)	11.433	CPS	
CH 112	(1.324 MEV)	11.987	CPS	
CH 113	(1.336 MEV)	11.846	CPS	
CH 114	(1.347 MEV)	11.896	CPS	
CH 115	(1.359 MEV)	11.470	CPS	
CH 116	(1.371 MEV)	11.884	CPS	POTASSIUM 40
CH 117	(1.383 MEV)	10.288	CPS	
CH 118	(1.395 MEV)	12.084	CPS	
CH 119	(1.407 MEV)	9.642	CPS	
CH 120	(1.418 MEV)	11.778	CPS	
CH 121	(1.430 MEV)	12.635	CPS	
CH 122	(1.442 MEV)	10.601	CPS	
CH 123	(1.454 MEV)	9.140	CPS	
CH 124	(1.466 MEV)	11.144	CPS	
CH 125	(1.477 MEV)	10.766	CPS	
CH 126	(1.489 MEV)	9.250	CPS	
CH 127	(1.501 MEV)	11.961	CPS	
CH 128	(1.513 MEV)	10.896	CPS	
CH 129	(1.525 MEV)	10.900	CPS	
CH 130	(1.537 MEV)	9.022	CPS	
CH 131	(1.548 MEV)	10.311	CPS	
CH 132	(1.560 MEV)	10.151	CPS	POTASSIUM 40
CH 133	(1.572 MEV)	9.361	CPS	
CH 134	(1.584 MEV)	8.753	CPS	
CH 135	(1.596 MEV)	11.176	CPS	
CH 136	(1.608 MEV)	10.130	CPS	
CH 137	(1.619 MEV)	10.551	CPS	
CH 138	(1.631 MEV)	9.204	CPS	
CH 139	(1.643 MEV)	9.159	CPS	
CH 140	(1.655 MEV)	8.738	CPS	
CH 141	(1.667 MEV)	8.679	CPS	BISMUTH 214
CH 142	(1.678 MEV)	10.154	CPS	
CH 143	(1.690 MEV)	9.743	CPS	
CH 144	(1.702 MEV)	9.453	CPS	
CH 145	(1.714 MEV)	9.418	CPS	
CH 146	(1.726 MEV)	8.425	CPS	
CH 147	(1.738 MEV)	9.263	CPS	
CH 148	(1.749 MEV)	9.653	CPS	
CH 149	(1.761 MEV)	9.412	CPS	
CH 150	(1.773 MEV)	9.019	CPS	
CH 151	(1.785 MEV)	9.329	CPS	
CH 152	(1.797 MEV)	10.232	CPS	
CH 153	(1.808 MEV)	9.686	CPS	
CH 154	(1.820 MEV)	7.911	CPS	
CH 155	(1.832 MEV)	8.104	CPS	
CH 156	(1.844 MEV)	9.602	CPS	
CH 157	(1.856 MEV)	9.473	CPS	BISMUTH 214
CH 158	(1.868 MEV)	8.568	CPS	
CH 159	(1.879 MEV)	8.105	CPS	
CH 160	(1.891 MEV)	8.014	CPS	
CH 161	(1.903 MEV)	8.365	CPS	
CH 162	(1.915 MEV)	8.759	CPS	
CH 163	(1.927 MEV)	6.994	CPS	
CH 164	(1.938 MEV)	8.477	CPS	
CH 165	(1.950 MEV)	8.144	CPS	
CH 166	(1.962 MEV)	7.798	CPS	
CH 167	(1.974 MEV)	8.214	CPS	
CH 168	(1.986 MEV)	9.240	CPS	
CH 169	(1.998 MEV)	7.945	CPS	
CH 170	(2.009 MEV)	7.615	CPS	
CH 171	(2.021 MEV)	6.816	CPS	
CH 172	(2.033 MEV)	8.408	CPS	
CH 173	(2.045 MEV)	7.196	CPS	
CH 174	(2.057 MEV)	7.231	CPS	
CH 175	(2.068 MEV)	7.473	CPS	
CH 176	(2.080 MEV)	9.062	CPS	
CH 177	(2.092 MEV)	8.116	CPS	
CH 178	(2.104 MEV)	8.235	CPS	
CH 179	(2.116 MEV)	7.653	CPS	
CH 180	(2.128 MEV)	8.338	CPS	
CH 181	(2.139 MEV)	7.237	CPS	
CH 182	(2.151 MEV)	7.528	CPS	
CH 183	(2.163 MEV)	8.039	CPS	
CH 184	(2.175 MEV)	8.536	CPS	
CH 185	(2.187 MEV)	8.888	CPS	
CH 186	(2.199 MEV)	7.485	CPS	
CH 187	(2.210 MEV)	8.211	CPS	
CH 188	(2.222 MEV)	8.233	CPS	
CH 189	(2.234 MEV)	8.055	CPS	
CH 190	(2.246 MEV)	7.825	CPS	
CH 191	(2.258 MEV)	7.062	CPS	
CH 192	(2.269 MEV)	8.435	CPS	
CH 193	(2.281 MEV)	7.440	CPS	
CH 194	(2.293 MEV)	7.686	CPS	
CH 195	(2.305 MEV)	7.110	CPS	
CH 196	(2.317 MEV)	7.329	CPS	
CH 197	(2.329 MEV)	7.890	CPS	
CH 198	(2.340 MEV)	7.771	CPS	
CH 199	(2.352 MEV)	7.147	CPS	
CH 200	(2.364 MEV)	6.729	CPS	
CH 201	(2.376 MEV)	6.264	CPS	
CH 202	(2.388 MEV)	6.318	CPS	
CH 203	(2.399 MEV)	7.050	CPS	
CH 204	(2.411 MEV)	6.506	CPS	THALLIUM 208
CH 205	(2.423 MEV)	6.488	CPS	
CH 206	(2.435 MEV)	6.589	CPS	
CH 207	(2.447 MEV)	7.033	CPS	
CH 208	(2.459 MEV)	6.515	CPS	
CH 209	(2.470 MEV)	6.852	CPS	
CH 210	(2.482 MEV)	6.871	CPS	
CH 211	(2.494 MEV)	6.573	CPS	
CH 212	(2.506 MEV)	6.417	CPS	
CH 213	(2.518 MEV)	5.845	CPS	
CH 214	(2.529 MEV)	6.127	CPS	
CH 215	(2.541 MEV)	6.355	CPS	
CH 216	(2.553 MEV)	6.964	CPS	
CH 217	(2.565 MEV)	6.820	CPS	
CH 218	(2.577 MEV)	6.670	CPS	
CH 219	(2.589 MEV)	6.808	CPS	
CH 220	(2.600 MEV)	5.940	CPS	
CH 221	(2.612 MEV)	6.177	CPS	
CH 222	(2.624 MEV)	6.176	CPS	
CH 223	(2.636 MEV)	6.109	CPS	
CH 224	(2.648 MEV)	6.347	CPS	
CH 225	(2.660 MEV)	7.049	CPS	
CH 226	(2.671 MEV)	5.757	CPS	
CH 227	(2.683 MEV)	5.645	CPS	
CH 228	(2.695 MEV)	5.229	CPS	
CH 229	(2.707 MEV)	5.415	CPS	
CH 230	(2.719 MEV)	6.190	CPS	
CH 231	(2.730 MEV)	6.092	CPS	
CH 232	(2.742 MEV)	6.466	CPS	
CH 233	(2.754 MEV)	7.032	CPS	
CH 234	(2.766 MEV)	5.533	CPS	
CH 235	(2.778 MEV)	6.309	CPS	
CH 236	(2.790 MEV)	5.559	CPS	
CH 237	(2.801 MEV)	5.206	CPS	THALLIUM 208
CH 238	(2.813 MEV)	6.045	CPS	
CH 239	(2.825 MEV)	5.257	CPS	
CH 240	(2.837 MEV)	5.640	CPS	
CH 241	(2.849 MEV)	5.835	CPS	
CH 242	(2.860 MEV)	5.348	CPS	
CH 243	(2.872 MEV)	4.804	CPS	
CH 244	(2.884 MEV)	4.742	CPS	
CH 245	(2.896 MEV)	5.304	CPS	
CH 246	(2.908 MEV)	5.248	CPS	
CH 247	(2.920 MEV)	6.036	CPS	
CH 248	(2.931 MEV)	5.711	CPS	
CH 249	(2.943 MEV)	5.513	CPS	
CH 250	(2.955 MEV)	5.010	CPS	
CH 251	(2.967 MEV)	5.579	CPS	
CH 252	(2.979 MEV)	6.256	CPS	
CH 253	(2.990 MEV)	5.207	CPS	
CH 254	(3.002 MEV)	9.302	CPS	TOTAL COUNT
CH 255	(3.014 MEV)	1000.000	CPS	

FIGURE VI

Thus, energy peaks within a spectrum of a given element are Gaussian shaped rather than pure line spectra. Additionally, we are dealing with finite spectral windows, multiple peaked spectra, and pulse pileup; all tend to couple each window's response to the other.

Keeping in mind that we are dealing with the count rates corresponding to the concentrations presented in the last table, we define the following:

KC_i = uncorrected system count rate for the K channel

UC_i = uncorrected system count rate for the U channel

TC_i = uncorrected system count rate for the T channel

K_i = the percent differential concentration of potassium

U_i = ppm differential concentration of uranium

T_i = ppm differential concentration of thorium

where "i" refers to the ith pad.

We also define the following:

ζ_{kk} = sensitivity of KC_i to concentrations of K_i

ζ_{ku} = sensitivity of KC_i to concentrations of U_i

ζ_{kt} = sensitivity of KC_i to concentrations of T_i

ζ_{uk} = sensitivity of UC_i to concentrations of K_i

ζ_{uu} = sensitivity of UC_i to concentrations of U_i

ζ_{ut} = sensitivity of UC_i to concentrations of T_i

ζ_{tk} = sensitivity of TC_i to concentrations of K_i

ζ_{tu} = sensitivity of TC_i to concentrations of U_i

ζ_{tt} = sensitivity of TC_i to concentrations of T_i

Using the above definitions, we now construct the functional relationship by means of the following nine (9) equations in sets of three (3) per pad.

<u>K pad</u>

$$KC_k = \zeta_{kk}K + \zeta_{ku}U + \zeta_{kt}T$$
$$UC_k = \zeta_{uk}K + \zeta_{uu}U + \zeta_{ut}T$$
$$TC_k = \zeta_{tk}K + \zeta_{tu}U + \zeta_{tt}T$$

<u>U pad</u>

$$KC_u = \zeta_{kk}K + \zeta_{ku}U + \zeta_{kt}T$$
$$UC_u = \zeta_{uk}K + \zeta_{uu}U + \zeta_{ut}T$$
$$TC_u = \zeta_{tk}K + \zeta_{tu}U + \zeta_{tt}T$$

<u>T pad</u>

$$KC_t = \zeta_{kk}K + \zeta_{ku}U + \zeta_{kt}T$$
$$UC_t = \zeta_{uk}K + \zeta_{uu}U + \zeta_{ut}T$$
$$TC_t = \zeta_{tk}K + \zeta_{tu}U + \zeta_{tt}T$$

Separating these equation into consistent groups, we get for the uncorrected count rates in the K channel

(K pad) $KC_k = \zeta_{kk}K_k + \zeta_{ku}U_k + \zeta_{kt}T_k$

(U pad) $KC_u = \zeta_{kk}K_u + \zeta_{ku}U_u + \zeta_{kt}T_u$

(T pad) $KC_t = \zeta_{kk}K_t + \zeta_{ku}U_t + \zeta_{kt}T_t$

The equations can be expressed in matrix notation

$$\begin{bmatrix} KC_k \\ KC_u \\ KC_t \end{bmatrix} = \begin{bmatrix} K_k & U_k & T_k \\ K_u & U_u & T_u \\ K_t & U_t & T_t \end{bmatrix} \cdot \begin{bmatrix} \zeta_{kk} \\ \zeta_{ku} \\ \zeta_{kt} \end{bmatrix}$$

Where the k, u and t subscripts represent the K, U and T pads.

In a similar manner we can write two other matrix equations for UC_i and TC_i respectively.

$$\begin{bmatrix} UC_k \\ UC_u \\ UC_t \end{bmatrix} = \begin{bmatrix} K_k & U_k & T_k \\ K_u & U_u & T_u \\ K_t & U_t & T_t \end{bmatrix} \cdot \begin{bmatrix} \zeta_{uk} \\ \zeta_{uu} \\ \zeta_{ut} \end{bmatrix}$$

$$\begin{bmatrix} TC_k \\ TC_u \\ TC_t \end{bmatrix} = \begin{bmatrix} K_k & U_k & T_k \\ K_u & U_u & T_u \\ K_t & U_t & T_t \end{bmatrix} \cdot \begin{bmatrix} \zeta_{tk} \\ \zeta_{tu} \\ \zeta_{tt} \end{bmatrix}$$

Collecting the above, these equations can be expressed in matrix form as

$$\begin{bmatrix} KC_k & UC_k & TC_k \\ KC_u & UC_u & TC_u \\ KC_t & UC_t & TC_t \end{bmatrix} = \begin{bmatrix} K_t & U_k & T_k \\ K_u & U_u & T_u \\ K_t & U_t & T_t \end{bmatrix} \cdot \begin{bmatrix} \zeta_{kk} & \zeta_{uk} & \zeta_{tk} \\ \zeta_{ku} & \zeta_{uu} & \zeta_{tu} \\ \zeta_{kt} & \zeta_{ut} & \zeta_{tt} \end{bmatrix}$$

or

$$\bar{A} = \bar{B} \cdot \bar{\zeta}$$

where $\bar{A}$ is the residual count rate matrix, $\bar{B}$ is the matrix of the known differential concentrations and $\bar{\zeta}$ the sensitivity matrix.

Rearranging the above equations we have

$$\bar{B} = \bar{A} \cdot \bar{\zeta}^{-1}$$

We now define

$$\bar{\zeta}^{-1} = \bar{\Delta}$$

Eliminating $\bar{\zeta}$, we get

$$\bar{B} = \bar{A} \cdot \bar{\Delta}$$

We can now solve for $\bar{\Delta}$ by matrix inversion.

Therefore, the differential concentrations in the mixed pad can be derived from the k,u,t pads to check the computed $\bar{\Delta}$.

$$\begin{bmatrix} K_m \\ U_m \\ T_m \end{bmatrix} = \begin{bmatrix} \Delta_{kk} & \Delta_{ku} & \Delta_{kt} \\ \Delta_{uk} & \Delta_{uu} & \Delta_{ut} \\ \Delta_{tk} & \Delta_{tu} & \Delta_{tt} \end{bmatrix} \cdot \begin{bmatrix} KC_m \\ UC_m \\ TC_m \end{bmatrix}$$

where the subscript m refers to the mixed pad. Expanding this in algebraic form we obtain the following set of equations:

$$K_m = \Delta_{kk}\left(KC_m + \frac{\Delta_{ku}}{\Delta_{kk}} UC_m + \frac{\Delta_{kt}}{\Delta_{kk}} TC_m\right)$$

$$U_m = \Delta_{uu}\left(UC_m + \frac{\Delta_{ut}}{\Delta_{kk}} TC_m + \frac{\Delta_{uk}}{\Delta_{uu}} KC_m\right)$$

$$T_m = \Delta_{tt}\left(TC_m + \frac{\Delta_{tu}}{\Delta_{tt}} UC_m + \frac{\Delta_{tk}}{\Delta_{tt}} KC^m\right)$$

The terms in parentheses in the above 3 equations are the "corrected stripped count rates" for the system, and the stripping coefficients are as follows:

$S_{ku} = \frac{\Delta_{ku}}{\Delta_{kk}}$ (effect of uranium on potassium)

$S_{kt} = \frac{\Delta_{kt}}{\Delta_{kk}}$ (effect of thorium on potassium)

$S_{ut} = \frac{\Delta_{ut}}{\Delta_{uu}}$ (effect of thorium on uranium)

$S_{uk} = \frac{\Delta_{uk}}{\Delta_{uu}}$ (effect of potassium on uranium)

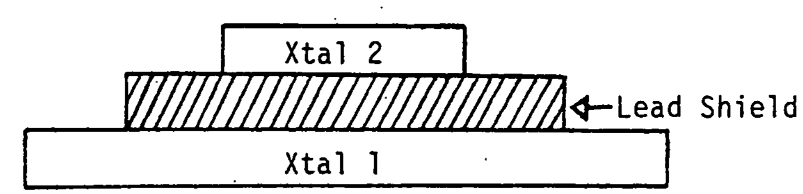
$S_{tu} = \frac{\Delta_{tu}}{\Delta_{tt}}$ (effect of uranium on thorium)

$S_{tk} = \frac{\Delta_{tk}}{\Delta_{tt}}$ (effect of potassium on thorium)

These stripping coefficients are defined in terms of S_{ij} in order to eliminate confusion with α, β, and γ, which are sometimes defined slightly differently.

ATMOSPHERIC RADON CORRECTION

Consider the crystal configuration shown below:



Let 1 and 2 designate the down and up crystal respectively. The down crystal sees radiation rates of I_1 composed of the air signal I_a and the ground signal I_g plus aircraft and cosmic background.

Therefore $I_1 = I_g + I_a + A_1 + C_1$

Similarly, the up crystal sees the air signal and ground signal (both somewhat attenuated) plus an aircraft and cosmic background.

Therefore $I_2 = \ell I_g + mI_a + A_2 + C_2$

Where m is the response to the air signal and is the % of the ground signal getting through to the up detector.

Using the test pad data, the factor can be determined. Consider the two previous equations. When we subtract the matrix pad data from the K, U, and T pad data, we have essentially set A_1, A_2, C_1, and C_2 and I_a equal to zero.

Therefore
$$I_1 = I_g$$
$$I_2 = \ell I_g$$
$$= \left(\frac{I_2}{I_1}\right)$$

Instead of using the count rates we can use the resultant sensitivities $1/\Delta_{uu}$ to determine ℓ for the elemental channel U.

$$= \frac{1/\Delta_{uu}\ (\text{up})}{1/\Delta_{uu}\ (\text{down})}$$

It should be noted that due to "shine around" (since the shielding is not an infinite plane, the upward looking crystal responds to the surrounding terrain) on the test pads, as altitude increases, should decrease, thus $\ell = f(h)$.

Only the factor m remains to be determined. This unfortunately cannot be determined from test pad data. It can however be determined by flying over water (e.g. use of the Lake Mead over-water data).

Consider the equations for I_1 and I_2 again

$$I_1 = I_g + I_a + A_1 + C_1$$
$$I_2 = \ell I_g + mI_a + A_2 + C_2$$

Over water $I_g = 0$

We have A_1, A_2, C_1, and C_2 defined.

Removing the aircraft and cosmic background from the over water data and we are left with

$$I_1 = I_a$$
$$I_2 = mI_a$$

Since m is the shielding factor response to the air signal, we should have an air signal to "shield". Thus m is best determined if there is radon present.

Both up and down counting rates are corrected for aircraft and cosmic background and so we can solve the following two equations for I_a.

$$I_1 = I_g + I_a$$
$$I_2 = \ell I_g + mI_a$$
$$mI_a = I_2 - \ell I_g$$

but $I_g = I_1 - I_a$

then $I_a(m-\ell) = I_2 - \ell I_1$

or $I_a = \dfrac{I_2 - \ell I_1}{m - \ell} = \text{Bi Air}$

and I_a is then the Bi Air contribution from the surrounding air. This is then subtracted from the down looking U count resulting in corrected data.

DATA PROCESSING

DATA PREPARATION

The following sections summarize the techniques used for reduction and processing of the airborne data collected by geoMetrics.

Field Tape Verification and Edit

The field data tapes containing the airborne data are read on a computer to verify the recording and data quality. Data recovery is essentially 100% from the field tapes. During this phase, statistics are generated summarizing all the variables recorded for each flight line. Simultaneously, the spectral peaks are evaluated for shifts using a centroid calculation and the particular window's peak channel. The data are also checked for correct scan lengths and proper justification of data fields within each scan and and live time calculations are made. During this process, the desired window data fields are extracted from each spectrum and rewritten as a reformatted copy tape. (Portions of this operation were performed in the field using the G-725 field computer system.)

The reformatted raw data for each flight line (with aborted or unnecessary flight line data edited out) are then checked for consistency, data spikes, gradients, etc. Every correction suggested by the computer is evaluated by the data processing personnel prior to implementation. Upon completion of the phase, the data on the output tape are "clean" and ready for subsequent correction of the radiometrics and tieing of the magnetics.

Flight Line Location

A single frame 35 mm camera is used for obtaining position recovery information. The photo locations are spotted or transferred to a suitable base map and are digitized. The fiducial numbers of the spotted points along each line are entered during the digitying process. A computer program is used to check the consistency of these data using calculated intersections from tie line to tie line and from traverse to traverse. This program allows easy detection of entry errors as well as potential flight path recovery errors.

A computer program then calculates the map location for each intersection and the beginning and end of each line based on the fiducial numbers and the control line/tie grid. A computer plot is made of these locations to check against the field plot and correct editing information. These flight lines are then overlain on the geologic base map and each map unit is digitized such that each sample falls within a single unit. This resulting location information is then merged with the geophysicial data using the fiducial numbers as common reference.

RADIOMETRIC DATA REDUCTION

Reduction of the raw window data was carried out utilizing system calibration constants as derived from high altitude over water flights, Lake Mead Dynamic Test Range, and the Walker Field Test Pads. The data reduction sequence used is summarized in Figure VII. Processing of the data was performed using the window energies given below:

Total count - 0.4 to 3.0 MeV

K - 1.37 to 1.57 MeV

U - 1.66 to 1.87 MeV (downward looking system)

U_{up} - 1.04 to 1.21 MeV and 1.65 to 2.42 MeV (upward looking system)

T - 2.41 to 2.81 MeV

Cosmic - 3 to 6 MeV (downward and upward looking system)

Aircraft and Cosmic background for the Queen Air over these windows are as follows:

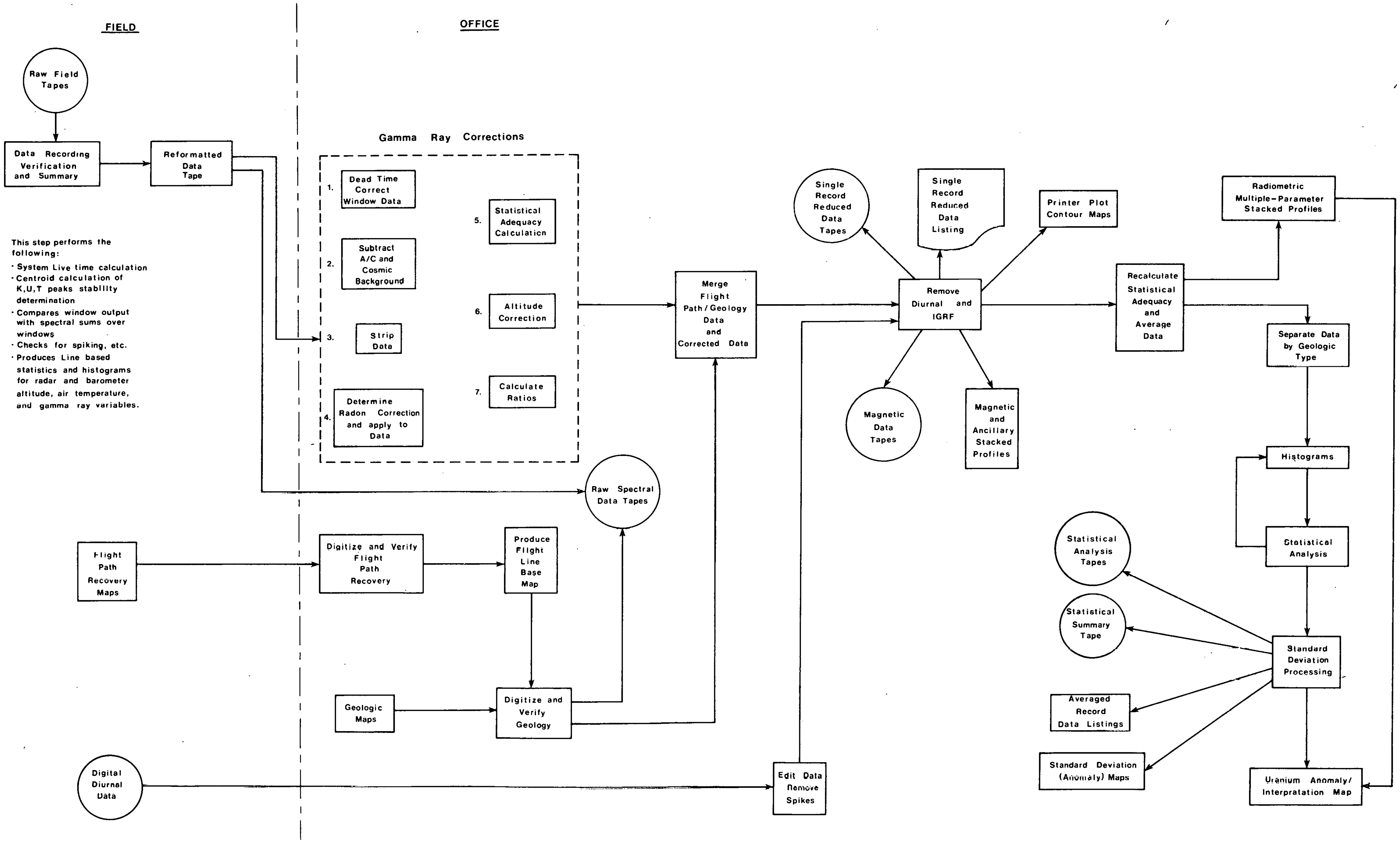
QUEEN AIR

		Aircraft	Cosmic*
TC	(cps)	152.04	2.3833
K	(cps)	16.06	0.1322
U_{dn}	(cps)	6.50	0.1098
U_{up}	(cps)	3.17	0.5540
T	(cps)	3.42	0.1503

*Cosmic background values are in cps per 1.0 cps in the 3-6 MeV window.

DATA PROCESSING FLOW DIAGRAM

FIGURE VII



Compton corrections to the down data were made using the following constants:

Sij	QUEEN AIR
S_{ku}	0.8437
S_{kt}	0.1584
S_{ut}	0.2703
S_{uk}	0.0
S_{tu}	0.05614
S_{tk}	0.0

The ij subscripts represent the influence of the j^{th} window on the i^{th} window.

All parameters except for S_{ut} are considered constants. S_{ut} was considered an altitude dependent paramenter utilizing the following expression (after Grasty, 1975).

$S_{ut} = S_{ut_0} + 0.0076h$, where h is the altitude in hundreds of feet.

Altitude attenuation coefficients used are defined as follows:

ALTITUDE ATTENUATION COEFFICIENTS

		QUEEN AIR
TC	(per foot)	0.002011
K	(per foot)	0.002740
U	(per foot)	0.002479
T	(per foot)	0.002048

All radiometric data presented in the strip charts have been normalized to 400 feet mean terrain clearance at STP using the expression:

$$\exp - u_i \frac{273.15}{760} \times \frac{P}{T} (h - 400)$$

where h is the height in feet, u_i is the appropriate altitude attenuation coefficient, P is in mm of Hg, and T is in degrees Kelvin. In cases where the altitude exceeds 1,000 feet, the correction coefficients were limited to the 1,000 foot value.

Bi Air calculations are made using the following expressions:

$$Bi_{Air} = \frac{U_{up} - (R_{us} + \frac{C'uk}{C'uu} R_{ks} + \frac{C'ut}{C'uu} R_{ts})\ell}{m - \ell}$$

Where U_{up} = count rate from upward detectors

ℓ = crystal coupling constant

m = crystal geometric factor

C'_{uk}, C'_{ut}, C'_{uu}, = stripping coefficients relating down data to up data

R_{us} = stripped uranium count rate - down system

R_{ks} = stripped potassium count rate - down system

R_{ts} = stripped thorium count rate - down system

The numerical values for the constants ℓ, m, C'_{uk}, and C'_{uu} are given below:

	QUEEN AIR
ℓ	0.1101
m	0.596
C'_{uk}	.00947
C'_{uu}	.07136
C'_{ut}	.04636
$\mu\ell$	-0.000032
μm	-0.000192

$\mu\ell$ & μm are altitude dependent as follows:

$$\ell = \ell - \mu\ell \times h, \text{ where h is in feet}$$

$$m = m - \mu m \times h, \text{ where h is in feet}$$

These Bi Air data are filtered and the filtered results are then removed on a point by point basis from the corrected uranium window data.

The window data are then evaluated for statistical adequacy prior to altitude correction to ensure they are significant within the context of the anticipated errors in count statistics.

Statistical Adequacy Test

The statistical adequacy test is made to determine whether the corrected data sample is sufficiently greater than the "noise" to represent the "signal" of interest.

We can define three separate criteria for detection thresholds (ref. Currie, Analytical Chemistry, Volume 40, No. 3, March 1968) of which only one is directly applicable to our case; this is the "critical level". This is the level at which the decision is made that a signal is "detected". We thus define this critical level as that level at which the data are statistically adequate.

Setting the actual levels in counts per second, "a priori " for each elemental window is difficult at best since the full effect of all parameters affecting the counts is not known to a sufficient degree of certainty. If the corrections to the data are a significant portion of the count rate, most of the error (exclusive of systematic errors due to electronics, etc.) in the corrected data can be ascribed to random errors within the applied corrections. The corrections are basically the results of counting radioactive decay products (gamma rays) and are therefore assumed to follow the classical Poisson distribution. The following assumptions concerning these corrections are:

1. In the best case, the error in each correction is additive.
2. The sum of these corrections also follows a Poisson distribution.
3. The uncertainty in the correction itself is equal to the square root of the correction applied.
4. This uncertainty is directly reflected in the corrected single record count rate.

With these assumptions in mind, the criterion for determining the statistical adequacy of a given data sample is defined as follows:

> "If a corrected single record data sample exceeds 1.5 times the square root of the summed correction applied to that data sample, then that data sample is statistically adequate."

Since any calculation using statistically inadequate data (such as ratios) is also inadequate, the adequacy of each element of the single sample record data is tested prior to the calculation. This is done during the course of the processing by retaining all corrections applied to each data sample and determining its adequacy as explained above.

Not only are the results of this statistical adequacy test used to insure that calculated ratios will be meaningful but they are also utilized to determine the optimum interval over which the data should be averaged (e.g. 5 seconds or 7 seconds, etc.) to improve the overall data statistical adequacy In the case of this project, the resulting averaging sample interval was 7 seconds.

Conversion to Equivalent ppm and Percent

At this point the data are single record corrected samples in units of counts per second. These data are then converted to equivalent ppm (parts per million) uranium, thorium and percent potassium. The conversion factors are the sensitivities derived from the Lake Mead Dynamic Test Range data at 400 feet mean terrain clearance.

Radioelement	Equivalent Percent/ppm	Queen Air Counts/Second
K	1%K	91.5
U	1 ppmeu	10.4
T	1 ppmeT	6.4

MAGNETIC DATA REDUCTION

The magnetic data reduction processes are: correction for diurnal variation, tieing to a common magnetic datum, and subtraction of the regional magnetic field as defined by the International Geomagnetic Reference Field (IGRF). During data acquisition, the magnetic field is monitored by a ground-based diurnal magnetometer that samples every four seconds at a sensitivity of one-quarter gamma. These data are recorded on magnetic tape along with the time for synchronization with the airborne data.

The diurnal data are edited to keep only samples taken during flight time and remove spikes and man-made magnetic events. After editing, these data are displayed in profile form to ensure that all corrections necessary have been made. Next, the data are synchronized in time with the airborne data, interpolated, and subtracted from the airborne magnetic data.

The diurnally corrected magnetic data are then processed by a tieing program that compares the magnetic differences at intersections of flight lines and tie lines. This program calculates individual magnetic field biases for each flight tie line based on tie line intersections. This allows miss-ties to be minimized throughout the survey. These biases usually represent, after diurnal correction, systematic magnetic changes caused by such things as heading error, changes in location of the ground-based magnetometer, or changes in the airborne equipment. The biases are manually evaluated and selectively applied.

DATA PRESENTATION

General

The majority of the data products are presented in this report. These include the uranium anomaly/interpretation maps and pseudo-contour maps of potassium, uranium, thorium, and magnetic data which are integrated as part of the text in the interpretation section. In addition to these data, this report contains data presented in the form of radiometric profiles, flight path recovery maps, standard deviation maps, and histograms. Microfiche data are contained in the back cover of each report. Data tapes are available separately.

Radiometric Profiles

Stacked profiles were prepared from the averaged data for each traverse and tie line. These stacked profiles, plotted at a linear scale of 1:250,000, contain the following parameters: corrected Total Count, percent potassium, equivalent ppm uranium, equivalent ppm thorium, eU/eT, eU/%K, and eT/%K ratios, equivalent ppm Bi Air, radar altimeter, and magnetometer data. Each of the stacked profile sheets contains a plot of the flight path superimposed on a geologic strip map. Included along these profiles are the fiducial numbers which correspond to flight path position as displayed on the flight path recovery maps. Each of the stacked profiles represents the data contained on the specific flight line within the boundaries of the specified NTMS Quadrangle sheet.

Radiometric traces on the stacked profiles contain an indicator showing those data which are statistically inadequate. These statistically inadequate data are marked by a small vertical tick at the sample location. The altitude profile has been limited in display to 1,000 feet. A dashed line at the 700 foot level is presented to show those data which do not meet the altitude specifications. The vertical scale of each variable remains constant on all stacked profiles. When overranging occurs, the trace is stepped and the step labeled showing the actual value. A pictorial representation of such a stepping profile is shown in Figure VIII. At the end of each stacked profile, a statistical summary of the minimum value, maximum value, mean, and standard deviation for that variable is presented.

This report contains an equivalent set of stacked profiles for each quadrangle, photographically reduced to an approximate scale of 1:500,000.

MAGNETIC PROFILES

A set of profiles containing the magnetic data (corrected, with IGRF removed), barometric altimeter data, radar altimeter data, diurnal monitor data, and temperature data are available at a linear scale of 1:250,000. Each of the stacked profiles contains a plot of the flight path superimposed on the geology over which the aircraft flew. Reduced scale (1:500,000) copies of these are presented in of this report.

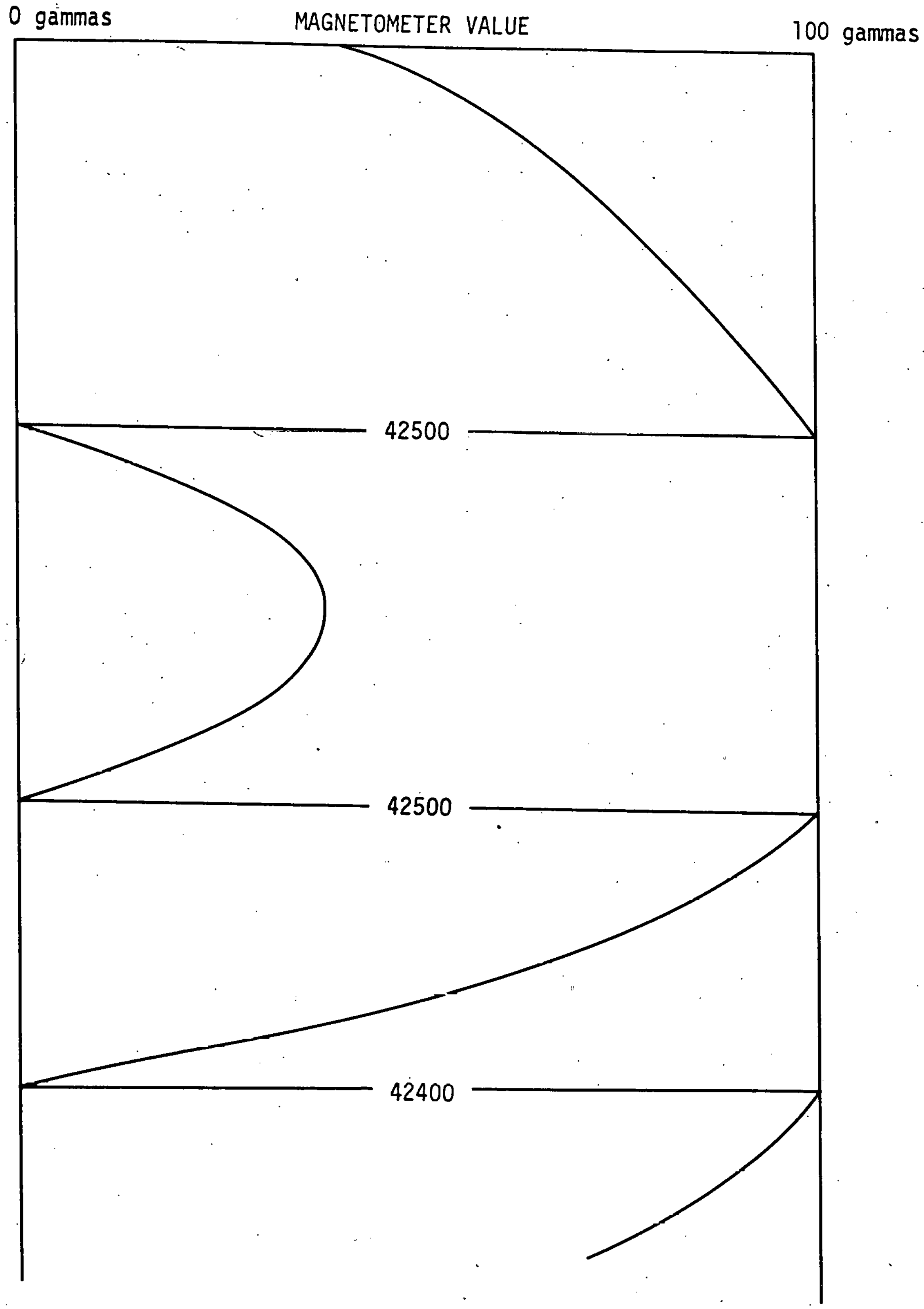


FIGURE VIII Plotter Step Value Labeling

FLIGHT PATH MAPS

For each of the NTMS quadrangle sheets covered by this survey, a flight path position map is available at a scale of 1:250,000. The actual flight path has been superimposed on the geologic quadrangle maps. Flight lines and tie lines are annotated along with fiducial numbers of located positions. Reduced scale (1:500,000) copies of these can be found in this report.

STANDARD DEVIATION MAPS

Gamma ray standard deviation maps have been prepared for each NTMS quadrangle included in this survey. The six maps generated represent the following parameters: percent potassium, equivalent ppm uranium, equivalent ppm thorium, and eU/eT, eU/%K and eT/%K ratios. The data contained in each map represent only those data which are considered statistically adequate. This automatically excludes all data collected over water or data which falls outside of altitude specifications (i.e. altitude greater than 700 and less than 200 feet). The symbolism of each of the six maps is identical. The center of each circle represents the central averaged sample since the data had been averaged over a 7 second interval. The small boxes adjacent to each of the circles represents one standard deviation from the mean for that specific data sample. In order to determine whether the data shown are represented by positive or negative standard deviations, consider each map with north pointing away from the viewer. For east/west lines (traverse lines) positive standard deviations lie above or to the north of the traverse line with negative standard deviation below or to the south. On the north/south lines (tie lines) positive standard deviations are to the left of the viewer (west) with negative standard deviations to the right (east).

These maps were generated at a scale of 1:250,000 for each NTMS sheet and in addition, are presented in each report at a reduced scale of approximately 1:500,000.

HISTOGRAMS

Computer generated histograms, showing the equivalent ppm and percent distributions for the three gamma ray emitters and their ratios measured and calculated as a function of computer map unit are presented in this report (See Figure IX). Information contained on these histograms includes the standard deviation as calculated about the arithmetic mean (or median), and the total number of samples from which the statistics were derived.

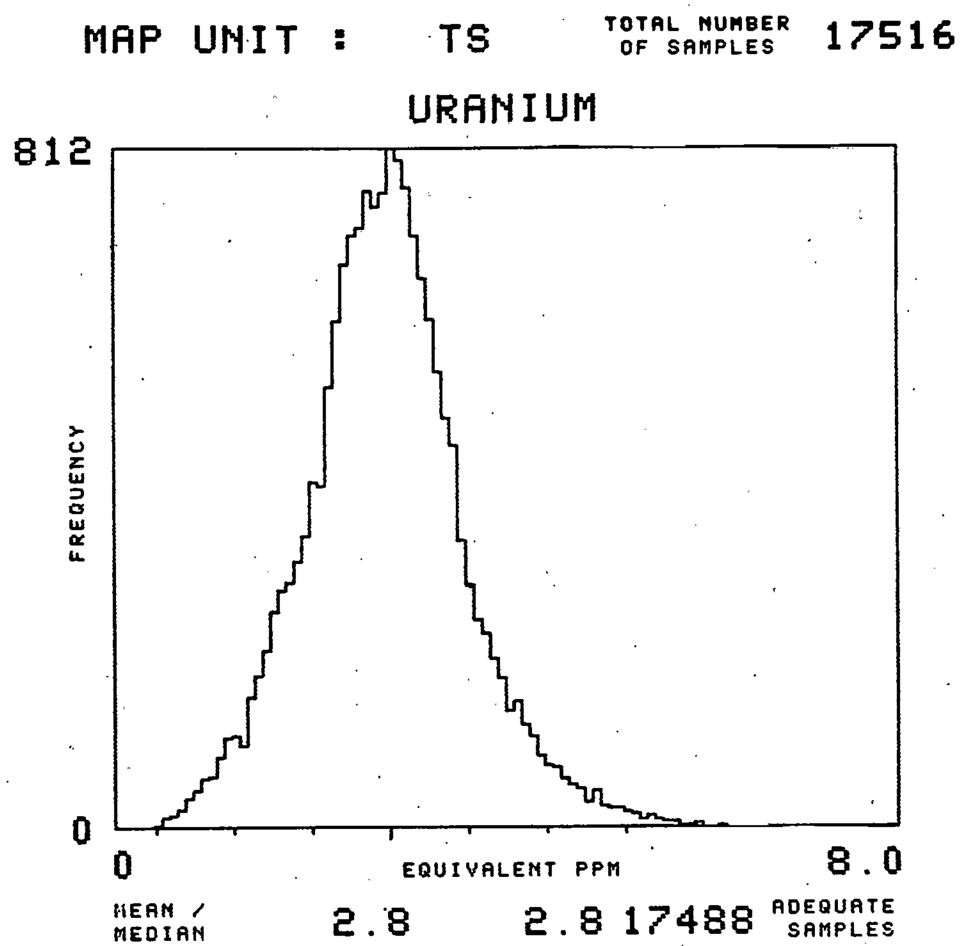


FIGURE IX Sample Computer Map Unit Histogram

DATA LISTINGS

Single record reduced and averaged record (statistical analysis) data listings have been prepared on microfiche. The microfiche are contained in each report. Each of the single record and averaged record data listings are presented for the data contained in a single quadrangle. The data contained in the single record data listings are summarized below:

1. Fiducial number
2. System/Quality (SAKUT) - The first digit identifies the system used to collect the sample. The remaining digits define the results of statistical adequacy testing for altitude, potassium, uranium, and thorium. A value of 0 indicated that the data are statistically adequate. A value of 1 indicates that the data are statistically inadequate. All data collected in excess of 700 feet and less than 200 feet are considered statistically inadequate.
3. Time - time presented in hours, minutes, and seconds
4. Altitude - altitude presented in feet above terrain
5. LAT/LONG - Latitude and Longitude presented in terms of decimal degrees
6. Magnetic field expressed in residual gammas
7. Geology - code representing geologic units
8. %K, eU, eT - percent potassium, equivalent ppm of uranium and thorium
9. eU/eTH, eU/%K, eTH/%K - calculated ratios of the three parameters
10. Total count - corrected total count data (0.4 to 3.0 MeV)
11. COS - downward looking cosmic count rate in the 3-6 MeV channel
12. Uair - atmospheric Bi-214 equivalent ppm
13. Temperature - outside air temperature in degrees centigrade
14. Press - barometric pressure in mm of mercury

The averaged record (statistical analysis) data listings are summarized below:

1. Fiducial number
2. System/Quality (SAKUT) - The first digit identifies the system used to collect the sample. The remaining digits define the results of statistical adequacy testing for altitude, potassium, uranium, and thorium. A value of 0 indicated that the data are statistically adequate. A value of 1 indicates that the data are statistically inadequate. All data collected in excess of 700 feet and less than 200 feet are considered statistically inadequate.
3. LAT/LONG - Latitude and longitude presented in terms of decimal degrees
4. Magnetic field expressed in residual gammas
5. Geology - code representing geologic formations
6. %K, eU, eT - percent potassium, equivalent ppm of uranium and thorium data and the number of ($\pm$) standard deviations from the mean
7. eU/eTH, eU/%K, eTh/%K - calculated ratios of the three parameters, and the number of ($\pm$) standard deviations from the mean
8. Total count - corrected total count data (0.4 to 3.0 MeV)
9. COS - downward looking cosmic count rate in the 3-6 MeV channel
10. Uair - atmospheric Bi-214 in equivalent ppm

DATA TAPES

Data tape files have been generated for each of the 1:250,000 NTMS quadrangle sheets. The tapes are IBM compatible and recorded on 9 track EBCDIC at 800 bpi. Five separate types of data tapes are presented: raw spectral data tapes, single record reduced data tapes, statistical analysis tapes, magnetic data tapes and a statistical analysis summary tape. Detailed descriptions of the data tape formats follow this discussion.

DATA INTERPRETATION METHODS

General

The stated objective of the NURE Program is the evaluation of the uranium potential of the United States. In support of this goal, high sensitivity airborne radiometric and magnetic surveys have been implemented to obtain reconnaissance information pertaining to regional distribution of uraniferous materials. Within this context, data interpretation has been oriented toward regional detection and description of anomalously high concentrations of uranium.

By far the most significant natural sources of gamma radiation in the geologic environment are the radioactive decay series of potassium 40 (K40), thorium 232 (Th232) and uranium 238 (U238) of which 0.7% is uranium 235. Potassium 40 is the largest contributor to natural radioactivity, accounting for nearly 98%, as it is the most abundant gamma ray emitter-.012% of all potassium in nature. (Refer to GSA Memoir 97 for abundances of uranium, thorium, and potassium).

Potassium 40 is directly identified by the airborne spectrometer from a single clear peak at 1.46 mev (million electron volts) in its gamma ray spectrum. However, thorium 232 and uranium 238 do not have any clear, distinct peaks at sufficiently high energies to allow direct detection from airborne systems. Instead, daughter products which do have distinct peaks are measured as representing the abundance of the parent element. For thorium 232, the daughter nuclide thallium 208 (T1208) has a distinct peak at 2.62 meV while uranium 238 has a daughter, bismuth 214 (Bi214) possessing a clear peak at 1.76 meV (see Figure 7 for a composite decay series spectrum). Consequently the fundamental assumption implicit to airborne uranium and thorium measurements is that the measured daughter products are in radioactive equilibrium - the number of atoms of disintegrating daughter nuclides are equal to the number being formed (see Adams and Gasparini, 1970).

An airborne gamma ray measurement is the sum of photons counted during a specified time interval from a multitude of gamma ray sources which include the three geologic emitters that are being sought plus other interfering sources. These others include, but are not limited to higher energy cosmic rays, aircraft and instruments, contributions from overlapping decay series and airborne radon 222. (See Burson, 1974 and McSharry, 1973 for a more complete discussion of airborne radiometric measurements, and Radiometric Data Reduction in this volume for a complete description of data correction procedures).

When correlating ground data (geochemical, geological, etc.) with the corrected data derived from raw airborne measurements, the interpreter must remember what an individual airborne gamma ray sample physically measures. First, the terrestrial component of the gamma radiation measured by the airborne detector emanated primarily from the upper 18 inches of material on the earth's surface (Gregory and

Horwood, 1963). The airborne measurement cannot "see" any deeper into the underlying rock material and is essentially a measurement of the soil's or exposed (weathered) rock's radioactivity. Secondly, since each airborne sample is an accumulation of gamma rays measured on a moving platform over a fixed period of time, the individual sample represents a large areal extent of surficial material. For this survey, with specifications of 400 feet mean terrain clearance and an average ground speed of 140 miles per hour, a one second sample corresponds to an oval approximately 750 feet long by 600 feet wide (assuming an infinite, uniformly distributed source). Accordingly, averaged samples represent tremendous volumes of surficial materials.

Methodology

As described previously, the gamma ray data were located by computer map units, histograms were produced and statistical analyses performed. The basic unit for interpretation then is the averaged sample and its attendant deviations about a particular map unit's mean.

The uranium anomaly/interpretation map displays each individual averaged sample that meets the following criteria:

1. The averaged uranium sample must be greater than or equal to 1 standard deviation above its map unit mean.

2. The sample must have a U/T ratio greater than or equal to 1 standard deviation above its unit mean.

3. Each U/T ratio defined in (2) must have a corresponding thorium value lying at least greater than minus one (-1) standard deviation below the mean. If the thorium sample is less than one standard deviation below the mean, the U/T ratio is considered questionable.

All the possible anomalies displayed on the map are then examined for clusters, trends, and comparisons with all other available data.

Minimum requirements in the subsequent interpretation discussions of each quadrangle for anomalies listed in the uranium anomaly summary are defined as follows:

> Two (2) consecutive averaged U samples lying two or more standard deviations above the mean or three (3) consecutive averaged U samples, two of which are one (1) or more standard deviations and the third of which is two (2) or more standard deviations above the mean.

Statistical anomalies which meet the above criteria can result from several factors or circumstances including: (1) true concentration of uraniferous minerals, (2) differential surface cover (soils and/or vegetation) within a lithologic unit, (3) local weather conditions such as rain and snow, (4) extreme facies variation within a mapped unit, and (5) differential weathering of rocks within mapped units. Obviously an averaged sample which lies on the boundary between two map units is not truly reflecting either one, but is rather an average of both. Thus, for two markedly different units, such a sample would be anomalous relative to one of the units and not be a true indication of radioactive differences within the unit.

The percent potassium, equivalent ppm thorium and uranium, the three ratios and residual magnetic data were plotted as separate pseudo-contour maps and overlain on the geologic base map and standard deviation maps. Regional trends of each variable and average valves could thus be easily and quickly determined and compared with the associated geological, magnetic, and statistical trends. Only the long wavelengths within each variable would show any line-to-line continuity on the pseudo-contour maps and thus, only regional trends will appear.

Each quadrangle's stacked profiles were also overlain on the corresponding geologic and standard deviation maps and anomaly map to further delineate trends and to allow a more detailed analysis of individual anomalies. Since the interpretation was concentrated on detection of anomalous uranium, subtle trends present in the potassium and thorium channels and ratios were only examined in a cursory manner. Even during such a brief examination of the profiles, it was evident that the spectrometer system was highly sensitive to changes in surface materials even in areas of low counting rates such as glacial drift. Thus radiometrics have a real potential for performing general surficial mapping "geochemical analysis" on a geologic unit (or soils) basis in addition to merely radioactive mineral "anomaly hunting".

TAPE FORMATS

SINGLE RECORD REDUCED DATA TAPE

REFERENCE: Paragraphs 4.7.6 and 6.1.6, BFEC 1200-C

The Single Record Tape is an unlabeled, nine track, 800 BPI, NRZI. All data are recorded as EBCDIC characters. Each tape contains but one file of format, header, data, and trailer records for no more than one quadrangle. The tape is divided into 6900-character blocks containing the following information.

Block 1 - Format Data

This block contains 6768 characters in 94 consecutive lines of 72 characters containing the following literal description.

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
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
13	I3	NUMBER OF CHANNELS (0-3 MEV) IN 4PI SYSTEM FOR FIRST AERIAL SYSTEM
14	I3	NUMBER OF CHANNELS (0-3 MEV) IN 2PI 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,I6,I3	REPEAT OF ITEMS 96-98 FOR SECOND FLIGHT LINE ON THIS TAPE
*	*	*
*	*	*
*	*	*
390-392	I4,I6,I3	REPEAT OF ITEMS 96-98 FOR 99th FLIGHT LINE ON THIS TAPE

FORMAT FOR SINGLE RECORD REDUCED 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	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 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-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K
19	F5.1	THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K

ITEM	FORMAT	DESCRIPTION
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

This description serves to identify the format of data on subsequent blocks on the tape. The remaining 132 characters on this block are blanks.

Block 2 - Single Record Reduced Identification Data

The second block contains the identifier information for the data contained in subsequent blocks. The identification information is written according to the format description in the first half of the first block. The remaining 4978 characters on this block are blanks.

Block 3 - Single Record Reduced Data

These blocks contain data written according to the format description in the second half of the first block. There will be 50 logical records per physical block. As of August 1979, the method for determining uncertainties specified in the data blocks remains undefined, and those values are filled with 9's under format control.

STATISTICAL ANALYSIS TAPE

REFERENCE: Paragraphs 4.7.7 and 6.1.6, BFEC 1200-C

The statistical analysis data tape is an unlabeled, nine track, 800 BPI, NRZI. All data is recorded as EBCDIC characters. The block length is 8000 characters long. Each tape contains one file of data for no more than one quadrangle.

Block 1 - Format Description Data

The first physical block on this tape contains a format description for data on subsequent blocks. The first 7560 characters on this block contains 105 lines of 72 characters exactly as written below:

03 0978 (DATA TAPE TYPE AND FORMAT SPECIFICATION DATE CODES)

STATISTICAL ANALYSIS 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
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 (99999)
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 4PI SYSTEM FOR FIRST AERIAL SYSTEM
14	I3	NUMBER OF CHANNELS (0-3 MEV) IN 2PI SYSTEM FOR FIRST AERIAL SYSTEM

ITEM	FORMAT	DESCRIPTION
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,I6,I3	REPEAT OF ITEMS 96-98 FOR SECOND FLIGHT LINE ON THIS TAPE
*	*	*
*	*	*
*	*	*
390-392	I4,I6,I3	REPEAT OF ITEMS 96-98 FOR 99th FLIGHT LINE ON THIS TAPE

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	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	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 ALGEBRIACALLY 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 DEICMAL PLACE IN PPM EQUIVALENT U
24	F4.1	AVERAGED URANIUM-TO-THORIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
25	F5.1	URANIUM-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	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
D8	F6.1	AVERÁGED 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

The remaining 440 characters in this block are blanks.

Block 2 - Statistical Analysis Identification Data

The second block contains the identifier information for the data contained in subsequent blocks according to the format specification in the first part of Block 1. The final 6078 characters on this block are blanks.

Block 3 - Statistical Analysis Data

The third and subsequent blocks contain statistical analysis data in the format specified by the second part of the Block 1. Fifty logical records are allowed per block. The method for determining uncertainty values shown, as of August 1979, remains undefined. These values are filled with 9's under format control.

MAGNETIC DATA TAPE

REFERENCE: Paragraphs 4.7.8 and 6.1.6, BFEC 1200-C

The Magentic Data Tape is an unlabeled, nine track, 800 BPI, NRZI. All data are recorded as EBCDIC characters. Each tape contains data for no more than one quadrangle and are divided into 8000-character blocks as described below.

Block 1 - Tape Format Description

The first block contains 3384 characters of format information in exactly the following format:

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 ON 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
*	*	*
*	*	*
*	*	*
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)

The remaining 4616 characters in this block are blanks.

Block 2 - Magnetic Tape Identification Data

This block contains information about the data in subsequent blocks organized according to the format specification in the first half of Block 1.

Block 3 - Magnetic Data

This block and subsequent block contains magnetic data for the quadrangle organized according to the format specifications in the second half of Block 1. There will be 100 logical records per physical block.

STATISTIC ANALYSIS SUMMARY TAPE

REFERENCE: Paragraphs 4.7.9, BFEC 1200-C

The statistical analysis summary tape is an unlabeled, nine track, 800 BPI, NRZI. All data is recorded as EBCDIC characters. The block length is 700 characters long. Each tape contains one file of data for no more than one quadrangle.

Block 1 - Format Description Data

The first physical block on this tape contains a format description for data on subsequent blocks. The first 4320 characters on this block contains 60 lines of 72 characters exactly as written below:

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 UNIT
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 U PER PPM EQUIVALENT TH
17	F6.1	URANIUM-TO-THORIUM RATIO STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVA-LENT 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
21	F6.1	URANIUM-TO-POTASSIUM RATIO STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT
22	A3	URANIUM-TO-POTASSIUM RATIO DISTRIBUTION
23	I6	NUMBER OF THORIUM-TO-POTASSIUM RATIO RECORDS COMPUTED FOR GEOLOGIC UNIT
24	F6.1	THORIUM-TO-POTASSIUM RATIO MEAN TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
25	F6.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
26	A3	THORIUM-TO-POTASSIUM RATIO DISTRIBUTION CODE

The remaining 2680 characters on this block shall be blanks.

Block 2 - Statistical Analysis Identification Data

The second block contains the identifier information for the data contained in subsequent blocks according to the format specification in the first part of Block 1. The final 6930 characters on this block are blanks.

Block 3 - Statistical Analysis Summary Data

The third and subsequent blocks contain statistical analysis data in the format specified by the second part of the Block 1. Fifty logical records are allowed per block.

BIBLIOGRAPHY

Adams, J. A. S., and Gasparini, P., 1970, Gamma-Ray Spectrometry of Rocks; Elsevier Publishing Co.

Burson, Z. G., 1974, Airborne Surveys of Terrestrial Gamma Radiation in Environmental Research; IEEE Trans. Nucl. Sci., NS-21, No. 1, p. 558-571.

Currie, L. A., 1968, Limits for Qualitative Detection and Quantitative Determination; Analytical Chemistry, Vol. 40, No. 3, p. 586-593.

Grasty, R. L., Uranium Measurement by Airborne Gamma-Ray Spectrometry; Geophysics, Vol. 40, No. 3, June 1975, p. 503-519.

Gregory, A. F., and Horwood, J. L., 1963, A Spectrometric Study of the Attenuation in Air of Gamma Rays from Mineral Resources; U.S. Atomic Energy Commission Report CEX-60-3, Washington, D.C.

McSharry, P. J. and Emerson, D. W., The Collection and Processing of Gamma Ray Spectrometer Data; 2nd International Conference on Geophysics of the Earth and Oceans, Sydney, Australia, January 1973.

APPENDIX B - Flight Summary

APPENDIX B

DAILY PRODUCTION SUMMARY JUNE AND JULY, 1980

EL DORADO, GREENWOOD, WEST POINT, HELENA, MEMPHIS,

RUSSELLVILLE, AND FORTH SMITH QUADRANGLES

QUEEN AIR N9AG

6-14-80	Ferry to Greenville, Mississippi
6-15-80	755 miles El Dorado, Greenwood, West Point
6-16-80	698 miles El Dorado, Greenwood, West Point, Helena
6-17-80	698 miles " " " "
6-18-80	698 miles " " " "
6-19-80	249 miles Greenwood, Helena, West Point
6-20-80 to 6-21-80	Weather - nil production
6-22-80	607 miles Greenwood, Helena, West Point
6-23-80 to 6-24-80	Weather - nil production
6-25-80	676 miles Greenwood, El Dorado, West Point
6-26-80	902 miles El Dorado, Greenwood, West Point, Helena
6-27-80	1,025 miles Greenwood, Helena, Memphis
6-28-80	587 miles " " "
6-29-80 to 7-1-80	Ferry to Fort Smith, Arkansas
7-2-80	678 miles Fort Smith, Russellville, Memphis
7-3-80	Equipment malfunctions - nil production
7-4-80	941 miles Fort Smith, Russellville, Memphis, Helena
7-5-80	678 miles Fort Smith, Russellville, Memphis
7-6-80	1,039 miles Fort Smith, Russellville, Memphis, Helena
7-7-80	736 miles Fort Smith, Russellville, Memphis
7-8-80 to 7-10-80	Equipment Repairs - nil production
7-11-80	2645 miles Fort Smith
7-12-80	1,086 miles Fort Smith, Russellville, Memphis, Helena
7-13-80	528 miles Fort Smith, Russellville

Total for the above period - 12,825 miles as recorded by the flight crew.

