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AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY OF PORTIONS OF THE GREAT PLAINS AND CENTRAL LOWLANDS BELOIT QUADRANGLE

VOLUME 2-E

TEXAS INSTRUMENTS INCORPORATED
Dallas, Texas

June 1978

WORK PERFORMED UNDER
BENDIX FIELD ENGINEERING CORPORATION
GRAND JUNCTION OPERATIONS, GRAND JUNCTION, COLORADO
Subcontract No. 77-072-L and Bendix Contract EY-76-C-13-1664

PREPARED FOR THE
DEPARTMENT OF ENERGY
Grand Junction, Colorado 81501

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ABSTRACT

The results of a high-sensitivity aerial gamma-ray spectrometer survey of the Beloit Quadrangle, Kansas, are presented. The work was done by Texas Instruments Incorporated under Bendix Field Engineering Corporation Subcontract No. 77-072-L as part of the U.S. Department of Energy National Uranium Resource Evaluation (NURE) Program. Descriptions of the instrumentation and methods are given in Volume 1 of this final report.

Statistical and geologic analysis of the radiometric data revealed 19 anomalies worthy of field checking as possible prospects. Of the 19 anomalies, 13 are located in or are suspected of being associated with the Tertiary Ogallala Formation and the Cretaceous Dakota Sandstone, which are believed to have the best potential for economic deposits. Three groups of anomalies are noted: those located at or near the Tertiary-Cretaceous boundary, those found in a cluster within the Cretaceous Niobrara Formation, and those clustered in the southern part of the quadrangle in Cretaceous Carlile Shale and Dakota Sandstone.

NARRATIVE

NARRATIVE

SECTION I
INTRODUCTION

A. GENERAL

This volume contains information and survey results pertaining specifically to the Beloit NTMS 1:250,000 scale Quadrangle, Kansas, one of a group of 14 such quadrangles included in an aerial radiometric and magnetic reconnaissance survey of portions of the Great Plains and Central Lowlands. Information of a general nature concerning the instrumentation and methods used in data acquisition, processing and interpretation is presented in Volume 1 of this final report.

The survey was conducted by Texas Instruments Incorporated under Bendix Field Engineering Corporation Subcontract No. 77-072-L as part of the U.S. Department of Energy National Uranium Resource Evaluation (NURE) Program.

B. URANIUM GEOLOGY AND OCCURRENCES

1. Uranium Occurrences

There are no reported uranium-mineral occurrences in this quadrangle.

2. Geologic Mapping

The geologic map used for the survey of the Beloit Quadrangle was adapted from the geologic map of Kansas (Kansas Geological Survey, 1964a) published at a scale of 1:500,000 and the geologic map of the Beloit Quadrangle (Kansas Geological Survey, 1964b) published at 1:250,000 scale. Table T-1 (TABLES Section) presents a listing of the mapped geologic units.

Sedimentary rocks exposed in this quadrangle range in age from Quaternary through Cretaceous with the oldest units exposed in the eastern portion.

3. Potential Uranium-Bearing Units

a. General

This area is near the eastern limits of a 500-mile-wide nearly north-south trending zone, to the east of the Rocky Mountains, which was indicated to be favorable for Colorado Plateau-type uranium deposits more than 20 years ago (Nininger, 1954). More recently, Malan (1972) suggested that a region to the west of this quadrangle was favorable for stratiform uranium deposits in Mesozoic and Cenozoic host rocks. Malan (1972) demonstrated the regional relationship between foldbelts, in which Precambrian rocks contain anomalously high uranium, and forelands where there are economic uranium deposits. Department of Energy (1977) indicates most of this quadrangle to be favorable for uranium resources. It is part of a hundred-mile-wide northeasterly trending belt that passes through Kansas and Nebraska. Department of Energy (1977) did not estimate potential uranium resources because of insufficient data.

b. Deposits Associated with Sediments

Based on occurrences in nearby areas the Dakota Sandstone holds the greatest potential for economic production. Uranium has been produced from the Dakota Sandstone in Colorado, New Mexico, and Utah (Finch, 1967). Limited exposures of the Dakota are located in the southeast corner of the quadrangle.

Occurrences of uranium minerals have been found in the Ogallala in New Mexico (Finch, 1967). Exposures of the Ogallala are present on the western side of the Quadrangle.

Zeller et al. (1975) reported anomalous radioactivity in western Kansas associated with beds in the Quaternary, Ogallala Formation, basal Pierre Formation (Sharon Springs Member), Smoky Hill Member of the Niobrara Formation, and the Dakota Sandstone.

SECTION II

RADIOMETRIC DATA INTERPRETATION

A. SELECTION OF URANIUM ANOMALIES

1. Statistical Considerations

The equivalent uranium (eU*), equivalent uranium/equivalent thorium (eU/eTh*), and equivalent uranium/potassium (eU/K*) data sets each were computer processed to identify and outline all individual or groups of statistically high data points on the following basis. If a single statistically high point is considered in terms of multiples of the standard deviation above the mean (i.e., significance factor), then the probability that its value was caused by random variation of the background is shown in Table 2-1.

The maximum probability of 1:768 was used to judge the reliability of single isolated statistically high points in the data interpretation.

Spatial groupings of statistically high values are less probable than a scattering of the same values over the map unit. If a spatial grouping consists of adjacent statistically high points, the probability (P) that all the points were caused by random fluctuations is:

$$P = P_1 \cdot P_2 \cdot P_3 \ \ldots \ P_n$$

where $P_1, P_2, \ldots P_n$ represent the single-point probabilities for n points.

Assuming the same certainty criterion of 1:768, Table 2-2 gives the minimum requirements for all adjacent points in a reliable anomaly. This allows groupings of statistically high (or low) points more than 0.87 standard deviations from the mean to be evaluated.

2. Uranium Anomalies

Data for the Beloit Quadrangle, including eU, eU/eTh and eU/K, were searched by the computer and all acceptable significant anomalies identified. These were printed out on the "preferred-anomaly" map (Figure 2-1) as asterisk symbols for each data point constituting a valid anomaly. The eU anomalies are indicated by asterisks along the flight line, and eU/eTh anomalies are shown by asterisks N of E-W flight lines and E of N-S flight lines. The eU/K anomalies are indicated by asterisks S of E-W flight lines and W of N-S flight lines.

Next, those eU anomalies were identified that showed a geochemical enrichment of eU over the eTh and/or K present. First-priority anomalies are those showing simultaneous statistically valid eU, eU/eTh and eU/K anomalies. The preferred-anomaly map (Figure 2-1) has been marked to indicate the locations of all first-priority anomalies, which are described in Table 2-3.

*eU = Equivalent uranium measured by bismuth-214.
eTh = Equivalent thorium measured by thallium-208.
K = Potassium measured by potassium-40.

TABLE 2-1. PROBABILITY THAT A SINGLE STATISTICALLY HIGH POINT IS CAUSED BY RANDOM DEVIATIONS*

Point Value	Probability
Mean + 1 standard deviation	0.1587 or 1:6.3
Mean + 2 standard deviations	0.0228 or 1:44
Mean + 3 standard deviations	0.0013 or 1:768

*A probability is determined as the area under the standardized normal distribution curve above the indicated value.

The user can outline these anomalies on the appropriate profile maps to evaluate more quantitatively the relative magnitudes of the anomalies. The profile maps are also useful in delineating areas relatively depleted in uranium, which was removed by geochemical activity and later concentrated in nearby deposits. Recent study has shown that the Gas Hills and Shirley Basin uranium districts are accompanied by uranium-barren altered areas detectable by aerial gamma-ray spectrometry (Texas Instruments, 1977).

Second-priority anomalies that, under special circumstances, may indicate potential uranium prospects are those showing a combination of only two statistically valid anomalies out of the three parameters, eU, eU/eTh and eU/K. These are easily identifiable on the preferred anomaly map. Examples illustrating special situations where second priority anomalies can be important indicators of uranium prospects are presented in Table 2-4.

B. DATA TABLES AND HISTOGRAMS

1. General

Microfiche copies of the single-record and averaged-record data listings are included in Volume 1 of this report. Statistical summary tables, flight-line mean values, and histograms for the gamma-ray parameters are presented by geologic unit in this volume. Further explanations are given in Volume 1.

2. Statistical Summary Tables

Tables showing the distribution types, statistical parameters, and number of samples for each geologic formation are presented for eU, eTh, K, eU/eTh, eU/K and eTh/K in the TABLES Section. These are useful in studying the magnitudes and variations of the radioactivity of the formations relative to one another and to the normal U, Th, and K abundances in the lithologic types represented. Approximate conversion factors from counts per second to concentration units are given in Table 2-5.

Examination of the Statistical Summary Tables shows all units except Qds to have equally high eU content. None, however, is abnormally high for its lithology.

TABLE 2-2. MINIMUM DEVIATION FROM THE MEAN FOR ALL POINTS FOR LIMITING PROBABILITY OF 1:768 (Elkins, 1940)

Number of Points Supporting Anomaly	Minimum Deviation
1	3.00 standard deviations
2	1.79 standard deviations
3	1.22 standard deviations
4	0.87 standard deviation

3. Flight-Line Averages

Mean values for eU, eTh, K, eU/eTh, eU/K, and eTh/K by geologic unit for each flight line in the Beloit Quadrangle are given in the TABLES Section. These may be used to study the variation in gamma-ray parameters within a formation at intervals across the quadrangle from N to S or E to W.

4. Histograms

Histograms for each radiometric parameter are presented for each geologic unit in the HISTOGRAMS section.

One of the preliminary histograms showed an obvious trimodal distribution, which indicated that more than one lithologic type was present in the mapped unit. The distributions for Kgg (Greenhorn Limestone and Greneros Shale) were split into Kgg-1, Kgg-2 and Kgg-3 based on the K histogram in H-7. New histograms were prepared and new means and standard deviations were calculated prior to the computerized geologic analysis of the data. The resulting split histograms are shown in H-8, H-9, and H-10. Table 2-6 summarizes the results of the histogram split for this quadrangle with median eU, eTh and K values computed from the Statistical Summary Tables and the calibration constants in Table 2-5. Comparing the values in Table 2-6 with the estimated crustal averages for various rock types in Table 2-7 as compiled by Kogan et al. (1971; see also Saunders and Potts, 1978) allows at least a reasonable guess concerning the average lithology of the subunits. Based on the description of Kgg it would seem that Kgg-1 is predominantly a shaly limestone, Kgg-2 is a calcareous shale and Kgg-3 is predominantly shale.

C. MAPS AND PROFILES

1. General

Explanations concerning the generation and presentation of maps and profiles are given in Volume 1.

2. Profile Maps

Profile maps depicting the significance-factor levels (with respect to geologic units) for eU, eTh, K, eU/eTh, eU/K and eTh/K are presented in the MAPS section along with a map of the record locations and geology (M-1 through M-7). These may be compared directly with the preferred anomaly map (Figure 2-1) in order to determine the relative strengths of the eU, eU/eTh and eU/K anomalies and their relationship to the geology.

3. Radiometric Stacked Profiles

The PROFILES section (P-1 to P-18) contains stacked profiles that show the variation in absolute magnitudes of eU, eTh, K, eU/eTh, eU/K and eTh/K as well as gross count, residual magnetic field, terrain clearance, eU-air values, and geology along each flight line. This presentation allows simultaneous examination of all information at each averaged-record location. The data as shown are not corrected for geology (as are those on the profile maps), thereby providing an opportunity to study the relative differences in counting rates among the geologic units.

The altitude (terrain clearance) trace allows identification of the portions of flight lines where terrain clearance requirements were exceeded and the data were discarded during the statistical processing. The averaged record locations are flagged along the baseline. The eU, eTh and K traces are similarly flagged where data is discarded because of failure of the Currie significance test. The discarded data points are included in the stacked profiles, and may be examined if it is kept in mind that they are generally statistically unreliable. If the rock types are sufficiently radioactive, normal terrain clearance may be exceeded somewhat with reasonably reliable statistics, and the added information may be useful.

4. Magnetic Stacked Profiles

The single-record (unaveraged) data on flight-level air temperature, flight-level barometric pressure, average terrain clearance, diurnal magnetics, residual total magnetic field and geology are shown for each flight line in the PROFILES section (P-19 through P-36).

D. CONCLUSION

1. General

Nineteen of the 52 first-priority anomalies in this quadrangle have been classified as possible uranium prospects based on their geology and eU-anomaly characteristics. (See Table 2-3.) Anomalies in shale units were arbitrarily classed as possible U prospects if the eU intensity of any sample in the anomaly exceeded 4.0 standard deviations above the mean. Ten of the 19 anomalies are located in or are associated with the Ogallala Formation, and three are located in or are associated with the Dakota Sandstone. Both formations are known to be uranium-bearing elsewhere and are judged to be the best possibilities for potential economic deposits.

Table 2-8 lists the number of anomalies and the total number of eU records in each formation. Most eU anomalies are found in Ql which covers most of the quadrangle. In this quadrangle Ql shows median values of the six gamma-ray parameters to be at least as high as or higher than Tertiary and Cretaceous units. Either Ql was derived from the Tertiary and/or Cretaceous units or Ql is not of sufficient thickness to completely mask the older units. The

TABLE 2-3. PREFERRED eU ANOMALIES--BELOIT QUADRANGLE

Anomaly No.	Line No.	Geologic Unit(s)	Highest eU S.F.*	Number of Averaged Records	Remarks
(1)	29	To/Ql	2.0	2	Possible U prospect (To)
2	211	Kn/Qnl	3.0	5	Possible high shale content
3	29	Kn/Qal	3.0	4	Possible high shale content
4	31	Ql	2.5	4	Possible high shale content
(5)	210	Kn/Qal	5.0	5	Possible black shale U prospect
6	31	Kn/Ql	2.0	2	Possible high shale content
7	31	Kn	3.0	6	Possible high shale content
(8)	32	To/Kn	3.0	2	Possible U prospect (To)
9	212	Kn	1.5	3	Possible high shale content (by road)
10	33	Kn/Ql/Qal	3.0	3	Possible high shale content (by road)
11	33	Ql	3.5	3	Possible high shale content (Kn)
12	33	Qal	2.0	2	Possible high shale content (Kn)
13	33	Ql	1.5	3	Possible high shale content (Kn)
(14)	34	Ql	3.0	3	Possible U prospect (To)
(15)	34	To/Ql	3.0	3	Possible U prospect (To)
(16)	34	To/Ql	2.0	5	Possible U prospect (To)
(17)	34	To	2.0	3	Possible U prospect (To)
18	34	Kn	2.5	3	Possible high shale content
19	34	Kn/Ql	2.0	3	Possible high shale content
20	34	Kn/Ql	2.0	4	Possible high shale content
(21)	35	Ql	3.0	2	Possible U prospect (To)
(22)	35	To/Kn/Ql	3.0	6	Possible U prospect (To)
23	35	Kn	2.5	2	Possible high shale content
24	35	Kn/Ql	2.0	2	Possible high shale content
25	35	Kn/Ql	2.5	3	Possible high shale content
26	36	Kn/Ql	2.0	3	Possible high shale content
27	37	Ql	2.0	2	Possible high shale content (Kn)
28	38	Kn	3.0	2	Possible high shale content
(29)	38	Ql	6.0	2	Possible black shale U prospect (Kn)
30	38	Ql	2.5	2	Possible high shale content (Kn)
31	38	Kn/Ql	2.0	3	Possible high shale content
32	38	Kn/Ql	2.0	3	Possible high shale content
33	38	Ql/Qal	2.0	4	Possible high shale content (Kn)
34	38	Ql	2.0	2	Possible high shale content (Kn)
35	38	Kgg/Qal	2.0	3	Possible high shale content
36	210	Kn/Ql	2.5	3	Possible high shale content
37	41	Kn/Ql	2.0	3	Possible high shale content
(38)	41	Kn	5.5	3	Possible black shale U prospect
39	41	Kc	2.5	9	Possible high shale content
40	41	Kc/Ql	3.0	10	Possible high shale content
(41)	41	Qal	2.0	2	Possible U prospect (Kd)
(42)	41	Kd/Kgg	2.0	2	Possible U prospect (Kd)
(43)	41	Kd/Kgg	2.0	2	Possible U prospect (Kd)
(44)	209	Kn/Ql	4.0	3	Possible black shale U prospect

TABLE 2-3. PREFERRED eU ANOMALIES--BELOIT QUADRANGLE (Continued)

Anomaly No.	Line No.	Geologic Unit(s)	Highest eU S.F.*	Number of Averaged Records	Remarks
(45)	42	To/Ql	3.0	2	Possible U prospect (To)
46	42	Ql	2.0	1	Possible high shale content (Kn)
47	42	Kn	2.5	3	Possible high shale content
(48)	42	To	2.5	2	Possible U prospect (To)
(49)	42	Kc/Ql	5.5	3	Possible black shale U prospect
50	42	Kc/Ql	3.0	3	Possible high shale content
(51)	42	Ql	4.0	2	Possible black shale U prospect (Kc)
52	211	Kgg	2.0	4	Possible high shale content

*S.F. = Significance factor (from eU profile map--nearest 0.5 unit).

◯ = Possible uranium prospect.

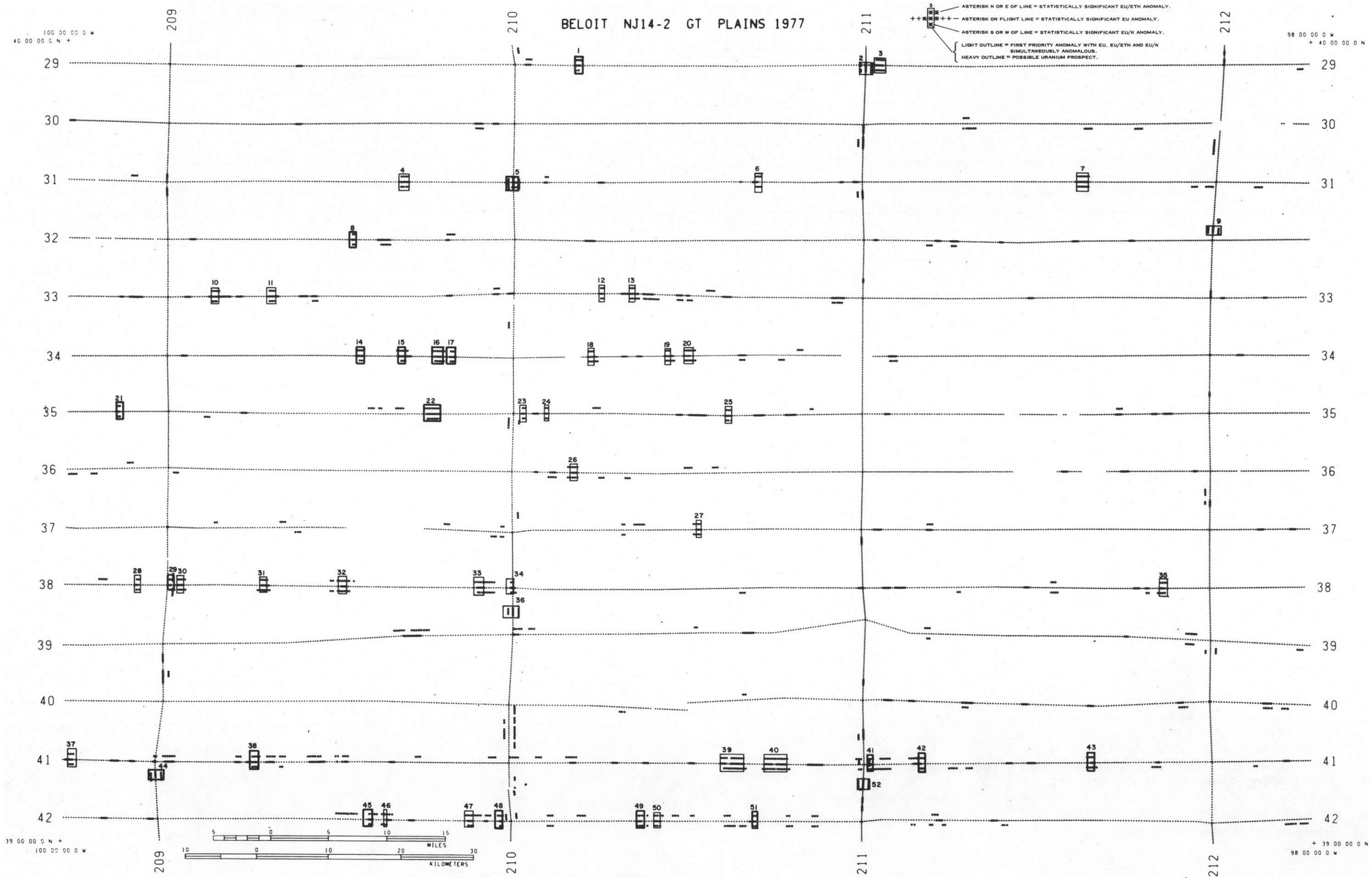

Figure 2-1. Preferred-Anomaly Map

TABLE 2-4. EXAMPLES OF POTENTIALLY IMPORTANT SECOND-PRIORITY ANOMALIES (Texas Instruments, 1977)

Valid Anomalies	No Anomaly	Locality Description
eU + eU/K	eU/eTh	Shirley Basin, Wyoming; high thorium due to surface layer of monazite yields normal eU/eTh even in areas where eU is anomalously high.
eU + eU/eTh	eU/K	Regions with surface evaporite deposits rich in potash yield normal eU/K even when eU is anomalously high.
eU/eTh + eU/K	eU	Areas of water-saturated surface material or heavy vegetation can shield eU, eTh, and K radiations simultaneously, but the ratios will still reflect the hidden relative eU enrichment.

highest ratios of anomalies to total records are Kn, To, and Kd. However, most anomalies in Kn are suspected of being uranium-rich shale units.

In this survey, uranium anomalies 14, 34, and 36 appeared to be associated with oilfields. These may have been due to radioactive residues in oil well sumps or slush pits that received water separated from the produced oil. Such radioactive occurrences in nearby areas of the Great Plains have been described by Blair et al. (1973), Gott and Hill (1953), Pierce et al. (1956), and Hail (1957). In general, they appear to be caused by radium and its daughters in the oilfield waters. No such occurrences have been described for this quadrangle; however, Pierce et al. (1956) indicated this area contains helium-bearing natural gases, and a large part of the helium is believed to be derived from alpha decay of uranium and its daughters contained in asphaltites of the gas-producing rocks.

TABLE 2-5. CALIBRATION CONSTANTS*

Element	Constant
eU	15.5 cps/ppm
eTh	7.9 cps/ppm
K	134.0 cps/%

*Based on Lake Mead Test Strip calibration of April 5, 1977.

2. **Uraniferous Provinces**

The anomalies can be divided mainly into three types: those located at or near the Tertiary-Cretaceous boundary (anomalies 1, 4, 5, 8, 10, 11, 14 to 17, 22, 28 to 32, 37, 38, and 44 to 48), those found in a cluster within the Cretaceous Niobrara Formation in the central part of the quadrangle (anomalies 12, 13, 18 to 20, 23 to 27, 33, 34 and 36), and those found clustered in the southern part of the quadrangle in the Cretaceous Carlile Shale and Dakota Sandstone (anomalies 39 to 43 and 49 to 51).

Any first-priority anomalies associated with oilfields in this region are suspect of being caused by radium-rich oilfield brines.

TABLE 2-6. RADIOMETRIC ANALYSES OF SELECTED MAP UNITS–BELOIT QUADRANGLE

Formation	Split On (cps)	Median Values eU (ppm)	eTh (ppm)	K (%)	eTh/eU	Probable Lithology	Possible Formation
Kgg-1	K = 160	2.7	7.1	0.98	2.6	Shaly limestone	Greenhorn Ls.
Kgg-2	K = 245	2.8	10.4	1.52	3.7	Calcareous shale	Greenhorn Ls.
Kgg-3		2.8	12.4	1.99	4.4	Shale	Greneros Shale

TABLE 2-7. AVERAGE U, Th, K CONTENT OF ROCKS (after Kogan et al., 1971)

Rock Type	Average Values U (ppm)	Th (ppm)	K (%)	Th/U
Continental Crust	2.5	13.0	2.5	5.2
Igneous Rocks				
Acidic (granites)	3.5	18.0	3.34	5.1
Intermed. (diorites)	1.8	7.0	2.31	4.0
Basic (basalt-gabbro)	0.5	3.0	0.83	6.0
Ultrabasic (dunite-peridotite)	0.003	0.005	0.03	1.7
Sediments				
Shale, clay	4.0	11.0	3.2	2.8
Sandstone	3.0	10.0	1.2	3.3
Limestone	1.4	1.8	0.3	1.3
Evaporite	0.1	0.4	0.1	4.0

TABLE 2-8. GEOLOGIC FORMATIONS WITH eU ANOMALIES

Formation	Number of First-Priority Anomalies	Total Number of eU Records in Formation
Qal	8	6,103
Qds	–	30
Ql	32	24,631
To	8	2,388
Kn	24	5,150
Kc	4	2,075
Kgg	4	1,685
Kd	2	815

3. Suggestions for Further Work

Follow-up studies should include ground checks of the most promising eU anomalies in the zones described in Section II.D.2. If study of the stronger anomalies indicate it to be desirable, the other anomalies should also be examined to verify their exact nature. Many of the anomalies could be caused by uranium-rich black shales that may become economically viable low-grade sources of uranium.

If the ground checks prove fruitful, it could be advantageous to fly detailed aerial radiometric surveys over the areas surrounding the most promising anomalies. This survey covered only a small percentage of the surface, and closer line spacing would delineate all anomalies that might represent potential uranium deposits.

Summary discussions of possible follow-up exploration methods are presented by Saunders and Potts (1978).

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TABLES

TABLES

TABLE T-1. GEOLOGIC MAP UNITS–BELOIT QUADRANGLE

Computer Symbol	Map Symbol	Description
Quaternary		
QAL	Qal	Aluvium
QDS	Qds	Dune Sand
QL	Ql	Loess
QT	Qt	Terrace Deposits: Includes McPherson Formation in Central Kansas, Gerlane Formation in Southwestern Kansas and approximately equivalent terrace deposits of gravel, sand and silt of the Arkansas River Valley.
Tertiary		
TO	To	Ogallala Formation: Includes undifferentiated areas of loess, sand and gravel belonging to the Sanborn Formation of Pleistocene Age.
Cretaceous		
KN	Kn	Niobrara Chalk: (Gulf Series = Colorado Group) Chalk and argillaceous limestone. Chalk contains interbedded layers of chalky shale.
KC	Kc	Carlile Shale: (Gulf Series) Shale, limestone and sandstone. At top is a siltstone or very fine-grained sandstone. Lower 100 feet of shale is calcareous and contains many thin bedded, shaly limestone layers.
KGG	Kgg	Greenhorn Limestone and Greneros Shale: (Gulf Series) Greenhorn Limestone is gray shaly limestone, dark-gray calcareous platy shale and yellowish-gray beds of calcarenite and limestone. Graneros shale is dark-gray noncalcareous shale.
KD	Kd	Dakota Group: (Comanche Series) Sandstone.

TABLE T-2. STATISTICAL SUMMARIES

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS

GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QAL	N	N	N	LN	LN	N
QDS	LN	LN	LN	N	N	N
QL	N	N	N	LN	LN	N
TO	N	N	N	N	LN	N
KN	N	N	N	LN	LN	N
KC	N	N	N	LN	LN	N
KGG-1	LN	LN	N	LN	N	N
KGG-2	N	N	N	LN	LN	N
KGG-3	N	N	LN	N	N	LN
KD	N	N	N	LN	LN	LN

GEOLOGIC UNITS ARE ABBREVIATIONS. FOR ACTUAL NAMES AND DESCRIPTIONS SEE TEXT.

N=NORMAL; LN=LOGNORMAL. (LN) INDICATES ASSUMED DISTRIBUTION TYPE; INSUFFICIENT DATA AVAILABLE FOR VALID STATISTICAL TEST

STATISTICAL SUMMARY FOR URANIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6103.	18.365	26.564	34.764	42.963	51.163	59.362	67.562
QDS	30.	19.378	22.132	25.277	28.869	32.971	37.656	43.007
QL	24631.	20.170	28.195	36.220	44.245	52.270	60.295	68.320
TO	2388.	14.721	23.980	33.238	42.497	51.755	61.014	70.273
KN	5150.	12.962	22.894	32.827	42.760	52.692	62.625	72.557
KC	2075.	14.704	24.193	33.682	43.171	52.660	62.148	71.637
KGG-1	362.	23.388	28.435	34.571	42.030	51.100	62.126	75.531
KGG-2	819.	17.973	26.319	34.665	43.012	51.358	59.704	68.050
KGG-3	504.	22.199	29.270	36.341	43.412	50.483	57.555	64.626
KD	815.	16.111	24.622	33.133	41.643	50.154	58.665	67.175

STATISTICAL SUMMARY FOR THORIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6115.	51.915	63.532	75.150	86.768	98.386	110.004	121.622
QDS	30.	44.762	48.771	53.139	57.898	63.084	68.734	74.890
QL	24640.	57.451	70.114	82.778	95.441	108.105	120.768	133.432
TO	2390.	54.999	66.778	78.557	90.336	102.116	113.895	125.674
KN	5155.	36.891	52.416	67.941	83.467	98.992	114.517	130.043
KC	2075.	43.985	59.714	75.443	91.172	106.901	122.630	138.359
KGG-1	362.	36.194	41.829	48.341	55.867	64.565	74.618	86.235
KGG-2	819.	49.608	60.409	71.209	82.009	92.810	103.610	114.410
KGG-3	504.	77.106	84.129	91.152	98.174	105.197	112.220	119.242
KD	815.	45.231	59.837	74.444	89.050	103.657	118.263	132.869

STATISTICAL SUMMARY FOR POTASSIUM

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6115.	152.708	189.083	225.458	261.833	298.207	334.582	370.957
QDS	30.	237.116	259.746	284.536	311.691	341.439	374.025	409.722
QL	24636.	179.277	208.516	237.755	266.994	296.233	325.472	354.711
TO	2390.	199.875	225.946	252.017	278.087	304.158	330.229	356.300
KN	5155.	103.001	148.428	193.854	239.280	284.706	330.133	375.559
KC	2075.	114.841	159.185	203.529	247.873	292.217	336.561	380.905
KGG-1	362.	79.544	96.834	114.123	131.413	148.702	165.992	183.281
KGG-2	819.	132.906	156.625	180.344	204.064	227.783	251.502	275.221
KGG-3	504.	233.063	243.942	255.329	267.247	279.721	292.778	306.444
KD	815.	52.282	103.966	155.650	207.334	259.018	310.702	362.386

VALUES LISTED ARE STATISTICALLY DERIVED ABSOLUTE COUNTING RATES AT 1,2, AND 3 STD. DEVIATIONS ABOVE AND BELOW THE RESPECTIVE MEANS. ANY NEGATIVE VALUES ARE THE RESULT OF STATISTICS ONLY AND HAVE NO REAL MEANING. RELATIVE MAGNITUDES OF THE LISTED MEDIAN VALUES ARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC ROCK UNITS.

TABLE T-2. STATISTICAL SUMMARIES (Continued)

STATISTICAL SUMMARY FOR URAN./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6103.	0.075	0.097	0.125	0.163	0.211	0.274	0.355
QDS	30.	0.054	0.067	0.080	0.094	0.107	0.120	0.133
QL	24631.	0.084	0.105	0.131	0.164	0.205	0.256	0.320
TO	2388.	0.027	0.070	0.113	0.156	0.199	0.242	0.284
KN	5150.	0.076	0.101	0.134	0.178	0.235	0.312	0.414
KC	2075.	0.076	0.100	0.132	0.173	0.227	0.298	0.391
KGG-1	362.	0.179	0.218	0.265	0.323	0.393	0.478	0.581
KGG-2	819.	0.101	0.128	0.163	0.208	0.265	0.337	0.429
KGG-3	504.	0.078	0.106	0.135	0.163	0.191	0.219	0.247
KD	815.	0.076	0.106	0.147	0.204	0.283	0.393	0.546

STATISTICAL SUMMARY FOR THOR./POT.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6115.	0.178	0.230	0.283	0.336	0.389	0.442	0.494
QDS	30.	0.125	0.146	0.166	0.187	0.207	0.228	0.249
QL	24636.	0.223	0.268	0.313	0.359	0.404	0.449	0.494
TO	2390.	0.189	0.235	0.281	0.327	0.373	0.419	0.465
KN	5155.	0.213	0.259	0.306	0.352	0.399	0.445	0.492
KC	2075.	0.262	0.298	0.334	0.370	0.406	0.442	0.478
KGG-1	362.	0.297	0.342	0.387	0.431	0.476	0.521	0.566
KGG-2	819.	0.299	0.334	0.368	0.403	0.437	0.471	0.506
KGG-3	504.	0.294	0.317	0.341	0.366	0.394	0.424	0.456
KD	815.	0.248	0.300	0.363	0.439	0.531	0.642	0.776

STATISTICAL SUMMARY FOR URAN./THOR.

