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GJBX-(81)-100

GJBX-100 '81

National Uranium Resource Evaluation

AERIAL GAMMA RAY AND MAGNETIC SURVEY VALDOSTA AND JACKSONVILLE QUADRANGLES GEORGIA AND FLORIDA

FINAL REPORT

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EG&G GEOMETRICS
Sunnyvale, California 94086

March 1981

GEOLOGY

GEOLOGICAL SURVEY OF WYOMING

PREPARED FOR U.S. DEPARTMENT OF ENERGY

Grand Junction Office, Colorado

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This report is a result of work performed by EG&G geoMetrics through a Bendix Field Engineering Corporation Subcontract, as part of the National Uranium Resource Evaluation. NURE is a program of the U.S. Department of Energy's Grand Junction, Colorado, Office to acquire and compile geologic and other information with which to assess the magnitude and distribution of uranium resources and to determine areas favorable for the occurrence of uranium in the United States.

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Prepared by
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Sunnyvale, California

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Prepared for the U.S. Department of Energy
Grand Junction Office, Colorado
Under Contract No. DE-AC13-76GJ01664
and Bendix Field Engineering Corporation
Subcontract No. 80-426-L

ABSTRACT

The combined Valdosta and Jacksonville quadrangles cover 10,912 square miles of land in southeastern Georgia and northeastern Florida. The area includes moderately thick sections of platform sediments covering the pre-Cretaceous Peninsular Arch. Surficial exposures are comprised of Tertiary to Recent deposits.

A search of available literature revealed no known significant uranium deposits.

A total of forty-three (43) uranium anomalies were detected and are discussed briefly in this report. None appear to be of significance.

Magnetic data appear to largely reflect known structure. Smaller linear features present could represent complexities in the Paleozoic and older basement material.

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INTRODUCTION

General

The Valdosta and Jacksonville quadrangles encompass approximately 10,912 square miles of land area in southeastern Georgia and the north-central peninsula of Florida (see Figure 1).

The geologic maps used in the interpretation were compiled by Martel Laboratories, Inc., in 1980. These geologic maps were compiled at a scale of 1:250,000 from maps published after 1960. The scale of the source map data ranged from 1:400,000 to 1:1,000,000. Some of the outlined units do not register well (up to .4 km) along the common border. This unfortunately limits the accuracy of the digitized units used in the interpretation. Geologic map unit descriptions, found in Appendix C, were taken directly from the Martel map legends. Supplementary geologic information was taken from Murray (1961), Fairbridge (ed.) 1975, Flint (1971), Florida Special Publication, No. 5 (1964),and Cohee and others (1962). Cultural and physiographic information was taken from the 1:250,000 scale Valdosta (1965 version) and Jacksonville (1966 version) topographic maps.

Radiometric and magnetic data for both the Valdosta and Jacksonville quadrangles were acquired in January of 1981, and processed in March. A detailed summary of data acquisition, processing, interpretation, and presentation methods can be found in Appendix A of this report. Appendix B contains a flight summary report for the two quadrangles. It should be noted that although Appendixes C, D, E, and H are presented as separate quadrangles, the interpretation report, statistics, data tapes, and microfiche are processed and presented as one area.

Physiography

The land area defined by the two quadrangles lies within the Gulf Coastal Physiographic Province to the west, and the Atlantic Coastal Physiographic Province to the east, with the Tertiary Ocala uplift separating the two provinces (Fairbridge, 1975). The gently-sloping topography is dominated by local timber production, swamps and poorly forested land ("sand barren"). Barrier beaches with interior marshes and swamps are prominent along the Atlantic coastal region, while nearly flat-lying hummock lands dominate the Gulf coast. The two provinces are divided nearly in half by the northwesterly trending Ocala uplift. Northeast of this uplift lies the Okefenokee Swamp. The Suwannee River (flowing SSW) watershed (including bayous) drain the swamp and outlying areas. An escarpment to the east separates the swamp from the lower elevation coastal terraces. These terraces are drained by several small rivers and bayous into the Atlantic Ocean. West of the uplift several rivers drain the area to the south. The Aucilla and Enconfina Rivers and associated tributarues drain large

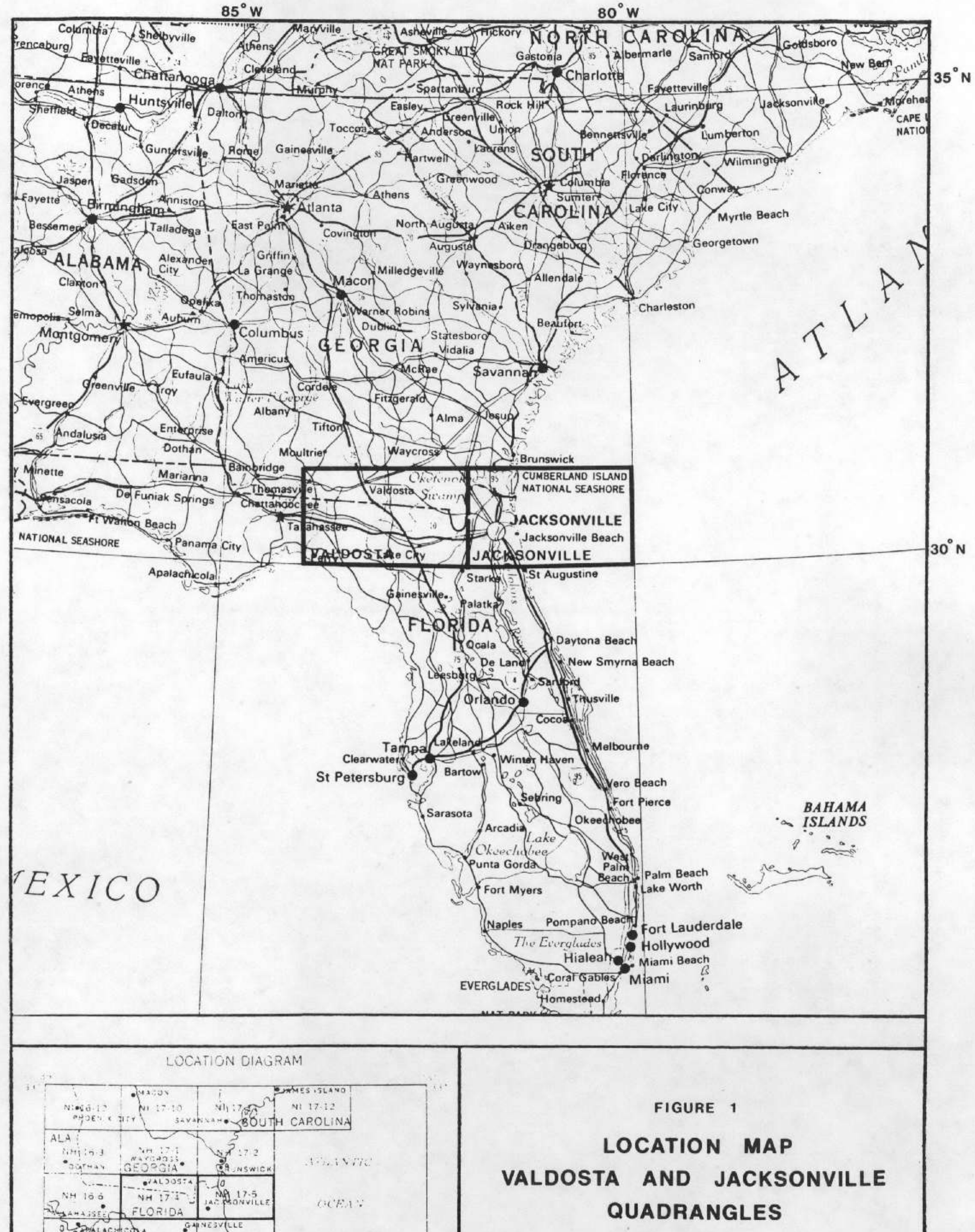


FIGURE 1

LOCATION MAP
VALDOSTA AND JACKSONVILLE
QUADRANGLES

Scale
100 50 0 100 MILES

portions of this region. Both flow into the Gulf of Mexico. The Little River and Alapaha Rivers drain the divide in the northern area, then merge into the Suwannee River in the central portion of the Valdosta quadrangle. This, in turn continues to flow generally south and drain the rest of the divide area within the quadrangle.

Topographically east of the divide is a series of recent, nearly flat lying terraces. The north-south trending escarpment east of the Okefenokee swamp separates two major elevation levels. The swamp area lies at approximately 120 feet, whereas east of the escarpement younger age terraces lie at approximately 50 feet. West of the divide is also generally divided into two areas. Most of the southwest quadrant in the Valdosta quadrangle contains an average elevation of 50 feet. The rest of the area west of the divide ranges from 100 to 250 feet, with large local variations due to stream erosion and dissolution of the limestone formations. Slopes west of the divide dip gently to the south, while slopes east of the divide dip more to the southeast.

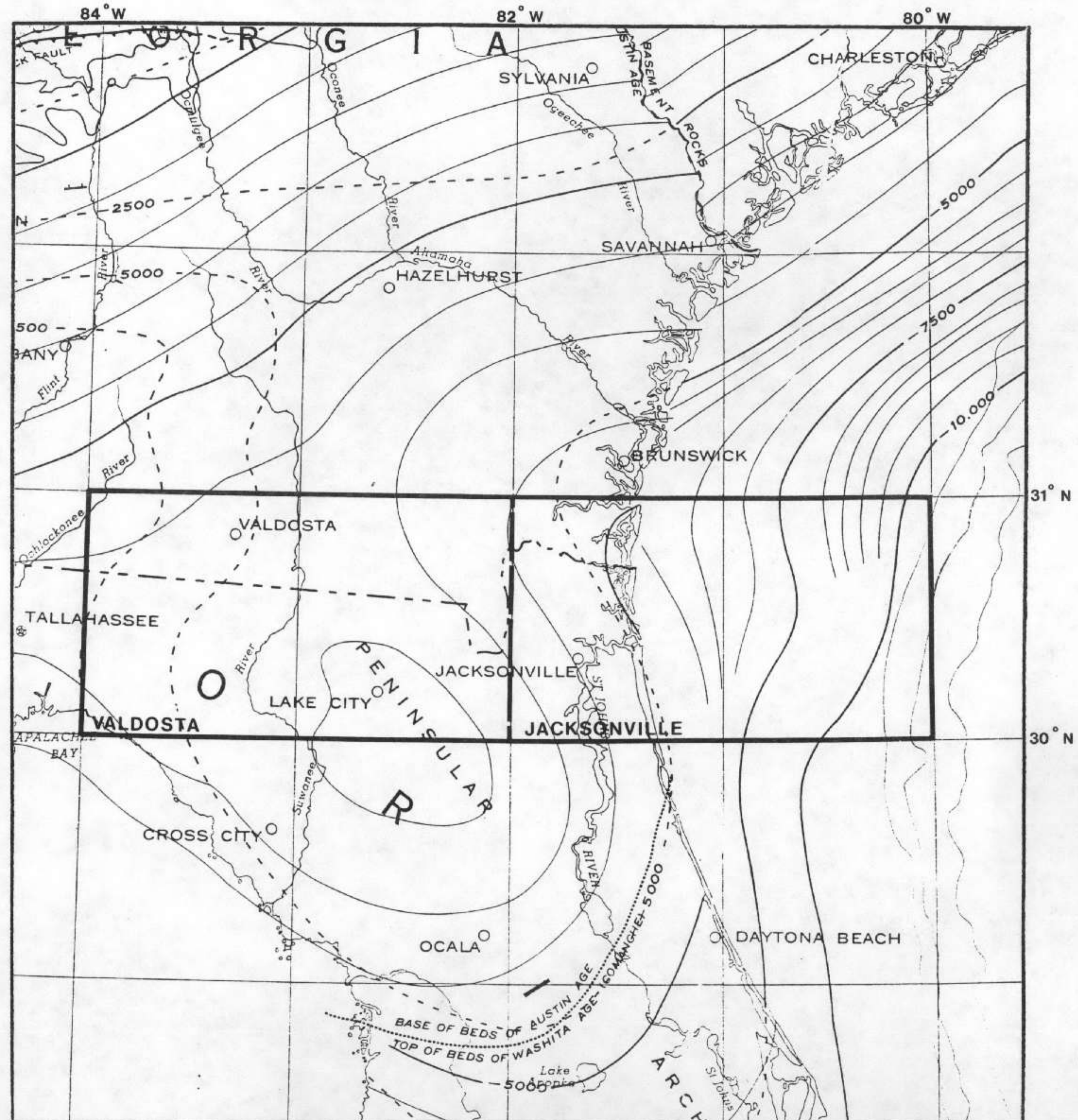
The area is moderately developed from a cultural standpoint. The largest cities are Jacksonville and Valdosta (populations 565,000 and 36,000 respectively). The Okefenokee Swamp dominates the north-central portion of the area, while small cities and towns dot the remainder of the area. The entire area contains locally extensive roads and railroads, with numerous federal and state highways extending across both quadrangles.

GEOLOGY

Structure

The surficial material in the two quadrangles directly overlie the pre-Cretaceous Peninsular Arch (see Figure 2) and the NNW trending Tertiary anticlinal folds of the Ocala uplift. Both axes are separate but approximately parallel, with the Ocala axis slightly to the west of the Peninsular Arch axis. The structural picture in the region during Lower Cretaceous to Recent times differs markedly from that of the underlying older sequences, as shown by well test data. The Cretaceous and younger sediments overlie, with angular unconformity and onlap, the Paleozoic and older basement material. The region is dominated by Cretaceous and younger age deposits. The thinnest, occurring over the Peninsular arch, is approximately 3800 feet thicker, while a thickening of sediments occurs to the SW and NE of the arch. The thickest sediments occur along the Atlantic coastline area, at 4700 feet, with thickening of sediments offshore in both the Gulf of Mexico and the Atlantic Ocean.

There are no known faults in surficial or Paleozoic deposits according to Martel Laboratories and Cohee et al, 1962. It should be noted that some faulting may have occurred on a local scale due to these fold systems.



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

FIGURE 2

TECTONIC STRUCTURE MAP VALDOSTA AND JACKSONVILLE QUADRANGLES

Scale 1:2,500,000

25 0 25 50 75 MILES

Surface Geology

As mapped, Cenozoic sedimentary material covers the entire surface of the region, with Tertiary exposures accounting for 45 percent of the area and Quaternary exposures covering 46 percent.

Part of the Quaternary system consists of alluvial, coastal barrier island, and marsh deposits, all of Holocene age. These deposits account for 3 percent of the surface in or near waterways along the Atlantic coast, while only alluvium deposits occur along the Gulf coast and the southern border of the area (adjacent to the Suwannee River). Pleistocene deposits consist of barrier island, marsh, and terrace deposits of early Sangamon to late Peorian interglacial stages. These deposits account for 43 percent of the total surface, and were mapped entirely within the eastern half of the land area. The terrace deposits occur roughly parallel to the Atlantic coast, with the Okefenokee Swamp being the oldest Pliestocene terrace, and younger terraces immediately east of the escarpment, along the eastern Valdosta border. Pleistocene - Pliocene sands and gravels, undifferentiated, account for 9 percent of the total surface. These deposits are confined to the north-central portion of the Valdosta quadrangle.

The Tertiary deposits consist of Eocene to Pliocene sands, clays, marls and limestones, with the Charlton and Hawthorne Formations containing minor to trace amounts of phosphate particles. Except for some Tertiary deposits along the eastern border of the Valdosta quadrangle, the majority of the Tertiary age deposits were mapped exclusively within the western half of the survey area.

Tertiary age materials were deposited in a series of alternating marine submergence and emergence. The environment ranged from shallow marine platform to near-shore environments with intermittent emergence. The Hawthorne Formation was probably exposed during late Miocene time, forming irregular karst topography and accumulations of phosphatic residuum (Altschuler and others, 1955).

Uranium

According to available sources, there are no known significant uranium deposits, though phosphoritic sediments contain concentrations of uranium that are higher than the adjacent rock units (Altschuler and others, 1955 and Cathcart, 1955).

INTERPRETATION OF GEOPHYSICAL DATA

Radiometric Data

A total of 43 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, in Figures 3 and 3a. the anomalies are summarized in the 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.

Concentrations of the three radioactive elements are extremely low. The overall average uranium concentration is 1.5 pmeU. Average thorium and potassium concentrations are 2.7 ppmeT and .18 percent respectively. Although map unit TPCD (Tertiary Charleton Formation and Dulin Marl, undifferentiated) contains the highest average uranium and thorium concentrations at 2.25 ppmeU and 6.6 ppmeT respectively, this unit contains less than 100 samples. Map unit QTPAM (Quaternary Pamlico terrace marsh deposits) consists of slightly lower concentrations at 2.0 pmeU and 6.2 ppmeT respectively, while sharing the highest average potassium concentrations with map unit QHI (Holocene Coastal Barrier Island deposits) at 0.24 percent. Pleistocene terrace deposits dominate peak concentrations of all three elements. Again map unit QTPAM shares the peak potassium concentrations with QAL (Holocene Alluvium) at 0.5 percent. Map unit QTW (Quaternary Wicomico terrace deposits) contains the peak uranium concentration at 13.2 ppmeU, while map unit QTSB (Quaternary Silver Bluff terrace deposits) contains the peak thorium concentration at 25.4 ppmeT.

In general, higher potassium concentrations are confined to the Jacksonville quadrangle. The entire Valdosta quadrangle consists of relatively uniform concentrations, that are lower than the area-wide average (see Appendix H). The highest concentrations of thorium are contained in the Jacksonville quadrangle, with additional local anomalous areas in the southeast and northwest corners of the Valdosta quadrangle (see Appendix H). The remainder of the Valdosta quadrangle contains extremely uniform concentrations less than the area-wide thorium average. Uranium on the other hand, appears in several anomalous localities with only the Okeefenokee Swamp area containing uniformly lower concentrations (< 1.0 ppmeU).

Generally, within the Jacksonville quadrangle, higher concentrations of all three radioactive elements appear to be attributed to the Silver Bluff, Pamlico terrace (QTPA) and Pamlico terrace marsh deposits. These terrace deposits may contain source material from a more northerly portion of the Atlantic coast, where material was drained from the Appalachian Mountains. On the other hand, the Valdosta quadrangle contains only higher concentrations of thorium and uranium. Map units TMH (Tertiary Hawthorne Formation), and TMM (Tertiary Miccosukee Formation) appear to contain these anomalous concentrations of thorium and uranium, with map units TOS (Suwannee limestone) and QTWM (Quaternary Wicomico terrace marsh deposits), being more local and containing only high uranium concentrations. The highest concentrations for all three elements are confined to the terrace deposits of the Jacksonville quadrangle.

Anomalies are scattered mainly within the Valdosta quadrangle. There are several small clusters in the central and southern border regions of the quadrangle (see Figure 3). Map units TOS, TMH and QTWM are associated with clusters in the southern portion of the Valdosta quadrangle, while QTPPS (Pleistocene - Pliocene sands and gravels, undifferentiated) is the dominant unit in the central portion of the quadrangle. Map unit TOS contains the highest peak concentration of all the anomalies, and ranged from 5.3 to 7.2 ppmeU. All other units contain peak uranium concentrations less than 4.4 ppmeU, with an approximate mean of 3.2 ppmeU. Most anomalies appear to be associated with cultural features of some sort (roads, railroads, quarries, cities, etc.).

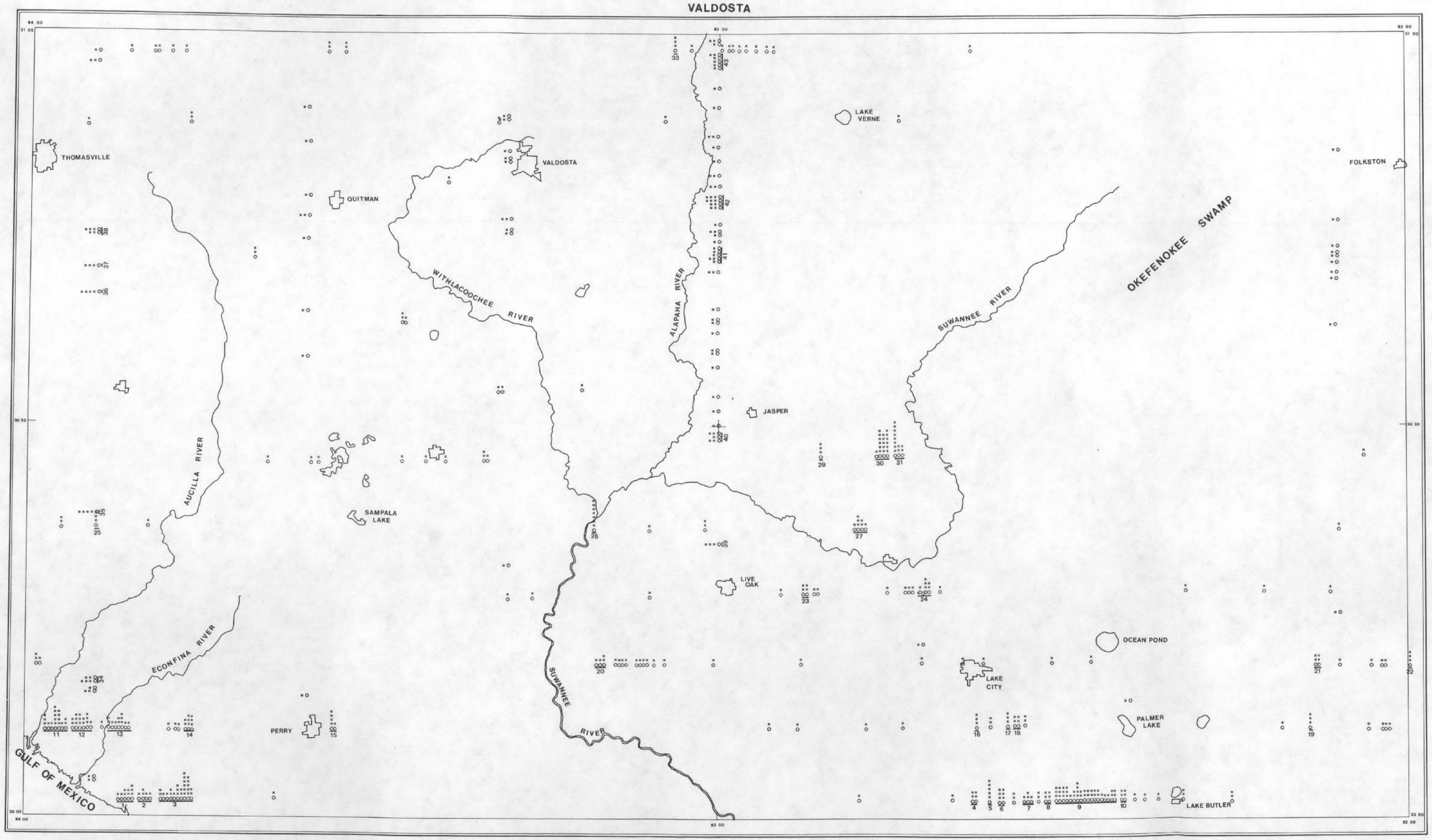
The low uranium concentrations, coupled with the correlation to cultural influences, suggest that none of the anomalies depicted in this report should be considered as reflecting significant uranium concentrations.

Magnetic Data

The magnetic field pseudo-contour maps appear in Appendix H.

The region contains moderate thicknesses of Mesozoic and Cenozoic platform material, which thickens to the SW and NE. Though the structural configuration of the underlying Paleozoic strata is not well known, it is thought to be of substantial thickness.

The magnetic field represents the strucutral interpretation of the region very well. The south-central portion of the area (over the Peninsular Arch) contains moderately low gradients and long wavelengths. The gradient decreases to the west and NE with an accompanying increase in wavelength. This could indicate a thickening of non-magnetic material to the west and NE. Several northeasterly trending linear features, mainly over the arch, may correlate with lithologic and/or structural complexities in the underlying Paleozoic and older basement material.



URANIUM ANOMALY/ INTERPRETATION MAP

VALDOSTA QUADRANGLE

U.S. DEPARTMENT OF ENERGY

APPROXIMATE SCALE 1:500,000

EXPLANATION

□ – CITY OR TOWN

– URANIUM SAMPLE MEETING FOLLOWING CRITERIA:

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

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

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

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

– URANIUM ANOMALY:

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

SURVEY AND COMPILATION BY

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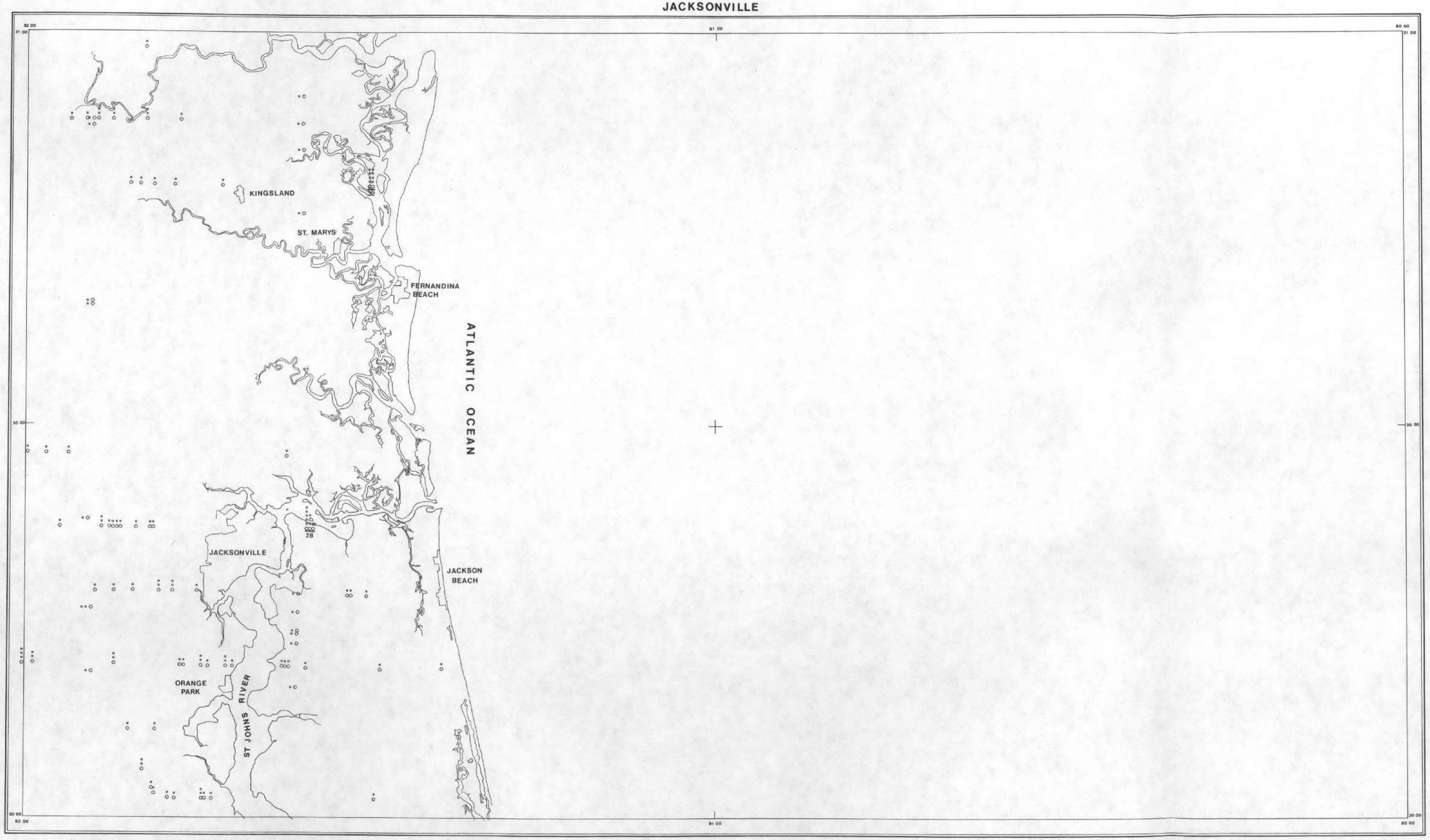
Figure 3 - Uranium Anomaly/Interpretation Map Valdosta Quadrangle



URANIUM ANOMALY/ INTERPRETATION MAP

JACKSONVILLE QUADRANGLE

U.S. DEPARTMENT OF ENERGY

APPROXIMATE SCALE 1:500,000

EXPLANATION

- CITY OR TOWN
- URANIUM SAMPLE MEETING FOLLOWING CRITERIA:
  - (1) $1.0 \le U \le \infty$
  - (2) $-1.0 \le T \le \infty$
  - (3) $1.0 \le U/T \le \infty$

  IN STANDARD DEVIATION UNITS.
  EACH SQUARE REPRESENTS 1 STANDARD DEVIATION.
- URANIUM ANOMALY:

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

N

SURVEY AND COMPILATION BY

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Figure 3a - Uranium Anomaly/Interpretation Map - Jacksonville Quadrangle

BIBLIOGRAPHY

Altschuler, Z.S., Jaffe, E.B., Cuttitta, F., 1955, The Aluminum Phosphate Zone of the Bone Valley Formation, florida, and its Uranium Deposits: in United Nations Int. Conf. on the Peaceful uses of Atomic Energy, Vol. 4., 507-513.

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

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

Cathcart, J.B., 1955, Distribution and Occurrence of Uranium in the Calcium Phosphate Zone of the Land-Pebble Phosphate District of Florida; in United Nations Int. Conf. on the Peaceful uses of Atomic Energy, Vol. 4., 514-519.

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

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

Murray, G.E., 1961, Geology of the Atlantic and Gulf Coastal Province of North America. New York: Harper and Row, 692 p.

Puri, H.S., and Vernon, R.O., 1964. Summary of the Geology of Florida and A Guidebook to the Classic Exposures. Florida Geological Survey Special Publication No. 5 (Revised).

Richards, H.G., 1975, United States - Atlantic Coastal Province: in The Encyclopedia of World Regional Geology Part 1; R. W. Fairbridge, editor.

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

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

APPENDIX A – Data Acquisition, Processing, and Interpretation Methods

INTRODUCTION

General

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

> "To develop and compile geologic and other information with which to assess the magnitude and distribution of uranium resources and to determine areas favorable for the occurrence of uranium in the United States." (DoE)

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

All Airborne data collected by geoMetrics during the course of this project were done so utilizing a Beechcraft B65 Queen Air Airplane (U.S. Registry No. N9AG) and a Rockwell Aero Commander (Registry No. N1213B). Both aircraft 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

The production summary presented below describes the general procedures involved in gathering data for the entire project. The detailed daily production summary in Appendix B describes a portion of the total project.

Prior to the start of the survey operations, the airplanes were calibrated at the DoE test pads and Dynamic Test Range (the Queen Air in April 1980, and the Aero Commander in October 1980). Requirements for system calibrations are listed in the 1250-A specifications from BFEC.

Throughout the course of the overall project, the average ground speed maintained by the Queen Air was 140 mph. The Aero Commander averaged 150 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 airplanes' objective ground speeds, mentioned previously, were 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.

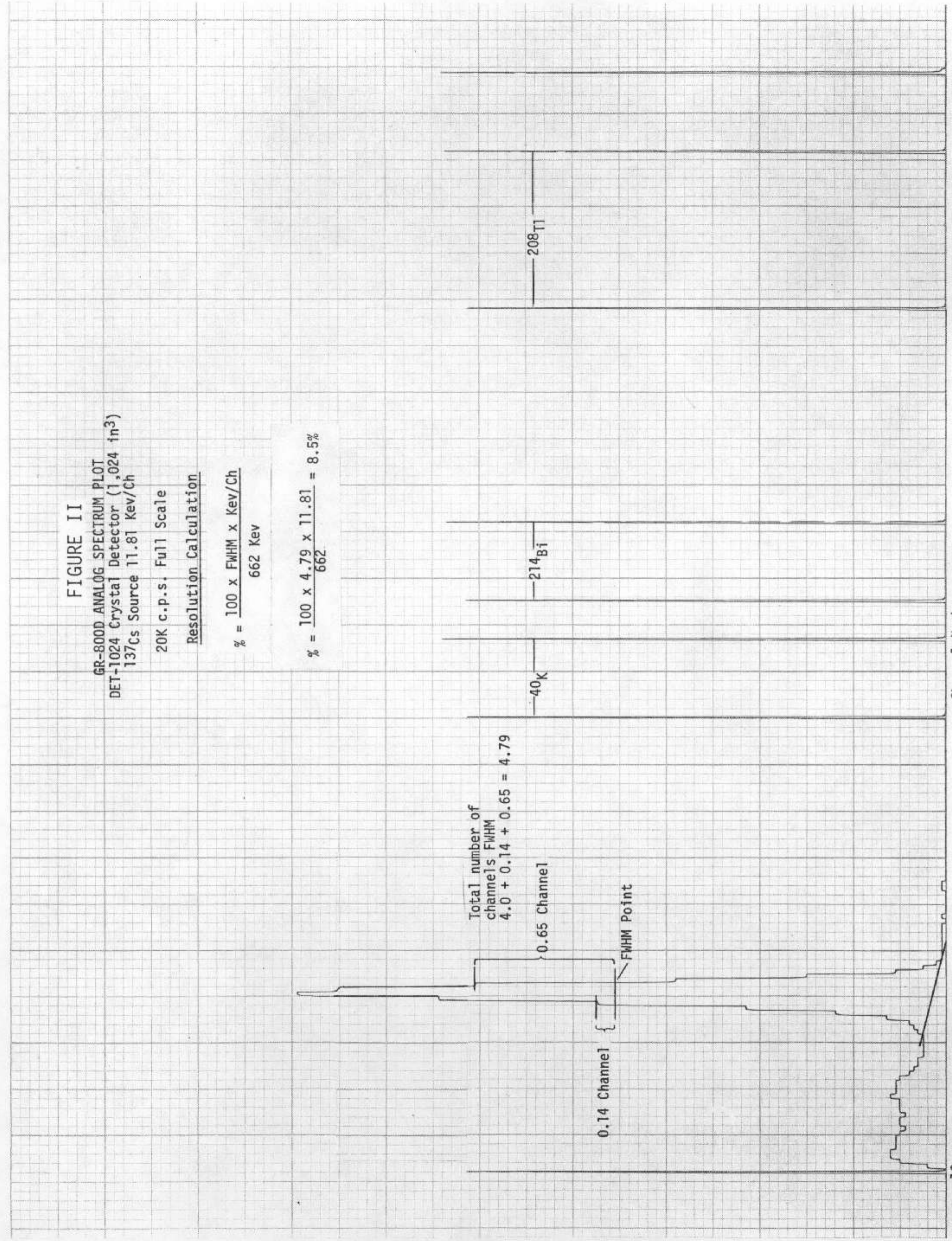
3. Finally run a full thorium analog spectrum of the down crystals and check for centering of K40 and Tl208 peaks in spectrum.

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 Tl208 window.

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

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

Field Digital Data Verification

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

DATA COLLECTION SYSTEM

AIRCRAFT

Two aircraft were used for this survey: (1) a Beechcraft Queen Air - Model 65 (U.S. Reg. No. N9AG), and (2) a Rockwell Aero Commander 680F (U.S. Reg. No. N1213B). Both these aircraft, being medium size with twin engines, possess overall performance and safety features which make them ideal for low level, fixed-wing airborne geophysical surveys in areas of up to moderately high topographic relief. They can carry adequate payloads at low constant airspeeds, while maintaining economy and a wide envelope of safety. Performance data for the two craft in their present survey configuration are given below.

	QUEEN AIR	AERO COMMANDER
Maximum Aircraft Gross Weight	7,700 lbs.	8,500 lbs.
Aircraft Empty (dry)	4,640 lbs.	5,200 lbs.
Max. useful load including fuel	3,060 lbs.	3,300 lbs
Geophysical Package	1,110 lbs.	1,110 lbs.
Navigation Equipment	125 lbs.	125 lbs.
Fuel Tanks Full	528 lbs.	1,338 lbs
Pilot & Electronics Operator	350 lbs.	350 lbs.
Total	2,113 lbs.	2,923 lbs.
Min. Control Speed at G.W. (IAS)	95 mph	NG
Safe Single Eng. Speed @ G.W. (IAS)	105 mph	NG
Rate of Climb 2 engines @ gross (FPM)	1,300	1,500
Rate of climb 1 engine @ gross (FPM)	210	250
Avgas consumption (ga/hr) at 75% power	36	38
Endurance (75% power)	6 hrs/6 mins.	5 hrs/30 mins.
Range (75% power - 45 min. reserve)	1,200 miles	1,100 miles
Cruise Configuration stalling speed at gross weight (IAS)		
0° bank	80 mph	80 mph
45° bank	95 mph	NG

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.

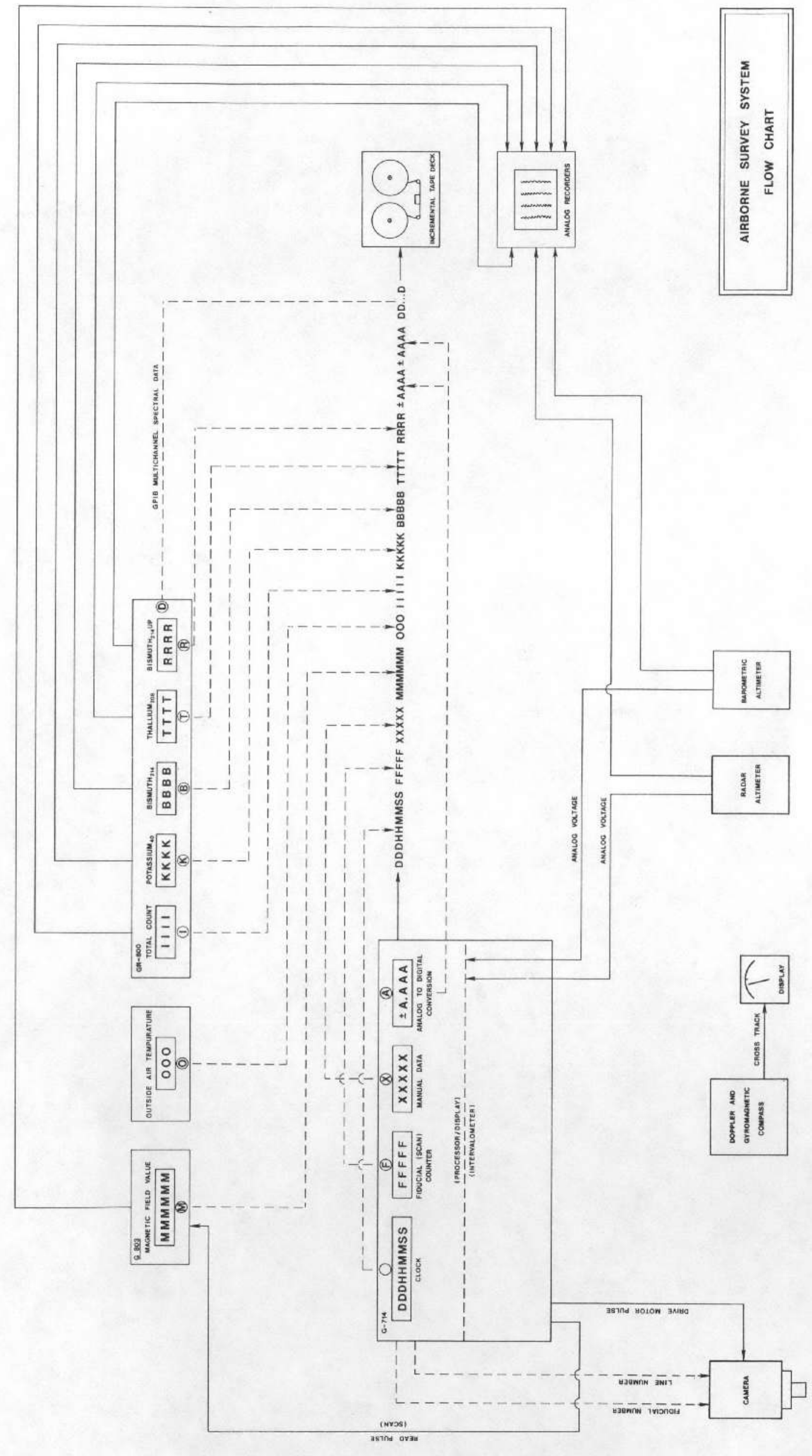


FIGURE III

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:

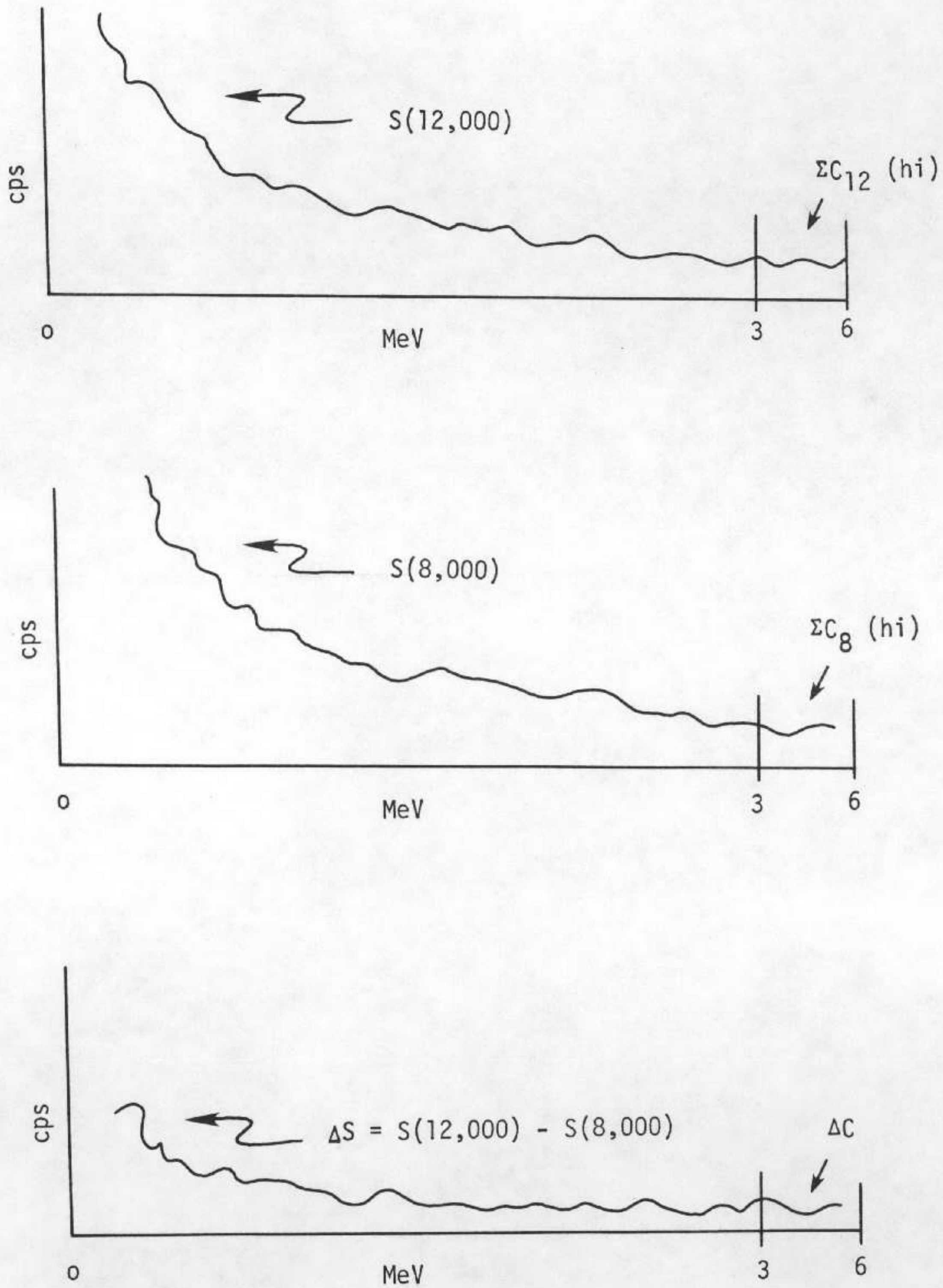


FIGURE IV - Multiple altitude spectra schematic

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).

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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)   3.792 CPS *************
CH  23 (0.272 MEV)   4.280 CPS ***************
CH  24 (0.284 MEV)   4.334 CPS ***************
CH  25 (0.295 MEV)   3.748 CPS *************
CH  26 (0.307 MEV)   3.897 CPS **************
CH  27 (0.319 MEV)   3.818 CPS *************
CH  28 (0.331 MEV)   4.236 CPS ***************
CH  29 (0.343 MEV)   3.433 CPS ************
CH  30 (0.355 MEV)   2.996 CPS ***********
CH  31 (0.366 MEV)   2.559 CPS **********
CH  32 (0.378 MEV)   2.269 CPS *********
CH  33 (0.390 MEV)   2.102 CPS ********
CH  34 (0.402 MEV)   2.081 CPS ******** TOTAL COUNT
CH  35 (0.414 MEV)   2.121 CPS ********
CH  36 (0.426 MEV)   2.114 CPS ********
CH  37 (0.437 MEV)   1.976 CPS ********
CH  38 (0.449 MEV)   2.290 CPS *********
CH  39 (0.461 MEV)   2.188 CPS *********
CH  40 (0.473 MEV)   2.226 CPS *********
CH  41 (0.485 MEV)   1.983 CPS ********
CH  42 (0.496 MEV)   2.165 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)   1.866 CPS ********
CH  54 (0.638 MEV)   1.682 CPS *******
CH  55 (0.650 MEV)   1.661 CPS *******
CH  56 (0.662 MEV)   1.480 CPS *****
CH  57 (0.674 MEV)   1.474 CPS *****
CH  58 (0.686 MEV)   1.447 CPS *****
CH  59 (0.697 MEV)   1.431 CPS *****
CH  60 (0.709 MEV)   1.476 CPS *****
CH  61 (0.721 MEV)   1.453 CPS *****
CH  62 (0.733 MEV)   1.467 CPS *****
CH  63 (0.745 MEV)   1.579 CPS ******
CH  64 (0.756 MEV)   1.497 CPS *****
CH  65 (0.768 MEV)   1.548 CPS ******
CH  66 (0.780 MEV)   1.421 CPS *****
CH  67 (0.792 MEV)   1.282 CPS *****
CH  68 (0.804 MEV)   1.155 CPS ****
CH  69 (0.816 MEV)   1.246 CPS *****
CH  70 (0.827 MEV)   1.245 CPS *****
CH  71 (0.839 MEV)   1.161 CPS ****
CH  72 (0.851 MEV)   1.253 CPS *****
CH  73 (0.863 MEV)   1.231 CPS *****
CH  74 (0.875 MEV)   1.425 CPS *****
CH  75 (0.887 MEV)   1.452 CPS *****
CH  76 (0.898 MEV)   1.543 CPS ******
CH  77 (0.910 MEV)   1.444 CPS *****
CH  78 (0.922 MEV)   1.364 CPS *****
CH  79 (0.934 MEV)   1.289 CPS *****
CH  80 (0.946 MEV)   1.150 CPS ****
CH  81 (0.957 MEV)   1.144 CPS ****
CH  82 (0.969 MEV)   1.085 CPS ****
CH  83 (0.981 MEV)   1.061 CPS ****
CH  84 (0.993 MEV)   0.941 CPS ****
CH  85 (1.005 MEV)   0.919 CPS ****
CH  86 (1.017 MEV)   0.822 CPS ***
CH  87 (1.028 MEV)   0.816 CPS ***
CH  88 (1.040 MEV)   0.853 CPS ****
CH  89 (1.052 MEV)   0.901 CPS **** BISMUTH 214
CH  90 (1.064 MEV)   0.822 CPS ***
CH  91 (1.076 MEV)   0.867 CPS ****
CH  92 (1.087 MEV)   0.968 CPS ****
CH  93 (1.099 MEV)   0.851 CPS ****
CH  94 (1.111 MEV)   0.905 CPS ****
CH  95 (1.123 MEV)   0.847 CPS ****
CH  96 (1.135 MEV)   0.861 CPS ****
CH  97 (1.147 MEV)   0.800 CPS ***
CH  98 (1.158 MEV)   0.727 CPS ***
CH  99 (1.170 MEV)   0.751 CPS ***
CH 100 (1.182 MEV)   0.607 CPS *** BISMUTH 214
CH 101 (1.194 MEV)   0.663 CPS ***
CH 102 (1.206 MEV)   0.657 CPS ***
CH 103 (1.217 MEV)   0.633 CPS ***
CH 104 (1.229 MEV)   0.719 CPS ***
CH 105 (1.241 MEV)   0.671 CPS ***
CH 106 (1.253 MEV)   0.475 CPS **
CH 107 (1.265 MEV)   0.601 CPS ***
CH 108 (1.277 MEV)   0.661 CPS ***
CH 109 (1.288 MEV)   0.669 CPS ***
CH 110 (1.300 MEV)   0.606 CPS ***
CH 111 (1.312 MEV)   0.630 CPS ***
CH 112 (1.324 MEV)   0.652 CPS ***
CH 113 (1.336 MEV)   0.644 CPS ***
CH 114 (1.347 MEV)   0.652 CPS ***
CH 115 (1.359 MEV)   0.791 CPS ***
CH 116 (1.371 MEV)   0.787 CPS *** POTASSIUM 40
CH 117 (1.383 MEV)   0.834 CPS ****
CH 118 (1.395 MEV)   0.984 CPS ****
CH 119 (1.407 MEV)   1.072 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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AIRCRAFT BACKGROUND
ROTARY WING AIRCRAFT
DOWNWARD LOOKING CRYSTAL
2048 CUBIC INCHES
DATE: 25 JULY 1977

FIGURE V

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

DERIVED COSMIC SPECTRUM FROM PACIFIC OCEAN DATA

DOWNWARD-LOOKING CRYSTAL SPECTRUM FOR LINE COSMIC, DATED 072577

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

CH 0	(0.000 MEV)	0.000 CPS	
CH 1	(0.012 MEV)	0.000 CPS	
CH 2	(0.024 MEV)	0.000 CPS	
CH 3	(0.035 MEV)	0.000 CPS	
CH 4	(0.047 MEV)	0.000 CPS	
CH 5	(0.059 MEV)	0.000 CPS	
CH 6	(0.071 MEV)	0.000 CPS	
CH 7	(0.083 MEV)	0.000 CPS	
CH 8	(0.095 MEV)	0.000 CPS	
CH 9	(0.106 MEV)	0.000 CPS	
CH 10	(0.118 MEV)	0.000 CPS	
CH 11	(0.130 MEV)	0.000 CPS	
CH 12	(0.142 MEV)	0.000 CPS	
CH 13	(0.154 MEV)	0.000 CPS	
CH 14	(0.165 MEV)	0.000 CPS	
CH 15	(0.177 MEV)	0.000 CPS	
CH 16	(0.189 MEV)	0.000 CPS	
CH 17	(0.201 MEV)	0.000 CPS	
CH 18	(0.213 MEV)	1.091 CPS	
CH 19	(0.225 MEV)	1.313 CPS	
CH 20	(0.236 MEV)	2.226 CPS	
CH 21	(0.248 MEV)	26.345 CPS	
CH 22	(0.260 MEV)	89.243 CPS	
CH 23	(0.272 MEV)	100.516 CPS	
CH 24	(0.284 MEV)	103.036 CPS	
CH 25	(0.295 MEV)	94.423 CPS	
CH 26	(0.307 MEV)	88.893 CPS	
CH 27	(0.319 MEV)	85.032 CPS	
CH 28	(0.331 MEV)	80.528 CPS	
CH 29	(0.343 MEV)	78.271 CPS	
CH 30	(0.355 MEV)	72.498 CPS	
CH 31	(0.366 MEV)	74.934 CPS	
CH 32	(0.378 MEV)	65.560 CPS	
CH 33	(0.390 MEV)	65.966 CPS	
CH 34	(0.402 MEV)	63.189 CPS	TOTAL COUNT
CH 35	(0.414 MEV)	62.880 CPS	
CH 36	(0.426 MEV)	64.078 CPS	
CH 37	(0.437 MEV)	67.602 CPS	
CH 38	(0.449 MEV)	69.116 CPS	
CH 39	(0.461 MEV)	76.972 CPS	
CH 40	(0.473 MEV)	84.879 CPS	
CH 41	(0.485 MEV)	96.049 CPS	
CH 42	(0.496 MEV)	94.167 CPS	
CH 43	(0.508 MEV)	86.706 CPS	
CH 44	(0.520 MEV)	68.016 CPS	
CH 45	(0.532 MEV)	48.444 CPS	
CH 46	(0.544 MEV)	40.965 CPS	
CH 47	(0.556 MEV)	30.512 CPS	
CH 48	(0.567 MEV)	33.160 CPS	
CH 49	(0.579 MEV)	31.892 CPS	
CH 50	(0.591 MEV)	25.907 CPS	
CH 51	(0.603 MEV)	30.781 CPS	
CH 52	(0.615 MEV)	27.055 CPS	
CH 53	(0.626 MEV)	27.982 CPS	
CH 54	(0.638 MEV)	25.776 CPS	
CH 55	(0.650 MEV)	22.988 CPS	
CH 56	(0.662 MEV)	27.787 CPS	
CH 57	(0.674 MEV)	25.274 CPS	
CH 58	(0.686 MEV)	25.240 CPS	
CH 59	(0.697 MEV)	23.489 CPS	
CH 60	(0.709 MEV)	24.769 CPS	
CH 61	(0.721 MEV)	22.350 CPS	
CH 62	(0.733 MEV)	22.242 CPS	
CH 63	(0.745 MEV)	22.424 CPS	
CH 64	(0.756 MEV)	22.234 CPS	
CH 65	(0.768 MEV)	20.332 CPS	
CH 66	(0.780 MEV)	18.821 CPS	
CH 67	(0.792 MEV)	20.493 CPS	
CH 68	(0.804 MEV)	19.339 CPS	
CH 69	(0.816 MEV)	19.021 CPS	
CH 70	(0.827 MEV)	17.949 CPS	
CH 71	(0.839 MEV)	20.235 CPS	
CH 72	(0.851 MEV)	17.491 CPS	
CH 73	(0.863 MEV)	18.370 CPS	
CH 74	(0.875 MEV)	16.244 CPS	
CH 75	(0.887 MEV)	16.331 CPS	
CH 76	(0.898 MEV)	17.519 CPS	
CH 77	(0.910 MEV)	16.689 CPS	
CH 78	(0.922 MEV)	17.150 CPS	
CH 79	(0.934 MEV)	19.230 CPS	
CH 80	(0.946 MEV)	17.111 CPS	
CH 81	(0.957 MEV)	16.248 CPS	
CH 82	(0.969 MEV)	14.954 CPS	
CH 83	(0.981 MEV)	17.324 CPS	
CH 84	(0.993 MEV)	16.276 CPS	
CH 85	(1.005 MEV)	14.813 CPS	
CH 86	(1.017 MEV)	15.703 CPS	
CH 87	(1.028 MEV)	13.767 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)	10.736 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)	5.648 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)	6.406 CPS	
CH 248	(2.931 MEV)	5.711 CPS	
CH 249	(2.943 MEV)	5.513 CPS	
CH 250	(2.955 MEV)	5.810 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.

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

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

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

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:

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

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

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

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

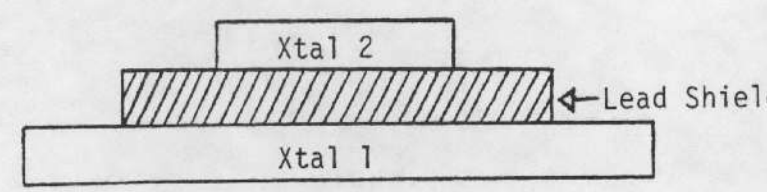
$$S_{tu} = \frac{\Delta_{tu}}{\Delta_{tt}} \quad \text{(effect of uranium on thorium)}$$

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

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.

<u>ATMOSPHERIC RADON CORRECTION</u>

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 digityingprocess. 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)

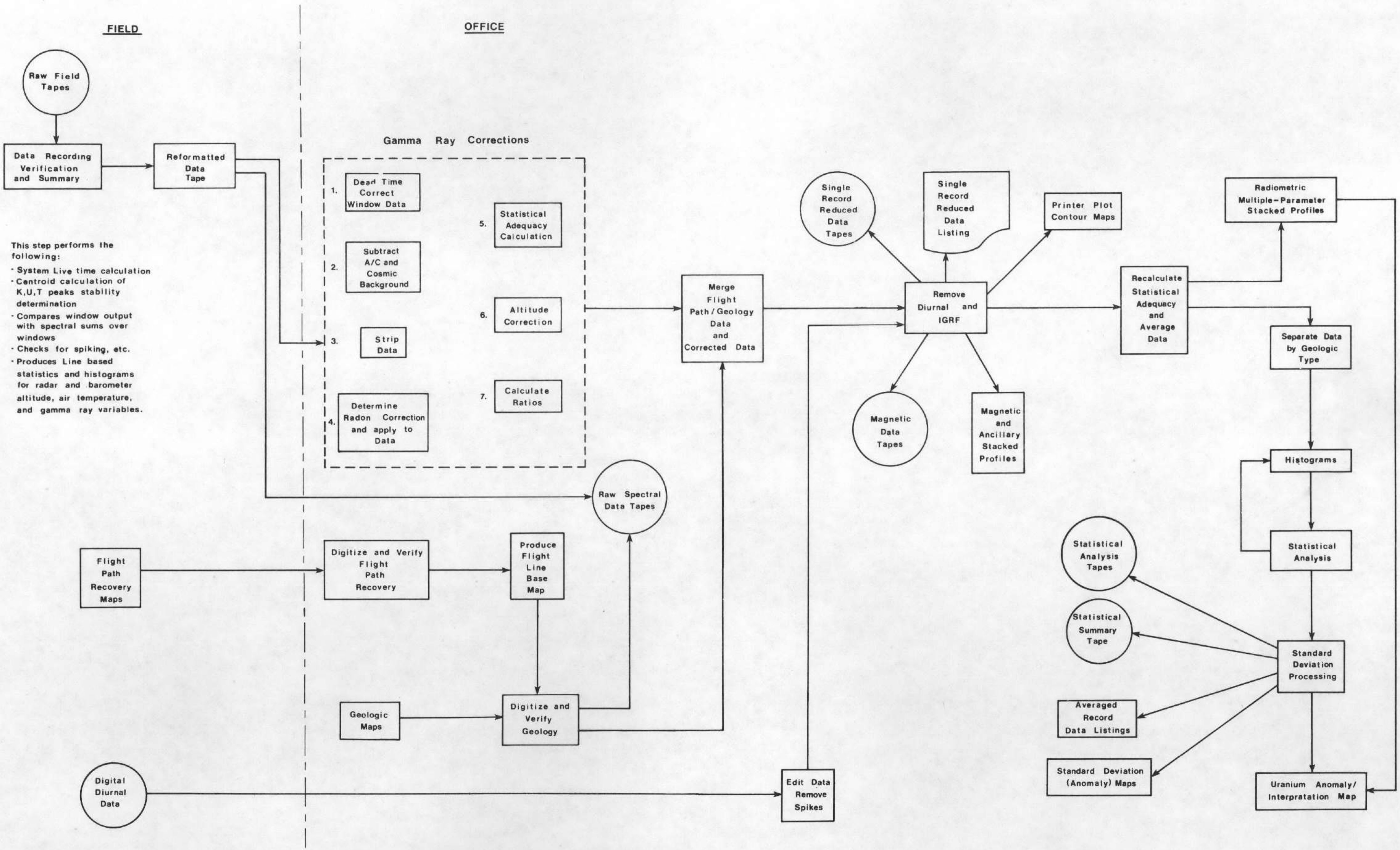
Aircraft and Cosmic background for the Queen Air/Aero Commander over these windows are as follows:

	QUEEN AIR		AERO COMMANDER	
	Aircraft	Cosmic*	Aircraft	Cosmic*
TC (cps)	152.04	2.3833	220.37	2.3915
K (cps)	16.06	0.1322	18.82	0.1334
U_{dn}(cps)	6.50	0.1098	10.85	0.1082
U_{up}(cps)	3.17	0.5540	5.35	0.5915
T (cps)	3.42	0.1503	4.35	0.1513

*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	AERO COMMANDER
S_{ku}	0.8437	0.8717
S_{kt}	0.1584	0.1408
S_{ut}	0.2703	0.2877
S_{uk}	0.0	0.0
S_{tu}	0.05614	0.09453
S_{tk}	0.0	0.0

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

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

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

Altitude attenuation coefficients used are defined as follows:

ALTITUDE ATTENUATION COEFFICIENTS

	QUEEN AIR	AERO COMMANDER
TC (per foot)	0.002011	0.001688
K (per foot)	0.002740	0.002800
U (per foot)	0.002479	0.002536
T (per foot)	0.002048	0.002102

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, $_i$ 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	AERO COMMANDER
ℓ	0.1101	0.0890
m	0.596	0.445
C'_{uk}	0.00947	0.00964
C'_{uu}	0.07136	0.08562
C'_{ut}	0.04636	0.05644
$\mu\ell$	-0.000032	-0.00019
μm	-0.000192	-0.000112

$\mu\ell$ & 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	Aero Commander Counts/Second
K	1%K	91.5	96.3
U	1 ppmeu	10.4	9.2
T	1 ppmeT	6.4	6.7

MAGNETIC DATA REDUCTION

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

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

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

DATA PRESENTATION

General

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

Radiometric Profiles

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

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

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

MAGNETIC PROFILES

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

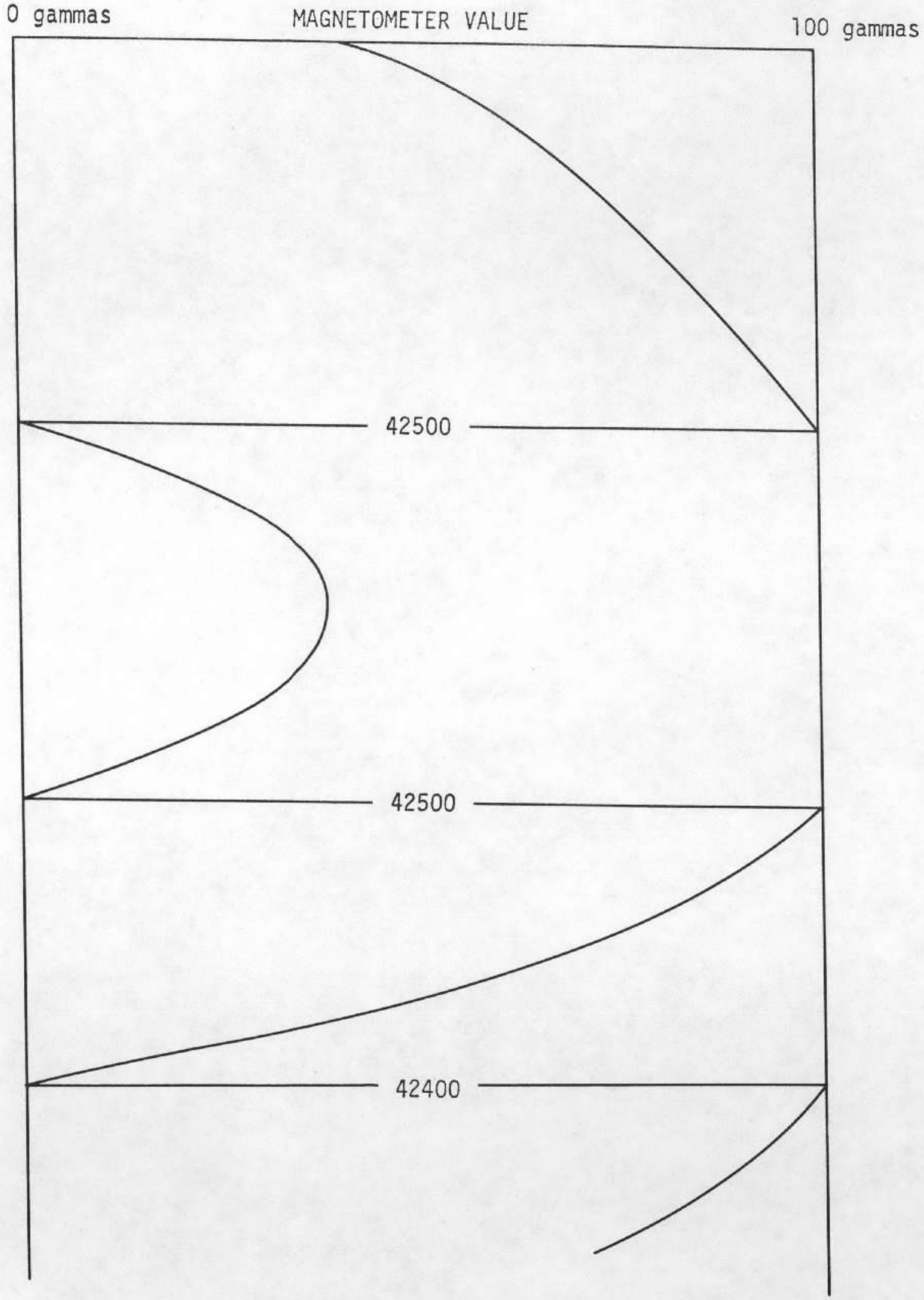


FIGURE VIII Plotter Step Value Labeling

FLIGHT PATH MAPS

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

STANDARD DEVIATION MAPS

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

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

HISTOGRAMS

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

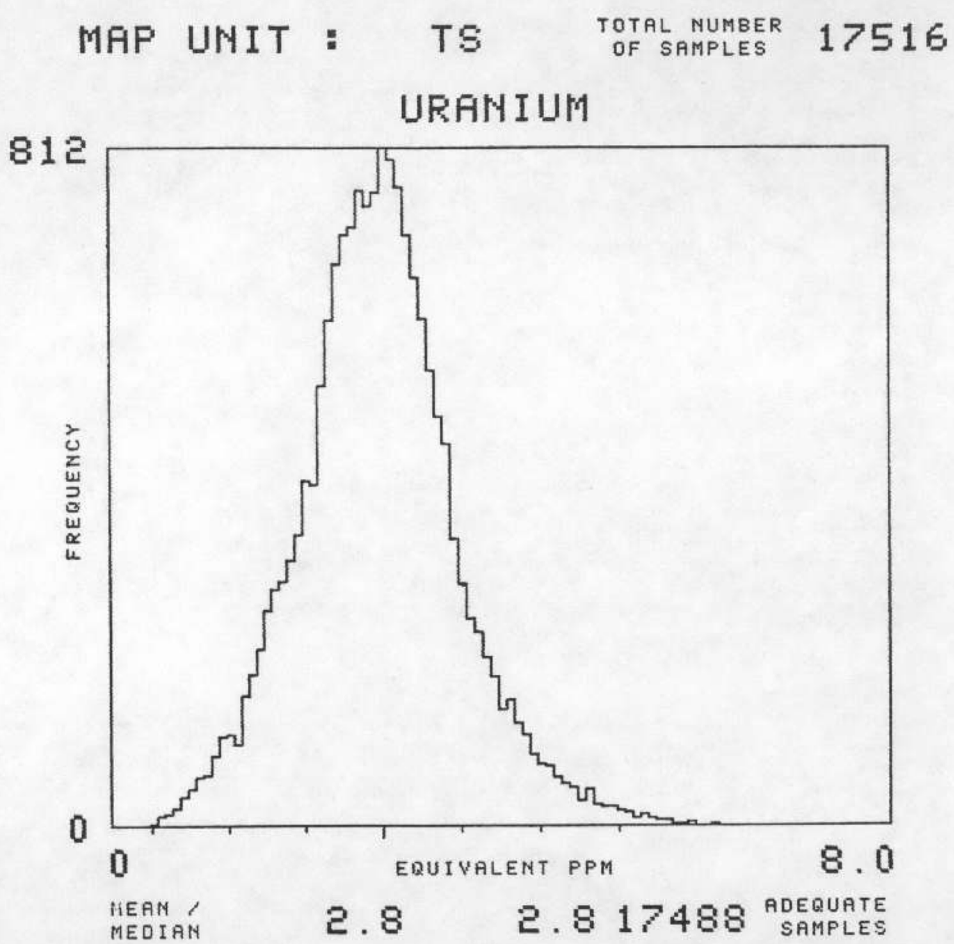


FIGURE IX Sample Computer Map Unit Histogram

DATA LISTINGS

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

1. Fiducial number

2. System/Quality (SAKUT) - The first digit identifies the system used to collect the sample. The remaining digits define the results of statistical adequacy testing for altitude, potassium, uranium, and thorium. A value of 0 indicated that the data are statistically adequate. A value of 1 indicates that the data are statistically inadequate. All data collected in excess of 700 feet and less than 200 feet are considered statistically inadequate.

3. Time - time presented in hours, minutes, and seconds

4. Altitude - altitude presented in feet above terrain

5. LAT/LONG - Latitude and Longitude presented in terms of decimal degrees

6. Magnetic field expressed in residual gammas

7. Geology - code representing geologic units

8. %K, eU, eT - percent potassium, equivalent ppm of uranium and thorium

9. eU/eTH, eU/%K, eTH/%K - calculated ratios of the three parameters

10. Total count - corrected total count data (0.4 to 3.0 MeV)

11. COS - downward looking cosmic count rate in the 3-6 MeV channel

12. Uair - atmospheric Bi-214 equivalent ppm

13. Temperature - outside air temperature in degrees centigrade

14. Press - barometric pressure in mm of mercury

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

1. Fiducial number

2. System/Quality (SAKUT) - The first digit identifies the system used to collect the sample. The remaining digits define the results of statistical adequacy testing for altitude, potassium, uranium, and thorium. A value of 0 indicated that the data are statistically adequate. A value of 1 indicates that the data are statistically inadequate. All data collected in excess of 700 feet and less than 200 feet are considered statistically inadequate.

3. LAT/LONG - Latitude and longitude presented in terms of decimal degrees

4. Magnetic field expressed in residual gammas

5. Geology - code representing geologic formations

6. %K, eU, eT - percent potassium, equivalent ppm of uranium and thorium data and the number of ($\pm$) standard deviations from the mean

7. eU/eTH, eU/%K, eTh/%K - calculated ratios of the three parameters, and the number of ($\pm$) standard deviations from the mean

8. Total count - corrected total count data (0.4 to 3.0 MeV)

9. COS - downward looking cosmic count rate in the 3-6 MeV channel

10. Uair - atmospheric Bi-214 in equivalent ppm

DATA TAPES

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

DATA INTERPRETATION METHODS

General

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

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

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

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

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

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

Methodology

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

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

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

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

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

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

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

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

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

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

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

TAPE FORMATS

SINGLE RECORD REDUCED DATA TAPE

REFERENCE: Paragraphs 4.7.6 and 6.1.6, BFEC 1200-C

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

Block 1 - Format Data

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

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

SINGLE RECORD REDUCED DATA TAPE

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

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

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

ITEM	FORMAT	DESCRIPTION
1	I1	AERIAL SYSTEM IDENTIFICATION CODE
2	I4	FLIGHT LINE NUMBER
3	I6	RECORD IDENTIFICATION NUMBER
4	I6	GMT TIME OF DAY (HHMMSS)
5	F8.4	LATITUDE TO FOUR DECIMAL PLACES IN DEGREES
6	F8.4	LONGITUDE TO FOUR DECIMAL PLACES IN DEGREES
7	F6.1	TERRAIN CLEARANCE TO ONE DECIMAL PLACE IN METERS
8	F7.1	RESIDUAL (IGRF REMOVED) MAGNETIC FIELD INTENSITY TO ONE DECIMAL PLACE IN GAMMAS
9	A8	SURFACE GEOLOGIC MAP UNIT CODE
10	I4	QUALITY FLAG CODES
11	F6.1	APPARENT CONCENTRATION OF TERRESTRIAL POTASSIUM (K-40) TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
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.

ITEM	FORMAT	DESCRIPTION
20	F8.1	GROSS GAMMA (0.4-3.0 MEV) COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
21	F6.1	UNCERTAINTY IN GROSS GAMMA COUNT RATE TO ONE DECIMAL PLACE IN COUNTS PER SECOND
22	F5.1	ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DECIMAL PLACE IN PPM EQUIVALENT U
23	F4.1	UNCERTAINTY IN ATMOSPHERIC BI-214 4PI CORRECTION TO ONE DEICMAL PLACE IN PPM EQUIVALENT U
24	F4.1	AVERAGED URANIUM-TO-THORIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PPM EQUIVALENT TH
25	F5.1	URANIUM-TO-THORIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
26	F6.1	AVERAGED URANIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT U PER PERCENT K
27	F5.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED
D8	F6.1	AVERÁGED THORIUM-TO-POTASSIUM RATIO TO ONE DECIMAL PLACE IN PPM EQUIVALENT TH PER PERCENT K
29	F5.1	THORIUM-TO-POTASSIUM RATIO STANDARD DEVIATION FROM THE MEAN TO ONE DECIMAL PLACE AND ALGEBRAICALLY SIGNED

The remaining 440 characters in this block are blanks.

Block 2 - Statistical Analysis Identification Data

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

Block 3 - Statistical Analysis Data

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

MAGNETIC DATA TAPE

REFERENCE: Paragraphs 4.7.8 and 6.1.6, BFEC 1200-C

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

Block 1 - Tape Format Description

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

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

MAGNETIC DATA TAPE

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

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

FORMAT FOR MAGNETIC DATA RECORD (THIRD THRU LAST BLOCK)

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

The remaining 4616 characters in this block are blanks.

Block 2 - Magnetic Tape Identification Data

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

Block 3 - Magnetic Data

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

STATISTIC ANALYSIS SUMMARY TAPE

REFERENCE: Paragraphs 4.7.9, BFEC 1200-C

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

Block 1 - Format Description Data

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

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

STATISTICAL ANALYSIS SUMMARY TAPE (OR FILE)

FORMAT FOR TAPE IDENTIFICATION BLOCK (SECOND BLOCK)

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

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

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

The remaining 2680 characters on this block shall be blanks.

