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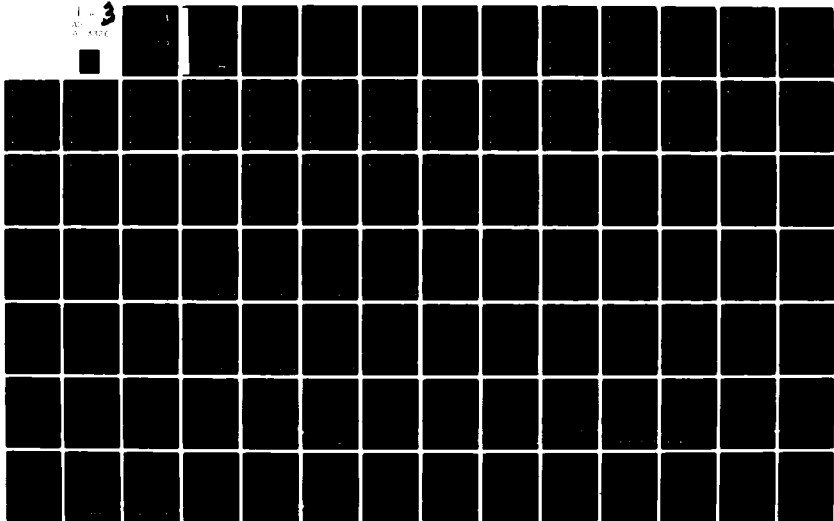
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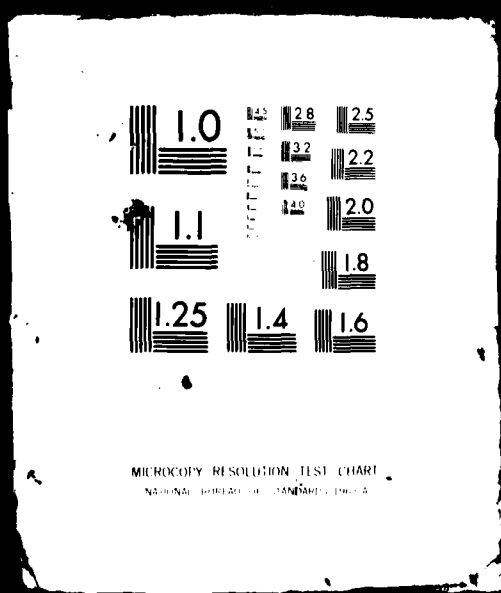


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MICROCOPY RESOLUTION TEST CHART
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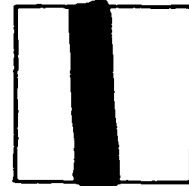
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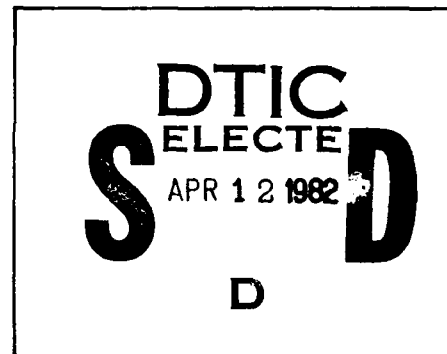
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**MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION**

AD A113326

**VOLUME IV
NEVADA-UTAH
VERIFICATION STUDIES, FY 79
GEOTECHNICAL DATA,
HAMLIN CDP, NEVADA**

**PREPARED FOR
SPACE AND MISSILE SYSTEMS ORGANIZATION (SAMSO)
NORTON AIR FORCE BASE, CALIFORNIA**

FURRO
NATIONAL, INC.
Consulting Engineers and Geologists

MX SITING INVESTIGATION
GEOTECHNICAL EVALUATION
VOLUME IV, NEVADA-UTAH
VERIFICATION STUDIES, FY 79
GEOTECHNICAL DATA
HAMLIN CDP, NEVADA

Prepared for:

U. S. Department of the Air Force
Space and Missile Systems Organization (SAMSO)
Norton Air Force Base, California 92409

Prepared by:

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3777 Long Beach Boulevard
Long Beach, California 90807

24 August 1979

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objectives of this report was to verify sufficient suitable areas for deployment of the MX system & to provide preliminary physical & engineering characteristics of the soils. are basic data consisting of boring and trench logs, seismic refraction surveys, sieve analyses, soil, electrical resistivity, depth to water, depth to rock.		

VOLUME IV
GEOTECHNICAL DATA, HAMLIN CDP

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- 1 ACTIVITY LOCATION MAP
- 2 CONE PENETROMETER TEST RESULTS

FOREWORD

This report was prepared for the Department of the Air Force, Space and Missile Systems Organization (SAMSO), in compliance with Contract No. F04704-78-C-0027, CDRL Item 005A2. It presents geological, geophysical, and geotechnical data and evaluates the suitability of portions of Nevada and Utah for siting the MX Land Mobile Advanced ICBM System.

This report is the first of several Verification reports which will be prepared. The objectives are to verify sufficient suitable area for deployment of the MX System and to provide preliminary physical and engineering characteristics of the soils. The Verification Studies are the final phase of a site-selection process which was begun in 1977. Previous studies have been termed Screening, Characterization, and Ranking. In preparing this report, it has been assumed that the reader is familiar with these previous studies.

Results of the FY 79 Verification studies are contained in 11 volumes as follows:

Geotechnical Results

Volume 1A - Sections 1.0, 2.0, and 3.0 contain Introduction, Results and Conclusions, and Recommendations for Future Studies. Sections 4.0 through 6.0 contain summary geotechnical data for Whirlwind, Snake East, and Hamlin CDP's.

Volume 1B - Sections 7.0 through 10.0 contain summary geotechnical data for White River North, Garden-Coal, Reveille-Railroad and Big Smoky CDP's.

Geotechnical Data Volumes

Volume	II - Whirlwind CDP
Volume	III - Snake East CDP
* Volume	IV - Hamlin CDP
Volume	V - White River North CDP
Volume	VI - Garden-Coal CDP
Volume	VII - Reveille-Railroad CDP
Volume	VIII - Big Smoky CDP
Volume	IX - Dry Lake CDP
Volume	X - Ralston CDP

* This volume is presented herein.

SECTION 1.0
GEOLOGIC STATION DATA

C

EXPLANATIONS OF GEOLOGIC STATION DATA

Geologic stations were established at selected locations throughout the CDP at which detailed descriptions of surficial basin-fill deposits or rock were recorded. Locations of all geologic stations are shown in Drawing 1, Activity Location Map. All data taken on surficial basin-fill units at these stations are listed in Table 1-1 and an explanation of the column headings in the table is given below. At stations where rock descriptions were made, only geologic unit designations are listed. A general explanation of all geologic unit symbols used in Verification Studies is included at the end of this section.

Column Heading
Table 1-1

Explanation

Station Number	Geologic stations are numbered sequentially. Where more than one geologic field team worked in a CDP, stations made by each team are differentiated with a letter (A, B, or C) following the station number.
Geologic Unit	Generic geologic unit only, i.e. the grain-size designation (f, s, g, c) is omitted from surficial basin-fill units. The letter B in the unit designation indicates a buried deposit not exposed at the surface.
MPS MM	Average maximum particle size in millimeters.
Grain Size (%B, %C, %G, %S, %F)	Estimated particle size distribution using the Unified Soil Classification System. Percentages of boulders (%B) and cobbles (%C) are based on the entire deposit, whereas percentages of gravel (%G), sand (%S) and fines (%F) are taken only on the fraction composed of particles less than 3 inches (76 mm) in diameter.
USCS	Soil class according to the Unified Soil Classification System.

- Munsell Color Soil color based on Munsell Soil Color Chart.
- Source Rock Types(s) Rock types of coarse clasts listed in order of abundance.
- * Physical Properties Data listed in columns 6 through 15 address specific soil properties. These are listed below in parentheses following the column heading number and are also listed at the bottom of Table 1-1. Data are coded with each numerical entry referring to a specific soil condition as listed below.
- 6 (Grain Shape) 1) Angular, 2) Subangular, 3) Subrounded, 4) Rounded, 5) Well rounded
 - 7 (Moisture Content) 1) Dry, 2) Moist, 3) Wet
 - 8 (Plasticity of Fines) 1) None, 2) Low, 3) Medium, 4) High
 - 9 (Consistency) Coarse grained: 1) Very Loose, 2) Loose, 3) Medium Dense, 4) Dense, 5) Very Dense,
Fine grained: 1) Soft, 2) Firm, 3) Stiff, 4) Hard
 - 10 (Structure) 1) Stratified Tabular, 2) Stratified Other (lensed, cross bedded, discontinuous beds), 3) Nonstratified
 - 11 (Cementation Induration) 1) None, 2) Weak, 3) Moderate, 4) Strong
 - 12 (Depth to Cemented Layers) Depth to layer (in centimeters) exhibiting cementation induration described in Column 11 (above)
 - 13 (Weathering of clasts) 1) Fresh, 2) Slight, 3) Moderate, 4) Very
 - 14 (Soil Profile Development) 1) None (A-C profile), 2) Poor (incipient B-horizon), 3) Well (prominent B-horizon)
 - 15 (Caliche Development) 1) Stage I, 2) Stage II, 3) Stage III, 4) Stage IV, 5) None

Drainage

DP (M)

Average depth of drainages (in meters)

WD (M)

Average width of drainages (in meters)

Slope (%)

Average slope of ground surface (in percent grade)

Sample

Number of samples taken

GENERALIZED GEOLOGIC UNITSExplanation

Surficial Basin-fill Units

- A1 Younger Fluvial Deposits - Major modern stream channel and flood-plain deposits.
- A2 Older Fluvial Deposits - Older incised stream channel and flood-plain deposits in elevated terraces bordering major modern drainages.
- A3 Eolian Deposits - wind-blown deposits of sand occurring as either thin sheets (A3s) or dunes (A3d).
- A4 Playa and Lacustrine Deposits - Deposits occurring in modern, active playas (A4) or in either inactive playas or older lake beds and abandoned shorelines associated with extinct lakes (A4o).
- A5 Alluvial Fan Deposits - Alluvial deposits consisting of debris flow and water-laid alluvium near mountain fronts, grading into predominantly water-laid alluvium deposited in shifting distributary channels near the basin center. Younger (A5y), intermediate (A5i), and older (A5o) alluvial fans are differentiated by surface soil development, terrain conditions, and present depositional/erosional environment.

Grain sizes of these deposits (except A3 deposits, which are exclusively sandy) are indicated by a single letter (f, s, g, or c) following the geologic unit symbol. These letters indicate the predominant grain size and range of soil types according to the Unified Soil Classification System:

f - fine-grained (ML, CL, MH, CH)

s - sands (SP, SW, SM, SC)

g - gravels (GP, GW, GM, GC)

c - coarse grained with greater than 30 percent boulders and cobbles (generally GP, GW, GM, GC)

ROCK UNITS

- I Igneous (undifferentiated). Rocks formed by solidification of a molten or partially molten mass.
 - I1 Intrusive - Plutonic rocks formed by solidification of molten material beneath the surface (e.g., granite, granodiorite, diorite, gabbro).
 - I2 Extrusive (intermediate and acidic) - Volcanic rocks of intermediate and acidic composition formed by solidification of molten material at or near the surface, (e.g., rhyolite, latite, dacite, andesite).
 - I3 Extrusive (basic) - Volcanic rocks of basic composition, generally formed by solidification of molten materials at or near the surface (e.g., basalt).
 - I4 Extrusive (pyroclastic) - Rocks formed by accumulation of volcanic ejecta (e.g., ash, tuff, welded tuff, agglomerate).
- S Sedimentary (undifferentiated) - Rocks formed by accumulation of clastic solids, organic solids and/or chemically precipitated minerals.
 - S1 Arenaceous and/or Siliceous Rocks - Composed of sand size particles (e.g., sandstone, orthoquartzite) or of cryptocrystalline silica (e.g., opal, chert).
 - S2 Carbonate Rocks - Composed predominantly of calcium carbonate detritus or chemical precipitates (e.g., limestone, dolomite, chalk).
 - S3 Argillaceous Rocks - Composed of clay and silt-sized particles (e.g., siltstone, shale, claystone).
 - S4 Evaporite Rocks - Precipitated from solution as a result of evaporation (e.g., halite, gypsum, anhydrite, sylvite).
 - S5 Coarse Clastic Rocks - Composed of gravel sized or larger clasts (e.g., conglomerate, breccia).
- M Metamorphic (undifferentiated) - Rocks formed through recrystallization in the solid state of preexisting rocks by heat and pressure (e.g., gneiss, schist, hornfels, metaquartzite).

PHYSICAL PROPERTIES :			
9 - GRAIN SHAPE	9 - CONSISTENCY	12 - DEPTH TO CEMENTED LAYER(S)	15 - CALICHE DEVELOPMENT
7 - MOISTURE CONTENT	10 - STRUCTURE	13 - WEATHERING OF CLASTS	
8 - PLASTICITY INDEX	11 - CEMENTATION-INDURATION	14 - SOIL PROFILE DEVELOPMENT	

FUGRO NATIONAL, INC.

SECTION 2.0
GROUND-WATER DATA

EXPLANATIONS OF GROUND-WATER DATA

Existing ground-water data were collected from all available sources. These data were updated where possible from measurements taken during Fugro field operations, and all data are shown on Table 2-1. Locations of water wells and boreholes in which water-level measurements were available are shown in Drawing 1. Well numbers listed in column 1 (Table 2-1) refer to well locations in Drawing 1. Actual well numbers giving location according to the Bureau of Land Management Land Survey System are shown in column 2.

Water levels generally refer to the static ground-water table in the unconfined basin-fill aquifer. Perched conditions or levels in artesian aquifers are noted where known.

WELL NO.	WELL LOCATION NUMBER* (Nevada)	ELEVATION OF GROUND SURFACE- FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL- FEET (METERS)	WATER LEVEL			REFERENCES**/ REMARKS
				DEPTH BELOW GROUND SURFACE- FEET (METERS)	DATE MEASURED	ELEVATION- FEET (METERS) ABOVE M.S.L.	
W1	14N/69E-24a	5680 (1731)	70 (21)	27 (8)	1958	5653 (1723)	1
W2	14N/70E-31c	5620 (1713)	65 (20)	25 (8)	1950	5595 (1705)	1
W3	13N/69E-11a	6300 (1920)	29 (9)	25 (8)	1958	6270 (1911)	1
W4	13N/70E-4d	5300 (1615)	153 (47)	44 (13)	1952	5256 (1602)	1
W5	13N/70E-9b	5350 (1631)	88 (27)	18 (5)	1958	5332 (1625)	1
W6	13N/70E-9c	5350 (1631)	84 (26)	51 (16)	1952	5299 (1615)	1
W7	13N/70E-10a	5220 (1591)	104 (32)	flowing	1948	--	1
W8	13N/70E-14c1	5200 (1585)	415 (126)	flowing	1949	--	1, flow 20gpm
W9	13N/70E-16c1	5400 (1646)	153 (47)	39 (12)	1953	5361 (1634)	1
W10	13N/70E-35a1	5330 (1625)	158 (48)	100 (30)	1947	5230 (1594)	1
W11	10N/70E-11d1	5500 (1676)	100 (30)	9 (3)	1953	5400 (1646)	1
W12	10N/70E-12b1	5490 (1673)	80 (24)	14 (4)	1953	5476 (1669)	1
W13	10N/70E-25d1	5535 (1687)	70 (21)	7 (2)	1953	5528 (1685)	1
W14	9N/70E-34d1	5640 (1719)	217 (66)	109 (33)	1947	5531 (1686)	1
W15	8N/69E-15b1	5730 (1747)	110 (34)	77 (23)	1964	5653 (1723)	1
W16	8N/69E-36a1	5760 (1756)	225 (69)	153 (47)	1947	5607 (1709)	1
W17	8N/70E-661	5670 (1728)	164 (50)	92 (28)	1947	5578 (1700)	1

*Mt. Diablo Baseline and Meridian

**References:

1. Hood and Rush (1966)

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

GROUND-WATER DATA
VERIFICATION SITE
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
2-1
1 OF 3

FUGRO NATIONAL, INC.

WELL NO.	WELL LOCATION NUMBER* (Nevada)	ELEVATION OF GROUND SURFACE- FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL- FEET (METERS)	WATER LEVEL			REFERENCES**/ REMARKS
				DEPTH BELOW GROUND SURFACE- FEET (METERS)	DATE MEASURED	ELEVATION- FEET (METERS) ABOVE M.S.L.	
W18	8N/70E-21a1	5710 (1740)	153 (47)	128 (39)	1964	5582 (1701)	

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

GROUND-WATER DATA
VERIFICATION SITE
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
2-1
2 OF 3

FUGRO NATIONAL, INC.

WELL NO.	WELL LOCATION NUMBER* (Utah)	ELEVATION OF GROUND SURFACE- FEET (METERS) ABOVE M.S.L.	DEPTH OF WELL- FEET (METERS)	WATER LEVEL			REFERENCES**/ REMARKS
				DEPTH BELOW GROUND SURFACE- FEET (METERS)	DATE MEASURED	ELEVATION- FEET (METERS) ABOVE M.S.L.	
W19	22S/19W-6bac1	5250 (1600)	167 (51)	49 (15)	1950	5201 (1585)	1
W20	23S/19W-9cdb1	5405 (1647)	270 (82)	15 (5)	1936	5390 (1643)	1
W21	23S/19W-13aab	5930 (1807)	540 (165)	476 (145)	--	5454 (1662)	1
W22	23S/19W-20bac1	5410 (1649)	40 (12)	15 (5)	1950	5395 (1644)	1
W23	23S/19W-24dcc	5780 (1762)	472 (144)	455 (139)	1939	5325 (1623)	1
W24	23S/19W-32a	--	-	200-250 (61-76)	--	--	2
W25	24S/19W-3db	5558 (1694)	172 (52)	138 (42)	--	5420 (1652)	1
W26	30S/19W-21cab	6325 (1928)	215 (66)	170 (52)	--	6155 (1876)	1
W27	32S/19W-10bba	6700 (2042)	-	flowing	1962	--	1, flow-2gpm
W28	32S/19W-21aba1	6800 (2073)	38 (12)	17 (5)	1962	6783 (2067)	1
W29	32S/19W-21aba2	6800 (2073)	61 (19)	58 (18)	1962	6742 (2055)	1
W30	32S/19W-22ddb	6800 (2073)	407 (124)	335 (102)	1964	6465 (1970)	1
W31	32S/19W-25aaa	--	40 (12)	dry	--	--	1

*Salt Lake Baseline and Meridian

**References:

1. Hood and Rush (1966)
2. Snyder (1963)

NOTE: All wells tap unconfined alluvial aquifers except where noted. Where published data are lacking or inaccurate, ground surface elevations are taken from topographic maps.

GROUND-WATER DATA
VERIFICATION SITE
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

TABLE
2-1
3 OF 3

FUGRO NATIONAL, INC.

SECTION 3.0
SEISMIC REFRACTION DATA

EXPLANATIONS OF SEISMIC REFRACTION DATA

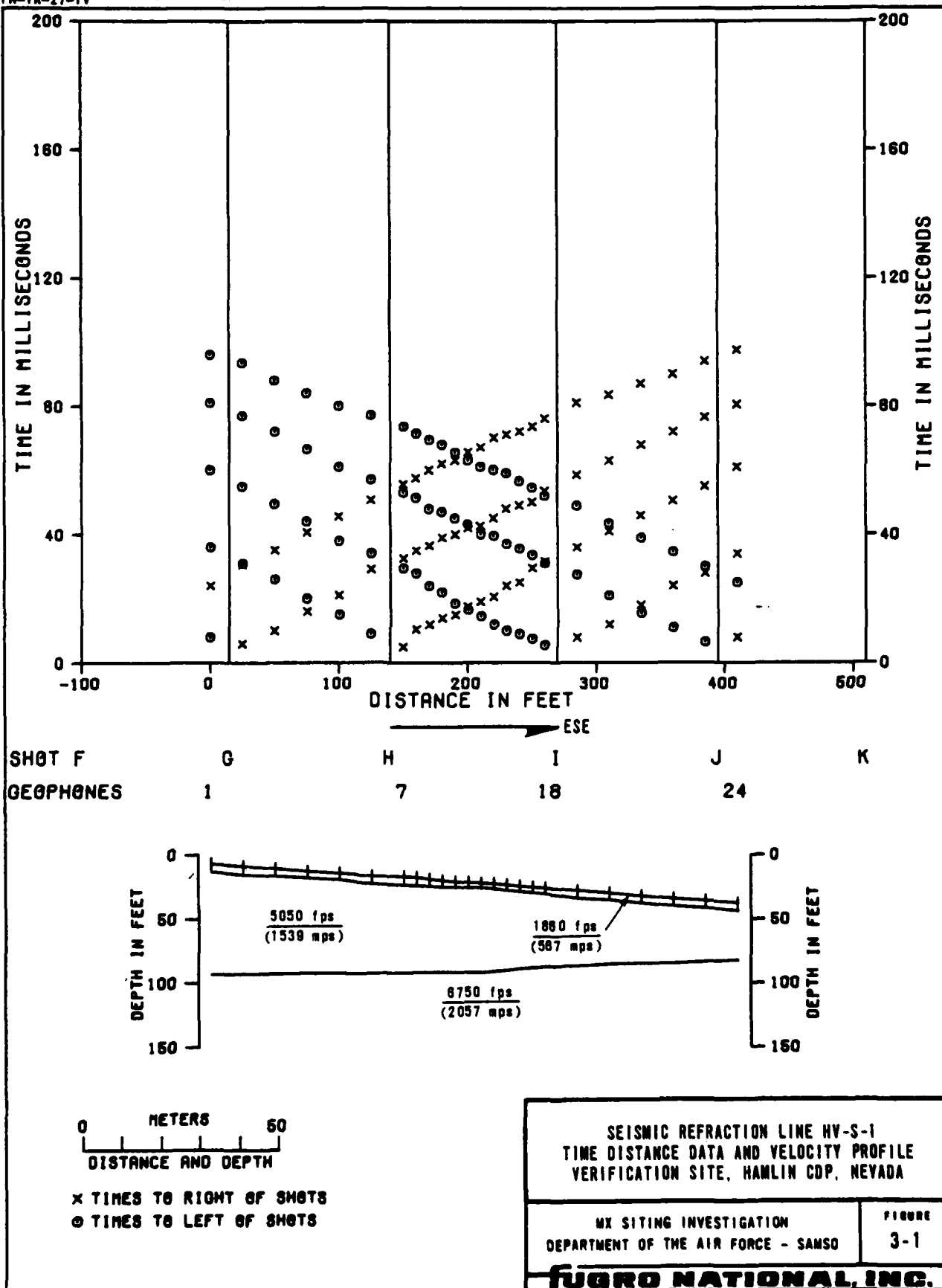
Each figure shows seismic wave travel times plotted versus surface distance between the energy source (shot) and the detector (geophone) for a single seismic line. Distances are measured along the line from geophone number 1 which is designated as zero distance. Distances to the right (on the paper) of geophone 1 are positive. The direction arrow gives the approximate direction of the geophone array from geophone 1 to geophone 24.

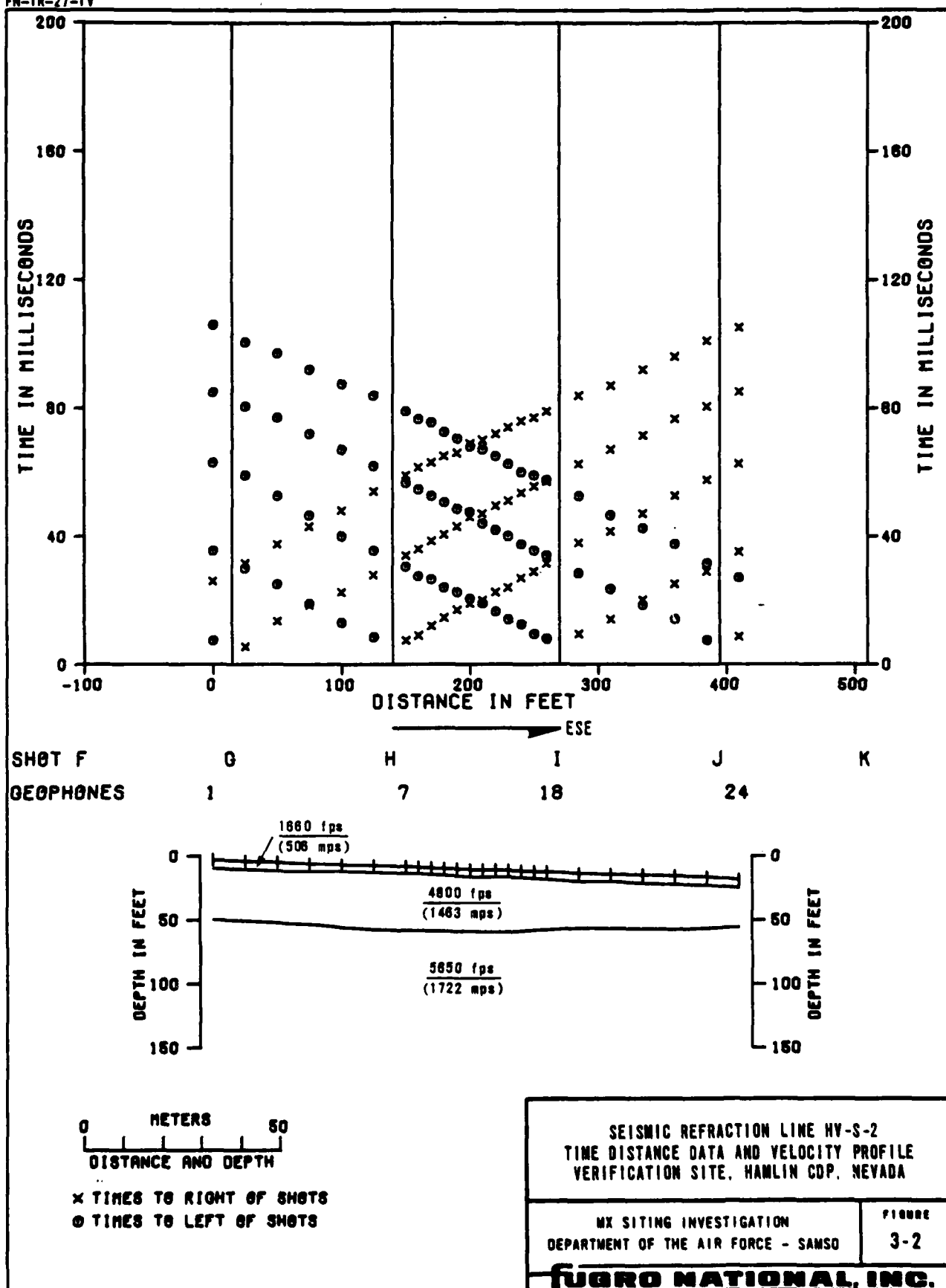
Travel Time Versus Distance Graph (Upper Half of Figure)

This is a travel time versus distance graph. The abscissa represents distance; the ordinate, time. The six vertical lines represent the locations of shots (designated as F, G, H, I, J, and K). The symbol, X, denotes travel times at geophones that were located to the right of a shot. The symbol, @, denotes travel times that were located to the left of shots.

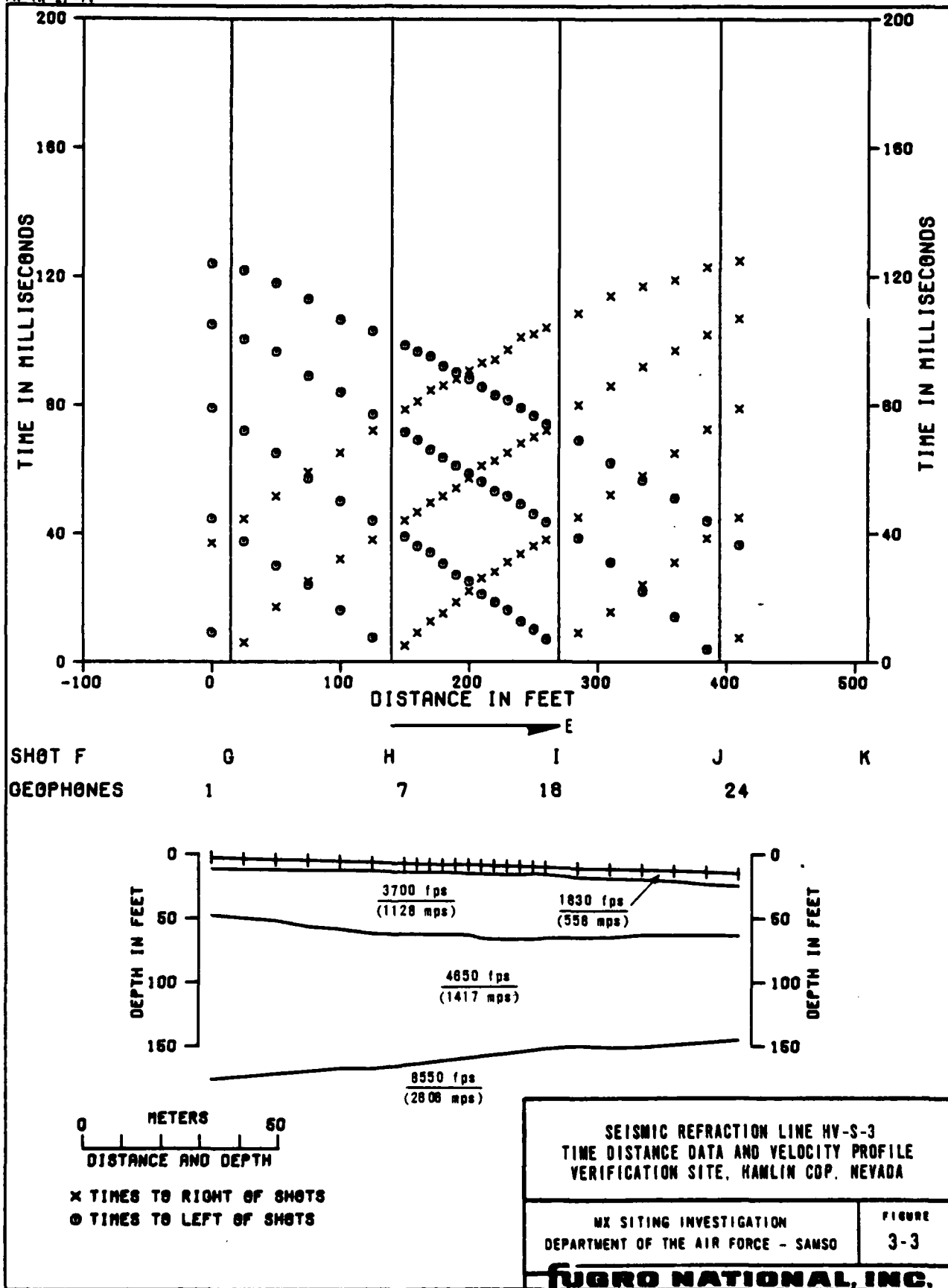
Velocity Cross Section (Lower Half of Figure)

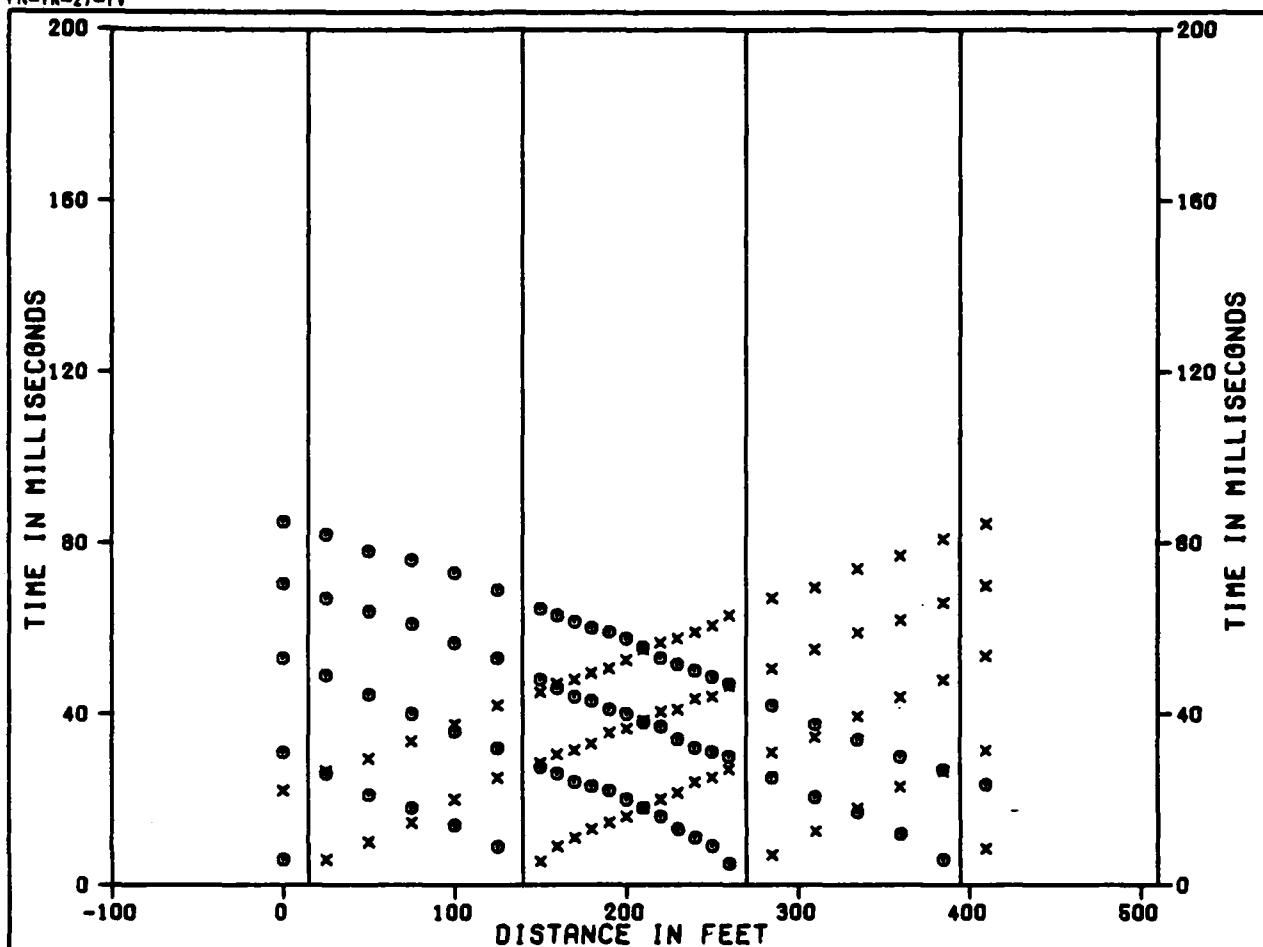
This is an interpreted velocity cross section beneath the seismic line. The top line represents the ground-surface profile. The short vertical lines crossing the top line mark the geophone positions. The depth scale is plotted relative to a point on the line which was arbitrarily chosen as "zero elevation" at the time the line was surveyed. The additional lines across the cross section represent the interpreted boundaries between layers of material with different compressional wave velocities. These boundaries are commonly called "refractors". The velocity interpreted to be representative of each layer is shown.





