

**AERIAL RADIOMETRIC AND MAGNETIC
RECONNAISSANCE SURVEY OF
PORTIONS OF ARIZONA, IDAHO, MONTANA,
NEW MEXICO, SOUTH DAKOTA AND WASHINGTON**

**FINAL REPORT
VOLUME 2-K
HOT SPRINGS QUADRANGLE**

**TEXAS INSTRUMENTS INCORPORATED
Dallas, Texas
July 1979**

**WORK PERFORMED UNDER
BENDIX FIELD ENGINEERING CORPORATION
GRAND JUNCTION OPERATIONS, GRAND JUNCTION, COLORADO
Subcontract No. 78-184-L and Bendix Contract EY-76-C-13-1664**

**PREPARED FOR
U.S. DEPARTMENT OF ENERGY
Grand Junction Office
Grand Junction, Colorado 81501**

MASTER

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SECTION I
INTRODUCTION

A. GENERAL

This volume contains information and survey results pertaining specifically to the Hot Springs NTMS 1:250,000 scale Quadrangle, South Dakota, one of a group of 12 such quadrangles in Arizona, Idaho, Montana, New Mexico, South Dakota, and Washington included in an aerial radiometric and magnetic reconnaissance survey. General information 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. 78-184-L as part of the U.S. Department of Energy National Uranium Resource Evaluation (NURE) Program. Production summary data are in Appendix A of this volume and in Appendix A of Volume 1.

B. URANIUM GEOLOGY AND OCCURRENCES

1. Uranium Occurrences

Table 1-1 summarizes uranium occurrences that have been studied in the Hot Springs Quadrangle. This information was obtained from Curtiss, 1955; Butler et al., 1962; Finch, 1967; and Weeks, 1976. Their locations are shown in Figure 2-1.

According to Schnabel (1975), 740,243 short tons of ore (average grade of 0.13 percent U_3O_8) produced about 2 million pounds of U_3O_8 in Fall River County. In Custer County about 166,675 tons of ore (average grade of 0.151 percent U_3O_8) produced about 0.5 million pounds of U_3O_8 . In Pennington County about 388 tons of ore (0.167 percent U_3O_8) produced about 1,000 pounds of ore.

Table 1-1
Uranium Occurrences in the Hot Springs Quadrangle

No.	Name	Location	Description
1	Freezeout Group	T.6S.,R.1E., west central Sec 36	Uraninite and uranopilite in quartzose sandstone of the Fall River Formation (Curtiss, 1955; Finch, 1967).
2	Lucky Strike Group	T.6S.,R.1E., east central Sec 36	Uraninite in sandstone and gray shale (Curtiss, 1955; Finch, 1967).
3	Virginia City Group, Coal Canyon Group, Road Hog No. 1A and 3A, etc.	T.7S.,R.2E., Sec 26 and 27	Uraninite, carnotite, and tyuyamunite in sandstone and siltstone and mudstone of Fall River Formation (Curtiss, 1955; Finch, 1967).
4	Traill Faction Group	T.7S.,R.2E., SE 1/4 Sec 23	Uranium occurrences (Curtiss, 1955).
5	Professor Group (Imogene, Helen, Gertrude, Eunice, and Dagmar)	T.7S.,R.3E., NW 1/4 Sec 19	Carnotite ore in sandstone of the Lakota Formation. Grab and channel samples contain from 0.015 to 0.33 percent uranium (Curtiss, 1955).
6	Clarabelle-Greenslipper Group	T.7S.,R.3E., NE 1/4 Sec 19	Carnotite ore in sandstone of the Lakota Formation (Curtiss, 1955).
7	Hot Point Area	T.7S.,R.3E., SW 1/4 Sec 28	Carnotite and tyuyamunite in sandstone and mudstone of Lakota Formation (Curtiss, 1955; Finch, 1967).
8	Holdup No. 15	T.7S.,R.3E., SE 1/4 Sec 33	Carnotite and tyuyamunite in sandstone and mudstone of Lakota Formation (Curtiss, 1955; Finch, 1967).
9	Gould Mine	T.8S.,R.3E., Sec 11 and 12	Carnotite and tyuyamunite in sandstone and conglomerate of the Dakota Sandstone (Curtiss, 1955).
10	Lion Group	T.8S.,R.3E., NW 1/4 Sec 15	Uraninite and carnotite in calcareous and ferruginous quartzose sandstone of the Fall River Formation (Curtiss, 1955; Finch, 1967).

Table 1-1 (Contd)

<u>No.</u>	<u>Name</u>	<u>Location</u>	<u>Description</u>
11	Accidental	T.8S.,R.4E., Sec 30	Carnotite in Lakota Sandstone (Curtiss, 1955; Finch, 1967).
12	Washboard	T.8S.,R.4E., north central Sec 31	
13	Damsite	T.8S.,R.4E., south central Sec 31	Carnotite in Lakota Sandstone. (Curtiss, 1955; Finch, 1967).
14	Pictograph, Ophelia	T.7S.,R.3E., Sec 30	Carnotite in Lakota Sandstone. Channel and grab samples contain 0.040 to 2.0 percent uranium (Curtiss, 1955).
15	Lucy	T.7S.,R.2E. Sec 24 and 25	Carnotite in Lakota Sandstone. A channel sample contained 0.032 per- cent uranium (Curtiss, 1955).
16	Hart Table	T.3S.,R.13E., NE 1/4 Sec 31	Uranocircite in a channel sand- stone of the Chadron Formation. Grab and channel samples contained up to 0.25 percent uranium (Curtiss, 1955).
17	Baxter Lease, (Rube Claims)	T.3S.,R.12E., NE 1/4 Sec 36	Metatyuyamunite(?) in limestone of the Chadron Formation and carno- tite was found in chalcedony veins. A limestone grab sample contained 0.023 percent uranium, and a chalcedony sample contained 0.008 percent uranium (Curtiss, 1955; Finch, 1967).
18		T.4S.,R.13E., NE 1/4 Sec 31	Carnotite in chalcedony veins of Brule Formation (Curtiss, 1955).
19		T.4S.,R.13E., NE 1/4 Sec 7	Carnotite in chalcedony veins of Brule Formation. A chalcedony sample contained 0.013 percent uranium (Curtiss, 1955).
20	Canyon Lode	Approx. T.8S., R.5E., Sec 30 and 31	Primary uranium minerals in Fall River Formation; minor vanadium present (Finch, 1967; Weeks, 1976).

Table 1-1 (Contd)

<u>No.</u>	<u>Name</u>	<u>Location</u>	<u>Description</u>
21	Runge Mine	Approx. T.8S., R.3E., Sec 6	Secondary uranium minerals in Fall River and Lakota formations (Finch, 1967; Weeks, 1976).
22	Caylor- Preston Ranch	Approx. T.2S., R.7E., Sec 24	Small uranium deposit in Colorado Formation; contains secondary uran- ium minerals (Finch, 1967; Weeks, 1976).
23	Lost Canyon #1 Mine	Approx. T.6S., R.1E., Sec 9	Small uranium deposit in Lakota Formation; contains carnotite (Finch, 1967; Weeks, 1976).
24	Kool, Dakota Prospect, Grizzly Creek, and Dorothea	Approx. T.2.S., R.5E., Sec. 14 and 13	Uranium in veins (Butler et al., 1962).
25	Harney No. 2 Prospect	Approx. T.2S., R.5E., Sec 18	Uranium occurrence (Butler et al., 1962).
26	Elkhorn No. 1	Approx. T.3S., R.5E., Sec 15	Uranium occurrence (Butler et al., 1962).

2. Geologic Mapping

The geologic map used for the survey of the Hot Springs Quadrangle was the 1:250,000-scale map produced by Texas Instruments Incorporated (1978). Table T-1 is a listing of the mapped geologic units.

3. Potential Uranium-Bearing Units

a. General

The Hot Springs Quadrangle lies in the Great Plains physiographic province, a 500-mile-wide, nearly north-south trending belt to the east of the Rocky Mountains, that Nininger (1954) indicated to be favorable for Colorado Plateau-type uranium deposits. Malan (1972) demonstrated the regional relationship between foldbelts, in which Precambrian rocks contain anomalously high uranium, and forelands where there are economic uranium deposits.

The most prominent feature in this quadrangle is the Black Hills, an elliptical mountainous area developed on a huge northwest-trending anticline (Wolcott, 1967). Precambrian igneous and metamorphic rocks are exposed in the center of the Black Hills, and these are surrounded by the eroded, uplifted edges of Paleozoic and Mesozoic sedimentary rocks.

Most exploration has been in the Edgemont district south of the Black Hills. The principal mining areas trend northwest from Chilson Canyon to Craven, Coal, and Driftwood canyons. These deposits are in the Lakota Sandstone of the Inyan Kara Group. According to Curtiss (1955), structural conditions appear to play a major role in the localization of the deposits. Bell et al. (1956) point out that the greatest density of uranium deposits is in the areas of abrupt changes in dip or in areas where abnormally low dips coincide with favorable lithologic character such as porosity, permeability, heterogeneous texture, continuity and thickness of the sandstone lenses, scour-and-fill structures, carbonaceous debris, and cementing material. Many similarities have been noted between the uranium deposits in the Edgemont mining district and those on the Colorado Plateau, particularly those in the

Salt Wash Sandstone member of the Morrison Formation (Bell and Post, 1971), as well as those in the Inyan Kara Group (Ryan, 1964).

According to Curtiss (1955), exploitable ore bodies vary from small size and low grade to relatively large size and locally high grade. The general minable grades range from 0.1 to about 0.5 percent U_3O_8 , with an average of about 0.2 percent, indicating that much low-grade ore recoverable at today's high prices is still available.

Curtiss (1955) states that the exploration techniques of airborne radiometric surveys have demonstrated their usefulness in detecting potential ore deposits. In particular, the Virginia City and Holdup 15 were discovered as a result of aerial surveys.

b. Deposits Associated with Igneous Rocks

Small quantities of uranium minerals have been obtained from the Precambrian zoned pegmatites of the Black Hills, but no production is reported (Schnabel, 1975). Interest was directed toward the Harney Peak Granite and nearby schists, but nothing came of that work.

The intrusive igneous rocks of the Black Hills may also have served as source rocks for uranium in sandstone-type deposits.

c. Deposits Associated with Sedimentary Rocks

Uranium deposits are located predominantly in the sandstones of the Cretaceous Inyan Kara Group. They are classified as yellow, oxidized deposits, purplish-black, partly oxidized deposits, or black, unoxidized deposits, depending on their mineralogy (Schnabel, 1975). Sandstone beds in the Lakota Formation and Fall River (Dakota) Formation of the Inyan Kara Group are wide, sinuous units probably deposited in ancient river valleys. The near-surface uranium deposits in the Edgemont district are mostly of the oxidized type. They seem to have been localized mainly by an abundance of carbonaceous material or pyrite, and they have been preserved in their present position in the oxidizing zone by a high percentage of vanadium or by

a local reducing environment caused by the accumulation of carbonaceous material or pyrite. ERDA (1976) indicates that there may be about 33,000 tons of 30-dollar uranium resources in the Inyan Kara Group in South Dakota.

The Tertiary Chadron and Brule formations of the White River Group are known to be favorable for hosting uranium deposits in this quadrangle and elsewhere (Curtiss, 1955; Finch, 1967; Schnabel, 1975). Curtiss (1955) states that in the Chadron Formation uranium occurs in the lower sandstone and in limestone beds and that the Brule Formation contains carnotite associated with thin veins of bluish-gray chalcedony. Curtiss (1955) considers that the source uranium material was originally present in volcanic ash deposits of the White River Group and that descending ground waters leached the uranium and transported it downward and laterally in the zone of circulation. ERDA (1976) speculates that there may be about 5,000 tons of 30-dollar uranium in the White River Formation.

Minor occurrences of uranium have also been located in the Cambrian Deadwood Formation, Pennsylvanian Minnelusa Formation, Triassic Spearfish Formation, Cretaceous New Castle Sandstone, and Cretaceous Pierre Shale as well as in several of the Tertiary formations in western South Dakota (Schnabel, 1975). Other formations that have hosted sandstone-type uranium deposits include the Tertiary Arikaree Formation (Curtiss, 1955), the Cretaceous Fox Hills Sandstone (ERDA, 1976), and the Jurassic Morrison Formation (Finch, 1967).

SECTION II
RADIOMETRIC DATA INTERPRETATION

A. SELECTION OF URANIUM ANOMALIES

1. Statistical Considerations

Each of the equivalent uranium, equivalent uranium/equivalent thorium, and equivalent uranium/potassium data sets was 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), the probability that its value was caused by random variation of the background is shown in Table 2-1.

Table 2-1
Probability That a Single Statistically High Point
Is Caused by Random Deviations*

<u>Point Value</u>	<u>Probability</u>
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
Mean + 4 standard deviations	0.00003 or 1:33,300

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

The maximum probability of 1:33,300 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 is 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:

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

where

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

Assuming the same certainty criterion of 1:33,300, 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 1.45 standard deviations from the mean to be evaluated.

Table 2-2
Minimum Deviation from the Mean for All Points for
Limiting Probability of 1:33,300 (Elkins, 1940)

<u>Number of Points Supporting Anomaly</u>	<u>Minimum Deviation</u>
1	4.00 standard deviations
2	2.54 standard deviations
3	1.87 standard deviations
4	1.45 standard deviations

2. Uranium Anomalies

Data for the Hot Springs Quadrangle, including eU,* eU/eTh,* and eU/K,* were searched by the computer, and all acceptable significant anomalies were 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 north of E-W flight lines and east of N-S flight lines. The eU/K anomalies are indicated by asterisks south of E-W flight lines and west of N-S flight lines.

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

Table 2-3. Preferred eU Anomalies — Hot Springs Quadrangle

Anomaly No.	Line No.	Geologic Unit(s)	Highest eU S.F.*	No. of Anomalous Records	Remarks	Anomaly No.	Line No.	Geologic Unit(s)	Highest eU S.F.*	No. of Anomalous Records	Remarks	Anomaly No.	Line No.	Geologic Unit(s)	Highest eU S.F.*	No. of Anomalous Records	Remarks
1	102	pCbg	1.6	5	Possible uranium prospect	46	101	PIpm	1.5	5	Possible uranium prospect	92	101	Kfl	1.9	15	Possible uranium prospect
2	1	Knc	1.8	4	Possible uranium prospect	47	101	PIpm	1.5	5	Possible uranium prospect	93	12	Tw	6.0	55	
3	1	Tw	2.4	5	Possible uranium prospect	48	5	pChp	1.8	10	Near occurrence 26	94	107	Tw	2.3	20	
4	1	Kp	2.0	55	Possible road fill	49	5	Kp	2.0	50	Possible uranium prospect	95	12	Tw	6.6	60	Possible uranium prospect
5	1	Kp	2.0	10	Possible uranium prospect	50	5	Kp/Qal	4.1	40		96	101	Kfl	3.7	5	Near occurrences 1 and 2
6	1	Kp	2.2	140		51	5	Tw/Kp/Qal	2.8	45		97	102	TRps	1.5	2	Possible uranium prospect
7	1	Kp	2.0	20		52	5	Tw/Kp	2.4	110		98	13	Knc	1.5	3	
8	1	Kp	3.0	25		53	5	Tw	1.8	5		99	13	Tw	6.4	60	
9	1	Kp	2.8	10		54	5	Tw	2.1	35		100	13	Tw	3.0	25	Possible uranium prospect
10	1	Kp/Qal	3.6	55		55	5	Tw	2.0	10		101	14	Kfl	4.8	50	Over numerous occurrences
11	1	Kf	2.7	15	Possible uranium prospect	56	5	Tw	1.5	10	Possible uranium prospect	102	14	Pmo	2.4	5	Possible uranium prospect
12	102	pCbg/pCms	2.4	10	On fault	57	5	Tw	2.0	30	Possible road fill	103	14	Knc	2.3	20	Possible uranium prospect
13	2	Kp	3.2	350	Possible uranium prospect	58	6	PIpm	2.0	5	Possible uranium prospect	104	15	Kfl	1.5	15	Over occurrence 10
14	2	Kp/Qal	2.9	65		59	6	pCbg	1.8	20	Over Custer	105	102	Ju	1.8	3	Near occurrence 9
15	2	Kp/Qal	3.0	20		60	6	Tw/Kp	2.8	75	Near occurrences 16 and 17	106	102	Ju	2.2	4	Near occurrence 9
16	3	Kp	2.0	40		61	6	Tw	2.2	60	Possible uranium prospect	107	16	Kfl	1.8	15	Possible uranium prospect
17	3	Kp	1.8	15		62	6	Tw	1.6	15		108	16	Tw	1.5	5	
18	3	Kp	2.1	10		63	6	Tw	1.8	10		109	16	Ta	3.7	10	
19	3	Kp/Qal	2.4	25		64	6	Tw	2.2	10		110	17	Qal	1.5	5	
20	3	Kp	2.0	5		65	6	Tw	2.2	20		111	17	Ta	2.0	5	
21	3	Qal	2.3	3		66	6	Tw	1.5	5		112	17	Ta	1.5	1	
22	3	Kp/Qal	2.9	10		67	6	Tw	2.0	5		113	17	Ta	2.6	15	
23	3	Qal	3.0	15		68	7	Tw	2.2	15	Possible uranium prospect	114	17	Ta	1.5	3	
24	3	Kp/Qal	2.4	15		69	7	Tw	1.5	10	Near occurrence 19	115	18	Kbm	1.5	5	
25	3	Tw	1.9	20		70	7	Tw	2.2	20	Possible uranium prospect	116	18	Kbm	1.8	2	
26	3	Tw/Kp	2.0	20		71	7	Tw	1.5	5		117	18	Knc	2.5	15	
27	3	Kp	2.0	10		72	7	Tw	2.0	10		118	19	Knc	1.9	20	Possible uranium prospect
28	3	Kp	2.3	10		73	7	Tw	1.5	10		119	19	Knc	2.0	15	Possible road fill
29	101	PIpm	1.5	5		74	7	Kp	2.4	5		120	19	Knc	1.4	15	Possible road fill
30	4	PIpm	1.5	10		75	7	Kp	2.4	10	Possible uranium prospect	121	19	Knc	2.3	10	Possible uranium prospect
31	4	pCms	2.1	1	Possible uranium prospect	76	8	Tw	3.3	60	Near occurrence 18	122	19	Knc/Kp	3.7	25	
32	4	pCgm	2.3	10	Near occurrence 25	77	8	Tw	1.6	5	Possible uranium prospect	123	20	Kp	2.2	15	
33	4	pChp	2.0	5	Near occurrence 24	78	9	Mpe	1.5	3		124	20	Knc/Qal	1.9	20	
34	4	Kbm/Qal/Kg	4.0	45	Near occurrence 22	79	9	Tw	4.0	80		125	20	Knc/Kp	2.1	10	
35	4	Kp	1.5	10	Possible uranium prospect	80	9,107	Tw	4.6	30		126	20	Kp	1.8	5	
36	4	Kp	2.0	5		81	102	PIpm	1.5	5		127	21	Knc	1.6	10	
37	4	Qal	1.5	4		82	10	Tw	3.0	40		128	101	Knc	1.6	10	
38	4	Kp/Qal	1.9	10		83	10	Tw	5.3	50		129	102	Kp	1.5	5	
39	4	Tw	2.2	10		84	107	Tw	2.2	3		130	103	Knc/Kp	1.7	5	
40	4	Kp	2.8	55		85	10	Tw	2.2	10	Possible uranium prospect	131	21	Ta	1.5	4	
41	4	Tw/Kp	2.6	60	Possible uranium prospect	86	11	Kfl	1.5	2	Near occurrence 23	132	22	Kp/Kn	3.7	60	
42	4	Tw	3.0	50	Possible road fill	87	11	Ju	1.9	4	Possible uranium prospect	133	22	Ta	1.5	10	
43	4	Tw	1.5	15	Possible uranium prospect	88	11	Mpe	1.5	5		134	22	Ta	1.5	3	
44	4	Tw	1.5	15	Possible uranium prospect	89	11	Tw	8.6	95		135	23	Kp	2.8	35	
45	5	PIpm	2.0	10	Possible uranium prospect	90	11	Tw	1.9	15		136	23	Kc/Kn/Kp/Tw/Ta	8.6	140	
						91	12	Kfl	2.0	25	Possible uranium prospect	137	106	Kn/Kp/Tw	2.4	70	Possible uranium prospect

S.F. = Significance factor

○ = Possible uranium prospect

HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978

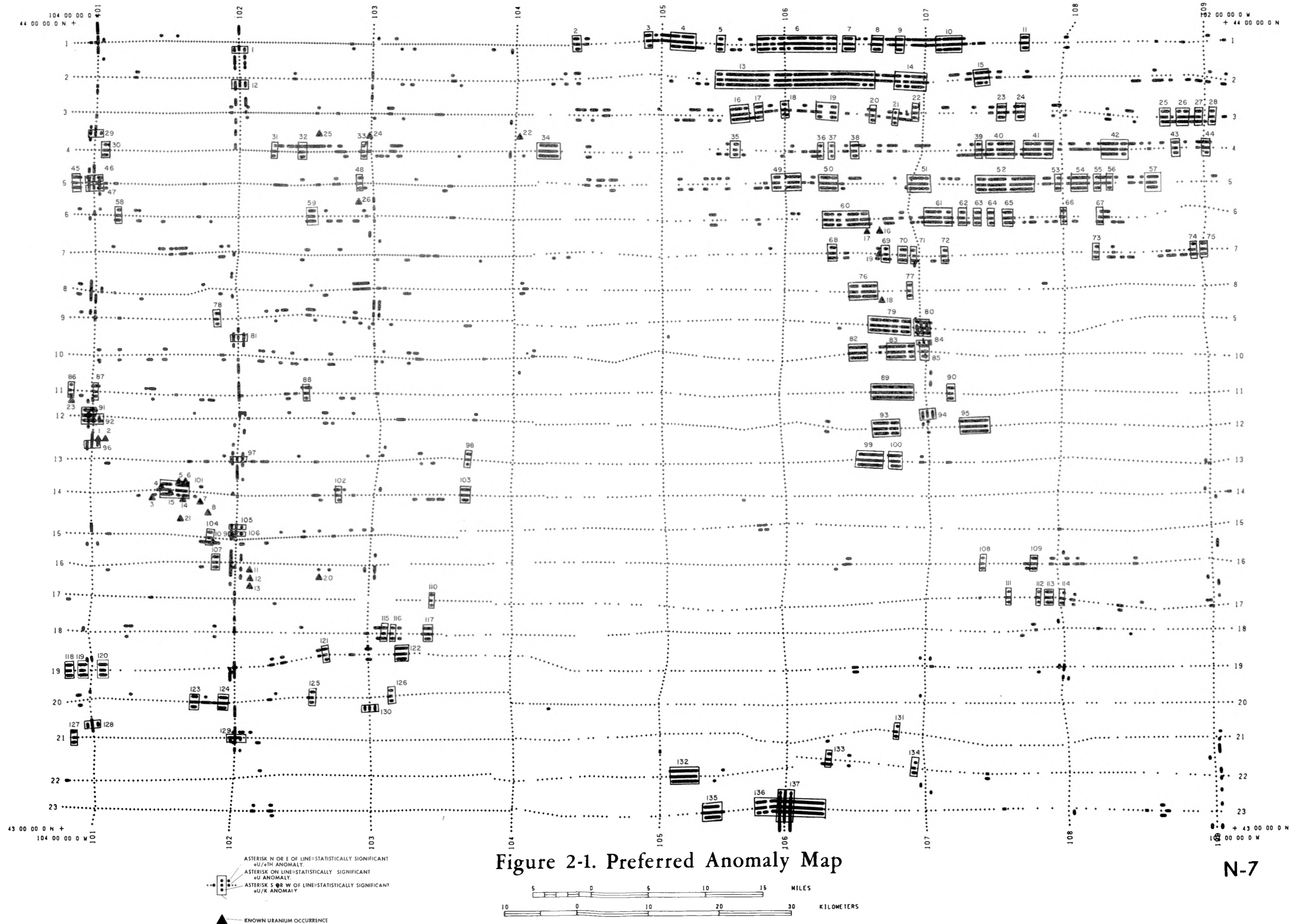


Figure 2-1. Preferred Anomaly Map

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

The data 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 of uranium that was removed by geochemical activity and 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 only a combination of 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 of special situations where second-priority anomalies can be important indicators of uranium prospects are given in Table 2-4.

B. DATA TABLES AND HISTOGRAMS

1. General

The flight-line numbers in the order they appear on each of the four types of data tapes (see Volume 1 for a description of these tapes) are as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 105, 102, 101, 103, 104, 109, 107, 108, 106.

This quadrangle was surveyed by the use of both rotary-wing (RW) and fixed-wing (FW) aircraft, and counting rates for the overlapping portions of RW and FW data are presented in the Tables section of this volume. The factors used to normalize fixed-wing thorium, uranium, potassium, and gross counts to rotary wing are 0.73, 1.20, 0.57, and 0.76 respectively.

Table 2-4
Examples of Potentially Important Second-Priority Anomalies
(Texas Instruments, 1977)

<u>Valid Anomalies</u>	<u>No Anomaly</u>	<u>Locality Description</u>
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.

Microfiche copies of the single-record and averaged-record data listings are attached to the inside back cover 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 explanatory details 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/K, eU/eTh, 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.

Table 2-5
Calibration Constants*

<u>Element</u>	<u>Constant</u>
eU	11.6 cps/ppm
eTh	7.4 cps/ppm
K	114.0 cps/%

*Based on Lake Mead Test Strip calibration of 28 June 1978.

Examination of the Statistical Summary Tables shows Kn-1 (Cretaceous Niobrara Formation) to have the highest mean eU content. The eU content of about 9 ppm is much higher than is expected for a unit with about 5.6 ppm eTh (see Table 2-7). This unit is composed of calcareous shale, limestone, and thin beds of bentonite (Norton, 1975). It is possible that uranium, leached from bentonite, precipitated in the shales.

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 Hot Springs Quadrangle are given in the Tables section. These may be used to study the variation in gamma-ray parameters within a formation as one crosses the quadrangle from north to south or east to west.

4. Histograms

Histograms for each radiometric parameter are presented for each geologic unit in the Histograms section. Several histograms showed multimodal distributions that indicated the presence of more than one distinct lithology in that geologic unit. In situations where the multimodal characteristic of a histogram was obvious, the unit was divided into two or more populations by splitting the histogram based on eTh or K but not eU. For example, in the case of Ta (Tertiary Arikaree Group), the eTh histogram could be reasonably split at one point. The distributions of the split and unsplit units are shown in the Histograms section. New means and standard deviations were calculated before computerized geologic analysis of the data. Table 2-6 summarizes all the histogram splits for the quadrangle. The eU, eTh, and K medians for the resulting subunits are given in concentration units 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 (Table 2-7) compiled by Kogan et al. (1971; see also Saunders and Potts, 1978) allows at least a reasonable estimate of the probable average lithology of the units. For example, the geologic unit Ta (Tertiary Arikaree Group) possibly includes gravel or calcareous sand (Ta-1) and sand (Ta-2).

Table 2-6
Radiometric Analysis of Selected Mapped Units

Geologic Unit	Split on (cps)	eTh (ppm)	eU (ppm)	K (%)	eTh/eU	Probable Lithology
Ta-1	Th = 48	4.2	2.5	1.14	1.7	Calcareous sand
Ta-2		10.2	5.1	1.57	2.0	Sand
Kf-1	K = 167	8.2	5.1	1.28	1.6	Sandstone
Kf-2		9.0	5.8	1.58	1.5	Sandy shale
Kn-1	Th = 48	5.6	9.0	0.92	0.6	Shaly limestone
Kn-2	Th = 73	8.0	8.4	1.23	1.0	Calcareous shale
Kn-3		10.7	6.4	1.47	1.7	Shale
Ju-1	K = 122	4.7	3.3	0.78	1.4	Sandy limestone
Ju-2		6.0	4.2	1.32	1.4	Sandstone
Pmo-1	K = 92	3.8	2.7	0.58	1.4	Limestone
Pmo-2		5.7	3.7	0.99	1.5	Shaly limestone
Ed-1	K = 90	4.1	2.6	0.53	1.6	Shaly limestone
Ed-2		7.9	4.2	1.27	1.9	Sandstone
pEhp-1	Th = 48	4.7	6.1	1.87	0.8	Gabbro
pEhp-2	Th = 69	7.9	7.8	2.09	1.0	Diorite
pEhp-3		11.1	8.5	2.29	1.3	Granodiorite
pEa-1	K = 67	2.7	1.2	0.38	2.3	Metagabbro
pEa-2	K = 114	5.1	3.1	0.82	1.6	Schist
pEa-3		7.4	4.4	1.23	1.7	Quartzite
pEgs-1	Th = 56	5.6	3.9	1.02	1.4	Schist
pEgs-2		9.9	5.0	1.59	2.0	Quartzite
pEbg-1	Th = 50	5.3	4.1	1.07	1.3	Schist
pEbg-2		9.7	5.2	1.49	1.9	Quartzite
pEg-1	Th = 64	6.6	3.8	1.10	1.8	Schist
pEg-2		10.4	5.1	1.53	2.0	Quartzite

Table 2-7
Average U, Th, K Content of Rocks (after Kogan et al., 1971)

Rock Type	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
Intermediate (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

C. MAPS AND PROFILES

1. General

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

2. Profile Maps

Profile maps showing the significance-factor levels for eU, eTh, K, eU/eTh, eU/K, and eTh/K on geologic bases are presented in the Maps section, along with a map showing the record locations and geology. These may be compared directly with the preferred-anomaly map (Figure 2-1) to determine the relative strengths of the eU, eU/eTh, and eU/K anomalies and their geologic locations. They are also useful in studying the geographic variations in the other radiometric parameters.

3. Radiometric Stacked Profiles

Stacked profiles showing 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 are presented in the Profiles section. This presentation provides a convenient way of examining simultaneously all the data at each averaged-record location. The data, as shown, are not corrected for geology (as are the profile maps) and provide an opportunity to study the relative differences in counting rates among the geologic units.

The altitude (terrain-clearance) trace allows identification of portions of flight lines where terrain-clearance requirements were exceeded and the data were discarded in the statistical processing. The averaged-record locations are flagged along the baseline. The eU, eTh, and K traces are similarly flagged for data discarded because of Currie significance test failure. The discarded data points are included in the stacked profiles and may be examined, keeping 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.

D. CONCLUSIONS

1. General

Table 2-8 lists the number of first-priority anomalies and the total number of eU records in each formation.

Table 2-8
Geologic Units with eU Anomalies

Geologic Unit	No. of First-Priority Anomalies	Total No. of eU Records	Geologic Unit	No. of First-Priority Anomalies	Total No. of eU Records
Qal	15	5,060	Pmo	1	1,266
Q1	-	69	PTm	7	3,198
Q	-	28	Mpe	2	2,134
Ta	9	6,694	Ed	-	398
Tw	47	21,122	pEhp	2	733
Kf	1	168	pEb	-	239
Kp	42	16,420	pEgm	1	2,140
Kn	3	186	pEa	-	120
Kc	1	45	pEgs	-	574
Knc	14	2,488	pEms	2	298
Kg	1	439	pEbg	3	1,097
Kbm	3	1,893	pEmp	-	46
Kfl	7	3,213	pEmc	-	32
Ju	3	976	pEg	-	1,573
TRps	1	1,574	pEgg	-	19

One hundred and thirty-two of the 137 first-priority anomalies in this quadrangle have been classified as possible uranium prospects based on their geologic location and eU-anomaly characteristics (see Table 2-3).

The statistical summary tables and Table 2-6 indicate the unusually high uranium content of the rocks in the Hot Springs Quadrangle; most rocks

have a Th/U ratio of about 3 to 5 (see Table 2-7), whereas those in this quadrangle are nearer to 1 or 2. The Precambrian rocks show this same characteristic, although the Th/U ratio is slightly higher than that for younger rocks. The Precambrian rocks may have been a source of uranium for sandstone-type deposits in the younger rocks.

Six anomalies are associated with Precambrian rocks: four may be associated with quartzites or schists, and two are related to the Harney Peak Granite. The latter anomalies are near occurrences 24 and 26.

Eleven anomalies indicate possible uranium prospects in Paleozoic rocks ranging in age from Triassic to Mississippian. Many of these anomalies could be due to uranium-rich shales in predominantly limestone units.

Sixty-two significant anomalies are associated with Mesozoic rocks. The three anomalies in Jurassic rocks and the six anomalies in the Fall River and Lakota Formation outline the uranium occurrences in the Edgemont District. Thirteen anomalies are located in the Niobrara Formation (Knc or Kn) or at the contact between the Niobrara and Pierre formations. Both formations are known to contain bentonite (Norton, 1975; Spivey, 1940; Gries, 1942). Bentonite is a clay-like material formed by the weathering of volcanic ash to produce montmorillonite and beidellite. Broad exposures of this material could give rise to apparent significant anomalies that register the presence of bentonite deposits rather than uranium deposits. Uranium leached from volcanic ash may have precipitated in favorable environments nearby, especially in the black shales of the Sharon Springs Member of the Pierre Shale.

Extensive volcanic activity in Colorado and in the Yellowstone Park area during the Oligocene furnished abundant volcanic ash to the Brule Formation of the White River Group. Like anomalies in the Pierre and Niobrara formations, these anomalies may be outlining zones of bentonite that may have been the source of uranium precipitated in deposits nearby. There are 38 such anomalies in the White River Group. In the northeast, occurrences 16 to 19 are located in the middle of a north-south trending zone of

first-priority anomalies. The eight anomalies associated with the Arikaree Formation may reflect the presence of sandstone-type uranium deposits.

The anomalies associated with Quaternary units may indicate the presence of uranium-rich source rocks that could host uranium mineralization.

2. Uraniferous Provinces

Numerous broad, immense, first-priority anomalies cluster in the northeast. They are most likely derived from extensive accumulations of bentonite in the Cretaceous Pierre Formation and the Tertiary White River Group. In particular, the north-south extension of this zone that passes through Hart Table is known to contain uranium occurrences. The Black Hills themselves are part of a uraniferous province that encloses the deposits in the Edgemont District and the Harney Peak Granite. In the southeast, the small cluster of first-priority and second-priority anomalies may be an extension of that in the northeast. The cluster of broad anomalies in the south-central part of the quadrangle may be part of a province farther south. This area appears similar to that in the northeast.

3. Suggestions for Further Work

The primary objective of this survey is to locate areas favorable for the occurrence of uranium. The low-density coverage during this reconnaissance survey precludes inferences as to the presence or absence of deposits over most of the area. The probabilities for encountering individual deposits in this type of survey are low, and consequently it will be necessary to conduct more detailed surveys (airborne or ground) in the most promising areas.

Further work is needed in the northeast to ascertain the nature of the numerous first-priority anomalies; uranium deposits may have formed down-slope from extensive bentonite beds. Should the bentonite prove to be economic, it could be mined itself. The areas covered by the small clusters of anomalies in the southeast and south should be studied. The contact between the Niobrara Formation and the Pierre Shale in the west along the

boundary of the Black Hills should be explored for possible uraniferous black shales in the Pierre Shale. The series of anomalies (29, 30, 45, 46, 47, 58, 78, 8, and 88) merit study to determine the favorability of the Minnelusa Sandstone.

SECTION III
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APPENDIX A
PRODUCTION SUMMARY

<u>Operation</u>	<u>Start</u>	<u>Completion</u>
Data Collection	19 September 1978	21 September 1978
Data Processing	26 September 1978	9 May 1979
Data Interpretation	15 February 1979	14 May 1979
Flight-Line Miles	2927	

Note: Additional production summary data are in Appendix A of Volume 1.

TABLE T-1. GEOLOGIC MAP UNITS — HOT SPRINGS QUADRANGLE

Computer Symbol	Map Symbol	Description	Computer Symbol	Map Symbol	Description
QUATERNARY			PERMIAN- PENNSYLVANIAN		
QAL	Qal	Alluvium	PPPM	P P m	Minnelusa Sandstone: Includes silt, marl, and limestone
QL	Ql	Landslide deposits	MISSISSIPPIAN		
Q	Q	Undivided	MPE	Mpe	Pahasapa and Englewood limestones
TERTIARY			CAMBRIAN		
TA	Ta	Arikaree Group: Includes the Harrison, Monroe Creek, and Sharps formations	CD	-Cd	Deadwood Formation: Sandstone, conglomerate, and shale
TW	Tw	White River Group: Includes Brule and Chadron formations	PRECAMBRIAN		
CRETACEOUS			PCHP	p C hp	Harney Peak Granite: Granite, granite pegmatite, and pegmatite
KF	Kf	Fox Hills Sandstone	PCB-2	p C b	Metamorphic Rocks: Interbedded schist, impure quartzite, meta-iron formation, streaked quartzite, metaconglomerate, and amphibolite
KP	Kp	Pierre Shale	PCQM	p C qm	Metamorphic Rocks: Quartz mica schist and phyllite with very minor beds of streaked quartzite, grunerite-bearing rocks, and garnet schists (Bugtown and Mayo formations).
KN	Kn	Niobrara Formation	PCA	p C a	Metamorphic Rocks: Amphibolite and metagabbro with interbeds of garnet-rich schist, streaked quartzite, and meta-iron formation (Crow Formation).
KC	Kc	Carlile Shale	PCQS	p C qs	Metamorphic Rocks: Quartzose schist and impure quartzite (Orville and Bugtown formations).
KNC	Knc	Niobrara Formation and Carlile Shale undivided	PCMS	p C ms	Metamorphic Rocks: Micaceous phyllite or schist, with magnetite, ilmenite, and garnet (Orville Formation?).
KG	Kg	Greenhorn Limestone	PCBG	p C bg	Metamorphic Rocks: Biotite-garnet phyllite or schist (Loues and Orville formations?).
KBM	Kbm	Belle Fourche and Mowry Shale, Newcastle Sandstone, and Skull Creek Shale	PCMP	p C mp	Metamorphic Rocks: Interbedded tremolite, marble, and schist (Vanderlehr Formation?).
KFL	Kfl	Fall River and Lakota formations	PCMC	p C mc	Metaconglomerate and Quartzite
JURASSIC			PCG	p C g	Quartzite: With sillimanite schist and phyllite
JU	Ju	Undivided units: Includes Sundance Formation, Unkpapa Sandstone, and Morrison Formation	PCGG	p C gg	Gneissic Granite and Biotite Schist
TRIASSIC- PERMIAN					
TRPS	TRps	Spearfish Formation: Siltstone, shale, and gypsum			
PERMIAN					
PMO	Pmo	Minnekahta Limestone and Opeche Formation			

TABLE T-2. STATISTICAL SUMMARIES

DISTRIBUTION TYPES OF GAMMA-RAY PARAMETERS						
GEOL UNIT	TH	U	K	U/K	U/TH	TH/K
QAL	N	LN	N	LN	LN	LN
QL	N	LN	N	LN	N	N
Q	LN	N	LN	LN	N	LN
TA-1	LN	LN	N	LN	LN	LN
TA-2	N	N	N	LN	LN	N
TW	N	N	N	LN	LN	LN
KF-1	LN	N	N	LN	LN	N
KF-2	LN	LN	LN	LN	LN	N
KP	N	LN	N	LN	LN	LN
KN-1	LN	LN	N	LN	N	N
KN-2	LN	N	LN	LN	N	N
KN-3	LN	LN	LN	LN	LN	N
KC	N	LN	LN	LN	LN	LN
KNC	N	LN	N	LN	LN	LN
KG	N	N	N	LN	LN	LN
KBM	N	N	N	LN	LN	N
KFL	N	LN	LN	LN	LN	LN
JU-1	LN	LN	N	LN	LN	LN
JU-2	LN	N	LN	LN	LN	LN
TRPS	N	N	N	LN	LN	LN
PMO-1	N	N	N	LN	LN	LN
PMO-2	N	LN	LN	N	LN	N
PPPM	LN	N	N	LN	LN	LN
MPE	LN	N	LN	LN	LN	LN
CD-1	LN	LN	N	LN	LN	LN
CD-2	N	LN	N	N	LN	LN
PCHP-1	N	LN	N	LN	N	LN
PCHP-2	N	LN	LN	LN	LN	N
PCHP-3	N	N	LN	LN	LN	N
PCB-2	N	N	N	LN	LN	N
PCQM	N	N	N	LN	LN	N
PCA-1	(LN)	(LN)	(LN)	(LN)	(LN)	(LN)
PCA-2	LN	N	LN	LN	LN	LN
PCA-3	LN	N	LN	LN	N	N
PCQS-1	N	N	LN	LN	LN	N
PCQS-2	LN	N	LN	N	N	LN
PCMS	N	N	LN	LN	N	N
PCBG-1	LN	N	LN	N	N	N
PCBG-2	N	LN	N	LN	LN	N
PCMP	N	LN	LN	LN	LN	N
PCMC	N	N	N	LN	LN	LN
PCG-1	N	N	N	LN	LN	LN
PCG-2	N	LN	N	LN	LN	LN
PCGG	(LN)	(LN)	(LN)	(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 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	5419.	23.903	35.847	47.791	59.734	71.678	83.622	95.565
QL	90.	36.549	46.277	56.006	65.735	75.464	85.193	94.922
Q	28.	30.707	35.295	40.570	46.632	53.600	61.610	70.817
TA-1	922.	19.214	22.593	26.567	31.240	36.734	43.195	50.792
TA-2	6603.	53.752	61.076	68.400	75.724	83.048	90.373	97.697
TW	23226.	37.102	48.733	60.363	71.993	83.623	95.253	106.883
KF-1	109.	42.270	47.655	53.727	60.572	68.290	76.991	86.800
KF-2	66.	55.739	59.068	62.596	66.335	70.297	74.496	78.945
KP	18521.	39.291	47.565	55.840	64.114	72.388	80.662	88.937
KN-1	49.	30.418	33.677	37.286	41.281	45.704	50.601	56.023
KN-2	137.	41.792	46.838	52.493	58.831	65.934	73.895	82.817
KN-3	35.	71.721	74.106	76.570	79.116	81.746	84.465	87.273
KC	45.	36.670	44.744	52.818	60.893	68.967	77.042	85.116
KNC	2600.	40.173	49.001	57.829	66.657	75.485	84.313	93.141
KG	439.	24.264	35.138	46.011	56.884	67.757	78.630	89.503
KBM	1927.	29.836	42.527	55.219	67.910	80.601	93.293	105.984
KFL	3213.	3.984	17.217	30.450	43.683	56.915	70.148	83.381
JU-1	522.	19.189	23.347	28.405	34.560	42.048	51.159	62.244
JU-2	454.	25.421	30.595	36.823	44.319	53.340	64.198	77.265
TRPS	1574.	13.049	22.411	31.773	41.134	50.496	59.858	69.220
PMO-1	738.	11.062	16.846	22.630	28.415	34.199	39.983	45.767
PMO-2	528.	21.067	28.160	35.253	42.345	49.438	56.531	63.623
PPPM	3198.	13.420	18.014	24.182	32.460	43.573	58.490	78.514
MPE	2134.	16.987	21.660	27.619	35.217	44.905	57.258	73.010
CD-1	225.	16.589	20.357	24.982	30.658	37.624	46.171	56.661
CD-2	173.	-8.140	14.084	36.308	58.533	80.757	102.982	125.206
PCHP-1	186.	13.436	20.426	27.417	34.408	41.398	48.389	55.380
PCHP-2	200.	42.234	47.619	53.004	58.389	63.773	69.158	74.543
PCHP-3	347.	56.006	64.723	73.439	82.156	90.872	99.589	108.305
PCB-2	239.	16.703	32.892	49.080	65.269	81.457	97.645	113.834
PCQM	2140.	13.407	29.619	45.831	62.043	78.255	94.467	110.679
PCA-1	18.	12.916	14.998	17.416	20.224	23.484	27.270	31.667
PCA-2	33.	25.164	28.751	32.849	37.531	42.880	48.991	55.974
PCA-3	69.	35.225	40.864	47.407	54.997	63.802	74.017	85.867
PCQS-1	121.	17.167	25.143	33.120	41.097	49.074	57.051	65.027
PCQS-2	453.	51.195	57.664	64.949	73.155	82.398	92.809	104.535
PCMS	298.	45.587	54.145	62.702	71.260	79.818	88.376	96.933
PCBG-1	105.	26.205	29.942	34.212	39.092	44.667	51.038	58.317
PCBG-2	992.	47.620	55.572	63.525	71.477	79.430	87.382	95.335
PCMP	46.	23.727	28.260	32.793	37.326	41.859	46.392	50.925
PCMC	32.	23.347	28.587	33.827	39.067	44.308	49.548	54.788
PCG-1	902.	22.713	31.517	40.321	49.125	57.929	66.733	75.537
PCG-2	671.	52.995	60.900	68.805	76.710	84.616	92.521	100.426
PCGG	19.	39.727	41.768	43.914	46.169	48.541	51.034	53.656

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 VALUESARE INDICATORS OF RELATIVE CONCENTRATIONS OF THE ELEMENTS IN THE VARIOUS GEOLOGIC RECK UNITS.

TABLE T-2. STATISTICAL SUMMARIES (Continued)

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	5060.	23.141	31.182	42.016	56.616	76.288	102.795	138.512
QL	69.	29.257	37.900	49.096	63.600	82.388	106.726	138.254
Q	28.	-1.557	27.152	55.861	84.570	113.279	141.988	170.697
TA-1	584.	15.259	18.888	23.379	28.937	35.818	44.334	54.875
TA-2	6110.	26.523	37.411	48.299	59.188	70.076	80.964	91.853
TW	21122.	-5.347	19.907	45.161	70.415	95.670	120.924	146.178
KF-1	109.	22.029	34.304	46.580	58.856	71.131	83.407	95.683
KF-2	59.	45.752	52.110	59.352	67.601	76.996	87.697	99.885
KP	16420.	25.953	34.508	45.884	61.011	81.124	107.868	143.428
KN-1	49.	53.923	67.084	83.457	103.827	129.168	160.694	199.914
KN-2	137.	37.279	57.218	77.157	97.096	117.036	136.975	156.914
KN-3	35.	47.759	55.338	64.119	74.293	86.082	99.742	115.570
KC	45.	41.493	52.727	67.001	85.139	108.189	137.477	174.696
KNC	2488.	32.355	41.894	54.244	70.235	90.941	117.750	152.463
KG	439.	24.719	36.695	48.670	60.645	72.621	84.596	96.571
KBM	1893.	13.589	29.930	46.271	62.612	78.953	95.294	111.635
KFL	3213.	13.690	19.898	28.922	42.037	61.100	88.807	129.079
JU-1	522.	16.229	21.647	28.874	38.513	51.371	68.521	91.397
JU-2	454.	28.726	35.256	41.786	48.316	54.846	61.376	67.905
TRPS	1574.	13.846	24.044	34.242	44.440	54.639	64.837	75.035
PMO-1	738.	12.244	18.609	24.974	31.340	37.705	44.070	50.435
PMO-2	528.	25.011	30.058	36.123	43.412	52.172	62.699	75.351
PPPM	3198.	8.676	19.394	30.112	40.831	51.549	62.267	72.985
MPE	2134.	7.058	15.998	24.939	33.879	42.819	51.759	60.699
CD-1	225.	15.886	19.556	24.073	29.634	36.480	44.907	55.282
CD-2	173.	22.369	29.087	37.823	49.182	63.952	83.158	108.132
PCHP-1	186.	42.368	50.351	59.837	71.111	84.510	100.432	119.355
PCHP-2	200.	52.264	62.783	75.420	90.601	108.837	130.744	157.060
PCHP-3	347.	50.222	66.173	82.124	98.075	114.026	129.977	145.928
PCB-2	239.	17.614	28.805	39.995	51.186	62.377	73.568	84.759
PCQM	2140.	25.799	36.994	48.189	59.384	70.580	81.775	92.970
PCA-1	18.	3.470	5.495	8.702	13.781	21.824	34.562	54.734
PCA-2	33.	18.343	24.361	30.378	36.396	42.414	48.432	54.450
PCA-3	69.	31.077	37.746	44.415	51.083	57.752	64.421	71.090
PCQS-1	121.	18.357	27.268	36.179	45.090	54.001	62.912	71.823
PCQS-2	453.	32.306	40.834	49.361	57.889	66.416	74.943	83.471
PCMS	298.	32.740	41.055	49.370	57.686	66.001	74.316	82.631
PCBG-1	105.	23.314	31.280	39.246	47.213	55.179	63.146	71.112
PCBG-2	992.	40.598	46.293	52.787	60.192	68.636	78.264	89.243
PCMP	46.	20.105	23.569	27.629	32.390	37.970	44.511	52.180
PCMC	32.	22.648	28.521	34.394	40.266	46.139	52.012	57.885
PCG-1	902.	10.630	21.811	32.992	44.173	55.353	66.534	77.715
PCG-2	671.	33.887	40.706	48.897	58.736	70.554	84.751	101.804
PCGG	19.	30.732	34.818	39.448	44.693	50.636	57.369	64.997

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	5419.	52.462	82.690	112.918	143.146	173.373	203.601	233.829
QL	90.	75.442	103.343	131.244	159.145	187.047	214.948	242.849
Q	28.	73.510	86.009	100.633	117.743	137.763	161.187	188.593
TA-1	922.	88.097	101.902	115.706	129.511	143.315	157.120	170.924
TA-2	6603.	133.730	148.956	164.182	179.408	194.633	209.859	225.085
TW	23226.	77.785	104.990	132.194	159.399	186.604	213.809	241.014
KF-1	109.	105.317	118.758	132.198	145.639	159.079	172.520	185.961
KF-2	66.	162.543	168.054	173.752	179.643	185.734	192.032	198.543
KP	18521.	95.630	116.113	136.596	157.078	177.561	198.044	218.526
KN-1	49.	63.910	77.648	91.385	105.122	118.859	132.597	146.334
KN-2	137.	94.596	107.996	123.293	140.758	160.696	183.459	209.446
KN-3	35.	126.086	138.553	152.252	167.306	183.847	202.025	221.999
KC	45.	116.848	127.758	139.686	152.729	166.988	182.580	199.627
KNC	2600.	84.960	107.825	130.690	153.555	176.420	199.285	222.150
KG	439.	30.665	60.630	90.595	120.560	150.524	180.489	210.454
KBM	1927.	52.328	78.608	104.889	131.169	157.450	183.730	210.011
KFL	3213.	23.804	34.817	50.926	74.487	108.949	159.355	233.083
JU-1	522.	28.178	48.319	68.461	88.602	108.743	128.885	149.026
JU-2	454.	106.369	119.317	133.840	150.131	168.404	188.902	211.895
TRPS	1574.	12.875	50.130	87.386	124.641	161.897	199.152	236.407
PMO-1	738.	24.579	38.336	52.094	65.851	79.608	93.365	107.123
PMO-2	528.	78.063	88.393	100.091	113.338	128.337	145.321	164.552
PPPM	3198.	29.410	49.788	70.167	90.545	110.924	131.302	151.681
MPE	2134.	26.577	37.186	52.029	72.797	101.855	142.512	199.398
CD-1	225.	14.407	29.687	44.967	60.247	75.527	90.807	106.086
CD-2	173.	-34.581	25.351	85.284	145.217	205.150	265.083	325.016
PCHP-1	186.	115.770	148.244	180.718	213.191	245.665	278.139	310.613
PCHP-2	200.	166.090	187.272	211.155	238.085	268.448	302.685	341.288
PCHP-3	347.	200.614	219.126	239.345	261.430	285.553	311.901	340.681
PCB-2	239.	34.723	75.422	116.121	156.820	197.519	238.218	278.917
PCQM	2140.	65.999	100.577	135.155	169.733	204.311	238.890	273.468
PCA-1	18.	25.140	30.250	36.399	43.797	52.699	63.410	76.299
PCA-2	33.	62.291	71.175	81.326	92.926	106.179	121.323	138.627
PCA-3	69.	104.753	115.295	126.898	139.669	153.725	169.195	186.223
PCQS-1	121.	50.549	66.695	87.999	116.107	153.193	202.124	266.686
PCQS-2	453.	123.919	140.534	159.378	180.749	204.984	232.470	263.641
PCMS	298.	124.982	138.286	153.007	169.294	187.315	207.255	229.317
PCBG-1	105.	60.965	76.887	96.969	122.296	154.237	194.521	245.327
PCBG-2	992.	106.834	127.920	149.006	170.092	191.177	212.263	233.349
PCMP	46.	38.869	52.068	69.750	93.436	125.167	167.672	224.611
PCMC	32.	21.436	59.616	97.795	135.974	174.154	212.333	250.513
PCG-1	902.	3.955	44.516	85.077	125.637	166.198	206.759	247.320
PCG-2	671.	44.654	87.928	131.203	174.477	217.751	261.026	304.300
PCGG	19.	92.567	104.709	118.444	133.980	151.554	171.433	193.920

TABLE T-2. STATISTICAL SUMMARIES (Continued)

STATISTICAL SUMMARY FOR URAN./POT.								
GEOLOG UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	5060.	0.175	0.232	0.309	0.411	0.547	0.728	0.968
QL	69.	0.209	0.263	0.331	0.417	0.526	0.662	0.835
Q	28.	0.179	0.279	0.432	0.671	1.042	1.618	2.511
TA-1	584.	0.110	0.140	0.178	0.227	0.289	0.367	0.467
TA-2	6110.	0.191	0.228	0.273	0.326	0.390	0.466	0.558
TW	21122.	0.157	0.219	0.305	0.425	0.593	0.825	1.150
KF-1	109.	0.234	0.279	0.333	0.398	0.475	0.567	0.677
KF-2	59.	0.258	0.293	0.332	0.376	0.427	0.484	0.548
KP	16420.	0.137	0.194	0.276	0.392	0.556	0.790	1.123
KN-1	49.	0.428	0.567	0.752	0.997	1.322	1.752	2.324
KN-2	137.	0.344	0.431	0.540	0.677	0.848	1.062	1.331
KN-3	35.	0.235	0.290	0.359	0.444	0.549	0.680	0.841
KC	45.	0.216	0.296	0.406	0.557	0.765	1.049	1.439
KNC	2488.	0.186	0.252	0.342	0.463	0.627	0.849	1.150
KG	439.	0.203	0.276	0.376	0.512	0.698	0.951	1.296
KBM	1893.	0.215	0.280	0.364	0.473	0.615	0.799	1.039
KFL	3213.	0.180	0.263	0.385	0.564	0.826	1.210	1.771
JU-1	522.	0.171	0.236	0.325	0.448	0.618	0.852	1.175
JU-2	454.	0.212	0.243	0.278	0.319	0.365	0.418	0.479
TRPS	1574.	0.188	0.234	0.292	0.363	0.453	0.565	0.704
PMO-1	738.	0.250	0.310	0.384	0.477	0.591	0.734	0.910
PMO-2	528.	0.199	0.262	0.325	0.388	0.451	0.514	0.577
PPPM	3198.	0.220	0.279	0.352	0.446	0.564	0.714	0.903
MPE	2134.	0.229	0.287	0.359	0.449	0.562	0.703	0.880
CD-1	225.	0.245	0.313	0.399	0.510	0.651	0.832	1.062
CD-2	173.	0.166	0.232	0.299	0.365	0.431	0.497	0.563
PCHP-1	186.	0.220	0.254	0.293	0.338	0.390	0.449	0.518
PCHP-2	200.	0.251	0.289	0.331	0.381	0.437	0.502	0.576
PCHP-3	347.	0.245	0.282	0.323	0.370	0.425	0.487	0.559
PCB-2	239.	0.202	0.238	0.281	0.332	0.391	0.462	0.544
PCQM	2140.	0.216	0.254	0.299	0.352	0.414	0.487	0.574
PCA-1	18.	0.096	0.143	0.212	0.315	0.467	0.693	1.028
PCA-2	33.	0.263	0.299	0.340	0.386	0.439	0.499	0.566
PCA-3	69.	0.221	0.261	0.308	0.363	0.427	0.504	0.594
PCQS-1	121.	0.226	0.269	0.320	0.380	0.452	0.537	0.638
PCQS-2	453.	0.157	0.212	0.266	0.321	0.376	0.431	0.486
PCMS	298.	0.210	0.246	0.288	0.337	0.395	0.462	0.541
PCBG-1	105.	0.212	0.270	0.327	0.385	0.442	0.499	0.557
PCBG-2	992.	0.222	0.260	0.304	0.357	0.418	0.490	0.574
PCMP	46.	0.190	0.232	0.284	0.347	0.424	0.518	0.634
PCMC	32.	0.155	0.195	0.245	0.308	0.386	0.486	0.610
PCG-1	902.	0.204	0.247	0.298	0.359	0.434	0.524	0.633
PCG-2	671.	0.230	0.264	0.302	0.347	0.397	0.456	0.522
PCGG	19.	0.300	0.311	0.322	0.334	0.345	0.358	0.370

STATISTICAL SUMMARY FOR URAN./THOR.								
GEOLOG UNIT	NUM. SAMPLES	-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	5060.	0.452	0.584	0.755	0.975	1.260	1.628	2.104
QL	69.	0.389	0.596	0.802	1.008	1.215	1.421	1.627
Q	28.	-0.127	0.516	1.159	1.803	2.446	3.089	3.733
TA-1	584.	0.459	0.579	0.730	0.922	1.163	1.468	1.852
TA-2	6110.	0.448	0.537	0.644	0.773	0.928	1.113	1.335
TW	21122.	0.392	0.524	0.701	0.937	1.253	1.676	2.240
KF-1	109.	0.551	0.662	0.794	0.953	1.143	1.372	1.646
KF-2	59.	0.692	0.785	0.891	1.011	1.147	1.301	1.476
KP	16420.	0.375	0.512	0.701	0.960	1.313	1.797	2.459
KN-1	49.	0.269	1.049	1.829	2.610	3.390	4.171	4.951
KN-2	137.	0.281	0.747	1.213	1.678	2.144	2.610	3.076
KN-3	35.	0.580	0.681	0.800	0.939	1.103	1.295	1.521
KC	45.	0.481	0.689	0.986	1.410	2.018	2.888	4.133
KNC	2488.	0.446	0.596	0.796	1.063	1.419	1.896	2.532
KG	439.	0.519	0.660	0.840	1.069	1.360	1.730	2.201
KBM	1893.	0.475	0.590	0.731	0.907	1.125	1.395	1.731
KFL	3213.	0.413	0.556	0.749	1.009	1.358	1.829	2.463
JU-1	522.	0.534	0.683	0.872	1.114	1.424	1.819	2.324
JU-2	454.	0.660	0.778	0.917	1.080	1.273	1.499	1.767
TRPS	1574.	0.650	0.770	0.912	1.080	1.279	1.514	1.792
PMO-1	738.	0.596	0.732	0.898	1.102	1.353	1.661	2.039
PMO-2	528.	0.579	0.704	0.856	1.040	1.264	1.537	1.867
PPPM	3198.	0.569	0.732	0.941	1.210	1.556	2.001	2.572
MPE	2134.	0.481	0.599	0.745	0.928	1.155	1.437	1.789
CD-1	225.	0.507	0.628	0.779	0.967	1.199	1.487	1.844
CD-2	173.	0.511	0.614	0.738	0.887	1.066	1.281	1.539
PCHP-1	186.	0.835	1.276	1.717	2.157	2.598	3.039	3.479
PCHP-2	200.	0.878	1.063	1.287	1.558	1.887	2.285	2.766
PCHP-3	347.	0.683	0.821	0.986	1.185	1.424	1.711	2.056
PCB-2	239.	0.433	0.529	0.647	0.791	0.967	1.182	1.444
PCQM	2140.	0.405	0.543	0.729	0.978	1.312	1.760	2.361
PCA-1	18.	0.234	0.335	0.477	0.681	0.972	1.388	1.980
PCA-2	33.	0.616	0.713	0.826	0.956	1.107	1.282	1.485
PCA-3	69.	0.363	0.555	0.747	0.940	1.132	1.325	1.517
PCQS-1	121.	0.544	0.687	0.867	1.095	1.382	1.744	2.201
PCQS-2	453.	0.428	0.549	0.671	0.792	0.913	1.034	1.156
PCMS	298.	0.488	0.597	0.706	0.815	0.924	1.033	1.142
PCBG-1	105.	0.638	0.826	1.015	1.203	1.391	1.580	1.768
PCBG-2	992.	0.544	0.631	0.731	0.848	0.983	1.139	1.321
PCMP	46.	0.496	0.599	0.724	0.875	1.056	1.276	1.542
PCMC	32.	0.576	0.699	0.848	1.028	1.247	1.513	1.836
PCG-1	902.	0.488	0.595	0.726	0.885	1.079	1.315	1.603
PCG-2	671.	0.431	0.523	0.634	0.770	0.934	1.133	1.375
PCGG	19.	0.729	0.801	0.881	0.968	1.064	1.170	1.286

TABLE T-2. STATISTICAL SUMMARIES (Continued)

GEOLOGICAL UNIT	NUM. SAMPLES	STATISTICAL SUMMARY FOR THOR./POT.						
		-3 S.D.	-2 S.D.	-1 S.D.	MEDIAN	+1 S.D.	+2 S.D.	+3 S.D.
QAL	5419.	0.246	0.294	0.352	0.420	0.503	0.601	0.718
QL	90.	0.234	0.296	0.358	0.420	0.483	0.545	0.607
Q	28.	0.295	0.325	0.359	0.396	0.437	0.482	0.533
TA-1	922.	0.158	0.182	0.210	0.243	0.280	0.324	0.374
TA-2	6603.	0.304	0.344	0.383	0.423	0.463	0.502	0.542
TW	23226.	0.277	0.327	0.385	0.454	0.535	0.631	0.744
KF-1	109.	0.293	0.335	0.378	0.420	0.462	0.505	0.547
KF-2	66.	0.307	0.328	0.349	0.370	0.391	0.411	0.432
KP	18521.	0.248	0.293	0.346	0.409	0.483	0.570	0.674
KN-1	49.	0.288	0.325	0.361	0.398	0.435	0.471	0.508
KN-2	137.	0.278	0.326	0.373	0.421	0.468	0.516	0.563
KN-3	35.	0.336	0.383	0.429	0.475	0.521	0.568	0.614
KC	45.	0.305	0.332	0.362	0.395	0.431	0.470	0.512
KNC	2600.	0.277	0.322	0.375	0.436	0.507	0.589	0.685
KG	439.	0.295	0.347	0.408	0.479	0.563	0.662	0.779
KBM	1927.	0.211	0.318	0.424	0.531	0.637	0.744	0.850
KFL	3213.	0.199	0.281	0.397	0.559	0.789	1.113	1.570
JU-1	522.	0.183	0.238	0.309	0.402	0.523	0.680	0.884
JU-2	454.	0.174	0.207	0.247	0.295	0.352	0.420	0.502
TRPS	1574.	0.196	0.235	0.281	0.337	0.403	0.482	0.577
PMO-1	738.	0.258	0.307	0.364	0.433	0.514	0.610	0.724
PMO-2	528.	0.209	0.263	0.318	0.372	0.427	0.481	0.536
PPPM	3198.	0.223	0.263	0.312	0.368	0.436	0.516	0.610
MPE	2134.	0.278	0.334	0.402	0.484	0.582	0.700	0.842
CD-1	225.	0.315	0.374	0.444	0.528	0.626	0.744	0.883
CD-2	173.	0.226	0.275	0.333	0.404	0.490	0.595	0.722
PCHP-1	186.	0.073	0.095	0.123	0.160	0.208	0.270	0.351
PCHP-2	200.	0.154	0.185	0.216	0.246	0.277	0.308	0.338
PCHP-3	347.	0.221	0.252	0.283	0.314	0.345	0.376	0.408
PCB-2	239.	0.249	0.307	0.365	0.424	0.482	0.540	0.599
PCQM	2140.	0.096	0.189	0.282	0.375	0.468	0.560	0.653
PCA-1	18.	0.282	0.333	0.392	0.462	0.544	0.641	0.755
PCA-2	33.	0.289	0.323	0.361	0.404	0.452	0.505	0.565
PCA-3	69.	0.276	0.316	0.356	0.396	0.436	0.475	0.515
PCQS-1	121.	0.078	0.172	0.267	0.362	0.456	0.551	0.646
PCQS-2	453.	0.293	0.326	0.363	0.405	0.451	0.502	0.559
PCMS	298.	0.263	0.316	0.368	0.421	0.474	0.526	0.579
PCBG-1	105.	0.147	0.206	0.266	0.326	0.386	0.446	0.505
PCBG-2	992.	0.296	0.338	0.380	0.423	0.465	0.508	0.550
PCMP	46.	0.131	0.223	0.316	0.408	0.501	0.593	0.686
PCNC	32.	0.103	0.147	0.209	0.299	0.427	0.610	0.870
PCG-1	902.	0.181	0.237	0.310	0.406	0.532	0.697	0.913
PCG-2	671.	0.222	0.281	0.356	0.450	0.570	0.721	0.913
PCGG	19.	0.260	0.286	0.314	0.345	0.378	0.415	0.456

TABLE T-3. FLIGHT-LINE AVERAGES

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 1					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	61.8	143.	82.3	143.	151.1	143.
TW	62.2	270.	63.6	270.	136.1	270.
KF-1	65.9	41.	72.9	41.	153.4	41.
KF-2	66.6	65.	66.8	65.	179.9	65.
KP	63.9	1029.	89.6	1029.	156.9	1029.
KNC	69.5	19.	68.8	19.	169.5	19.
KG	60.3	15.	55.5	15.	142.4	15.
KBM	60.3	107.	50.3	107.	107.8	107.
KFL	36.4	40.	40.4	40.	103.1	40.
JU-2	50.6	10.	50.7	10.	167.8	10.
TRPS	29.5	22.	33.1	22.	79.9	22.
PMO-1	26.9	22.	26.7	22.	70.5	22.
PMO-2	39.2	4.	31.1	4.	95.9	4.
PPPM	38.0	138.	40.7	138.	97.3	138.
MPE	39.3	92.	36.8	92.	88.6	92.
CD-1	32.8	31.	25.4	31.	61.3	31.
CD-2	44.9	39.	40.2	39.	121.0	39.
PCB-2	59.6	68.	44.6	68.	139.6	68.
PCQM	57.3	155.	47.7	155.	142.4	155.
PCA-2	36.6	16.	34.7	16.	94.2	16.
PCA-3	54.3	25.	47.4	25.	137.3	25.
PCQ5-1	46.9	20.	50.1	20.	137.2	20.
PCQ5-2	74.0	143.	54.3	143.	177.4	143.
PCMS	67.4	96.	55.0	96.	182.6	96.
PCBG-1	44.9	10.	48.5	10.	149.2	10.
PCBG-2	71.2	462.	59.6	462.	174.0	462.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 2					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	55.6	211.	67.1	211.	127.8	211.
TW	66.7	642.	71.4	642.	136.9	642.
KP	61.5	870.	94.7	870.	145.4	870.
KNC	46.8	5.	5.	5.	95.8	5.
KFL	46.1	34.	34.5	34.	76.6	34.
JU-1	34.5	12.	25.3	12.	67.1	12.
TRPS	31.3	8.	24.6	8.	62.6	8.
PPPM	37.9	156.	39.8	156.	101.6	156.
MPE	40.7	185.	36.0	185.	96.5	185.
CD-1	40.0	2.	32.0	2.	81.3	2.
CD-2	48.4	11.	44.8	11.	140.3	11.
PCB-2	80.9	43.	55.3	43.	188.6	43.
PCQM	73.9	140.	57.0	140.	182.1	140.
PCA-1	20.5	18.	15.2	18.	46.5	18.
PCA-2	34.4	5.	34.6	5.	92.3	5.
PCA-3	57.1	5.	51.3	5.	147.0	5.
PCQ5-2	75.6	60.	61.2	60.	193.0	60.
PCMS	68.6	46.	51.2	46.	163.7	46.
PCBG-1	38.6	30.	42.9	30.	117.2	30.
PCBG-2	74.3	177.	57.2	177.	172.9	177.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 3					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	56.2	222.	77.5	222.	142.0	222.
QL	65.3	12.	104.5	12.	181.1	12.
TW	64.0	626.	76.8	626.	138.1	626.
KP	64.8	691.	91.7	691.	152.6	691.
KNC	42.1	32.	68.3	32.	95.0	32.
KBM	48.5	23.	42.3	23.	89.4	23.
KFL	42.4	43.	34.9	43.	80.8	43.
JU-1	37.8	5.	37.9	5.	111.2	5.
JU-2	40.7	19.	48.8	19.	150.8	19.
TRPS	50.1	12.	44.3	12.	153.1	12.
PMO-1	29.6	28.	30.1	28.	58.1	28.
PMO-2	36.6	1.	34.8	1.	93.0	1.
PPPM	35.1	191.	37.8	191.	93.1	191.
MPE	36.7	259.	32.2	259.	79.0	259.
CD-1	34.6	11.	31.0	11.	68.5	11.
CD-2	71.9	14.	62.1	14.	196.7	14.
PCHP-1	33.8	96.	66.8	96.	197.6	96.
PCHP-2	51.0	5.	78.7	5.	201.7	5.
PCB-2	77.3	26.	63.6	26.	178.4	26.
PCQM	65.7	280.	34.7	280.	186.6	280.
PCA-2	43.0	2.	34.7	2.	86.8	2.
PCA-3	45.6	2.	44.2	2.	124.9	2.
PCQ5-1	43.9	19.	41.9	19.	108.8	19.
PCQ5-2	73.1	133.	57.1	133.	184.7	133.
PCMS	72.5	70.	58.0	70.	161.7	70.
PCBG-1	38.5	23.	48.5	23.	127.1	23.
PCBG-2	69.5	117.	57.4	117.	136.9	117.
PCMP	39.5	13.	37.6	13.	132.8	13.
PCMC	39.9	26.	42.5	26.	151.4	26.
PCGG	46.2	19.	45.0	19.	134.9	19.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 4					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	54.7	186.	68.7	186.	130.1	186.
QL	78.9	13.	100.2	13.	188.4	13.
TW	68.0	875.	90.5	875.	148.2	875.
KP	61.8	517.	84.0	517.	138.8	517.
KNC	55.6	7.	94.3	7.	106.8	7.
KG	51.9	5.	124.4	5.	107.8	5.
KBM	70.5	37.	72.2	37.	113.8	37.
KFL	37.5	46.	35.6	46.	61.1	46.
JU-1	37.8	2.	36.0	2.	117.0	2.
JU-2	41.6	1.	40.4	1.	135.2	1.
PMO-2	44.3	11.	44.5	11.	142.3	11.
PPPM	34.1	208.	40.4	208.	87.3	208.
MPE	37.8	202.	32.6	202.	80.3	202.
CD-1	37.3	16.	33.3	16.	75.7	16.
CD-2	41.5	8.	42.2	8.	114.3	8.
PCHP-1	33.0	63.	83.2	63.	243.3	63.
PCHP-2	57.8	77.	98.2	77.	244.2	77.
PCHP-3	81.8	81.	113.8	81.	272.2	81.
PCB-2	47.4	5.	66.2	5.	150.6	5.
PCQM	52.5	376.	63.1	376.	183.7	376.
PCA-3	58.8	17.	53.4	17.	145.4	17.
PCQ5-1	35.0	38.	45.9	38.	133.8	38.
PCMS	78.0	50.	63.8	50.	173.4	50.
PCBG-1	37.3	5.	60.6	5.	228.5	5.
PCBG-2	70.3	24.	55.2	24.	162.1	24.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 5					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	59.0	212.	73.3	212.	140.4	212.
QL	60.0	4.	78.8	4.	146.5	4.
TW	68.2	966.	88.3	966.	153.6	966.
KP	59.8	437.	87.8	437.	134.4	437.
KNC	65.8	39.	63.0	39.	141.9	39.
KG	47.6	10.	60.8	10.	91.9	10.
KFL	48.8	46.	42.9	46.	126.6	46.
JU-2	43.7	9.	48.9	9.	149.9	9.
PMO-2	42.6	8.	37.2	8.	128.5	8.
PPPM	31.9	234.	43.1	234.	87.1	234.
MPE	37.9	230.	34.9	230.	80.3	230.
CD-1	27.6	22.	27.5	22.	45.0	22.
CD-2	48.3	6.	37.8	6.	128.3	6.
PCHP-2	58.6	53.	92.3	53.	239.8	53.
PCHP-3	84.7	106.	94.7	106.	262.8	106.
PCQM	67.9	287.	64.2	287.	173.4	287.
PCB-2	77.2	51.	71.2	51.	174.6	51.
PCQ-1	49.7	141.	48.7	141.	153.8	141.
PCQ-2	77.6	39.	62.7	39.	208.0	39.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

GEOLOGIC UNIT	FLIGHT LINE 6					
	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES
QAL	64.4	262.	58.7	262.	147.6	262.
TW	74.8	1219.	83.7	1219.	145.1	1219.
KP	66.3	301.	78.4	301.	152.9	301.
KFL	47.2	31.	34.1	31.	59.8	31.
JU-1	36.3	12.	24.6	12.	92.3	12.
PMO-1	19.1	28.	24.2	28.	55.3	28.
PPPM	31.1	193.	42.1	193.	85.8	193.
MPE	37.5	169.	31.8	169.	72.9	169.
CD-1	33.8	22.	34.1	22.	71.3	22.
PCB-2	38.6	23.	35.4	23.	87.2	23.
PCQM	62.0	273.	56.2	273.	150.6	273.
PCA-3	60.0	3.	42.9	3.	154.7	3.
PCBG-2	69.7	19.	76.5	19.	160.4	19.
PCBG-1	49.9	108.	44.7	108.	126.0	108.
PCG-2	73.0	77.	56.6	77.	161.6	77.

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

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 7												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	59.4	184.	52.5	184.	139.9	184.	0.38	184.	0.90	184.	0.43	184.
QL	74.0	10.	78.8	10.	142.1	10.	0.56	10.	1.07	10.	0.52	10.
TW	69.4	1178.	68.9	1178.	136.4	1178.	0.51	1178.	0.99	1178.	0.52	1178.
KP	66.7	394.	70.5	394.	133.0	394.	0.56	394.	1.06	394.	0.52	394.
KNC	66.6	20.	61.7	20.	115.7	20.	0.53	20.	0.94	20.	0.58	20.
KFL	44.8	47.	39.0	47.	77.8	47.	0.51	47.	0.88	47.	0.59	47.
JU-1	39.9	13.	38.7	13.	65.8	13.	0.60	13.	0.97	13.	0.62	13.
TRPS	44.2	49.	44.0	49.	110.8	49.	0.40	49.	1.00	49.	0.40	49.
PMO-1	27.0	22.	28.8	22.	61.6	22.	0.47	22.	1.10	22.	0.44	22.
PMO-2	42.4	8.	46.2	8.	109.1	8.	0.42	8.	1.08	8.	0.39	8.
PPPM	28.9	166.	39.5	166.	86.8	166.	0.46	166.	1.38	166.	0.34	166.
MPE	39.0	250.	39.4	250.	86.5	250.	0.48	250.	1.05	250.	0.47	250.
CD-1	23.7	15.	27.4	15.	44.5	15.	0.63	15.	1.18	15.	0.53	15.
CD-2	85.6	32.	62.7	32.	197.7	32.	0.34	32.	0.74	32.	0.46	32.
PCB-2	68.3	5.	58.9	5.	158.8	5.	0.37	5.	0.86	5.	0.43	5.
PCQM	56.6	205.	56.9	205.	169.3	205.	0.34	205.	1.04	205.	0.34	205.
PCA-3	48.1	2.	63.5	2.	115.7	2.	0.55	2.	1.32	2.	0.42	2.
PCBG-2	72.4	4.	66.5	4.	170.3	4.	0.39	4.	0.92	4.	0.42	4.
PCG-1	49.4	256.	42.0	256.	119.3	256.	0.36	256.	0.86	256.	0.43	256.
PCG-2	77.2	80.	58.6	80.	166.4	80.	0.36	80.	0.76	80.	0.47	80.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 10												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	48.4	70.	42.5	70.	122.1	70.	0.38	70.	0.96	70.	0.40	70.
Q	43.3	10.	48.1	10.	118.7	10.	0.40	10.	1.11	10.	0.36	10.
TW	70.4	1183.	66.3	1183.	160.5	1183.	0.42	1183.	0.94	1183.	0.44	1183.
KP	64.4	418.	45.1	418.	163.0	418.	0.28	418.	0.70	418.	0.40	418.
KNC	63.6	110.	68.8	110.	149.1	110.	0.47	110.	1.09	110.	0.44	110.
KG	61.8	31.	72.1	31.	127.9	31.	0.57	31.	1.21	31.	0.48	31.
KBM	71.5	63.	55.1	63.	112.1	63.	0.49	63.	0.77	63.	0.64	63.
KFL	37.4	38.	35.3	38.	55.0	38.	0.67	38.	0.95	38.	0.72	38.
JU-1	32.0	17.	39.6	17.	93.3	17.	0.43	17.	1.23	17.	0.35	17.
JU-2	33.4	2.	40.5	2.	133.9	2.	0.30	2.	1.22	2.	0.25	2.
TRPS	40.3	123.	45.4	123.	131.6	123.	0.36	123.	1.14	123.	0.31	123.
PMO-1	27.2	139.	31.4	139.	62.8	139.	0.52	139.	1.18	139.	0.45	139.
PMO-2	37.7	59.	44.1	59.	111.8	59.	0.40	59.	1.19	59.	0.34	59.
PPPM	30.5	265.	38.6	265.	85.2	265.	0.46	265.	1.28	265.	0.36	265.
MPE	32.6	160.	34.9	160.	64.3	160.	0.56	160.	1.08	160.	0.52	160.
CD-1	29.2	31.	29.8	31.	55.7	31.	0.55	31.	1.04	31.	0.53	31.
CD-2	57.7	31.	50.3	31.	126.1	31.	0.40	31.	0.90	31.	0.47	31.
PCG-1	50.1	55.	43.4	55.	126.1	55.	0.37	55.	0.89	55.	0.42	55.
PCG-2	73.4	35.	59.3	35.	165.2	35.	0.36	35.	0.81	35.	0.46	35.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 8												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	59.9	245.	52.2	245.	140.3	245.	0.38	245.	0.90	245.	0.43	245.
TW	65.9	1263.	62.1	1263.	152.6	1263.	0.42	1263.	0.94	1263.	0.44	1263.
KP	64.2	206.	50.8	206.	151.8	206.	0.34	206.	0.79	206.	0.43	206.
KNC	69.6	20.	64.5	20.	139.8	20.	0.47	20.	0.93	20.	0.50	20.
KG	56.0	26.	54.5	26.	114.0	26.	0.47	26.	0.96	26.	0.49	26.
KBM	61.9	15.	47.1	15.	127.3	15.	0.37	15.	0.76	15.	0.49	15.
KFL	35.2	24.	28.2	24.	74.1	24.	0.38	24.	0.80	24.	0.48	24.
JU-1	28.6	5.	31.1	5.	78.4	5.	0.40	5.	1.09	5.	0.36	5.
TRPS	35.0	100.	36.6	100.	93.1	100.	0.41	100.	1.07	100.	0.39	100.
PMO-1	27.7	69.	30.4	69.	63.9	69.	0.49	69.	1.11	69.	0.44	69.
PMO-2	52.1	9.	45.5	9.	126.1	9.	0.36	9.	0.88	9.	0.41	9.
PPPM	25.4	166.	32.8	166.	74.8	166.	0.45	166.	1.32	166.	0.34	166.
MPE	31.0	169.	26.1	169.	55.6	169.	0.48	169.	0.85	169.	0.58	169.
CD-1	34.1	30.	29.9	30.	57.2	30.	0.54	30.	0.90	30.	0.61	30.
CD-2	50.2	3.	38.0	3.	101.3	3.	0.38	3.	0.76	3.	0.50	3.
PCHP-1	41.5	9.	61.4	9.	183.9	9.	0.33	9.	1.49	9.	0.23	9.
PCHP-2	51.1	7.	59.3	7.	199.5	7.	0.30	7.	1.16	7.	0.26	7.
PCB-2	57.0	4.	66.5	4.	174.0	4.	0.38	4.	1.18	4.	0.33	4.
PCQM	61.7	50.	55.2	50.	165.0	50.	0.34	50.	0.92	50.	0.38	50.
PCG-1	47.0	92.	42.2	92.	117.9	92.	0.38	92.	0.89	92.	0.44	92.
PCG-2	77.6	148.	61.5	148.	181.6	148.	0.35	148.	0.80	148.	0.46	148.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 12												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	55.8	89.	53.4	89.	139.0	89.	0.39	89.	0.98	89.	0.40	89.
TA-2	75.7	21.	56.5	21.	175.0	21.	0.32	21.	0.75	21.	0.43	21.
TW	73.5	1210.	70.1	1210.	161.4	1210.	0.44	1210.	0.96	1210.	0.46	1210.
KP	58.9	472.	45.6	472.	155.5	472.	0.29	472.	0.78	472.	0.38	472.
KNC	66.1	23.	83.6	23.	159.3	23.	0.53	23.	1.27	23.	0.42	23.
KBM	53.0	34.	47.1	34.	99.4	34.	0.48	34.	0.93	34.	0.54	34.
KFL	39.1	211.	43.6	211.	78.2	211.	0.61	211.	1.11	211.	0.54	211.
JU-1	32.7	28.	39.8	28.	100.7	28.	0.40	28.	1.22	28.	0.33	28.
JU-2	43.0	55.	45.2	55.	147.1	55.	0.31	55.	1.07	55.	0.29	55.
TRPS	41.5	218.	44.6	218.	137.5	218.	0.34	218.	1.09	218.	0.31	218.
PMO-1	29.0	113.	29.3	113.	68.0	113.	0.44	113.	1.03	113.	0.43	113.
PMO-2	43.8	46.	43.2	46.	119.0	46.	0.37	46.	1.01	46.	0.37	46.
PPPM	29.4	260.	37.4	260.	86.1	260.	0.45	260.	1.31	260.	0.35	260.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 11												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	54.0	106.	52.5	106.	137.8	106.	0.41	106.	0.99	106.	0.41	106.
TW	72.1	1211.	72.1	1211.	168.1	1211.	0.45	1211.	1.01	1211.	0.43	1211.
KP	62.0	316.	48.6	316.	162.5	316.	0.30	316.	0.79	316.	0.38	316.
KNC	64.6	59.	56.9	59.	156.3	59.	0.39	59.	0.89	59.	0.43	59.
KG	46.9	4.	49.4	4.	77.5	4.	0.64	4.	1.06	4.	0.61	4.
KBM	63.8	28.	54.8	28.	104.5	28.	0.53	28.	0.86	28.	0.62	28.
KFL	41.9	50.	44.9	50.	60.5	50.	0.83	50.	1.06	50.	0.78	50.
JU-1	31.5	69.	43.2	69.	94.6	69.	0.47	69.	1.39	69.	0.34	69.
JU-2	36.3	67.	45.9	67.	147.0	67.	0.31	67.	1.28	67.	0.25	67.
TRPS	44.9	153.	46.1	153.	139.2	153.	0.34	153.	1.04	153.	0.33	153.
PMO-1	27.3	68.	30.9	68.	60.3	68.	0.54	68.	1.16	68.	0.46	68.
PMO-2	42.8	17.	45.9	17.	124.5	17.	0.37	17.	1.08	17.	0.35	17.
PPPM	38.5	269.	41.2	269.	99.9	269.	0.42	269.	1.12	269.	0.38	269.
MPE	33.0	103.	33.7	103.	66.3	103.	0.53	103.	1.02	103.	0.53	103.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 9												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	52.8	131.	44.8	131.	114.4	131.	0.43	131.	0.91	131.	0.49	131.
TW	63.1	1429.	59.9	1429.	150.4	1429.	0.41	1429.	0.94	1429.	0.43	1429.
KP	65.5	310.	54.8	310.	149.3	310.	0.37	310.	0.84	310.	0.44	310.
KBM	52.6	4.	33.4	4.	45.8	4.	0.74	4.	0.63	4.	1.16	4.
KFL	63.2	5.	49.3	5.	131.7	5.	0.38	5.	0.78	5.	0.48	5.
JU-2	62.5	3.	42.8	3.	134.5	3.	0.32	3.	0.68	3.	0.47	3.
TRPS	36.5	43.	43.0	43.	109.9	43.	0.41	43.	1.19	43.	0.34	43.
PMO-1	29.6	51.	31.6	51.	65.7	51.	0.48	51.	1.08	51.	0.46	51.
PMO-2	44.7	28.	47.7	28.	113.8	28.	0.42	28.	1.08	28.	0.39	28.
PPPM	24.4	169.	27.3	169.	64.5	169.	0.43	169.	1.13	169.	0.38	169.
MPE	32.1	135.	32.4	135.	68.6	135.	0.48	135.	1.03	135.	0.48	135.
CD-1	49.2	1.	47.6	1.	89.8	1.	0.53	1.	0.97	1.	0.55	1.
CD-2	52.3	11.	57.9	11.	136.7	11.	0.43	11.	1.17	11.	0.38	11.
PCB-2	53.4	6.	70.0	6.	196.6	6.	0.36	6.	1.31	6.	0.27	6.
PCQM	50.3	52.	59.6	52.	179.6	52.	0.34	52.	1.25	52.	0.29	52.
PCBG-2	52.5	2.	60.2	2.	187.7	2.	0.32	2.	1.15	2.	0.28	2.
PCG-1	51.3	84.	48.2	84.	119.0	84.	0.42	84.	0.95	84.	0.47	84.
PCG-2	78.3	126.	60.3	126.	165.1	126.	0.37	126.	0.77	126.	0.49	126.

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

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 14												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES	
QAL	58.6	198.	54.5	198.	135.9	198.	0.41	198.	0.94	198.	0.45	198.
TA-2	87.7	50.	68.4	50.	211.0	50.	0.33	50.	0.78	50.	0.42	50.
TW	79.8	902.	71.1	902.	187.5	902.	0.39	902.	0.90	902.	0.43	902.
KP	68.4	637.	61.8	637.	162.8	637.	0.39	637.	0.91	637.	0.43	637.
KNC	62.3	80.	80.9	80.	124.1	80.	0.69	80.	1.31	80.	0.53	80.
KG	38.1	18.	53.7	18.	60.3	18.	0.90	18.	1.42	18.	0.64	18.
KBM	58.9	53.	55.0	53.	119.9	53.	0.51	53.	0.95	53.	0.53	53.
KFL	43.6	405.	57.9	405.	77.8	405.	0.74	405.	1.26	405.	0.60	405.
JU-1	33.8	118.	37.2	118.	92.0	118.	0.42	118.	1.12	118.	0.37	118.
JU-2	49.6	120.	49.7	120.	153.1	120.	0.33	120.	1.01	120.	0.33	120.
TRPS	45.1	62.	43.4	62.	138.9	62.	0.32	62.	0.97	62.	0.34	62.
PMO-1	29.4	39.	36.7	39.	68.8	39.	0.54	39.	1.27	39.	0.44	39.
PMO-2	33.1	18.	42.1	18.	98.4	18.	0.43	18.	1.30	18.	0.34	18.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 19												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	63.5	169.	57.5	169.	158.0	169.	0.37	169.	0.92	169.	0.40	169.
TA-2	49.2	18.	104.8	18.	119.3	18.	0.92	18.	2.19	18.	0.42	18.
TW	78.6	743.	55.0	743.	180.4	743.	0.31	743.	0.70	743.	0.44	743.
KP	77.0	389.	59.7	389.	173.3	389.	0.35	389.	0.78	389.	0.45	389.
KNC	64.1	628.	52.2	628.	166.1	628.	0.32	628.	0.82	628.	0.39	628.
KG	64.2	393.	64.0	393.	152.2	393.	0.44	393.	1.05	393.	0.42	393.
KBM	49.0	29.	67.3	29.	94.6	29.	0.75	29.	1.44	29.	0.53	29.
	77.2	171.	70.7	171.	132.5	171.	0.54	171.	0.92	171.	0.59	171.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 15												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES	
QAL	59.0	287.	59.1	287.	144.3	287.	0.43	287.	1.02	287.	0.42	287.
TA-2	84.8	58.	59.5	58.	198.2	58.	0.30	58.	0.70	58.	0.43	58.
TW	82.6	942.	69.7	942.	185.2	942.	0.38	942.	0.85	942.	0.45	942.
KP	68.3	706.	53.8	706.	164.1	706.	0.33	706.	0.79	706.	0.42	706.
KNC	54.7	37.	57.9	37.	152.8	37.	0.38	37.	1.06	37.	0.36	37.
KBM	67.9	220.	62.0	220.	136.2	220.	0.47	220.	0.92	220.	0.51	220.
KFL	39.4	458.	42.9	458.	81.4	458.	0.58	458.	1.13	458.	0.53	458.
JU-1	31.9	59.	31.0	59.	75.2	59.	0.44	59.	0.99	59.	0.46	59.
JU-2	39.3	26.	44.0	26.	143.3	26.	0.31	26.	1.13	26.	0.27	26.
TRPS	39.8	26.	45.1	26.	121.4	26.	0.37	26.	1.14	26.	0.33	26.
PMO-1	35.5	10.	33.3	10.	73.0	10.	0.46	10.	0.95	10.	0.49	10.
PMO-2	47.1	61.	43.6	61.	120.5	61.	0.36	61.	0.92	61.	0.39	61.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 20												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	67.3	389.	59.9	389.	161.0	389.	0.37	389.	0.89	389.	0.42	389.
TA-2	76.5	818.	51.3	818.	178.7	818.	0.29	818.	0.67	818.	0.43	818.
TW	72.7	489.	56.6	489.	164.0	489.	0.35	489.	0.78	489.	0.45	489.
KP	68.9	477.	61.5	477.	165.5	477.	0.37	477.	0.89	477.	0.42	477.
KNC	67.8	391.	82.3	391.	159.7	391.	0.52	391.	1.23	391.	0.43	391.
KG	63.5	26.	60.2	26.	120.9	26.	0.52	26.	0.96	26.	0.55	26.
KBM	79.1	70.	68.9	70.	134.9	70.	0.51	70.	0.88	70.	0.59	70.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 16												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES	
QAL	59.3	224.	57.2	224.	144.2	224.	0.41	224.	0.99	224.	0.42	224.
QL	42.1	6.	42.9	6.	79.7	6.	0.54	6.	1.02	6.	0.53	6.
TA-2	80.3	382.	67.8	382.	202.2	382.	0.34	382.	0.85	382.	0.40	382.
TW	81.7	675.	74.1	675.	183.7	675.	0.41	675.	0.91	675.	0.45	675.
KP	64.3	683.	52.8	683.	167.3	683.	0.32	683.	0.83	683.	0.39	683.
KNC	68.3	93.	62.0	93.	160.3	93.	0.39	93.	0.92	93.	0.43	93.
KG	52.6	30.	59.4	30.	114.8	30.	0.55	30.	1.16	30.	0.47	30.
KBM	62.5	129.	59.0	129.	142.5	129.	0.43	129.	0.96	129.	0.45	129.
KFL	42.9	324.	41.9	324.	74.0	324.	0.59	324.	0.99	324.	0.61	324.
JU-1	33.0	56.	36.0	56.	78.9	56.	0.47	56.	1.09	56.	0.43	56.
JU-2	46.1	6.	50.7	6.	167.0	6.	0.30	6.	1.10	6.	0.28	6.
TRPS	35.6	51.	38.0	51.	103.8	51.	0.39	51.	1.07	51.	0.36	51.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 21												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	66.7	173.	61.7	173.	158.5	173.	0.40	173.	0.93	173.	0.42	173.
TA-2	74.4	841.	54.5	841.	176.2	841.	0.31	841.	0.74	841.	0.42	841.
TW	81.4	471.	64.5	471.	178.1	471.	0.36	471.	0.79	471.	0.46	471.
KP	63.9	1100.	53.8	1100.	157.6	1100.	0.34	1100.	0.85	1100.	0.41	1100.
KNC	61.0	86.	83.4	86.	150.4	86.	0.56	86.	1.38	86.	0.41	86.
KG	73.4	16.	64.2	16.	169.9	16.	0.38	16.	0.88	16.	0.43	16.
KBM	74.7	13.	69.6	13.	165.5	13.	0.42	13.	0.93	13.	0.45	13.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 17												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES	
QAL	57.7	207.	55.8	207.	140.1	207.	0.41	207.	0.99	207.	0.42	207.
TA-2	78.6	478.	62.0	478.	184.3	478.	0.34	478.	0.79	478.	0.43	478.
TW	81.1	596.	67.5	596.	182.1	596.	0.37	596.	0.84	596.	0.45	596.
KP	65.6	643.	52.4	643.	167.2	643.	0.31	643.	0.81	643.	0.39	643.
KNC	69.7	189.	67.6	189.	166.2	189.	0.41	189.	0.98	189.	0.43	189.
KG	48.6	42.	55.5	42.	121.6	42.	0.48	42.	1.16	42.	0.41	42.
KBM	73.1	206.	70.5	206.	150.4	206.	0.47	206.	0.97	206.	0.49	206.
KFL	48.9	219.	47.8	219.	102.2	219.	0.49	219.	1.00	219.	0.50	219.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT												
FLIGHT LINE 22												
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	AVG.	TH/K SAMPLES
QAL	63.5	174.	58.3	174.	161.4	174.	0.36	174.	0.93	174.	0.39	174.
TA-1	33.4	204.	22.0	204.	132.9	204.	0.17	204.	0.67	204.	0.25	204.
TA-2	74.6	680.	54.6	680.	178.6	680.	0.31	680.	0.73	680.	0.42	680.
TW	76.2	159.	63.4	159.	170.2	159.	0.38	159.	0.85	159.	0.45	159.
KP	64.3	1219.	57.9	1219.	157.5	1219.	0.40	1219.	0.99	1219.	0.41	1219.
KN-1	41.3	32.	103.7	32.	100.2	32.	1.08	32.	2.58	32.	0.41	32.
KN-2	60.5	58.	88.9	58.	144.6	58.	0.63	58.	1.51	58.	0.42	58.
KN-3	79.2	13.	71.0	13.	171.8	13.	0.42	13.	0.90	13.	0.47	13.
KNC	69.0	21.	68.5	21.	171.7	21.	0.40	21.	1.00	21.	0.40	21.

AVERAGE COUNTING RATES PER GEOLOGIC UNIT													
FLIGHT LINE 18													
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES		
QAL	60.2	154.	53.6	154.	154.8	154.	0.36	154.	0.91	154.	0.39	154.	
TA-2	77.8	567.	55.8	567.	180.2	567.	0.31	567.	0.72	567.	0.43	567.	
TW	79.7	606.	64.0	606.	177.9	606.	0.36	606.	0.81	606.	0.45	606.	
KP	66.0	545.	52.7	545.	165.9	545.	0.32	545.	0.81	545.	0.40	545.	
KNC	64.6	327.	64.3	327.	147.9	327.	0.44	327.	1.02	327.	0.44	327.	
KG	63.4	68.	57.5	68.	137.9	68.	0.42	68.	0.91	68.	0.46	68.	
KBM	62.9	345.	58.8	345.	138.0	345.	0.44	345.	0.95	345.	0.46	345.	
KFL	65.5	38.	54.6	38.	153.3	38.	0.36	38.	0.83	38.	0.43	38.	

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

AVERAGE COUNTING RATES PER GEOLOGIC UNIT											
FLIGHT LINE 101											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
QAL	60.1	189.	66.5	189.	137.5	189.	0.49	189.	1.13	189.	0.44
KP	59.9	195.	61.3	195.	156.3	195.	0.39	195.	1.02	195.	0.38
KNC	72.2	312.	75.8	312.	151.9	312.	0.51	312.	1.07	312.	0.48
KG	63.0	28.	63.1	28.	141.4	28.	0.46	28.	1.01	28.	0.45
KBM	72.5	118.	72.3	118.	131.7	118.	0.56	118.	1.01	118.	0.57
KFL	63.4	115.	73.4	115.	85.9	115.	0.90	115.	1.16	115.	0.76
JU-1	39.3	31.	49.1	31.	77.7	31.	0.72	31.	1.26	31.	0.57
JU-2	48.8	8.	58.3	8.	136.3	8.	0.43	8.	1.20	8.	0.36
TRPS	37.6	183.	41.9	183.	94.3	183.	0.46	183.	1.12	183.	0.41
PMO-1	33.0	40.	35.4	40.	72.5	40.	0.50	40.	1.10	40.	0.46
PMO-2	46.9	93.	45.7	93.	110.8	93.	0.41	93.	0.97	93.	0.43
PPPM	35.0	438.	48.1	438.	94.3	438.	0.52	438.	1.39	438.	0.37
MPE	42.3	40.	50.2	40.	116.3	40.	0.44	40.	1.19	40.	0.36

AVERAGE COUNTING RATES PER GEOLOGIC UNIT											
FLIGHT LINE 104											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
QAL	56.1	283.	50.5	283.	135.2	283.	0.40	283.	0.91	283.	0.45
QL	61.9	26.	58.0	26.	155.3	26.	0.38	26.	0.94	26.	0.40
TW	62.6	319.	49.2	319.	124.8	319.	0.41	319.	0.79	319.	0.53
KP	59.1	827.	53.7	827.	159.0	827.	0.34	827.	0.92	827.	0.37
KNC	69.9	105.	69.8	105.	168.0	105.	0.42	105.	1.01	105.	0.42
KG	61.5	4.	58.4	4.	127.8	4.	0.46	4.	0.95	4.	0.48
KBM	56.2	28.	43.4	28.	114.5	28.	0.38	28.	0.77	28.	0.49
KFL	50.3	298.	41.0	298.	63.8	298.	0.67	298.	0.82	298.	0.82

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 102											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
QAL	55.9	246.	60.0	246.	118.5	246.	0.54	246.	1.10	246.	0.49
TW	30.1	2.	31.4	2.	73.7	2.	0.43	2.	1.04	2.	0.41
KP	70.4	196.	68.7	196.	155.6	196.	0.45	196.	0.98	196.	0.46
KNC	76.2	126.	83.5	126.	158.0	126.	0.54	126.	1.10	126.	0.49
KG	62.6	11.	80.2	11.	90.9	11.	0.88	11.	1.29	11.	0.69
KBM	81.9	93.	80.5	93.	137.7	93.	0.59	93.	0.98	93.	0.60
KFL	52.2	187.	59.9	187.	90.9	187.	0.76	187.	1.21	187.	0.62
JU-1	46.1	67.	56.6	67.	98.0	67.	0.61	67.	1.23	67.	0.48
JU-2	50.9	45.	52.9	45.	161.0	45.	0.33	45.	1.07	45.	0.32
TRPS	44.3	94.	57.4	94.	132.3	94.	0.45	94.	1.32	94.	0.34
PMO-1	44.2	1.	51.0	1.	90.0	1.	0.57	1.	1.15	1.	0.49
PMO-2	42.1	58.	50.9	58.	115.6	58.	0.44	58.	1.22	58.	0.37
PPPM	44.3	199.	52.1	199.	107.0	199.	0.51	199.	1.31	199.	0.41
MPE	31.6	117.	30.4	117.	61.7	117.	0.51	117.	0.95	117.	0.55
CD-1	27.7	16.	28.7	16.	61.9	16.	0.47	16.	1.04	16.	0.45
CD-2	54.5	15.	58.2	15.	137.6	15.	0.42	15.	1.07	15.	0.40
PCQM	68.5	255.	55.6	255.	151.6	255.	0.37	255.	0.87	255.	0.43
PCA-2	40.4	10.	40.3	10.	95.0	10.	0.43	10.	1.00	10.	0.43
PCA-3	55.0	15.	55.5	15.	139.6	15.	0.40	15.	1.04	15.	0.39
PCQS-1	43.9	25.	45.9	25.	99.9	25.	0.47	25.	1.05	25.	0.45
PCQS-2	66.1	37.	60.0	37.	148.1	37.	0.41	37.	0.91	37.	0.45
PCMS	73.0	36.	64.0	36.	157.4	36.	0.41	36.	0.88	36.	0.47
PCBG-1	39.5	37.	47.7	37.	111.4	37.	0.43	37.	1.21	37.	0.36
PCBG-2	68.6	133.	66.6	133.	155.4	133.	0.43	133.	0.98	133.	0.44
PCMP	36.5	33.	30.9	33.	83.5	33.	0.38	33.	0.86	33.	0.45
PCMC	35.4	6.	30.4	6.	69.2	6.	0.44	6.	0.86	6.	0.51

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 103											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
QAL	51.9	49.	49.7	49.	116.9	49.	0.48	49.	1.06	49.	0.46
KP	63.7	244.	53.3	244.	148.3	244.	0.36	244.	0.84	244.	0.43
KNC	64.1	69.	64.3	69.	161.7	69.	0.41	69.	1.02	69.	0.40
KG	54.7	71.	56.1	71.	118.2	71.	0.50	71.	1.06	71.	0.47
KBM	73.7	71.	62.0	71.	134.7	71.	0.47	71.	0.85	71.	0.55
KFL	34.0	273.	38.2	273.	78.4	273.	0.51	273.	1.16	273.	0.45
JU-1	31.6	9.	25.9	9.	98.9	9.	0.26	9.	0.82	9.	0.32
JU-2	40.4	12.	43.7	12.	153.2	12.	0.29	12.	1.08	12.	0.26
TRPS	37.4	190.	40.1	190.	122.1	190.	0.33	190.	1.09	190.	0.31
PMO-2	37.9	24.	36.9	24.	105.7	24.	0.35	24.	0.98	24.	0.36
PPPM	47.4	103.	40.9	103.	110.9	103.	0.38	103.	0.88	103.	0.43
MPE	27.8	23.	29.5	23.	57.0	23.	0.53	23.	1.07	23.	0.49
CD-1	30.1	28.	35.3	28.	63.6	28.	0.56	28.	1.18	28.	0.48
CD-2	48.0	3.	43.0	3.	105.1	3.	0.41	3.	0.90	3.	0.46
PCHP-1	39.1	18.	67.7	18.	206.0	18.	0.33	18.	1.78	18.	0.20
PCHP-2	60.5	58.	89.1	58.	242.1	58.	0.37	58.	1.48	58.	0.25
PCHP-3	80.6	160.	92.4	160.	257.3	160.	0.36	160.	1.15	160.	0.31
PCB-2	68.5	59.	51.6	59.	166.3	59.	0.31	59.	0.76	59.	0.41
PCQM	74.7	67.	66.4	67.	186.9	67.	0.36	67.	0.90	67.	0.40
PCQS-1	40.8	19.	40.4	19.	115.0	19.	0.35	19.	0.98	19.	0.36
PCQS-2	76.2	80.	62.1	80.	194.5	80.	0.32	80.	0.82	80.	0.39
PCBG-2	89.9	3.	76.6	3.	216.8	3.	0.35	3.	0.85	3.	0.41
PCG-1	47.5	166.	42.7	166.	118.7	166.	0.37	166.	0.90	166.	0.43
PCG-2	76.6	166.	59.2	166.	179.3	166.	0.34	166.	0.78	166.	0.46

AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 108											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
QAL	77.0	8.	57.3	8.	169.7	8.	0.34	8.	0.75	8.	0.45
QL	81.8	2.	69.2	2.	197.5	2.	0.35	2.	0.85	2.	0.41
TA-1	31.2	71.	33.2	71.	126.4	71.	0.26	71.	1.08	71.	0.25
TA-2	74.0	529.	62.7	529.	177.6	529.	0.35	529.	0.85	529.	0.42
TW	69.0	950.	57.9	950.	155.5	950.	0.37	950.	0.85	950.	0.45
KF-1	58.0	68.	50.4	68.	141.0	68.	0.36	68.	0.87	68.	0.41
KF-2	53.2	1.	50.3	1.	167.6	1.	0.30	1.	0.95	1.	0.32
KP	70.4	21.	54.4	21.	139.5	21.	0.39	21.	0.78	21.	0.51

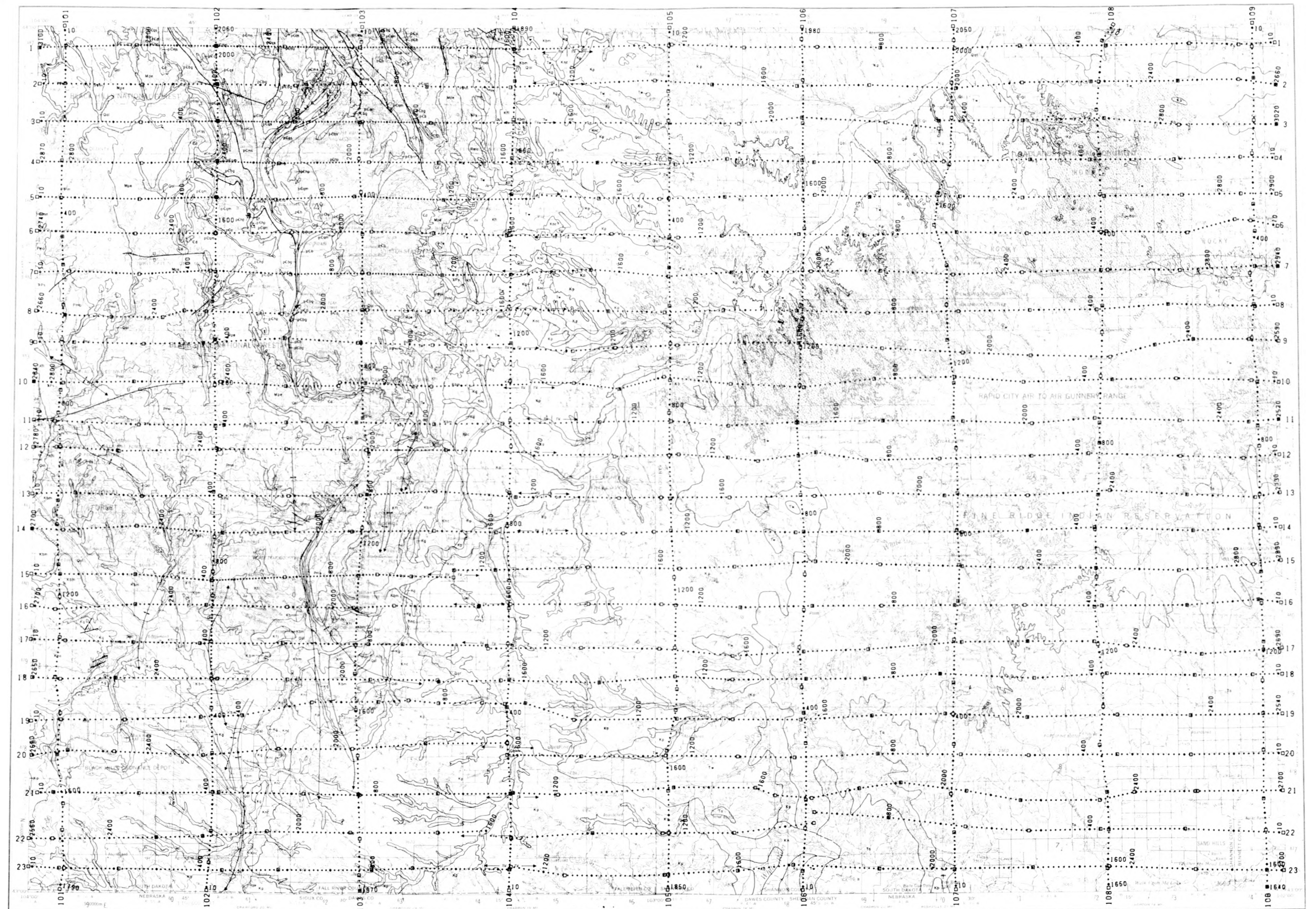
AVERAGE COUNTING RATES PER GEOLOGIC UNIT

FLIGHT LINE 109											
GEOLOGIC UNIT	AVG.	TH SAMPLES	AVG.	U SAMPLES	AVG.	K SAMPLES	AVG.	U/K SAMPLES	AVG.	U/TH SAMPLES	TH/K SAMPLES
TA-1	29.6	152.	31.8	152.	118.5	152.	0.27	152.	1.09	152.	0.25
TA-2	69.9	569.	61.3	569.	170.8	569.	0.36	569.	0.88	569.	0.41
TW	69.1	697.	59.7	697.	157.9	697.	0.38	697.	0.87	697.	0.44
KP	64.0	222.	55.2	222.	149.9	222.	0.37	222.	0.87	222.	0.43

TABLE T-4. ROTARY-WING/FIXED-WING OVERLAP DATA

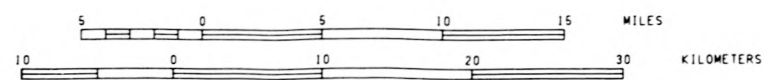
HOT SPRINGS OVERLAP DATA IN CPS (FW-SYS1, RW-SYS3)							
SYS	LINE	DAY	RECORDS	THORIUM	URANIUM	POTASSIUM	GROSS
1	1	283	53	86.6	70.7	264.3	3581.4
3	1	262	72	62.5	57.4	141.5	2401.5
3	2	262	71	50.2	48.9	111.1	1981.4
1	2	283	68	70.9	59.6	209.3	3050.3
3	3	262	71	50.5	41.7	114.8	1896.2
1	3	283	74	77.5	33.7	221.6	2828.8
1	4	283	64	90.0	97.2	203.8	3516.7
3	4	263	70	67.8	64.5	121.8	2566.1
3	5	263	64	65.7	57.7	136.6	2447.2
1	5	283	52	87.1	54.5	238.9	3416.6
1	6	283	57	86.3	41.9	253.0	3310.8
3	6	263	63	63.1	57.0	134.3	2360.1
3	7	263	66	64.1	51.0	132.2	2267.9
1	7	283	62	87.4	42.1	211.3	3037.3
1	8	283	61	88.3	56.4	250.5	3340.5
3	8	263	63	66.5	65.6	141.7	2585.0
3	9	263	62	68.0	52.0	138.4	2328.9
1	9	283	63	95.4	37.2	261.0	3108.4
1	10	283	68	82.0	56.4	279.9	3397.6
3	10	263	66	59.5	70.6	155.2	2715.6
3	11	263	57	65.8	58.0	159.5	2506.6
1	11	283	48	90.5	38.6	286.4	3146.9
1	12	283	56	88.8	40.4	263.0	3136.4
3	12	263	61	69.1	62.7	161.7	2666.6
3	13	264	83	56.9	55.7	149.7	2402.8
1	13	284	75	83.6	46.6	287.1	3192.1
1	14	284	58	82.4	44.9	261.2	3052.2
3	14	264	61	63.1	55.0	152.8	2383.7
3	15	264	59	53.1	52.6	170.3	2441.7
1	15	284	53	75.8	40.4	309.2	3212.2
1	16	284	56	67.3	37.5	317.3	3112.8
3	16	264	57	52.6	56.4	169.7	2380.1
3	17	264	54	53.2	50.5	176.1	2371.3
1	17	284	48	72.8	37.0	297.1	3060.3
1	20	284	94	91.8	36.7	275.7	3105.6
3	20	264	79	69.3	58.4	165.8	2632.7
3	21	264	61	66.5	58.9	167.6	2611.2
1	21	284	47	90.3	38.8	267.5	3047.9
1	22	284	45	93.3	45.1	271.9	3200.6
3	22	264	50	66.4	57.8	161.2	2635.7
3	23	264	63	66.3	61.2	180.7	2763.0
1	23	284	52	86.5	39.6	323.0	3337.7

HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



RECORD LOCATION MAP

LEGEND: □ = PHOTO-RECOVERED POINT

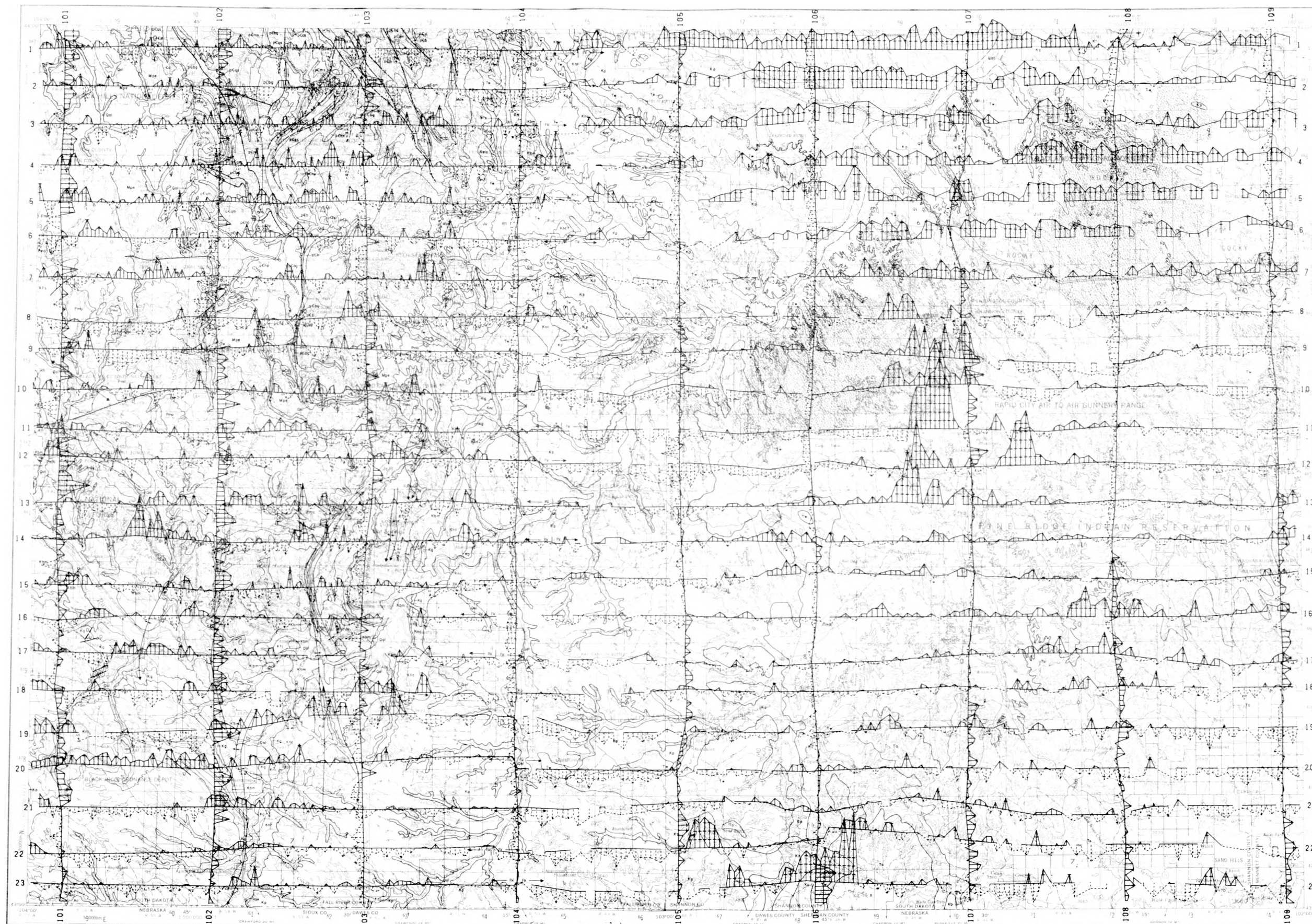


AERIAL RADIOMETRIC AND MAGNETIC RECONNAISSANCE SURVEY

PREPARED BY
TEXAS INSTRUMENTS INCORPORATED
DALLAS, TEXAS

WORK PERFORMED UNDER
BENDIX FIELD ENGINEERING CORPORATION
SUBCONTRACT NO. 78-184-L

PREPARED FOR
U.S. DEPARTMENT OF ENERGY

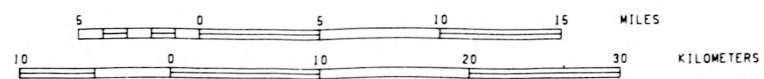


PROFILE MAP

URANIUM 6.0 S.D./IN.

TEXAS INSTRUMENTS

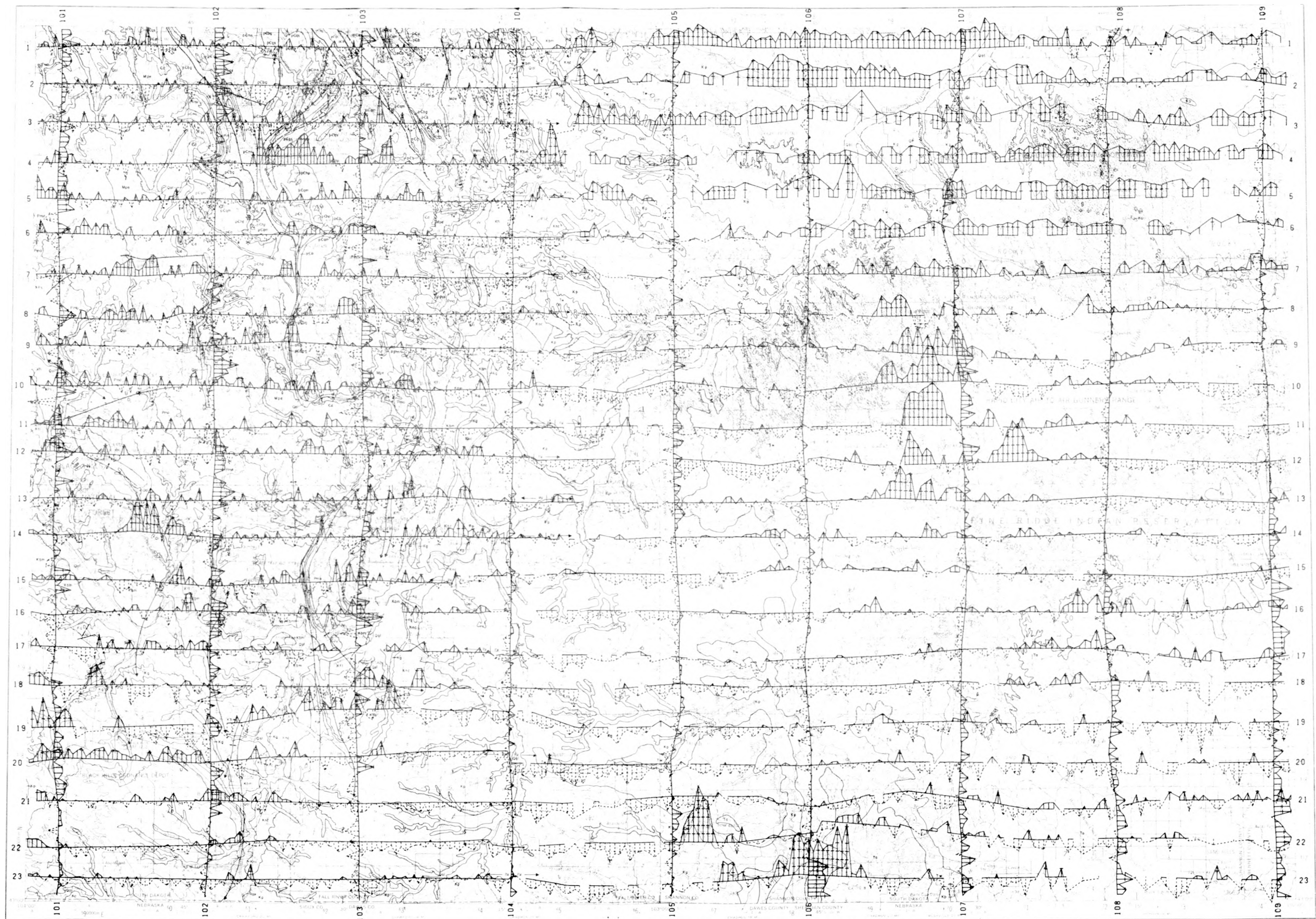
LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
 NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

AERIAL RADIOMETRIC AND MAGNETIC
RECONNAISSANCE SURVEY

PREPARED BY
 TEXAS INSTRUMENTS INCORPORATED
 DALLAS, TEXAS

WORK PERFORMED UNDER
 BENDIX FIELD ENGINEERING CORPORATION
 SUBCONTRACT NO. 78-184-L

PREPARED FOR
 U.S. DEPARTMENT OF ENERGY



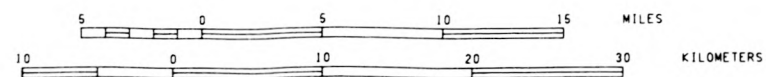
PROFILE MAP

U/TH

6.0 S.D./IN.

TEXAS INSTRUMENTS

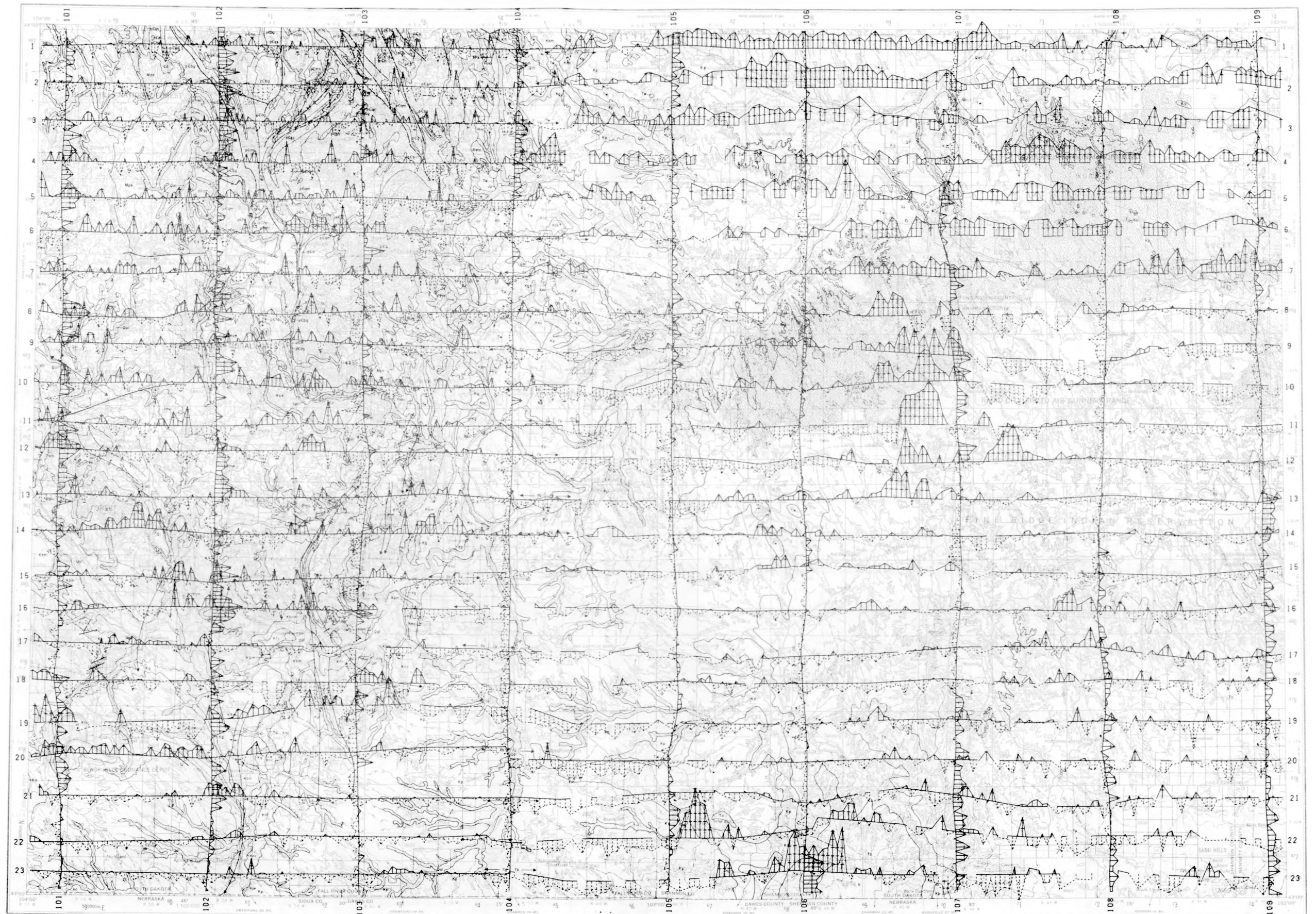
LEGEND: POSITIVE SIGNIFICANCE FACTORS—SOLID LINES
 NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

AERIAL RADIOMETRIC AND MAGNETIC
RECONNAISSANCE SURVEY

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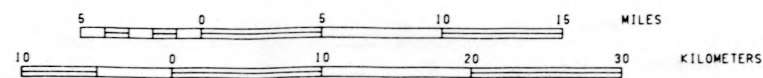
PREPARED FOR
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PROFILE MAP

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

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

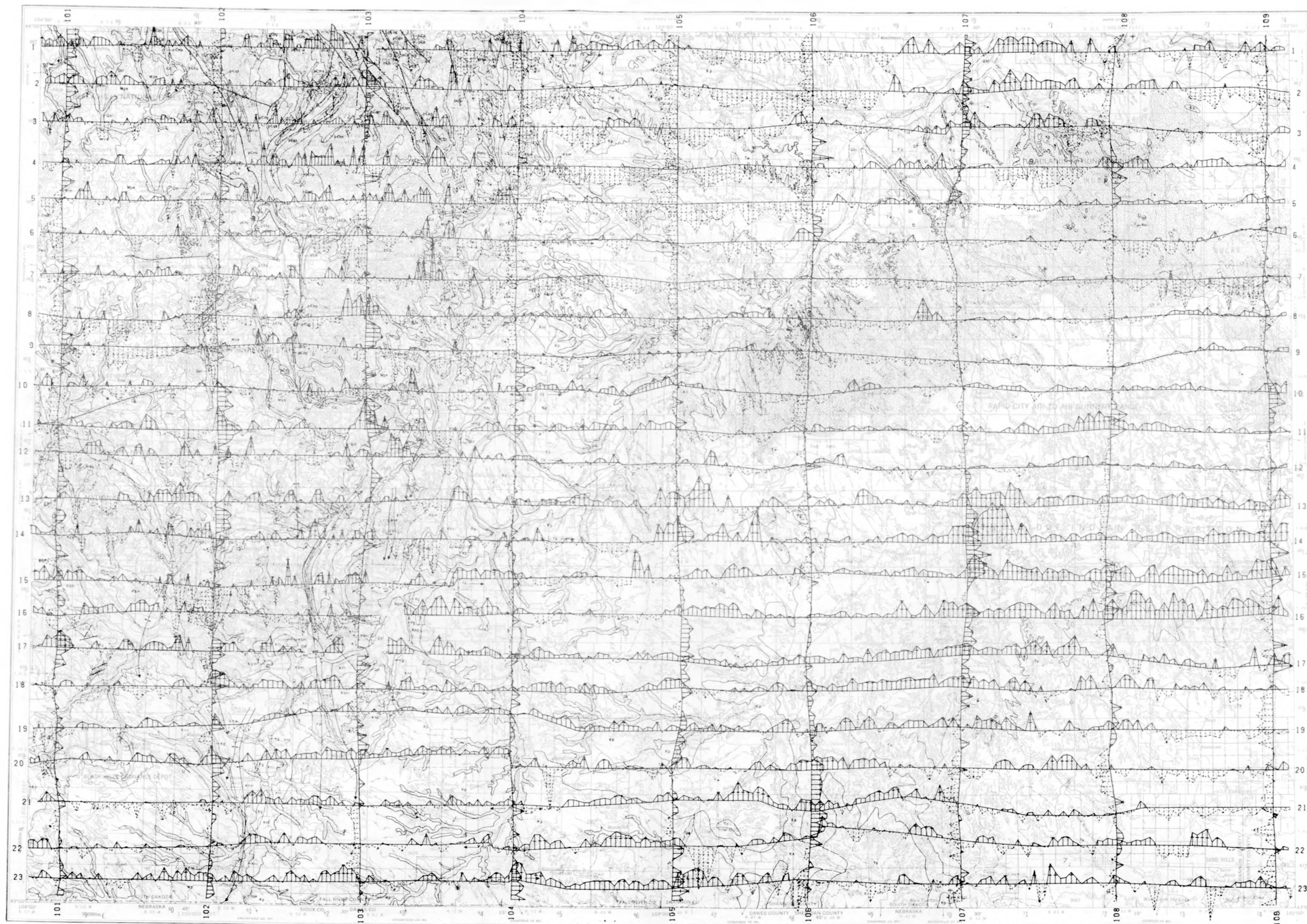


AERIAL RADIOMETRIC AND MAGNETIC
RECONNAISSANCE SURVEY

PREPARED BY
TEXAS INSTRUMENTS INCORPORATED
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SUBCONTRACT NO. 78-184-L

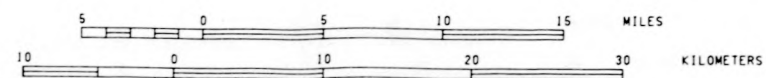
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PROFILE MAP

POTASSIUM 6.0 S.D./IN. TEXAS INSTRUMENTS

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NEGATIVE SIGNIFICANCE FACTORS—DOTTED LINES

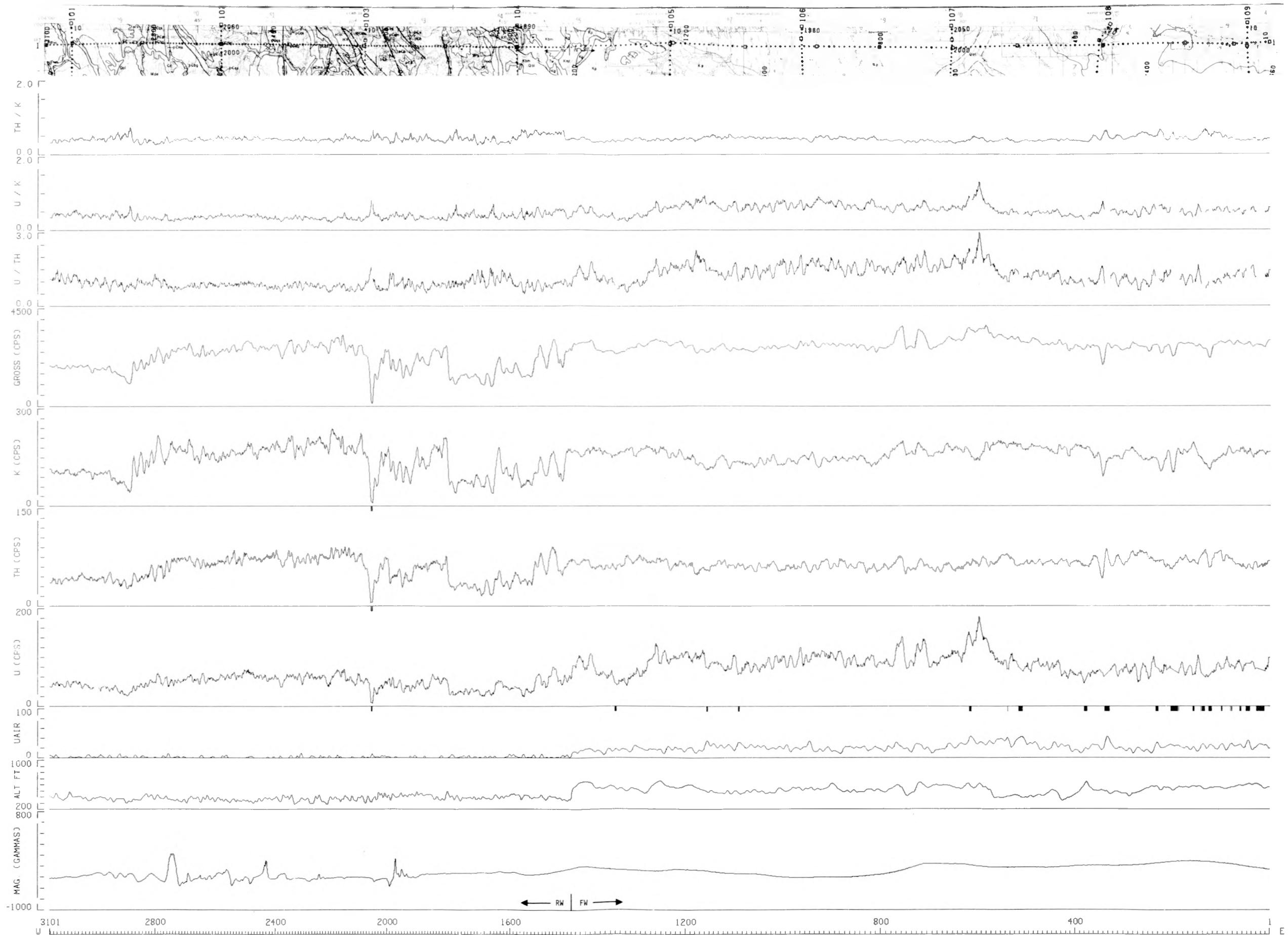


AERIAL RADIOMETRIC AND MAGNETIC
RECONNAISSANCE SURVEY

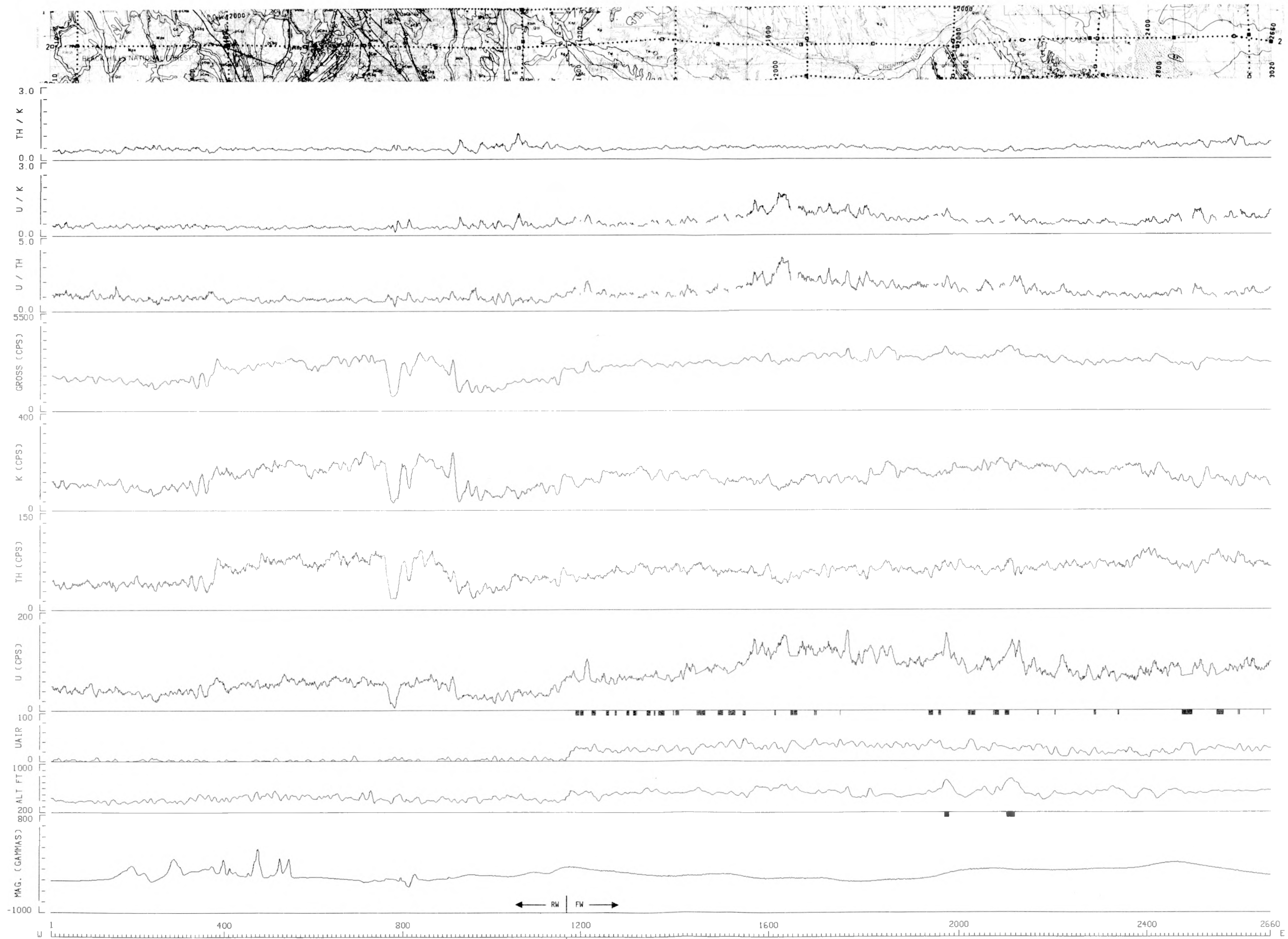
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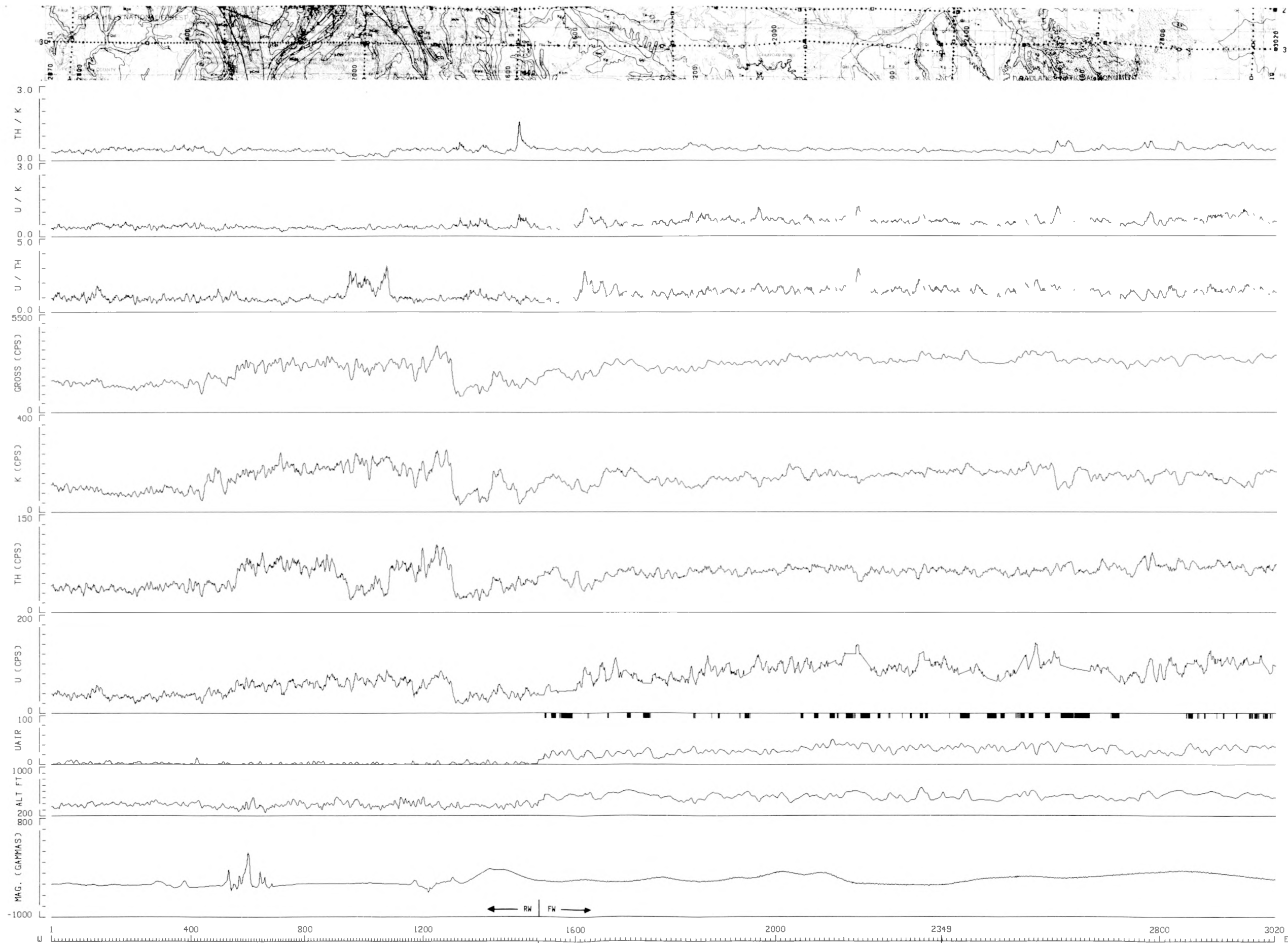
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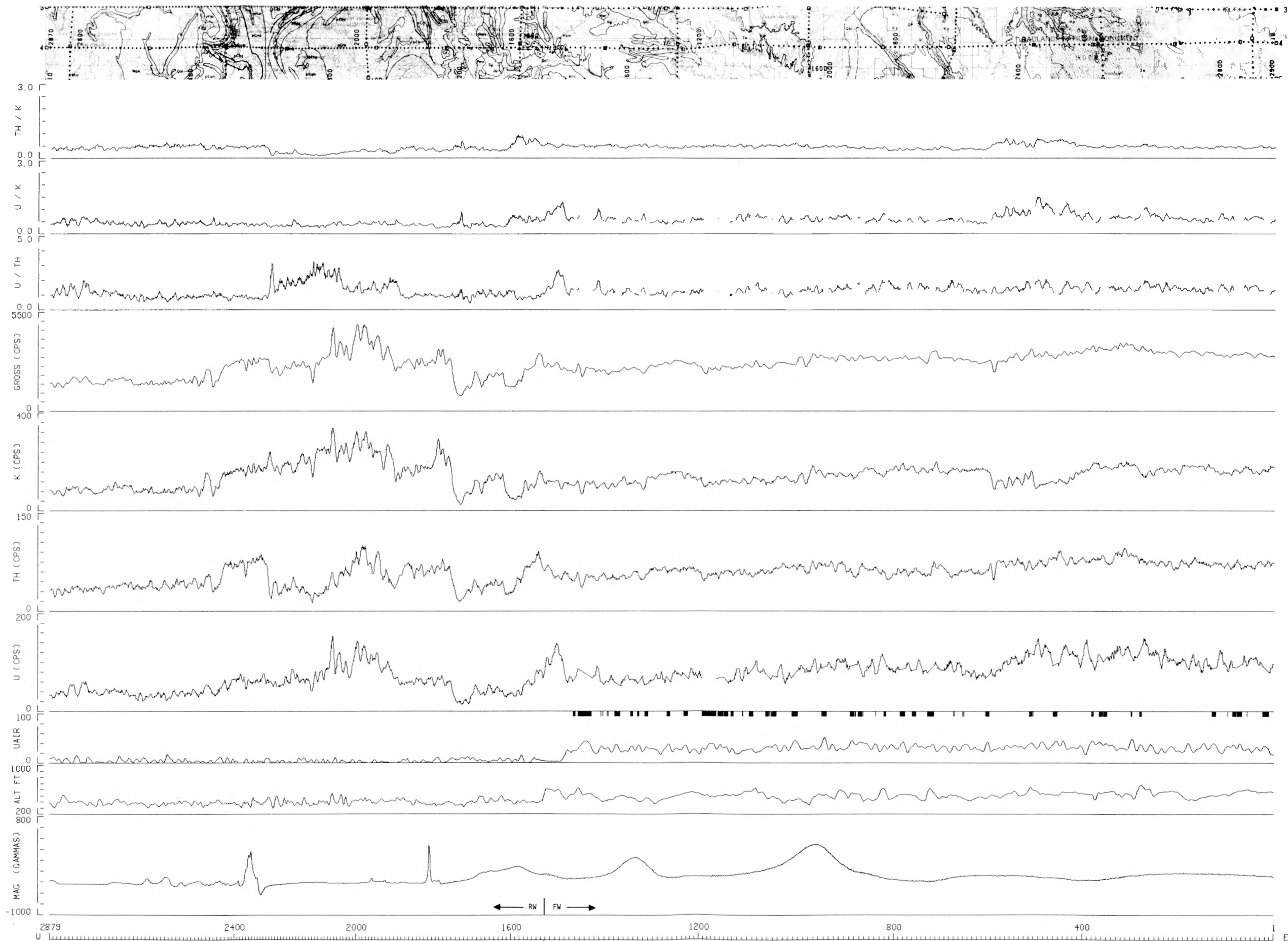
SWEET GRASS SURVEY 1978 US DEPT OF ENERGY TEXAS INSTRUMENTS
 FL-001 HOT SPRINGS NK13-3