Block 2 - Statistical Analysis Identification Data

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

Block 3 - Statistical Analysis Summary Data

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

BIBLIOGRAPHY

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

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

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

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

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

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

APPENDIX B - Flight Summary

APPENDIX B

DAILY PRODUCTION SUMMARY

JANUARY, FEBRUARY, 1981

QUEEN AIR N9AG

Jan. 12-13	Aircraft Mobilization
14-15	Radar Compensation, Magnetometer Calibration
16-17	Weather - Nil production
18	988 Line Miles - Valdosta, Jacksonville
19	940 Line Miles - Valdosta, Jacksonville
20	716 Line Miles - Valdosta, Gainesville, Daytona Beach
21	Weather - Nil production
22	818 Line Miles - Valdosta, Gainesville, Daytona Beach
23	749 Line Miles - Valdosta, Gainesville, Daytona Beach, Jacksonville
24	721 Line Miles - Daytona Beach, Orlando, Tarpon Springs
25	652 Line Miles - Gainesville, Daytona Beach, Orlando, Tarpon Springs
26-28	Base Mobilization
29	994 Line Miles - Tarpon Springs, Tampa, Fort Pierce
30	923 Line Miles - West Palm Beach, Tampa, Fort Pierce
31	867 Line Miles - West Palm Beach, Tampa, Fort Pierce
Feb. 1	858 Line Miles - West Palm Beach, Tampa, Miami
2-3	Weather - Nil production
4	766 Line Miles - West Palm Beach, Orlando, Miami, Fort Pierce
5	Magnetometer repair
6-8	Weather - Nil production
9	771 Line Miles - Tampa, West Palm Beach, Fort Pierce, Miami
10	362 Line Miles - Tampa, West Palm Beach, Fort Pierce, Miami, Key West
11-12	Base Mobilization
13	480 Line Miles - Andalusia
14	Weather - Nil production
15	719 Line Miles - Dothan
16-18	Weather - Nil production
19	720 Line Miles - Tallahassee
20	845 Line Miles - Andalusia
21	1075 Line Miles - Andalusia, Dothan
22	Weather - Nil production
23	541 Line Miles - Dothan, Tallahassee
24	792 Line Miles - Tallahassee
25	665 Line Miles - Pensacola, Andalusia
26	682 Line Miles - Pensacola, Andalusia, Dothan

Total for the above period = 17,644.0 miles

Total miles for the included quadrangles:

Valdosta	1907.0	West Palm Beach	1709.0
Jacksonville	566.0	Miami	508.0
Gainesville	1251.0	Key West	114.0
Daytona Beach	840.0	Dothan	1897.0
Tarpon Springs	737.0	Pensacola	914.0
Orlando	1279.0	Andalusia	1897.0
Tampa	624.0	Tallahassee	1811.0
Fort Pierce	1590.0		

AERO COMMANDER N1213B

Jan. 10-11	Base Mobilization
12	Weather - Nil production
13-19	Magnetometer replaced and calibrated
20-22	Weather - Nil production
23	365 Line Miles - Brunswick, Waycross
24	568 Line Miles - Brunswick, Waycross
25	Equipment Check
26	452 Line Miles - Brunswick, Waycross
27-28	Weather - Nil production
29	501 Line Miles - Brunswick, Waycross
30	468 Line Miles - Brunswick, Waycross
31	310 Line Miles - Brunswick, Waycross
Feb. 1-2	Weather - Nil production
3-5	Base Mobilization and Maintenance
6-7	Weather - Nil production
8-12	Equipment repairs and testing
13	225 Line Miles - Apalachicola

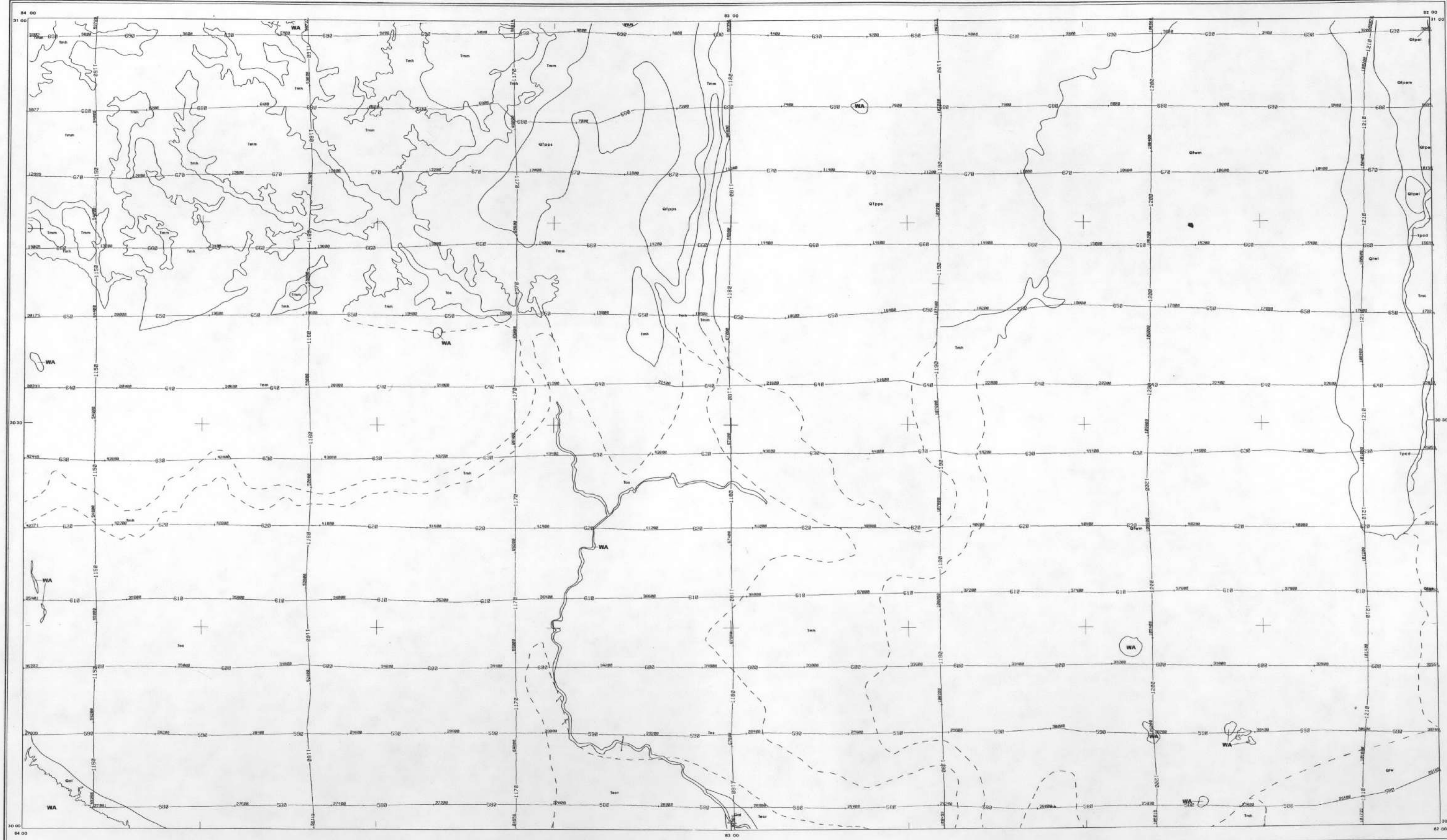
Total for the above period = 2889.0 miles

Total miles for the included quadrangles:

Waycross	1897.0
Brunswick	767.0
Apalachicola	225.0

APPENDIX C - Flight Path and Geologic Map

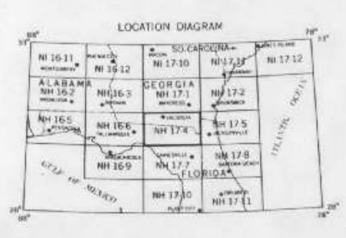
VALDOSTA



SCALE 1:500,000

FIDUCIAL NUMBER — 053-0 — LINE NUMBER

FLIGHT LINE SPACING .... 6.0 MILE(S)
FLIGHT ALTITUDE .... 400 FEET AMT
FLOWN AND COMPILED 1980-1981



SURVEY AND COMPILATION BY:

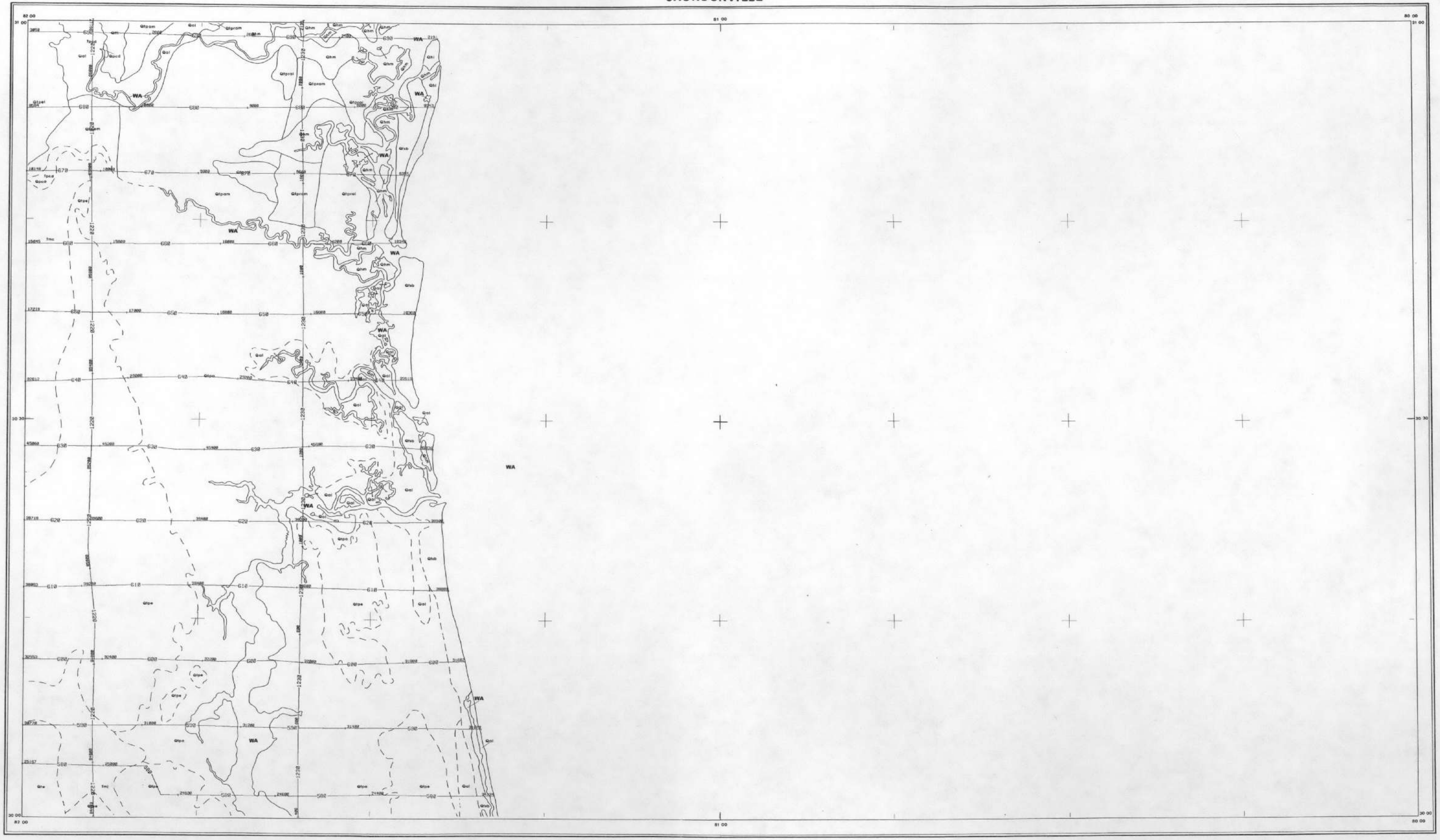
EG&G GEOMETRICS

FLIGHT PATH RECOVERY

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

JACKSONVILLE



SCALE 1:500,000

FLIGHT LINE SPACING .... 6.0 MILE(S)
FLIGHT ALTITUDE .... 400 FEET AMT
FLOWN AND COMPILED 1980-1981

LOCATION DIAGRAM

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

FLIGHT PATH RECOVERY

MISSISSIPPI / FLORIDA PROJECT

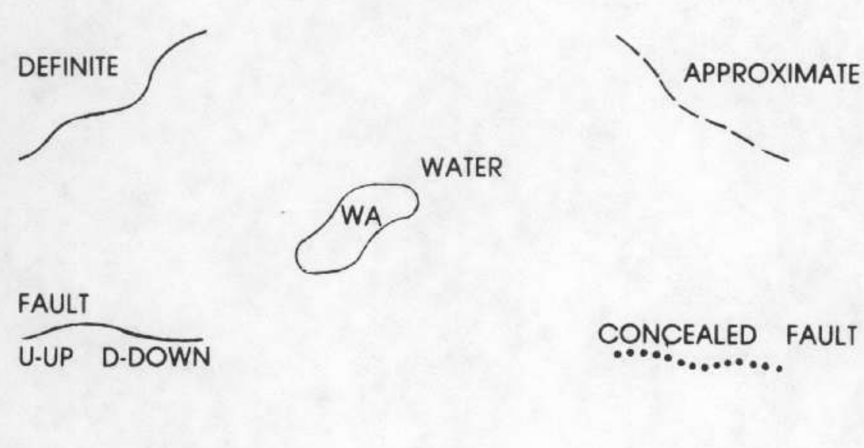
U. S. DEPARTMENT OF ENERGY

VALDOSTA QUADRANGLE
GEOLOGIC MAP EXPLANATION
(Martel Laboratories, 1981)

ERA	Symbol	Unit	EPOCH	PERIOD
CENOZOIC	Qal	**ALLUVIUM:** HOLOCENE ALLUVIAL DEPOSITS	HOLOCENE	QUATERNARY
	Qtpe	**PENHOLOWAY TERRACE DEPOSITS:** PLEISTOCENE TERRACE DEPOSITS OF THE SANGAMON INTERGLACIAL PERIOD	PLEISTOCENE	
	Qtpem	**PENHOLOWAY TERRACE MARSH DEPOSITS:** ALLUVIAL DEPOSITS OF THE MID-SANGAMON INTERGLACIAL PERIOD		
	Qtpei	**PENHOLOWAY TERRACE BARRIER ISLAND DEPOSITS:** ALLUVIAL DEPOSITS OF THE MID-SANGAMON INTERGLACIAL PERIOD		
	Qtw	**WICOMICO TERRACE DEPOSITS:** PLEISTOCENE TERRACE DEPOSITS OF THE SANGAMON INTERGLACIAL PERIOD		
	Qtwm	**WICOMICO TERRACE MARSH DEPOSITS:** ALLUVIAL DEPOSITS OF THE EARLY SANGAMON INTERGLACIAL PERIOD		
	Qtwi	**WICOMICO TERRACE BARRIER ISLAND DEPOSITS:** ALLUVIAL DEPOSITS OF THE EARLY SANGAMON INTERGLACIAL PERIOD		
	QTpps	**PLEISTOCENE-PLIOCENE SANDS AND GRAVELS, UNDIFFERENTIATED:** INCLUDES THE SUNDERLAND, COHARIE AND BRANDYWINE FORMATIONS		QUATERNARY AND TERTIARY
	Tmm	**MICCOSUKEE FORMATION:** YELLOWISH RED, CROSS-BEDDED, THINLY LAMINATED, SILTY, CLAYEY QUARTZ SANDS	MIOCENE	TERTIARY
	Tpcd	**CHARLTON FORMATION AND DUPLIN MARL, UNDIFFERENTIATED**		
	Tmc	**CHARLTON FORMATION:** PHOSPHORITIC CLAYS AND ARGILLACEOUS, SANDY LIMESTONES		
	Tmj	**JACKSON BLUFF FORMATION:** ARGILLACEOUS, CARBONACEOUS SANDS AND SANDY SHELL MARL		
	Tma	**ALACHUA FORMATION:** INTERBEDDED, IRREGULAR DEPOSITS OF CLAY, SAND, AND SANDY CLAY		
	Tmh	**HAWTHORN FORMATION:** MARINE SANDS, CLAYS, MARLS AND SANDY LIMESTONES, ALL OF WHICH ARE PHOSPHORITIC		
	Tmsm	**ST. MARKS FORMATION:** SANDY, CHALKY LIMESTONE		
	Tos	**SUWANNEE LIMESTONE:** GRANULAR, THIN-BEDDED, SOFT, SHALLOW MARINE, HIGHLY FOSSILIFEROUS LIMESTONE, WITH PORTIONS HIGHLY DOLOMITIZED	OLIGOCENE	
	Tecr	**CRYSTAL RIVER FORMATION:** SHALLOW MARINE LIMESTONE	EOCENE	

SYMBOLS

FORMATION CONTACTS



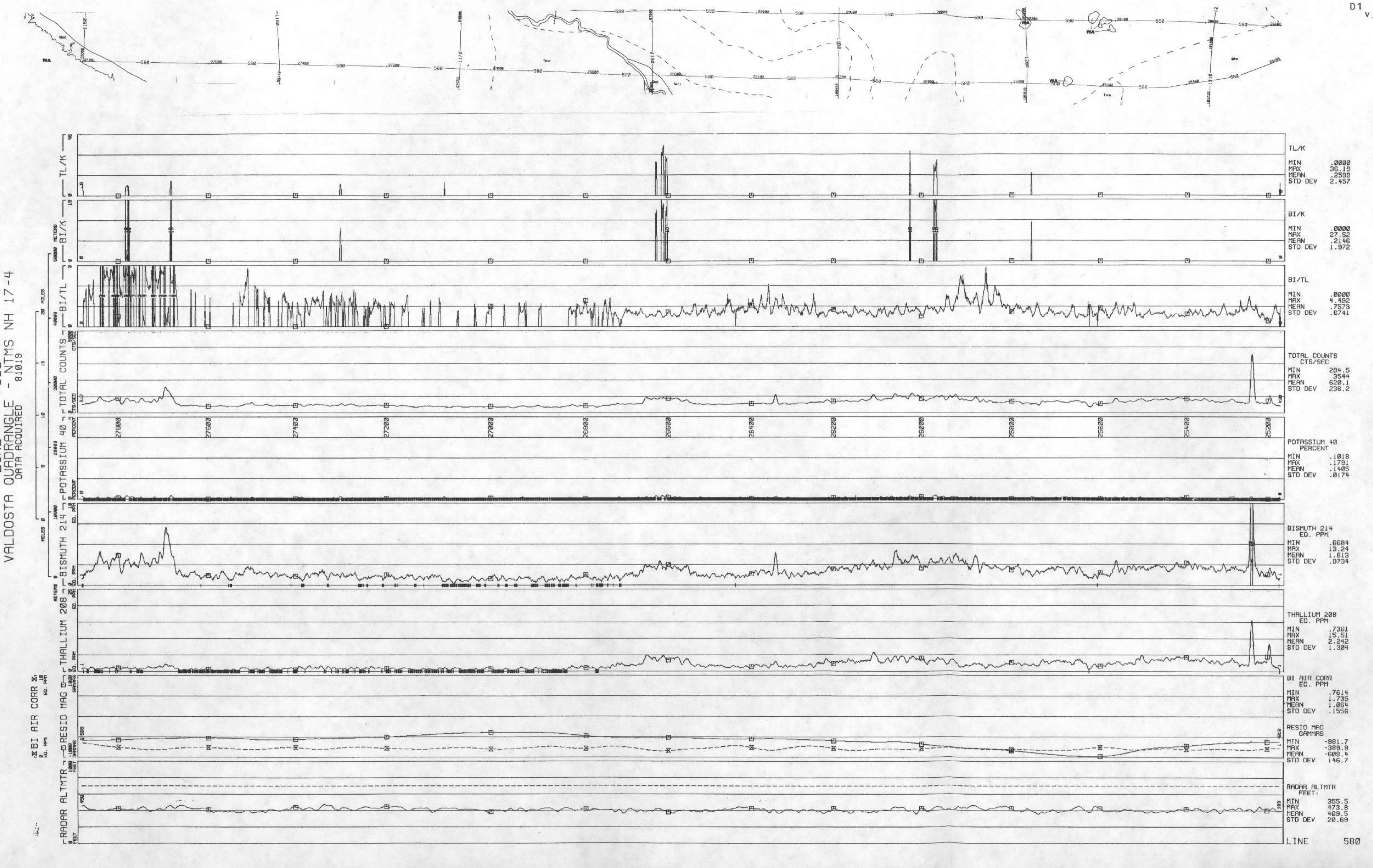
C3vj

JACKSONVILLE QUADRANGLE
GEOLOGIC MAP EXPLANATION
(Martel Laboratories, 1981)

ERA		SEDIMENTARY ROCKS	EPOCH	PERIOD
CENOZOIC	Qal	**ALLUVIUM:** HOLOCENE ALLUVIAL DEPOSITS	HOLOCENE	QUATERNARY
	Qhm	**HOLOCENE COASTAL MARSH DEPOSITS**		
	Qhi	**HOLOCENE COASTAL BARRIER ISLAND DEPOSITS**		
	Qtsb	**SILVER BLUFF TERRACE DEPOSITS**		
	Qtpram	**PRINCESS ANNE TERRACE MARSH DEPOSITS:** ALLUVIAL DEPOSITS OF THE LATE PEORIAN INTERGLACIAL PERIOD	PLEISTOCENE	
	Qtprai	**PRINCESS ANNE TERRACE BARRIER ISLAND DEPOSITS:** ALLUVIAL DEPOSITS OF THE LATE PEORIAN INTERGLACIAL PERIOD		
	Qtpa	**PAMILCO TERRACE DEPOSITS:** PLEISTOCENE TERRACE DEPOSITS OF THE PEORIAN INTERGLACIAL PERIOD		
	Qtpam	**PAMLICO TERRACE MARSH DEPOSITS:** ALLUVIAL DEPOSITS OF THE PEORIAN INTERGLACIAL PERIOD		
	Qtti	**TALBOT TERRACE BARRIER ISLAND DEPOSITS:** ALLUVIAL DEPOSITS OF THE LATE SANGAMON INTERGLACIAL PERIOD		
	Qtpe	**PENHOLOWAY TERRACE DEPOSITS:** PLEISTOCENE TERRACE DEPOSITS OF THE SANGAMON INTERGLACIAL PERIOD		
	Qtpem	**PENHOLOWAY TERRACE MARSH DEPOSITS:** ALLUVIAL DEPOSITS OF THE MID-SANGAMON INTERGLACIAL PERIOD		
	Qtpei	**PENHOLOWAY TERRACE BARRIER ISLAND DEPOSITS:** ALLUVIAL DEPOSITS OF THE MID-SANGAMON INTERGLACIAL PERIOD		
	Qtw	**WICOMICO TERRACE DEPOSITS:** PLEISTOCENE TERRACE DEPOSITS OF THE SANGAMON INTERGLACIAL PERIOD		
	Tpcd	**CHARLTON FORMATION AND DUPLIN MARL, UNDIFFERENTIATED**	PLIOCENE	TERTIARY
	Tmc	**CHARLTON FORMATION:** PHOSPHORITIC CLAYS AND ARGILLACEOUS, SANDY LIMESTONES	MIOCENE	
	Tmj	**JACKSON BLUFF FORMATION:** ARGILLACEOUS, CARBONACEOUS SANDS AND SANDY SHELL MARL		

APPENDIX D - Profiles

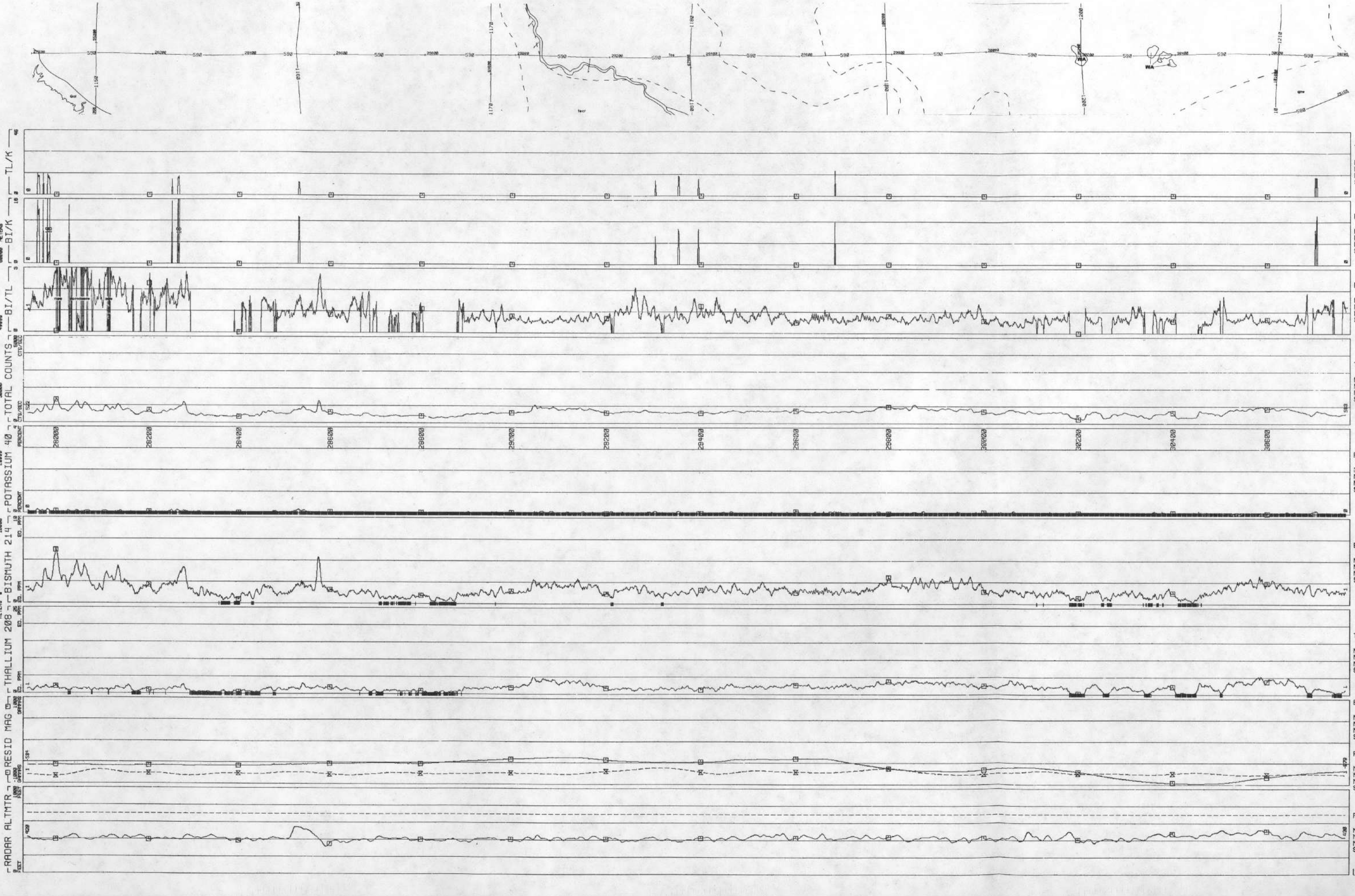
D1 vj



LINE 580
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
TL/K MIN .0000 MAX 36.19 MEAN .2599 STD DEV 2.457
BI/K MIN .0000 MAX 27.52 MEAN .2146 STD DEV 1.972
BI/TL MIN .0000 MAX 4.492 MEAN .7573 STD DEV .6741
TOTAL COUNTS CTS/SEC MIN 294.5 MAX 3544 MEAN 620.1 STD DEV 236.2
POTASSIUM 40 PERCENT MIN .1018 MAX .1791 MEAN .1405 STD DEV .0174
BISMUTH 214 EQ. PPM MIN .6684 MAX 13.24 MEAN 1.813 STD DEV .9734
THALLIUM 208 EQ. PPM MIN .7361 MAX 15.51 MEAN 2.242 STD DEV 1.304
BI AIR CORR EQ. PPM MIN .7614 MAX 1.735 MEAN 1.064 STD DEV .1556
RESID MAG GAMMAS MIN -981.7 MAX -389.9 MEAN -608.4 STD DEV 146.7
RADAR ALTMTR FEET MIN 355.5 MAX 473.8 MEAN 409.5 STD DEV 20.69
LINE 580

D2 vj

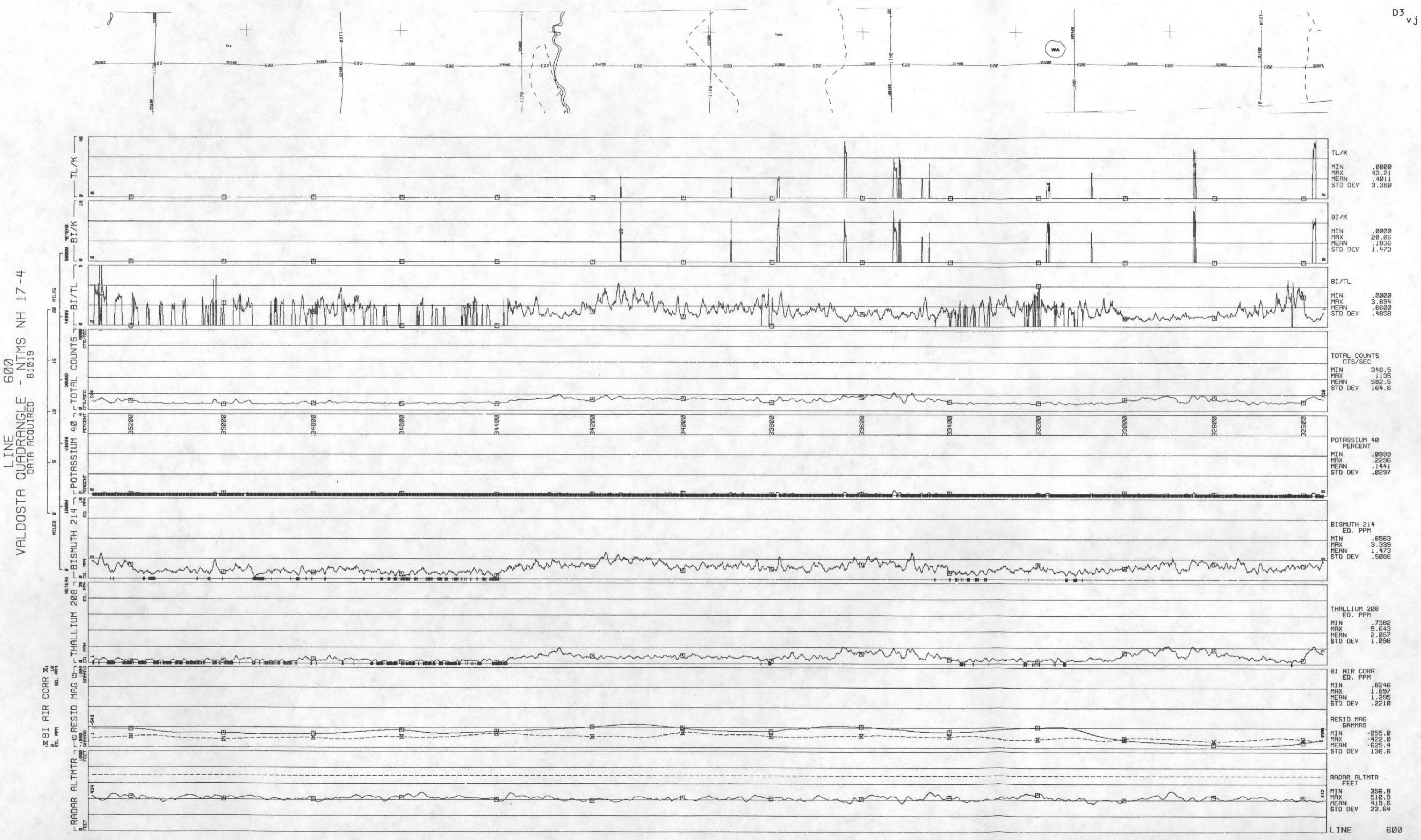
LINE 590
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019



TL/K	
MIN	.0000
MAX	17.30
MEAN	.1303
STD DEV	1.272
BI/K	
MIN	.0000
MAX	23.54
MEAN	.1674
STD DEV	1.662
BI/TL	
MIN	.0000
MAX	3.844
MEAN	.7757
STD DEV	.6200
TOTAL COUNTS CTS/SEC	
MIN	257.8
MAX	1344
MEAN	644.4
STD DEV	177.5
POTASSIUM 40 PERCENT	
MIN	.1127
MAX	.1730
MEAN	.1372
STD DEV	.0162
BISMUTH 214 EQ. PPM	
MIN	.6813
MAX	6.195
MEAN	1.729
STD DEV	.7169
THALLIUM 208 EQ. PPM	
MIN	.7388
MAX	5.206
MEAN	2.135
STD DEV	.9290
BI AIR CORR EQ. PPM	
MIN	.8452
MAX	1.920
MEAN	1.306
STD DEV	.2129
RESID MAG GAMMAS	
MIN	-976.9
MAX	-375.4
MEAN	-593.6
STD DEV	157.0
RADAR ALTMTR FEET	
MIN	317.4
MAX	546.9
MEAN	423.9
STD DEV	32.90

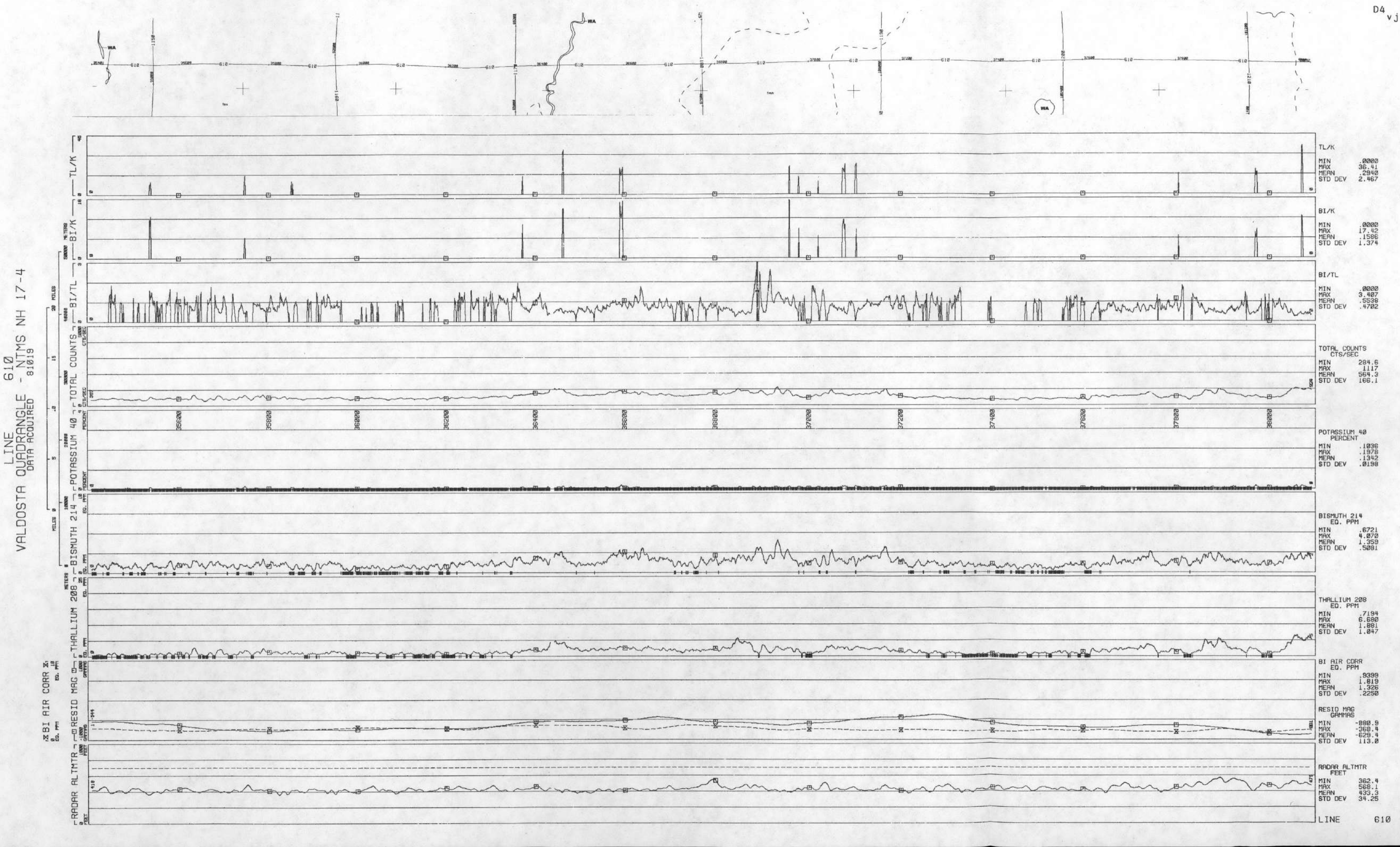
LINE 590

D3 vj

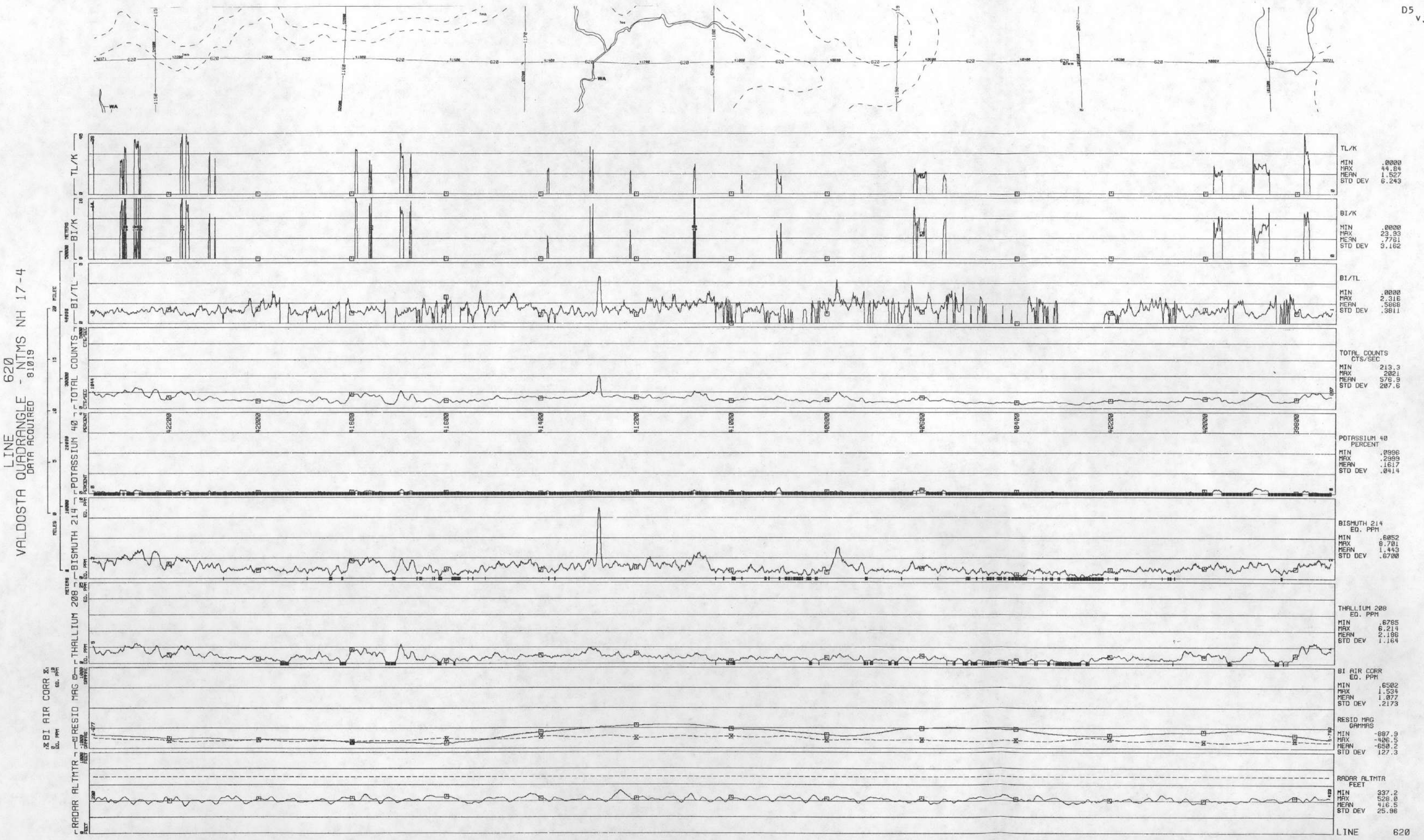


LINE 600
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
TL/K
MIN .0000
MAX 43.21
MEAN .4011
STD DEV 3.380
BI/K
MIN .0000
MAX 20.06
MEAN .1836
STD DEV 1.473
BI/TL
MIN .0000
MAX 3.894
MEAN .6600
STD DEV .4858
TOTAL COUNTS CTS/SEC
MIN 348.5
MAX 1135
MEAN 592.5
STD DEV 164.6
POTASSIUM 40 PERCENT
MIN .0999
MAX .2296
MEAN .1441
STD DEV .0297
BISMUTH 214 EQ. PPM
MIN .6563
MAX 3.339
MEAN 1.473
STD DEV .5086
THALLIUM 208 EQ. PPM
MIN .7382
MAX 5.643
MEAN 2.057
STD DEV 1.098
BI AIR CORR EQ. PPM
MIN .8246
MAX 1.897
MEAN 1.295
STD DEV .2210
RESID MAG GAMMAS
MIN -955.0
MAX -422.0
MEAN -625.4
STD DEV 136.6
RADAR ALTMTR FEET
MIN 356.8
MAX 510.9
MEAN 419.6
STD DEV 23.64
LINE 600

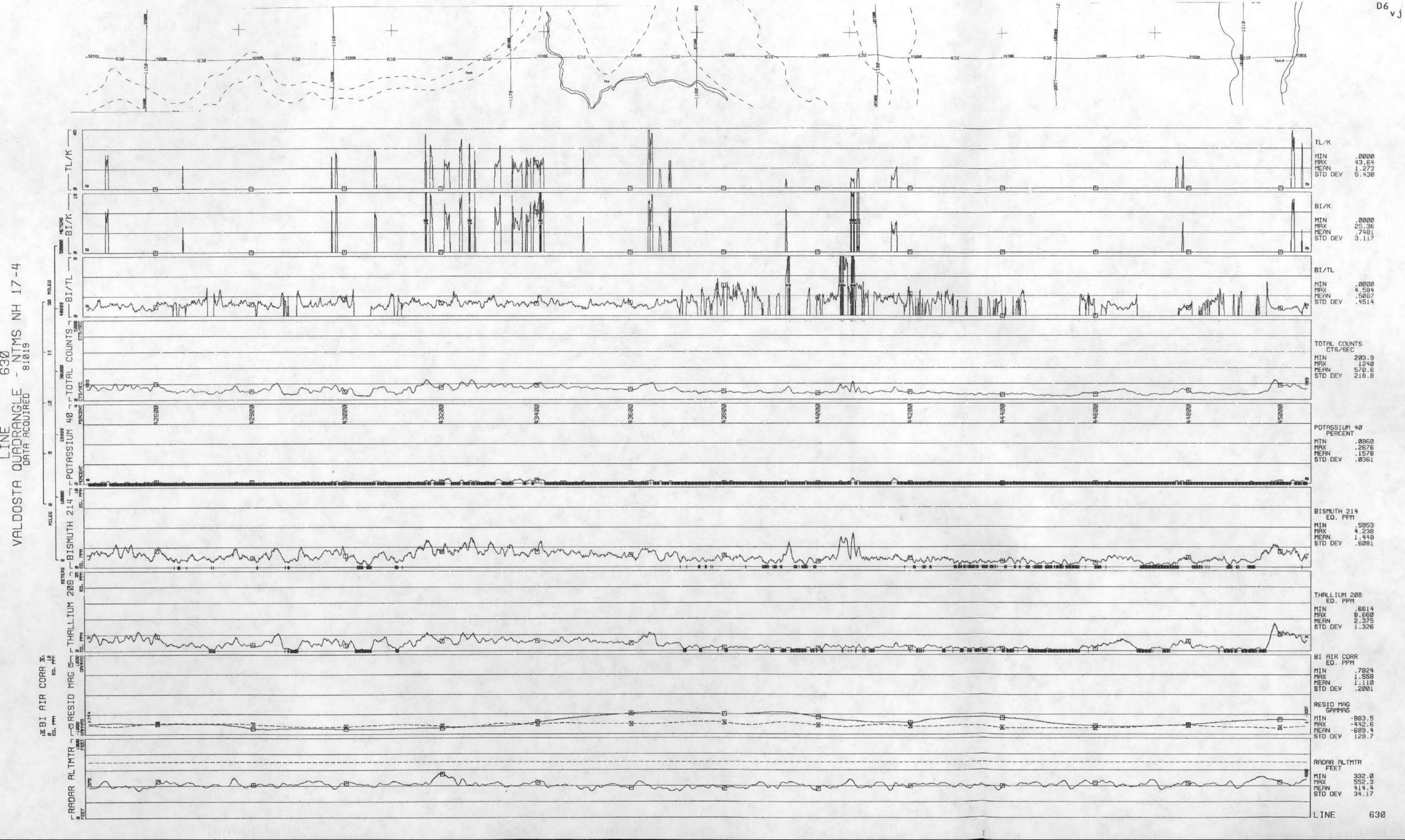
D4 vj


LINE 610
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
TL/K
MIN .0000
MAX 36.41
MEAN .2940
STD DEV 2.467
BI/K
MIN .0000
MAX 17.42
MEAN .1586
STD DEV 1.374
BI/TL
MIN .0000
MAX 3.407
MEAN .5538
STD DEV .4702
TOTAL COUNTS
CTS/SEC
MIN 284.6
MAX 1117
MEAN 564.3
STD DEV 166.1
POTASSIUM 40
PERCENT
MIN .1036
MAX .1978
MEAN .1342
STD DEV .0198
BISMUTH 214
EQ. PPM
MIN .6721
MAX 4.070
MEAN 1.359
STD DEV .5081
THALLIUM 208
EQ. PPM
MIN .7194
MAX 6.680
MEAN 1.881
STD DEV 1.047
BI AIR CORR
EQ. PPM
MIN .9399
MAX 1.819
MEAN 1.326
STD DEV .2250
RESID MAG
GAMMAS
MIN -880.9
MAX -368.4
MEAN -629.4
STD DEV 113.0
RADAR ALTMTR
FEET
MIN 362.4
MAX 568.1
MEAN 433.3
STD DEV 34.25
LINE 610

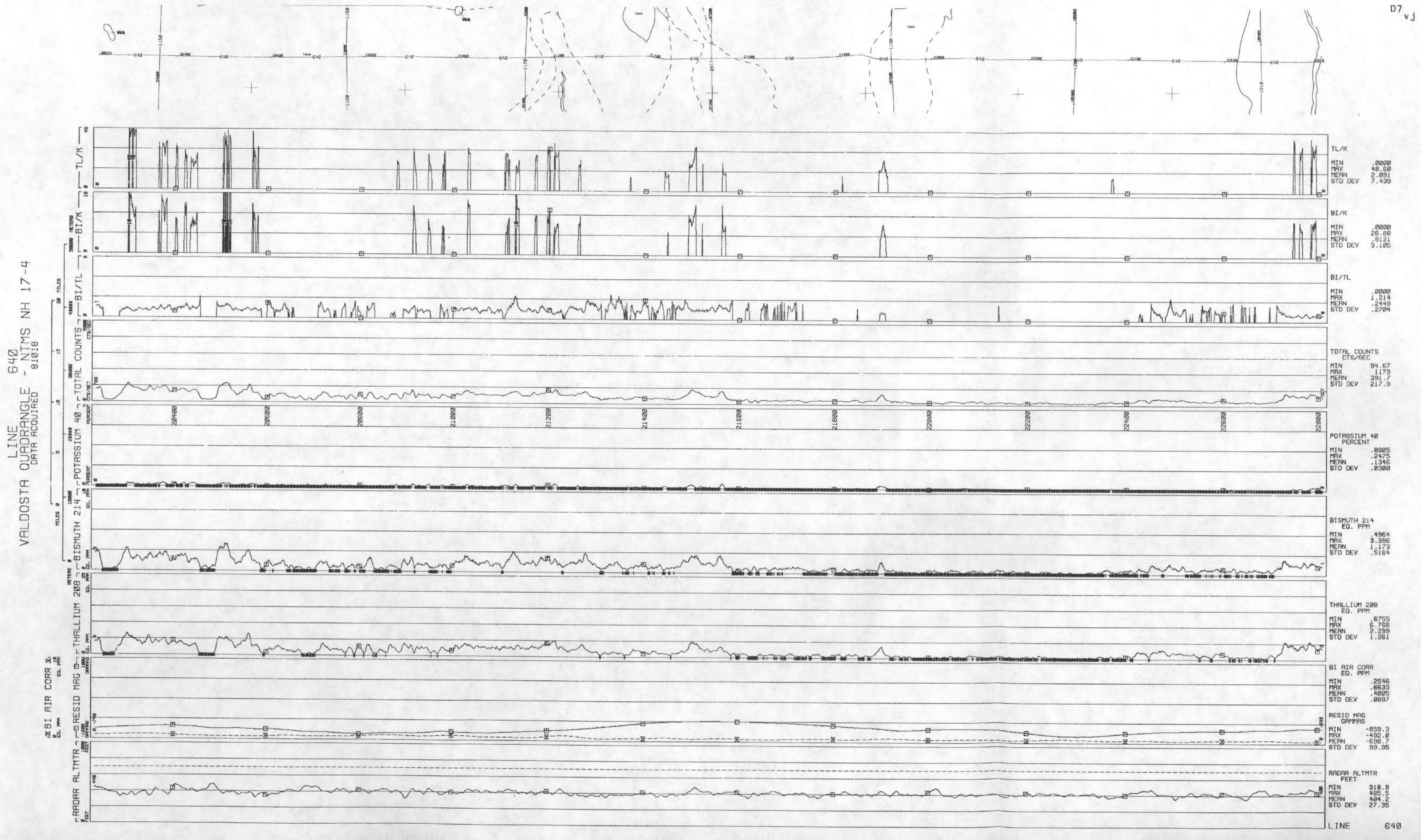
D5 vj



LINE 620
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
TL/K
MIN .0000
MAX 44.84
MEAN 1.527
STD DEV 6.243
BI/K
MIN .0000
MAX 23.93
MEAN .7761
STD DEV 3.162
BI/TL
MIN .0000
MAX 2.316
MEAN .5868
STD DEV .3811
TOTAL COUNTS
CTS/SEC
MIN 213.3
MAX 2021
MEAN 576.9
STD DEV 207.6
POTASSIUM 40
PERCENT
MIN .0996
MAX .2999
MEAN .1617
STD DEV .0414
BISMUTH 214
EQ. PPM
MIN .6052
MAX 8.701
MEAN 1.443
STD DEV .6700
THALLIUM 208
EQ. PPM
MIN .6785
MAX 6.214
MEAN 2.186
STD DEV 1.164
BI AIR CORR
EQ. PPM
MIN .6502
MAX 1.534
MEAN 1.077
STD DEV .2173
RESID MAG
GAMMAS
MIN -887.9
MAX -406.5
MEAN -650.2
STD DEV 127.3
RADAR ALTMTR
FEET
MIN 337.2
MAX 528.0
MEAN 416.5
STD DEV 25.98
LINE 620

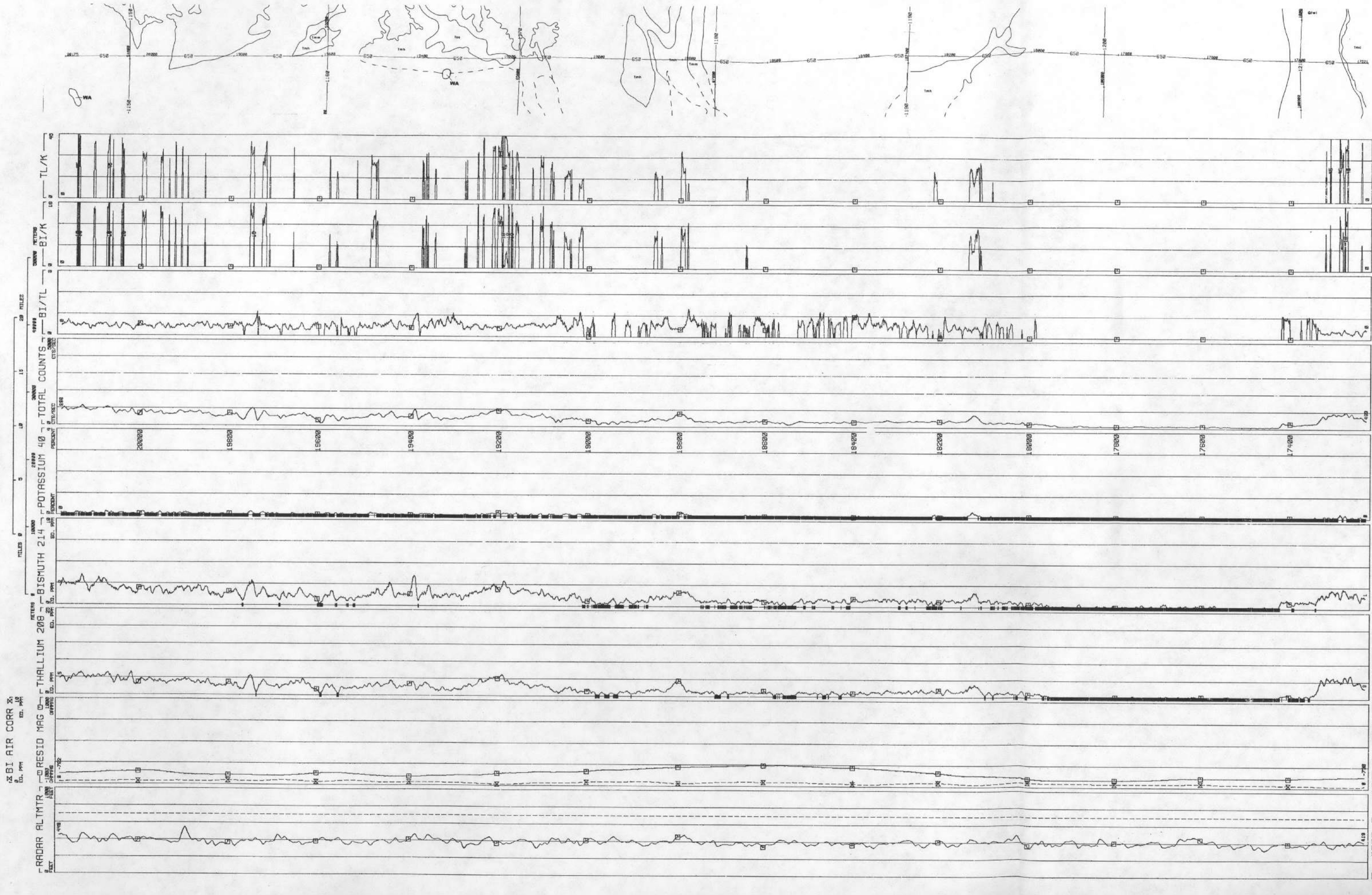

LINE 630
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
TL/K
MIN .0000
MAX 43.64
MEAN 1.273
STD DEV 5.430
BI/K
MIN .0000
MAX 25.36
MEAN .7481
STD DEV 3.117
BI/TL
MIN .0000
MAX 4.584
MEAN .5087
STD DEV .4514
TOTAL COUNTS CTS/SEC
MIN 203.9
MAX 1240
MEAN 570.6
STD DEV 218.8
POTASSIUM 40 PERCENT
MIN .0960
MAX .2676
MEAN .1578
STD DEV .0361
BISMUTH 214 EQ. PPM
MIN .5953
MAX 4.238
MEAN 1.449
STD DEV .6081
THALLIUM 208 EQ. PPM
MIN .6614
MAX 8.660
MEAN 2.375
STD DEV 1.326
BI AIR CORR EQ. PPM
MIN .7824
MAX 1.558
MEAN 1.110
STD DEV .2001
RESID MAG GAMMAS
MIN -883.5
MAX -442.6
MEAN -689.4
STD DEV 129.7
RADAR ALTMTR FEET
MIN 332.0
MAX 552.3
MEAN 414.4
STD DEV 34.17
LINE 630
42600
42800
43000
43200
43400
43600
43800
44000
44200
44400
44600
44800
45000

D7 vj


LINE 640
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
20400
20600
20800
21000
21200
21400
21600
21800
22000
22200
22400
22600
22800
TL/K
MIN .0000
MAX 48.60
MEAN 2.091
STD DEV 7.439
BI/K
MIN .0000
MAX 26.88
MEAN .8121
STD DEV 3.105
BI/TL
MIN .0000
MAX 1.214
MEAN .2449
STD DEV .2704
TOTAL COUNTS
CTS/SEC
MIN 94.67
MAX 1173
MEAN 391.7
STD DEV 217.9
POTASSIUM 40
PERCENT
MIN .0805
MAX .2475
MEAN .1346
STD DEV .0300
BISMUTH 214
EQ. PPM
MIN .4964
MAX 3.396
MEAN 1.173
STD DEV .5164
THALLIUM 208
EQ. PPM
MIN .6755
MAX 6.768
MEAN 2.299
STD DEV 1.261
BI AIR CORR
EQ. PPM
MIN .2546
MAX .6633
MEAN .4005
STD DEV .0897
RESID MAG
GAMMAS
MIN -859.3
MAX -492.0
MEAN -698.7
STD DEV 99.95
RADAR ALTMTR
FEET
MIN 318.9
MAX 485.5
MEAN 404.2
STD DEV 27.35
LINE 640

D8 vj

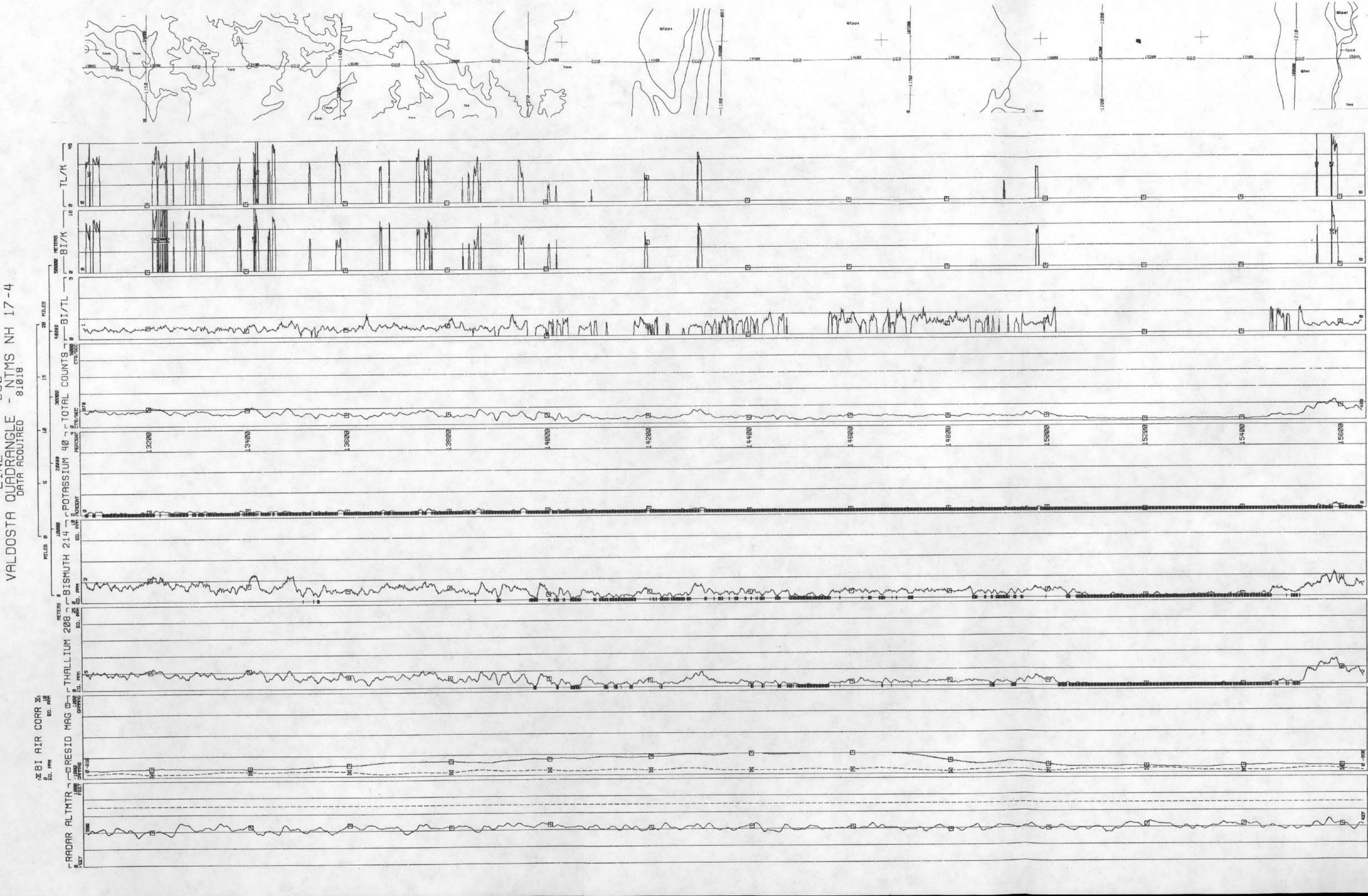
LINE 650
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018



TL/K	
MIN	.0000
MAX	53.69
MEAN	2.369
STD DEV	8.280
BI/K	
MIN	.0000
MAX	22.80
MEAN	1.010
STD DEV	3.592
BI/TL	
MIN	.0000
MAX	1.327
MEAN	.3395
STD DEV	.2909
TOTAL COUNTS CTS/SEC	
MIN	78.90
MAX	1138
MEAN	433.5
STD DEV	249.9
POTASSIUM 40 PERCENT	
MIN	.0875
MAX	.2537
MEAN	.1306
STD DEV	.0290
BISMUTH 214 EQ. PPM	
MIN	.4952
MAX	3.518
MEAN	1.312
STD DEV	.5938
THALLIUM 208 EQ. PPM	
MIN	.6719
MAX	6.807
MEAN	2.579
STD DEV	1.487
BI AIR CORR EQ. PPM	
MIN	.1474
MAX	.5363
MEAN	.3685
STD DEV	.0815
RESID MAG GAMMAS	
MIN	-833.0
MAX	-514.4
MEAN	-711.7
STD DEV	93.74
RADAR ALTMTR FEET	
MIN	309.5
MAX	542.7
MEAN	393.6
STD DEV	29.62

LINE 650

D9 vj



TL/K
MIN .0000
MAX 50.85
MEAN 2.230
STD DEV 8.146

BI/K
MIN .0000
MAX 22.84
MEAN .8006
STD DEV 3.296

BI/TL
MIN .0000
MAX 1.464
MEAN .3267
STD DEV .2867

TOTAL COUNTS
CTS/SEC
MIN 80.74
MAX 1199
MEAN 464.2
STD DEV 258.1

POTASSIUM 40
PERCENT
MIN .0915
MAX .2186
MEAN .1393
STD DEV .0246

BISMUTH 214
EQ. PPM
MIN .5403
MAX 3.169
MEAN 1.320
STD DEV .5623

THALLIUM 208
EQ. PPM
MIN .6943
MAX 7.665
MEAN 2.720
STD DEV 1.538

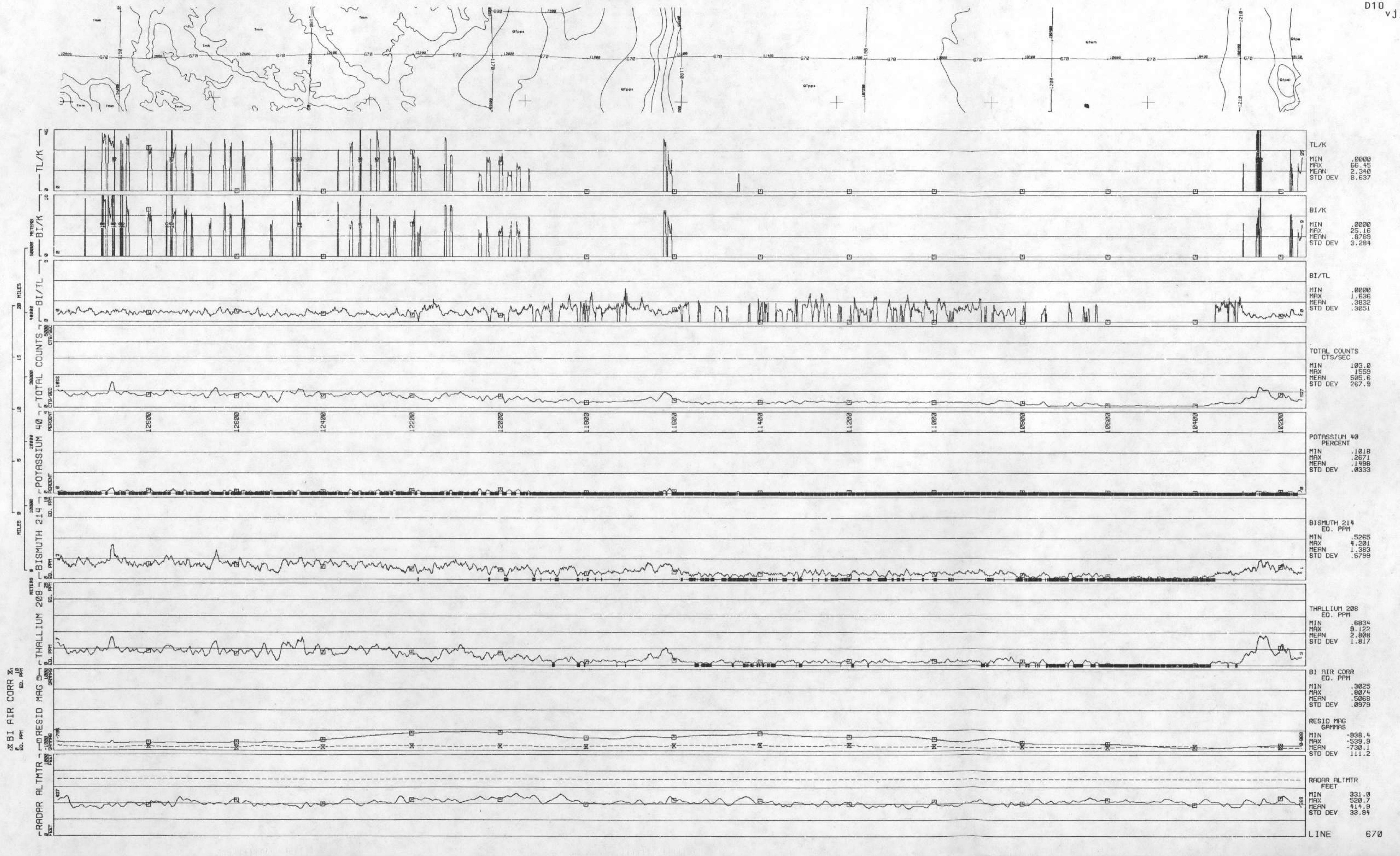
BI AIR CORR
EQ. PPM
MIN .2553
MAX .7616
MEAN .4894
STD DEV .1159

RESID MAG
GAMMAS
MIN -871.0
MAX -495.6
MEAN -703.1
STD DEV 126.7

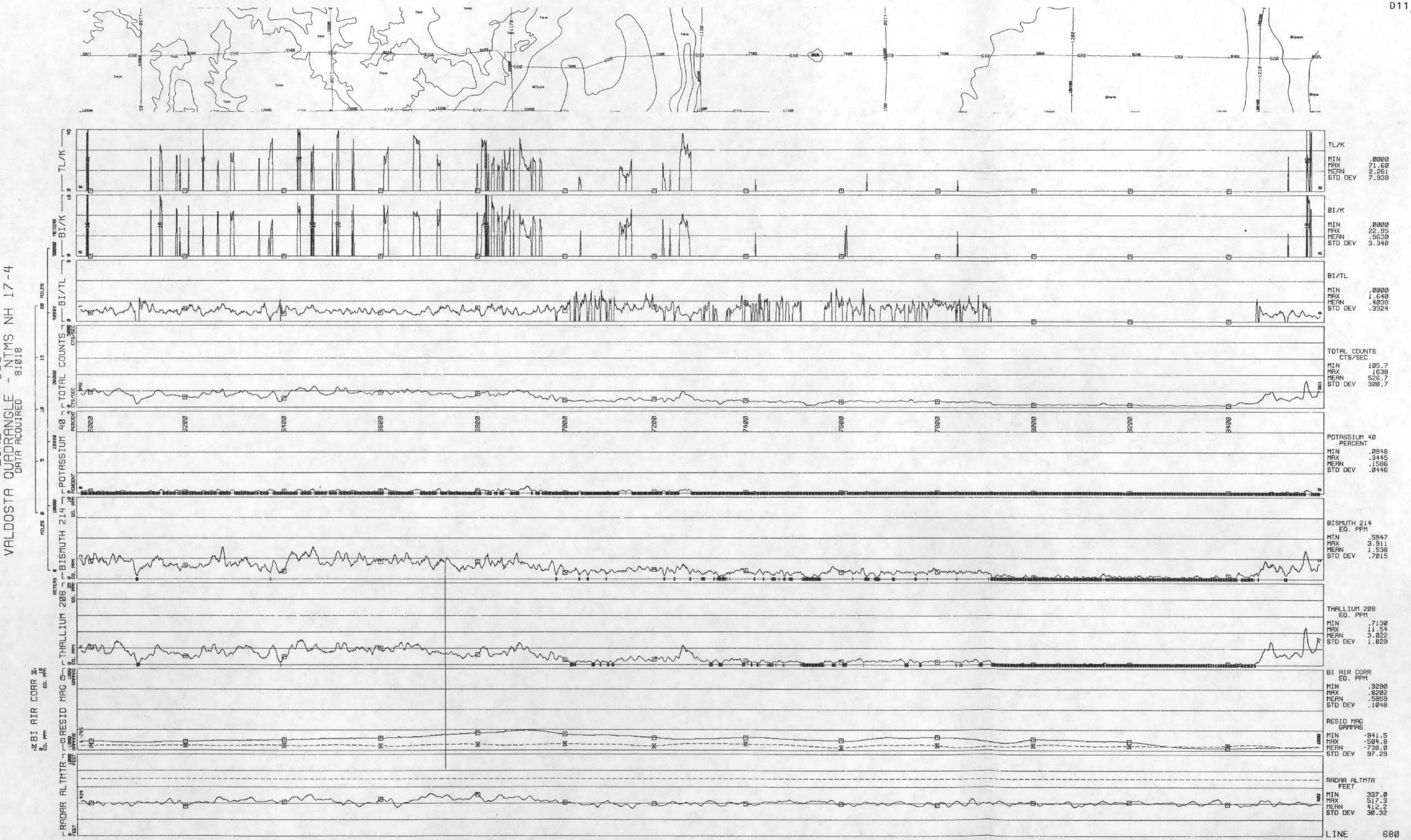
RADAR ALTMTR
FEET
MIN 329.0
MAX 500.3
MEAN 416.2
STD DEV 29.13

LINE 660

D10 vj

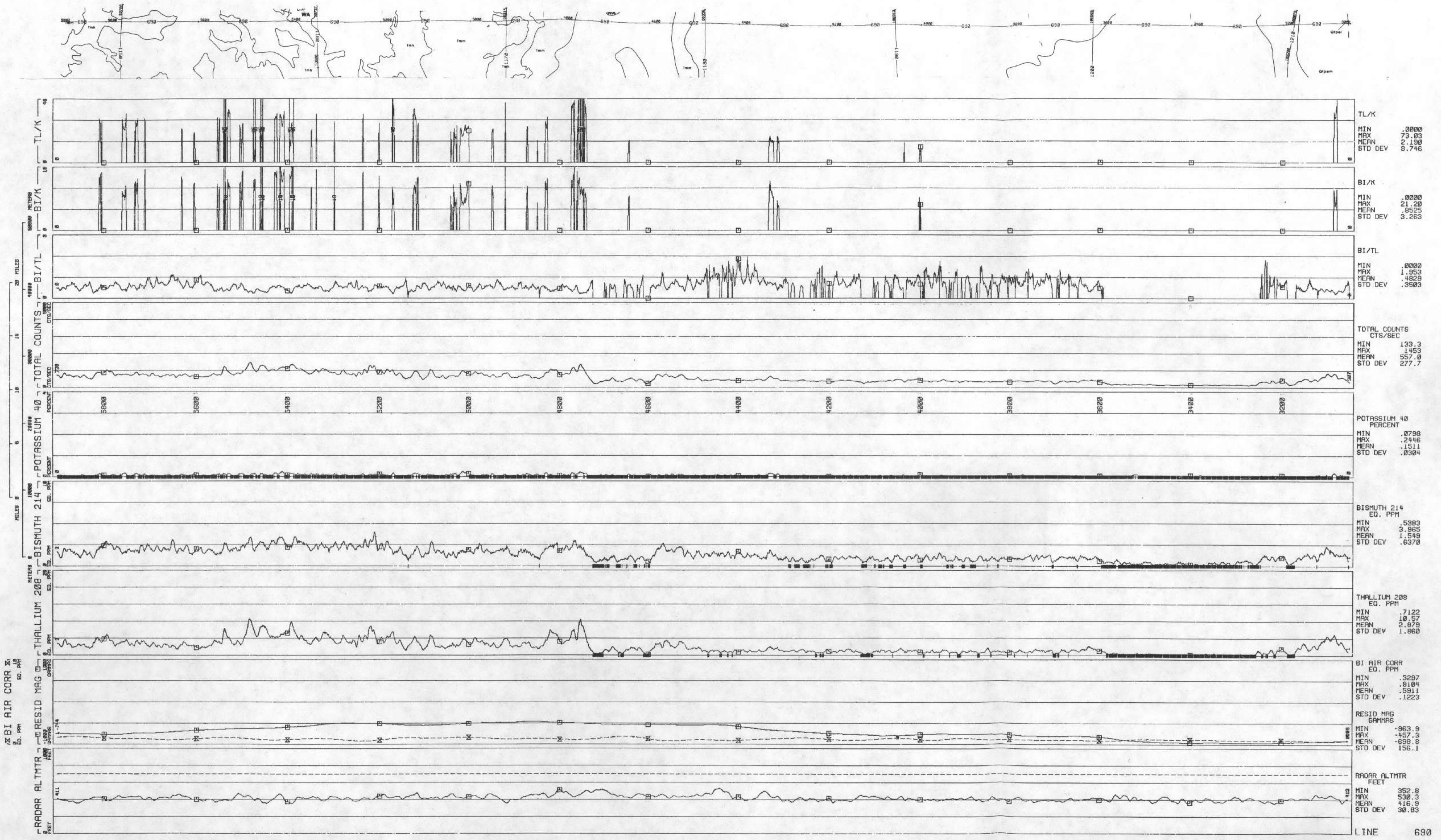


LINE 670
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
TL/K
MIN .0000
MAX 66.45
MEAN 2.340
STD DEV 8.637
BI/K
MIN .0000
MAX 25.16
MEAN .8789
STD DEV 3.284
BI/TL
MIN .0000
MAX 1.636
MEAN .3832
STD DEV .3051
TOTAL COUNTS CTS/SEC
MIN 103.0
MAX 1559
MEAN 505.6
STD DEV 267.9
POTASSIUM 40 PERCENT
MIN .1018
MAX .2671
MEAN .1498
STD DEV .0333
BISMUTH 214 EQ. PPM
MIN .5265
MAX 4.201
MEAN 1.383
STD DEV .5799
THALLIUM 208 EQ. PPM
MIN .6834
MAX 9.122
MEAN 2.808
STD DEV 1.817
BI AIR CORR EQ. PPM
MIN .3025
MAX .8074
MEAN .5068
STD DEV .0979
RESID MAG GAMMAS
MIN -938.4
MAX -539.9
MEAN -730.1
STD DEV 111.2
RADAR ALTMTR FEET
MIN 331.0
MAX 520.7
MEAN 414.9
STD DEV 33.94
LINE 670

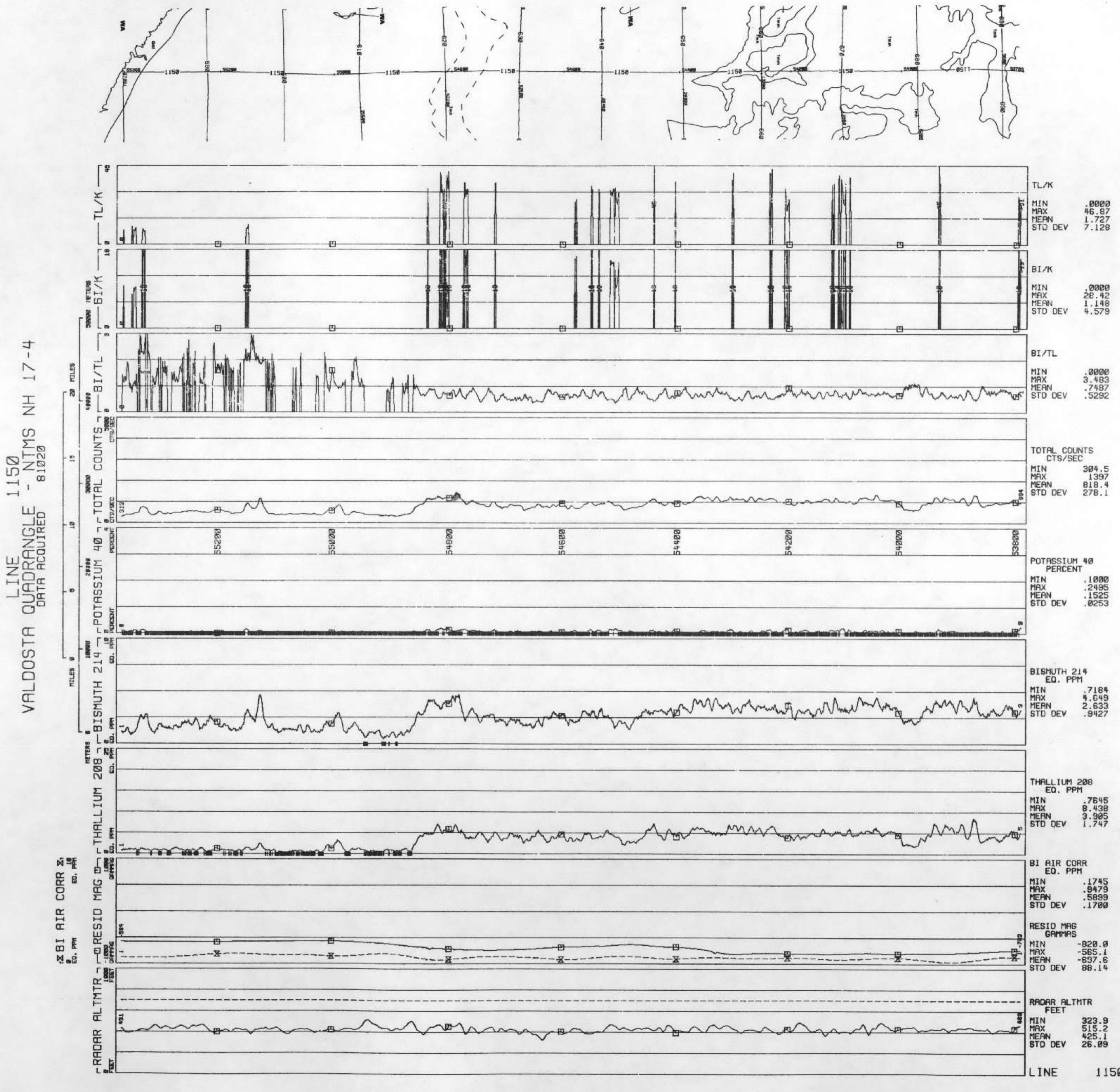


LINE 680
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018
TL/K
BI/K
BI/TL
TOTAL COUNTS
POTASSIUM 40
BISMUTH 214
THALLIUM 208
BI AIR CORR
RESID MAG
RADAR ALTMTR
6000
6200
6400
6600
6800
7000
7200
7400
7600
7800
8000
8200
8400
TL/K
MIN .0000
MAX 71.60
MEAN 2.261
STD DEV 7.938
BI/K
MIN .0000
MAX 22.95
MEAN .9630
STD DEV 3.348
BI/TL
MIN .0000
MAX 1.640
MEAN .4038
STD DEV .3324
TOTAL COUNTS CTS/SEC
MIN 105.7
MAX 1638
MEAN 526.7
STD DEV 300.7
POTASSIUM 40 PERCENT
MIN .0948
MAX .3445
MEAN .1586
STD DEV .0446
BISMUTH 214 EQ. PPM
MIN .5947
MAX 3.911
MEAN 1.538
STD DEV .7015
THALLIUM 208 EQ. PPM
MIN .7130
MAX 11.54
MEAN 3.022
STD DEV 1.829
BI AIR CORR EQ. PPM
MIN .3290
MAX .8202
MEAN .5859
STD DEV .1048
RESID MAG GAMMAS
MIN -941.5
MAX -504.8
MEAN -738.0
STD DEV 97.29
RADAR ALTMTR FEET
MIN 337.0
MAX 517.3
MEAN 412.2
STD DEV 30.32
LINE 680

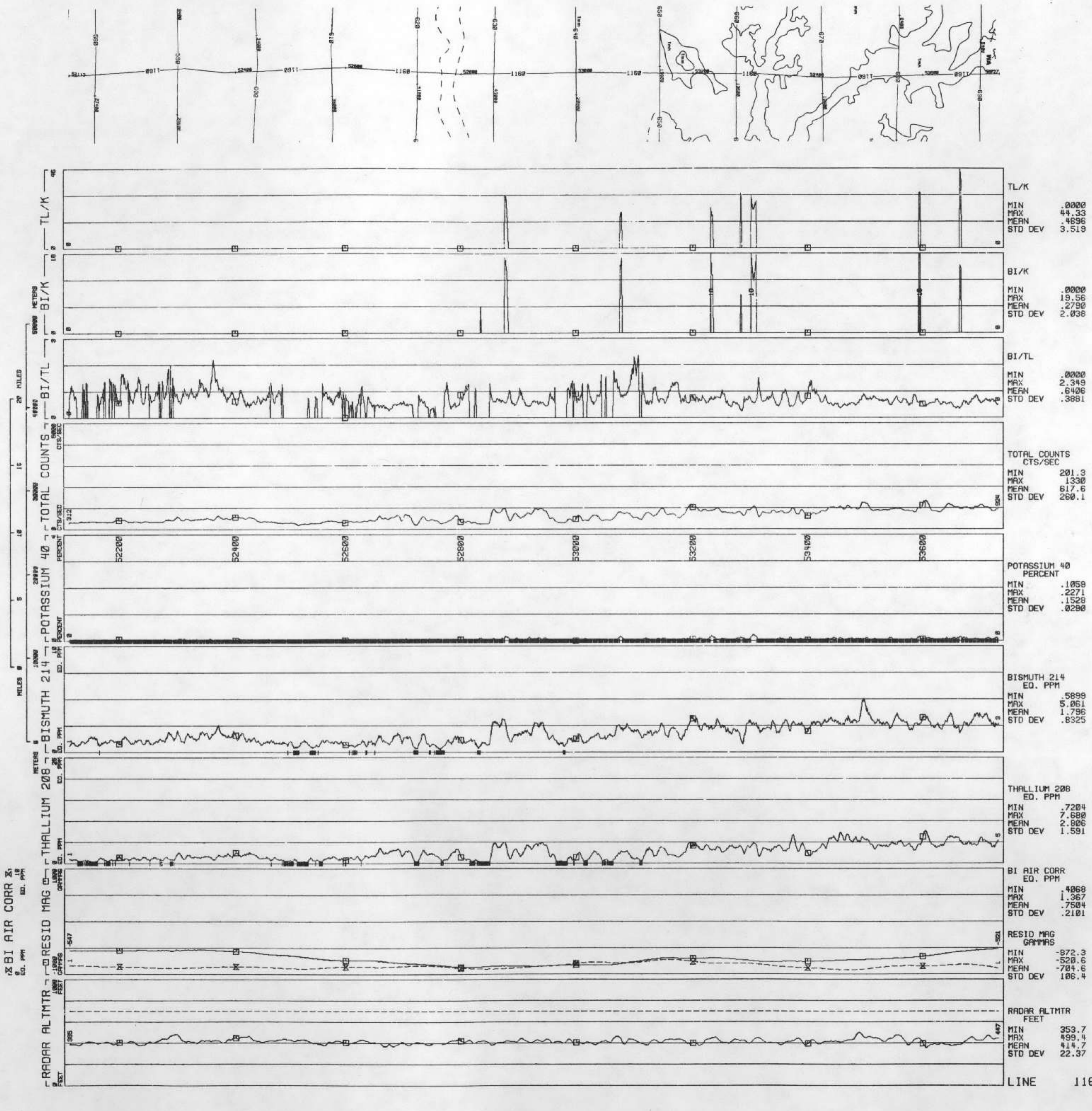
LINE 690
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018



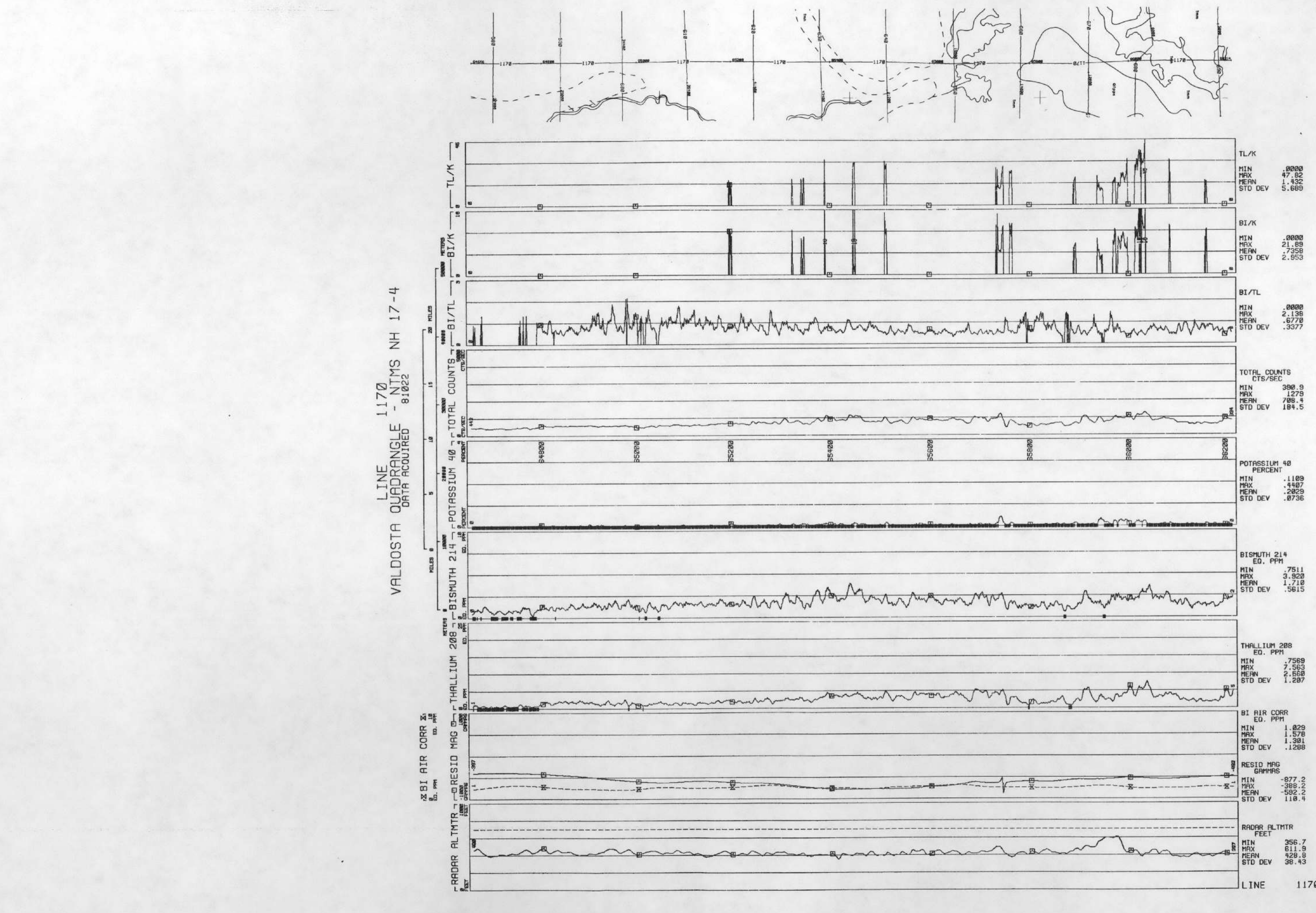
D13 vj


LINE 1150
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81020
TL/K
MIN .0000
MAX 46.87
MEAN 1.727
STD DEV 7.128
BI/K
MIN .0000
MAX 28.42
MEAN 1.148
STD DEV 4.579
BI/TL
MIN .0000
MAX 3.483
MEAN .7487
STD DEV .5292
TOTAL COUNTS CTS/SEC
MIN 304.5
MAX 1397
MEAN 818.4
STD DEV 278.1
POTASSIUM 40 PERCENT
MIN .1000
MAX .2495
MEAN .1525
STD DEV .0253
BISMUTH 214 EQ. PPM
MIN .7184
MAX 4.649
MEAN 2.633
STD DEV .8427
THALLIUM 208 EQ. PPM
MIN .7645
MAX 8.438
MEAN 3.905
STD DEV 1.747
BI AIR CORR EQ. PPM
MIN .1745
MAX .8479
MEAN .5899
STD DEV .1700
RESID MAG GAMMAS
MIN -820.0
MAX -565.1
MEAN -697.6
STD DEV 88.14
RADAR ALTMTR FEET
MIN 323.9
MAX 515.2
MEAN 425.1
STD DEV 26.09
LINE 1150

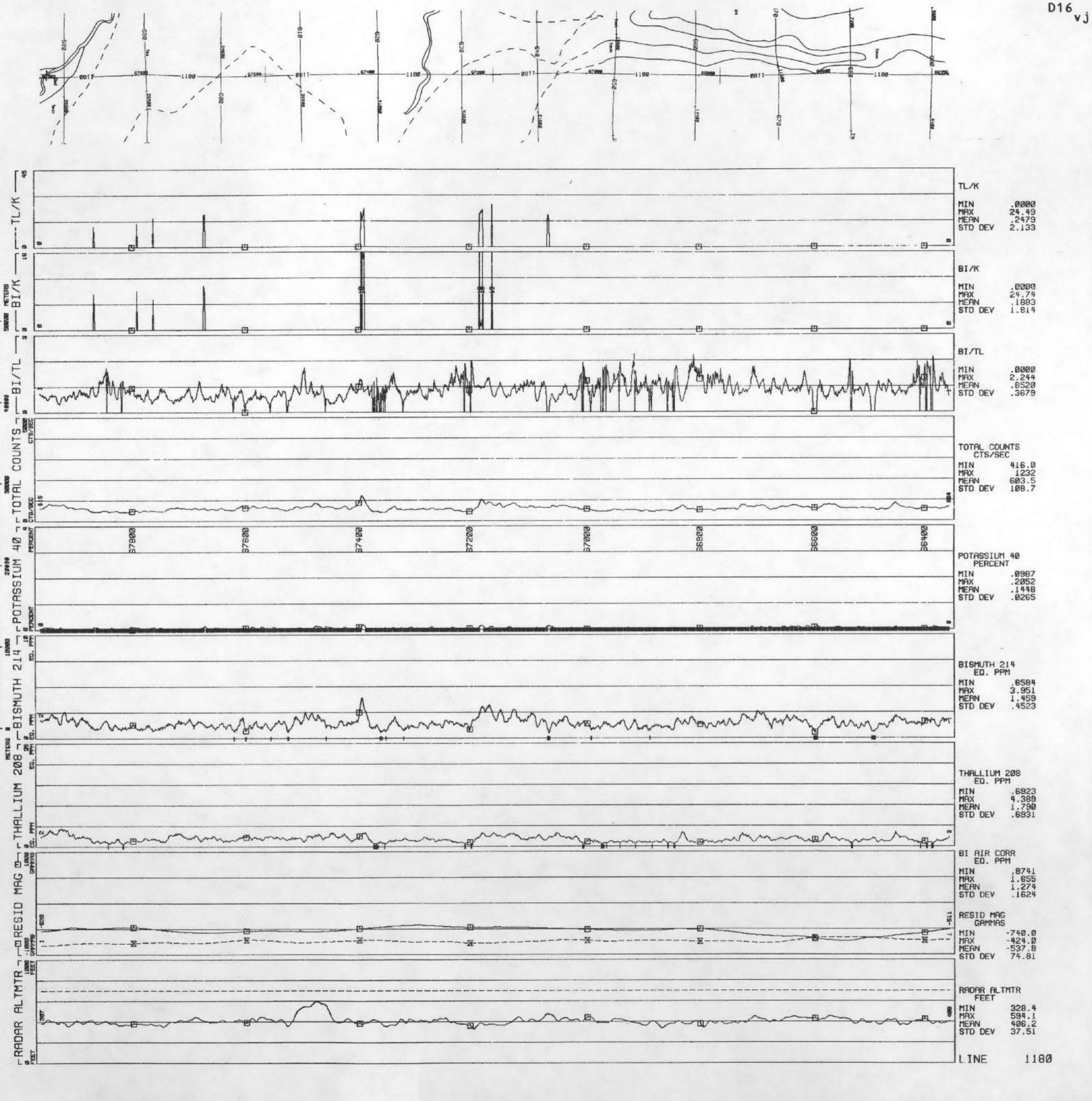
LINE 1160
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81020



