

FOGO ISLAND

FOGO ISLAND ON-SHORE OFF-SHORE EXPERIMENT

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PASSCAL Data Report 92-004



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NOTICE

There is an error in the SEG-Y header. The scalar factor to multiply the source and receiver locations by should be -100. That is, the source and receiver coordinates should be multiplied by a factor of 0.01 to get true distance in meters. Also there are time corrections described in the report which must be applied to the data.

Data Acquisition

The data were acquired during July 1991 in conjunction with LITHOPROBE East. Three marine airgun lines, numbered 1, 11 & 12, were shot on the northeast Newfoundland shelf and recorded on Fogo Island off the north coast of Newfoundland (Fig. 1). The source was an untuned array of five 1000cu in airguns and shots were fired on the minute.

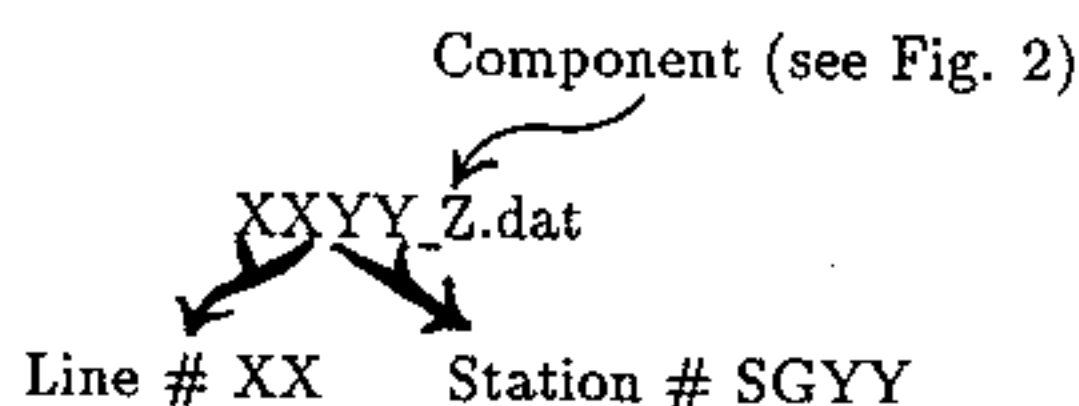
An array of receivers was deployed on Fogo Island with two approximately perpendicular arms of length $\approx 1500m$ (see Figs. 2 & 3). Seven stations were planned along each arm with the corner instrument (SG07) being common. Unfortunately, due to instrument failure, the corner instrument was never deployed. Each RefTek instrument recorded two 3-component stations so that every second station was linked with a 250m cable (SG01, SG03, SG05, SG09, SG11, SG13). This resulted in more noise on the second set of channels, but most could subsequently be removed by frequency filtering. The receivers were MARK L22D 3-component 2Hz geophones oriented so that channel 1 was down, channel 2 was magnetic north, and channel 3 was east (see Fig. 2). In most cases the geophones were cemented to the bedrock but several stations (SG04 & SG12) were situated in boggy locations.

The recording parameters were chosen to obtain continuous recording during the shooting of the line, but with 60sec long files corresponding to the shots. Preliminary testing revealed that the best approach was to record the data in two separate data streams: one recording on the even minutes with a 60sec record length and the other recording on the odd minutes with a 60sec record length. A problem was encountered at some level of data reduction (initial testing suggests conversion of segy to sierra using REC2SIERRA) so that the first $\approx 0.6sec$ of each trace (even and odd) was corrupted. This interval has been muted in the enclosed SEGY files. As arrivals were visible in the data beyond the 60sec record length, traces were merged to generate 90sec long traces.