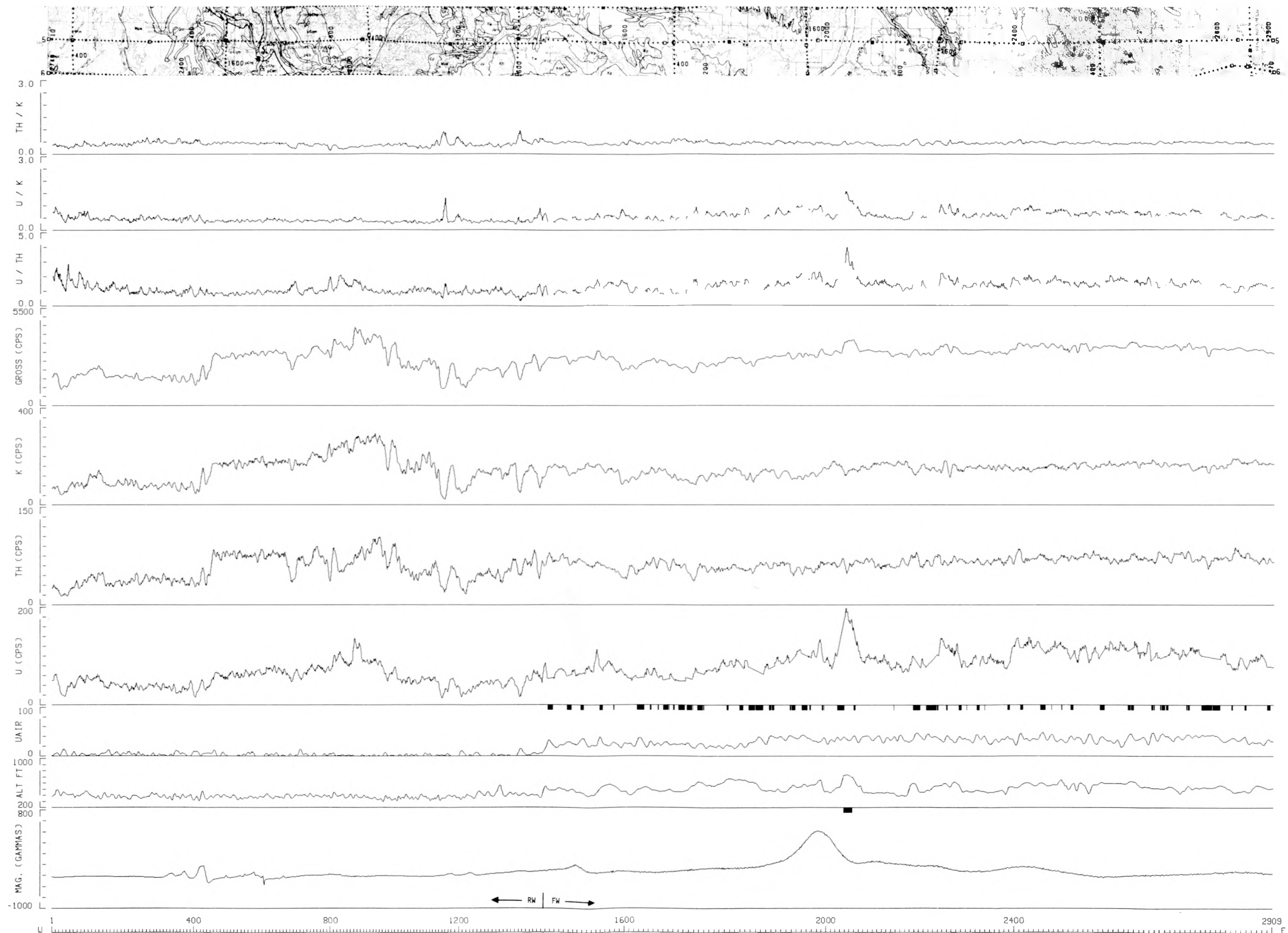
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 FL-002 HOT SPRINGS NK13-3



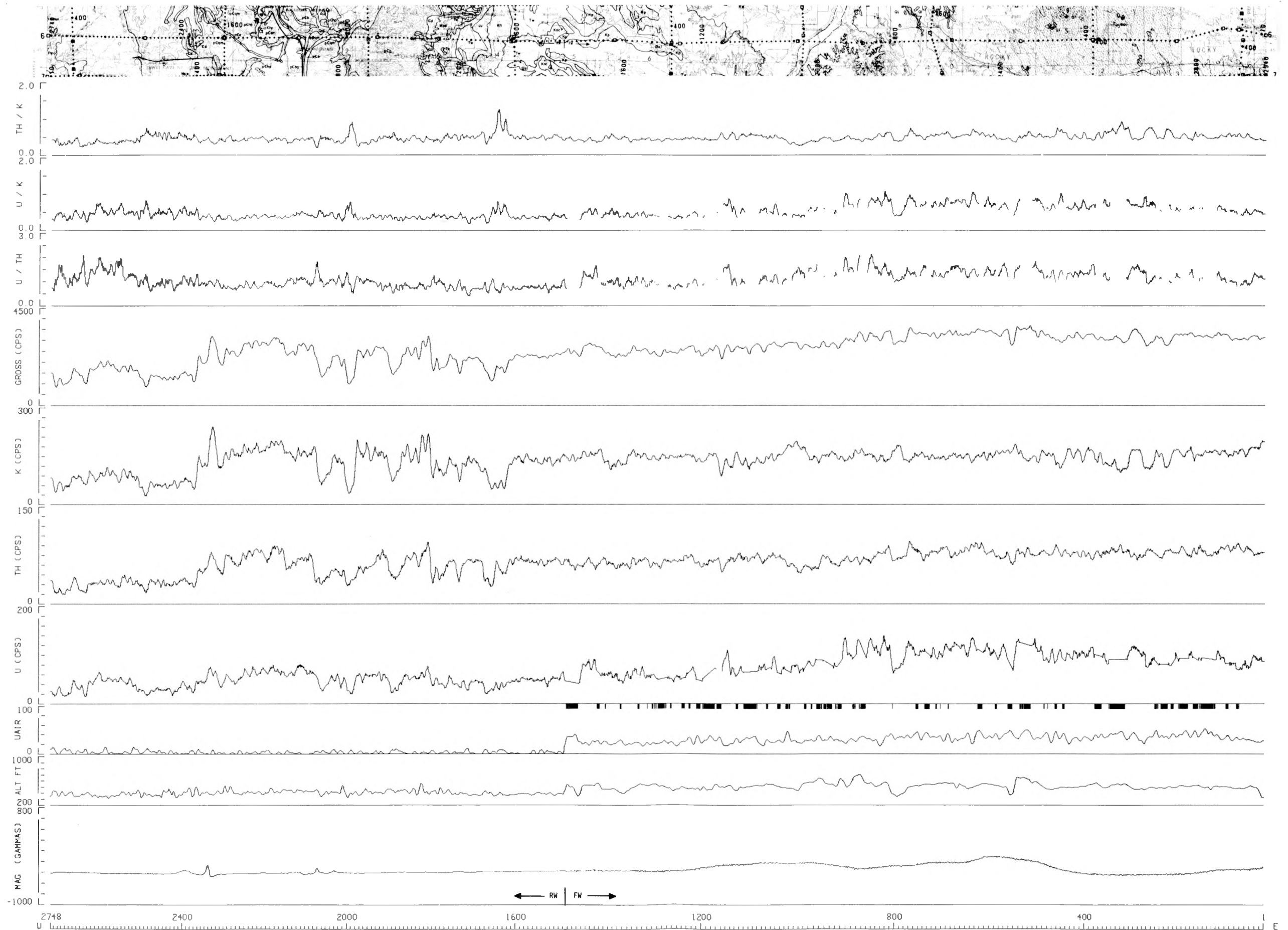
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 FL-003 HOT SPRINGS NK13-3



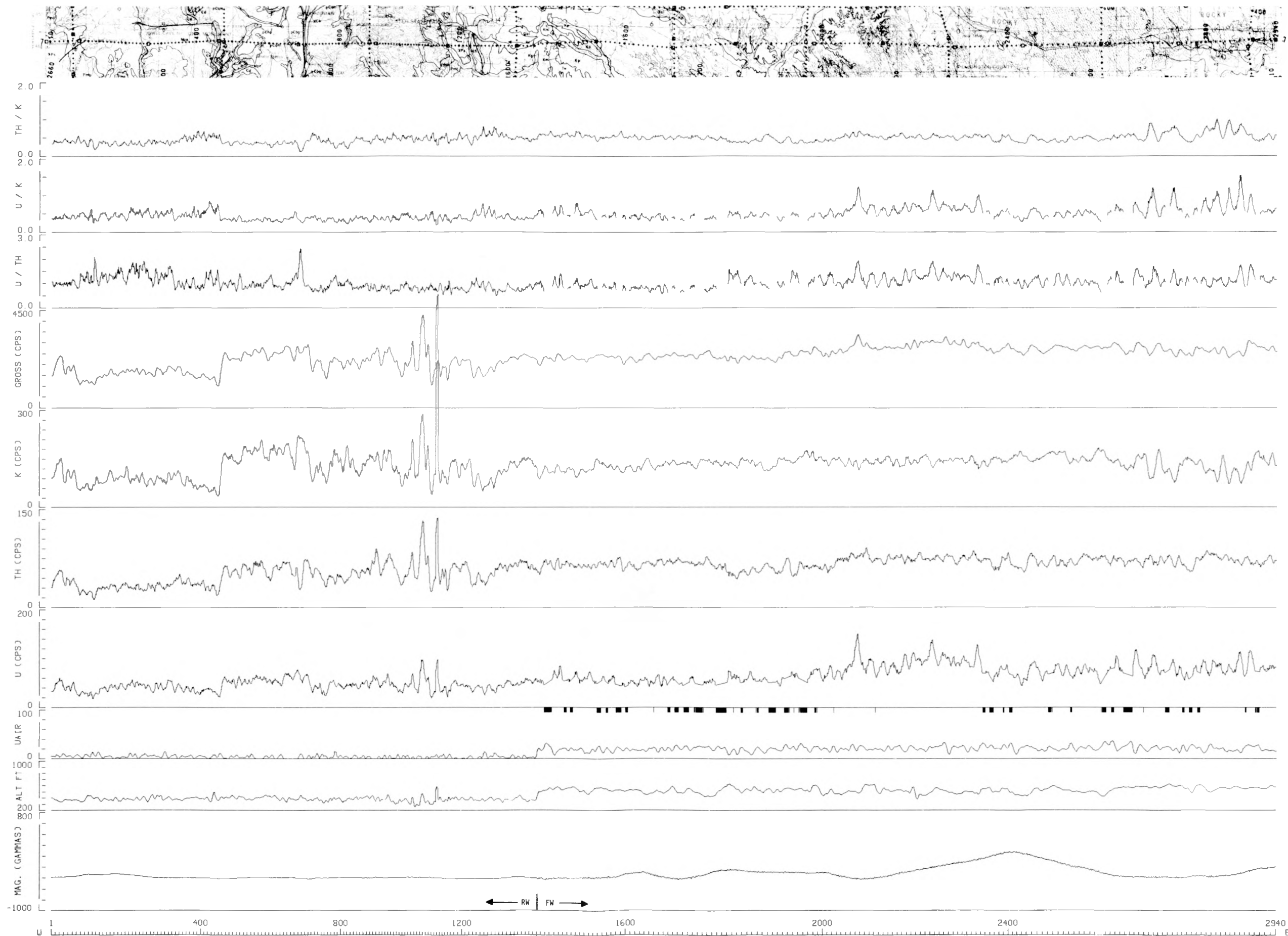
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 FL-004 HOT SPRINGS NK13-3

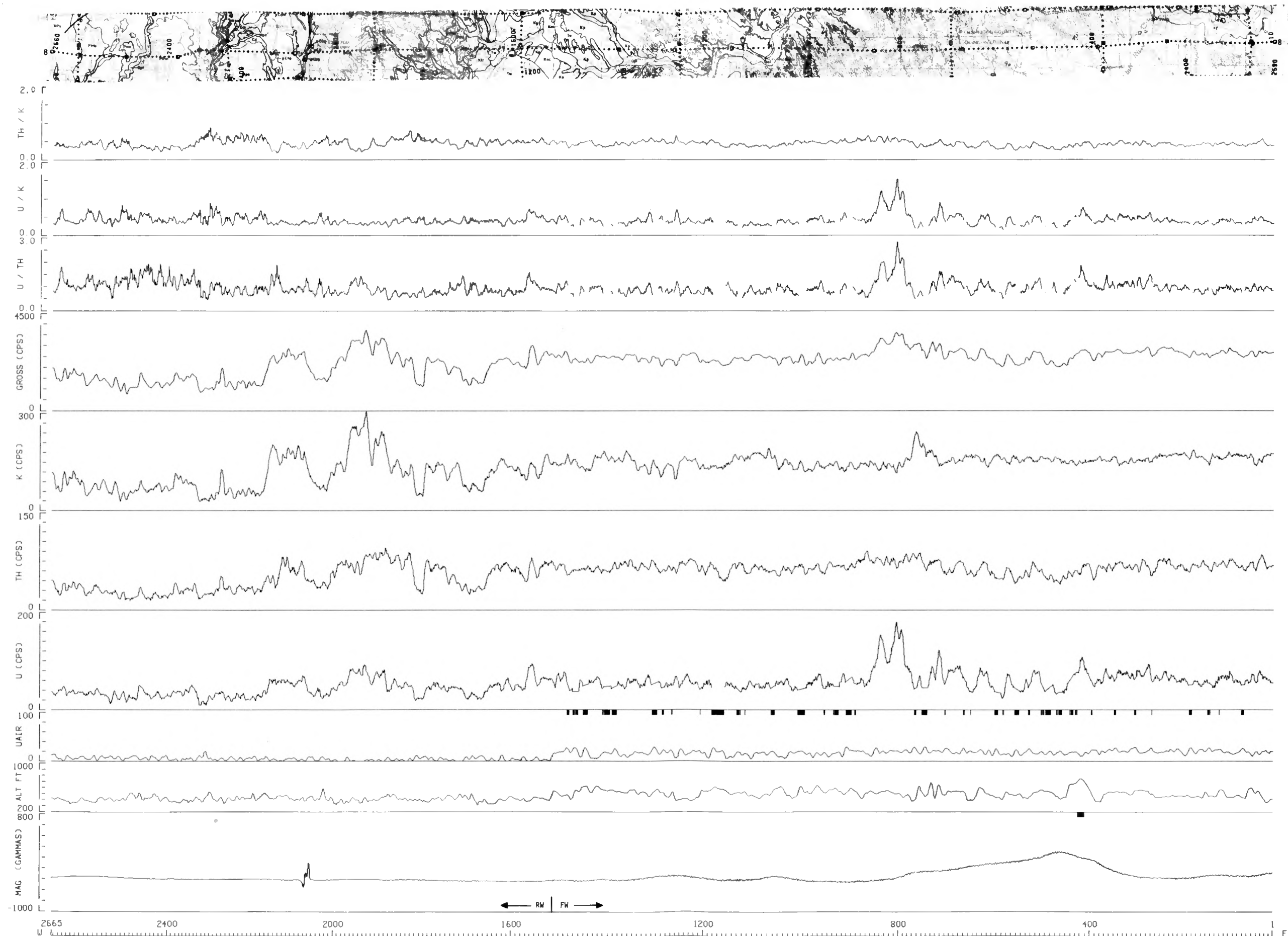


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 FL-005 HOT SPRINGS NK13-3

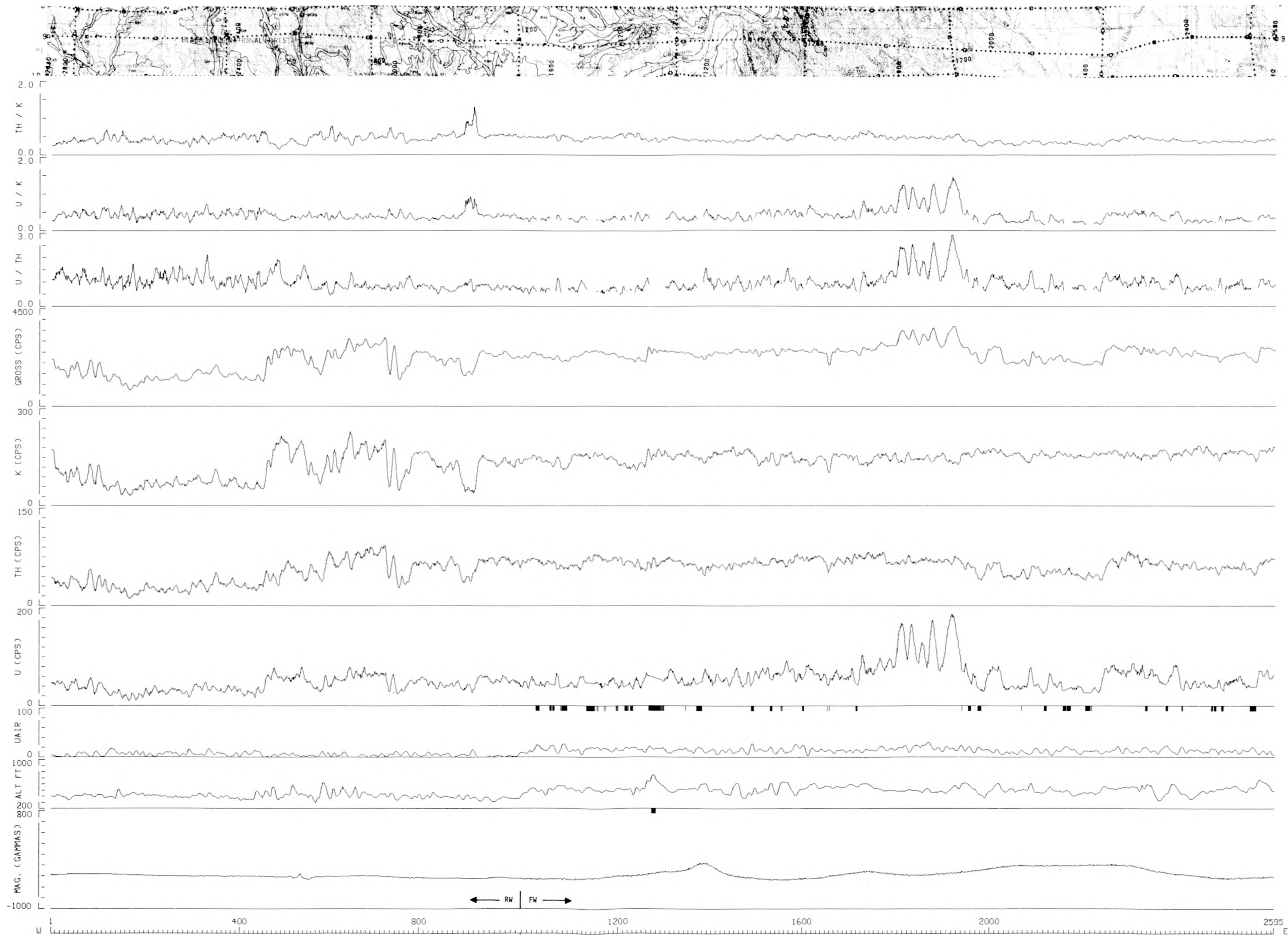


SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
FL-006 HOT SPRINGS NK13-3

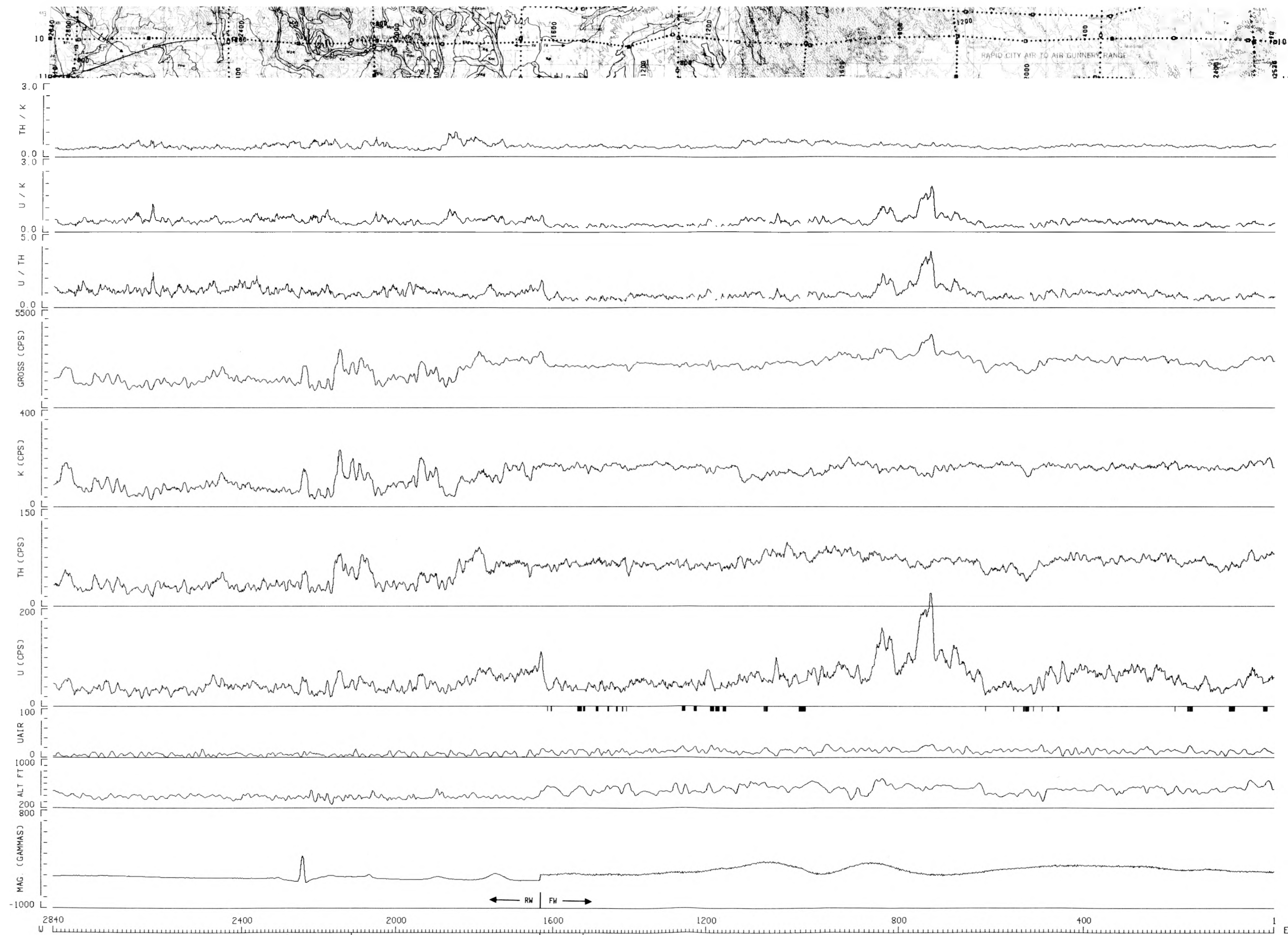




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 FL-008 HOT SPRINGS NK13-3

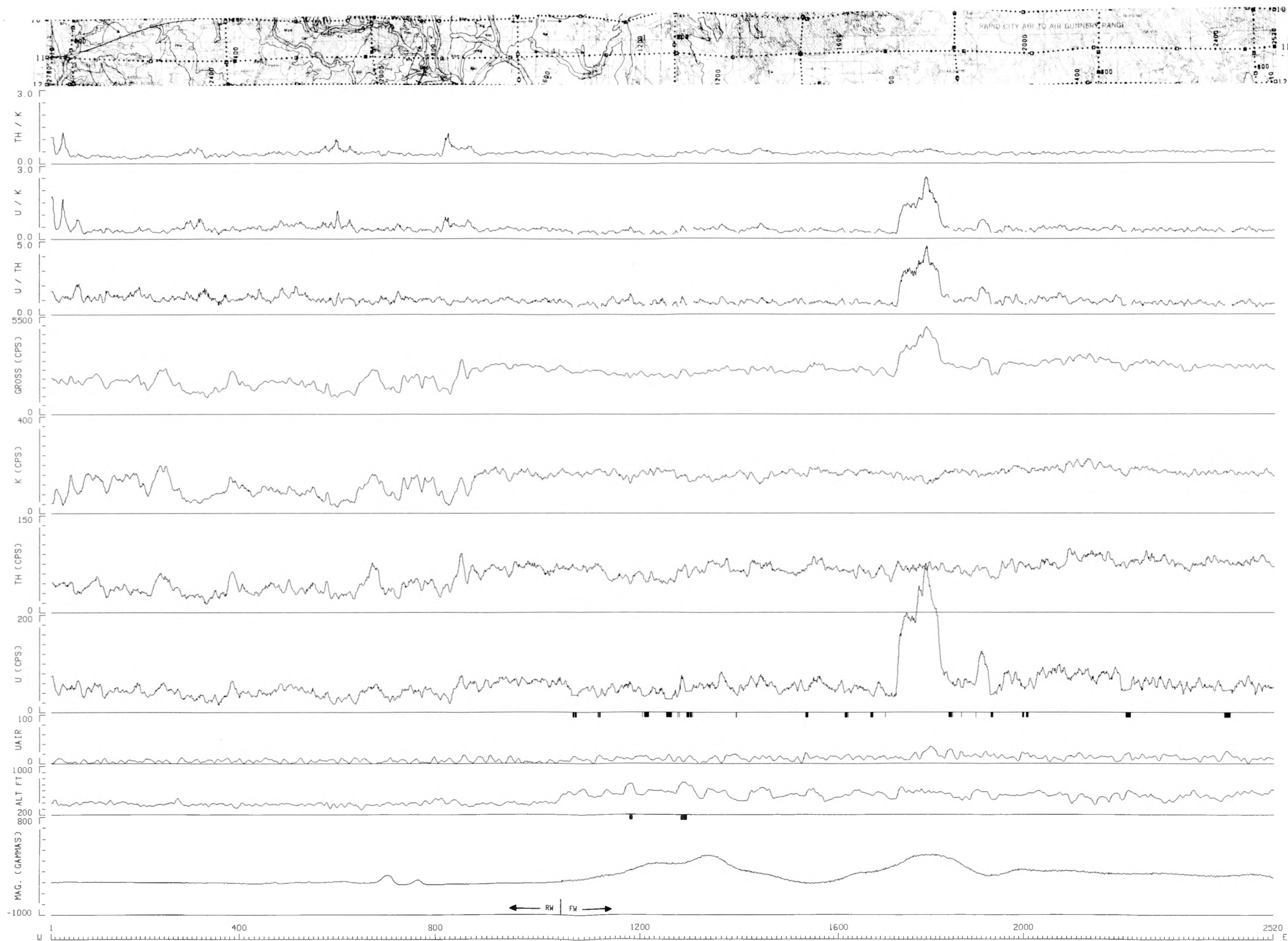


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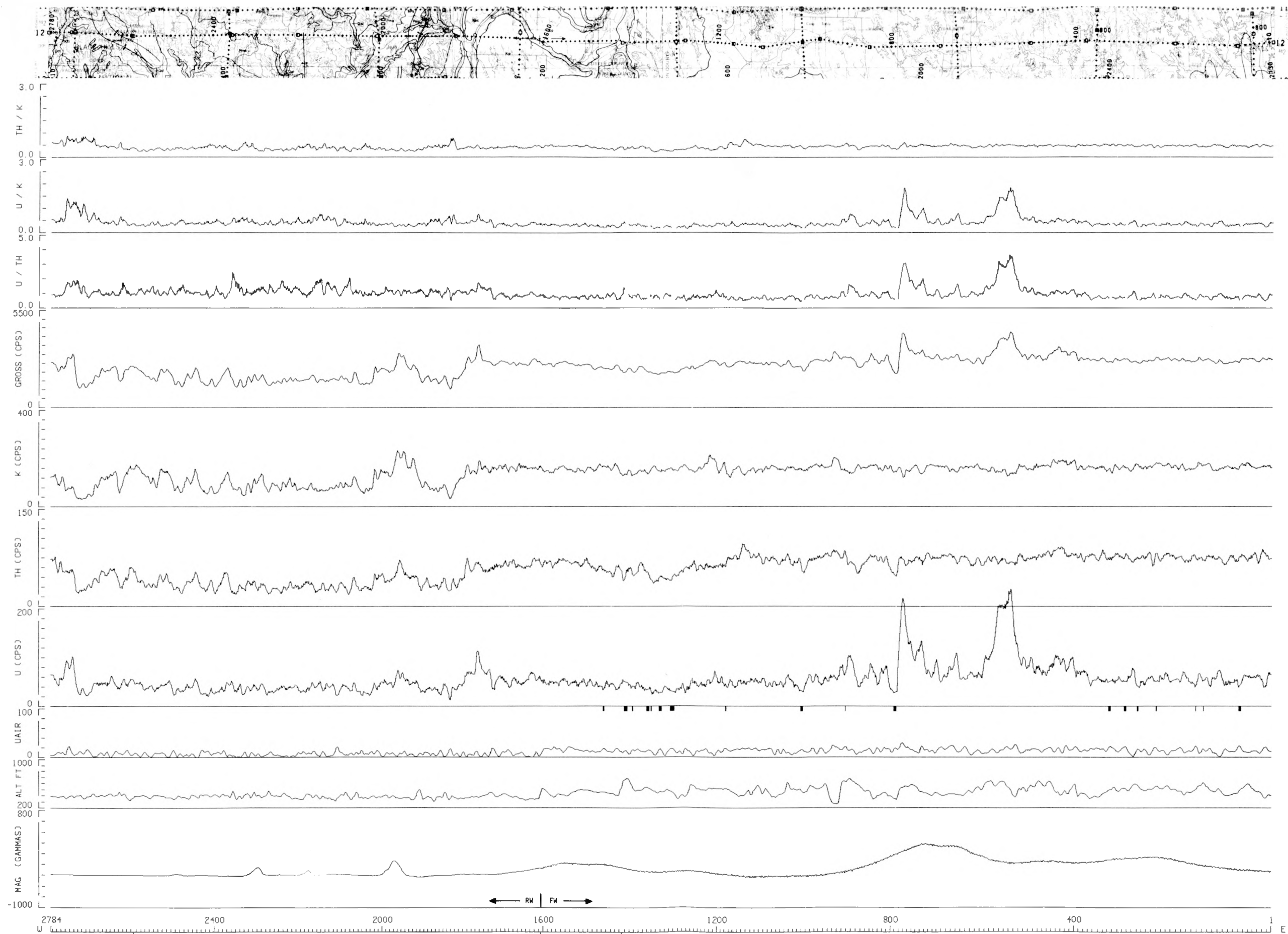


SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-010 HOT SPRINGS NK13-3

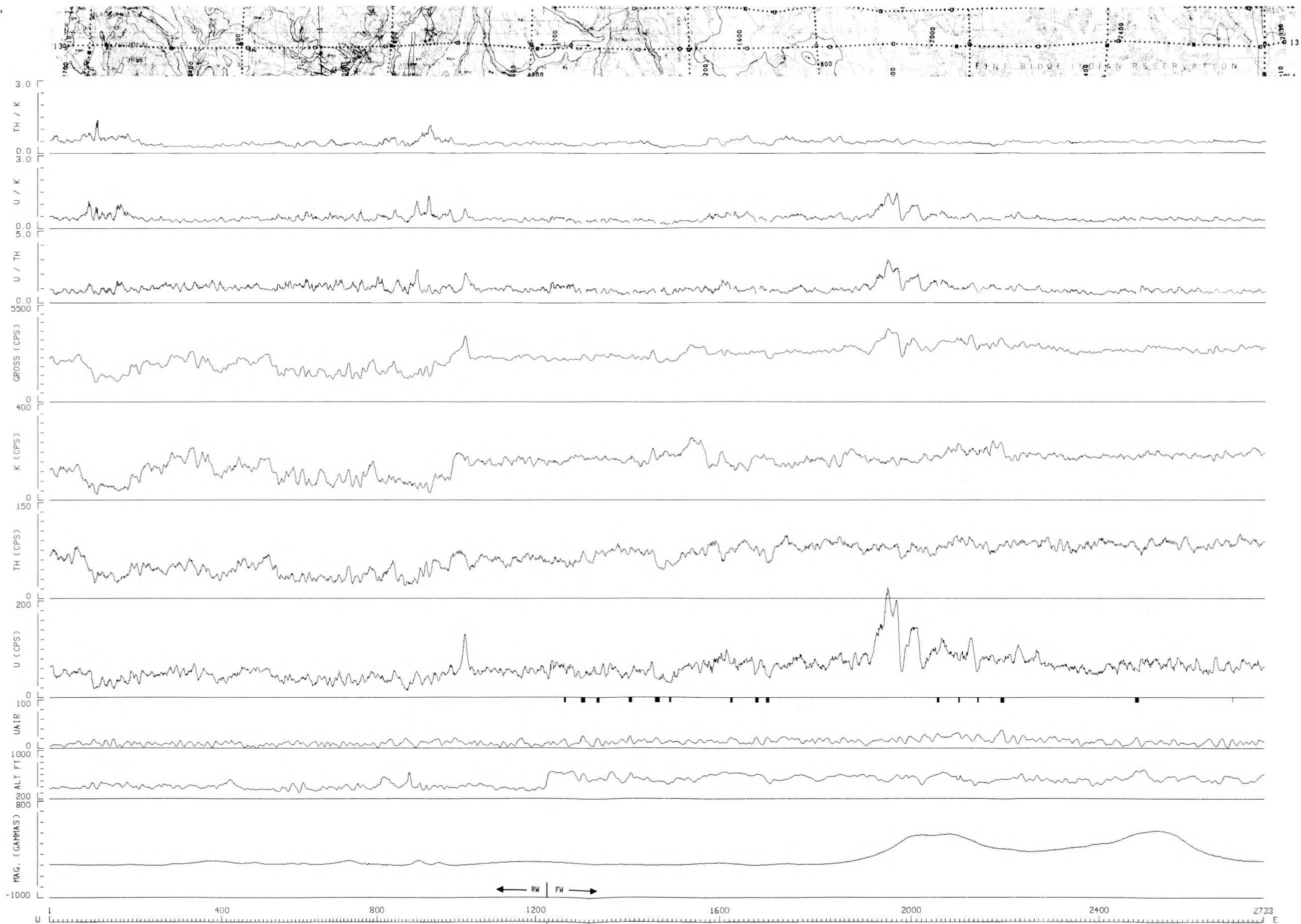




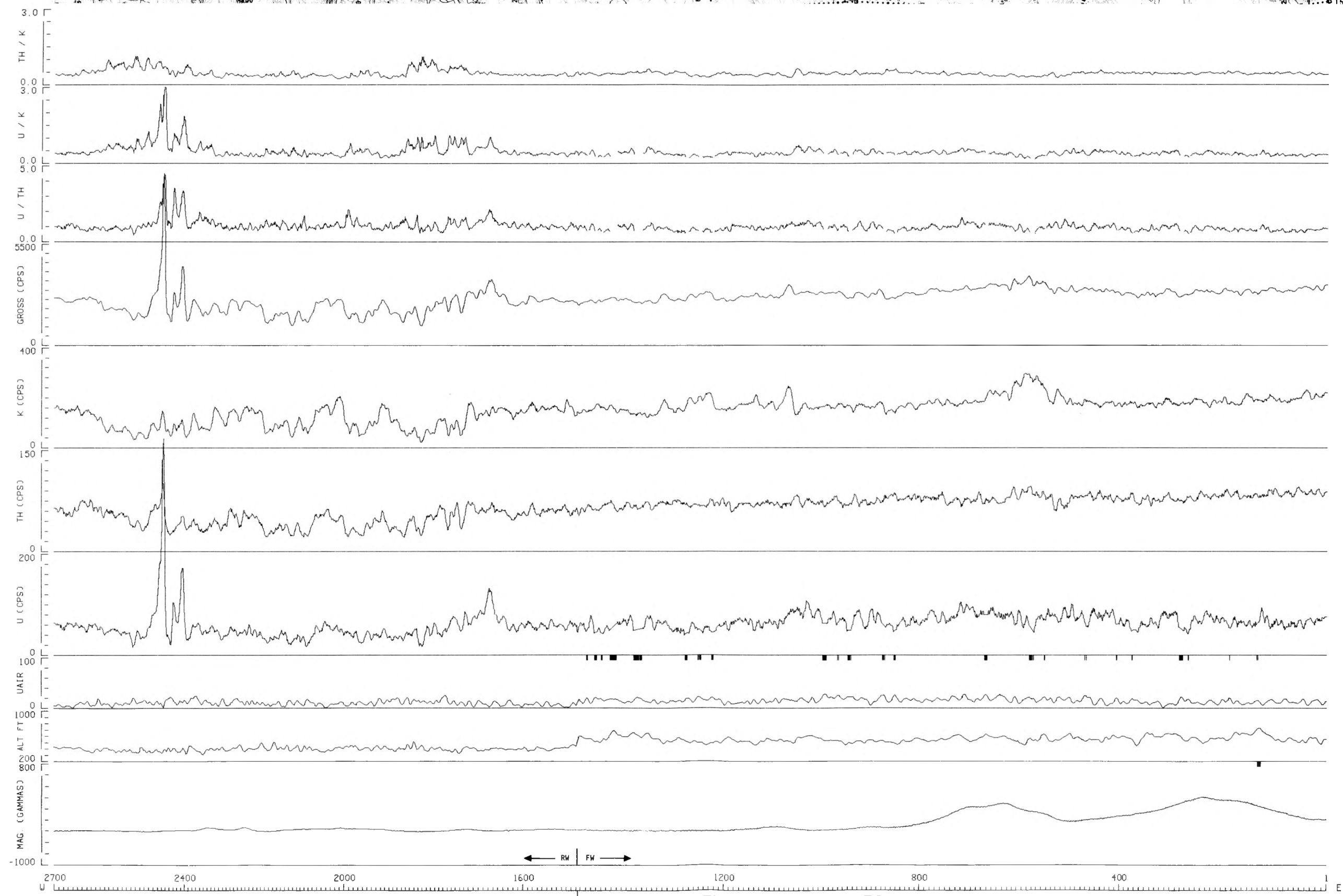
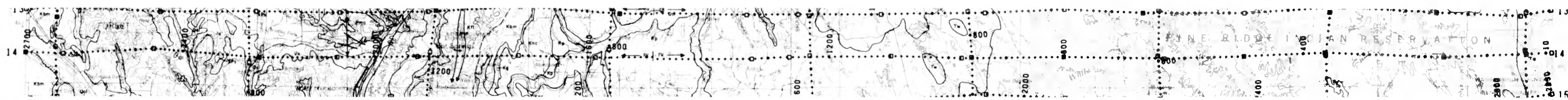
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 FL-011 HOT SPRINGS NK13-3



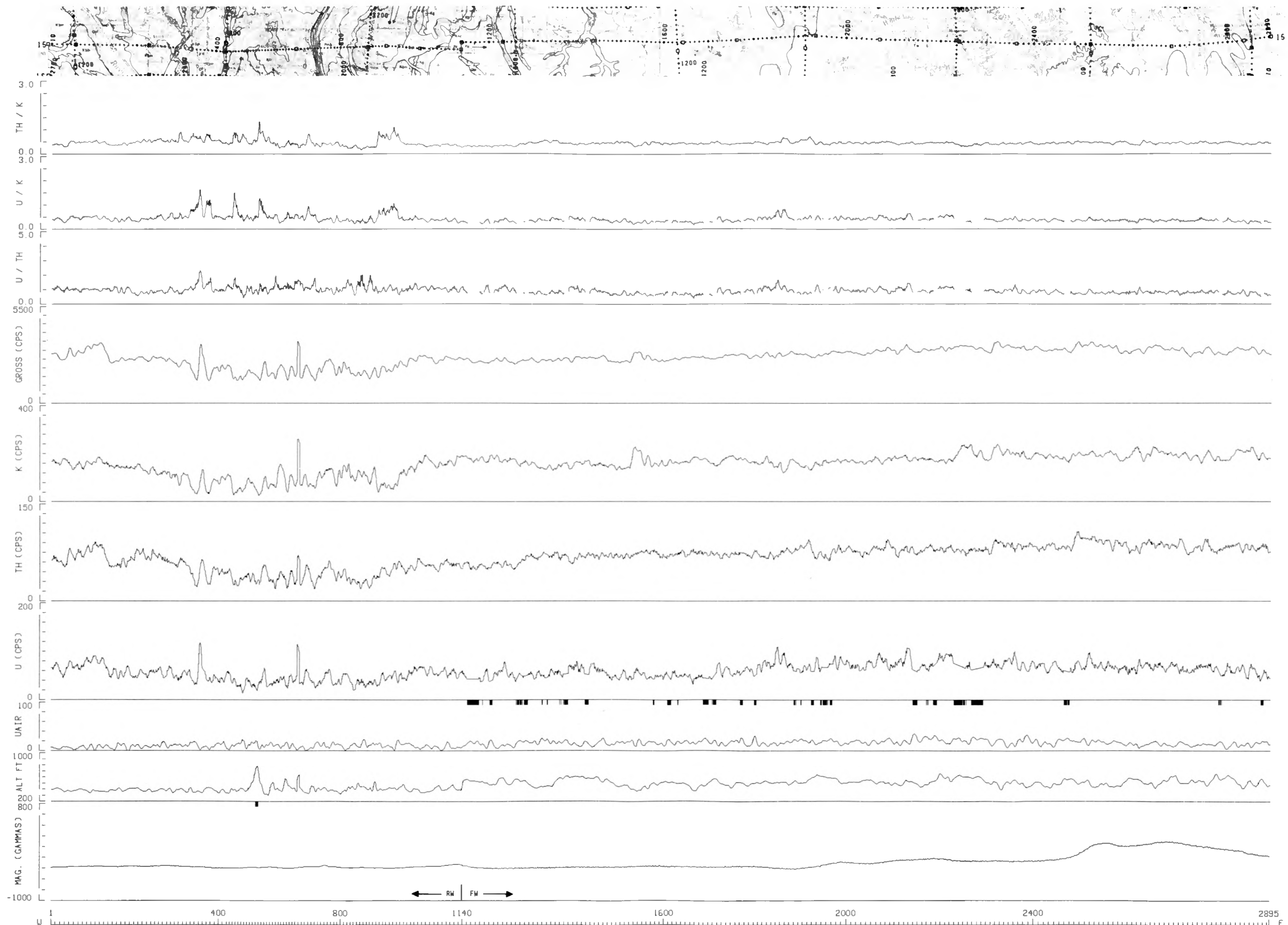
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 FL-012 HOT SPRINGS NK13-3

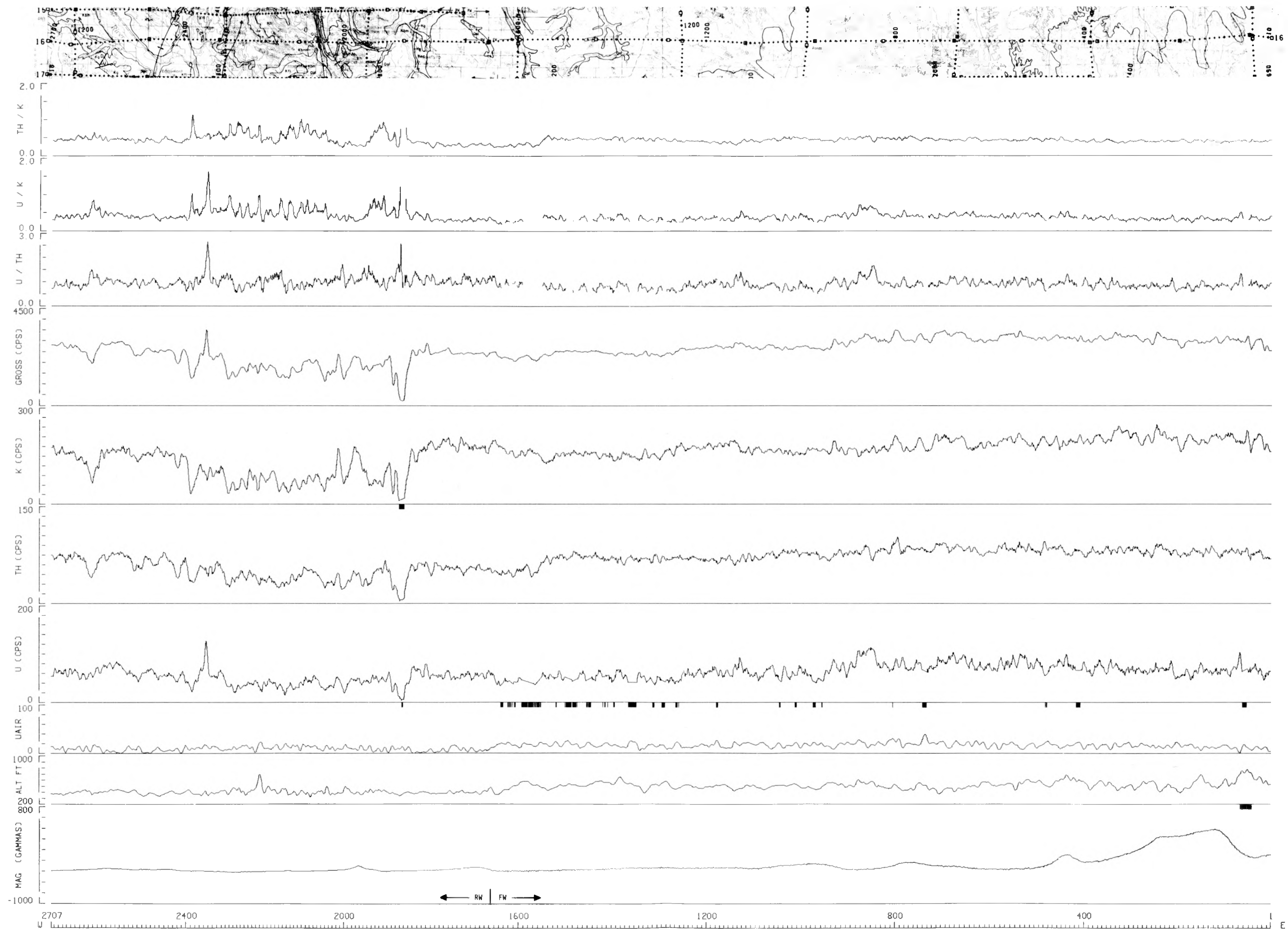


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 FL-013 HOT SPRINGS NK13-3

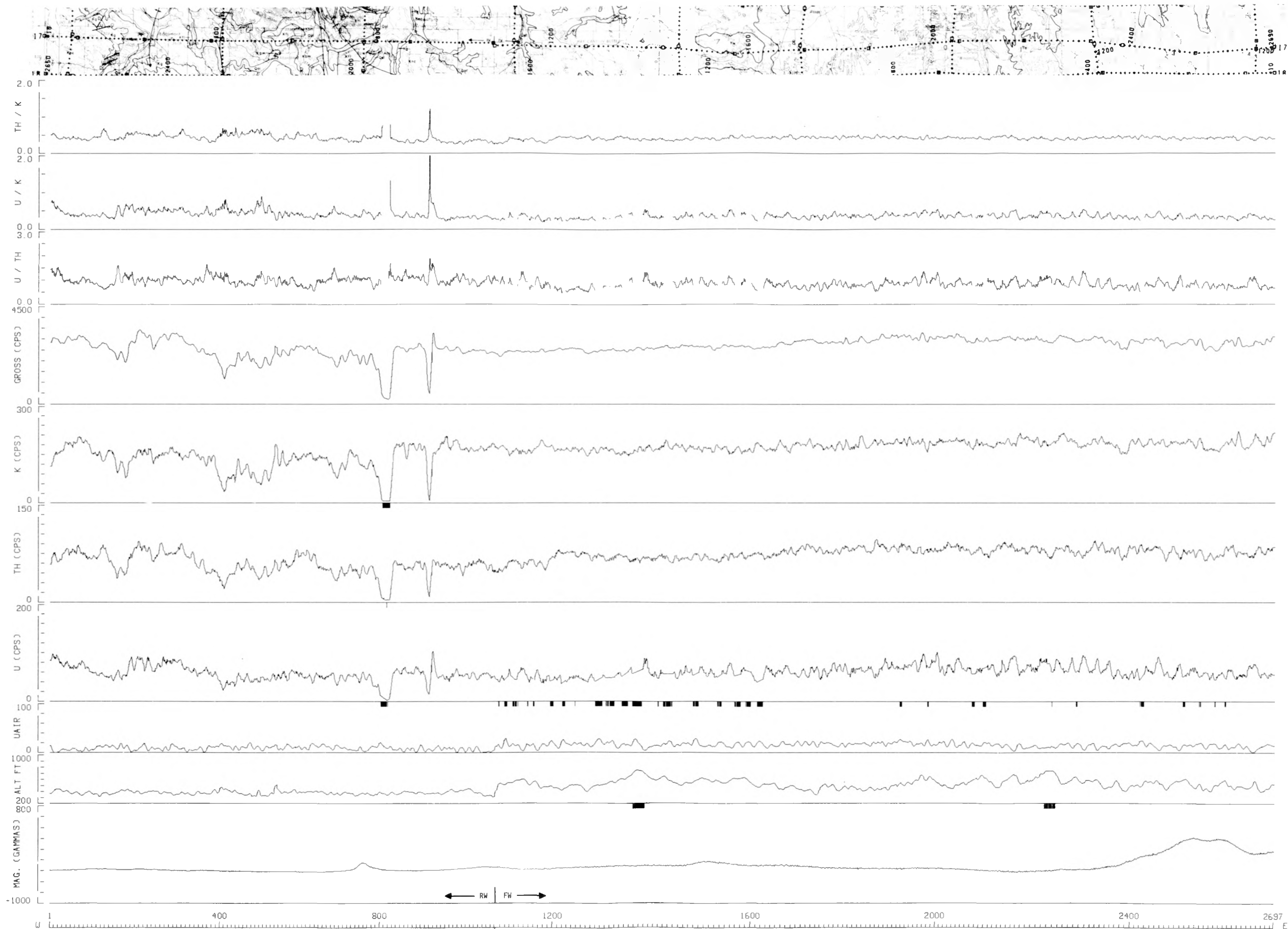


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FL-014 HOT SPRINGS NK13-3

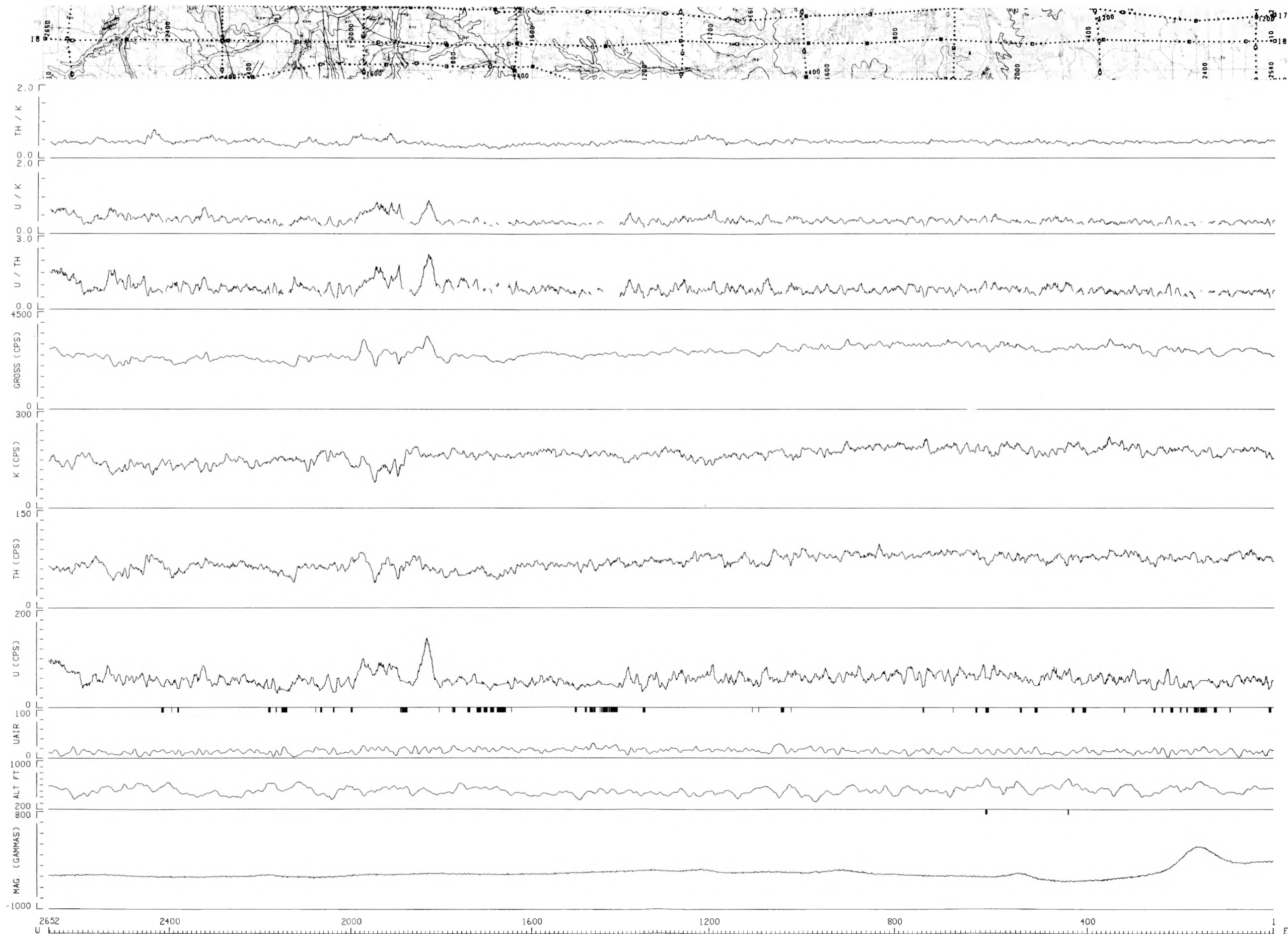




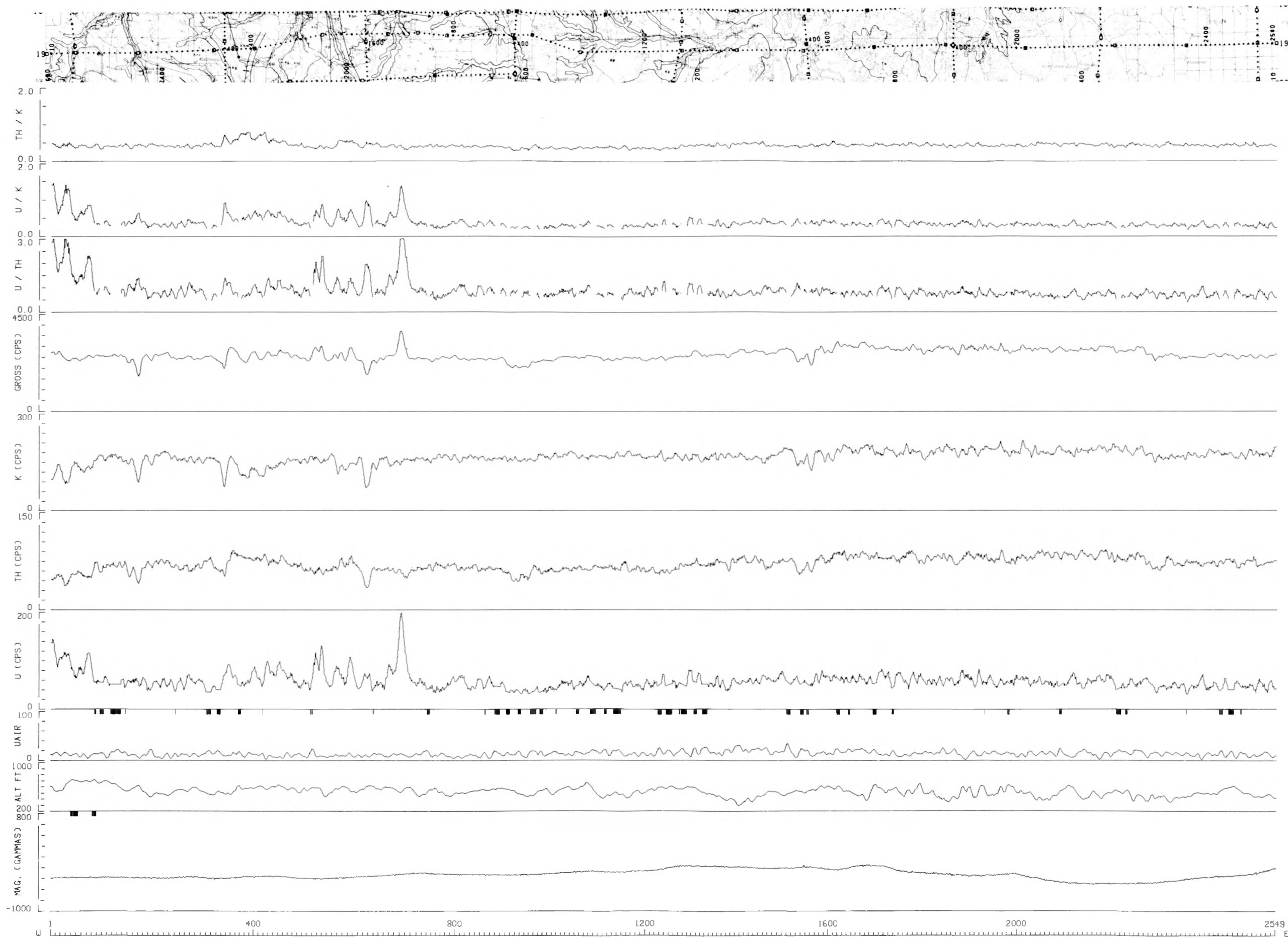
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-016 HOT SPRINGS NK13-3



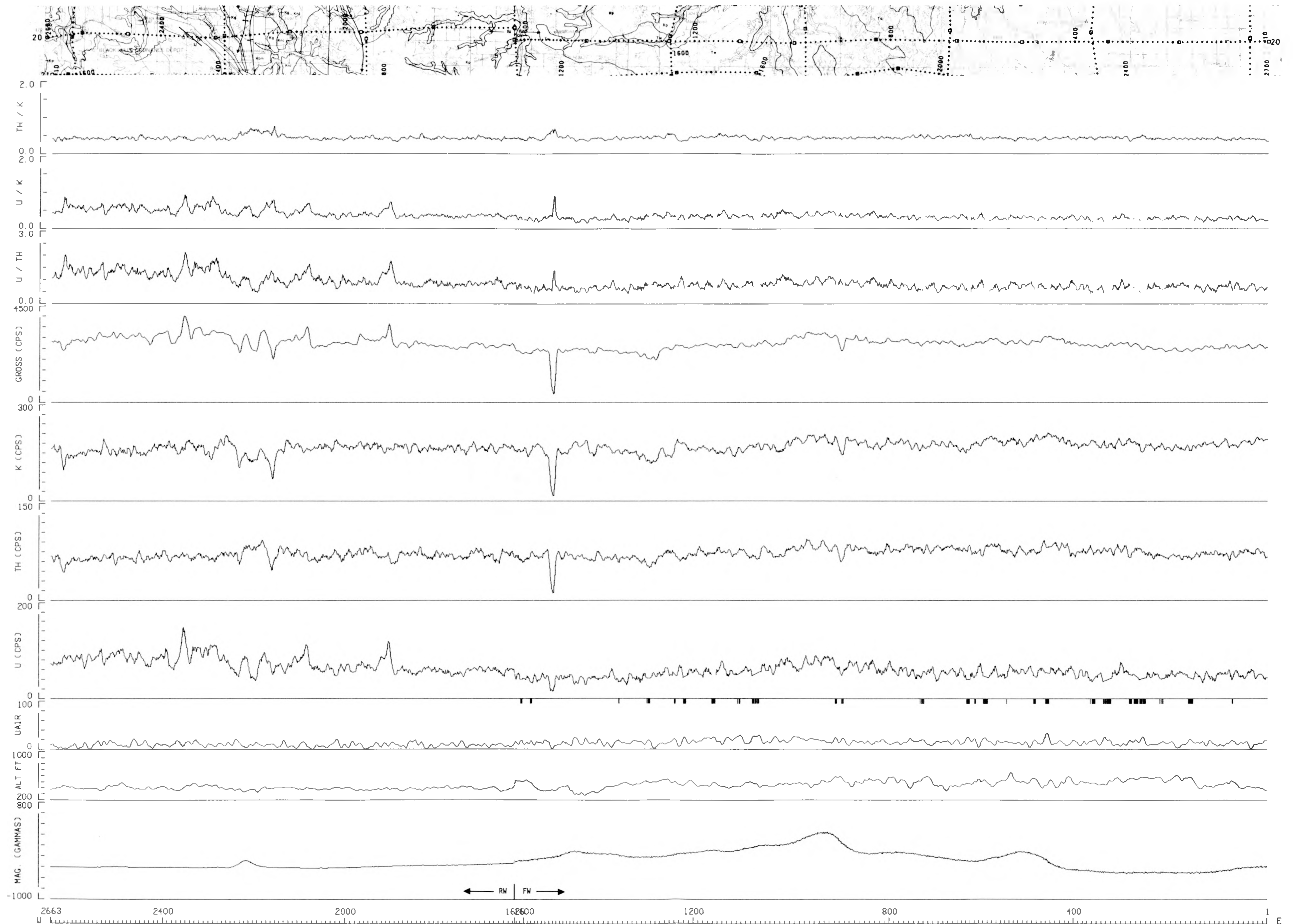
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-017 HOT SPRINGS NK13-3



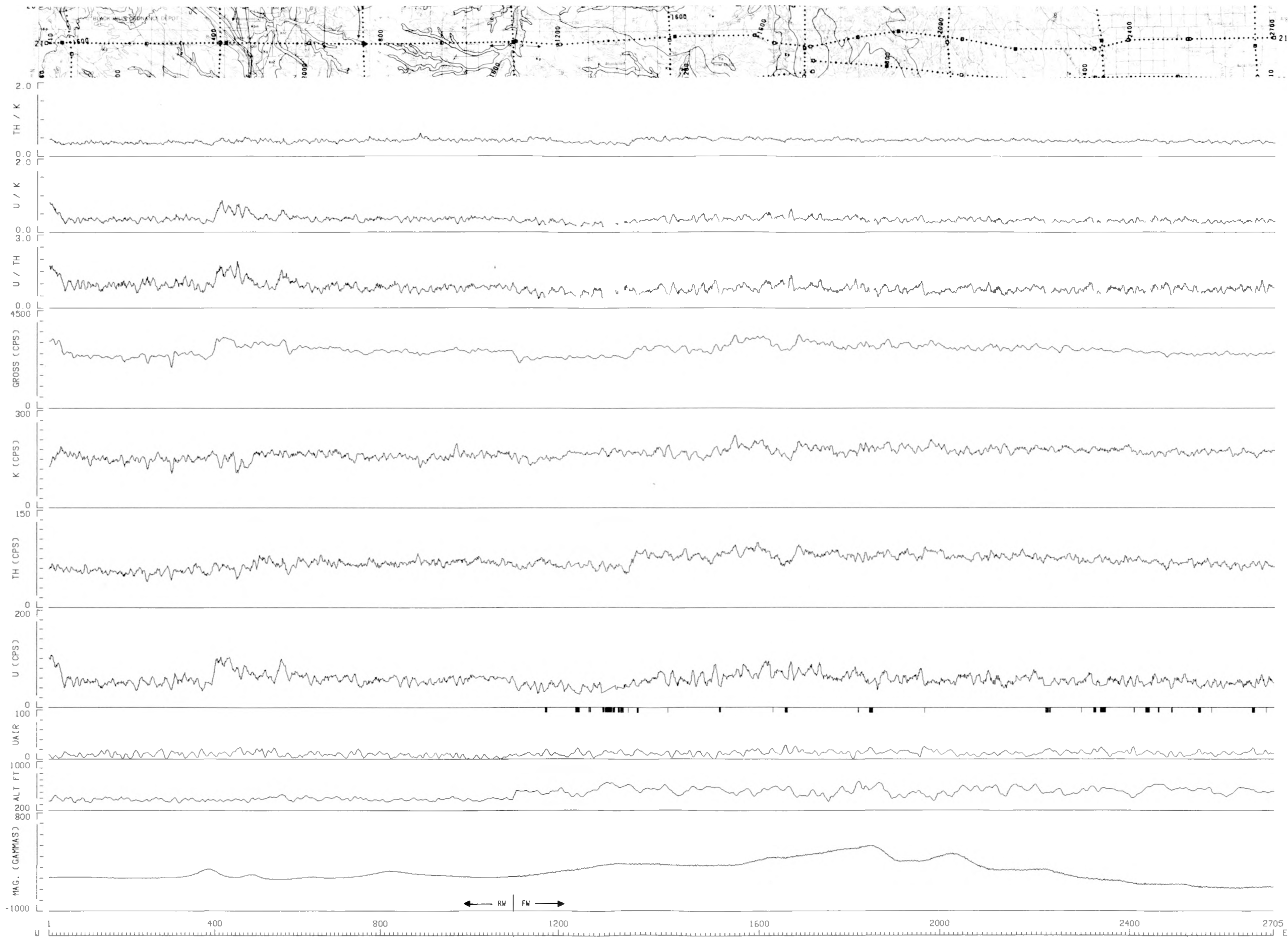
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 FL-018 HOT SPRINGS NK13-3



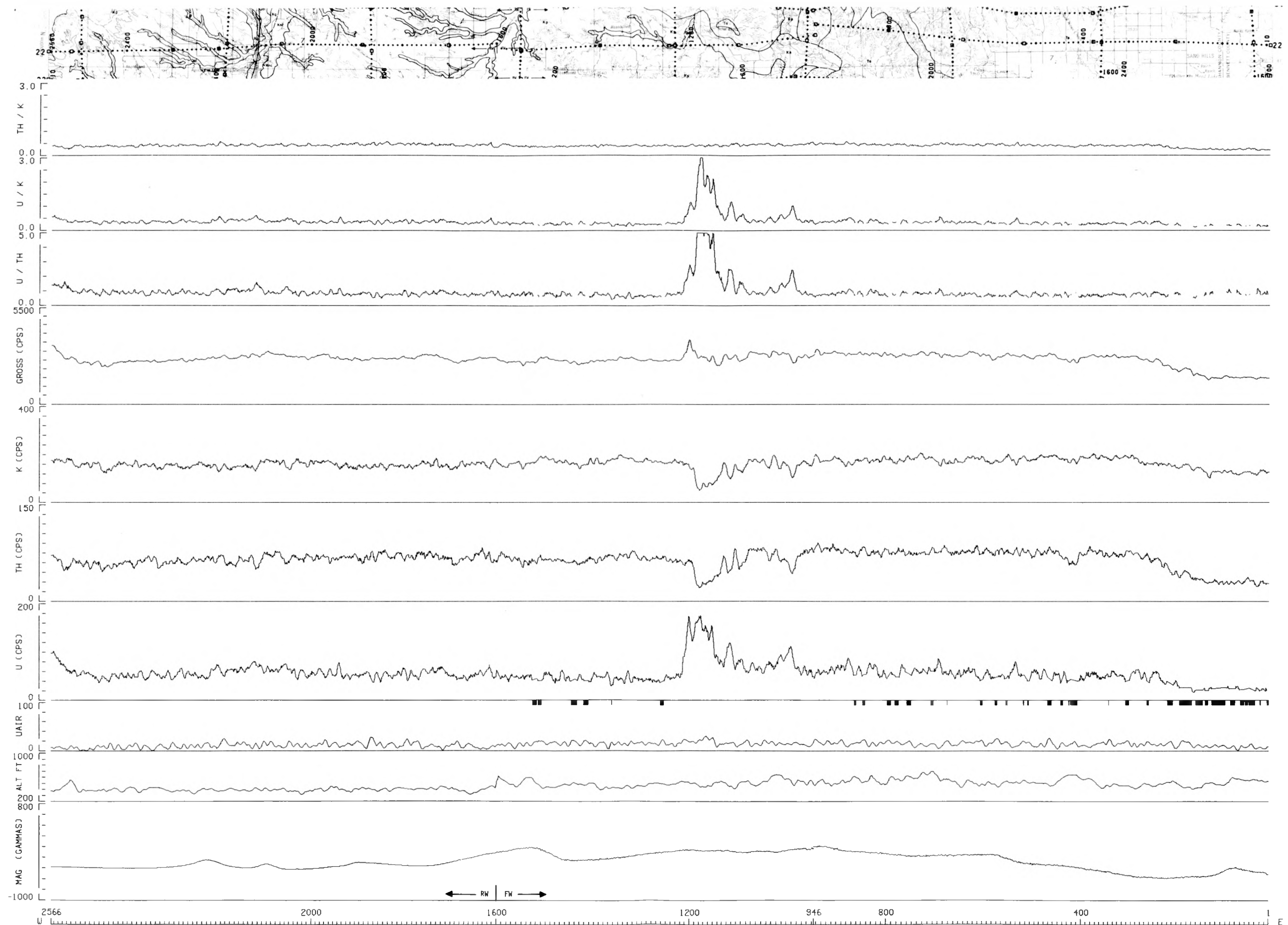
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 FL-019 HOT SPRINGS NK13-3



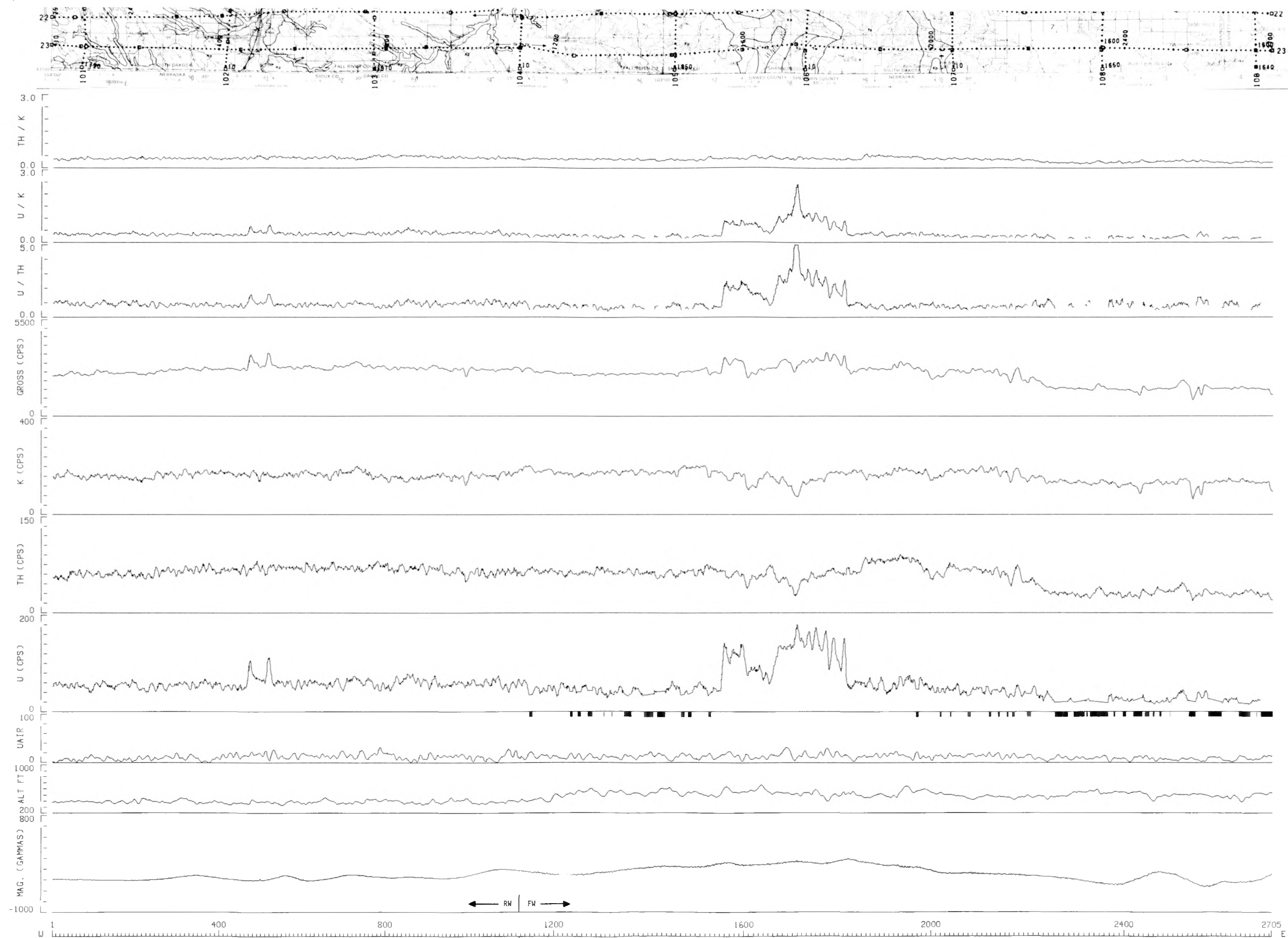
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-020 HOT SPRINGS NK13-3



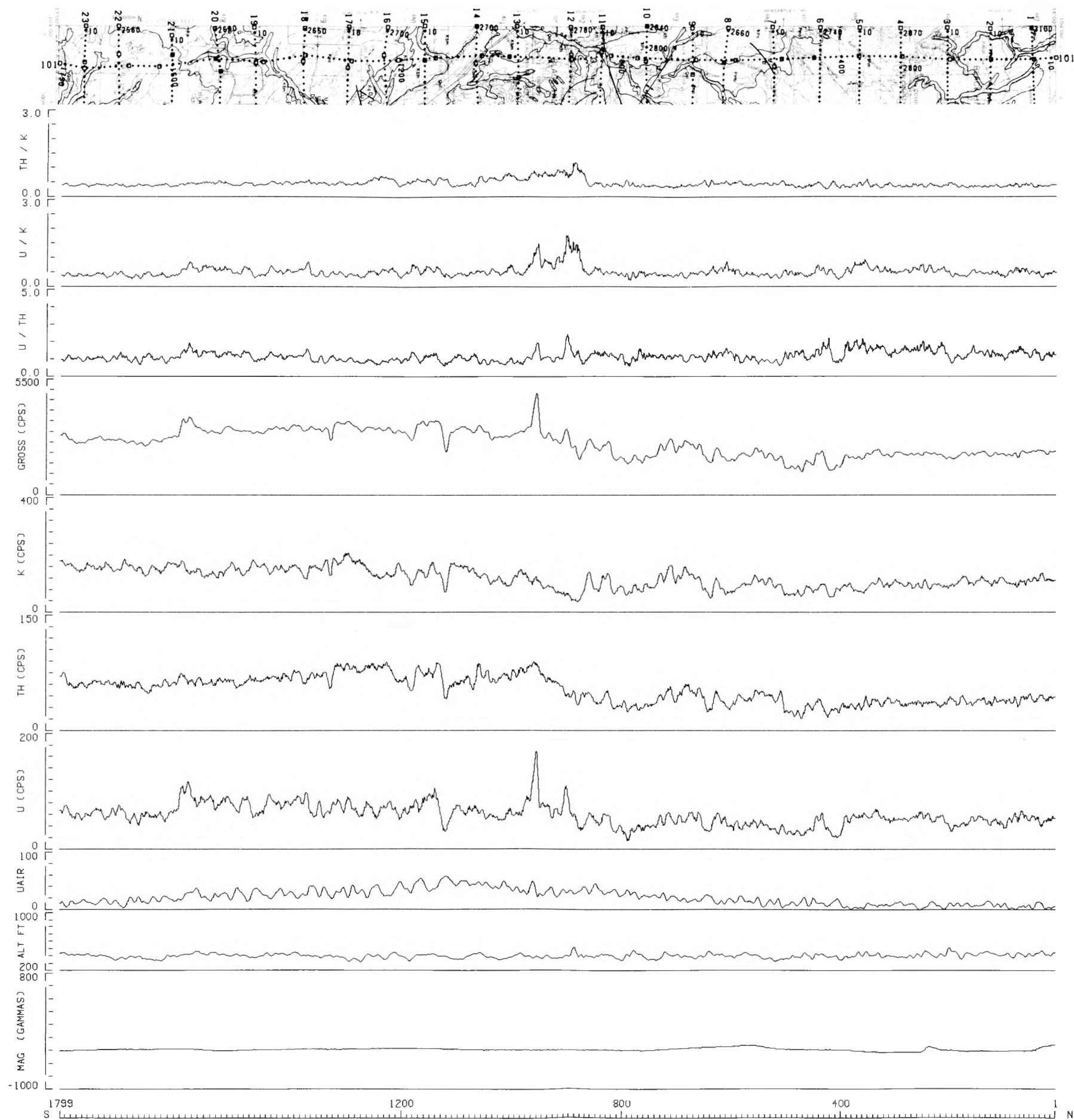
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 FL-021 HOT SPRINGS NK13-3



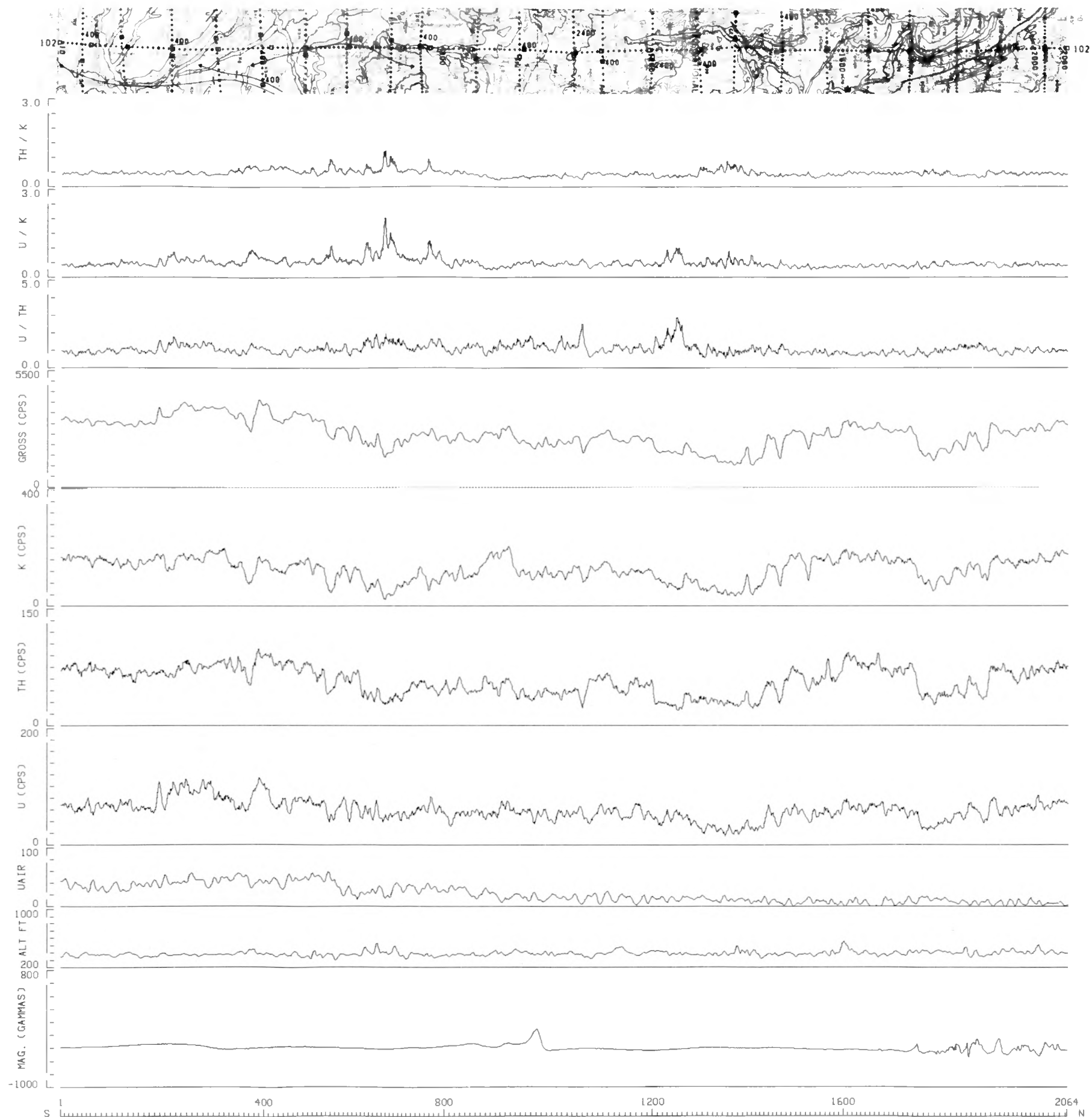
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 FL-022 HOT SPRINGS NK13-3



SWEET GRASS SURVEY 1978 US DEPT OF ENERGY TEXAS INSTRUMENTS
 FL-023 HOT SPRINGS NK13-3

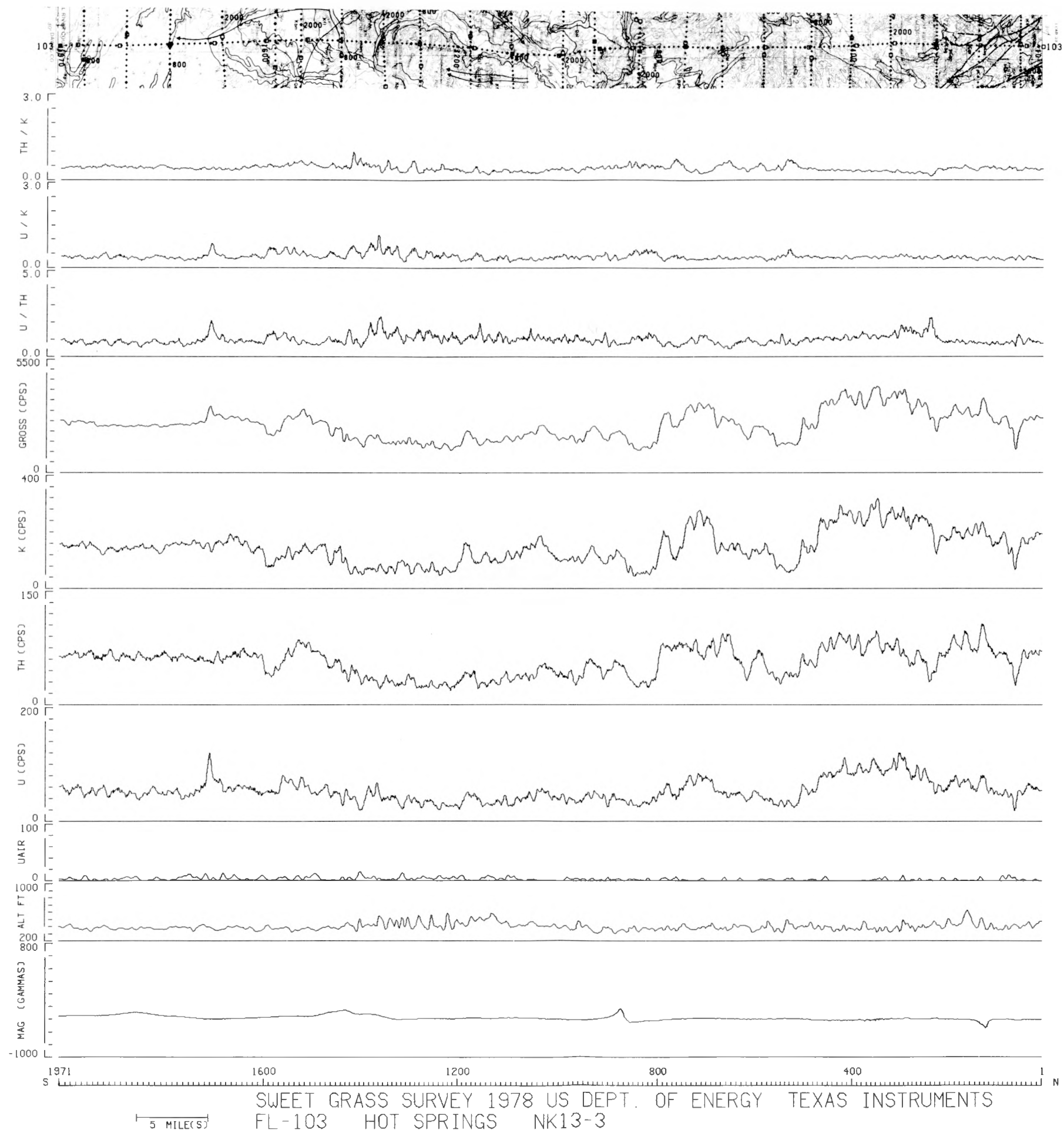


SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-101 HOT SPRINGS NK13-3

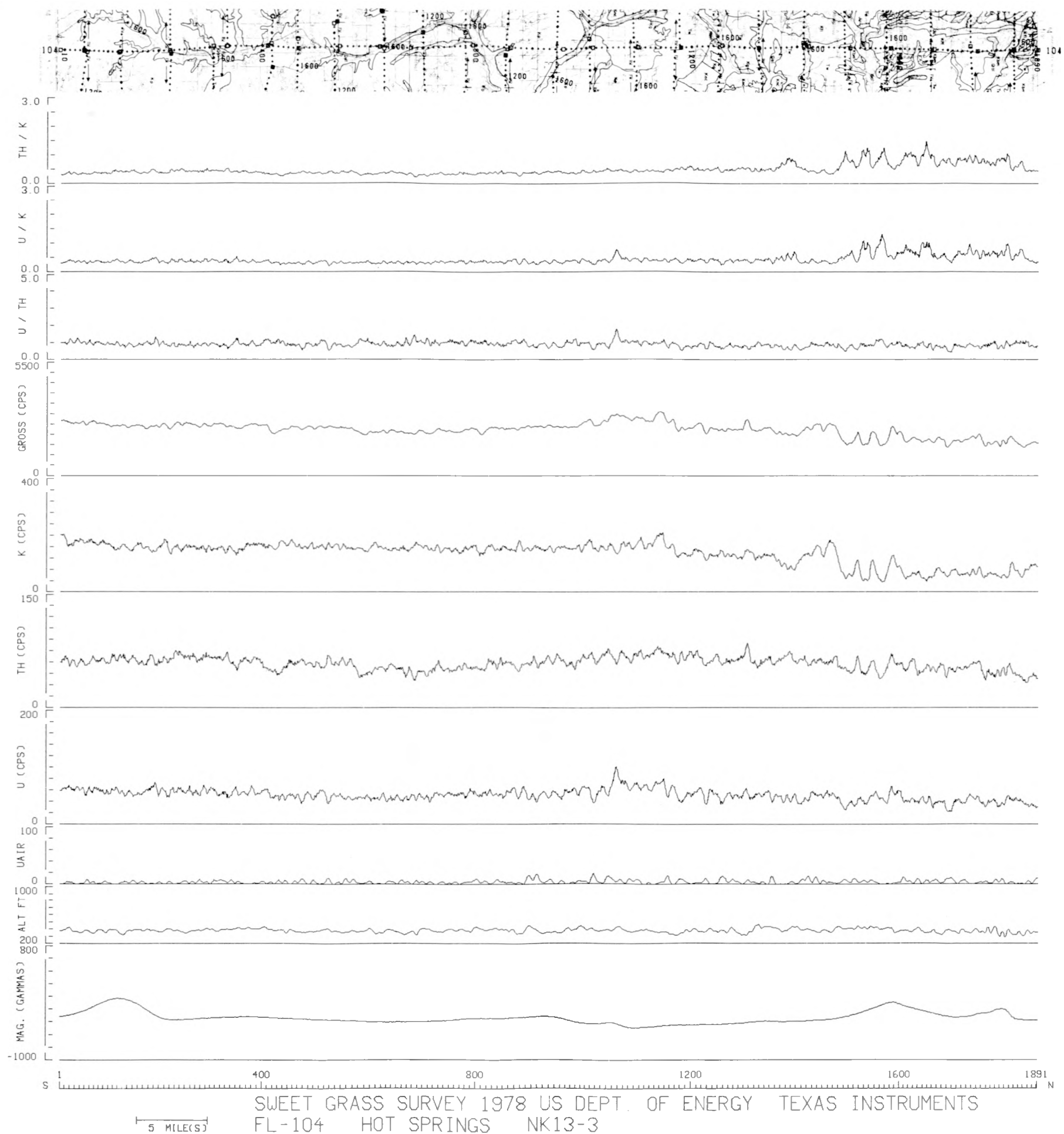


SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-102 HOT SPRINGS NK13-3

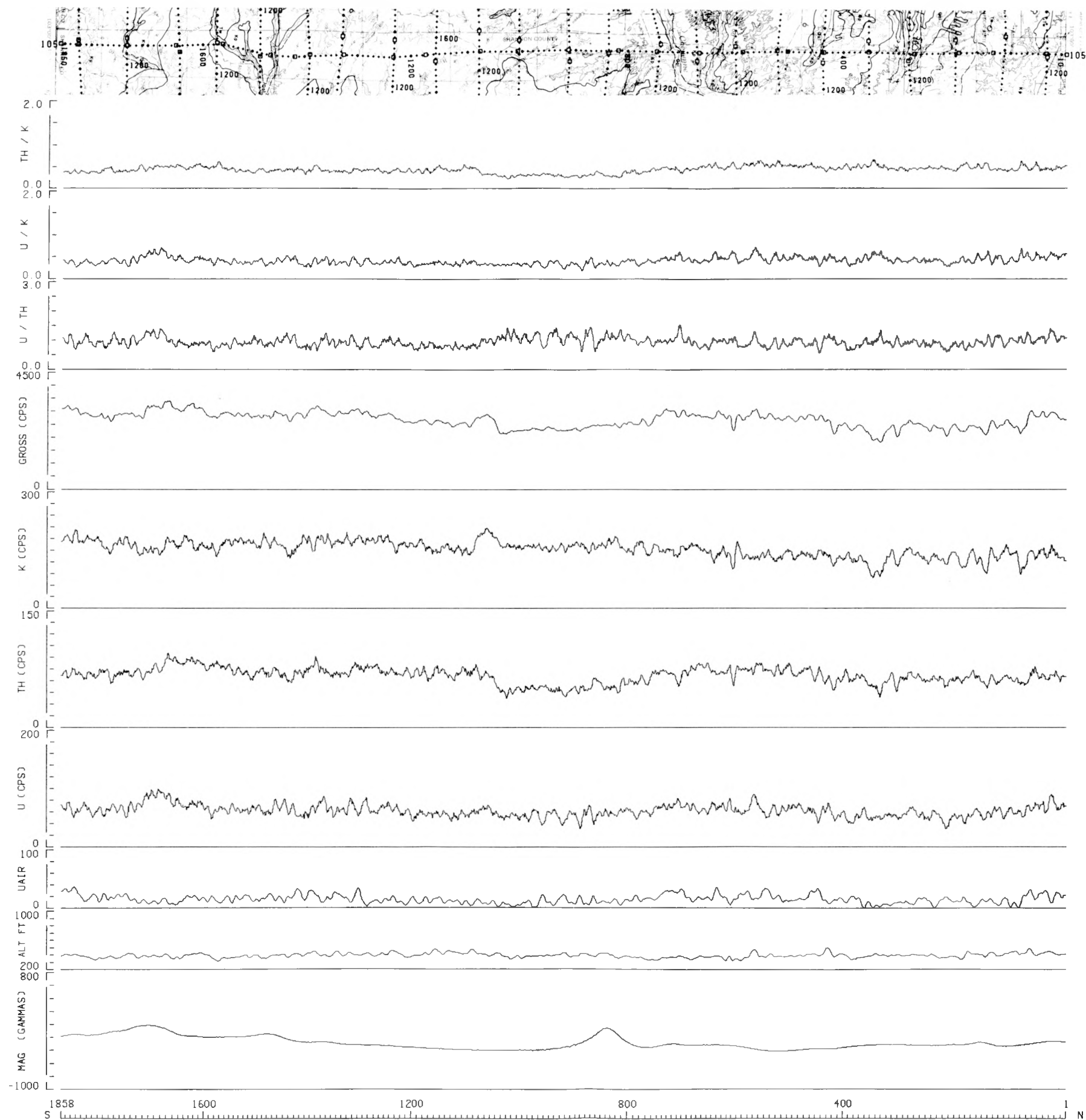
5 MILE(S)



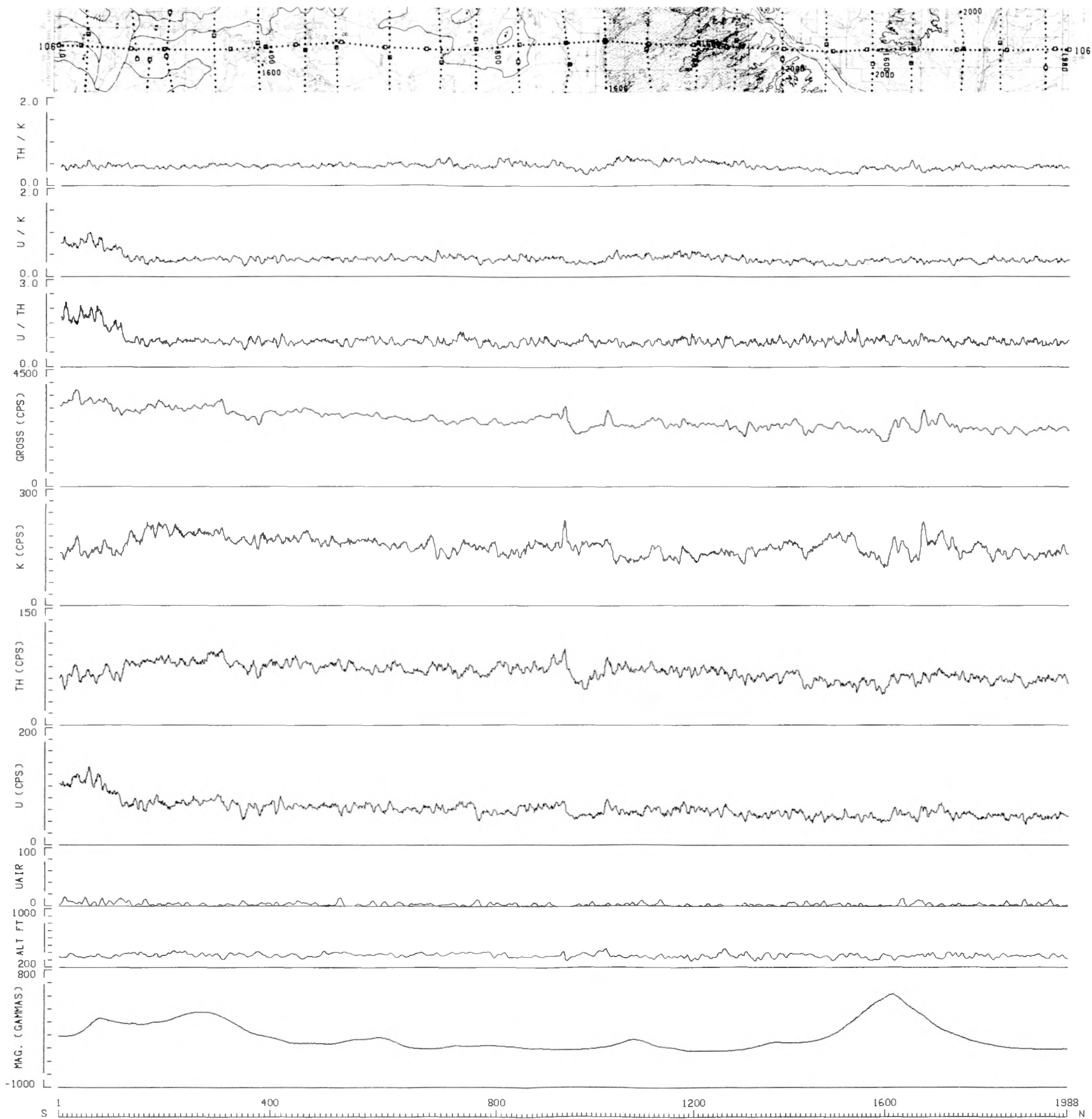
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 FL-103 HOT SPRINGS NK13-3



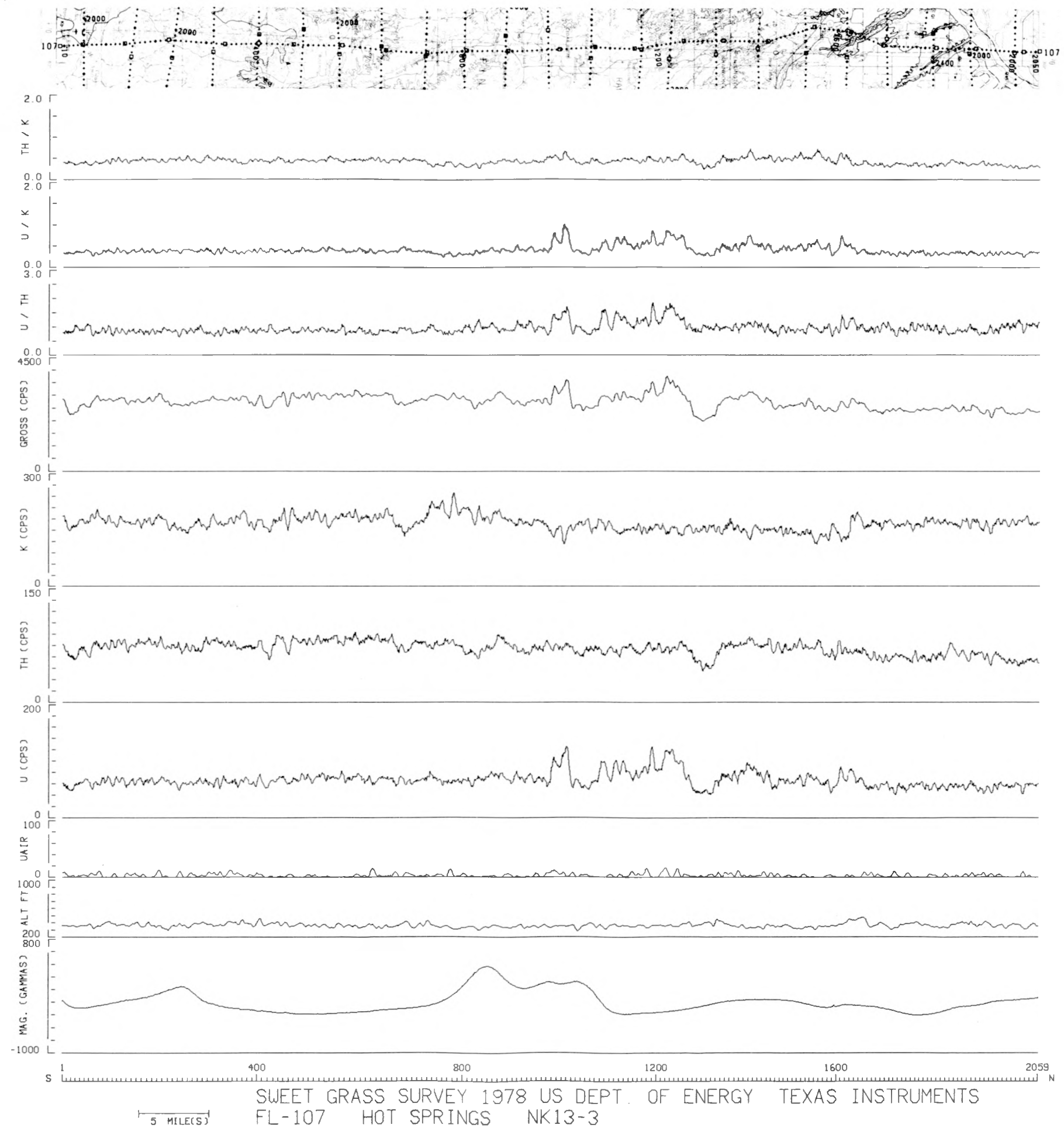
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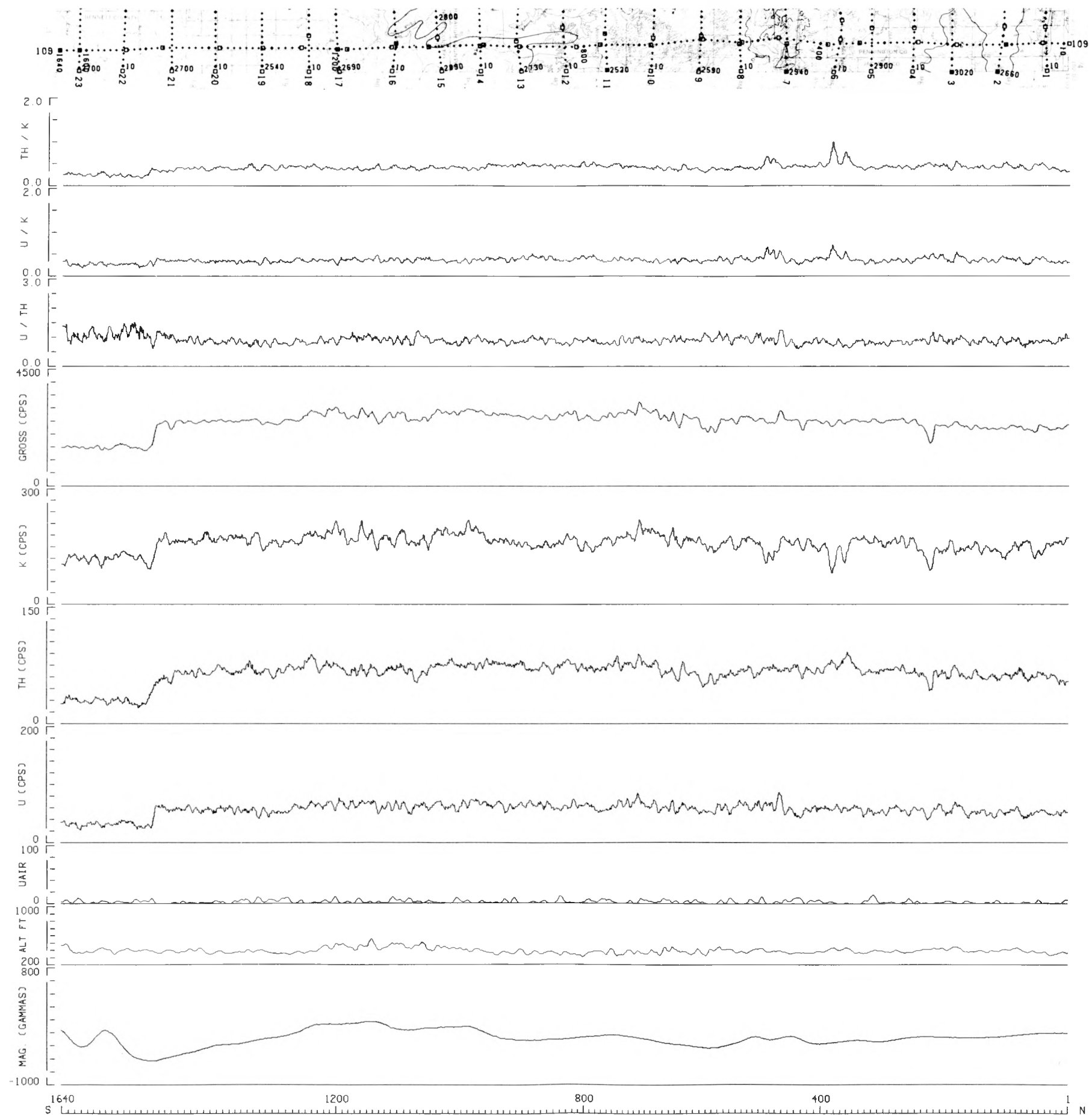
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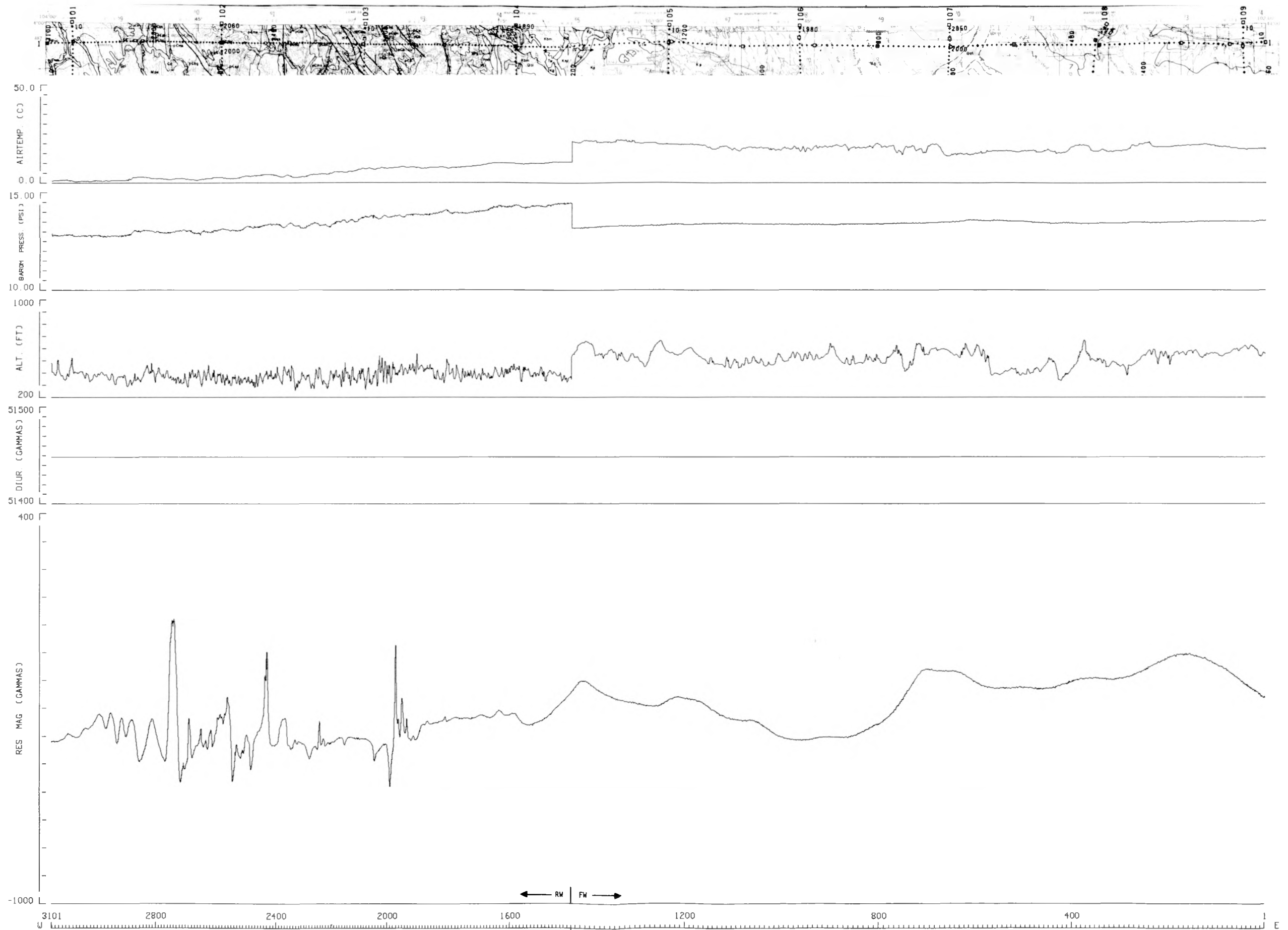


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 FL-106 HOT SPRINGS NK13-3

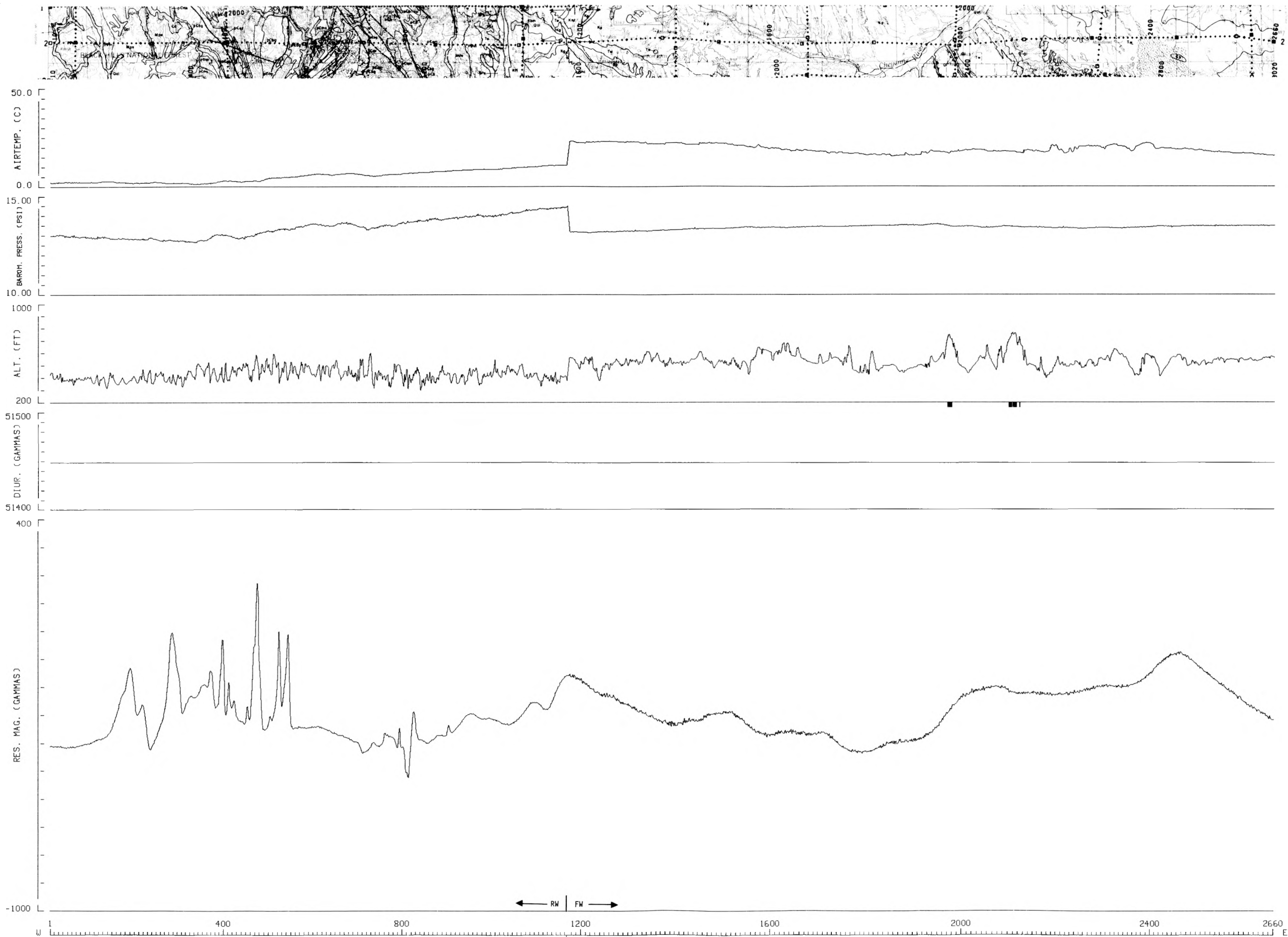


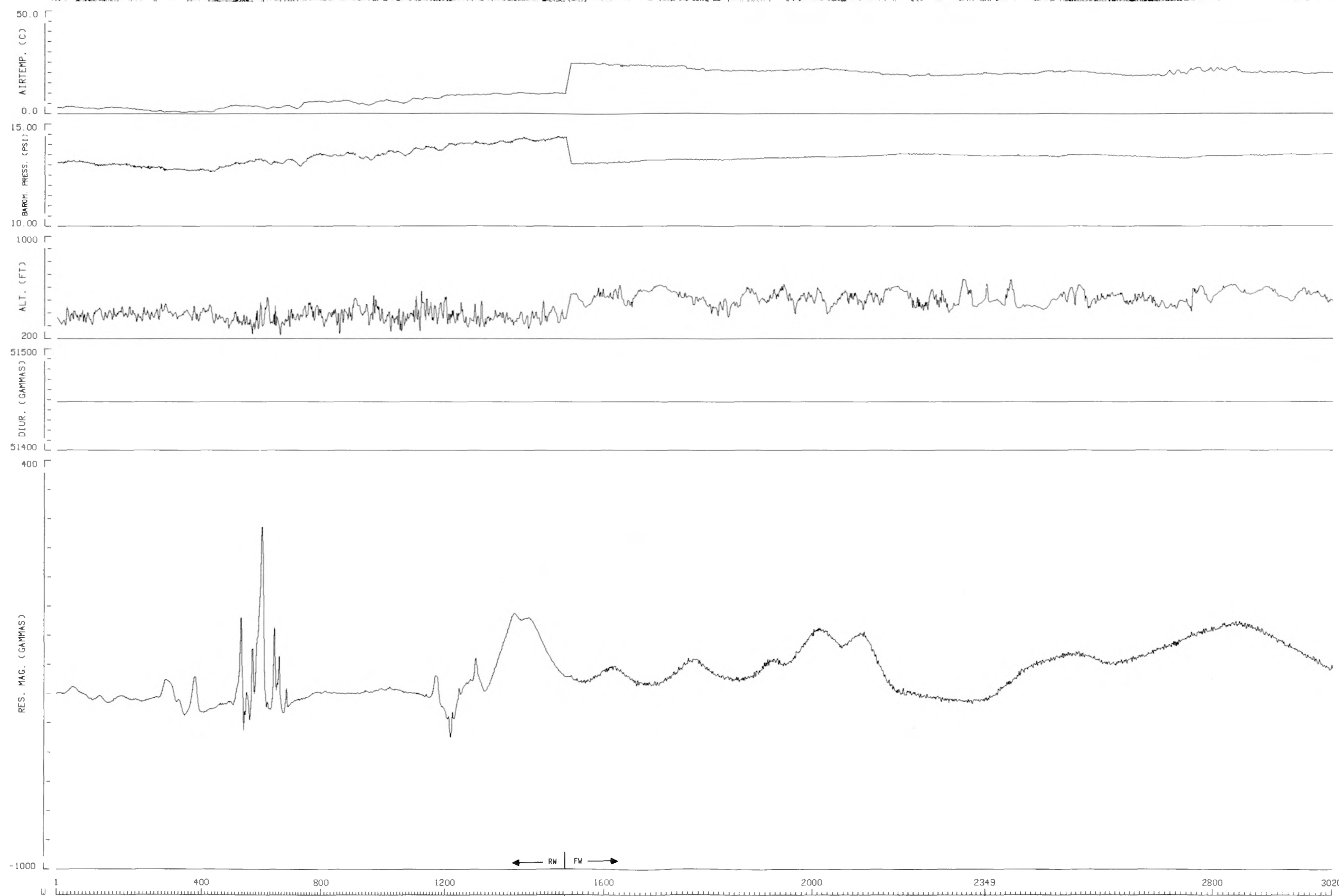
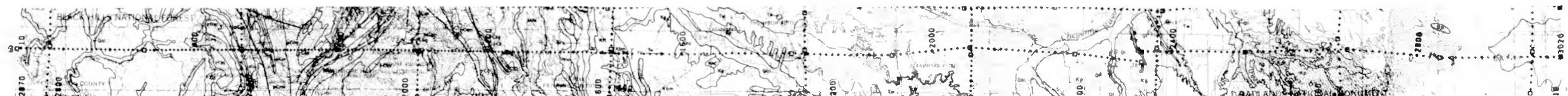
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 FL-107 HOT SPRINGS NK13-3



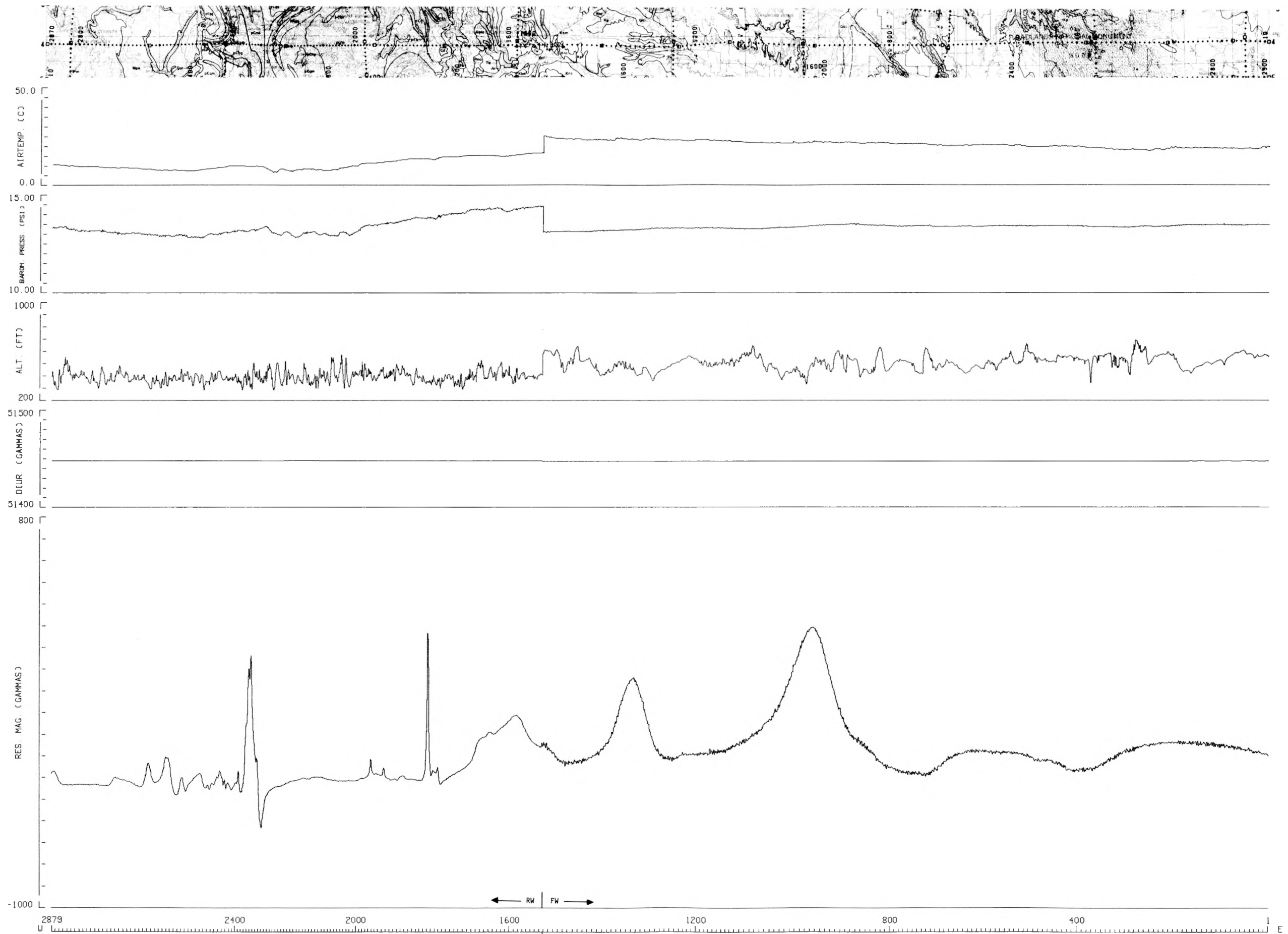


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 FL-001 HOT SPRINGS NK13-3

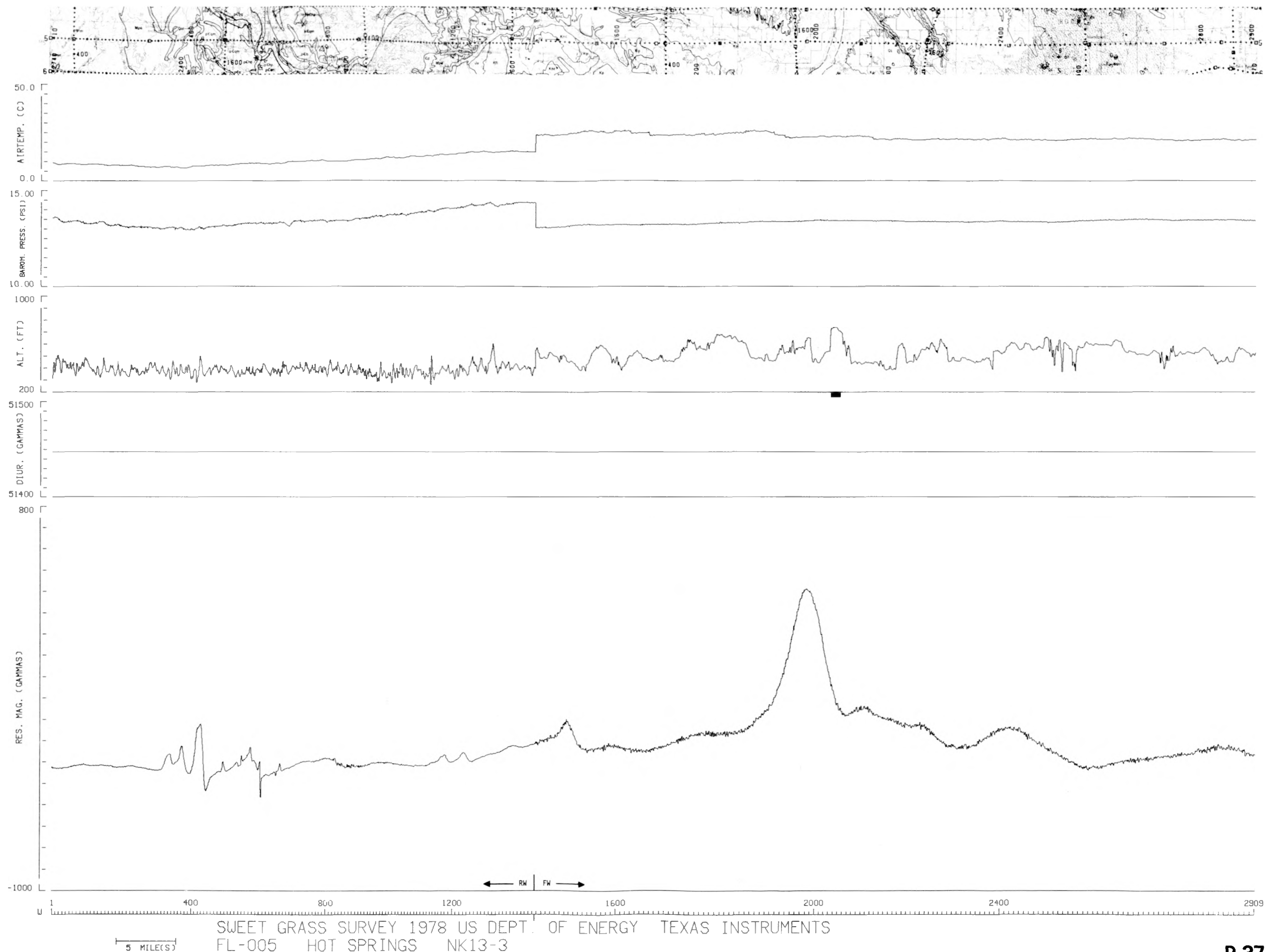




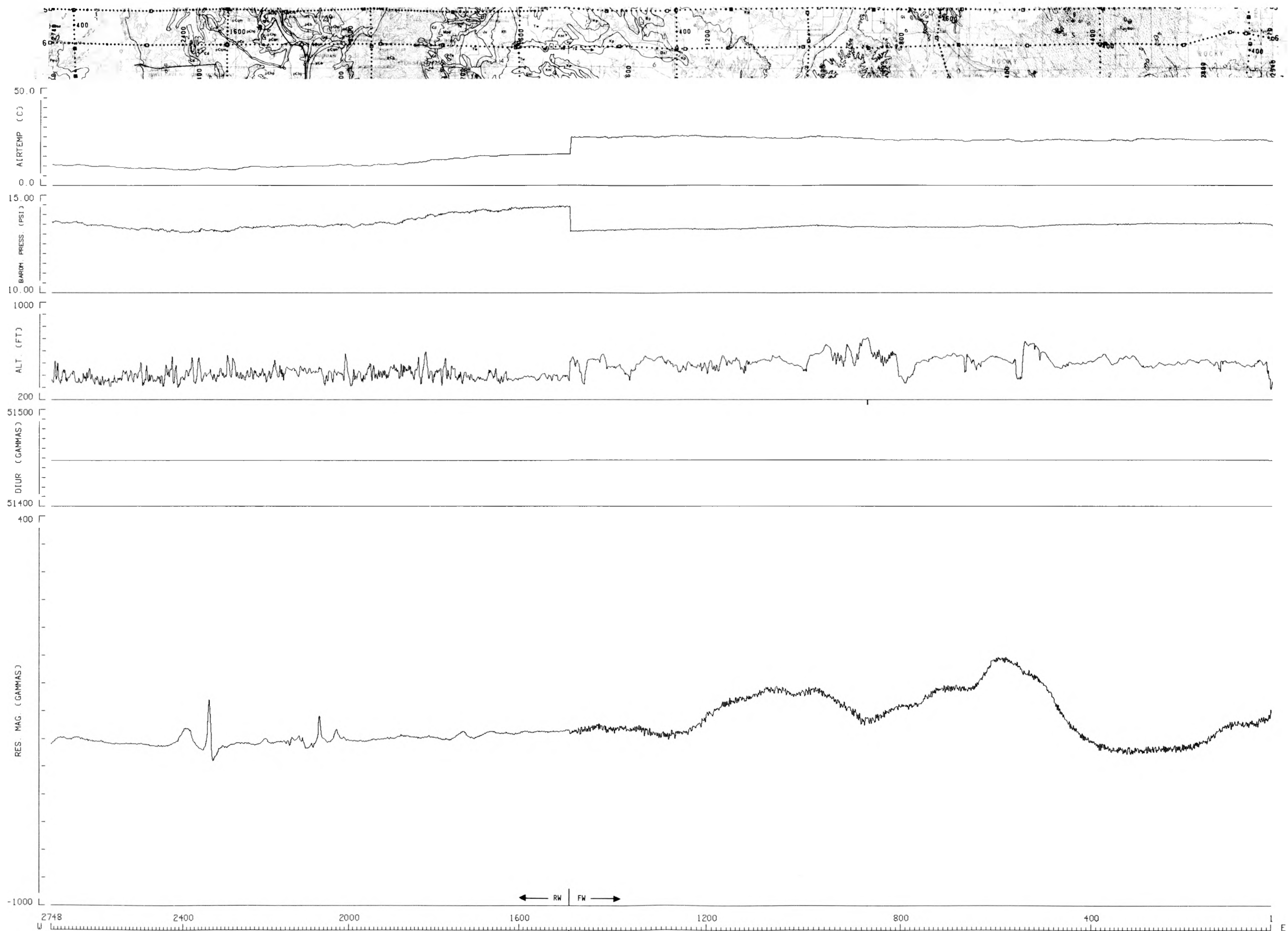
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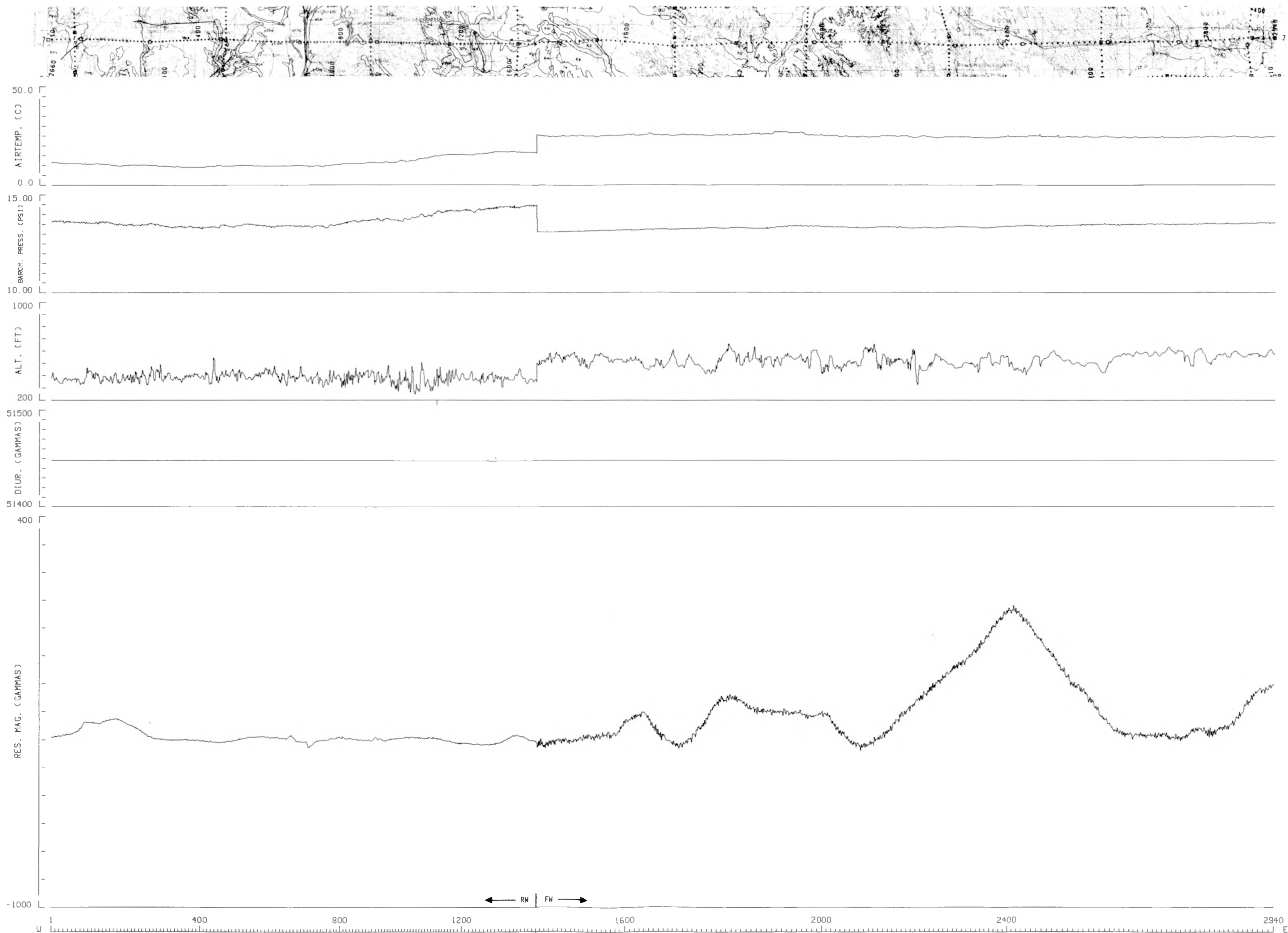
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 FL-004 HOT SPRINGS NK13-3



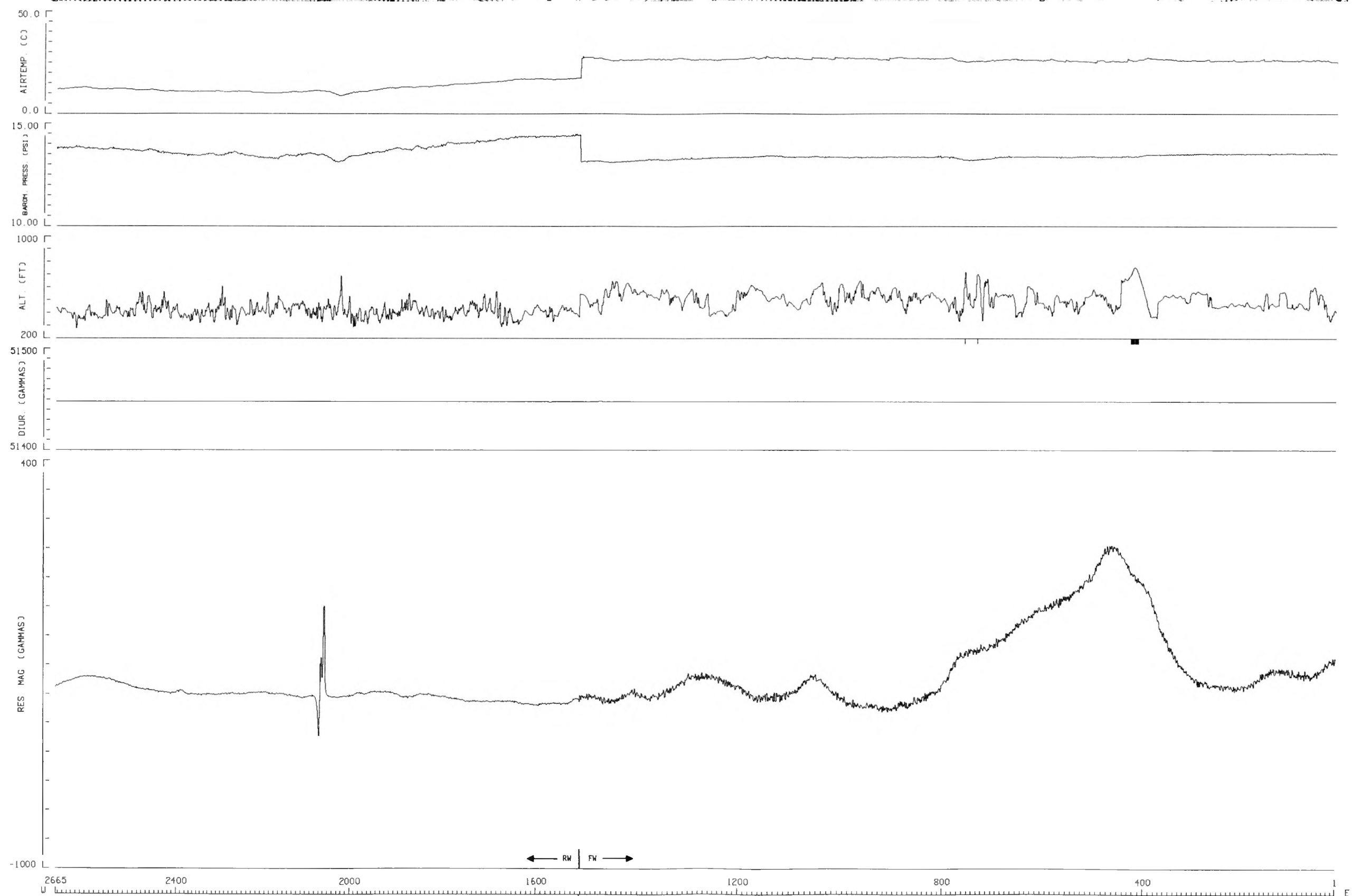
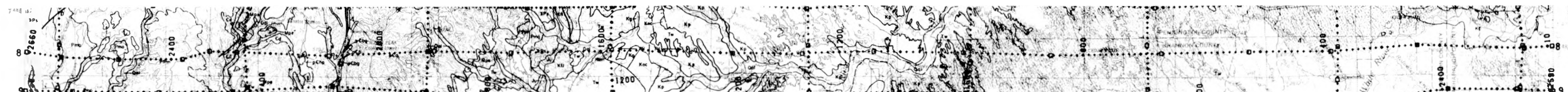
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FL-005 HOT SPRINGS NK13-3

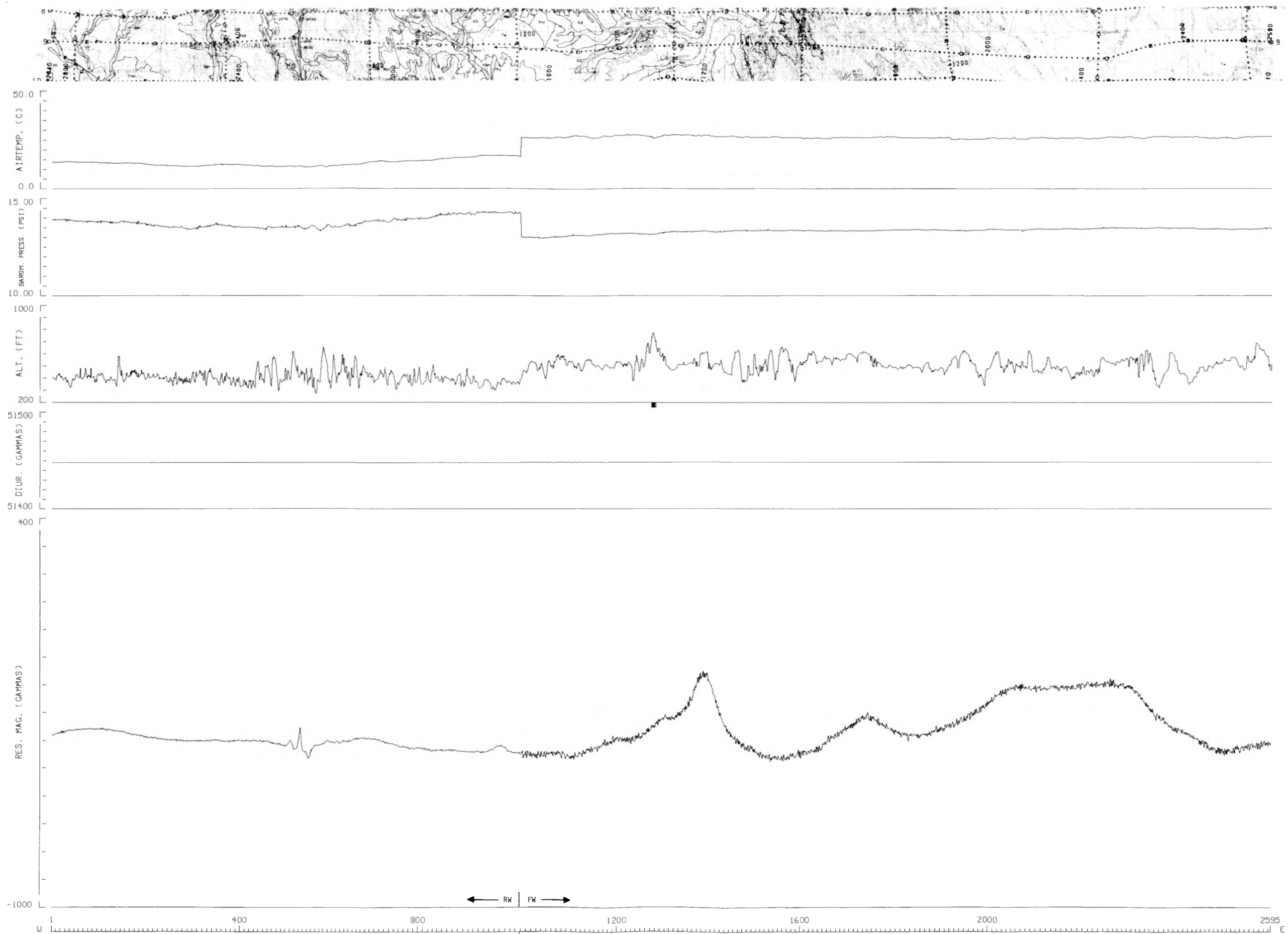


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FL-006 HOT SPRINGS NK13-3

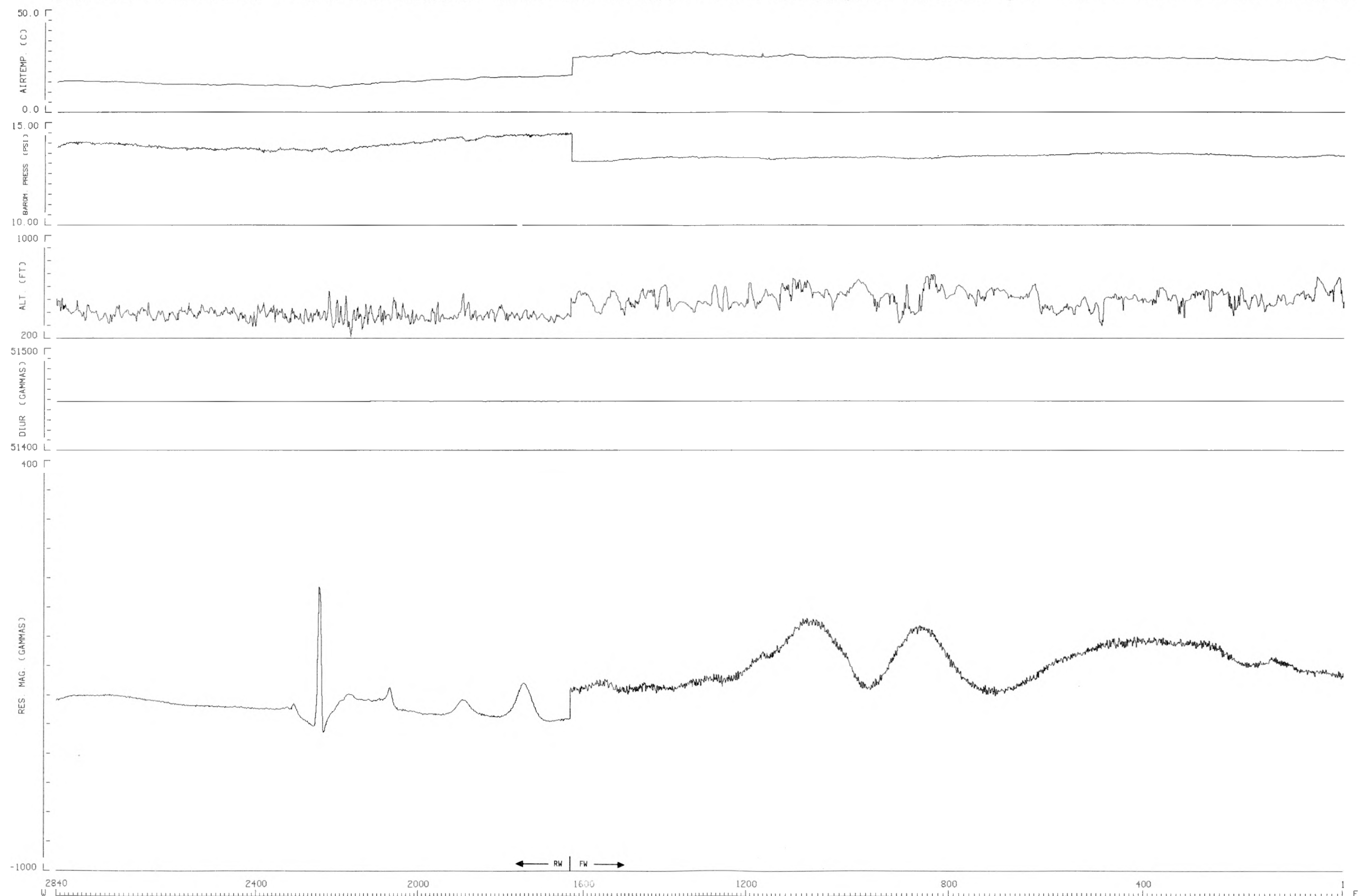
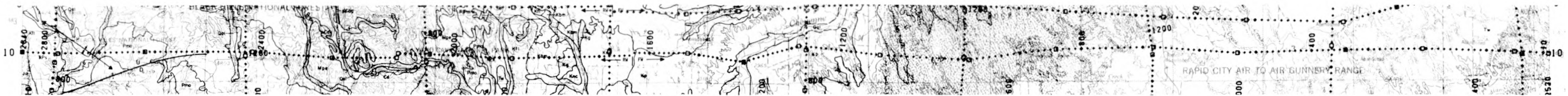