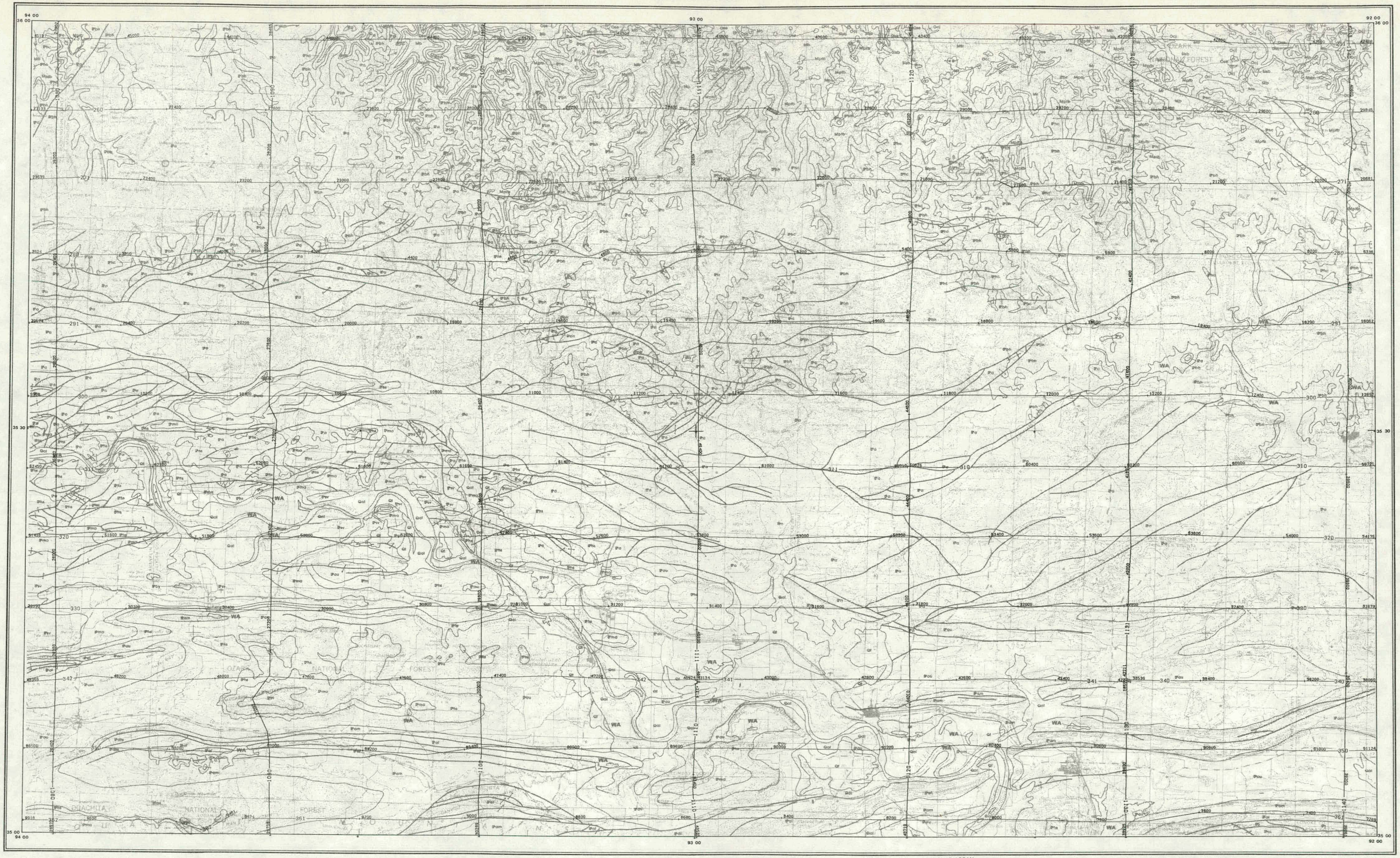
Total from May, 1980 for Russellville quadrangle - 109 miles.

Total miles for the included quadrangles:

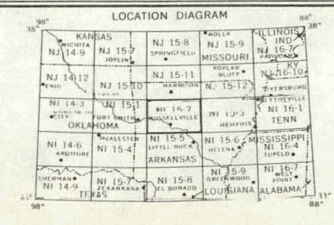
El Dorado	1,867
Greenwood	1,867
West Point	1,867
Helena	1,851
Fort Smith	1,834
Russellville	1,834
Memphis	1,834

APPENDIX C - Flight Path and Geologic Map

RUSSELLVILLE



SCALE 1:500,000



SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

FIDUCIAL NUMBER 123400 053-0 123600 LINE NUMBER

FLIGHT LINE SPACING .... 6.0 MILES
FLIGHT ALTITUDE .... 400 FEET AMT
FLOWN AND COMPILED 1980

FLIGHT PATH RECOVERY

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

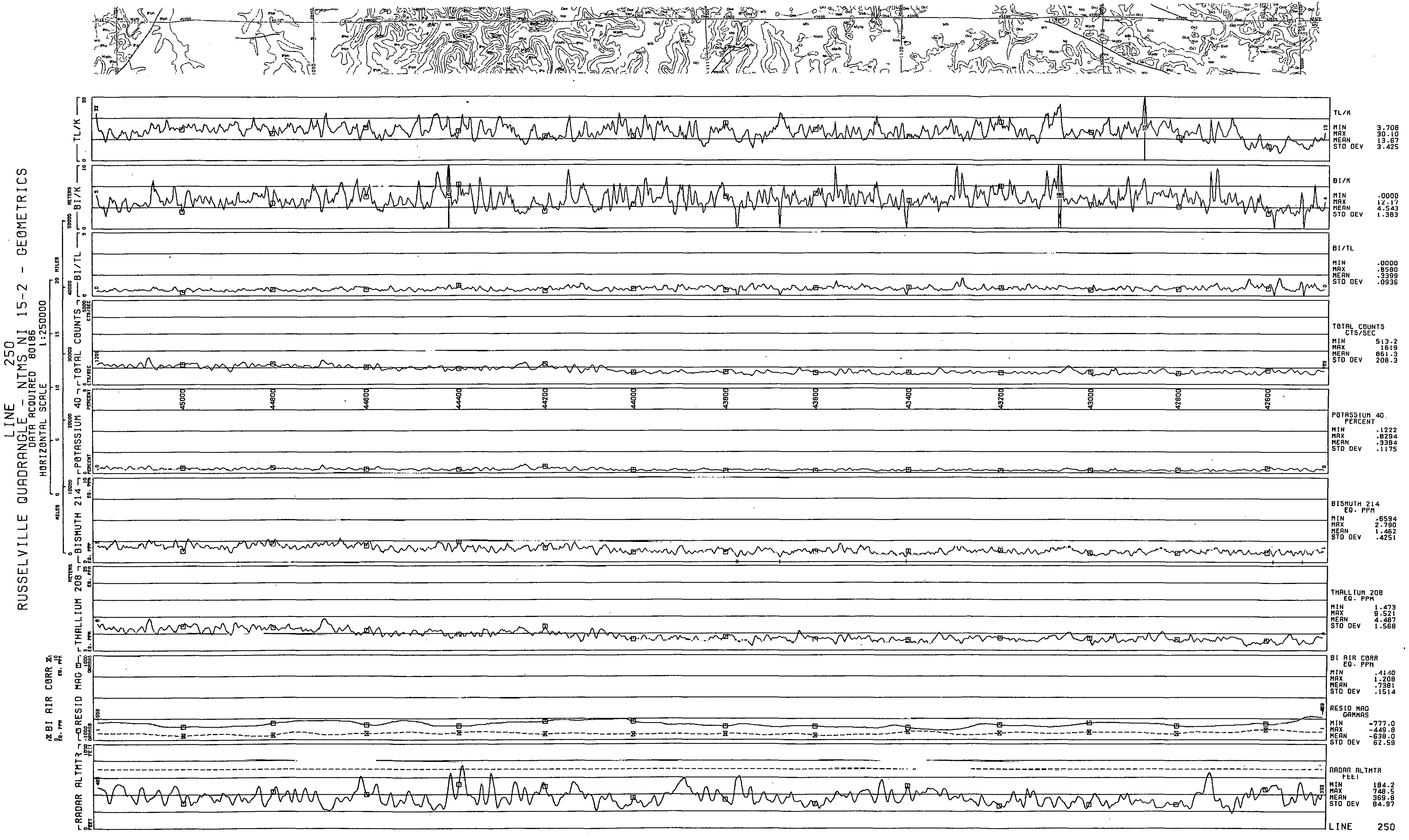
GEOLOGIC MAP EXPLANATION
RUSSELLVILLE QUADRANGLE
(from Martel Laboratories, 1980)

SEDIMENTARY ROCKS

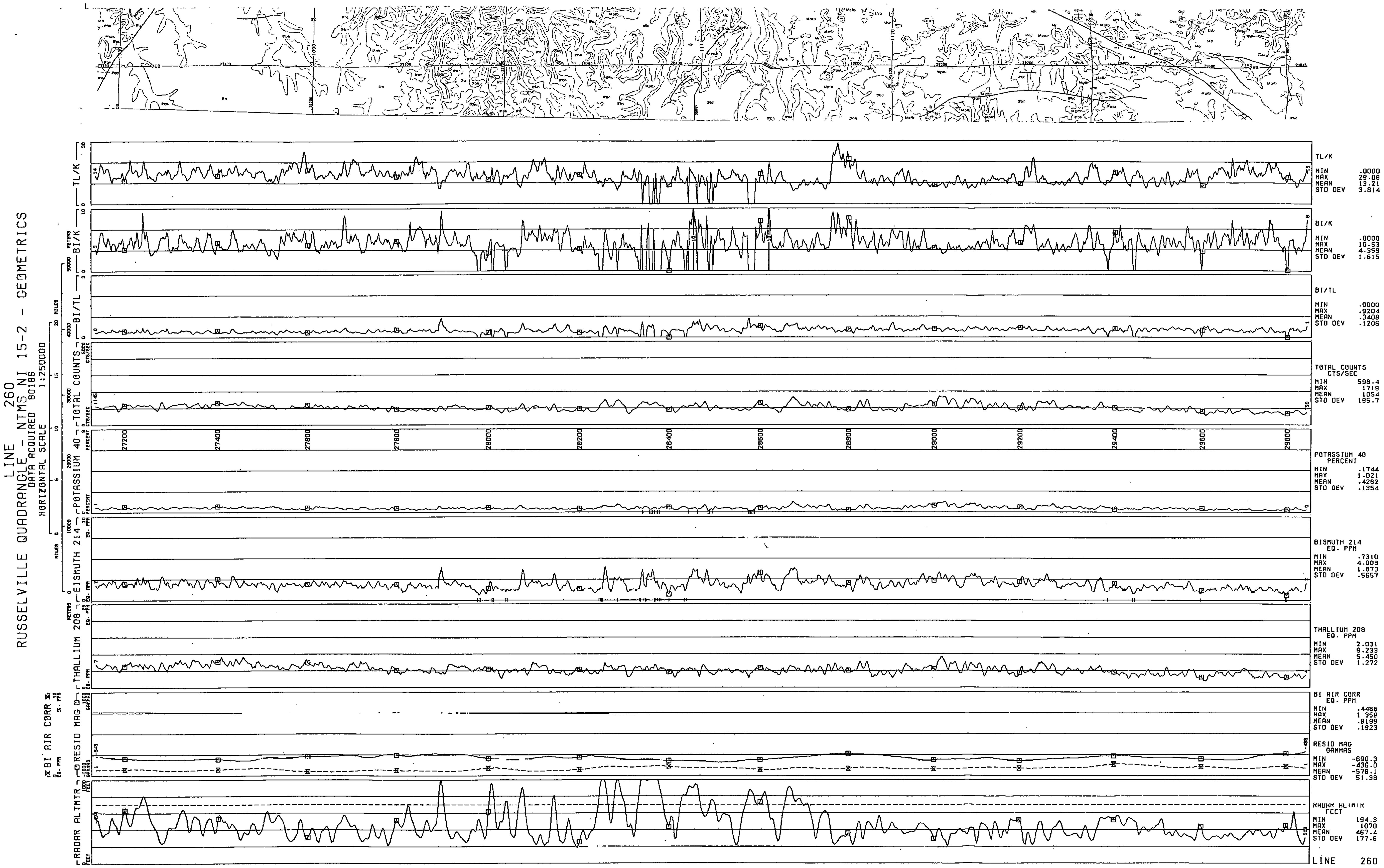
ERA			EPOCH	PERIOD
CENOZOIC	Qal	**ALLUVIUM**: ALLUVIAL DEPOSITS OF PRESENT STREAMS.	HOLOCENE	QUATERNARY
	Qt	**PLEISTOCENE TERRACE DEPOSITS**: ALLUVIAL DEPOSITS ON ONE OR MORE TERRACE LEVELS	PLEISTOCENE	
PALEOZOIC	IPby	BOGGY FORMATION		PENNSYLVANIAN
	IPsv	SAVANNA FORMATION		
	IPma	McALESTER FORMATION		
	IPhs	HARTSHORNE SANDSTONE		
	IPa	ATOKA FORMATION, UNDIVIDED		
	IPau	**UPPER ATOKA FORMATION**: MOSTLY LIMESTONE		
	IPam	**MIDDLE ATOKA FORMATION**: MOSTLY SANDSTONE		
	IPal	**LOWER ATOKA FORMATION**: MOSTLY SANDSTONE		
	IPbh	BLOYD SHALE AND PRAIRIE GROVE MEMBER OF THE HALE FORMATION		
	IPhc	CANE HILL MEMBER OF THE HALE FORMATION		
	IPj	JACKFORK SANDSTONE		
	Mpfb	PITKIN LIMESTONE, FAYETTEVILLE SHALE AND BATESVILLE SANDSTONE		MISSISSIPPIAN
	Mr	RUDDELL SHALE		
	Mb	BOONE FORMATION		
	Slsb	LAFFERTY, ST. CLAIR AND BRASSFIELD LIMESTONES		SILURIAN
	Ocj	CASON SHALE, FERNVALE LIMESTONE, KIMMSWICK LIMESTONE, PLATTIN LIMESTONE AND JOACHIM DOLOMITE		ORDOVICIAN
	Ose	ST. PETER SANDSTONE AND EVERTON FORMATION		

APPENDIX D - Profiles

D1r



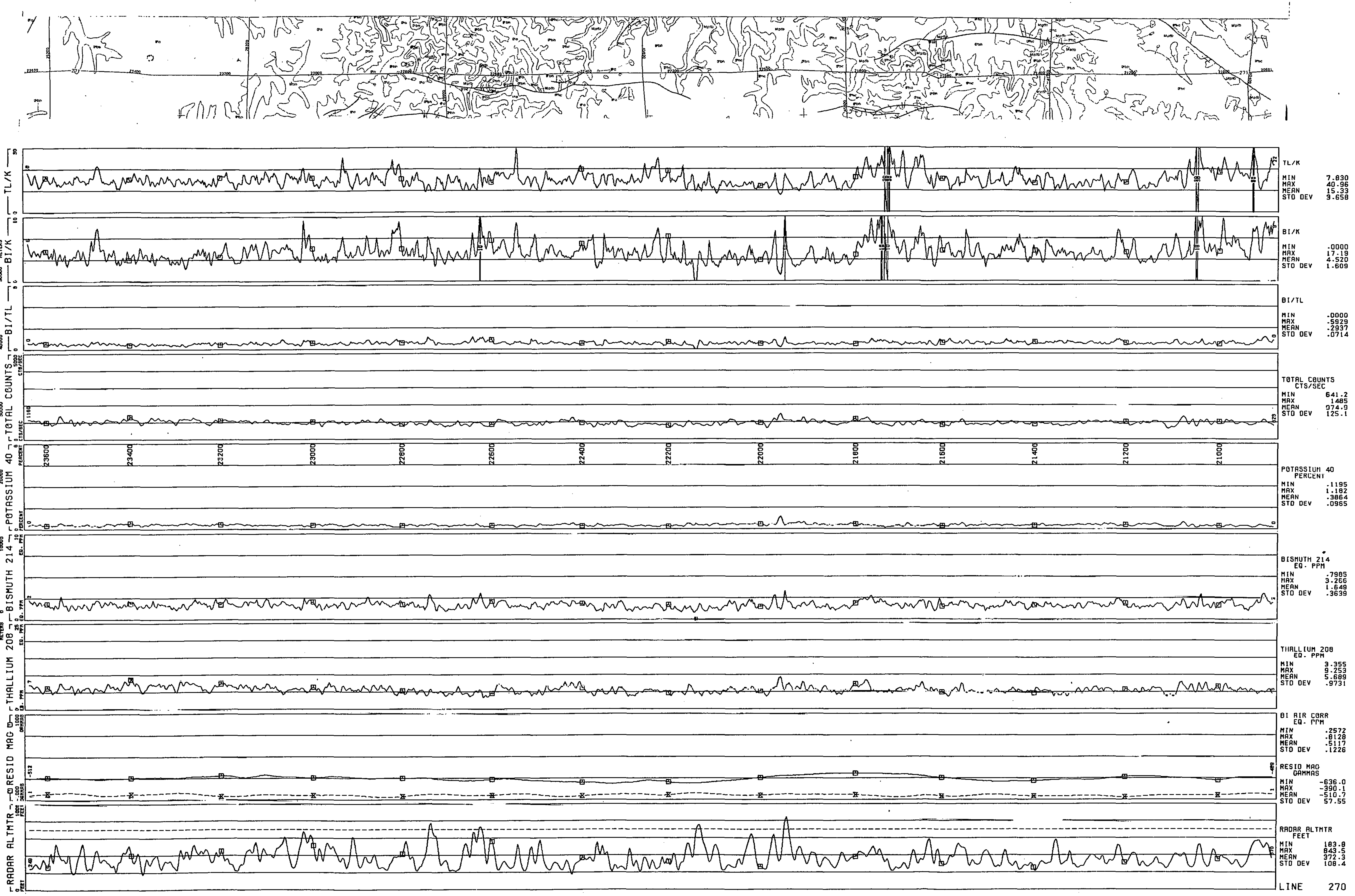
LINE 250
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80186
HORIZONTAL SCALE 1:250000
TL/K
MIN 3.708
MAX 30.10
MEAN 13.67
STD DEV 3.425
BI/K
MIN .0000
MAX 12.17
MEAN 4.543
STD DEV 1.383
BI/TL
MIN .0000
MAX .8580
MEAN .3399
STD DEV .0936
TOTAL COUNTS CTS/SEC
MIN 513.2
MAX 1619
MEAN 861.3
STD DEV 208.3
POTASSIUM 40 PERCENT
MIN .1222
MAX .8294
MEAN .3384
STD DEV .1175
BISMUTH 214 EQ. PPM
MIN .6594
MAX 2.790
MEAN 1.462
STD DEV .4251
THALLIUM 208 EQ. PPM
MIN 1.473
MAX 9.521
MEAN 4.487
STD DEV 1.568
BI AIR CORR EQ. PPM
MIN .4140
MAX 1.208
MEAN .7381
STD DEV .1514
RESID MAG GAMMAS
MIN -777.0
MAX -449.8
MEAN -638.0
STD DEV 62.59
RADAR ALTMTR FEET
MIN 184.2
MAX 748.5
MEAN 369.8
STD DEV 84.97
LINE 250

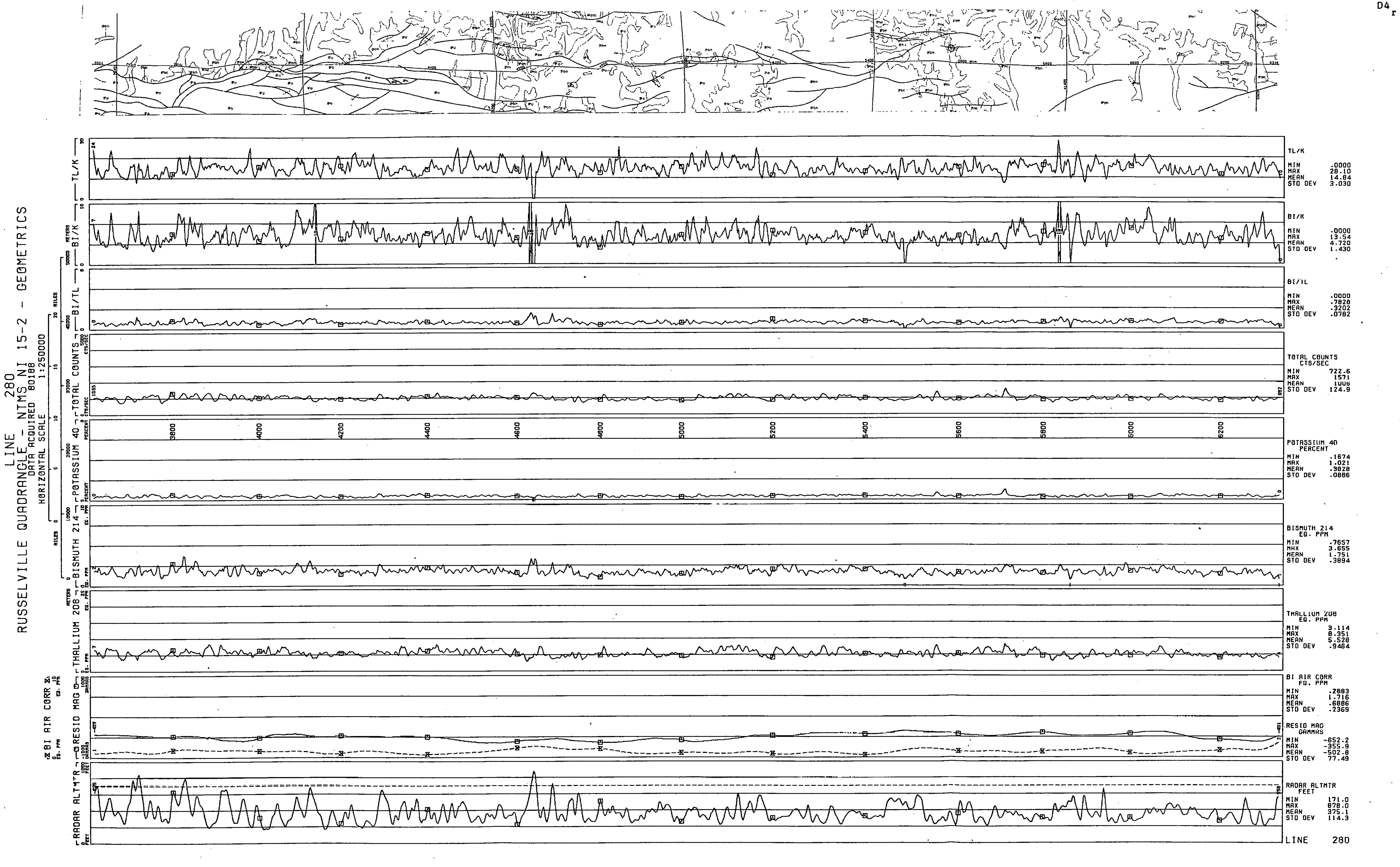


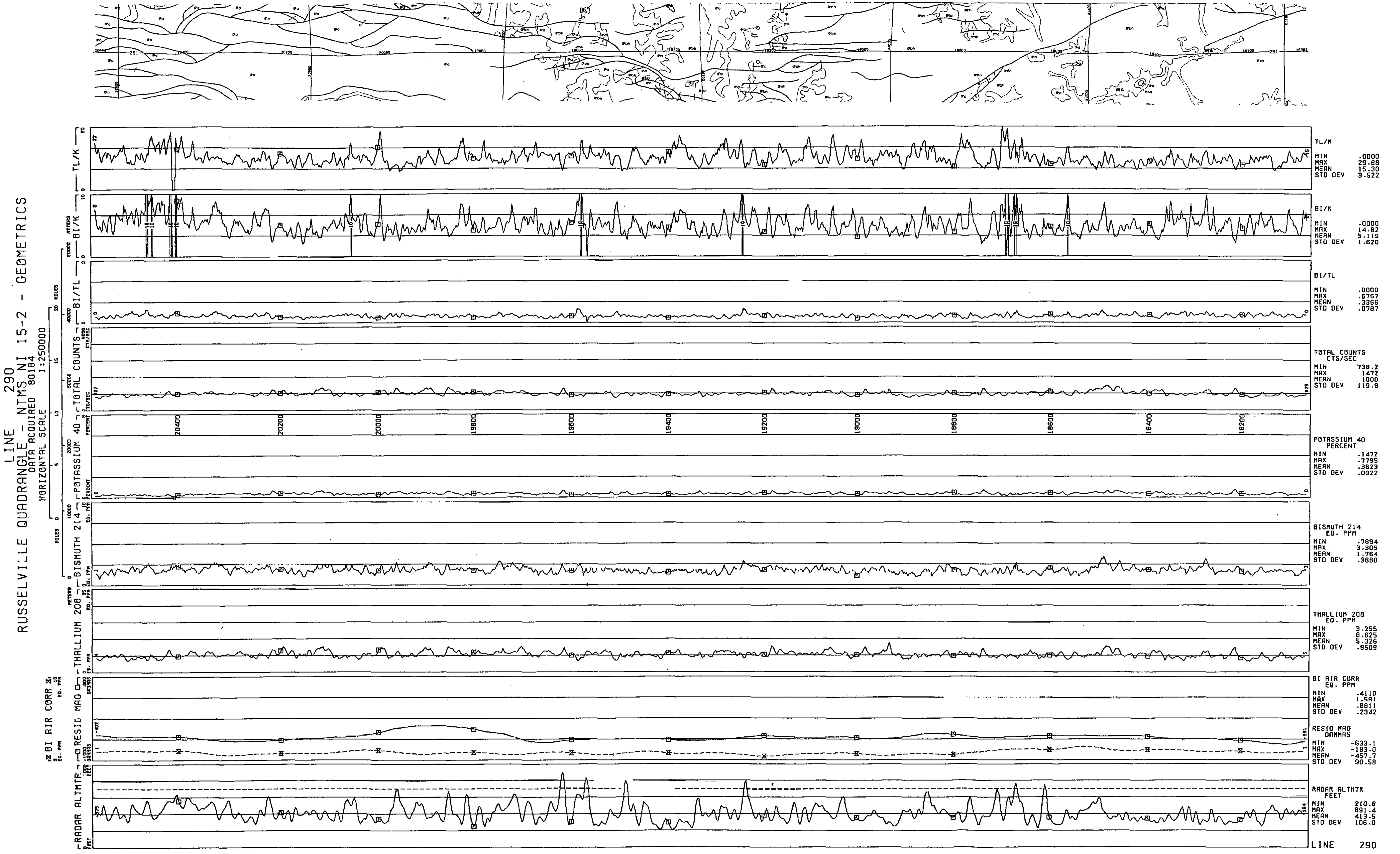
LINE 260
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80186
HORIZONTAL SCALE 1:250000
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
27200
27400
27600
27800
28000
28200
28400
28600
28800
29000
29200
29400
29600
29800
TL/K
MIN .0000
MAX 29.08
MEAN 13.21
STD DEV 3.814
BI/K
MIN .0000
MAX 10.53
MEAN 4.359
STD DEV 1.615
BI/TL
MIN .0000
MAX .9204
MEAN .3408
STD DEV .1206
TOTAL COUNTS CTS/SEC
MIN 598.4
MAX 1719
MEAN 1054
STD DEV 195.7
POTASSIUM 40 PERCENT
MIN .1744
MAX 1.021
MEAN .4262
STD DEV .1354
BISMUTH 214 EQ. PPM
MIN .7310
MAX 4.003
MEAN 1.873
STD DEV .5657
THALLIUM 208 EQ. PPM
MIN 2.031
MAX 9.233
MEAN 5.450
STD DEV 1.272
BI AIR CORR EQ. PPM
MIN .4466
MAX 1.359
MEAN .8199
STD DEV .1923
RESID MAG GAMMAS
MIN -690.3
MAX -436.0
MEAN -578.1
STD DEV 51.38
RADAR ALTMTR FEET
MIN 194.3
MAX 1070
MEAN 467.4
STD DEV 177.6
LINE 260

D3r

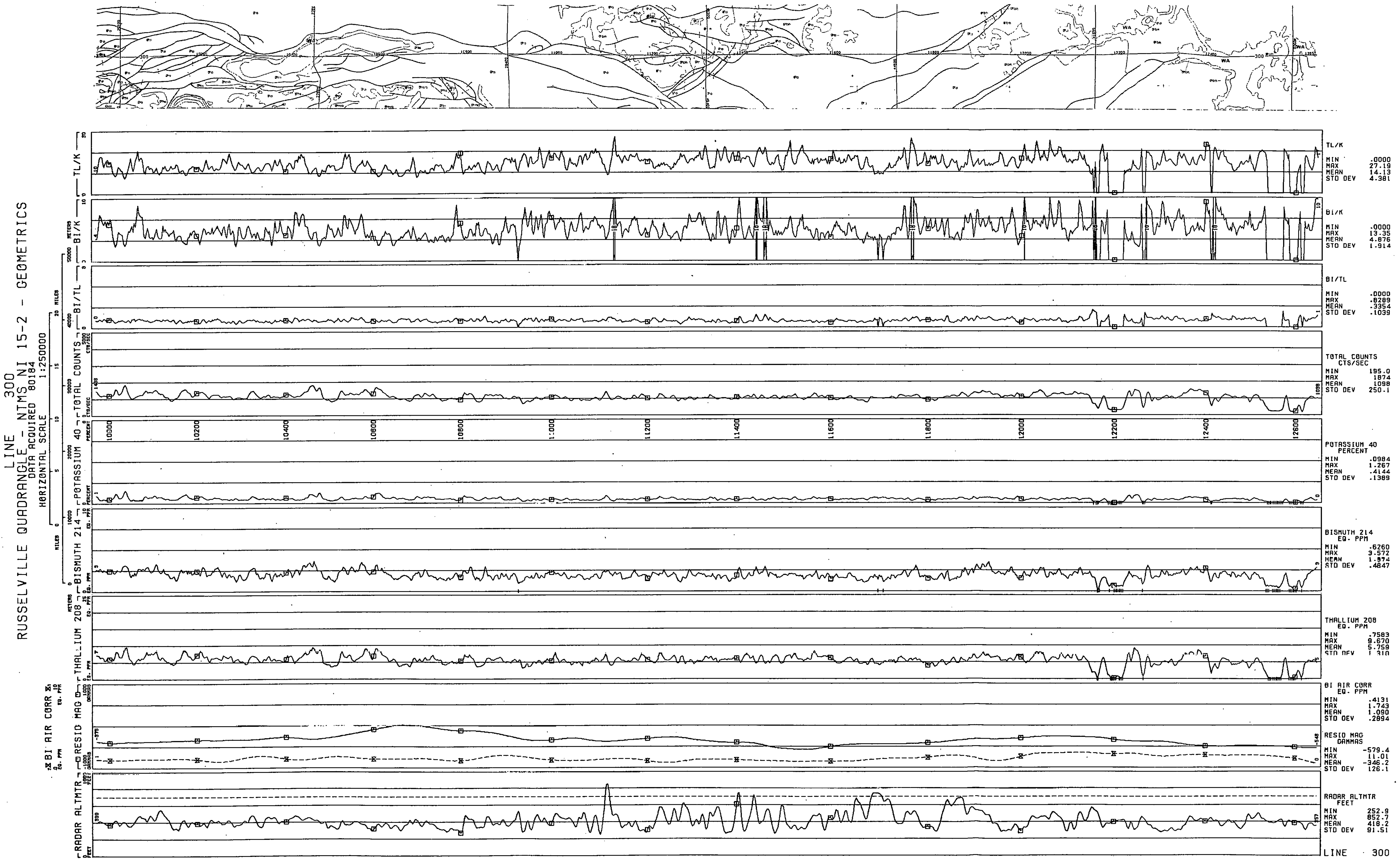
LINE 270
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80188
HORIZONTAL SCALE 1:250000



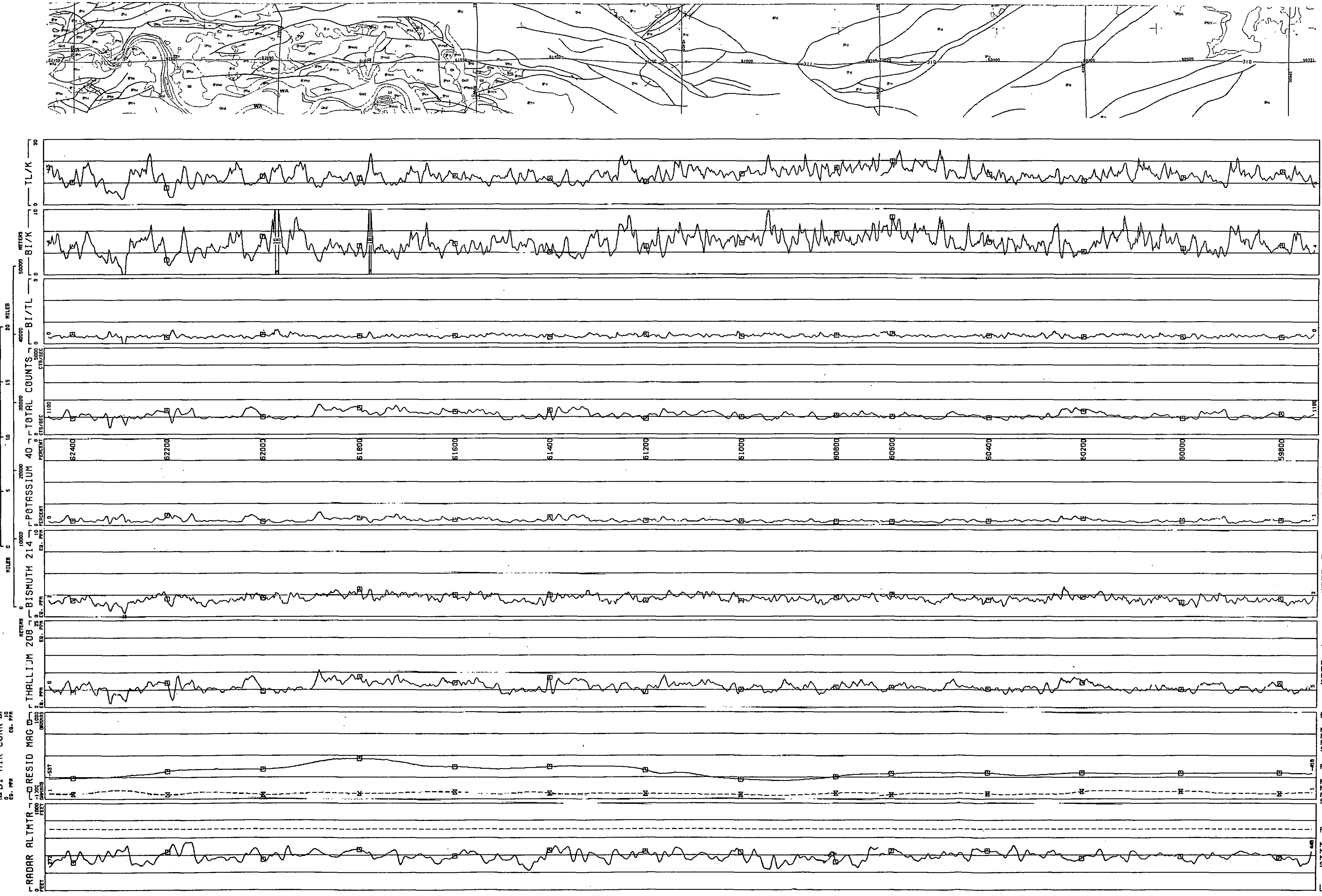

LINE 280
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80108
HORIZONTAL SCALE 1:250000
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
3800
4000
4200
4400
4600
4800
5000
5200
5400
5600
5800
6000
6200
TL/K
MIN .0000
MAX 28.10
MEAN 14.84
STD DEV 3.030
BI/K
MIN .0000
MAX 13.54
MEAN 4.720
STD DEV 1.430
BI/TL
MIN .0000
MAX .7828
MEAN .3202
STD DEV .0782
TOTAL COUNTS
CTS/SEC
MIN 722.6
MAX 1571
MEAN 1006
STD DEV 124.9
POTASSIUM 40
PERCENT
MIN .1674
MAX 1.021
MEAN .9828
STD DEV .0886
BISMUTH 214
EQ. PPM
MIN .7657
MAX 3.655
MEAN 1.751
STD DEV .3894
THALLIUM 208
EQ. PPM
MIN 3.114
MAX 8.351
MEAN 5.528
STD DEV .9464
BI AIR CORR
EQ. PPM
MIN .2883
MAX 1.716
MEAN .6886
STD DEV .2369
RESID MAG
GAMMAS
MIN -652.2
MAX -355.9
MEAN -502.8
STD DEV 77.49
RADAR ALTMTR
FEET
MIN 171.0
MAX 878.0
MEAN 375.1
STD DEV 114.3
LINE 280


LINE 290
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80184
HORIZONTAL SCALE 1:250000
TL/K
MIN .0000
MAX 29.88
MEAN 15.30
STD DEV 9.522
BI/K
MIN .0000
MAX 14.82
MEAN 5.119
STD DEV 1.620
BI/TL
MIN .0000
MAX .6767
MEAN .3366
STD DEV .0787
TOTAL COUNTS CTS/SEC
MIN 738.2
MAX 1472
MEAN 1000
STD DEV 119.8
POTASSIUM 40 PERCENT
MIN .1472
MAX .7795
MEAN .3623
STD DEV .0922
BISMUTH 214 EQ. PPM
MIN .7894
MAX 3.305
MEAN 1.764
STD DEV .9880
THALLIUM 208 EQ. PPM
MIN 3.255
MAX 8.625
MEAN 5.326
STD DEV .8509
BI AIR CORR EQ. PPM
MIN .4110
MAX 1.581
MEAN .8811
STD DEV .2342
RESID MAG GAMMAS
MIN -633.1
MAX -183.0
MEAN -457.7
STD DEV 90.58
RADAR ALTMTR FEET
MIN 210.8
MAX 691.4
MEAN 413.5
STD DEV 106.0
LINE 290

D6r


LINE 300
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80184
HORIZONTAL SCALE 1:250000
10000
10200
10400
10600
10800
11000
11200
11400
11600
11800
12000
12200
12400
12600
TL/K
MIN .0000
MAX 27.19
MEAN 14.13
STD DEV 4.381
BI/K
MIN .0000
MAX 13.35
MEAN 4.876
STD DEV 1.914
BI/TL
MIN .0000
MAX .8289
MEAN .3354
STD DEV .1039
TOTAL COUNTS
CTS/SEC
MIN 195.0
MAX 1874
MEAN 1098
STD DEV 250.1
POTASSIUM 40
PERCENT
MIN .0984
MAX 1.267
MEAN .4144
STD DEV .1389
BISMUTH 214
EQ. PPM
MIN .6260
MAX 3.572
MEAN 1.974
STD DEV .4847
THALLIUM 208
EQ. PPM
MIN .7583
MAX 9.670
MEAN 5.759
STD DEV 1.310
BI AIR CORR
EQ. PPM
MIN .4131
MAX 1.743
MEAN 1.090
STD DEV .2894
RESID MAG
GAMMAS
MIN -579.4
MAX 11.01
MEAN -346.2
STD DEV 126.1
RADAR ALTMTR
FEET
MIN 252.9
MAX 852.7
MEAN 418.2
STD DEV 91.51
LINE 300

LINE 310
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80187
HORIZONTAL SCALE 1:250000



TL/K

MIN	2.465
MAX	25.17
MEAN	13.59
STD DEV	3.288

BI/K

MIN	.0000
MAX	10.83
MEAN	4.763
STD DEV	1.493

BI/TL

MIN	.0000
MAX	.6495
MEAN	.3486
STD DEV	.0649

TOTAL COUNTS
CTS/SEC

MIN	409.8
MAX	1736
MEAN	1126
STD DEV	189.9

POTASSIUM 40
PERCENT

MIN	.1894
MAX	1.206
MEAN	.4699
STD DEV	.1669

BISMUTH 214
EQ. PPM

MIN	.6494
MAX	3.401
MEAN	2.061
STD DEV	.3985

THALLIUM 208
EQ. PPM

MIN	1.232
MAX	10.40
MEAN	5.990
STD DEV	1.259

BI AIR CORR
EQ. PPM

MIN	.3249
MAX	.9894
MEAN	.6371
STD DEV	.1333

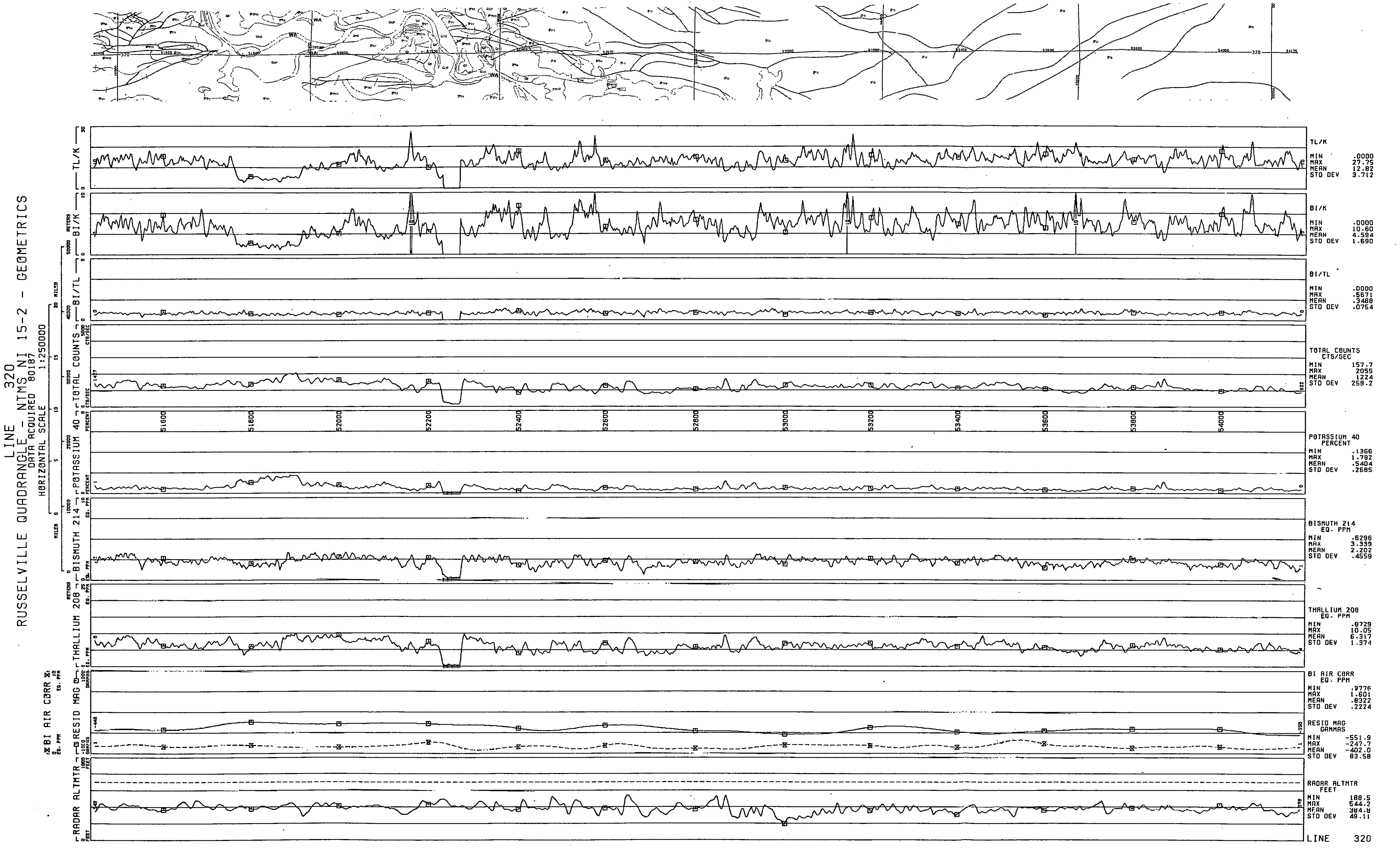
RESID MAG
GAMMAS

MIN	-587.5
MAX	-75.96
MEAN	-375.0
STD DEV	117.3

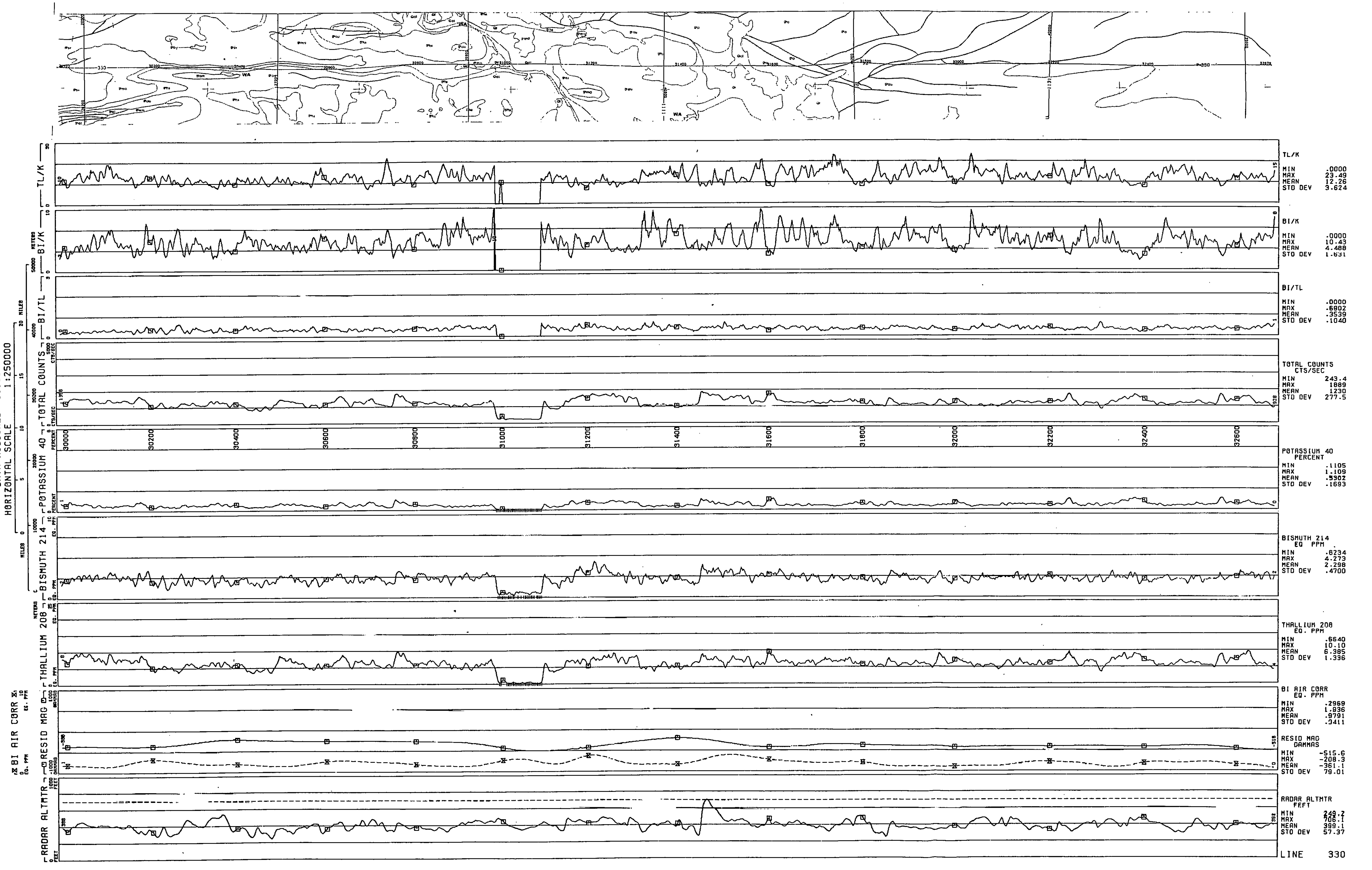
RADAR ALTMTR
FEET

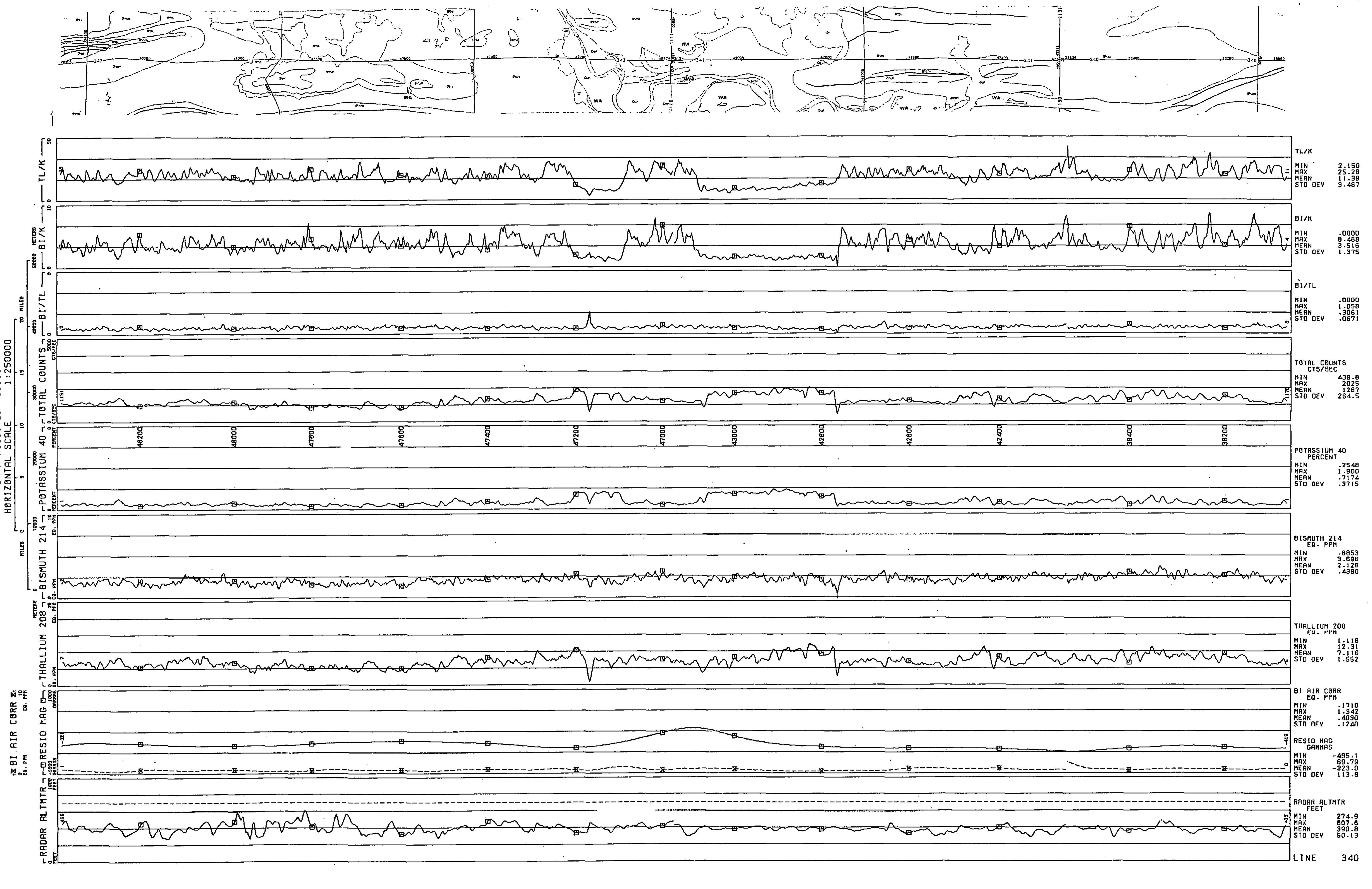
MIN	225.3
MAX	553.7
MEAN	389.1
STD DEV	53.42

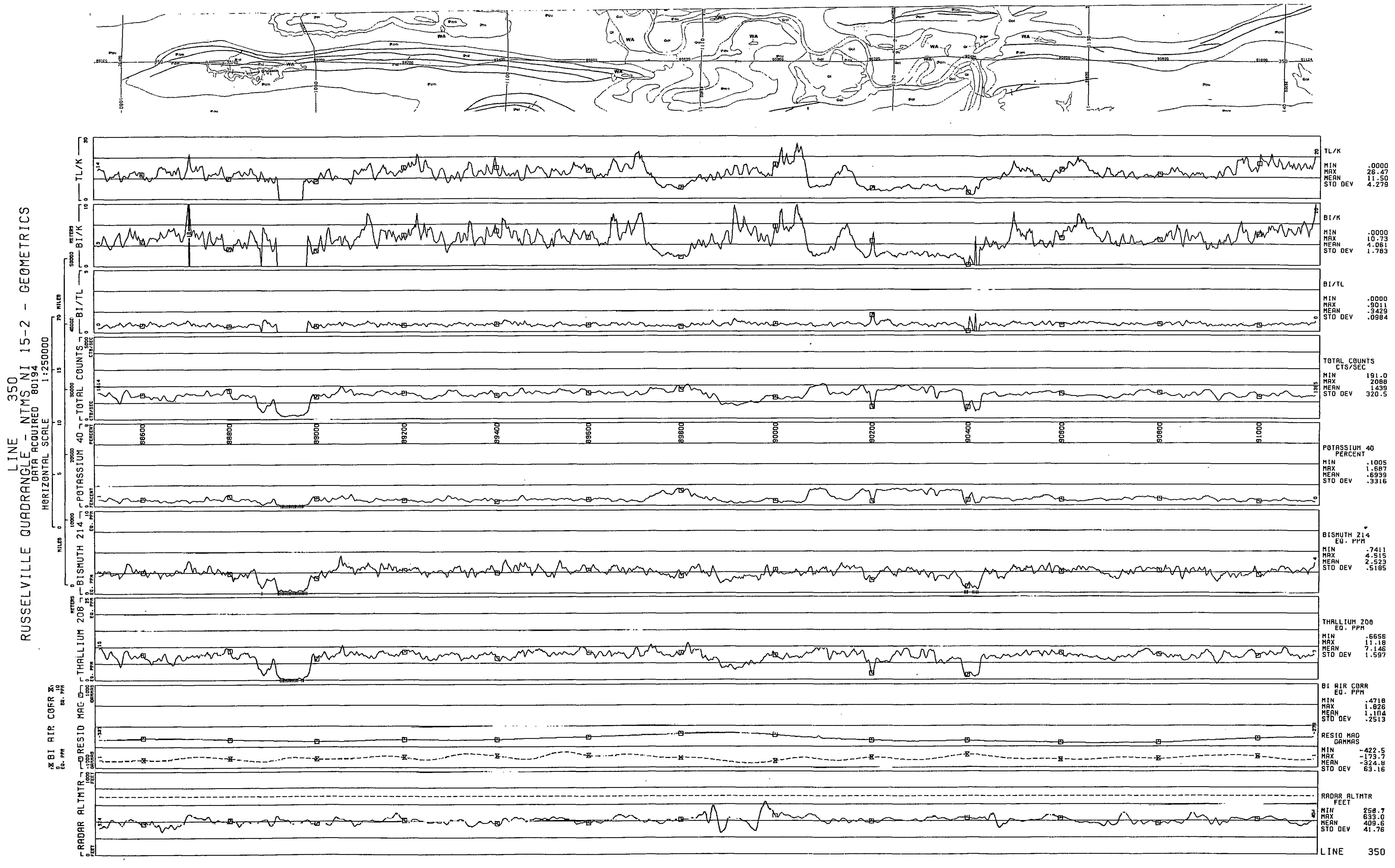
LINE 310

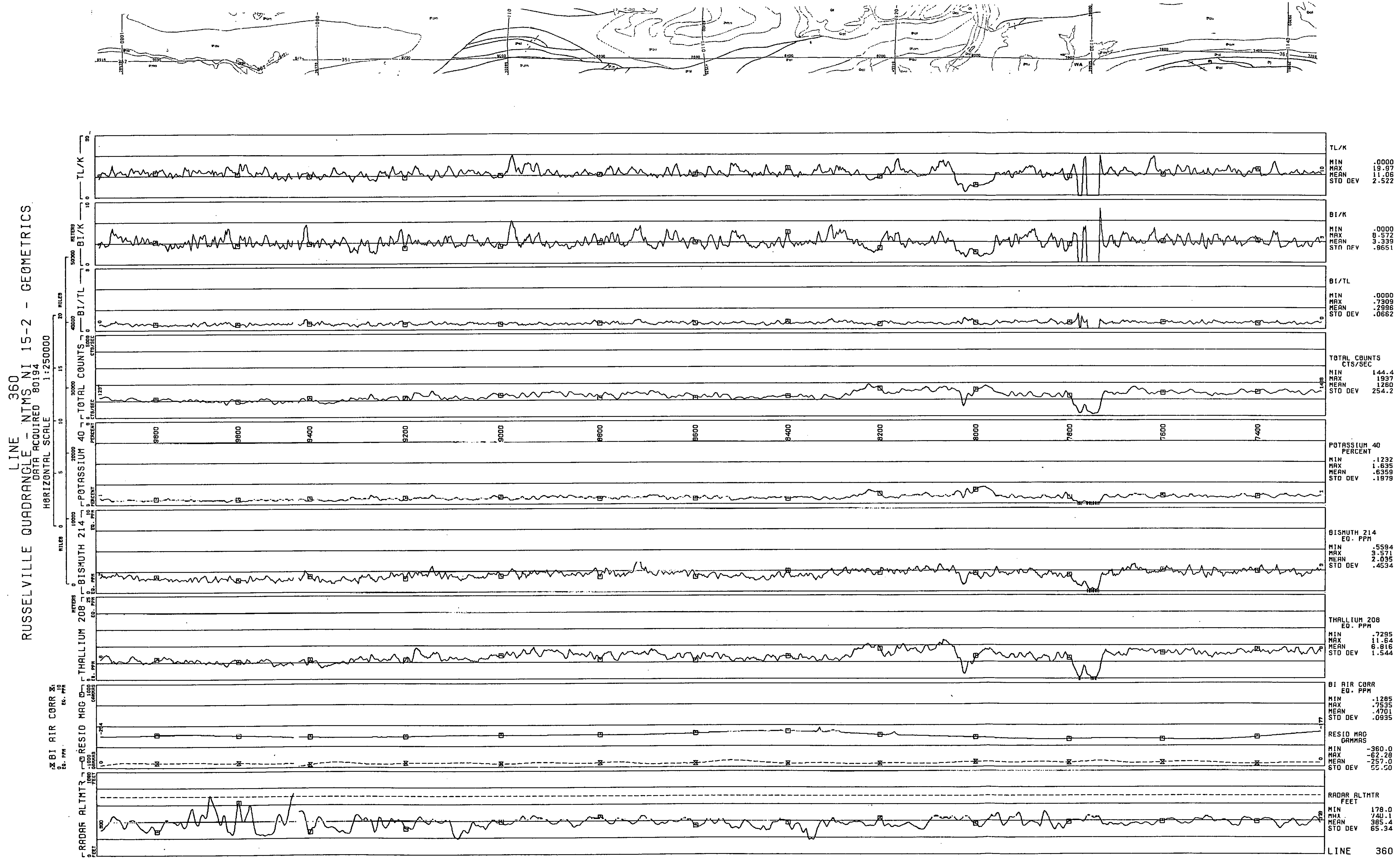

LINE 320
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80107
HORIZONTAL SCALE 1:250000
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
51600
51800
52000
52200
52400
52600
52800
53000
53200
53400
53600
53800
54000
TL/K
MIN .0000
MAX 27.75
MEAN 12.82
STD DEV 3.712
BI/K
MIN .0000
MAX 10.60
MEAN 4.594
STD DEV 1.690
BI/TL
MIN .0000
MAX .5671
MEAN .3488
STD DEV .0754
TOTAL COUNTS CTS/SEC
MIN 157.7
MAX 2055
MEAN 1224
STD DEV 258.2
POTASSIUM 40 PERCENT
MIN .1366
MAX 1.792
MEAN .5404
STD DEV .2685
BISMUTH 214 EQ. PPM
MIN .6296
MAX 3.339
MEAN 2.202
STD DEV .4559
THALLIUM 208 EQ. PPM
MIN .8729
MAX 10.05
MEAN 6.317
STD DEV 1.374
BI AIR CORR EQ. PPM
MIN .9776
MAX 1.601
MEAN .8322
STD DEV .2224
RESID MAG GAMMAS
MIN -551.9
MAX -247.7
MEAN -402.0
STD DEV 83.58
RADAR ALTMTR FEET
MIN 188.5
MAX 644.2
MEAN 384.8
STD DEV 49.11
LINE 320

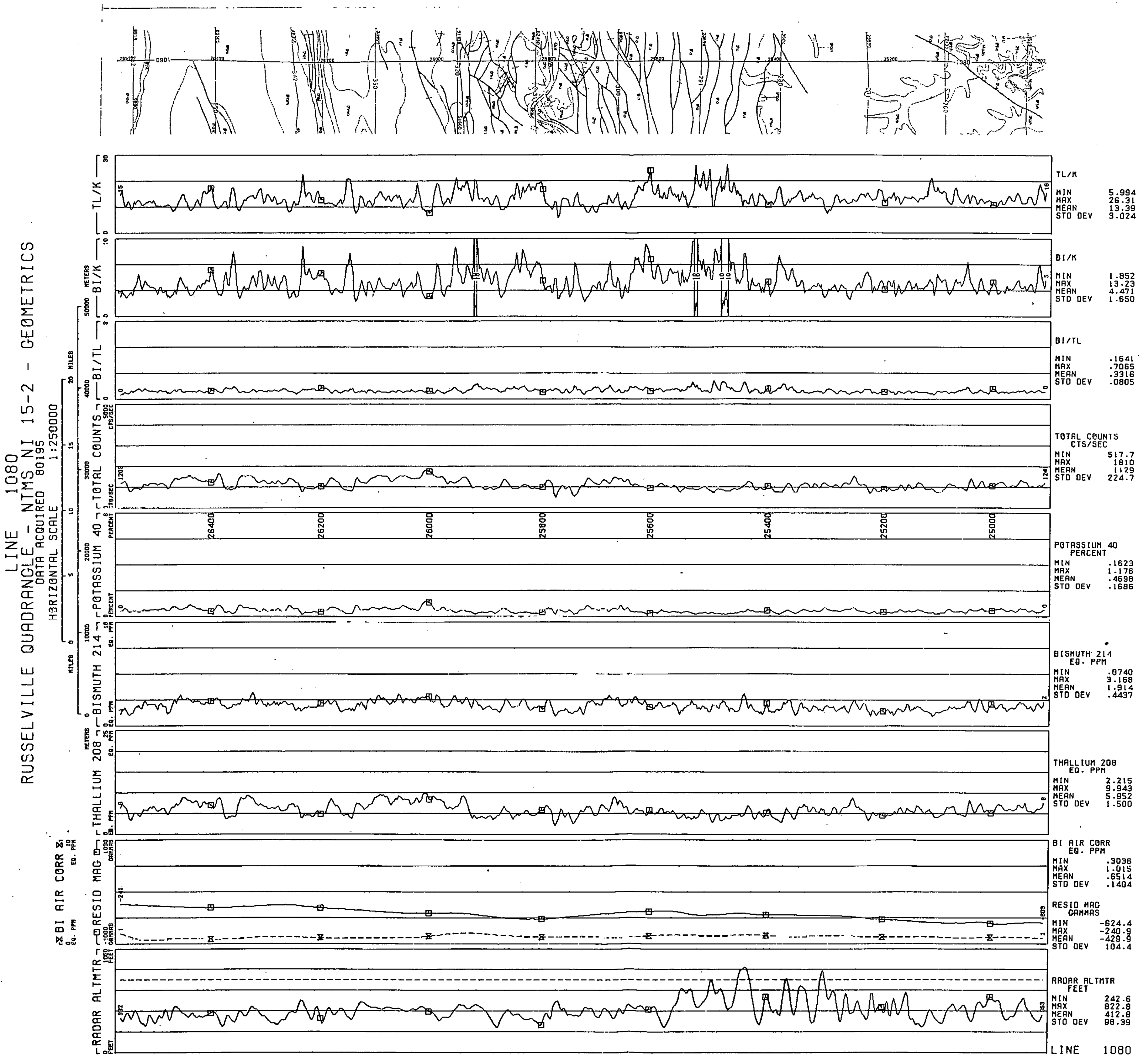
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
LINE 330
DATA ACQUIRED 80189
HORIZONTAL SCALE 1:250000