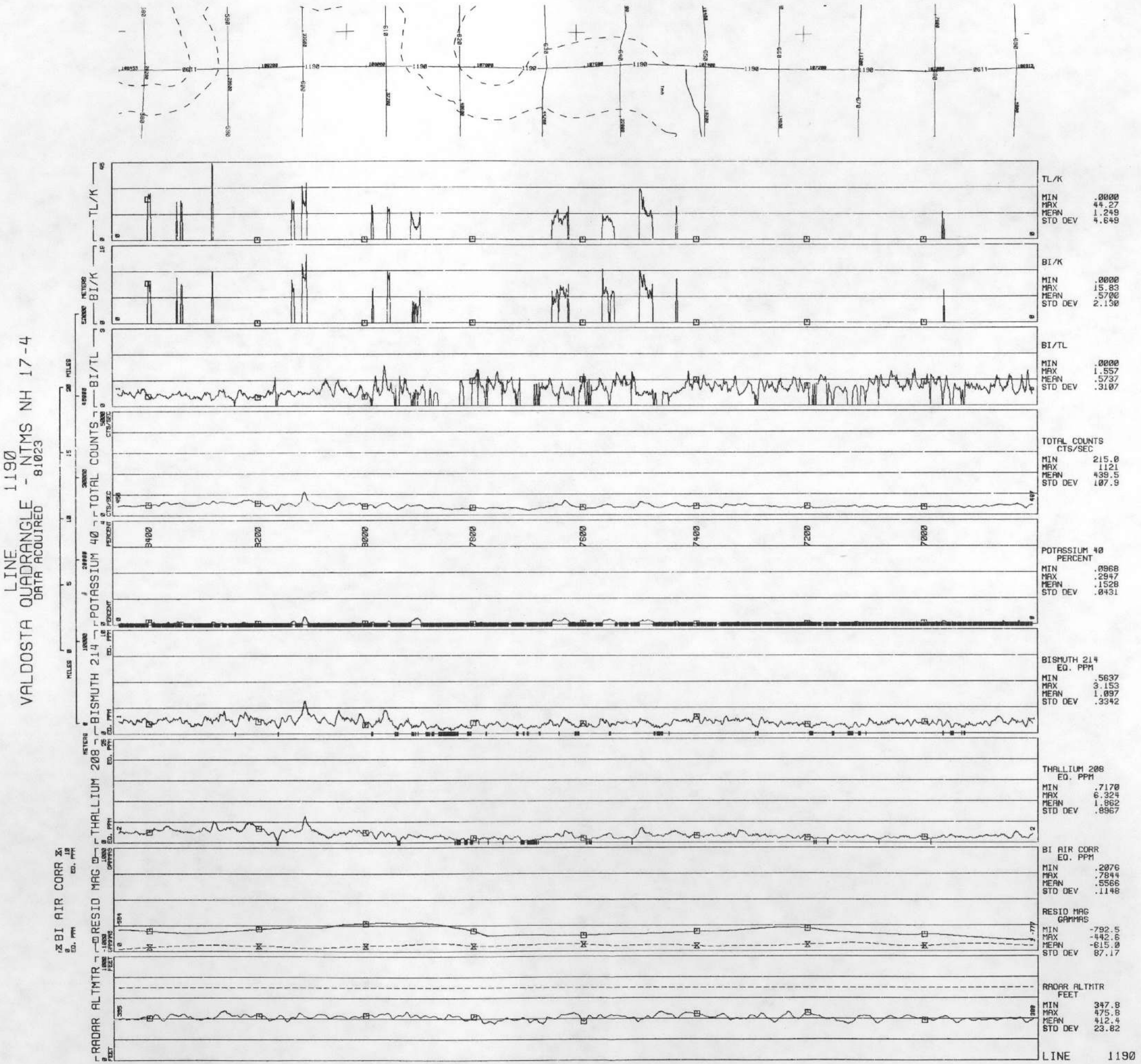
D15 vj


LINE 1170
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81022
TL/K
MIN .0000
MAX 47.82
MEAN 1.432
STD DEV 5.689
BI/K
MIN .0000
MAX 21.89
MEAN .7358
STD DEV 2.953
BI/TL
MIN .0000
MAX 2.198
MEAN .6770
STD DEV .3377
TOTAL COUNTS CTS/SEC
MIN 380.9
MAX 1279
MEAN 708.4
STD DEV 184.5
POTASSIUM 40 PERCENT
MIN .1109
MAX .4407
MEAN .2029
STD DEV .0736
BISMUTH 214 EQ. PPM
MIN .7511
MAX 3.920
MEAN 1.710
STD DEV .5615
THALLIUM 208 EQ. PPM
MIN .7569
MAX 7.563
MEAN 2.660
STD DEV 1.207
BI AIR CORR EQ. PPM
MIN 1.029
MAX 1.578
MEAN 1.301
STD DEV .1288
RESID MAG GAMMAS
MIN -877.2
MAX -388.2
MEAN -592.2
STD DEV 110.4
RADAR ALTMTR FEET
MIN 356.7
MAX 611.9
MEAN 428.8
STD DEV 38.43
LINE 1170

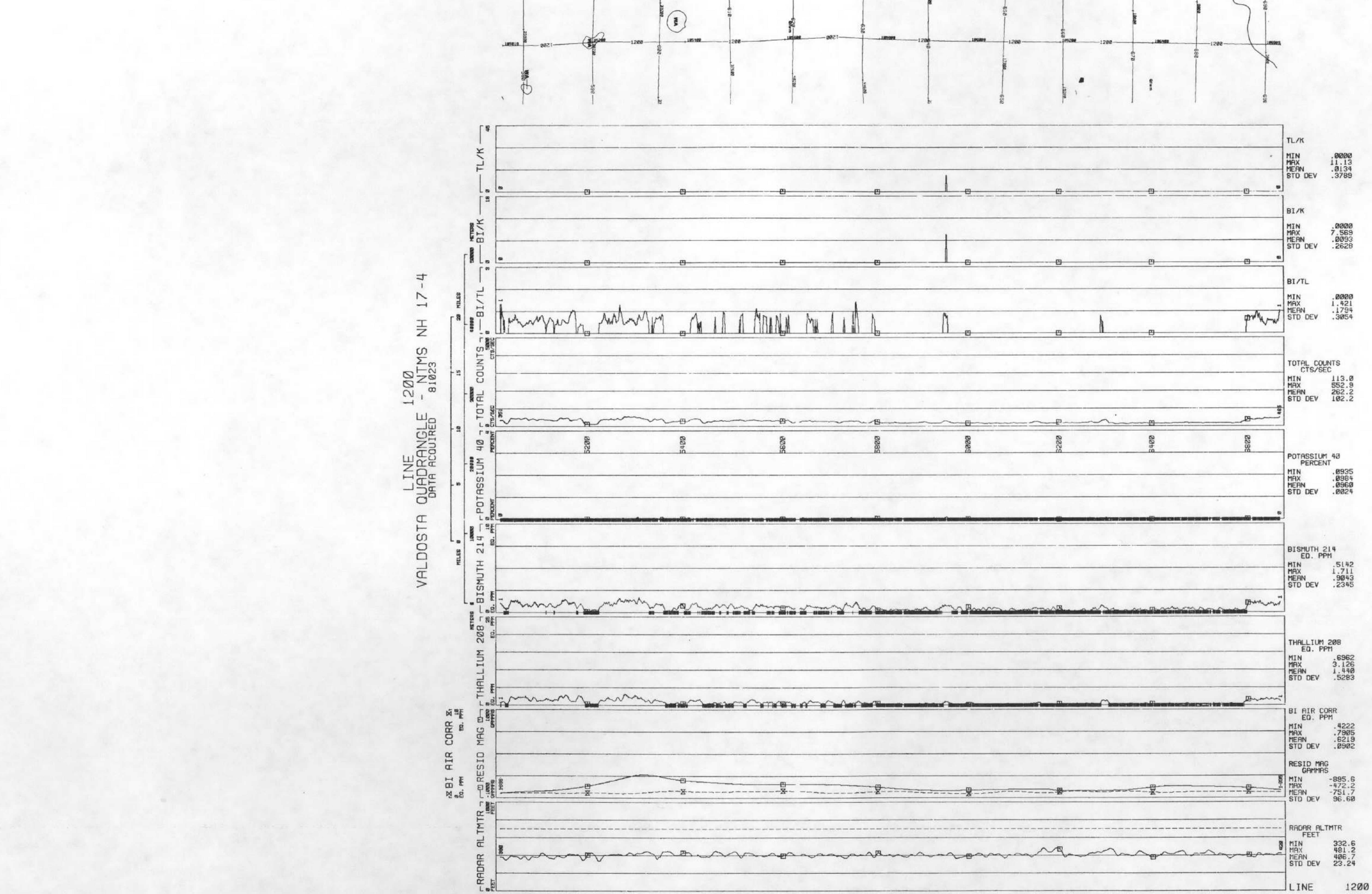
LINE 1180
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81022



D17 vj

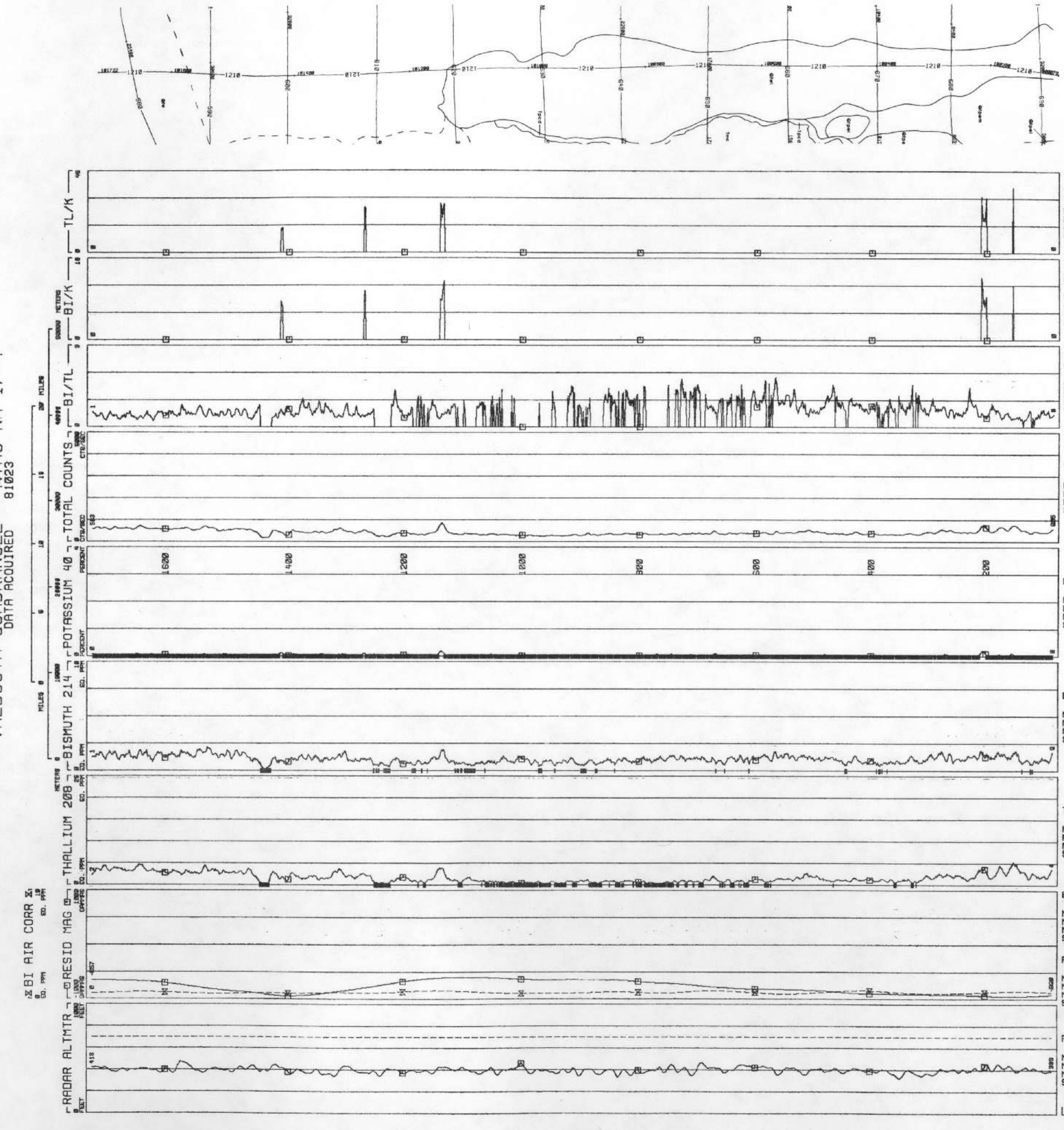

LINE 1190
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023
TL/K
MIN .0000
MAX 44.27
MEAN 1.249
STD DEV 4.649
BI/K
MIN .0000
MAX 15.83
MEAN .5700
STD DEV 2.130
BI/TL
MIN .0000
MAX 1.557
MEAN .5737
STD DEV .3107
TOTAL COUNTS CTS/SEC
MIN 215.0
MAX 1121
MEAN 439.5
STD DEV 107.9
POTASSIUM 40 PERCENT
MIN .0968
MAX .2947
MEAN .1528
STD DEV .0431
BISMUTH 214 EQ. PPM
MIN .5637
MAX 3.153
MEAN 1.097
STD DEV .3342
THALLIUM 208 EQ. PPM
MIN .7170
MAX 6.324
MEAN 1.862
STD DEV .8967
BI AIR CORR EQ. PPM
MIN .2076
MAX .7844
MEAN .5566
STD DEV .1148
RESID MAG GAMMAS
MIN -792.5
MAX -442.6
MEAN -615.0
STD DEV 87.17
RADAR ALTMTR FEET
MIN 347.8
MAX 475.8
MEAN 412.4
STD DEV 23.82
LINE 1190
8400
8200
8000
7800
7600
7400
7200
7000

D18 vj



LINE 1200
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023
TL/K
MIN .0000 MAX 11.13 MEAN .0134 STD DEV .3789
BI/K
MIN .0000 MAX 7.589 MEAN .0093 STD DEV .2628
BI/TL
MIN .0000 MAX 1.421 MEAN .1794 STD DEV .3054
TOTAL COUNTS CTS/SEC
MIN 113.0 MAX 552.9 MEAN 262.2 STD DEV 102.2
POTASSIUM 40 PERCENT
MIN .0935 MAX .0984 MEAN .0960 STD DEV .0024
BISMUTH 214 EQ. PPM
MIN .5142 MAX 1.711 MEAN .9043 STD DEV .2345
THALLIUM 208 EQ. PPM
MIN .6962 MAX 3.126 MEAN 1.440 STD DEV .5283
BI AIR CORR EQ. PPM
MIN .4222 MAX .7905 MEAN .6219 STD DEV .0902
RESID MAG GAMMAS
MIN -895.6 MAX -472.2 MEAN -751.7 STD DEV 96.60
RADAR ALTMTR FEET
MIN 332.6 MAX 481.2 MEAN 406.7 STD DEV 23.24
LINE 1200

LINE 1210
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023



TL/K
MIN .0000
MAX 36.06
MEAN .3214
STD DEV 2.731

BI/K
MIN .0000
MAX 13.73
MEAN .1422
STD DEV 1.189

BI/TL
MIN .0000
MAX 1.827
MEAN .5108
STD DEV .3877

TOTAL COUNTS CTS/SEC
MIN 166.7
MAX 841.8
MEAN 422.8
STD DEV 115.8

POTASSIUM 40 PERCENT
MIN .1063
MAX .2089
MEAN .1498
STD DEV .0334

BISMUTH 214 EQ. PPM
MIN .5327
MAX 2.125
MEAN 1.097
STD DEV .3051

THALLIUM 208 EQ. PPM
MIN .6802
MAX 5.245
MEAN 1.941
STD DEV .9919

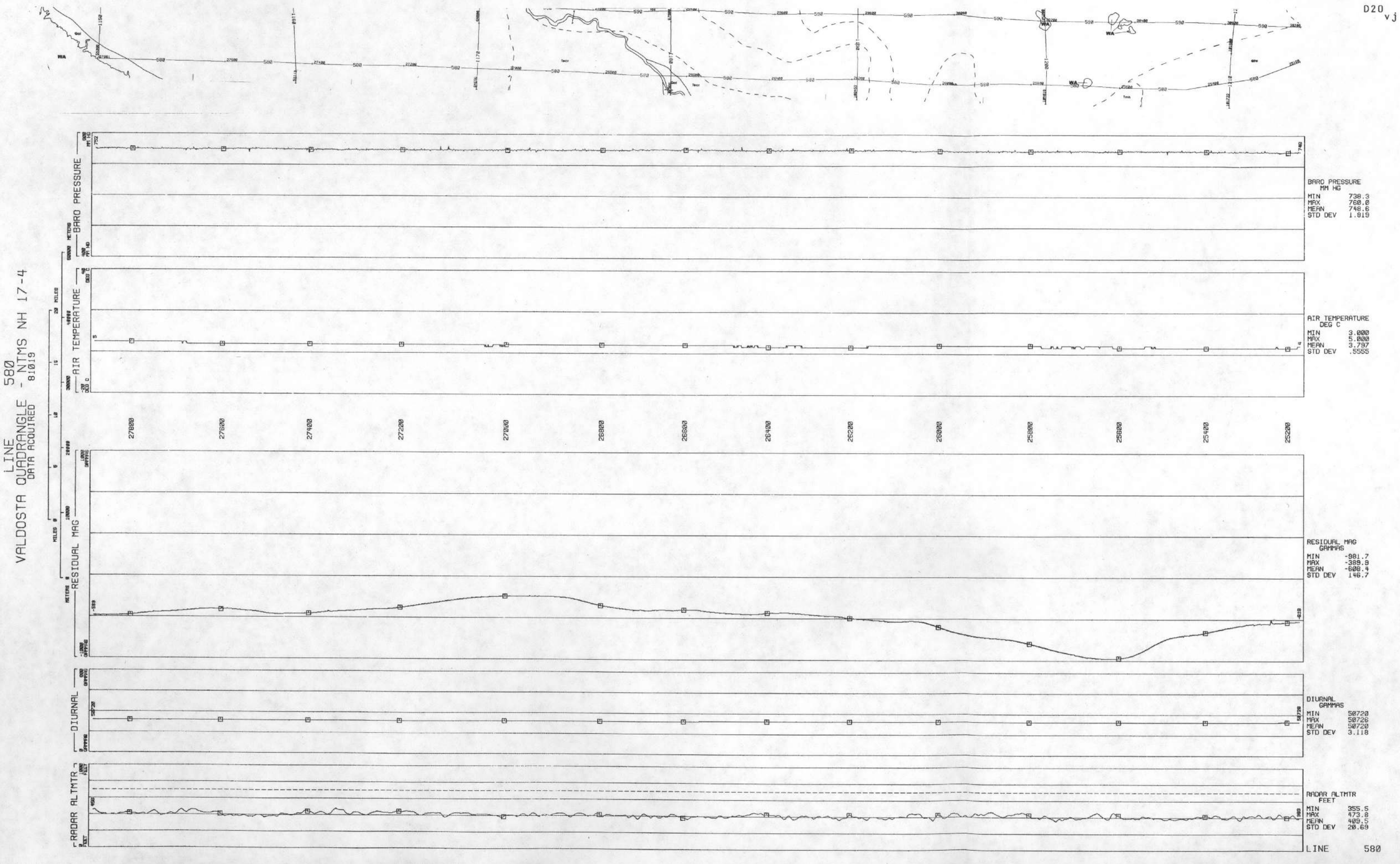
BI AIR CORR EQ. PPM
MIN .4506
MAX .7822
MEAN .5946
STD DEV .0842

RESID MAG GAMMAS
MIN -953.5
MAX -595.0
MEAN -785.6
STD DEV 117.0

RADAR ALTMTR FEET
MIN 324.7
MAX 473.5
MEAN 396.6
STD DEV 24.18

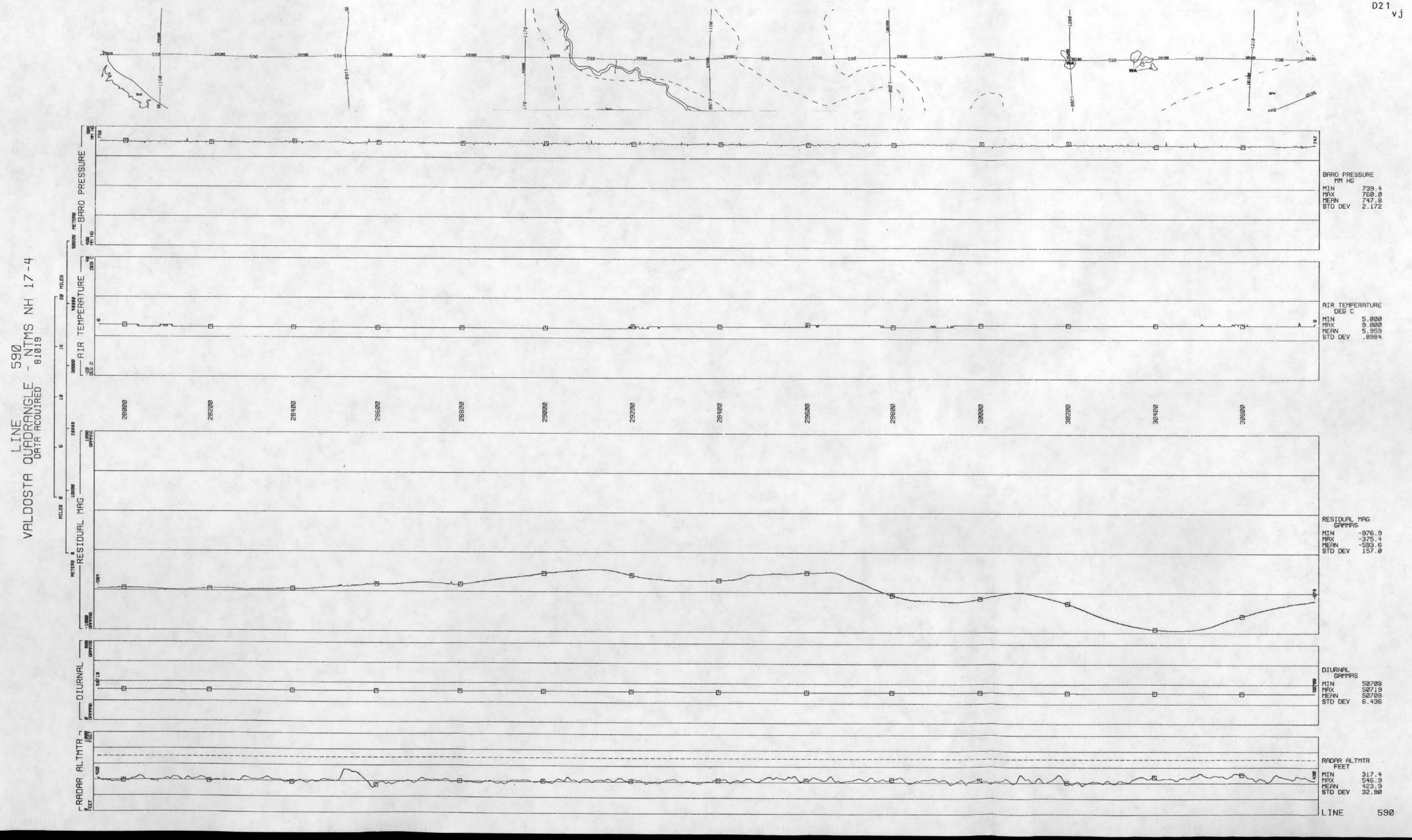
LINE 1210

D20 vj



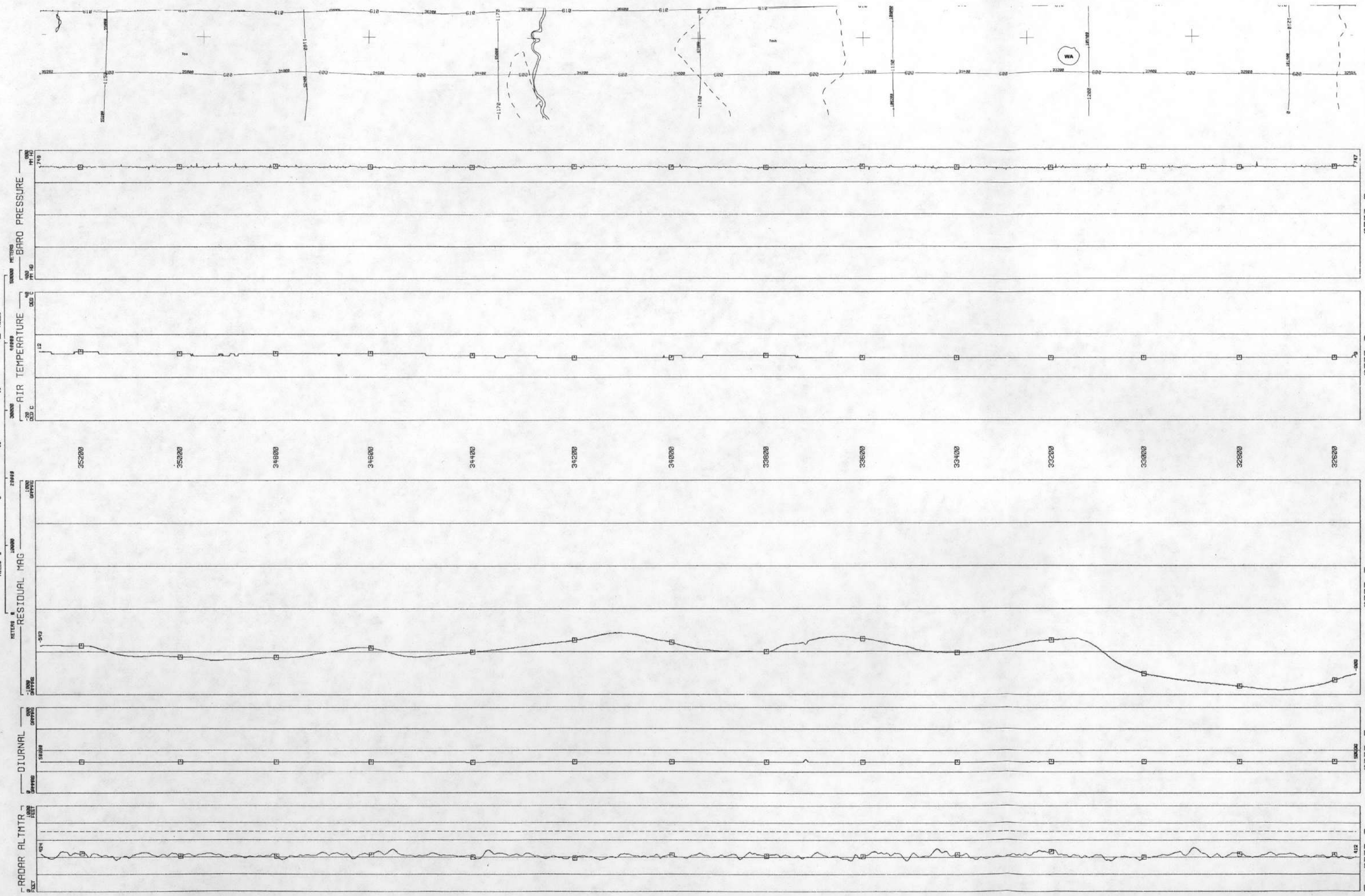
LINE 580

D21 vj


LINE 590
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
BARO PRESSURE
MM HG
MIN 739.4
MAX 760.0
MEAN 747.8
STD DEV 2.172
AIR TEMPERATURE
DEG C
MIN 5.000
MAX 9.000
MEAN 5.959
STD DEV .8984
RESIDUAL MAG
GAMMAS
MIN -976.9
MAX -375.4
MEAN -593.6
STD DEV 157.0
DIURNAL
GAMMAS
MIN 50708
MAX 50719
MEAN 50708
STD DEV 6.436
RADAR ALTMTR
FEET
MIN 317.4
MAX 546.9
MEAN 423.9
STD DEV 32.90
LINE 590

D22 vj

LINE 600
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019



BARO PRESSURE
MM HG
MIN 737.2
MAX 760.0
MEAN 746.5
STD DEV 1.850

AIR TEMPERATURE
DEG C
MIN 9.000
MAX 12.00
MEAN 9.729
STD DEV .9057

RESIDUAL MAG
GAMMAS
MIN -955.0
MAX -422.0
MEAN -625.4
STD DEV 136.6

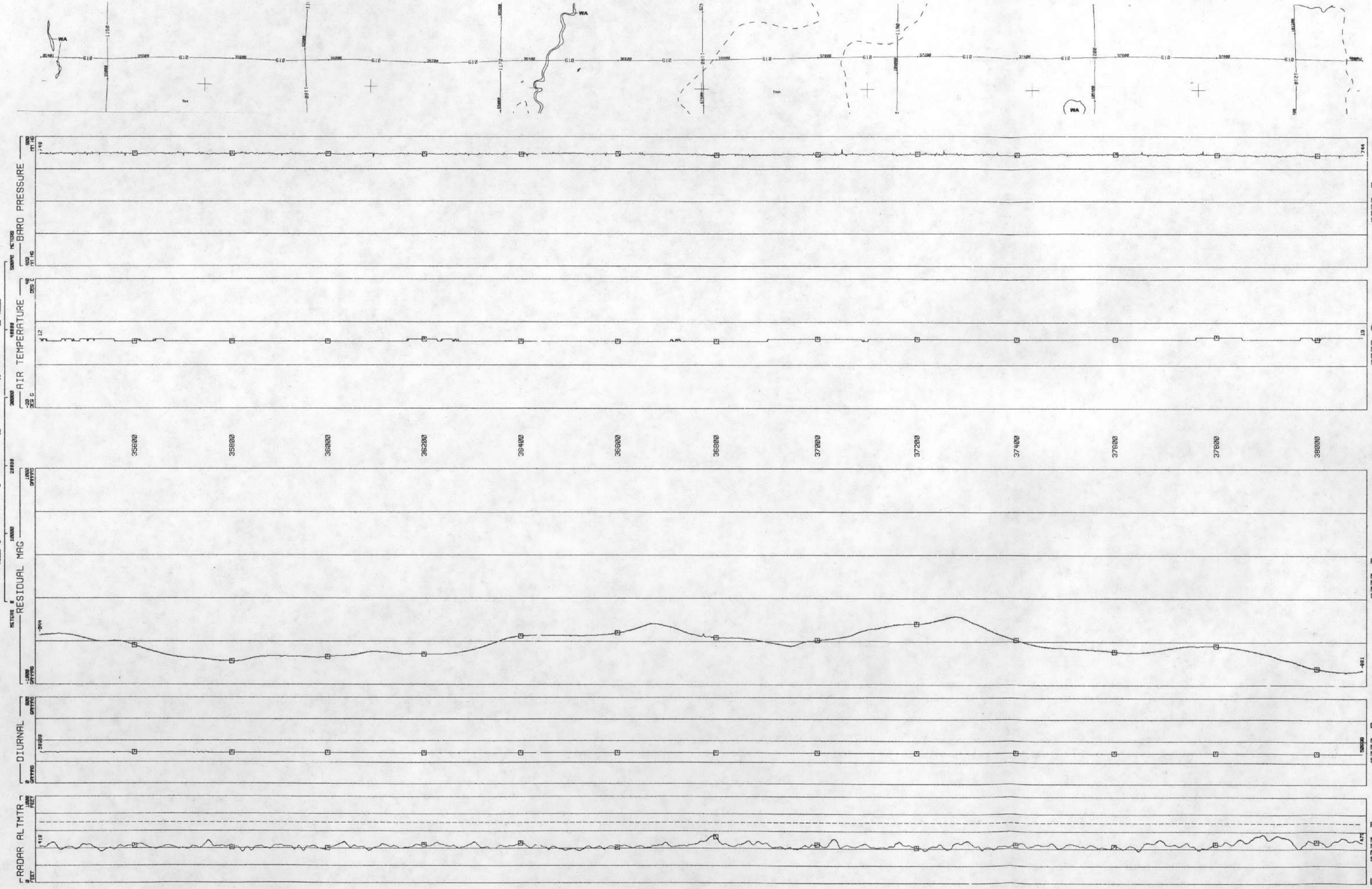
DIURNAL
GAMMAS
MIN 50687
MAX 50716
MEAN 50688
STD DEV 4.824

RADAR ALTMTR
FEET
MIN 356.8
MAX 510.9
MEAN 419.6
STD DEV 23.64

LINE 600

D23 vj

LINE 610
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019



BARO PRESSURE
MM HG
MIN 736.9
MAX 758.4
MEAN 745.4
STD DEV 2.191

AIR TEMPERATURE
DEG C
MIN 11.00
MAX 13.00
MEAN 11.60
STD DEV .6266

RESIDUAL MAG
GAMMAS
MIN -880.9
MAX -368.4
MEAN -629.4
STD DEV 113.0

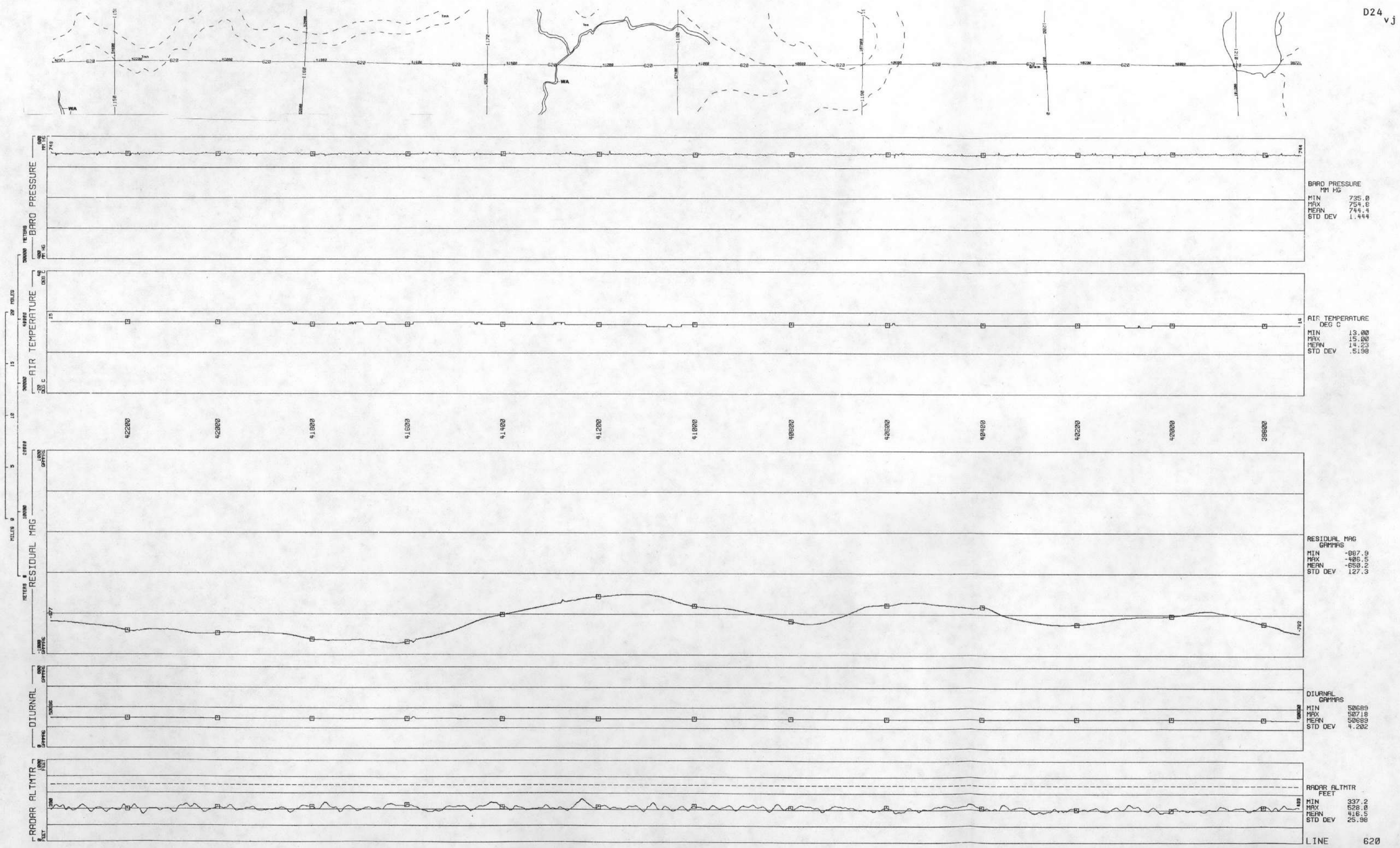
DIURNAL
GAMMAS
MIN 50688
MAX 50691
MEAN 50688
STD DEV 1.181

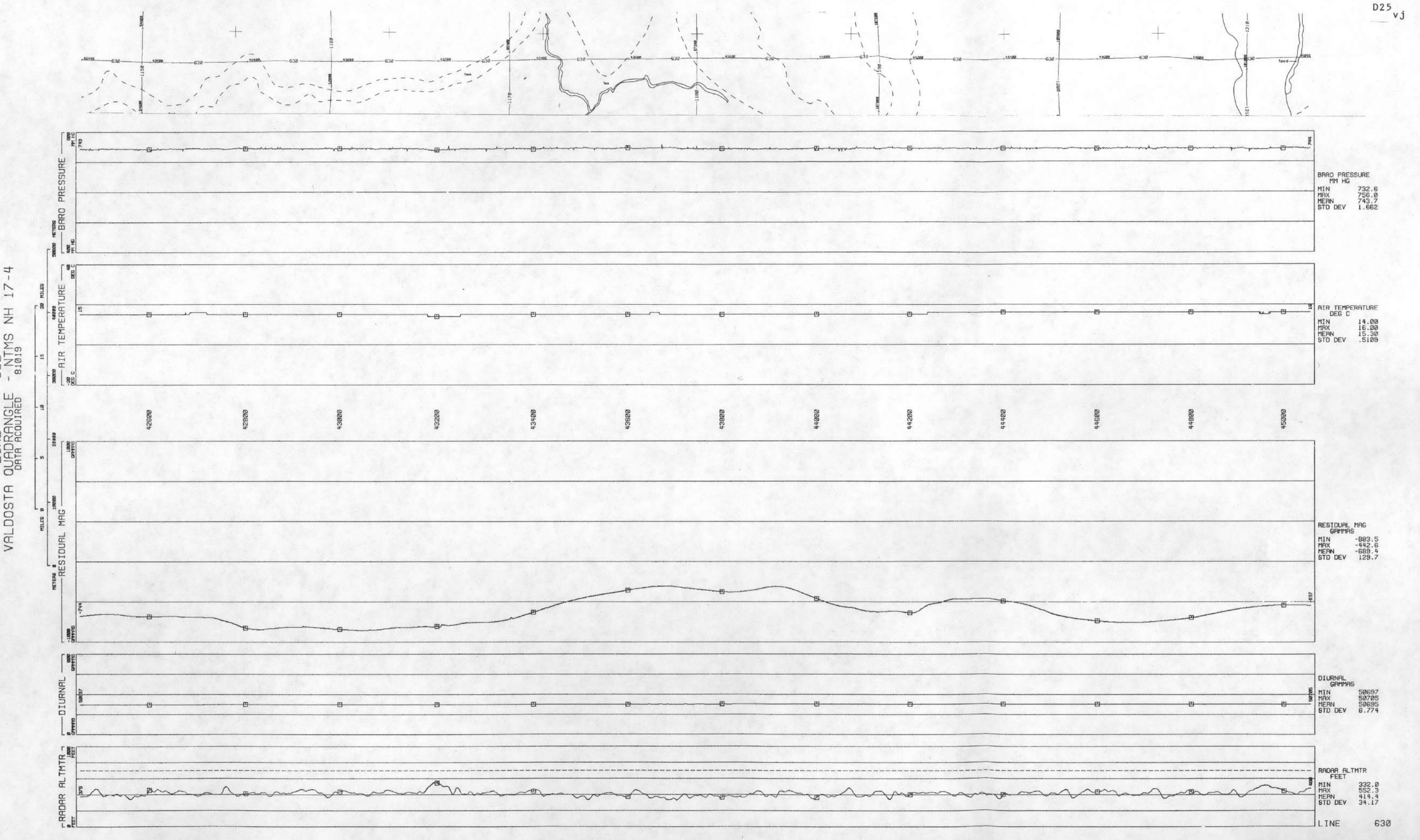
RADAR ALTMTR
FEET
MIN 362.4
MAX 568.1
MEAN 433.3
STD DEV 34.25

LINE 610

D24 vj

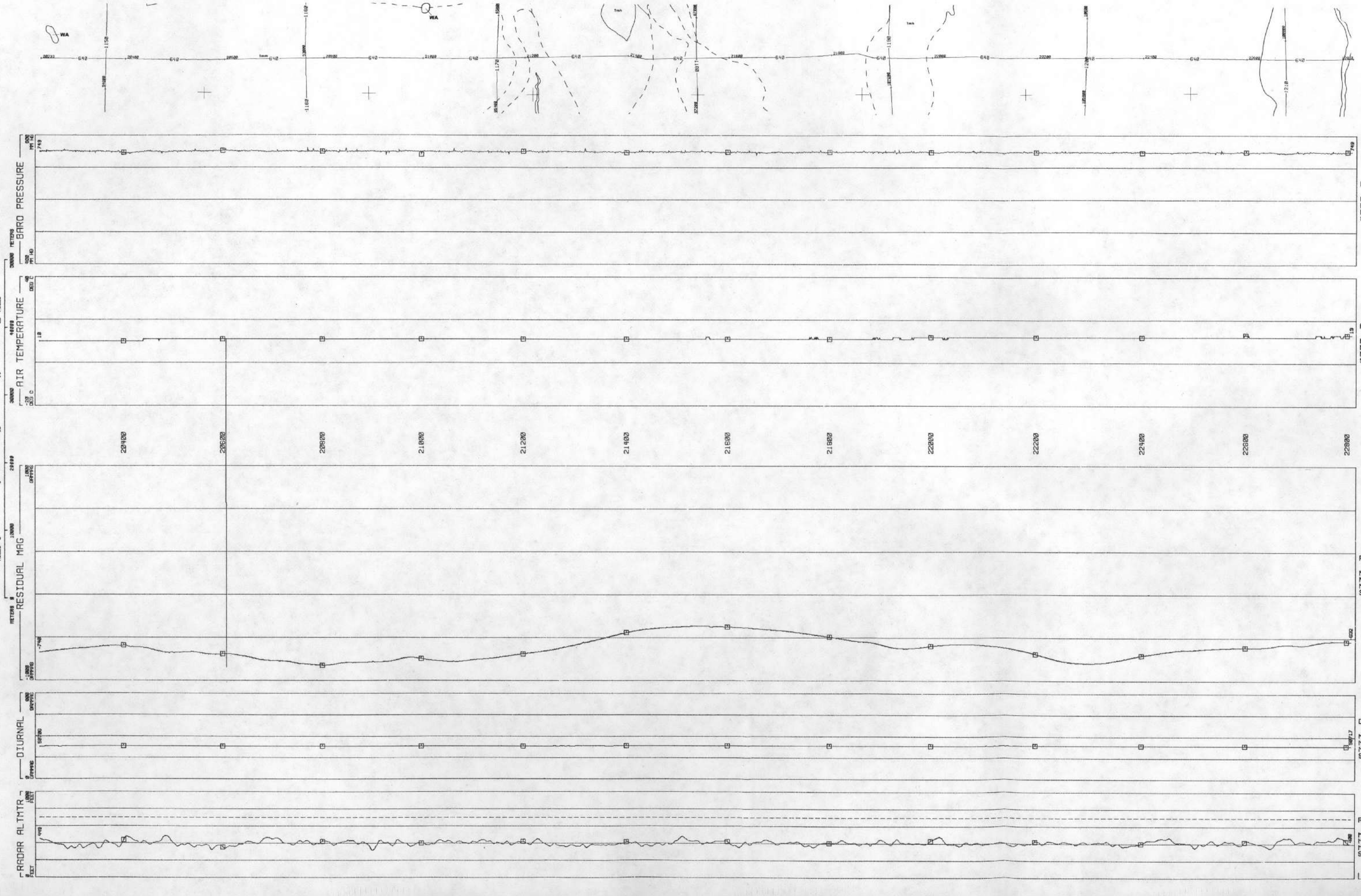
LINE 620
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019




D25 vj
LINE 630
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
42000
42200
43000
43200
43400
43600
43800
44000
44200
44400
44600
44800
45000
BARO PRESSURE MM HG
MIN 732.6
MAX 756.0
MEAN 743.7
STD DEV 1.662
AIR TEMPERATURE DEG C
MIN 14.00
MAX 16.00
MEAN 15.30
STD DEV .5109
RESIDUAL MAG GAMMAS
MIN -883.5
MAX -442.6
MEAN -689.4
STD DEV 129.7
DIURNAL GAMMAS
MIN 50697
MAX 50705
MEAN 50695
STD DEV 6.774
RADAR ALTMTR FEET
MIN 332.0
MAX 552.3
MEAN 414.4
STD DEV 34.17
LINE 630

D26
vj

LINE 640
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018



BARO PRESSURE
MM HG
MIN 738.3
MAX 760.0
MEAN 748.5
STD DEV 1.640

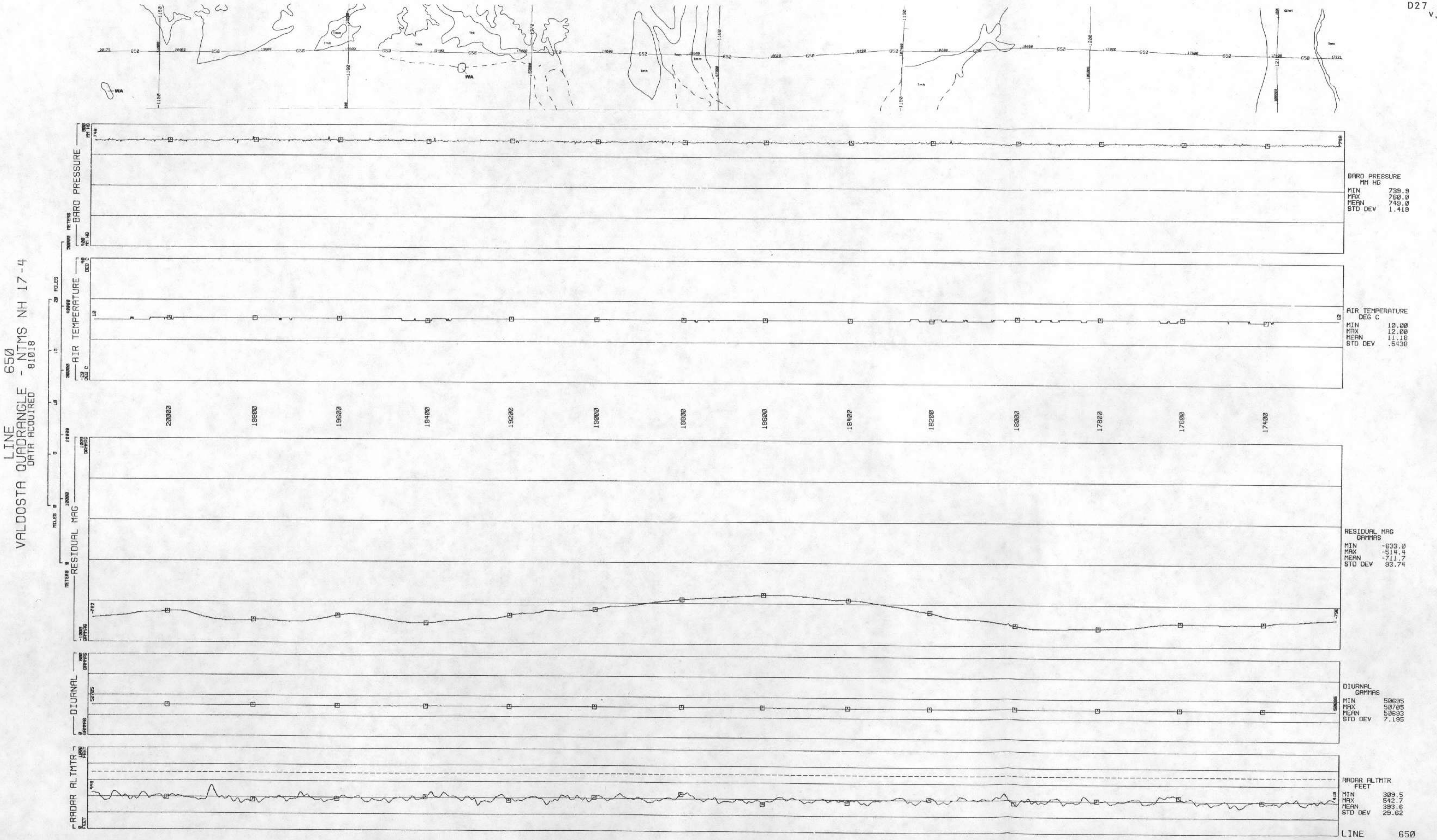
AIR TEMPERATURE
DEG C
MIN 10.00
MAX 13.00
MEAN 11.28
STD DEV .6383

RESIDUAL MAG
GAMMAS
MIN -859.3
MAX -492.0
MEAN -698.7
STD DEV 99.95

DIURNAL
GAMMAS
MIN 50706
MAX 50717
MEAN 50704
STD DEV 7.680

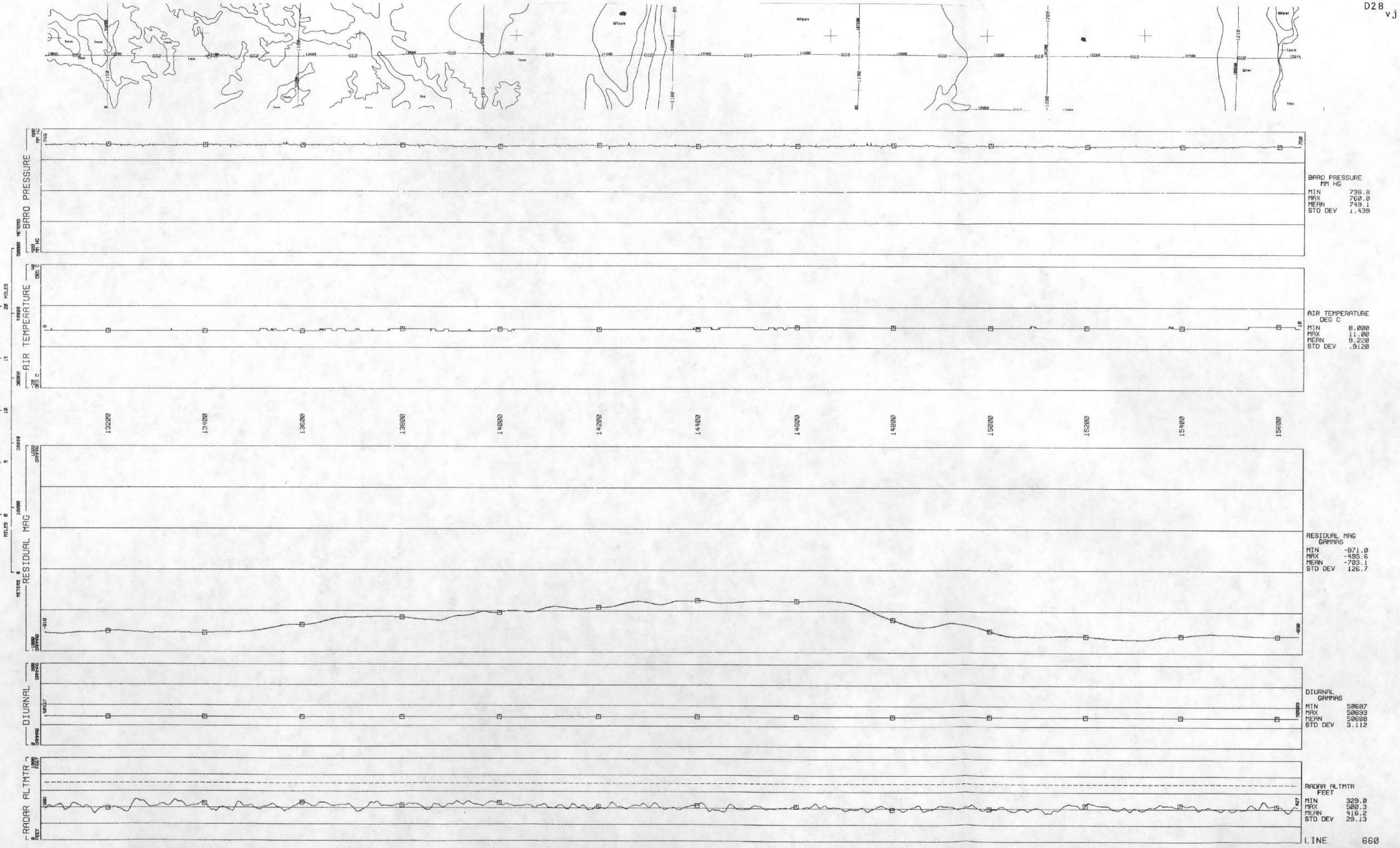
RADAR ALTMTR
FEET
MIN 318.9
MAX 485.5
MEAN 404.2
STD DEV 27.35

LINE 640

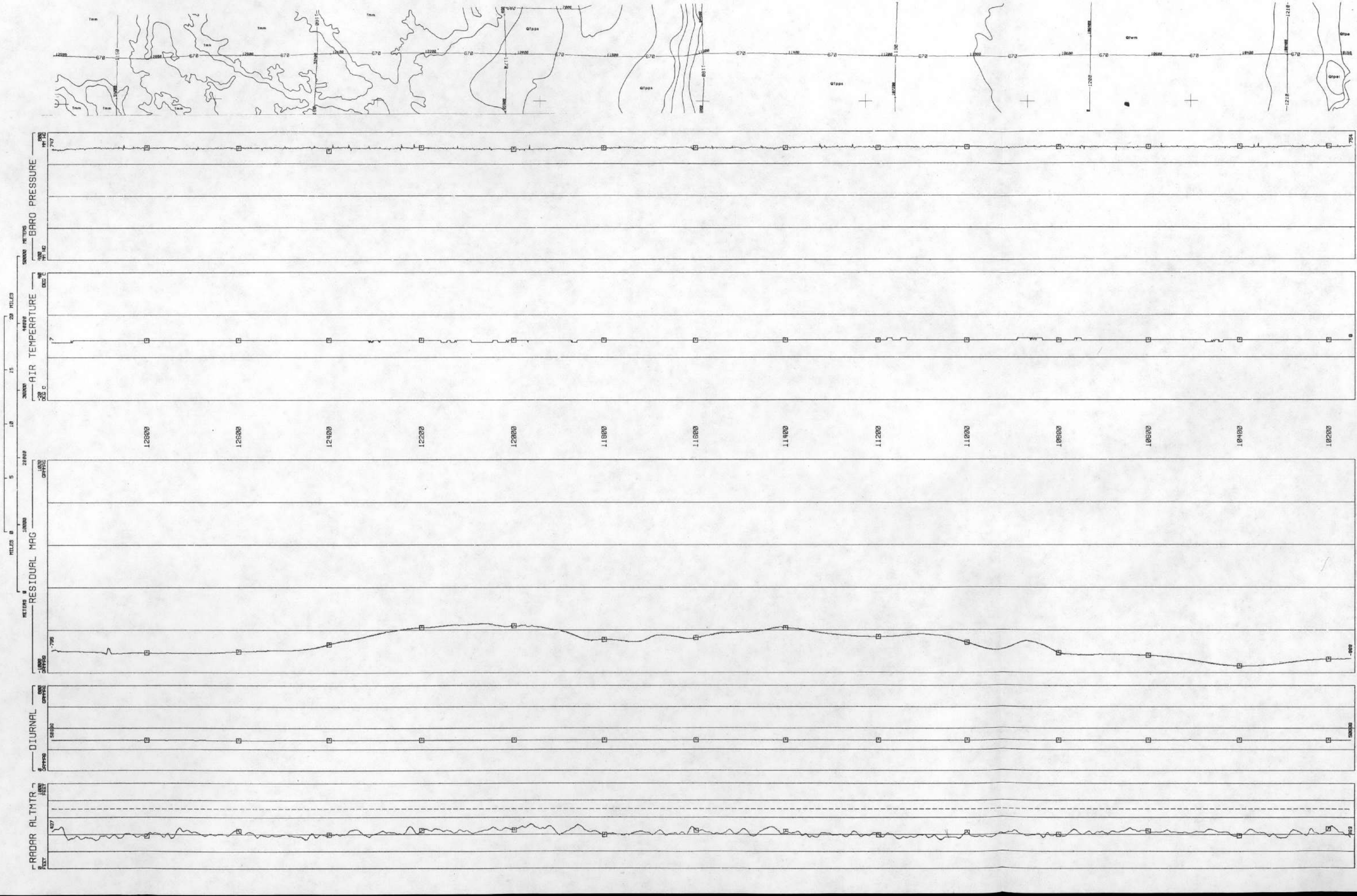

LINE 650
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
20000
19800
19600
19400
19200
19000
18800
18600
18400
18200
18000
17800
17600
17400
BARO PRESSURE
MM HG
MIN 739.9
MAX 760.0
MEAN 749.0
STD DEV 1.419
AIR TEMPERATURE
DEG C
MIN 10.00
MAX 12.00
MEAN 11.18
STD DEV .5438
RESIDUAL MAG
GAMMAS
MIN -833.0
MAX -514.4
MEAN -711.7
STD DEV 93.74
DIURNAL
GAMMAS
MIN 50695
MAX 50705
MEAN 50693
STD DEV 7.195
RADAR ALTMTR
FEET
MIN 309.5
MAX 542.7
MEAN 393.6
STD DEV 29.62
LINE 650

D28 vj

LINE 660
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018



LINE 670
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81018



BARO PRESSURE
MM HG
MIN 740.4
MAX 760.0
MEAN 749.8
STD DEV 1.822

AIR TEMPERATURE
DEG C
MIN 7.000
MAX 9.000
MEAN 7.966
STD DEV .3055

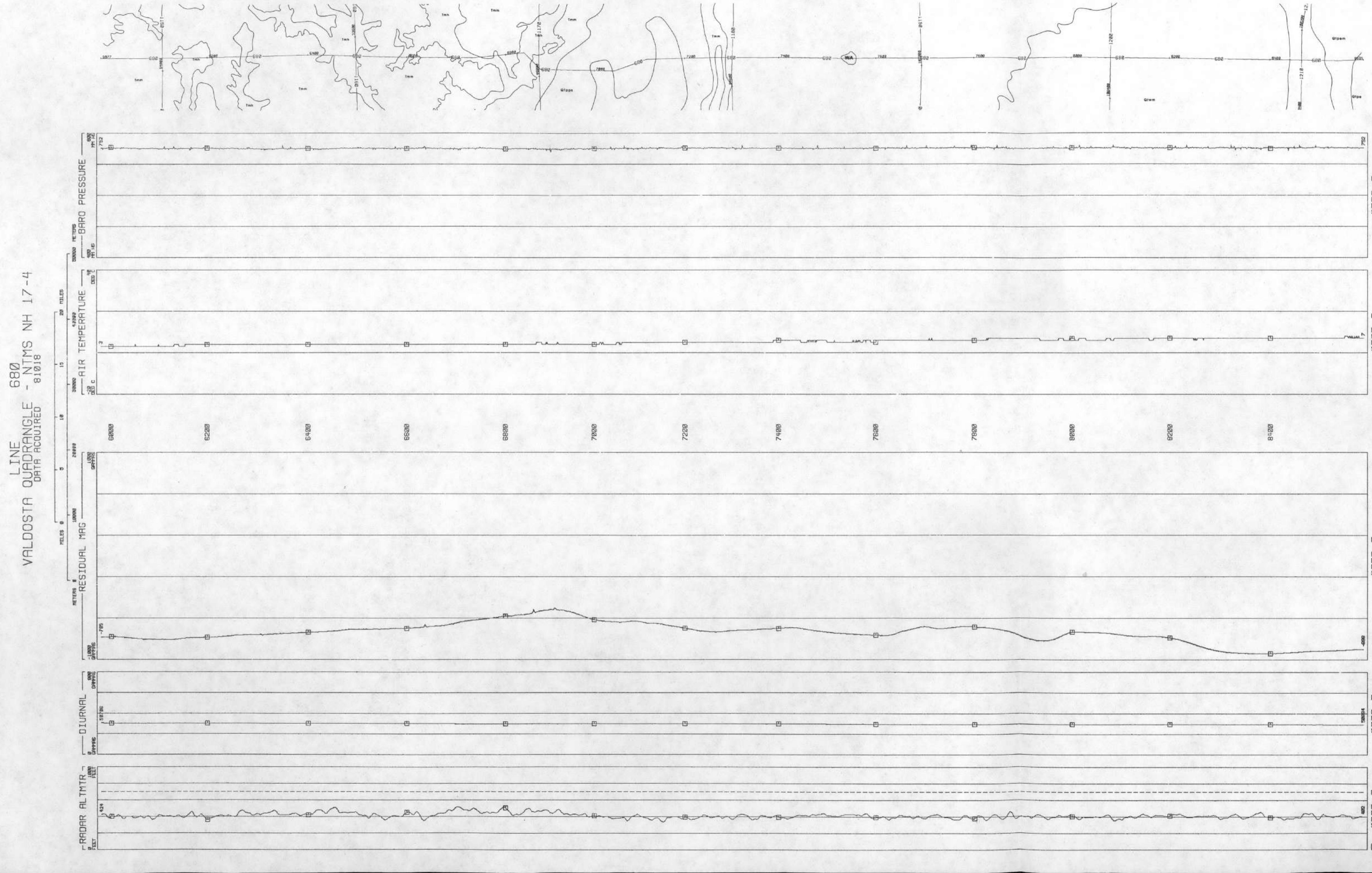
RESIDUAL MAG
GAMMAS
MIN -938.4
MAX -539.9
MEAN -730.1
STD DEV 111.2

DIURNAL
GAMMAS
MIN 50685
MAX 50690
MEAN 50685
STD DEV 2.989

RADAR ALTMTR
FEET
MIN 331.0
MAX 520.7
MEAN 414.9
STD DEV 33.94

LINE 670

D30 vj



BARO PRESSURE
MM HG

MIN	740.4
MAX	760.0
MEAN	751.0
STD DEV	1.515

AIR TEMPERATURE
DEG C

MIN	3.000
MAX	8.000
MEAN	5.219
STD DEV	1.321

RESIDUAL MAG
GAMMAS

MIN	-941.5
MAX	-504.8
MEAN	-738.0
STD DEV	97.29

DIURNAL
GAMMAS

MIN	50693
MAX	50706
MEAN	50694
STD DEV	6.649

RADAR ALTMTR
FEET

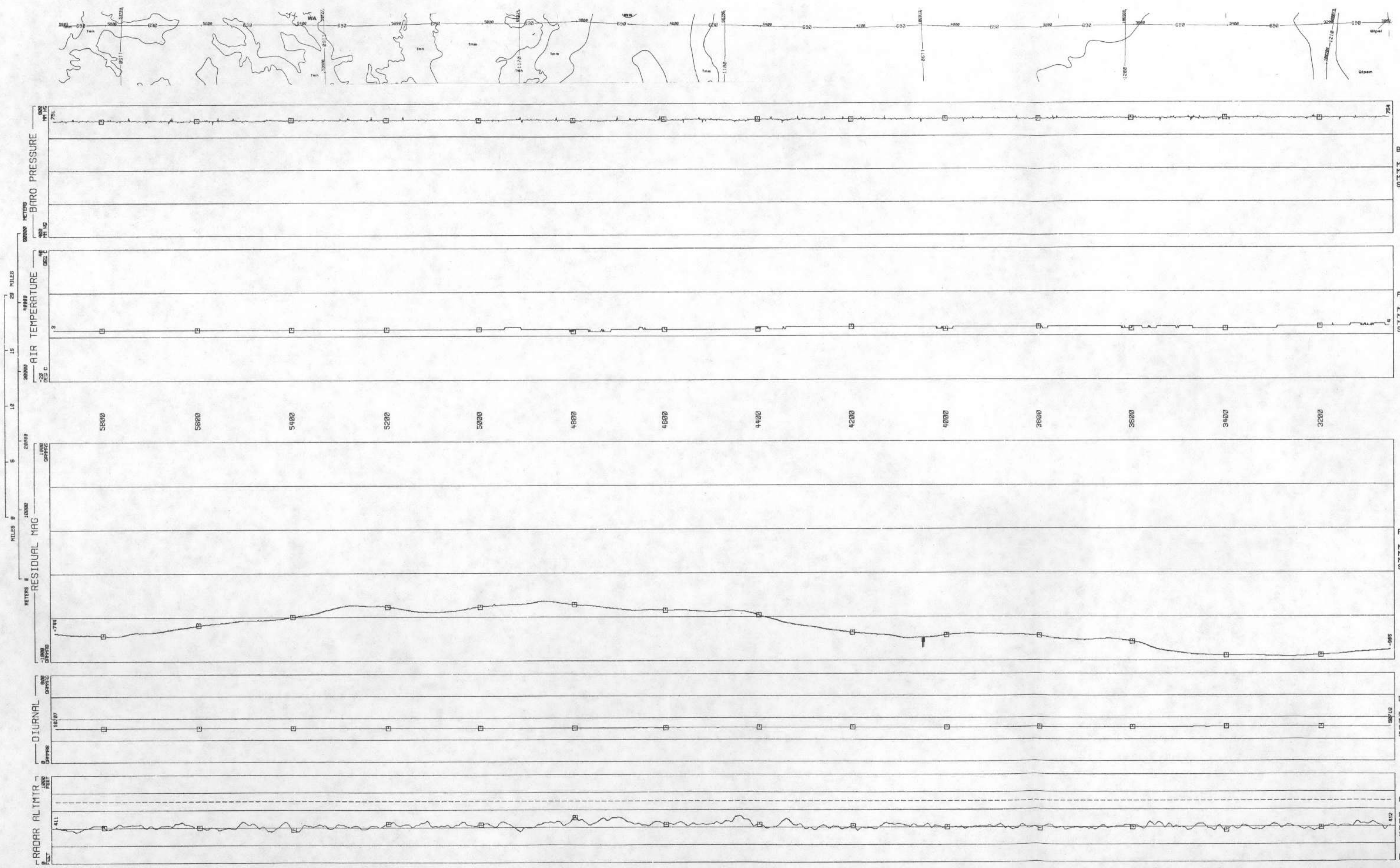
MIN	337.0
MAX	517.3
MEAN	412.2
STD DEV	30.32

LINE 680

LINE 690

VALDOSTA QUADRANGLE - NTMS NH 17-4

DATA ACQUIRED 81018



BARO PRESSURE
MM HG

MIN	741.3
MAX	760.0
MEAN	751.3
STD DEV	1.687

AIR TEMPERATURE
DEG C

MIN	2.000
MAX	5.000
MEAN	3.382
STD DEV	.5577

RESIDUAL MAG
GAMMAS

MIN	-863.9
MAX	-457.3
MEAN	-698.8
STD DEV	156.1

DIURNAL
GAMMAS

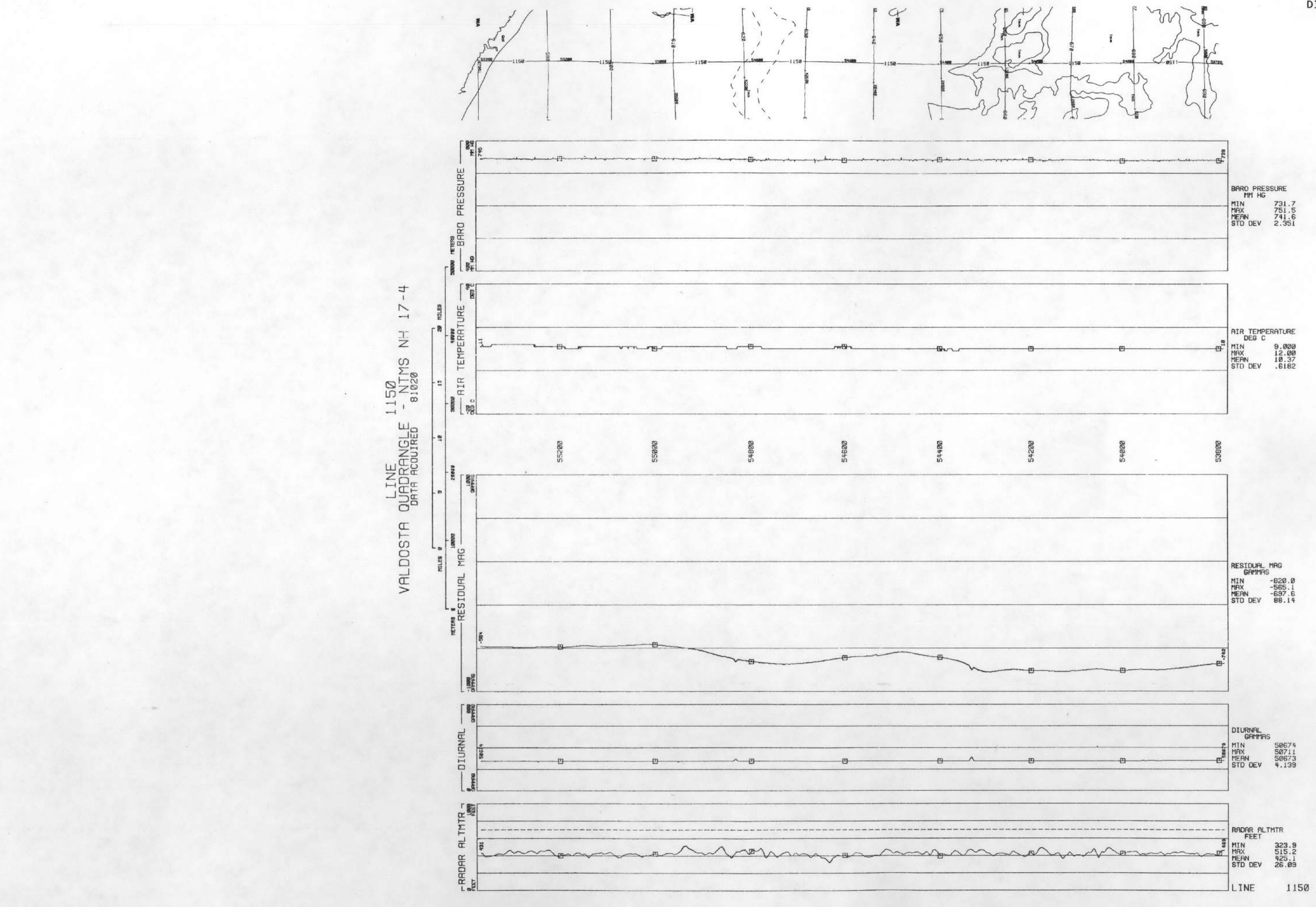
MIN	50706
MAX	50716
MEAN	50704
STD DEV	7.841

RADAR ALTMTR
FEET

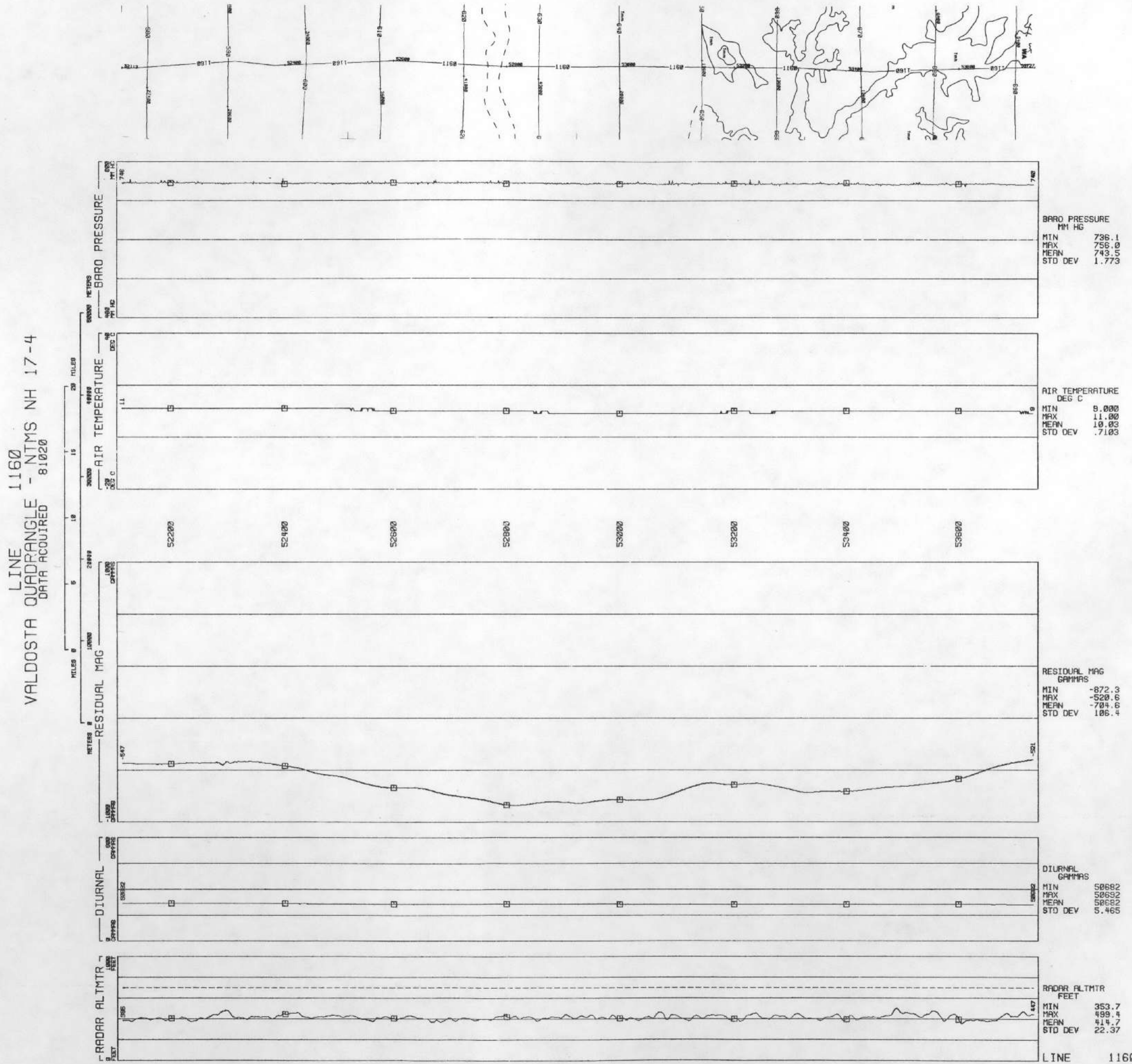
MIN	352.8
MAX	530.3
MEAN	416.9
STD DEV	30.83

LINE 690

D32 vj

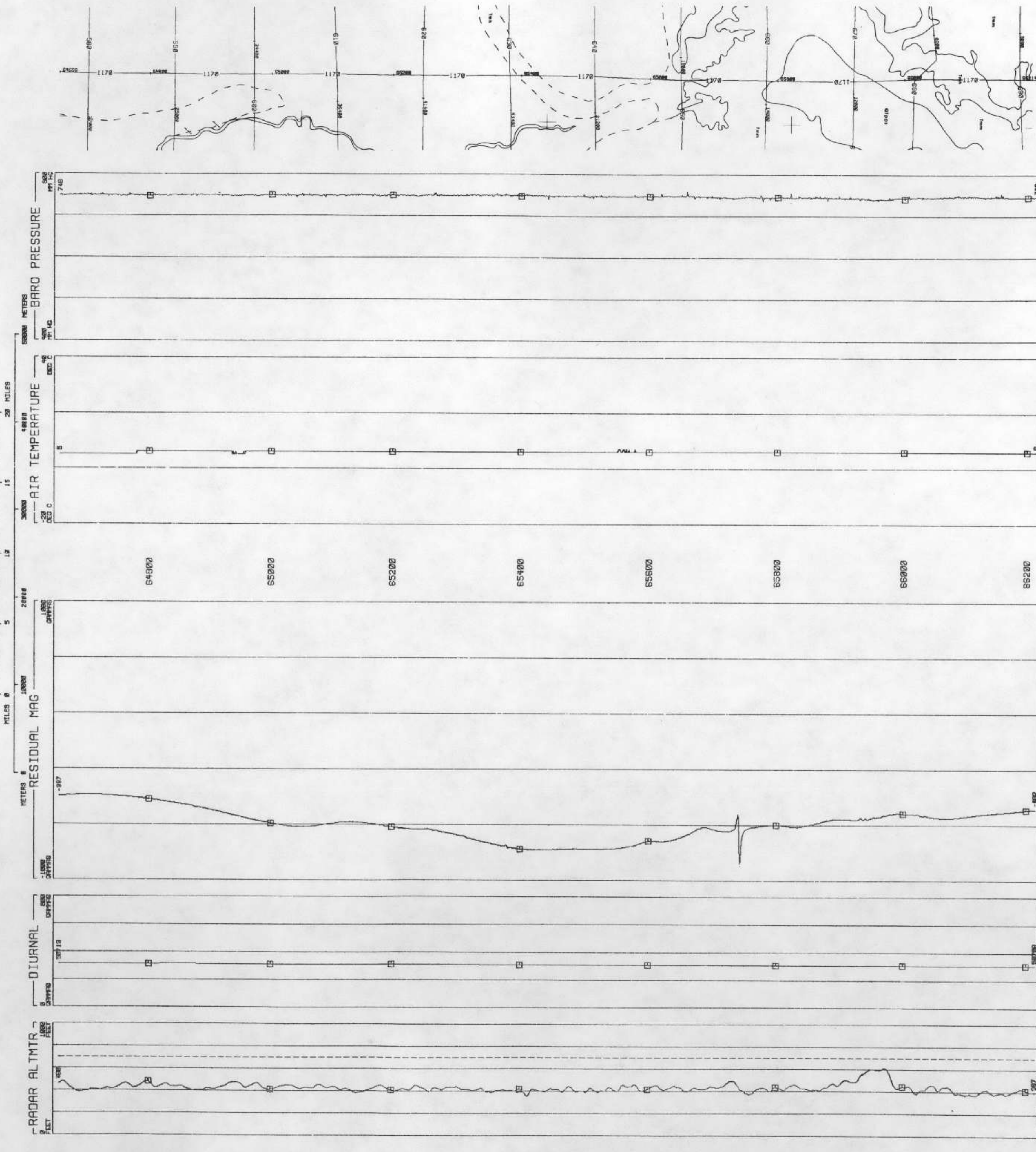

LINE 1150
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81020
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
55200 55000 54800 54600 54400 54200 54000 53800
BARO PRESSURE MM HG
MIN 731.7
MAX 751.5
MEAN 741.6
STD DEV 2.351
AIR TEMPERATURE DEG C
MIN 9.000
MAX 12.00
MEAN 10.37
STD DEV .6182
RESIDUAL MAG GAMMAS
MIN -820.0
MAX -565.1
MEAN -697.6
STD DEV 88.14
DIURNAL GAMMAS
MIN 50674
MAX 50711
MEAN 50673
STD DEV 4.139
RADAR ALTMTR FEET
MIN 323.9
MAX 515.2
MEAN 425.1
STD DEV 26.09
LINE 1150

D33 vj


LINE 1160
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81020
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
52200
52400
52600
52800
53000
53200
53400
53600
BARO PRESSURE MM HG
MIN 736.1
MAX 756.0
MEAN 743.5
STD DEV 1.773
AIR TEMPERATURE DEG C
MIN 9.000
MAX 11.00
MEAN 10.03
STD DEV .7103
RESIDUAL MAG GAMMAS
MIN -872.3
MAX -520.6
MEAN -704.6
STD DEV 106.4
DIURNAL GAMMAS
MIN 50682
MAX 50692
MEAN 50682
STD DEV 5.465
RADAR ALTMTR FEET
MIN 353.7
MAX 499.4
MEAN 414.7
STD DEV 22.37
LINE 1160

D34 vj

LINE 1170
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81022



BARO PRESSURE
MM HG
MIN 737.8
MAX 758.2
MEAN 747.2
STD DEV 2.243

AIR TEMPERATURE
DEG C
MIN 5.000
MAX 7.000
MEAN 5.914
STD DEV .2980

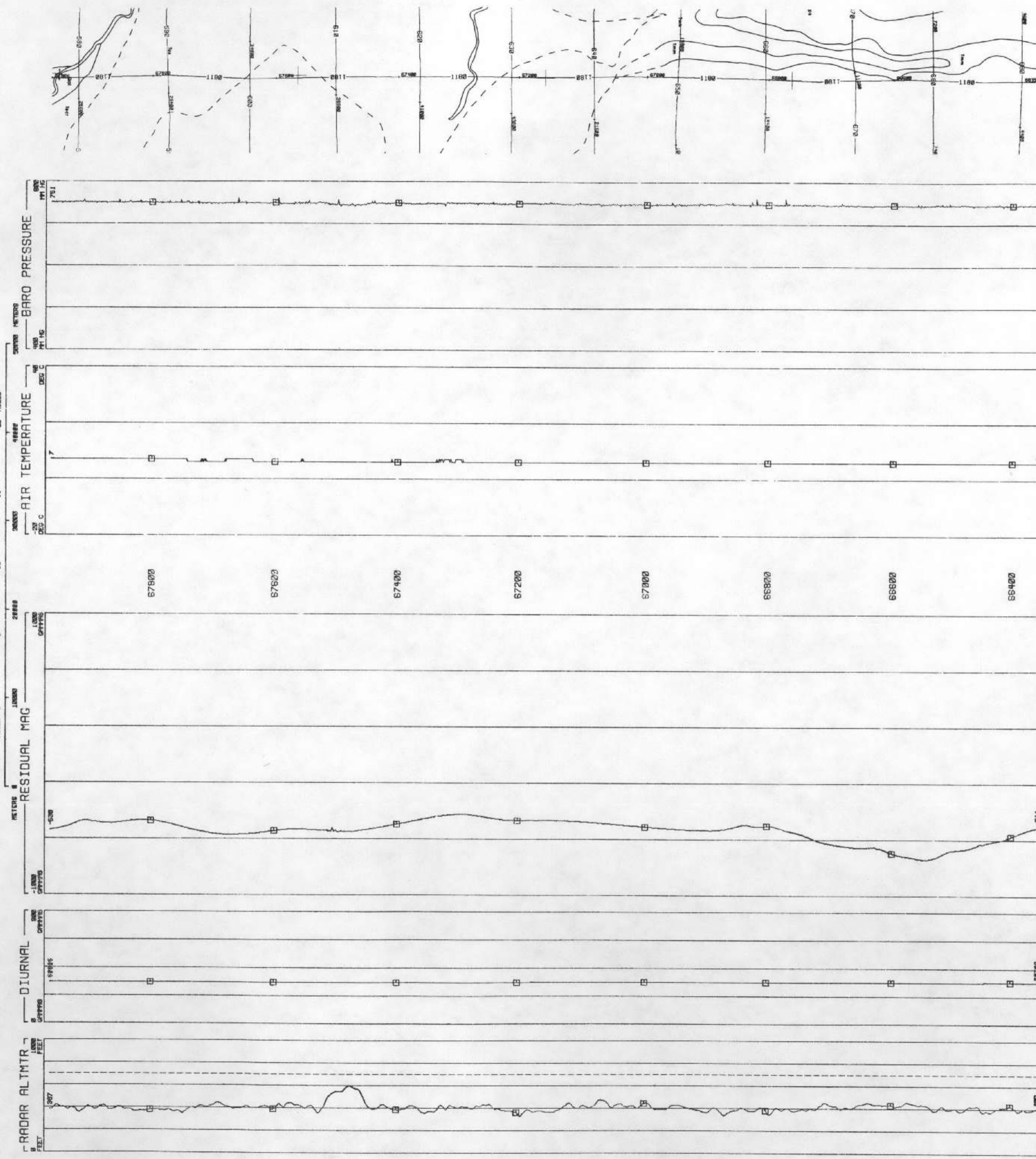
RESIDUAL MAG
GAMMAS
MIN -877.2
MAX -388.2
MEAN -582.2
STD DEV 110.4