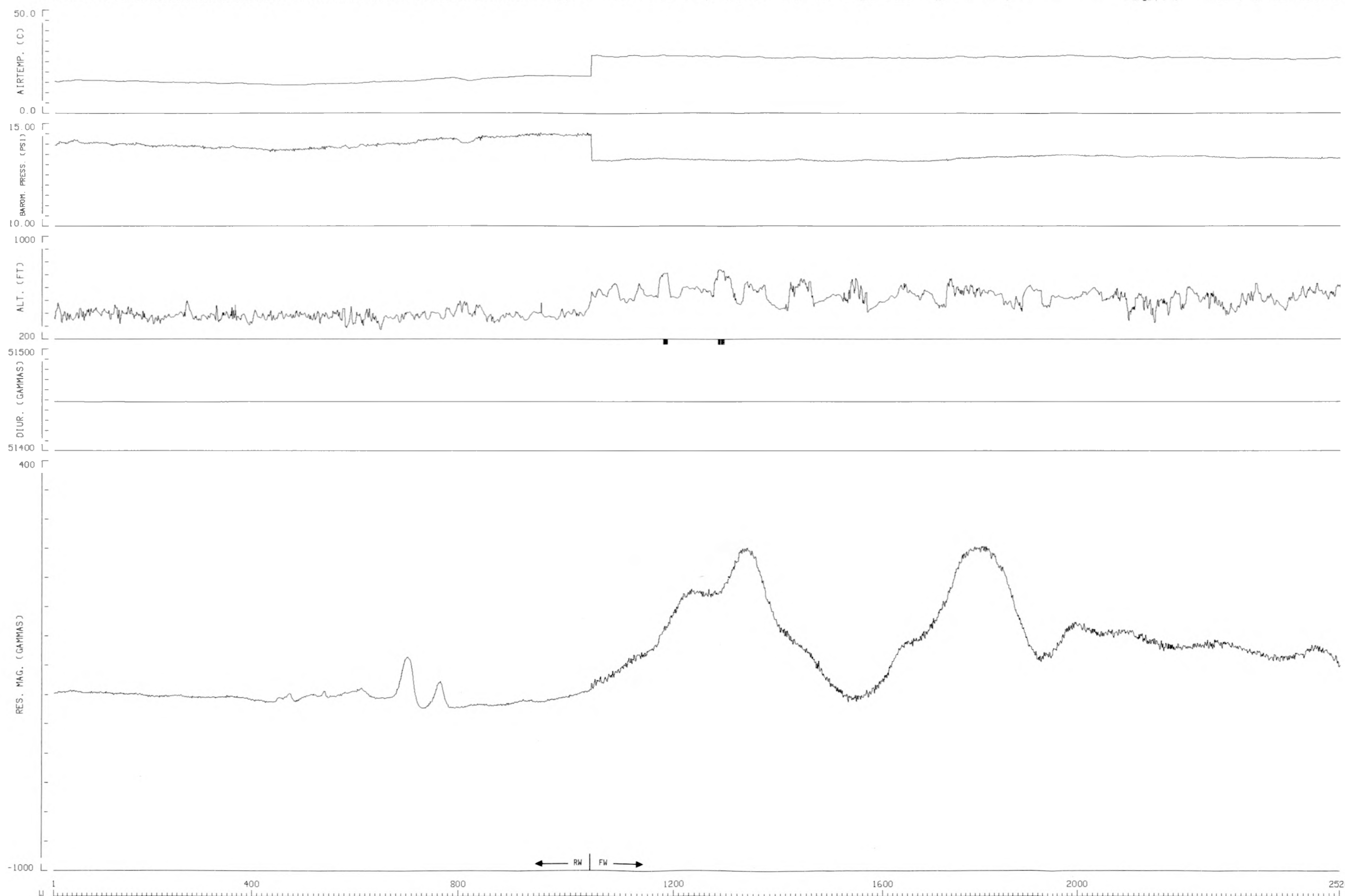
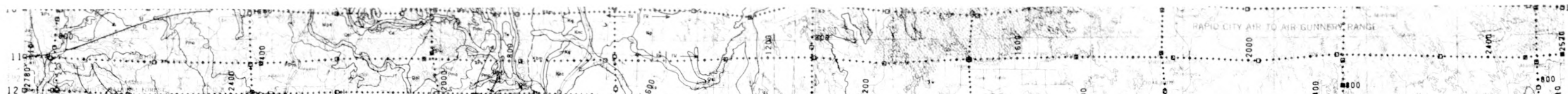
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FL-007 HOT SPRINGS NK13-3





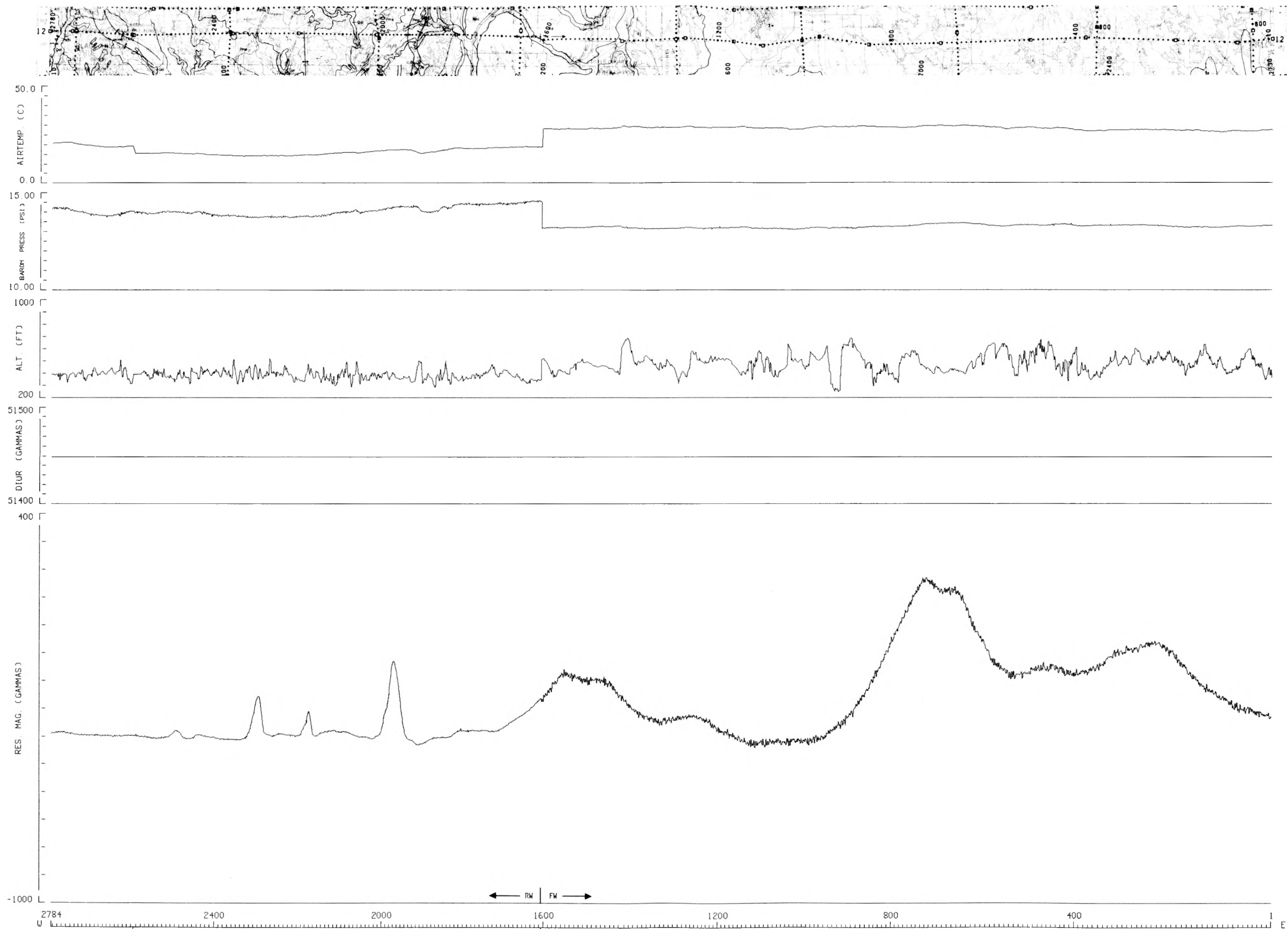
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FL-009 HOT SPRINGS NK13-3



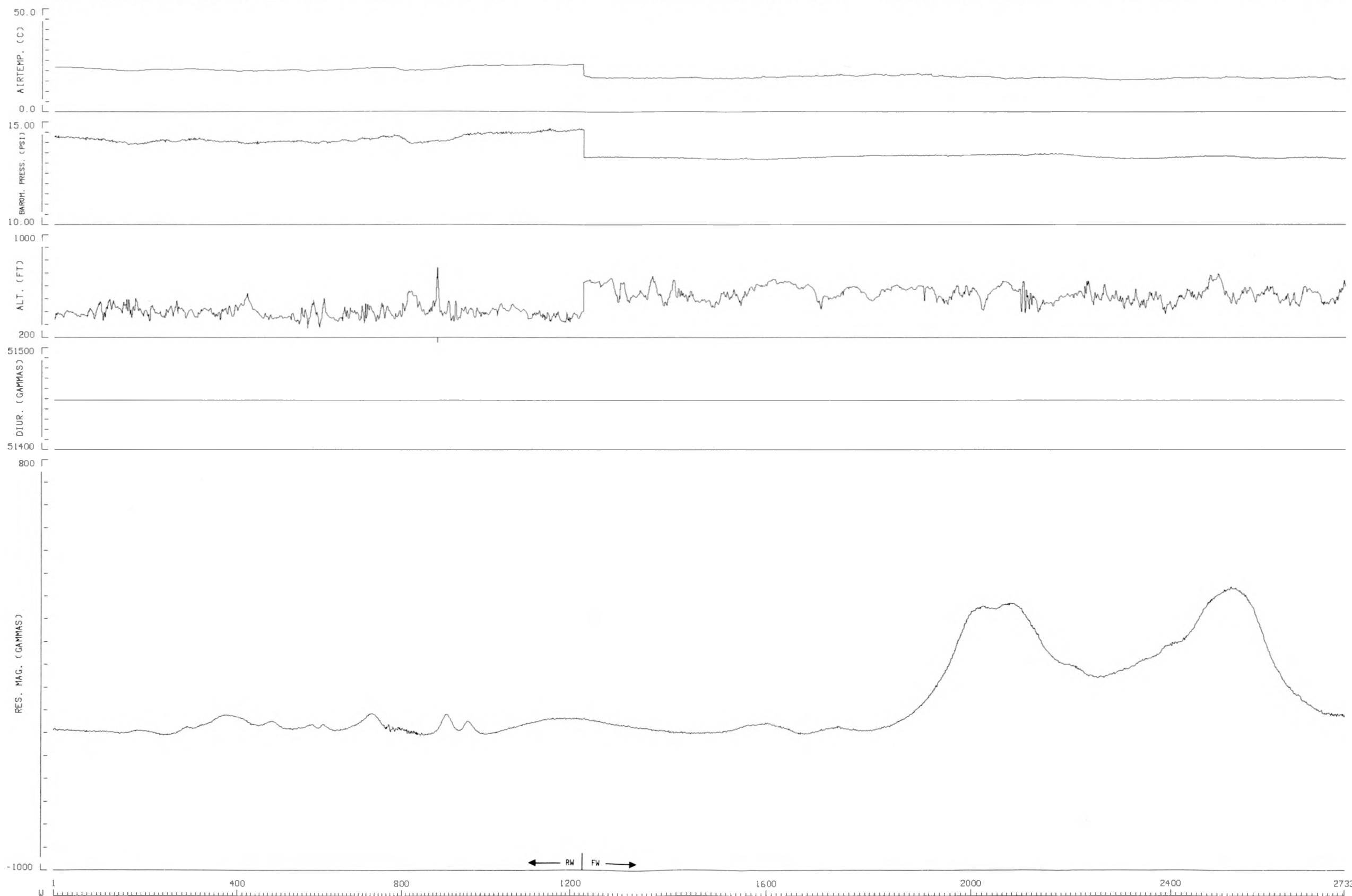
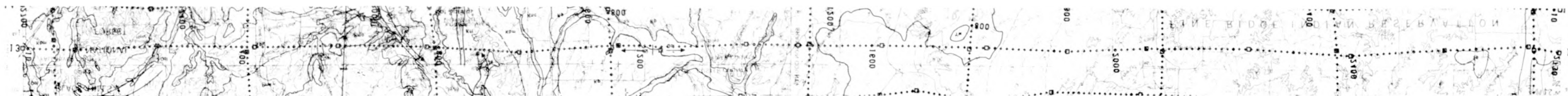


5 MILE(S)

SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
FL-011 HOT SPRINGS NK13-3

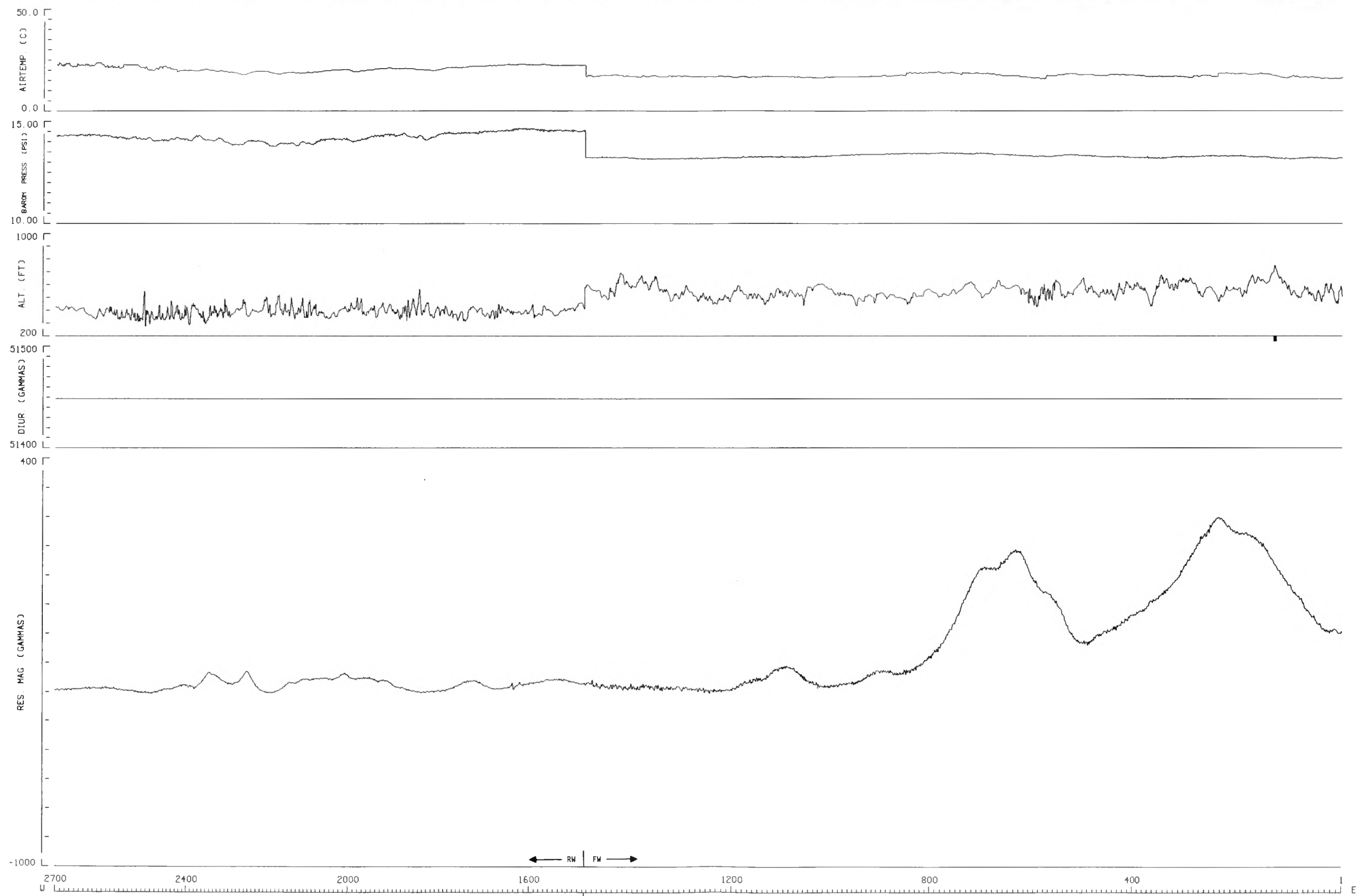
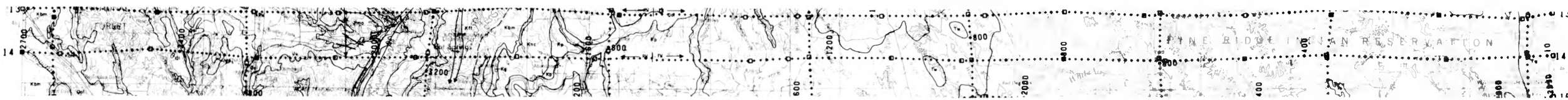


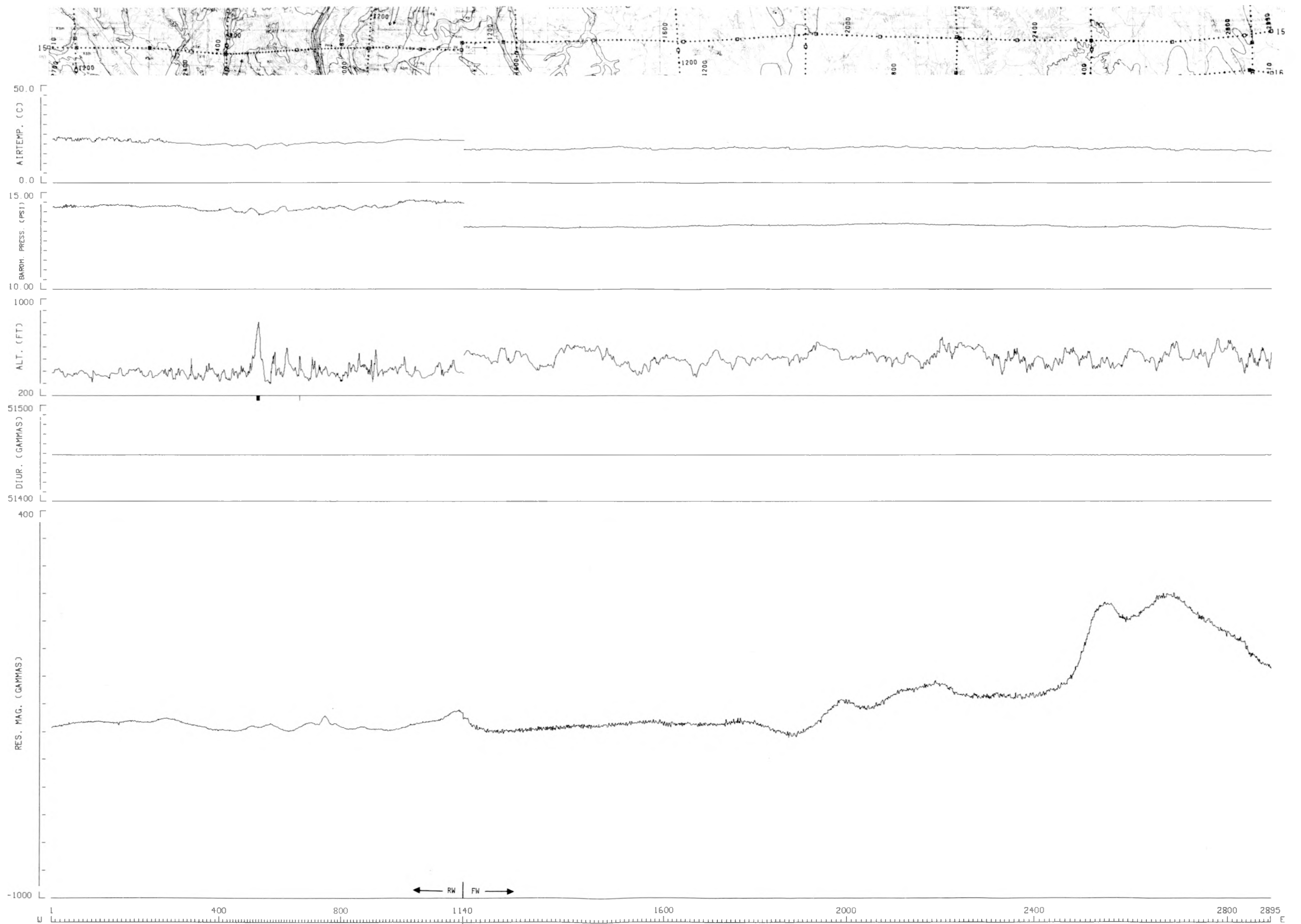
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FL-012 HOT SPRINGS NK13-3



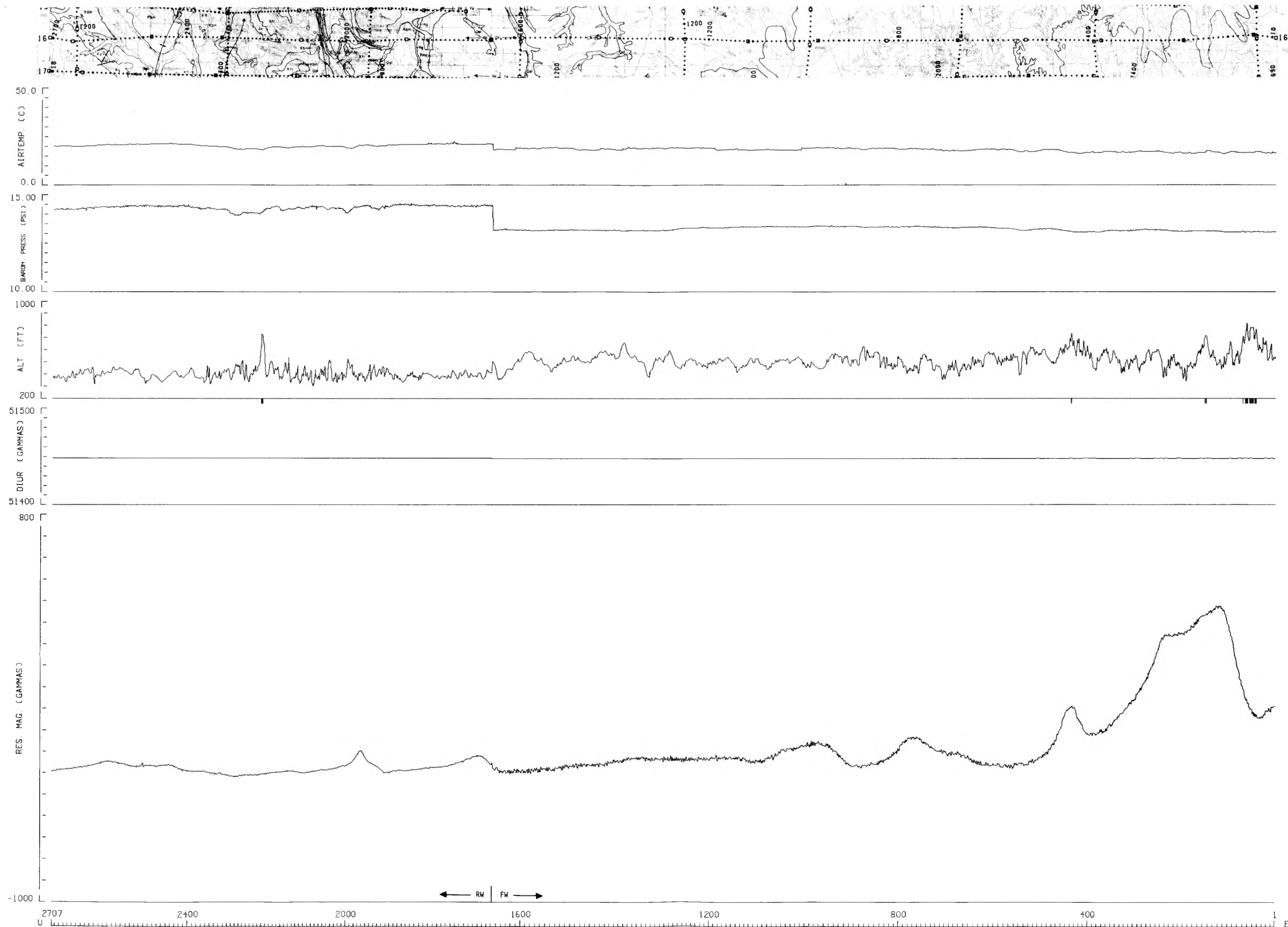
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FL-013 HOT SPRINGS NK13-3

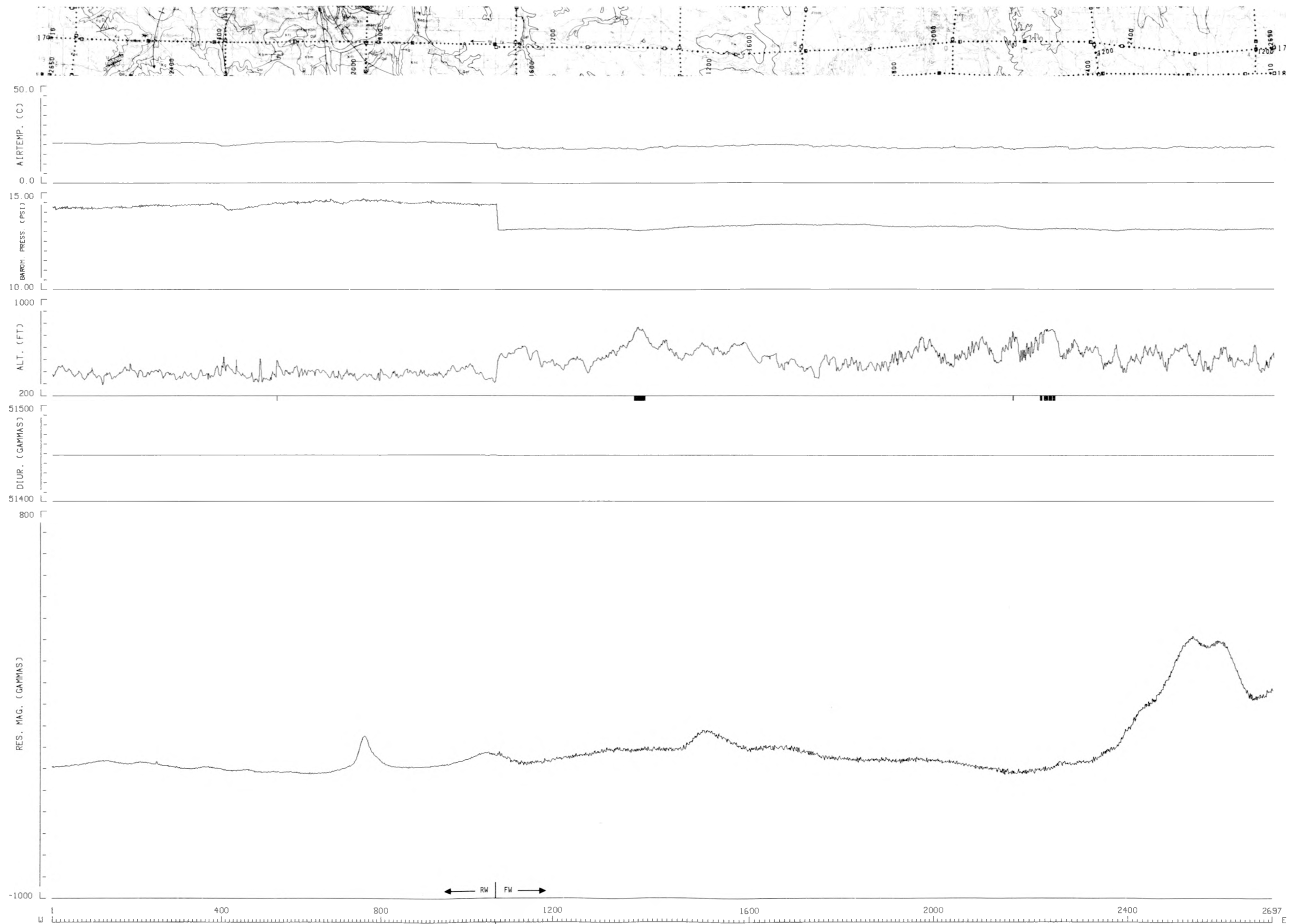




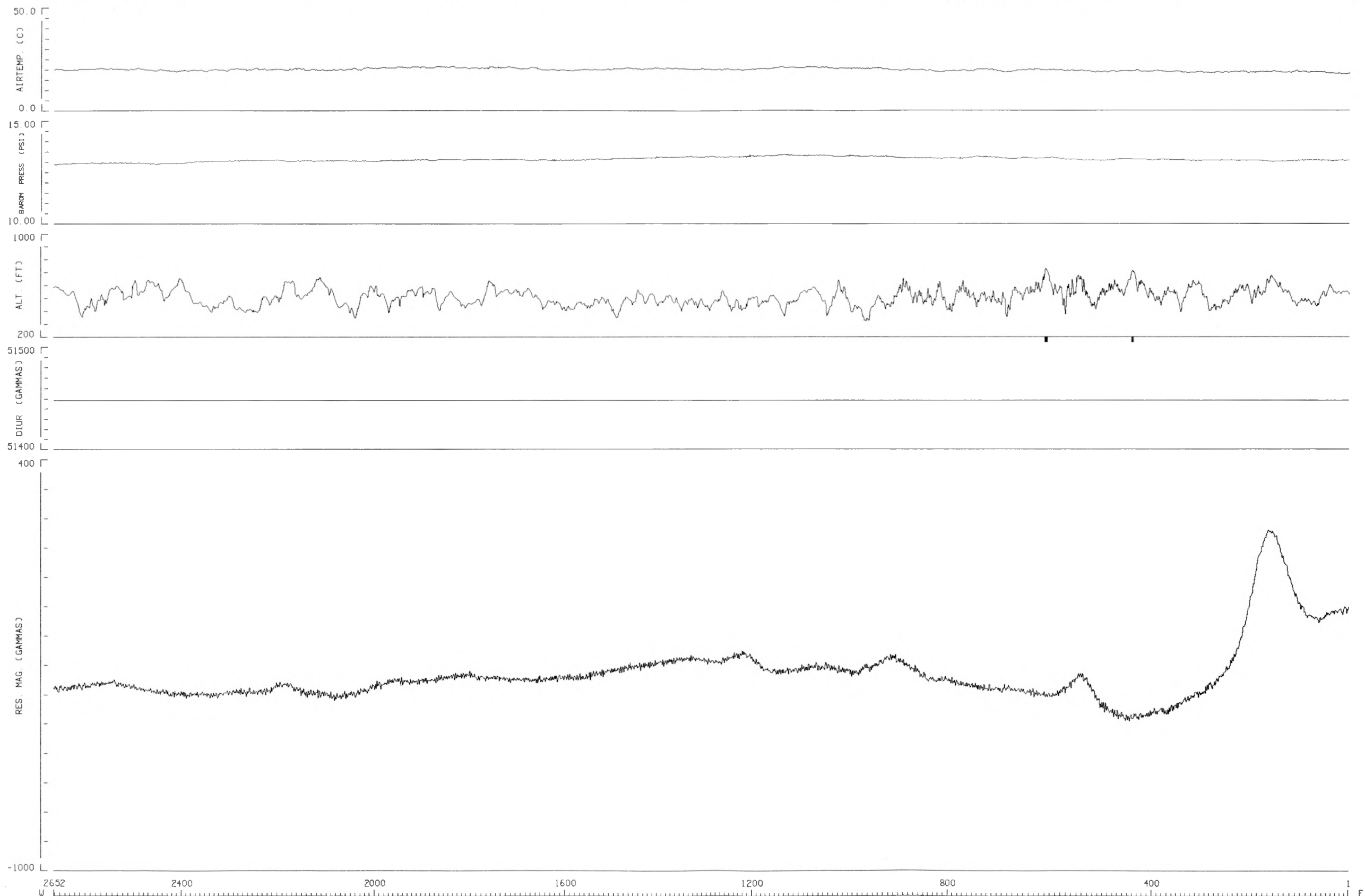
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FL-015 HOT SPRINGS NK13-3



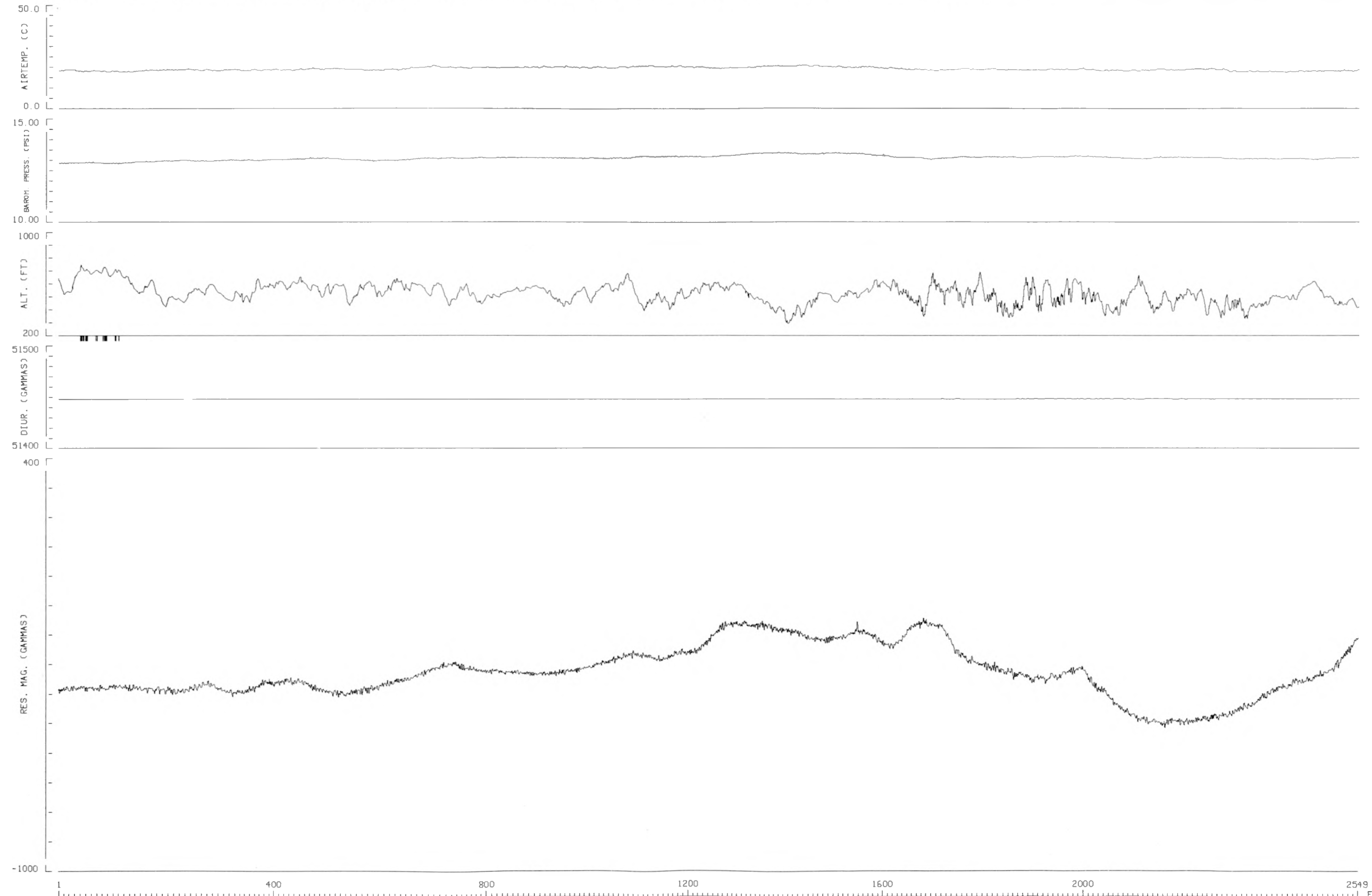
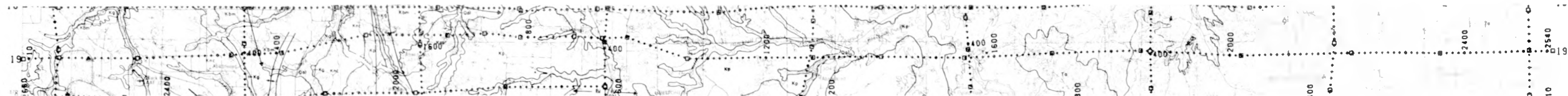
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-016 HOT SPRINGS NK13-3



SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
FL-017 HOT SPRINGS NK13-3

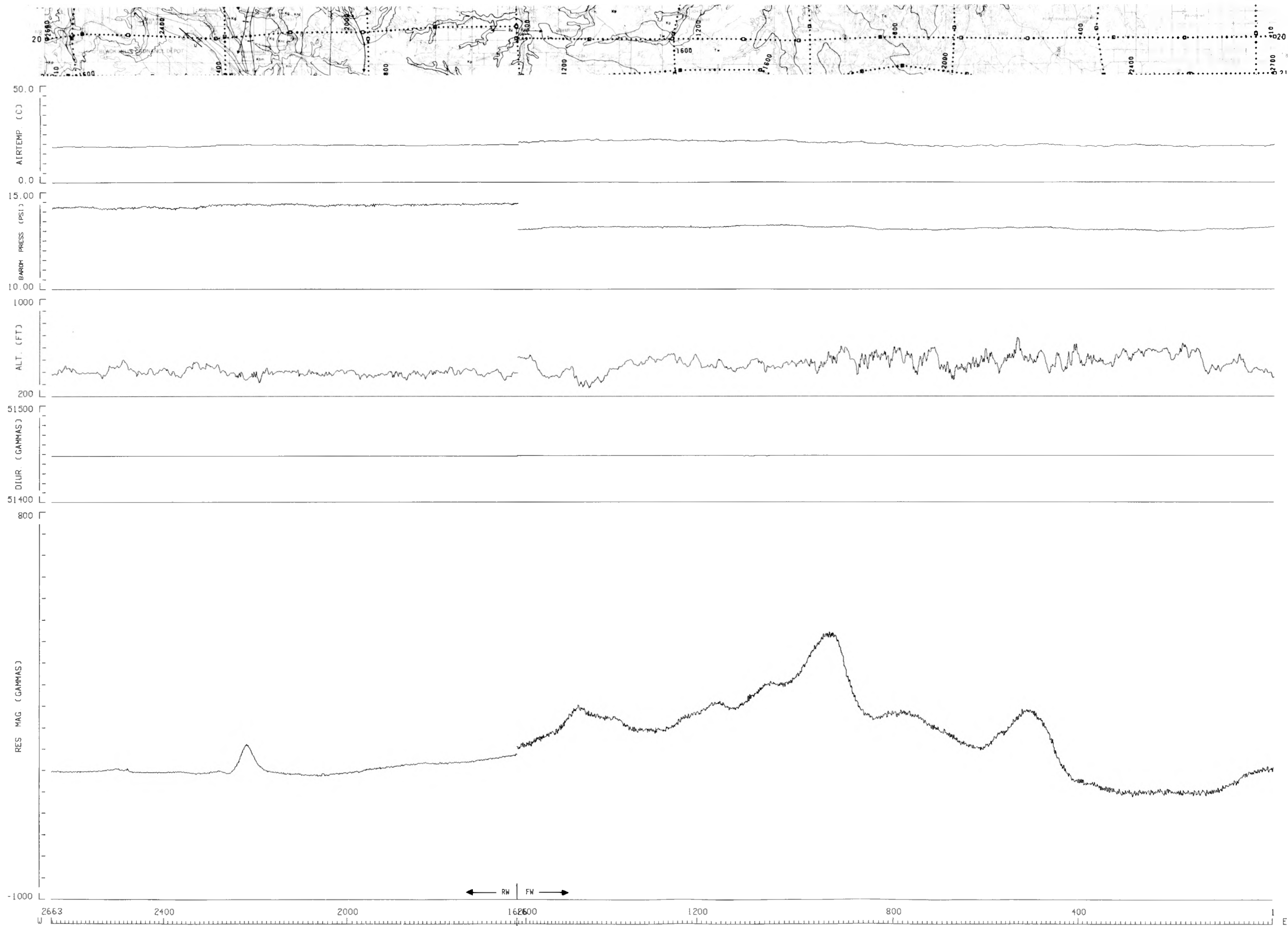


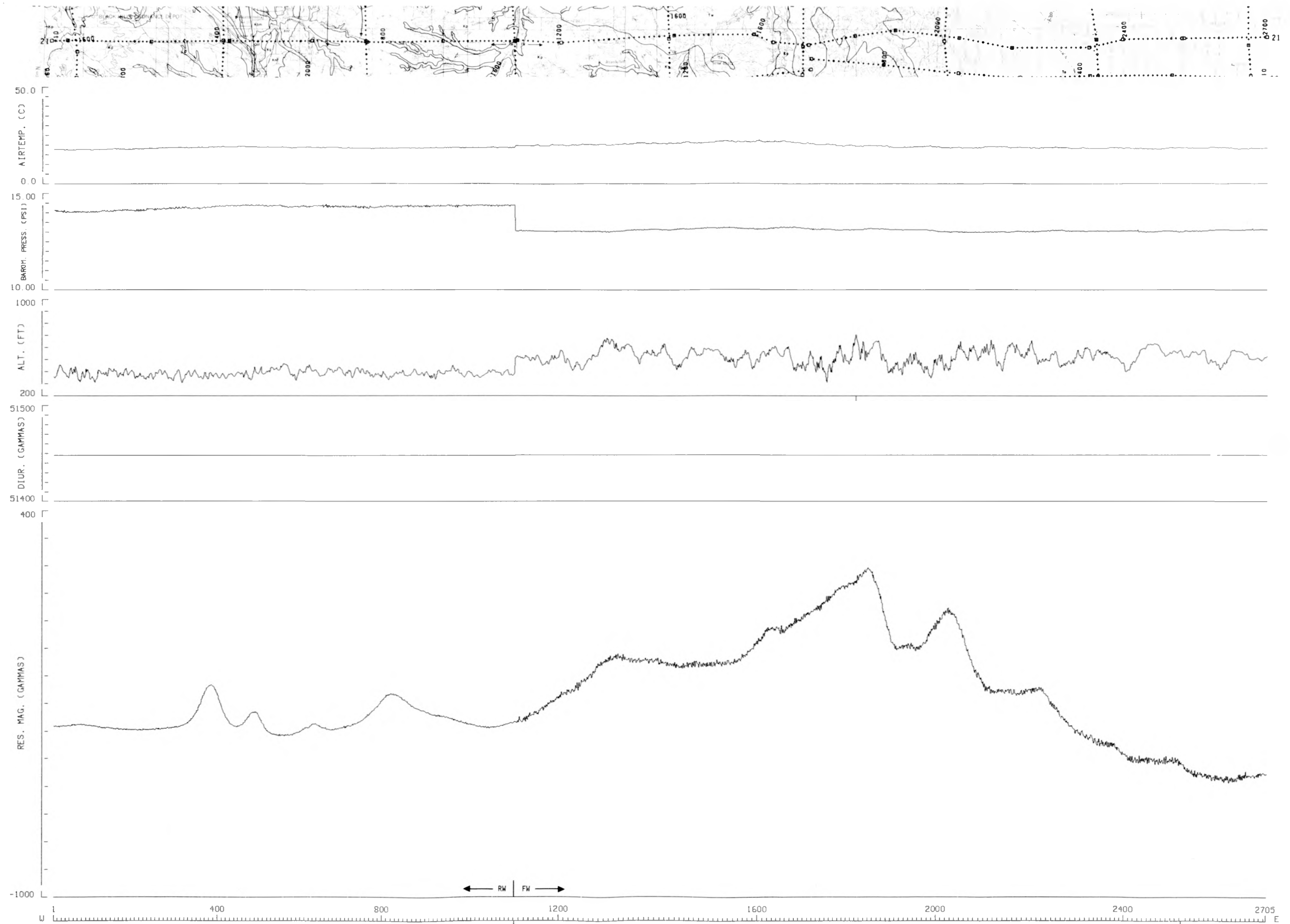
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FL-018 HOT SPRINGS NK13-3



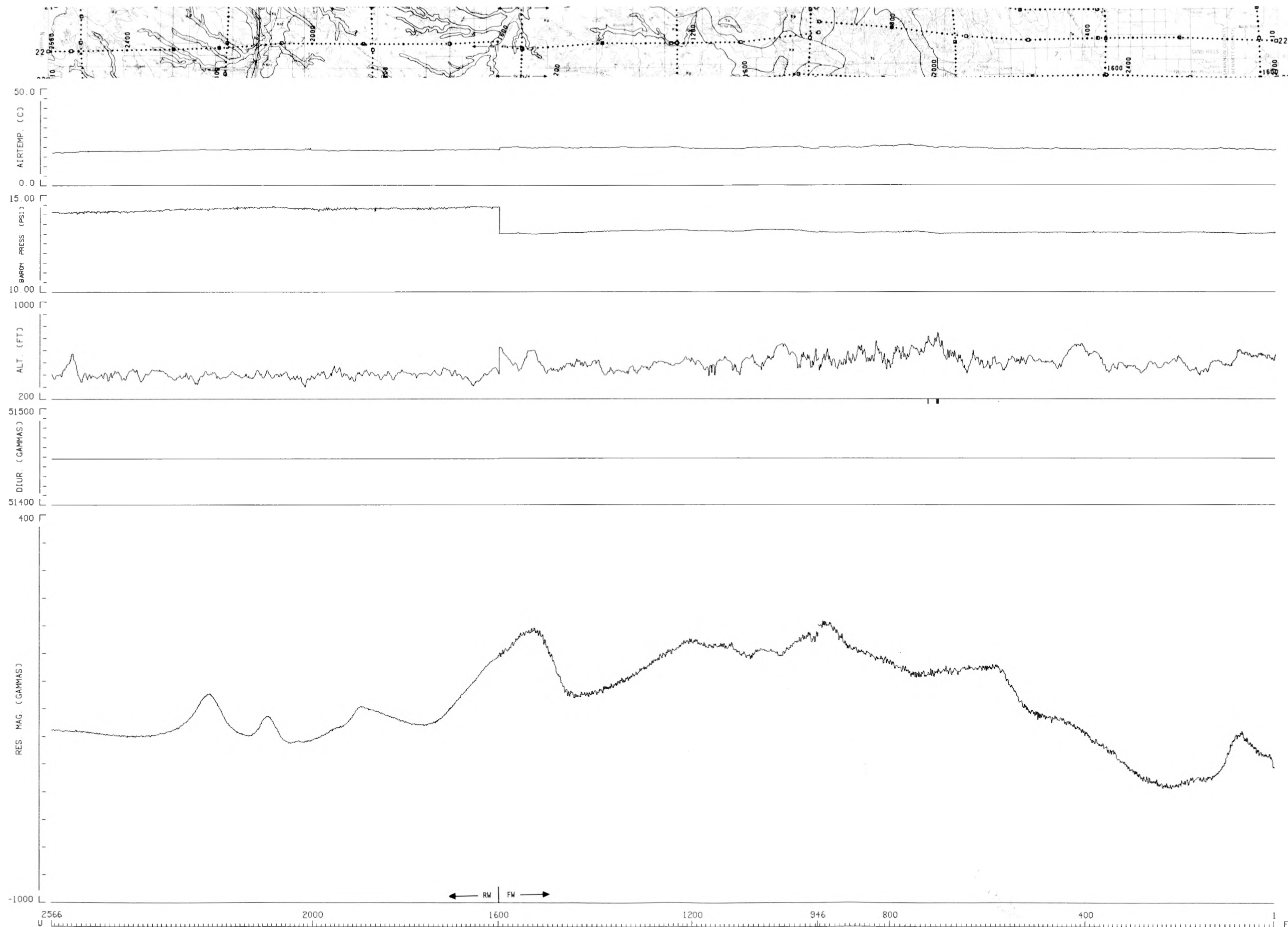
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FL-019 HOT SPRINGS NK13-3

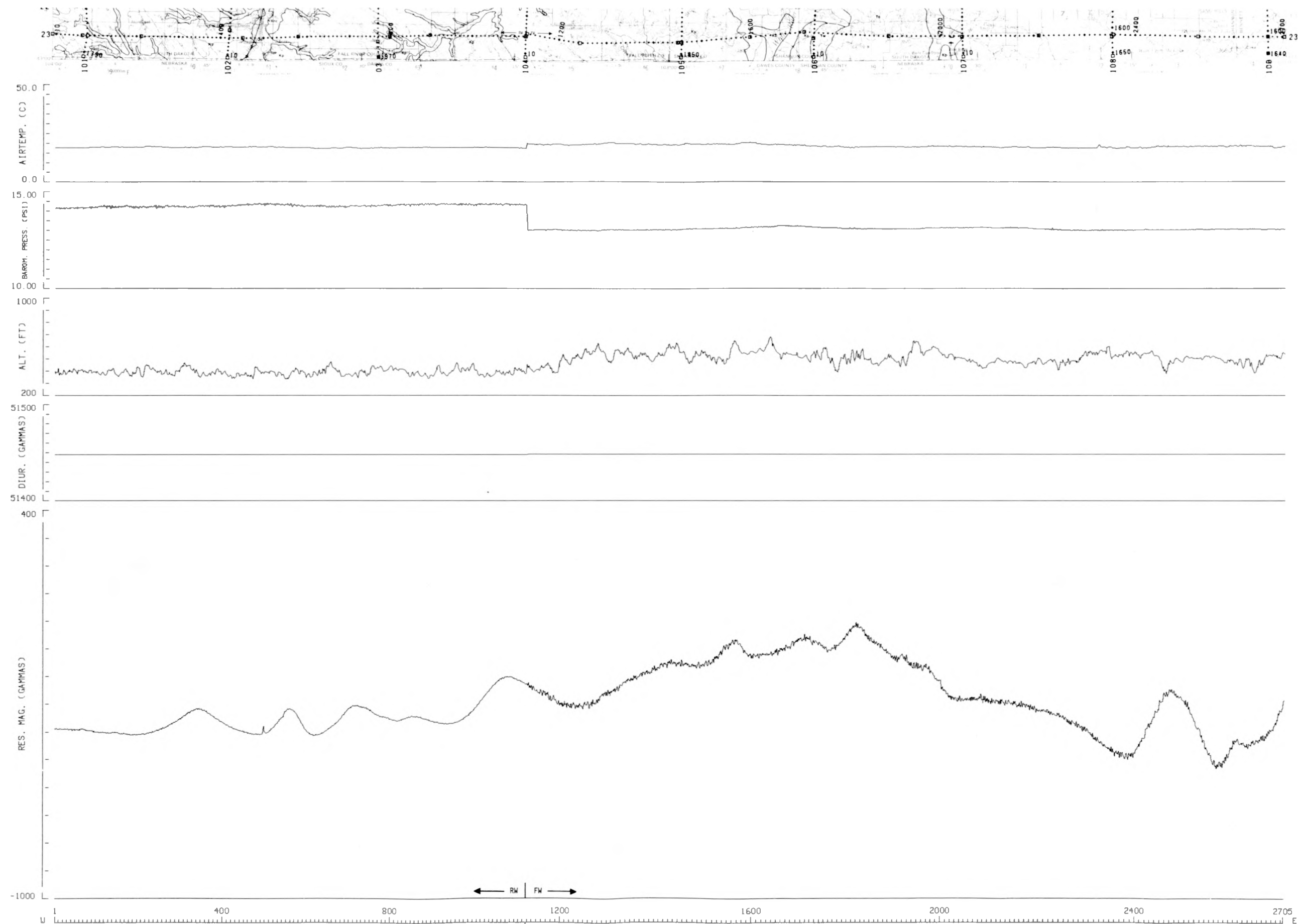
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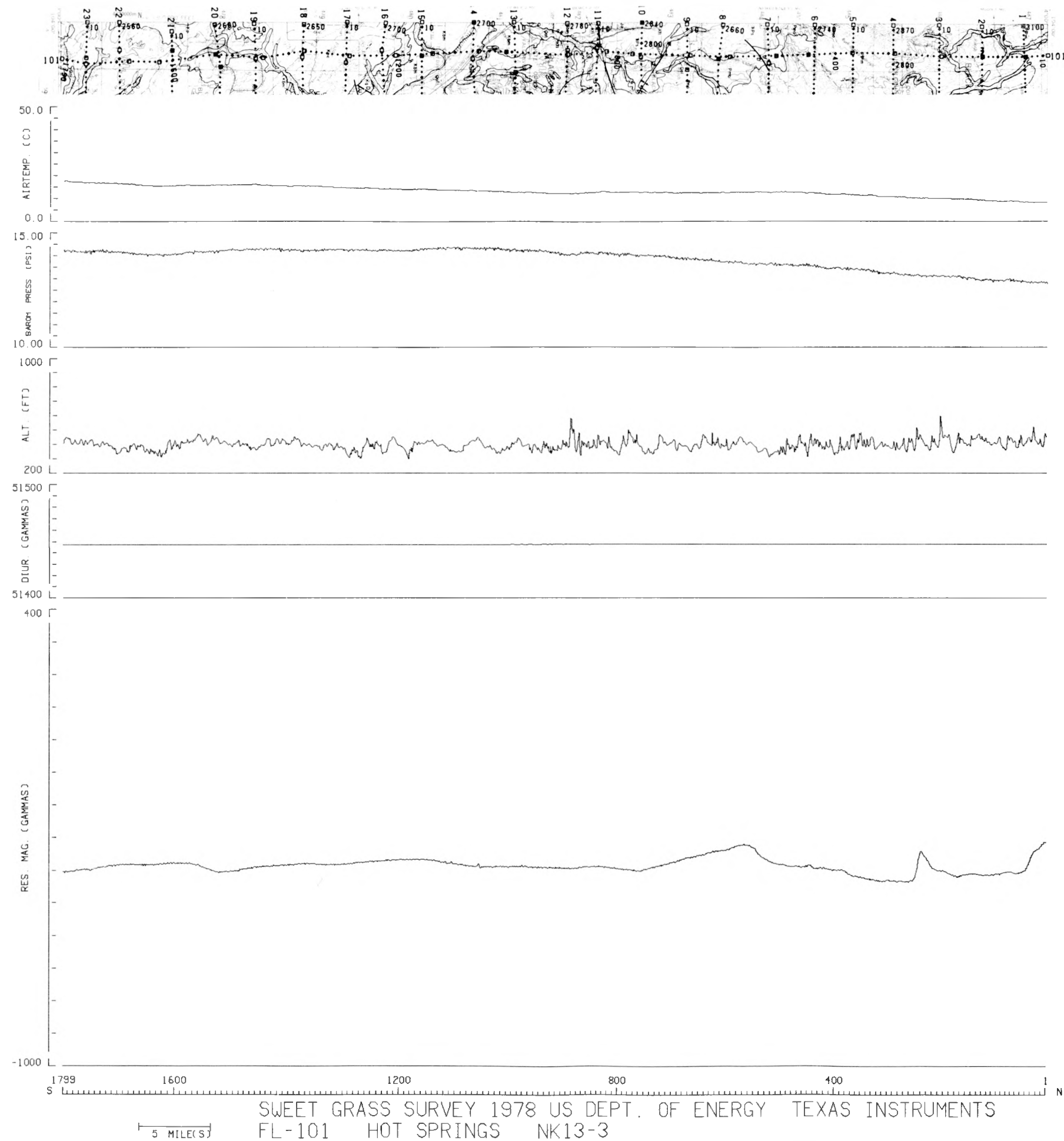


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 FL-021 HOT SPRINGS NK13-3



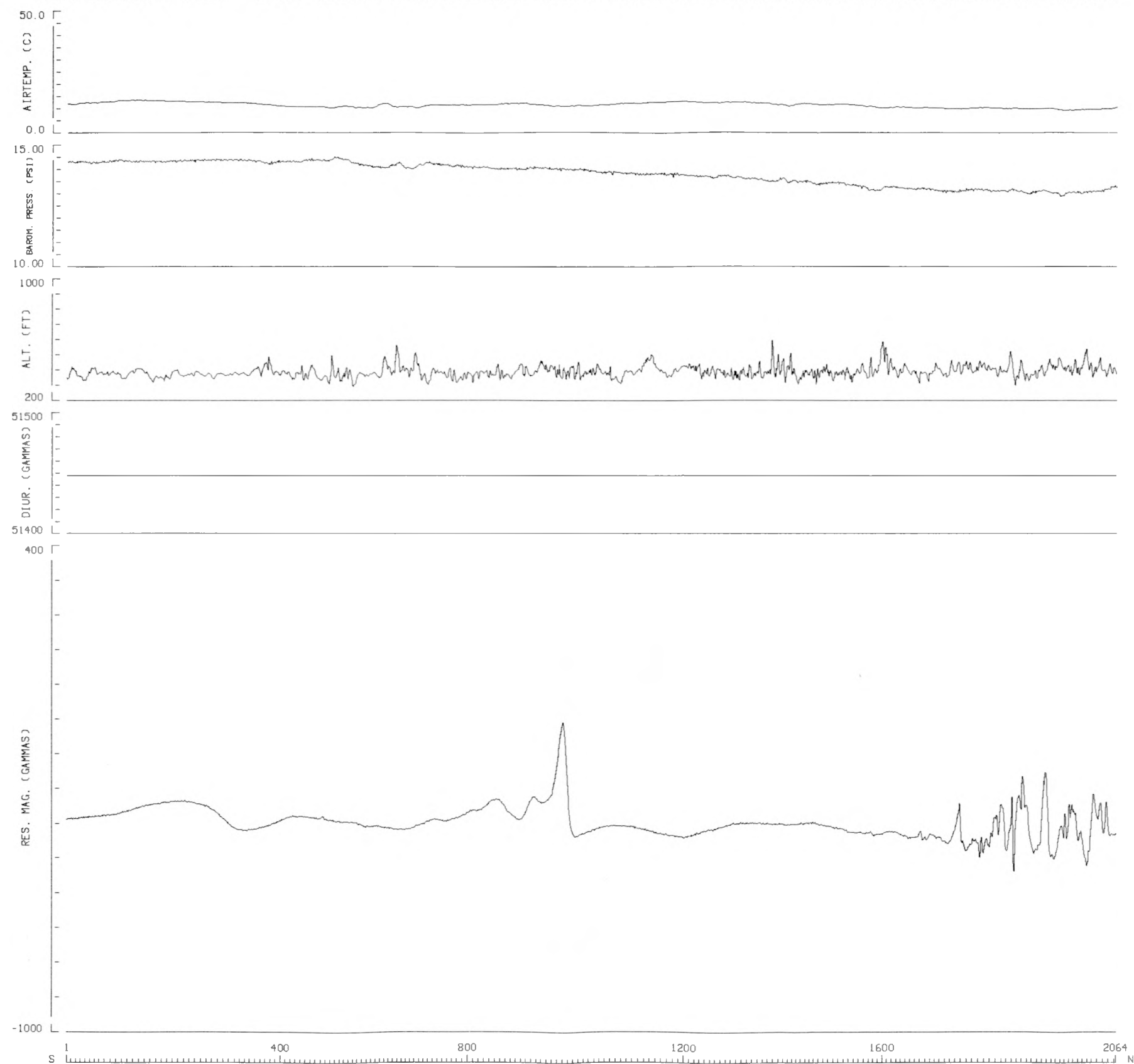
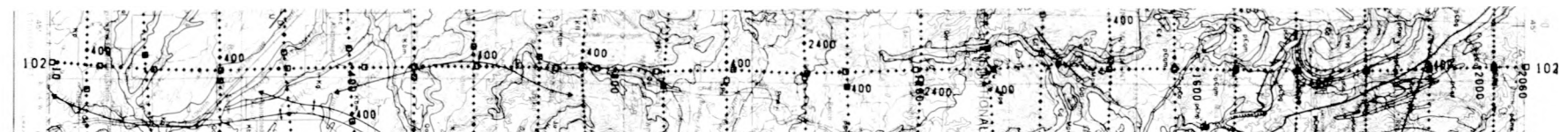


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FL-023 HOT SPRINGS NK13-3

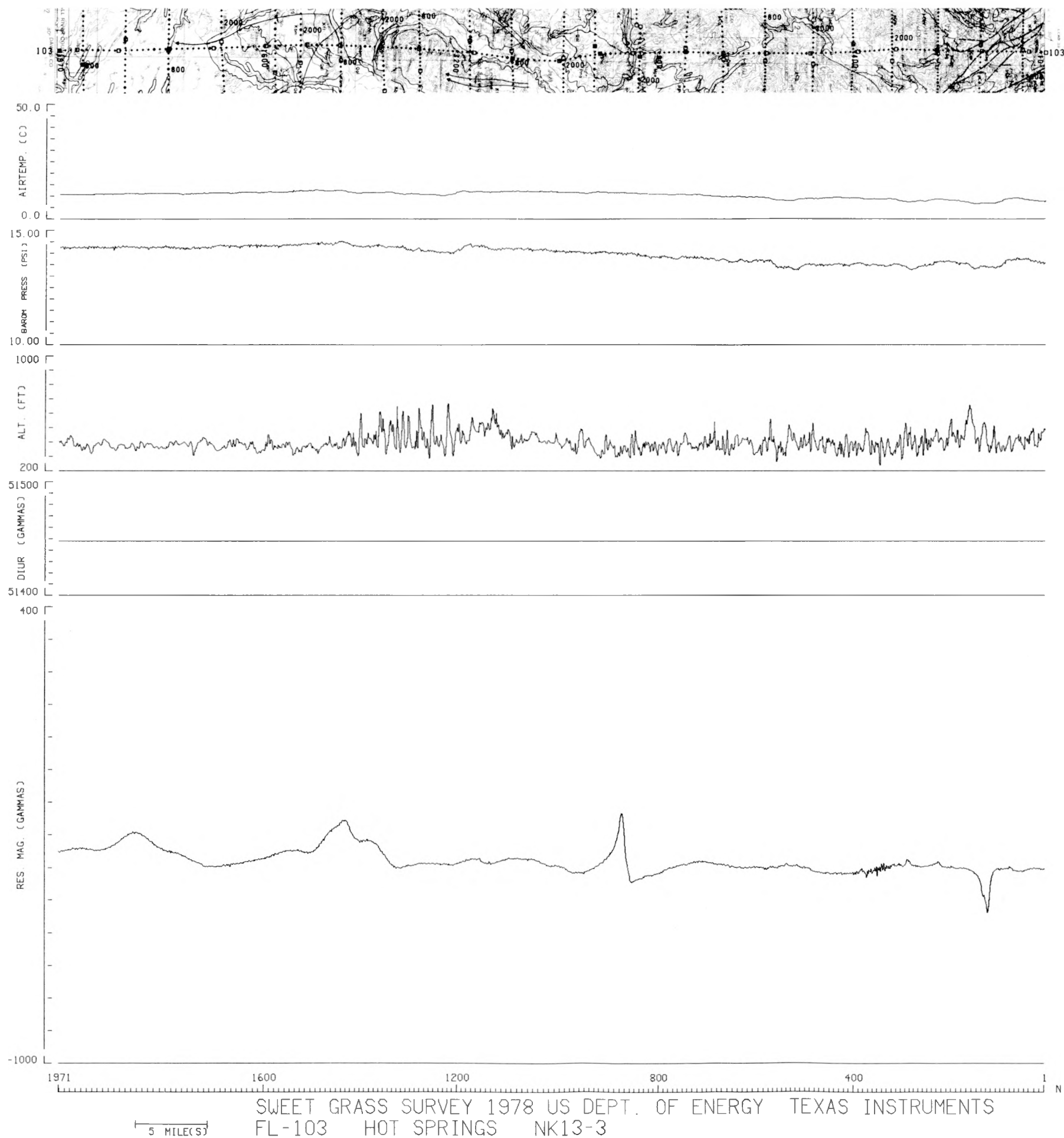


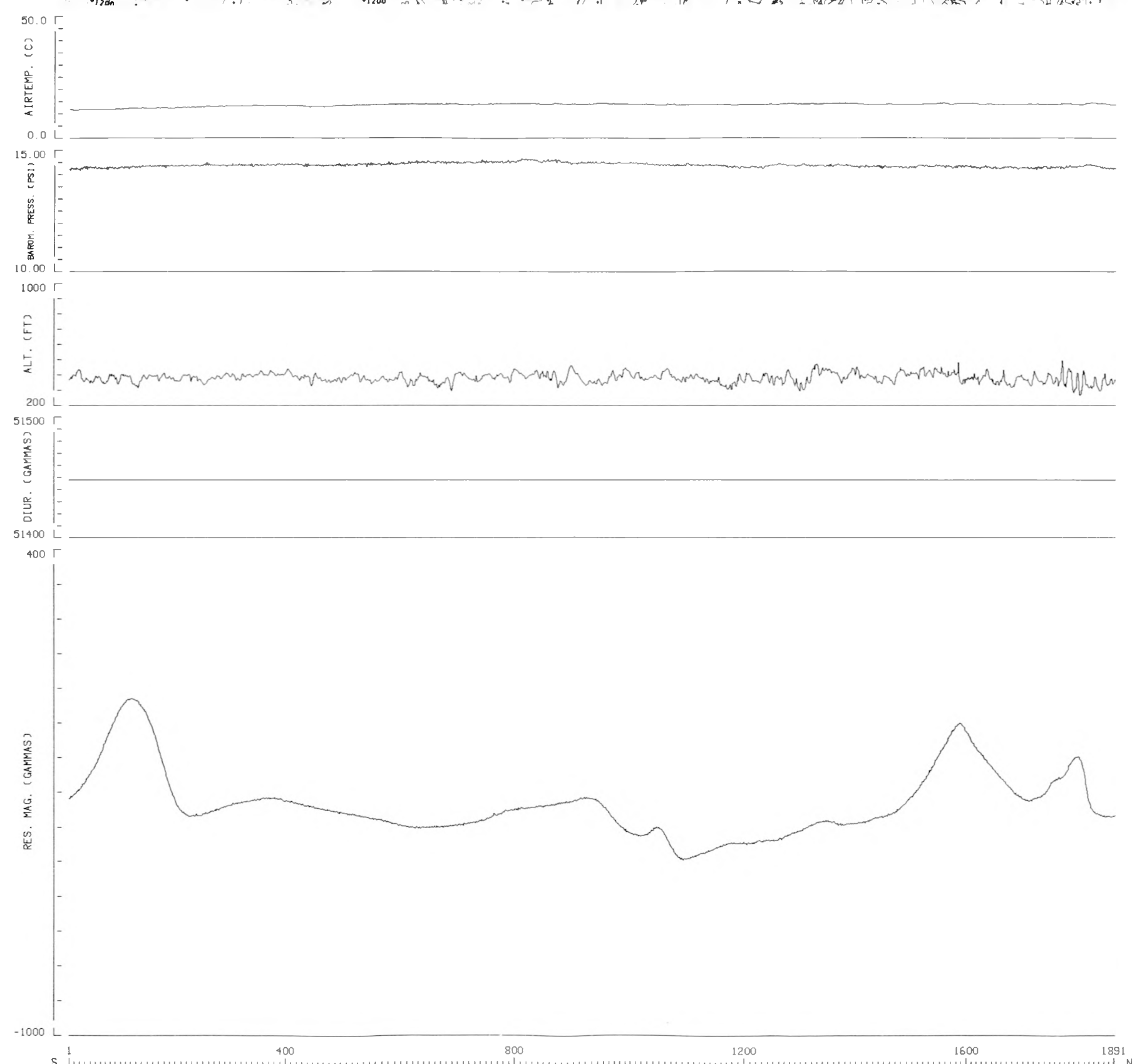
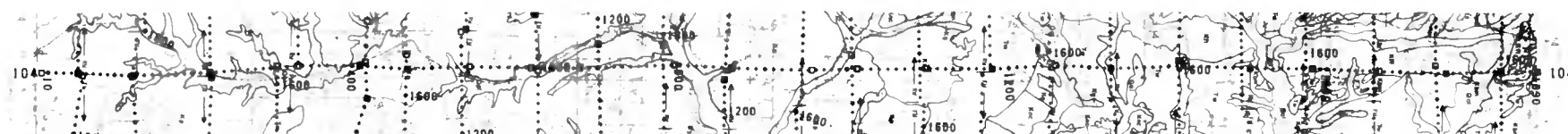
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
 FL-101 HOT SPRINGS NK13-3

5 MILE(S)

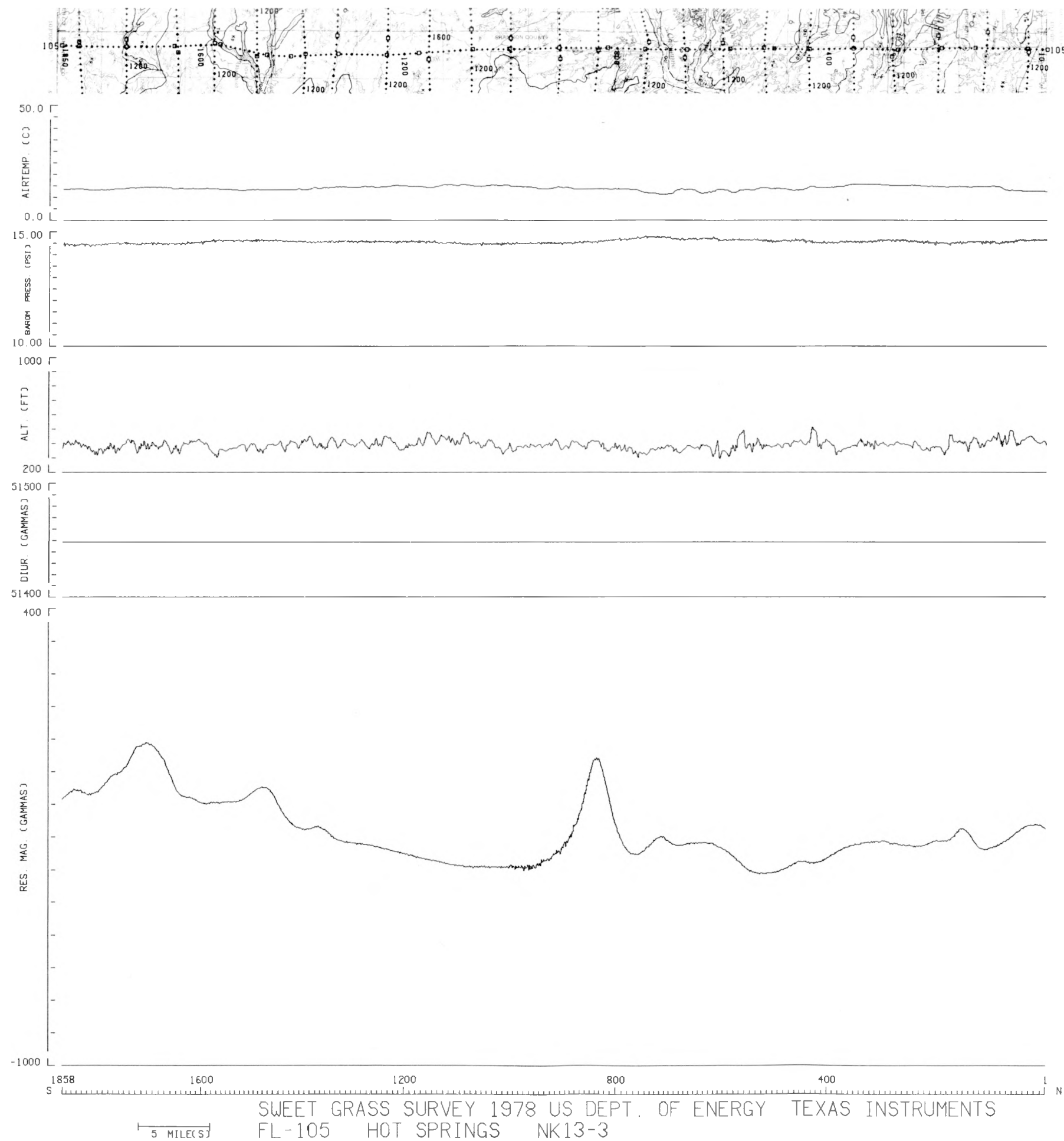


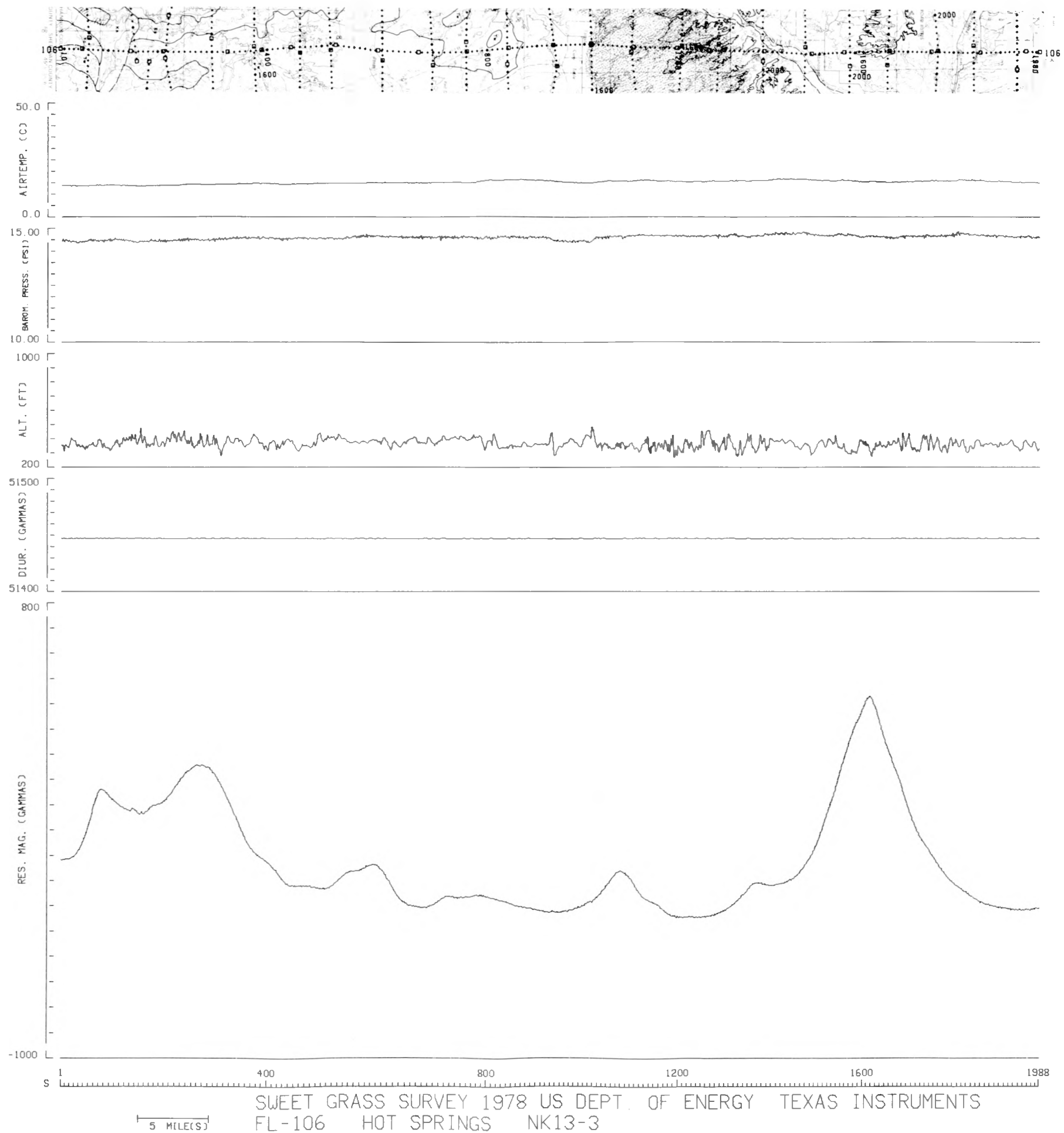
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
FL-102 HOT SPRINGS NK13-3

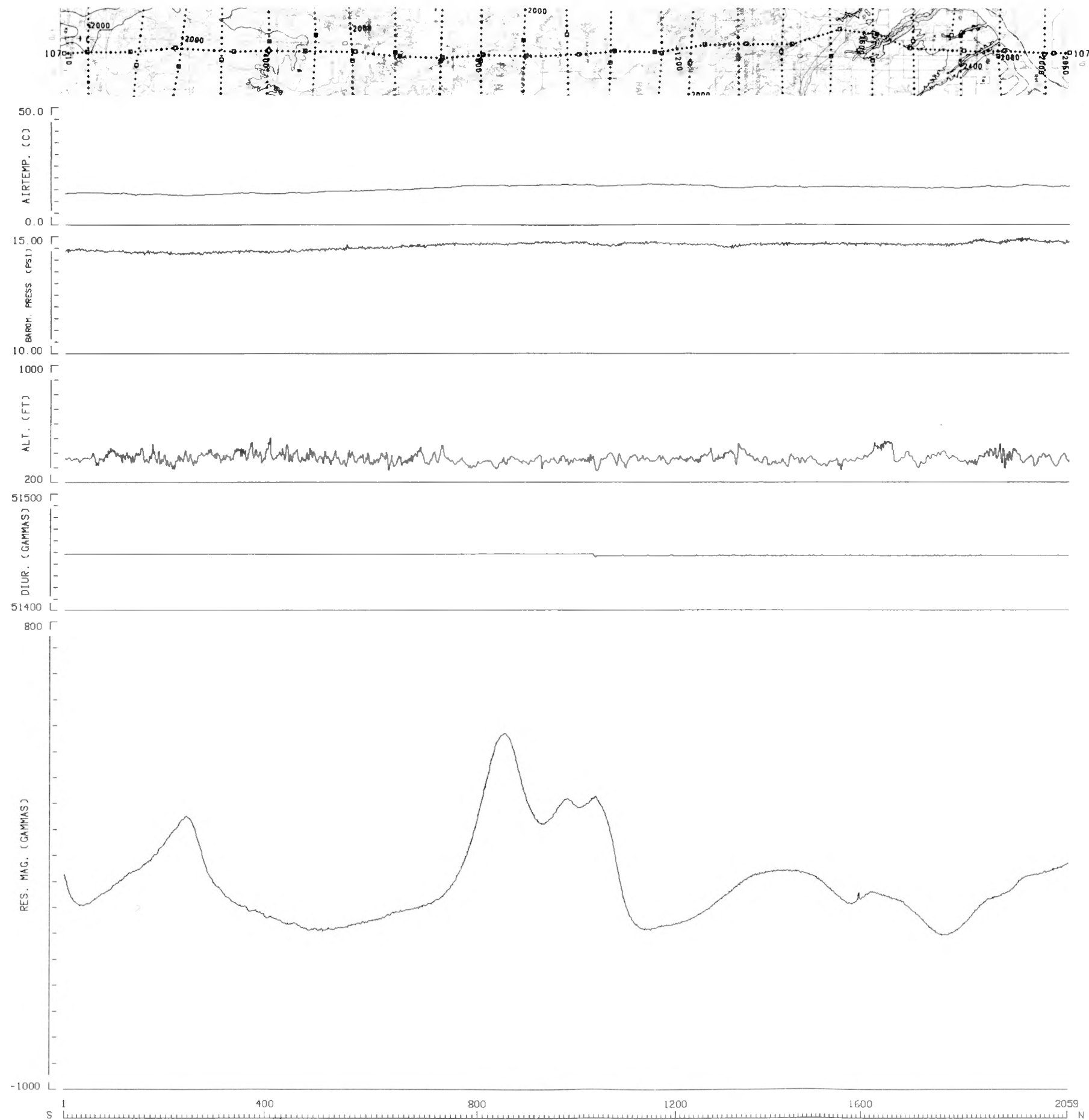


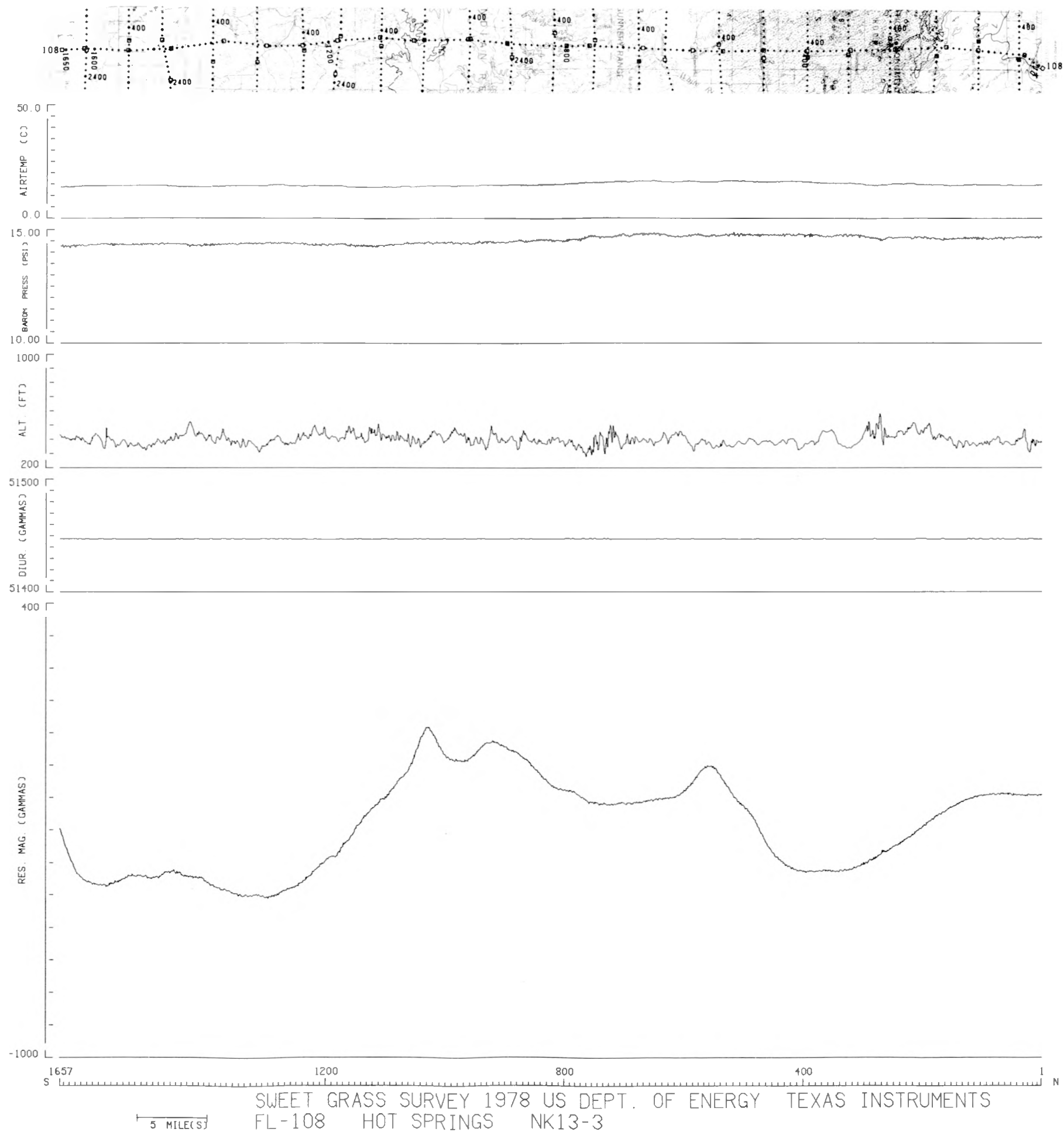


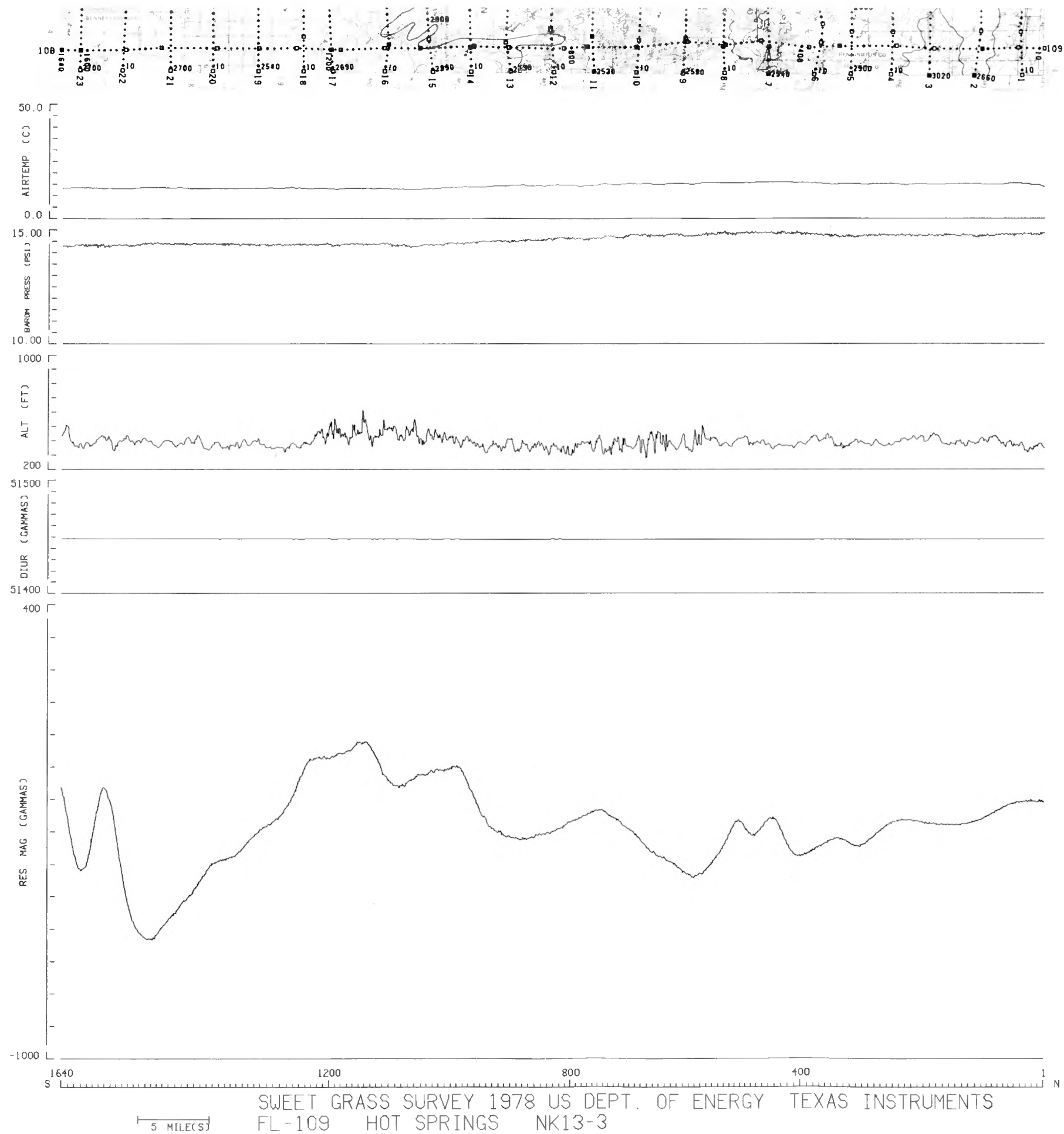
SWEET GRASS SURVEY 1978 US DEPT. OF ENERGY TEXAS INSTRUMENTS
FL-104 HOT SPRINGS NK13-3





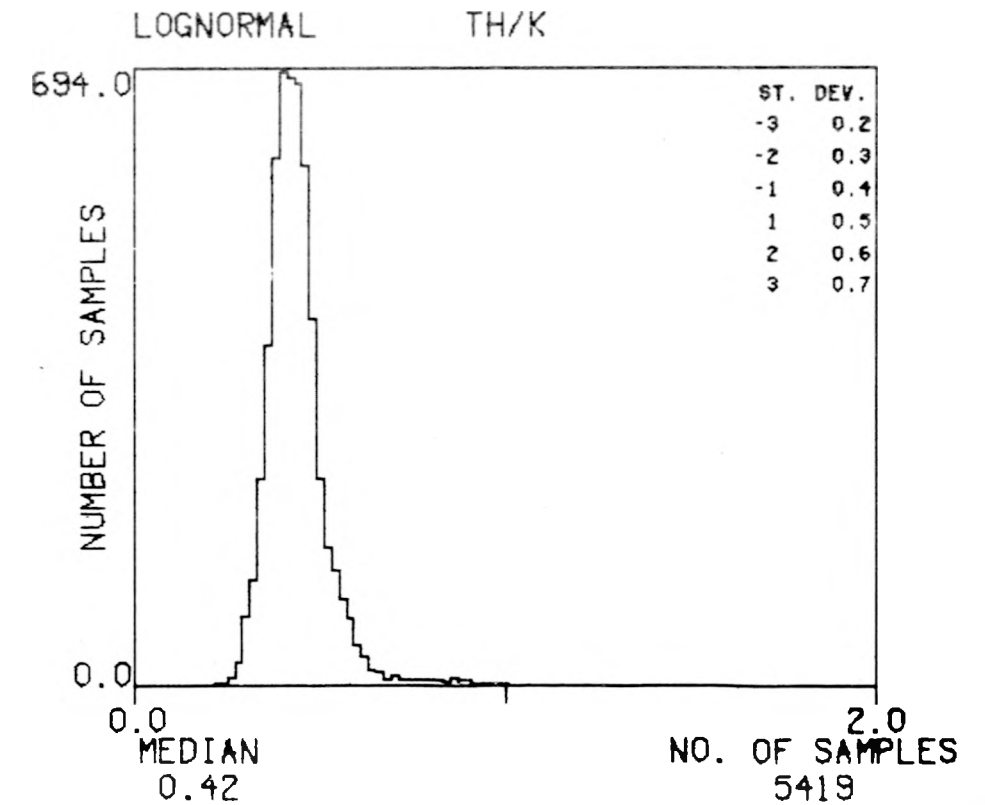
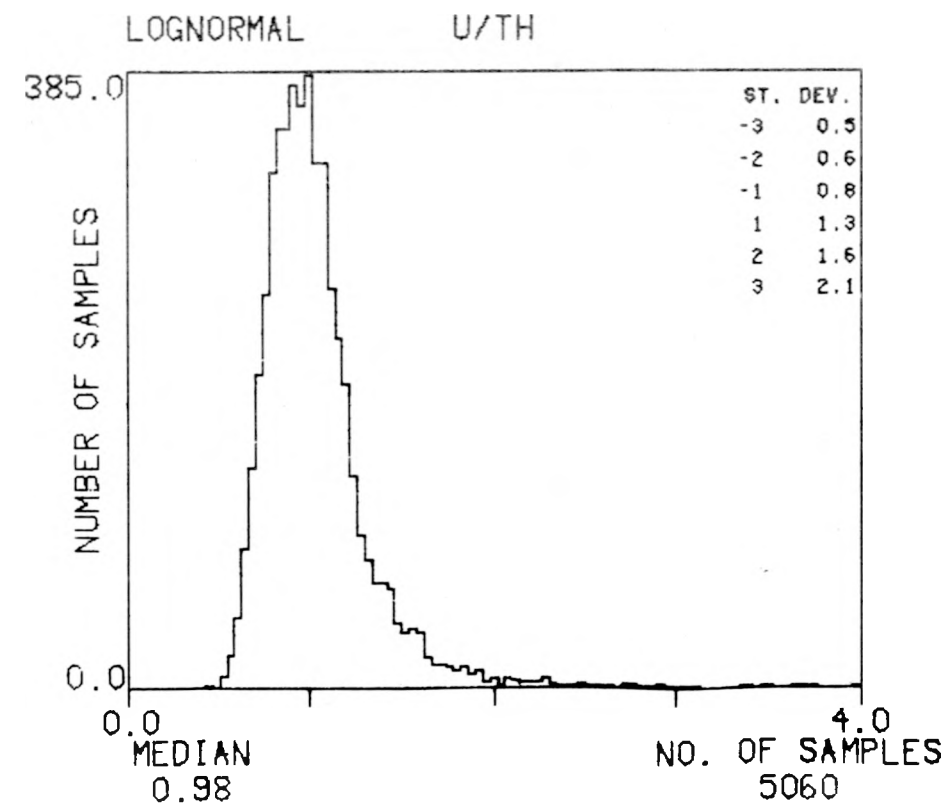
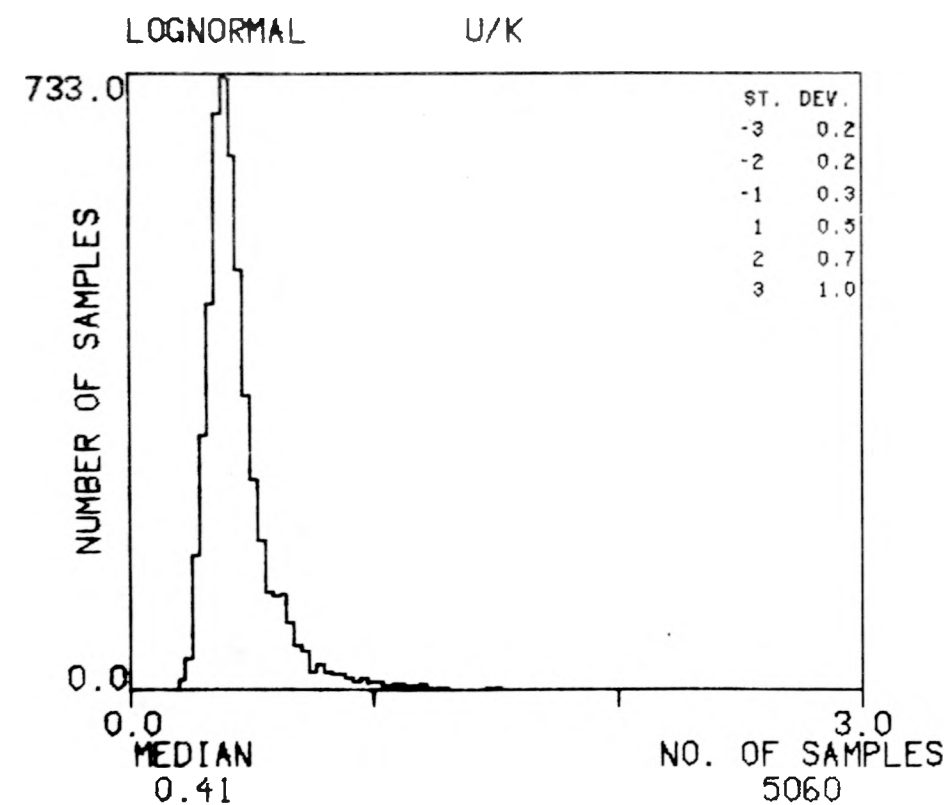
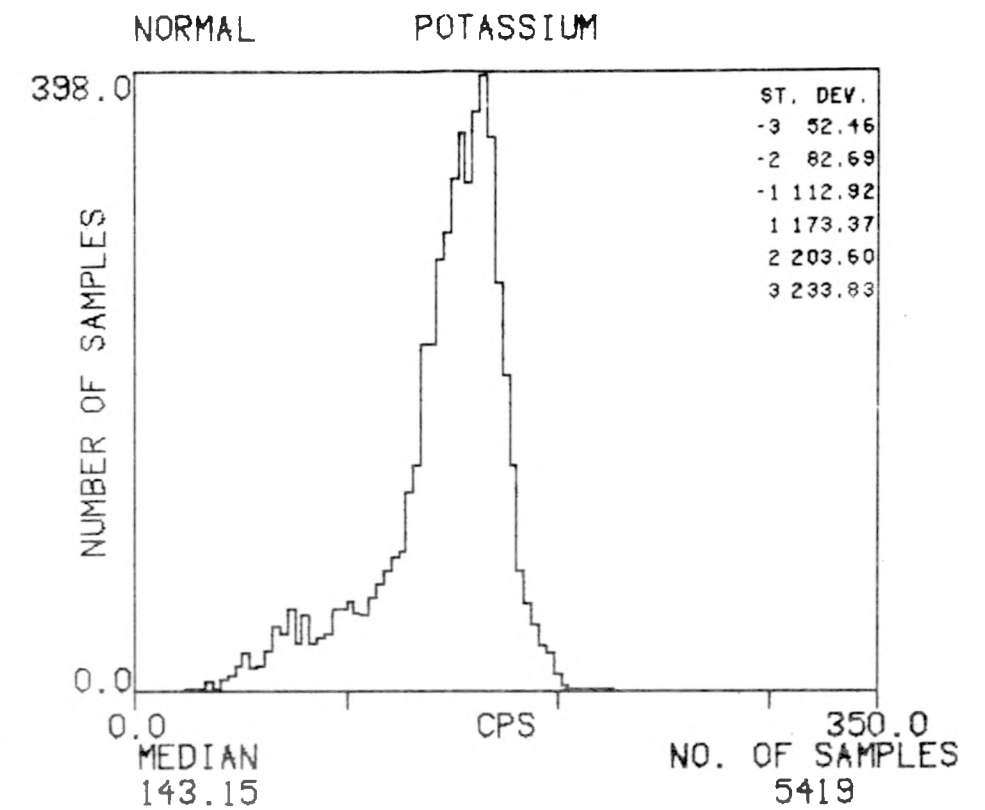
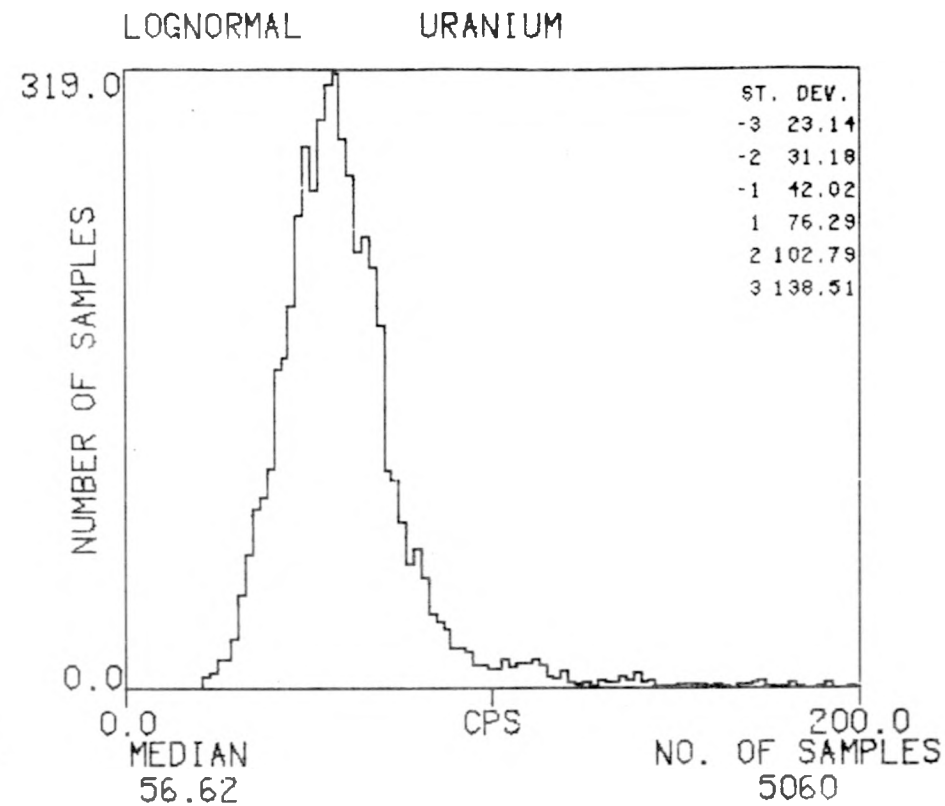
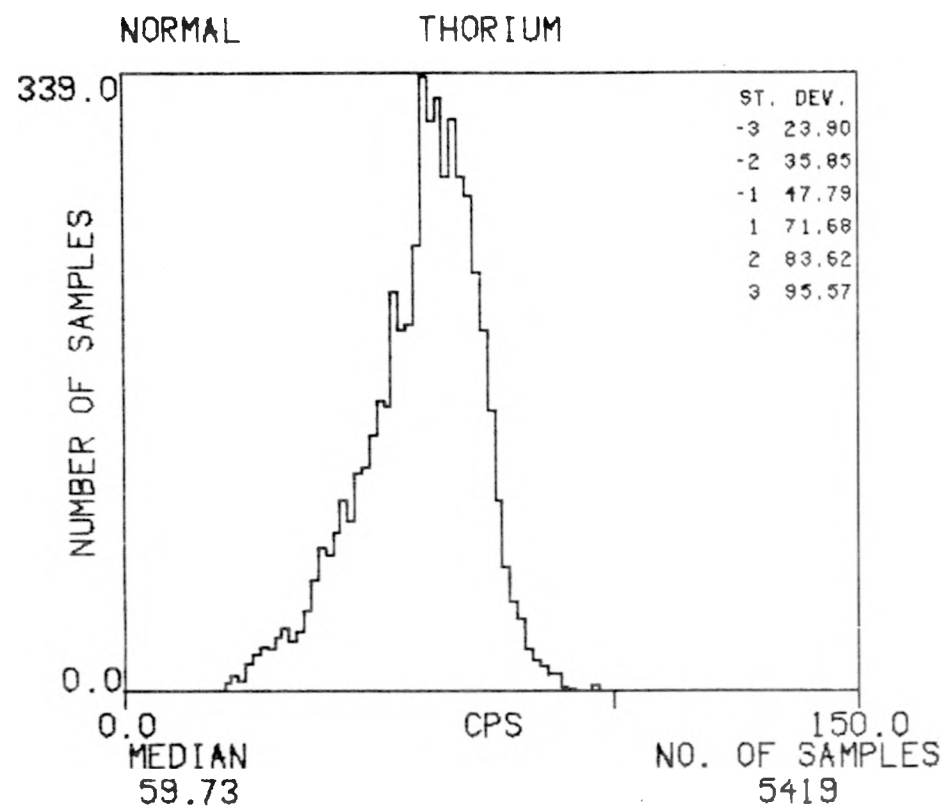






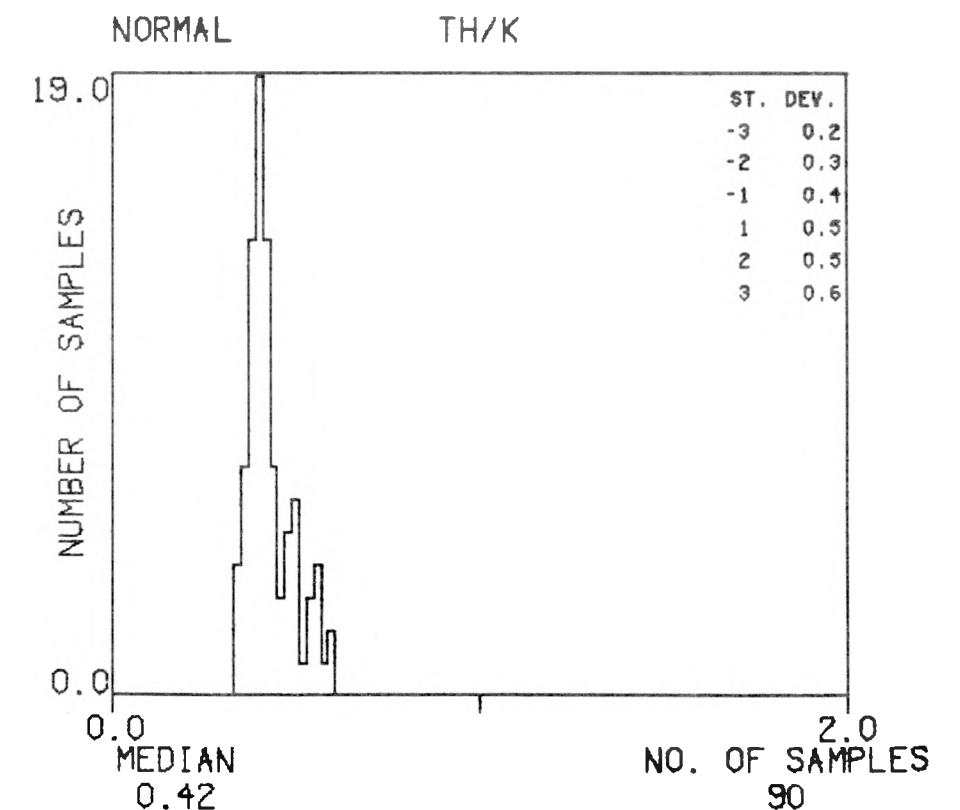
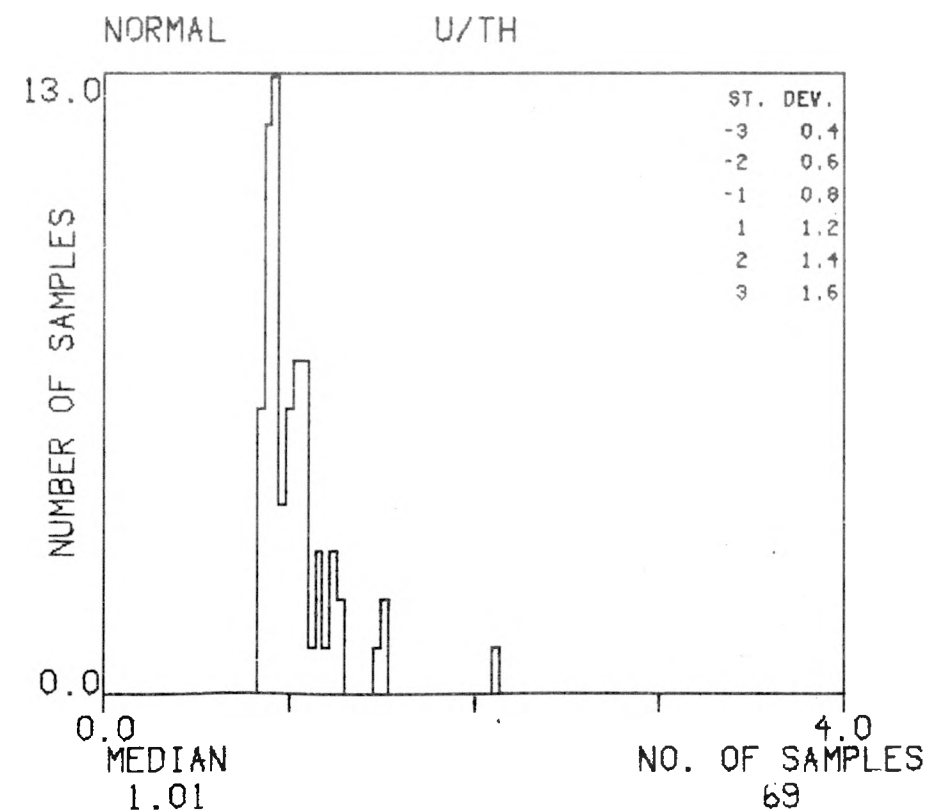
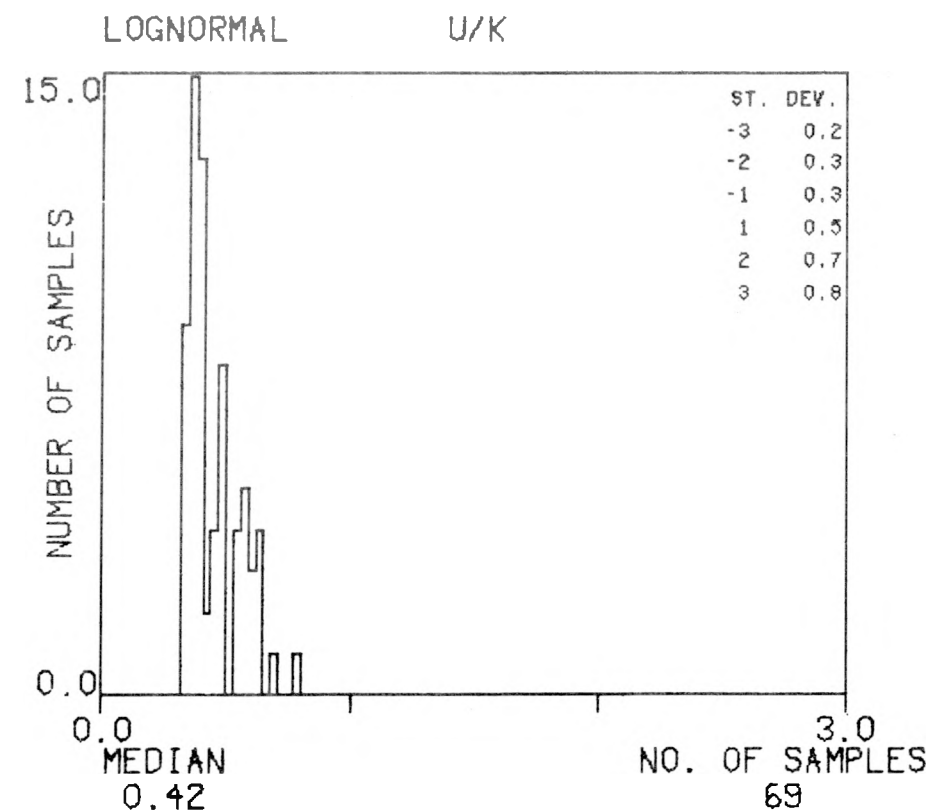
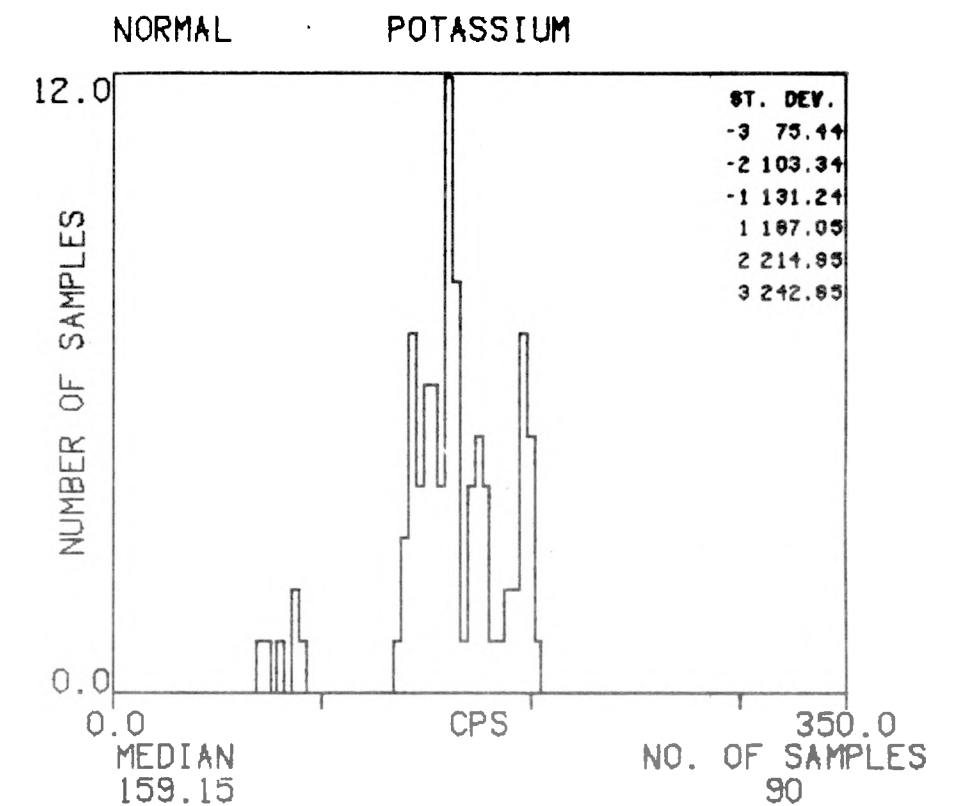
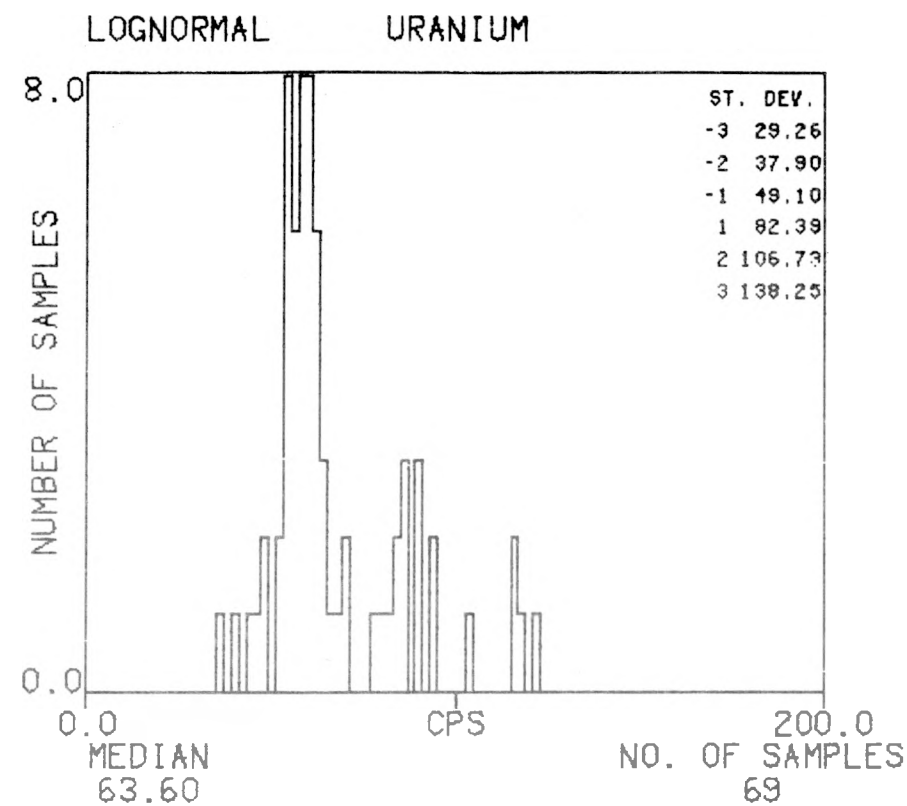
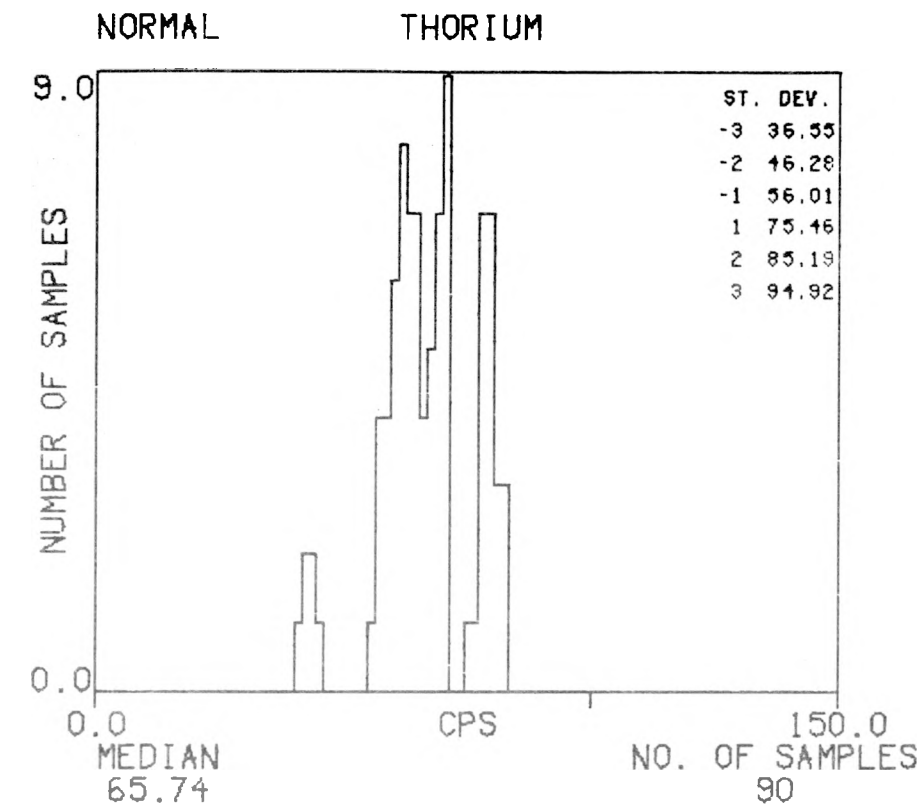
HISTOGRAMS : QAL

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



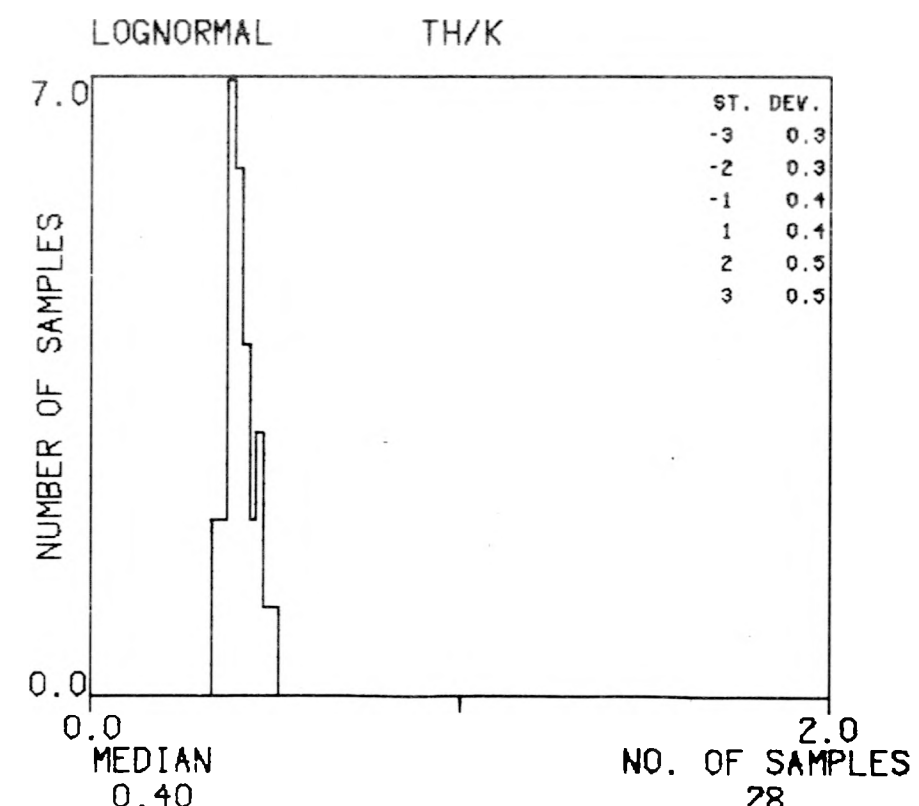
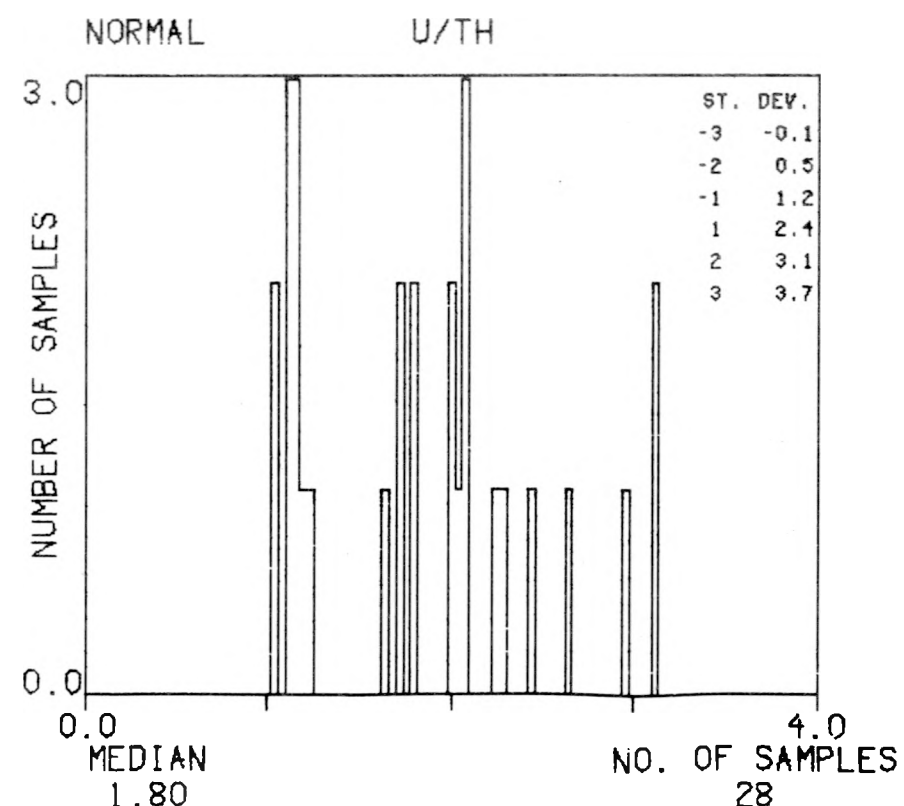
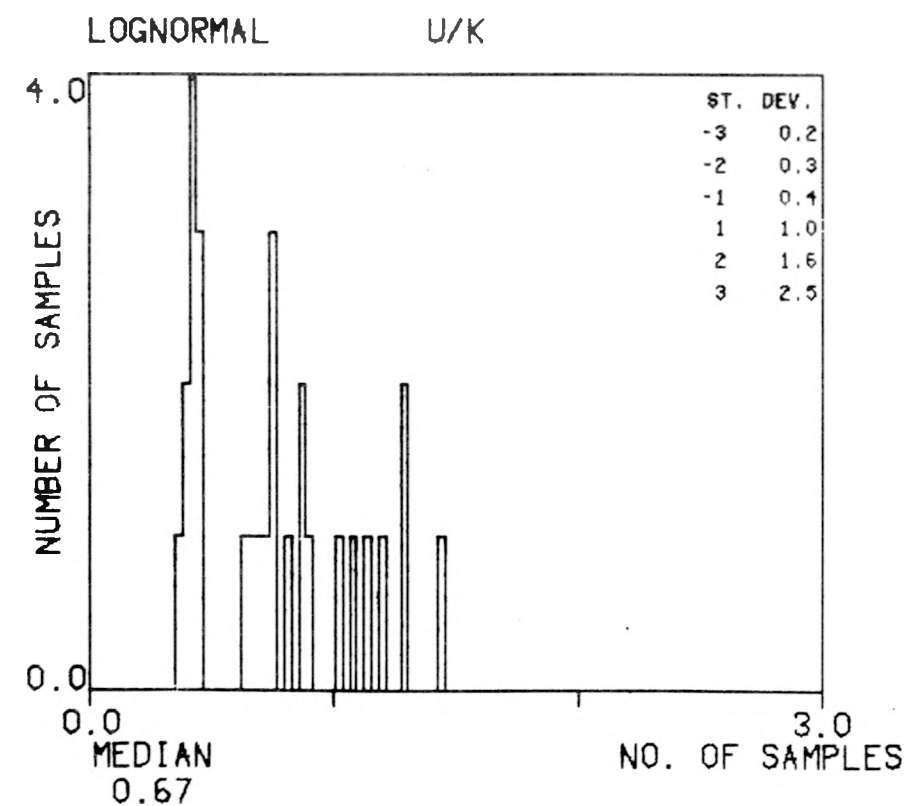
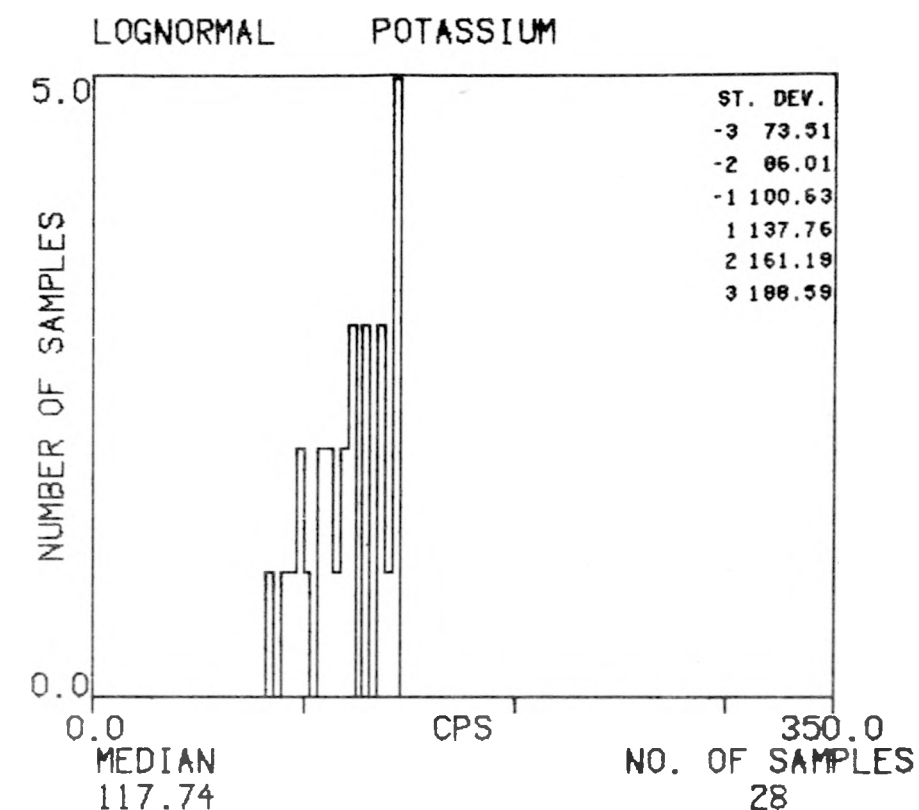
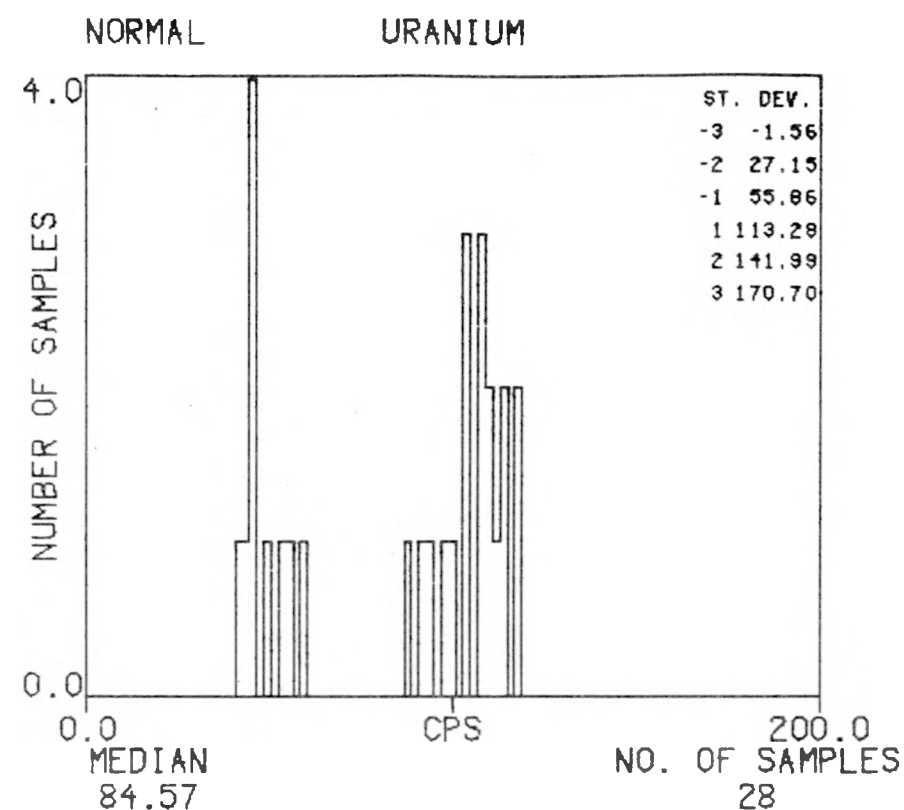
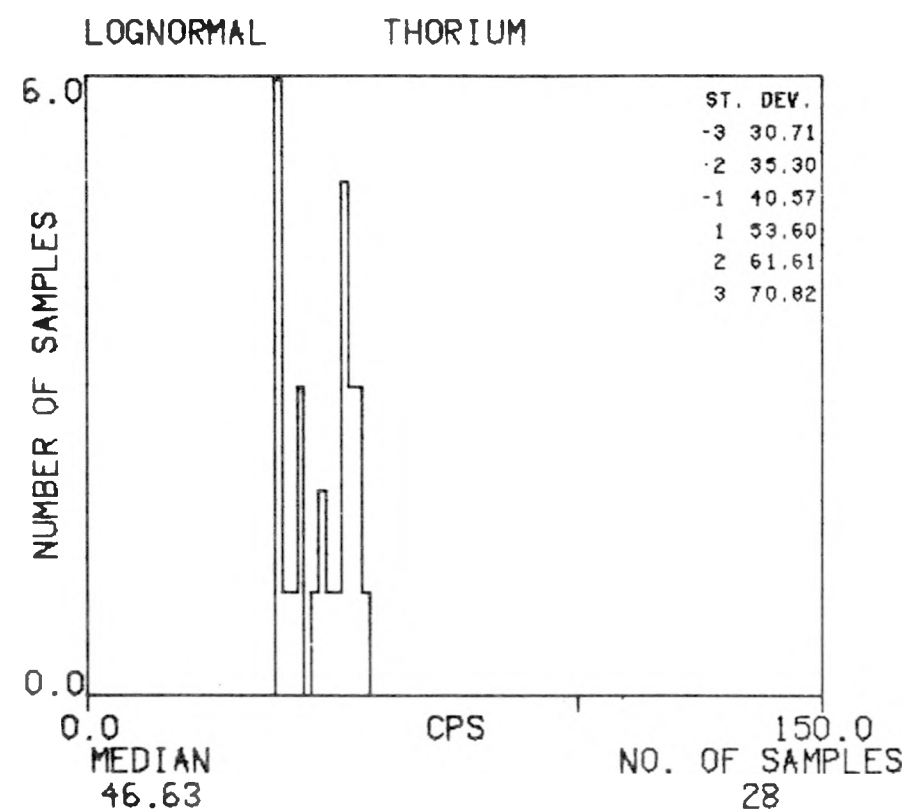
HISTOGRAMS : QL

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



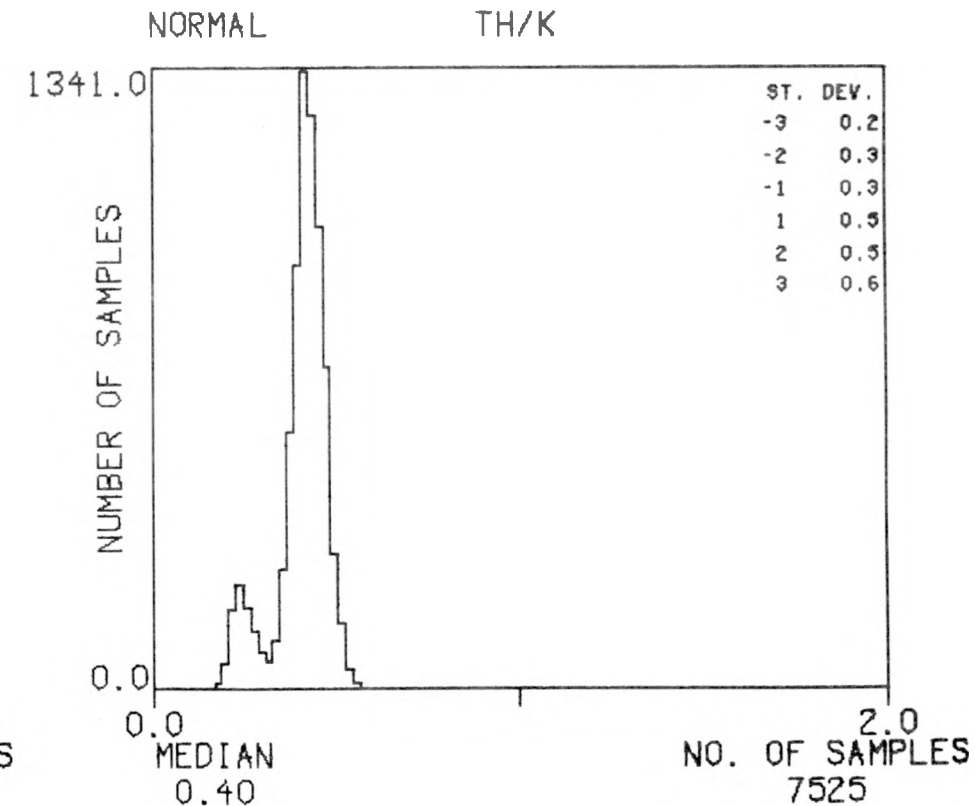
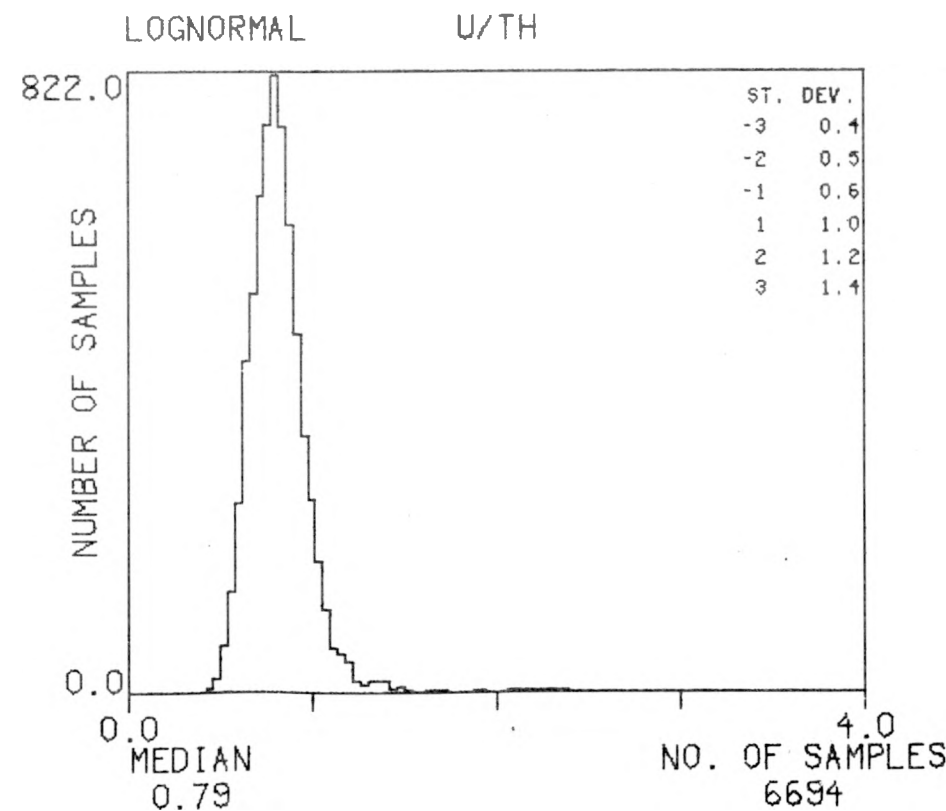
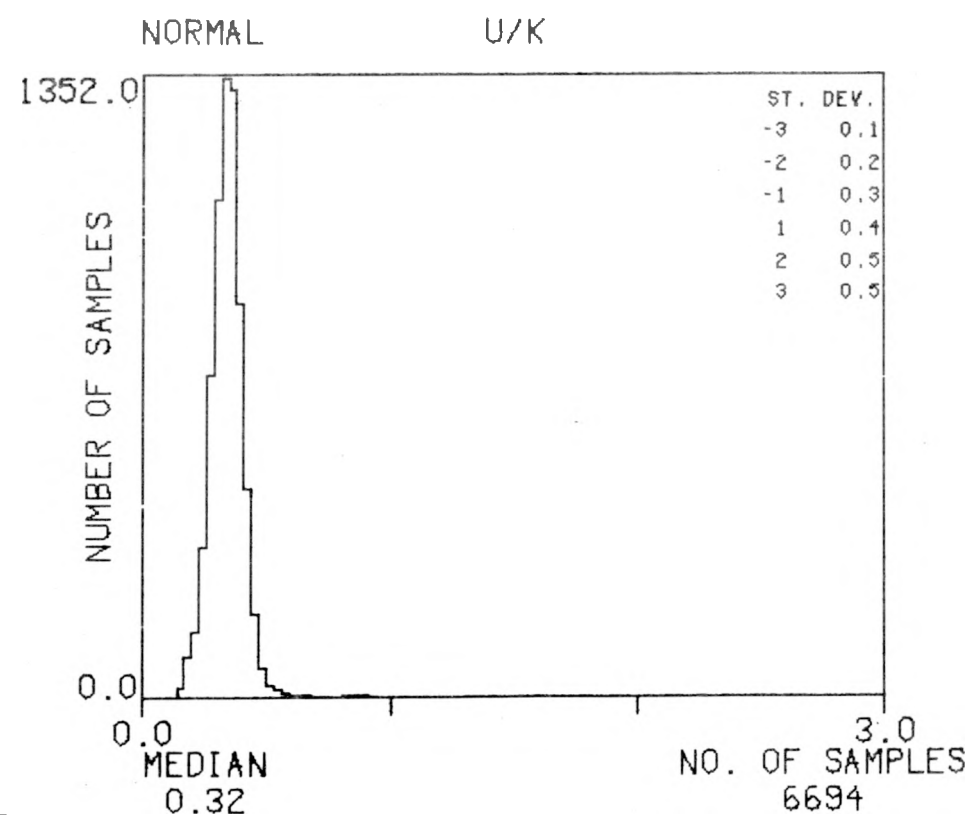
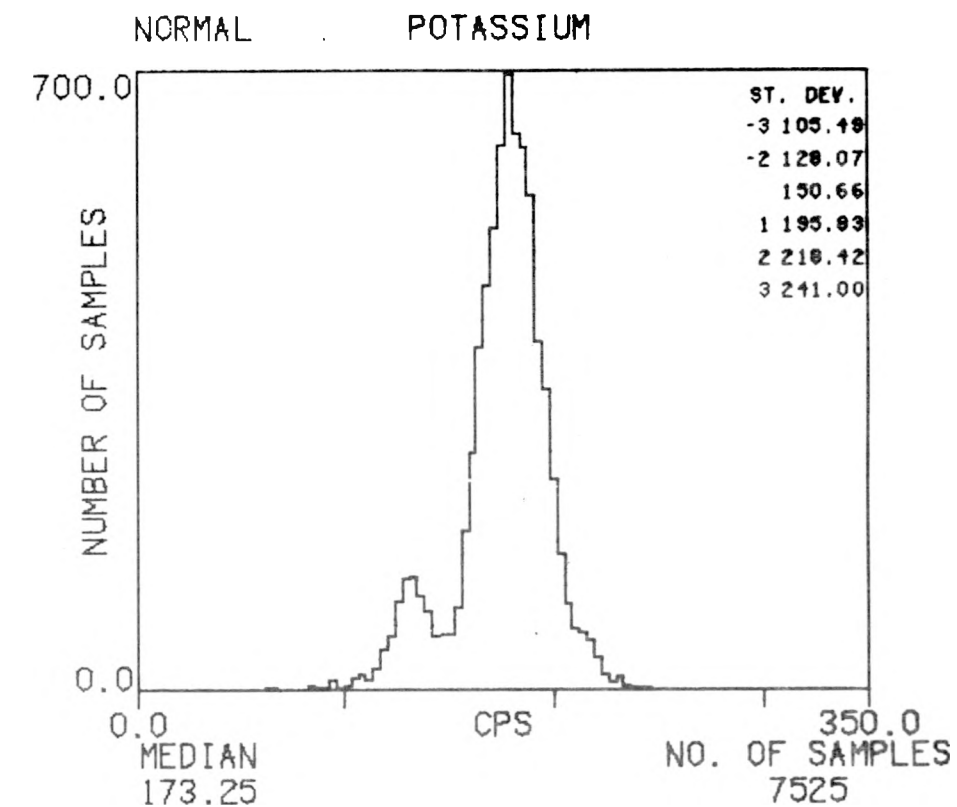
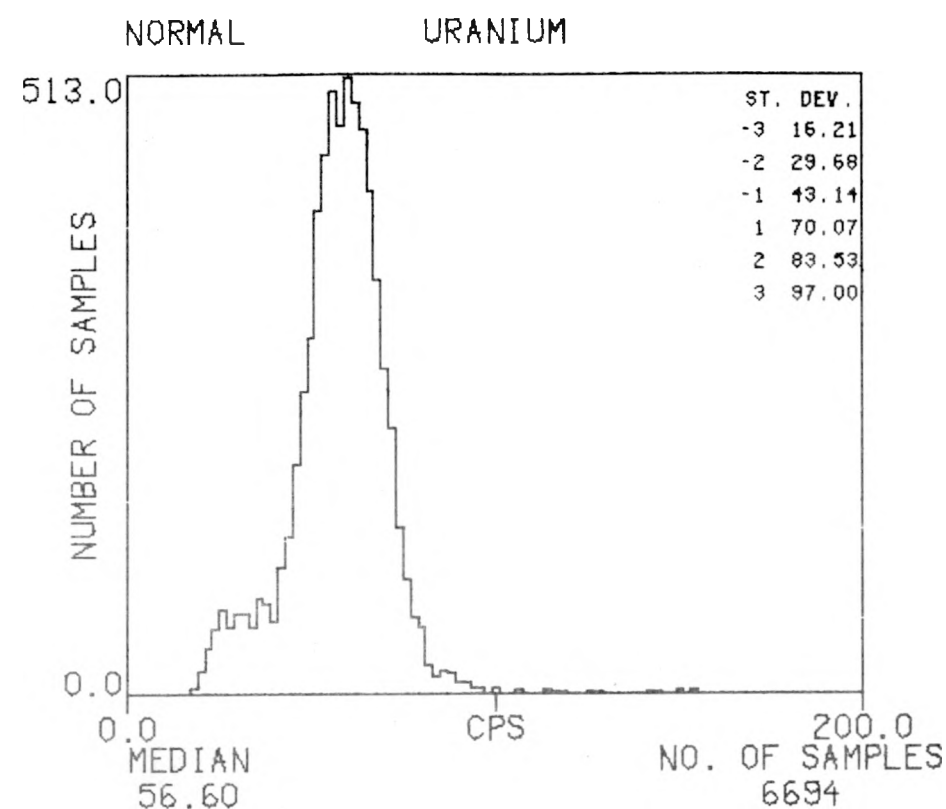
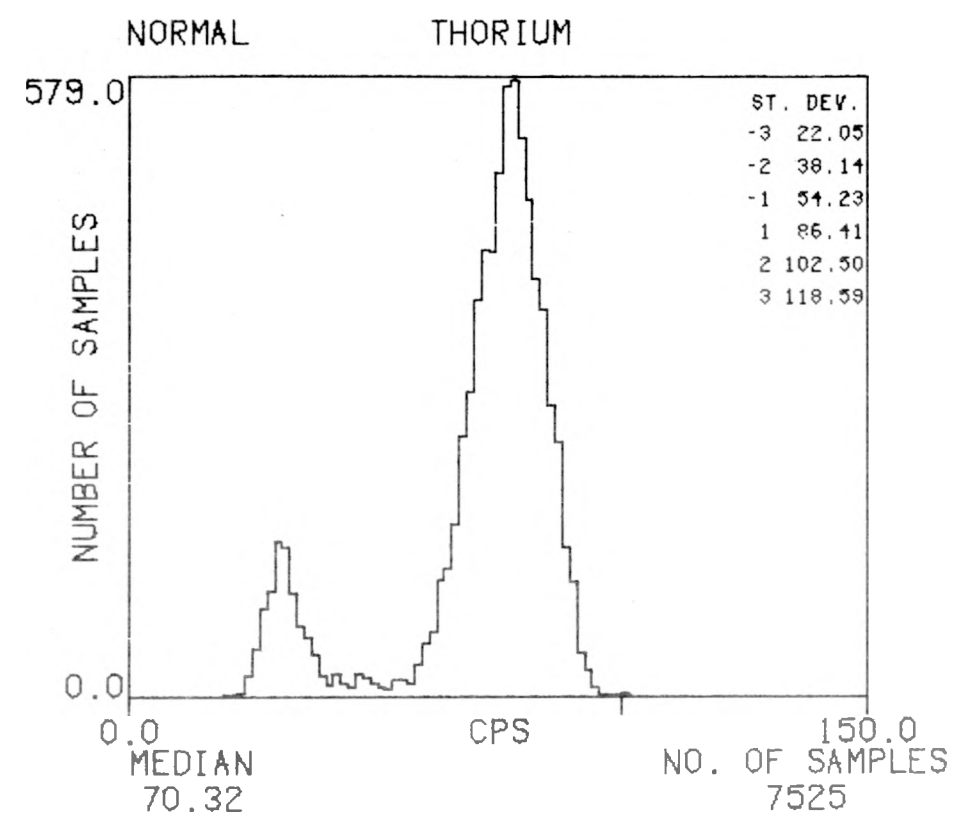
HISTOGRAMS : Q

