Public-data File 91-22x

NATIONAL URANIUM RESOURCE EVALUATION GEOCHEMICAL DATA FOR STREAM- AND LAKE-SEDIMENT SAMPLES IN THE MOUNT HAYES QUADRANGLE, ALASKA

by

M.A. Wiltse

Alaska Division of
Geological & Geophysical Surveys

December 1990

794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

PDF 91 - 22: ERRATA

ONE ELEMENT WAS OMITTED FROM LISTING OF ELEMENTS ON DISK. THAT ELEMENT WAS ....SE.....IT SHOULD GO BETWEEN AS AND ZR.

CORRECT ORDER OF ELEMENTS ON FILE IS:

U AG BI CD CU NB NI PB SN
W AS SE ZR MO BE LI AL AU
BA CA CE CL CO CR CS DY EU
FE HF K LA LU MN MG NA RB
SB SC SM SR TA TB TH TI V
YB ZN and U/TH

PDF 91-22 - UPDATE

The section of PDF 91-22 which describes the format of the NURE data as it is available on computer disk has changed. Instead of all data on one file/quadrangle in columnar format separated by blanks, it is now split into 3 files/quadrangle with commas and blanks separating the fields. The new files are named "NXXX#.ASC". N is for NURE data, XXX is the 3 character quadrangle identification, and # is 1, 2, or 3. This new version will make it easier for users to input the data directly into Quatro-Pro, Lotus, or other spread sheets with a 250 character limit on record length. In Quatro-Pro use IMPORT option, ASCII file, QUOTE & COMMA delimited. Two records were added in front of the data:

1.) a header record which says

"Part <n>, Quadrangle: <name>"

2.) a record with column headings so users can tell which elements are in the file and the order. The column headings are comma and blank delimited too. The data is still in ASCII format and the commas can be eliminated by using a variety of text editors.

Following are the formats of the 3 files. Column 1 was left blank for all records so that all data in the files could be printed even when the first item is interpreted as a carriage control character.

FILE 1:

Record 1: 55 Characters of text. - starts col 2 and length depends on length of quadrangle name. It is enclosed in quotes.

Record 2: col 2-39

"Samp-Id","RC", "Lat.", "Long.", "ST" (Sample Type--see main text)

Starting in col 40, 14 groups of: , "Xx" which are the elements names for the columns. For this record they are: U, Ag, Bi, Cd, Cu, Nb, Ni, Pb, Sn, W, As, Se, Zr, and Mo. NOTE: There is NOT a comma after the last item and all items are enclosed in quotes.

Record 3 to end:

col 2-8. 7 digit sample number.

col 9-10 ", " - a comma followed by a blank

col 11-13 replicate code - 3 digits allowed, most values will be 0 or 1 digit.

col 14-24 ", " followed by Latitude in decimal degrees with 5 decimal places

col 25-35 ", " followed by Longitude in decimal degrees with 5 decimal places

col 36-39 ", " followed by 2 digit sample type

Starting in col 40, 17 groups of "," (comma) followed by 8 digit value of element in ppm. Decimal point is present. None of the values require all 8 digits so that leaves a blank space after the comma. NOTE: no comma after the last item.

FILE 2:

Record 1: - Same as for file 1

Record 2: col 2 to 8 - "Samp-Id"

Starting in col 9, 17 groups of: , "Xx", which are element names for the columns. For this file they are: Be, Li, Al, Au, Ba, Ca, Ce, Cl, Co, Cr, Cs, Dy, Eu, Fe, Hf, K, and La. NOTE: no comma at end and items enclosed in quotes.

Record 3 to end:

Col 2-8 7 digit sample number.

Starting in col 9, 17 groups of ",", followed by 8 eight digit value of element. As in File 1.

FILE 3: Same format as file 2 with different elements. The elements are: Lu, Mn, Mg, Na, Rb, Sb, Sc, Sm, Sr, Ta, Tb, Th, Ti, V, Yb, Zn, and U/Th

NOTE: In the original listing of the elements, Se was accidently left out. It goes between As and Zr.

A copy of this file is included on disk. It is labeled README.NUR. If there are any problems reading this data contact Shirley Liss at DGGS. (907) - 474 - 7147.

NATIONAL URANIUM RESOURCE EVALUATION GEOCHEMICAL DATA FOR STREAM- AND LAKE-SEDIMENT SAMPLES IN THE MOUNT HAYES QUADRANGLE, ALASKA

by
M.A. Wiltse

INTRODUCTION

Purpose:

In December of 1990 the Alaska Division of Geological and Geophysical Surveys (ADGGS) began a mineral resource evaluation of those lands still available for state selection under the Alaska Statehood Act. As part of that process ADGGS is reviewing the stream- and lake-sediment geochemical data generated during the U.S. Department of Energy, National Uranium Resource Evaluation (NURE) program.

This Public-data File has been released so that a summary of that data is available to interested persons. This publication has not been formally reviewed for technical accuracy or for conformity to the editorial standards of ADGGS.

Scope of data:

ADGGS has reviewed NURE geochemical data for the following 1:250,000 quadrangles:

Anchorage	ANC
Baird Mountains	XBM
Beaver	BVR
Bendeleben	BEN
Bering Glacier	XBG
Bettles	BET
Big Delta	XBD
Black River	BLR
Candle	CAN
Chandalar	CHN
Charley River	CHR
Circle	CIR
Eagle	EAG
Gulkana	GUL
Healy	HEA
Hughes	HUG
Iditarod	IDT
Kateel River	KAT
Lime Hills	LIM
Livengood	LIV
Medfra	MED
Melozitna	MLZ
Misheguk Mountain	MIS
Mount Hayes	XMH
Nabesna	NAB

Nome	NOM
Norton Bay	NOB
Nulato	NUT
Phillip Smith Mountains	PSM
Point Hope	XPH
Point Lay	XPL
Ruby	RUB
Selawik	SLK
Shungnak	SHU
Sleetmute	SLT
Solomon	SOL
Talkeetna Mountains	TLM
Tanacross	TNX
Tanana	TAN
Teller	TEL
Umiat	UMI
Unalakleet	UKT
Utukok River	XUR
Valdez	VAL
Wiseman	WIS

Limitations of data:

Our review has been limited to the following elements: Ag, As, Au, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, La, Mn, Mo, Ni, Pb, Sb, Sn, Ti, U, U/Th, V, W, Zn

The Nure data set also contains analyses for: Al, Ca, Ce, Cl, Cs, Dy, Eu, Hf, K, Li, Lu, Mg, Na, Nb, Rb, Sc, Sm, Sr, Ta, Tb, Th, Yb, Zr. These data have not been analyzed in the present study.

Because of the procedures used in generating the initial chemical analyses, the NURE geochemical data set has severe limitations. Many elements were determined at only a few sample sites resulting in many samples having incomplete data coverage. The detection limit for many elements is high, making those data of limited effectiveness in delineating mineral resources. Regardless of these and other shortcomings, however, the NURE data do provide information concerning mineralization in many poorly accessible parts of Alaska.

Contents:

This Public-data File (PDF), and the PDF's for the above listed quadrangles, contain a columnar ASCII file on a 5 1/4" high density floppy disk that includes: sample number, replicate code, sample type code, latitude, longitude, and the complete set of elemental analyses available for each sample in the quadrangle. These data are consistently ordered in the file as shown below:

Sample number, Replicate code, Latitude, Longitude, Sample-type code, U Ag Bi Cd Cu Nb Ni Pb Sn W As Zr Mo Be Li Al Au Ba Ca Ce Cl Co Cr Cs Dy Eu Fe Hf K La Lu Mn Mg Na Rb Sb Sc Sm Sr Ta Tb Th Ti V Yb Zn U/Th

All values are entered as parts per million. The data file bears a three letter identification and the extension "ASC" (eg. EAG.ASC for the Eagle Quadrangle data file).

A sample replicate code of "0" indicates that the sample is the initial sample taken at a site and is the code found for most samples. Subsequent samples collected from the same site have successively

higher integer designations. Sample type codes range from "01" to "99". The definition of these codes is found in Appendix A "Key to Sample Types".

Within the elemental analysis fields of a sample, values of -999 indicate that no analyses was attempted for that element. Other negative numbers (eg. -5) in an elemental analysis field of a record indicate that the element was not detected at a level equal to the absolute value of the negative number tabulated.

TREATMENT OF DATA

Elements:

Although all the elemental NURE data available for a quadrangle is included in the digital ASCII file supplied with this PDF, only a 24 element subset of data was analyzed for this PDF: Ag, As, Au, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, La, Mn, Mo, Ni, Pb, Sb, Sn, Ti, U, U/Th, V, W, Zn.

Grouping of data:

The majority of the Alaska Nure geochemical data is derived from stream sediment or lake sediment samples. Many data sets, however, have a few samples that are subtypes of these two fundamental sample groups. For the purpose of the data review released in this PDF, all subtype samples have been recoded to either the stream sediment type or the lake sediment type, whichever type they most closely resembled. We estimate that less than 1 percent of the samples encountered in this review were recoded.

Following sample-type recoding, brief summary statistics were calculated separately for the stream sediment samples (type = 12) and for the lake sediment samples (type = 13). These statistics provide a quick reference to the number of samples that have analytical values exceeding the detection limit and provide an indication of the geochemical dispersion of the elements for each sample type.

Single-element Pseudomaps of the data have been made that show the location of all samples having analytical values greater than the mean. This was accomplished by separately standardizing the data for each sample type, recoding all standard scores that were less-than-or-equal-to-zero to zero and then plotting a symbol at each sample site, the size of which is proportional to the elemental standardized value (Z-score) at that sample site. Because Z-scores are measures of standard deviation, this procedure results in a psuedomap with varying symbol size that directly reflects how far a sample's element content is above the mean. The larger symbols correspond to element values that are farthest above the mean value for the element in question. A Symbol-size key is provided in figure 1 which indicates the symbol size for element abundances from 1 to 6 standard deviations above the mean.

Mount Hayes

THE FOLLOWING RESULTS ARE FOR:
TYPE = 12.000

TOTAL OBSERVATIONS: 362

	U	AG	BI	CD	CU
N OF CASES	362	2	19	2	327
MINIMUM	0.320	5.000	5.000	5.000	10.000
MAXIMUM	22.350	10.000	9.000	6.000	473.000
MEAN	3.959	7.500	6.316	5.500	65.869
STANDARD DEV	2.501	3.536	1.336	0.707	55.254

	NI	PB	SN	W	AS
N OF CASES	291	239	12	11	31
MINIMUM	15.000	5.000	10.000	17.000	10.000
MAXIMUM	1016.000	123.000	53.000	28.000	196.000
MEAN	56.368	17.264	20.917	21.273	46.774
STANDARD DEV	78.859	12.625	14.694	3.524	42.221

	MO	BE	AU	BA	CO
N OF CASES	0	320	4	339	358
MINIMUM	.	1.000	0.120	232.000	2.600
MAXIMUM	.	8.000	0.580	3790.000	282.000
MEAN	.	2.753	0.340	935.684	22.784
STANDARD DEV	.	0.994	0.205	420.906	17.019

	CR	FE	MN	SB	TI
N OF CASES	352	362	362	54	356
MINIMUM	12.000	9693.000	217.000	2.000	1086.000
MAXIMUM	4351.000	238500.000	28120.000	19.000	27740.000
MEAN	180.020	51444.815	1036.000	6.870	6112.868
STANDARD DEV	323.679	20325.735	1475.025	4.038	2752.260

	V	ZN	UTH	LA
N OF CASES	361	185	337	318
MINIMUM	21.000	36.000	0.167	7.000
MAXIMUM	576.000	381.000	2.569	119.000
MEAN	145.535	151.941	0.395	43.840
STANDARD DEV	76.211	57.218	0.238	20.700

THE FOLLOWING RESULTS ARE FOR:
TYPE = 13.000

TOTAL OBSERVATIONS: 547

	U	AG	BI	CD	CU
N OF CASES	547	1	27	2	416
MINIMUM	0.290	5.000	5.000	5.000	11.000
MAXIMUM	49.350	5.000	14.000	10.000	282.000
MEAN	3.115	5.000	6.630	7.500	49.075
STANDARD DEV	3.144	.	2.467	3.536	26.937

	NI	PB	SN	W	AS
N OF CASES	363	259	6	6	91
MINIMUM	15.000	5.000	10.000	16.000	6.000
MAXIMUM	690.000	86.000	72.000	22.000	96.000
MEAN	46.138	11.903	24.000	18.500	21.110
STANDARD DEV	57.489	8.792	24.257	2.811	18.857

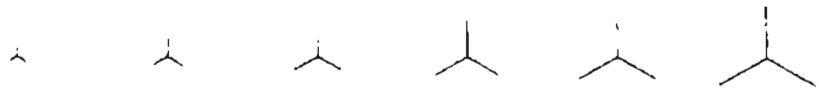
	MO	BE	AU	BA	CO
N OF CASES	0	330	0	499	520
MINIMUM	.	1.000	.	253.000	3.700
MAXIMUM	.	5.000	.	3765.000	132.000
MEAN	.	2.185	.	788.822	15.575
STANDARD DEV	.	0.889	.	340.695	9.048

	CR	FE	MN	SB	TI
N OF CASES	526	546	547	20	525
MINIMUM	22.000	6873.000	143.000	4.000	1153.000
MAXIMUM	3975.000	233400.000	16230.000	15.000	11280.000
MEAN	140.441	33210.487	621.817	6.500	4110.309
STANDARD DEV	238.033	20717.894	802.014	2.524	1298.752

	V	ZN	UTH	LA
N OF CASES	543	258	483	362
MINIMUM	12.000	52.000	0.160	7.000
MAXIMUM	462.000	552.000	8.658	112.000
MEAN	114.068	178.136	0.447	30.196
STANDARD DEV	50.458	73.874	0.466	13.840