Tapes

Three SEGY format tapes are included: one for each line that was recorded. Navigation data and timing information has been included in the headers. All of this processing and merging was performed with Inverse Theory & Applications (ITA) standard software and then the data was converted to SEGY. Table 1 is the cross-wire file that was used to convert the files from ITA to SEGY. It shows the location of all the information in the ITA header and how each header word was then written into the SEGY header. The goal was to write the SEGY headers in the latest SEGY IASPEI format. Also included are the manual pages from ITA's SEGY_WRITE software and the response file that was used to write all of the files.

All stations for each line are included on the one tape. The stations are further broken down so that there is a file for each component at each station. The naming of the files is as follows:



Instruments

line 01: Station 7 was never deployed but all other instruments recorded properly.

Line 11: Station 7 not deployed. The instrument recording stations 8 & 9 was stolen during the experiment so no information is available

Line 12: Station 7 not deployed. The instrument recording stations 10 and 11 failed and the data could not be recovered.

Timing

Note in the headers that the shot time was not exactly on the minute so that a static shift will be required to the data. The shot times for each line are recorded in the header and should be referenced. A further shift is required because the ship time was 0.109 seconds fast. For example, the shift for Line #1 is -1.40s (shot time) and +.109 seconds (ship clock error), resulting in a total shift of -1.291 seconds to be applied to the data. THIS HAS NOT BEEN APPLIED TO THE ENCLOSED DATA.

The ship also reported that the shots on the odd minute were delayed an additional 0.030 seconds relative to the shots on the even minute. No evidence of this is seen in this data and subsequently it has not been accounted for in the present data.