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



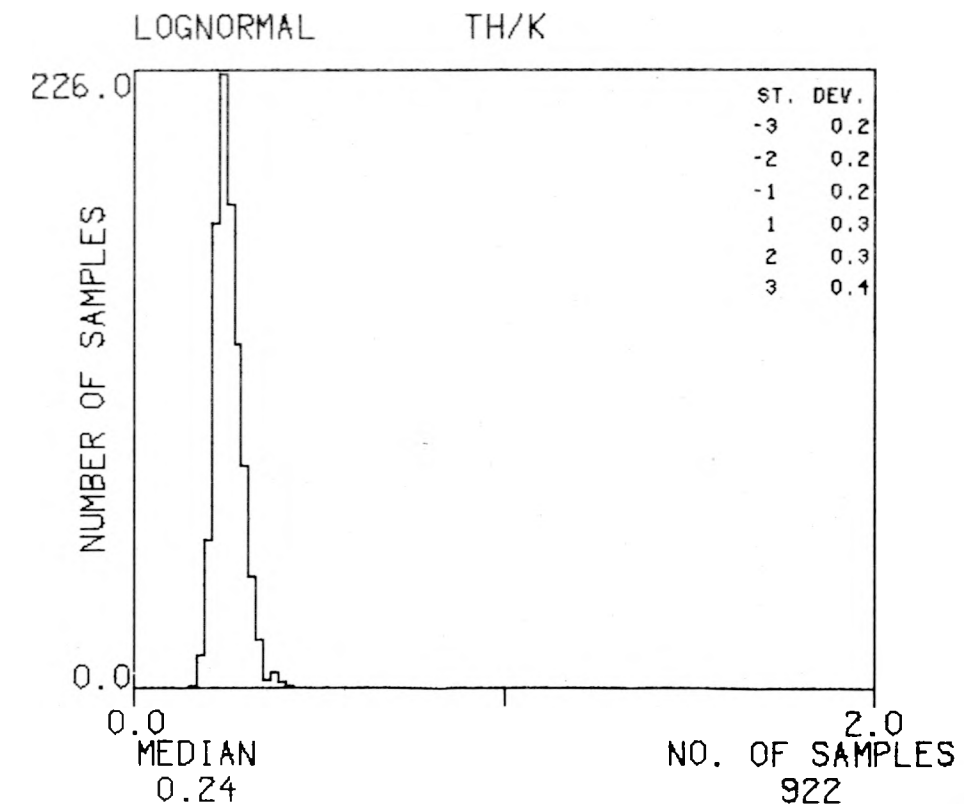
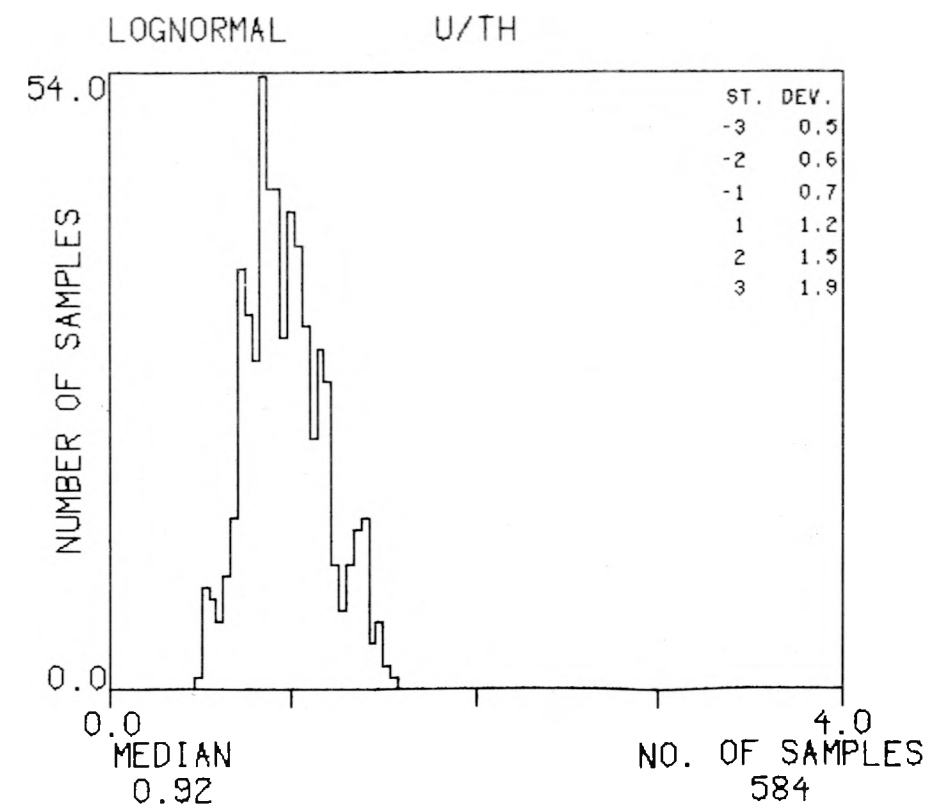
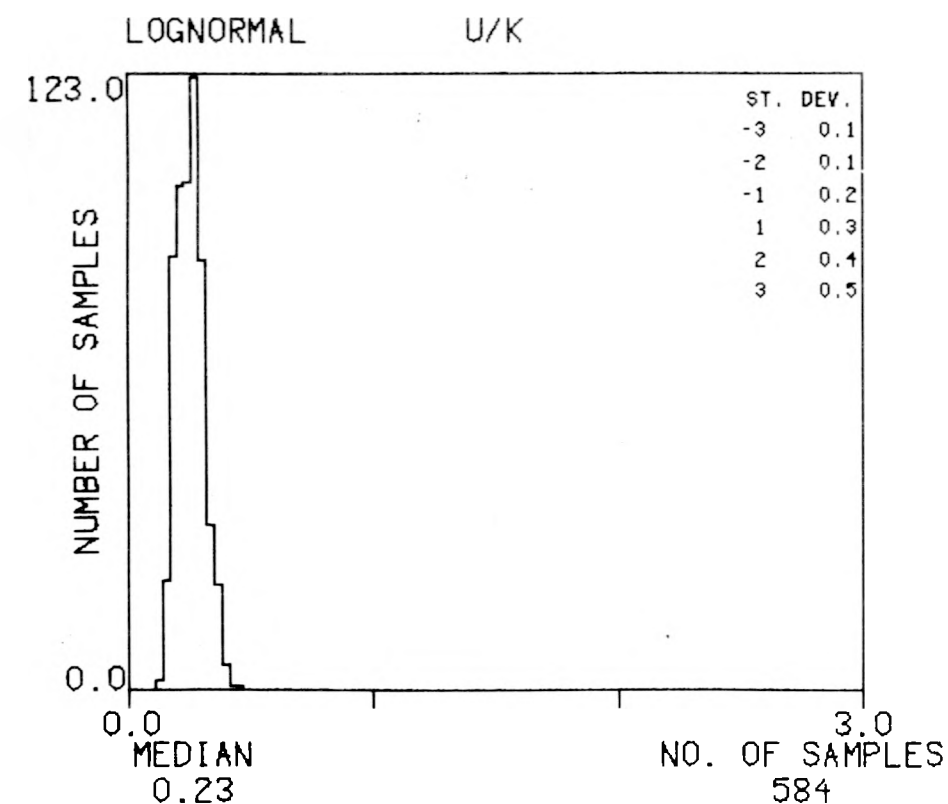
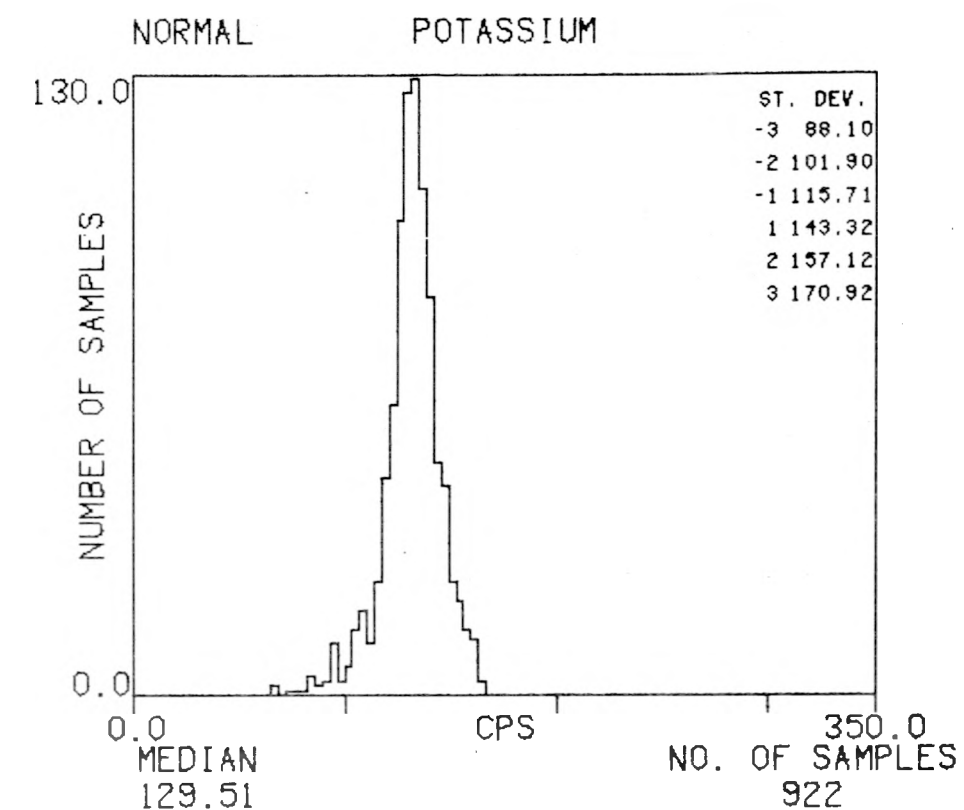
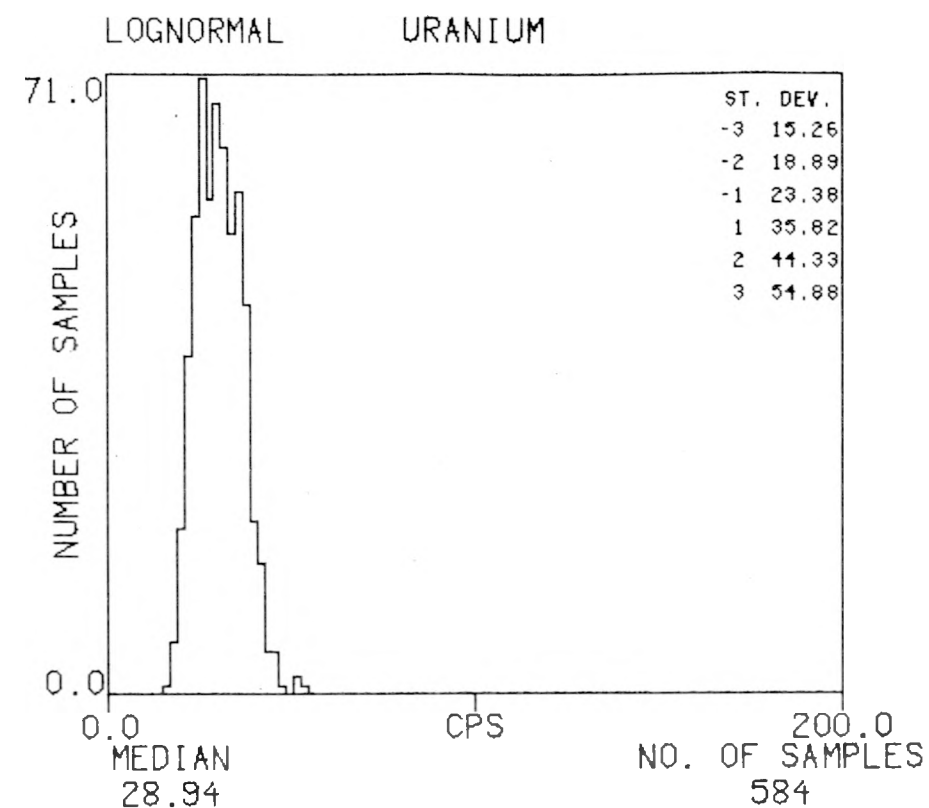
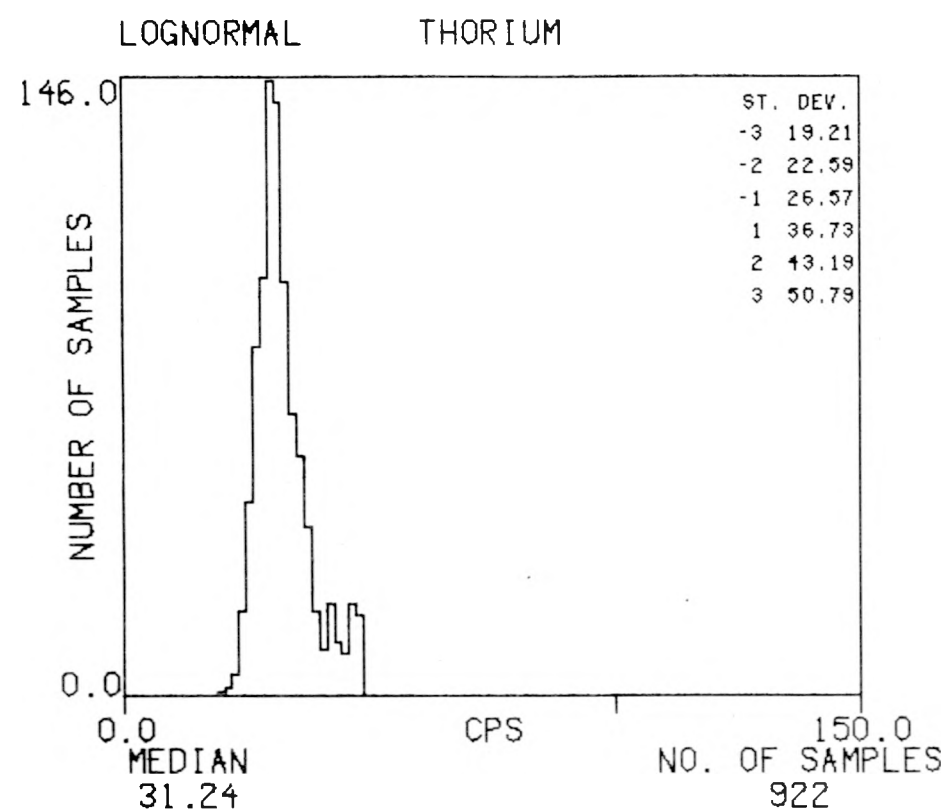
HISTOGRAMS : TA

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



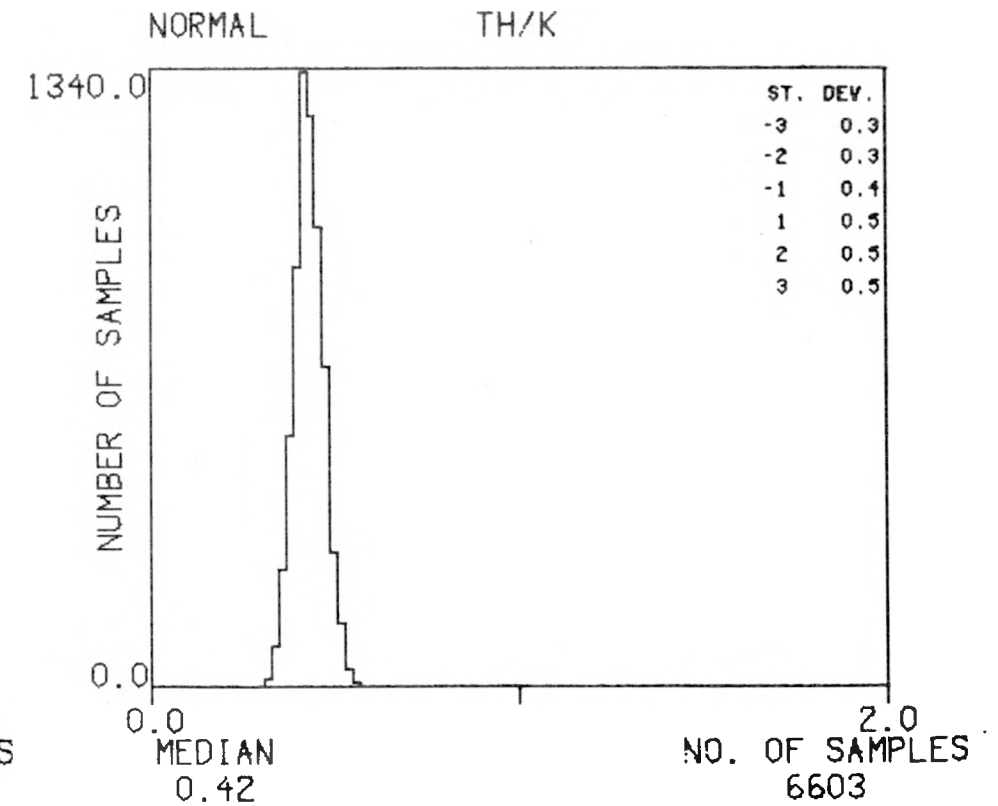
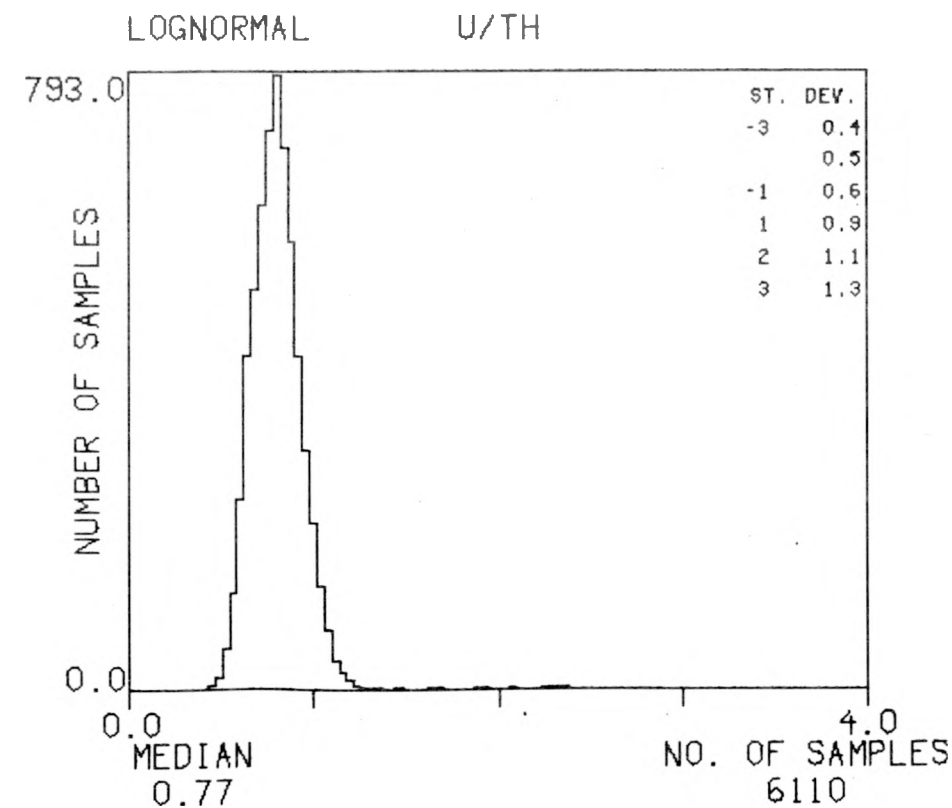
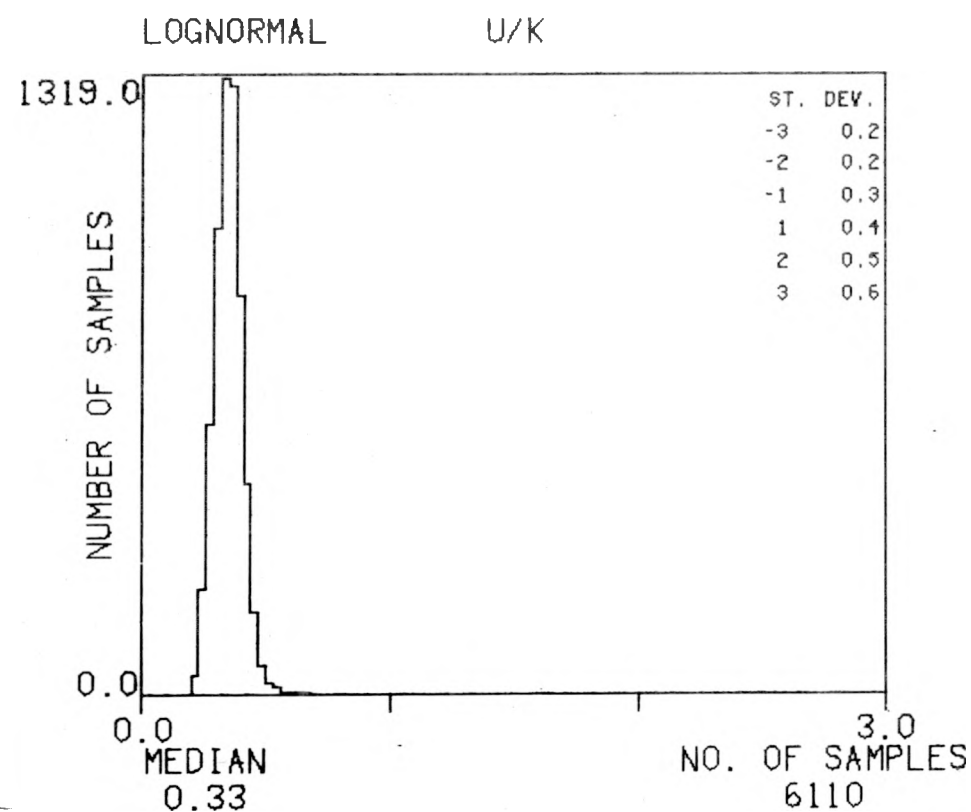
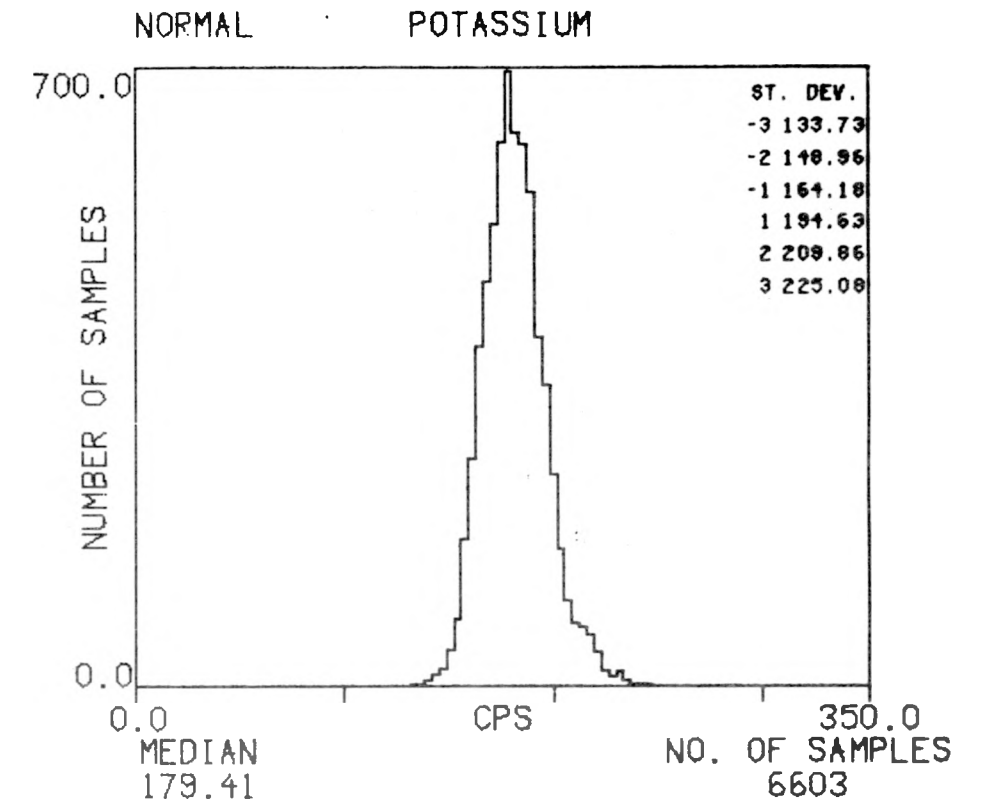
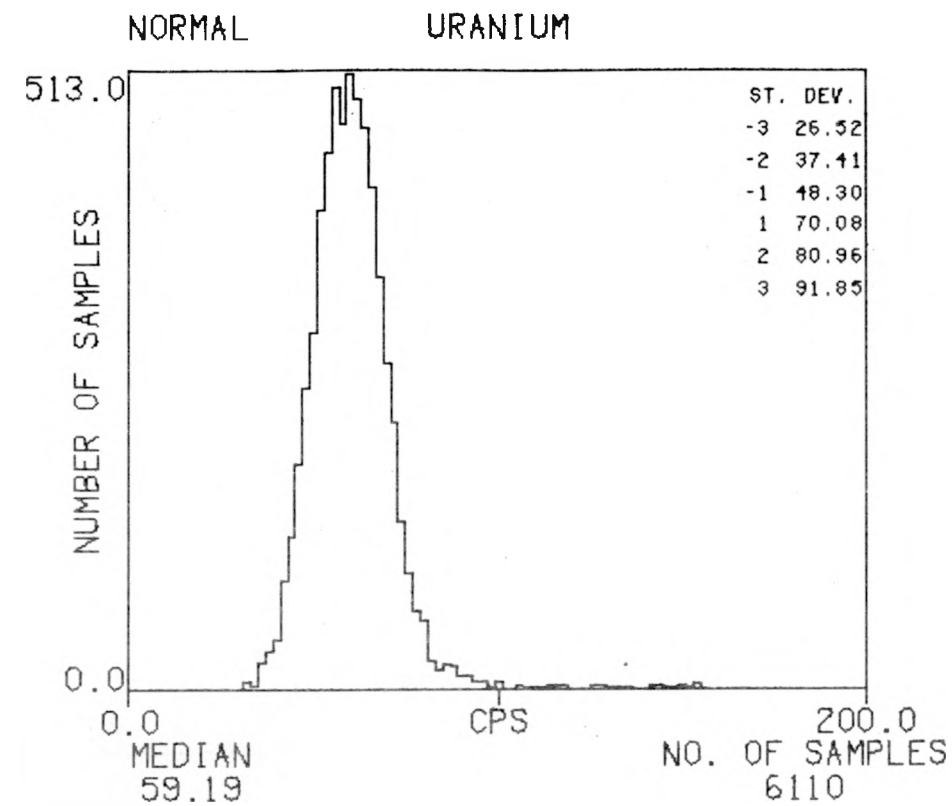
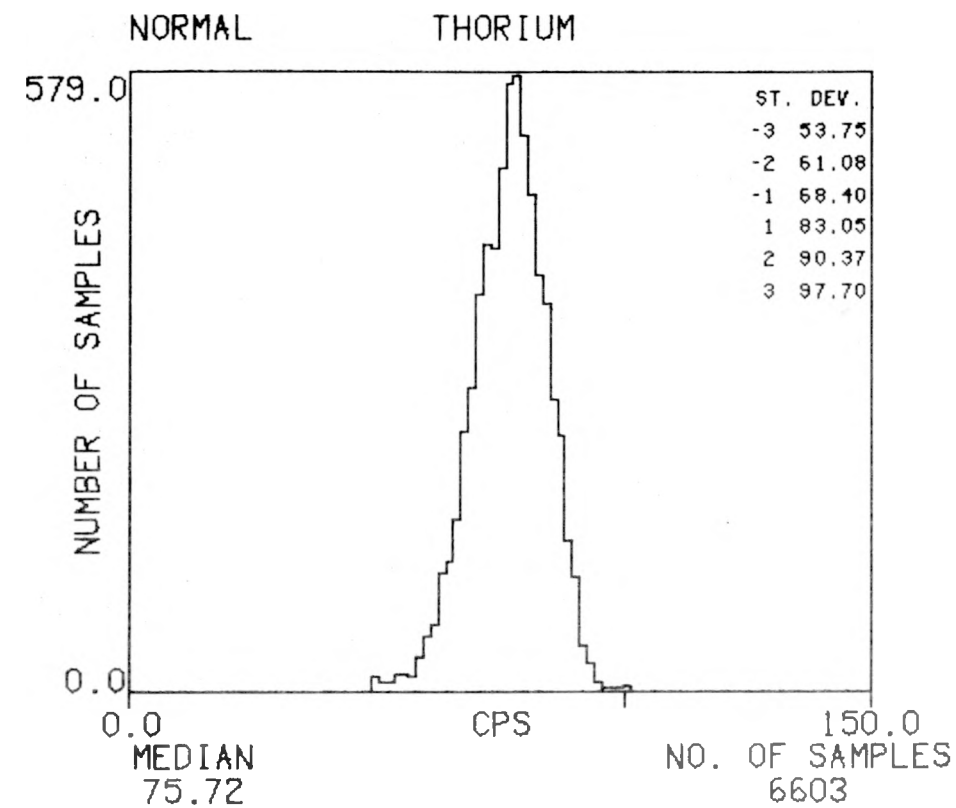
HISTOGRAMS : TA-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



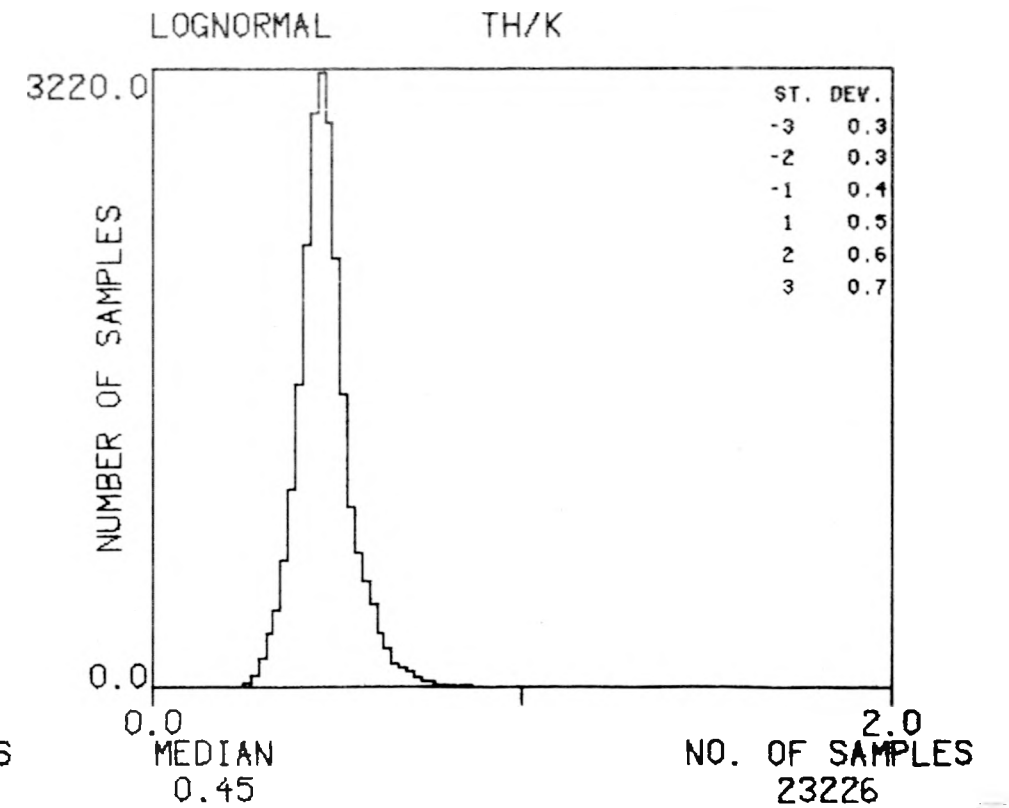
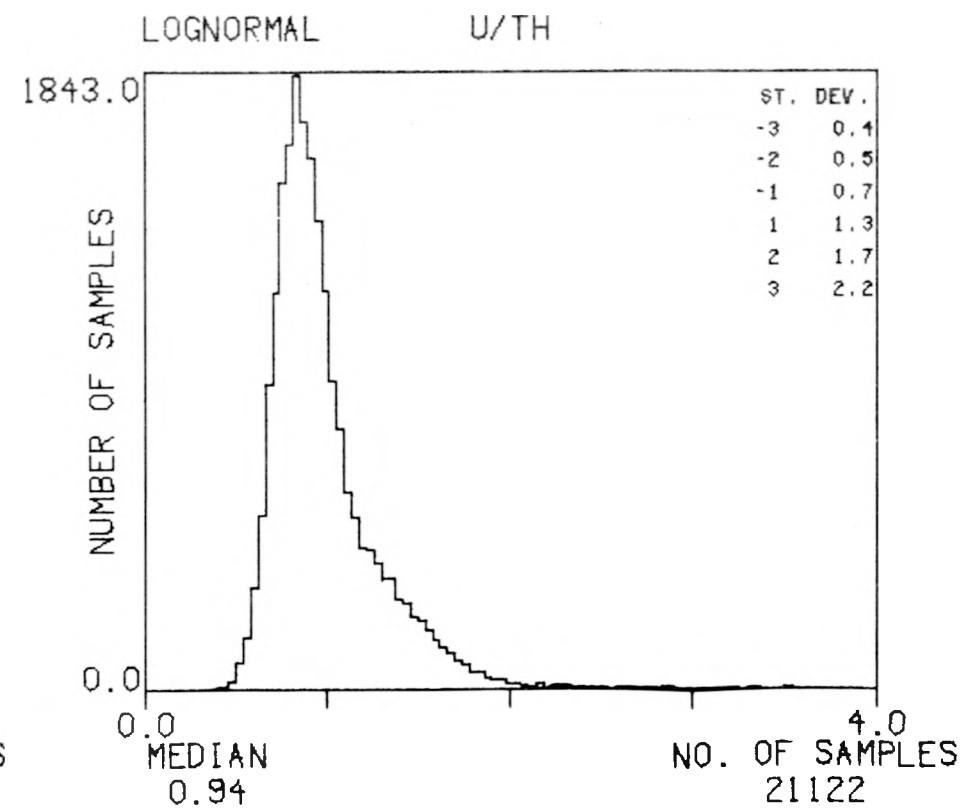
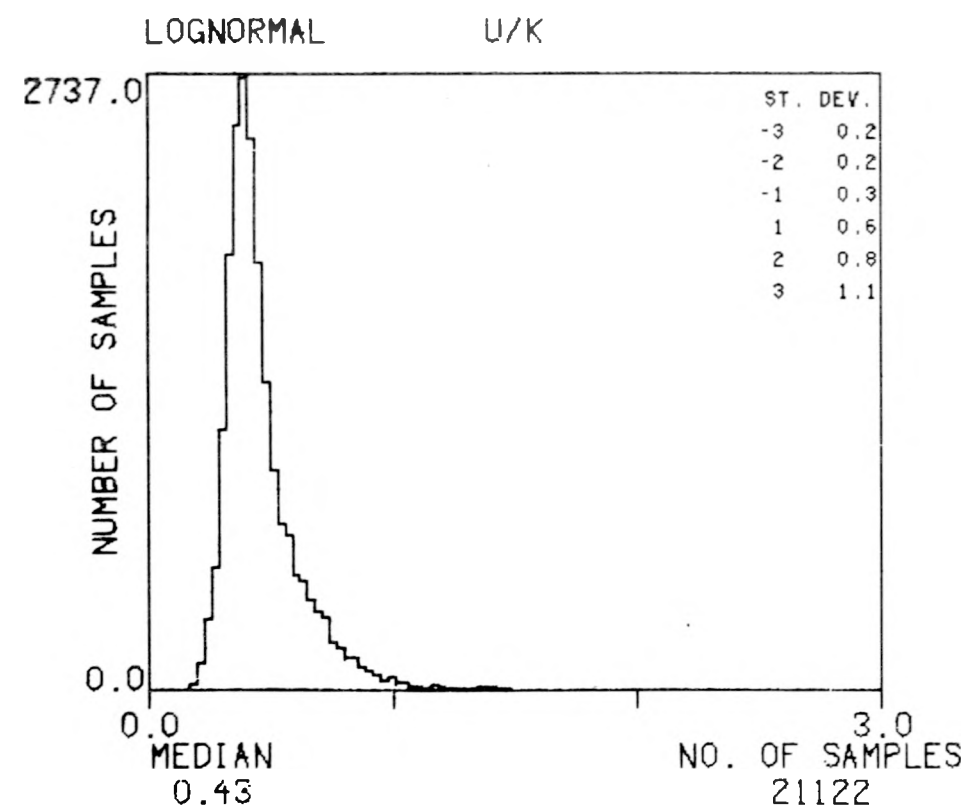
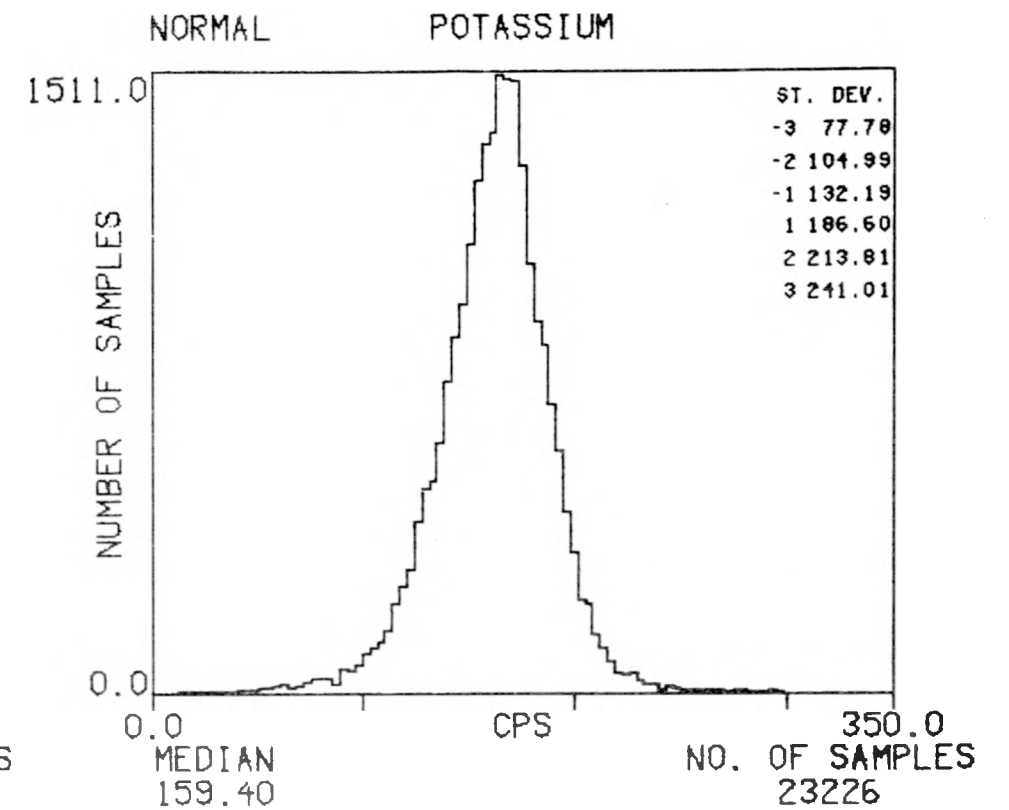
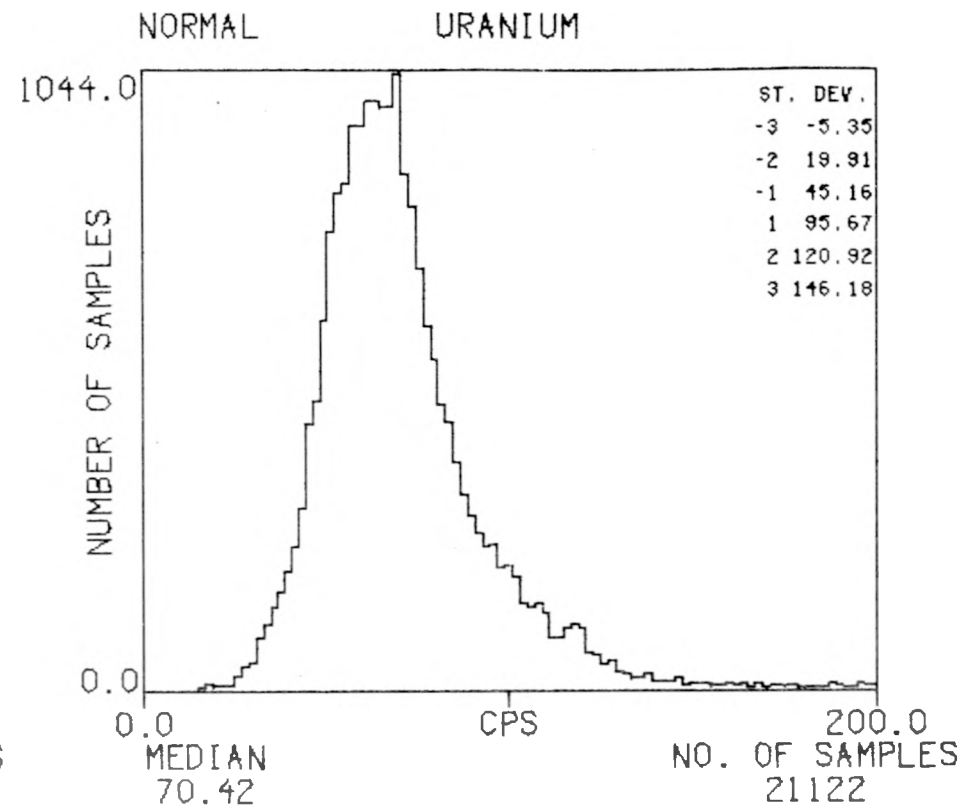
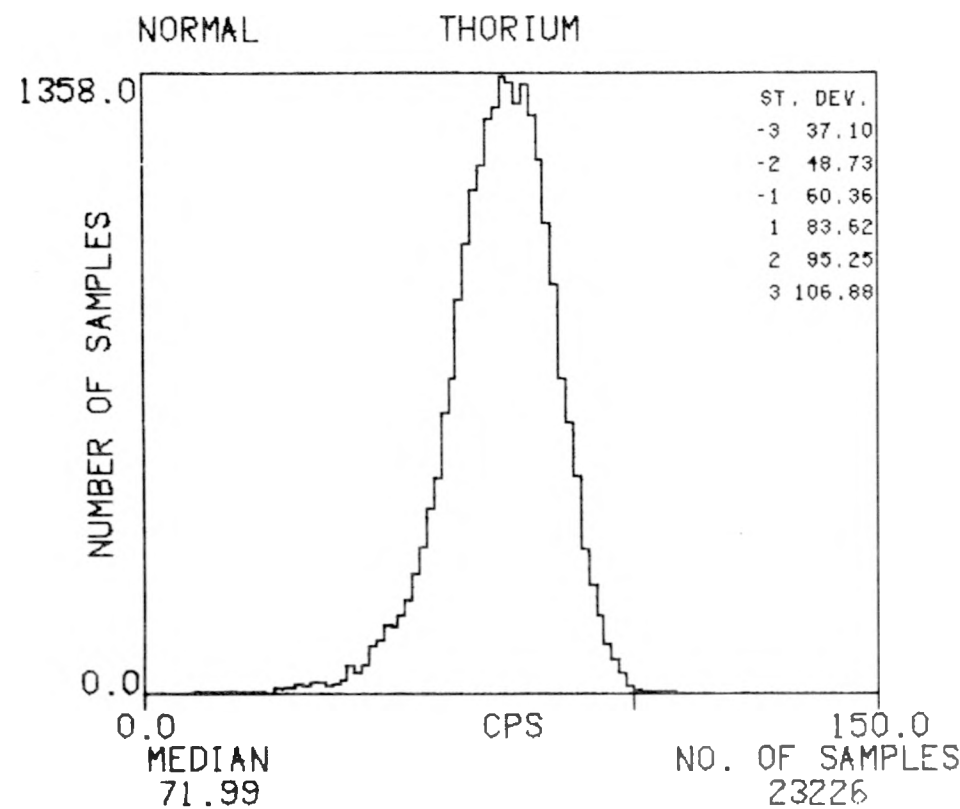
HISTOGRAMS : TA-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



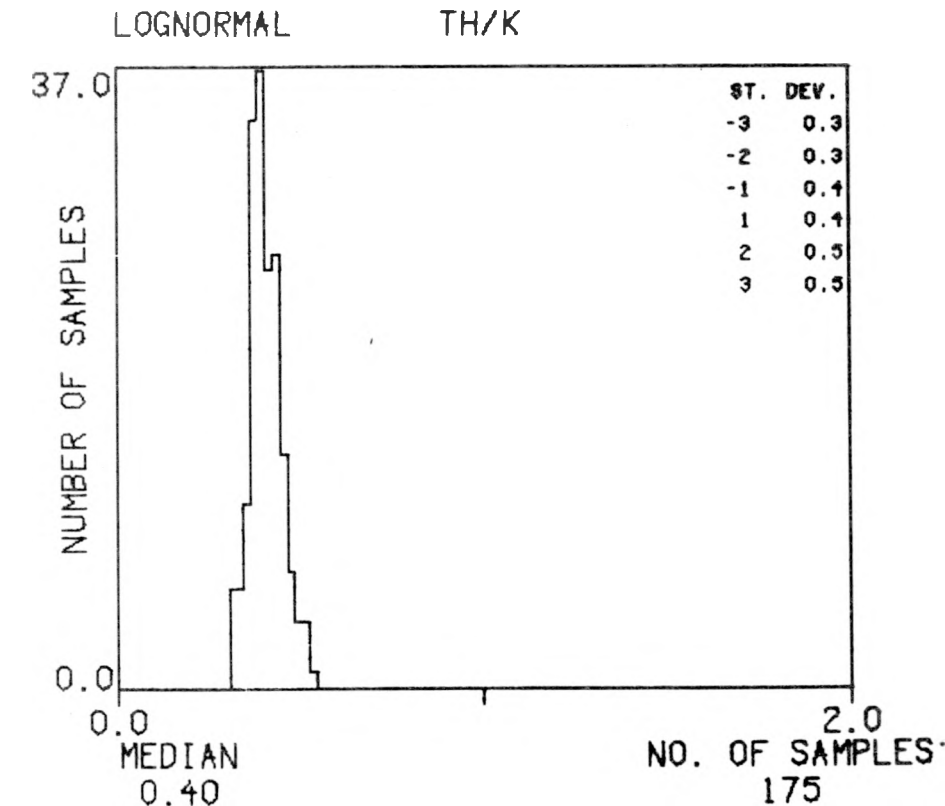
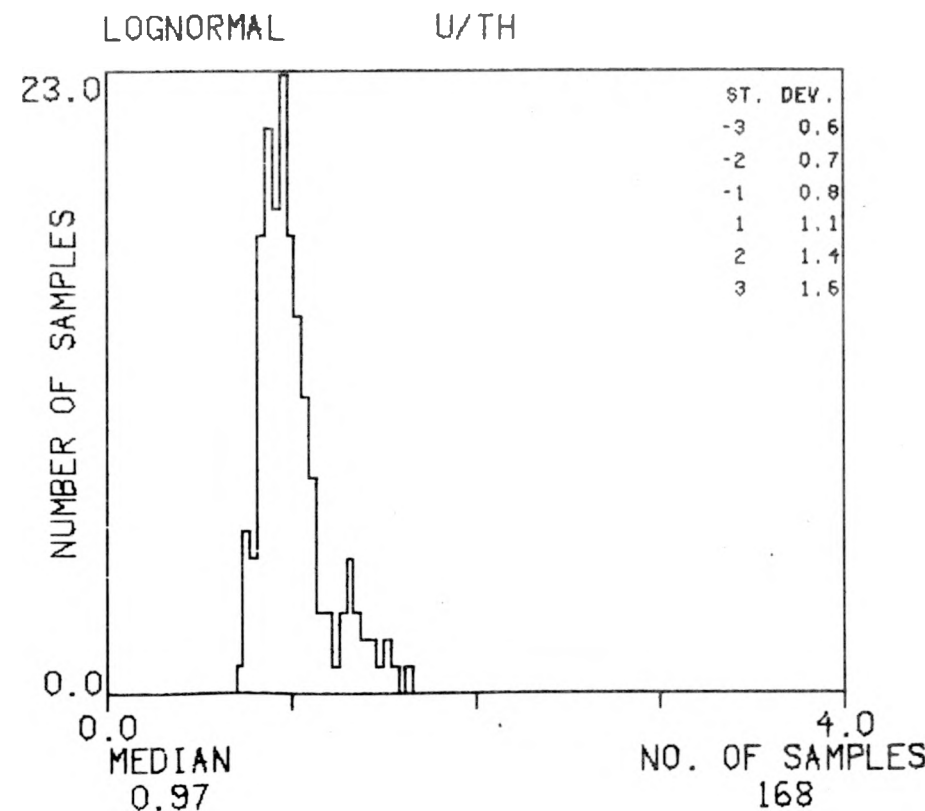
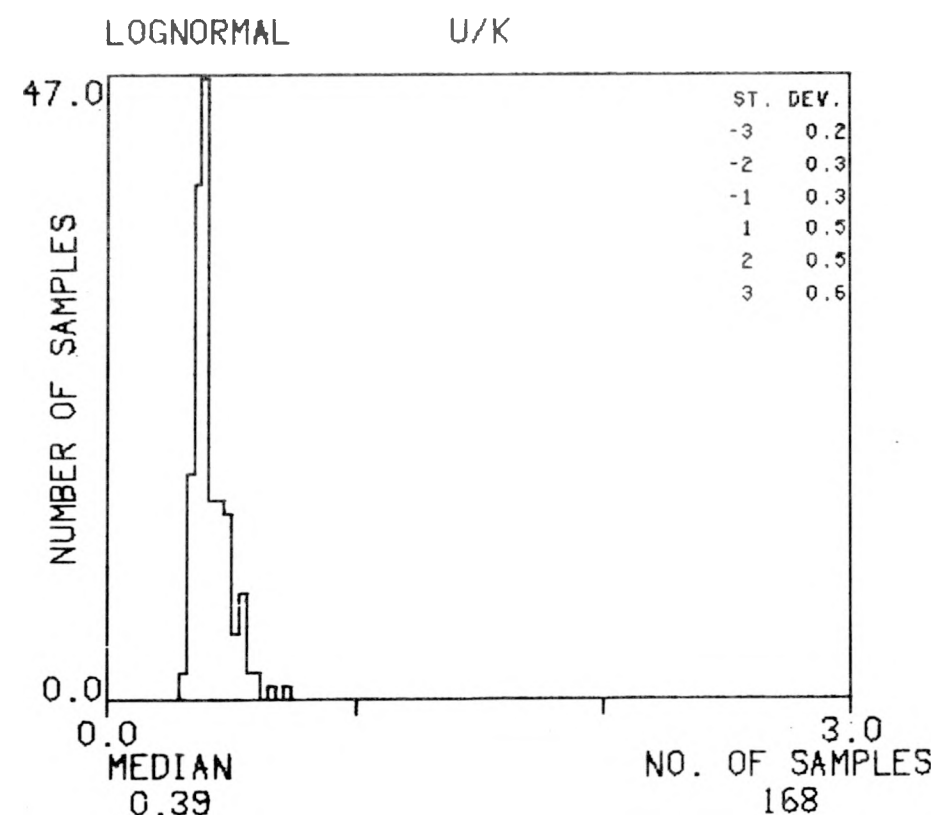
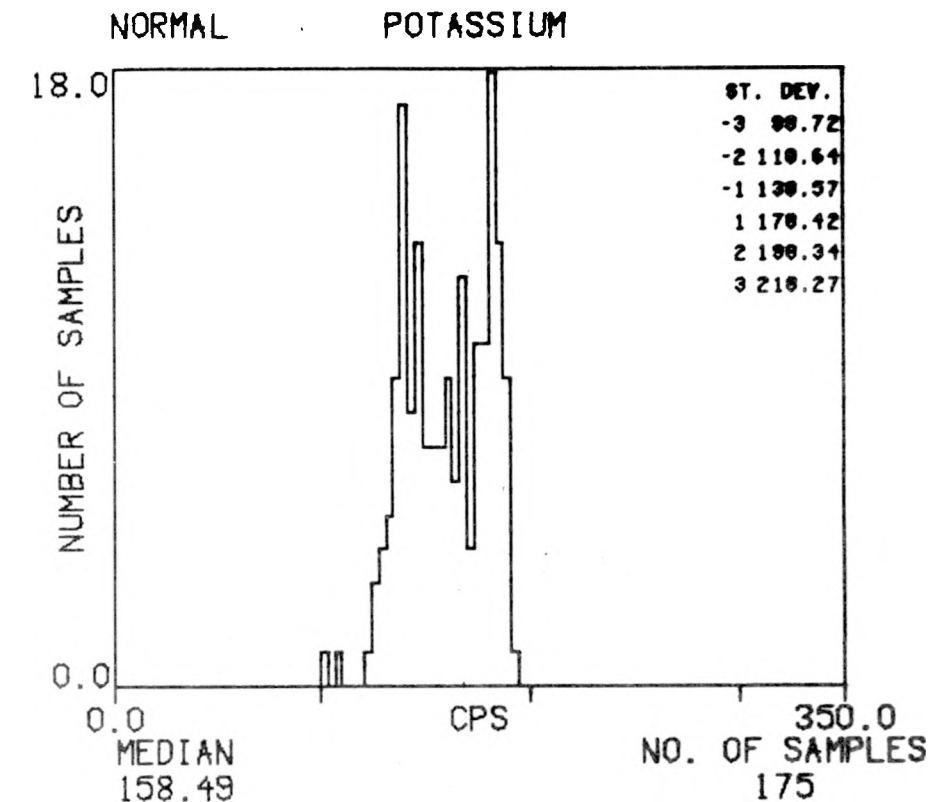
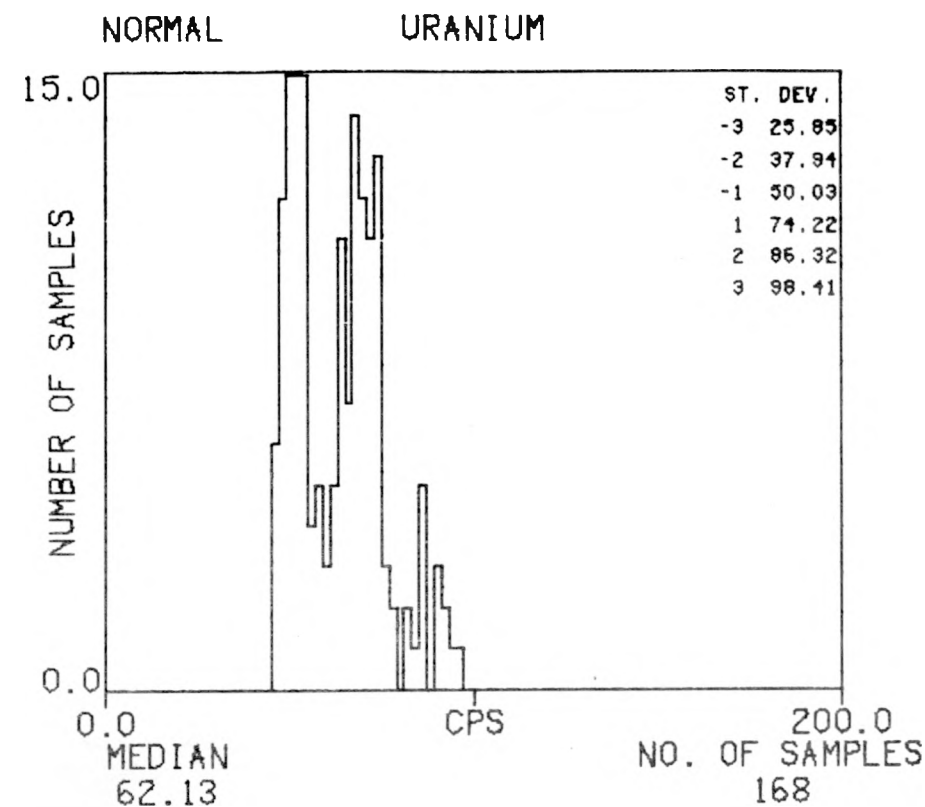
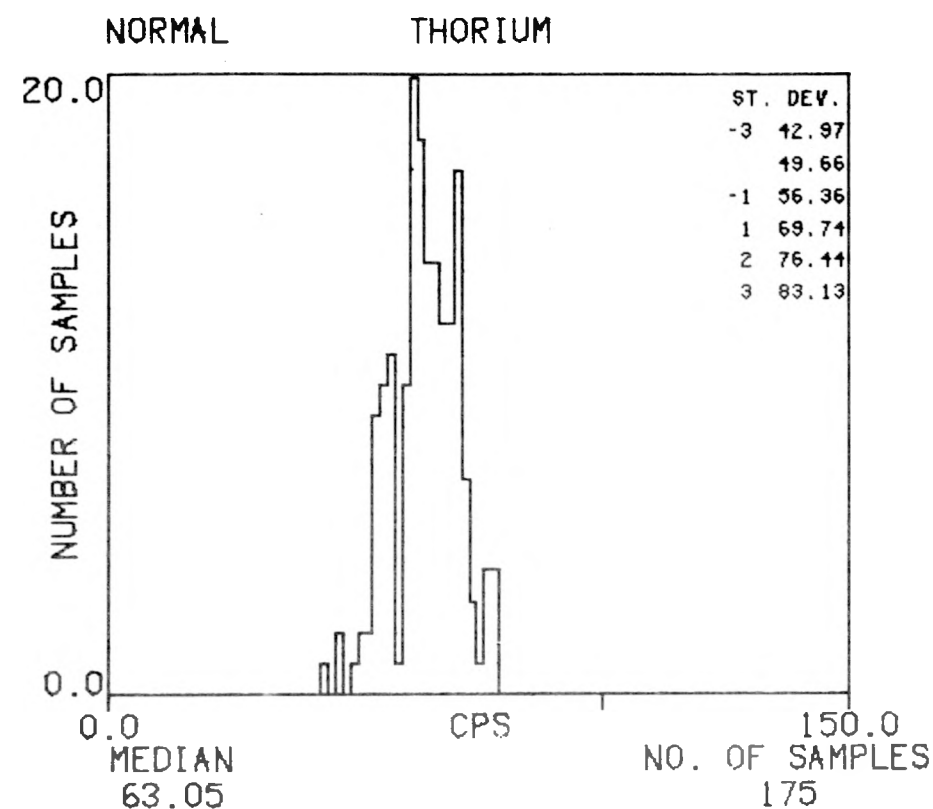
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TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



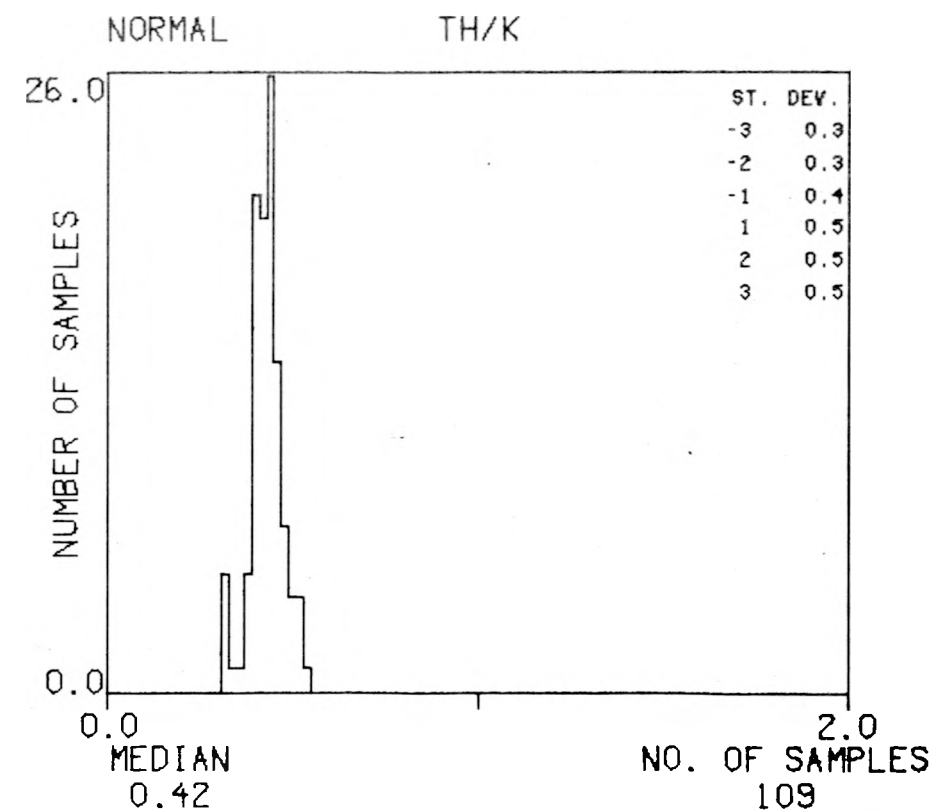
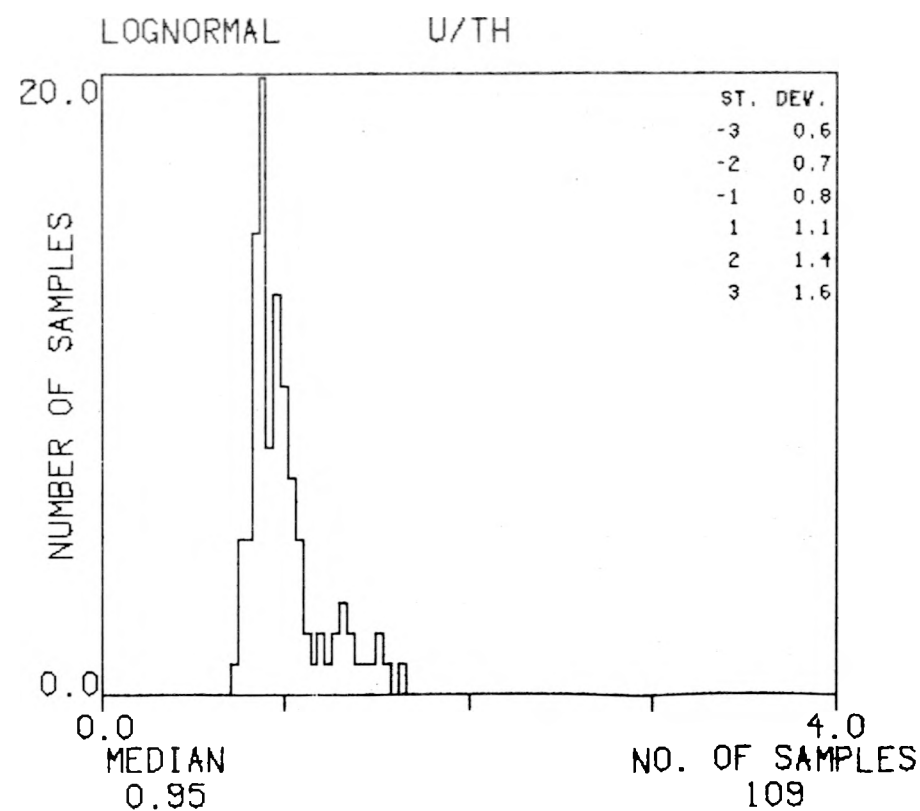
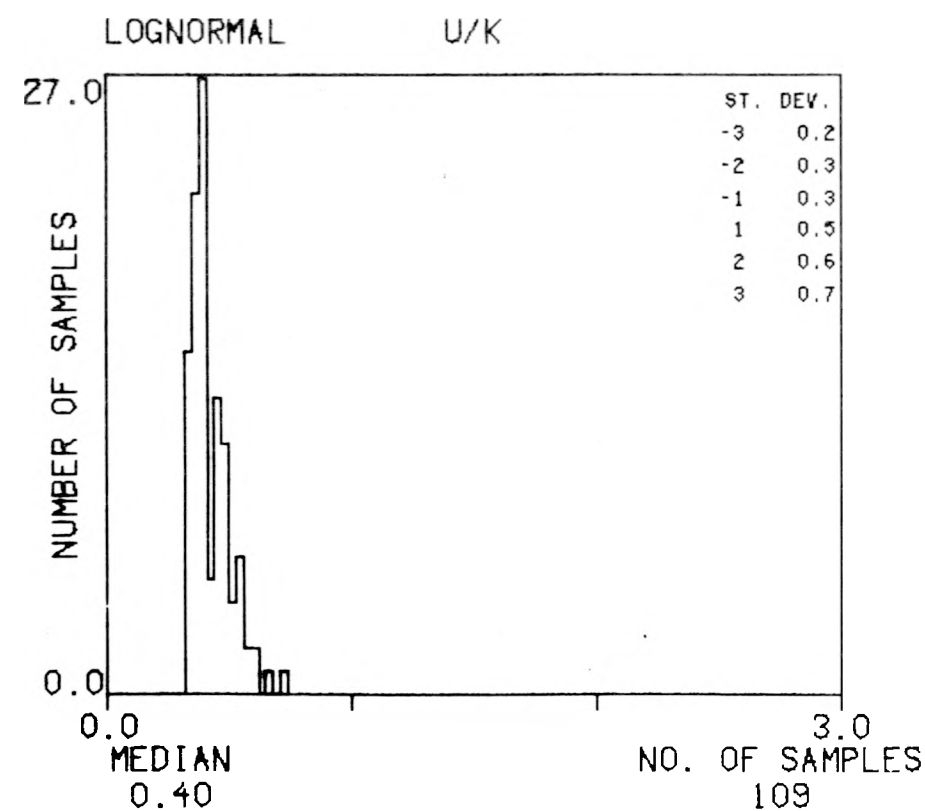
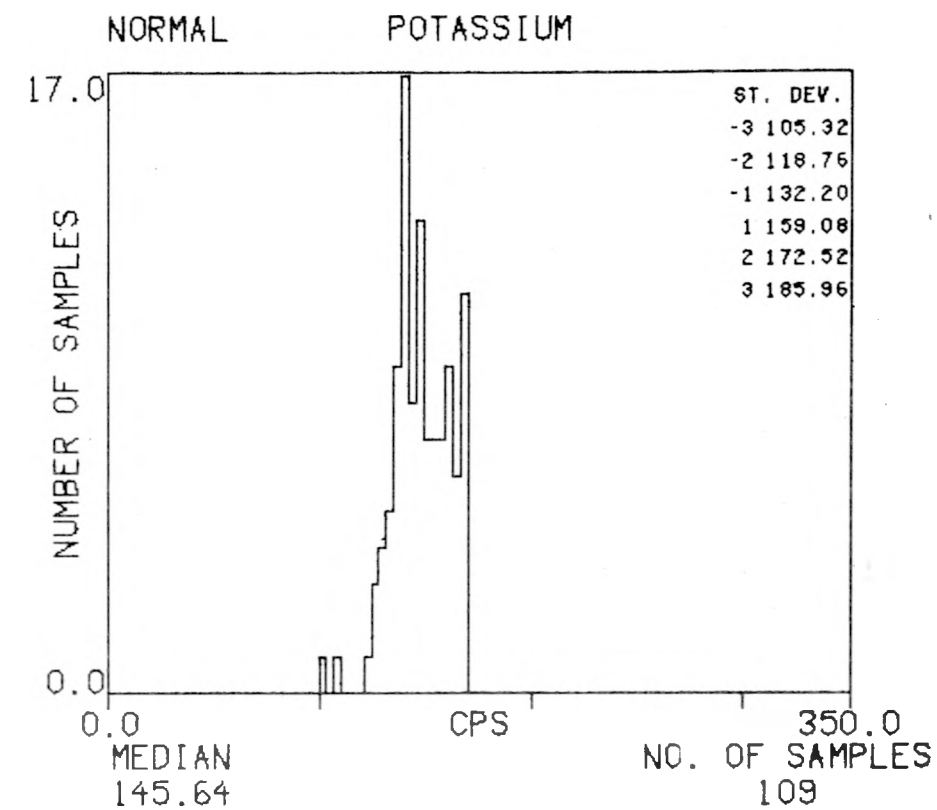
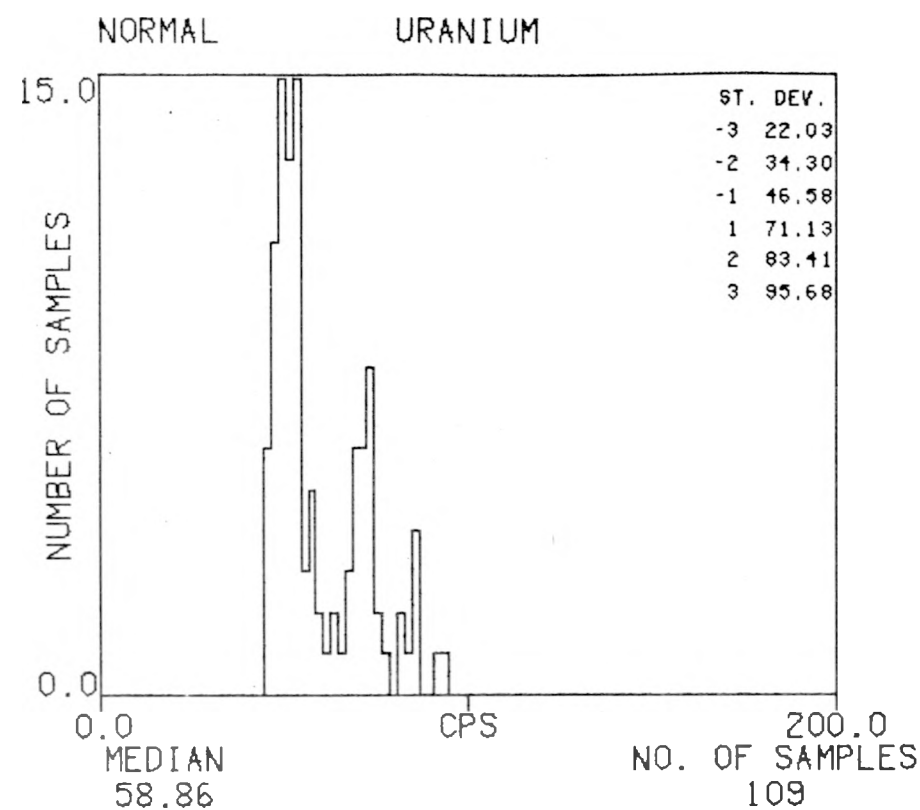
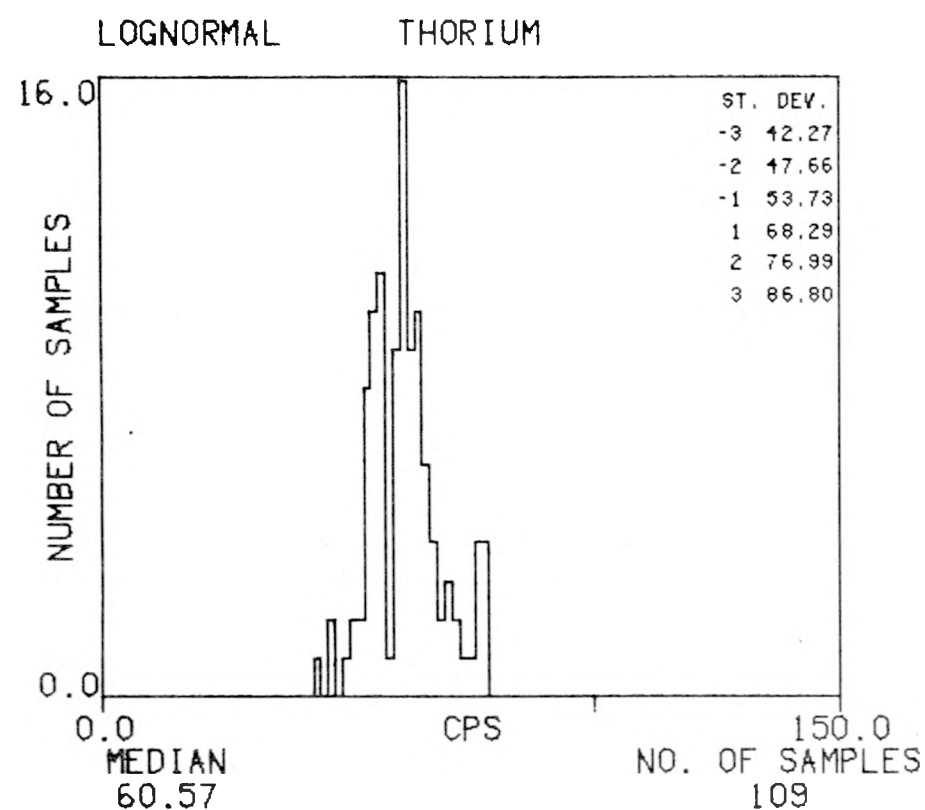
HISTOGRAMS : KF

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



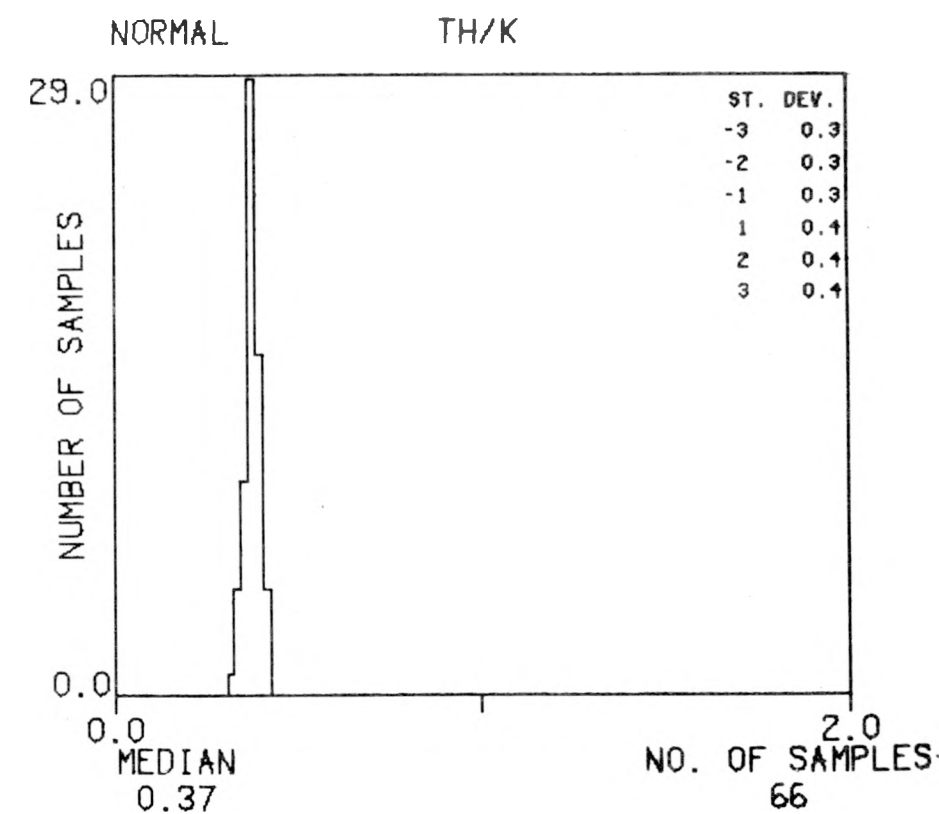
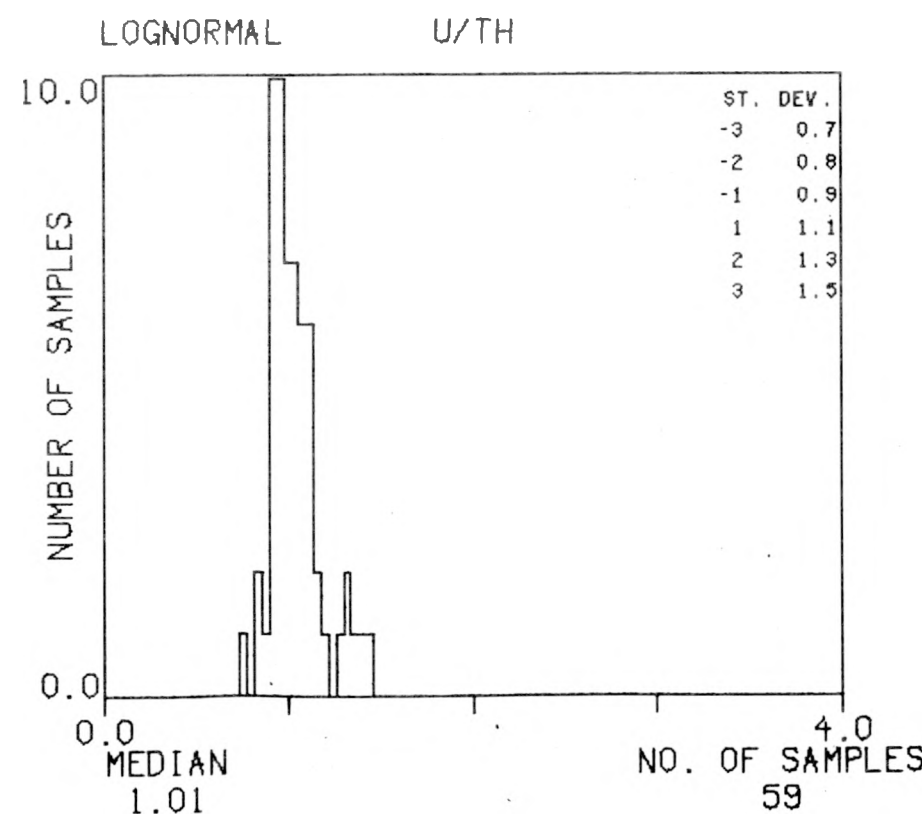
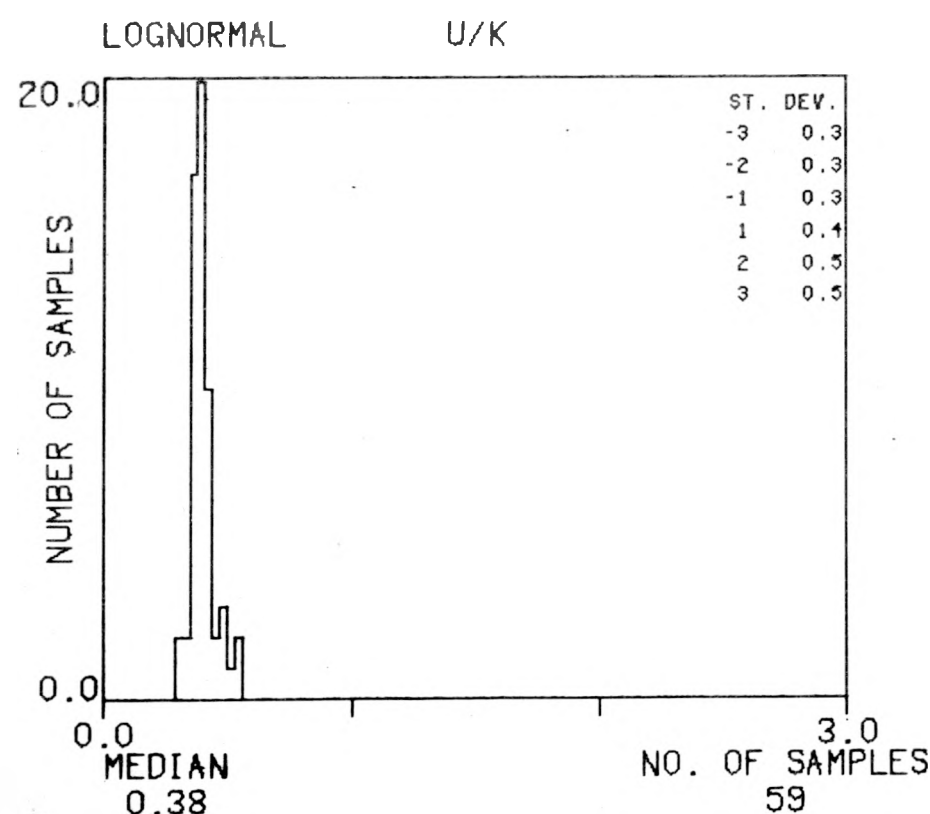
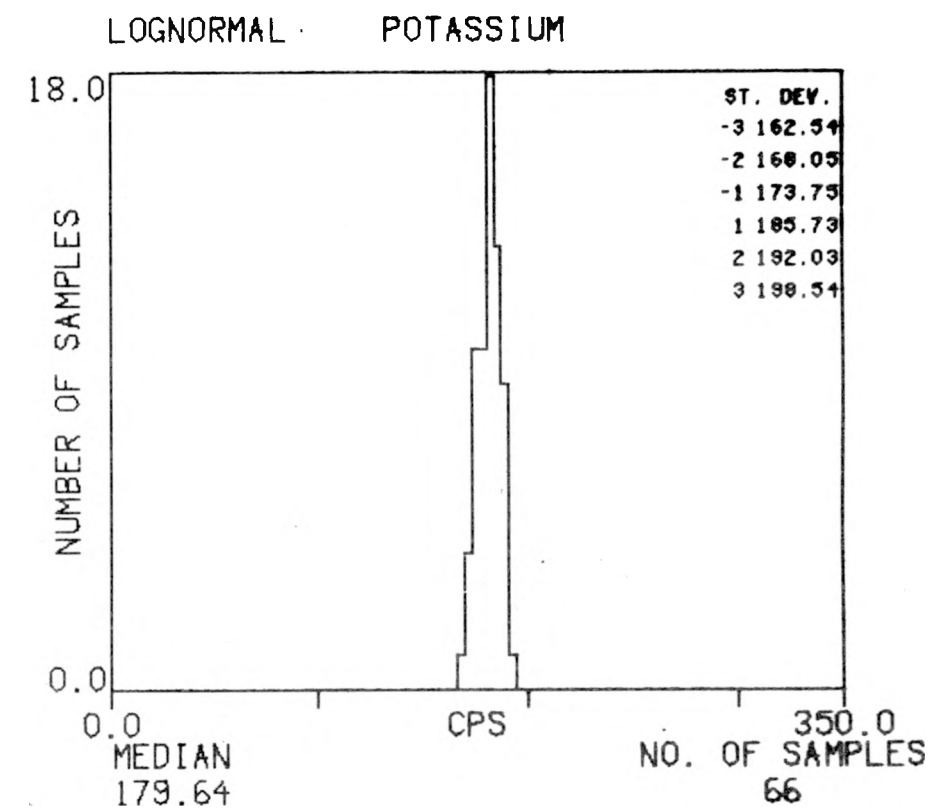
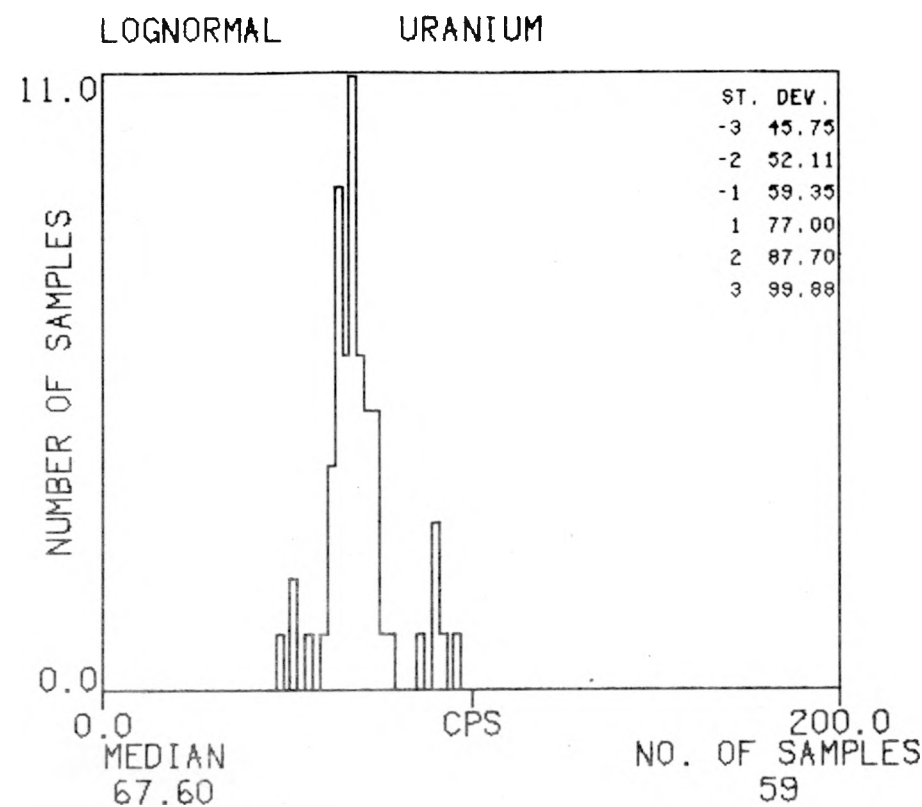
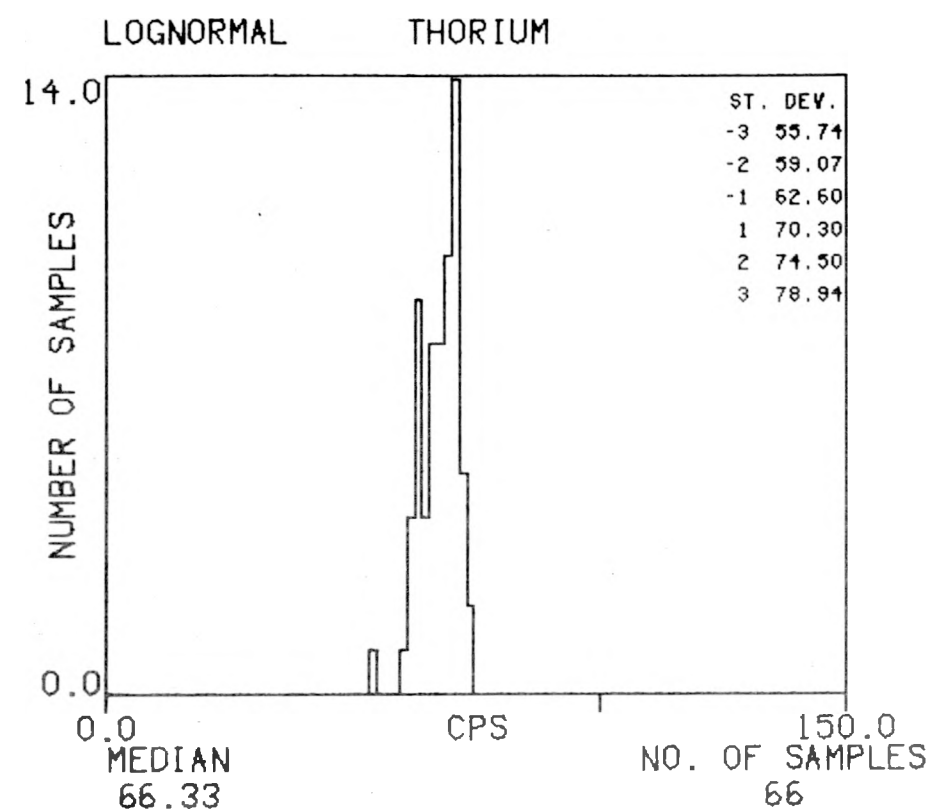
HISTOGRAMS : KF-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



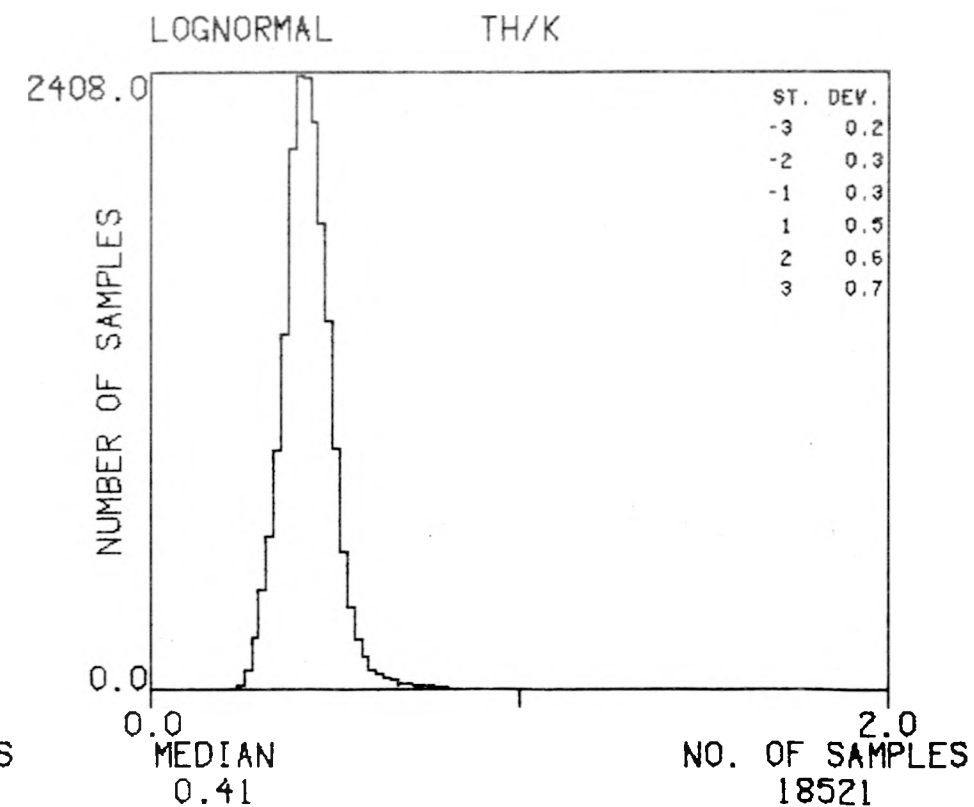
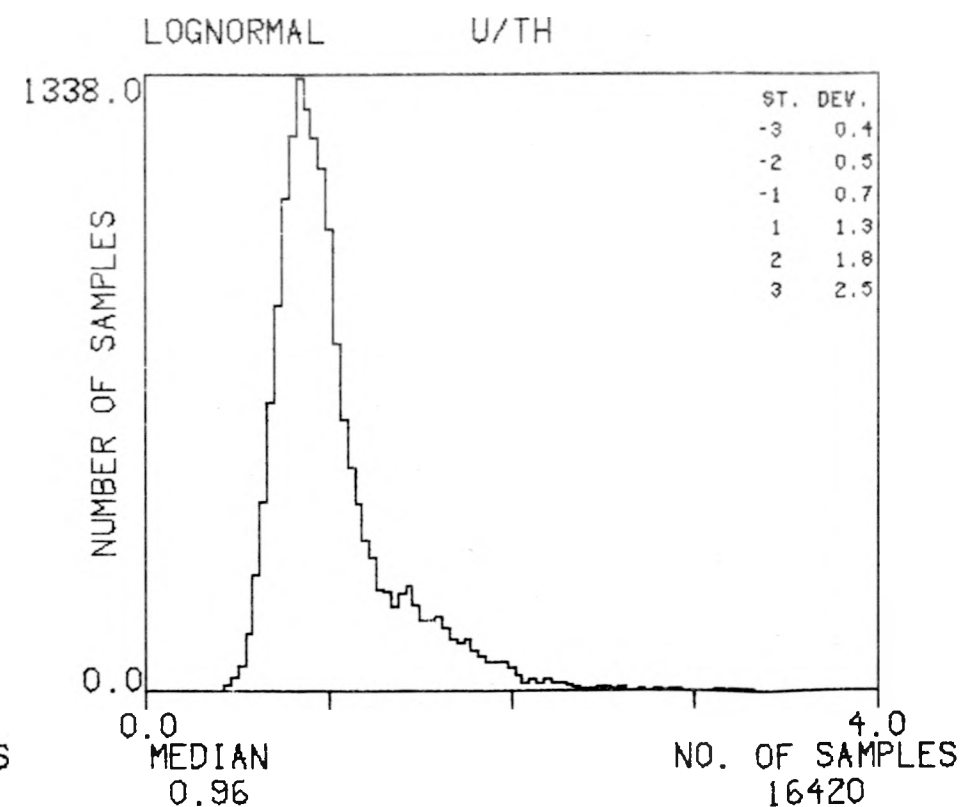
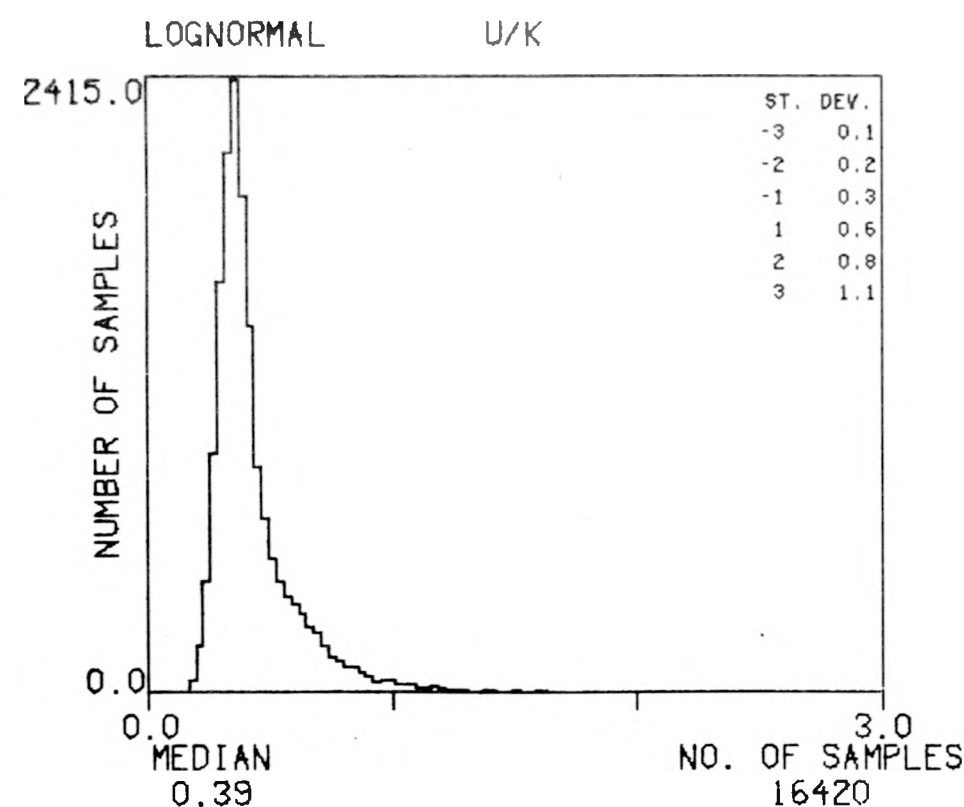
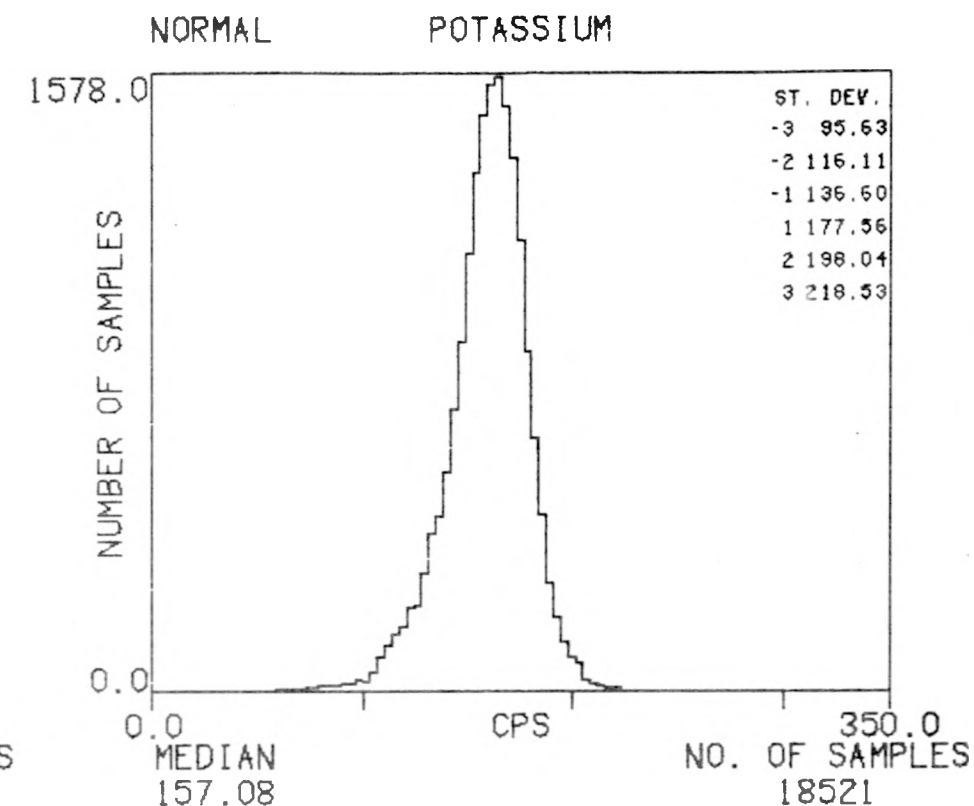
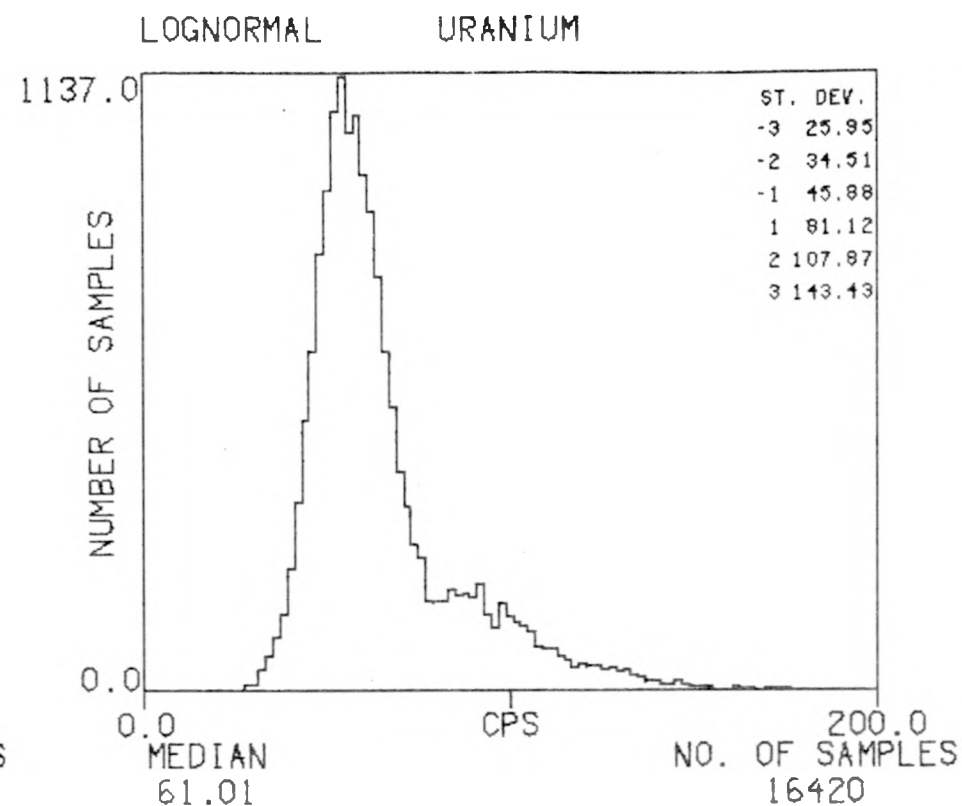
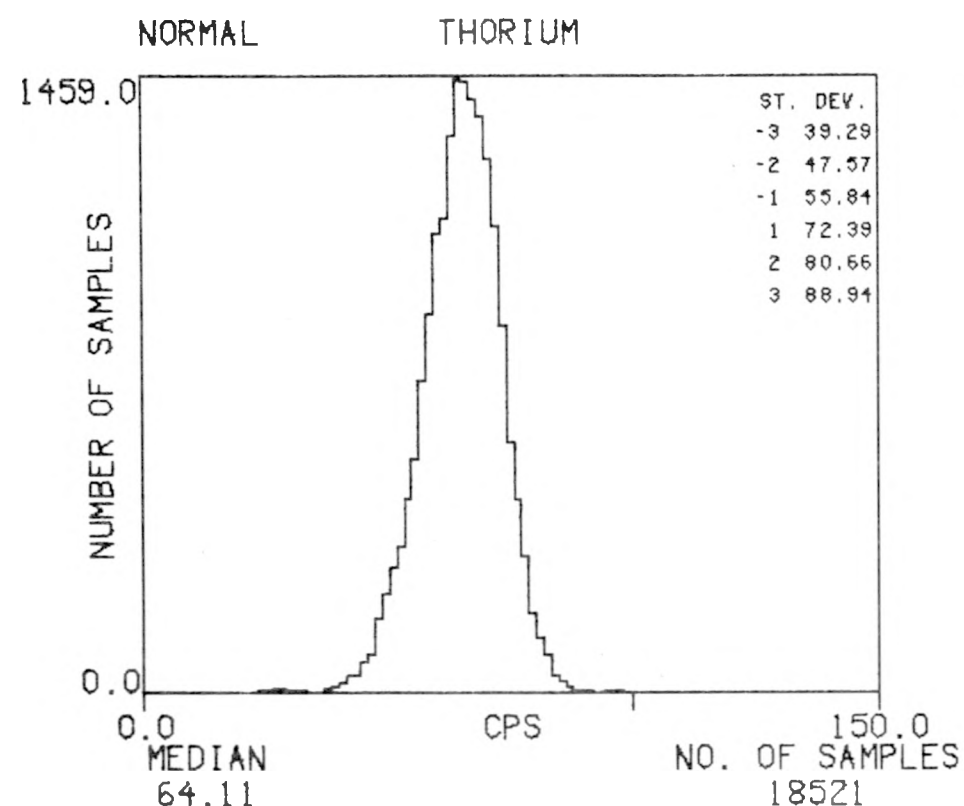
HISTOGRAMS : KF-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



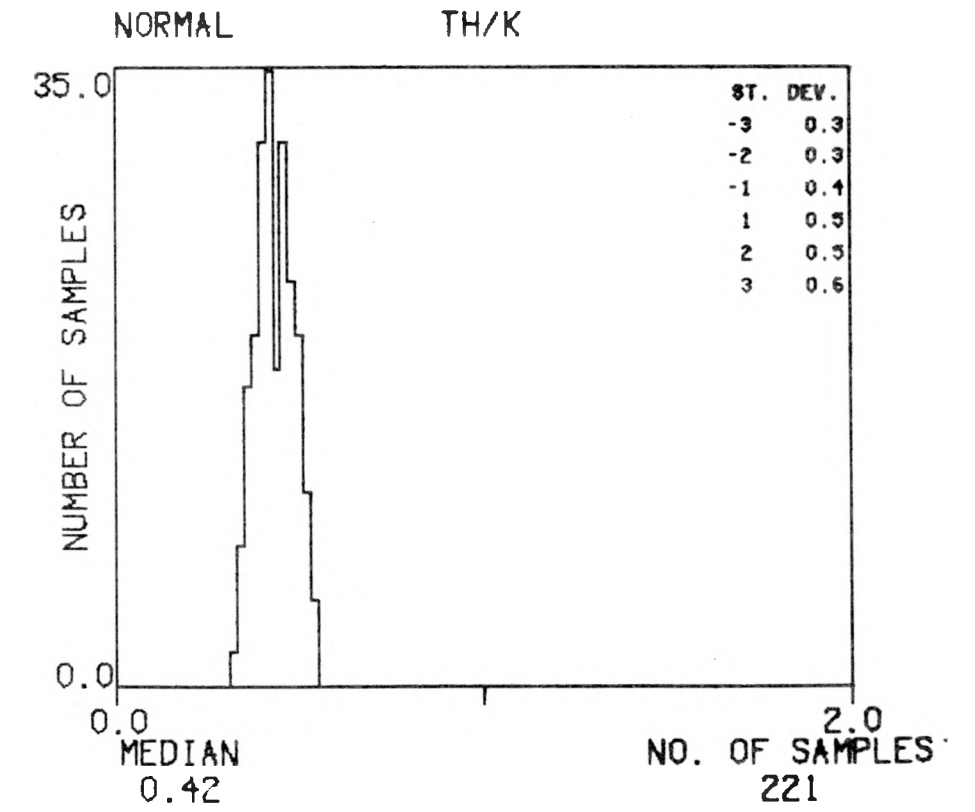
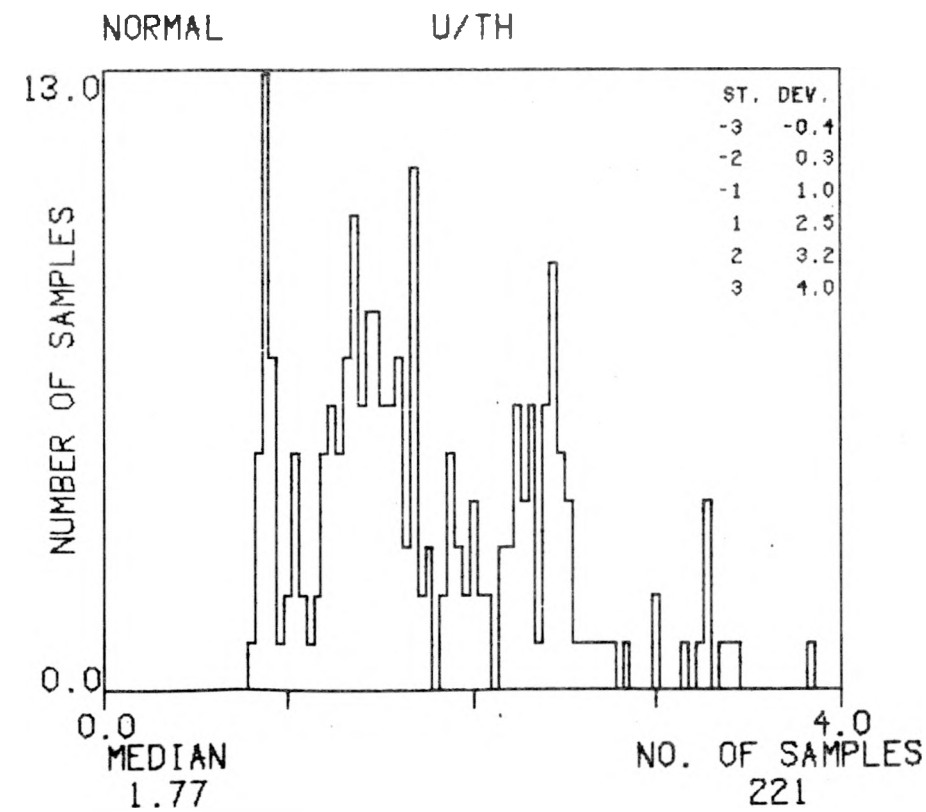
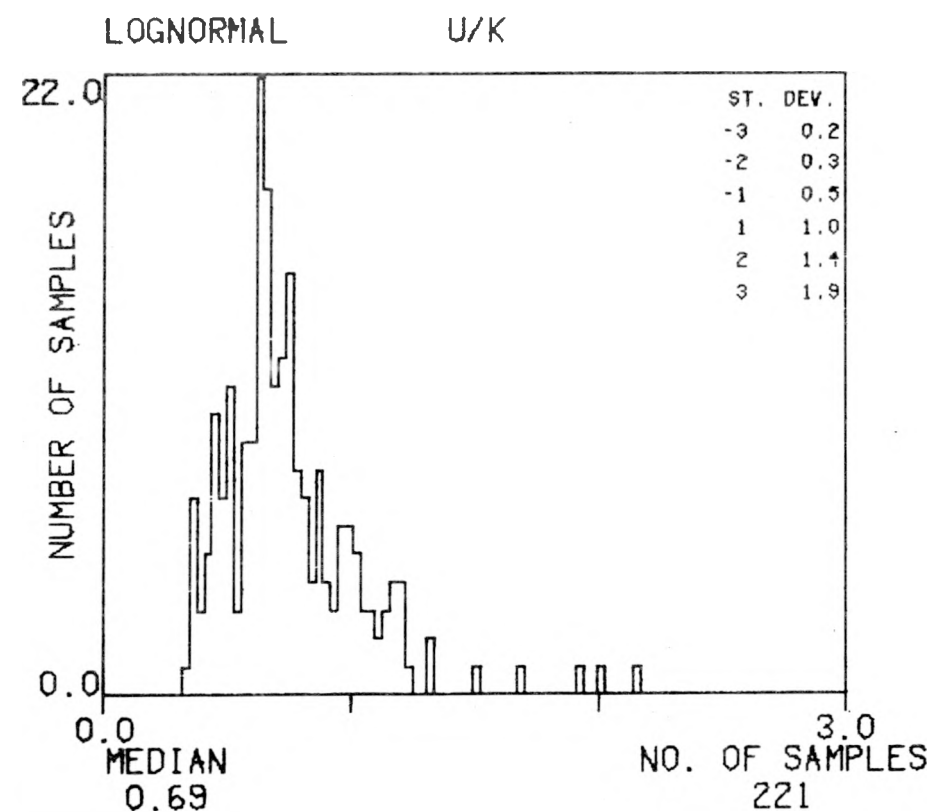
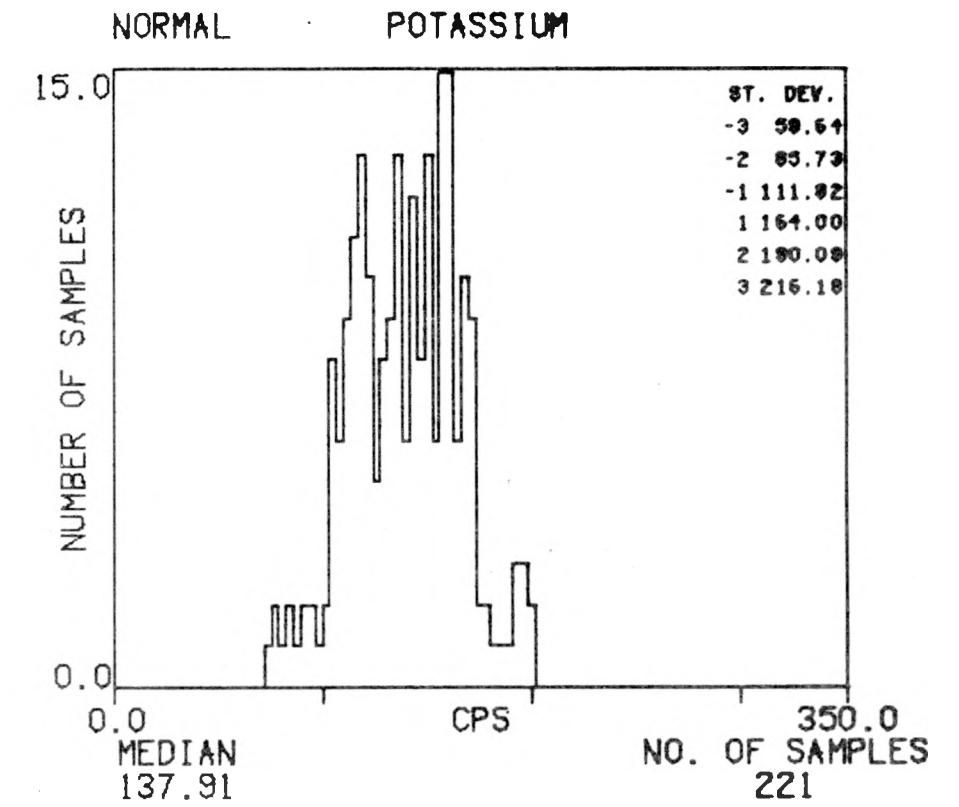
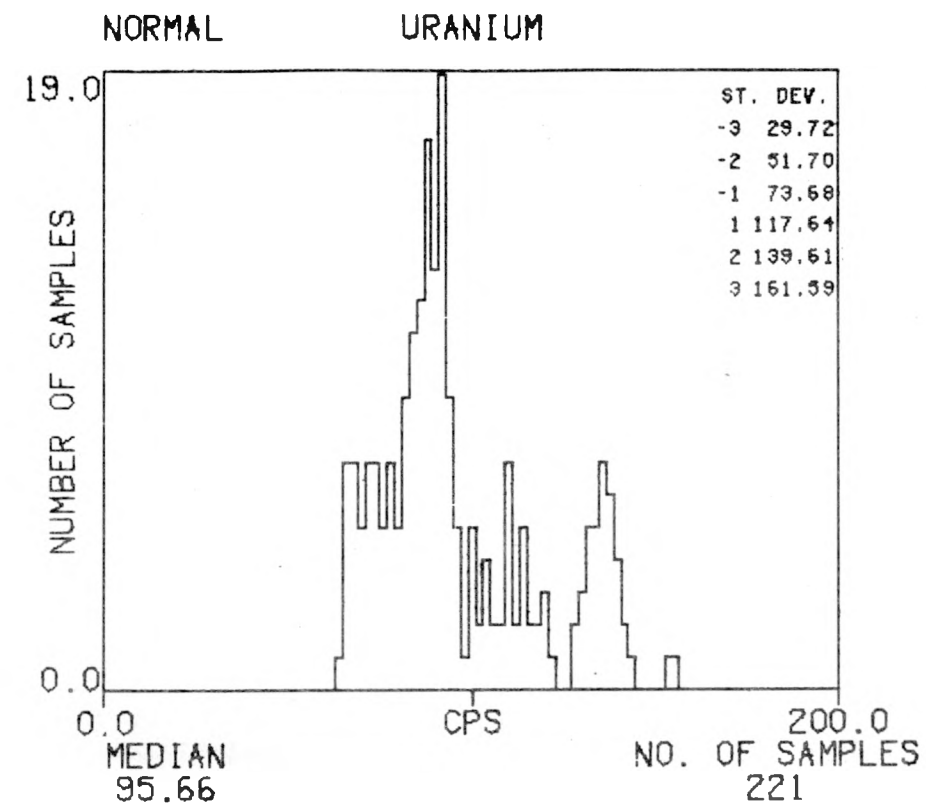
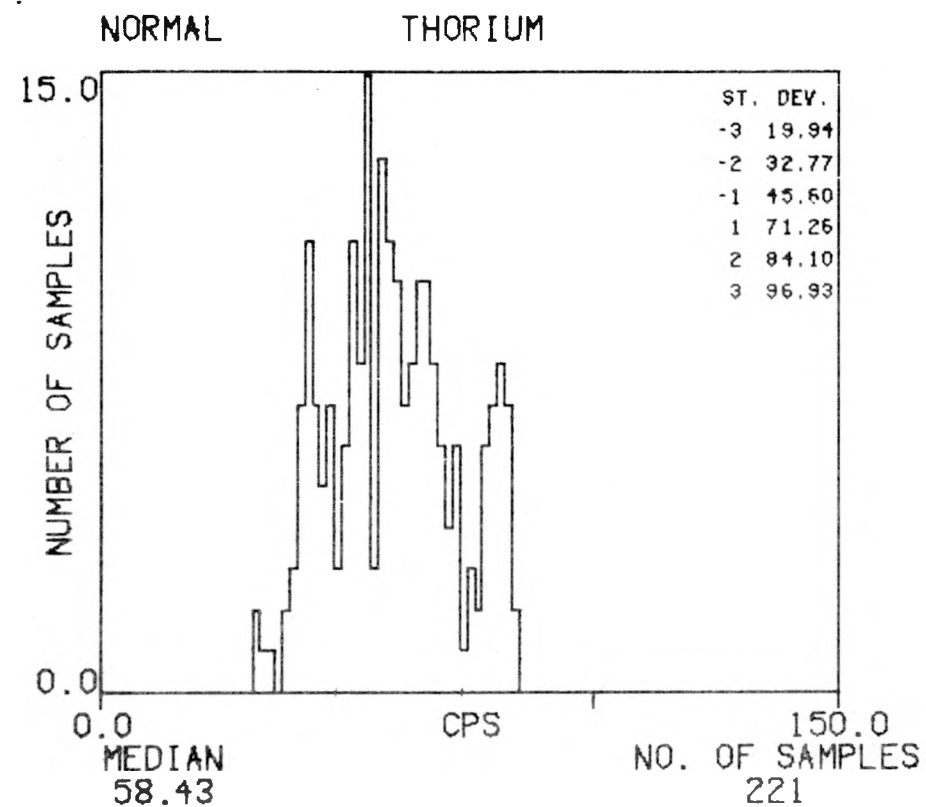
HISTOGRAMS : KP

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



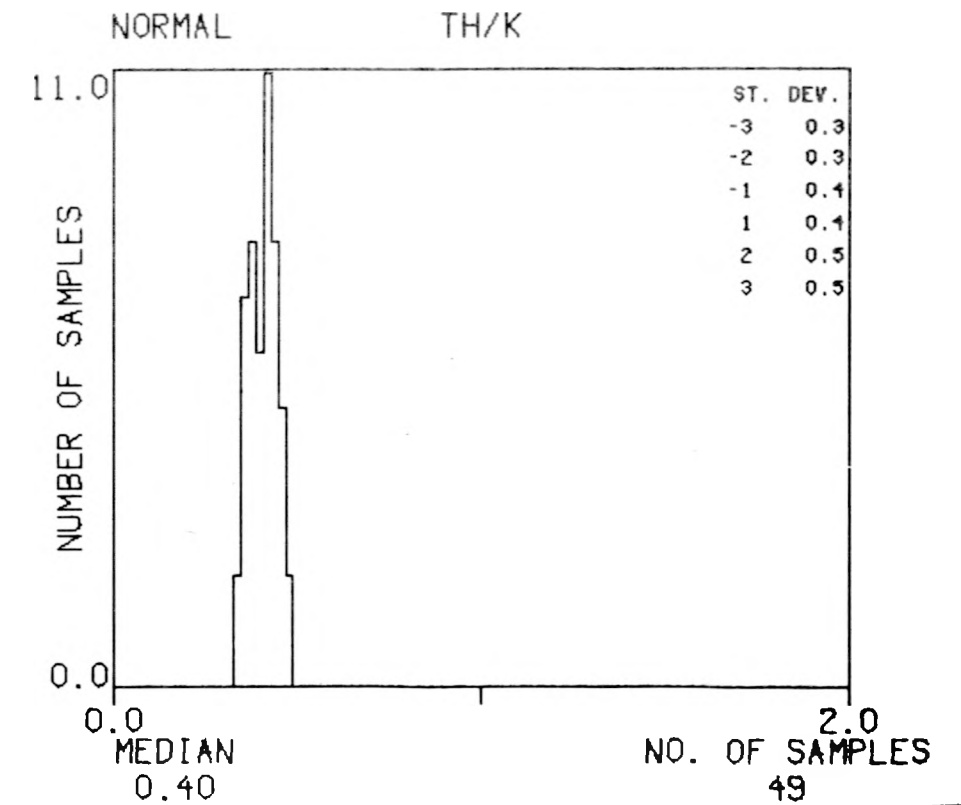
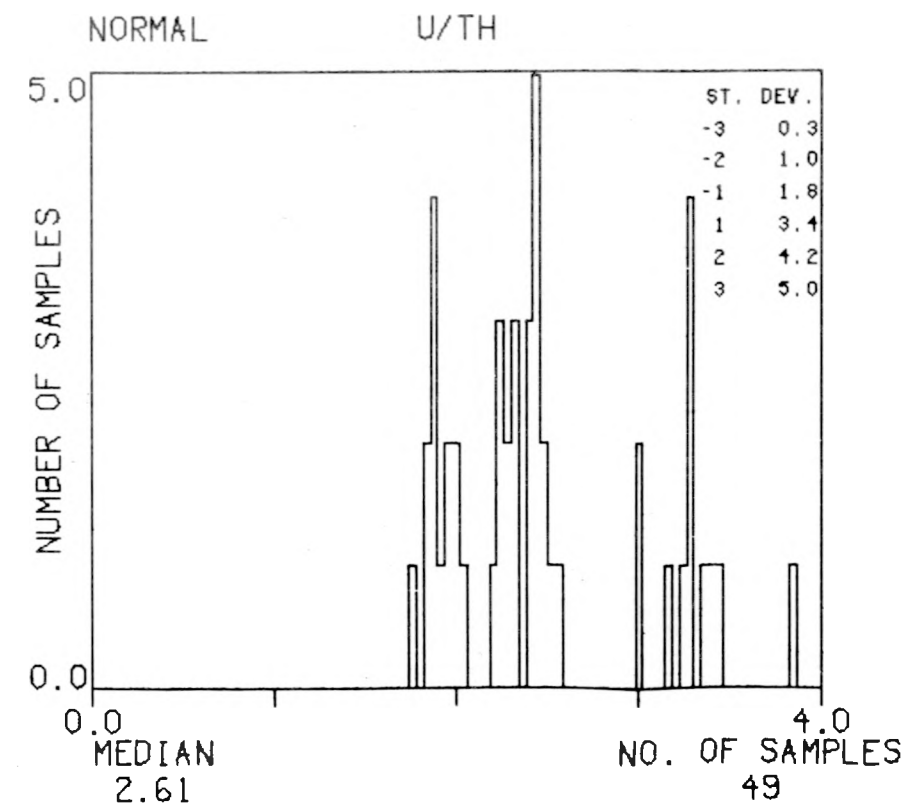
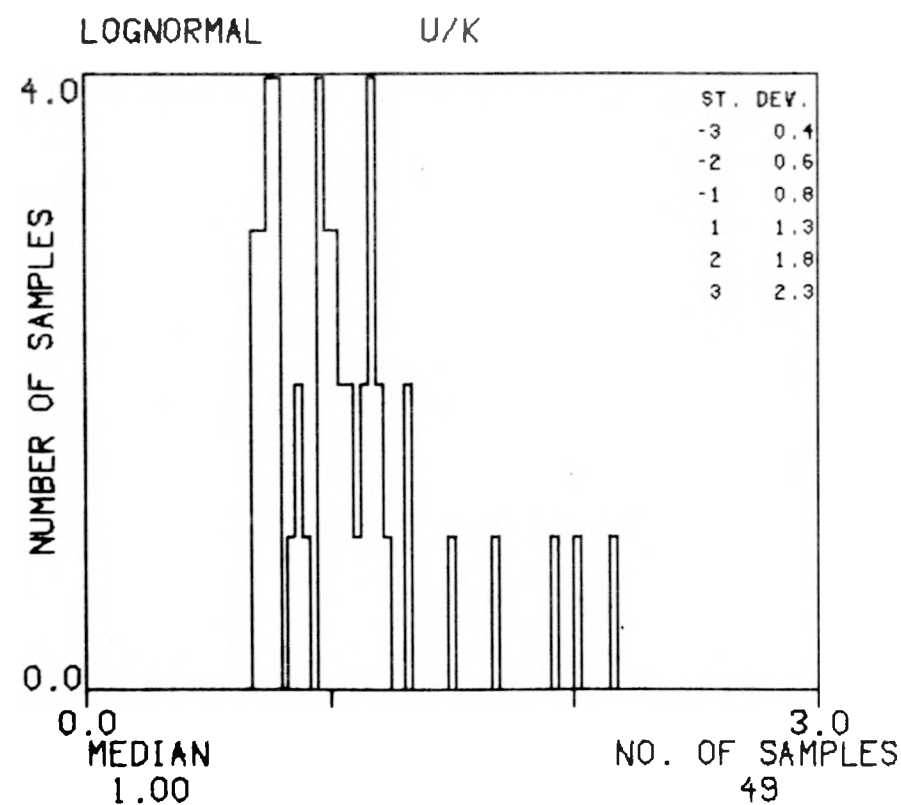
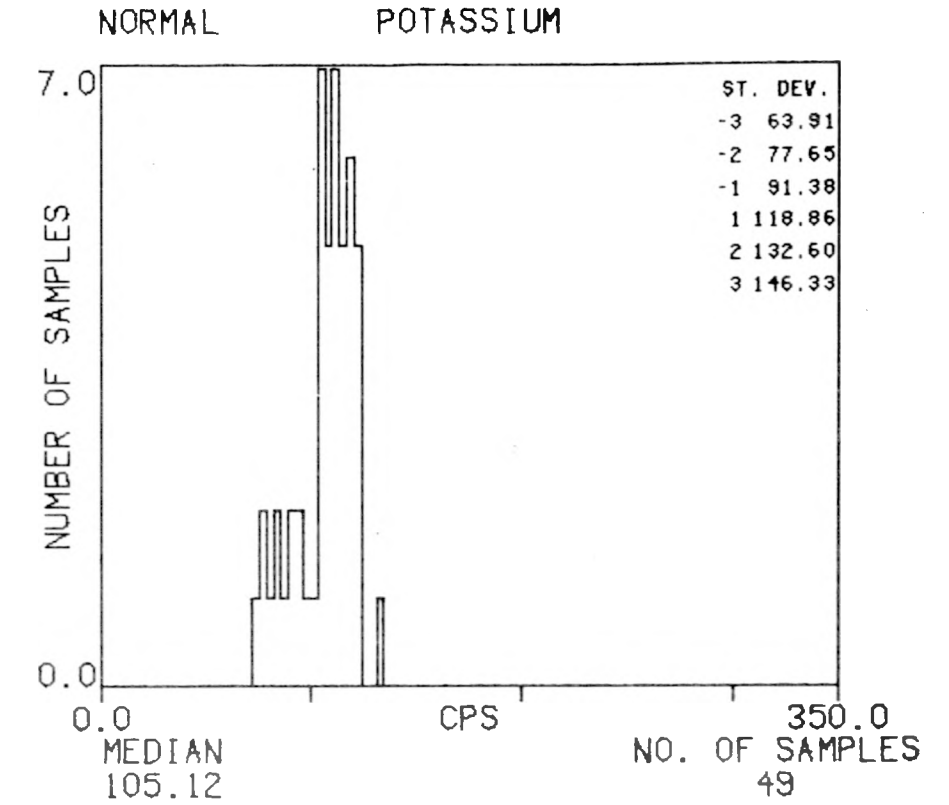
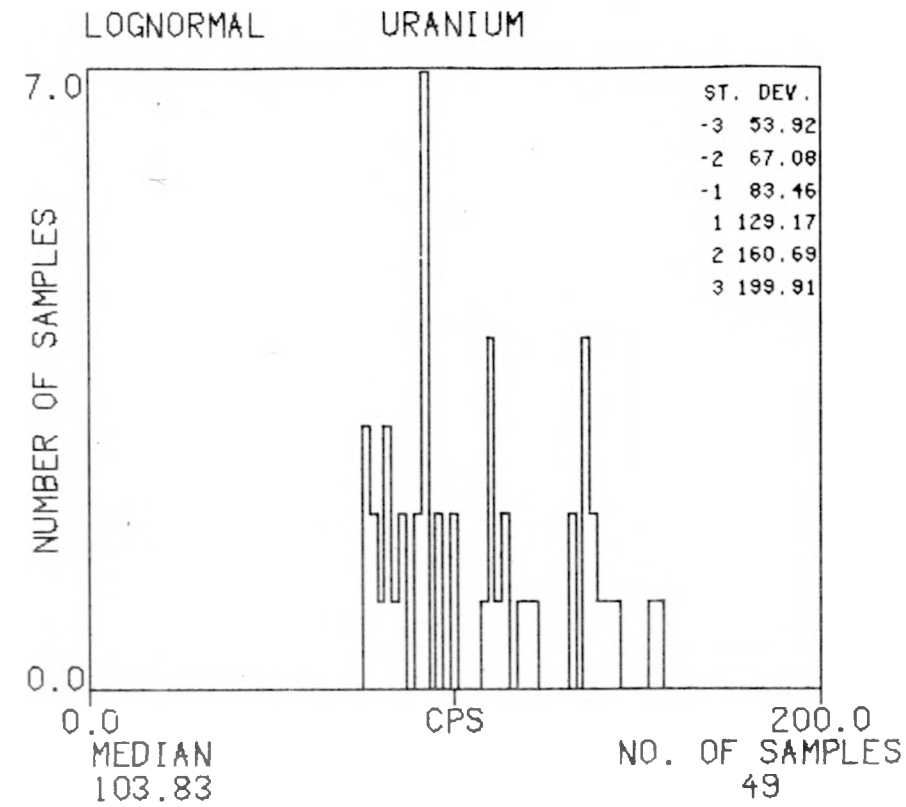
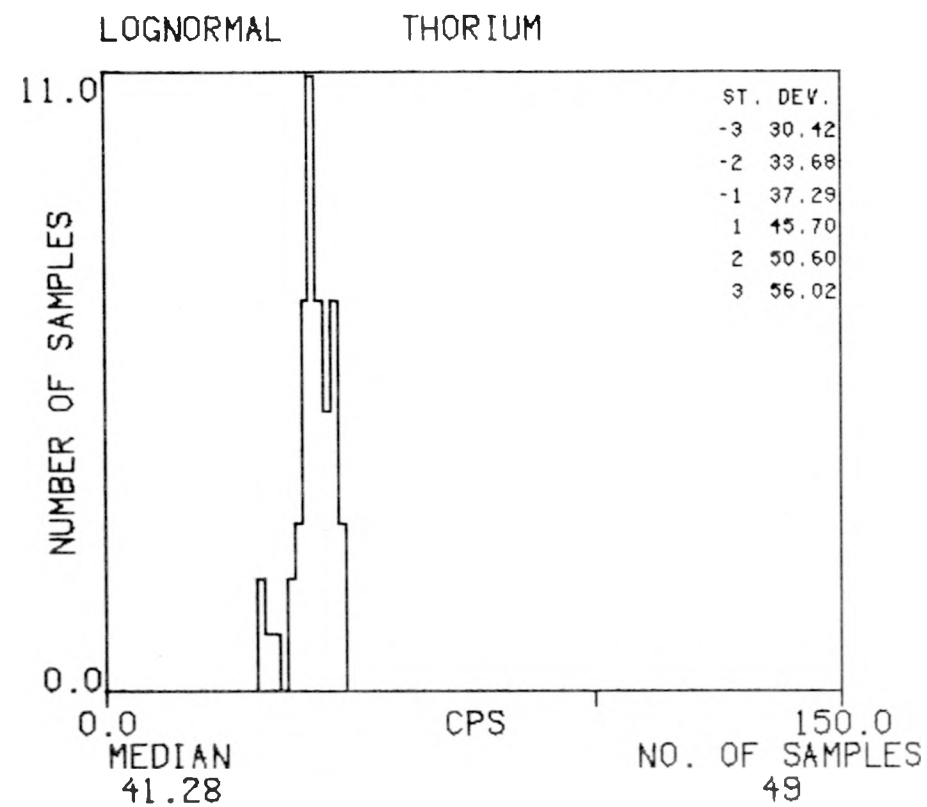
HISTOGRAMS : KN

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



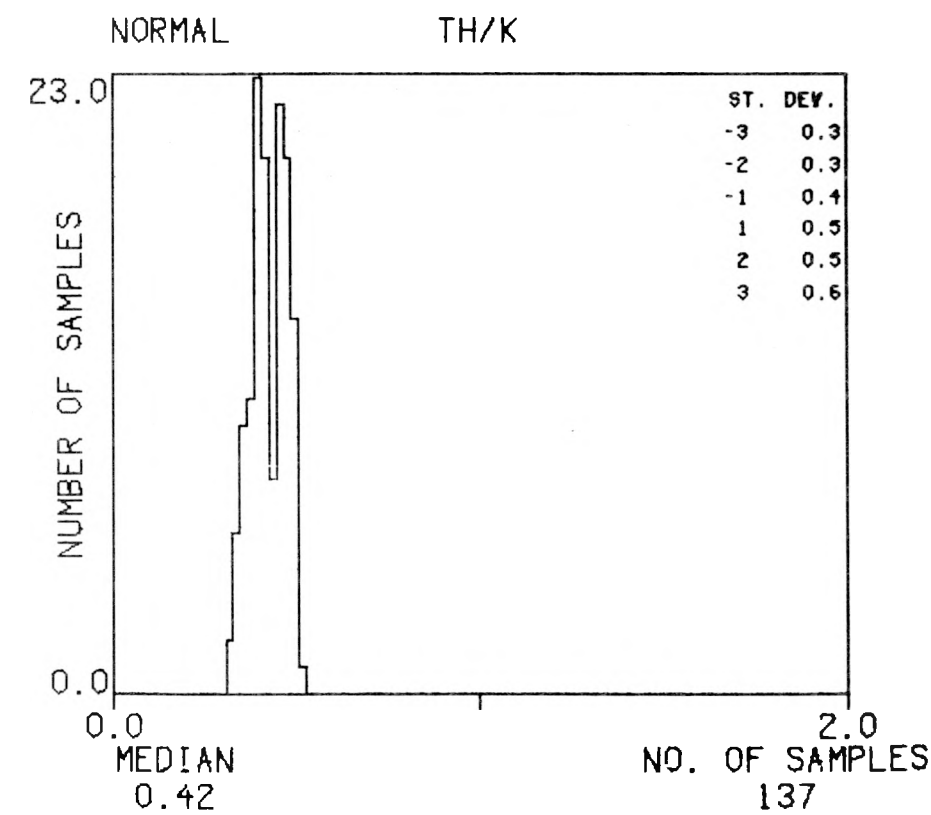
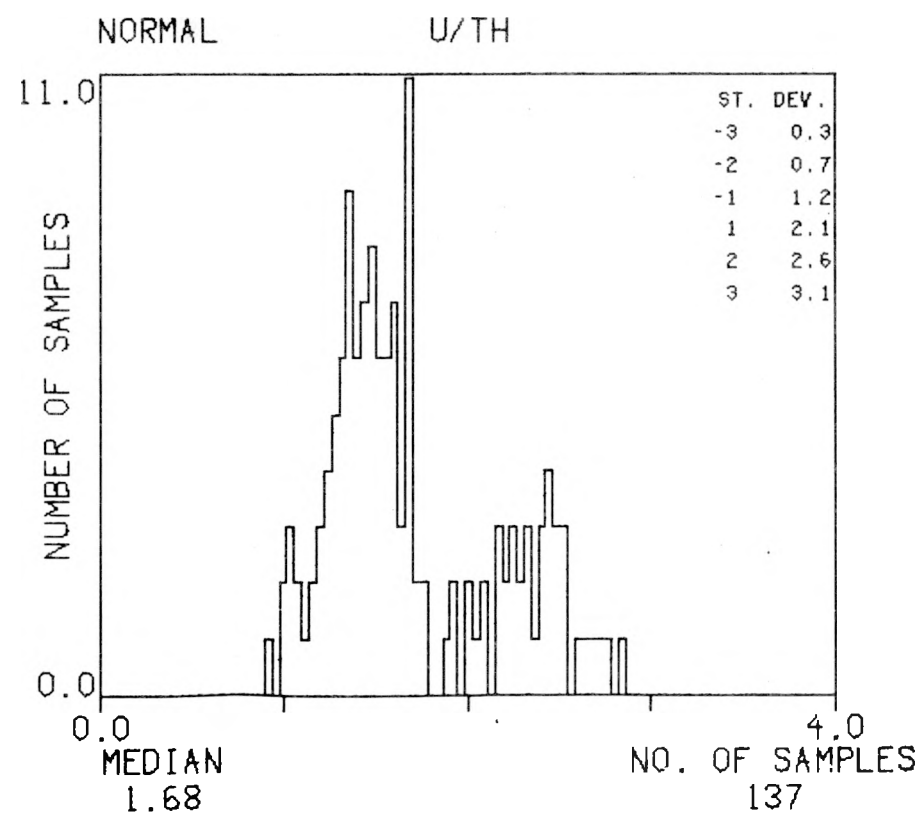
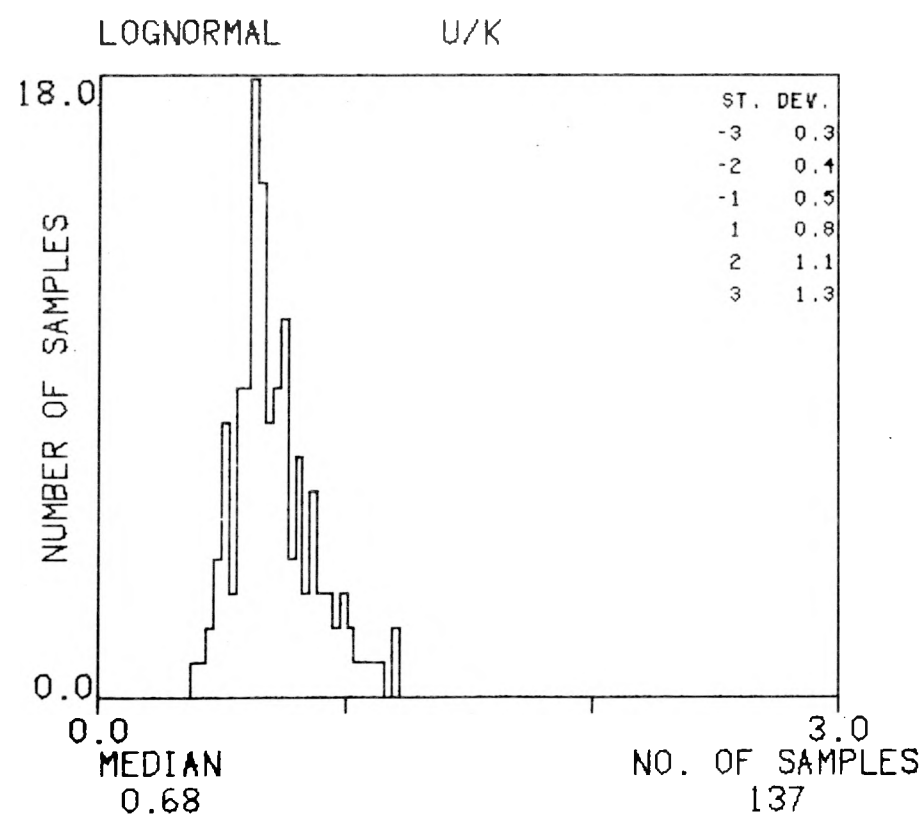
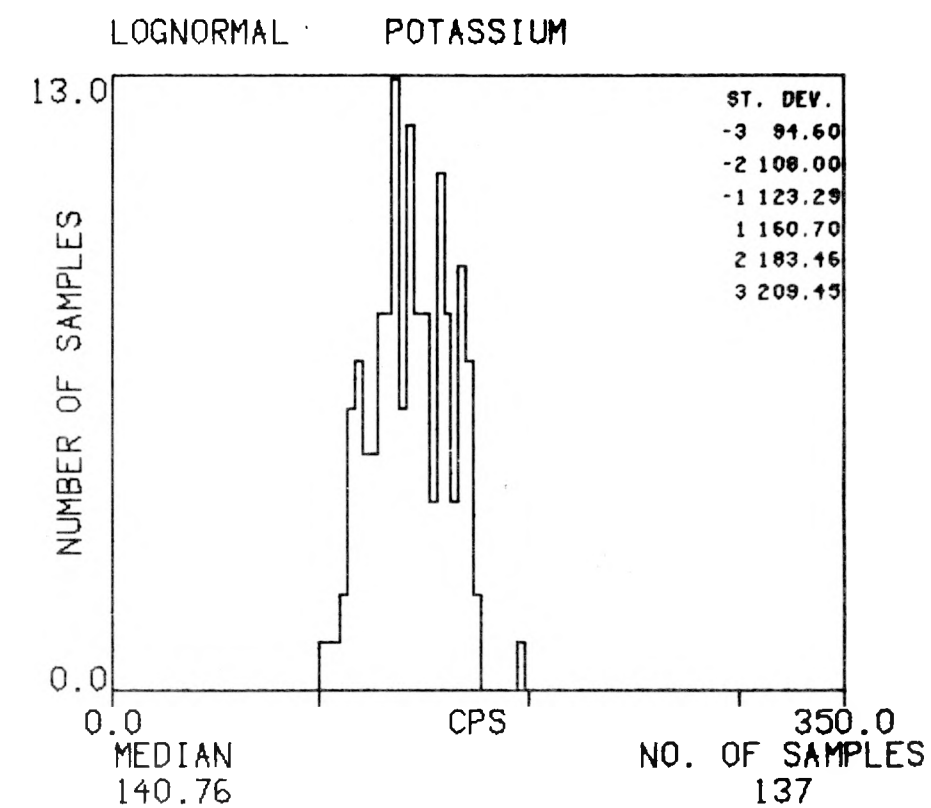
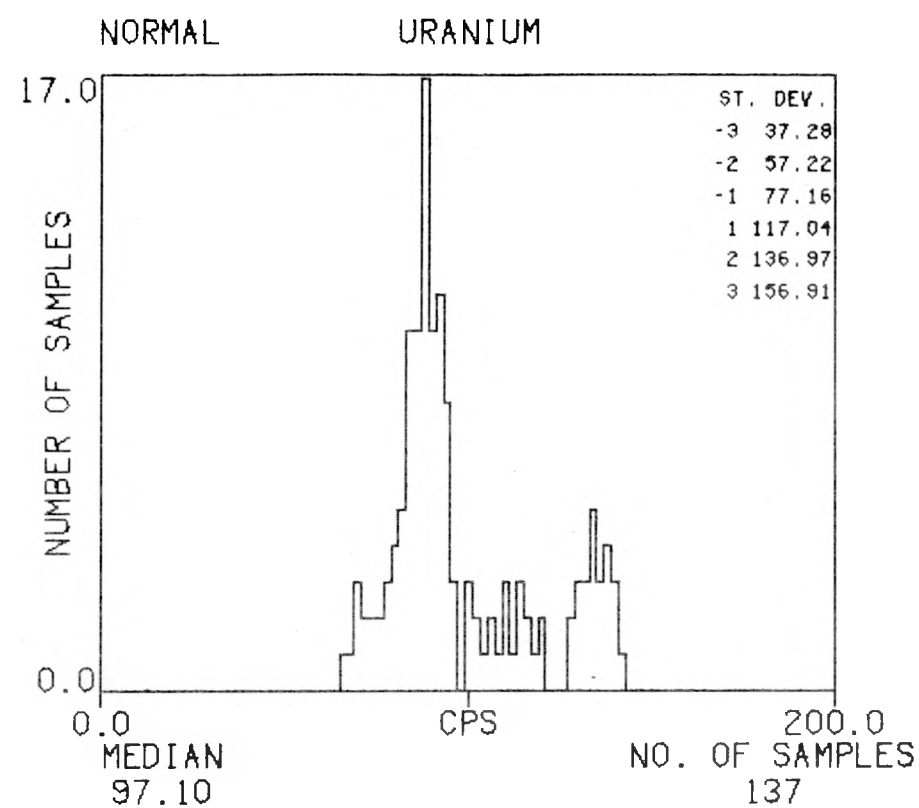
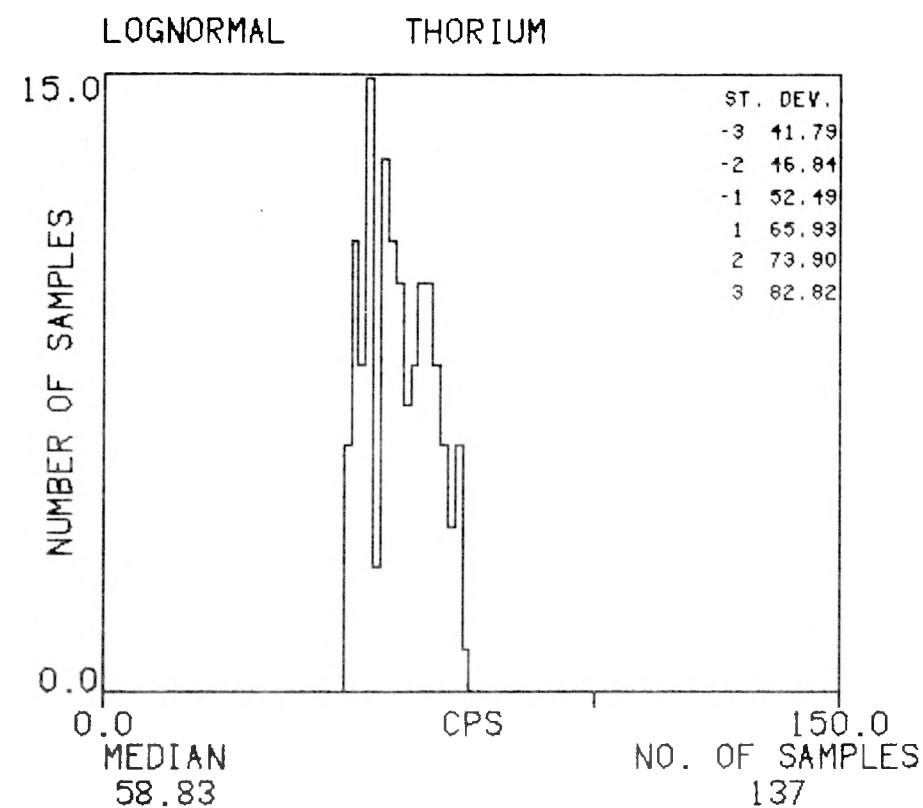
HISTOGRAMS : KN-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