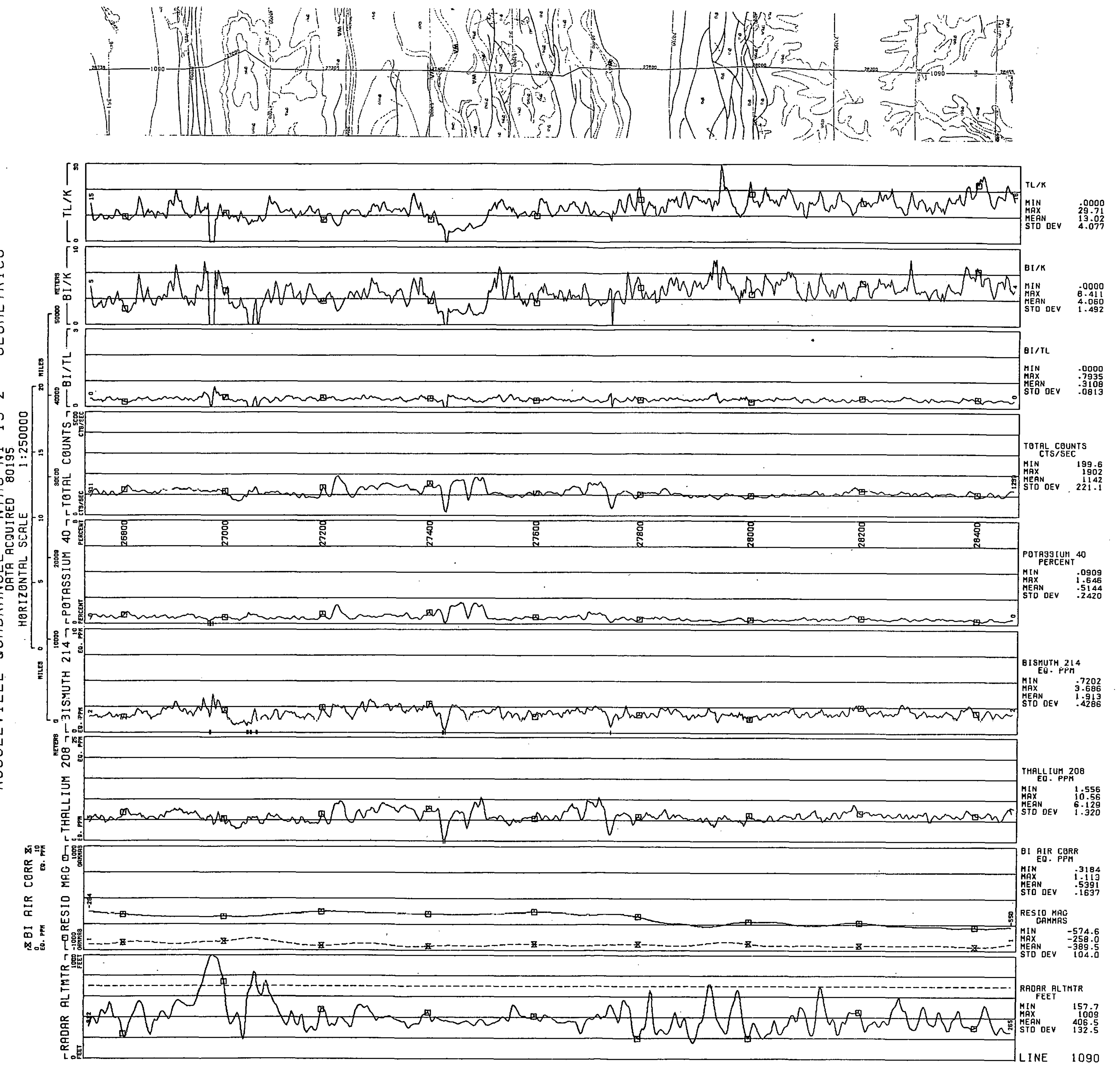

RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
LINE 340
DATA ACQUIRED 80189
HORIZONTAL SCALE 1:250000
TL/K
MIN 2.150
MAX 25.28
MEAN 11.38
STD DEV 3.467
BI/K
MIN .0000
MAX 8.488
MEAN 3.516
STD DEV 1.375
BI/TL
MIN .0000
MAX 1.058
MEAN .3061
STD DEV .0671
TOTAL COUNTS CTS/SEC
MIN 438.8
MAX 2025
MEAN 1287
STD DEV 264.5
POTASSIUM 40 PERCENT
MIN .2548
MAX 1.900
MEAN .7174
STD DEV .3715
BISMUTH 214 EQ. PPM
MIN .8853
MAX 3.696
MEAN 2.128
STD DEV .4380
THALLIUM 208 EQ. PPM
MIN 1.118
MAX 12.31
MEAN 7.116
STD DEV 1.552
BI AIR CORR EQ. PPM
MIN .1710
MAX 1.342
MEAN .4030
STD DEV .1740
RESID MAG GAMMAS
MIN -485.1
MAX 69.79
MEAN -323.0
STD DEV 113.8
RADAR ALTMTR FEET
MIN 274.8
MAX 607.6
MEAN 390.8
STD DEV 50.13
LINE 340

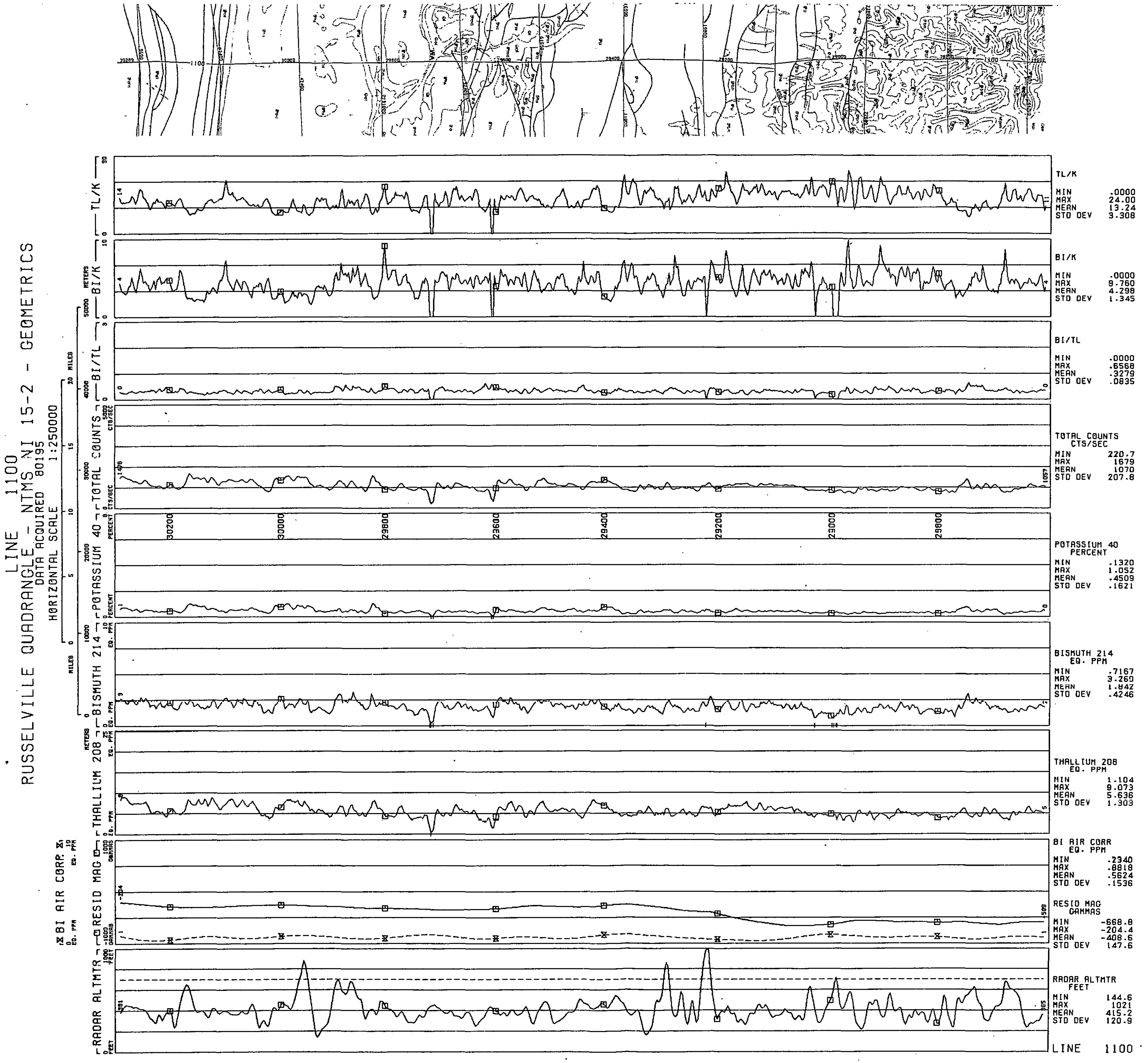

LINE 350
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80194
HORIZONTAL SCALE 1:250000
88600
88800
89000
89200
89400
89600
89800
90000
90200
90400
90600
90800
91000
TL/K
MIN .0000
MAX 26.47
MEAN 11.50
STD DEV 4.279
BI/K
MIN .0000
MAX 10.73
MEAN 4.061
STD DEV 1.783
BI/TL
MIN .0000
MAX .9011
MEAN .3429
STD DEV .0984
TOTAL COUNTS
CTS/SEC
MIN 191.0
MAX 2088
MEAN 1439
STD DEV 320.5
POTASSIUM 40
PERCENT
MIN .1005
MAX 1.687
MEAN .6939
STD DEV .3316
BISMUTH 214
EQ. PPM
MIN .7411
MAX 4.515
MEAN 2.523
STD DEV .5185
THALLIUM 208
EQ. PPM
MIN .6656
MAX 11.18
MEAN 7.146
STD DEV 1.597
BI AIR CORR
EQ. PPM
MIN .4718
MAX 1.826
MEAN 1.104
STD DEV .2513
RESID MAG
GAMMAS
MIN -422.5
MAX -173.7
MEAN -324.8
STD DEV 63.16
RADAR ALTMTR
FEET
MIN 258.7
MAX 633.0
MEAN 409.6
STD DEV 41.76
LINE 350


LINE 360
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80194
HORIZONTAL SCALE 1:250000
TL/K
MIN .0000
MAX 19.97
MEAN 11.06
STD DEV 2.522
BI/K
MIN .0000
MAX 8.572
MEAN 3.339
STD DEV .8651
BI/TL
MIN .0000
MAX .7309
MEAN .2996
STD DEV .0662
TOTAL COUNTS CTS/SEC
MIN 144.4
MAX 1937
MEAN 1260
STD DEV 254.2
POTASSIUM 40 PERCENT
MIN .1232
MAX 1.635
MEAN .6359
STD DEV .1979
BISMUTH 214 EQ. PPM
MIN .5594
MAX 3.571
MEAN 2.035
STD DEV .4534
THALLIUM 208 EQ. PPM
MIN .7295
MAX 11.64
MEAN 6.816
STD DEV 1.544
BI AIR CORR EQ. PPM
MIN .1285
MAX .7535
MEAN .4701
STD DEV .0935
RESID MAG GAMMAS
MIN -360.0
MAX -62.28
MEAN -257.0
STD DEV 55.50
RADAR ALTMTR FEET
MIN 178.0
MAX 740.1
MEAN 385.4
STD DEV 65.34
LINE 360
9800 9600 9400 9200 9000 8800 8600 8400 8200 8000 7800 7600 7400


LINE 1080
RUSSELVILLE QUADRANGLE - NIMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80195
HORIZONTAL SCALE 1:250000
TL/K
MIN 5.994
MAX 26.31
MEAN 13.39
STD DEV 3.024
BI/K
MIN 1.852
MAX 13.23
MEAN 4.471
STD DEV 1.650
BI/TL
MIN .1641
MAX .7065
MEAN .3316
STD DEV .0805
TOTAL COUNTS
CTS/SEC
MIN 517.7
MAX 1810
MEAN 1129
STD DEV 224.7
POTASSIUM 40
PERCENT
MIN .1623
MAX 1.176
MEAN .4698
STD DEV .1686
BISMUTH 214
EQ. PPM
MIN .8740
MAX 3.168
MEAN 1.914
STD DEV .4437
THALLIUM 208
EQ. PPM
MIN 2.215
MAX 9.943
MEAN 5.952
STD DEV 1.500
BI AIR CORR
EQ. PPM
MIN .3036
MAX 1.015
MEAN .6514
STD DEV .1404
RESID MAG
GAMMAS
MIN -624.4
MAX -240.9
MEAN -429.9
STD DEV 104.4
RADAR ALTMTR
FEET
MIN 242.6
MAX 822.8
MEAN 412.8
STD DEV 98.39
LINE 1080

LINE 1090
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80195
HORIZONTAL SCALE 1:250000



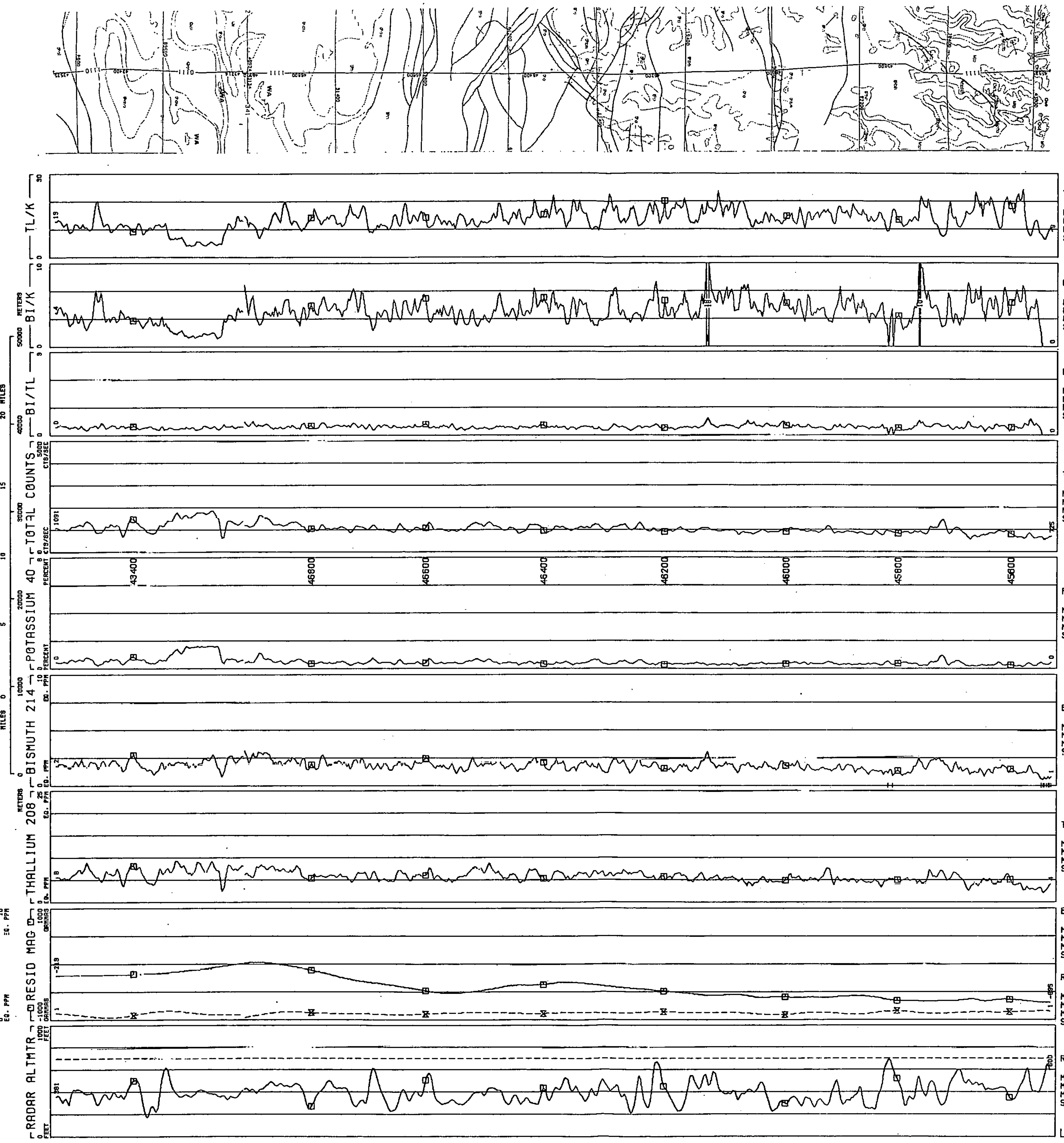

LINE 1100
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80195
HORIZONTAL SCALE 1:250000
TL/K
MIN .0000
MAX 24.00
MEAN 13.24
STD DEV 3.308
BI/K
MIN .0000
MAX 9.760
MEAN 4.298
STD DEV 1.345
BI/TL
MIN .0000
MAX .6568
MEAN .3279
STD DEV .0835
TOTAL COUNTS CTS/SEC
MIN 220.7
MAX 1679
MEAN 1070
STD DEV 207.8
POTASSIUM 40 PERCENT
MIN .1320
MAX 1.052
MEAN .4509
STD DEV .1621
BISMUTH 214 EQ. PPM
MIN .7167
MAX 3.260
MEAN 1.842
STD DEV .4246
THALLIUM 208 EQ. PPM
MIN 1.104
MAX 9.073
MEAN 5.636
STD DEV 1.303
BI AIR CORR EQ. PPM
MIN .2340
MAX .8818
MEAN .5624
STD DEV .1536
RESID MAG GAMMAS
MIN -668.8
MAX -204.4
MEAN -408.6
STD DEV 147.6
RADAR ALTMTR FEET
MIN 144.6
MAX 1021
MEAN 415.2
STD DEV 120.9
LINE 1100
30200
30000
29800
29600
29400
29200
29000
28800

LINE 1110

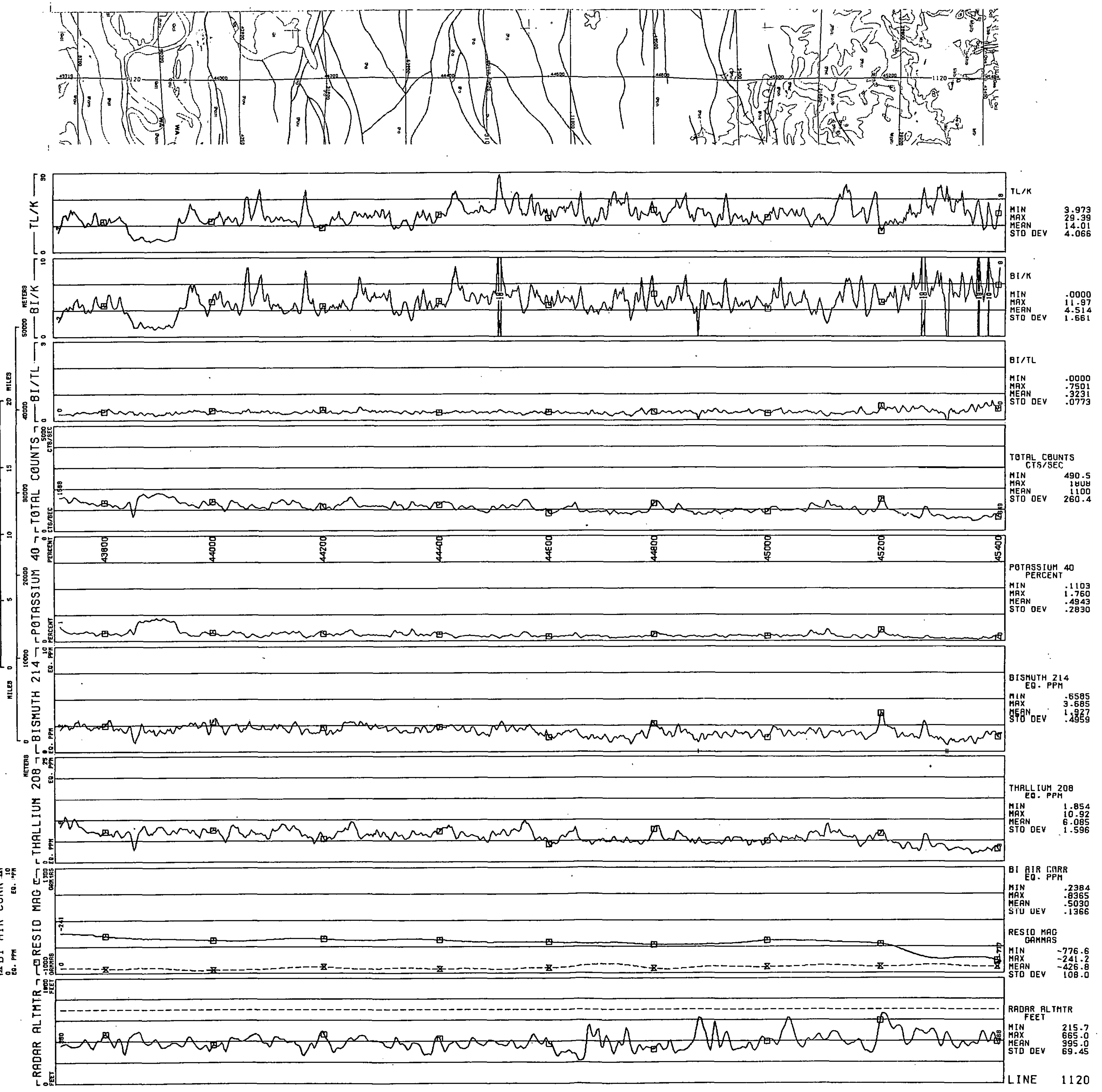
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS

DATA ACQUIRED 80189

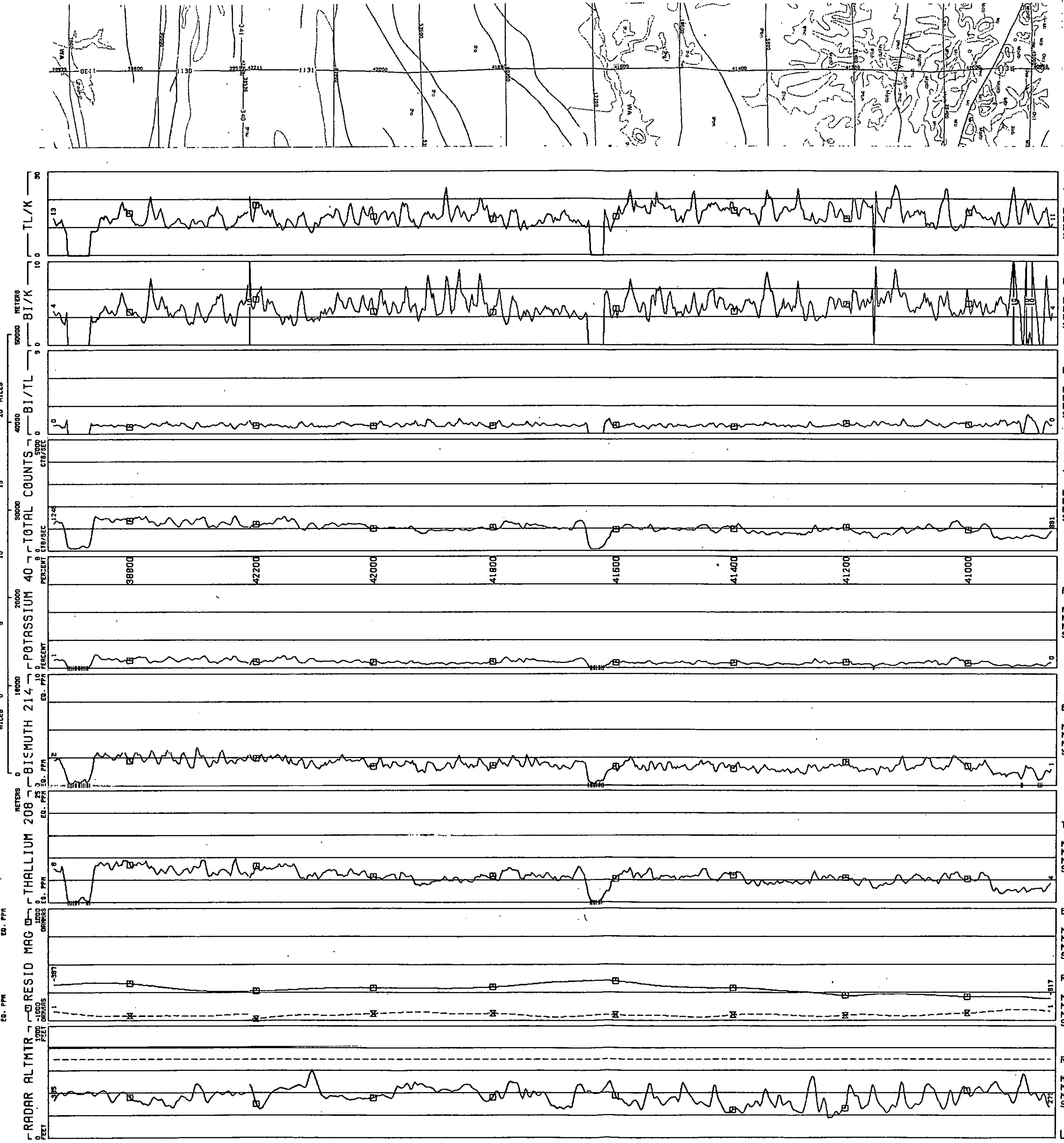
HORIZONTAL SCALE 1:250000



LINE 1120
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80189
HORIZONTAL SCALE 1:250000



LINE 1130
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80189
HORIZONTAL SCALE 1:250000



TL/K
MIN .0000
MAX 25.11
MEAN 13.71
STD DEV 4.144

BI/K
MIN .0000
MAX 11.48
MEAN 4.386
STD DEV 1.665

BI/TL
MIN .0000
MAX .6859
MEAN .3092
STD DEV .0938

TOTAL COUNTS CTS/SEC
MIN 85.17
MAX 1587
MEAN 1010
STD DEV 285.0

POTASSIUM 40 PERCENT
MIN .0907
MAX .9898
MEAN .4332
STD DEV .1601

BISMUTH 214 EQ. PPM
MIN .6300
MAX 3.356
MEAN 1.870
STD DEV .4816

THALLIUM 208 EQ. PPM
MIN .6724
MAX 9.803
MEAN 5.822
STD DEV 1.593

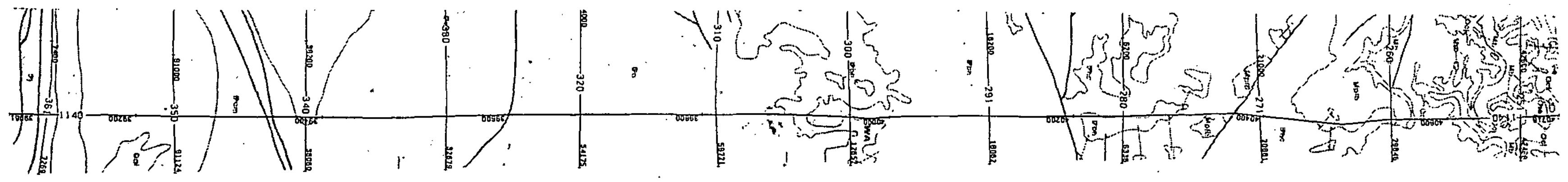
BI AIR CORR EQ. PPM
MIN .0818
MAX .9403
MEAN .4850
STD DEV .1560

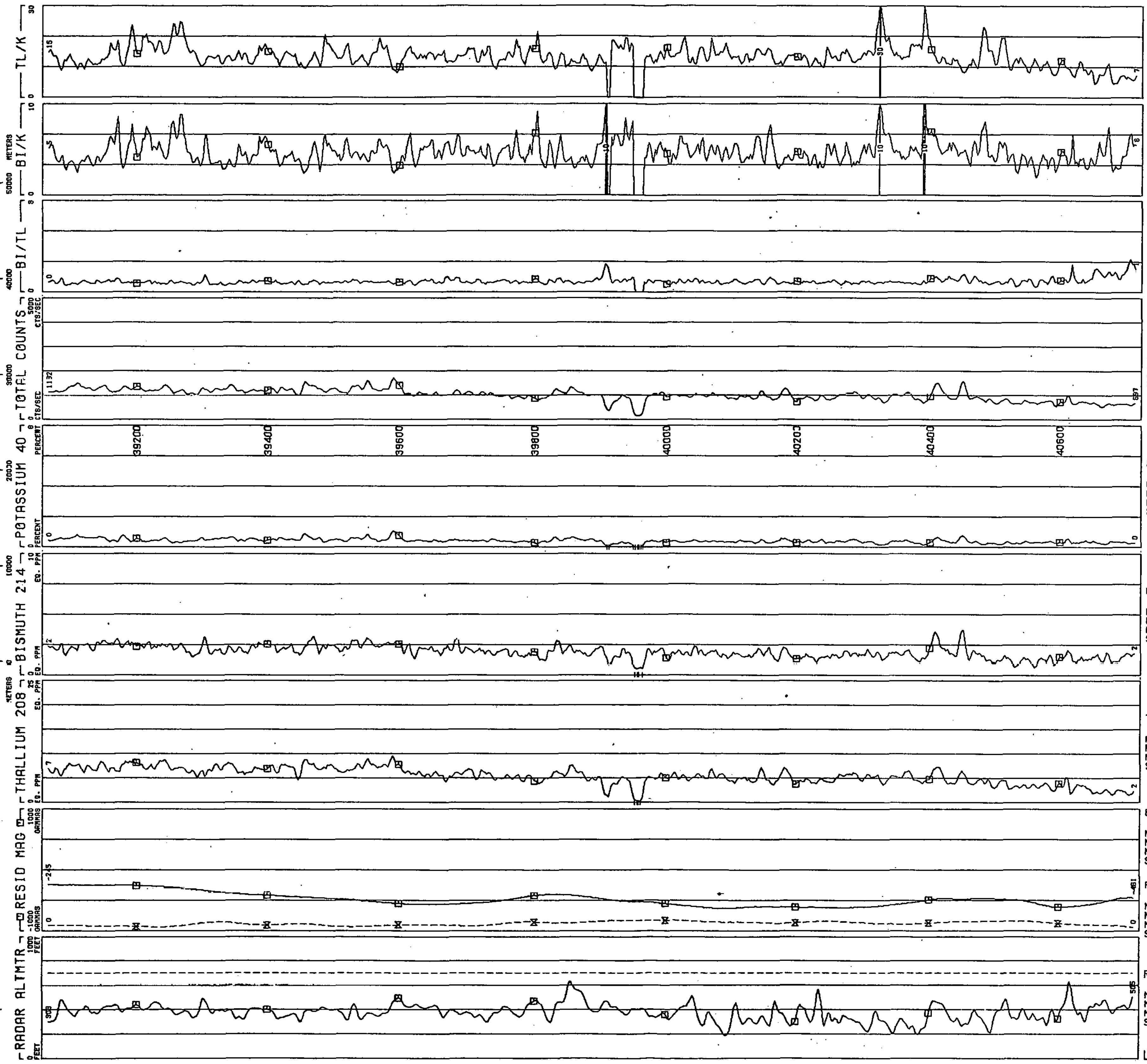
RESID MAG GAMMAS
MIN -617.2
MAX -291.4
MEAN -443.3
STD DEV 84.14

RADAR ALTMTR FEET
MIN 178.8
MAX 606.8
MEAN 372.1
STD DEV 73.88

LINE 1130

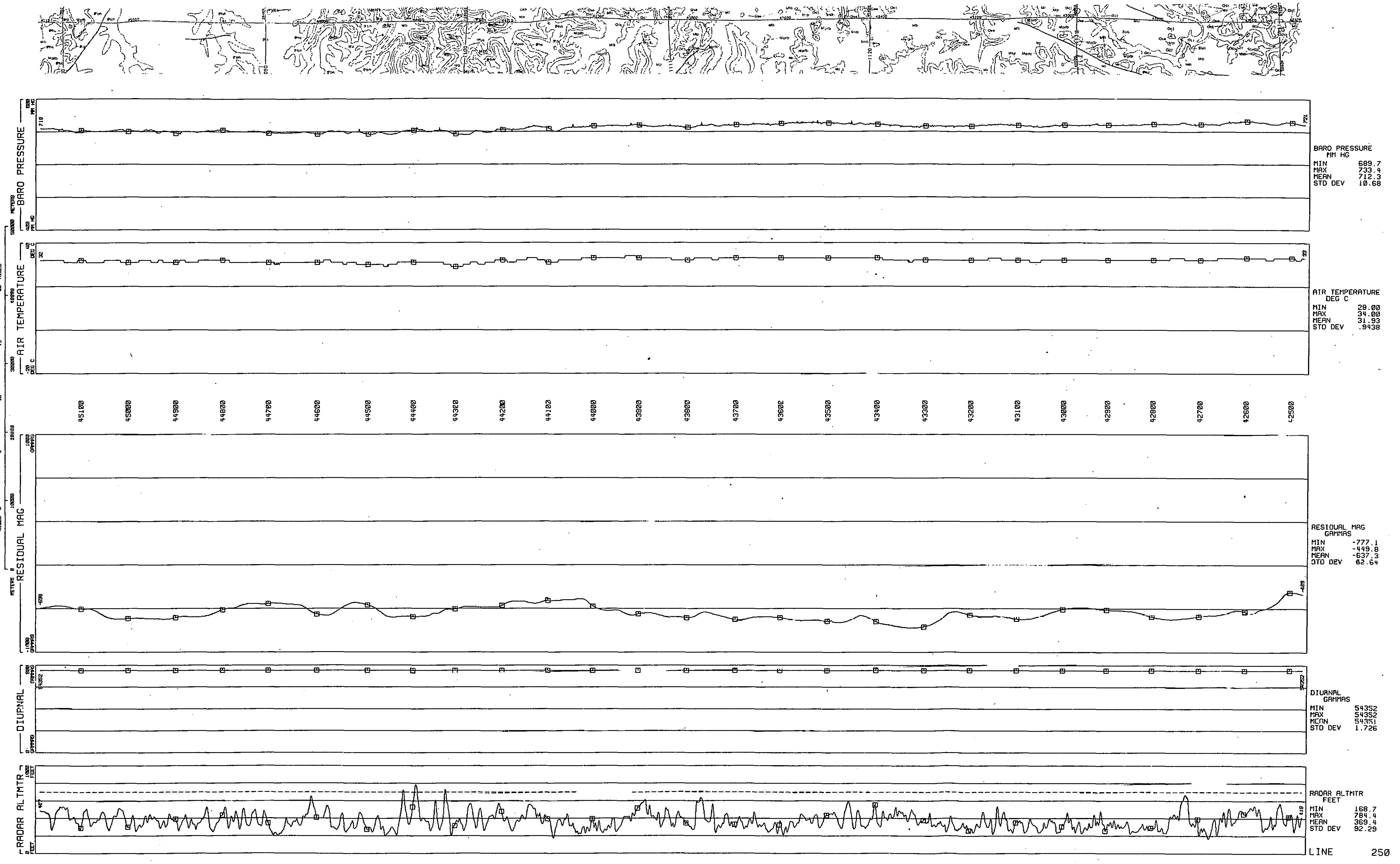
LINE 1140
RUSSELVILLE QUADRANGLE - NTMS NI 15-2 - GEOMETRICS
DATA ACQUIRED 80189
HORIZONTAL SCALE 1:250000



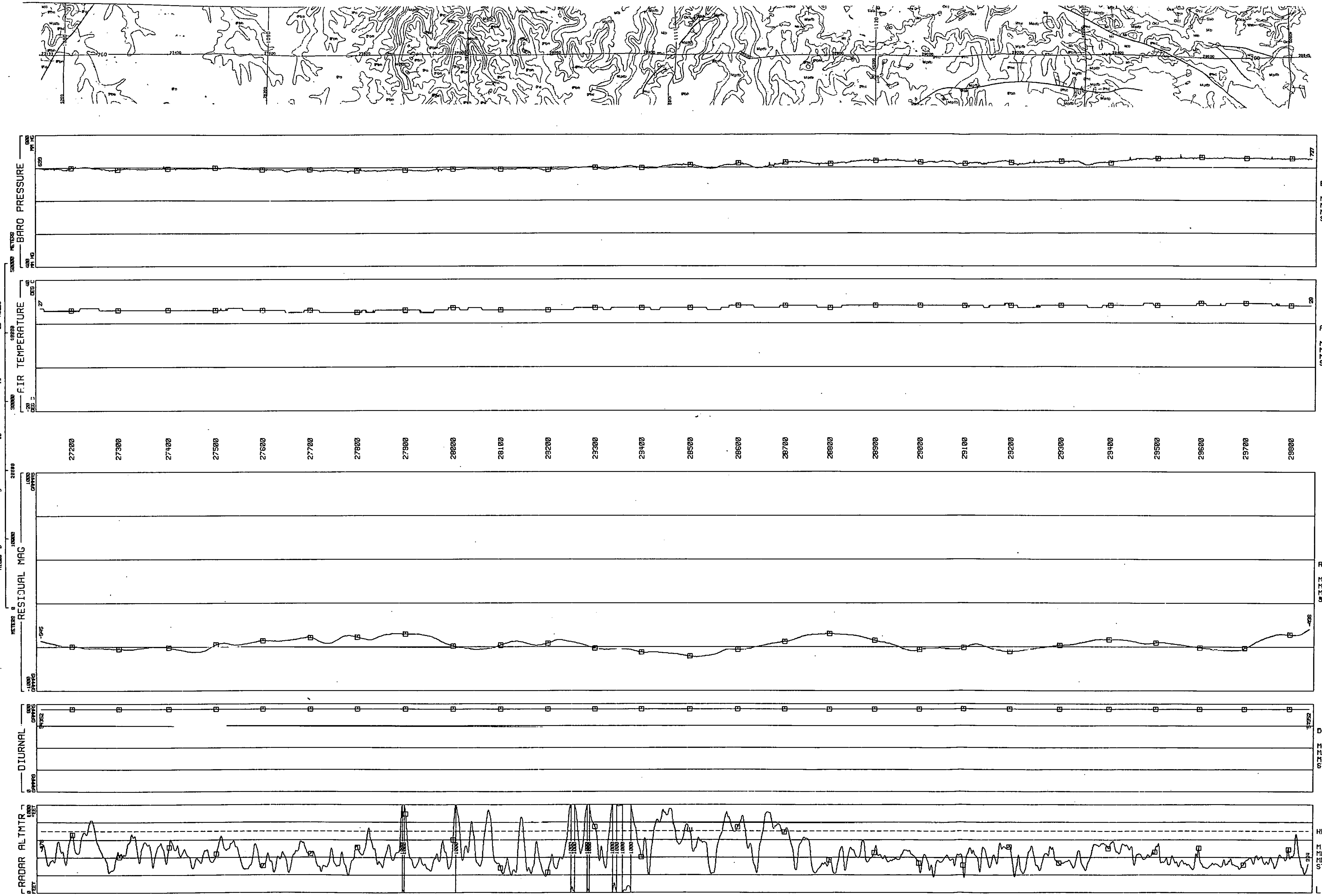


D20r

LINE 250
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80186



LINE 260
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80186



BARO PRESSURE
MM HG
MIN 685.3
MAX 738.3
MEAN 706.7
STD DEV 12.49

AIR TEMPERATURE
DEG C
MIN 25.00
MAX 29.00
MEAN 27.00
STD DEV 1.071

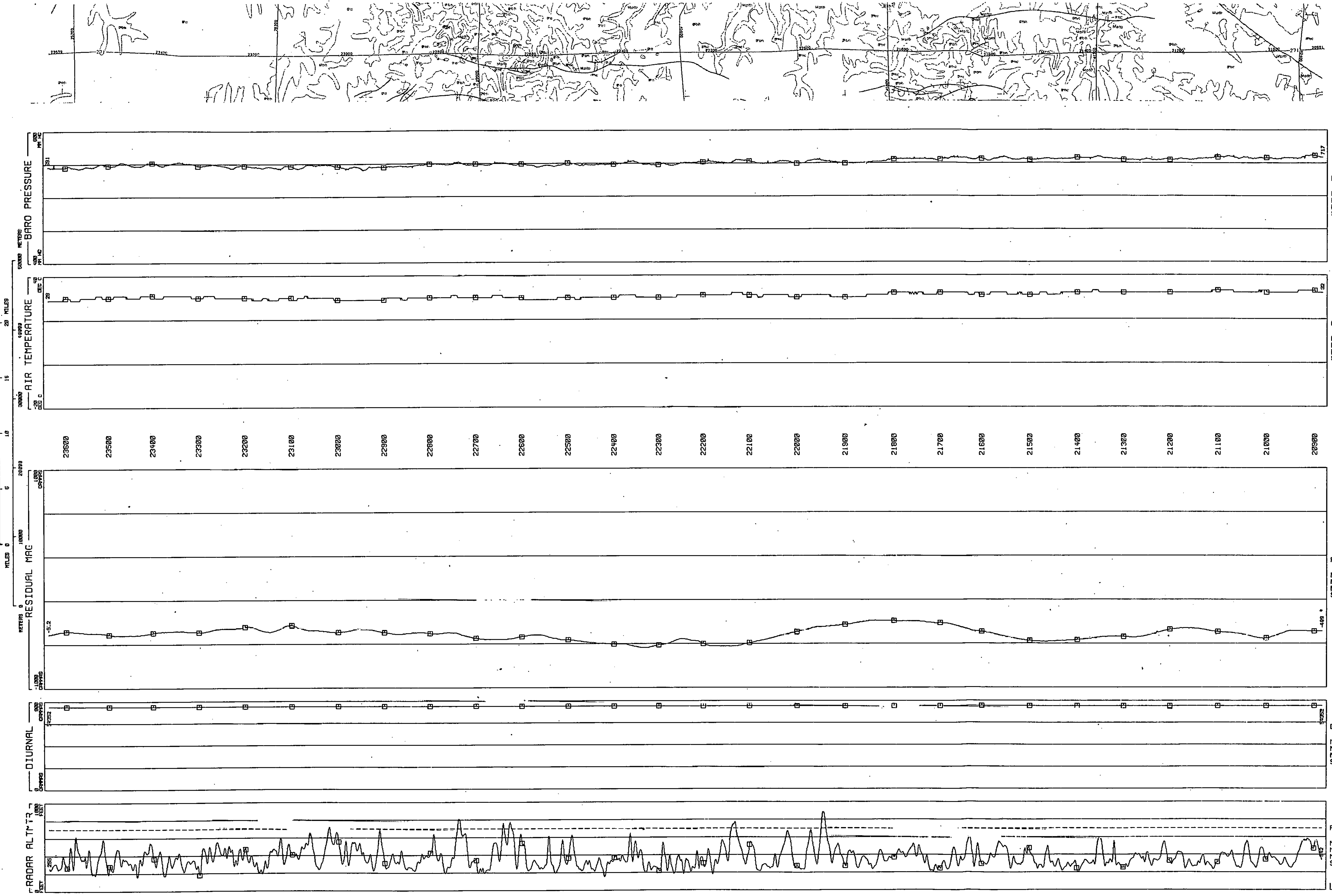
RESIDUAL MAG
GAMMAS
MIN -680.3
MAX -436.0
MEAN -577.8
STD DEV 51.43

DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54351
STD DEV 1.711

RADAR ALTIMTR
FEET
MIN 171.1
MAX 1108
MEAN 466.5
STD DEV 182.7

LINE 260

LINE 270
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80188



BARO PRESSURE
MM HG
MIN 681.5
MAX 727.2
MEAN 702.6
STD DEV 9.096

AIR TEMPERATURE
DEG C
MIN 29.00
MAX 33.00
MEAN 30.75
STD DEV 1.067

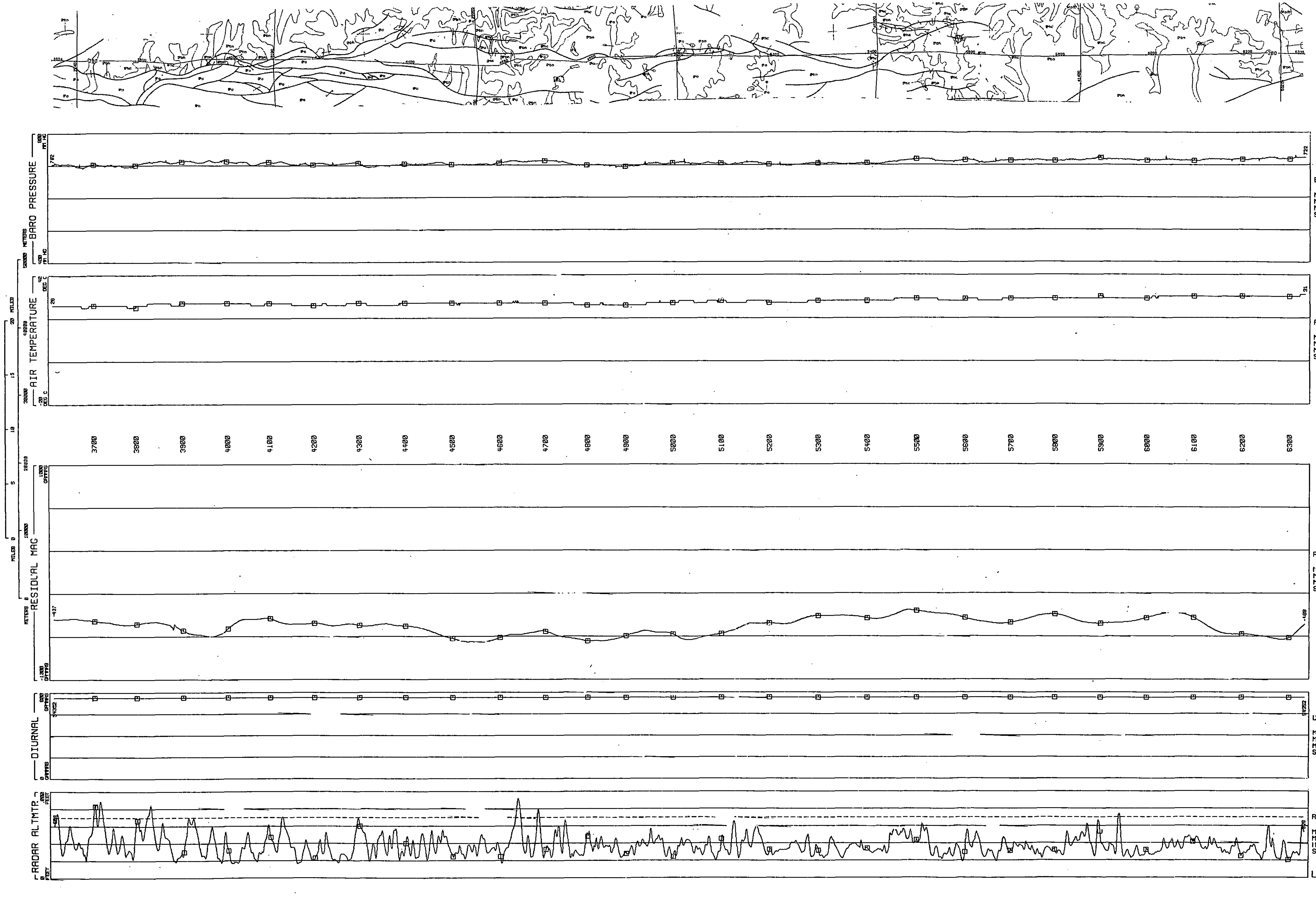
RESIDUAL MAG
GAMMAS
MIN -636.3
MAX -389.7
MEAN -511.3
STD DEV 57.48

DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54350
STD DEV 1.938

RADAR ALTMTR
FEET
MIN 152.7
MAX 886.7
MEAN 372.0
STD DEV 116.1

LINE 270

LINE 280
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80188



BARO PRESSURE
MM HG
MIN 691.0
MAX 729.6
MEAN 708.0
STD DEV 6.773

AIR TEMPERATURE
DEG C
MIN 25.00
MAX 31.00
MEAN 27.59
STD DEV 1.353

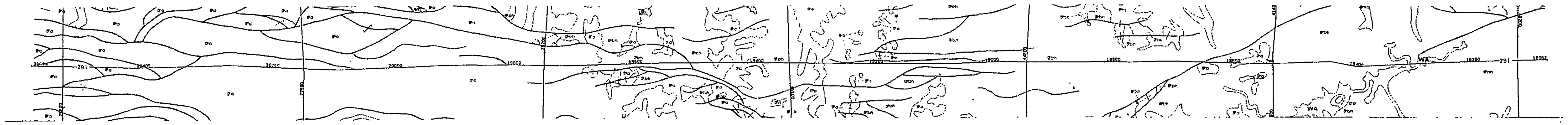
RESIDUAL MAG
GAMMAS
MIN -652.3
MAX -355.9
MEAN -504.1
STD DEV 77.66

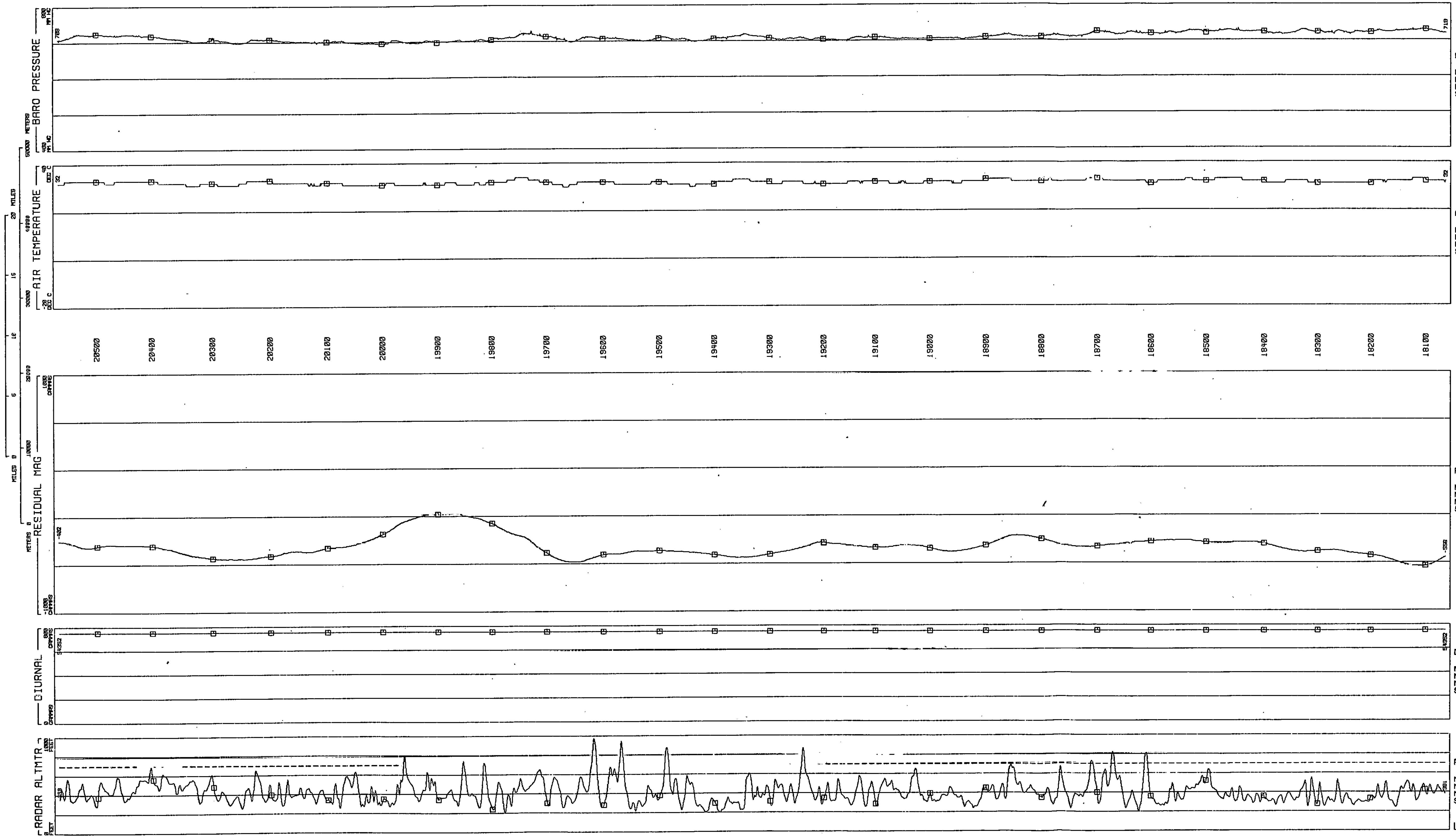
DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54350
STD DEV 1.813

RADAR ALTMTR
FEET
MIN 167.0
MAX 918.8
MEAN 376.0
STD DEV 122.1

LINE 280

LINE 290
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80184





BARO PRESSURE
MM HG
MIN 693.8
MAX 731.7
MEAN 711.0
STD DEV 8.742

AIR TEMPERATURE
DEG C
MIN 30.00
MAX 34.00
MEAN 31.85
STD DEV .7416

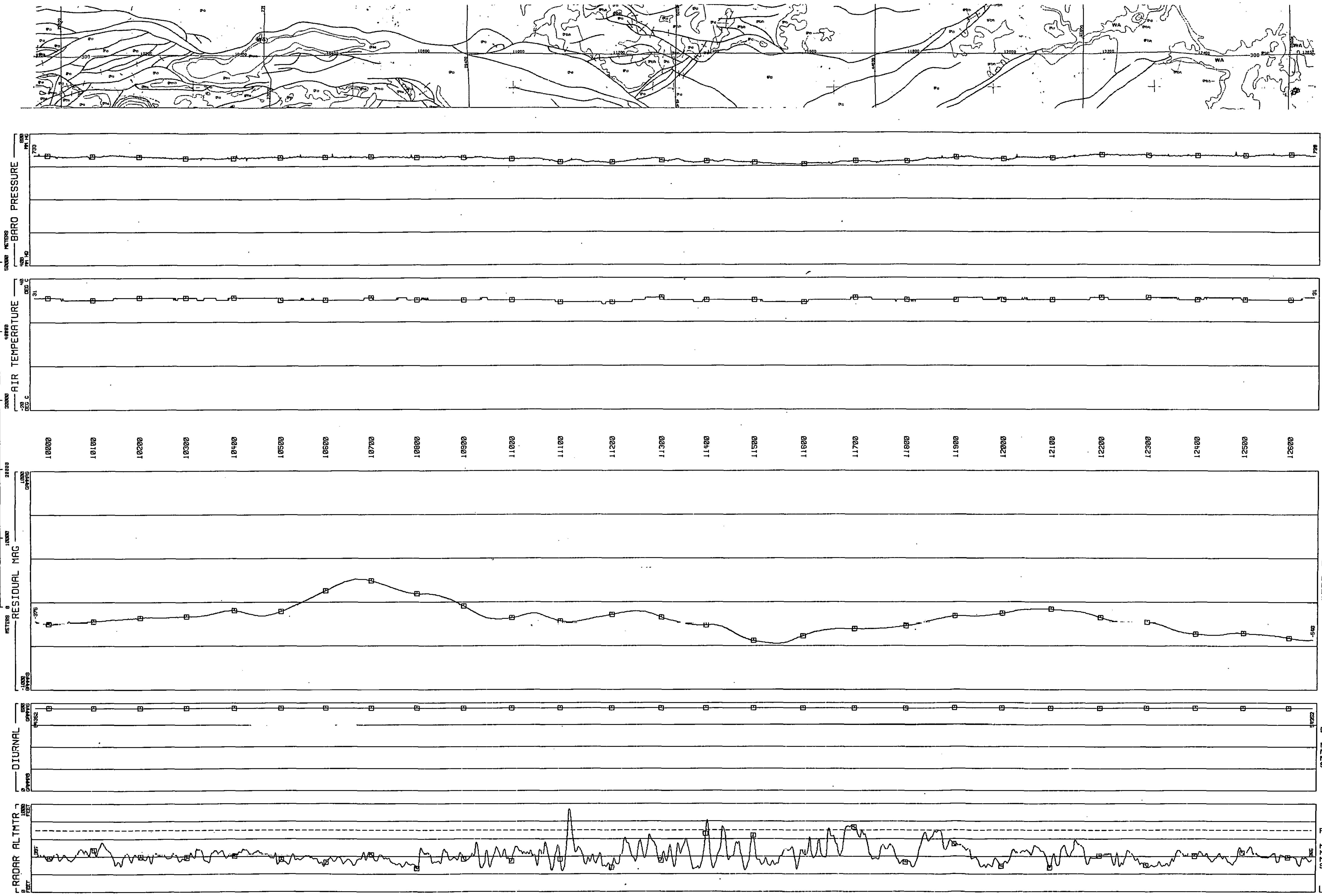
RESIDUAL MAG
GAMMAS
MIN -633.3
MAX -182.9
MEAN -457.0
STD DEV 90.79

DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .5234

RADAR ALTMTR
FEET
MIN 200.2
MAX 974.0
MEAN 413.0
STD DEV 114.9

LINE 290

LINE 300
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80184



BARO PRESSURE
MM HG
MIN 703.5
MAX 743.2
MEAN 723.6
STD DEV 7.886

AIR TEMPERATURE
DEG C
MIN 28.00
MAX 31.00
MEAN 30.20
STD DEV .6066

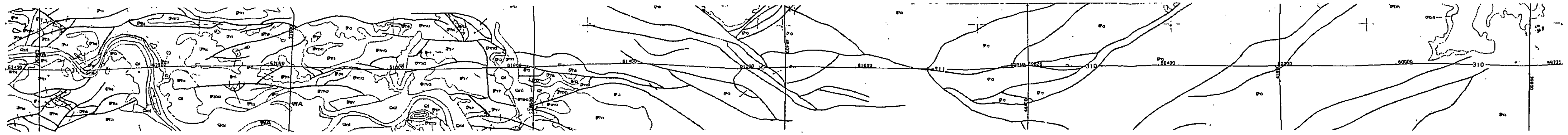
RESIDUAL MAG
GAMMAS
MIN -579.4
MAX 11.01
MEAN -344.2
STD DEV 127.3

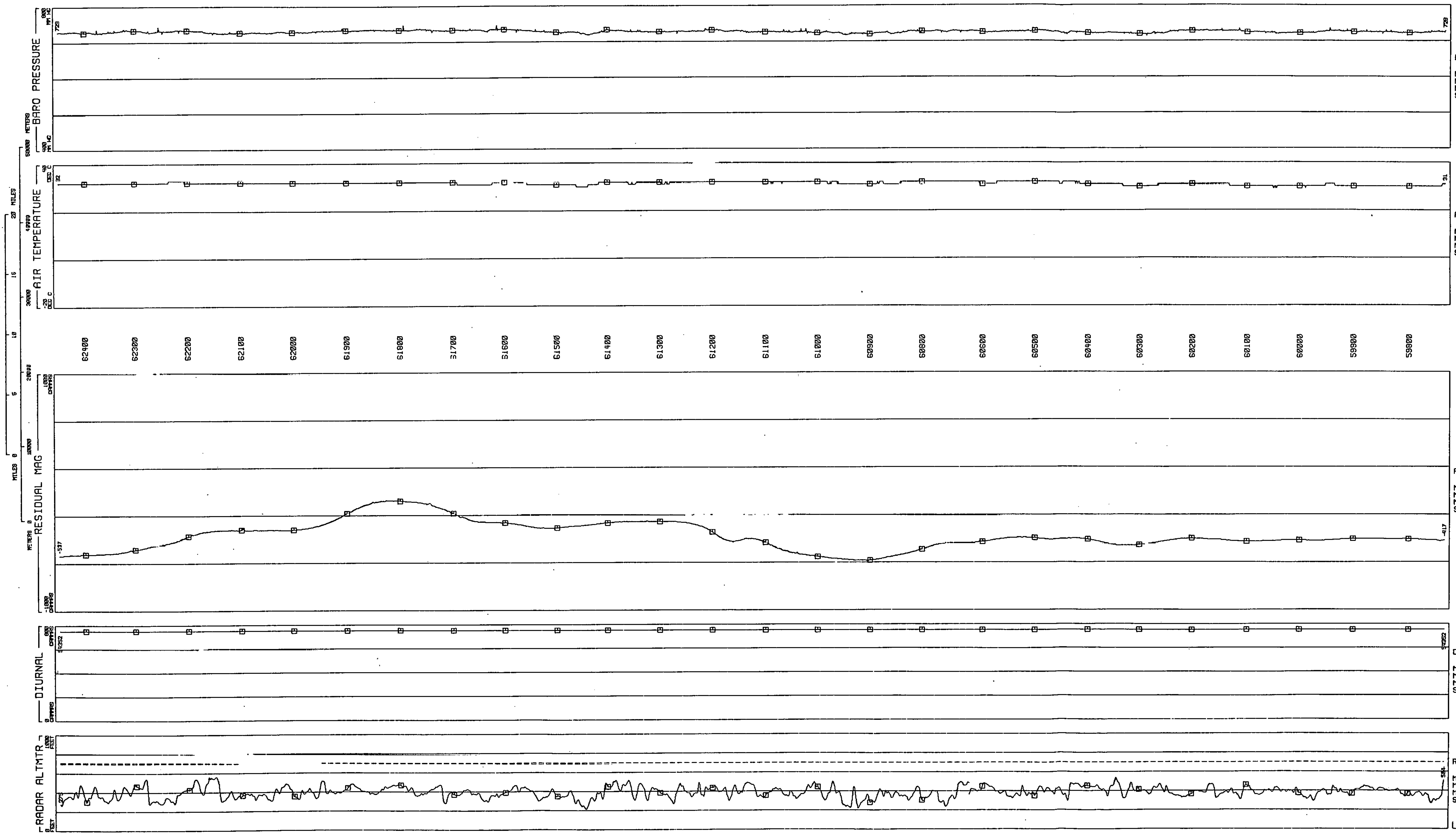
DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54351
STD DEV 1.547