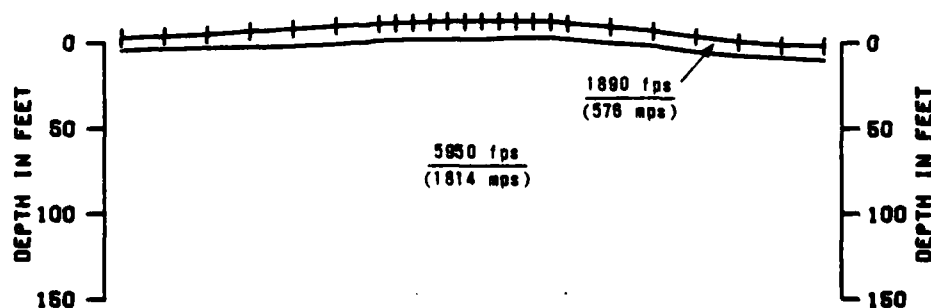
FN-TR-27-1V





SHOT F
GEOPHONES

G H I J K
1 7 18 24



0 METERS 50
DISTANCE AND DEPTH

x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

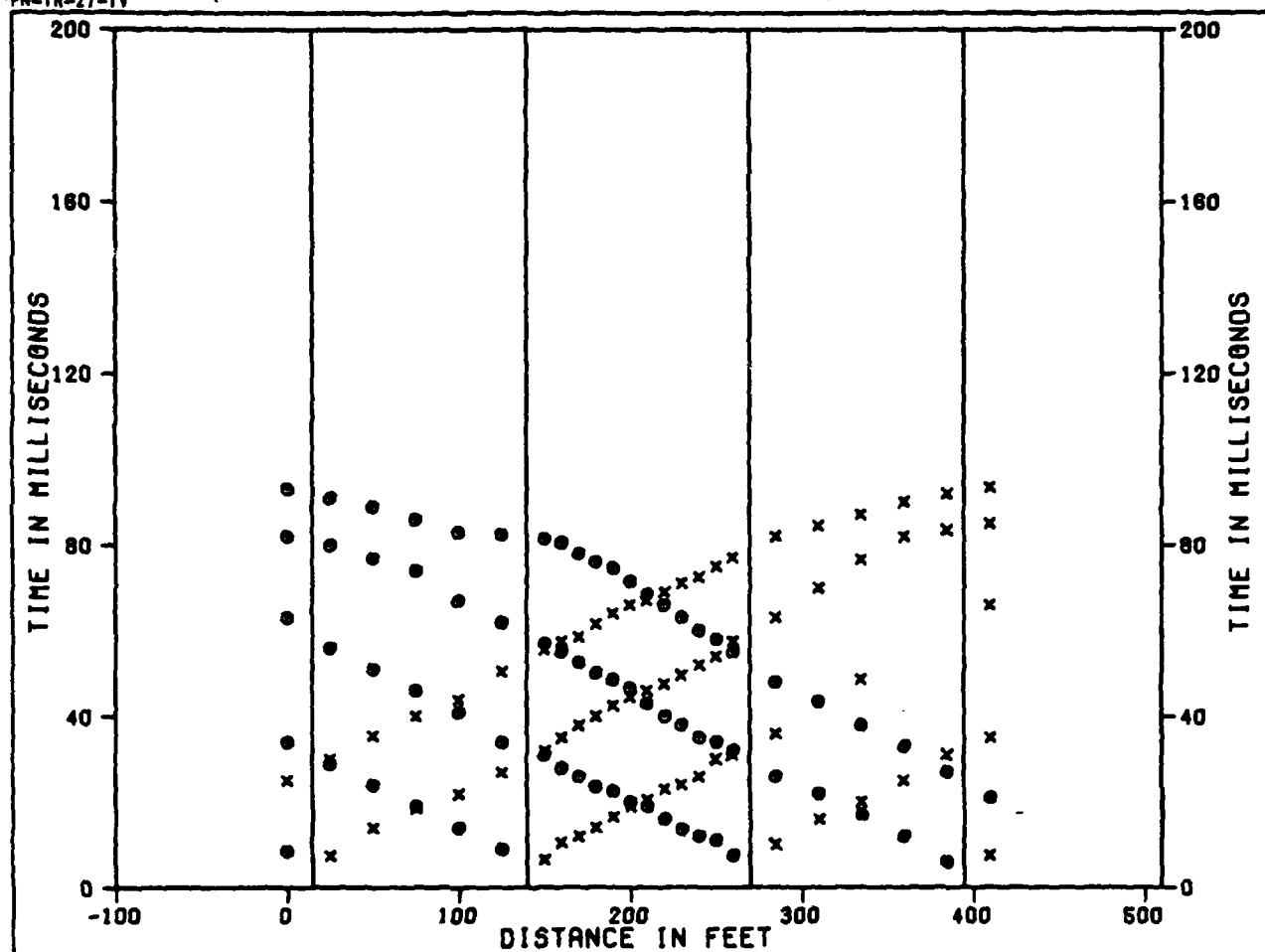
SEISMIC REFRACTION LINE HV-S-4
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN COP, NEVADA

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FIGURE
3-4

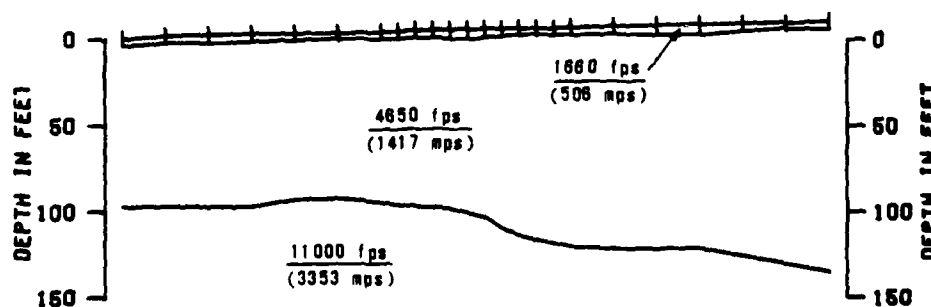
FUGRO NATIONAL, INC.

FN-TR-27-IV



SHOT F
GEOPHONES

0 1 H 7 I 18 J 24 K



0 METERS 50
DISTANCE AND DEPTH

x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

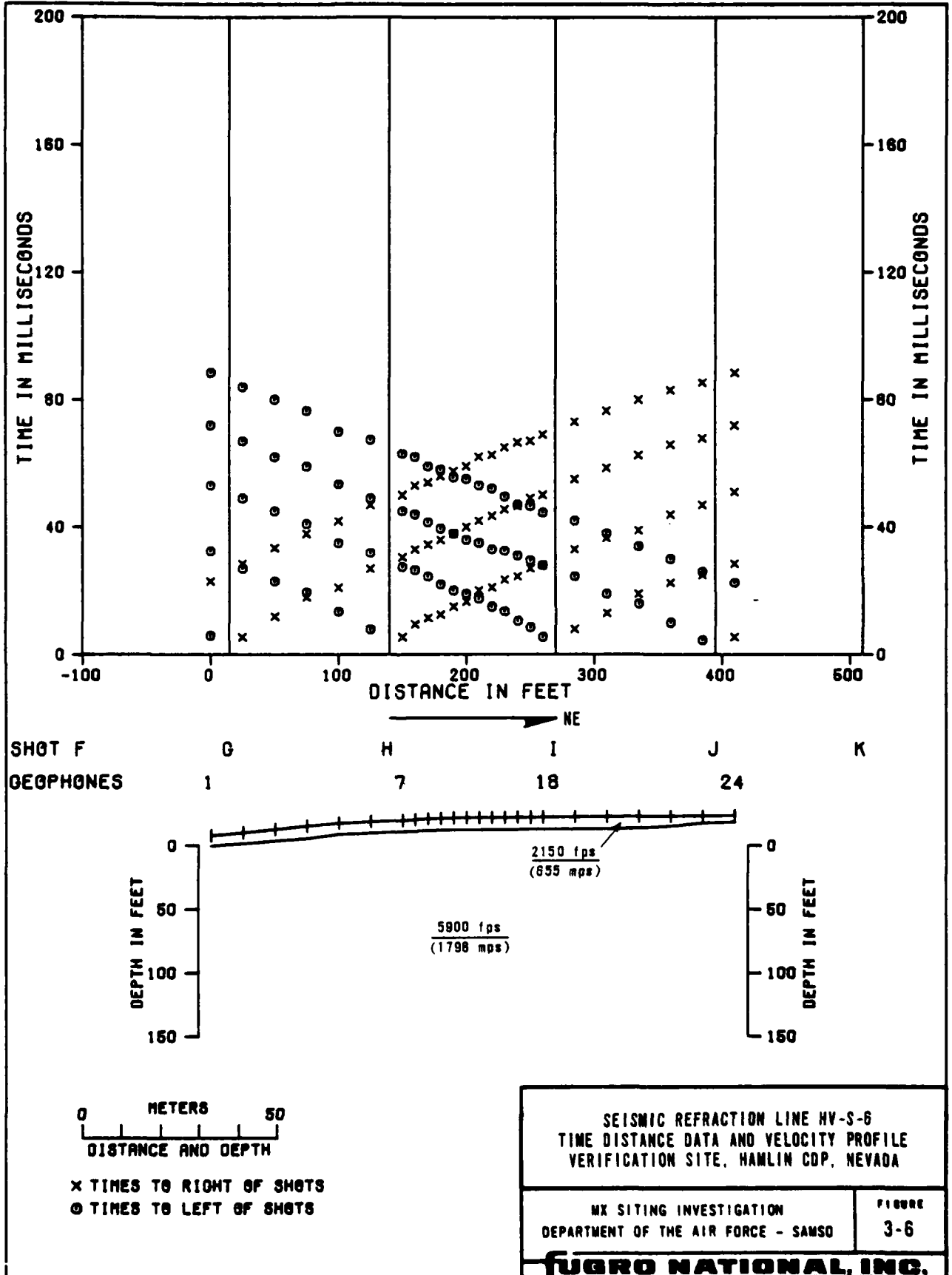
SEISMIC REFRACTION LINE HV-S-5
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN COP, NEVADA

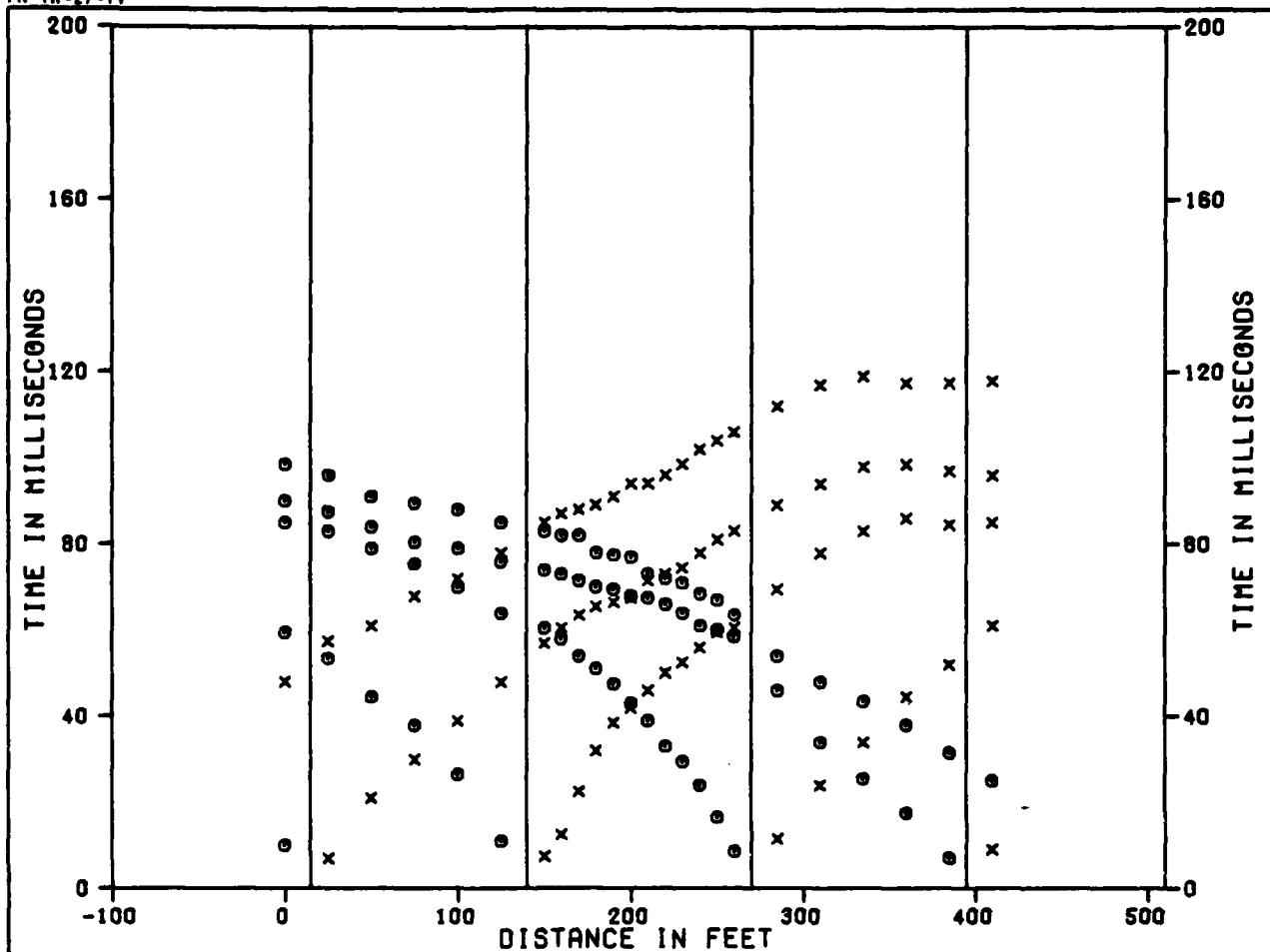
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FIGURE
3-5

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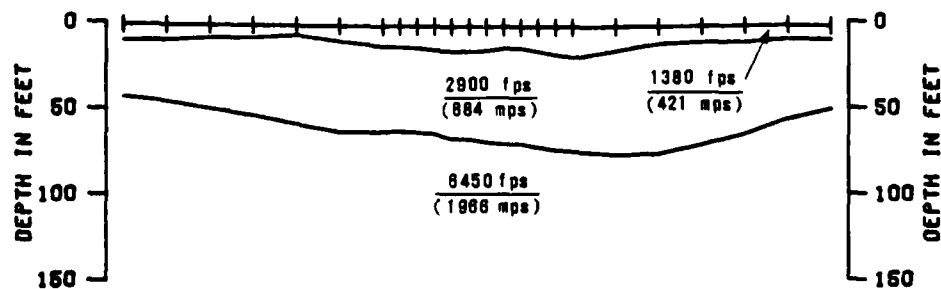
2 JUL 78





SHOT F
GEOPHONES

G H I J K
1 7 18 24



0 METERS 50
DISTANCE AND DEPTH

x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

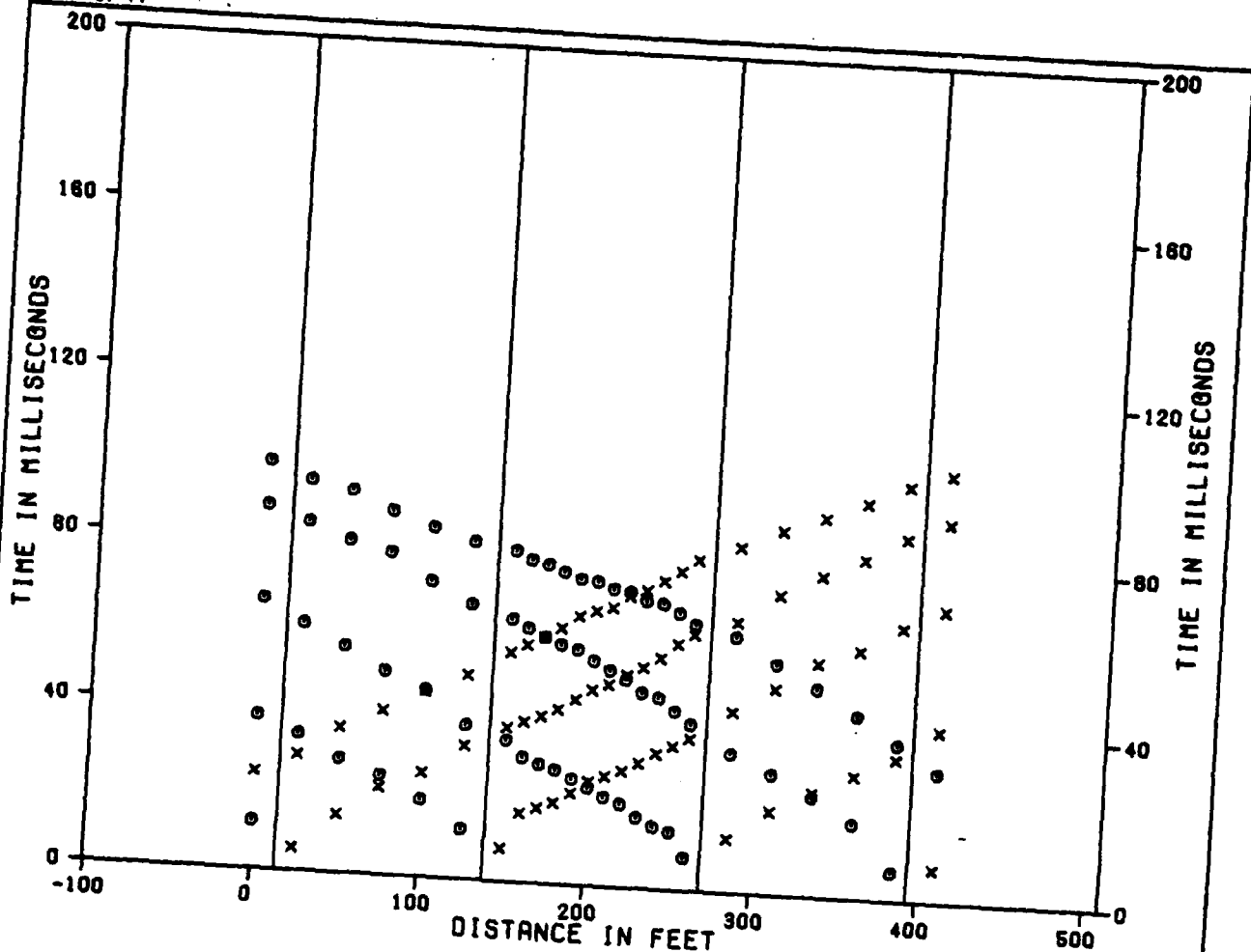
SEISMIC REFRACTION LINE HV-S-7
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
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FIGURE
3-7

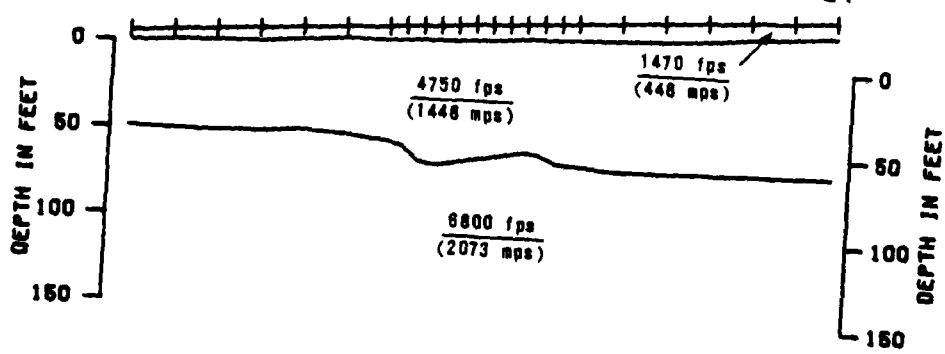
FUGRO NATIONAL, INC.

FN-TR-27-IV



SHOT F
GEOPHONES

G H I J K
1 7 18 24



0 METERS 50
DISTANCE AND DEPTH

x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE HV-S-8
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN COP, NEVADA

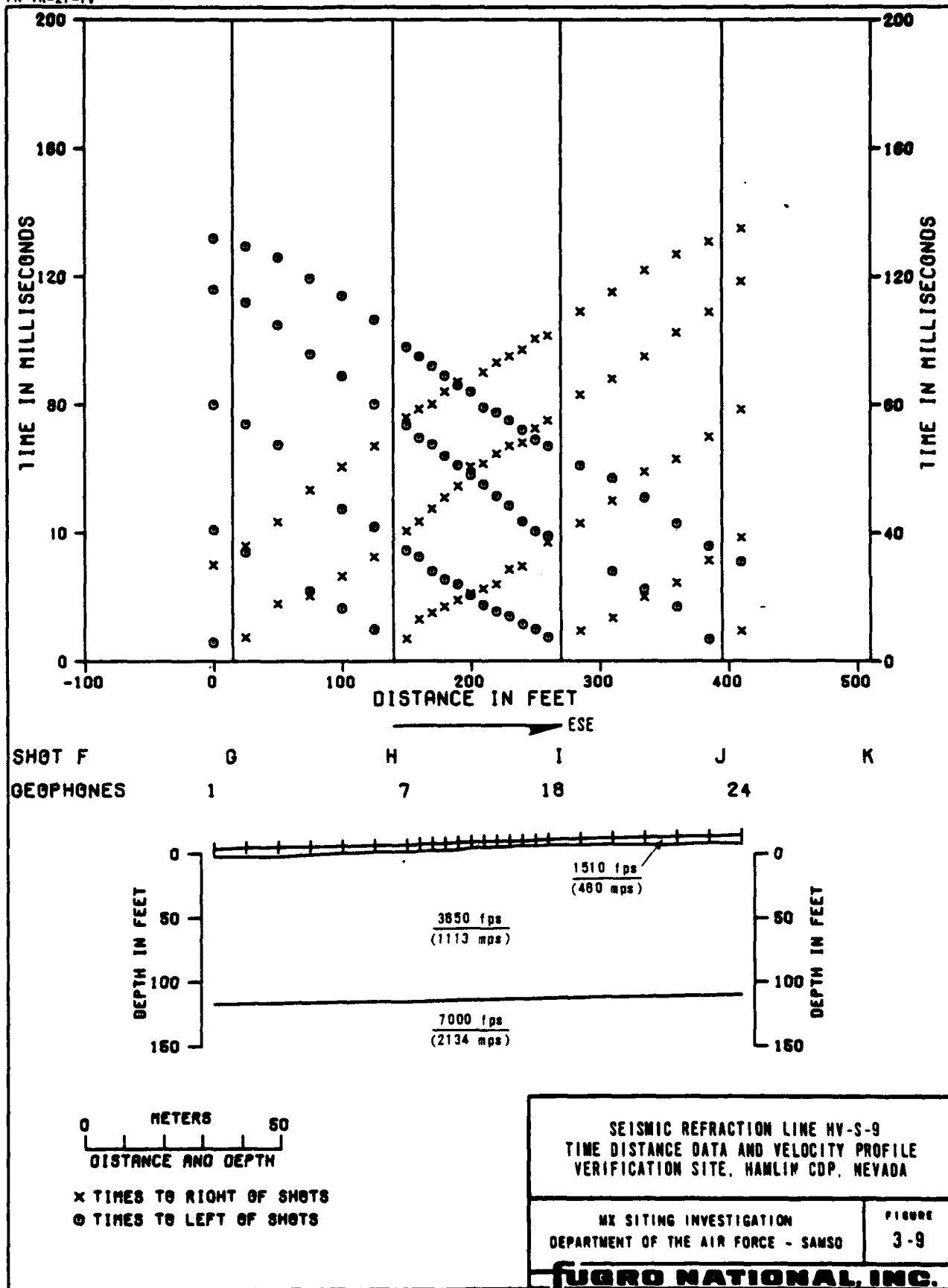
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

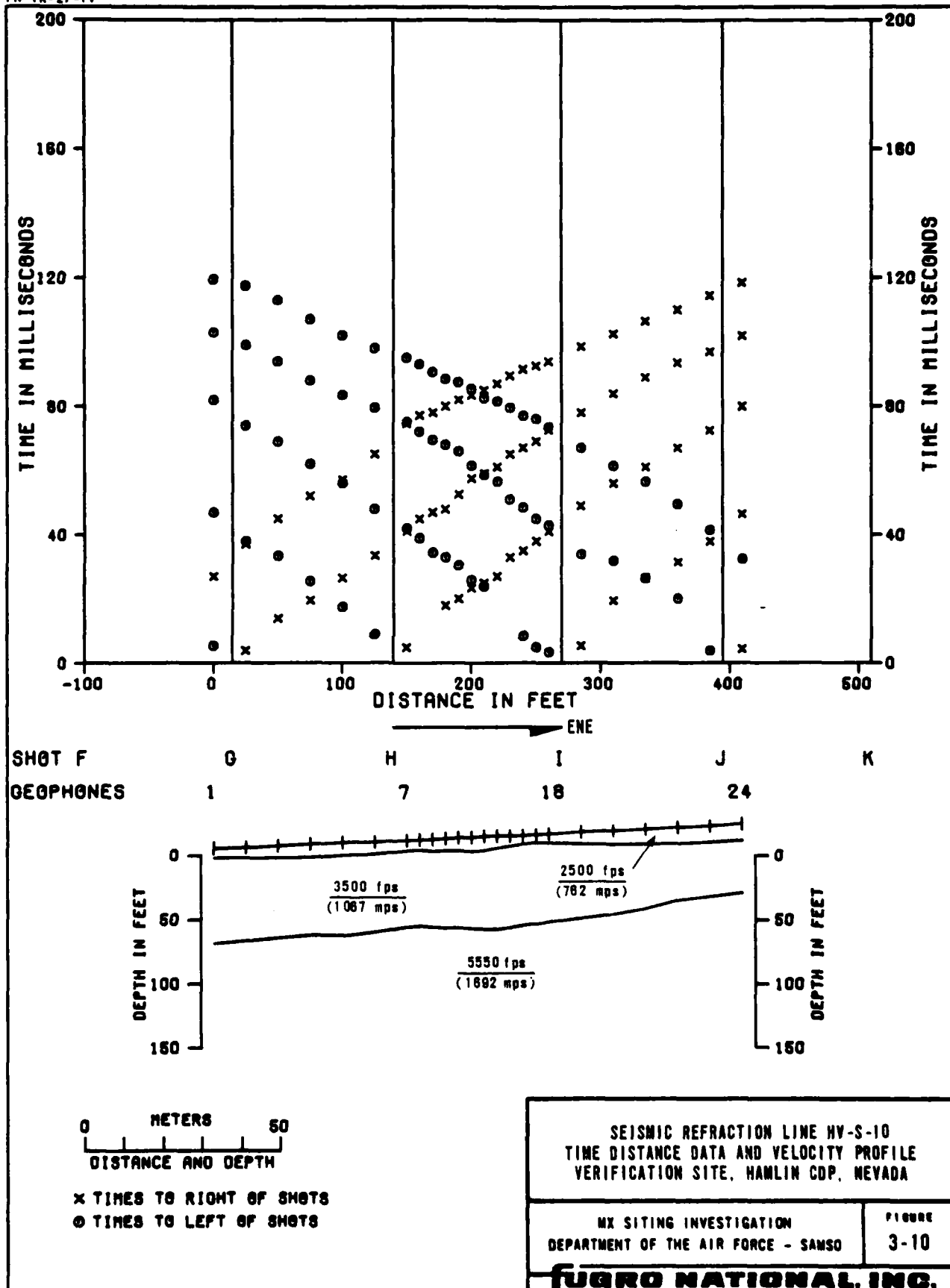
FIGURE
3-8

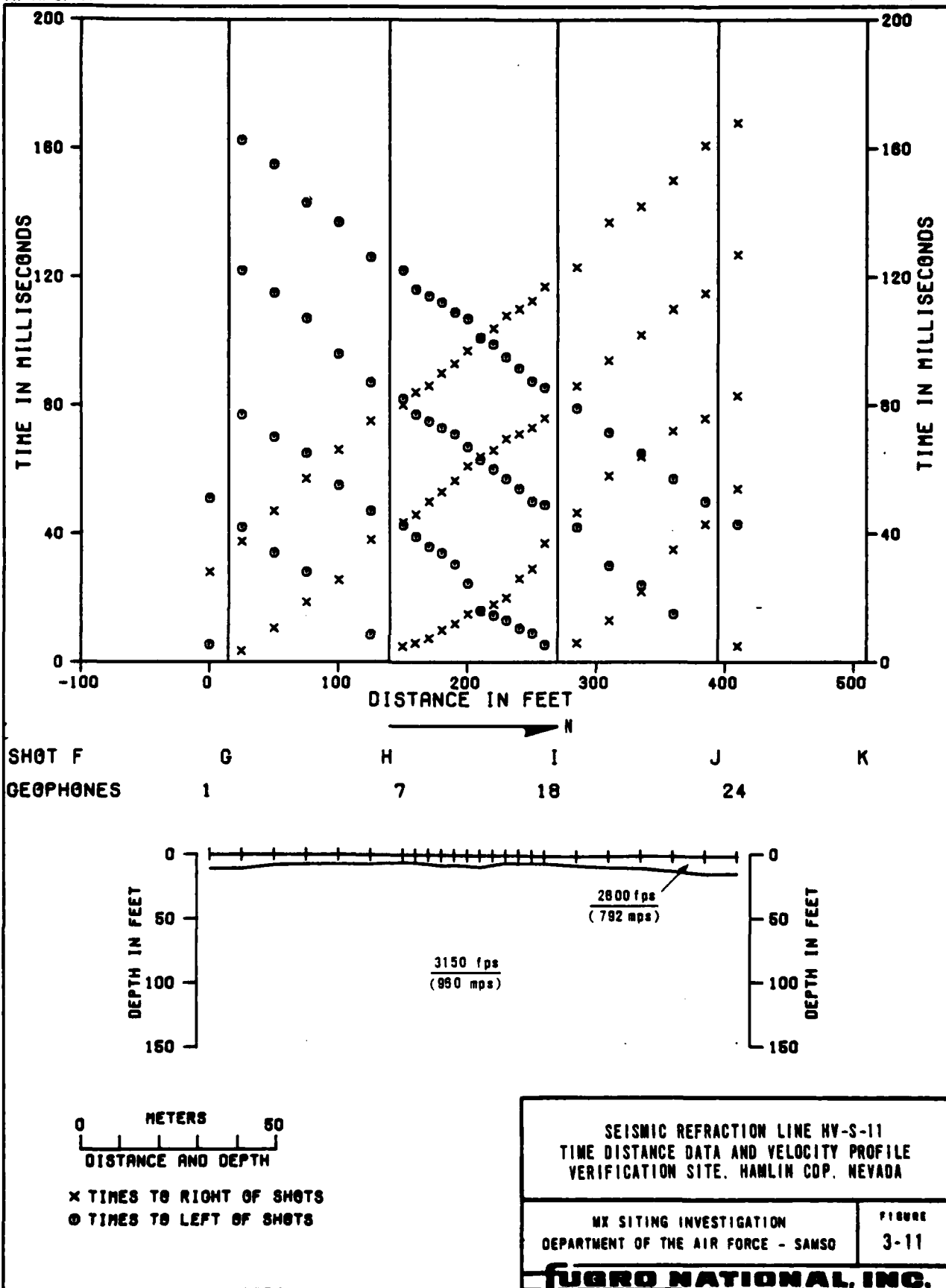
FUGRO NATIONAL, INC.

2 JUL 78

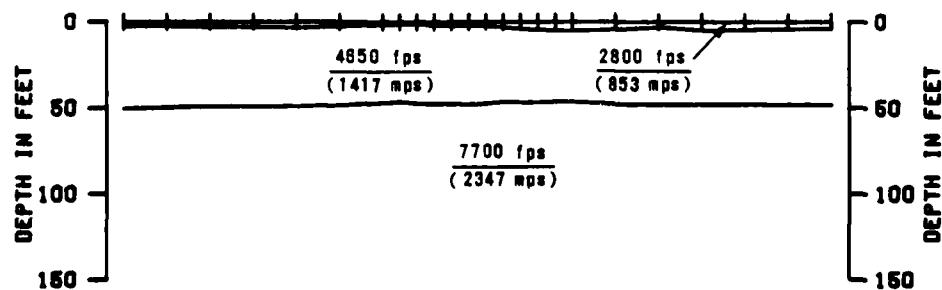
FN-TR-27-IV







K



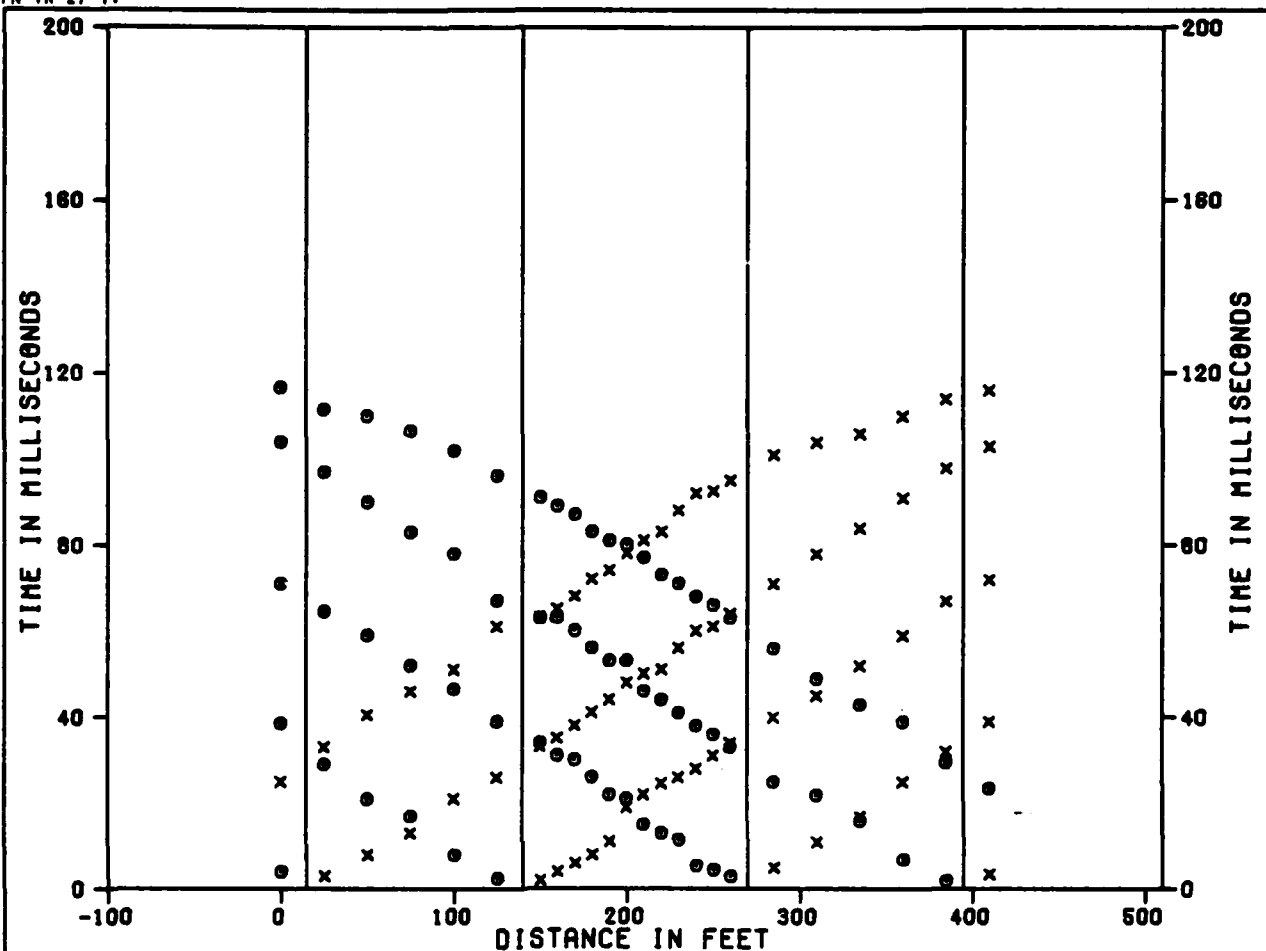
X TIMES TO RIGHT OF SHOTS
O TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE HV-S-12
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

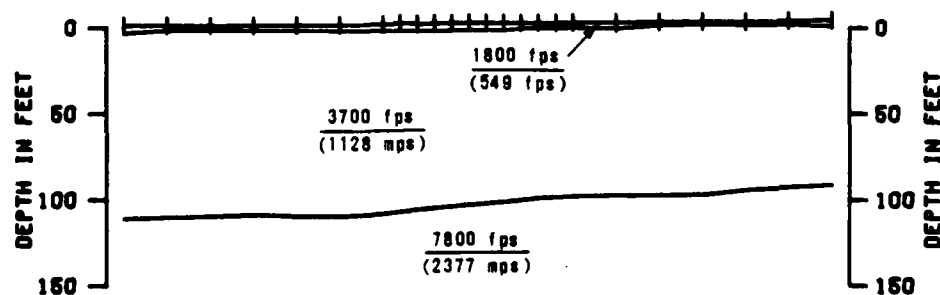
FIGURE
3-12

FUGRO NATIONAL, INC.