DIURNAL
GAMMAS
MIN 50708
MAX 50714
MEAN 50707
STD DEV 4.028

RADAR ALTMTR
FEET
MIN 356.7
MAX 611.9
MEAN 428.8
STD DEV 38.43

LINE 1170

LINE 1180
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81022



BARO PRESSURE
MM HG
MIN 741.0
MAX 760.0
MEAN 747.7
STD DEV 1.810

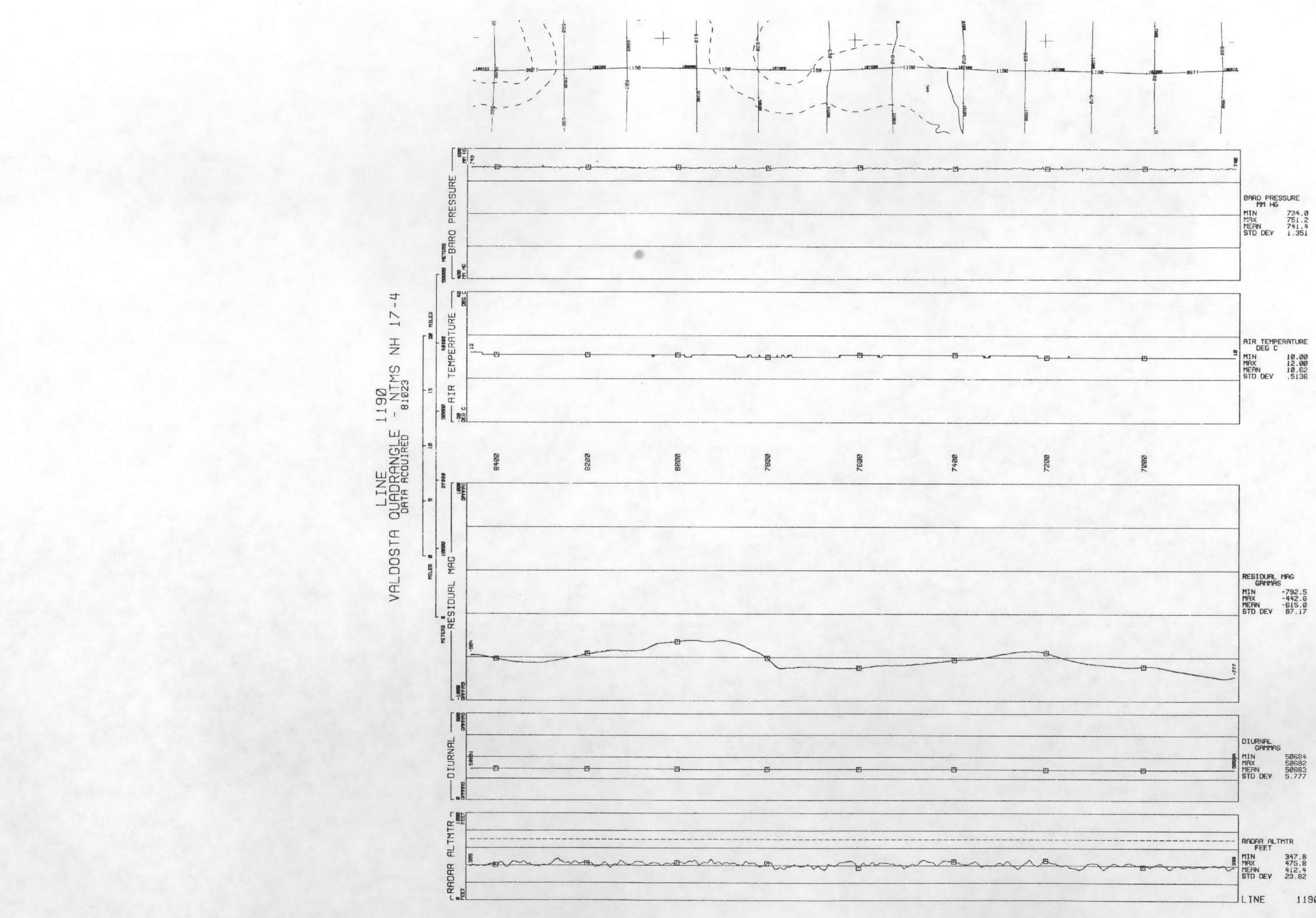
AIR TEMPERATURE
DEG C
MIN 6.000
MAX 7.000
MEAN 6.190
STD DEV .3923

RESIDUAL MAG
GAMMAS
MIN -740.0
MAX -424.0
MEAN -537.0
STD DEV 74.81

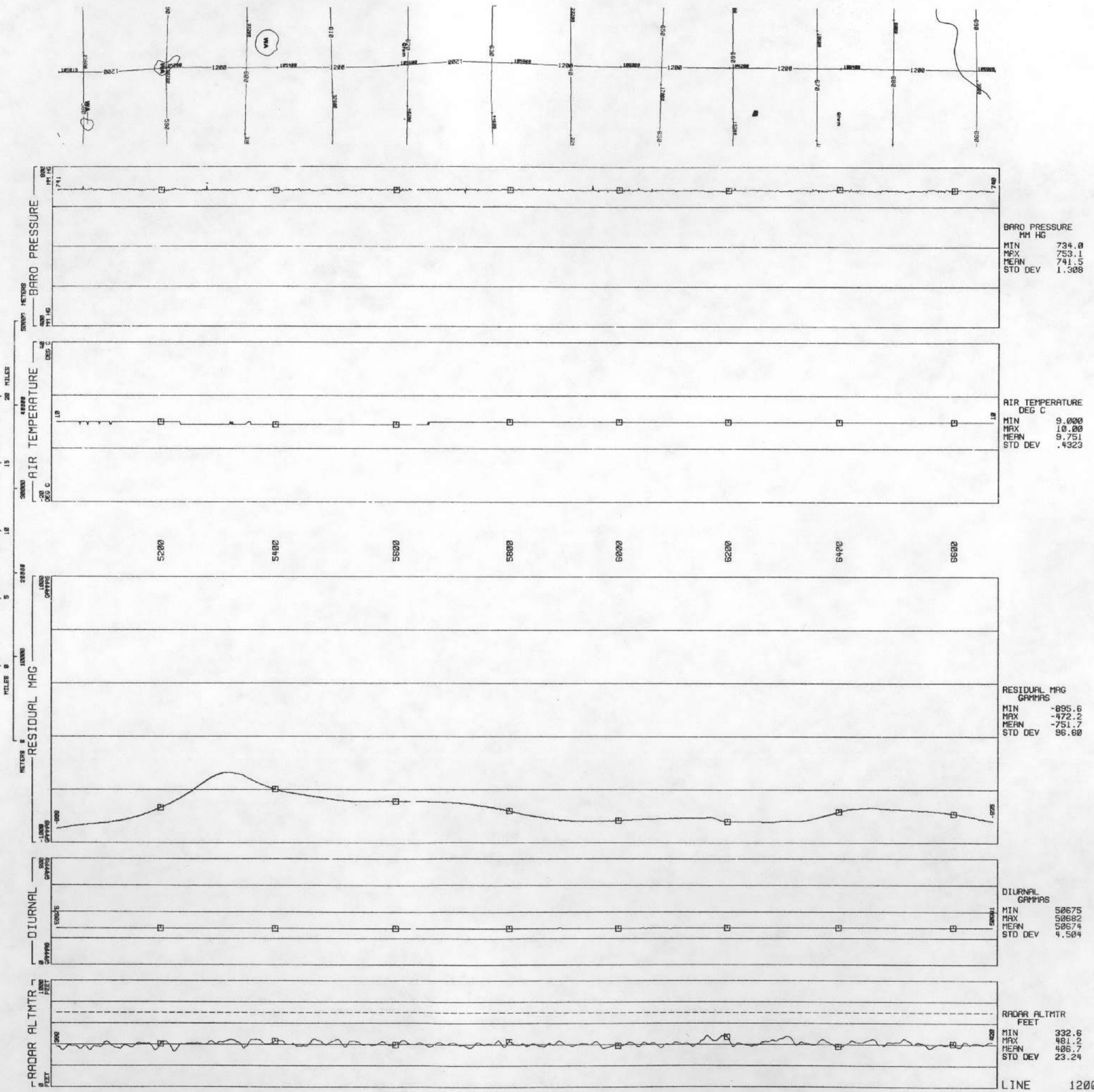
DIURNAL
GAMMAS
MIN 50695
MAX 50703
MEAN 50694
STD DEV 4.385

RADAR ALTMTR
FEET
MIN 328.4
MAX 584.1
MEAN 406.2
STD DEV 37.51

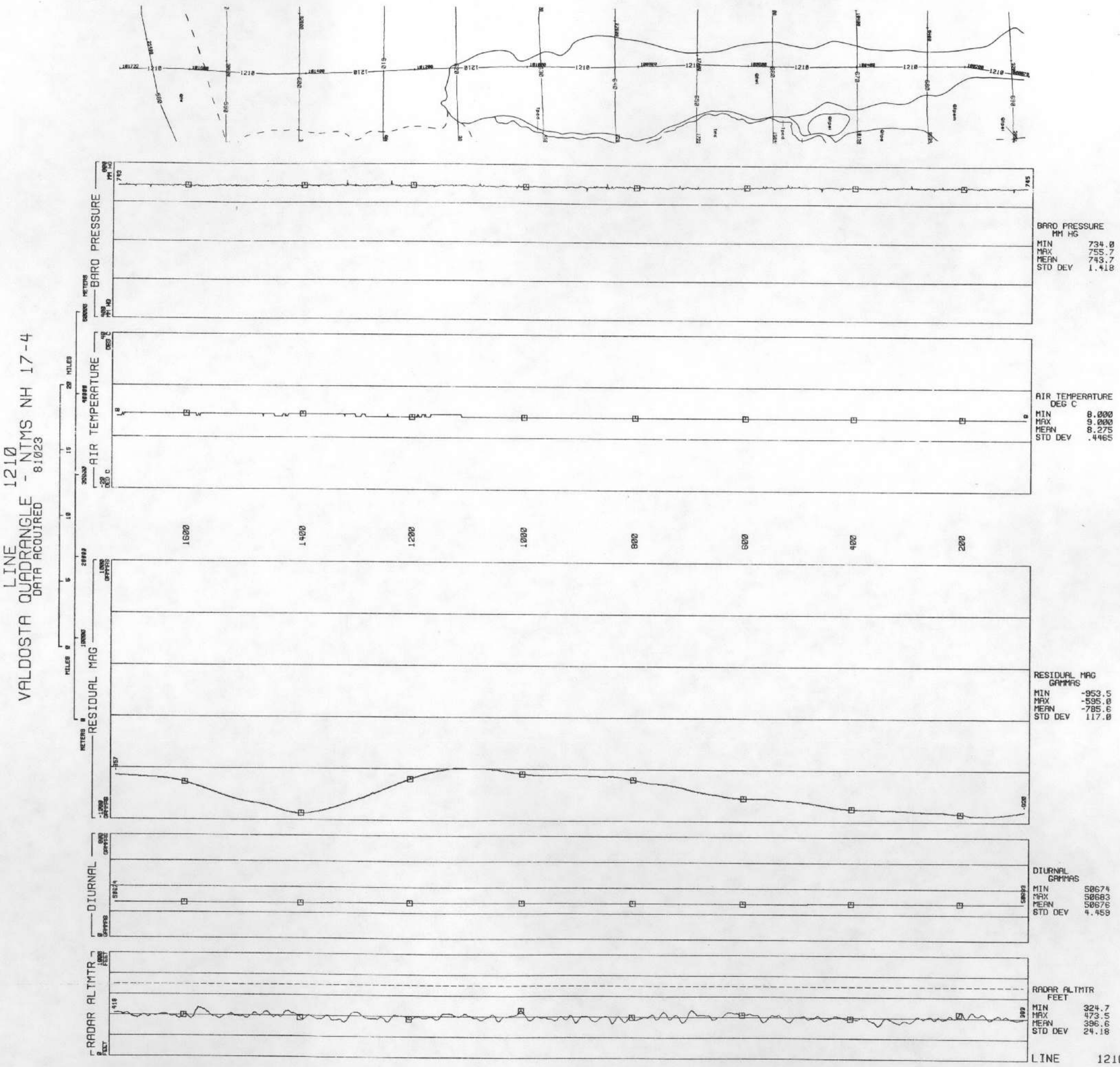
LINE 1180


LINE 1190
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
8400
8200
8000
7800
7600
7400
7200
7000
BARO PRESSURE MM HG
MIN 734.0
MAX 751.2
MEAN 741.4
STD DEV 1.351
AIR TEMPERATURE DEG C
MIN 10.00
MAX 12.00
MEAN 10.62
STD DEV .5136
RESIDUAL MAG GAMMAS
MIN -792.5
MAX -442.6
MEAN -615.0
STD DEV 87.17
DIURNAL GAMMAS
MIN 50684
MAX 50692
MEAN 50683
STD DEV 5.777
RADAR ALTMTR FEET
MIN 347.8
MAX 475.8
MEAN 412.4
STD DEV 23.82
LINE 1190

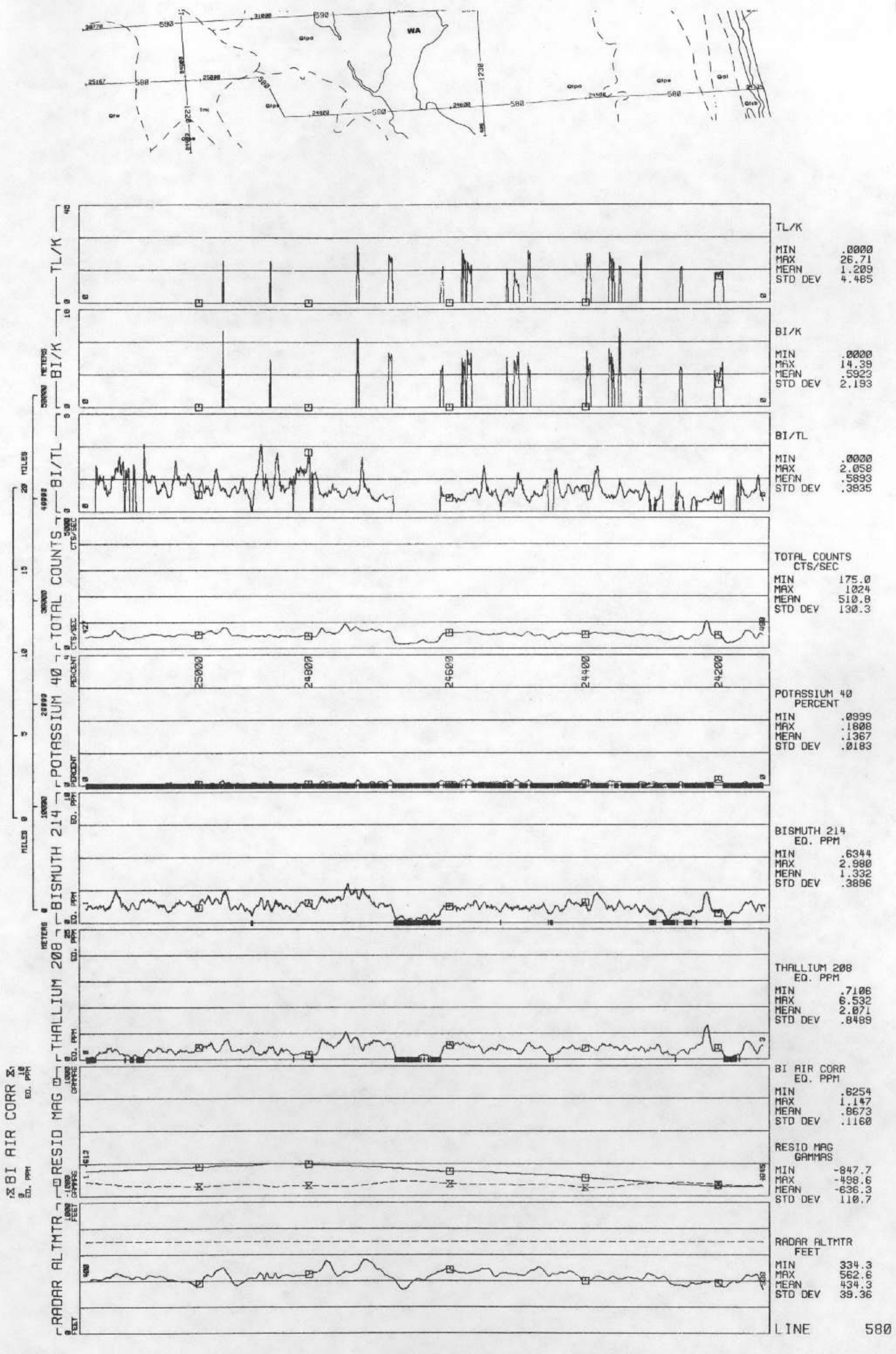
LINE 1200
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023



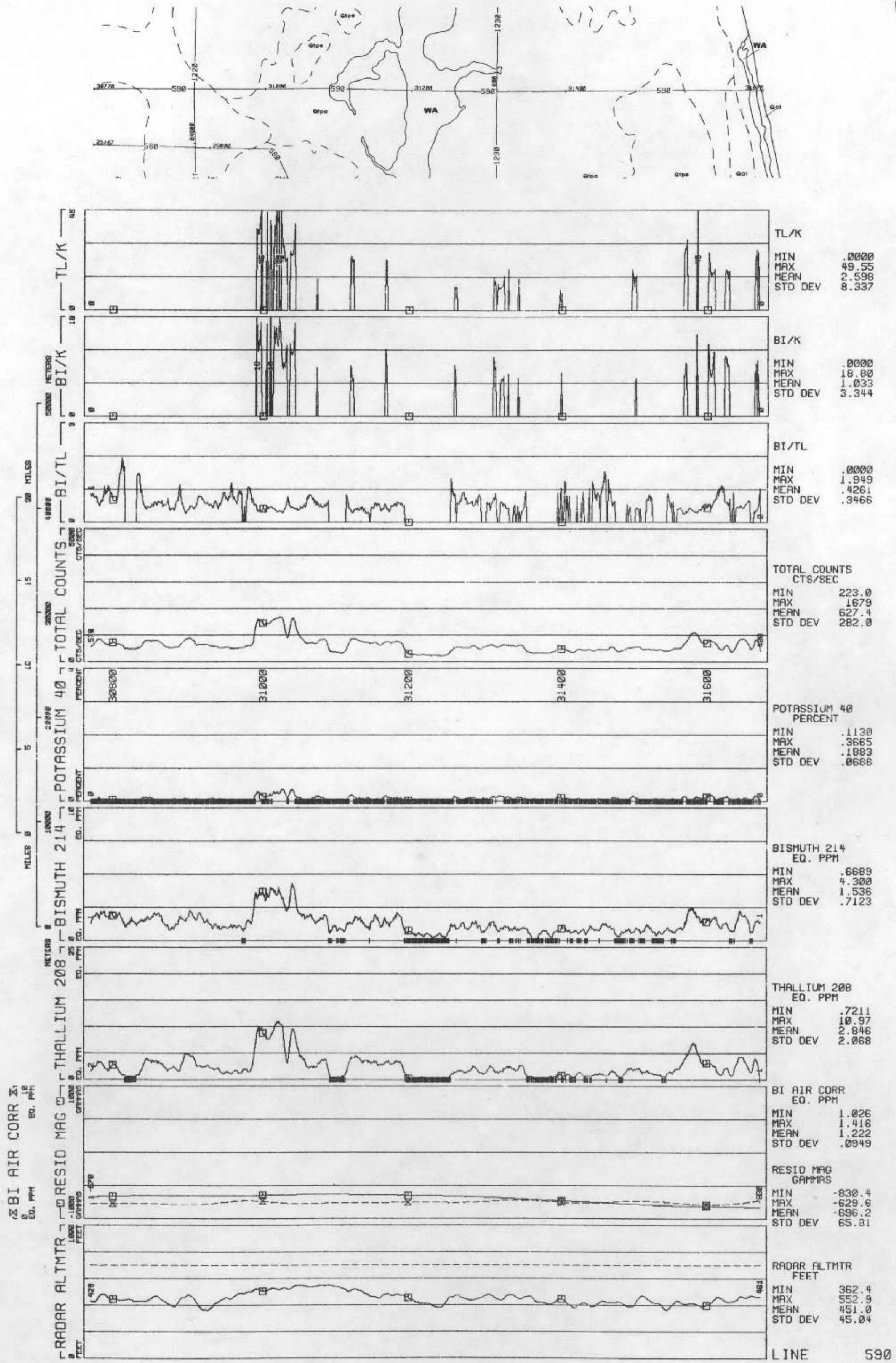
D38 vj


LINE 1210
VALDOSTA QUADRANGLE - NTMS NH 17-4
DATA ACQUIRED 81023
BARO PRESSURE
MM HG
MIN 734.0
MAX 755.7
MEAN 743.7
STD DEV 1.418
AIR TEMPERATURE
DEG C
MIN 8.000
MAX 9.000
MEAN 8.275
STD DEV .4465
RESIDUAL MAG
GAMMAS
MIN -953.5
MAX -595.0
MEAN -785.6
STD DEV 117.0
DIURNAL
GAMMAS
MIN 50674
MAX 50683
MEAN 50676
STD DEV 4.459
RADAR ALTMTR
FEET
MIN 324.7
MAX 473.5
MEAN 396.6
STD DEV 24.18
LINE 1210

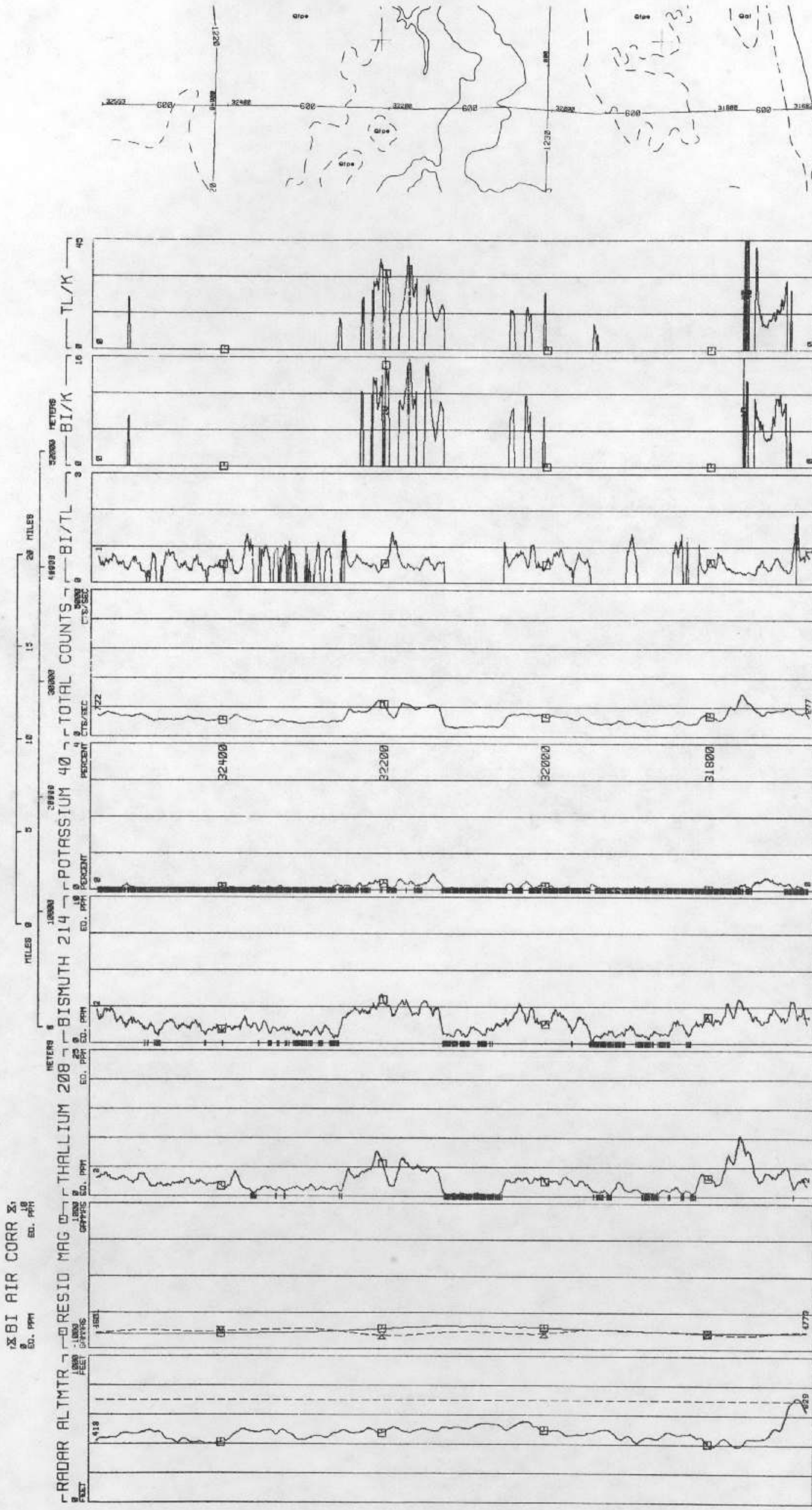
D39 vj


LINE 580
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
TL/K
MIN .0000
MAX 26.71
MEAN 1.209
STD DEV 4.485
BI/K
MIN .0000
MAX 14.39
MEAN .5923
STD DEV 2.193
BI/TL
MIN .0000
MAX 2.050
MEAN .5893
STD DEV .3035
TOTAL COUNTS CTS/SEC
MIN 175.0
MAX 1024
MEAN 510.8
STD DEV 130.3
POTASSIUM 40 PERCENT
MIN .0999
MAX .1808
MEAN .1367
STD DEV .0183
BISMUTH 214 EQ. PPM
MIN .6344
MAX 2.980
MEAN 1.332
STD DEV .3886
THALLIUM 208 EQ. PPM
MIN .7106
MAX 6.532
MEAN 2.071
STD DEV .8489
BI AIR CORR EQ. PPM
MIN .6254
MAX 1.147
MEAN .8673
STD DEV .1160
RESID MAG GAMMAS
MIN -847.7
MAX -498.6
MEAN -636.3
STD DEV 110.7
RADAR ALTMTR FEET
MIN 334.3
MAX 562.6
MEAN 434.3
STD DEV 39.36
LINE 580
25000
24800
24600
24400
24200

LINE 590
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019



LINE 600
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 810919



TL/K
MIN .0000
MAX 67.67
MEAN 3.151
STD DEV 8.318

BI/K
MIN .0000
MAX 19.14
MEAN 1.467
STD DEV 3.811

BI/TL
MIN .0000
MAX 1.862
MEAN .4437
STD DEV .3455

TOTAL COUNTS
CTS/SEC
MIN 288.4
MAX 1458
MEAN 652.0
STD DEV 221.5

POTASSIUM 40
PERCENT
MIN .1252
MAX .4337
MEAN .2172
STD DEV .0618

BISMUTH 214
EQ. PPM
MIN .7551
MAX 3.356
MEAN 1.636
STD DEV .5803

THALLIUM 208
EQ. PPM
MIN .7972
MAX 10.52
MEAN 2.659
STD DEV 1.661

BI AIR CORR
EQ. PPM
MIN .8850
MAX 1.403
MEAN 1.171
STD DEV .1359

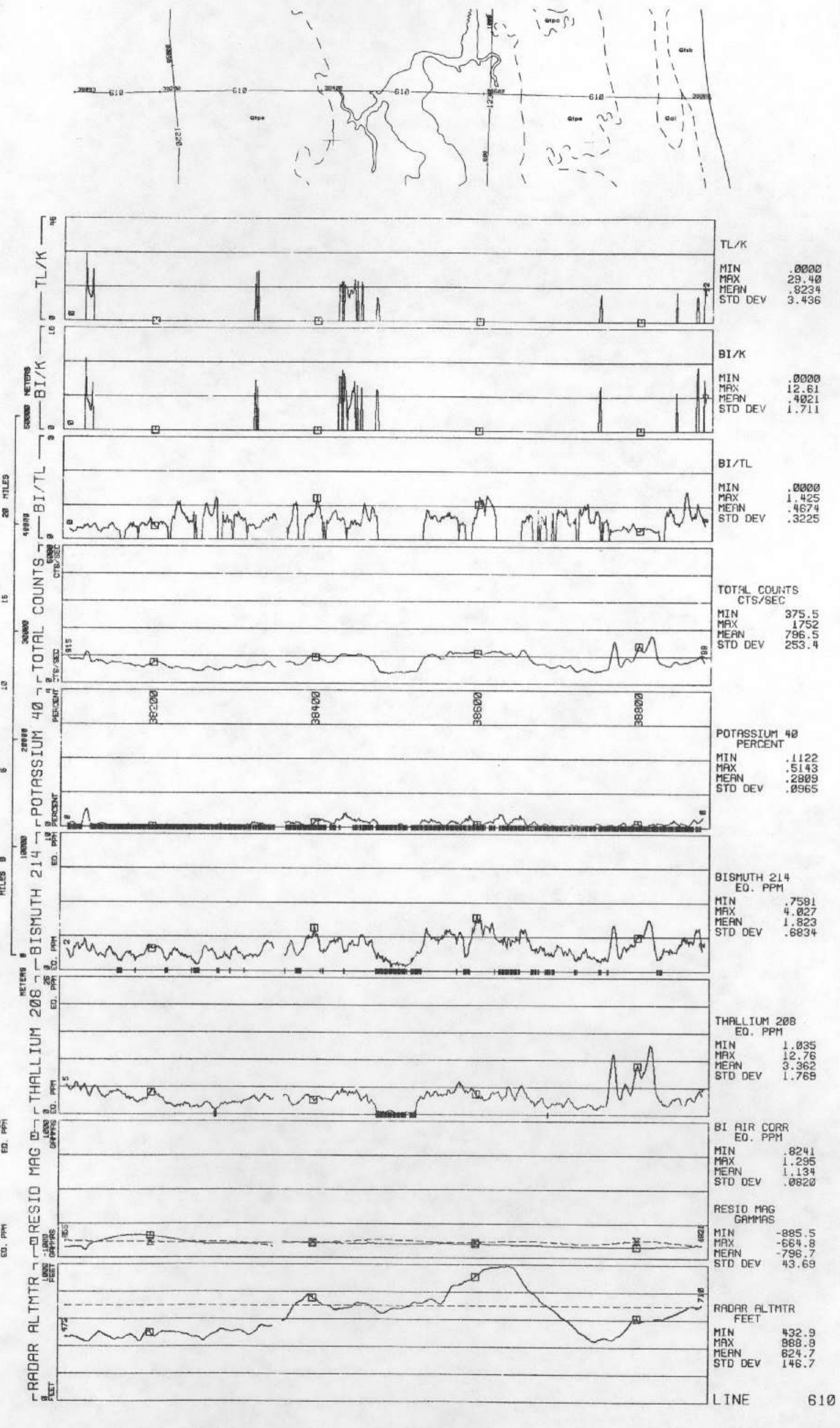
RESID MAG
GAMMAS
MIN -802.7
MAX -679.4
MEAN -752.7
STD DEV 40.02

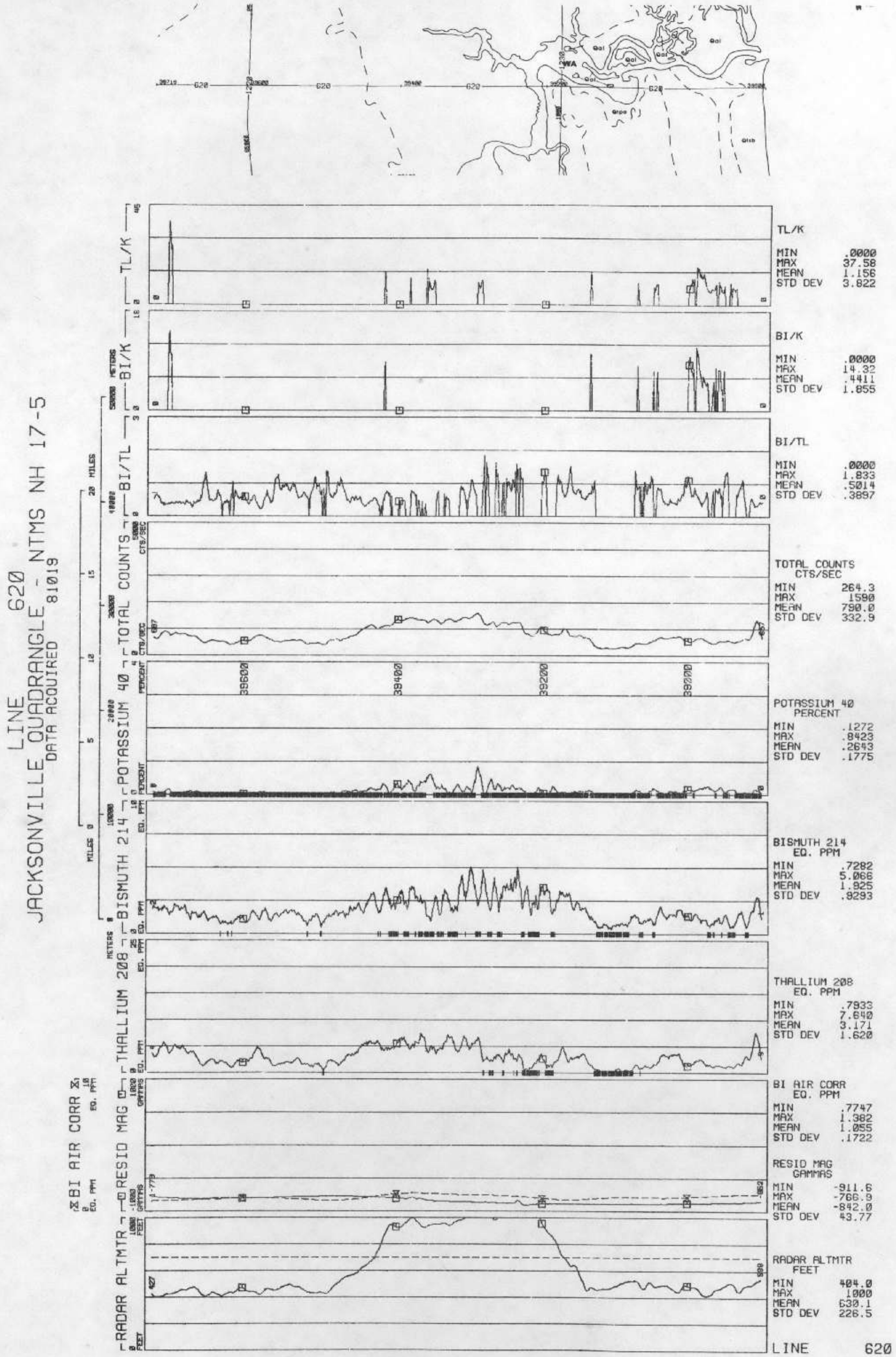
RADAR ALTMTR
FEET
MIN 387.6
MAX 721.0
MEAN 477.4
STD DEV 51.58

LINE 600

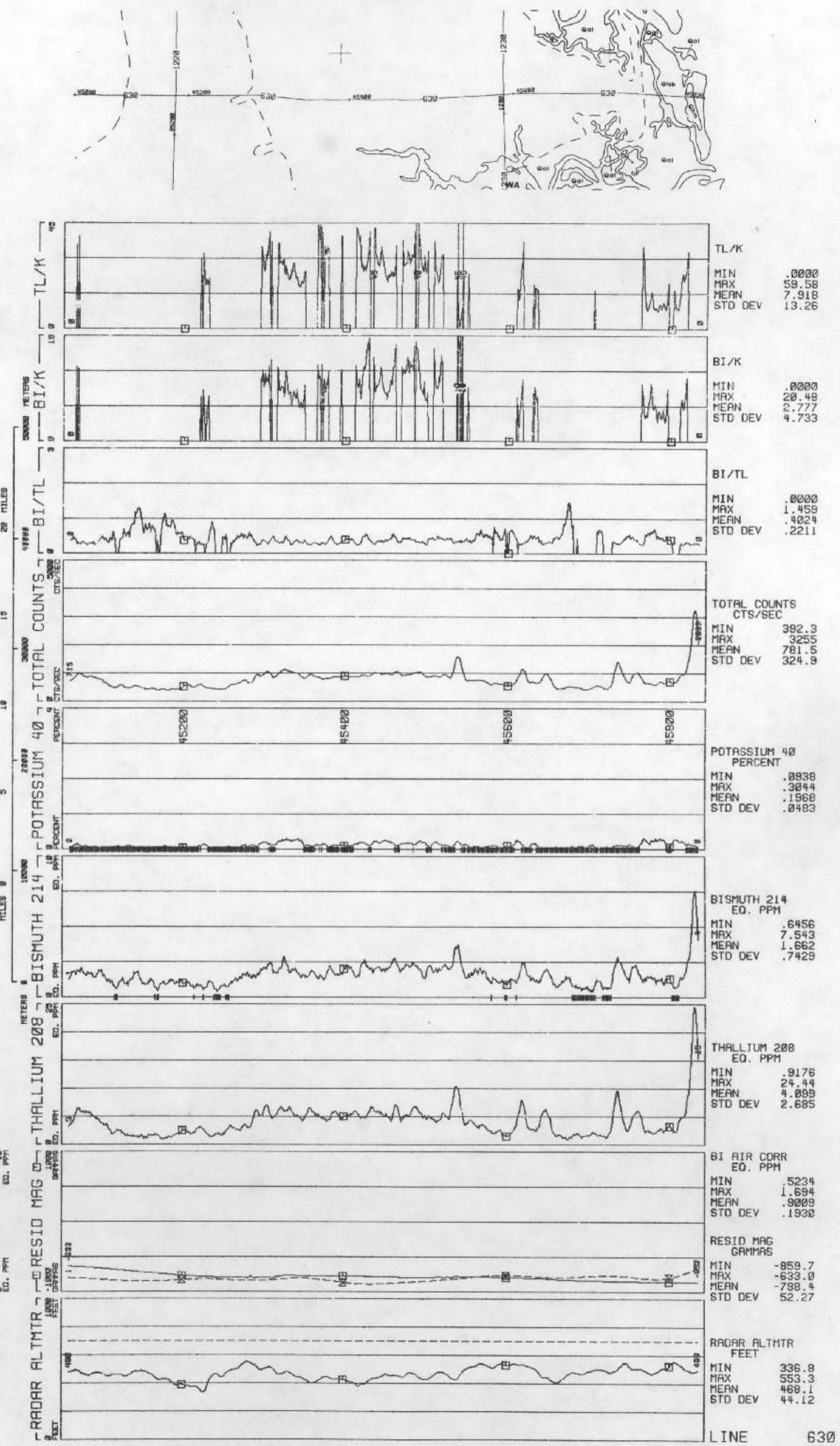
D42 vj

LINE 610
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019



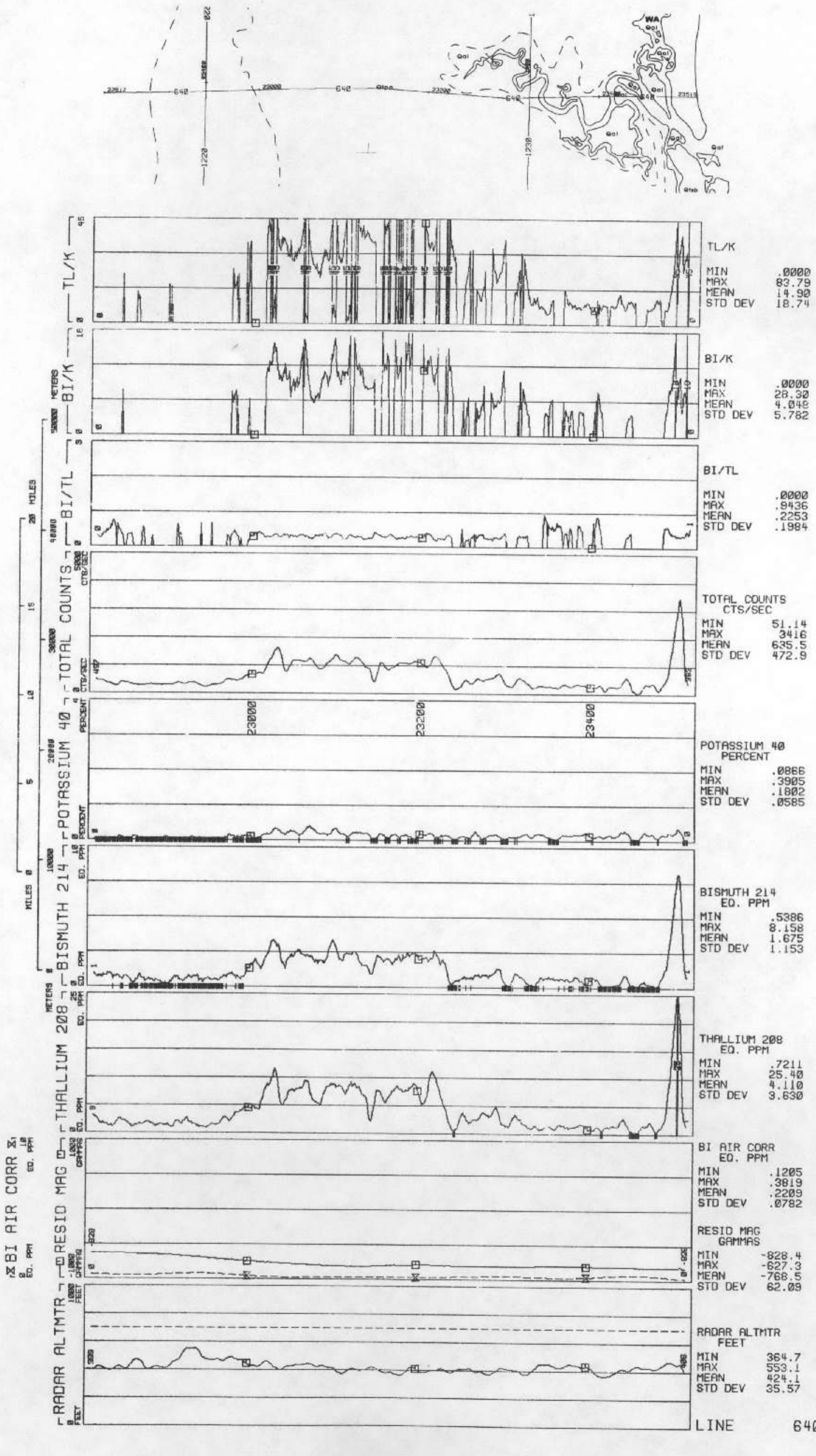

LINE 620
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
TL/K
MIN .0000
MAX 37.58
MEAN 1.156
STD DEV 3.822
BI/K
MIN .0000
MAX 14.32
MEAN .4411
STD DEV 1.055
BI/TL
MIN .0000
MAX 1.833
MEAN .5014
STD DEV .3897
TOTAL COUNTS CTS/SEC
MIN 264.3
MAX 1599
MEAN 790.0
STD DEV 332.9
POTASSIUM 40 PERCENT
MIN .1272
MAX .8423
MEAN .2643
STD DEV .1775
BISMUTH 214 EQ. PPM
MIN .7282
MAX 5.066
MEAN 1.825
STD DEV .9293
THALLIUM 208 EQ. PPM
MIN .7933
MAX 7.640
MEAN 3.171
STD DEV 1.620
BI AIR CORR EQ. PPM
MIN .7747
MAX 1.382
MEAN 1.055
STD DEV .1722
RESID MAG GAMMAS
MIN -911.6
MAX -766.9
MEAN -842.0
STD DEV 43.77
RADAR ALTMTR FEET
MIN 404.0
MAX 1000
MEAN 630.1
STD DEV 226.5
LINE 620

D44 vj

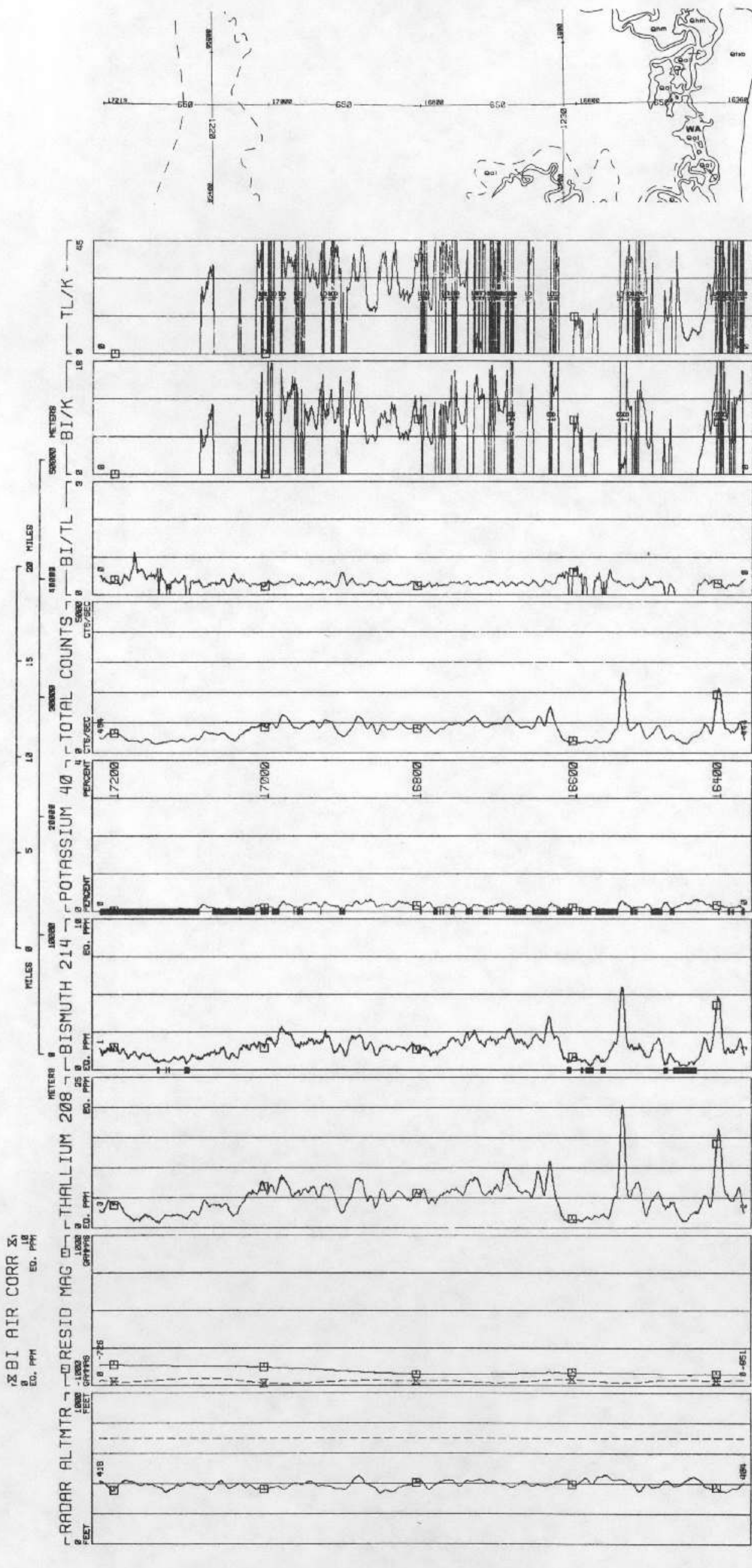

LINE 630
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
TL/K
MIN .0000
MAX 59.58
MEAN 7.918
STD DEV 13.26
BI/K
MIN .0000
MAX 20.48
MEAN 2.777
STD DEV 4.733
BI/TL
MIN .0000
MAX 1.459
MEAN .4024
STD DEV .2211
TOTAL COUNTS CTS/SEC
MIN 392.3
MAX 3255
MEAN 701.5
STD DEV 324.9
POTASSIUM 40 PERCENT
MIN .0838
MAX .3044
MEAN .1960
STD DEV .0483
BISMUTH 214 EQ. PPM
MIN .6456
MAX 7.543
MEAN 1.662
STD DEV .7429
THALLIUM 208 EQ. PPM
MIN .9176
MAX 24.44
MEAN 4.099
STD DEV 2.685
BI AIR CORR EQ. PPM
MIN .5234
MAX 1.694
MEAN .9009
STD DEV .1930
RESID MAG GAMMAS
MIN -859.7
MAX -633.0
MEAN -798.4
STD DEV 52.27
RADAR ALTMTR FEET
MIN 336.8
MAX 553.3
MEAN 468.1
STD DEV 44.12
LINE 630

D45 vj

LINE 640
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



LINE 650
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



TL/K
MIN .0000
MAX 99.93
MEAN 18.23
STD DEV 20.56

BI/K
MIN .0000
MAX 28.96
MEAN 5.112
STD DEV 5.977

BI/TL
MIN .0000
MAX 1.130
MEAN .3074
STD DEV .1395

TOTAL COUNTS
CTS/SEC
MIN 294.6
MAX 2653
MEAN 761.6
STD DEV 323.2

POTASSIUM 40
PERCENT
MIN .0895
MAX .3244
MEAN .1737
STD DEV .0508

BISMUTH 214
EQ. PPM
MIN .5351
MAX 5.449
MEAN 1.569
STD DEV .6974

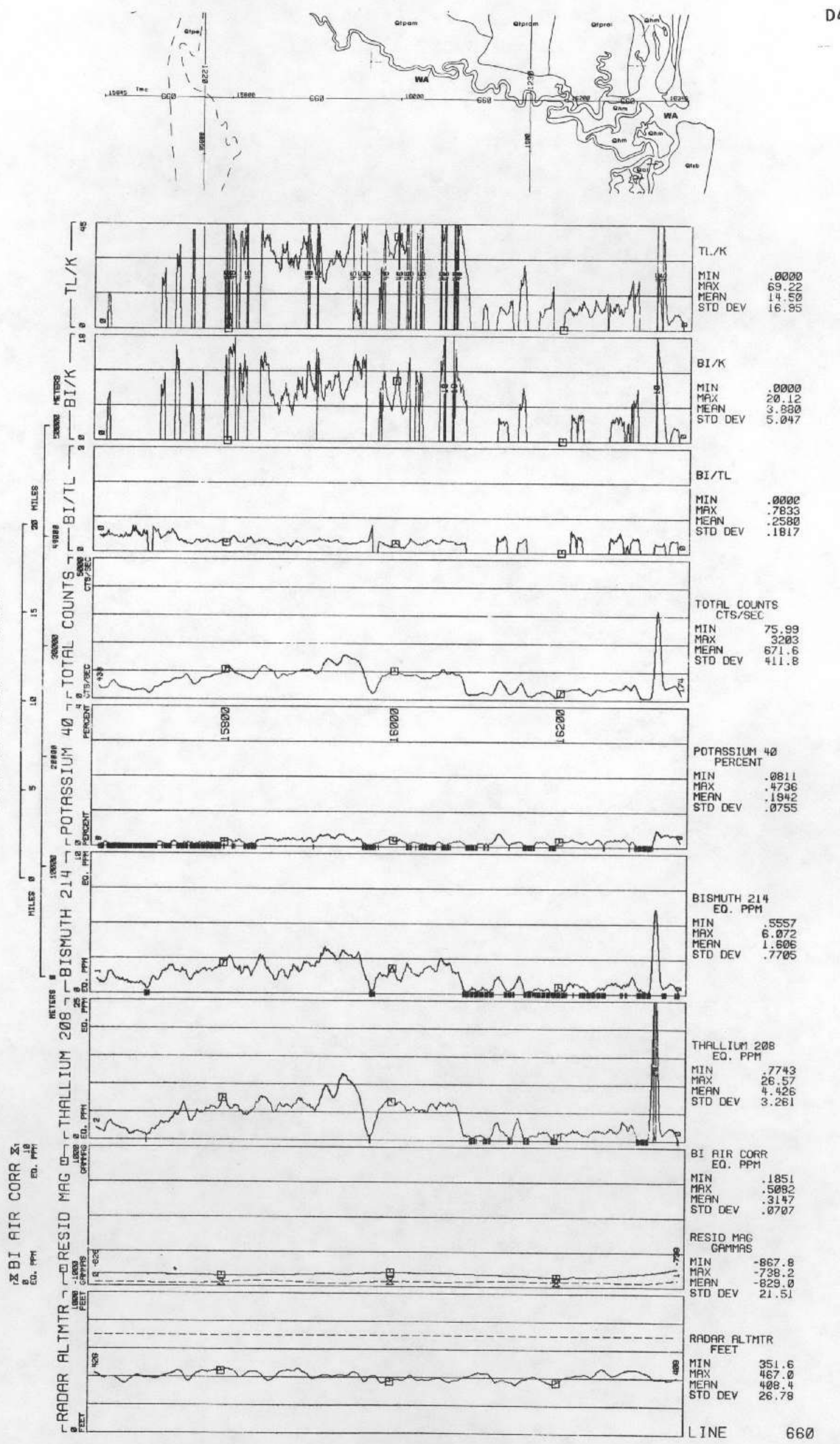
THALLIUM 208
EQ. PPM
MIN .7993
MAX 20.20
MEAN 4.854
STD DEV 2.670

BI AIR CORR
EQ. PPM
MIN .1213
MAX .4744
MEAN .2812
STD DEV .0845

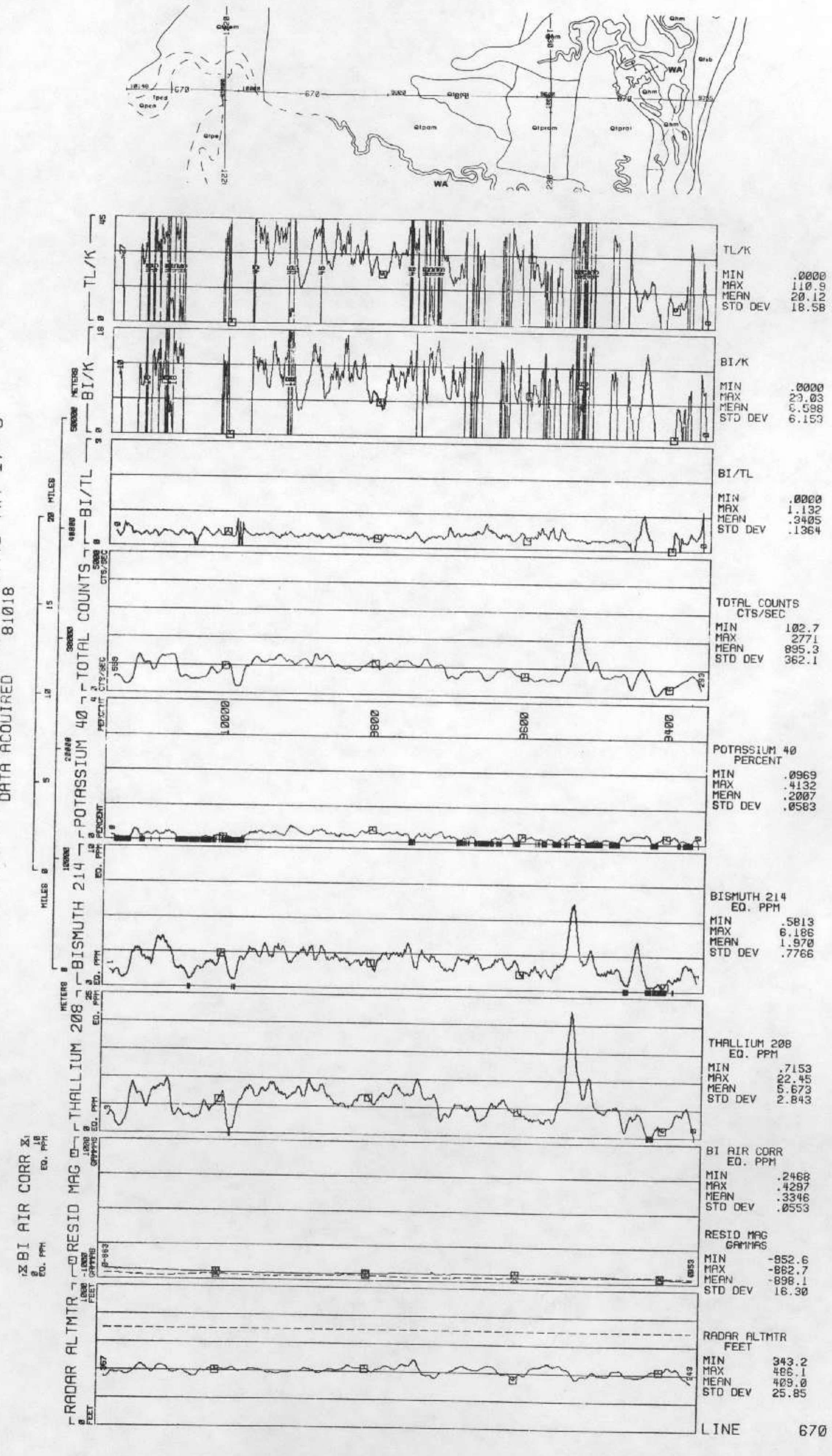
RESID MAG
GAMMAS
MIN -858.1
MAX -722.0
MEAN -804.3
STD DEV 47.02

RADAR ALTMTR
FEET
MIN 336.8
MAX 457.8
MEAN 393.3
STD DEV 23.73

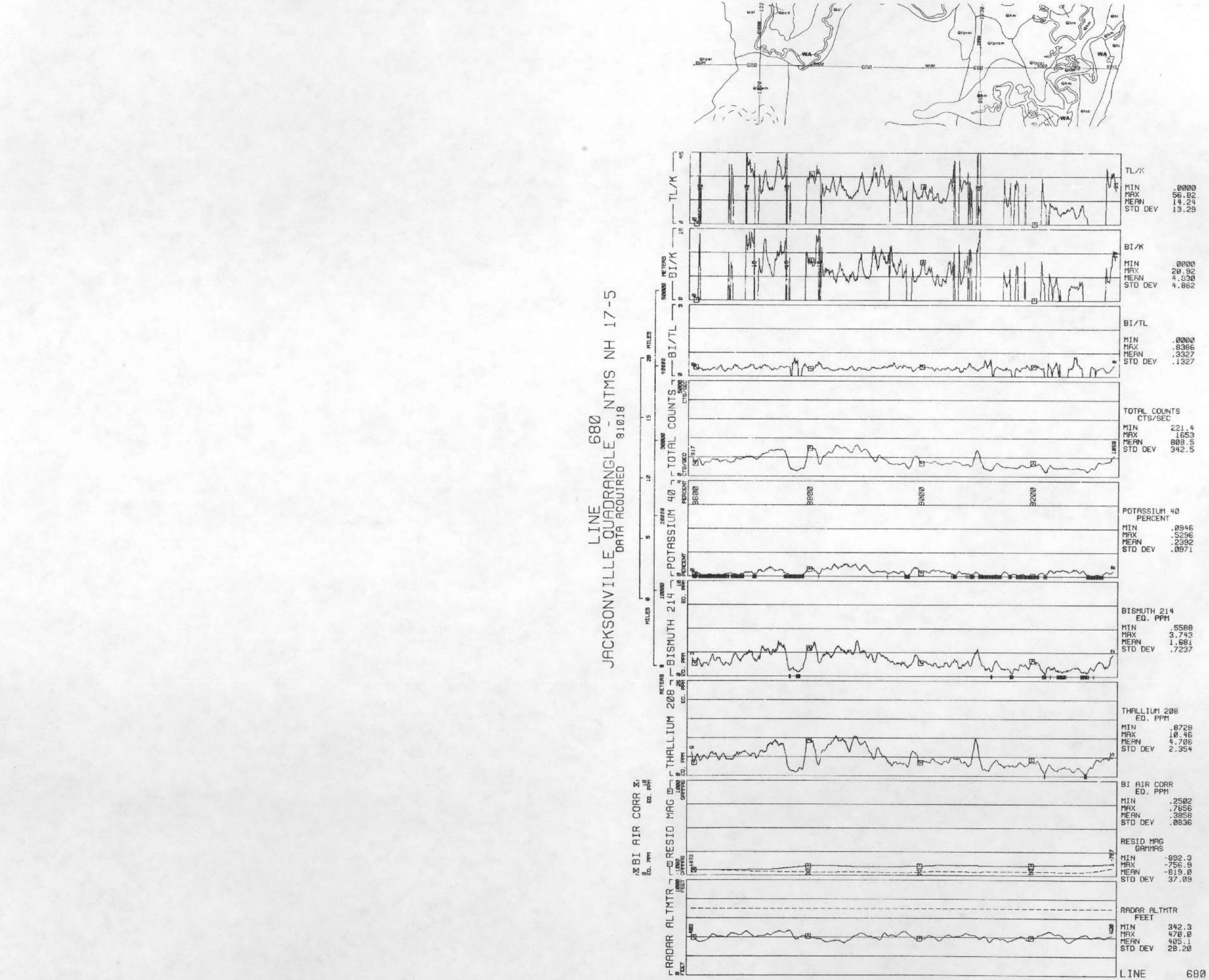
LINE 650


LINE 660
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
TL/K
MIN .0000
MAX 69.22
MEAN 14.50
STD DEV 16.85
BI/K
MIN .0000
MAX 20.12
MEAN 3.880
STD DEV 5.047
BI/TL
MIN .0000
MAX .7833
MEAN .2580
STD DEV .1817
TOTAL COUNTS CTS/SEC
MIN 75.99
MAX 3203
MEAN 671.6
STD DEV 411.8
POTASSIUM 40 PERCENT
MIN .0811
MAX .4736
MEAN .1842
STD DEV .0755
BISMUTH 214 EQ. PPM
MIN .5557
MAX 6.072
MEAN 1.606
STD DEV .7705
THALLIUM 208 EQ. PPM
MIN .7743
MAX 26.57
MEAN 4.426
STD DEV 3.261
BI AIR CORR EQ. PPM
MIN .1851
MAX .5082
MEAN .3147
STD DEV .0707
RESID MAG GAMMAS
MIN -867.8
MAX -738.2
MEAN -829.0
STD DEV 21.51
RADAR ALTMTR FEET
MIN 351.6
MAX 467.0
MEAN 408.4
STD DEV 26.78
LINE 660

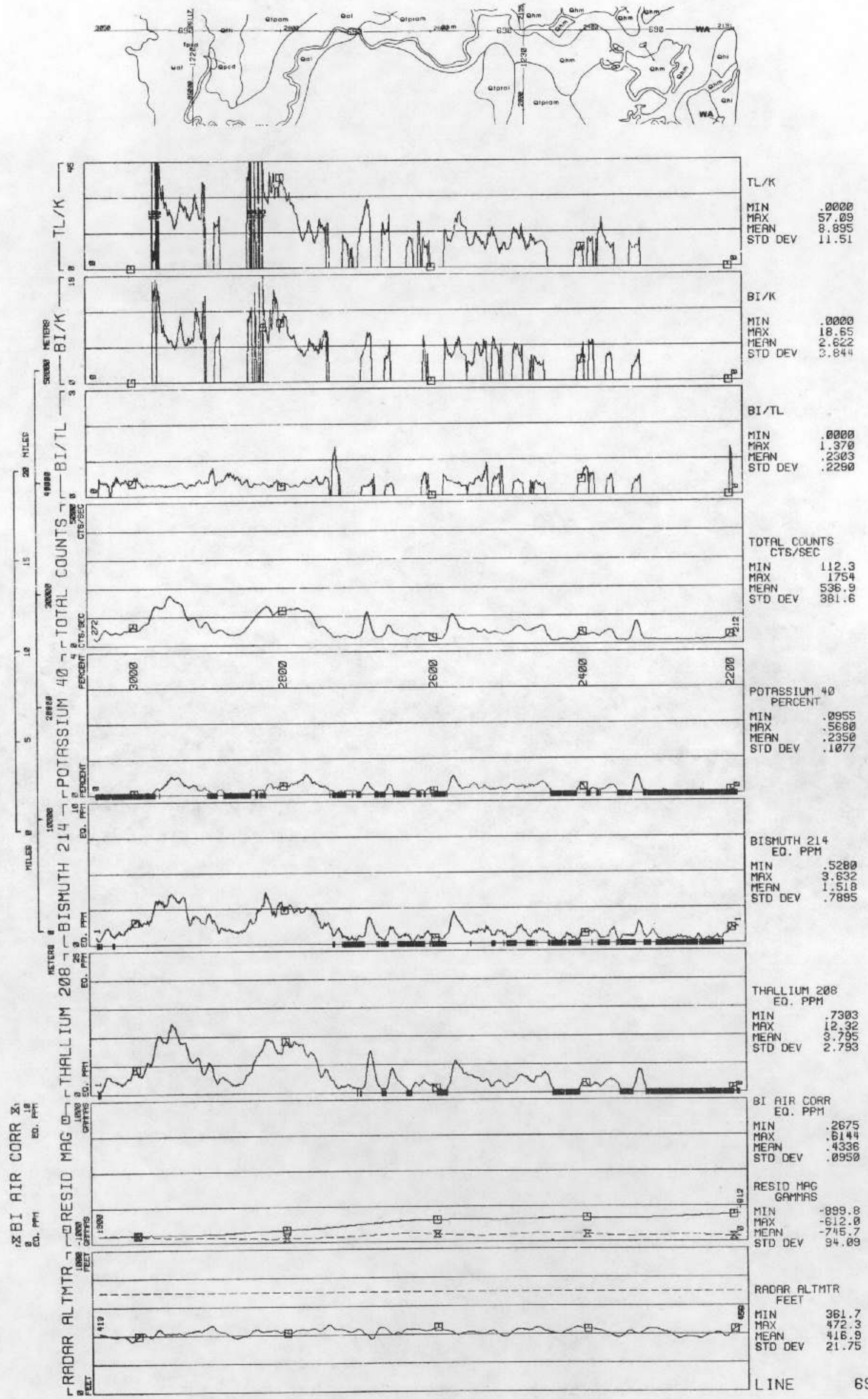
LINE 670
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018

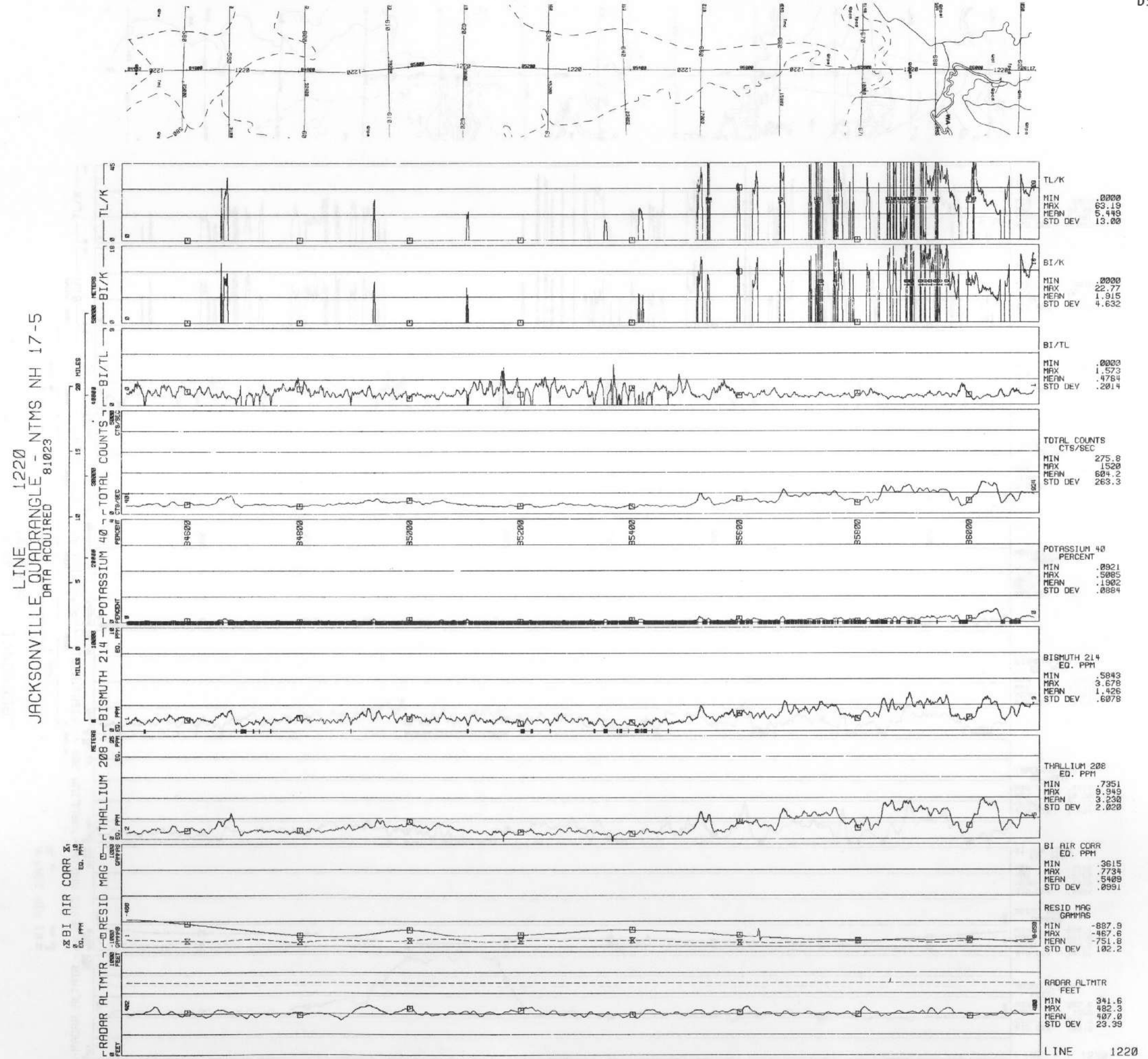


D49 vj

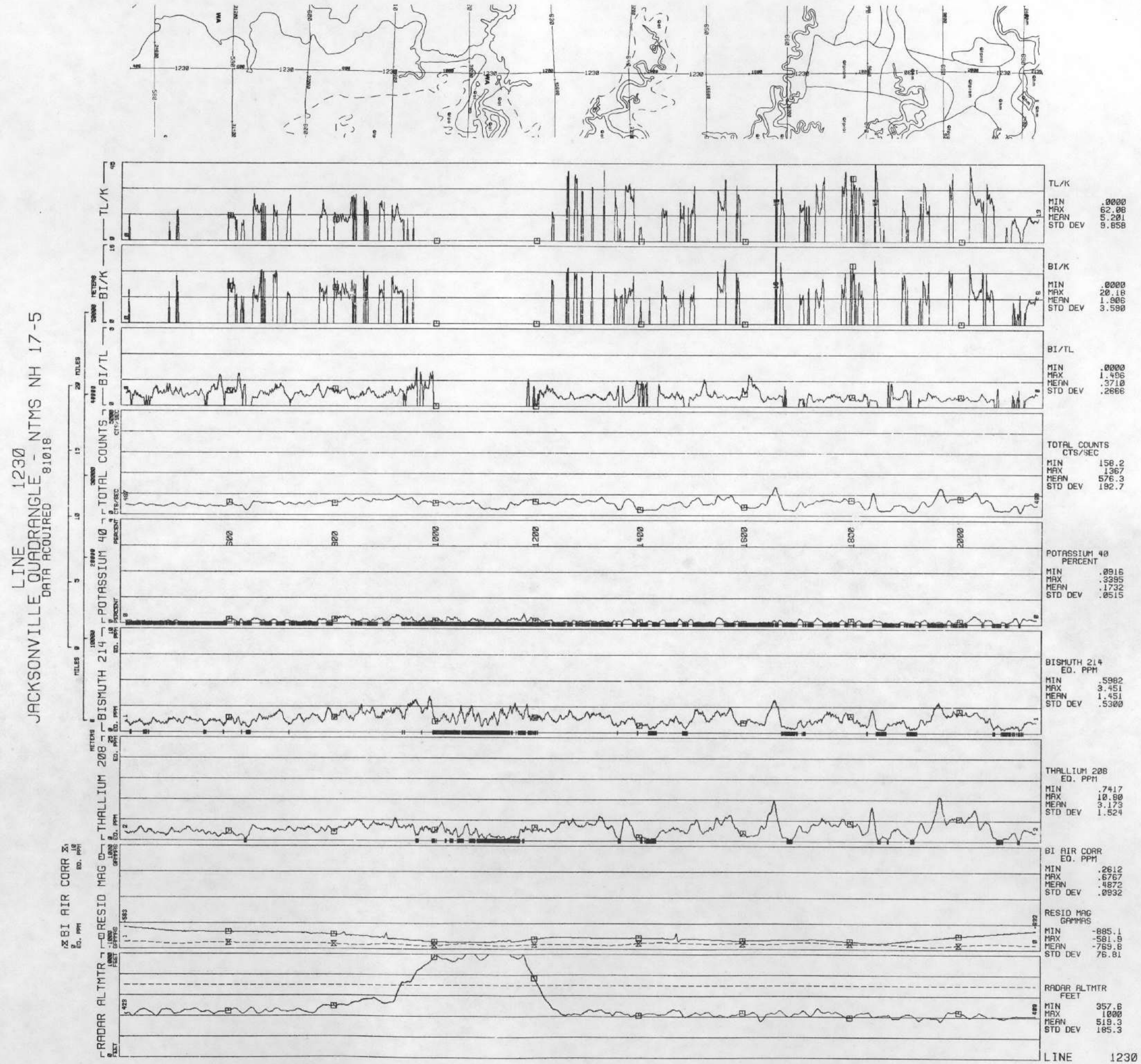

LINE 680
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
TL/K
MIN .0000
MAX 56.82
MEAN 14.24
STD DEV 13.29
BI/K
MIN .0000
MAX 20.92
MEAN 4.530
STD DEV 4.862
BI/TL
MIN .0000
MAX .8386
MEAN .3327
STD DEV .1327
TOTAL COUNTS CTS/SEC
MIN 221.4
MAX 1653
MEAN 808.5
STD DEV 342.5
POTASSIUM 40 PERCENT
MIN .0946
MAX .5296
MEAN .2392
STD DEV .0971
BISMUTH 214 EQ. PPM
MIN .5588
MAX 3.743
MEAN 1.681
STD DEV .7237
THALLIUM 208 EQ. PPM
MIN .8728
MAX 10.46
MEAN 4.706
STD DEV 2.354
BI AIR CORR EQ. PPM
MIN .2502
MAX .7656
MEAN .3858
STD DEV .0836
RESID MAG GAMMAS
MIN -892.3
MAX -756.9
MEAN -819.0
STD DEV 37.09
RADAR ALTMTR FEET
MIN 342.3
MAX 470.0
MEAN 405.1
STD DEV 28.20
LINE 680

D50 vj

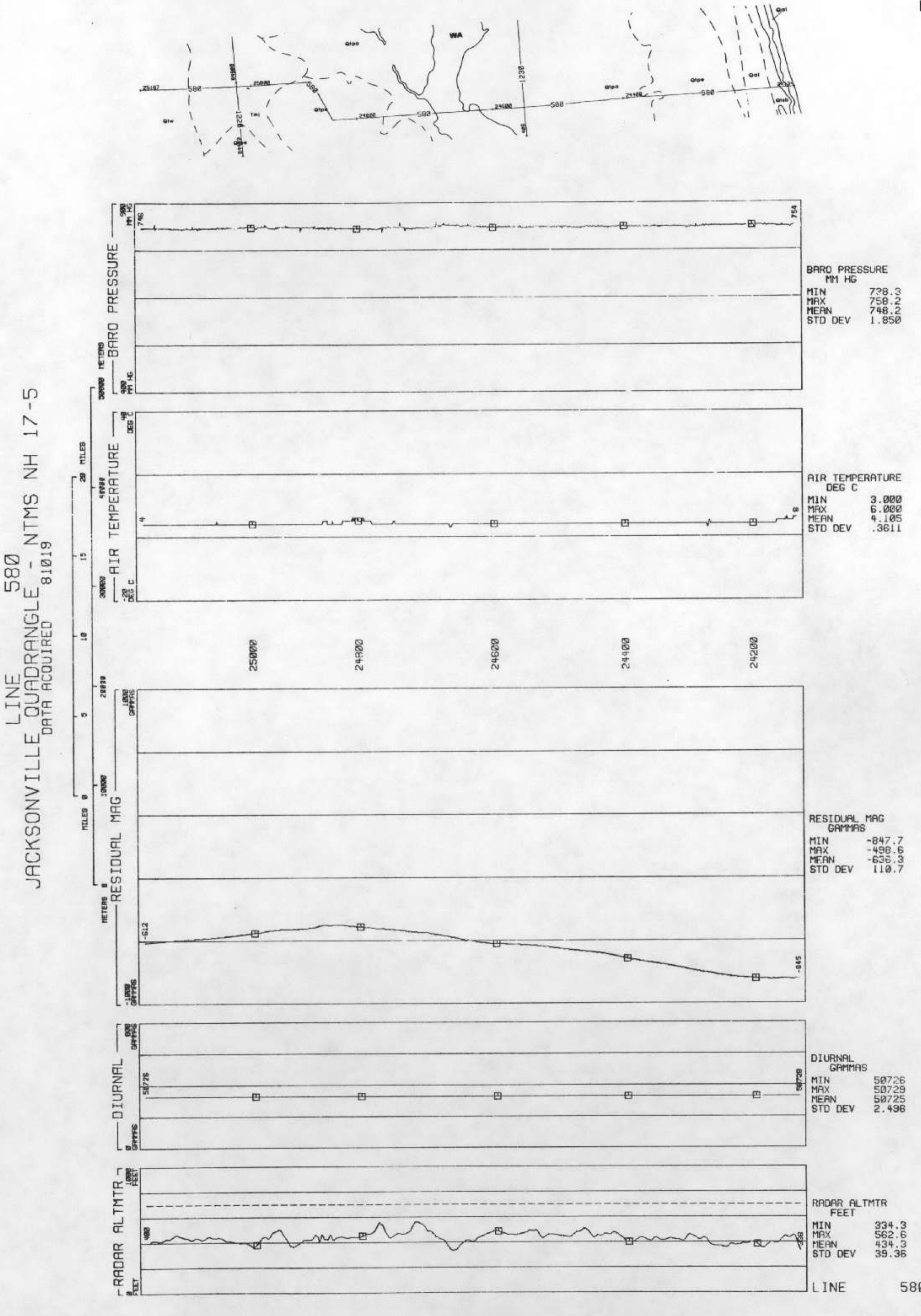

LINE 690
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
TL/K
MIN .0000
MAX 57.09
MEAN 8.895
STD DEV 11.51
BI/K
MIN .0000
MAX 18.65
MEAN 2.622
STD DEV 3.844
BI/TL
MIN .0000
MAX 1.370
MEAN .2303
STD DEV .2290
TOTAL COUNTS CTS/SEC
MIN 112.3
MAX 1754
MEAN 536.9
STD DEV 381.6
POTASSIUM 40 PERCENT
MIN .0955
MAX .5680
MEAN .2350
STD DEV .1077
BISMUTH 214 EQ. PPM
MIN .5280
MAX 3.632
MEAN 1.510
STD DEV .7885
THALLIUM 208 EQ. PPM
MIN .7303
MAX 12.32
MEAN 3.795
STD DEV 2.793
BI AIR CORR EQ. PPM
MIN .2675
MAX .6144
MEAN .4336
STD DEV .0950
RESID MAG GAMMAS
MIN -899.8
MAX -612.0
MEAN -745.7
STD DEV 94.09
RADAR ALTMTR FEET
MIN 361.7
MAX 472.3
MEAN 416.9
STD DEV 21.75
LINE 690
3000
2800
2600
2400
2200

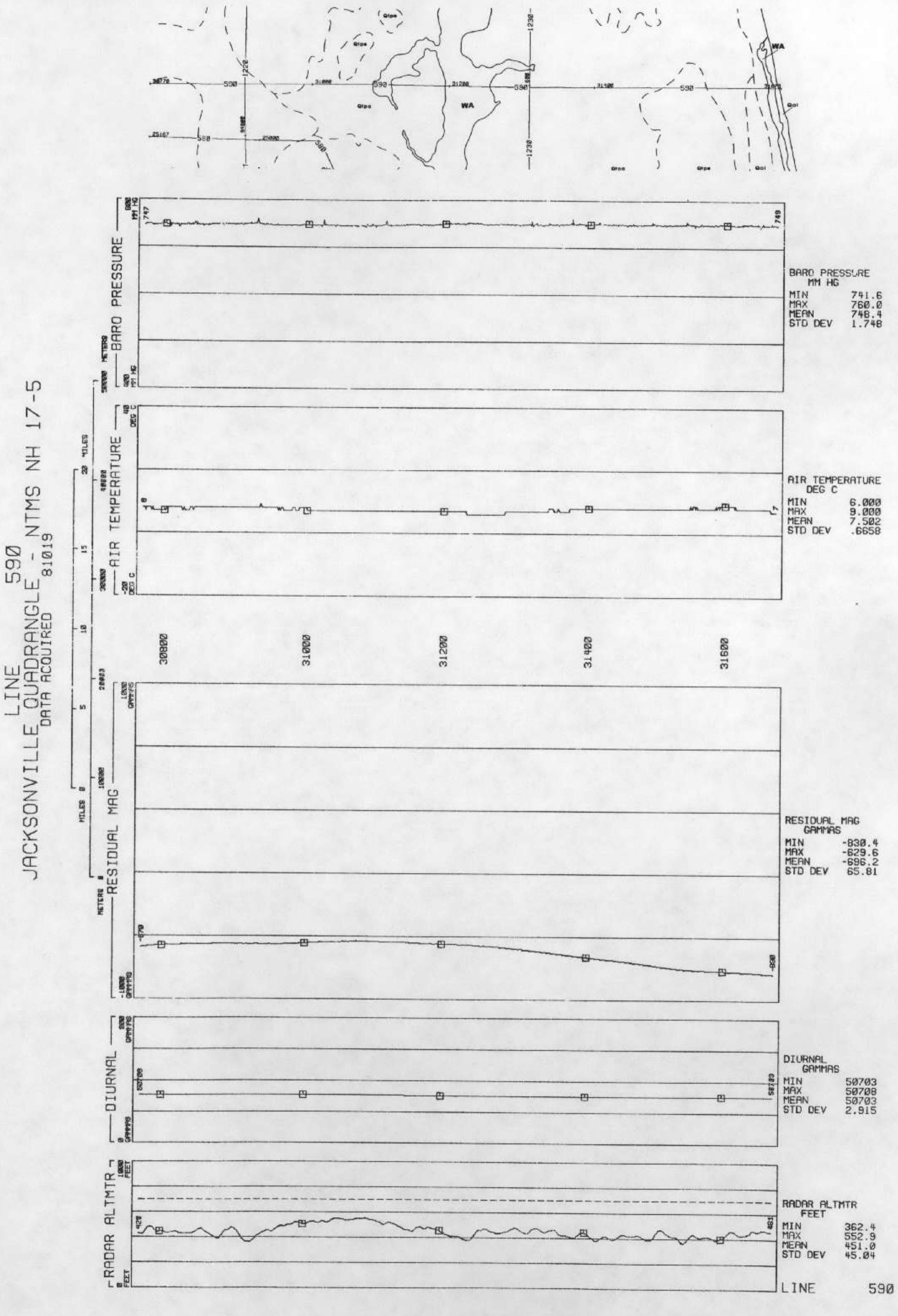

LINE 1220
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81023
TL/K
MIN .0000
MAX 63.19
MEAN 5.449
STD DEV 13.00
BI/K
MIN .0000
MAX 22.77
MEAN 1.915
STD DEV 4.632
BI/TL
MIN .0000
MAX 1.573
MEAN .4784
STD DEV .2014
TOTAL COUNTS CTS/SEC
MIN 275.8
MAX 1520
MEAN 604.2
STD DEV 263.3
POTASSIUM 40 PERCENT
MIN .0921
MAX .5085
MEAN .1902
STD DEV .0884
BISMUTH 214 EQ. PPM
MIN .5843
MAX 3.678
MEAN 1.426
STD DEV .6078
THALLIUM 208 EQ. PPM
MIN .7351
MAX 9.949
MEAN 3.230
STD DEV 2.020
BI AIR CORR EQ. PPM
MIN .3615
MAX .7734
MEAN .5409
STD DEV .0991
RESID MAG GAMMAS
MIN -887.9
MAX -467.6
MEAN -751.8
STD DEV 102.2
RADAR ALTMTR FEET
MIN 341.6
MAX 482.3
MEAN 407.0
STD DEV 23.39
LINE 1220