ää

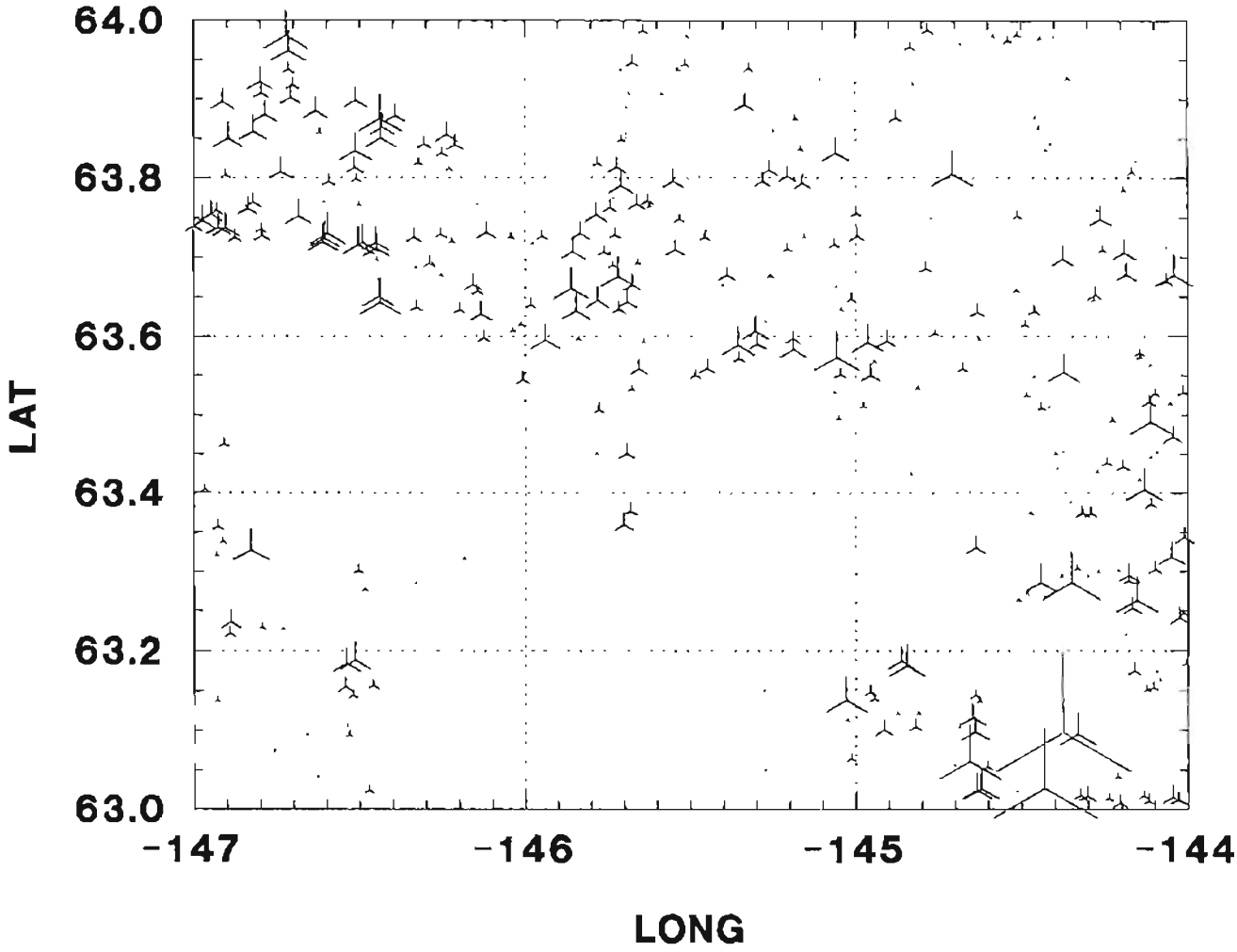
Figure 1. Symbol-size key for single element pseudomaps indicating the size of plotted symbols for values that are from 1 to 6 standard deviations above the mean.