SHOT F
GEOPHONES

G H I J K
1 7 18 24



0 METERS 50
DISTANCE AND DEPTH

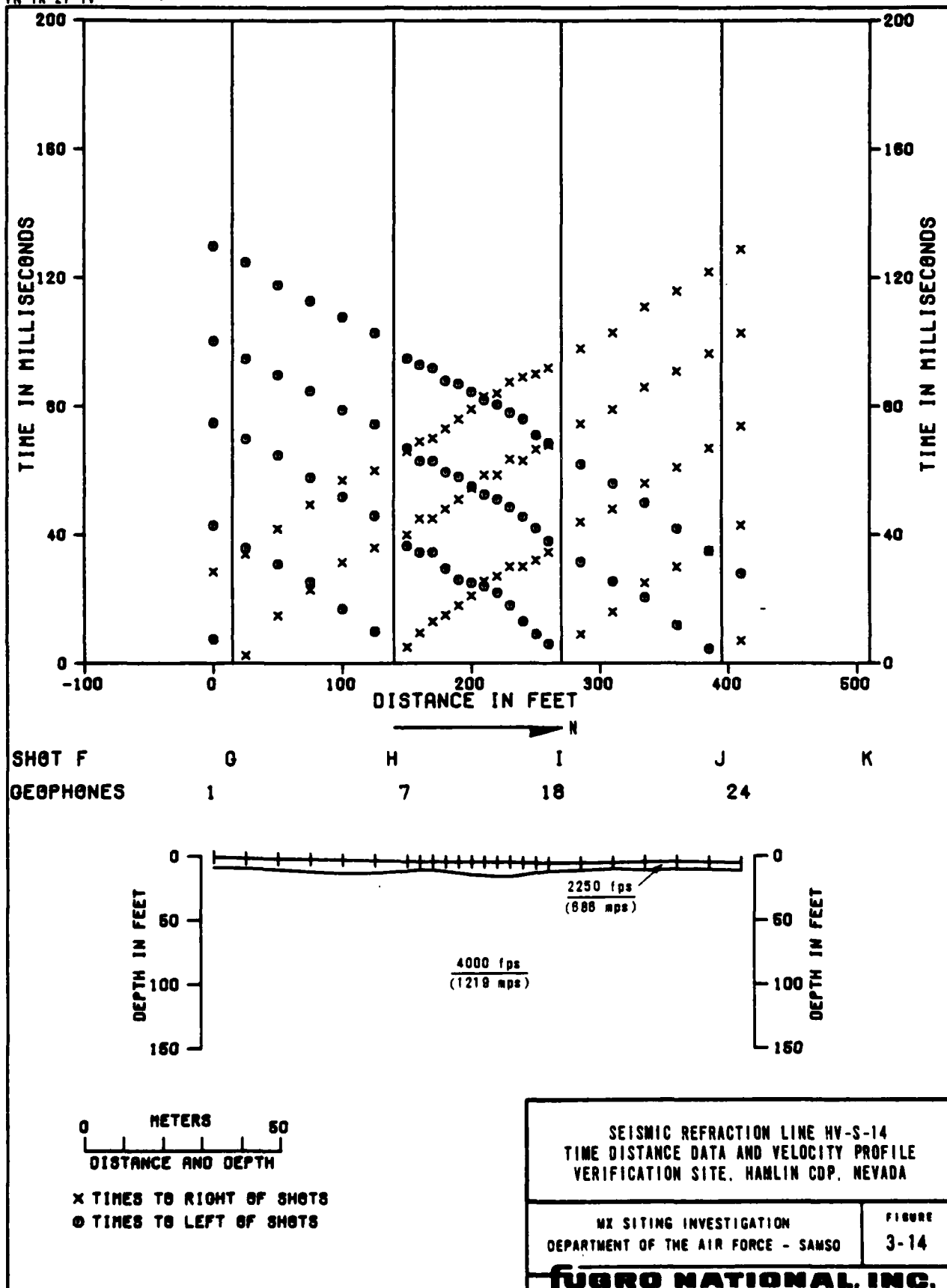
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

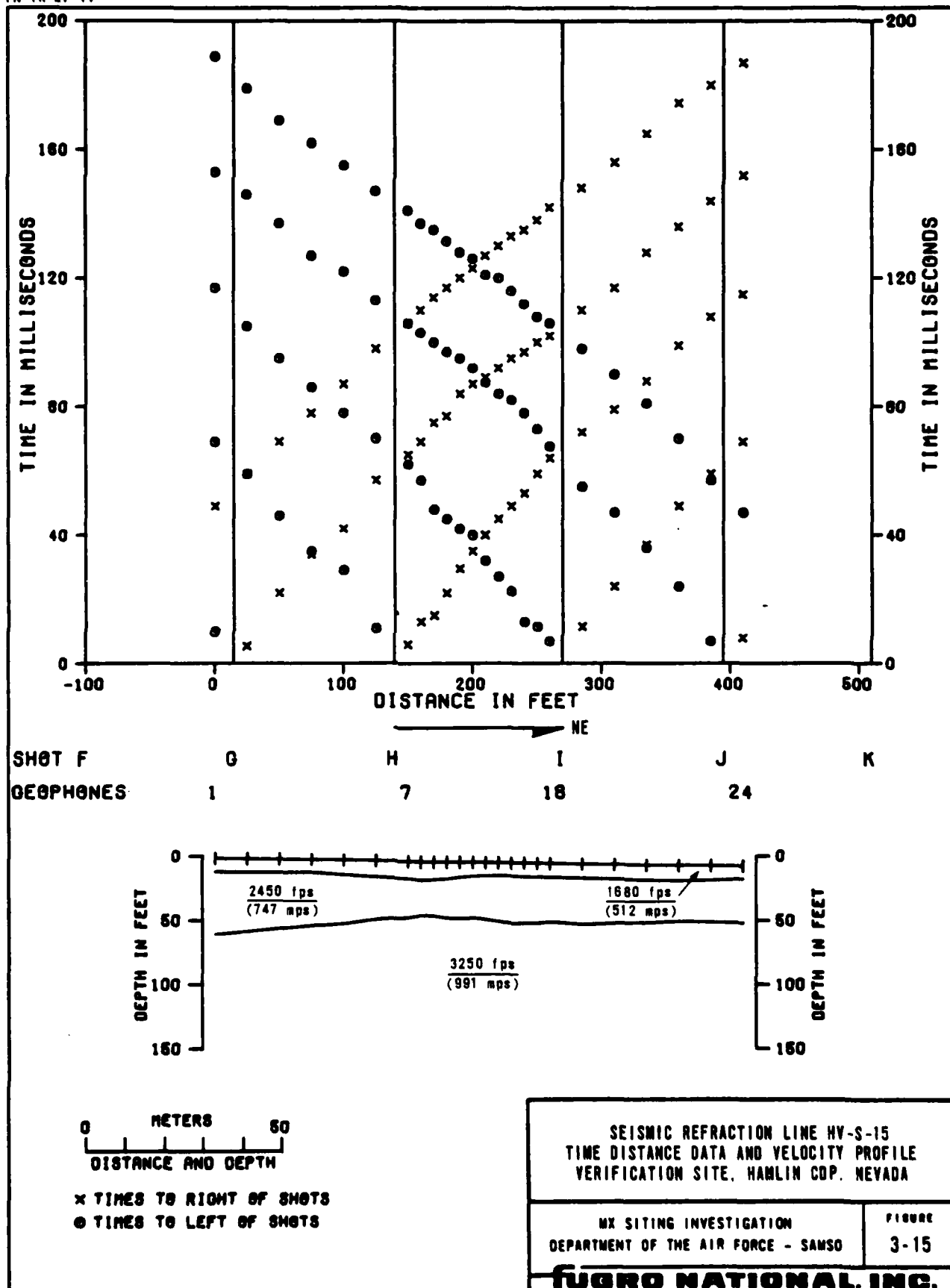
SEISMIC REFRACTION LINE HV-S-13
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN CDP, NEVADA

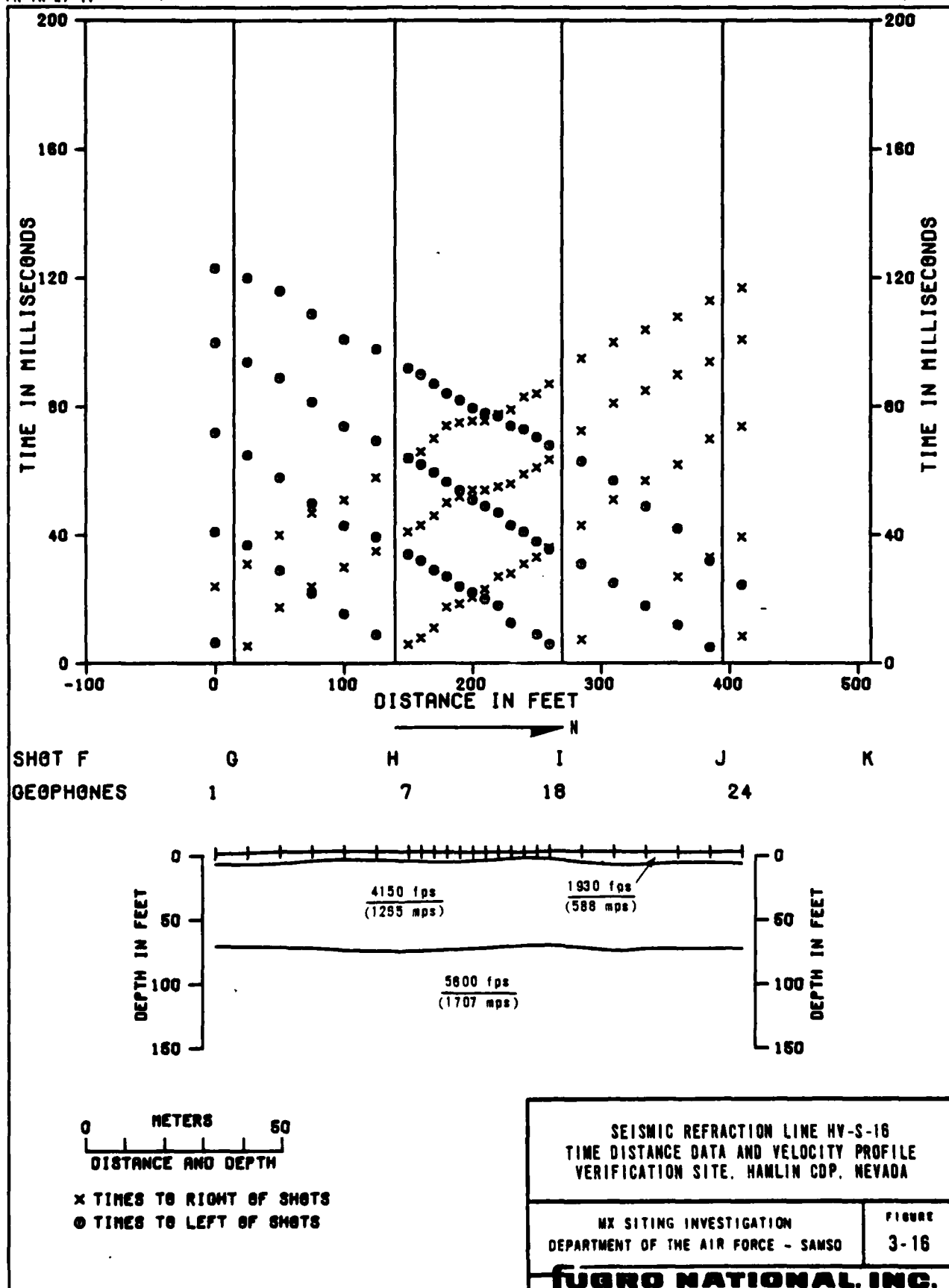
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

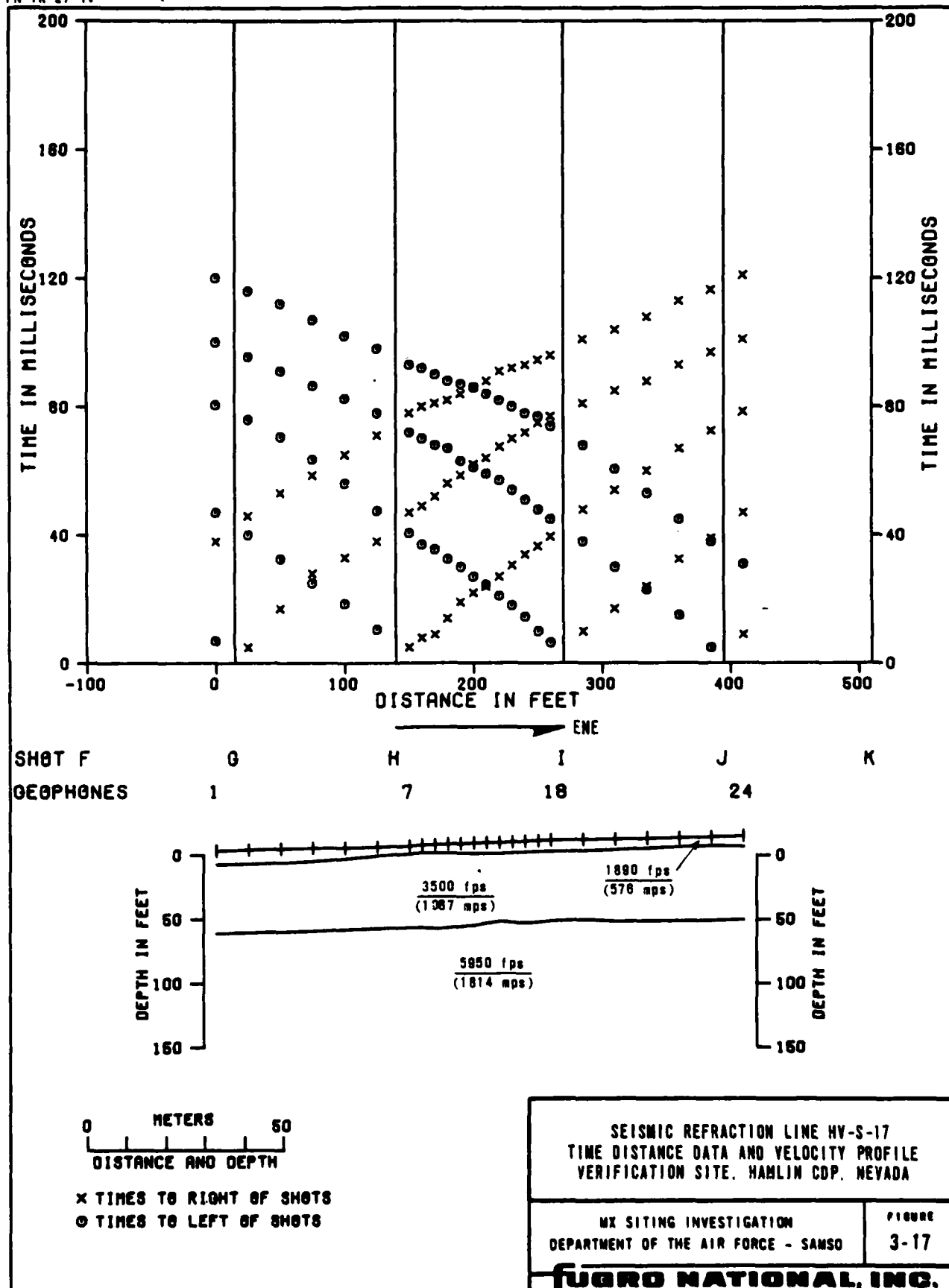
FIGURE
3-13

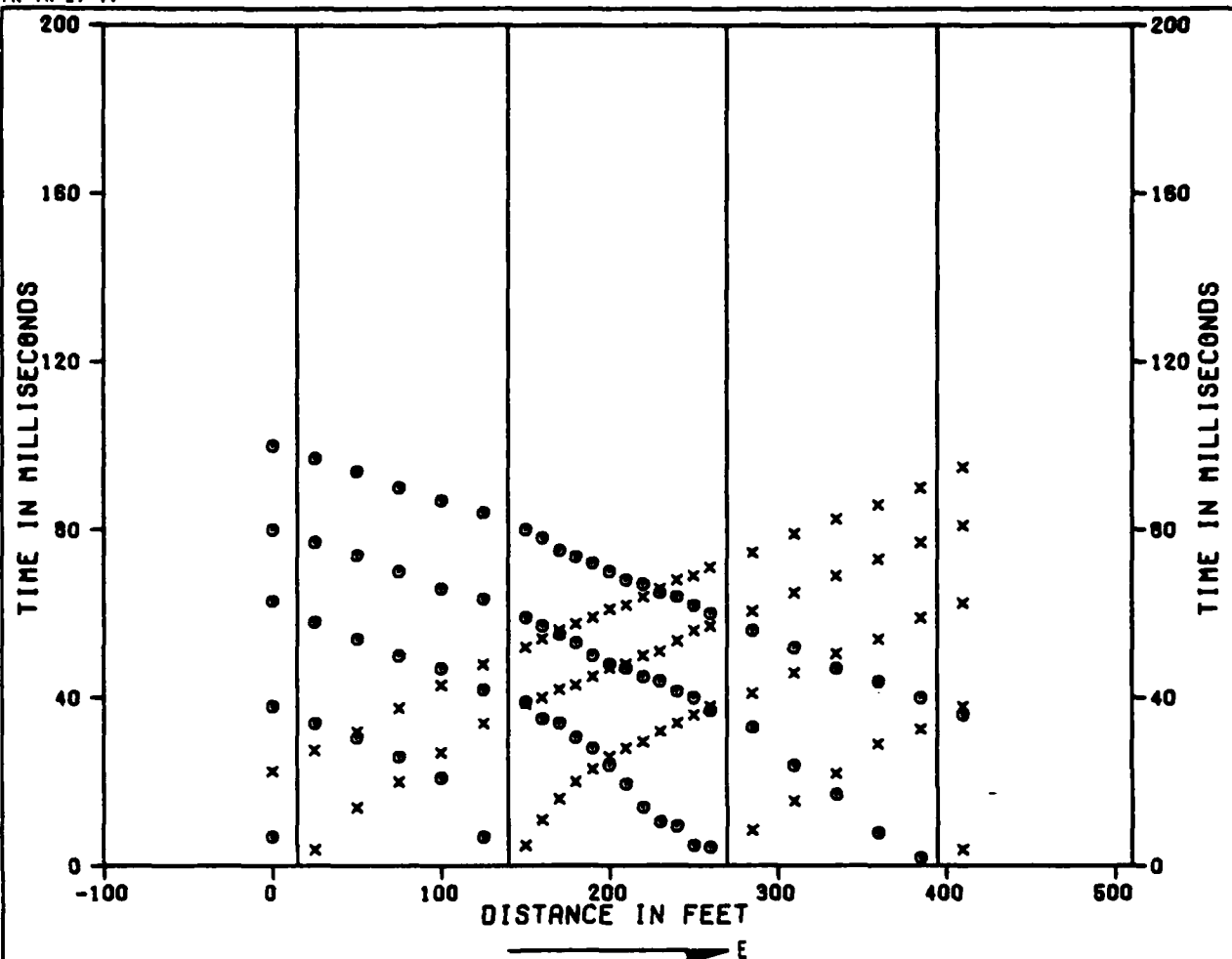
FUGRO NATIONAL, INC.





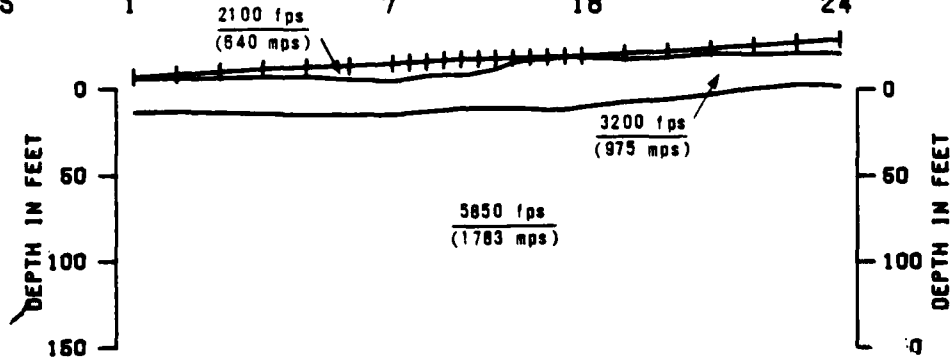






SHOT F
GEOPHONES

SHOT	F	0	H	I	J	K
GEOPHONES	1		7	18	24	



0 METERS 50
DISTANCE AND DEPTH

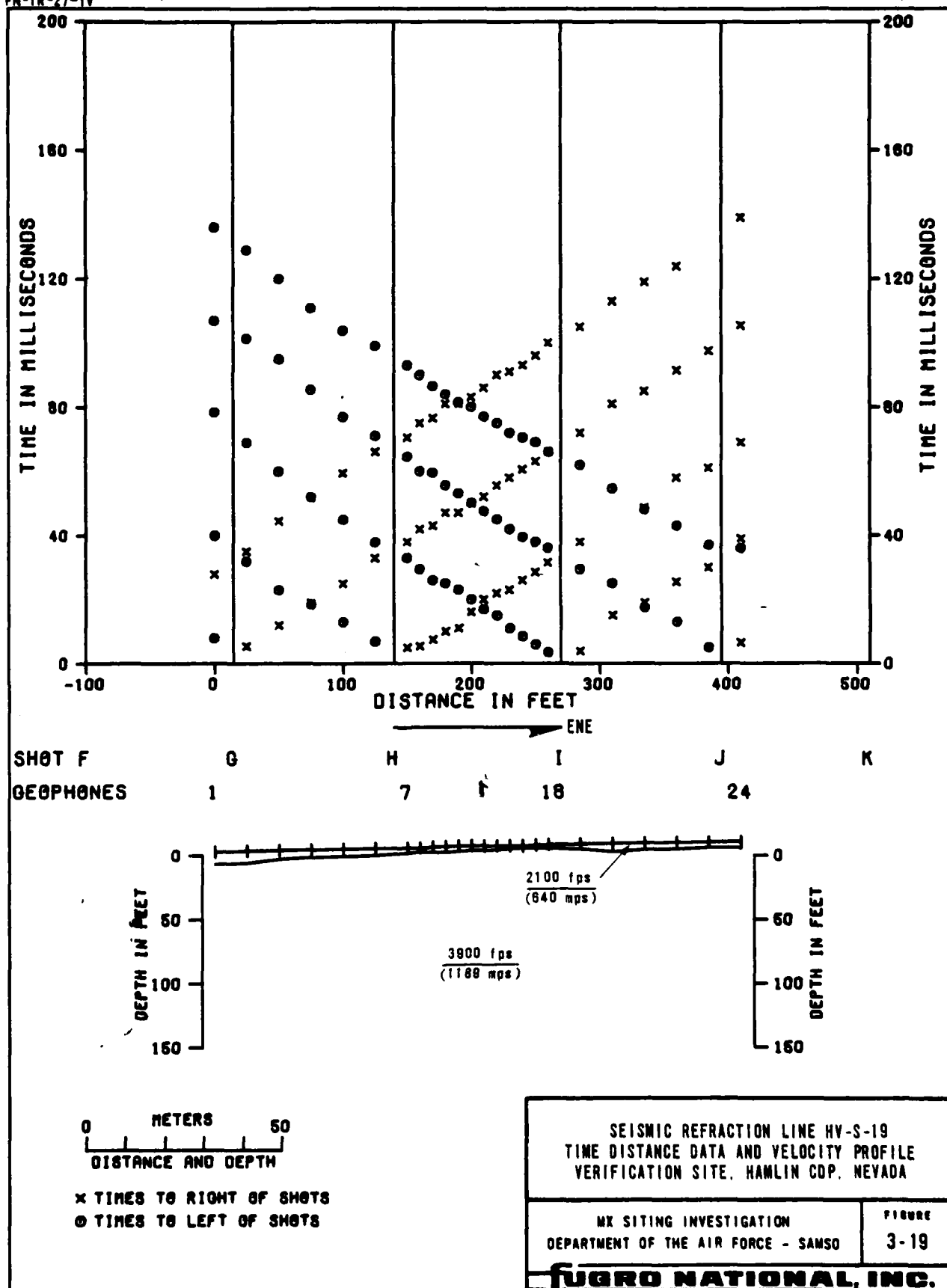
x TIMES TO RIGHT OF SHOTS
o TIMES TO LEFT OF SHOTS

SEISMIC REFRACTION LINE HV-S-18
TIME DISTANCE DATA AND VELOCITY PROFILE
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
3-18

FUGRO NATIONAL, INC.



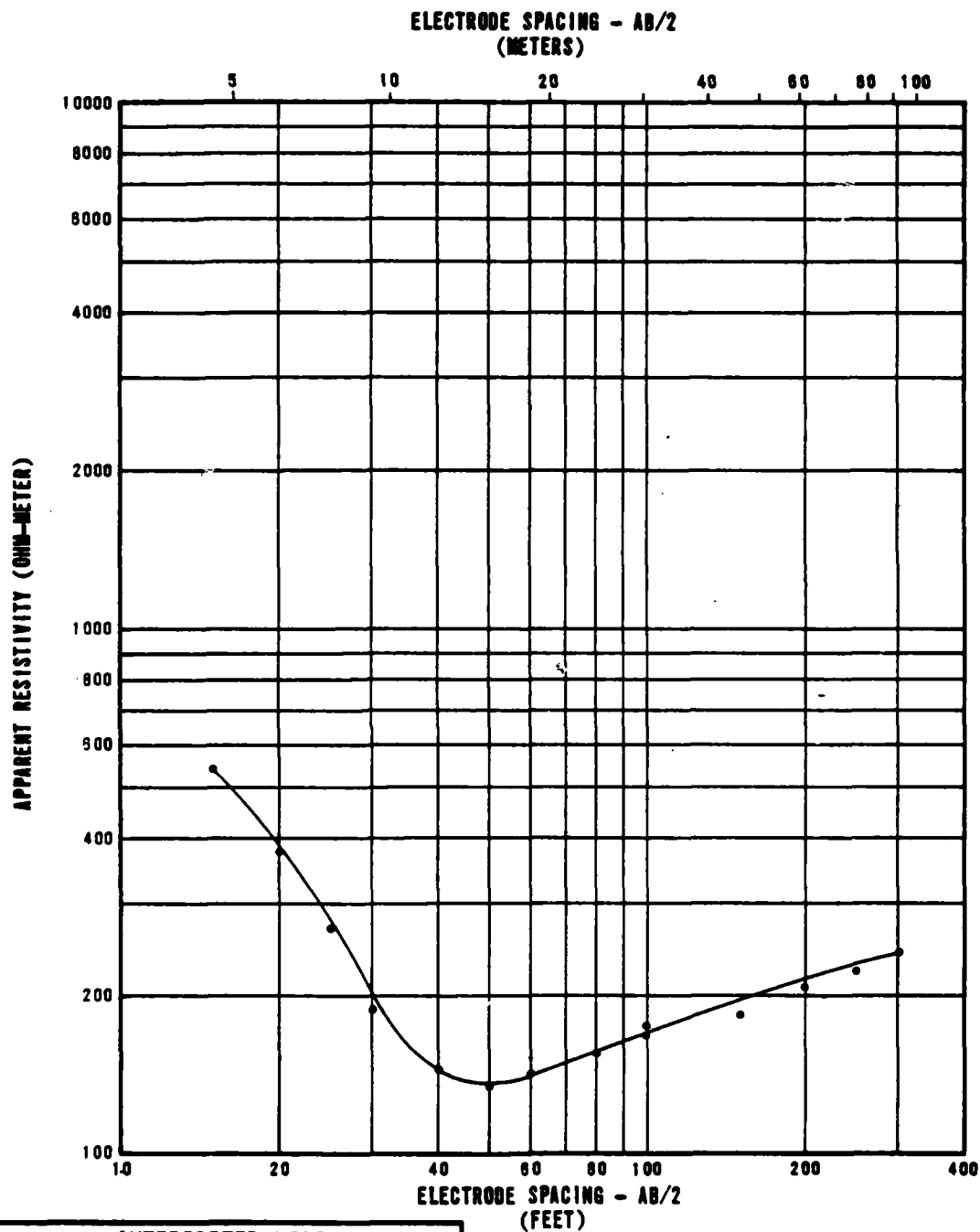
SECTION 4.0
ELECTRICAL RESISTIVITY DATA

EXPLANATIONS OF ELECTRICAL RESISTIVITY DATA

Each figure in this section presents the data obtained from a resistivity sounding and a tabulated model of resistivity layers that would produce a curve similar to the observed curve.

The upper portion of the figures is a graph in which measured apparent resistivity values in ohm-meters are plotted versus one-half the distance between the current electrodes.

The interpreted model tabulated at the bottom of the page shows a combination of true resistivity layers and thicknesses obtained by matching theoretical curves to the field curve.



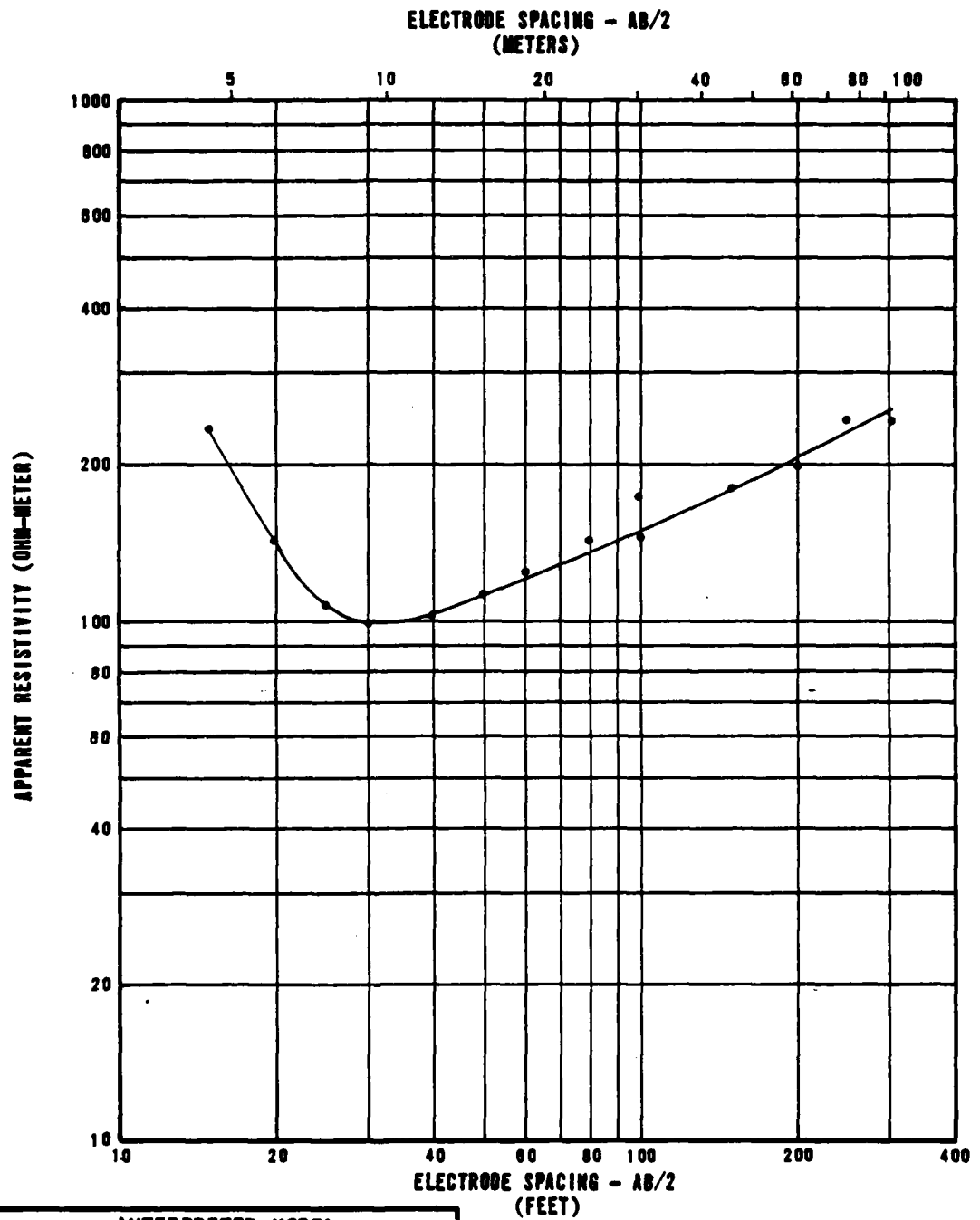
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	840
8	2	230
158	48	380

RESISTIVITY SOUNDING HV-R-1
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-1

FURRO NATIONAL, INC.



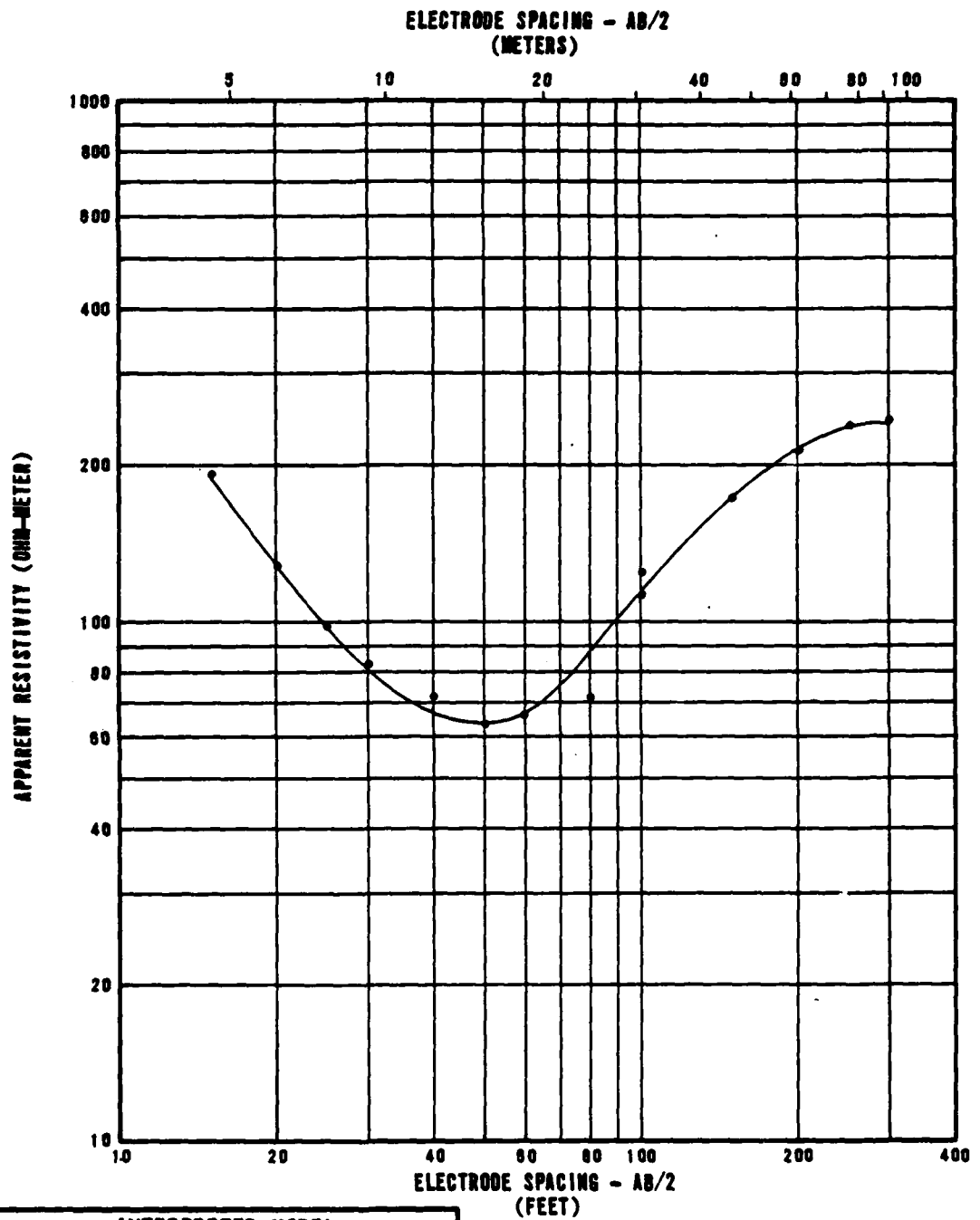
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	230
11	3	60
31	9	320

RESISTIVITY SOUNDING HV-R-2
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HANLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-2

FUGRO NATIONAL, INC.



