AERIAL GAMMA RAY AND MAGNETIC SURVEY
DANVILLE QUADRANGLE
INDIANA AND ILLINOIS

FINAL REPORT

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ABSTRACT

The Danville quadrangle covers approximately 7,250 square miles of area in Illinois and Indiana within the Midwestern Physiographic Province. Thick glacial deposits overlie lower Paleozoic strata in this area. Precambrian crystalline material comprises the basement in this area.

A search of available literature revealed no known uranium deposits.

A total of sixty-seven (67) uranium anomalies were detected and are discussed briefly in this report. None were considered significant and all appear to be related to cultural features.

Magnetic data appears to be in agreement with existing structural interpretations of the area, though some high gradient areas may represent complexities in the Precambrian basement material.

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INTRODUCTION

General

The Danville quadrangle covers a 7,250 square mile area of eastern Illinois and western Indiana, (see Figure 1).

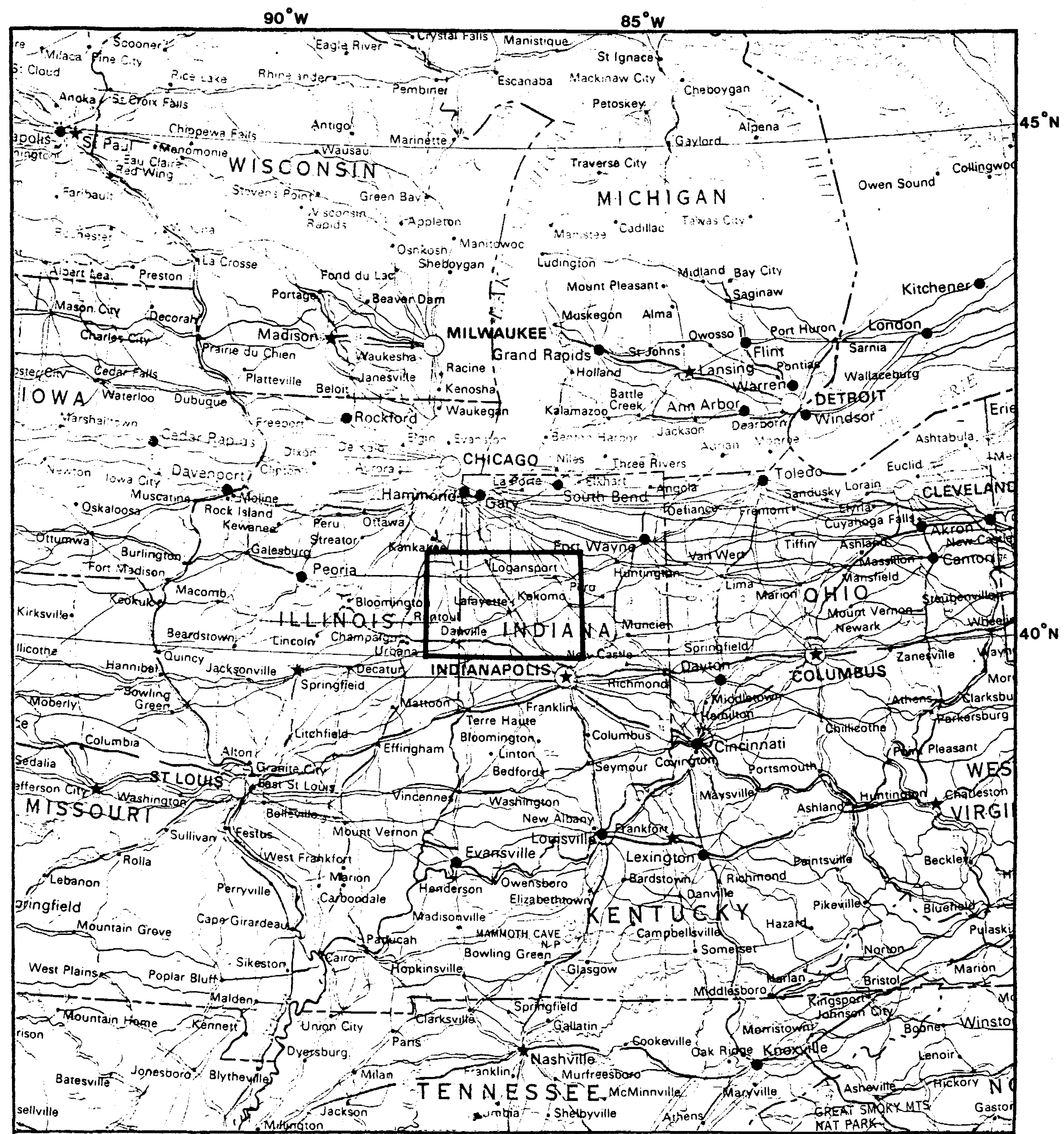
The geologic base map used was compiled by the Indiana Geological Survey in 1966 from a combination of published and unpublished direct field sources. Both surficial and bedrock units appear on the map, but only surficial units were used except where bedrock is mapped as being exposed. All map unit descriptions, as they appear on the map, can be found in Appendix C. Supplementary geologic information was taken from Fairbridge (ed.) 1975, Flint (1945), and Cohee and others (1962). Cultural and physiographic information was taken from the 1:250,000 scale Danville topographic sheet (1971 versions).

Radiometric and magnetic data were acquired in October of 1980 and were processed in January 1981. A detailed summary of data acquisition, processing, interpretation, and presentation methods can be found in Appendix A of this report. A flight summary report for the Danville quadrangle is contained in Appendix B.

Physiography

The area covered by the Danville quadrangle lies within a flat glacial plain of the easternmost Midwestern Physiographic Province. The largely flat, nearly featureless topography is dominated by agricultural activity. The region is primarily drained by the Wabash River or its tributaries. This water eventually joins the Mississippi to the southwest. The northeastern quadrant of the quadrangle lies within the Iroquois River watershed, which flows into Lake Michigan. The drainage divide between the two systems is a series of low hills with peaks of 800 to 900 feet in elevation. Elevations in the quadrangle range from below 500 feet at the lowest base level of the Wabash River, to nearly 1,000 feet atop several hills in the southeastern corner. Slopes in the plains grade very gently between the minimum and maximum elevations.

Though the region is largely agricultural, it contains several large towns and cities. The largest cities in the area are Danville, Lafayette, and Kokomo; each with populations of almost 45,000. The entire quadrangle is covered with a dense grid of roads and railroads, and contains an extensive network of U.S. and interstate freeways. Some mining (coal?) has occurred and is probably taking place in several areas of the quadrangle.



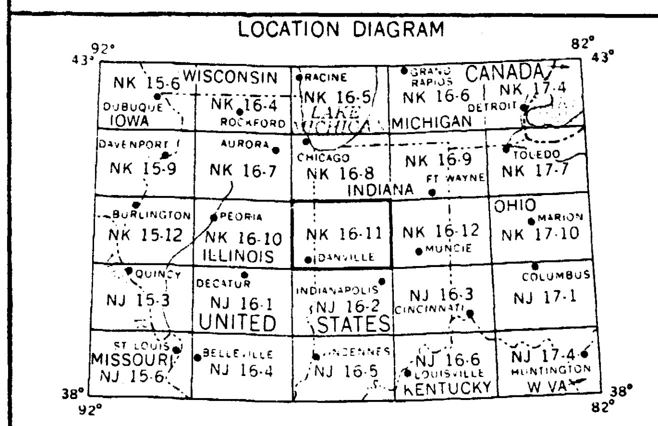


FIGURE 1

LOCATION MAP

DANVILLE QUADRANGLE

Scale

100 50 0 100 MILES

GEOLOGY

Structure

The Danville quadrangle overlies the axis of the Kankakee Arch, which strikes northwest through the northeastern quadrant (see Figure 2). Lower Paleozoic sediments thin to slightly more than 500 feet atop the Arch. Paleozoics thicken to the southwest in excess of 2,000 feet at the southwestern corner (in the Illinois Basin) and include some Mississippian and Pennsylvanian sediments. Sediments shoal sharply along the southern west edge in a region adjacent to the NNW striking LaSalle Anticlinal Belt.

As mapped by Wayne and others (1971), no faults of any kind disturb surficial units. Cohee and others (1962) show no structural complexities in the Paleozoics which have been interpreted to be faults. Some faults may exist in conjunction with the LaSalle Anticlinal system, but no evidence for this is reported by available references.

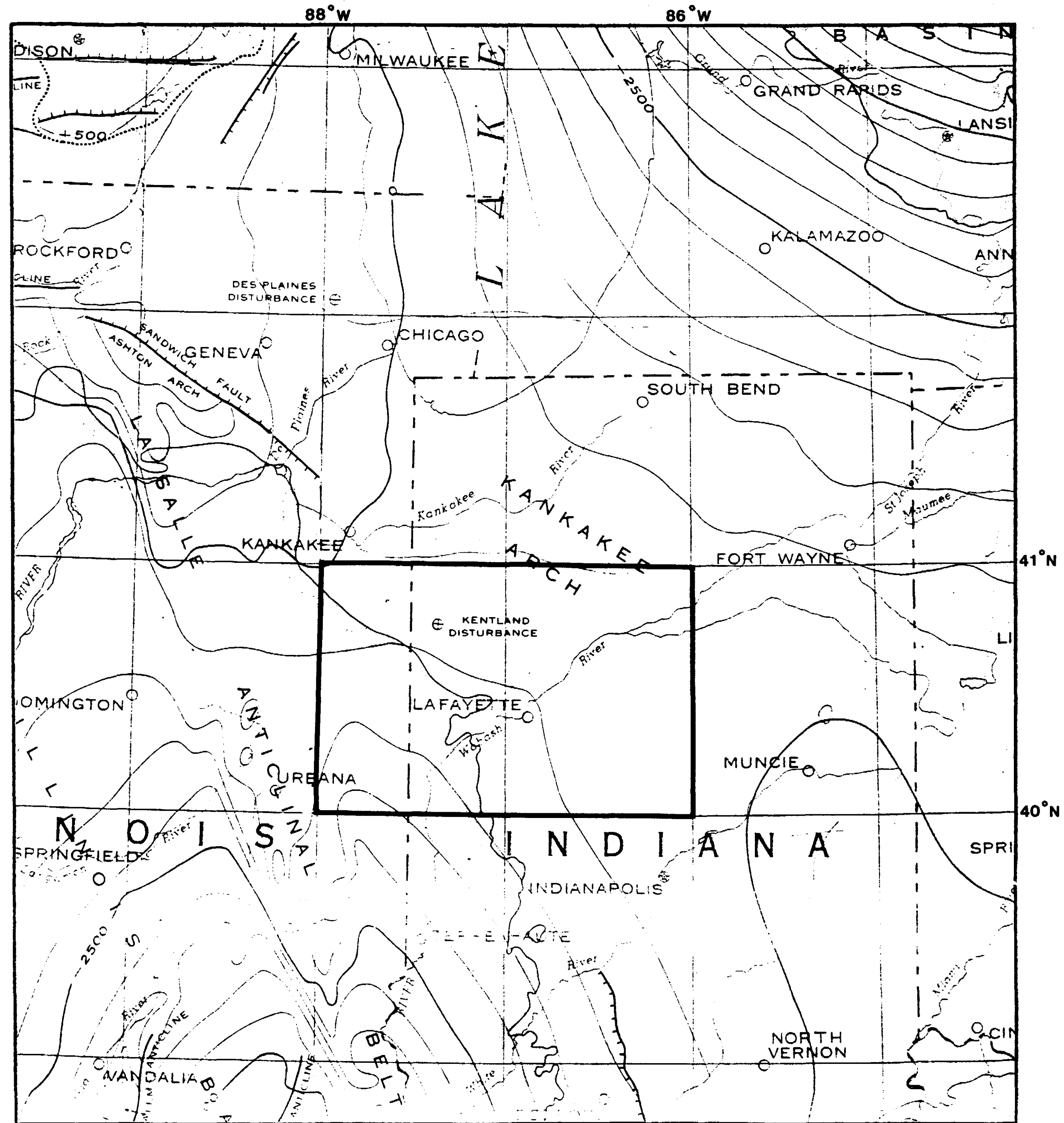
Surface Geology

As mapped by Wayne and others, Quaternary deposits cover over 99 percent of the surface. Exposures of Ordovician through Mississippian age materials occur only in some deeply eroded river channels and in some local areas of thin glacial cover where some karst topography is displayed. These rock units, where exposed, consist largely of limestones and dolomites, with some shales. Coal beds, and adjacent rock units are exposed by the strip mining activity.

The Quaternary system is dominated by a wide variety of Wisconsinan glacial and periglacial deposits. Glacial till from ground and end moraines of the Tazwell or Cary stages cover approximately 77 percent of the surface, Kame and esker deposits are intersperced through the till, but account for less than 1 percent of the surface. Outwash sands and silts are mapped within or adjacent to the modern drainage systems, and cover approximately 10 percent of the surface. Lacustrine sediments from glacial lakes cover a significant portion of the northwestern quadrant, and account for 8 percent of the total surface exposures. Eolian sands and silts are mapped in close association with the lacustrine sediments, and account for another 3 percent of the surface. Post-glacial fluvial, alluvial, colluvial, and paludal deposits have extremely minor surficial extent (<1 percent) and are largely confined to narrow modern or fossil drainage systems. Recent alluvium is mapped in most major drainage systems, but covers only 1 percent of the surface.

Uranium

According to available literature, there are no known uranium deposits in the Danville quadrangle.



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

FIGURE 2

TECTONIC STRUCTURE MAP
DANVILLE QUADRANGLE

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

INTERPRETATION OF GEOPHYSICAL DATA

Radiometric Data

A total of 67 groups of uranium (Bi214) samples meet the minimum statistical requirements for anomaly definitions as set forth in the data interpretation section of Appendix A. 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 and as such cannot be taken as directly determined geochemical values.

The Danville quadrangle contains moderate concentrations of potassium, uranium, and thorium. These elements appear to be distributed almost uniformly throughout the quadrangle. Potassium has a quadrangle mean of 1.2 percent. Uranium averages 2.3 ppmeU, and thorium has a mean concentration of 5.5 ppmeT.

Uranium concentrations vary considerably over short distances but through a narrow range. The highest peak uranium concentration is 4.7 ppmeU in map unit QLE (Quaternary lacustrine clay, silt, and sand deposits overlying end moraine topography). This unit also has the highest average uranium concentration at 2.7 ppmeU.

Potassium and thorium also have relatively narrow concentration ranges, but vary through those ranges only over much longer distances. The two elements vary in tandem. With lowest concentrations along the central northern border, and highest values along the western edge. Highest average potassium and thorium (1.7 percent and 7.2 ppmeT respectively) are found in map unit QLE, as well as the highest peak thorium concentration at 9.0 ppmeT. Highest peak potassium (2.3 percent) occurs in map unit QCL (Quaternary lacustrine clay, silt, and sand).

The concentrations of the three radioactive elements within those areas of mapped exposed bedrock are very similar to those in the overlying Quaternary materials. This suggests that the glacial material may be primarily of local origin. Even so, some bimodality in the thorium and potassium concentrations in certain genetic units (such as moraine material) suggests that the moraines from different glacial stages sampled slightly different source material.

Anomalies occur mainly in the southeast, and in the high uranium concentration area of the northwest. All these anomalies appear to have cultural origins (such as roads, railroads, quarries, etc.). These anomalies range in peak concentration from 2.8 to 4.7 ppmeU. The cultural associations, coupled with the low concentration levels, indicates that none of the anomalies have any significance.

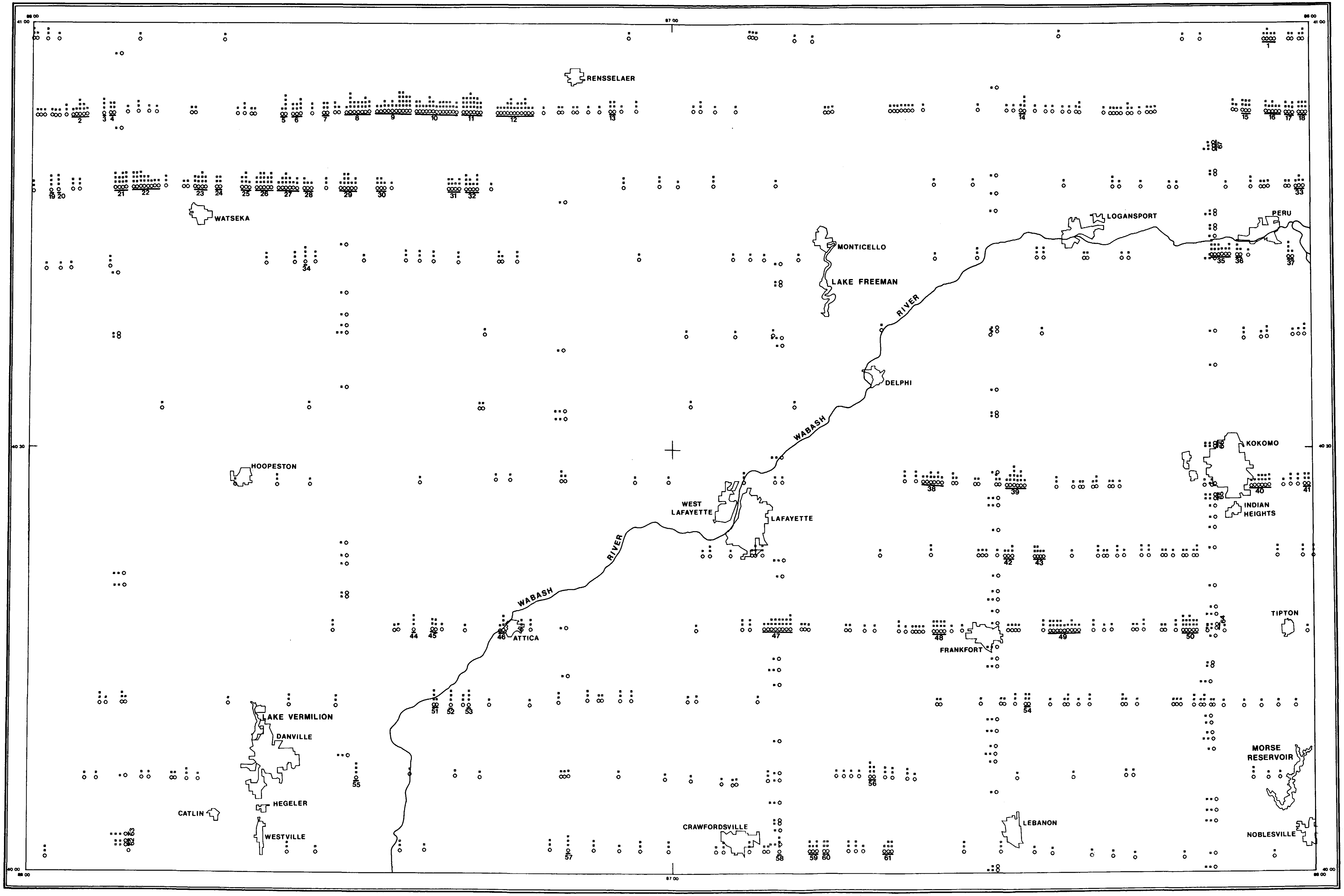
Magnetic Data

The magnetic field pseudocontour map appears in Appendix A.

The quadrangle is dominated by moderate to long wavelengths of low amplitude. The resulting picture suggests large complex structures at depth. Though gradients generally decrease away from the axis of the Kankakee Arch, the most obvious contribution to the magnetic field appears to be local isolated structures and linear features oriented in a variety of directions. One possible contribution may be complexities in lithology and/or structure in the underlying Precambrian basement.

da

DANVILLE



URANIUM ANOMALY/ INTERPRETATION MAP

DANVILLE QUADRANGLE

U.S. DEPARTMENT OF ENERGY

APPROXIMATE SCALE 1:500,000

EXPLANATION

□ – CITY OR TOWN

– URANIUM SAMPLE MEETING FOLLOWING CRITERIA:

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

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

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

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, $4.0 \leq sum \leq \infty$, WITH AT LEAST ONE SAMPLE OF 2 OR MORE STANDARD DEVIATIONS.

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

Figure 3 - Uranium Anomaly/Interpretation Map - Danville Quadrangle

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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.

Some 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. N9AG). 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 thirty six quadrangles a total of 52,870 line miles, excluding reflights and overlaps and missing data, were flown by the aircraft. 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 aircraft 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.

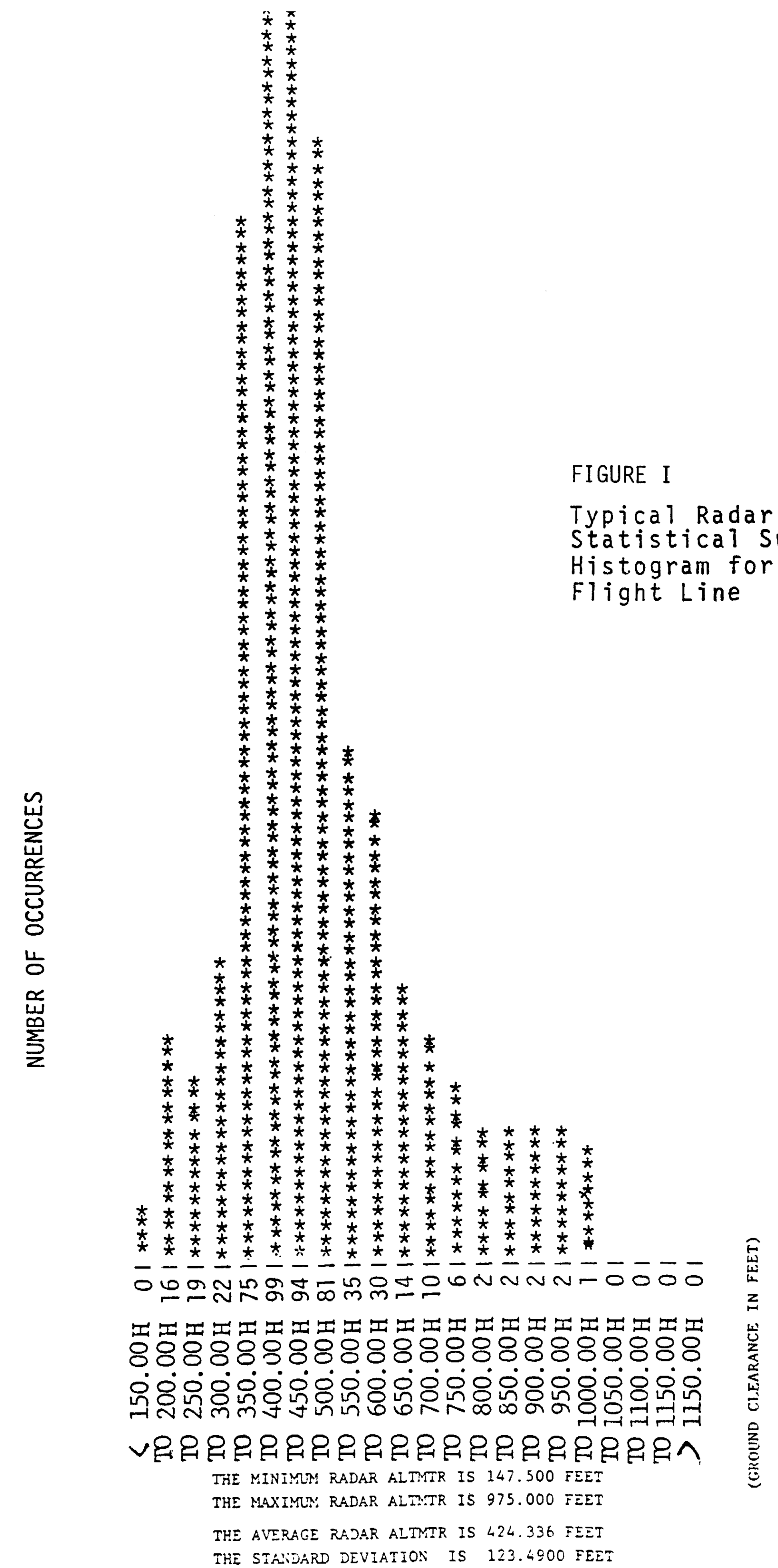


FIGURE I

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.

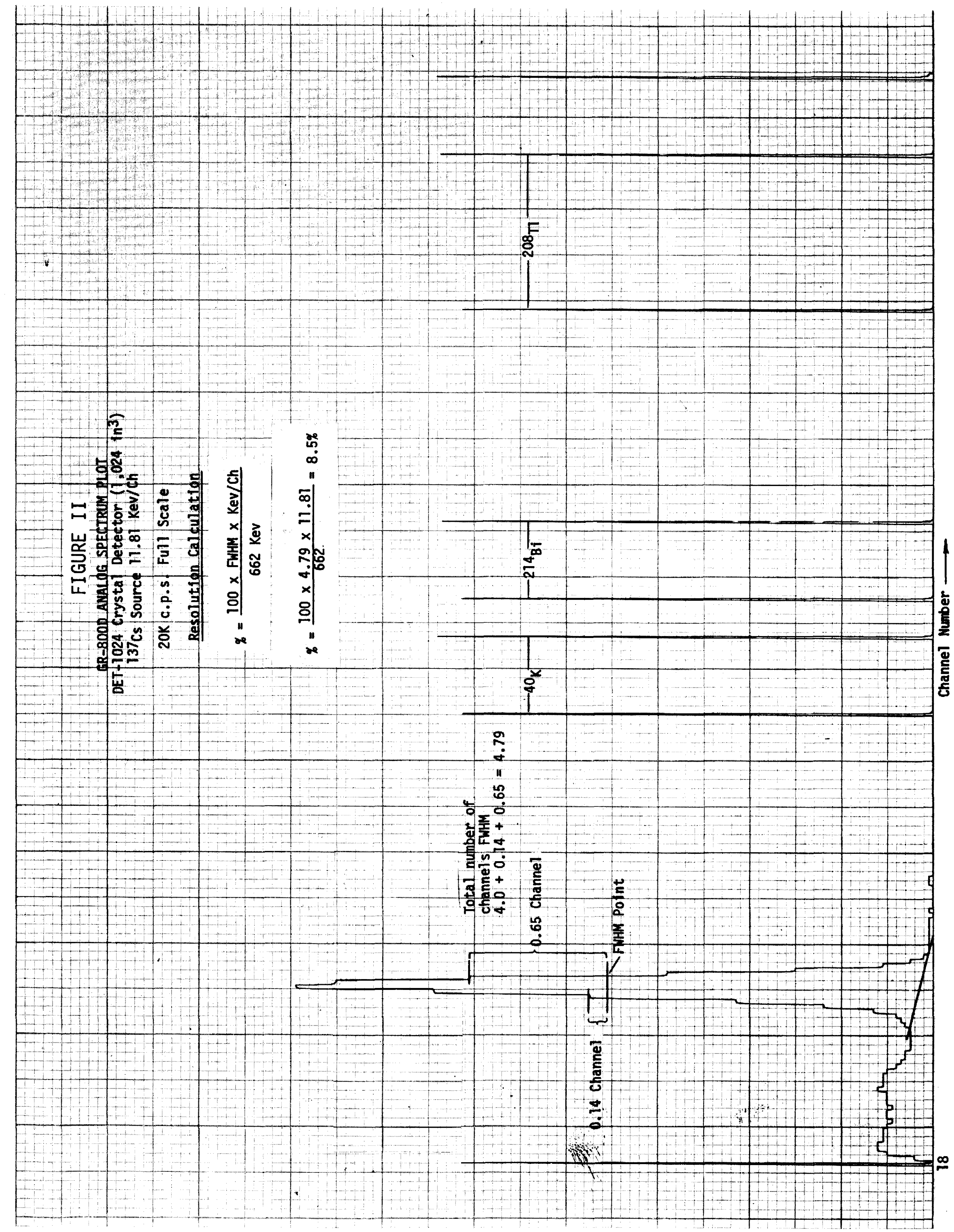
3. Finally run a full thorium analog spectrum of the down crystals and check for centering of K40 and Tl208 peaks in spectrum.

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 T1208 window.

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

4. Determine shift, if any, in T1208 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 portion of the survey was a Beechcraft Queen Air Model 65, U.S. Registry Number N9AG. 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.

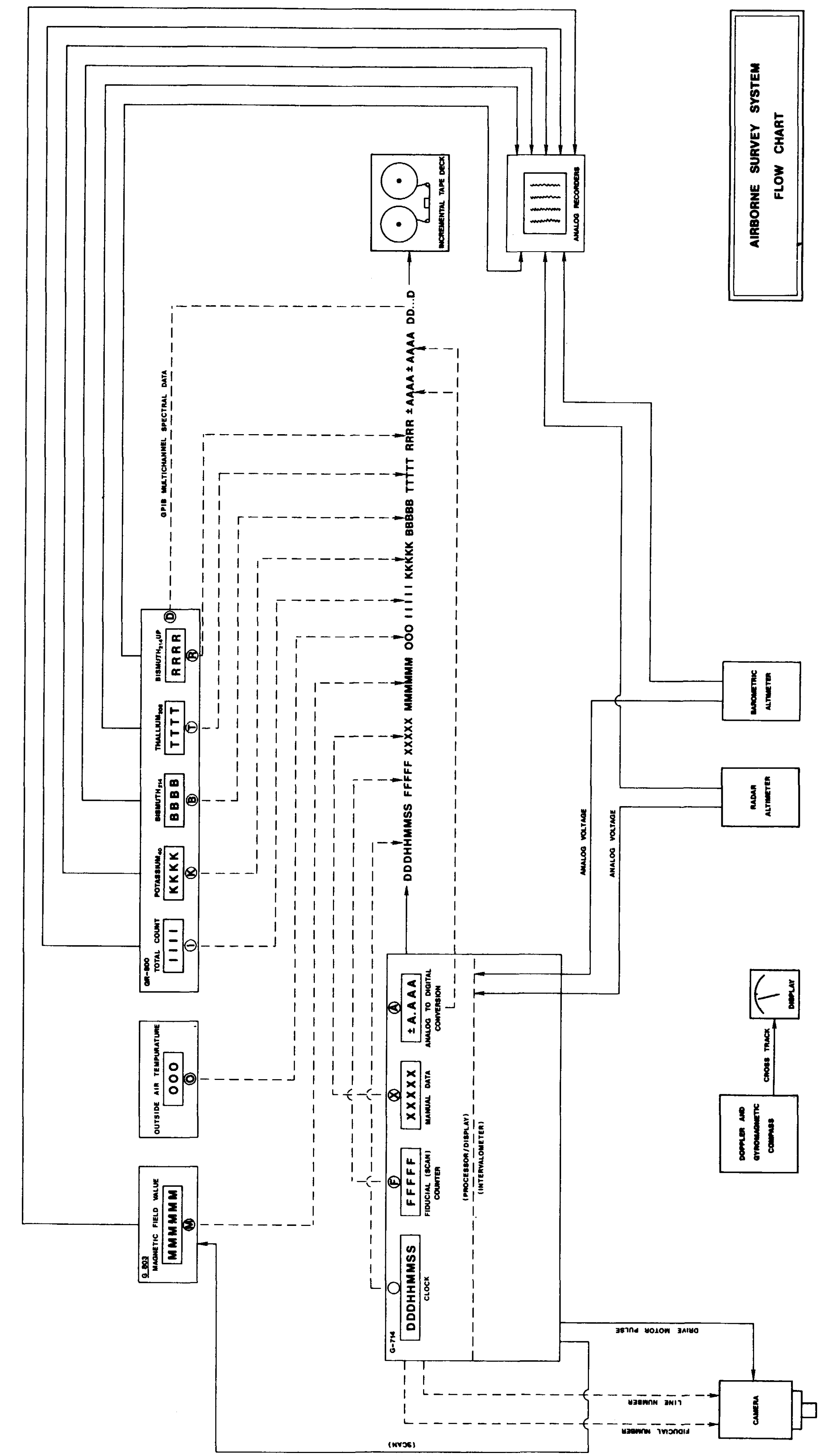


FIGURE III

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:

$$\frac{C_{12}(h_i)}{\Delta C} \times \Delta S = \Delta C(12{,}000)$$ 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:

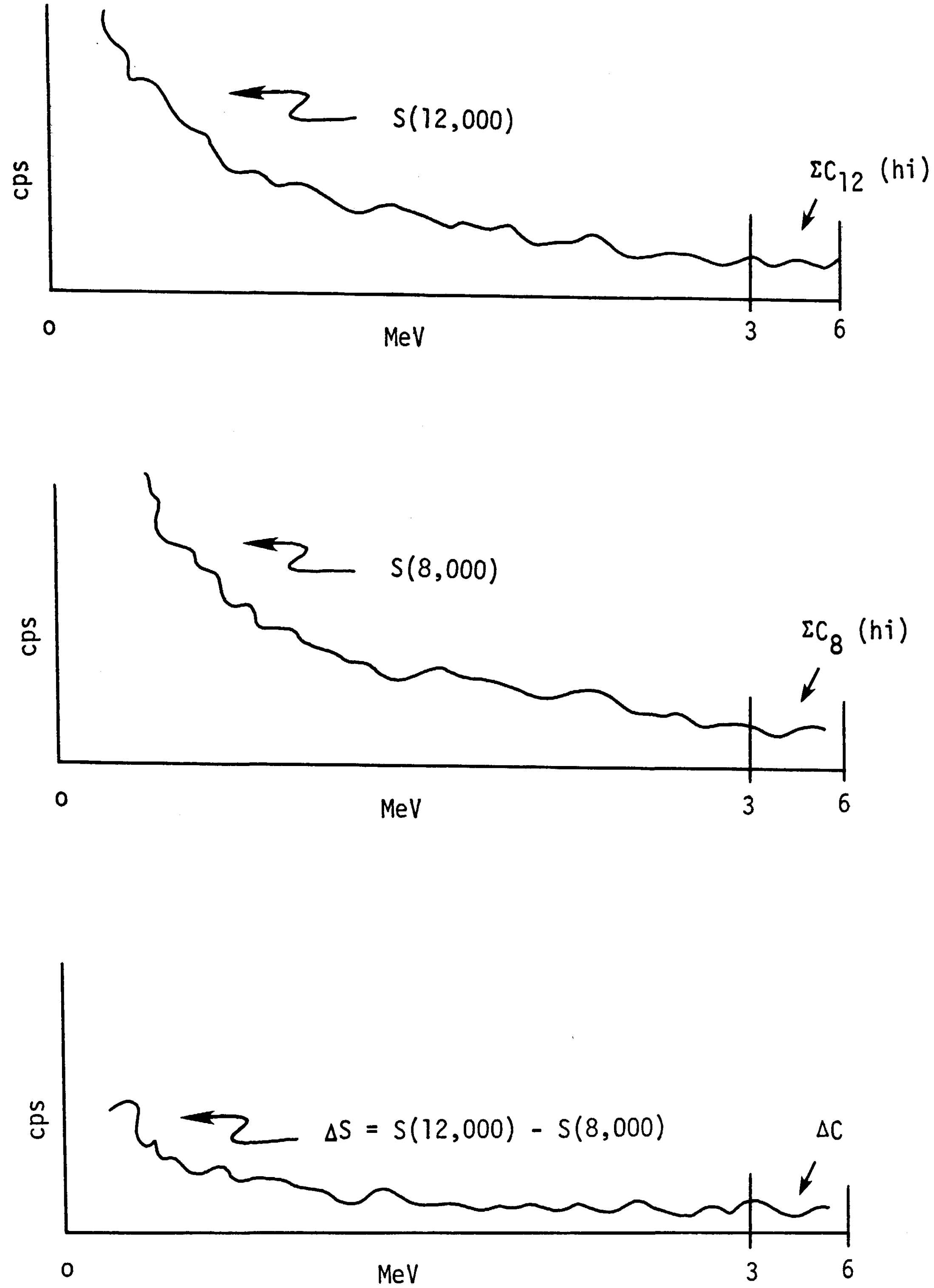


FIGURE IV - Multiple altitude spectra schematic

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).

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

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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 (0.035 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)   -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)    3.798 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)    2.165 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)    1.868 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)    0.689 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)    1.072 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 *
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FIGURE V

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)	13.767 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)	13.602 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)	11.927 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)	11.864 CPS	POTASSIUM 40
CH 117	(1.383 MEV)	10.286 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)	10.296 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)	6.486 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)

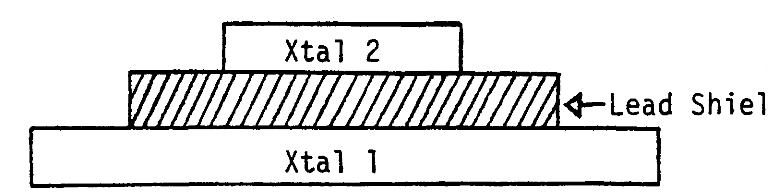
$S_{tu} = \frac{\Delta tu}{\Delta tt}$ (effect of uranium on thorium)

$S_{tk} = \frac{\Delta tk}{\Delta tt}$ (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.

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

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

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:

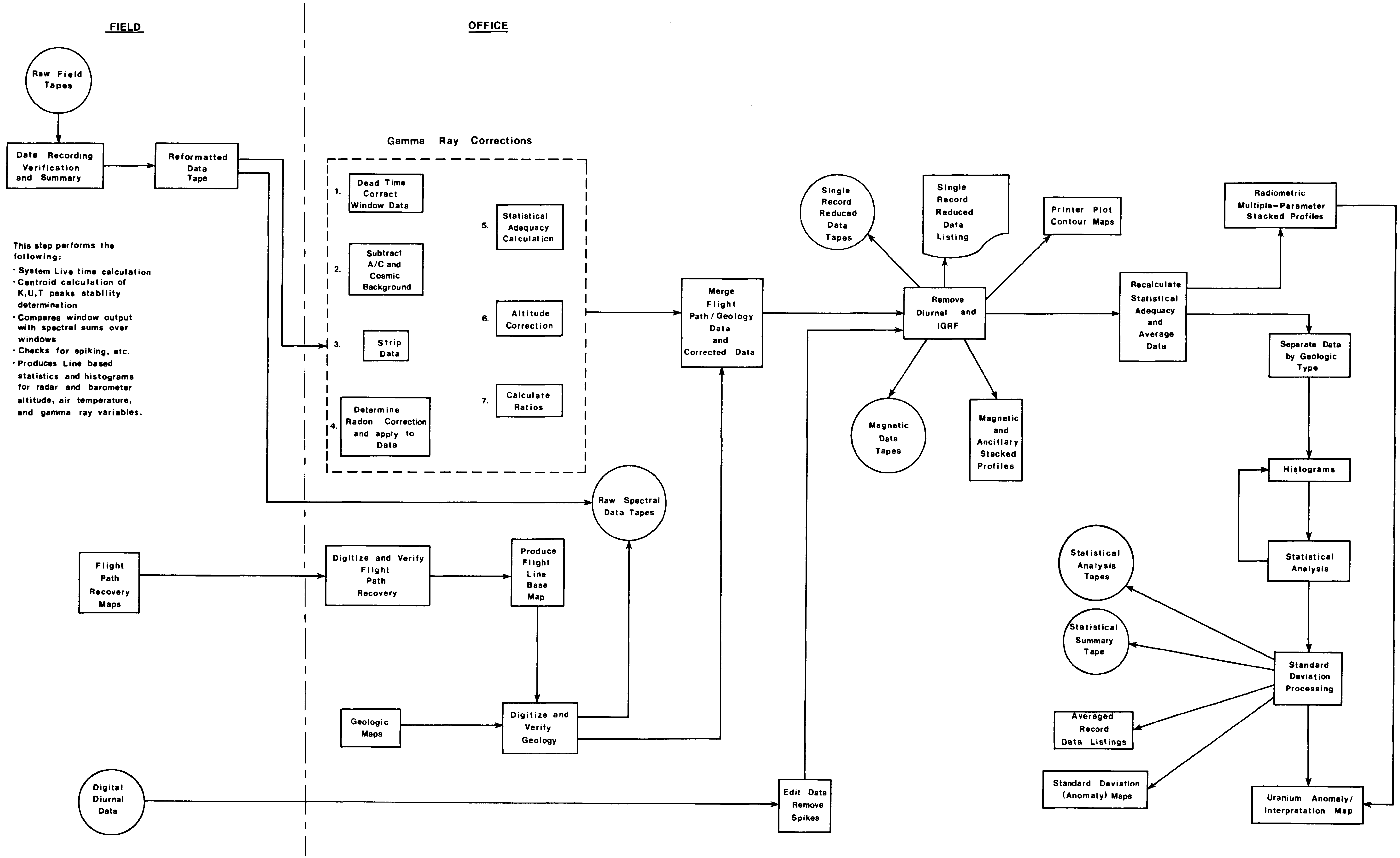
QUEEN AIR

		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).

$S_{ut} = S_{ut_o} + 0.0076h$, 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.

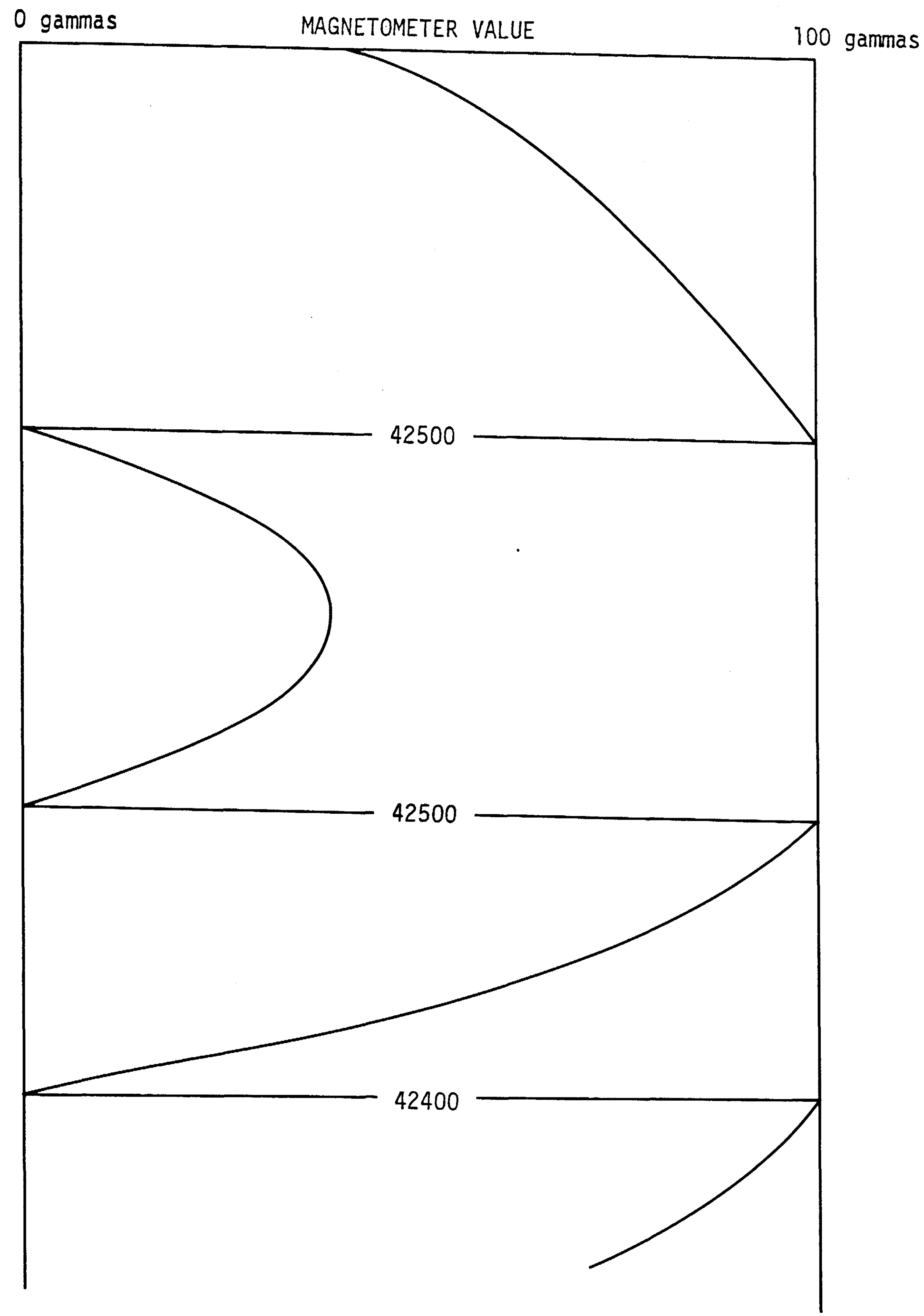


FIGURE VIII Plotter Step Value Labeling

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.

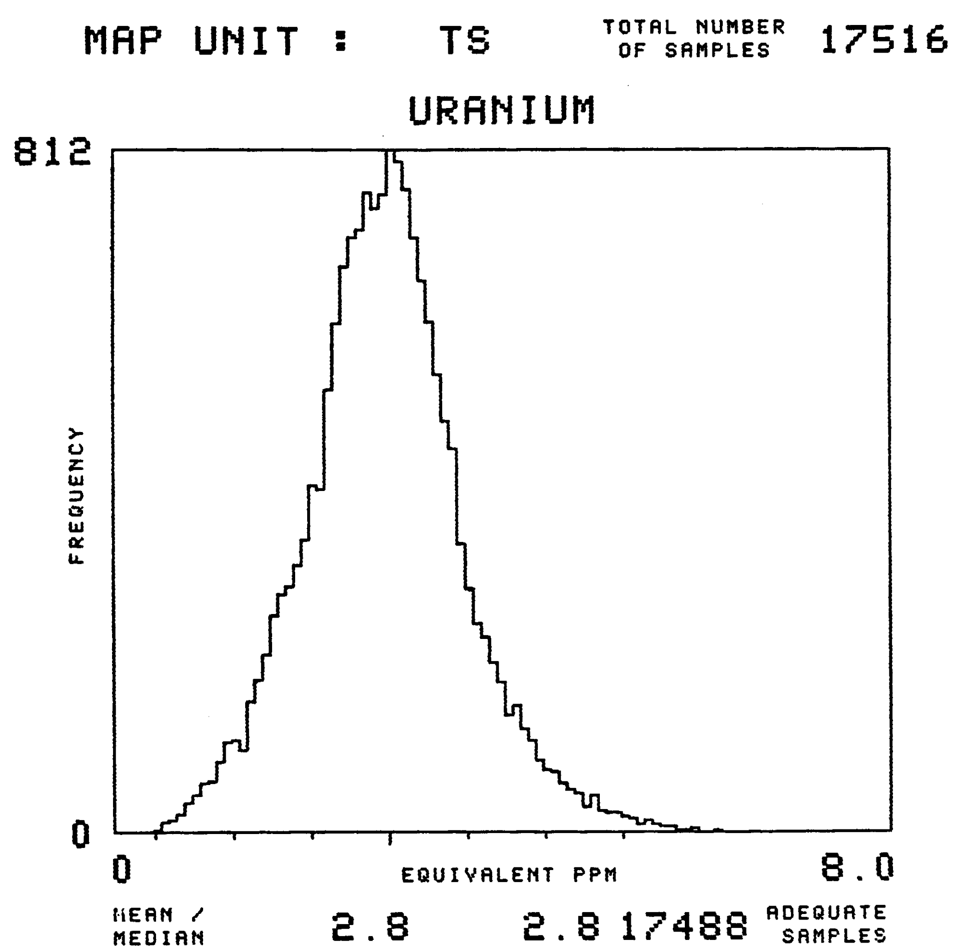


FIGURE IX Sample Computer Map Unit Histogram

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

ITEM	FORMAT	DESCRIPTION
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
12	F4.1	UNCERTAINTY IN TERRESTRIAL POTASSIUM TO ONE DECIMAL PLACE IN PERCENT K
13	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL URANIUM (BI-214) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
14	F4.1	UNCERTAINTY IN TERRESTRIAL URANIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
15	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL THORIUM (TL-208) TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH
16	F4.1	UNCERTAINTY IN TERRESTRIAL THORIUM TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH

ITEM	FORMAT	DESCRIPTION
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
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	AVERAGED 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.