GEOL UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	6103.	0.251	0.314	0.392	0.490	0.613	0.766	0.958
QDS	30.	0.291	0.362	0.433	0.503	0.574	0.645	0.715
QL	24631.	0.238	0.296	0.369	0.458	0.570	0.709	0.881
TO	2388.	0.209	0.272	0.355	0.463	0.603	0.786	1.025
KN	5150.	0.225	0.295	0.387	0.508	0.666	0.873	1.144
KC	2075.	0.216	0.280	0.363	0.469	0.608	0.787	1.019
KGG-1	362.	0.306	0.460	0.614	0.768	0.922	1.076	1.230
KGG-2	819.	0.245	0.315	0.404	0.518	0.666	0.855	1.097
KGG-3	504.	0.212	0.290	0.367	0.444	0.522	0.599	0.676
KD	815.	0.211	0.275	0.357	0.465	0.604	0.786	1.022

TABLE T-3. FLIGHT-LINE AVERAGES

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 29

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	89.7	215.	44.1	215.	253.8	215.	0.16	215.	0.50	215.	0.35	215.
QL	95.4	2060.	43.3	2060.	258.2	2060.	0.17	2060.	0.46	2060.	0.37	2060.
TO	93.0	165.	43.5	165.	260.5	165.	0.17	165.	0.47	165.	0.36	165.
KN	91.1	90.	45.5	90.	247.0	90.	0.19	90.	0.51	90.	0.37	90.
KC	99.8	10.	48.3	10.	273.4	10.	0.18	10.	0.49	10.	0.37	10.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 30

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	90.2	545.	42.5	545.	251.2	545.	0.17	545.	0.47	545.	0.36	545.
QL	94.8	1585.	43.8	1585.	261.6	1585.	0.17	1585.	0.47	1585.	0.36	1585.
TO	95.6	270.	45.9	270.	273.6	270.	0.17	270.	0.48	270.	0.35	270.
KN	90.4	150.	45.1	150.	249.7	150.	0.18	150.	0.50	150.	0.36	150.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 31

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	88.0	385.	44.1	385.	261.1	385.	0.17	385.	0.51	385.	0.34	385.
QL	93.8	1665.	44.2	1665.	259.8	1665.	0.17	1665.	0.48	1665.	0.36	1665.
TO	94.7	115.	46.8	115.	279.8	115.	0.17	115.	0.50	115.	0.34	115.
KN	85.5	435.	44.8	435.	238.5	435.	0.19	435.	0.54	435.	0.36	435.
KC	80.9	10.	34.3	10.	186.3	10.	0.19	10.	0.42	10.	0.44	10.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 32

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	94.0	445.	44.3	445.	265.2	445.	0.17	445.	0.48	445.	0.36	445.
QL	100.6	1650.	45.2	1650.	277.1	1650.	0.16	1650.	0.45	1650.	0.36	1650.
TO	100.5	120.	46.6	120.	275.4	120.	0.17	120.	0.47	120.	0.37	120.
KN	96.7	390.	45.2	390.	259.2	390.	0.18	390.	0.47	390.	0.38	390.
KC	92.1	80.	38.4	80.	235.7	80.	0.17	80.	0.43	80.	0.39	80.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 33

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	93.5	470.	46.7	470.	274.8	470.	0.17	470.	0.50	470.	0.34	470.
QL	100.7	1617.	47.6	1617.	275.6	1617.	0.17	1617.	0.48	1617.	0.37	1617.
TO	100.1	25.	45.4	25.	283.2	25.	0.16	25.	0.45	25.	0.36	25.
KN	92.8	355.	46.8	355.	263.1	355.	0.18	355.	0.51	355.	0.35	355.
KC	86.1	105.	40.2	105.	226.7	105.	0.18	105.	0.47	105.	0.38	105.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 34

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	67.1	480.	41.3	480.	268.2	480.	0.16	480.	0.48	480.	0.33	480.
QDS	58.9	15.	30.1	15.	339.5	15.	0.09	15.	0.51	15.	0.17	15.
QL	95.8	1455.	45.1	1455.	276.7	1455.	0.17	1455.	0.48	1455.	0.35	1455.
TO	82.7	180.	43.4	180.	279.8	180.	0.16	180.	0.54	180.	0.30	180.
KN	83.3	450.	42.5	450.	245.0	450.	0.18	450.	0.52	450.	0.35	450.
KC	92.1	80.	37.3	80.	257.5	80.	0.15	80.	0.42	80.	0.36	80.
KGG-2	86.7	16.	39.8	16.	230.0	16.	0.17	16.	0.46	16.	0.38	16.
KGG-3	98.0	9.	37.1	9.	260.2	9.	0.14	9.	0.38	9.	0.38	9.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 35

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	92.6	195.	45.0	195.	274.2	195.	0.16	195.	0.49	195.	0.34	195.
QL	95.1	1700.	45.3	1700.	270.7	1700.	0.17	1700.	0.48	1700.	0.35	1700.
TO	82.4	285.	41.7	285.	283.4	285.	0.15	285.	0.51	285.	0.29	285.
KN	85.9	185.	47.2	185.	239.5	185.	0.20	185.	0.56	185.	0.36	185.
KC	87.5	90.	44.1	90.	245.6	90.	0.18	90.	0.51	90.	0.36	90.
KGG-2	85.9	15.	48.0	15.	225.0	15.	0.21	15.	0.57	15.	0.38	15.
KGG-3	94.6	50.	44.1	50.	269.1	50.	0.16	50.	0.47	50.	0.35	50.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 36

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	81.6	580.	40.7	580.	274.8	580.	0.15	580.	0.50	580.	0.30	580.
QL	91.8	1425.	43.2	1425.	255.2	1425.	0.23	1425.	0.47	1425.	0.36	1425.
TO	95.4	30.	46.7	30.	244.9	30.	0.19	30.	0.50	30.	0.39	30.
KN	80.8	285.	42.1	285.	225.9	285.	0.19	285.	0.53	285.	0.36	285.
KC	98.8	110.	44.2	110.	272.8	110.	0.16	110.	0.45	110.	0.36	110.
KGG-2	77.6	15.	41.9	15.	218.1	15.	0.19	15.	0.54	15.	0.35	15.
KGG-3	97.3	55.	39.7	55.	264.3	55.	0.15	55.	0.41	55.	0.37	55.

TABLE T-3. FLIGHT-LINE AVERAGES (Continued)

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 37

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	83.4	320.	39.1	320.	257.8	320.	0.15	320.	0.48	320.	0.33	320.
QDS	57.3	15.	28.1	15.	286.4	15.	0.10	15.	0.49	15.	0.20	15.
QL	94.5	1495.	42.6	1495.	262.0	1495.	0.16	1495.	0.46	1495.	0.36	1495.
TO	91.8	50.	43.1	50.	268.5	50.	0.16	50.	0.48	50.	0.34	50.
KN	76.8	295.	41.1	295.	218.2	295.	0.20	295.	0.56	295.	0.35	295.
KC	99.9	215.	46.2	215.	267.1	215.	0.17	215.	0.47	215.	0.38	215.
KGG-1	62.1	13.	56.9	13.	142.5	13.	0.40	13.	0.92	13.	0.44	13.
KGG-2	93.6	4.	41.6	4.	209.9	4.	0.21	4.	0.49	4.	0.44	4.
KGG-3	116.8	3.	37.3	3.	260.5	3.	0.14	3.	0.32	3.	0.45	3.
KD	74.8	5.	49.3	5.	172.0	5.	0.29	5.	0.67	5.	0.44	5.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 38

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	86.6	275.	43.2	275.	247.2	275.	0.18	275.	0.51	275.	0.35	275.
QL	93.1	1510.	44.2	1510.	253.5	1510.	0.18	1510.	0.48	1510.	0.37	1510.
TO	83.4	90.	37.2	90.	255.9	90.	0.15	90.	0.46	90.	0.33	90.
KN	81.9	550.	41.2	550.	227.8	550.	0.19	550.	0.51	550.	0.36	550.
KC	92.5	245.	47.1	245.	253.4	245.	0.19	245.	0.52	245.	0.37	245.
KGG-2	81.0	15.	45.0	15.	202.8	15.	0.22	15.	0.56	15.	0.40	15.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 39

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	92.6	115.	43.9	115.	249.5	115.	0.18	115.	0.48	115.	0.37	115.
QL	94.2	1480.	42.8	1480.	276.3	1480.	0.16	1480.	0.46	1480.	0.34	1480.
TO	93.4	275.	40.5	275.	300.2	275.	0.14	275.	0.44	275.	0.31	275.
KN	83.7	275.	42.7	275.	251.9	275.	0.17	275.	0.52	275.	0.34	275.
KC	94.6	275.	40.8	275.	265.3	275.	0.16	275.	0.44	275.	0.36	275.
KGG-1	57.9	21.	40.8	21.	137.2	21.	0.30	21.	0.71	21.	0.42	21.
KGG-2	80.8	63.	41.1	63.	199.1	63.	0.21	63.	0.52	63.	0.41	63.
KGG-3	106.2	16.	50.8	16.	271.6	16.	0.19	16.	0.48	16.	0.39	16.
KD	92.6	35.	38.8	35.	231.5	35.	0.17	35.	0.43	35.	0.40	35.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 40

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	85.5	120.	39.8	120.	241.8	120.	0.17	120.	0.47	120.	0.36	120.
QL	94.4	1145.	39.4	1145.	276.2	1145.	0.15	1145.	0.42	1145.	0.34	1145.
TO	89.0	260.	33.3	260.	294.6	260.	0.11	260.	0.38	260.	0.30	260.
KN	76.3	415.	32.5	415.	226.5	415.	0.15	415.	0.44	415.	0.34	415.
KC	91.3	140.	41.2	140.	238.8	140.	0.17	140.	0.46	140.	0.38	140.
KGG-1	64.6	25.	46.5	25.	135.4	25.	0.35	25.	0.73	25.	0.48	25.
KGG-2	82.5	119.	46.5	119.	207.3	119.	0.23	119.	0.57	119.	0.40	119.
KGG-3	99.4	136.	45.9	136.	269.3	136.	0.17	136.	0.46	136.	0.37	136.
KD	91.7	85.	42.8	85.	206.5	85.	0.24	85.	0.48	85.	0.48	85.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 41

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	80.1	650.	43.6	650.	272.0	650.	0.17	650.	0.56	650.	0.30	650.
QL	93.6	705.	46.6	705.	273.4	705.	0.17	705.	0.50	705.	0.35	705.
TO	84.5	25.	48.0	25.	260.0	25.	0.19	25.	0.70	25.	0.32	25.
KN	79.2	245.	48.0	245.	276.4	245.	0.18	245.	0.65	245.	0.29	245.
KC	87.9	300.	46.4	300.	235.3	300.	0.21	300.	0.55	300.	0.38	300.
KGG-1	54.7	135.	42.3	135.	127.8	135.	0.33	135.	0.78	135.	0.43	135.
KGG-2	80.1	250.	43.2	250.	198.1	250.	0.22	250.	0.55	250.	0.41	250.
KGG-3	95.5	90.	42.7	90.	263.6	90.	0.16	90.	0.45	90.	0.36	90.
KD	91.6	200.	45.7	200.	227.9	200.	0.22	200.	0.53	200.	0.42	200.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 42

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	83.7	355.	43.2	355.	229.0	355.	0.19	355.	0.52	355.	0.37	355.
QL	93.8	840.	46.1	840.	265.6	840.	0.18	840.	0.51	840.	0.36	840.
TO	86.4	255.	45.2	255.	265.5	255.	0.17	255.	0.54	255.	0.32	255.
KN	76.7	220.	43.6	220.	232.8	220.	0.19	220.	0.58	220.	0.33	220.
KC	86.5	150.	43.8	150.	242.3	150.	0.19	150.	0.52	150.	0.36	150.
KGG-1	59.6	47.	48.6	47.	143.1	47.	0.34	47.	0.83	47.	0.42	47.
KGG-2	82.5	181.	44.0	181.	206.0	181.	0.22	181.	0.55	181.	0.40	181.
KGG-3	100.6	97.	41.3	97.	271.6	97.	0.15	97.	0.41	97.	0.37	97.
KD	87.5	345.	40.0	345.	193.4	345.	0.22	345.	0.46	345.	0.48	345.

TABLE T-3. FLIGHT-LINE AVERAGES (Continued)

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 209

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	86.1	255.	43.6	255.	294.6	255.	0.15	255.	0.51	255.	0.29	255.
QL	95.5	1160.	43.6	1160.	276.8	1160.	0.16	1160.	0.46	1160.	0.35	1160.
TO	92.4	185.	44.7	185.	274.9	185.	0.16	185.	0.50	185.	0.34	185.
KN	82.0	105.	46.5	105.	272.5	105.	0.18	105.	0.58	105.	0.30	105.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 210

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	76.2	290.	39.5	290.	252.4	290.	0.16	290.	0.53	290.	0.31	290.
QL	92.9	995.	44.9	995.	261.5	995.	0.17	995.	0.49	995.	0.36	995.
TO	99.7	60.	40.4	60.	273.5	60.	0.15	60.	0.41	60.	0.36	60.
KN	73.5	330.	42.2	330.	209.5	330.	0.21	330.	0.60	330.	0.35	330.
KC	66.9	45.	34.8	45.	210.5	45.	0.18	45.	0.56	45.	0.32	45.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 211

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	90.7	195.	44.8	195.	270.1	195.	0.17	195.	0.50	195.	0.34	195.
QL	101.5	1290.	46.4	1290.	273.1	1290.	0.17	1290.	0.46	1290.	0.37	1290.
KN	91.5	245.	42.7	245.	250.1	245.	0.17	245.	0.47	245.	0.37	245.
KC	92.7	105.	41.7	105.	261.6	105.	0.16	105.	0.45	105.	0.36	105.
KGG-1	53.2	12.	39.6	12.	125.5	12.	0.32	12.	0.75	12.	0.43	12.
KGG-2	77.2	13.	36.3	13.	195.7	13.	0.19	13.	0.47	13.	0.40	13.
KGG-3	99.1	5.	39.7	5.	271.7	5.	0.15	5.	0.40	5.	0.36	5.
KD	95.8	35.	40.4	35.	254.3	35.	0.17	35.	0.44	35.	0.38	35.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

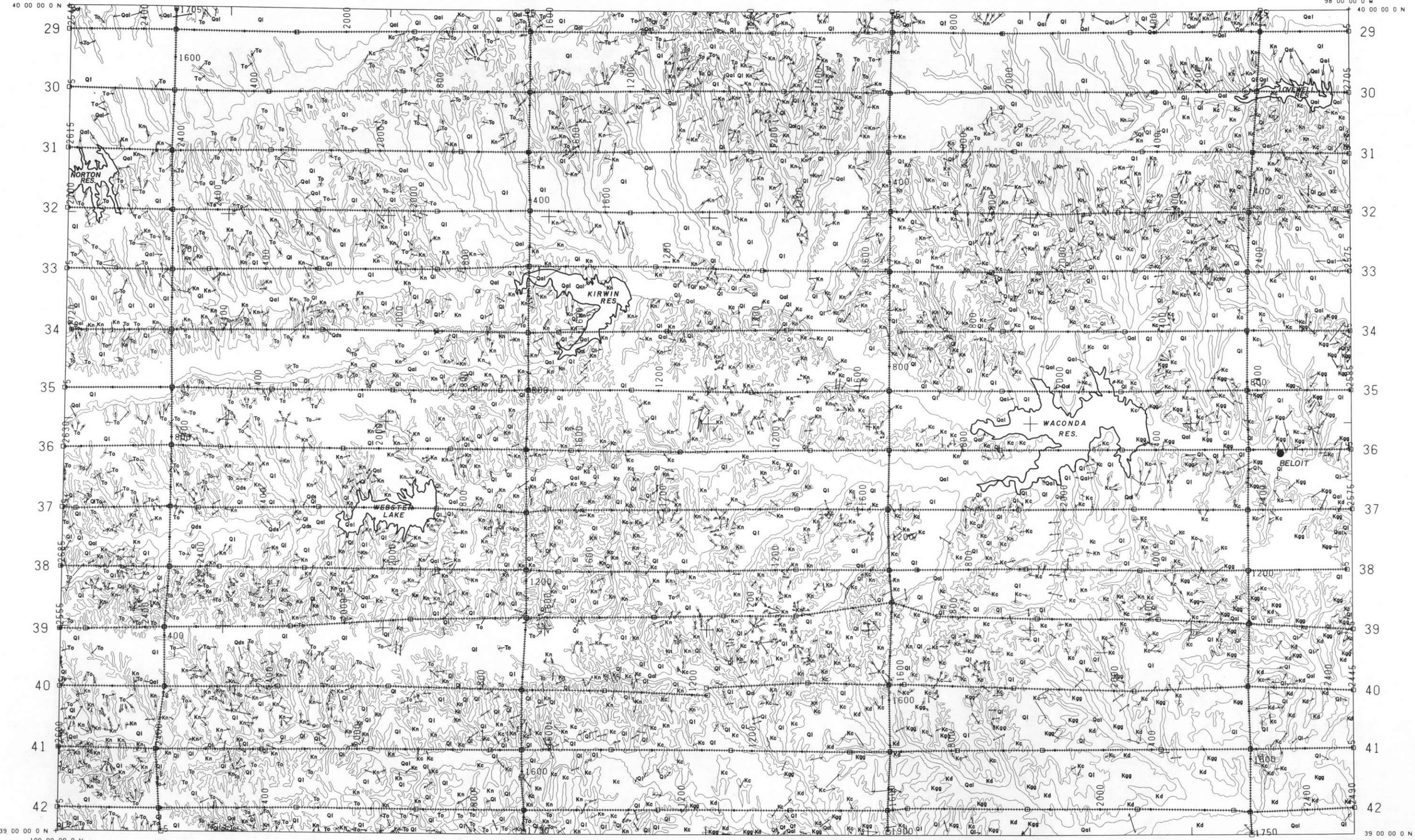
FLIGHT LINE 212

GEOLOGIC UNIT	TH AVG.	TH SAMPLES	U AVG.	U SAMPLES	K AVG.	K SAMPLES	U/K AVG.	U/K SAMPLES	U/TH AVG.	U/TH SAMPLES	TH/K AVG.	TH/K SAMPLES
QAL	90.9	225.	43.3	225.	240.8	225.	0.18	225.	0.48	225.	0.38	225.
QL	99.8	865.	43.5	865.	265.8	865.	0.16	865.	0.44	865.	0.38	865.
KN	77.5	135.	38.9	135.	194.1	135.	0.20	135.	0.51	135.	0.40	135.
KC	85.8	115.	41.6	115.	214.3	115.	0.20	115.	0.50	115.	0.40	115.
KGG-1	54.8	109.	39.3	109.	128.2	109.	0.31	109.	0.73	109.	0.43	109.
KGG-2	84.9	128.	39.4	128.	206.0	128.	0.19	128.	0.47	128.	0.41	128.
KGG-3	95.2	43.	45.2	43.	264.0	43.	0.17	43.	0.48	43.	0.36	43.
KD	84.6	110.	39.6	110.	200.7	110.	0.20	110.	0.48	110.	0.42	110.

MAPS

MAPS

BELOIT NJ14-2 GT. PLAINS 1977



RECORD LOCATION MAP

LEGEND : ☐ = PHOTO-RECOVERED POINT

5 0 5 10 15 MILES

10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

PREPARED BY
TEXAS INSTRUMENTS INCORPORATED
DALLAS, TEXAS
1977

WORK PERFORMED UNDER
BENDIX FIELD ENGINEERING CORPORATION
SUBCONTRACT NO. 77-072-L

PREPARED FOR
U.S. DEPARTMENT OF ENERGY

M-1

BELOIT NJ14-2 GT. PLAINS 1977

100 00 00 0 W
40 00 00 0 N
98 00 00 0 W
39 00 00 0 N

209 210 211 212

29 30 31 32 33 34 35 36 37 38 39 40 41 42

NORTON RES.
KIRWIN RES.
WEBSTER LAKE
WACONDA RES.
LOVEWELL RES
BELOIT

PROFILE MAP URANIUM 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES
10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY
PREPARED BY
TEXAS INSTRUMENTS INCORPORATED
DALLAS, TEXAS
1977
WORK PERFORMED UNDER
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SUBCONTRACT NO. 77-072-L
PREPARED FOR
U.S. DEPARTMENT OF ENERGY

M-2

BELOIT NJ14-2 GT. PLAINS 1977

100 00 00 0 W
40 00 00 0 N
98 00 00 0 W
39 00 00 0 N

209 210 211 212

29 30 31 32 33 34 35 36 37 38 39 40 41 42

NORTON RES.
KIRWIN RES.
WEBSTER LAKE
WACONDA RES.
LOVEWELL RES.
BELOIT

PROFILE MAP U/TH 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES
10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

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DALLAS, TEXAS
1977
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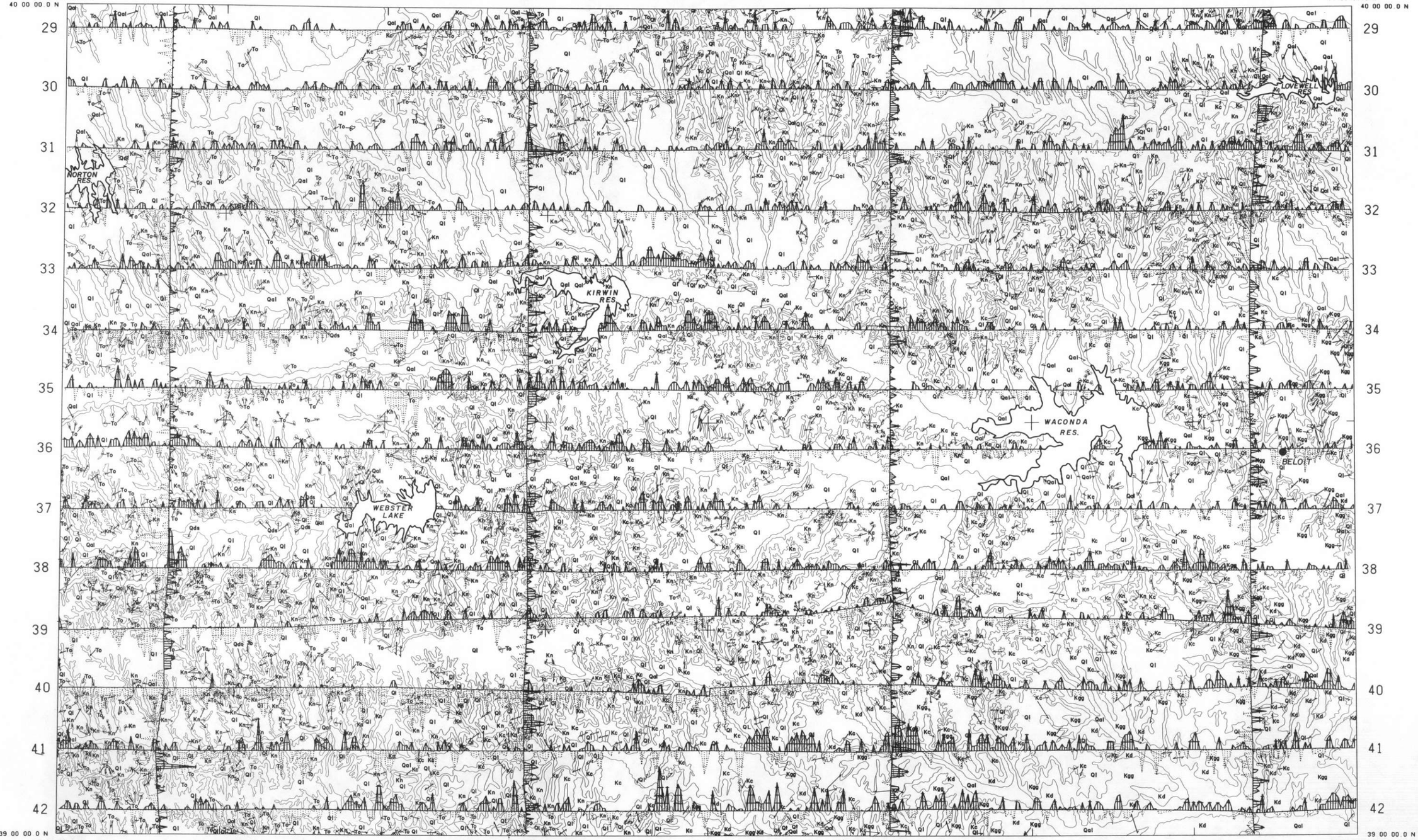
SUBCONTRACT NO. 77-072-L
PREPARED FOR
U.S. DEPARTMENT OF ENERGY

M-3

BELOIT NJ14-2 GT. PLAINS 1977



PROFILE MAP U/K 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES

10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

PREPARED BY
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1977
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U.S. DEPARTMENT OF ENERGY

M-4

BELOIT NJ14-2 GT. PLAINS 1977

100 00 00 0 W
40 00 00 0 N
98 00 00 0 W
39 00 00 0 N

209 210 211 212

29 30 31 32 33 34 35 36 37 38 39 40 41 42

NORTON RES.
KIRWIN RES.
WEBSTER LAKE
WACONDA RES.
LOVEWELL RES.
BELOIT

PROFILE MAP THORIUM 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES
10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

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M-5

BELOIT NJ14-2 GT. PLAINS 1977

100 00 00.0 W
40 00 00.0 N
98 00 00.0 W
39 00 00.0 N

209 210 211 212

29 30 31 32 33 34 35 36 37 38 39 40 41 42

NORTON RES.
KIRWIN RES.
WEBSTER LAKE
WACONDA RES.
LOVEWELL RES.
BELOIT

PROFILE MAP POTASSIUM 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES
10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

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1977
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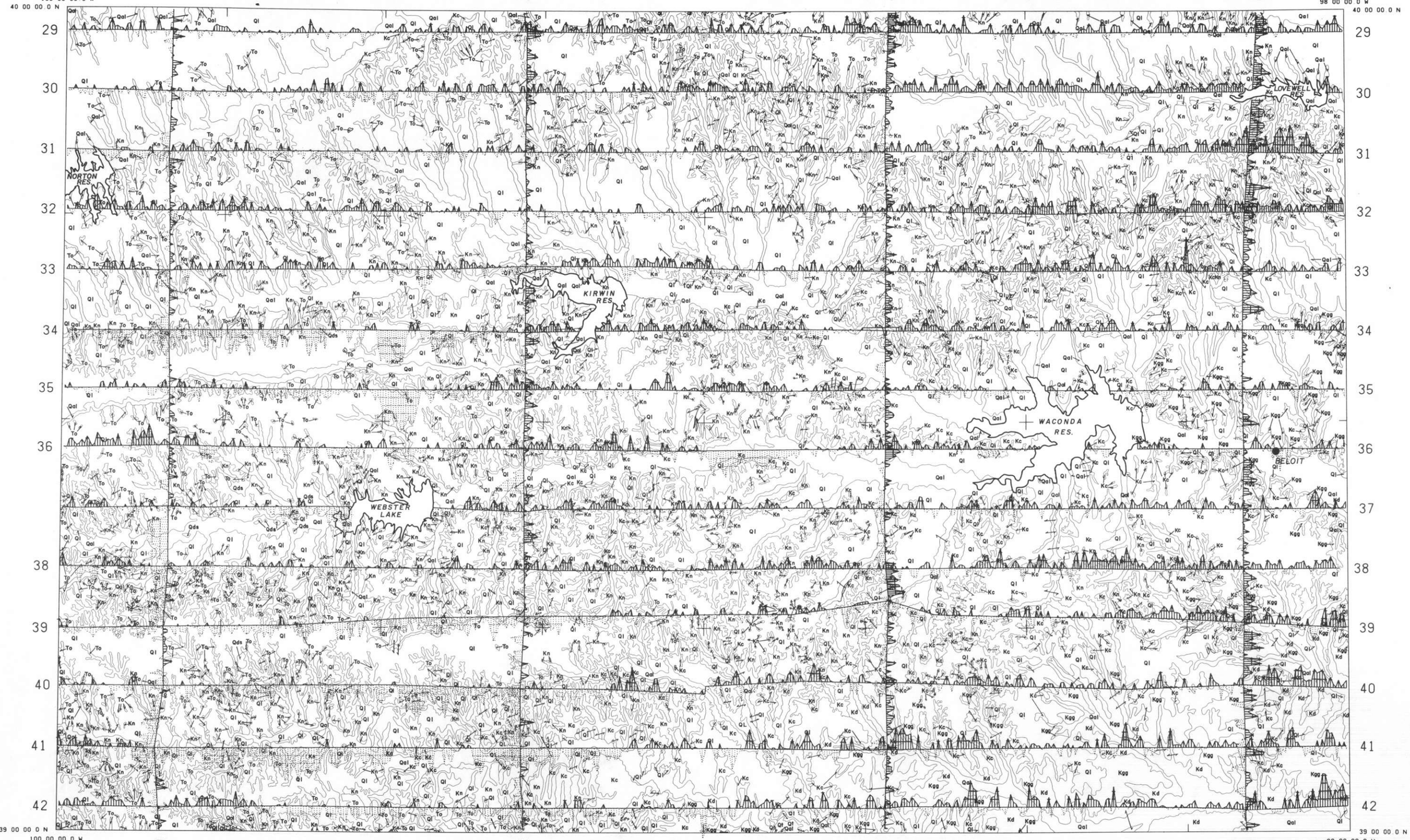
M-6

BELOIT NJ14-2 GT. PLAINS 1977



PROFILE MAP TH/K 6.0 S.D./IN. TEXAS INSTRUMENTS

LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

5 0 5 10 15 MILES

10 0 10 20 30 KILOMETERS

AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

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DALLAS, TEXAS
1977
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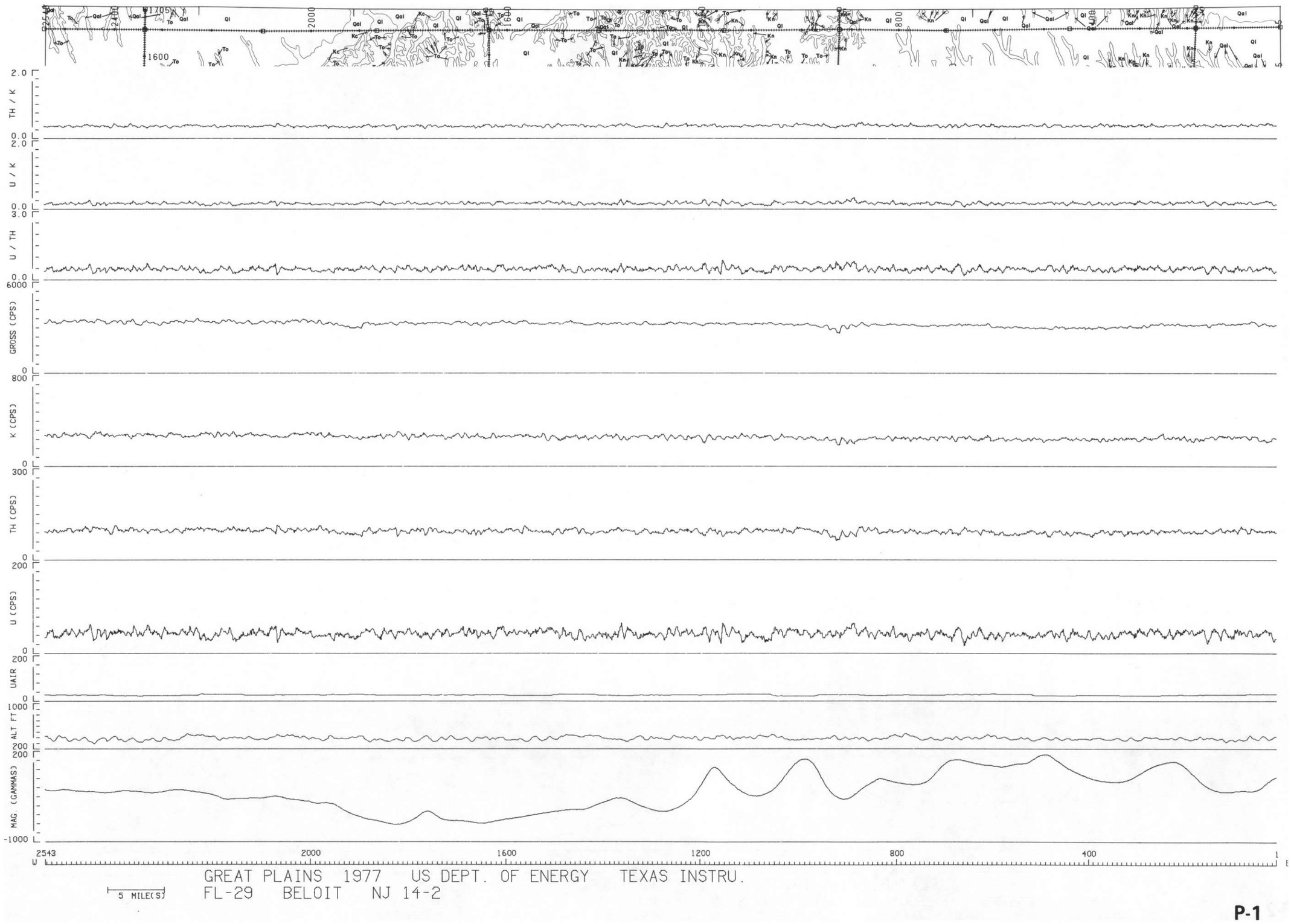
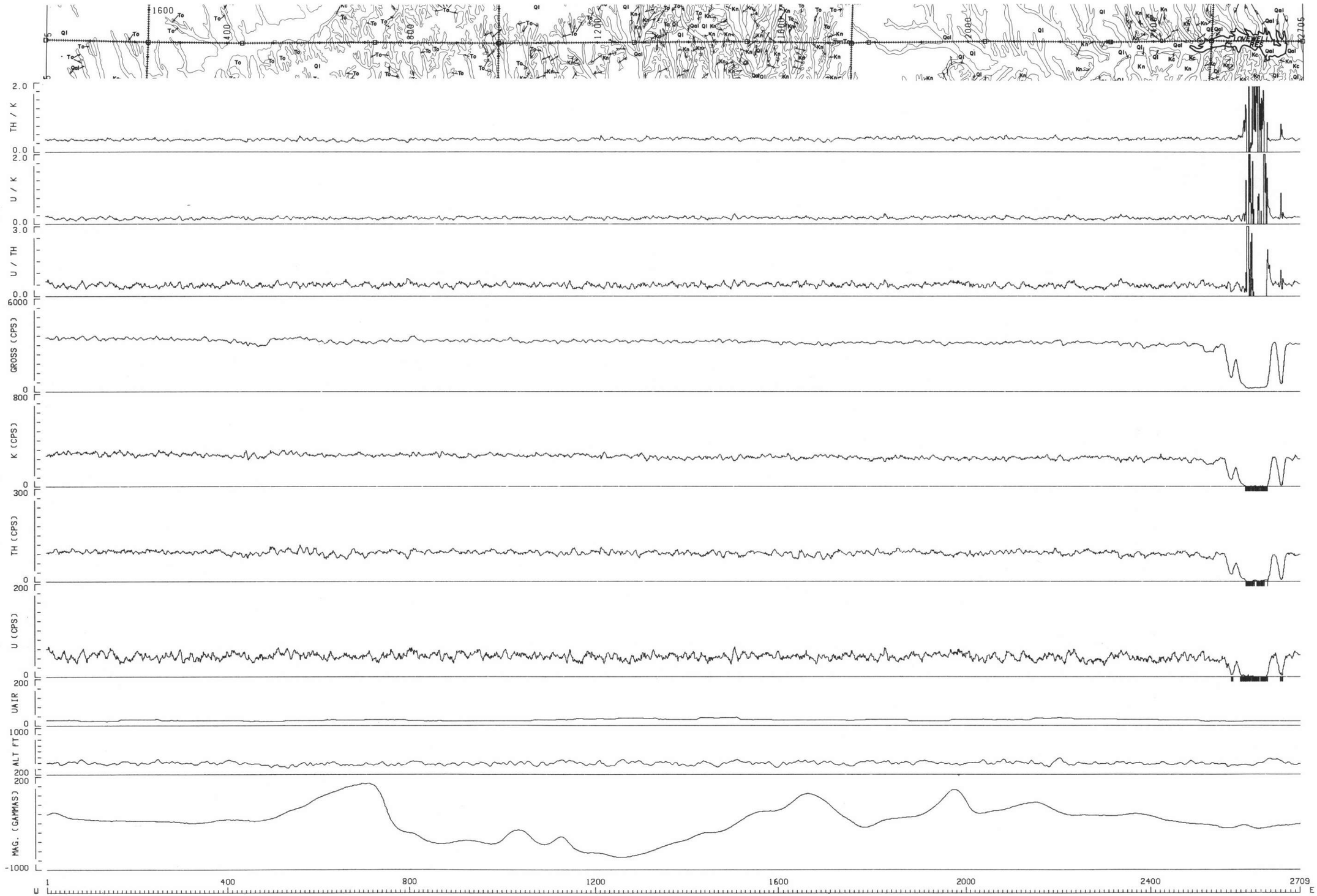
M-7