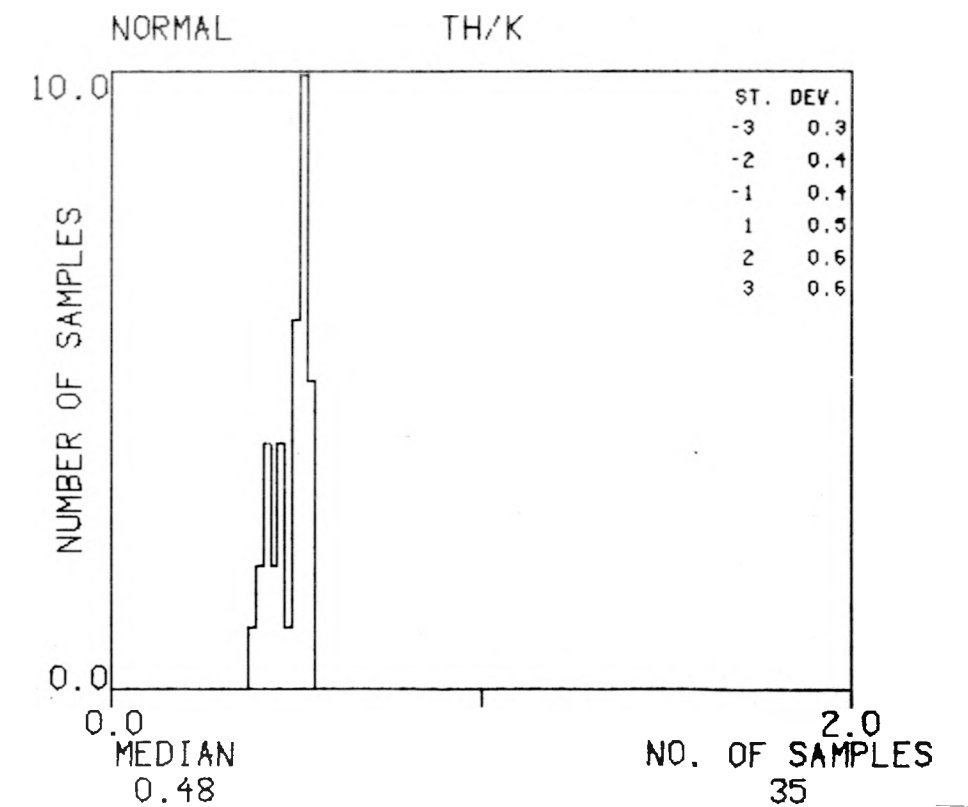
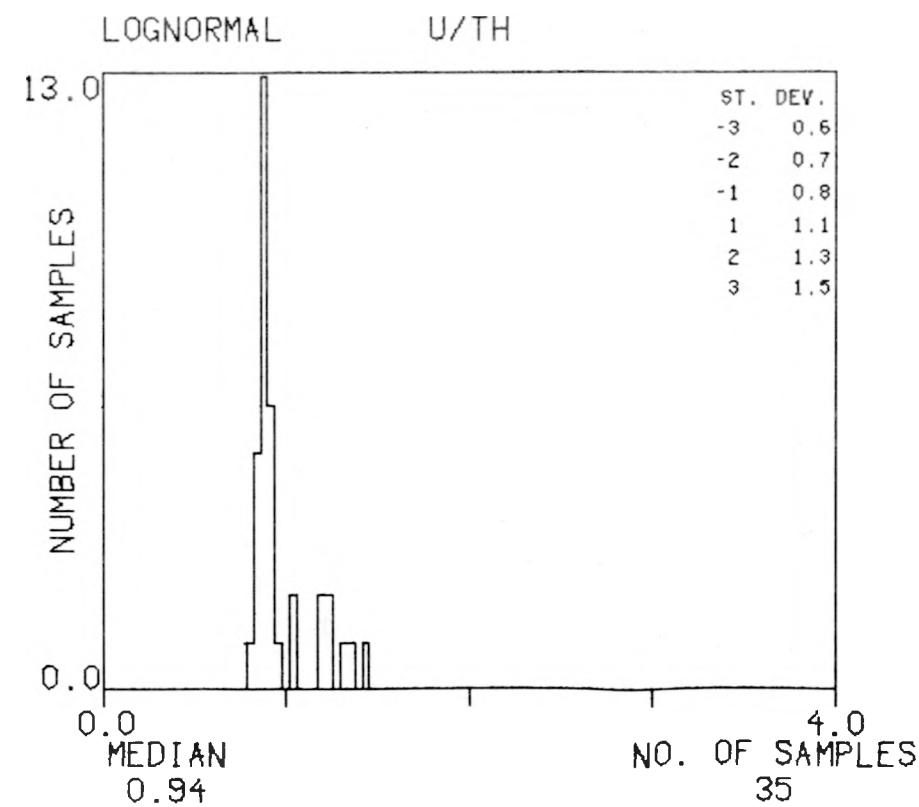
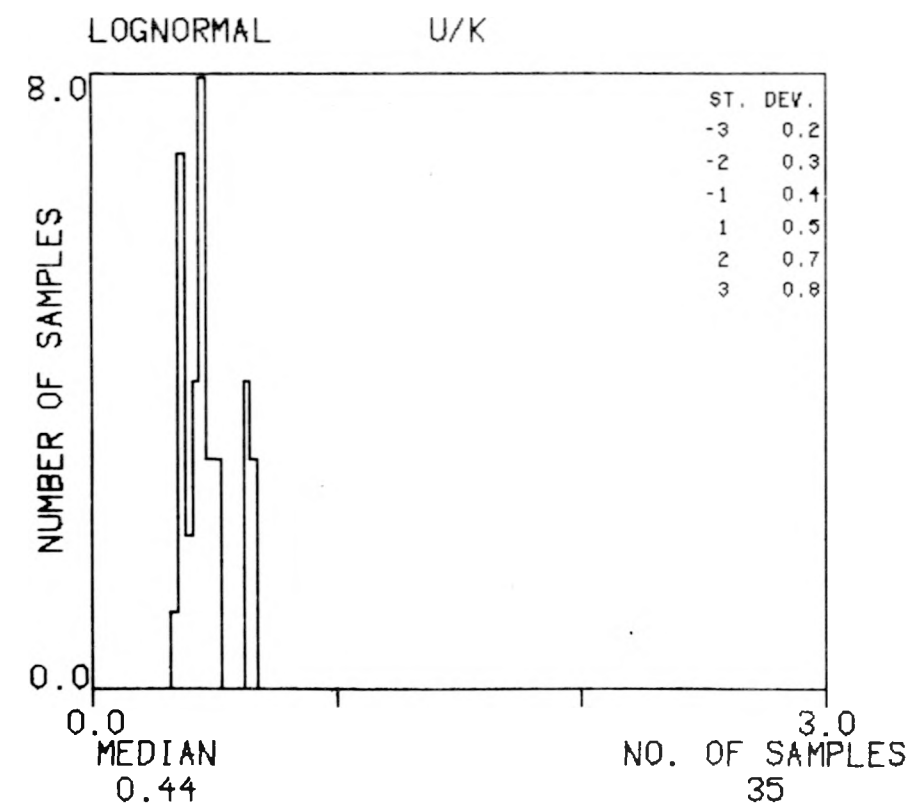
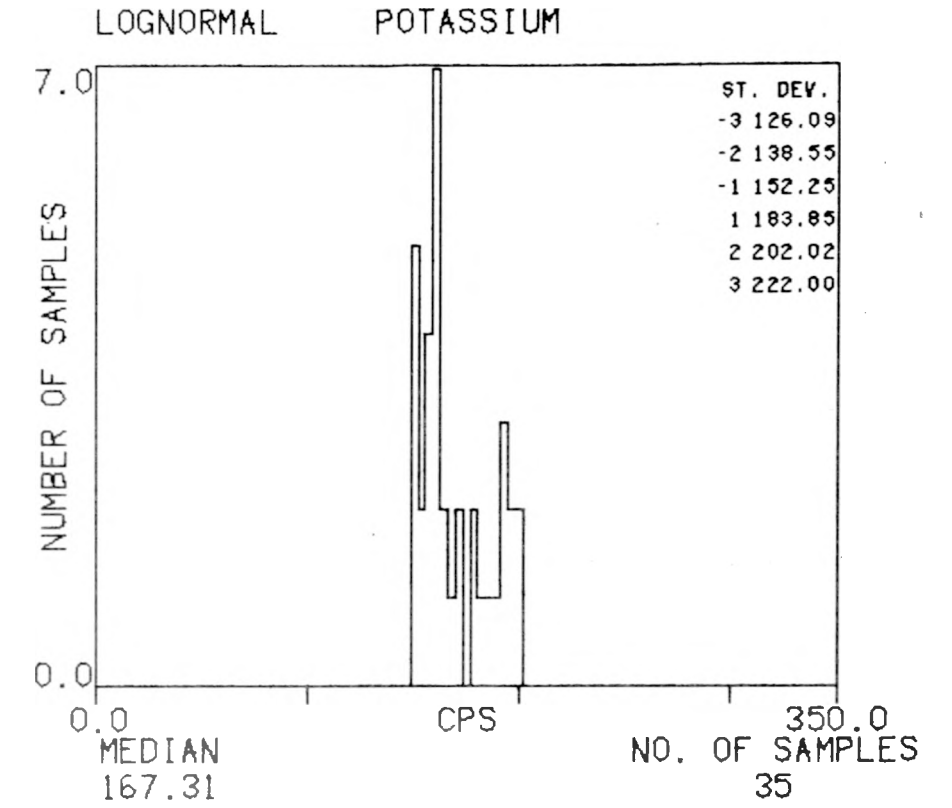
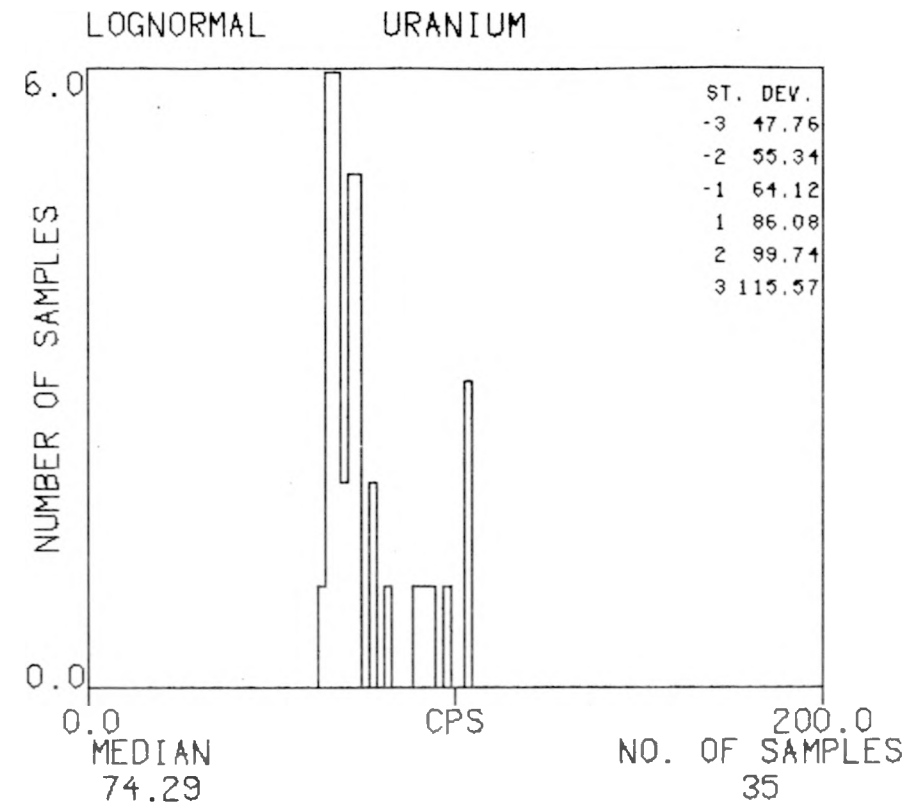
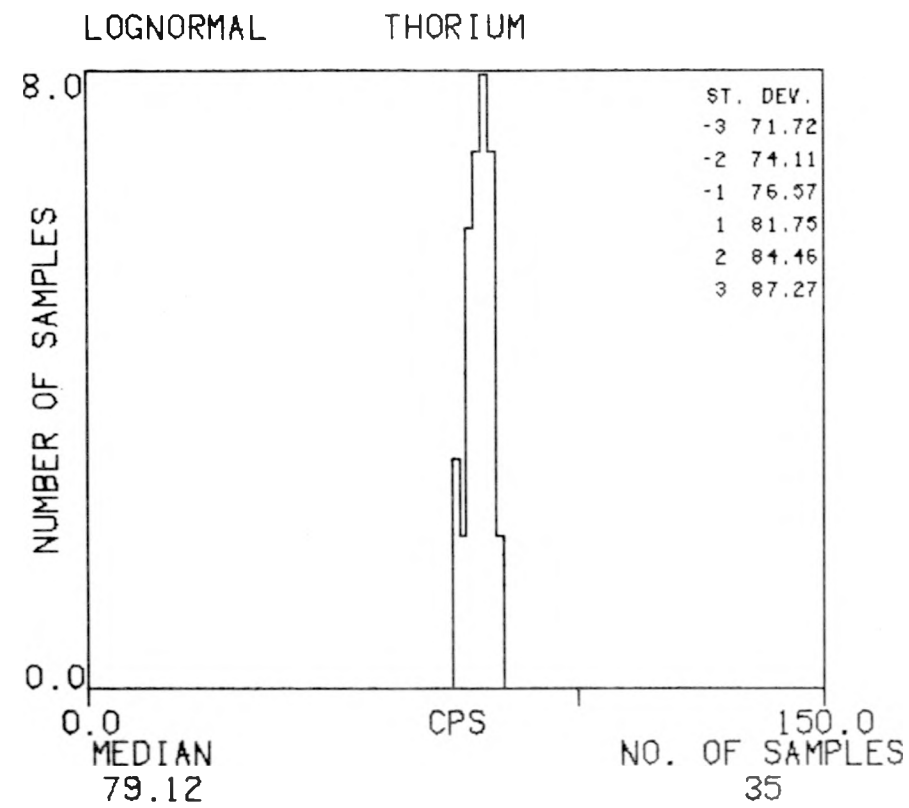
HISTOGRAMS : KN-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



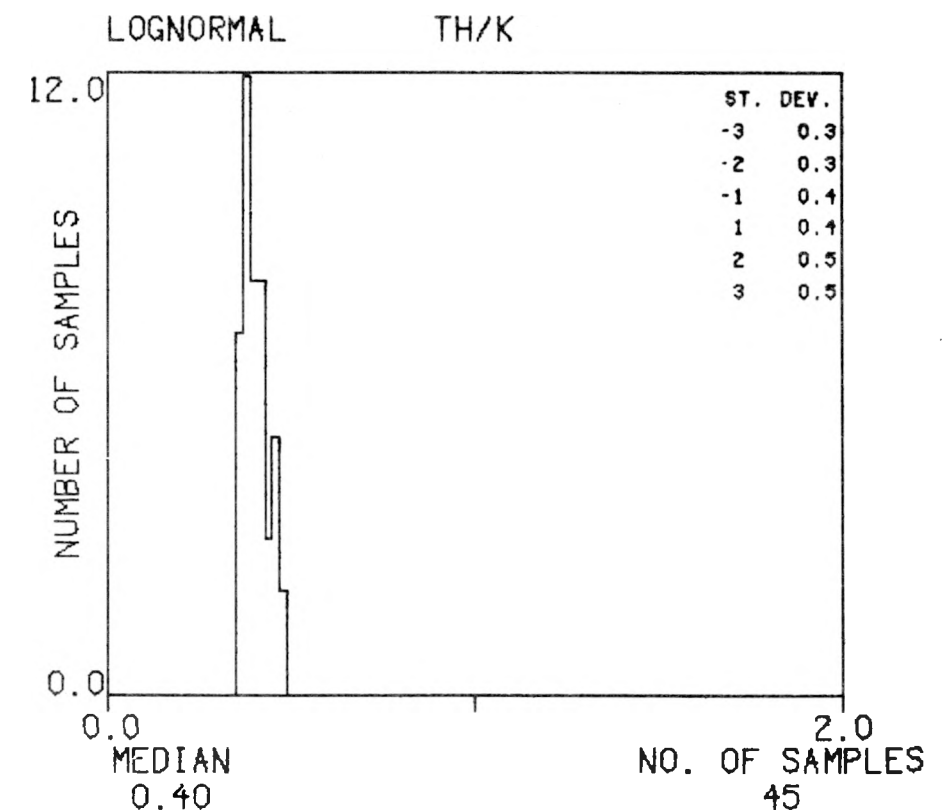
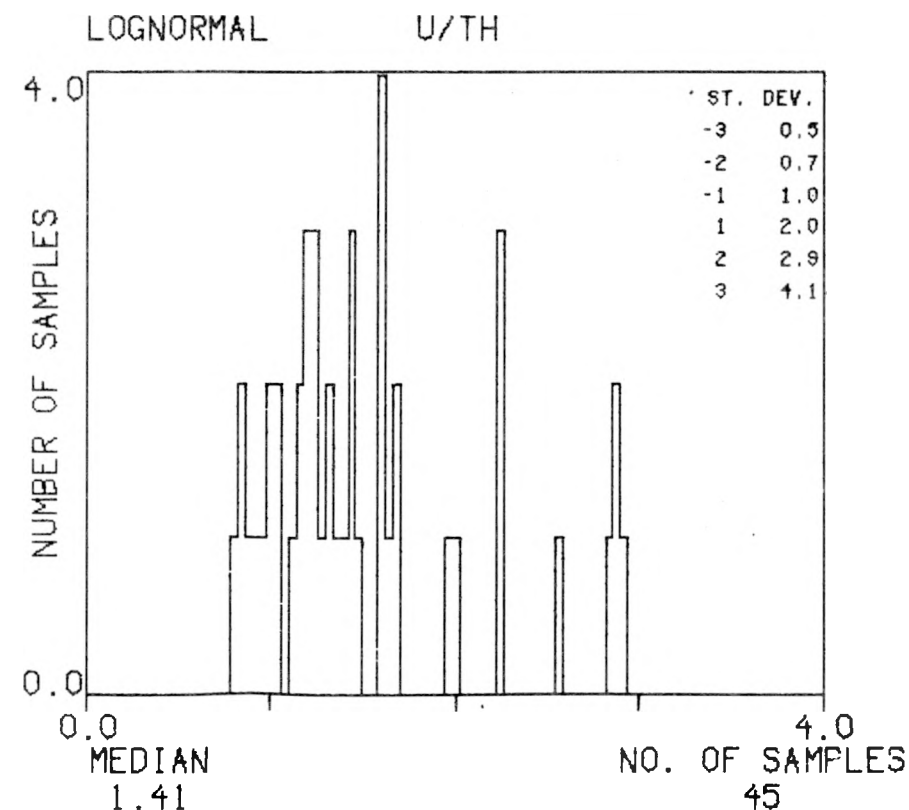
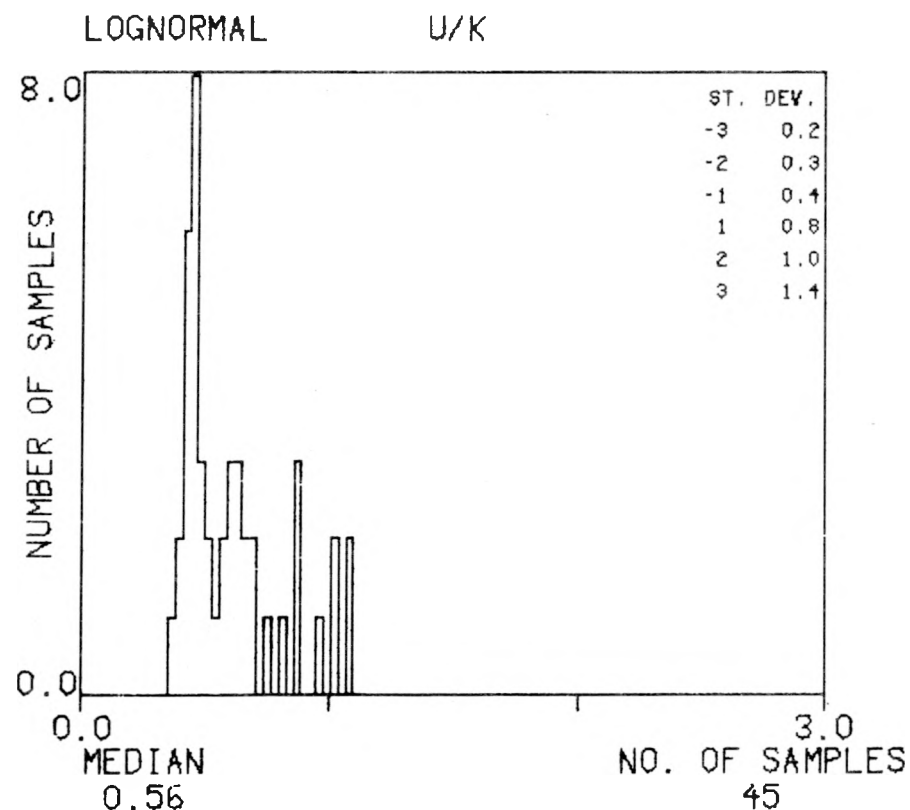
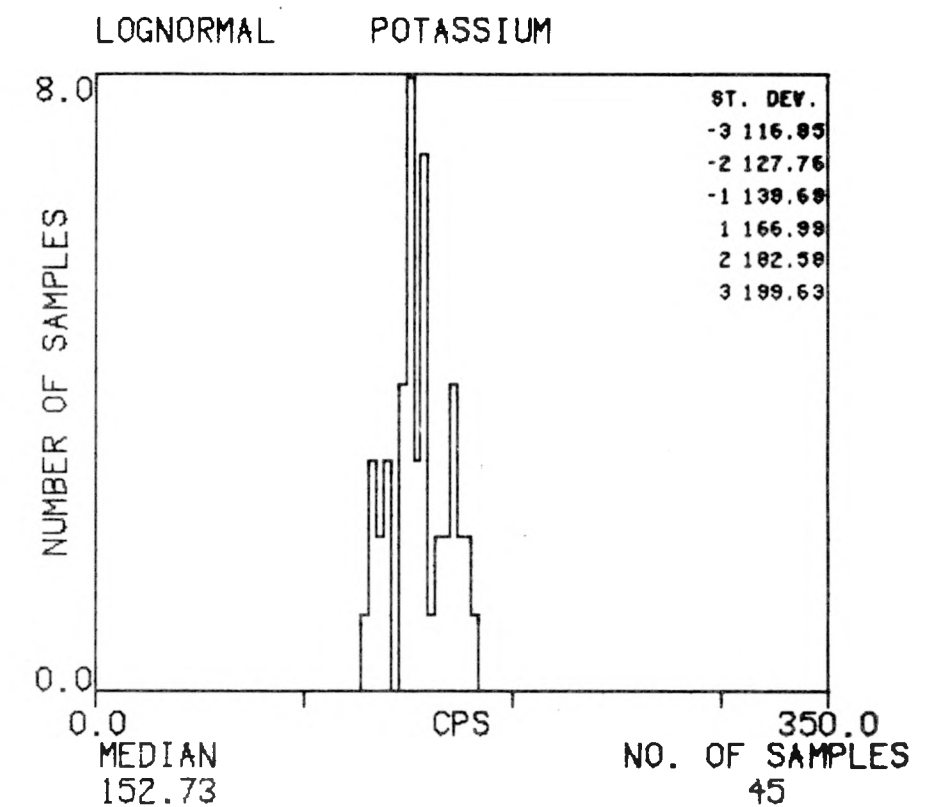
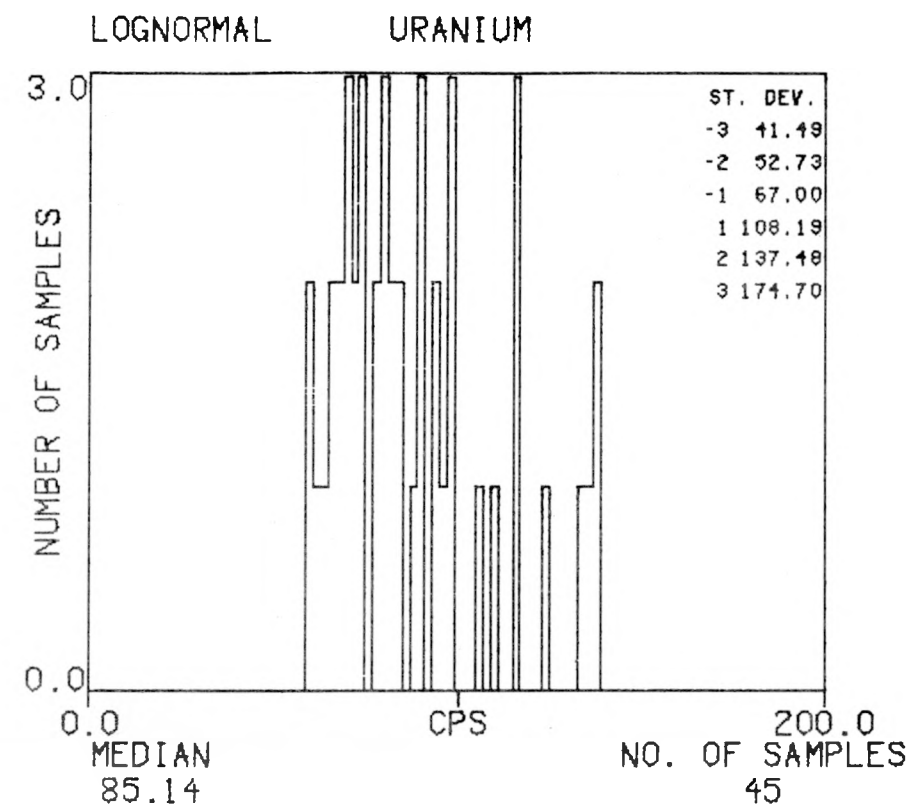
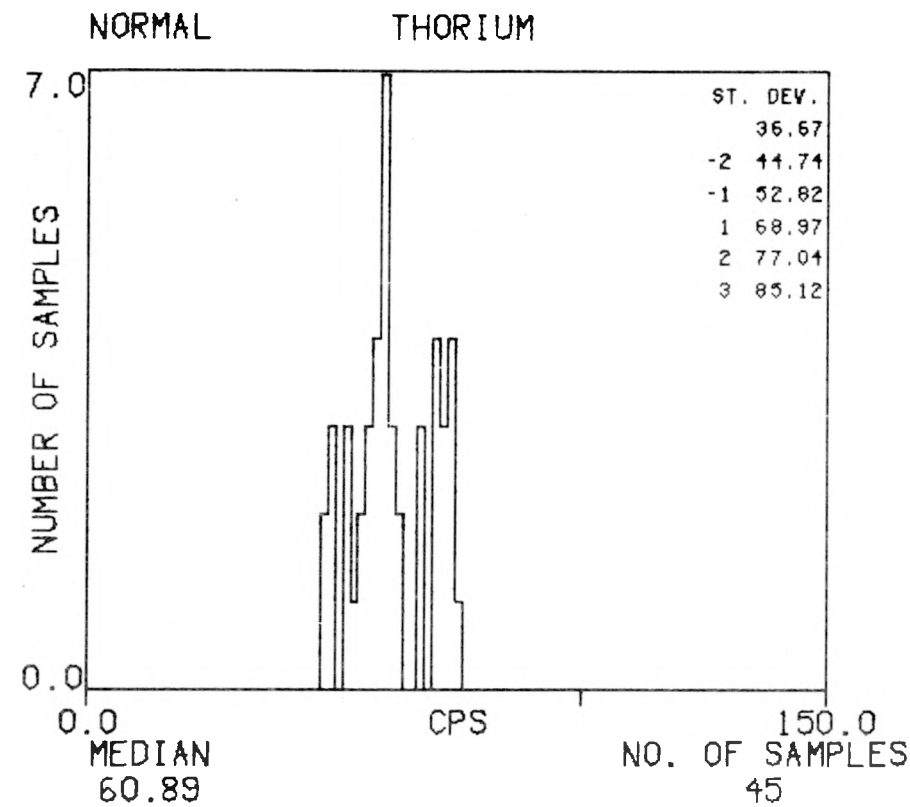
HISTOGRAMS : KN-3

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



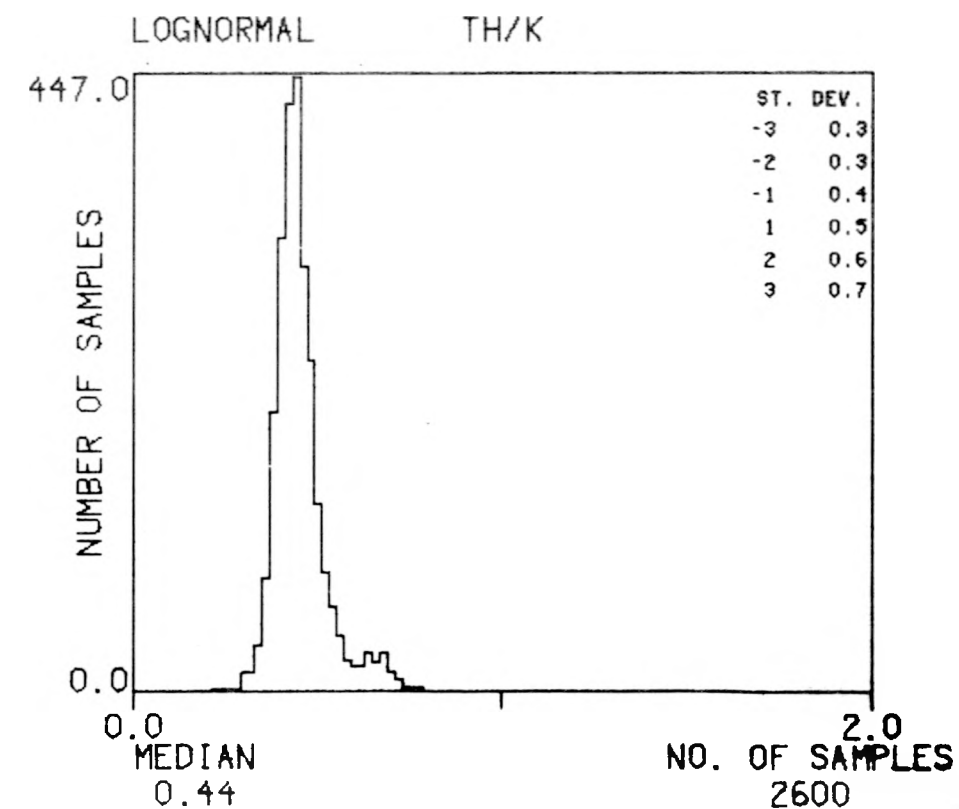
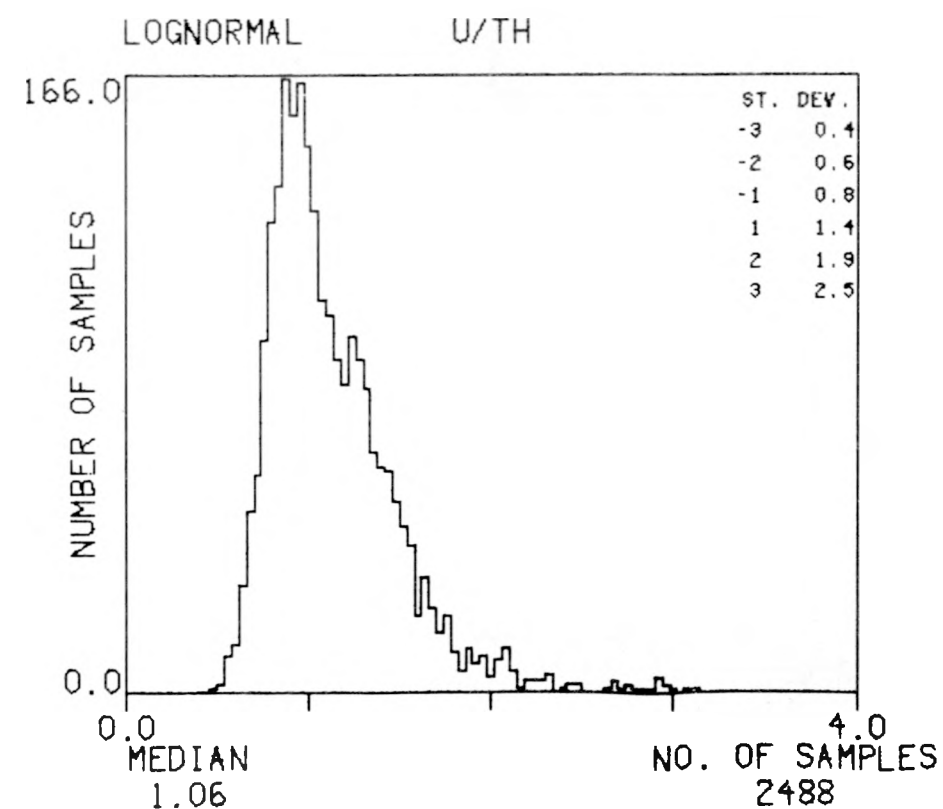
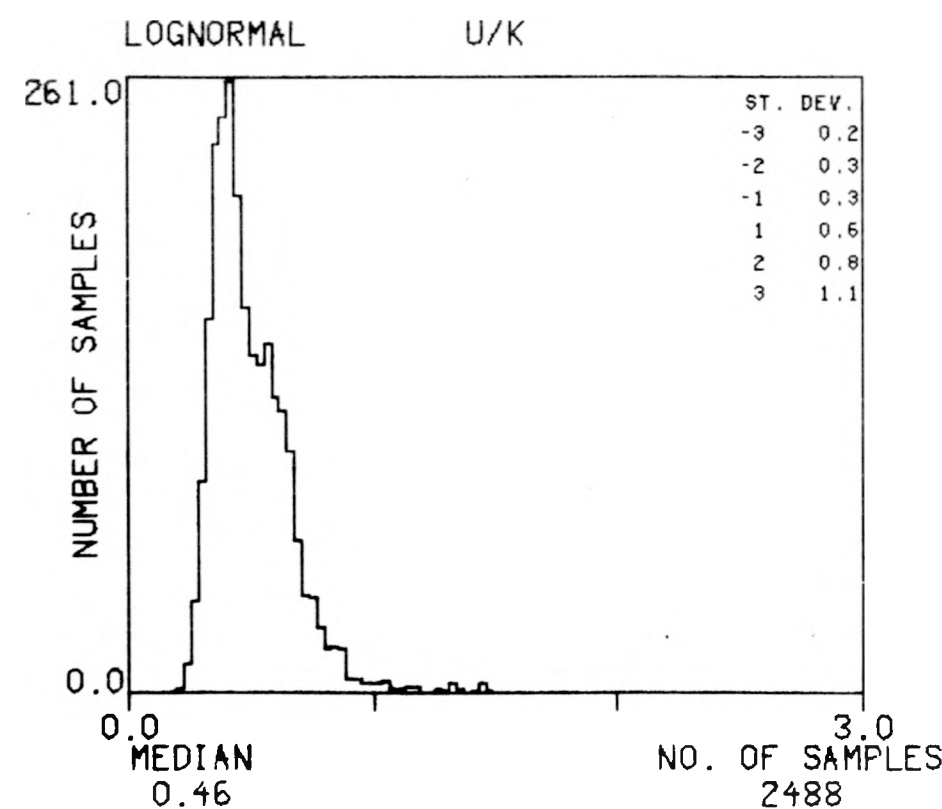
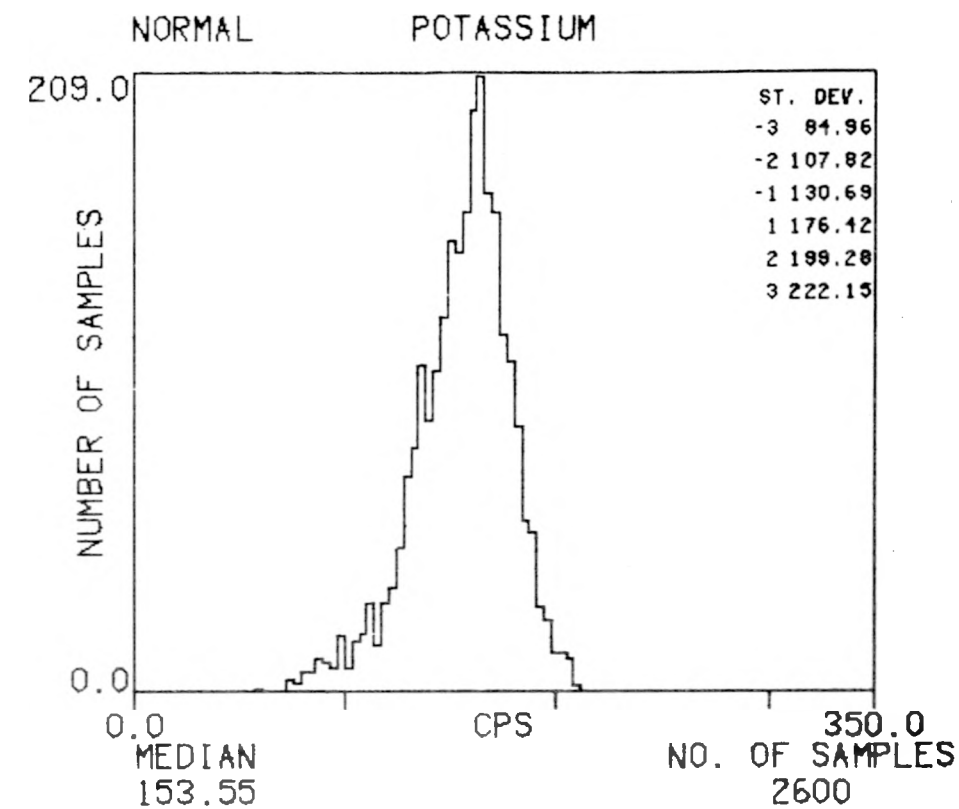
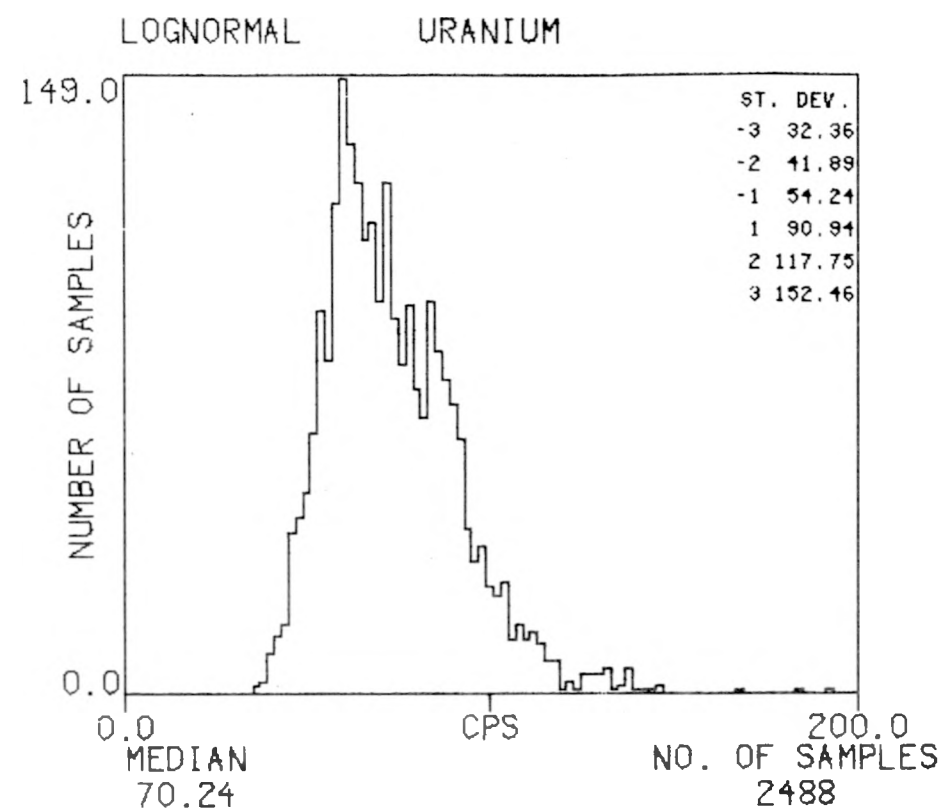
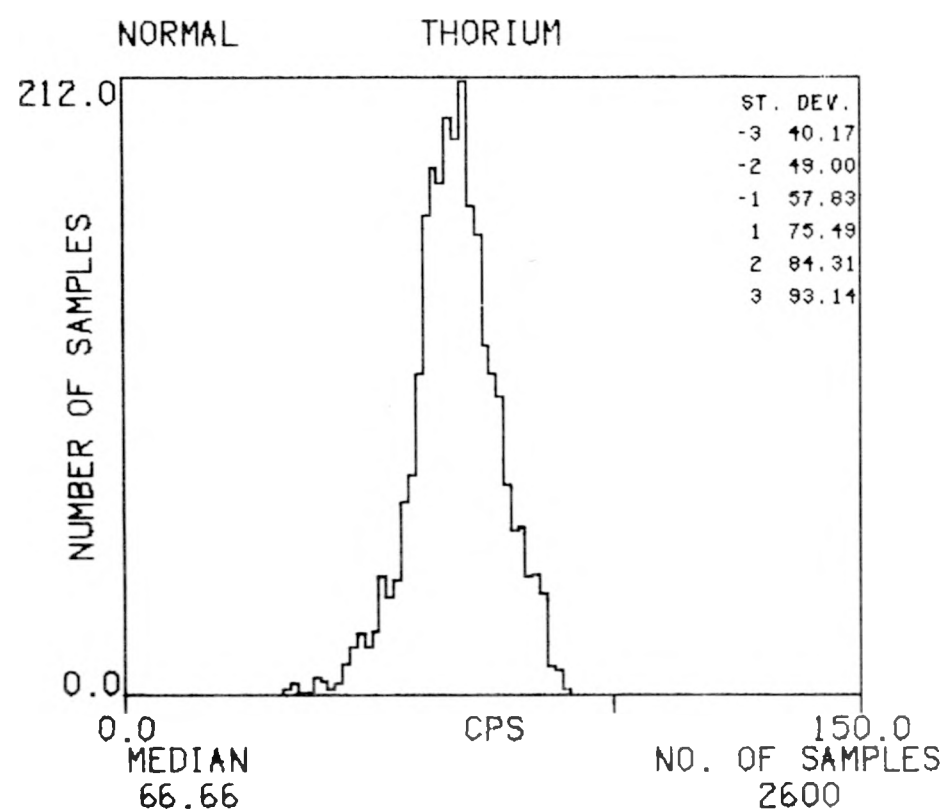
HISTOGRAMS : KC

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



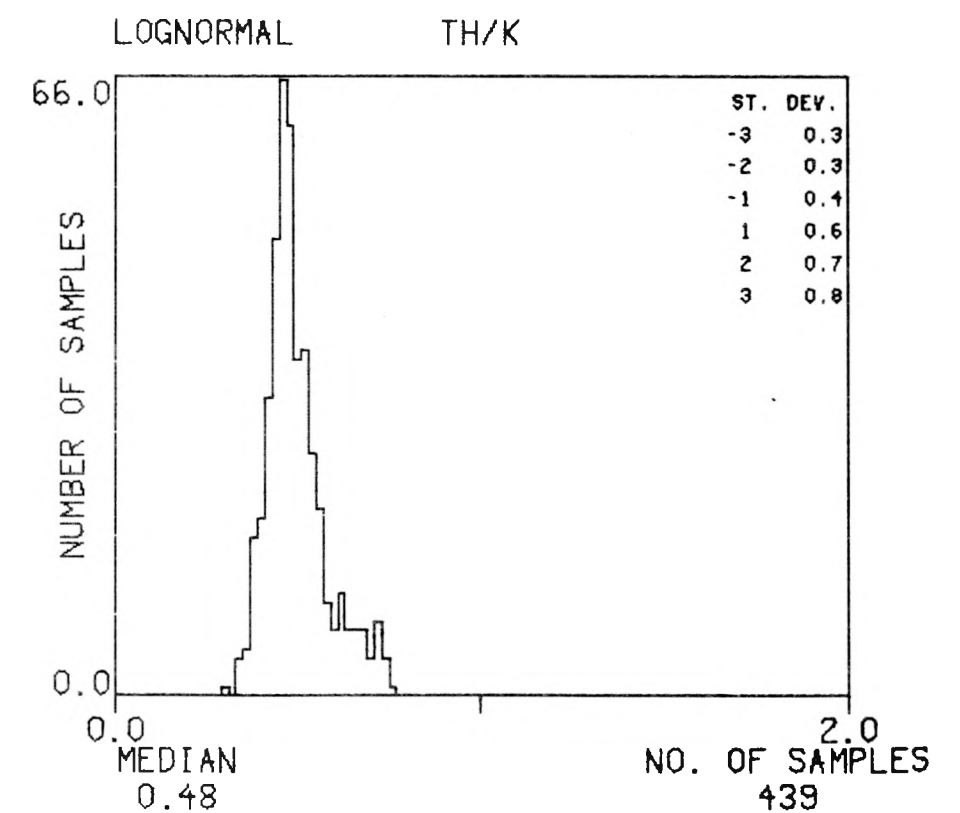
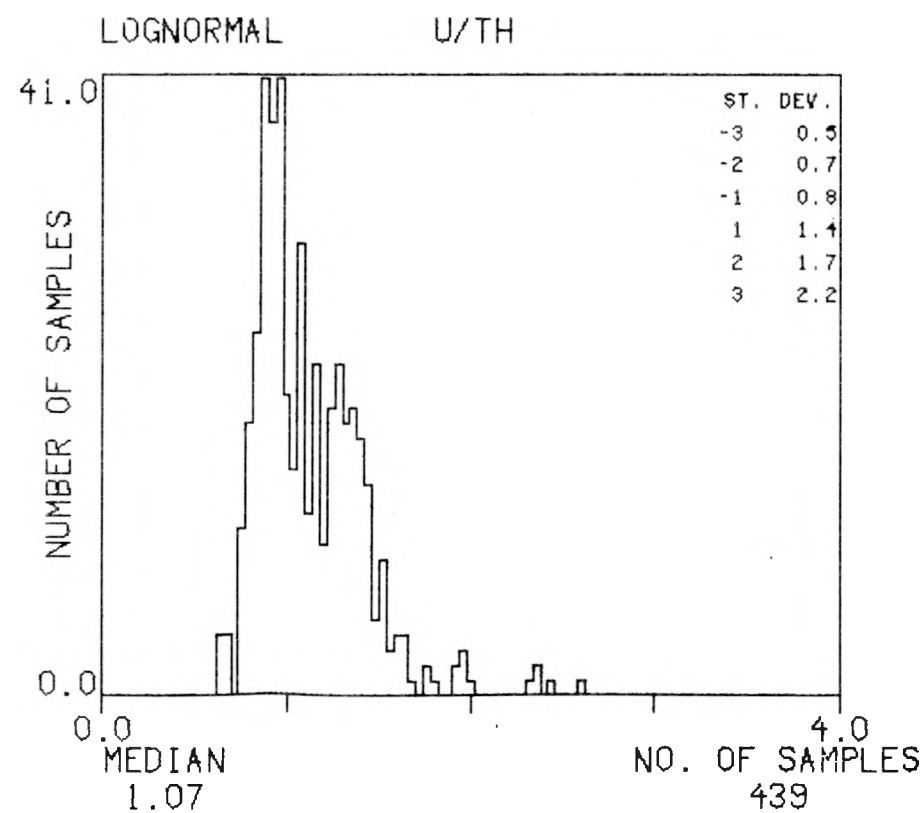
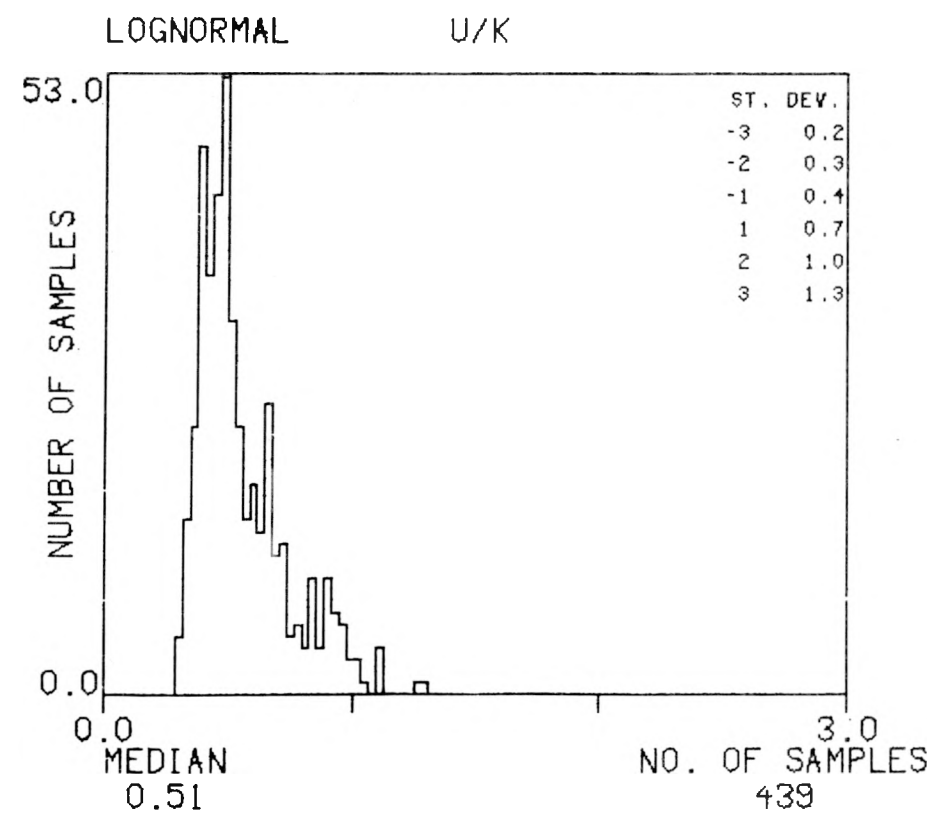
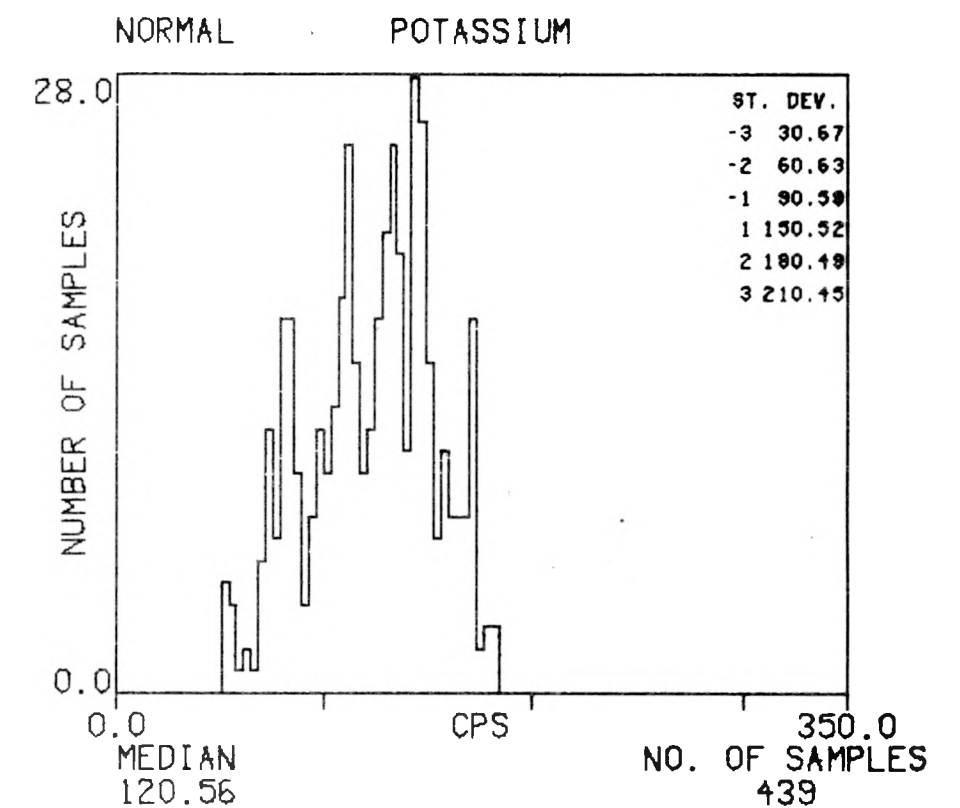
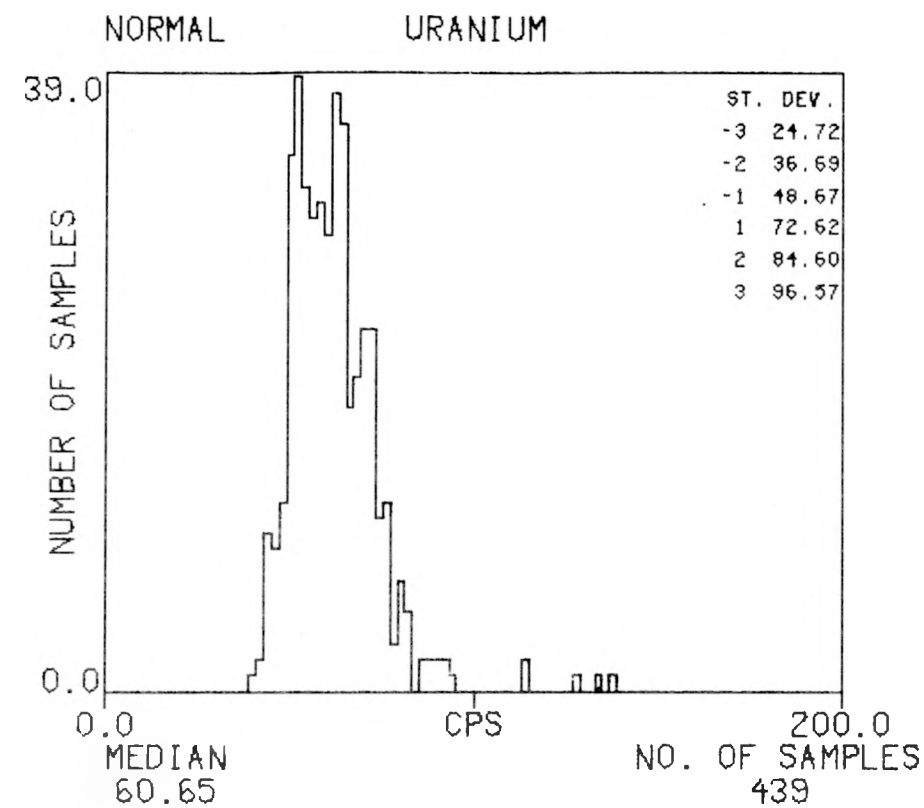
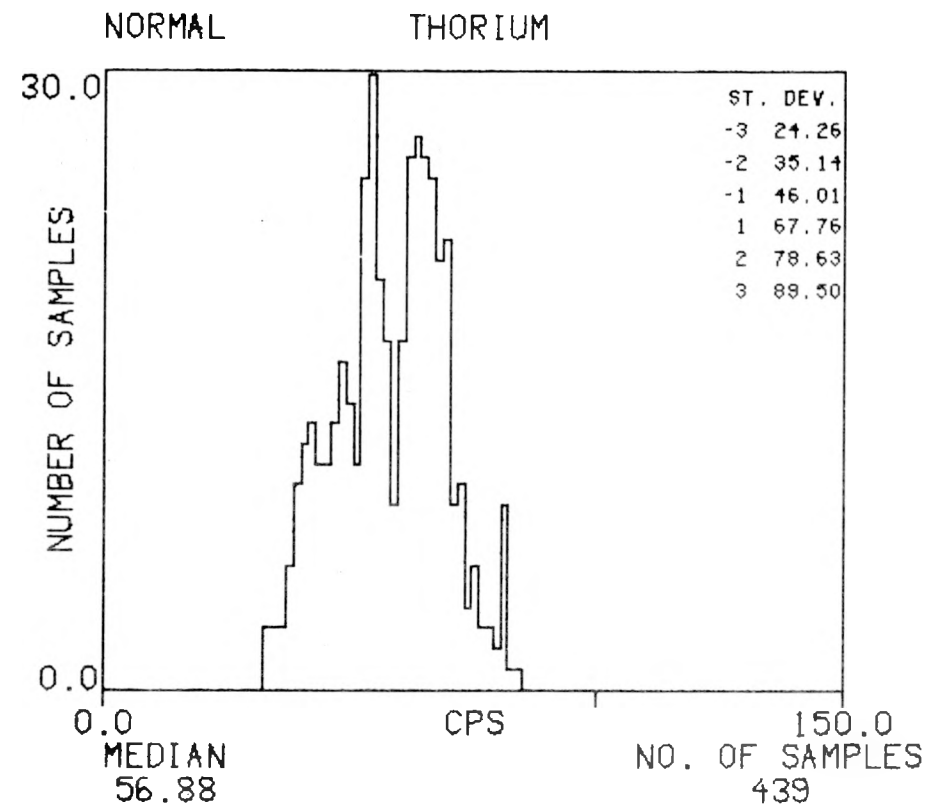
HISTOGRAMS : KNC

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



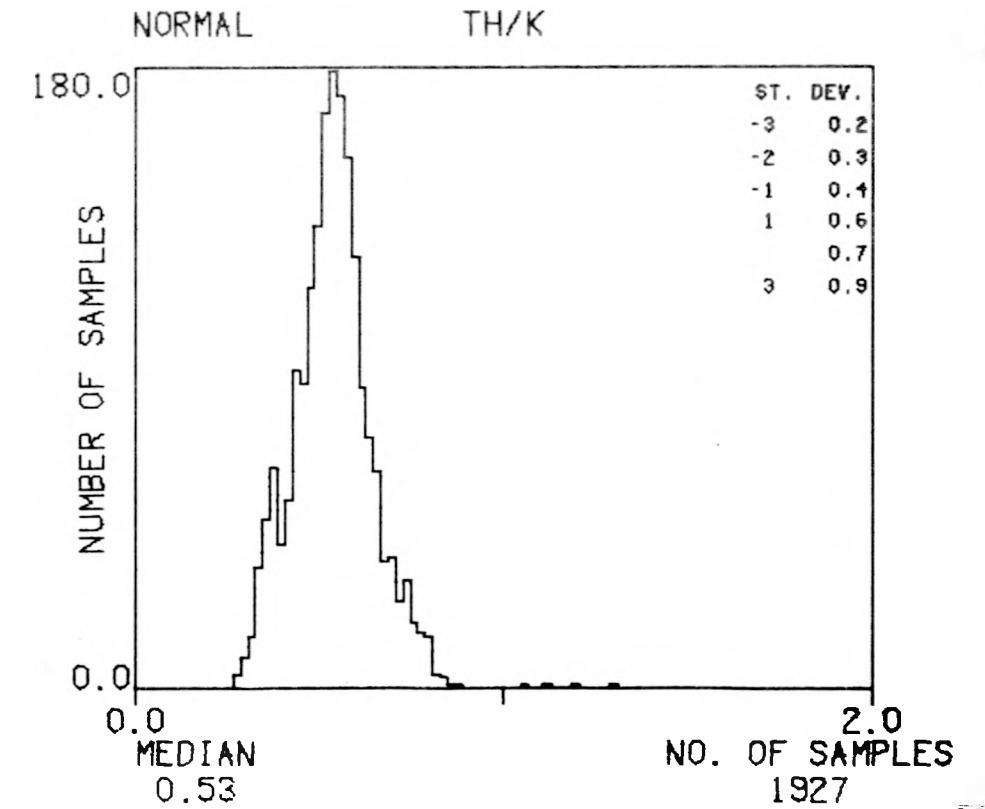
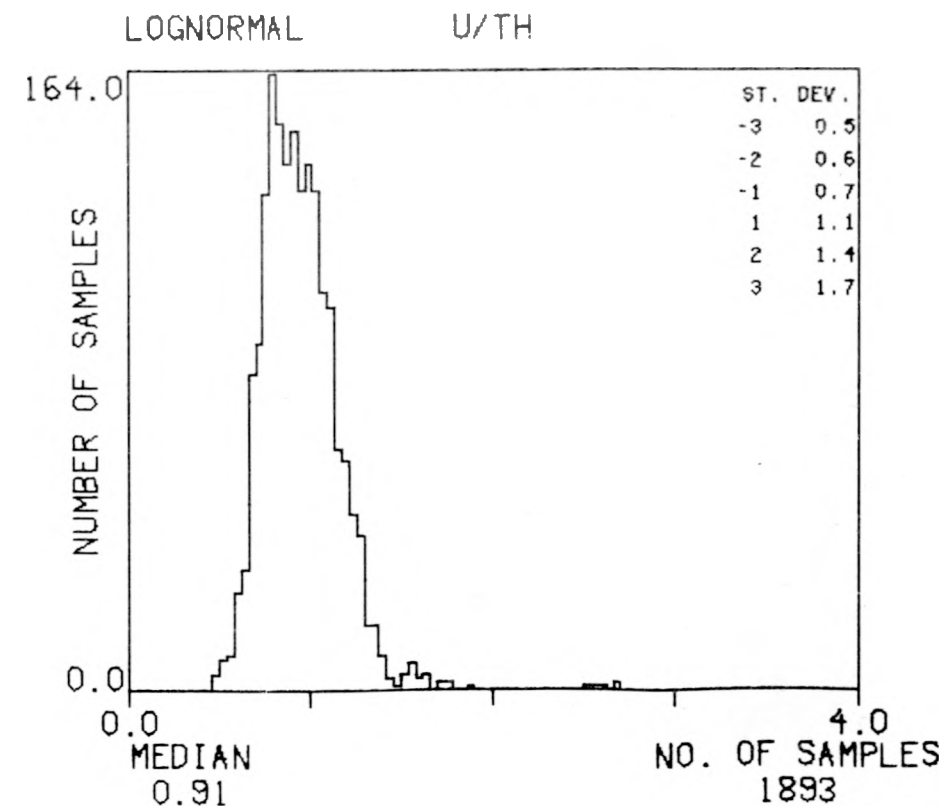
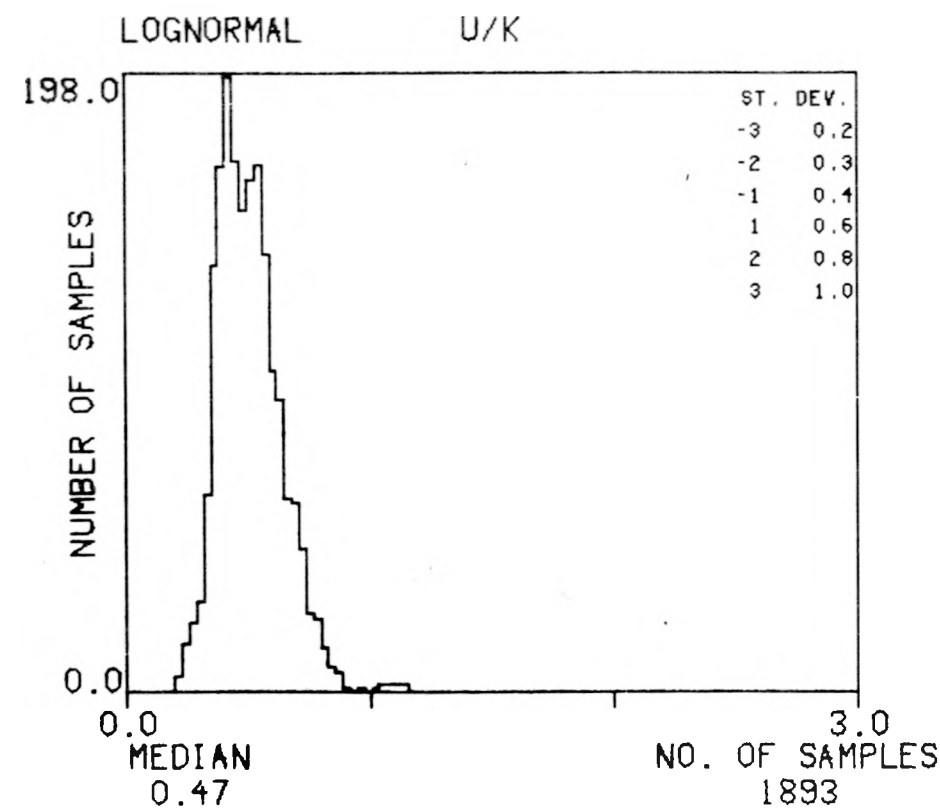
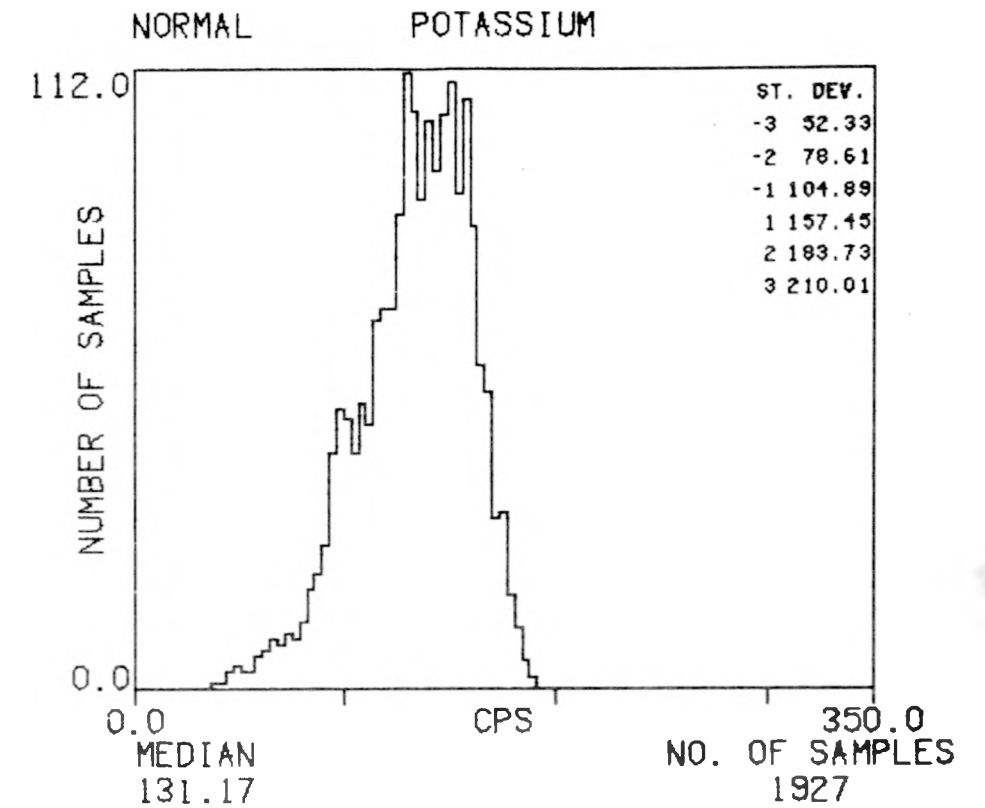
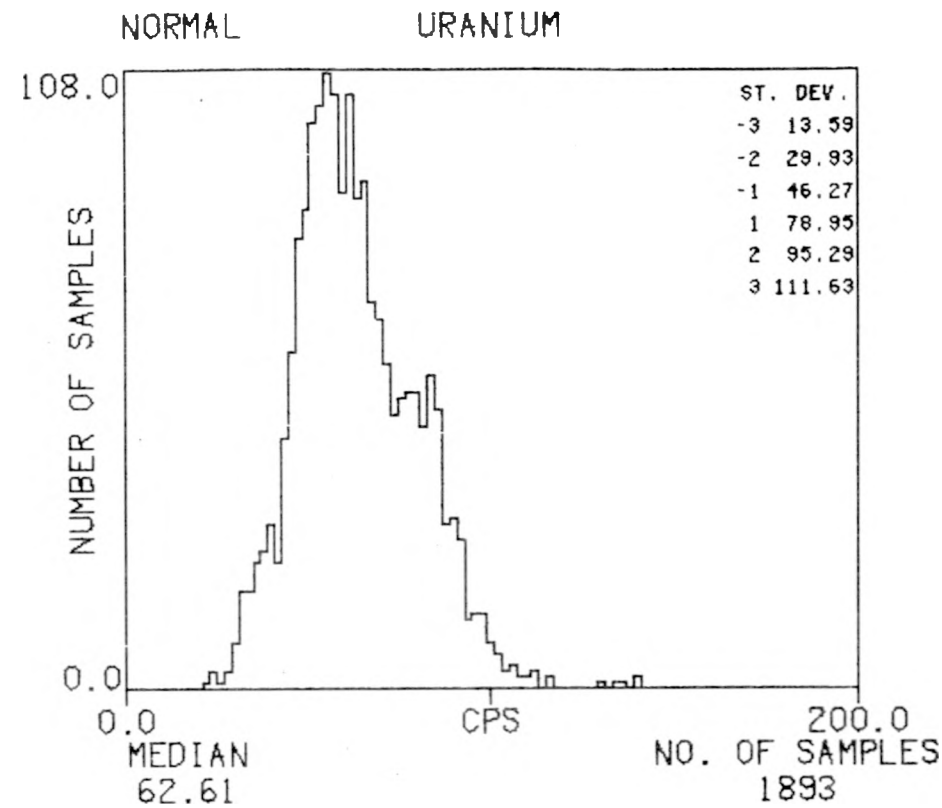
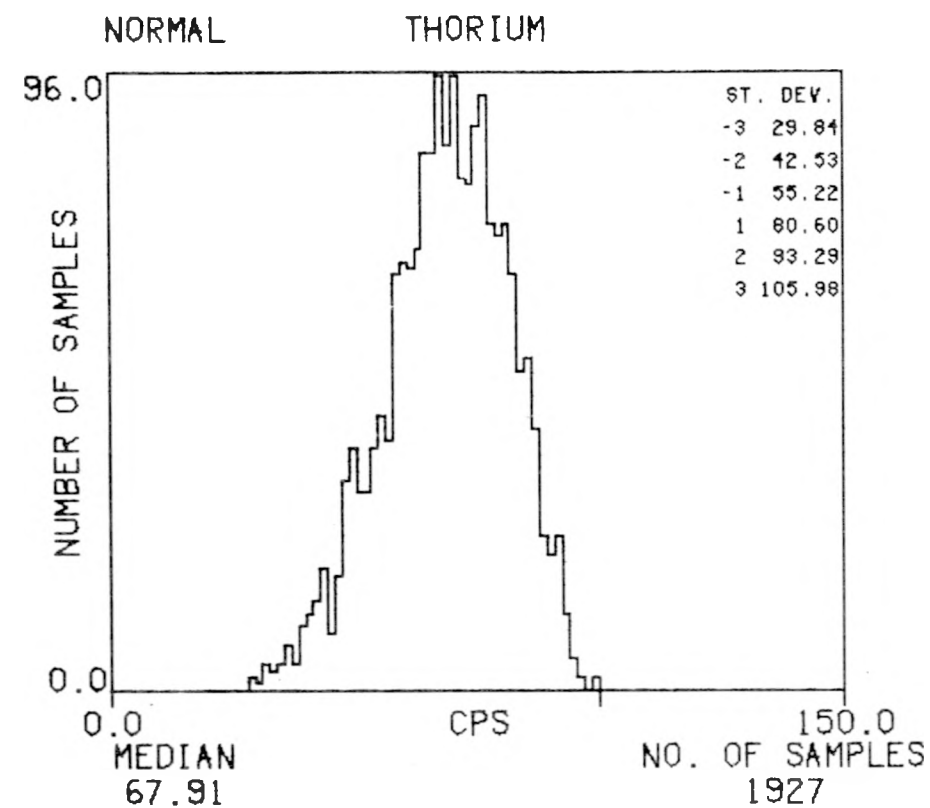
HISTOGRAMS : KG

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



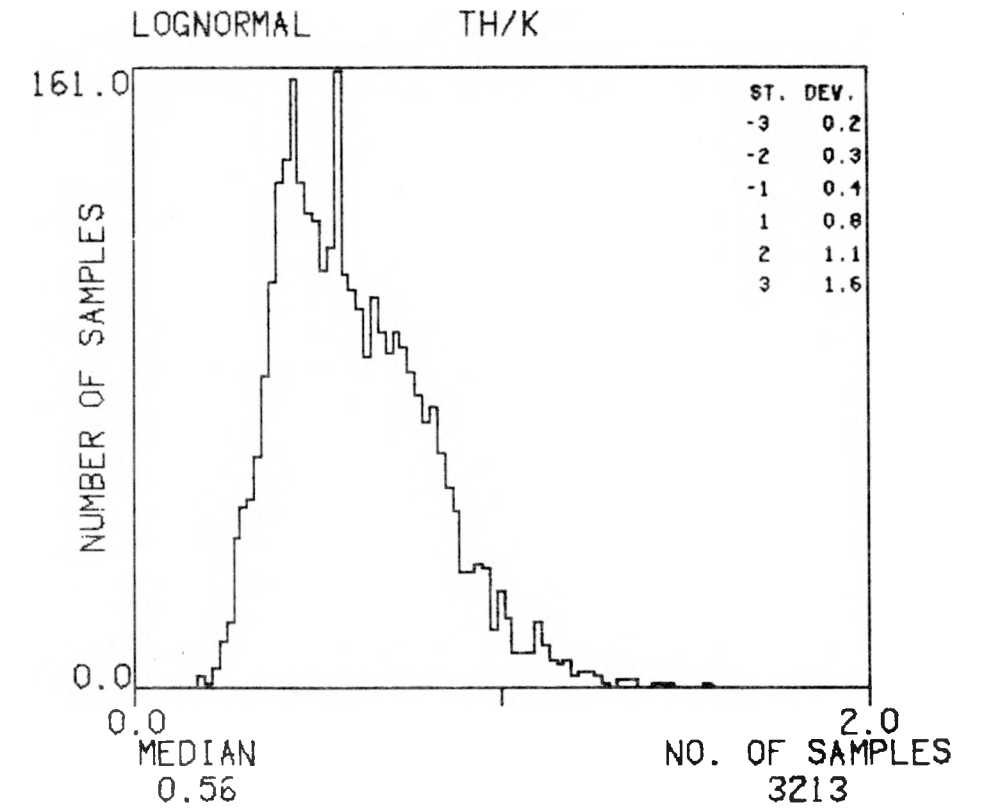
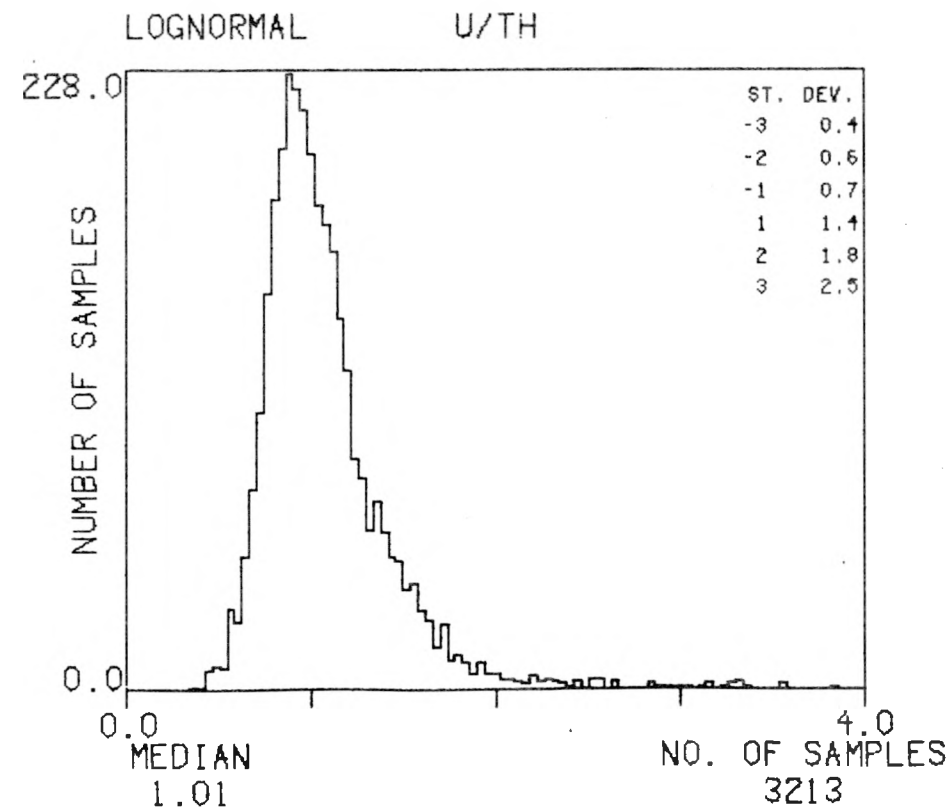
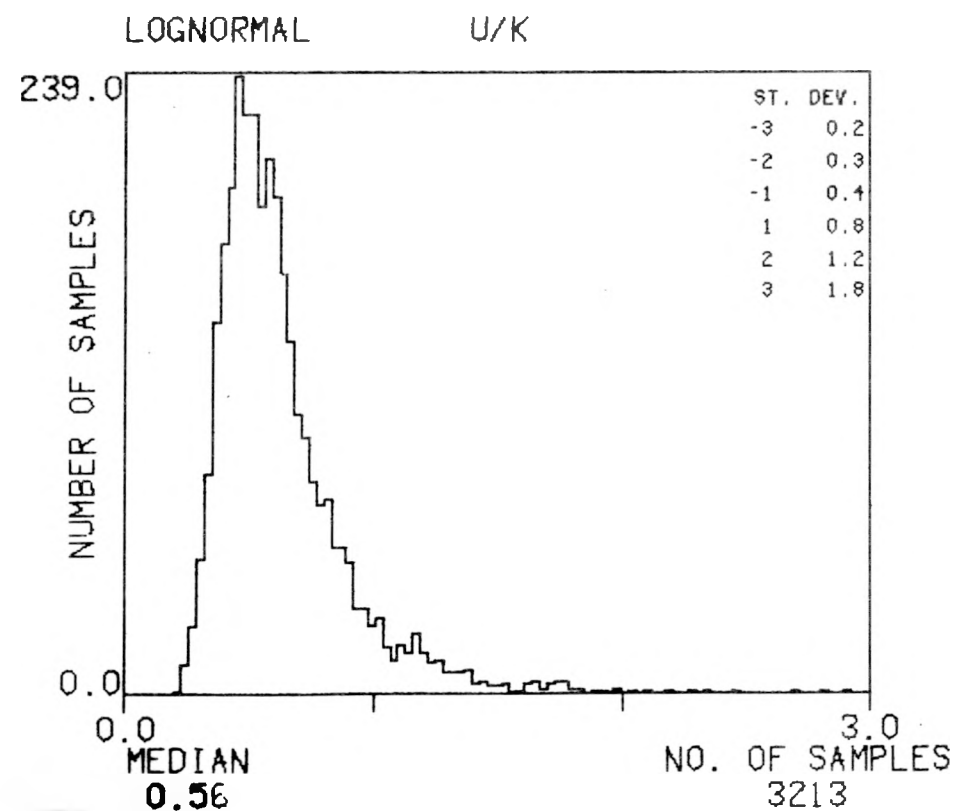
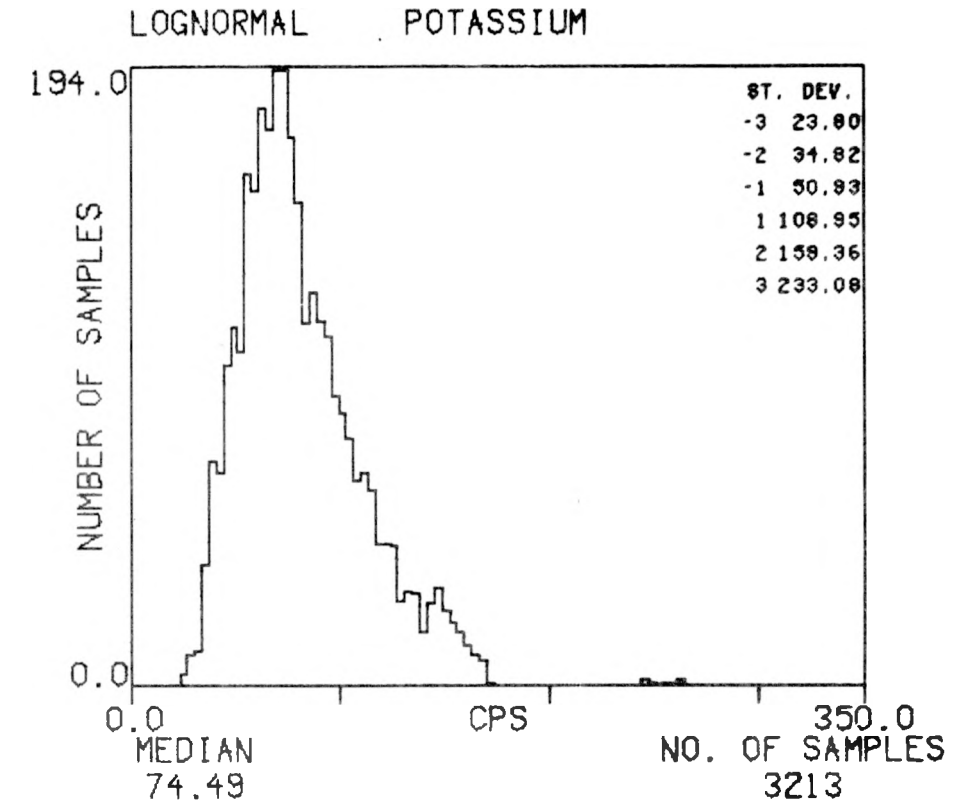
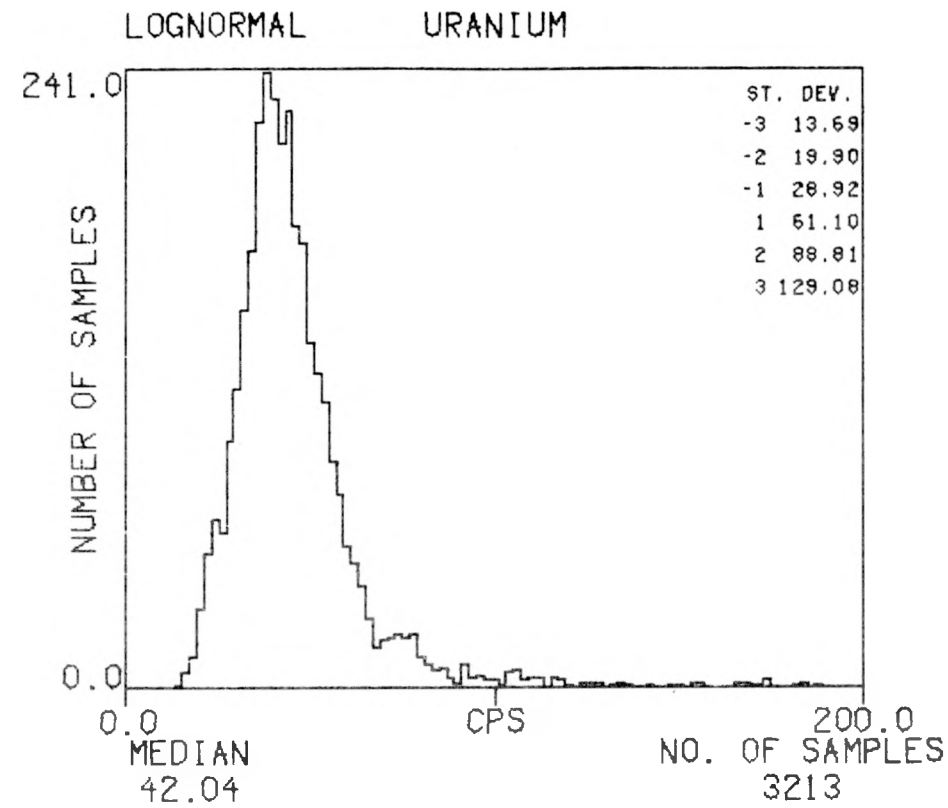
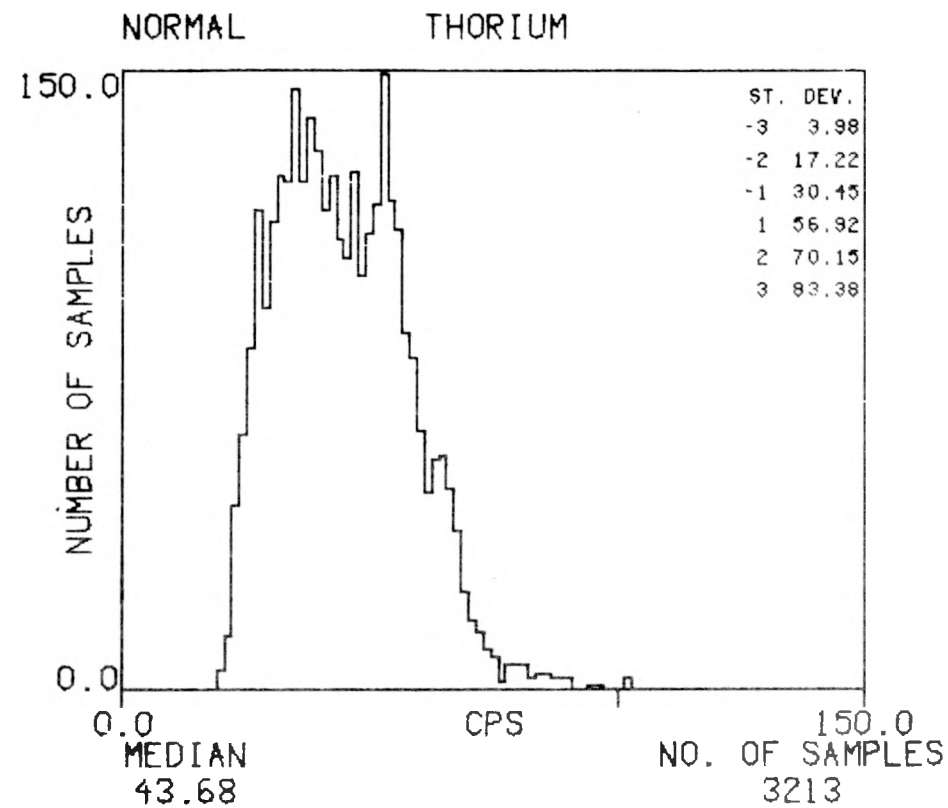
HISTOGRAMS : KBM

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



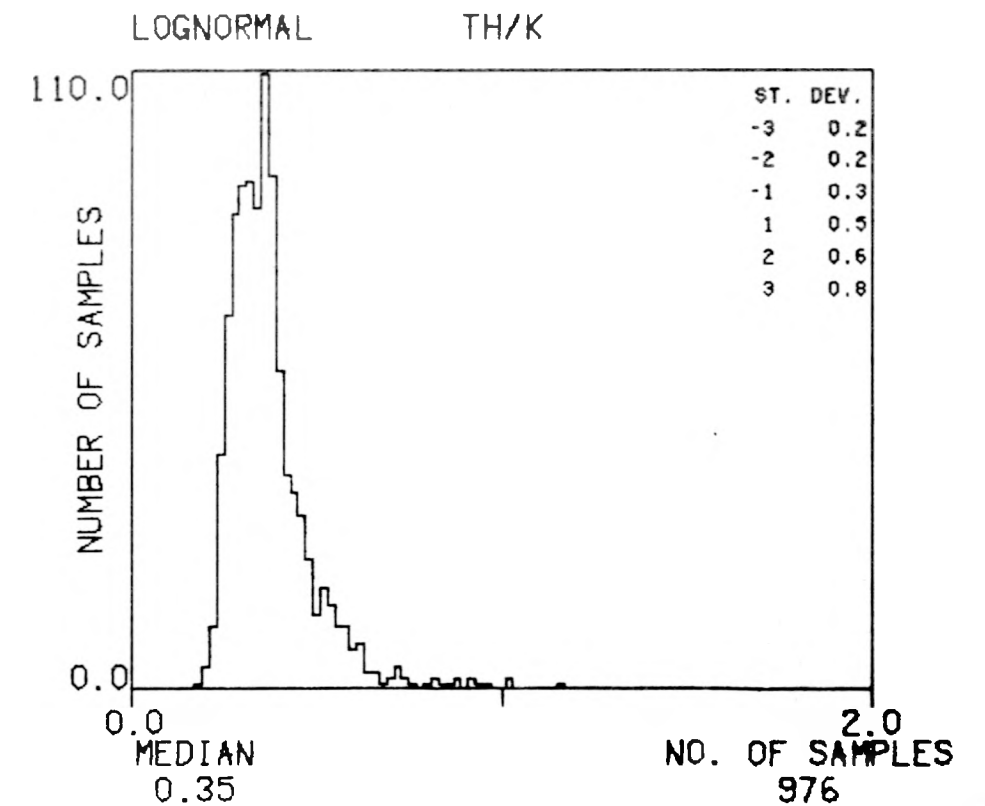
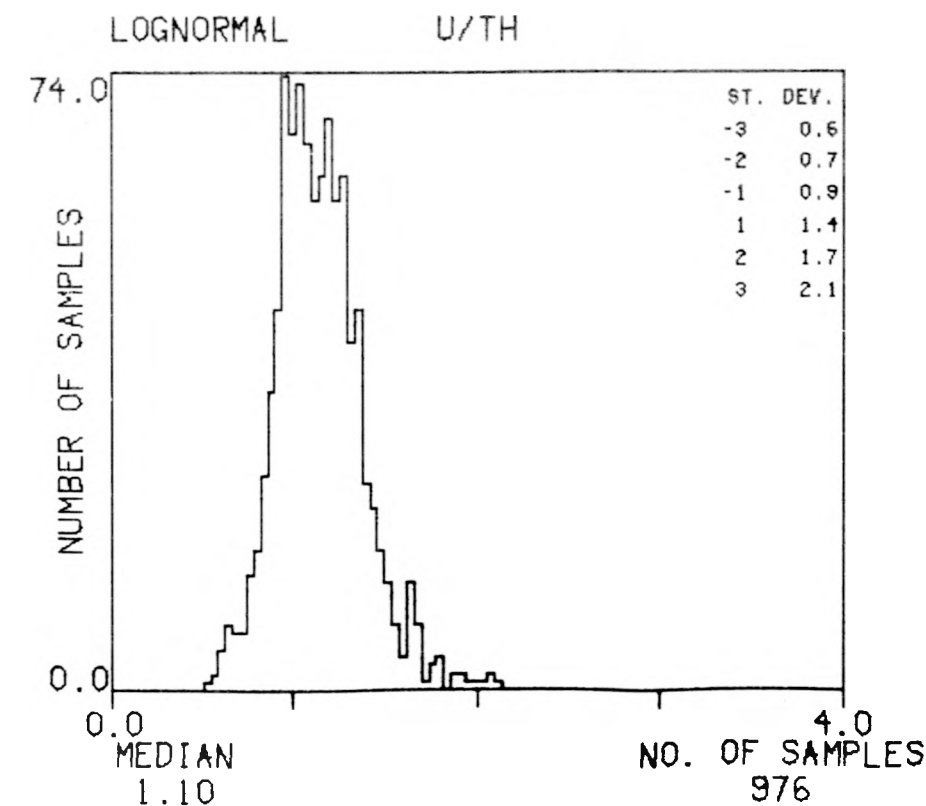
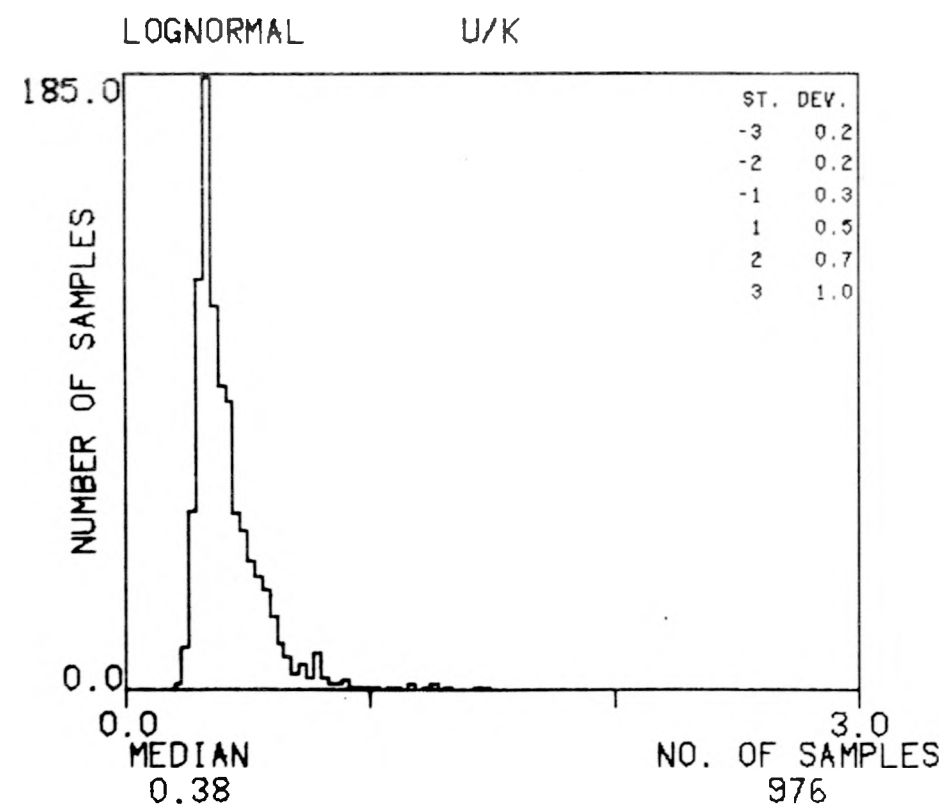
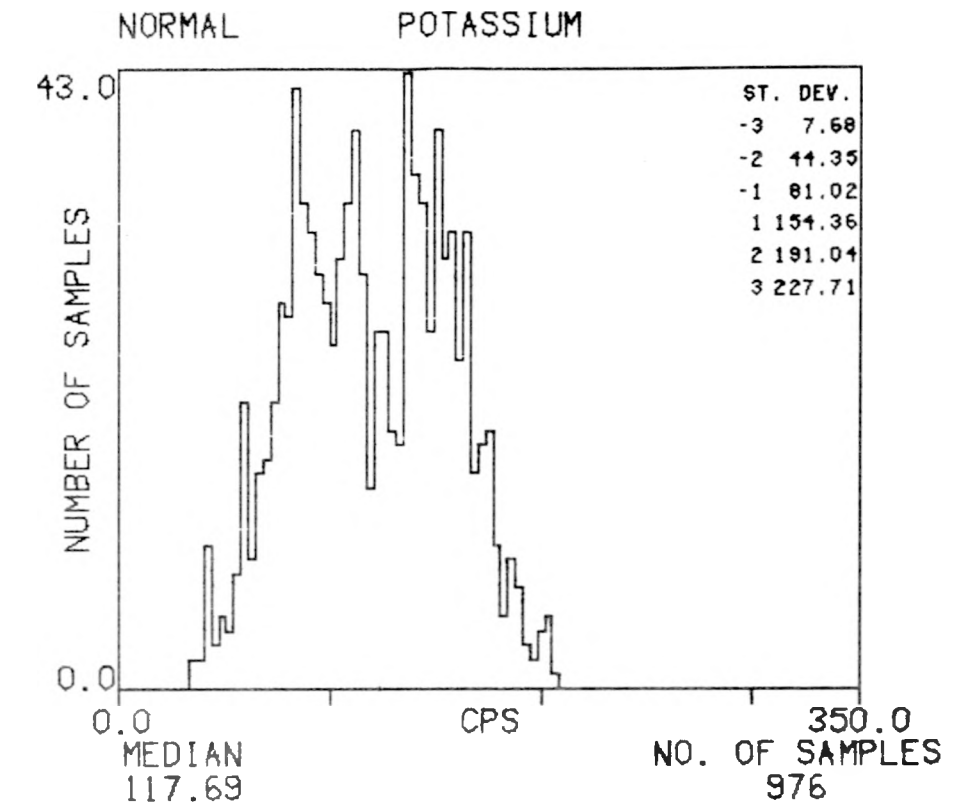
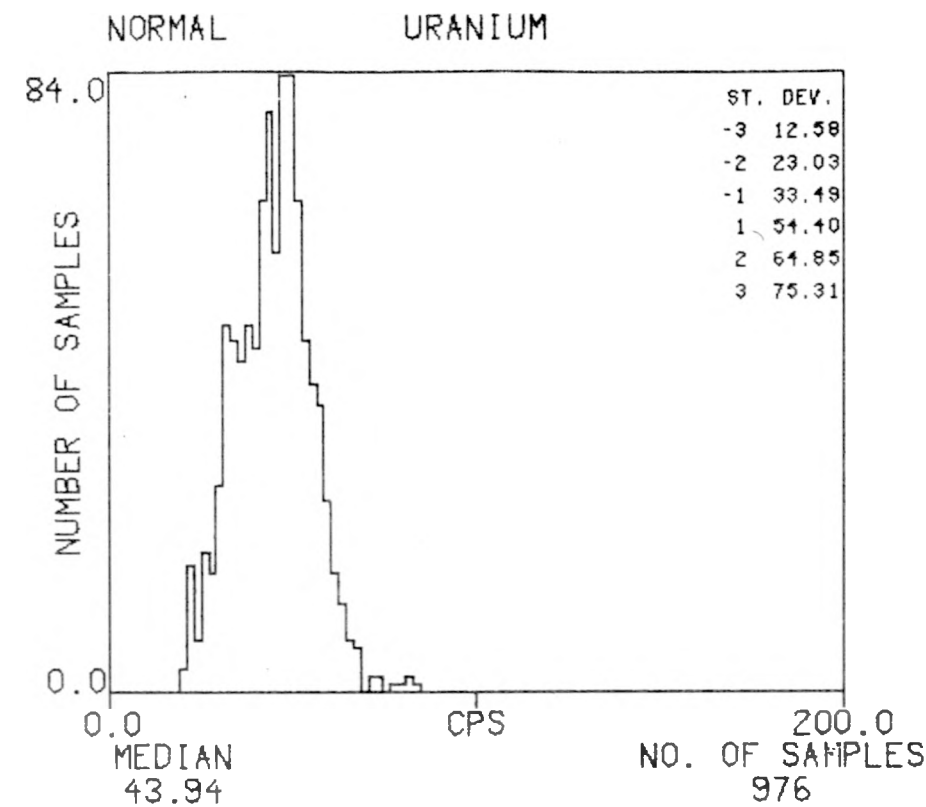
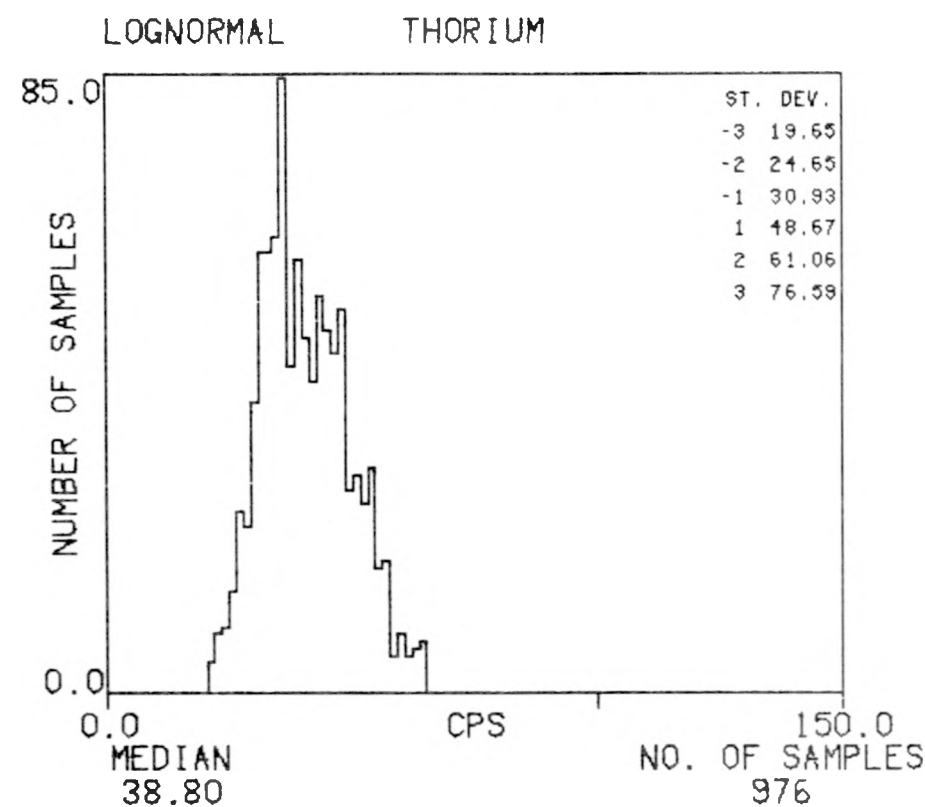
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TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



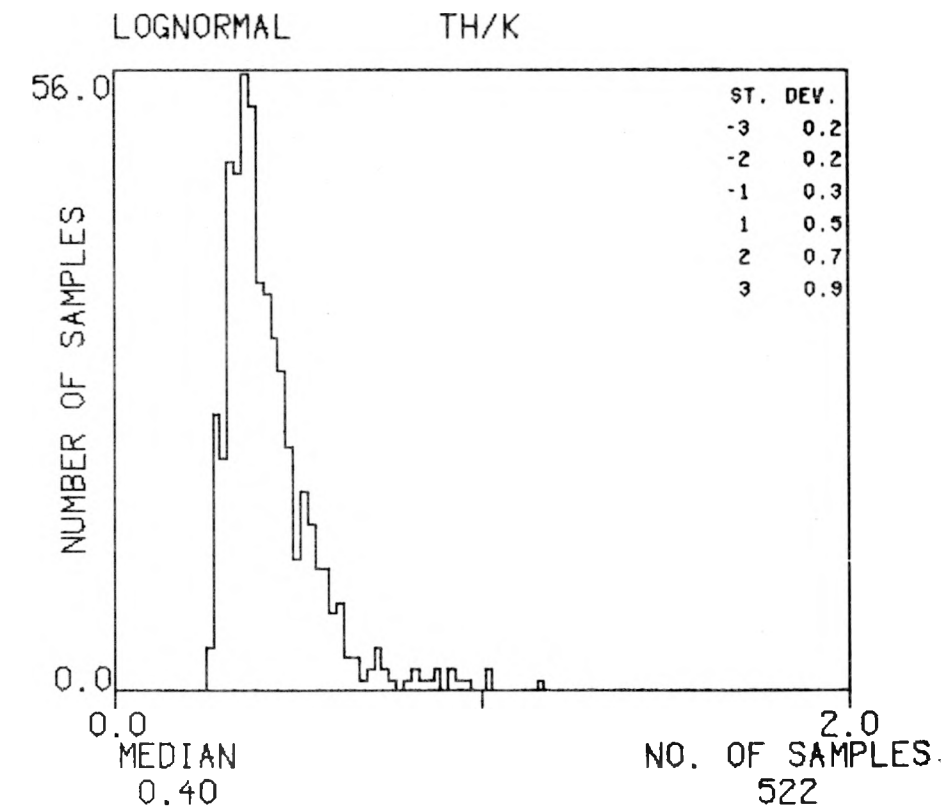
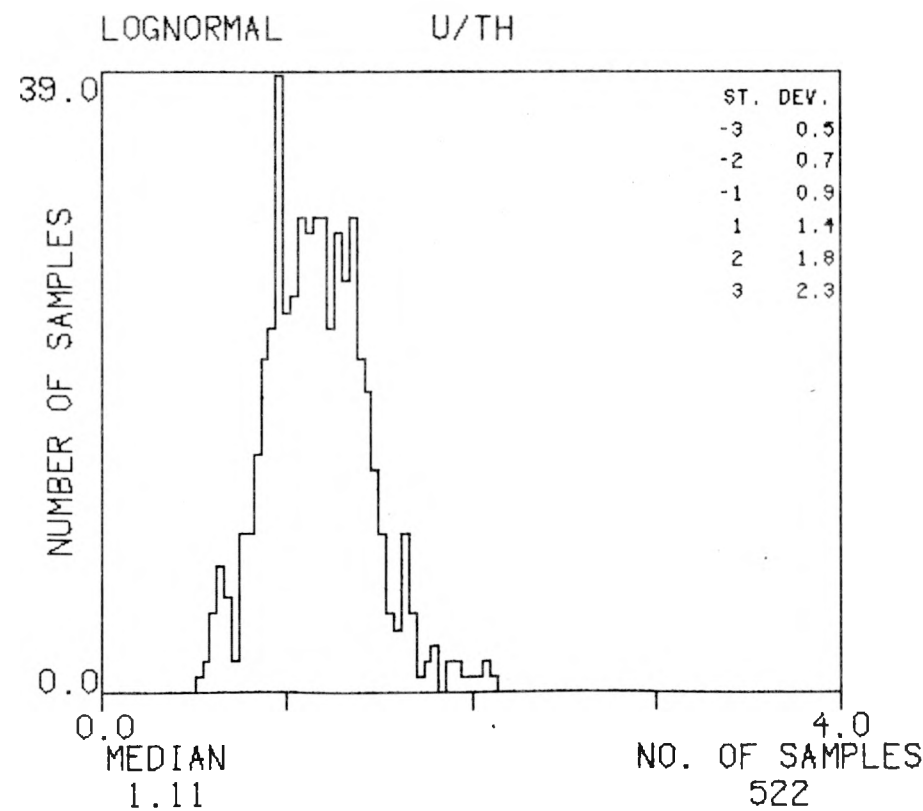
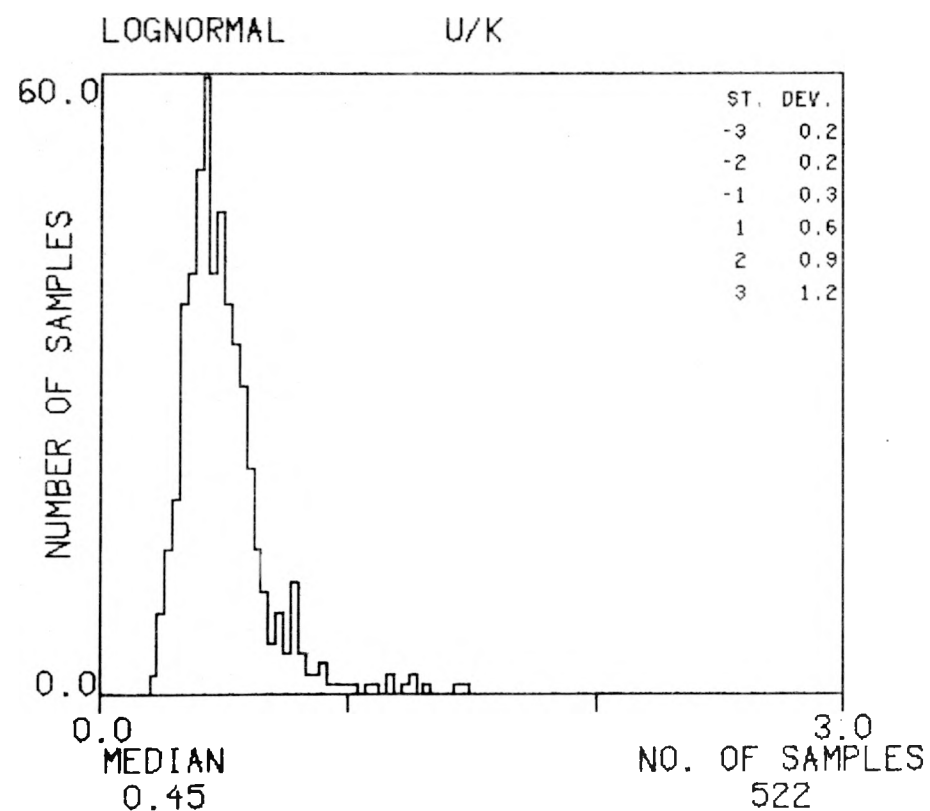
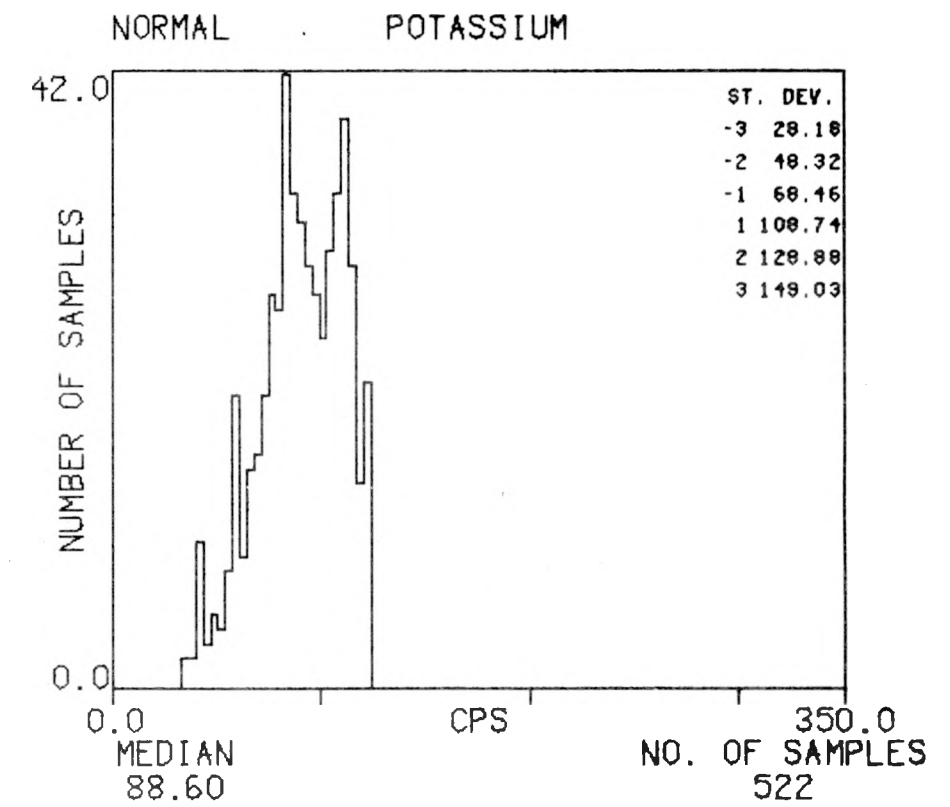
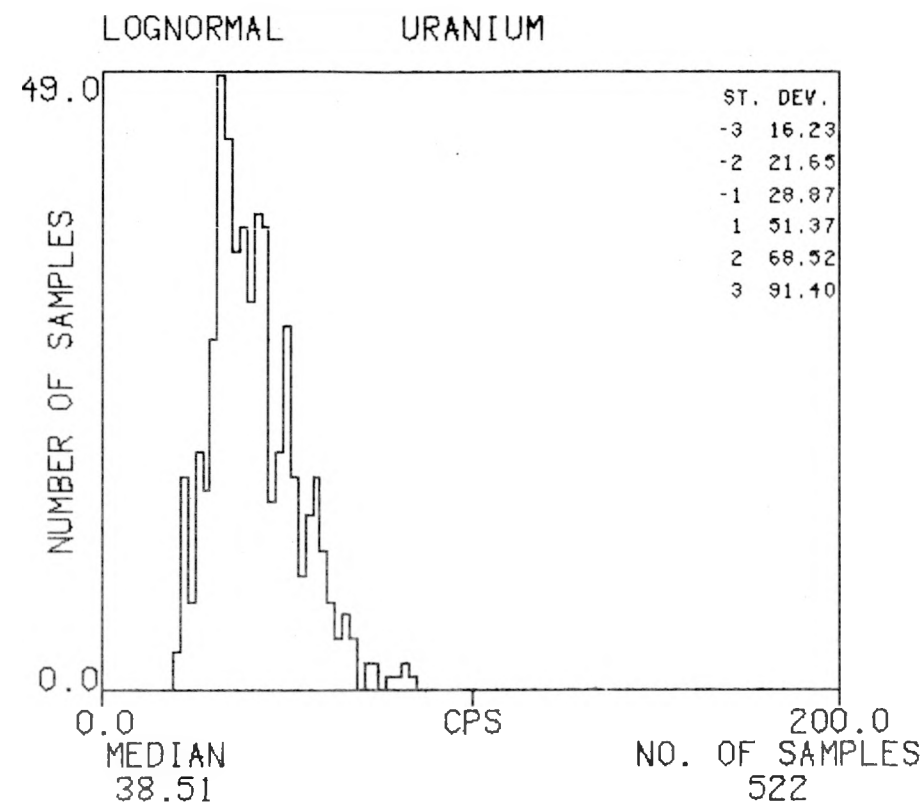
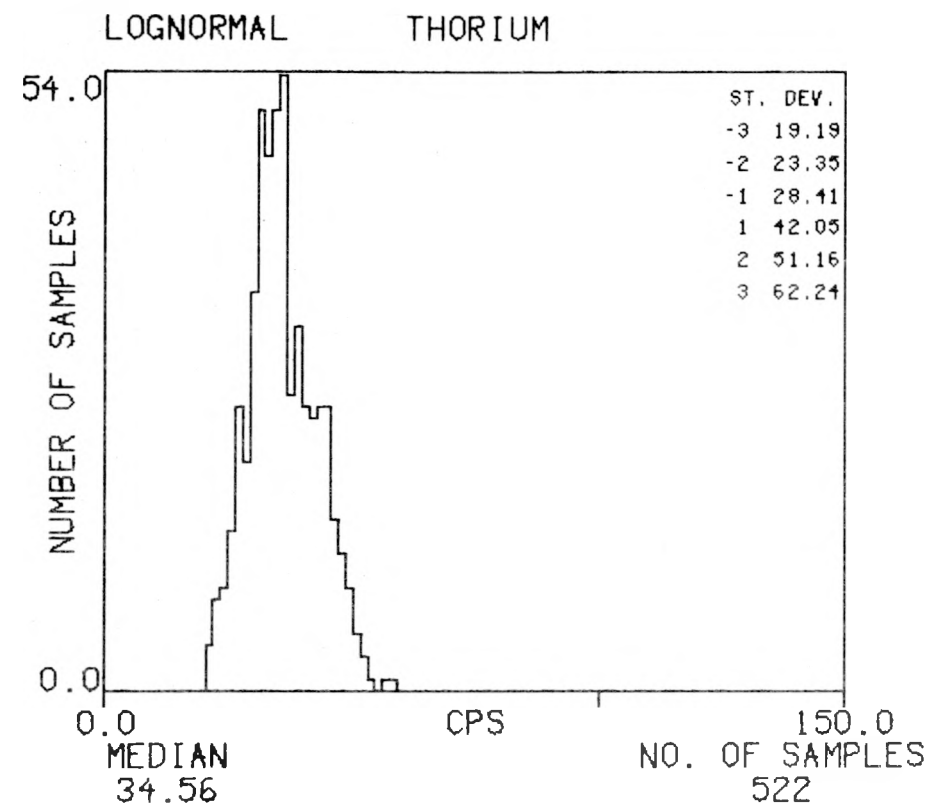
HISTOGRAMS : JU

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



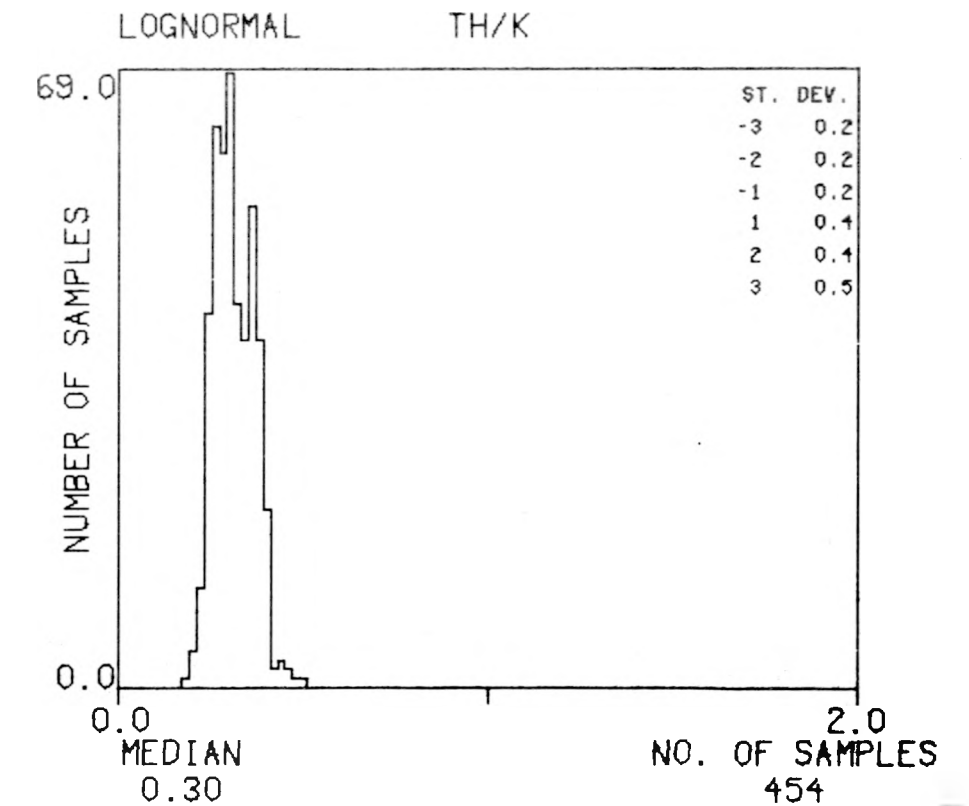
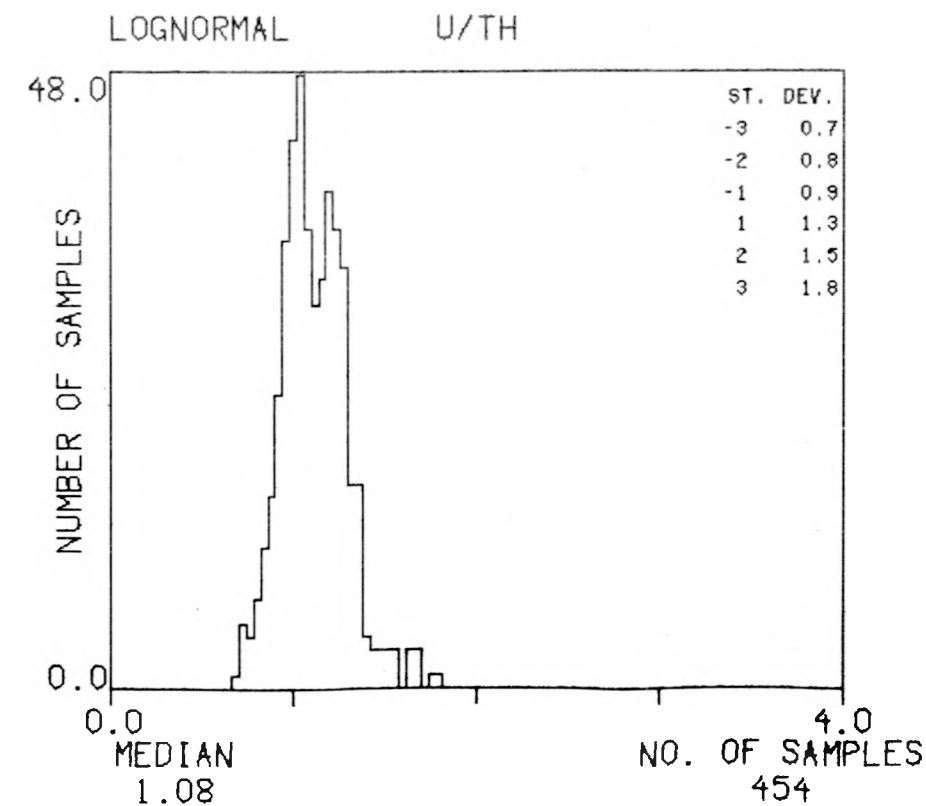
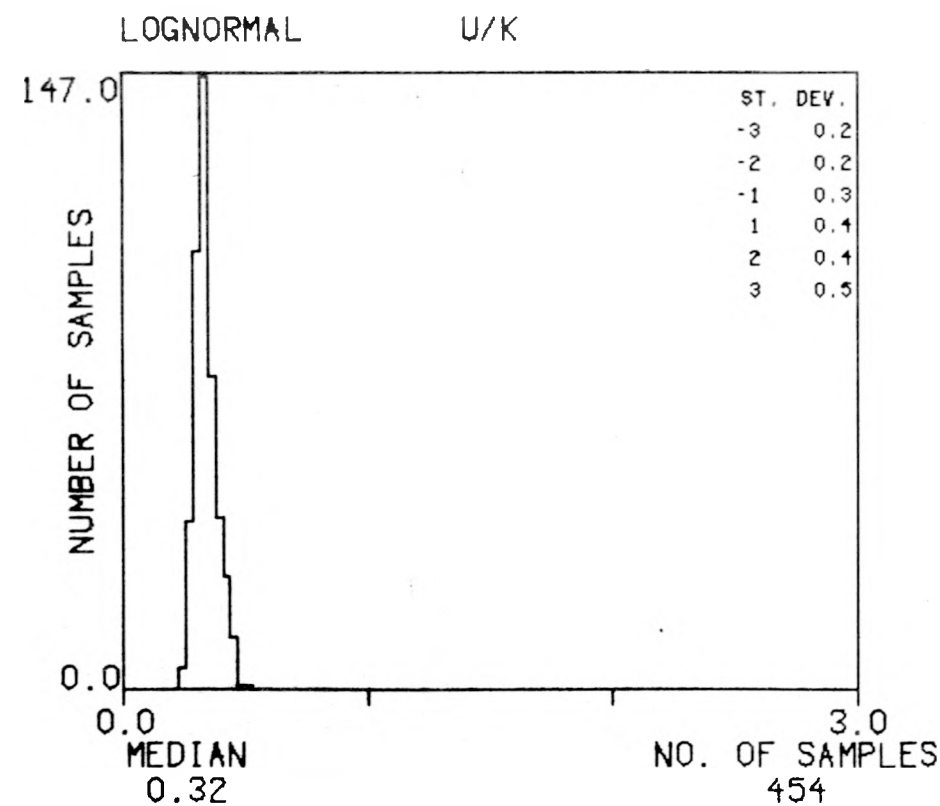
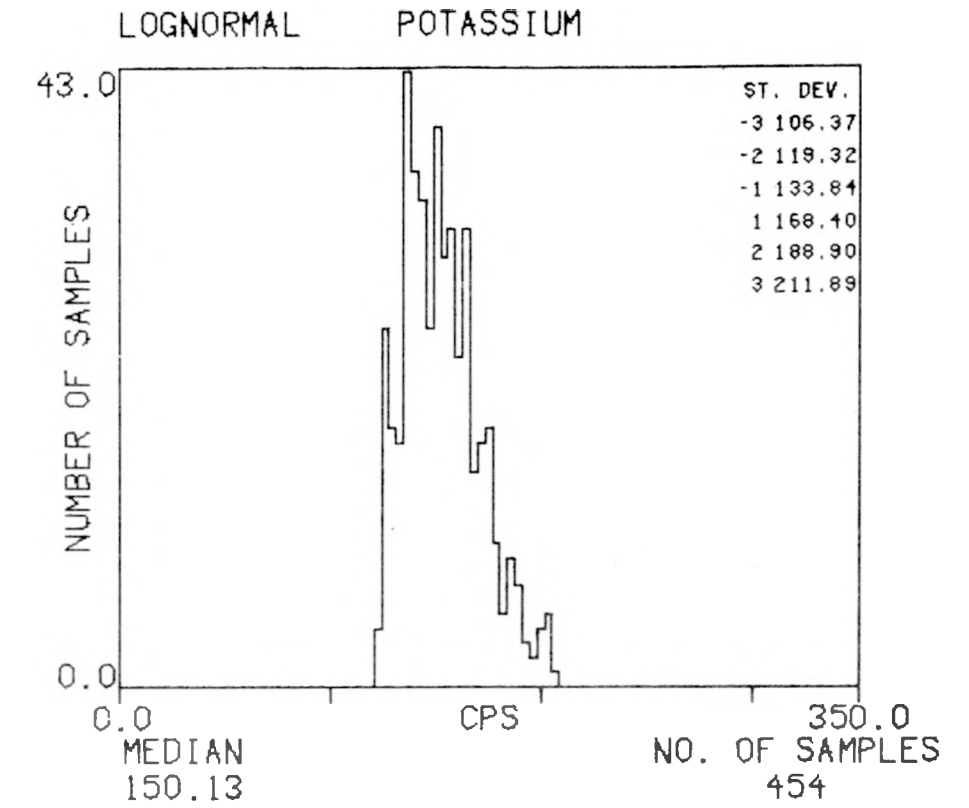
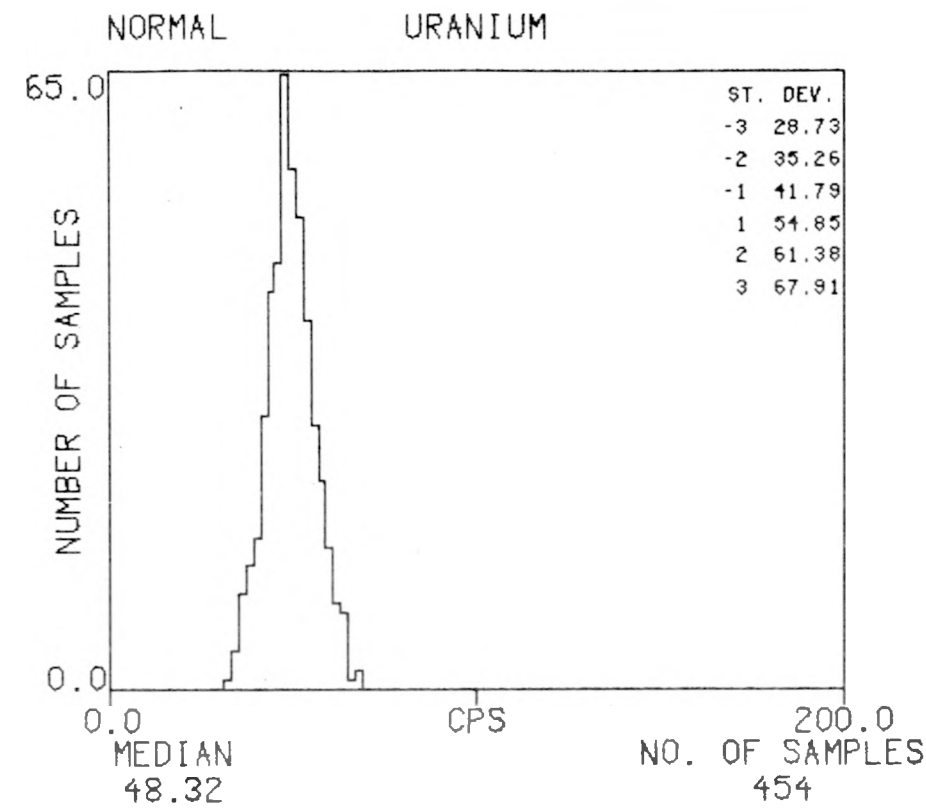
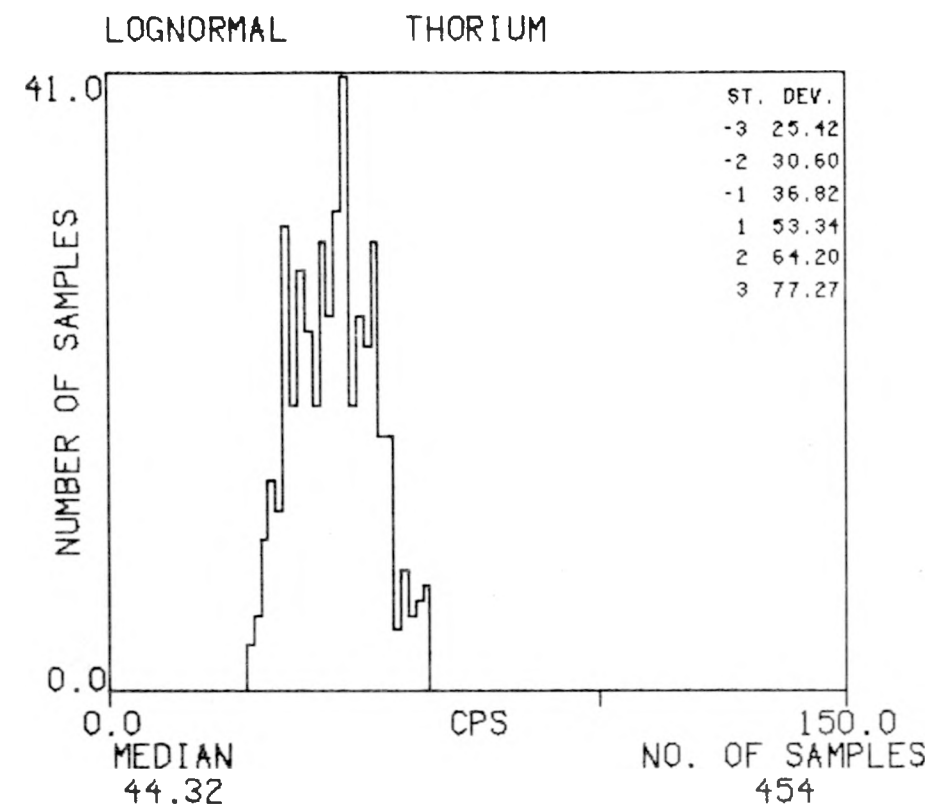
HISTOGRAMS : JU-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



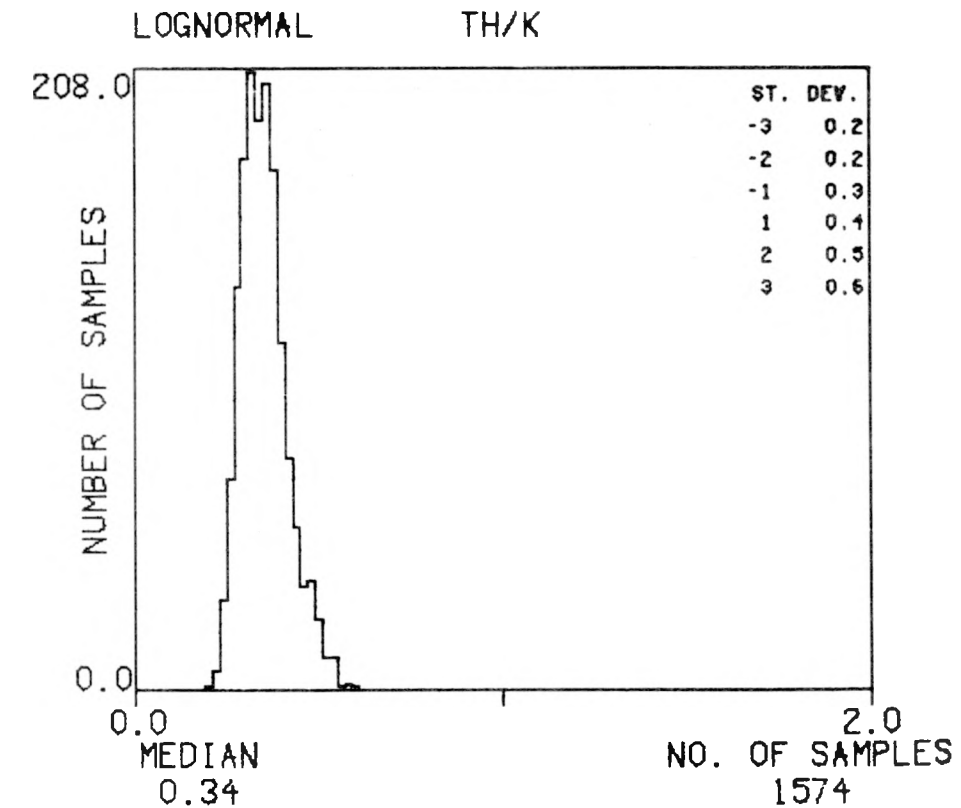
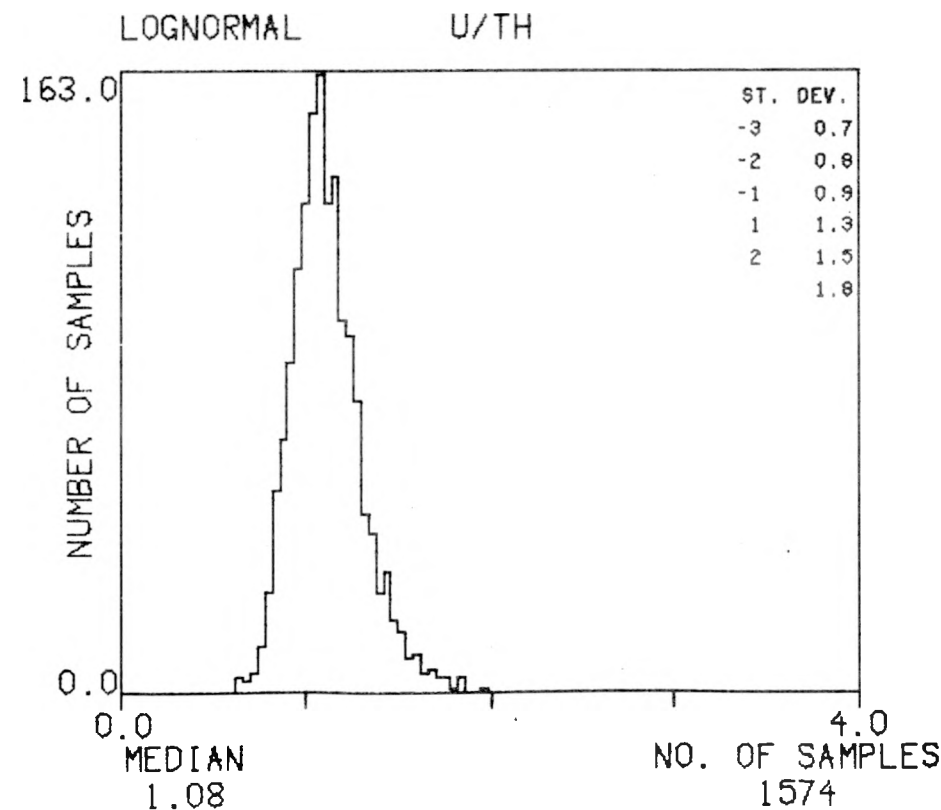
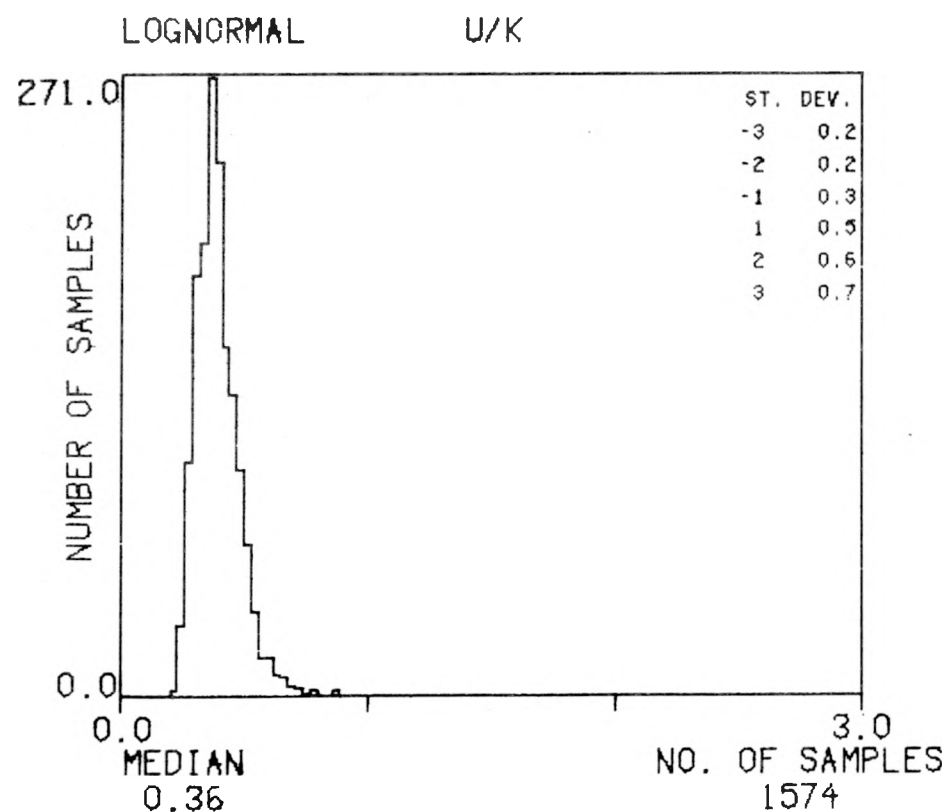
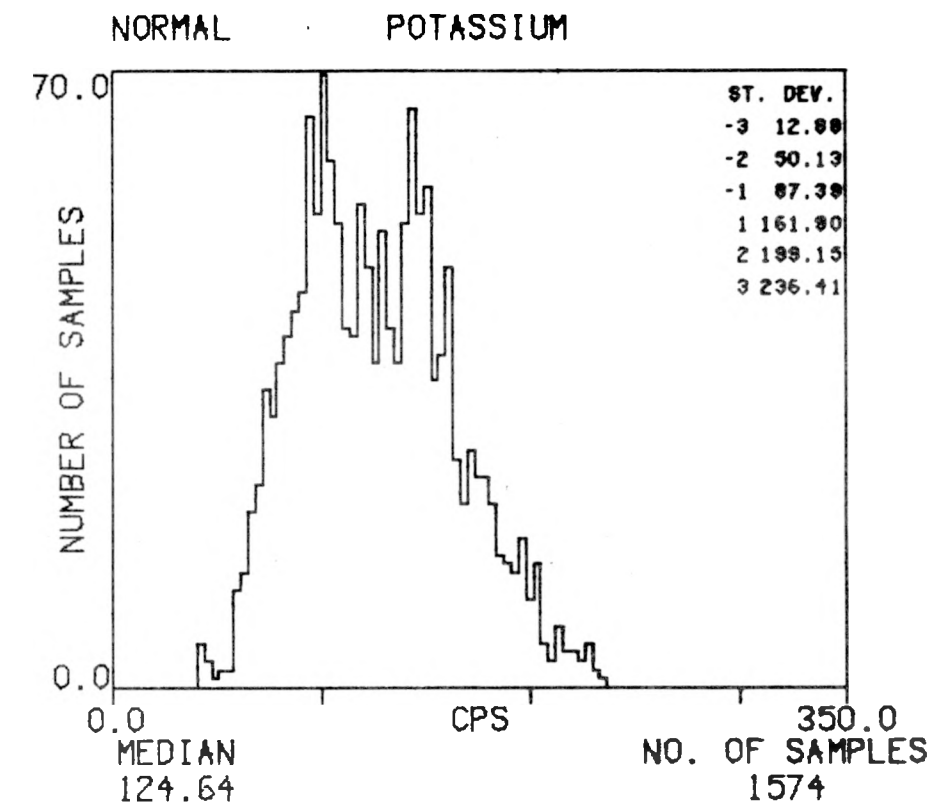
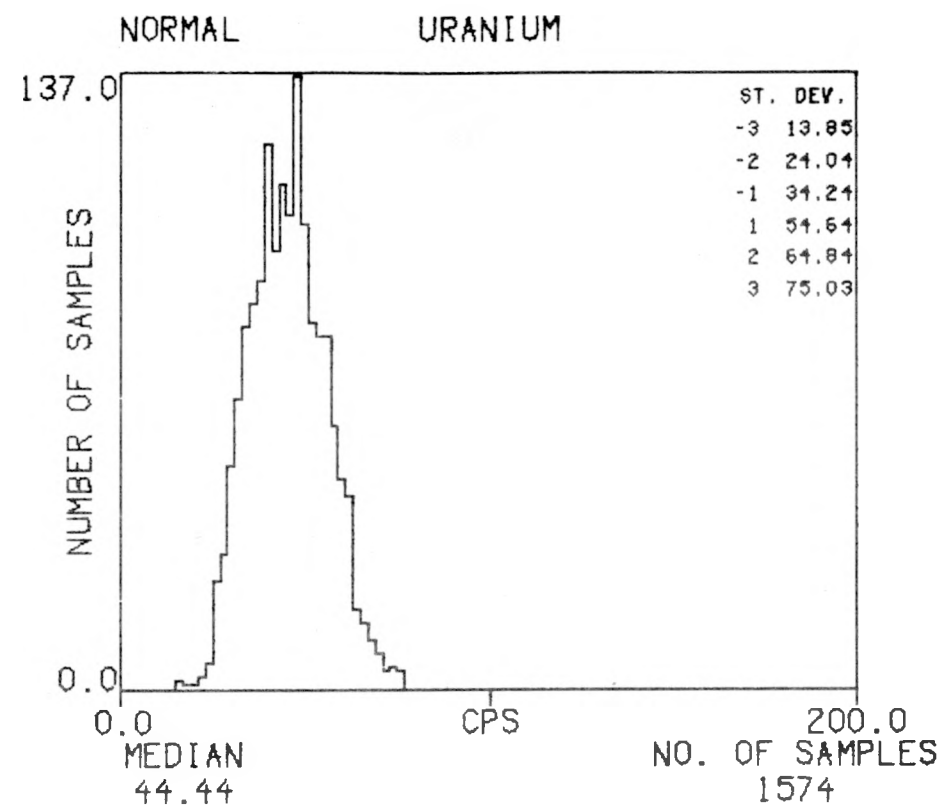
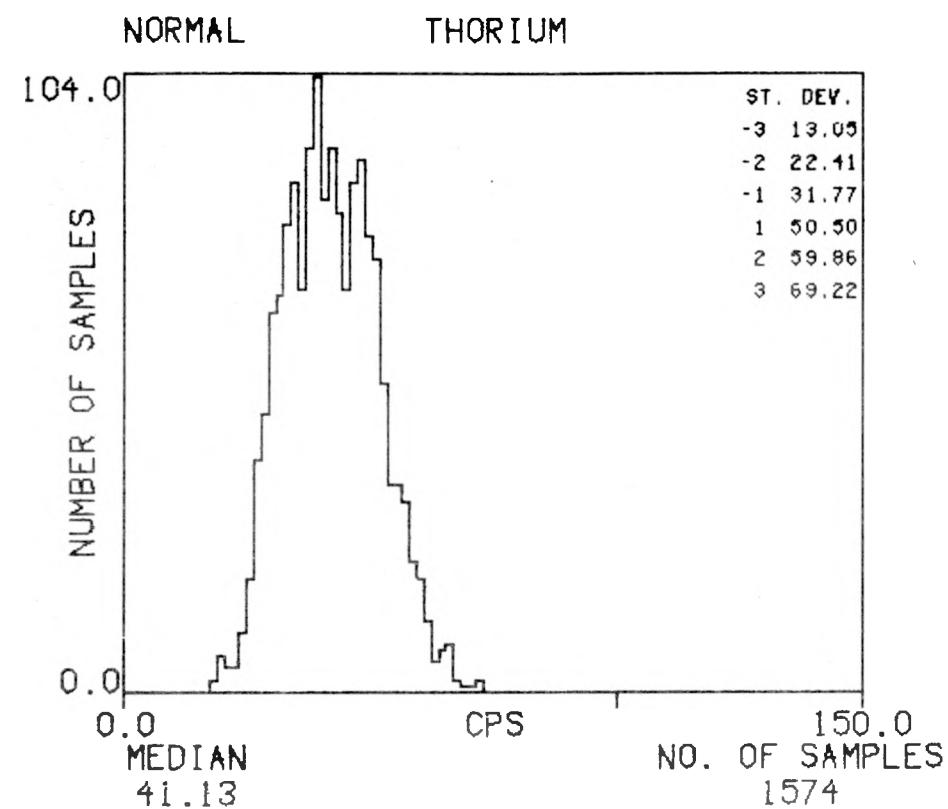
HISTOGRAMS : JU-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