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APPENDIX B - Flight Summary

APPENDIX B

DAILY PRODUCTION SUMMARY

October, 1980

QUEEN AIR N9AG

Oct.	12 - 14	Base Mobilization
	15	840 line miles Danville, Muncie
	16	840 " " " "
	17	Weather, nil production
	18	840 line miles Danville, Muncie
	19	831.6 " " " "
	20	832 " " Chicago, Fort Wayne
	21	822 " " " "
	22	694 " " " "
	23	593.6 " " " "

Total miles for the above period - 6,283.2 line miles

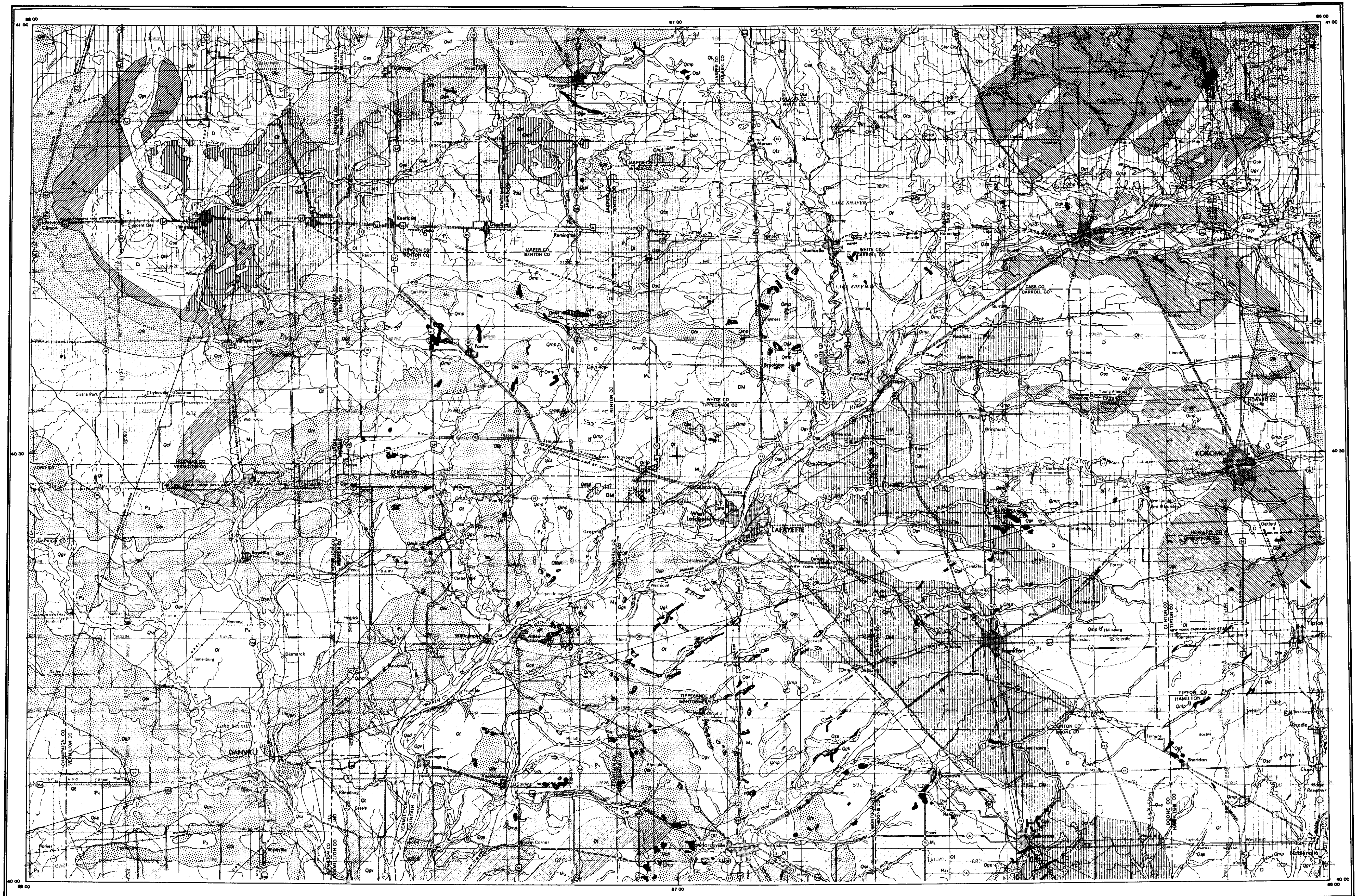
Total miles for the included quadrangles:

Danville	1,675.8
Muncie	1,675.8
Chicago	1,275.0
Fort Wayne	1,656.6

APPENDIX C - Flight Path and Geologic Map

DANVILLE

C1*da



SCALE 1:500,000

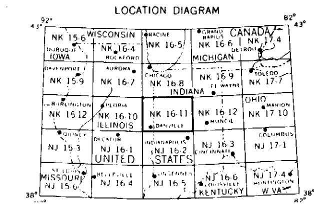
MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

FIDUCIAL NUMBER
123400 — 053-0 — 123600
LINE NUMBER

FLIGHT LINE SPACING .... 6.0 MILE(S)
FLIGHT ALTITUDE .... 400 FEET AMT
FLOWN AND COMPILED 1980

LOCATION DIAGRAM



SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

N

FLIGHT PATH RECOVERY

GREAT LAKES PROJECT

U. S. DEPARTMENT OF ENERGY

DANVILLE QUADRANGLE
GEOLOGIC MAP EXPLANATION
(Martel Laboratories, 1981)

UNCONSOLIDATED DEPOSITS

QUATERNARY (PLEISTOCENE)

Recent

Qsa

Silt, sand, and gravel

Mostly alluvium, but includes some colluvial and paludal deposits. Martinsville Formation in Indiana

Qmp

Muck, peat, and marl

Paludal and lacustrine deposits. Martinsville Formation in Indiana

Wisconsin and Recent

Qsd

Sand and some silt

Eolian deposits. Dune facies of Atherton Formation in Indiana

Qcl / Qle

Clay, silt, and sand

Qcl, lacustrine deposits; Qle, lacustrine deposits overlying end moraine topography. Lacustrine facies of Atherton Formation in Indiana

Wisconsin

Qgv / Qgp

Gravel, sand, and silt

Qgv, valley-train deposits; Qgp, outwash-plain deposits. Outwash facies of Atherton Formation in Indiana

Qgk

Gravel, sand, and some silt

Ice-contact stratified drift. Kame and esker facies of Trafalgar Formation in Indiana

Qts

Sand or gravel over till

Extensive but very thin (generally less than 3 to 5 feet) deposits of dune sand and (or) outwash-plain gravel and sand over till. Part of Atherton Formation over Trafalgar Formation in Indiana

Qt / Qte

Till

Includes some ice-contact stratified drift. Qt, mainly ground-moraine but includes some end-moraine deposits; Qte, mainly end-moraine deposits. Major part of Trafalgar Formation in Indiana

Illinoian and older

Qti

Till

Contains lenses of sand, gravel, and silt. Part of Jessup Formation in Indiana

BEDROCK UNITS

PENNSYLVANIAN

P_4

McLeansboro Group, middle part

Shale, sandstone, thick limestone, and thin coal

P_3

McLeansboro Group, lower part

Shale, sandstone, limestone, and thin coal

P_2

Carbondale Group

Shale, sandstone, limestone, thick clay, and thick coal

P_1

Raccoon Creek Group

Shale, sandstone, limestone, clay, and lenticular coal beds

MISSISSIPPIAN

M_2

Harrodsburg Limestone, major part

Mostly limestone

M_1

Lower part of Harrodsburg Limestone, Borden Group, and Rockford Limestone

Siltstone, shale, sandstone, and some limestone

DEVONIAN AND MISSISSIPPIAN

DM

New Albany Shale

Mostly black shale

DEVONIAN

D

Rocks of middle Devonian age

Mostly limestone and dolomite

SILURIAN

S_2

Salina Formation

Limestone and dolomite

LC / S_1 / W

Niagaran Series

Limestone, dolomite, and calcareous siltstone. LC, base of Liston Creek Limestone Member; W, base of Waldron Formation

ORDOVICIAN

O

Rocks of Ordovician age

Mostly limestone and dolomite, some shale and sandstone; structurally disturbed rocks of Kentland area

Boundary of mapped unit

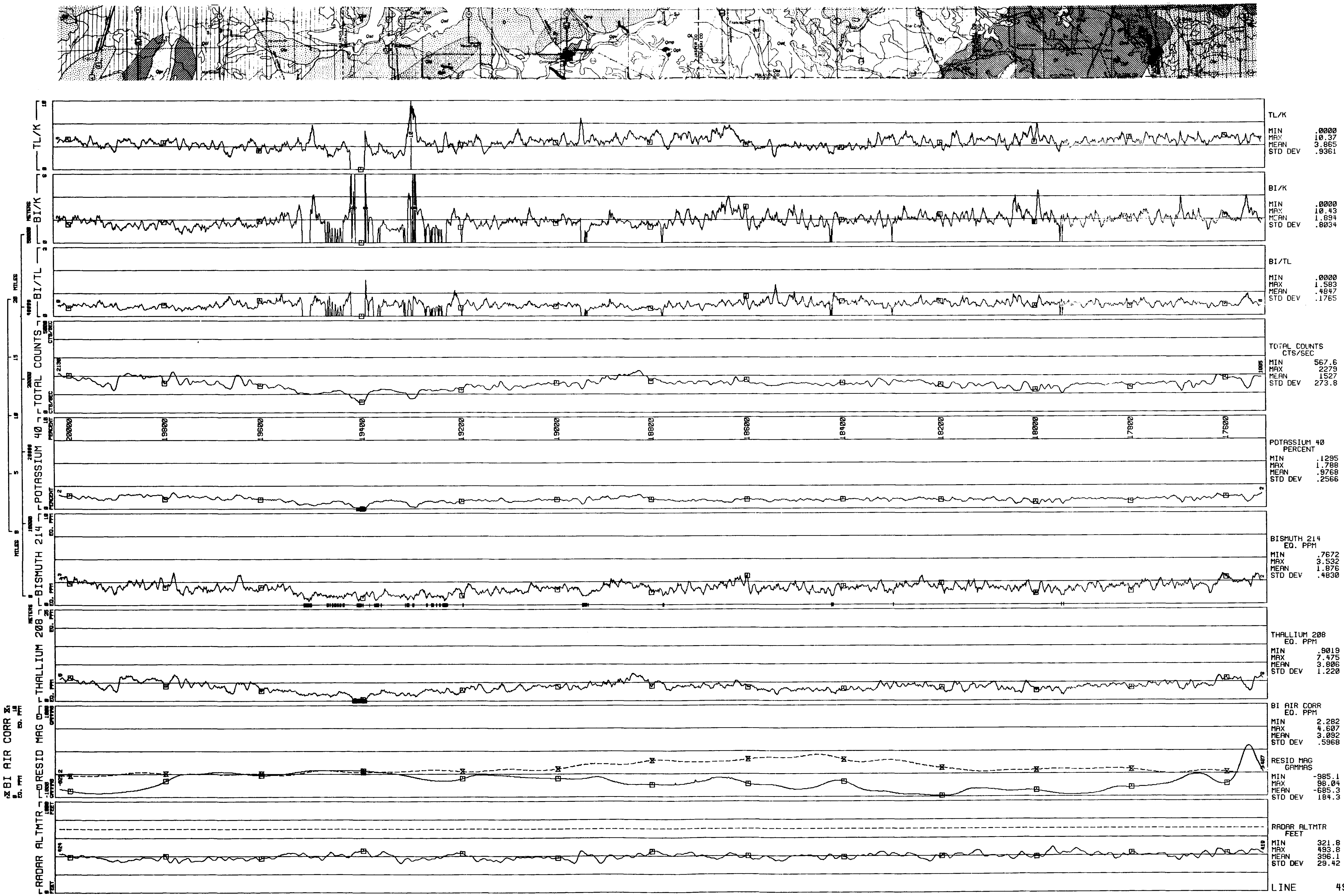
Bedrock boundaries dashed where covered by unconsolidated deposits

Significant ice-marginal position

Marked by stratigraphic or topographic break

APPENDIX D - Profiles

LINE 490
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289



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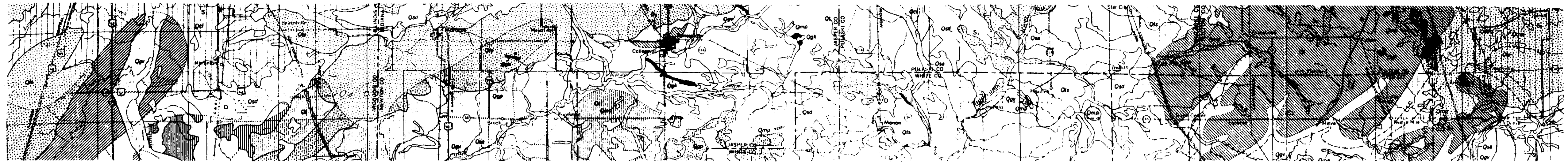
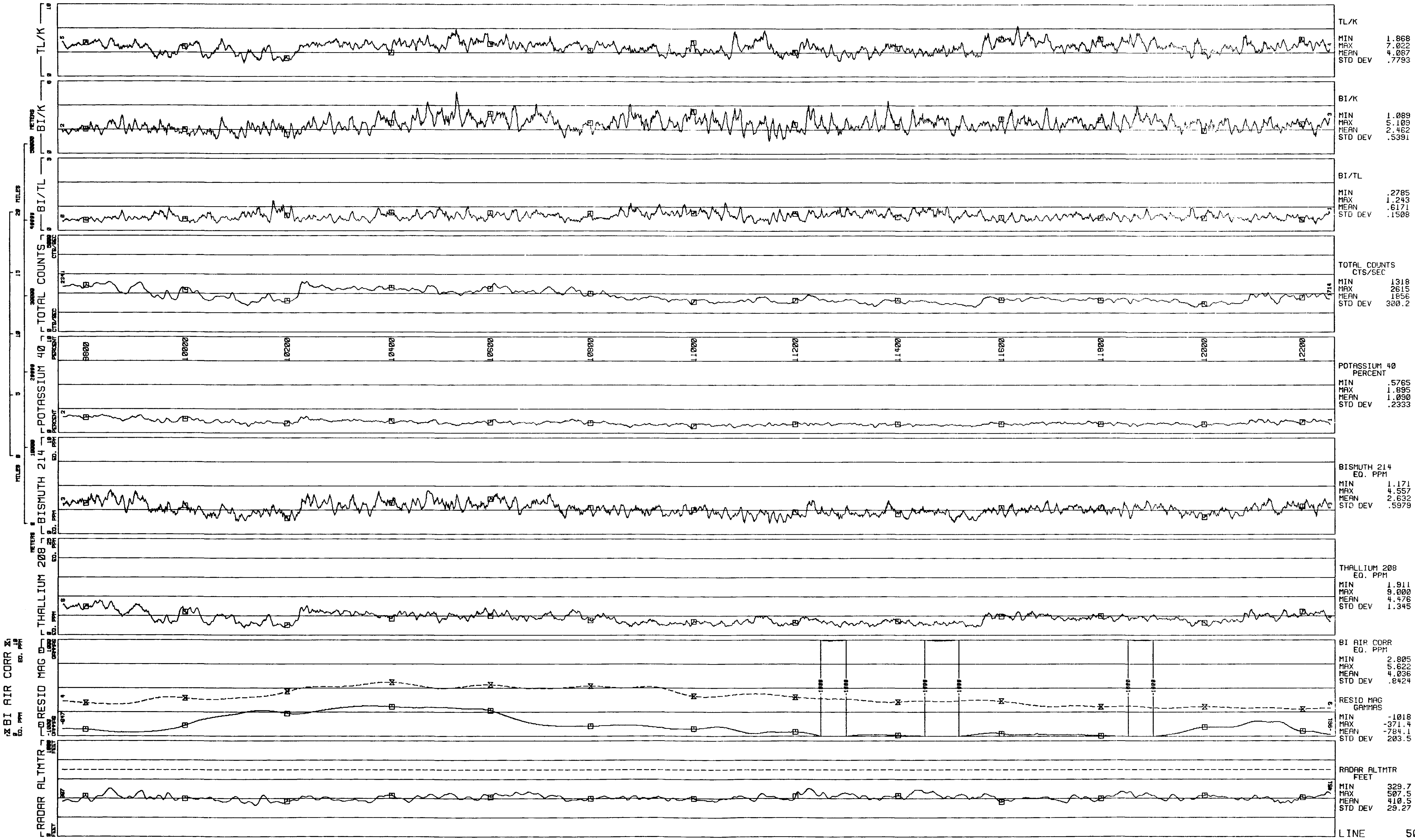
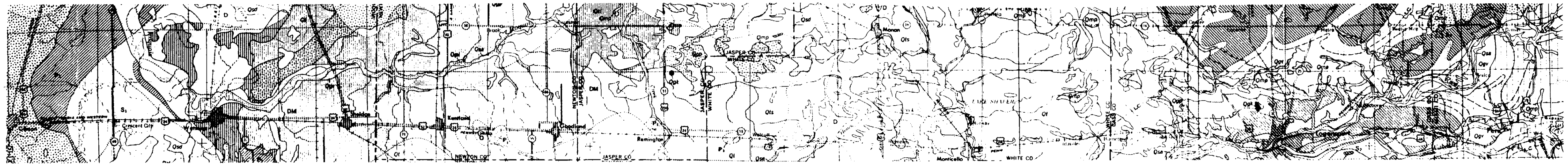
DATA ACQUIRED 80289

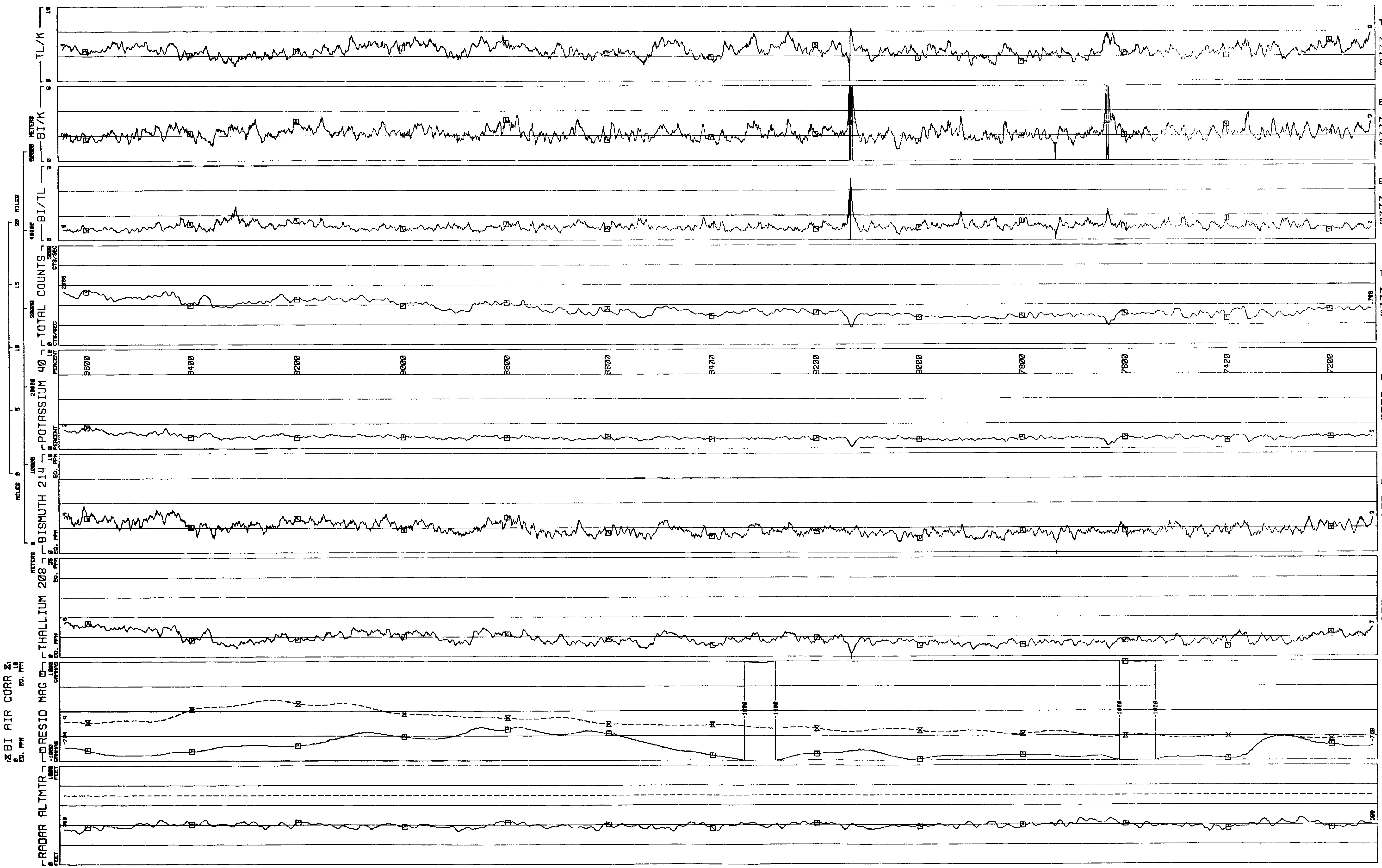




LINE 500

LINE 510
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289





TL/K
MIN .0000
MAX 7.000
MEAN 4.066
STD DEV .7807

BI/K
MIN .0000
MAX 13.35
MEAN 2.212
STD DEV .6496

BI/TL
MIN .0000
MAX 2.480
MEAN .5543
STD DEV .1494

TOTAL COUNTS CTS/SEC
MIN 853.9
MAX 2737
MEAN 1770
STD DEV 369.8

POTASSIUM 40 PERCENT
MIN .1577
MAX 2.265
MEAN 1.109
STD DEV .2514

BISMUTH 214 EQ. PPM
MIN 1.003
MAX 4.690
MEAN 2.403
STD DEV .6140

THALLIUM 208 EQ. PPM
MIN .8492
MAX 8.767
MEAN 4.527
STD DEV 1.396

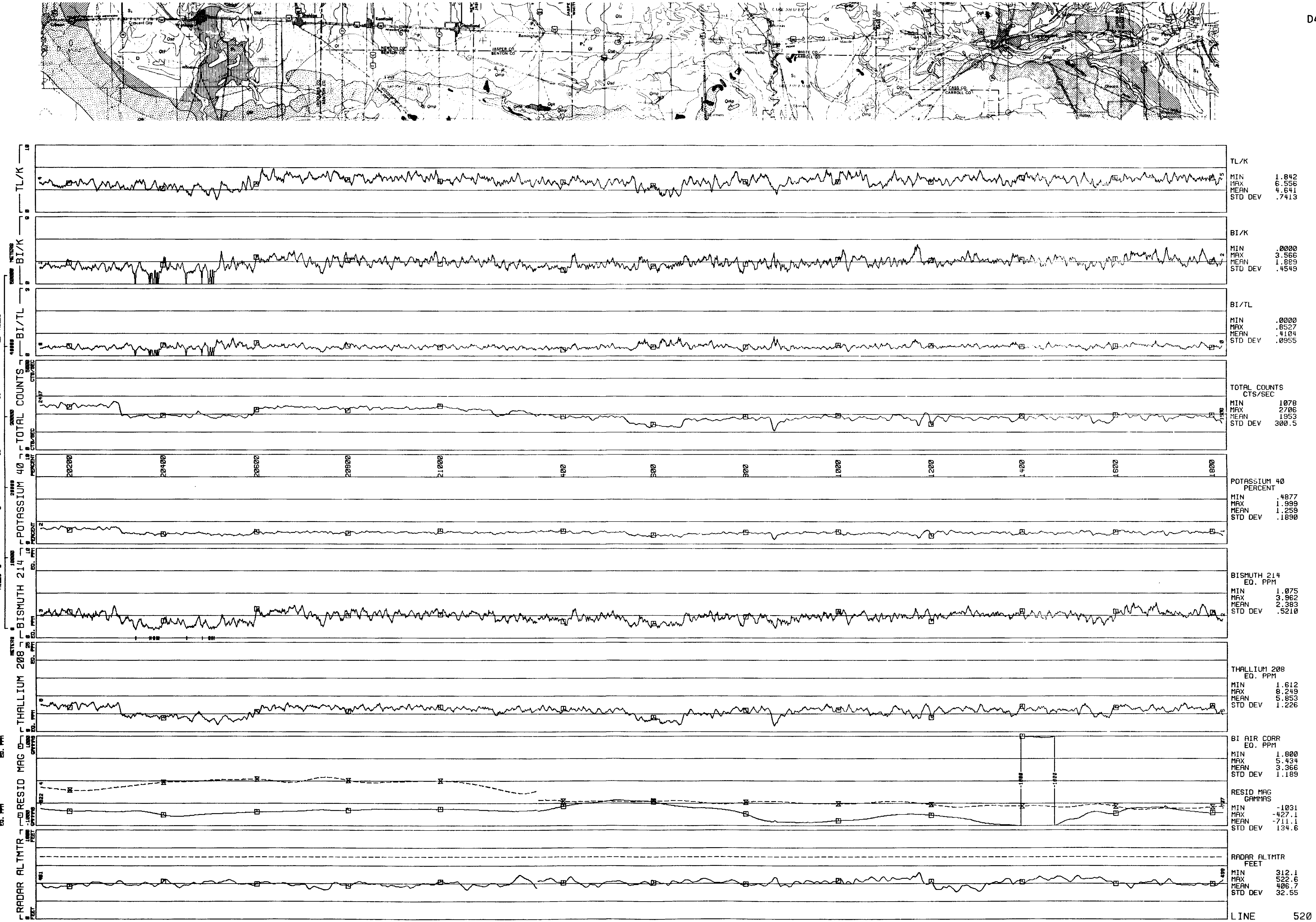
BI AIR CORR EQ. PPM
MIN 2.149
MAX 6.113
MEAN 3.649
STD DEV 1.095

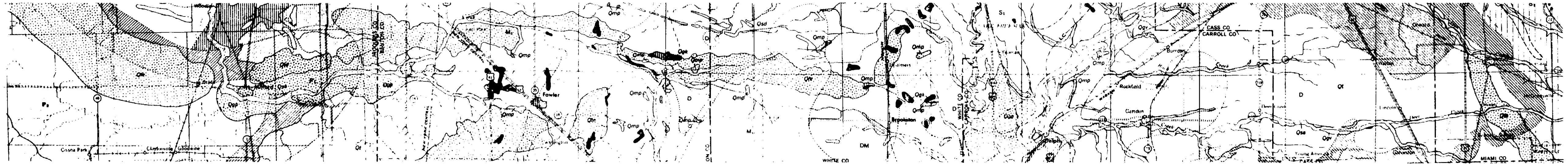
RESID MAG GAMMAS
MIN -1035
MAX -323.6
MEAN -748.6
STD DEV 197.8

RADAR ALTMTR FEET
MIN 317.5
MAX 472.1
MEAN 394.3
STD DEV 24.39

LINE 510

LINE 520
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289





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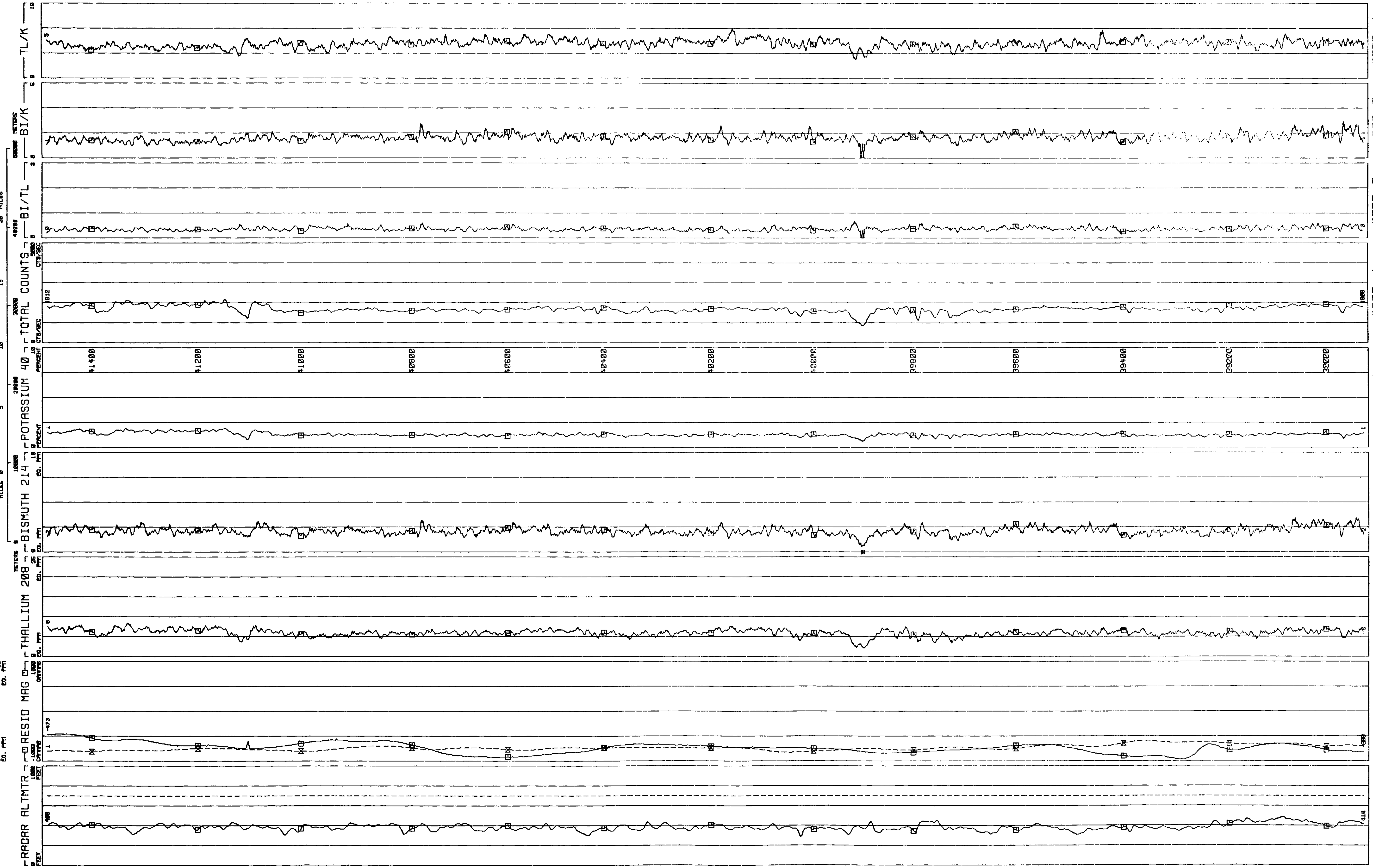
DATA ACQUIRED 80290

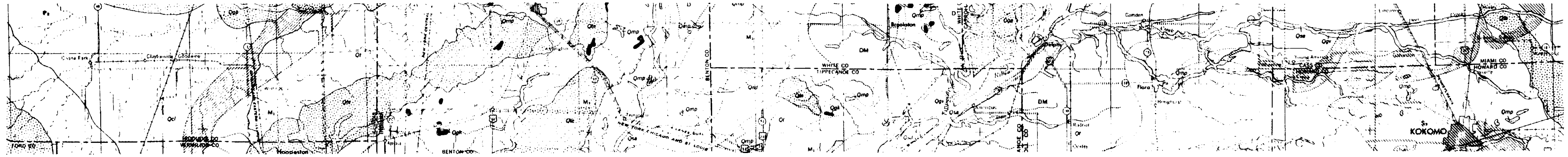


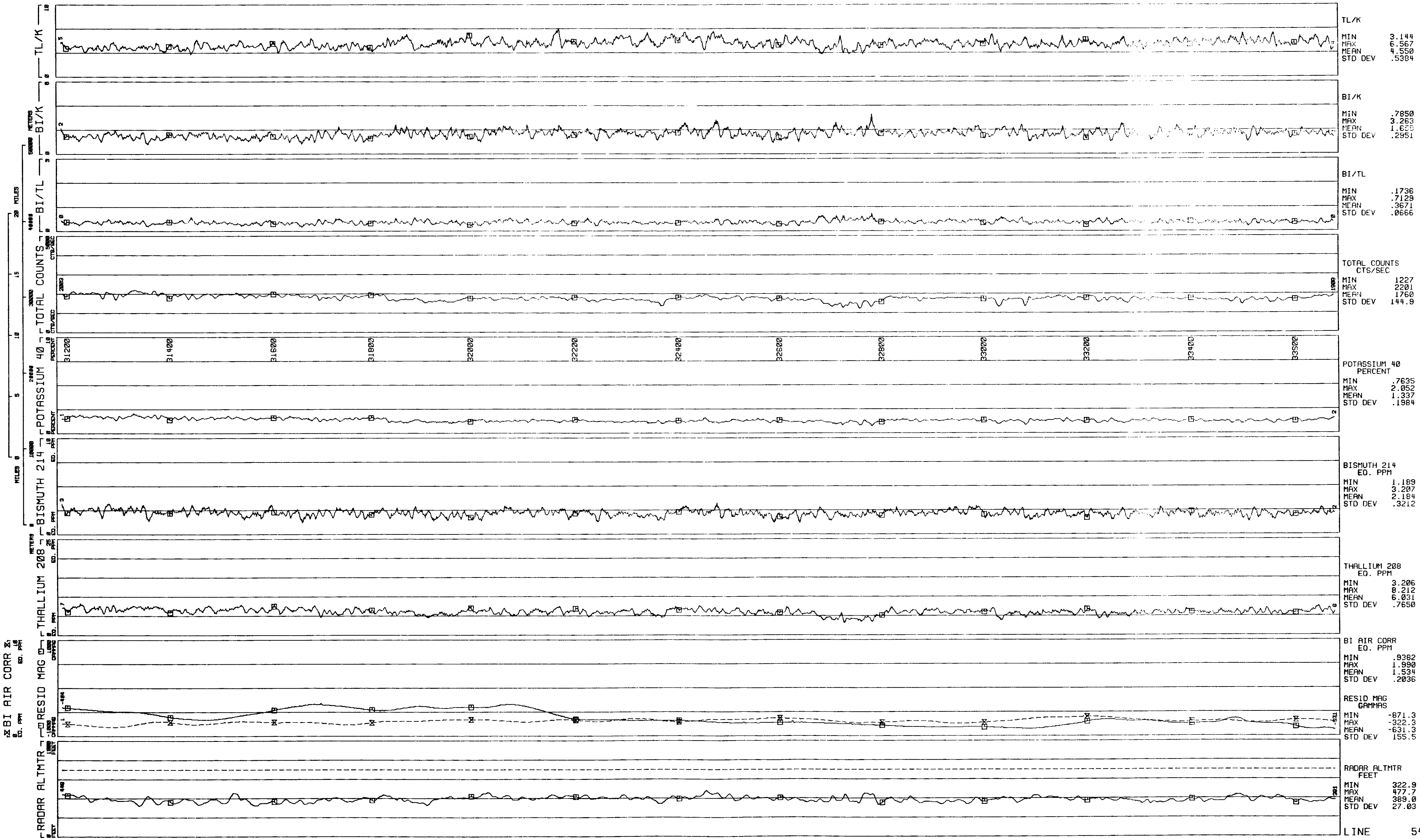
	MIN	MAX	MEAN	STD DEV
TL/K	2.454	6.506	4.596	.5308
BI/K	.0000	2.864	1.640	.2978
BI/TL	.0000	.6568	.3595	.0687
TOTAL COUNTS CTS/SEC	844.2	2162	1688	162.1
POTASSIUM 40 PERCENT	.6245	1.920	1.297	.1762
BISMUTH 214 EQ. PPM	.6915	3.398	2.114	.3658
THALLIUM 208 EQ. PPM	2.158	8.409	5.935	.8328
BI AIR CORR EQ. PPM	.8718	2.030	1.330	.2552
RESID MAG GAMMAS	-965.1	-460.0	-738.3	106.5
RADAR ALTMTR FEET	287.8	485.7	385.0	31.96

LINE 530

D6 da

LINE 540
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80290





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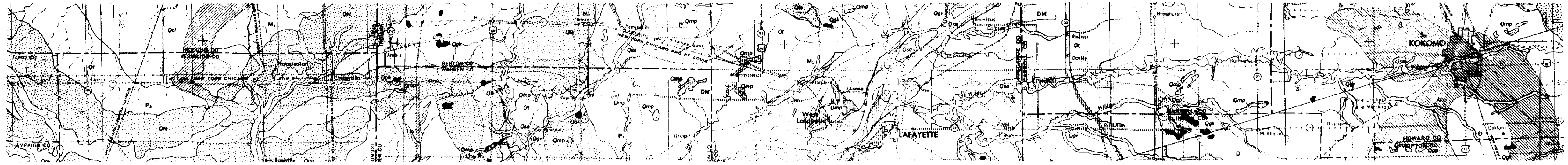
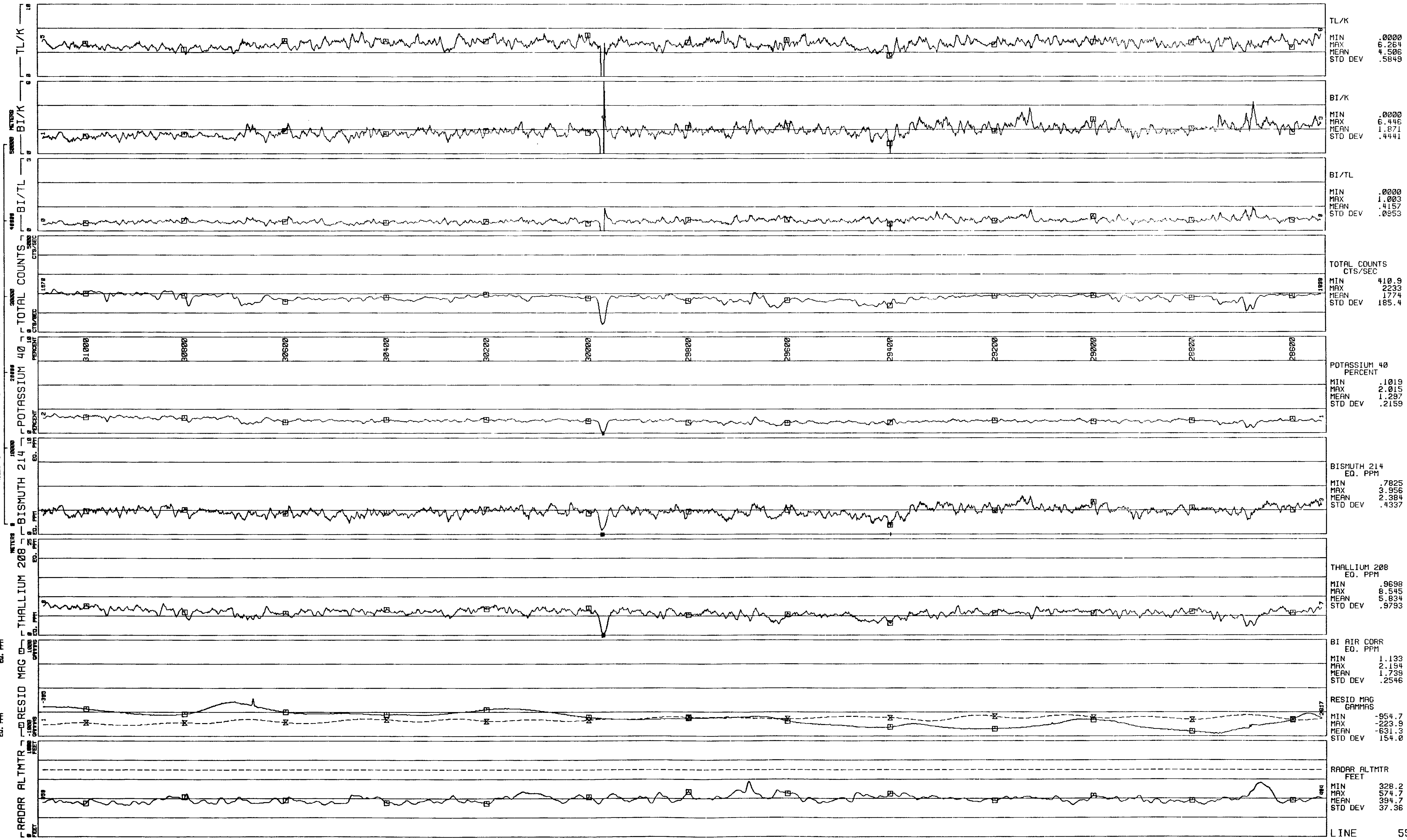
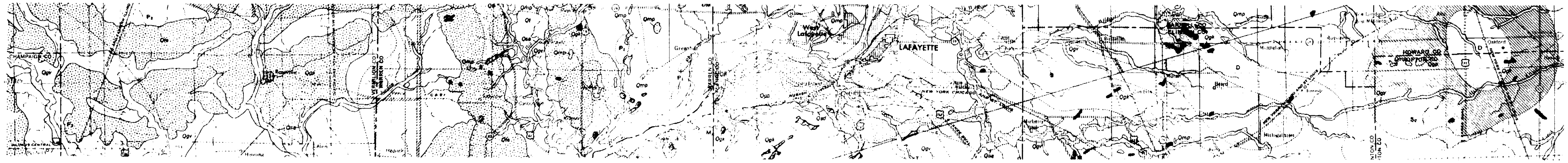
DATA ACQUIRED 80290





LINE 550



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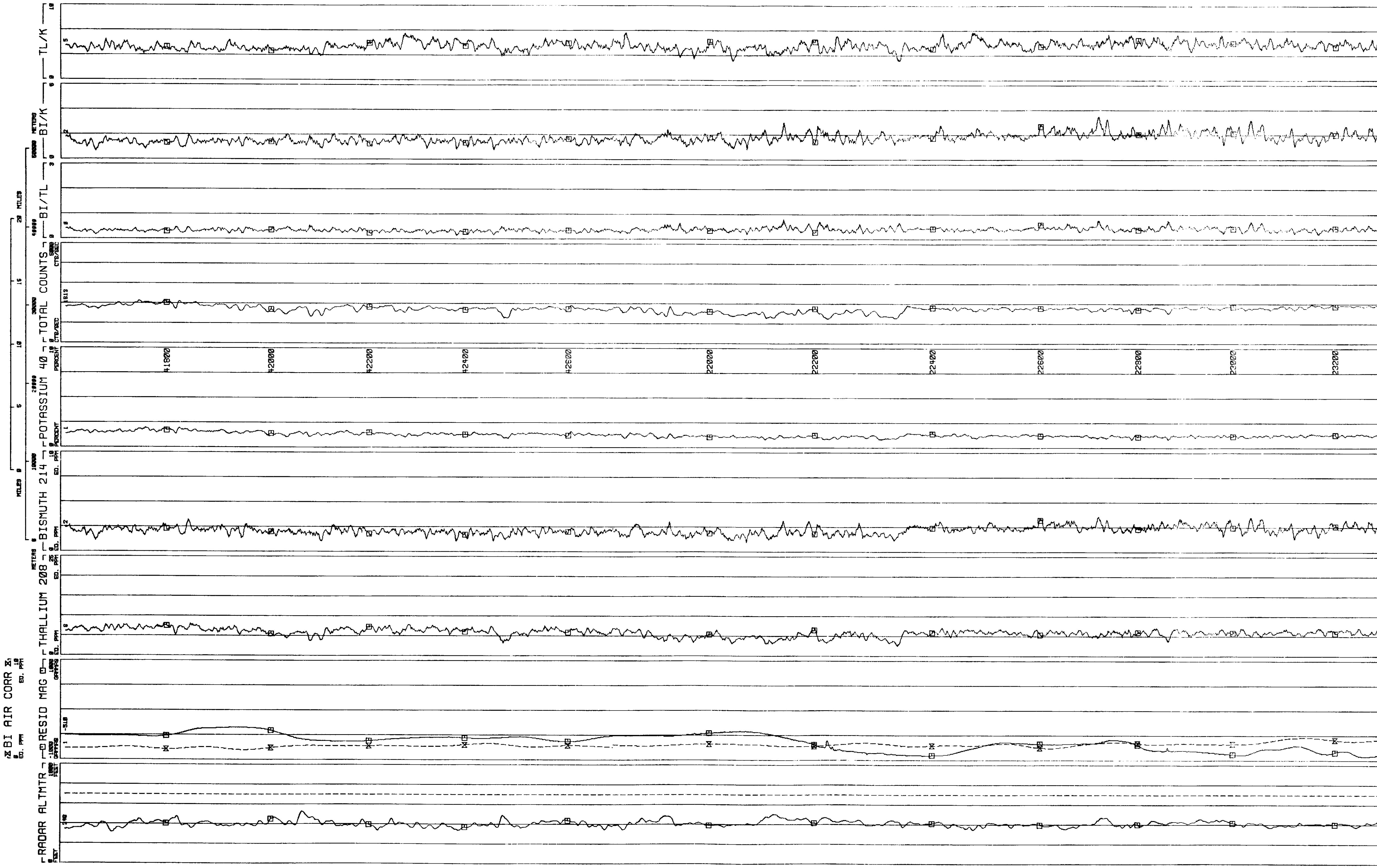
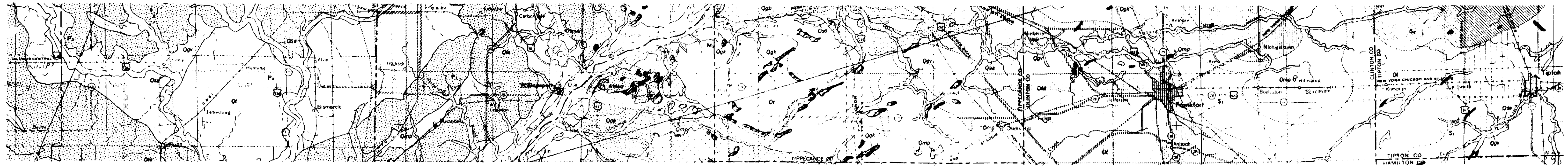
DATA ACQUIRED 80290

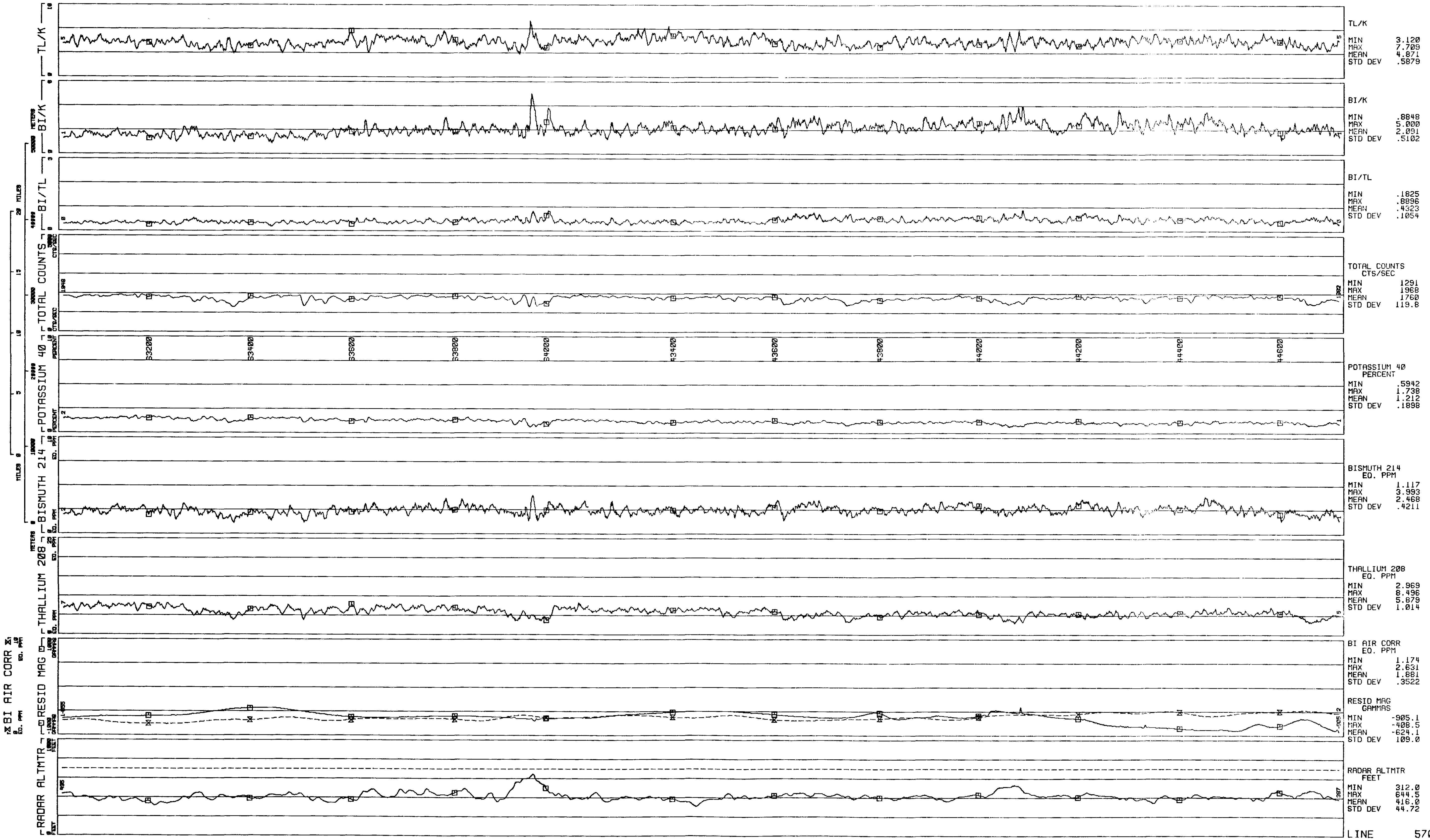


	MIN	MAX	MEAN	STD DEV
TL/K	2.572	6.415	4.593	.5773
BI/K	.6584	3.473	1.729	.4190
BI/TL	.1449	.7766	.3783	.0871
TOTAL COUNTS CTS/SEC	1258	2137	1732	155.0
POTASSIUM 40 PERCENT	.8049	1.973	1.283	.1904
BISMUTH 214 EQ. PPM	.9297	3.565	2.175	.4253
THALLIUM 208 EQ. PPM	2.667	7.966	5.864	.9175
BI AIR CORR EQ. PPM	.9719	2.304	1.502	.2610
RESID MAG GAMMAS	-919.5	-351.9	-631.6	149.9
RADAR ALTMTR FEET	317.9	528.0	407.3	30.18

LINE 560

LINE 570
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292





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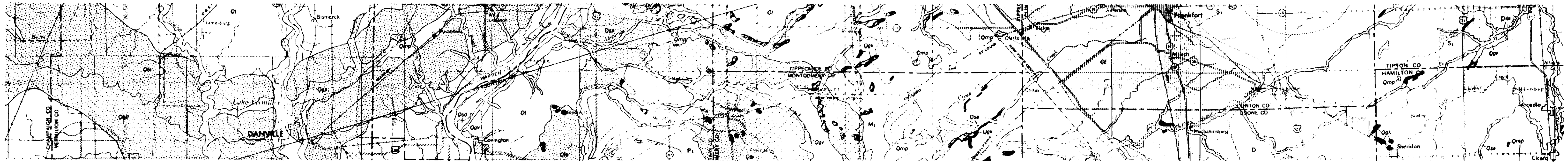
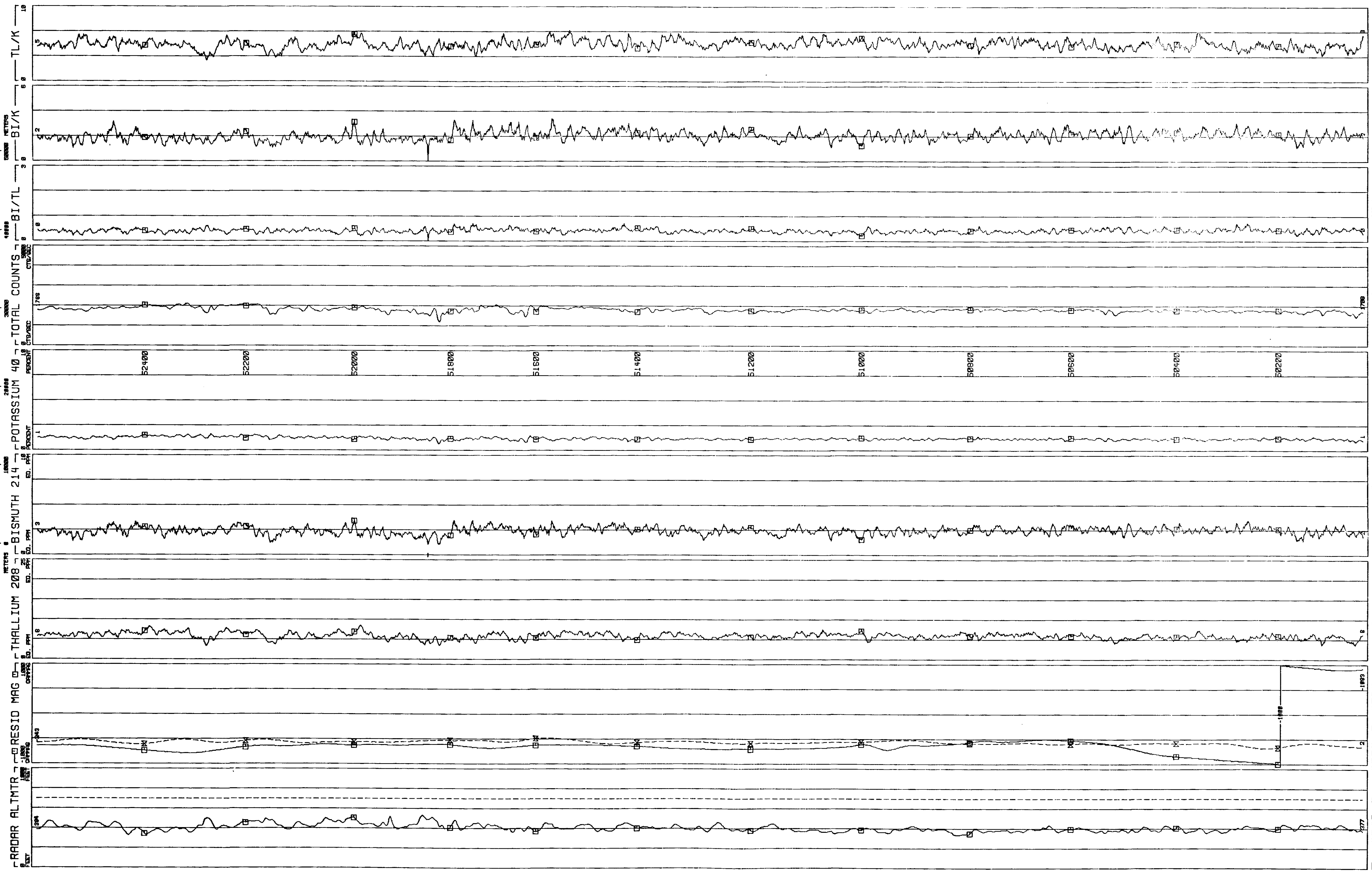
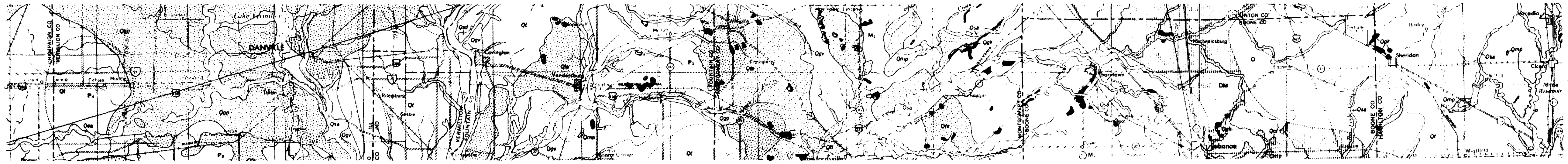
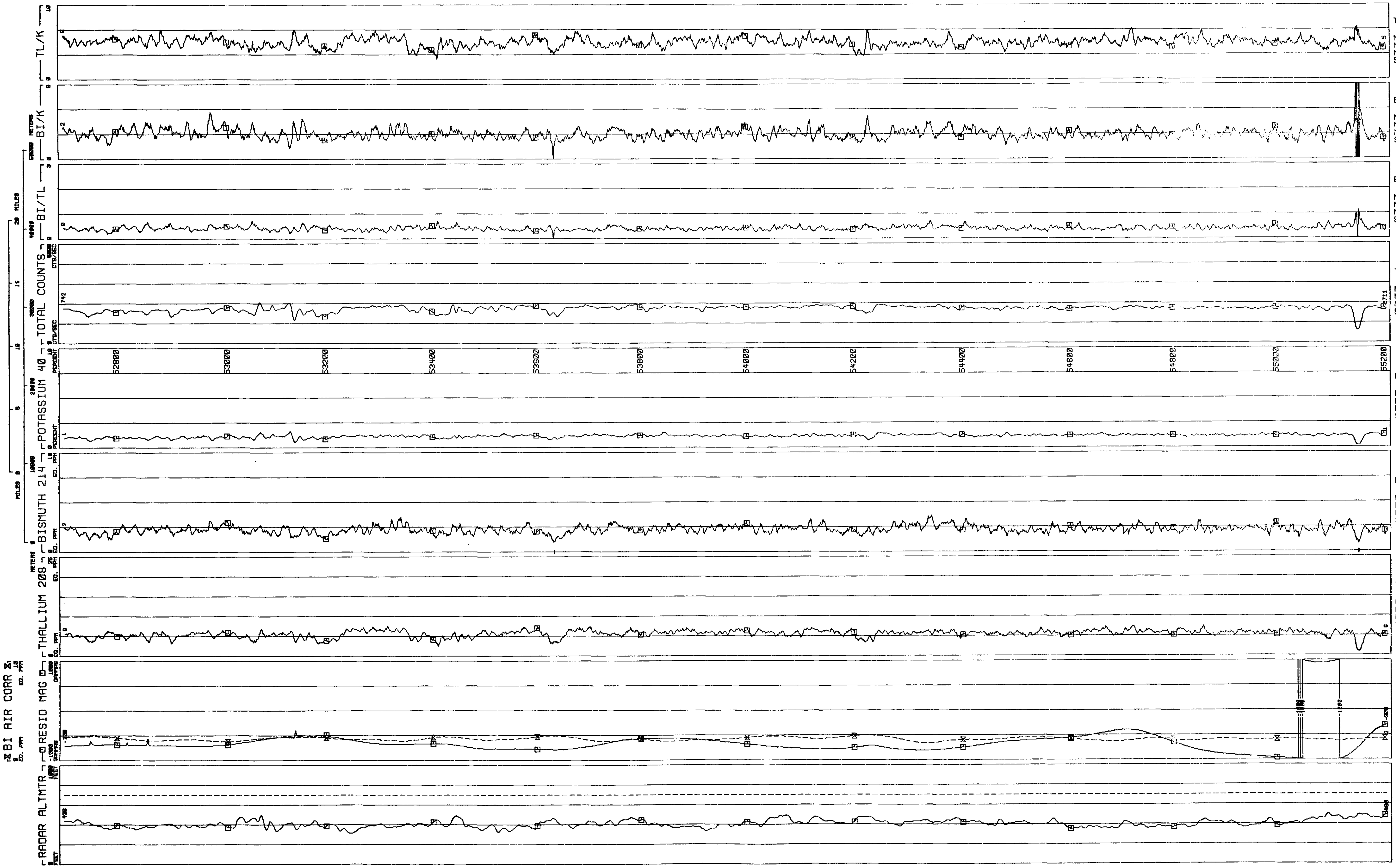




LINE 580

LINE 590
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292





TL/K
MIN 2.735
MAX 6.976
MEAN 4.945
STD DEV .6073

BI/K
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MAX 7.327
MEAN 2.006
STD DEV .4344

BI/TL
MIN .0000
MAX 1.117
MEAN .4081
STD DEV .0817

TOTAL COUNTS CTS/SEC
MIN 617.5
MAX 2043
MEAN 1718
STD DEV 137.6

POTASSIUM 40 PERCENT
MIN .1541
MAX 1.607
MEAN 1.126
STD DEV .1390

BISMUTH 214 EQ. PPM
MIN .9783
MAX 3.580
MEAN 2.231
STD DEV .3728

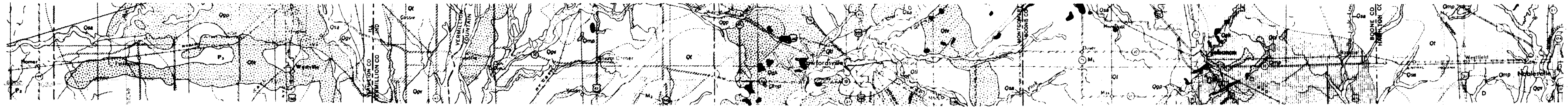
THALLIUM 208 EQ. PPM
MIN .9947
MAX 7.592
MEAN 5.549
STD DEV .8394

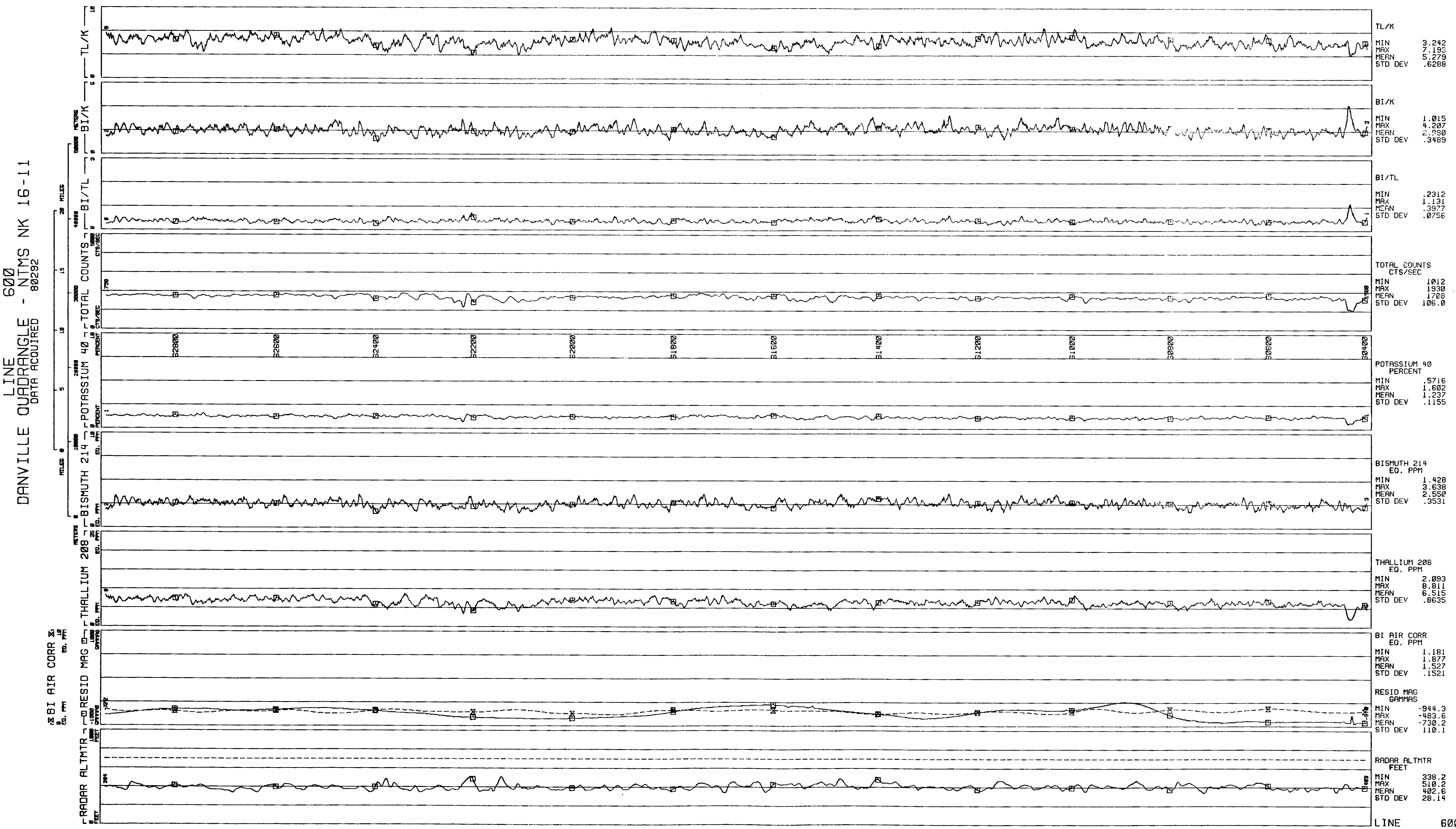
BI AIR CORR EQ. PPM
MIN 1.691
MAX 2.483
MEAN 2.114
STD DEV .1677