RADAR ALTMTR
FEET
MIN 233.7
MAX 000.0
MEAN 416.9
STD DEV 94.86

LINE 300

LINE 310
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80187





BARO PRESSURE
MM HG
MIN 712.7
MAX 746.5
MEAN 727.4
STD DEV 4.208

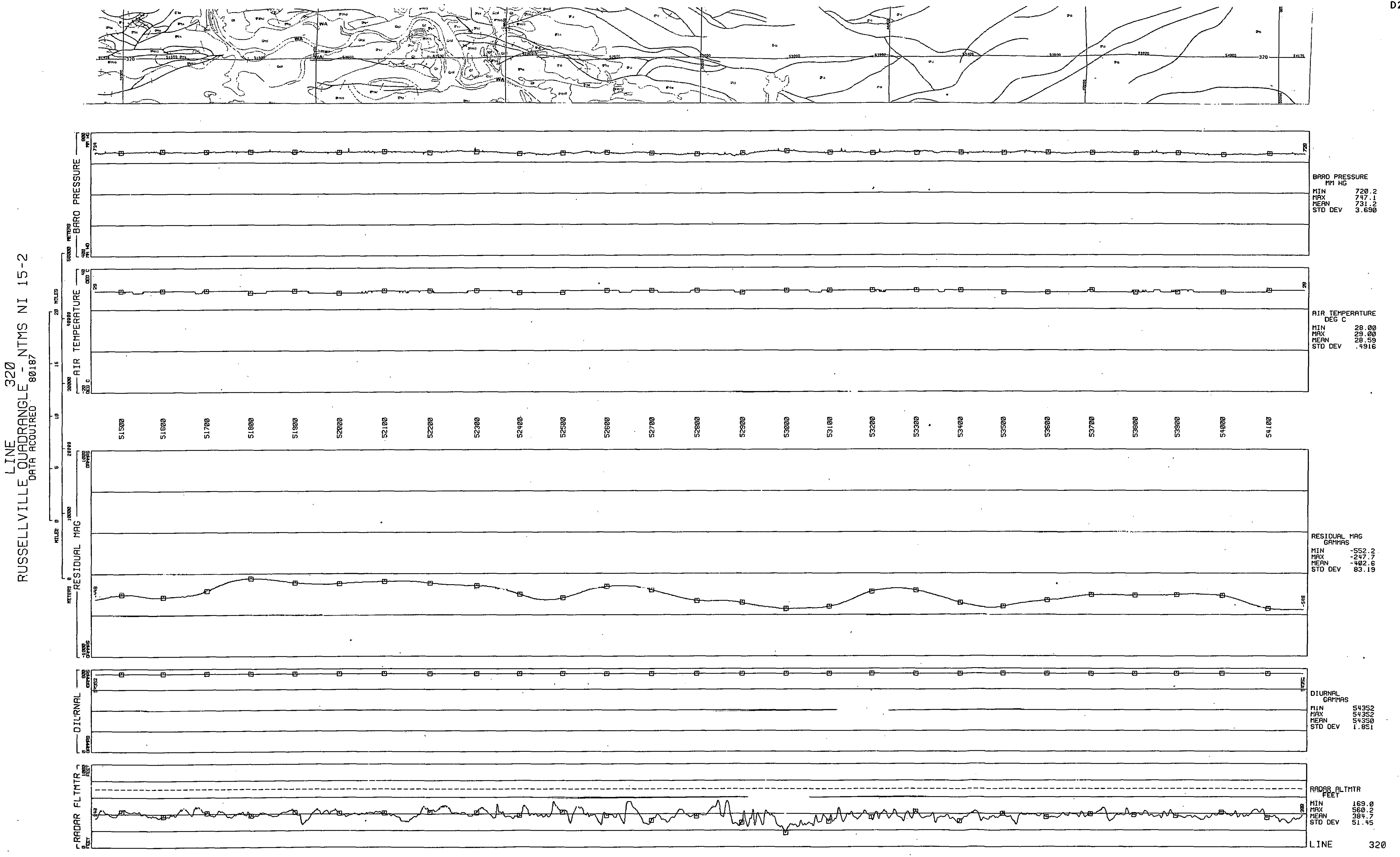
AIR TEMPERATURE
DEG C
MIN 29.00
MAX 33.00
MEAN 31.42
STD DEV .7944

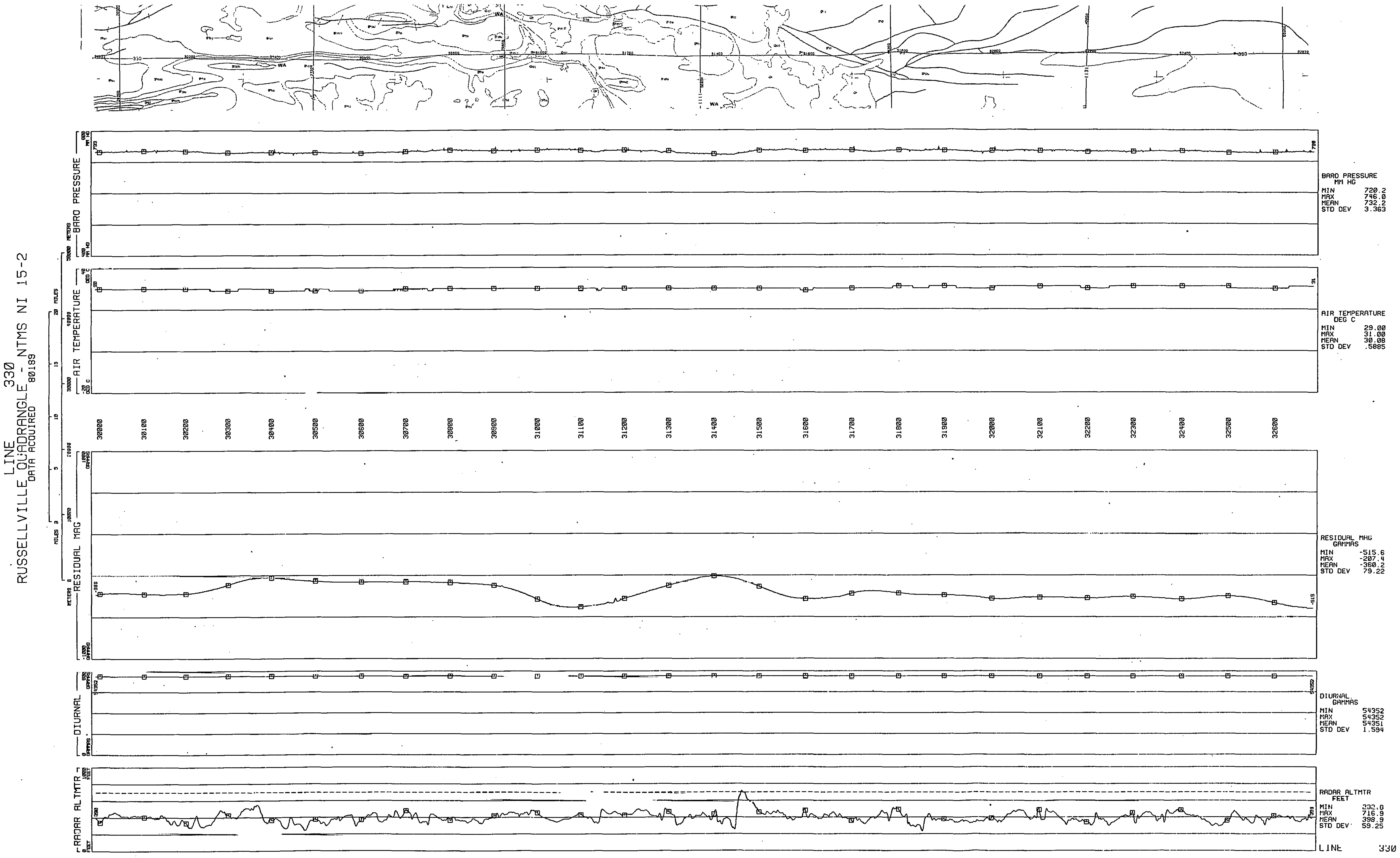
RESIDUAL MAG
GAMMAS
MIN -589.2
MAX -75.86
MEAN -375.5
STD DEV 117.2

DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54351
STD DEV 1.320

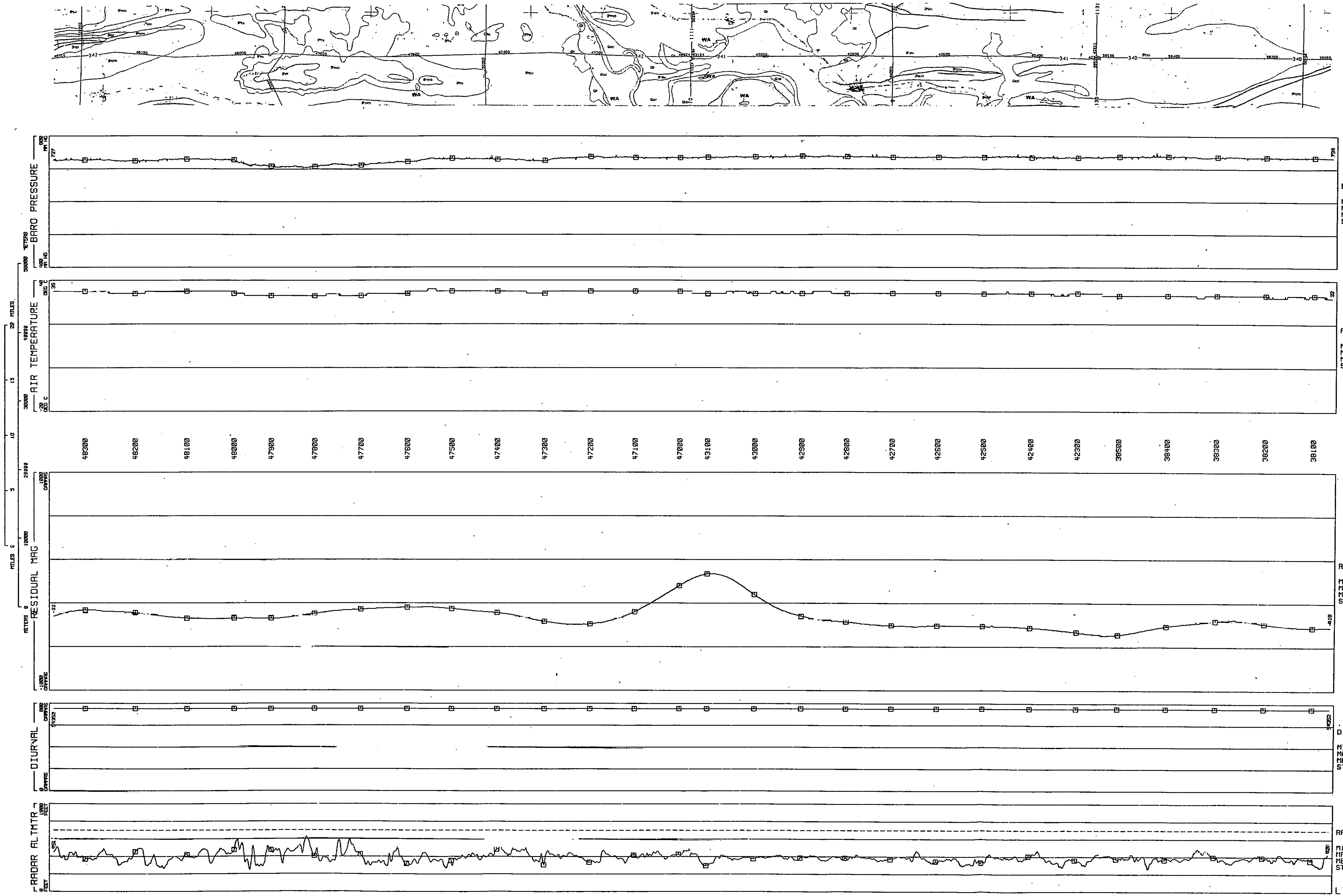
RADAR ALTMTR
FEET
MIN 215.4
MAX 561.5
MEAN 388.9
STD DEV 56.63

LINE 310


LINE 320
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80187
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
51500 51600 51700 51800 51900 52000 52100 52200 52300 52400 52500 52600 52700 52800 52900 53000 53100 53200 53300 53400 53500 53600 53700 53800 53900 54000 54100
BARO PRESSURE MM HG
MIN 720.2
MAX 747.1
MEAN 731.2
STD DEV 3.690
AIR TEMPERATURE DEG C
MIN 28.00
MAX 29.00
MEAN 28.59
STD DEV .4916
RESIDUAL MAG GAMMAS
MIN -552.2
MAX -247.7
MEAN -402.6
STD DEV 83.19
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54350
STD DEV 1.851
RADAR ALTMTR FEET
MIN 169.0
MAX 560.2
MEAN 384.7
STD DEV 51.45
LINE 320


LINE 330
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
30000
30100
30200
30300
30400
30500
30600
30700
30800
30900
31000
31100
31200
31300
31400
31500
31600
31700
31800
31900
32000
32100
32200
32300
32400
32500
32600
BARO PRESSURE MM HG
MIN 720.2
MAX 746.0
MEAN 732.2
STD DEV 3.363
AIR TEMPERATURE DEG C
MIN 29.00
MAX 31.00
MEAN 30.08
STD DEV .5885
RESIDUAL MAG GAMMAS
MIN -515.6
MAX -207.4
MEAN -360.2
STD DEV 79.22
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54351
STD DEV 1.594
RADAR ALTMTR FEET
MIN 332.0
MAX 716.9
MEAN 398.9
STD DEV 59.25
LINE 330

LINE 340
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189



BARO PRESSURE
MM HG
MIN 703.5
MAX 749.8
MEAN 730.5
STD DEV 8.429

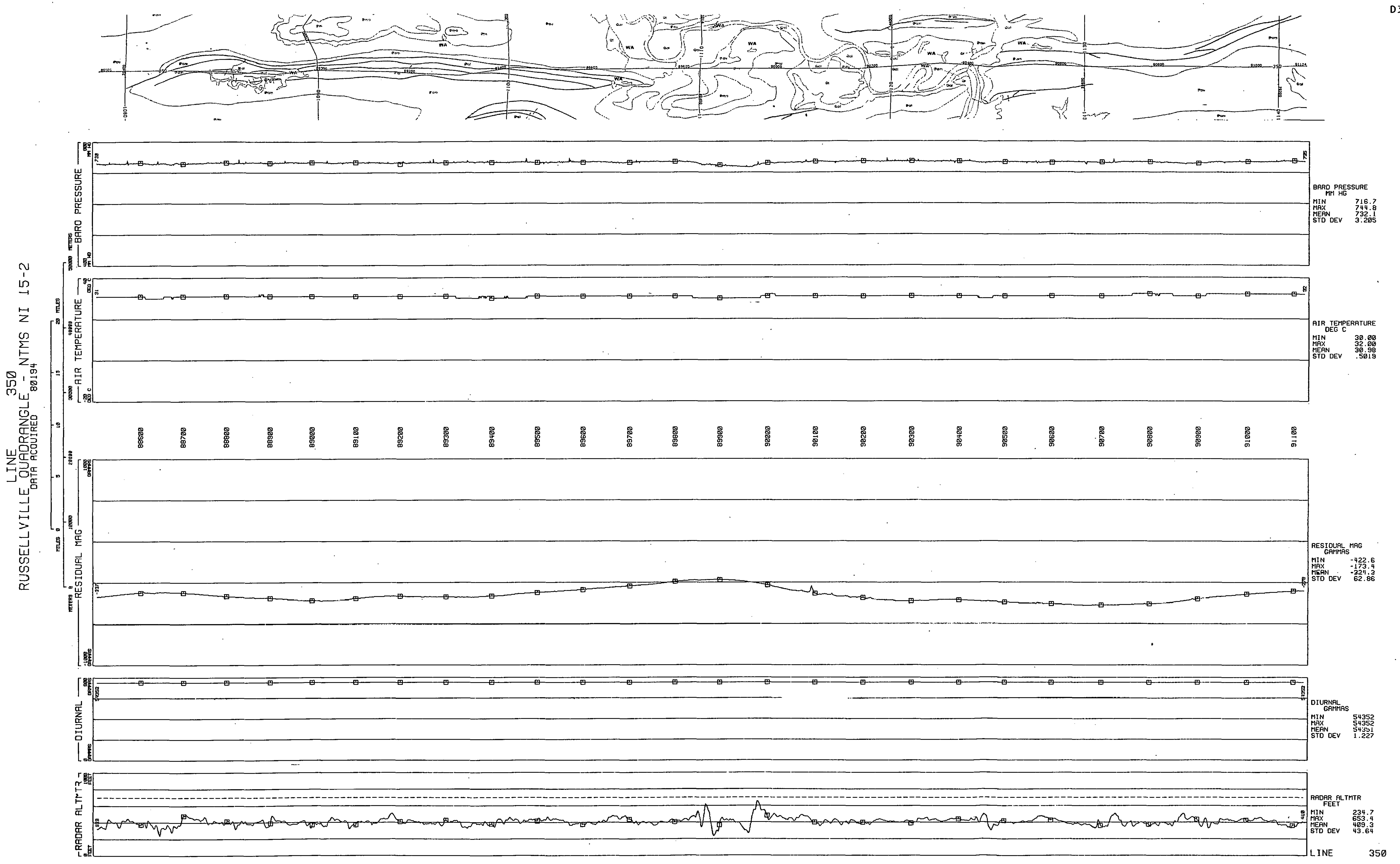
AIR TEMPERATURE
DEG C
MIN 32.00
MAX 36.00
MEAN 34.06
STD DEV .8561

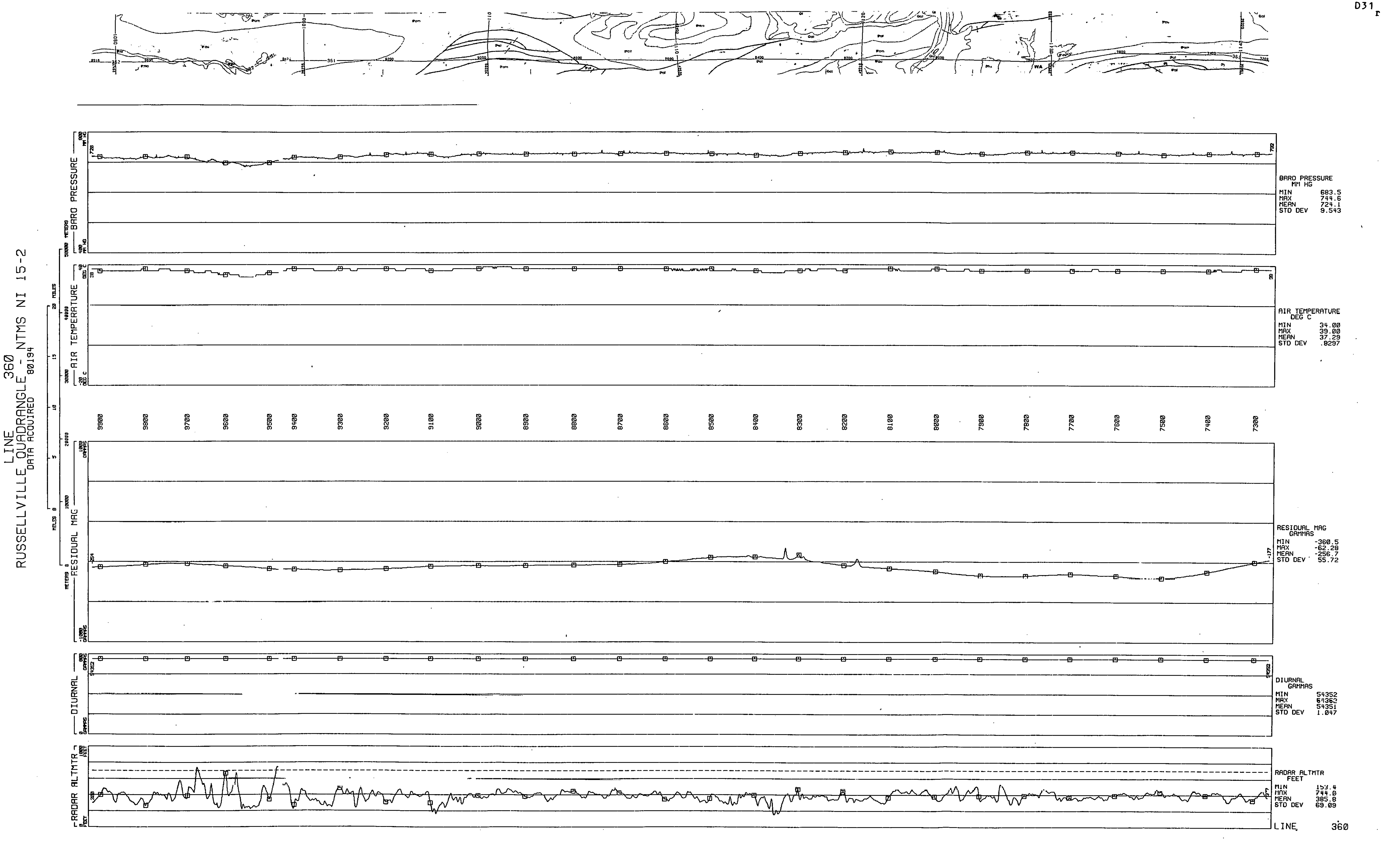
RESIDUAL MAG
GAMMAS
MIN -495.1
MAX 70.74
MEAN -322.8
STD DEV 113.8

DIURNAL
GAMMAS
MIN 54352
MAX 54362
MEAN 54350
STD DEV 1.953

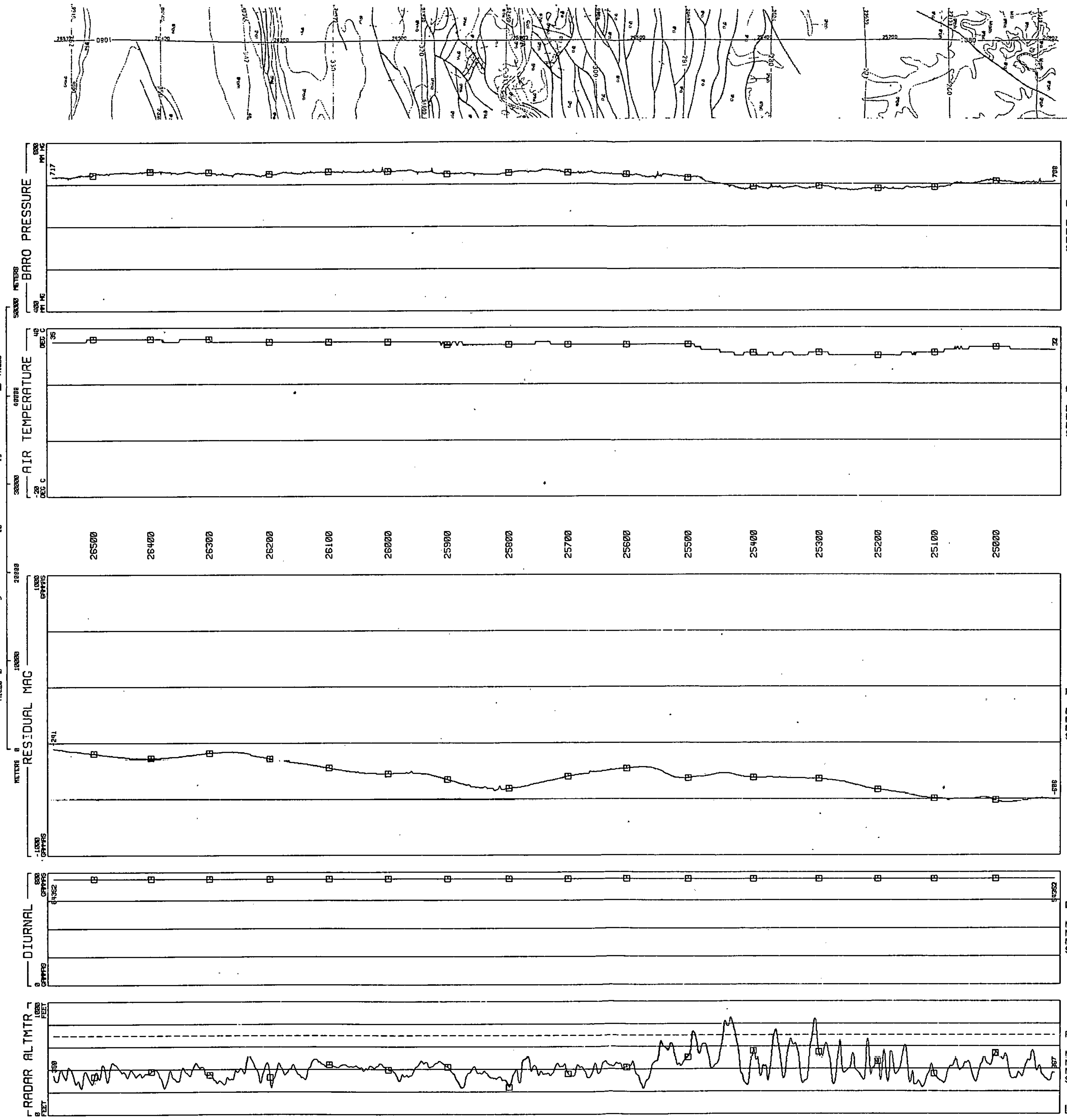
RADAR ALTMTR
FEET
MIN 249.1
MAX 625.5
MEAN 391.1
STD DEV 52.83

LINE 340


LINE 350
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80194
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
BARO PRESSURE MM HG
MIN 716.7
MAX 744.8
MEAN 732.1
STD DEV 3.205
AIR TEMPERATURE DEG C
MIN 30.00
MAX 32.00
MEAN 30.98
STD DEV .5019
RESIDUAL MAG GAMMAS
MIN -422.6
MAX -173.4
MEAN -324.3
STD DEV 62.86
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54351
STD DEV 1.227
RADAR ALTMTR FEET
MIN 234.7
MAX 653.4
MEAN 409.3
STD DEV 43.64
LINE 350


LINE 360
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80194
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
9900 9800 9700 9600 9500 9400 9300 9200 9100 9000 8900 8800 8700 8600 8500 8400 8300 8200 8100 8000 7900 7800 7700 7600 7500 7400 7300
BARO PRESSURE
MM HG
MIN 683.5
MAX 744.6
MEAN 724.1
STD DEV 9.543
AIR TEMPERATURE
DEG C
MIN 34.00
MAX 39.00
MEAN 37.29
STD DEV .8297
RESIDUAL MAG
GAMMAS
MIN -360.5
MAX -62.28
MEAN -256.7
STD DEV 55.72
DIURNAL
GAMMAS
MIN 54352
MAX 54362
MEAN 54351
STD DEV 1.047
RADAR ALTMTR
FEET
MIN 153.4
MAX 744.0
MEAN 385.8
STD DEV 69.09
LINE 360

LINE 1080
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80195



BARO PRESSURE
MM HG
MIN 683.8
MAX 739.4
MEAN 715.5
STD DEV 15.58

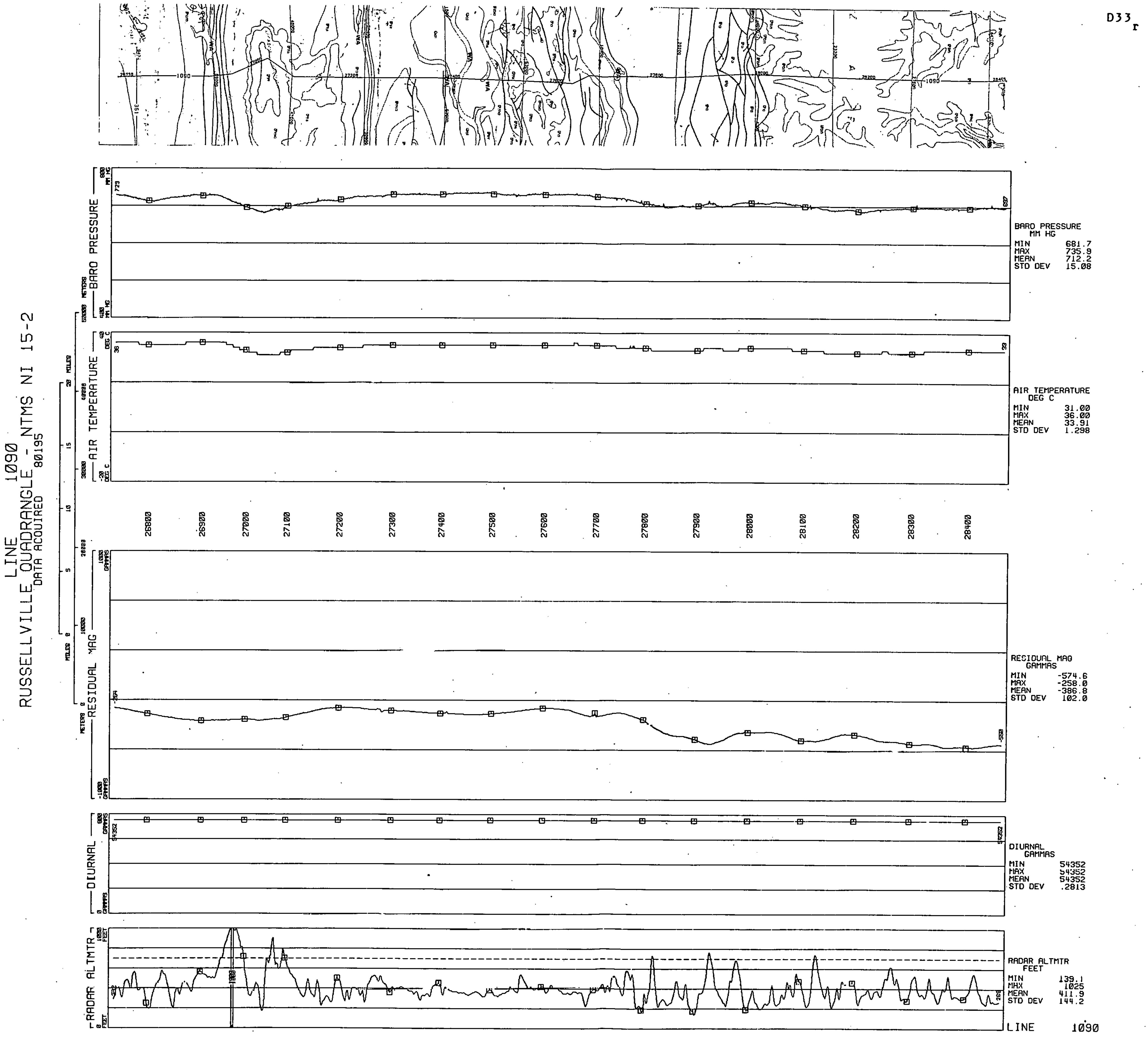
AIR TEMPERATURE
DEG C
MIN 30.00
MAX 36.00
MEAN 33.54
STD DEV 1.934

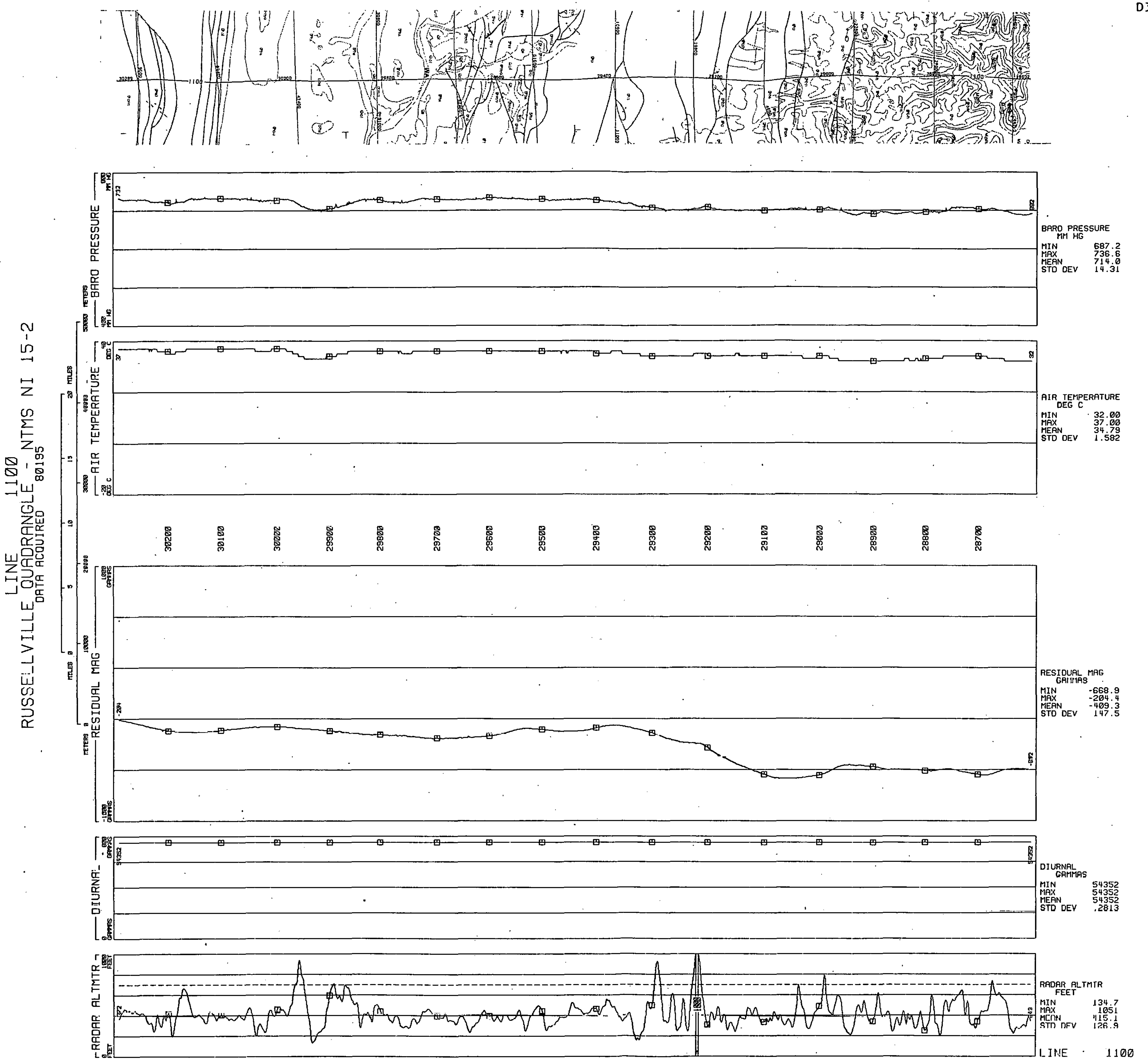
RESIDUAL MAG
GAMMAS
MIN -624.8
MAX -240.9
MEAN -429.1
STD DEV 105.0

DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .2813

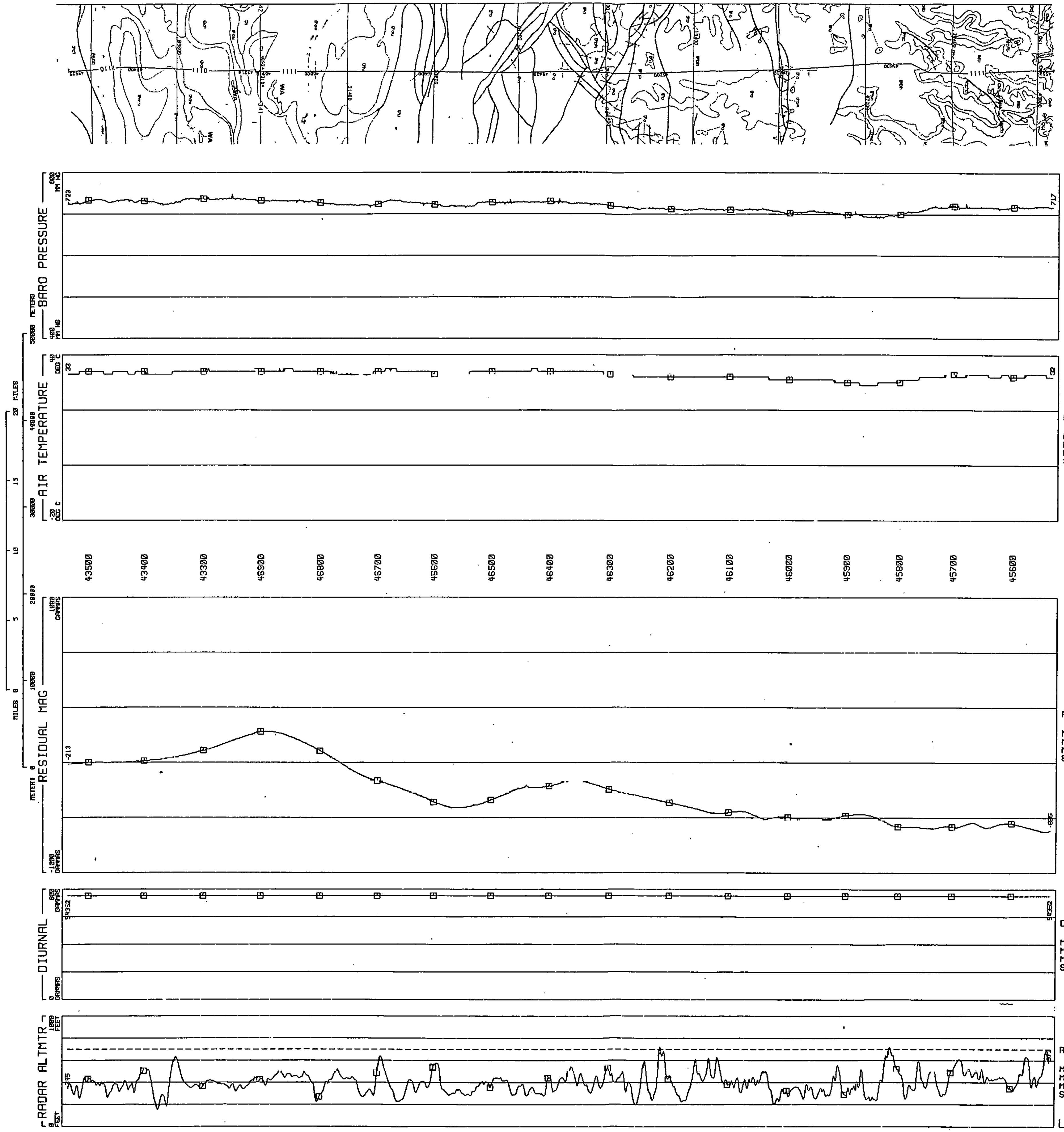
RADAR ALTMTR
FEET
MIN 228.0
MAX 853.2
MEAN 410.8
STD DEV 101.9

LINE 1080


LINE 1090
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80195
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
26800 26900 27000 27100 27200 27300 27400 27500 27600 27700 27800 27900 28000 28100 28200 28300 28400
BARO PRESSURE MM HG
MIN 681.7
MAX 735.9
MEAN 712.2
STD DEV 15.08
AIR TEMPERATURE DEG C
MIN 31.00
MAX 36.00
MEAN 33.91
STD DEV 1.298
RESIDUAL MAG GAMMAS
MIN -574.6
MAX -258.0
MEAN -386.8
STD DEV 102.0
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .2813
RADAR ALTMTR FEET
MIN 139.1
MAX 1025
MEAN 411.9
STD DEV 144.2
LINE 1090


LINE 1100
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80195
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
30200
30100
30000
29900
29800
29700
29600
29500
29400
29300
29200
29100
29000
28900
28800
28700
BARO PRESSURE
MM HG
MIN 687.2
MAX 736.6
MEAN 714.0
STD DEV 14.31
AIR TEMPERATURE
DEG C
MIN 32.00
MAX 37.00
MEAN 34.79
STD DEV 1.582
RESIDUAL MAG
GAMMAS
MIN -668.9
MAX -204.4
MEAN -409.3
STD DEV 147.5
DIURNAL
GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .2813
RADAR ALTMTR
FEET
MIN 134.7
MAX 1051
MEAN 415.1
STD DEV 126.9
LINE 1100

LINE 1110
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189



BARO PRESSURE
MM HG

MIN	691.8
MAX	747.9
MEAN	720.0
STD DEV	11.15

AIR TEMPERATURE
DEG C

MIN	29.00
MAX	35.00
MEAN	32.82
STD DEV	1.352

RESIDUAL MAG
GAMMAS

MIN	-699.8
MAX	25.37
MEAN	-408.6
STD DEV	210.5

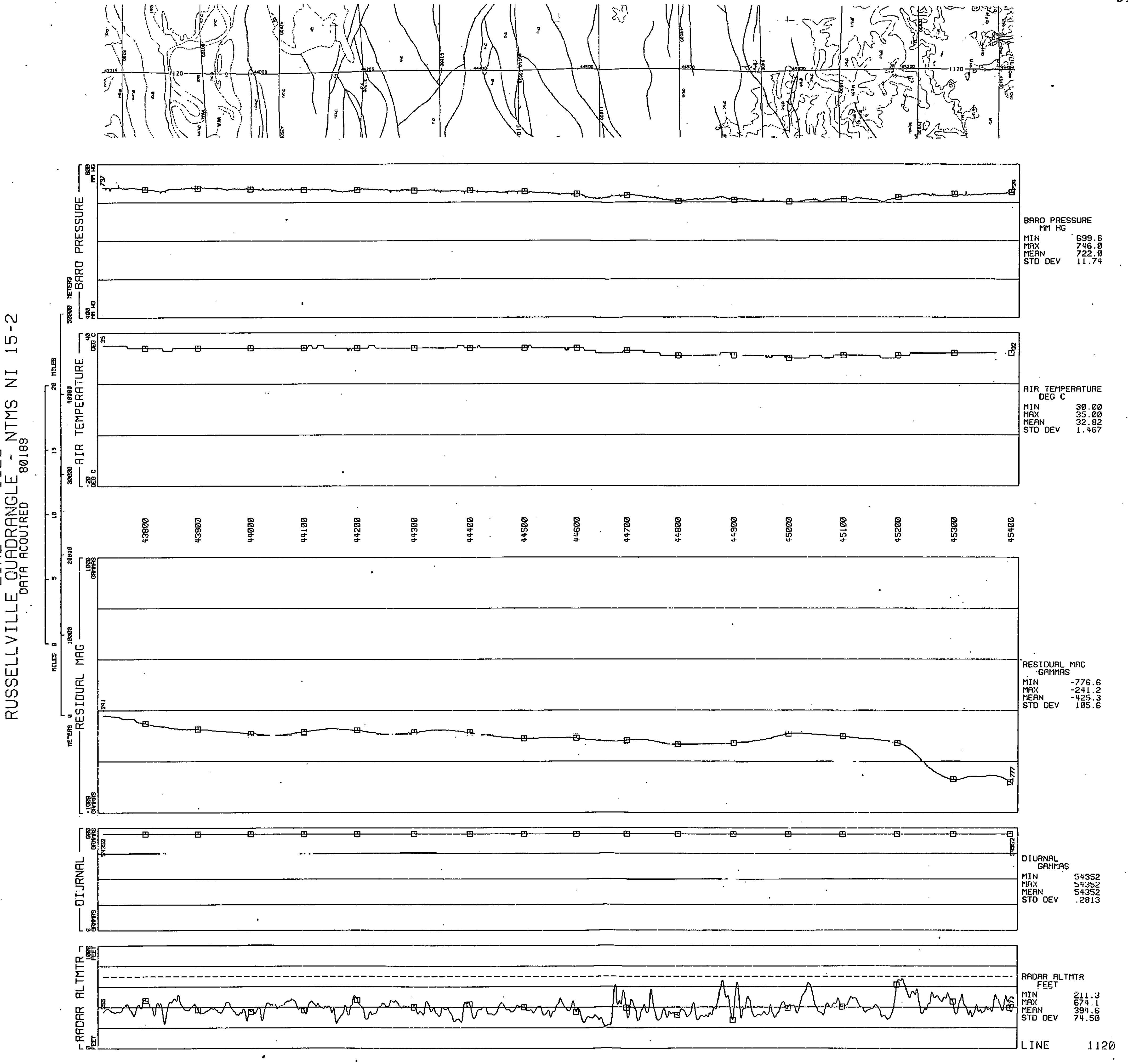
DIURNAL
GAMMAS

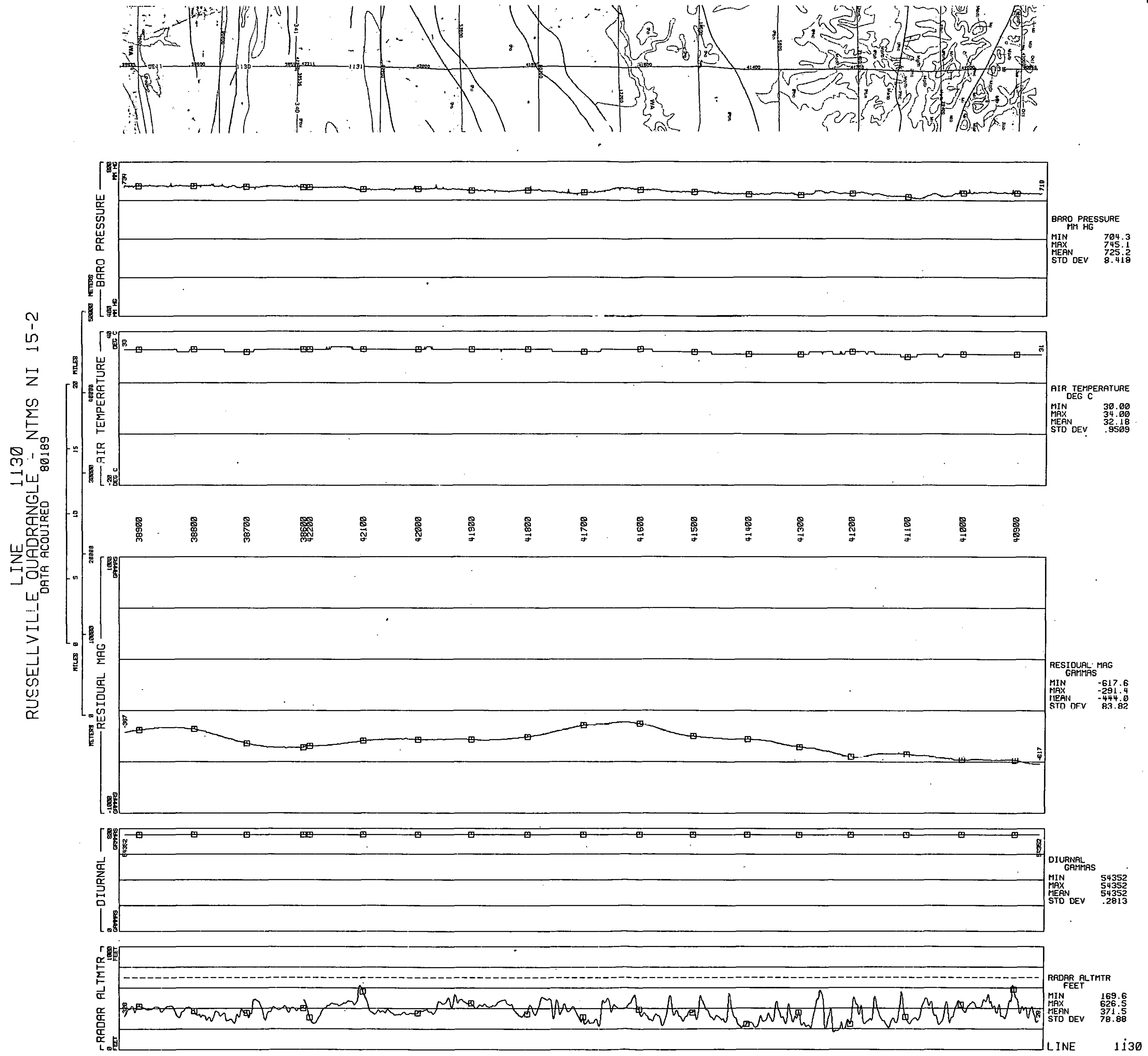
MIN	54352
MAX	54352
MEAN	54352
STD DEV	.2813

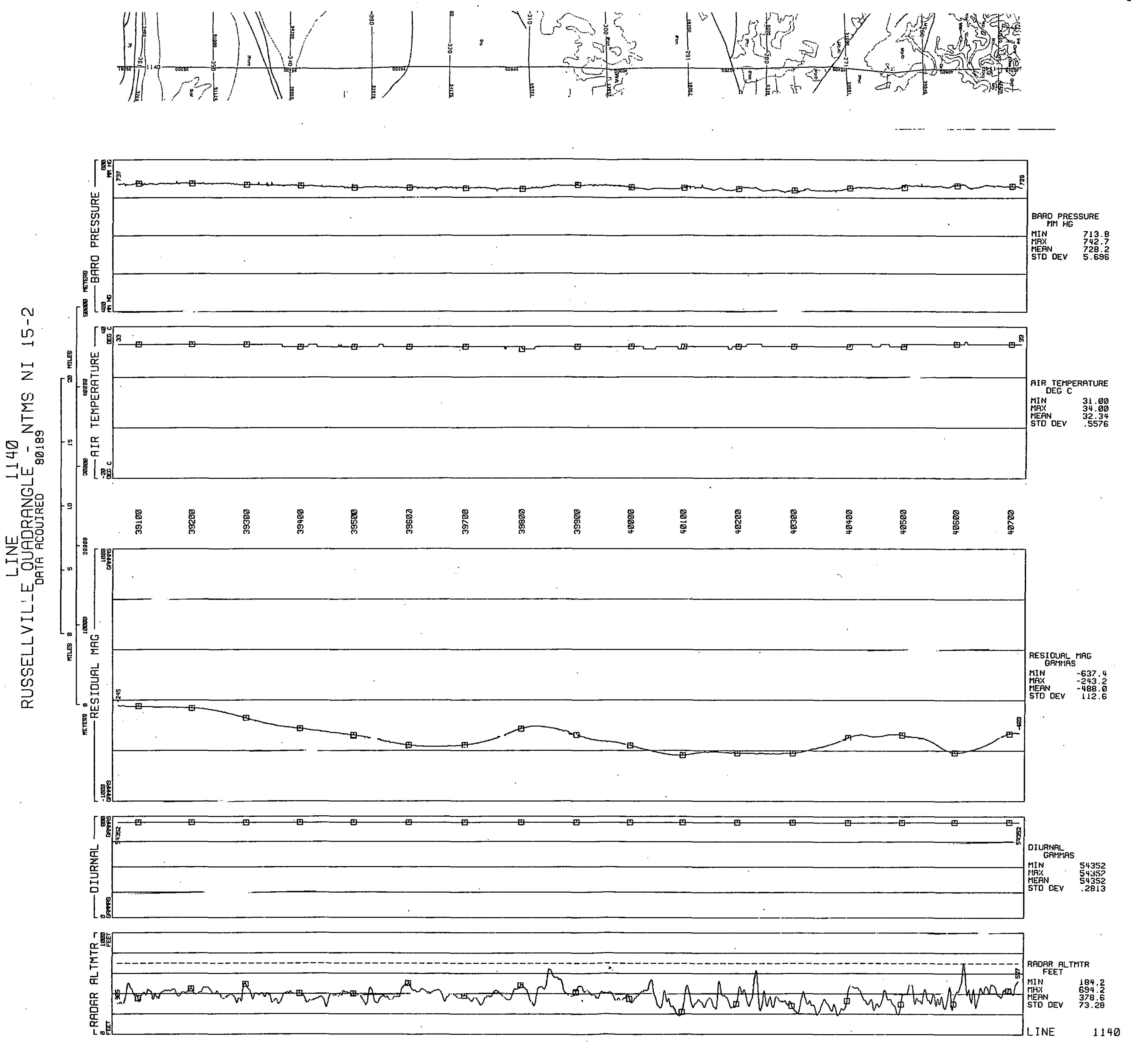
RADAR ALTMTR
FEET

MIN	153.5
MAX	720.9
MEAN	396.7
STD DEV	94.94

LINE 1110

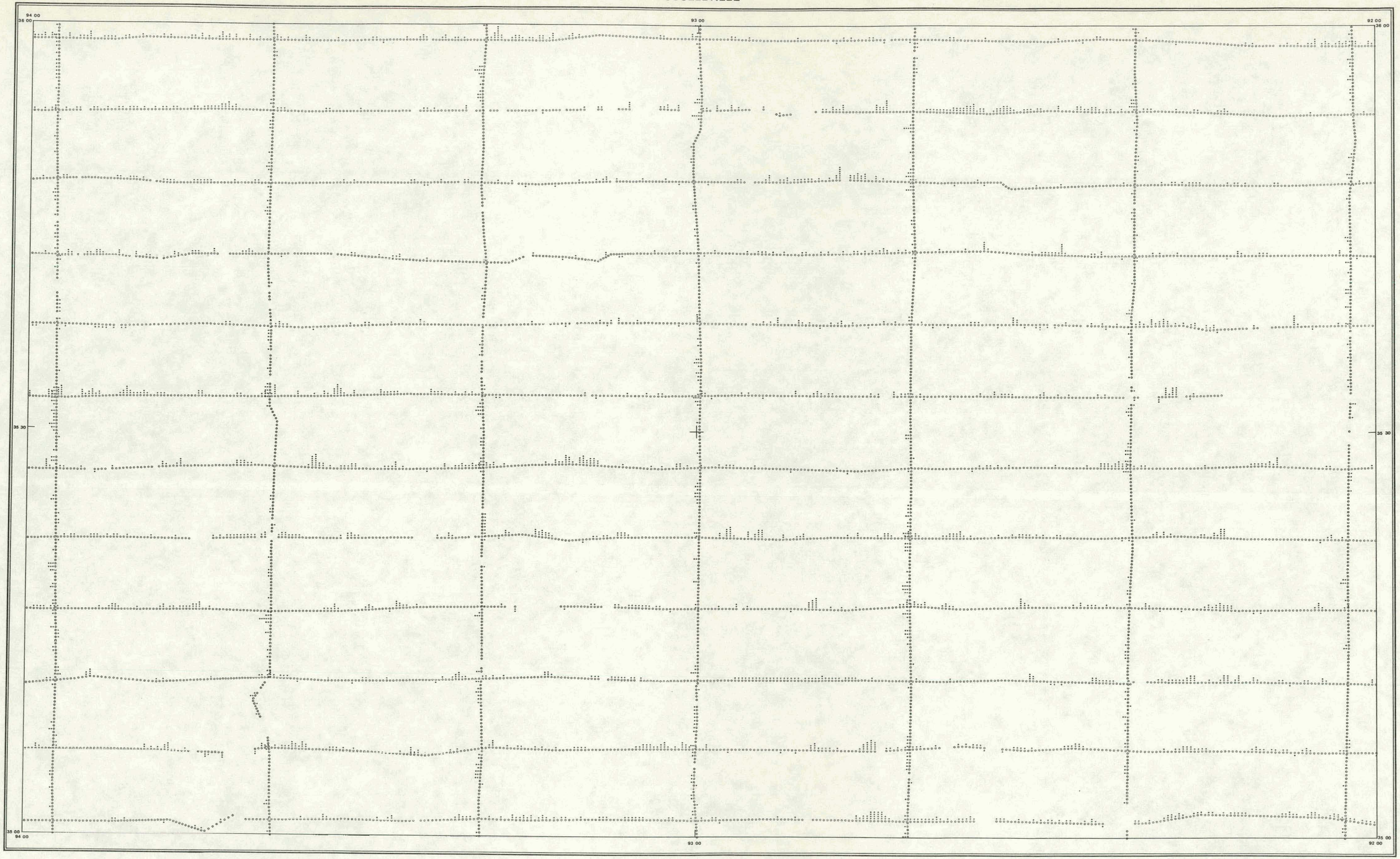

LINE 1120
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189
BARO PRESSURE
BARO PRESSURE MM HG
MIN 699.6
MAX 746.0
MEAN 722.0
STD DEV 11.74
AIR TEMPERATURE
AIR TEMPERATURE DEG C
MIN 30.00
MAX 35.00
MEAN 32.82
STD DEV 1.467
43800 43900 44000 44100 44200 44300 44400 44500 44600 44700 44800 44900 45000 45100 45200 45300 45400
RESIDUAL MAG
RESIDUAL MAG GAMMAS
MIN -776.6
MAX -241.2
MEAN -425.3
STD DEV 105.6
DIURNAL
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .2813
RADAR ALTMTR
RADAR ALTMTR FEET
MIN 211.3
MAX 674.1
MEAN 394.6
STD DEV 74.50
LINE 1120


LINE 1130
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
BARO PRESSURE MM HG
MIN 704.3
MAX 745.1
MEAN 725.2
STD DEV 8.418
AIR TEMPERATURE DEG C
MIN 30.00
MAX 34.00
MEAN 32.18
STD DEV .9509
RESIDUAL MAG GAMMAS
MIN -617.6
MAX -291.4
MEAN -444.0
STD DEV 83.82
DIURNAL GAMMAS
MIN 54352
MAX 54352
MEAN 54352
STD DEV .2813
RADAR ALTMTR FEET
MIN 169.6
MAX 626.5
MEAN 371.5
STD DEV 78.88
LINE 1130


LINE 1140
RUSSELLVILLE QUADRANGLE - NTMS NI 15-2
DATA ACQUIRED 80189
BARO PRESSURE
BARO PRESSURE MM HG
MIN 713.8
MAX 742.7
MEAN 728.2
STD DEV 5.696
AIR TEMPERATURE
AIR TEMPERATURE DEG C
MIN 31.00
MAX 34.00
MEAN 32.34
STD DEV .5576
39100 39200 39300 39400 39500 39600 39700 39800 39900 40000 40100 40200 40300 40400 40500 40600 40700
RESIDUAL MAG
RESIDUAL MAG GAMMAS
MIN -637.4
MAX -243.2
MEAN -488.0
STD DEV 112.6
DIURNAL
DIURNAL GAMMAS
MIN 54352
MAX 54357
MEAN 54352
STD DEV .2813
RADAR ALTMTR
RADAR ALTMTR FEET
MIN 184.2
MAX 694.2
MEAN 378.6
STD DEV 73.28
LINE 1140

APPENDIX E - Standard Deviation Maps

RUSSELLVILLE



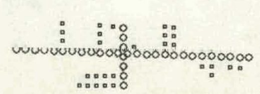
SCALE 1:500,000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

SURVEY AND COMPILATION BY:

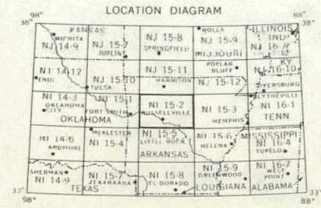
EG&G GEOMETRICS



O - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▫ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH. ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM