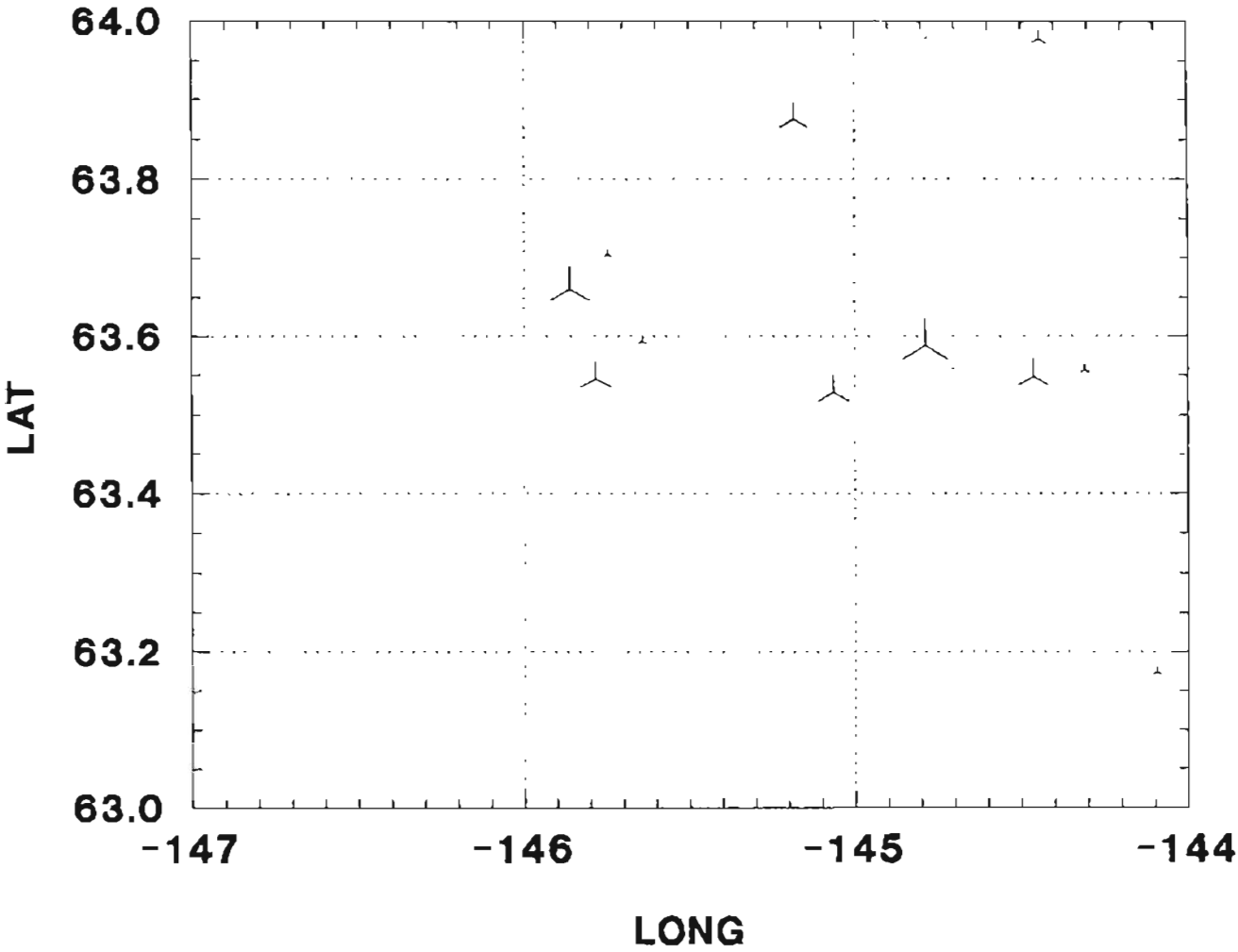
1 2 3 4 5 6

STANDARD DEVIATIONS ABOVE THE MEAN

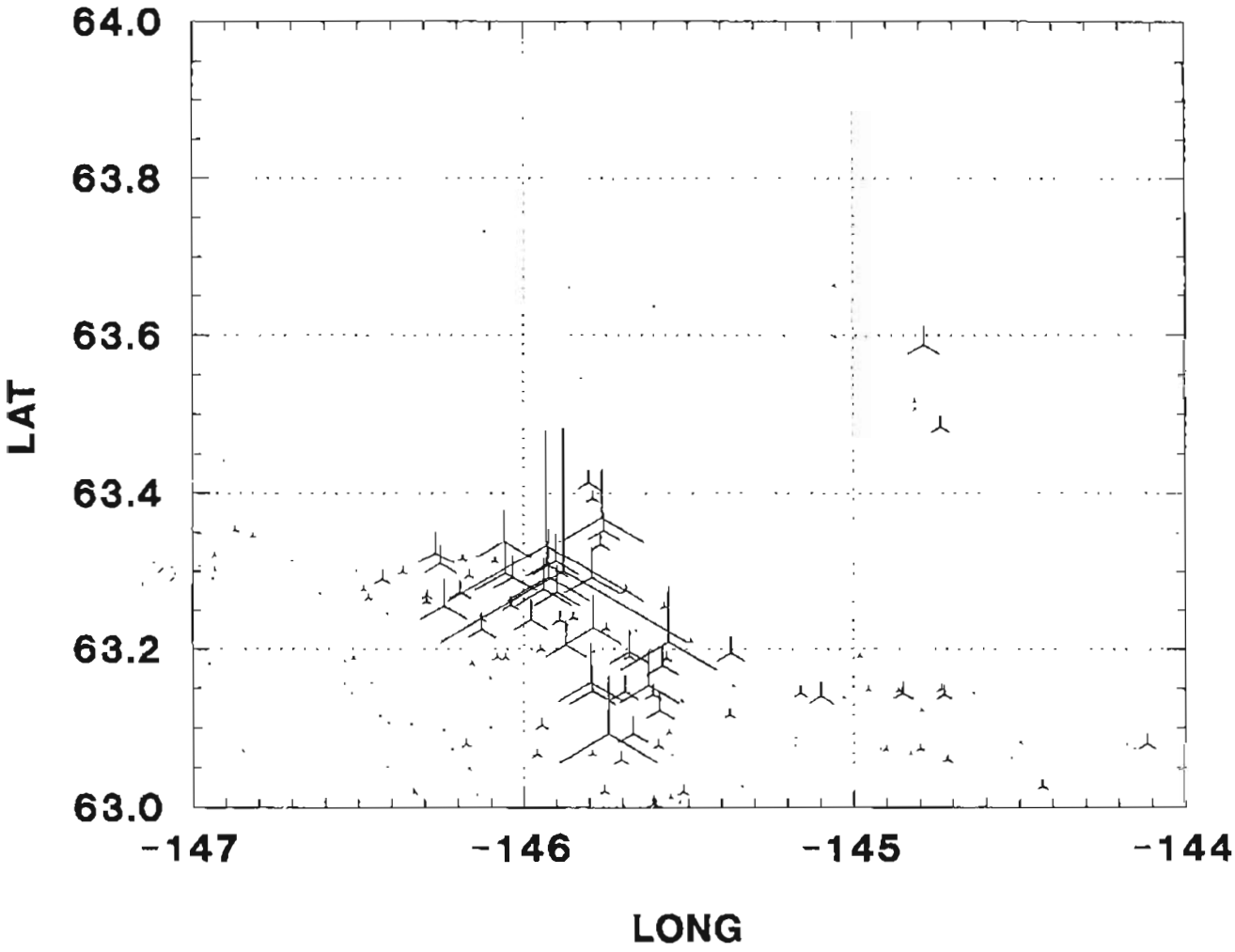
XMHZMAP NURE DATA FOR BA



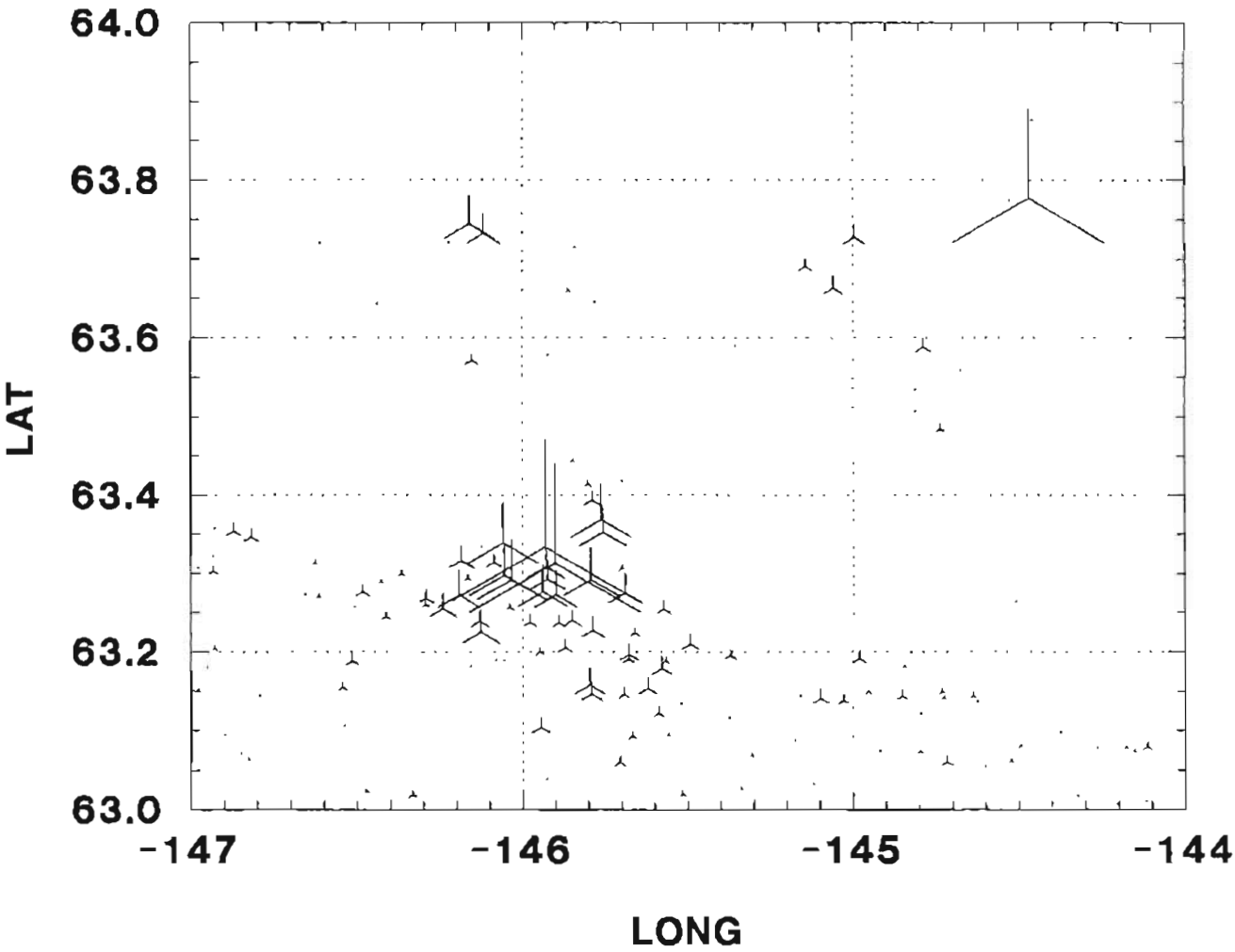
XMHZMAP NURE DATA FOR BI



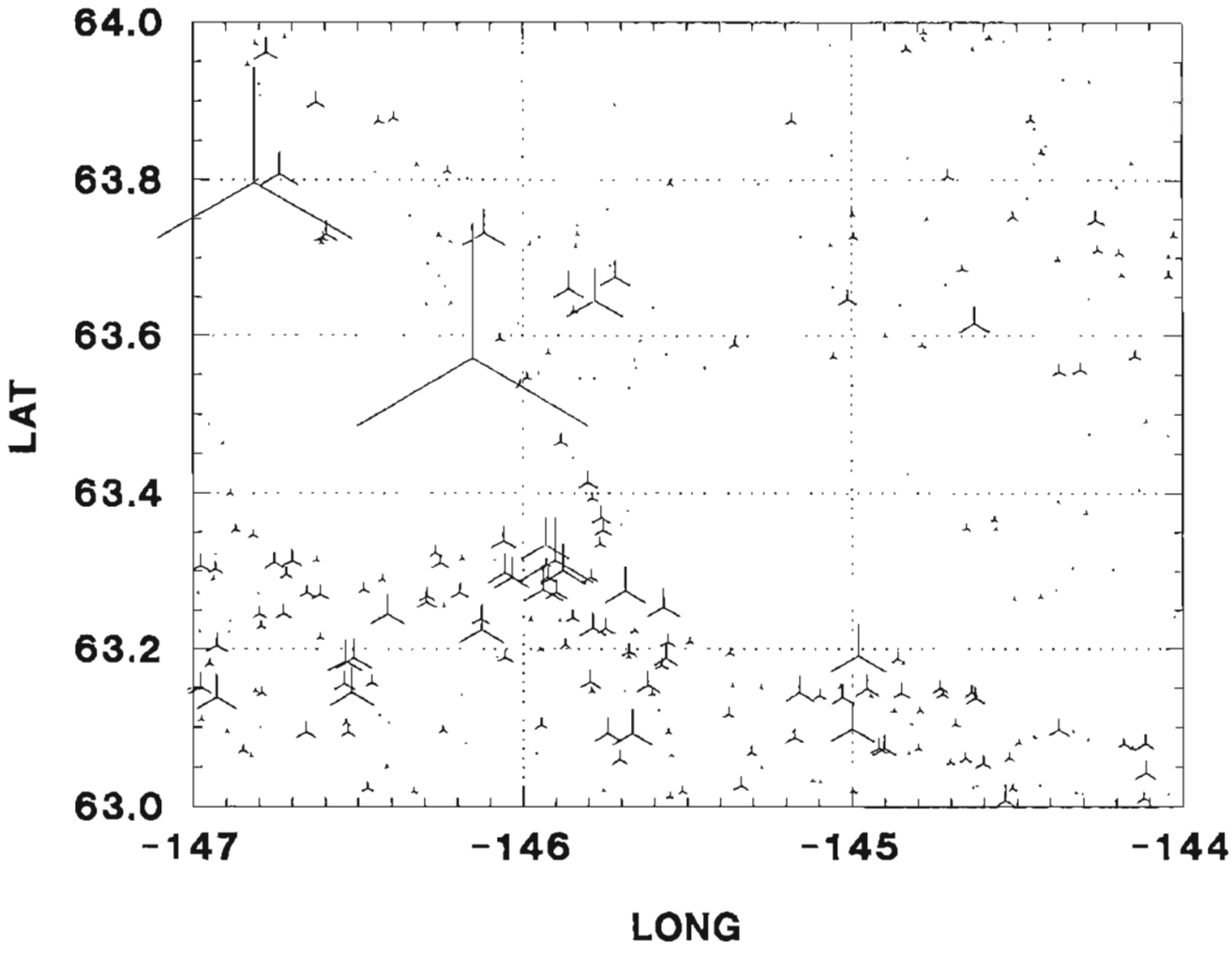
XMHZMAP NURE DATA FOR CR



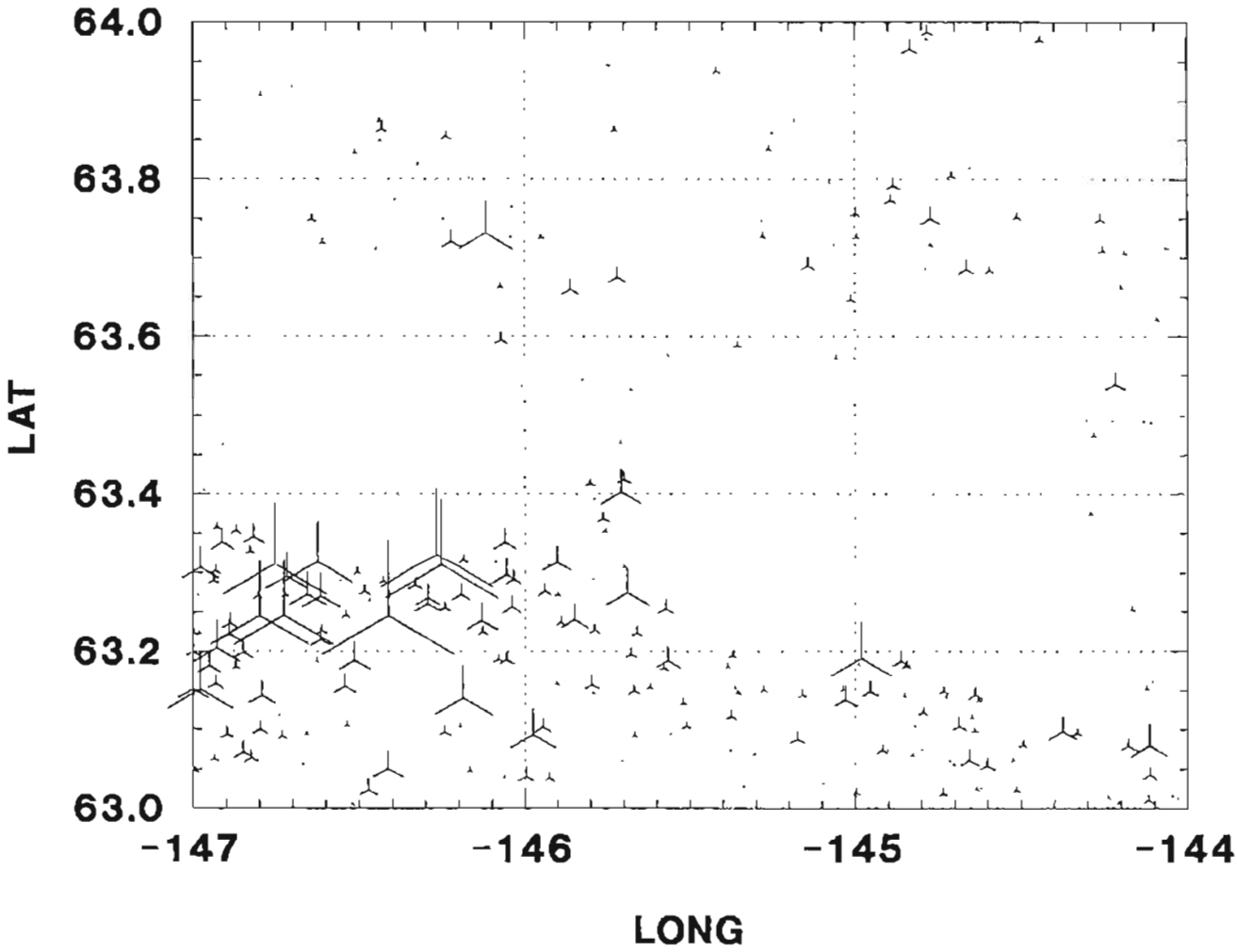
XMHZMAP NURE DATA FOR NI



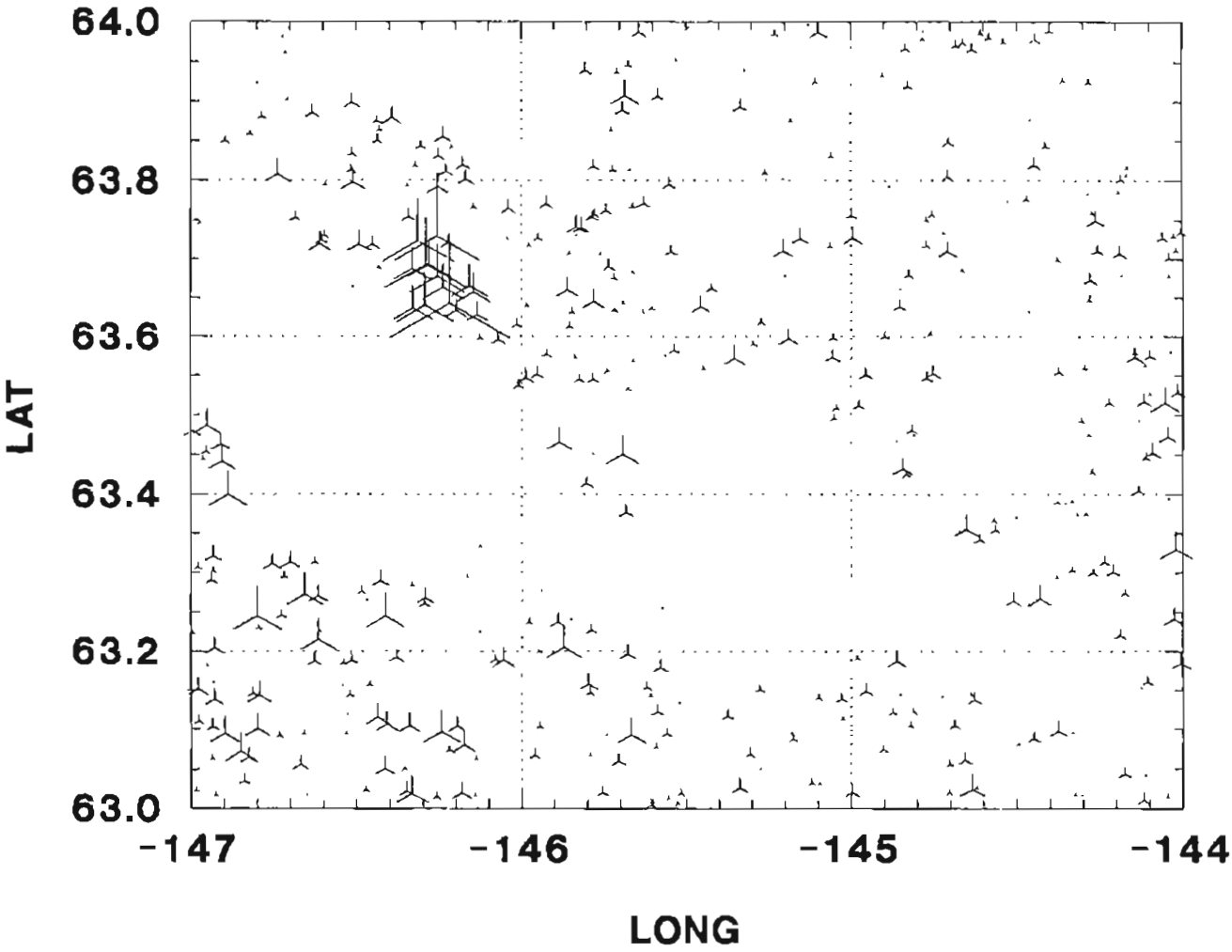
XMHZMAP NURE DATA FOR CO



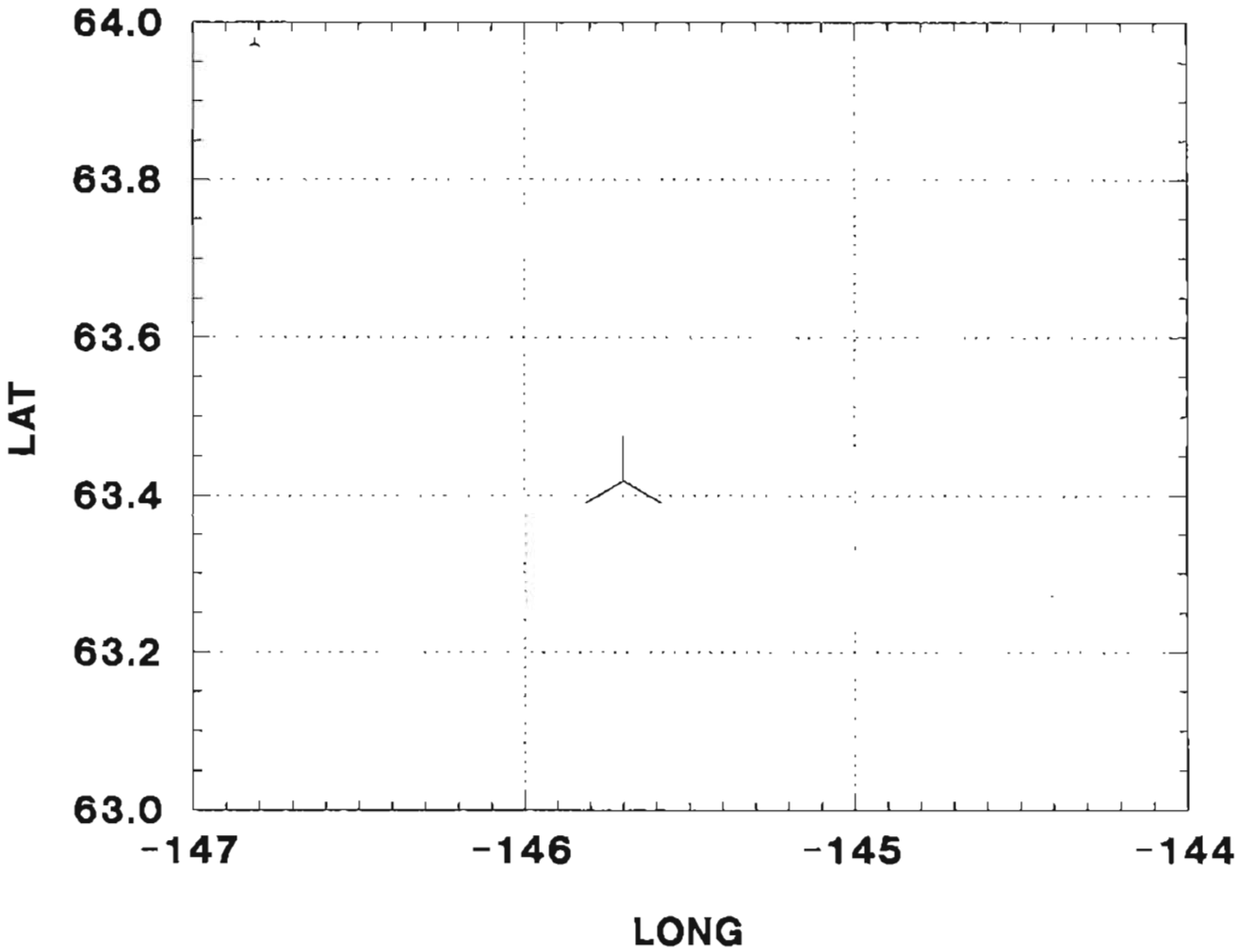
XMHZMAP NURE DATA FOR CU



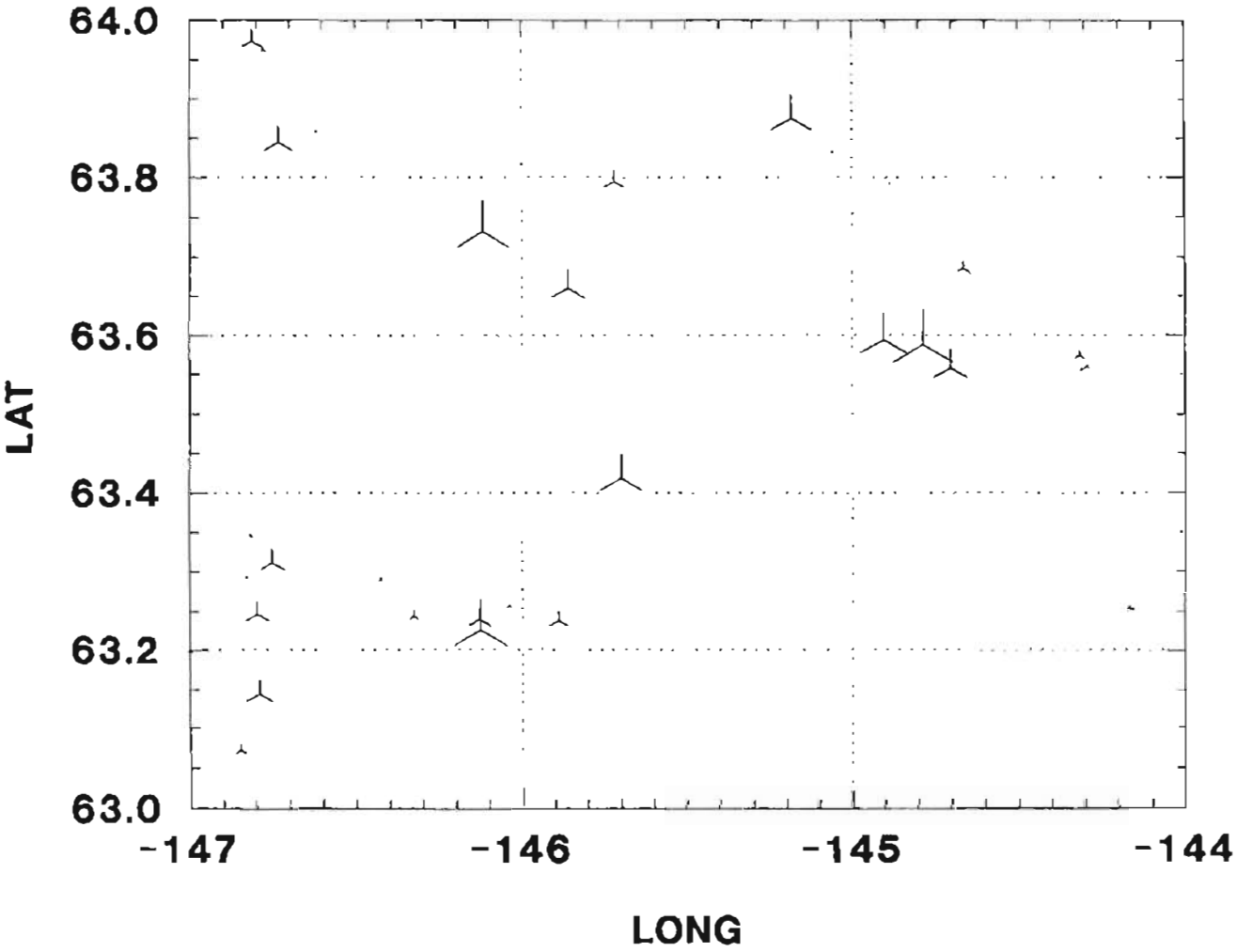
XMHZMAP NURE DATA FOR TI



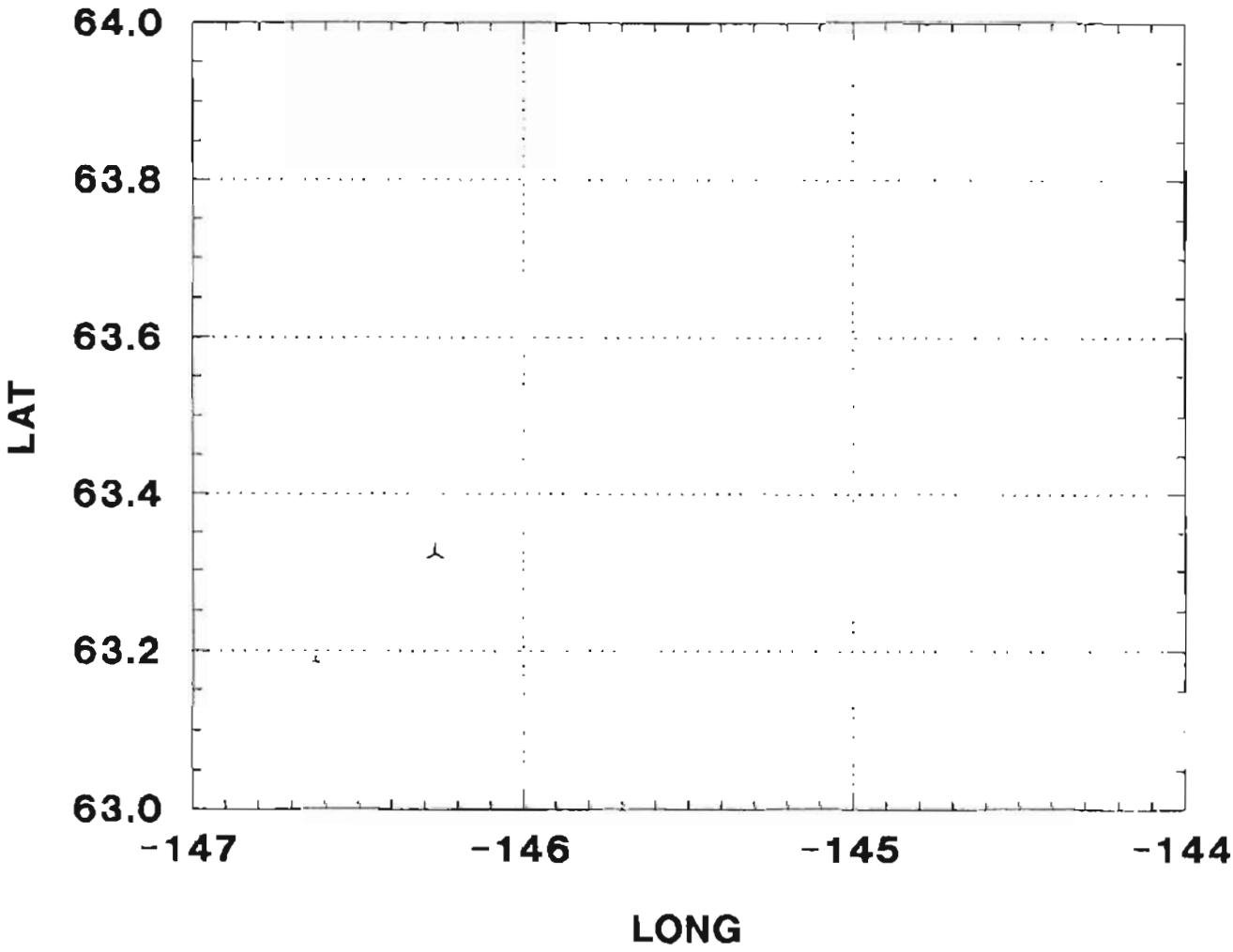
XMHZMAP NURE DATA FOR AG



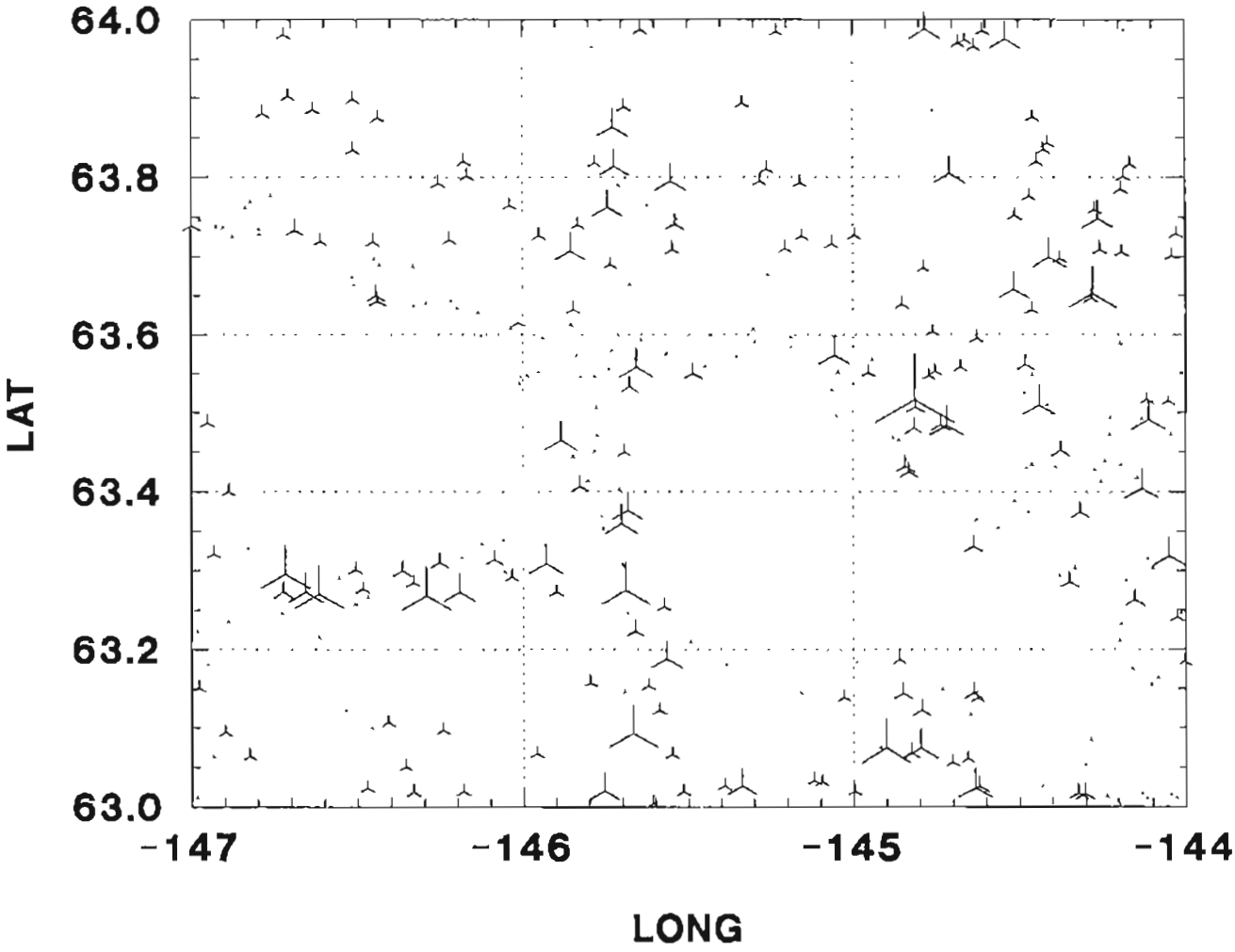
XMHZMAP NURE DATA FOR AS



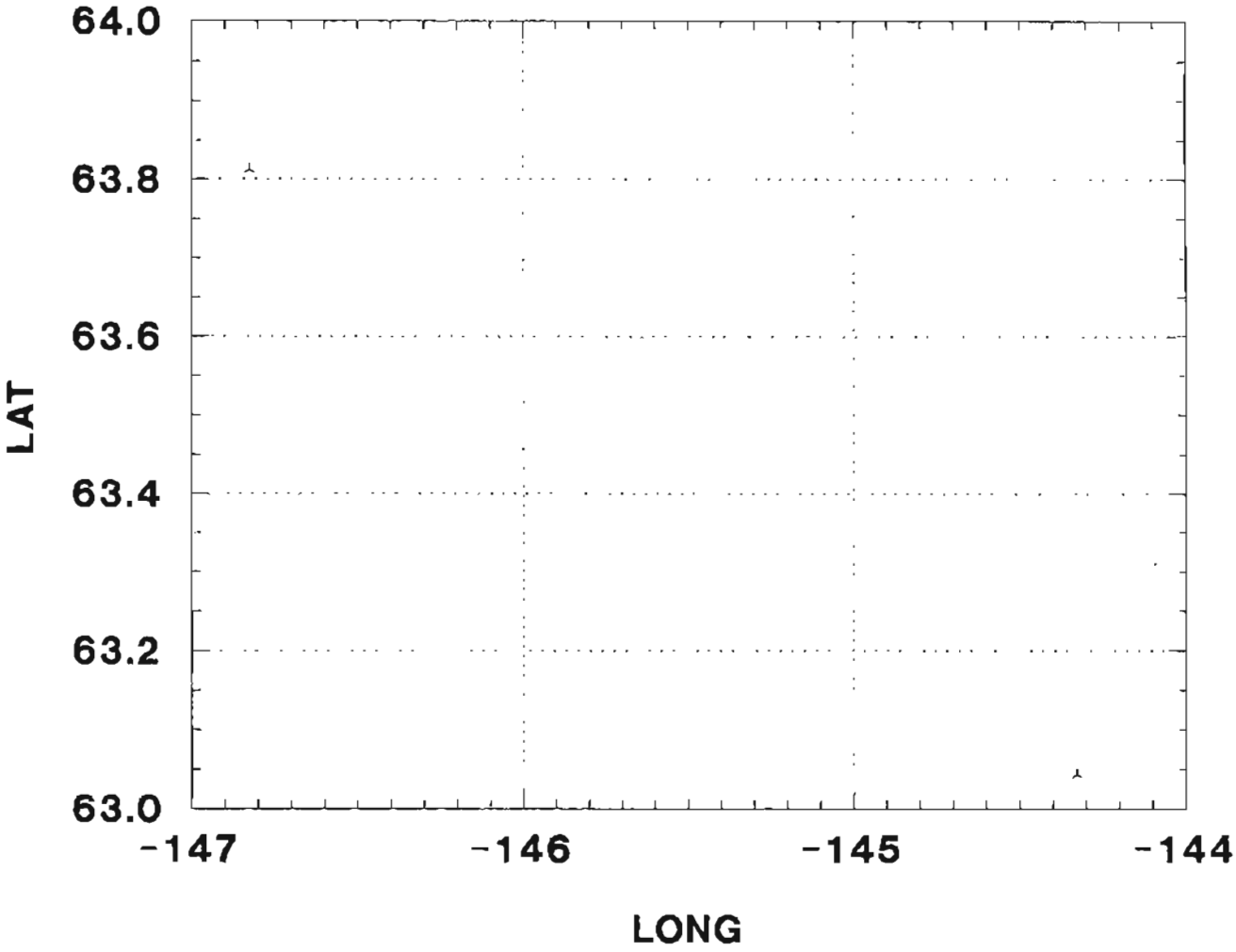
XMHZMAP NURE DATA FOR AU



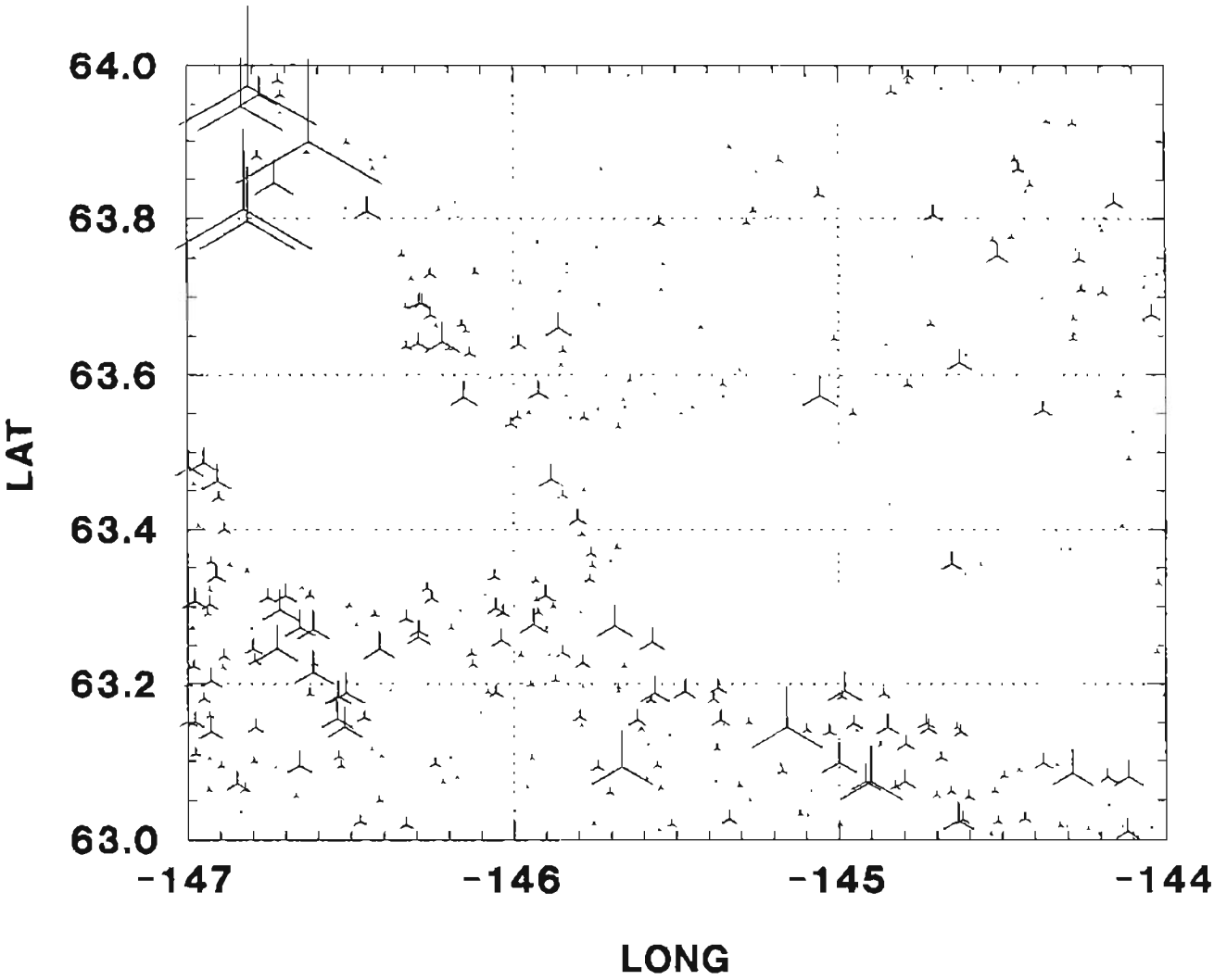
XMHZMAP NURE DATA FOR BE



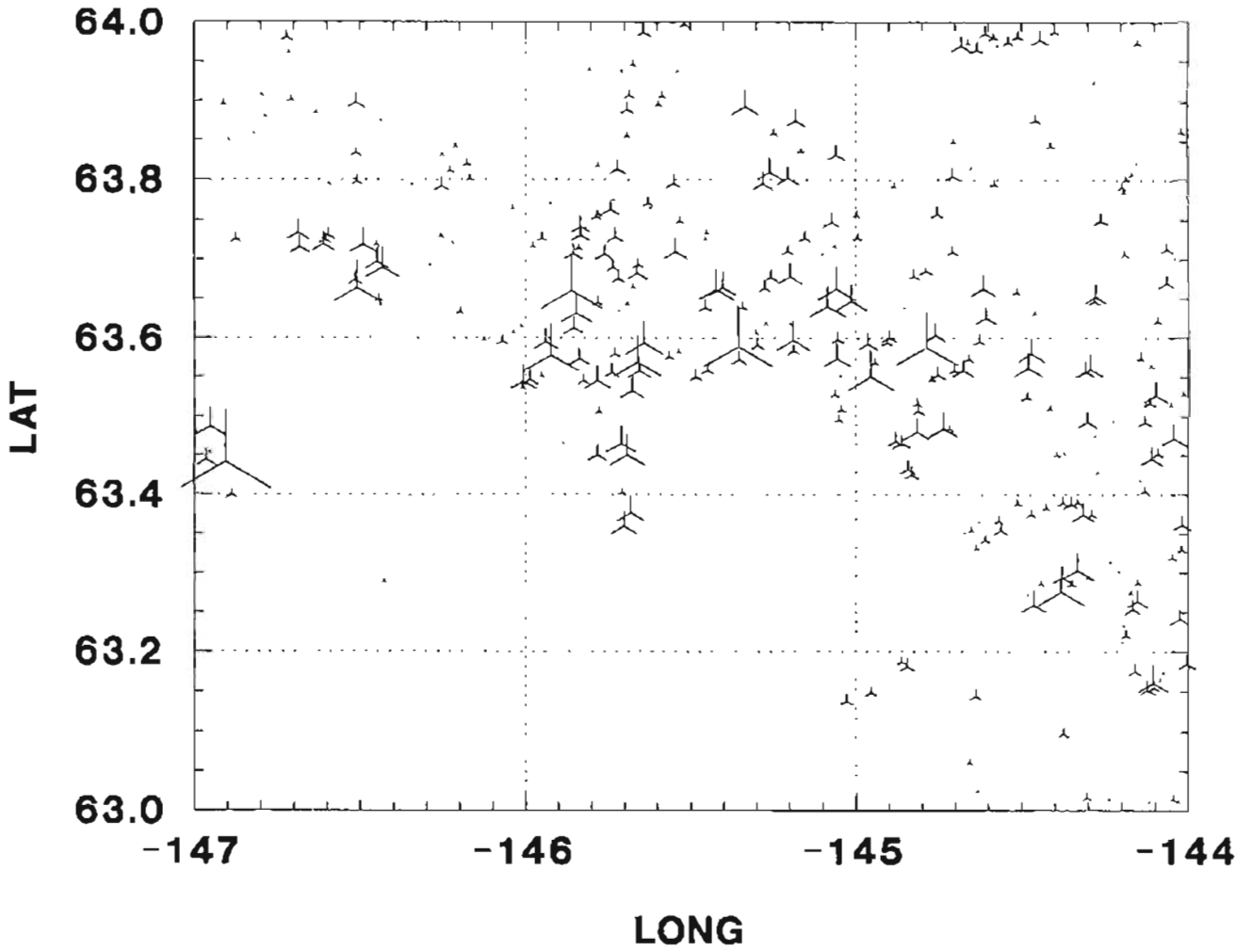
XMHZMAP NURE DATA FOR CD



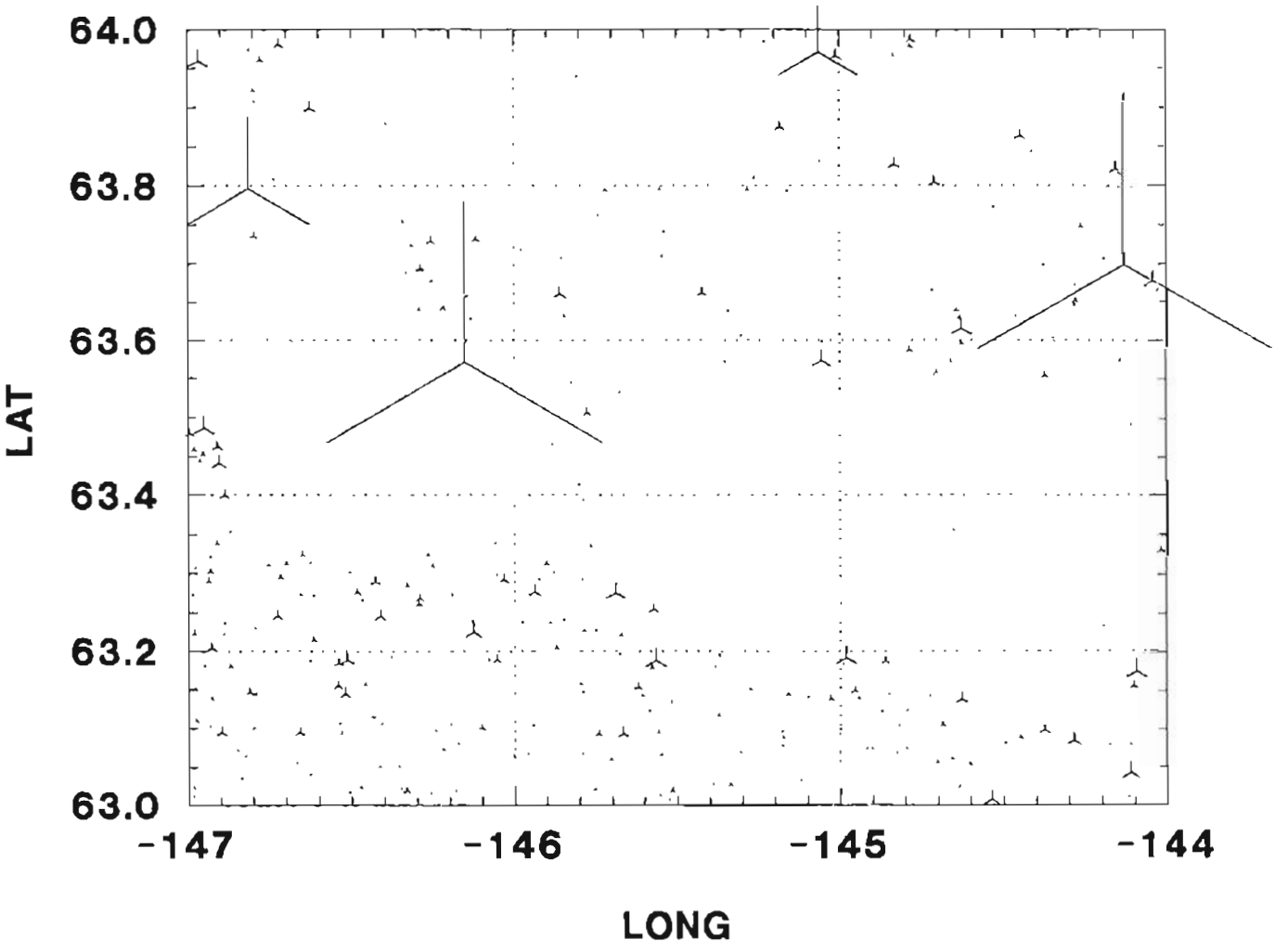
XMHZMAP NURE DATA FOR FE



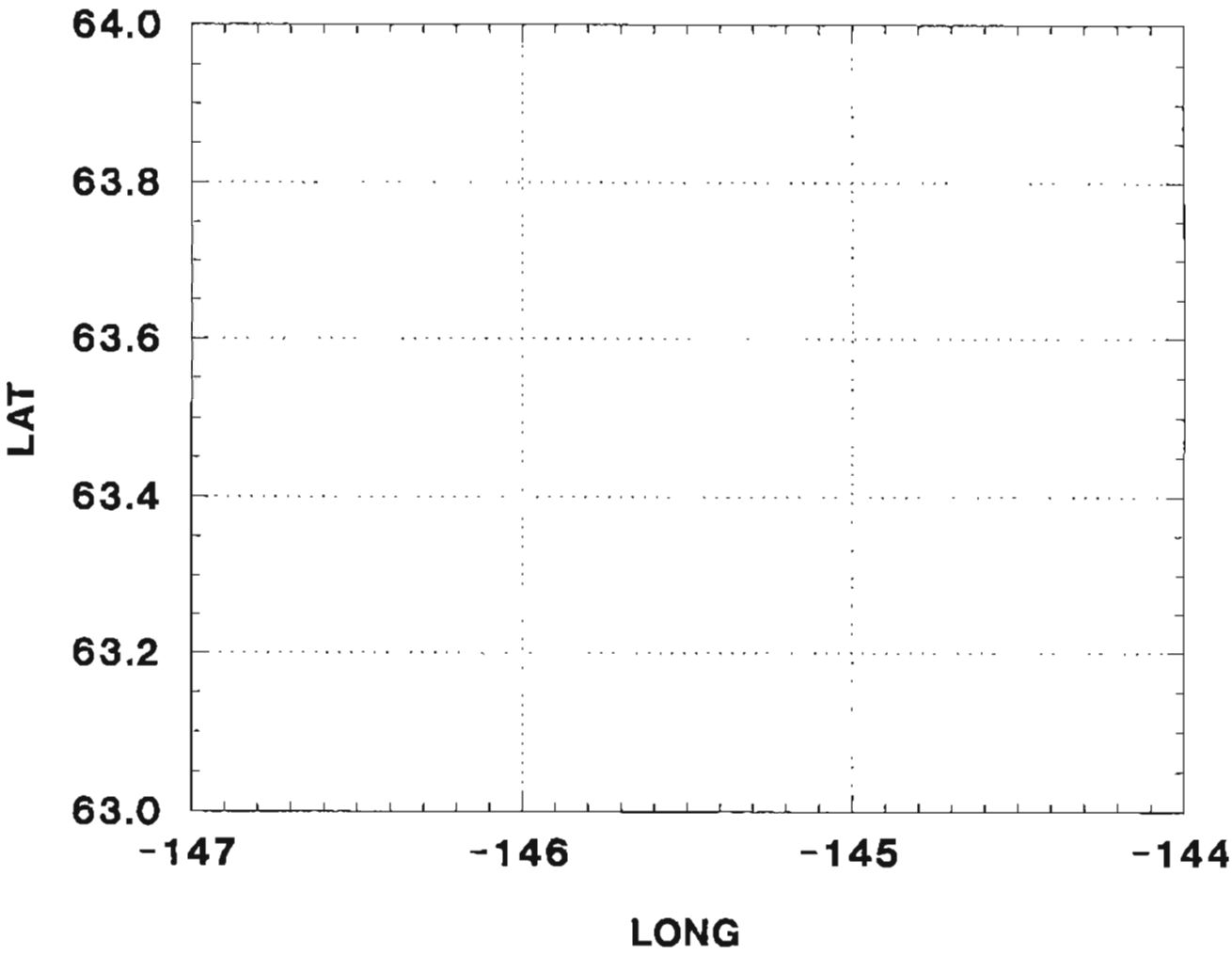
XMHZMAP NURE DATA FOR LA



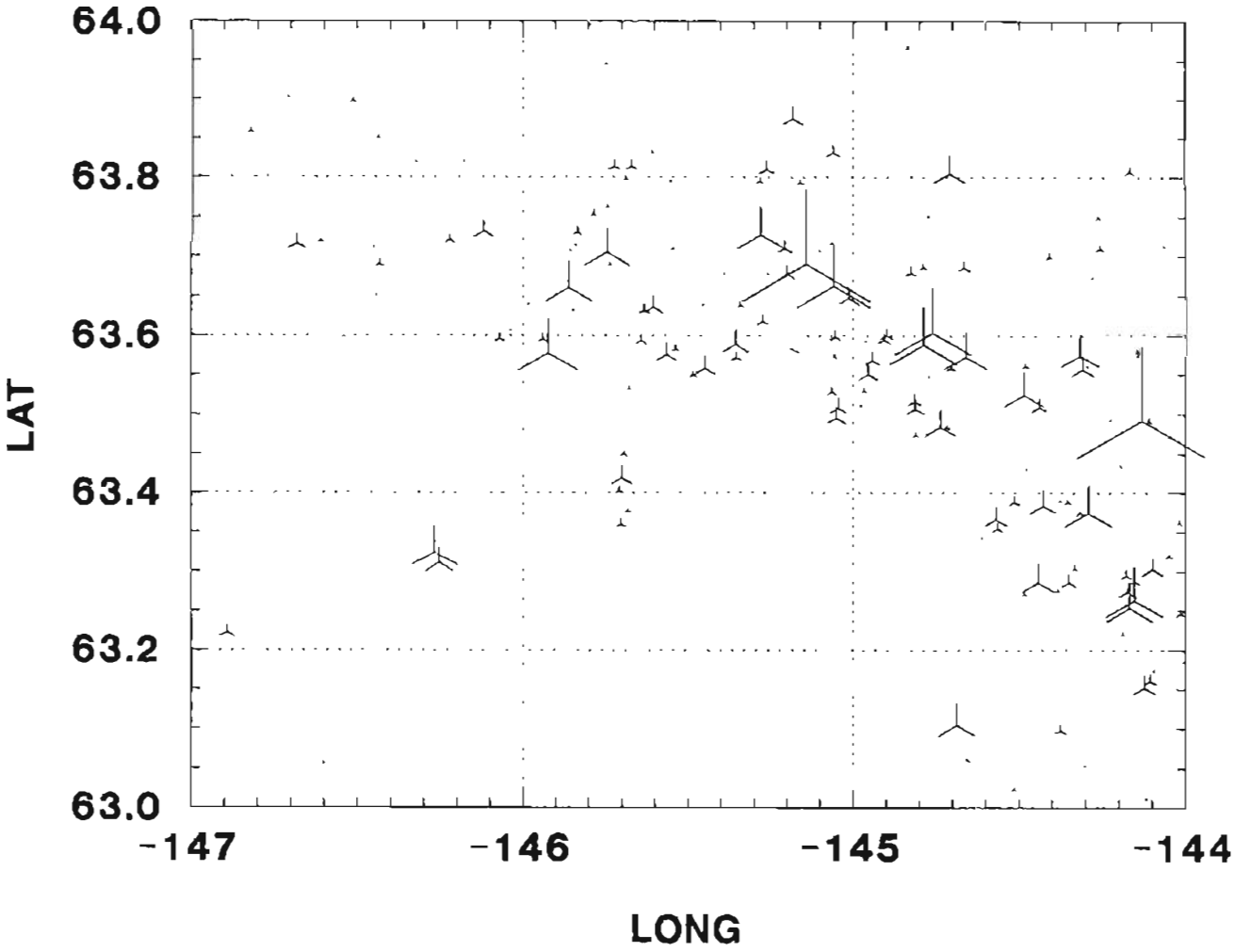
XMHZMAP NURE DATA FOR MN



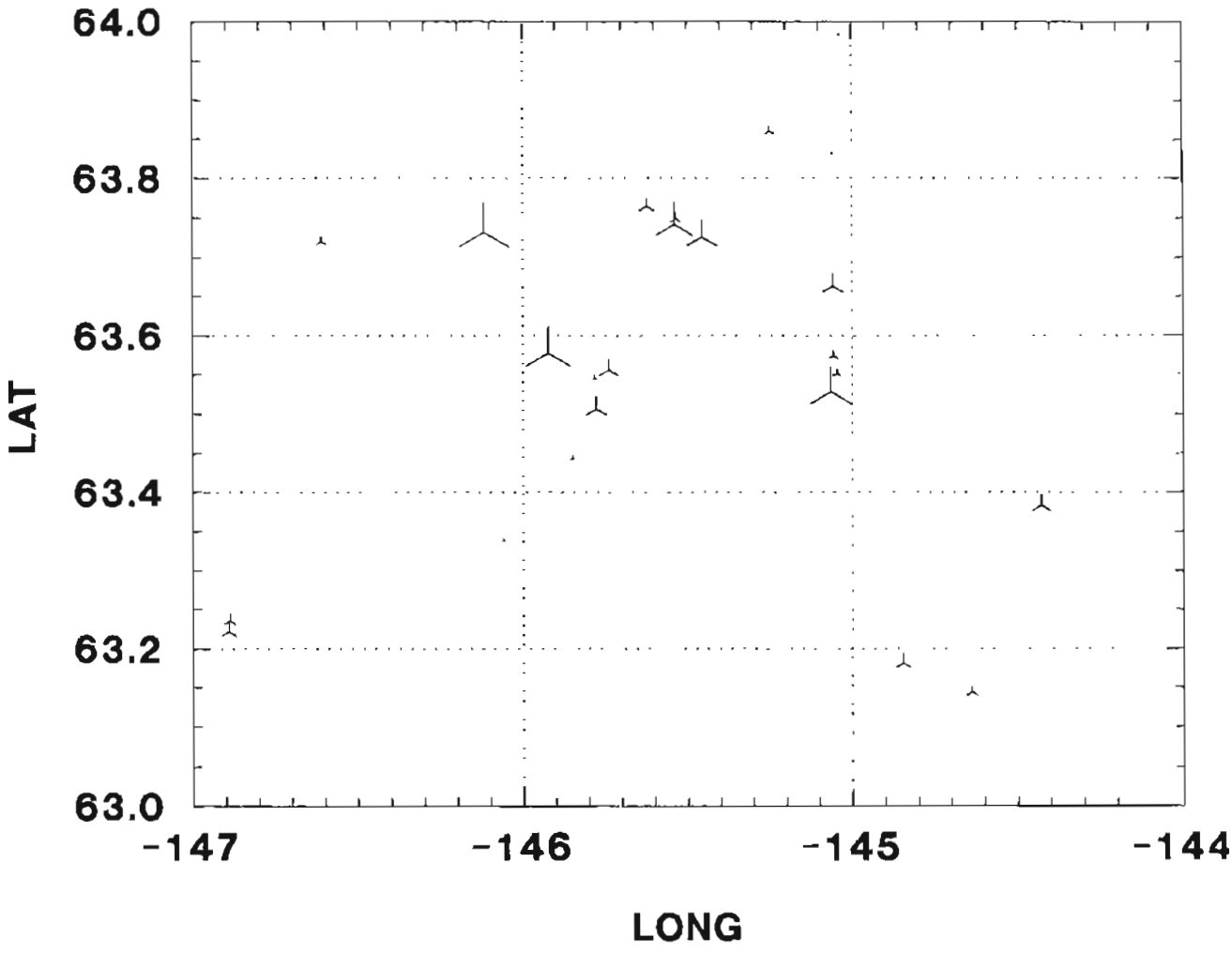
XMHZMAP NURE DATA FOR MO



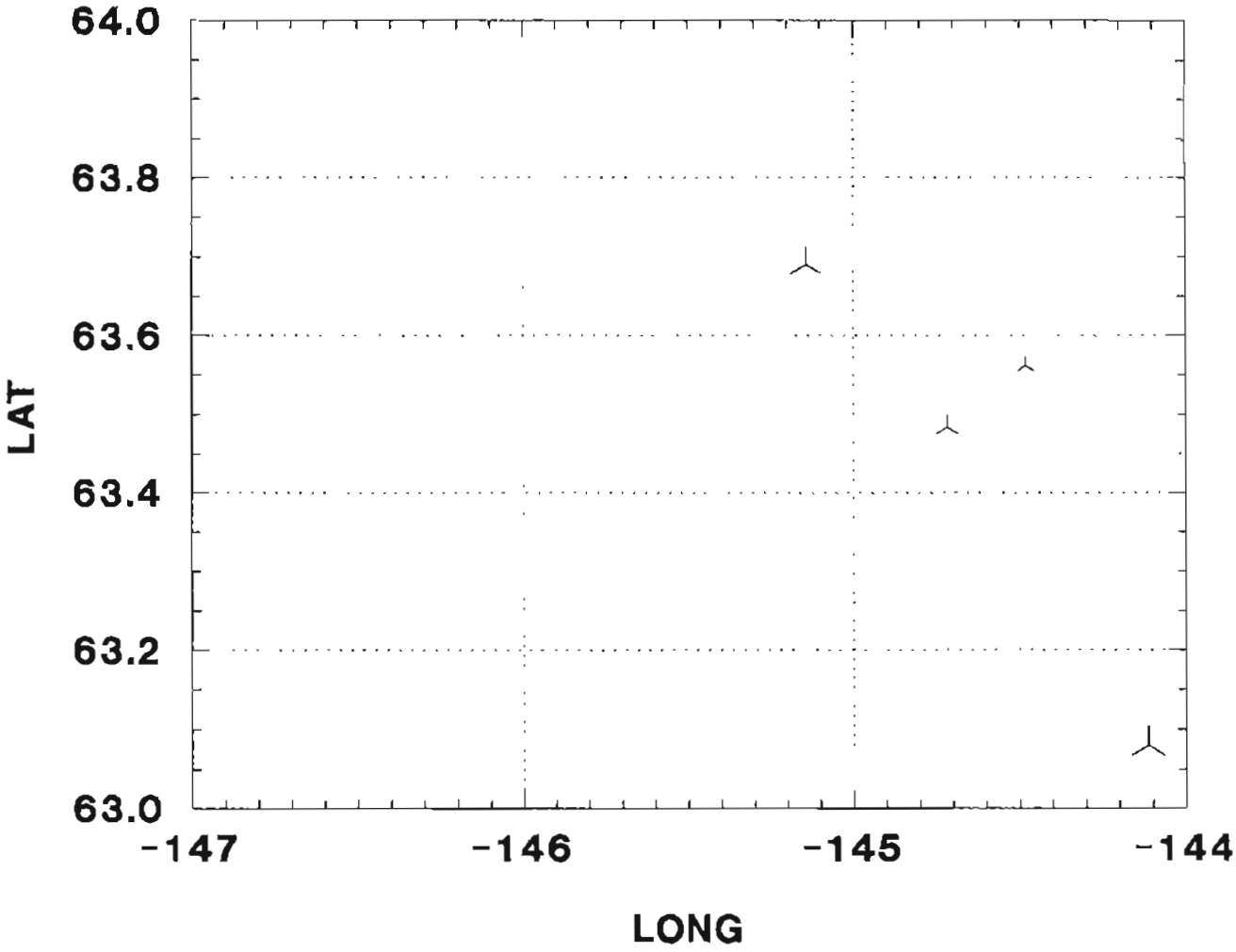
XMHZMAP NURE DATA FOR PB



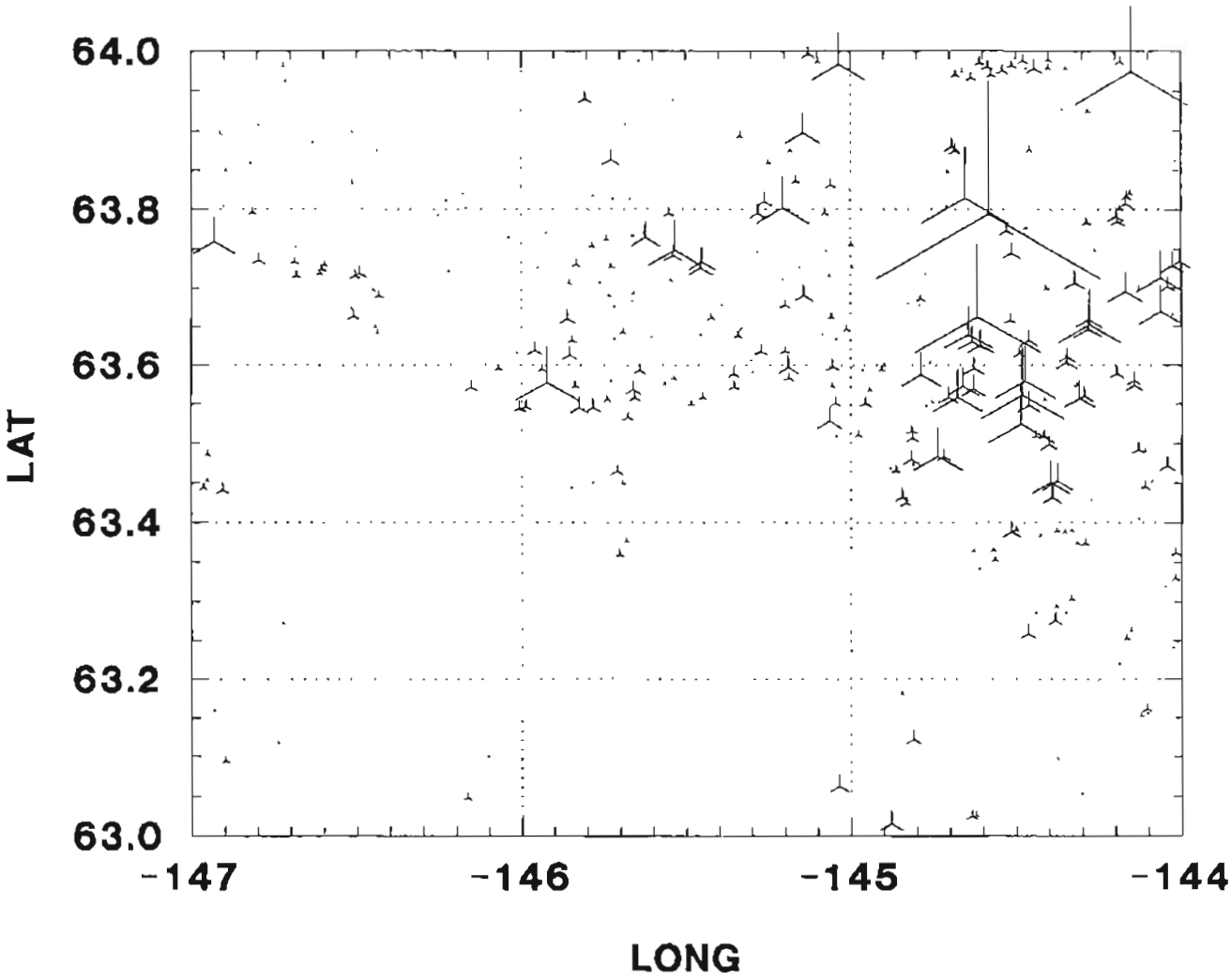
XMHZMAP NURE DATA FOR SB



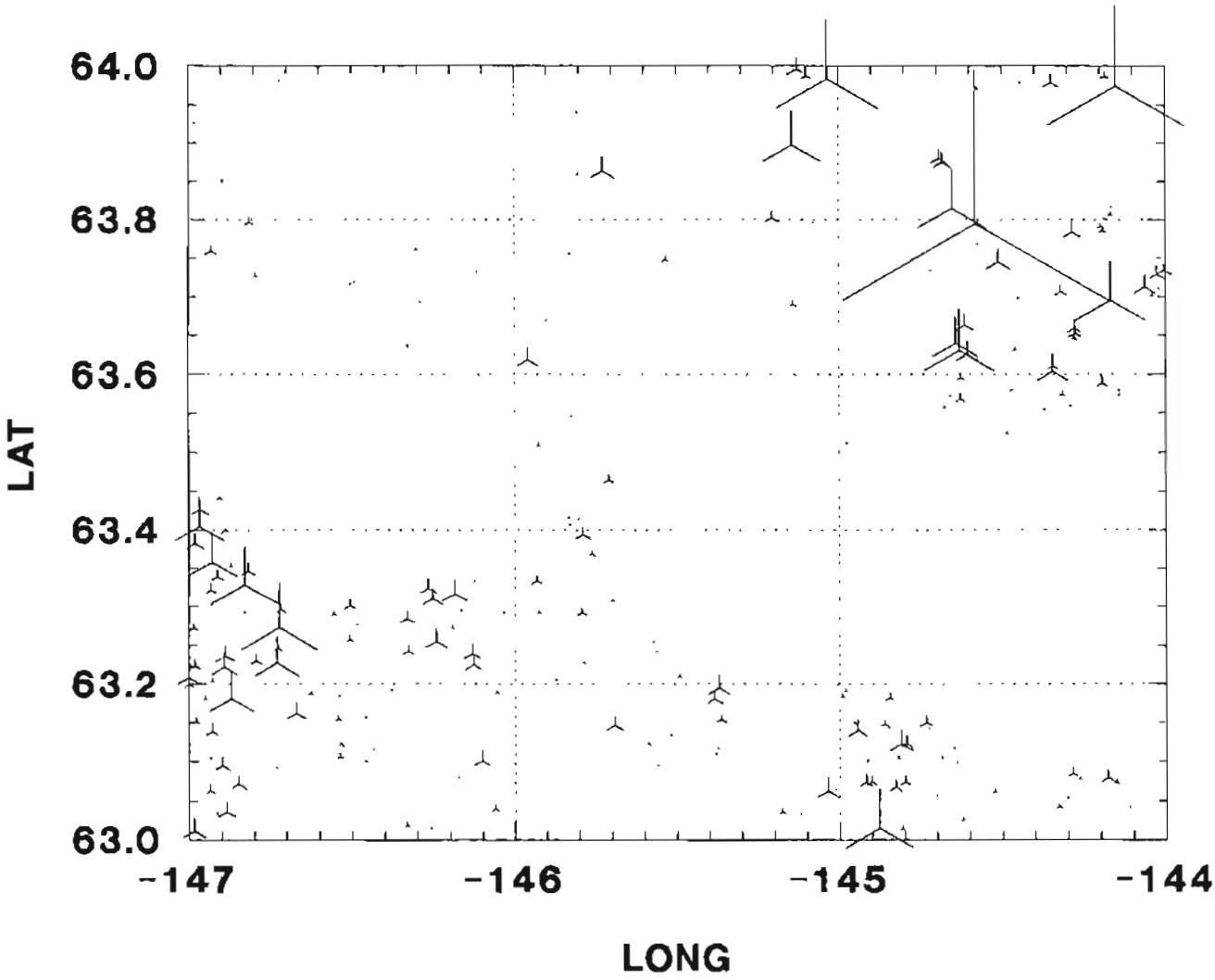
XMHZMAP NURE DATA FOR SN



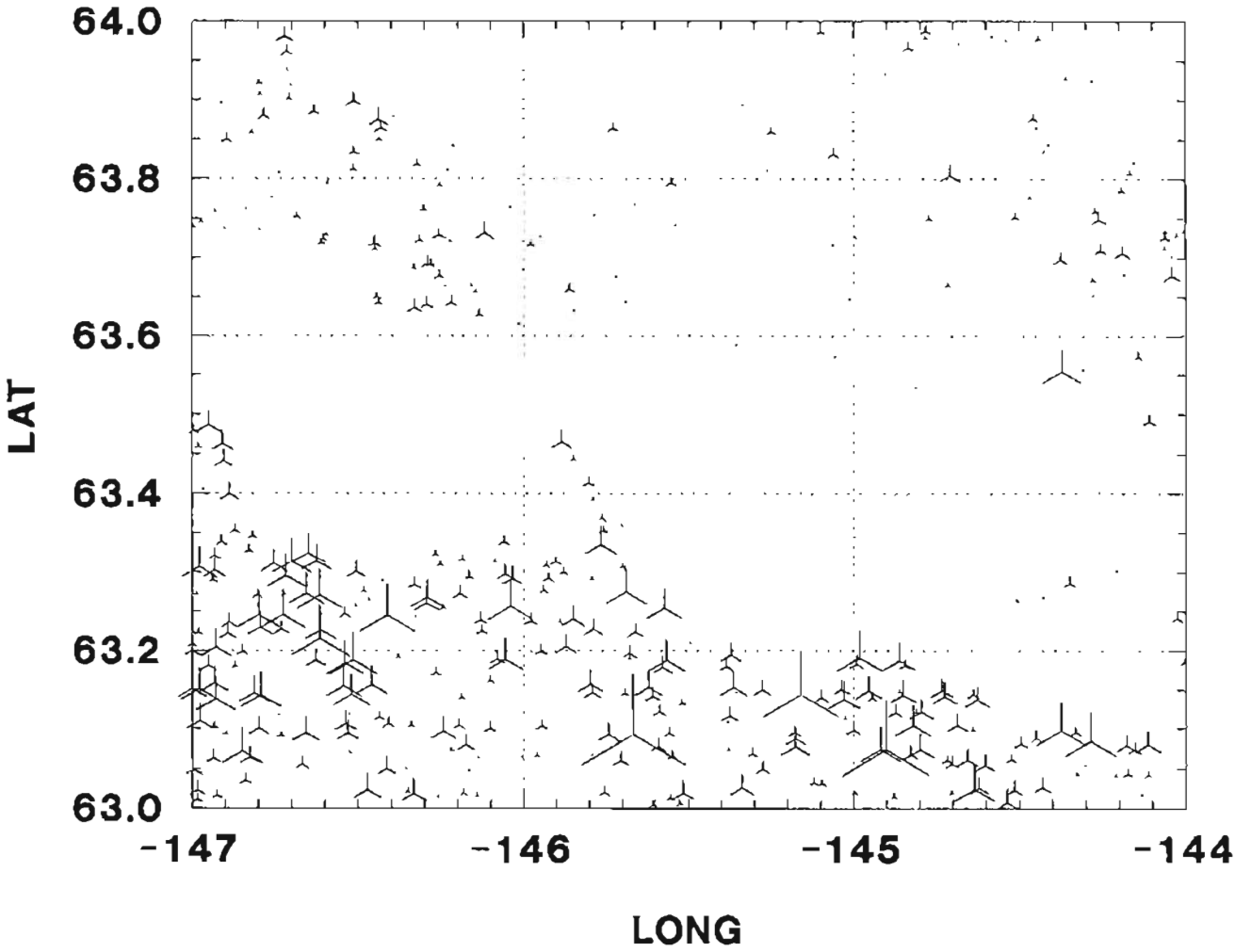
XMHZMAP NURE DATA FOR U



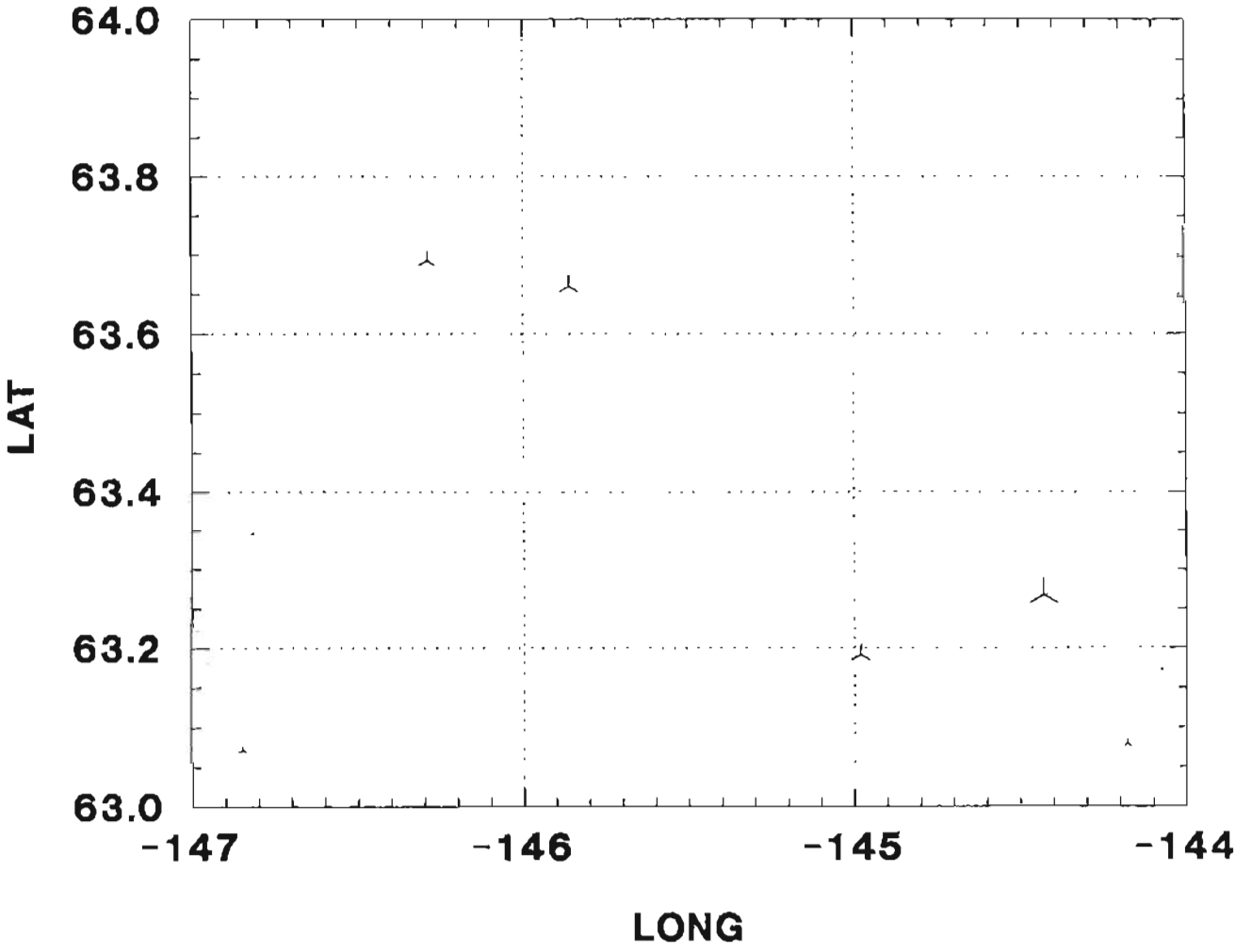
XMHZMAP NURE DATA FOR UTH