RESID MAG GAMMAS
MIN -1063
MAX -306.3
MEAN -692.2
STD DEV 138.2

RADAR ALTMTR FEET
MIN 313.6
MAX 499.5
MEAN 406.1
STD DEV 34.85

LINE 590

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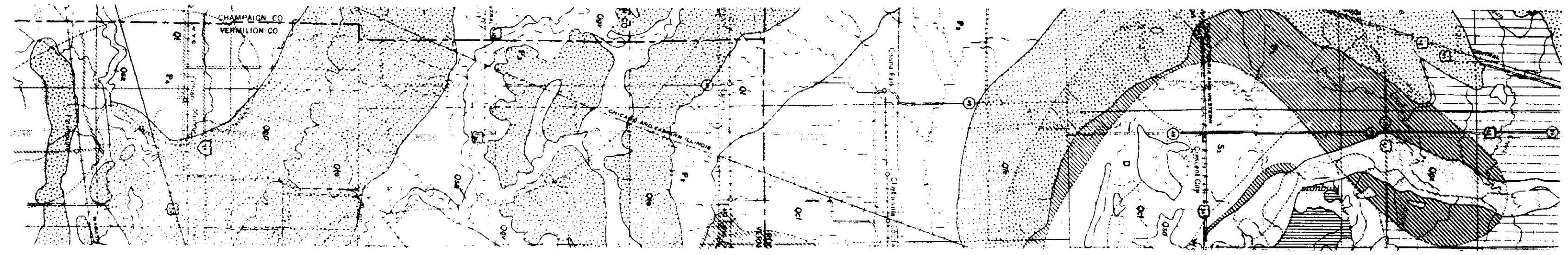
DATA ACQUIRED 80292
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
S2800
S2600
S2400
S2200
S2000
S1800
S1600
S1400
S1200
S1000
S0800
S0600
S0400
TL/K
MIN 3.242
MAX 7.193
MEAN 5.279
STD DEV .6288
BI/K
MIN 1.015
MAX 4.207
MEAN 2.080
STD DEV .3489
BI/TL
MIN .2312
MAX 1.131
MEAN .3977
STD DEV .0756
TOTAL COUNTS
CTS/SEC
MIN 1012
MAX 1930
MEAN 1708
STD DEV 106.0
POTASSIUM 40
PERCENT
MIN .5716
MAX 1.602
MEAN 1.237
STD DEV .1155
BISMUTH 214
EQ. PPM
MIN 1.428
MAX 3.638
MEAN 2.550
STD DEV .3531
THALLIUM 208
EQ. PPM
MIN 2.093
MAX 8.811
MEAN 6.515
STD DEV .8635
BI AIR CORR
EQ. PPM
MIN 1.181
MAX 1.877
MEAN 1.527
STD DEV .1521
RESID MAG
GAMMAS
MIN -944.3
MAX -483.6
MEAN -730.2
STD DEV 110.1
RADAR ALTMTR
FEET
MIN 338.2
MAX 510.2
MEAN 402.6
STD DEV 28.14
LINE 600



LINE 1010
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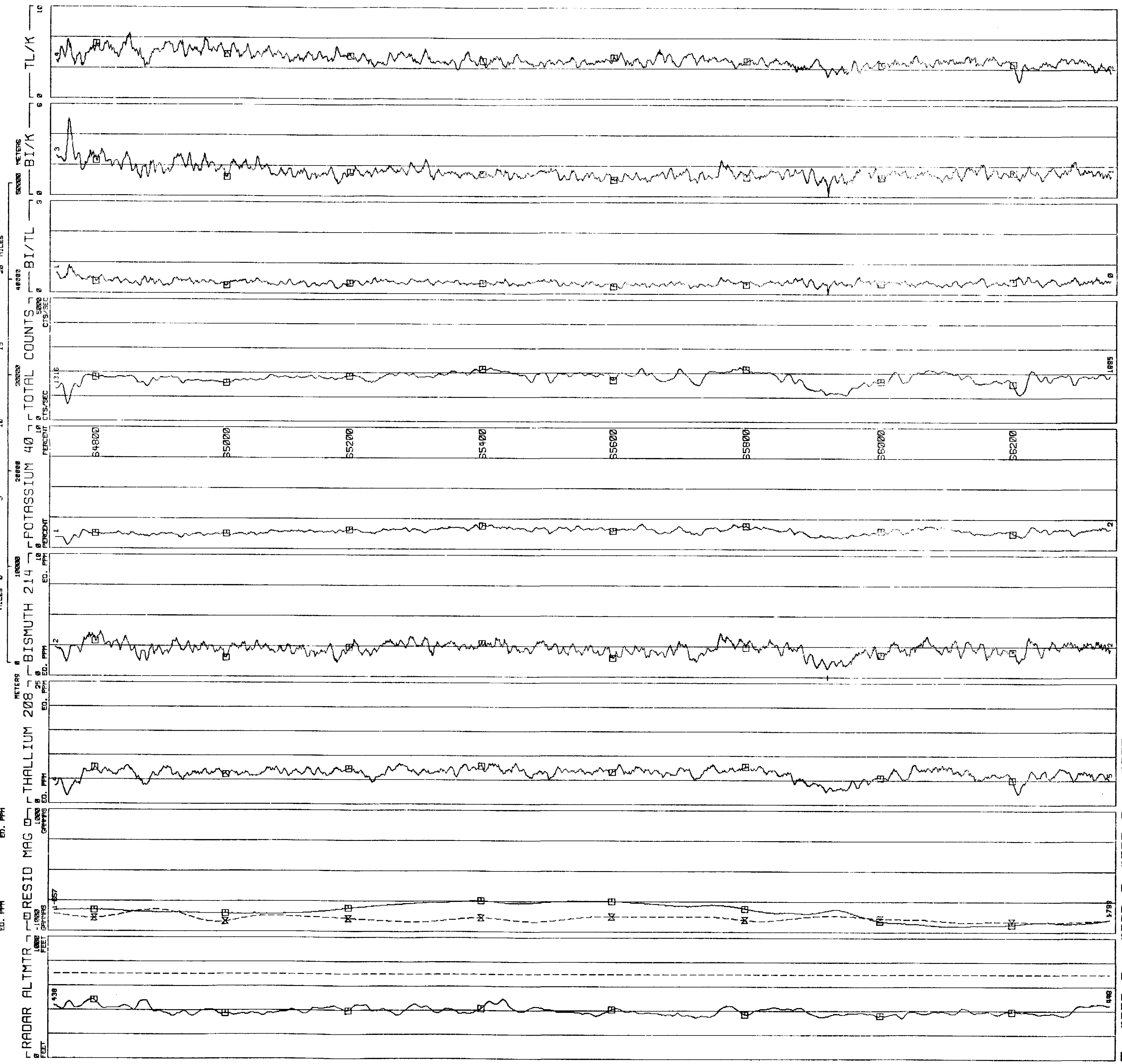
DATA ACQUIRED 80293



TL/K
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MEAN 4.343
STD DEV .6806

BI/K
MIN .0000
MAX 5.023
MEAN 1.612
STD DEV .4331

BI/TL
MIN .0000
MAX .8945
MEAN .3723
STD DEV .0816

TOTAL COUNTS CTS/SEC
MIN 667.0
MAX 2218
MEAN 1794
STD DEV 232.3

POTASSIUM 40 PERCENT
MIN .2591
MAX 2.093
MEAN 1.472
STD DEV .2685

BISMUTH 214 EQ. PPM
MIN .6990
MAX 3.687
MEAN 2.316
STD DEV .4732

THALLIUM 208 EQ. PPM
MIN 1.635
MAX 8.503
MEAN 6.323
STD DEV 1.144

BI AIR CORR EQ. PPM
MIN .7856
MAX 1.789
MEAN 1.096
STD DEV .2202

RESID MAG GAMMAS
MIN -900.5
MAX -485.6
MEAN -665.7
STD DEV 126.1

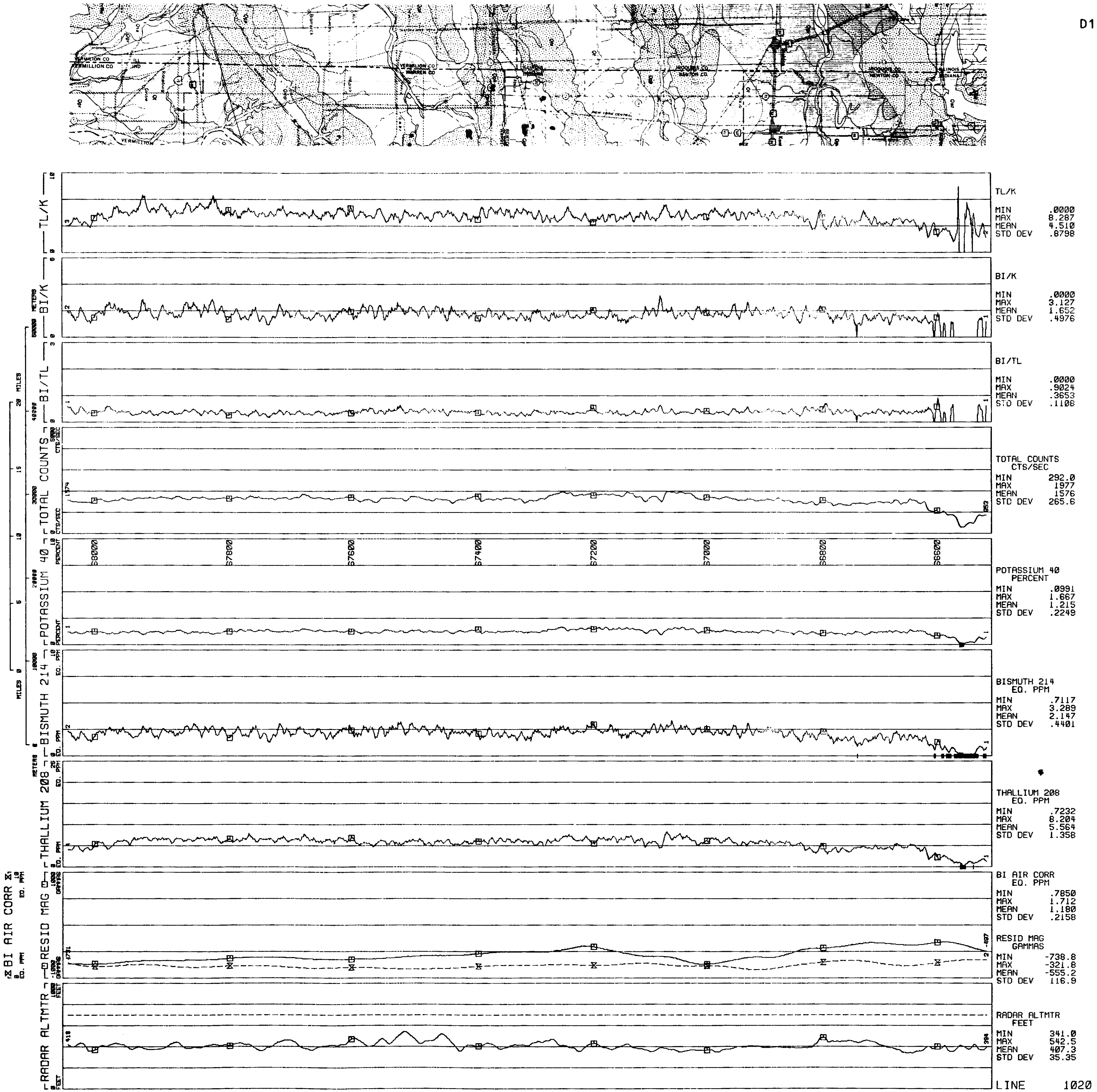
RADAR ALTMTR FEET
MIN 341.3
MAX 493.4
MEAN 398.5
STD DEV 30.02

LINE 1010

DANVILLE QUADRANGLE - NTMS NK 16-11

LINE 1020

DATA ACQUIRED 80293



LINE 1030
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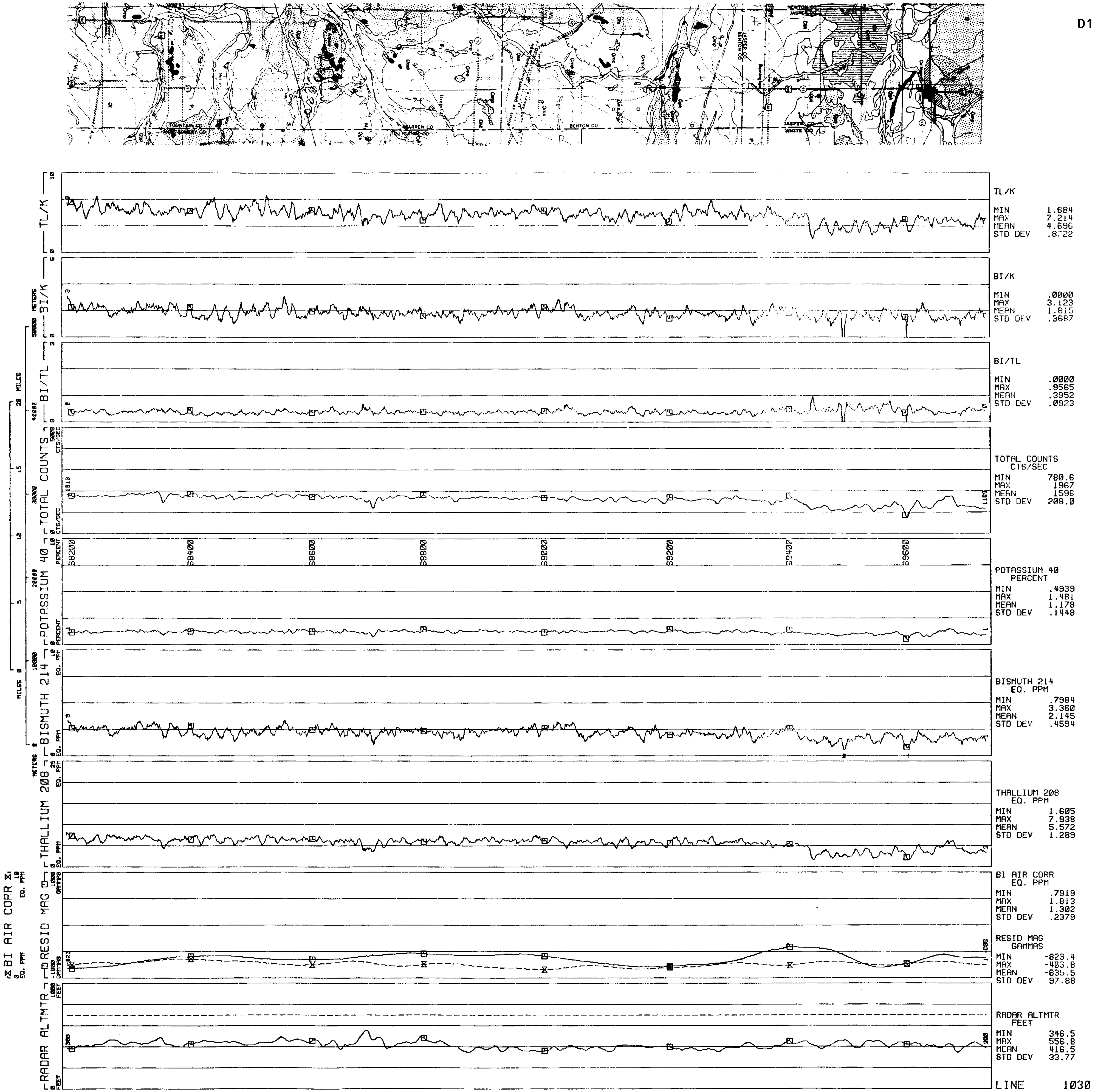

D16da

LINE 1040
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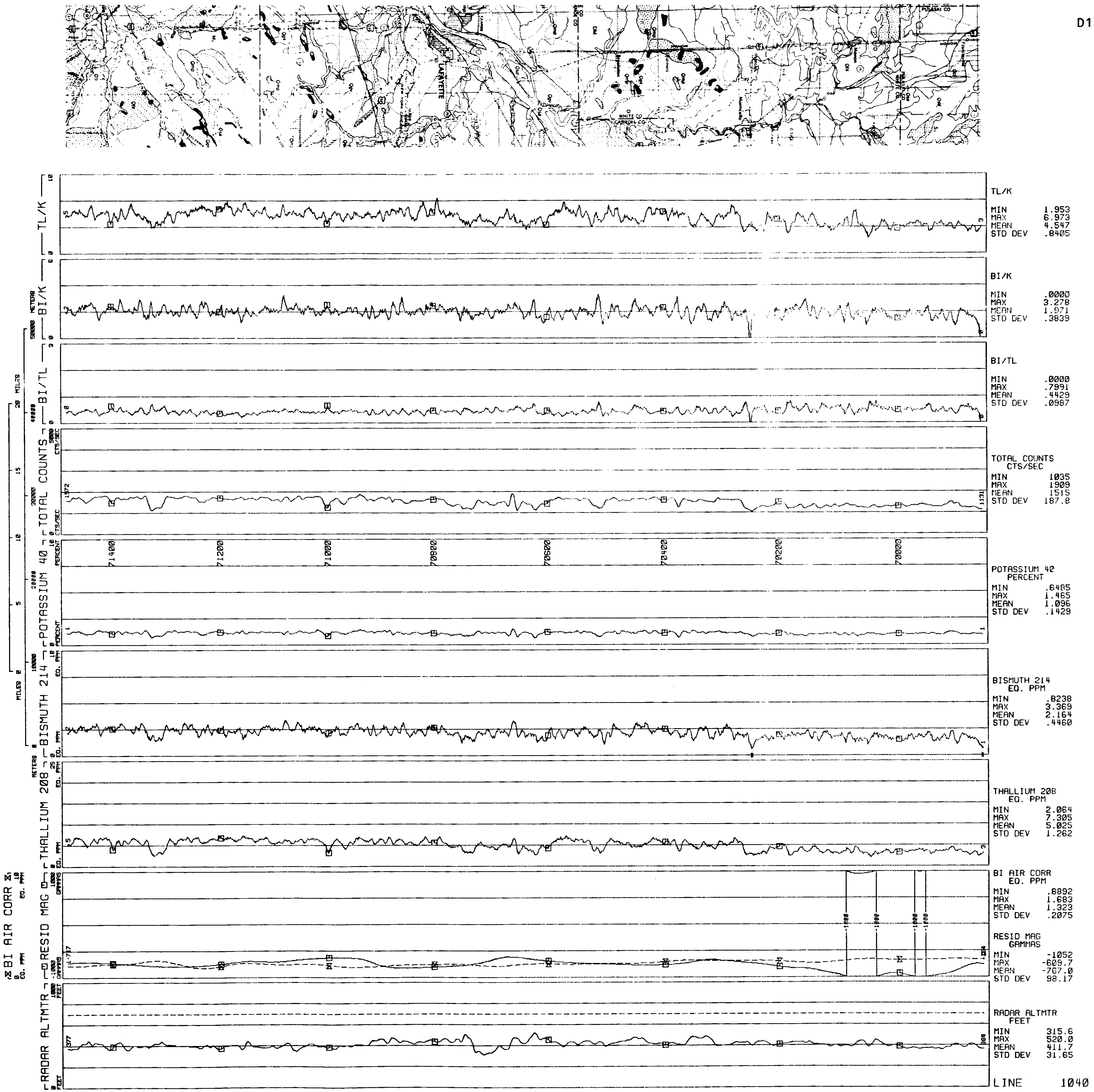

LINE 1050
DANVILLE QUADRANGLE - NTMS NK 16-11
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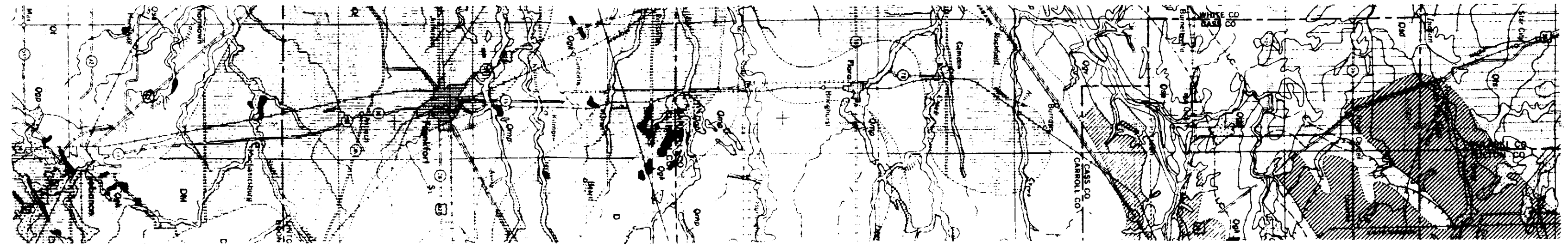
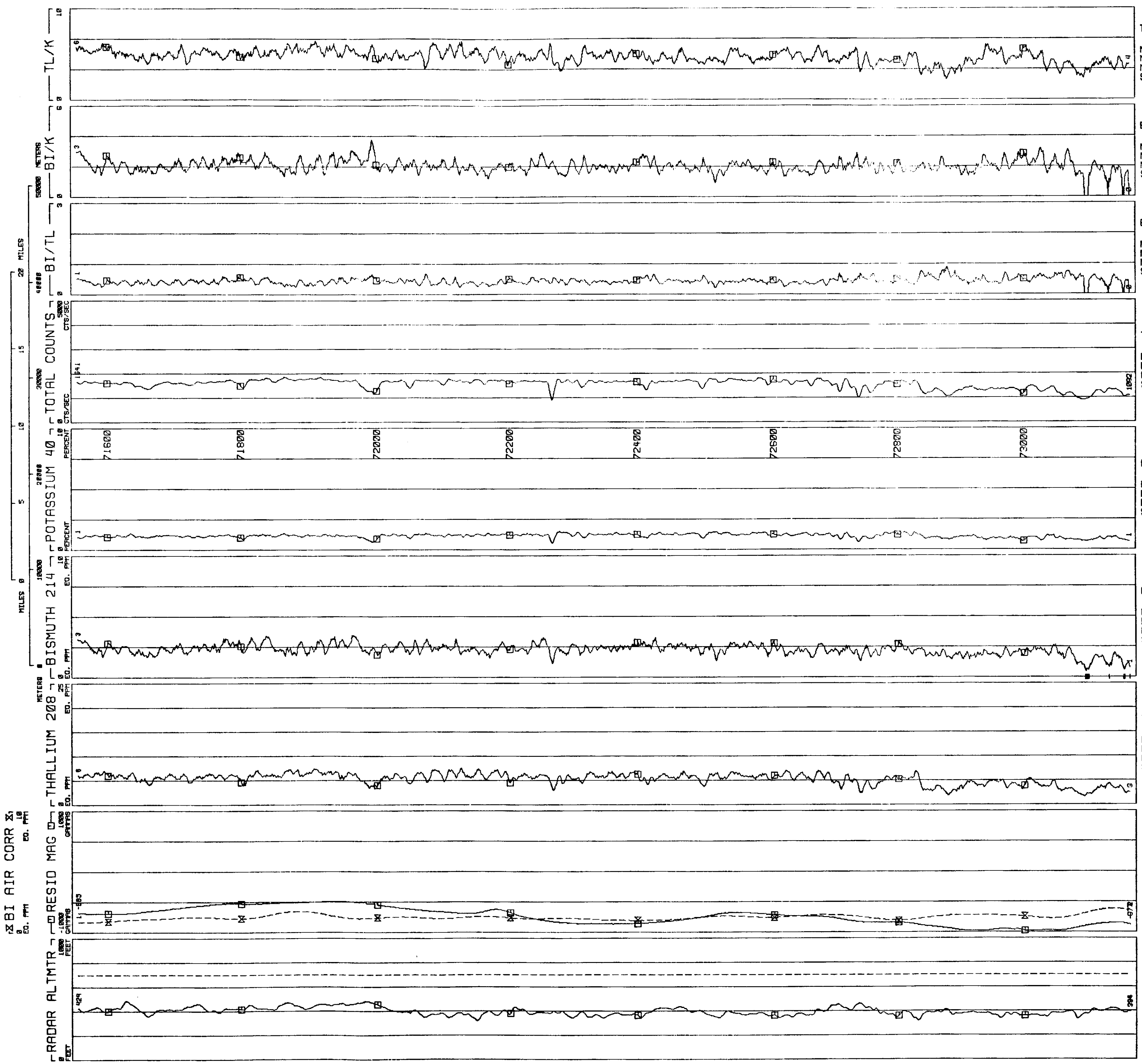
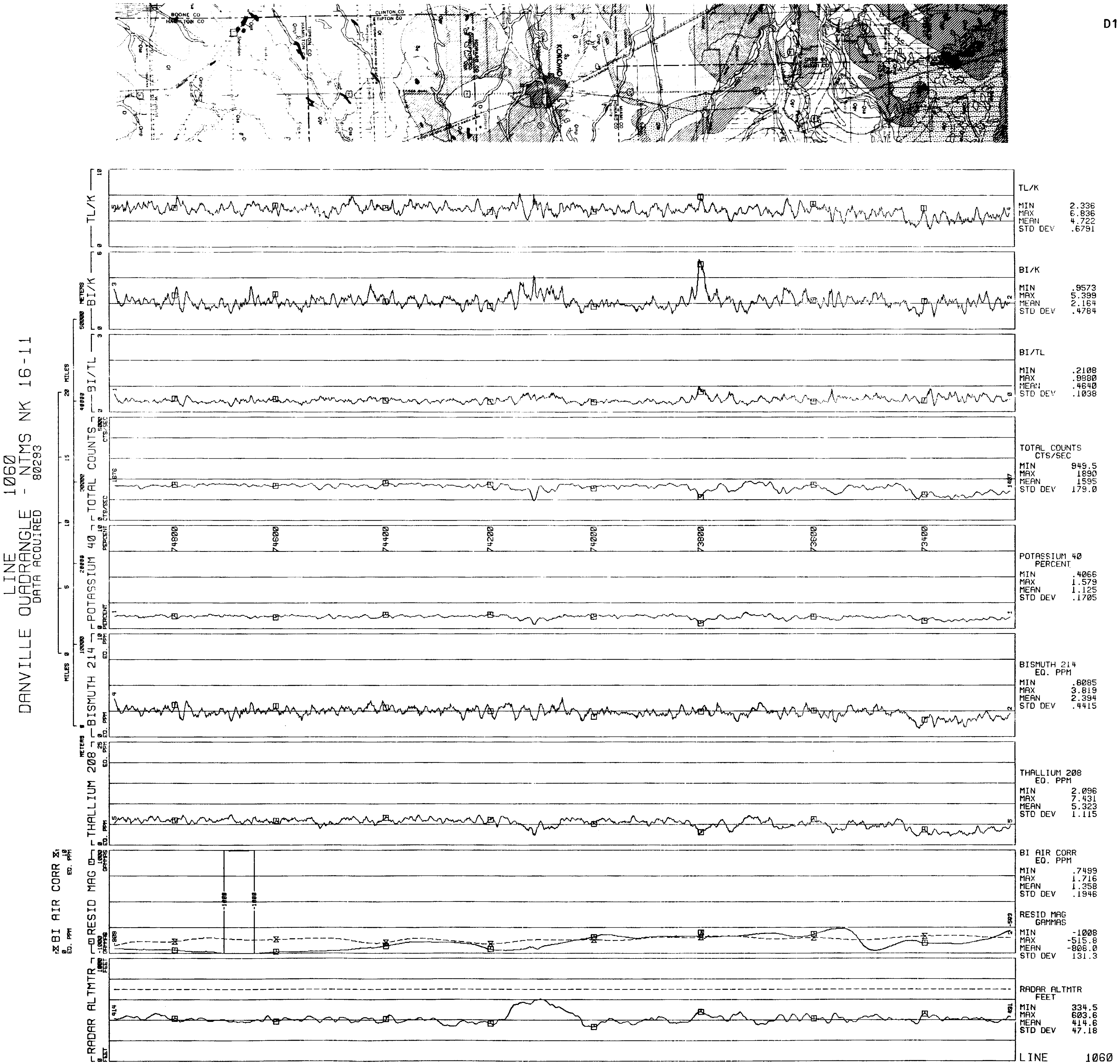




TL/K		
MIN	2.221	
MAX	6.470	
MEAN	4.672	
STD DEV	.7388	
BI/K		
MIN	.0000	
MAX	3.771	
MEAN	2.016	
STD DEV	.4140	
BI/TL		
MIN	.0000	
MAX	.8862	
MEAN	.4385	
STD DEV	.1017	
TOTAL COUNTS CTS/SEC		
MIN	898.5	
MAX	1847	
MEAN	1549	
STD DEV	204.2	
POTASSIUM 40 PERCENT		
MIN	.5294	
MAX	1.483	
MEAN	1.122	
STD DEV	.1725	
BISMUTH 214 EQ. PPM		
MIN	.7638	
MAX	3.449	
MEAN	2.265	
STD DEV	.4330	
THALLIUM 208 EQ. PPM		
MIN	1.658	
MAX	7.463	
MEAN	5.274	
STD DEV	1.207	
BI AIR CORR EQ. PPM		
MIN	.8382	
MAX	1.896	
MEAN	1.240	
STD DEV	.2049	
RESID MAG GAMMAS		
MIN	-985.1	
MAX	-486.6	
MEAN	-742.1	
STD DEV	146.9	
RADAR ALTMTR FEET		
MIN	320.5	
MAX	487.2	
MEAN	396.8	
STD DEV	32.89	

LINE 1050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DATA ACQUIRED 80293
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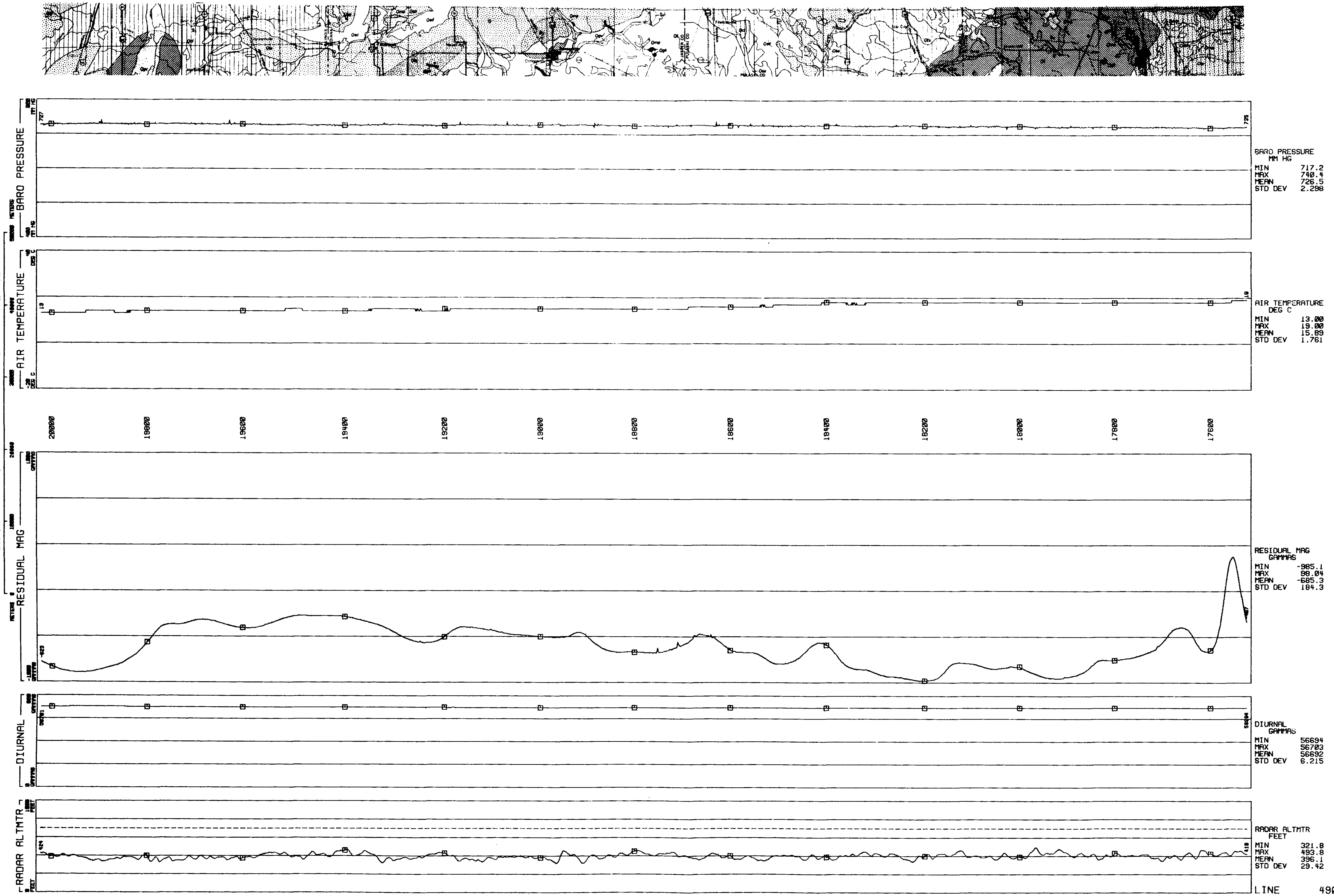
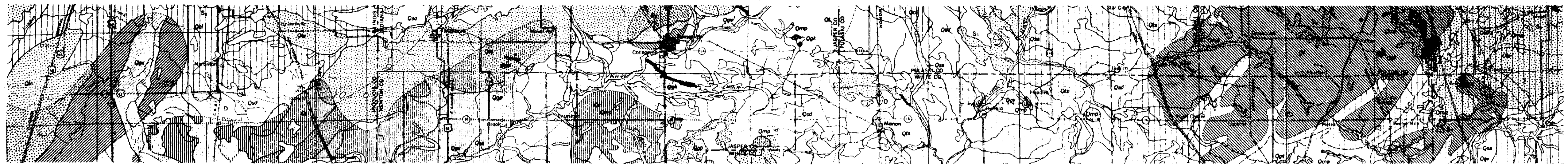
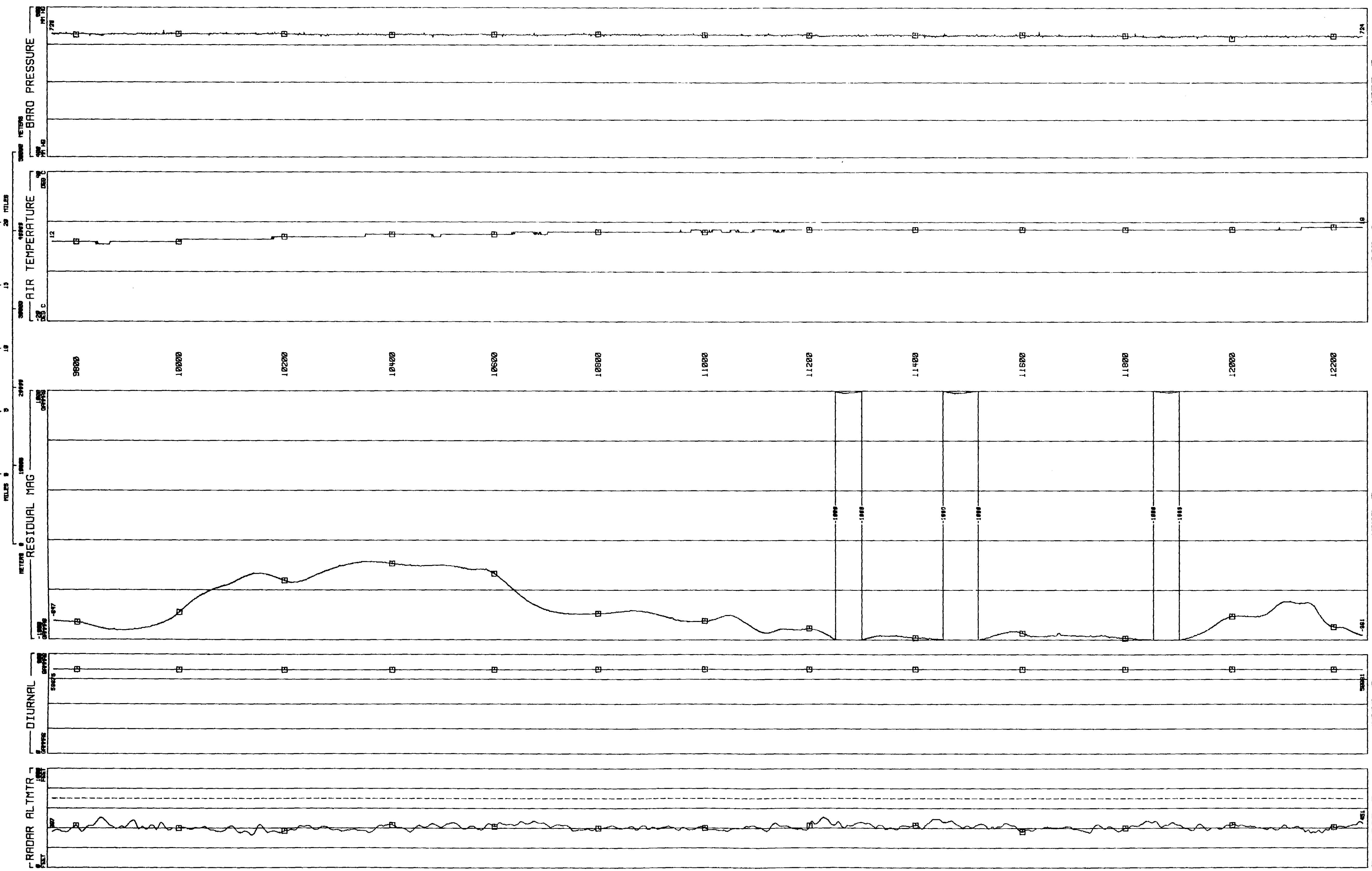
MIN 2.336
MAX 6.836
MEAN 4.722
STD DEV .6791
BI/K
MIN .9573
MAX 5.399
MEAN 2.164
STD DEV .4784
BI/TL
MIN .2108
MAX .9880
MEAN .4640
STD DEV .1038
TOTAL COUNTS CTS/SEC
MIN 949.5
MAX 1890
MEAN 1595
STD DEV 179.0
POTASSIUM 40 PERCENT
MIN .4066
MAX 1.579
MEAN 1.125
STD DEV .1705
BISMUTH 214 EQ. PPM
MIN .6085
MAX 3.819
MEAN 2.394
STD DEV .4415
THALLIUM 208 EQ. PPM
MIN 2.096
MAX 7.431
MEAN 5.323
STD DEV 1.115
BI AIR CORR EQ. PPM
MIN .7499
MAX 1.716
MEAN 1.358
STD DEV .1946
RESID MAG GAMMAS
MIN -1008
MAX -515.8
MEAN -806.0
STD DEV 131.3
RADAR ALTMTR FEET
MIN 334.5
MAX 603.6
MEAN 414.6
STD DEV 47.18
LINE 1060
74800
74600
74400
74200
74000
73800
73600
73400
KOKOMO

LINE 490
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289



LINE 500
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289





BARO PRESSURE
MM HG
MIN 717.8
MAX 738.3
MEAN 726.8
STD DEV 2.129

AIR TEMPERATURE
DEG C
MIN 11.00
MAX 18.00
MEAN 15.65
STD DEV 1.800

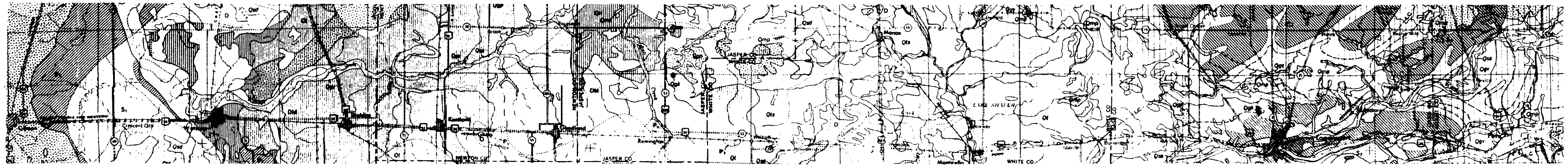
RESIDUAL MAG
GAMMAS
MIN -1018
MAX -371.4
MEAN -784.1
STD DEV 203.5

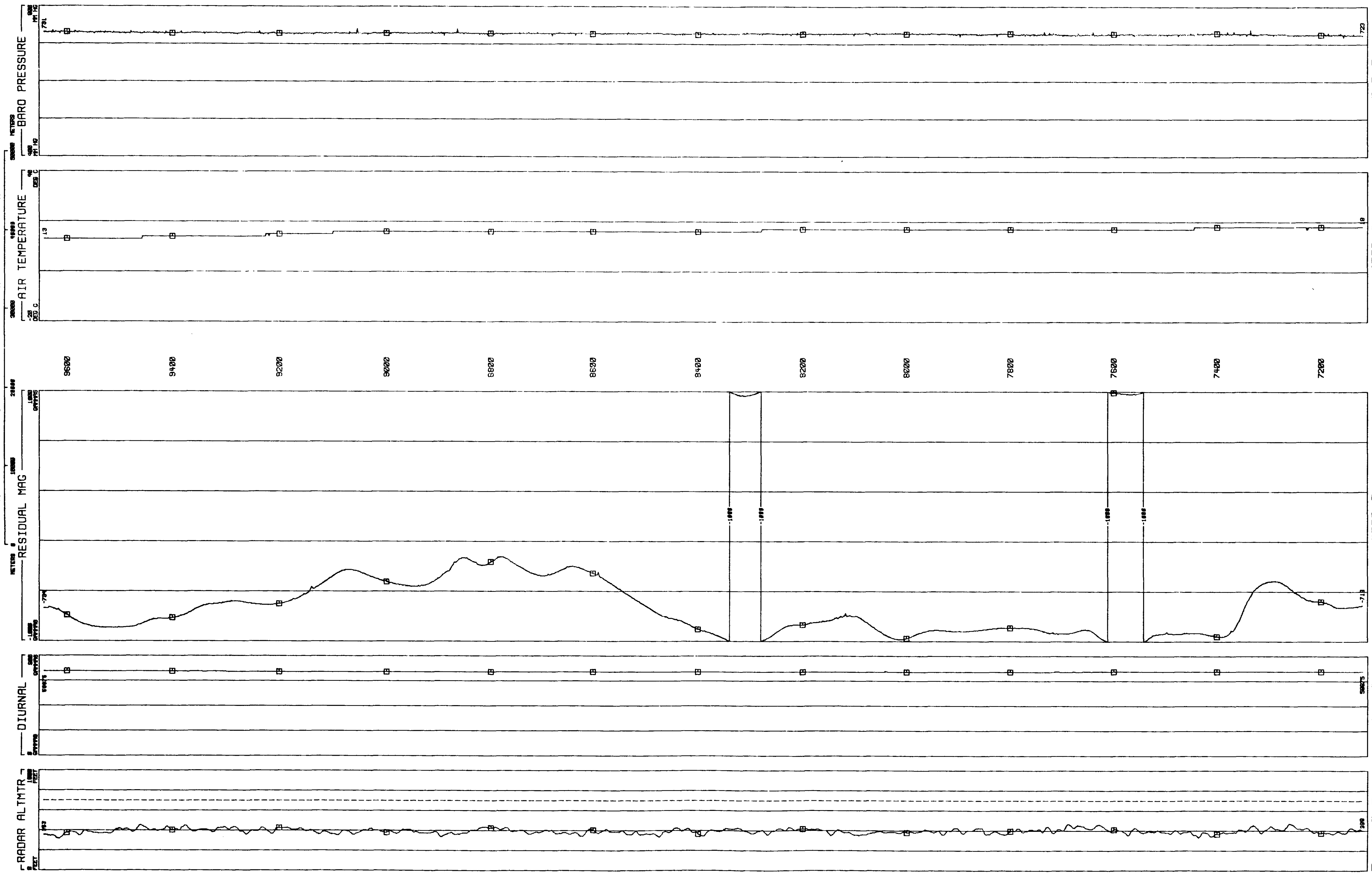
DIURNAL
GAMMAS
MIN 56675
MAX 56681
MEAN 56673
STD DEV 6.213

RADAR ALTMTR
FEET
MIN 329.7
MAX 507.5
MEAN 410.5
STD DEV 29.27

LINE 500

LINE 510
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289





BARO PRESSURE
MM HG

MIN	718.8
MAX	740.2
MEAN	727.5
STD DEV	1.588

AIR TEMPERATURE
DEG C

MIN	13.00
MAX	18.00
MEAN	16.13
STD DEV	1.380

RESIDUAL MAG
GAMMAS

MIN	-1035
MAX	-323.6
MEAN	-748.6
STD DEV	197.8

DIURNAL
GAMMAS

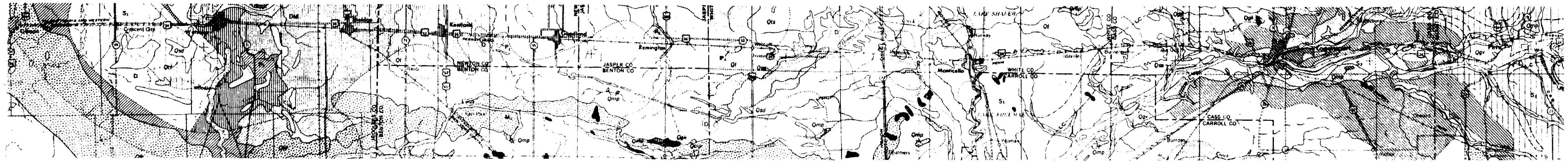
MIN	56673
MAX	56676
MEAN	56672
STD DEV	1.680

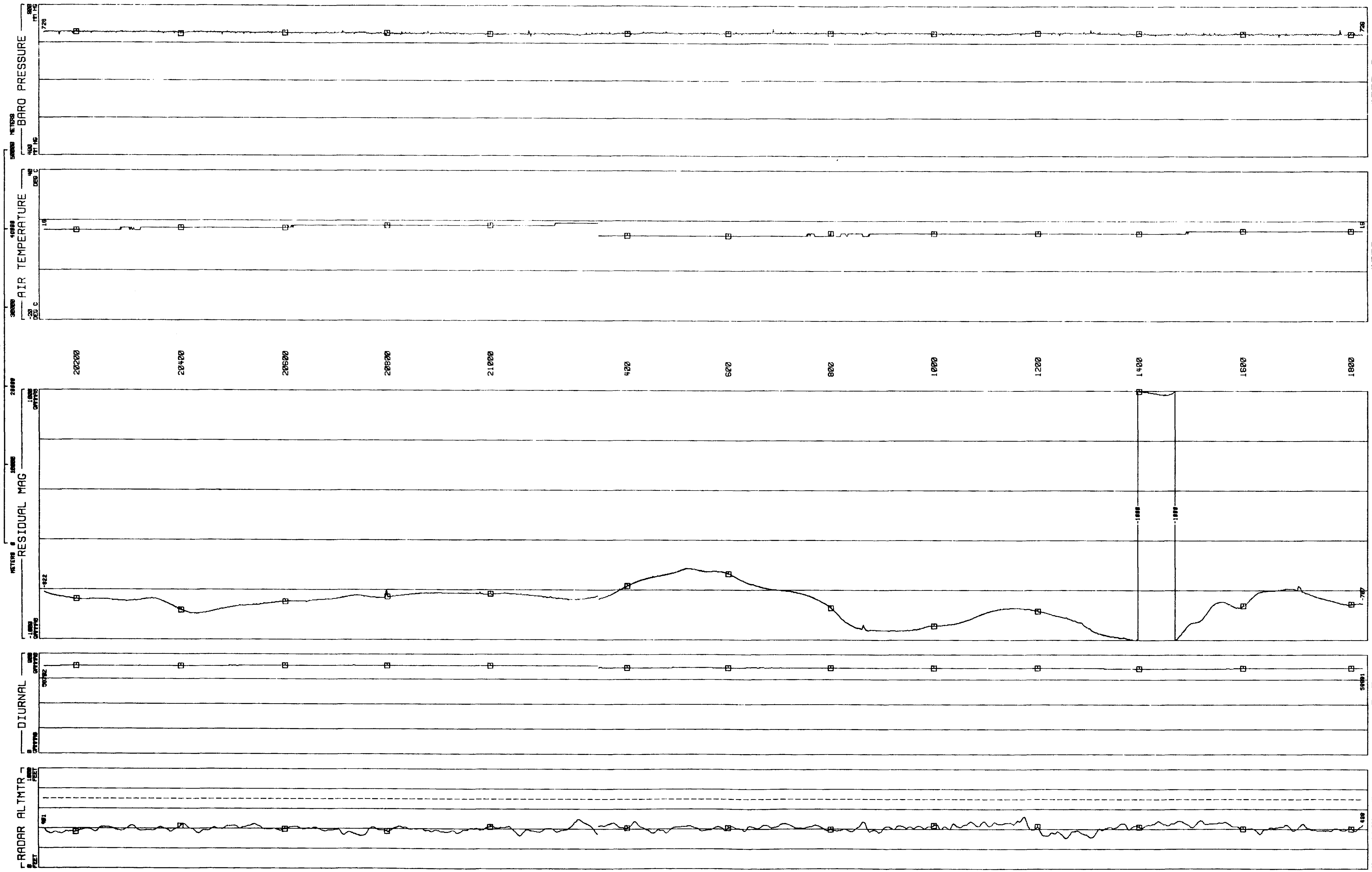
RADAR ALTMTR
FEET

MIN	317.5
MAX	472.1
MEAN	394.3
STD DEV	24.39

LINE 510

LINE 520
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80289





BARO PRESSURE
MM HG
MIN 718.6
MAX 737.5
MEAN 726.8
STD DEV 1.557

AIR TEMPERATURE
DEG C
MIN 14.00
MAX 19.00
MEAN 15.97
STD DEV 1.490

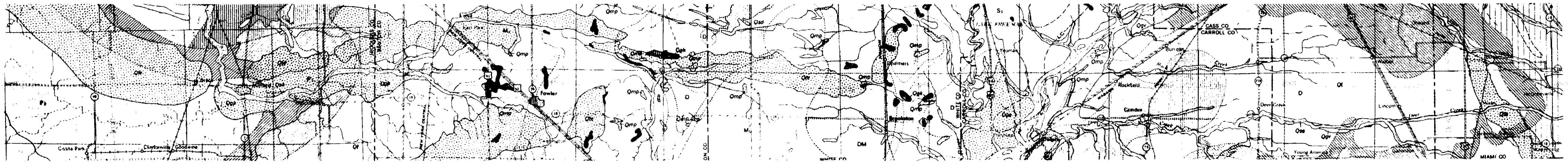
RESIDUAL MAG
GAMMAS
MIN -1031
MAX -427.1
MEAN -711.1
STD DEV 134.6

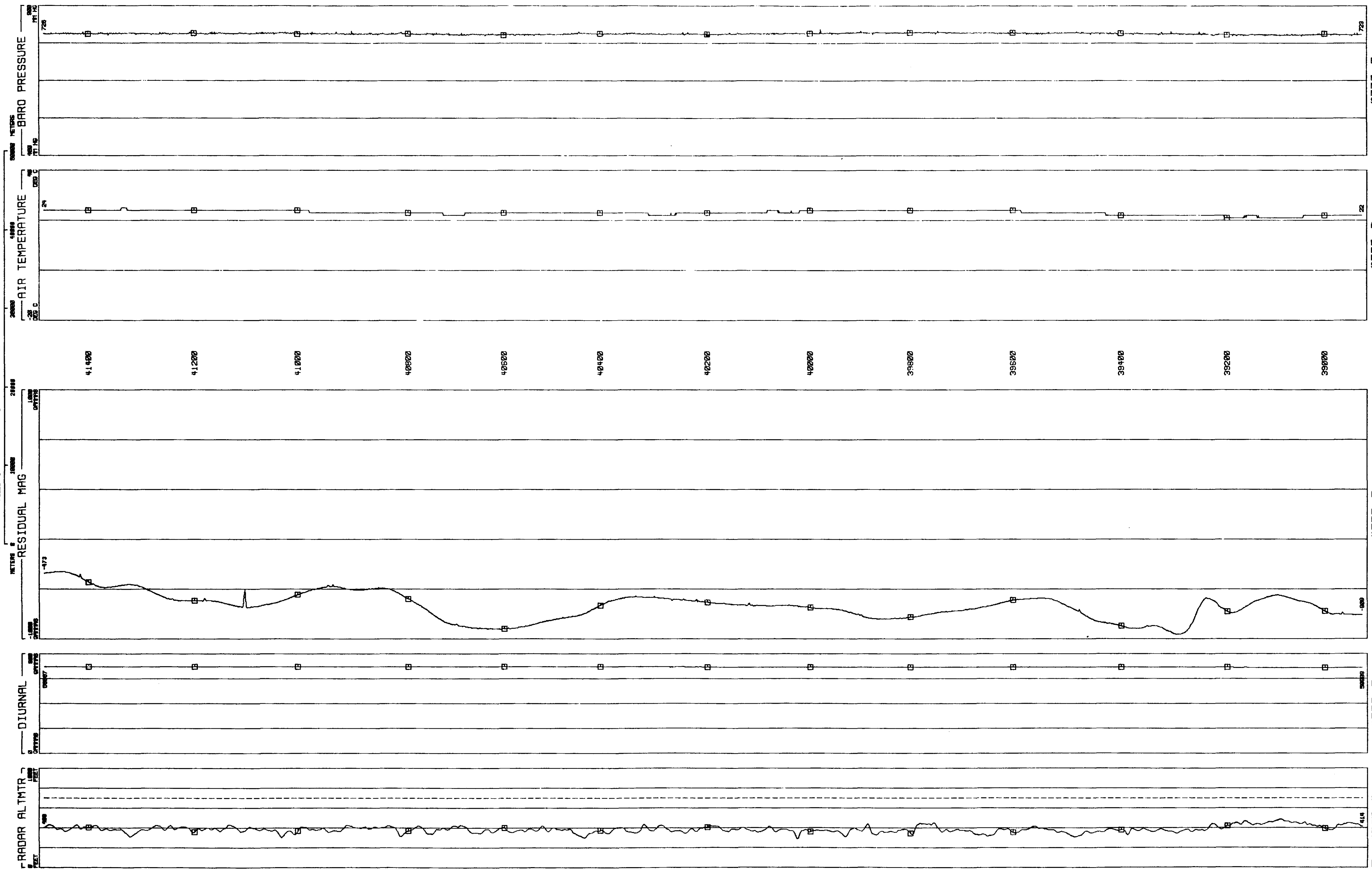
DIURNAL
GAMMAS
MIN 56689
MAX 56710
MEAN 56694
STD DEV 9.217