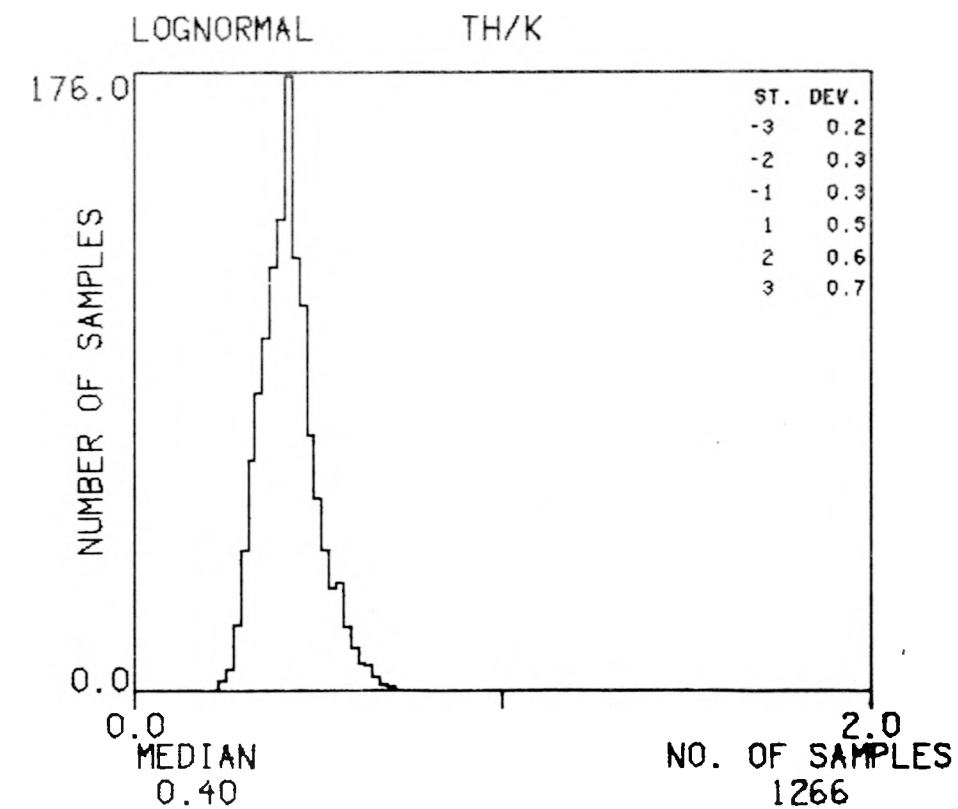
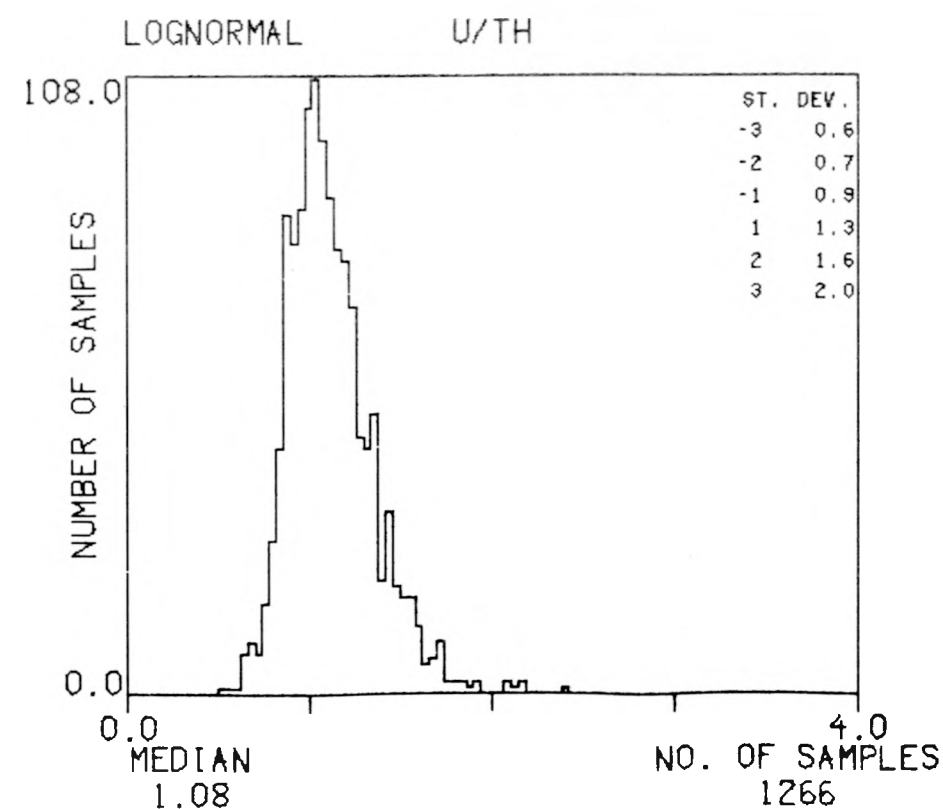
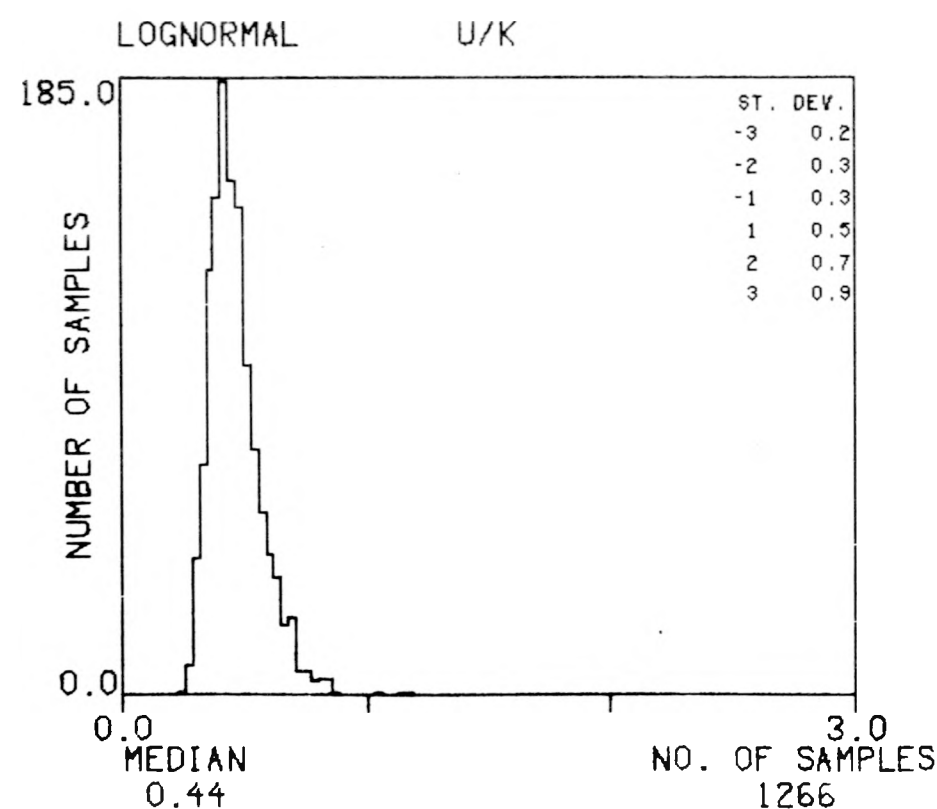
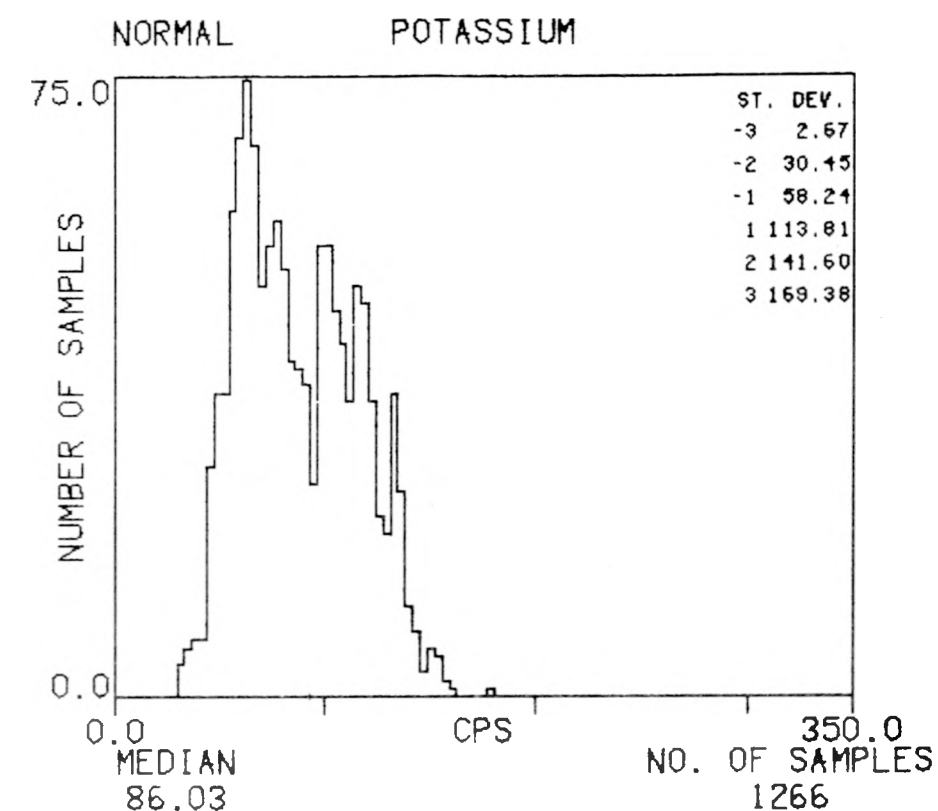
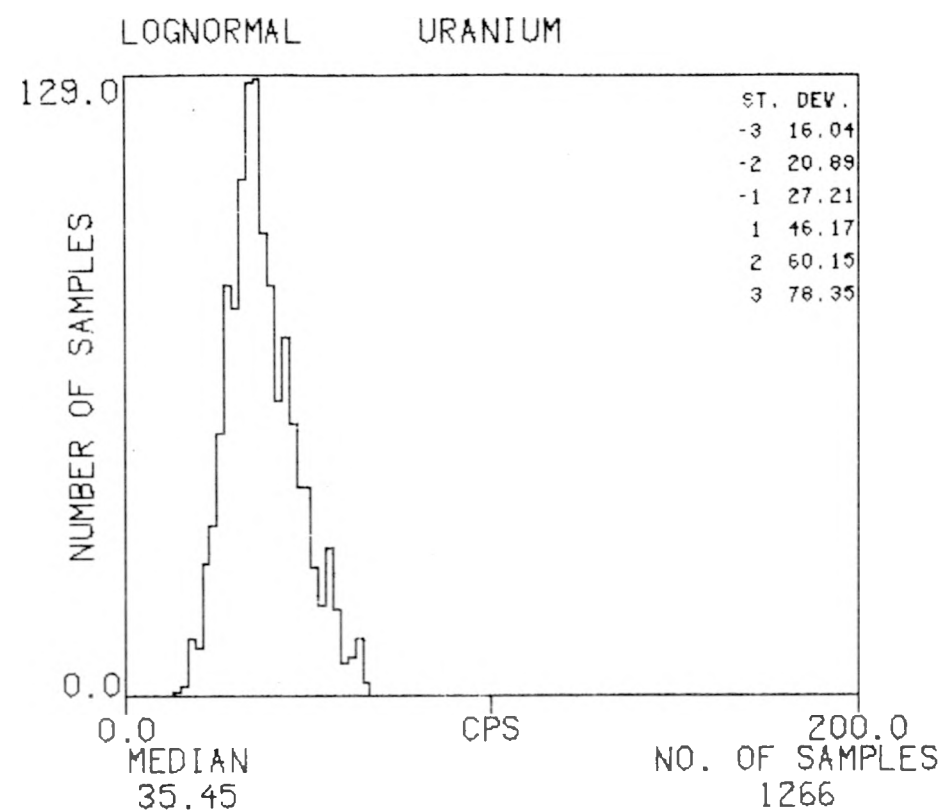
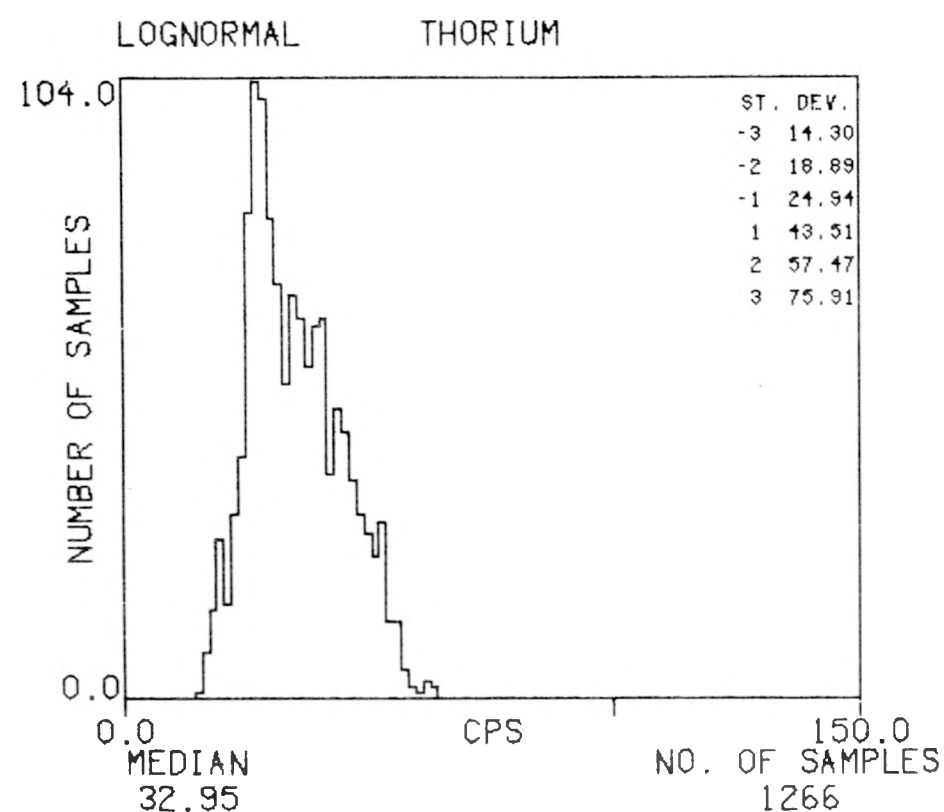
HISTOGRAMS : TRPS

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



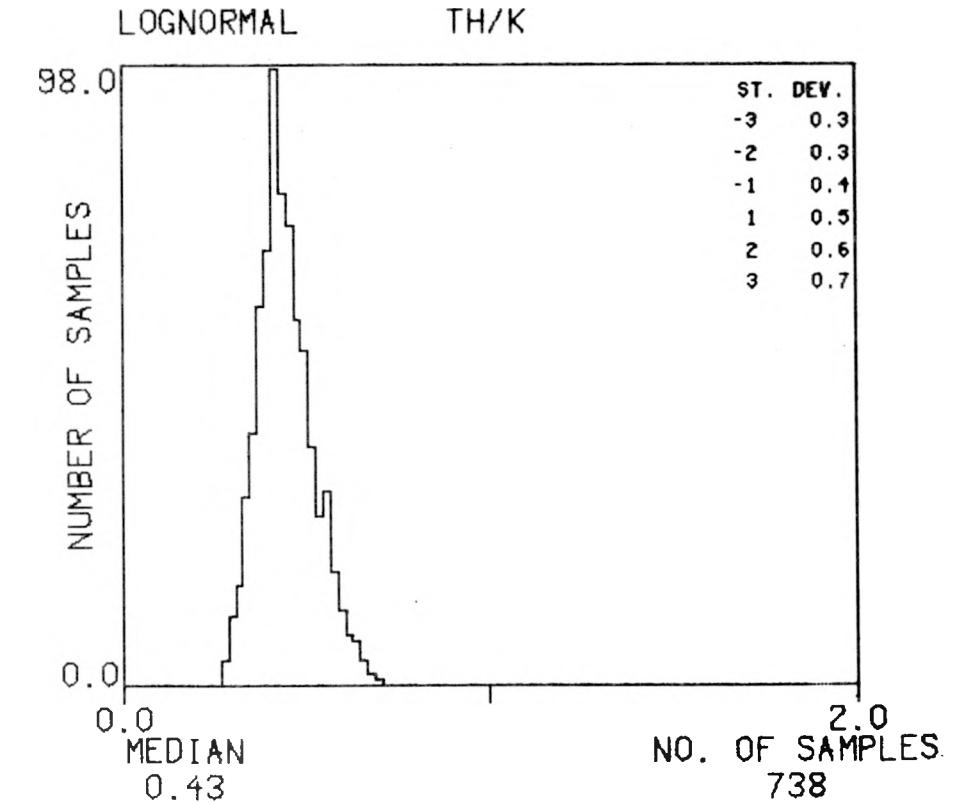
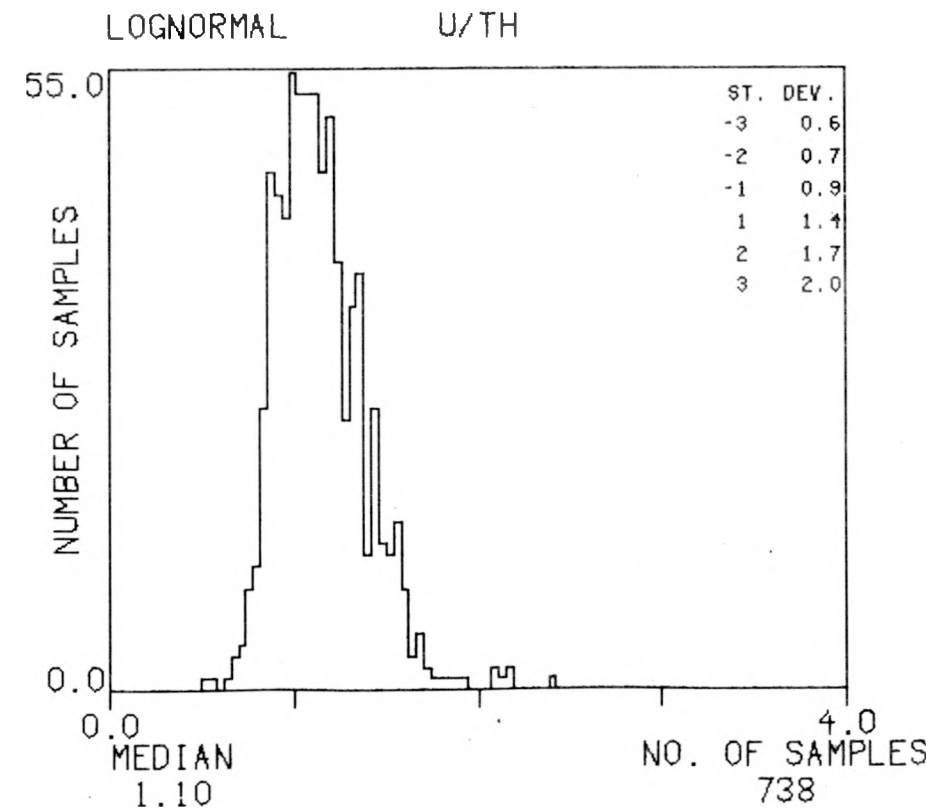
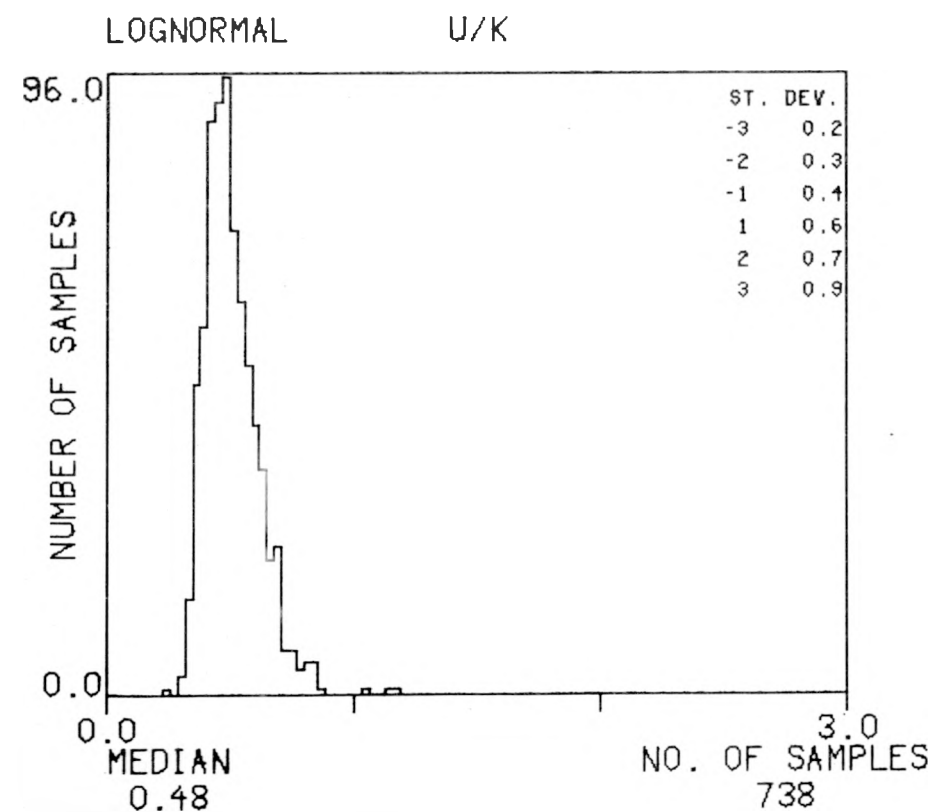
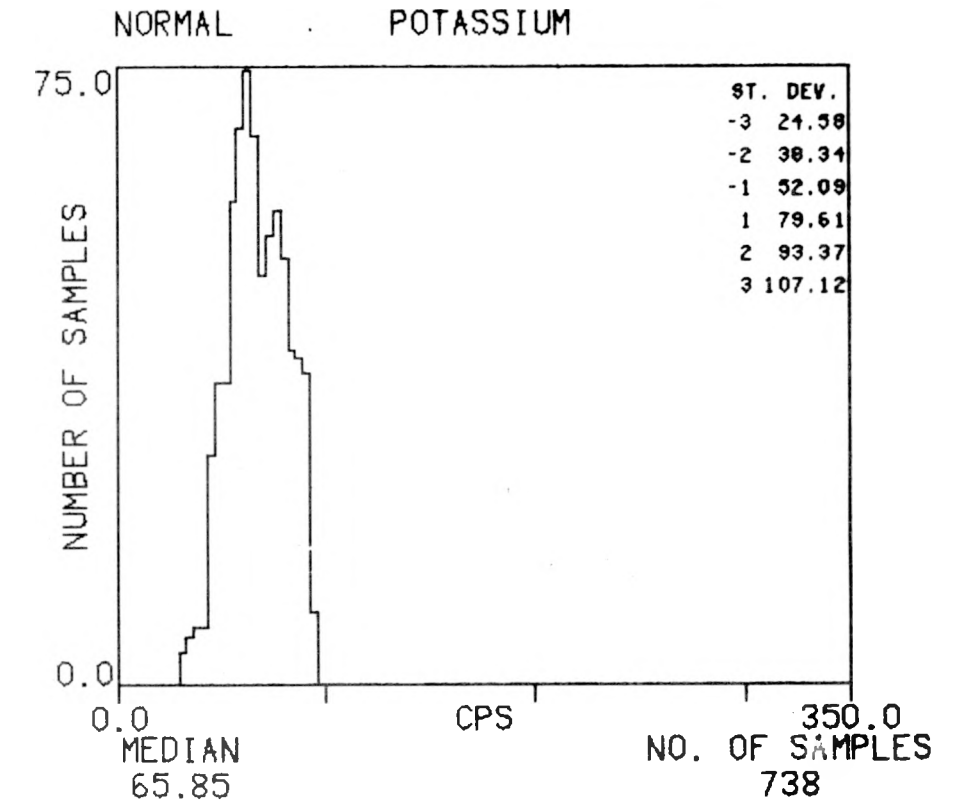
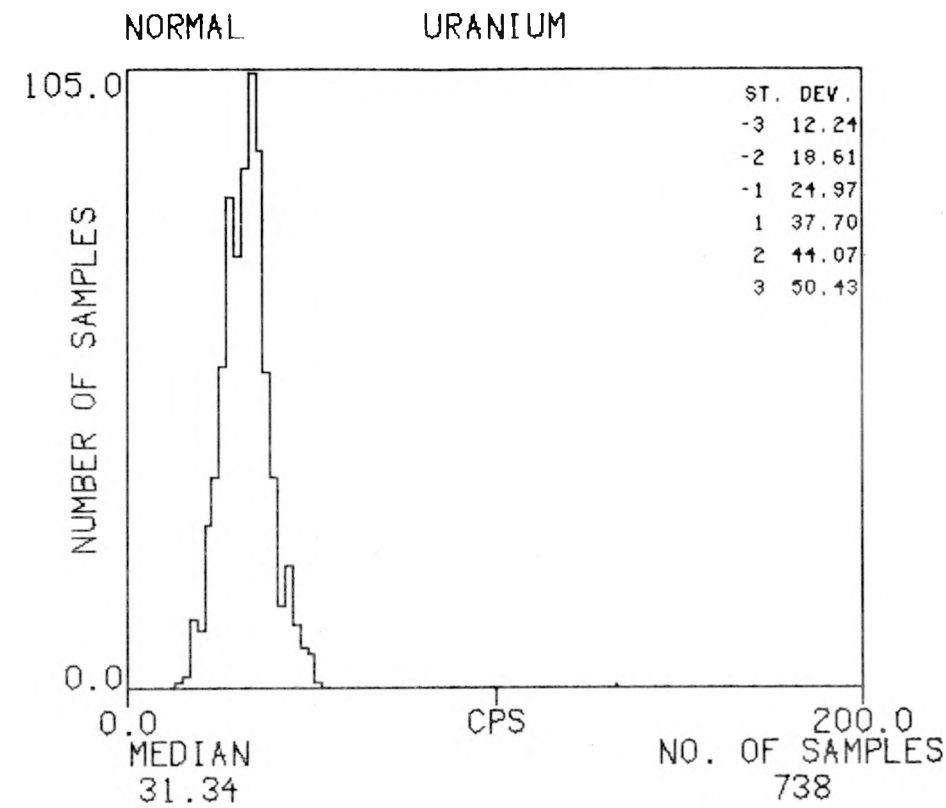
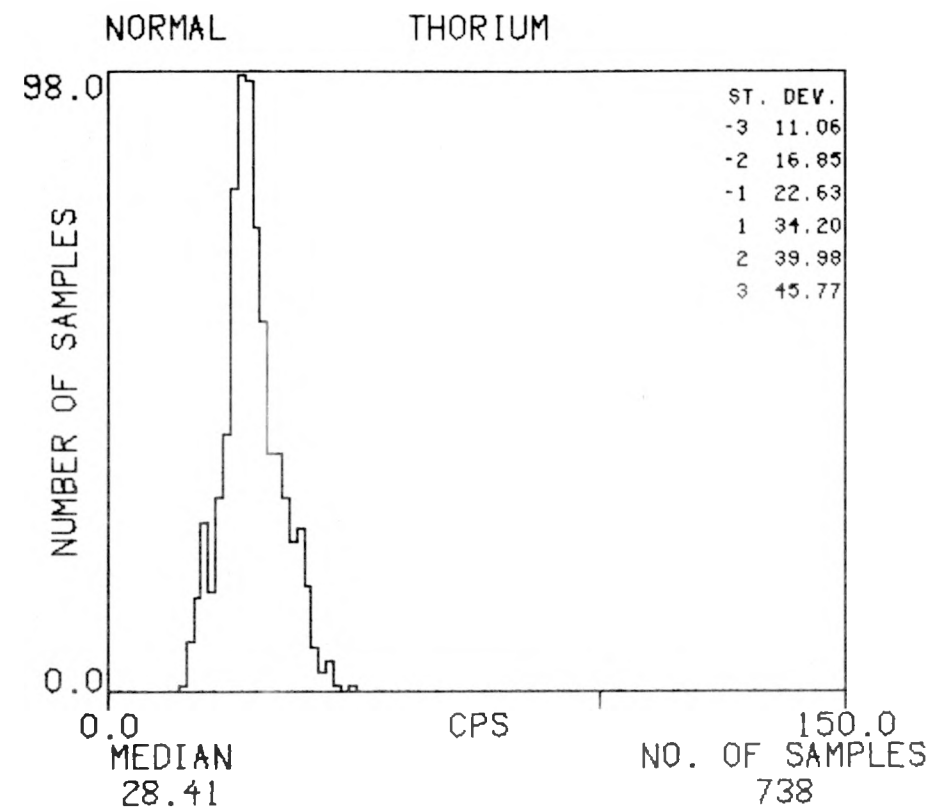
HISTOGRAMS : PMO

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



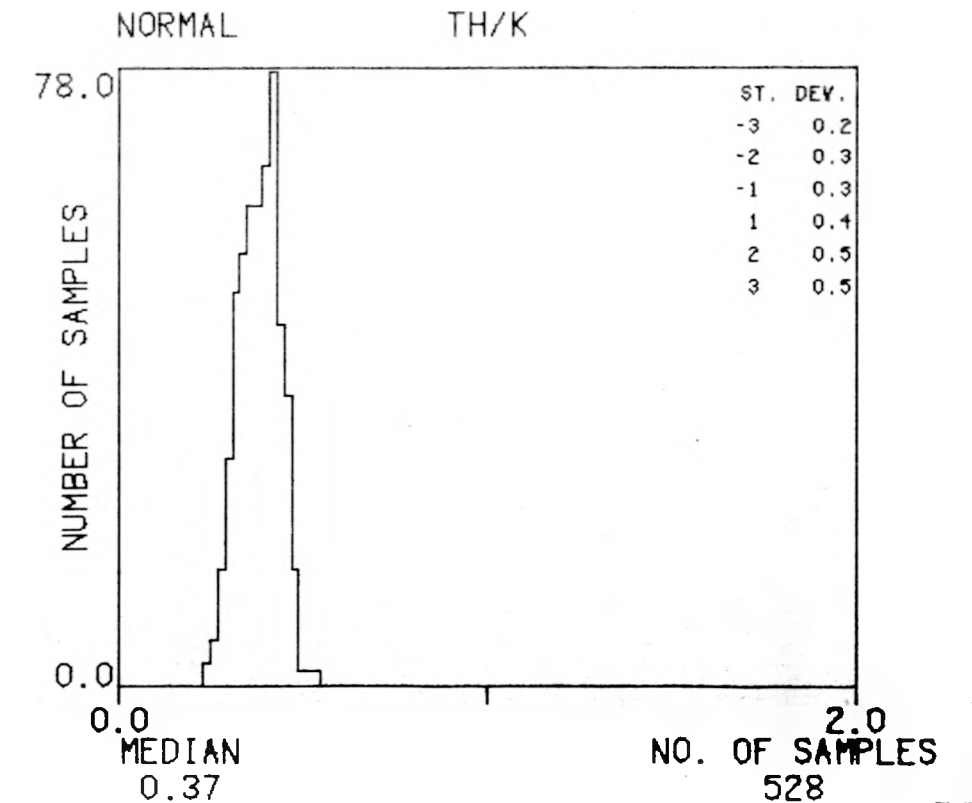
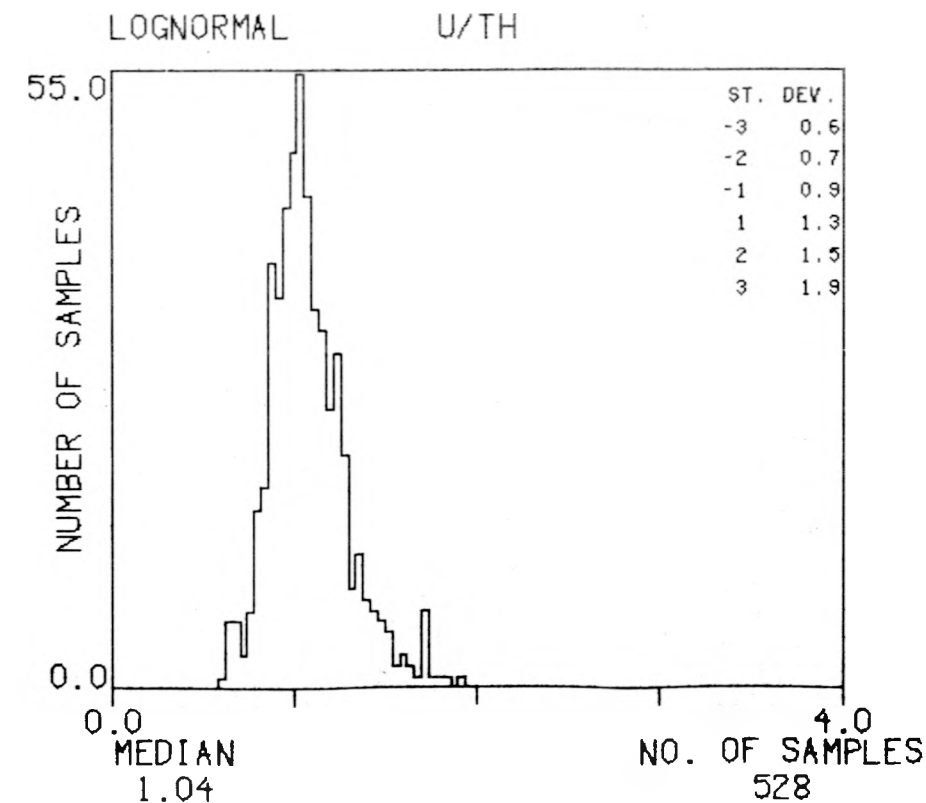
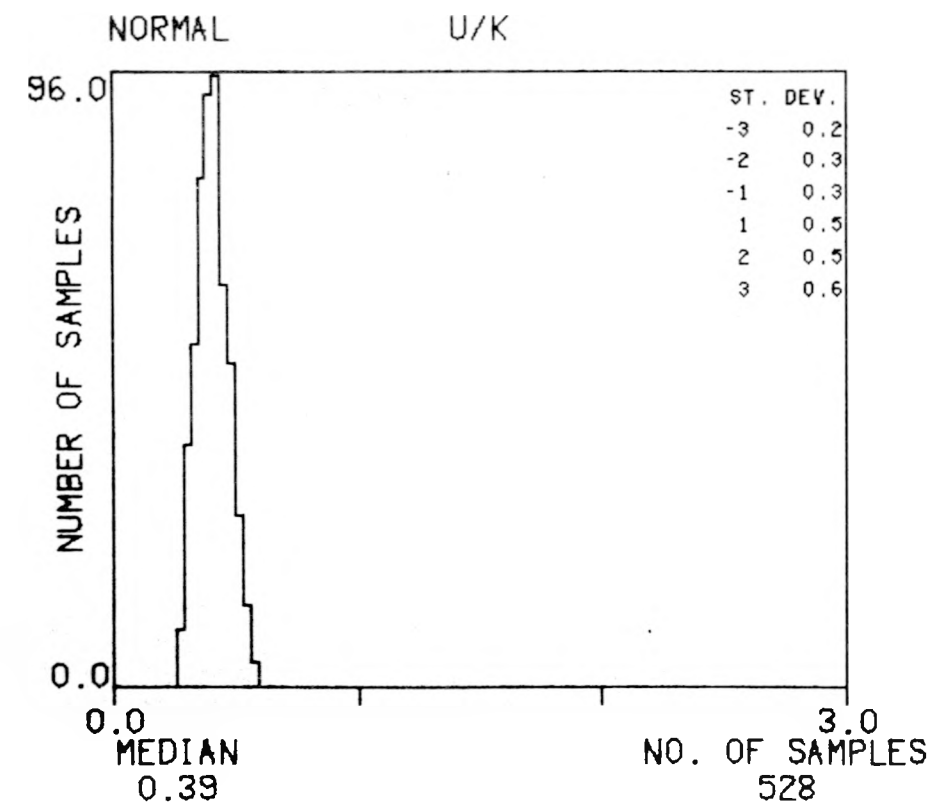
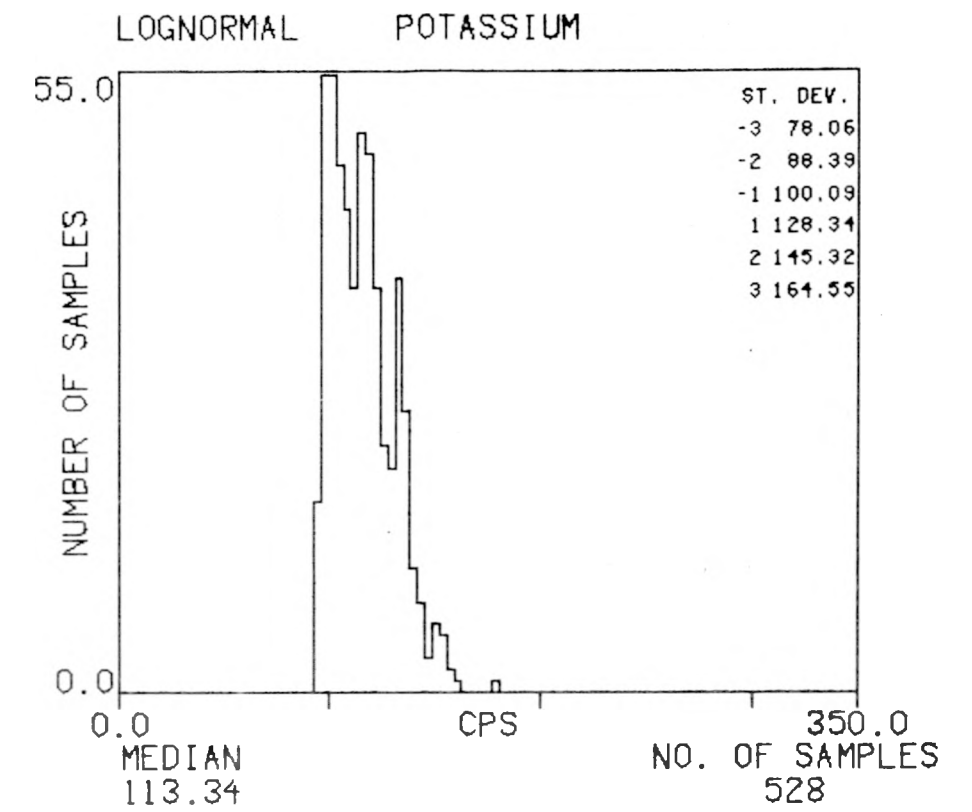
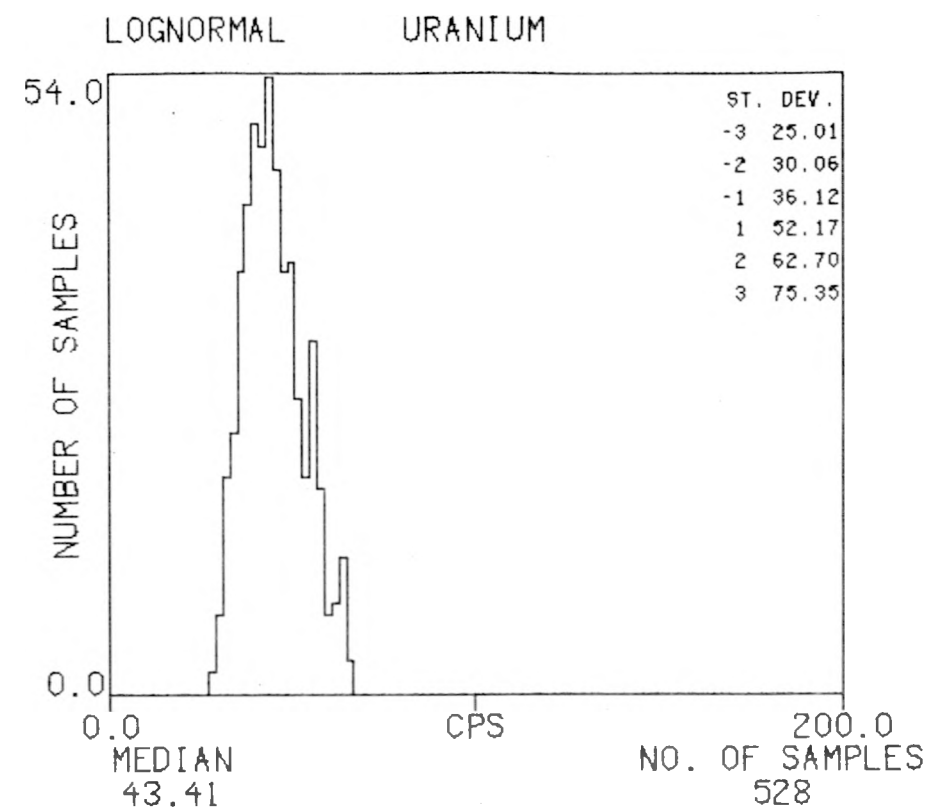
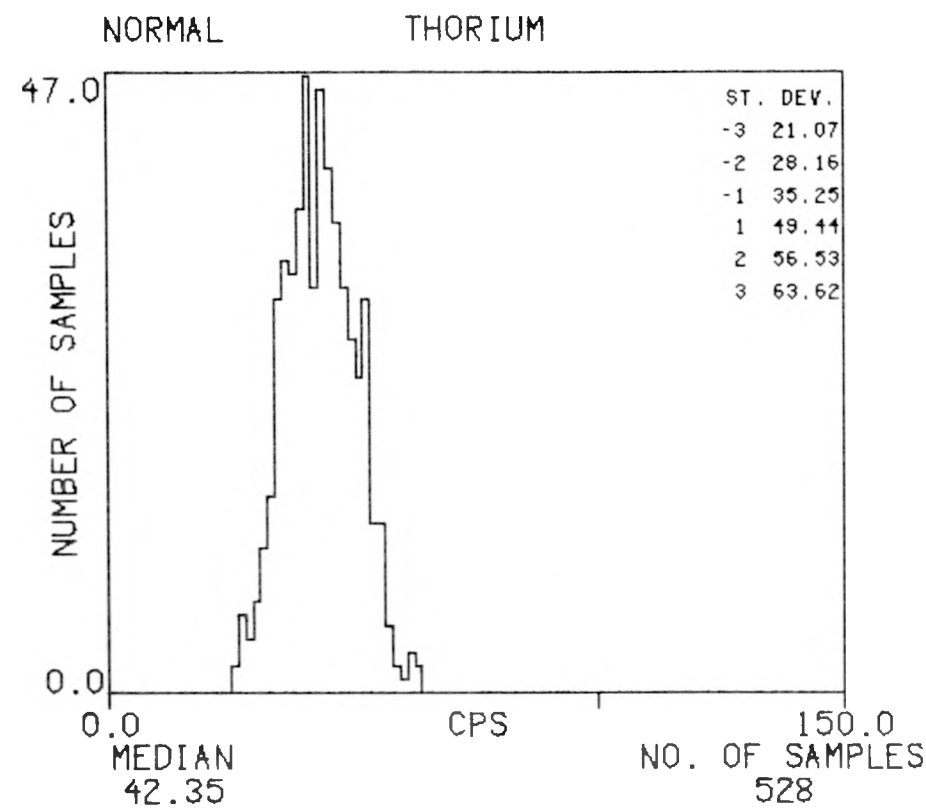
HISTOGRAMS : PMO-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



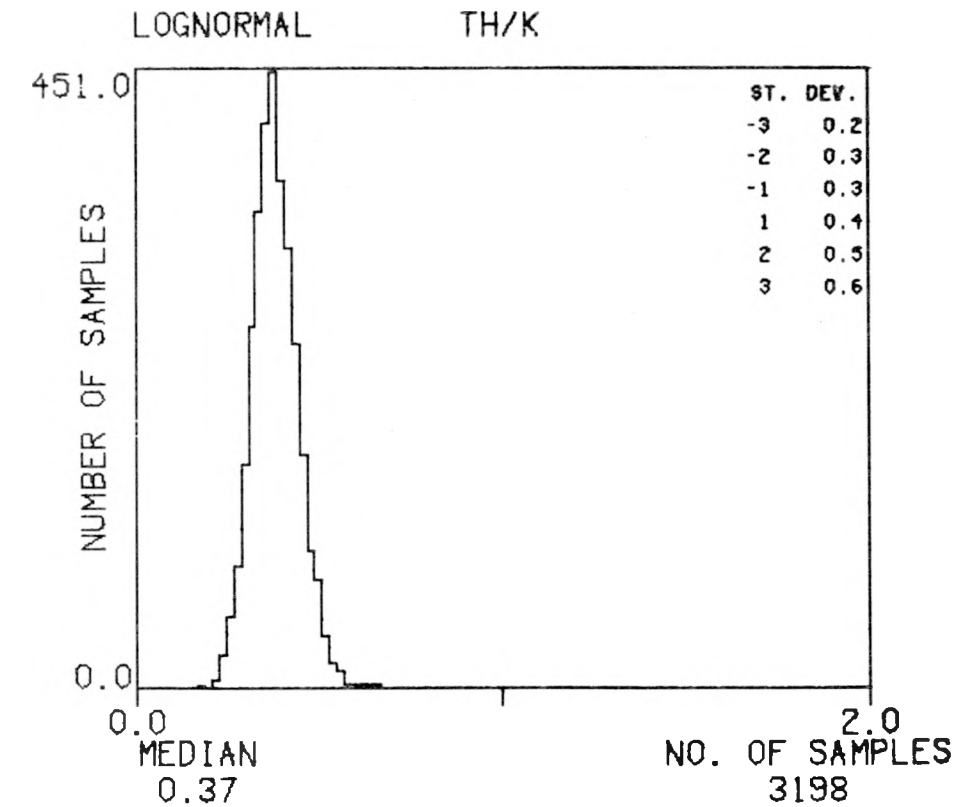
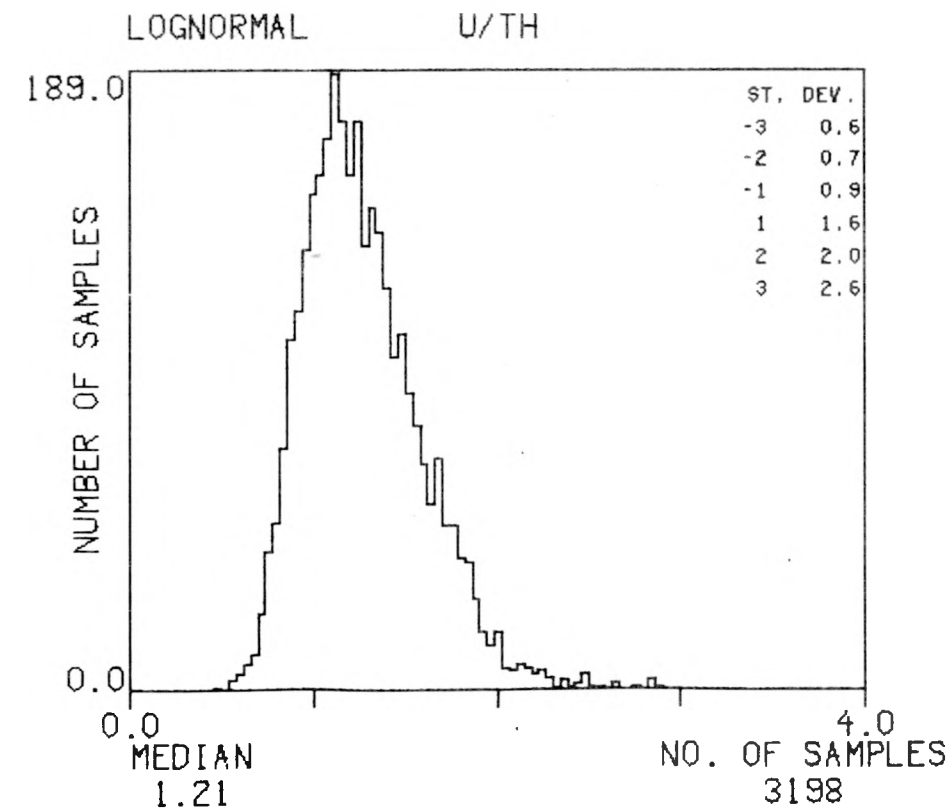
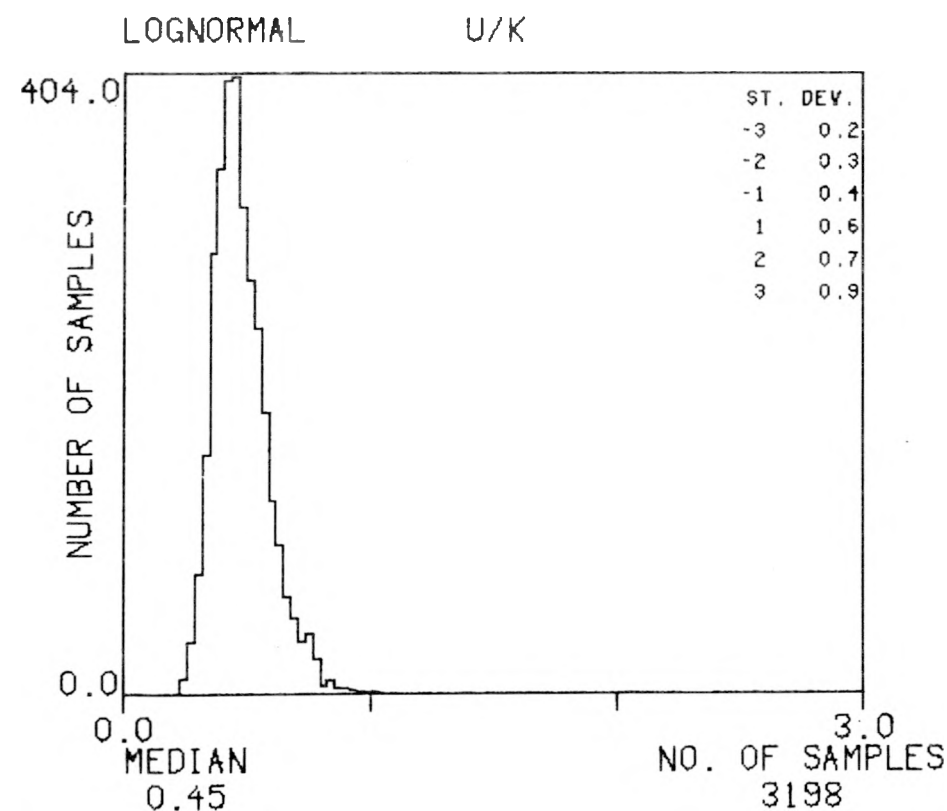
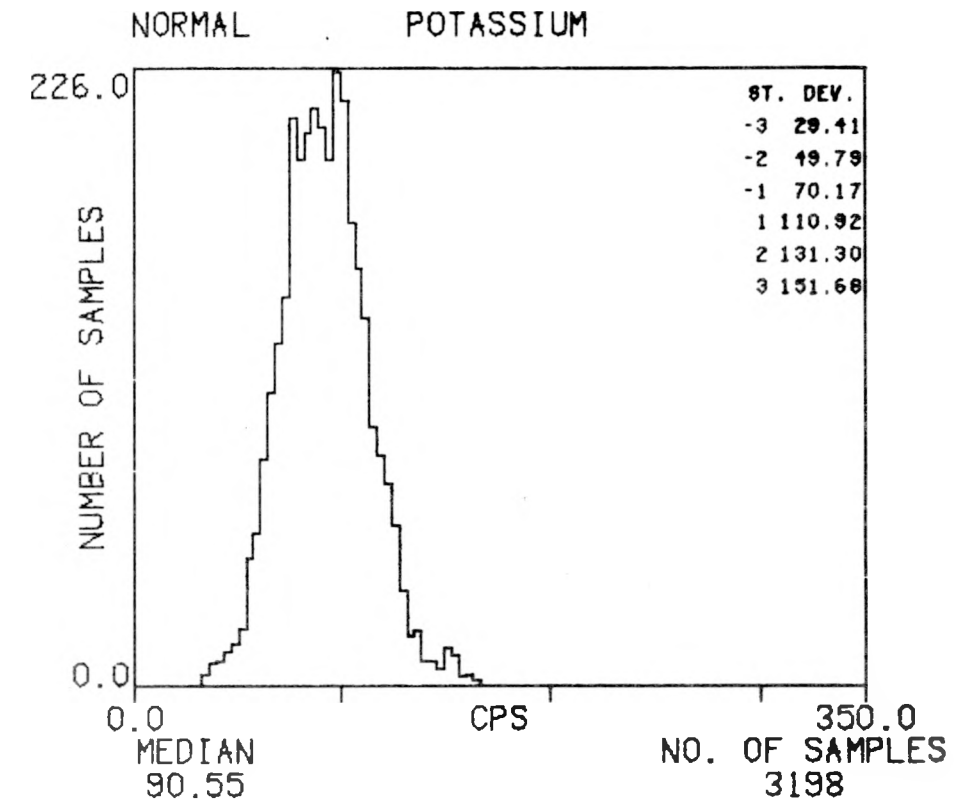
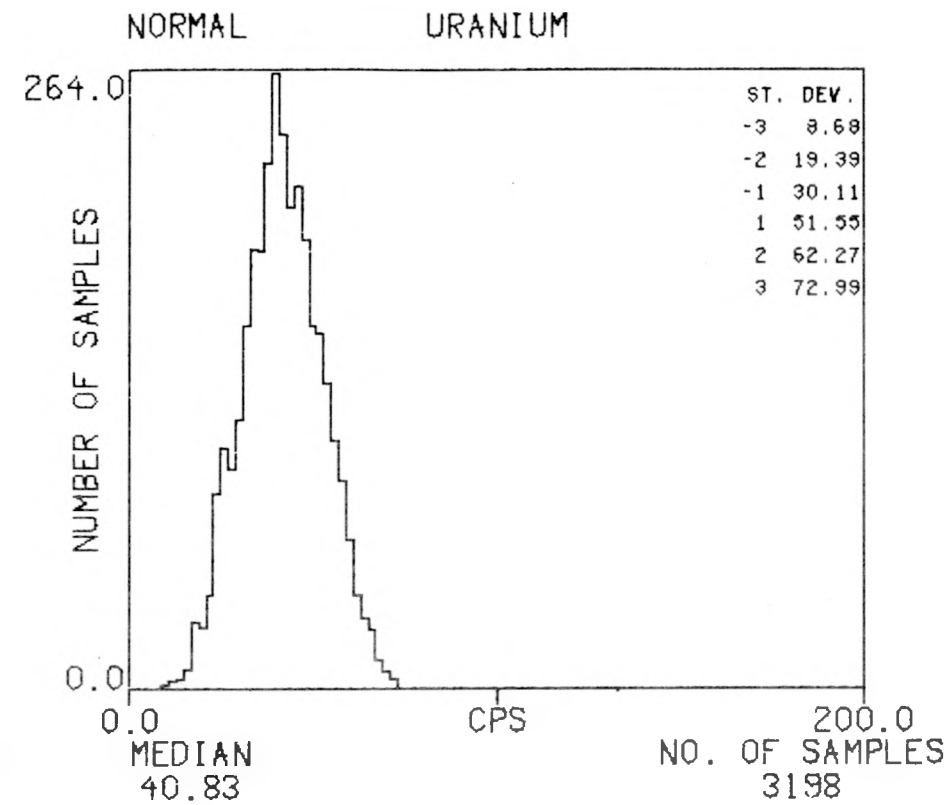
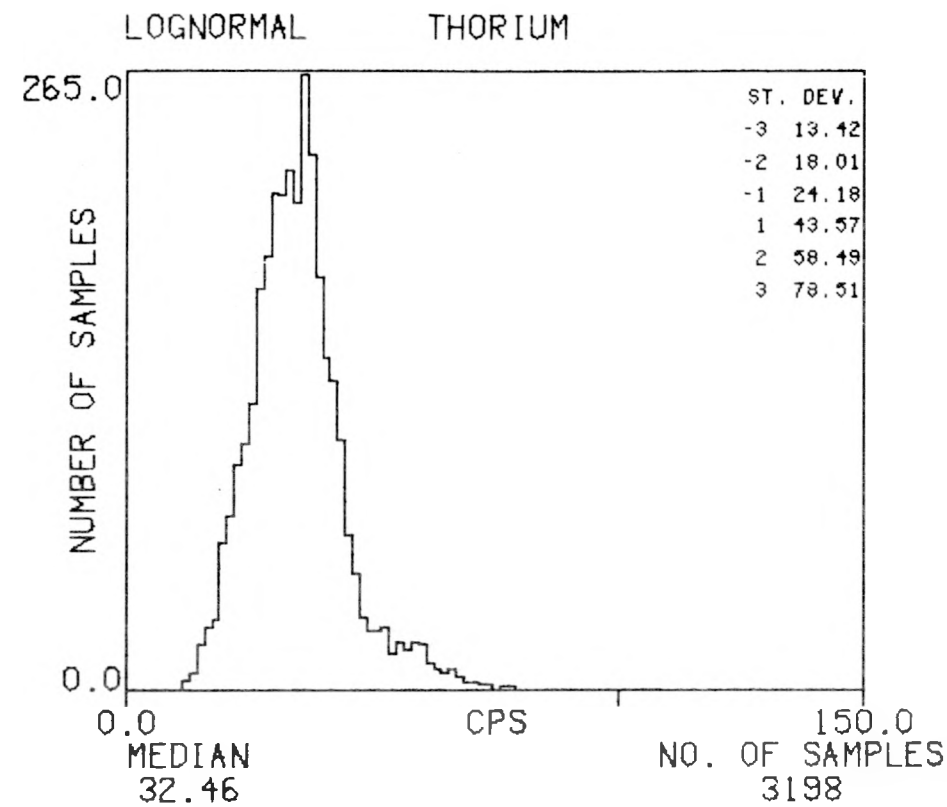
HISTOGRAMS : PMO-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



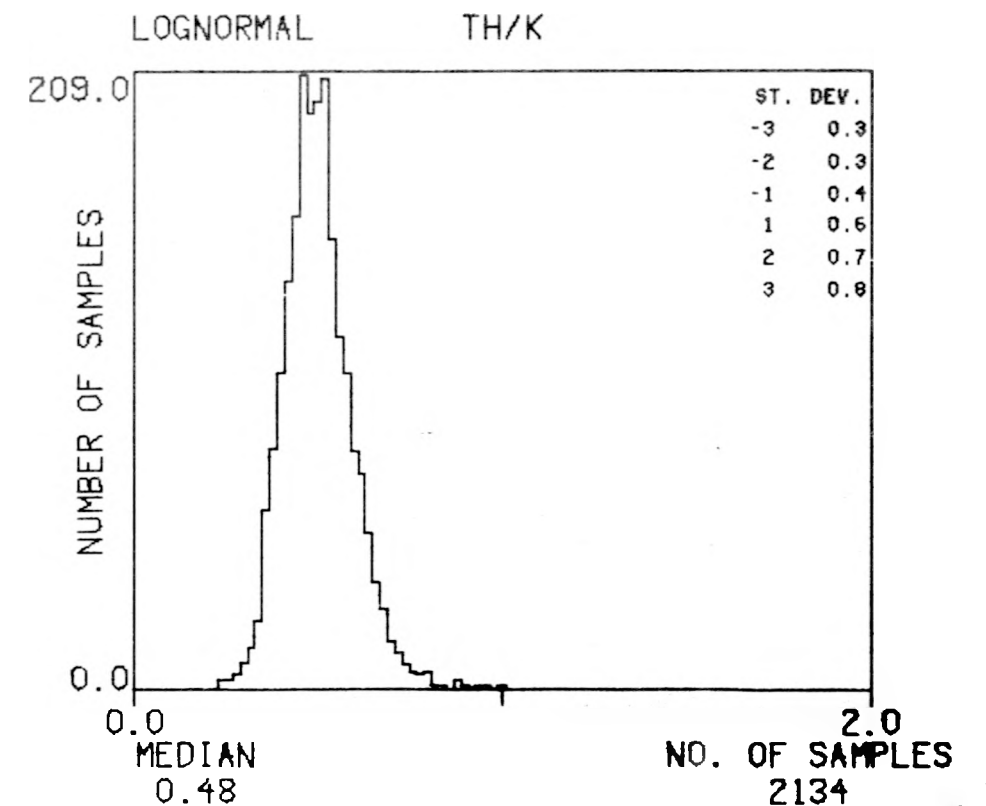
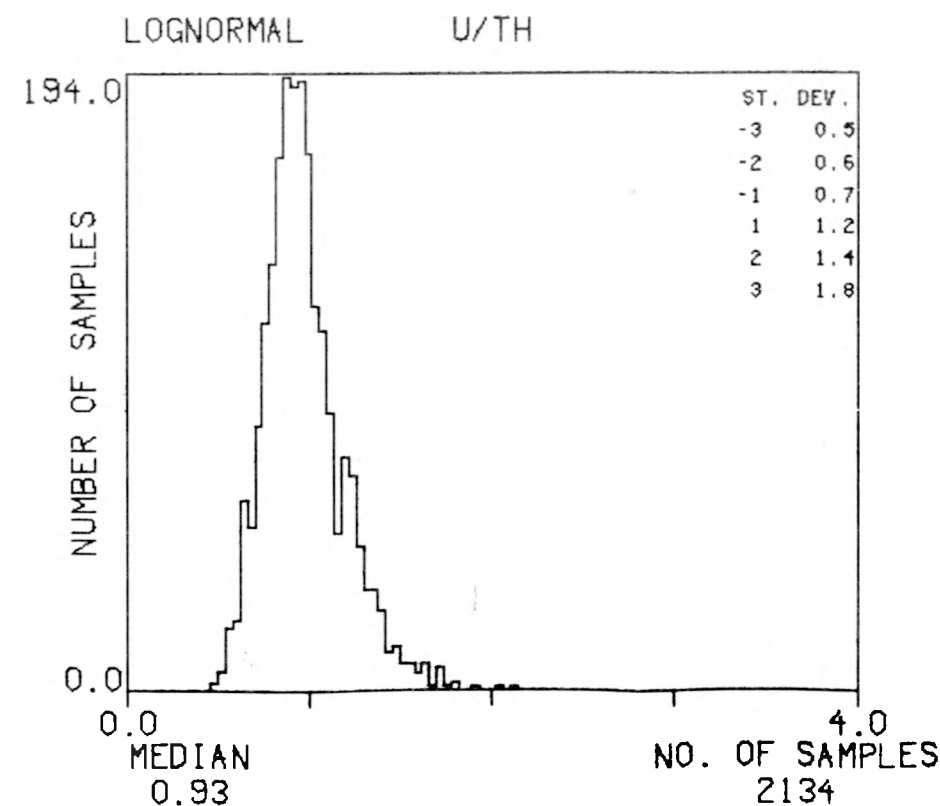
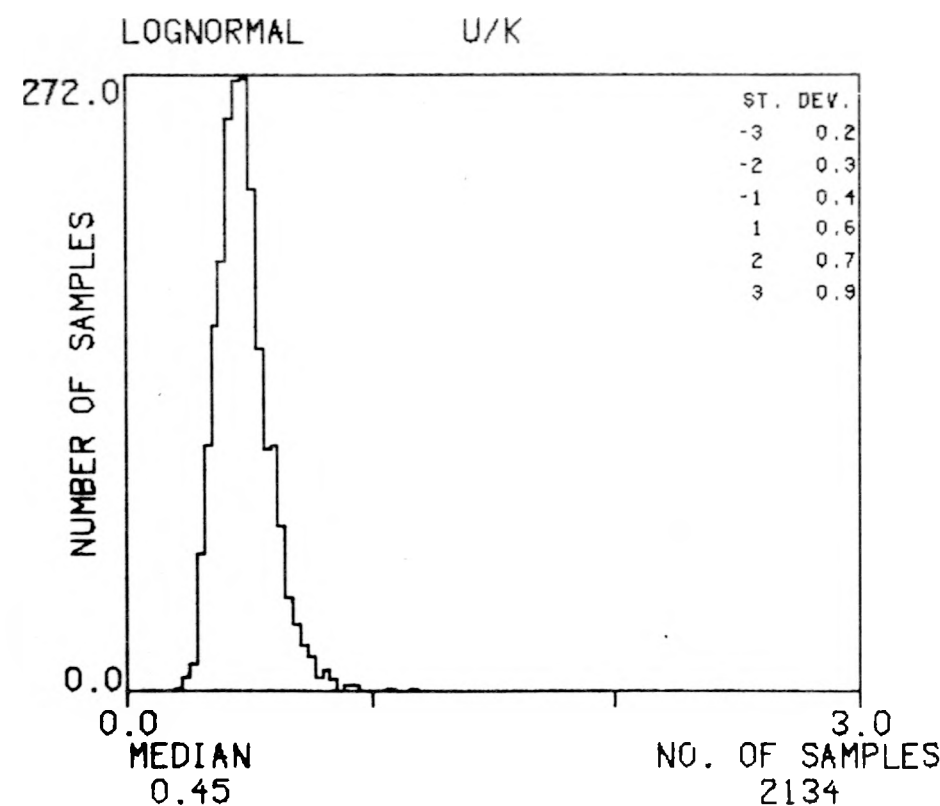
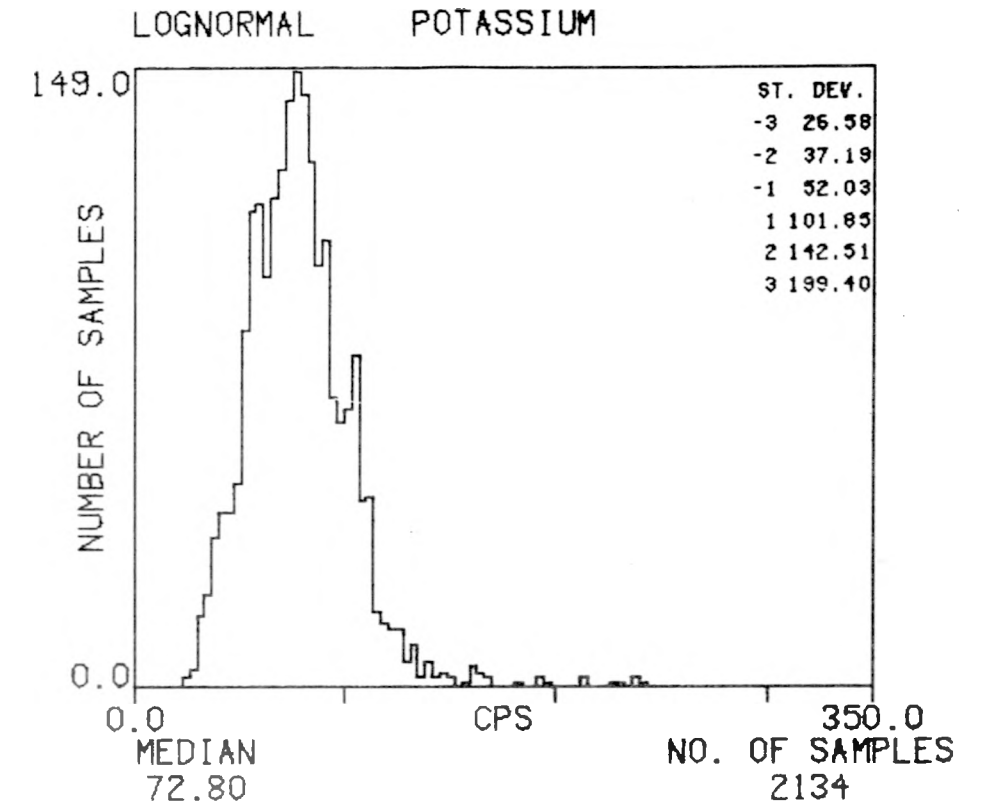
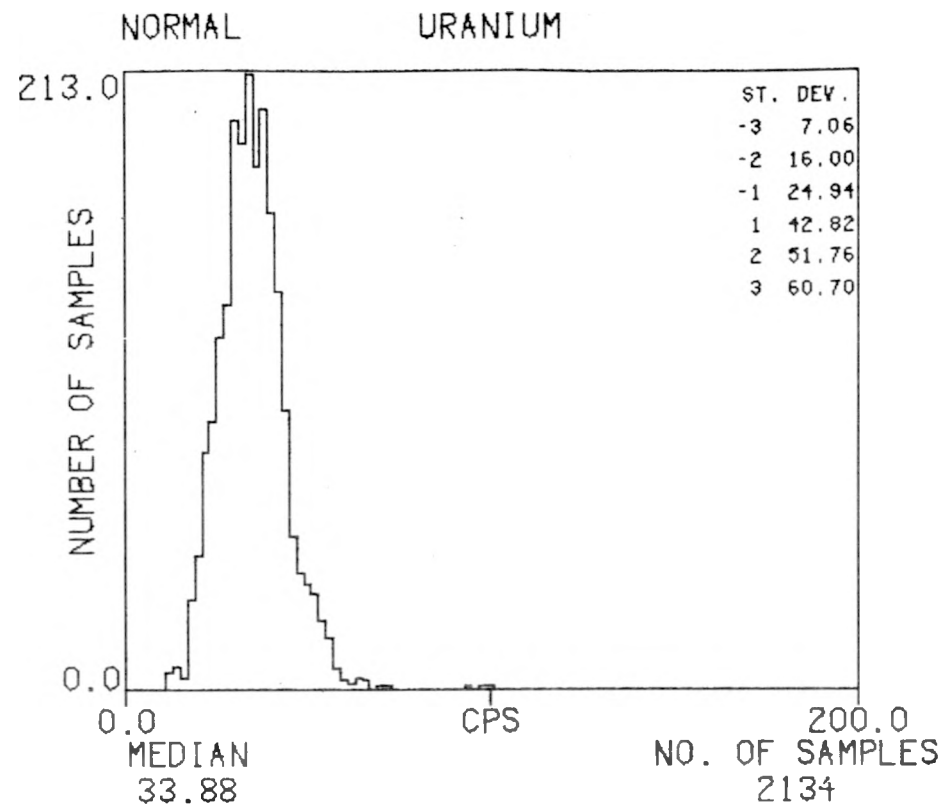
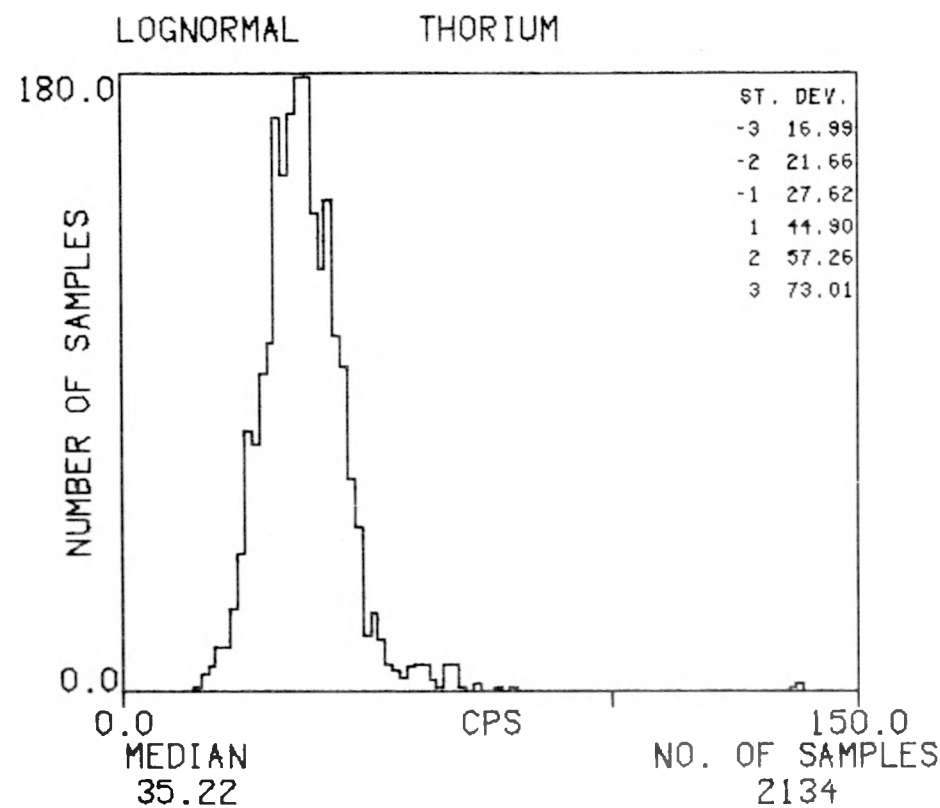
HISTOGRAMS : P P P M

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



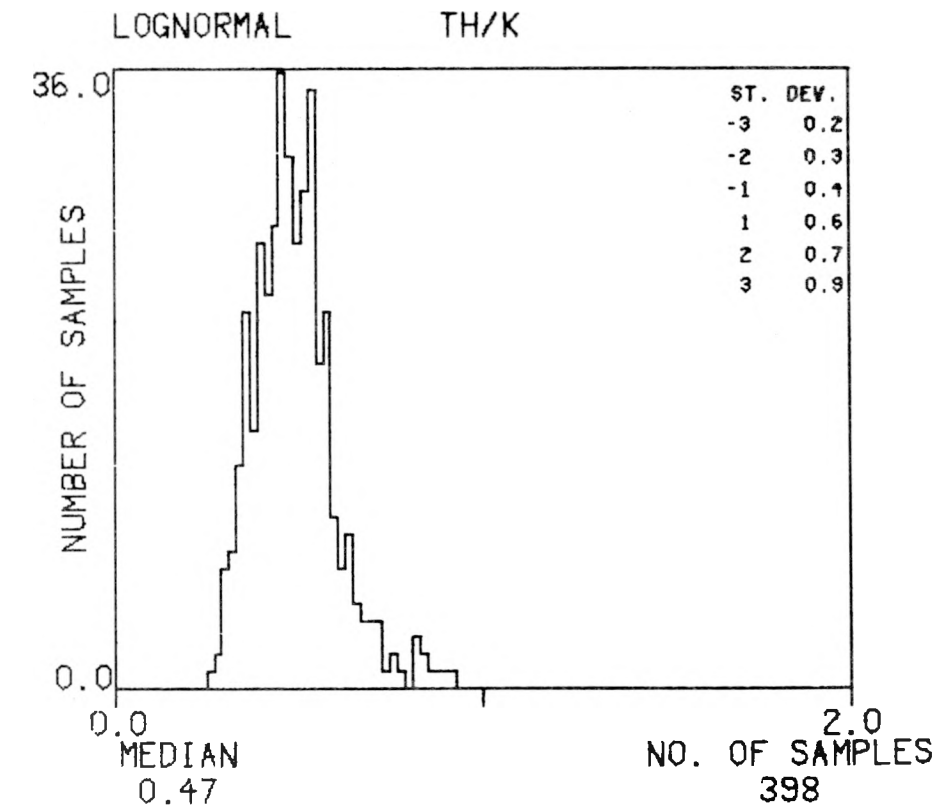
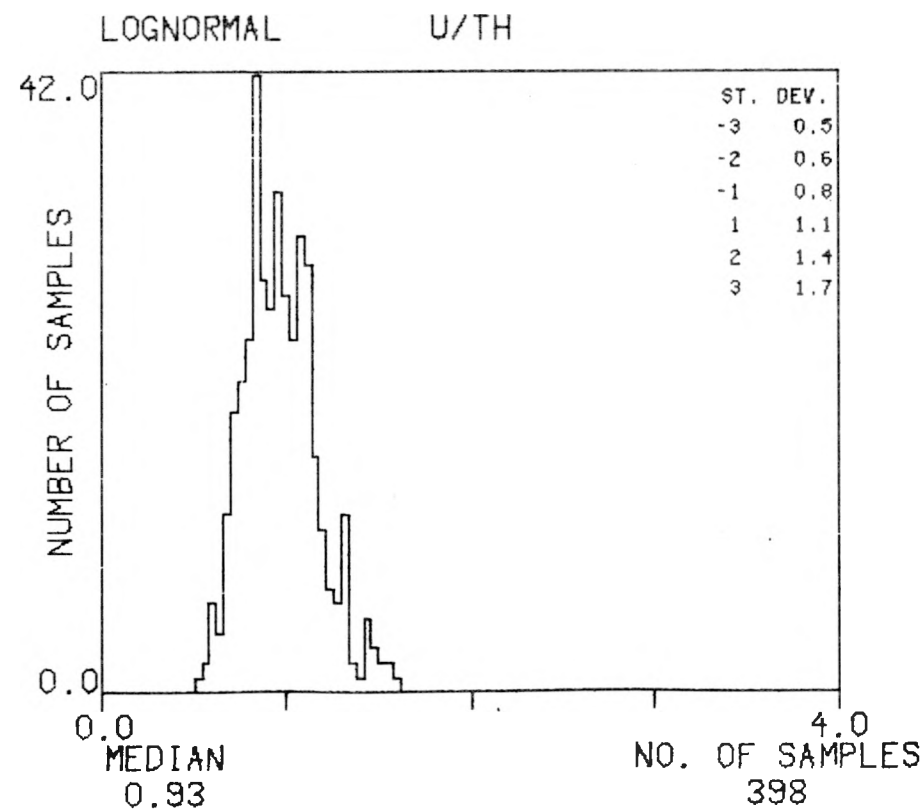
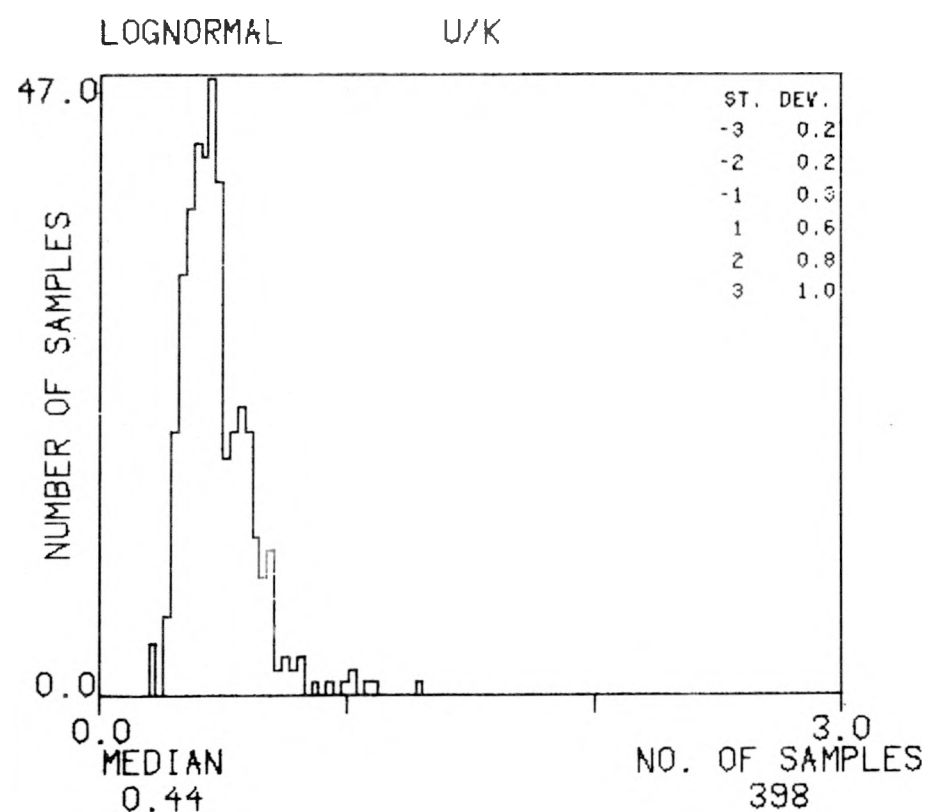
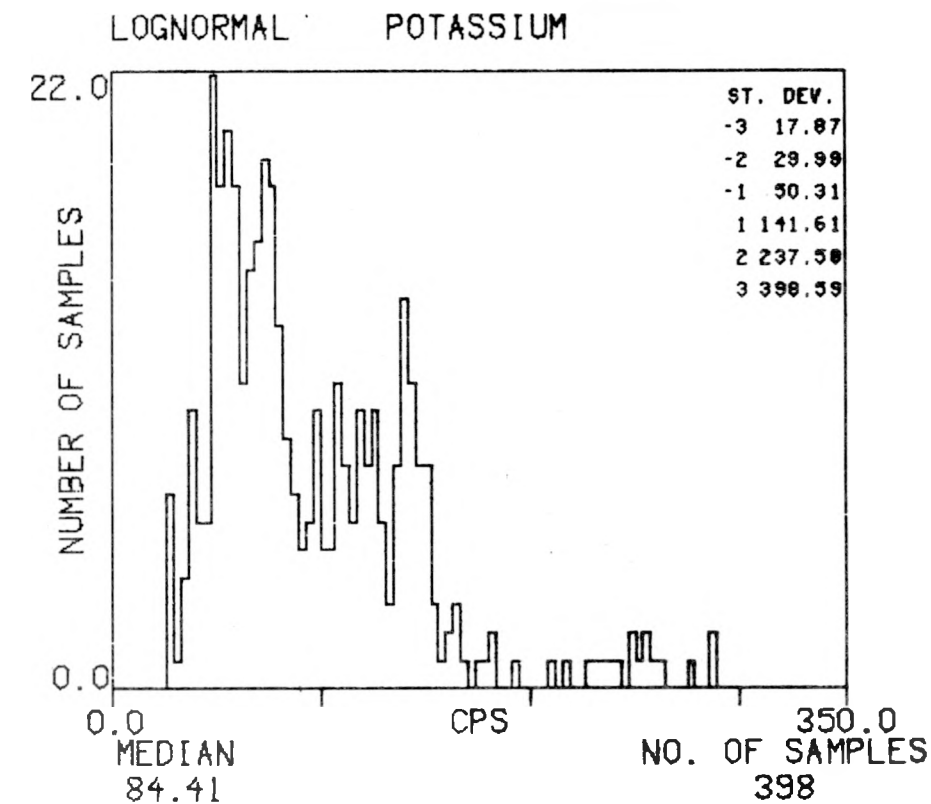
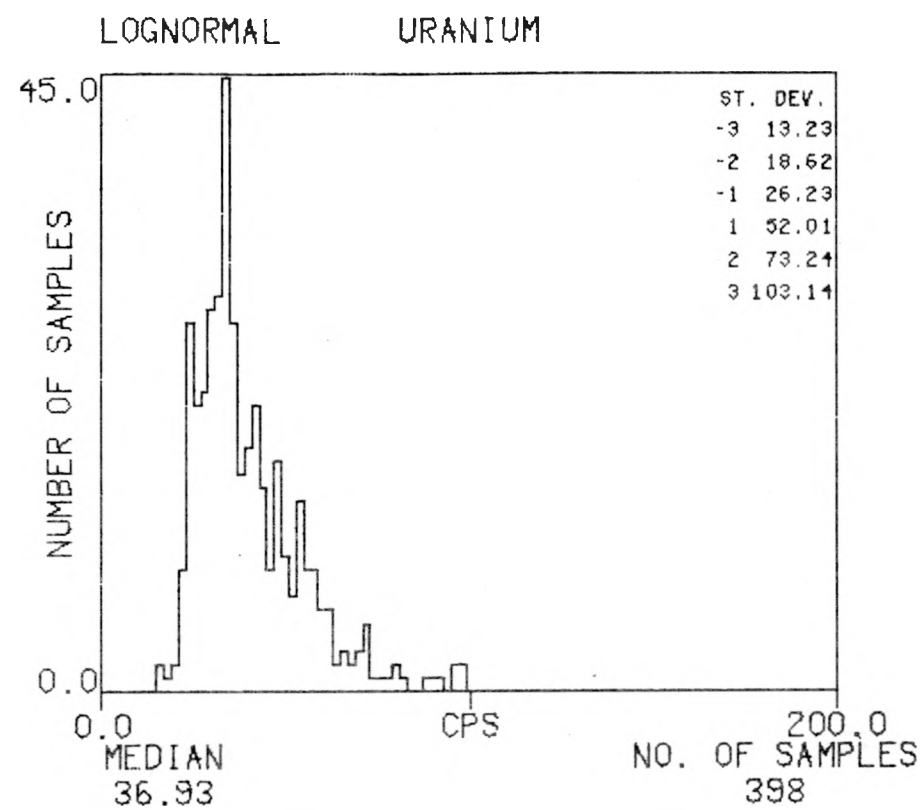
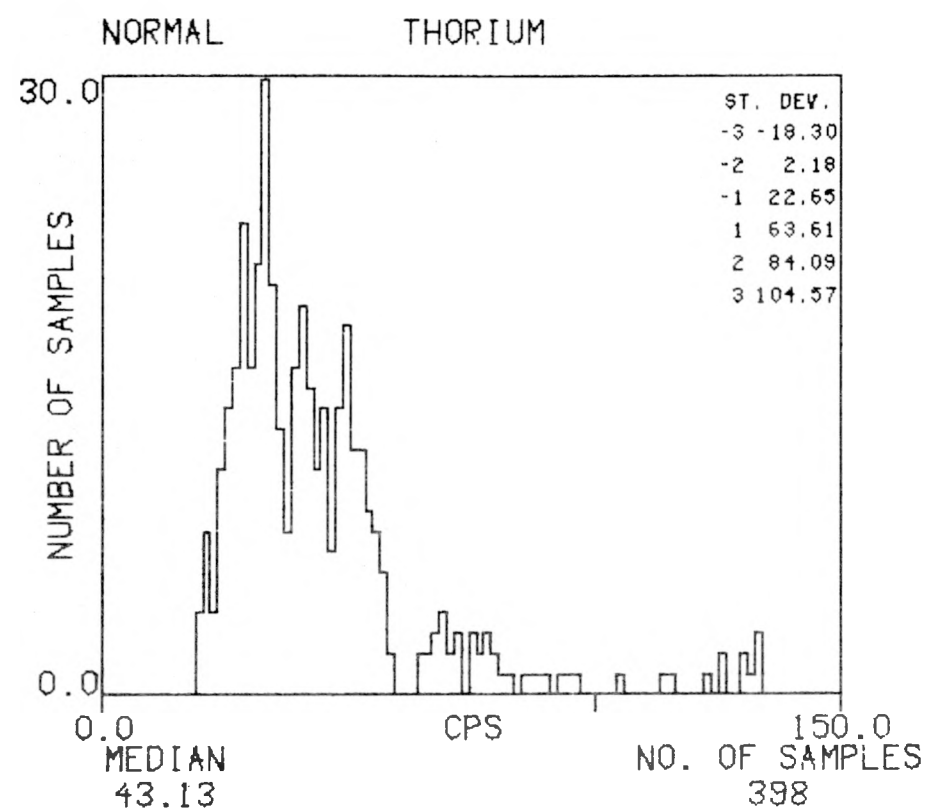
HISTOGRAMS : MPE

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



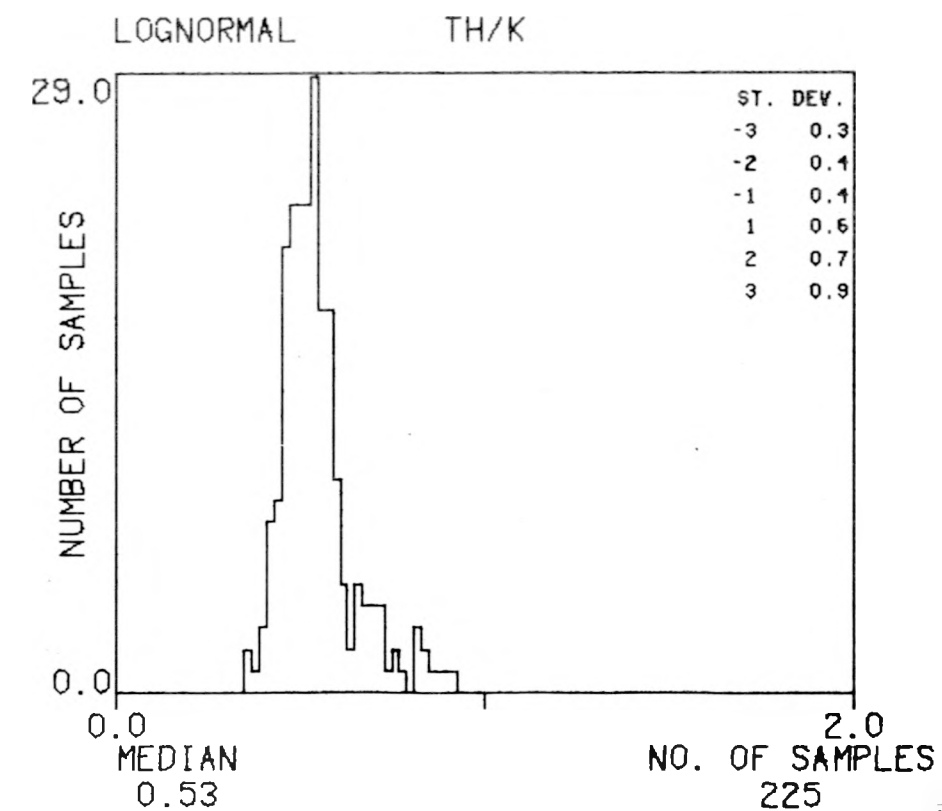
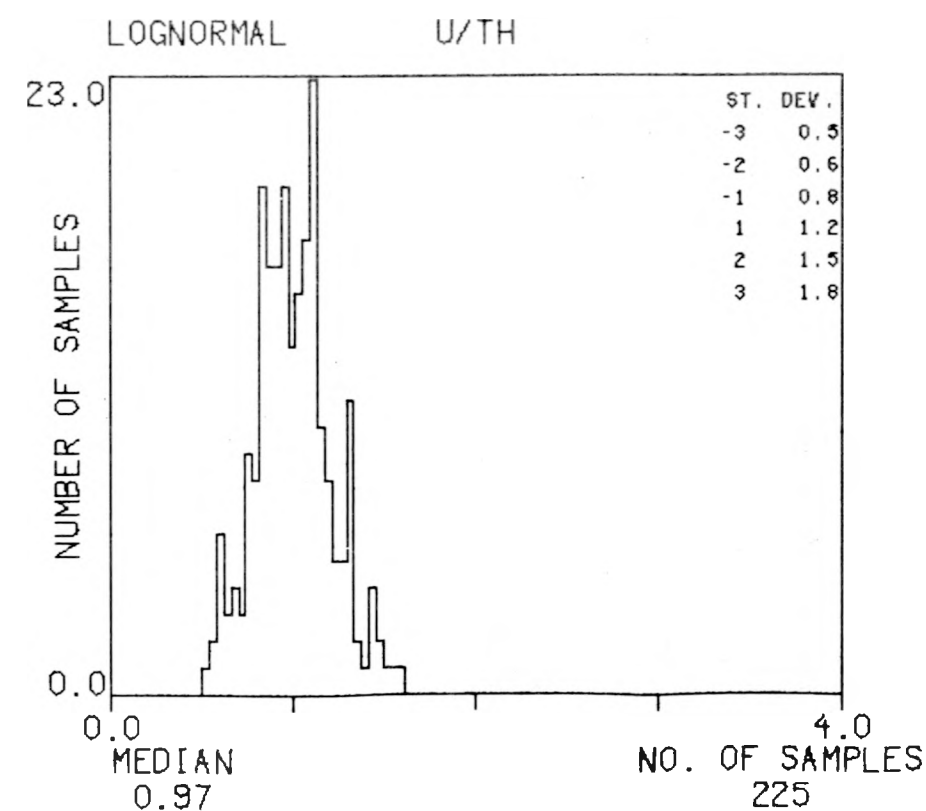
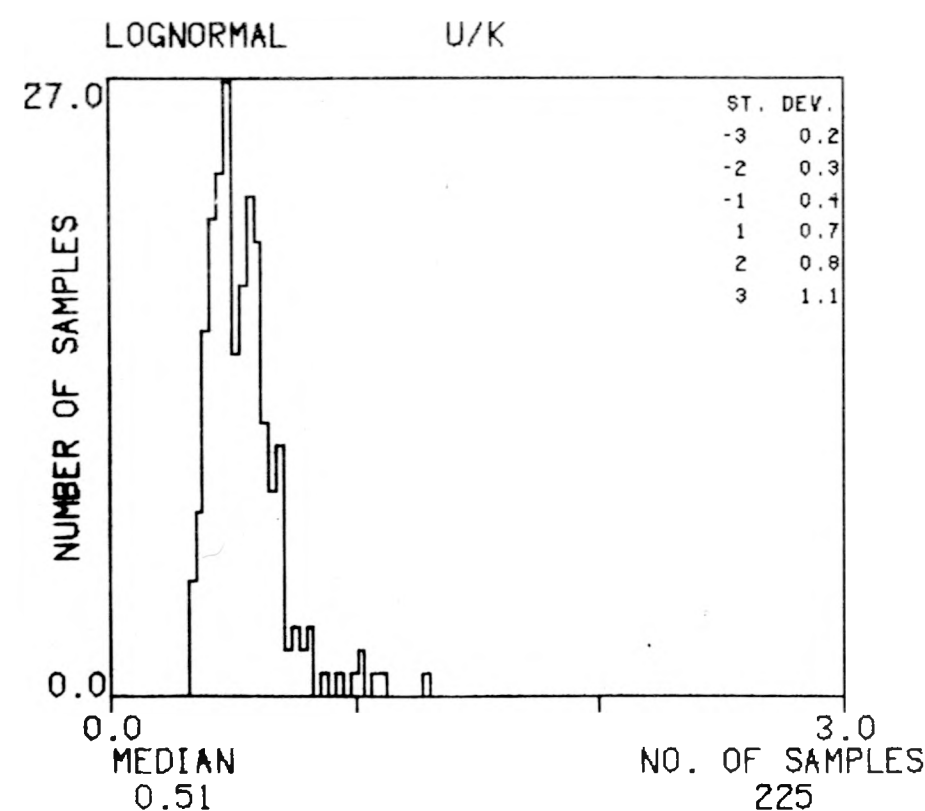
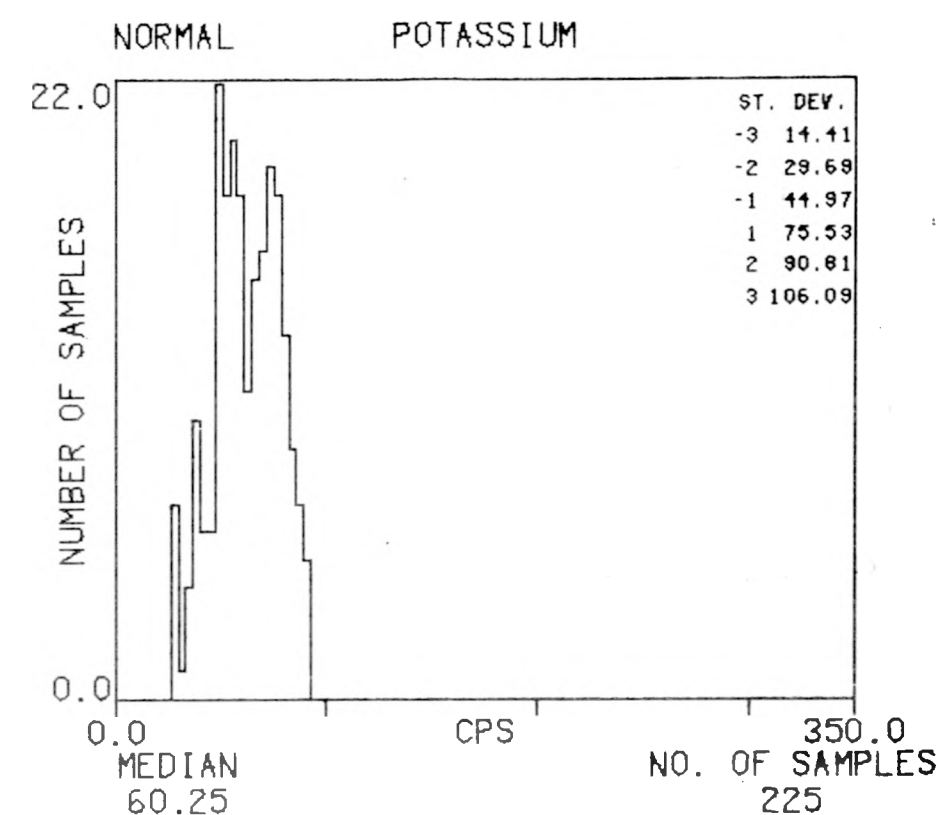
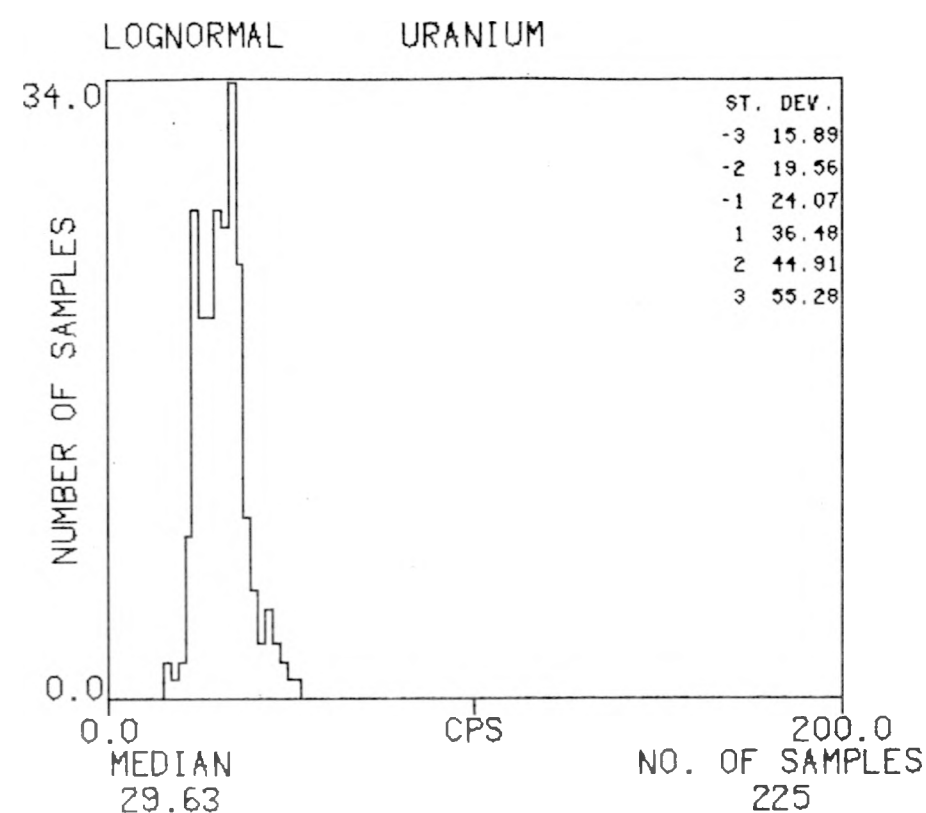
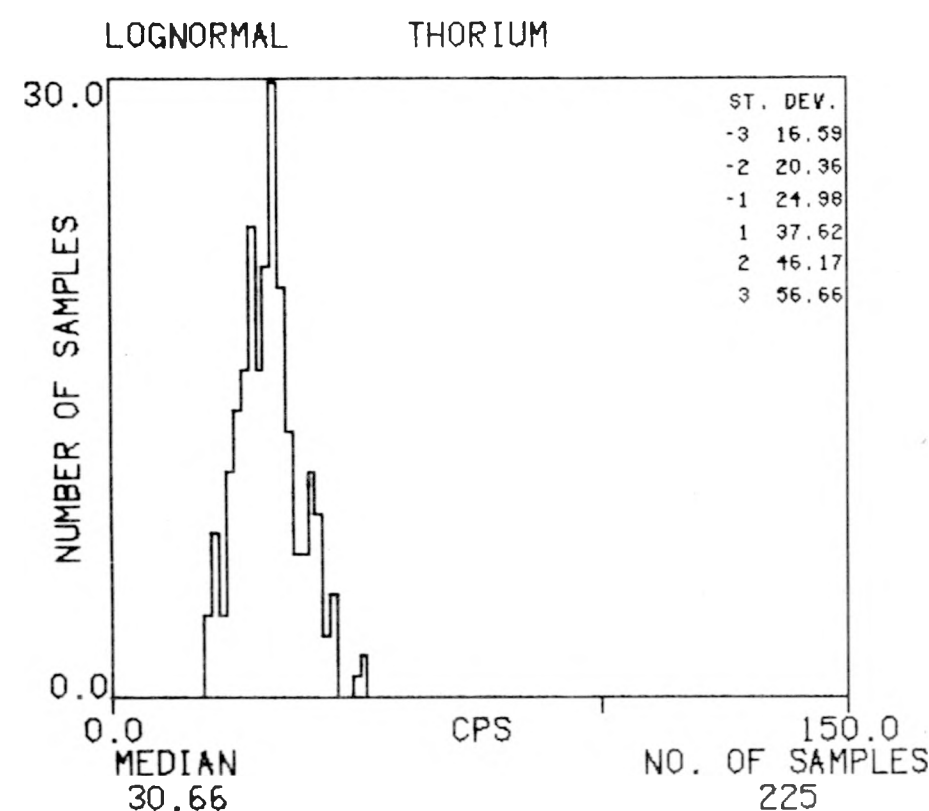
HISTOGRAMS : CD

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



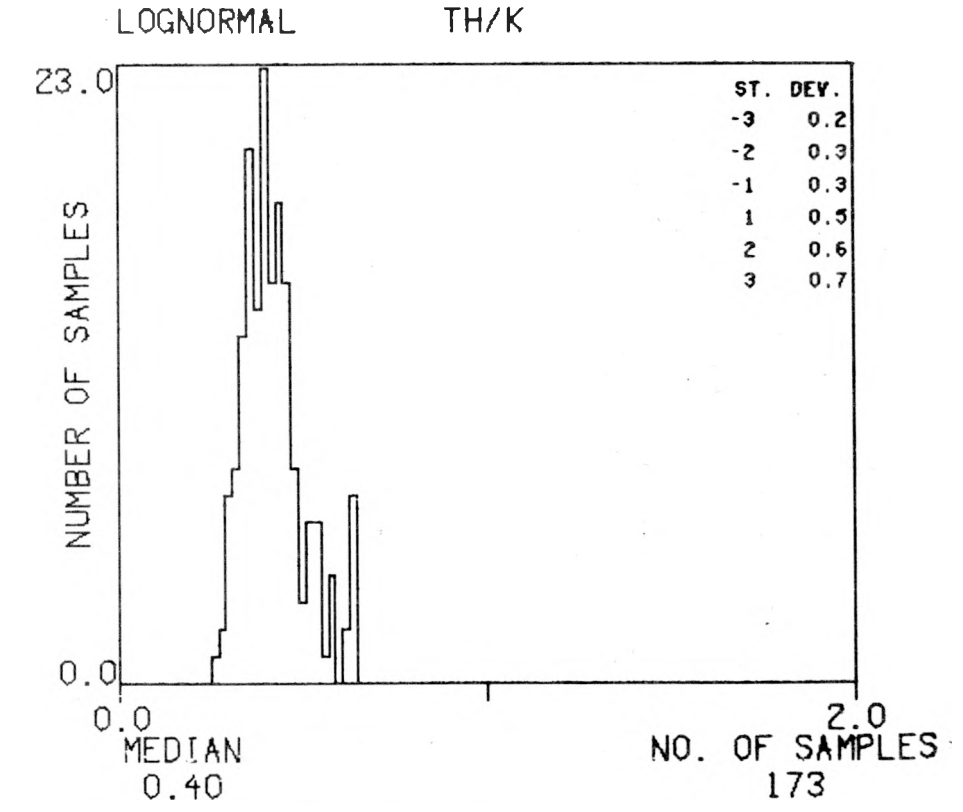
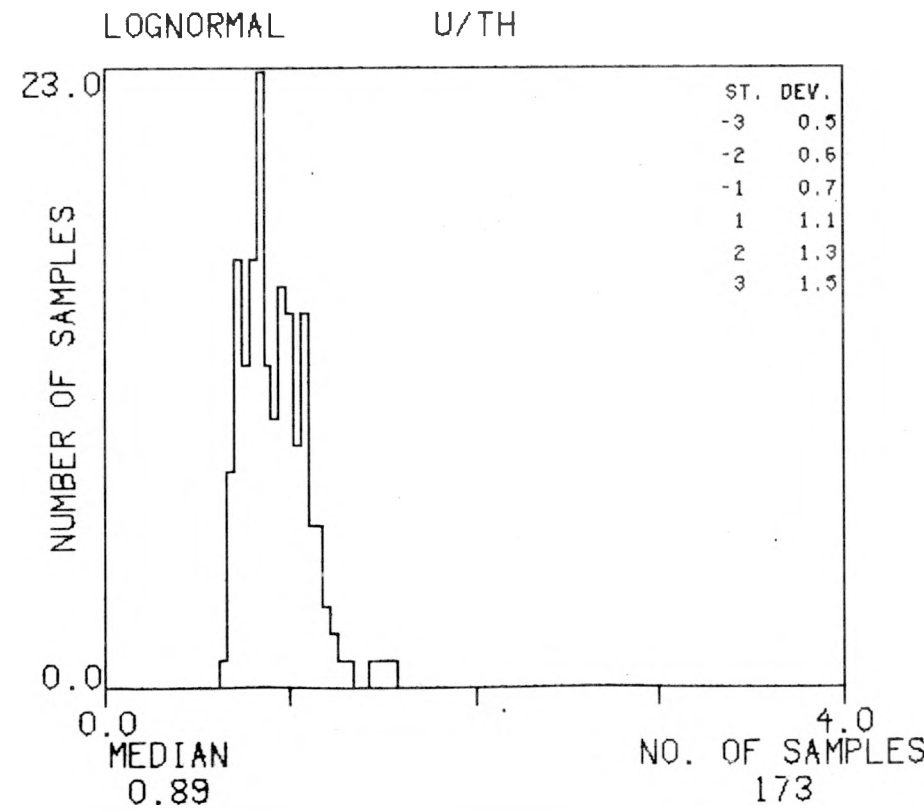
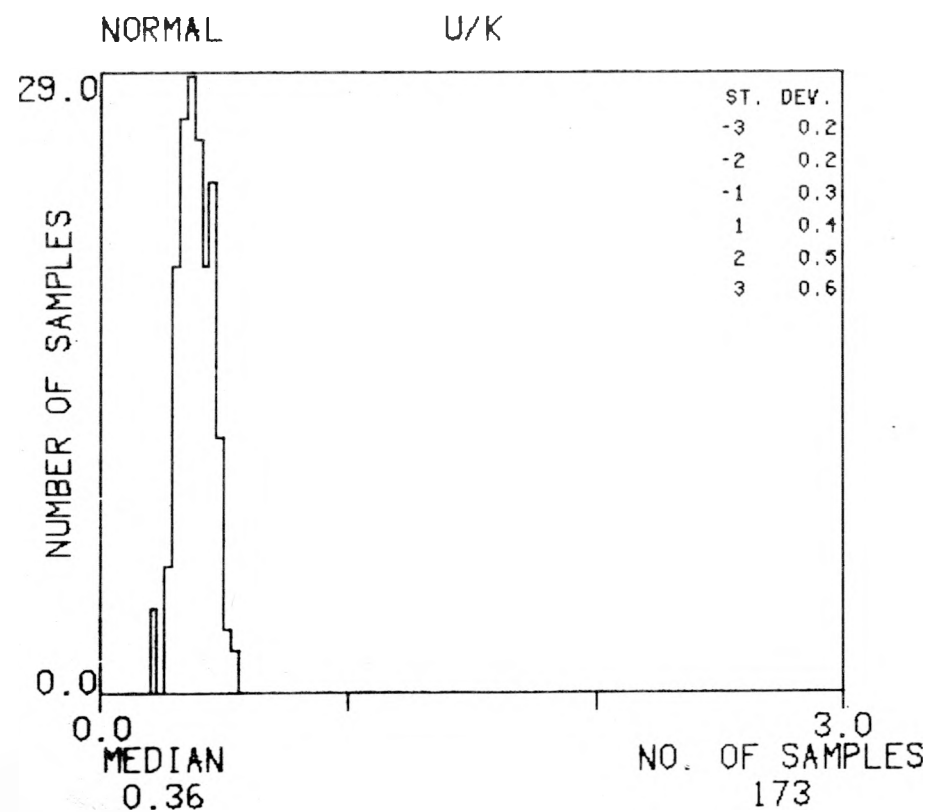
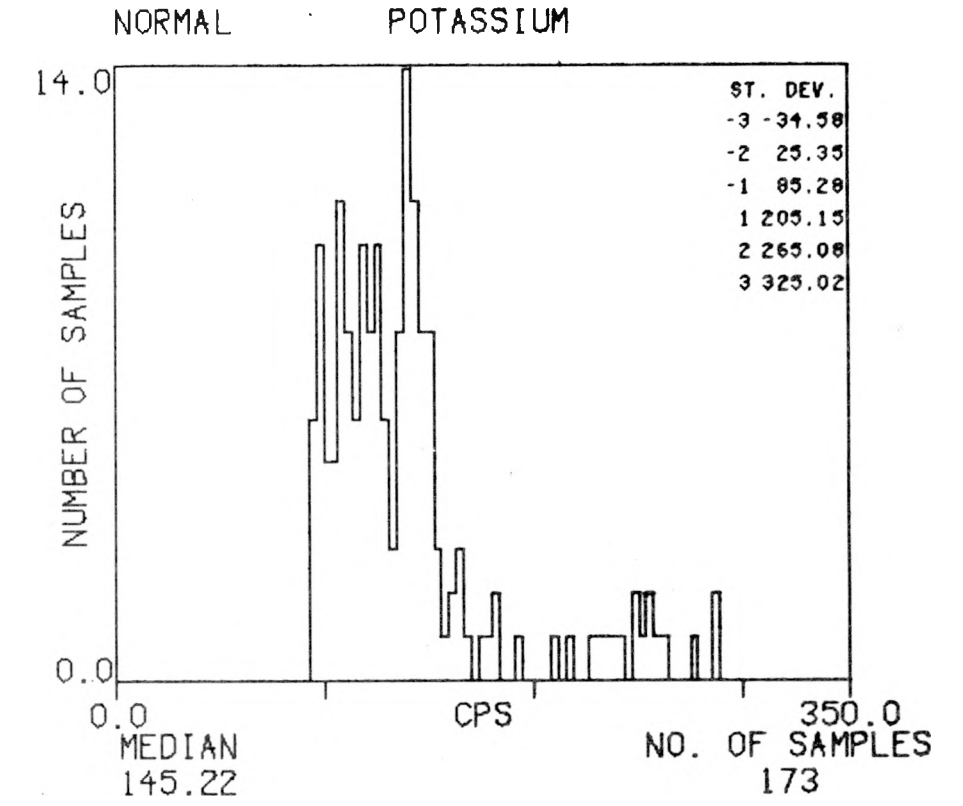
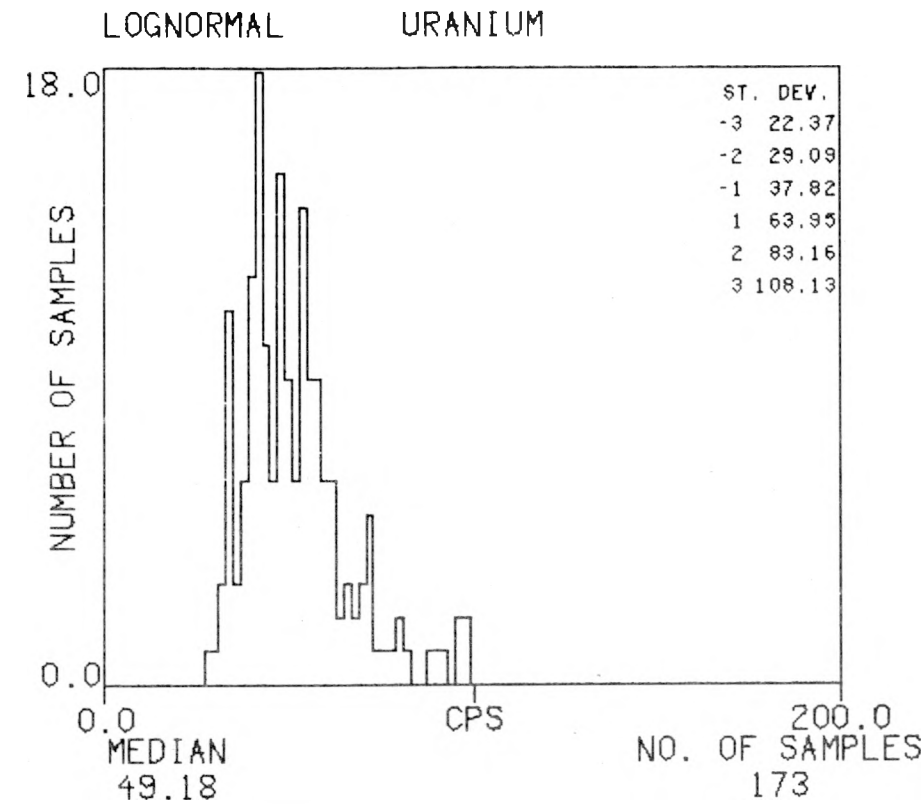
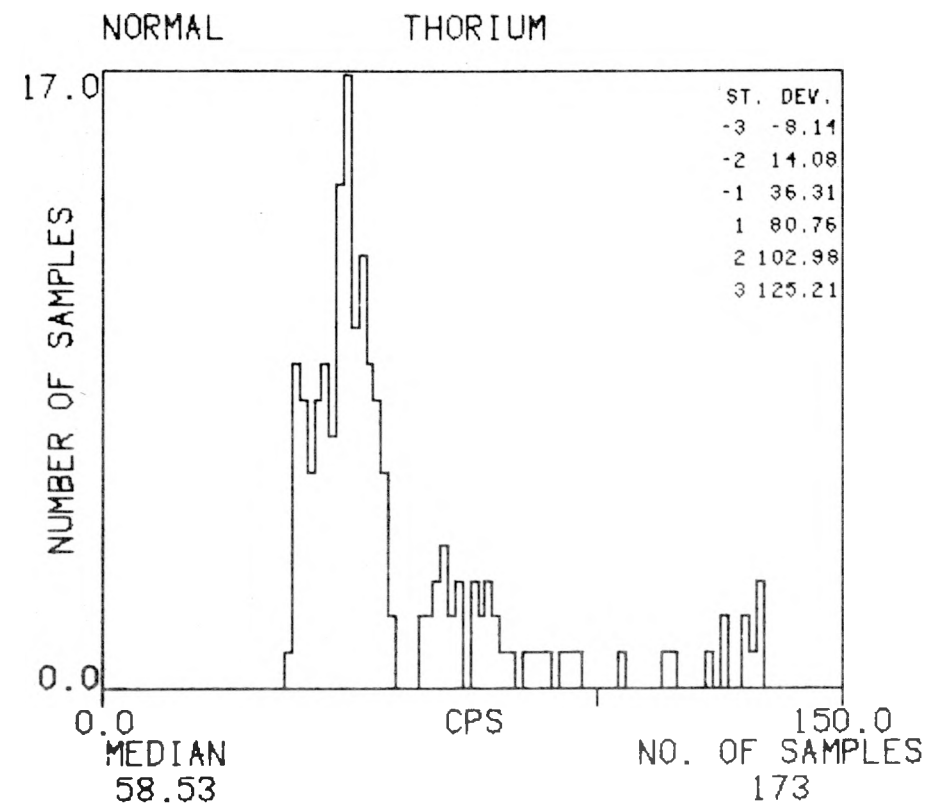
HISTOGRAMS : CD-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



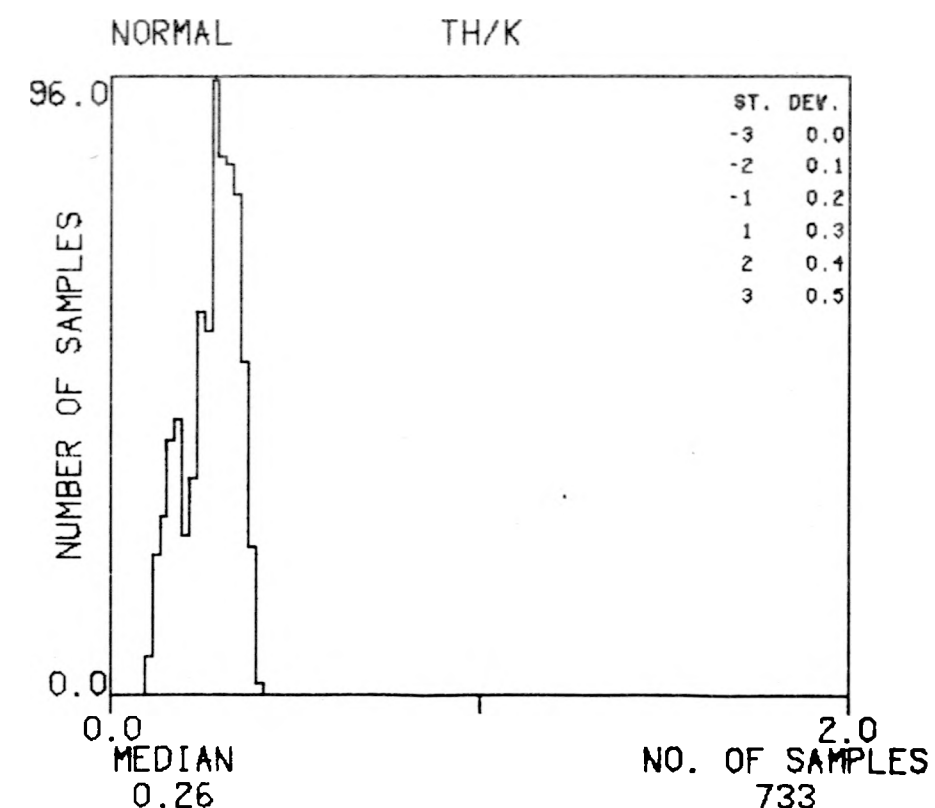
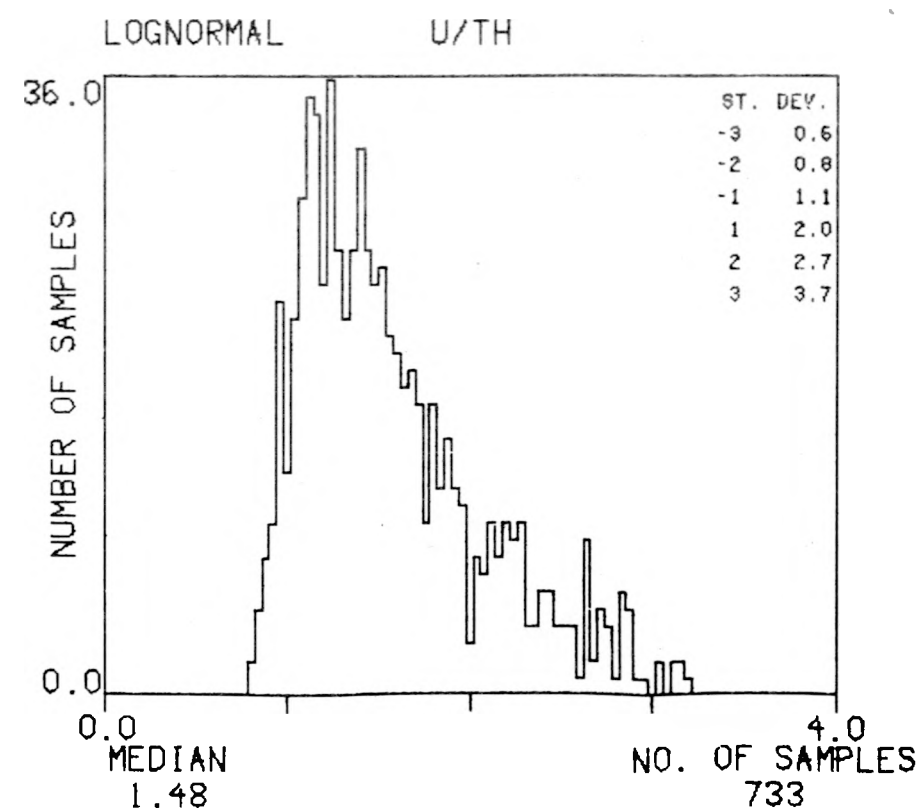
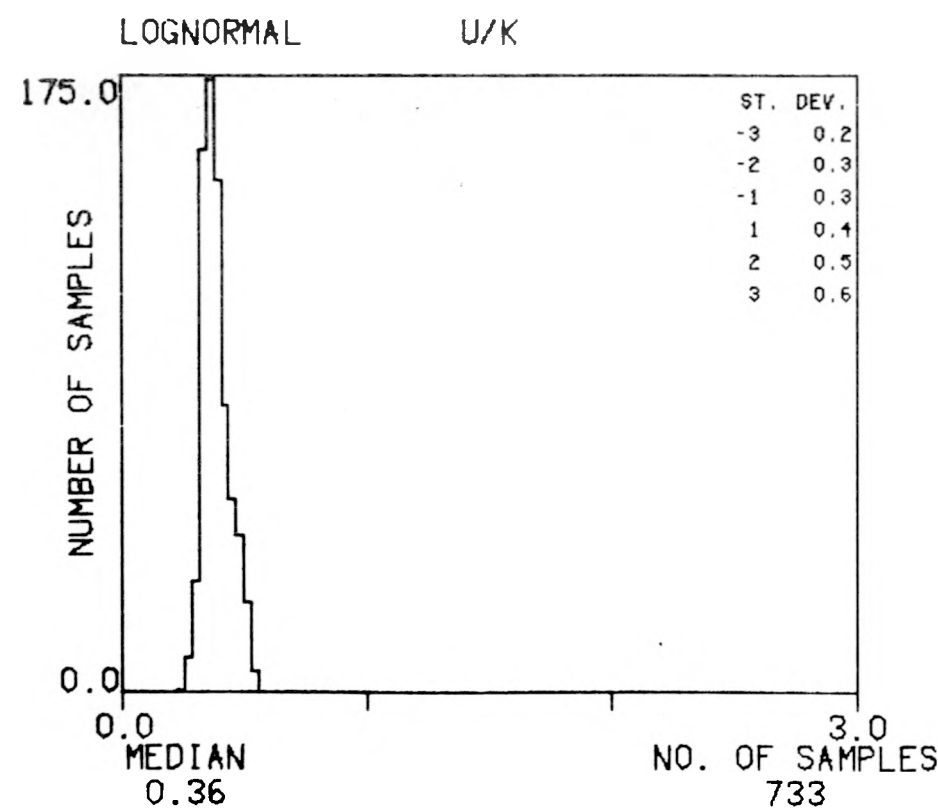
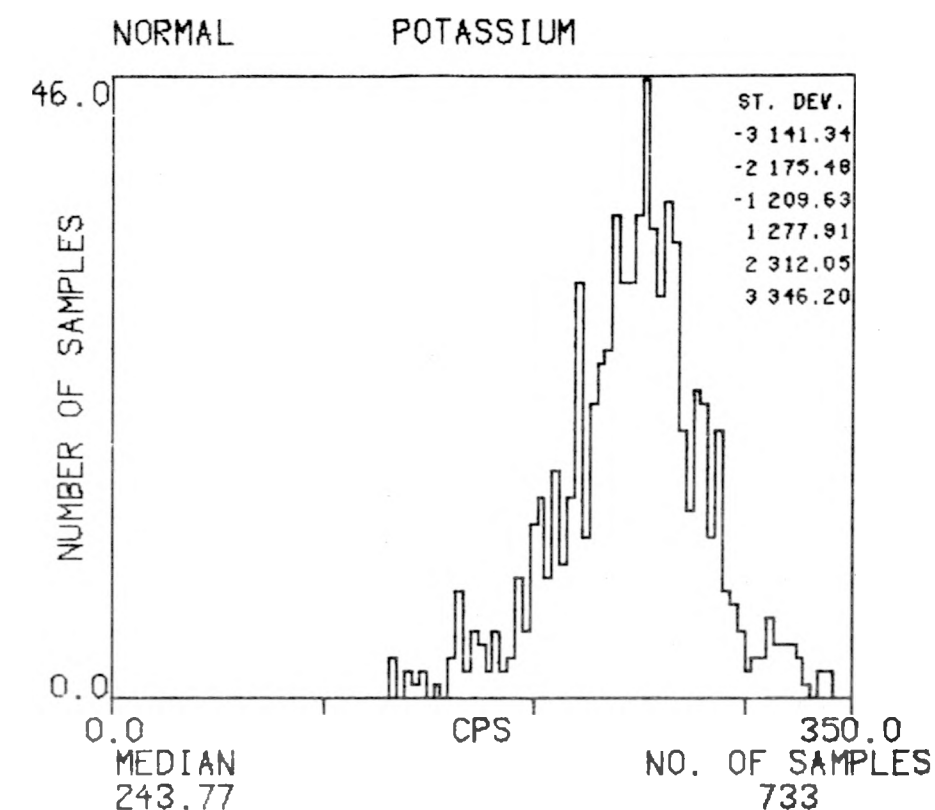
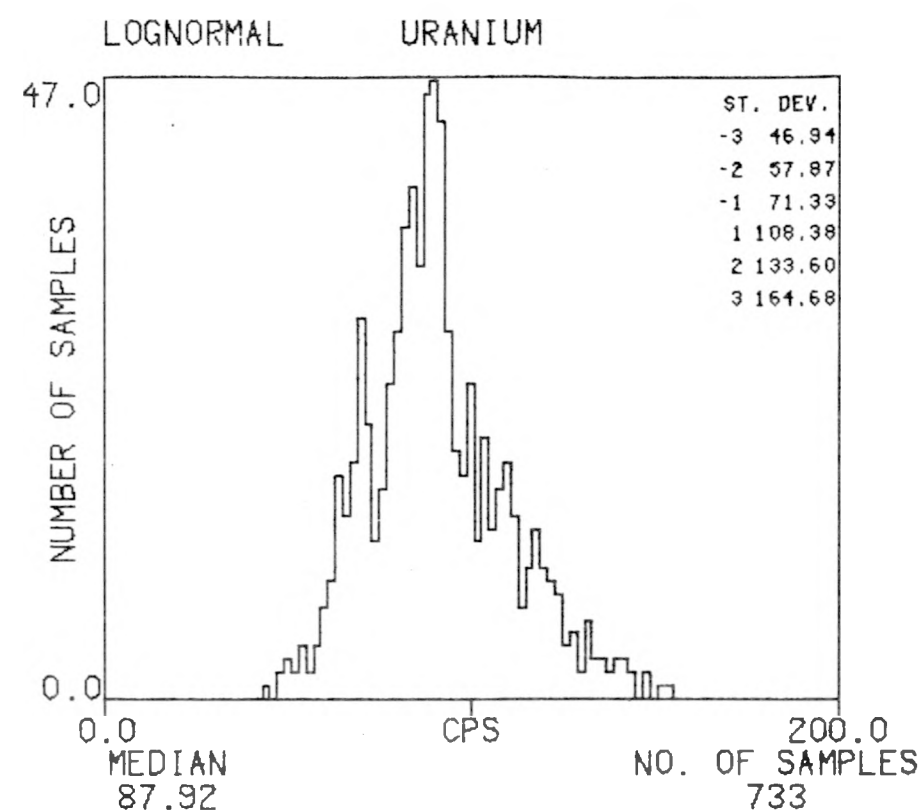
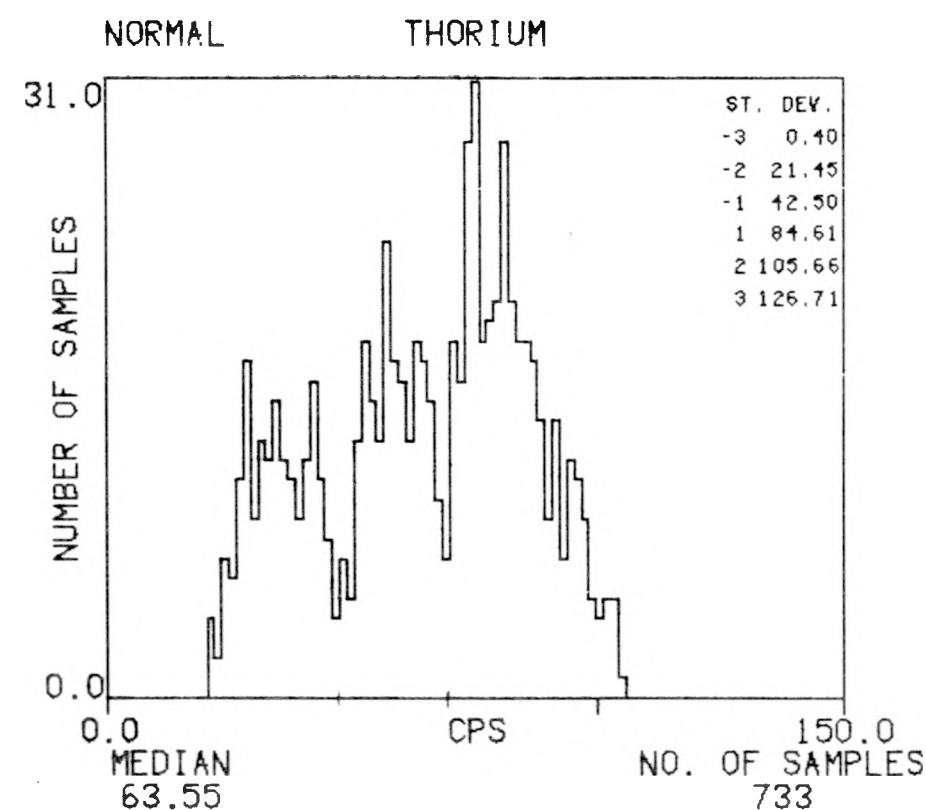
HISTOGRAMS : CD-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



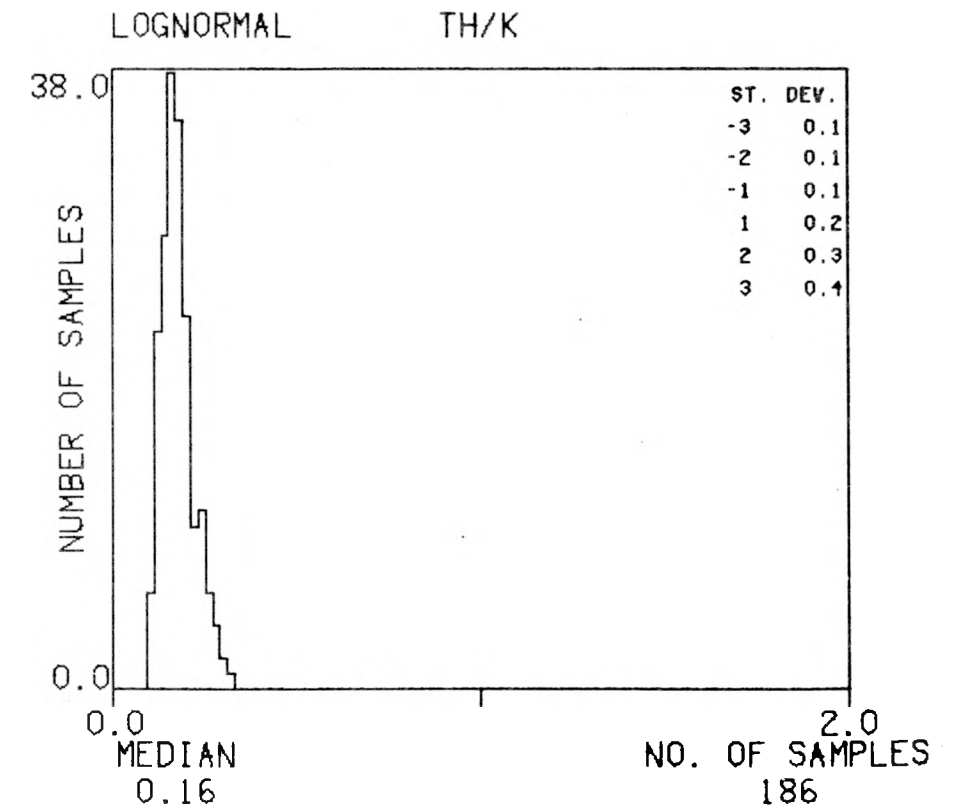
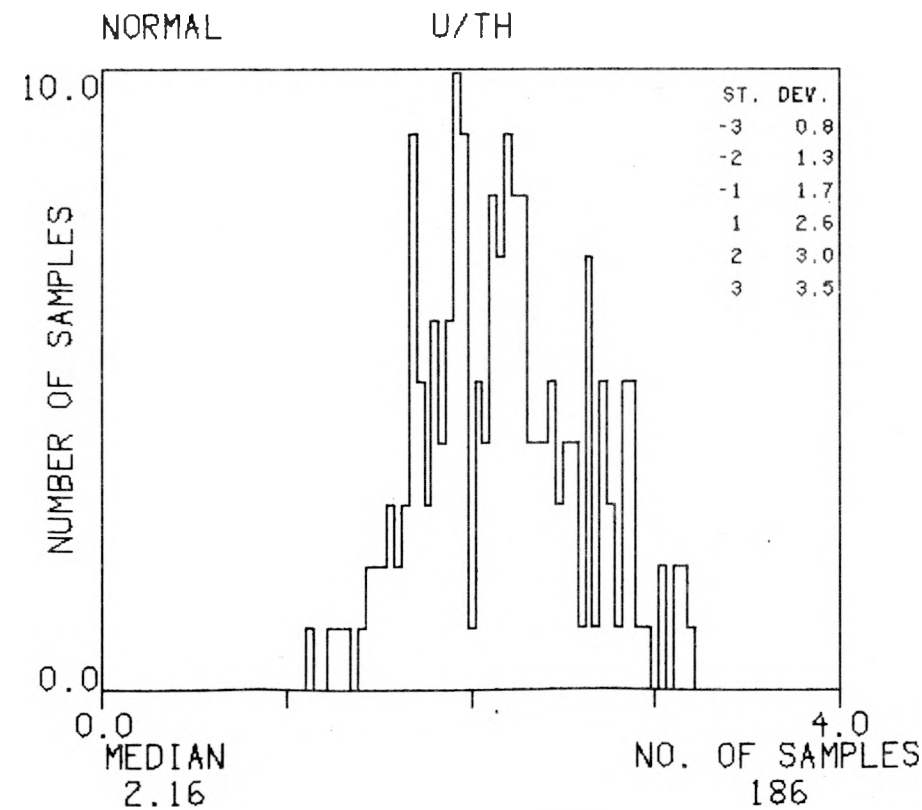
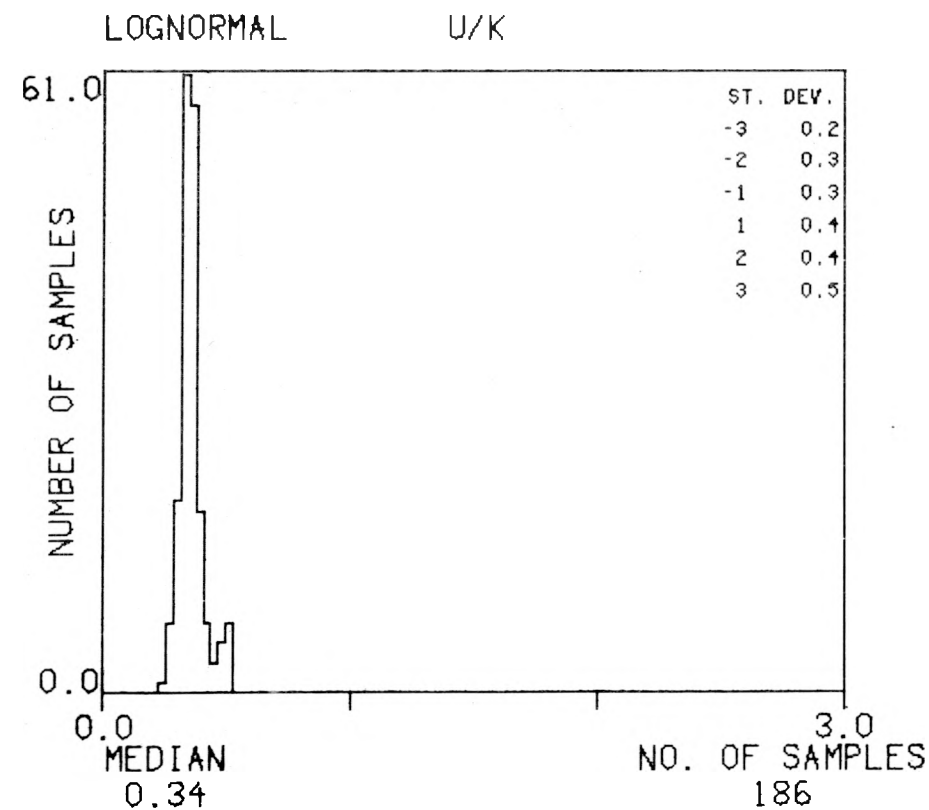
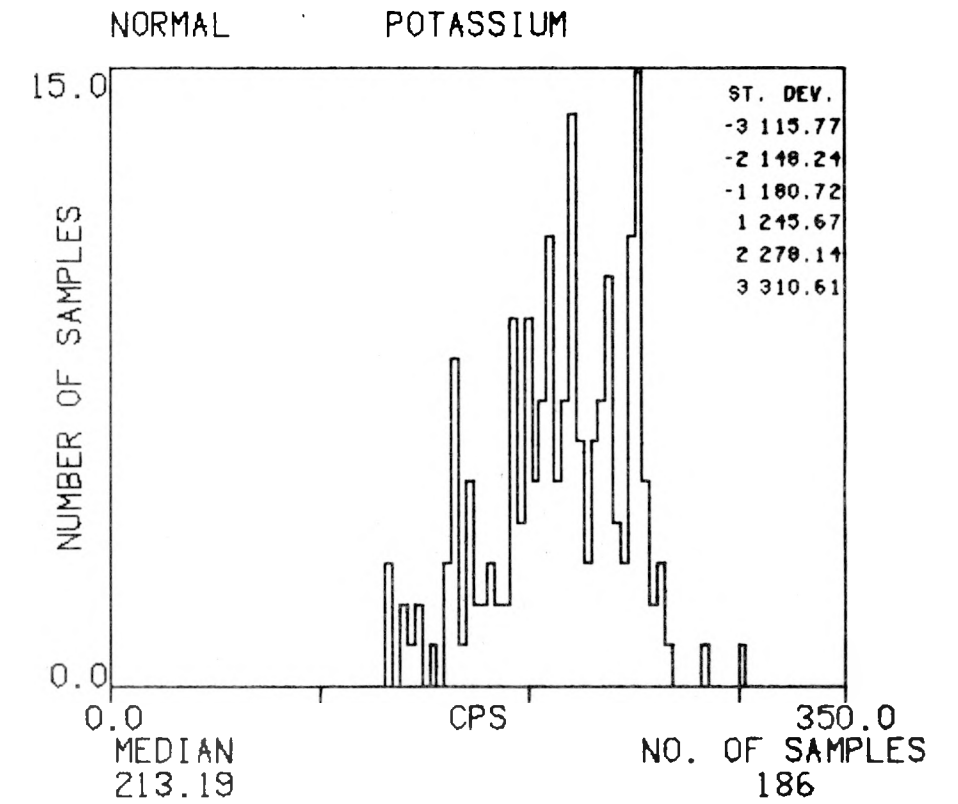
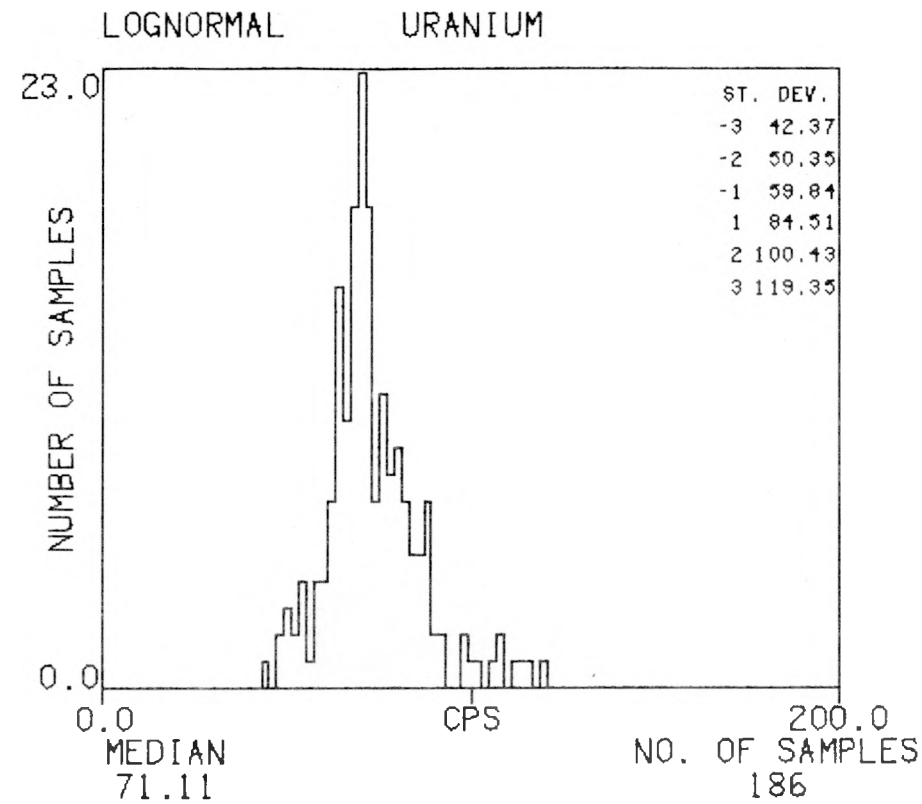
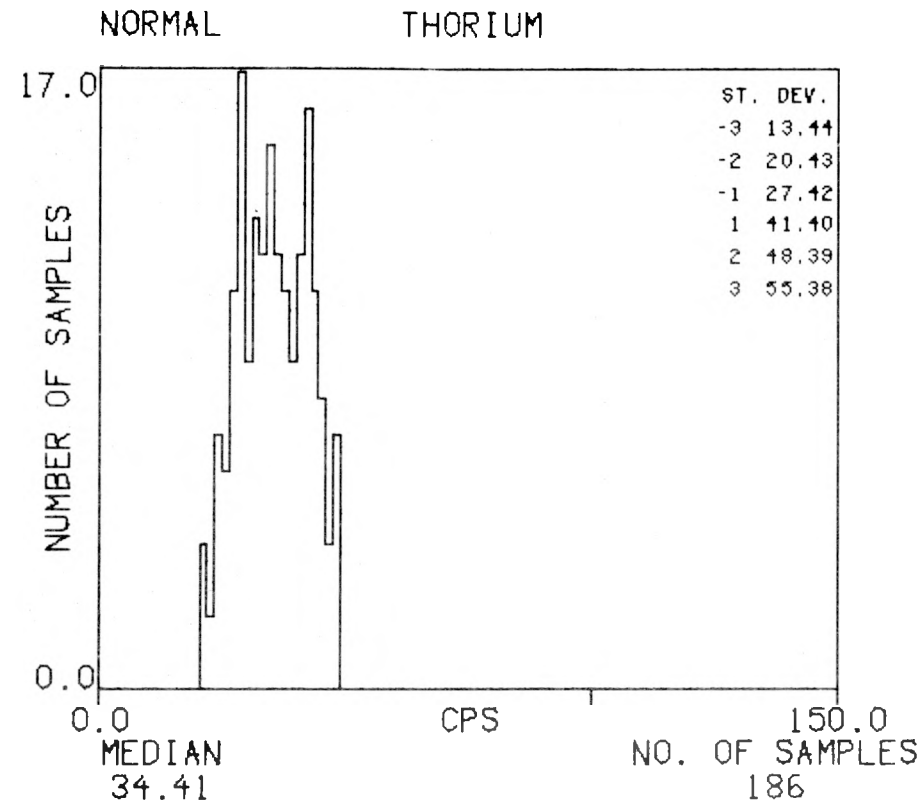
HISTOGRAMS : PCHP