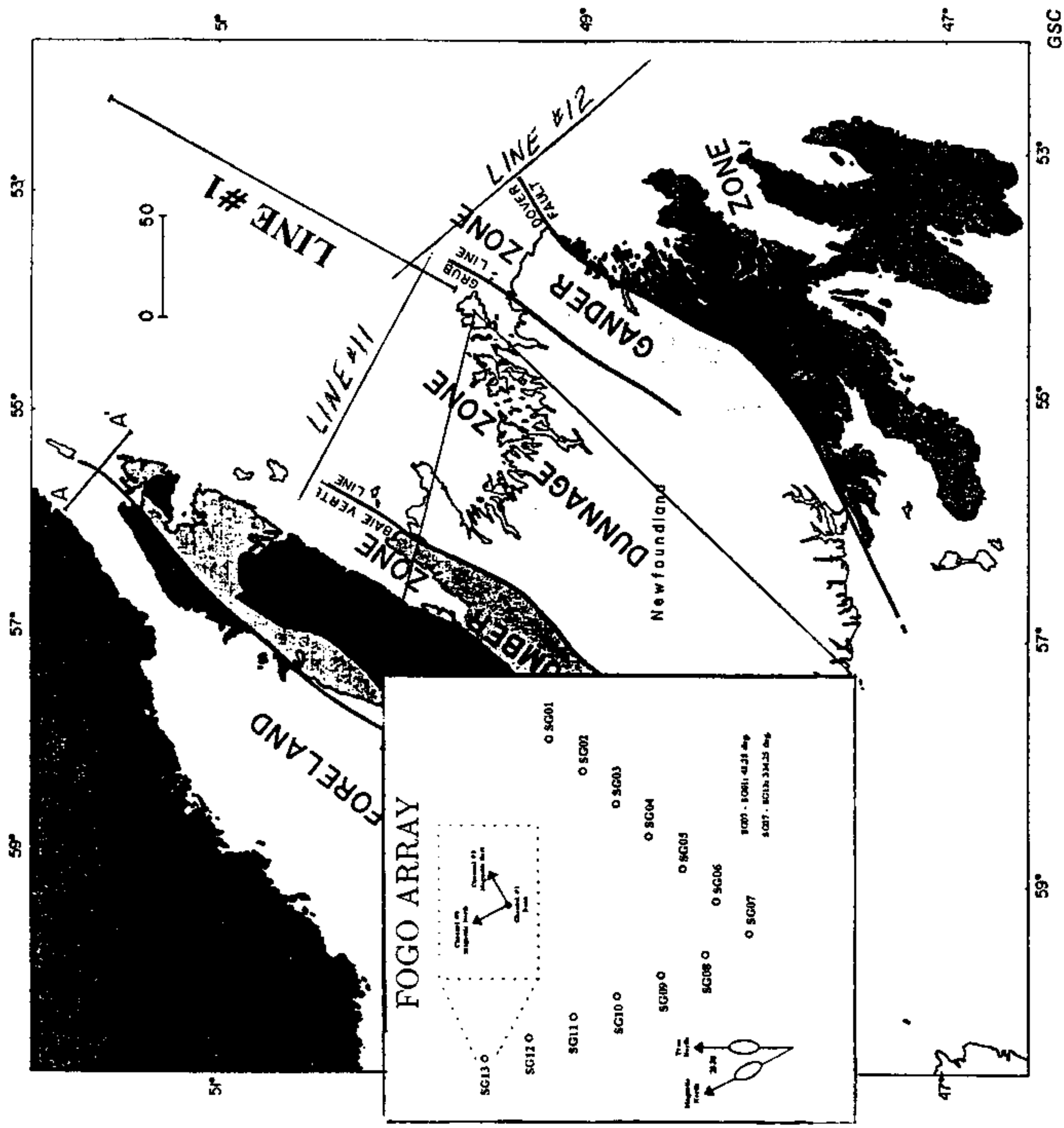


FIGURE # 1

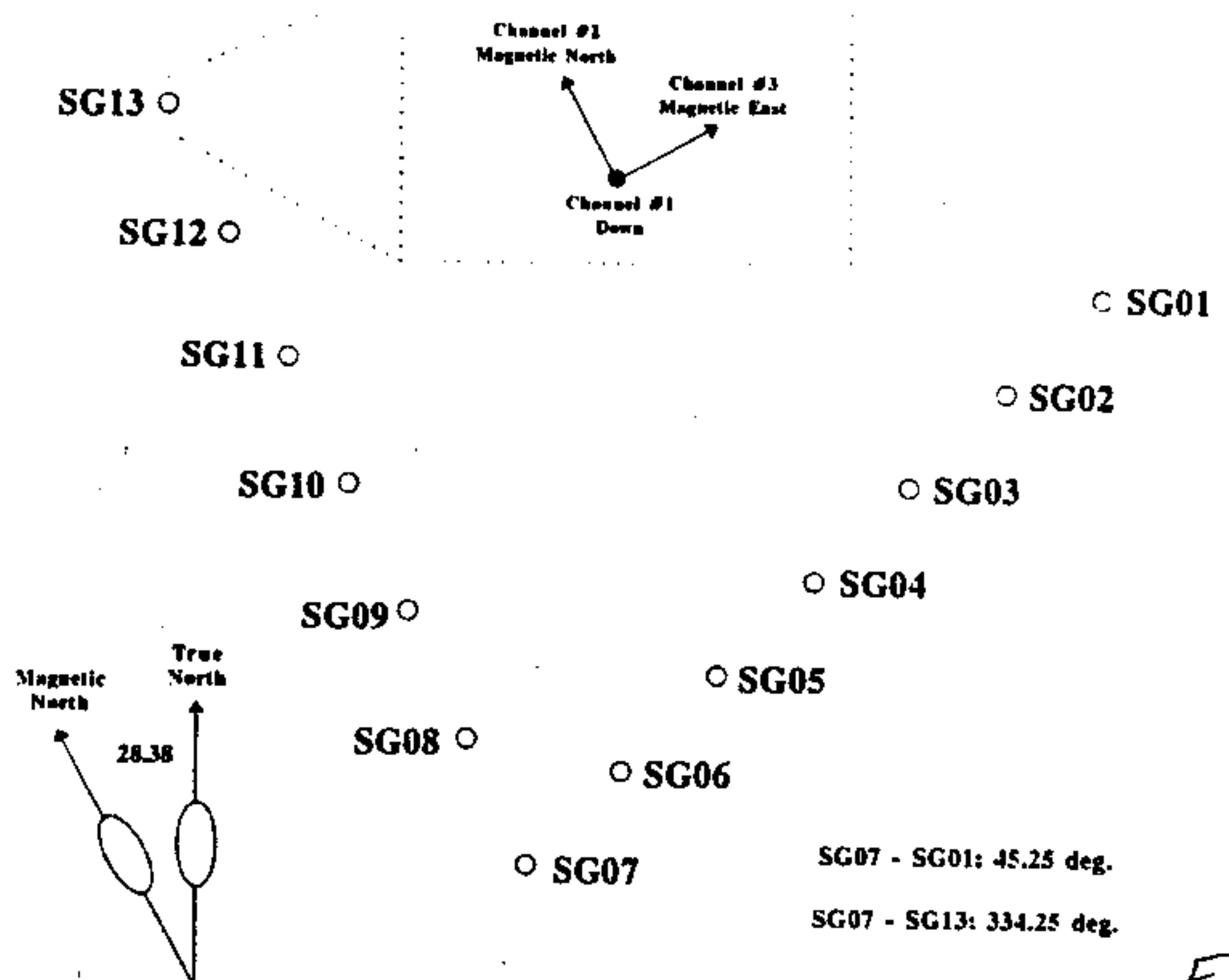


FIGURE #2

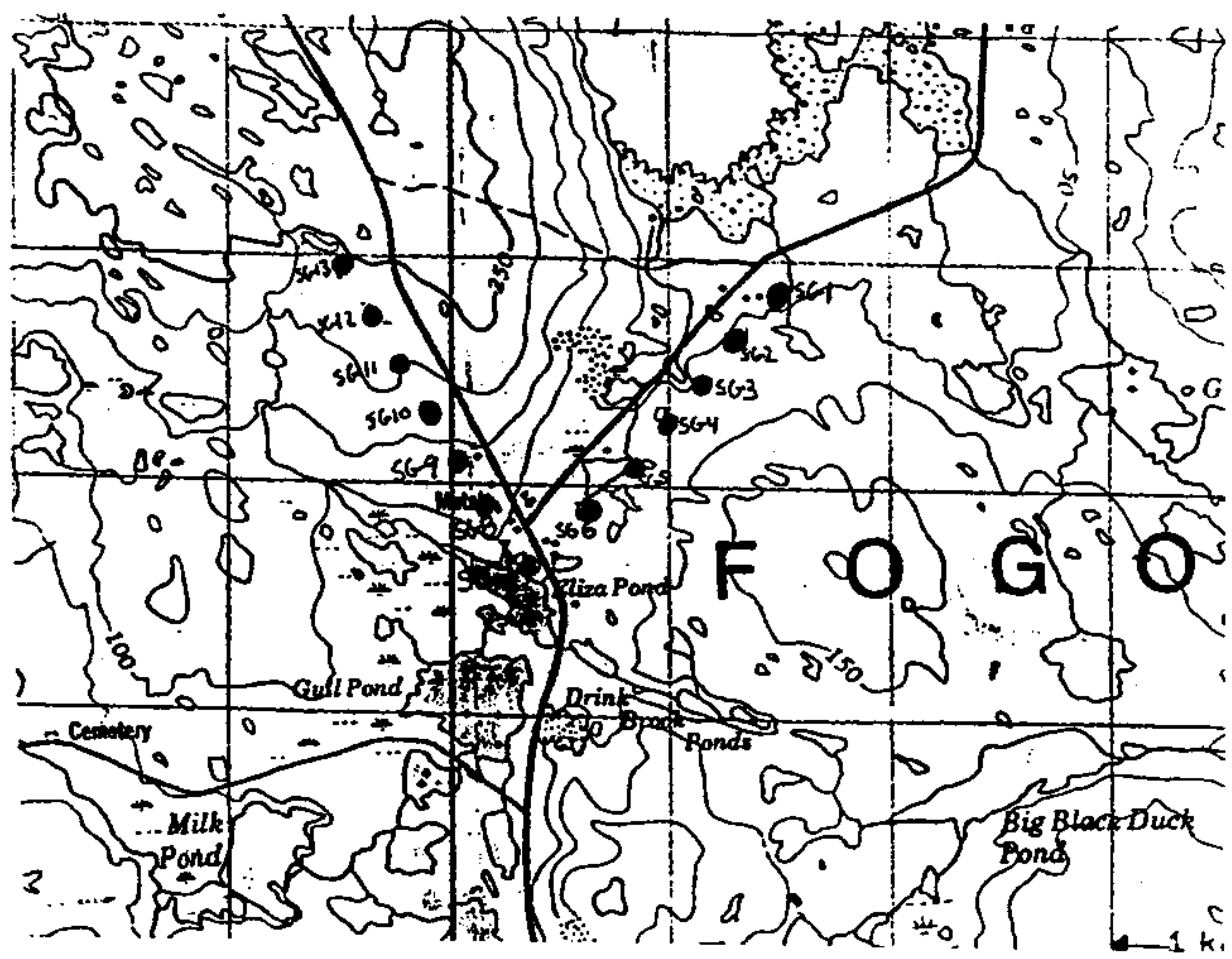


FIGURE #

driv '/dev/nrst0'
open 1 1 '1213_3.dat'
ocrs 'iaspei_w.crs'
oebc 'ebcdic.hed'
chan 1 1 1
out 1 885 1
form 1
time 0. 80.
nrew

SEGY_WRITE

response file

TABLE #1

IASPEI_W.CRS

```

! iaspei_w.crs      iaspei_write.crs
! Crosswire file allowing ITA formatted files to be written to tape in SEG-Y
! format using the new SEG_Y_IASPEI standard.
!
! Isa Asudeh, June 8, 1992.
!
! all lines marked with IASPEI match LithoSEIS SEG_Y_IASPEI format.
! all lines marked with DUMMY are undefined and their variables get dummied.
! all other lines are original segy or ita.
!
! Words 7,8,10,12, and 13 are set automatically