RADAR ALTMTR
FEET
MIN 312.1
MAX 522.6
MEAN 406.7
STD DEV 32.55

LINE 520

LINE 530
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80290





BARO PRESSURE
MM HG

MIN	717.8
MAX	736.9
MEAN	725.1
STD DEV	1.945

AIR TEMPERATURE
DEG C

MIN	21.00
MAX	25.00
MEAN	23.09
STD DEV	.8795

RESIDUAL MAG
GAMMAS

MIN	-965.1
MAX	-460.0
MEAN	-738.3
STD DEV	106.5

DIURNAL
GAMMAS

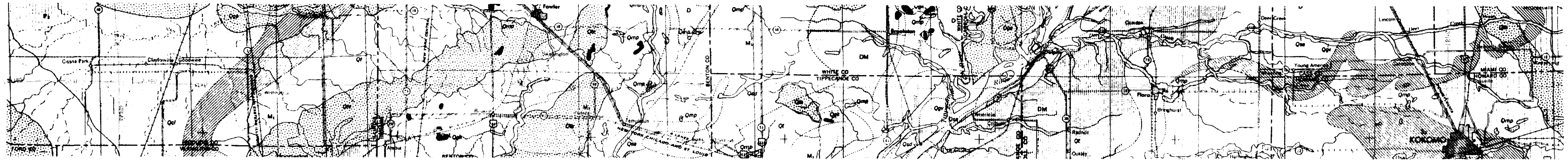
MIN	56689
MAX	56697
MEAN	56688
STD DEV	5.734

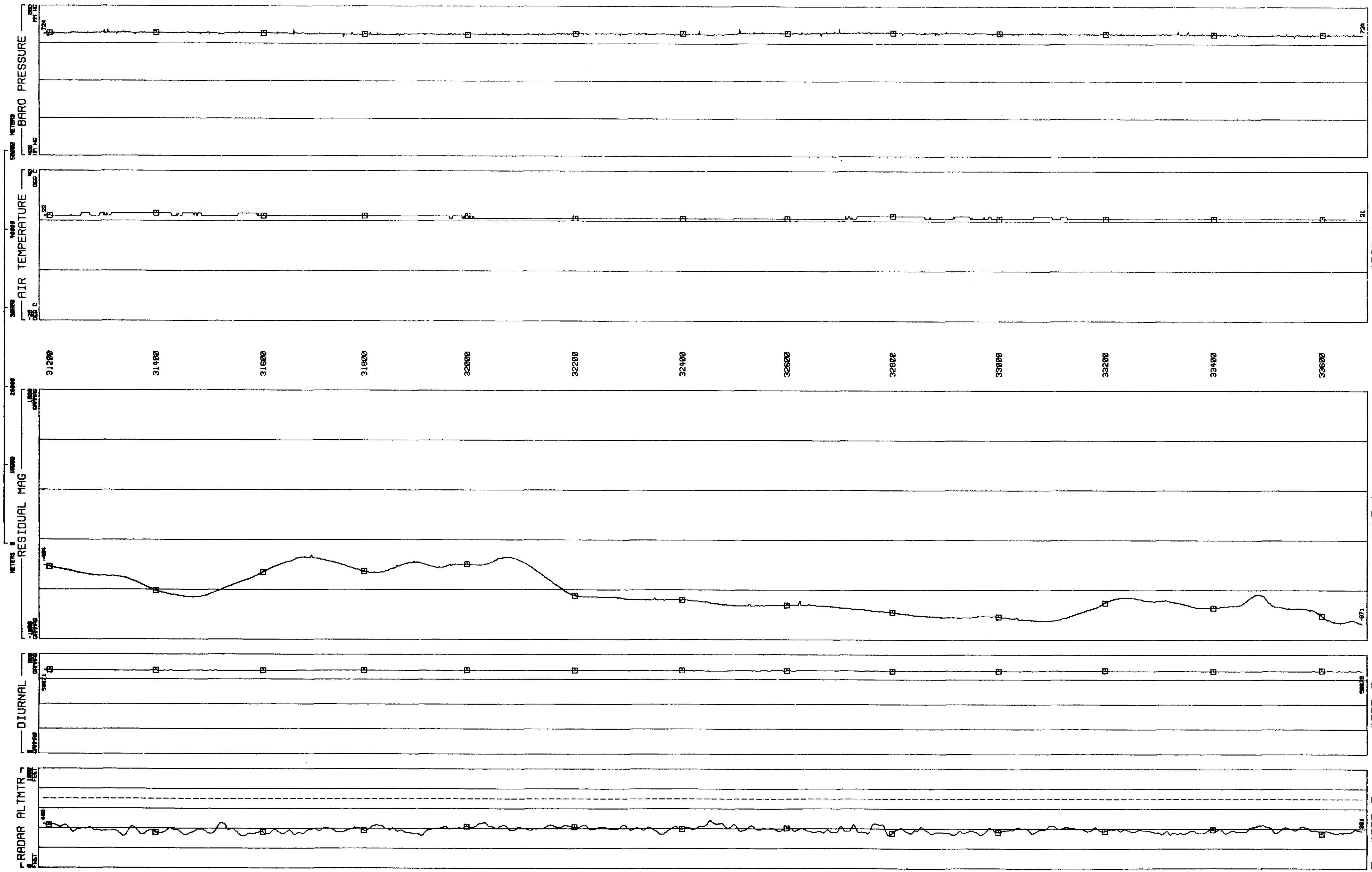
RADAR ALTMTR
FEET

MIN	287.8
MAX	485.7
MEAN	385.0
STD DEV	31.96

LINE 530

LINE 540
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80290





BARO PRESSURE
MM HG
MIN 717.2
MAX 738.8
MEAN 726.5
STD DEV 1.956

AIR TEMPERATURE
DEG C
MIN 21.00
MAX 23.00
MEAN 21.50
STD DEV .6498

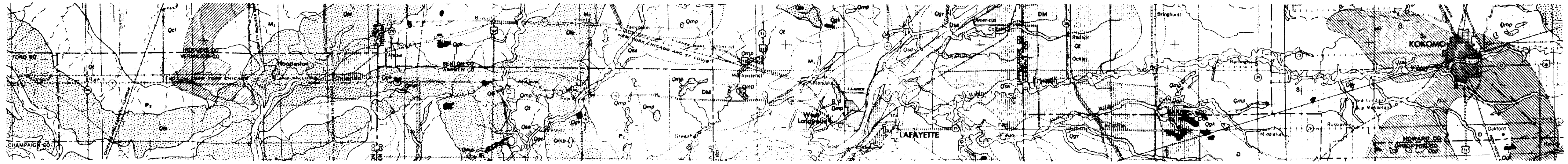
RESIDUAL MAG
GAMMAS
MIN -871.3
MAX -322.3
MEAN -631.3
STD DEV 155.5

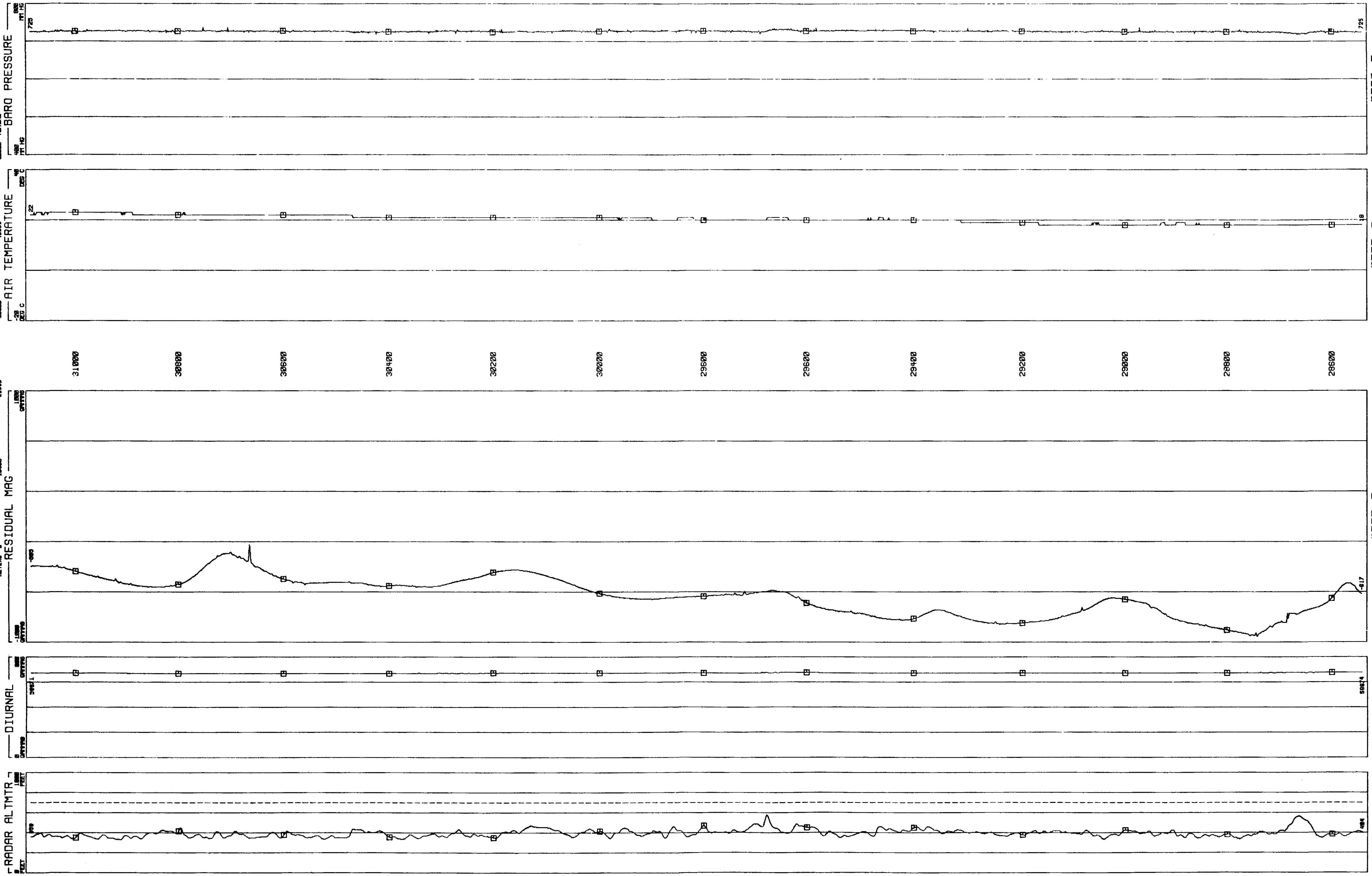
DIURNAL
GAMMAS
MIN 56667
MAX 56671
MEAN 56660
STD DEV 9.843

RADAR ALTMTR
FEET
MIN 322.9
MAX 477.7
MEAN 389.0
STD DEV 27.03

LINE 540

LINE 550
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80290





BARO PRESSURE
MM HG
MIN 719.1
MAX 736.6
MEAN 726.5
STD DEV 1.764

AIR TEMPERATURE
DEG C
MIN 18.00
MAX 23.00
MEAN 20.28
STD DEV 1.582

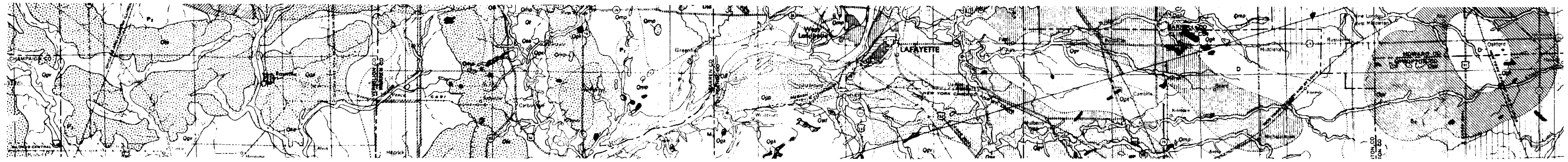
RESIDUAL MAG
GAMMAS
MIN -954.7
MAX -223.9
MEAN -631.3
STD DEV 154.0

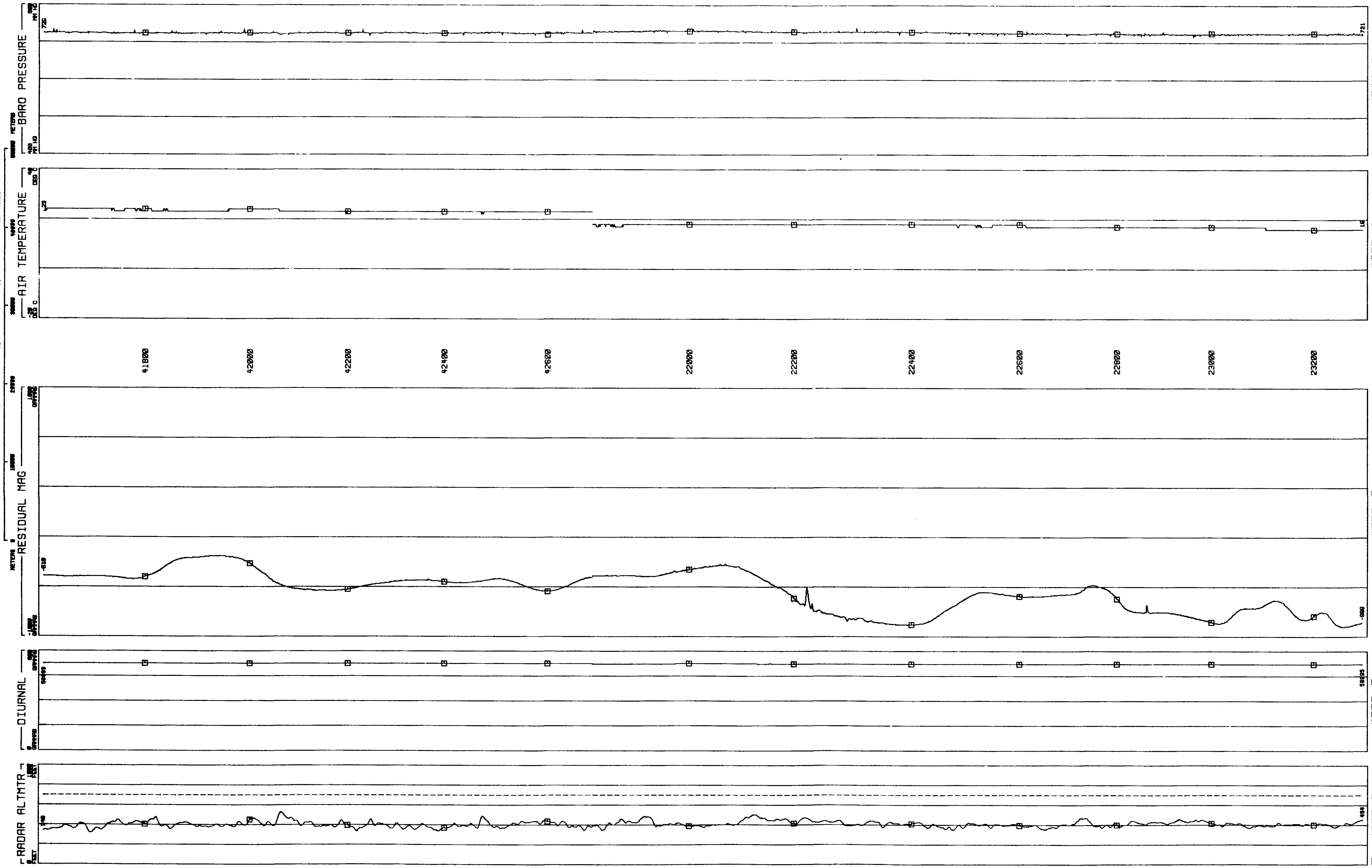
DIURNAL
GAMMAS
MIN 56668
MAX 56674
MEAN 56670
STD DEV 2.916

RADAR ALTMTR
FEET
MIN 328.2
MAX 574.7
MEAN 394.7
STD DEV 37.36

LINE 550

LINE 560
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80290





BARO PRESSURE
MM HG
MIN 715.6
MAX 738.3
MEAN 725.5
STD DEV 2.614

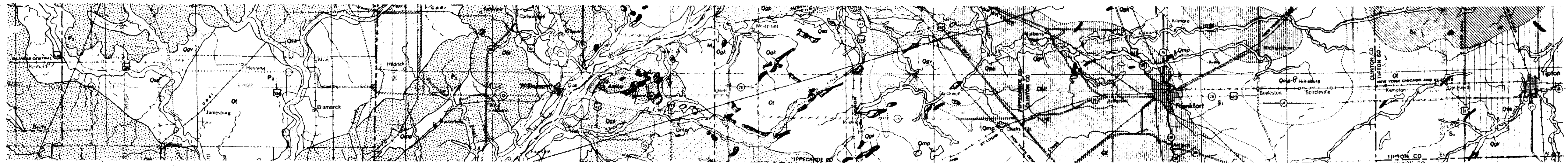
AIR TEMPERATURE
DEG C
MIN 16.00
MAX 24.00
MEAN 19.86
STD DEV 2.965

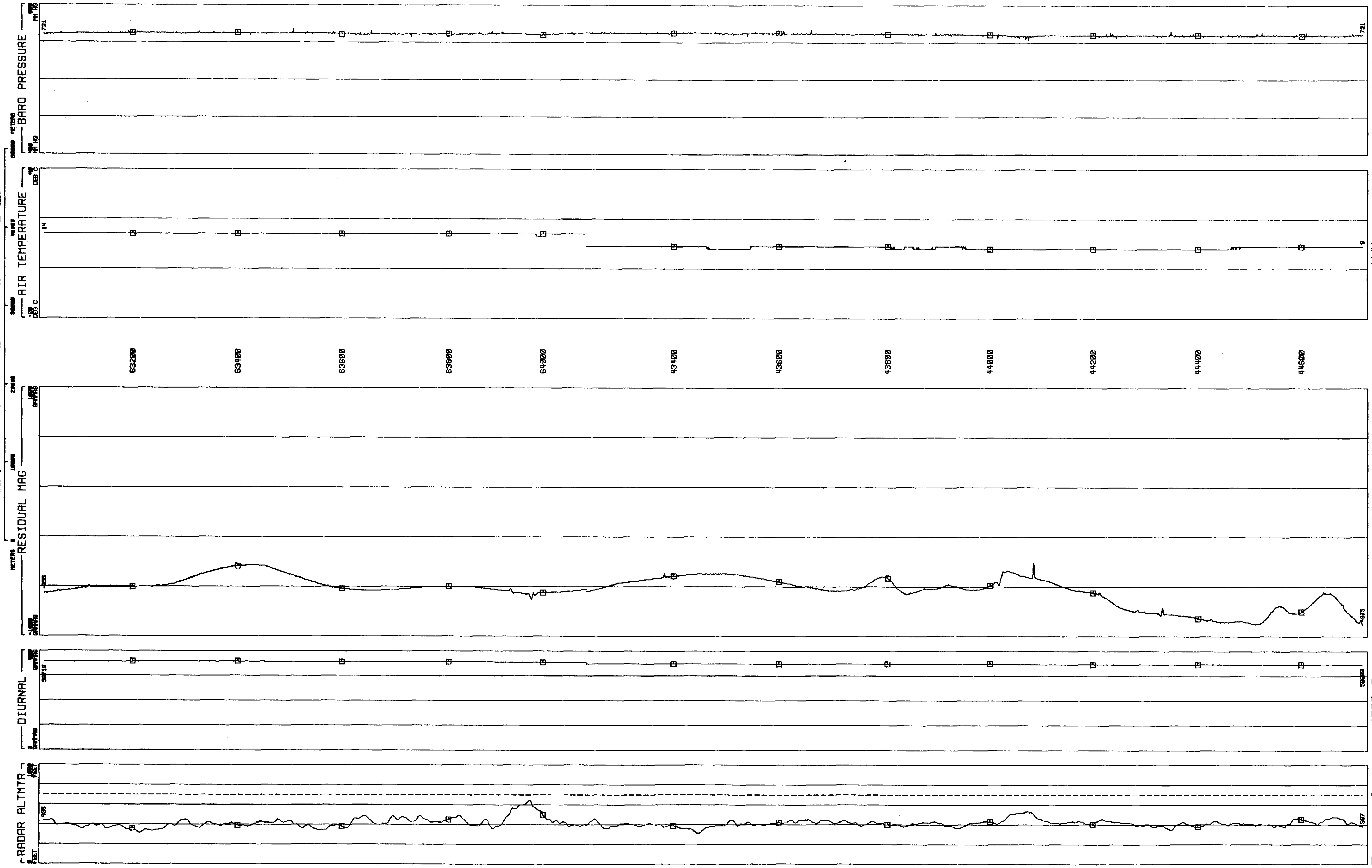
RESIDUAL MAG
GAMMAS
MIN -910.5
MAX -351.9
MEAN -631.6
STD DEV 149.9

DIURNAL
GAMMAS
MIN 56695
MAX 56701
MEAN 56691
STD DEV 7.311

RADAR ALTMTR
FEET
MIN 317.9
MAX 528.0
MEAN 407.3
STD DEV 30.18

LINE 570
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292





BARO PRESSURE
MM HG
MIN 709.3
MAX 734.5
MEAN 722.2
STD DEV 2.417

AIR TEMPERATURE
DEG C
MIN 8.000
MAX 14.00
MEAN 10.82
STD DEV 2.709

RESIDUAL MAG
GAMMAS
MIN -905.1
MAX -408.5
MEAN -624.1
STD DEV 109.0

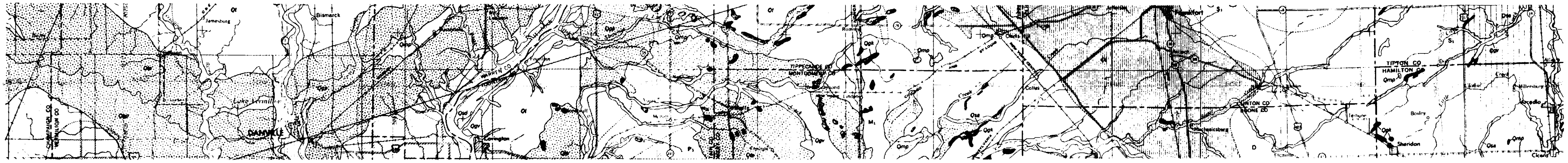
DIURNAL
GAMMAS
MIN 56693
MAX 56715
MEAN 56696
STD DEV 10.84

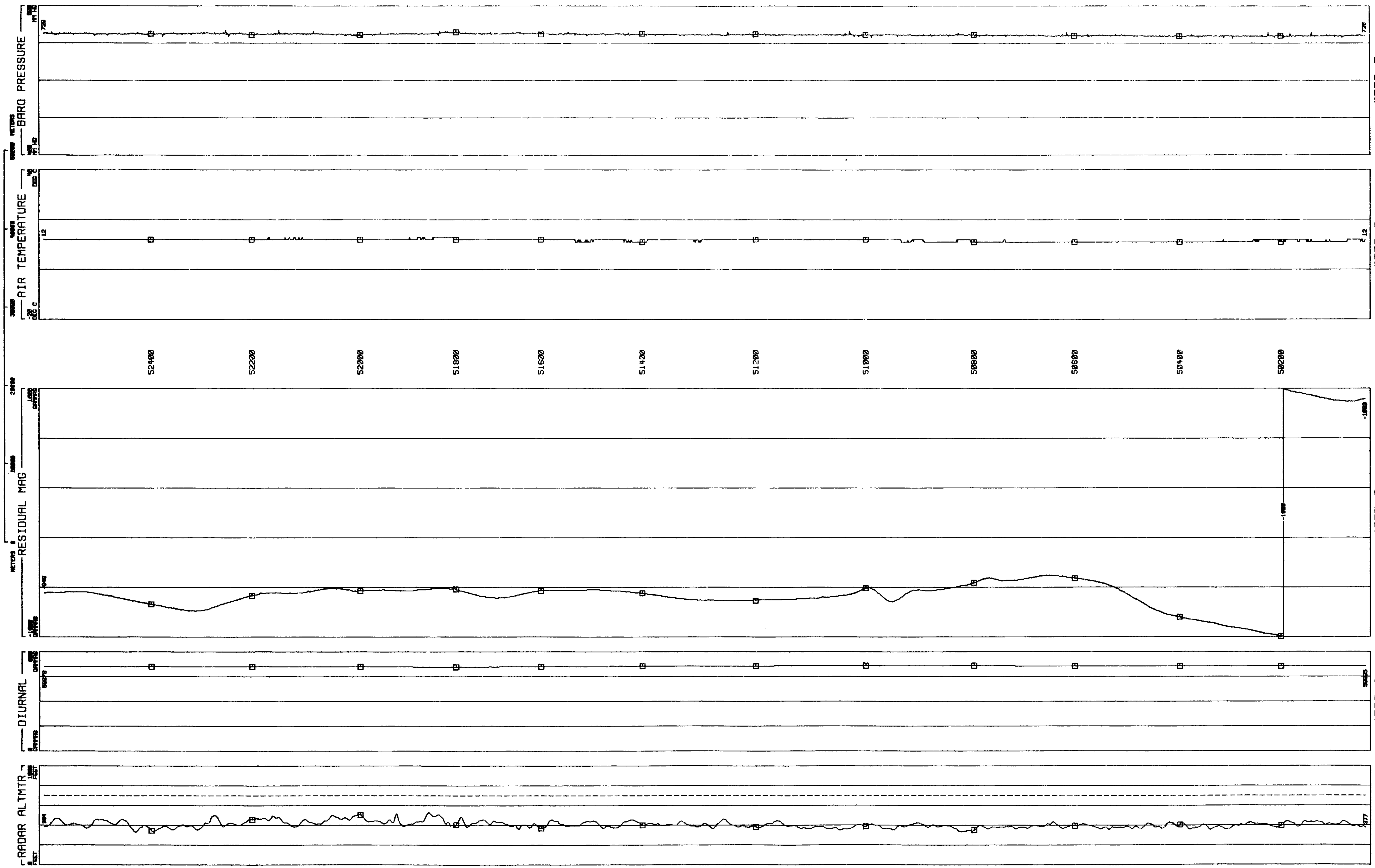
RADAR ALTMTR
FEET
MIN 312.0
MAX 644.5
MEAN 416.0
STD DEV 44.72

LINE 570

D28da

LINE 580
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292





BARO PRESSURE
MM HG
MIN 713.0
MAX 734.0
MEAN 722.8
STD DEV 2.683

AIR TEMPERATURE
DEG C
MIN 11.00
MAX 13.00
MEAN 11.72
STD DEV .5055

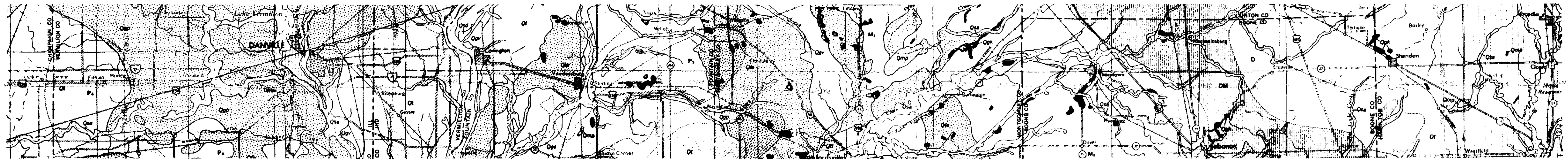
RESIDUAL MAG
GAMMAS
MIN -1105
MAX -504.0
MEAN -699.3
STD DEV 136.7

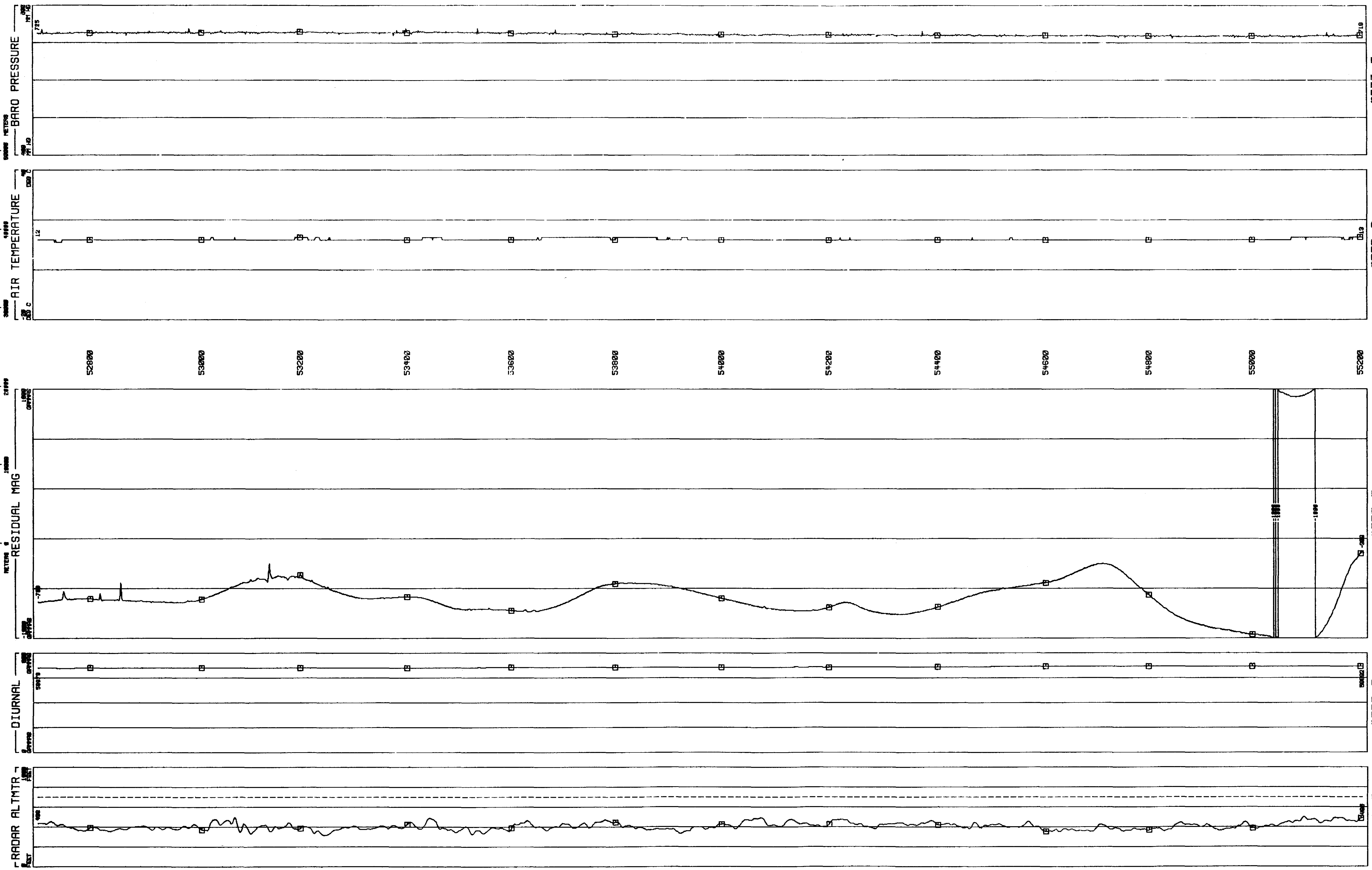
DIURNAL
GAMMAS
MIN 56677
MAX 56687
MEAN 56674
STD DEV 9.250

RADAR ALTMTR
FEET
MIN 331.8
MAX 528.3
MEAN 407.4
STD DEV 33.84

LINE 580

LINE 590
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292





BARO PRESSURE
MM HG
MIN 711.7
MAX 737.2
MEAN 722.8
STD DEV 3.788

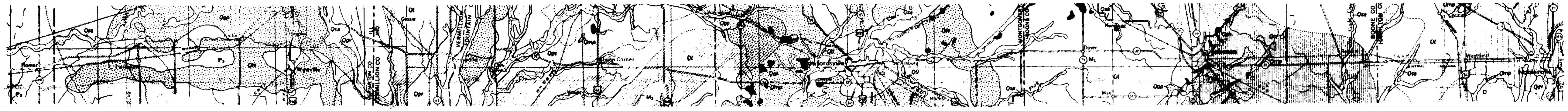
AIR TEMPERATURE
DEG C
MIN 11.00
MAX 13.00
MEAN 12.17
STD DEV .3848

RESIDUAL MAG
GAMMAS
MIN -1063
MAX -306.3
MEAN -692.2
STD DEV 138.2

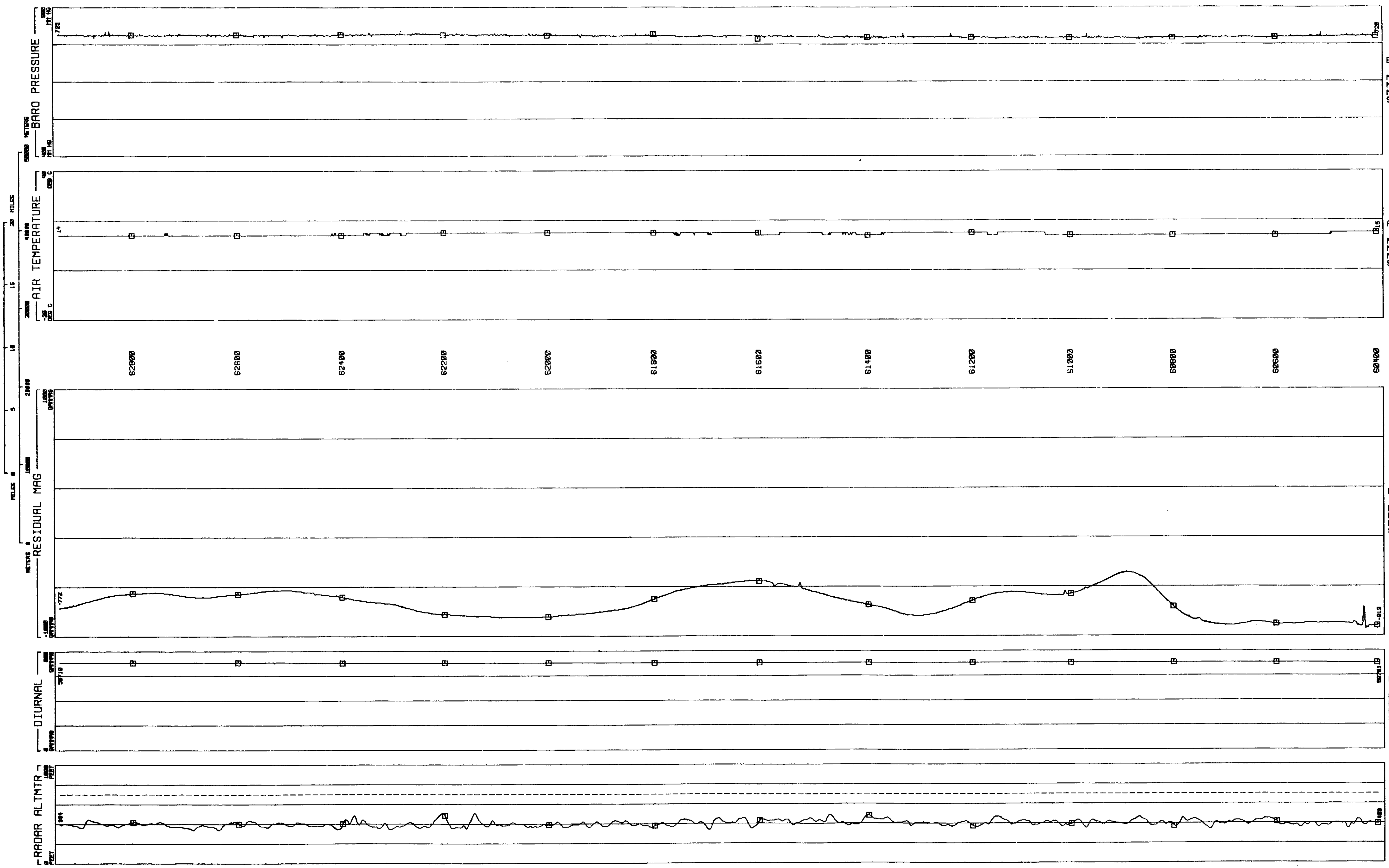
DIURNAL
GAMMAS
MIN 56678
MAX 56692
MEAN 56681
STD DEV 6.636

RADAR ALTMTR
FEET
MIN 313.6
MAX 499.5
MEAN 406.1
STD DEV 34.85

LINE 590



LINE 600
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80292



BARO PRESSURE
MM HG
MIN 712.5
MAX 735.9
MEAN 721.7
STD DEV 3.554

AIR TEMPERATURE
DEG C
MIN 14.00
MAX 15.00
MEAN 14.49
STD DEV .4997

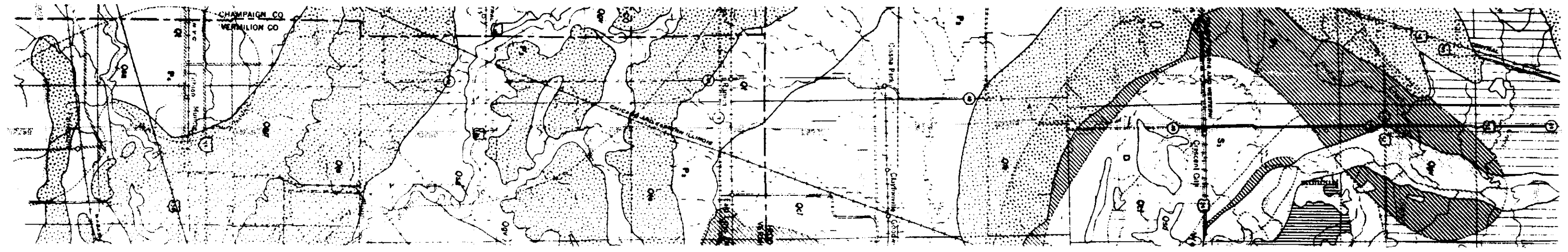
RESIDUAL MAG
GAMMAS
MIN -944.3
MAX -483.6
MEAN -730.2
STD DEV 110.1

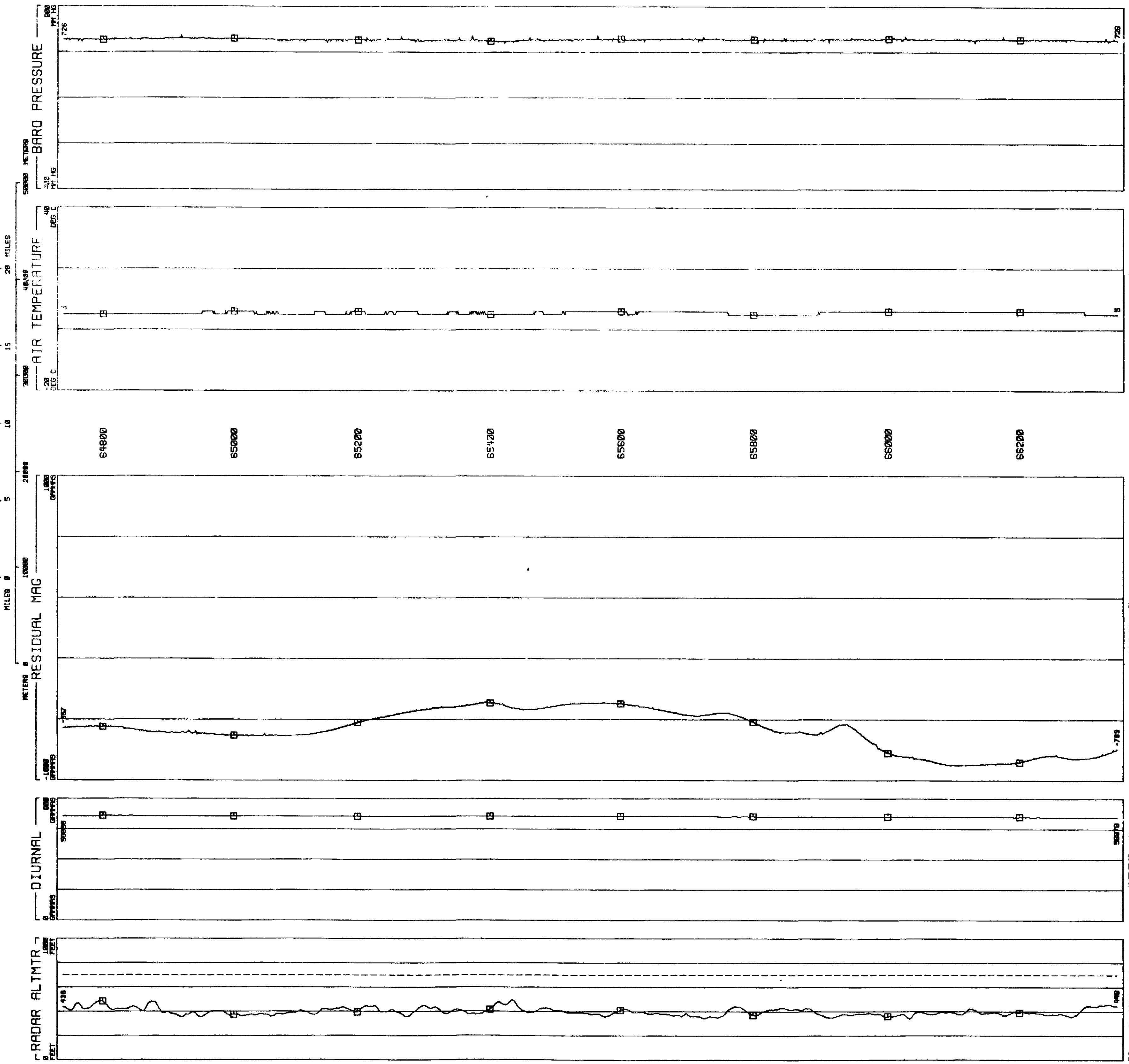
DIURNAL
GAMMAS
MIN 56701
MAX 56710
MEAN 56695
STD DEV 9.980

RADAR ALTMTR
FEET
MIN 338.2
MAX 510.2
MEAN 402.6
STD DEV 28.14

LINE 600

LINE 1010
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293





BARO PRESSURE
MM HG

MIN	719.9
MAX	736.1
MEAN	727.5
STD DEV	1.585

AIR TEMPERATURE
DEG C

MIN	5.000
MAX	6.000
MEAN	5.519
STD DEV	.4996

RESIDUAL MAG
GAMMAS

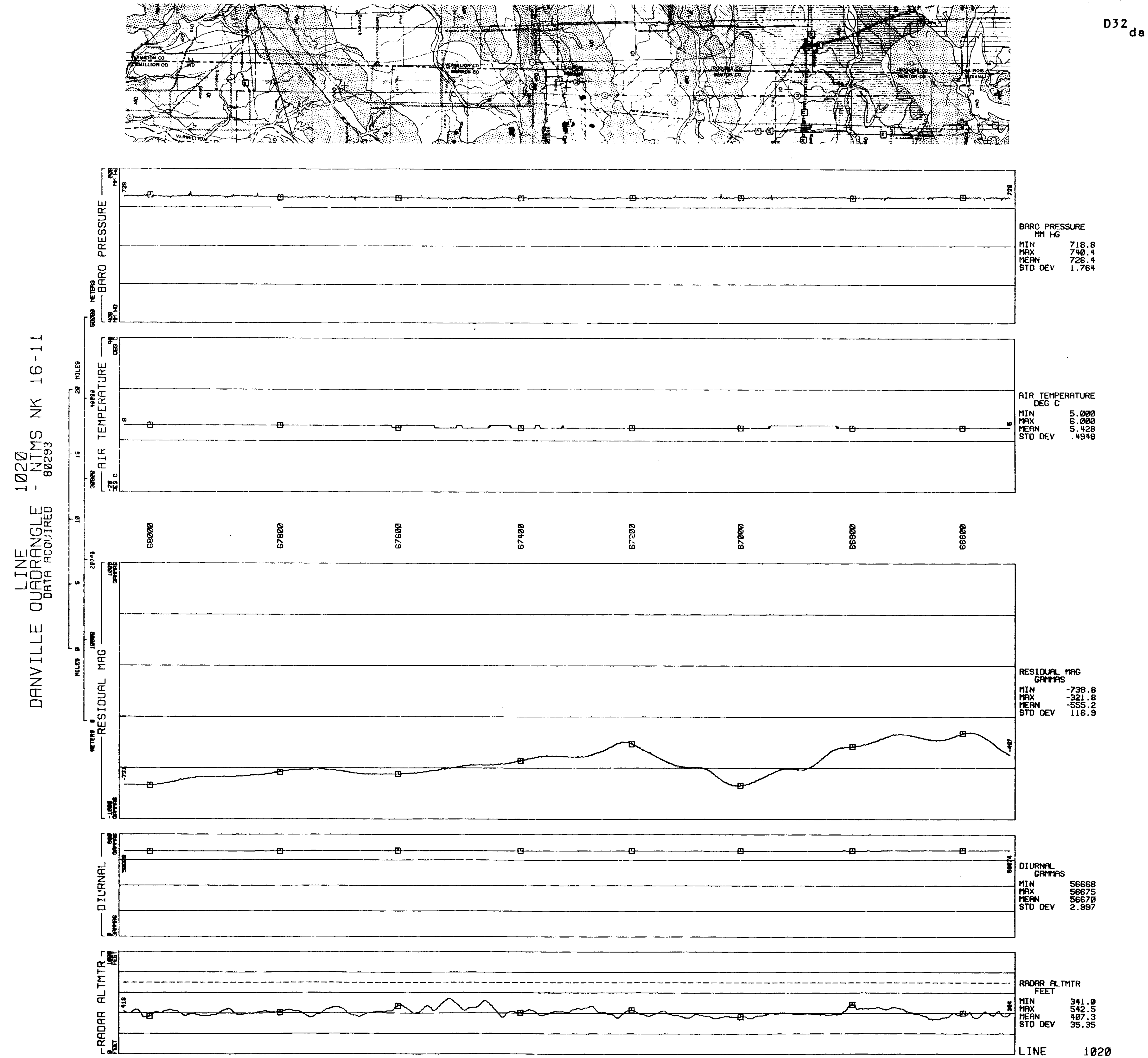
MIN	-900.5
MAX	-485.6
MEAN	-665.7
STD DEV	126.1

DIURNAL
GAMMAS

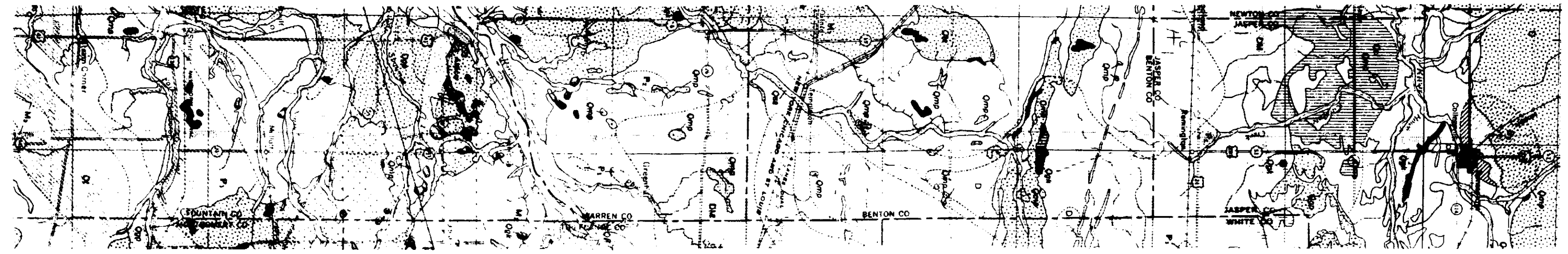
MIN	56677
MAX	56686
MEAN	56679
STD DEV	4.152

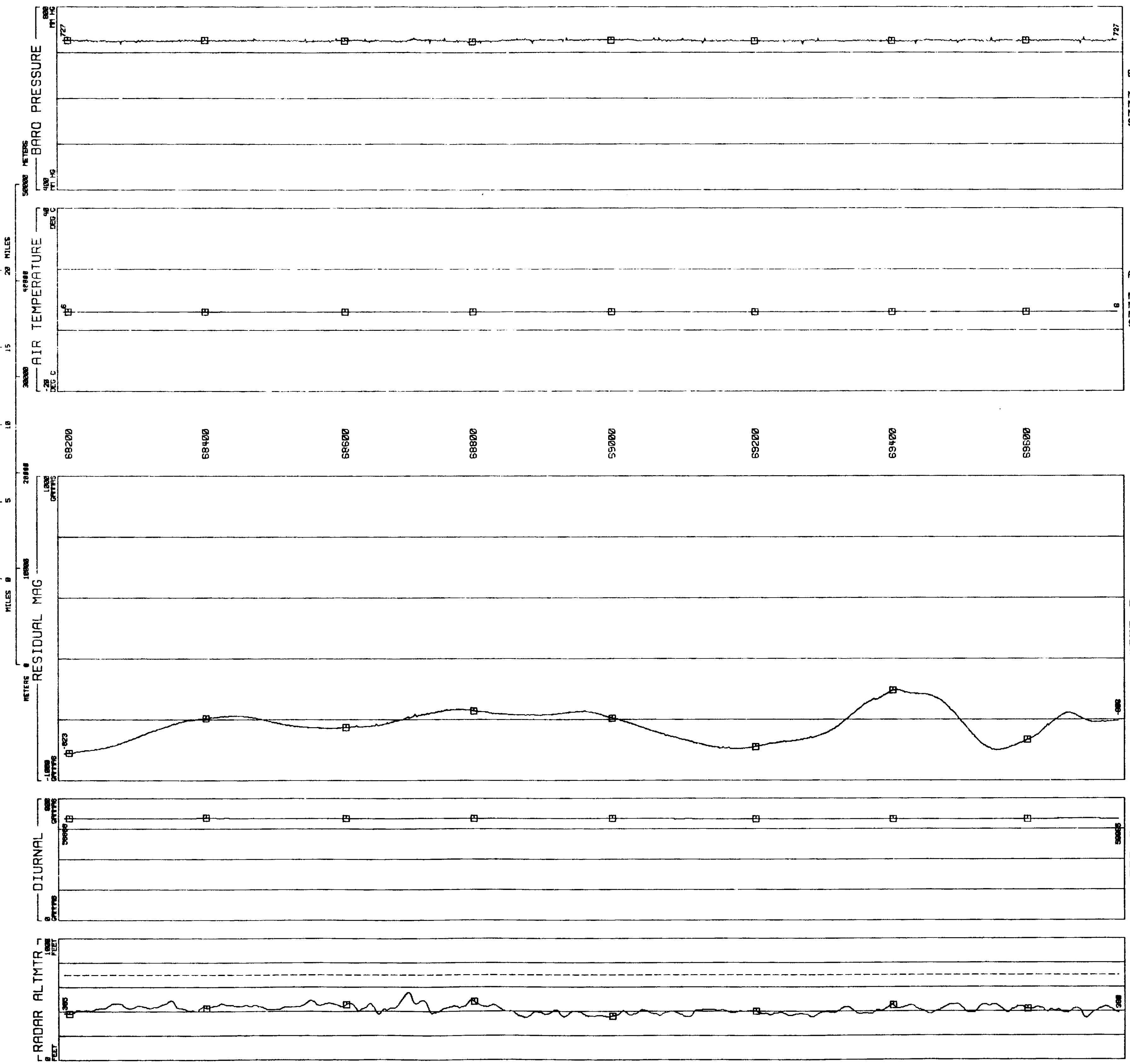
RADAR ALTMTR
FEET

MIN	341.3
MAX	493.4
MEAN	398.5
STD DEV	30.02


LINE 1020
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
68000
67800
67600
67400
67200
67000
66800
66600
BARO PRESSURE MM HG
MIN 718.8
MAX 740.4
MEAN 726.4
STD DEV 1.764
AIR TEMPERATURE DEG C
MIN 5.000
MAX 6.000
MEAN 5.428
STD DEV .4948
RESIDUAL MAG GAMMAS
MIN -738.8
MAX -321.8
MEAN -555.2
STD DEV 116.9
DIURNAL GAMMAS
MIN 56668
MAX 56675
MEAN 56670
STD DEV 2.997
RADAR ALTMTR FEET
MIN 341.0
MAX 542.5
MEAN 407.3
STD DEV 35.35
LINE 1020

LINE 1030
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293





BARO PRESSURE
MM HG
MIN 717.8
MAX 733.4
MEAN 726.0
STD DEV 1.312

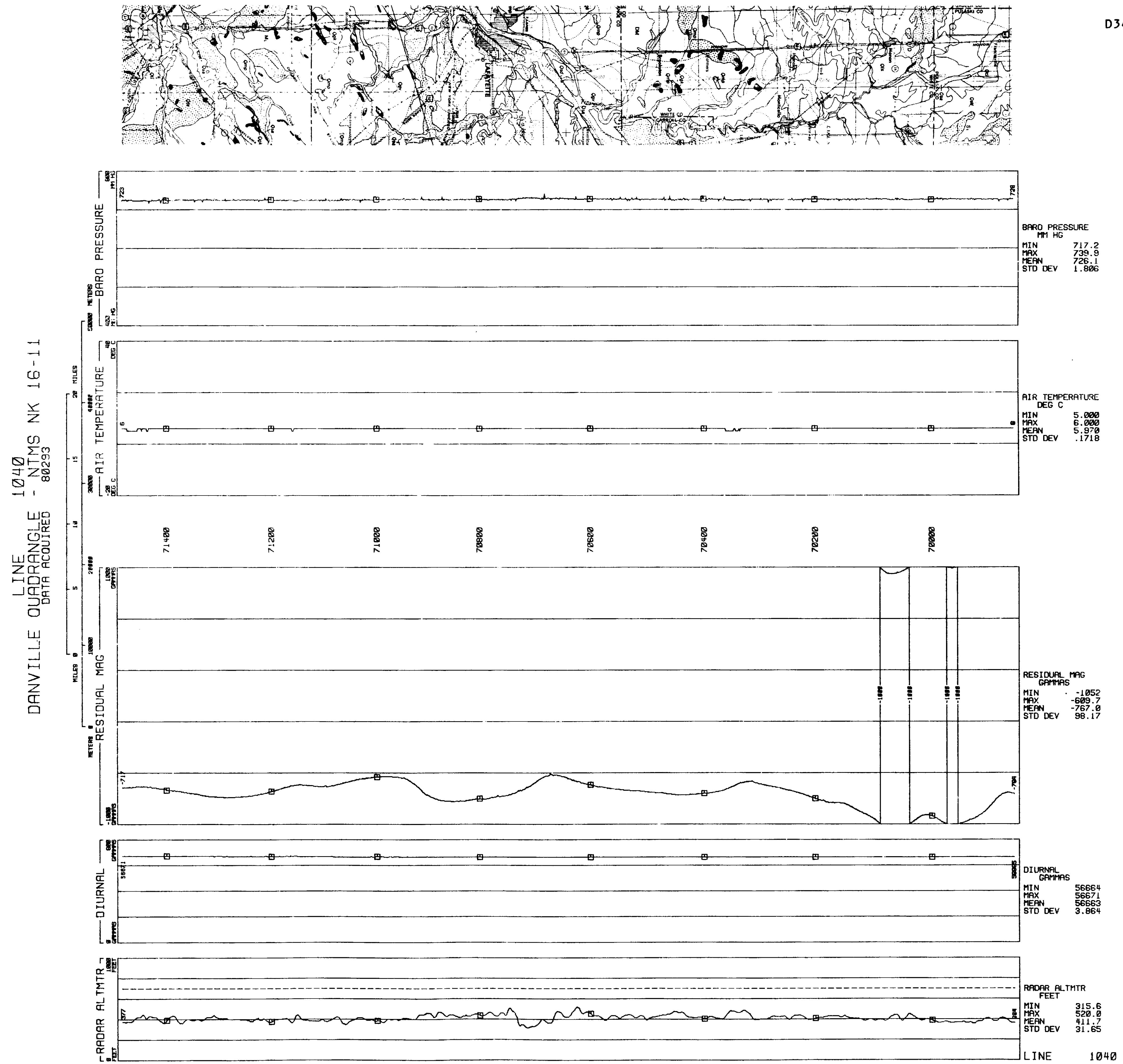
AIR TEMPERATURE
DEG C
MIN 6.000
MAX 6.000
MEAN 6.000
STD DEV .0000