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



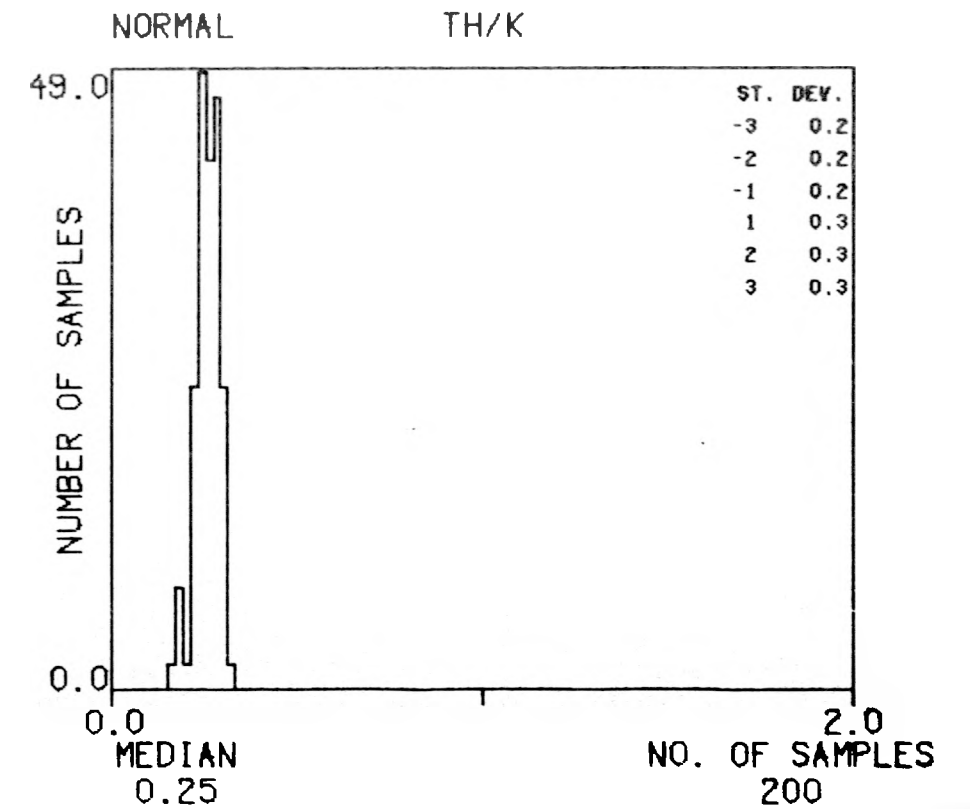
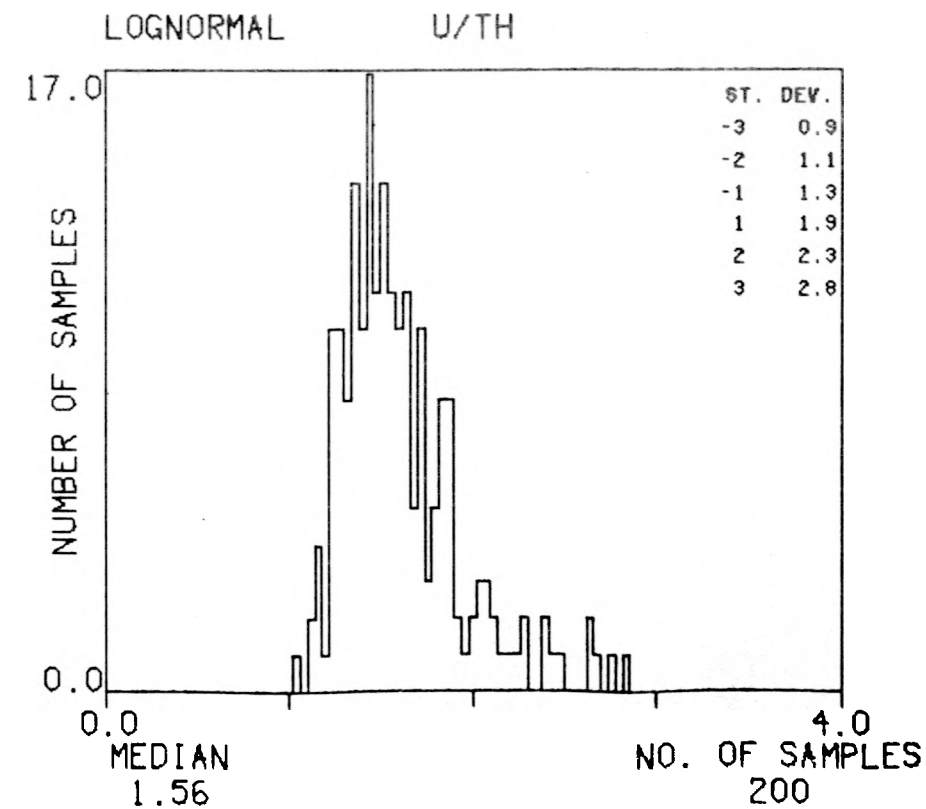
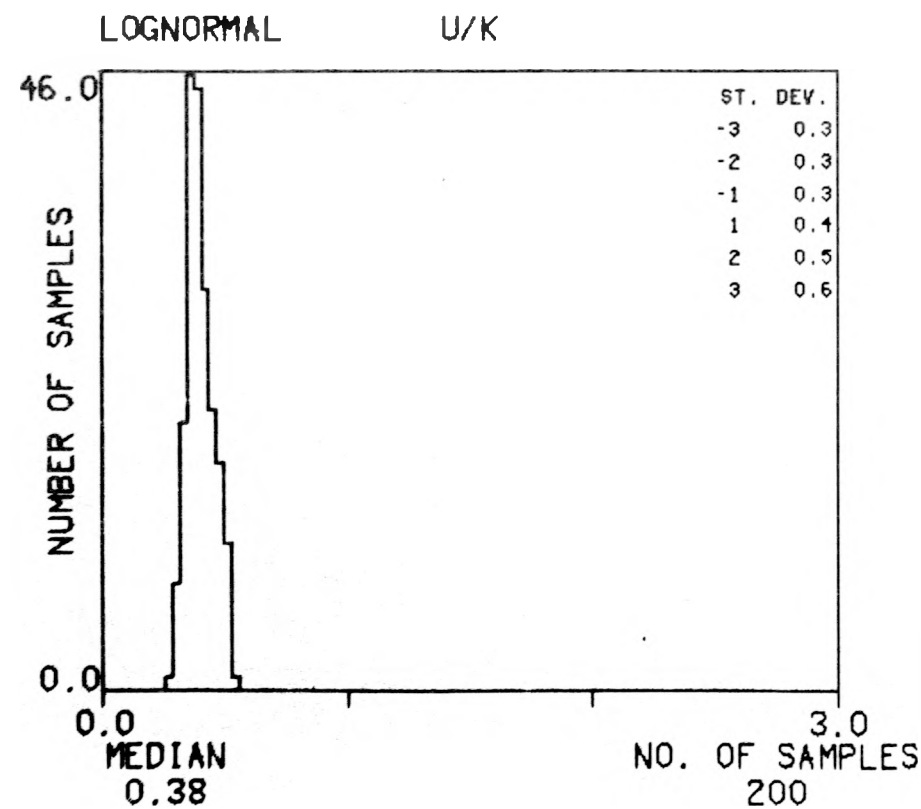
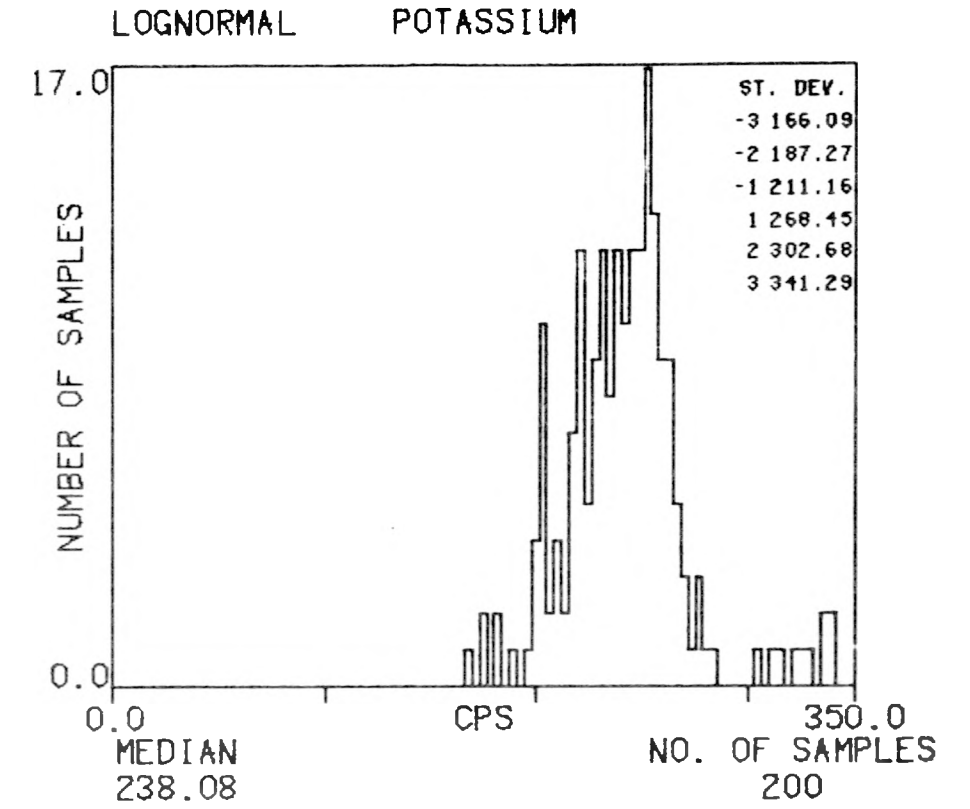
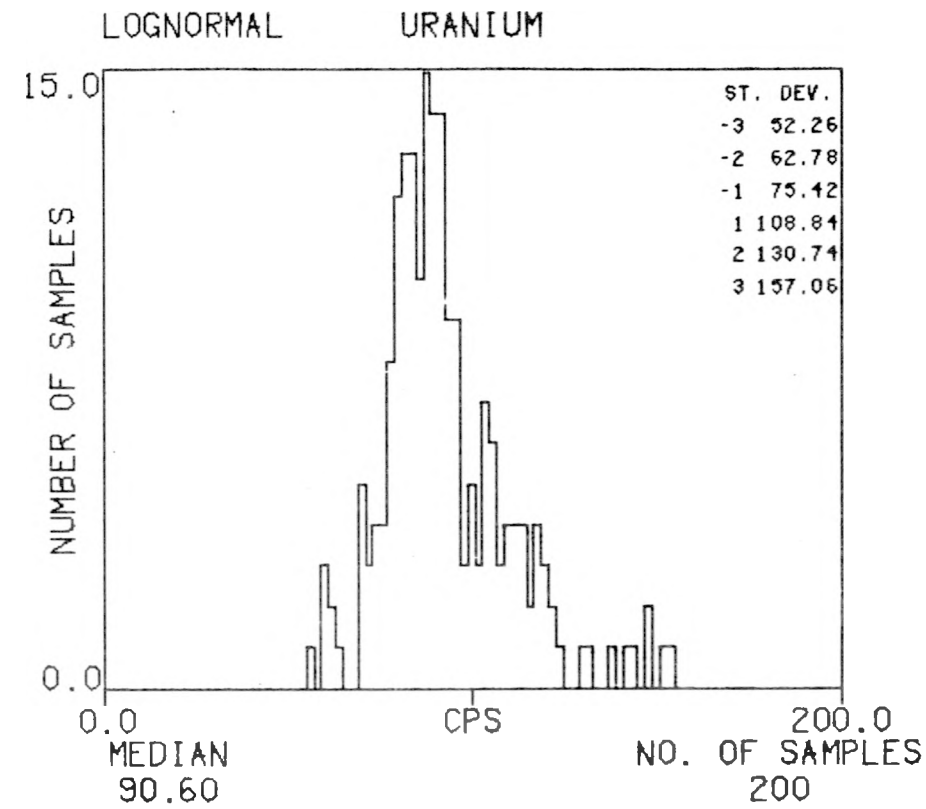
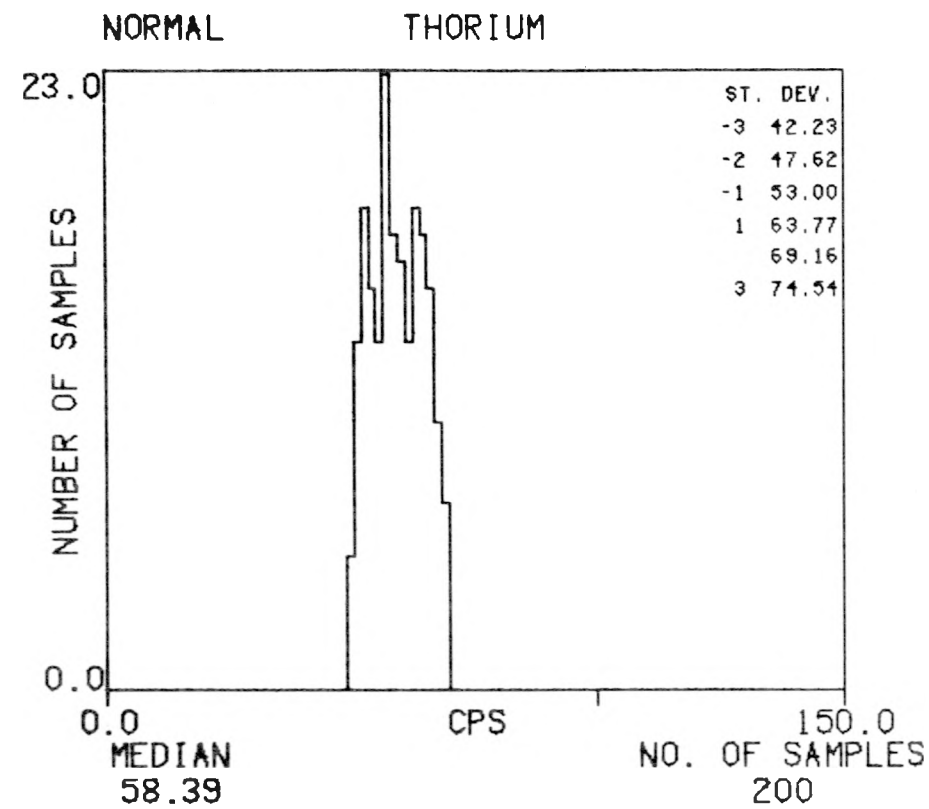
HISTOGRAMS : PCHP-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



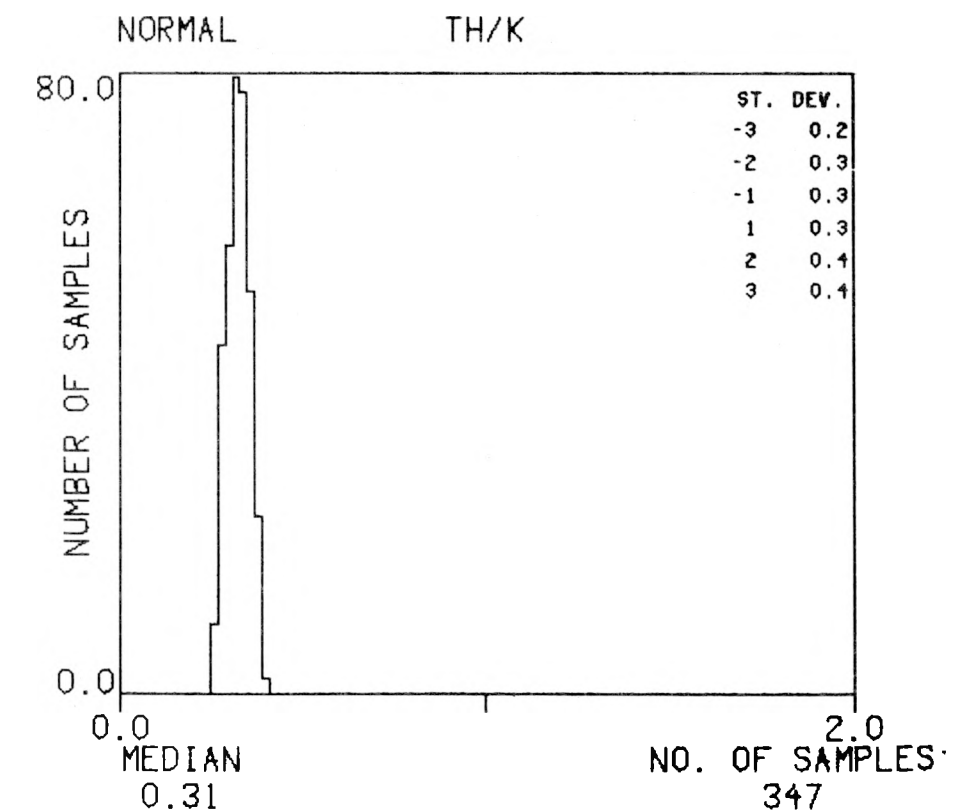
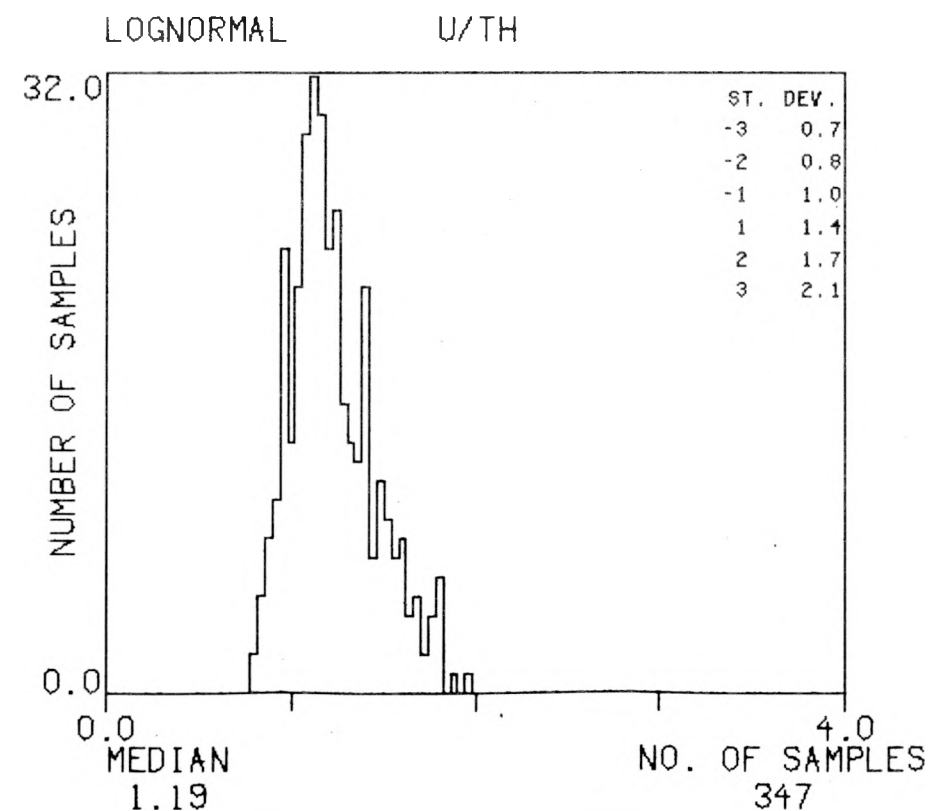
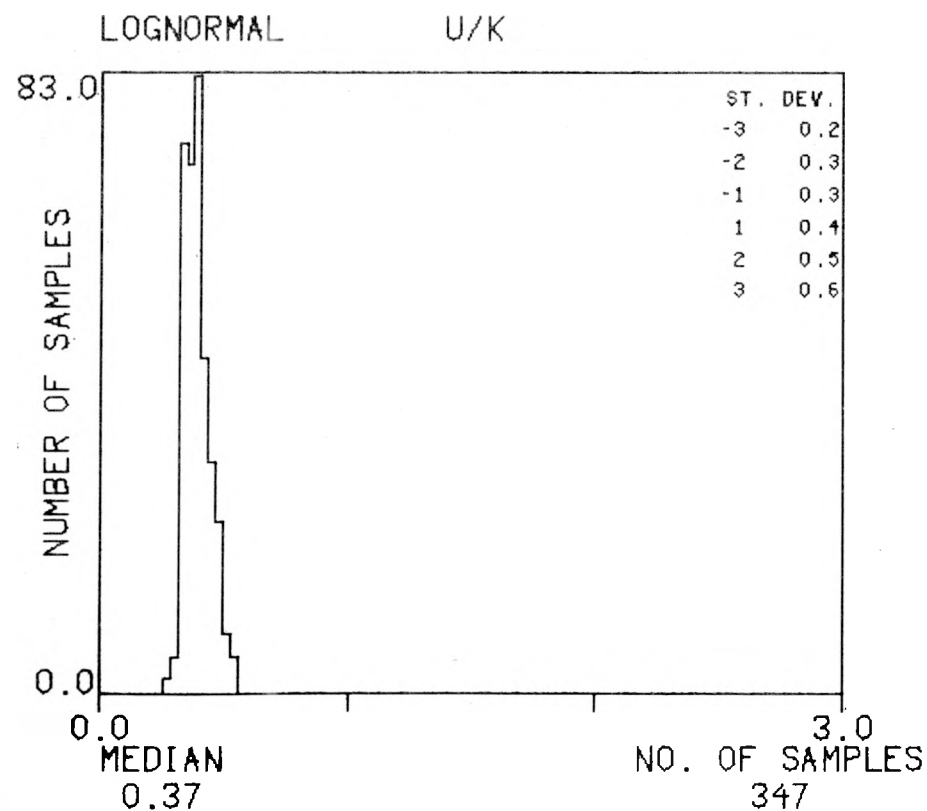
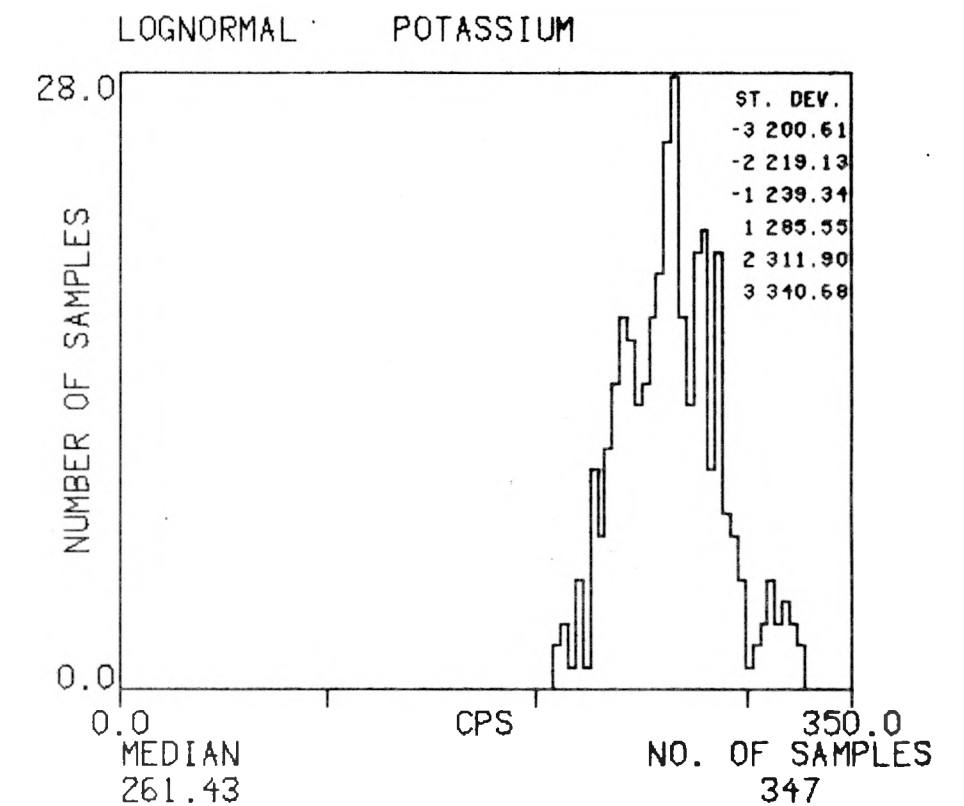
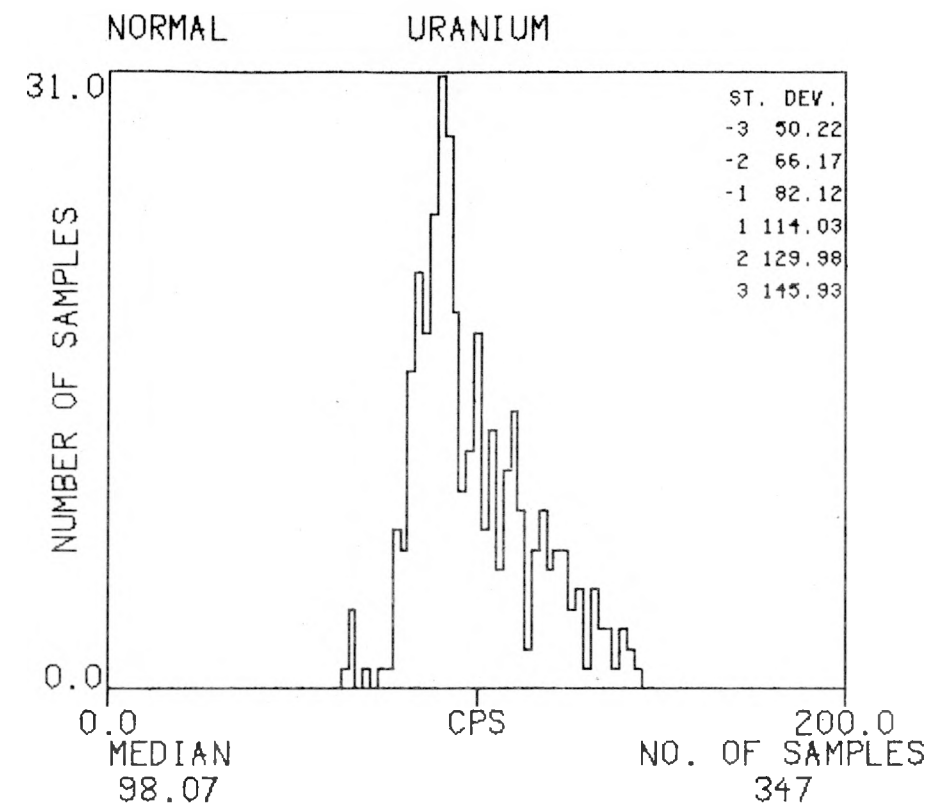
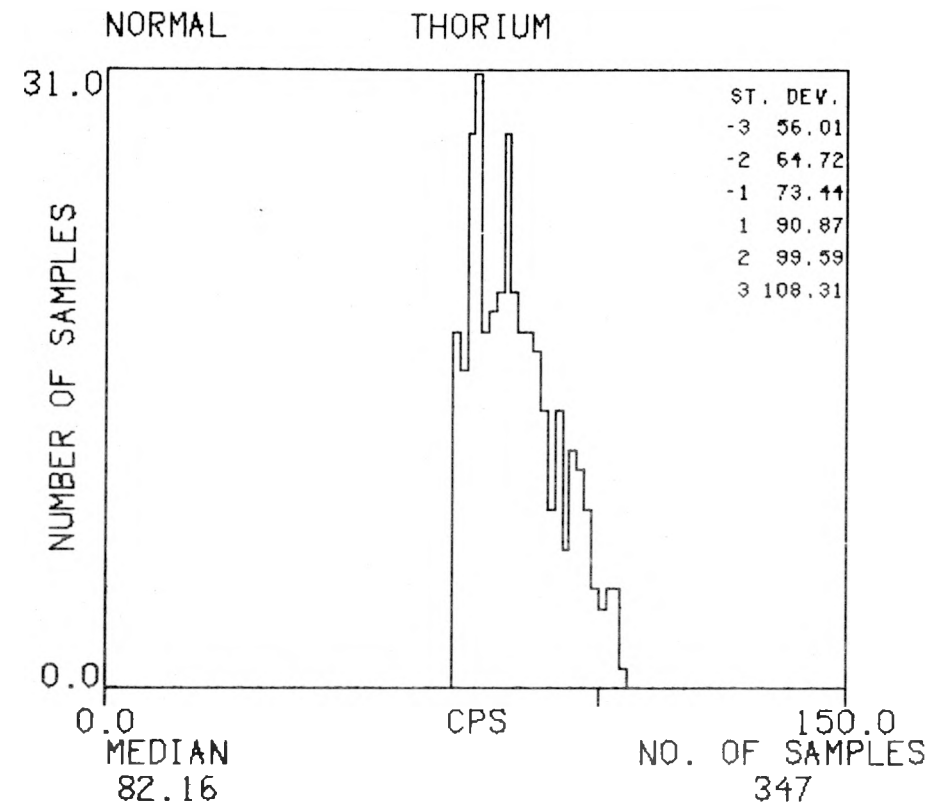
HISTOGRAMS : PCHP-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



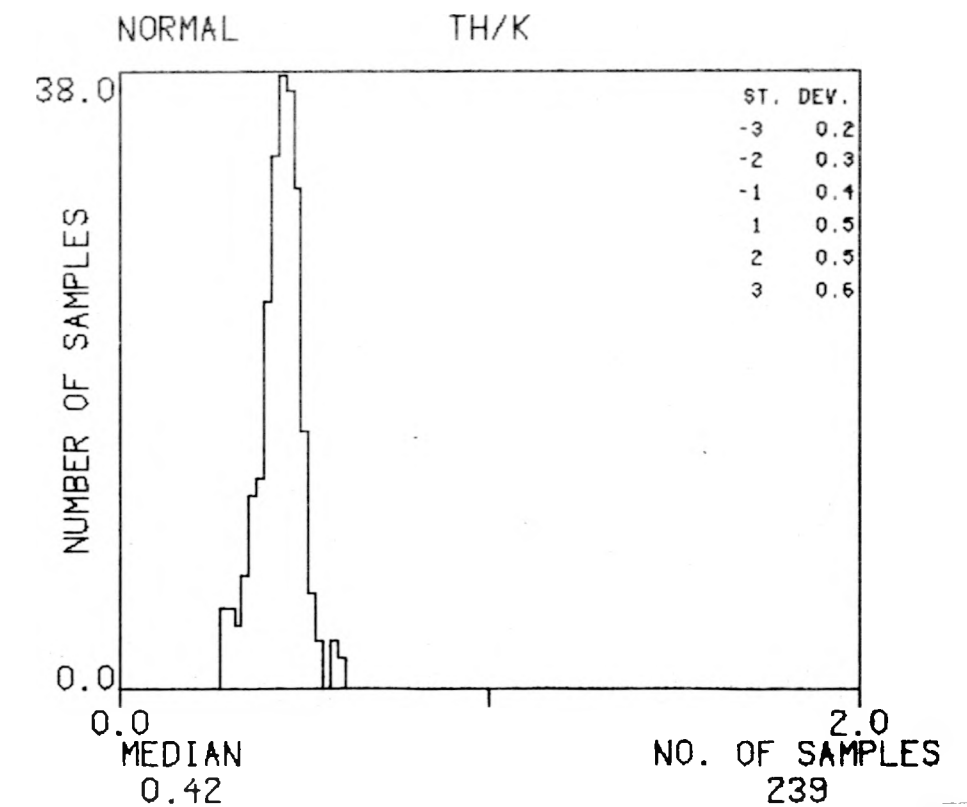
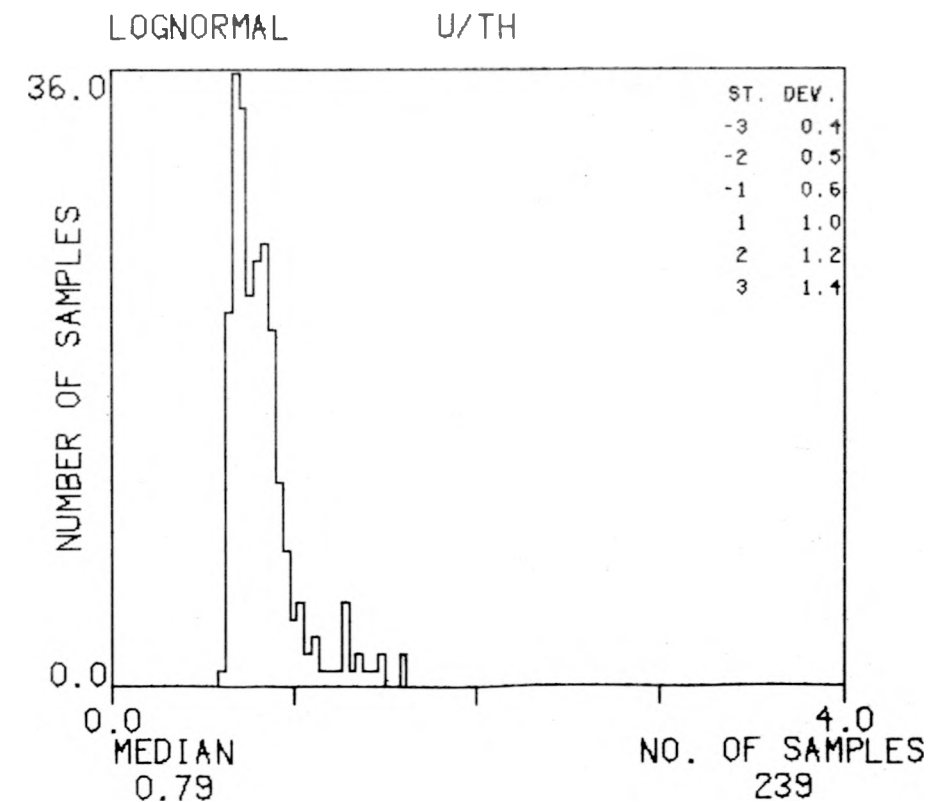
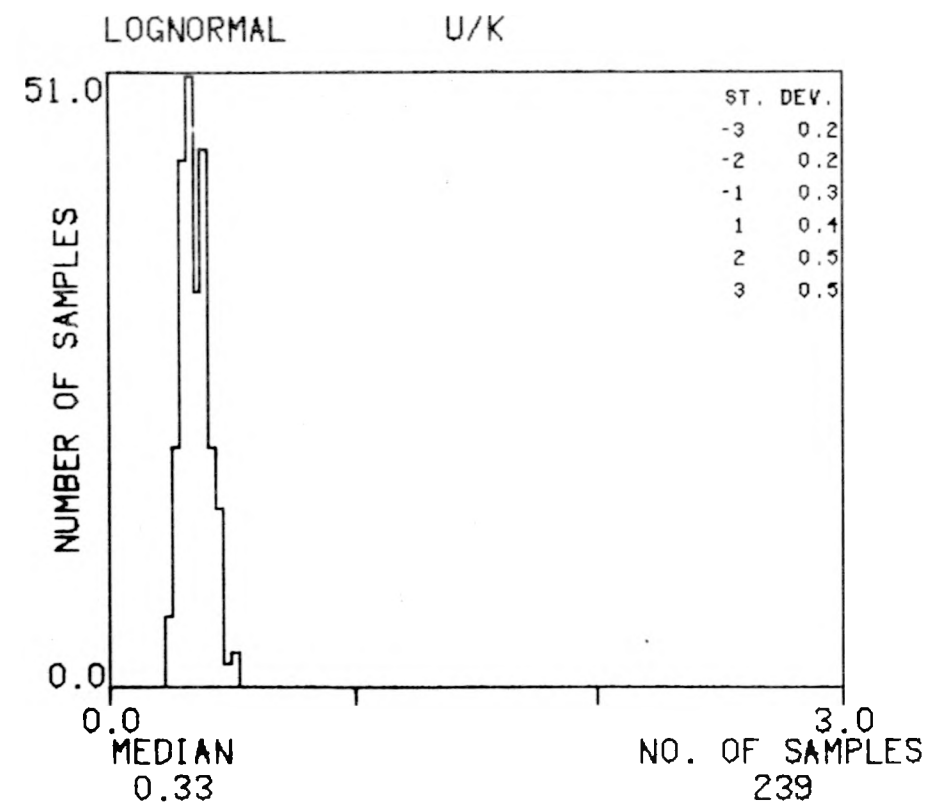
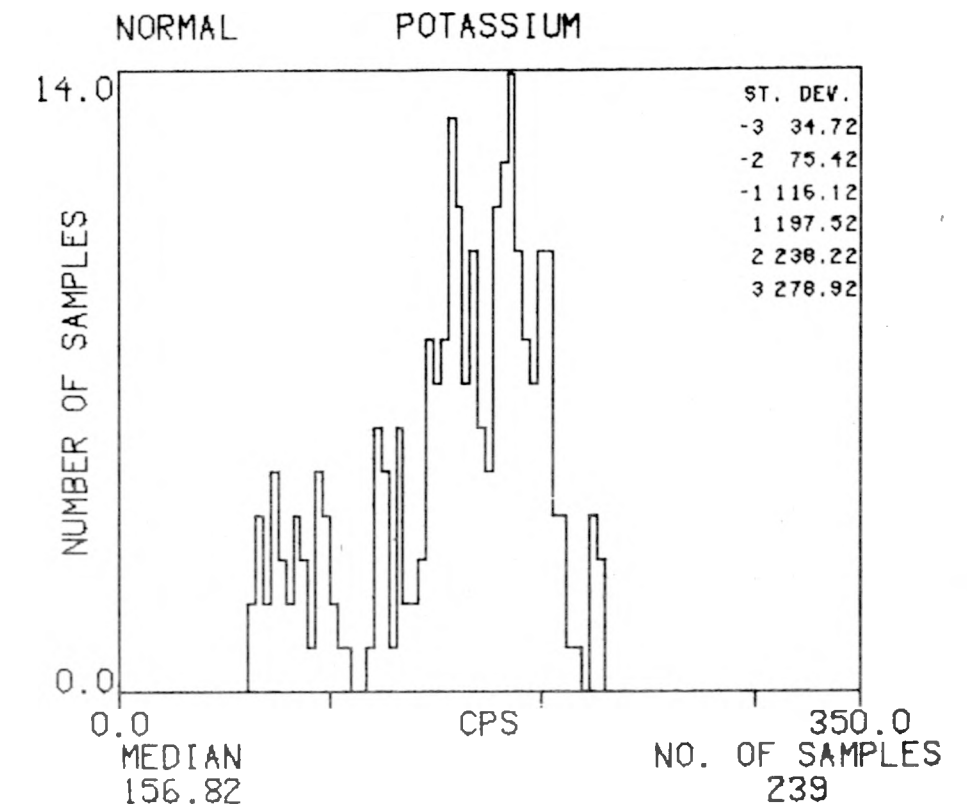
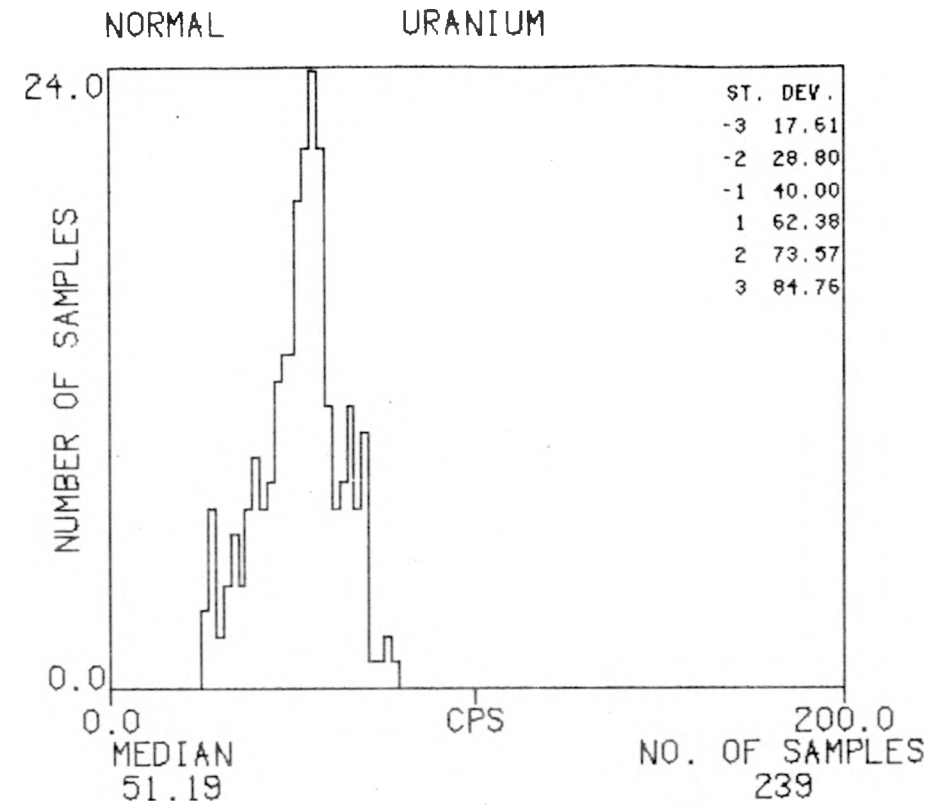
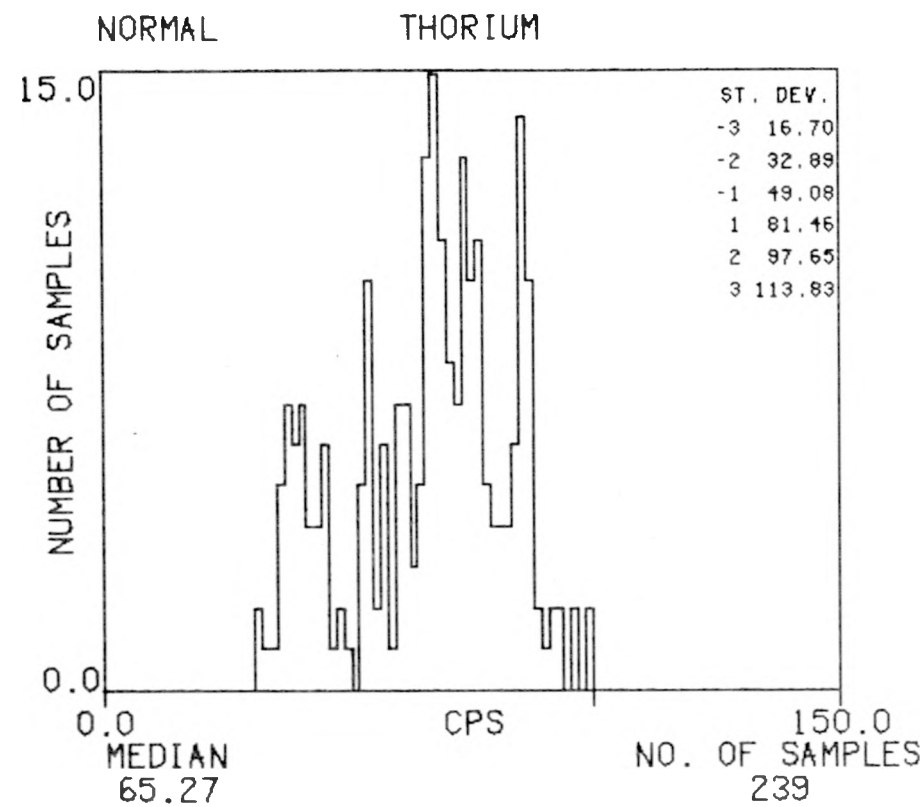
HISTOGRAMS : PCHP-3

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



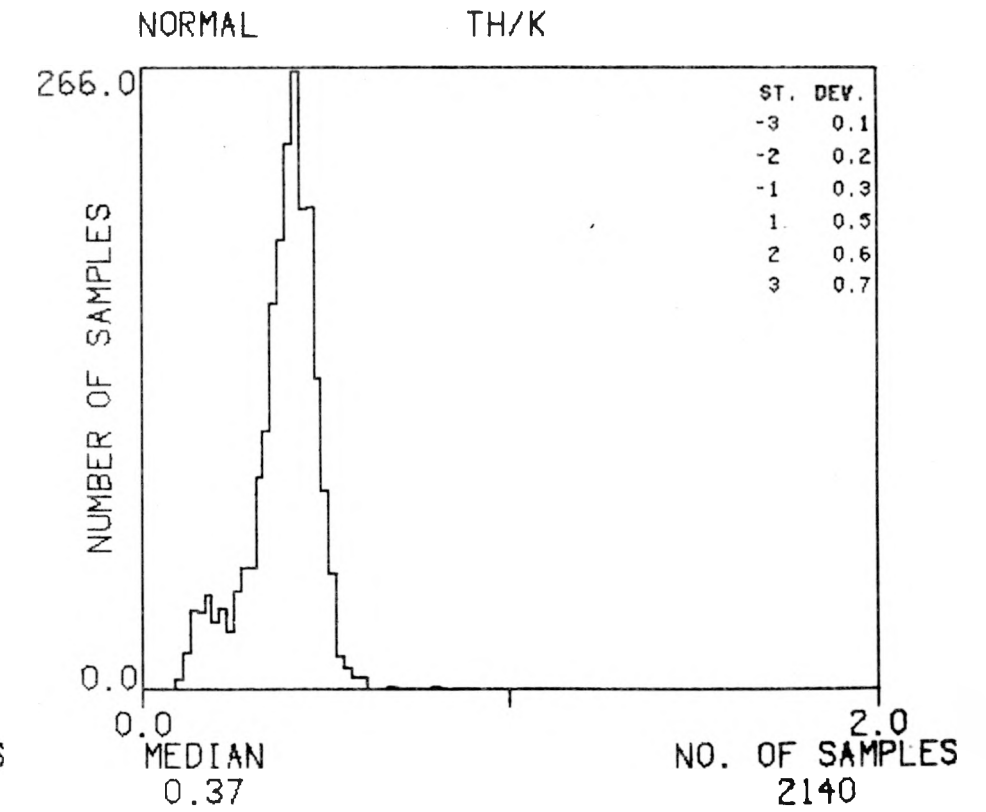
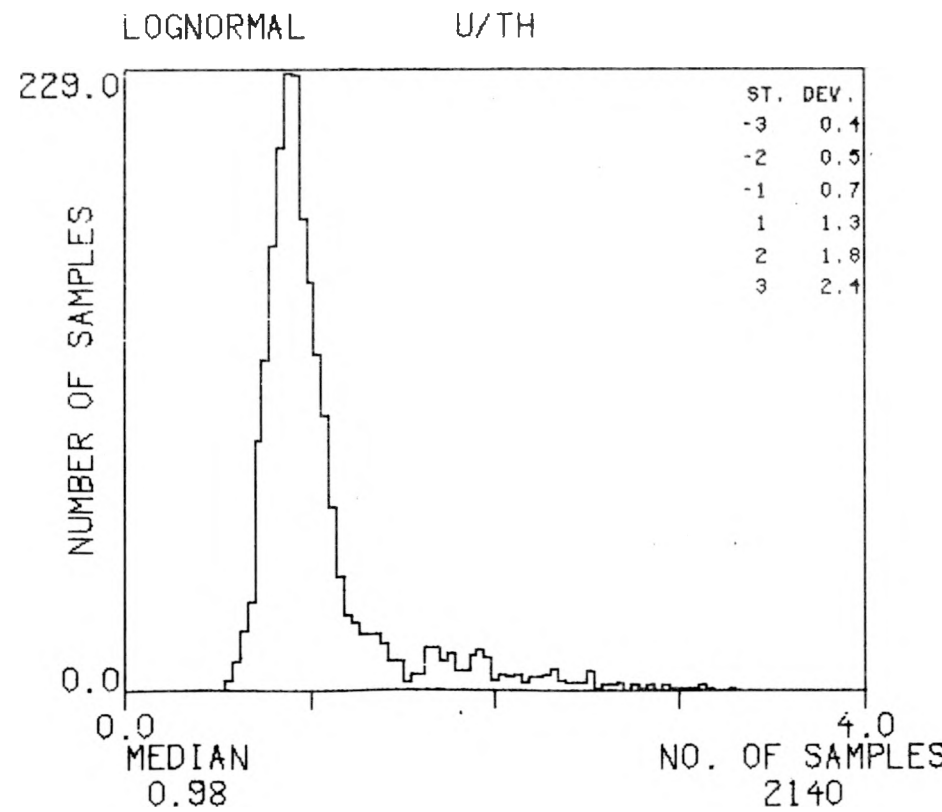
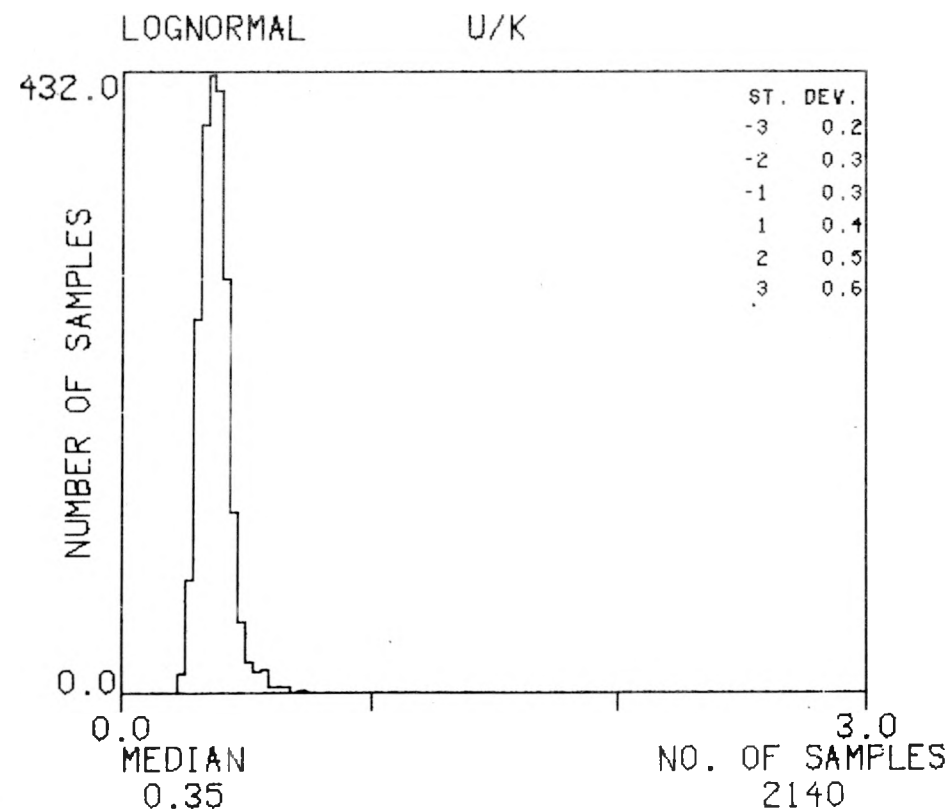
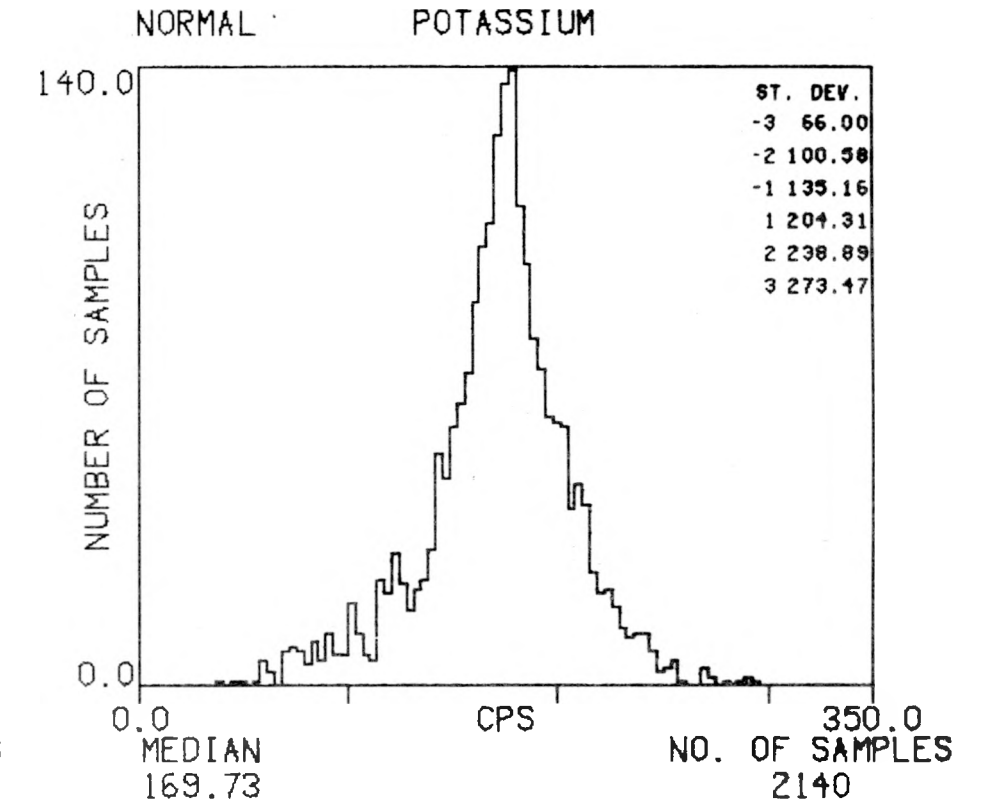
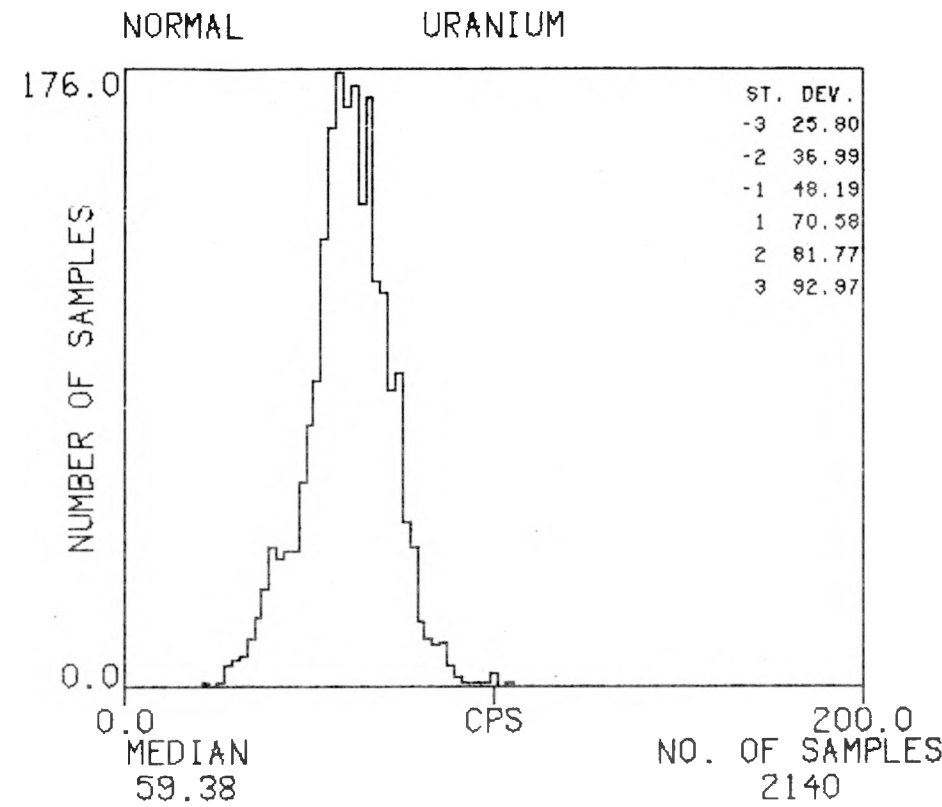
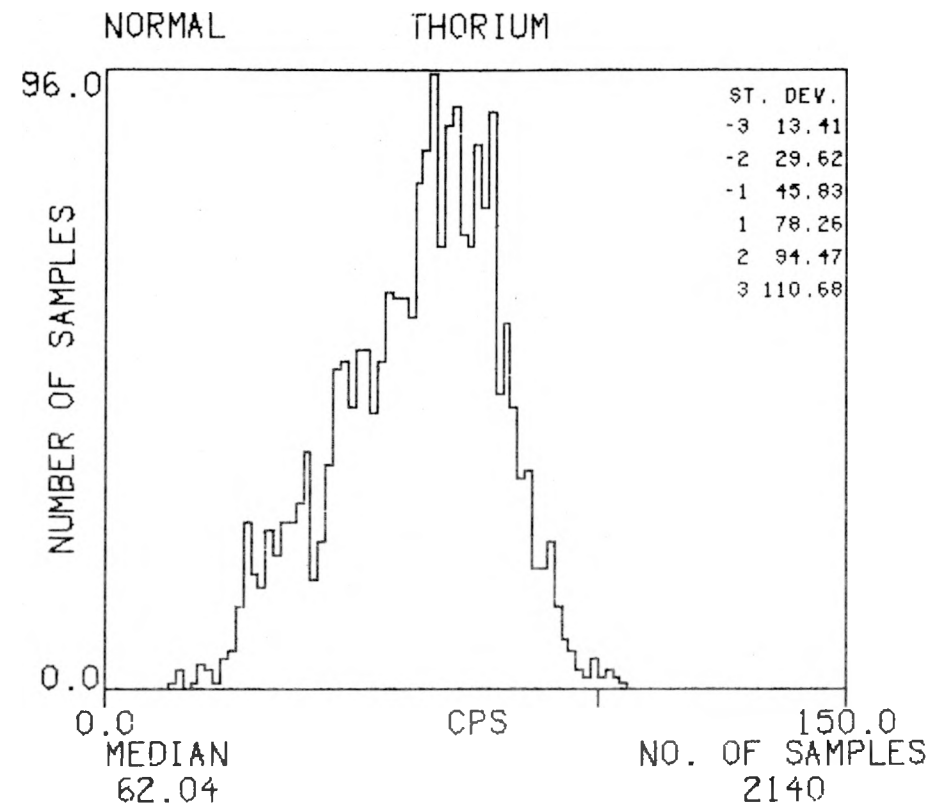
HISTOGRAMS : PCB-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



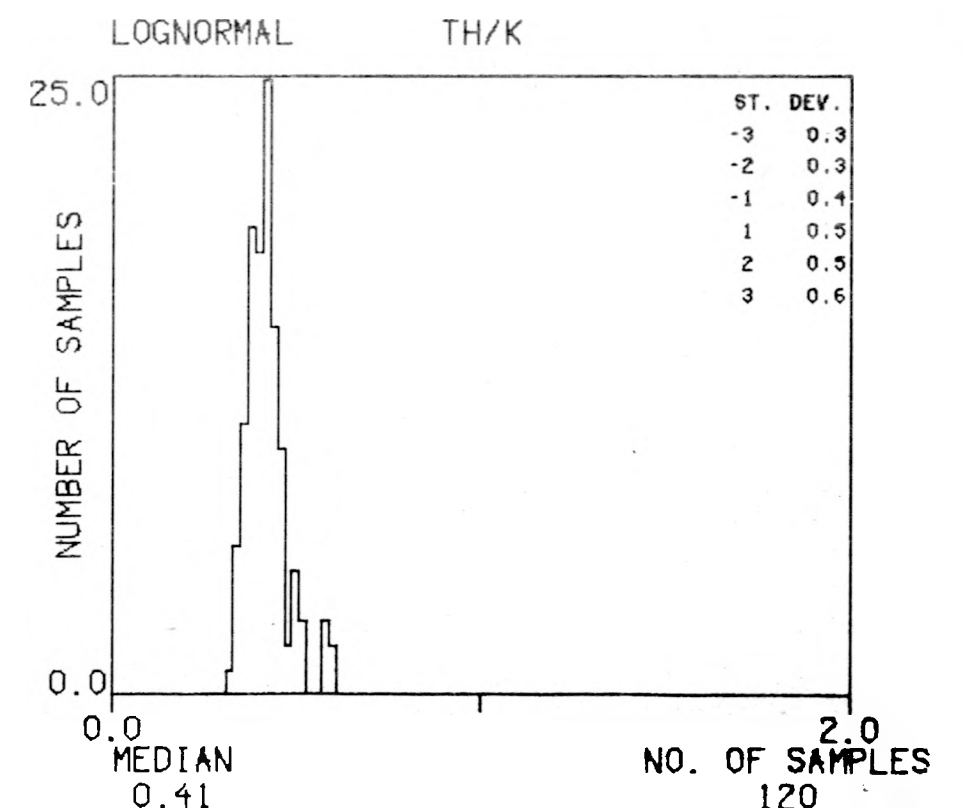
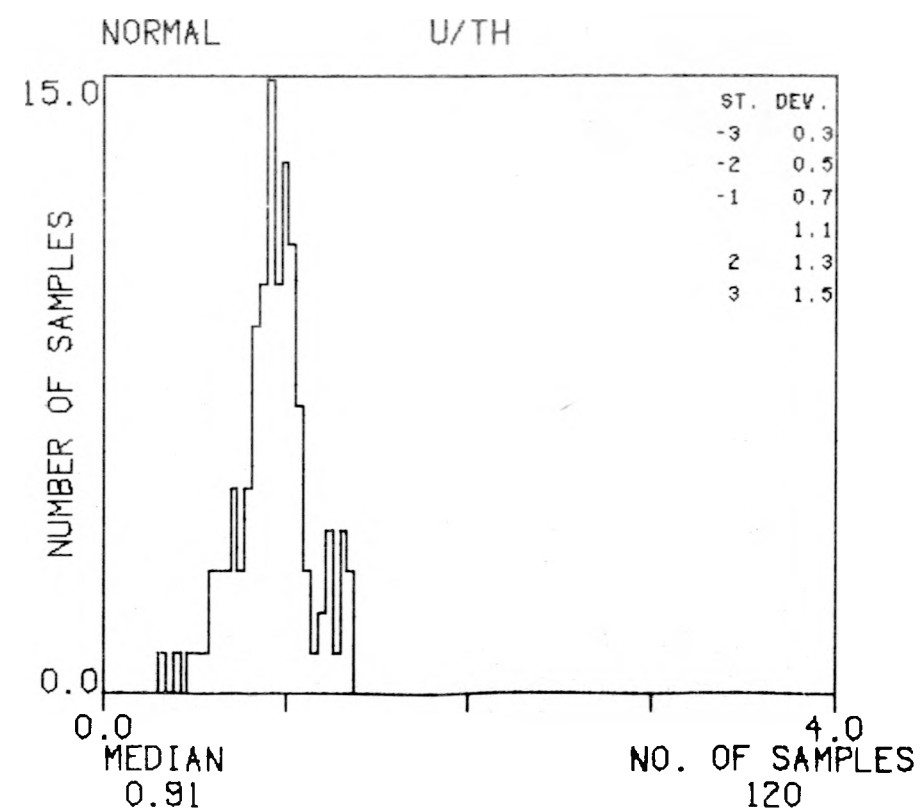
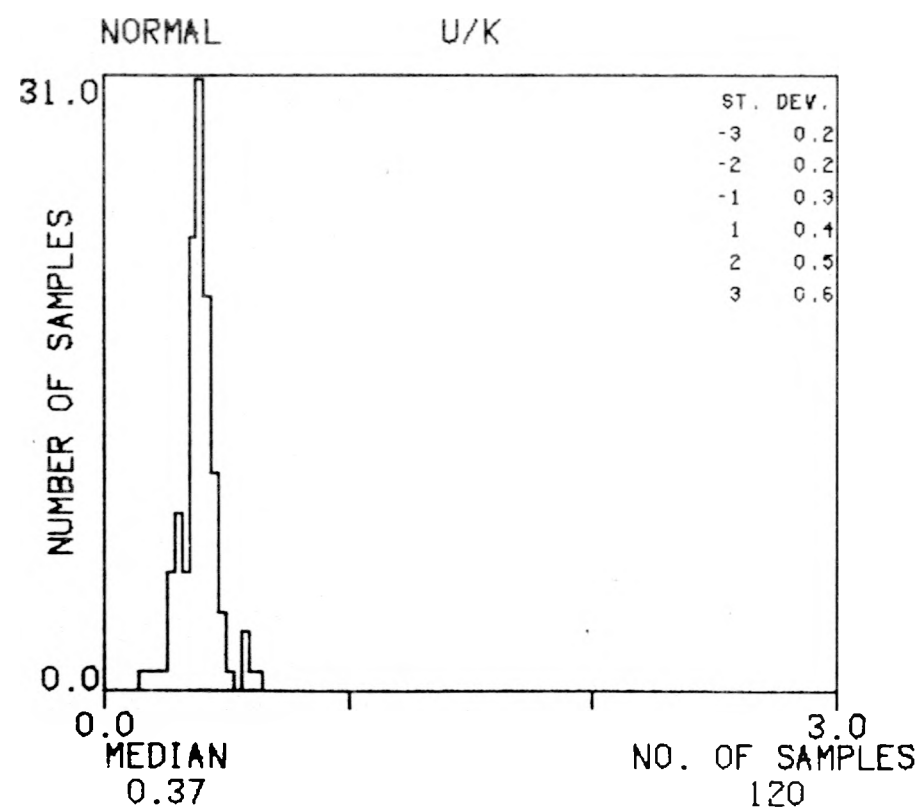
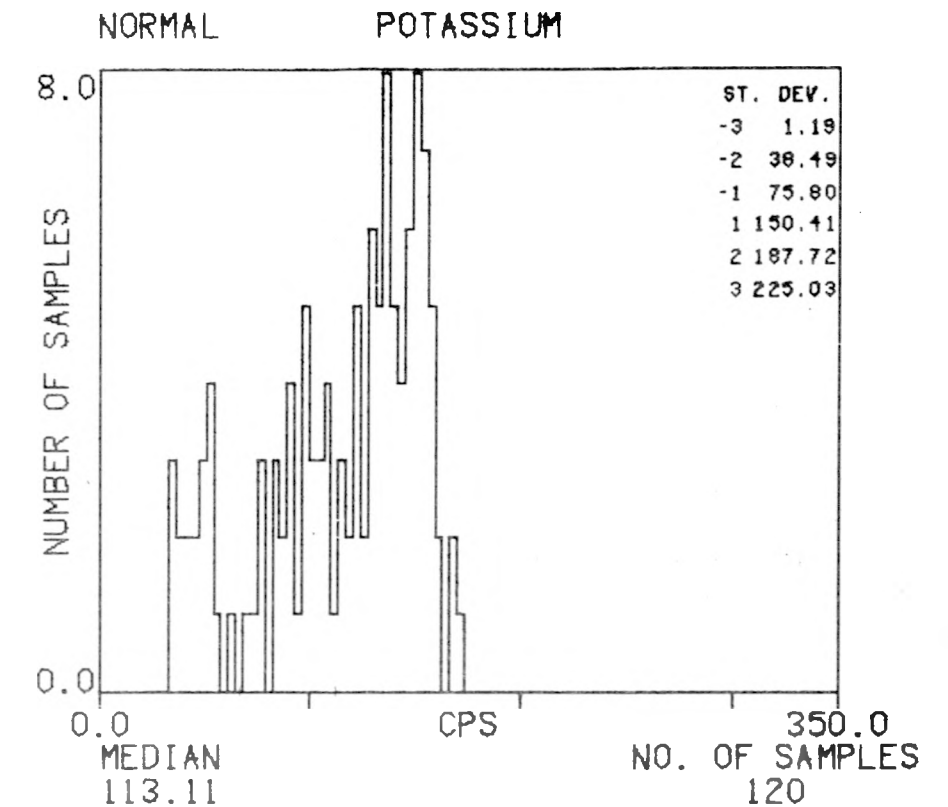
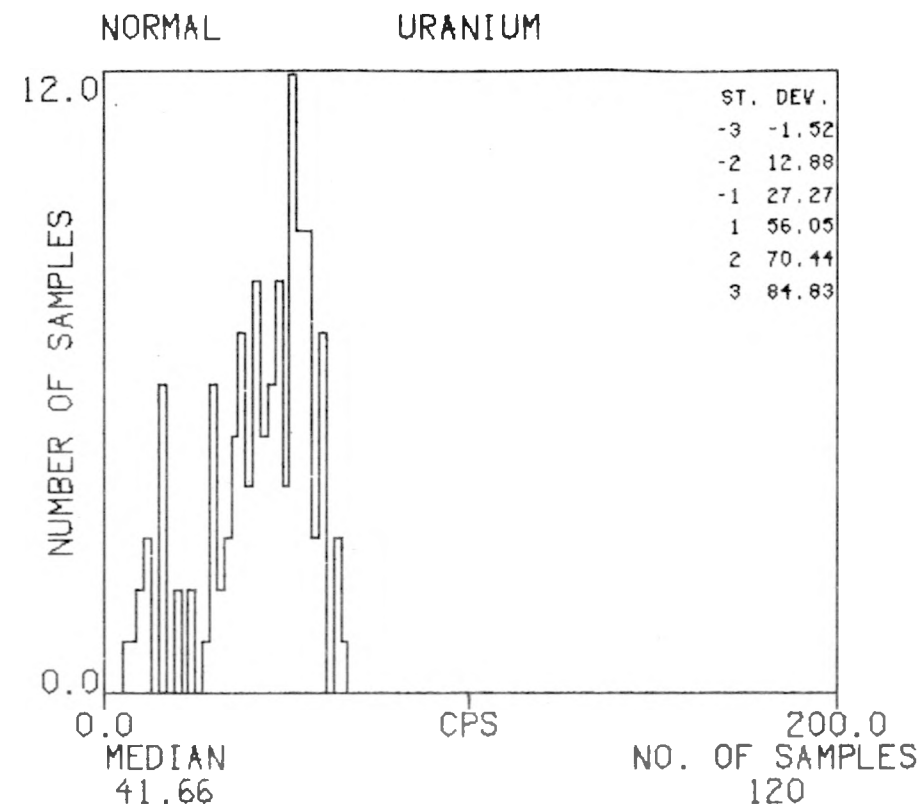
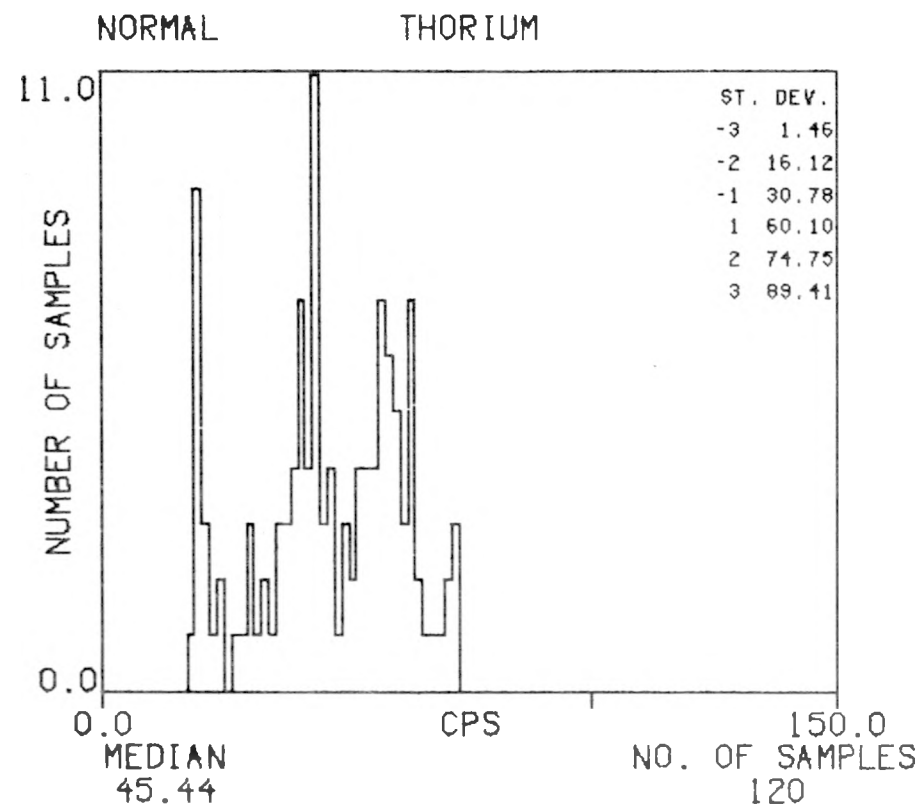
HISTOGRAMS : PCGM

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



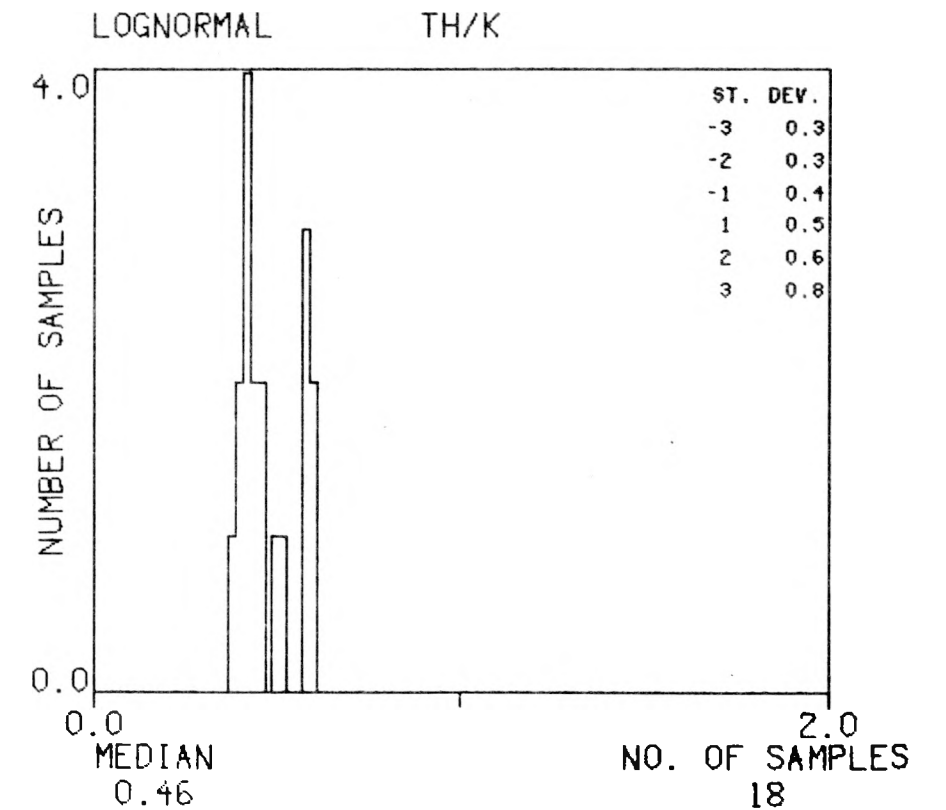
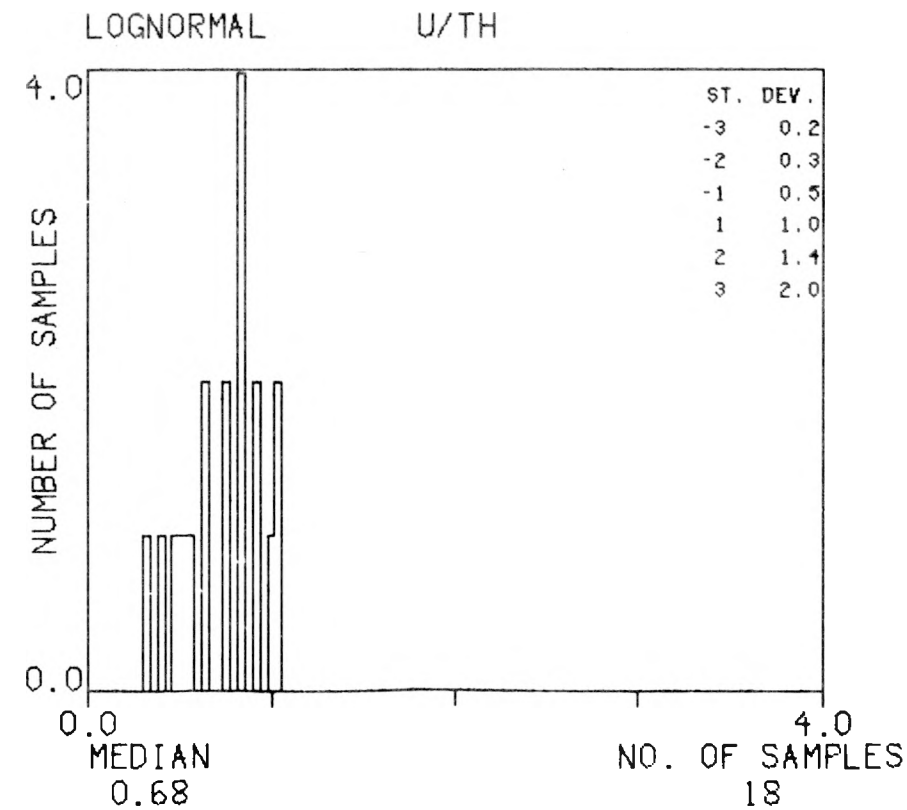
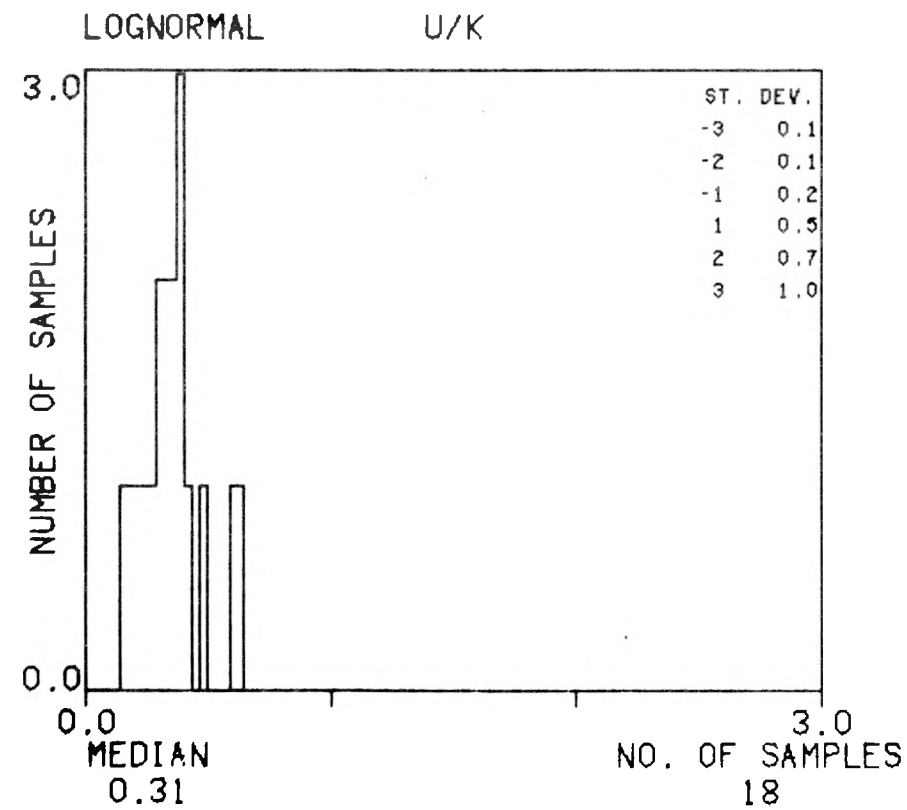
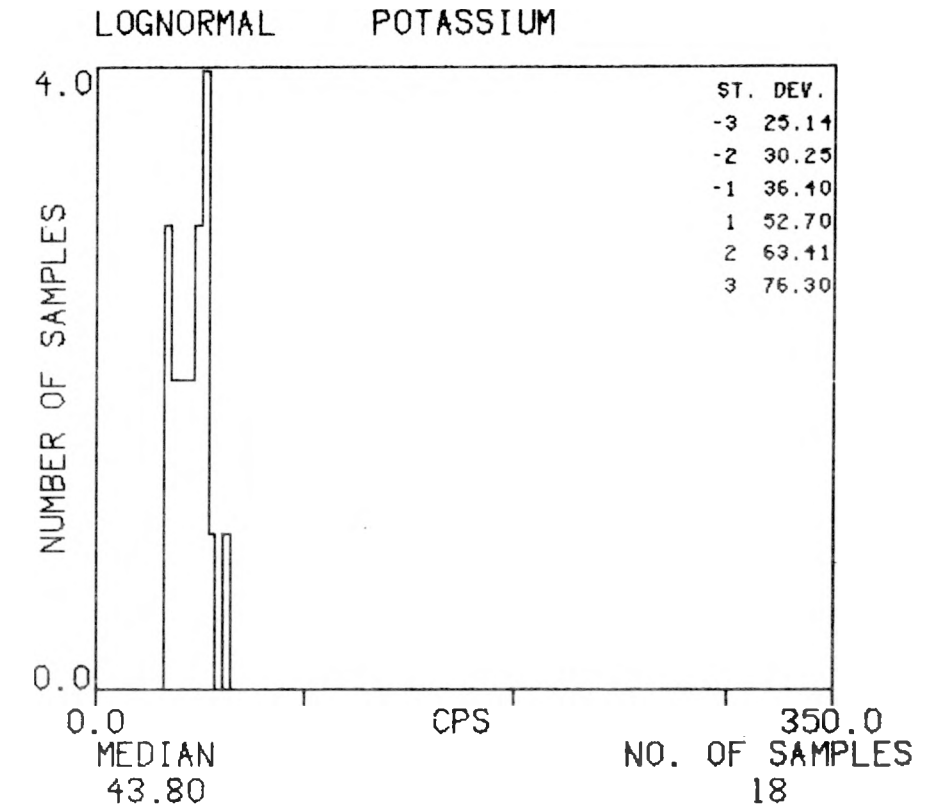
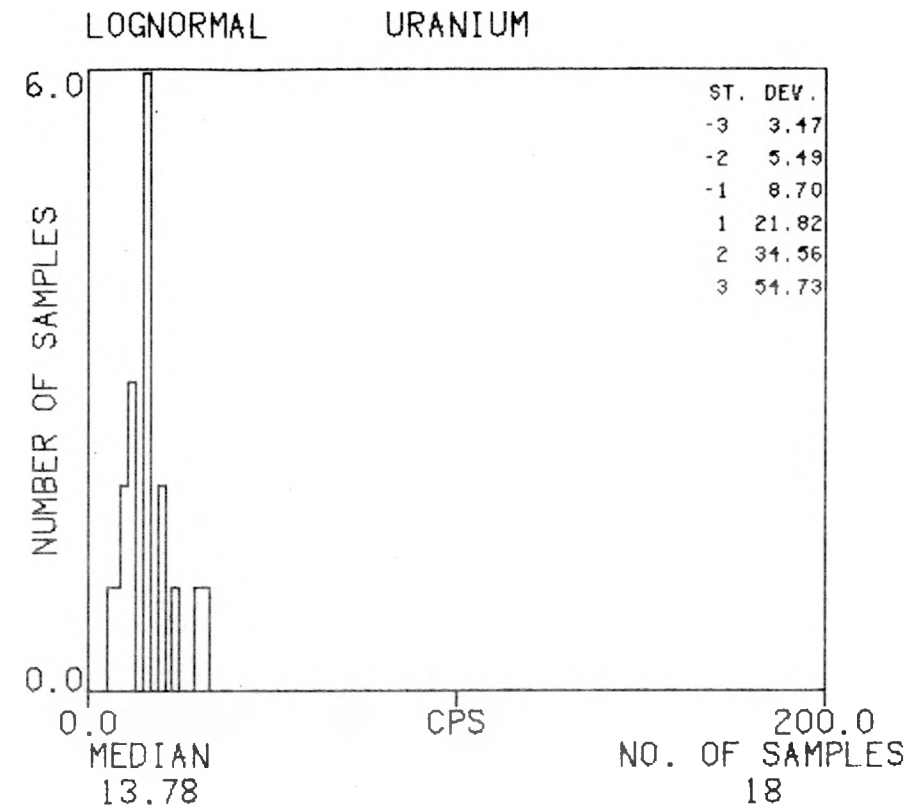
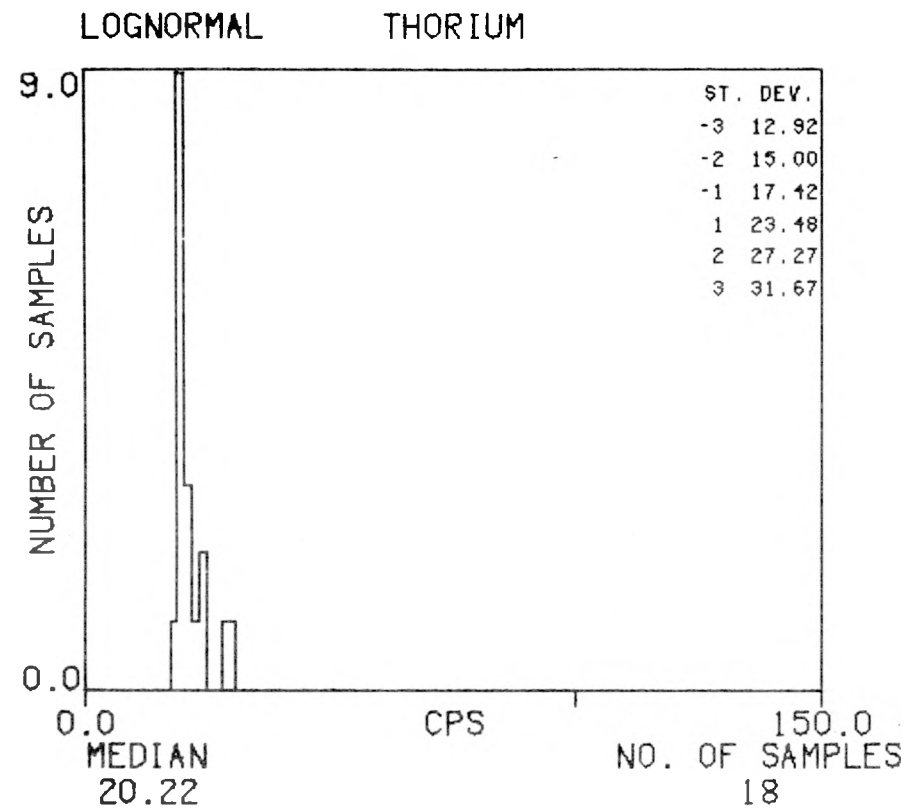
HISTOGRAMS : PCA

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



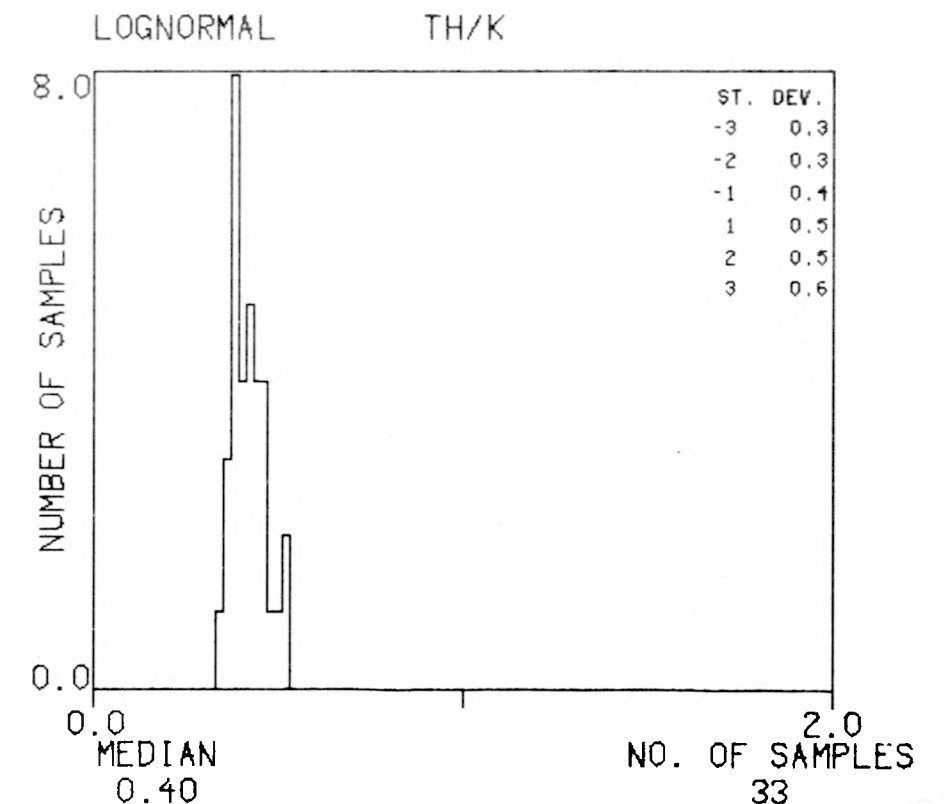
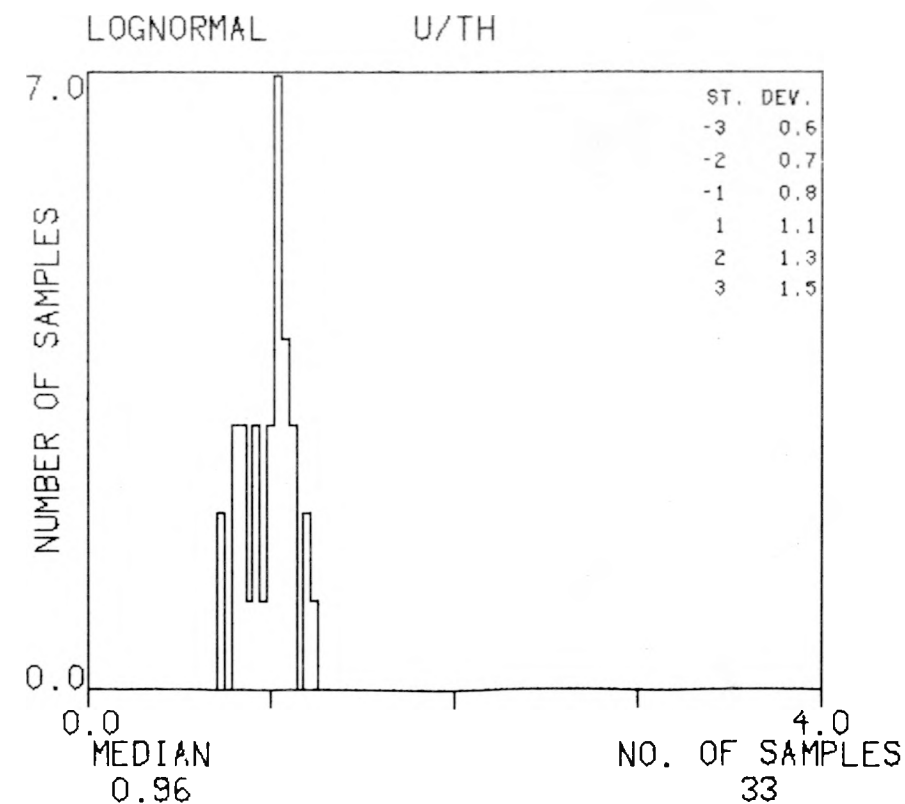
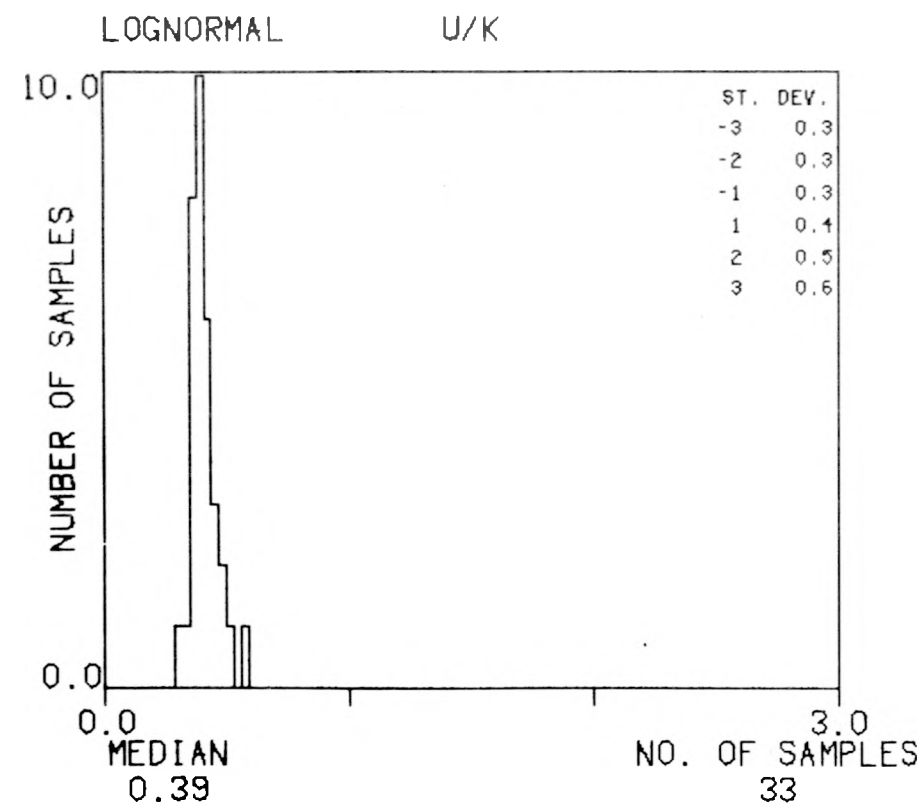
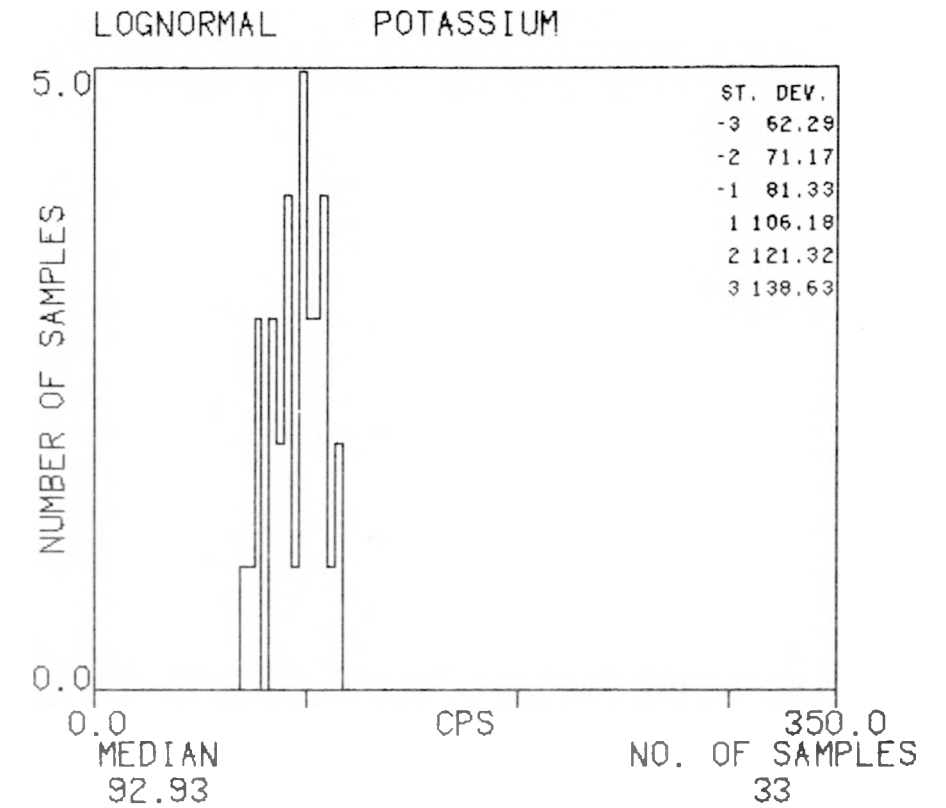
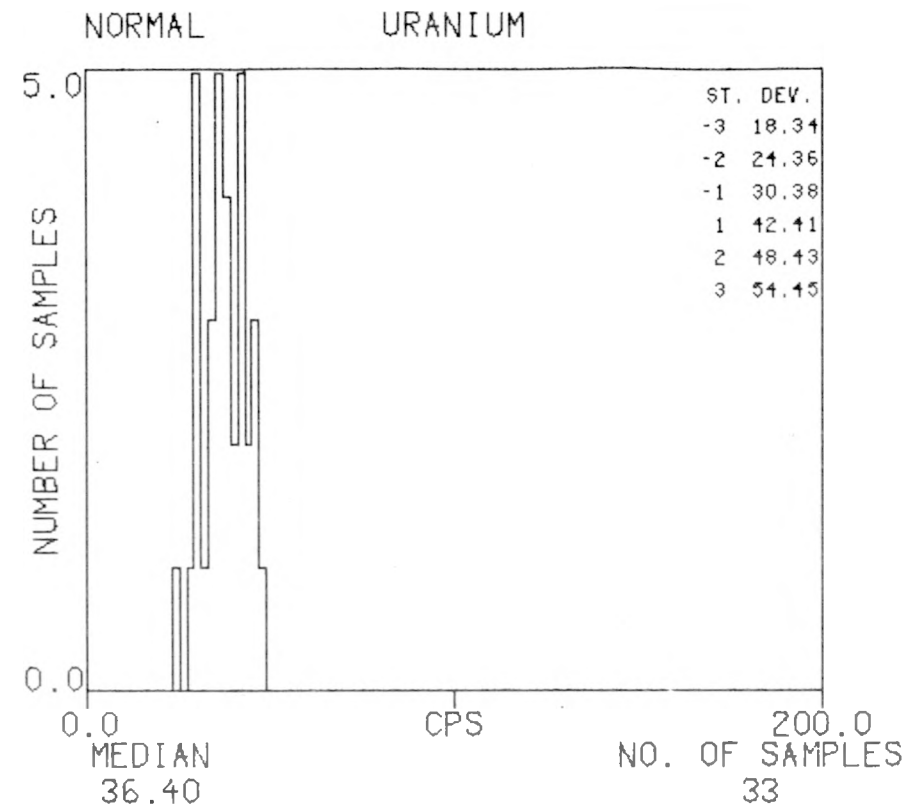
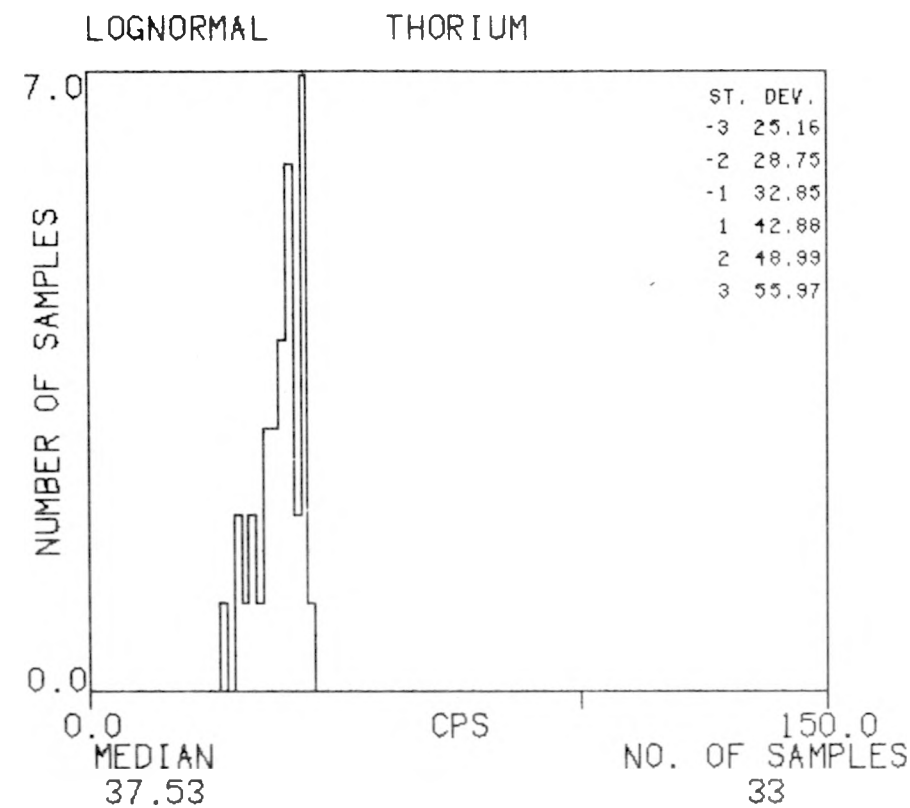
HISTOGRAMS : PCA-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



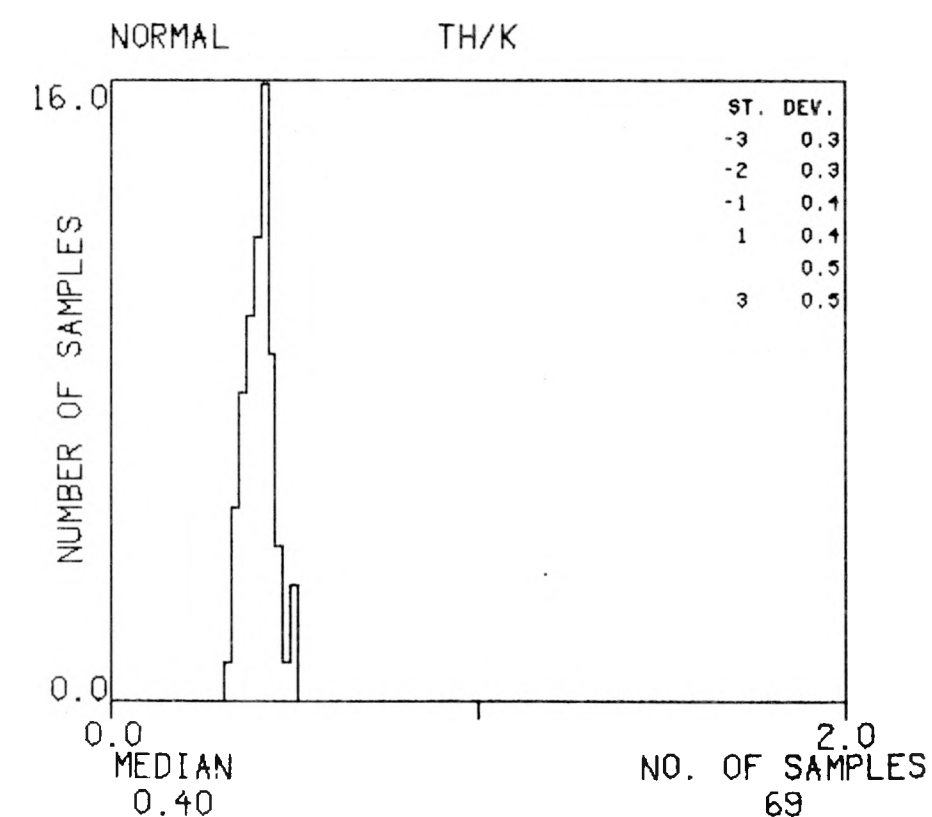
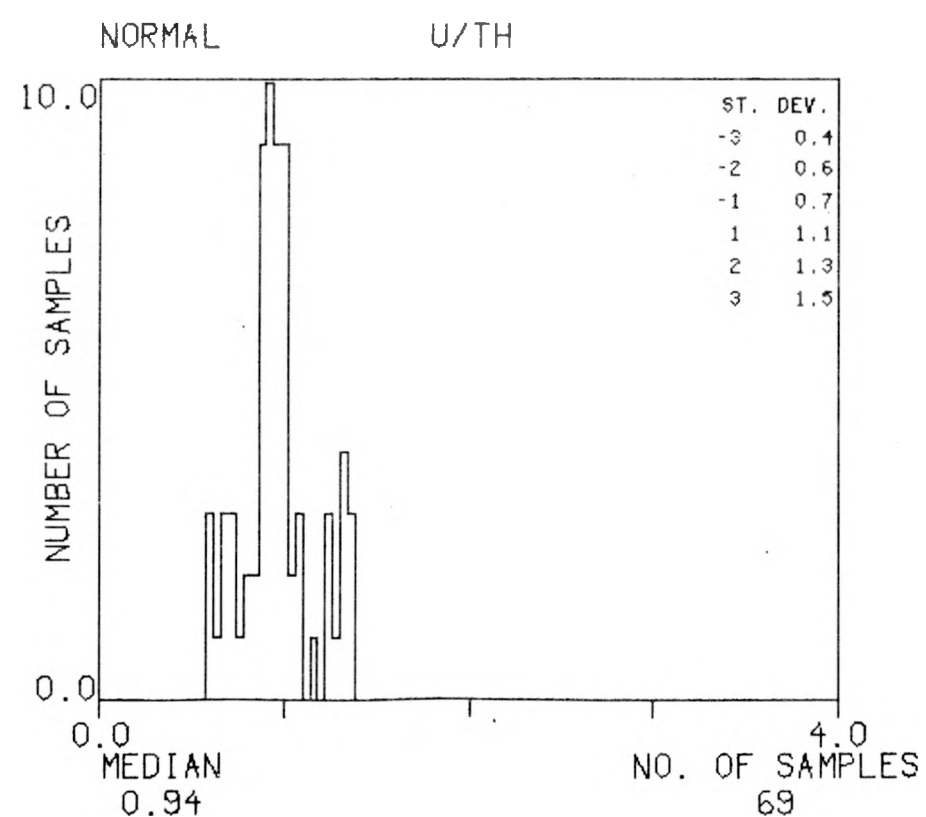
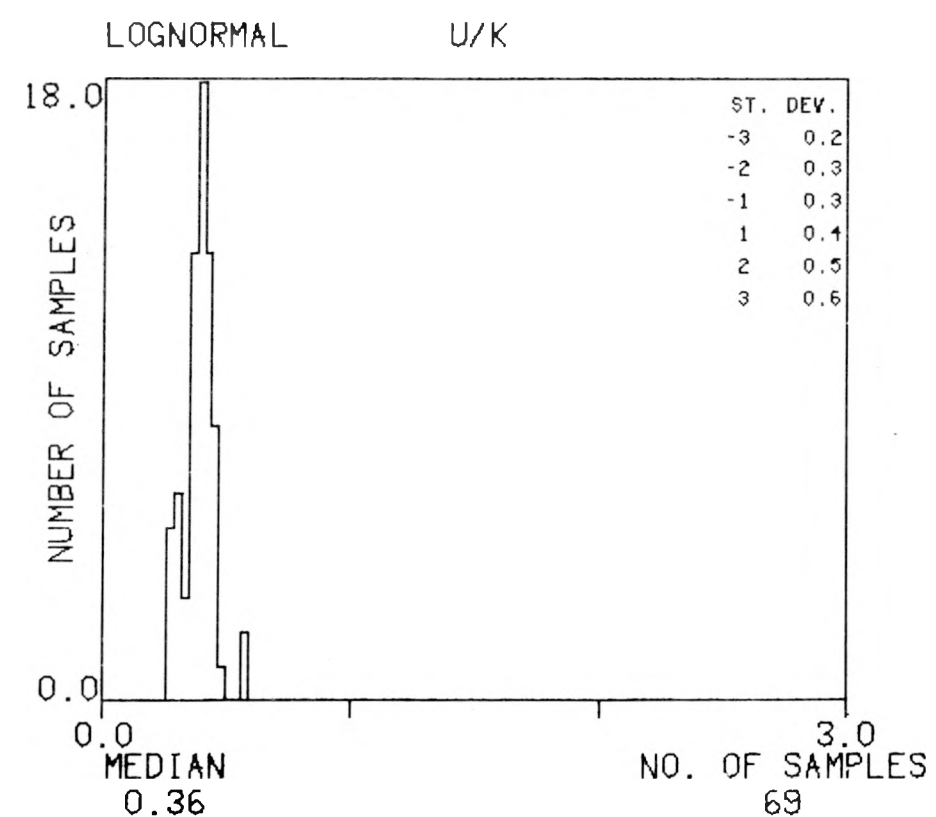
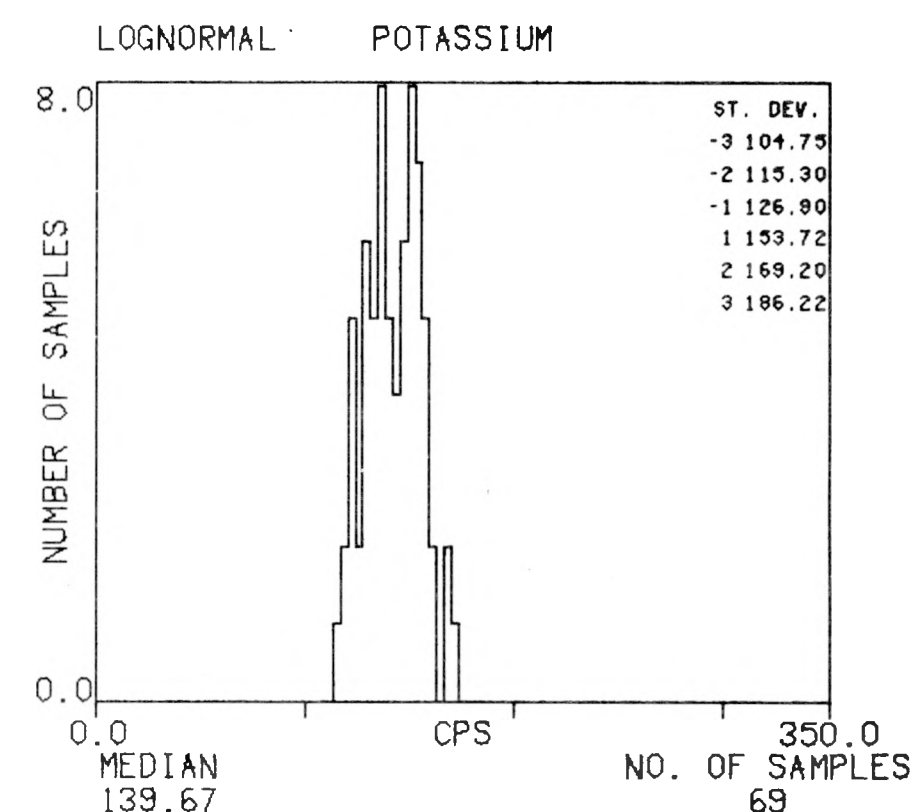
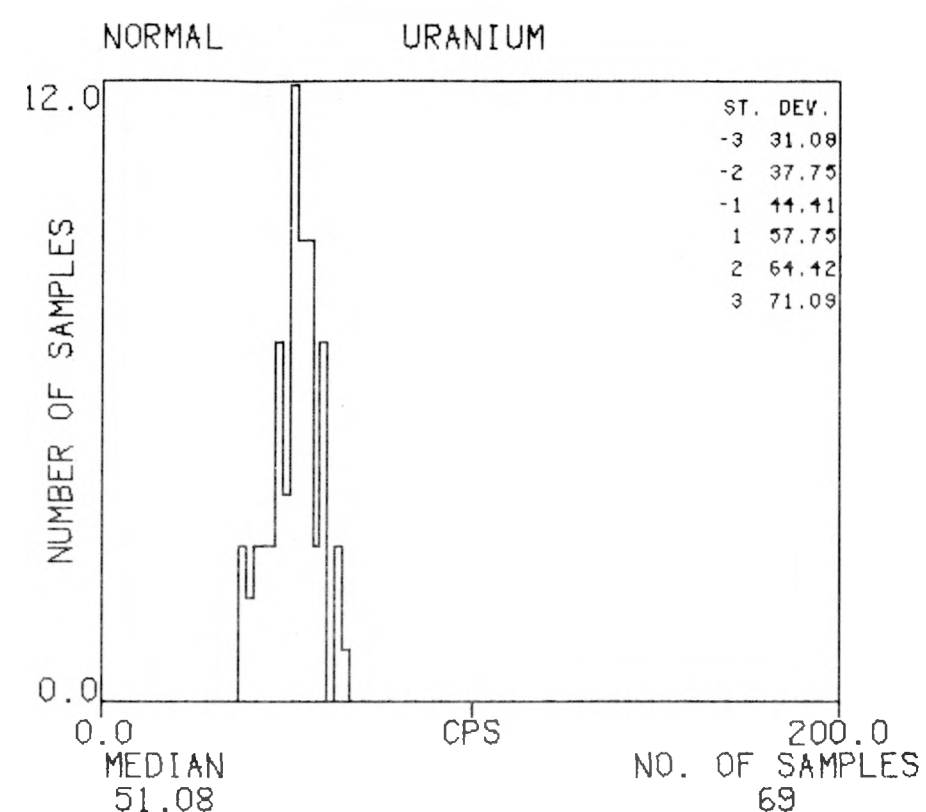
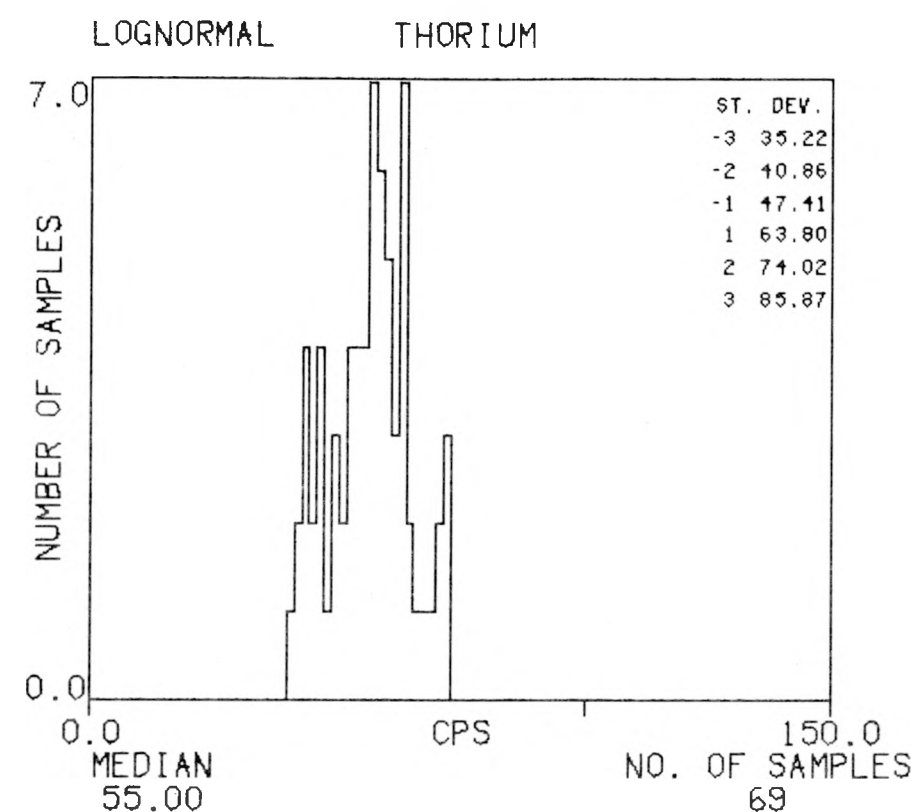
HISTOGRAMS : PCA-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



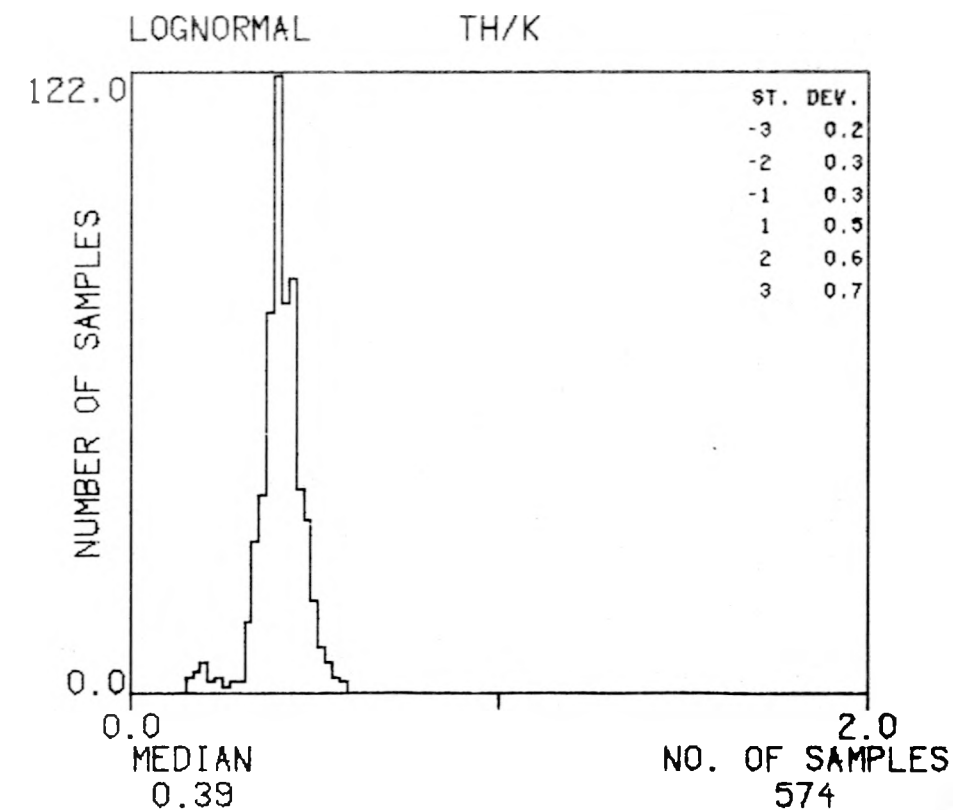
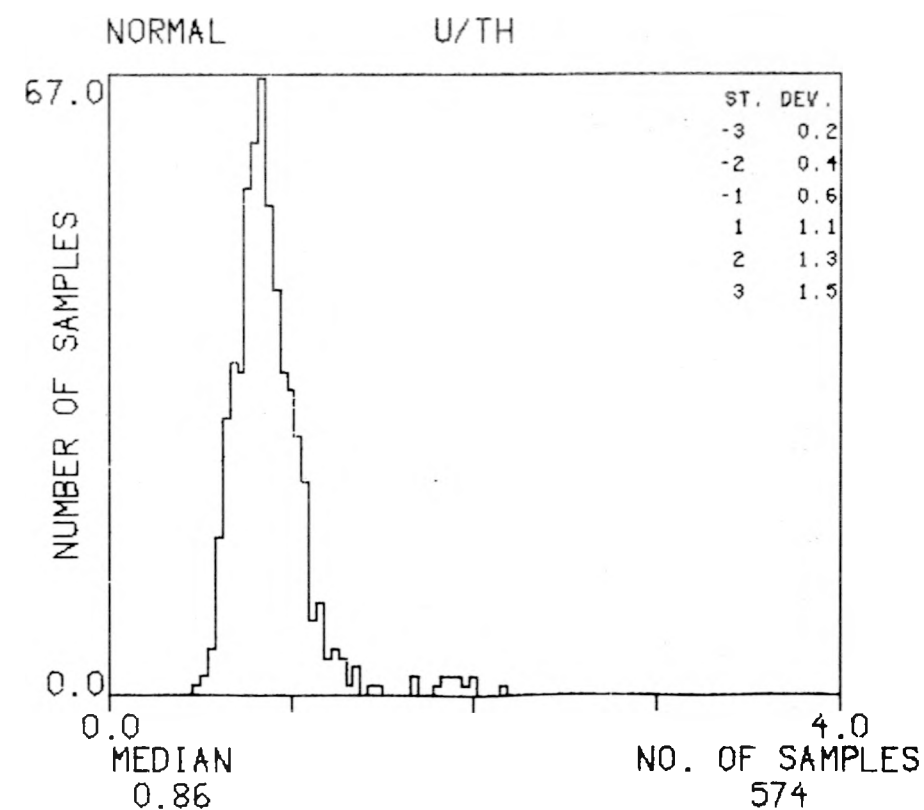
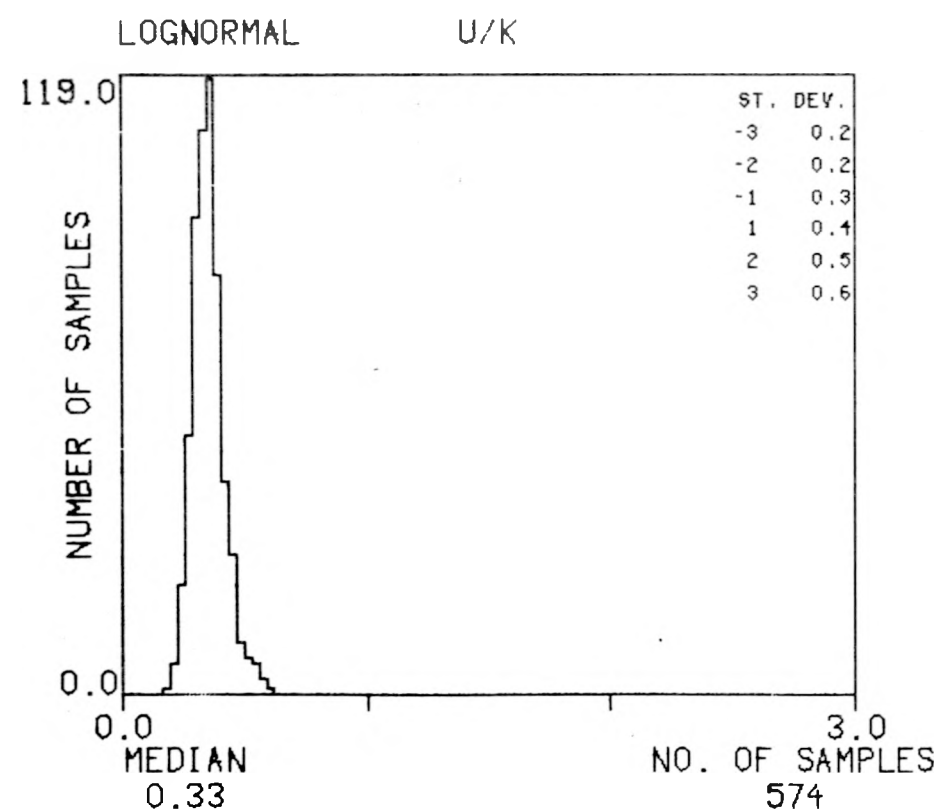
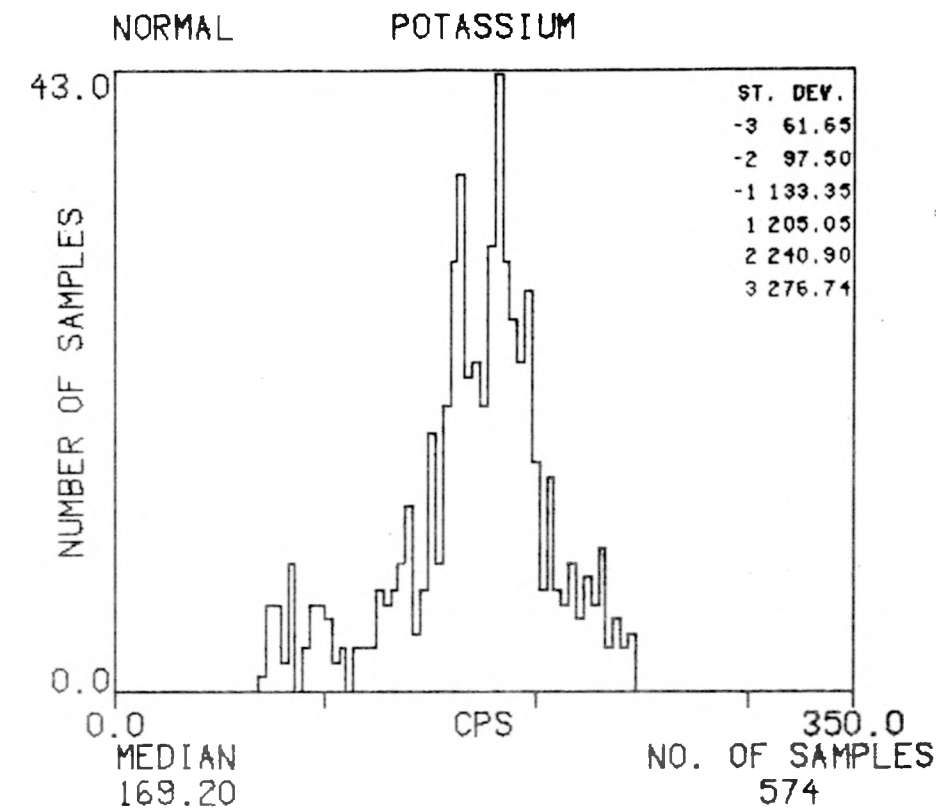
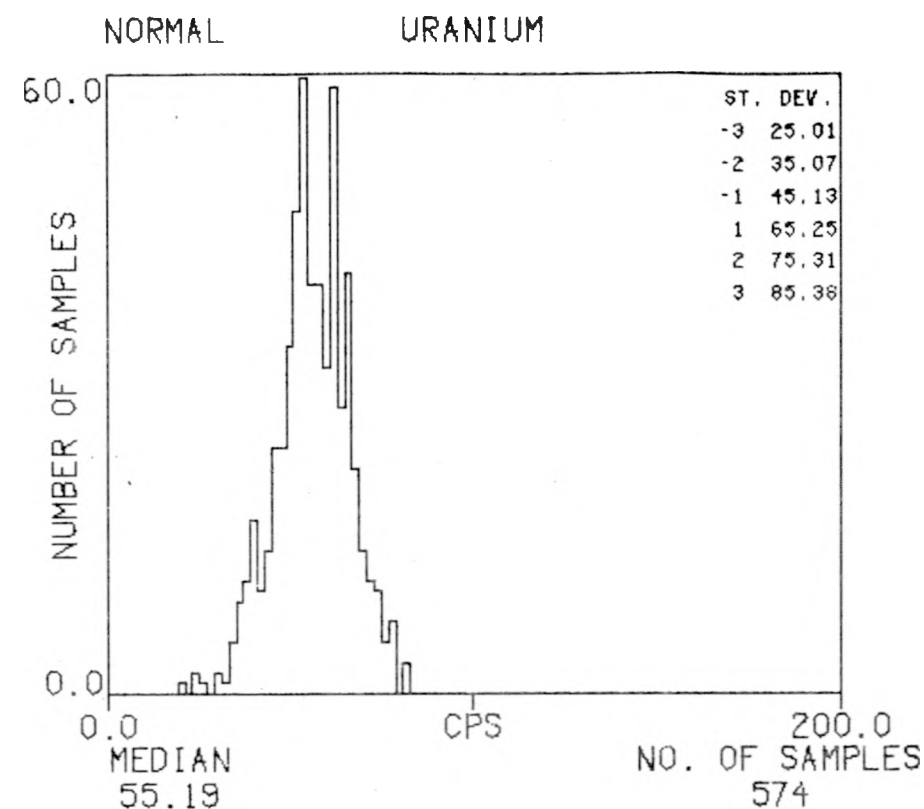
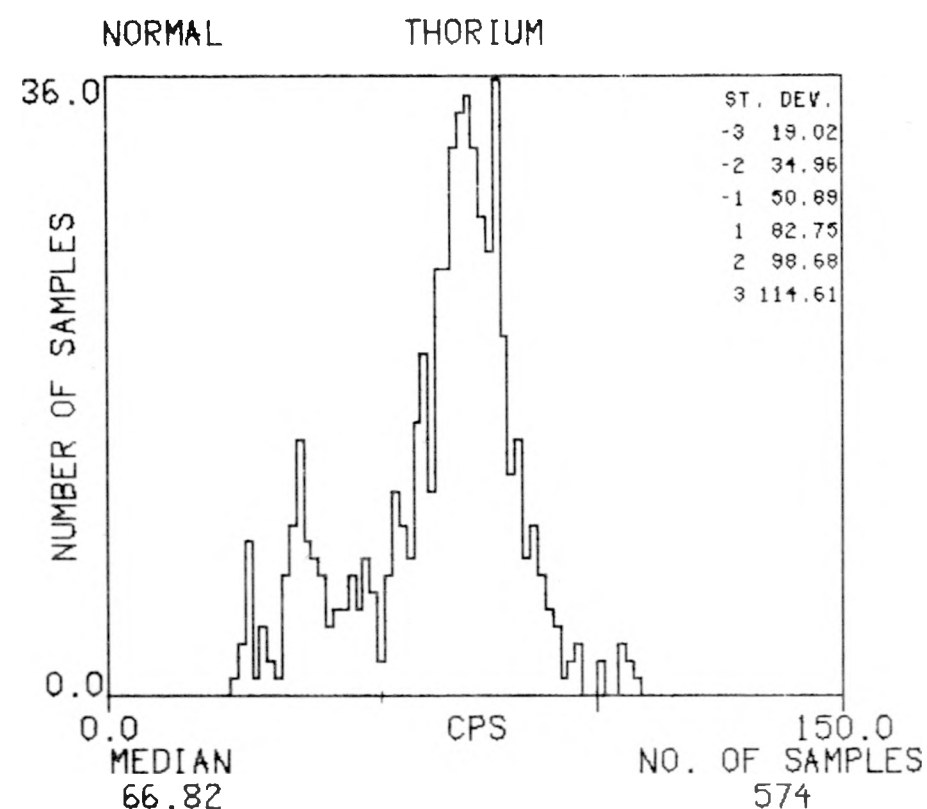
HISTOGRAMS : PCA-3

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



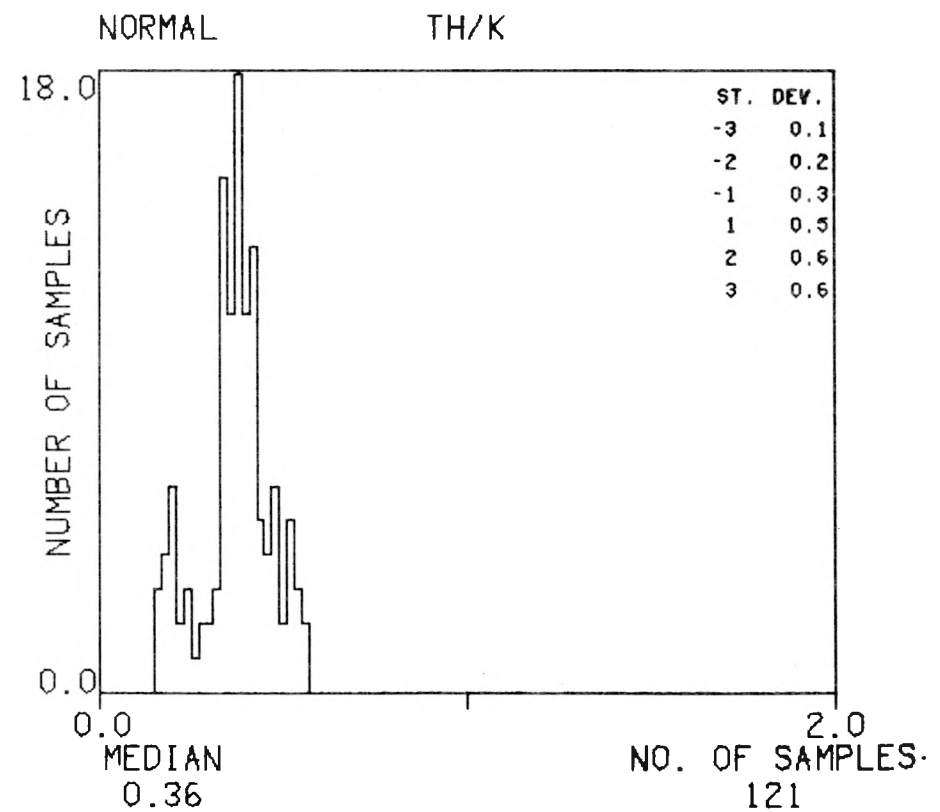
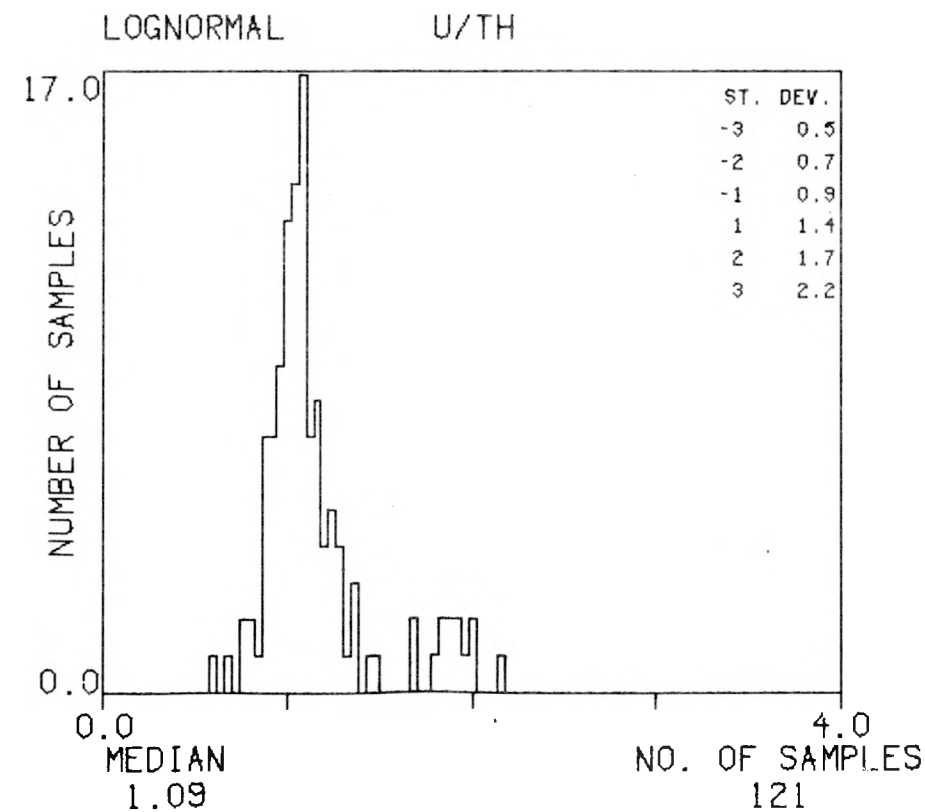
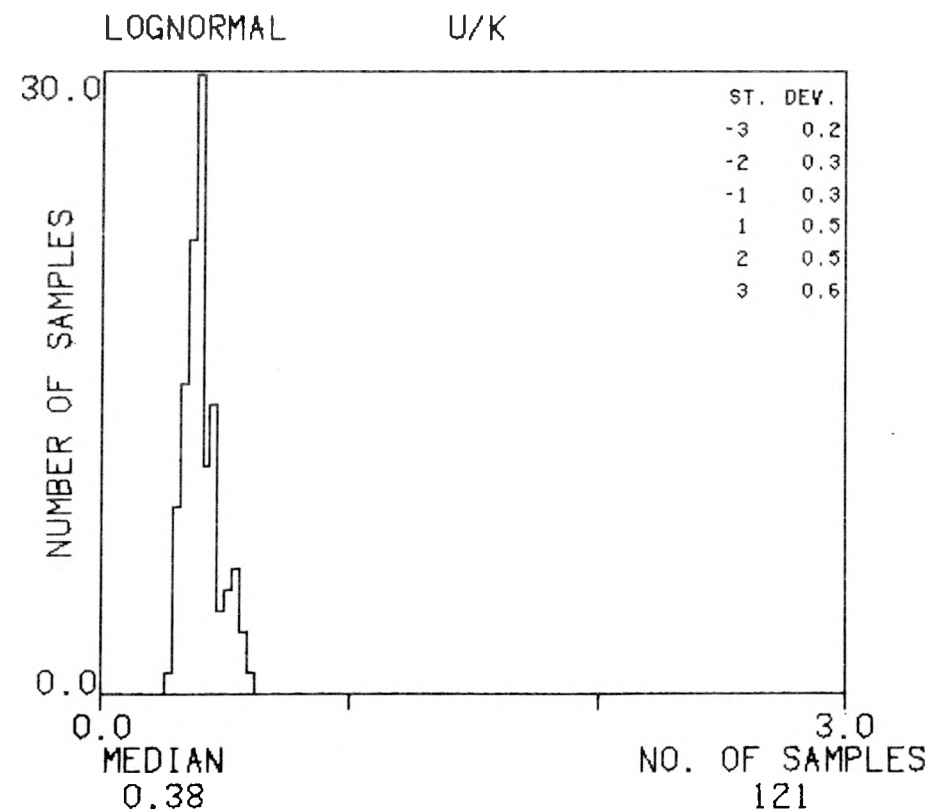
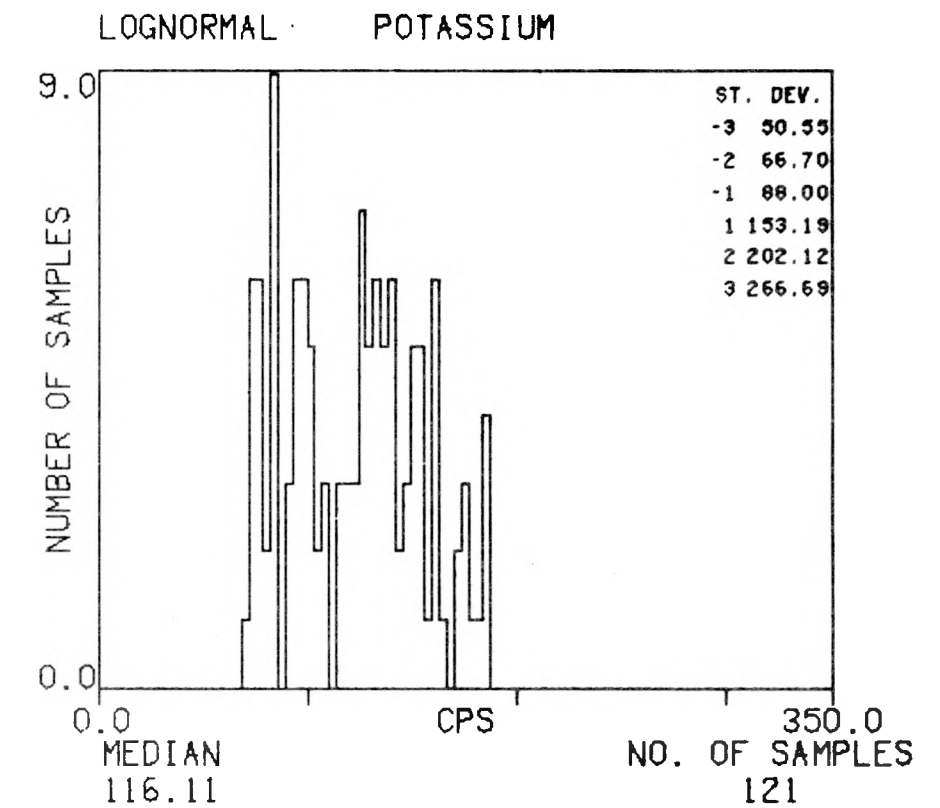
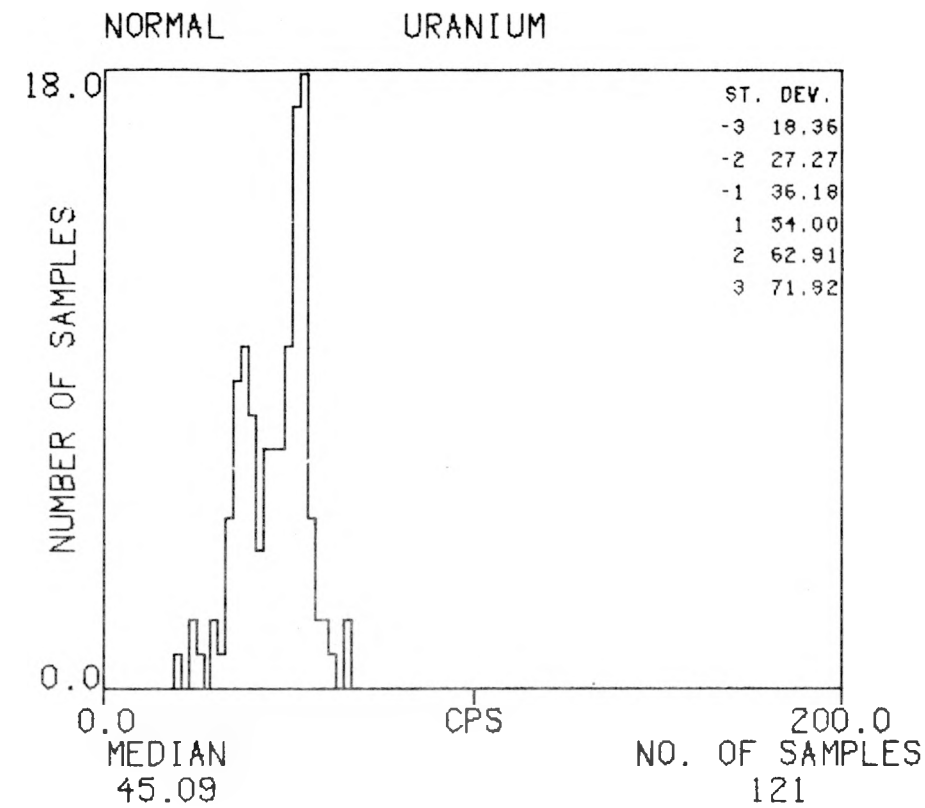
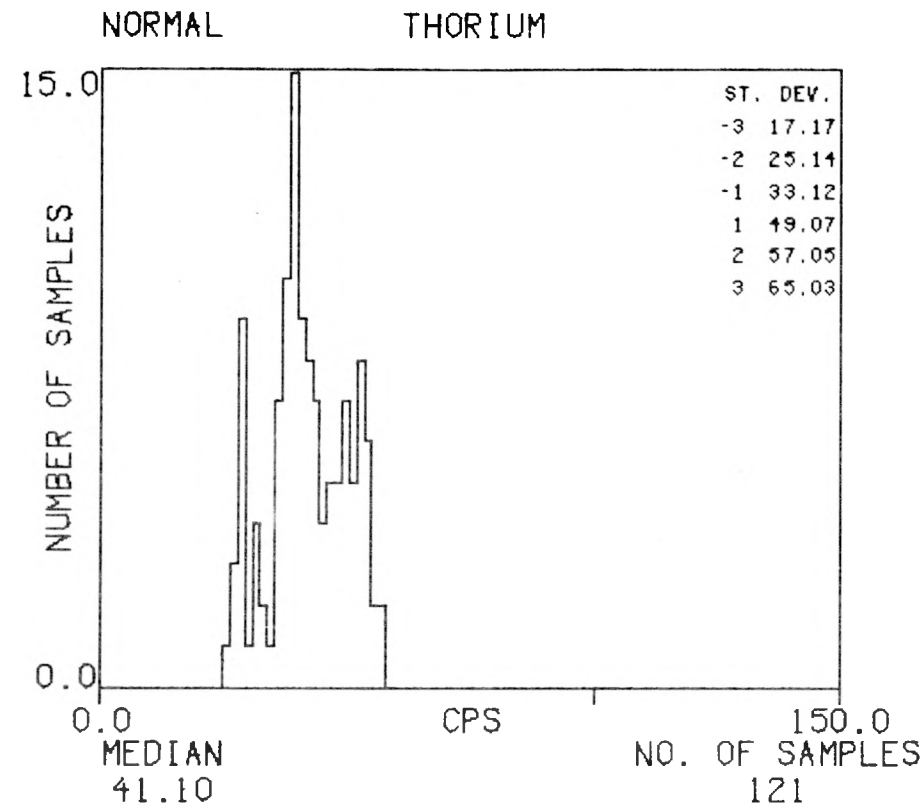
HISTOGRAMS : PCQS