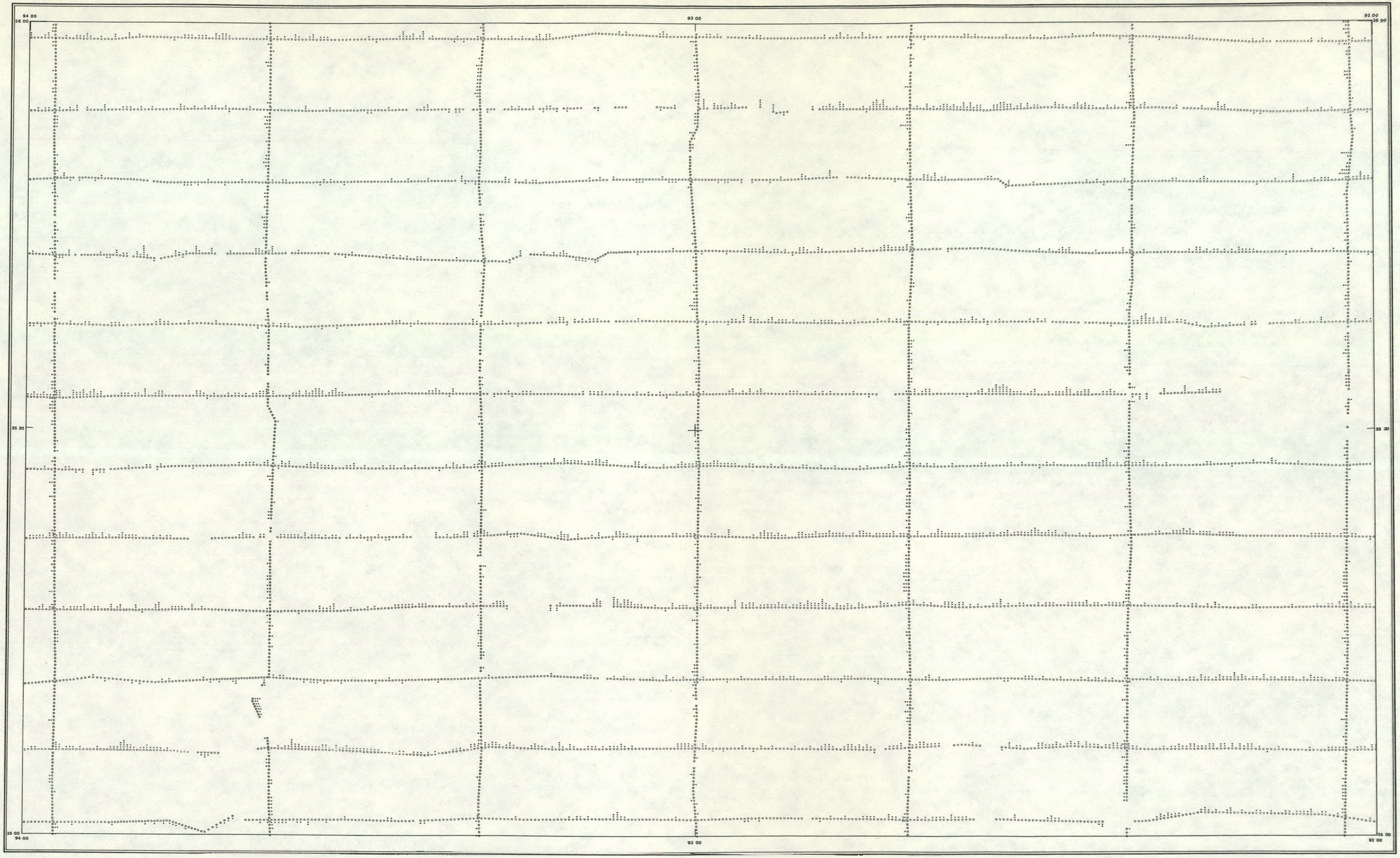


POTASSIUM STANDARD DEVIATION MAP

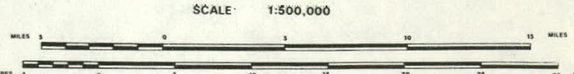
MISSISSIPPI / FLORIDA PROJECT

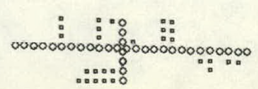
U. S. DEPARTMENT OF ENERGY

RUSSELLVILLE



SCALE 1:500,000

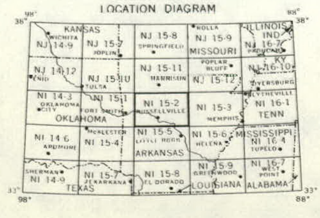




○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH.
ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM



SURVEY AND
COMPILATION BY:

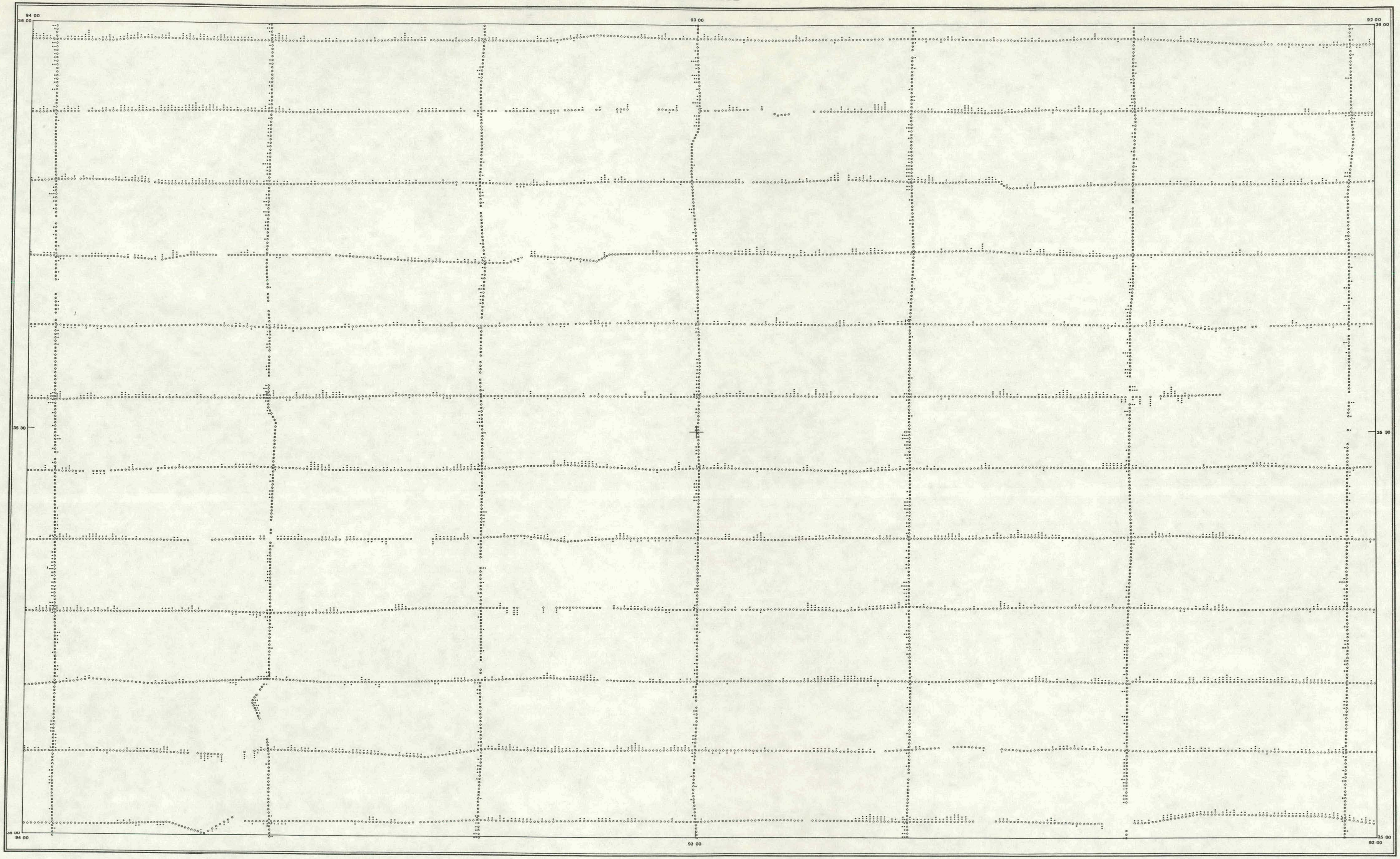
EG&G GEOMETRICS

URANIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

RUSSELLVILLE



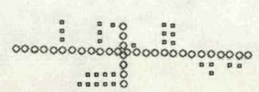
SCALE: 1:500,000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

SURVEY AND COMPILATION BY

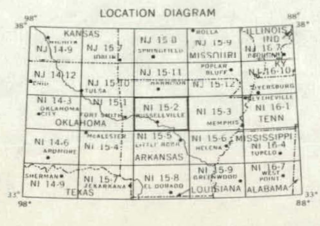
EG&G GEOMETRICS



○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH.
ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM

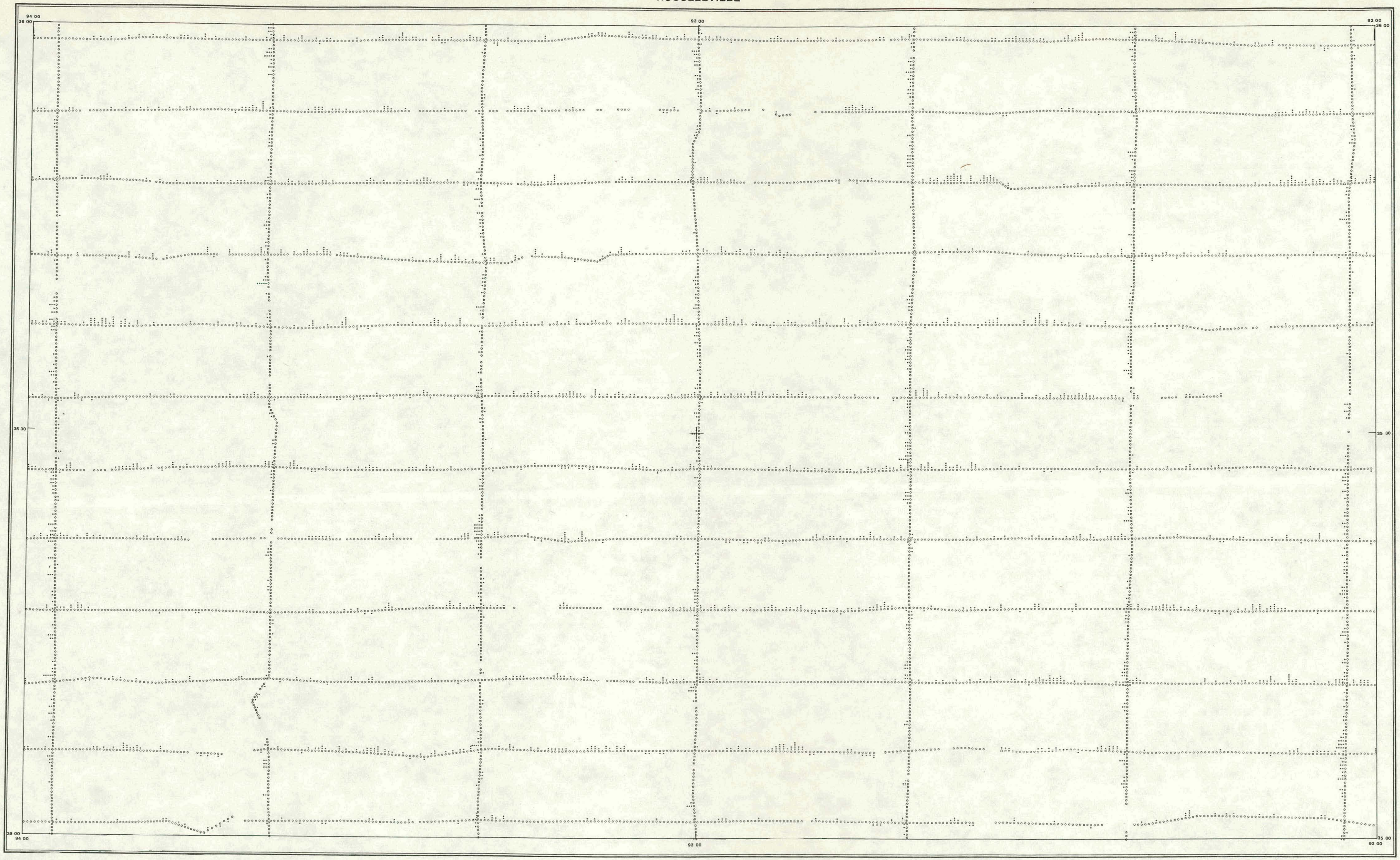


THORIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

RUSSELLVILLE



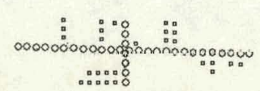
SCALE 1:500,000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

SURVEY AND COMPILATION BY:

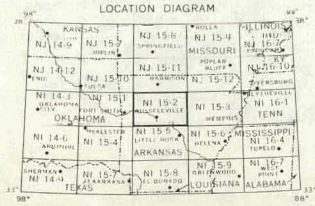
EG&G GEOMETRICS



O - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, $+\sigma$ TO NORTH, $-\sigma$ TO SOUTH.
ON N-S LINES, $+\sigma$ TO WEST, $-\sigma$ TO EAST.

LOCATION DIAGRAM

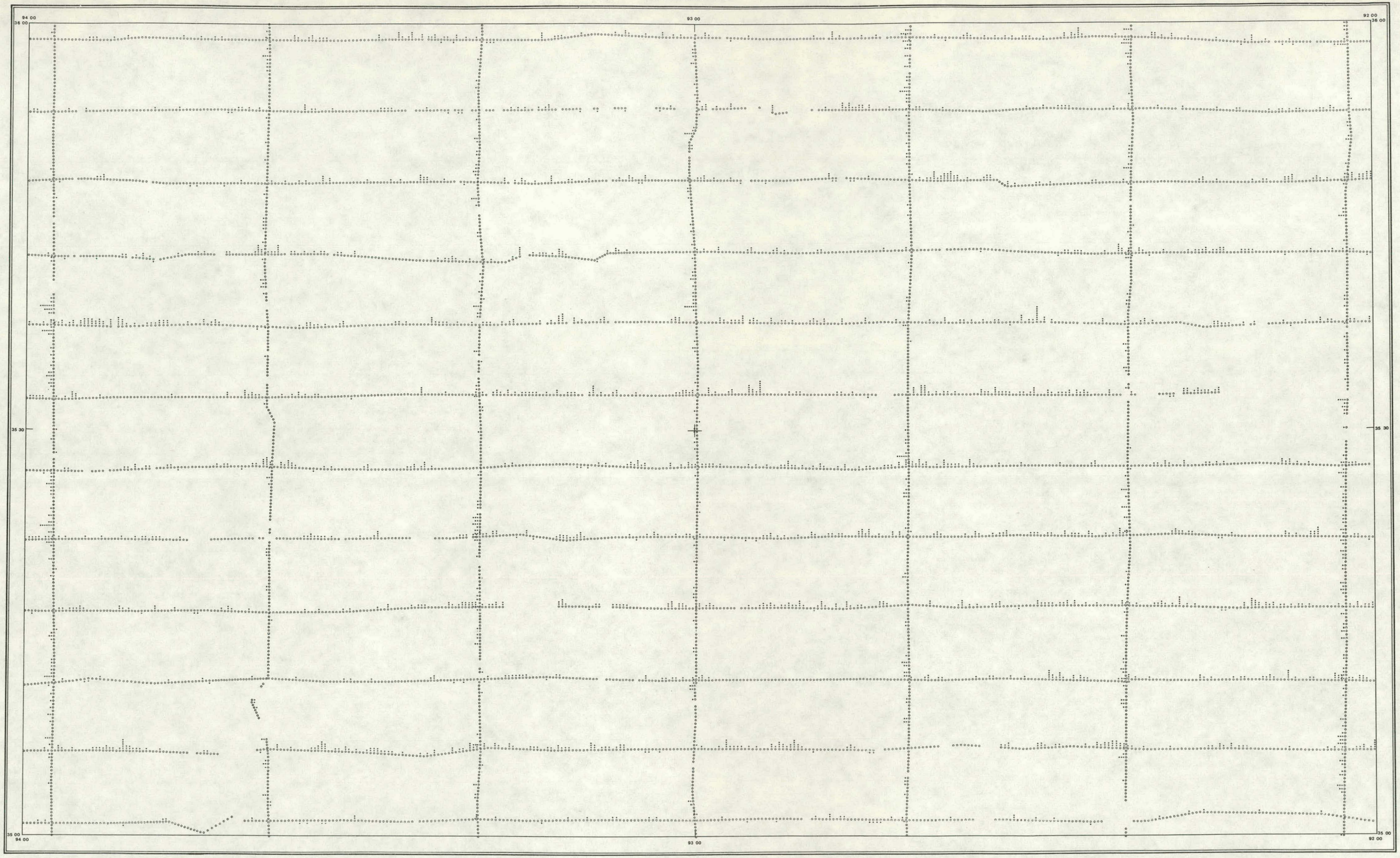


THORIUM/POTASSIUM STANDARD DEVIATION MAP

MISSISSIPPI/FLORIDA PROJECT

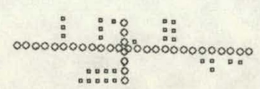
U. S. DEPARTMENT OF ENERGY

RUSSELLVILLE



SCALE: 1:500,000

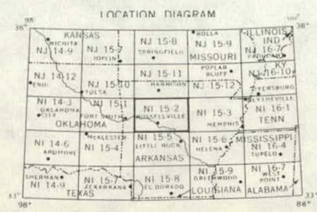
KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES



○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▫ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH.
ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM



URANIUM/POTASSIUM STANDARD DEVIATION MAP

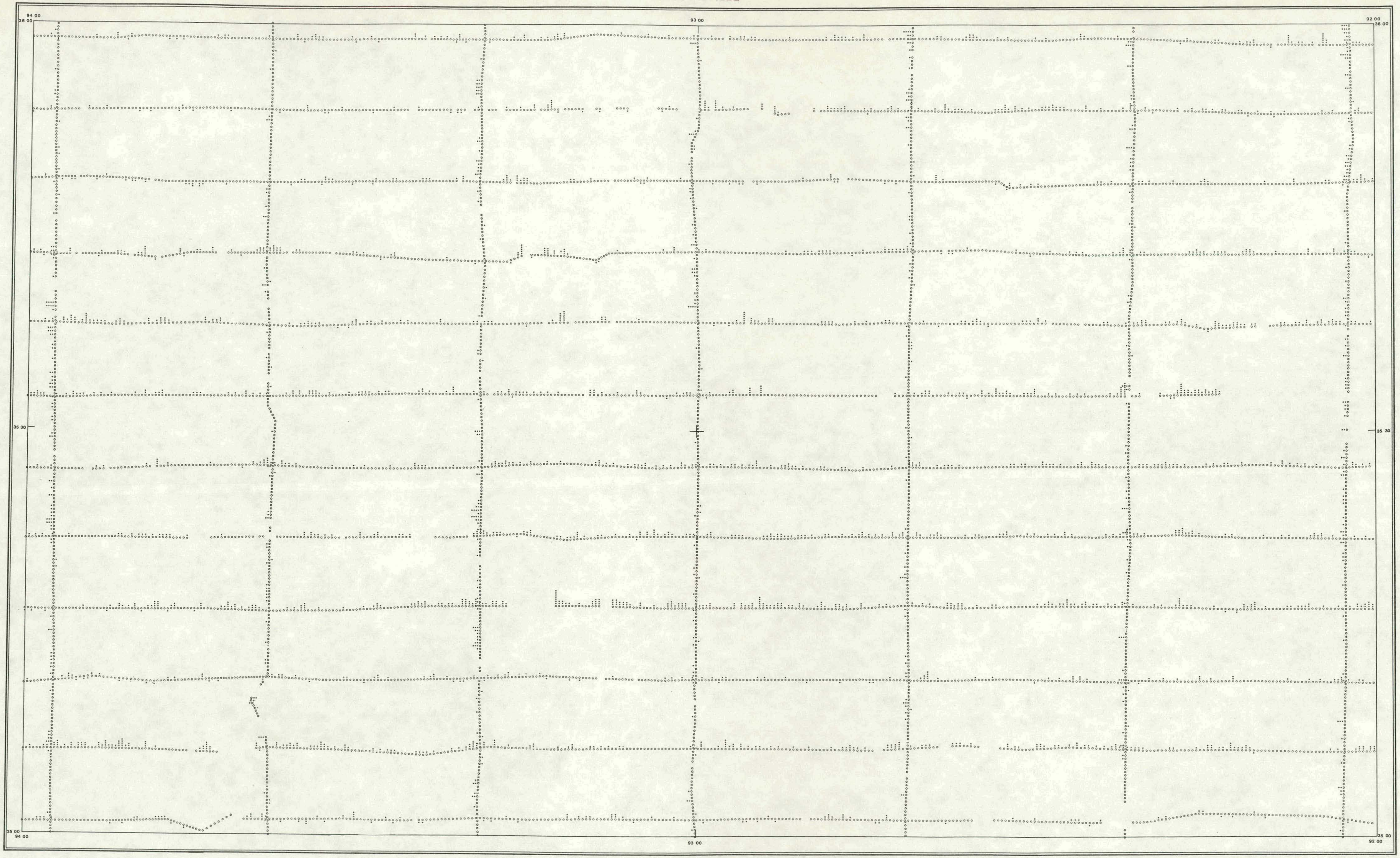
MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

SURVEY AND COMPILATION BY

EG&G GEOMETRICS

RUSSELLVILLE



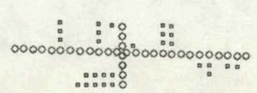
SCALE. 1:500,000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

SURVEY AND COMPILATION BY:

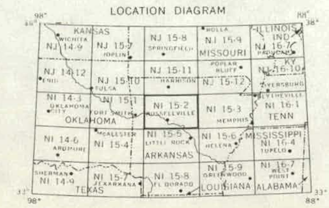
EG&G GEOMETRICS



○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH.
ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM



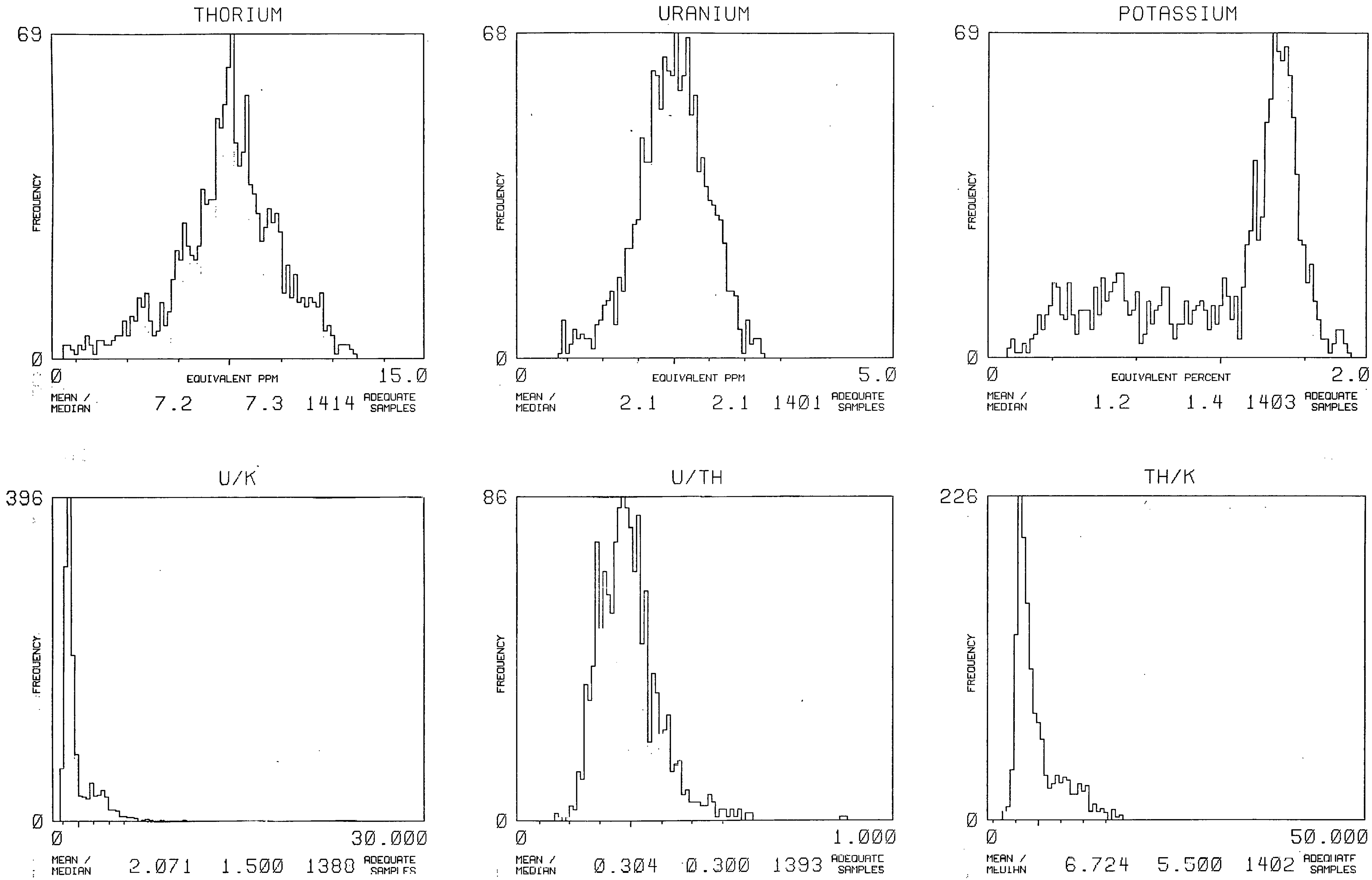
URANIUM/THORIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

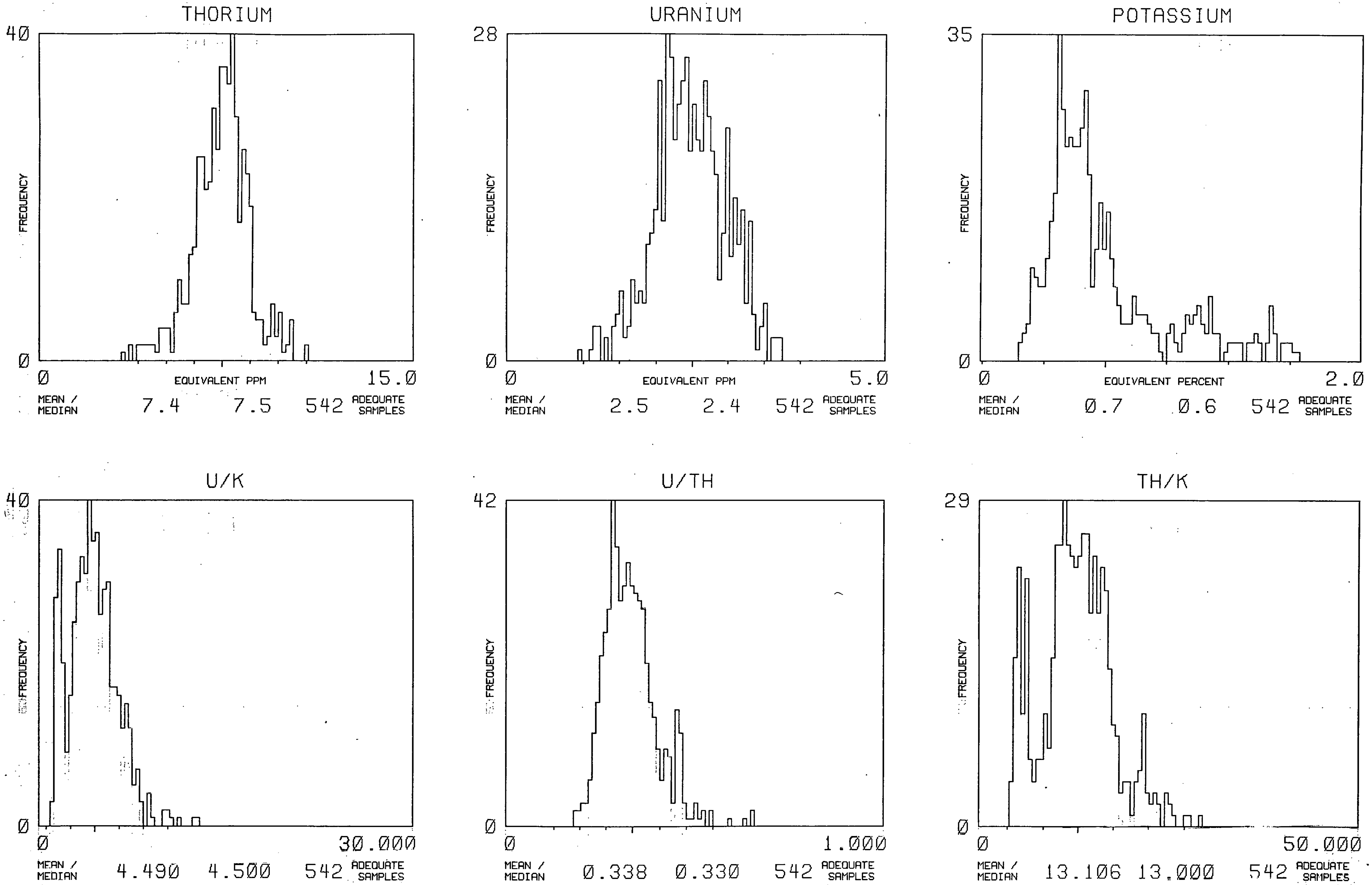
U. S. DEPARTMENT OF ENERGY

APPENDIX F – Histograms and Map Unit Conversion Table

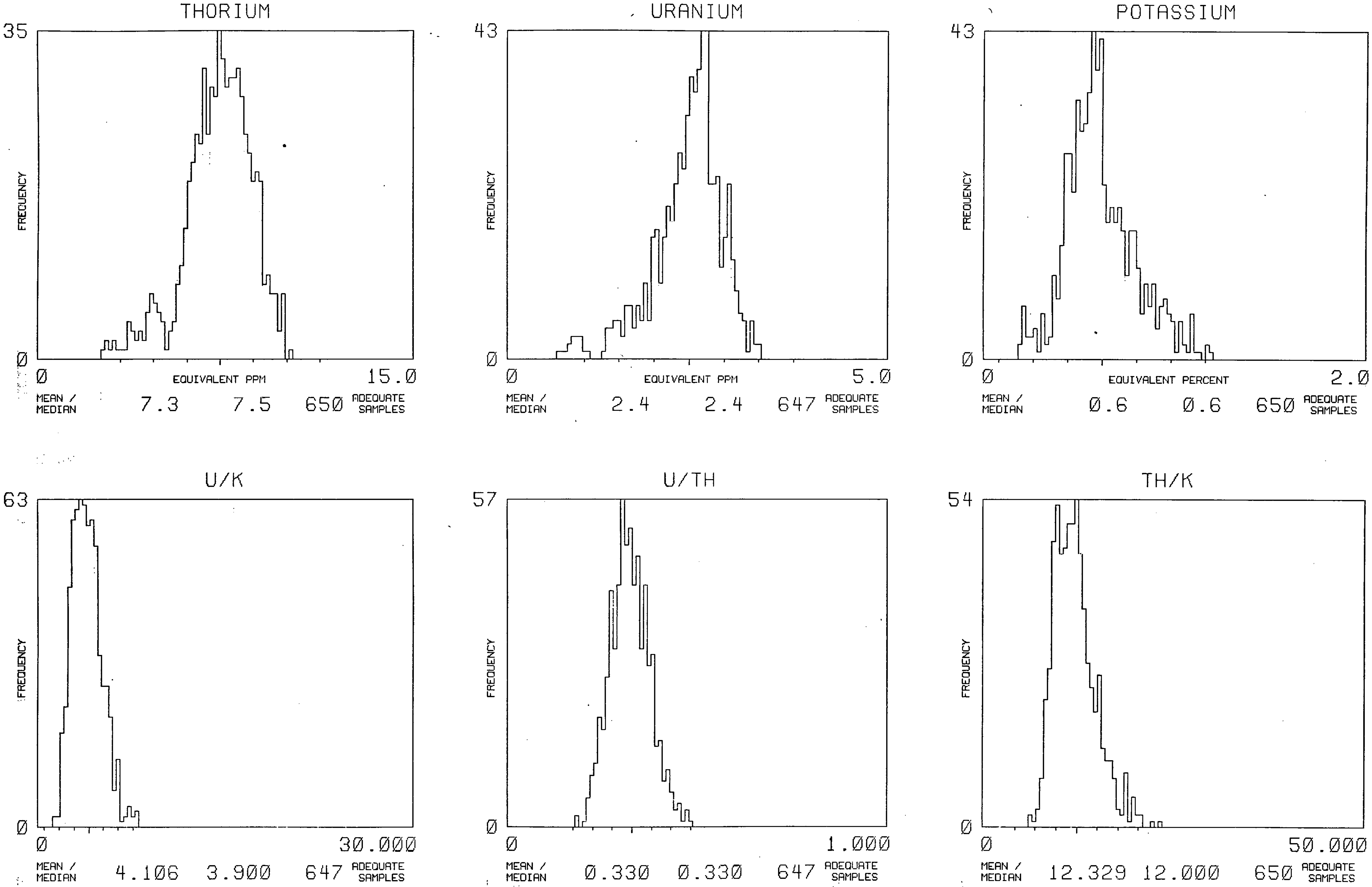
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : QAL TOTAL NUMBER OF SAMPLES 1488



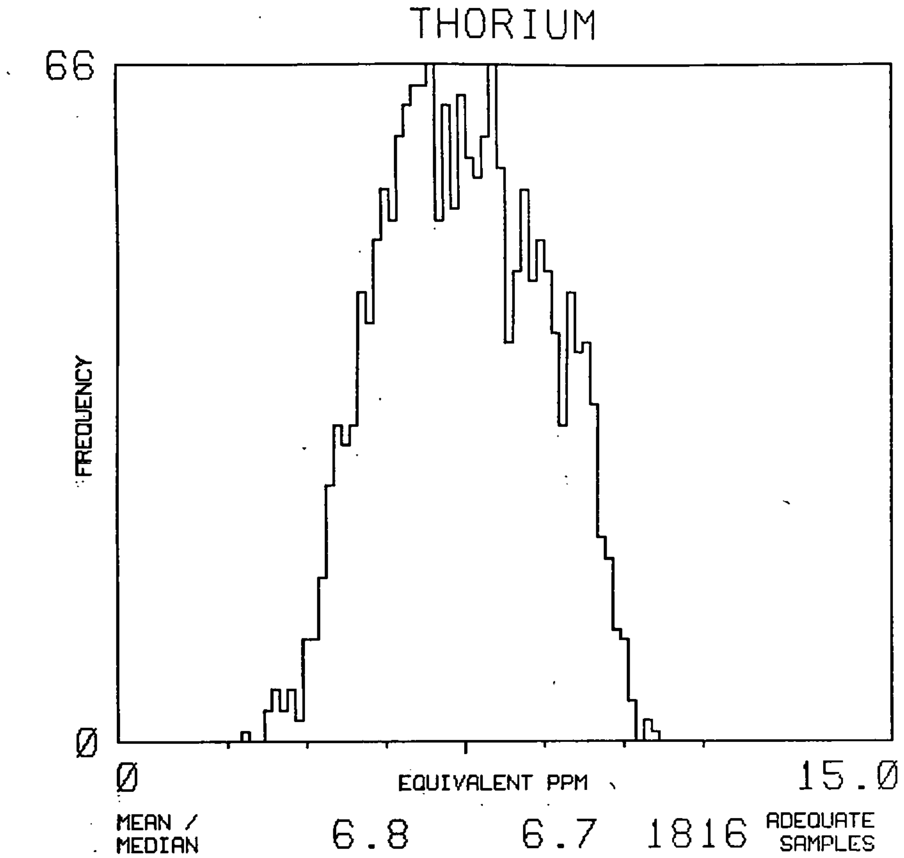
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : QT TOTAL NUMBER OF SAMPLES 546

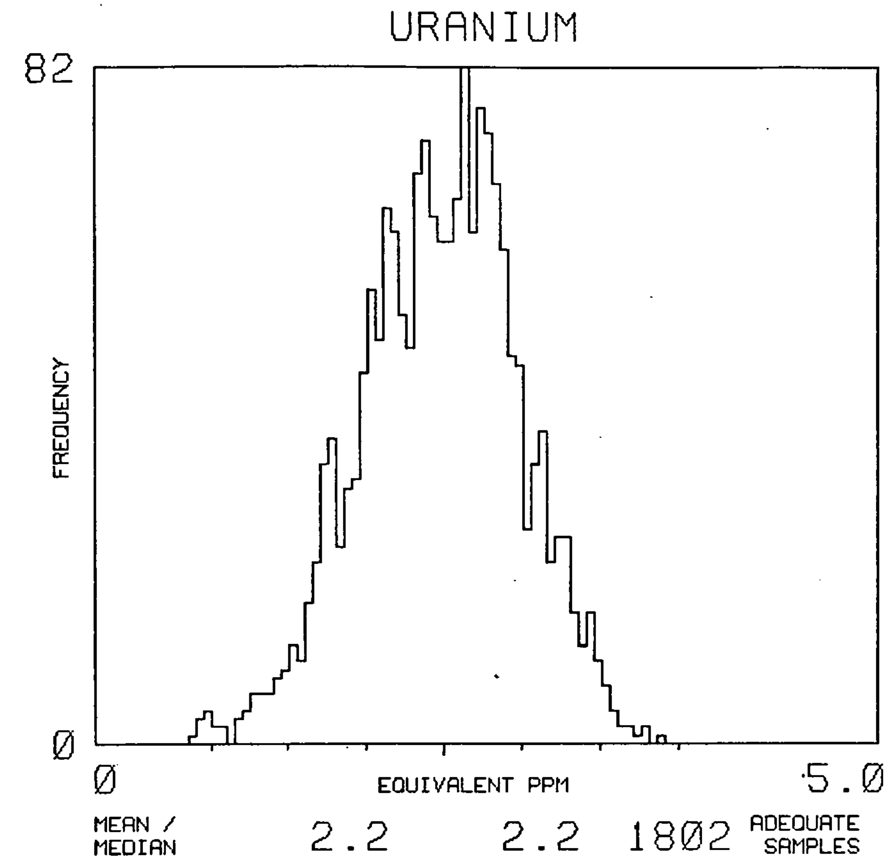


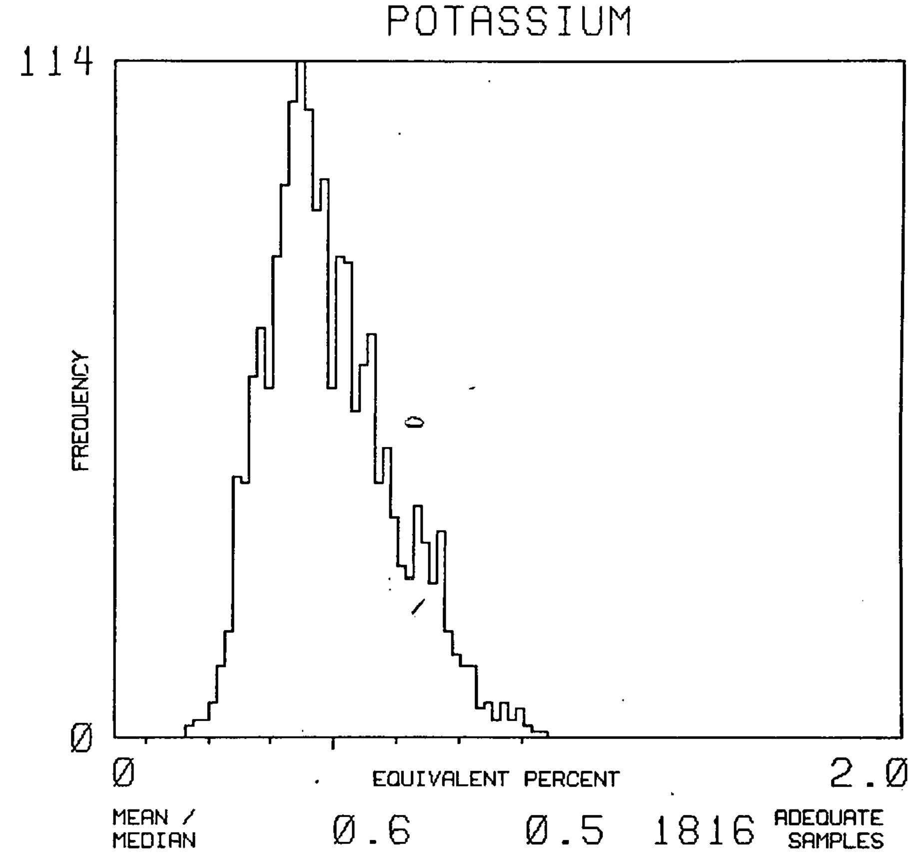
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PSV TOTAL NUMBER OF SAMPLES 653

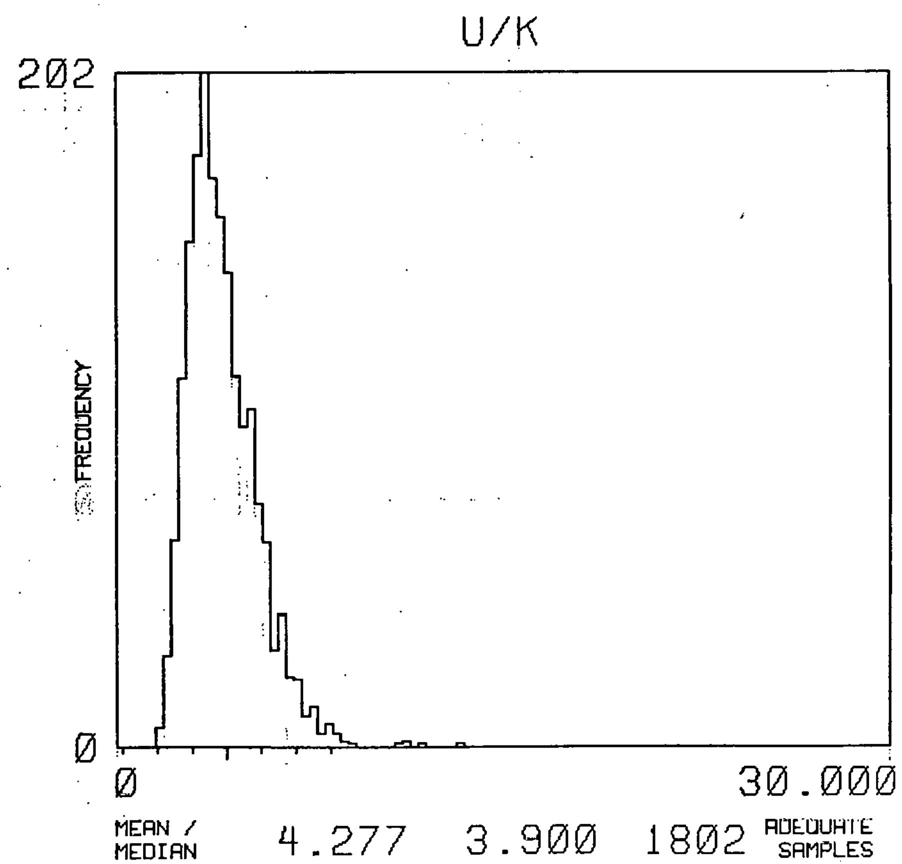


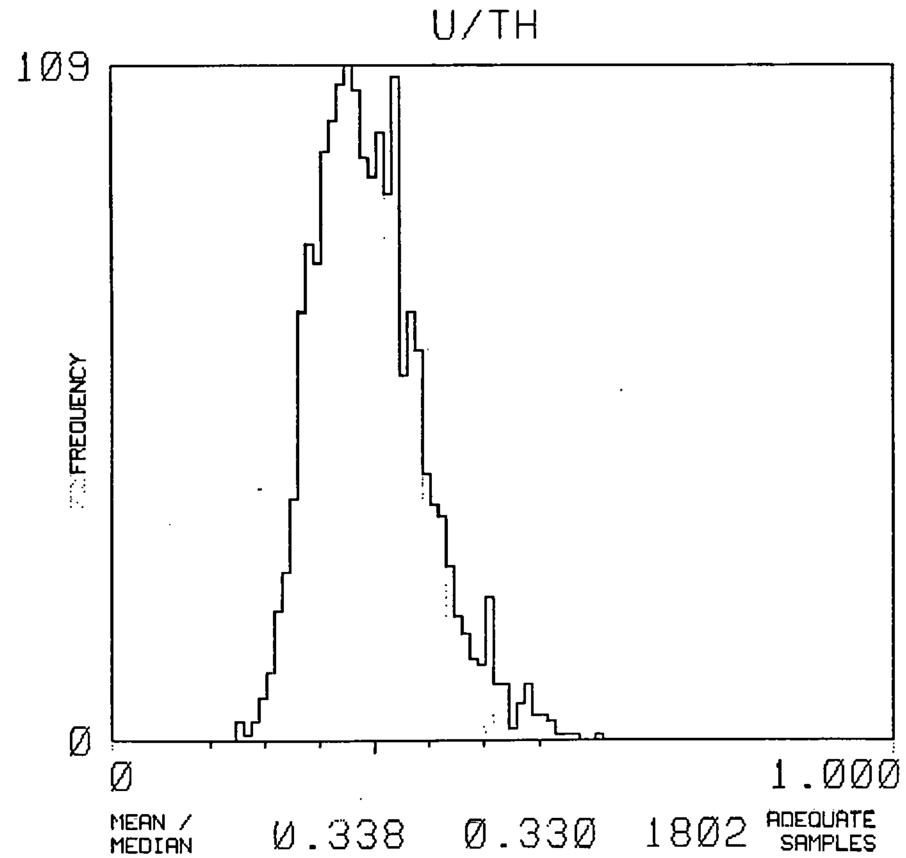
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PMA TOTAL NUMBER OF SAMPLES 1829

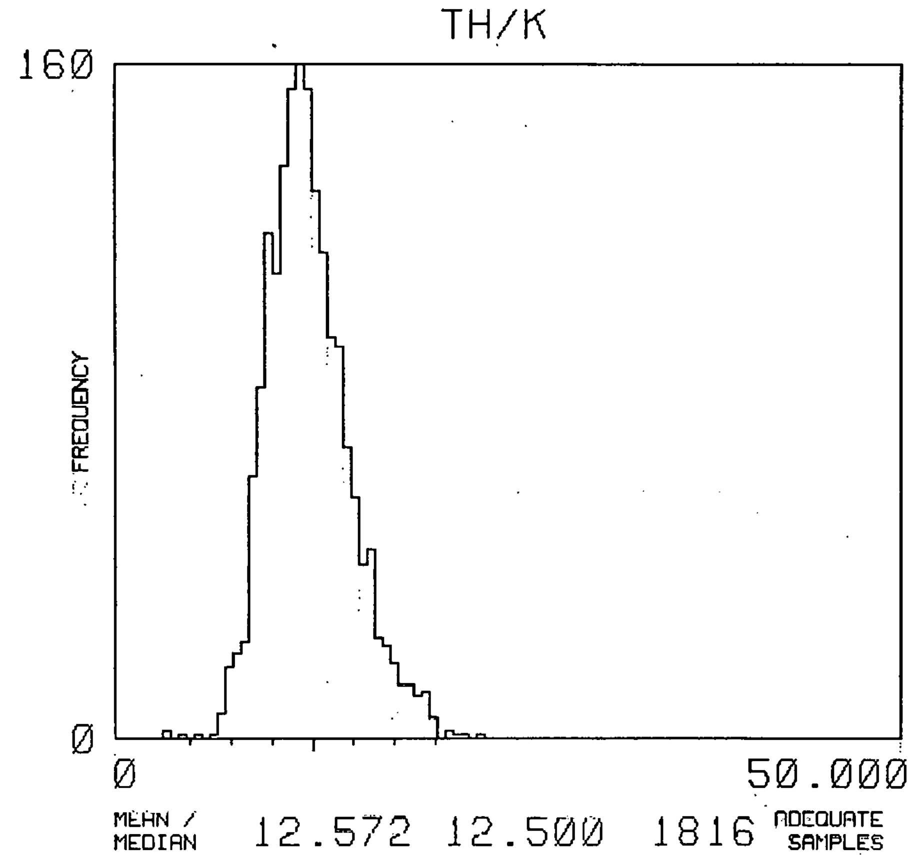




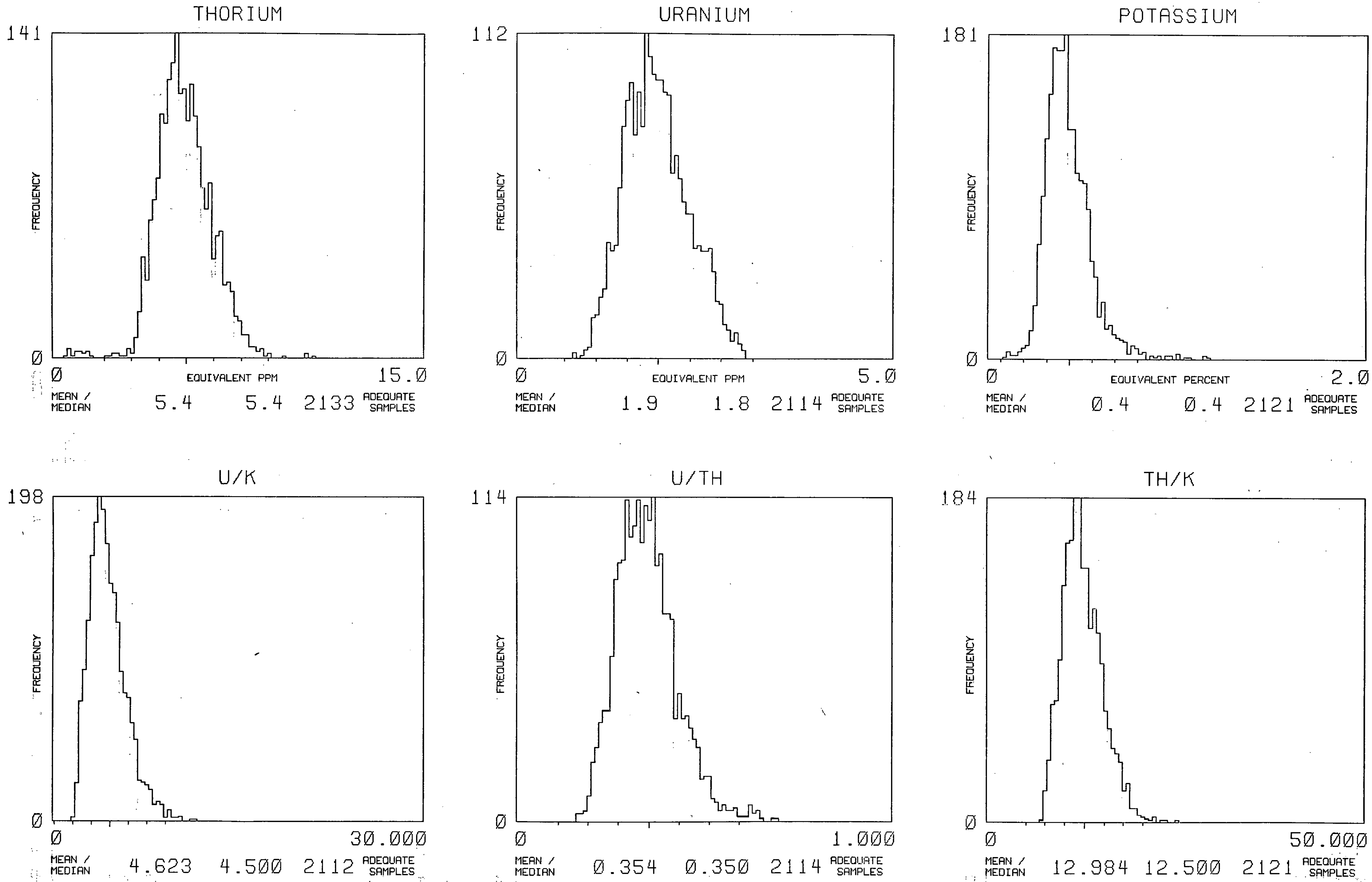


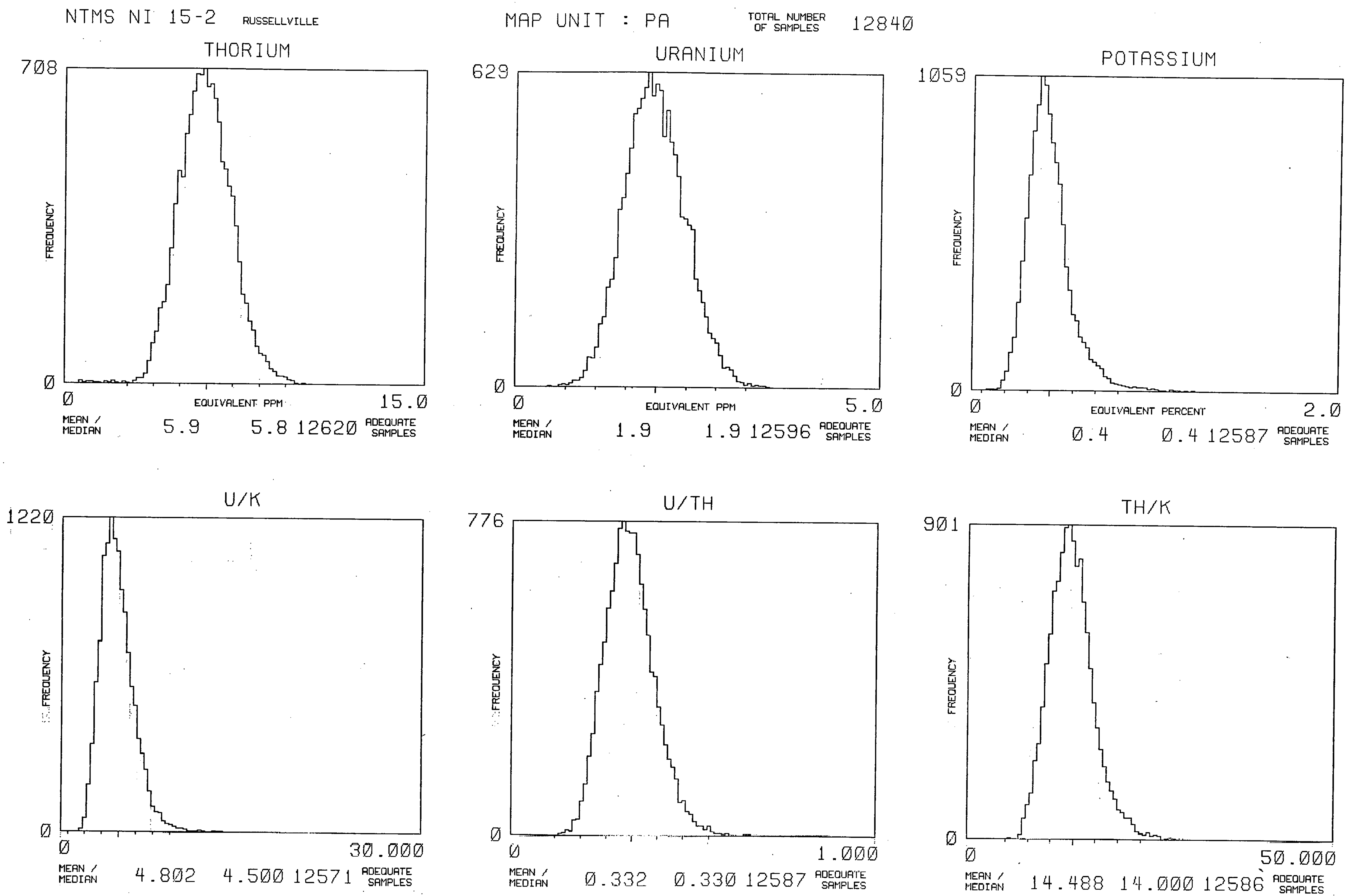






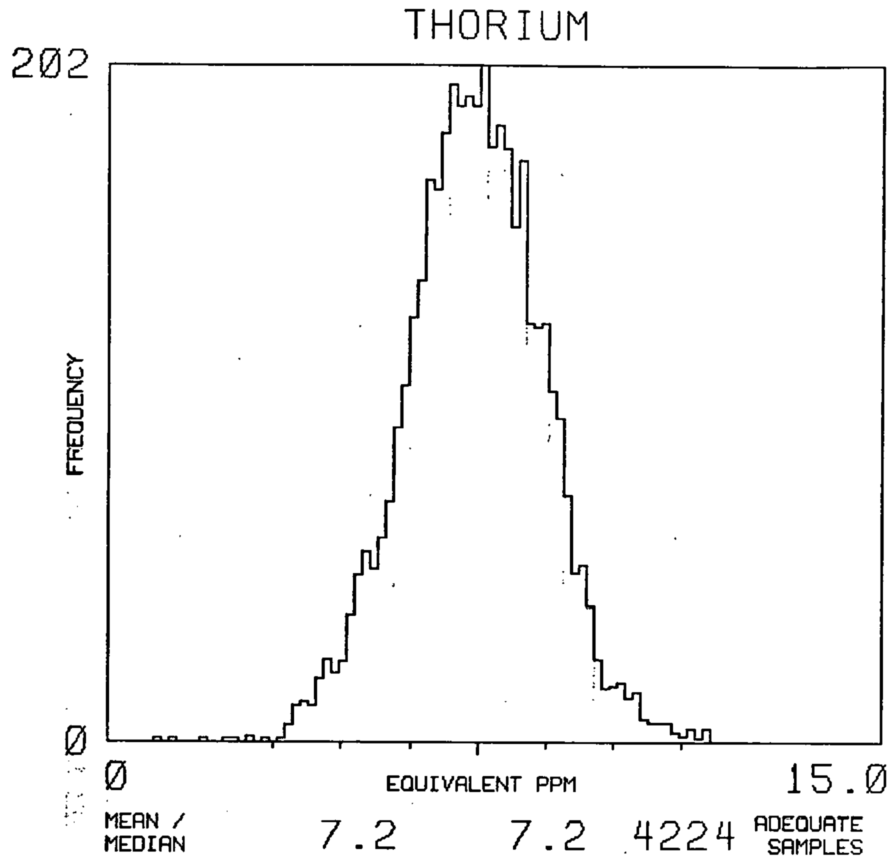
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PHS TOTAL NUMBER OF SAMPLES 2185

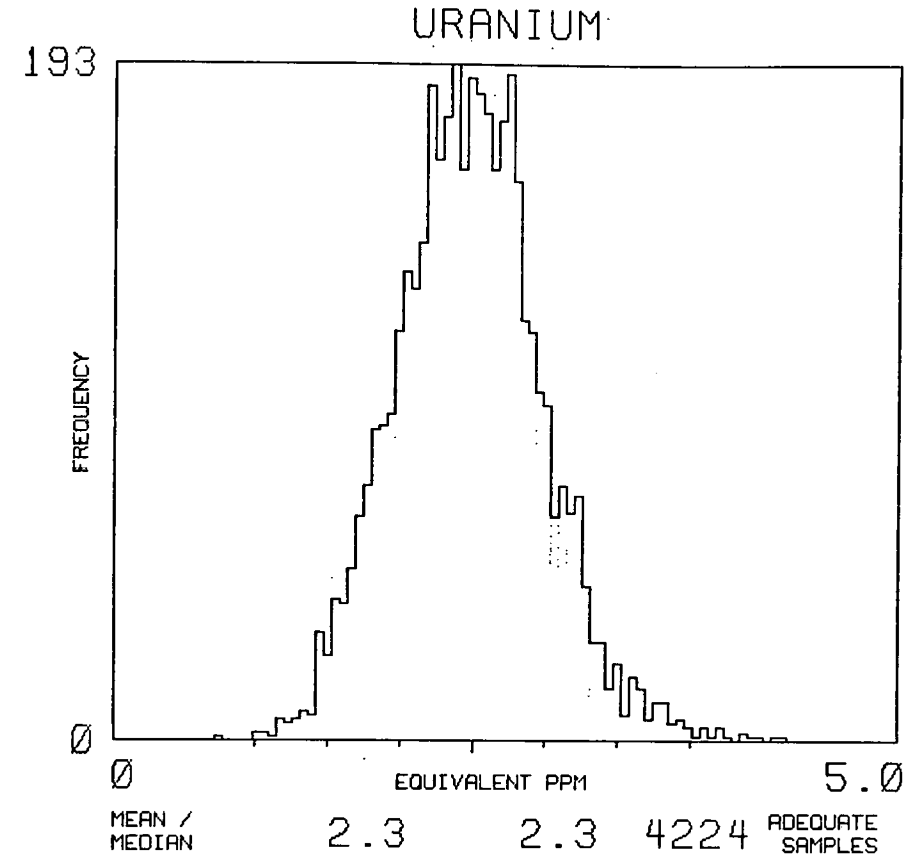


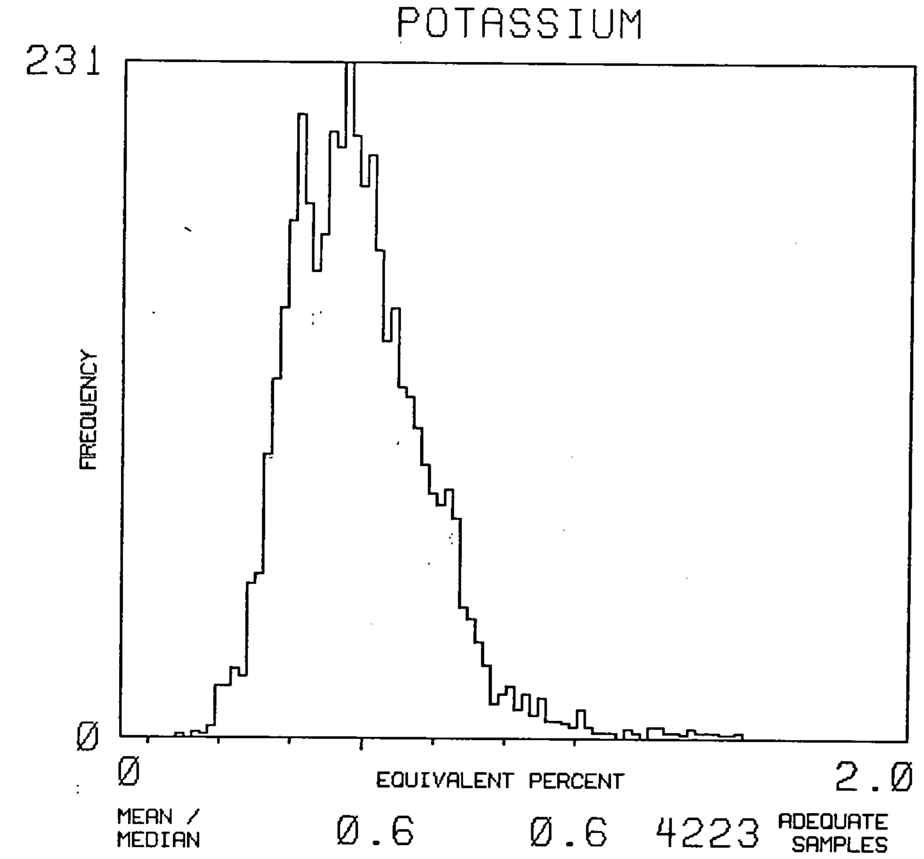

NTMS NI 15-2 RUSSELLVILLE
MAP UNIT : PA
TOTAL NUMBER OF SAMPLES 12840
THORIUM
708
FREQUENCY
0
0
EQUIVALENT PPM
15.0
MEAN / MEDIAN 5.9 5.8 12620 ADEQUATE SAMPLES
URANIUM
629
FREQUENCY
0
0
EQUIVALENT PPM
5.0
MEAN / MEDIAN 1.9 1.9 12596 ADEQUATE SAMPLES
POTASSIUM
1059
FREQUENCY
0
0
EQUIVALENT PERCENT
2.0
MEAN / MEDIAN 0.4 0.4 12587 ADEQUATE SAMPLES
U/K
1220
FREQUENCY
0
0
30.000
MEAN / MEDIAN 4.802 4.500 12571 ADEQUATE SAMPLES
U/TH
776
FREQUENCY
0
0
1.000
MEAN / MEDIAN 0.332 0.330 12587 ADEQUATE SAMPLES
TH/K
901
FREQUENCY
0
0
50.000
MEAN / MEDIAN 14.488 14.000 12586 ADEQUATE SAMPLES