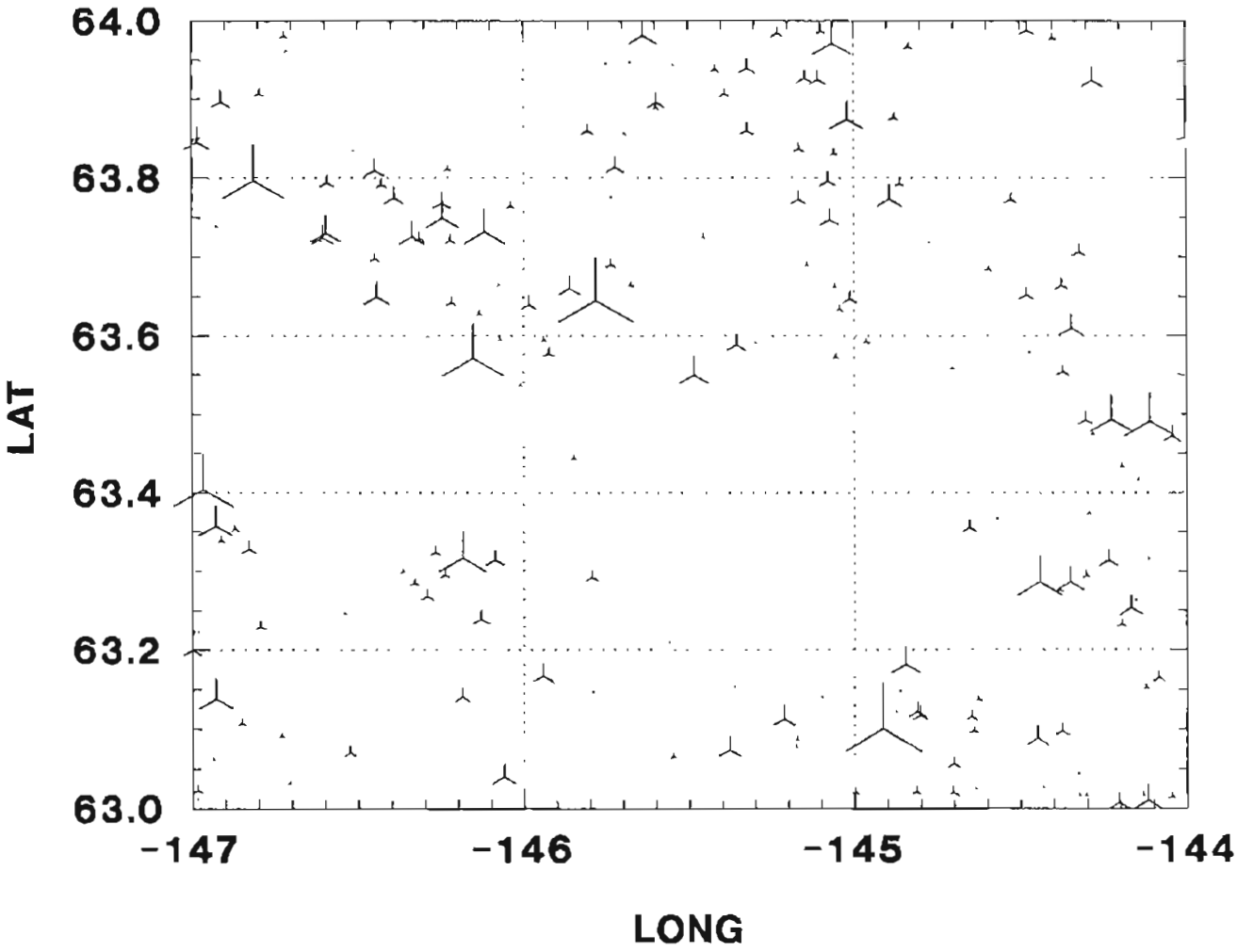
XMHZMAP NURE DATA FOR V



XMHZMAP NURE DATA FOR W



XMHZMAP NURE DATA FOR ZN



APPENDIX A

KEY TO SAMPLE TYPES

This numerical key provides the necessary tie between the specific type or form of each sample taken and each individual suite of field and laboratory data to which the sample relates. It defines the various sample types collected by the LASL in the DOE HSSR for uranium.

The two-digit key number assigned to each sample type designates three distinct properties of the samples taken. These properties are: (a) The general sample source (spring, stream, dry stream, etc.); (b) The sample medium (water or sediment); and (c) The treatment given the sample in the field or laboratory prior to its analysis by the LASL.

The key numbers are inserted in the sample type columns of the specially formatted DOE sample numbering system to positively identify the sample type for all LASL sample data submitted.

KEY NO. SOURCE / MEDIUM / TREATMENT

01 - Spring water sample untreated.

02 - Stream water sample untreated.

03 - Well water sample untreated.

04 - Natural pond water sample untreated.

05 - Artificial pond water sample untreated.

06 - Spring water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

07 - Stream water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

08 - Well water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

09 - Natural pond water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

10 - Artificial pond water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