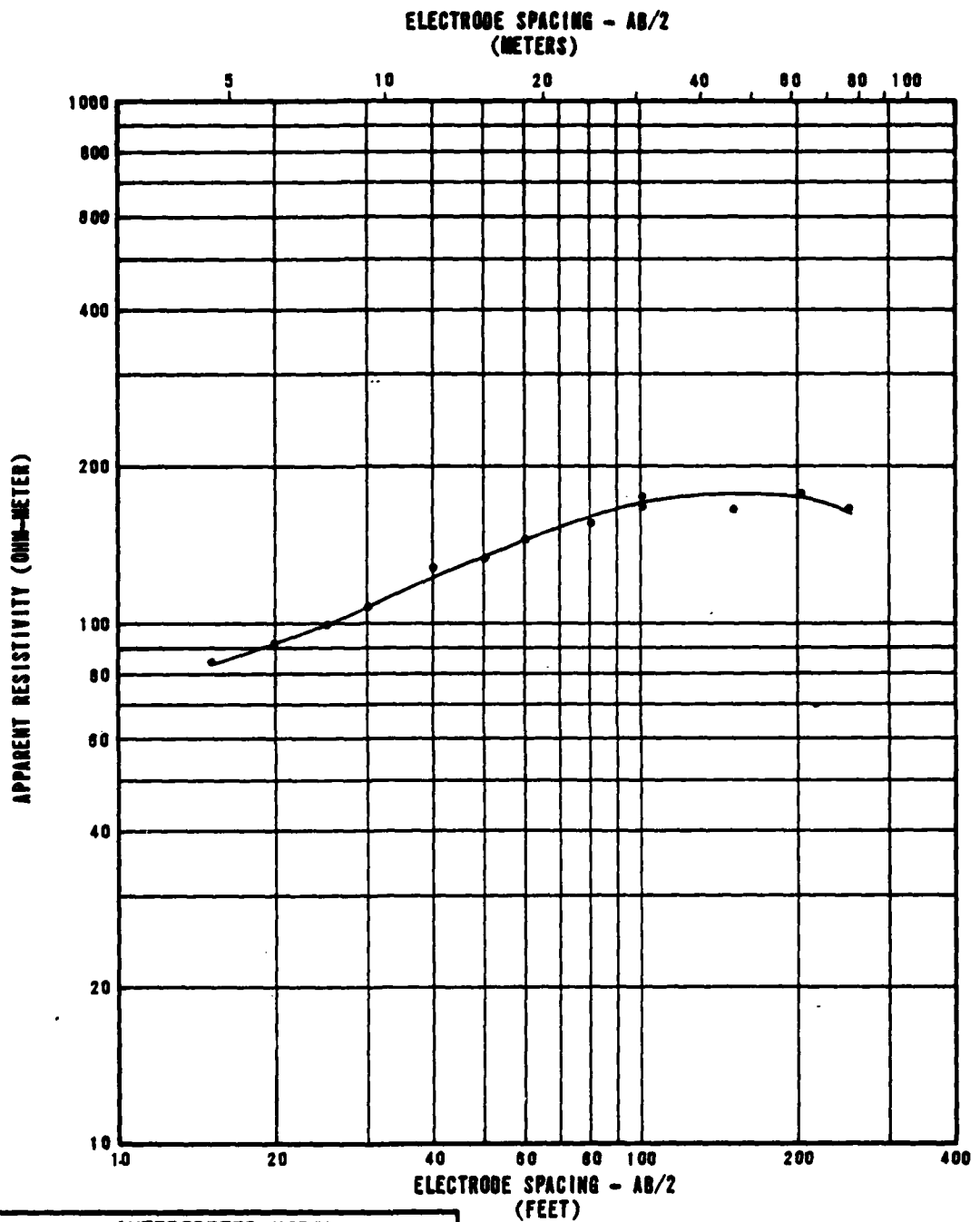
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	190
15	5	30
41	12	420

RESISTIVITY SOUNDING 4V-R-3
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
4-3

FUSRO NATIONAL INC.



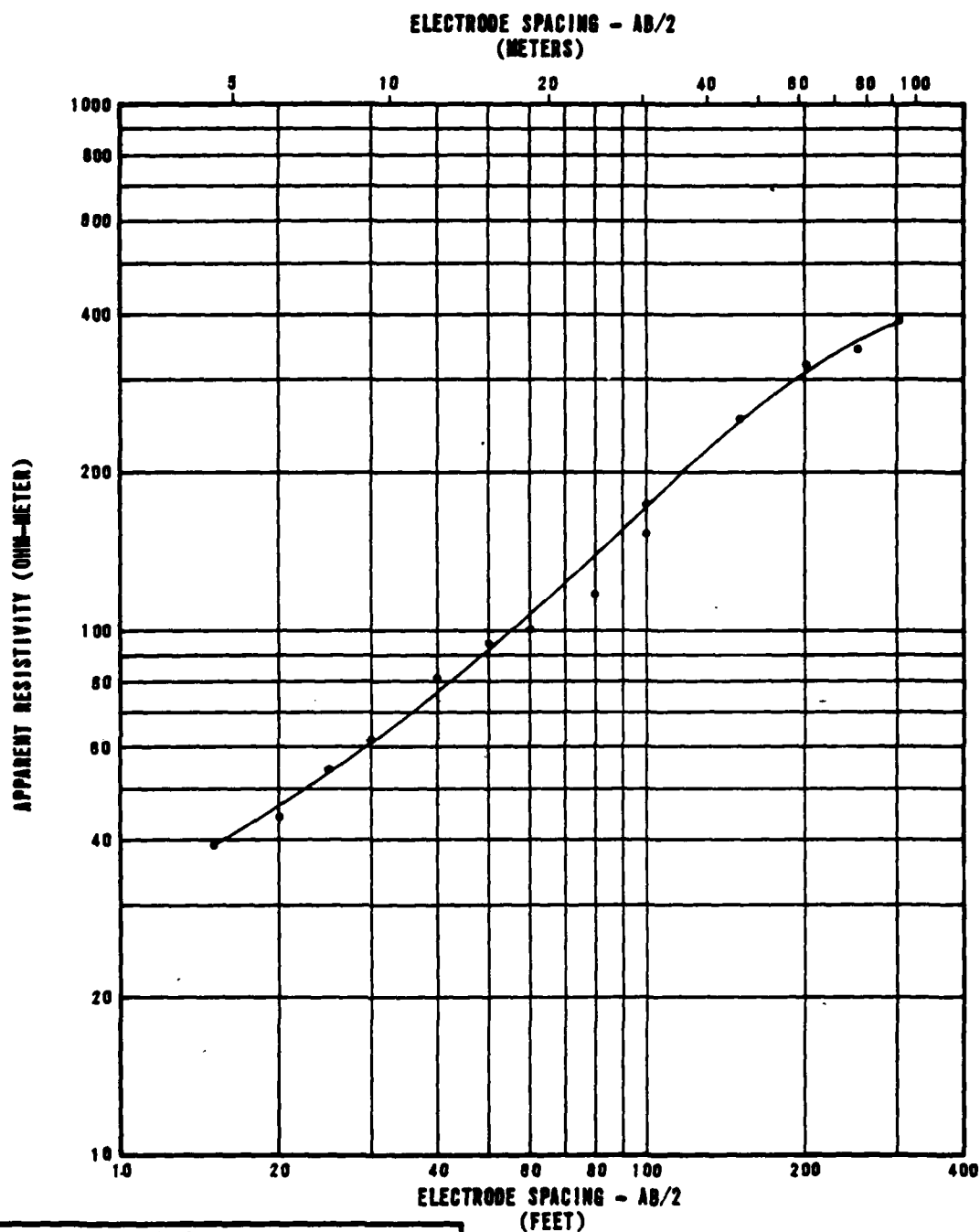
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	80
18	5	230
122	37	100

RESISTIVITY SOUNDING HV-R-4
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-4

FUGRO NATIONAL INC.



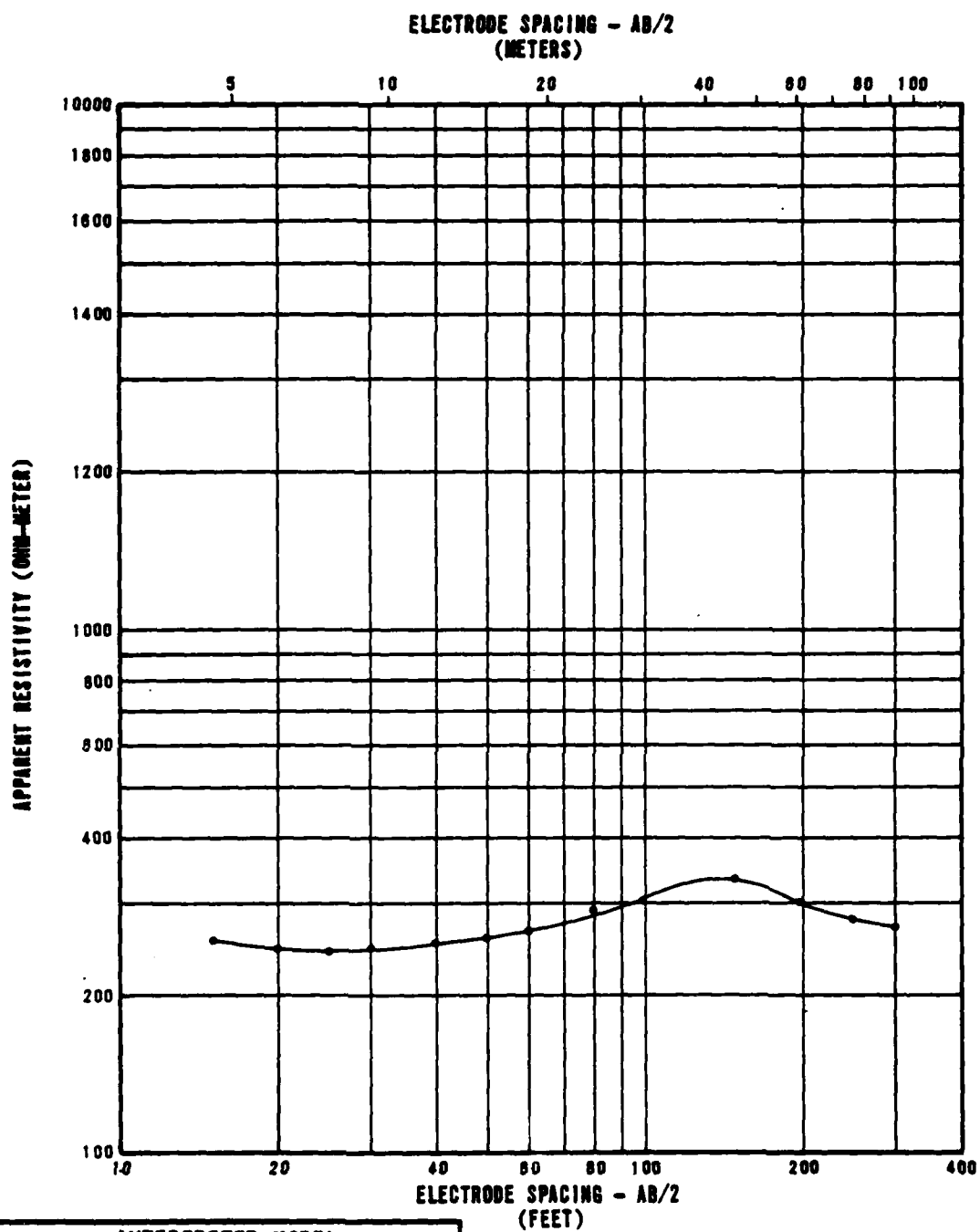
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	35
12	4	140
33	10	850

RESISTIVITY SOUNDING HV-R-5
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-5

TUBRO NATIONAL INC.



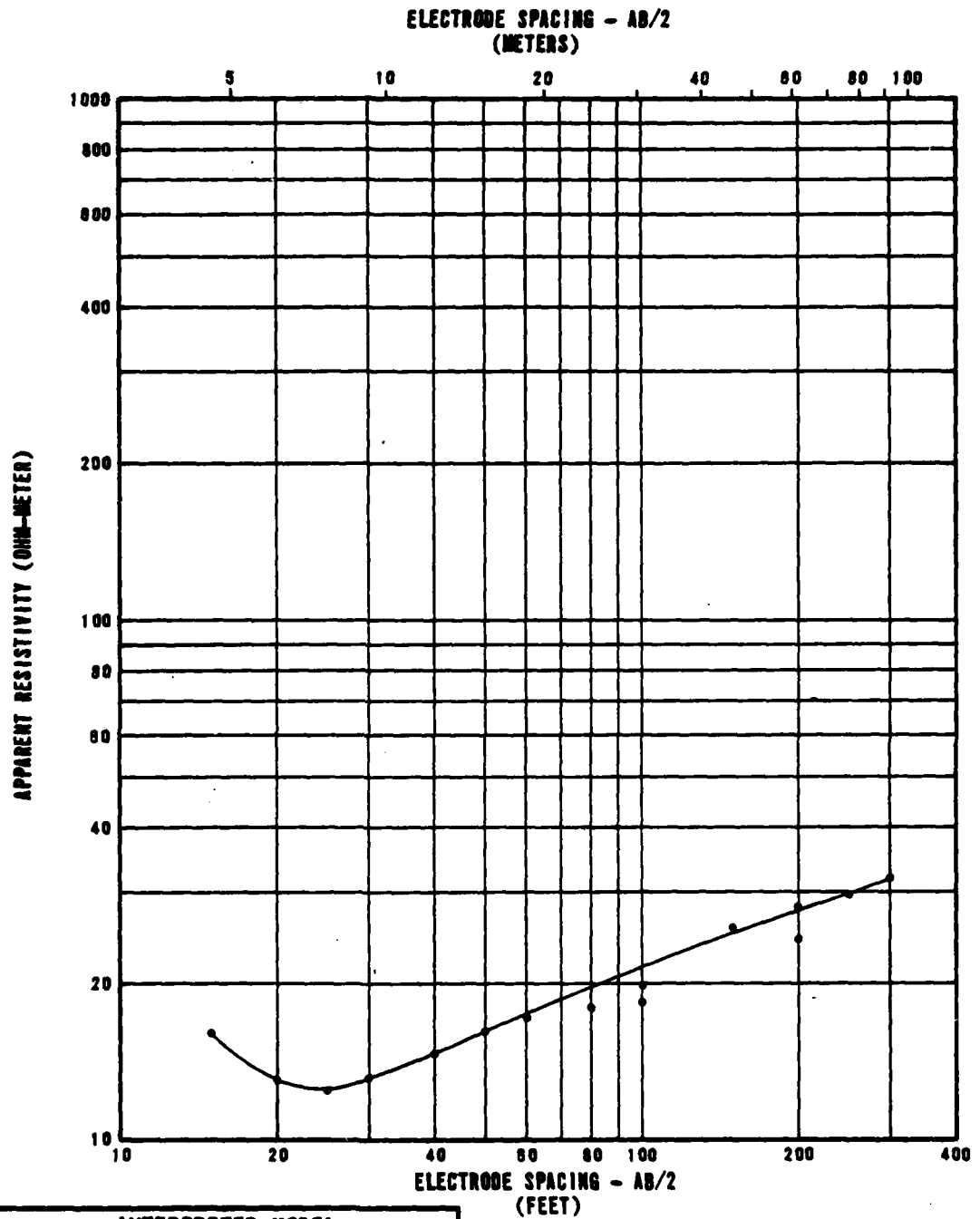
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	280
7	2	220
27	8	380
118	36	180

RESISTIVITY SOUNDING HY-R-6
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-6

FURRO NATIONAL INC.



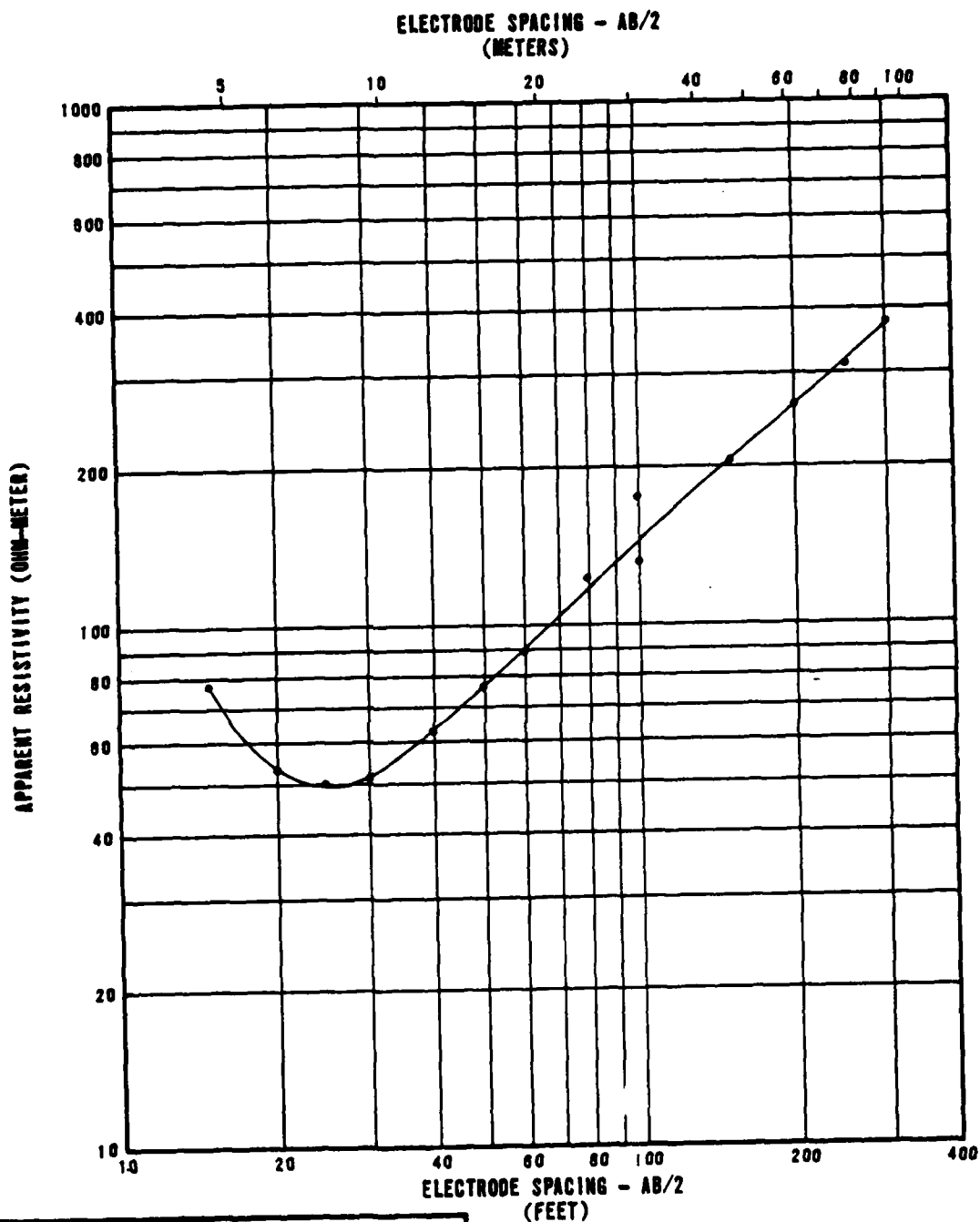
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	.25
8	2	.10
24	7	30

RESISTIVITY SOUNDING HV-R-7
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-7

UBRO NATIONAL, INC.



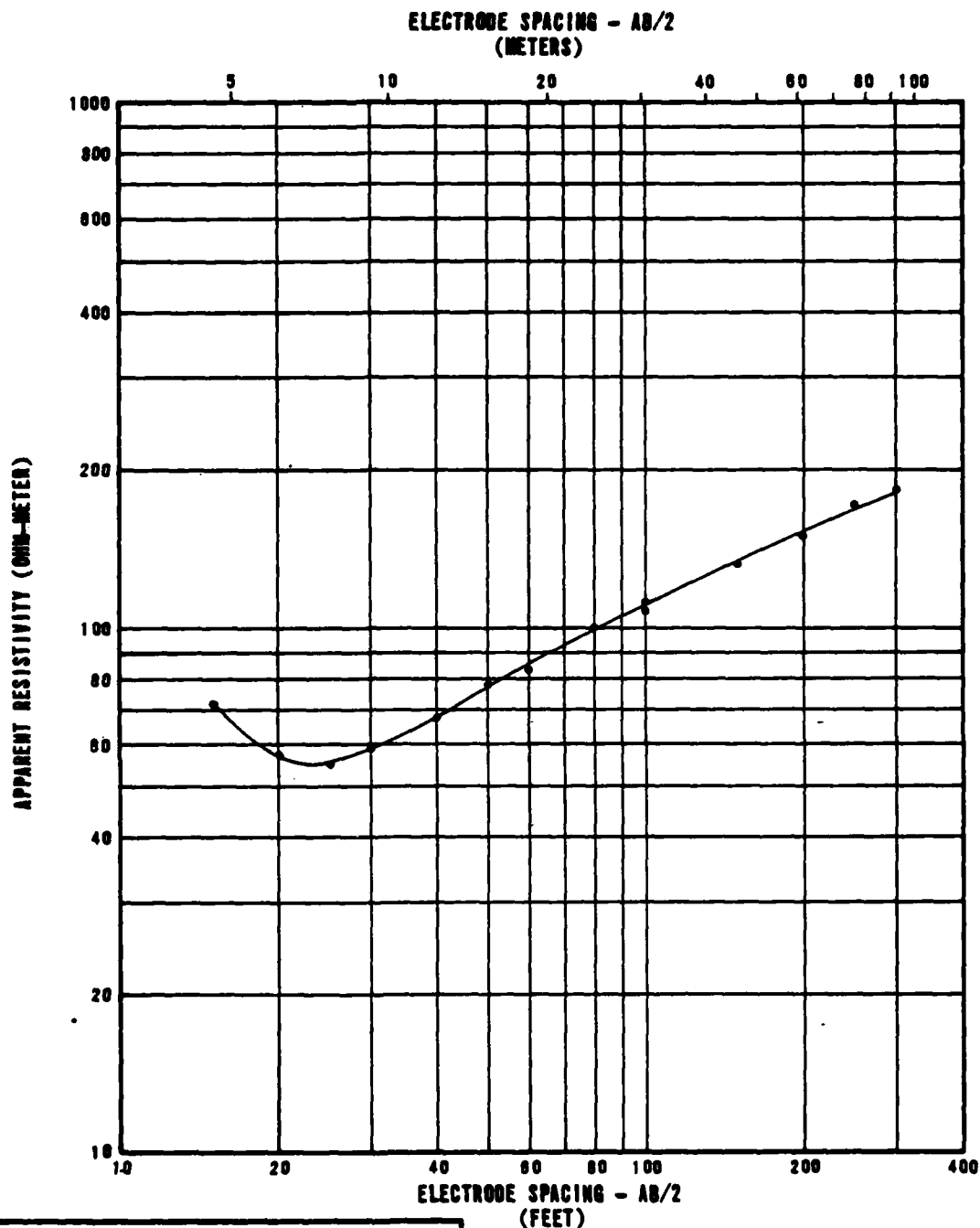
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	75
8	2	55
38	11	980

RESISTIVITY SOUNDING HV-R-8
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAWLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-8

FUGRO NATIONAL INC.



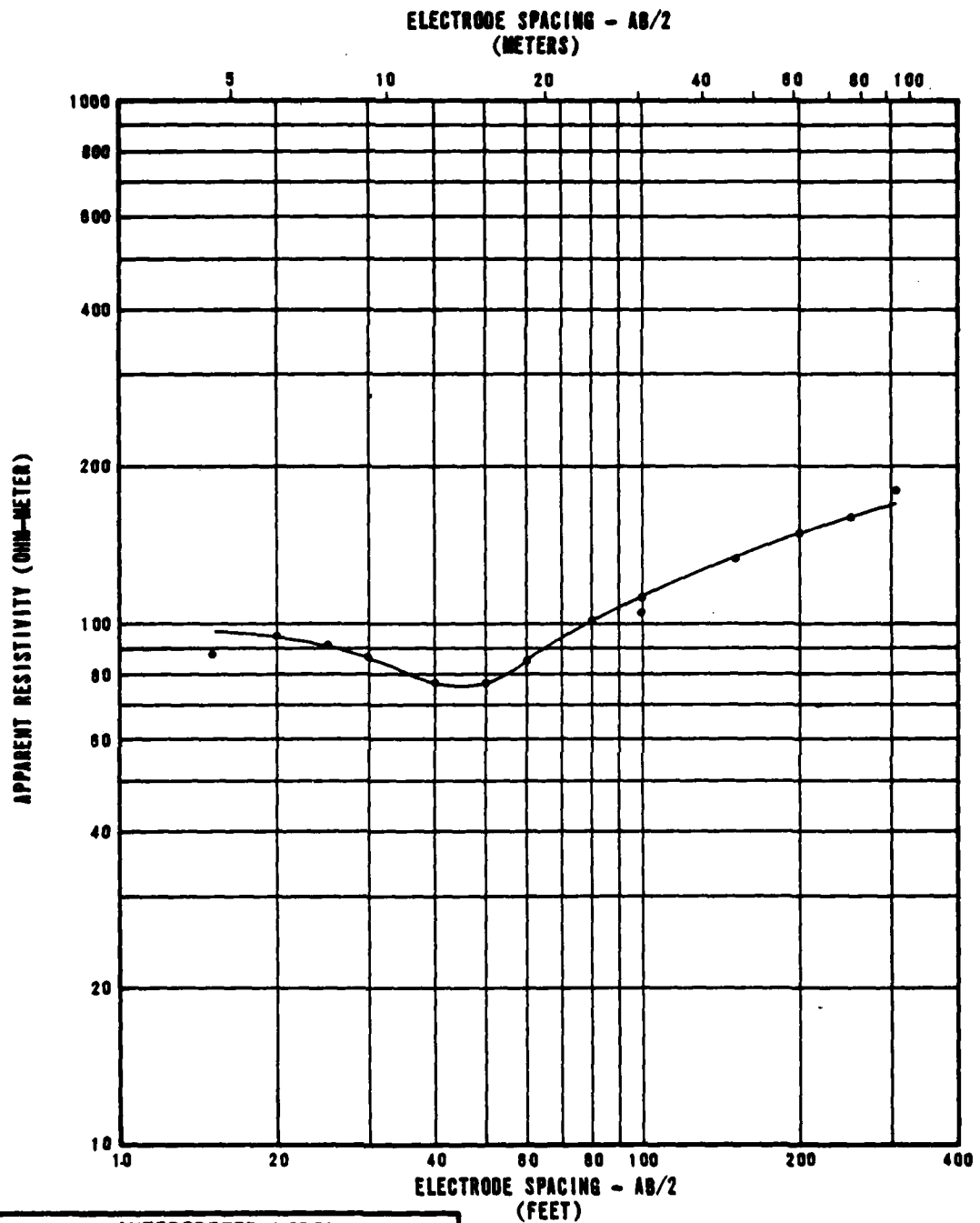
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	110
5	2	50
28	9	160
123	37	320

RESISTIVITY SOUNDING HV-R-9
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-9

FURRO NATIONAL INC.



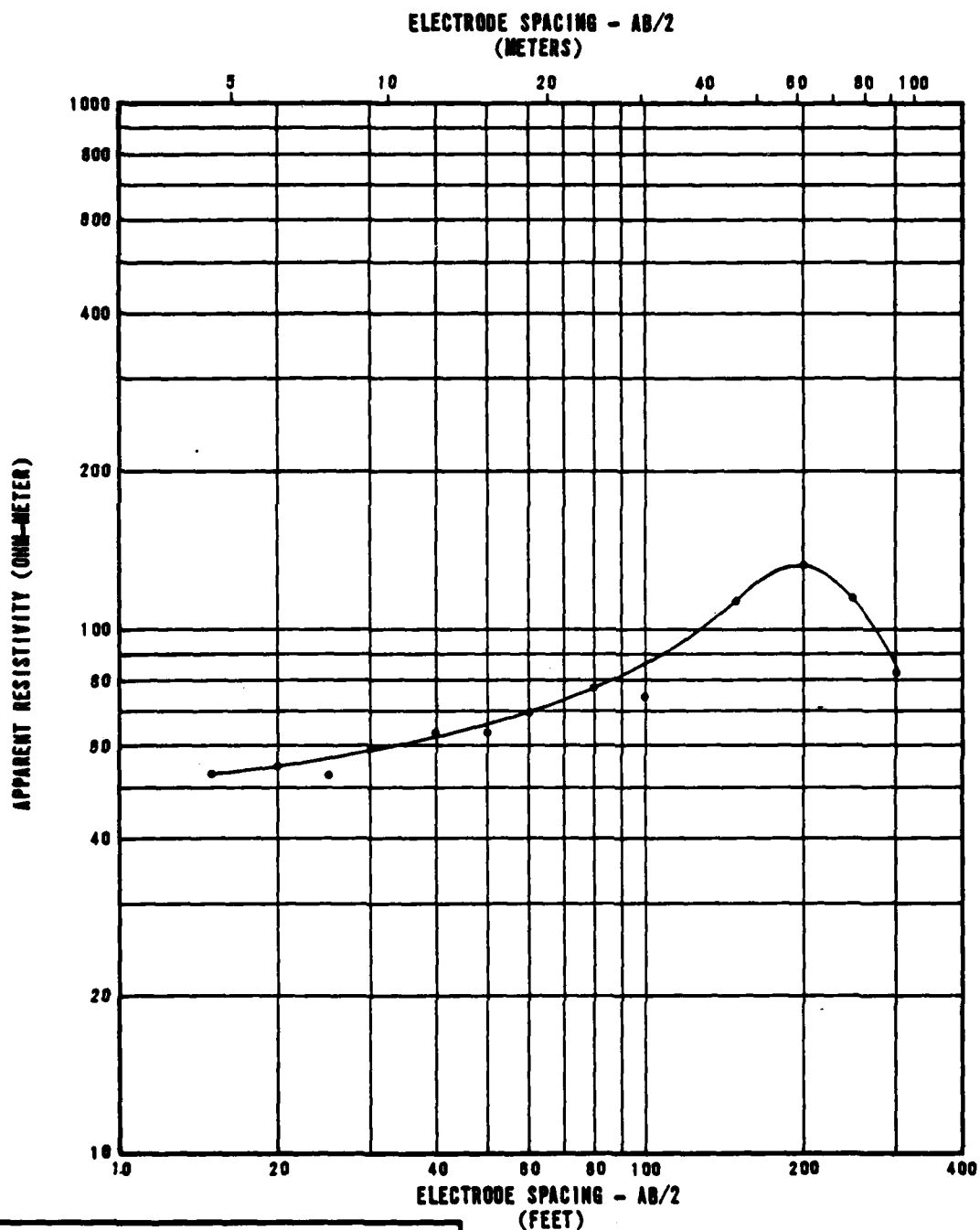
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	120
10	3	55
39	12	230
70	21	180

RESISTIVITY SOUNDING HV-R-10
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-10

FUGRO NATIONAL INC.



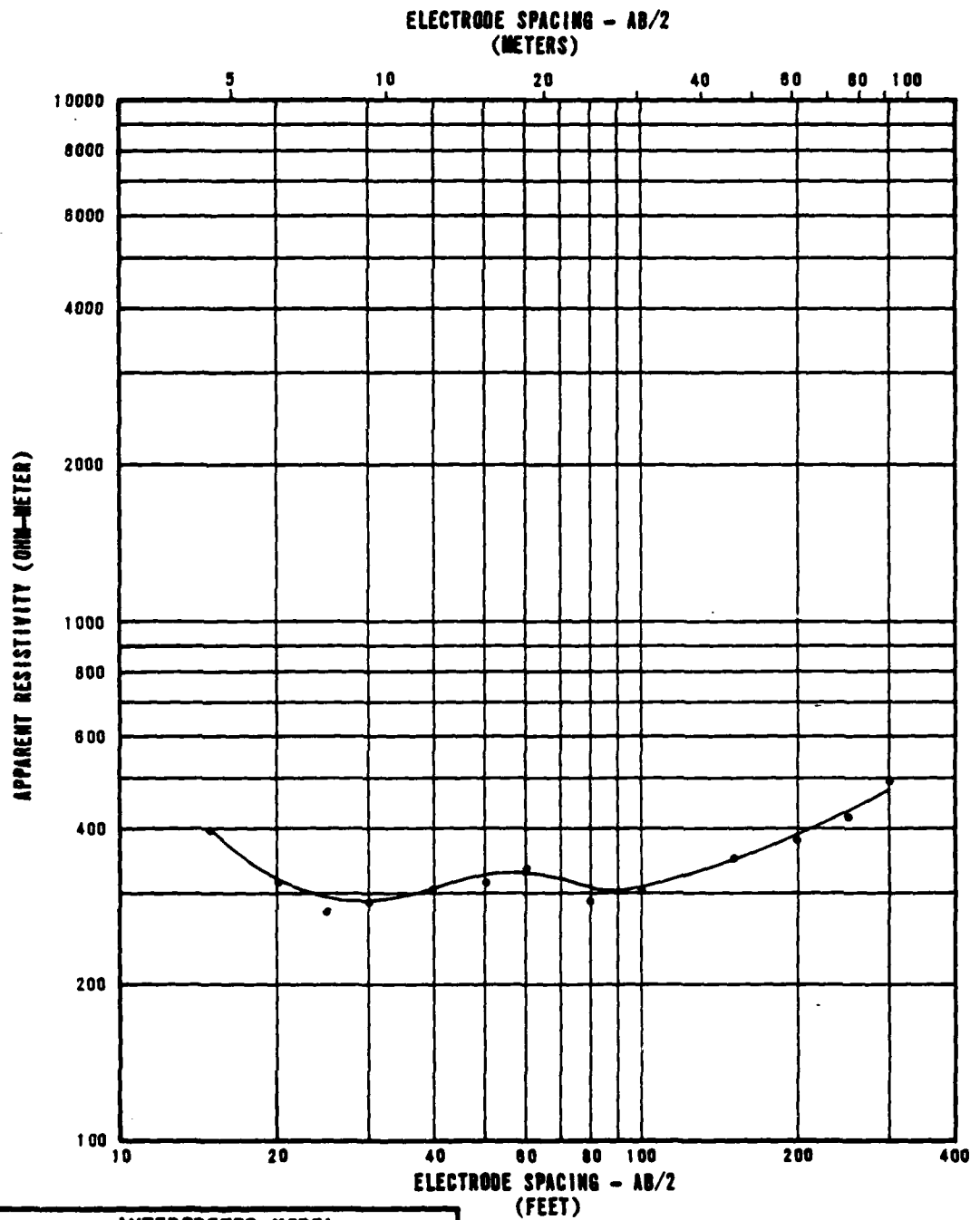
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	50
28	9	160
182	55	25

RESISTIVITY SOUNDING HV-R-11
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
4-11

TUBRO NATIONAL INC.