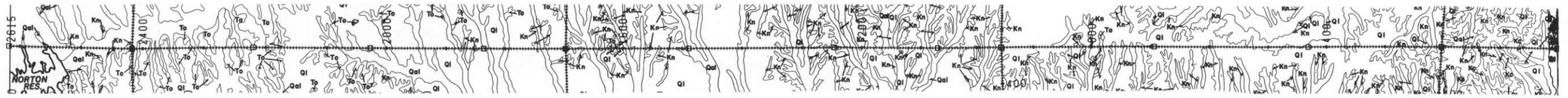
PROFILES

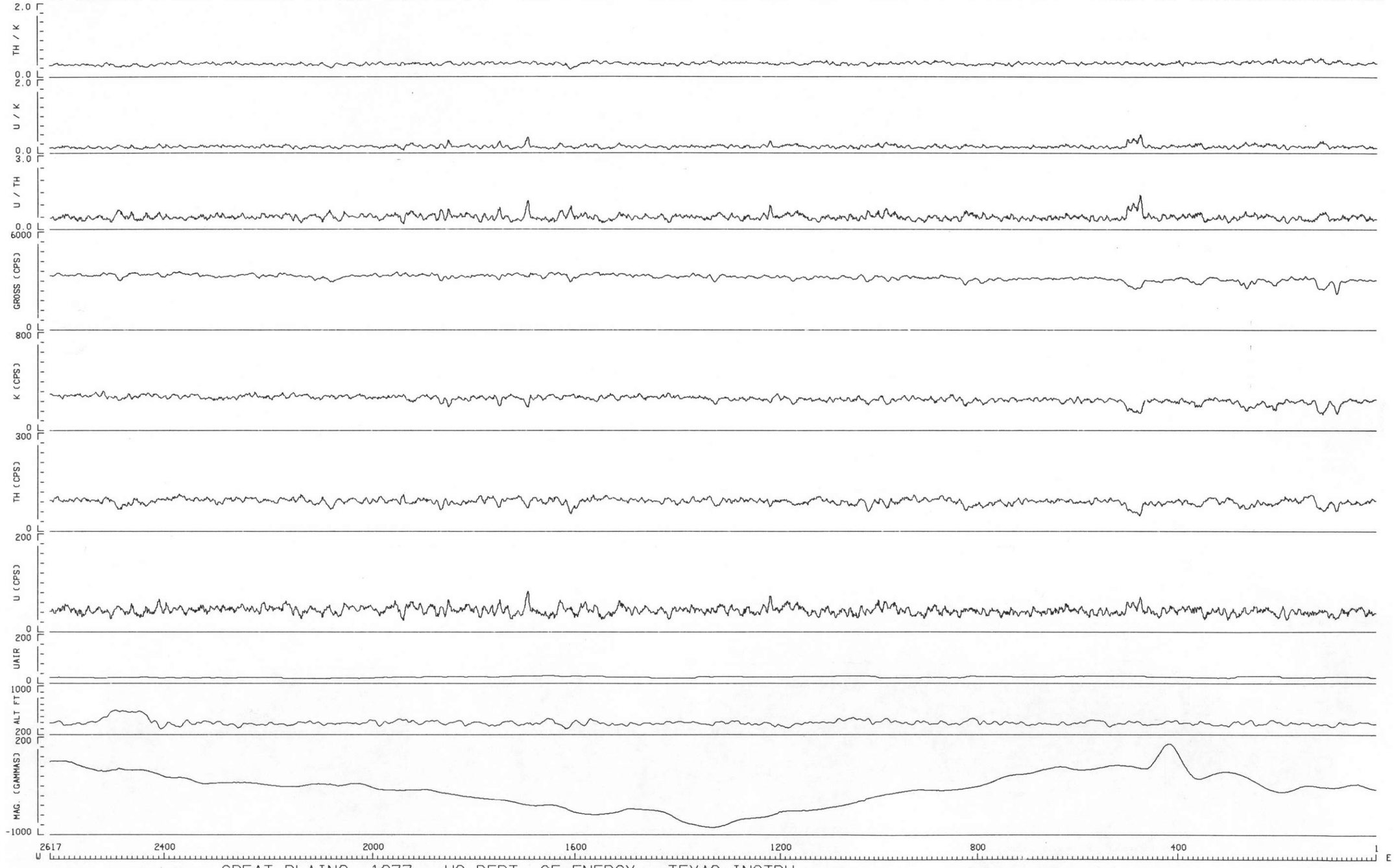
PROFILES



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-29 BELOIT NJ 14-2

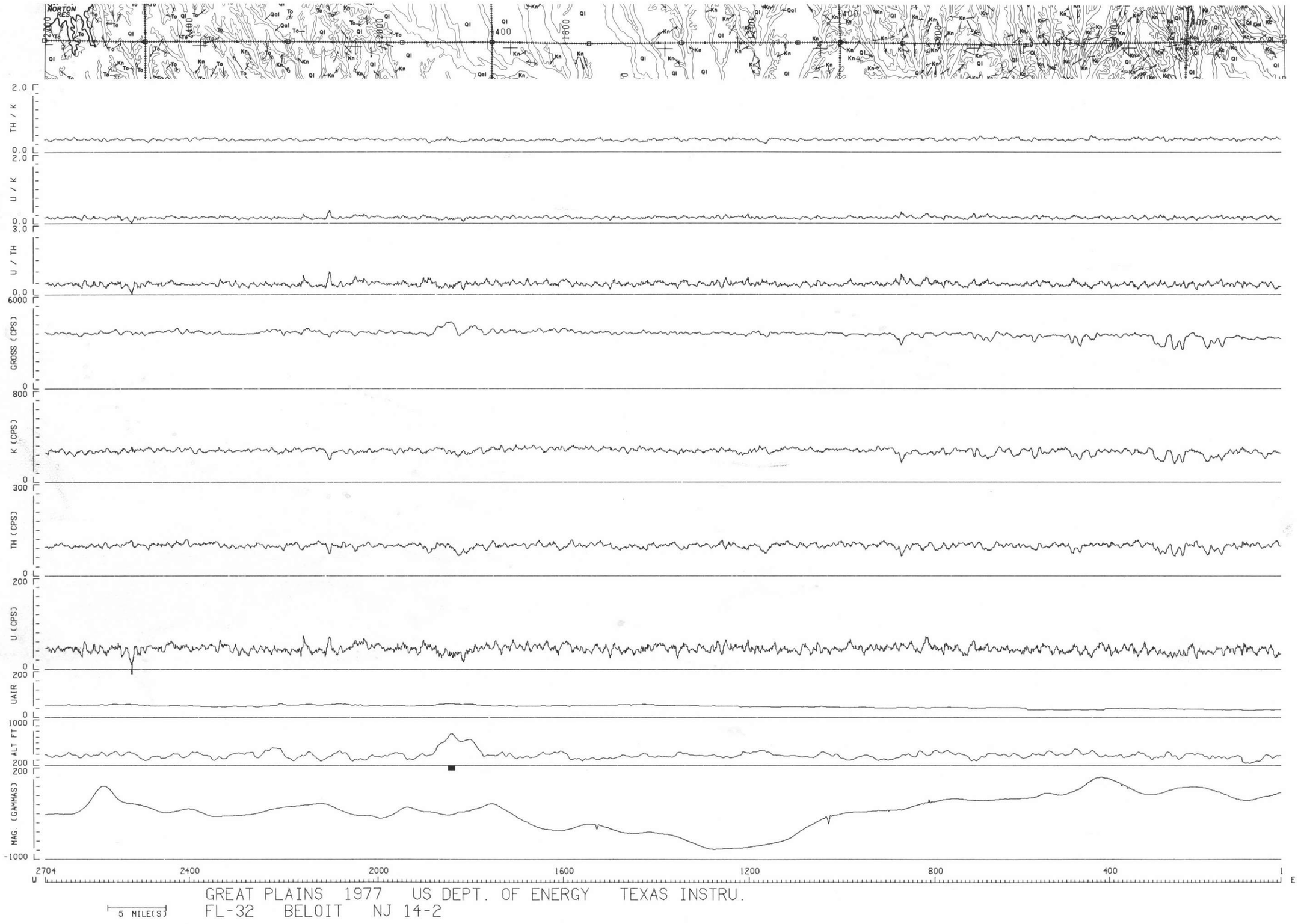

TH / K
U / K
U / TH
GROSS (CPS)
K (CPS)
TH (CPS)
U (CPS)
UAIR
ALT FT
MAG. (GAMMAS)
2.0
0.0
3.0
6000
800
300
200
1000
-1000
1
400
800
1200
1600
2000
2400
2709
E
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-30 BELOIT NJ 14-2





5 MILE(S)

GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-31 BELOIT NJ 14-2



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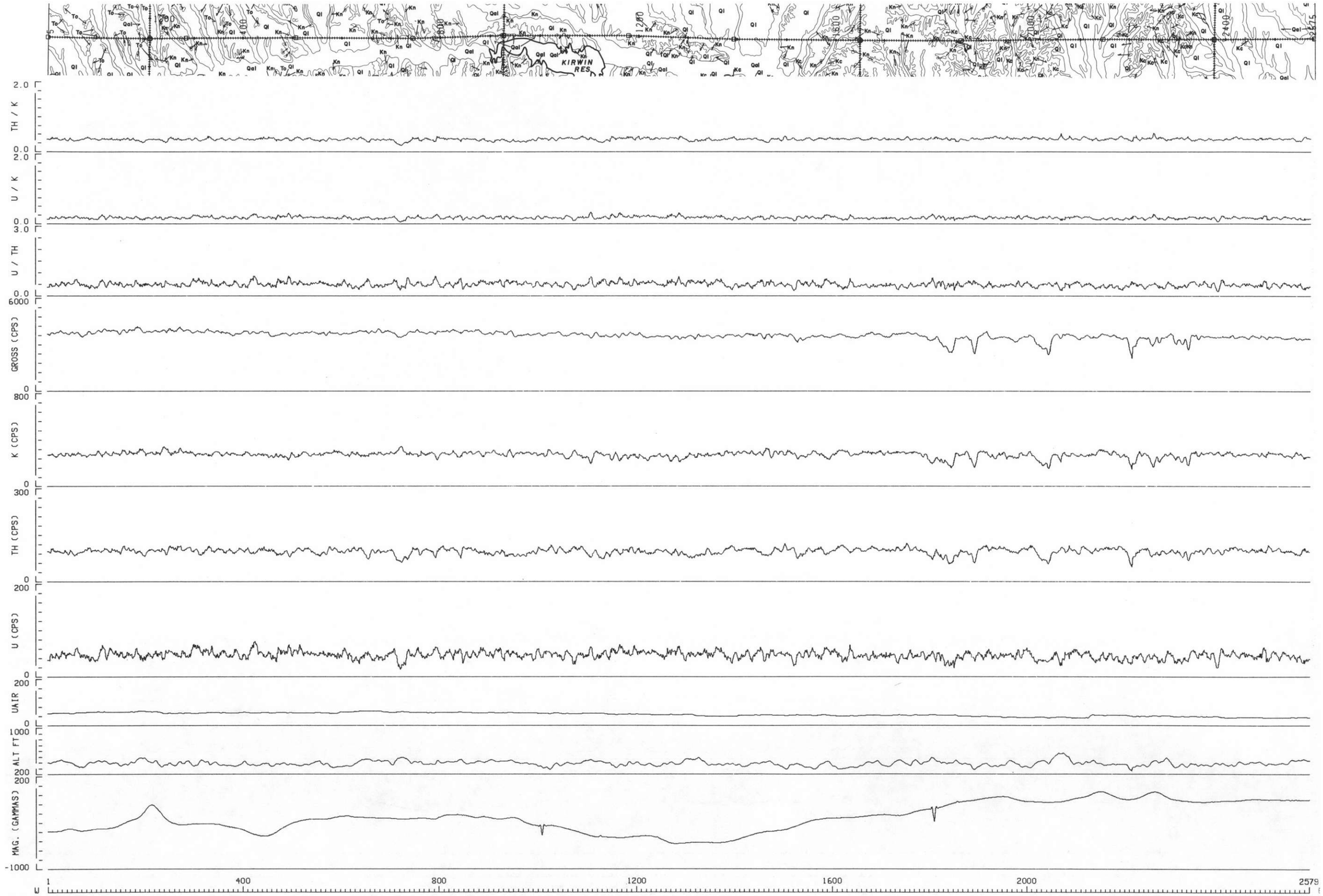
FL-32 BELOIT NJ 14-2



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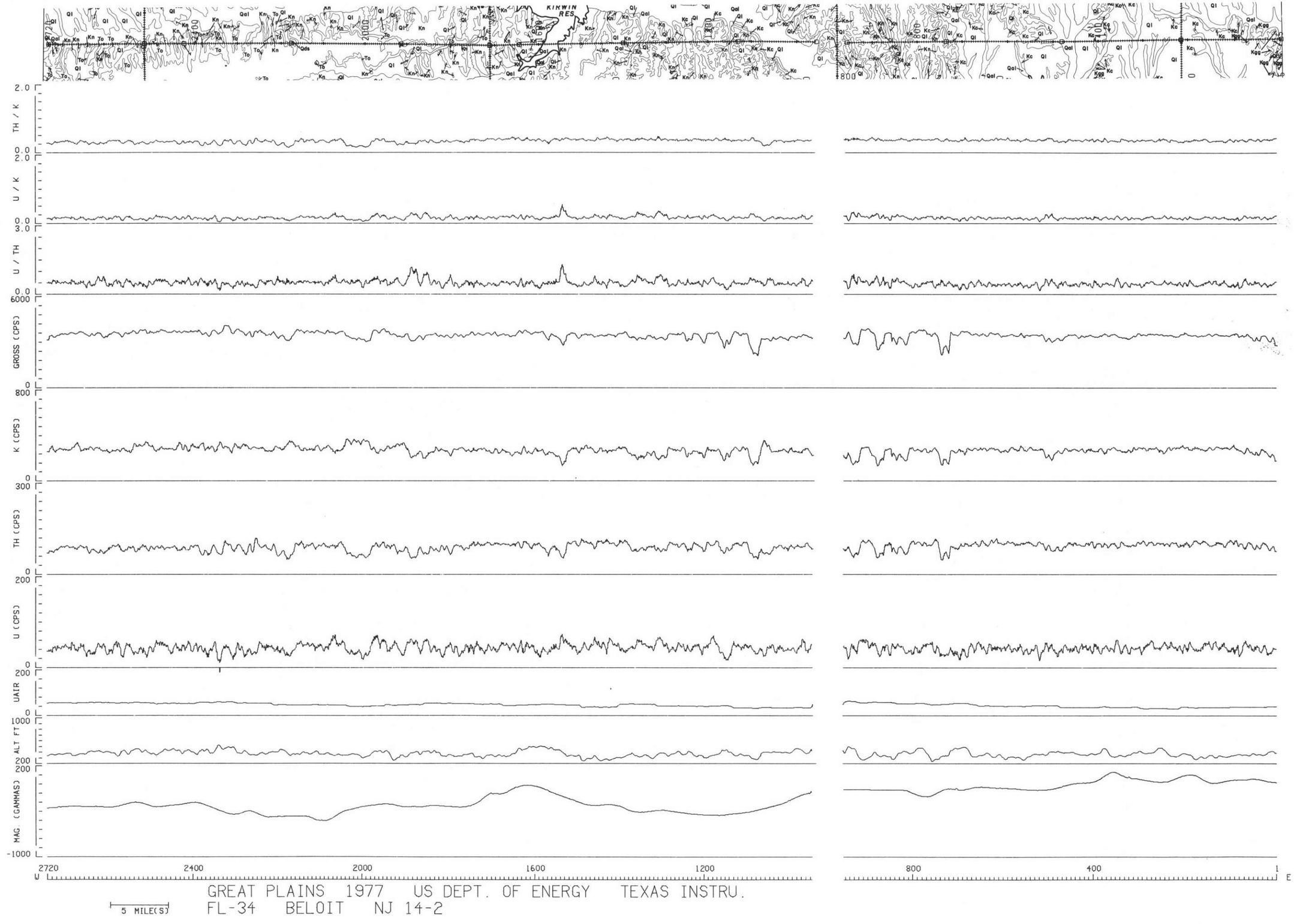
FL-33 BELOIT NJ 14-2



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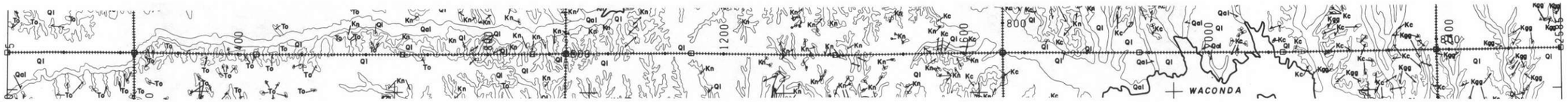
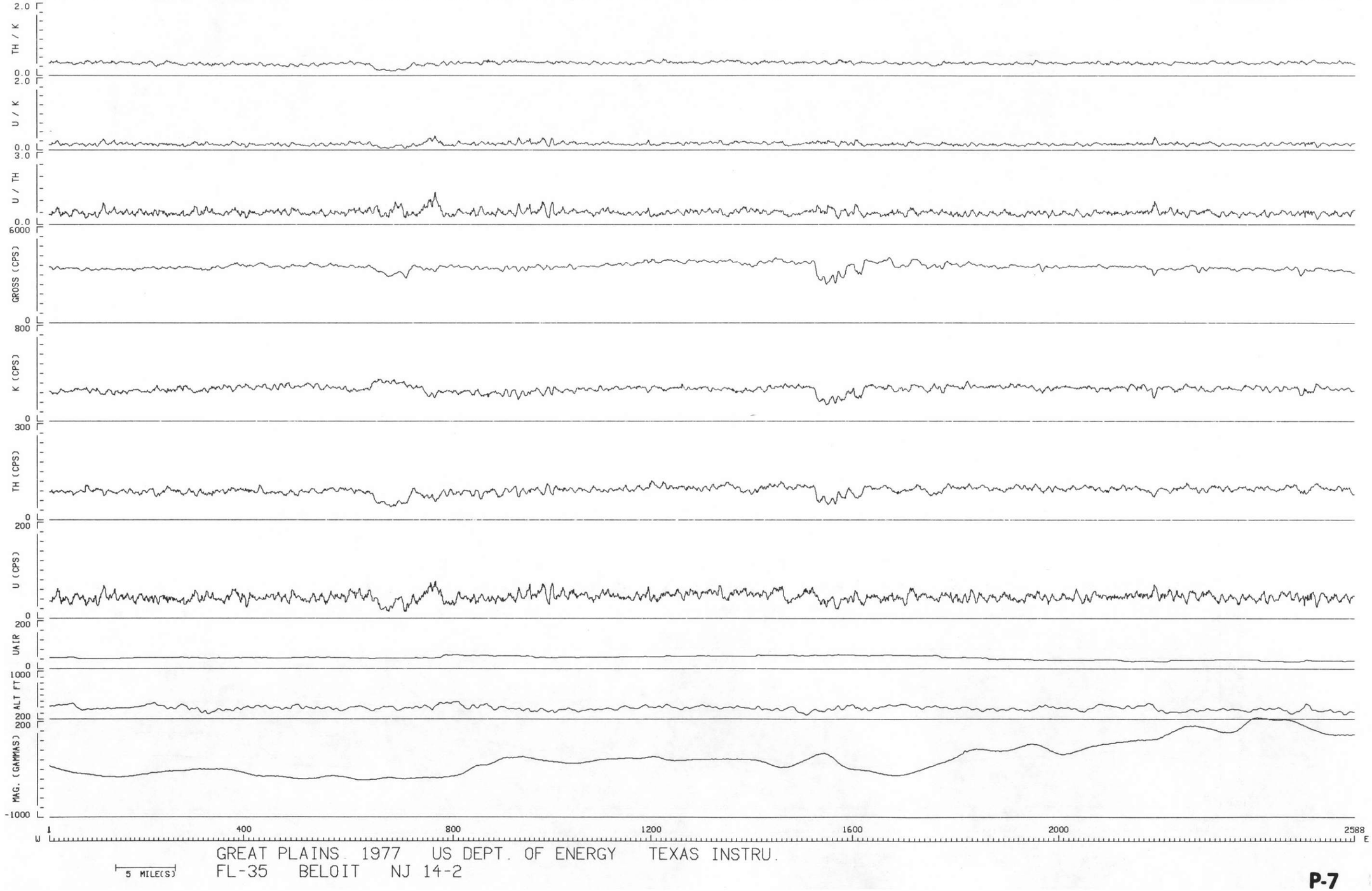
FL-34 BELOIT NJ 14-2





5 MILE(S)

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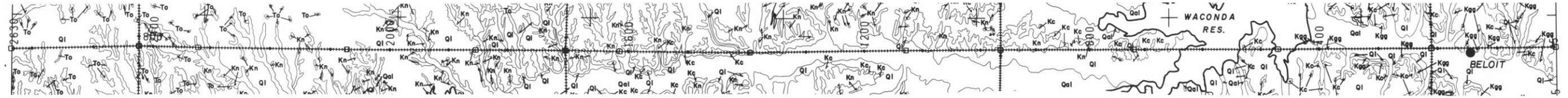
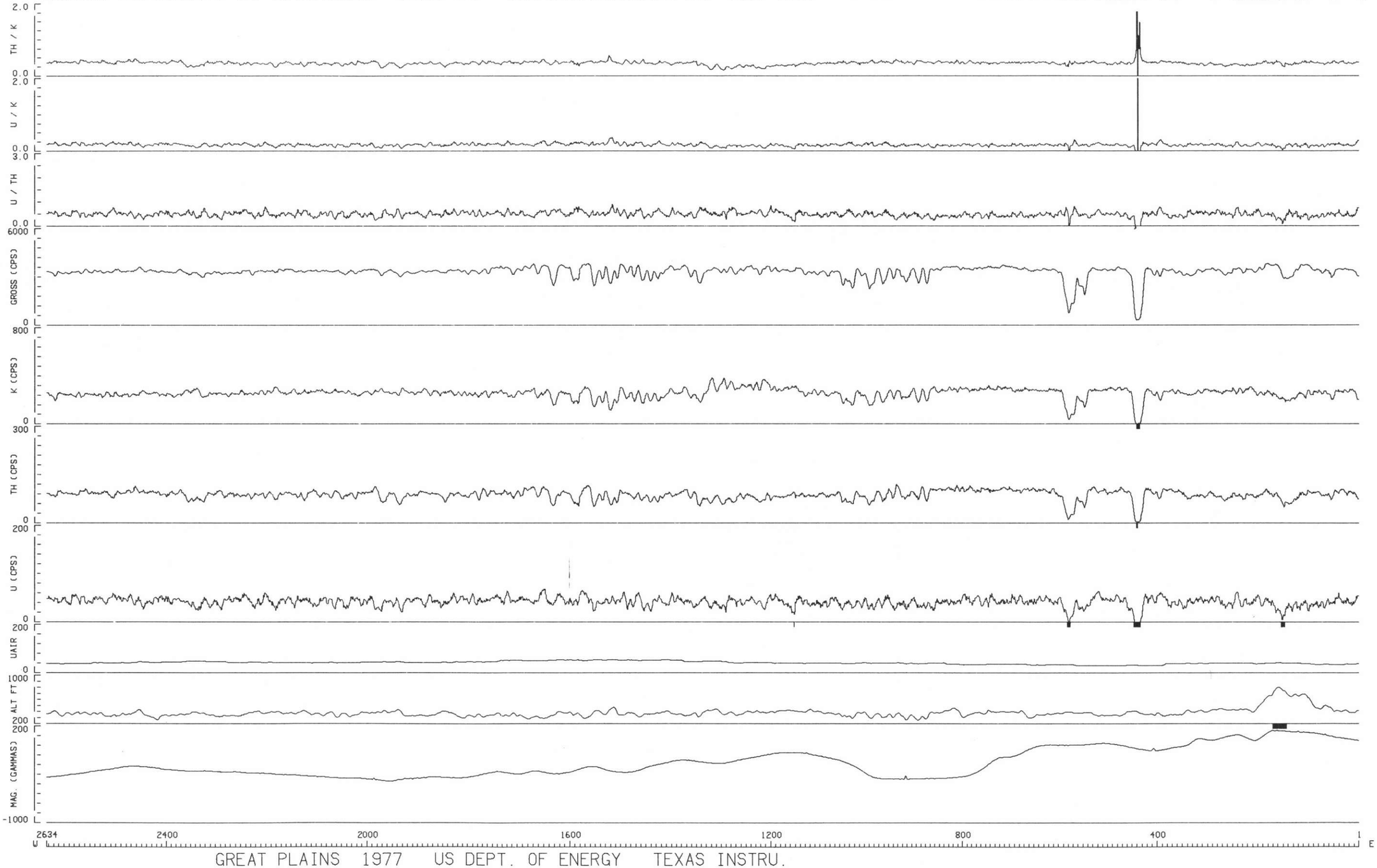
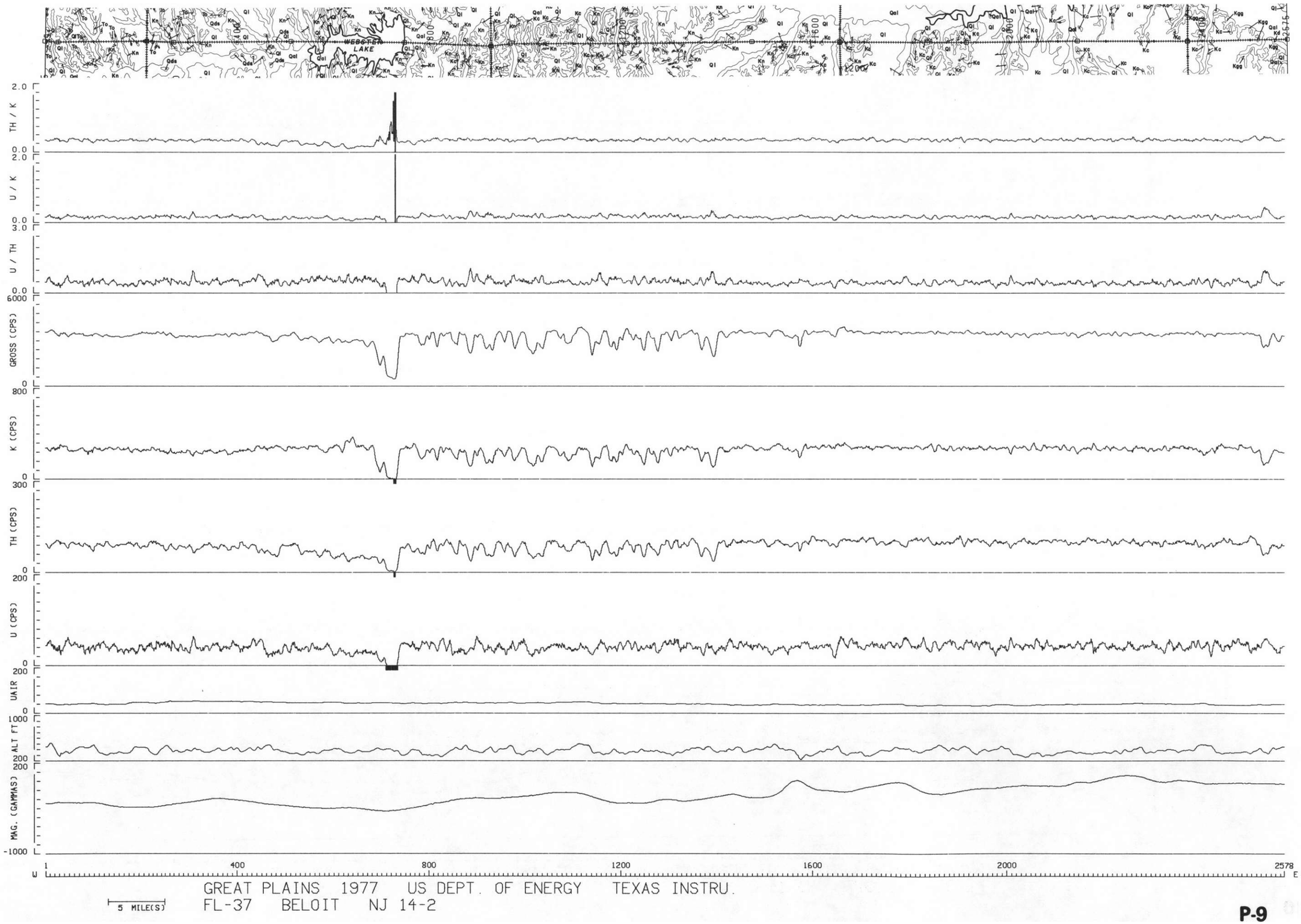
FL-35 BELOIT NJ 14-2