D52 vj

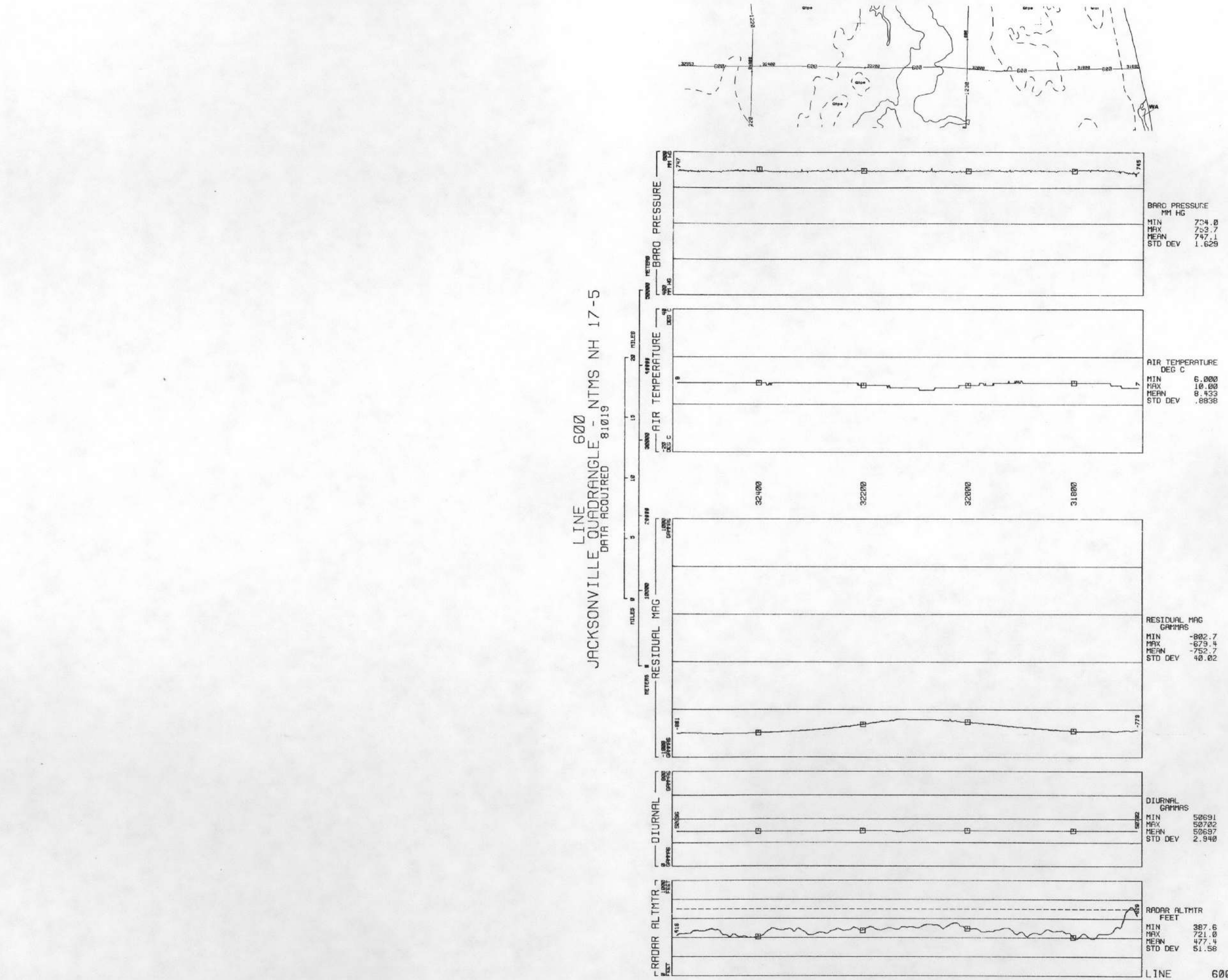

LINE 1230
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
TL/K
MIN .0000
MAX 62.08
MEAN 5.201
STD DEV 9.858
BI/K
MIN .0000
MAX 20.18
MEAN 1.806
STD DEV 3.590
BI/TL
MIN .0000
MAX 1.406
MEAN .3710
STD DEV .2666
TOTAL COUNTS CTS/SEC
MIN 158.2
MAX 1367
MEAN 576.3
STD DEV 192.7
POTASSIUM 40 PERCENT
MIN .0916
MAX .3395
MEAN .1732
STD DEV .0515
BISMUTH 214 EQ. PPM
MIN .5982
MAX 3.451
MEAN 1.451
STD DEV .5300
THALLIUM 208 EQ. PPM
MIN .7417
MAX 10.80
MEAN 3.173
STD DEV 1.524
BI AIR CORR EQ. PPM
MIN .2612
MAX .6767
MEAN .4872
STD DEV .0932
RESID MAG GAMMAS
MIN -885.1
MAX -581.5
MEAN -769.8
STD DEV 76.81
RADAR ALTMTR FEET
MIN 357.6
MAX 1000
MEAN 519.3
STD DEV 185.3
LINE 1230

D53 vj


LINE 580
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
25000
24800
24600
24400
24200
BARO PRESSURE
MM HG
MIN 728.3
MAX 758.2
MEAN 748.2
STD DEV 1.850
AIR TEMPERATURE
DEG C
MIN 3.000
MAX 6.000
MEAN 4.105
STD DEV .3611
RESIDUAL MAG
GAMMAS
MIN -847.7
MAX -498.6
MEAN -636.3
STD DEV 110.7
DIURNAL
GAMMAS
MIN 50726
MAX 50729
MEAN 50725
STD DEV 2.496
RADAR ALTMTR
FEET
MIN 334.3
MAX 562.6
MEAN 434.3
STD DEV 39.36
LINE 580


LINE 590
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
30800
31000
31200
31400
31600
BARO PRESSURE MM HG
MIN 741.6
MAX 760.0
MEAN 748.4
STD DEV 1.748
AIR TEMPERATURE DEG C
MIN 6.000
MAX 9.000
MEAN 7.502
STD DEV .6658
RESIDUAL MAG GAMMAS
MIN -830.4
MAX -629.6
MEAN -696.2
STD DEV 65.81
DIURNAL GAMMAS
MIN 50703
MAX 50708
MEAN 50703
STD DEV 2.915
RADAR ALTMTR FEET
MIN 362.4
MAX 552.9
MEAN 451.0
STD DEV 45.04
LINE 590

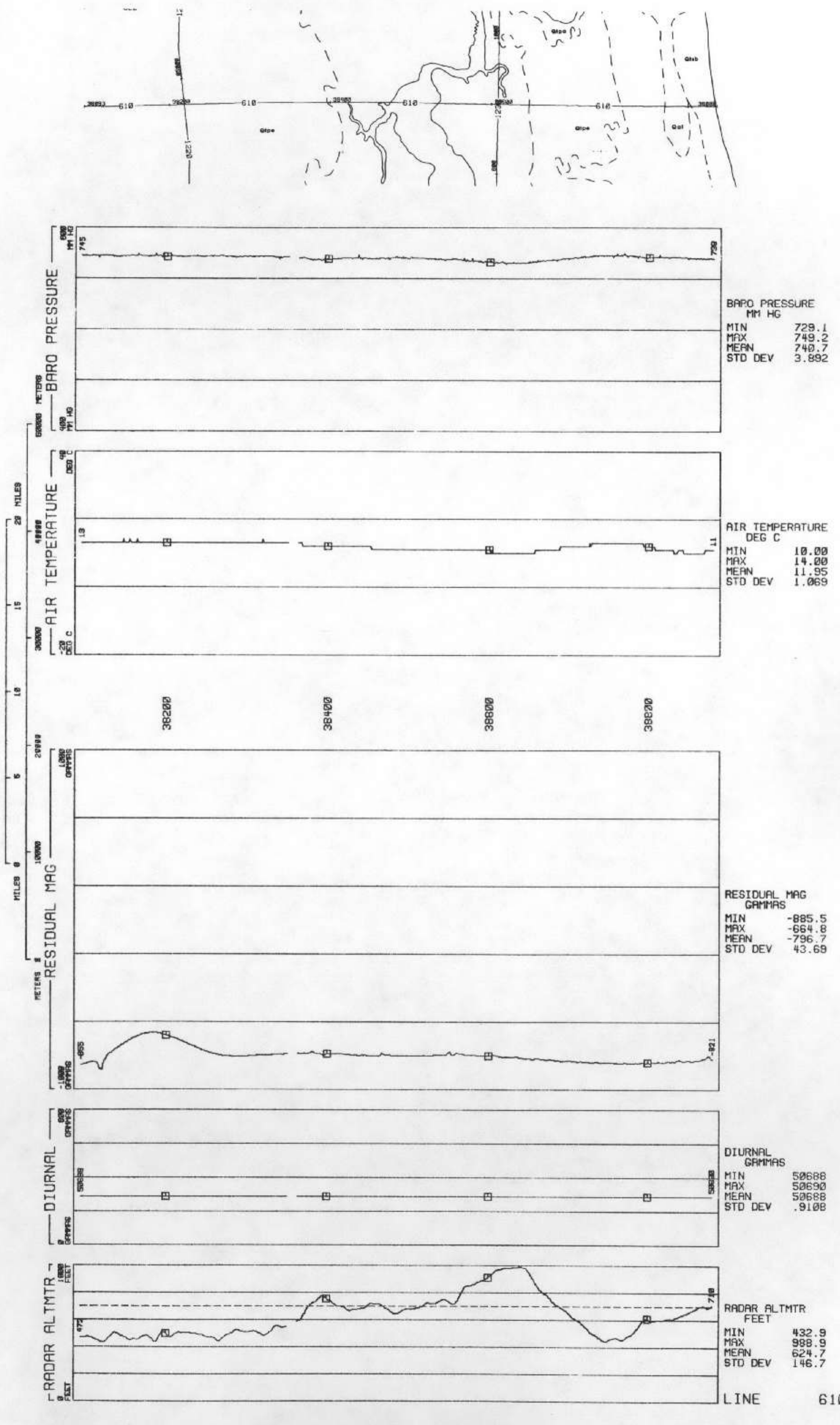
D55 vj



LINE 600
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
32400
32200
32000
31800
BARO PRESSURE MM HG
MIN 734.0
MAX 753.7
MEAN 747.1
STD DEV 1.629
AIR TEMPERATURE DEG C
MIN 6.000
MAX 10.00
MEAN 8.433
STD DEV .8838
RESIDUAL MAG GAMMAS
MIN -802.7
MAX -679.4
MEAN -752.7
STD DEV 40.02
DIURNAL GAMMAS
MIN 50691
MAX 50702
MEAN 50697
STD DEV 2.940
RADAR ALTMTR FEET
MIN 387.6
MAX 721.0
MEAN 477.4
STD DEV 51.58
LINE 600

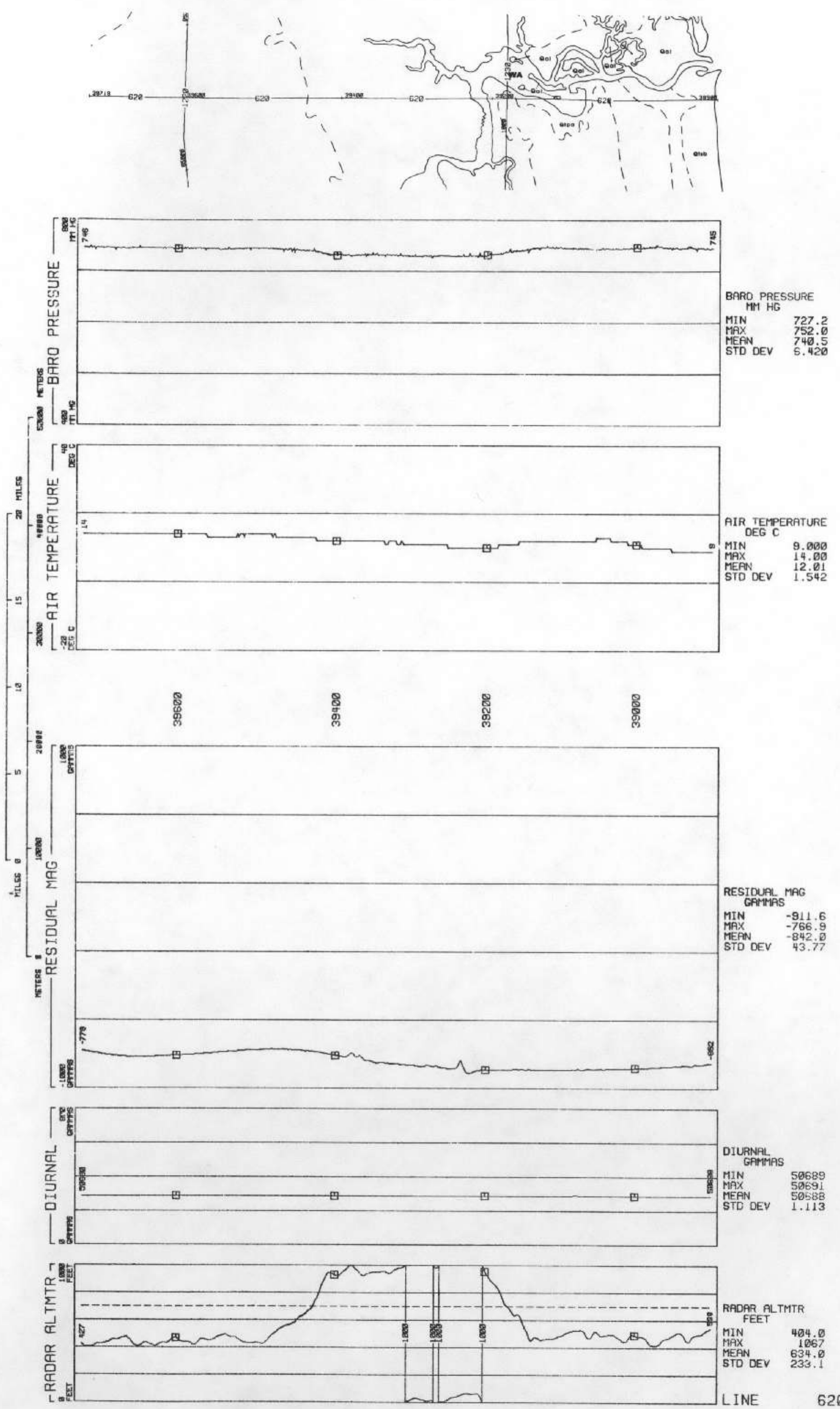
D56 vj

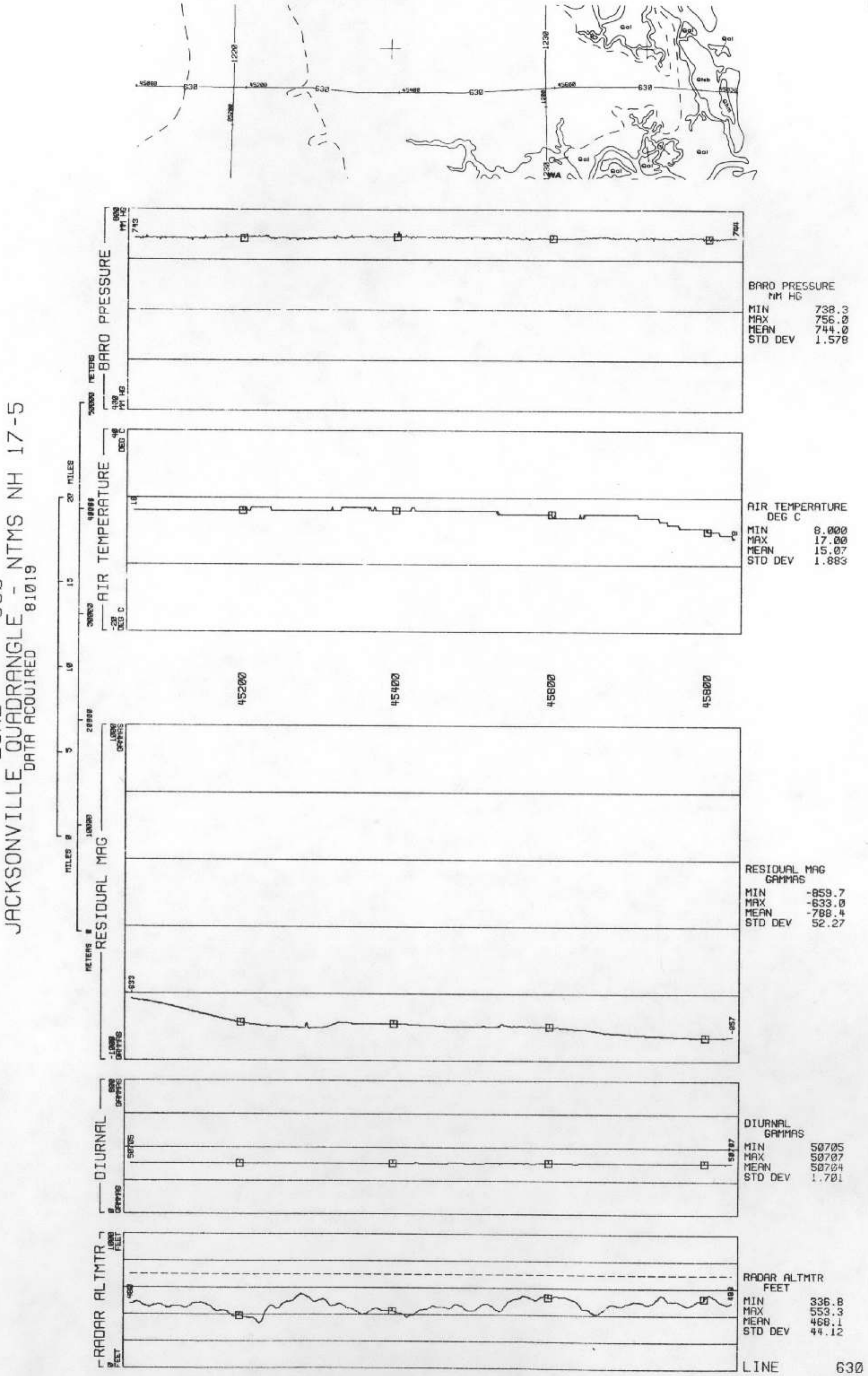
LINE 610
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019

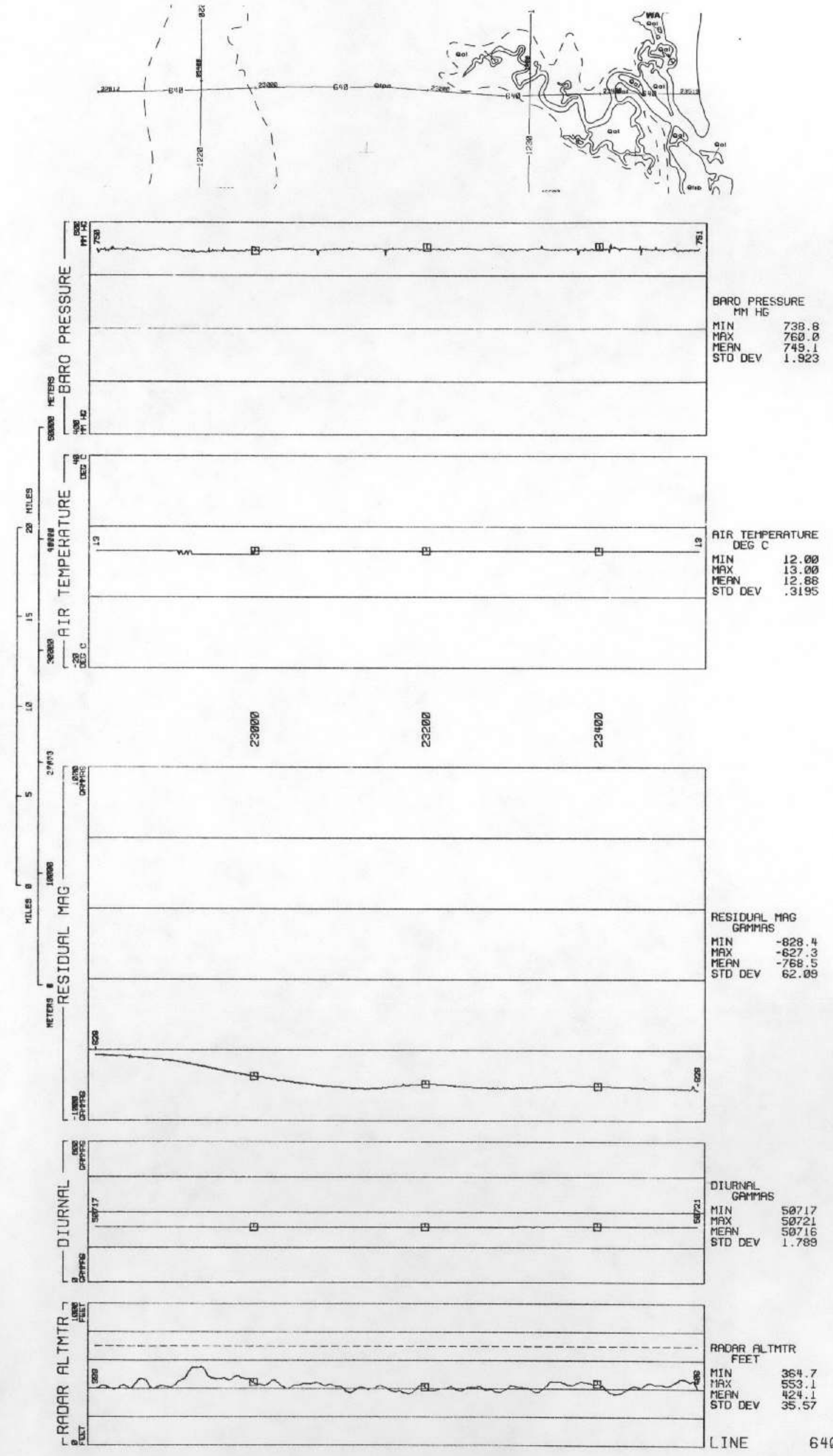


D57 vj

LINE 620
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019

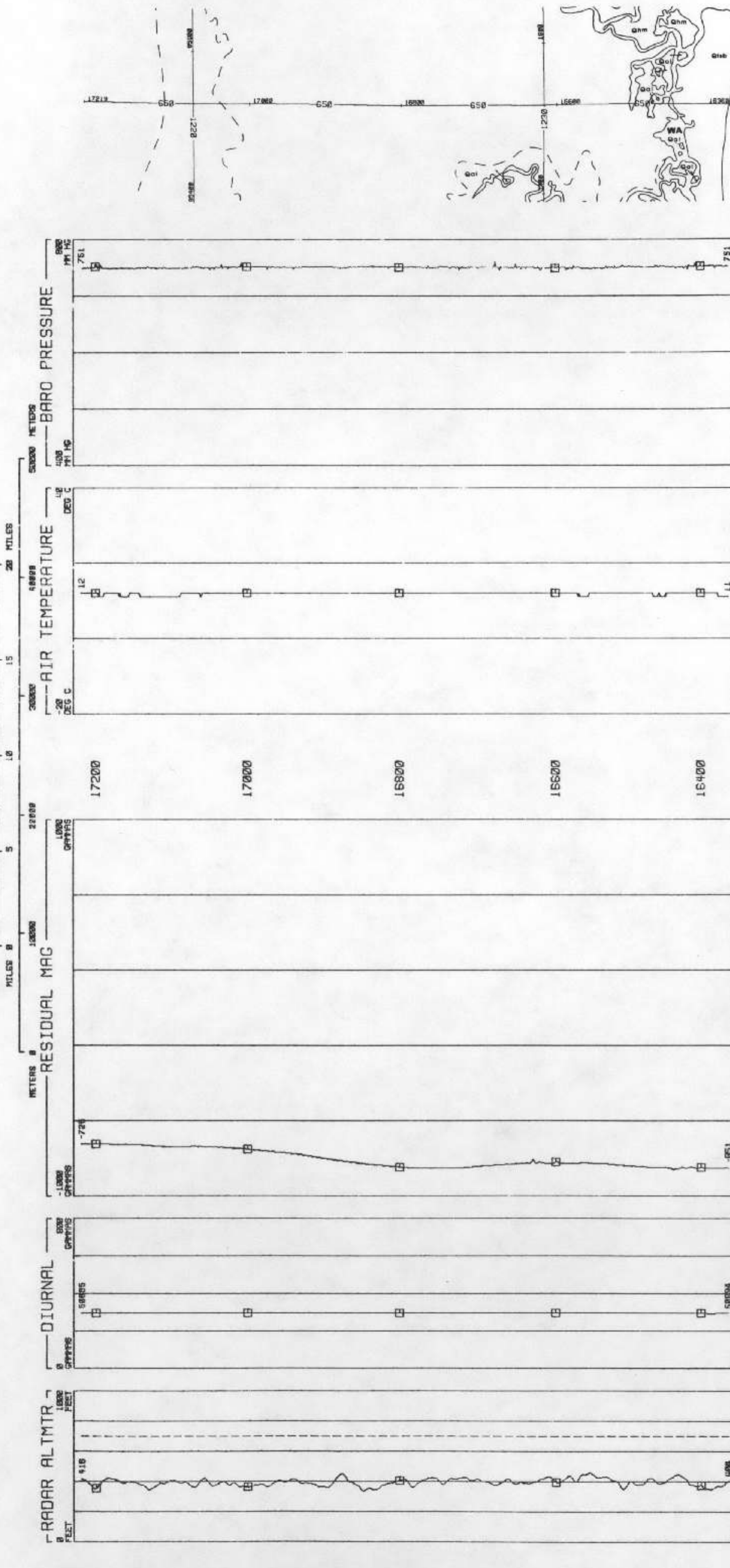



LINE 630
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81019
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
45200
45400
45600
45800
BARO PRESSURE MM HG
MIN 738.3
MAX 756.0
MEAN 744.0
STD DEV 1.578
AIR TEMPERATURE DEG C
MIN 8.000
MAX 17.00
MEAN 15.07
STD DEV 1.883
RESIDUAL MAG GAMMAS
MIN -859.7
MAX -633.0
MEAN -788.4
STD DEV 52.27
DIURNAL GAMMAS
MIN 50705
MAX 50707
MEAN 50704
STD DEV 1.701
RADAR ALTMTR FEET
MIN 336.8
MAX 553.3
MEAN 468.1
STD DEV 44.12
LINE 630


LINE 640
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
23000
23200
23400
BARO PRESSURE MM HG
MIN 738.8
MAX 760.0
MEAN 749.1
STD DEV 1.923
AIR TEMPERATURE DEG C
MIN 12.00
MAX 13.00
MEAN 12.88
STD DEV .3195
RESIDUAL MAG GAMMAS
MIN -828.4
MAX -627.3
MEAN -768.5
STD DEV 62.09
DIURNAL GAMMAS
MIN 50717
MAX 50721
MEAN 50716
STD DEV 1.789
RADAR ALTMTR FEET
MIN 364.7
MAX 553.1
MEAN 424.1
STD DEV 35.57
LINE 640

D60 vj

LINE 650
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



BARO PRESSURE
MM HG
MIN 745.4
MAX 759.9
MEAN 750.7
STD DEV 1.330

AIR TEMPERATURE
DEG C
MIN 11.00
MAX 12.00
MEAN 11.86
STD DEV .3453

RESIDUAL MAG
GAMMAS
MIN -858.1
MAX -722.0
MEAN -804.3
STD DEV 47.02

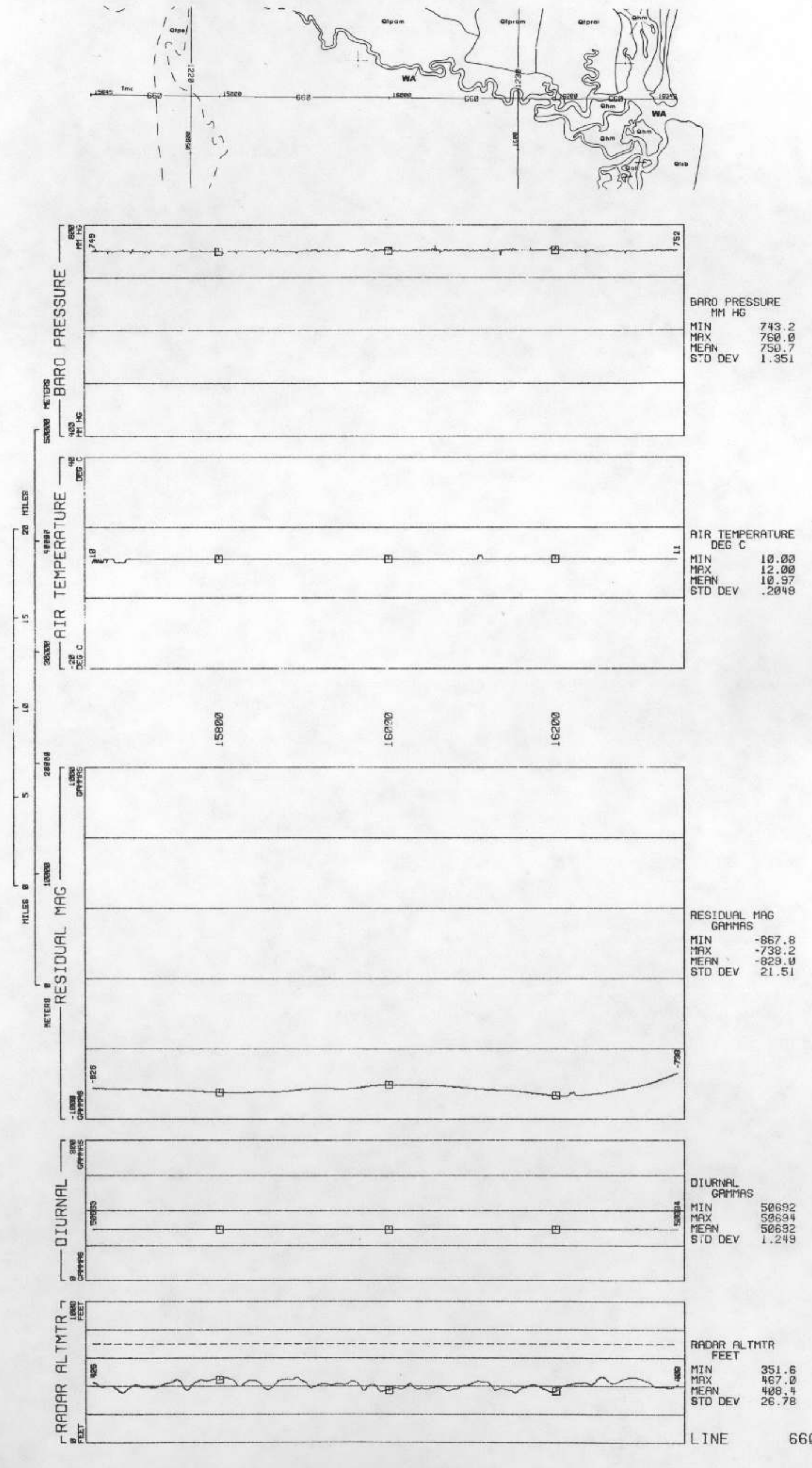
DIURNAL
GAMMAS
MIN 50693
MAX 50695
MEAN 50692
STD DEV 2.700

RADAR ALTMTR
FEET
MIN 336.8
MAX 457.8
MEAN 393.3
STD DEV 23.73

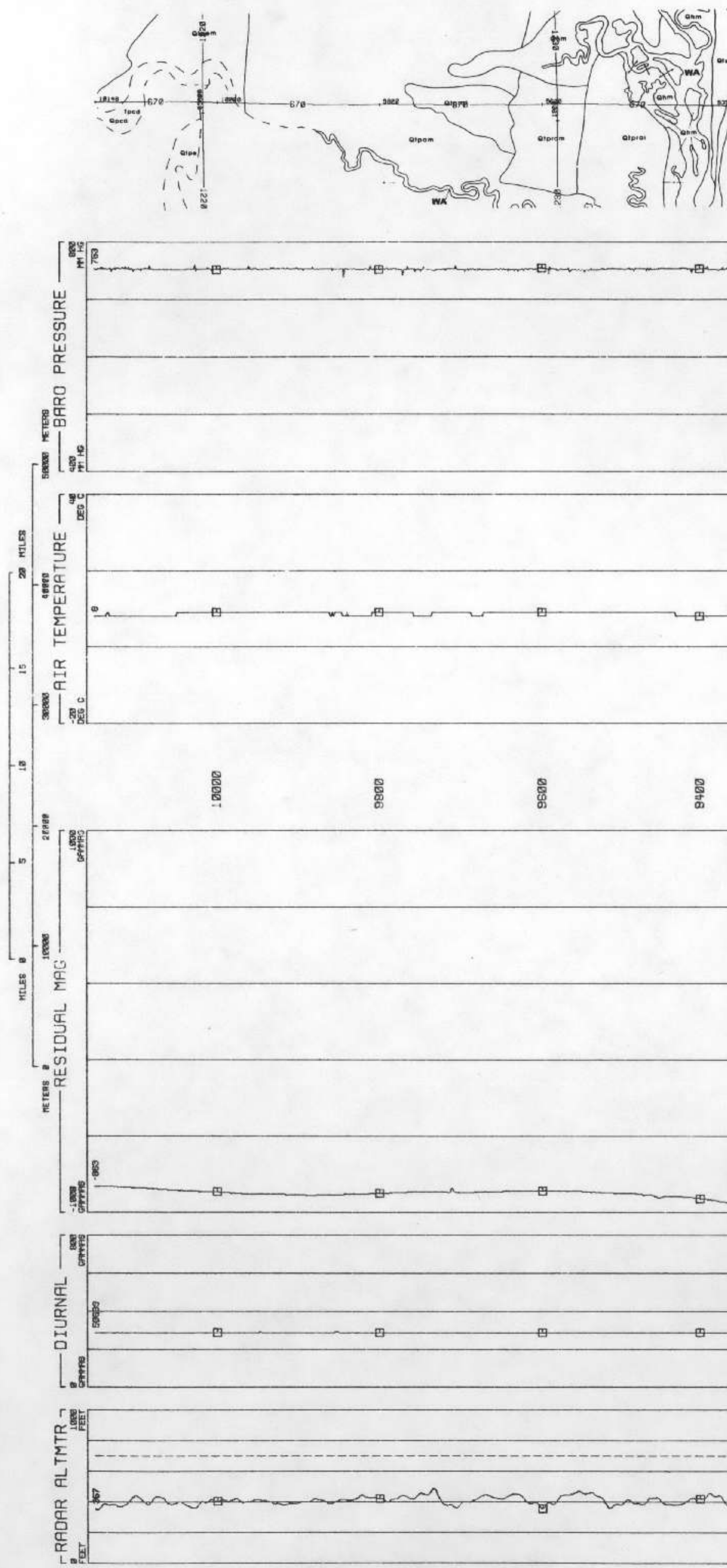
LINE 650

D61 vj

LINE 660
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



LINE 670
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



BARO PRESSURE
MM HG
MIN 740.4
MAX 759.6
MEAN 752.8
STD DEV 1.381

AIR TEMPERATURE
DEG C
MIN 8.000
MAX 9.000
MEAN 8.682
STD DEV .4656

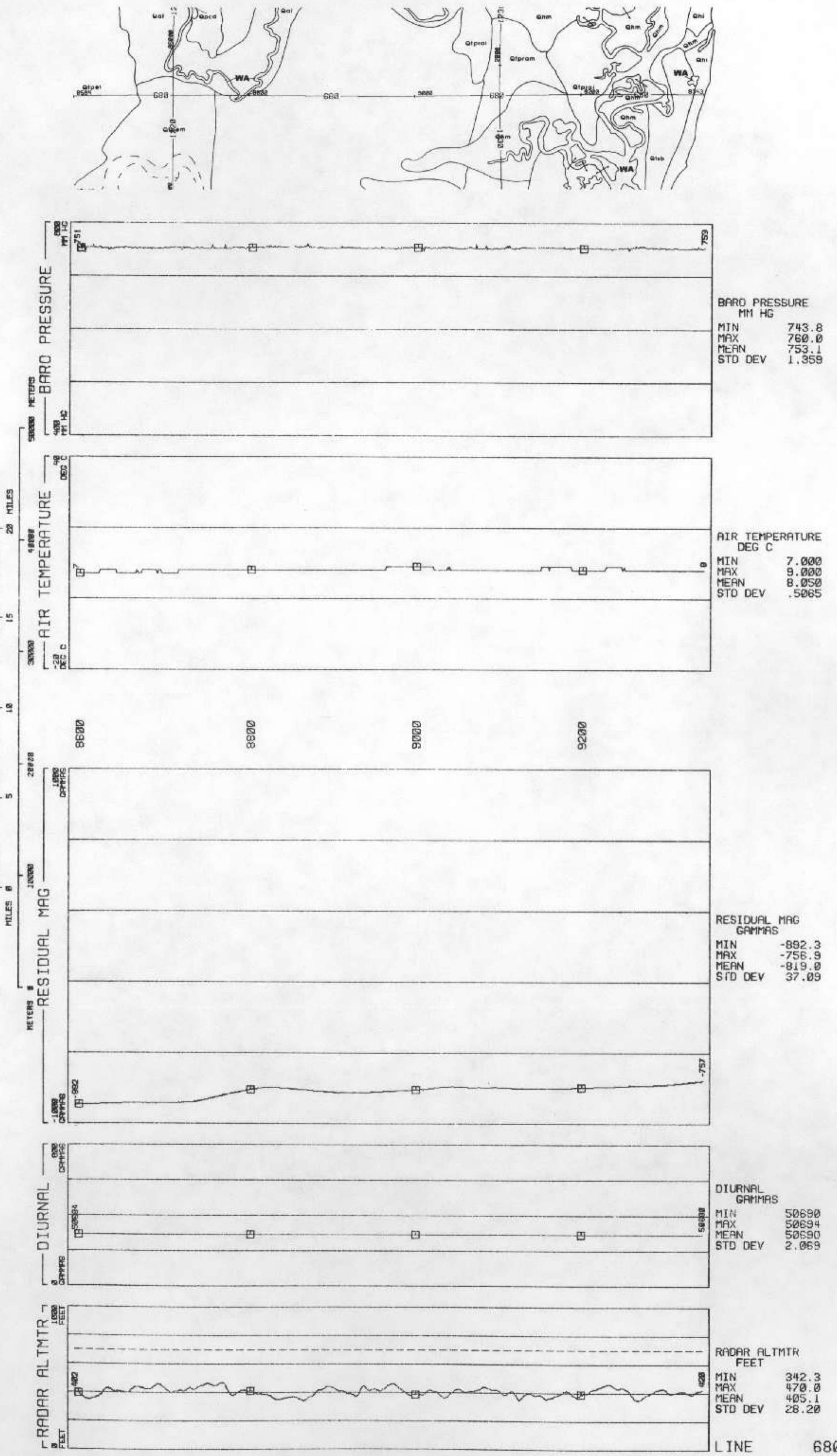
RESIDUAL MAG
GAMMAS
MIN -952.6
MAX -862.7
MEAN -898.1
STD DEV 18.30

DIURNAL
GAMMAS
MIN 50689
MAX 50690
MEAN 50690
STD DEV 1.362

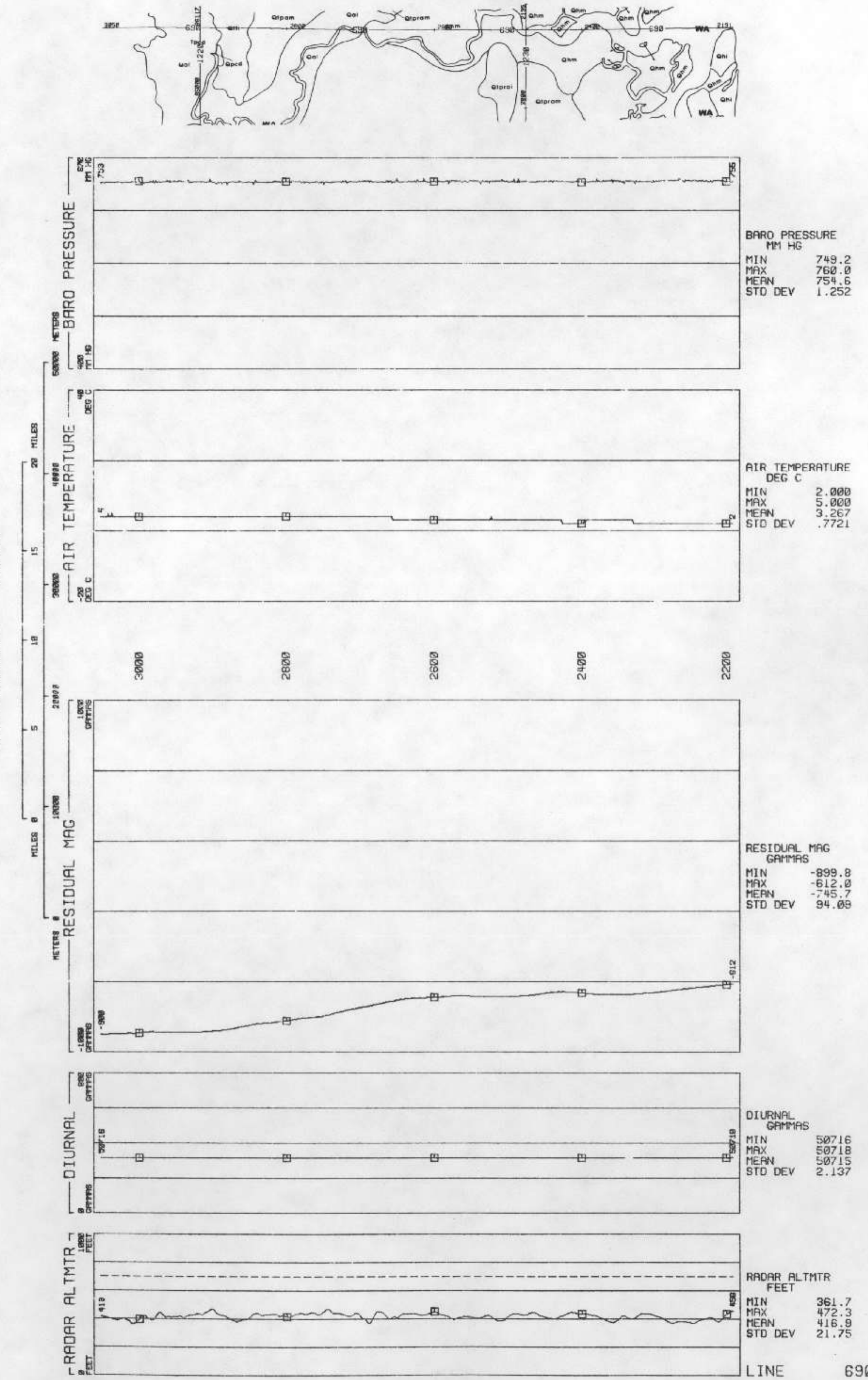
RADAR ALTMTR
FEET
MIN 343.2
MAX 486.1
MEAN 409.0
STD DEV 25.85

LINE 670

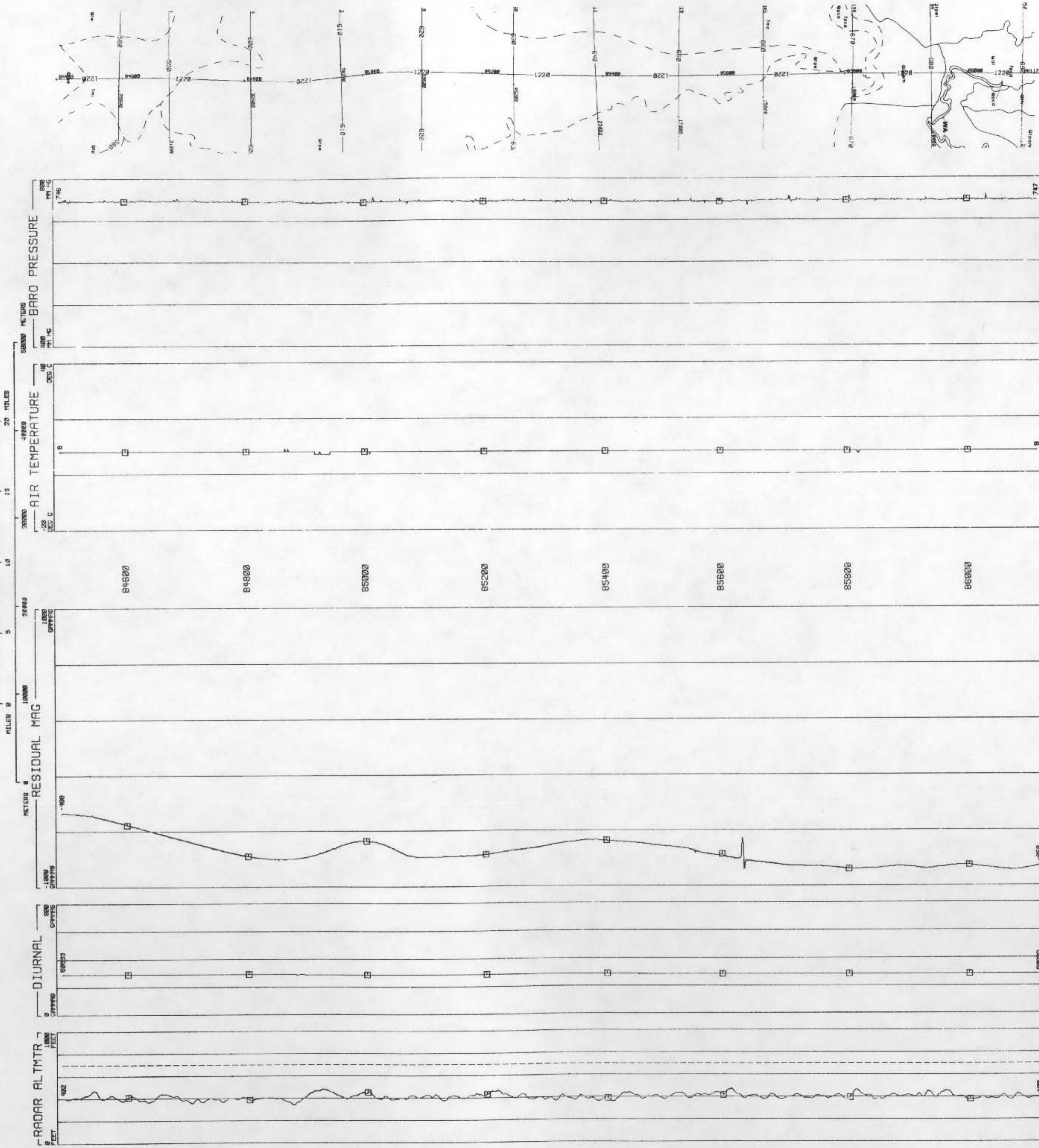
LINE 680
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



D64 vj


LINE 690
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018
BARO PRESSURE
AIR TEMPERATURE
RESIDUAL MAG
DIURNAL
RADAR ALTMTR
3000
2800
2600
2400
2200
BARO PRESSURE MM HG
MIN 749.2
MAX 760.0
MEAN 754.6
STD DEV 1.252
AIR TEMPERATURE DEG C
MIN 2.000
MAX 5.000
MEAN 3.267
STD DEV .7721
RESIDUAL MAG GAMMAS
MIN -899.8
MAX -612.0
MEAN -745.7
STD DEV 94.09
DIURNAL GAMMAS
MIN 50716
MAX 50718
MEAN 50715
STD DEV 2.137
RADAR ALTMTR FEET
MIN 361.7
MAX 472.3
MEAN 416.9
STD DEV 21.75
LINE 690

LINE 1220
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81023



BARO PRESSURE
MM HG
MIN 736.1
MAX 758.2
MEAN 745.8
STD DEV 1.451

AIR TEMPERATURE
DEG C
MIN 7.000
MAX 9.000
MEAN 7.984
STD DEV .1357

RESIDUAL MAG
GAMMAS
MIN -887.9
MAX -467.6
MEAN -751.8
STD DEV 102.2

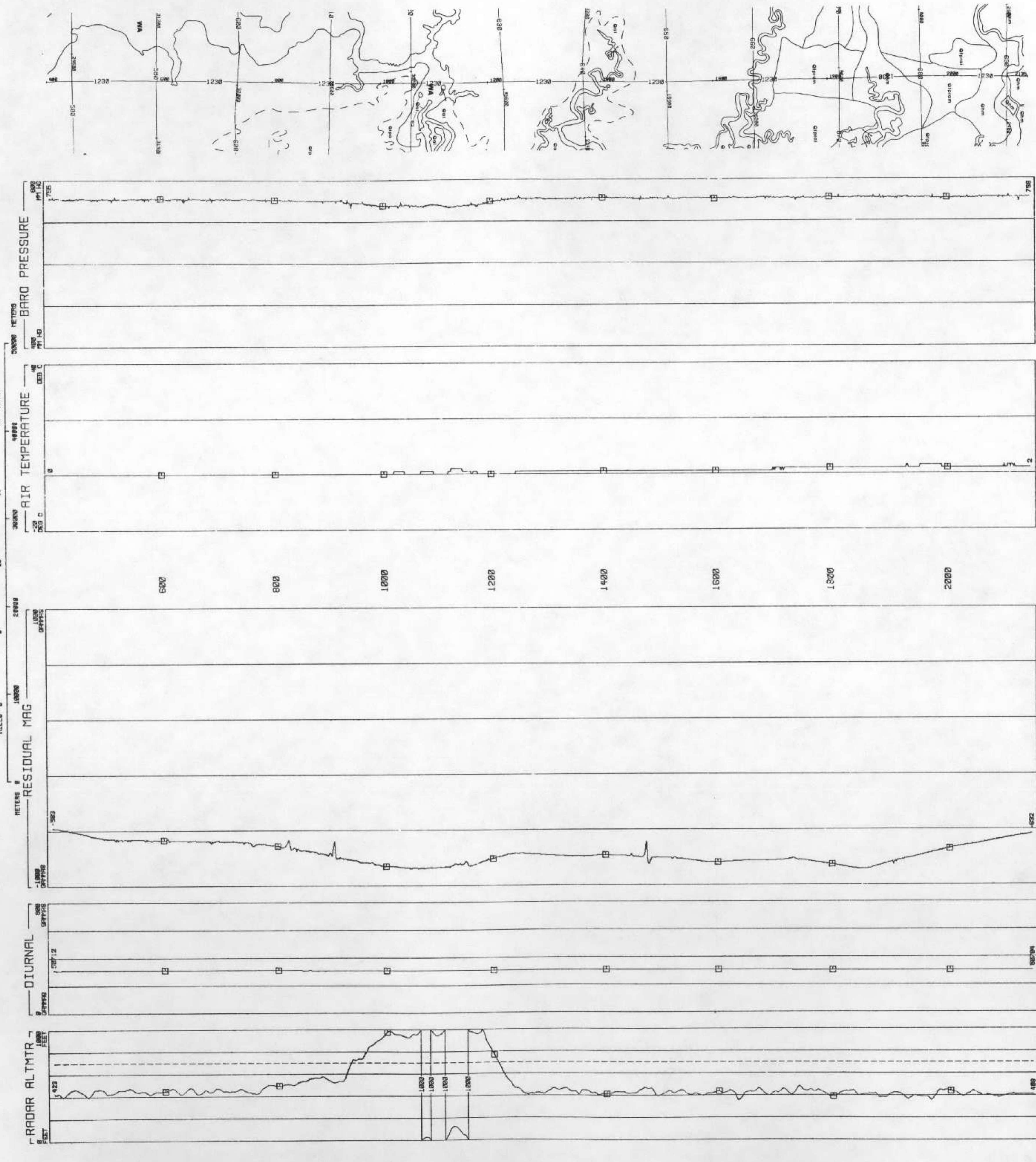
DIURNAL
GAMMAS
MIN 50682
MAX 50693
MEAN 50683
STD DEV 5.550

RADAR ALTMTR
FEET
MIN 341.6
MAX 482.3
MEAN 407.0
STD DEV 23.39

LINE 1220

D66 vj

LINE 1230
JACKSONVILLE QUADRANGLE - NTMS NH 17-5
DATA ACQUIRED 81018



BARO PRESSURE
MM HG

MIN	733.1
MAX	760.0
MEAN	751.8
STD DEV	5.780

AIR TEMPERATURE
DEG C

MIN	.0000
MAX	3.000
MEAN	.8586
STD DEV	.8676

RESIDUAL MAG
GAMMAS

MIN	-885.1
MAX	-581.9
MEAN	-769.8
STD DEV	76.81

DIURNAL
GAMMAS

MIN	50704
MAX	50712
MEAN	50706
STD DEV	3.148

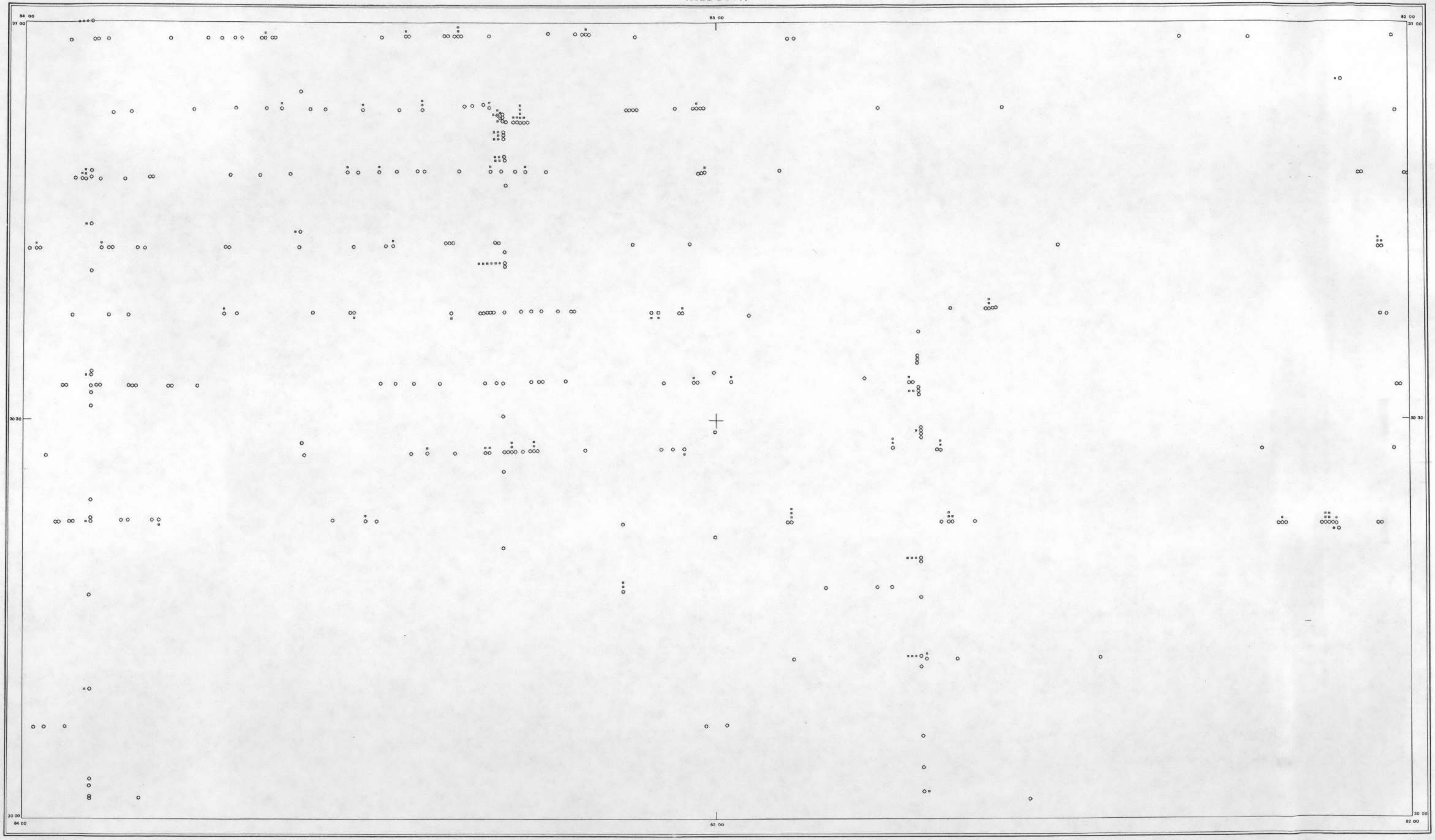
RADAR ALTMTR
FEET

MIN	357.6
MAX	1123
MEAN	521.3
STD DEV	190.9

LINE 1230

APPENDIX E – Standard Deviation Maps

VALDOSTA



SCALE 1:500 000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES

SURVEY AND COMPILATION BY

EG&G GEOMETRICS

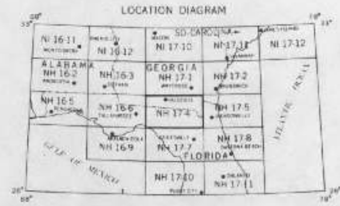
O - DATA STATISTICALLY ADEQUATE

BLANK - DATA STATISTICALLY INADEQUATE

■ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

LOCATION DIAGRAM

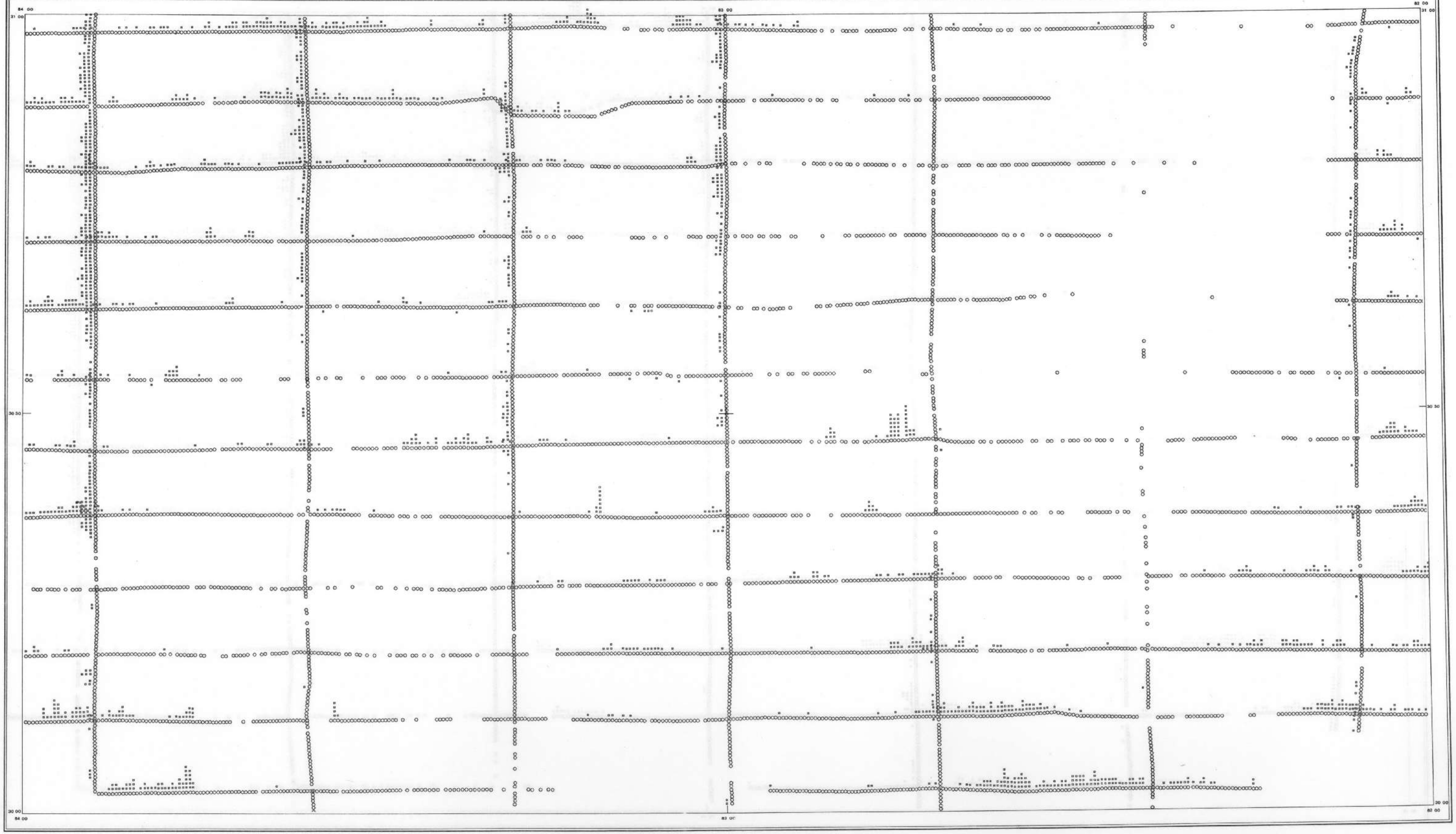


POTASSIUM STANDARD DEVIATION MAP

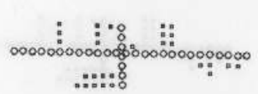
MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

VALDOSTA



SCALE 1:500,000



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

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

SURVEY AND COMPILATION BY

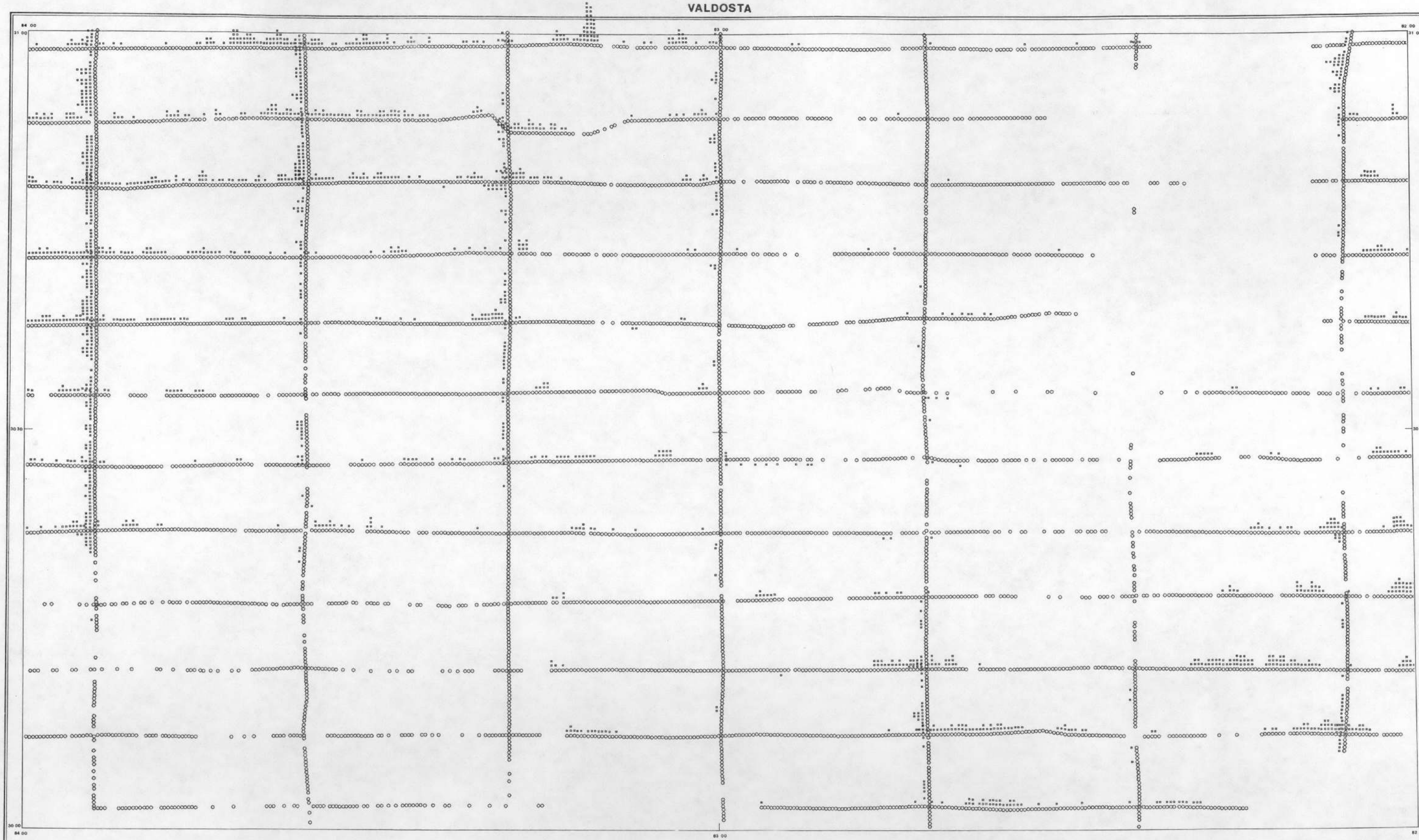
EG&G GEOMETRICS

URANIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

VALDOSTA



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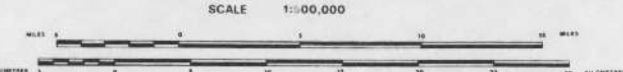
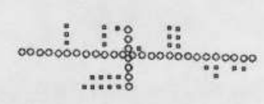
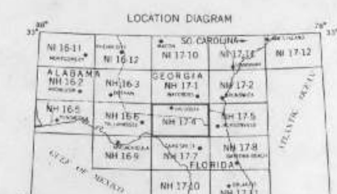




○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

LOCATION DIAGRAM



SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

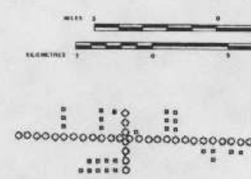
THORIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

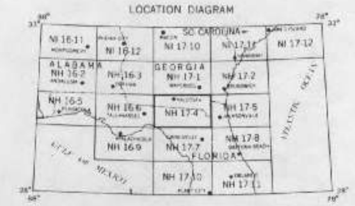
VALDOSTA

SCALE 1:500,000



○ - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY
NOTE: ON E-W LINES, +σ TO NORTH, -σ TO SOUTH.
ON N-S LINES, +σ TO WEST, -σ TO EAST.

LOCATION DIAGRAM



SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

THORIUM/POTASSIUM STANDARD DEVIATION MAP

MISSISSIPPI/FLORIDA PROJECT

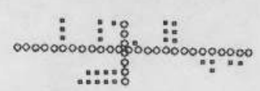
U.S. DEPARTMENT OF ENERGY

VALDOSTA

SCALE 1:500,000

MILES 5 0 5 10 15 MILES

KILOMETRES 5 0 5 10 15 20 25 30 KILOMETRES



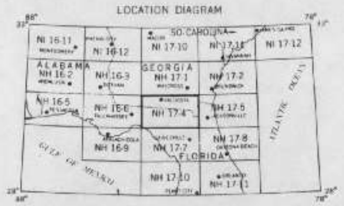
O - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
■ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

LOCATION DIAGRAM

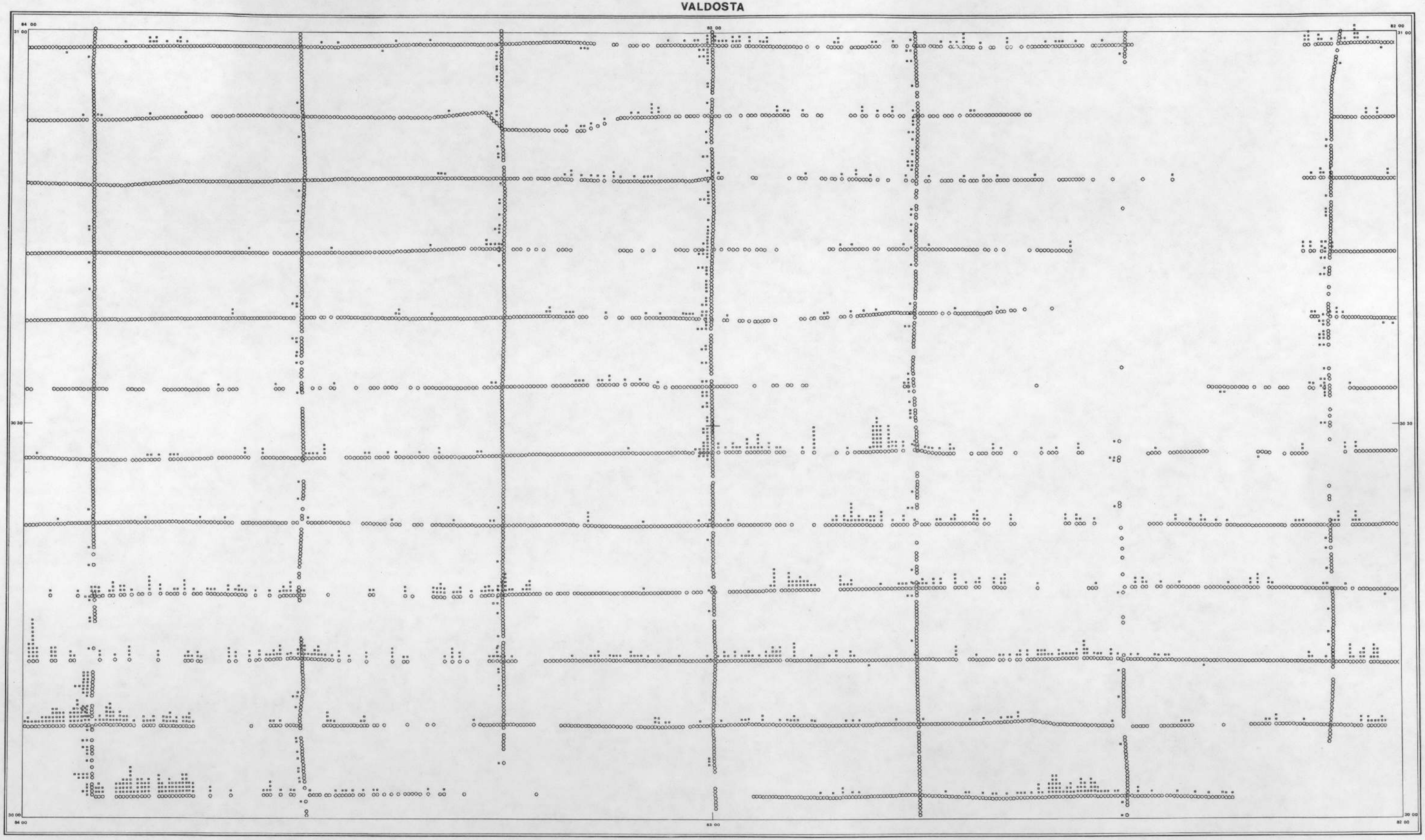


URANIUM/POTASSIUM STANDARD DEVIATION MAP

MISSISSIPPI/FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

VALDOSTA



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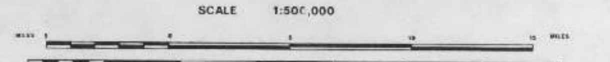
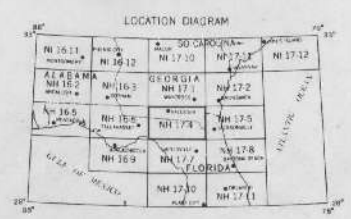
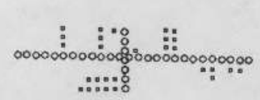




URANIUM/THORIUM STANDARD DEVIATION MAP

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS



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

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

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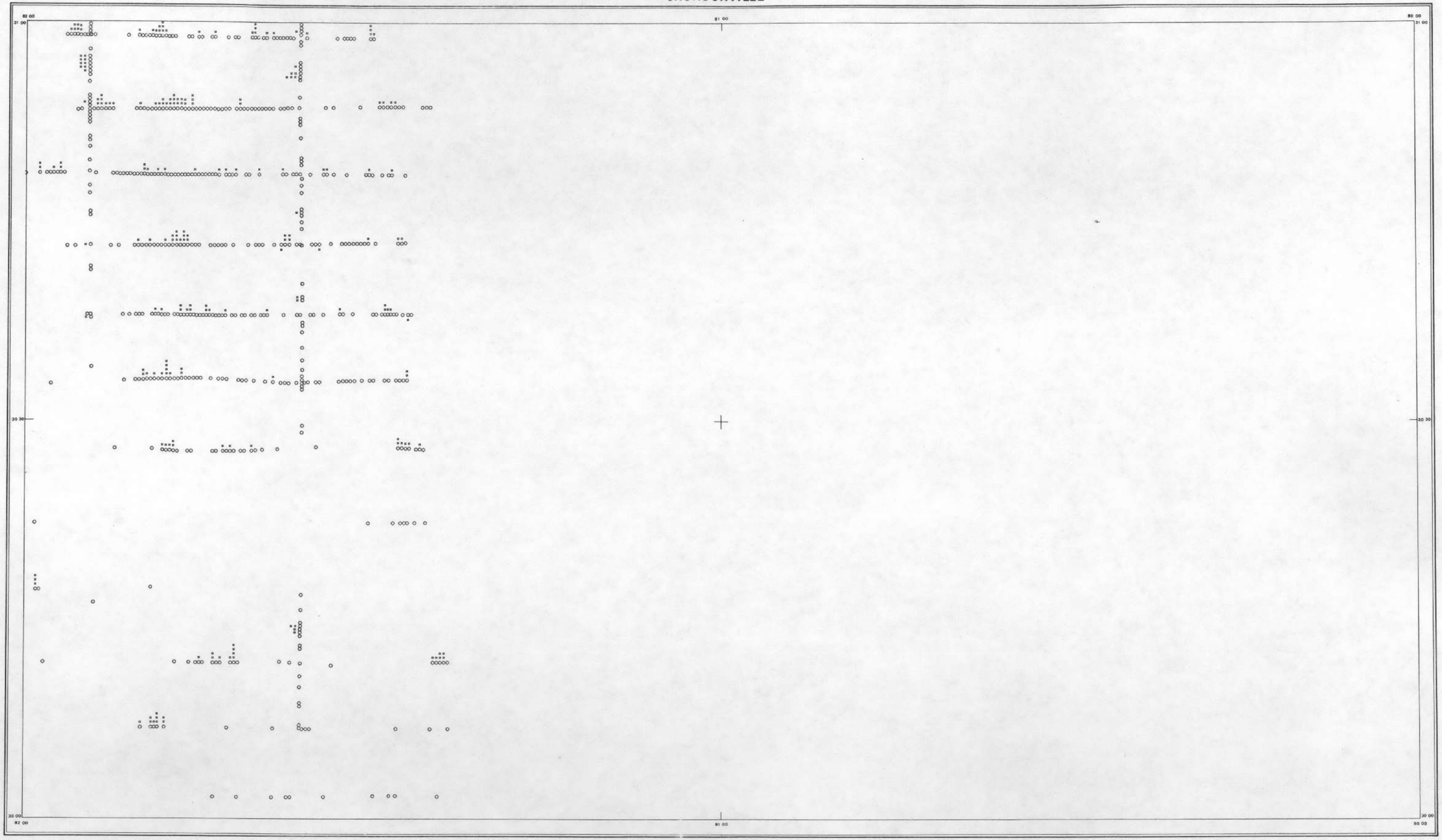
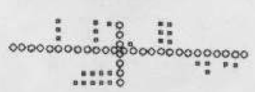
JACKSONVILLE



SCALE 1 500,000

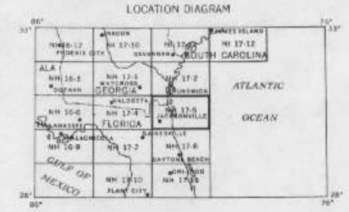
MILES · KILOMETRES



○ - 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



SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

POTASSIUM STANDARD DEVIATION MAP

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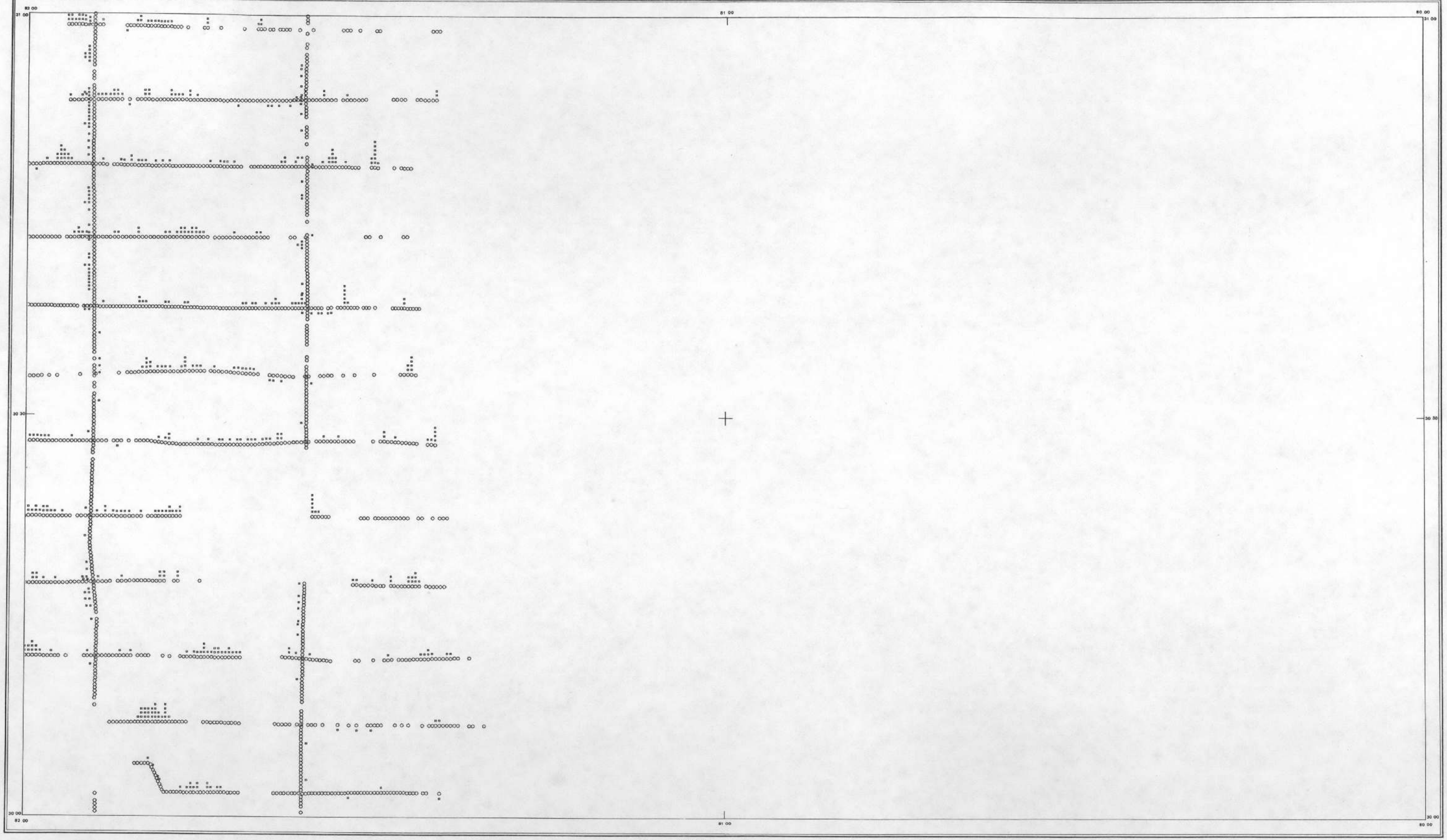
U. S. DEPARTMENT OF ENERGY

JACKSONVILLE



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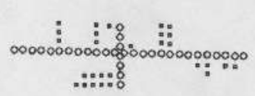

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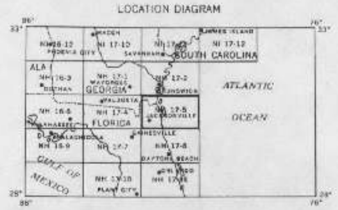
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

LOCATION DIAGRAM



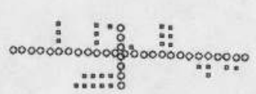
URANIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

JACKSONVILLE

SCALE 1:500,000



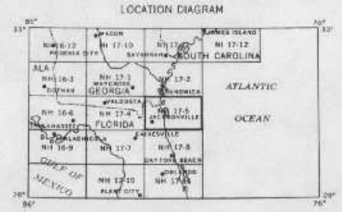
O - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