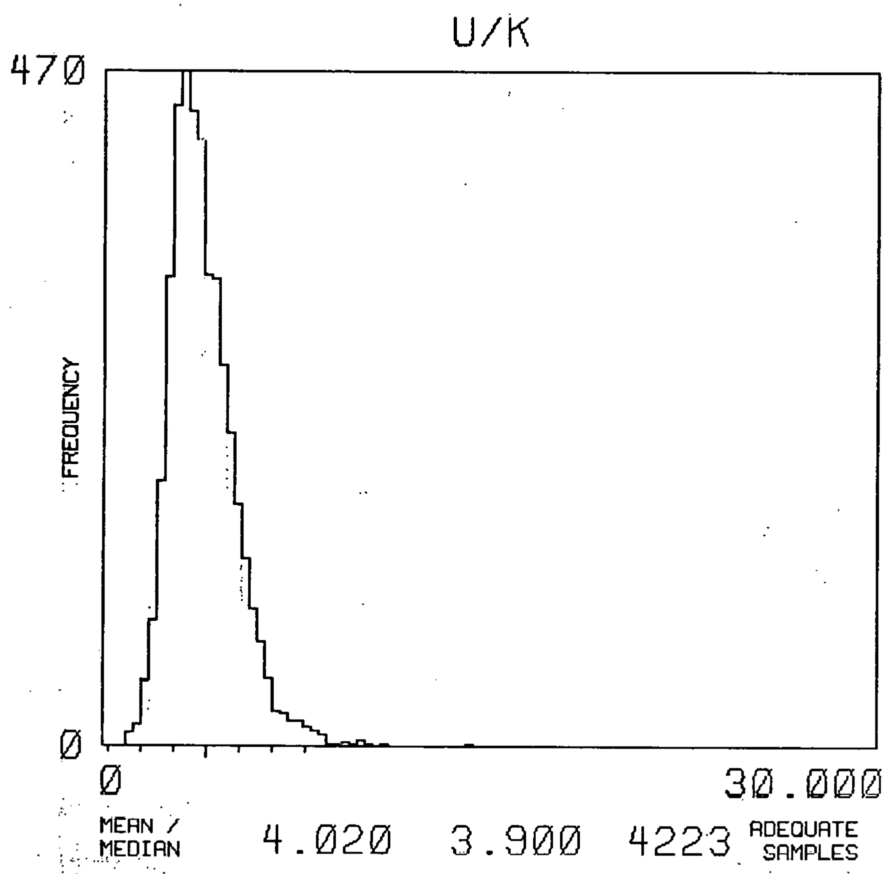
F6r

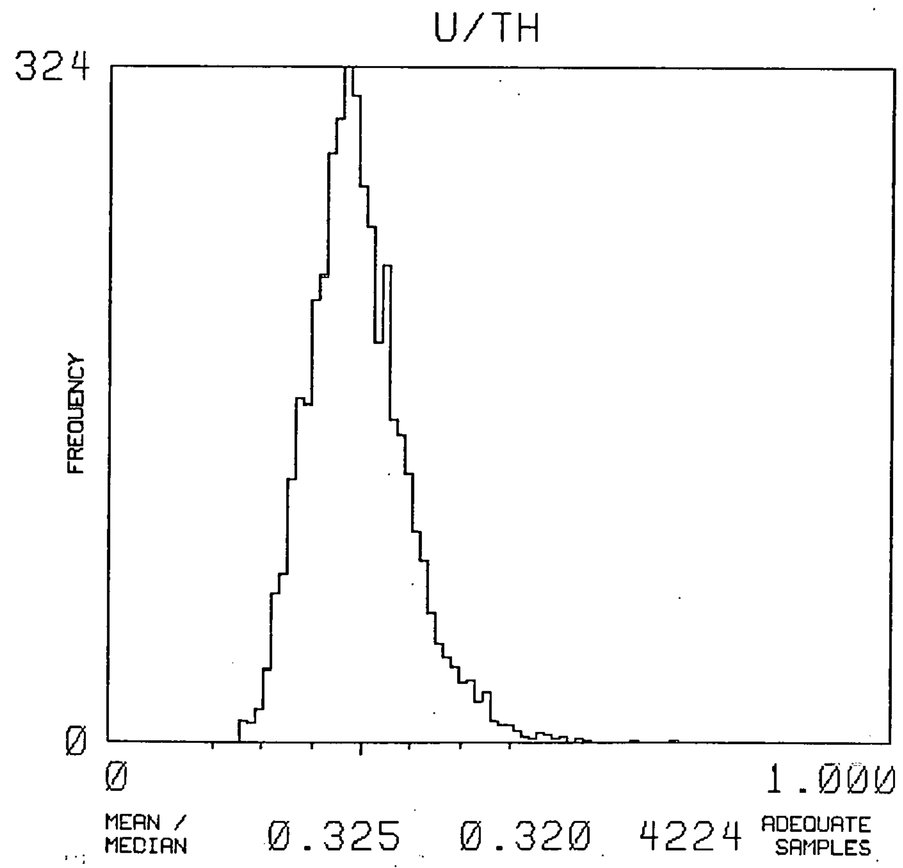
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PAU TOTAL NUMBER OF SAMPLES 4291

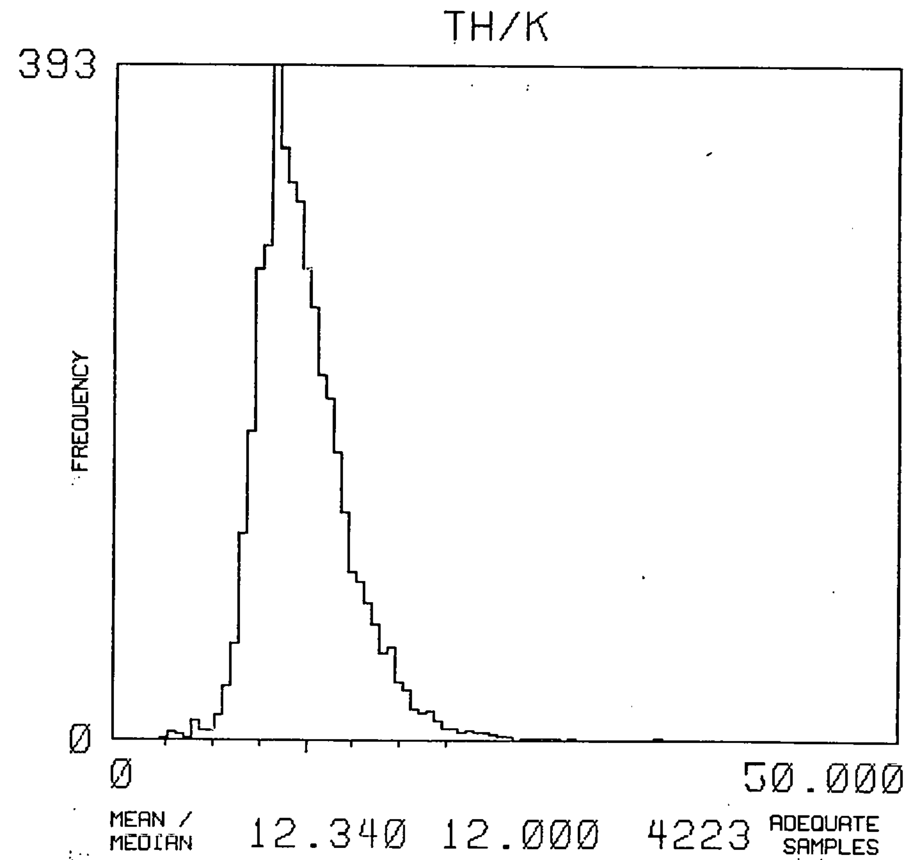




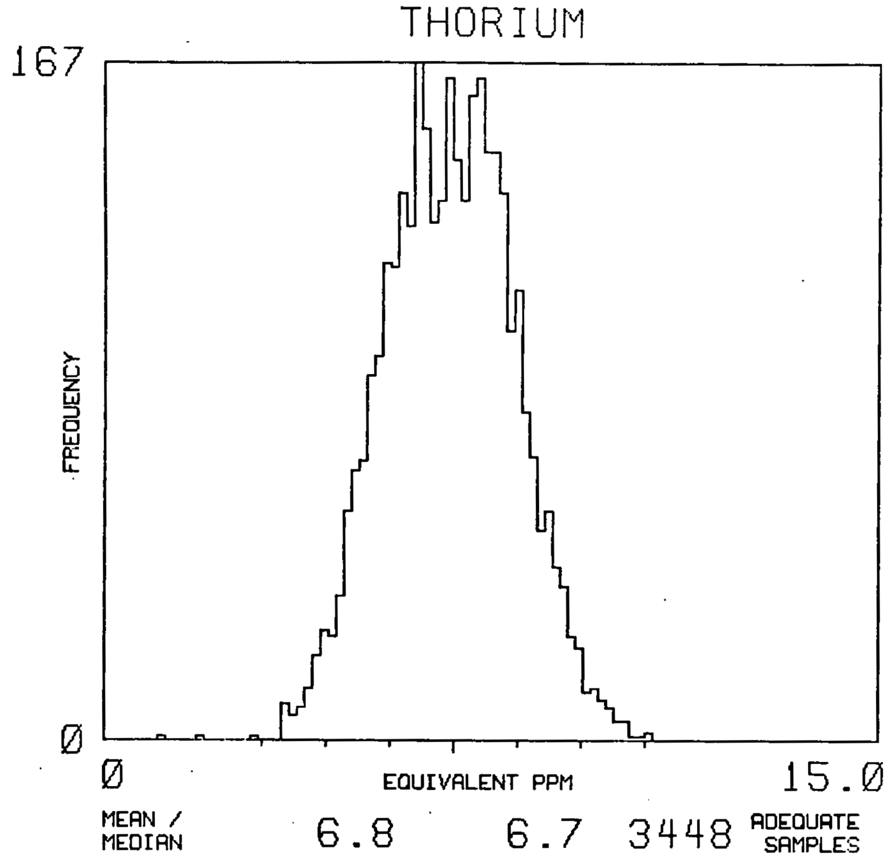


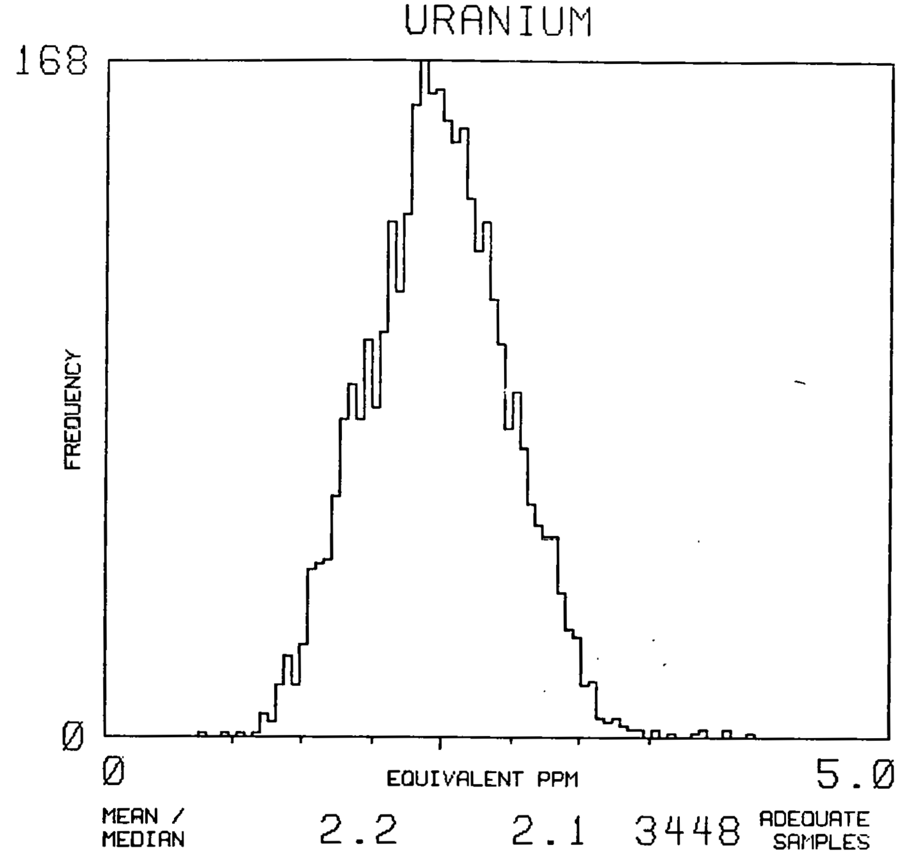


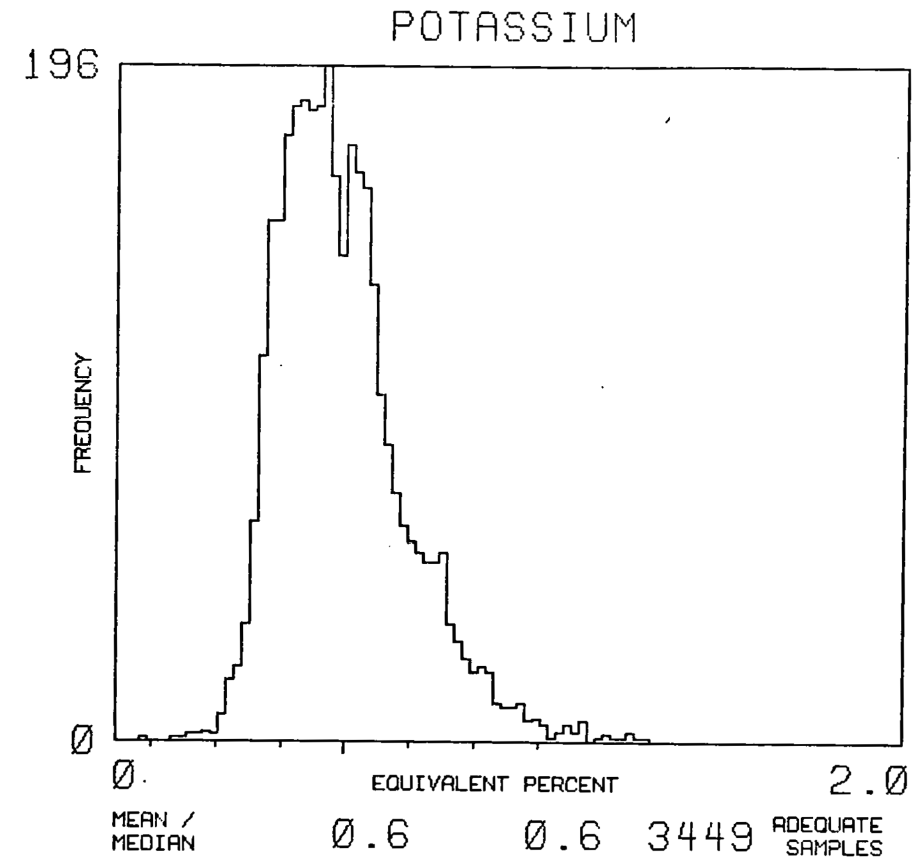


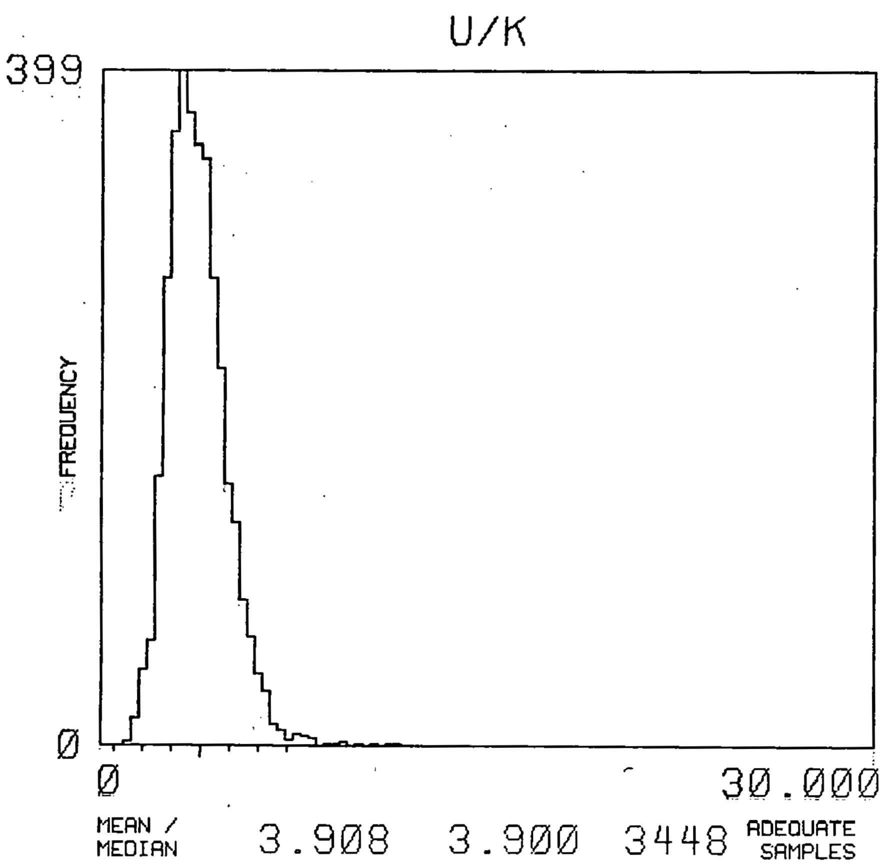


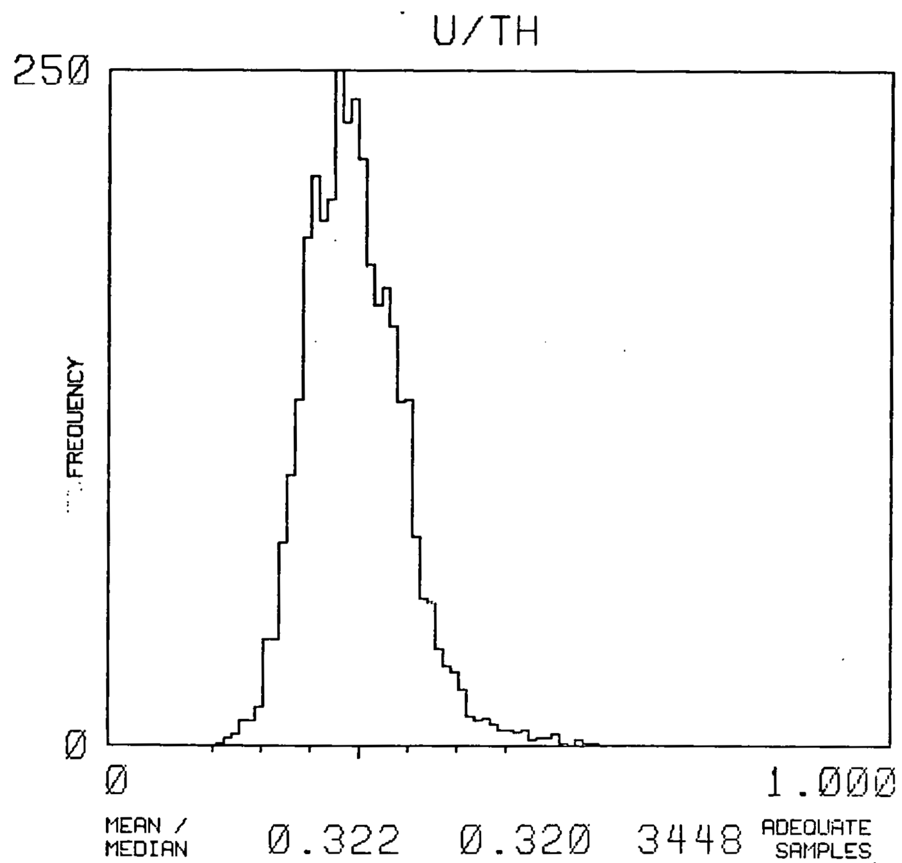
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PAM TOTAL NUMBER OF SAMPLES 3457 F8r

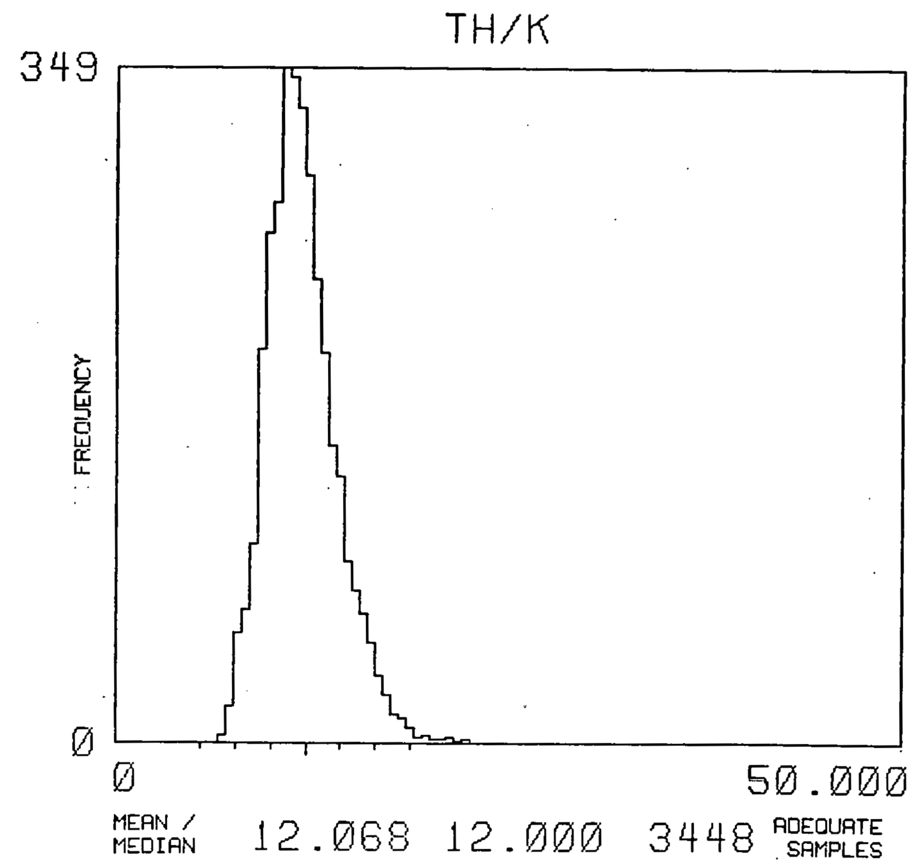










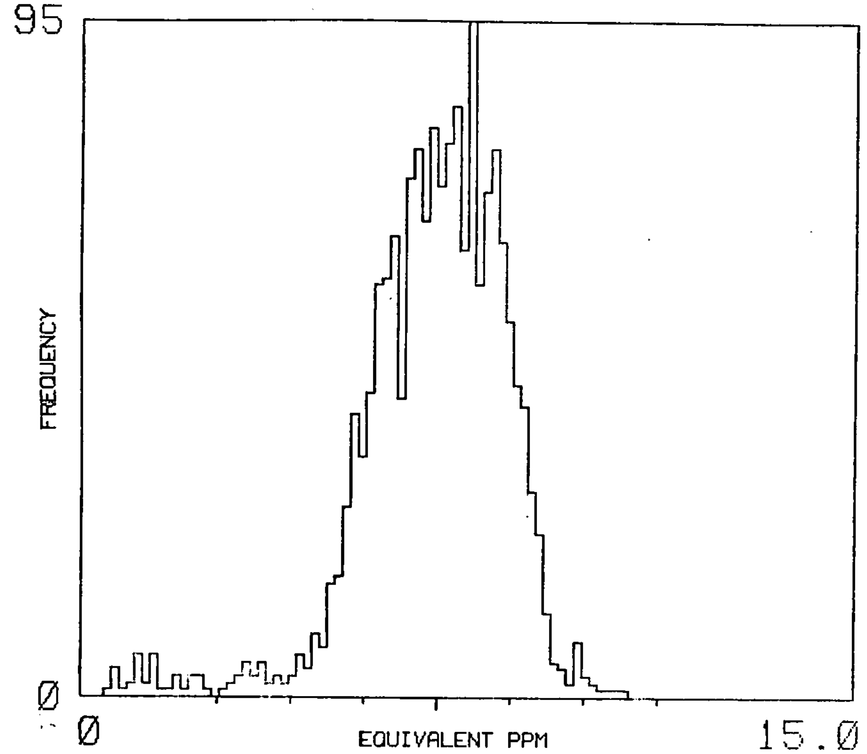


NTMS NI 15-2 RUSSELLVILLE

MAP UNIT : PAL

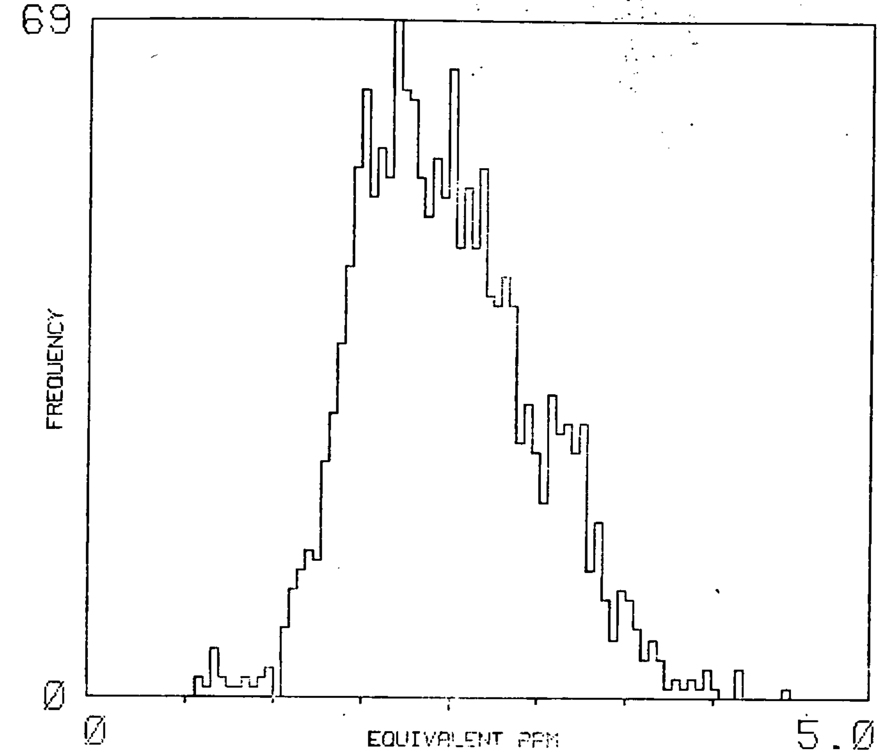
TOTAL NUMBER OF SAMPLES 1753

THORIUM



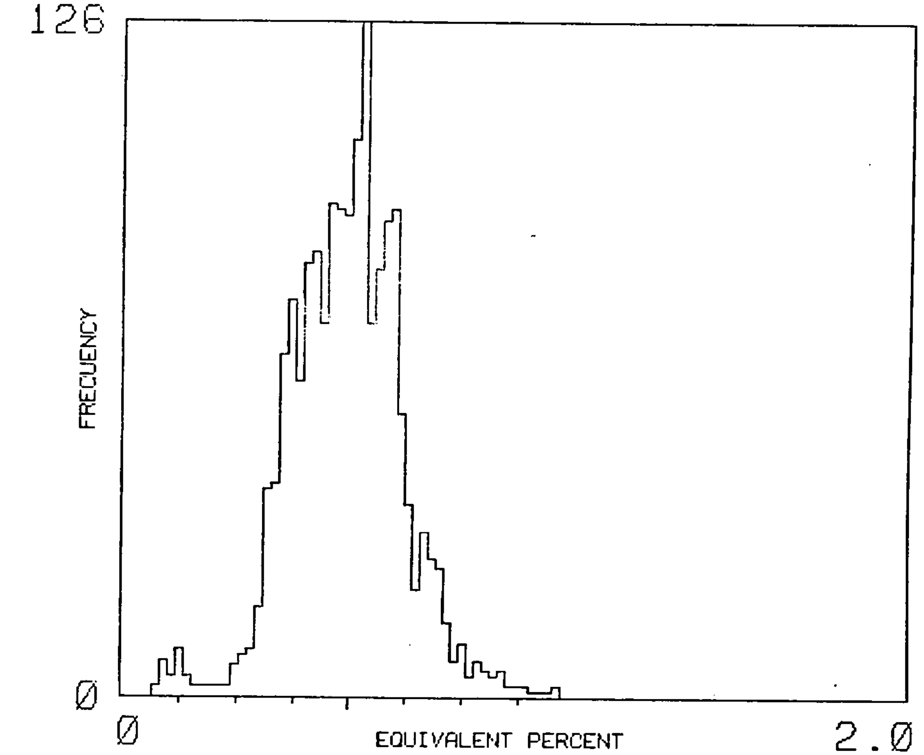
MEAN / MEDIAN 6.9 7.Ø 1679 ADEQUATE SAMPLES

URANIUM



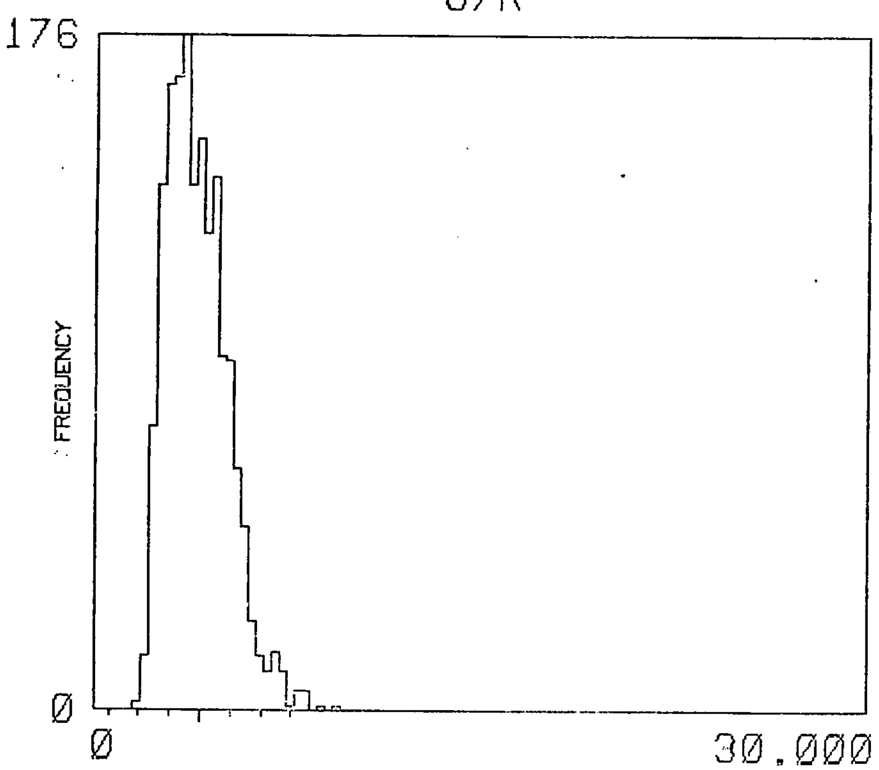
MEAN / MEDIAN 2.3 2.2 1659 ADEQUATE SAMPLES

POTASSIUM



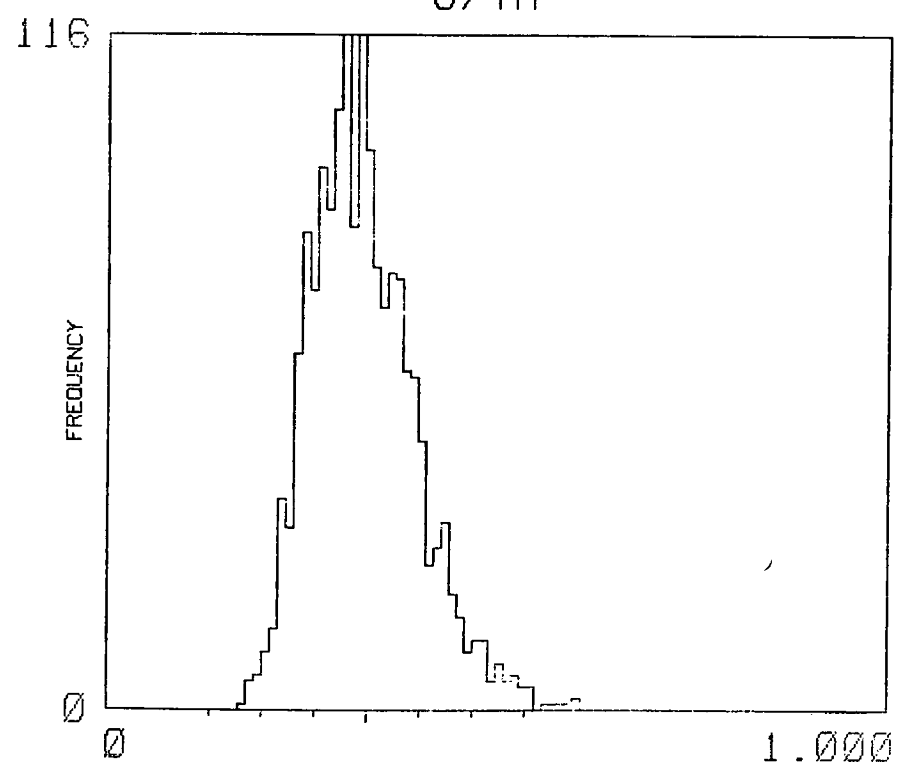
MEAN / MEDIAN Ø.6 Ø.6 1676 ADEQUATE SAMPLES

U/K



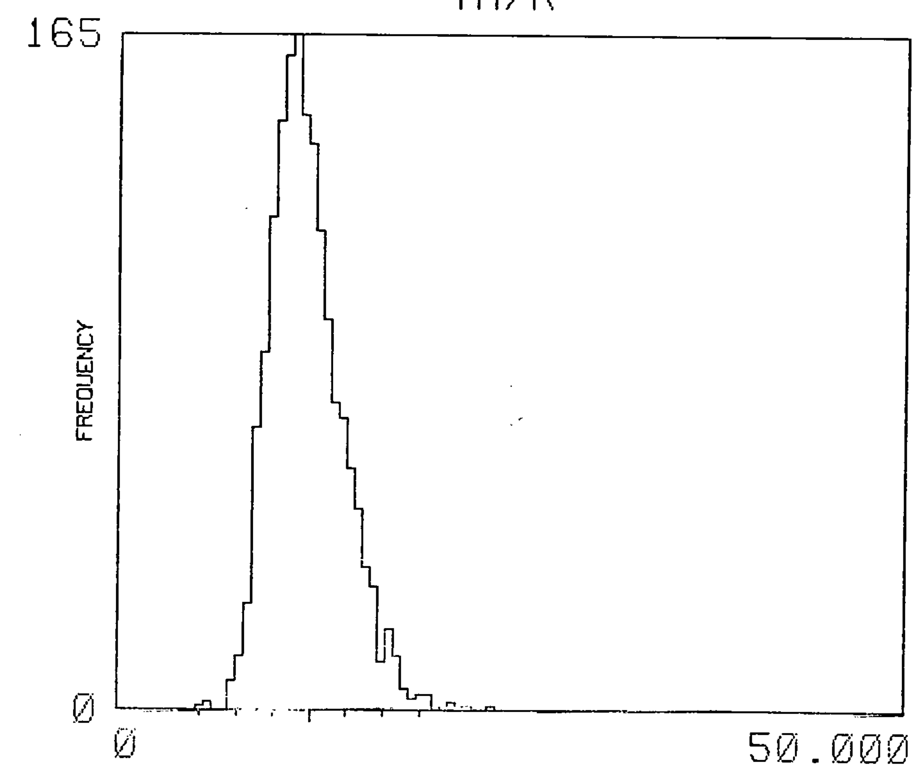
MEAN / MEDIAN 4.12Ø 3.9ØØ 1659 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN Ø.335 Ø.33Ø 1659 ADEQUATE SAMPLES

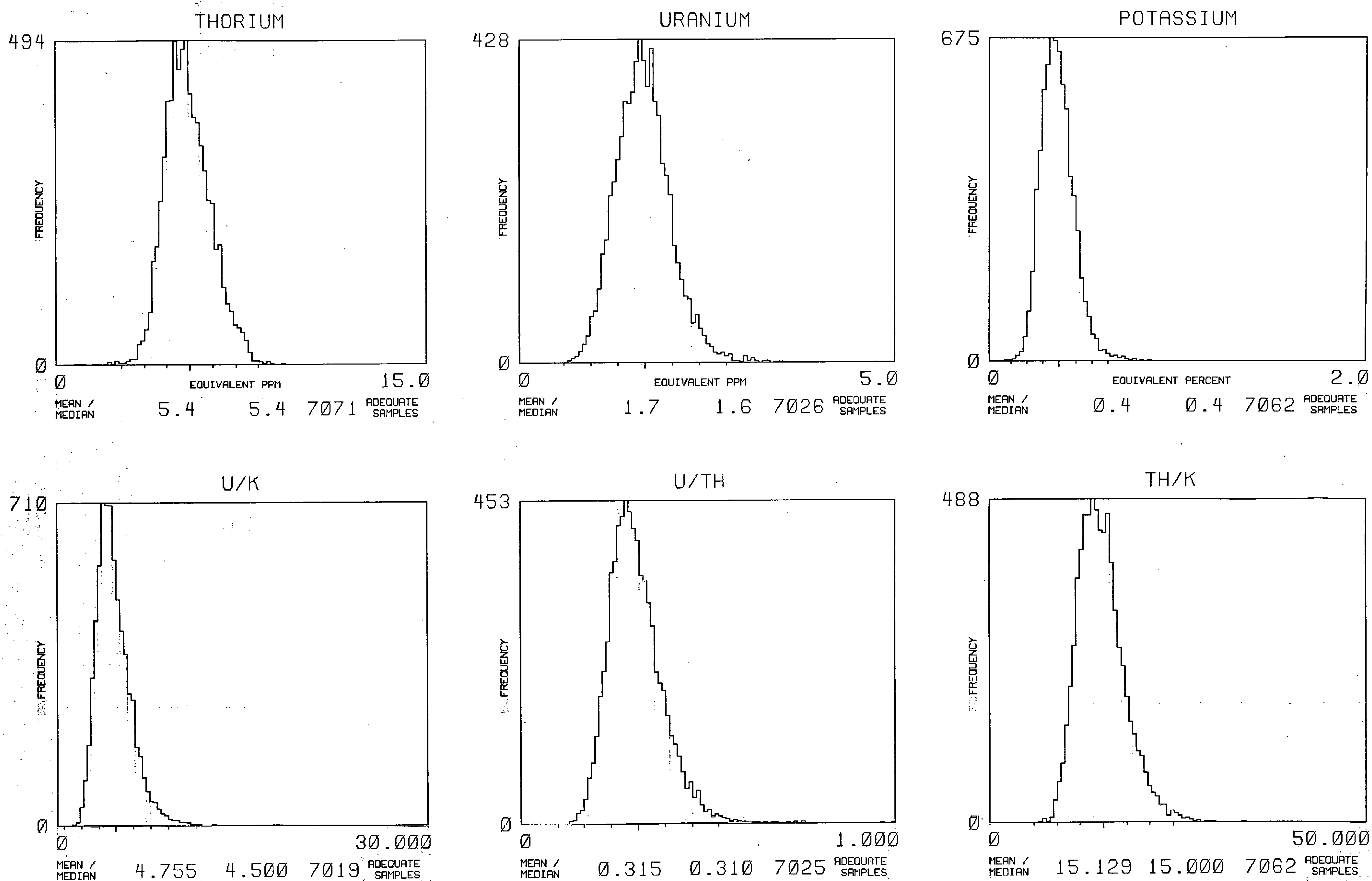
TH/K



MEAN / MEDIAN 12.231 12.ØØØ 1675 ADEQUATE SAMPLES

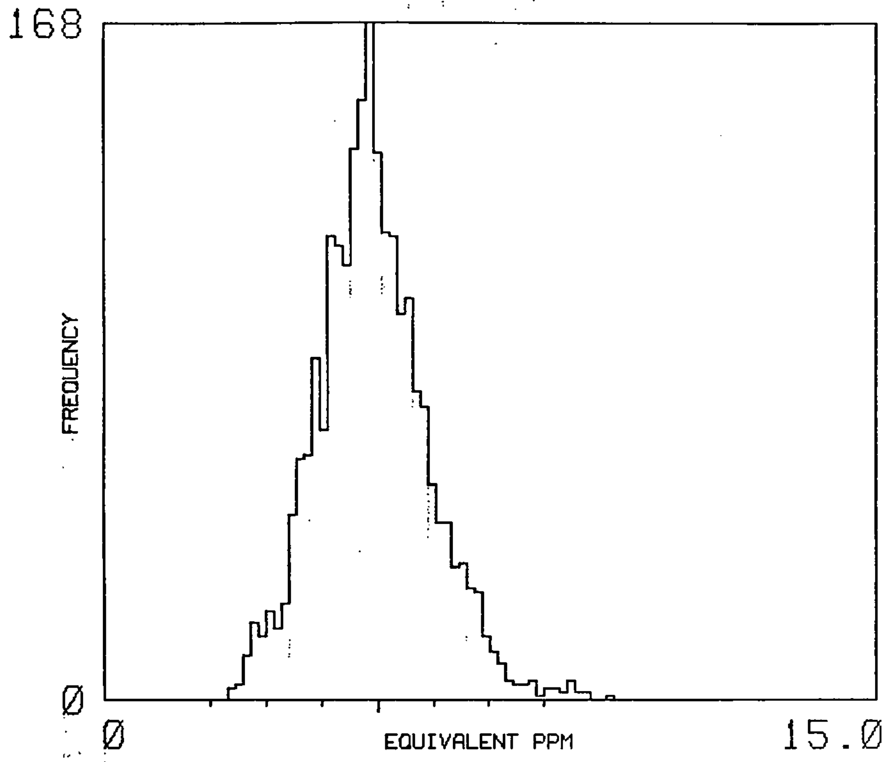
F10r

NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PBH TOTAL NUMBER OF SAMPLES 7316



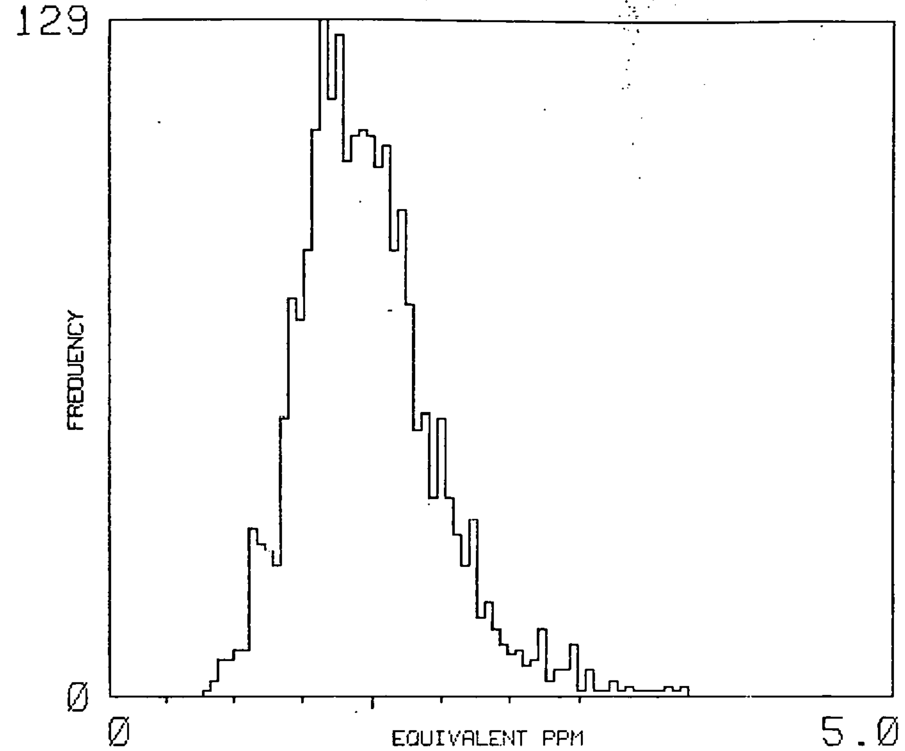
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : PHC TOTAL NUMBER OF SAMPLES 2351

THORIUM



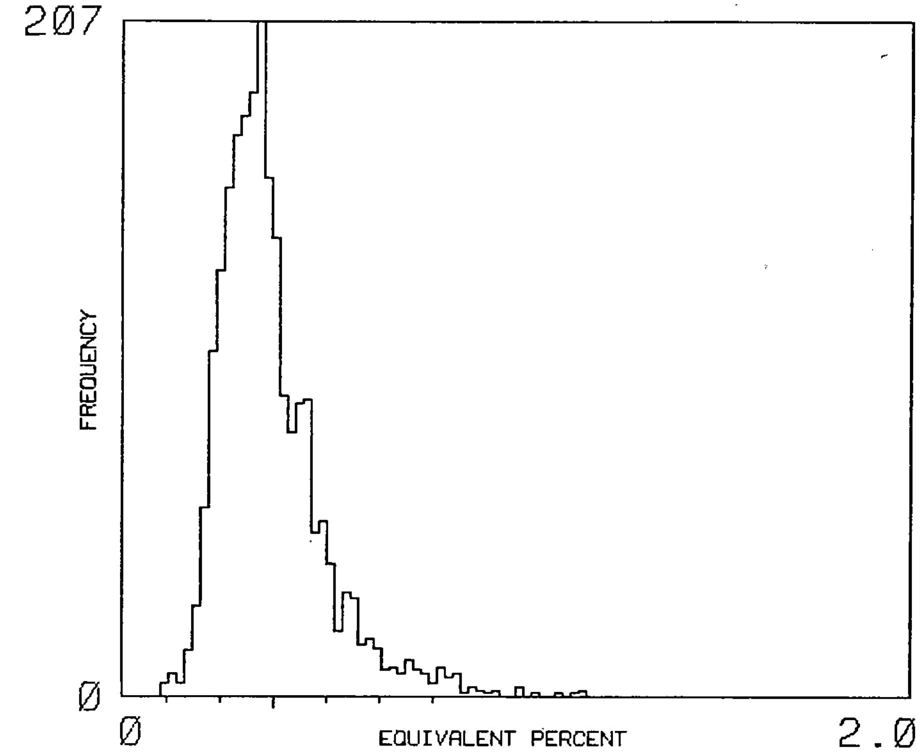
MEAN / MEDIAN 5.3 5.2 2277 ADEQUATE SAMPLES

URANIUM



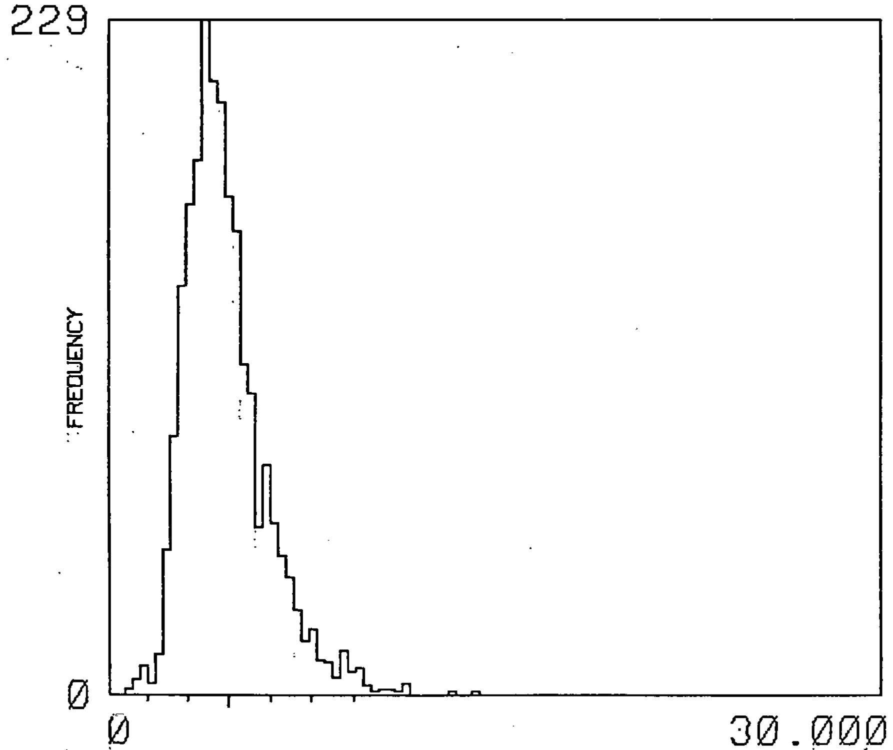
MEAN / MEDIAN 1.7 1.6 2265 ADEQUATE SAMPLES

POTASSIUM



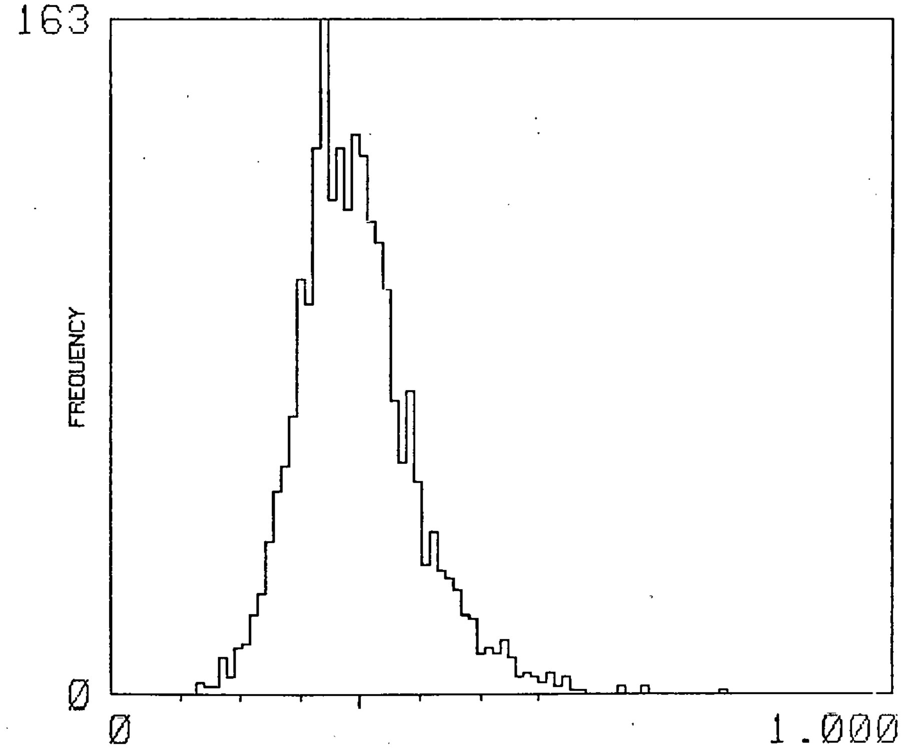
MEAN / MEDIAN Ø.4 Ø.4 2273 ADEQUATE SAMPLES

U/K



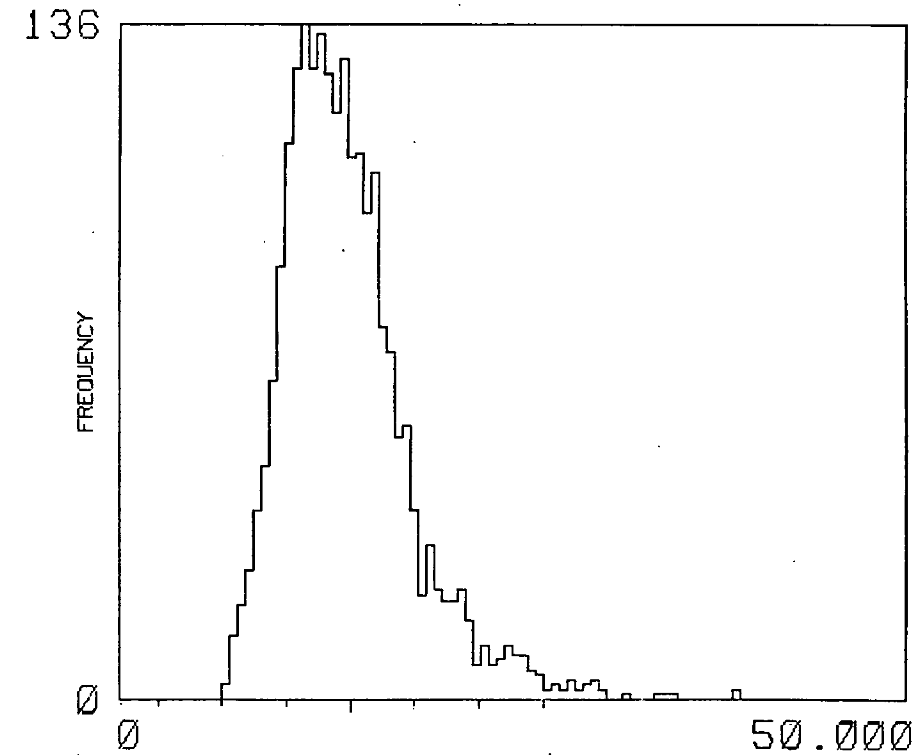
MEAN / MEDIAN 4.685 4.5ØØ 2261 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN Ø.321 Ø.31Ø 2265 ADEQUATE SAMPLES

TH/K



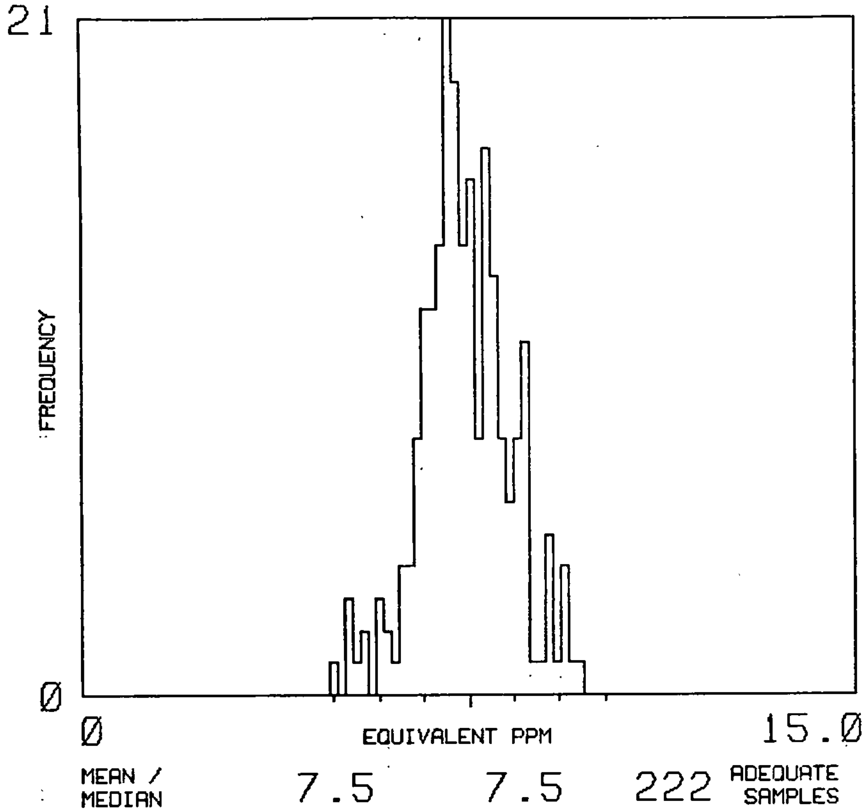
MEAN / MEDIAN 14.7ØØ 14.ØØØ 2273 ADEQUATE SAMPLES