RESIDUAL MAG
GAMMAS
MIN -823.4
MAX -403.8
MEAN -635.5
STD DEV 97.88

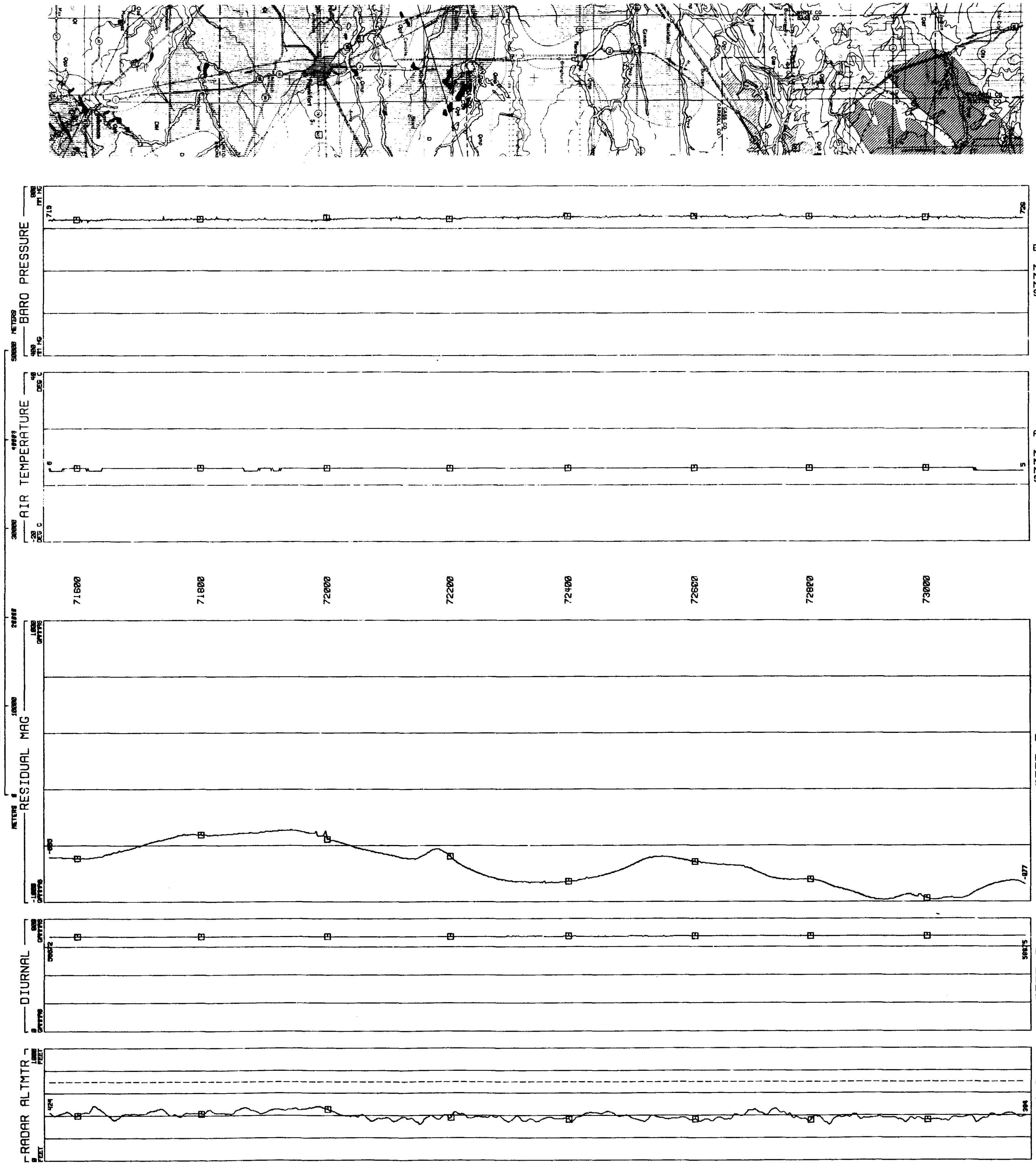
DIURNAL
GAMMAS
MIN 56664
MAX 56670
MEAN 56663
STD DEV 3.962

RADAR ALTMTR
FEET
MIN 346.5
MAX 556.8
MEAN 416.5
STD DEV 33.77

LINE 1030


LINE 1040
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
71400
71200
71000
70800
70600
70400
70200
70000
BARO PRESSURE MM HG
MIN 717.2
MAX 739.9
MEAN 726.1
STD DEV 1.806
AIR TEMPERATURE DEG C
MIN 5.000
MAX 6.000
MEAN 5.970
STD DEV .1718
RESIDUAL MAG GAMMAS
MIN -1052
MAX -609.7
MEAN -767.0
STD DEV 98.17
DIURNAL GAMMAS
MIN 56664
MAX 56671
MEAN 56663
STD DEV 3.864
RADAR ALTMTR FEET
MIN 315.6
MAX 520.0
MEAN 411.7
STD DEV 31.65
LINE 1040

LINE 1050
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293



BARO PRESSURE
MM HG
MIN 713.5
MAX 736.1
MEAN 724.2
STD DEV 2.932

AIR TEMPERATURE
DEG C
MIN 5.000
MAX 6.000
MEAN 5.898
STD DEV .3028

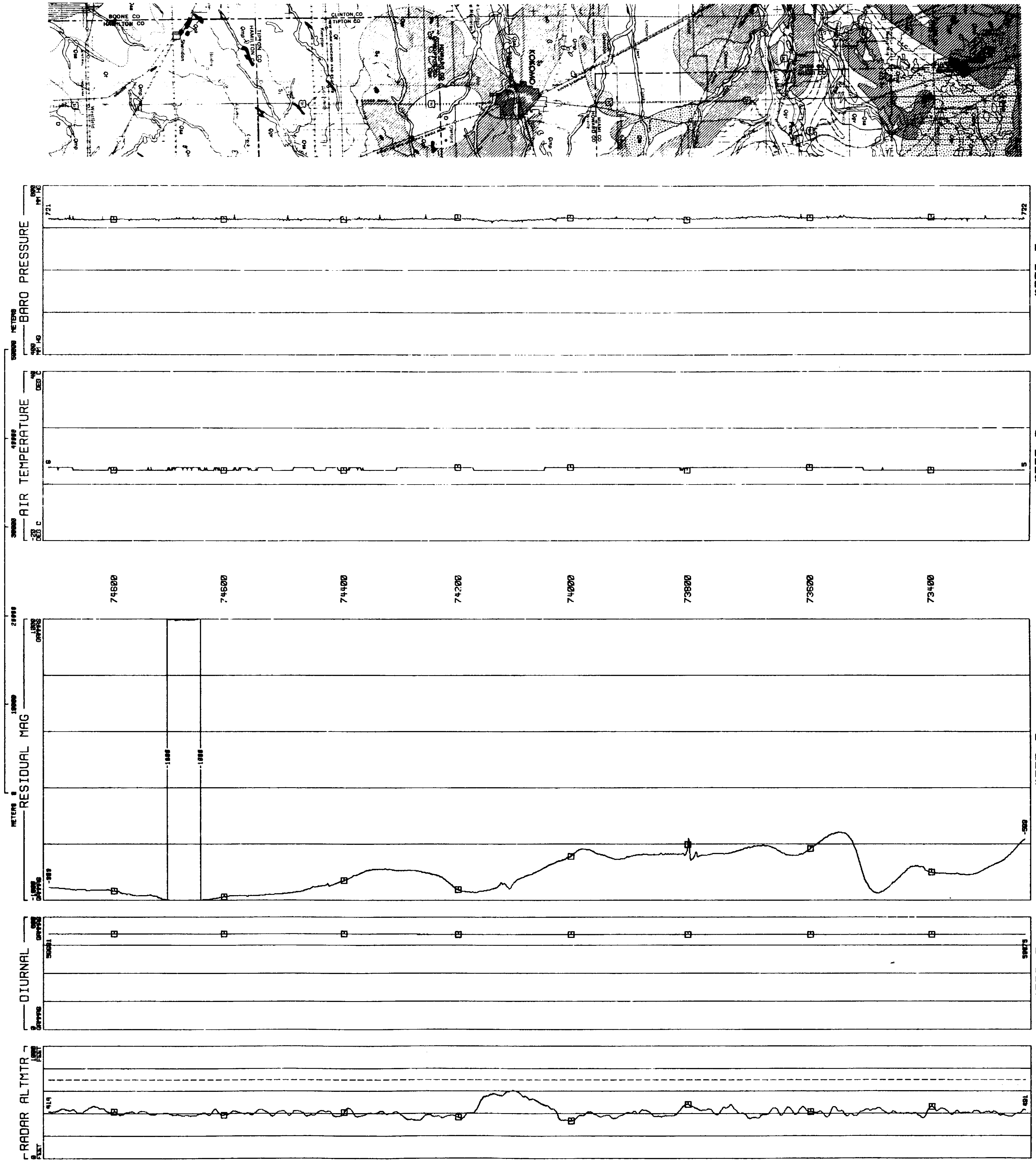
RESIDUAL MAG
GAMMAS
MIN -985.1
MAX -486.6
MEAN -742.1
STD DEV 146.9

DIURNAL
GAMMAS
MIN 56672
MAX 56676
MEAN 56672
STD DEV 2.176

RADAR ALTMTR
FEET
MIN 320.5
MAX 487.2
MEAN 396.8
STD DEV 32.89

LINE 1050

LINE 1060
DANVILLE QUADRANGLE - NTMS NK 16-11
DATA ACQUIRED 80293



BARO PRESSURE
MM HG
MIN 712.5
MAX 731.7
MEAN 721.8
STD DEV 2.180

AIR TEMPERATURE
DEG C
MIN 5.000
MAX 6.000
MEAN 5.533
STD DEV .4989

RESIDUAL MAG
GAMMAS
MIN -1000
MAX -515.8
MEAN -808.0
STD DEV 131.3

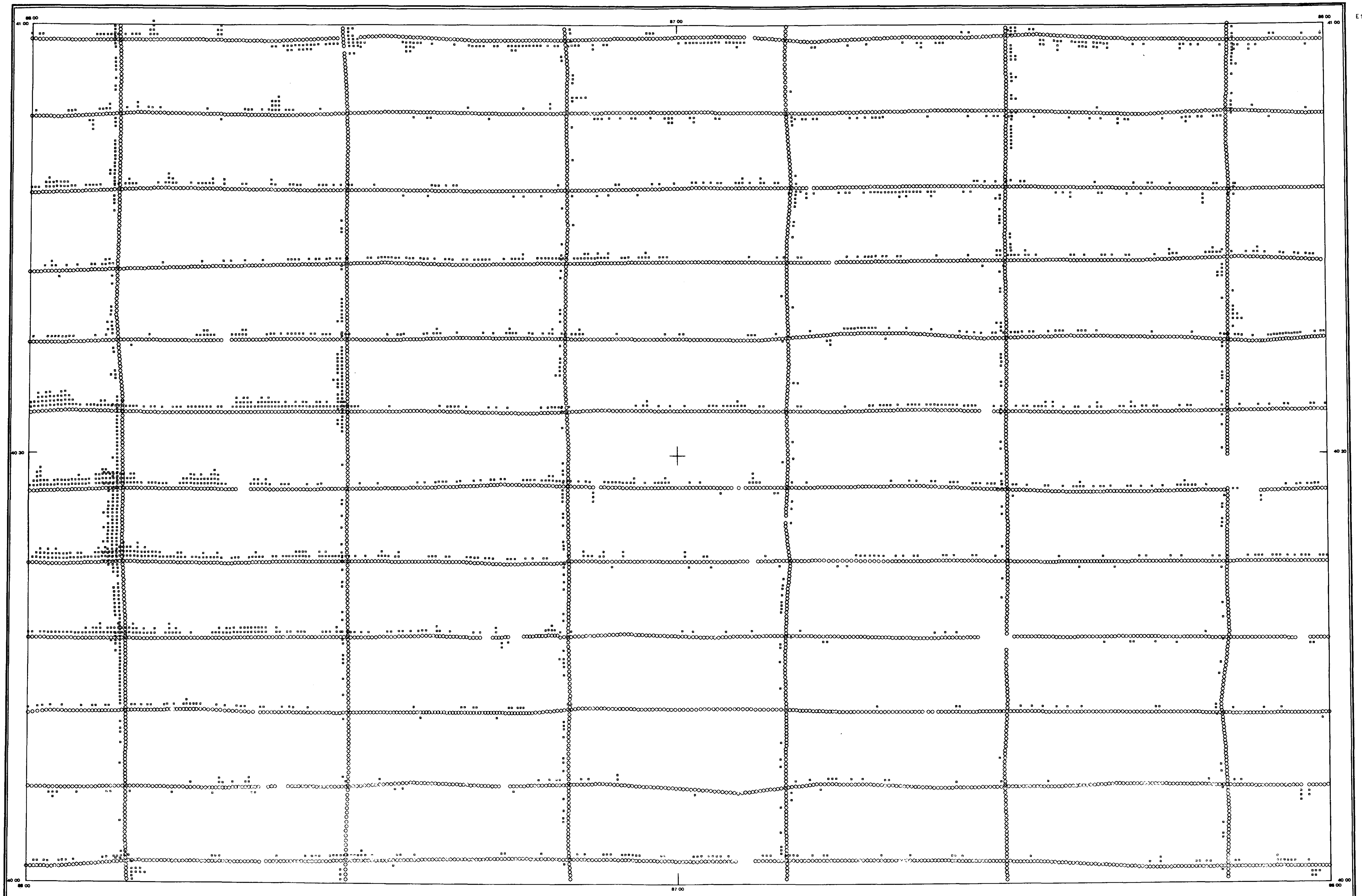
DIURNAL
GAMMAS
MIN 56675
MAX 56681
MEAN 56674
STD DEV 3.967

RADAR ALTMTR
FEET
MIN 334.5
MAX 603.6
MEAN 414.6
STD DEV 47.18

LINE 1060

APPENDIX E - Standard Deviation Maps

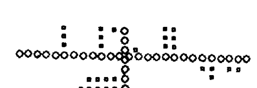
DANVILLE



SCALE 1:500,000

MILES 5 0 5 10 15 MILES

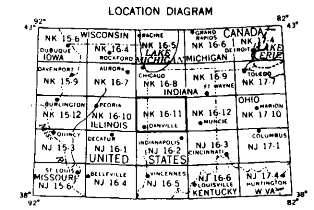
KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES



○ - 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



POTASSIUM STANDARD DEVIATION MAP

GREAT LAKES PROJECT

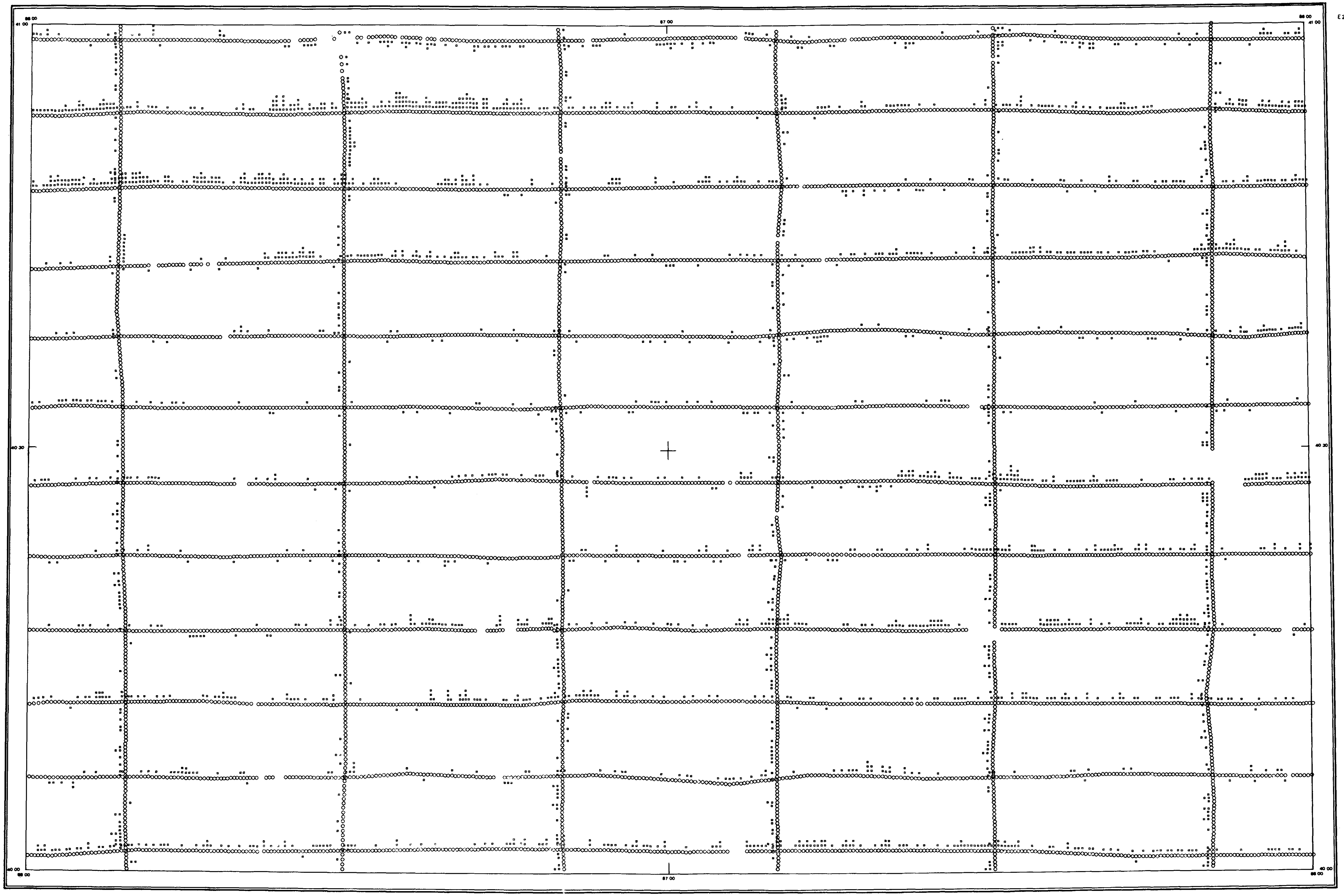
U. S. DEPARTMENT OF ENERGY

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

DANVILLE

E2 d8



SCALE 1:500,000

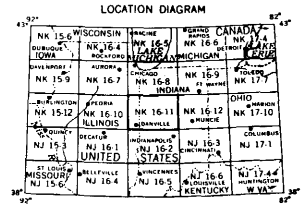
SURVEY AND COMPILATION BY:

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

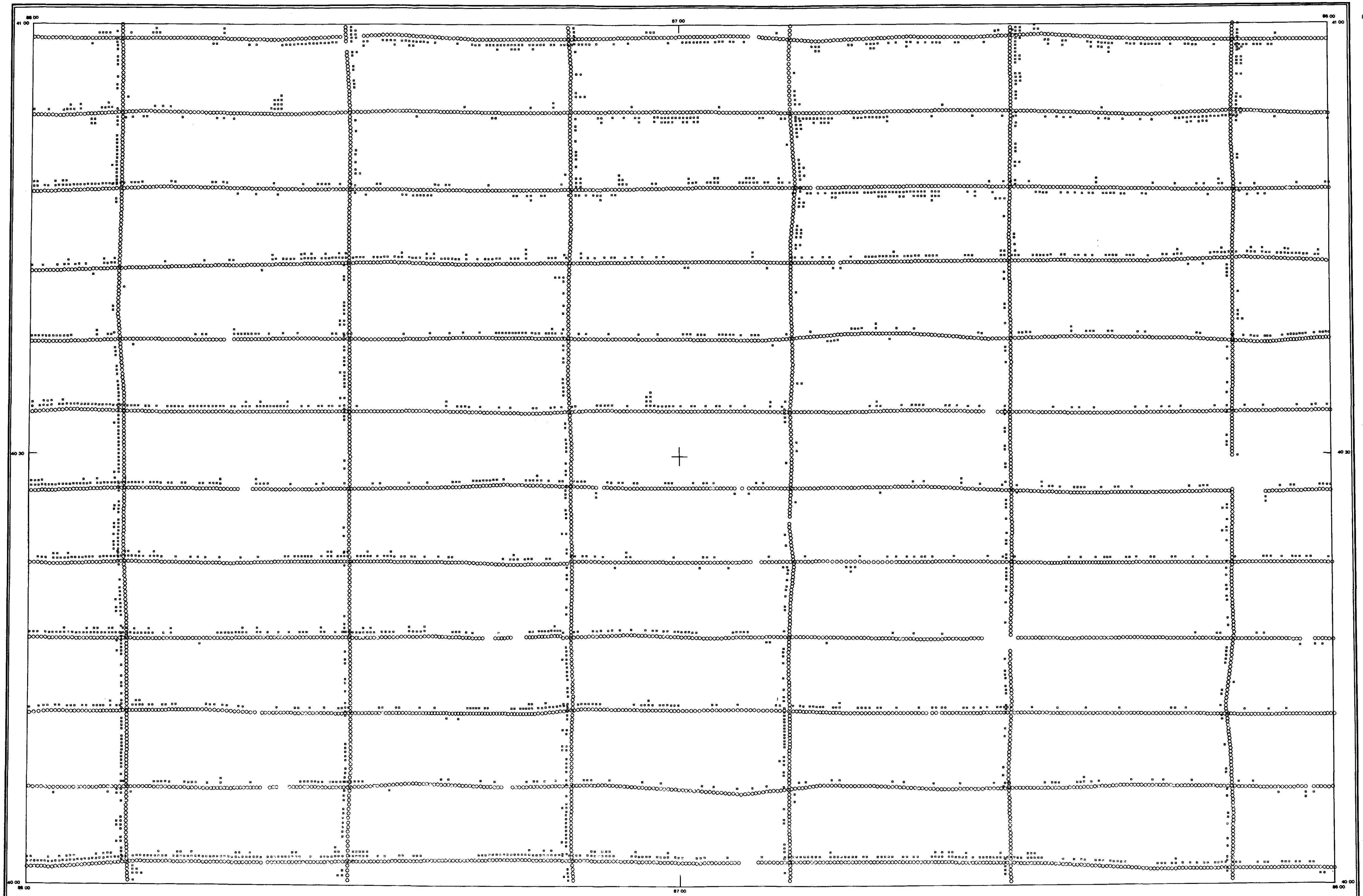


URANIUM STANDARD DEVIATION MAP

GREAT LAKES PROJECT

U. S. DEPARTMENT OF ENERGY

DANVILLE



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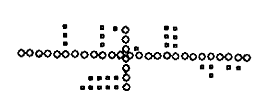
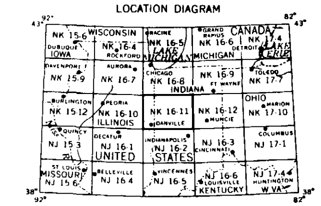


○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

GREAT LAKES PROJECT

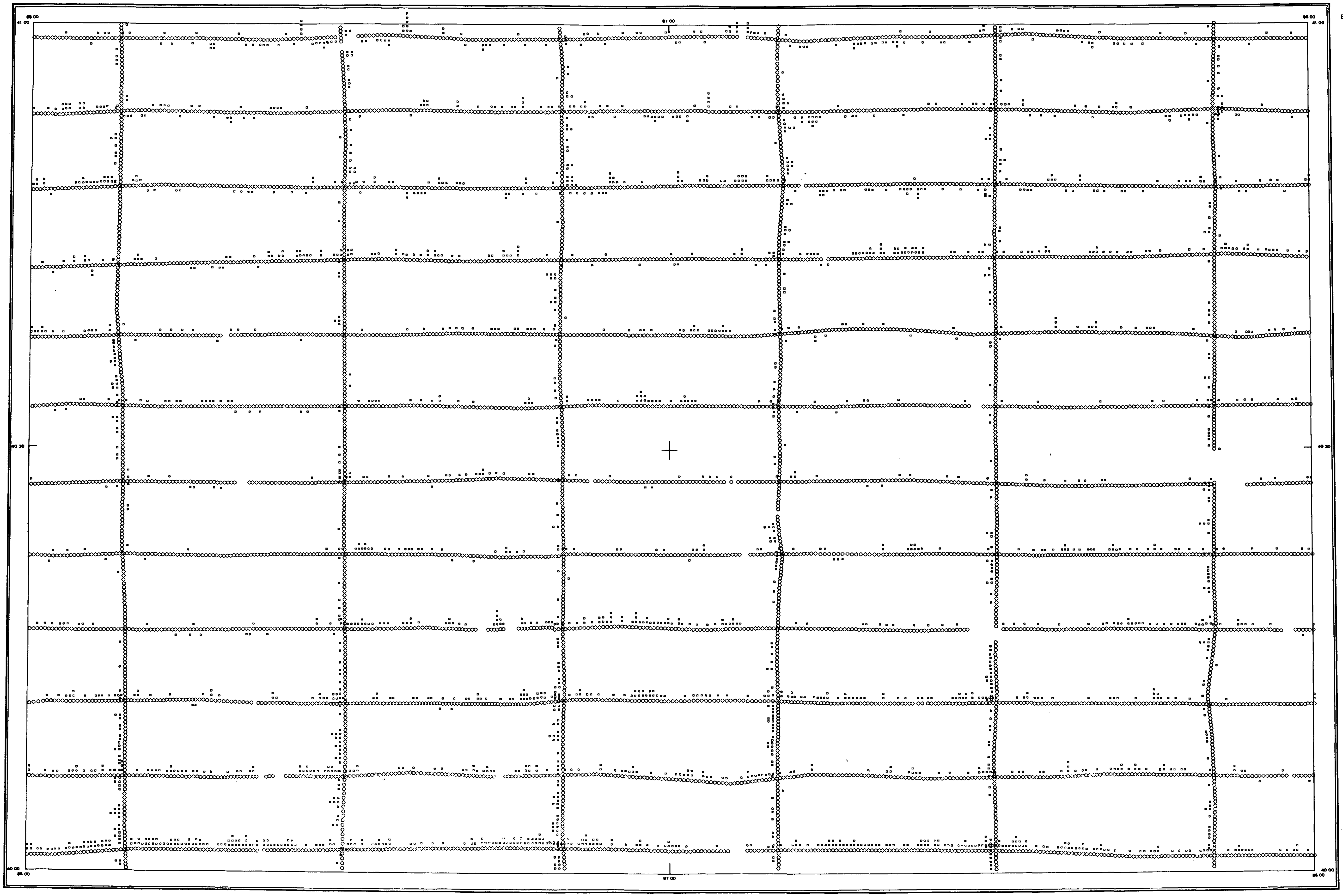
U. S. DEPARTMENT OF ENERGY

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

DANVILLE

E4da



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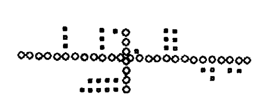

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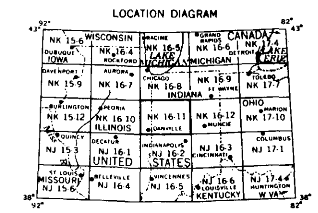
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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:

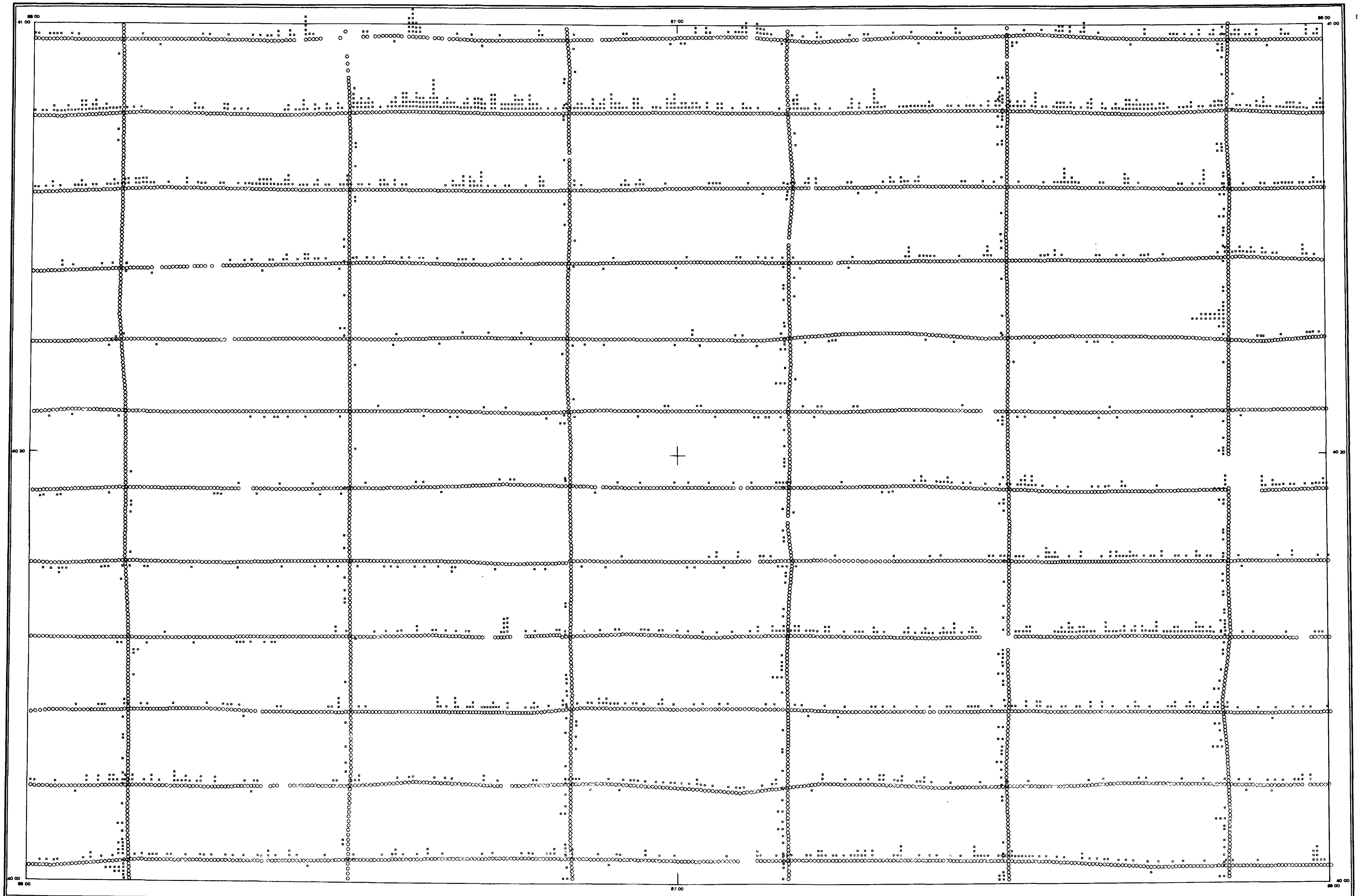
EG&G GEOMETRICS

THORIUM/POTASSIUM STANDARD DEVIATION MAP

GREAT LAKES PROJECT

U. S. DEPARTMENT OF ENERGY

DANVILLE



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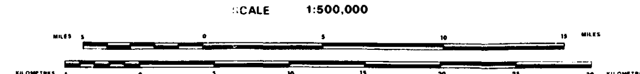
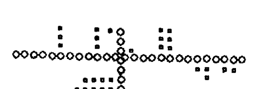
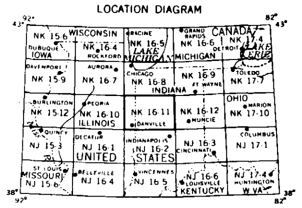




○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

GREAT LAKES PROJECT

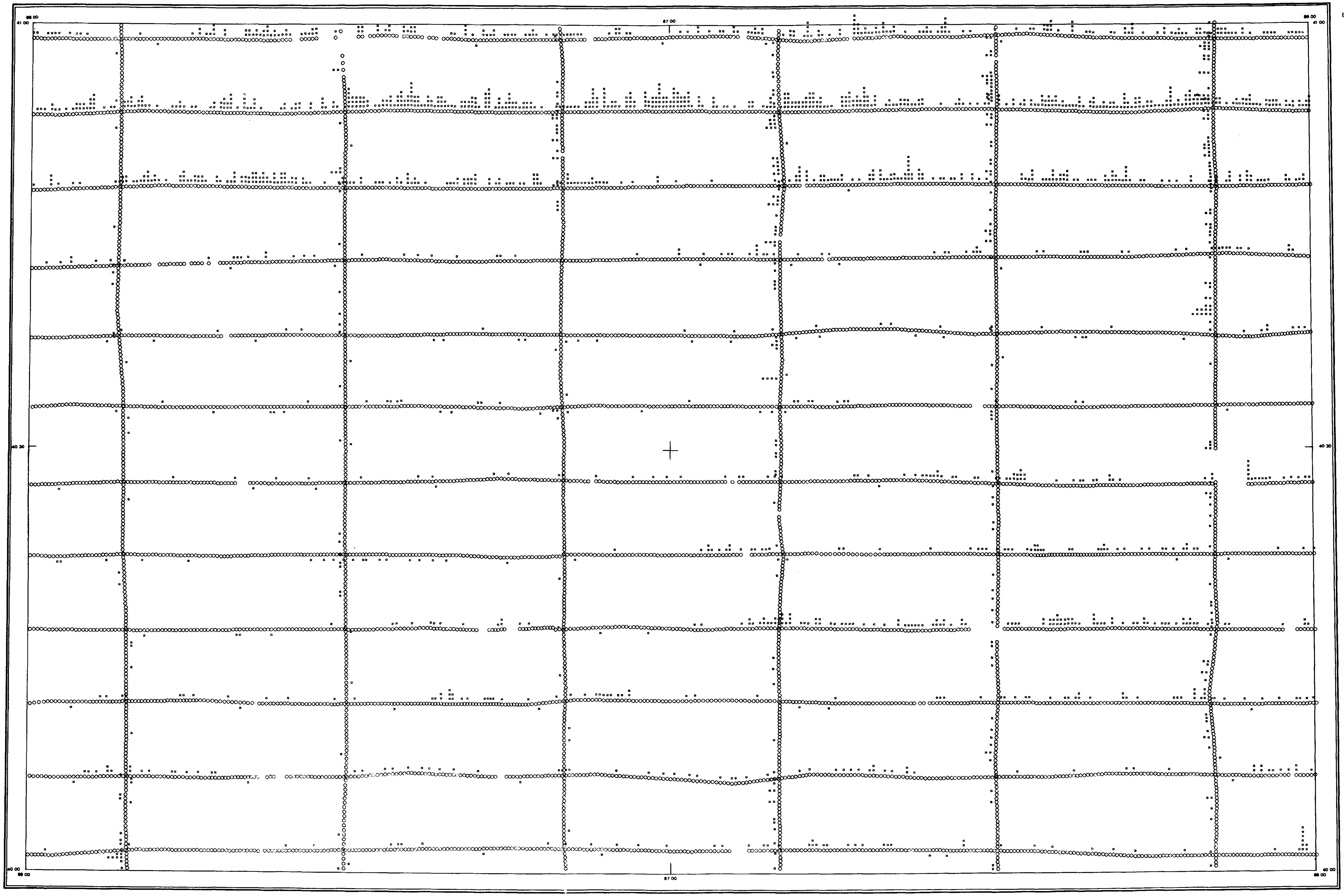
U. S. DEPARTMENT OF ENERGY

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

DANVILLE

E6da



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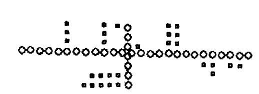
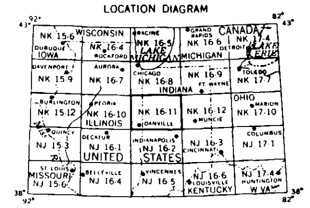
KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES



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



URANIUM/THORIUM STANDARD DEVIATION MAP

GREAT LAKES PROJECT

U. S. DEPARTMENT OF ENERGY

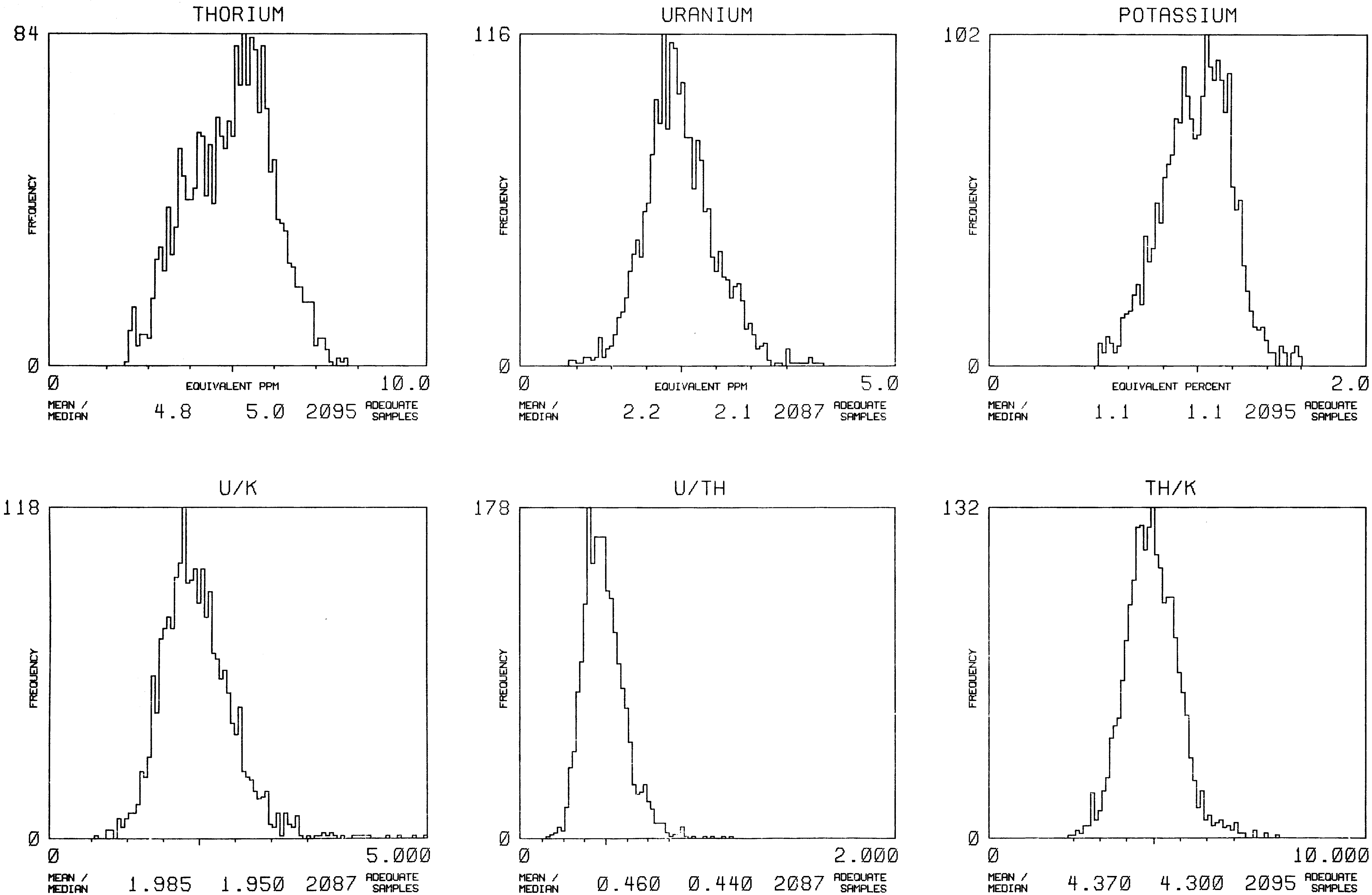
SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

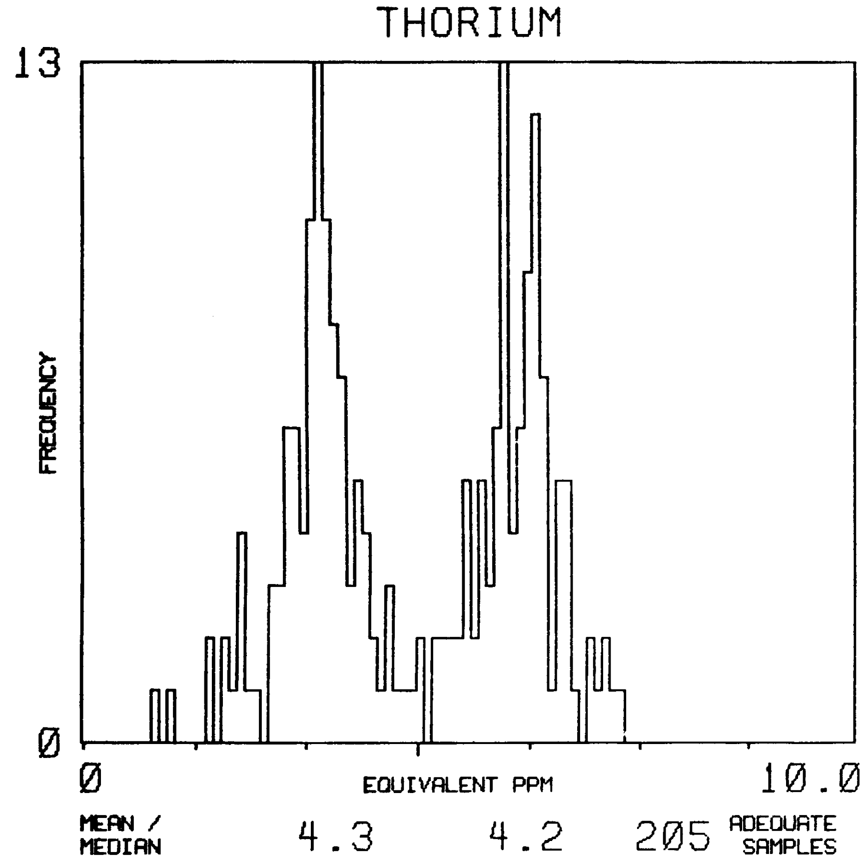
N

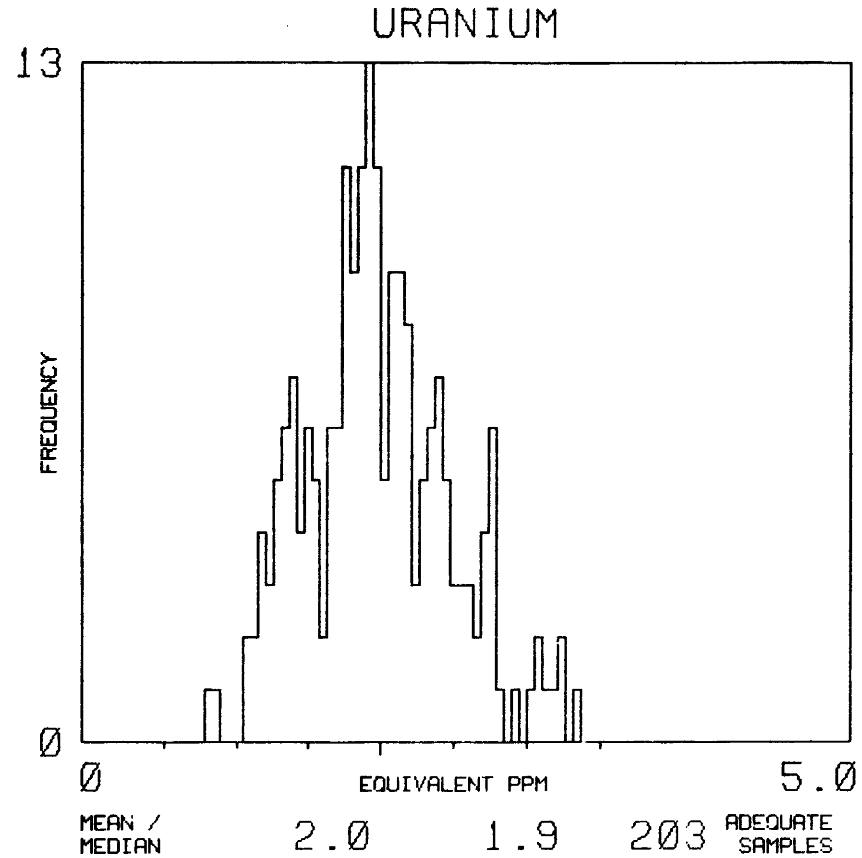
APPENDIX F - Histograms and Map Unit Conversion Table

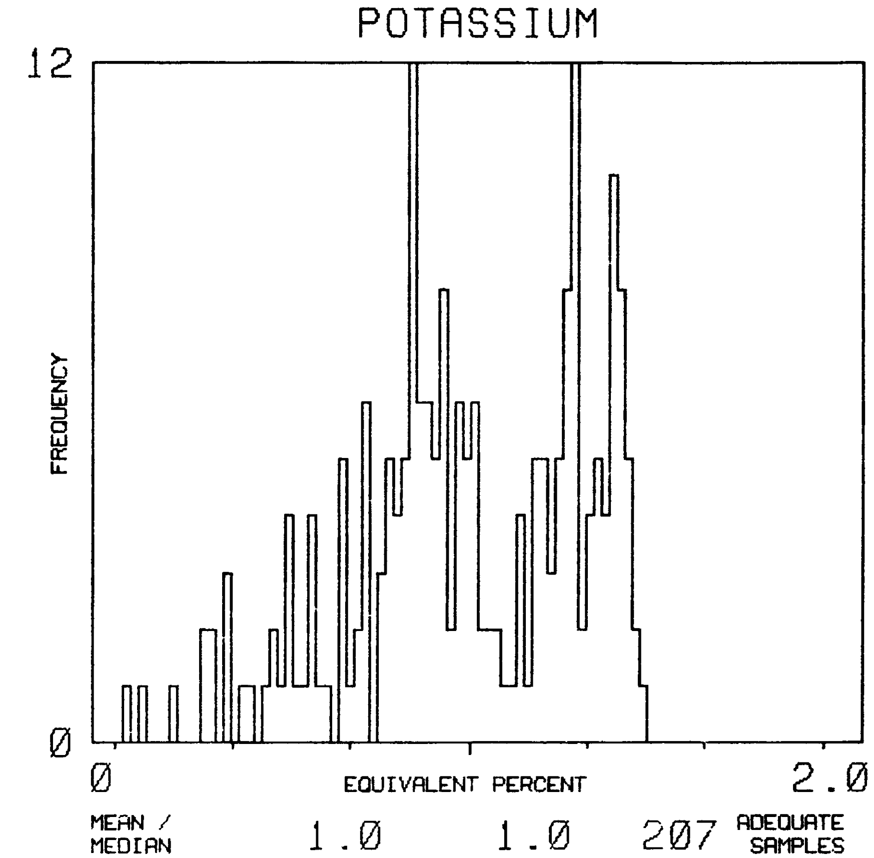
NK 16-11 DANVILLE MAP UNIT : QSA TOTAL NUMBER OF SAMPLES 2095 F1da

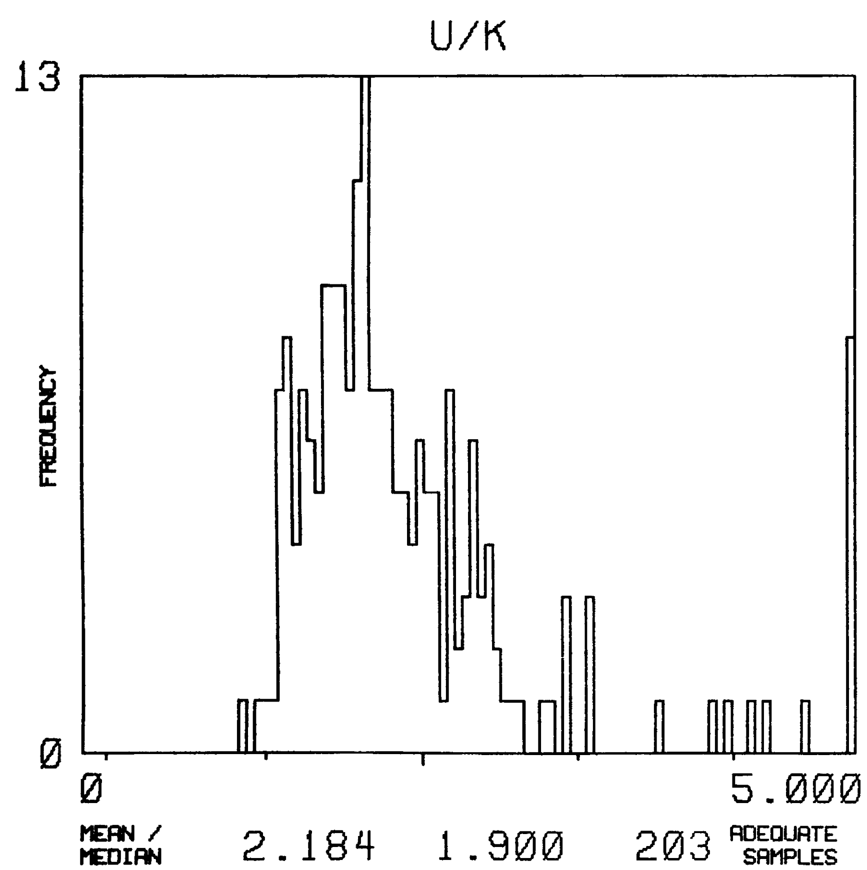


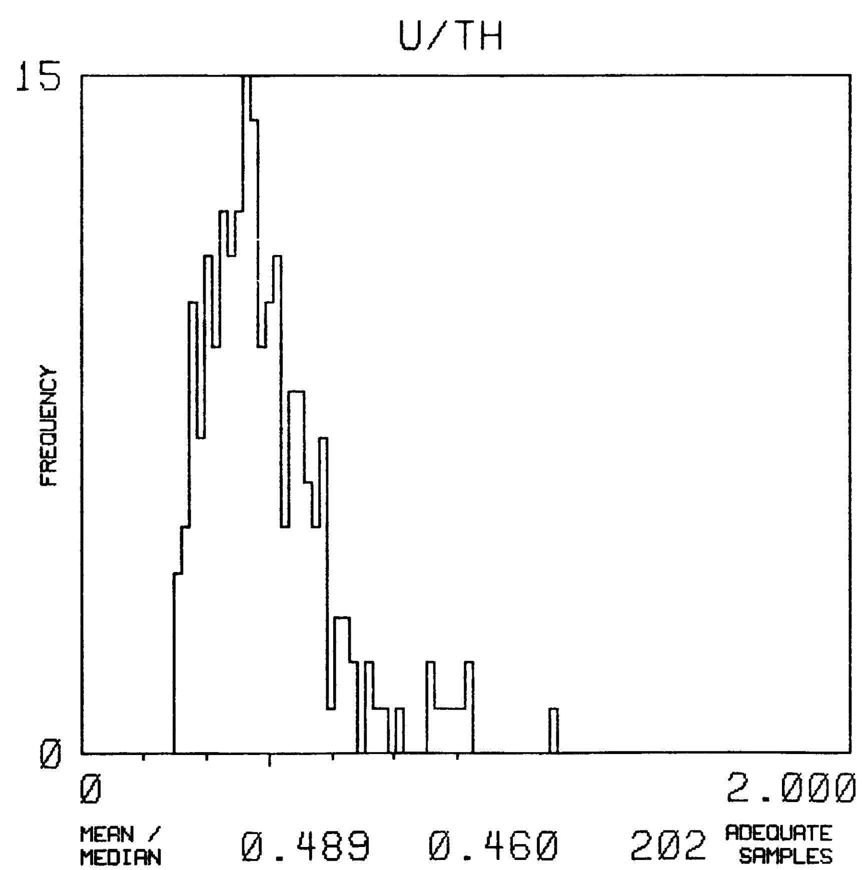
NK 16-11 DANVILLE MAP UNIT : QMP TOTAL NUMBER OF SAMPLES 21Ø F2da