LOCATION DIAGRAM

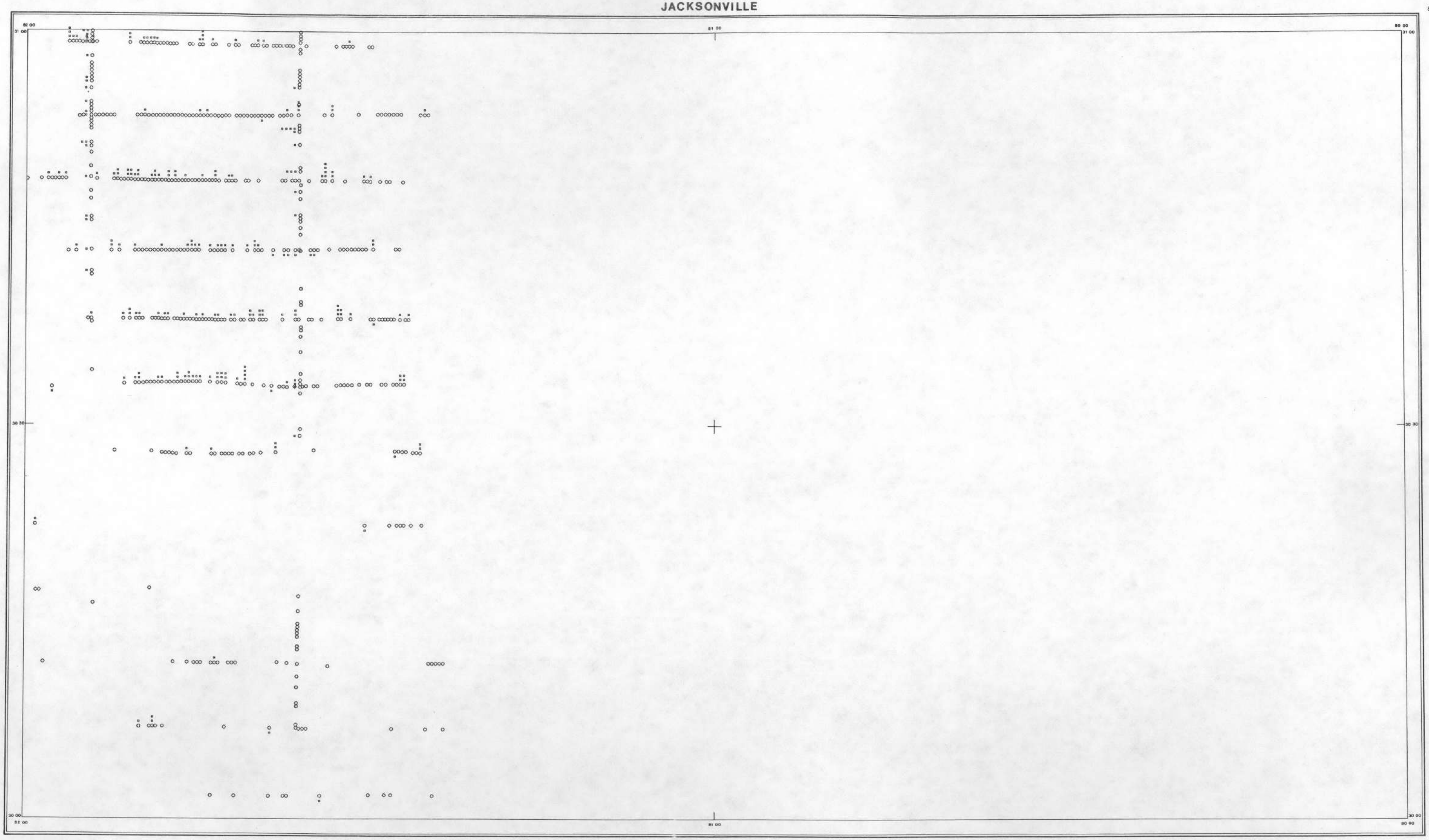


THORIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

JACKSONVILLE



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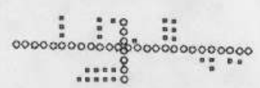


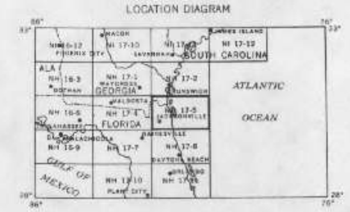
O - DATA STATISTICALLY ADEQUATE
BLANK - DATA STATISTICALLY INADEQUATE
▪ - 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

LOCATION DIAGRAM

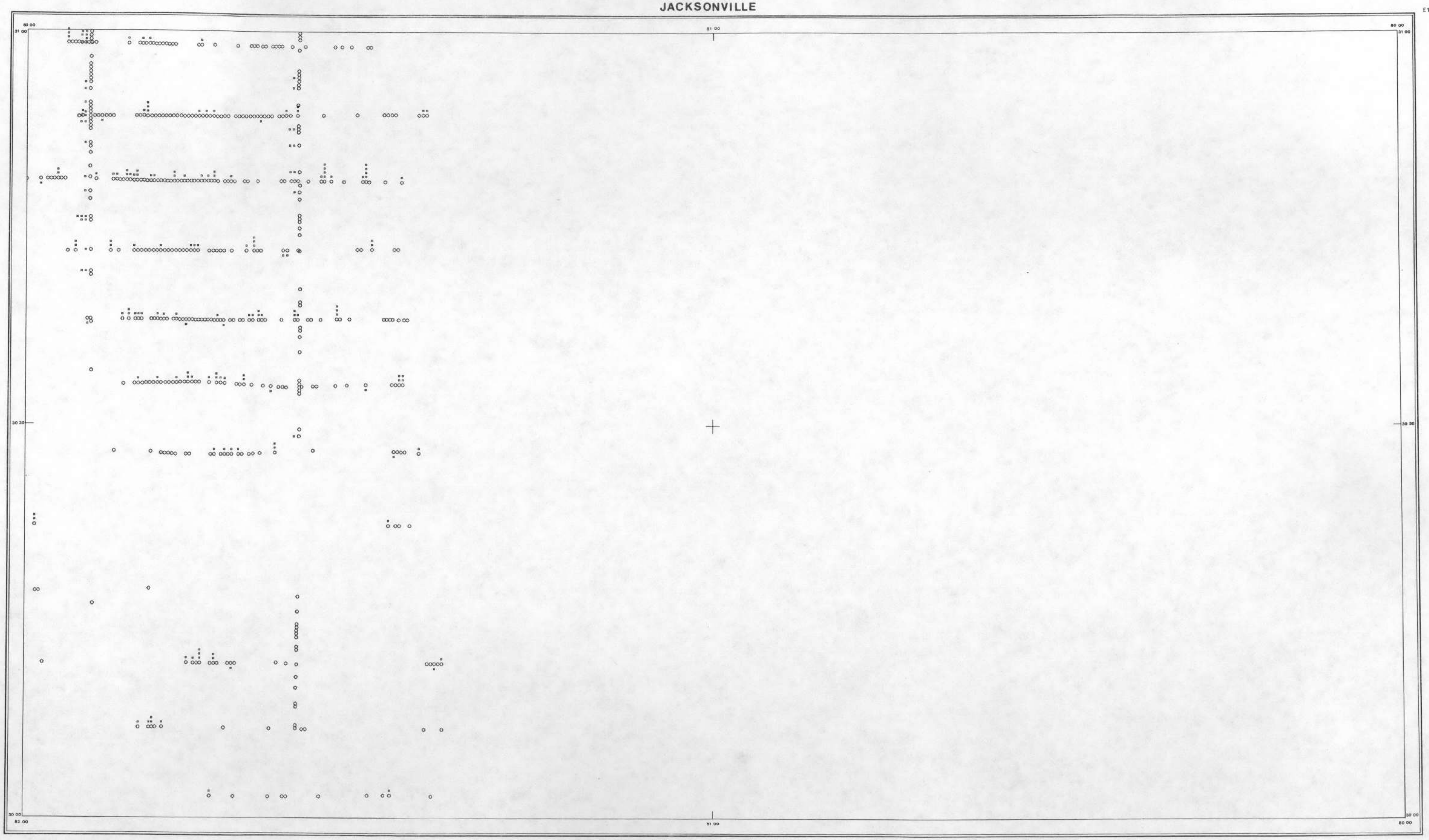


THORIUM / POTASSIUM STANDARD DEVIATION MAP

MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

JACKSONVILLE



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MILES / KILOMETRES

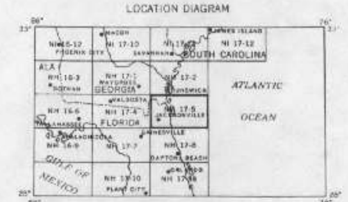
○ – DATA STATISTICALLY ADEQUATE
BLANK – DATA STATISTICALLY INADEQUATE
▪ – 1 σ ABOUT MEASURE OF CENTRAL TENDENCY

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

SURVEY AND COMPILATION BY:

EG&G GEOMETRICS

LOCATION DIAGRAM



URANIUM/POTASSIUM STANDARD DEVIATION MAP

MISSISSIPPI/FLORIDA PROJECT

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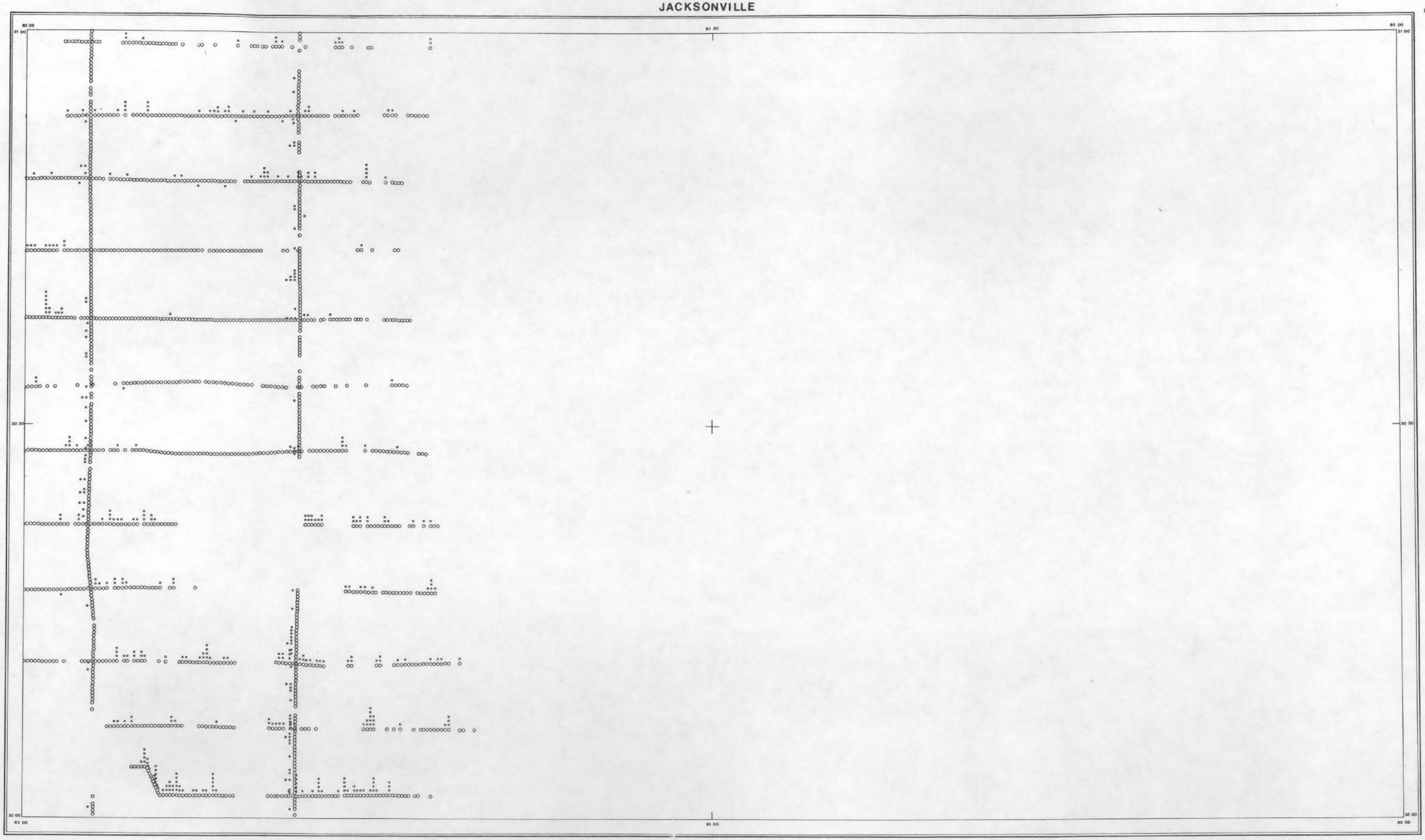
JACKSONVILLE



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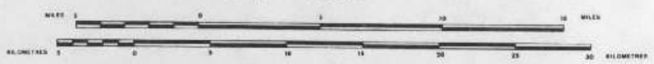
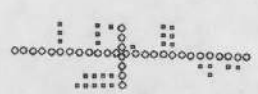


SURVEY AND COMPILATION BY:

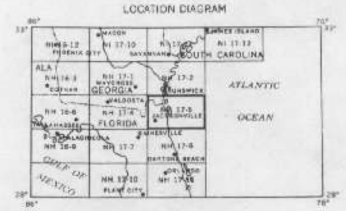
EG&G GEOMETRICS



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

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

LOCATION DIAGRAM



URANIUM/THORIUM STANDARD DEVIATION MAP

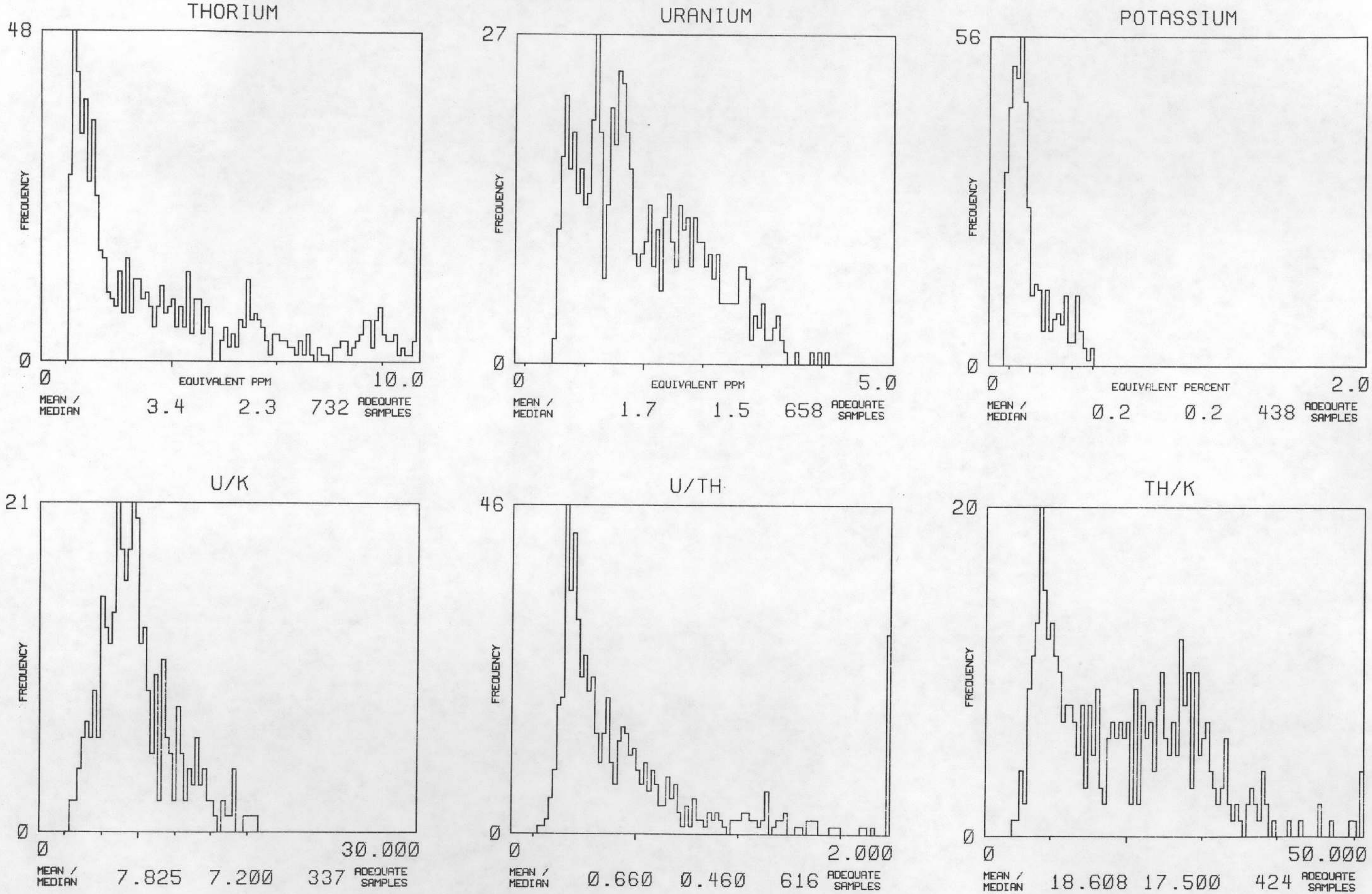
MISSISSIPPI / FLORIDA PROJECT

U. S. DEPARTMENT OF ENERGY

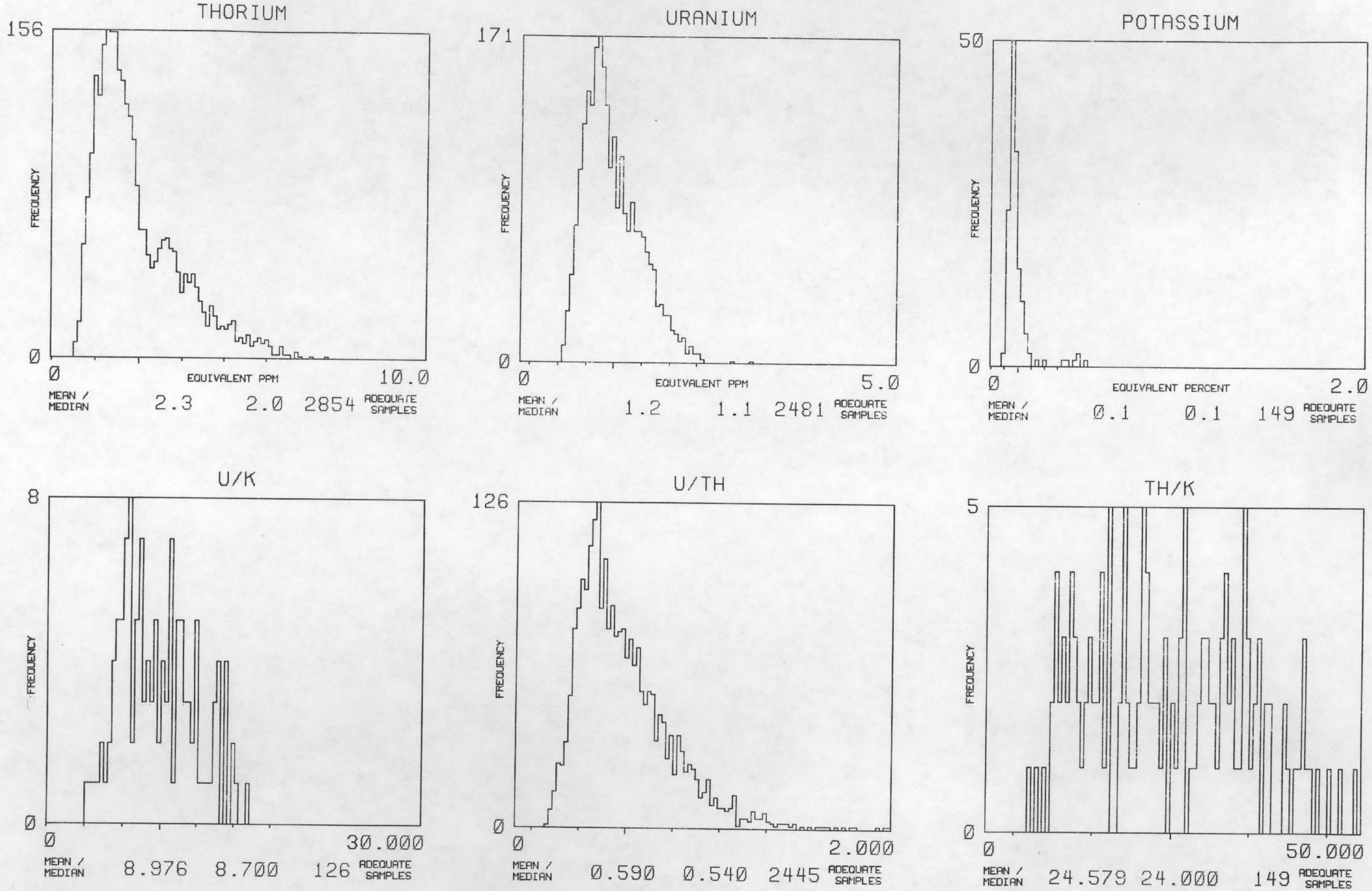
APPENDIX F – Histograms and Map Unit Conversion Table

NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QAL TOTAL NUMBER OF SAMPLES 794

F1 vj

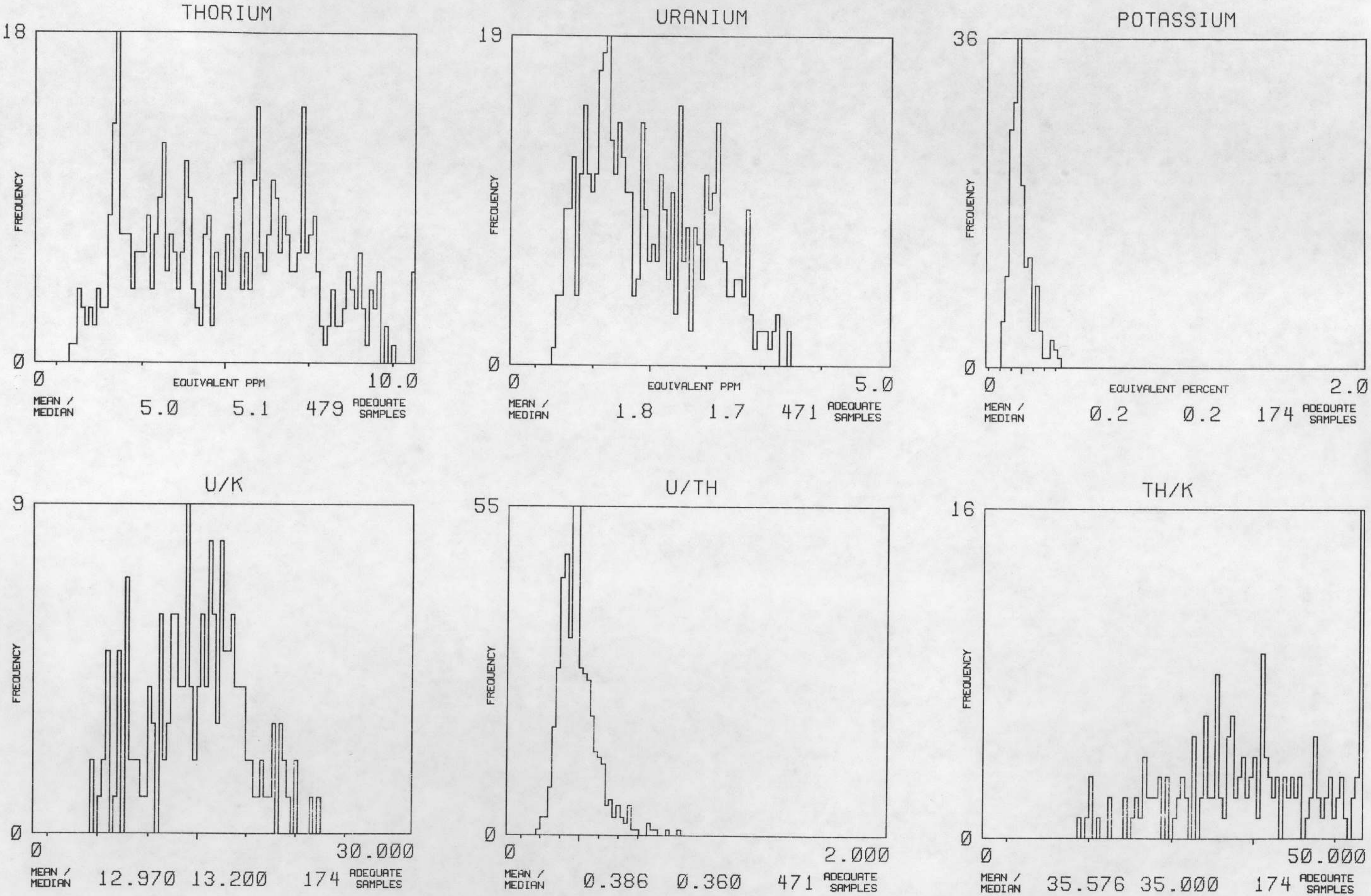


NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPE TOTAL NUMBER OF SAMPLES 3070



NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPEM TOTAL NUMBER OF SAMPLES 479

F3 vj

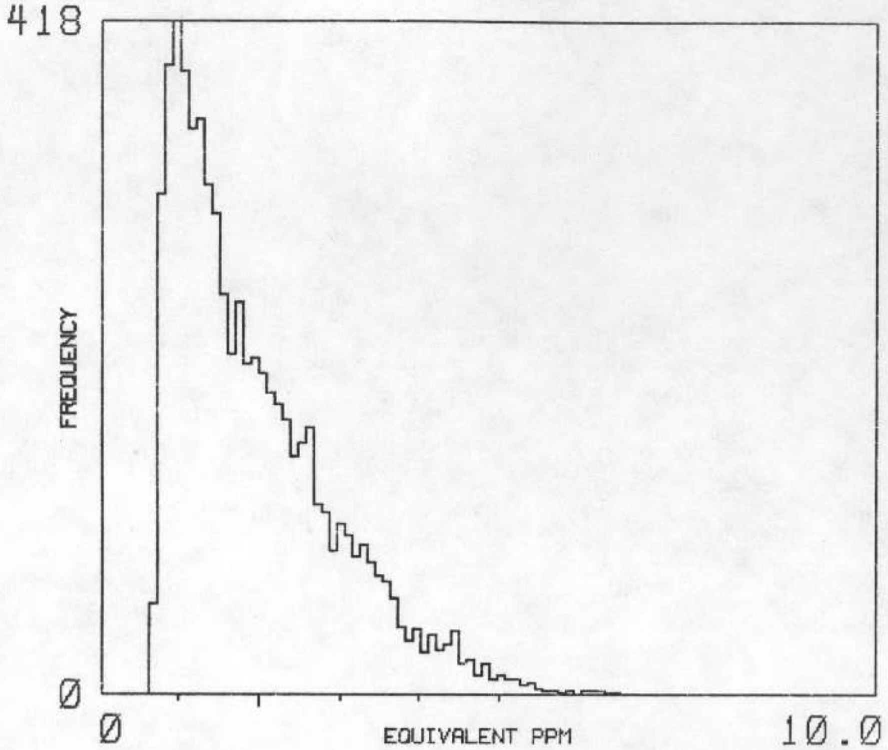


F4 vj

NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE

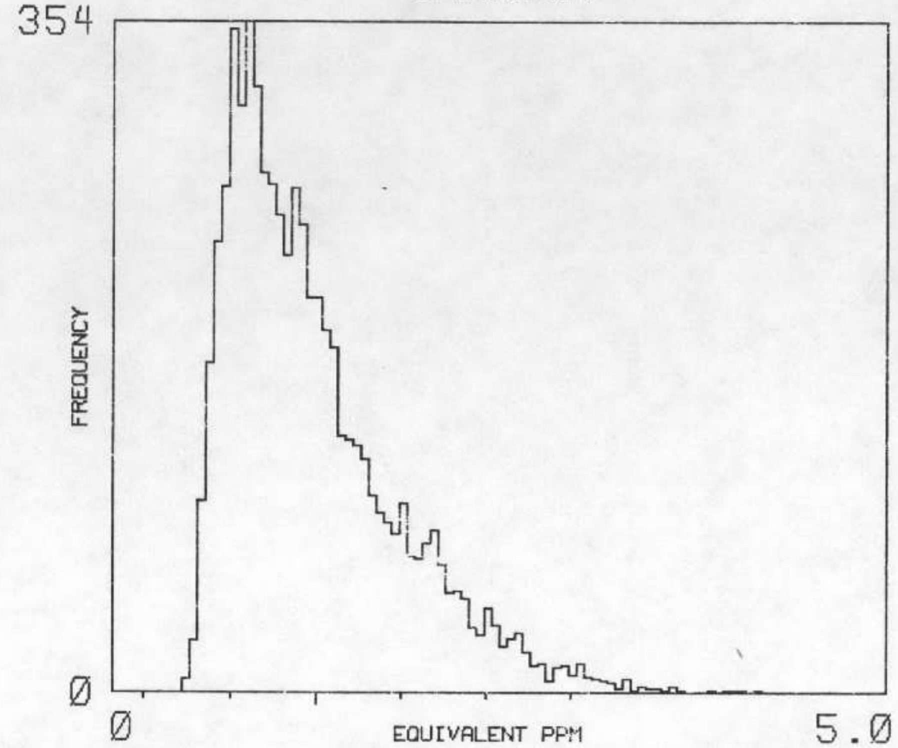
MAP UNIT : QTWM TOTAL NUMBER OF SAMPLES 11091

THORIUM



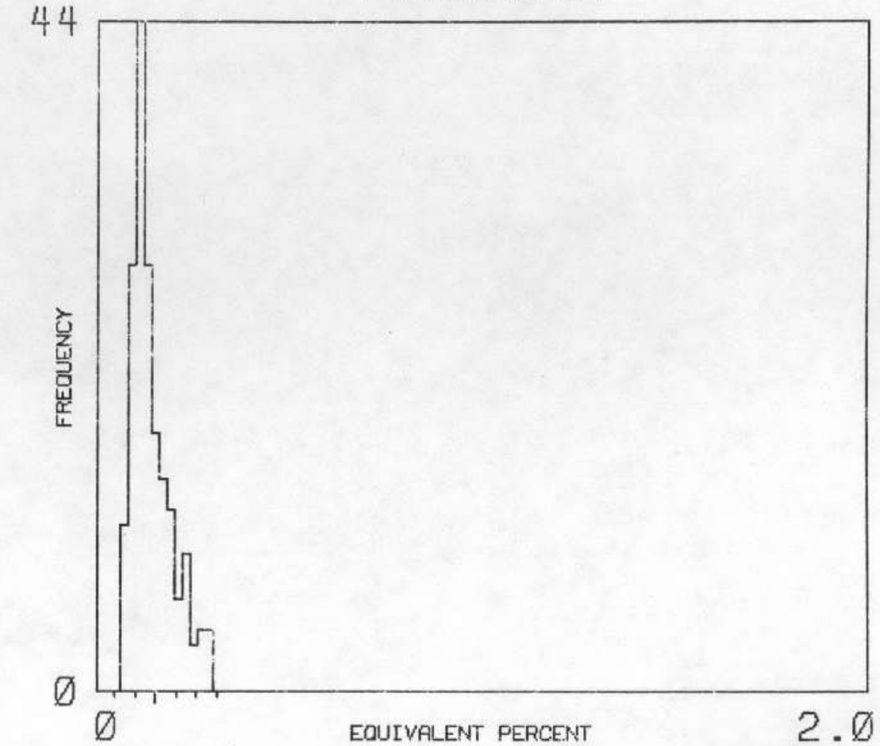
MEAN / MEDIAN 2.0 1.7 6625 ADEQUATE SAMPLES

URANIUM



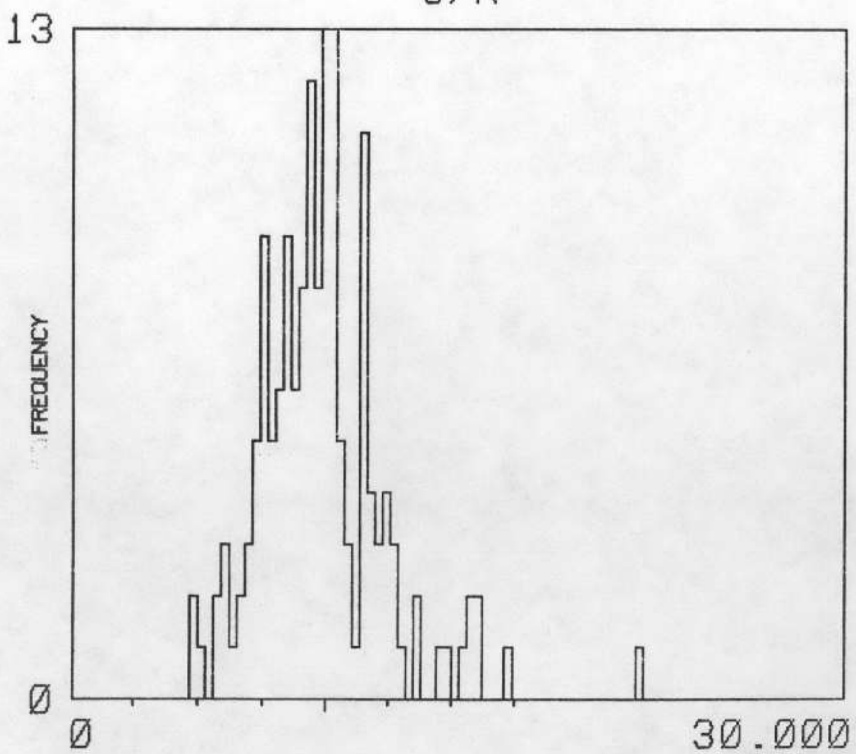
MEAN / MEDIAN 1.3 1.2 6390 ADEQUATE SAMPLES

POTASSIUM



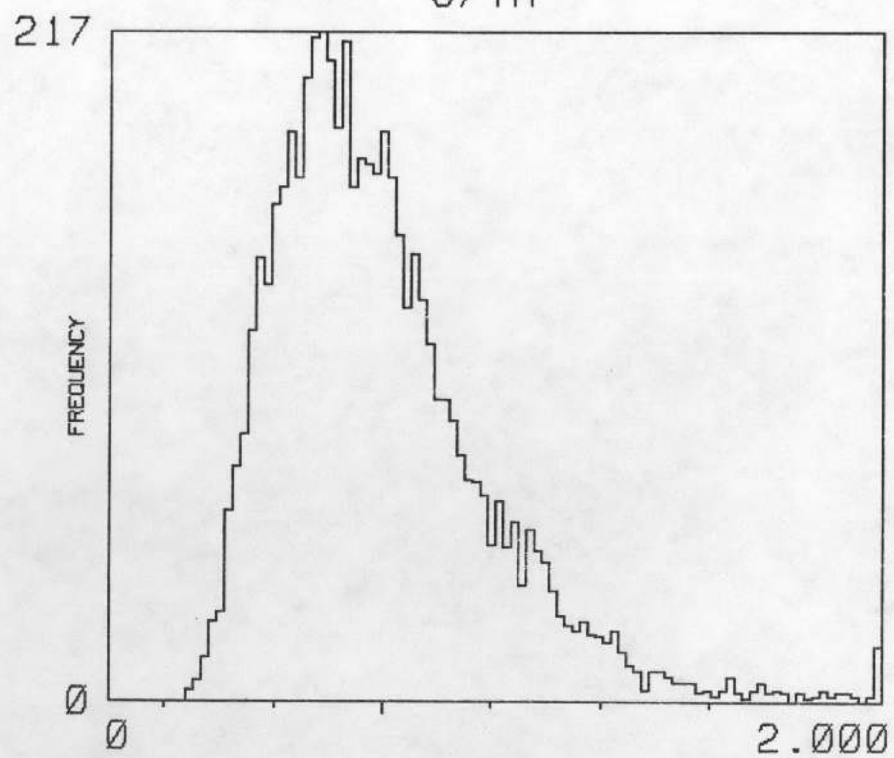
MEAN / MEDIAN 0.2 0.1 180 ADEQUATE SAMPLES

U/K



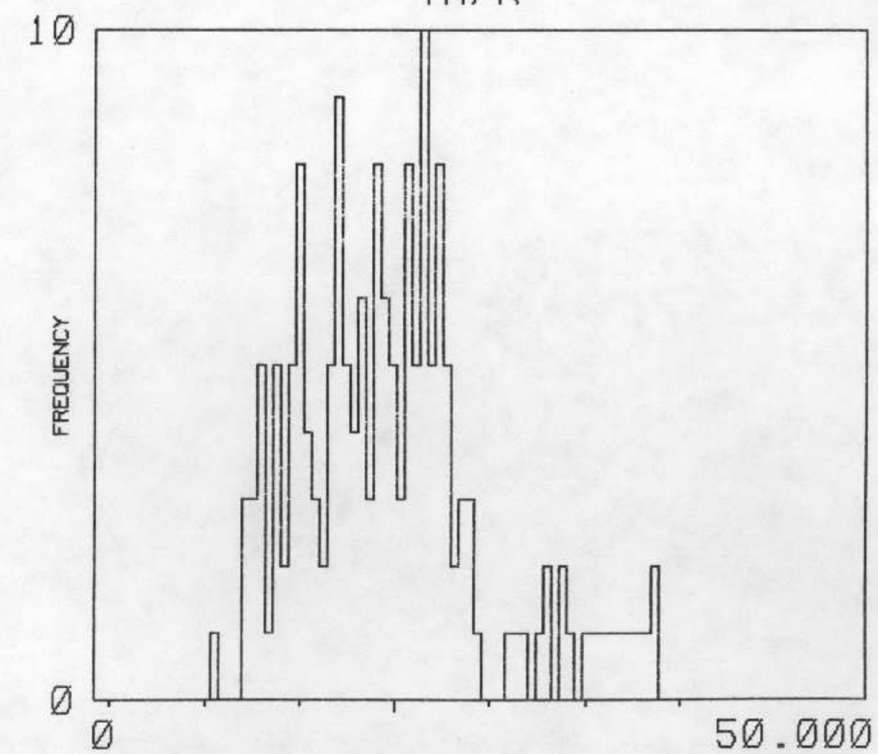
MEAN / MEDIAN 9.752 9.600 154 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN 0.710 0.660 5727 ADEQUATE SAMPLES

TH/K

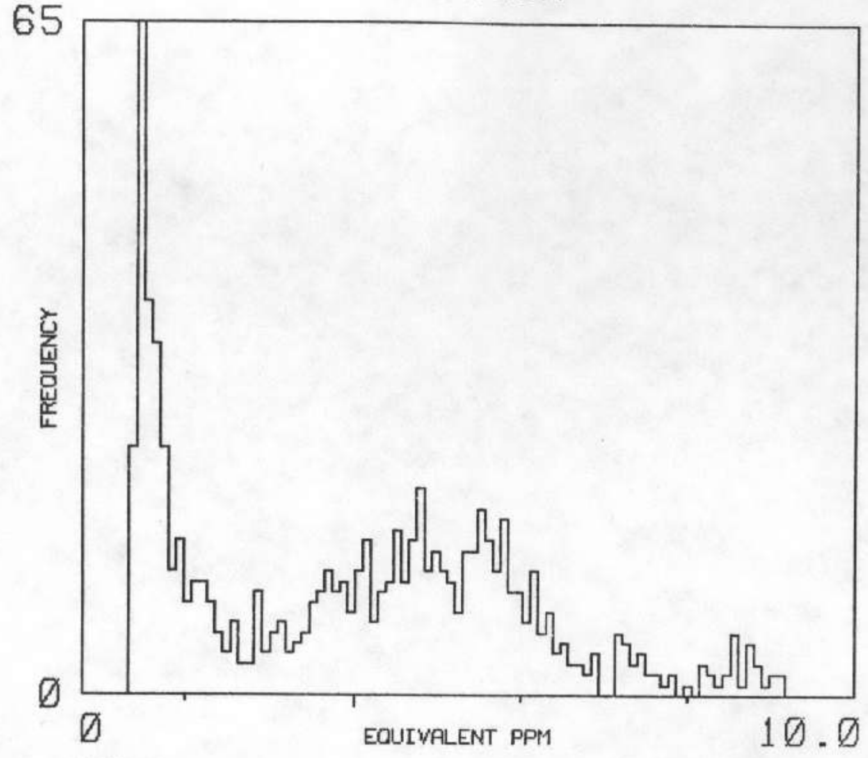


MEAN / MEDIAN 19.417 19.000 166 ADEQUATE SAMPLES

NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTWI TOTAL NUMBER OF SAMPLES 996

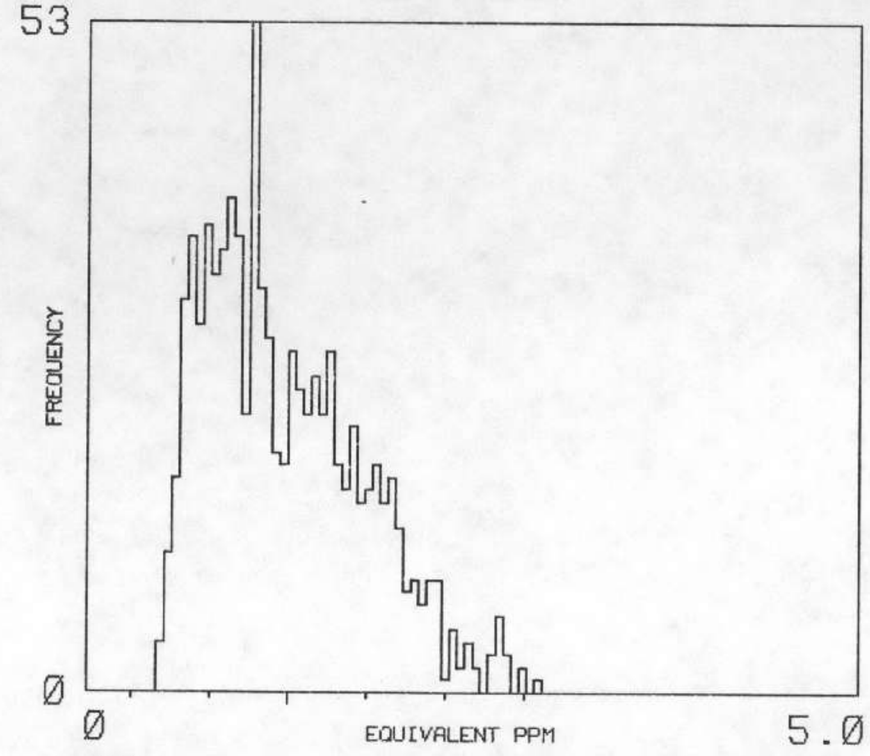
F5 vj

THORIUM



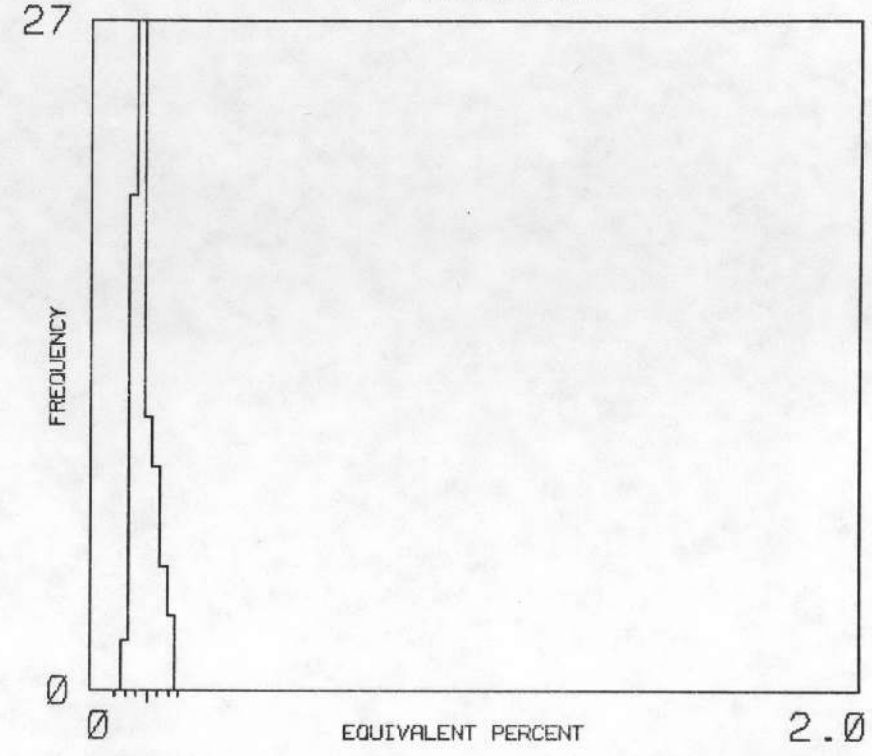
MEAN / MEDIAN 3.5 3.6 769 ADEQUATE SAMPLES

URANIUM



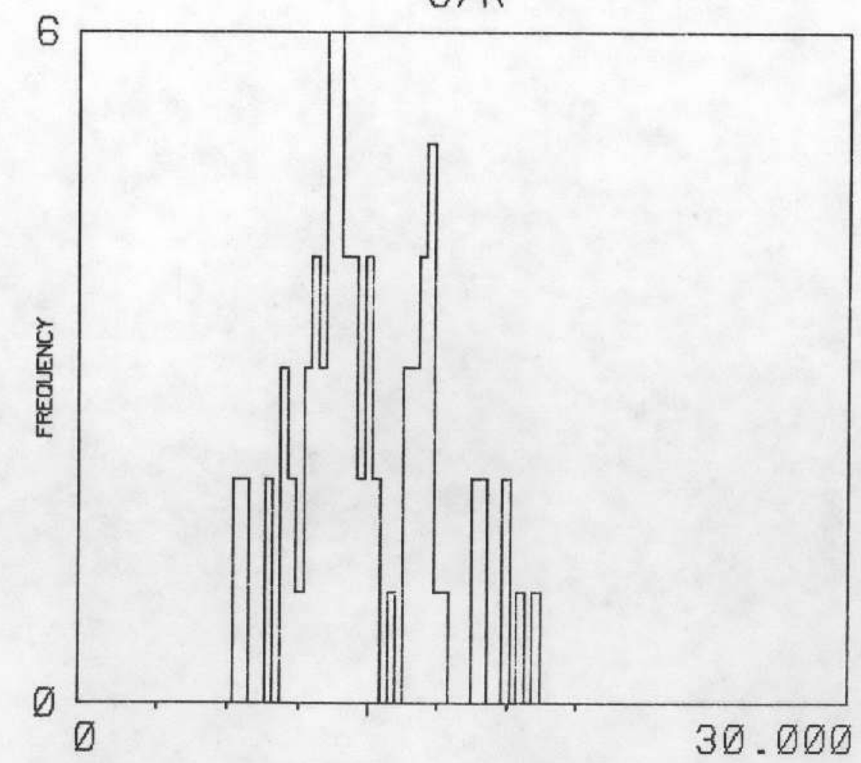
MEAN / MEDIAN 1.3 1.2 847 ADEQUATE SAMPLES

POTASSIUM



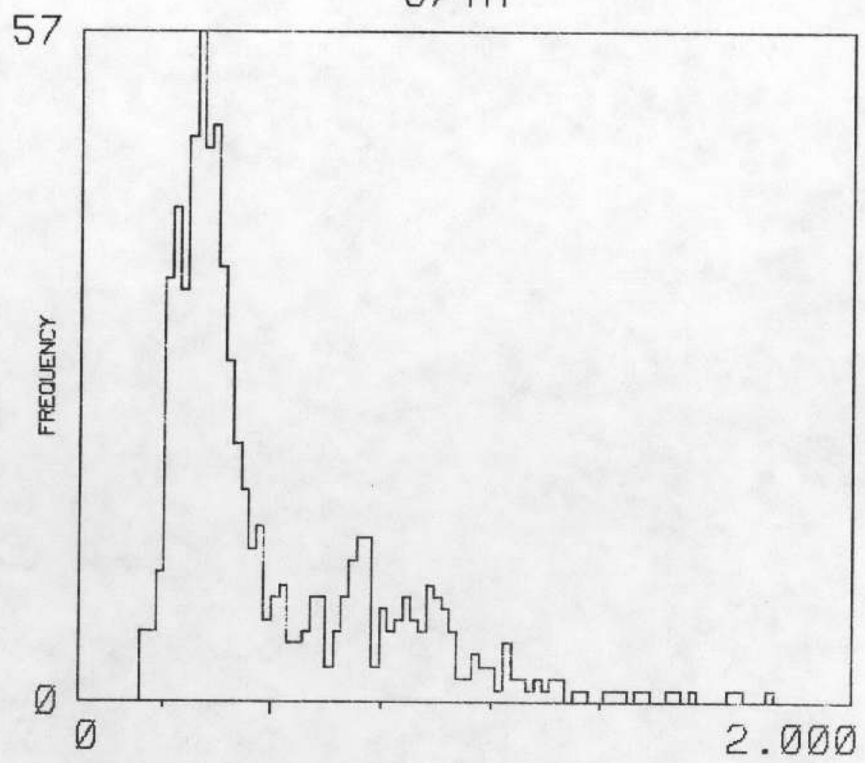
MEAN / MEDIAN 0.1 0.1 77 ADEQUATE SAMPLES

U/K



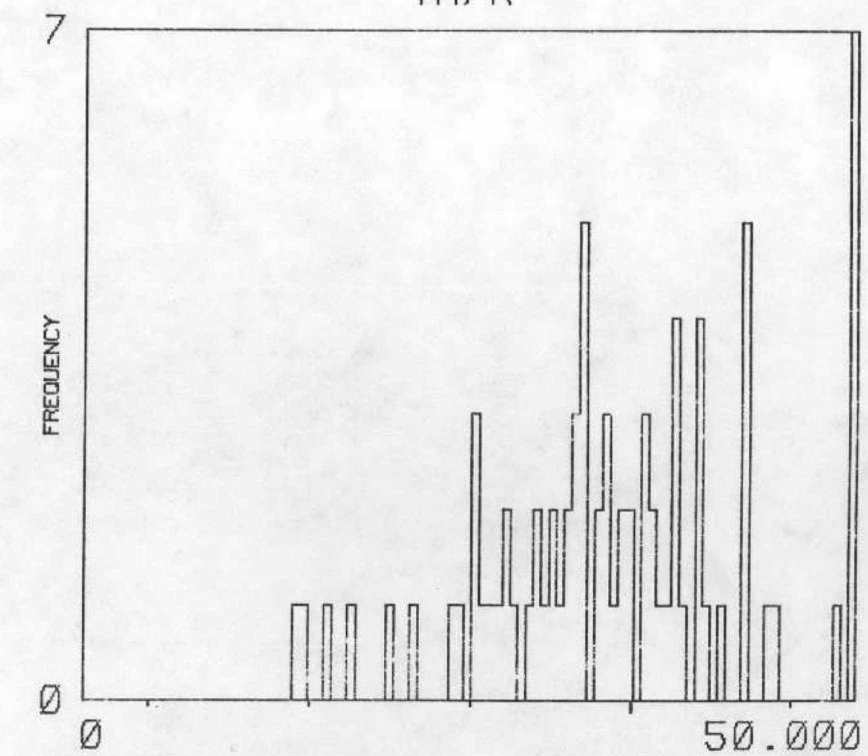
MEAN / MEDIAN 11.253 10.500 76 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN 0.502 0.380 713 ADEQUATE SAMPLES

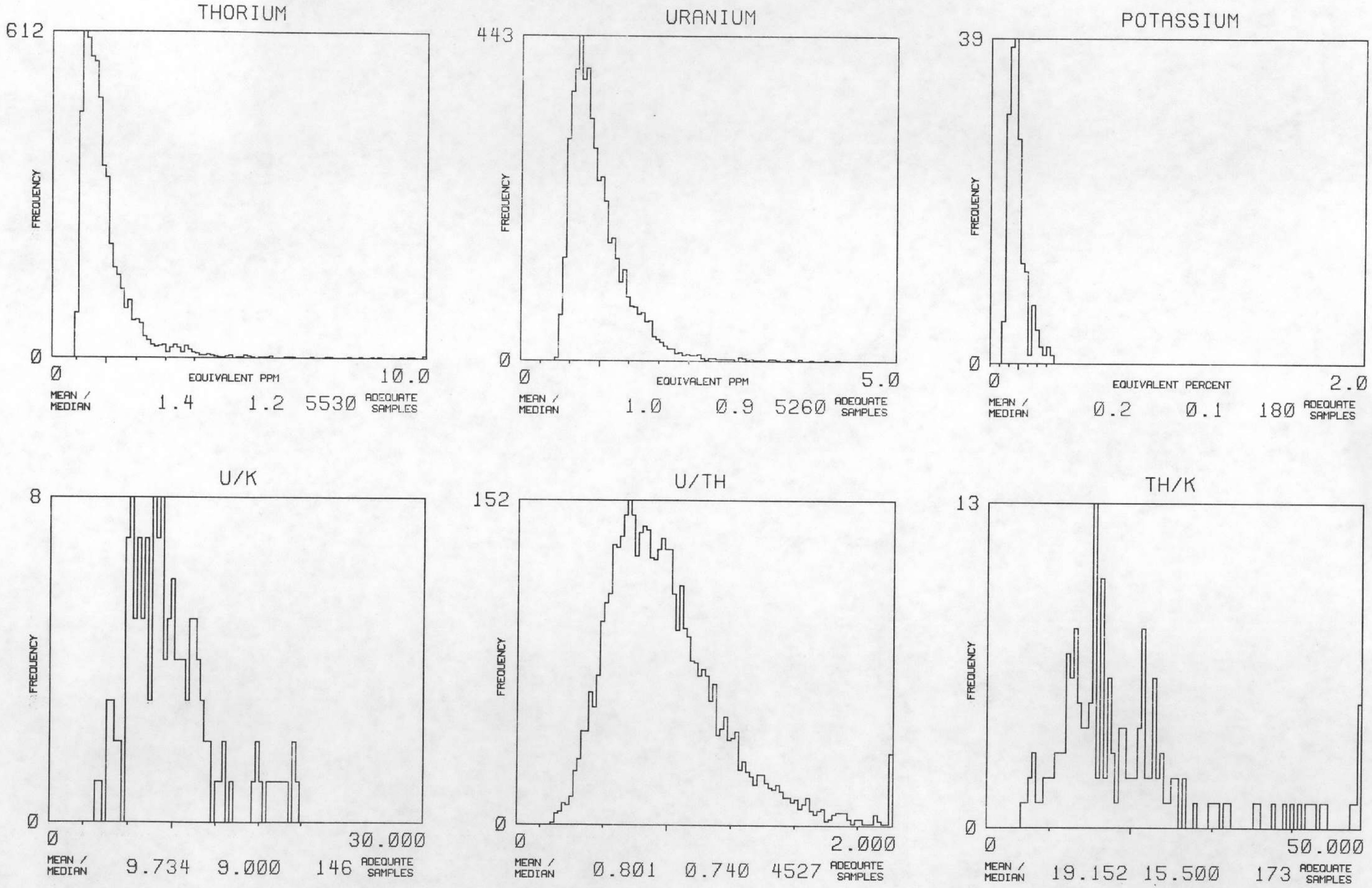
TH/K



MEAN / MEDIAN 35.348 34.000 77 ADEQUATE SAMPLES

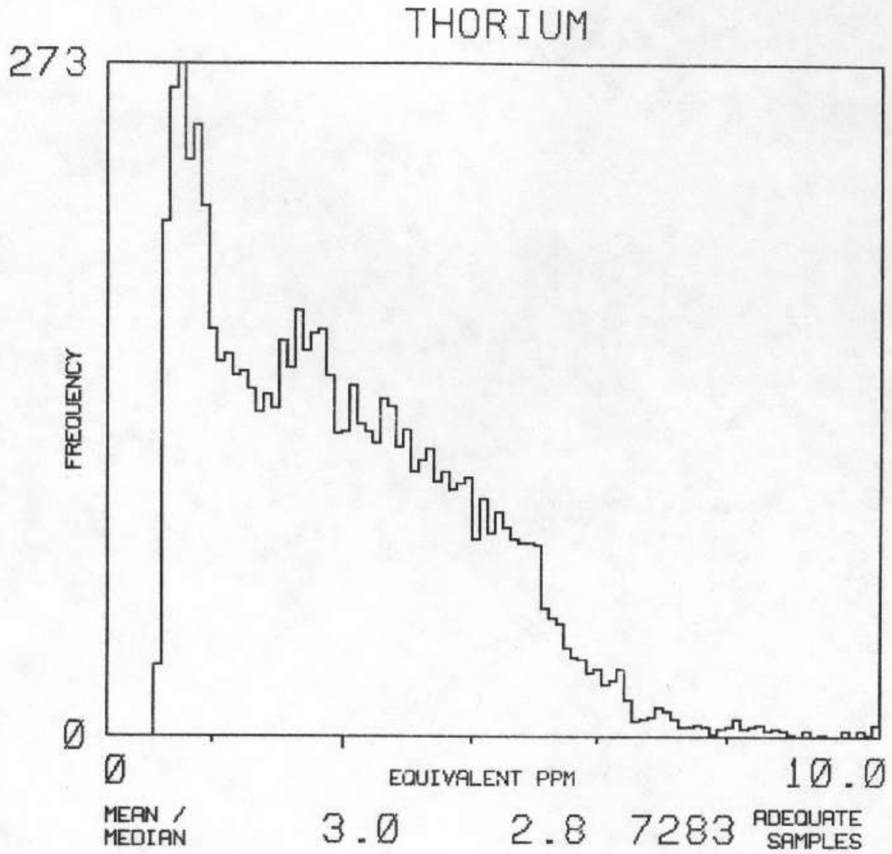
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPPS TOTAL NUMBER OF SAMPLES 6674

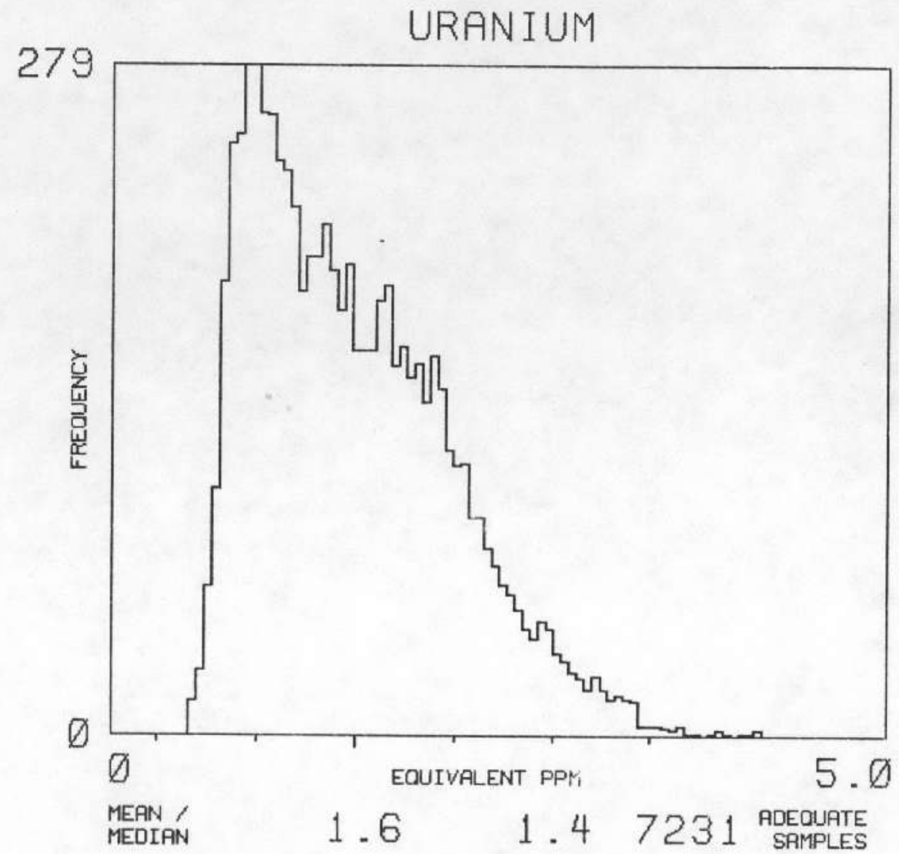
F6 vj

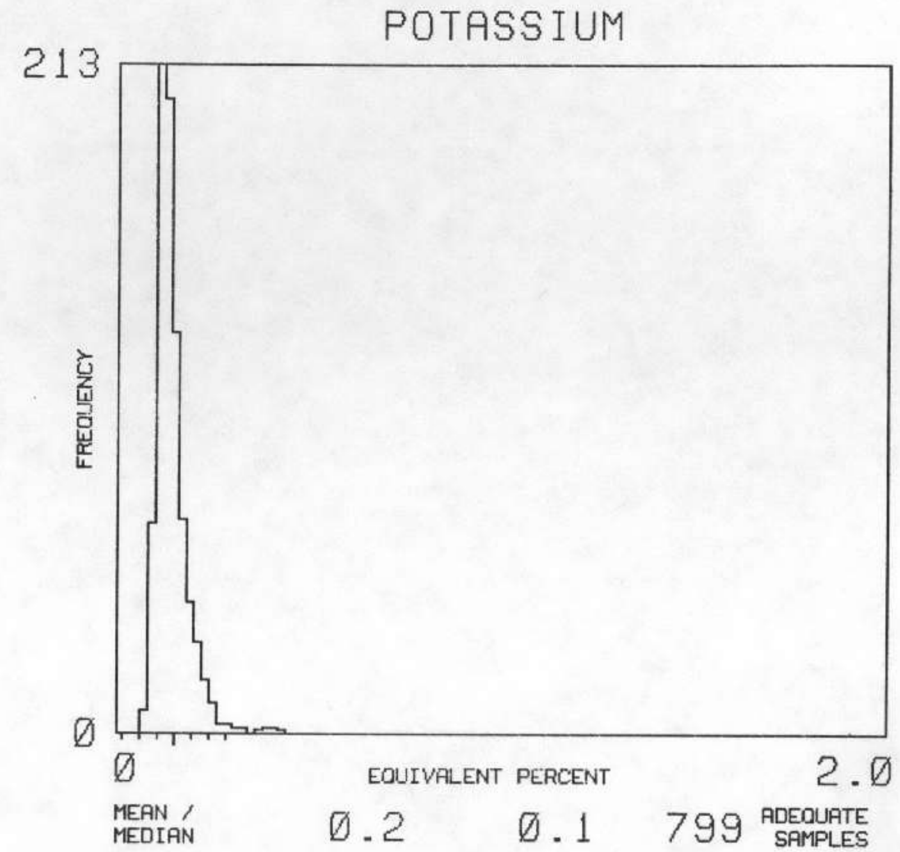


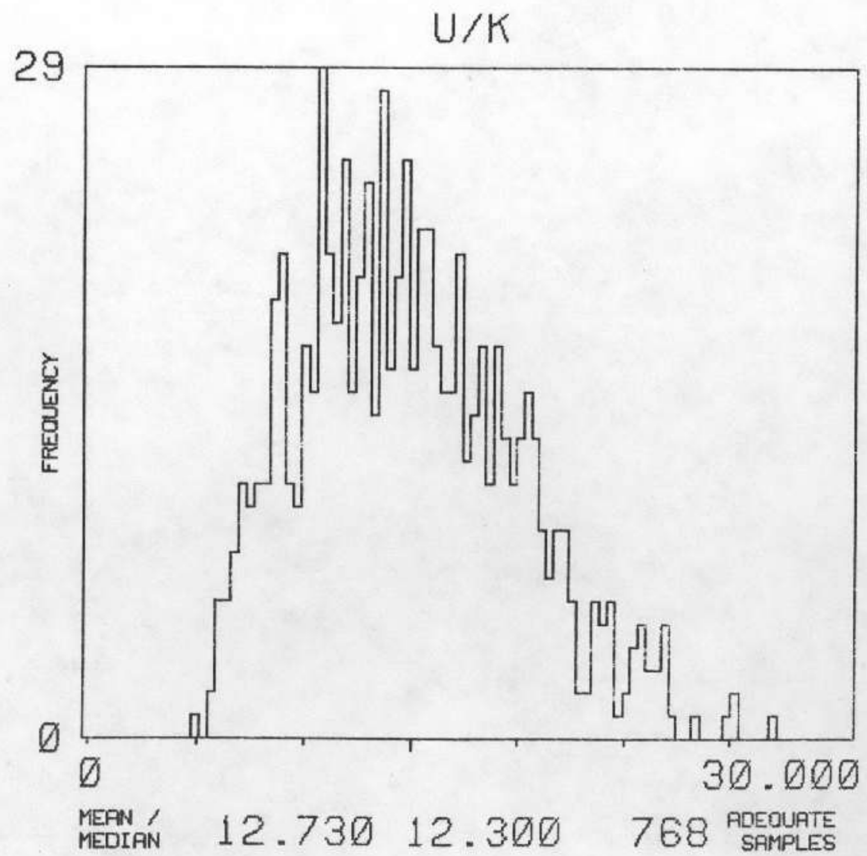
F7 vj

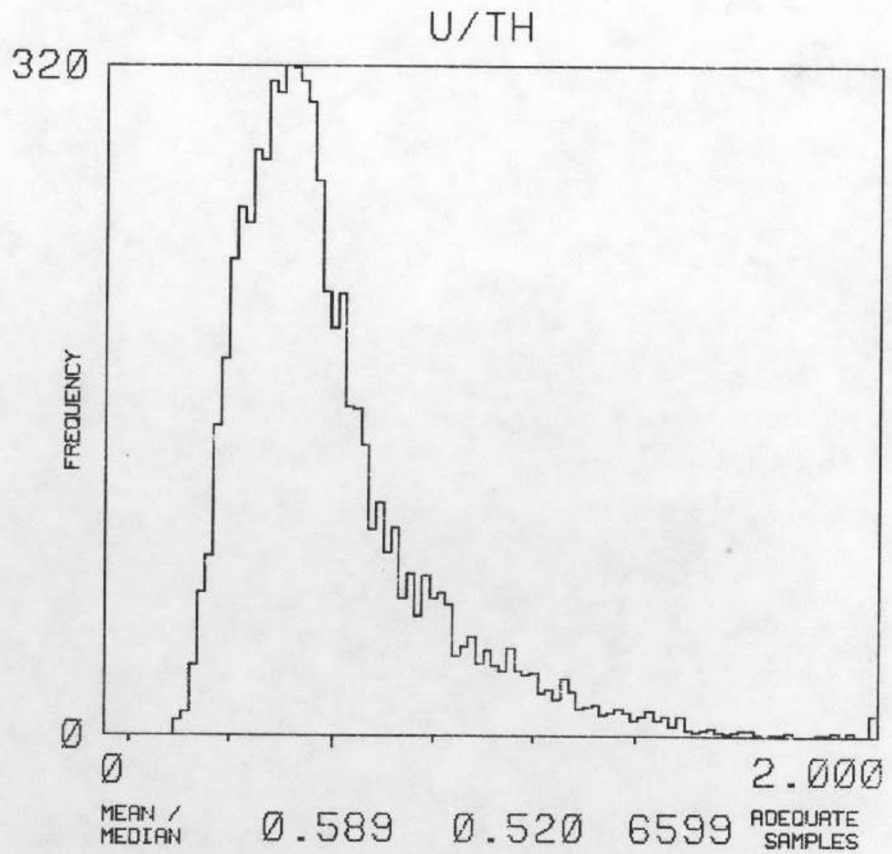
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : TMM TOTAL NUMBER OF SAMPLES 8366

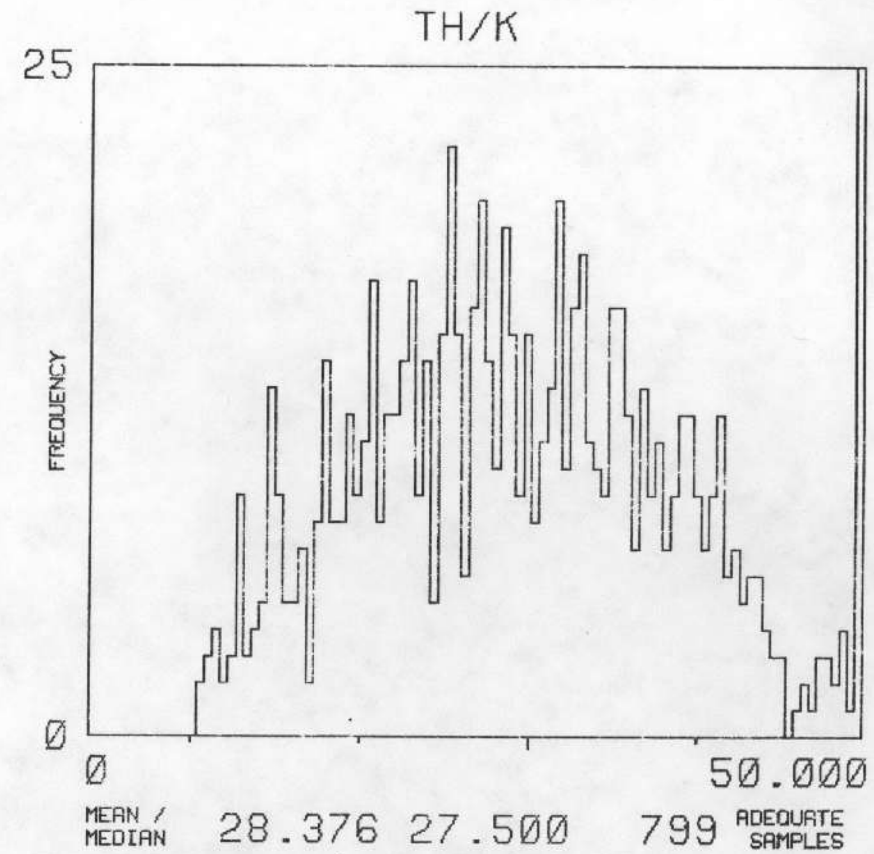






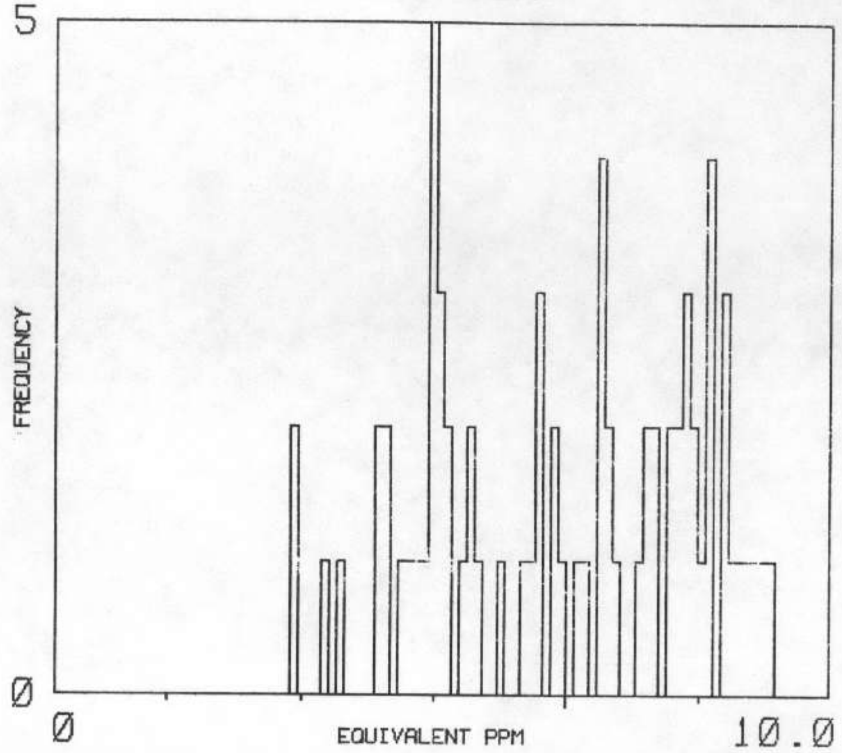






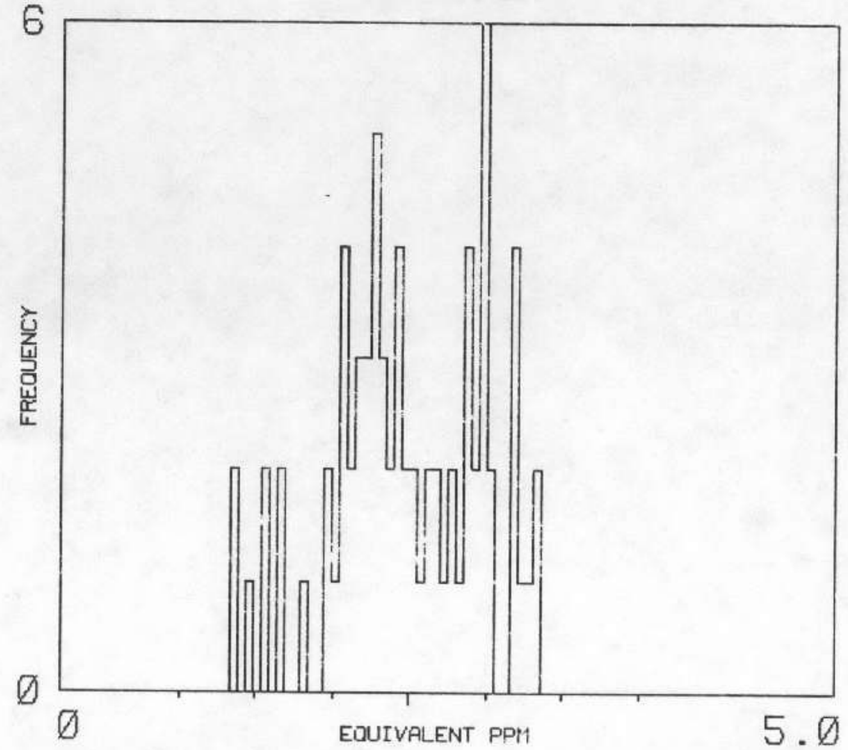
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : TPCD TOTAL NUMBER OF SAMPLES 72

THORIUM



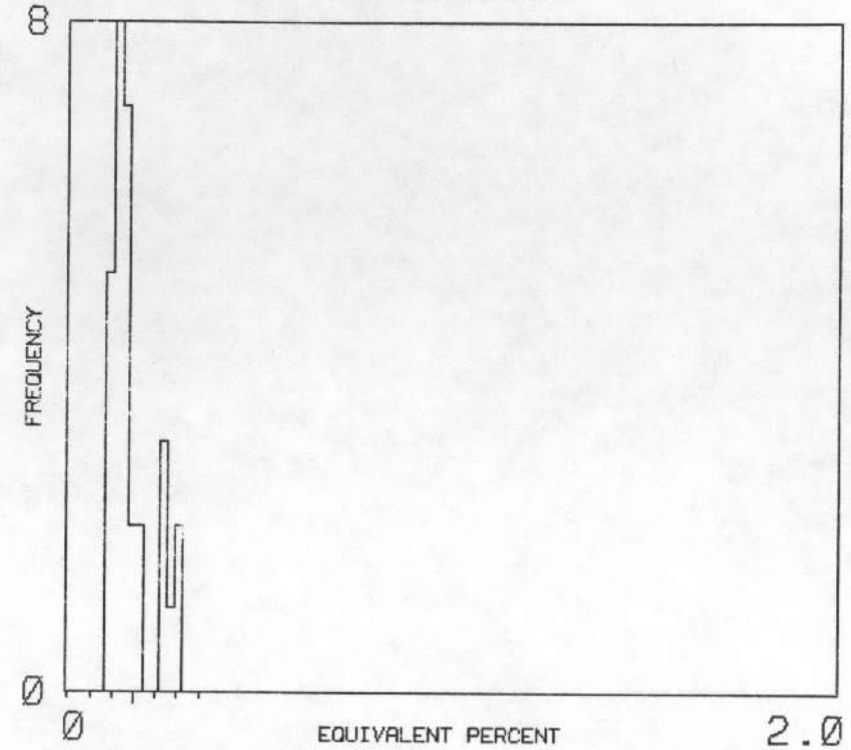
MEAN / MEDIAN 6.6 6.8 72 ADEQUATE SAMPLES

URANIUM



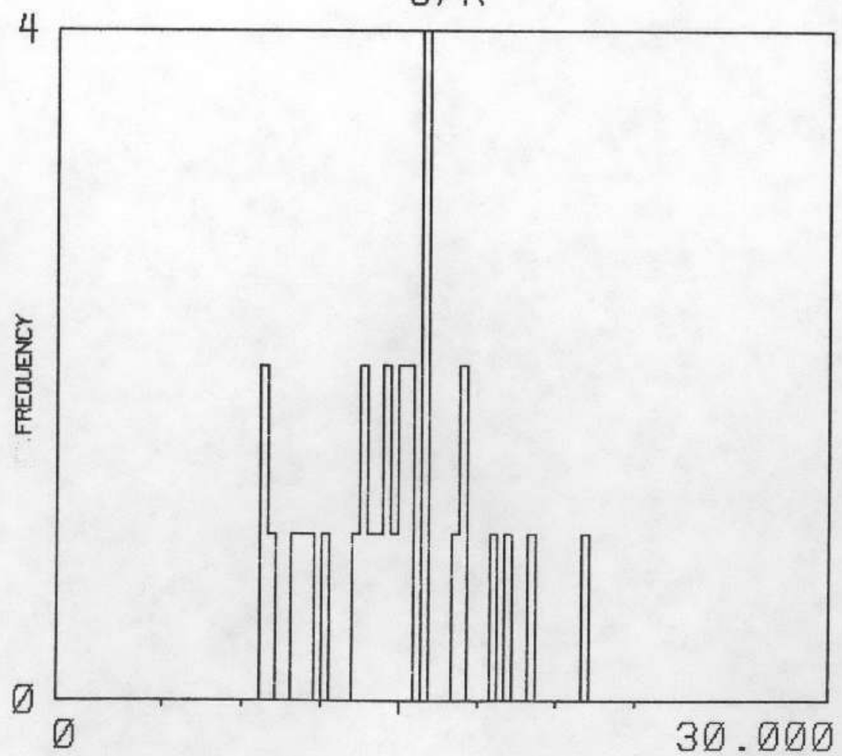
MEAN / MEDIAN 2.3 2.2 72 ADEQUATE SAMPLES

POTASSIUM



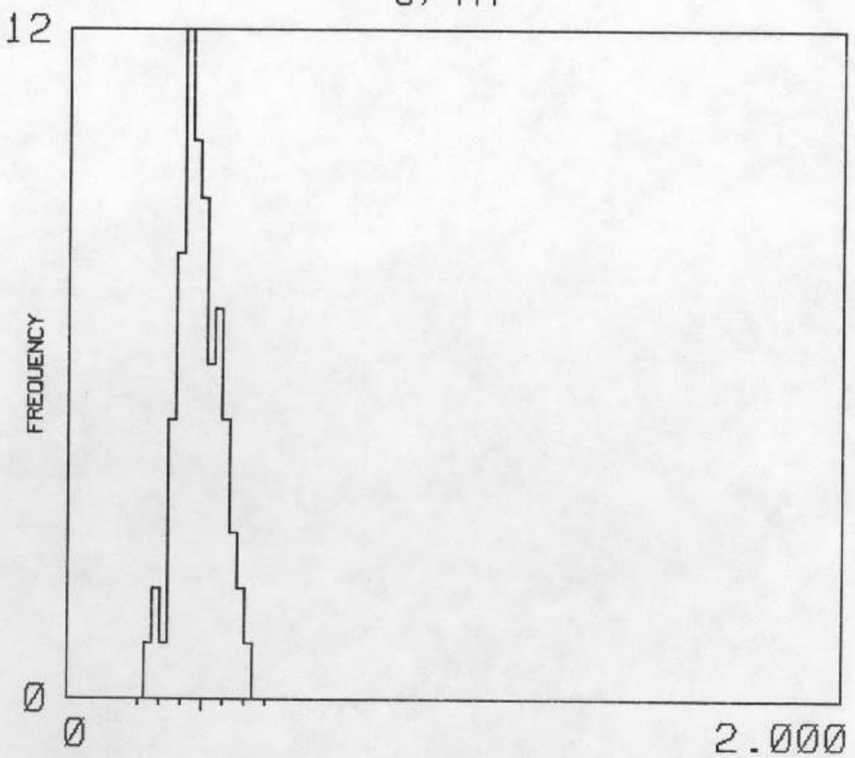
MEAN / MEDIAN Ø.2 Ø.2 3Ø ADEQUATE SAMPLES

U/K



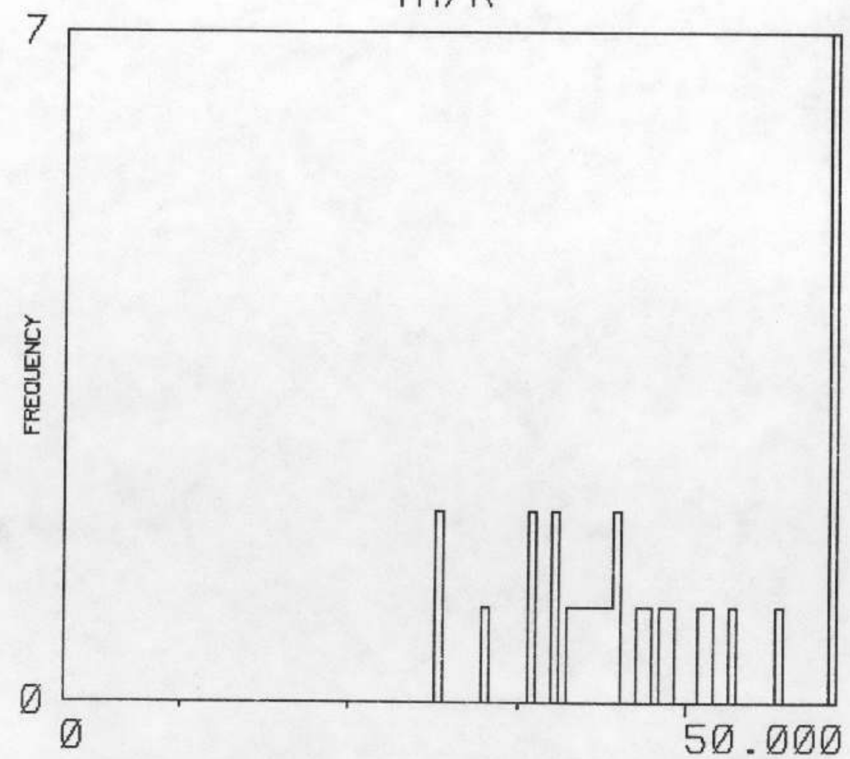
MEAN / MEDIAN 13.243 13.2ØØ 3Ø ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN Ø.349 Ø.34Ø 72 ADEQUATE SAMPLES