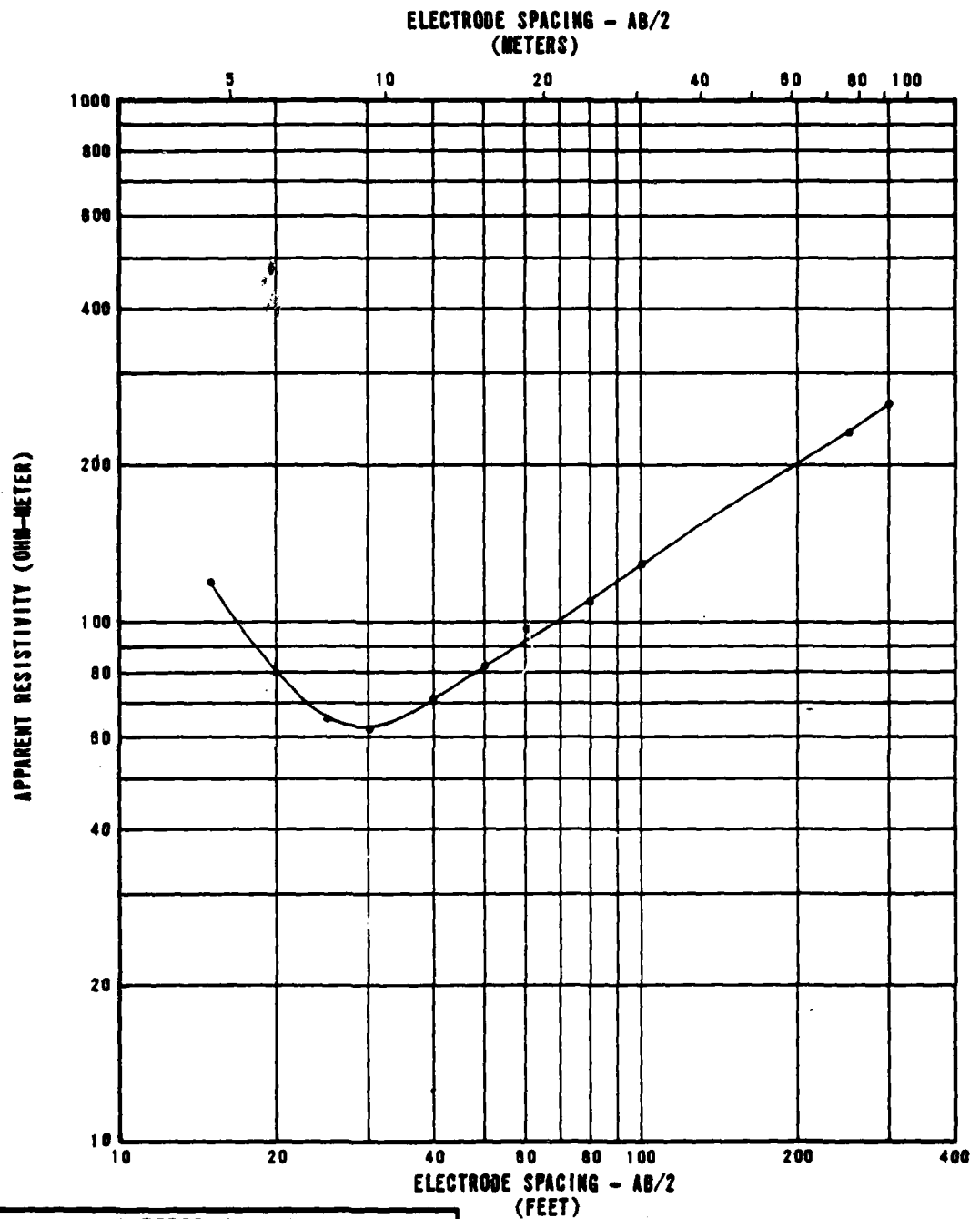
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	840
7	2	150
14	4	380
52	16	140
77	23	510

RESISTIVITY SOUNDING HV-R-12
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-12

FURRO NATIONAL INC.



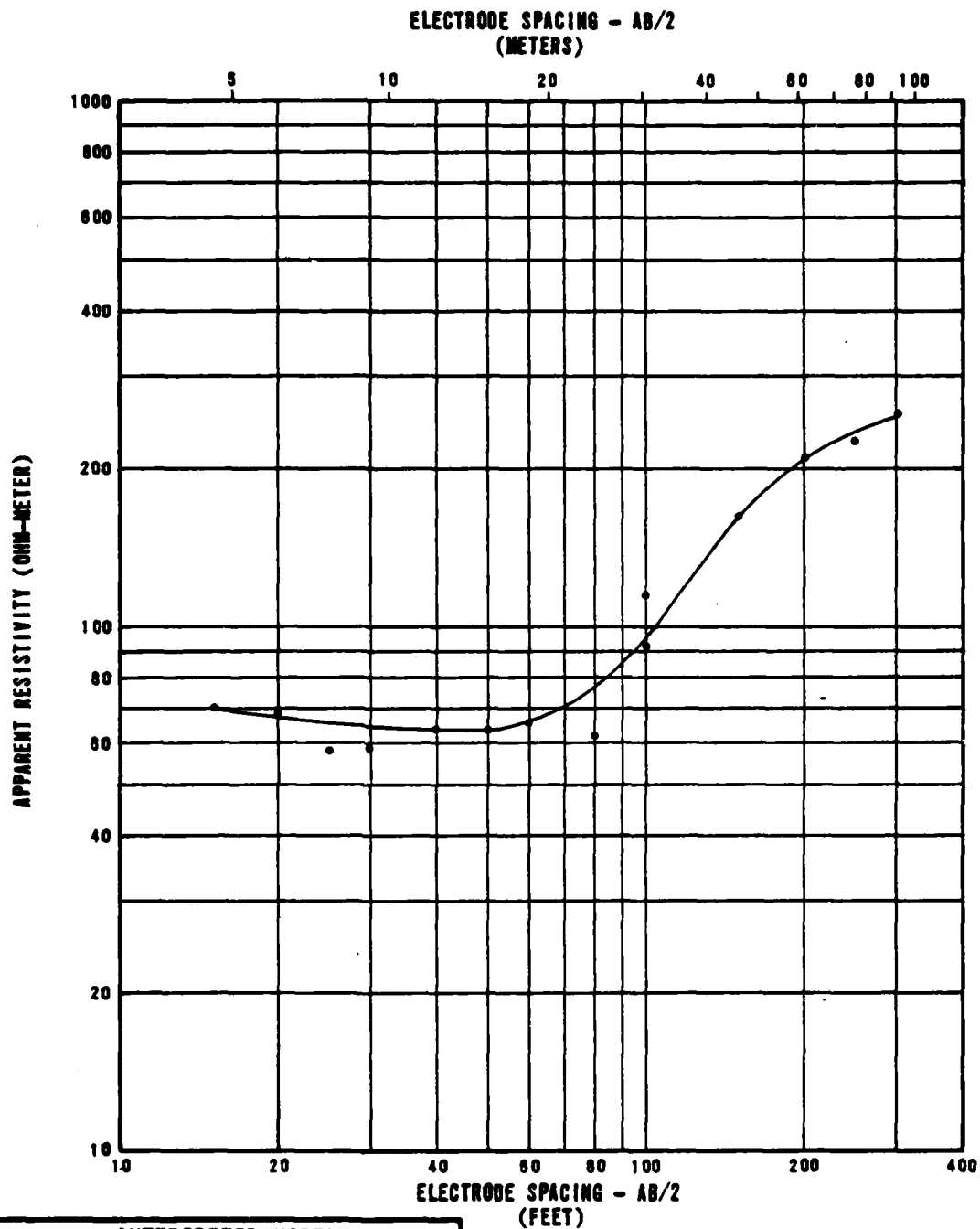
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	200
7	2	35
20	8	380
139	42	880

RESISTIVITY SOUNDING HV-R-13
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-13

TEKNO NATIONAL INC.



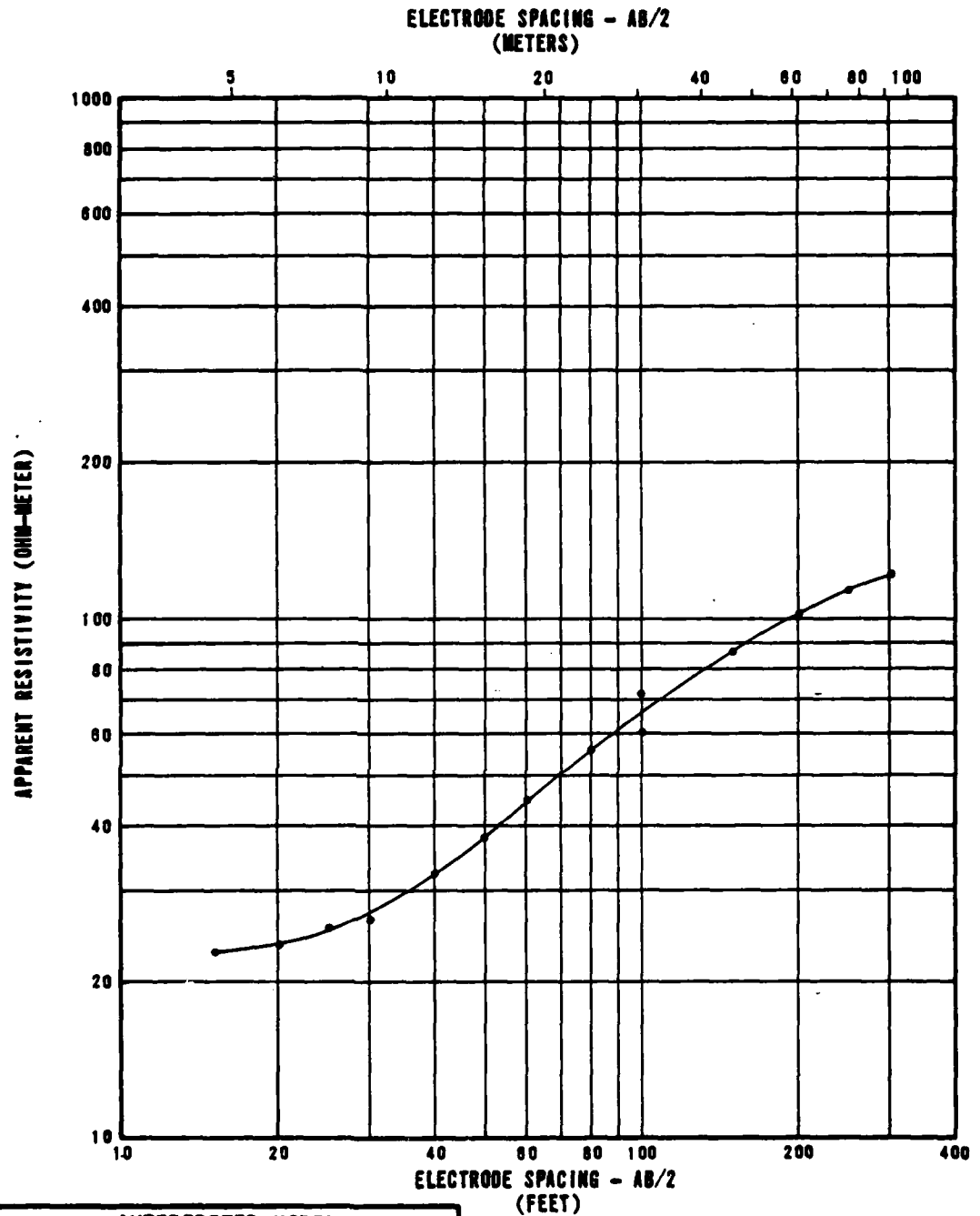
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	80
14	4	45
50	15	1170
67	20	840

RESISTIVITY SOUNDING HV-R-14
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-14

FUGRO NATIONAL, INC.



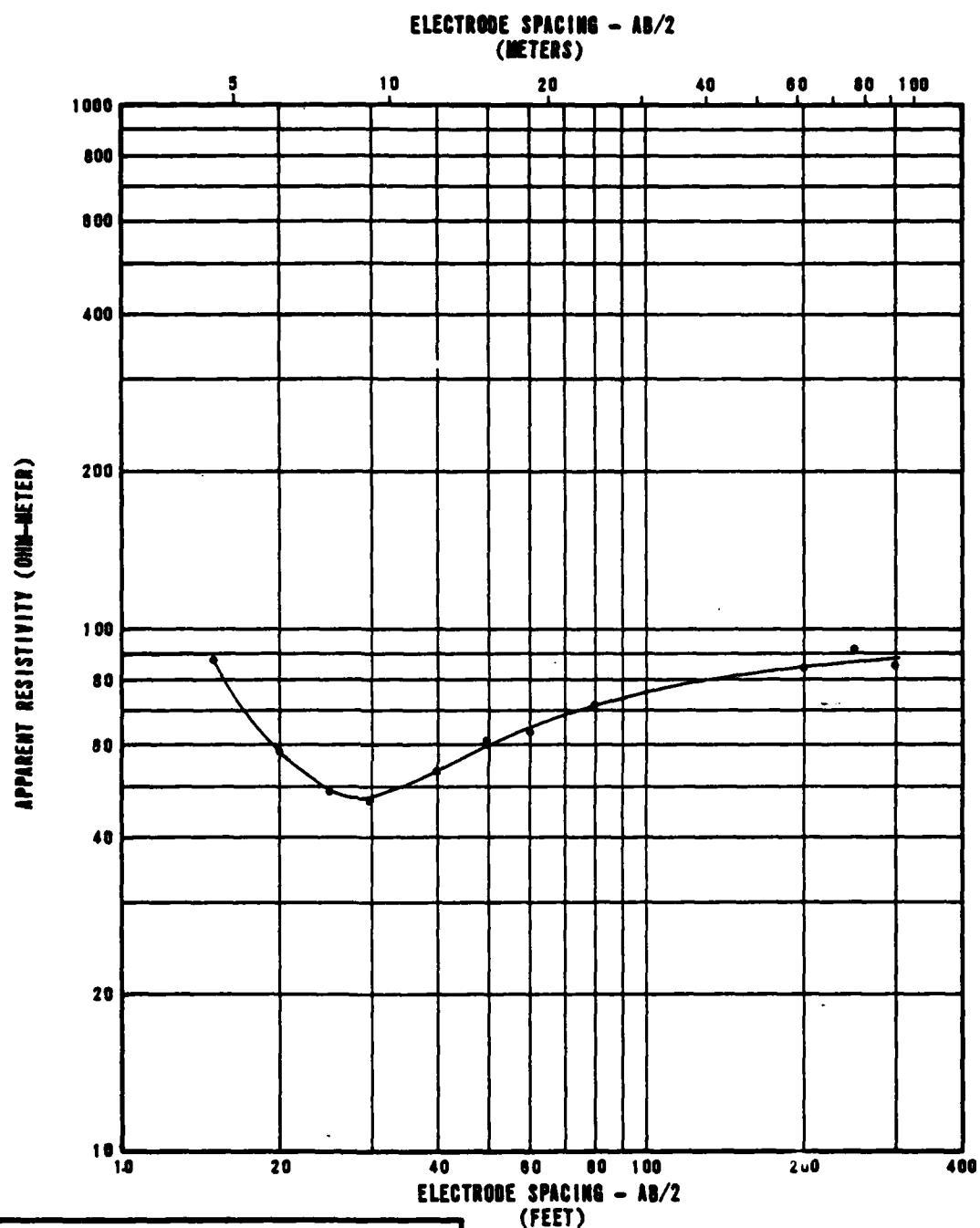
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	20
25	8	210
157	48	180

RESISTIVITY SOUNDING HV-R-15
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-15

FUGRO NATIONAL INC.



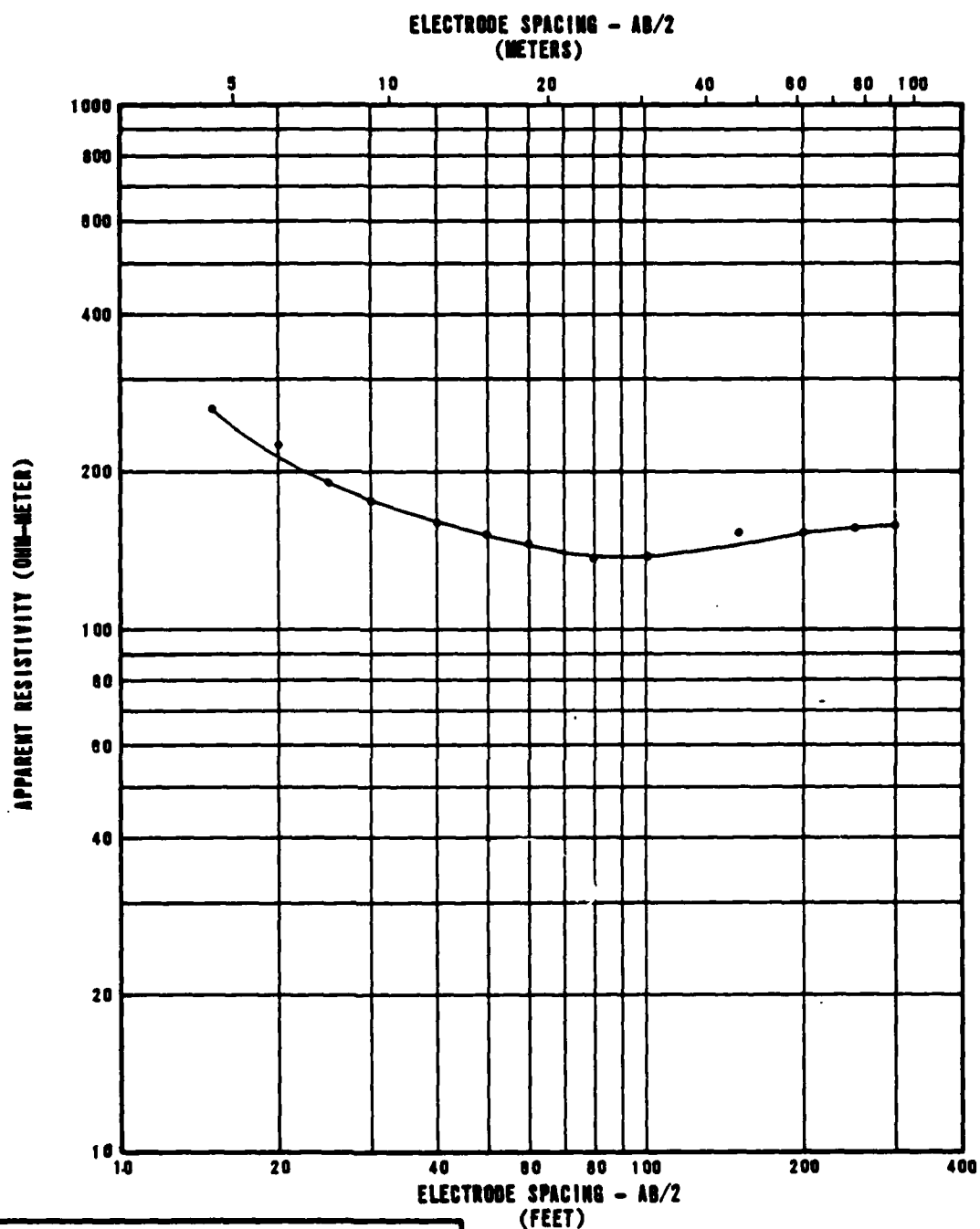
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	85
9	3	40
30	9	180
53	18	90

RESISTIVITY SOUNDING HV-R-18
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
4-16

FUGRO NATIONAL, INC.



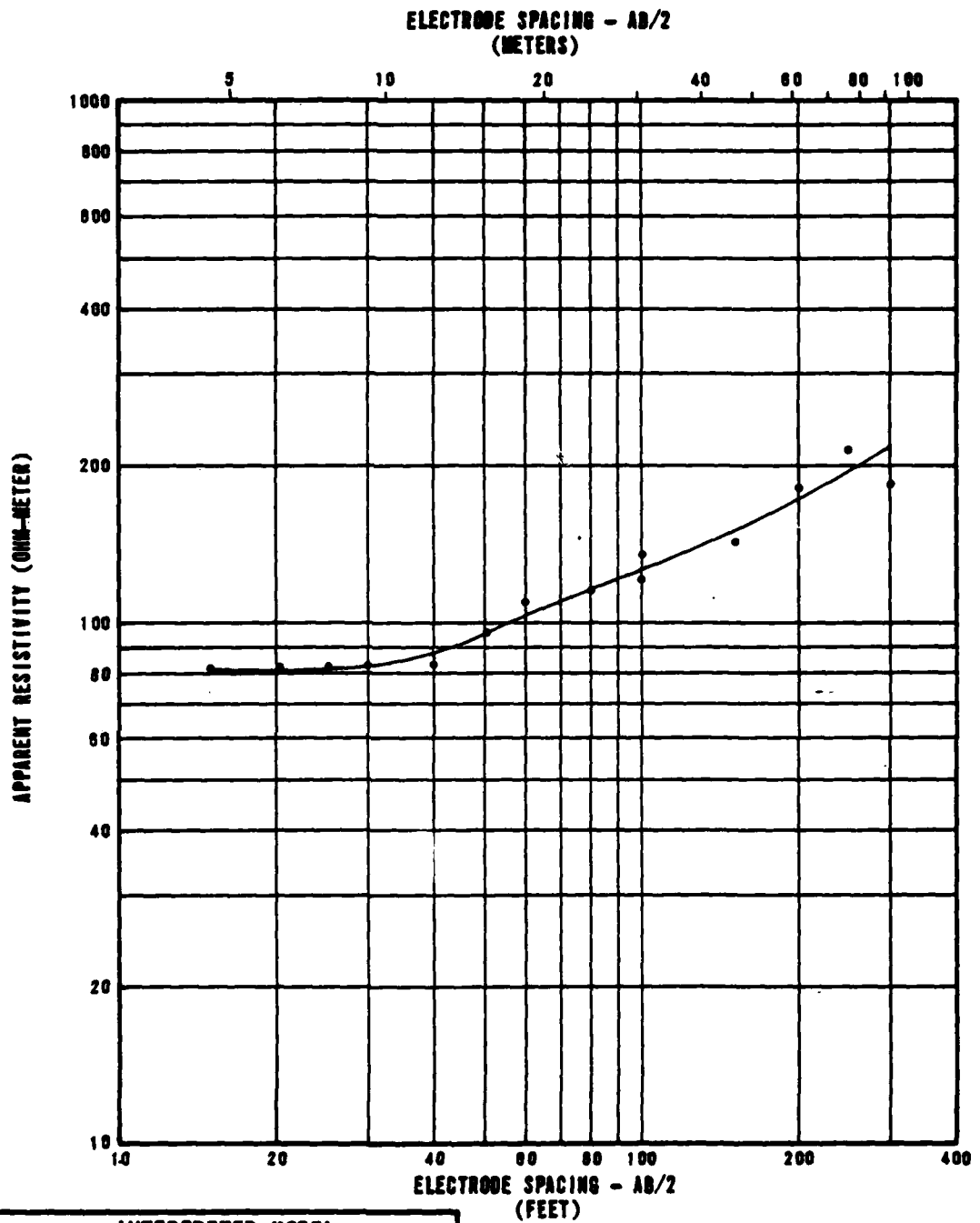
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	400
8	2	120
80	18	180

RESISTIVITY SOUNDING HV-R-17
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-17

JORDO NATIONAL INC.



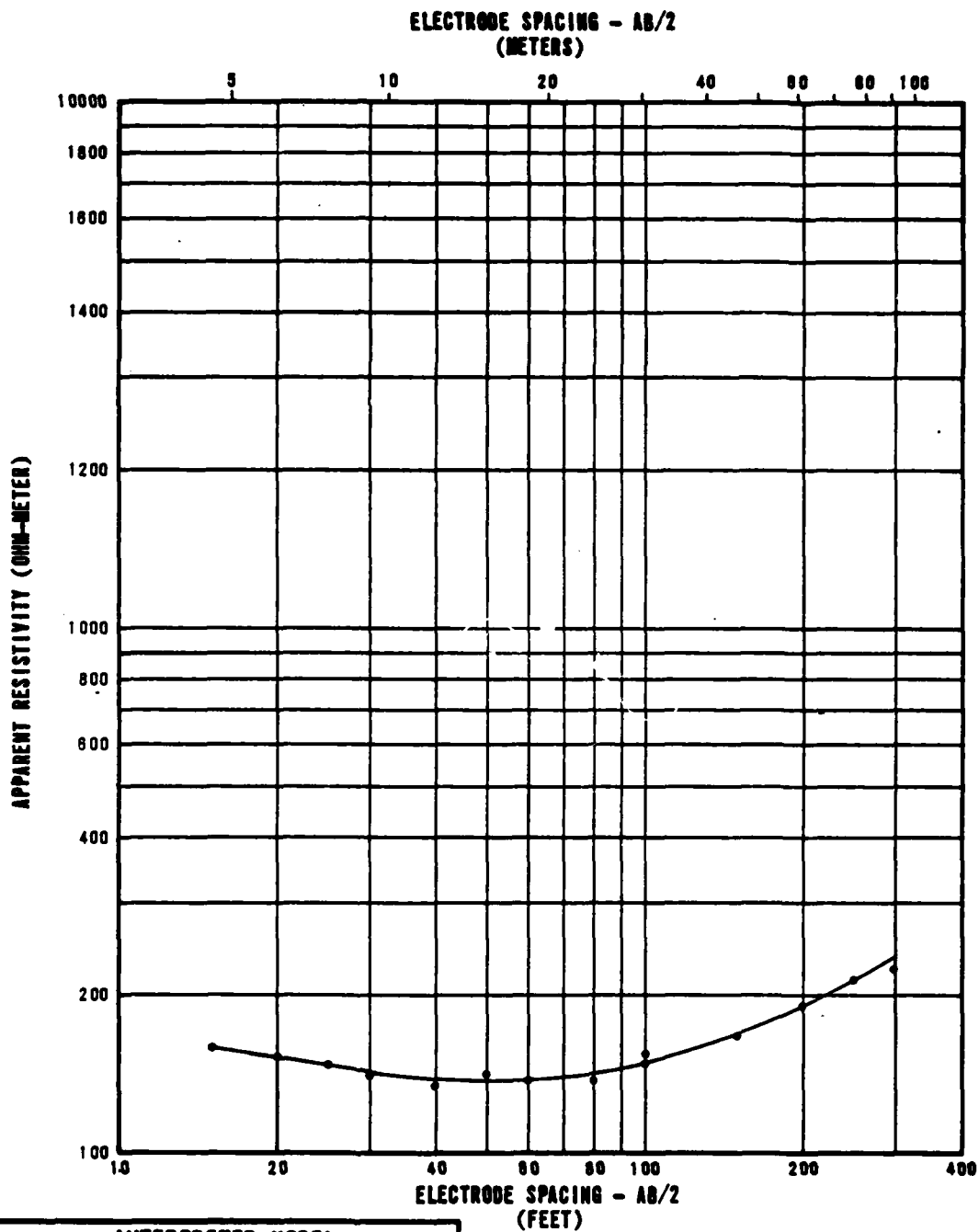
INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	80
43	13	280
200	61	490

RESISTIVITY SOUNDING HV-R-18
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-18

FURRO NATIONAL, INC.



INTERPRETED MODEL		
LAYER DEPTH		RESISTIVITY VALUES
FEET	METERS	OHM-METER
0	0	130
58	18	300

RESISTIVITY SOUNDING HV-R-19
SOUNDING CURVE AND INTERPRETATION
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
4-19

FURRO NATIONAL, INC.

SECTION 5.0

GRAVITY DATA

EXPLANATIONS OF GRAVITY DATA

Gravity data were not available in time (prior to June 1979) for incorporation into this report. A supplemental report containing gravity data and results will be issued at a later date.

SECTION 6.0

BORING LOGS

EXPLANATIONS OF BORING, TRENCH, AND TEST PIT LOGS

All data from borings, trenches, and test pits are presented on standard Fugro National logs in Sections 6.0 and 7.0. The following explanations are provided as a key to the logs.

- A. Designations - Borings, trenches, and test pits are identified as follows:

WW-B-1

WW - abbreviation for the site (e.g., WW-Whirlwind)

B - abbreviation for activity (e.g., B-boring, T-trench, P-test pit)

1 - number of activity

- B. Sample Type - Different sampling techniques were used and the symbols are explained at the bottom of the boring logs. For details of sampling techniques, see Section A5.0 of Appendix in Volume I. Horizontal lines, to scale, indicate the depth where sampling was attempted.
- C. Percent Recovery - The numbers shown represent the ratio (in percent) of the soil sample recovered in the sampler to the full penetration of the sampler.
- D. N Value - Corresponds to standard penetration resistance, which is number of blows required to drive a standard split-spoon sampler for the second and third of three 6-inch (15 cm) increments with a 140-pound (63.5 kg) hammer falling 30 inches (76 cm) (ASTM D 1586-67).
- E. Depth - Corresponds to depth below ground surface in meters and feet.
- F. Lithology - Graphic representation of the soil and rock types.

- G. USCS - Unified Soil Classification System (see Table 6-1 for complete details) symbols.
- H. Soil Description - Except in cases where samples were classified based on laboratory test data, the descriptions are based on visual classification. The procedures outlined in ASTM D 2487-69, Classification of Soils for Engineering Purposes, and D 2488-69, Description of Soils (Visual-Manual Procedure) were followed. Solid lines across the column indicate known change in strata at the depth shown.

Definitions of some of the terms and criteria to describe soils and conditions encountered during the exploration follow.

Gradation : A coarse-grained soil is well graded if it has a wide range in grain size and substantial amounts of most intermediate particle sizes.

Poorly graded indicates that the soil consists predominantly of one size (uniformly graded) or has a wide range of sizes with some intermediate sizes obviously missing (gap-graded).

Moisture :	Dry	- no feel of moisture
	Slightly Moist	- much less than normal moisture
	Moist	- normal moisture for soil
	Very Moist	- much greater than normal moisture
	Wet	- for soils below the water table (if known)

[illegible]

UNIFIED SOIL CLASSIFICATION SYSTEM	
MX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE - SANSO	TABLE 6-1
FUGRO NATIONAL, INC.	

Consistency: Consistency descriptions of coarse-grained soils (GW, GP, GM, GC, SW, SP, SM, SC) are as follows.

<u>Consistency</u>	<u>N Value (ASTM D 1586-67)</u>
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

Consistency descriptions of fine-grained soils (ML, CL, MH, CH,) are as follows:

<u>Consistency</u>	<u>Shear Strength (ksf) (kn/m²)</u>		<u>Field Guide</u>
Very Soft	0.25	12	Sample with height equal to twice the diameter, sags under own weight
Soft	0.25- 0.50	12 - 24	Can be squeezed between thumb and forefinger
Firm	0.50- 1.00	24- 48	Can be molded easily with fingers
Stiff	1.00- 2.00	48- 96	Can be imprinted with slight pressure from fingers
Very Stiff	2.00- 4.00	96- 192	Can be imprinted with considerable pressure from fingers
Hard	over 4.00	over 192	Cannot be imprinted by fingers

Grain Shape: Angular - particles have sharp edges and relatively plane sides with unpolished surfaces.

Subangular - particles are similar to angular but have somewhat rounded edges.

Subrounded - particles exhibit nearly plane sides but have well-rounded corners and edges.

Rounded - particles have smoothly curved sides and no edges.

Calcareous : Containing calcium carbonate; presence of calcium carbonate is commonly identified on the basis of reaction with dilute hydrochloric acid.

Caliche : Soils cemented by porous calcium carbonate and/or other soluble minerals by upward-moving solutions.

Degree of
Cementation: (Stages of development of caliche profile)

Stage	<u>Gravelly Soils</u>	<u>Nongravelly Soils</u>
I	Thin, discontinuous pebble coatings	Few filaments or faint coatings
II	Continuous pebble coatings, some interpebble fillings	Few to abundant nodules, flakes, filaments
III	Many interpebble fillings	Many nodules and internodular fillings
IV	Laminar horizon overlying plugged horizon	Increasing carbonate impregnation

Secondary
Material : Example - Sand with trace to some silt

Trace - 5-12% (by dry weight)
Little - 13-20% (by dry weight)
Some - >21% (by dry weight)

Plasticity : Plasticity index is the range of water content, expressed as a percentage of the weight of the oven-dried soil, through which the soil is plastic. It is defined as the liquid limit minus the plastic limit. Descriptive ranges used on the logs include:

Nonplastic	(PI, 0 - 4)
Slightly Plastic	(PI, 4 - 15)
Medium Plastic	(PI, 15 - 30)
Highly Plastic	(PI, >31)

Cobbles and

Boulders : A cobble is a rock fragment, usually rounded by weathering or abrasion, with an average diameter ranging between 3 and 12 inches (8 and 30 cm).

A boulder is a rock fragment, usually rounded by weathering or abrasion, with an average diameter of 12 inches (30 cm) or more.

- I. Remarks - This column was provided on boring and trench logs for comments regarding drilling difficulty, number and size of cobbles or boulders encountered, trench wall stability, loss of drilling fluid in the boring, and other conditions encountered during drilling and excavations.
- J. Dry Density and Moisture Content - The boring logs include a graphical display of laboratory test results for dry density (ASTM D 2937-71) in pounds per cubic foot and kilograms per cubic meter and moisture content (ASTM D 2216-71) in percent from representative samples taken during drilling. The symbols are explained at the bottom of the boring logs.

K. Sieve Analysis - The numbers represent the percentage by dry weight (ASTM D 422-63) of each of the following soil components:

GR - Gravel, rock particles that will pass a 3-inch (76 mm) sieve and are retained on No. 4 (4.75 mm) sieve.

SA - Sand, soil particles passing No. 4 sieve and retained on No. 200 (0.075 mm) sieve.

FI - Fines, silt or clay, soil particles passing No. 200 sieve.

L. Atterberg Limits (LL and PI) -

LL - Liquid Limit, the water content corresponding to the arbitrary limit between the liquid and plastic states of consistency of a soil (ASTM D 423-66).

PL - Plastic Limit, the water content corresponding to an arbitrary limit between the plastic and the semisolid state of consistency of a soil (ASTM D 424-59).

PI - Plasticity Index, numerical difference between the liquid limit (LL) and the plastic limit (PL) indicating the range of moisture content within which a soil-water mixture is plastic.

NP - Nonplastic.

M. Miscellaneous Information -

Elevations - indicated elevations on the logs are estimated from topographic maps of the study area, within an accuracy of half the contour interval.

Surficial
Geologic Unit - indicates the surficial geologic unit in which the activity is located.

Date Drilled - indicates the period from beginning to completion of the activity.

Drilling
Method - signifies the type of drilling procedure used such as rotary wash.

Hole Diameter - nominal size of boring drilled.