```

SEG_Y				ITA			
head	1	'i*4'	1.0 0.0	1	'i*4'	!original trace sequential #	
head	5	'i*4'	1.0 0.0	2	'i*4'	!file #	
head	21	'i*4'	1.0 0.0	3	'i*4'	!cdp #	
head	89	'i*2'	1.0 0.0	4	'i*4'	!coordinate unit IASPEI	
!		'i*4'	1.0 0.0	5	'i*4'	!ITA shotpoint or sorting word	
head	29	'i*2'	1.0 0.0	6	'i*4'	!trace type flag (SEE NOTES)	
!				7		!# of points per trace	
!				8		!sampling interval (microsecs)	
head	9	'i*4'	1.0 0.0	9	'i*4'	!shot name IASPEI	
!				10		!trace end time (ms)	
!				11		!scratch word used in getdat	
!				12		!disk record fold	
!				13		!disk trace in record position	
!		'i*2'	0.0 0.0	14	'i*4'	!horizon bit mask, ita use for later	
!		'i*2'	0.0 0.0	15	'r*4'	!horizon 1 pick time, zeroed on tape	
!		'i*2'	0.0 0.0	16	'r*4'	!horizon 2 pick time, zeroed on tape	
!		'i*2'	0.0 0.0	17	'r*4'	!horizon 3 pick time, zeroed on tape	
!		'i*4'	0.0 0.0	18	'r*4'	!horizon 4 pick time, zeroed on tape	
!		'i*2'	0.0 0.0	19	'r*4'	!horizon 5 pick time, zeroed on tape	
!							
head	189	'i*2'	1.0 0.0	20	'r*4'	!shot time day IASPEI	
head	191	'i*2'	1.0 0.0	21	'r*4'	!shot time hour IASPEI	
head	193	'i*2'	1.0 0.0	22	'r*4'	!shot time min IASPEI	
head	195	'i*2'	1.0 0.0	23	'r*4'	!shot time seconds IASPEI	
head	197	'i*4'	1.0 0.0	24	'r*4'	!shot time milliseconds IASPEI	
head	71	'i*2'	1.0 0.0	25	'r*4'	!multiplier for segy bytes 73-88 IASPEI	
head	17	'i*4'	1.0 0.0	26	'i*4'	!shot site number IASPEI ✓	
head	13	'i*4'	1.0 0.0	27	'i*4'	!receiver site number IASPEI (SEE NOTE)	
!		'i*4'	0.001 0.0	28	'i*4'	! INTEGER OFFSET IN METERS	
head	77	'i*4'	0.01 0.0	29	'r*8'	!source y coordinate	
head	73	'i*4'	0.01 0.0	31	'r*8'	!source x coordinate	
head	45	'i*4'	1.0 0.0	33	'r*8'	!source elevation WATER DEPTH	
head	85	'i*4'	0.01 0.0	35	'r*8'	!rcvr y coordinate	
head	81	'i*4'	0.01 0.0	37	'r*8'	!rcvr x coordinate	
head	41	'i*4'	1.0 0.0	39	'r*8'	!receiver elevation	
!		'i*2'	1.0 0.0	41	'r*8'	!RECEIVER LATITUDE	-DUMMY
!		'i*2'	1.0 0.0	43	'r*8'	!RECEIVER LONGITUDE	DUMMY
!		'i*2'	1.0 0.0	45	'r*8'	!SOURCE - RECEIVER AZIMUTH	DUMMY
!		'i*2'	1.0 0.0	47	'r*8'	!SOURCE LATITUDE	DUMMY
!		'i*2'	1.0 0.0	49	'r*8'	!SOURCE LONGITUDE	DUMMY
head	105	'i*2'	1.0 0.0	51	'r*4'	!lag time A in milliseconds IASPEI	
!		'i*4'	1.0 0.0	52	'r*4'	!DUMMY	
head	37	'i*4'	1.0 0.0	53	'r*4'	!offset in feet or meters	
!							
head	159	'i*2'	1.0 0.0	54	'r*4'	!day of start of trace IASPEI	
head	161	'i*2'	1.0 0.0	55	'r*4'	!hour of start of trace IASPEI	
head	163	'i*2'	1.0 0.0	56	'r*4'	!min of start of trace IASPEI	

head 165	'i*2'	1.0	0.0	57	'r*4'	!sec of start of trace IASPEI
head 181	'i*4'	1.0	0.0	58	'r*4'	!mid tt seconds of start of trace IASPEI
!						
head 217	'i*2'	1.0	0.0	59	'r*4'	!milliseconds of trace time correctio
head 209	'i*4'	1.0	0.0	60	'i*4'	!actual trace time correction- micros
!						
head 213	'i*2'	1.0	0.0	61	'r*4'	! ttrace application flag IASPEI
head 215	'i*2'	1.0	0.0	62	'r*4'	! recording instrument type IASPEI
head 69	'i*2'	0.0	1.0	63	'r*4'	! scaler factor of 1 for bytes 41-48
head 167	'i*2'	0.0	2.0	64	'r*4'	!time basis code of 2 IASPEI
end						