NTMS NI 15-2 RUSSELLVILLE

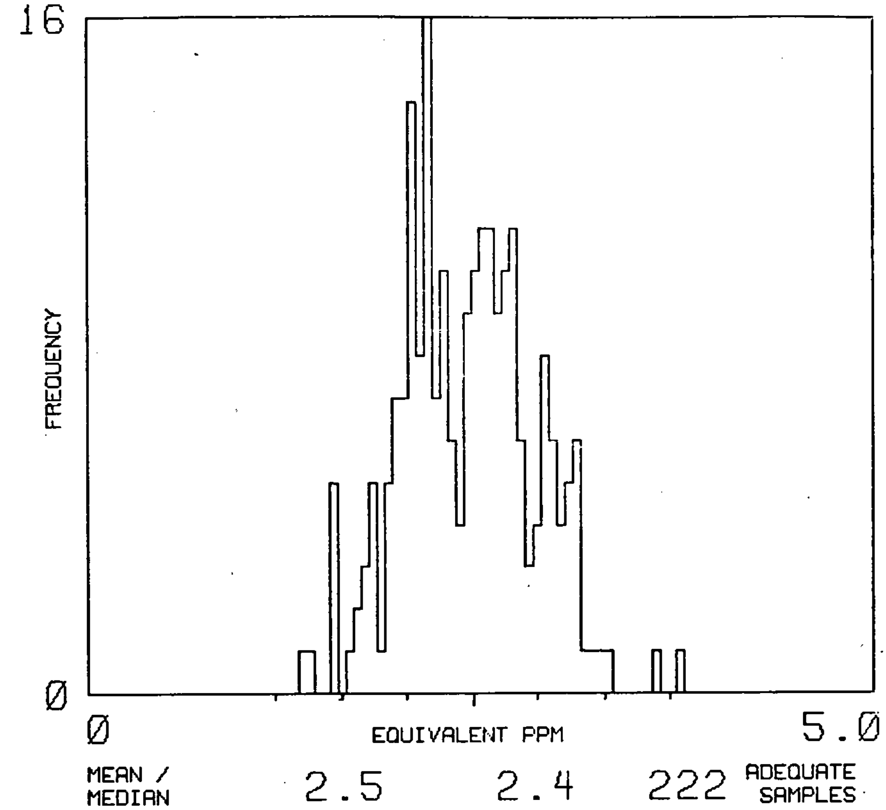
MAP UNIT : PJ

TOTAL NUMBER OF SAMPLES 222

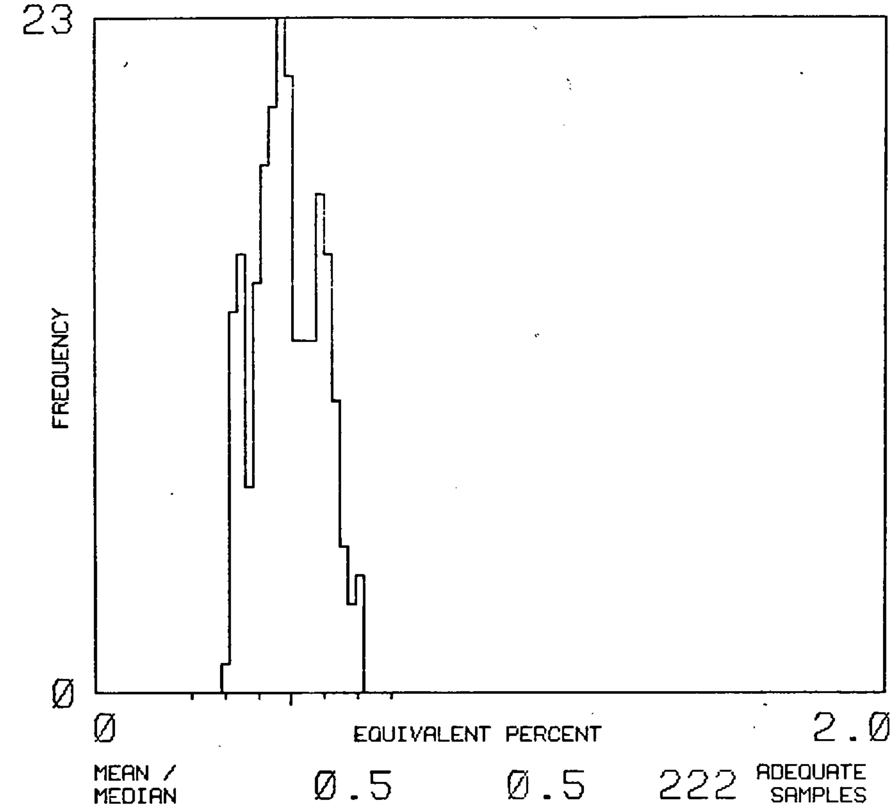
THORIUM



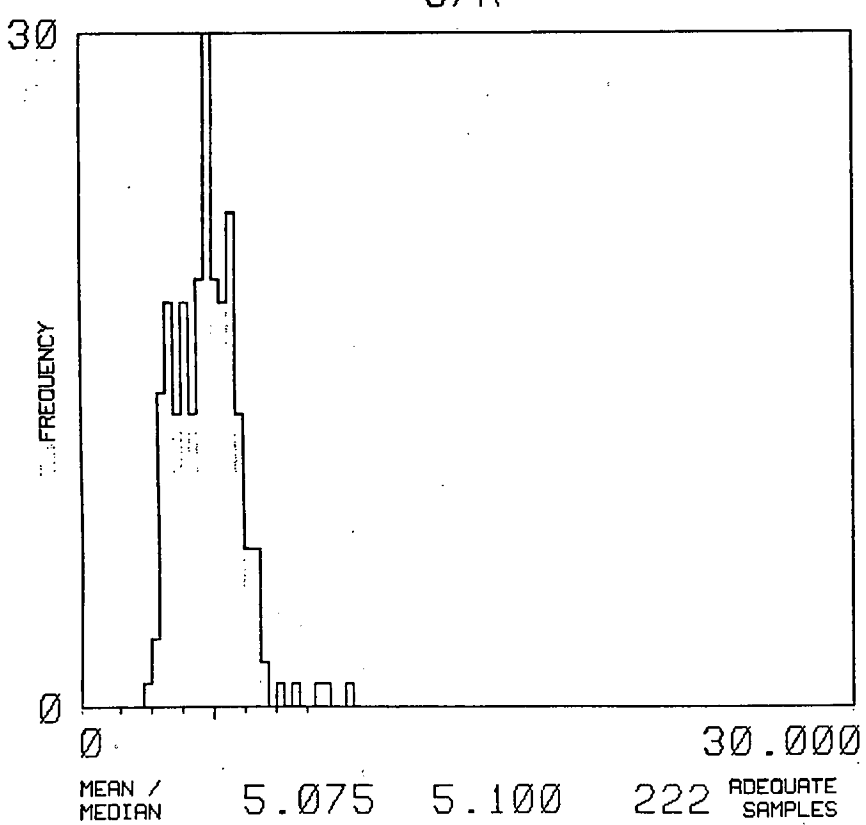
URANIUM



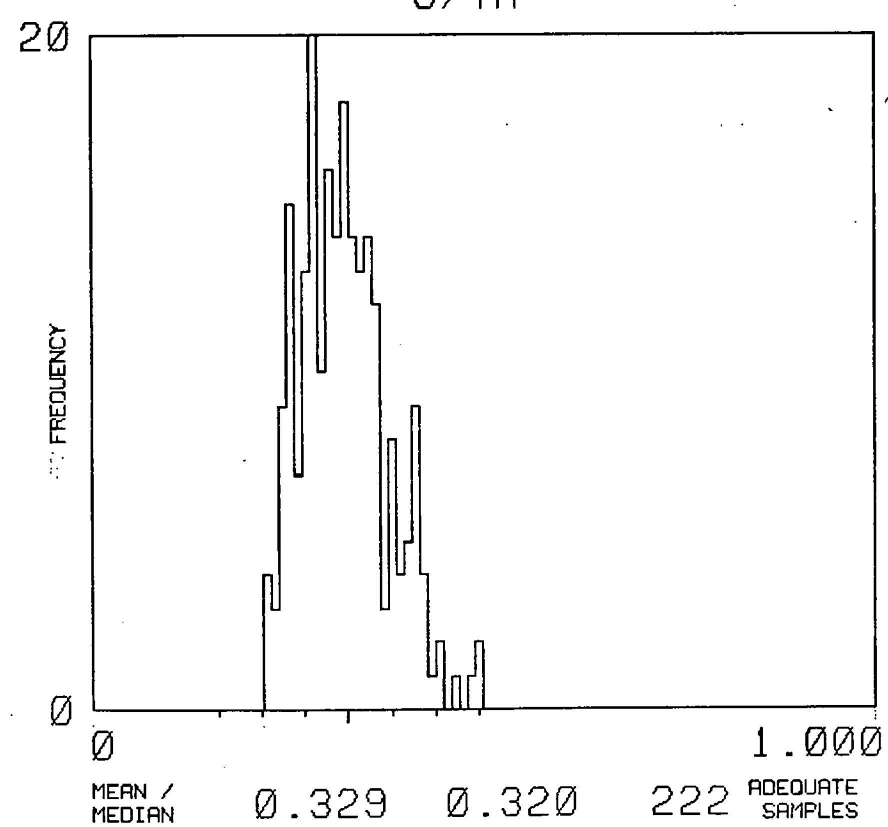
POTASSIUM



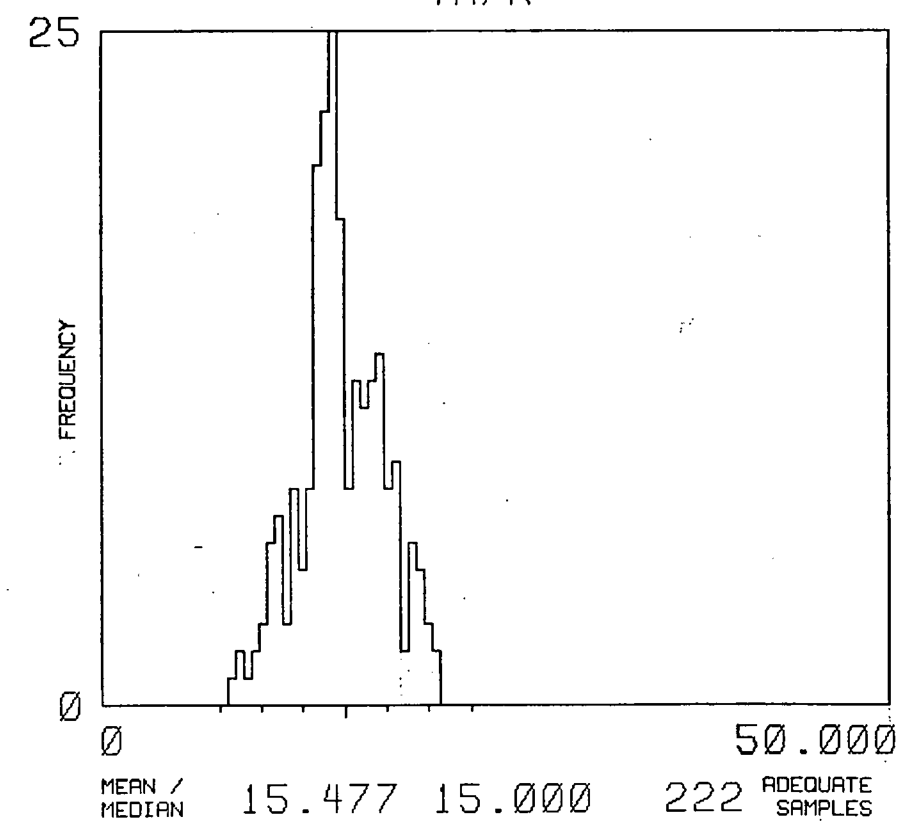
U/K



U/TH

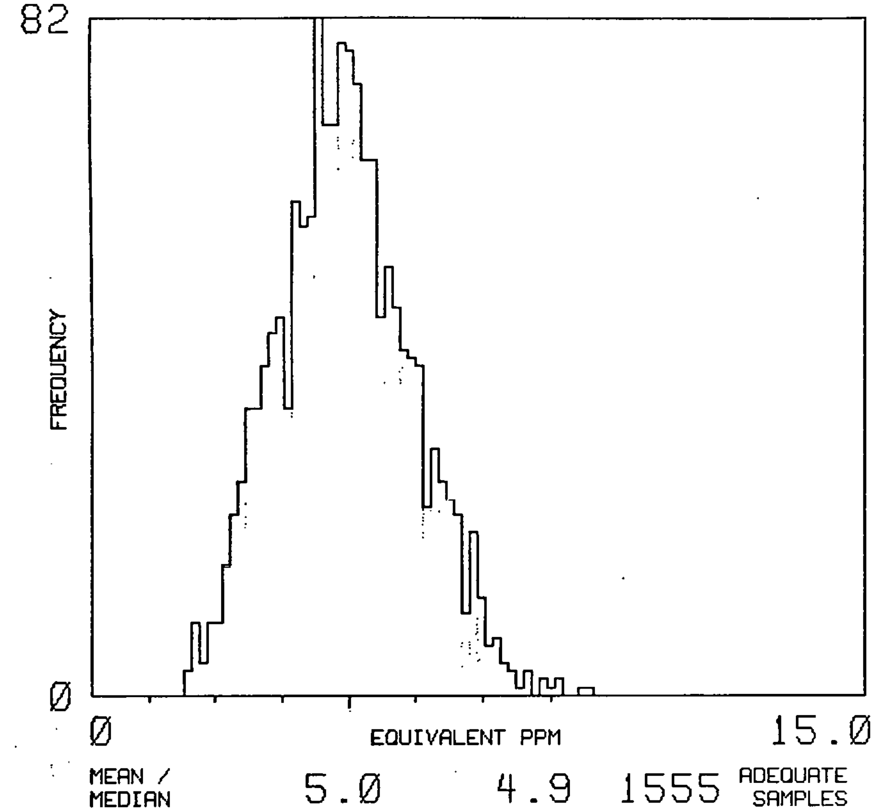


TH/K

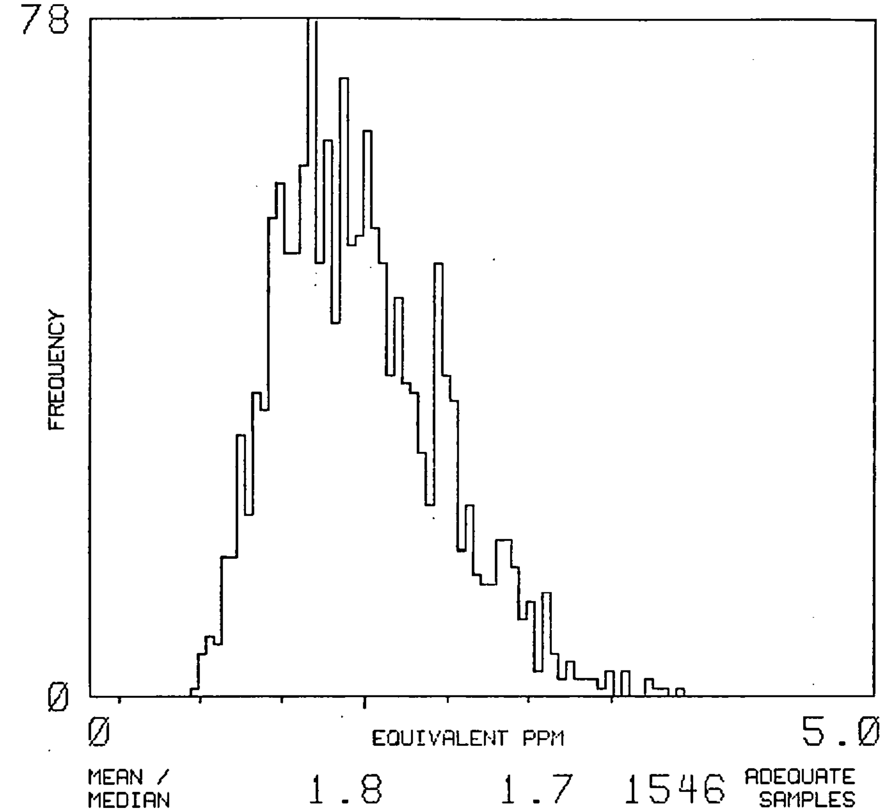


NTMS NI 15-2 RUSSELLVILLE MAP UNIT : MPFB TOTAL NUMBER OF SAMPLES 1659

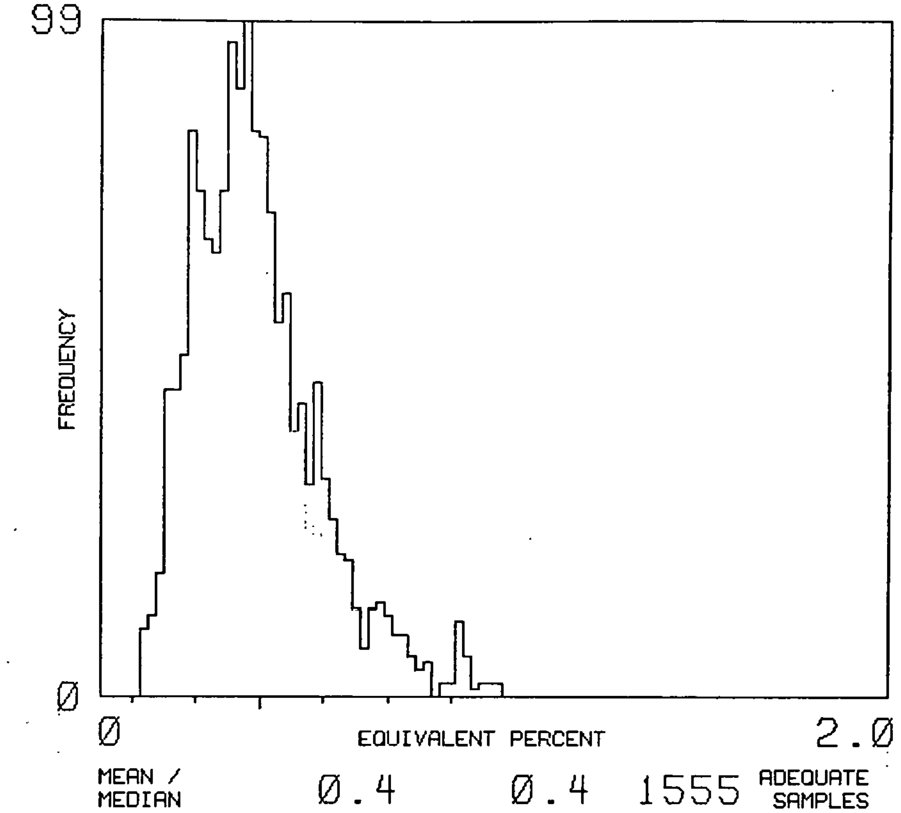
THORIUM



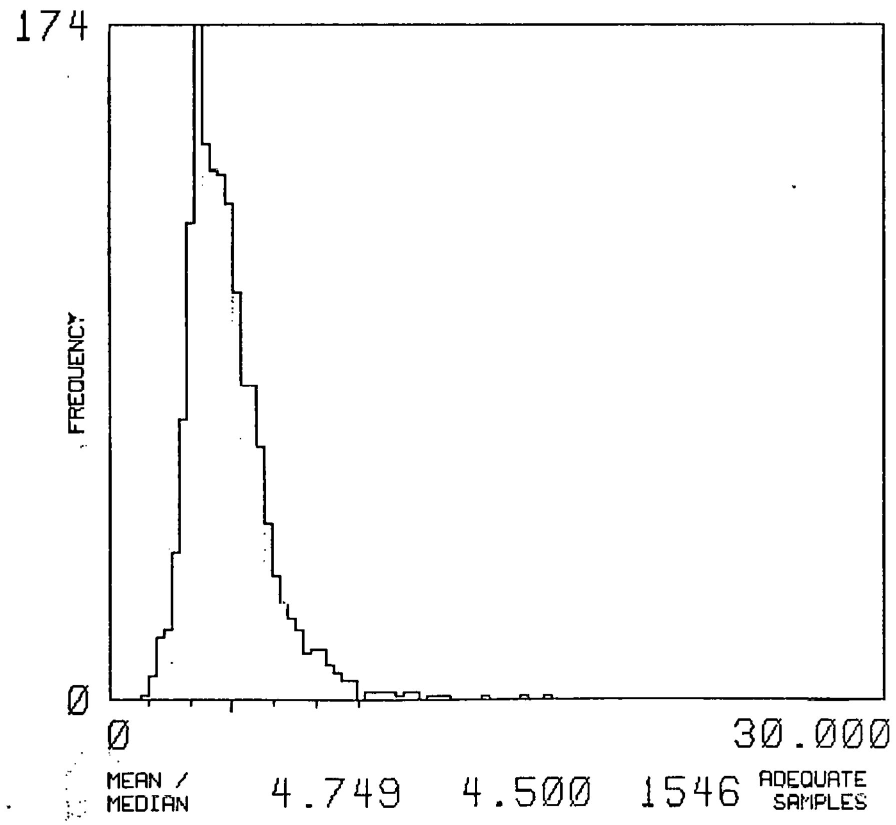
URANIUM



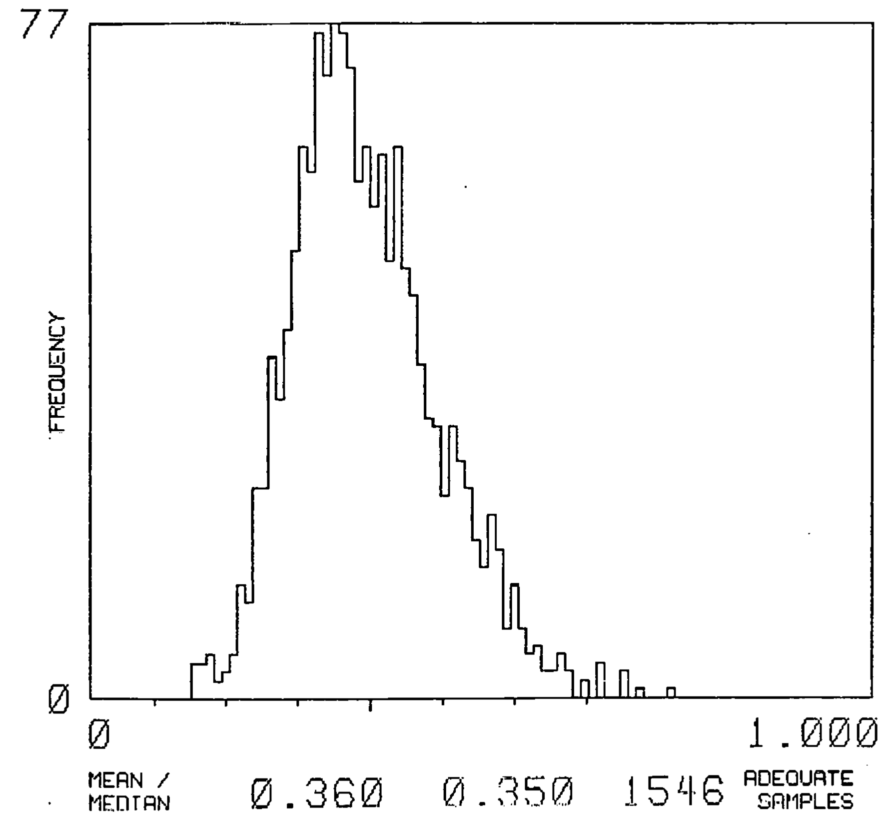
POTASSIUM



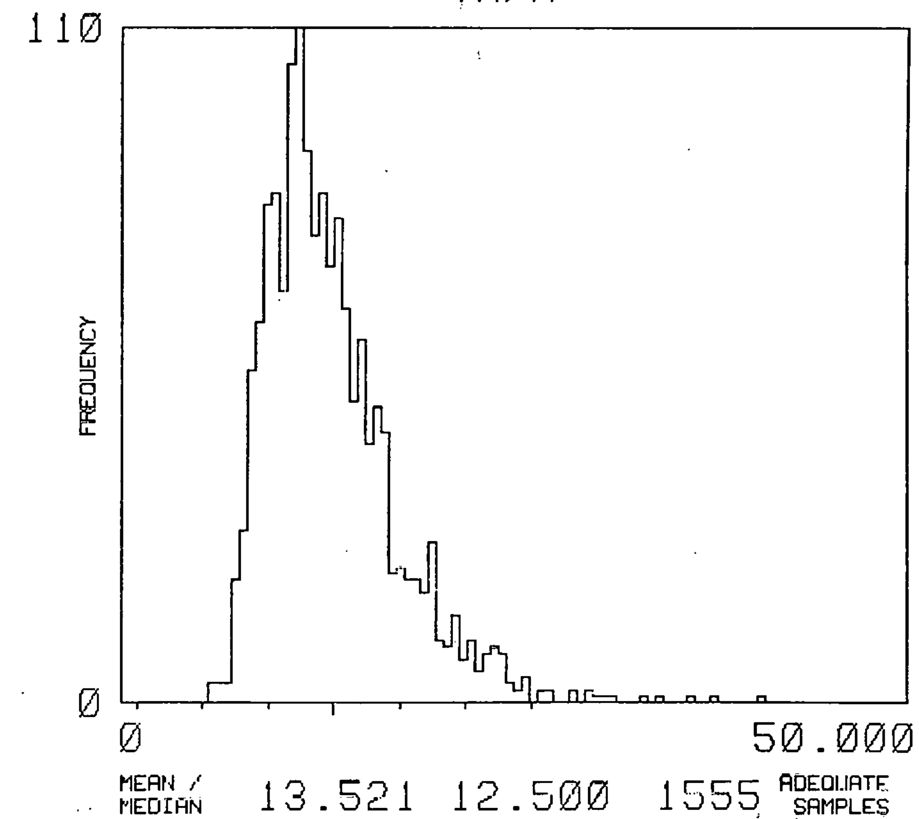
U/K



U/TH



TH/K

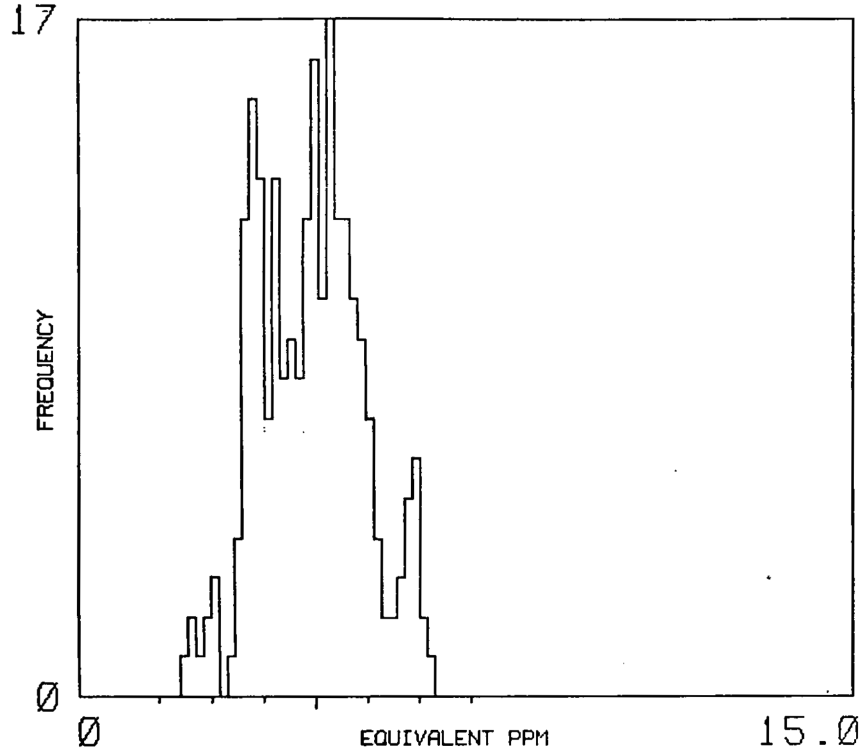


NTMS NI 15-2 RUSSELLVILLE

MAP UNIT : MR

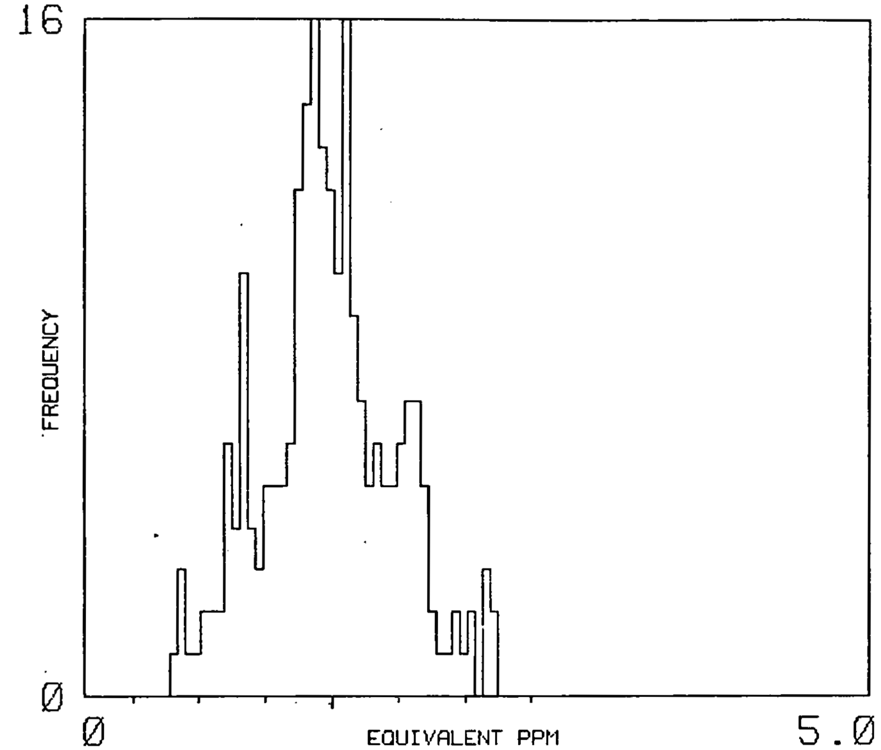
TOTAL NUMBER OF SAMPLES 229

THORIUM



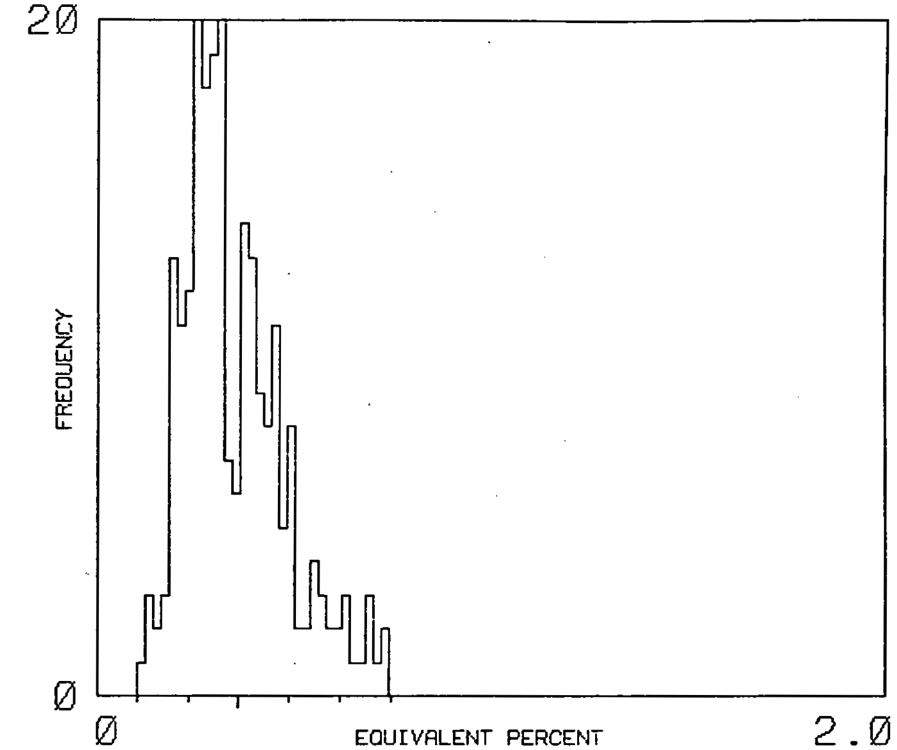
MEAN / MEDIAN 4.6 4.6 229 ADEQUATE SAMPLES

URANIUM



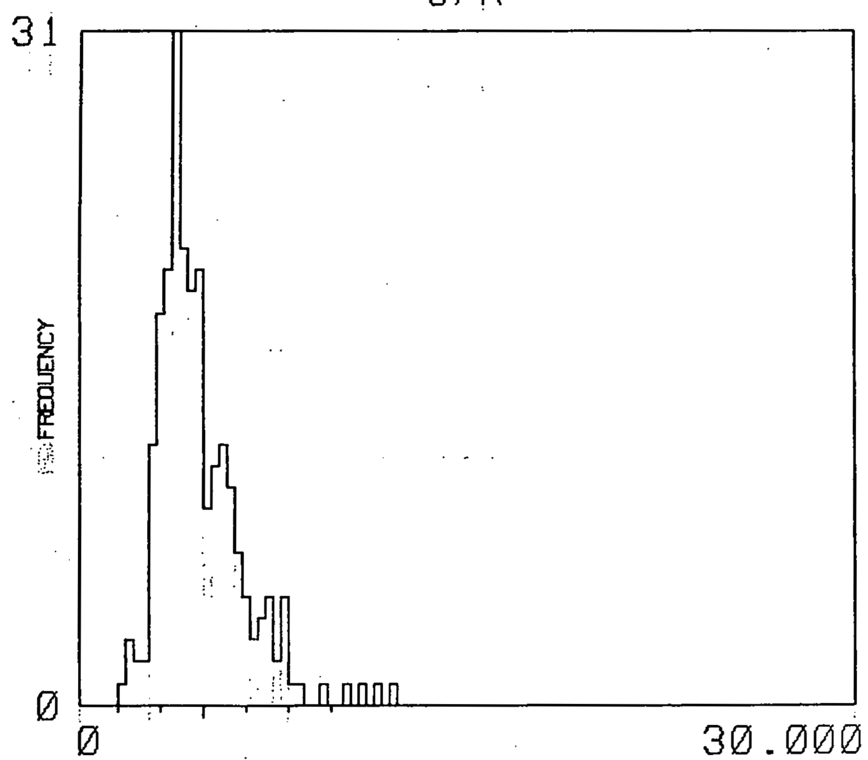
MEAN / MEDIAN 1.6 1.5 229 ADEQUATE SAMPLES

POTASSIUM



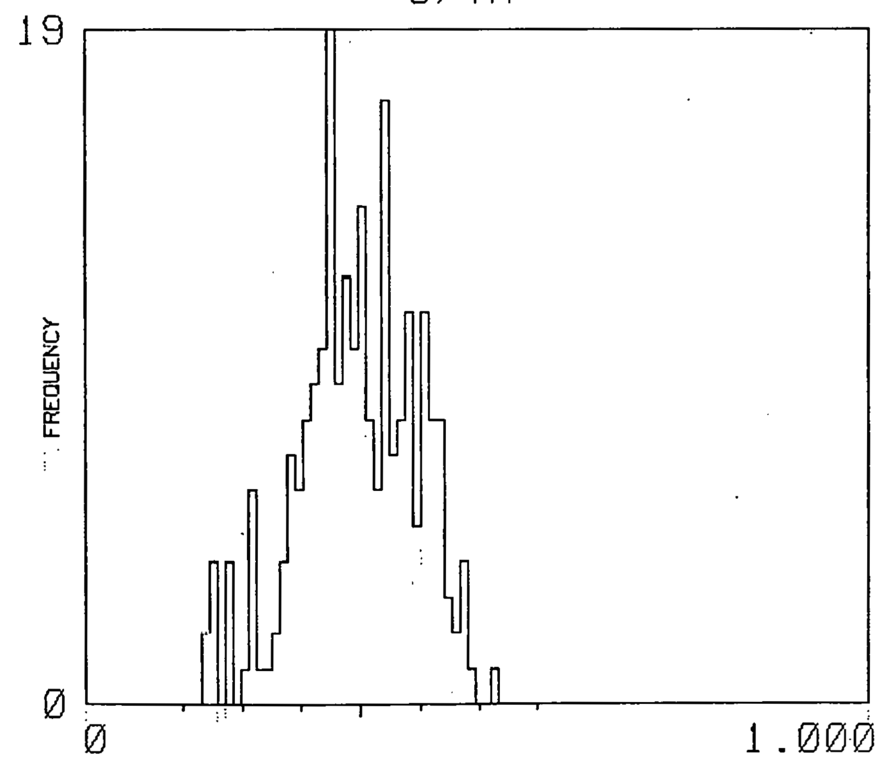
MEAN / MEDIAN 0.4 0.3 229 ADEQUATE SAMPLES

U/K



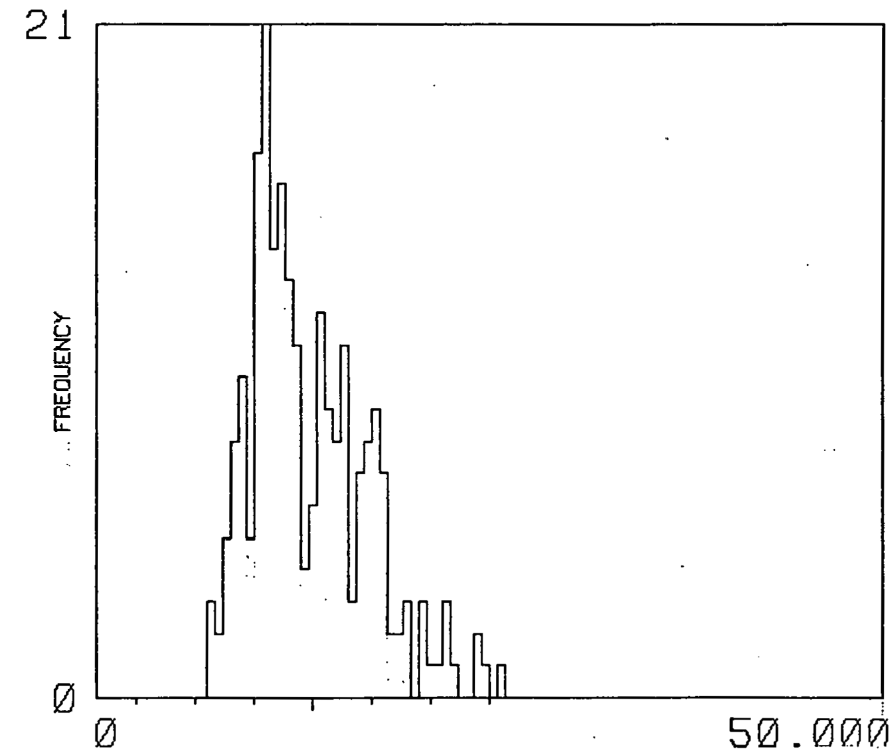
MEAN / MEDIAN 4.809 4.500 229 ADEQUATE SAMPLES

U/TH



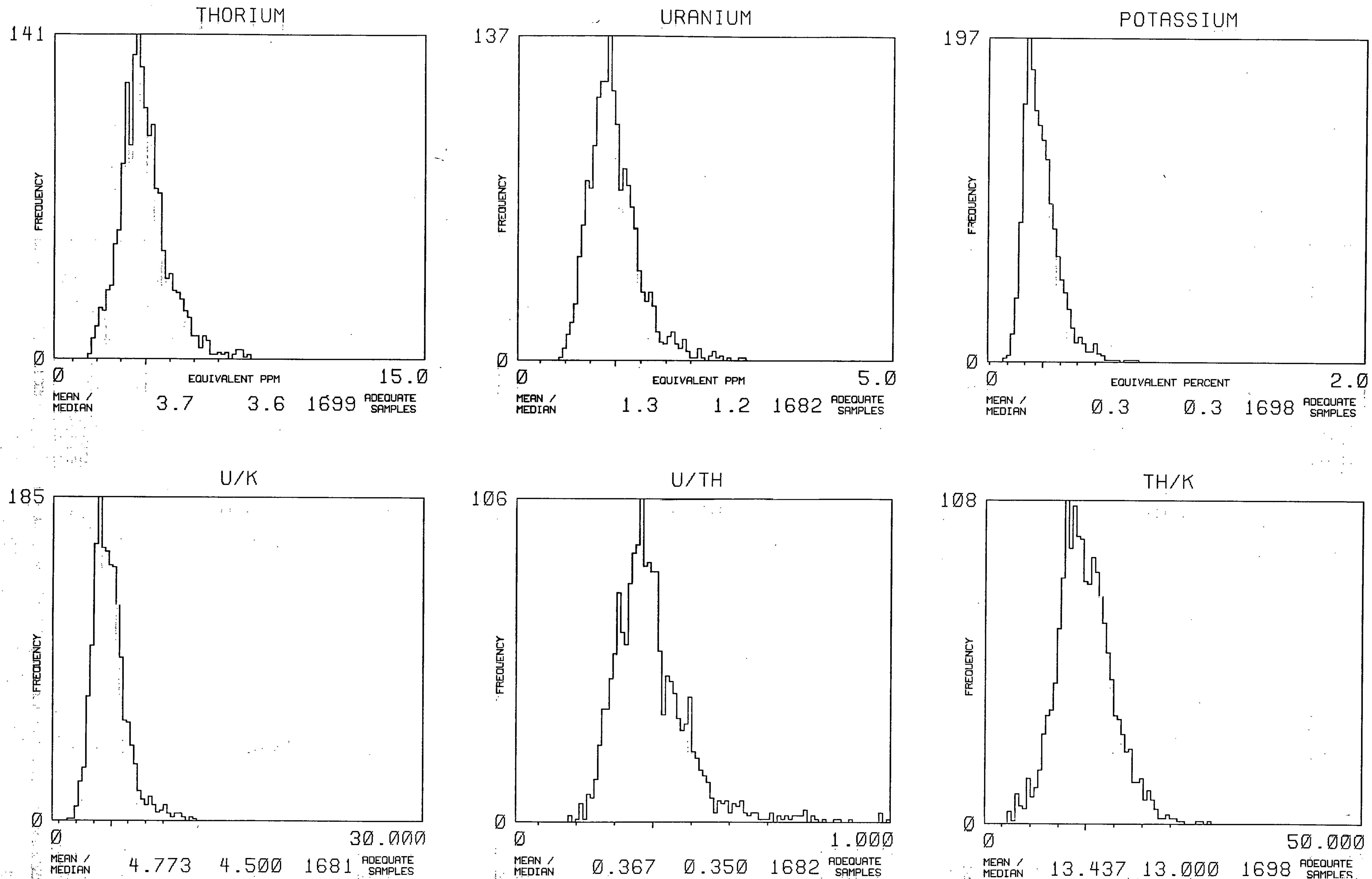
MEAN / MEDIAN 0.353 0.350 229 ADEQUATE SAMPLES

TH/K

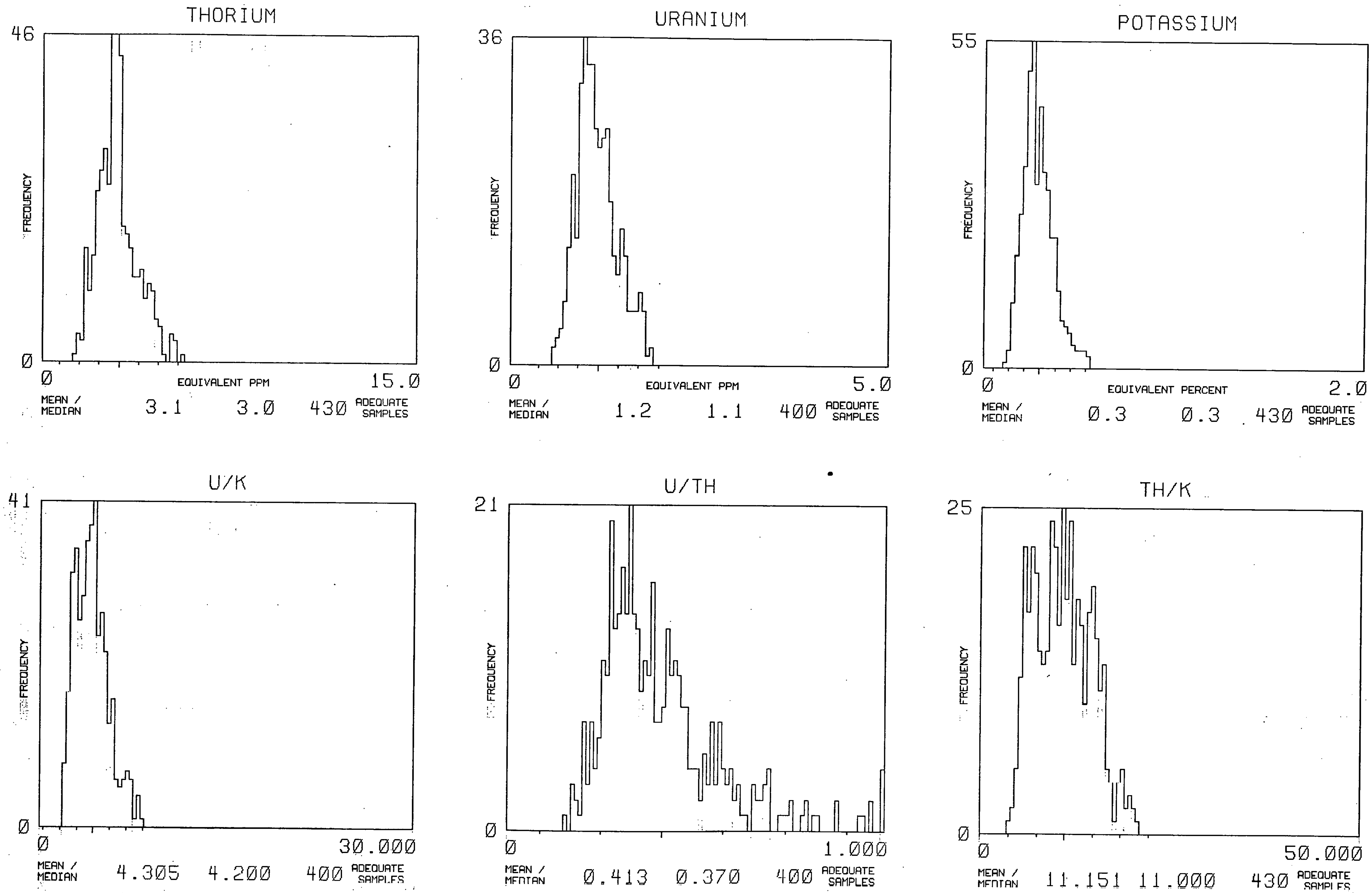


MEAN / MEDIAN 13.747 13.000 229 ADEQUATE SAMPLES

NTMS NI 15-2 RUSSELLVILLE MAP UNIT : MB TOTAL NUMBER OF SAMPLES 1789



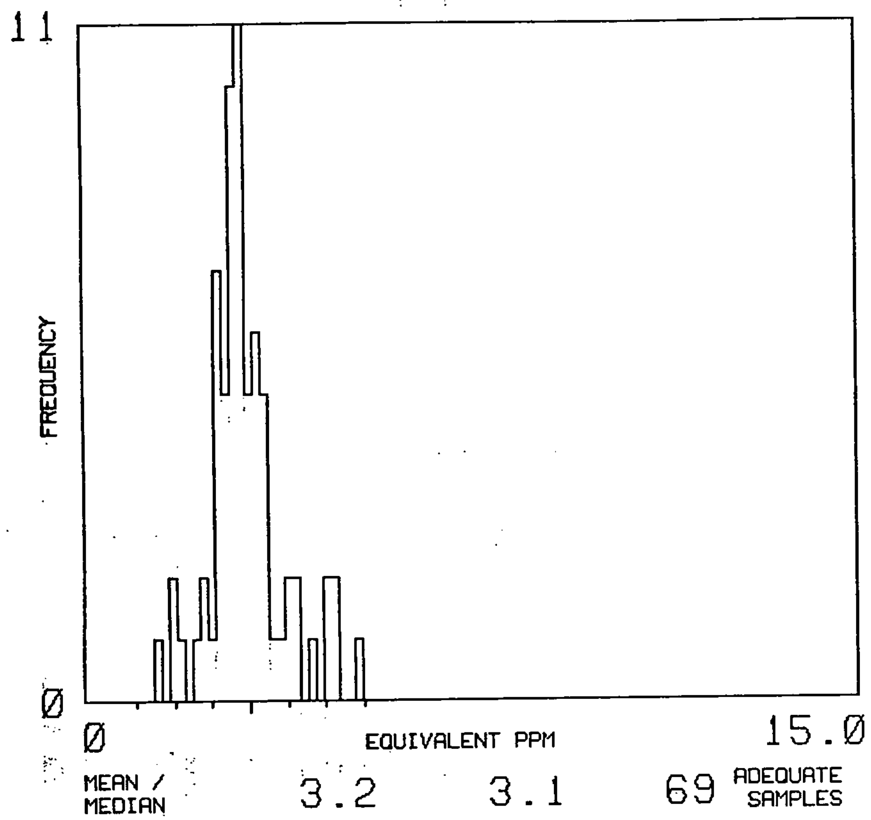
NTMS NI 15-2 RUSSELLVILLE MAP UNIT : OCJ TOTAL NUMBER OF SAMPLES 430



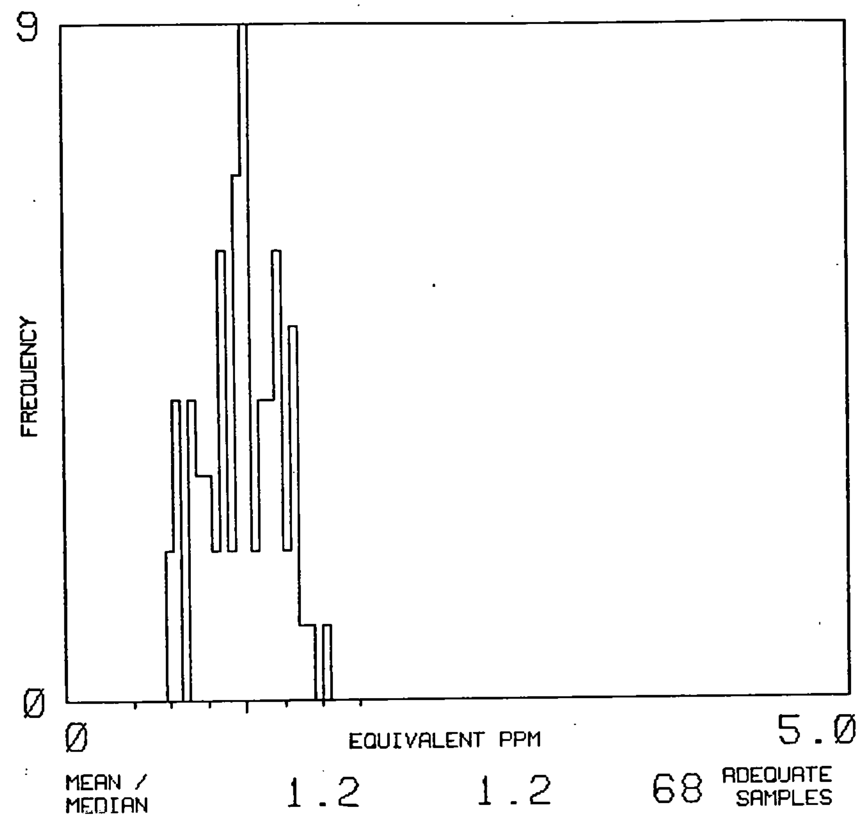
NTMS NI 15-2 RUSSELLVILLE

MAP UNIT : OSE TOTAL NUMBER OF SAMPLES 69

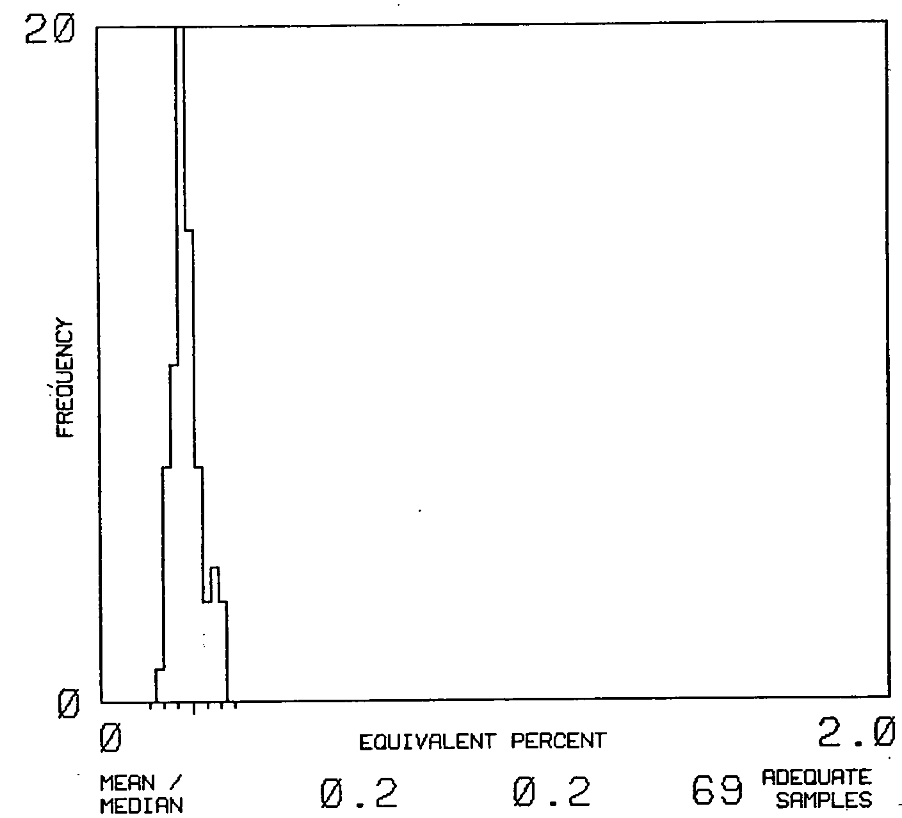
THORIUM



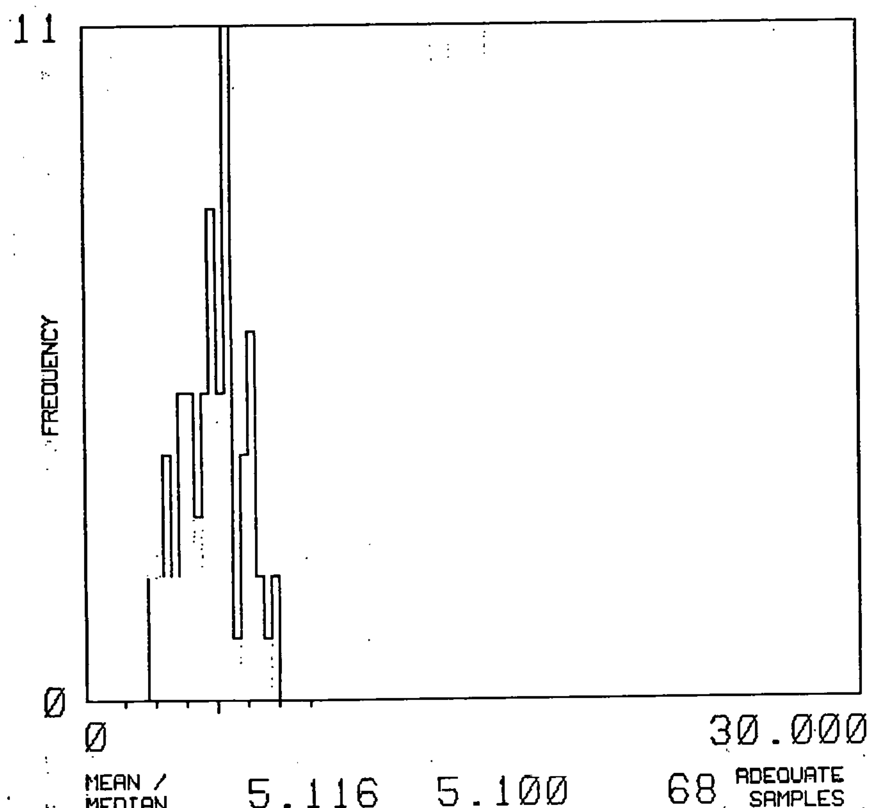
URANIUM



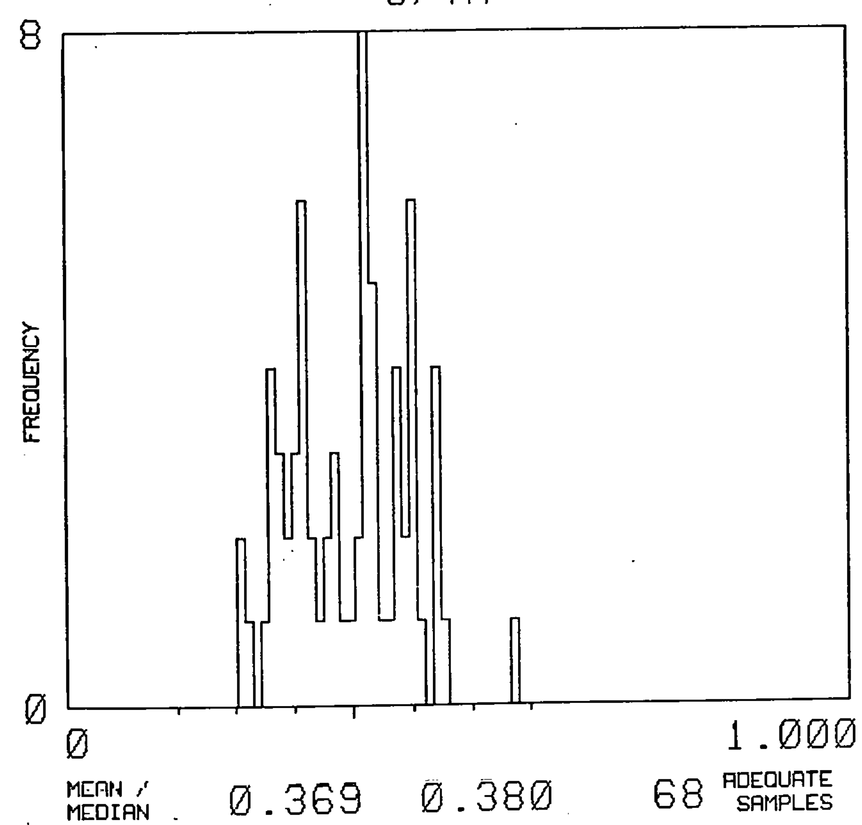
POTASSIUM



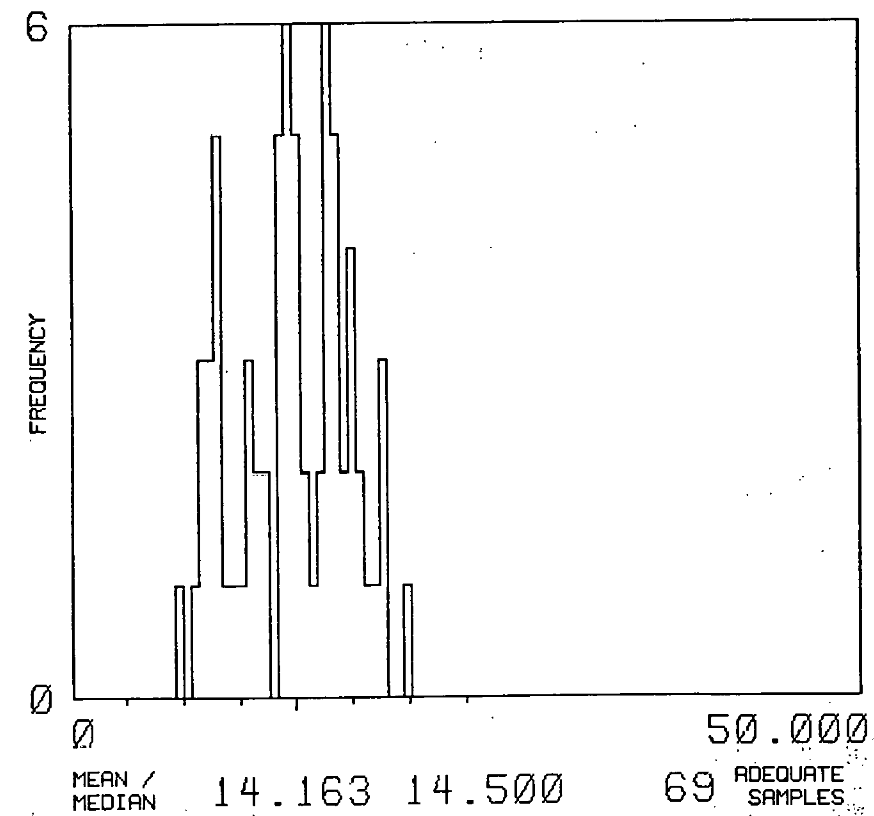
U/K



U/TH



TH/K



RUSSELLVILLE QUADRANGLE

Computer Map Unit Symbol Conversion Table

Computer Map Unit Symbol	Geologic Map Unit Symbol
QAL	Qal
QT	Qt
* PBY	IPby
PSV	IPsv
PMA	IPma
PHS	IPhs
PA	IPa
PAU	IPau
PAM	IPam
PAL	IPal
PBH	IPbh
PHC	IPhc
PJ	IPj
MPFB	Mpfb
MR	Mr
MB	Mb
* SLSB	Slsb
OCJ	Ocj
OSE	Ose

NOTES:

On the following pages, histograms for each computer map unit are included in the same order as they appear on the above list.

Geologic descriptions of the original geologic map units are in Appendix A.

Areas over water or cultural features were assigned separate map unit symbols and were removed from the data block during processing.

* A statistical analysis was not done due to an inadequate number of samples. Therefore, there are no histograms for units marked in this way.

APPENDIX G - Uranium Anomaly Summary and Statistical Tables

ANOMALY SUMMARY TABLE

ANOMALY	FLIGHT	COMPUTER MAP UNIT AND NO. ANOMALOUS SAMPLES IN UNIT			PEAK PPM	NUMBER OF SAMPLES WITH A STANDARD DEVIATION OF : 1	2	3	4	5	6	7	GT7
1 C	250	PBH	/ 2	/ 0	2.4	0	2	0	0	0	0	0	
2 C	250	MB	/ 1	/ 0	2.4	0	0	1	0	0	0	0	
3 C	260	PHC	/ 1	/ 0	3.4	0	0	0	1	0	0	0	
4 C	260	MPFB	/ 1PBH	/ 1	3.2	0	0	2	0	0	0	0	
5 C	260	MPFB	/ 3	/ 0	2.7	2	1	0	0	0	0	0	
6 C	260	PHC	/ 2	/ 0	2.8	0	1	1	0	0	0	0	
7 C	260	MPFB	/ 2	/ 0	2.8	0	2	0	0	0	0	0	
8 C	260	MPFB	/ 3	/ 0	2.7	2	1	0	0	0	0	0	
9 C	260	MPFB	/ 1	/ 0	3.2	0	0	1	0	0	0	0	
10 C	260	MPFB	/ 2PHC	/ 3	3.0	0	3	2	0	0	0	0	
11 C	260	PHC	/ 1MPFB	/ 2	2.6	2	1	0	0	0	0	0	
12 C	270	PHC	/ 1	/ 0	2.9	0	0	1	0	0	0	0	
13 C	270	PBH	/ 1	/ 0	2.7	0	0	1	0	0	0	0	
14 C	270	PHC	/ 3	/ 0	2.5	2	1	0	0	0	0	0	
15 C	270	PHC	/ 1	/ 0	2.9	0	0	1	0	0	0	0	
16 C	270	PHC	/ 4	/ 0	3.0	3	0	1	0	0	0	0	
17 C	280	PBH	/ 3	/ 0	3.5	1	1	0	0	1	0	0	
18 C	280	PBH	/ 1PA	/ 1	2.6	1	0	1	0	0	0	0	
19 C	280	PBH	/ 1PA	/ 2	2.9	1	2	0	0	0	0	0	
20 C	280	PA	/ 2	/ 0	3.0	1	0	1	0	0	0	0	
21 C	280	PBH	/ 3	/ 0	2.5	2	1	0	0	0	0	0	
22 C	280	PBH	/ 8	/ 0	2.5	5	3	0	0	0	0	0	
23 C	280	PBH	/ 2	/ 0	2.6	0	2	0	0	0	0	0	
24 C	290	PA	/ 4	/ 0	2.6	3	1	0	0	0	0	0	
25 C	290	PBH	/ 4	/ 0	2.8	2	1	1	0	0	0	0	
26 C	290	PBH	/ 4	/ 0	3.1	2	0	1	1	0	0	0	
27 C	300	PA	/ 5	/ 0	2.7	3	2	0	0	0	0	0	
28 C	300	PA	/ 1	/ 0	3.2	0	0	1	0	0	0	0	
29 C	300	PA	/ 4	/ 0	3.0	0	2	2	0	0	0	0	
30 C	300	PA	/ 1	/ 0	3.1	0	0	1	0	0	0	0	
31 C	300	PA	/ 1	/ 0	3.0	0	0	1	0	0	0	0	
32 C	300	PA	/ 3	/ 0	2.8	1	2	0	0	0	0	0	
33 C	300	PA	/ 2	/ 0	2.8	0	2	0	0	0	0	0	
34 C	300	PMA	/ 1	/ 0	3.5	0	0	1	0	0	0	0	
35 C	300	PA	/ 4	/ 0	3.1	1	1	2	0	0	0	0	
36 C	300	PA	/ 3	/ 0	2.6	1	2	0	0	0	0	0	
37 C	300	PBH	/ 3PA	/ 2	3.1	0	1	2	2	0	0	0	
38 C	300	PBH	/ 1	/ 0	3.0	0	0	1	0	0	0	0	
39 C	300	PBH	/ 3	/ 0	2.4	2	1	0	0	0	0	0	
40 C	310	PHS	/ 3	/ 0	2.8	1	2	0	0	0	0	0	
41 C	310	PA	/ 2	/ 0	2.9	0	2	0	0	0	0	0	
42 C	310	PA	/ 2	/ 0	2.8	0	2	0	0	0	0	0	
43 C	310	PA	/ 3	/ 0	2.7	1	2	0	0	0	0	0	
44 C	310	PA	/ 1	/ 0	3.1	0	0	1	0	0	0	0	
45 C	310	PA	/ 3	/ 0	2.7	2	1	0	0	0	0	0	
46 C	320	PHS	/ 5	/ 0	2.8	2	3	0	0	0	0	0	
47 C	320	PHS	/ 2	/ 0	3.0	1	0	1	0	0	0	0	
48 C	320	PA	/ 7	/ 0	3.0	3	3	1	0	0	0	0	
49 C	320	PA	/ 3	/ 0	2.9	1	2	0	0	0	0	0	
50 C	320	PA	/ 2	/ 0	2.8	0	2	0	0	0	0	0	

ANOMALY SUMMARY TABLE

ANOMALY	FLIGHT	COMPUTER MAP UNIT AND NO. ANOMALOUS SAMPLES IN UNIT			PEAK PPM	NUMBER OF SAMPLES WITH A STANDARD DEVIATION OF : 1	2	3	4	5	6	7 GT7
51 C	320	PA	/ 4	/ 0	3.1	2	1	1	0	0	0	0
52 C	320	PA	/ 3	/ 0	2.7	2	1	0	0	0	0	0
53 C	320	PA	/ 1	/ 0	3.0	0	0	1	0	0	0	0
54 C	320	PA	/ 6	/ 0	2.8	4	2	0	0	0	0	0
55 C	330	PHS	/ 2	/ 0	3.1	0	1	1	0	0	0	0
56 C	330	PAU	/ 3	/ 0	3.5	1	1	1	0	0	0	0
57 C	330	PAU	/ 6	/ 0	4.0	1	1	3	1	0	0	0
58 C	330	PAU	/ 1QT	/ 4	3.9	1	3	1	0	0	0	0
59 C	330	QT	/ 4QAL	/ 2	3.4	5	1	0	0	0	0	0
60 C	330	PA	/ 3	/ 0	3.4	0	2	0	1	0	0	0
61 C	330	PA	/ 4	/ 0	2.9	2	2	0	0	0	0	0
62 C	330	PA	/ 5	/ 0	2.9	1	4	0	0	0	0	0
63 C	340	PAU	/ 1	/ 0	3.7	0	0	1	0	0	0	0
64 C	350	PAU	/ 2	/ 0	3.5	0	1	1	0	0	0	0
65 C	350	PAM	/ 7	/ 0	3.9	3	2	1	1	0	0	0
66 C	350	PAL	/ 5	/ 0	4.5	2	2	0	1	0	0	0
67 C	350	PAL	/ 6	/ 0	3.5	4	2	0	0	0	0	0
68 C	350	PAL	/ 3	/ 0	3.5	1	2	0	0	0	0	0
69 C	350	PAL	/ 1	/ 0	3.9	0	0	1	0	0	0	0
70 C	350	QT	/ 2PAU	/ 3	3.2	2	3	0	0	0	0	0
71 C	350	QAL	/ 4	/ 0	2.9	3	1	0	0	0	0	0
72 C	350	QAL	/ 3	/ 0	2.9	2	1	0	0	0	0	0
73 C	350	PAU	/ 3	/ 0	3.1	1	2	0	0	0	0	0
74 C	350	PAU	/ 2PAM	/ 5	3.1	3	4	0	0	0	0	0
75 C	350	PAM	/ 2	/ 0	3.3	0	2	0	0	0	0	0
76 C	350	PAM	/ 2	/ 0	2.9	0	2	0	0	0	0	0
77 C	350	PAM	/ 4	/ 0	2.9	1	3	0	0	0	0	0
78 C	350	PJ	/ 2	/ 0	3.4	0	2	0	0	0	0	0
79 C	360	PAU	/ 2	/ 0	3.7	0	1	1	0	0	0	0
80 C	1080	PA	/ 2	/ 0	2.7	0	2	0	0	0	0	0
81 C	1100	MPFB	/ 5	/ 0	2.8	4	1	0	0	0	0	0
82 C	1110	PBH	/ 3	/ 0	2.9	2	0	1	0	0	0	0
83 C	1120	PA	/ 2	/ 0	2.9	0	2	0	0	0	0	0
84 C	1120	PHC	/ 1	/ 0	3.6	0	0	0	1	0	0	0
85 C	1130	PBH	/ 1	/ 0	2.6	0	0	1	0	0	0	0
86 C	1130	MR	/ 1	/ 0	2.7	0	0	1	0	0	0	0
87 C	1140	PHC	/ 5	/ 0	3.4	3	0	1	1	0	0	0
88 C	1140	PHC	/ 1MPFB	/ 1	3.7	1	0	0	1	0	0	0

NOTES: M INDICATES THAT THE ANOMALY LIES OVER A URANIUM MINE OR PROSPECT.