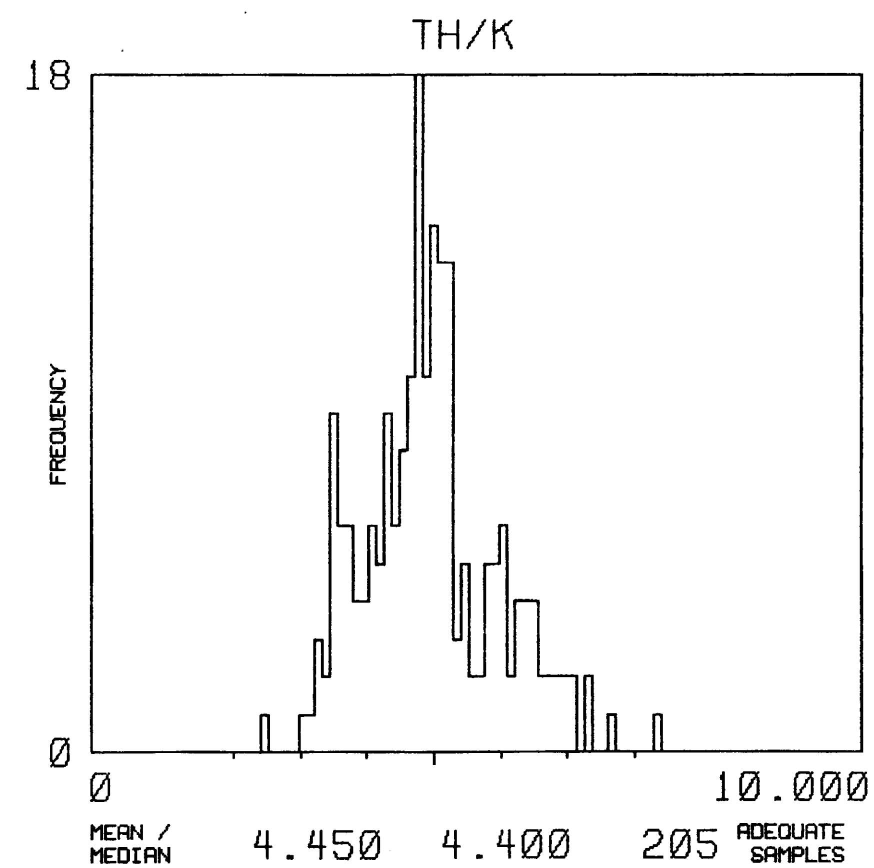






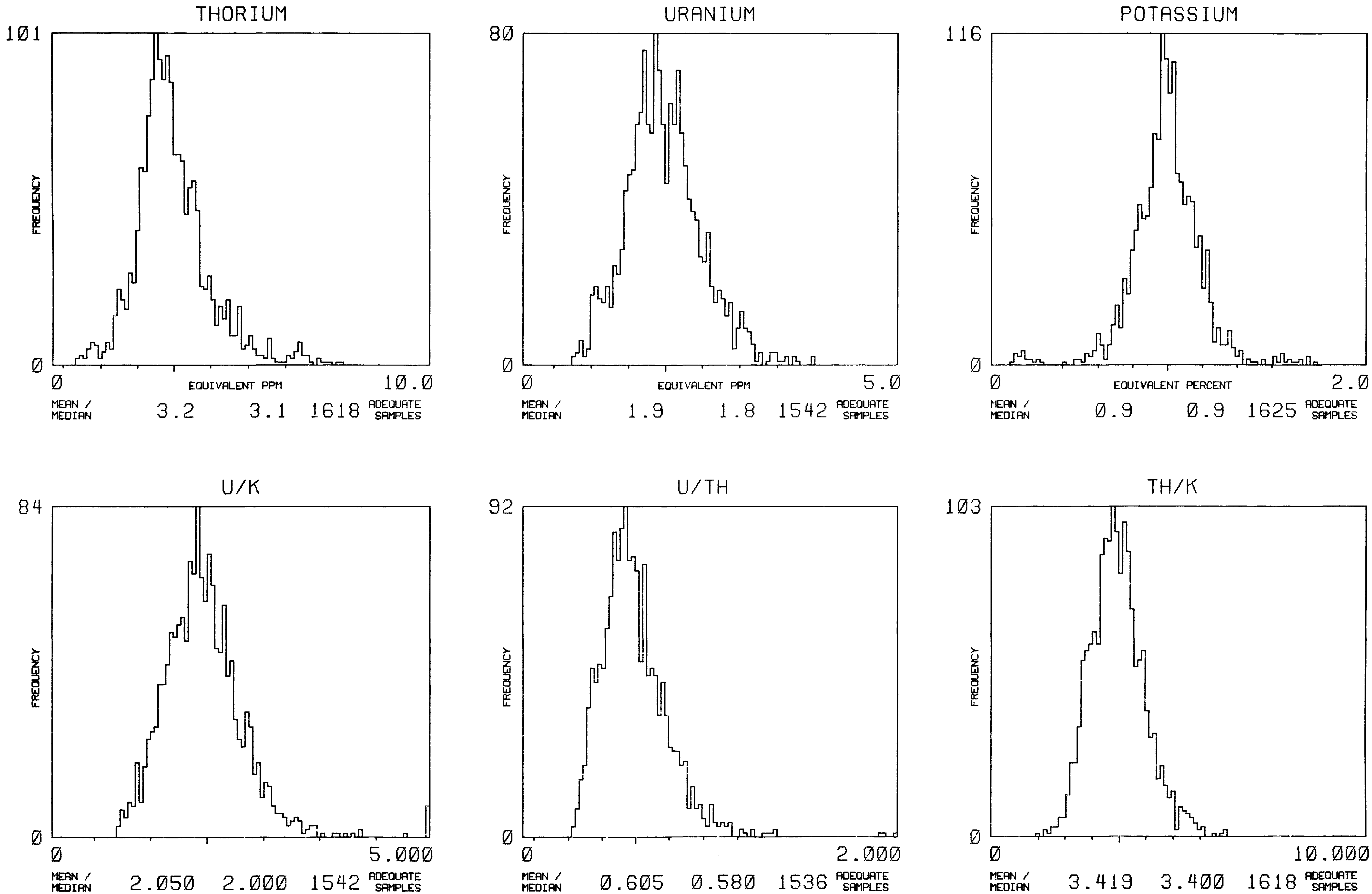






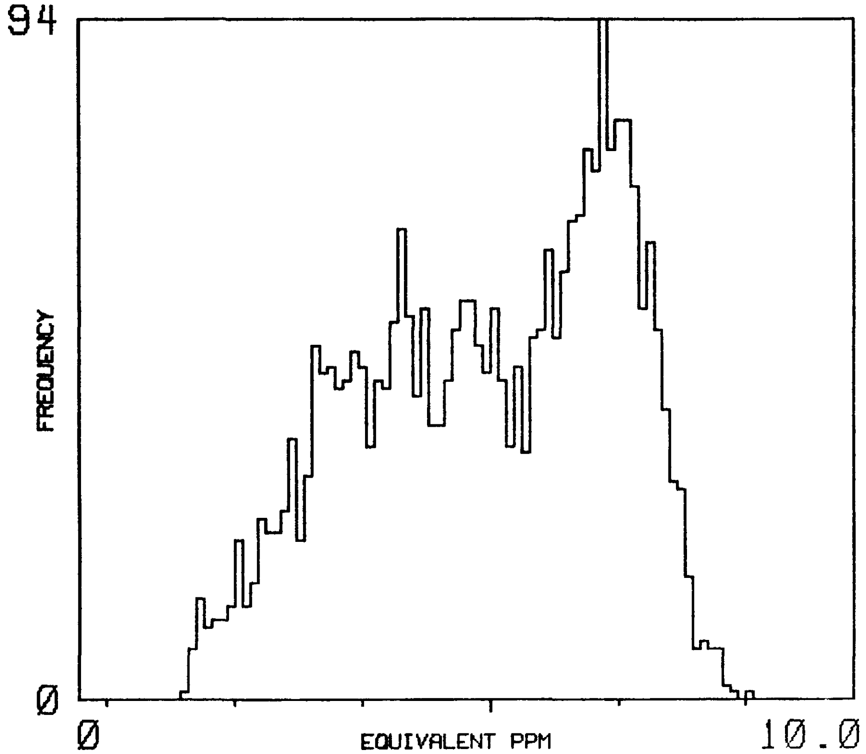
NK 16-11 DANVILLE MAP UNIT : QSD TOTAL NUMBER OF SAMPLES 1630

F3 da



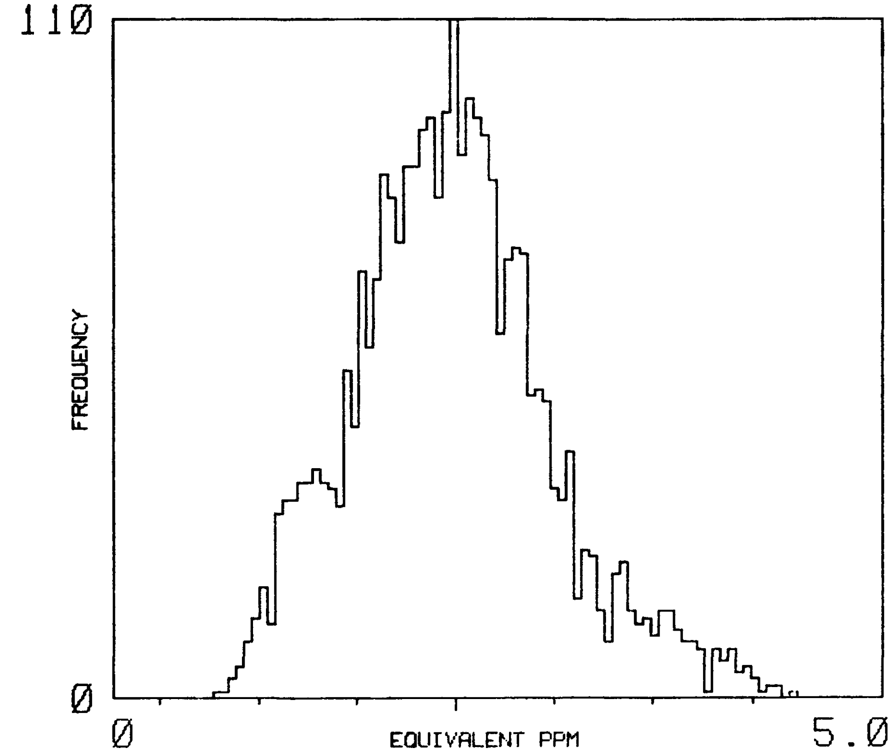
NK 16-11 DANVILLE MAP UNIT : QCL TOTAL NUMBER OF SAMPLES 2873 F4da

THORIUM



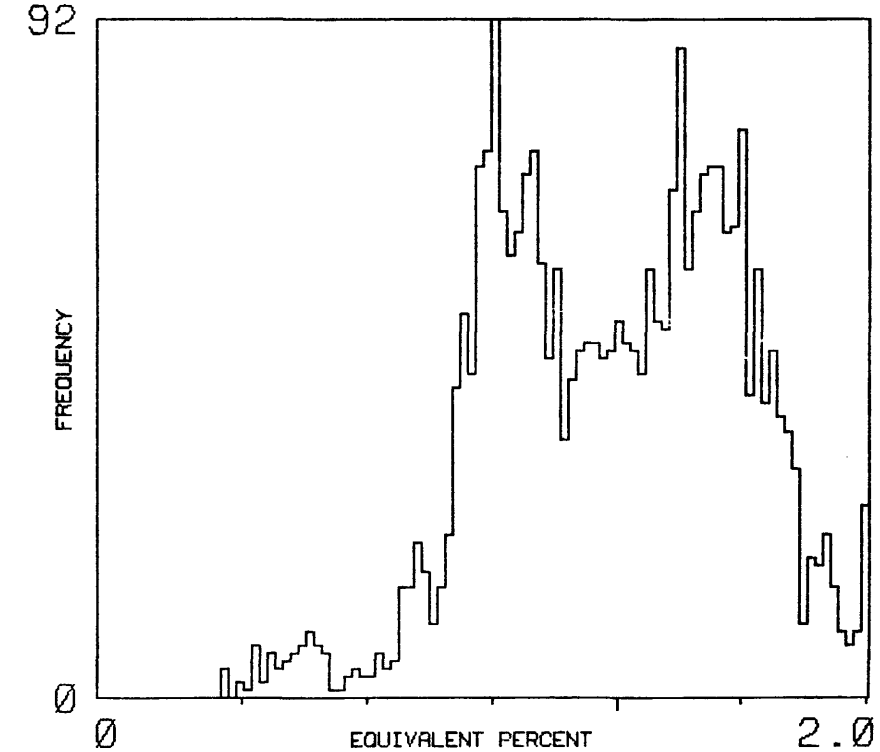
MEAN / MEDIAN 5.3 5.4 2873 ADEQUATE SAMPLES

URANIUM



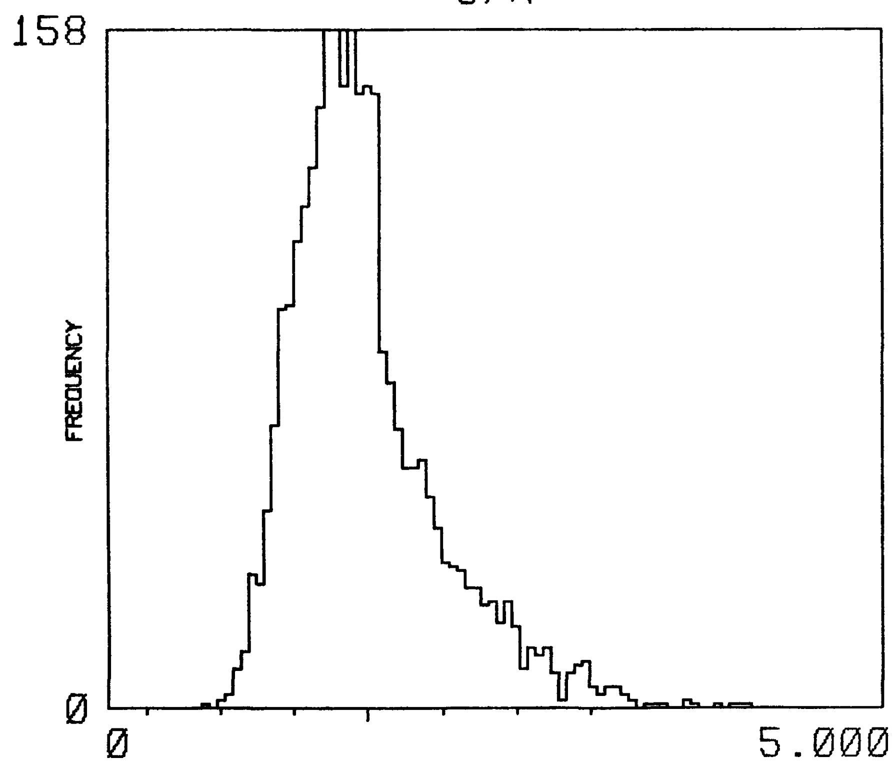
MEAN / MEDIAN 2.2 2.2 2803 ADEQUATE SAMPLES

POTASSIUM



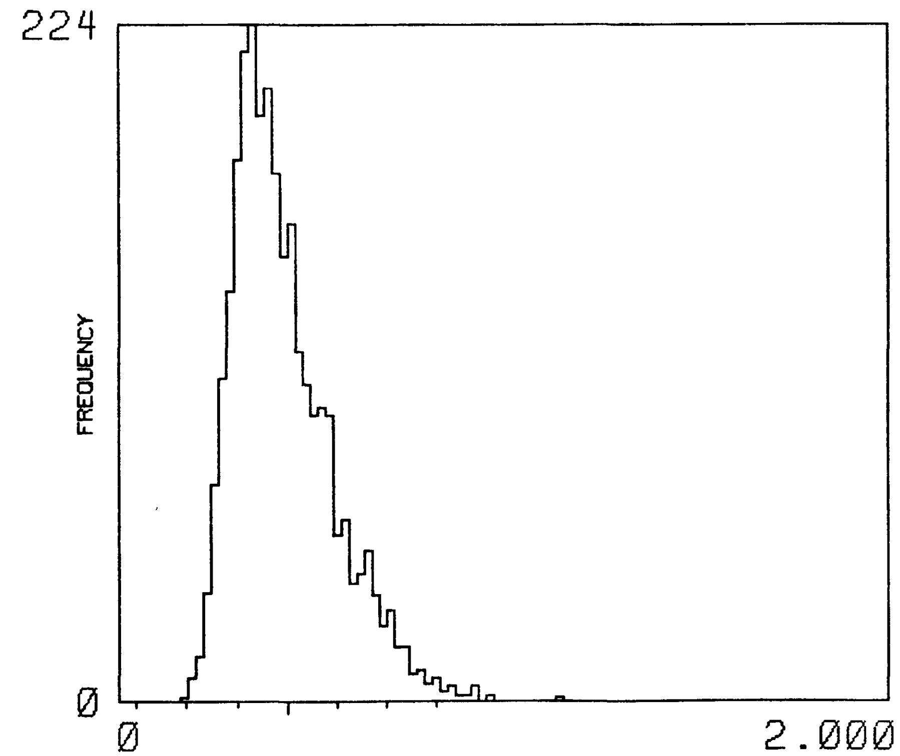
MEAN / MEDIAN 1.3 1.4 2873 ADEQUATE SAMPLES

U/K



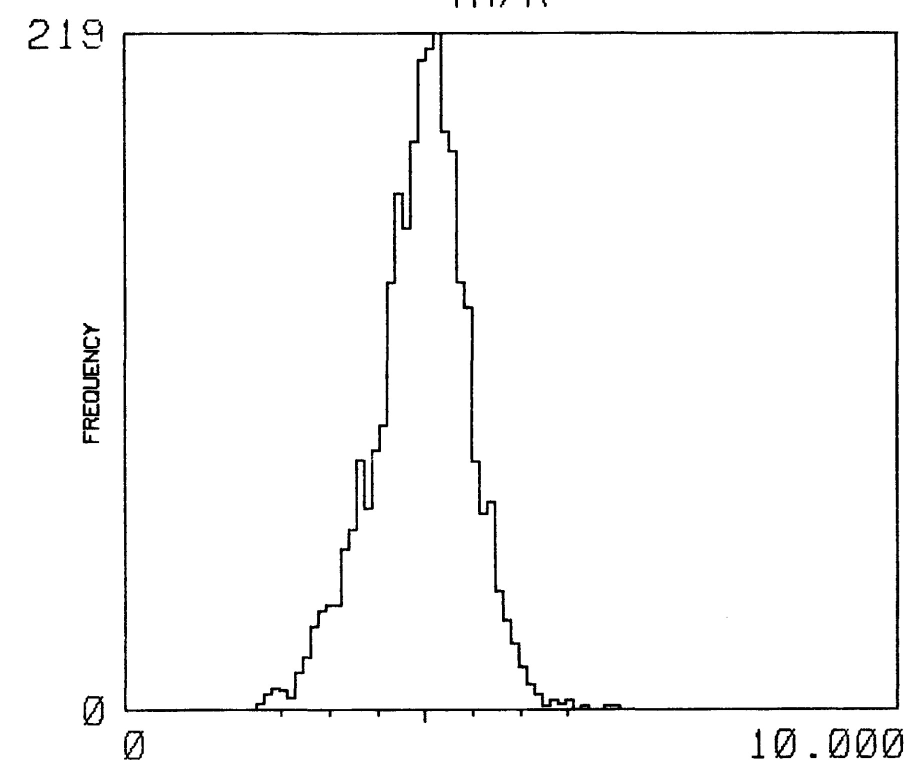
MEAN / MEDIAN 1.680 1.600 2803 ADEQUATE SAMPLES

U/TH



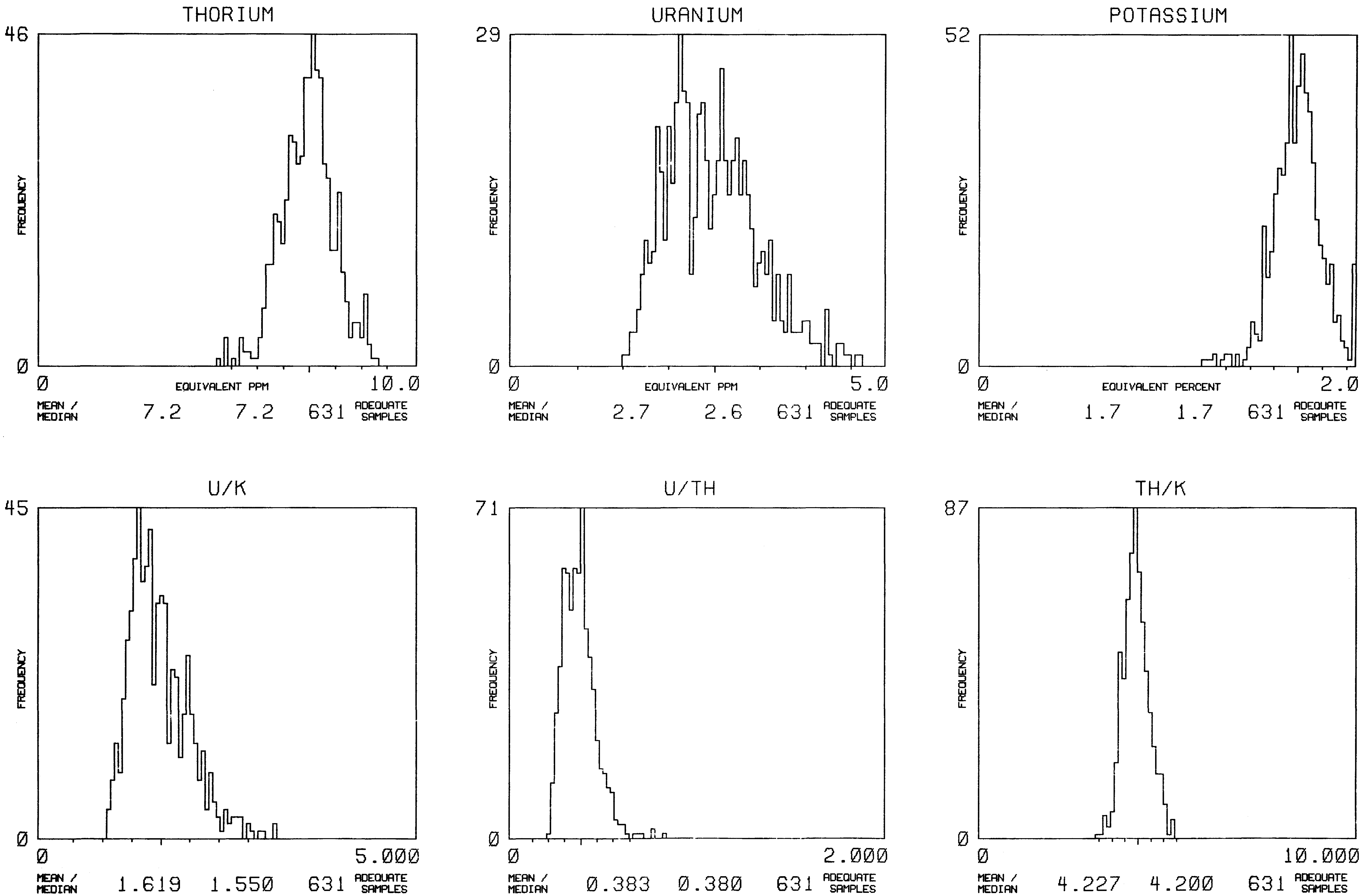
MEAN / MEDIAN 0.439 0.420 2803 ADEQUATE SAMPLES

TH/K



MEAN / MEDIAN 3.882 3.900 2873 ADEQUATE SAMPLES

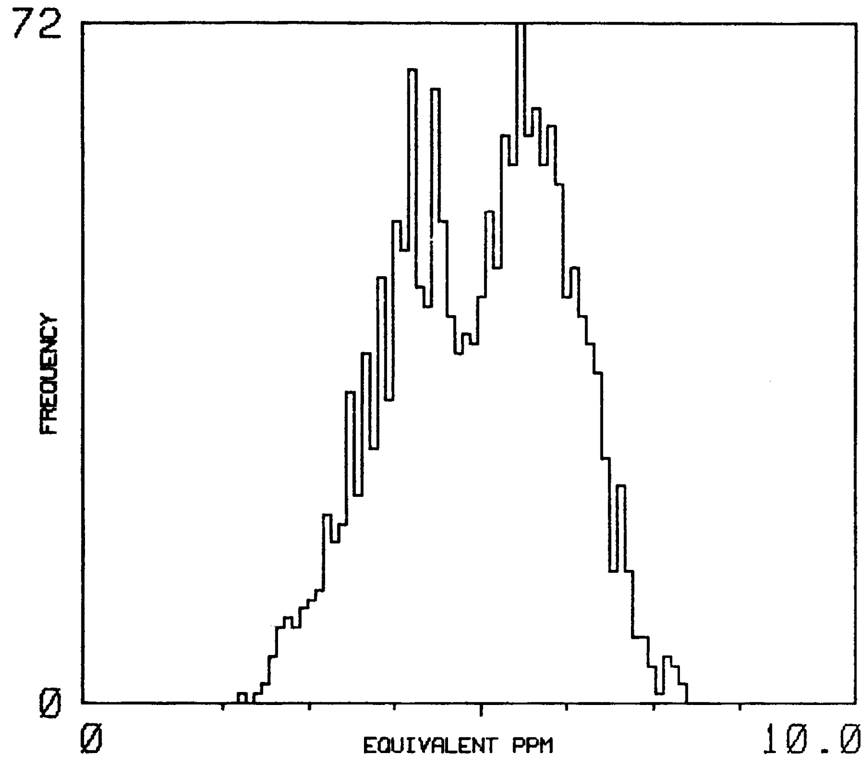
NK 16-11 DANVILLE MAP UNIT : QLE TOTAL NUMBER OF SAMPLES 631 F5da



NK 16-11 DANVILLE

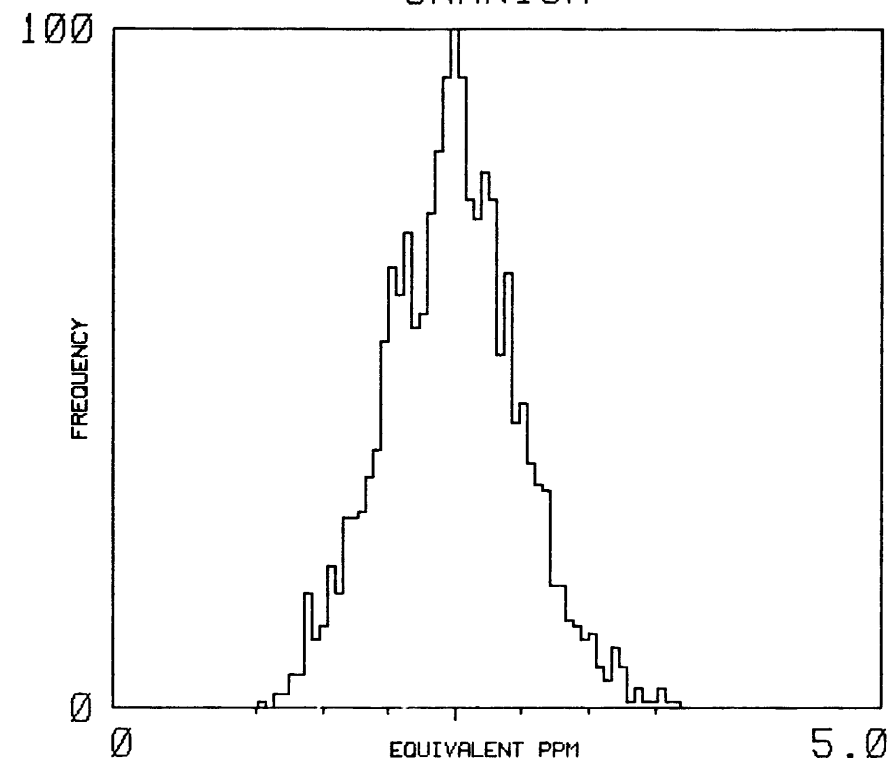
MAP UNIT : QGV TOTAL NUMBER OF SAMPLES 1778

THORIUM



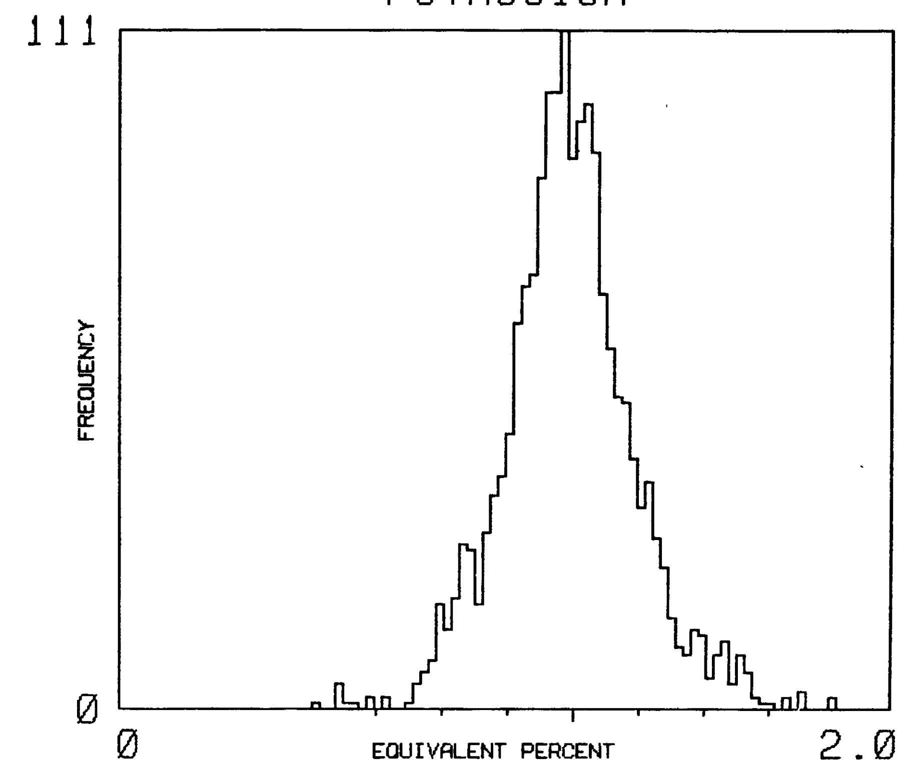
MEAN / MEDIAN 5.1 5.3 1778 ADEQUATE SAMPLES

URANIUM



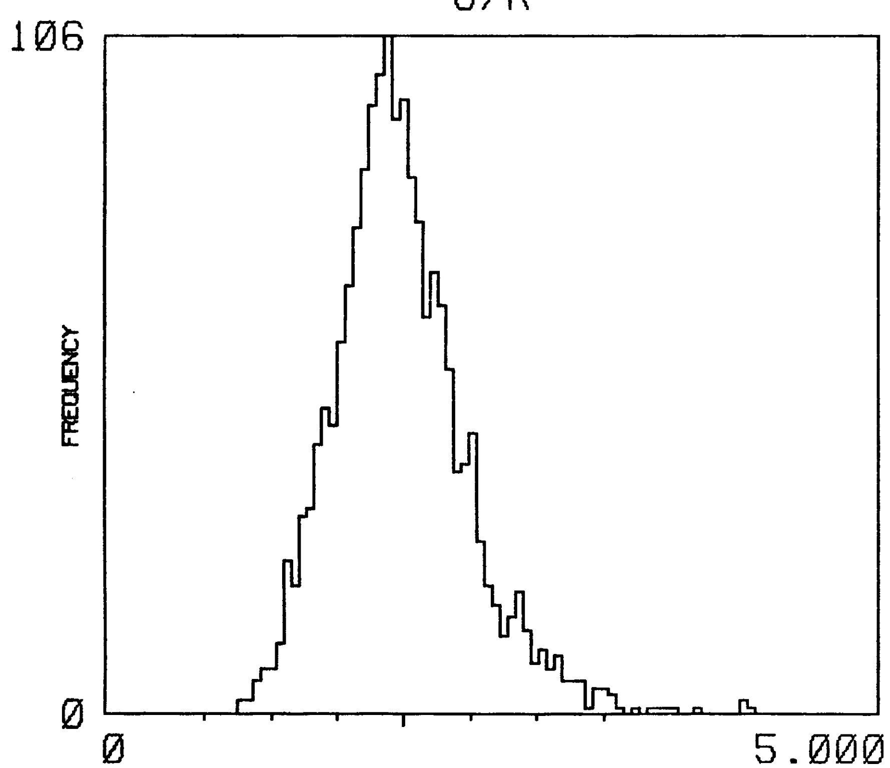
MEAN / MEDIAN 2.2 2.2 1777 ADEQUATE SAMPLES

POTASSIUM



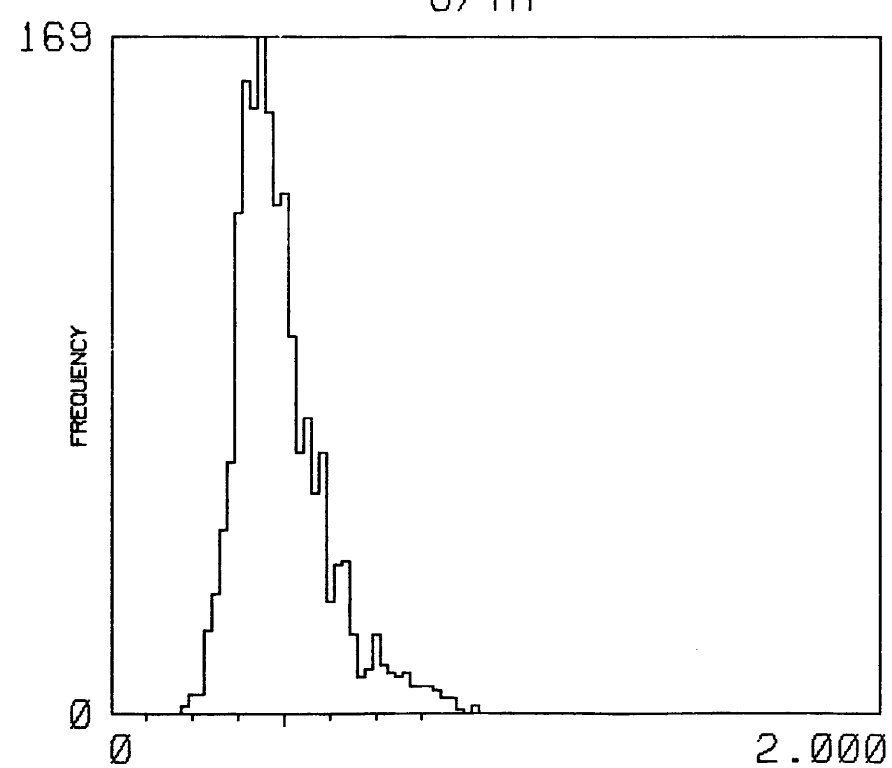
MEAN / MEDIAN 1.2 1.2 1778 ADEQUATE SAMPLES

U/K



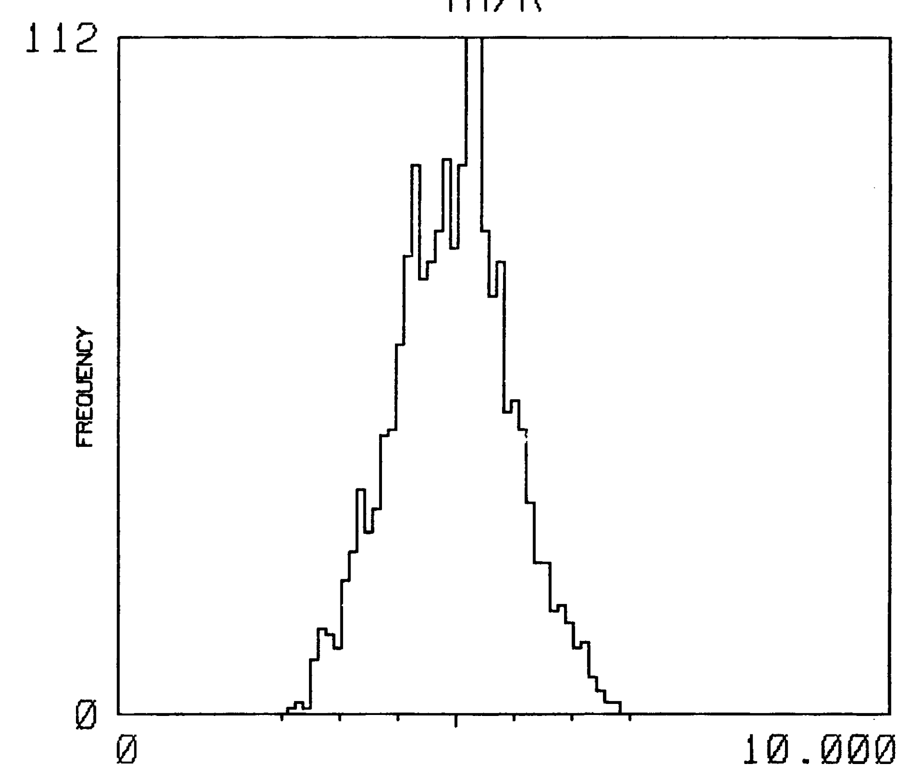
MEAN / MEDIAN 1.931 1.900 1777 ADEQUATE SAMPLES

U/TH



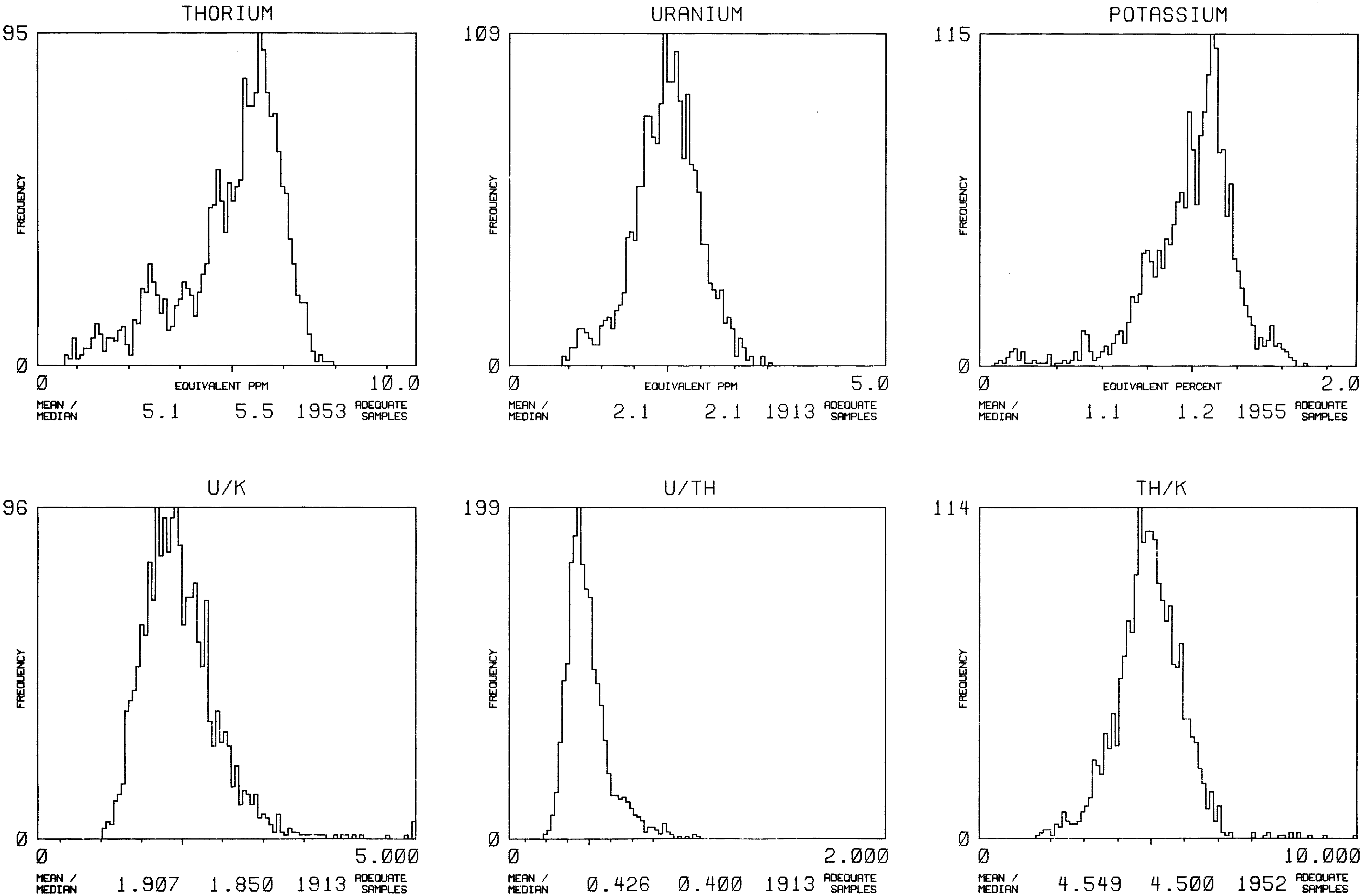
MEAN / MEDIAN 0.451 0.420 1777 ADEQUATE SAMPLES

TH/K

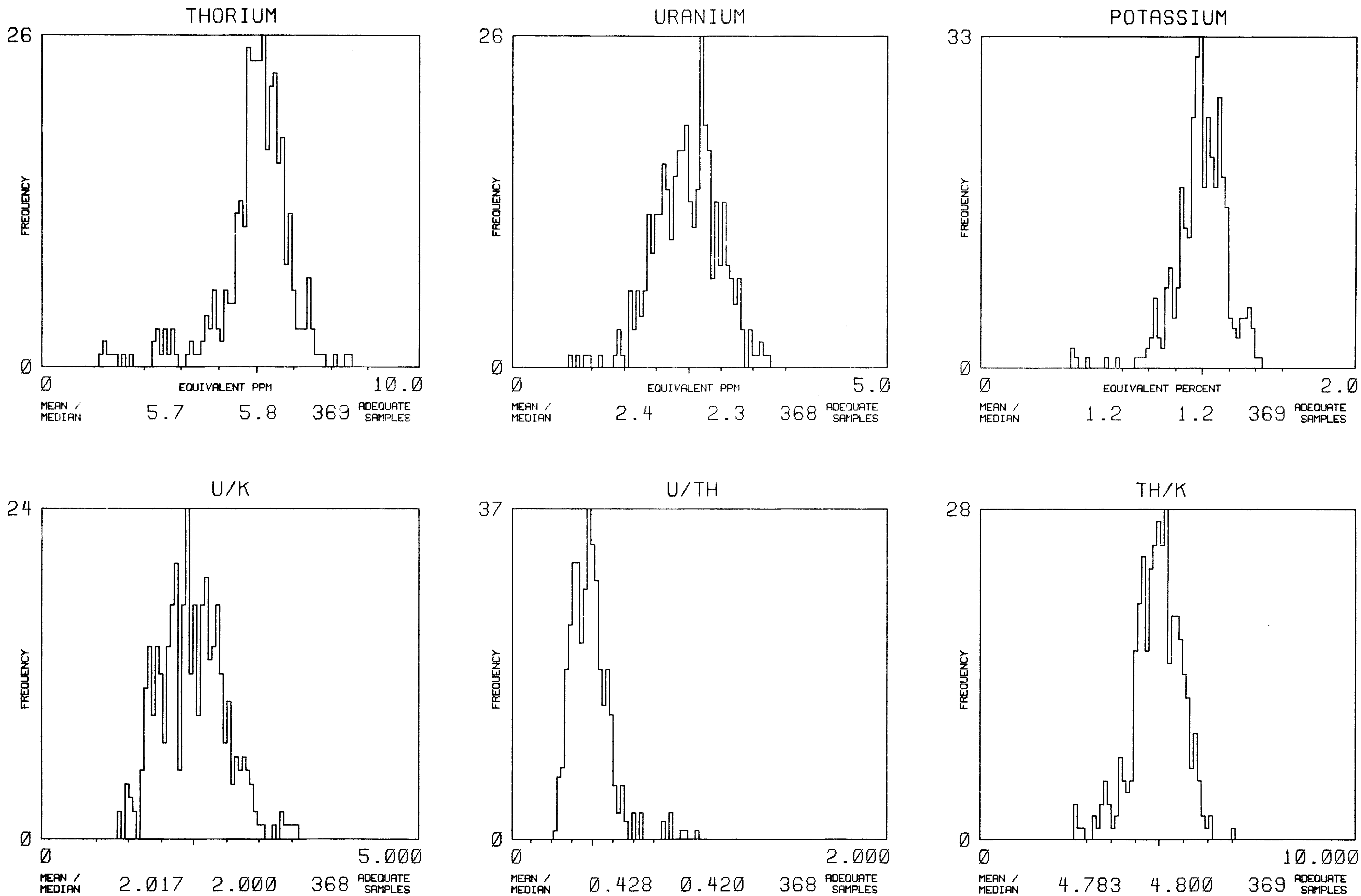


MEAN / MEDIAN 4.382 4.400 1778 ADEQUATE SAMPLES

NK 16-11 DANVILLE MAP UNIT : QGP TOTAL NUMBER OF SAMPLES 1962 F7da



NK 16-11 DANVILLE MAP UNIT : QGK TOTAL NUMBER OF SAMPLES 369



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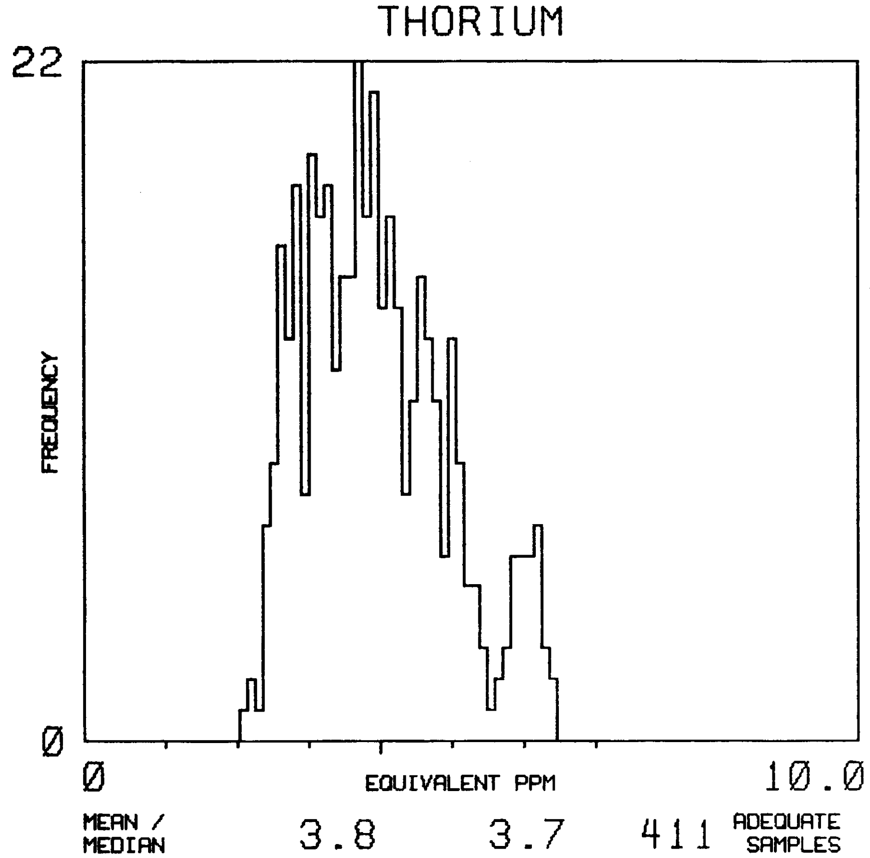
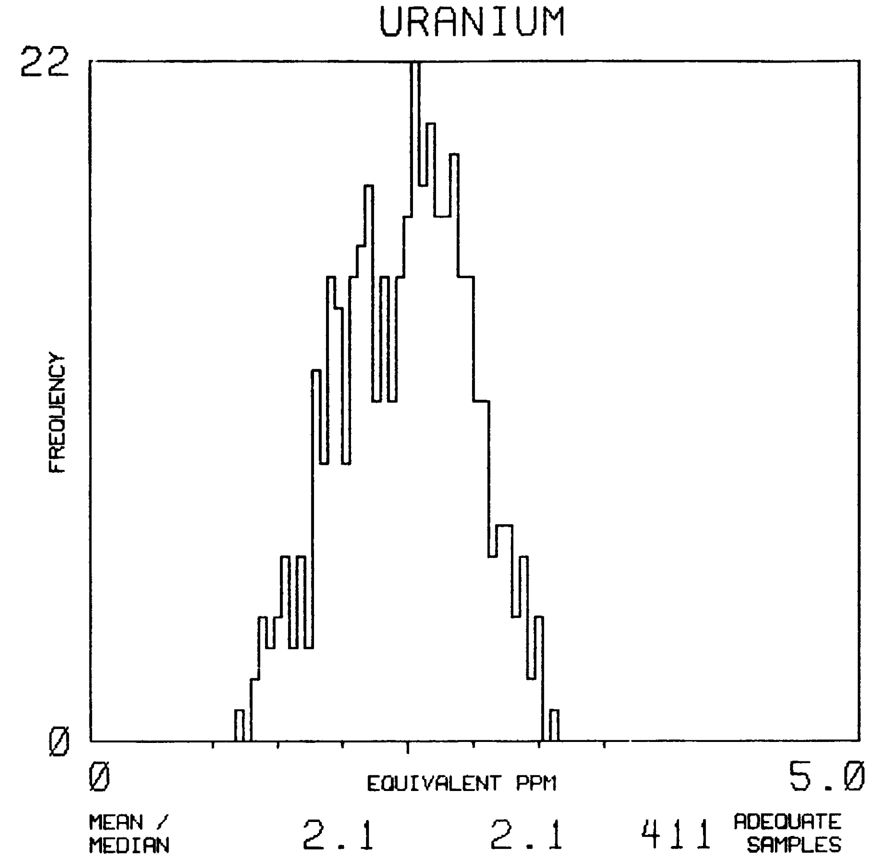
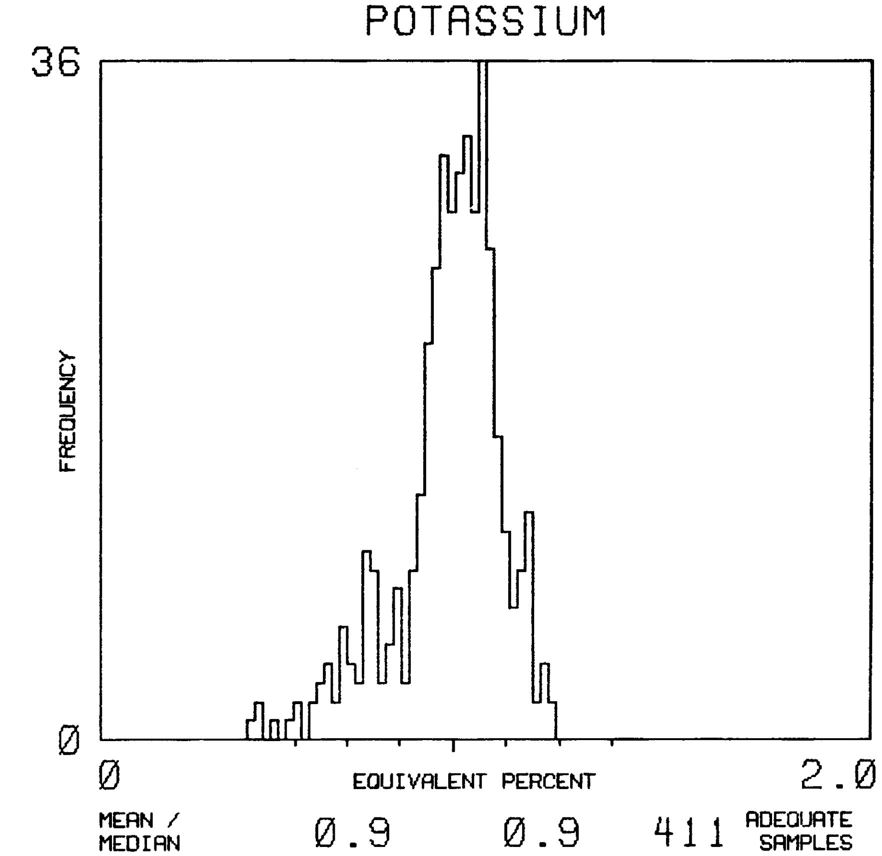
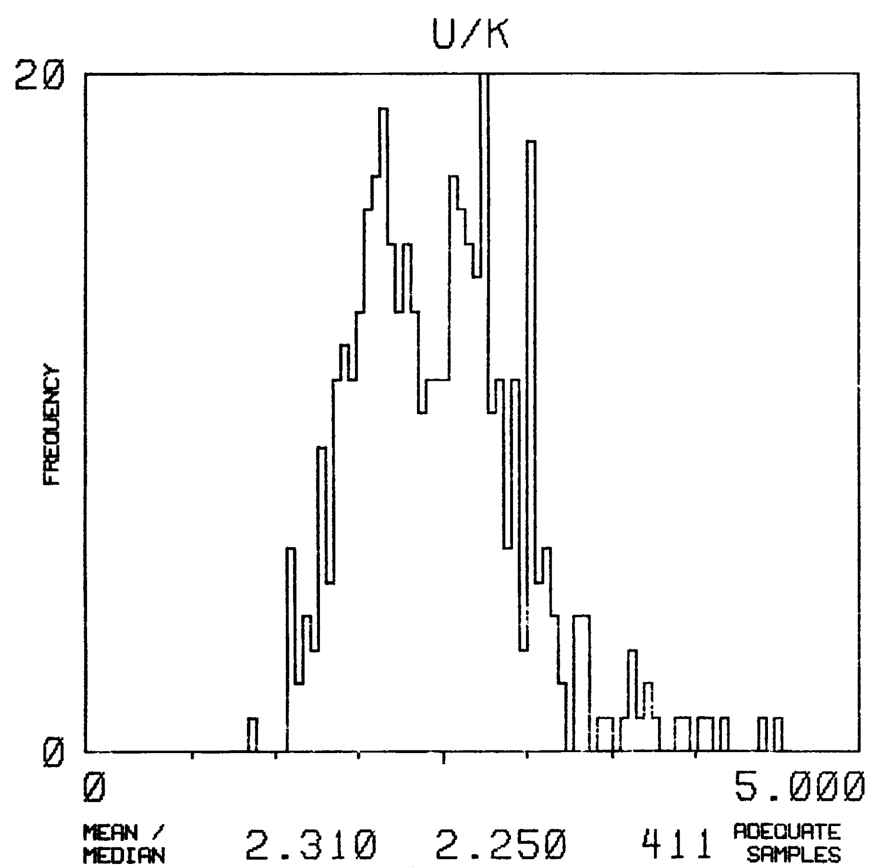
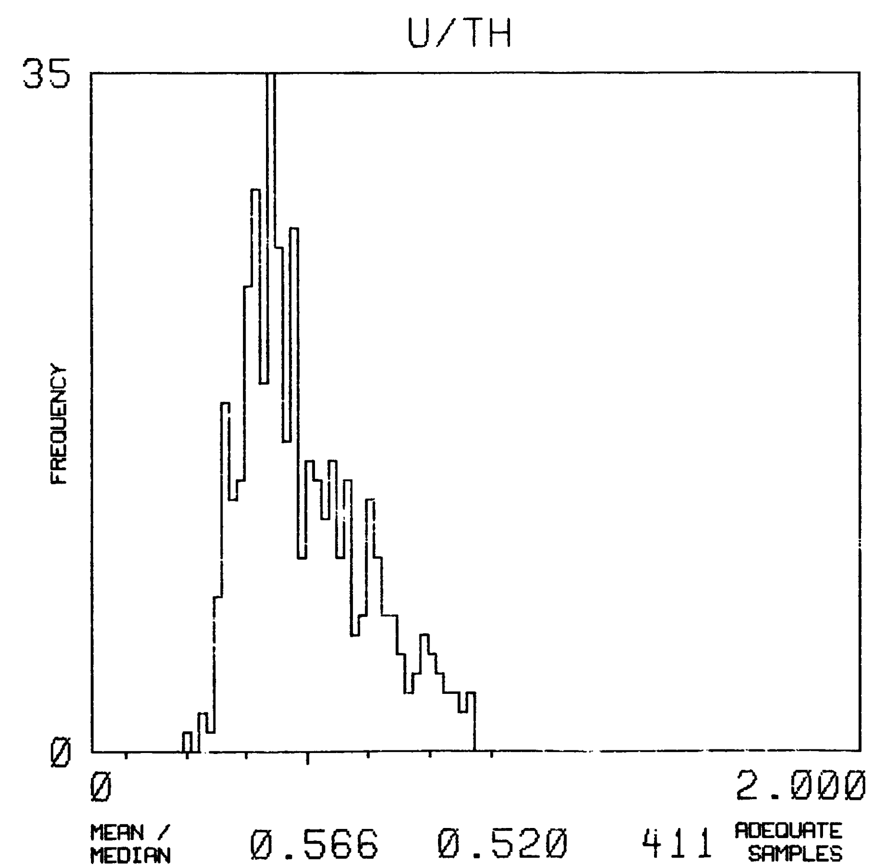
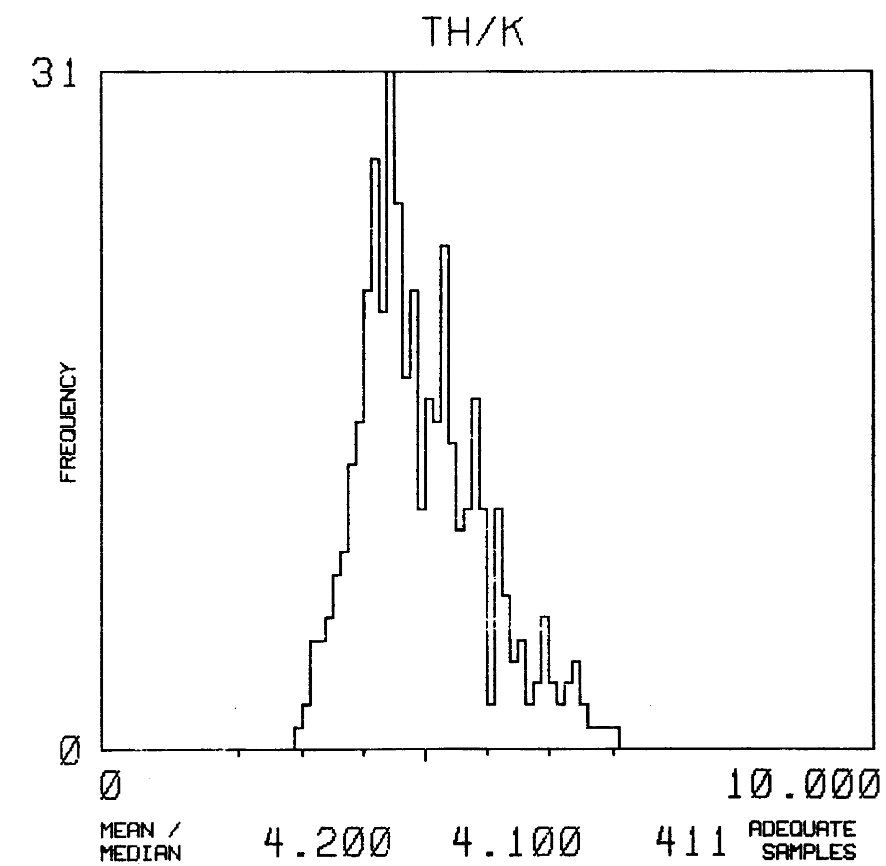