ITA #6 TRACE FLAG 0 = DEAD (NO SHOT)
 ELSE = 10 + CHANNEL NUMBER.
 °° II = CHANNEL #1

ITA # 27 RECEIVER NUMBER

9101 ← LINE #1
 LE91 → STATION #01

1 = FOGO ARRAY LINE#1
 2 = " " LINE#11
 3 = " " LINE#12
 4 = LAND DEPLOYED LINE#

NOTE ITA 29 → 39 → X and Y positions are all relative to SITE 5607 in FOGO ARRAY

LITHOPROBE East 1991 Fogo Island Array

Line 1 Data Tape Order	
File #	File Name
1	0101_1.dat
2	0101_2.dat
3	0101_3.dat
4	0102_1.dat
5	0102_2.dat
6	0102_3.dat
7	0103_1.dat
8	0103_2.dat
9	0103_3.dat
10	0104_1.dat
11	0104_2.dat
12	0104_3.dat
13	0105_1.dat
14	0105_2.dat
15	0105_3.dat
16	0106_1.dat
17	0106_2.dat
18	0106_3.dat
19	0108_1.dat
20	0108_2.dat
21	0108_3.dat
22	0109_1.dat
23	0109_2.dat
24	0109_3.dat
25	0110_1.dat
26	0110_2.dat
26	0110_3.dat
28	0111_1.dat
29	0111_2.dat
30	0111_3.dat
31	0112_1.dat
32	0112_2.dat
33	0112_3.dat
34	0113_1.dat
35	0113_2.dat
36	0113_3.dat

Note: Station 7 was not recorded on this line.

LITHOPROBE East 1991 Fogo Island Array

Line 11 Data Tape Order	
File #	File Name
1	1101_1.dat
2	1101_2.dat
3	1101_3.dat
4	1102_1.dat
5	1102_2.dat
6	1102_3.dat
7	1103_1.dat
8	1103_2.dat
9	1103_3.dat
10	1104_1.dat
11	1104_2.dat
12	1104_3.dat
13	1105_1.dat
14	1105_2.dat
15	1105_3.dat
16	1106_1.dat
17	1106_2.dat
18	1106_3.dat
19	1110_1.dat
20	1110_2.dat
21	1110_3.dat
22	1111_1.dat
23	1111_2.dat
24	1111_3.dat
25	1112_1.dat
26	1112_2.dat
27	1112_3.dat
28	1113_1.dat
29	1113_2.dat
30	1113_3.dat

Note; Stations 7, 8 and 9 were not recorded for this line.

LITHOPROBE East 1991 Fogo Island Array

Line 12 Data Tape Order	
File #	File Name
1	1201_1.dat
2	1201_2.dat
3	1201_3.dat
4	1202_1.dat
5	1202_2.dat
6	1202_3.dat
7	1203_1.dat
8	1203_2.dat
9	1203_3.dat
10	1204_1.dat
11	1204_2.dat
12	1204_3.dat
13	1205_1.dat
14	1205_2.dat
15	1205_3.dat
16	1206_1.dat
17	1206_2.dat
18	1206_3.dat
19	1208_1.dat
20	1208_2.dat
21	1208_3.dat
22	1209_1.dat
23	1209_2.dat
24	1209_3.dat
25	1112_1.dat
26	1112_2.dat
27	1112_3.dat
28	1113_1.dat
29	1113_2.dat
30	1113_3.dat

Note: Stations 7, 10, and 11 were not recorded on this line.

4.8 - TAPE UTILITIES

SEGY_WRITE

SEGY_WRITE

SEGY_WRITE reads disk files in INSIGHT/1 format and writes the data to tape or disk file in SEG-Y format.

SEGY_WRITE is initiated at the UNIX level indicated by a % prompt, by entering:

```
% segy_write segy_write.in5
```

The parameter file `SEGY_WRITE.IN5`, or other valid system filename, contains information as illustrated in the following example:

```
DRIV 'TAPE1'           ! 'DRIVE'  
OPEN 1 1 'OUTPUT.DAT' ! IUNIT, ISTAT, 'FILENAME'  
OHED 'HEAD.LIS'       ! 'FILENAME'  
OCRS 'SEGY_ITA.CRS'   ! 'FILENAME'  
OEBC 'EBCDIC.HED'    ! 'FILENAME'  
OUT 1 10 1           ! IREC1, IREC2, IEVERY  
CHAN 1 120 1         ! ICHAN1, ICHAN2, IEVERY  
TIME 0 2.0           ! TMIN, TMAX  
MAXS                 ! ISHOTS  
FLIP                 !  
NREW                 !  
FORM 1               ! IFORMAT  
MEAN 2000 0.0 2.0    ! ISCALE, T1, T2  
NHED
```

The commands and their parameters are as follows :

CHAN

The window of sequential traces, to output in SEG-Y format.