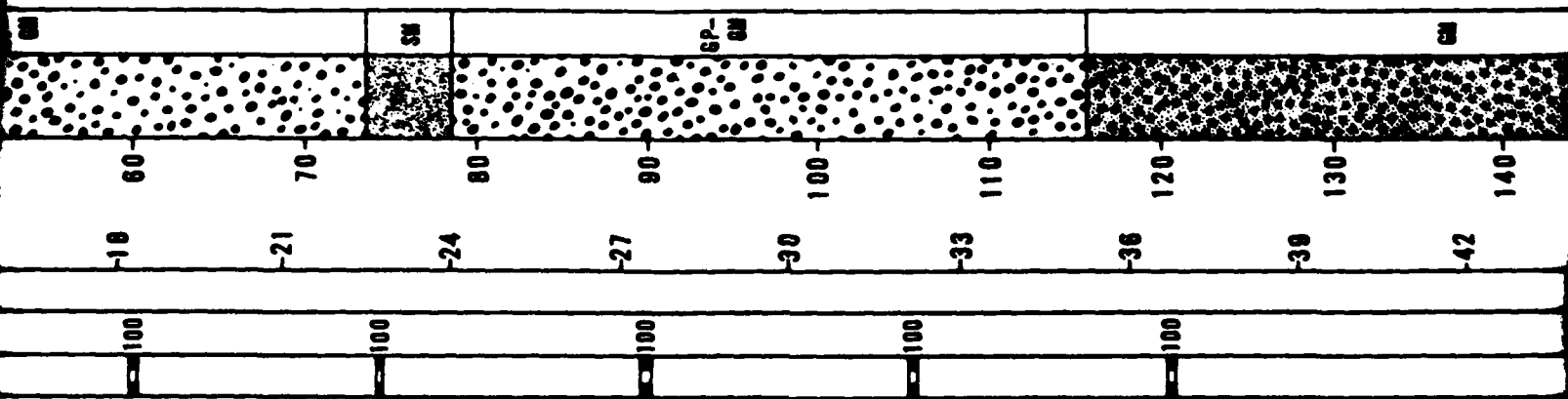
Water Level - indicates depth from ground surface to water table where encountered.

Trench Length - length at ground surface of final trench excavation.

Trench
Orientation - bearing of longitudinal trench centerline.

CONFIDENTIAL

[illegible]

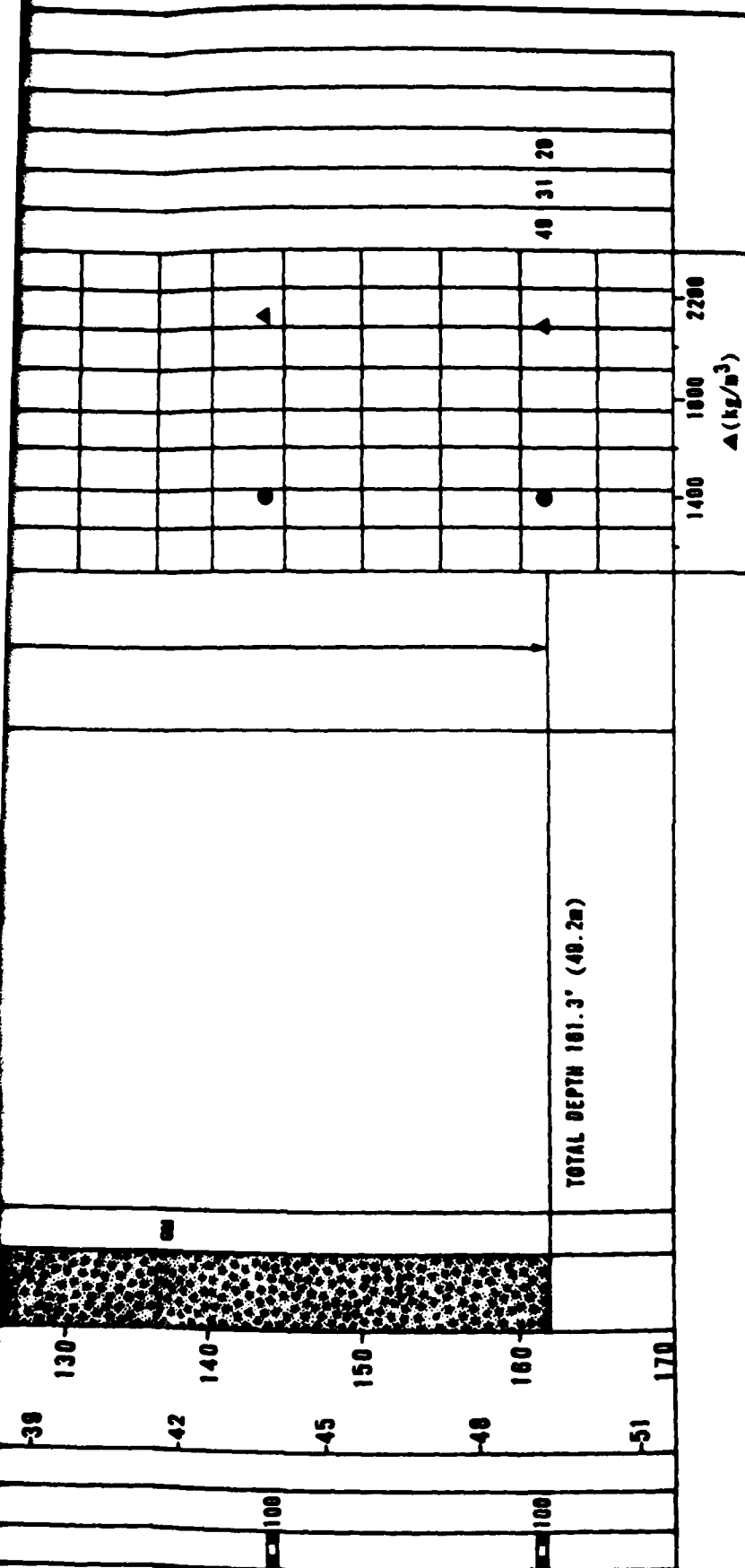


drill chatter

18 71 13

58 32 12

2



EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

□ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION

SURFICIAL GEOLOGIC UNIT : A51

DATE DRILLED : 14-15 November 1978

DRILLING METHOD : Rotary Wash

HOLE DIAMETER : 4 3/4" (121mm)

WATER LEVEL : Not Encountered

LOG OF BORING BV-8-1
VERIFICATION SITE, HADLIN COP, NEVADA

ON SITE INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
8-1

FUGRO NATIONAL INC.

AFV-01

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS
07	87		0	0			GRAVELLY SAND, light brown to brown, fine to coarse, poorly graded, medium dense to very dense, angular to sub- rounded, calcareous; little to some fine to coarse gravel; trace to little silt; layer of sandy gravel (24.0"- 26.0"); interbedded lenses of silty sand (134.0"-180.7').	
100	100		3	10		SM		
100	100		6	20				
100	100		9	30		GP-SM		
80	80		12	40				
100	100		15	50				

-15 50 -18 60 -21 70 -24 80 -27 90 -30 100 -33 110 -36 120 -39 130

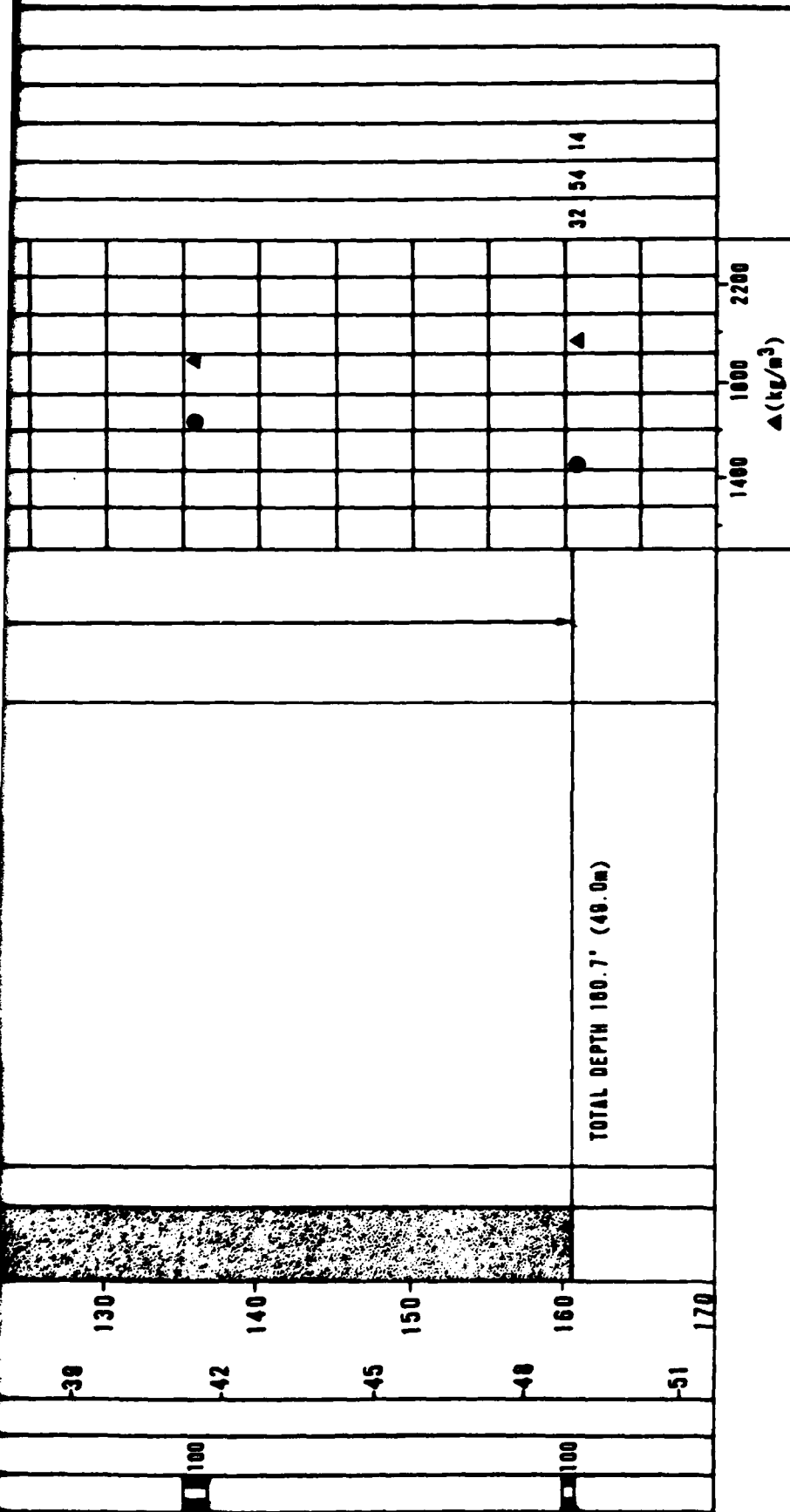
38 45 19

irregular
drill chatter

SM

-100 -100 -100 -100 -100

2



EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

□ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2216-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5800' (1707m)
 SURFICIAL GEOLOGIC UNIT : A51
 DATE DRILLED : 15-17 November 1978
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 3/4" (121mm)
 WATER LEVEL : Not Encountered

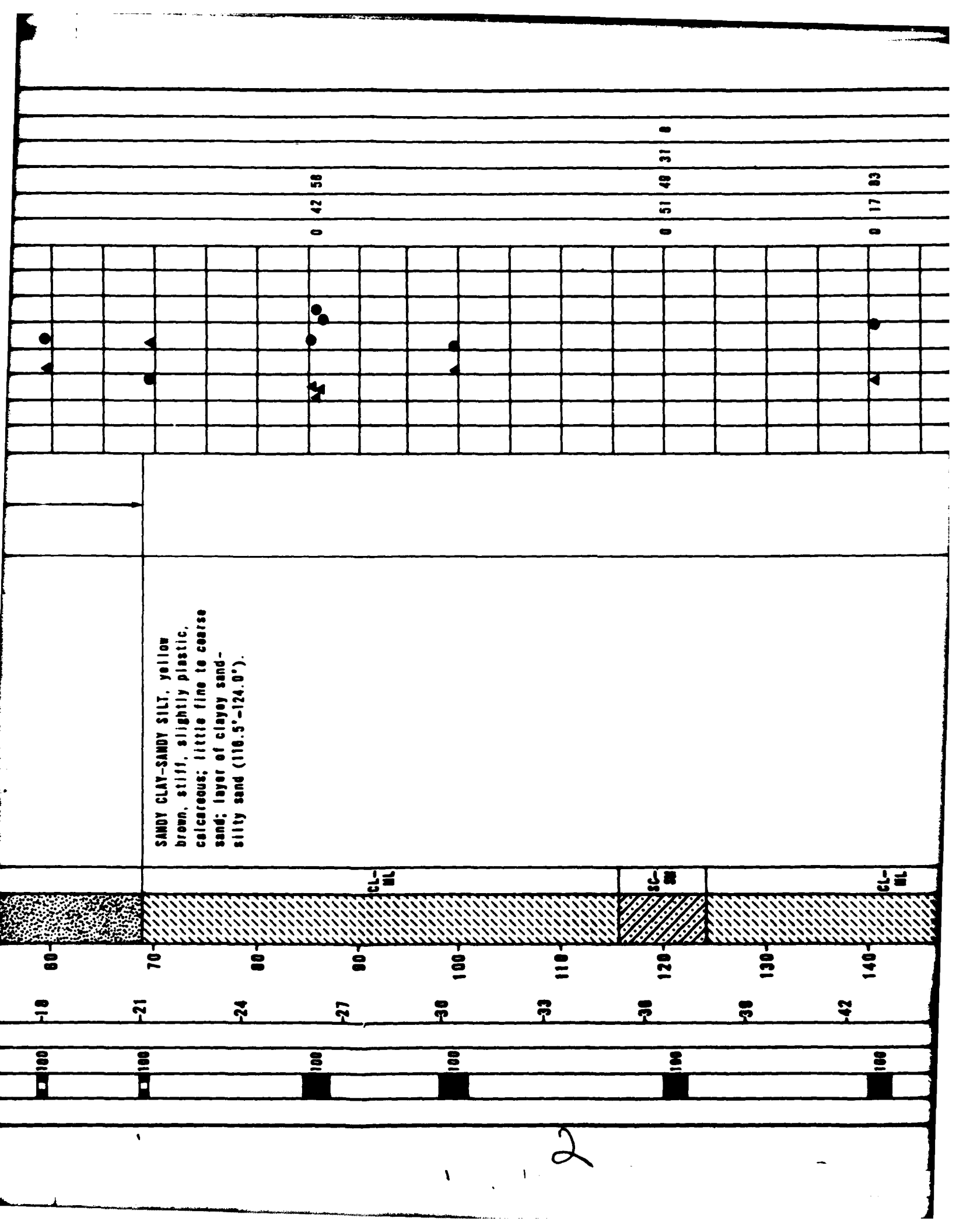
LOG OF BORING NV-D-2
 VERIFICATION SITE, NAMLIN COP, NEVADA

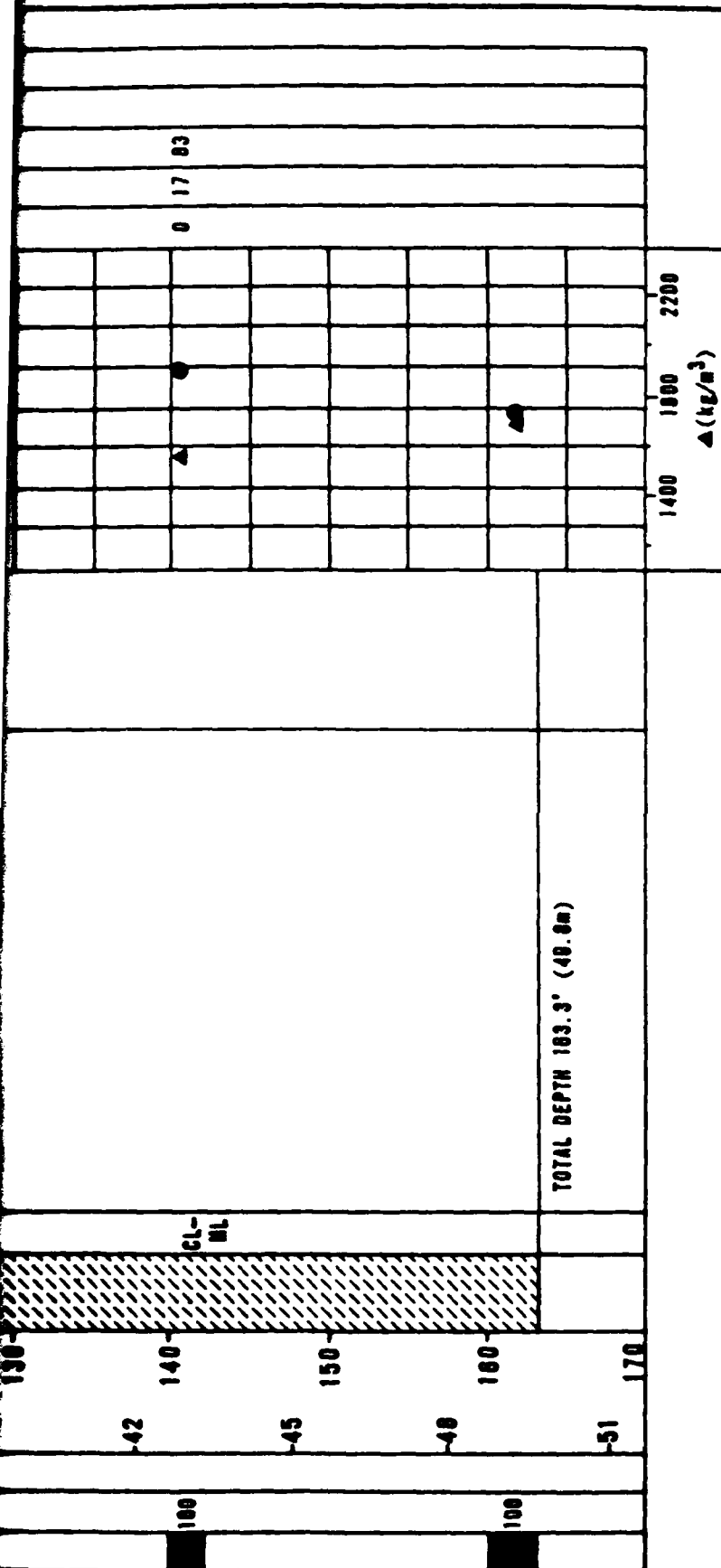
ON SITE INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 6-2

FUGRO NATIONAL INC.

APP

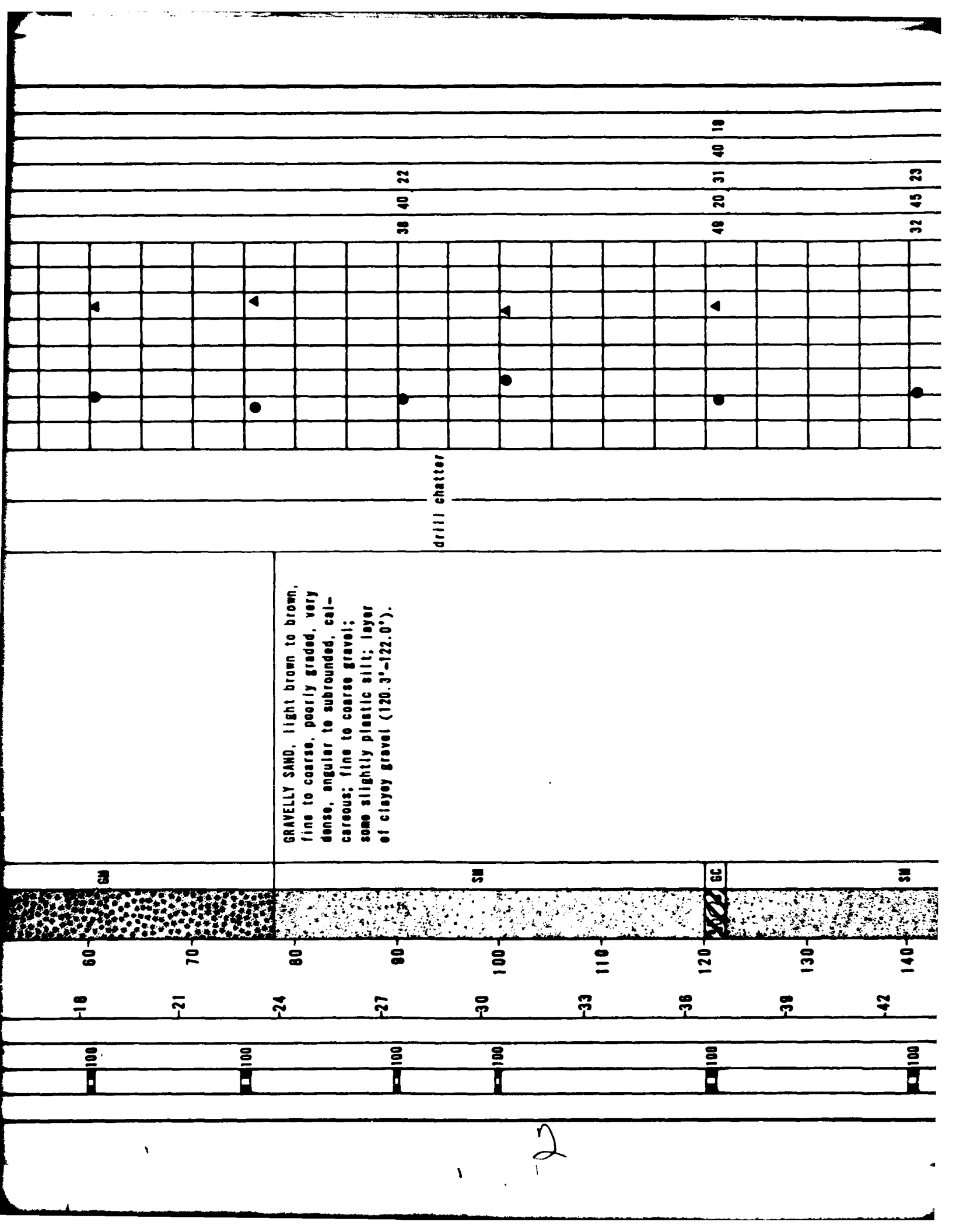


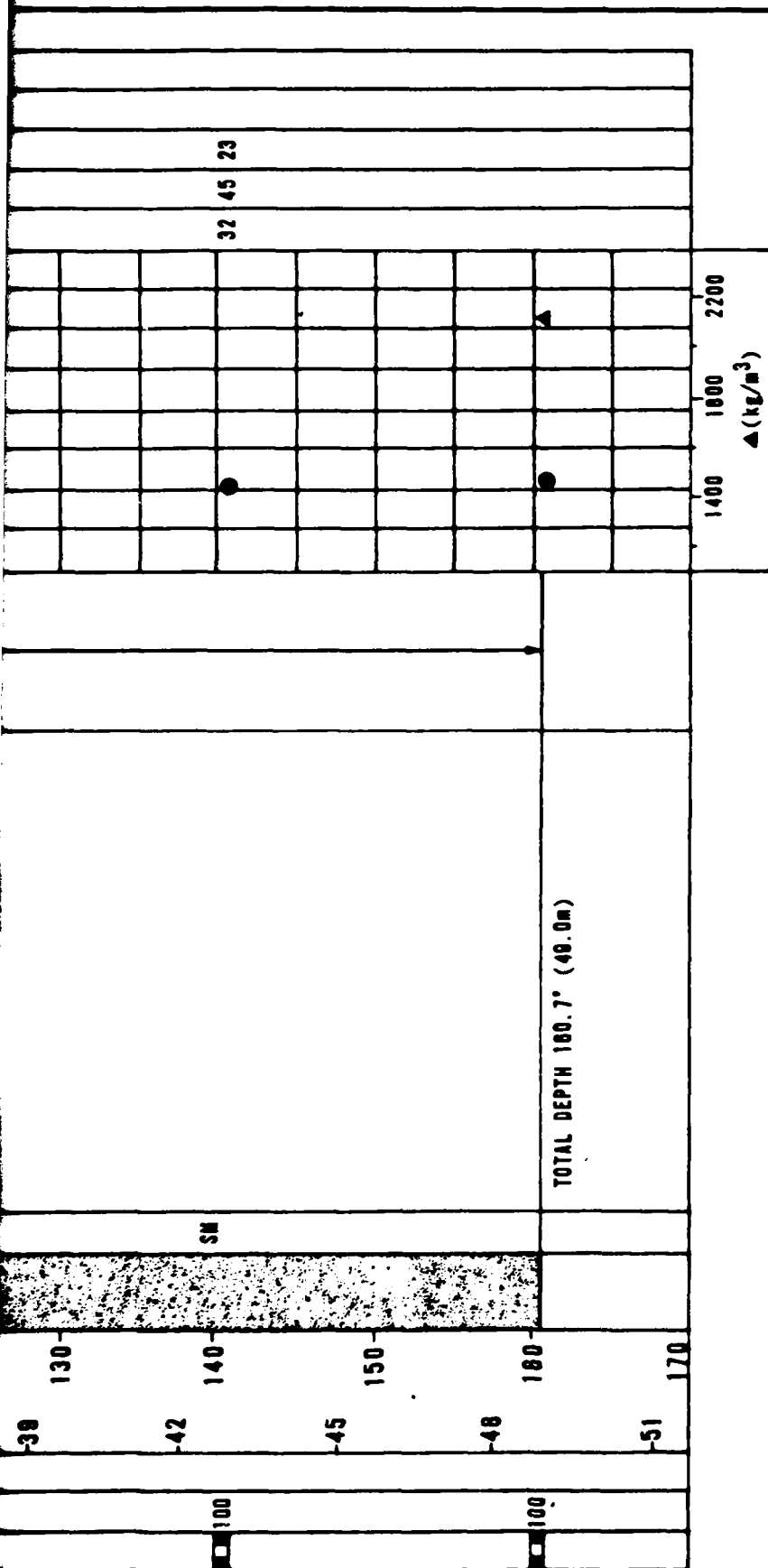


LOG OF BORING HV-8-3 VERIFICATION SITE, HAMLIN CDP, NEVADA	
UX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE - SAUSO	FIGURE 8-3

FUGRO NATIONAL INC.

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf) ●(s)														SIEVE ANALYSIS												
									30	35	40	45	50	60	70	80	90	100	110	120	130	140	GR	SA	FI	LL	PI								
1	100		0	0		SM	GRAVELLY SAND, light brown to brown, fine to coarse, poorly graded, medium dense to very dense, angular to subrounded, calcareous; some fine to coarse gravel; some silt; layer of sandy gravel (0.0"-1.5"); layer of silty sand (7.2"-13.0").	drill hole caving	●	▲																	41	35	24						
2	100		3	10					●	▲																						35	44	21	
3	100		6	20					●	▲																							30	40	21
4	100		9	30		GP-GM	SANDY GRAVEL, yellow brown to brown, fine to coarse, poorly graded, dense to very dense, angular to subangular, calcareous; some fine to coarse sand; trace to little silt.		●	▲																				53	30	11			
5	100		12	40					●	▲																							83	28	11
6	100		15	50					●	▲																								48	34





EXPLANATION

■ FUGRO DRIVE SAMPLE

□ BULK SAMPLE

■ PITCHER TUBE SAMPLE

□ STANDARD PENETRATION TEST SAMPLE

▨ CORE SAMPLE

N - STANDARD PENETRATION RESISTANCE

▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)

● - MOISTURE CONTENT (ASTM: D-2218-71)

NR - NO RECOVERY

BORING DETAILS

ELEVATION : 5785' (1763m)
 SURFICIAL GEOLOGIC UNIT : A5y/A5i
 DATE DRILLED : 18-19 November 1978
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 WATER LEVEL : Not Encountered

LOG OF BORING NV-B-4
 VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 8-4

FUGRO NATIONAL, INC.

AFV-00

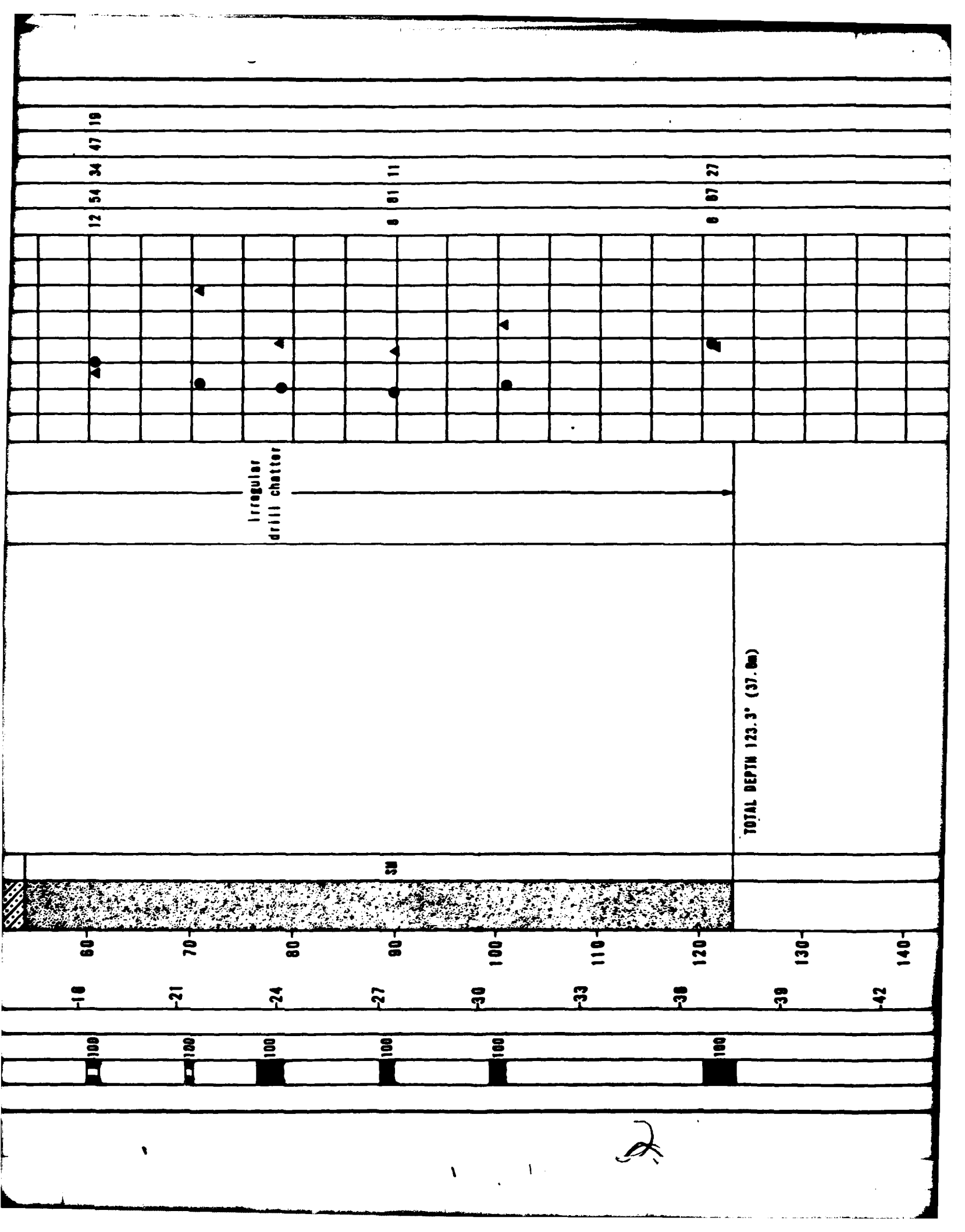
CHECKED BY _____

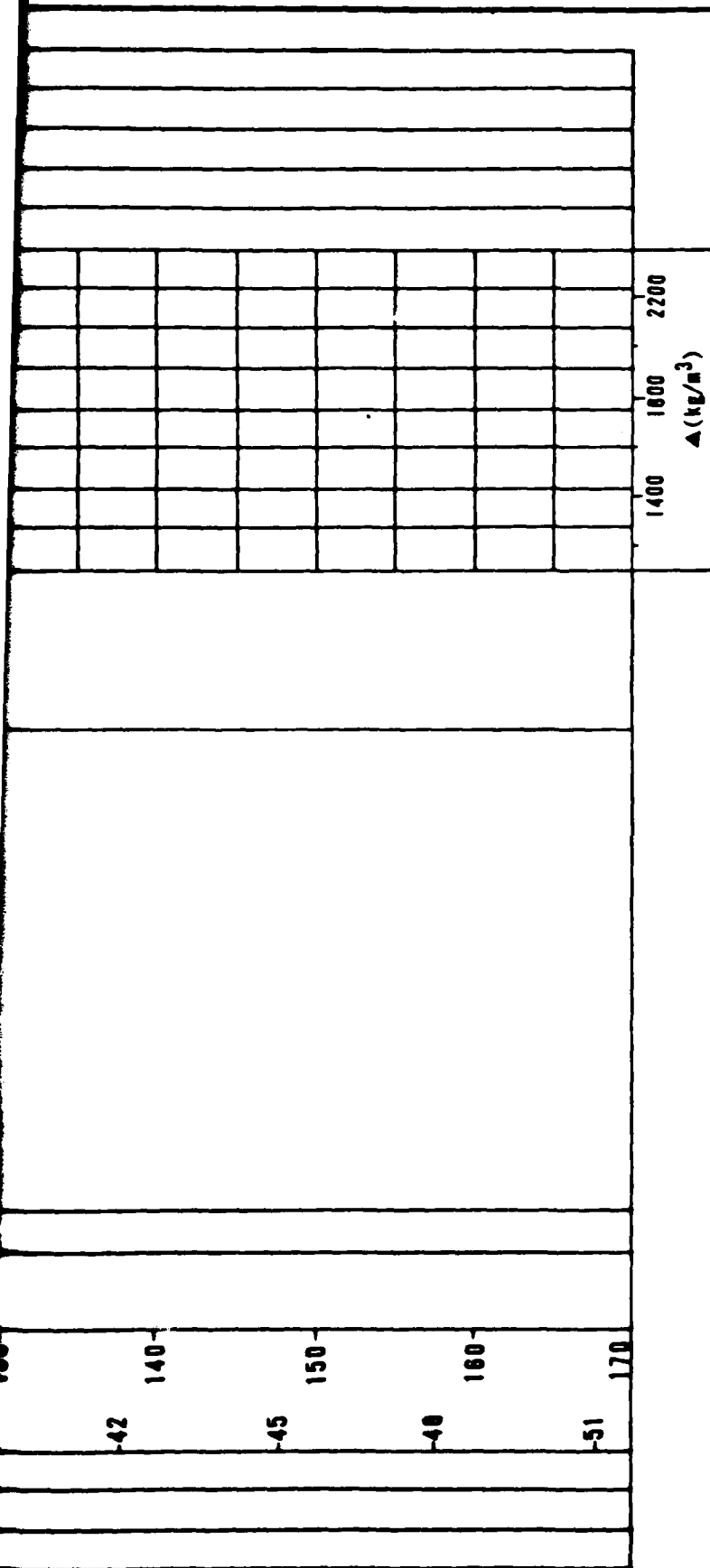
APPROVED BY _____

FD-27-IV

2 JUL 78

SAMPLE TYPE	% RECOVERY	N VALUE	METERS	DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲ (pcf)													SIEVE ANALYSIS				
									00	00	100	110	120	130	140	GR	SA	FI	LL	PI	GR	SA	FI	LL	PI	
	87		0	0	SM	SM	SILTY SAND, light brown to brown, fine to coarse, poorly graded, medium dense, subangular to subrounded, calcareous; some slightly plastic silt; trace to little fine to coarse gravel.		▲								18	48	33							
	87				SM-ML	SM-ML			▲									6	44	50						
	87				SM	SM			▲																	
	100		3	10	CL	CL	SANDY CLAY, brown, stiff, medium plastic, calcareous; some fine to coarse sand; layer of sandy silt (14.0').		▲								3	40	57	42	19					
	100				ML	ML			▲																	
	87		6	20	SM	SM	SILTY SAND, light brown to brown fine to coarse, poorly graded, medium dense to very dense, angular to rounded, calcareous; little nonplastic to medium plastic silt; trace to little fine to coarse gravel; layer of clayey gravel (40.0'-43.0'); layer of clayey sand (47.5'-54.0'); lenses of gravelly sand throughout.		▲																	
	100				SM	SM													50	41						
	100		9	30	SM	SM																				
	80		12	40	SC	SC																				
	100		15	50	SC	SC											15	67	18	38	13					