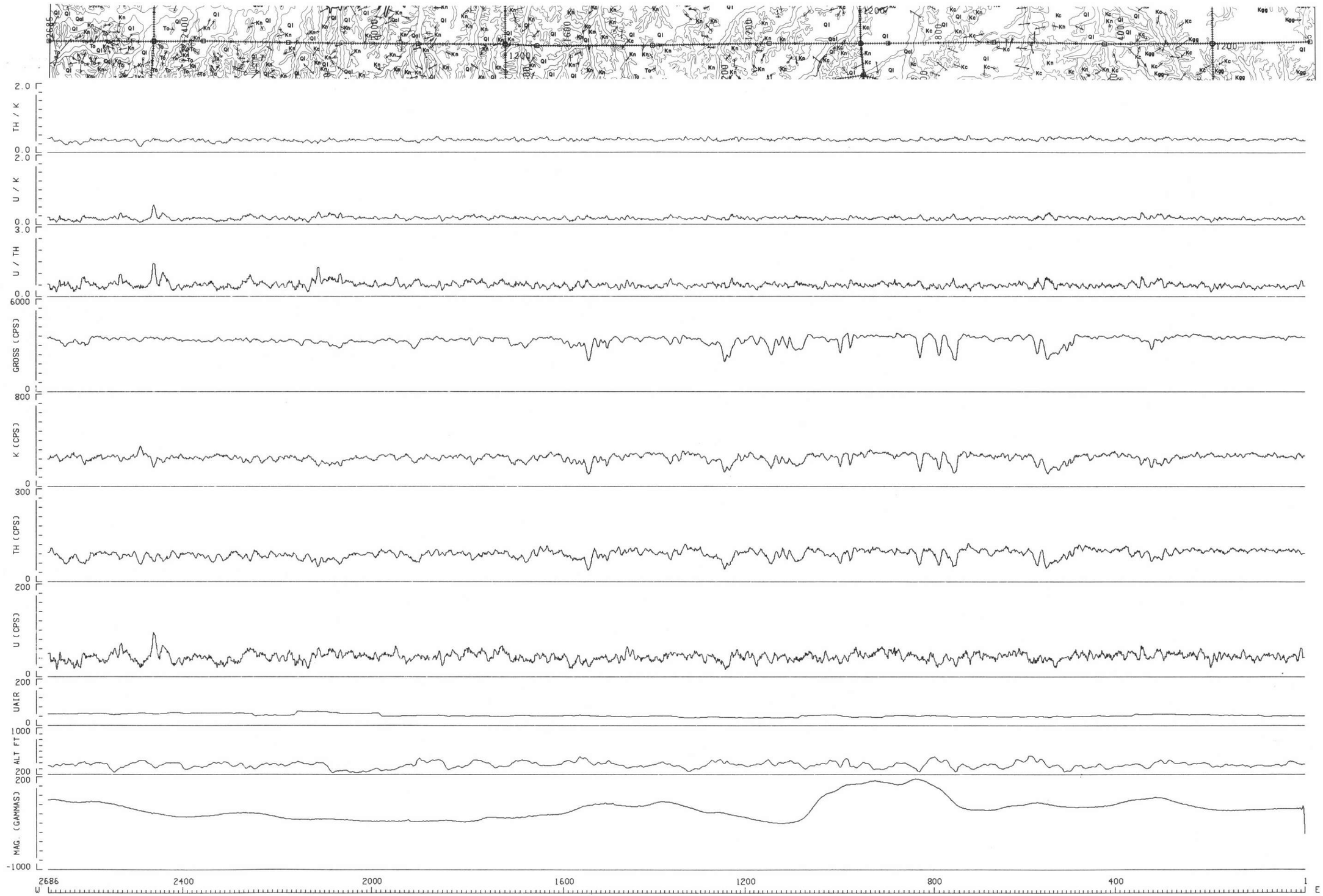


GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-36 BELOIT NJ 14-2

5 MILE(S)



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-37 BELOIT NJ 14-2



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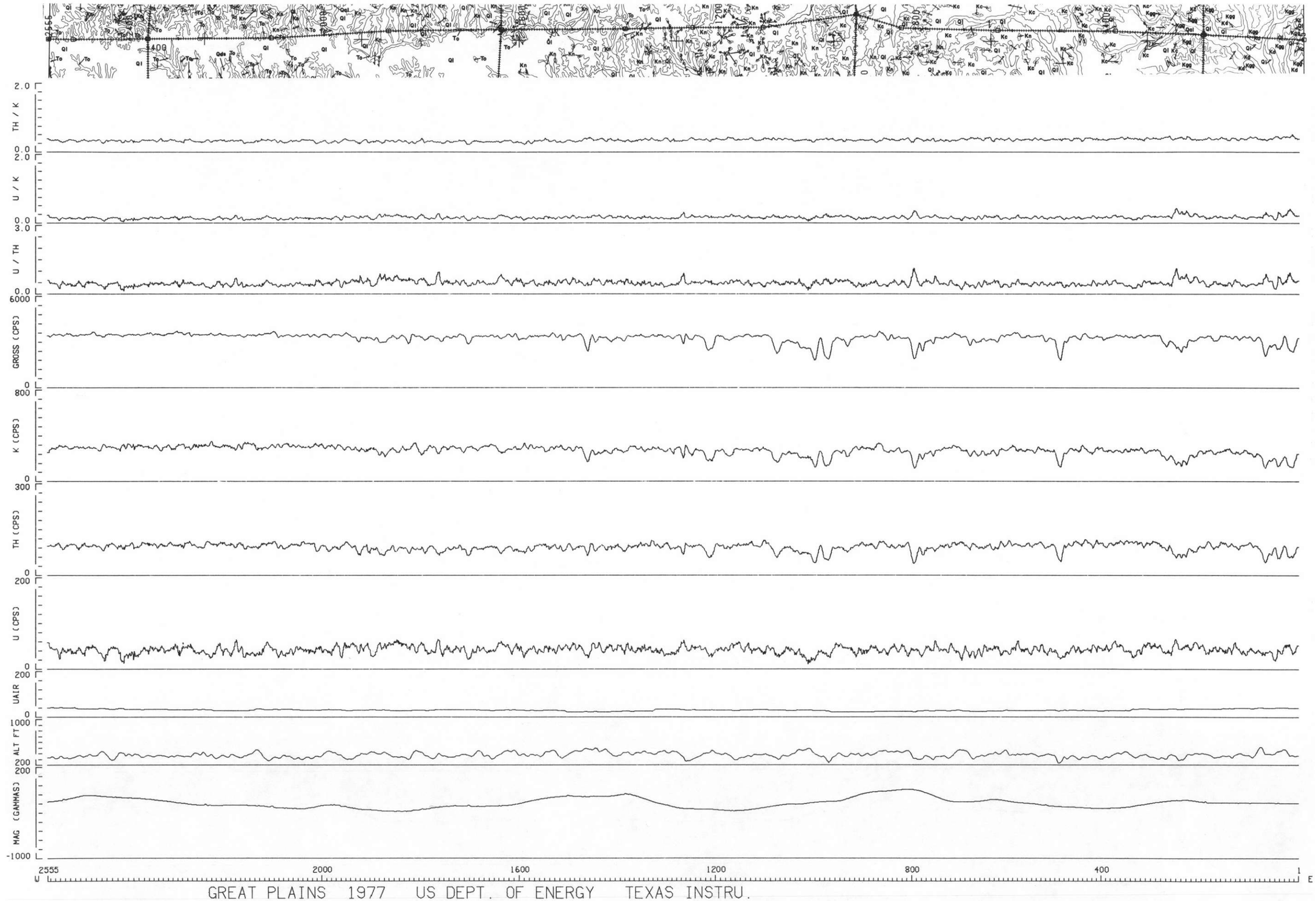
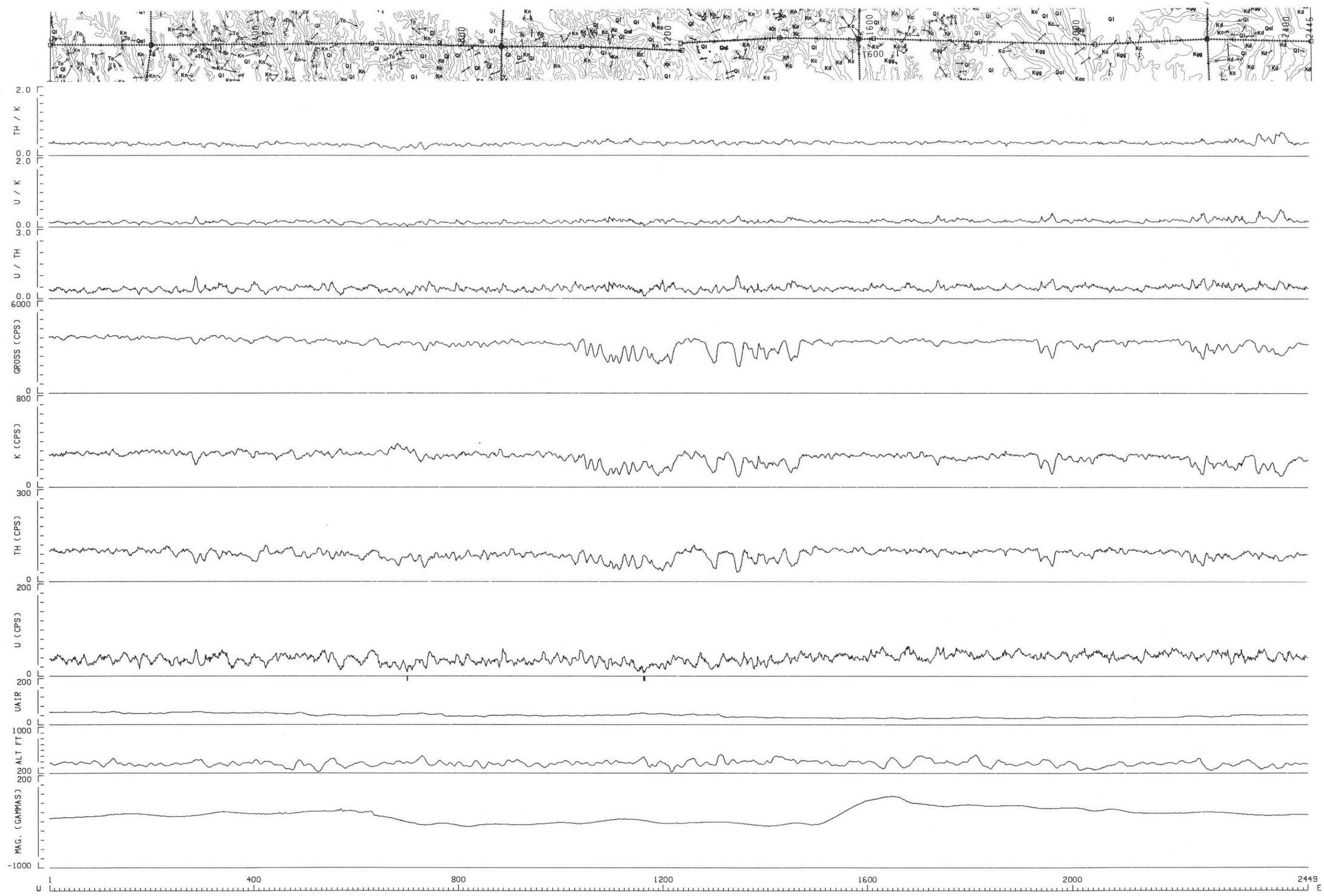
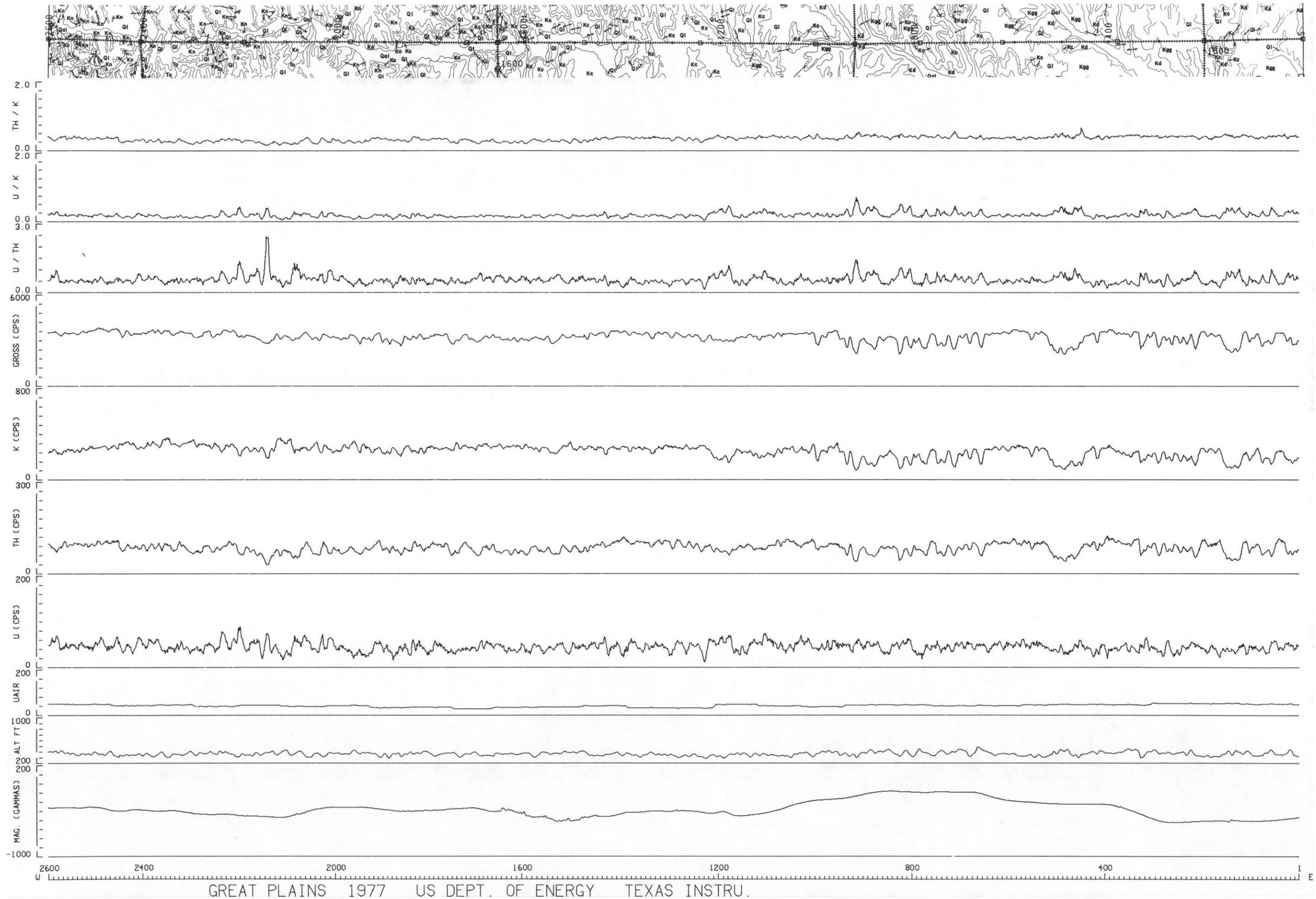
FL-38 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-39 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-40 BELOIT NJ 14-2



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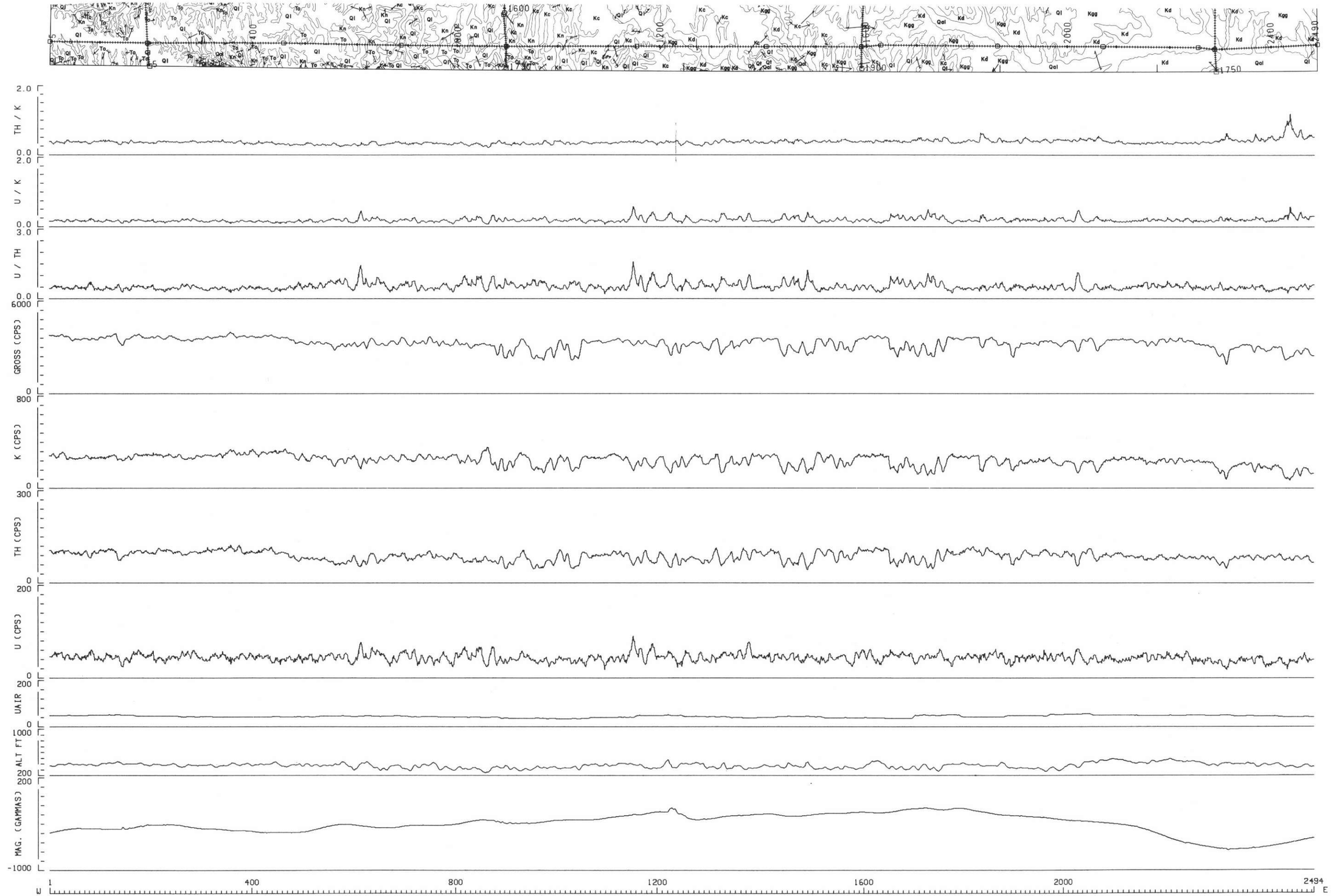
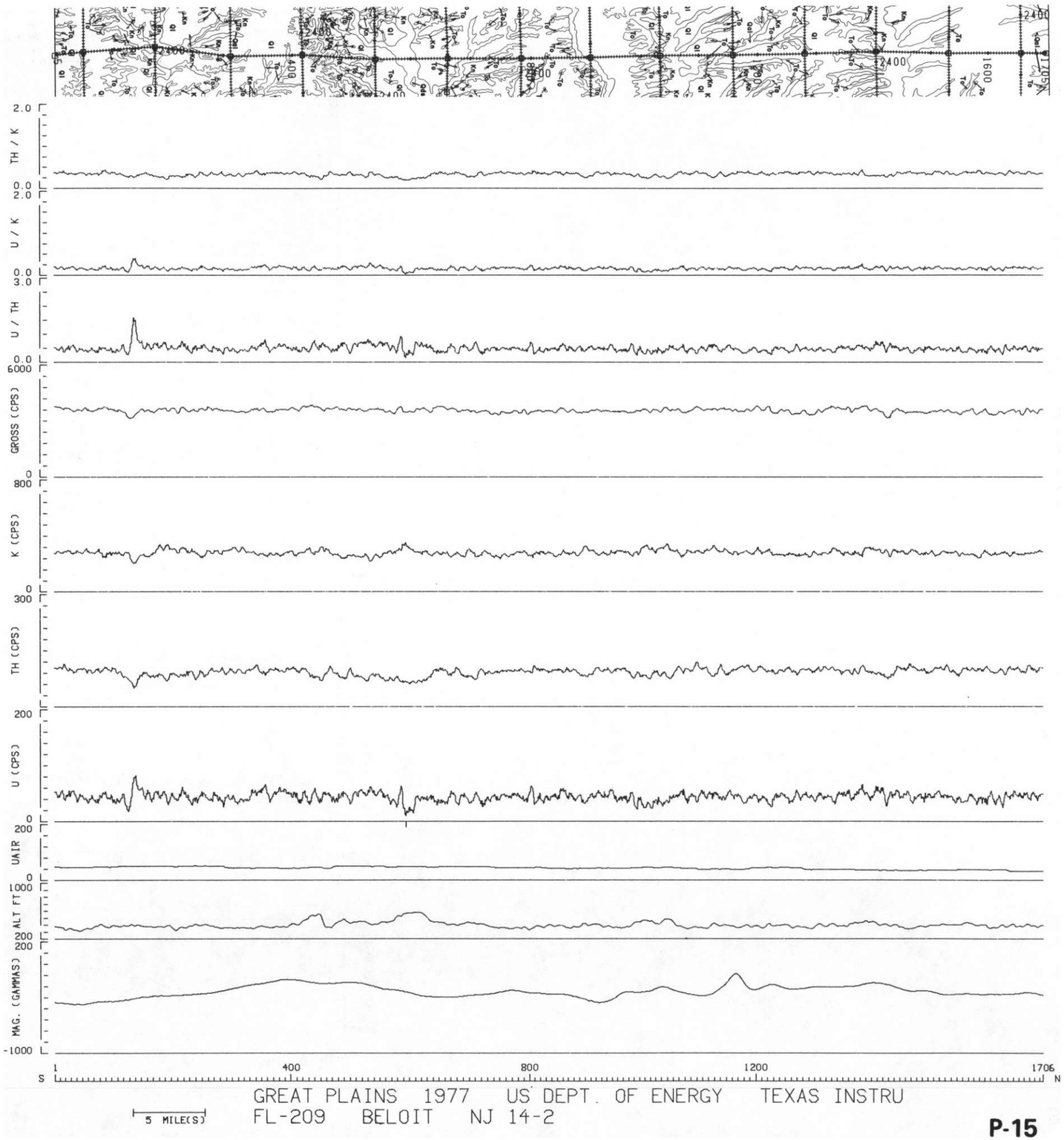
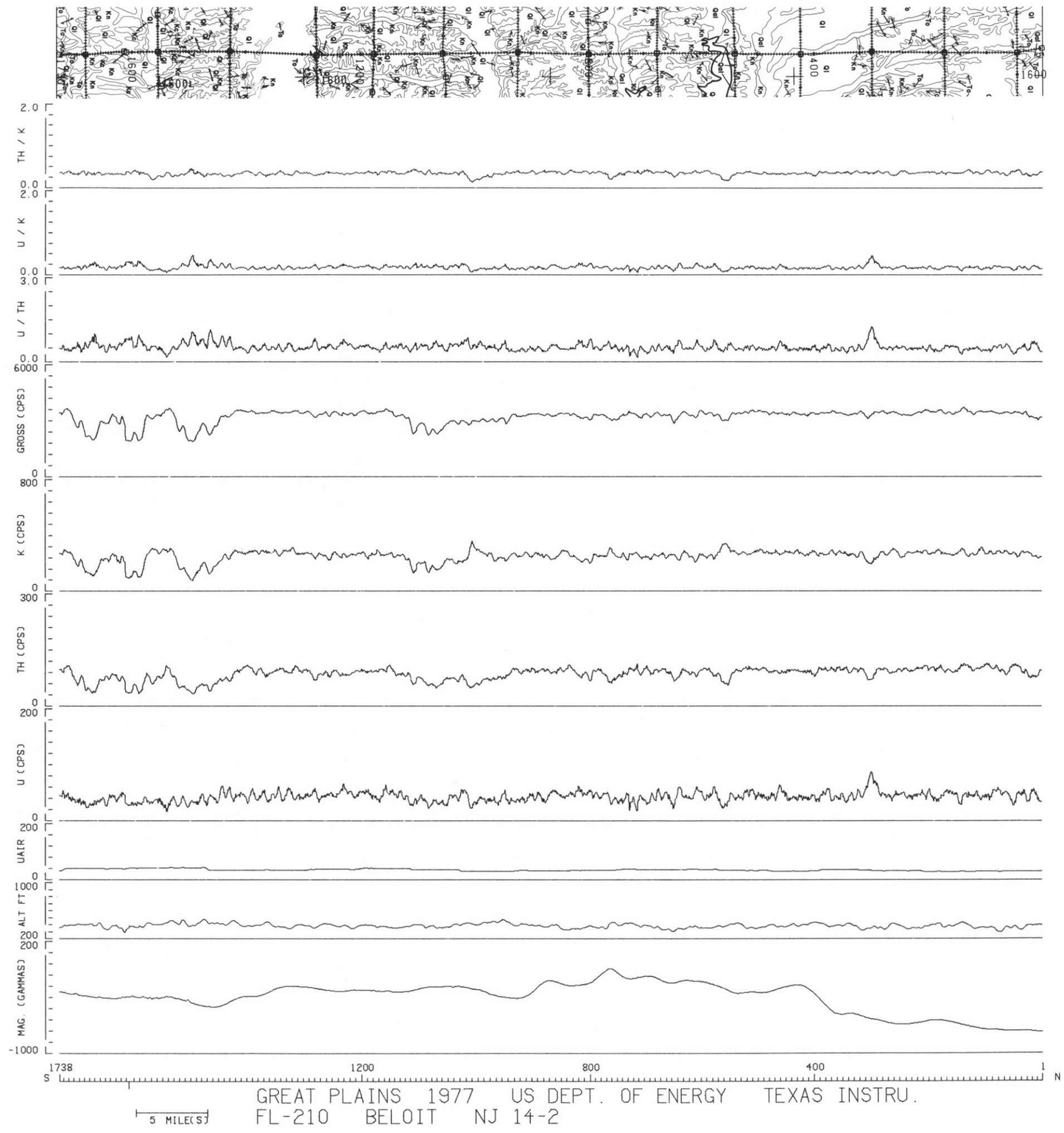
FL-41 BELOIT NJ 14-2

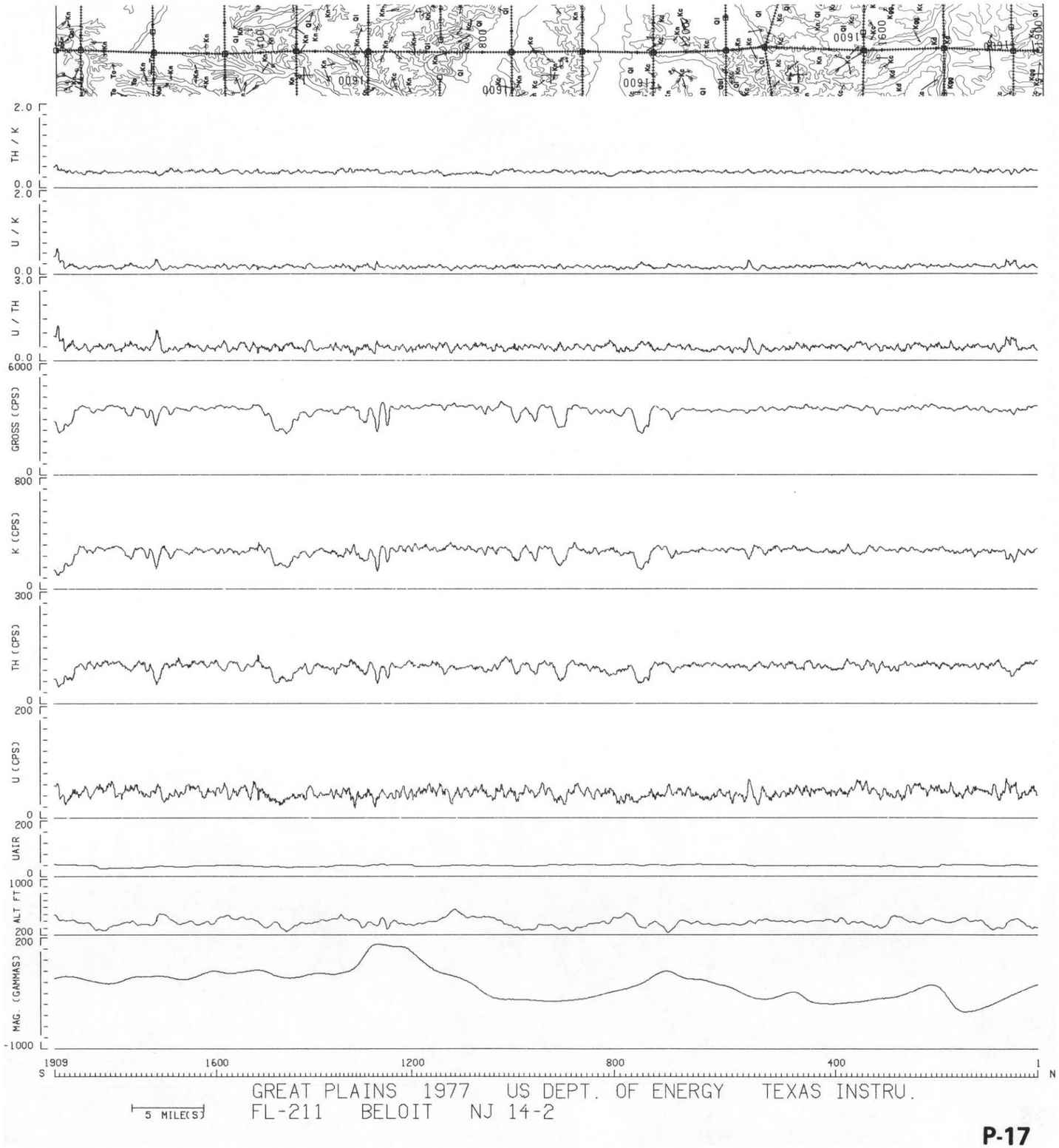


GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-42 BELOIT NJ 14-2

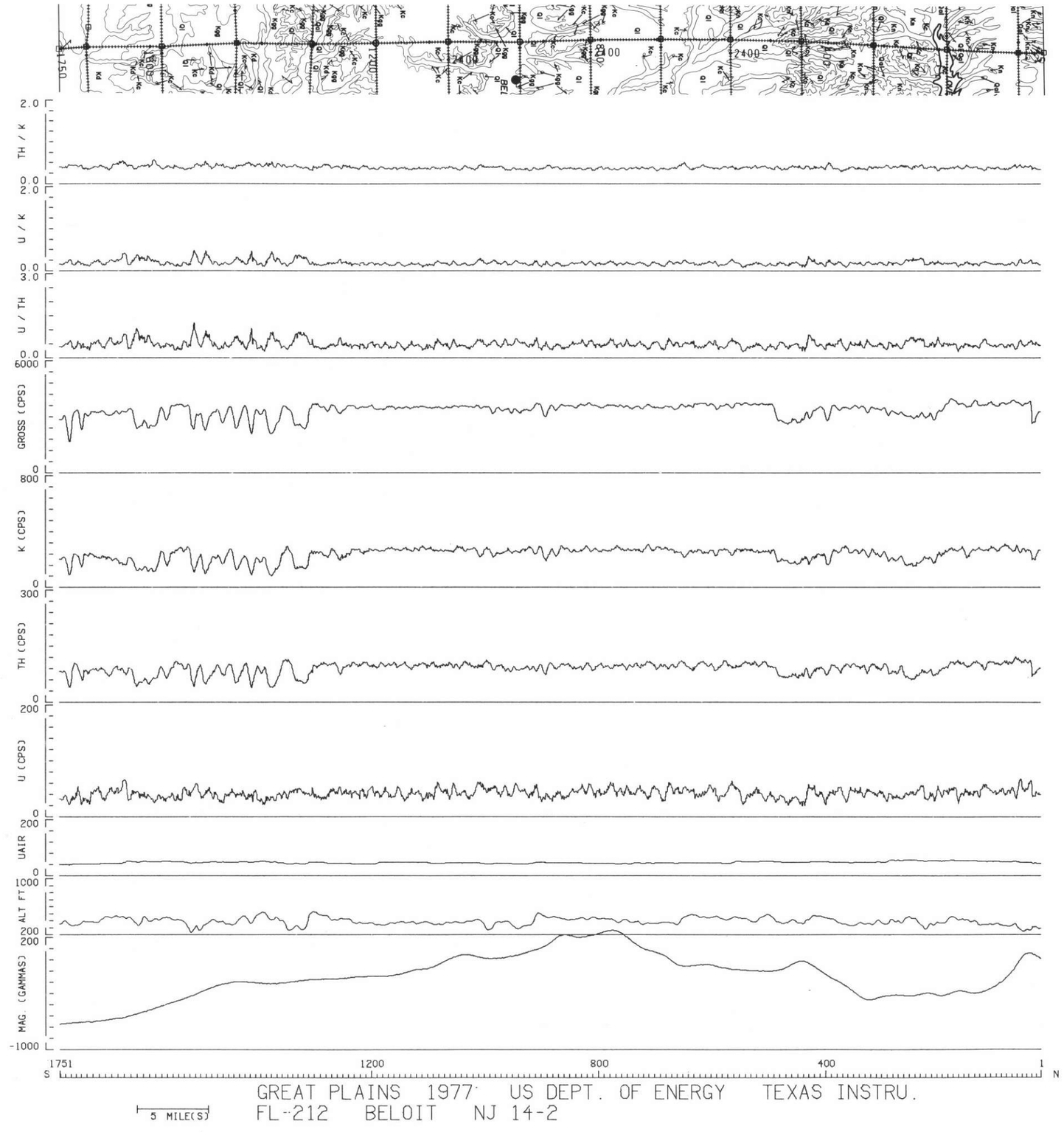


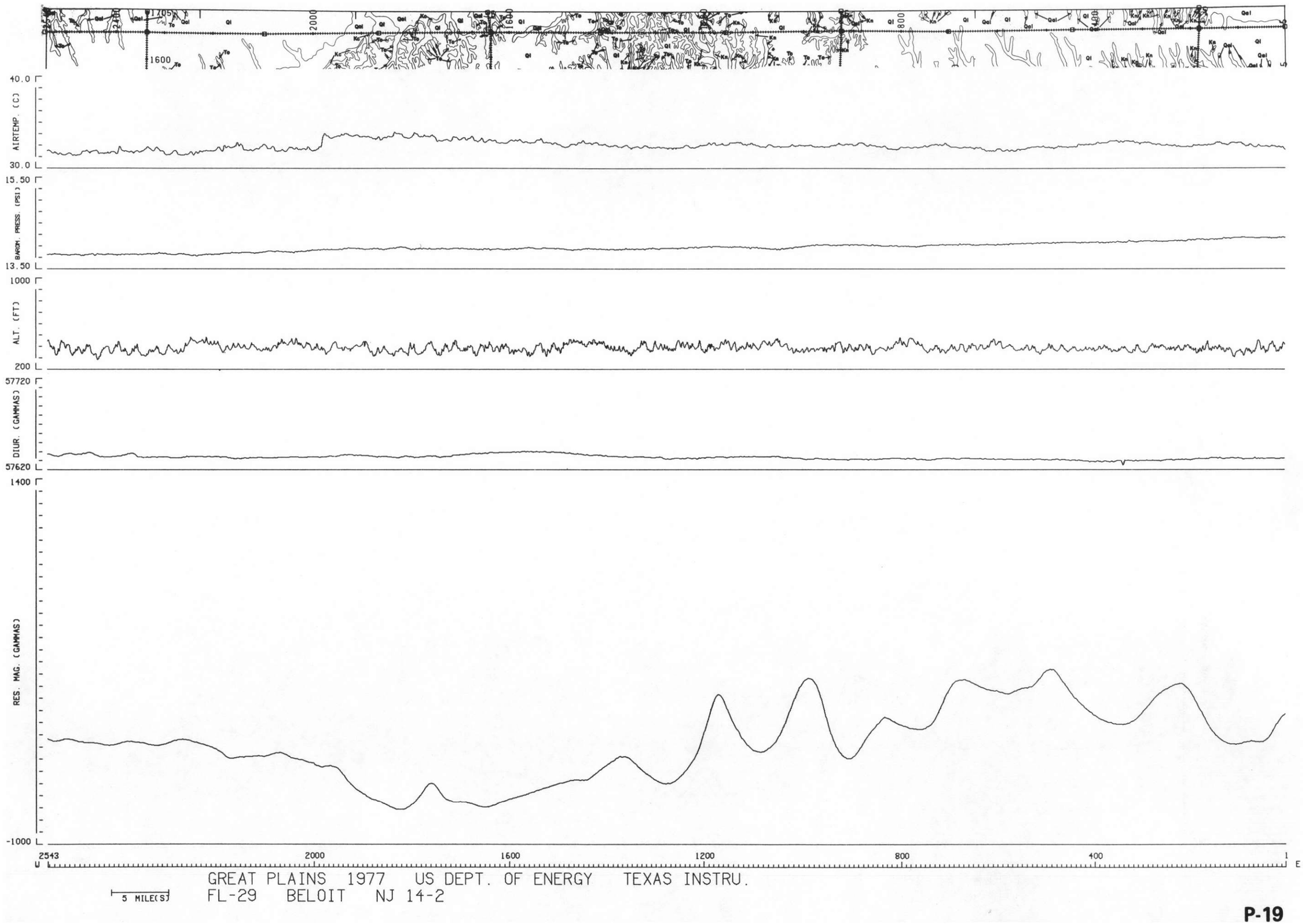
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU
FL-209 BELOIT NJ 14-2


TH / K
U / K
U / TH
GROSS (CPS)
K (CPS)
TH (CPS)
U (CPS)
UAIR
ALT FT
MAG. (GAMMAS)
2.0
0.0
3.0
6000
800
300
200
1000
-1000
1738
1200
800
400
1
S
N
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-210 BELOIT NJ 14-2

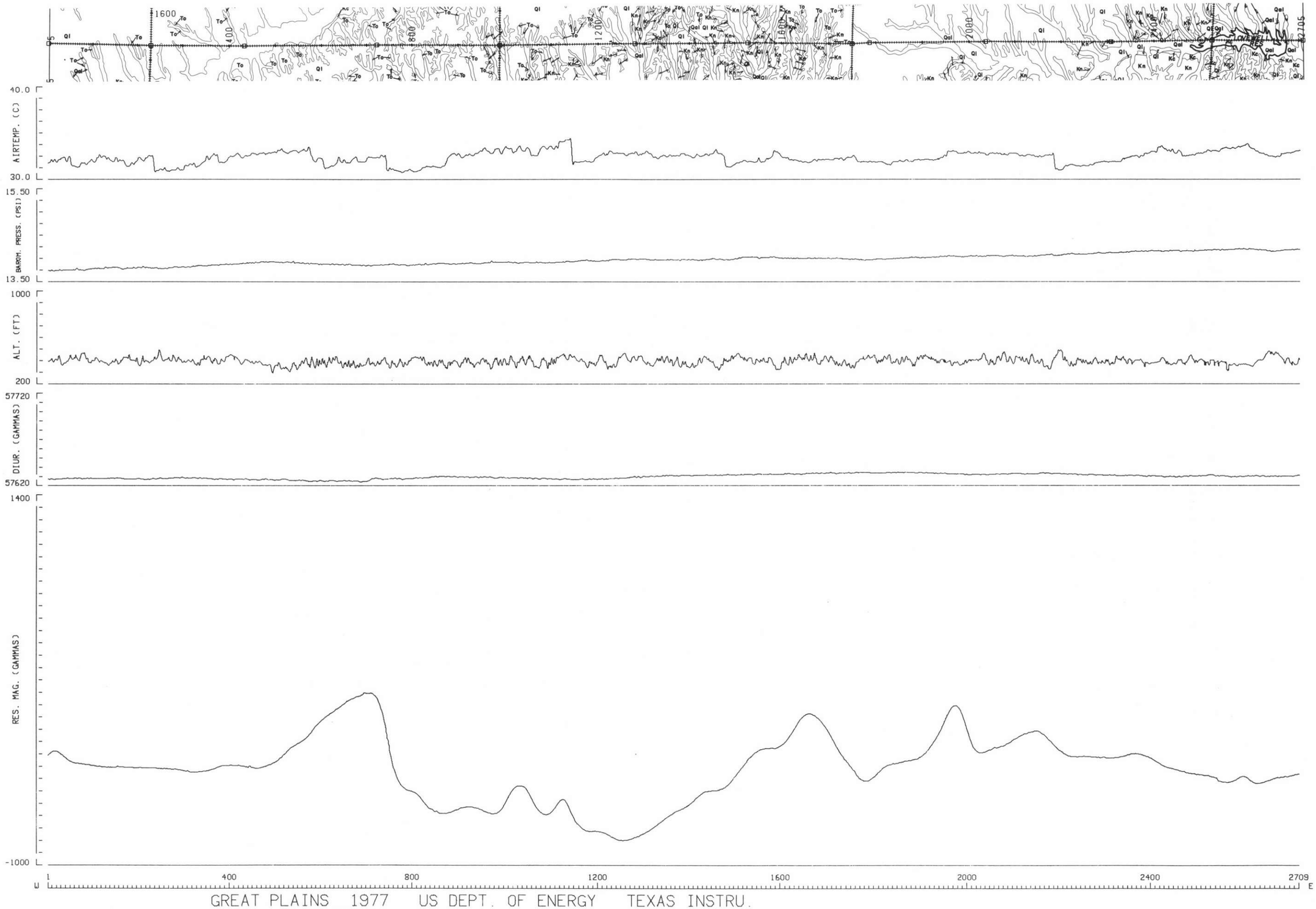


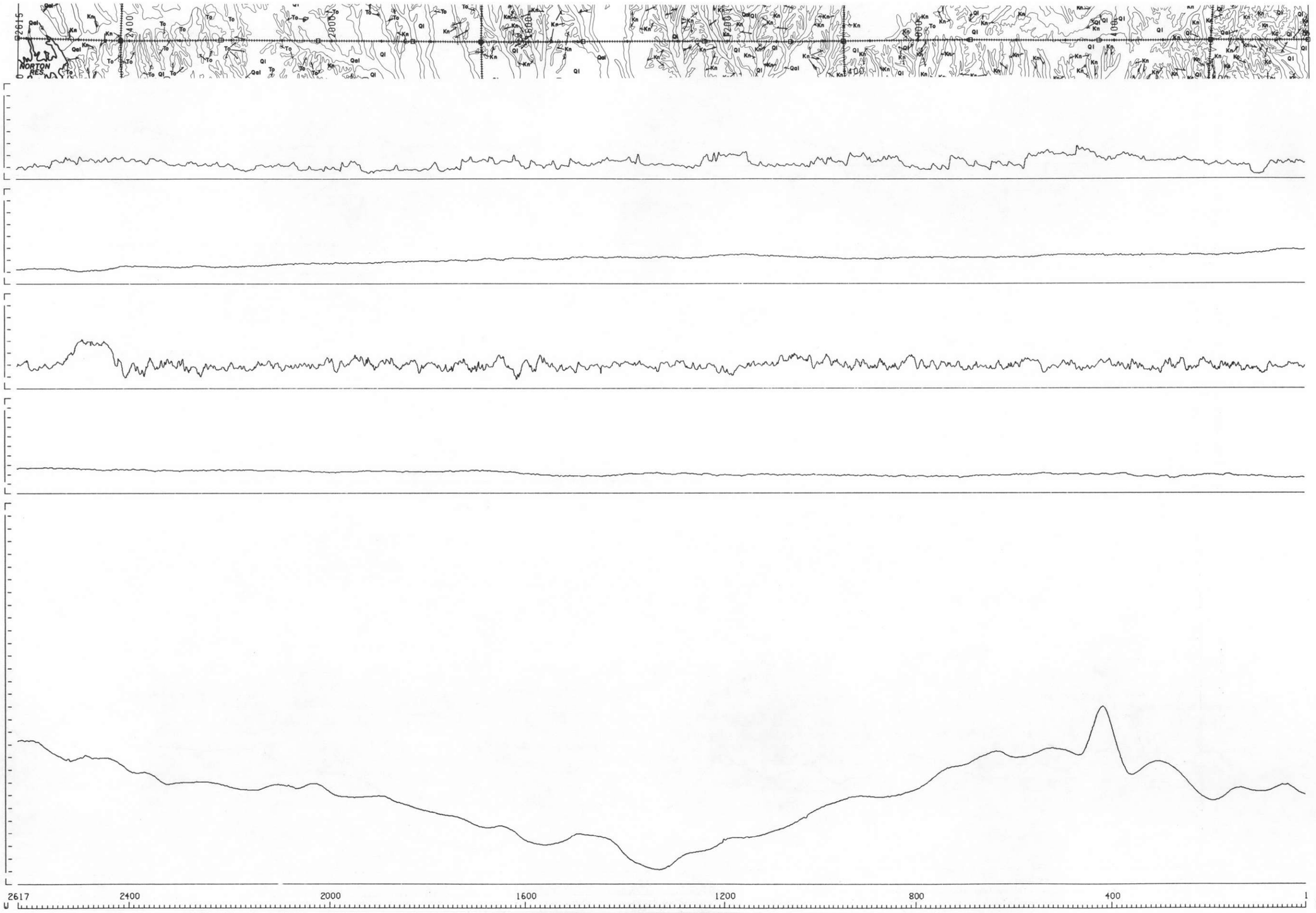
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-211 BELOIT NJ 14-2