Parameters : *ICHAN1 ICHAN2 IEVERY*

ICHAN1	Initial sequential trace to output.
ICHAN2	Final sequential trace to output.
IEVERY	Increment at which to output sequential traces.

DRIV

Specifies the name of the tape drive upon which the reels will be mounted; or output disk file name, as applicable.

Parameters: *'DRIVE'*

DRIVE	Tape device or alias name of tape drive or disk file name for output, in all cases enclosed by single quotes.
-------	---

FLIP

Specifies that the data polarity is to be reversed, prior to writing in SEG-Y format.

Parameters : *NONE*

FORM

Code number specifying the SEG-Y format to be written to tape.

Parameters : *IFORMAT*

IFORMAT Format code as specified within the SEG-Y standards. The available options are listed below:

1 - 32 bit IBM floating point

2 - 32 bit fixed point

3 - 16 bit fixed point

MAXS

Specifies the maximum number of records to write to a single SEG-Y tape.

Parameters : *ISHOTS*

ISHOTS Maximum number of records to write to a single SEG-Y tape. This value overrides the default estimation made by the program.

MEAN

Parameters: *ISCALE T1 T2*

ISCALE The value to which the mean absolute amplitude of the output data, within the **TIME WINDOW**, are to be scaled. The mean absolute amplitude and **ISCALE** values are used to calculate a scalar to apply to all data samples, before writing to SEG-Y tape.

T1,T2 The time window over which to determine the mean absolute amplitude of the data.

4.10 - TAPE UTILITIES

SEGY_WRITE

NHED

By including this parameter file, EBCDIC and BINARY headers will not be included on the output tape.

Parameters : *NONE*

NREW

This option instructs the tape drive not to rewind the tape.

Parameters : *NONE*

OCRS

Specifies the crosswire filename used to make assignments between INSIGHT/1 trace header words and SEG-Y tape header words.

Parameters : *'FILENAME'*

FILENAME Name of the crosswire file, enclosed in single quotes.

NOTE: See the Appendix in this User Manual for more information about the crosswire file format.

OEBC

Specifies the 40-line, 80 column ASCII file used to construct the SEG-Y EBCDIC header.

Parameters : *'FILENAME'*

FILENAME Name of the ASCII file, enclosed in single quotes.

NOTE: A blank template for this file may be found in \$IN5DIR/ebcdic.hed.

OHED

Specifies the header filename from which SEG-Y header information will be obtained.

Parameters : *'FILENAME'*

FILENAME Name of the header file, enclosed in single quotes.

OPEN

Specifies the input datafile to be reformatted from INSIGHT/I format on disk and output in SEG-Y format.

Parameters : *IUNIT ISTAT 'FILENAME'*

IUNIT Logical I/O unit attached to the datafile.
ISTAT The status of the file. This parameter should be set to 1, to indicate an "old" file.
FILENAME Name of datafile, enclosed in single quotes.

OUT

The range of sequential record numbers and increment to output in SEG-Y format.

Parameters : *IREC1 IREC2 IEVERY*

IREC1 Initial sequential record to output.
IREC2 Final sequential record to output.
IEVERY Increment at which to output sequential records.

TIME

Sets the time values (in seconds) of the data to write to tape.

Parameters : *TMIN TMAX*

TMIN Minimum time value (s).
TMAX Maximum time value (s).