11 - Wet spring sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

12 - Wet stream sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

13 - Wet natural pond sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

14 - Wet artificial pond sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

15 - Dry stream sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

26 - Spring water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

27 - Stream water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

29 - Natural pond or lake water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

31- Wet spring sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

32- Wet stream sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

33- Wet natural lake sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

35- Dry stream sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

41- Wet spring sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

42- Wet stream sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

43- Wet natural lake sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

45- Dry stream sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

51- Wet spring sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

52- Wet stream sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

53- Wet natural lake sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

55- Dry stream sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

61- Wet spring sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

62- Wet stream sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

63- Wet natural lake sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

65- Dry stream sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

71- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -40 mesh through stainless steel sieves.

72- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -80 mesh through stainless steel sieves.

73- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -100 mesh through stainless steel sieves.

74- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -170 mesh through stainless steel sieves.

75- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -230 mesh through stainless steel sieves.

96 - Dry natural pond sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

97 - Dry artificial pond sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

98 - Other water
99 - Other sediment

These key numbers are to be used only for water (98) or sediment (99) samples coming from a special source and/or given a special treatment not described for any of the types of samples above.

PDF 91 - 22: ERRATA

ONE ELEMENT WAS OMITTED FROM LISTING OF ELEMENTS ON DISK. THAT ELEMENT WAS ....SE.....IT SHOULD GO BETWEEN AS AND ZR.

CORRECT ORDER OF ELEMENTS ON FILE IS:

U AG BI CD CU NB NI PB SN
W AS SE ZR MO BE LI AL AU
BA CA CE CL CO CR CS DY EU
FE HF K LA LU MN MG NA RB
SB SC SM SR TA TB TH TI V
YB ZN and U/TH

PDF 91-22 - UPDATE