EXPLANATION

- FUGRO DRIVE SAMPLE
- ▨ BULK SAMPLE
- ▩ PITCHER TUBE SAMPLE
- STANDARD PENETRATION TEST SAMPLE
- ▤ CORE SAMPLE
- N - STANDARD PENETRATION RESISTANCE
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

LOG OF BORING NV 9-5,
VERIFICATION SITE, HAMLIN COP. NEVADA

MR SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

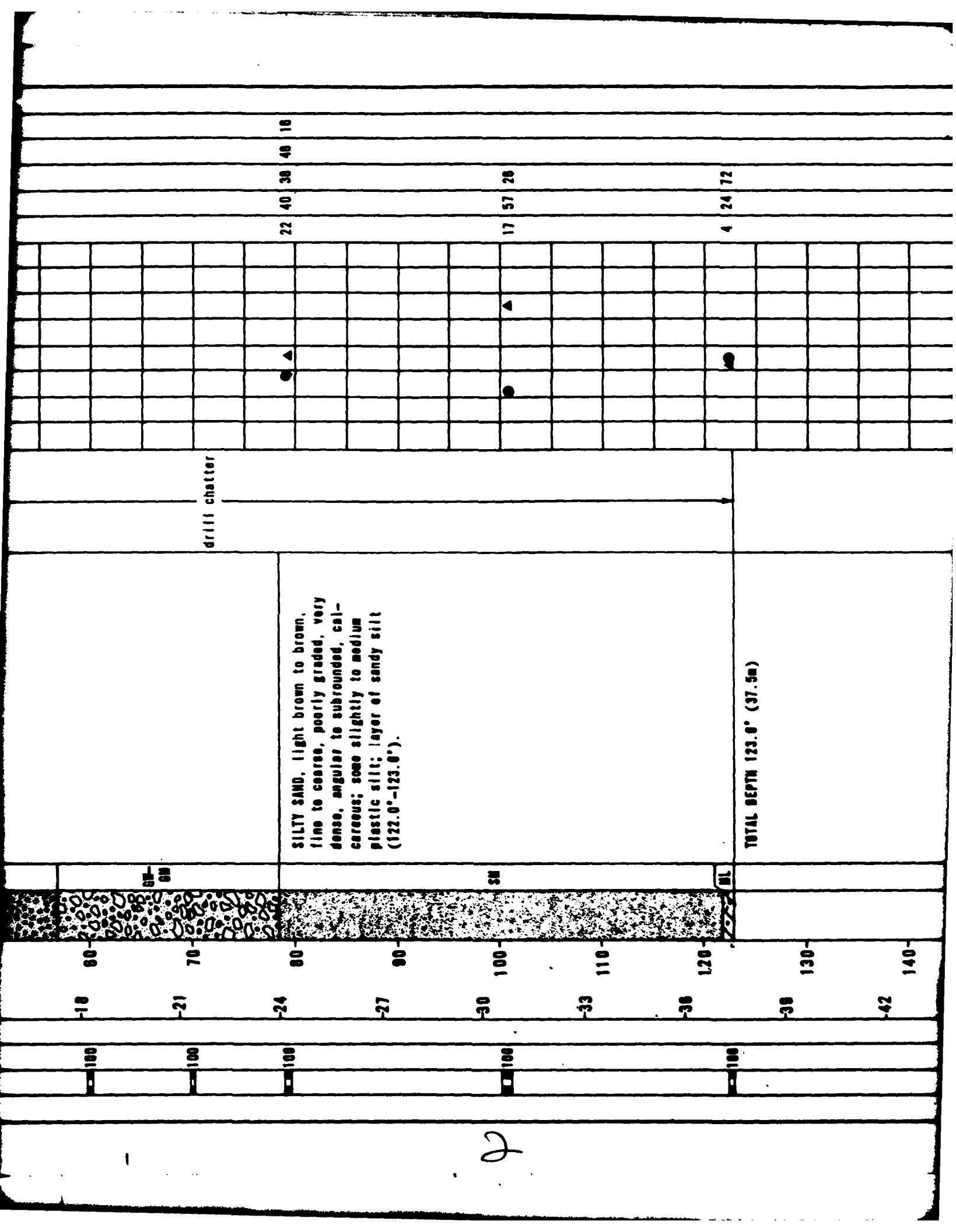
FIGURE
8-5

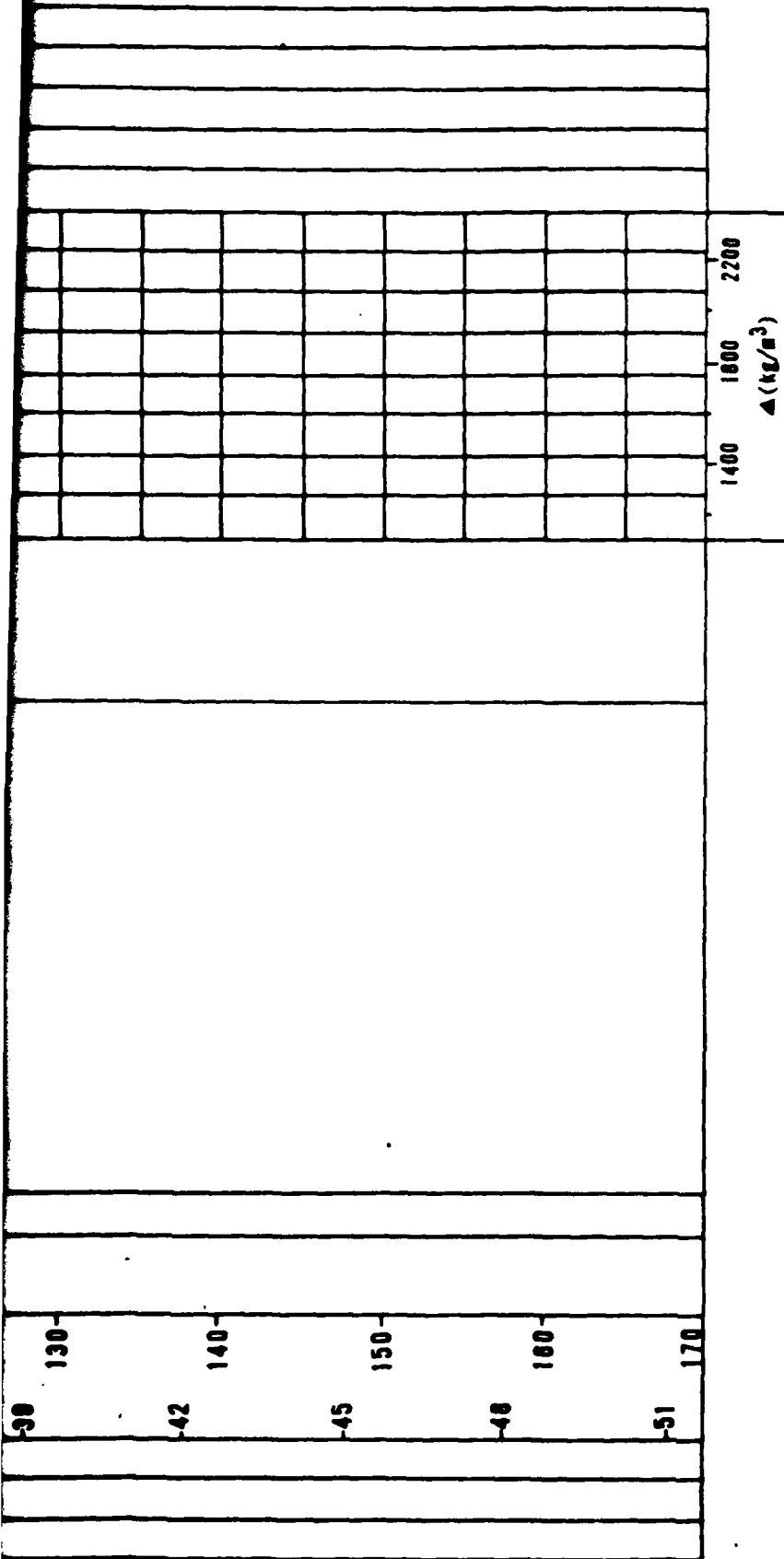
FUGRO NATIONAL INC.

AFV-00

CHECKED BY: APPROVED BY:

SAMPLE TYPE	% RECOVERY	N VALUE	DEPTH METERS	DEPTH FEET	LITHOLOGY	USCS	SOIL DESCRIPTION	REMARKS	▲(pcf)										SIEVE ANALYSIS						
									5	10	15	20	25	30	35	40	45	50	GR	SA	FI	LL	PI		
□	100		0	0		SM	SANDY GRAVEL, light brown to brown, fine to coarse, well graded, dense to very dense, angular to subrounded, calcareous; some fine to coarse sand; trace to some silt; layer of silty sand (8.0'-8.0'); layer of gravelly sand (20.0'-24.0').	cobble to 4" size	●	▲										40	35	10			
□	100																								
□	100		3	10		SC			●			▲									20	57	23		
□	80					GM			drill hole caving	●											50	35	8		
□	100		6	20		SM			●																
□	80		9	30		GM			●											45	48	8			
□	80		12	40		SM																			
□	100		15	50		SM				●										48	40	14			





EXPLANATION

- ☒ FUGRO DRIVE SAMPLE
- ☐ BULK SAMPLE
- ☒ PITCHER TUBE SAMPLE
- ☐ STANDARD PENETRATION TEST SAMPLE
- ☒ CORE SAMPLE
- N - STANDARD PENETRATION RESISTANCE
- ▲ - DRY UNIT WEIGHT (ASTM: D-2937-71)
- - MOISTURE CONTENT (ASTM: D-2216-71)
- NR - NO RECOVERY

BORING DETAILS

ELEVATION : 6220' (1896m)
 SURFICIAL GEOLOGIC UNIT : A5y/A5i
 DATE DRILLED : 21 November 1978
 DRILLING METHOD : Rotary Wash
 HOLE DIAMETER : 4 7/8" (124mm)
 WATER LEVEL : Not Encountered

LOG OF BORING NV-8-8,
VERIFICATION SITE, HANLIN COP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 8-8

FUGRO NATIONAL INC.

SECTION 7.0
TRENCH AND TEST PIT LOGS

EXPLANATIONS OF TRENCH AND TEST PIT LOGS

See Section 6.0, "Boring Logs", for explanations.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subrounded, calcareous; some nonplastic silt; little fine gravel	vertical walls stable	13	80	27		NP
	2										
	4										
	6										
	8		GM	dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse subangular to subrounded sand; little silt; occasional cobbles to 8" size (11.0'-14.0').						
	10										
	12			very dense							
	14				TOTAL DEPTH 14.0' (4.3m)						
	16										
	18										
	20										

TRENCH DETAILS

SURFACE ELEVATION : 5875' (1730m)
 DATE EXCAVATED : 14 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A5y/A5i
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : E-W

**LOG OF TRENCH HV-T-1
 VERIFICATION SITE, HAMLIN CDP, NEVADA**

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 7-1

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse gravel; little to some silt; stage II caliche (0.3'-3.0'); stage I caliche (3.0'-10.0').	vertical walls stable	35	42	23		
	2										
	4			SM							
	6										
	8										
	10			very dense							
	12				TOTAL DEPTH 10.0' (3.0m)						
	14										
	16										
	18										
	20										
	22										

TRENCH DETAILS

SURFACE ELEVATION : 5785' (1763m)
 DATE EXCAVATED : 18 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A5y/A5i
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : NW-SE

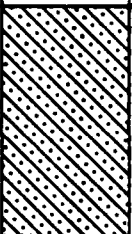
**LOG OF TRENCH HV-T-2
 VERIFICATION SITE, HAMLIN CDP, NEVADA**

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
 7-2

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0				CLAYEY SAND, brown, fine to coarse, poorly graded, slightly moist, sub-angular to subrounded, calcareous; some slightly plastic clay; trace fine to coarse gravel; stage II caliche (1.0'-2.0'); stage I caliche (2.0'-4.0')	vertical walls stable	10	61	28	30	9
	2			SC								
1	4				medium							
	6				dense							
2	8					GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, sub-angular, calcareous; some fine to coarse gravel; little silt.	vertical walls stable					
	10			SM								
3	12											
	14				dense							
	16					TOTAL DEPTH 14.0' (4.3m)						
5	18											
	20											

TRENCH DETAILS

SURFACE ELEVATION : 5845' (1812m)
 DATE EXCAVATED : 17 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT: A51/A40
 TRENCH LENGTH : 14.0' (4.3m)
 TRENCH ORIENTATION : E-W

LOG OF TRENCH HV-T-3
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-3

USRO NATIONAL, INC.

2 JUL 79

AFV-04

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; little to some silt, slightly plastic (0.0"-2.0"); trace fine to coarse gravel; stage II caliche (1.0"-3.0")		7	85	28		
	2		SM	medium dense							
	4										
	6				SANDY SILT, light brown, slightly moist, slightly plastic, calcareous; little fine to coarse sand.		0	19	81		
	8		ML	stiff		vertical walls stable					
	10				GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse gravel; little silt; stage I caliche.						
	12		SM	dense							
	14				TOTAL DEPTH 14.0' (4.3m)						
	16										
	18										
	20										

TRENCH DETAILS

SURFACE ELEVATION : 5980' (1823m)
 DATE EXCAVATED : 17 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A51/A40
 TRENCH LENGTH : 14.0' (4.3m)
 TRENCH ORIENTATION : NW-SE

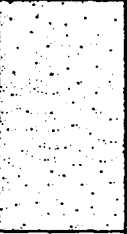
LOG OF TRENCH HV-T-4
 VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-4

FUSRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SM	medium dense	SPLTY SAND, brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; little to some silt; little fine to coarse gravel; stage III caliche (1.0'-4.0').	vertical walls stable	15	58	27		
		2			very dense							
	1											
	4											
		6				TOTAL DEPTH 4.0' (1.2m)	cementation at 4.0' exceeded capacity of Case 580C backhoe					
	2											
		8										
	3	10										
		12										
	4											
		14										
	5	16										
		18										
	6	20										

TRENCH DETAILS

SURFACE ELEVATION : 8240' (1902m)
 DATE EXCAVATED : 18 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A51
 TRENCH LENGTH : 12.0' (3.7m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HV-T-5
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 7-5

FUGRO NATIONAL, INC.

2 JUL 79

AFV-04

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FUGRO NATIONAL INC LONG BEACH CA

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MX SITING INVESTIGATION. GEOTECHNICAL EVALUATION. VOLUME IV. NE--ETC(U)

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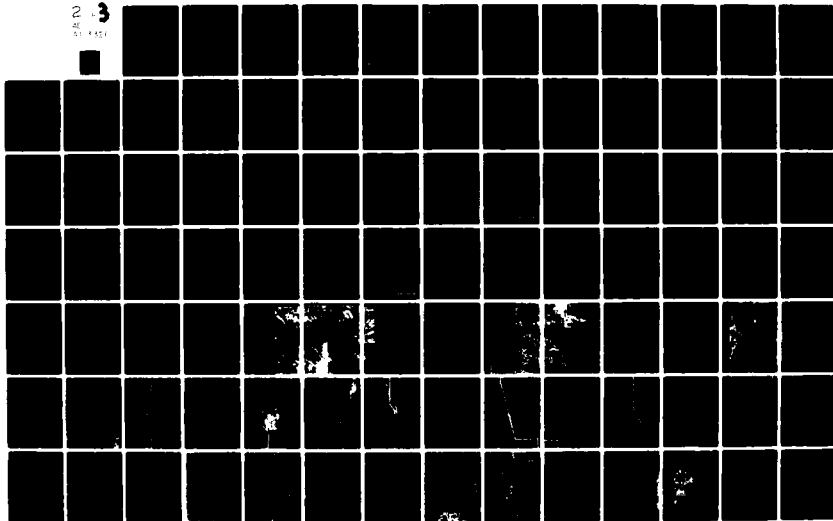
F04708-78-C-0027

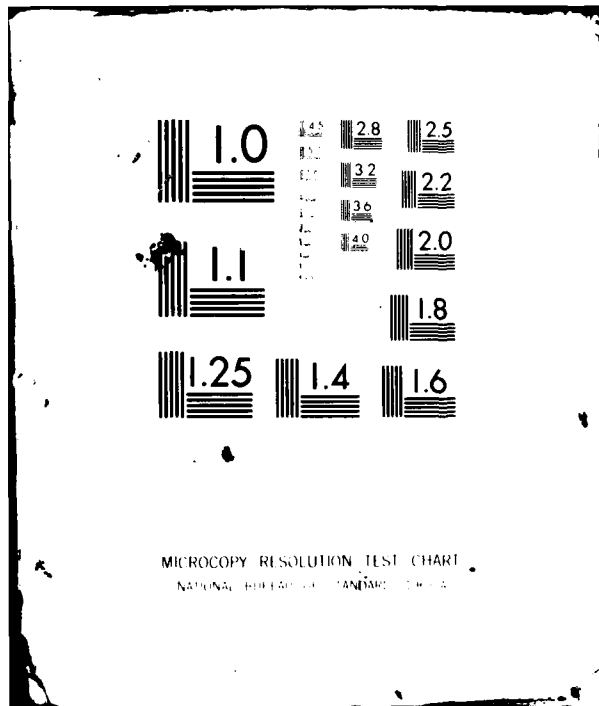
UNCLASSIFIED

FN-TR-27-VOL-4

NL

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45 1 1 1 1





BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SM	medium dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, sub-angular to subrounded, calcareous; little fine to coarse gravel; little silt; layer of silty sand (0.0'-1.5'); stage II caliche (1.5'-2.5'); stage I caliche (2.5'-3.5').	vertical walls stable	7	74	19		NP
	2											
	4			SP-SM	medium dense		slight caving					
	6											
	8											
	10											
	12			GP	dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, angular to subrounded, calcareous; some fine to coarse subangular to subrounded sand; occasional cobbles to 6" size.						
	14					TOTAL DEPTH 14.0' (4.3m)						
	16											
	18											
	20											

TRENCH DETAILS

SURFACE ELEVATION : 6145' (1873m)
 DATE EXCAVATED : 19 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : ASI
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : E-W

LOG OF TRENCH HV-T-8
 VERIFICATION SITE, HAMLIN CDP, NEVADA

4X SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-8

FUGRO NATIONAL, INC.

2 JUL 78

APV-04

CHECKED BY _____ APPROVED BY _____

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	2		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; little fine gravel.		14	64	22		NP
	4				SANDY GRAVEL, light brown, fine to coarse, poorly graded, dry, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; stage II caliche (3.5"-4.5"); occasional cobbles to 5" size.						
	6		GP-GM	dense							
	8										
	10										
	12										
	14										
	16										
	18										
	20										
					TOTAL DEPTH 14.0' (4.3m)						

vertical walls stable

TRENCH DETAILS

SURFACE ELEVATION : 5000' (1788m)
 DATE EXCAVATED : 20 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A51/A5y
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HV-T-7
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-7

TUBRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0			loose	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, sub-angular, calcareous; some silt; trace fine gravel; stage II caliche (1.0"-2.0").	vertical walls stable	8	73	21		
	2			SM								
	1					GRAVELLY SAND, light brown, fine to coarse, poorly graded, dry, angular to subangular, calcareous; trace fine to coarse gravel.	vertical walls caving					
	4			SP								
	6											
	2											
	8				dense							
	3	10				SILTY SAND, light brown, fine to coarse, poorly graded, dry, sub-angular, calcareous; some silt.	vertical walls stable					
				SM								
	12											
	4											
	14					TOTAL DEPTH 14.0' (4.3m)						
	5	16										
	18											
	6	20										

TRENCH DETAILS

SURFACE ELEVATION : 5740' (1750m)
 DATE EXCAVATED : 20 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A2
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HV-T-8
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSD

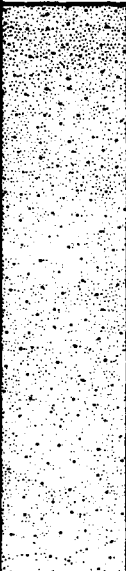
FIGURE
 7-8

FUGRO NATIONAL, INC.

2 JUL 79

APV-04

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0			medium dense	GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist to dry, angular to subangular, calcareous; some fine to coarse gravel; little silt; occasional cobbles to 5" size (5.0'-10.0'); stage III caliche (0.5'-2.0').	vertical wells stable					
		2						40	48	14		
		4										
		6										
		8										
		10										
		12										
		14										
		16										
		18										
		20										
						TOTAL DEPTH 10.0' (3.0m)	soil strength exceeded capacity of Case 580C backhoe at 10.0'					

TRENCH DETAILS

SURFACE ELEVATION : 8160' (1878m)
 DATE EXCAVATED : 20 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : ASI
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HV-T-9
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-9

FURRO NATIONAL, INC.

2 JUL 78

AFV-04

BULK SAMPLE	DEPTH		LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
	METERS	FEET						GR	SA	FI	LL	PI
	0	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, sub-angular, calcareous; some silt; some fine to coarse gravel.	vertical walls stable	25	48	28		NP
	2			GP	medium dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; occasional cobbles to 5" size (5.0'-14.0').						
	4											
	8											
	12											
	14					TOTAL DEPTH 14.0' (4.3m)						
	16											
	18											
	20											

TRENCH DETAILS

SURFACE ELEVATION : 9830' (1716m)
 DATE EXCAVATED : 21 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A51
 TRENCH LENGTH : 14.0' (4.3m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HY-T-10
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
 7-10

FURRO NATIONAL INC.

2 JUL 79

AFV-04

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BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0			loose	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; trace silt; occasional cobbles to 5" size (2.0"-5.0").	↑ slight caving ↓	58	34	10		
	2			medium							
1	4			dense							
	6										
2	8		GP-GM			↑ vertical walls stable ↓					
	10			dense							
3	12										
4	14										
	16				TOTAL DEPTH 14.0' (4.3m)						
5	18										
	20										

TRENCH DETAILS

SURFACE ELEVATION : 5700' (1737m)
 DATE EXCAVATED : 21 NOVEMBER 1978
 SURFICIAL GEOLOGIC UNIT : A51
 TRENCH LENGTH : 15.0' (4.6m)
 TRENCH ORIENTATION : N-S

LOG OF TRENCH HV-T-11
 VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
 DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
 7-11

FUSRO NATIONAL, INC.

2 JUL 79

AFV-04

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt.						
	1		SM	medium dense							
	2										
	3		SM	dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little fine to coarse rounded gravel; little silt; stage I caliche (2.0'-4.25'); layer of sandy gravel (4.5'-5.0').						
	4										
	5		GM	dense							
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5480' (1684m)
SURFICIAL GEOLOGIC UNIT: A4a

LOG OF TEST PIT HV-P-1

	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; some fine to coarse subrounded to subangular gravel.						
	1										
	2		GM	dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little fine to coarse sand; trace to little silt; occasional cobbles to 7" size.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5820' (1774m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT HV-P-2

LOGS OF TEST PITS HV-P-1 AND HV-P-2
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-12

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0 0		GM	very dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded calcareous; little fine to coarse sand; little silt; occasional cobbles to 6" size, stage III caliche (1.5'-2.5').						
	1 1										
	2 2										
	3 3				TOTAL DEPTH 2.5' (0.8m)	cementation exceeded capacity of Case 580C backhoe at 2.5'					
	4 4										
	5 5										

SURFACE ELEVATION: 8200' (1890m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT HV-P-3

	0										
	0		SM	medium dense	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded; calcareous; little silt; trace fine subrounded to angular gravel.						
	1		GM	very dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse sand; little silt; occasional cobbles to 7" size; stage II caliche.						
	2										
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 8220' (1896m)
SURFICIAL GEOLOGIC UNIT: A5y/A51

LOG OF TEST PIT HV-P-4

LOGS OF TEST PITS HV-P-3 AND HV-P-4
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-13

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	medium dense	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; trace fine subrounded to angular gravel.						
	1										
	2		GM	very dense	SANDY GRAVEL, brown, fine to coarse, poorly graded, slightly moist, subrounded to subangular, calcareous; some fine to coarse sand; little silt; occasional cobbles to 8" size; stage I caliche.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5970' (1820m)
SURFICIAL GEOLOGIC UNIT: A5y/A5i

LOG OF TEST PIT HV-P-5

	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; trace fine subangular to subrounded gravel.						
	1										
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subrounded to angular, calcareous; some fine to coarse sand; little silt; stage II caliche.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 6120' (1865m)
SURFICIAL GEOLOGIC UNIT: A5g

LOG OF TEST PIT HV-P-6

LOGS OF TEST PITS HV-P-5 AND HV-P-6
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
7-14

FUGRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS					
							GR	SA	FI	LL	PI	
	0			medium dense	GRAVELLY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse gravel; some silt; occasional cobbles to 5" size (1.0'-5.0'); stage II caliche (1.0'-5.0').		23	55	22			
	1											
	2											
	3		SM	dense								
	4											
	5				TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 8070' (1850m)
SURFICIAL GEOLOGIC UNIT: A5y

LOG OF TEST PIT HV-P-7

	0				SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; trace fine subangular to subrounded gravel; stage II caliche.							
	1		SM	medium dense								
	2				GRAVELLY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little fine to coarse subrounded to subangular gravel; little silt; occasional cobbles to 5" size.							
	3		SM	dense								
	4											
	5				TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 6170' (1881m)
SURFICIAL GEOLOGIC UNIT: A51/A4a

LOG OF TEST PIT HV-P-8

LOGS OF TEST PITS HV-P-7 AND HV-P-8
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-15

UGRO NATIONAL, INC.

2 JUL 78

AFV-03

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		CL-ML	firm	SANDY CLAY-SANDY SILT, dark brown, slightly moist, slightly plastic; some fine to coarse sand.				85	23	5
	1				SANDY CLAY, light brown, slightly moist, slightly plastic, calcareous some fine to coarse sand; trace fine subrounded gravel; stage I caliche						
	2										
	3		CL	firm							
	4										
	5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5920' (1804m)
SURFICIAL GEOLOGIC UNIT: A5i/A4e

LOG OF TEST PIT HV-P-9

	0				CLAYEY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some slightly plastic clay; trace fine gravel; stage I caliche (0.8'-3.0').		8	70	24		
	1		SC	medium dense							
	2										
	3				SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little slightly plastic silt.						
	4		SM	dense							
	5				TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5905' (1800m)
SURFICIAL GEOLOGIC UNIT: A5i/A4e

LOG OF TEST PIT HV-P-10

LOGS OF TEST PITS HV-P-9 AND HV-P-10
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-16

FUGRO NATIONAL, INC.

2 JUL 79.

APV-03

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1			medium dense	SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; stage II caliche (1.0"-2.0").						
	2										
	3		SM		SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; trace fine subangular gravel.						
	4			dense							
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 6065' (1849m)
SURFICIAL GEOLOGIC UNIT: A51-A46

LOG OF TEST PIT HV-P-11

	0										
	1		SM	medium dense	SILTY SAND, dark brown, fine to medium, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt.						
	2										
	3		ML	firm	SILT, light brown, slightly moist, slightly plastic, calcareous.		0	3	97	37	8
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5880' (1823m)
SURFICIAL GEOLOGIC UNIT: A46/A1

LOG OF TEST PIT HV-P-12

LOGS OF TEST PITS HV-P-11 AND HV-P-12
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

FIGURE
7-17

FUSRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1			medium dense	SILTY SAND, light brown to brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; trace fine to coarse gravel, stage I caliche (1.3'-4.5').		8	89	23		
	2										
	3		SM	dense							
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 8350' (1935m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT HV-P-13

	0										
	1			medium dense	SILTY SAND, brown, fine to medium, poorly graded, slightly moist, subangular to subrounded, calcareous; some little slightly plastic silt.						
	2										
	3		SM	dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; trace fine subangular to subrounded gravel; stage I caliche.						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 8140' (1671m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT HV-P-14

LOGS OF TEST PITS HV-P-13 AND HV-P-14
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-18

FUGRO NATIONAL, INC.

2 JUL 78

AFV-03

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, brown, fine to coarse, poorly graded, slightly moist, subrounded to subangular, calcareous; little silt; trace fine subangular to subrounded gravel (1.0"-3.0"); stage I caliche (1.5"-3.0"); trace fine to coarse gravel (3.0"-5.0"); occasional cobbles to 6" size (1.5"-5.0").						
	1										
	2										
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5960' (1817m)
SURFICIAL GEOLOGIC UNIT: ASI

LOG OF TEST PIT HV-P-15

	0				SILTY SAND, light brown to brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; little fine gravel; occasional cobbles to 5" size (0.0"-1.0"); stage I caliche (2.5'-3.5').						
	1										
	2										
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 6250' (1905m)
SURFICIAL GEOLOGIC UNIT: ASI

LOG OF TEST PIT HV-P-16

LOGS OF TEST PITS HV-P-15 AND HV-P-16
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-19

USRO NATIONAL, INC.

2 JUL 79

AFV-03

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1			medium			22	84	14		
	2			dense							
	3		SM								
	4			dense							
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5780' (1782m)
SURFICIAL GEOLOGIC UNIT: A51/A4a

LOG OF TEST PIT HV-P-17

	0										
	1										
	2										
	3		CL	firm			2	42	56	31	10
	4										
	5		GM	dense							
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5785' (1757m)
SURFICIAL GEOLOGIC UNIT: A4a/A1

LOG OF TEST PIT HV-P-18

LOGS OF TEST PITS HV-P-17 AND HV-P-18
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-20

FLUORO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; little silt; stage I caliche.						
	1										
	2										
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5780' (1758m)
SURFICIAL GEOLOGIC UNIT: A5y

LOG OF TEST PIT HV-P-19

	0				SANDY SILT, light brown, slightly moist, nonplastic, calcareous; some fine to medium sand.						
	1										
	2										
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5780' (1762m)
SURFICIAL GEOLOGIC UNIT: A5y

LOG OF TEST PIT HV-P-20

LOGS OF TEST PITS HV-P-19 AND HV-P-20
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-21

FUSRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS					
							GR	SA	FI	LL	PI	
	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some silt; little fine subangular gravel.							
	1											
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse sand; little silt; stage I caliche (2.5'-3.5').							
	3											
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 5880' (1788m)
SURFICIAL GEOLOGIC UNIT: A51

LOG OF TEST PIT HV-P-21

	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some silt, little fine to coarse gravel.		20	59	21			
	1											
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, dry, angular to subrounded, calcareous; some fine to coarse sand; little silt; occasional cobbles to 5" size; stage I caliche (0.8'-2.5').							
	3											
	4											
	5											
					TOTAL DEPTH 5.0' (1.5m)							

SURFACE ELEVATION: 8120' (1885m)
SURFICIAL GEOLOGIC UNIT: A51/A5y

LOG OF TEST PIT HV-P-22

LOGS OF TEST PITS HV-P-21 AND HV-P-22
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-22

USRO NATIONAL, INC.

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0										
	1			medium							
	2			dense							
	3		SM								
	4			dense							
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5740' (1750m)
SURFICIAL GEOLOGIC UNIT: ASy/ASI

LOG OF TEST PIT HV-P-23

	0										
	1		SM	medium	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel.		11	88	23		
	2										
	3		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; little silt; stage III caliche (1.0'-2.0').						
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 6180' (1884m)
SURFICIAL GEOLOGIC UNIT: ASI

LOG OF TEST PIT HV-P-24

LOGS OF TEST PITS HV-P-23 AND HV-P-24
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
7-23

USRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some silt; trace fine gravel.						
	1										
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, angular to subangular, calcareous; some fine to coarse sand; little silt; occasional cobbles to 5" size; stage III caliche (1.0'-2.0').						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 6480' (1989m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT HV-P-25

	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; little silt; trace fine subangular gravel.						
	1										
	2		GM	dense	SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular to subrounded, calcareous; some fine to coarse, subangular sand; little silt; occasional cobbles to 6" size.						
	3										
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5805' (1769m)
SURFICIAL GEOLOGIC UNIT: A5y/A5i

LOG OF TEST PIT HV-P-26

LOGS OF TEST PITS HV-P-25 AND HV-P-26
VERIFICATION SITE, HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-24

FUSRO NATIONAL, INC.

2 JUL 79.

AFV-03

BULK SAMPLE	DEPTH METERS FEET	LITHOLOGY	USCS	CONSISTENCY	SOIL DESCRIPTION	REMARKS	SIEVE ANALYSIS				
							GR	SA	FI	LL	PI
	0		SM	medium dense	SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, calcareous; little silt; trace fine gravel.						
	1				SANDY GRAVEL, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; some fine to coarse subangular sand; stage I caliche (0.5'-1.0').						
	2										
	3		GM	medium dense							
	4										
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5820' (1774m)
SURFICIAL GEOLOGIC UNIT: A5y/A5i

LOG OF TEST PIT HV-P-27

	0				SILTY SAND, light brown, fine to coarse, poorly graded, slightly moist, subangular, calcareous; little silt; trace fine subangular gravel (0.0'-4.0'); some fine to coarse subangular gravel (4.0'-5.0'); stage II caliche (0.5'-2.5').						
	1										
	2			medium dense							
	3		SM								
	4			dense							
	5										
					TOTAL DEPTH 5.0' (1.5m)						

SURFACE ELEVATION: 5800' (1767m)
SURFICIAL GEOLOGIC UNIT: A5i

LOG OF TEST PIT HV-P-28

LOGS OF TEST PITS HV-P-27 AND HV-P-28
VERIFICATION SITE, HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
7-25

FUGRO NATIONAL, INC.

SECTION 8.0
SURFICIAL SAMPLE LOGS

EXPLANATIONS OF SURFICIAL SAMPLE LOGS

Finalized logs of the surficial samples are presented in this section. The explanations provided here are to serve as general guidelines to reading the logs.

A. Designations - Surficial samples are identified as follows:

SE-CS-1

SE - abbreviation for the site (e.g., SE - Snake East)

CS - abbreviation for surficial sample

1 - number of activity

B. Ground Surface Elevation - Indicated elevations on the logs are estimated from topographic maps of the study area within an accuracy of half the contour interval.

C. Surficial Geologic Unit - Indicates the surficial geologic unit in which the activity is located.

D. Depth - Indicates depth interval for which soil description is given.

E. USCS - Unified Soil Classification Symbol; see Table 6-1 of Section 6.0, "Boring Logs", for details of USCS.

F. Soil Description - Soil is described based on field visual descriptions and/or laboratory test results. See Section 6.0, "Boring Logs", for procedures of soil description.