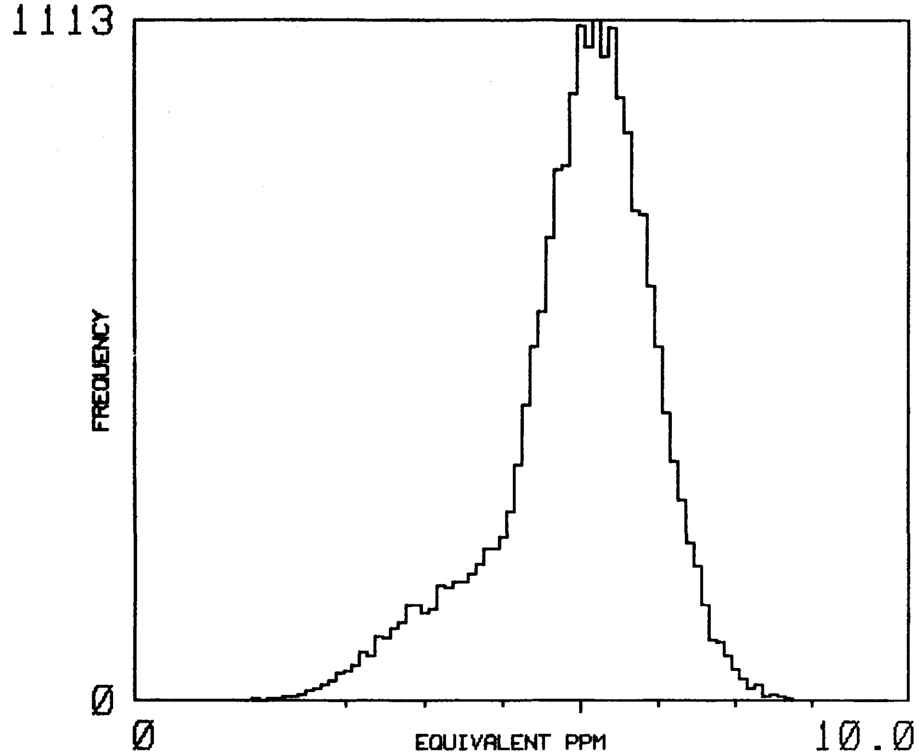






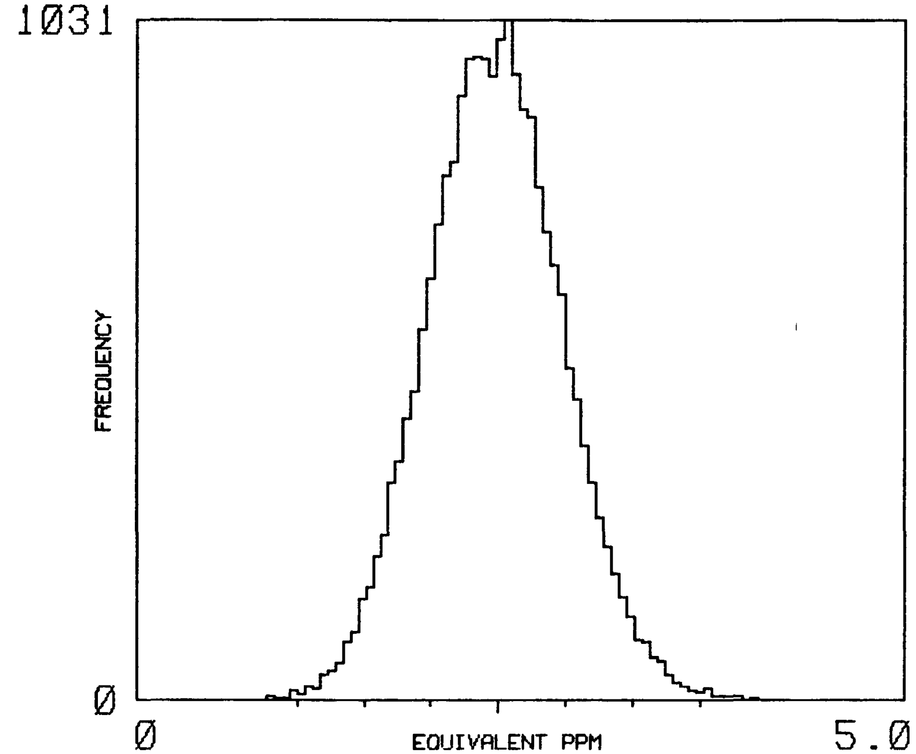
NK 16-11 DANVILLE MAP UNIT : QT TOTAL NUMBER OF SAMPLES 21757

THORIUM



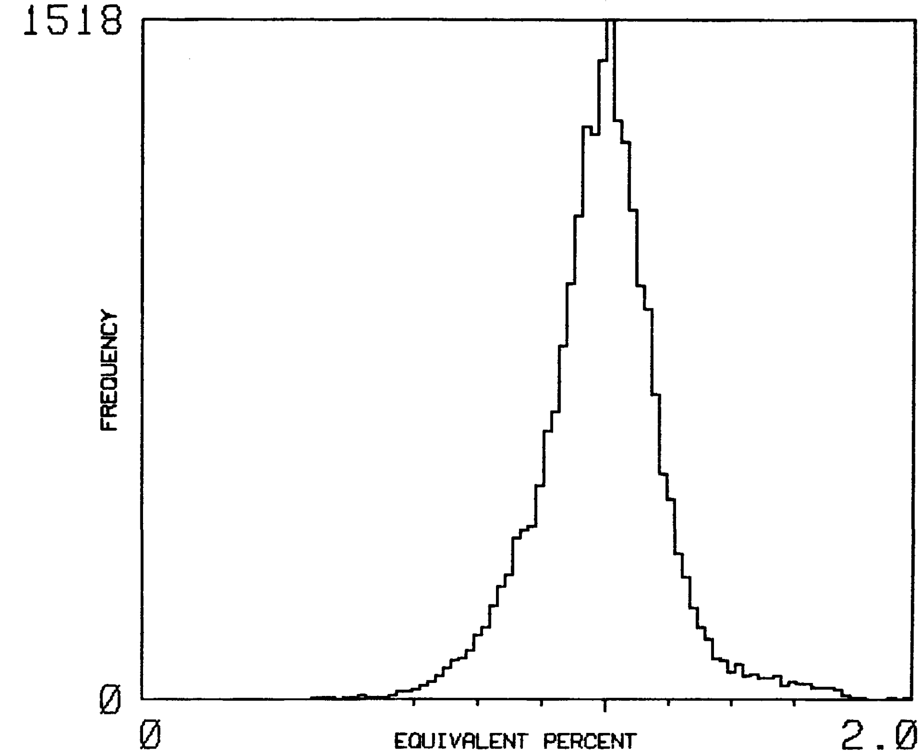
MEAN / MEDIAN 5.7 5.9 21756 ADEQUATE SAMPLES

URANIUM



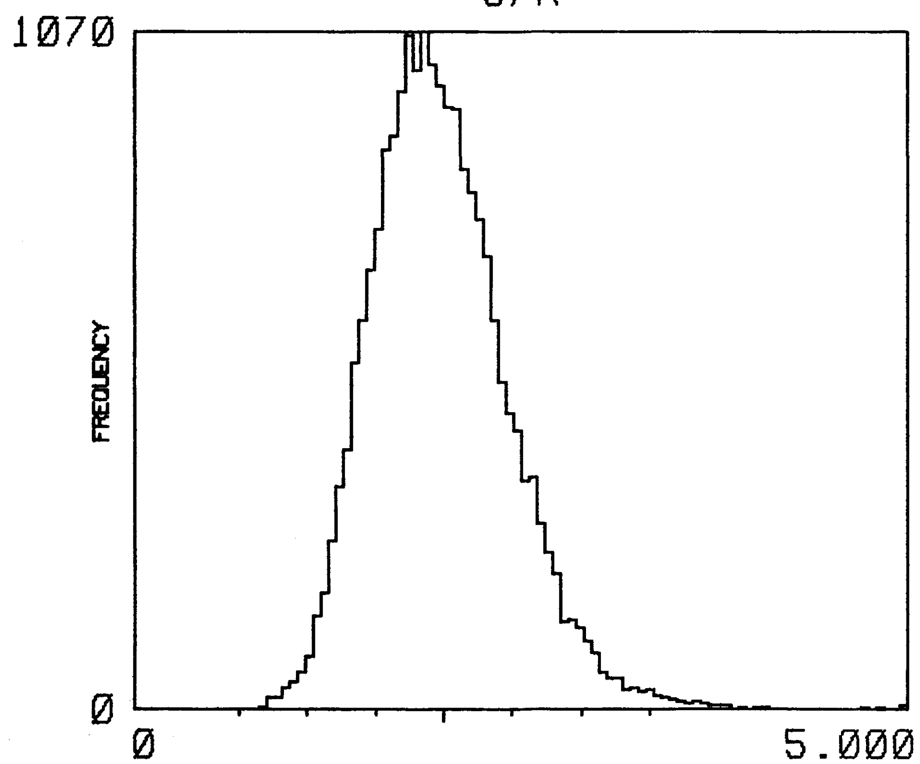
MEAN / MEDIAN 2.4 2.3 21744 ADEQUATE SAMPLES

POTASSIUM



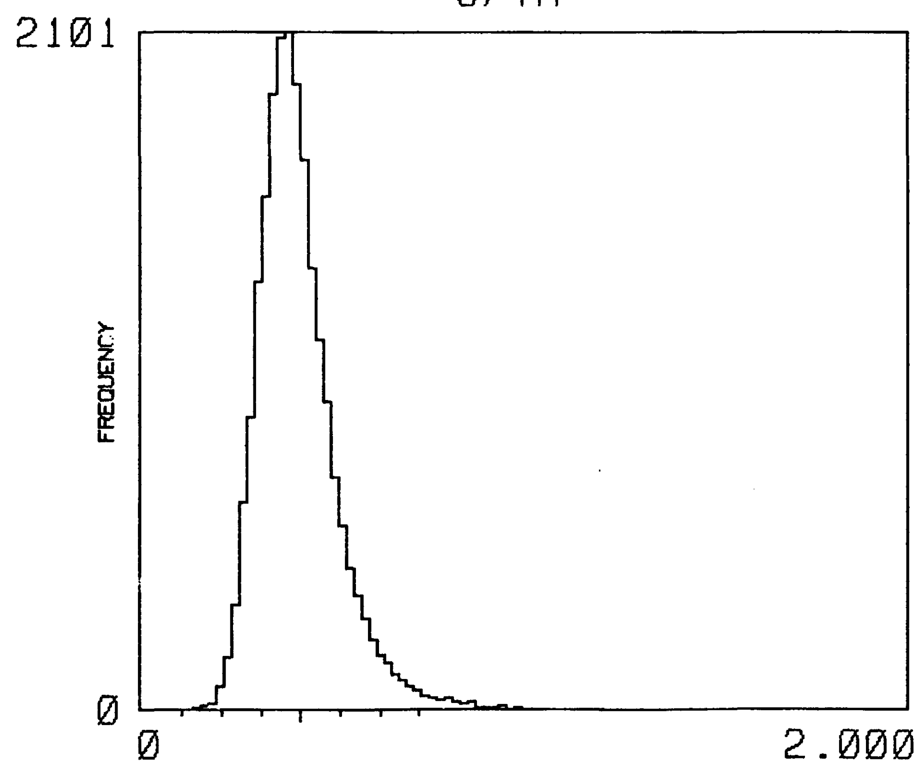
MEAN / MEDIAN 1.2 1.2 21757 ADEQUATE SAMPLES

U/K



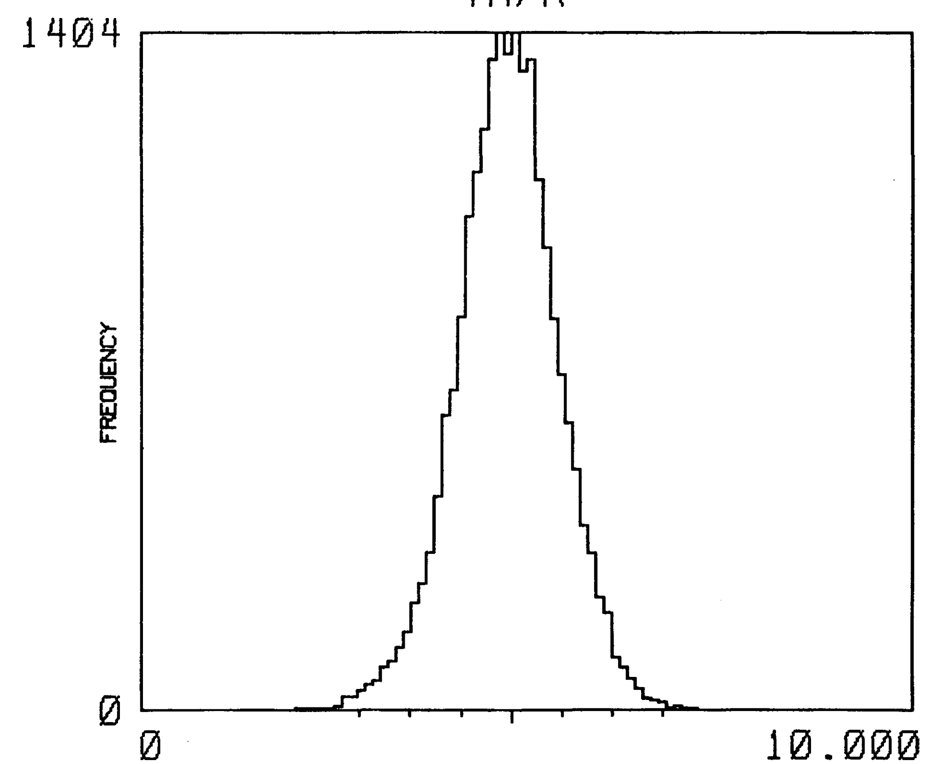
MEAN / MEDIAN 1.999 1.950 21744 ADEQUATE SAMPLES

U/TH



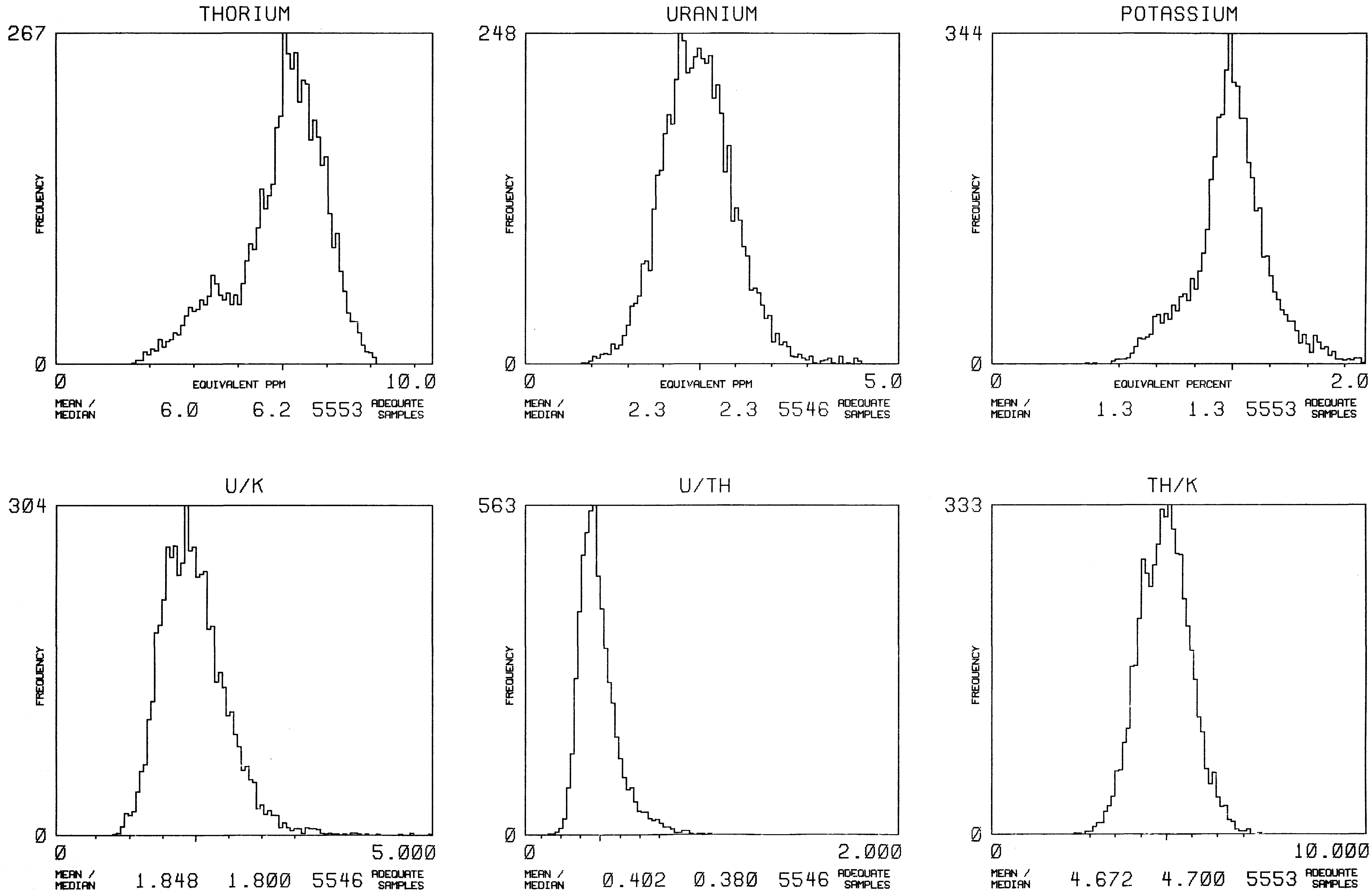
MEAN / MEDIAN 0.422 0.400 21744 ADEQUATE SAMPLES

TH/K



MEAN / MEDIAN 4.792 4.800 21756 ADEQUATE SAMPLES

NK 16-11 DANVILLE MAP UNIT : QTE TOTAL NUMBER OF SAMPLES 5553 F11de

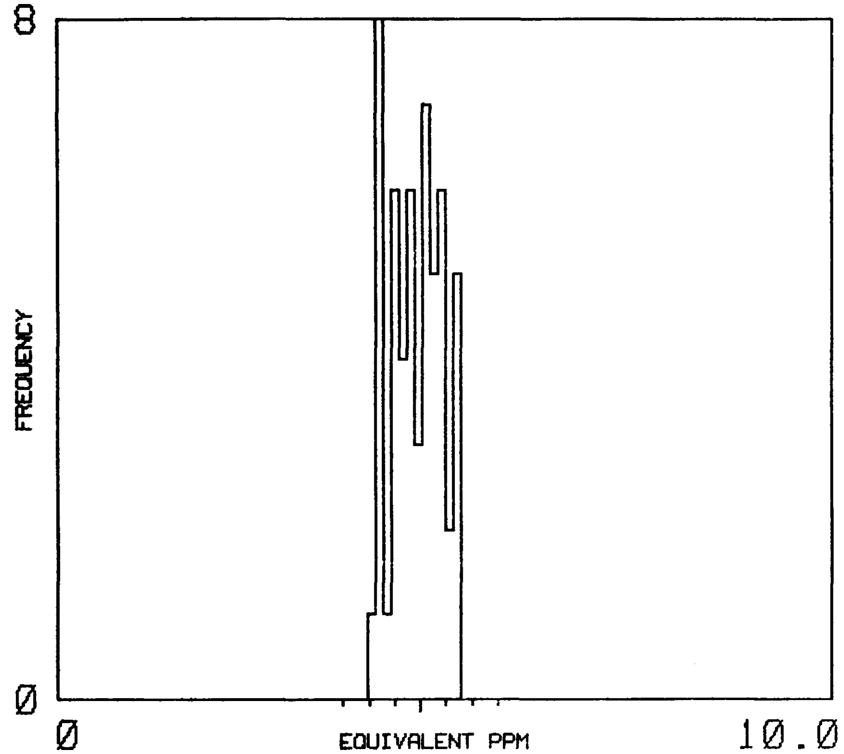


F12da

NK 16-11 DANVILLE

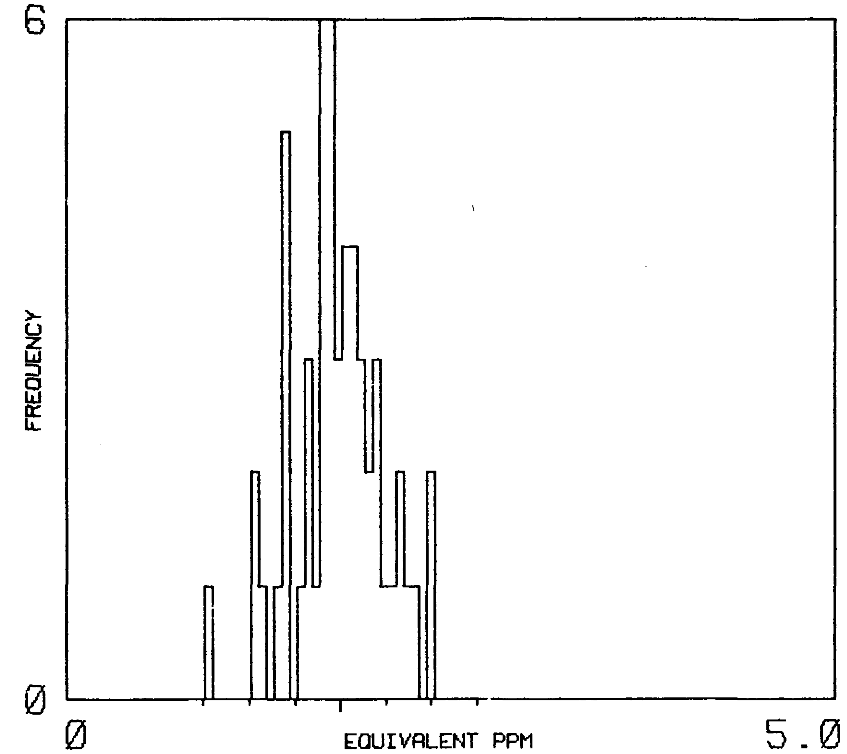
MAP UNIT : QTI TOTAL NUMBER OF SAMPLES 54

THORIUM



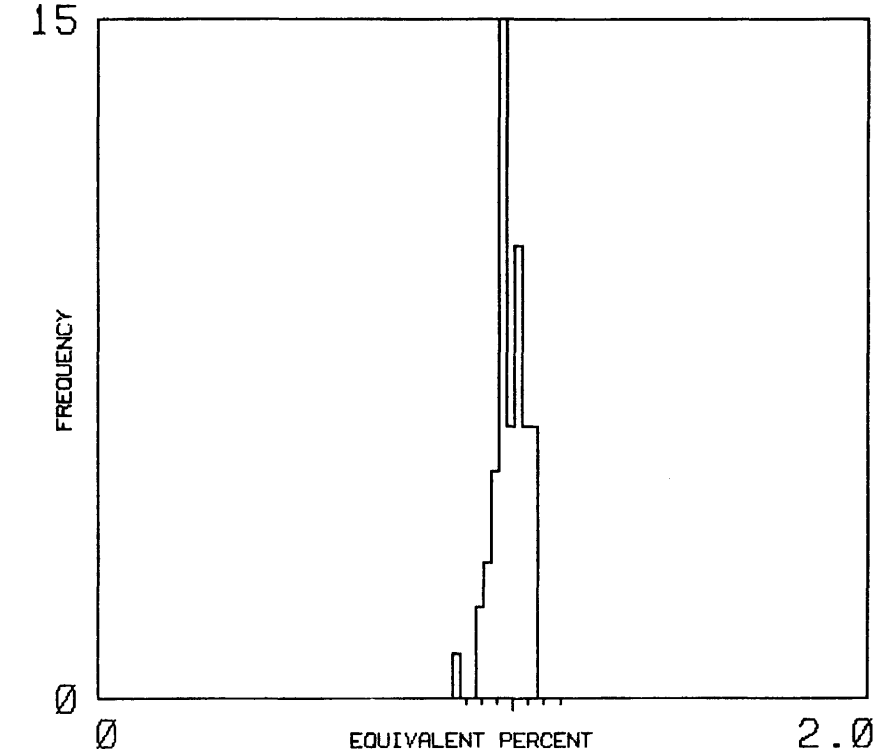
MEAN / MEDIAN 4.7 4.7 54 ADEQUATE SAMPLES

URANIUM



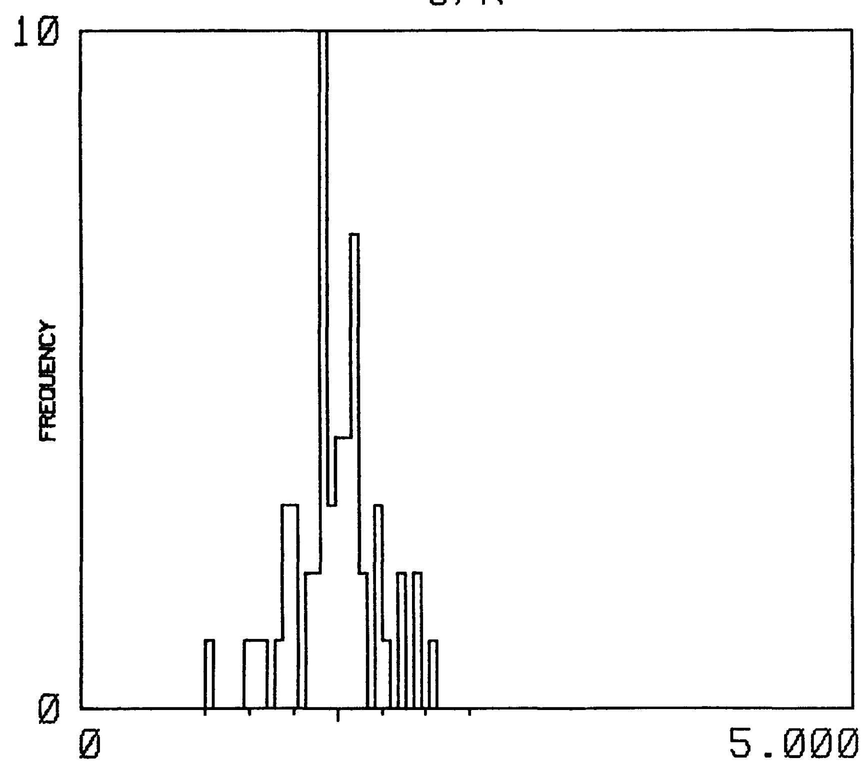
MEAN / MEDIAN 1.8 1.7 54 ADEQUATE SAMPLES

POTASSIUM



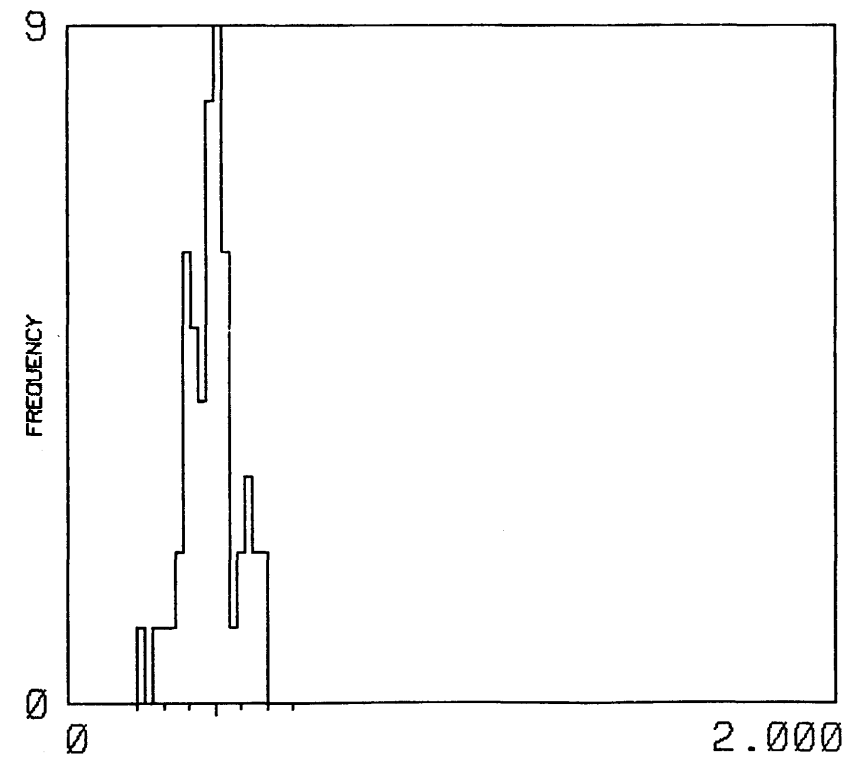
MEAN / MEDIAN 1.1 1.1 54 ADEQUATE SAMPLES

U/K



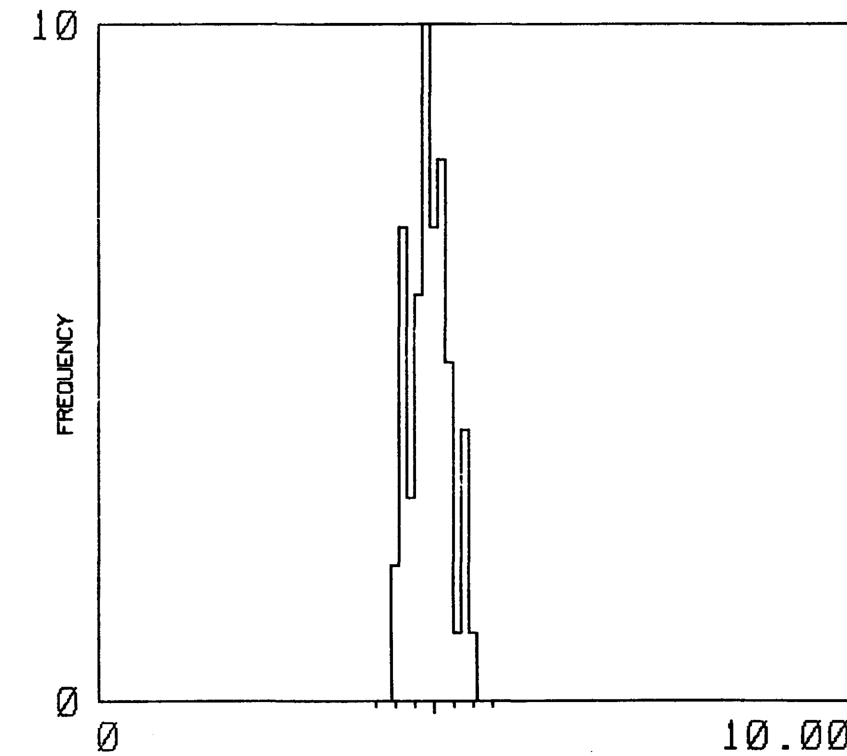
MEAN / MEDIAN 1.659 1.650 54 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN 0.383 0.380 54 ADEQUATE SAMPLES

TH/K

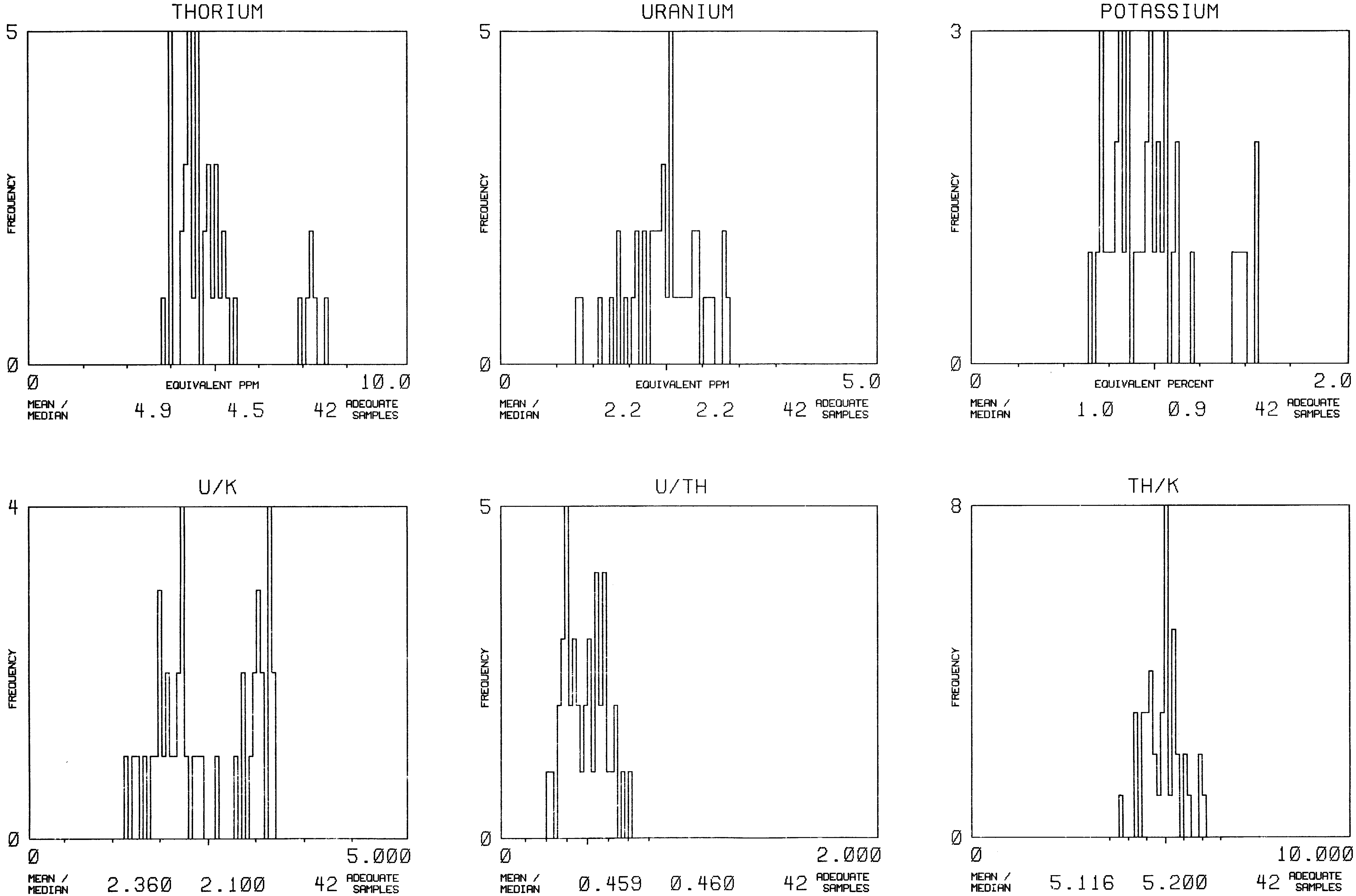


MEAN / MEDIAN 4.347 4.300 54 ADEQUATE SAMPLES

NK 16-11 DANVILLE

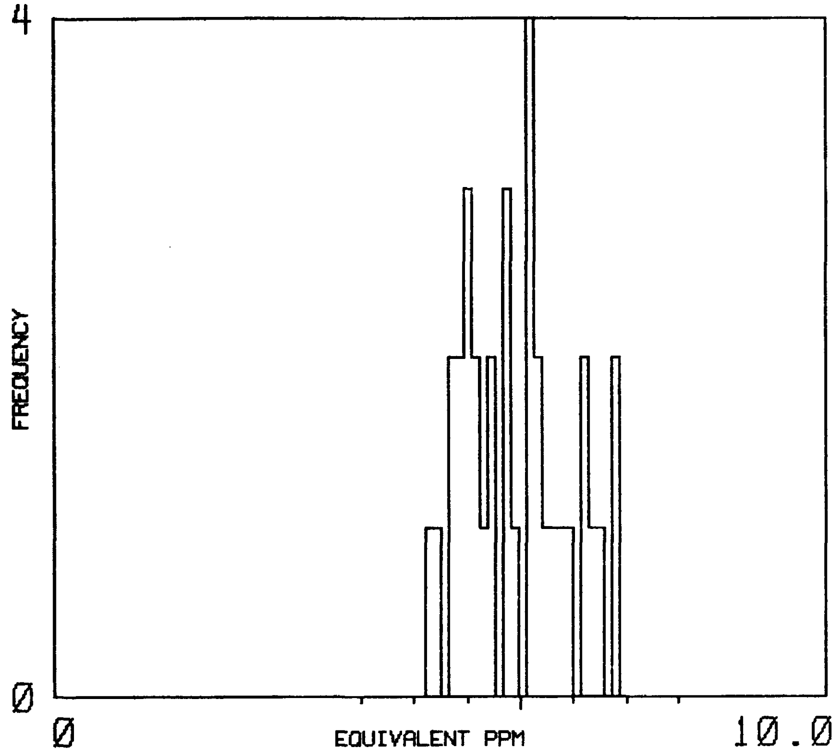
MAP UNIT : S TOTAL NUMBER OF SAMPLES 42

F13d



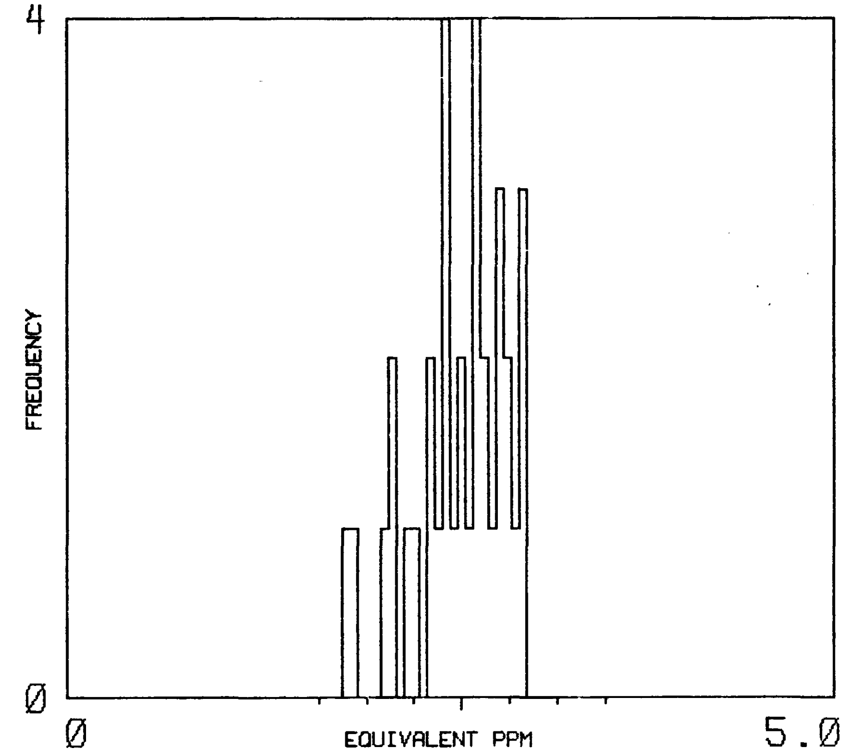
NK 16-11 DANVILLE MAP UNIT : M1 TOTAL NUMBER OF SAMPLES 34

THORIUM



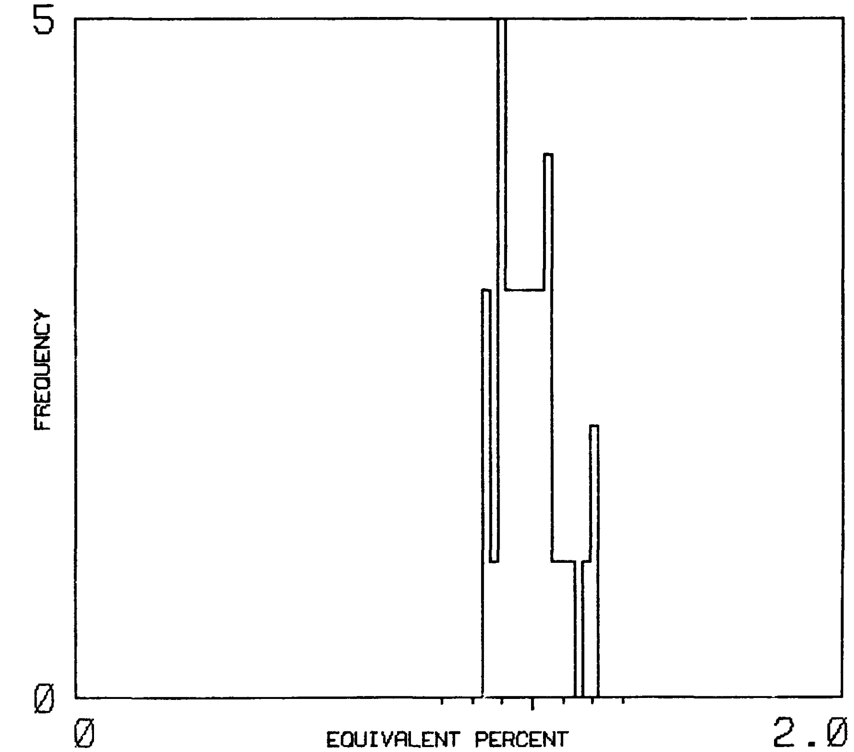
MEAN / MEDIAN 6.0 5.9 34 ADEQUATE SAMPLES

URANIUM



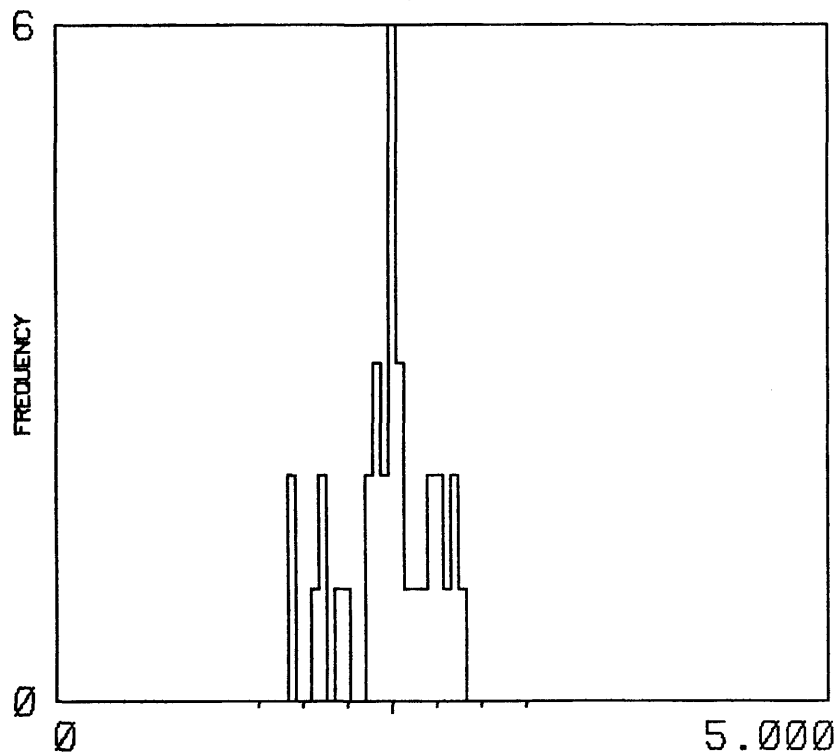
MEAN / MEDIAN 2.6 2.6 34 ADEQUATE SAMPLES

POTASSIUM



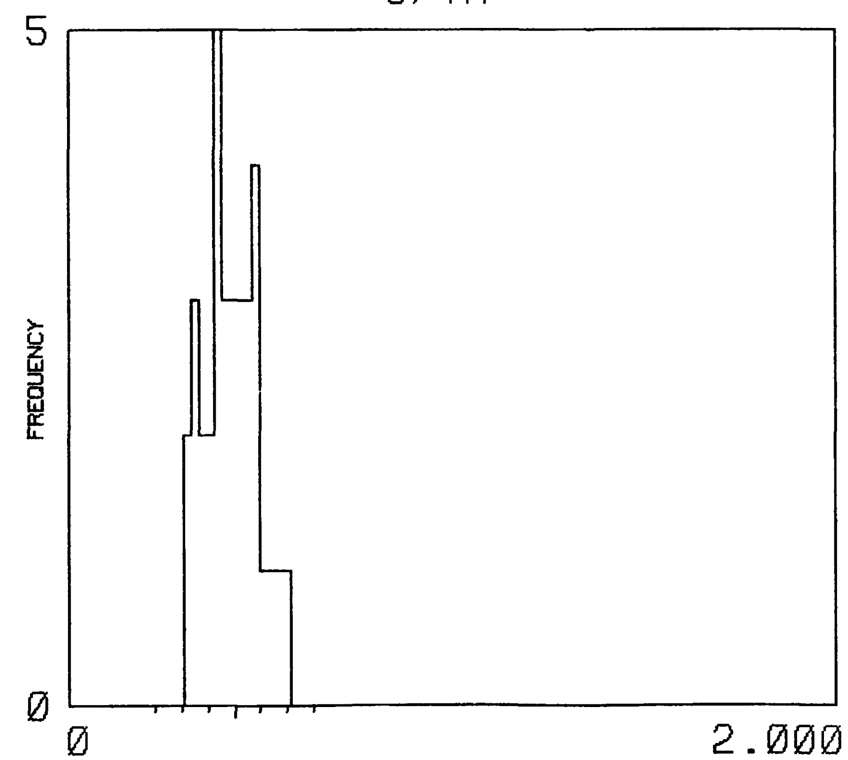
MEAN / MEDIAN 1.2 1.2 34 ADEQUATE SAMPLES

U/K



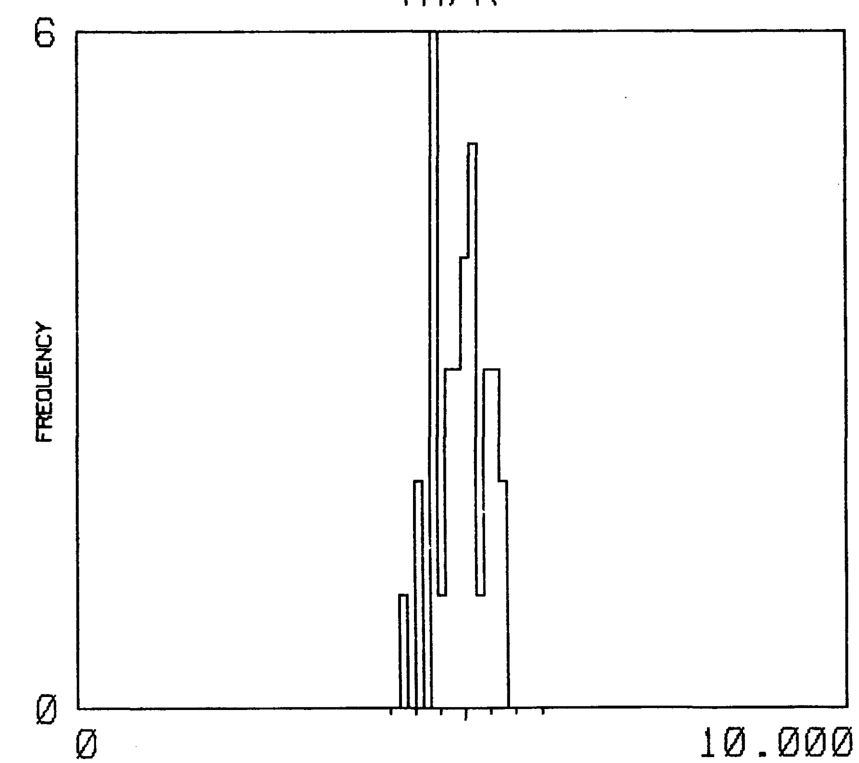
MEAN / MEDIAN 2.174 2.200 34 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN 0.433 0.420 34 ADEQUATE SAMPLES

TH/K



MEAN / MEDIAN 5.053 5.100 34 ADEQUATE SAMPLES

DANVILLE QUADRANGLE

Computer Map Unit Symbol Conversion Table

Computer Map Unit Symbol	Geologic Map Unit Symbol
QSA	Qsa
QMP	Qmp
QSD	Qsd
QCL	Qcl
QLE	Qle
QGV	Qgv
QGP	Qgp
QGK	Qgk
QTS	Qts
QT	Qt
QTE	Qte
QTI	Qti
S	S1
M1	M1

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 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.