The section of PDF 91-22 which describes the format of the NURE data as it is available on computer disk has changed. Instead of all data on one file/quadrangle in columnar format separated by blanks, it is now split into 3 files/quadrangle with commas and blanks separating the fields. The new files are named "NXXX#.ASC". N is for NURE data, XXX is the 3 character quadrangle identification, and # is 1, 2, or 3. This new version will make it easier for users to input the data directly into Quatro-Pro, Lotus, or other spread sheets with a 250 character limit on record length. In Quatro-Pro use IMPORT option, ASCII file, QUOTE & COMMA delimited. Two records were added in front of the data:

1.) a header record which says

"Part <n>, Quadrangle: <name>"

2.) a record with column headings so users can tell which elements are in the file and the order. The column headings are comma and blank delimited too. The data is still in ASCII format and the commas can be eliminated by using a variety of text editors.

Following are the formats of the 3 files. Column 1 was left blank for all records so that all data in the files could be printed even when the first item is interpreted as a carriage control character.

FILE 1:

Record 1: 55 Characters of text. - starts col 2 and length depends on length of quadrangle name. It is enclosed in quotes.

Record 2: col 2-39

"Samp-Id","RC", "Lat.", "Long.", "ST" (Sample Type--see main text)

Starting in col 40, 14 groups of: , "Xx" which are the elements names for the columns. For this record they are: U, Ag, Bi, Cd, Cu, Nb, Ni, Pb, Sn, W, As, Se, Zr, and Mo. NOTE: There is NOT a comma after the last item and all items are enclosed in quotes.