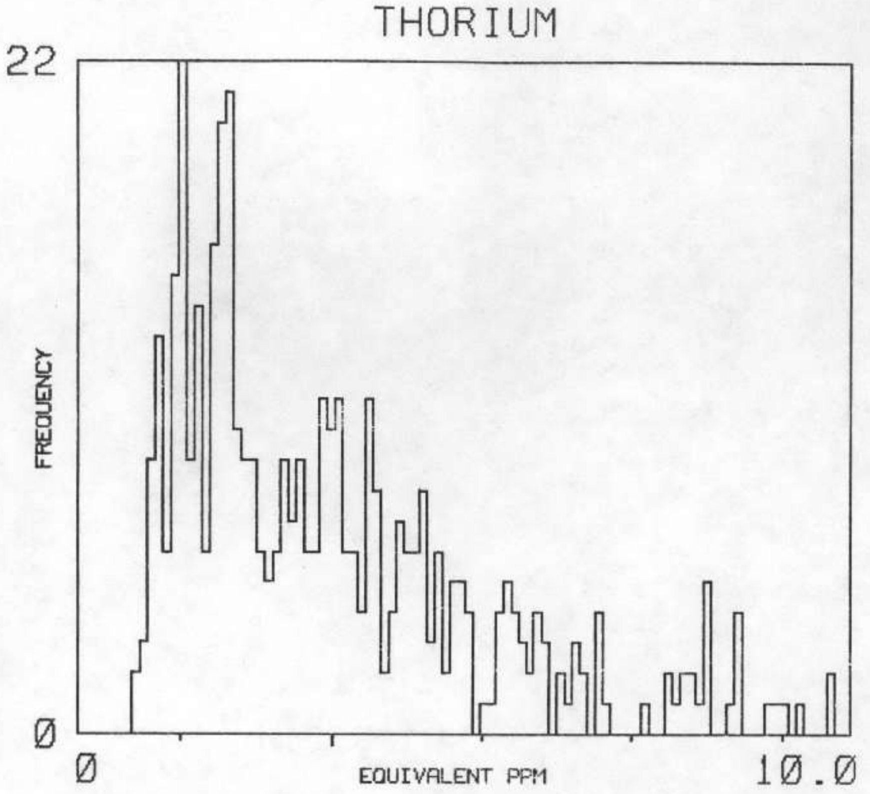
TH/K



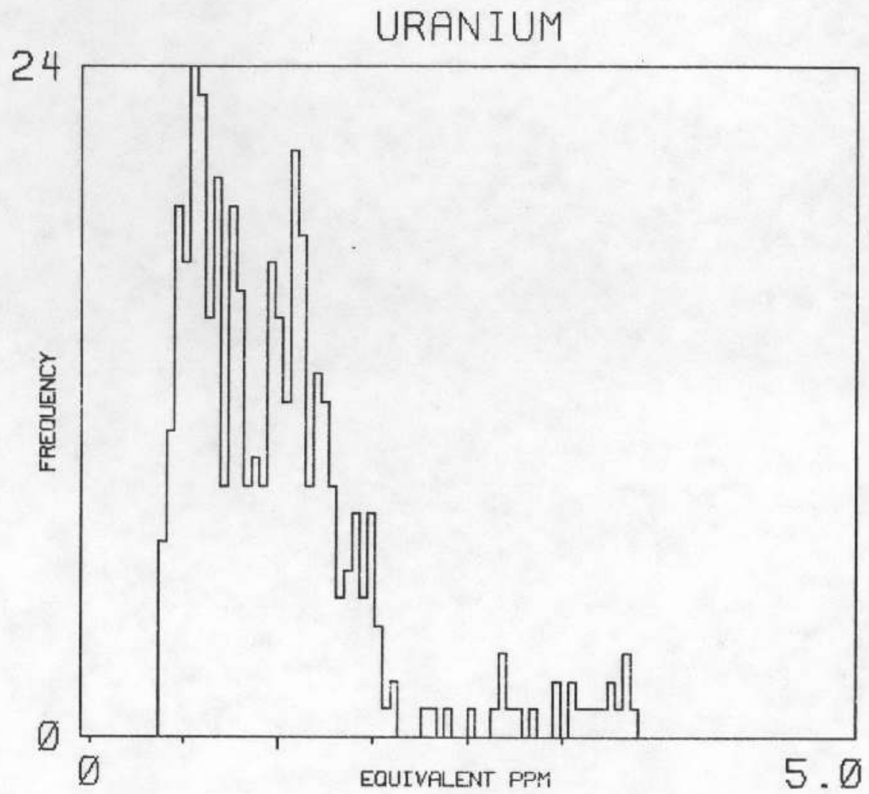
MEAN / MEDIAN 4Ø.25Ø 36.ØØØ 3Ø ADEQUATE SAMPLES

F9 vj

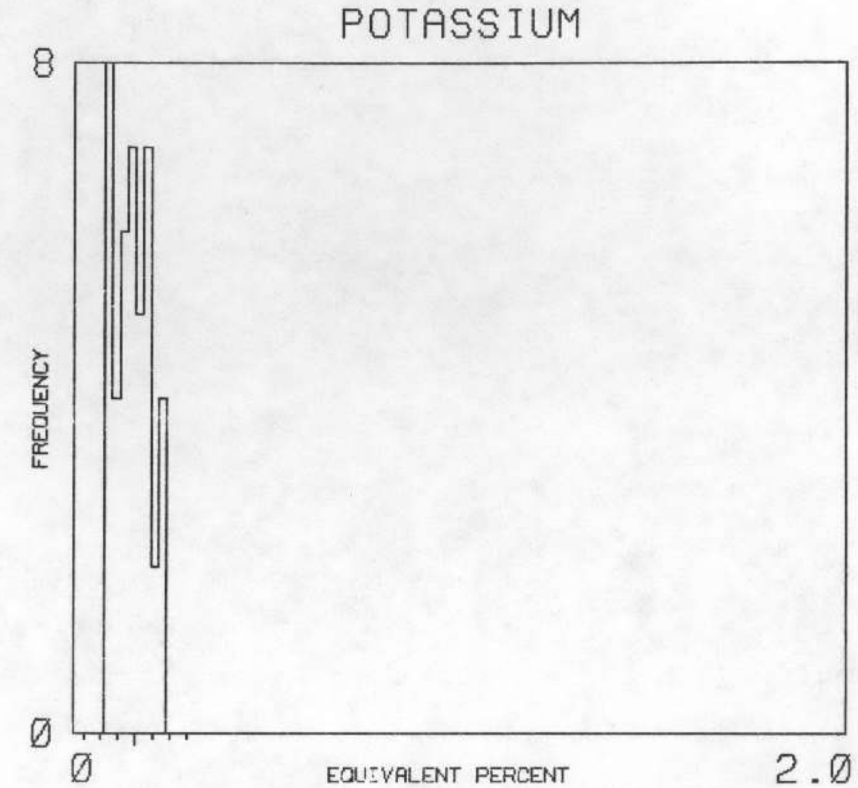
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : TMC TOTAL NUMBER OF SAMPLES 429



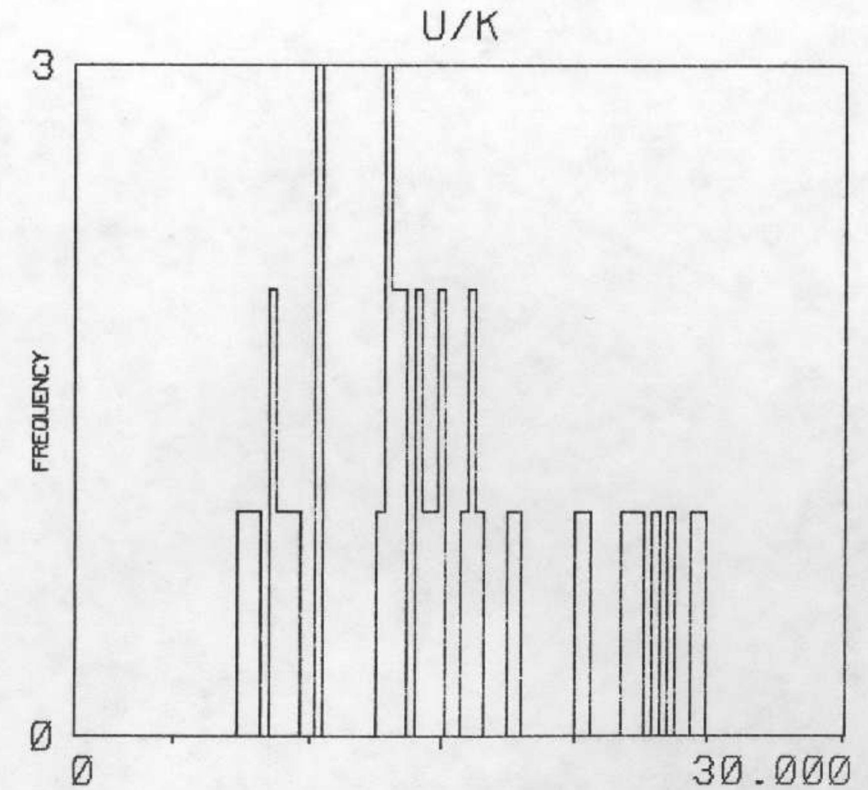
MEAN / MEDIAN 3.3 2.8 428 ADEQUATE SAMPLES



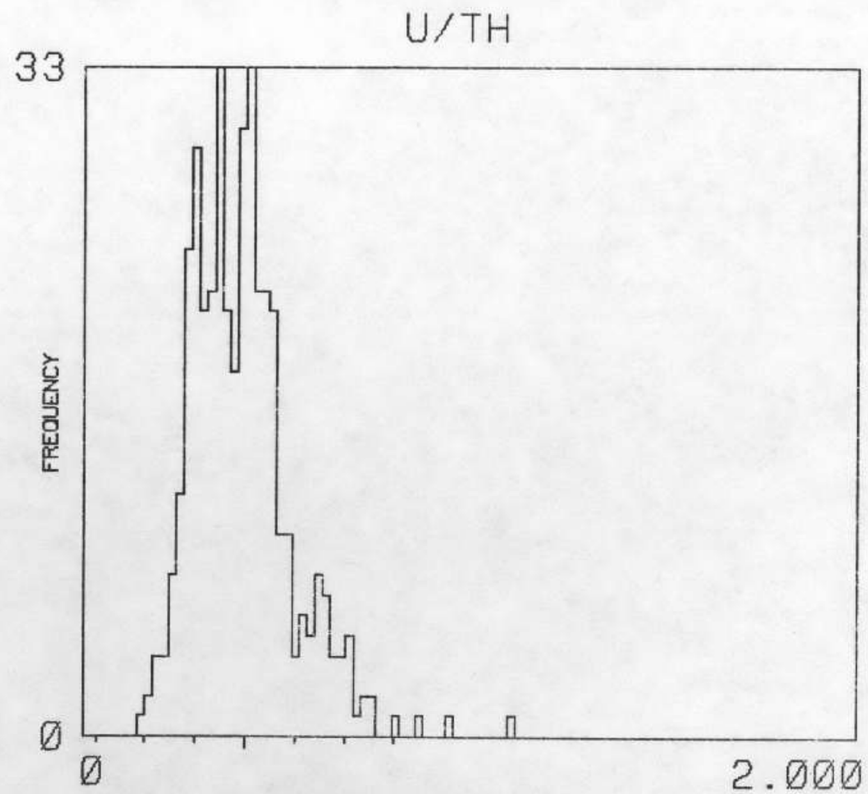
MEAN / MEDIAN 1.3 1.2 399 ADEQUATE SAMPLES



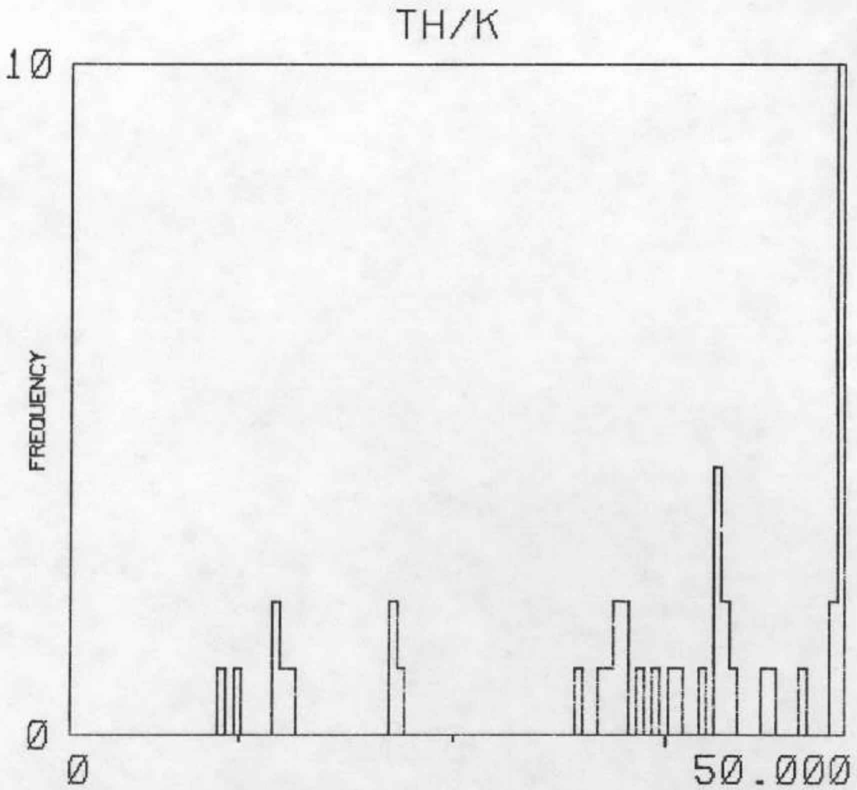
MEAN / MEDIAN 0.2 0.2 43 ADEQUATE SAMPLES



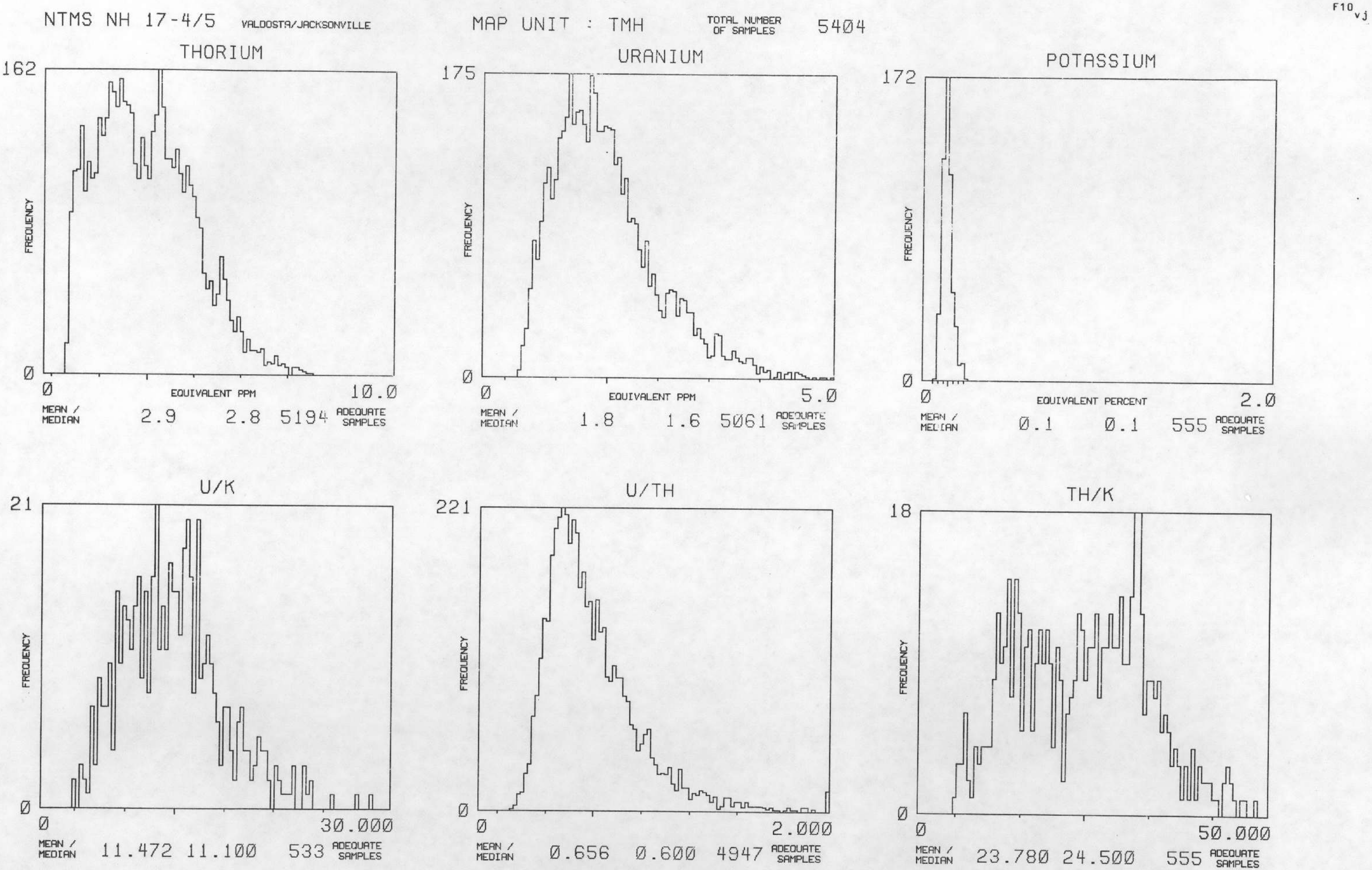
MEAN / MEDIAN 14.267 13.500 40 ADEQUATE SAMPLES



MEAN / MEDIAN 0.420 0.420 399 ADEQUATE SAMPLES

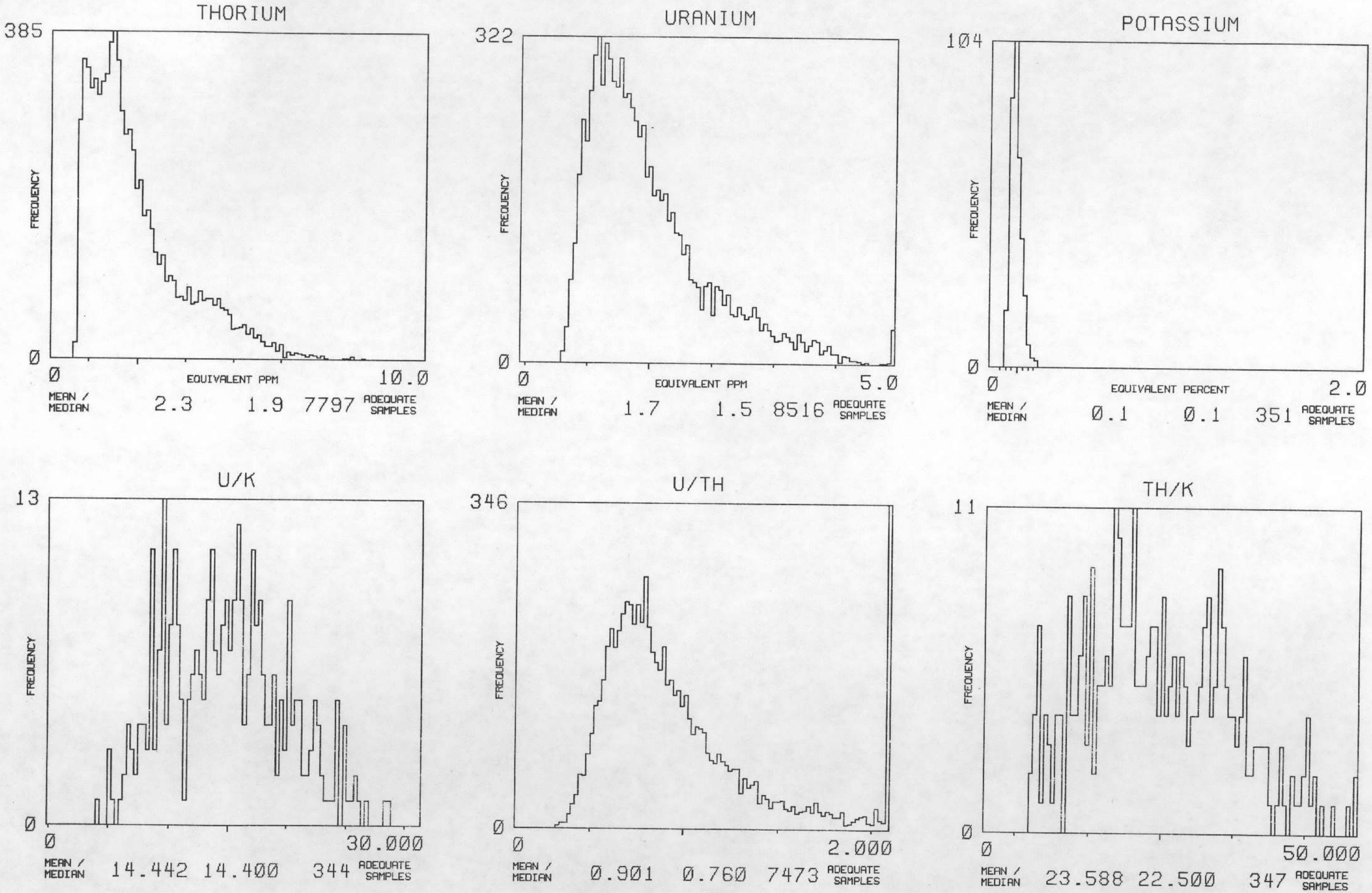


MEAN / MEDIAN 38.364 42.000 43 ADEQUATE SAMPLES


NTMS NH 17-4/5
VALDOSTA/JACKSONVILLE
MAP UNIT : TMH
TOTAL NUMBER OF SAMPLES 5404
F10 vj
THORIUM
162
FREQUENCY
0
EQUIVALENT PPM
10.0
MEAN / MEDIAN 2.9 2.8 5194 ADEQUATE SAMPLES
URANIUM
175
FREQUENCY
0
EQUIVALENT PPM
5.0
MEAN / MEDIAN 1.8 1.6 5061 ADEQUATE SAMPLES
POTASSIUM
172
FREQUENCY
0
EQUIVALENT PERCENT
2.0
MEAN / MEDIAN 0.1 0.1 555 ADEQUATE SAMPLES
U/K
21
FREQUENCY
0
30.000
MEAN / MEDIAN 11.472 11.100 533 ADEQUATE SAMPLES
U/TH
221
FREQUENCY
0
2.000
MEAN / MEDIAN 0.656 0.600 4947 ADEQUATE SAMPLES
TH/K
18
FREQUENCY
0
50.000
MEAN / MEDIAN 23.780 24.500 555 ADEQUATE SAMPLES

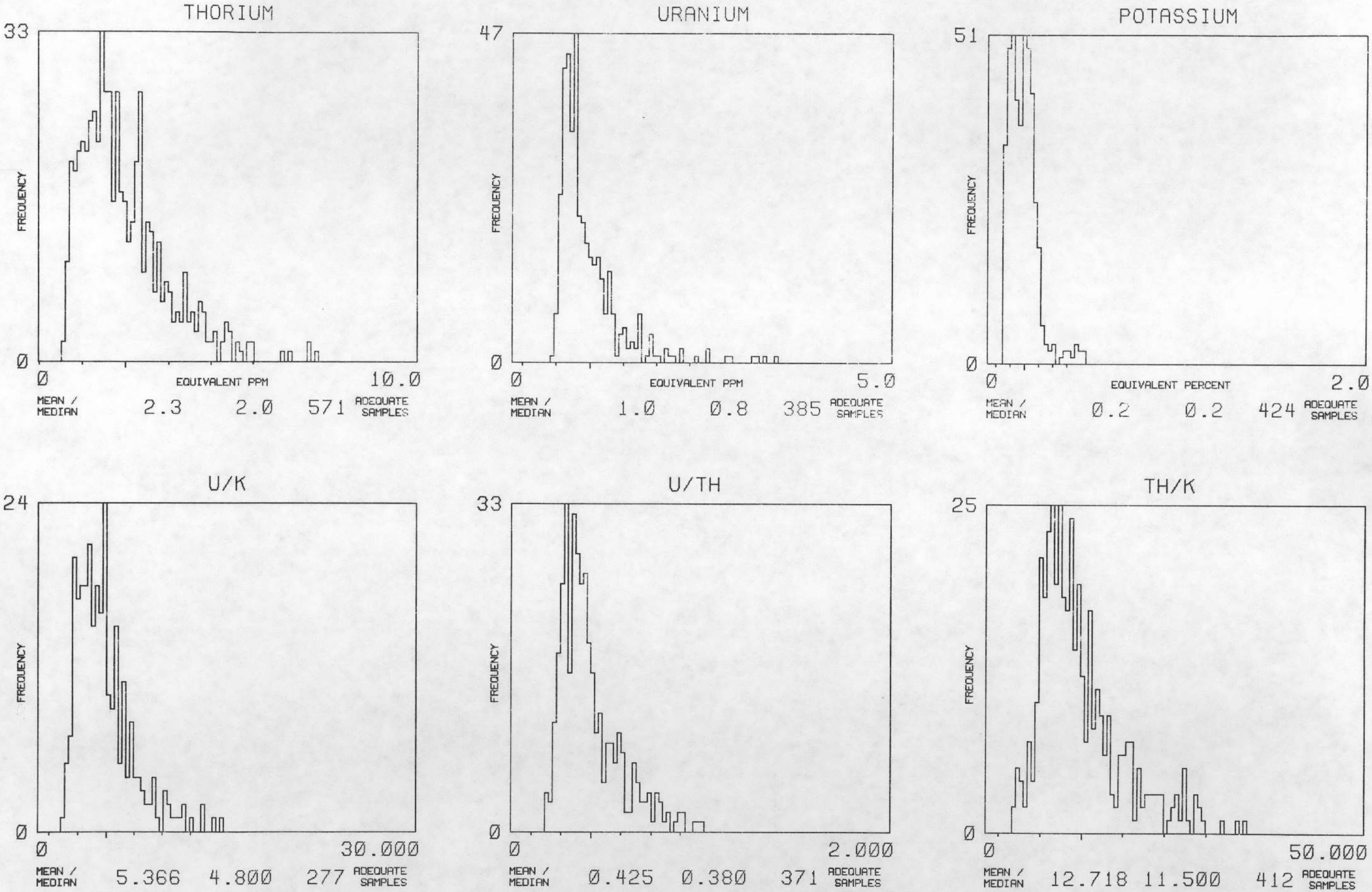
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : TOS TOTAL NUMBER OF SAMPLES 9108

F11 vj



F12 vj

NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QHM TOTAL NUMBER OF SAMPLES 652

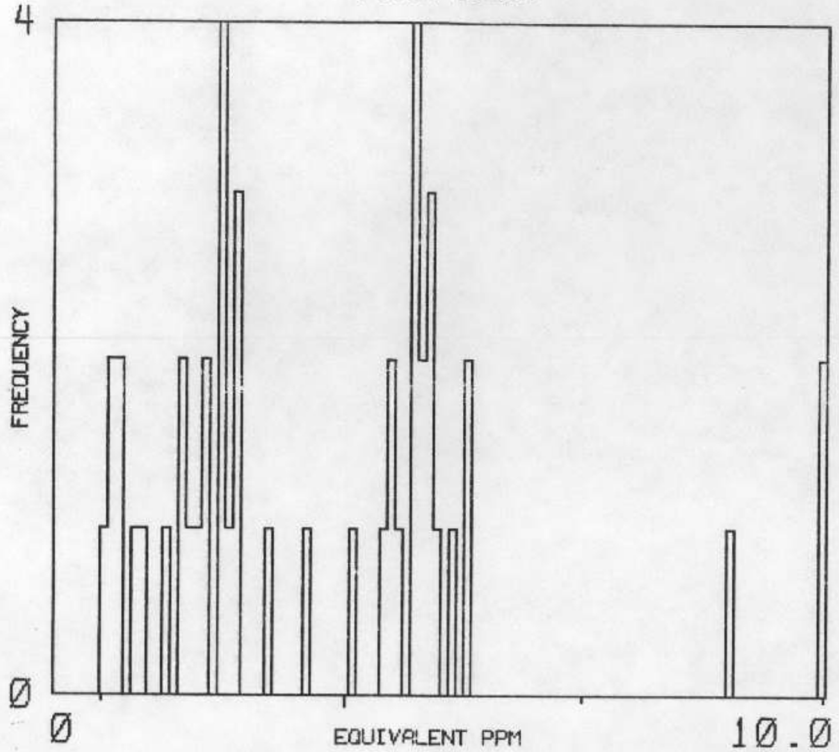


NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE

MAP UNIT : QHI

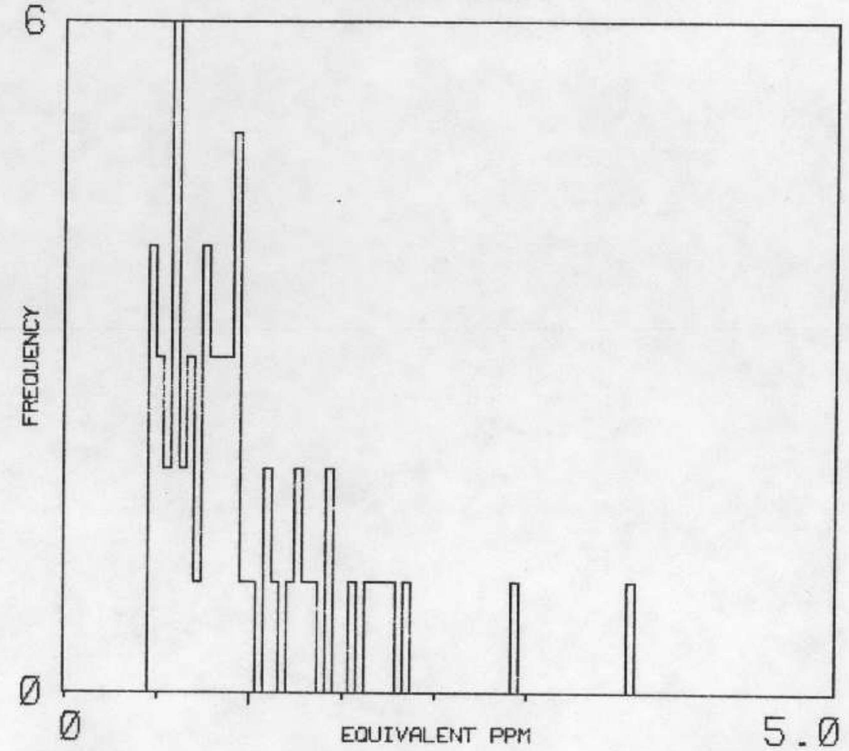
TOTAL NUMBER OF SAMPLES 65

THORIUM



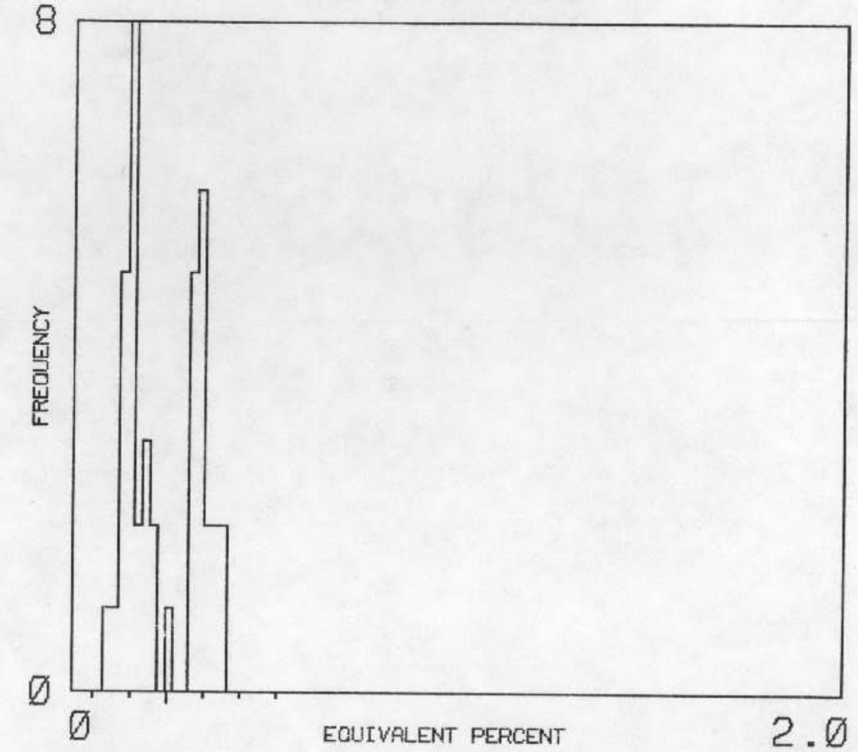
MEAN / MEDIAN 3.7 2.8 45 ADEQUATE SAMPLES

URANIUM



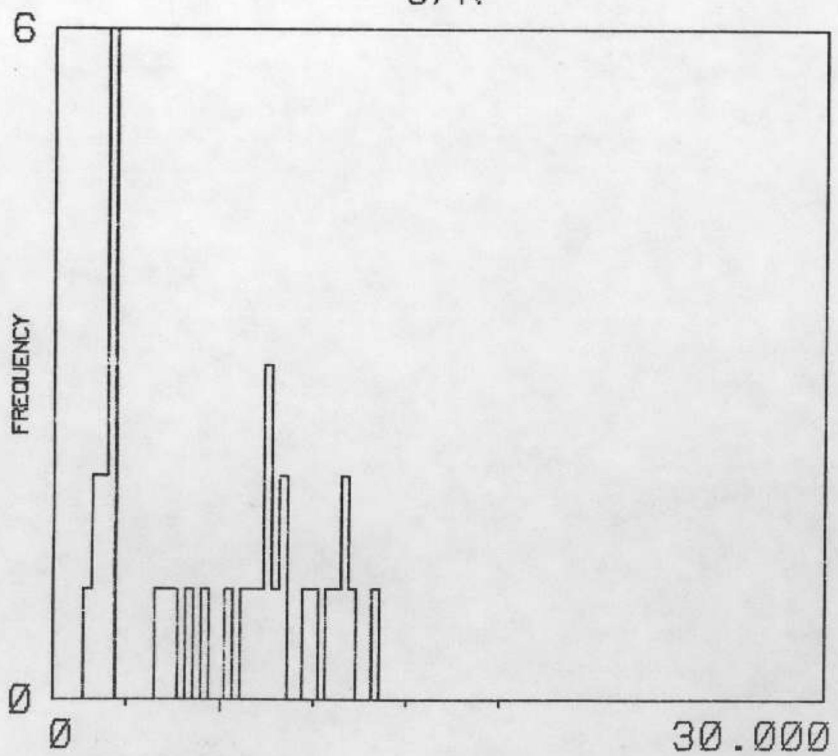
MEAN / MEDIAN 1.2 1.Ø 59 ADEQUATE SAMPLES

POTASSIUM



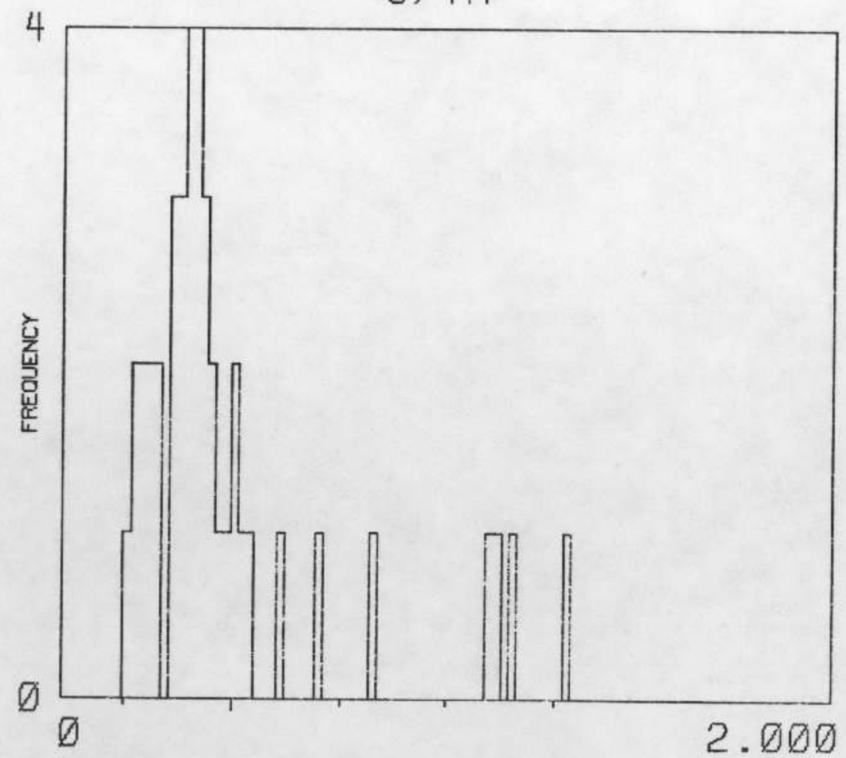
MEAN / MEDIAN Ø.2 Ø.2 4Ø ADEQUATE SAMPLES

U/K



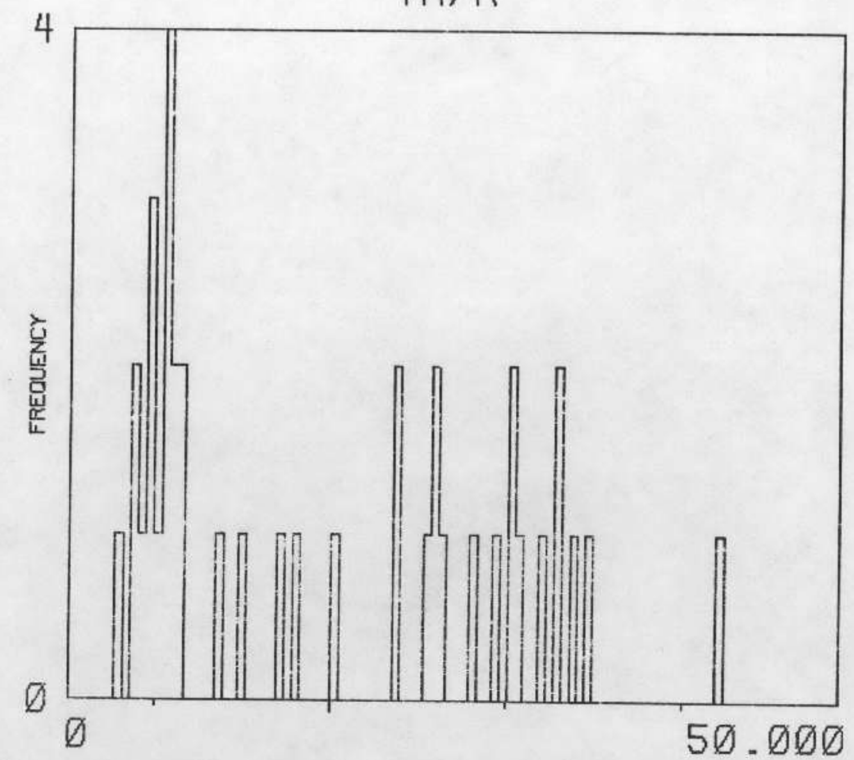
MEAN / MEDIAN 6.468 6.9ØØ 34 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN Ø.445 Ø.36Ø 41 ADEQUATE SAMPLES

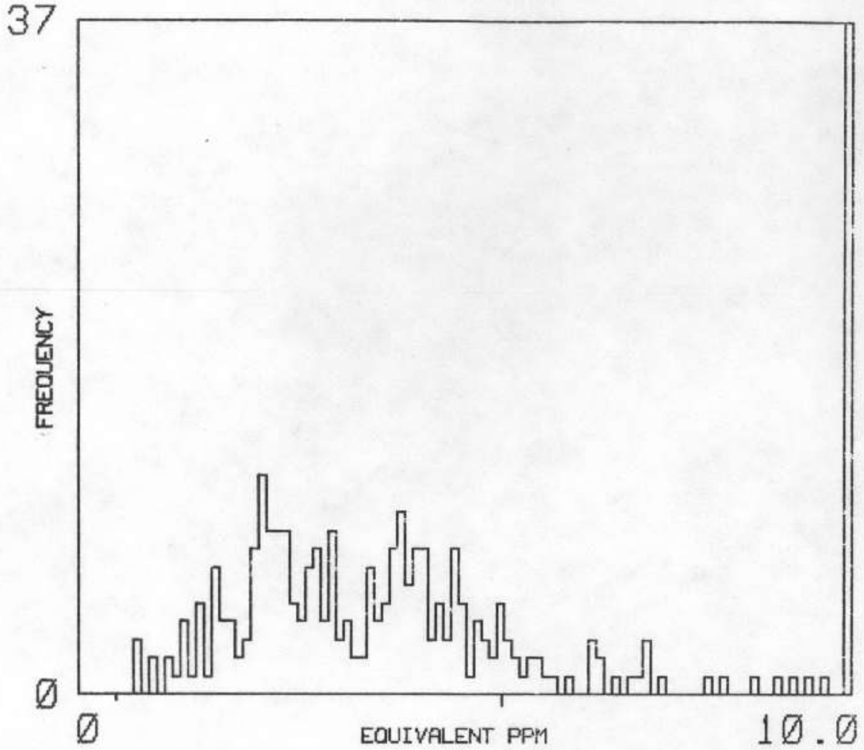
TH/K



MEAN / MEDIAN 17.Ø42 14.ØØØ 38 ADEQUATE SAMPLES

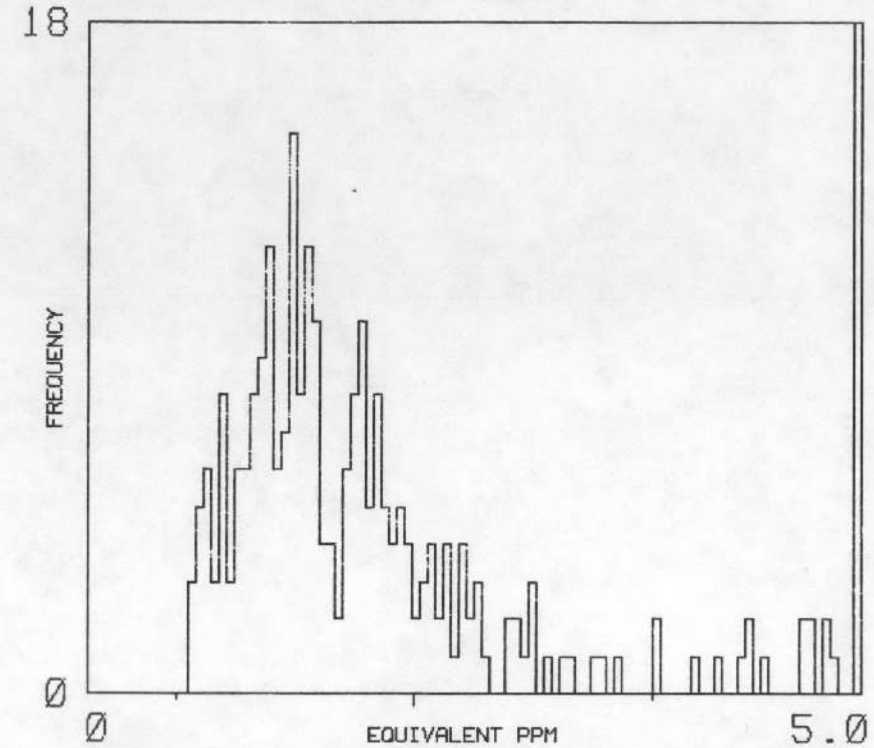
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTSB TOTAL NUMBER OF SAMPLES 310

THORIUM



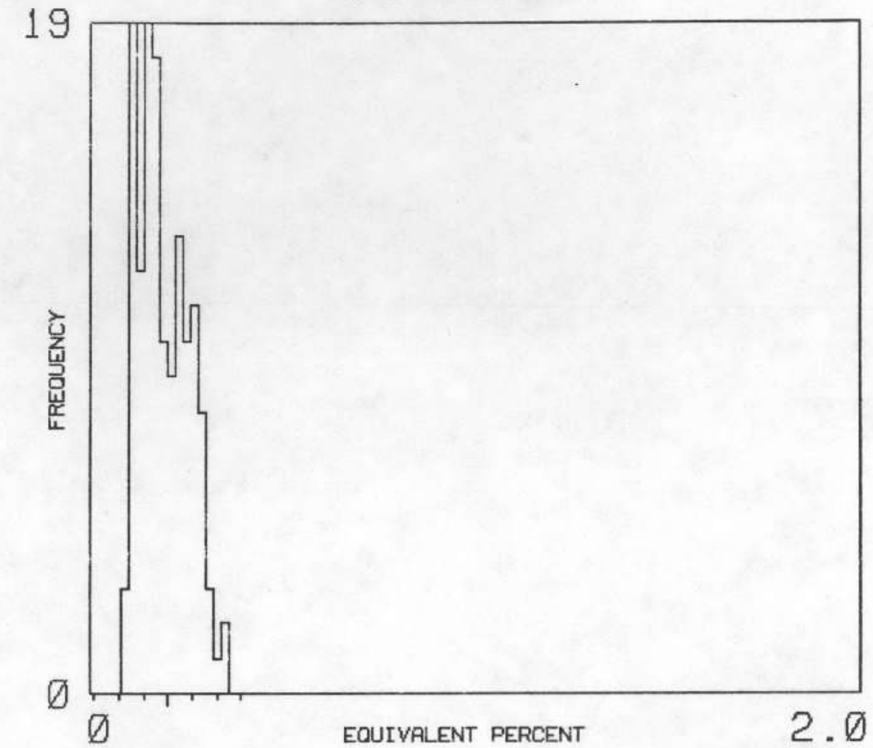
MEAN / MEDIAN 5.5 4.0 298 ADEQUATE SAMPLES

URANIUM



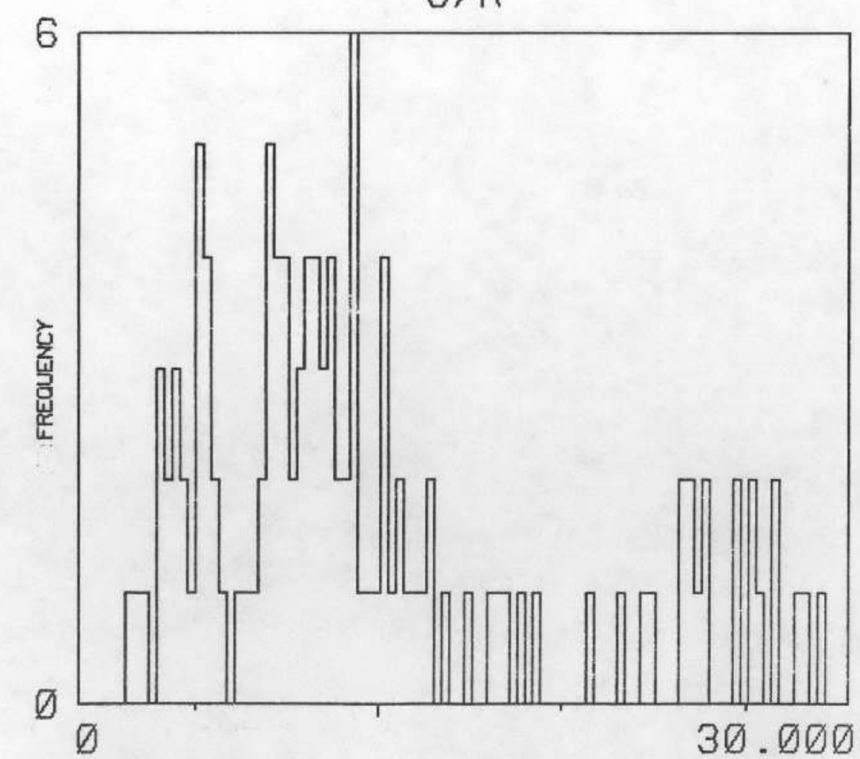
MEAN / MEDIAN 2.1 1.6 265 ADEQUATE SAMPLES

POTASSIUM



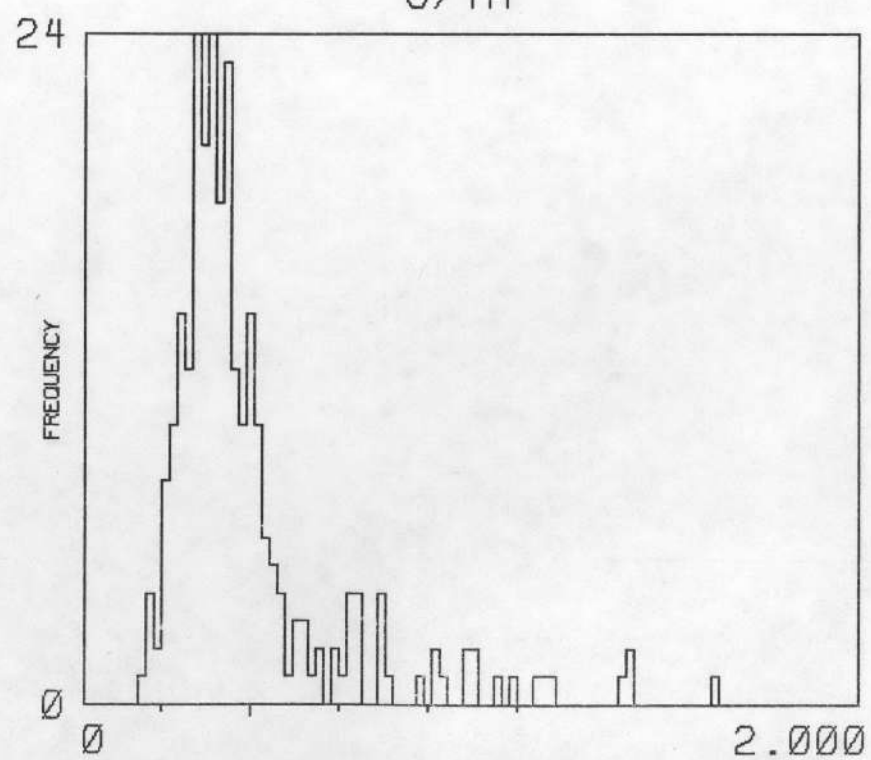
MEAN / MEDIAN 0.2 0.2 138 ADEQUATE SAMPLES

U/K



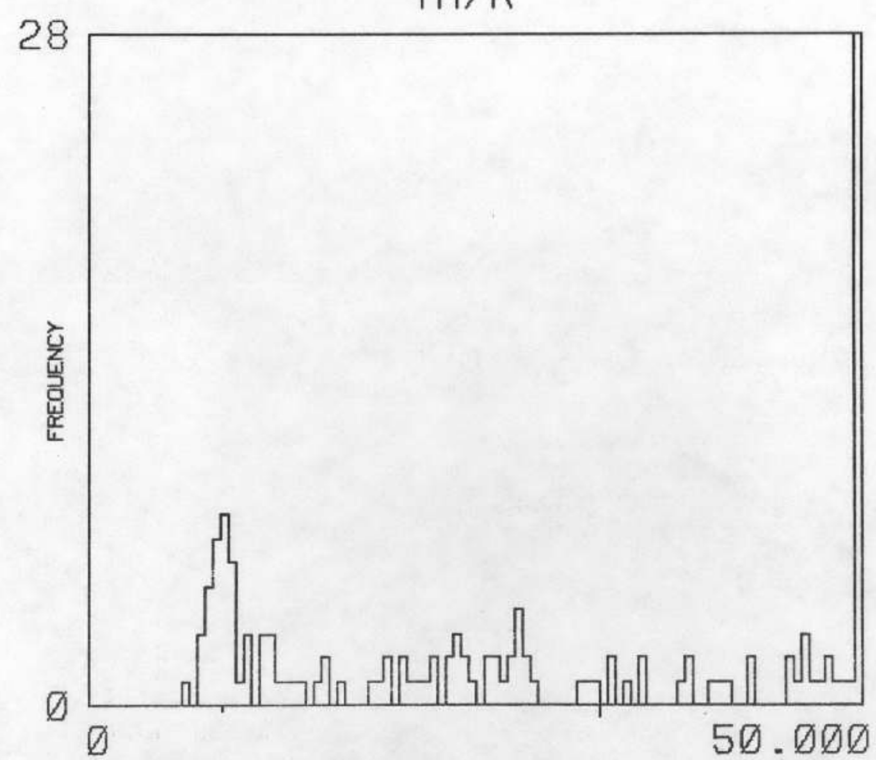
MEAN / MEDIAN 11.662 9.600 117 ADEQUATE SAMPLES

U/TH



MEAN / MEDIAN 0.429 0.360 264 ADEQUATE SAMPLES

TH/K

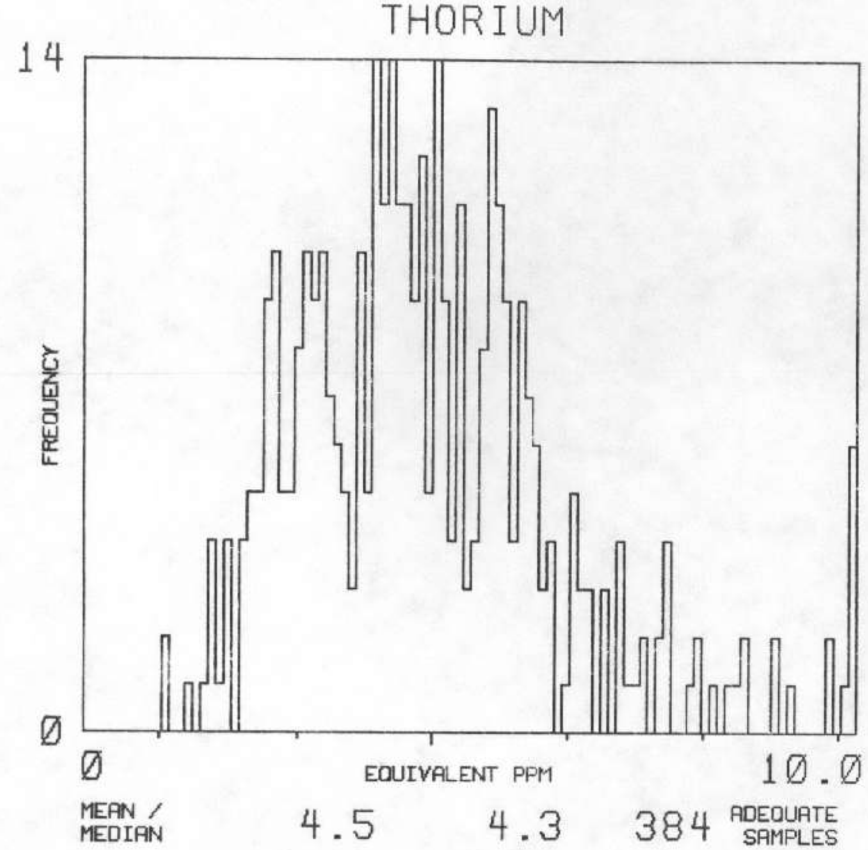


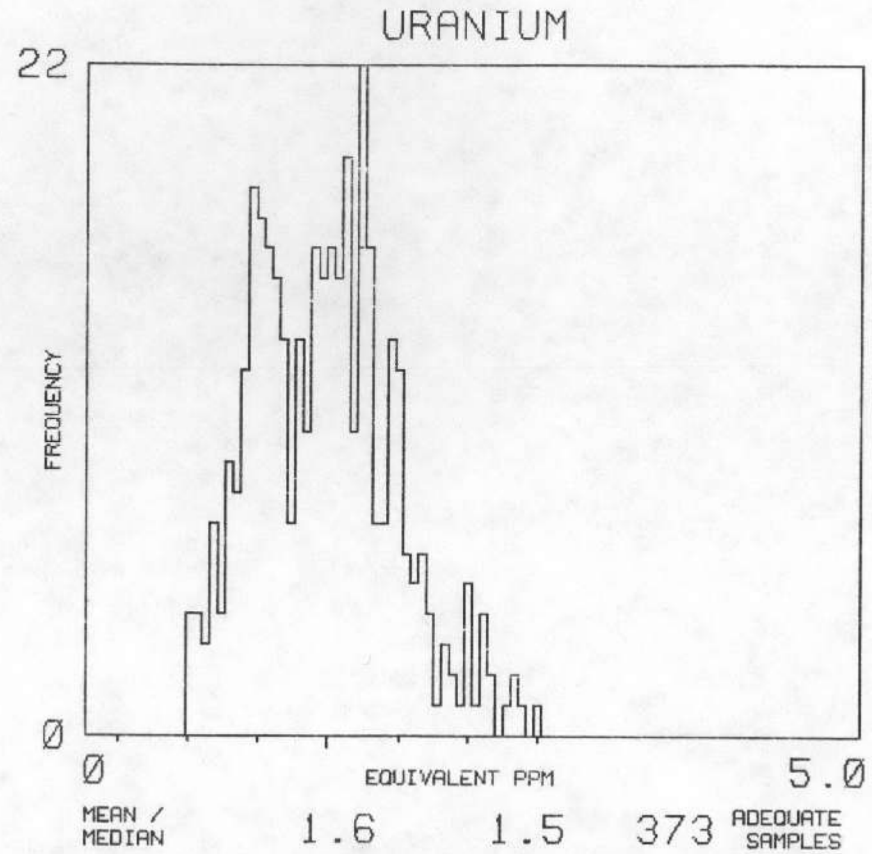
MEAN / MEDIAN 33.056 26.000 138 ADEQUATE SAMPLES

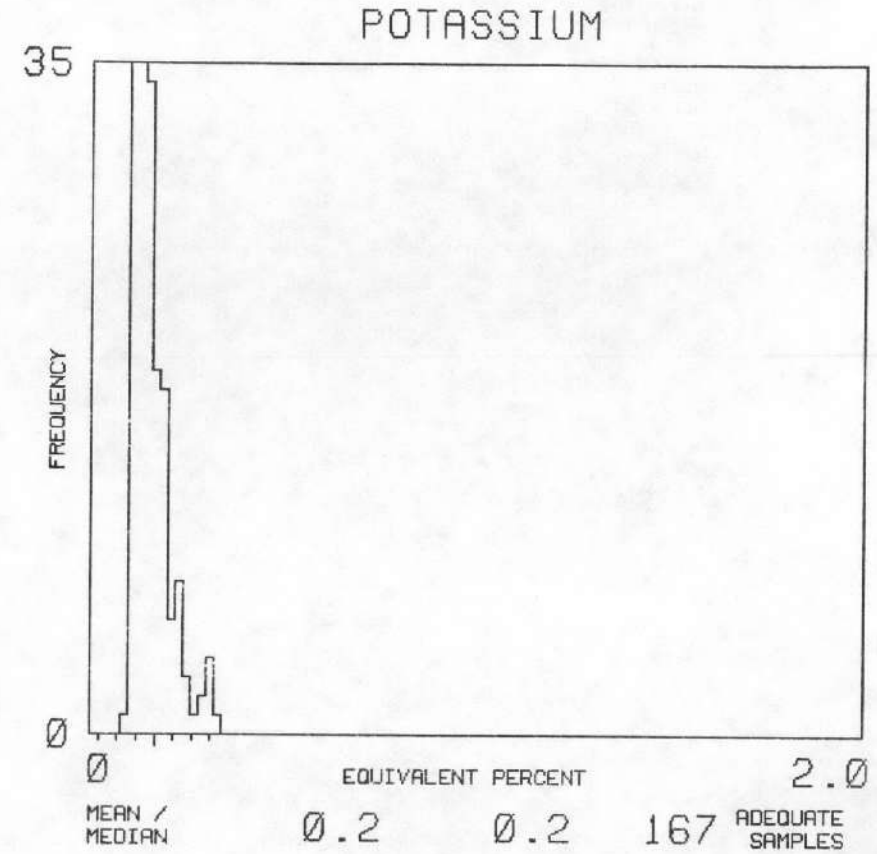
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE

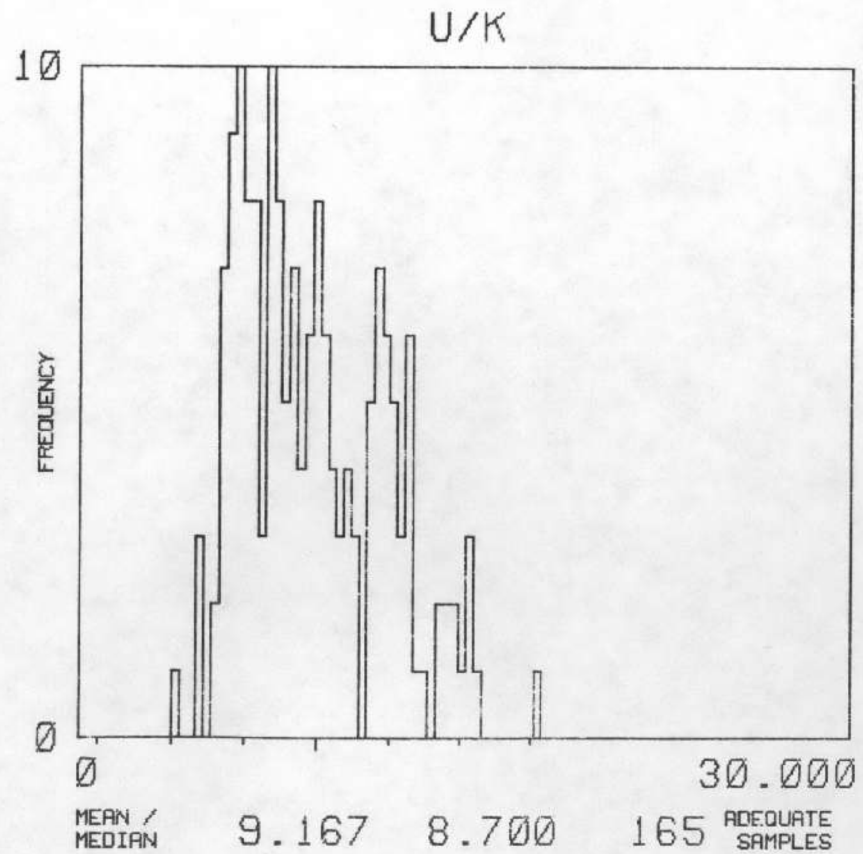
MAP UNIT : QTPRAM TOTAL NUMBER OF SAMPLES 384

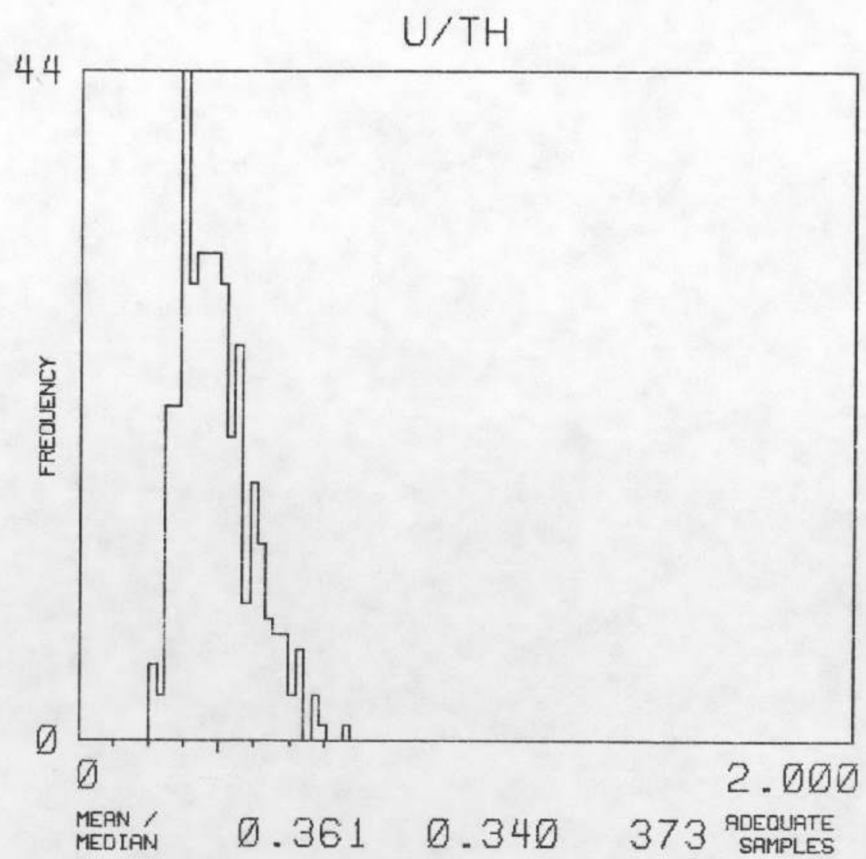
F15 vj

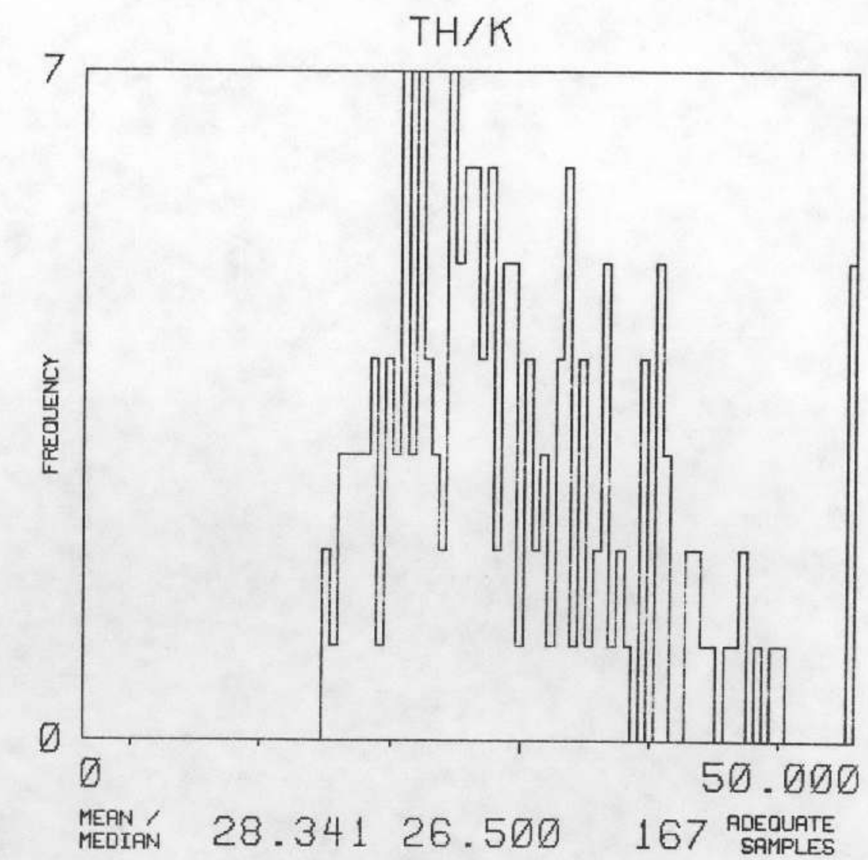






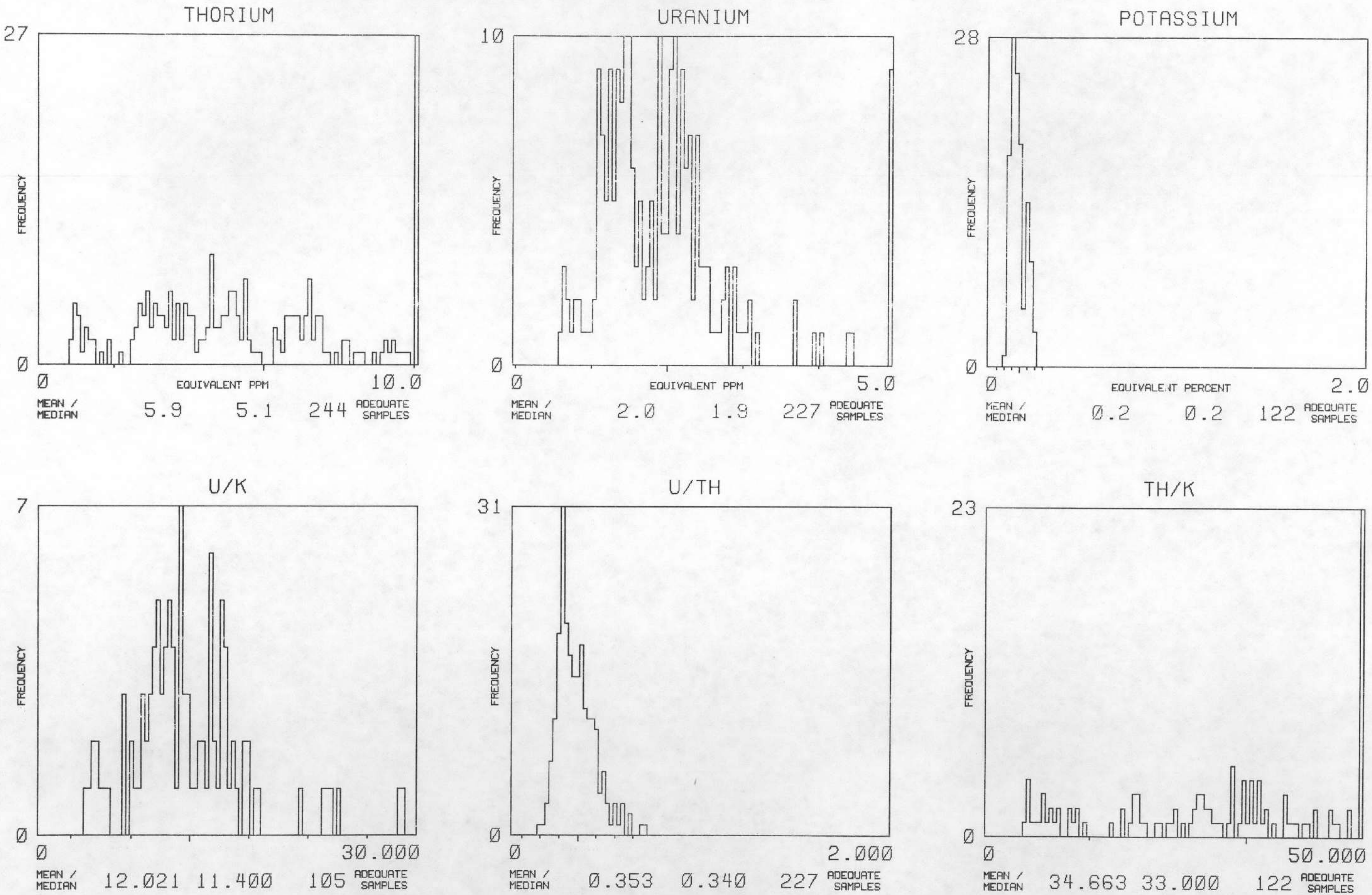






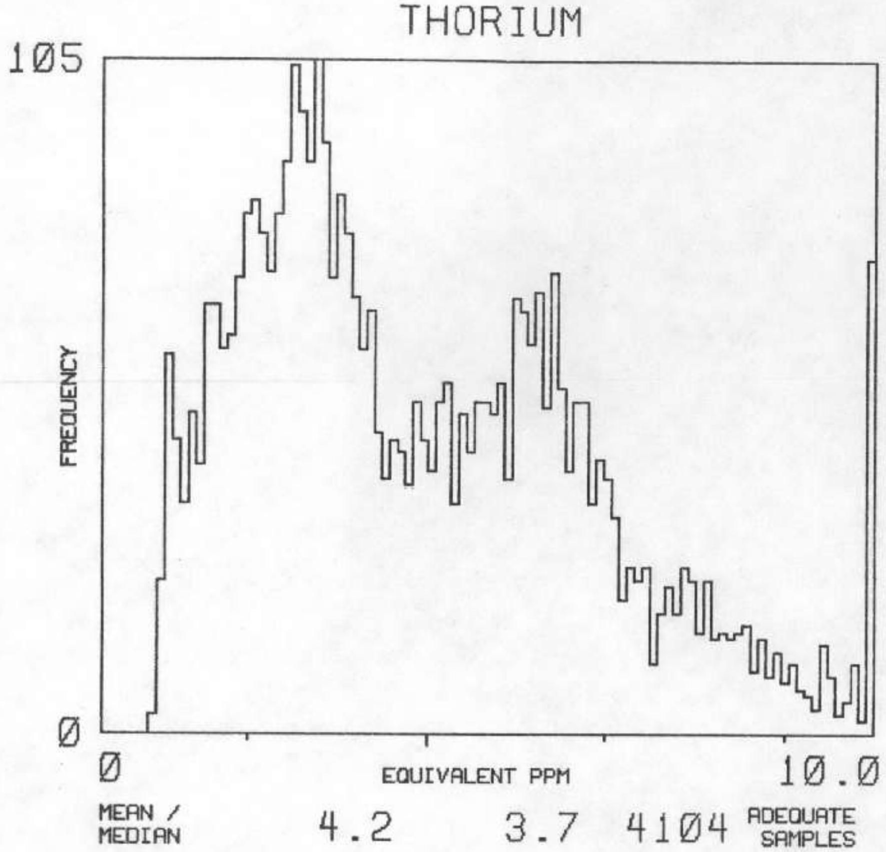
F16 vj

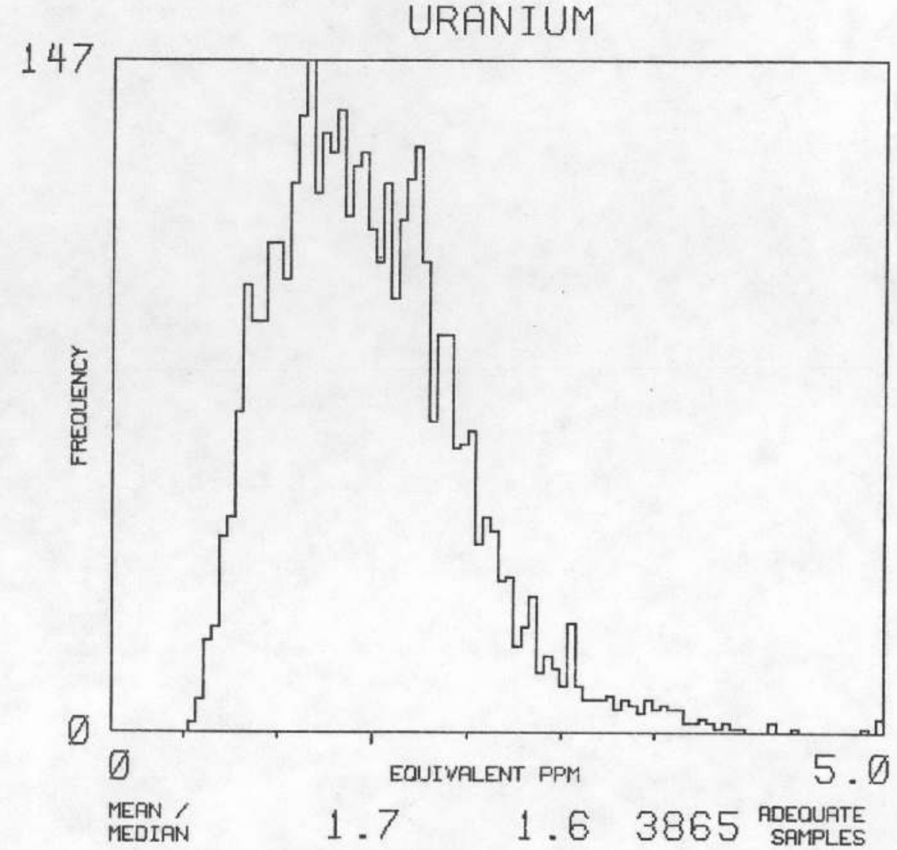
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPRAI TOTAL NUMBER OF SAMPLES 244

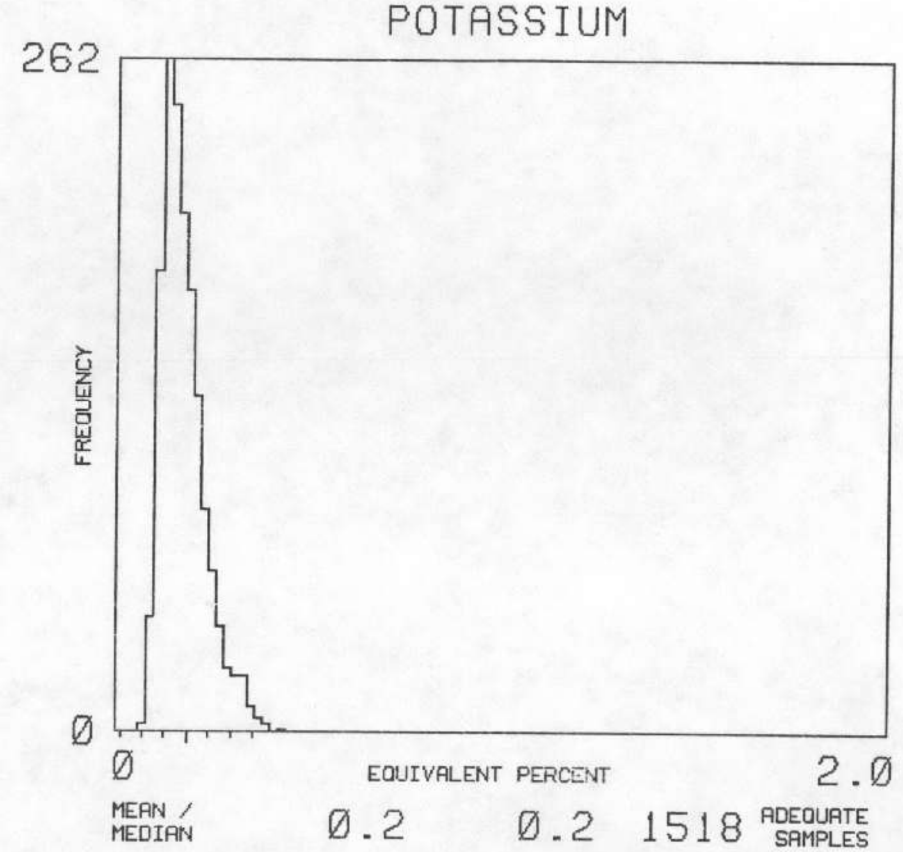


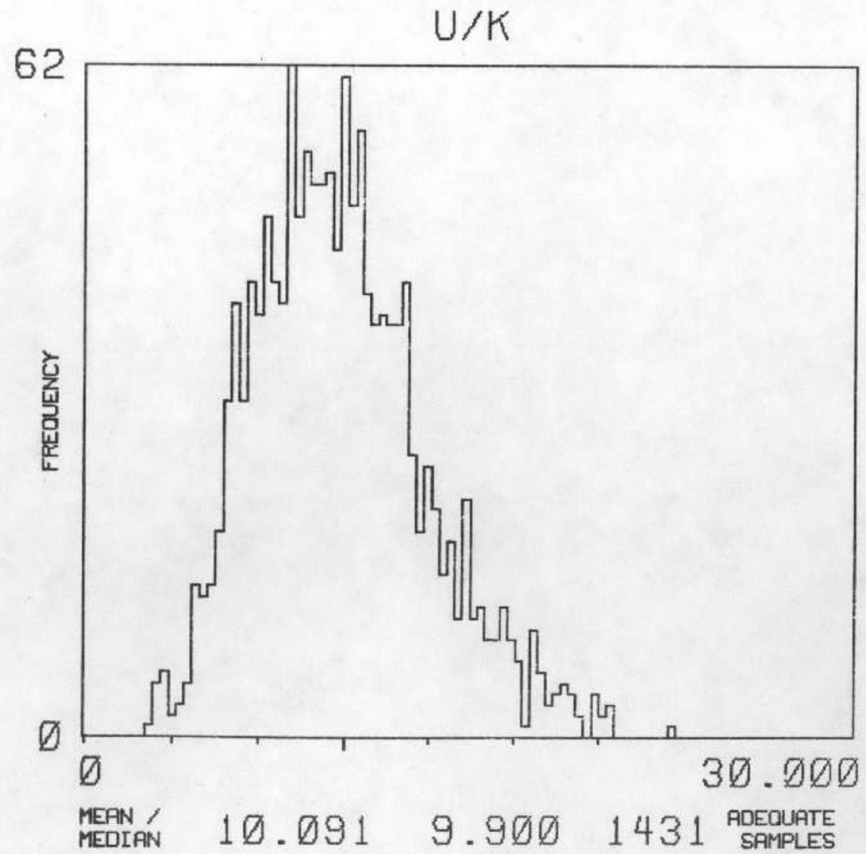
NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPA TOTAL NUMBER OF SAMPLES 4573

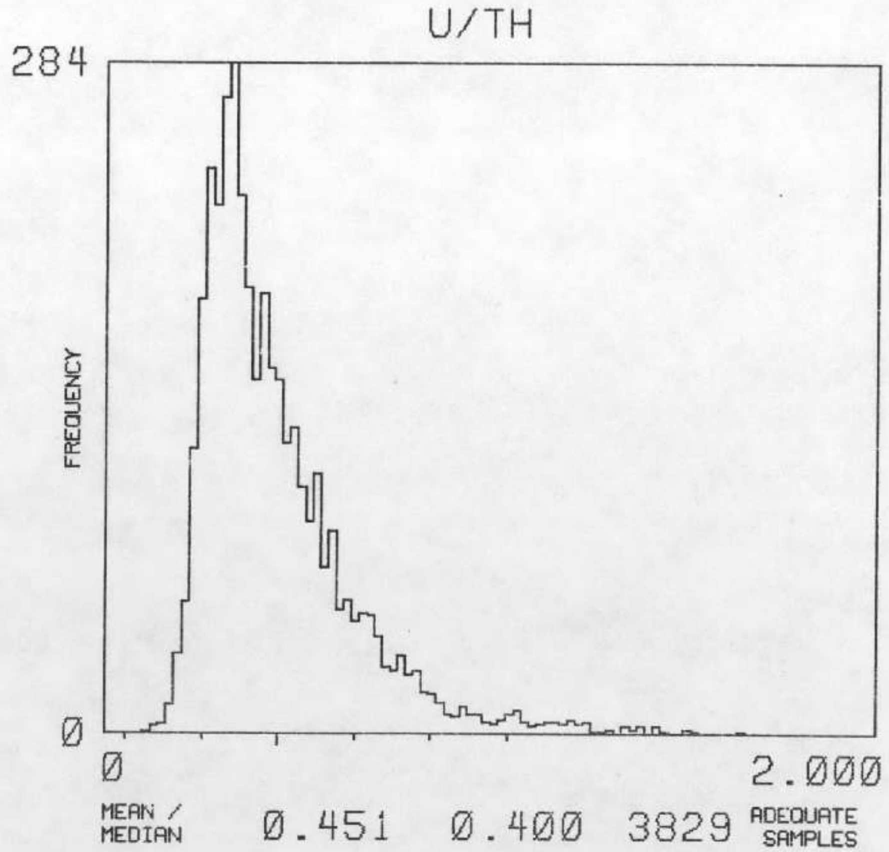
F17 vj

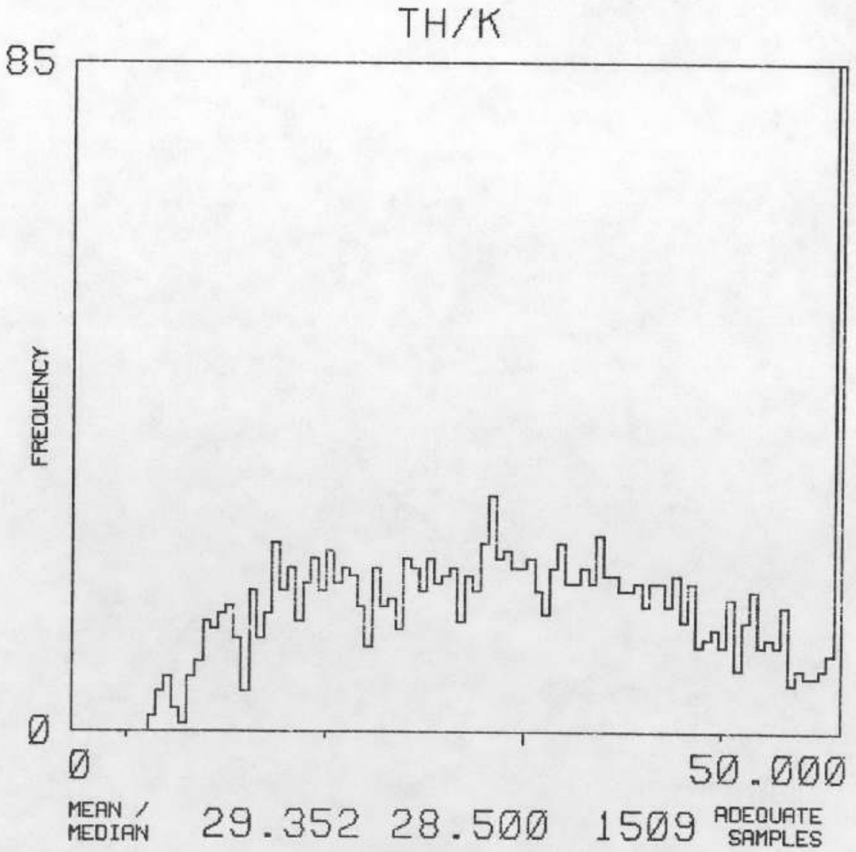






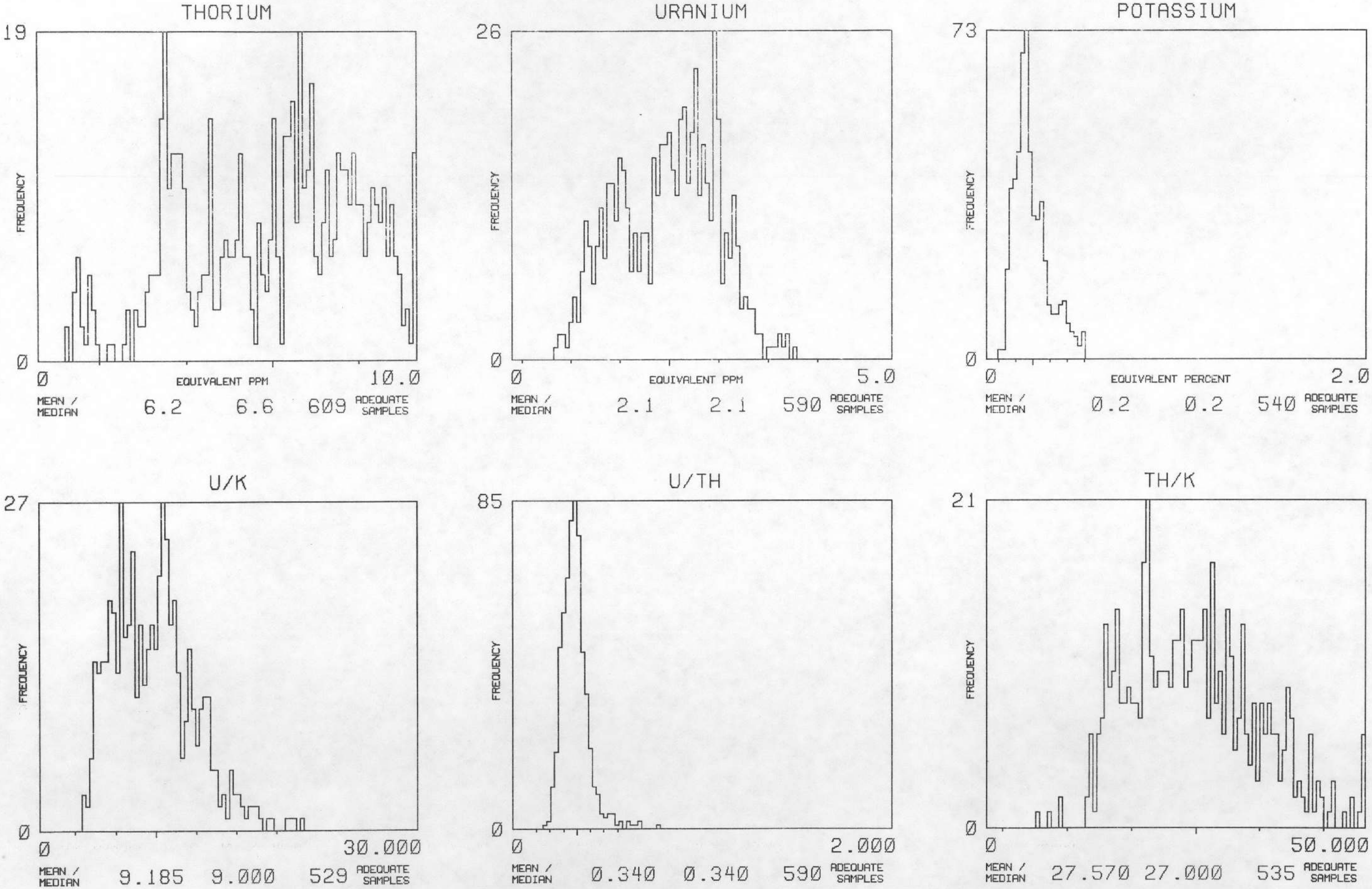






F18 vj

NTMS NH 17-4/5 VALDOSTA/JACKSONVILLE MAP UNIT : QTPAM TOTAL NUMBER OF SAMPLES 616



VALDOSTA AND JACKSONVILLE QUADRANGLES

Computer Map Unit Symbol Conversion Table

Computer Map Unit Symbol	Geologic Map Unit Symbol
QAL	Qal
QTPE	Qtpe
QTPEM	Qtpem
*QTPEI	Qtpei
*QTW	Qtw
QTWM	Qtwm
QTWI	Qtwi
QTPPS	Qtpps
TMM	Tmm
TPCD	Tpcd
TMC	Tmc
*TMJ	Tmj
*TMA	Tma
TMH	Tmh
*TMSM	Tmsm
TOS	Tos
*TECR	Tecr
QHM	Qhm
QHI	Qhi
QTSB	Qtsb
QTPRAM	Qtpram
QTPRAI	Qtprai
QTPA	Qtpa
QTPAM	Qtpam
*QTTI	Qtti

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.