TH / K
U / K
U / TH
GROSS (CPS)
K (CPS)
TH (CPS)
U (CPS)
UAIR
ALT FT
MAG. (GAMMAS)
2.0
0.0
6000
800
300
200
1000
-1000
1751
1200
800
400
1
S
N
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-212 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-29 BELOIT NJ 14-2


AIRTEMP. (C)
40.0
30.0
BAROM. PRESS. (PSI)
15.50
13.50
ALT. (FT)
1000
200
DIUR. (GAMMAS)
57720
57620
RES. MAG. (GAMMAS)
1400
-1000
1
400
800
1200
1600
2000
2400
2709
E
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-30 BELOIT NJ 14-2



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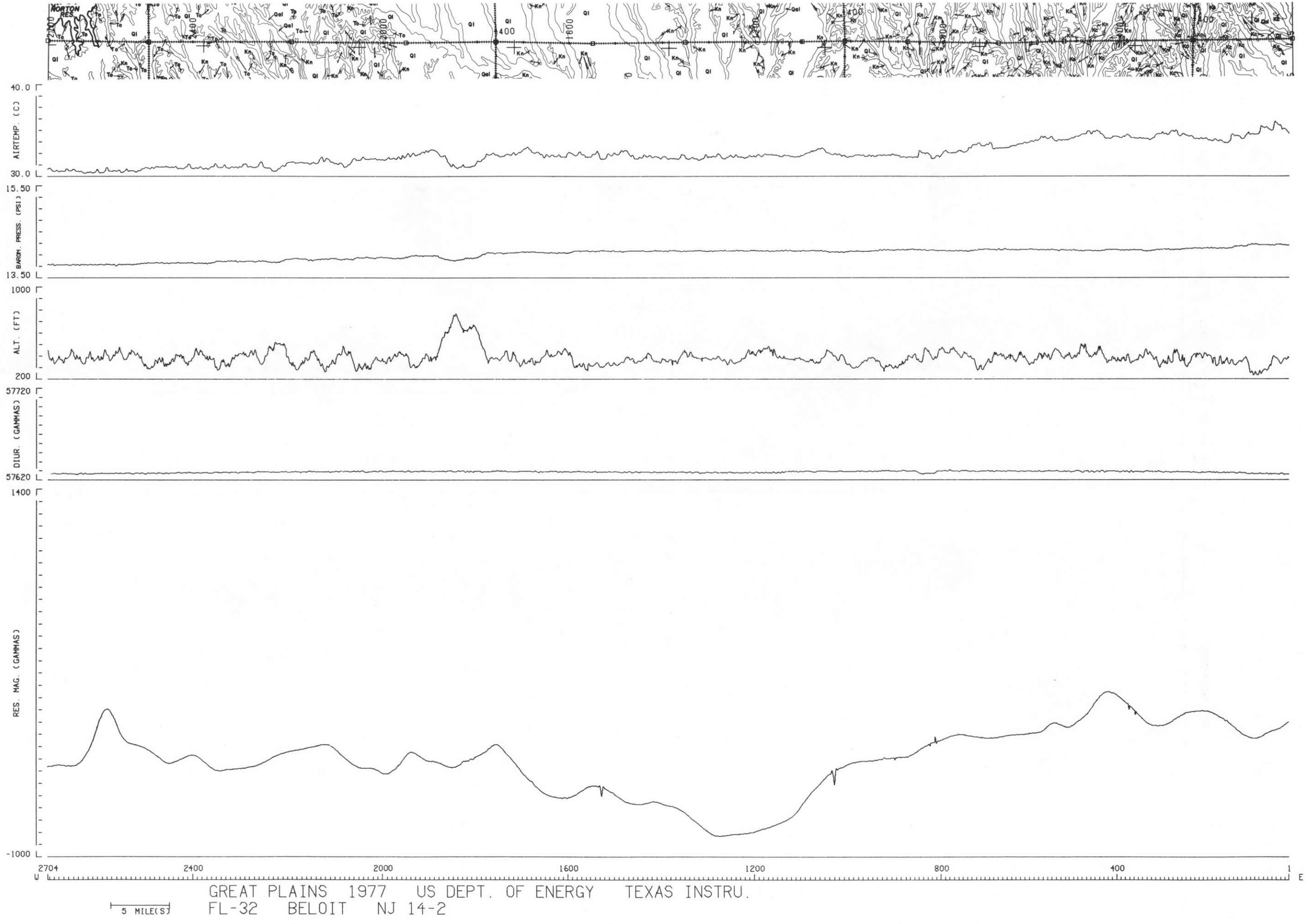
FL-31 BELOIT NJ 14-2



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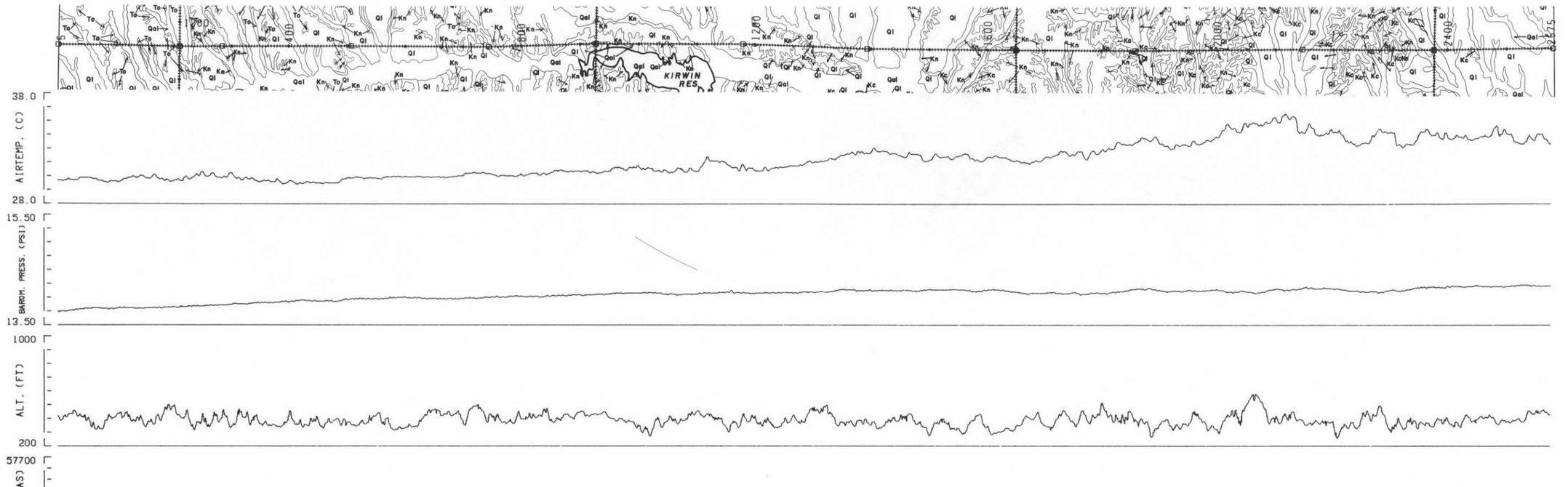
FL-32 BELOIT NJ 14-2



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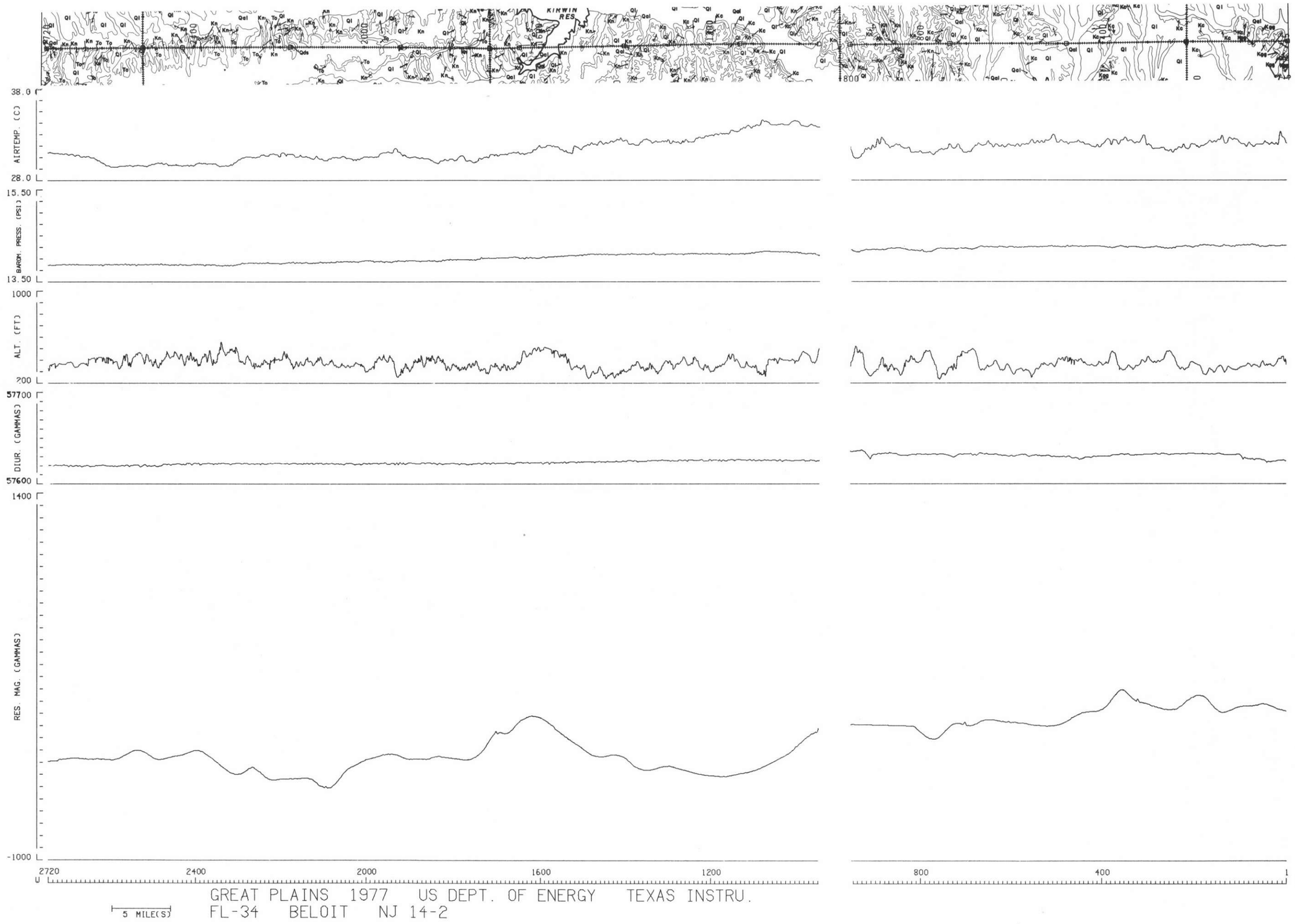
FL-33 BELOIT NJ 14-2



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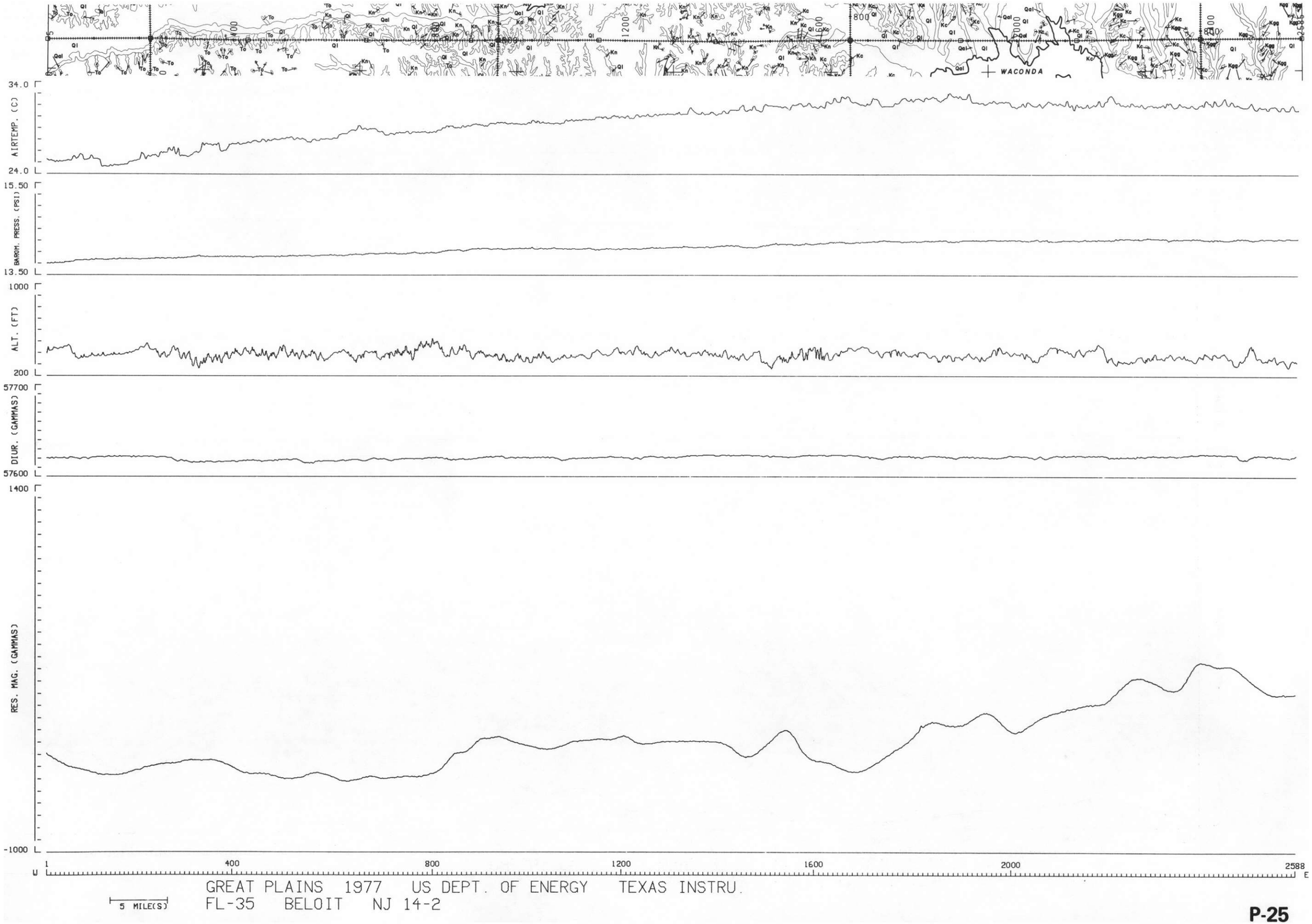
FL-34 BELOIT NJ 14-2



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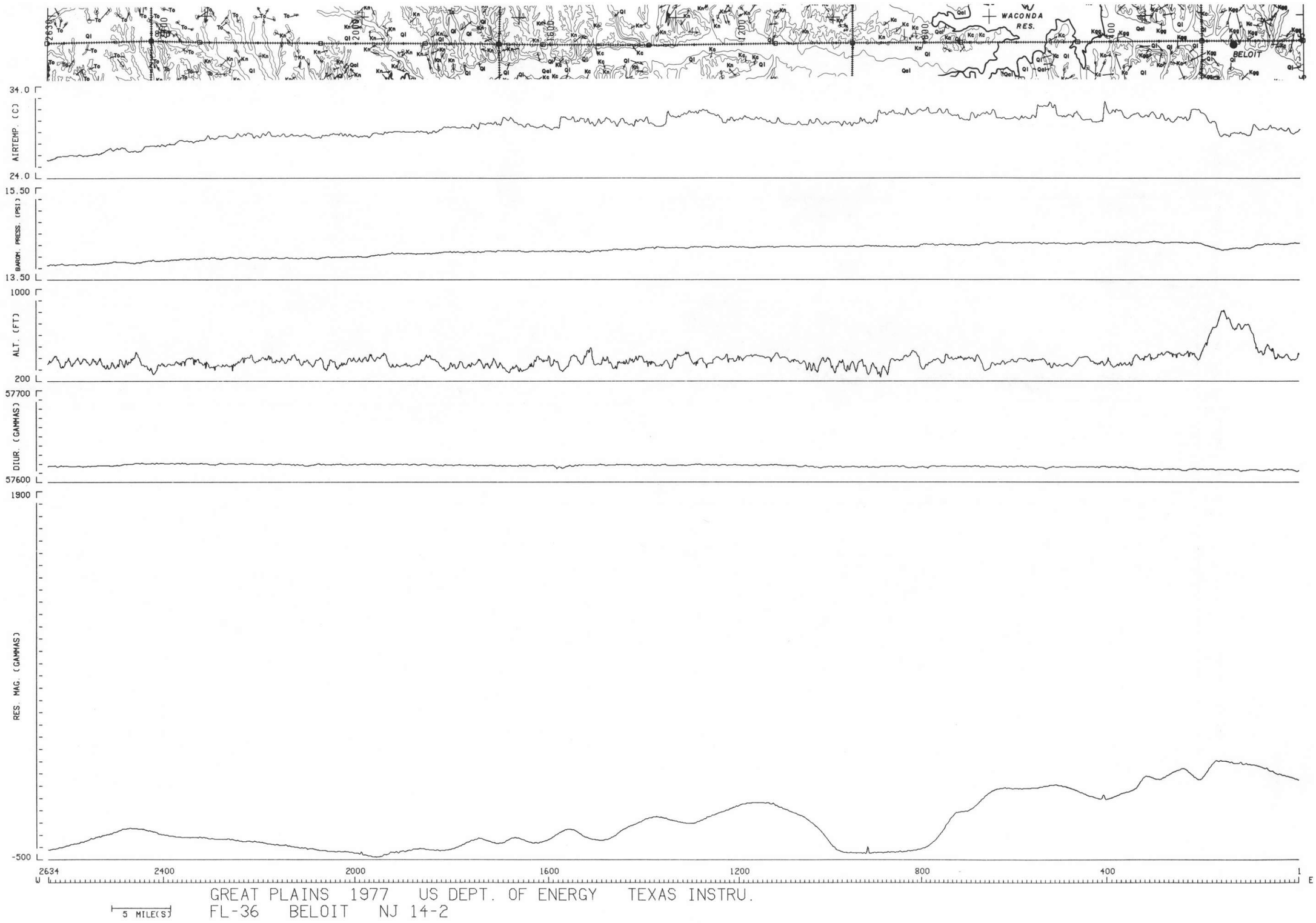
FL-35 BELOIT NJ 14-2



5 MILE(S)

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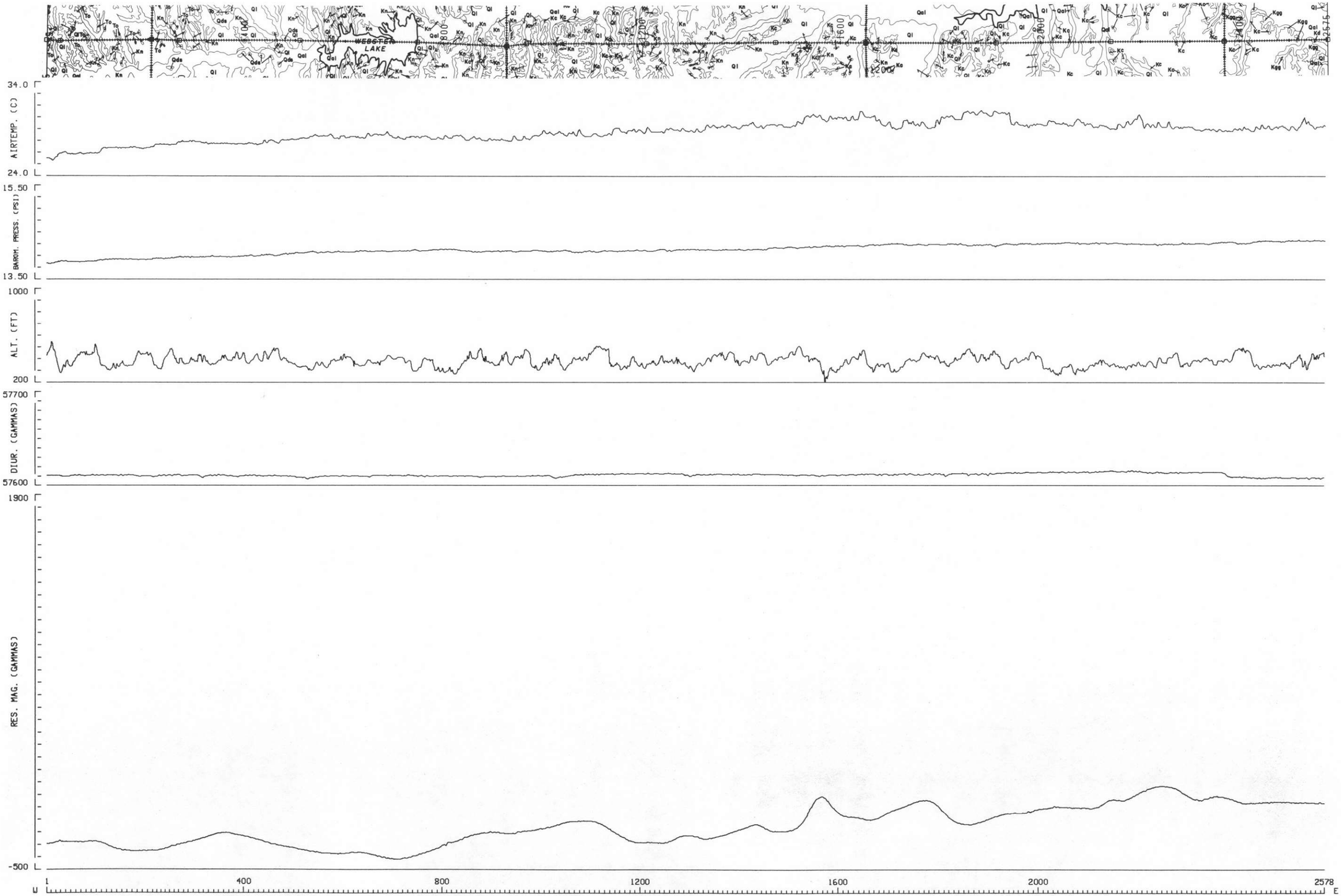
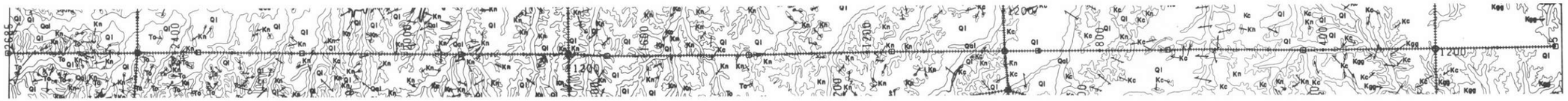
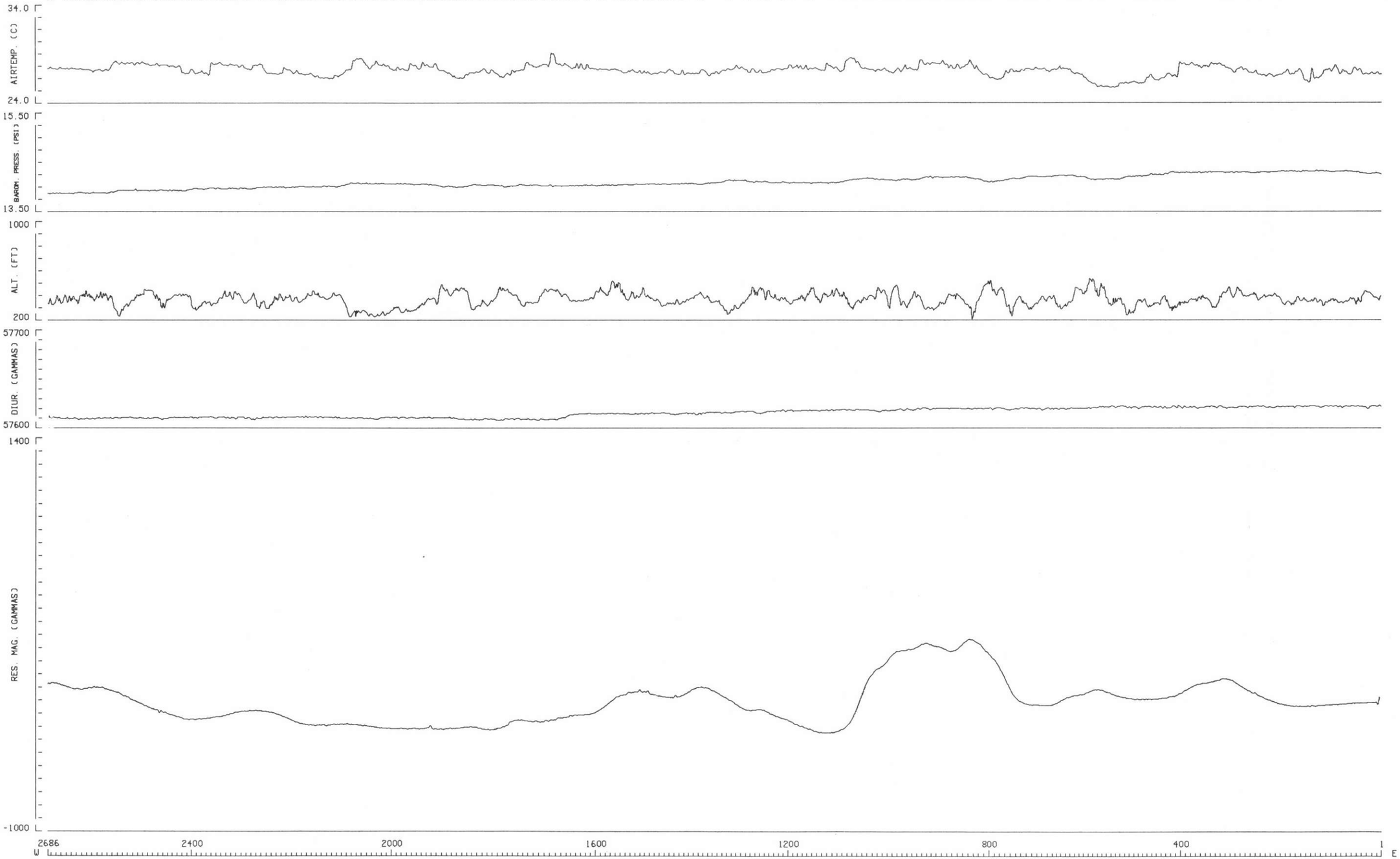
FL-36 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-37 BELOIT NJ 14-2





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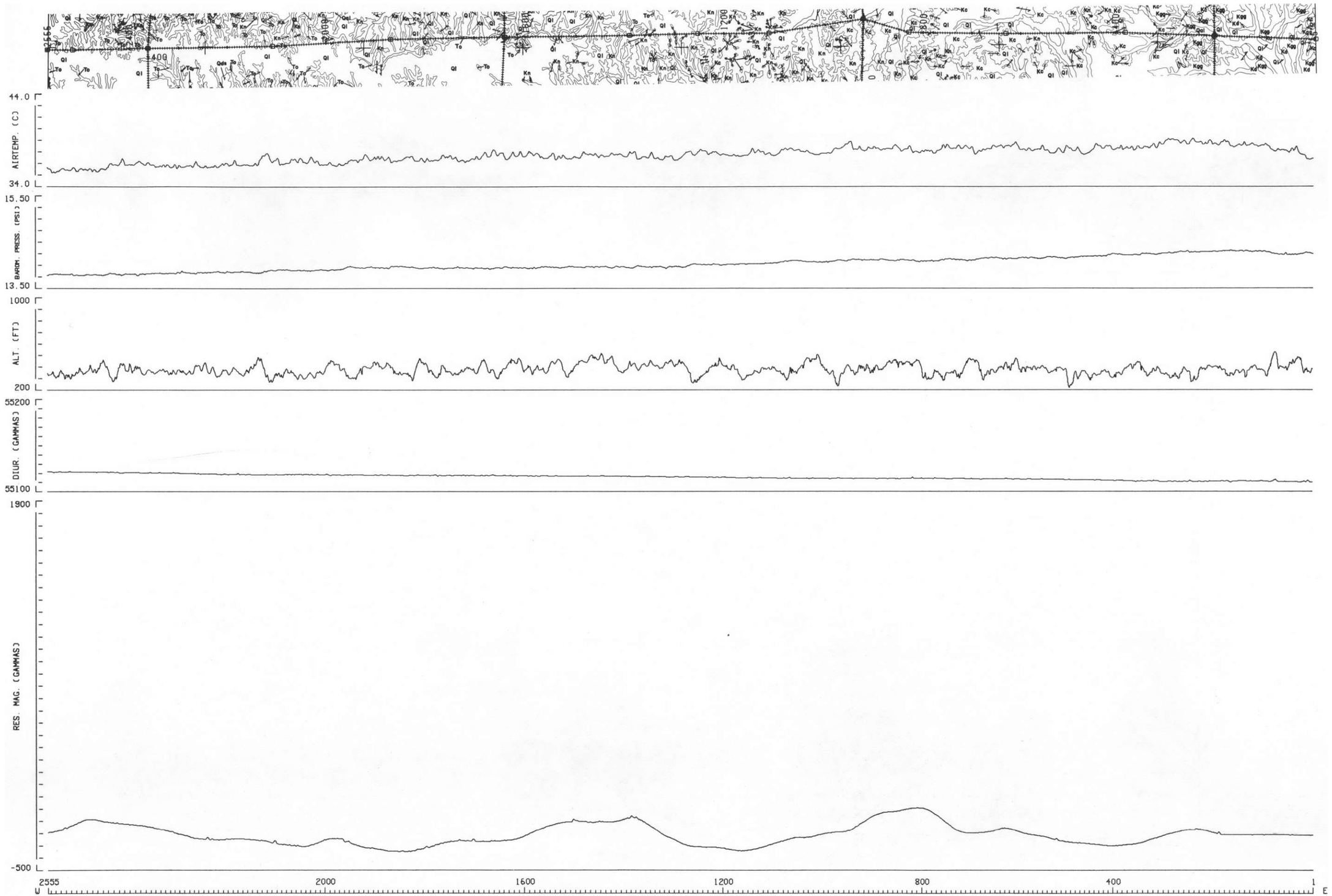
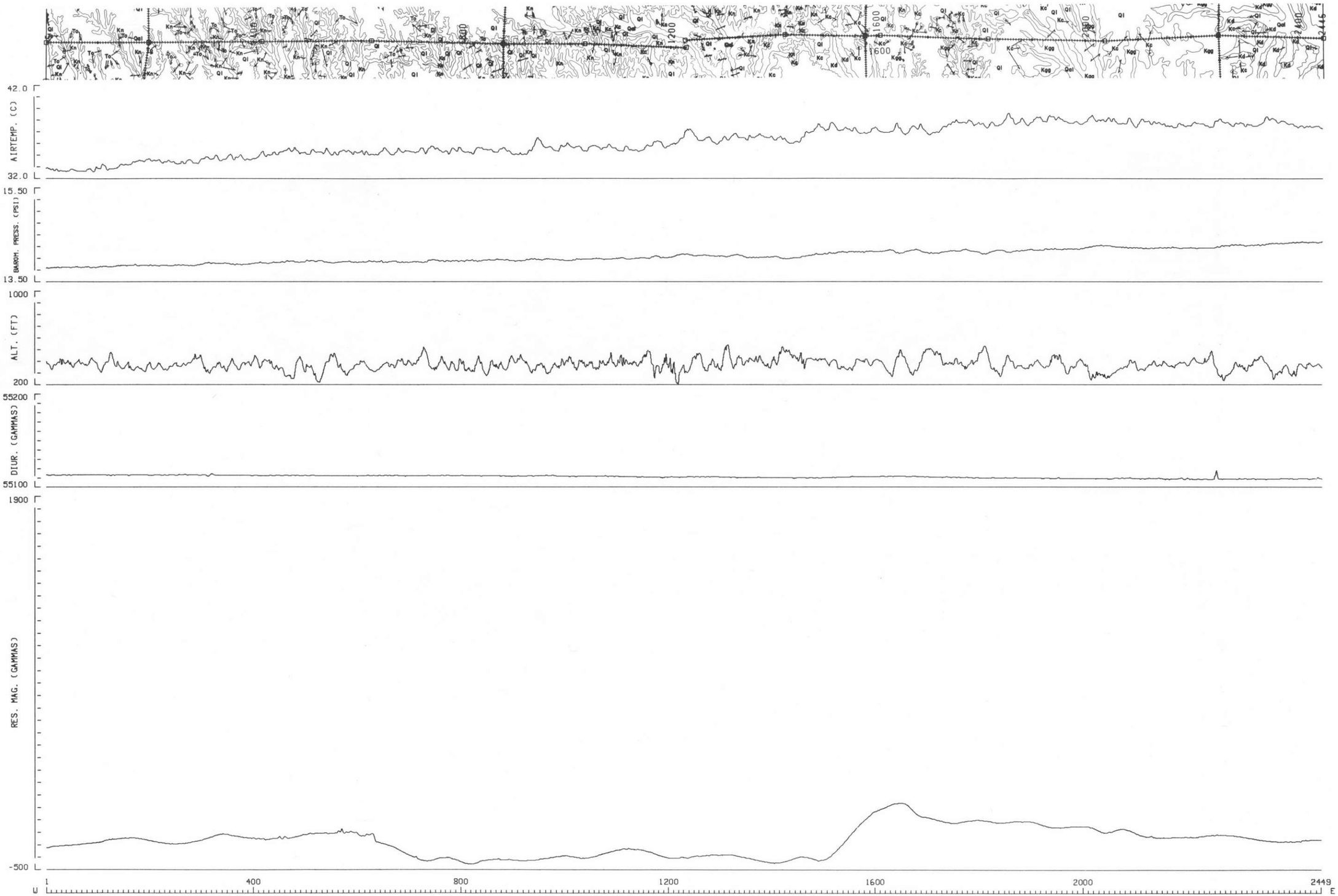
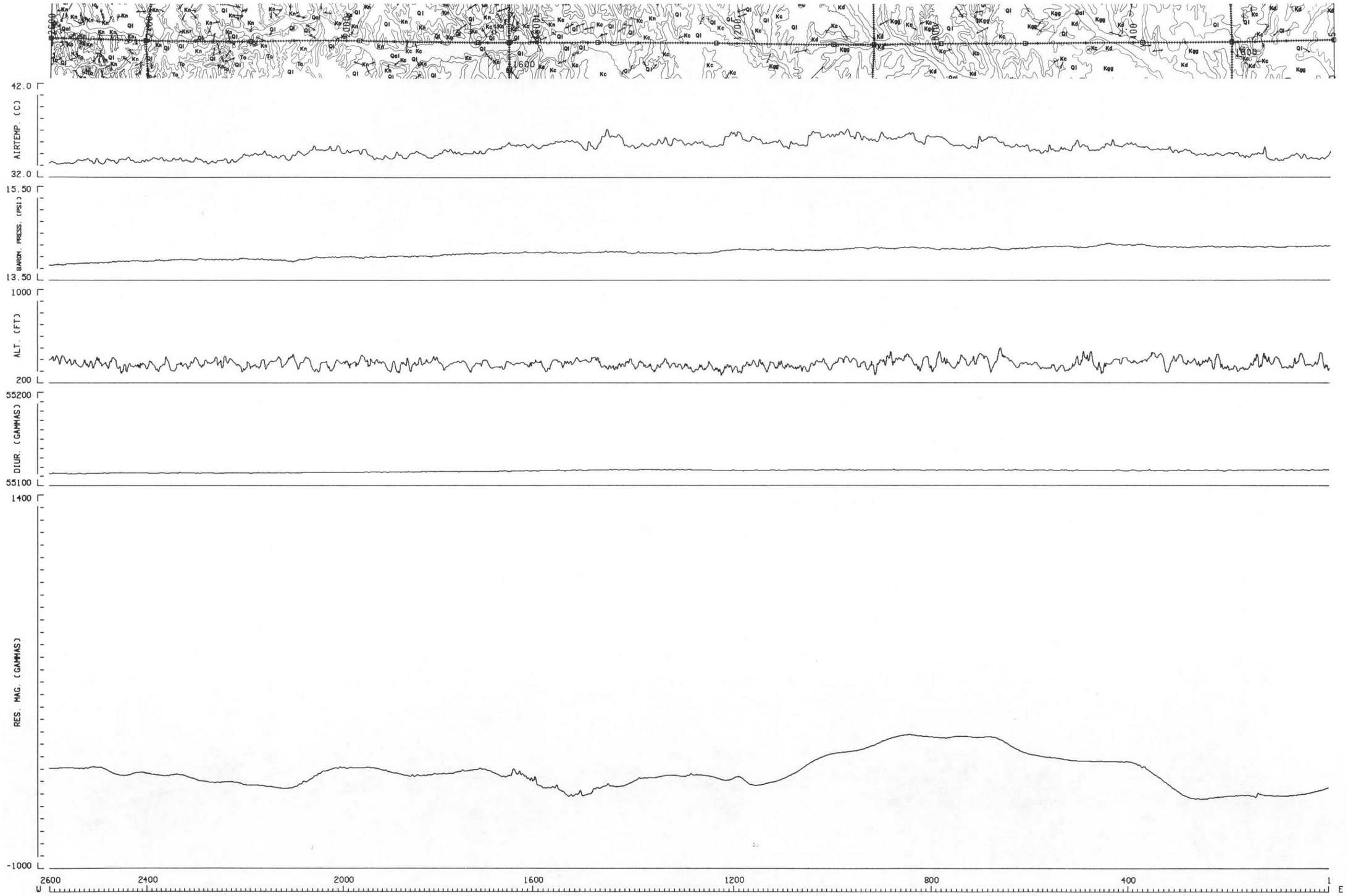
FL-38 BELOIT NJ 14-2