C INDICATES THAT THE ANOMALY LIES OVER A CULTURAL FEATURE.

W INDICATES POSSIBLE INTERFERENCE BY WEATHER PHENOMENA.

MAP UNIT QAL

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	-0.1074	0.3381	0.7836	1.2291	1.6746	2.1201	2.5656
URANIUM	DIST NORMAL	0.6763	1.1489	1.6215	2.0941	2.5667	3.0393	3.5119
THORIUM	DIST NORMAL	0.9708	3.0406	5.1104	7.1802	9.2500	11.3198	13.3896
U/K	DIST NORMAL	-1.6621	-0.4178	0.8265	2.0708	3.3151	4.5594	5.8037
U/TH	DIST NORMAL	0.0591	0.1409	0.2227	0.3045	0.3863	0.4681	0.5499
TH/K	DIST NORMAL	-2.3066	0.7035	3.7136	6.7237	9.7338	12.7439	15.7540

MAP UNIT QT

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	-0.3112	0.0121	0.3354	0.6587	0.9820	1.3053	1.6286
URANIUM	DIST NORMAL	1.0291	1.5058	1.9825	2.4592	2.9359	3.4126	3.8893
THORIUM	DIST NORMAL	3.9871	5.1115	6.2359	7.3603	8.4847	9.6091	10.7335
U/K	DIST NORMAL	-1.3774	0.5783	2.5340	4.4897	6.4454	8.4011	10.3568
U/TH	DIST NORMAL	0.1269	0.1974	0.2679	0.3384	0.4089	0.4794	0.5499
TH/K	DIST NORMAL	-0.8694	3.7892	8.4478	13.1064	17.7650	22.4236	27.0822

MAP UNIT PSV

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	0.0822	0.2621	0.4420	0.6219	0.8018	0.9817	1.1616
URANIUM	DIST NORMAL	1.0216	1.4810	1.9404	2.3998	2.8592	3.3186	3.7780
THORIUM	DIST NORMAL	3.3433	4.6681	5.9929	7.3177	8.6425	9.9673	11.2921
U/K	DIST NORMAL	0.5621	1.7434	2.9247	4.1060	5.2873	6.4686	7.6499
U/TH	DIST NORMAL	0.1746	0.2264	0.2782	0.3300	0.3818	0.4336	0.4854
TH/K	DIST NORMAL	4.2216	6.9242	9.6268	12.3294	15.0320	17.7346	20.4372

MAP UNIT PMA

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	0.0780	0.2374	0.3968	0.5562	0.7156	0.8750	1.0344
URANIUM	DIST NORMAL	0.7446	1.2429	1.7412	2.2395	2.7378	3.2361	3.7344
THORIUM	DIST NORMAL	2.1529	3.6873	5.2217	6.7561	8.2905	9.8249	11.3593
U/K	DIST NORMAL	0.2477	1.5907	2.9337	4.2767	5.6197	6.9627	8.3057
U/TH	DIST NORMAL	0.1266	0.1970	0.2674	0.3378	0.4082	0.4786	0.5490
TH/K	DIST NORMAL	4.7863	7.3815	9.9767	12.5719	15.1671	17.7623	20.3575

MAP UNIT PHS

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	0.0703	0.1915	0.3127	0.4339	0.5551	0.6763	0.7975
URANIUM	DIST NORMAL	0.6409	1.0584	1.4759	1.8934	2.3109	2.7284	3.1459
THORIUM	DIST NORMAL	2.0857	3.1952	4.3047	5.4142	6.5237	7.6332	8.7427
U/K	DIST NORMAL	0.1337	1.6302	3.1267	4.6232	6.1197	7.6162	9.1127
U/TH	DIST NORMAL	0.1129	0.1933	0.2737	0.3541	0.4345	0.5149	0.5953
TH/K	DIST NORMAL	5.2024	7.7962	10.3900	12.9838	15.5776	18.1714	20.7652

MAP UNIT PA

		-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST NORMAL	0.0544	0.1786	0.3028	0.4270	0.5512	0.6754	0.7996
URANIUM	DIST NORMAL	0.7020	1.1142	1.5264	1.9386	2.3508	2.7630	3.1752
THORIUM	DIST NORMAL	2.6096	3.7122	4.8148	5.9174	7.0200	8.1226	9.2252
U/K	DIST NORMAL	0.5637	1.9765	3.3893	4.8021	6.2149	7.6277	9.0405
U/TH	DIST NORMAL	0.1210	0.1915	0.2620	0.3325	0.4030	0.4735	0.5440
TH/K	DIST NORMAL	5.2736	8.3449	11.4162	14.4875	17.5588	20.6301	23.7014

MAP UNIT PAU

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0687	0.2501	0.4315	0.6129	0.7943	0.9757	1.1571
URANIUM DIST NORMAL	0.9169	1.3783	1.8397	2.3011	2.7625	3.2239	3.6853
THORIUM DIST NORMAL	3.2321	4.5514	5.8707	7.1900	8.5093	9.8286	11.1479
U/K DIST NORMAL	0.1888	1.4657	2.7426	4.0195	5.2964	6.5733	7.8502
U/TH DIST NORMAL	0.1346	0.1981	0.2616	0.3251	0.3886	0.4521	0.5156
TH/K DIST NORMAL	3.4273	6.3982	9.3691	12.3400	15.3109	18.2818	21.2527

MAP UNIT PAM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0884	0.2530	0.4176	0.5822	0.7468	0.9114	1.0760
URANIUM DIST NORMAL	0.8203	1.2646	1.7089	2.1532	2.5975	3.0418	3.4861
THORIUM DIST NORMAL	3.0576	4.2983	5.5390	6.7797	8.0204	9.2611	10.5018
U/K DIST NORMAL	0.5142	1.6455	2.7768	3.9081	5.0394	6.1707	7.3020
U/TH DIST NORMAL	0.1339	0.1966	0.2593	0.3220	0.3847	0.4474	0.5101
TH/K DIST NORMAL	5.3959	7.6201	9.8443	12.0685	14.2927	16.5169	18.7411

MAP UNIT PAL

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.1495	0.2936	0.4377	0.5818	0.7259	0.8700	1.0141
URANIUM DIST NORMAL	0.6380	1.1994	1.7608	2.3222	2.8836	3.4450	4.0064
THORIUM DIST NORMAL	2.6611	4.0859	5.5107	6.9355	8.3603	9.7851	11.2099
U/K DIST NORMAL	0.5638	1.7492	2.9346	4.1200	5.3054	6.4908	7.6762
U/TH DIST NORMAL	0.1313	0.1992	0.2671	0.3350	0.4029	0.4708	0.5387
TH/K DIST NORMAL	5.2527	7.5788	9.9049	12.2310	14.5571	16.8832	19.2093

MAP UNIT PBH

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.1128	0.1991	0.2854	0.3717	0.4580	0.5443	0.6306
URANIUM DIST NORMAL	0.5996	0.9628	1.3260	1.6892	2.0524	2.4156	2.7788
THORIUM DIST NORMAL	2.6568	3.5855	4.5142	5.4429	6.3716	7.3003	8.2290
U/K DIST NORMAL	0.5036	1.9207	3.3378	4.7549	6.1720	7.5891	9.0062
U/TH DIST NORMAL	0.0991	0.1711	0.2431	0.3151	0.3871	0.4591	0.5311
TH/K DIST NORMAL	5.9248	8.9930	12.0612	15.1294	18.1976	21.2658	24.3340

MAP UNIT PHC

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0169	0.1175	0.2519	0.3863	0.5207	0.6551	0.7895
URANIUM DIST NORMAL	0.3586	0.8000	1.2414	1.6828	2.1242	2.5656	3.0070
THORIUM DIST NORMAL	2.0679	3.1495	4.2311	5.3127	6.3943	7.4759	8.5575
U/K DIST NORMAL	-0.1215	1.4807	3.0829	4.6851	6.2873	7.8895	9.4917
U/TH DIST NORMAL	0.0910	0.1677	0.2444	0.3211	0.3978	0.4745	0.5512
TH/K DIST NORMAL	2.4479	6.5318	10.6157	14.6996	18.7835	22.8674	26.9513

MAP UNIT PJ

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.2464	0.3300	0.4136	0.4972	0.5808	0.6644	0.7480
URANIUM DIST NORMAL	1.2000	1.6193	2.0386	2.4579	2.8772	3.2965	3.7158
THORIUM DIST NORMAL	4.8849	5.7638	6.6427	7.5216	8.4005	9.2794	10.1583
U/K DIST NORMAL	1.4752	2.6753	3.8754	5.0755	6.2756	7.4757	8.6758
U/TH DIST NORMAL	0.1631	0.2183	0.2735	0.3287	0.3839	0.4391	0.4943
TH/K DIST NORMAL	7.4777	10.1441	12.8105	15.4769	18.1433	20.8097	23.4761

MAP UNIT MPFB

			-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST	NORMAL	-0.0831	0.0792	0.2415	0.4038	0.5661	0.7284	0.8907
URANIUM	DIST	NORMAL	0.1920	0.7160	1.2400	1.7640	2.2880	2.8120	3.3360
THORIUM	DIST	NORMAL	1.1141	2.4141	3.7141	5.0141	6.3141	7.6141	8.9141
U/K	DIST	NORMAL	-0.1514	1.4822	3.1158	4.7494	6.3830	8.0166	9.6502
U/TH	DIST	NORMAL	0.0826	0.1751	0.2676	0.3601	0.4526	0.5451	0.6376
TH/K	DIST	NORMAL	0.9557	5.1441	9.3325	13.5209	17.7093	21.8977	26.0861

MAP UNIT MR

			-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST	NORMAL	-0.0302	0.0987	0.2276	0.3565	0.4854	0.6143	0.7432
URANIUM	DIST	NORMAL	0.3136	0.7393	1.1650	1.5907	2.0164	2.4421	2.8678
THORIUM	DIST	NORMAL	1.5300	2.5409	3.5518	4.5627	5.5736	6.5845	7.5954
U/K	DIST	NORMAL	-0.1622	1.4950	3.1522	4.8094	6.4666	8.1238	9.7810
U/TH	DIST	NORMAL	0.1257	0.2015	0.2773	0.3531	0.4289	0.5047	0.5805
TH/K	DIST	NORMAL	2.5239	6.2651	10.0063	13.7475	17.4887	21.2299	24.9711

MAP UNIT MB

			-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST	NORMAL	0.0103	0.1036	0.1969	0.2902	0.3835	0.4768	0.5701
URANIUM	DIST	NORMAL	0.3009	0.6371	0.9733	1.3095	1.6457	1.9819	2.3181
THORIUM	DIST	NORMAL	0.7498	1.7327	2.7156	3.6985	4.6814	5.6643	6.6472
U/K	DIST	NORMAL	0.5428	1.9528	3.3628	4.7728	6.1828	7.5928	9.0028
U/TH	DIST	NORMAL	0.0597	0.1622	0.2647	0.3672	0.4697	0.5722	0.6747
TH/K	DIST	NORMAL	2.3004	6.0125	9.7246	13.4367	17.1488	20.8609	24.5730

MAP UNIT OCJ

			-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST	NORMAL	0.0479	0.1293	0.2107	0.2921	0.3735	0.4549	0.5363
URANIUM	DIST	NORMAL	0.3729	0.6395	0.9061	1.1727	1.4393	1.7059	1.9725
THORIUM	DIST	NORMAL	0.6720	1.4679	2.2638	3.0597	3.8556	4.6515	5.4474
U/K	DIST	NORMAL	0.3078	1.6402	2.9726	4.3050	5.6374	6.9698	8.3022
U/TH	DIST	NORMAL	-0.0753	0.0875	0.2503	0.4131	0.5759	0.7387	0.9015
TH/K	DIST	NORMAL	0.0368	3.7415	7.4462	11.1509	14.8556	18.5603	22.2650

MAP UNIT OSE

			-3	-2	-1	0	+1	+2	+3
POTASIUM	DIST	NORMAL	0.1250	0.1609	0.1968	0.2327	0.2686	0.3045	0.3404
URANIUM	DIST	NORMAL	0.4360	0.6788	0.9216	1.1644	1.4072	1.6500	1.8928
THORIUM	DIST	NORMAL	1.0141	1.7523	2.4905	3.2287	3.9669	4.7051	5.4433
U/K	DIST	NORMAL	1.5064	2.7097	3.9130	5.1163	6.3196	7.5229	8.7262
U/TH	DIST	NORMAL	0.1422	0.2177	0.2932	0.3687	0.4442	0.5197	0.5952
TH/K	DIST	NORMAL	3.3749	6.9709	10.5669	14.1629	17.7589	21.3549	24.9509

LINE BASED MEAN CONCENTRATIONS
AND RATIOS PER ROCK TYPE

MAP UNIT QAL

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.723	1.365	0.543	1.336	1.354	1.296	0.000	1.239	0.409
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	1.414	2.057	2.172	2.138	2.357	2.002	0.000	1.990	1.701
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	3.558	6.928	5.718	8.122	7.035	8.091	0.000	6.816	4.604
U/K	0.000	0.000	0.000	0.000	0.000	0.000	2.139	1.671	4.848	1.815	1.803	1.799	0.000	1.624	4.494
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.390	0.301	0.411	0.272	0.341	0.251	0.000	0.300	0.389
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	5.344	5.482	11.991	6.718	5.397	6.767	0.000	5.550	12.097

	1110	1120	1130	1140
POTASIUM	1.294	1.377	0.000	0.000
URANIUM	2.098	1.916	0.000	0.000
THORIUM	7.672	7.102	0.000	0.000
U/K	1.905	1.576	0.000	0.000
U/TH	0.276	0.271	0.000	0.000
TH/K	6.776	5.731	0.000	0.000

MAP UNIT QT

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.488	0.449	0.590	0.530	0.879	1.048	0.000	0.000	0.467
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	2.449	2.106	3.076	2.301	2.548	2.308	0.000	0.000	2.175
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	7.022	6.189	6.827	7.445	8.071	7.529	0.000	0.000	6.820
U/K	0.000	0.000	0.000	0.000	0.000	0.000	5.667	5.197	5.434	4.524	3.871	2.303	0.000	0.000	4.678
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.351	0.344	0.456	0.311	0.318	0.307	0.000	0.000	0.321
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	15.920	14.855	11.994	14.452	11.774	7.533	0.000	0.000	14.722

	1110	1120	1130	1140
POTASIUM	0.000	0.707	0.000	0.000
URANIUM	0.000	2.474	0.000	0.000
THORIUM	0.000	7.609	0.000	0.000
U/K	0.000	3.854	0.000	0.000
U/TH	0.000	0.327	0.000	0.000
TH/K	0.000	11.691	0.000	0.000

MAP UNIT PBY

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000

MAP UNIT PSV

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.518	0.669	0.729	0.000	0.000	0.000	0.625	0.574	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	2.310	2.640	2.117	0.000	0.000	0.000	2.168	2.258	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	6.786	7.817	7.758	0.000	0.000	0.000	7.226	6.663	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	4.690	4.151	2.988	0.000	0.000	0.000	3.911	4.027	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.341	0.274	0.000	0.000	0.000	0.304	0.337	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	13.614	12.113	10.887	0.000	0.000	0.000	12.704	11.781	0.000

	1110	1120	1130	1140
POTASIUM	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000

MAP UNIT PMA

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.559	0.654	0.563	0.551	0.445	0.000	0.000	0.503	0.560	0.598
URANIUM	0.000	0.000	0.000	0.000	0.000	2.727	2.301	2.569	2.383	1.634	0.000	0.000	2.113	1.883	2.358
THORIUM	0.000	0.000	0.000	0.000	0.000	7.277	7.246	7.469	6.785	5.272	0.000	0.000	6.709	6.441	6.293
U/K	0.000	0.000	0.000	0.000	0.000	5.278	3.760	4.713	4.583	3.846	0.000	0.000	4.547	3.489	4.631
U/TH	0.000	0.000	0.000	0.000	0.000	0.377	0.323	0.347	0.361	0.316	0.000	0.000	0.329	0.295	0.385
TH/K	0.000	0.000	0.000	0.000	0.000	13.917	11.639	13.545	12.734	12.194	0.000	0.000	13.641	11.624	11.631

	1110	1120	1130	1140
POTASIUM	0.563	0.000	0.000	0.000
URANIUM	1.929	0.000	0.000	0.000
THORIUM	5.945	0.000	0.000	0.000
U/K	3.519	0.000	0.000	0.000
U/TH	0.328	0.000	0.000	0.000
TH/K	10.787	0.000	0.000	0.000

MAP UNIT PHS

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.750	0.440	0.437	0.440	0.468	0.351	0.470	0.351	0.428	0.386
URANIUM	0.000	0.000	0.000	0.000	0.000	2.153	1.973	2.197	2.027	1.726	1.752	1.662	1.732	1.741	1.637
THORIUM	0.000	0.000	0.000	0.000	0.000	7.185	5.706	5.873	5.167	5.542	4.506	5.609	4.932	5.120	4.791
U/K	0.000	0.000	0.000	0.000	0.000	3.047	4.854	5.373	4.876	3.788	5.341	3.553	5.264	4.214	4.292
U/TH	0.000	0.000	0.000	0.000	0.000	0.304	0.352	0.381	0.390	0.317	0.400	0.296	0.356	0.347	0.343
TH/K	0.000	0.000	0.000	0.000	0.000	9.964	13.696	13.962	12.450	12.093	13.143	12.024	14.590	12.208	12.567

	1110	1120	1130	1140
POTASIUM	0.454	0.000	0.000	0.000
URANIUM	1.884	0.000	0.000	0.000
THORIUM	5.879	0.000	0.000	0.000
U/K	4.343	0.000	0.000	0.000
U/TH	0.324	0.000	0.000	0.000
TH/K	13.354	0.000	0.000	0.000

MAP UNIT PA

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.445	0.433	0.431	0.399	0.360	0.431	0.438	0.452	0.467	0.000	0.000	0.000	0.414	0.400	0.424
URANIUM	1.932	1.863	1.735	1.798	1.819	2.004	2.037	2.111	2.271	0.000	0.000	0.000	1.768	1.864	1.807
THORIUM	6.483	6.467	6.335	5.802	5.412	5.750	5.875	5.953	6.271	0.000	0.000	0.000	5.389	6.123	5.792
U/K	4.527	4.435	4.143	4.712	5.337	4.968	4.962	4.953	5.182	0.000	0.000	0.000	4.687	4.857	4.486
U/TH	0.304	0.292	0.278	0.315	0.342	0.353	0.352	0.359	0.366	0.000	0.000	0.000	0.337	0.307	0.316
TH/K	14.909	15.202	14.898	15.049	15.655	14.190	14.085	13.730	14.149	0.000	0.000	0.000	13.856	15.929	14.283

	1110	1120	1130	1140
POTASIUM	0.443	0.434	0.434	0.000
URANIUM	1.798	1.905	1.892	0.000
THORIUM	6.124	6.150	5.681	0.000
U/K	4.230	4.613	4.557	0.000
U/TH	0.296	0.311	0.334	0.000
TH/K	14.246	14.910	13.646	0.000

MAP UNIT PAU

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.638	0.604	0.650	0.670	0.593	0.623	0.613
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.483	2.258	2.647	2.239	2.190	1.769	2.159
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.763	7.257	7.359	7.443	7.029	6.090	6.523
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.976	3.974	4.546	3.470	3.917	3.067	3.822
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.370	0.316	0.364	0.309	0.318	0.296	0.341
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.869	12.530	12.493	11.307	12.267	10.304	11.144

	1110	1120	1130	1140
POTASIUM	0.605	0.578	0.597	0.464
URANIUM	2.126	2.348	2.385	2.431
THORIUM	6.903	7.538	7.620	7.457
U/K	3.724	4.356	4.270	5.580
U/TH	0.311	0.317	0.317	0.328
TH/K	11.995	13.589	13.324	16.963

MAP UNIT PAM

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.560	0.548	0.622	0.621	0.544	0.532	0.681
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.239	1.828	2.526	2.040	1.996	2.146	2.208
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.701	6.365	7.171	6.875	6.323	6.373	7.482
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.379	3.532	4.244	3.404	3.900	4.253	3.603
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.291	0.356	0.301	0.319	0.337	0.301
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.676	12.050	11.843	11.315	12.103	12.501	11.766

	1110	1120	1130	1140
POTASIUM	0.000	0.638	0.564	0.501
URANIUM	0.000	2.495	2.175	2.138
THORIUM	0.000	7.375	6.799	6.461
U/K	0.000	3.975	3.895	4.443
U/TH	0.000	0.339	0.322	0.335
TH/K	0.000	11.712	12.165	13.273

MAP UNIT PAL

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.593	0.598	0.351	0.608	0.521
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.646	2.014	1.875	1.997	2.054
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.262	6.798	4.830	6.878	6.424
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.566	3.484	5.521	3.401	4.059
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.362	0.299	0.389	0.291	0.327
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.578	11.613	14.290	11.657	12.416

	1110	1120	1130	1140
POTASIUM	0.475	0.580	0.000	0.591
URANIUM	1.770	2.393	0.000	2.173
THORIUM	5.465	6.817	0.000	7.250
U/K	3.842	4.168	0.000	3.870
U/TH	0.324	0.353	0.000	0.303
TH/K	11.765	11.863	0.000	12.642

MAP UNIT PBH

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.428	0.393	0.377	0.372	0.360	0.382	0.000	0.000	0.000	0.000	0.000	0.000	0.420	0.387	0.304
URANIUM	1.714	1.724	1.555	1.712	1.703	1.881	0.000	0.000	0.000	0.000	0.000	0.000	1.753	1.847	1.497
THORIUM	5.920	5.607	5.412	5.447	5.262	5.907	0.000	0.000	0.000	0.000	0.000	0.000	5.728	5.959	4.726
U/K	4.192	4.573	4.317	4.776	4.994	5.247	0.000	0.000	0.000	0.000	0.000	0.000	4.308	4.925	5.006
U/TH	0.292	0.312	0.290	0.319	0.330	0.326	0.000	0.000	0.000	0.000	0.000	0.000	0.312	0.312	0.321
TH/K	14.377	14.650	14.851	15.003	15.272	16.096	0.000	0.000	0.000	0.000	0.000	0.000	13.826	15.805	15.833

	1110	1120	1130	1140
POTASIUM	0.369	0.399	0.341	0.371
URANIUM	1.627	1.740	1.633	1.694
THORIUM	5.440	5.398	5.409	4.998
U/K	4.593	4.450	4.955	4.740
U/TH	0.303	0.325	0.307	0.341
TH/K	15.155	13.791	16.245	13.850

MAP UNIT PHC

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.446	0.420	0.360	0.383	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.368
URANIUM	1.756	1.800	1.623	1.657	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.906	0.000	1.548
THORIUM	5.772	5.063	5.430	5.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.309	0.000	4.886
U/K	4.206	4.535	4.865	4.550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.872	0.000	4.434
U/TH	0.307	0.355	0.305	0.328	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.305	0.000	0.317
TH/K	13.652	13.000	15.967	13.865	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.797	0.000	14.104

	1110	1120	1130	1140
POTASIUM	0.262	0.444	0.347	0.337
URANIUM	2.000	1.749	1.478	1.710
THORIUM	4.643	5.883	5.119	4.909
U/K	7.841	4.343	4.771	5.290
U/TH	0.430	0.304	0.295	0.348
TH/K	18.210	14.298	15.966	15.542

MAP UNIT PJ

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.491	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.480	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.614	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.178	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.327	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.821	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.000	0.000	0.000	0.570
URANIUM	0.000	0.000	0.000	2.188
THORIUM	0.000	0.000	0.000	6.404
U/K	0.000	0.000	0.000	3.839
U/TH	0.000	0.000	0.000	0.349
TH/K	0.000	0.000	0.000	11.332

MAP UNIT MPFB

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.386	0.437	0.356	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.524	0.000	0.491
URANIUM	1.650	1.810	1.754	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.913	0.000	2.134
THORIUM	5.233	4.942	5.678	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.626	0.000	4.919
U/K	4.520	4.412	5.488	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.661	0.000	4.476
U/TH	0.325	0.370	0.313	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288	0.000	0.441
TH/K	13.982	12.155	17.438	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.724	0.000	10.630

	1110	1120	1130	1140
POTASIUM	0.510	0.279	0.427	0.361
URANIUM	1.938	1.574	1.756	1.671
THORIUM	6.005	4.144	5.180	4.197
U/K	4.324	6.095	4.223	4.788
U/TH	0.324	0.396	0.347	0.390
TH/K	13.502	16.030	12.403	12.751

MAP UNIT MR

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.245	0.373	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	1.355	1.656	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	3.965	4.710	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/K	6.298	4.673	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.347	0.358	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	17.571	13.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.000	0.252	0.391	0.310
URANIUM	0.000	1.552	1.689	0.747
THORIUM	0.000	3.923	4.719	3.671
U/K	0.000	6.229	4.642	2.425
U/TH	0.000	0.405	0.362	0.206
TH/K	0.000	15.564	12.993	11.925

MAP UNIT MB

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.274	0.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.408
URANIUM	1.258	1.592	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.615
THORIUM	3.563	4.610	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.606
U/K	4.777	4.707	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.377
U/TH	0.364	0.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355
TH/K	13.541	13.641	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.105

	1110	1120	1130	1140
POTASIUM	0.305	0.000	0.208	0.359
URANIUM	1.339	0.000	1.197	1.339
THORIUM	4.210	0.000	2.985	3.076
U/K	4.875	0.000	6.524	3.793
U/TH	0.326	0.000	0.412	0.464
TH/K	15.075	0.000	15.509	8.720

MAP UNIT SLSB

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.228	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	0.965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	3.223	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/K	4.594	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.304	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	14.811	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.000	0.201	0.000	0.000
URANIUM	0.000	1.134	0.000	0.000
THORIUM	0.000	3.017	0.000	0.000
U/K	0.000	5.661	0.000	0.000
U/TH	0.000	0.378	0.000	0.000
TH/K	0.000	15.060	0.000	0.000

MAP UNIT OCJ

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.293	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	1.120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	3.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/K	4.102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.377	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	11.252	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.295	0.186	0.203	0.323
URANIUM	1.217	1.214	0.898	1.470
THORIUM	4.113	2.309	2.984	2.480
U/K	4.615	6.385	5.579	4.742
U/TH	0.261	0.522	0.335	0.646
TH/K	14.513	12.678	15.131	7.680

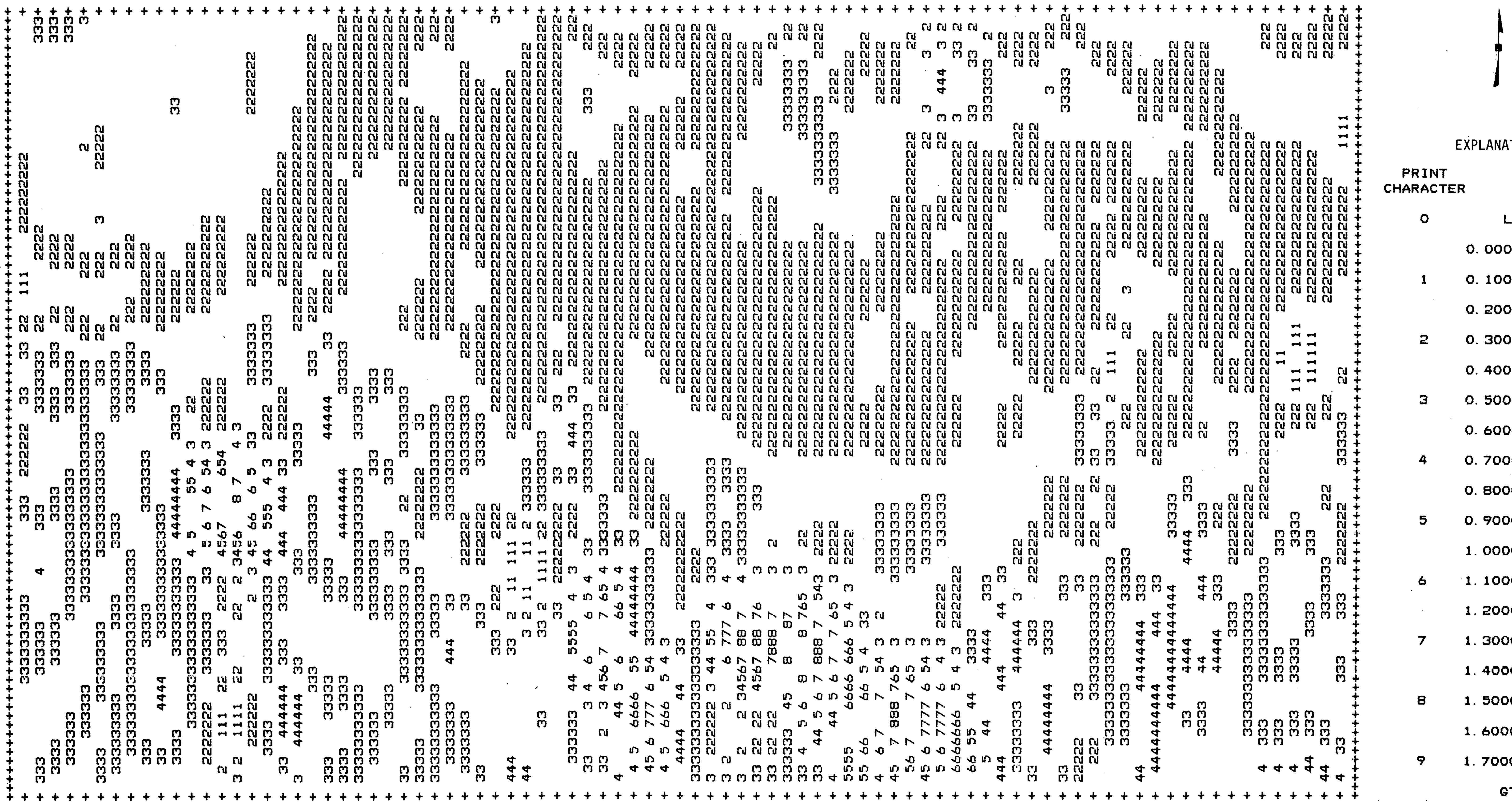
MAP UNIT OSE

	250	260	270	280	290	300	310	320	330	340	350	360	1080	1090	1100
POTASIUM	0.231	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	1.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	3.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/K	5.058	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	13.712	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1110	1120	1130	1140
POTASIUM	0.250	0.000	0.000	0.000
URANIUM	1.459	0.000	0.000	0.000
THORIUM	4.971	0.000	0.000	0.000
U/K	5.850	0.000	0.000	0.000
U/TH	0.294	0.000	0.000	0.000
TH/K	19.937	0.000	0.000	0.000

APPENDIX H - Pseudo Contour Maps

RUSSELLVILLE



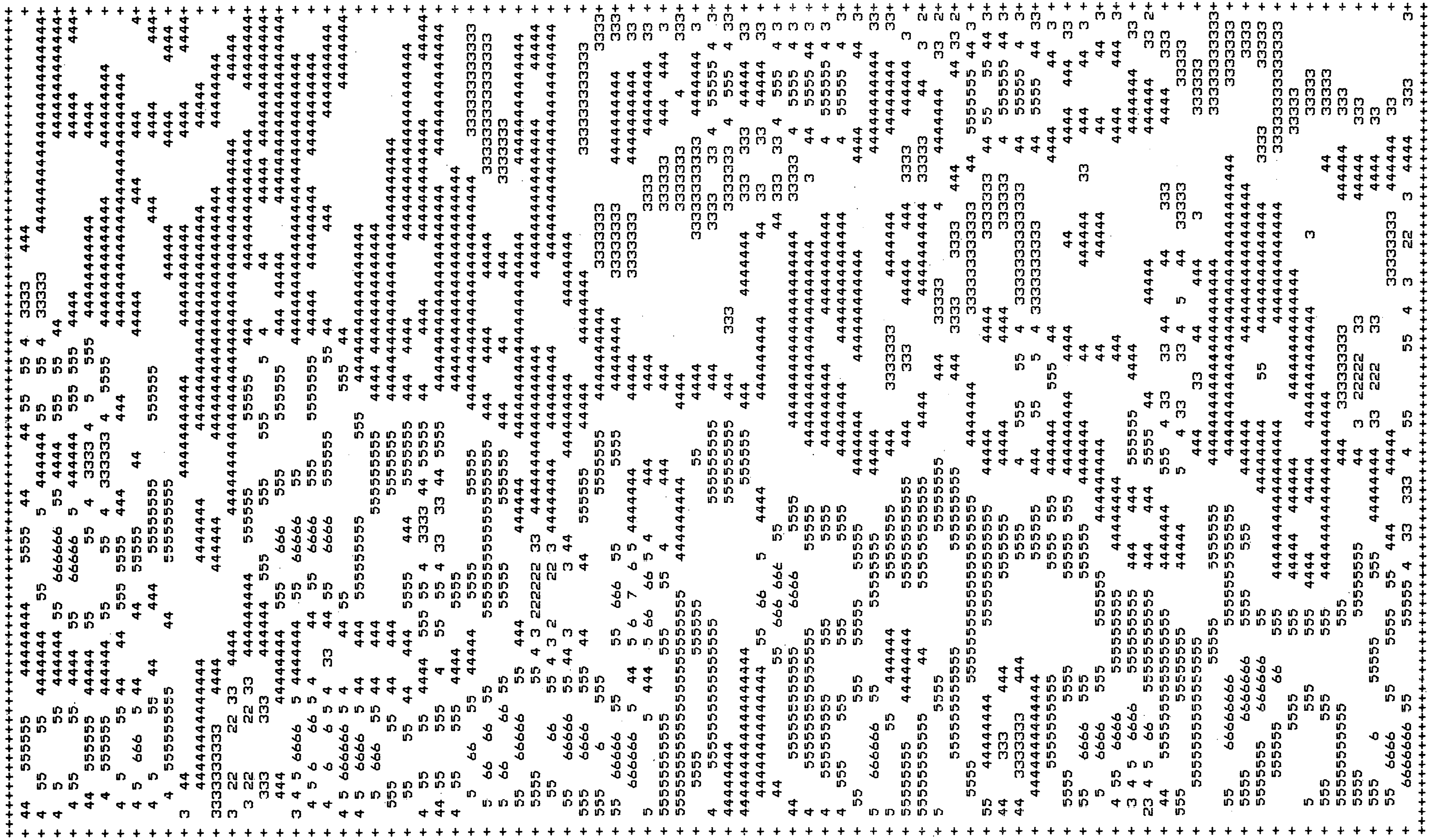
Potassium Pseudo-Contour Map - Russellville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.1000
1	0.1000	0.2000
	0.2000	0.3000
2	0.3000	0.4000
	0.4000	0.5000
3	0.5000	0.6000
	0.6000	0.7000
4	0.7000	0.8000
	0.8000	0.9000
5	0.9000	1.0000
	1.0000	1.1000
6	1.1000	1.2000
	1.2000	1.3000
7	1.3000	1.4000
	1.4000	1.5000
8	1.5000	1.6000
	1.6000	1.7000
9	1.7000	1.8000
	GT	1.8000

SCALE IN EQUIVALENT PERCENT

RUSSELLVILLE



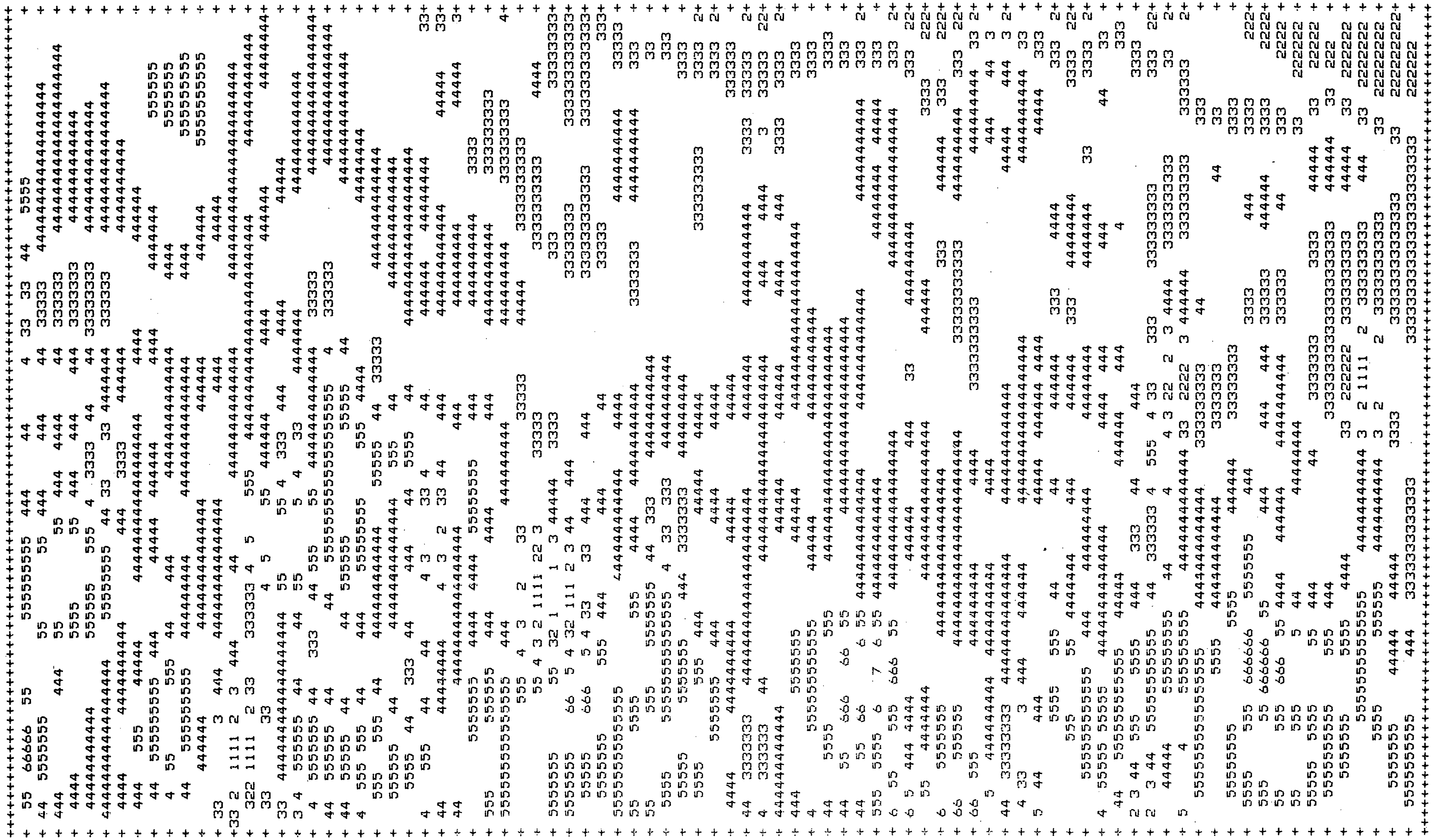
Uranium Pseudo-Contour Map - Russellville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.2500
1	0.2500	0.5000
	0.5000	0.7500
2	0.7500	1.0000
	1.0000	1.2500
3	1.2500	1.5000
	1.5000	1.7500
4	1.7500	2.0000
	2.0000	2.2500
5	2.2500	2.5000
	2.5000	2.7500
6	2.7500	3.0000
	3.0000	3.2500
7	3.2500	3.5000
	3.5000	3.7500
8	3.7500	4.0000
	4.0000	4.2500
9	4.2500	4.5000
	GT	4.5000

SCALE IN EQUIVALENT PPM

RUSSELLVILLE



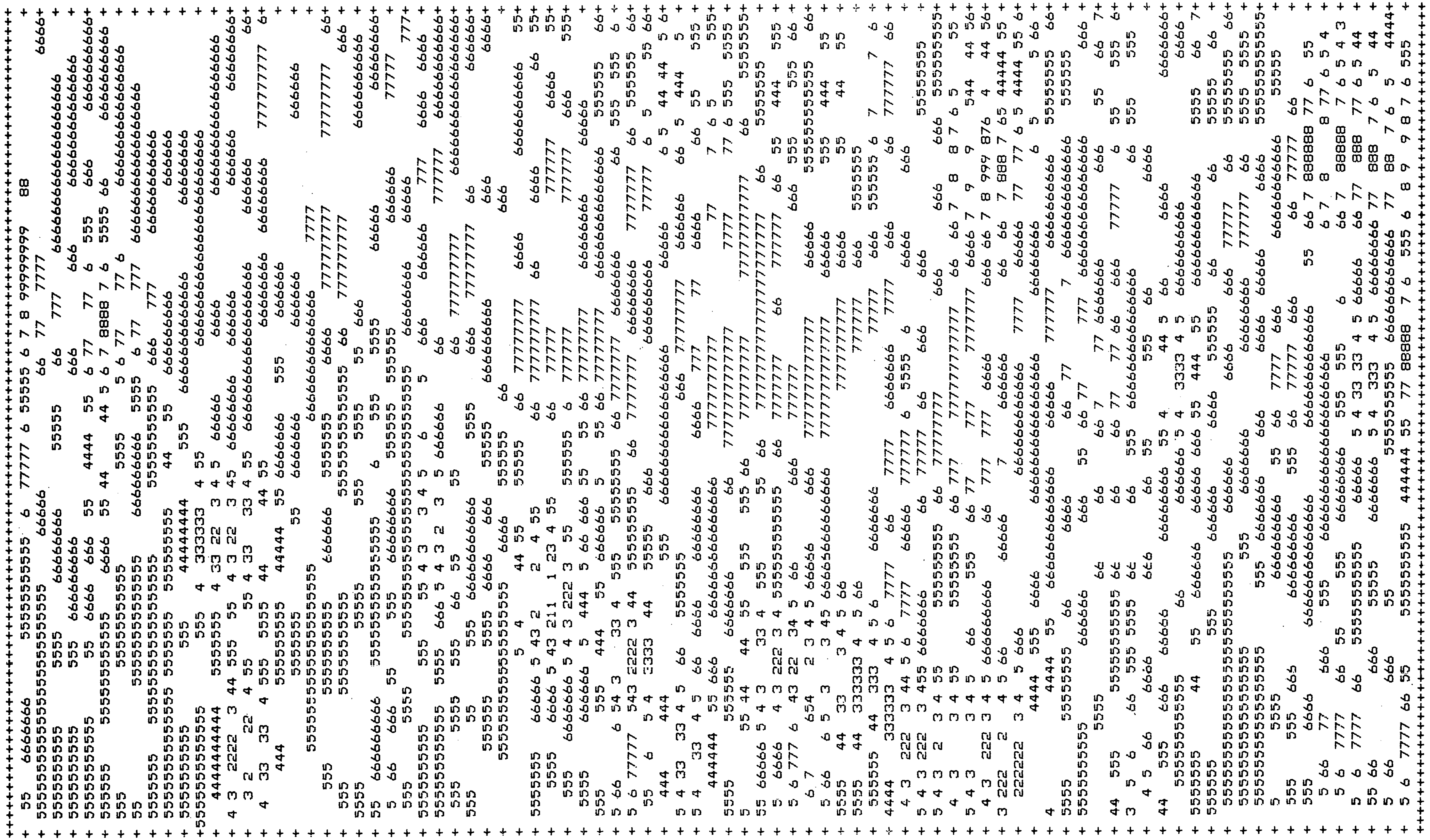
Thorium Pseudo-Contour Map - Russellville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.5000
	0.5000	1.2500
1	1.2500	2.0000
	2.0000	2.7500
2	2.7500	3.5000
	3.5000	4.2500
3	4.2500	5.0000
	5.0000	5.7500
4	5.7500	6.5000
	6.5000	7.2500
5	7.2500	8.0000
	8.0000	8.7500
6	8.7500	9.5000
	9.5000	10.2500
7	10.2500	11.0000
	11.0000	11.7500
8	11.7500	12.5000
	12.5000	13.2500
9	13.2500	14.0000
	GT	14.0000

SCALE IN EQUIVALENT PPM

RUSSELLVILLE

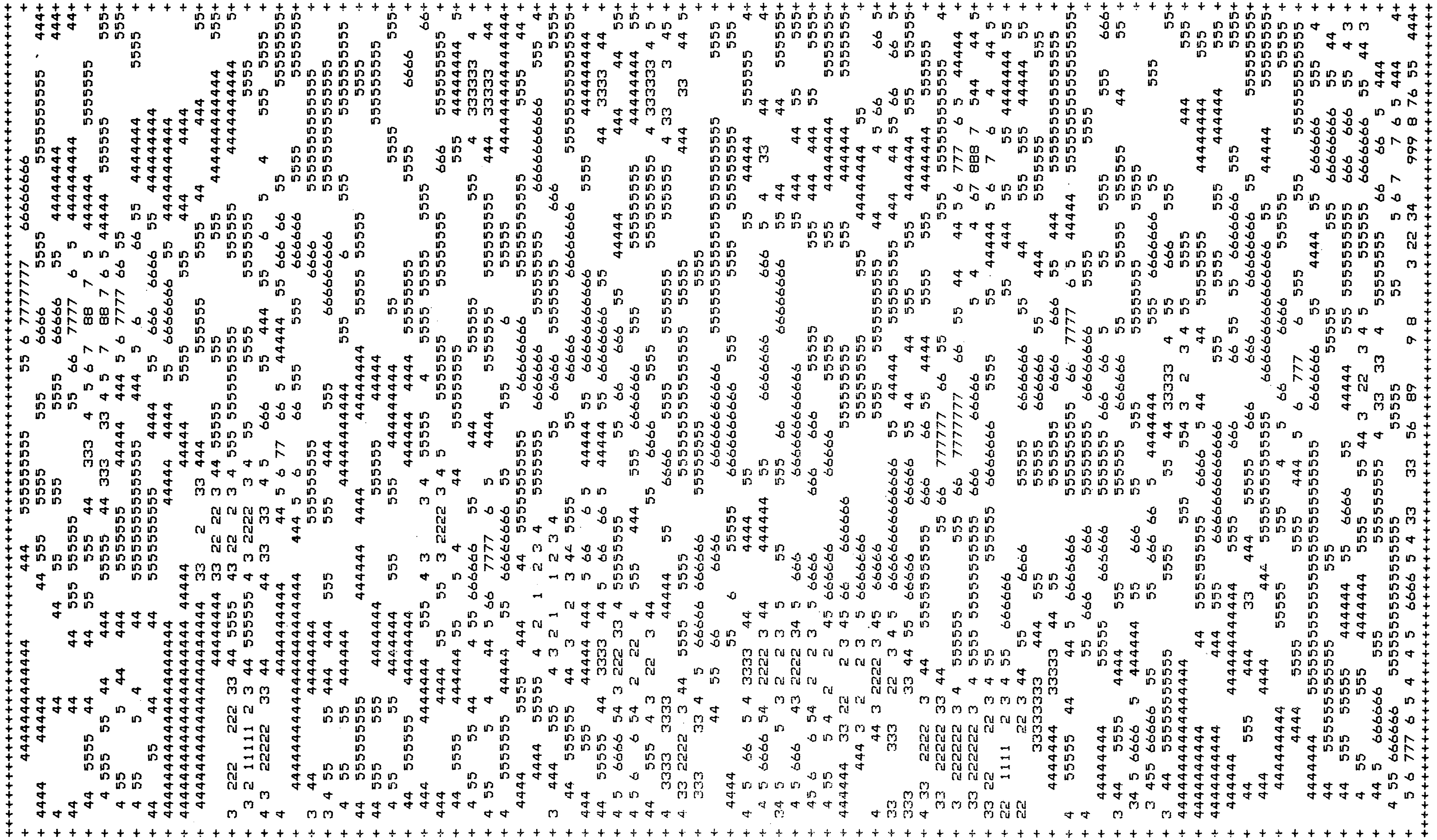


EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	1.2500
1	1.2500	2.5000
	2.5000	3.7500
2	3.7500	5.0000
	5.0000	6.2500
3	6.2500	7.5000
	7.5000	8.7500
4	8.7500	10.0000
	10.0000	11.2500
5	11.2500	12.5000
	12.5000	13.7500
6	13.7500	15.0000
	15.0000	16.2500
7	16.2500	17.5000
	17.5000	18.7500
8	18.7500	20.0000
	20.0000	21.2500
9	21.2500	22.5000
	GT	22.5000

Thorium/Potassium Pseudo-Contour Map - Russellville Quadrangle

RUSSELLVILLE

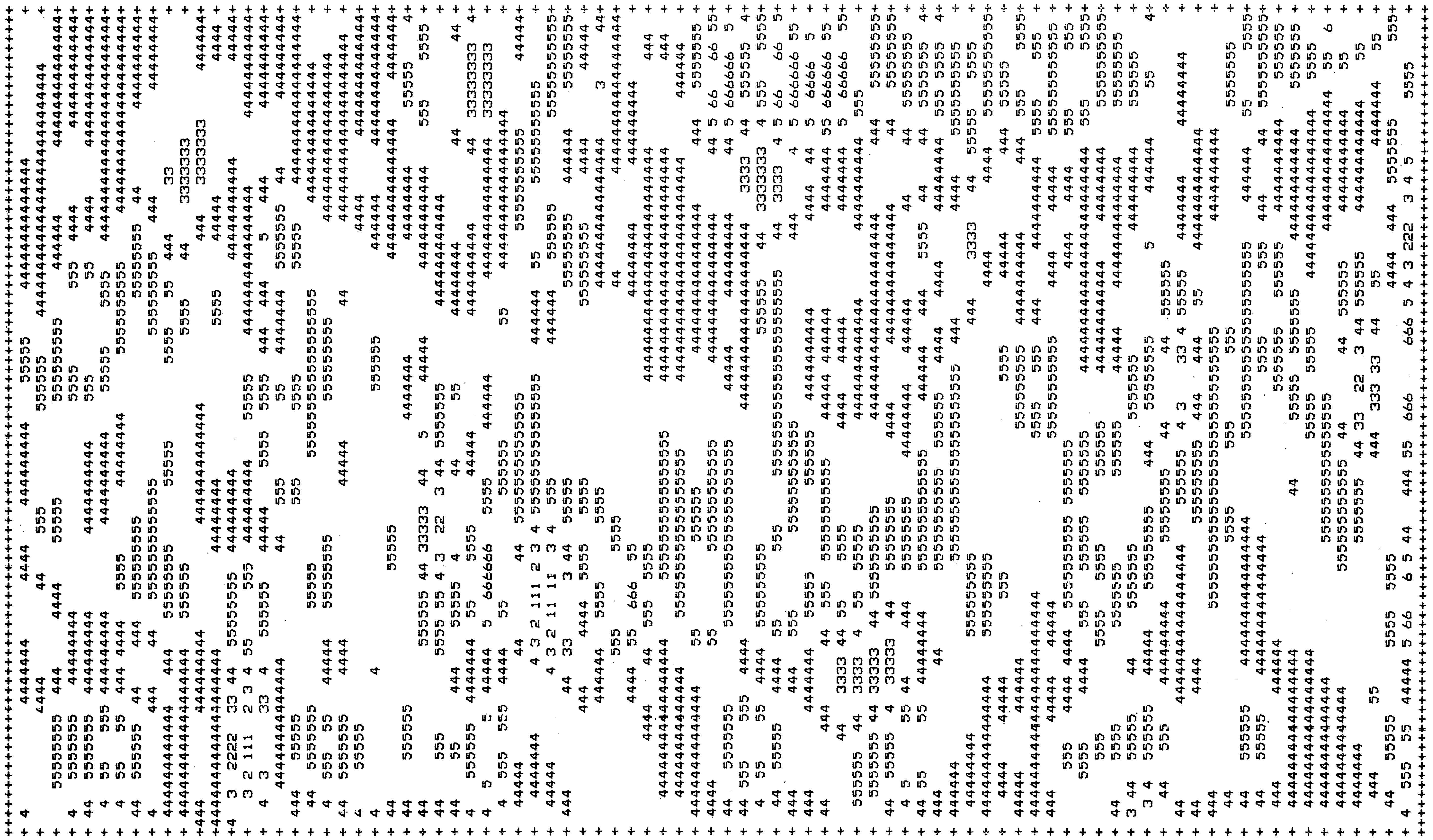


Uranium/Potassium Pseudo-Contour Map - Russellville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.5000
1	0.5000	1.0000
	1.0000	1.5000
2	1.5000	2.0000
	2.0000	2.5000
3	2.5000	3.0000
	3.0000	3.5000
4	3.5000	4.0000
	4.0000	4.5000
5	4.5000	5.0000
	5.0000	5.5000
6	5.5000	6.0000
	6.0000	6.5000
7	6.5000	7.0000
	7.0000	7.5000
8	7.5000	8.0000
	8.0000	8.5000
9	8.5000	9.0000
	GT	9.0000

RUSSELLVILLE

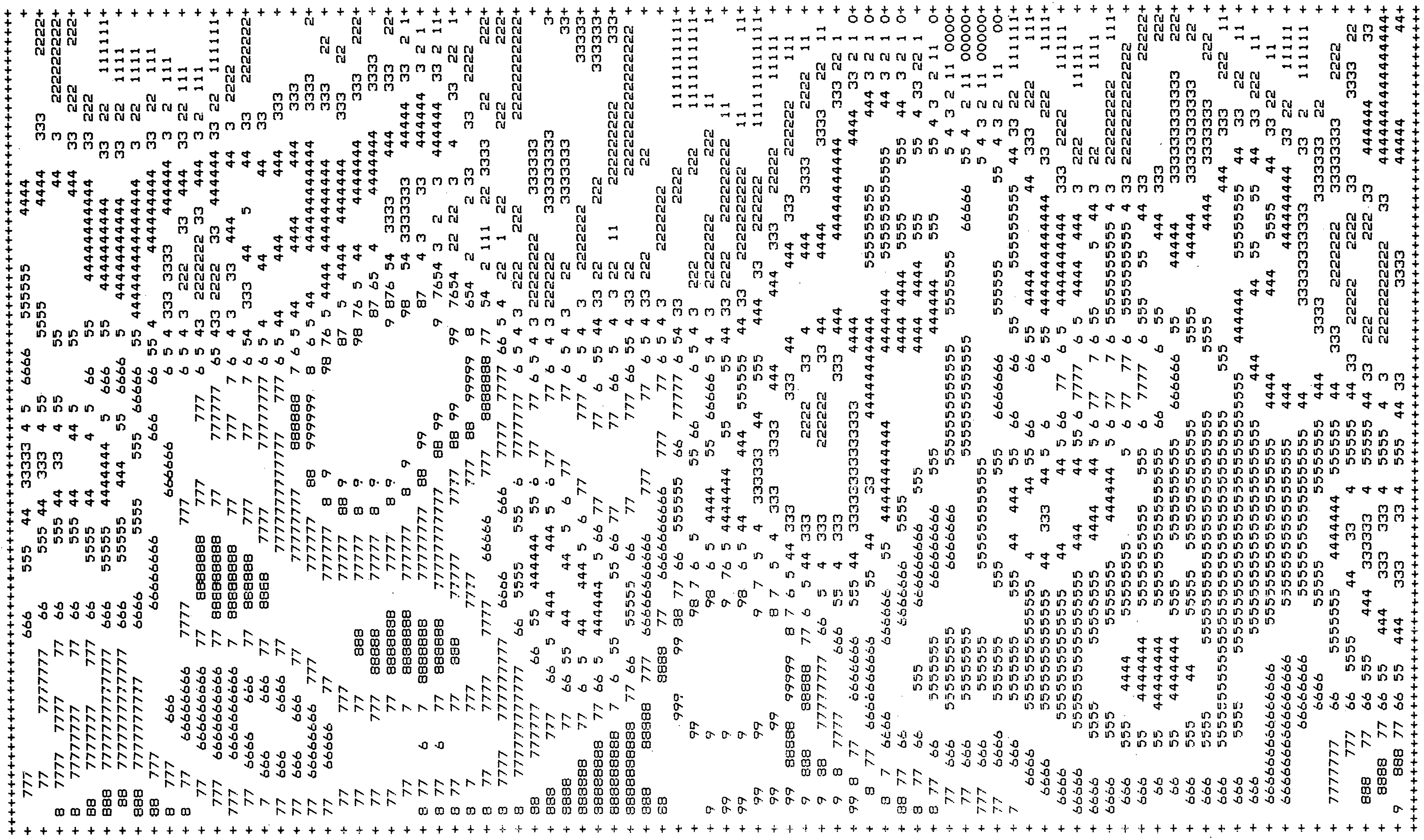


EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.0400
1	0.0400	0.0800
	0.0800	0.1200
2	0.1200	0.1600
	0.1600	0.2000
3	0.2000	0.2400
	0.2400	0.2800
4	0.2800	0.3200
	0.3200	0.3600
5	0.3600	0.4000
	0.4000	0.4400
6	0.4400	0.4800
	0.4800	0.5200
7	0.5200	0.5600
	0.5600	0.6000
8	0.6000	0.6400
	0.6400	0.6800
9	0.6800	0.7200
	GT	0.7200

Uranium/Thorium Pseudo-Contour Map - Russellville Quadrangle

RUSSELLVILLE



Residual Magnetic Pseudo-Contour Map - Russellville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	-700.0000
	-700.0000	-670.0000
1	-670.0000	-640.0000
	-640.0000	-610.0000
2	-610.0000	-580.0000
	-580.0000	-550.0000
3	-550.0000	-520.0000
	-520.0000	-490.0000
4	-490.0000	-460.0000
	-460.0000	-430.0000
5	-430.0000	-400.0000
	-400.0000	-370.0000
6	-370.0000	-340.0000
	-340.0000	-310.0000
7	-310.0000	-280.0000
	-280.0000	-250.0000
8	-250.0000	-220.0000
	-220.0000	-190.0000
9	-190.0000	-160.0000
	GT	-160.0000

SCALE IN GAMMAS

RUSSELLVILLE QUADRANGLE NTMS NI 15-2 LINE 250
SINGLE RECORD LISTING - GEOMETRICS DATA ACQUIRED 80186

RUSSELVILLE QUADRANGLE - NTMS NI 15-2 LINE 250
AVERAGED RECORD LISTING - GEOMETRICS DATA ACQUIRED 80186