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	490	QTE	/ 4	/ 0	/ 0	/ 0	3.2	3	1	0	0	0	0	0	0
2 C	500	QLE	/ 5	/ 0	/ 0	/ 0	4.4	3	1	1	0	0	0	0	0
3 C	500	QCL	/ 1	/ 0	/ 0	/ 0	4.2	0	0	1	0	0	0	0	0
4 C	500	QCL	/ 2	/ 0	/ 0	/ 0	3.7	0	2	0	0	0	0	0	0
5 C	500	QCL	/ 1QT	/ 1	/ 0	/ 0	4.1	1	0	0	1	0	0	0	0
6 C	500	QTE	/ 3	/ 0	/ 0	/ 0	3.7	0	2	1	0	0	0	0	0
7 C	500	QTE	/ 2	/ 0	/ 0	/ 0	3.5	0	2	0	0	0	0	0	0
8 C	500	QTE	/ 7	/ 0	/ 0	/ 0	4.1	1	4	1	1	0	0	0	0
9 C	500	QTE	/ 7QT	/ 3	/ 0	/ 0	4.2	4	2	2	2	0	0	0	0
10 C	500	QTE	/ 5QGP	/ 3QT	/ 5	/ 0	3.8	4	8	1	0	0	0	0	0
11 C	500	QT	/ 6	/ 0	/ 0	/ 0	3.9	0	1	4	1	0	0	0	0
12 C	500	QCL	/ 9QSA	/ 2	/ 0	/ 0	4.0	6	3	2	0	0	0	0	0
13 C	500	QSD	/ 2	/ 0	/ 0	/ 0	2.8	0	2	0	0	0	0	0	0
14 C	500	QT	/ 2	/ 0	/ 0	/ 0	3.5	1	0	1	0	0	0	0	0
15 C	500	QTE	/ 3	/ 0	/ 0	/ 0	3.5	0	3	0	0	0	0	0	0
16 C	500	QTE	/ 5	/ 0	/ 0	/ 0	3.3	3	2	0	0	0	0	0	0
17 C	500	QTE	/ 3	/ 0	/ 0	/ 0	3.5	1	2	0	0	0	0	0	0
18 C	500	QTE	/ 3	/ 0	/ 0	/ 0	3.4	0	3	0	0	0	0	0	0
19 C	510	QLE	/ 1	/ 0	/ 0	/ 0	4.7	0	0	1	0	0	0	0	0
20 C	510	QCL	/ 1	/ 0	/ 0	/ 0	3.9	0	0	1	0	0	0	0	0
21 C	510	QCL	/ 4	/ 0	/ 0	/ 0	4.1	0	1	3	0	0	0	0	0
22 C	510	QCL	/ 4QGV	/ 4	/ 0	/ 0	4.0	3	2	3	0	0	0	0	0
23 C	510	QSD	/ 4	/ 0	/ 0	/ 0	3.2	0	3	1	0	0	0	0	0
24 C	510	QSD	/ 2	/ 0	/ 0	/ 0	3.0	0	2	0	0	0	0	0	0
25 C	510	QTE	/ 3	/ 0	/ 0	/ 0	3.6	1	1	1	0	0	0	0	0
26 C	510	QTE	/ 1QGV	/ 2QSA	/ 1QSD	/ 1	3.4	0	2	3	0	0	0	0	0
27 C	510	QT	/ 6	/ 0	/ 0	/ 0	3.7	2	3	1	0	0	0	0	0
28 C	510	QT	/ 3	/ 0	/ 0	/ 0	3.1	2	1	0	0	0	0	0	0
29 C	510	QT	/ 4QSA	/ 1	/ 0	/ 0	3.5	2	1	2	0	0	0	0	0
30 C	510	QT	/ 3	/ 0	/ 0	/ 0	3.2	1	2	0	0	0	0	0	0
31 C	510	QT	/ 3QSA	/ 1	/ 0	/ 0	3.4	1	3	0	0	0	0	0	0
32 C	510	QT	/ 4	/ 0	/ 0	/ 0	3.8	1	1	2	0	0	0	0	0
33 C	510	QT	/ 3	/ 0	/ 0	/ 0	3.4	2	1	0	0	0	0	0	0
34 C	520	QT	/ 1	/ 0	/ 0	/ 0	3.6	0	0	1	0	0	0	0	0
35 C	520	QT	/ 6	/ 0	/ 0	/ 0	3.6	2	3	1	0	0	0	0	0
36 C	520	QT	/ 2	/ 0	/ 0	/ 0	3.6	1	0	1	0	0	0	0	0
37 C	520	QT	/ 2	/ 0	/ 0	/ 0	3.8	1	0	1	0	0	0	0	0
38 C	550	QSA	/ 2QT	/ 4	/ 0	/ 0	3.3	4	2	0	0	0	0	0	0
39 C	550	QT	/ 6	/ 0	/ 0	/ 0	4.0	2	2	1	1	0	0	0	0
40 C	550	QT	/ 6	/ 0	/ 0	/ 0	3.1	2	4	0	0	0	0	0	0
41 C	550	QT	/ 2	/ 0	/ 0	/ 0	3.4	0	2	0	0	0	0	0	0
42 C	560	QT	/ 3	/ 0	/ 0	/ 0	3.1	2	1	0	0	0	0	0	0
43 C	560	QT	/ 4	/ 0	/ 0	/ 0	3.2	2	2	0	0	0	0	0	0
44 C	570	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
45 C	570	QTE	/ 2	/ 0	/ 0	/ 0	3.1	0	2	0	0	0	0	0	0
46 C	570	QSA	/ 2	/ 0	/ 0	/ 0	3.6	1	0	1	0	0	0	0	0
47 C	570	QSA	/ 4QT	/ 4	/ 0	/ 0	3.5	2	5	1	0	0	0	0	0
48 C	570	QT	/ 4	/ 0	/ 0	/ 0	3.4	0	4	0	0	0	0	0	0
49 C	570	QT	/ 9	/ 0	/ 0	/ 0	3.4	4	5	0	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
50 C	570	QT	/ 3QGV	/ 2	/ 0	/ 0	3.6	0	3	2	0	0	0	0	0
51 C	580	QGV	/ 1QSA	/ 1	/ 0	/ 0	3.4	1	0	1	0	0	0	0	0
52 C	580	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
53 C	580	QSA	/ 1	/ 0	/ 0	/ 0	3.3	0	0	1	0	0	0	0	0
54 C	580	QT	/ 2	/ 0	/ 0	/ 0	3.1	0	2	0	0	0	0	0	0
55 C	590	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
56 C	590	QT	/ 2	/ 0	/ 0	/ 0	3.5	0	1	1	0	0	0	0	0
57 C	600	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
58 C	600	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
59 C	600	QT	/ 3	/ 0	/ 0	/ 0	3.3	1	2	0	0	0	0	0	0
60 C	600	QT	/ 1QTE	/ 1	/ 0	/ 0	3.3	0	2	0	0	0	0	0	0
61 C	600	QT	/ 2QGV	/ 1	/ 0	/ 0	3.3	1	2	0	0	0	0	0	0
62 C	1010	QTE	/ 2	/ 0	/ 0	/ 0	3.5	0	2	0	0	0	0	0	0
63 C	1010	QT	/ 1	/ 0	/ 0	/ 0	3.5	0	0	1	0	0	0	0	0
64 C	1060	QT	/ 2	/ 0	/ 0	/ 0	3.2	0	2	0	0	0	0	0	0
65 C	1060	QT	/ 2	/ 0	/ 0	/ 0	3.2	0	2	0	0	0	0	0	0
66 C	1060	QT	/ 2	/ 0	/ 0	/ 0	3.2	0	2	0	0	0	0	0	0
67 C	1060	QT	/ 2QTE	/ 1	/ 0	/ 0	3.0	2	1	0	0	0	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 QSA

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.5585	0.7414	0.9243	1.1072	1.2901	1.4730	1.6559
URANIUM DIST NORMAL	0.7632	1.2292	1.6952	2.1612	2.6272	3.0932	3.5592
THORIUM DIST NORMAL	1.5182	2.6268	3.7354	4.8440	5.9526	7.0612	8.1698
U/K DIST NORMAL	0.5574	1.0333	1.5092	1.9851	2.4610	2.9369	3.4128
U/TH DIST NORMAL	0.1208	0.2340	0.3472	0.4604	0.5736	0.6868	0.8000
TH/K DIST NORMAL	2.2452	2.9536	3.6620	4.3704	5.0788	5.7872	6.4956

MAP UNIT QMP

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0583	0.3649	0.6715	0.9781	1.2847	1.5913	1.8979
URANIUM DIST NORMAL	0.5361	1.0084	1.4807	1.9530	2.4253	2.8976	3.3699
THORIUM DIST NORMAL	0.0364	1.4682	2.9000	4.3318	5.7636	7.1954	8.6272
U/K DIST NORMAL	-0.8592	0.1552	1.1696	2.1840	3.1984	4.2128	5.2272
U/TH DIST NORMAL	-0.0022	0.1616	0.3254	0.4892	0.6530	0.8168	0.9806
TH/K DIST NORMAL	1.8587	2.7225	3.5863	4.4501	5.3139	6.1777	7.0415

MAP UNIT QSD

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.3825	0.5681	0.7537	0.9393	1.1249	1.3105	1.4961
URANIUM DIST NORMAL	0.4137	0.9115	1.4093	1.9071	2.4049	2.9027	3.4005
THORIUM DIST NORMAL	0.2850	1.2664	2.2478	3.2292	4.2106	5.1920	6.1734
U/K DIST NORMAL	-0.1831	0.5613	1.3057	2.0501	2.7945	3.5389	4.2833
U/TH DIST NORMAL	0.0614	0.2427	0.4240	0.6053	0.7866	0.9679	1.1492
TH/K DIST NORMAL	1.2683	1.9853	2.7023	3.4193	4.1363	4.8533	5.5703

MAP UNIT QCL

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.3764	0.7002	1.0240	1.3478	1.6716	1.9954	2.3192
URANIUM DIST NORMAL	0.3046	0.9472	1.5898	2.2324	2.8750	3.5176	4.1602
THORIUM DIST NORMAL	0.3404	1.9919	3.6434	5.2949	6.9464	8.5979	10.2494
U/K DIST NORMAL	0.2503	0.7270	1.2037	1.6804	2.1571	2.6338	3.1105
U/TH DIST NORMAL	0.0462	0.1771	0.3080	0.4389	0.5698	0.7007	0.8316
TH/K DIST NORMAL	2.0266	2.6450	3.2634	3.8818	4.5002	5.1186	5.7370

MAP UNIT QLE

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	1.3083	1.4378	1.5673	1.6968	1.8263	1.9558	2.0853
URANIUM DIST NORMAL	0.9106	1.5178	2.1250	2.7322	3.3394	3.9466	4.5538
THORIUM DIST NORMAL	5.0929	5.7825	6.4721	7.1617	7.8513	8.5409	9.2305
U/K DIST NORMAL	0.4608	0.8469	1.2330	1.6191	2.0052	2.3913	2.7774
U/TH DIST NORMAL	0.1226	0.2095	0.2964	0.3833	0.4702	0.5571	0.6440
TH/K DIST NORMAL	3.2046	3.5453	3.8860	4.2267	4.5674	4.9081	5.2488

MAP UNIT QGV

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.6672	0.8365	1.0058	1.1751	1.3444	1.5137	1.6830
URANIUM DIST NORMAL	0.9376	1.3700	1.8024	2.2348	2.6672	3.0996	3.5320
THORIUM DIST NORMAL	1.8071	2.9205	4.0339	5.1473	6.2607	7.3741	8.4875
U/K DIST NORMAL	0.6384	1.0692	1.5000	1.9308	2.3616	2.7924	3.2232
U/TH DIST NORMAL	0.0923	0.2118	0.3313	0.4508	0.5703	0.6898	0.8093
TH/K DIST NORMAL	2.1290	2.8801	3.6312	4.3823	5.1334	5.8845	6.6356

MAP UNIT QGP

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.4100	0.6490	0.8880	1.1270	1.3660	1.6050	1.8440
URANIUM DIST NORMAL	0.7840	1.2262	1.6684	2.1106	2.5528	2.9950	3.4372
THORIUM DIST NORMAL	1.0309	2.3950	3.7591	5.1232	6.4873	7.8514	9.2155
U/K DIST NORMAL	0.2966	0.8333	1.3700	1.9067	2.4434	2.9801	3.5168
U/TH DIST NORMAL	0.0825	0.1969	0.3113	0.4257	0.5401	0.6545	0.7689
TH/K DIST NORMAL	1.9005	2.7832	3.6659	4.5486	5.4313	6.3140	7.1967

MAP UNIT QQK

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.7536	0.8961	1.0386	1.1811	1.3236	1.4661	1.6086
URANIUM DIST NORMAL	1.0669	1.4967	1.9265	2.3563	2.7861	3.2159	3.6457
THORIUM DIST NORMAL	2.6916	3.6826	4.6736	5.6646	6.6556	7.6466	8.6376
U/K DIST NORMAL	0.7209	1.1529	1.5849	2.0169	2.4489	2.8809	3.3129
U/TH DIST NORMAL	0.0977	0.2077	0.3177	0.4277	0.5377	0.6477	0.7577
TH/K DIST NORMAL	2.8533	3.4967	4.1401	4.7835	5.4269	6.0703	6.7137

MAP UNIT QTS

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.5036	0.6405	0.7774	0.9143	1.0512	1.1881	1.3250
URANIUM DIST NORMAL	0.8062	1.2296	1.6530	2.0764	2.4998	2.9232	3.3466
THORIUM DIST NORMAL	1.0604	1.9841	2.9078	3.8315	4.7552	5.6789	6.6026
U/K DIST NORMAL	0.6845	1.2265	1.7685	2.3105	2.8525	3.3945	3.9365
U/TH DIST NORMAL	0.0890	0.2480	0.4070	0.5660	0.7250	0.8840	1.0430
TH/K DIST NORMAL	1.7828	2.5886	3.3944	4.2002	5.0060	5.8118	6.6176

MAP UNIT QT

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.7048	0.8698	1.0348	1.1998	1.3648	1.5298	1.6948
URANIUM DIST NORMAL	1.0536	1.4903	1.9270	2.3637	2.8004	3.2371	3.6738
THORIUM DIST NORMAL	2.7336	3.7379	4.7422	5.7465	6.7508	7.7551	8.7594
U/K DIST NORMAL	0.6746	1.1161	1.5576	1.9991	2.4406	2.8821	3.3236
U/TH DIST NORMAL	0.1116	0.2152	0.3188	0.4224	0.5260	0.6296	0.7332
TH/K DIST NORMAL	2.8290	3.4834	4.1378	4.7922	5.4466	6.1010	6.7554

MAP UNIT QTE

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.6806	0.8820	1.0834	1.2848	1.4862	1.6876	1.8890
URANIUM DIST NORMAL	0.8885	1.3706	1.8527	2.3348	2.8169	3.2990	3.7811
THORIUM DIST NORMAL	2.4697	3.6463	4.8229	5.9995	7.1761	8.3527	9.5293
U/K DIST NORMAL	0.5302	0.9695	1.4088	1.8481	2.2874	2.7267	3.1660
U/TH DIST NORMAL	0.0830	0.1892	0.2954	0.4016	0.5078	0.6140	0.7202
TH/K DIST NORMAL	2.6290	3.3101	3.9912	4.6723	5.3534	6.0345	6.7156

MAP UNIT QTI

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.9552	0.9956	1.0360	1.0764	1.1168	1.1572	1.1976
URANIUM DIST NORMAL	0.8878	1.1863	1.4848	1.7833	2.0818	2.3803	2.6788
THORIUM DIST NORMAL	3.6871	4.0179	4.3487	4.6795	5.0103	5.3411	5.6719
U/K DIST NORMAL	0.8059	1.0904	1.3749	1.6594	1.9439	2.2284	2.5129
U/TH DIST NORMAL	0.1802	0.2477	0.3152	0.3827	0.4502	0.5177	0.5852
TH/K DIST NORMAL	3.5999	3.8488	4.0977	4.3466	4.5955	4.8444	5.0933

MAP UNIT S

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.2482	0.4888	0.7294	0.9700	1.2106	1.4512	1.6918
URANIUM DIST NORMAL	0.7530	1.2376	1.7222	2.2068	2.6914	3.1760	3.6606
THORIUM DIST NORMAL	1.4455	2.6035	3.7615	4.9195	6.0775	7.2355	8.3935
U/K DIST NORMAL	0.4615	1.0943	1.7271	2.3599	2.9927	3.6255	4.2583
U/TH DIST NORMAL	0.1310	0.2405	0.3500	0.4595	0.5690	0.6785	0.7880
TH/K DIST NORMAL	3.6534	4.1410	4.6286	5.1162	5.6038	6.0914	6.5790

MAP UNIT M1

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.9547	1.0332	1.1117	1.1902	1.2687	1.3472	1.4257
URANIUM DIST NORMAL	1.6469	1.9574	2.2679	2.5784	2.8889	3.1994	3.5099
THORIUM DIST NORMAL	3.9779	4.6609	5.3439	6.0269	6.7099	7.3929	8.0759
U/K DIST NORMAL	1.3098	1.5979	1.8860	2.1741	2.4622	2.7503	3.0384
U/TH DIST NORMAL	0.2262	0.2950	0.3638	0.4326	0.5014	0.5702	0.6390
TH/K DIST NORMAL	4.0648	4.3943	4.7238	5.0533	5.3828	5.7123	6.0418

LINE BASED MEAN CONCENTRATIONS
AND RATIOS PER ROCK TYPE

MAP UNIT QSA

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.885	1.020	1.055	1.162	1.107	1.119	1.156	1.205	1.114	1.154	1.087	1.100	1.235	1.115	1.167
URANIUM	1.415	2.434	2.409	2.329	1.811	2.032	2.123	1.858	2.430	2.314	2.103	2.341	2.281	2.316	2.150
THORIUM	2.667	4.132	4.278	5.378	4.560	4.987	4.721	5.362	4.953	5.318	4.777	4.930	6.504	5.242	5.311
U/K	1.619	2.464	2.302	2.049	1.591	1.858	1.844	1.588	2.314	2.016	1.961	2.186	1.864	2.093	1.867
U/TH	0.547	0.624	0.569	0.433	0.396	0.424	0.450	0.362	0.502	0.440	0.445	0.501	0.349	0.453	0.423
TH/K	3.058	3.996	4.080	4.670	4.069	4.456	4.077	4.437	4.577	4.640	4.417	4.473	5.316	4.705	4.540

	1040	1050	1060
POTASIUM	0.956	1.101	1.116
URANIUM	1.958	2.201	2.283
THORIUM	3.822	5.023	5.120
U/K	2.059	2.035	2.057
U/TH	0.521	0.454	0.464
TH/K	3.984	4.561	4.551

MAP UNIT QMP

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.801	0.000	0.640	1.075	1.172	0.000	1.103	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.249
URANIUM	1.627	0.000	1.711	2.347	1.947	0.000	2.098	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.765
THORIUM	3.319	0.000	2.756	5.310	5.287	0.000	4.854	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.602
U/K	1.895	0.000	3.228	2.175	1.655	0.000	2.120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.425
U/TH	0.494	0.000	0.655	0.440	0.368	0.000	0.495	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.318
TH/K	4.449	0.000	4.660	4.934	4.506	0.000	4.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.507

	1040	1050	1060
POTASIUM	1.066	1.198	0.804
URANIUM	2.296	2.320	1.566
THORIUM	5.561	5.005	3.021
U/K	2.203	1.982	1.973
U/TH	0.423	0.478	0.526
TH/K	5.240	4.174	3.800

MAP UNIT QSD

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.850	0.948	0.997	0.986	0.000	1.143	0.000	1.164	0.000	0.000	0.000	0.000	0.000	0.749	1.016
URANIUM	1.591	2.114	2.099	1.736	0.000	1.996	0.000	1.658	0.000	0.000	0.000	0.000	0.000	1.328	1.784
THORIUM	2.811	3.151	3.518	3.433	0.000	5.865	0.000	4.144	0.000	0.000	0.000	0.000	0.000	2.337	4.567
U/K	1.995	2.283	2.144	1.763	0.000	1.739	0.000	1.427	0.000	0.000	0.000	0.000	0.000	1.379	1.755
U/TH	0.576	0.699	0.621	0.524	0.000	0.340	0.000	0.395	0.000	0.000	0.000	0.000	0.000	0.483	0.399
TH/K	3.274	3.339	3.526	3.457	0.000	5.110	0.000	3.580	0.000	0.000	0.000	0.000	0.000	3.215	4.473

	1040	1050	1060
POTASIUM	0.910	0.879	0.733
URANIUM	1.399	1.681	1.516
THORIUM	2.875	2.928	2.709
U/K	1.507	1.858	2.070
U/TH	0.487	0.590	0.570
TH/K	3.173	3.234	3.706

MAP UNIT QCL

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	1.106	1.209	1.540	1.197	1.554	1.638	1.568	0.000	0.000	0.000	0.000	0.000	1.514	0.887	0.968
URANIUM	1.937	2.659	3.233	1.743	2.205	2.361	2.423	0.000	0.000	0.000	0.000	0.000	2.170	0.865	1.557
THORIUM	3.986	4.851	6.521	4.454	6.605	6.763	6.134	0.000	0.000	0.000	0.000	0.000	6.032	2.374	3.212
U/K	1.784	2.236	2.134	1.452	1.425	1.448	1.541	0.000	0.000	0.000	0.000	0.000	1.433	0.994	1.604
U/TH	0.500	0.570	0.514	0.397	0.337	0.352	0.398	0.000	0.000	0.000	0.000	0.000	0.366	0.380	0.495
TH/K	3.592	3.984	4.224	3.707	4.268	4.144	3.901	0.000	0.000	0.000	0.000	0.000	3.966	2.674	3.315

	1040	1050	1060
POTASIUM	1.036	0.000	0.000
URANIUM	1.665	0.000	0.000
THORIUM	3.642	0.000	0.000
U/K	1.622	0.000	0.000
U/TH	0.459	0.000	0.000
TH/K	3.526	0.000	0.000

MAP UNIT QLE

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.000	1.639	1.842	1.721	1.664	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.734	0.000	0.000
URANIUM	0.000	3.453	3.493	2.705	2.177	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.649	0.000	0.000
THORIUM	0.000	7.246	7.981	7.273	6.899	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.088	0.000	0.000
U/K	0.000	2.126	1.893	1.580	1.312	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.538	0.000	0.000
U/TH	0.000	0.484	0.439	0.375	0.317	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.376	0.000	0.000
TH/K	0.000	4.415	4.353	4.239	4.147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.098	0.000	0.000

	1040	1050	1060
POTASIUM	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000
U/K	0.000	0.000	0.000
U/TH	0.000	0.000	0.000
TH/K	0.000	0.000	0.000

MAP UNIT QGV

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	1.416	1.166	1.118	1.208	1.169	1.205	1.134	1.265	1.135	1.129	1.131	1.158	1.436	0.000	1.196
URANIUM	2.269	2.471	2.399	2.376	1.746	2.165	2.075	1.998	2.325	2.290	2.130	2.336	2.365	0.000	2.186
THORIUM	5.657	3.674	4.212	5.890	4.623	4.919	4.641	5.343	5.213	5.495	5.238	5.629	6.028	0.000	5.739
U/K	1.602	2.160	2.190	1.995	1.498	1.803	1.857	1.607	2.051	2.036	1.903	2.062	1.644	0.000	1.839
U/TH	0.404	0.698	0.590	0.413	0.382	0.450	0.449	0.389	0.442	0.422	0.413	0.425	0.394	0.000	0.391
TH/K	3.985	3.140	3.768	4.881	3.950	4.074	4.109	4.219	4.594	4.870	4.634	4.880	4.200	0.000	4.791

	1040	1050	1060
POTASIUM	1.118	1.107	1.034
URANIUM	2.010	2.278	2.300
THORIUM	4.489	4.877	4.607
U/K	1.798	2.077	2.257
U/TH	0.452	0.474	0.511
TH/K	4.003	4.402	4.481

MAP UNIT QGP

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.808	0.901	0.000	0.000	1.296	0.000	1.268	1.240	1.295	1.219	1.075	1.109	1.190	0.829	1.252
URANIUM	1.627	2.114	0.000	0.000	2.041	0.000	2.117	1.963	2.480	2.352	2.211	2.547	2.245	2.040	2.323
THORIUM	2.878	3.852	0.000	0.000	5.628	0.000	5.423	5.282	6.714	5.957	5.343	6.165	6.091	3.444	6.232
U/K	2.135	2.375	0.000	0.000	1.579	0.000	1.699	1.608	1.914	1.954	2.109	2.306	1.893	1.767	1.872
U/TH	0.575	0.563	0.000	0.000	0.368	0.000	0.398	0.381	0.369	0.398	0.419	0.417	0.372	0.451	0.373
TH/K	3.812	4.307	0.000	0.000	4.358	0.000	4.297	4.257	5.182	4.922	5.031	5.550	5.120	3.869	5.015

	1040	1050	1060
POTASIUM	1.164	1.158	0.000
URANIUM	2.354	2.416	0.000
THORIUM	6.028	5.313	0.000
U/K	2.036	2.108	0.000
U/TH	0.396	0.464	0.000
TH/K	5.204	4.604	0.000

MAP UNIT QGK

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.000	0.970	0.000	1.211	1.270	0.000	1.308	1.327	1.211	1.094	1.209	1.148	0.000	0.000	1.113
URANIUM	0.000	2.589	0.000	2.685	2.026	0.000	2.316	2.417	2.685	2.336	2.298	2.599	0.000	0.000	2.127
THORIUM	0.000	4.114	0.000	5.953	5.879	0.000	6.475	5.895	6.166	5.523	5.793	6.165	0.000	0.000	5.485
U/K	0.000	2.685	0.000	2.223	1.618	0.000	1.771	1.868	2.229	2.147	1.919	2.271	0.000	0.000	1.878
U/TH	0.000	0.665	0.000	0.451	0.347	0.000	0.358	0.418	0.439	0.428	0.402	0.421	0.000	0.000	0.404
TH/K	0.000	4.213	0.000	4.939	4.644	0.000	4.953	4.453	5.088	5.040	4.816	5.379	0.000	0.000	4.790

	1040	1050	1060
POTASIUM	1.189	1.226	1.013
URANIUM	2.191	2.478	2.524
THORIUM	5.431	5.511	4.970
U/K	1.844	2.031	2.491
U/TH	0.409	0.453	0.509
TH/K	4.565	4.495	4.907

MAP UNIT QTS

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.853	0.894	1.009	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	1.958	2.282	2.216	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	3.491	3.170	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
U/K	2.347	2.582	2.216	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	0.573	0.745	0.478	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	4.159	3.533	4.671	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1040	1050	1060
POTASIUM	0.909	0.000	0.000
URANIUM	1.629	0.000	0.000
THORIUM	3.708	0.000	0.000
U/K	1.812	0.000	0.000
U/TH	0.451	0.000	0.000
TH/K	4.114	0.000	0.000

MAP UNIT QT

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.921	0.999	1.079	1.268	1.248	1.305	1.293	1.247	1.206	1.180	1.137	1.239	1.399	1.247	1.216
URANIUM	1.863	2.640	2.377	2.504	2.149	2.158	2.520	2.306	2.472	2.485	2.271	2.573	2.385	2.210	2.258
THORIUM	3.842	4.308	4.650	6.181	5.911	6.035	5.945	5.930	5.875	5.914	5.704	6.565	6.321	5.872	6.031
U/K	2.056	2.664	2.209	1.985	1.725	1.673	1.982	1.876	2.094	2.117	2.013	2.089	1.823	1.786	1.863
U/TH	0.499	0.633	0.524	0.409	0.366	0.360	0.430	0.395	0.430	0.425	0.403	0.396	0.394	0.381	0.380
TH/K	4.203	4.311	4.282	4.878	4.747	4.662	4.626	4.775	4.896	5.025	5.030	5.315	4.628	4.727	4.967

	1040	1050	1060
POTASIUM	1.118	1.138	1.178
URANIUM	2.239	2.288	2.509
THORIUM	5.306	5.450	5.746
U/K	2.009	2.023	2.167
U/TH	0.436	0.429	0.445
TH/K	4.716	4.772	4.899

MAP UNIT QTE

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	1.073	1.186	1.362	0.000	1.285	1.339	1.409	1.491	1.381	1.295	1.189	1.294	1.519	1.312	1.185
URANIUM	2.046	2.965	3.050	0.000	2.221	2.197	2.260	2.080	2.517	2.413	2.307	2.591	2.486	2.100	2.095
THORIUM	4.547	5.174	4.866	0.000	6.627	6.090	6.479	6.540	6.816	6.297	6.086	6.994	6.933	5.919	5.407
U/K	1.917	2.532	2.246	0.000	1.730	1.657	1.625	1.405	1.836	1.883	1.954	2.015	1.669	1.602	1.779
U/TH	0.458	0.584	0.638	0.000	0.338	0.364	0.352	0.320	0.373	0.389	0.381	0.374	0.361	0.358	0.395
TH/K	4.225	4.372	3.563	0.000	5.174	4.580	4.636	4.423	4.949	4.882	5.141	5.430	4.615	4.509	4.538

	1040	1050	1060
POTASIUM	1.235	0.000	0.976
URANIUM	2.496	0.000	1.870
THORIUM	6.013	0.000	3.748
U/K	2.031	0.000	1.925
U/TH	0.421	0.000	0.515
TH/K	4.872	0.000	3.810

MAP UNIT QTI

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.076	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	1.783	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	4.679	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	1.659	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	0.383	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	4.347	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	1040	1050	1060
POTASIUM	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000
U/K	0.000	0.000	0.000
U/TH	0.000	0.000	0.000
TH/K	0.000	0.000	0.000

MAP UNIT S

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.000	0.000	0.000	1.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.933
URANIUM	0.000	0.000	0.000	2.598	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.461
THORIUM	0.000	0.000	0.000	6.265	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.434
U/K	0.000	0.000	0.000	2.355	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.566
U/TH	0.000	0.000	0.000	0.442	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.329
TH/K	0.000	0.000	0.000	5.287	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.758

	1040	1050	1060
POTASIUM	0.000	1.008	0.827
URANIUM	0.000	2.075	2.458
THORIUM	0.000	4.905	4.380
U/K	0.000	2.059	2.987
U/TH	0.000	0.425	0.563
TH/K	0.000	4.877	5.364

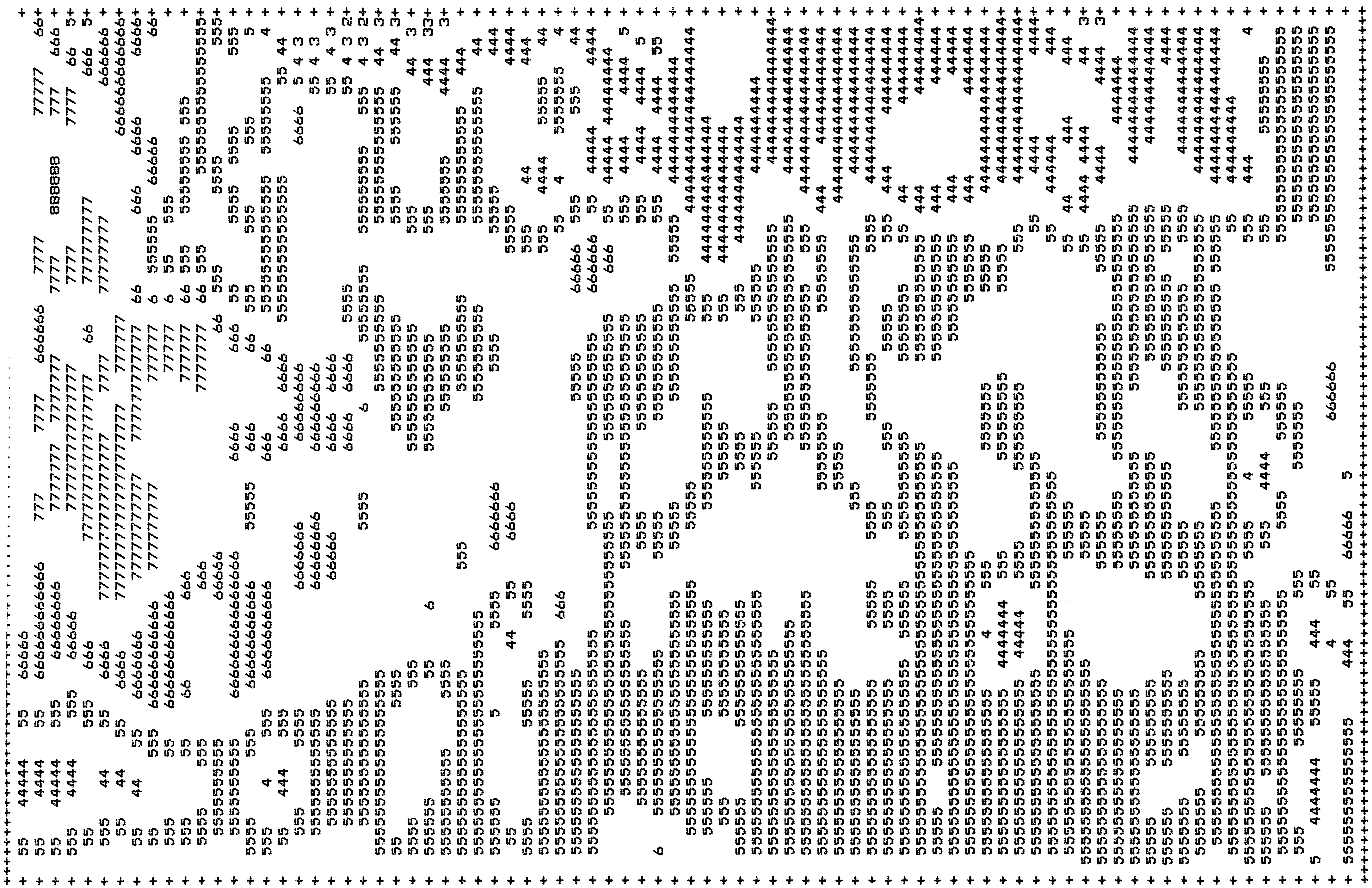
MAP UNIT M1

	490	500	510	520	530	540	550	560	570	580	590	600	1010	1020	1030
POTASIUM	0.000	0.000	0.000	1.220	0.000	0.000	0.000	0.000	0.000	1.157	0.000	1.184	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	2.788	0.000	0.000	0.000	0.000	0.000	2.565	0.000	2.269	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	6.445	0.000	0.000	0.000	0.000	0.000	5.737	0.000	5.731	0.000	0.000	0.000
U/K	0.000	0.000	0.000	2.295	0.000	0.000	0.000	0.000	0.000	2.225	0.000	1.923	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.437	0.000	0.000	0.000	0.000	0.000	0.454	0.000	0.400	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	5.275	0.000	0.000	0.000	0.000	0.000	4.949	0.000	4.837	0.000	0.000	0.000

	1040	1050	1060
POTASIUM	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000
U/K	0.000	0.000	0.000
U/TH	0.000	0.000	0.000
TH/K	0.000	0.000	0.000

APPENDIX H - Pseudo Contour Maps

DANVILLE



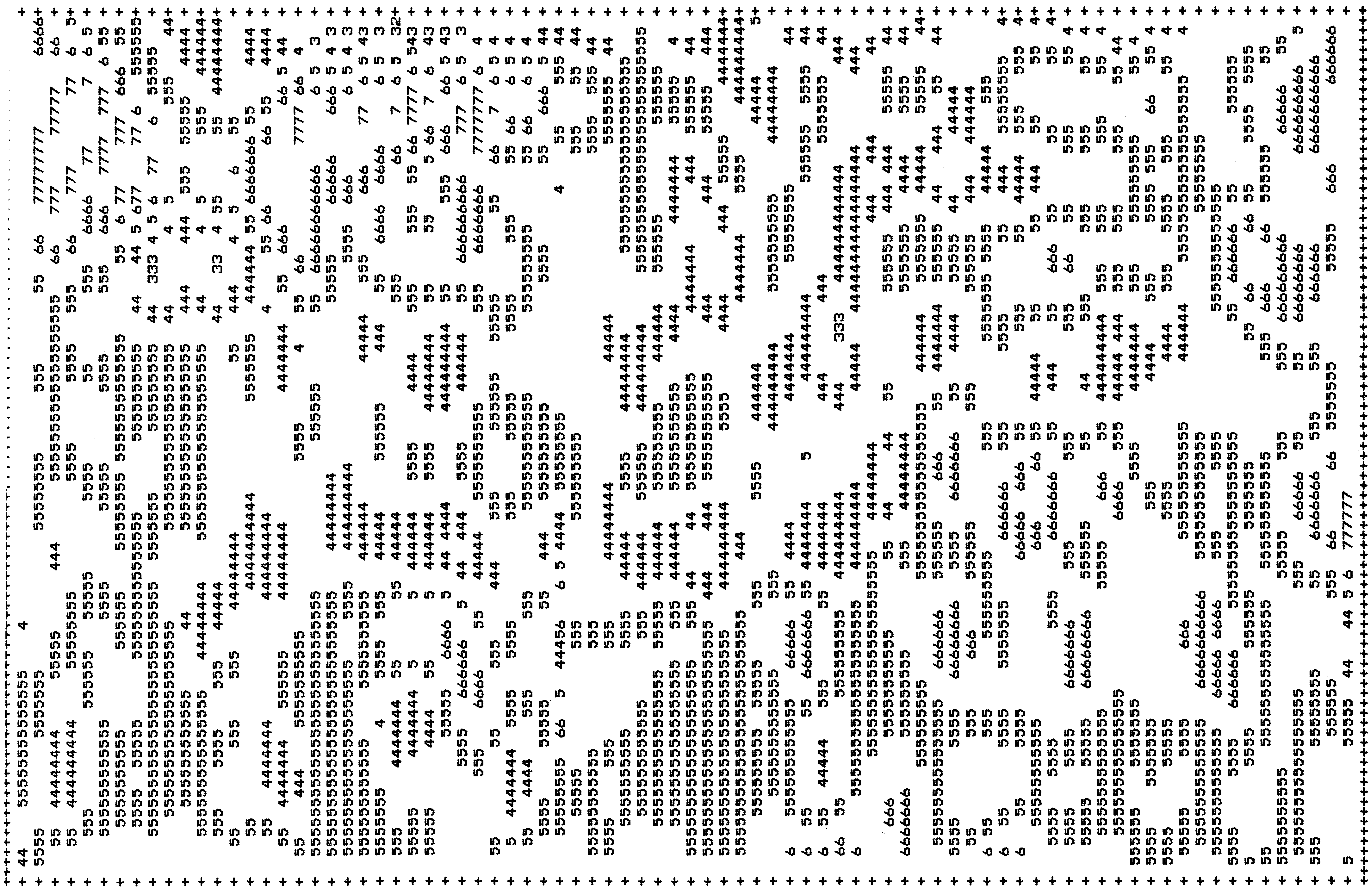
Potassium Pseudo-Contour Map - Danville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.1250
1	0.1250	0.2500
	0.2500	0.3750
2	0.3750	0.5000
	0.5000	0.6250
3	0.6250	0.7500
	0.7500	0.8750
4	0.8750	1.0000
	1.0000	1.1250
5	1.1250	1.2500
	1.2500	1.3750
6	1.3750	1.5000
	1.5000	1.6250
7	1.6250	1.7500
	1.7500	1.8750
8	1.8750	2.0000
	2.0000	2.1250
9	2.1250	2.2500
	GT	2.2500

SCALE IN EQUIVALENT PERCENT

DANVILLE



Uranium Pseudo-Contour Map - Danville Quadrangle

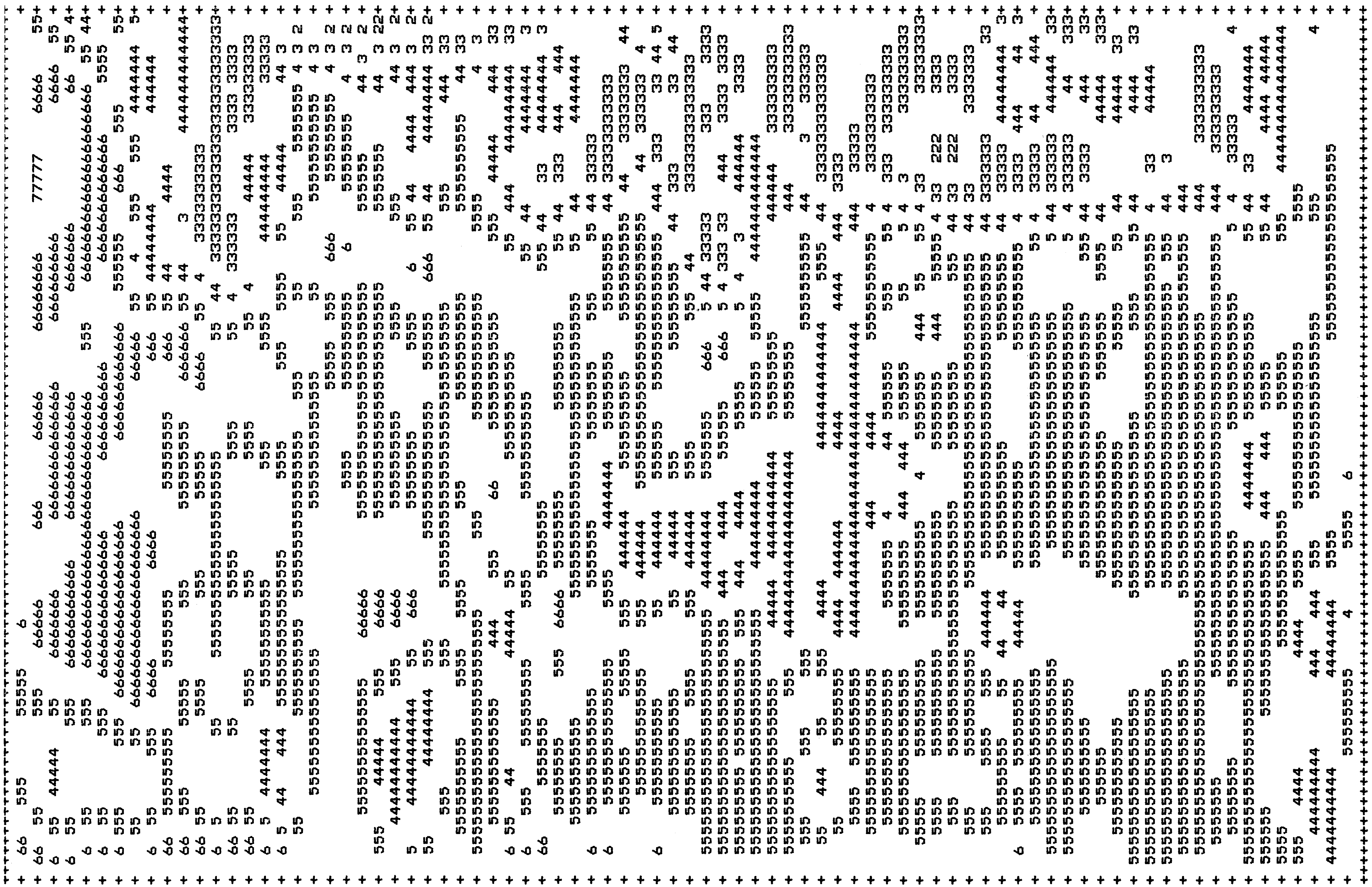
EXPLANATION

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

H3 da

DANVILLE



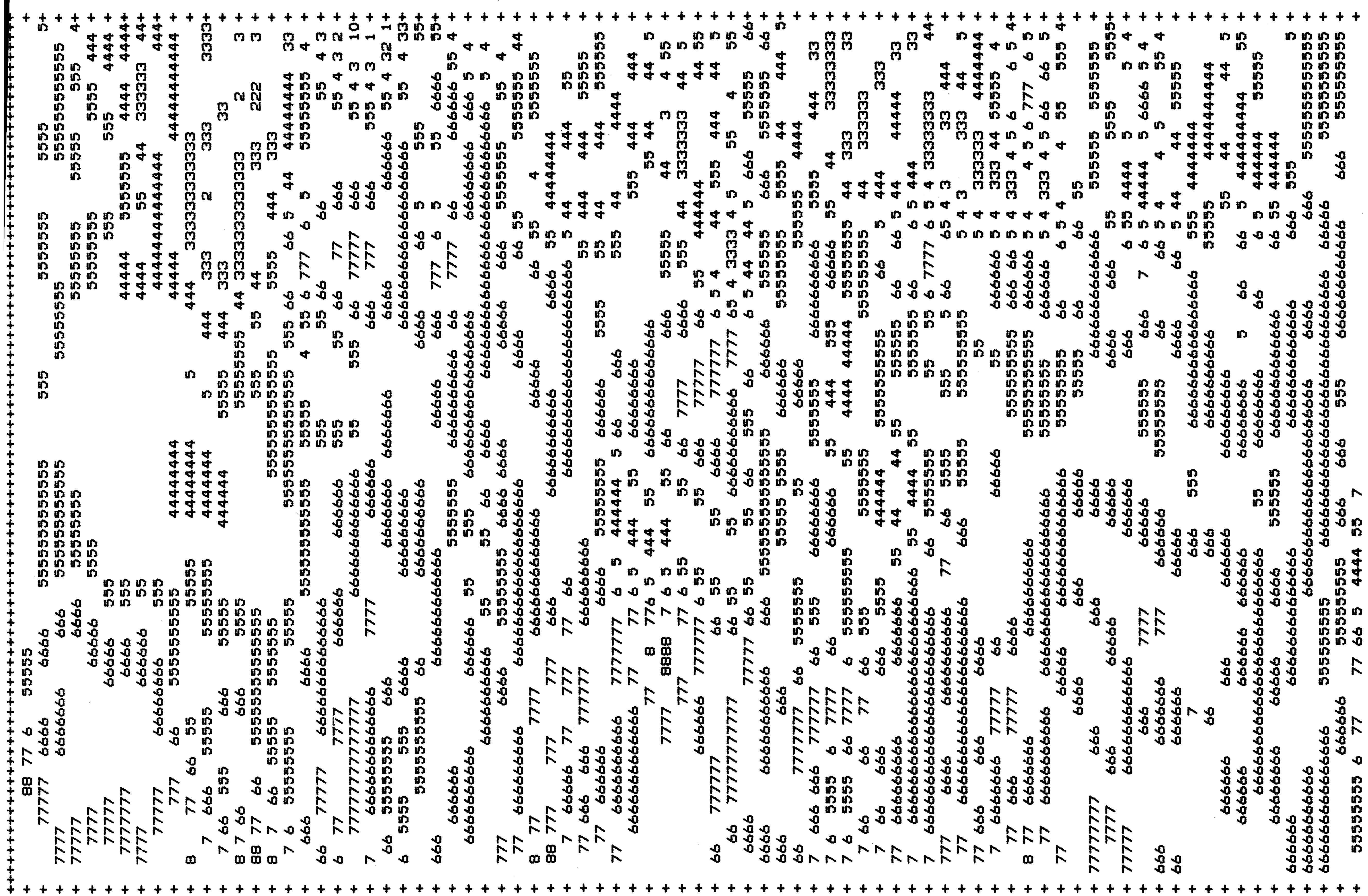
Thorium Pseudo-Contour Map - Danville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.6250
1	0.6250	1.2500
	1.2500	1.8750
2	1.8750	2.5000
	2.5000	3.1250
3	3.1250	3.7500
	3.7500	4.3750
4	4.3750	5.0000
	5.0000	5.6250
5	5.6250	6.2500
	6.2500	6.8750
6	6.8750	7.5000
	7.5000	8.1250
7	8.1250	8.7500
	8.7500	9.3750
8	9.3750	10.0000
	10.0000	10.6250
9	10.6250	11.2500
	GT	11.2500

SCALE IN EQUIVALENT PPM

DANVILLE

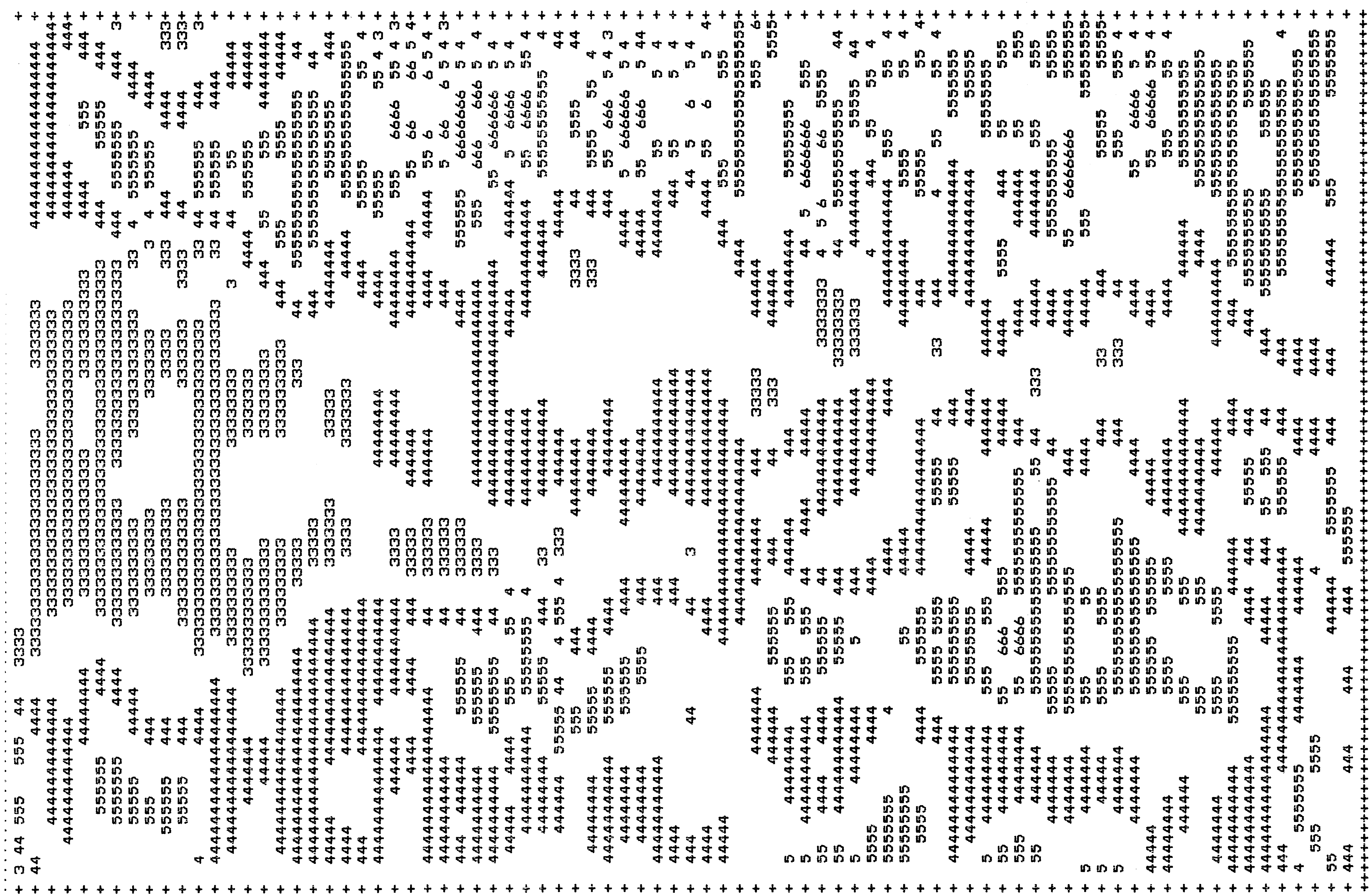


EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	2.0000
	2.0000	2.2500
1	2.2500	2.5000
	2.5000	2.7500
2	2.7500	3.0000
	3.0000	3.2500
3	3.2500	3.5000
	3.5000	3.7500
4	3.7500	4.0000
	4.0000	4.2500
5	4.2500	4.5000
	4.5000	4.7500
6	4.7500	5.0000
	5.0000	5.2500
7	5.2500	5.5000
	5.5000	5.7500
8	5.7500	6.0000
	6.0000	6.2500
9	6.2500	6.5000
	GT	6.5000

Thorium/Potassium Pseudo-Contour Map - Danville Quadrangle

DANVILLE

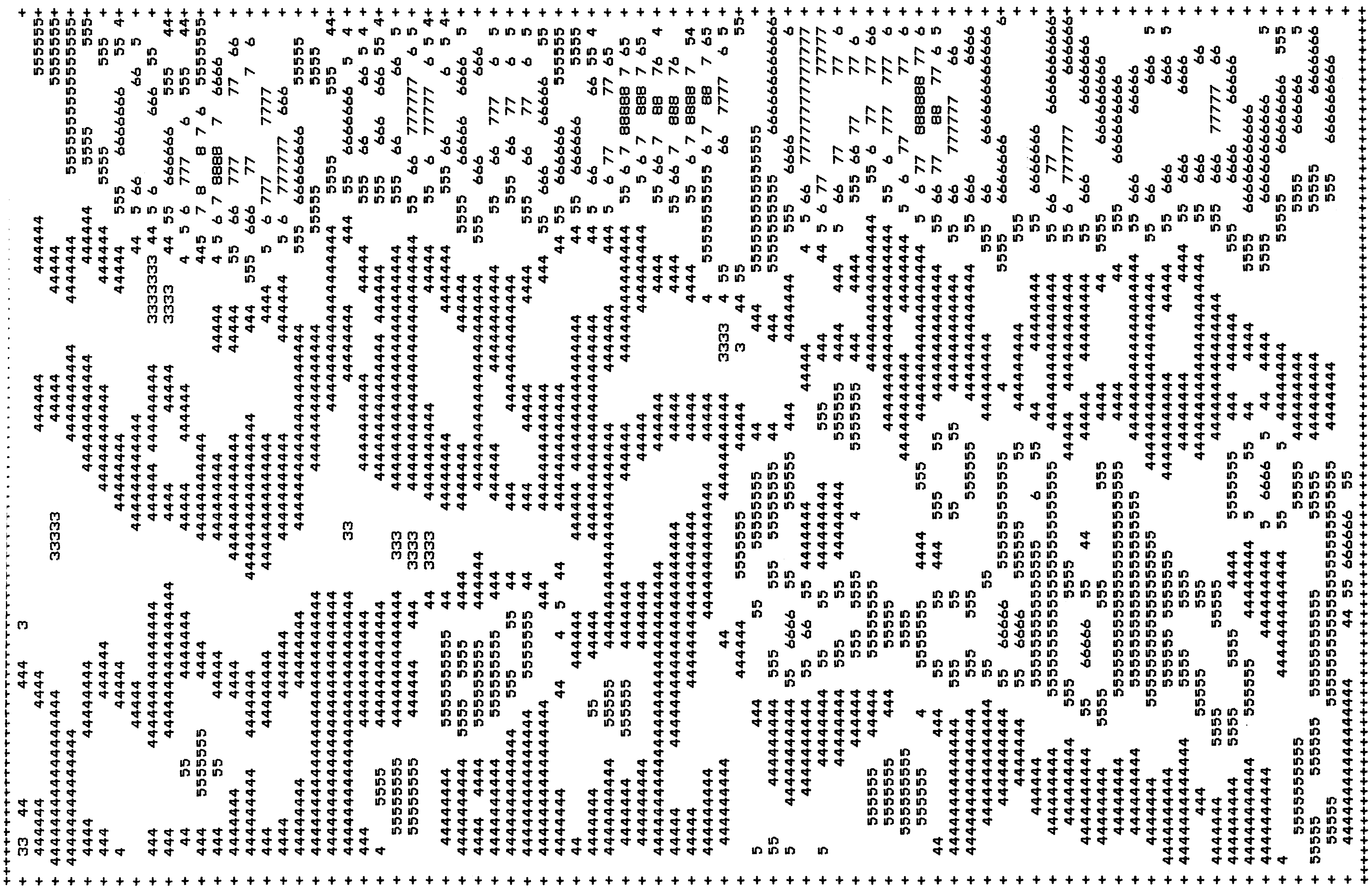


EXPLANATION

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

Uranium/Potassium Pseudo-Contour Map - Danville Quadrangle

DANVILLE



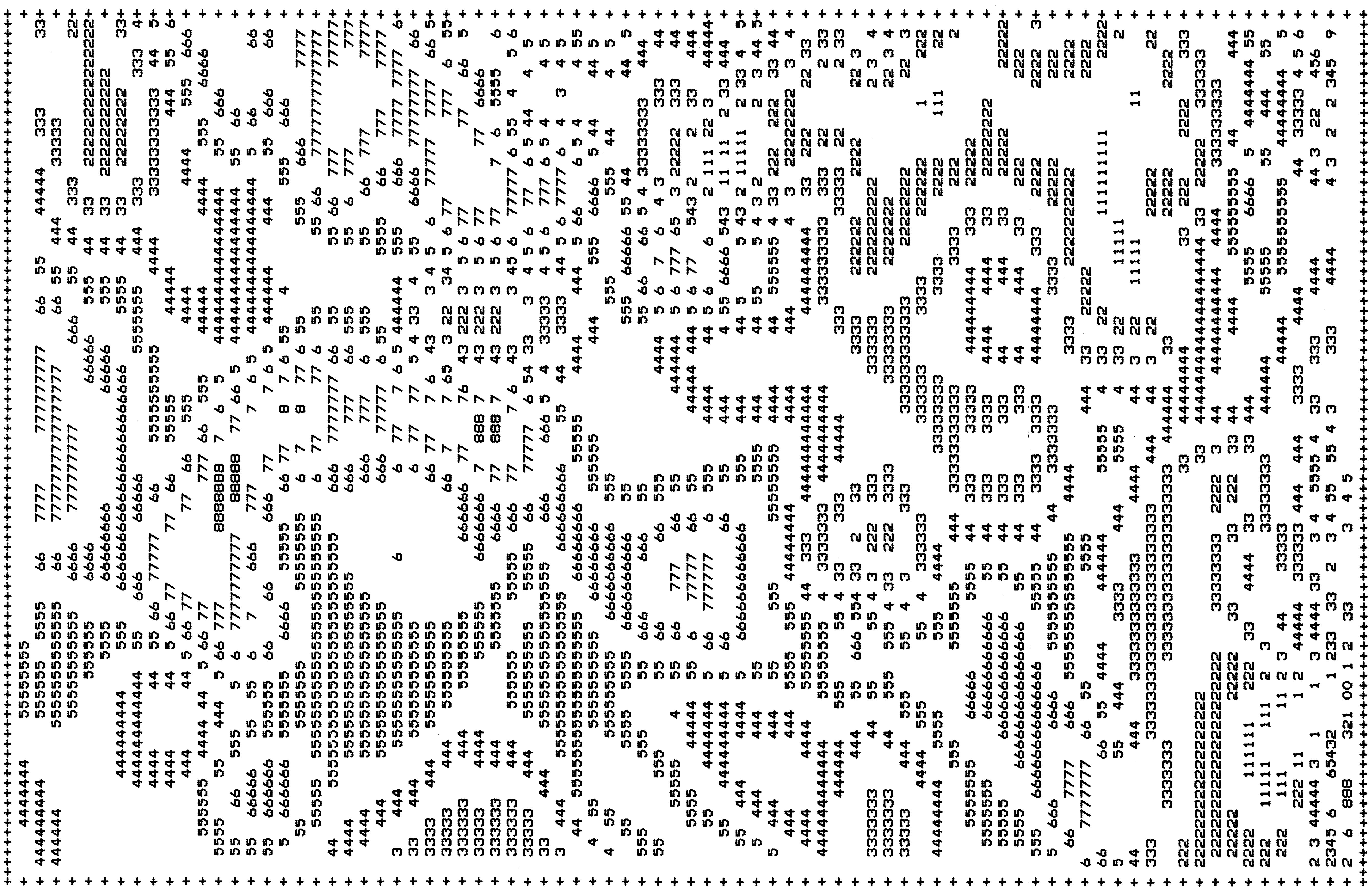
EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.0500
1	0.0500	0.1000
	0.1000	0.1500
2	0.1500	0.2000
	0.2000	0.2500
3	0.2500	0.3000
	0.3000	0.3500
4	0.3500	0.4000
	0.4000	0.4500
5	0.4500	0.5000
	0.5000	0.5500
6	0.5500	0.6000
	0.6000	0.6500
7	0.6500	0.7000
	0.7000	0.7500
8	0.7500	0.8000
	0.8000	0.8500
9	0.8500	0.9000
	GT	0.9000

Uranium/Thorium Pseudo-Contour Map - Danville Quadrangle

H7d

DANVILLE



Residual Magnetic Pseudo-Contour Map - Danville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE
0	LE-1100.0000
	-1100.0000-1050.0000
1	-1050.0000-1000.0000
	-1000.0000 -950.0000
2	-950.0000 -900.0000
	-900.0000 -850.0000
3	-850.0000 -800.0000
	-800.0000 -750.0000
4	-750.0000 -700.0000
	-700.0000 -650.0000
5	-650.0000 -600.0000
	-600.0000 -550.0000
6	-550.0000 -500.0000
	-500.0000 -450.0000
7	-450.0000 -400.0000
	-400.0000 -350.0000
8	-350.0000 -300.0000
	-300.0000 -250.0000
9	-250.0000 -200.0000
	GT -200.0000

SCALE IN GAMMAS