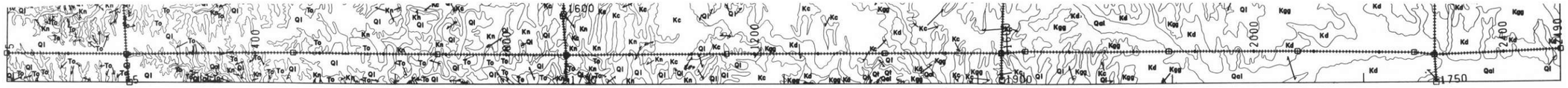
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-39 BELOIT NJ 14-2

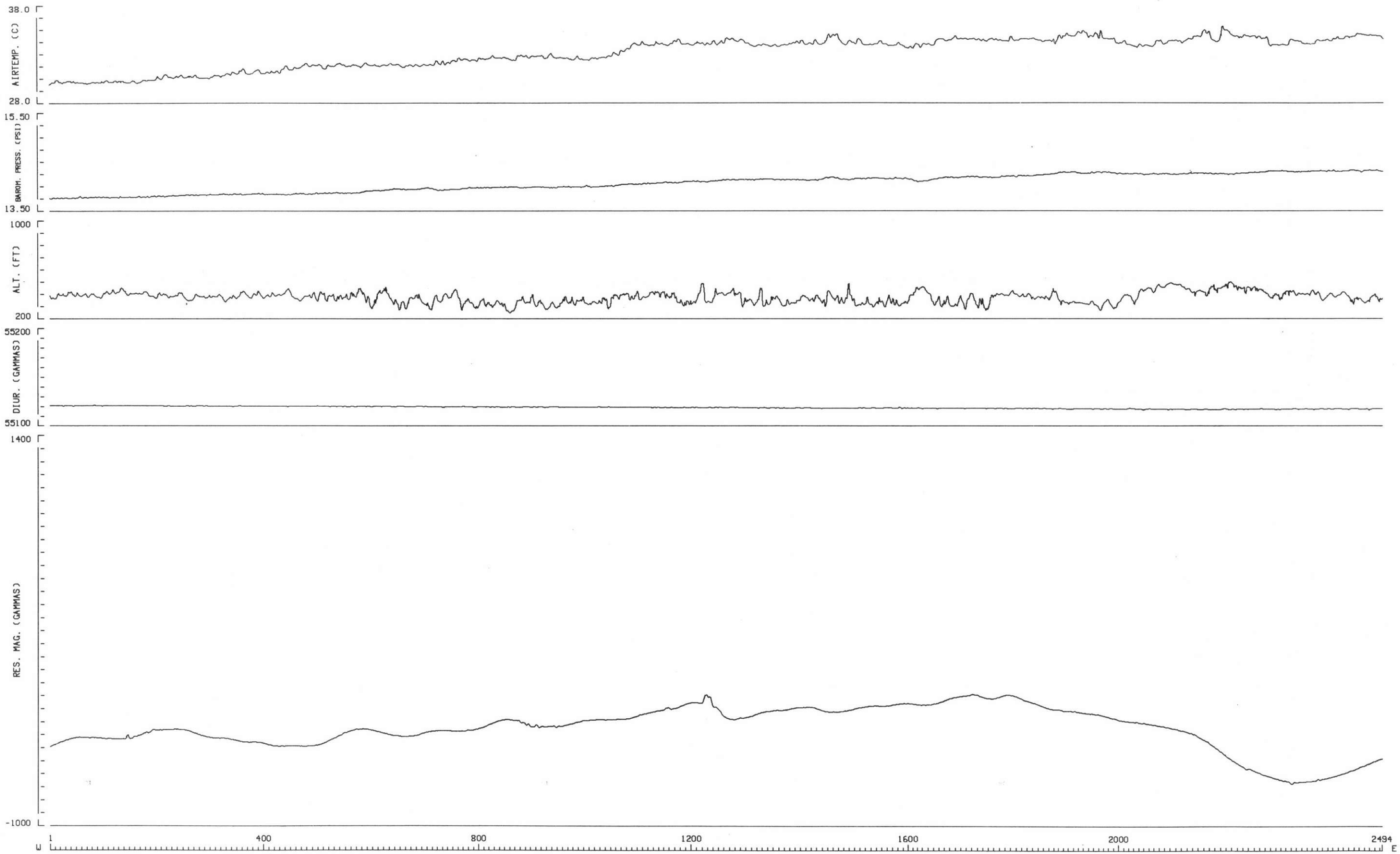


GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-40 BELOIT NJ 14-2



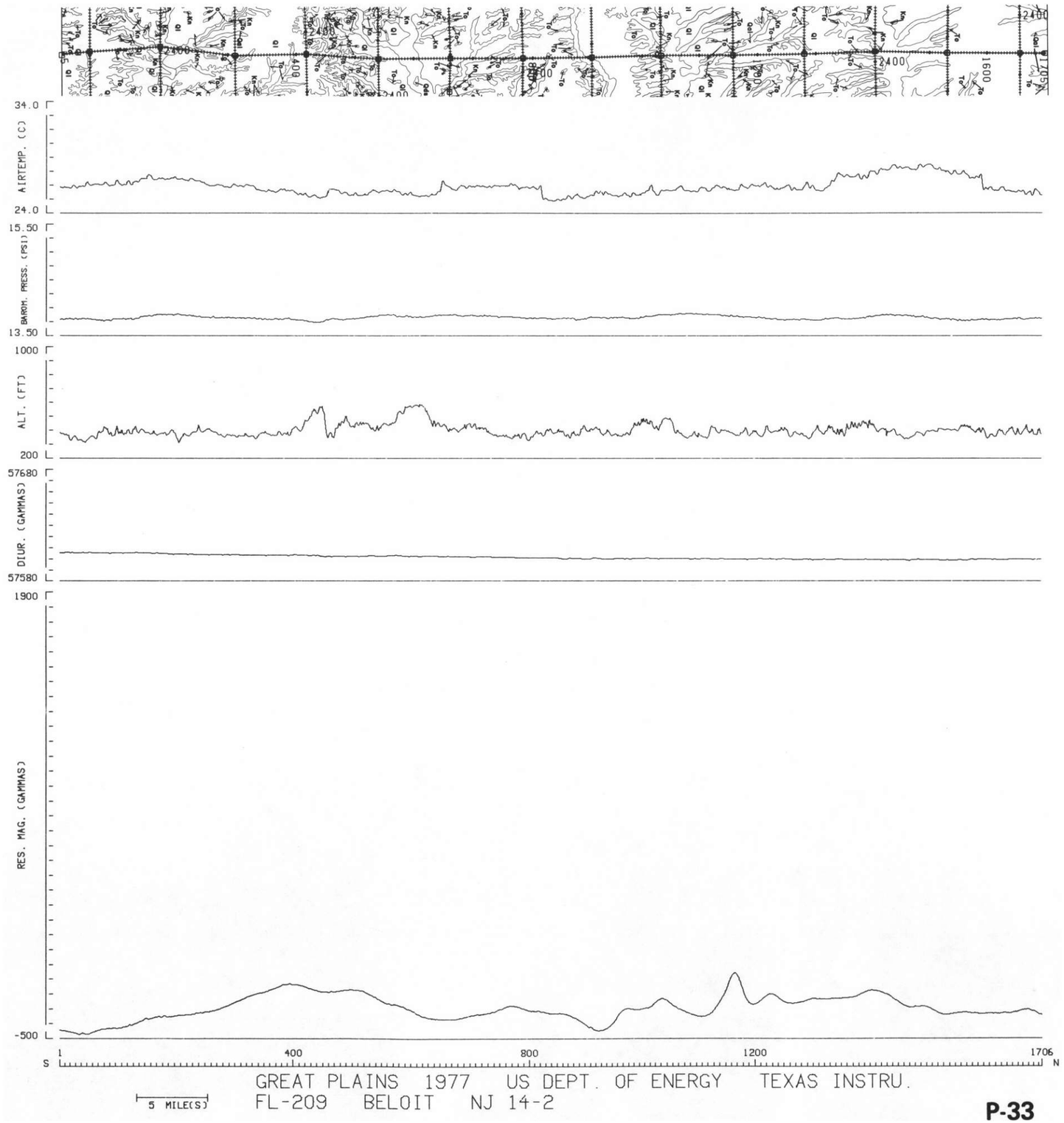
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-41 BELOIT NJ 14-2



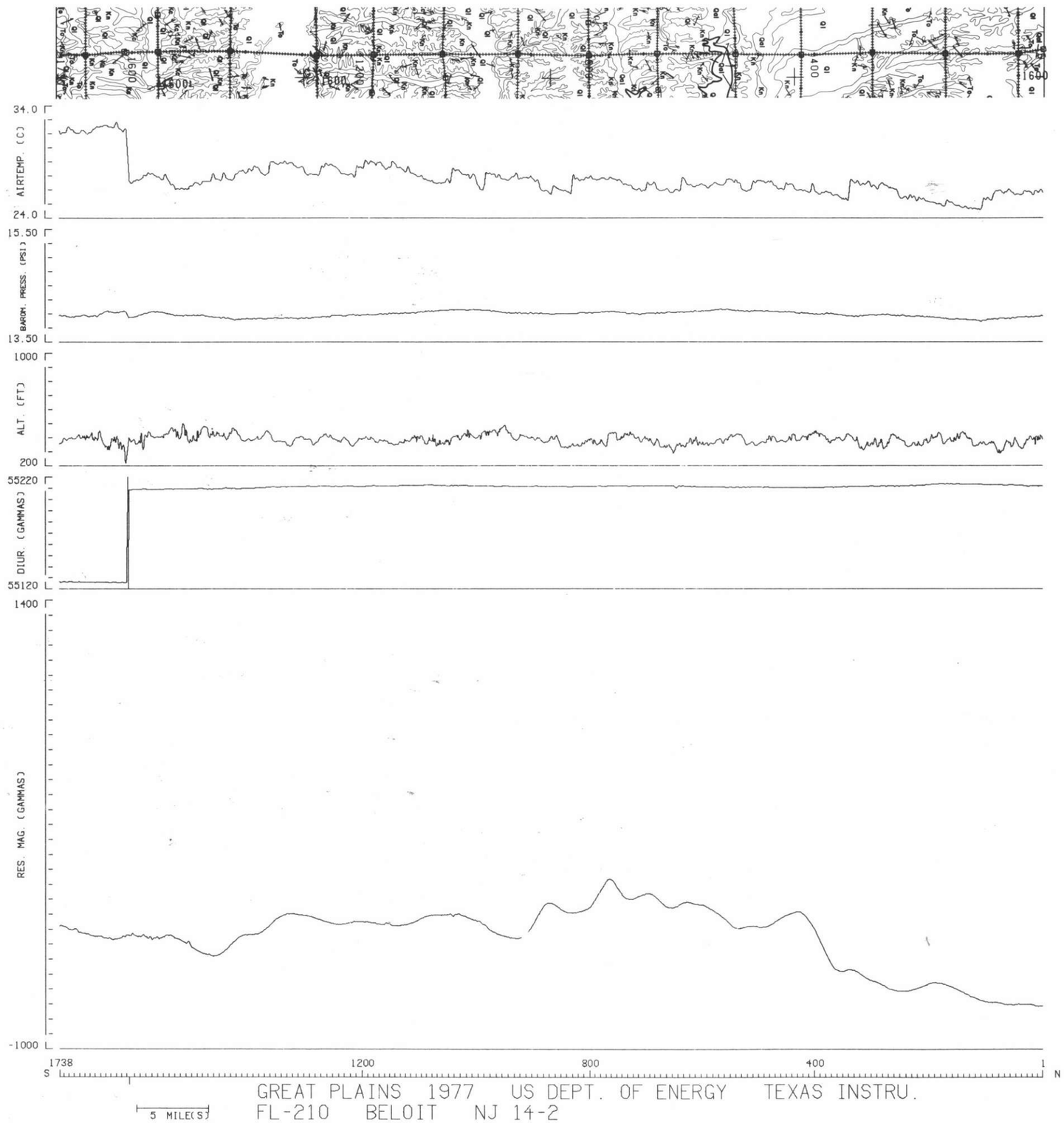


5 MILE(S)

GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-42 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-209 BELOIT NJ 14-2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1000
800
600
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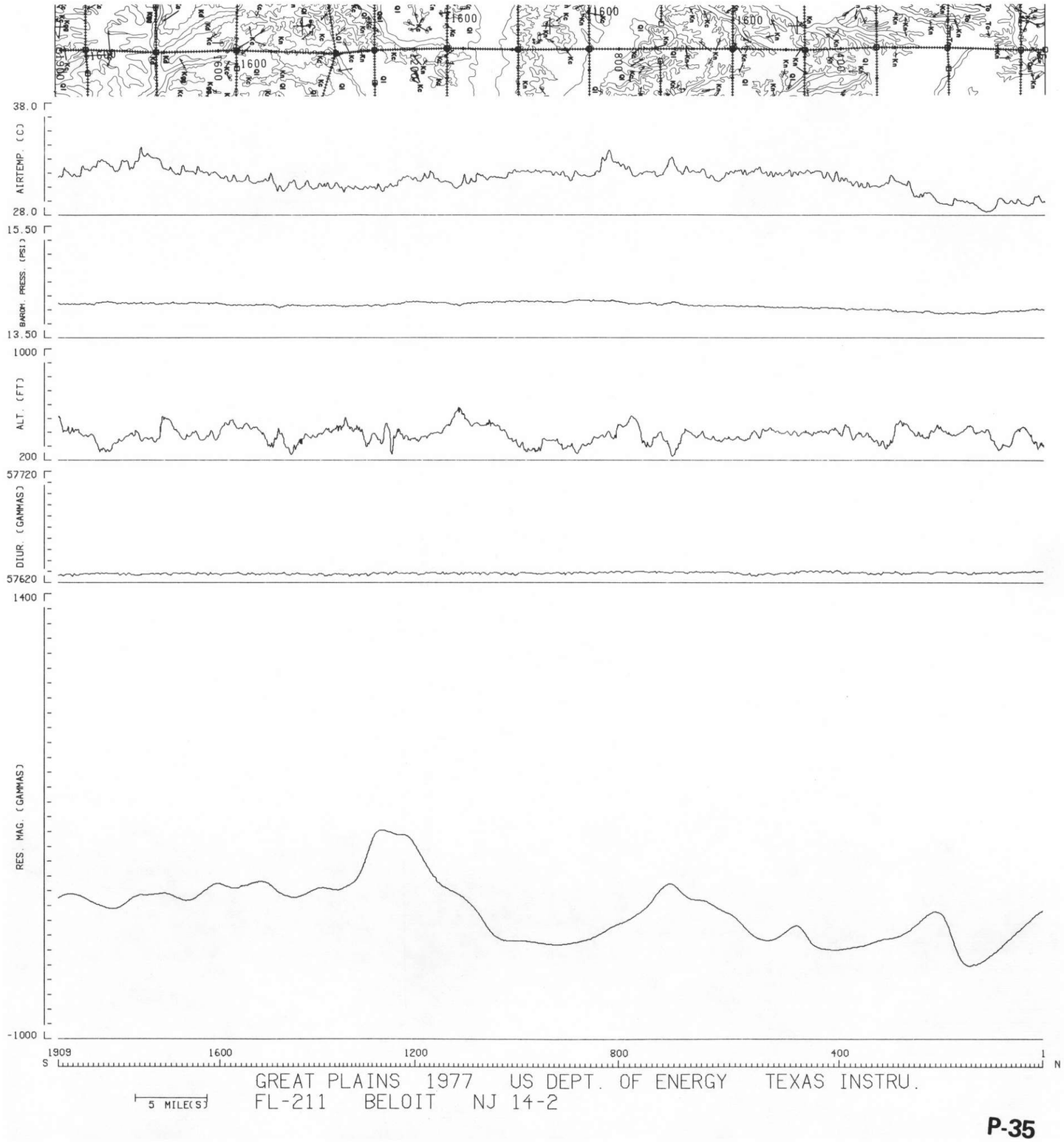
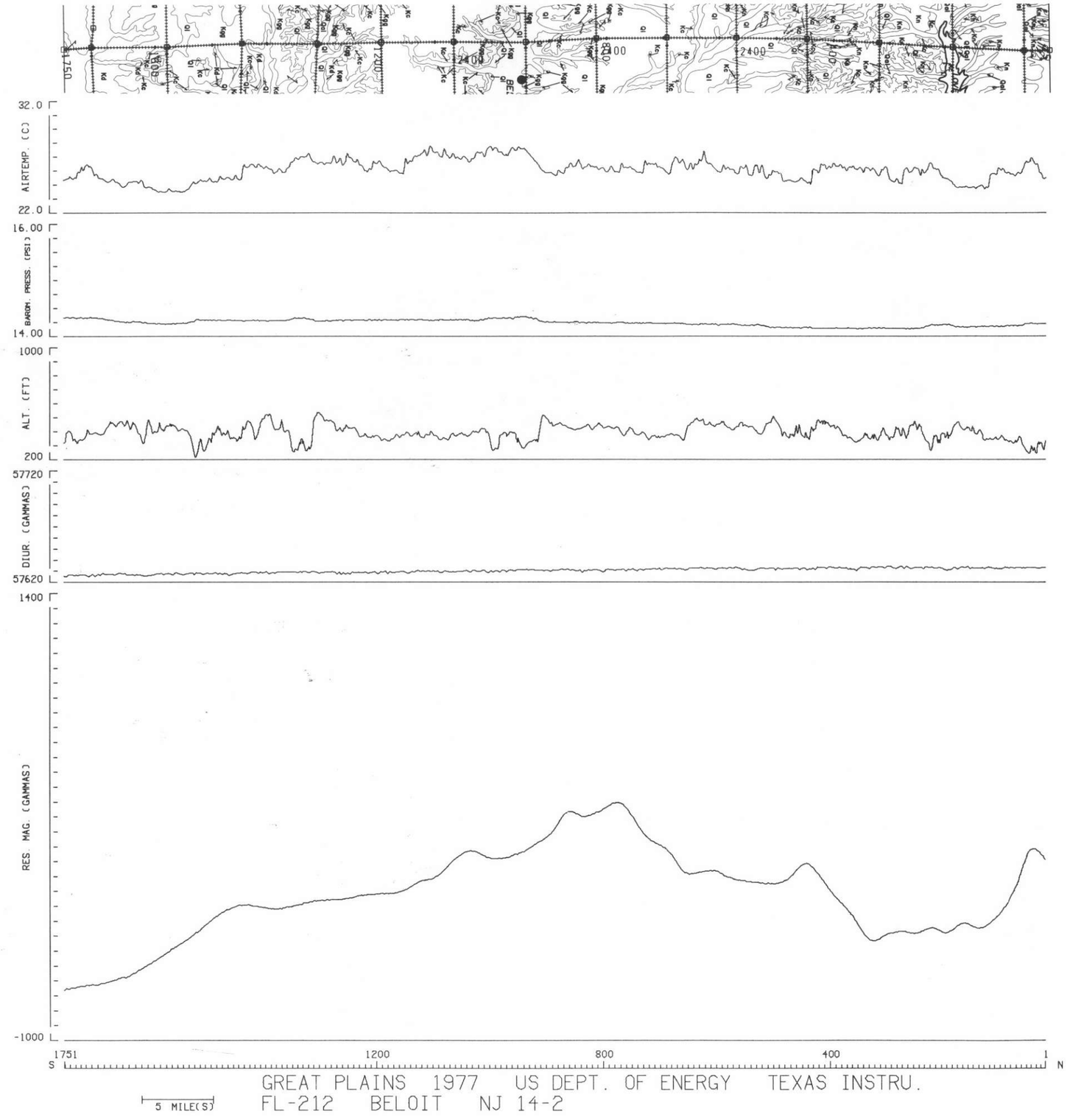
AIRTEMP. (C)
24.0
15.50
BAROM. PRESS. (PSI)
13.50
1000
ALT. (FT)
200
55220
DIUR. (GAMMAS)
55120
1400
RES. MAG. (GAMMAS)
-1000
1738
1200
800
400
1
S
N
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-210 BELOIT NJ 14-2



GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-211 BELOIT NJ 14-2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22.0
BAROM. PRESS. (PSI)
16.00
14.00
ALT. (FT)
1000
200
DIUR. (GAMMAS)
57720
57620
RES. MAG. (GAMMAS)
1400
-1000
1751
1200
800
400
1
S
N
5 MILE(S)
GREAT PLAINS 1977 US DEPT. OF ENERGY TEXAS INSTRU.
FL-212 BELOIT NJ 14-2

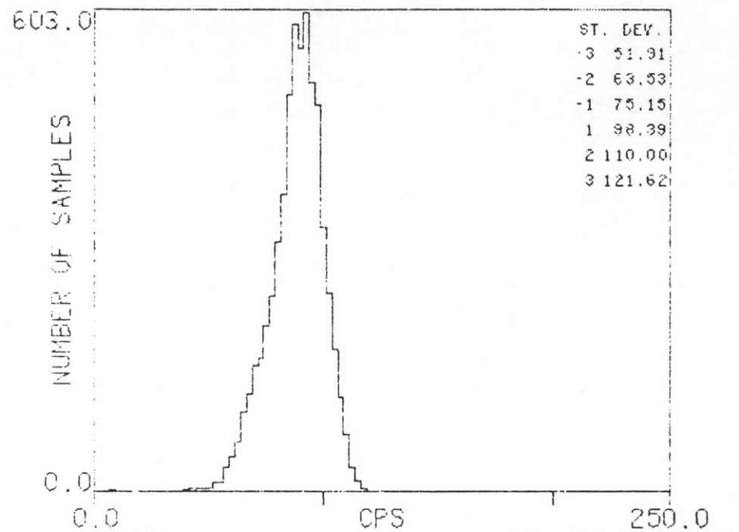
HISTOGRAMS

HISTOGRAMS

HISTOGRAMS : QAL

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

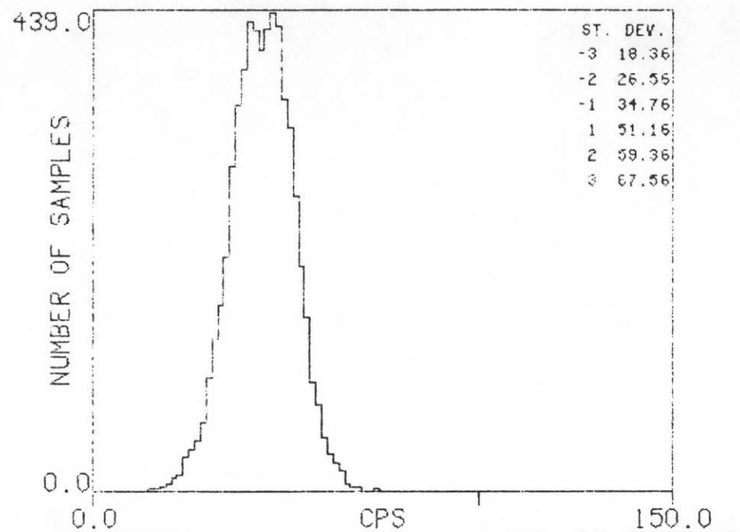
NORMAL THORIUM



MEDIAN 86.77

NO. OF SAMPLES 6115

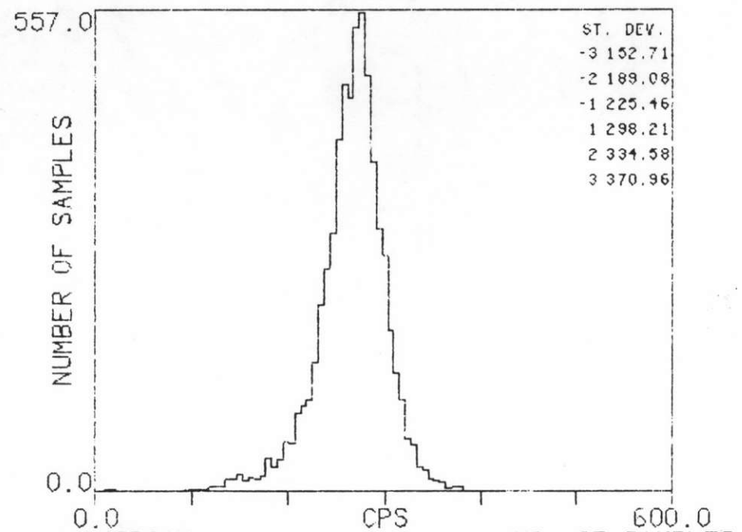
NORMAL URANIUM



MEDIAN 42.96

NO. OF SAMPLES 6103

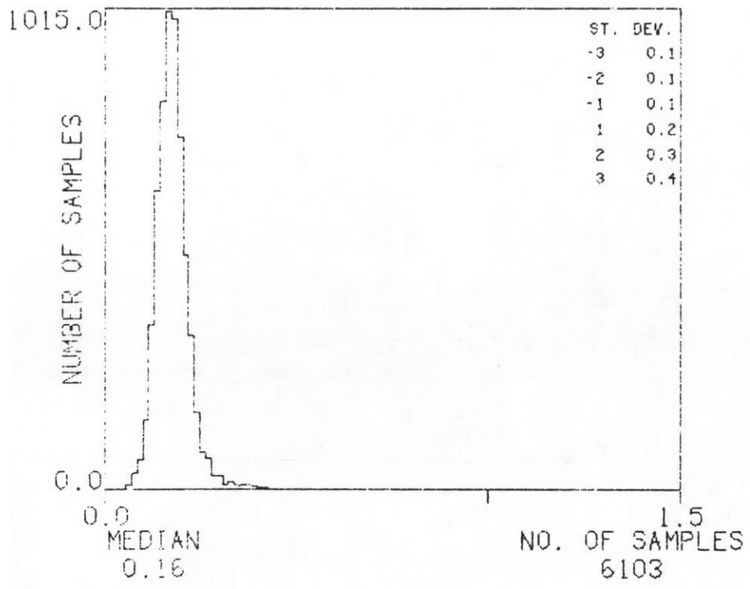
NORMAL POTASSIUM



MEDIAN 261.83

NO. OF SAMPLES 6115

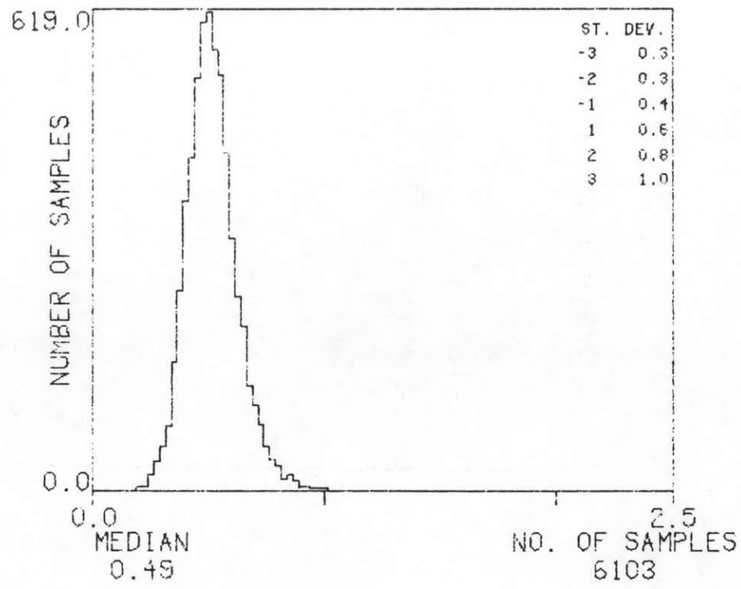
LOGNORMAL U/K



MEDIAN 0.16

NO. OF SAMPLES 6103

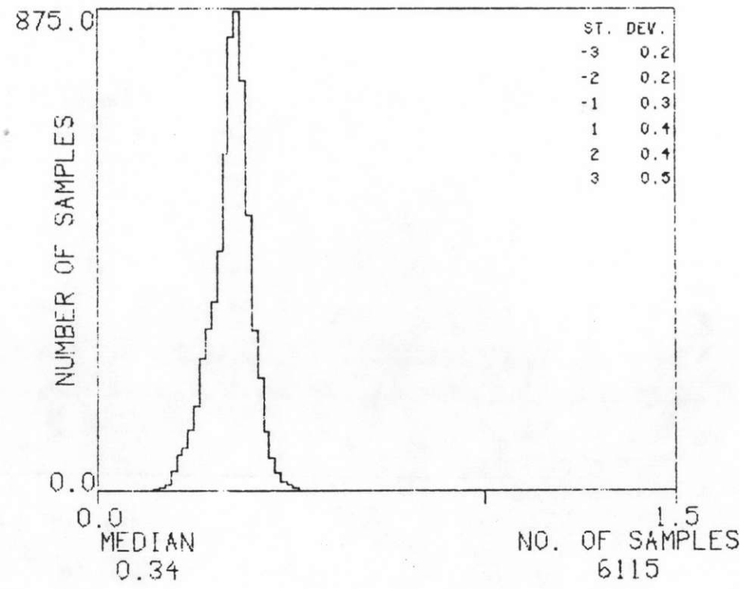
LOGNORMAL U/TH



MEDIAN 0.49

NO. OF SAMPLES 6103

NORMAL TH/K



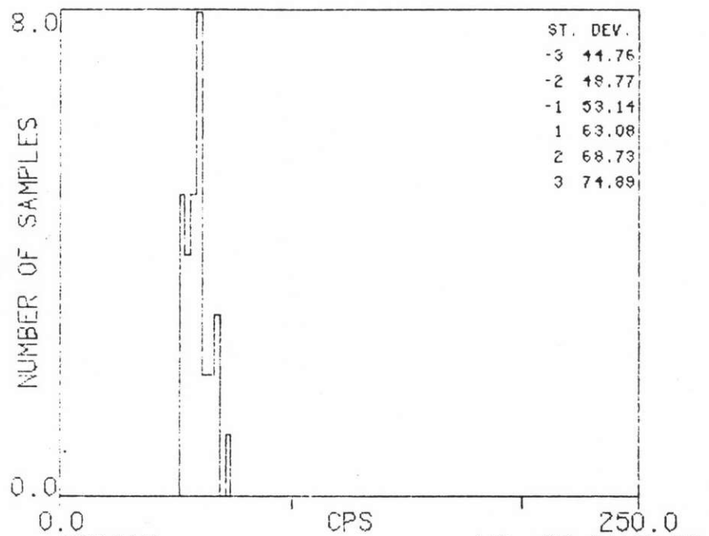
MEDIAN 0.34

NO. OF SAMPLES 6115

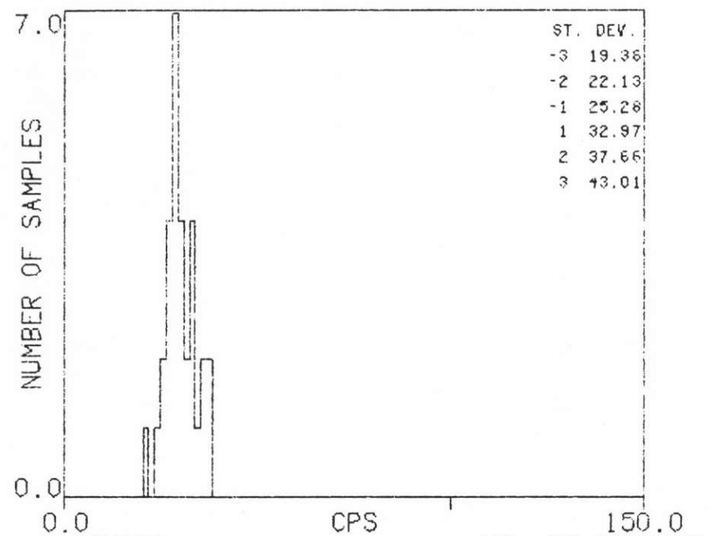
HISTOGRAMS : QDS

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

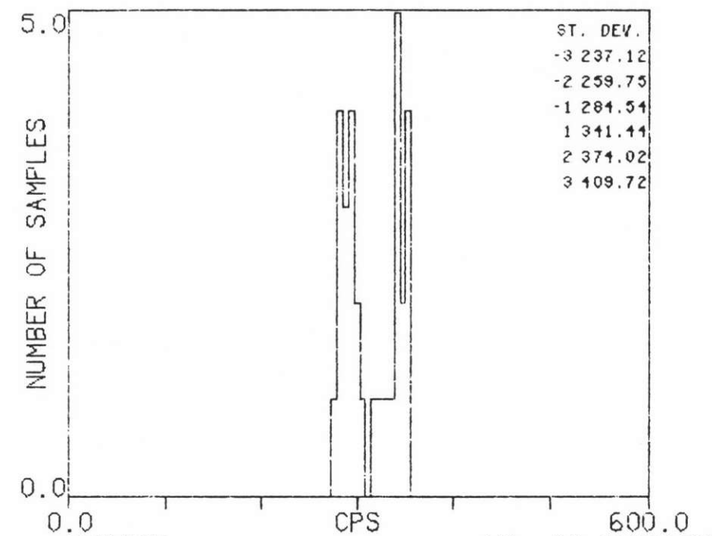
LOGNORMAL THORIUM



LOGNORMAL URANIUM



LOGNORMAL POTASSIUM



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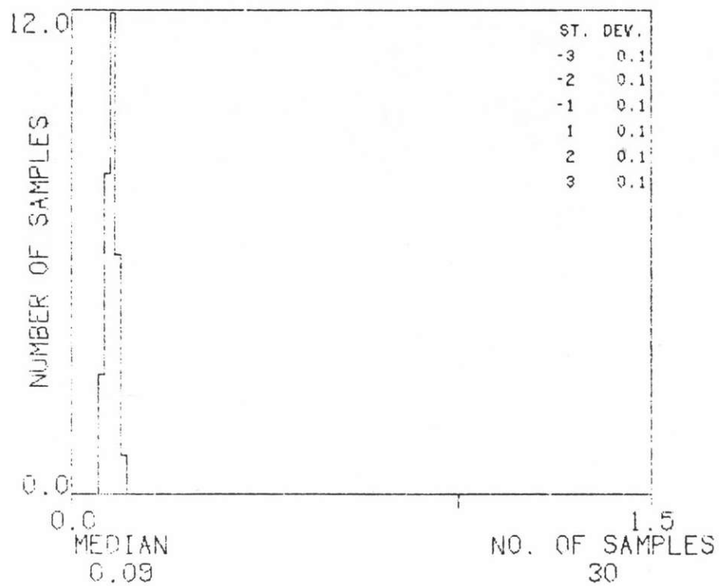