Record 3 to end:

col 2-8. 7 digit sample number.

col 9-10 ", " - a comma followed by a blank

col 11-13 replicate code - 3 digits allowed, most values will be 0 or 1 digit.

col 14-24 ", " followed by Latitude in decimal degrees with 5 decimal places

col 25-35 ", " followed by Longitude in decimal degrees with 5 decimal places

col 36-39 ", " followed by 2 digit sample type

Starting in col 40, 17 groups of "," (comma) followed by 8 digit value of element in ppm. Decimal point is present. None of the values require all 8 digits so that leaves a blank space after the comma. NOTE: no comma after the last item.

FILE 2:

Record 1: - Same as for file 1

Record 2: col 2 to 8 - "Samp-Id"

Starting in col 9, 17 groups of: , "Xx", which are element names for the columns. For this file they are: Be, Li, Al, Au, Ba, Ca, Ce, Cl, Co, Cr, Cs, Dy, Eu, Fe, Hf, K, and La. NOTE: no comma at end and items enclosed in quotes.

Record 3 to end:

Col 2-8 7 digit sample number.

Starting in col 9, 17 groups of ",", followed by 8 eight digit value of element. As in File 1.

FILE 3: Same format as file 2 with different elements. The elements are: Lu, Mn, Mg, Na, Rb, Sb, Sc, Sm, Sr, Ta, Tb, Th, Ti, V, Yb, Zn, and U/Th

NOTE: In the original listing of the elements, Se was accidently left out. It goes between As and Zr.

A copy of this file is included on disk. It is labeled README.NUR. If there are any problems reading this data contact Shirley Liss at DGGS. (907) - 474 - 7147.