*Statistical analysis was not performed on these units due to what was considered an inadaquate number of samples.

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	580	GAL	/ 3TOS	/ 2	/ 0	4.0	2	2	1	0	0	0	0	0
2 C	580	TOS	/ 4	/ 0	/ 0	3.1	3	1	0	0	0	0	0	0
3 C	580	TOS	/10	/ 0	/ 0	7.0	3	4	1	0	1	1	0	0
4 C	580	QTWM	/ 2	/ 0	/ 0	2.3	0	2	0	0	0	0	0	0
5 C	580	QTWM	/ 1	/ 0	/ 0	4.1	0	0	0	0	1	0	0	0
6 C	580	QTWM	/ 2	/ 0	/ 0	3.1	0	0	2	0	0	0	0	0
7 C	580	TMH	/ 3	/ 0	/ 0	3.1	2	1	0	0	0	0	0	0
8 C	580	TMH	/ 2	/ 0	/ 0	3.4	0	2	0	0	0	0	0	0
9 C	580	TMH	/ 1QTWM	/17	/ 0	3.8	4	9	4	1	0	0	0	0
10 C	580	QTWM	/ 2	/ 0	/ 0	2.3	0	2	0	0	0	0	0	0
11 C	590	TOS	/ 7	/ 0	/ 0	5.7	3	1	1	1	1	0	0	0
12 C	590	TOS	/ 6	/ 0	/ 0	4.2	1	2	3	0	0	0	0	0
13 C	590	TOS	/ 7	/ 0	/ 0	4.2	4	2	1	0	0	0	0	0
14 C	590	TOS	/ 3	/ 0	/ 0	3.9	0	1	2	0	0	0	0	0
15 C	590	TOS	/ 2	/ 0	/ 0	5.3	1	0	0	1	0	0	0	0
16 C	590	QTWM	/ 1	/ 0	/ 0	2.9	0	0	1	0	0	0	0	0
17 C	590	QTWM	/ 1	/ 0	/ 0	2.9	0	0	1	0	0	0	0	0
18 C	590	QTWM	/ 2	/ 0	/ 0	2.7	0	2	0	0	0	0	0	0
19 C	590	QTWM	/ 1	/ 0	/ 0	3.0	0	0	1	0	0	0	0	0
20 C	600	TOS	/ 3	/ 0	/ 0	3.3	2	1	0	0	0	0	0	0
21 C	600	QTWM	/ 2	/ 0	/ 0	2.5	0	2	0	0	0	0	0	0
22 C	600	QTPE	/ 1	/ 0	/ 0	2.2	0	0	1	0	0	0	0	0
23 C	610	TMH	/ 2	/ 0	/ 0	3.5	0	2	0	0	0	0	0	0
24 C	610	QTWM	/ 3	/ 0	/ 0	3.0	1	1	1	0	0	0	0	0
25 C	620	TMM	/ 1	/ 0	/ 0	3.2	0	0	1	0	0	0	0	0
26 C	620	TOS	/ 1	/ 0	/ 0	7.2	0	0	0	0	0	0	1	0
27 C	620	TMH	/ 4	/ 0	/ 0	3.6	2	1	1	0	0	0	0	0
28 C	620	QTPE	/ 1QTPA	/ 2	/ 0	3.1	2	0	0	0	1	0	0	0
29 C	630	QTPPS	/ 1	/ 0	/ 0	2.4	0	0	1	0	0	0	0	0
30 C	630	QTPPS	/ 4	/ 0	/ 0	3.4	1	0	0	0	1	2	0	0
31 C	630	QTPPS	/ 3	/ 0	/ 0	4.1	0	2	0	0	0	0	0	1
32 C	670	QHM	/ 2	/ 0	/ 0	2.6	0	0	0	2	0	0	0	0
33 C	690	QTPPS	/ 1	/ 0	/ 0	2.4	0	0	1	0	0	0	0	0
34 C	1150	TOS	/ 2	/ 0	/ 0	4.5	0	1	1	0	0	0	0	0
35 C	1150	TMH	/ 1	/ 0	/ 0	4.4	0	0	0	1	0	0	0	0
36 C	1150	TMH	/ 1	/ 0	/ 0	4.4	0	0	0	1	0	0	0	0
37 C	1150	TMH	/ 1	/ 0	/ 0	3.9	0	0	1	0	0	0	0	0
38 C	1150	TMH	/ 2	/ 0	/ 0	3.7	0	1	1	0	0	0	0	0
39 C	1180	TOS	/ 1	/ 0	/ 0	3.9	0	0	1	0	0	0	0	0
40 C	1180	TMH	/ 3	/ 0	/ 0	3.1	1	2	0	0	0	0	0	0
41 C	1180	QTPPS	/ 5	/ 0	/ 0	2.0	4	1	0	0	0	0	0	0
42 C	1180	QTPPS	/ 4	/ 0	/ 0	2.4	0	2	2	0	0	0	0	0
43 C	1180	QTPPS	/ 5	/ 0	/ 0	1.8	4	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 QAL

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.1113	-0.0003	0.1107	0.2217	0.3327	0.4437	0.5547
URANIUM DIST NORMAL	-0.6399	0.1411	0.9221	1.7031	2.4841	3.2651	4.0461
THORIUM DIST NORMAL	-4.9295	-2.1427	0.6441	3.4309	6.2177	9.0045	11.7913
U/K DIST NORMAL	-0.8217	2.0606	4.9429	7.8252	10.7075	13.5898	16.4721
U/TH DIST NORMAL	-0.9620	-0.4213	0.1194	0.6601	1.2008	1.7415	2.2822
TH/K DIST NORMAL	-11.4784	-1.4496	8.5792	18.6080	28.6368	38.6656	48.6944

MAP UNIT QTPE

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0659	0.0055	0.0769	0.1483	0.2197	0.2911	0.3625
URANIUM DIST NORMAL	0.1285	0.4996	0.8707	1.2418	1.6129	1.9840	2.3551
THORIUM DIST NORMAL	-1.1095	0.0345	1.1785	2.3225	3.4665	4.6105	5.7545
U/K DIST NORMAL	0.0166	3.0029	5.9892	8.9755	11.9618	14.9481	17.9344
U/TH DIST NORMAL	-0.1586	0.0909	0.3404	0.5899	0.8394	1.0889	1.3384
TH/K DIST NORMAL	-6.7401	3.6995	14.1391	24.5787	35.0183	45.4579	55.8975

MAP UNIT QTPEM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0138	0.0733	0.1328	0.1923	0.2518	0.3113	0.3708
URANIUM DIST NORMAL	-0.4149	0.3372	1.0893	1.8414	2.5935	3.3456	4.0977
THORIUM DIST NORMAL	-1.6257	0.5861	2.7979	5.0097	7.2215	9.4333	11.6451
U/K DIST NORMAL	1.2040	5.1259	9.0478	12.9697	16.8916	20.8135	24.7354
U/TH DIST NORMAL	0.0774	0.1802	0.2830	0.3858	0.4886	0.5914	0.6942
TH/K DIST NORMAL	3.2870	14.0499	24.8128	35.5757	46.3386	57.1015	67.8644

MAP UNIT QTWM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0058	0.0466	0.0990	0.1514	0.2038	0.2562	0.3086
URANIUM DIST NORMAL	-0.3464	0.2061	0.7586	1.3111	1.8636	2.4161	2.9686
THORIUM DIST NORMAL	-1.1131	-0.0738	0.9655	2.0048	3.0441	4.0834	5.1227
U/K DIST NORMAL	2.3235	4.7997	7.2759	9.7521	12.2283	14.7045	17.1807
U/TH DIST NORMAL	-0.1366	0.1455	0.4276	0.7097	0.9918	1.2739	1.5560
TH/K DIST NORMAL	0.9922	7.1338	13.2754	19.4170	25.5586	31.7002	37.8418

MAP UNIT QTWI

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0649	0.0928	0.1207	0.1486	0.1765	0.2044	0.2323
URANIUM DIST NORMAL	-0.2295	0.2822	0.7939	1.3056	1.8173	2.3290	2.8407
THORIUM DIST NORMAL	-3.0172	-0.8440	1.3292	3.5024	5.6756	7.8488	10.0220
U/K DIST NORMAL	3.0543	5.7873	8.5203	11.2533	13.9863	16.7193	19.4523
U/TH DIST NORMAL	-0.3463	-0.0635	0.2193	0.5021	0.7849	1.0677	1.3505
TH/K DIST NORMAL	4.2879	14.6414	24.9949	35.3484	45.7019	56.0554	66.4089

MAP UNIT QTPPS

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0006	0.0505	0.1004	0.1503	0.2002	0.2501	0.3000
URANIUM DIST NORMAL	-0.1371	0.2581	0.6533	1.0485	1.4437	1.8389	2.2341
THORIUM DIST NORMAL	-0.9007	-0.1219	0.6569	1.4357	2.2145	2.9933	3.7721
U/K DIST NORMAL	-0.8152	2.7011	6.2174	9.7337	13.2500	16.7663	20.2826
U/TH DIST NORMAL	-0.2151	0.1236	0.4623	0.8010	1.1397	1.4784	1.8171
TH/K DIST NORMAL	-13.2617	-2.4571	8.3475	19.1521	29.9567	40.7613	51.5659

MAP UNIT TMM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0162	0.0613	0.1064	0.1515	0.1966	0.2417	0.2868
URANIUM DIST NORMAL	-0.3323	0.3032	0.9387	1.5742	2.2097	2.8452	3.4807
THORIUM DIST NORMAL	-1.9697	-0.3038	1.3621	3.0280	4.6939	6.3598	8.0257
U/K DIST NORMAL	0.2319	4.3980	8.5641	12.7302	16.8963	21.0624	25.2285
U/TH DIST NORMAL	-0.1961	0.0655	0.3271	0.5887	0.8503	1.1119	1.3735
TH/K DIST NORMAL	-4.3178	6.5803	17.4784	28.3765	39.2746	50.1727	61.0708

MAP UNIT TPCD

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0064	0.0626	0.1188	0.1750	0.2312	0.2874	0.3436
URANIUM DIST NORMAL	0.7733	1.2669	1.7605	2.2541	2.7477	3.2413	3.7349
THORIUM DIST NORMAL	1.4350	3.1600	4.8850	6.6100	8.3350	10.0600	11.7850
U/K DIST NORMAL	4.0230	7.0964	10.1698	13.2432	16.3166	19.3900	22.4634
U/TH DIST NORMAL	0.1831	0.2385	0.2939	0.3493	0.4047	0.4601	0.5155
TH/K DIST NORMAL	7.4403	18.3769	29.3135	40.2501	51.1867	62.1233	73.0599

MAP UNIT TMC

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0282	0.0725	0.1168	0.1611	0.2054	0.2497	0.2940
URANIUM DIST NORMAL	-0.5535	0.0568	0.6671	1.2774	1.8877	2.4980	3.1083
THORIUM DIST NORMAL	-2.5797	-0.6281	1.3235	3.2751	5.2267	7.1783	9.1299
U/K DIST NORMAL	-1.4003	3.8220	9.0443	14.2666	19.4889	24.7112	29.9335
U/TH DIST NORMAL	0.0331	0.1620	0.2909	0.4198	0.5487	0.6776	0.8065
TH/K DIST NORMAL	-2.7877	10.9294	24.6465	38.3636	52.0807	65.7978	79.5149

MAP UNIT TMH

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0588	0.0883	0.1178	0.1473	0.1768	0.2063	0.2358
URANIUM DIST NORMAL	-0.4048	0.3215	1.0478	1.7741	2.5004	3.2267	3.9530
THORIUM DIST NORMAL	-1.1126	0.2361	1.5848	2.9335	4.2822	5.6309	6.9796
U/K DIST NORMAL	-1.3620	2.9160	7.1940	11.4720	15.7500	20.0280	24.3060
U/TH DIST NORMAL	-0.1640	0.1094	0.3828	0.6562	0.9296	1.2030	1.4764
TH/K DIST NORMAL	-3.7619	5.4189	14.5997	23.7805	32.9613	42.1421	51.3229

MAP UNIT TOS

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0610	0.0904	0.1198	0.1492	0.1786	0.2080	0.2374
URANIUM DIST NORMAL	-0.7525	0.0754	0.9033	1.7312	2.5591	3.3870	4.2149
THORIUM DIST NORMAL	-1.5616	-0.2766	1.0084	2.2934	3.5784	4.8634	6.1484
U/K DIST NORMAL	0.1254	4.8976	9.6698	14.4420	19.2142	23.9864	28.7586
U/TH DIST NORMAL	-0.6073	-0.1046	0.3981	0.9008	1.4035	1.9062	2.4089
TH/K DIST NORMAL	-5.3278	4.3107	13.9492	23.5877	33.2262	42.8647	52.5032

MAP UNIT QHM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0282	0.0464	0.1210	0.1956	0.2702	0.3448	0.4194
URANIUM DIST NORMAL	-0.2996	0.1400	0.5796	1.0192	1.4588	1.8984	2.3380
THORIUM DIST NORMAL	-1.1113	0.0203	1.1519	2.2835	3.4151	4.5467	5.6783
U/K DIST NORMAL	-1.3387	0.8963	3.1313	5.3663	7.6013	9.8363	12.0713
U/TH DIST NORMAL	-0.0473	0.1100	0.2673	0.4246	0.5819	0.7392	0.8965
TH/K DIST NORMAL	-3.6501	1.8058	7.2617	12.7176	18.1735	23.6294	29.0853

MAP UNIT GHI

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0424	0.0530	0.1484	0.2438	0.3392	0.4346	0.5300
URANIUM DIST NORMAL	-0.5816	0.0163	0.6142	1.2121	1.8100	2.4079	3.0058
THORIUM DIST NORMAL	-5.5806	-2.4718	0.6370	3.7458	6.8546	9.9634	13.0722
U/K DIST NORMAL	-4.3592	-0.7503	2.8586	6.4675	10.0764	13.6853	17.2942
U/TH DIST NORMAL	-0.3913	-0.1127	0.1659	0.4445	0.7231	1.0017	1.2803
TH/K DIST NORMAL	-17.1341	-5.7419	5.6503	17.0425	28.4347	39.8269	51.2191

MAP UNIT QTSB

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0108	0.0742	0.1376	0.2010	0.2644	0.3278	0.3912
URANIUM DIST NORMAL	-2.4968	-0.9612	0.5744	2.1100	3.6456	5.1812	6.7168
THORIUM DIST NORMAL	-9.5328	-4.5318	0.4692	5.4702	10.4712	15.4722	20.4732
U/K DIST NORMAL	-9.8652	-2.6896	4.4860	11.6616	18.8372	26.0128	33.1884
U/TH DIST NORMAL	-0.2596	-0.0299	0.1998	0.4295	0.6592	0.8889	1.1186
TH/K DIST NORMAL	-40.1694	-15.7610	8.6474	33.0558	57.4642	81.8726	106.2810

MAP UNIT QTPRAM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0236	0.0717	0.1198	0.1679	0.2160	0.2641	0.3122
URANIUM DIST NORMAL	0.2070	0.6601	1.1132	1.5663	2.0194	2.4725	2.9256
THORIUM DIST NORMAL	-0.7834	0.9783	2.7400	4.5017	6.2634	8.0251	9.7868
U/K DIST NORMAL	0.7661	3.5664	6.3667	9.1670	11.9673	14.7676	17.5679
U/TH DIST NORMAL	0.0900	0.1805	0.2710	0.3615	0.4520	0.5425	0.6330
TH/K DIST NORMAL	3.1351	11.5372	19.9393	28.3414	36.7435	45.1456	53.5477

MAP UNIT QTPRAI

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0489	0.0890	0.1291	0.1692	0.2093	0.2494	0.2895
URANIUM DIST NORMAL	-0.9611	0.0383	1.0377	2.0371	3.0365	4.0359	5.0353
THORIUM DIST NORMAL	-5.9544	-1.9884	1.9776	5.9436	9.9096	13.8756	17.8416
U/K DIST NORMAL	-2.0941	2.6108	7.3157	12.0206	16.7255	21.4304	26.1353
U/TH DIST NORMAL	0.0589	0.1570	0.2551	0.3532	0.4513	0.5494	0.6475
TH/K DIST NORMAL	-27.6893	-6.9053	13.8787	34.6627	55.4467	76.2307	97.0147

MAP UNIT QTPA

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	0.0134	0.0703	0.1272	0.1841	0.2410	0.2979	0.3548
URANIUM DIST NORMAL	-0.1397	0.4698	1.0793	1.6888	2.2983	2.9078	3.5173
THORIUM DIST NORMAL	-2.7823	-0.4534	1.8755	4.2044	6.5333	8.8622	11.1911
U/K DIST NORMAL	0.1048	3.4335	6.7622	10.0909	13.4196	16.7483	20.0770
U/TH DIST NORMAL	-0.1396	0.0574	0.2544	0.4514	0.6484	0.8454	1.0424
TH/K DIST NORMAL	-9.2706	3.6035	16.4776	29.3517	42.2258	55.0999	67.9740

MAP UNIT QTPAM

	-3	-2	-1	0	+1	+2	+3
POTASIUM DIST NORMAL	-0.0227	0.0670	0.1567	0.2464	0.3361	0.4258	0.5155
URANIUM DIST NORMAL	0.1331	0.7810	1.4289	2.0768	2.7247	3.3726	4.0205
THORIUM DIST NORMAL	-0.6865	1.6062	3.8989	6.1916	8.4843	10.7770	13.0697
U/K DIST NORMAL	-0.4602	2.7547	5.9696	9.1845	12.3994	15.6143	18.8292
U/TH DIST NORMAL	0.1254	0.1968	0.2682	0.3396	0.4110	0.4824	0.5538
TH/K DIST NORMAL	2.1645	10.6329	19.1013	27.5697	36.0381	44.5065	52.9749

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LINE BASED MEAN CONCENTRATIONS
AND RATIOS PER ROCK TYPE

MAP UNIT QAL

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.139	0.000	0.000	0.215	0.174	0.000	0.166	0.000	0.000	0.000	0.000	0.292	0.110	0.000	0.000
URANIUM	2.420	1.514	0.000	1.692	1.187	0.000	0.720	0.000	0.000	0.000	0.722	2.207	1.232	0.000	0.000
THORIUM	1.020	1.186	0.000	3.729	1.577	0.000	1.548	0.000	0.000	0.000	1.898	5.775	0.925	0.000	0.000
U/K	0.000	0.000	0.000	6.743	6.875	0.000	4.817	0.000	0.000	0.000	0.000	7.943	8.974	0.000	0.000
U/TH	2.219	1.323	0.000	0.591	0.762	0.000	0.514	0.000	0.000	0.000	0.395	0.379	1.296	0.000	0.000
TH/K	6.586	0.000	0.000	12.954	9.629	0.000	10.087	0.000	0.000	0.000	0.000	22.699	8.622	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.251	0.145
URANIUM	1.962	0.000	0.000	0.000	1.948	0.975
THORIUM	3.491	0.000	0.000	0.000	5.074	2.536
U/K	0.000	0.000	0.000	0.000	9.519	7.152
U/TH	0.577	0.000	0.000	0.000	0.426	0.499
TH/K	0.000	0.000	0.000	0.000	26.047	22.053

MAP UNIT QTPE

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.115	0.124	0.142	0.296	0.159	0.114	0.121	0.133	0.124	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	1.264	1.030	1.313	1.392	1.487	1.020	0.797	0.969	1.498	0.000	0.000	0.000	0.000	0.000	0.000
THORIUM	1.697	1.558	2.161	2.808	2.839	1.849	1.868	2.930	4.126	0.000	0.000	0.000	0.000	0.000	0.000
U/K	7.119	6.403	10.928	6.331	9.798	6.812	6.690	7.456	11.739	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.828	0.666	0.640	0.554	0.606	0.629	0.394	0.334	0.388	0.000	0.000	0.000	0.000	0.000	0.000
TH/K	16.530	15.217	28.595	15.238	17.776	23.354	22.045	27.883	31.003	0.000	0.000	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.136	0.000
URANIUM	0.000	0.000	0.000	0.000	1.146	0.000
THORIUM	0.000	0.000	0.000	0.000	2.274	0.000
U/K	0.000	0.000	0.000	0.000	10.595	0.000
U/TH	0.000	0.000	0.000	0.000	0.549	0.000
TH/K	0.000	0.000	0.000	0.000	27.685	0.000

MAP UNIT QTPEM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.136	0.228	0.163	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.241	2.061	1.334	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.518	5.736	3.312	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.134	12.202	8.861	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.380	0.364	0.436	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24.127	33.148	35.357	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.176	0.000
URANIUM	0.000	0.000	0.000	0.000	2.642	0.000
THORIUM	0.000	0.000	0.000	0.000	7.186	0.000
U/K	0.000	0.000	0.000	0.000	15.194	0.000
U/TH	0.000	0.000	0.000	0.000	0.371	0.000
TH/K	0.000	0.000	0.000	0.000	41.208	0.000

MAP UNIT QTWM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.121	0.133	0.148	0.135	0.190	0.114	0.084	0.091	0.103	0.000	0.000	0.094	0.000	0.000	0.000
URANIUM	2.115	1.731	1.507	1.325	1.119	0.925	0.768	0.745	0.909	0.807	0.696	0.621	0.000	0.000	0.000
THORIUM	2.496	2.665	2.373	2.039	1.767	1.473	1.466	1.064	1.803	1.273	0.738	0.842	0.000	0.000	0.000
U/K	16.800	11.306	10.874	9.206	9.005	8.706	0.000	0.000	10.285	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.937	0.688	0.753	0.755	0.719	0.684	0.502	0.736	0.576	0.631	0.000	0.000	0.000	0.000	0.000
TH/K	24.174	13.781	23.018	20.637	17.953	18.920	9.802	13.882	22.883	0.000	0.000	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.162	0.096	0.137	0.000	0.000
URANIUM	0.000	1.149	0.904	1.135	0.000	0.000
THORIUM	0.000	1.857	1.427	2.164	0.000	0.000
U/K	0.000	10.122	7.418	9.082	0.000	0.000
U/TH	0.000	0.687	0.651	0.566	0.000	0.000
TH/K	0.000	19.930	10.688	19.941	0.000	0.000

MAP UNIT QTWI

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0. 000	0. 000	0. 000	0. 000	0. 150	0. 141	0. 137	0. 154	0. 175	0. 128	0. 000	0. 000	0. 000	0. 000	0. 000
URANIUM	0. 000	0. 000	0. 000	0. 000	1. 299	1. 623	1. 115	1. 181	1. 435	1. 293	1. 371	0. 951	0. 000	0. 000	0. 000
THORIUM	0. 000	0. 000	0. 000	0. 000	2. 353	4. 441	3. 016	3. 830	4. 172	4. 129	3. 608	1. 300	0. 000	0. 000	0. 000
U/K	0. 000	0. 000	0. 000	0. 000	11. 867	13. 039	9. 456	10. 252	12. 007	12. 441	0. 000	0. 000	0. 000	0. 000	0. 000
U/TH	0. 000	0. 000	0. 000	0. 000	0. 736	0. 478	0. 390	0. 458	0. 429	0. 479	0. 437	0. 810	0. 000	0. 000	0. 000
TH/K	0. 000	0. 000	0. 000	0. 000	27. 803	35. 160	32. 510	35. 636	38. 679	50. 260	0. 000	0. 000	0. 000	0. 000	0. 000

	1180	1190	1200	1210	1220	1230
POTASIUM	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
THORIUM	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
U/TH	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

MAP UNIT QTPPS

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0. 000	0. 000	0. 000	0. 000	0. 000	0. 159	0. 086	0. 109	0. 100	0. 149	0. 133	0. 150	0. 000	0. 000	0. 233
URANIUM	0. 000	0. 000	0. 000	0. 000	0. 954	1. 629	0. 662	0. 744	0. 838	0. 961	0. 942	1. 087	0. 000	0. 000	1. 452
THORIUM	0. 000	0. 000	0. 000	0. 000	0. 977	1. 169	1. 011	1. 283	1. 285	1. 426	1. 353	1. 566	0. 000	0. 000	2. 315
U/K	0. 000	0. 000	0. 000	0. 000	0. 000	17. 599	0. 000	7. 463	0. 000	8. 118	8. 447	10. 616	0. 000	0. 000	6. 451
U/TH	0. 000	0. 000	0. 000	0. 000	1. 003	1. 575	0. 672	0. 617	0. 674	0. 703	0. 746	0. 791	0. 000	0. 000	0. 730
TH/K	0. 000	0. 000	0. 000	0. 000	0. 000	8. 631	11. 946	16. 524	13. 664	18. 139	15. 903	28. 665	0. 000	0. 000	13. 108

	1180	1190	1200	1210	1220	1230
POTASIUM	0. 000	0. 000	0. 000	0. 163	0. 000	0. 000
URANIUM	1. 413	0. 827	0. 921	1. 035	0. 000	0. 000
THORIUM	1. 475	1. 028	1. 545	1. 556	0. 000	0. 000
U/K	0. 000	0. 000	0. 000	10. 355	0. 000	0. 000
U/TH	1. 038	0. 849	0. 612	0. 795	0. 000	0. 000
TH/K	0. 000	0. 000	0. 000	23. 984	0. 000	0. 000

MAP UNIT TMM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.120	0.154	0.148	0.127	0.127	0.134	0.154	0.167	0.159	0.154	0.000	0.216
URANIUM	0.000	0.000	1.146	1.132	2.402	1.635	1.276	1.539	1.427	1.697	1.895	2.012	3.395	0.000	1.912
THORIUM	0.000	0.000	1.166	1.319	4.139	2.905	2.525	3.131	2.956	3.843	3.943	4.240	5.924	0.000	3.337
U/K	0.000	0.000	0.000	9.729	18.585	14.348	12.630	13.100	11.979	13.209	11.407	13.358	21.398	0.000	11.199
U/TH	0.000	0.000	1.060	0.921	0.585	0.608	0.484	0.504	0.464	0.487	0.537	0.517	0.579	0.000	0.649
TH/K	0.000	0.000	0.000	10.305	34.304	26.505	26.213	27.232	28.094	33.739	26.849	32.978	40.769	0.000	22.304

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	1.812	0.000	0.000	0.000	0.000	0.000
THORIUM	2.331	0.000	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.797	0.000	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000

MAP UNIT TPCD

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.151	0.000	0.196	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	2.120	1.492	2.300	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	5.526	4.520	6.765	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	14.687	0.000	12.171	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	0.388	0.327	0.345	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	39.407	0.000	35.859	0.000	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.134	0.000
URANIUM	0.000	0.000	0.000	0.000	2.411	0.000
THORIUM	0.000	0.000	0.000	0.000	7.255	0.000
U/K	0.000	0.000	0.000	0.000	15.014	0.000
U/TH	0.000	0.000	0.000	0.000	0.344	0.000
TH/K	0.000	0.000	0.000	0.000	54.268	0.000

MAP UNIT TMC

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.147	0.102	0.117	0.103	0.185	0.000	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	1.550	0.778	1.137	1.015	1.965	0.000	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	4.454	1.842	3.076	2.095	5.380	0.000	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	12.571	7.718	10.432	8.065	16.075	0.000	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.362	0.432	0.418	0.499	0.362	0.000	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	37.432	13.820	46.131	16.864	44.716	0.000	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	1.568	0.000
THORIUM	0.000	0.000	0.000	0.000	3.447	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.455	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000

MAP UNIT TMH

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.157	0.000	0.133	0.123	0.142	0.175	0.159	0.132	0.140	0.143	0.161	0.145	0.154	0.147	0.130
URANIUM	2.428	1.614	1.547	1.814	1.641	1.242	1.317	1.416	1.720	1.636	2.078	1.912	3.352	2.549	1.962
THORIUM	3.063	2.272	1.972	2.385	2.278	1.612	2.213	2.698	3.938	3.719	4.024	3.569	4.928	4.090	3.373
U/K	17.551	0.000	12.119	12.528	11.758	9.319	8.436	10.774	12.791	11.754	12.575	12.481	20.363	15.919	13.176
U/TH	0.816	0.734	0.848	0.932	0.807	0.854	0.510	0.522	0.442	0.464	0.527	0.563	0.696	0.657	0.603
TH/K	21.132	0.000	19.203	14.879	22.369	15.291	18.419	24.202	32.009	29.153	25.526	30.607	30.724	28.143	30.441

	1180	1190	1200	1210	1220	1230
POTASIUM	0.144	0.154	0.000	0.000	0.000	0.000
URANIUM	1.612	0.970	0.000	0.000	0.000	0.000
THORIUM	2.041	1.751	0.000	0.000	0.000	0.000
U/K	19.210	6.910	0.000	0.000	0.000	0.000
U/TH	0.837	0.611	0.000	0.000	0.000	0.000
TH/K	19.238	13.610	0.000	0.000	0.000	0.000

MAP UNIT TOS

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.141	0.134	0.120	0.151	0.150	0.155	0.163	0.135	0.179	0.000	0.000	0.000	0.156	0.155	0.136
URANIUM	1.556	1.761	1.956	1.591	1.446	1.670	1.227	2.111	1.837	0.000	0.000	0.000	2.529	1.571	1.626
THORIUM	1.470	1.659	2.157	2.134	2.051	2.891	2.620	4.867	4.408	0.000	0.000	0.000	3.727	2.377	2.136
U/K	19.020	16.419	20.065	14.529	12.869	11.968	10.130	16.549	10.160	0.000	0.000	0.000	18.263	13.929	14.154
U/TH	1.257	1.234	0.984	0.756	0.737	0.608	0.510	0.438	0.420	0.000	0.000	0.000	0.908	0.791	0.837
TH/K	8.215	12.391	16.247	21.928	22.186	20.678	25.133	38.441	25.881	0.000	0.000	0.000	27.512	23.989	22.710

	1180	1190	1200	1210	1220	1230
POTASIUM	0.145	0.113	0.000	0.000	0.000	0.000
URANIUM	1.340	1.246	0.000	0.000	0.000	0.000
THORIUM	1.811	2.797	0.000	0.000	0.000	0.000
U/K	14.054	9.166	0.000	0.000	0.000	0.000
U/TH	0.792	0.456	0.000	0.000	0.000	0.000
TH/K	17.224	23.643	0.000	0.000	0.000	0.000

MAP UNIT GHM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.213	0.000	0.000	0.191	0.195	0.205	0.208	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	1.399	0.000	0.000	0.801	1.679	0.892	1.025	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	4.653	0.000	0.000	2.008	2.594	2.323	2.314	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	6.779	0.000	0.000	4.264	7.684	4.429	4.953	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.293	0.000	0.000	0.400	0.549	0.396	0.421	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	22.118	0.000	0.000	10.941	13.012	11.161	12.732	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.160
URANIUM	0.000	0.000	0.000	0.000	0.000	0.942
THORIUM	0.000	0.000	0.000	0.000	0.000	2.018
U/K	0.000	0.000	0.000	0.000	0.000	6.145
U/TH	0.000	0.000	0.000	0.000	0.000	0.437
TH/K	0.000	0.000	0.000	0.000	0.000	13.993

MAP UNIT QHI

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.317	0.142	0.175	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.209	1.360	1.540	0.929	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.839	3.236	4.789	0.854	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.350	8.927	8.930	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.317	0.544	0.322	1.208	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.666	15.660	27.945	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	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
THORIUM	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
U/TH	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

MAP UNIT QTSB

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.152	0.180	0.000	0.000	0.242	0.228	0.188	0.000	0.126	0.167	0.000	0.000	0.000	0.000
URANIUM	0.000	1.460	1.968	2.204	1.799	2.716	3.753	1.883	0.000	1.400	1.192	0.000	0.000	0.000	0.000
THORIUM	0.000	2.747	3.636	2.444	3.938	7.456	10.489	5.747	0.000	4.221	3.988	0.000	0.000	0.000	0.000
U/K	0.000	8.499	9.551	0.000	0.000	5.364	17.464	11.834	0.000	7.710	6.188	0.000	0.000	0.000	0.000
U/TH	0.000	0.512	0.628	0.965	0.507	0.371	0.417	0.301	0.000	0.329	0.299	0.000	0.000	0.000	0.000
TH/K	0.000	24.290	25.067	0.000	0.000	11.716	48.577	35.614	0.000	32.811	29.390	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	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
THORIUM	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
U/TH	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

MAP UNIT QTPRAM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.157	0.148	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.539	1.688	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.110	4.802	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.664	12.523	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.393	0.391	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	27.414	37.004	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.177
URANIUM	0.000	0.000	0.000	0.000	0.000	1.559
THORIUM	0.000	0.000	0.000	0.000	0.000	4.602
U/K	0.000	0.000	0.000	0.000	0.000	8.376
U/TH	0.000	0.000	0.000	0.000	0.000	0.345
TH/K	0.000	0.000	0.000	0.000	0.000	27.526

MAP UNIT QTPRAI

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.149	0.176	0.143	0.000	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.705	2.221	1.232	0.000	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.191	6.996	3.140	0.000	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.423	12.735	6.764	0.000	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.499	0.345	0.380	0.000	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.109	41.616	18.098	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	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
THORIUM	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
U/TH	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

MAP UNIT QTPA

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.138	0.196	0.222	0.233	0.141	0.194	0.192	0.171	0.193	0.129	0.000	0.000	0.000	0.000	0.000
URANIUM	1.379	1.646	1.966	2.200	1.856	1.762	1.880	1.737	1.839	1.606	0.000	0.000	0.000	0.000	0.000
THORIUM	2.441	3.361	3.740	6.068	3.112	4.386	6.217	5.556	5.530	4.481	0.000	0.000	0.000	0.000	0.000
U/K	8.655	11.132	10.277	9.461	9.426	10.251	10.325	10.626	9.665	12.974	0.000	0.000	0.000	0.000	0.000
U/TH	0.601	0.563	0.577	0.404	0.659	0.418	0.293	0.316	0.305	0.388	0.000	0.000	0.000	0.000	0.000
TH/K	17.718	24.833	20.813	16.102	12.584	28.157	35.677	35.331	31.418	38.996	0.000	0.000	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.139	0.169
URANIUM	0.000	0.000	0.000	0.000	1.931	1.418
THORIUM	0.000	0.000	0.000	0.000	5.080	3.007
U/K	0.000	0.000	0.000	0.000	14.181	8.478
U/TH	0.000	0.000	0.000	0.000	0.390	0.505
TH/K	0.000	0.000	0.000	0.000	38.741	19.633

MAP UNIT QTPAM

	580	590	600	610	620	630	640	650	660	670	680	690	1150	1160	1170
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.120	0.234	0.266	0.229	0.000	0.000	0.000
URANIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.296	1.898	2.355	0.000	0.000	0.000
THORIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.254	7.171	5.581	7.270	0.000	0.000	0.000
U/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.430	8.001	11.136	0.000	0.000	0.000
U/TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.322	0.355	0.329	0.000	0.000	0.000
TH/K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.811	32.076	23.322	35.740	0.000	0.000	0.000

	1180	1190	1200	1210	1220	1230
POTASIUM	0.000	0.000	0.000	0.000	0.000	0.177
URANIUM	0.000	0.000	0.000	0.000	0.000	1.056
THORIUM	0.000	0.000	0.000	0.000	0.000	2.567
U/K	0.000	0.000	0.000	0.000	0.000	5.736
U/TH	0.000	0.000	0.000	0.000	0.000	0.306
TH/K	0.000	0.000	0.000	0.000	0.000	19.532

APPENDIX H - Pseudo Contour Maps

VALDOSTA

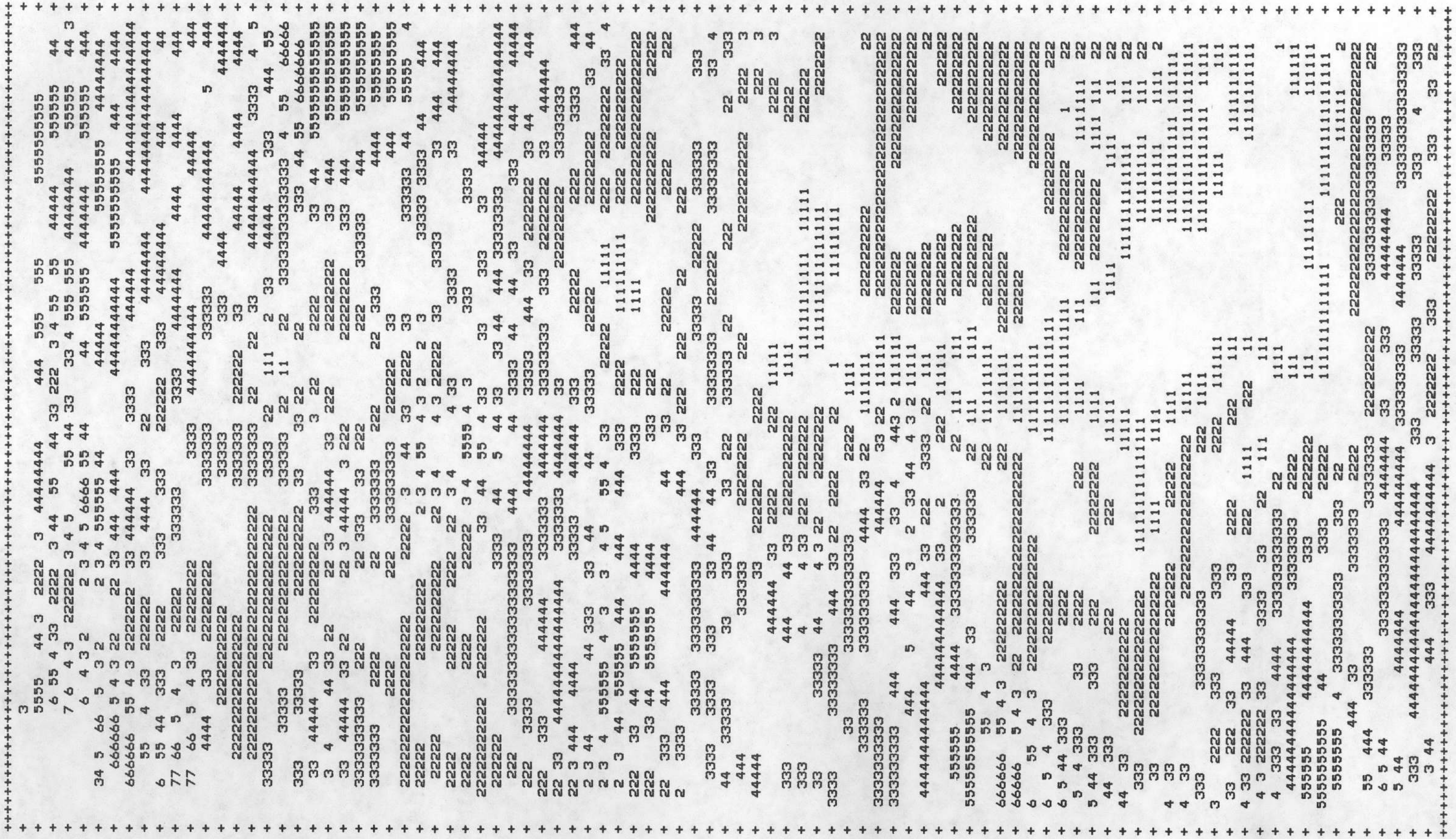
EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.0250
1	0.0250	0.0500
	0.0500	0.0750
2	0.0750	0.1000
	0.1000	0.1250
3	0.1250	0.1500
	0.1500	0.1750
4	0.1750	0.2000
	0.2000	0.2250
5	0.2250	0.2500
	0.2500	0.2750
6	0.2750	0.3000
	0.3000	0.3250
7	0.3250	0.3500
	0.3500	0.3750
8	0.3750	0.4000
	0.4000	0.4250
9	0.4250	0.4500
	GT	0.4500

SCALE IN EQUIVALENT PERCENT

Potassium Pseudo-Contour Map - Valdosta Quadrangle

VALDOSTA



Uranium Pseudo-Contour Map - Valdosta 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

VALDOSTA

Thorium Pseudo-Contour Map - Valdosta 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

VALDOSTA

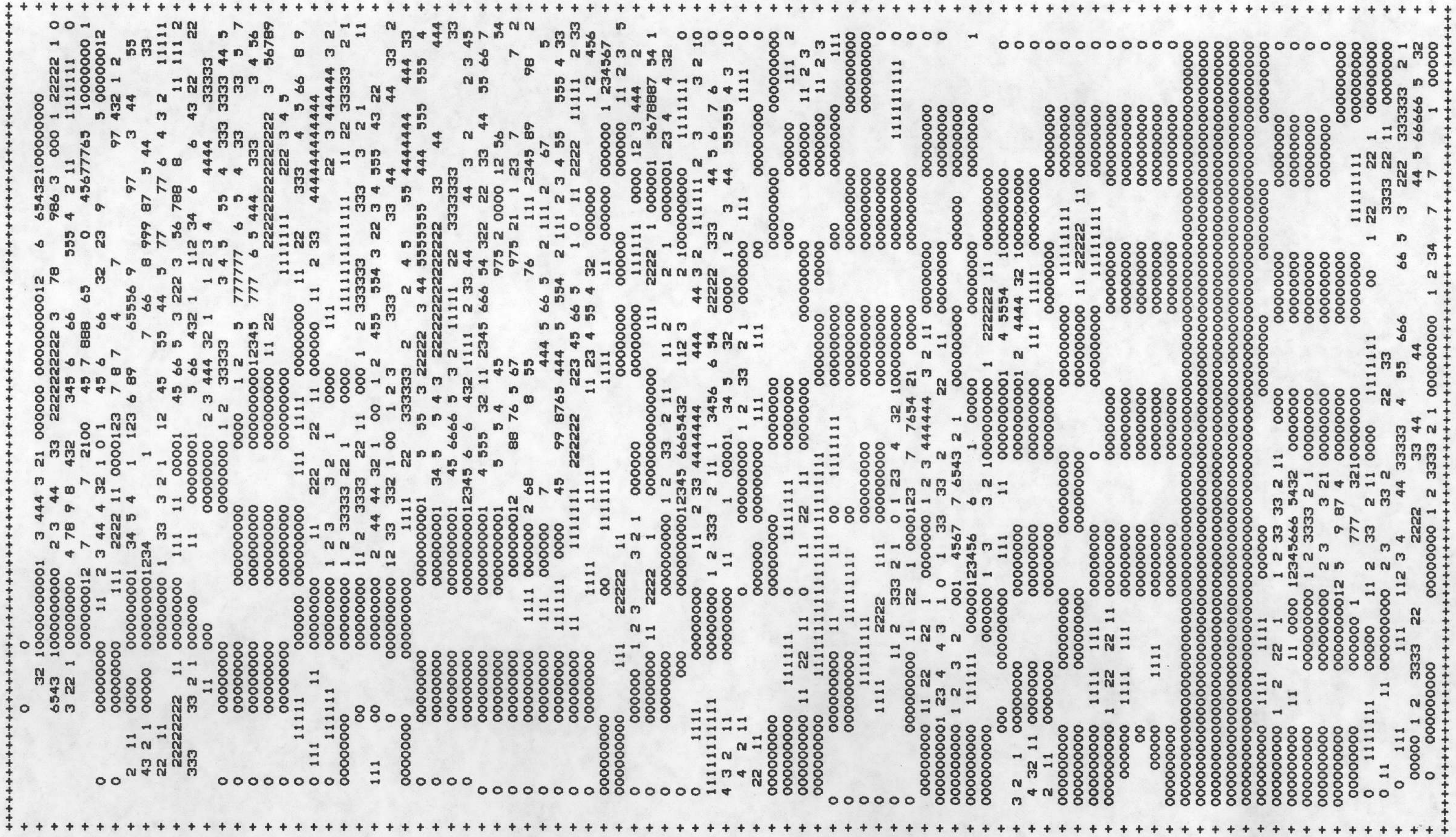
EXPLANATION

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

Thorium/Potassium Pseudo-Contour Map - Valdosta Quadrangle

H5 vj

VALDOSTA

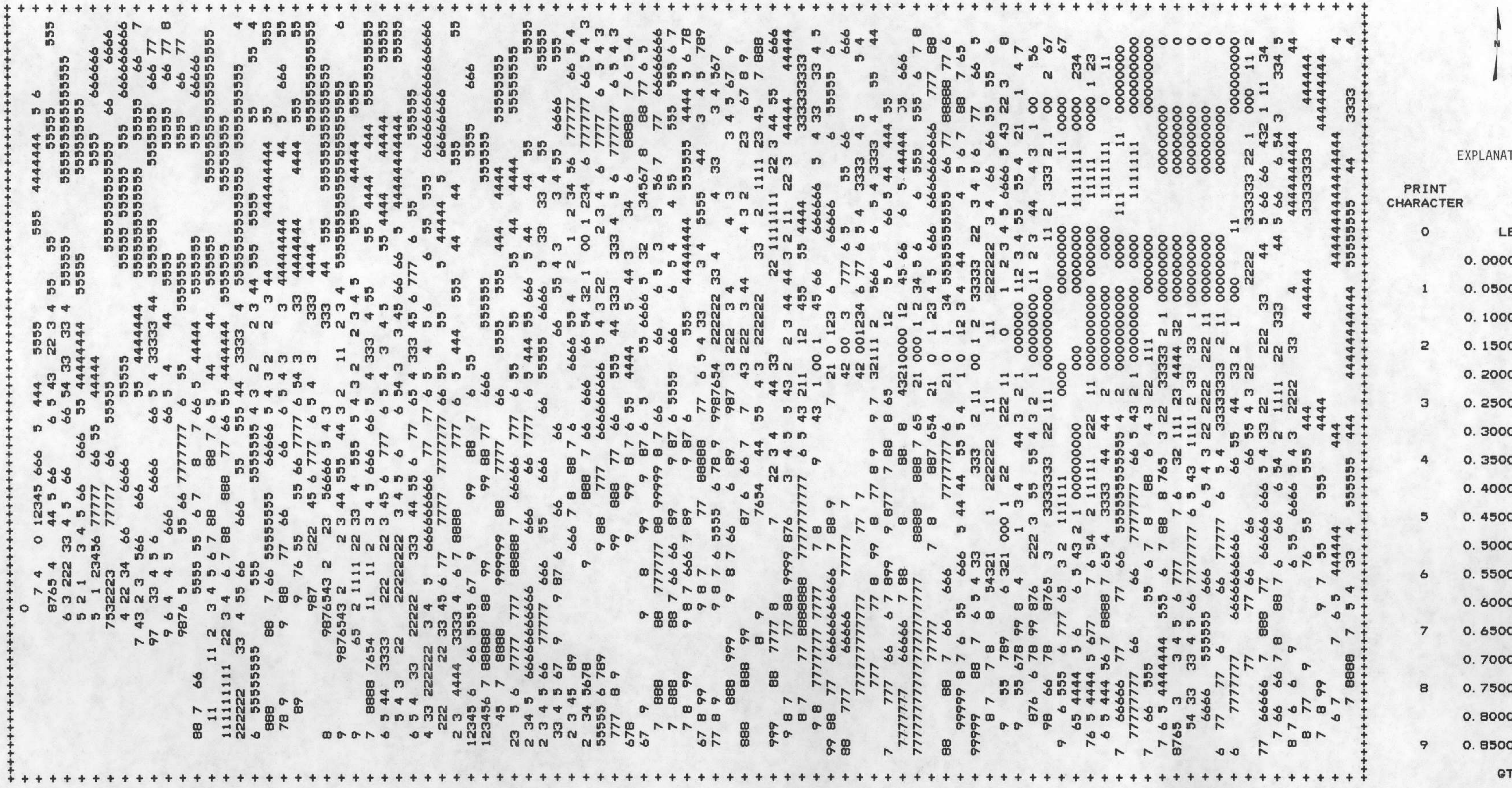


EXPLANATION

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 - Valdosta Quadrangle

VALDOSTA



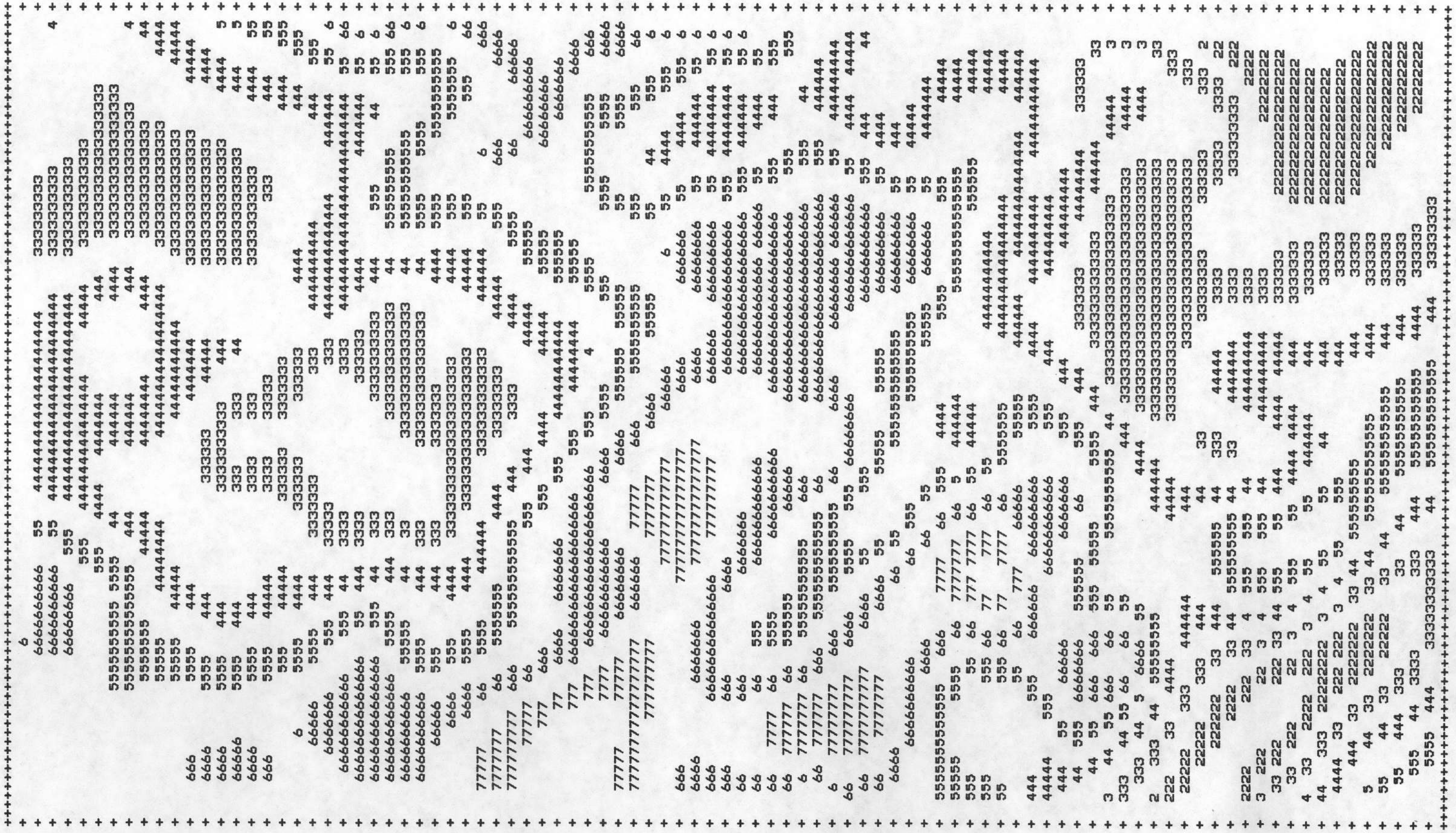
EXPLANATION

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 - Valdosta Quadrangle

H7 vj

VALDOSTA



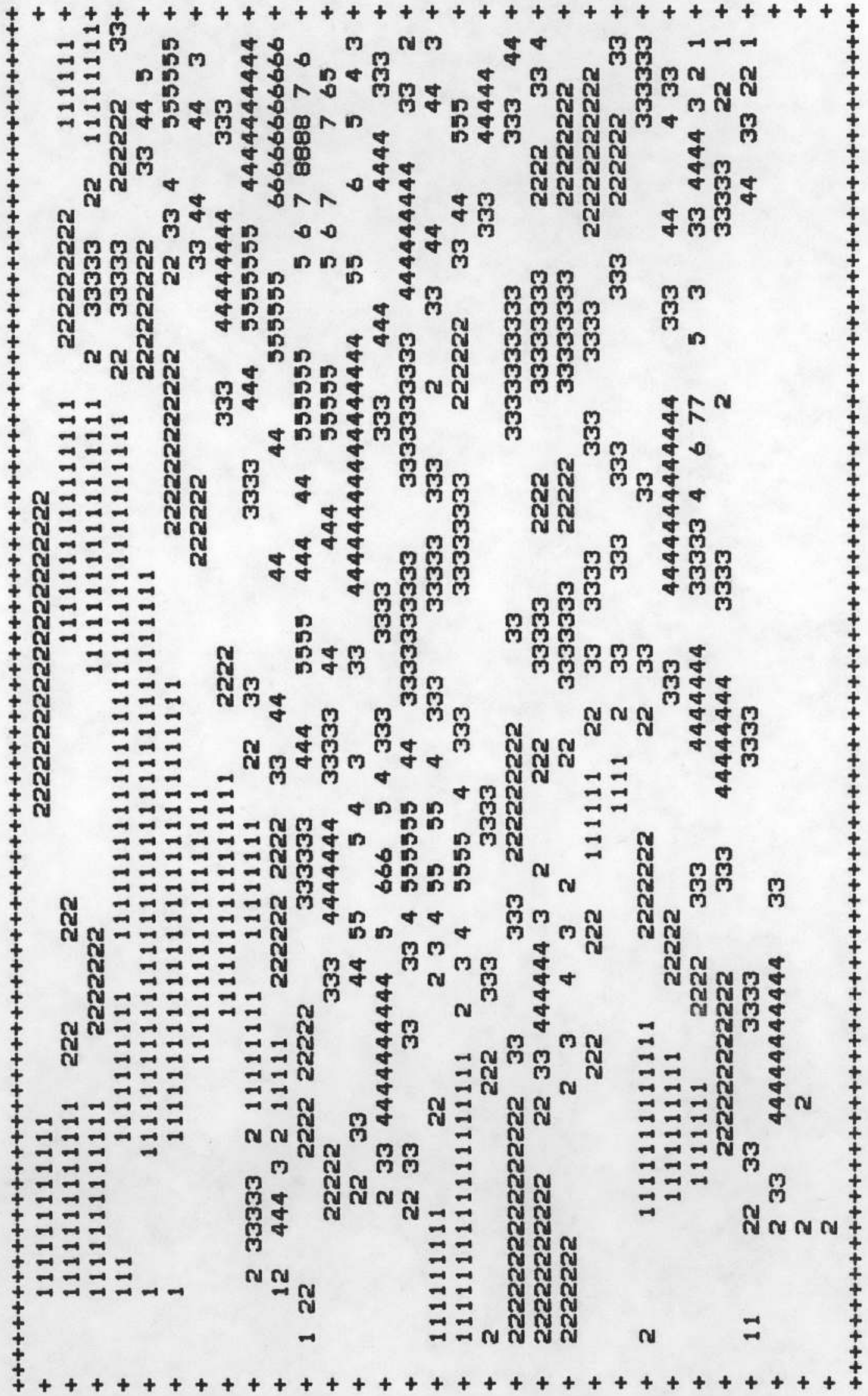
Residual Magnetic Pseudo-Contour Map - Valdosta Quadrangle

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

JACKSONVILLE



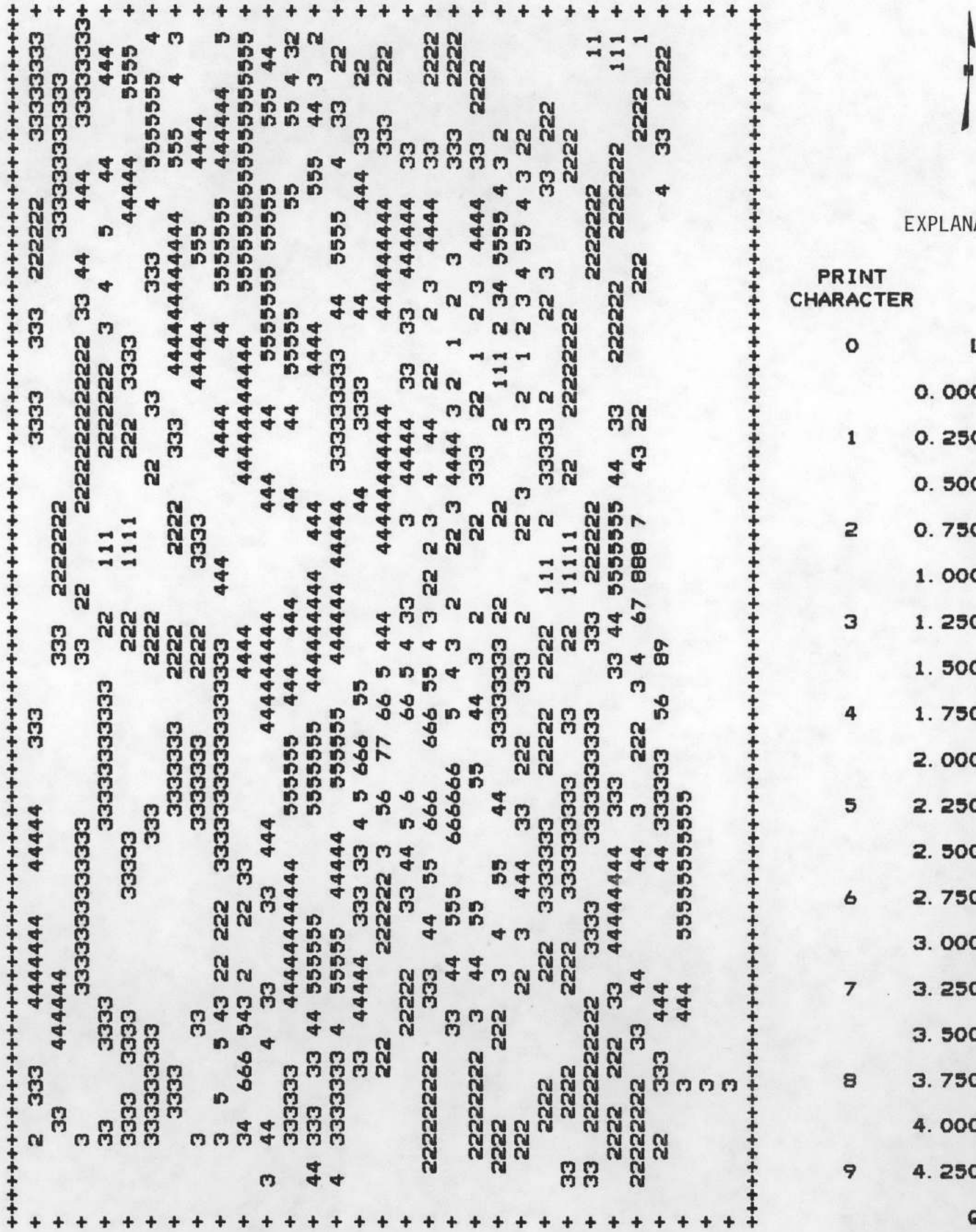
Potassium Pseudo-Contour Map - Jacksonville Quadrangle

EXPLANATION

PRINT CHARACTER	VALUE	
0	LE	0.0000
	0.0000	0.0250
1	0.0250	0.0500
	0.0500	0.0750
2	0.0750	0.1000
	0.1000	0.1250
3	0.1250	0.1500
	0.1500	0.1750
4	0.1750	0.2000
	0.2000	0.2250
5	0.2250	0.2500
	0.2500	0.2750
6	0.2750	0.3000
	0.3000	0.3250
7	0.3250	0.3500
	0.3500	0.3750
8	0.3750	0.4000
	0.4000	0.4250
9	0.4250	0.4500
	GT	0.4500

SCALE IN EQUIVALENT PERCENT

JACKSONVILLE



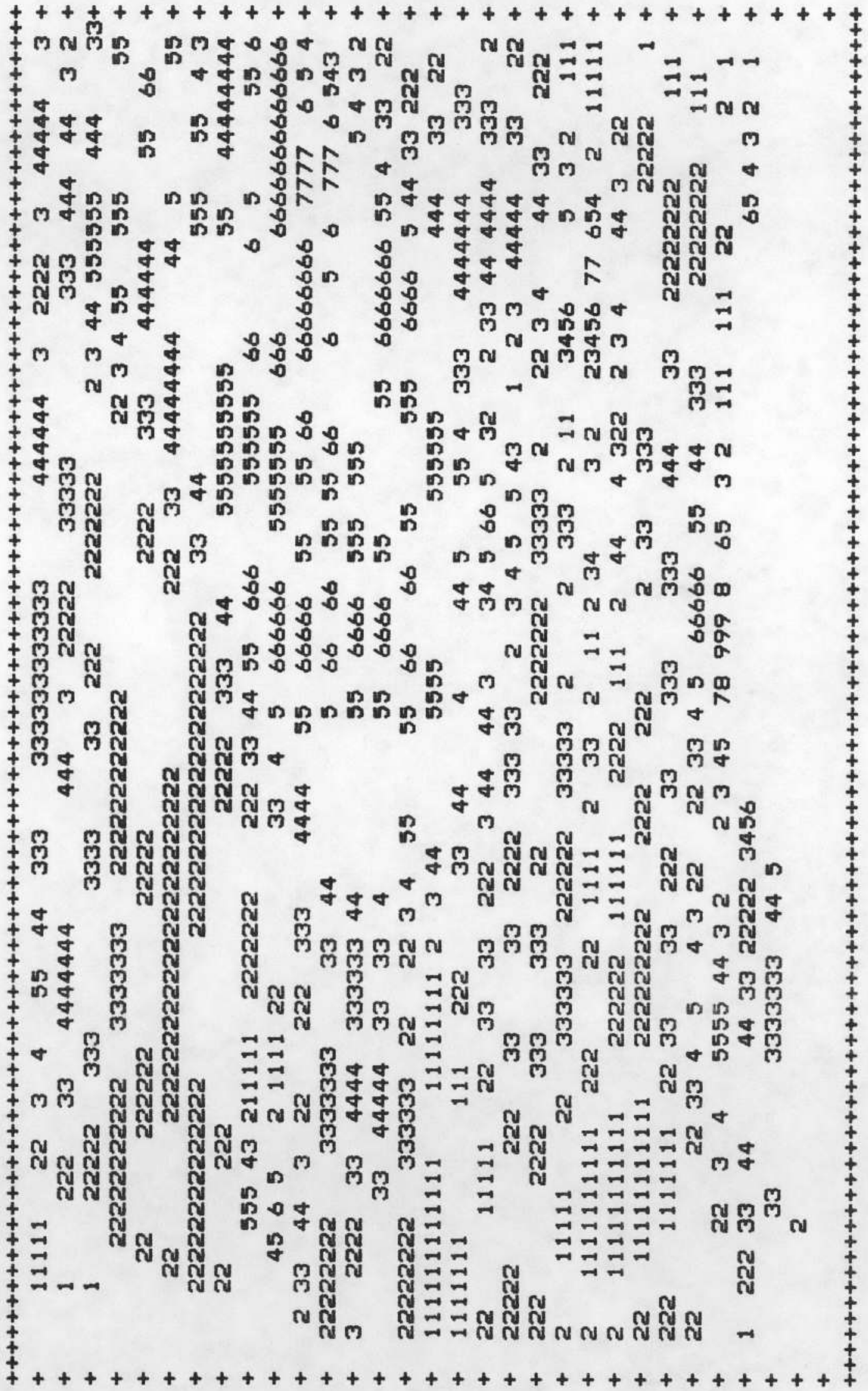
Uranium Pseudo-Contour Map - Jacksonville Quadrangle

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

JACKSONVILLE



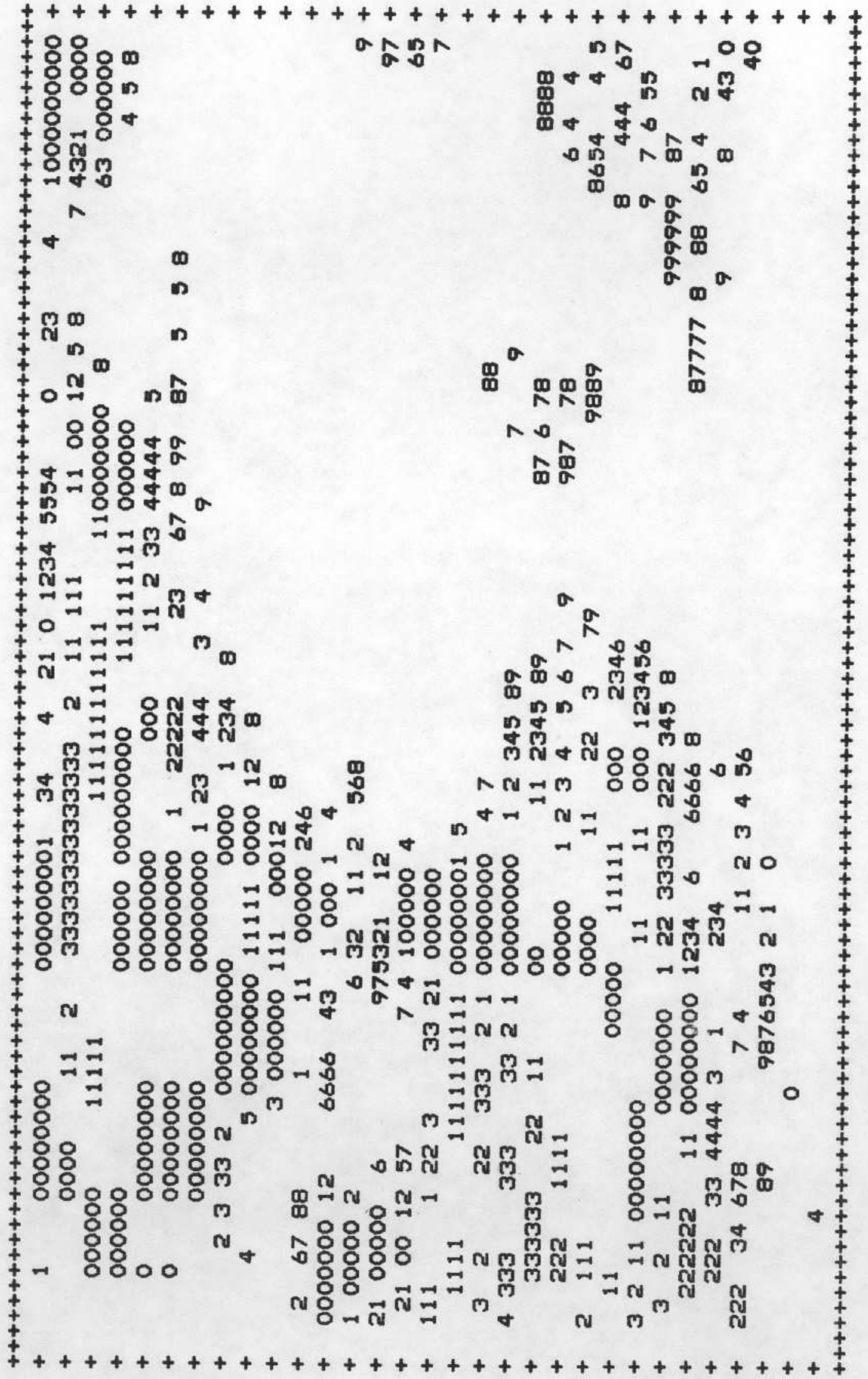
Thorium Pseudo-Contour Map - Jacksonville Quadrangle

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

JACKSONVILLE

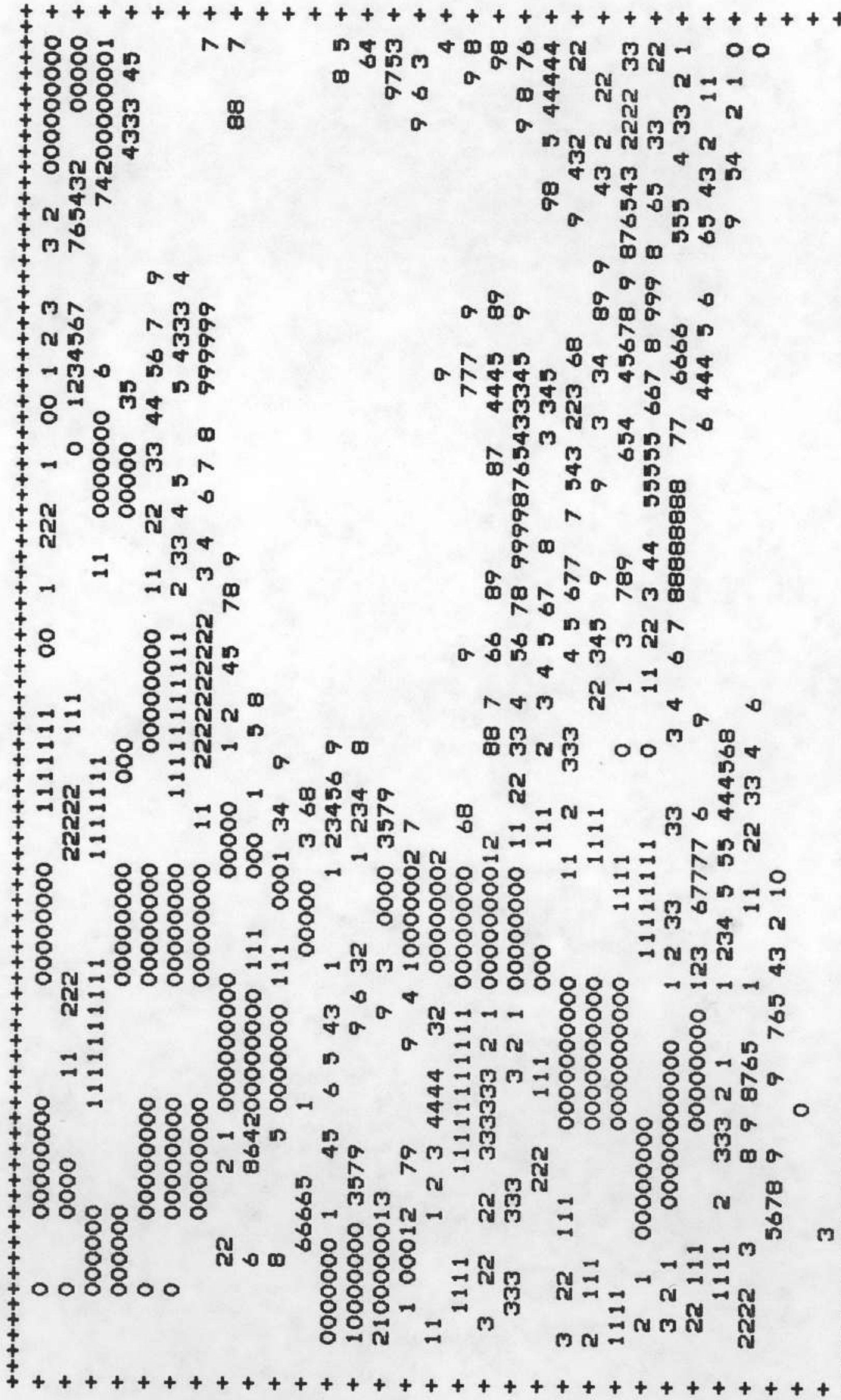


Thorium/Potassium Pseudo-Contour Map - Jacksonville Quadrangle

EXPLANATION

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

JACKSONVILLE

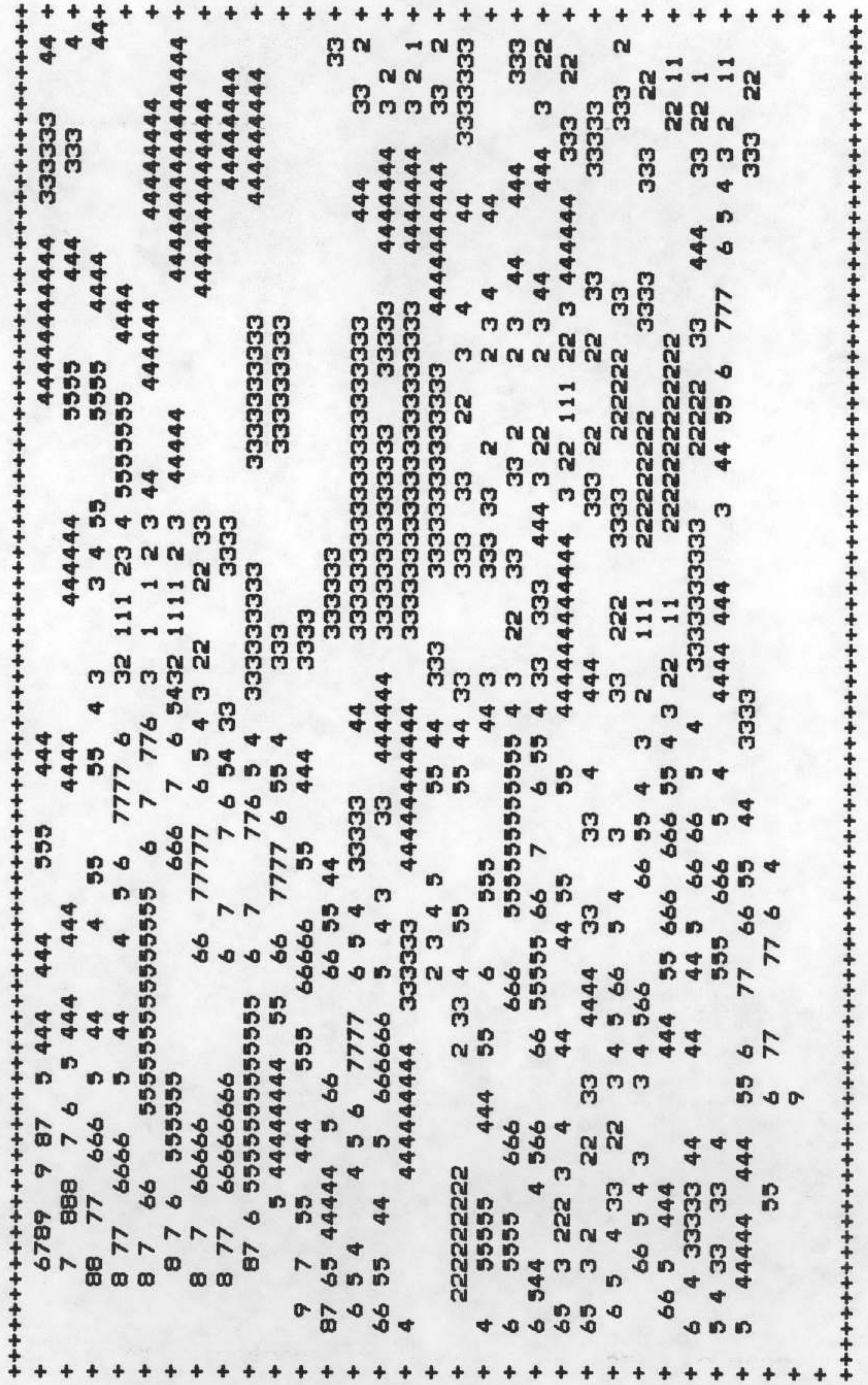


Uranium/Potassium Pseudo-Contour Map - Jacksonville Quadrangle

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

JACKSONVILLE



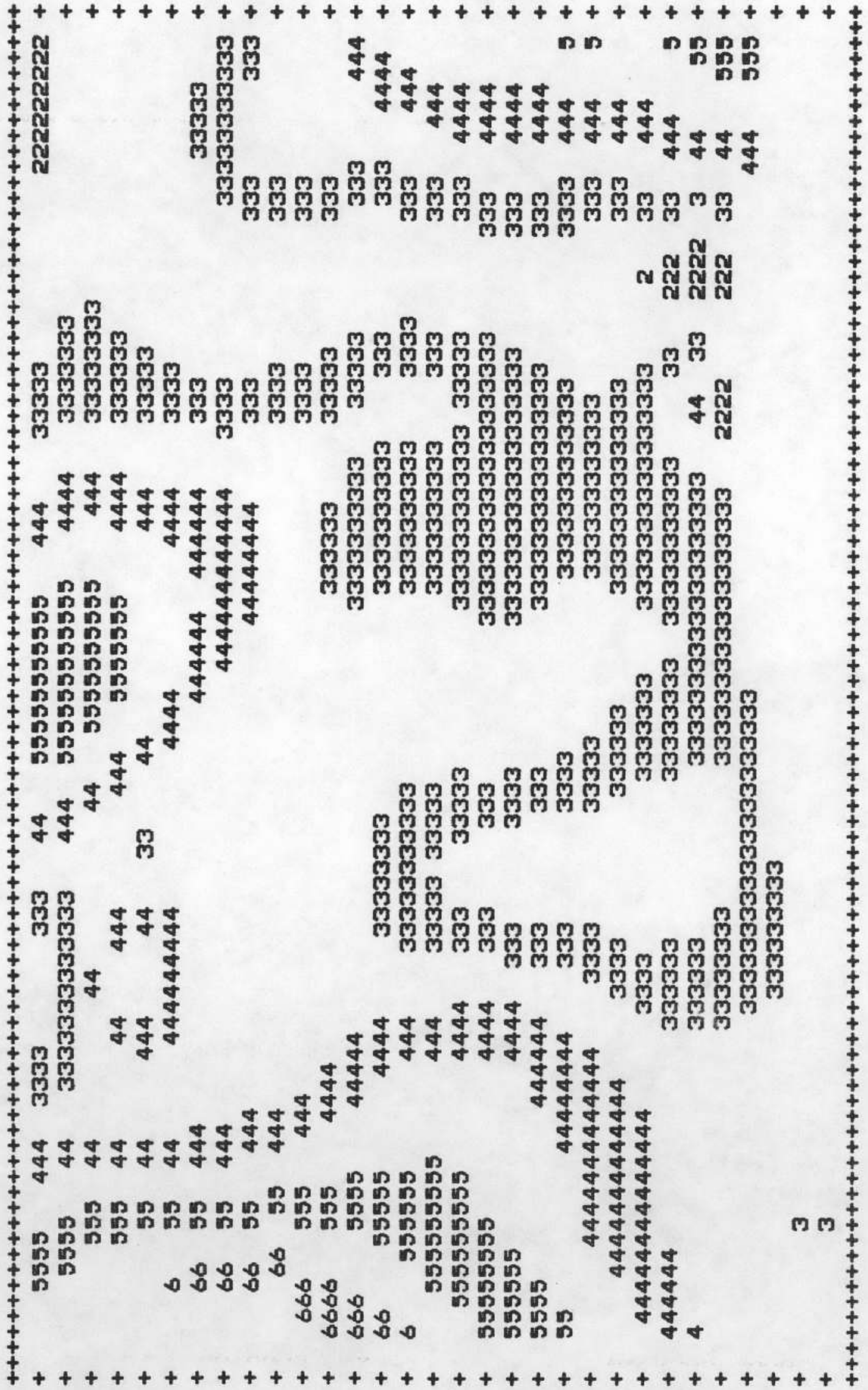
Uranium/Thorium Pseudo-Contour Map - Jacksonville Quadrangle

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

H14 vj

JACKSONVILLE



Residual Magnetic Pseudo-Contour Map - Jacksonville 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