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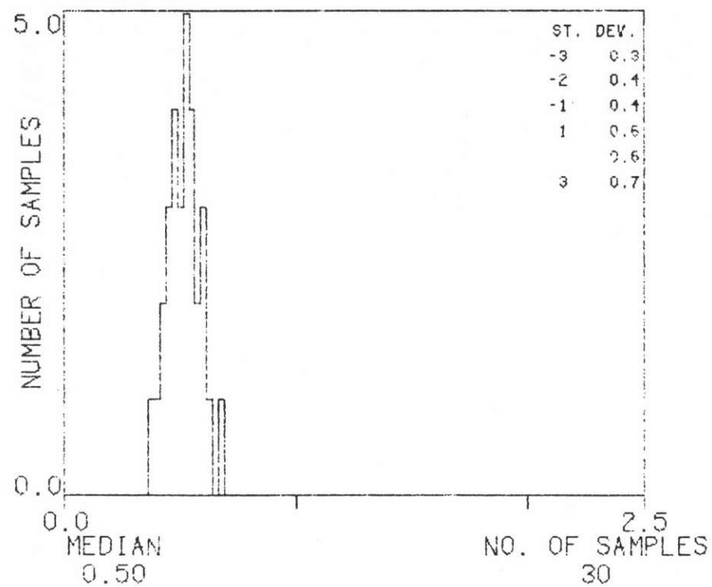
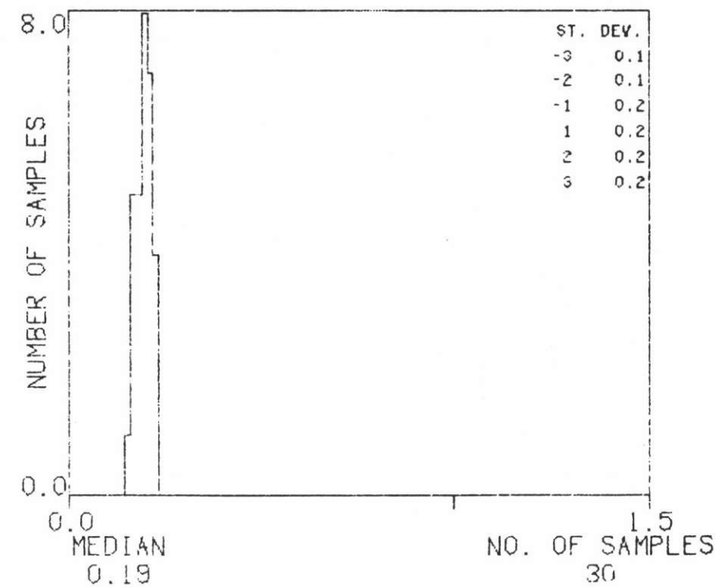
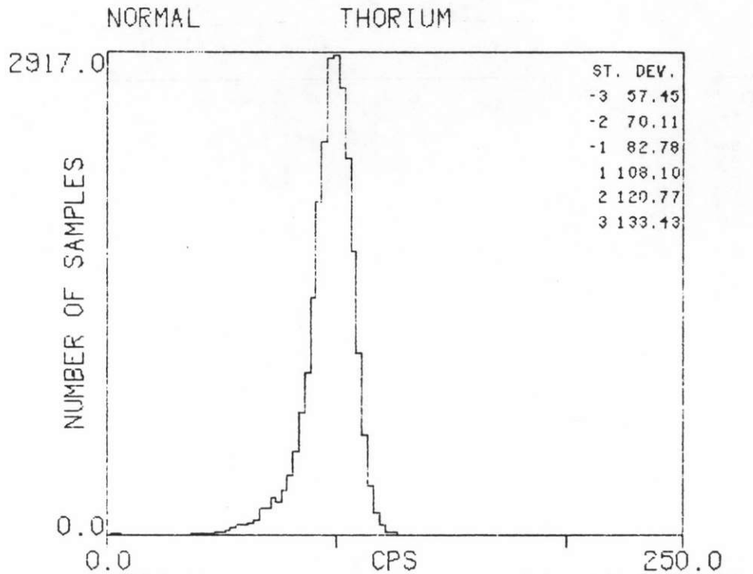


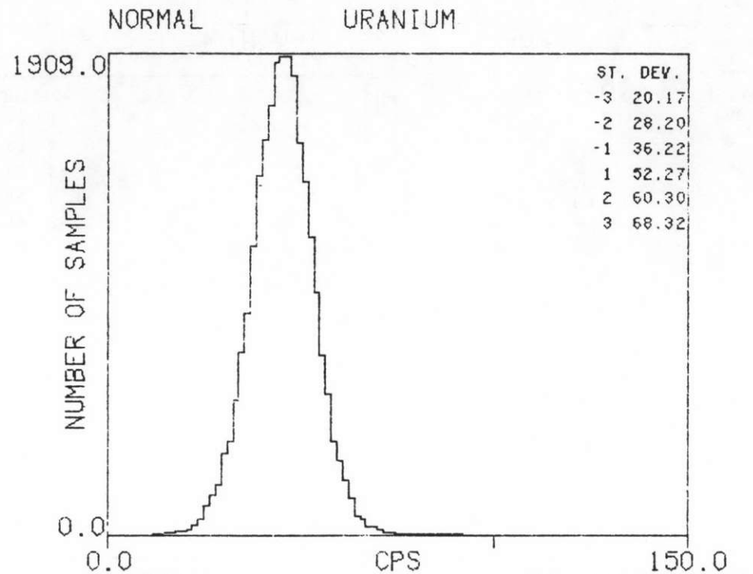
NORMAL TH/K

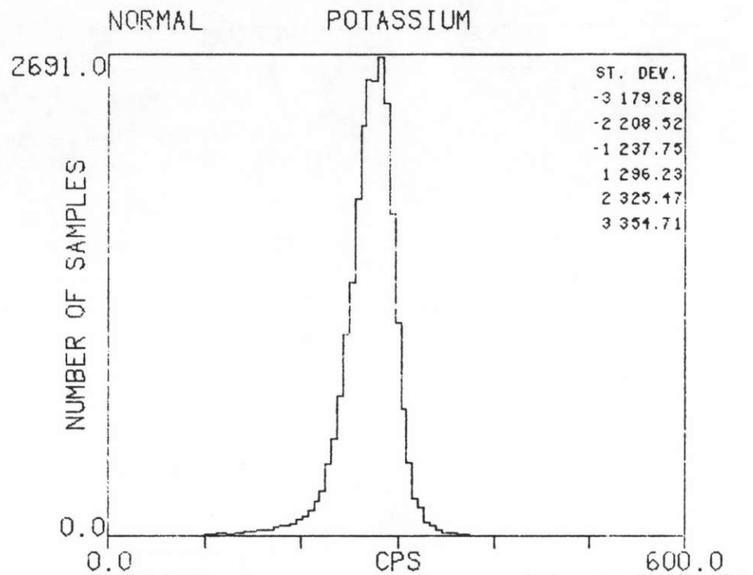


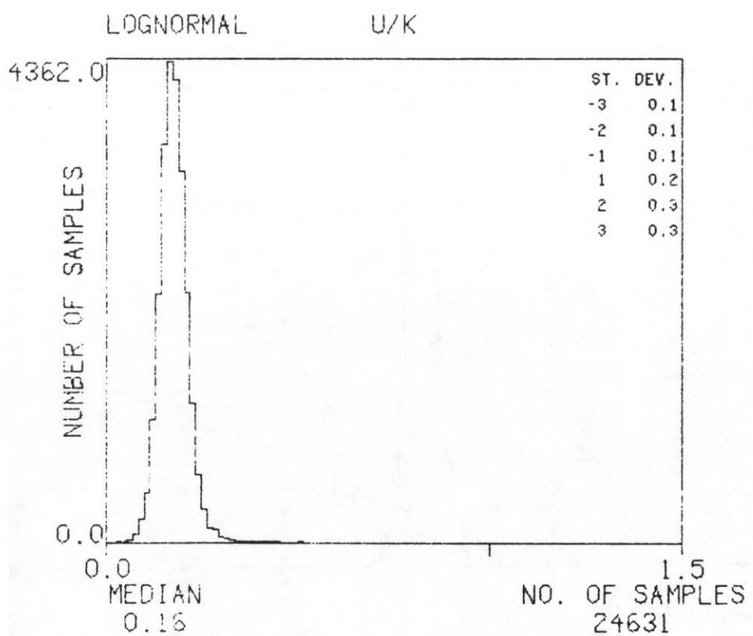
HISTOGRAMS : QL

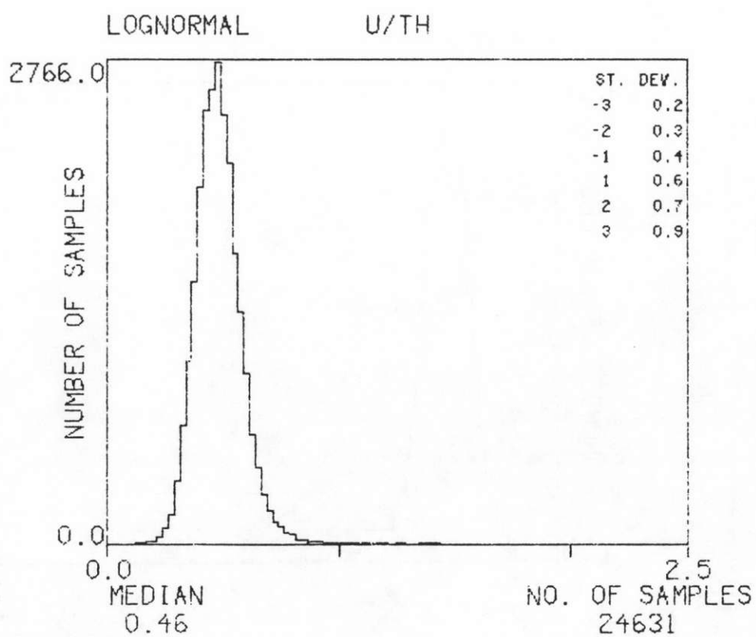
TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

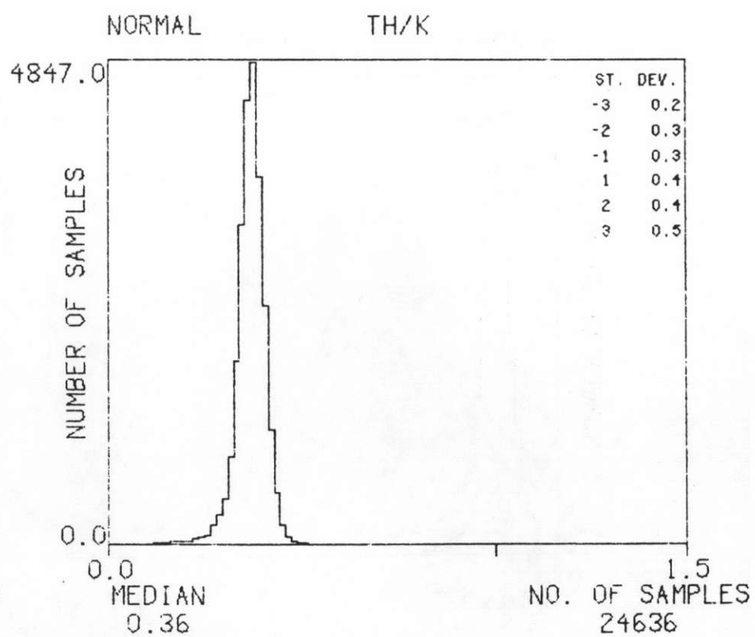








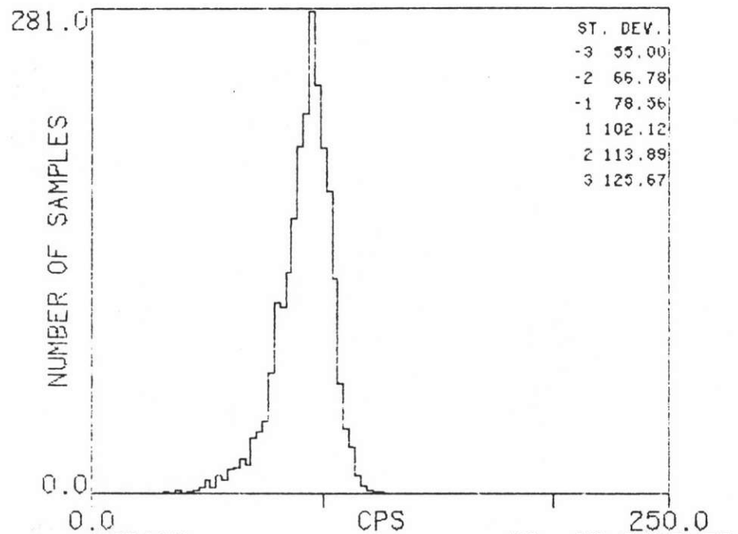




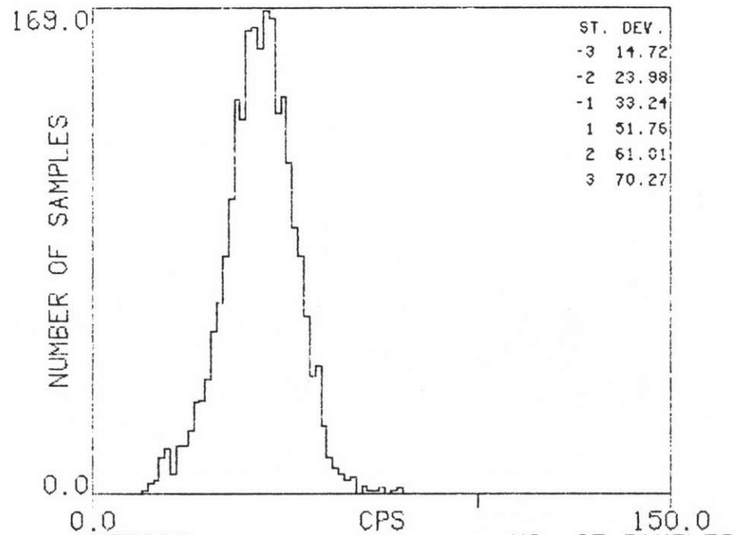
HISTOGRAMS : TO

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

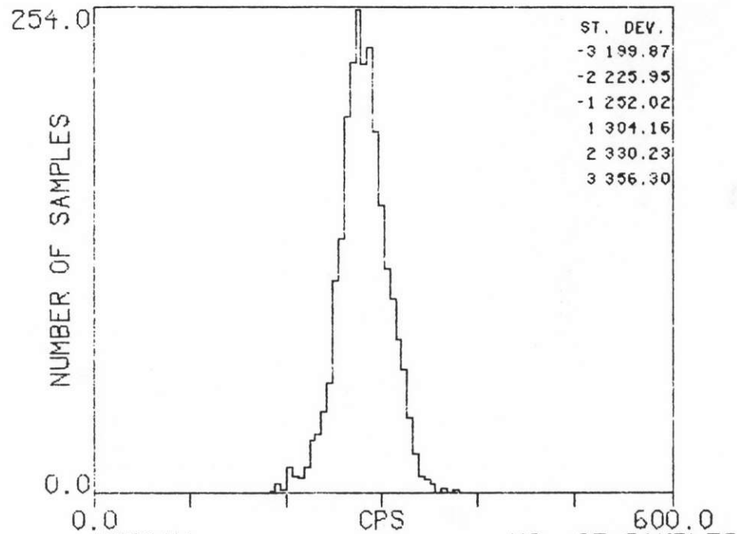
NORMAL THORIUM



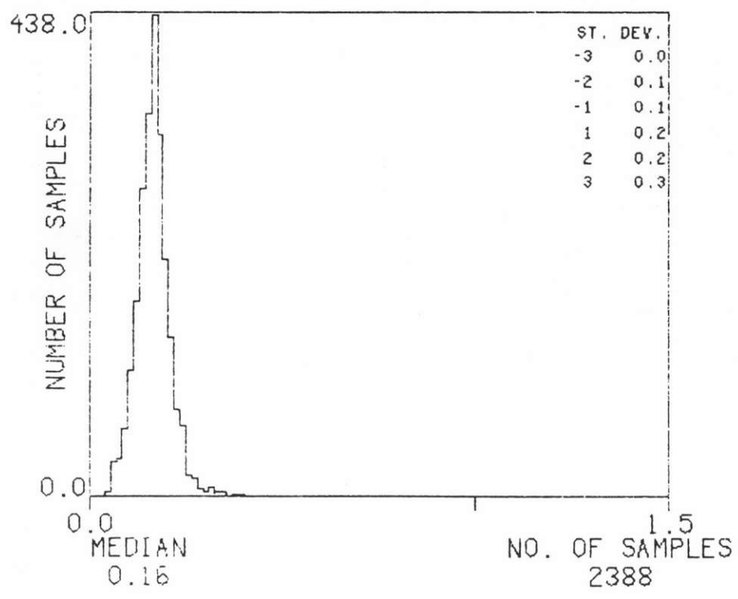
NORMAL URANIUM



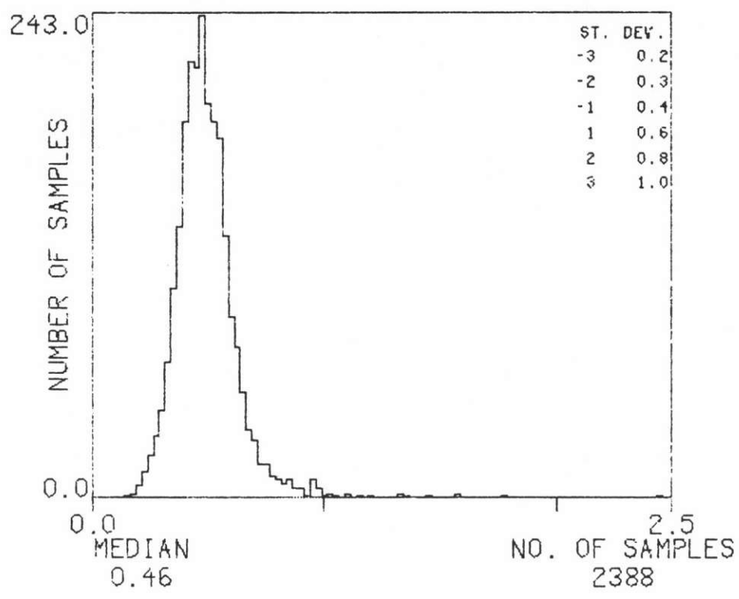
NORMAL POTASSIUM



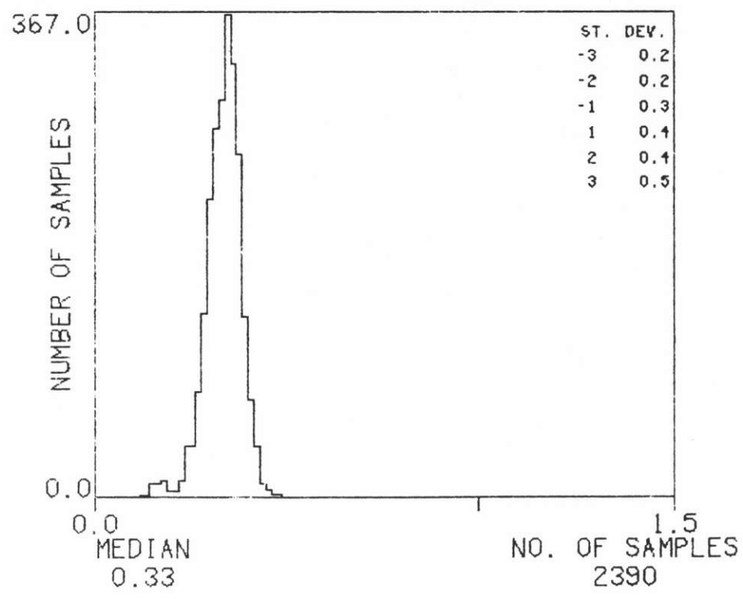
NORMAL U/K



LOGNORMAL U/TH

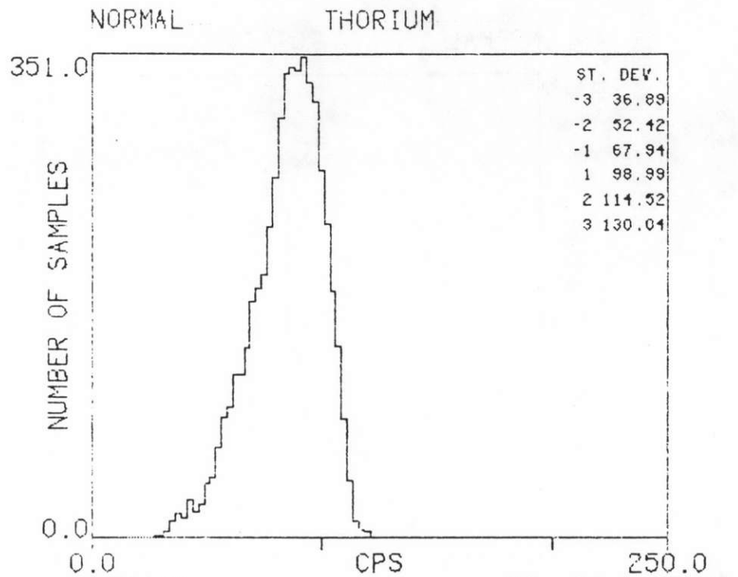


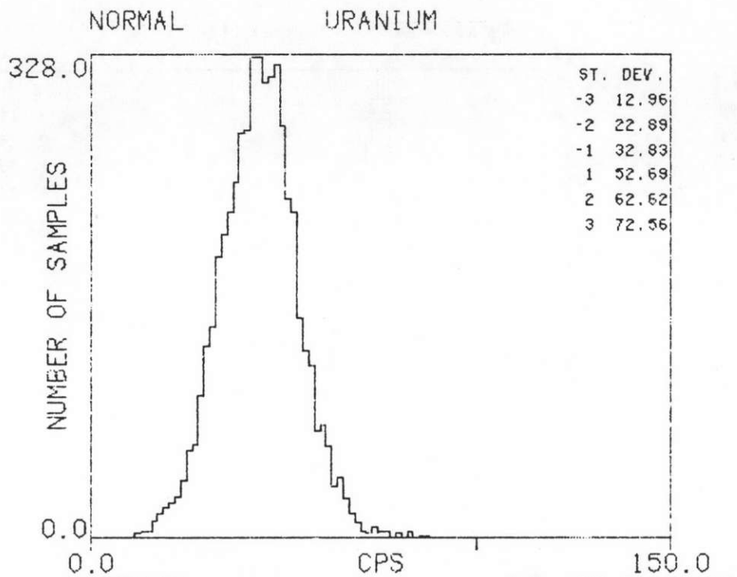
NORMAL TH/K

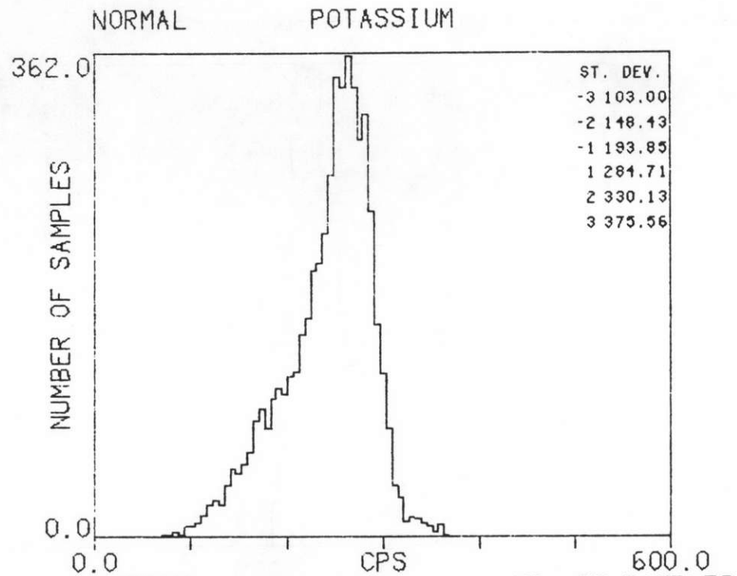


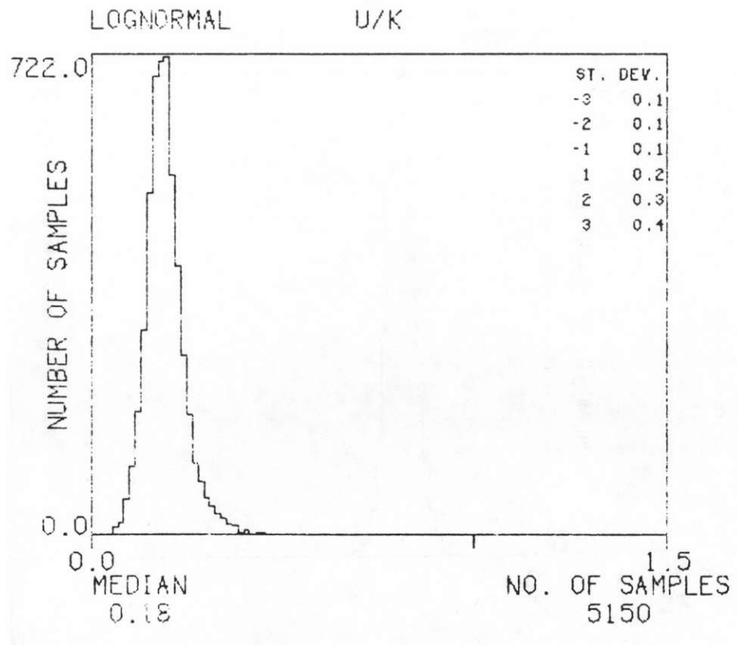
HISTOGRAMS : KN

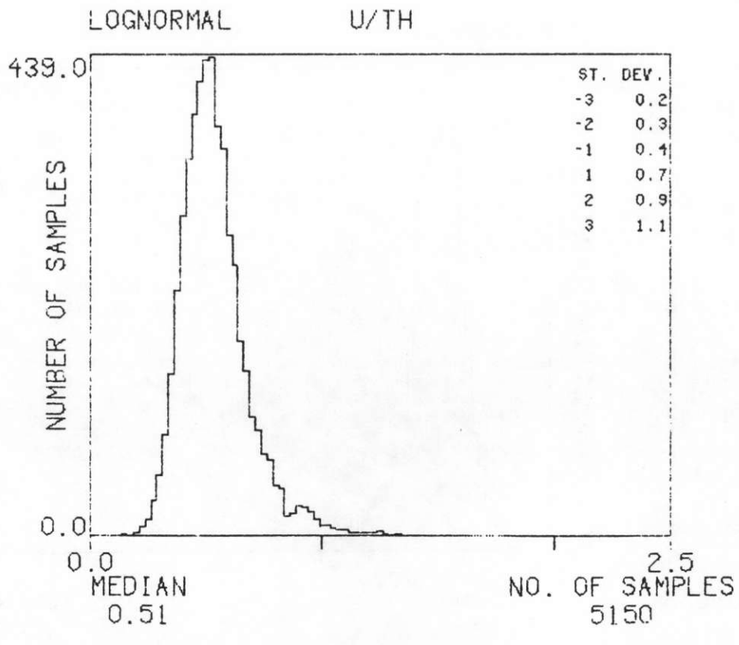
TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

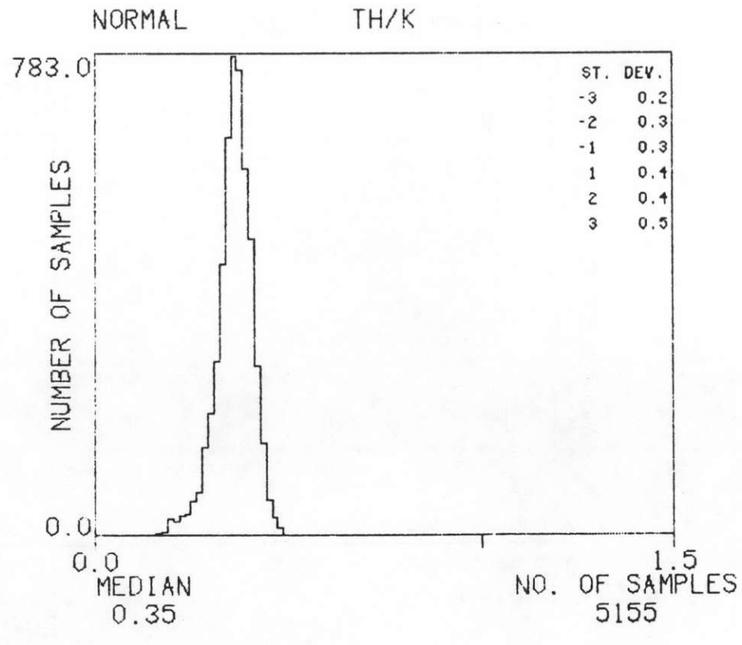








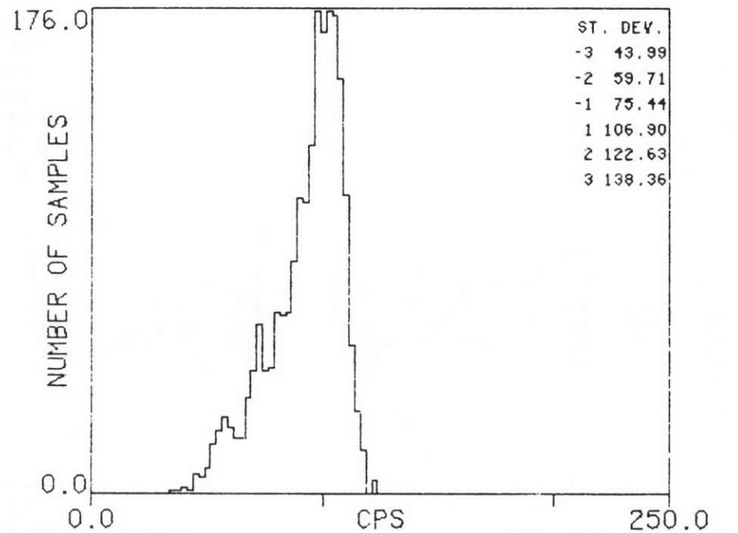




HISTOGRAMS : KC

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

NORMAL THORIUM



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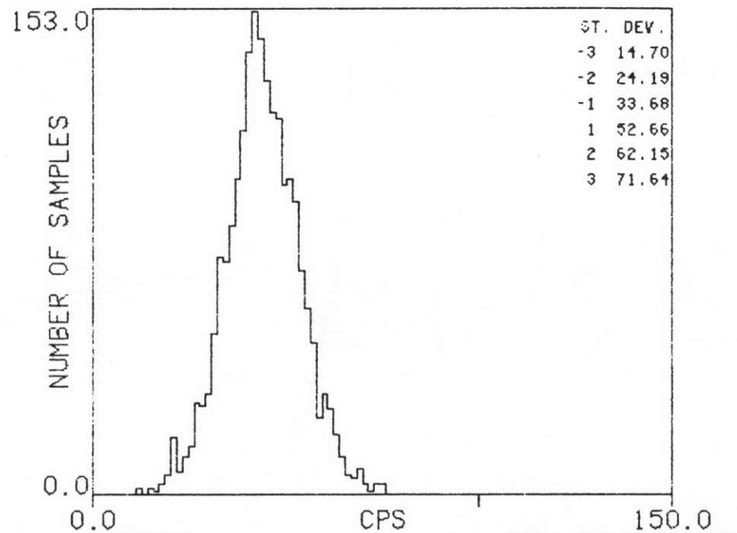

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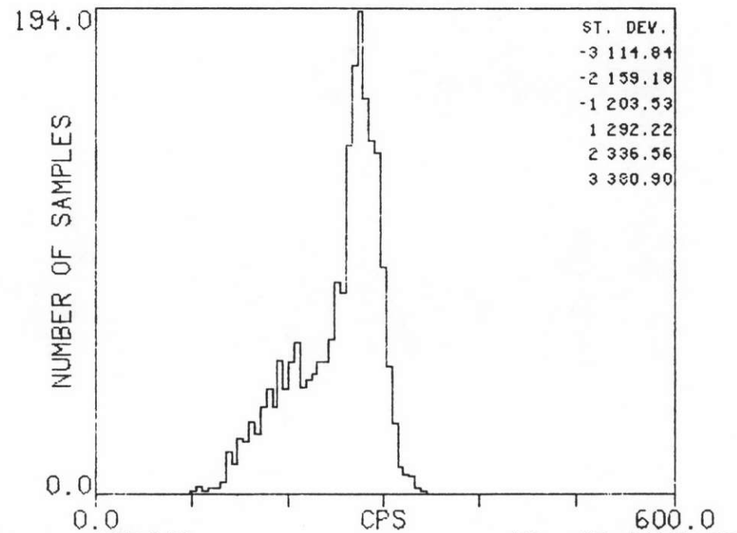

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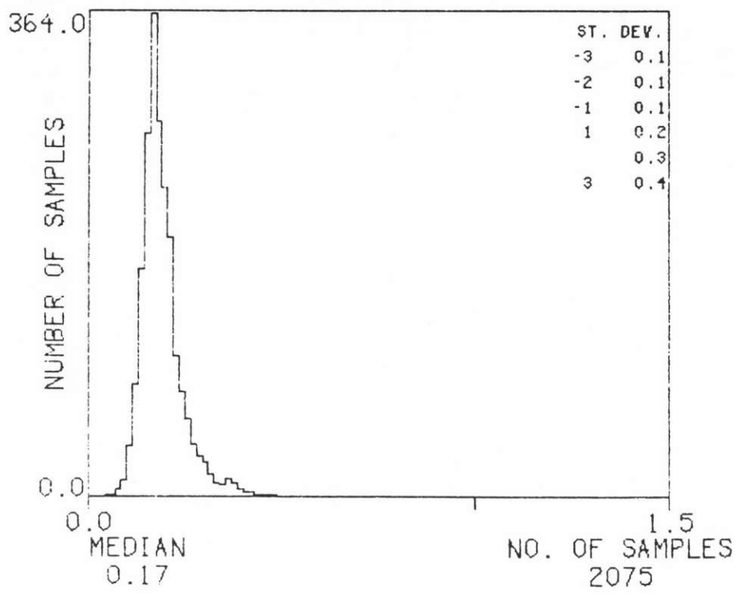

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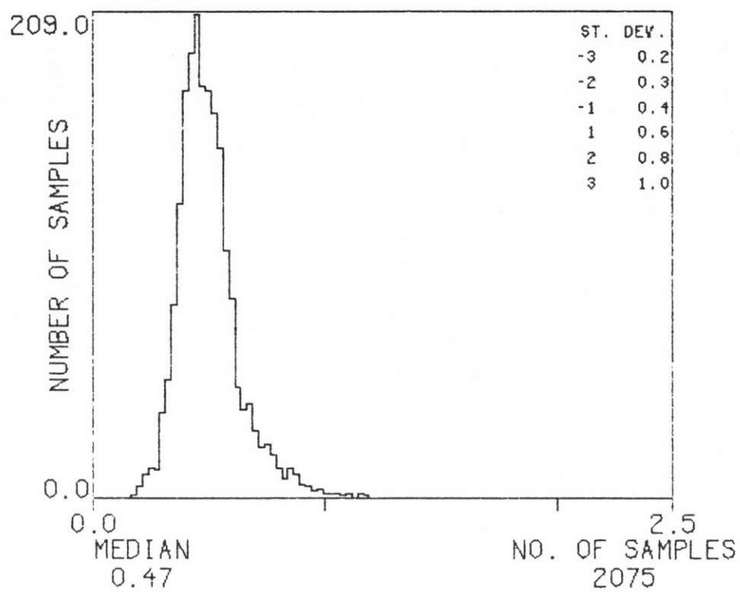