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



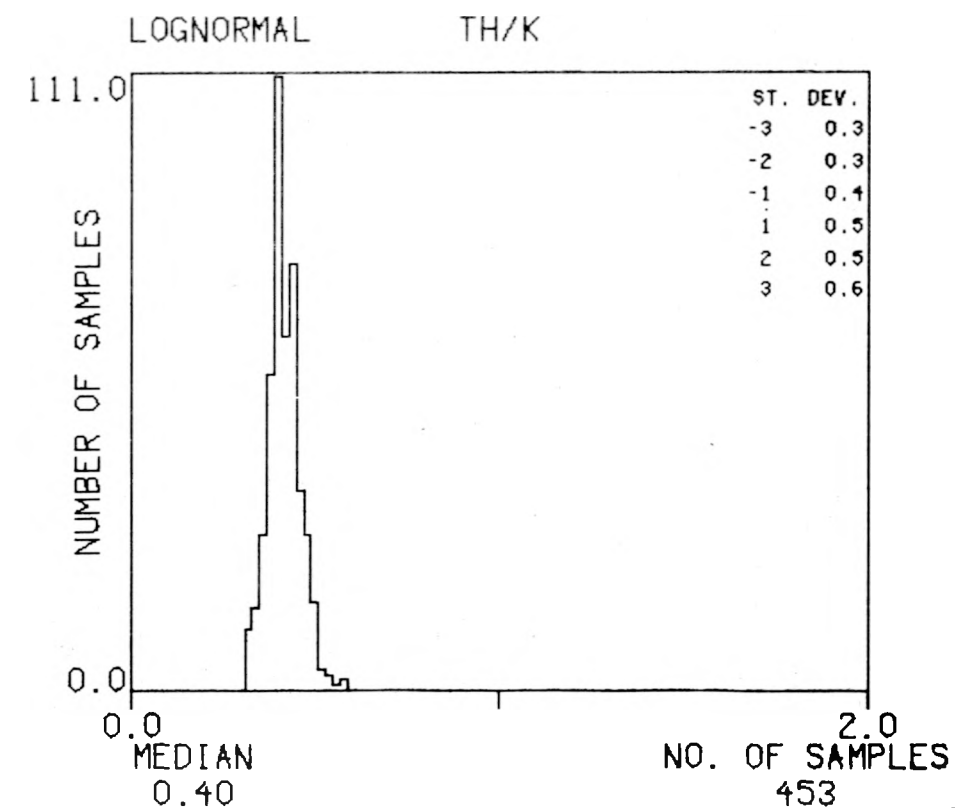
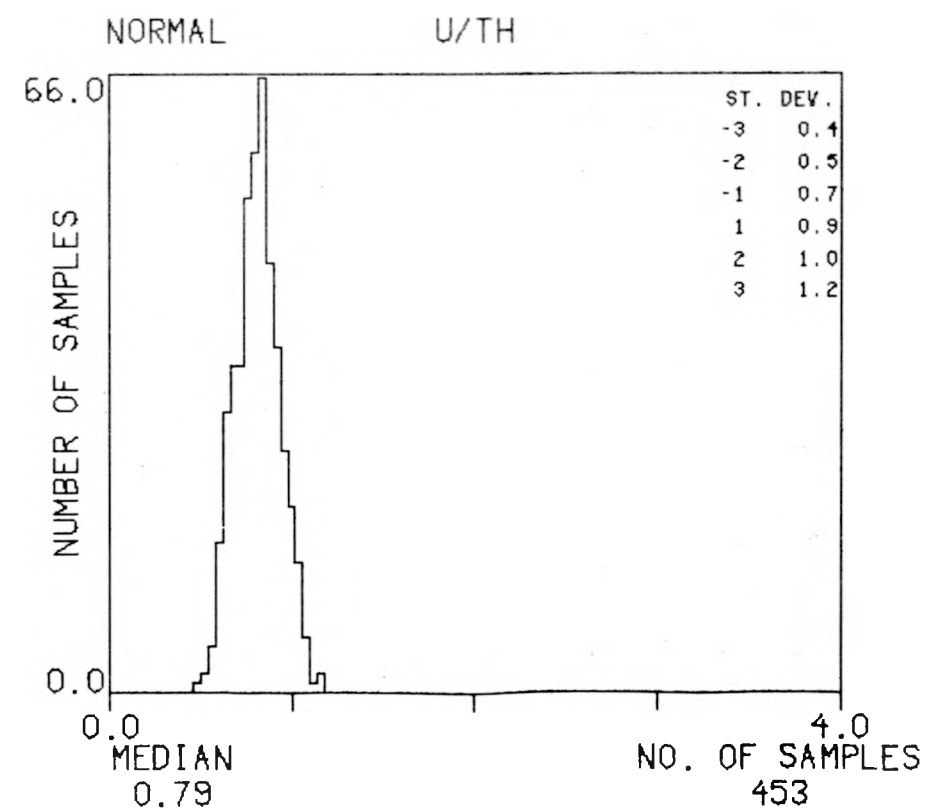
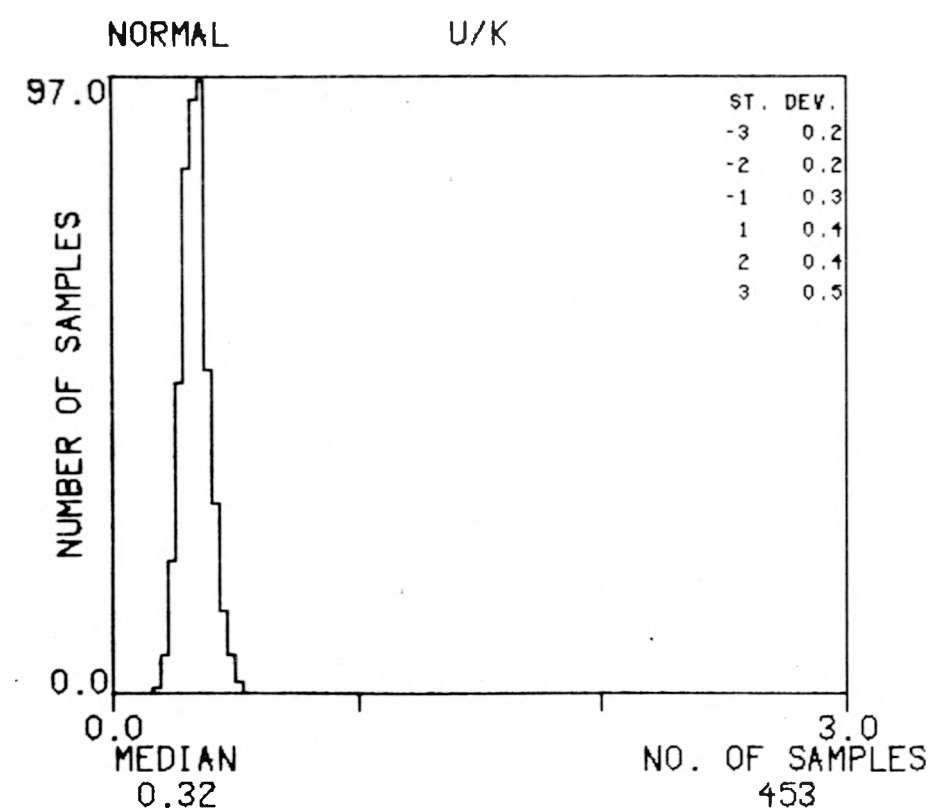
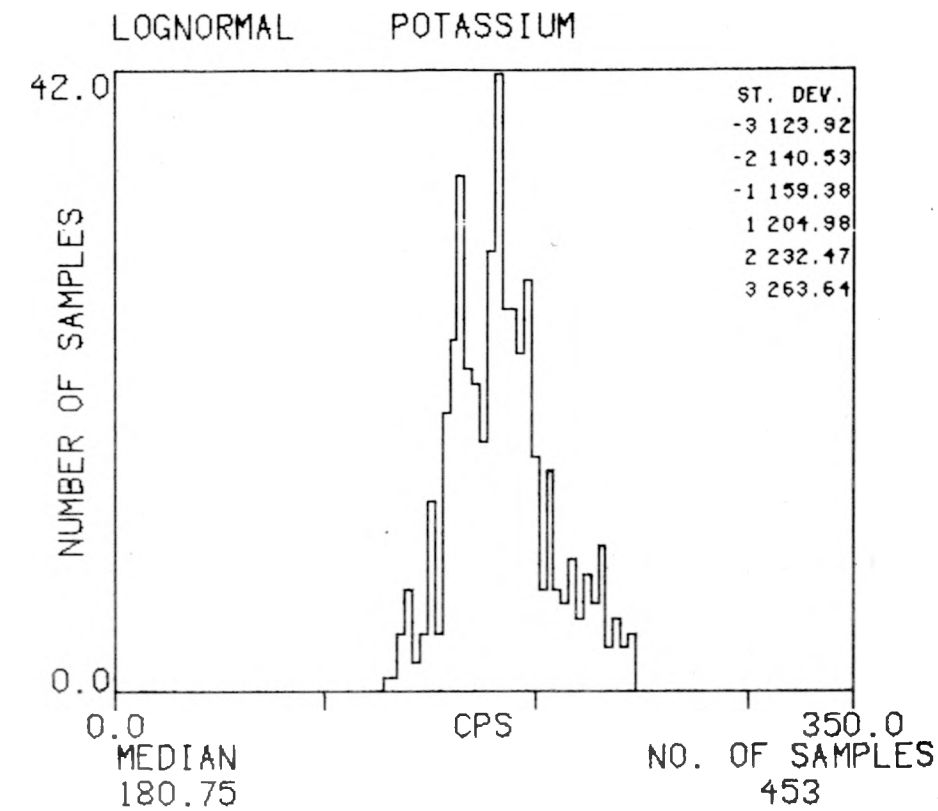
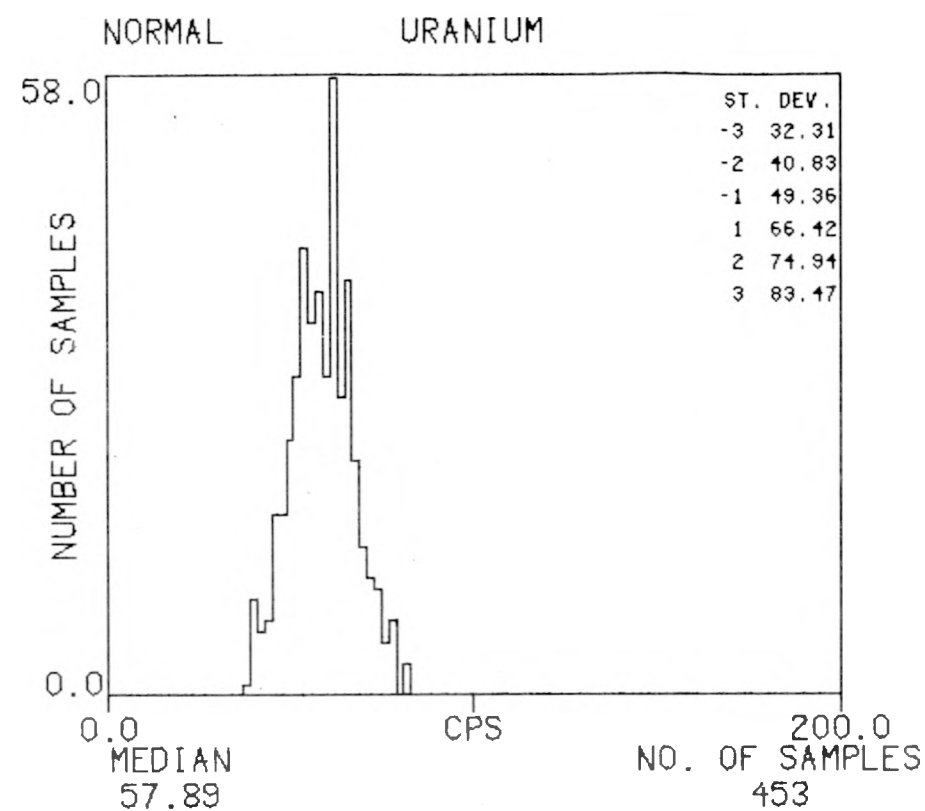
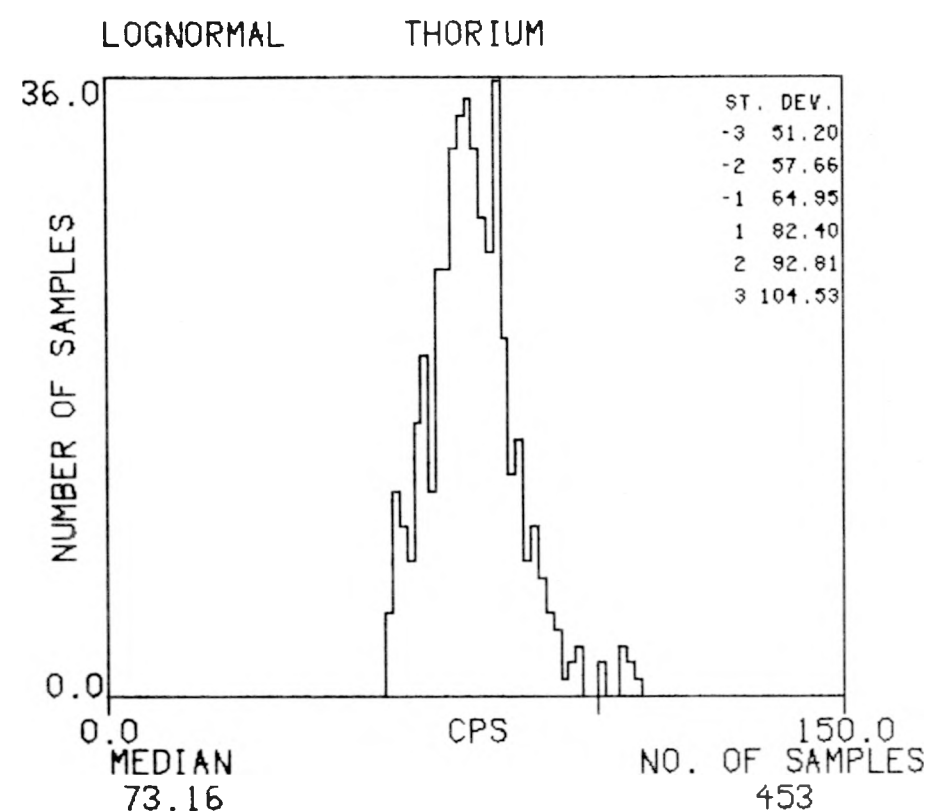
HISTOGRAMS : PCQS-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



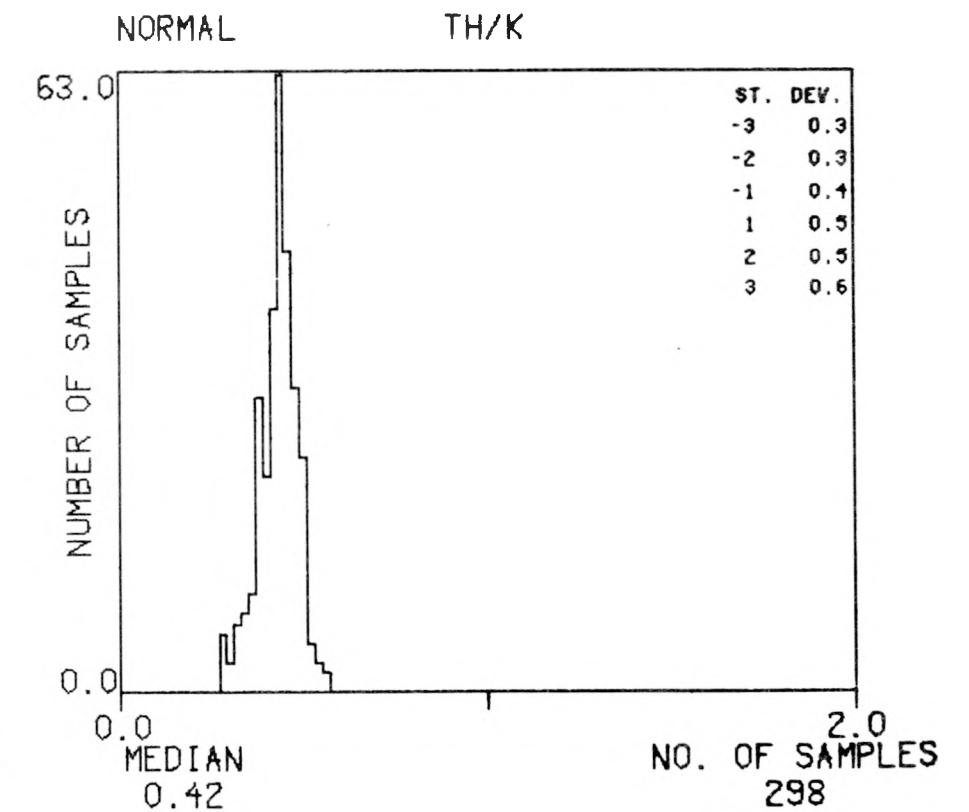
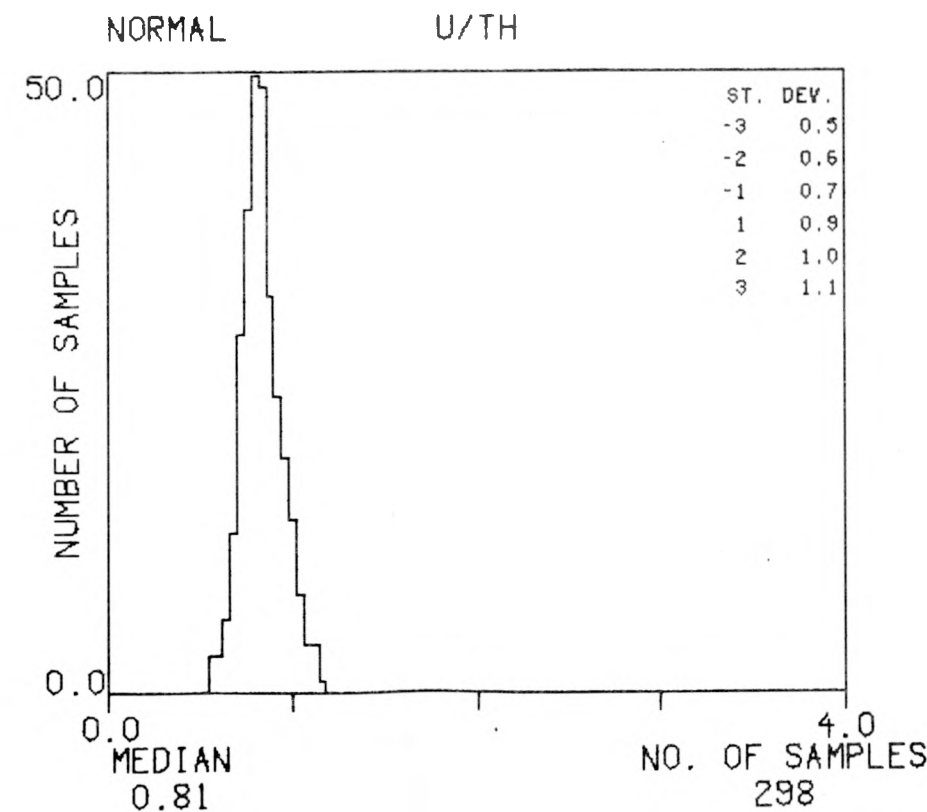
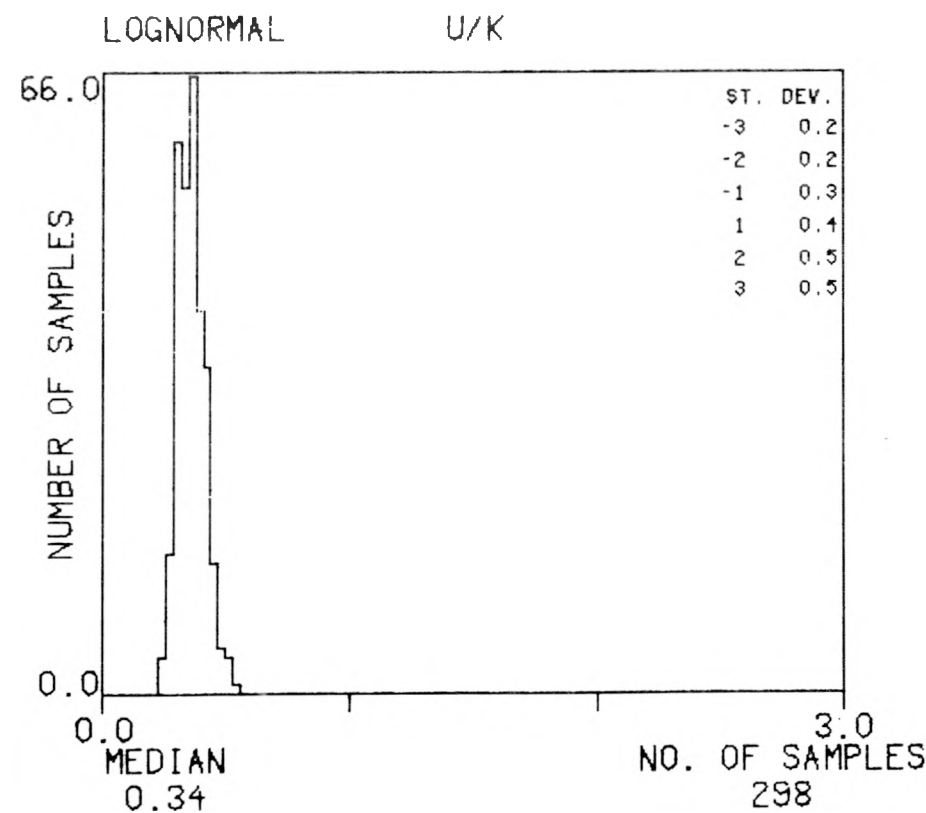
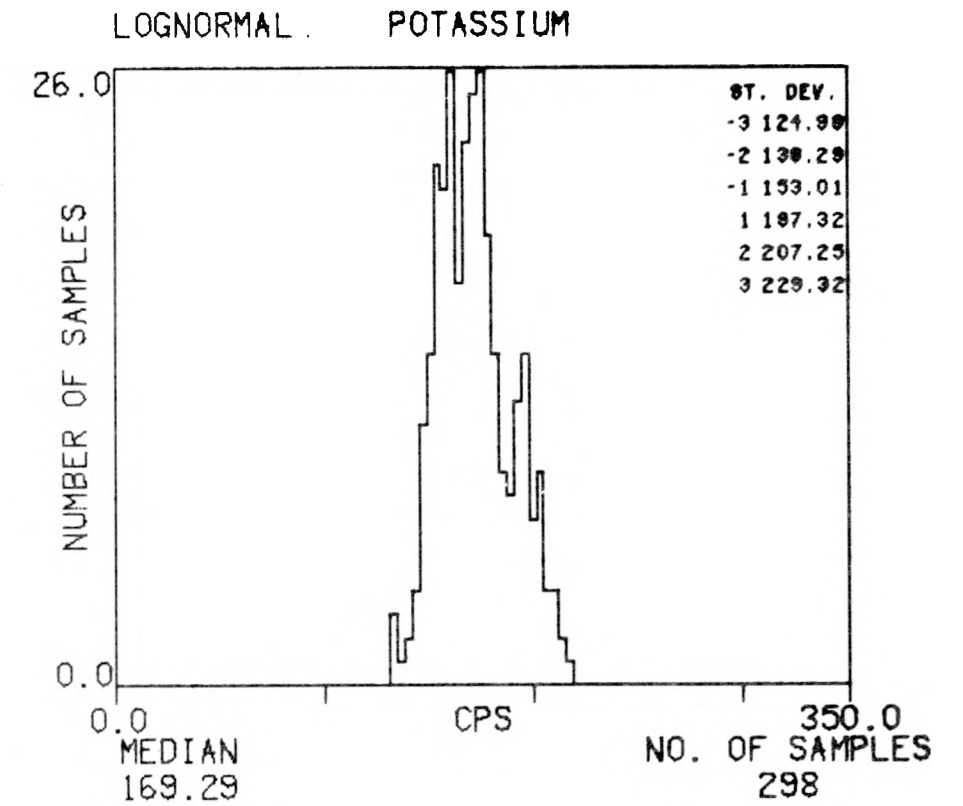
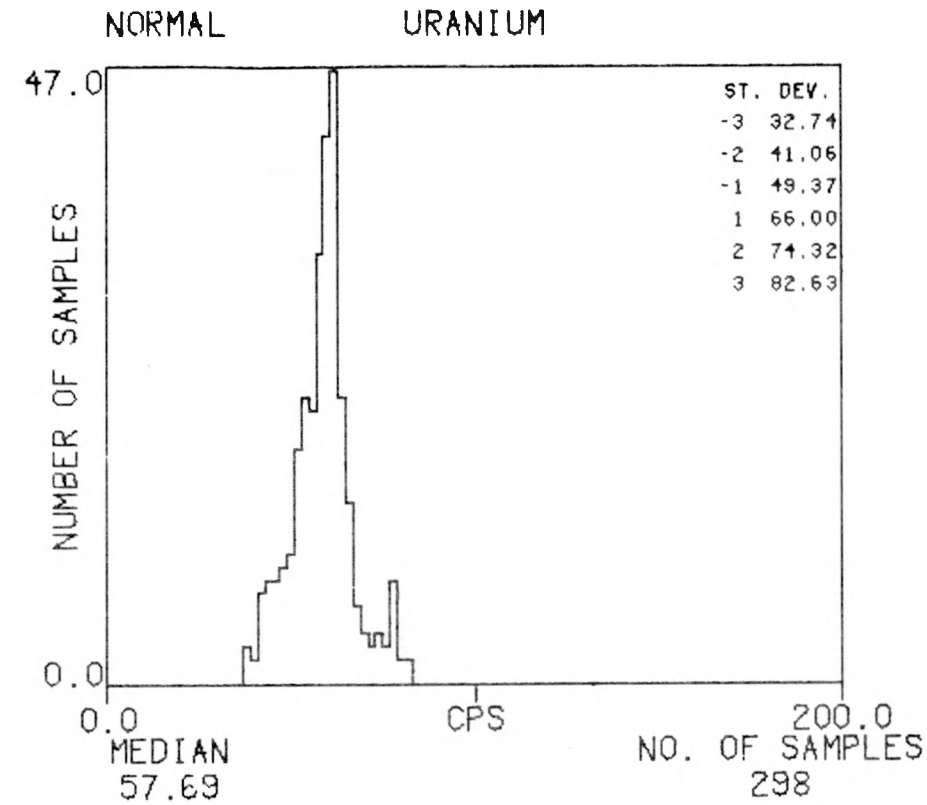
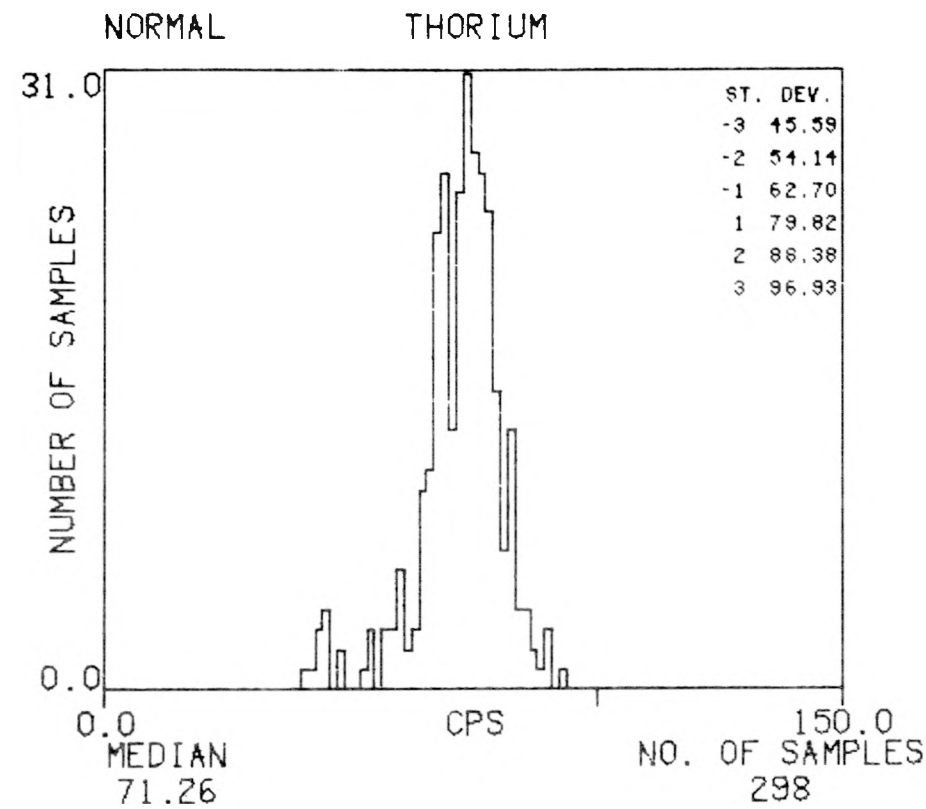
HISTOGRAMS : PCQS-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



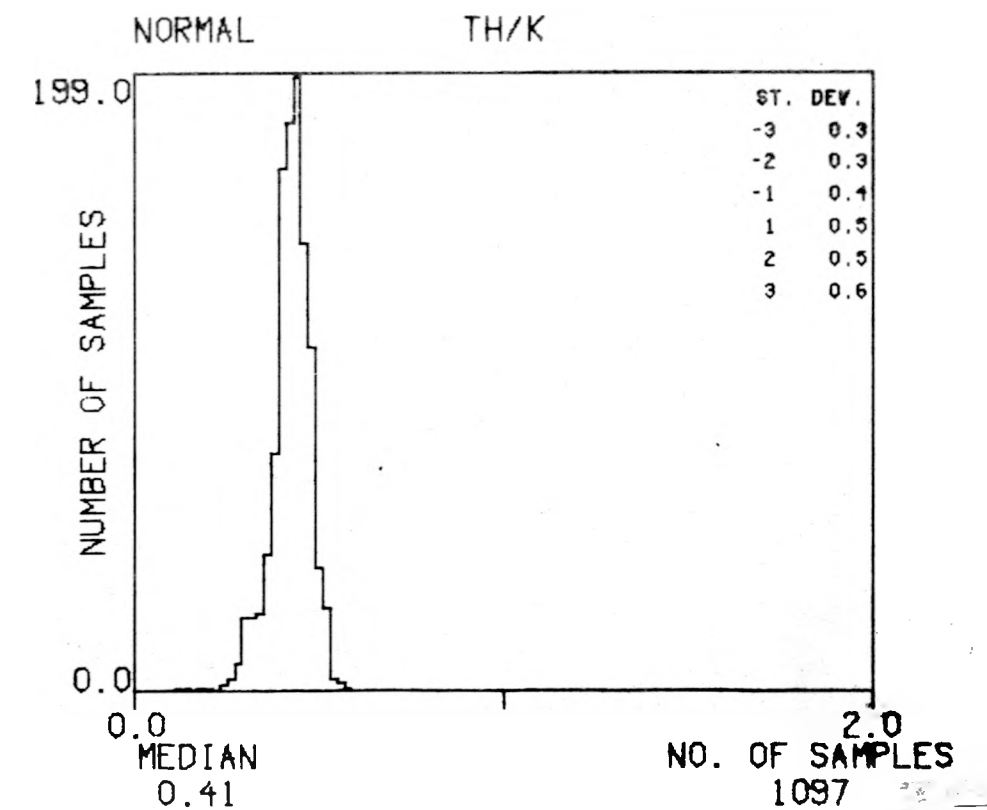
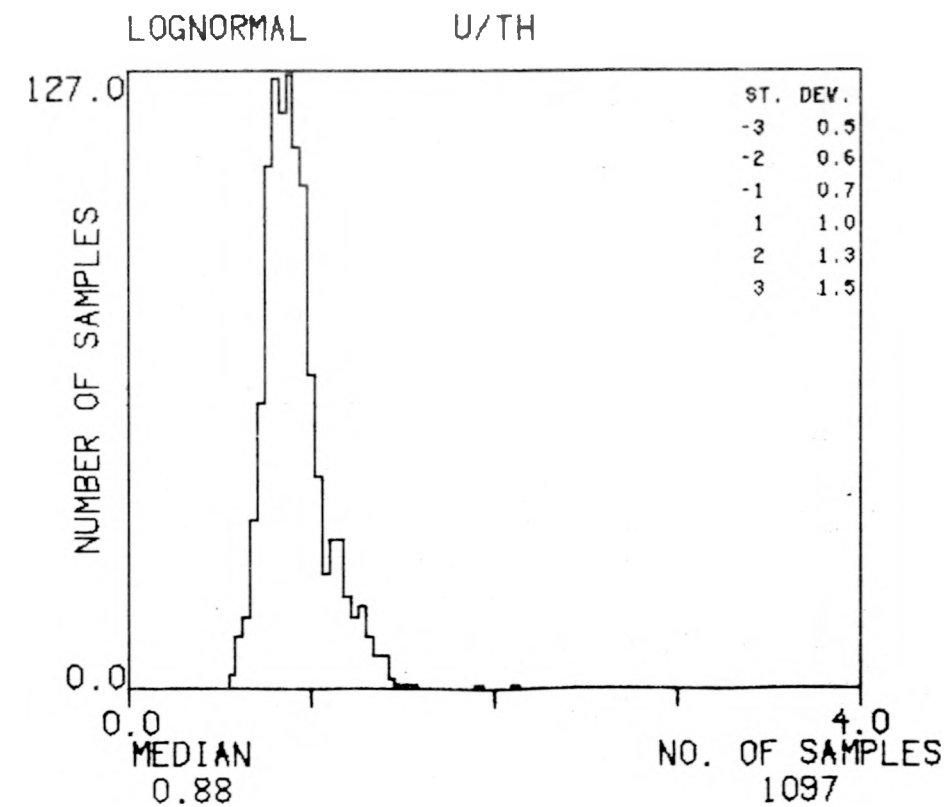
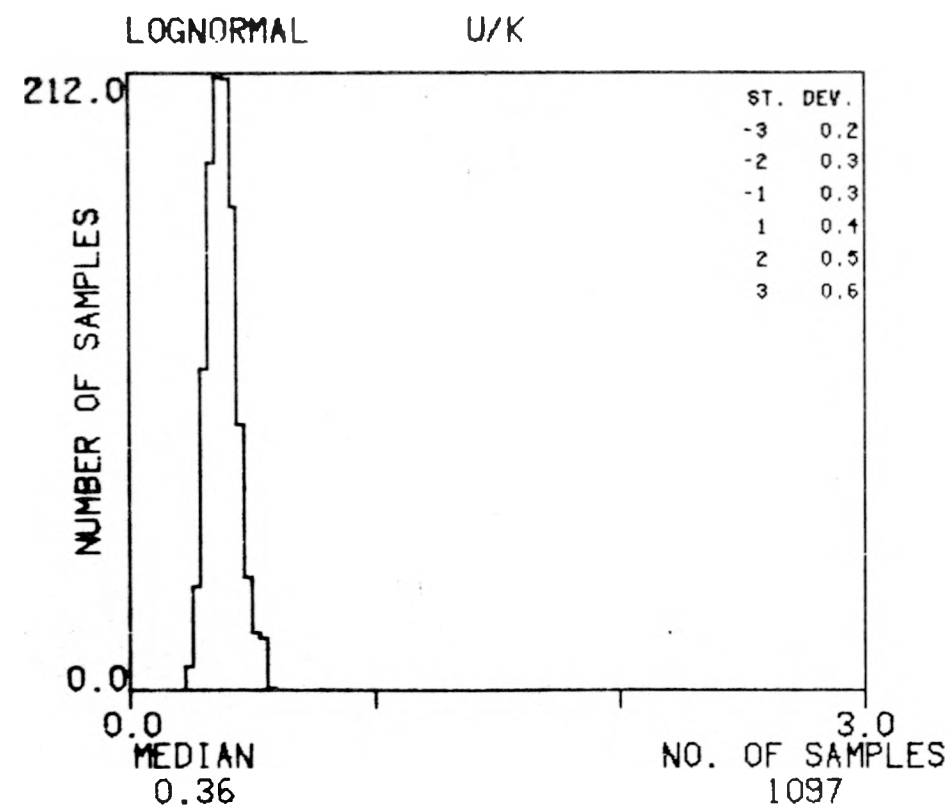
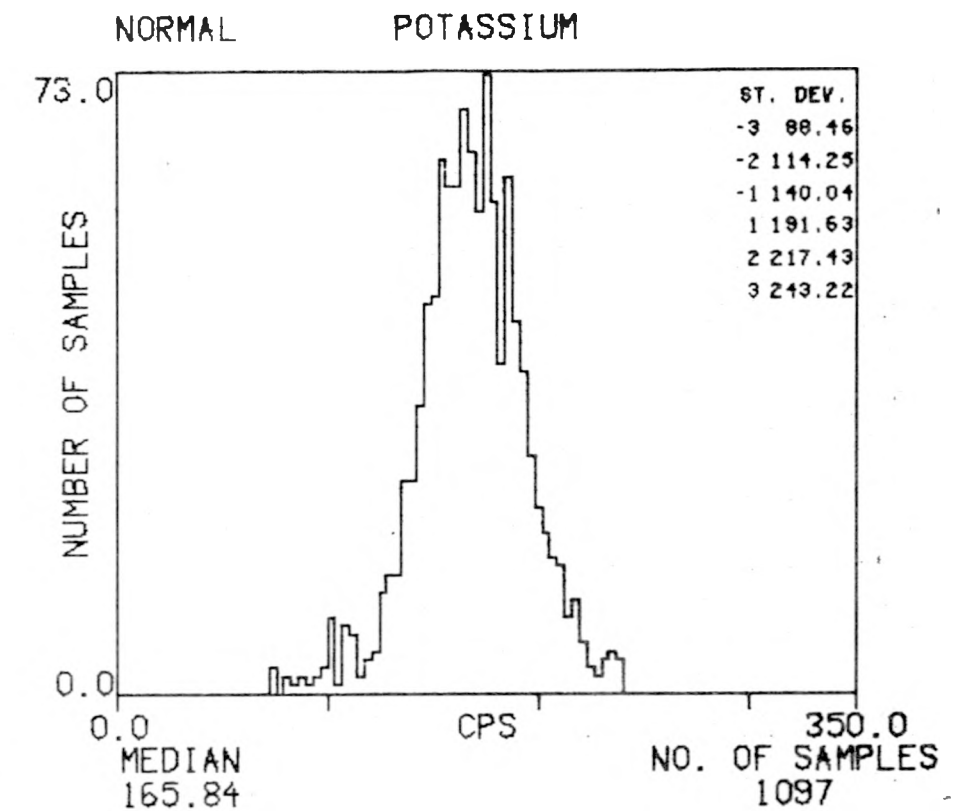
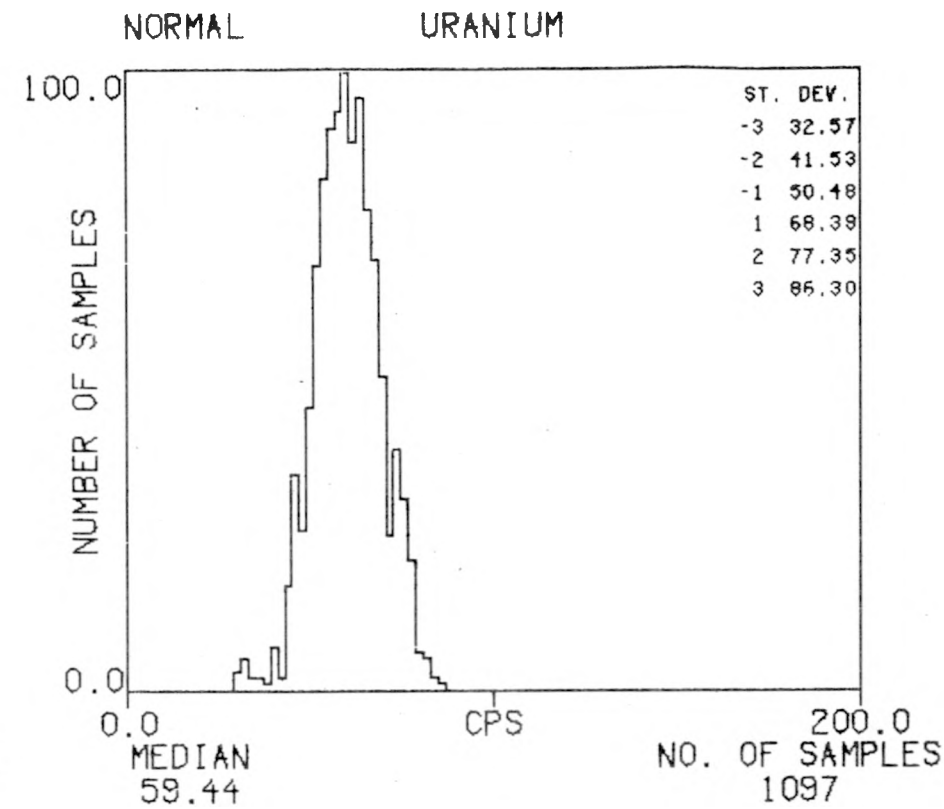
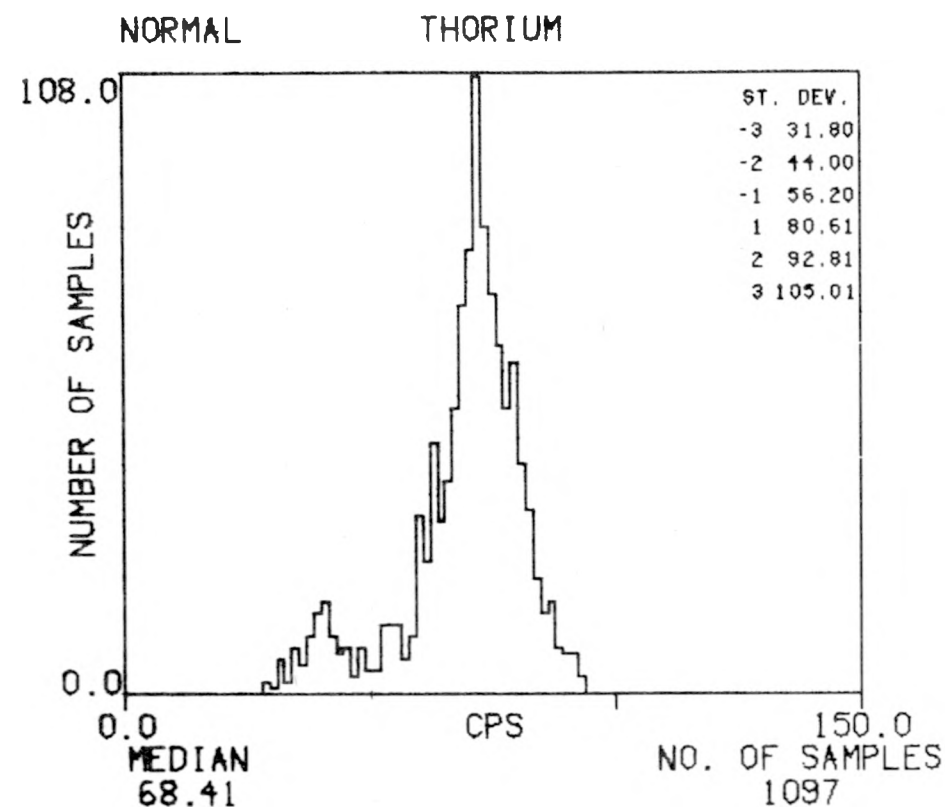
HISTOGRAMS : PCMS

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



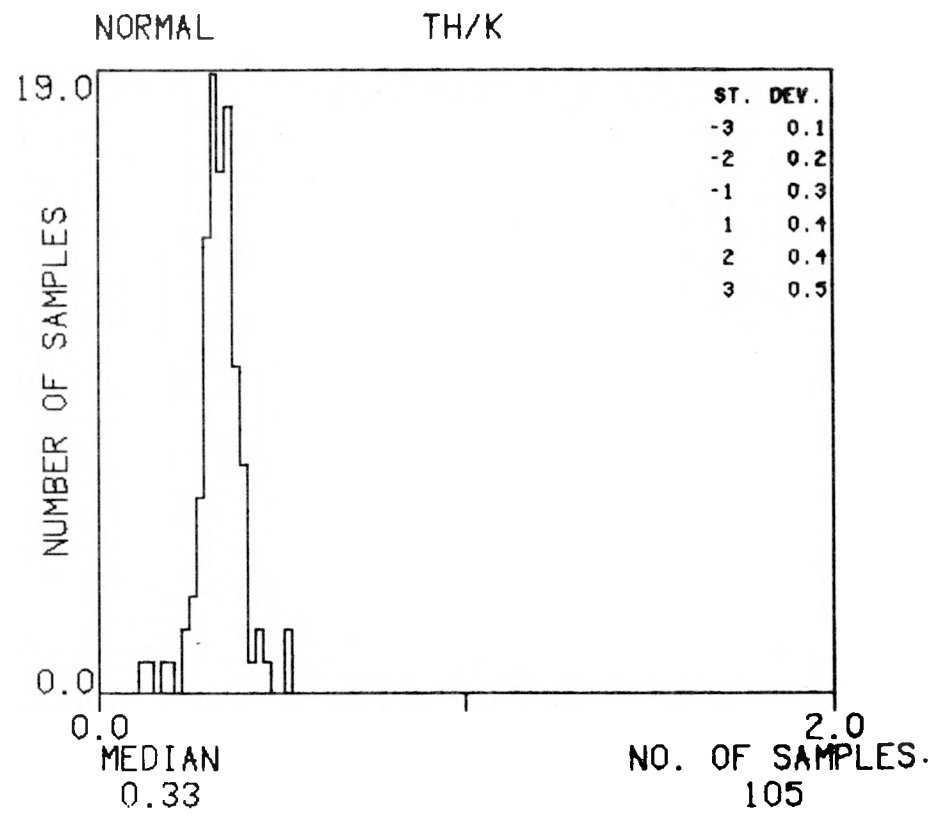
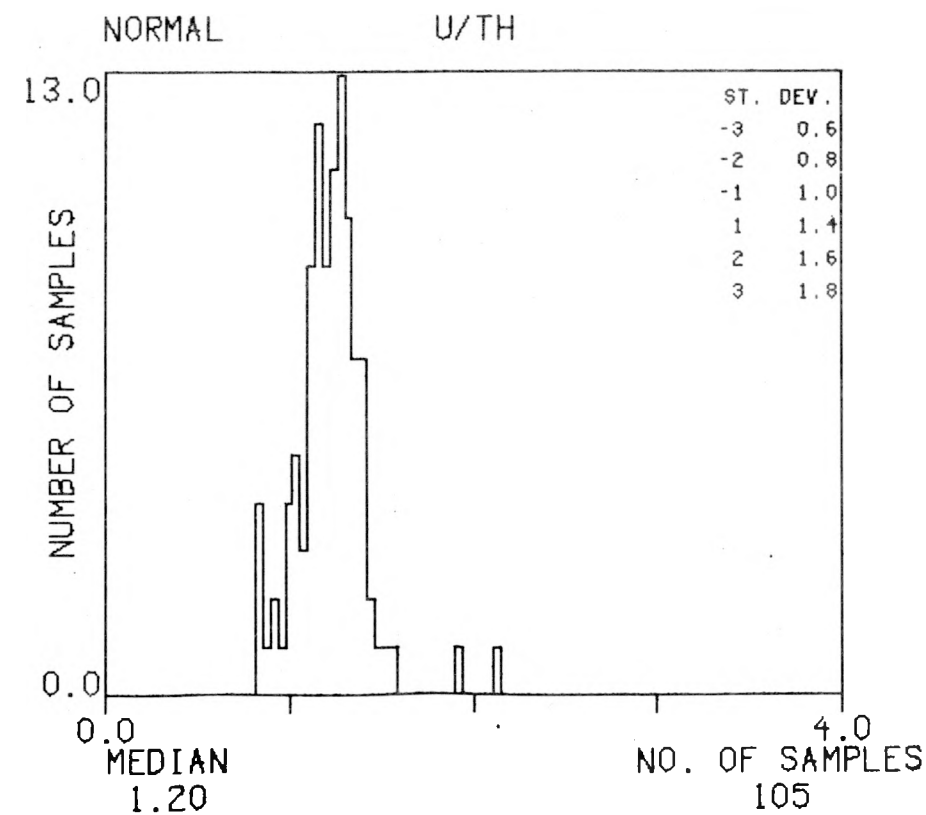
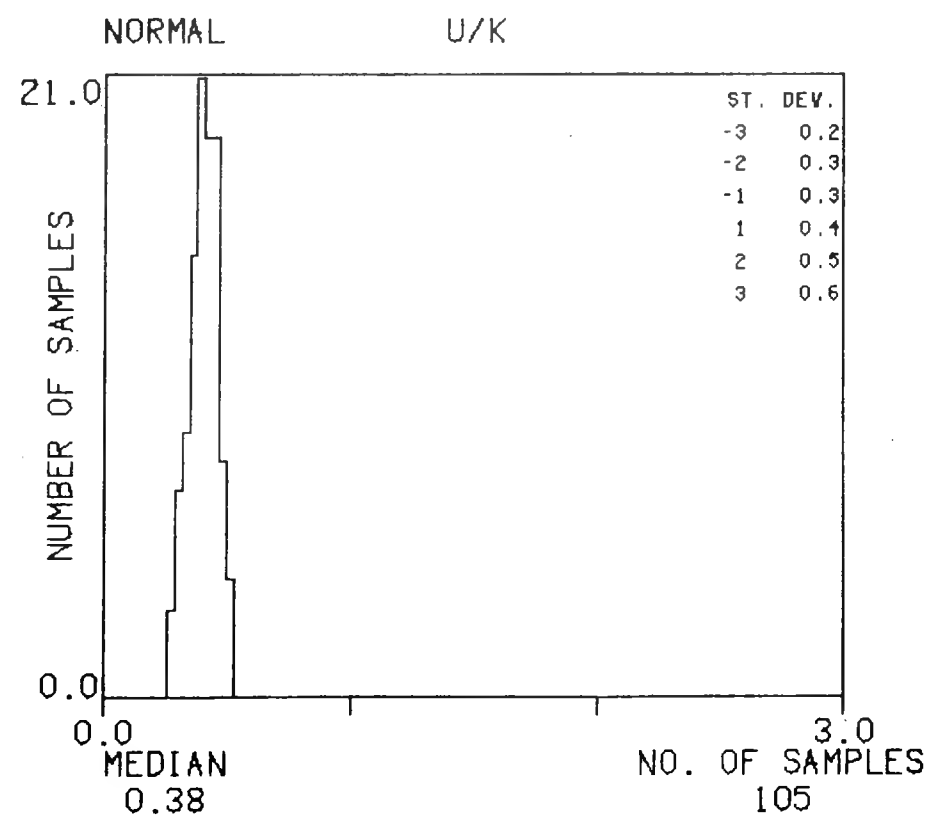
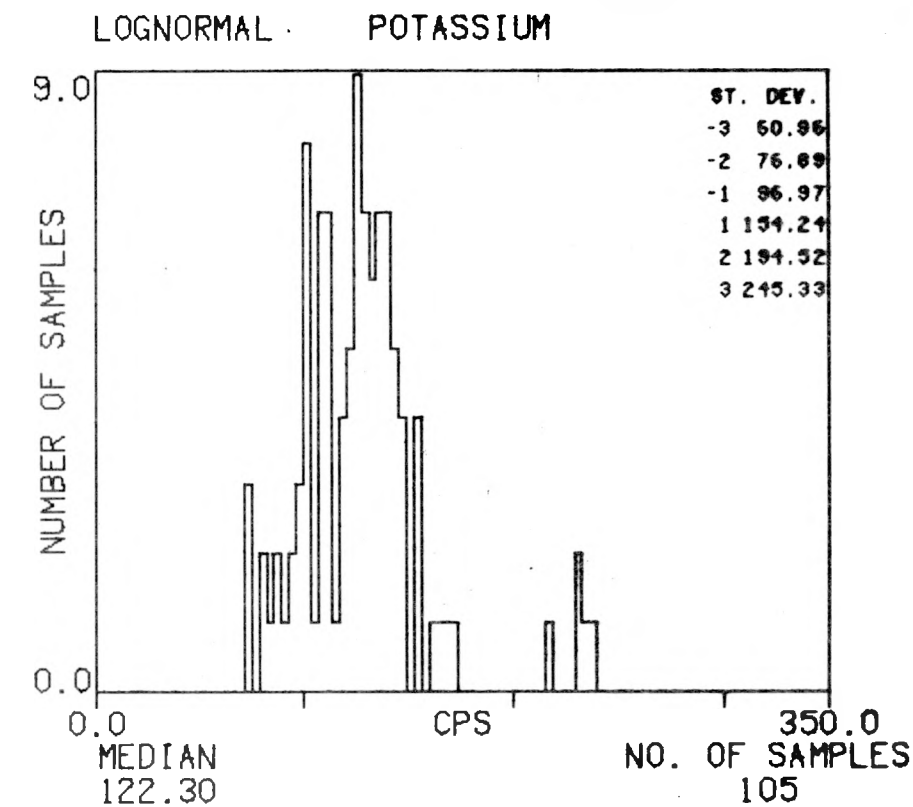
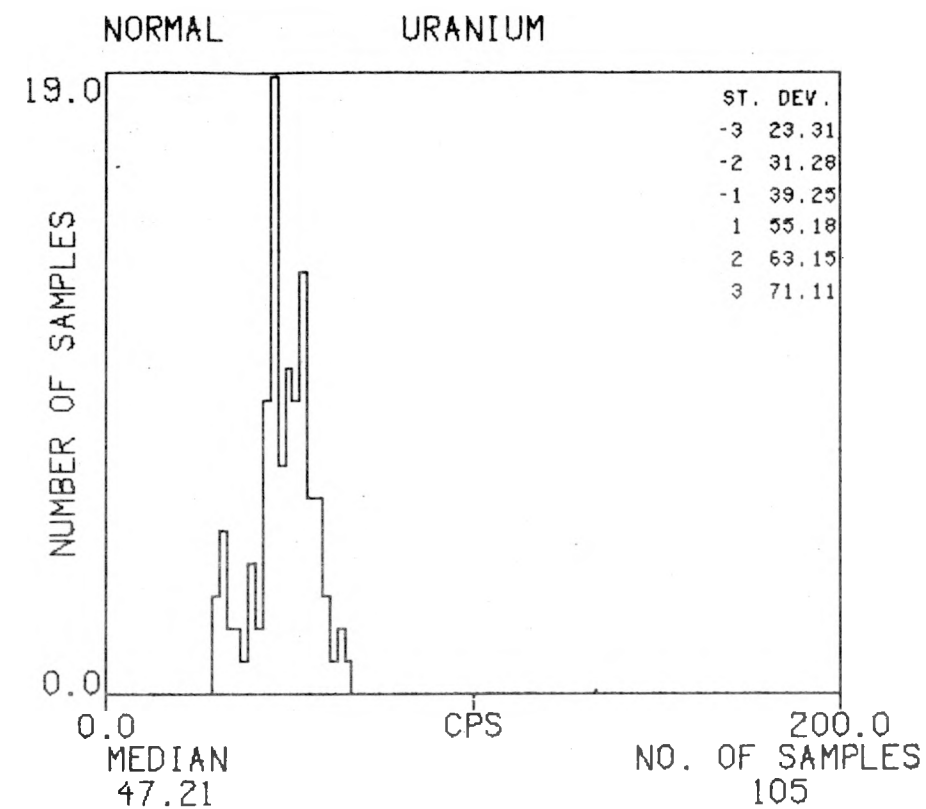
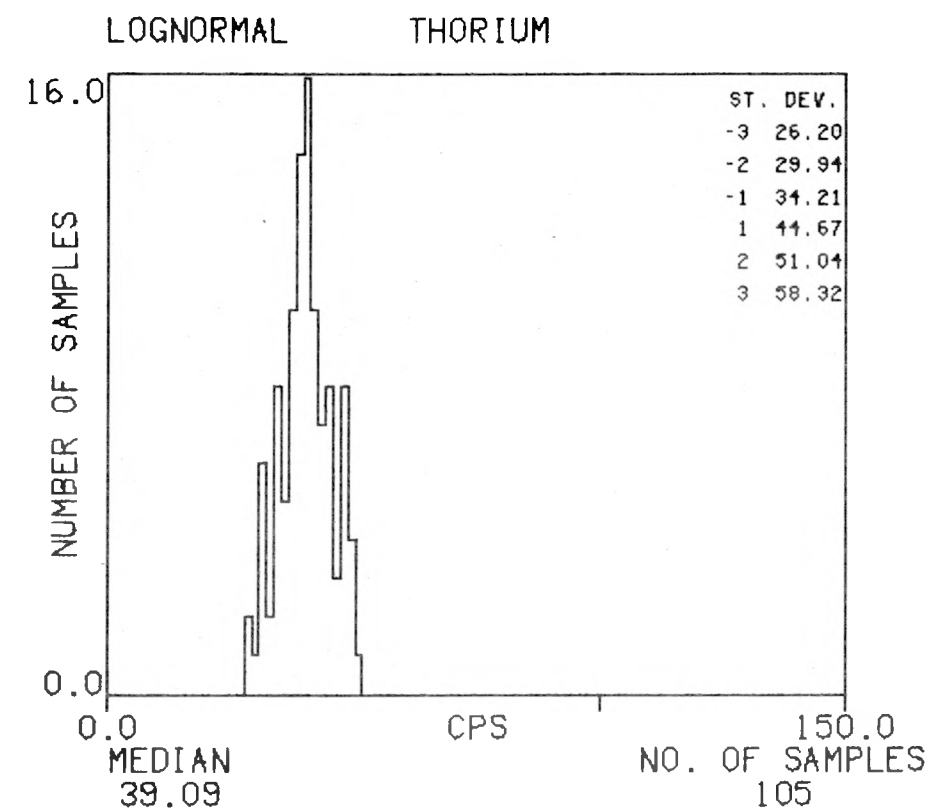
HISTOGRAMS : PCBG

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



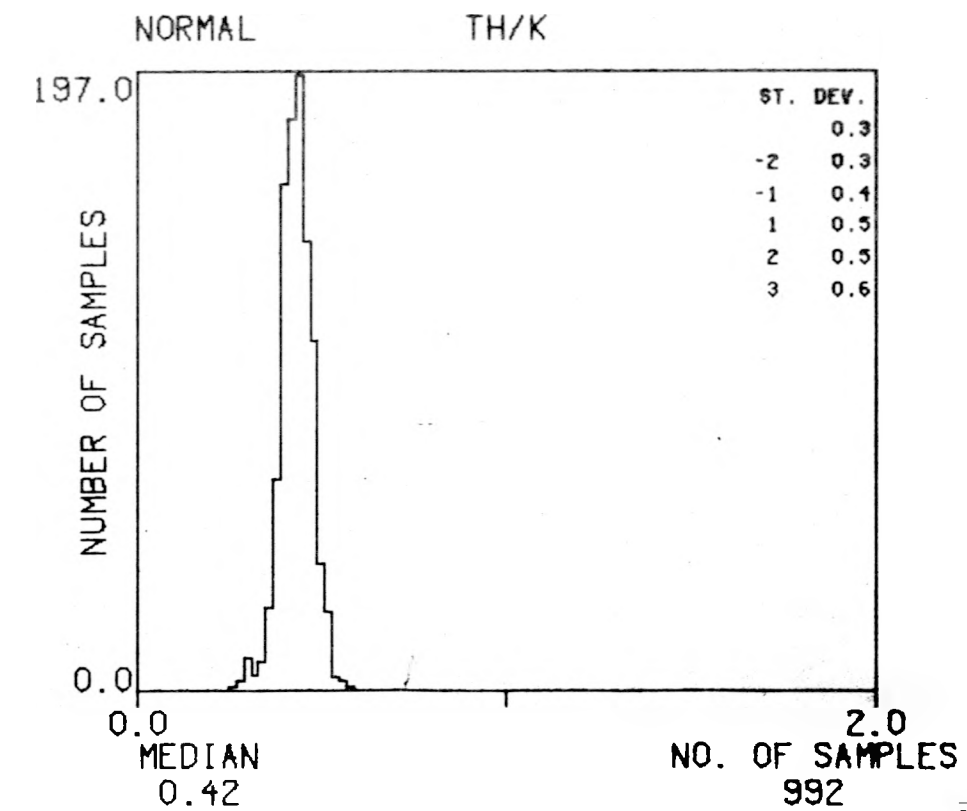
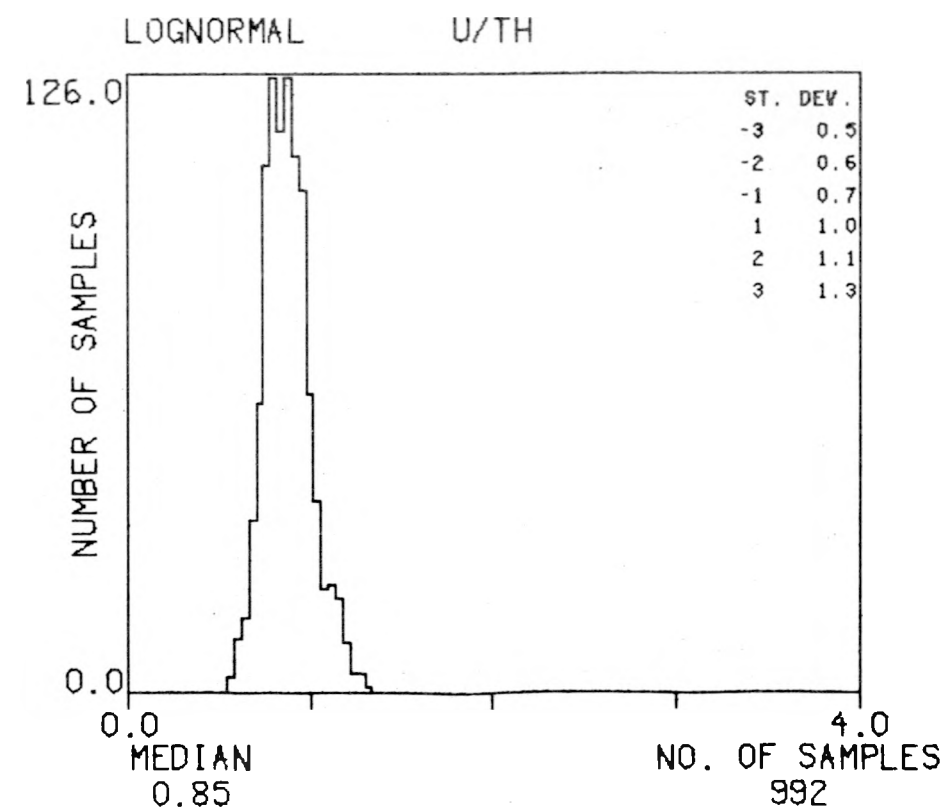
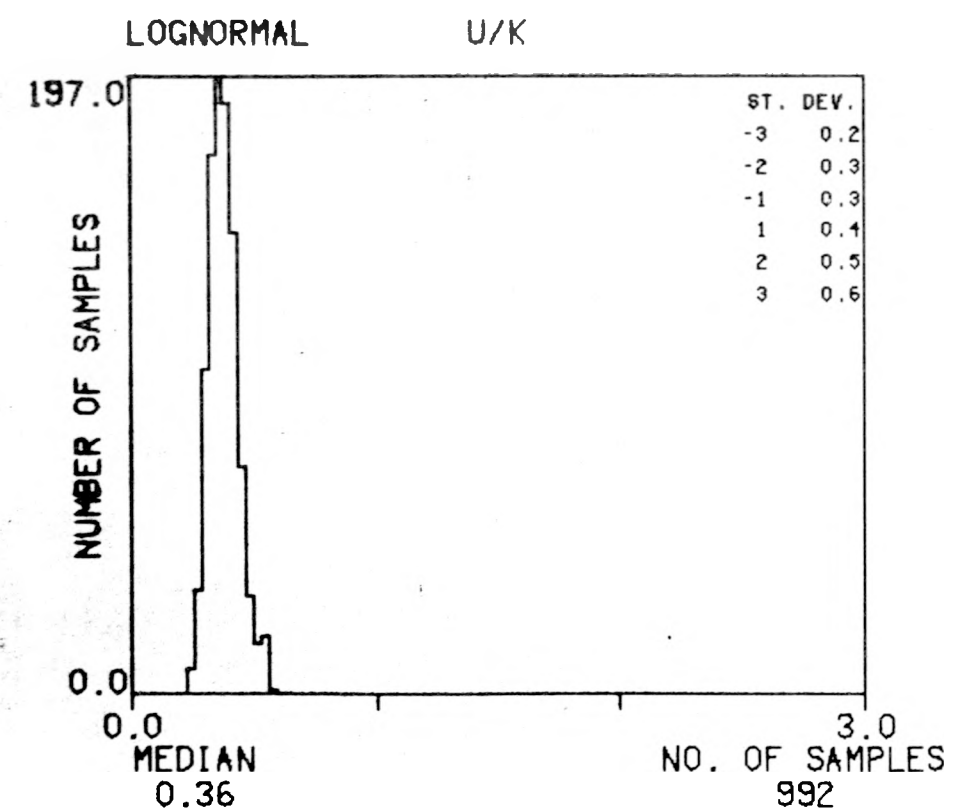
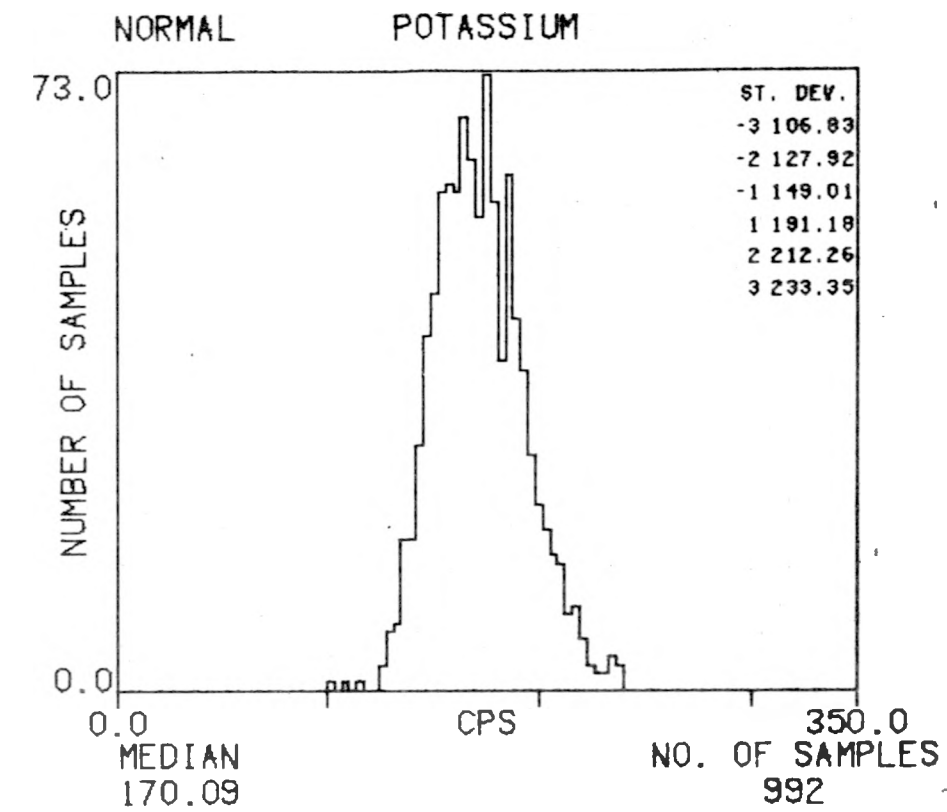
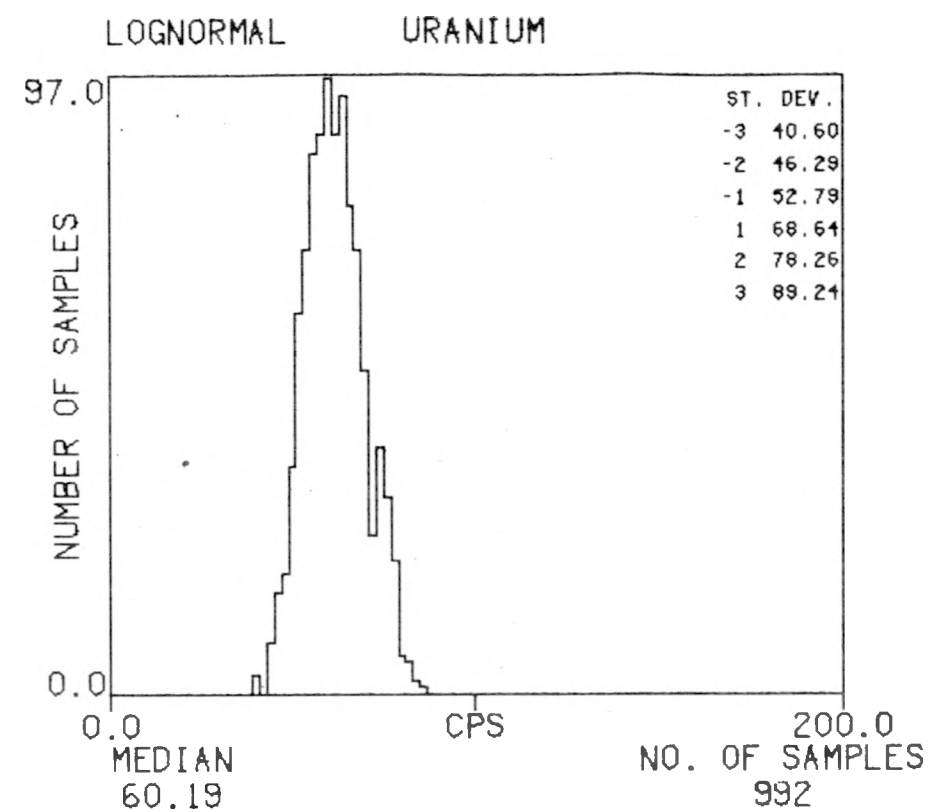
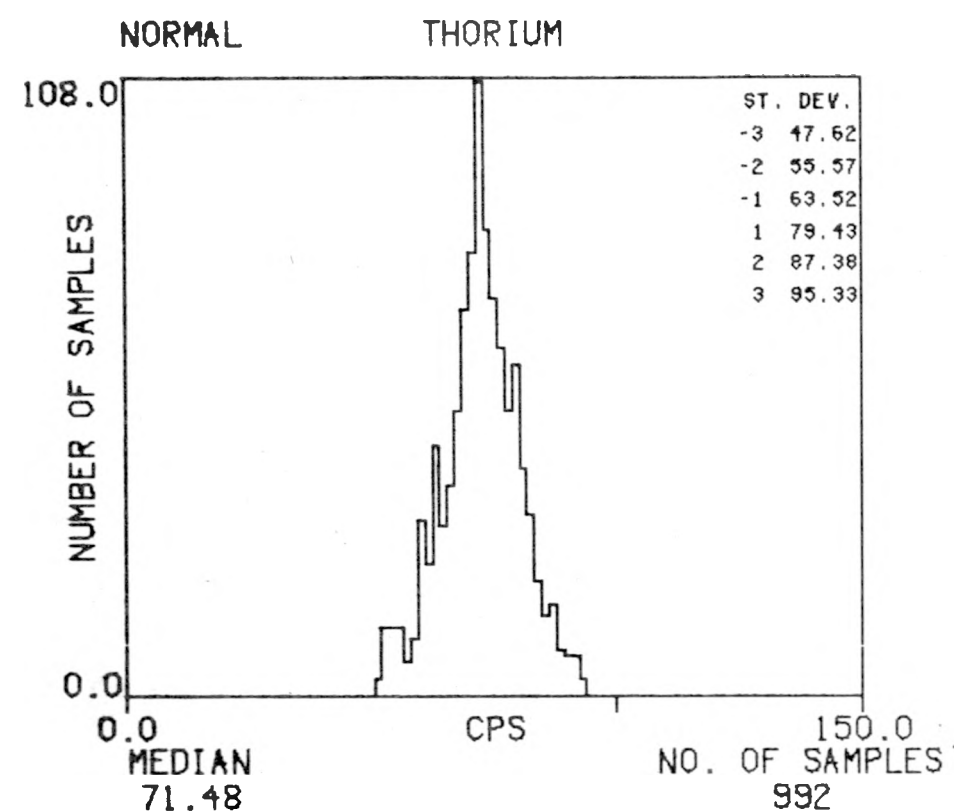
HISTOGRAMS : PCBG-1

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



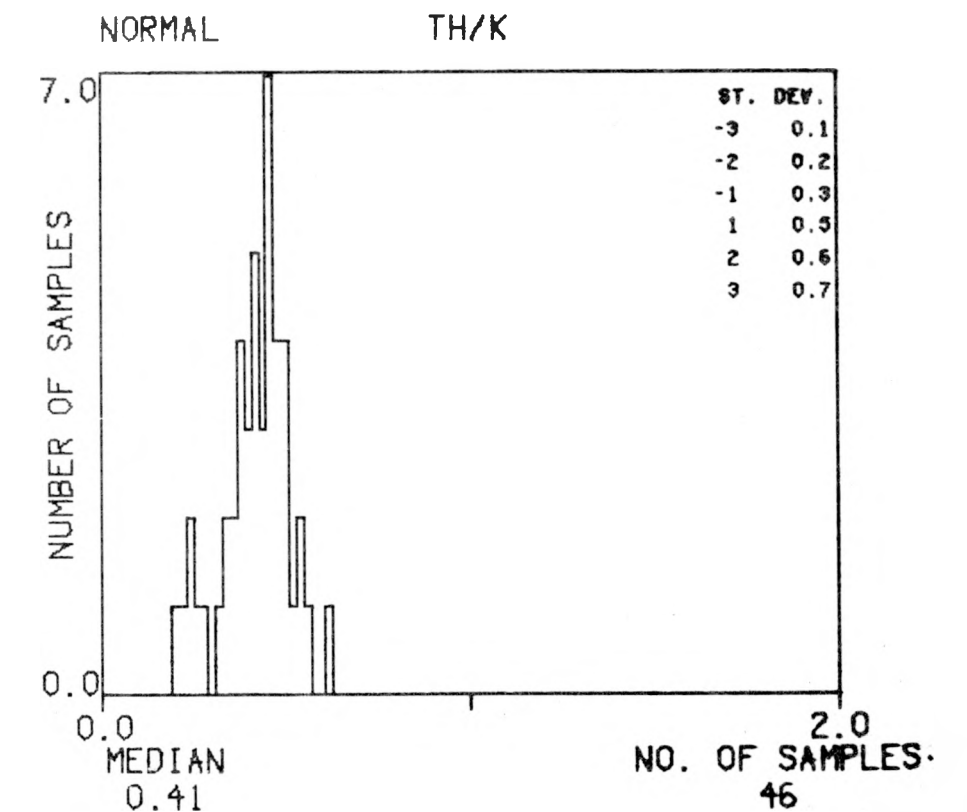
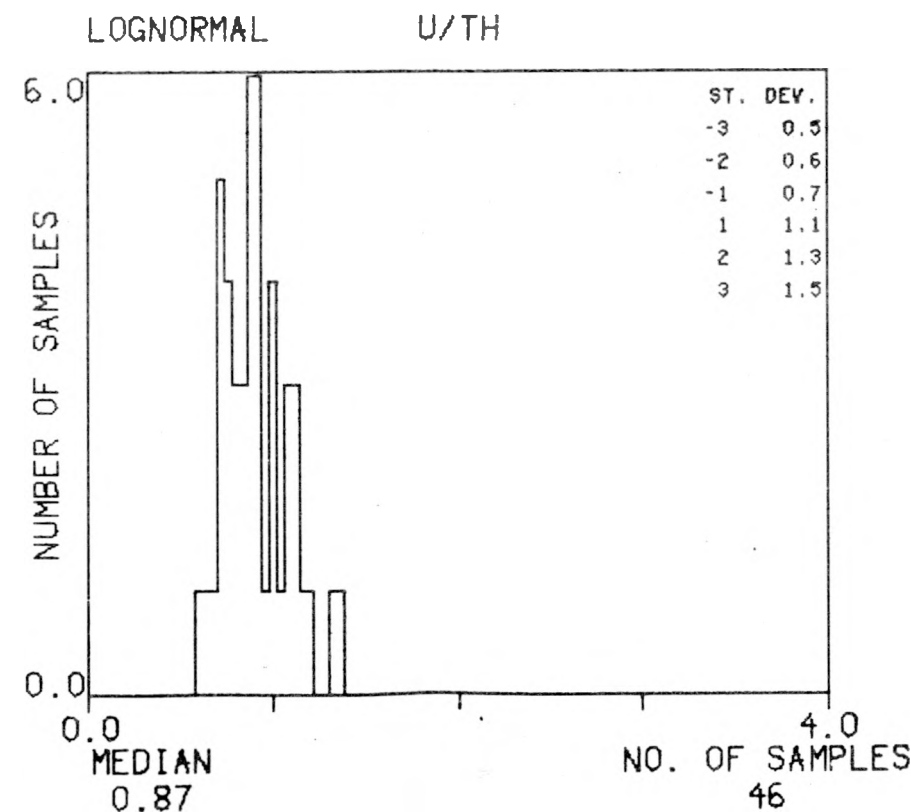
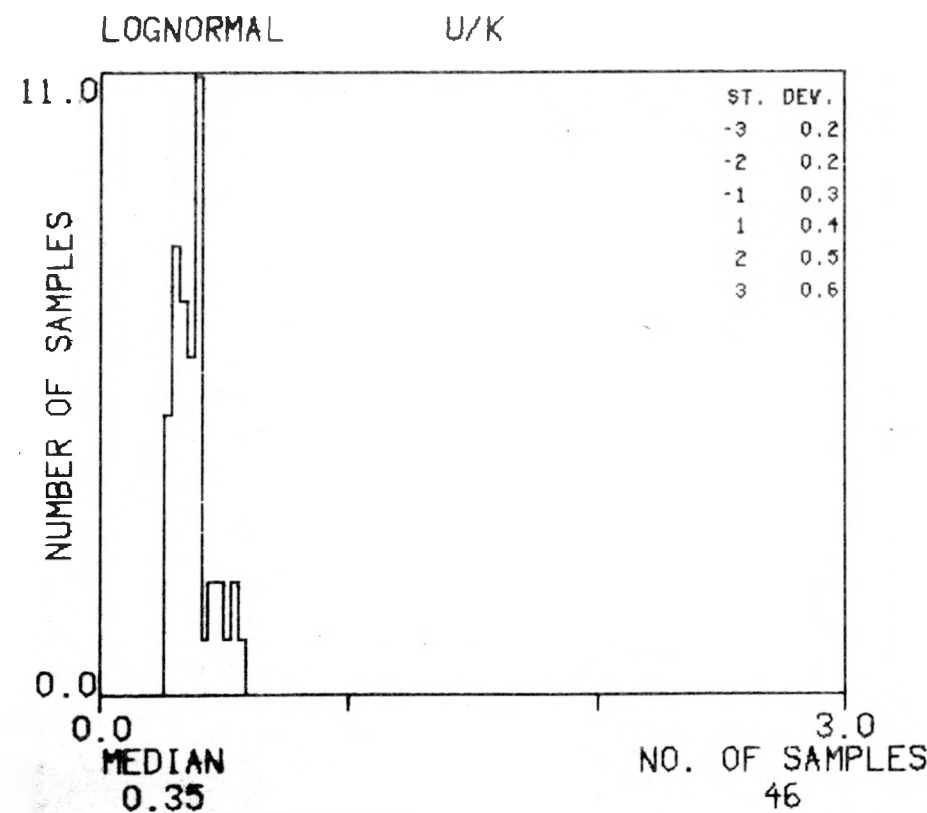
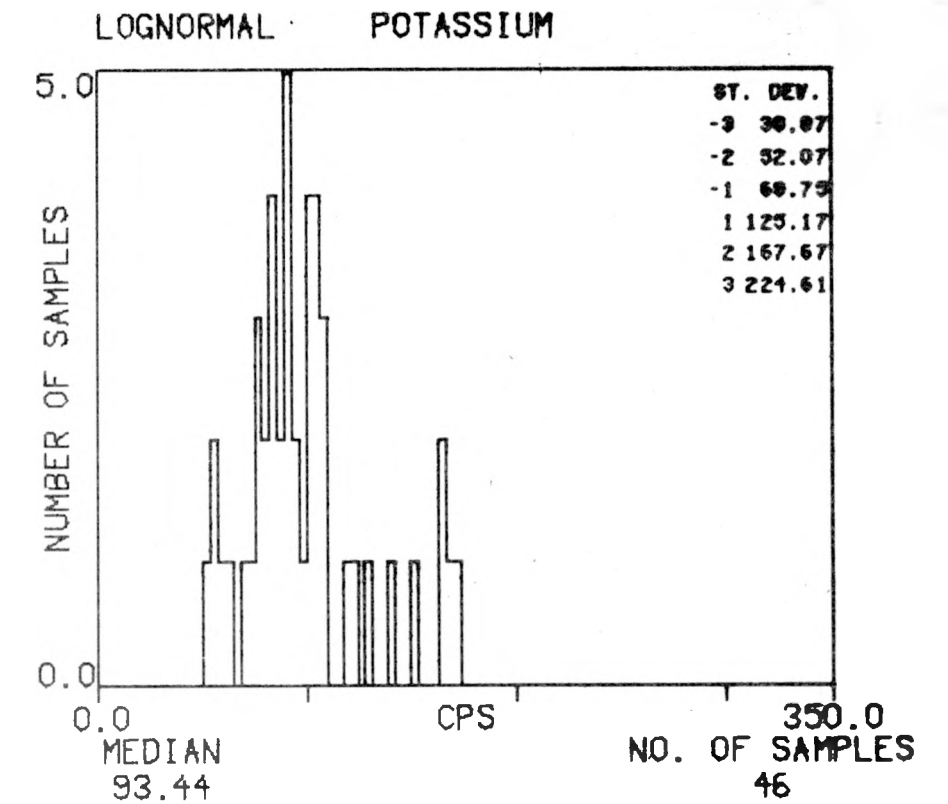
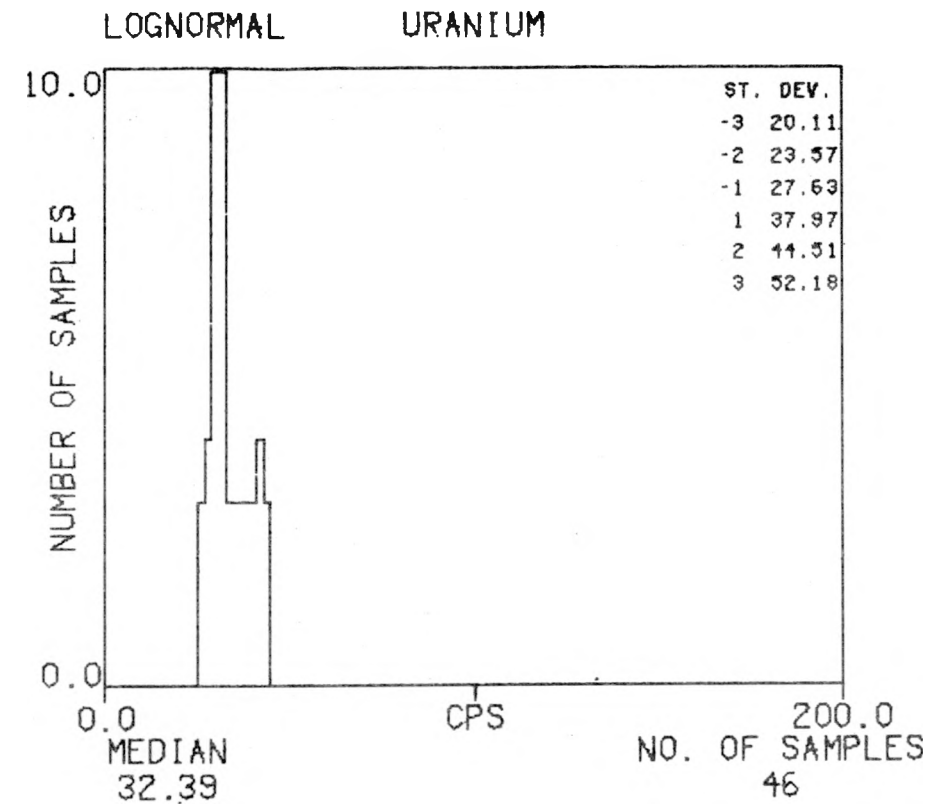
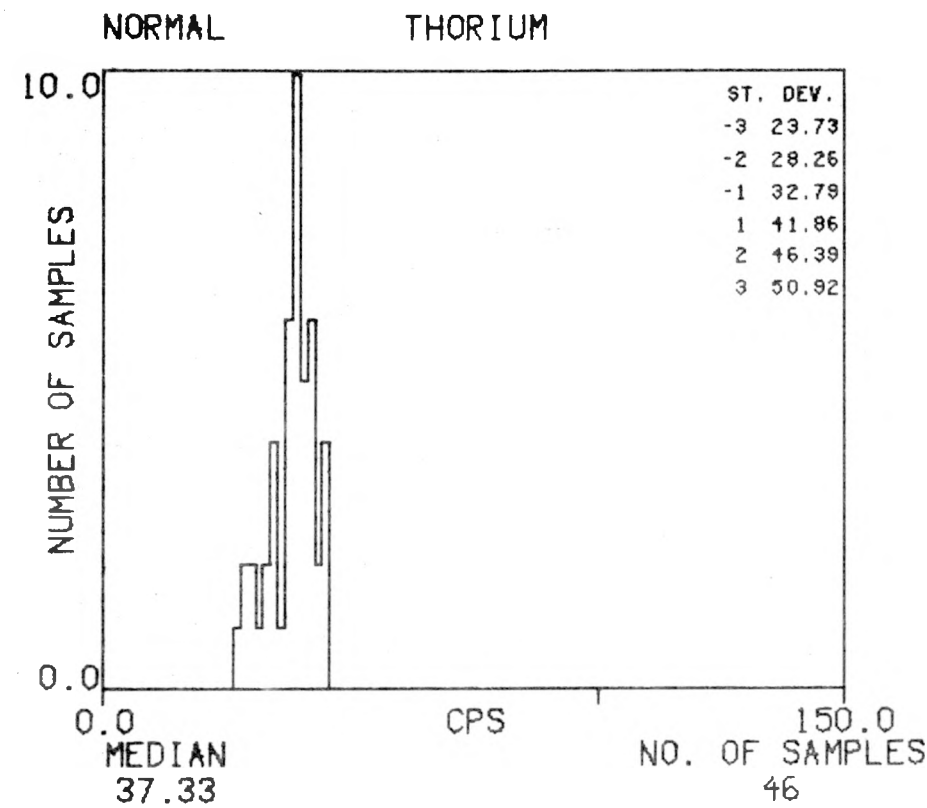
HISTOGRAMS : PCBG-2

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



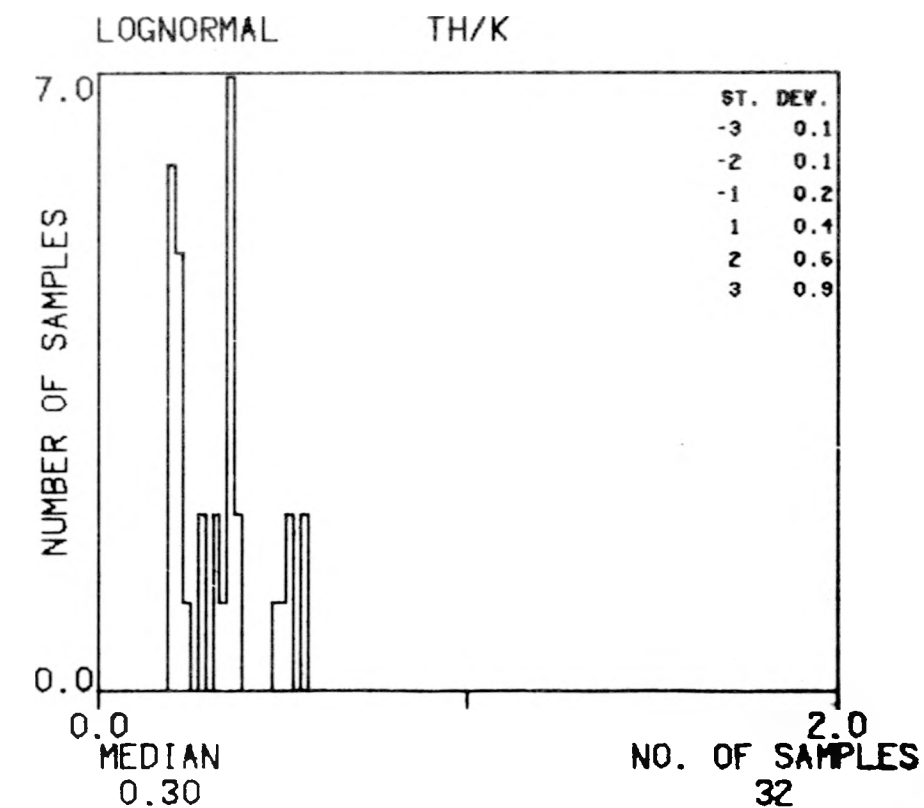
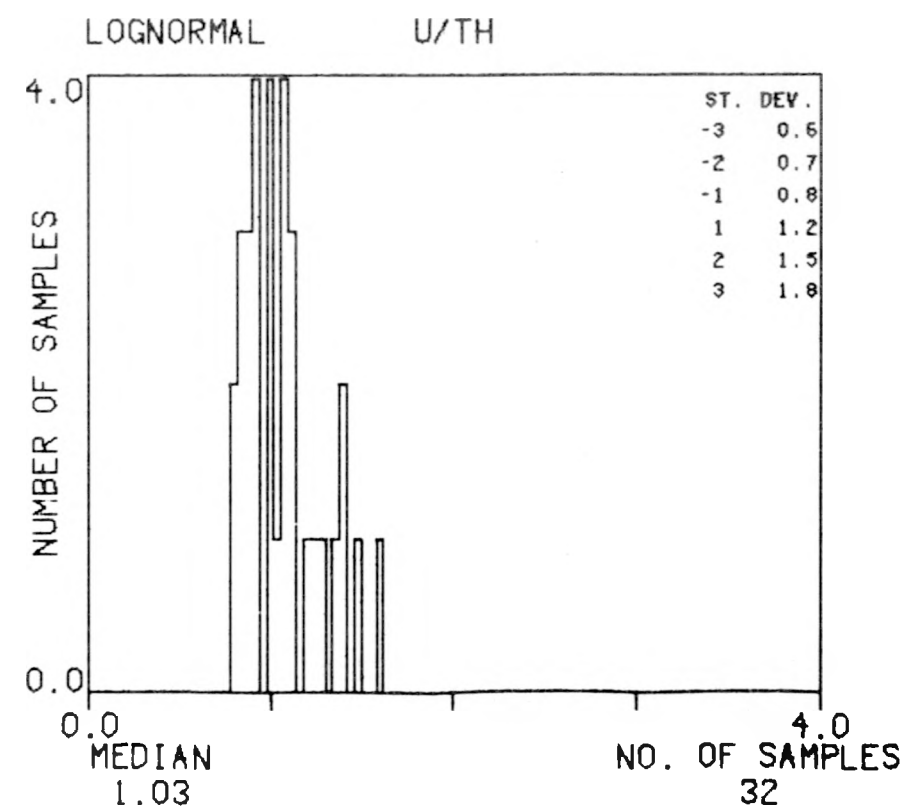
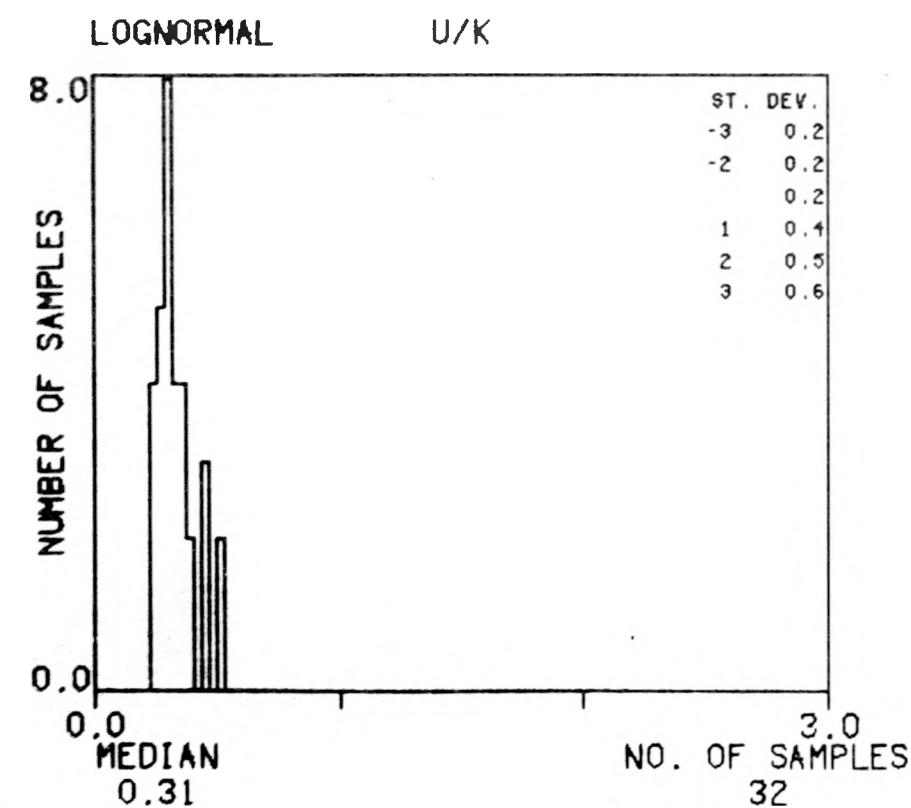
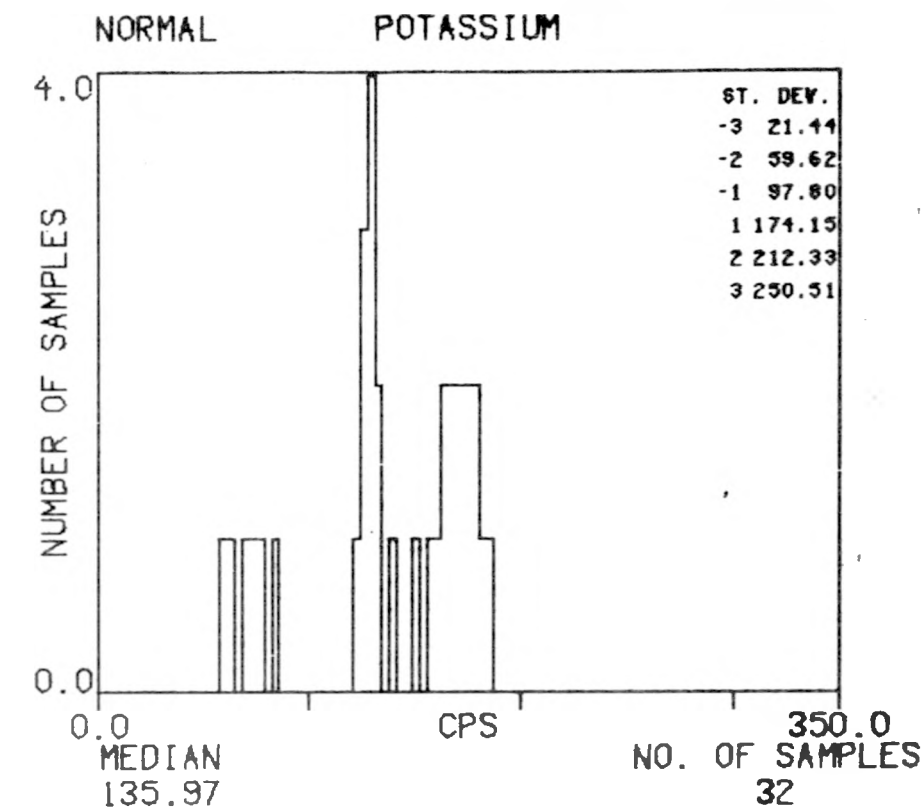
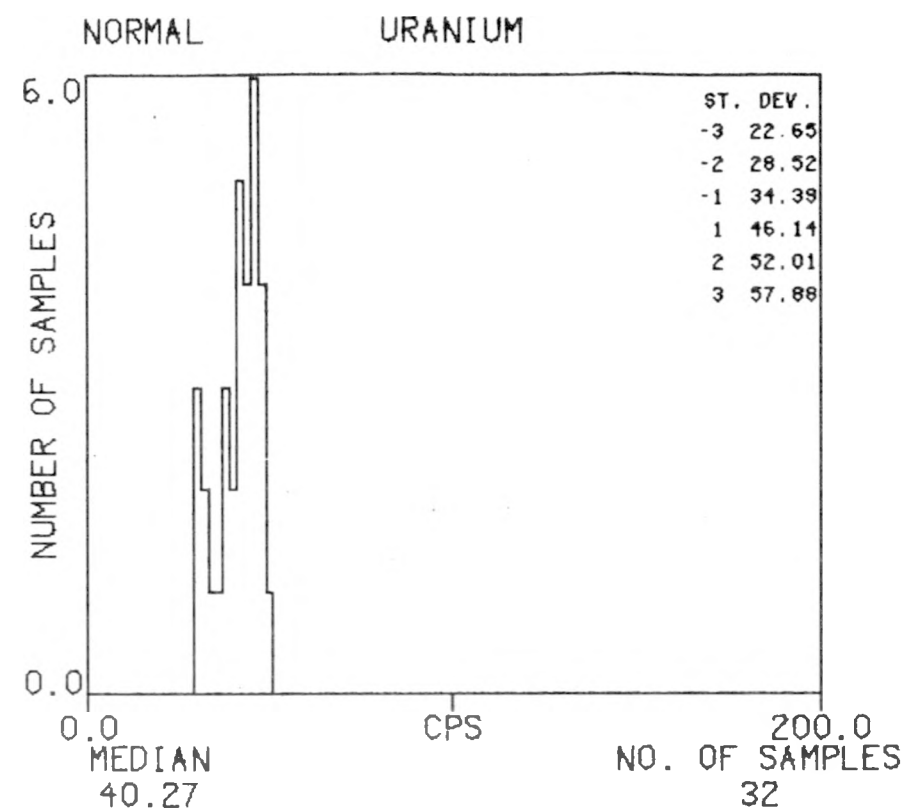
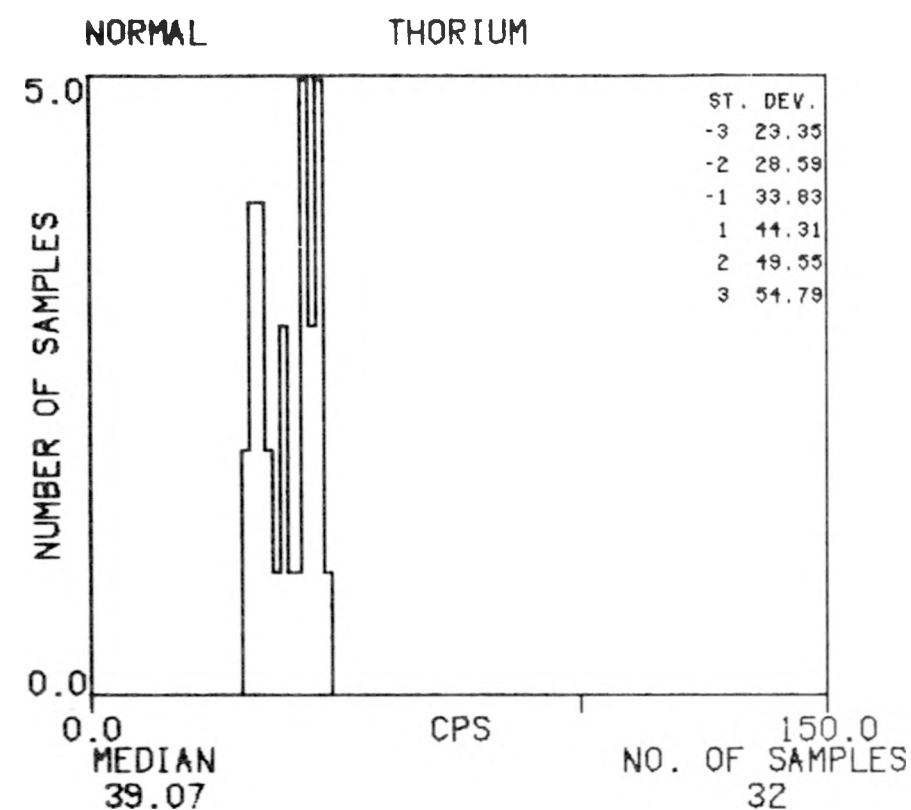
HISTOGRAMS : PCMP

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



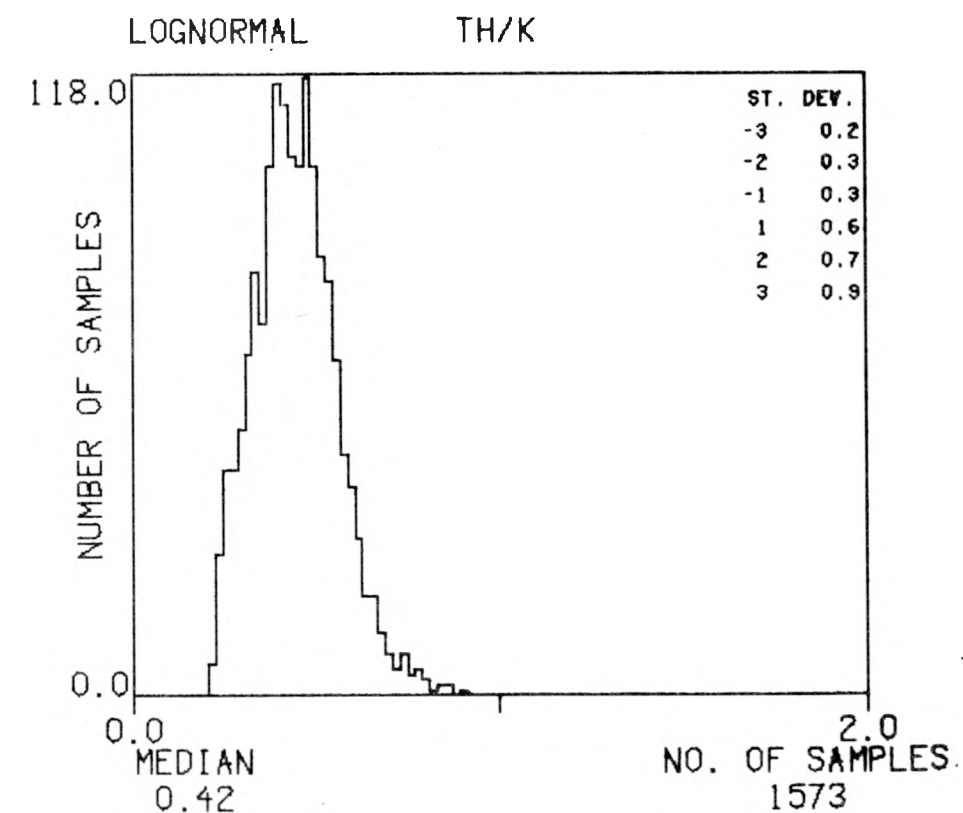
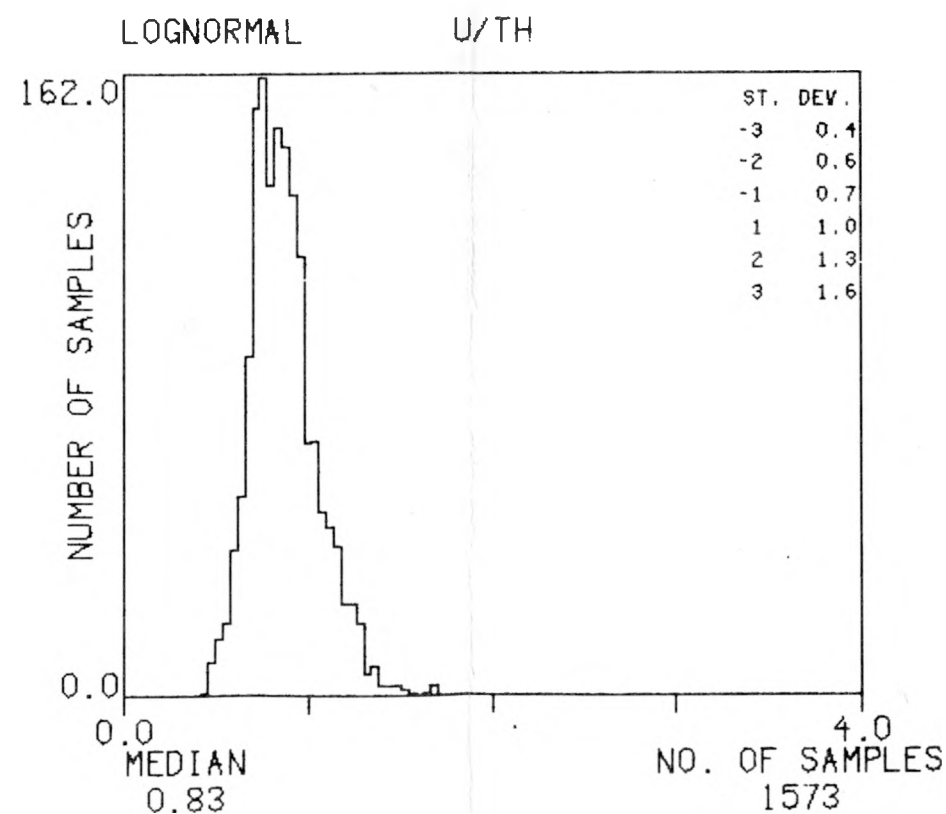
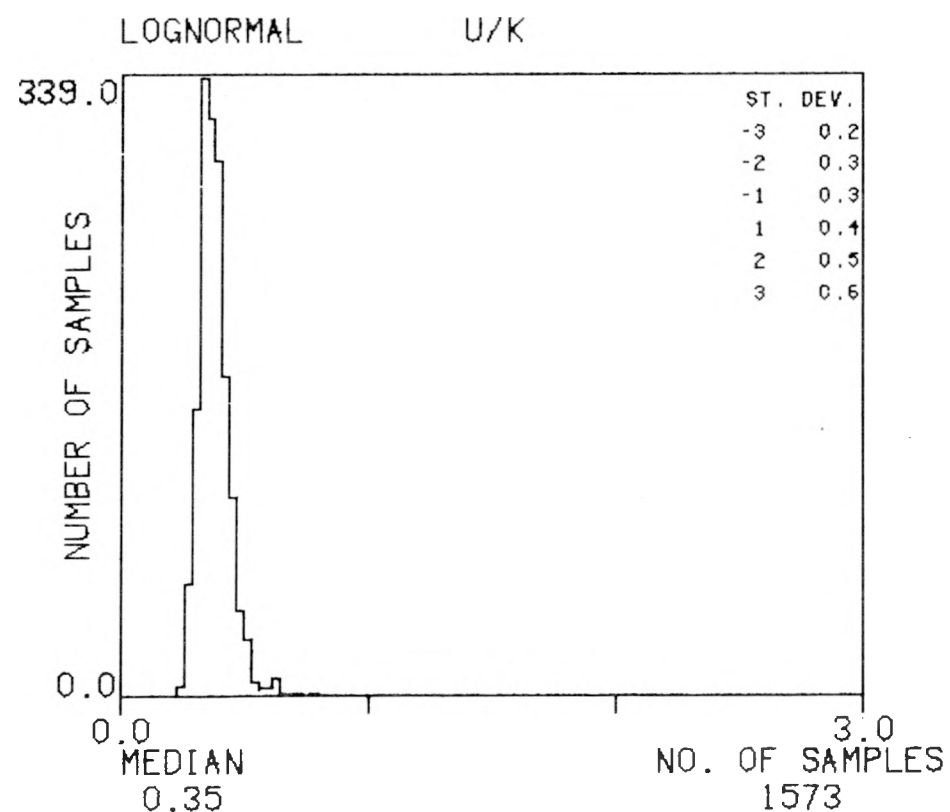
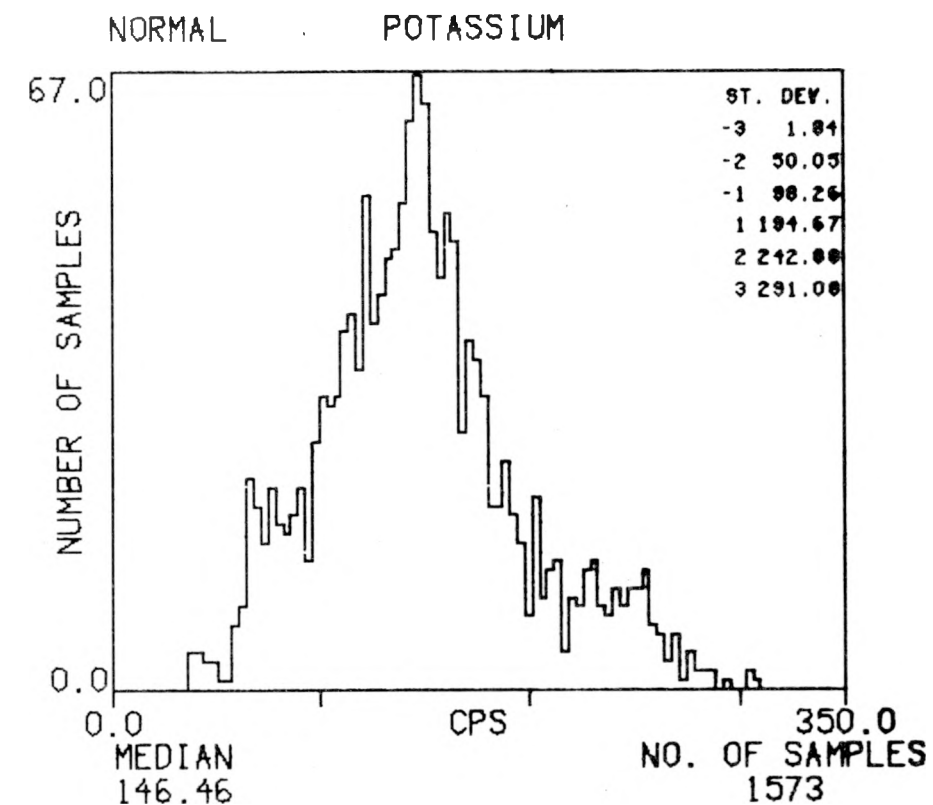
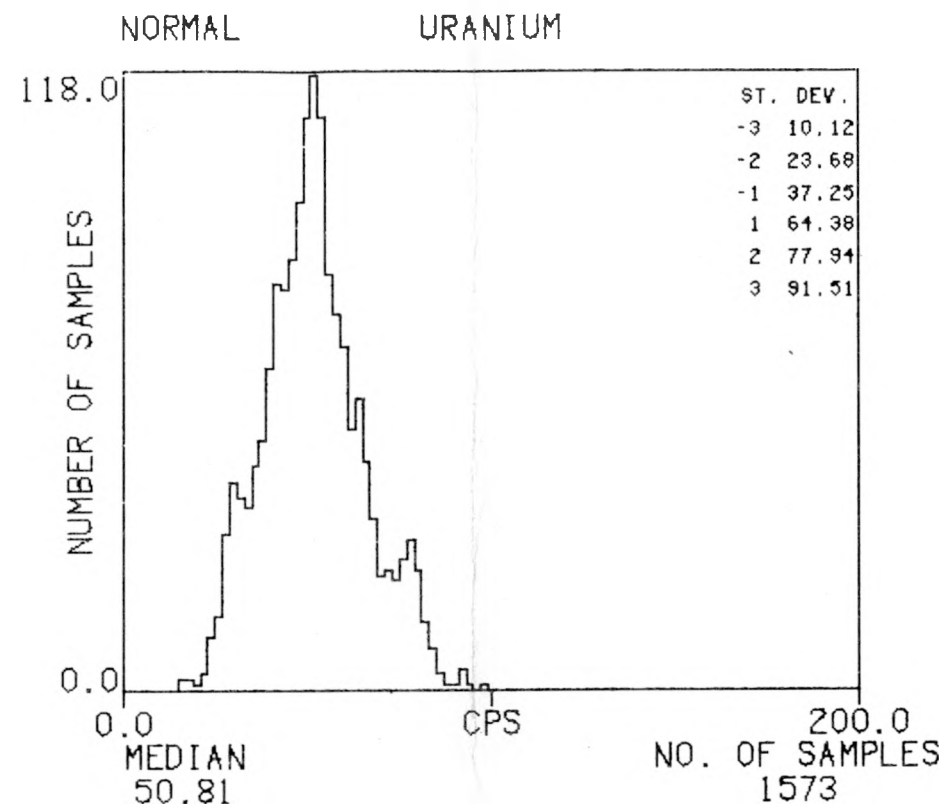
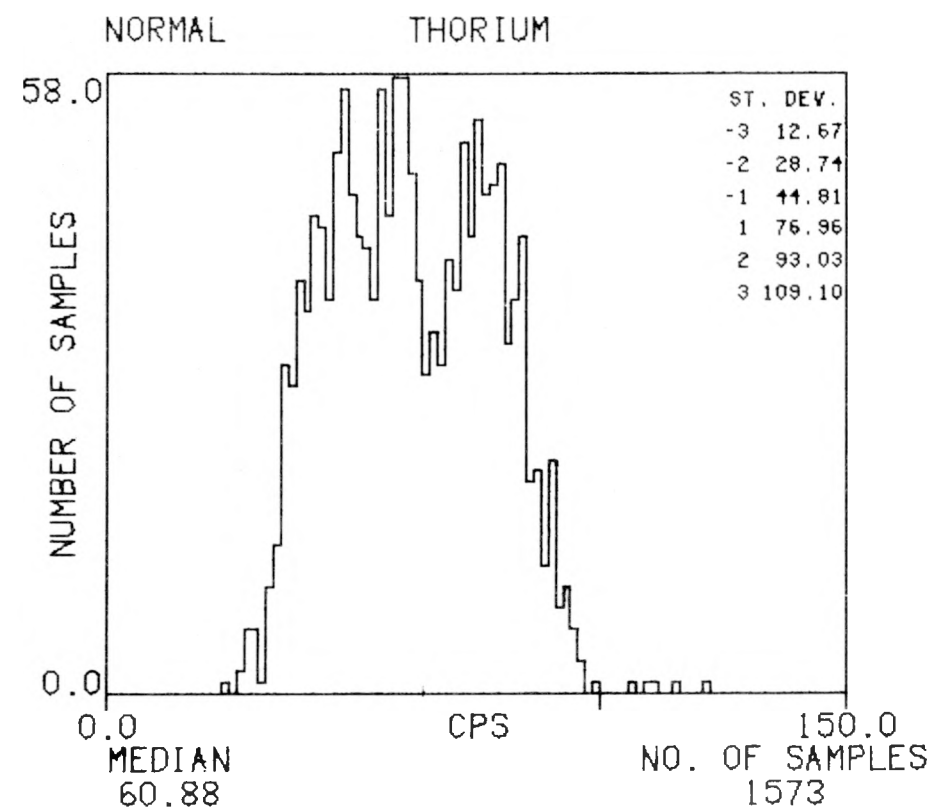
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TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



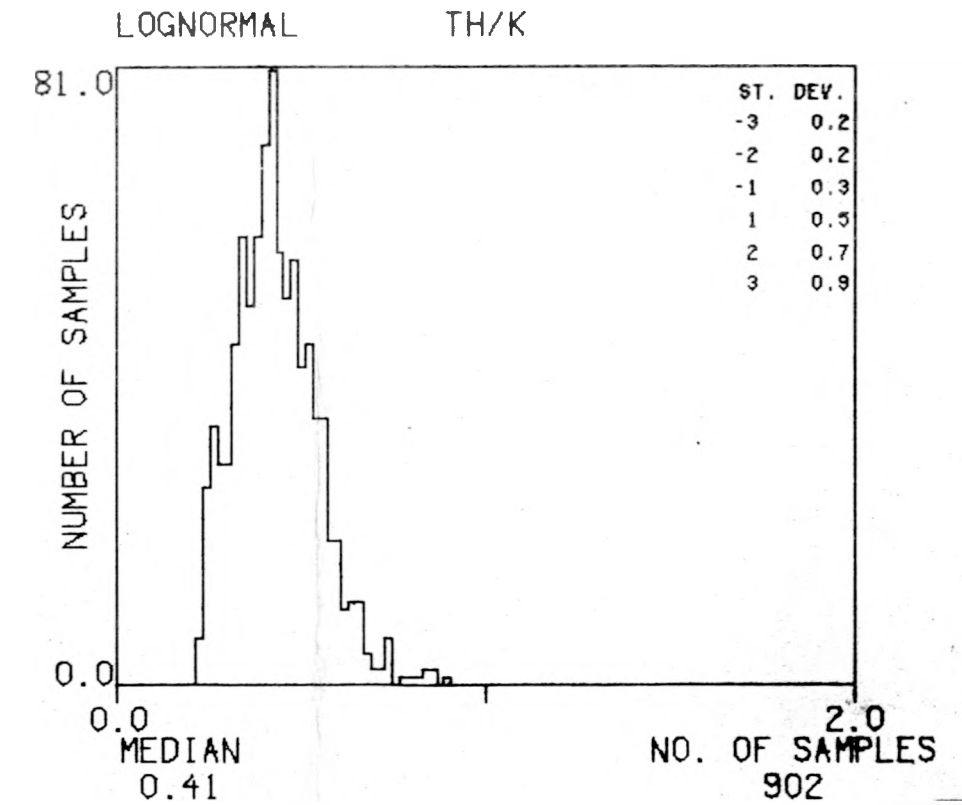
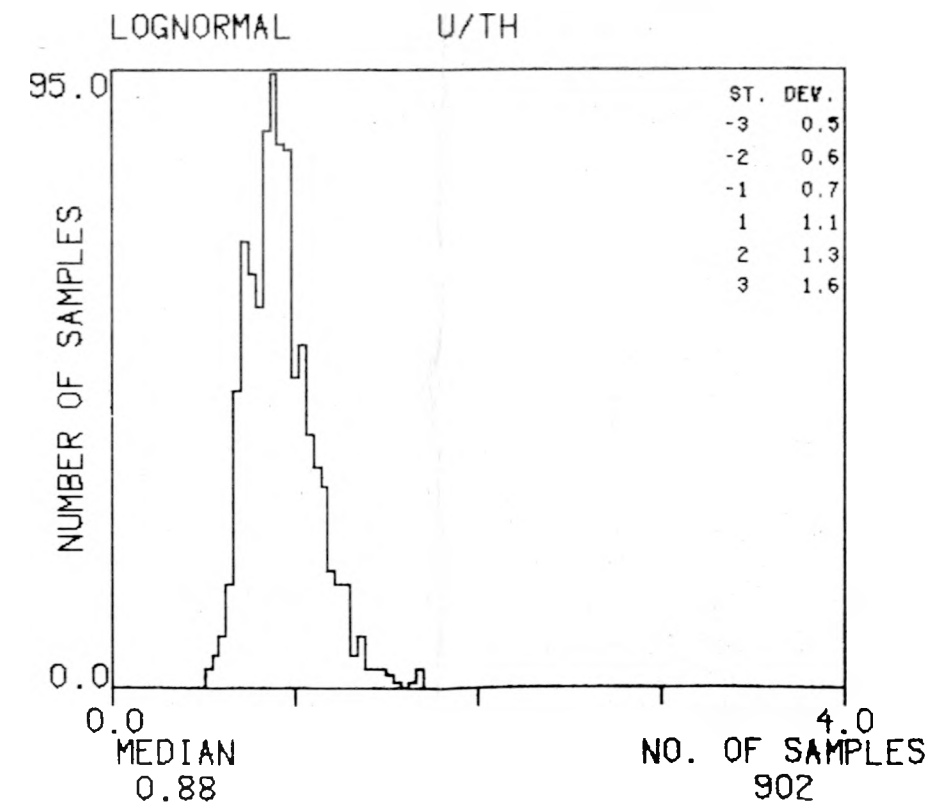
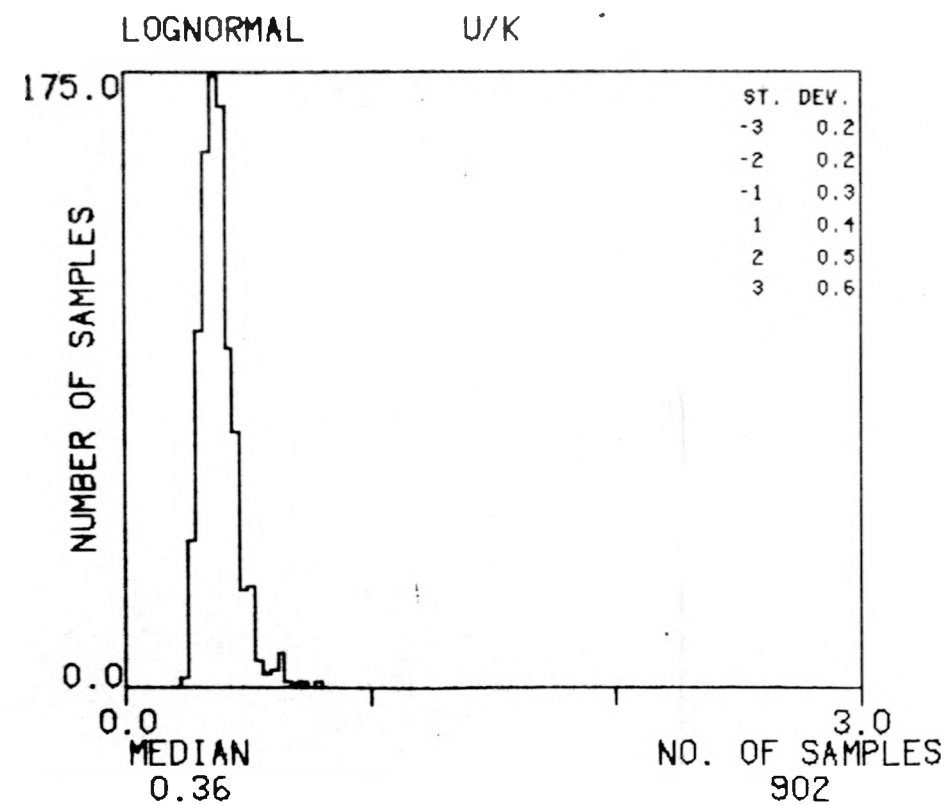
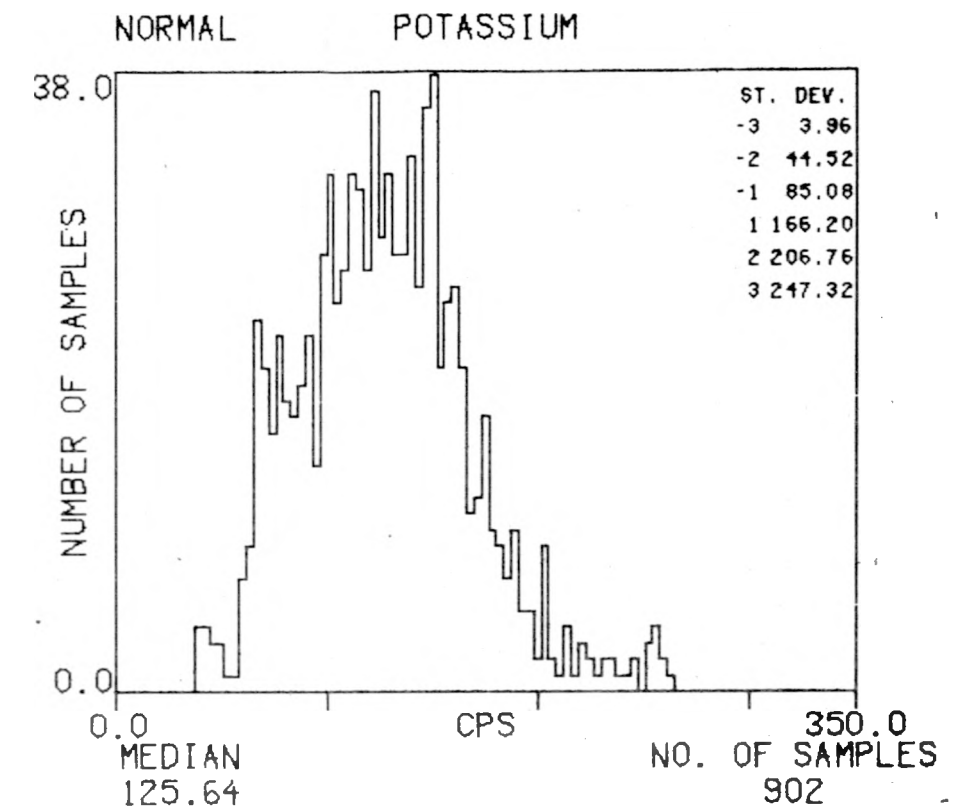
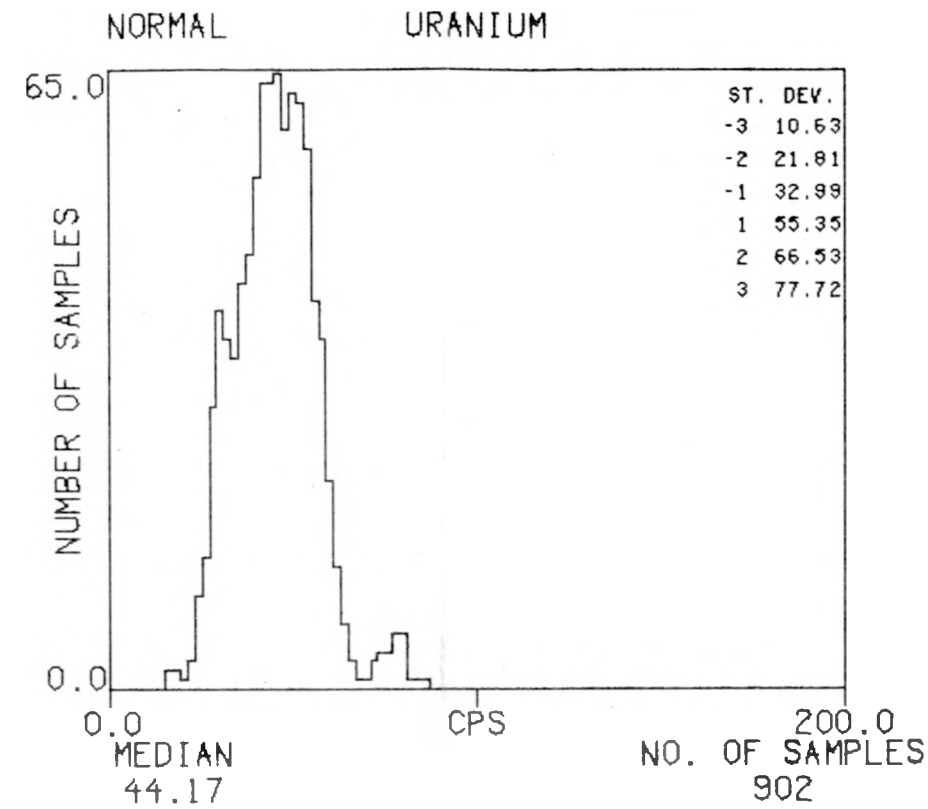
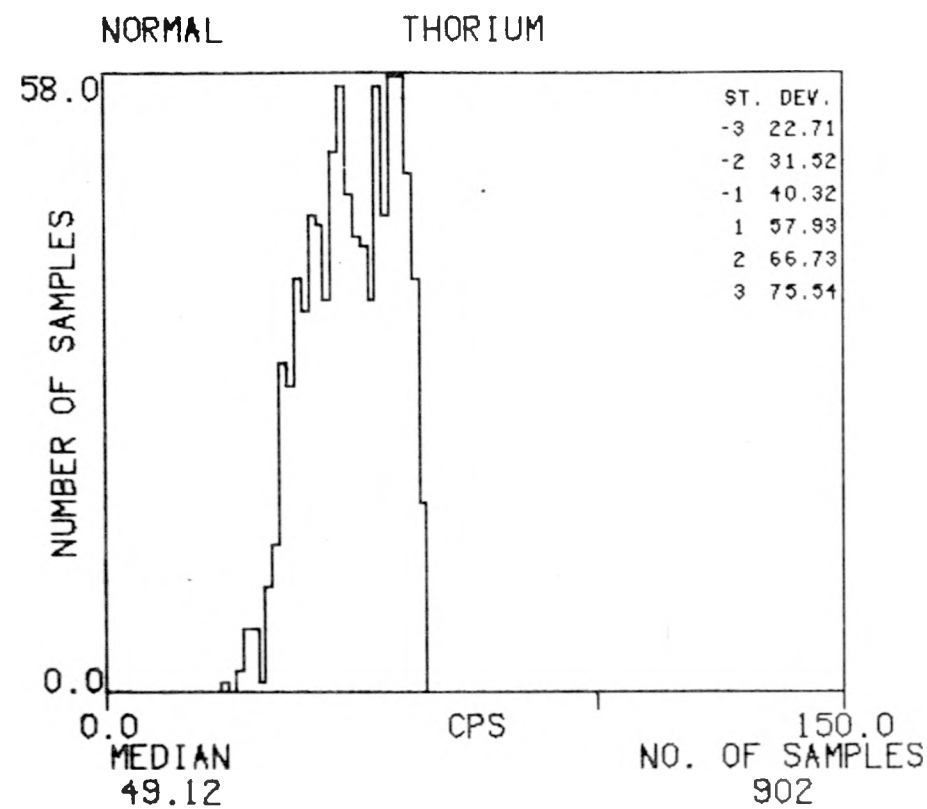
HISTOGRAMS : PCG

TEXAS INSTRUMENTS INC. HOT SPRINGS NK13-3 SWEET GRASS SURVEY 1978



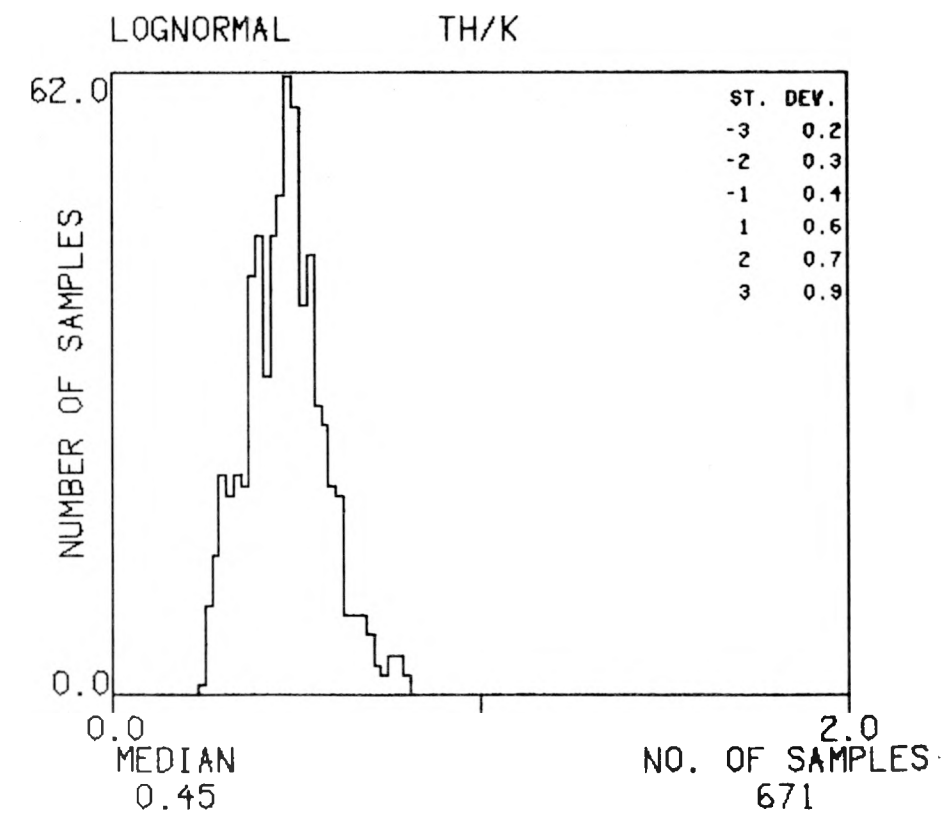
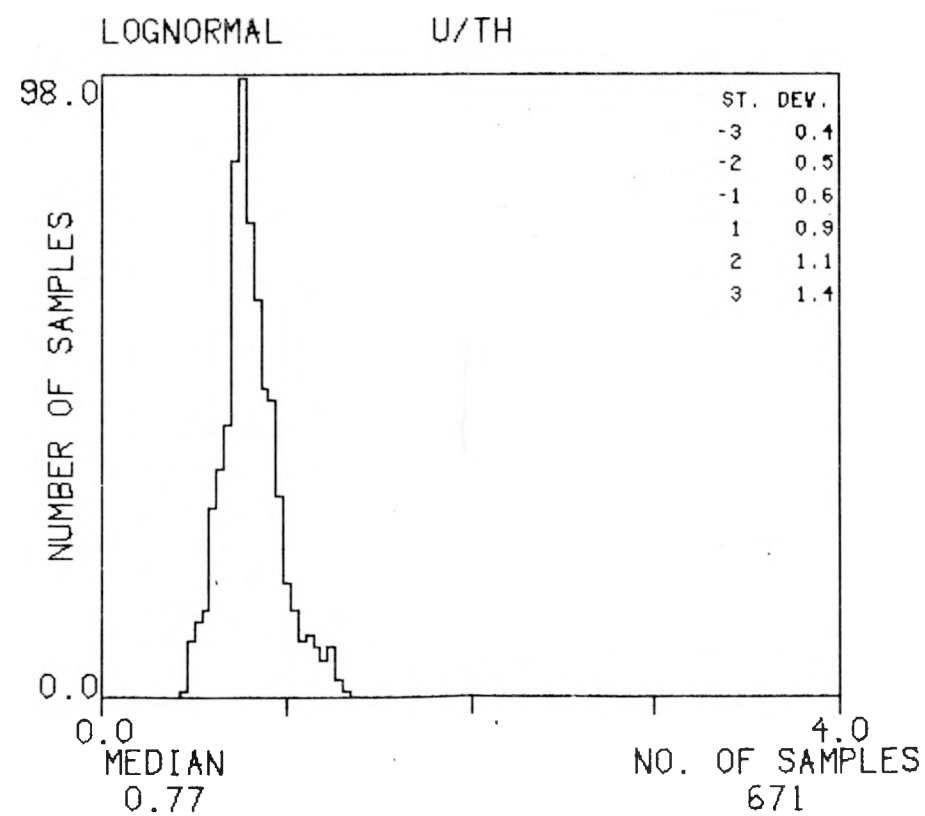
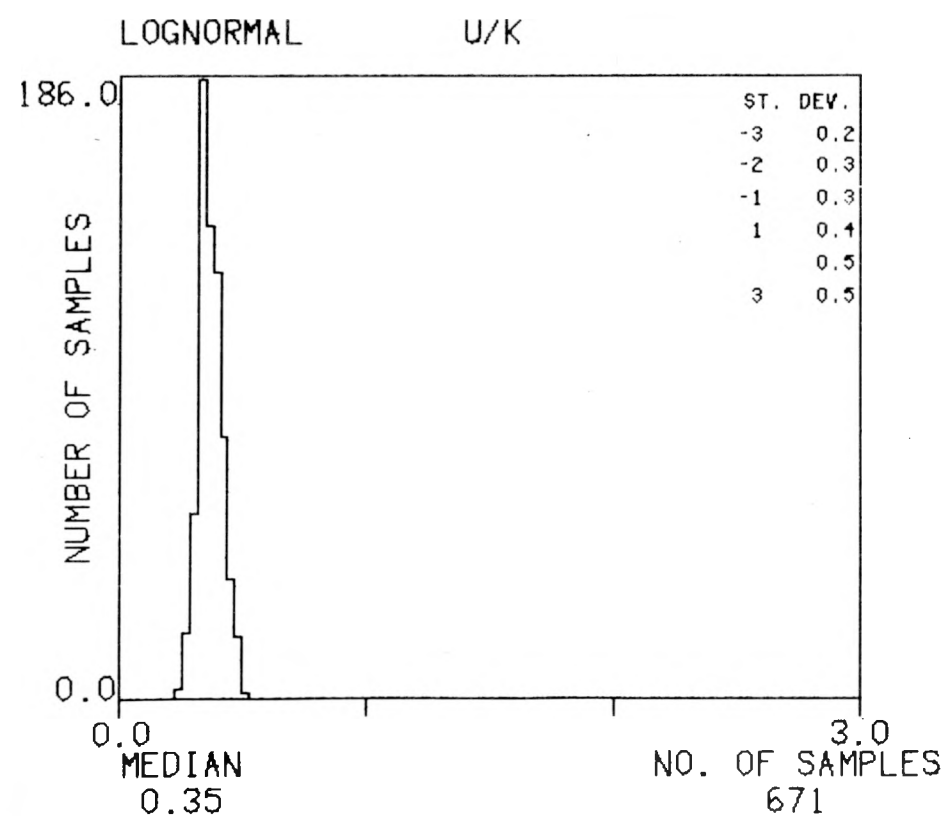
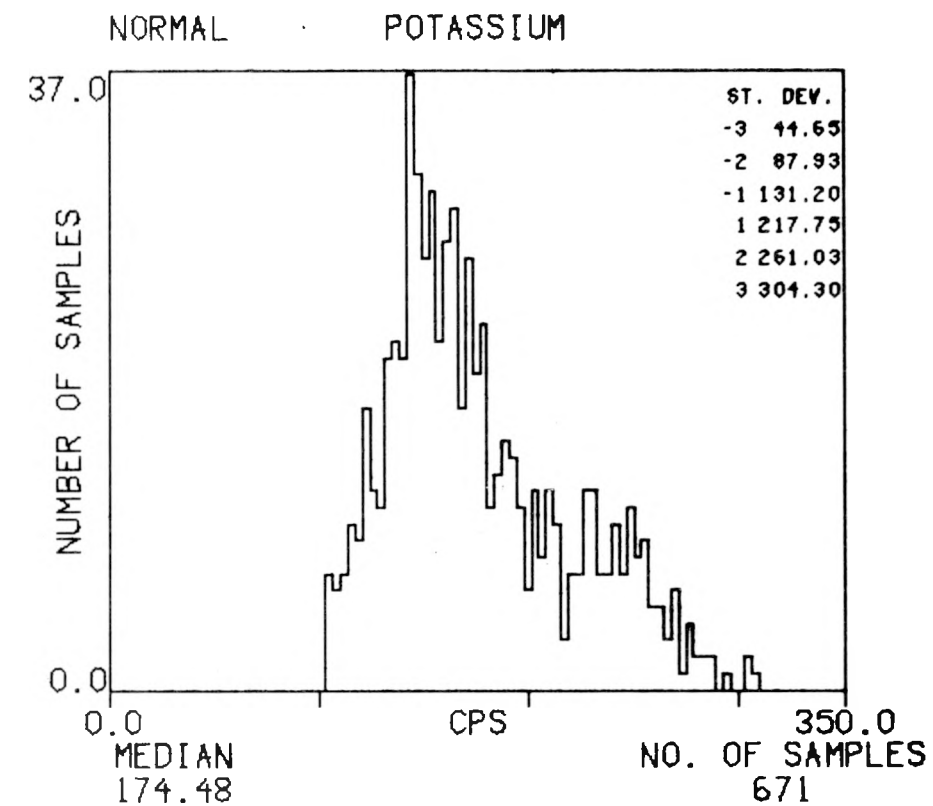
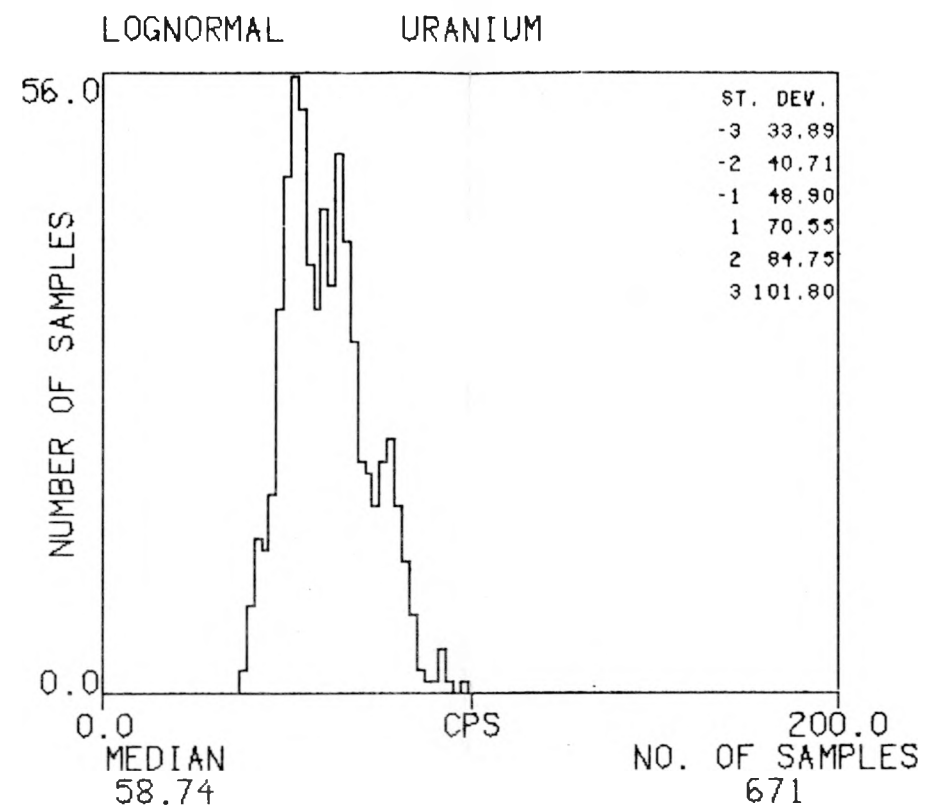
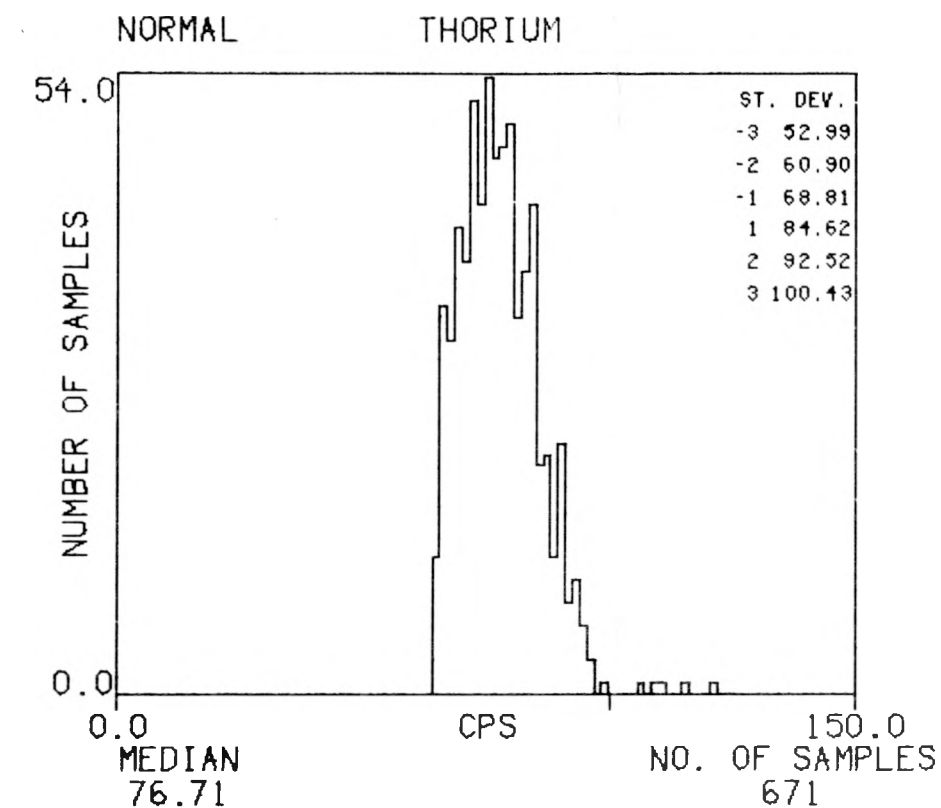
HISTOGRAMS : PCG-1

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HISTOGRAMS : PCG-2

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HISTOGRAMS : PCGG

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