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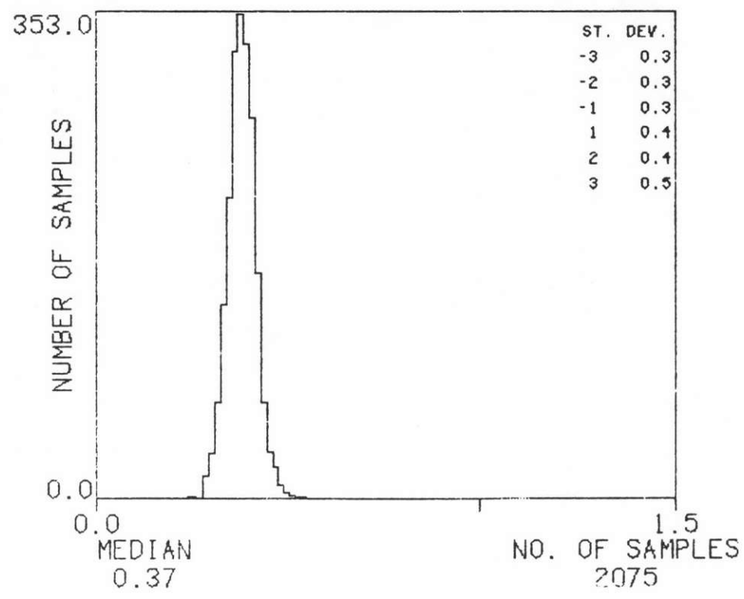
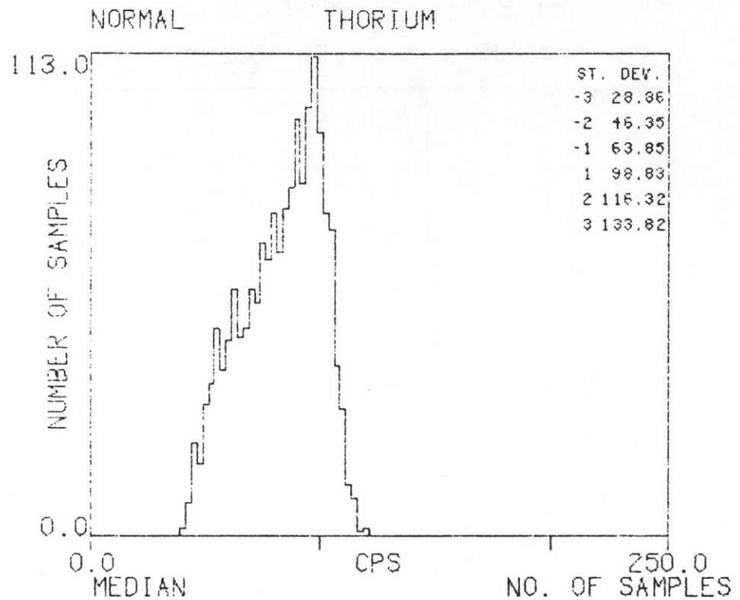
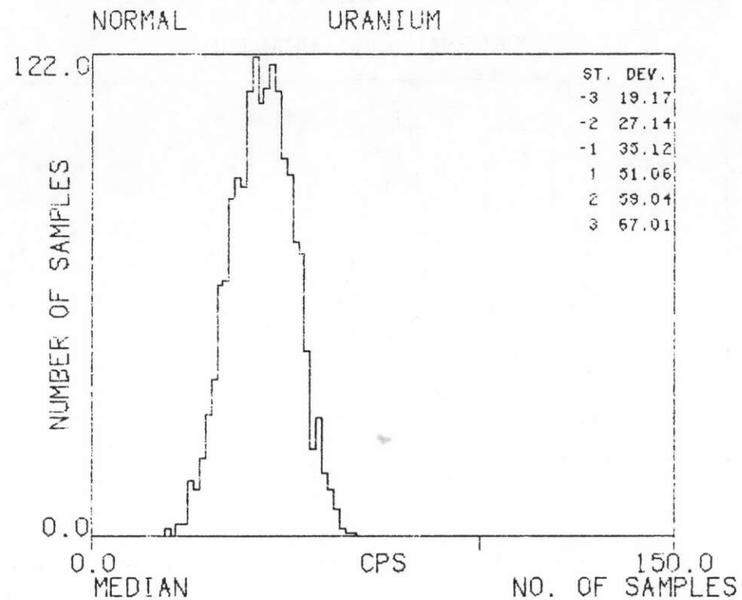
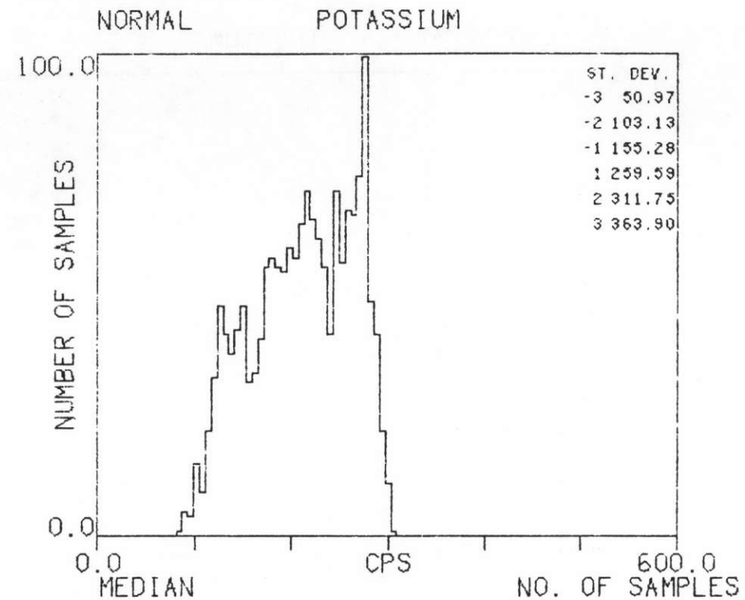


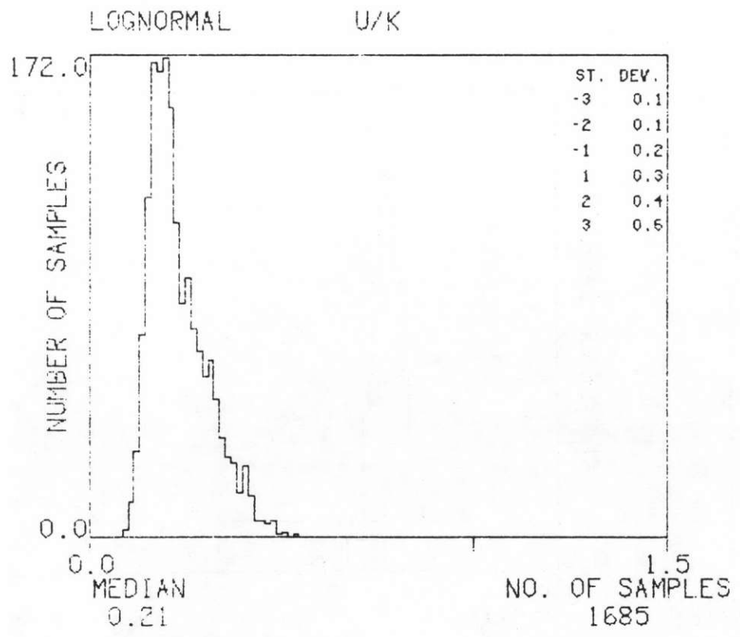
HISTOGRAMS : KGG

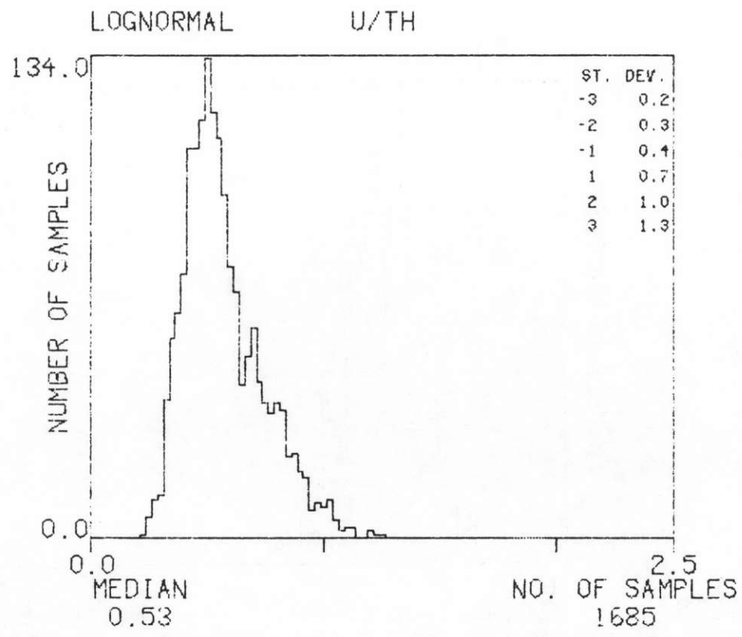
TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

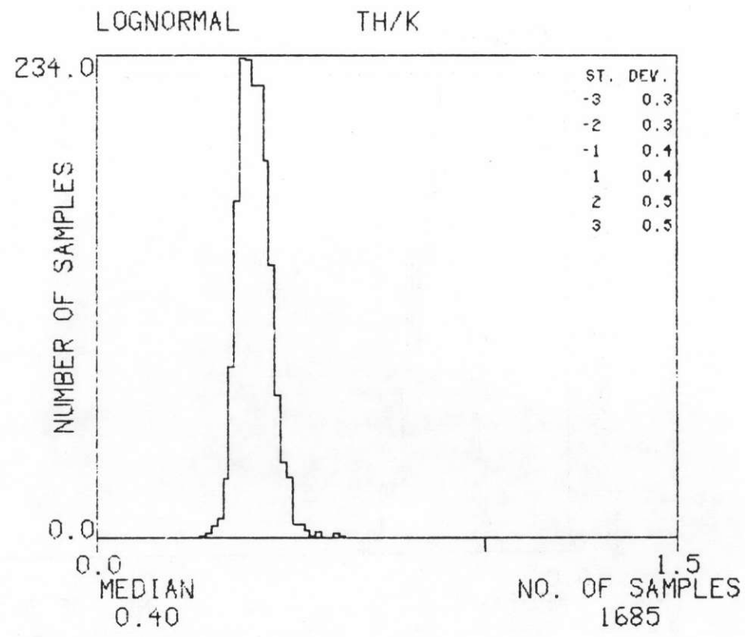








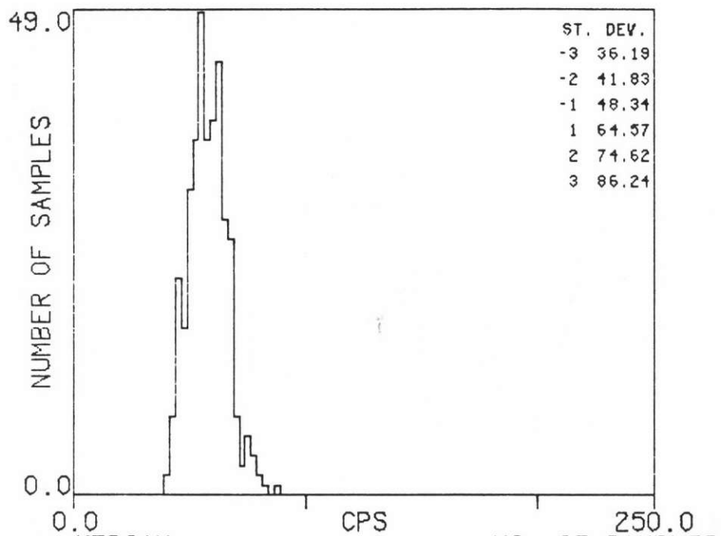




HISTOGRAMS : KGG-1

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

LOGNORMAL THORIUM



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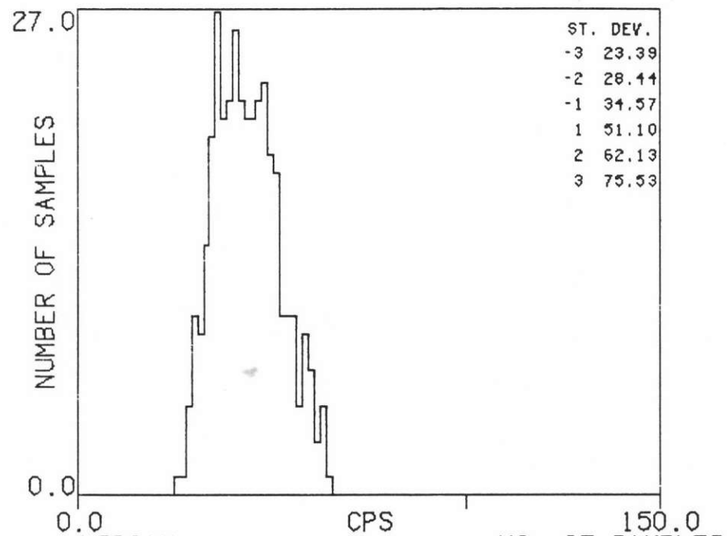

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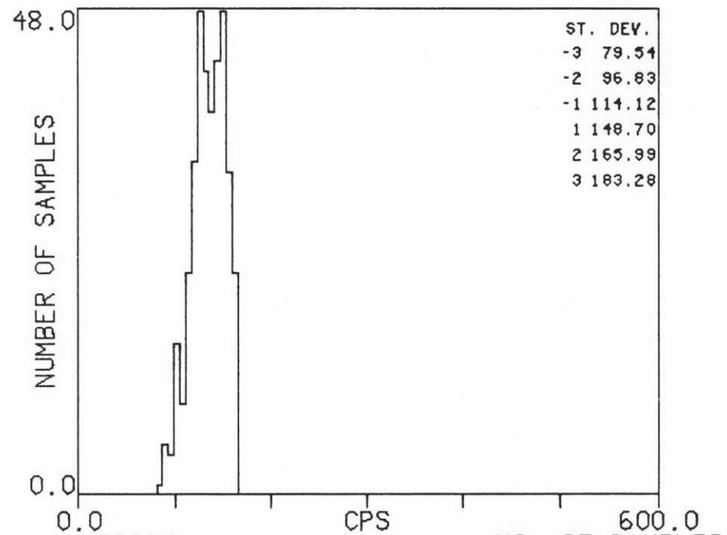
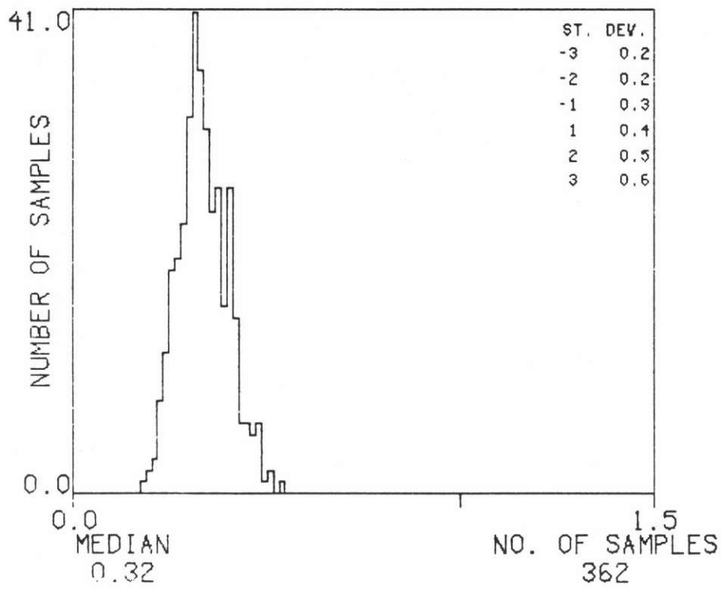


LOGNORMAL U/K



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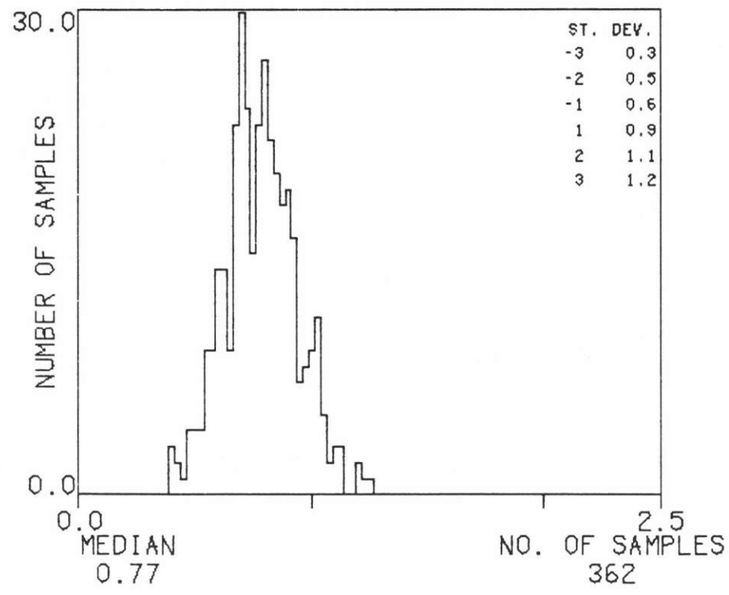

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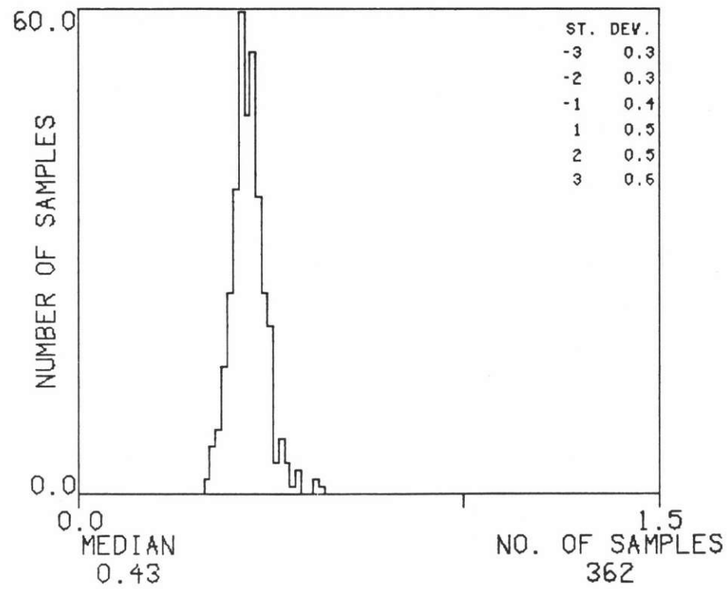
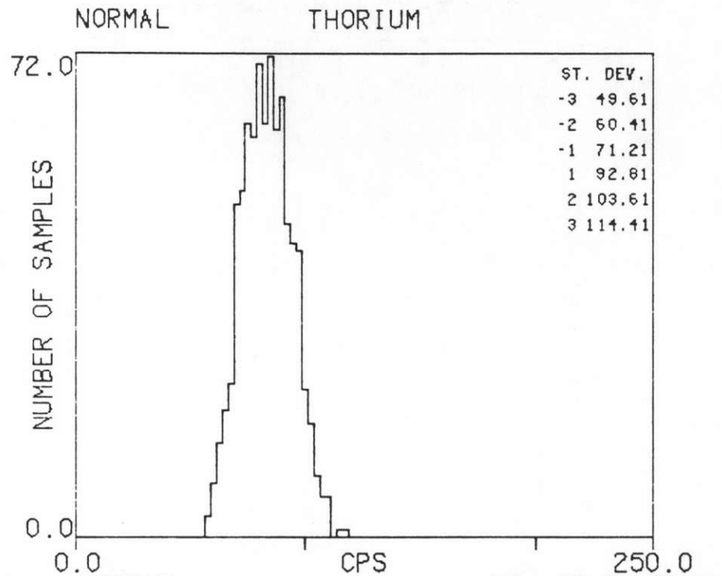
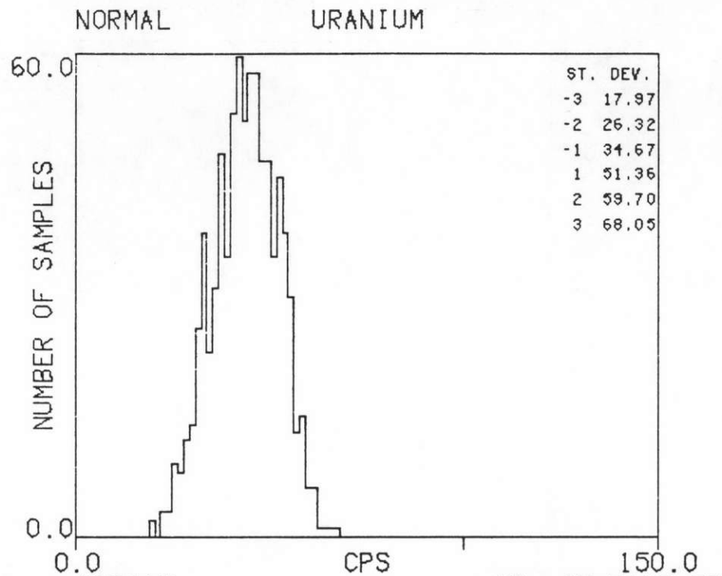
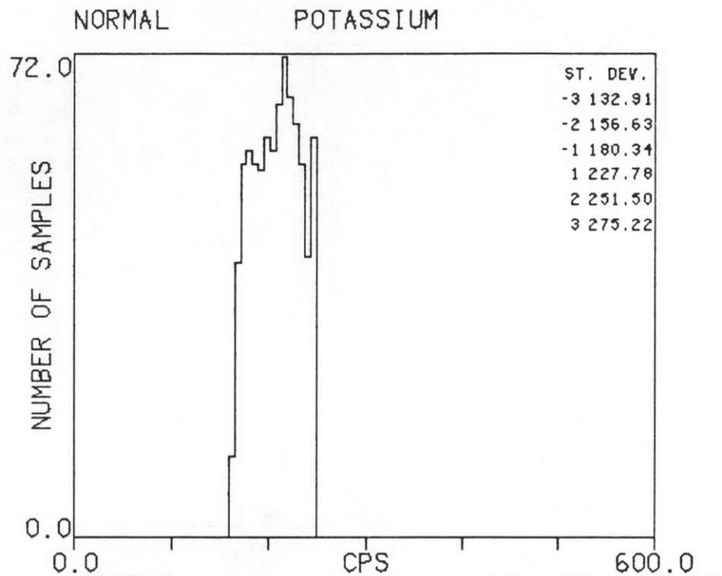


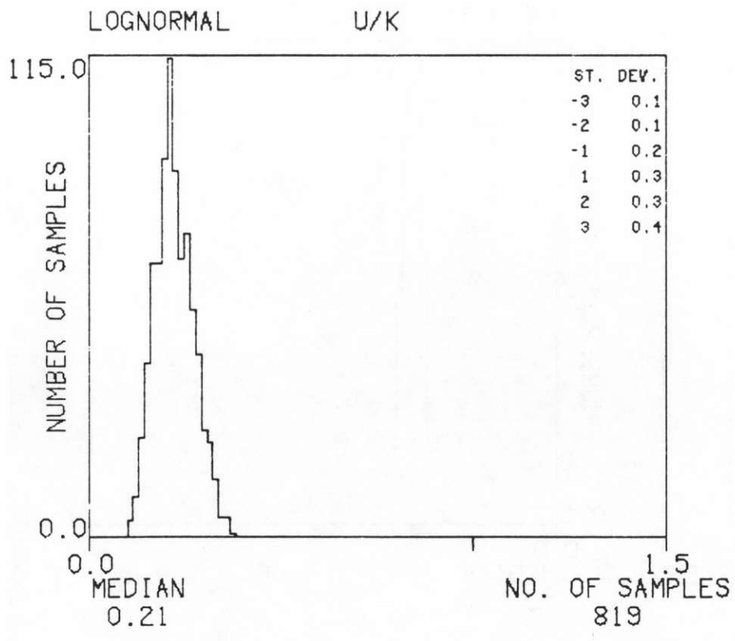
HISTOGRAMS : KGG-2

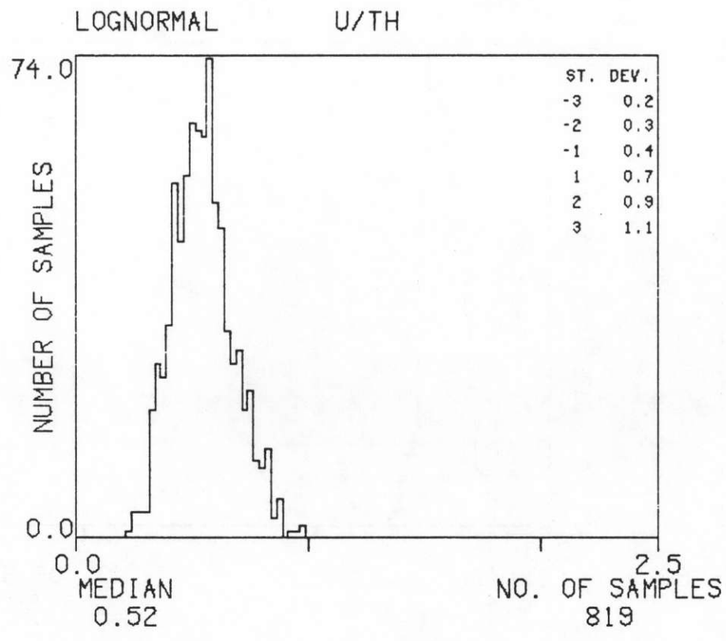
TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

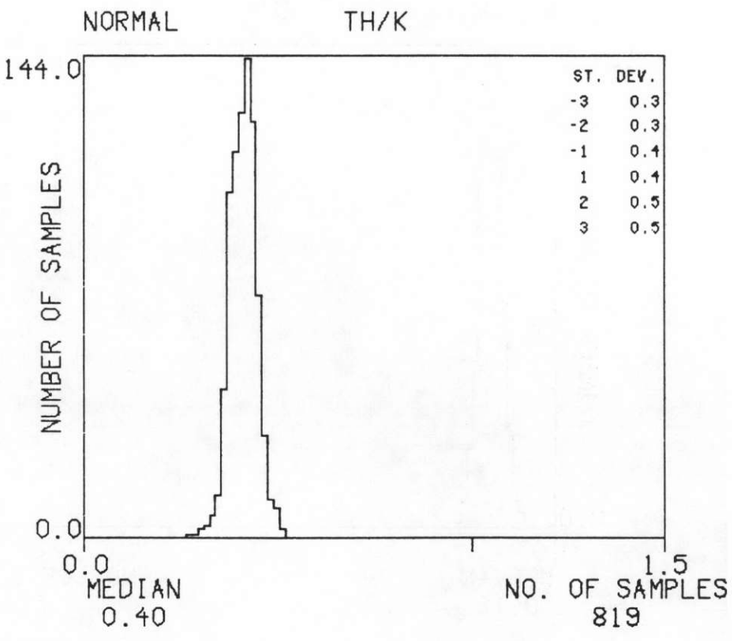








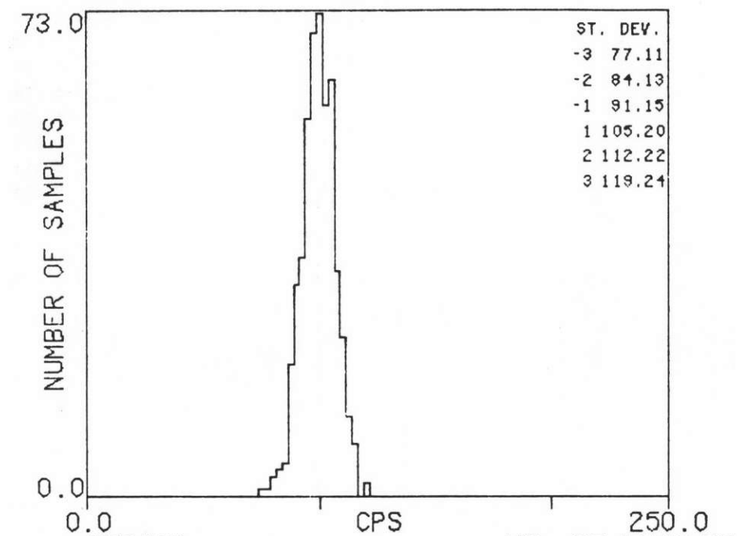




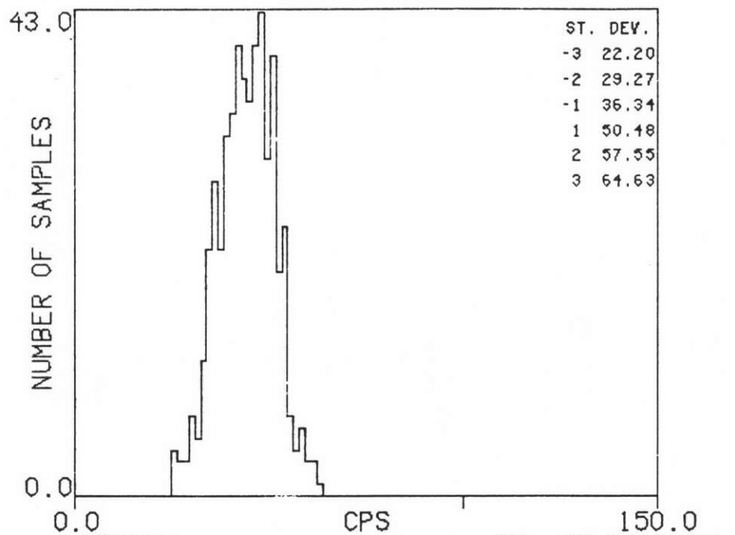
HISTOGRAMS : KGG-3

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977

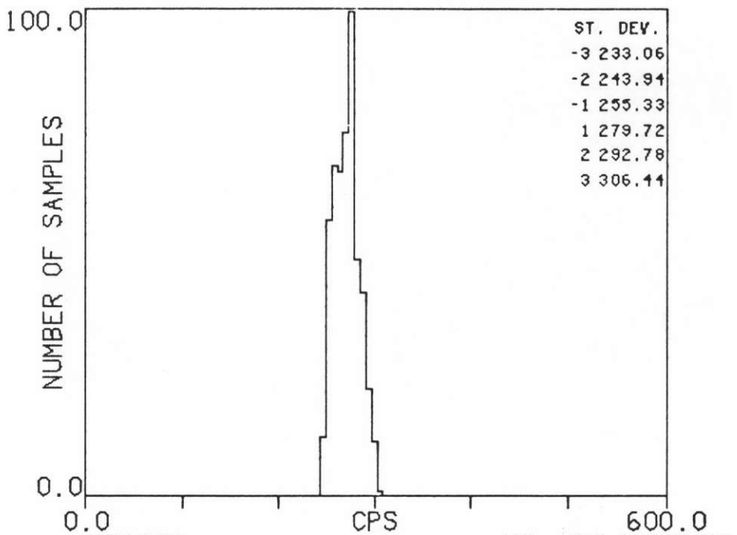
NORMAL THORIUM



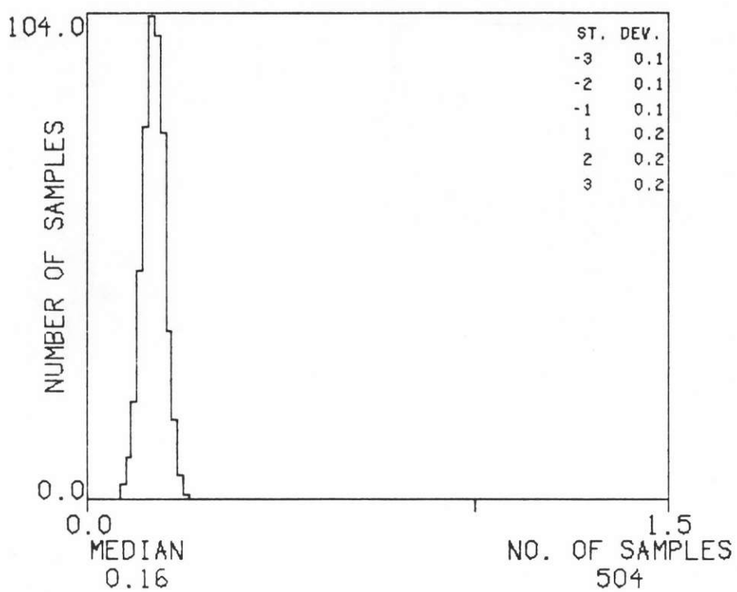
NORMAL URANIUM



LOGNORMAL POTASSIUM



NORMAL U/K



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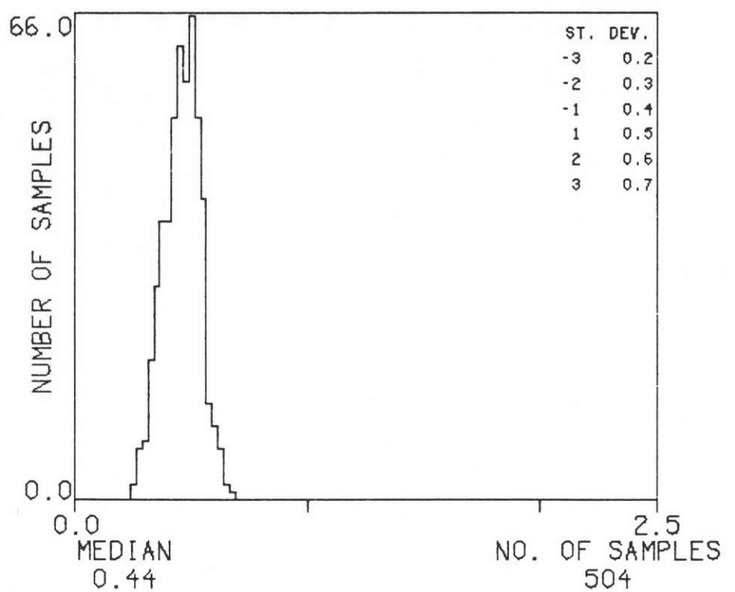

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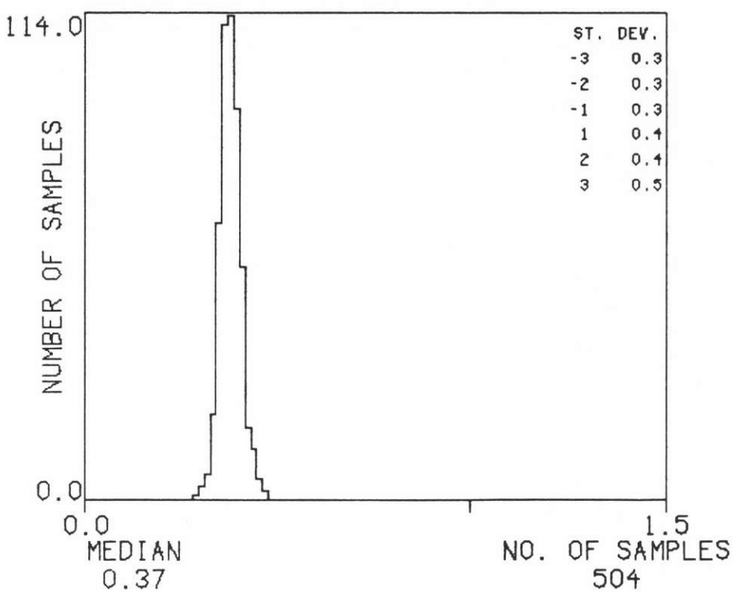

HISTOGRAMS : KD

TEXAS INSTRUMENTS INC. BELOIT NJ14-2 GREAT PLAINS 1977