G. Sieve Analysis, LL and PI - These are from results of laboratory tests. See Section 6.0, "Boring Logs", for explanation.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
HV-CS-1	5480 (1664)	A4e	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; little fine gravel.	20	44	36		
HV-CS-5	5850 (1814)	A5i	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.					
			0.75-2.0 (0.2-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; little fine to coarse sand; trace silt; occasional cobbles.					
HV-CS-10	5925 (1806)	A5y/A5i	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular to angular, calcareous; little silt; little fine gravel.					
HV-CS-13	5780 (1782)	A5i	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, angular to subangular, calcareous; little silt; trace fine gravel; stage $\square$ caliche (0.75-1.5').					
HV-CS-16	8420 (1957)	A5i	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular, calcareous; little silt; trace fine gravel.					
			0.75-1.75 (0.2-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular, calcareous; some fine to coarse sand; stage $\square$ caliche at 1.75'.					
HV-CS-19	8040 (1841)	A5i	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown to white, fine to coarse, poorly graded, angular, calcareous; little silt; trace fine gravel; stage $\square$ caliche (0.5'-2.0').					
HV-CS-20	5735 (1748)	A5y/A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; some fine gravel.	23	49	28		
			1.0-2.0 (0.3-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subrounded to subangular, calcareous; some fine to coarse sand; trace silt.					
HV-CS-21	5844 (1781)	A5y/A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
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FIGURE
8-1
1 OF 3

FUGRO NATIONAL, INC.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
HV-CS-23	8120 (1865)	A5e	0.0-2.0 (0.0-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; stage II caliche (0.25'-2.0').					
HV-CS-24	8210 (1893)	A5e	0.0-2.0 (0.0-0.6)	GP-SM	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace nonplastic silt; occasional cobbles.	50	38	11		NP
HV-CS-28	8120 (1865)	A5e	0.0-2.0 (0.0-0.6)	GM	SANDY GRAVEL, brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; some silt.	42	35	23		
HV-CS-27	8100 (1859)	A5i	0.0-0.75 (0.0-0.2)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; little silt; trace fine gravel.					
			0.75-2.0 (0.2-0.6)	SP	GRAVELLY SAND, light brown, fine to coarse, poorly graded, calcareous; little fine to coarse gravel; trace silt; stage II caliche (0.75'-2.0').					
HV-CS-32	5775 (1780)	A4e/A1	0.0-2.0 (0.0-0.6)	SC	CLAYEY SAND, light brown, fine to coarse, poorly graded, calcareous; some slightly plastic clay; stage II caliche (1.0'-2.0').					
HV-CS-35	5780 (1782)	A4e/A1	0.0-2.0 (0.0-0.6)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, calcareous; little silt.					
HV-CS-37	5830 (1777)	A5y	0.0-1.5 (0.0-0.5)	SM	GRAVELLY SAND, brown, fine to coarse, poorly graded, calcareous; some fine to coarse gravel; little silt.					
			1.5-2.0 (0.5-0.6)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt; occasional cobbles.					
HV-CS-38	5980 (1823)	A5i/A5y	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, light brown, fine to coarse, poorly graded, subangular, calcareous; some silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	GP	SANDY GRAVEL, brown, fine, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt.					

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
HAMLIN COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
8-1
2 OF 3

FUGRO NATIONAL, INC.

ACTIVITY NUMBER	GROUND SURFACE ELEVATION, FEET (METERS)	SURFICIAL GEOLOGIC UNIT	DEPTH, FEET (METERS)	USCS	SOIL DESCRIPTION	SIEVE ANALYSIS				
						GR	SA	FI	LL	PI
HV-CS-45	8240 (1902)	A5i	0.0-2.0 (0.0-0.6)	SC	CLAYEY SAND, brown to light brown, fine to medium, poorly graded, cal- careous; little slightly plastic clay; trace fine gravel.					
HV-CS-47	8420 (1957)	A5i	0.0-1.0 (0.0-0.3)	SM	SILTY SAND, brown, fine to medium, poorly graded, calcareous; some silt; trace fine gravel.					
			1.0-2.0 (0.3-0.6)	SP	SAND, light brown, fine to coarse, poorly graded, calcareous; trace fine gravel; trace silt.					
HV-CS-48	8050 (1844)	A5i/A4o	0.0-1.5 (0.0-0.5)	SC-SM	CLAYEY SAND, brown, fine to coarse, poorly graded, calcareous; some slightly plastic clay; trace fine gravel.	12	63	25	36	12
			1.5-2.0 (0.5-0.8)	GP	SANDY GRAVEL, light brown, fine to coarse, poorly graded, subangular to subrounded, calcareous; some fine to coarse sand; trace silt.					
HV-CS-51	8130 (1868)	A5i/A4o	0.0-2.0 (0.0-0.6)	SC-SM	CLAYEY SAND, brown to light brown, fine to coarse, poorly graded, calcareous; some slightly plastic clay; trace fine gravel.	4	68	28		
HV-CS-52	8160 (1878)	A5i/A4o	0.0-2.0 (0.0-0.8)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some silt.					
HV-CS-55	8120 (1865)	A5i/A4o	0.0-2.0 (0.0-0.8)	SM	SILTY SAND, brown, fine to coarse, poorly graded, calcareous; some silt; trace fine gravel; occasional cobbles.					
HV-CS-56	8080 (1847)	A5i/A4o	0.0-2.0 (0.0-0.8)	SC-SM	CLAYEY SAND, brown, fine to coarse; poorly graded, calcareous; some medium plastic clay; little fine gravel; stage II-III caliche (1.0'-2.0').	20	48	34	45	18
HV-CS-57	8010 (1832)	A5i/A4o	0.0-2.0 (0.0-0.8)	SC-SM	CLAYEY SAND, brown, fine to coarse, poorly graded, calcareous; some medium plastic clay; little fine gravel; stage II-III caliche (1.0'-2.0').					
HV-CS-61	8280 (1908)	A5y/A4o	0.0-2.0 (0.0-0.8)	SM	SILTY SAND, brown to light brown, fine to coarse, poorly graded, cal- careous; some silt; stage I caliche (1.5'-2.0').	4	87	29		

LOGS OF SURFICIAL SOIL SAMPLES
VERIFICATION SITE,
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
8-1
3 OF 3

FUGRO NATIONAL, INC.

SECTION 9.0
LABORATORY TEST RESULTS

EXPLANATIONS OF LABORATORY TEST RESULTS

Laboratory test results are presented in this section. Table 9-1 contains a summary of laboratory test results. This table contains results of sieve analysis; plasticity data; in-situ dry unit weight, moisture content, degree of saturation, and void ratio for drive and Pitcher samples; results of compaction tests; and specific gravity of solids. Other tests such as triaxial compression, unconfined compression, direct shear, consolidation, chemical, and California Bearing Ratio (CBR) are indicated on the table. Tables 9-2 through 9-6 and Figures 9-1 through 9-3 present results of triaxial compression, unconfined compression, direct shear, consolidation, chemical, and CBR tests.

All tests were performed in general accordance with the American Society for Testing and Materials (ASTM) procedures. The following table presents the ASTM designations for the tests performed during the investigation.

<u>Type of Test</u>	<u>ASTM Designations</u>
Particle Size Analysis	D 422-63
Liquid Limit	D 423-66
Plastic Limit	D 424-59
Unit Weight	D 2937-71
Moisture Content	D 2216-71
Compaction	D 1557-70
Specific Gravity of Solids	D 854-58
Triaxial	D 2850-70
Unconfined Compression	D 2166-66
Direct Shear	D 3080-72
Consolidation	D 2435-70
Test for Alkalinity (pH)	D 1067-70
Water Soluble Sodium	D 1428-64
Water Soluble Chloride	D 512-67
Water Soluble Sulphate	D 516-68
Water Soluble Calcium	D 511-72
Calcium Carbonate	D 1126-67
California Bearing Ratio (CBR)	D 1883-73

Explanation for the tables and figures presented in this section are as follows.

- A. Activity Number - Boring, trench, test pit, or surficial sample designation.
- B. Sample Number - Prefix indicates the type of sample; explanation is at the bottom of the table.
- C. Sample Interval - This is the depth range measured from ground surface over which the sample was obtained.
- D. Percent Finer by Weight - Presents the results of laboratory particle size analysis (ASTM D 422-63) performed on representative soil samples at the depth indicated. The numbers represent the percent (by dry weight) of the total sample weight passing through each sieve size indicated.
- E. Atterberg Limits (ASTM D 423-66 and D 424-59)
 - LL - Liquid Limit, the water content (as percent of soil dry weight) corresponding to the arbitrary limit between the liquid and plastic states of consistency of a soil (ASTM D 423-66).
 - PL - Plastic Limit, the water content corresponding to an arbitrary limit between the plastic and the semisolid state of consistency of a soil (ASTM D 424-59).
 - PI - Plasticity Index, numerical difference between the liquid limit (LL) and the plastic limit (PL) indicating the range of moisture content within which a soil-water mixture is plastic.
 - NP - Nonplastic.
- F. USCS - Unified Soil Classification Symbols are given here; see Table 6.1 in Section 6.0, "Boring Logs", for complete details of USCS system.

G. In Situ - Presents results of tests on drive and Pitcher samples.

Dry Unit Weight - indicates dry unit weight of soil determined as per ASTM D 2937-71

Moisture Content - weight of water reported in percent of dry weight of soil sample (ASTM D 2216-71)

Saturation - the degree of saturation in a soil sample is defined as the ratio (in percent) of the volume of water to the volume of all voids in the soil

Void Ratio - the numerical ratio of the volume of voids to the volume of solids in a soil specimen

H. Compacted - Indicates results of laboratory maximum dry density and optimum moisture content test as per ASTM D 1557-70.

I. Specific Gravity of Solids (ASTM D 854-58) - Indicates the ratio of (1) the weight in air of a given volume of soil solids at a stated temperature, to (2) the weight in air of an equal volume of distilled water at a stated temperature.

J. Triaxial - The triaxial compression tests were performed in accordance with the procedures of ASTM D 2850-70. The following explanations and definitions apply.

Triaxial Compression Test - a cylindrical specimen of soil is surrounded by a fluid in a pressure chamber and subjected to an isotropic pressure. An additional compressive load is then applied, directed along the axis of the specimen called the axial load.

Consolidated-Drained (CD) Test - a triaxial compression test in which the soil was first consolidated under an all-around confining stress (test chamber pressure), and was then compressed (and hence sheared) by increasing the

vertical stress. Drained indicates that excess pore water pressure generated by strains are permitted to dissipate by the free movement of pore water during consolidation and compression.

Consolidated-Undrained (CU) Test - a triaxial compression test in which essentially complete consolidation under the confining (chamber) pressure is followed by a shear test at constant water content.

Confining Pressure (σ_3) - the isotropic chamber pressure applied to the soil specimen during consolidation and compression.

Maximum Deviator Stress ($\sigma_1 - \sigma_3$) - the difference between the major and minor principal stresses in the specimen at failure. The major principal stress on the specimen is equal to the unit axial load plus the chamber pressure and the minor principal stress on the specimen is equal to the chamber pressure.

Strain Rate - axial strain, ϵ , at a given stress level is defined as the ratio of the change in length (ΔL) of the specimen to the original length of the specimen (L_0). The rate of strain was controlled during the test so that this ratio increased at equal increments for each minute of testing.

Back Pressure - pressure in excess of atmospheric applied to the pore water of a soil sample. Back pressure is usually applied to (1) increase saturation of the sample, or (2) simulate the actual in-situ pressure regime.

- K. Unconfined Compression - Test procedures were as described in ASTM D 2166-66. Unconfined compressive strength is defined as the load per unit area at which an unconfined prismatic or cylindrical specimen of soil will fail in a simple compression test. In these methods, unconfined compressive strength is taken as the maximum load attained per unit area or the load per unit area at 20 percent axial strain, whichever occurred first during the performance of a test.

- L. Direct Shear - The procedures of ASTM D 3080-72 were followed for direct shear testing. In this test, soil under an applied normal load is stressed to failure by moving one section of the soil container (shear box) relative to the other section. Normal stress is the value of load per unit area acting perpendicular to the plane of shearing. Maximum shear strength is defined as the maximum resistance (ksf) of a soil to shearing (tangential) stresses.
- M. Consolidation (ASTM D 2435-70) - A consolidation test is a test in which a cylindrical soil specimen is laterally confined in a ring and compressed between porous plates. The term "consolidation", as used here, indicates the gradual reduction in volume of the soil mass resulting from an increase in compressive stress (axial load per unit area).
- N. Chemical - The chemical tests performed on soil samples included: pH; water soluble sodium, chloride, sulphate, calcium; and calcium carbonate content. pH is an index of the acidity or alkalinity of a soil in terms of the logarithm of the reciprocal of the hydrogen ion concentration. ASTM test procedure designations for these chemical tests are included in the table at the beginning of the "Explanation of Laboratory Test Results".
- O. CBR - California Bearing Ratio (CBR) is the ratio (in percent) of the resistance to penetration developed by a subgrade soil to that developed by a standard crushed-rock

base material. The procedures for conducting a CBR test were as outlined in ASTM D 1883-73. The materials tested for CBR were also analyzed for particle size distribution (ASTM D 422-63) and compaction characteristics (ASTM D 1557-70). The term "percentage of maximum density" indicates the ratio (as a percentage) of the compacted sample dry unit weight to maximum dry density obtained in the laboratory from ASTM D 1557-70, "Moisture-Density Relations of Soils Using 10-pound (4.5 kg) Hammer and 18-inch (457 mm) Drop".

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STANDARD		
		FEET	METERS	BLDS	COBBLES		GRAVEL				SAND		
				24"	12"	8"	3"	1½"	3/4"	3/8"	4	10	40
	P-16	100.0-101.2	30.48-30.85										
	P-17	120.0-123.2	36.58-37.55							100	94	89	73
HV-B-6	D-1	0.5-1.0	0.15-0.30					100	87	64	52	46	40
	D-3	6.0-6.5	1.83-1.98						100	95	80	62	39
	D-4	10.8-11.4	3.29-3.47										
	D-5	15.6-15.9	4.75-4.85					100	78	63	41	24	11
	D-6	20.2-20.5	6.16-6.25					100	97	73	55	38	21
	D-9	50.0-50.2	15.24-15.30					100	92	69	54	40	21
	D-12	79.0-79.7	24.08-24.29					100	96	85	78	69	62
	D-13	100.2-100.9	30.54-30.75						100	96	83	67	54
	D-14	122.5-122.8	37.34-37.43						100	99	96	94	92
HV-T-1	B-1	0.25-0.75	0.08-0.23							100	87	77	64
HV-T-2	B-1	0.25-1.5	0.08-0.46						100	76	65	54	41
HV-T-3	B-1	0.1-1.0	0.03-0.30						100	92	90	86	64
HV-T-4	B-1	0.1-1.0	0.03-0.30						100	97	93	86	62
	b-2	5.0-6.0	1.52-1.83									100	99
HV-T-5	B-1	0.1-1.0	0.03-0.30						100	92	85	77	56
	b-2	2.0-2.5	0.61-0.76										
HV-T-6	B-1	0.5-1.5	0.15-0.46						100	95	93	89	59
HV-T-7	B-1	0.5-1.5	0.15-0.46				100	99	97	92	86	81	61
HV-T-8	B-1	0.1-1.0	0.03-0.30							100	94	86	64
HV-T-9	B-1	0.5-2.0	0.15-0.61					100	91	77	60	44	29
HV-T-10	B-1	0.1-1.5	0.03-0.46					100	97	83	75	70	64
HV-T-11	B-1	0.1-2.0	0.03-0.61				100	98	93	70	44	29	19
HV-P-1	b-1	0.25-1.0	0.08-0.30										
HV-P-7	b-1	0.1-0.5	0.03-0.15					100	94	88	77	69	59
HV-P-9	b-1	0.25-1.0	0.08-0.30										

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

B - Fugro Drive

b,b - Bulk

(b) NP - Not Plastic

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed
and results are included in this report

3/8"	4	10	40	100	200	.005	.001	LL	PL	PI		(pcf)	(kg/m³)	W	W ₅₀	W ₁₀₀	(pcf)	(kg/m³)
											SM	115.7	1853	11.2	66.4	0.46		
100	94	89	73	44	27						SM	107.2	1717	18.3	86.2	0.57		
64	52	46	40	22	16						GM	106.7	1709	4.3	20.2	0.58		
95	80	62	38	27	23						SM	126.1	2020	1.3	10.3	0.34		
											GW-GM	140.2	2246	5.8	77.3	0.20		
63	41	24	11	7	6						GW-GM	140.0	2243	8.0	100.0	0.20		
73	55	38	21	12	9						SW-SM	140.7	2254	7.2	98.6	0.20		
69	54	40	27	18	14						GM			13.2				
85	78	69	62	44	38	13	8	48	32	16	SM	108.3	1735	14.8	71.9	0.56		
96	83	67	54	37	26						SM	123.0	1970	11.7	85.2	0.37		
99	96	94	92	85	72						ML	102.2	1637	17.5	72.7	0.65		
100	87	77	64	41	27					NP	SM							
76	65	54	41	31	23						SM							
92	90	86	64	39	29			30	21	9	SC							
97	93	86	62	40	28						SM							
		100	95	88	81	19	7				ML							
92	85	77	56	35	27						SM							
											SM							
95	93	89	58	27	19					NP	SM						128.0	2051
92	86	81	67	32	22					NP	SM						127.2	2038
100	94	86	60	31	21						SM							
77	60	44	28	17	14						SM						133.7	2142
83	75	70	60	39	29					NP	SM						129.5	2074
70	44	29	19	13	10						GP-GM						141.9	2273
											SM							

HSG S (b)		USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m³)				(pcf)	(kg/m³)								
		SM	115.7	1853	11.2	66.4	0.46										
		SM	107.2	1717	18.3	86.2	0.57										
		GM	106.7	1709	4.3	20.2	0.58										
		SM	126.1	2020	1.3	10.3	0.34										
		GW-GM	140.2	2246	5.8	77.3	0.20										
		GW-GM	140.0	2243	8.0	100.0	0.20										
		SW-SM	140.7	2254	7.2	98.6	0.20										
		GM			13.2												
22	16	SM	108.3	1735	14.8	71.9	0.56										
		SM	123.0	1970	11.7	85.2	0.37										
		ML	102.2	1637	17.5	72.7	0.65										
	NP	SM															
		SM															
21	9	SC															
		SM															
		ML															
		SM															
		SM															
	NP	SM						128.0	2051	10.0							•
	NP	SM						127.2	2038	10.9							•
		SM															
		SM						133.7	2142	7.9							•
	NP	SM						129.5	2074	9.0							•
		GP-GM						141.9	2273	6.0							•
		SM														•	
		SM															
18	5	CL-ML															

SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
01

FLUORO NATIONAL INC.

APV-01

2

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT								U S ST	
				STANDARD SIEVE OPENING									
		FEET	METERS	BLDRS	COBBLES		GRAVEL				4	10	
12"	6"				3"	1½"	¾"	3/8"					
HV-B-1	D-1	0.0-0.7	0.00-0.21						100	89	74	60	
	D-2	3.1-3.8	0.94-1.16					100	96	75	56	36	
	D-3	6.1-6.8	1.86-2.07				100	90	90	80	66	50	
	D-4	10.5-10.8	3.20-3.29										
	D-5	15.2-15.4	4.63-4.69										
	D-6	20.0-20.2	6.10-6.16					100	91	70	49	33	
	D-7	25.2-25.7	7.68-7.83						100	71	50	34	
	D-8	30.0-30.2	9.14-9.20										
	D-9	40.7-40.9	12.41-12.47										
	D-10	50.0-50.7	15.24-15.45					100	80	67	50	39	
	D-11	60.0-60.5	18.29-18.44										
	D-12	74.0-74.8	22.56-22.80						100	98	84	57	
	D-13	90.0-90.4	27.43-27.55				100	84	76	60	44	32	
	D-15	120.0-120.3	36.58-36.67										
	D-16	144.0-144.5	43.89-44.04										
	D-17	161.0-161.2	49.07-49.13				100	71	71	66	51	42	
	HV-B-2	D-1	0.5-1.2	0.15-0.37					100	82	75	69	65
D-3		6.2-6.9	1.89-2.10						100	94	81	60	
D-4		9.7-10.4	2.96-3.17						100	87	75	60	
D-5		15.2-15.9	4.63-4.85						100	89	72	60	
D-6		20.0-20.2	6.10-6.16						100	89	81	70	
D-7		25.1-25.7	7.65-7.83					100	91	67	49	33	
D-8		30.0-30.6	9.14-9.33										
D-9		40.0-40.2	12.19-12.25										
D-10		55.0-55.3	16.76-16.86						100	84	64	50	
D-11		70.0-70.4	21.34-21.46										
D-12		90.2-90.7	27.49-27.65										
D-15		135.9-136.4	41.42-41.57										
D-16		160.1-160.6	48.80-48.95						100	92	68	50	
HV-B-3	D-1	0.7-1.4	0.21-0.43				100	69	66	56	52	40	
	D-2	3.2-3.9	0.98-1.19							100	99	90	
	D-3	7.9-8.5	2.41-2.59										
	D-4	10.7-11.4	3.26-3.47						100	78	60	40	
	D-5	16.2-16.9	4.94-5.15						100	86	76	60	
	D-6	21.2-21.9	6.46-6.68										
	D-7	26.2-26.9	7.99-8.20						100	94	91	80	
	D-8	31.2-31.9	9.51-9.72						100	98	93	80	
	D-9	40.2-40.9	12.25-12.46										
	D-10	50.0-50.4	15.24-15.36					100	94	88	87	70	
	D-11	59.4-59.9	18.11-18.26										
	D-12	69.4-69.9	21.15-21.31										

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

D - Fugro Drive

B.b - Bulk

(b) NP - Not Plastic

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed and results are included in this report

PERCENT FINER BY WEIGHT										ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					MAXIM DRY DEN
SIEVE OPENING				U S STANDARD SIEVE NO				PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	
GRAVEL				SAND				SILT OR CLAY		(pcf)	(kg/m ³)								
3"	1½"	¾"	⅜"	4	10	40	100	200	.005	.001	LL	PL	PI						
		100	89	74	60	47	37	29						SM	91.5	1466	6.2	19.9	0.84
	100	96	75	56	36	24	15	10						SP-SM	132.9	2129	1.2	12.4	0.27
100	90	90	80	66	50	35	28	24						SM	124.7	1998	2.7	20.8	0.35
														GP-GM	143.5	2299	8.5	100.0	0.17
														GP-GM	131.7	2110	6.3	60.8	0.28
	100	91	70	49	33	21	15	12						GP-GM	136.8	2191	8.6	99.7	0.23
		100	71	50	34	23	14	9						GW-GM	134.6	2156	6.4	68.7	0.25
														GW-GM	132.8	2127	9.8	98.3	0.27
														GP-GM	123.9	1985	8.6	65.0	0.36
	100	80	67	50	39	28	17	11						GP-GM	136.3	2183	8.2	93.5	0.24
														GP-GM	133.2	2134	8.8	89.9	0.27
		100	98	84	57	24	16	13						SM	133.3	2135	8.9	90.8	0.26
100	84	76	60	44	32	22	16	12						GP-GM	134.2	2150	7.9	83.1	0.26
														GM	133.1	2132	8.9	90.0	0.27
														GM	132.4	2121	9.2	90.8	0.27
100	71	71	66	51	42	33		20						GM	130.4	2089	9.1	84.2	0.29
	100	82	75	69	65	53	29	21						SM	85.6	1371	6.9	19.4	0.97
		100	94	81	68	48	20	13						SM	112.7	1805	3.9	21.3	0.5
		100	87	75	63	42	25	19						SM	117.9	1889	3.1	19.5	0.43
		100	89	72	61	46	21	15						SM	115.0	1842	6.3	36.4	0.47
		100	89	81	70	54	29	19						SM					
	100	91	67	49	35	25	14	8						GP-GM	119.1	1908	10.3	67.3	0.42
														SM	117.2	1877	12.3	75.9	0.44
														SM	120.3	1927	12.4	83.9	0.40
		100	84	64	50	35	26	19						SM	117.8	1887	10.3	64.9	0.43
														SM	123.1	1972	10.6	77.9	0.37
														SM	133.1	2132	8.8	89.2	0.27
														SM	119.8	1919	16.6	100.0	0.41
		100	92	68	56	47	21	14						SM	123.8	1983	11.6	86.7	0.36
100	69	66	56	52	48	38	20	14						GM	101.4	1624	3.7	15.3	0.66
			100	99	95	68	43	33						SM	102.0	1634	7.7	36.4	0.57
		100	78	60	47	24	7	5						SP-SM					
		100	80	76	70	46	20	14						SP-SM	122.1	1956	9.6	68.5	0.38
														SM	112.3	1799	9.4	50.6	0.50
														SM	130.9	2097	4.7	44.2	0.29
		100	94	91	88	73	33	19						SM	111.9	1792	9.9	52.7	0.51
		100	98	93	87	67	32	20						SM	114.9	1841	11.4	66.0	0.47
														SP-SM	128.8	2063	5.5	47.9	0.31
	100	94	88	87	84	41	10	6						SP-SM	101.6	1627	20.9	85.5	0.66
														SP-SM	103.3	1655	22.5	96.5	0.63
														CI-MI	112.6	1804	14.3	78.0	0.50

Classification System

has been performed
included in this report

2

UNIFORMITY COEFFICIENTS (b)		USCS (c)	IN-SITU					COMPACTED		OPTIMUM MOISTURE (%)	SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY									
			(pcf)	(kg·m ⁻³)				(pcf)	(kg·m ⁻³)								
PL	PI																
		SM	91.5	1466	6.2	19.9	0.84										
		SP-SM	132.9	2129	1.2	12.4	0.27										
		SM	124.7	1998	2.7	20.8	0.35										
		GP-GM	143.5	2299	8.5	100.0	0.17										
		GP-GM	131.7	2110	6.3	60.8	0.28										
		GP-GM	136.8	2191	8.6	99.7	0.23										
		GW-GM	134.6	2156	6.4	68.7	0.25										
		GW-GM	132.8	2127	9.8	98.3	0.27										
		GP-GM	123.9	1985	8.6	65.0	0.36										
		GP-GM	136.3	2183	8.2	93.5	0.24										
		GP-GM	133.2	2134	8.8	89.9	0.27										
		SM	133.3	2135	8.9	90.8	0.26										
		GP-GM	134.2	2150	7.9	83.1	0.26										
		GM	133.1	2132	8.9	90.0	0.27										
		GM	132.4	2121	9.2	90.8	0.27										
		GM	130.4	2089	9.1	84.2	0.29										
		SM	85.6	1371	6.9	19.4	0.97										
		SM	112.7	1805	3.9	21.3	0.5										
		SM	117.9	1889	3.1	19.5	0.43										
		SM	115.0	1842	6.3	36.4	0.47										
		SM															
		GP-GM	119.1	1908	10.3	67.3	0.42										
		SM	117.2	1877	12.3	75.9	0.44										
		SM	120.3	1927	12.4	83.9	0.40										
		SM	117.8	1887	10.3	64.9	0.43										
		SM	123.1	1972	10.6	77.9	0.37										
		SM	133.1	2132	8.8	89.2	0.27										
		SM	119.8	1919	16.6	100.0	0.41										
		SM	123.8	1983	11.6	86.7	0.36										
		GM	101.4	1624	3.7	15.3	0.66										
		SM	102.0	1634	7.7	36.4	0.57										
		SP-SM														*	
		SP-SM	122.1	1956	9.6	68.5	0.38										
		SM	112.3	1799	9.4	50.6	0.50										
		SM	130.9	2097	4.7	44.2	0.29										
		SM	111.9	1792	9.9	52.7	0.51										
		SM	114.9	1841	11.4	66.0	0.47									*	
		SP-SM	128.8	2063	5.5	47.9	0.31										
		SP-SM	101.6	1627	20.9	85.5	0.66										
		SP-SM	103.3	1655	22.5	96.5	0.63										
		CL-MI	112.6	1804	14.3	78.0	0.50									*	

SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, LIN VALLEY COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SANSO

TABLE
9-1
1 OF 4

FUGRO NATIONAL INC.

AFV-01

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									U S STAN	
				STANDARD SIEVE OPENING						U S STAN				
		FEET	METERS	BLORS.	COBBLES		GRAVEL			SA				
24"	12"			6"	3"	1½"	¾"	⅜"	4	10				
IV-B-3	P-13	85.0-85.6	25.91-26.09									100	99	
	P-13	85.6-86.2	26.09-26.27											
	P-13	86.2-86.9	26.27-26.49											
	P-14	98.5-101.2	30.02-30.85											
	P-15	120.1-122.2	36.61-37.25									100	98	
	P-16	141.1-143.0	43.01-43.59										100	
	P-17	160.5-163.3	48.92-49.77											
IV-B-4	D-1	0.7-1.4	0.21-0.43					100	88	72	59	51		
	D-2	3.2-3.9	0.98-1.19						100	86	65	46		
	D-3	6.2-6.9	1.89-2.10						100	87	61	42		
	D-4	10.7-11.4	3.26-3.47						100	99	84	71		
	D-5	15.2-15.9	4.63-4.85											
	D-6	20.2-20.9	6.16-6.37											
	D-7	25.2-25.9	7.68-7.89					100	93	78	47	33		
	D-8	30.2-30.9	9.20-9.42					100	70	48	37	29		
	D-9	40.4-40.9	12.31-12.47											
	D-10	50.4-50.9	15.36-15.51					100	85	68	54	45		
	D-11	60.0-60.3	18.29-18.38											
	D-12	75.4-75.9	22.98-23.13											
	D-13	90.0-90.3	27.74-27.52					100	93	78	62	47		
	D-14	100.0-100.2	30.48-30.54											
	D-15	120.4-120.9	36.70-36.85					100	83	60	51	44		
	D-16	141.1-142.0	43.01-43.28						100	96	68	49		
	D-17	160.5-163.2	48.92-49.74											
HV-B-5	D-1	0.2-0.9	0.06-0.27					100	91	85	81	75		
	D-2	3.5-4.2	1.07-1.28						100	96	94	92		
	D-3	7.0-7.7	2.13-2.35											
	P-4	10.0-10.7	3.05-3.26							100	98	94		
	P-4	10.7-11.4	3.26-3.47											
	P-4	11.4-12.1	3.47-3.68											
	P-5	15.0-15.3	4.57-4.66											
	P-5	15.3-15.9	4.66-4.85											
	P-5	15.9-16.8	4.85-5.12											
	D-7	20.3-21.0	6.19-6.40											
	P-8	24.5-26.7	7.47-8.14						100	99	92	85		
	D-10	40.4-40.9	12.31-12.47											
	P-11	49.5-51.8	15.09-15.79						100	97	85	70		
	D-12	60.9-61.4	18.56-18.71						100	92	88	80		
	D-13	70.2-70.7	21.40-21.55											
P-14	77.1-79.4	23.50-24.20												
	P-15	89.2-90.2	27.19-27.49						100	98	92	84		

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

D - Fugro Drive

B.b - Bulk

(b) NP - Not Plastic

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed and results are included in this report

2

ORG (b)	USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
		DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
		(pcf)	(kg. m ³)				(pcf)	(kg. m ³)								
		CL-ML	90.1	1539	22.3	79.9	0.75				*					
		CL-ML	91.5	1466	28.2	90.5	0.84				*					
		CL-ML	95.6	1531	26.3	93.1	0.76				*					
		CL-ML	101.2	1621	20.9	84.7	0.67									
8		SC-SM	86.4	1384	35.0	99.6	0.95								*	
		CL-ML	98.0	1570	24.9	93.5	0.72								*	
		CL-ML	106.9	1712	19.7	92.6	0.58								*	
		GM	103.1	1652	6.6	28.2	0.63									
		SM	116.5	1866	4.3	25.8	0.45									
		SM	119.3	1911	3.4	22.0	0.41									
		SM	107.1	1716	6.5	30.6	0.57									
		SM	111.2	1781	7.8	40.9	0.52									
		GP-GM	125.1	2004	9.8	76.5	0.35									
		GP-GM	120.4	2025	7.8	63.5	0.33									
		GP-GM	124.8	1999	9.5	72.9	0.35									
		GP-GM	131.9	2113	9.0	87.3	0.28									
		GM	120.6	1932	7.6	51.8	0.40									
		GM	125.6	2012	10.2	81.0	0.34									
		GM	127.4	2041	8.0	66.6	0.32									
		SM			9.9											
		SM	123.8	1983	13.4	99.9	0.36									
2	18	GC	125.4	2009	9.6	75.2	0.34									
		SM			10.3											
		SM	133.7	2142	11.3	100.0	0.26									
		SM	88.1	1411	21.0	62.1	0.91									
		SM-MI	98.2	1573	10.6	40.1	0.72									
		SM	103.4	1656	5.7	24.6	0.63									
3	19	CL	101.0	1618	16.7	67.5	0.67				*					
		CL	81.6	1307	23.2	58.8	1.06				*					
		CL	85.6	1371	26.2	73.1	0.97				*					
5	9	ML	79.2	1269	36.4	87.2	1.13							*		
		SM	95.0	1523	21.7	75.8	0.77					*				
		SM	99.1	1587	14.5	55.9	0.70									
		SM	90.2	1445	12.8	39.8	0.87									
		SM	88.5	1418	18.6	55.7	0.90						*			
		GC	123.8	1983	9.3	69.5	0.36									
3	13	SC	118.4	1897	12.6	80.3	0.42								*	
8	19	SM	96.8	1551	15.8	57.6	0.74									
		SM	129.1	2068	11.8	104.3	0.31									
		SM	108.9	1744	10.4	51.3	0.55									
		SM	106.6	1708	9.6	44.9	0.58									

SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSO

TABLE
9-1
2 OF 4

FUGRO NATIONAL, INC.

AFV-01

ACTIVITY NUMBER	SAMPLE NUMBER (a)	SAMPLE INTERVAL		PERCENT FINER BY WEIGHT									
				STANDARD SIEVE OPENING							U S STANDARD		
				BLDRS.	COBBLES		GRAVEL				SAND		
		FEET	METERS	24"	12"	6"	3"	1 1/2"	3/4"	3/8"	4	10	40
	P-16	100.0-101.2	30.48-30.85										
	P-17	120.0-123.2	36.58-37.55							100	84	89	7
HV-B-1	D-1	0.5-1.0	0.15-0.30					100	87	64	52	46	4
	D-3	6.0-6.5	1.83-1.98					100	95	80	62	3	
	D-4	10.8-11.4	3.29-3.47										
	D-5	15.0-15.9	4.75-4.85					100	76	63	41	24	1
	D-6	20.2-20.5	6.16-6.25					100	97	73	55	38	2
	D-9	50.0-50.2	15.24-15.30					100	92	69	54	46	2
	D-12	79.0-79.7	24.06-24.29					100	96	85	78	69	6
	D-13	100.2-100.9	30.54-30.75						100	96	83	67	5
	D-14	122.5-122.8	37.34-37.43						100	99	96	94	9
HV-T-1	B-1	0.25-0.75	0.08-0.23							100	87	77	6
HV-T-2	B-1	0.25-1.5	0.08-0.46						100	76	65	54	4
HV-T-3	B-1	0.1-1.0	0.03-0.30						100	92	90	86	6
HV-T-4	B-1	0.1-1.0	0.03-0.30						100	97	93	86	6
	b-2	5.0-6.0	1.52-1.83									100	9
HV-T-5	B-1	0.1-1.0	0.03-0.30						100	92	85	77	5
	b-2	2.0-2.5	0.61-0.76										
HV-T-6	B-1	0.5-1.5	0.15-0.46						100	95	93	89	5
HV-T-7	B-1	0.5-1.5	0.15-0.46				100	99	97	92	86	81	6
HV-T-8	B-1	0.1-1.0	0.03-0.30							100	94	86	6
HV-T-9	B-1	0.5-2.0	0.15-0.61					100	91	77	60	44	2
HV-T-10	B-1	0.1-1.5	0.03-0.46					100	97	83	75	70	1
HV-T-11	B-1	0.1-2.0	0.03-0.61				100	98	93	70	44	29	
HV-P-1	b-1	0.25-1.0	0.08-0.30										
HV-P-7	b-1	0.1-0.5	0.03-0.15					100	94	88	77	69	
HV-P-9	b-1	0.25-1.0	0.08-0.30										

NOTES:

(a) Sample types

SS - Standard split spoon

P - Pitcher

D - Fugro Drive

B, b - Bulk

(b) NP - Not Plastic

(c) USCS - Unified Soil Classification System

(d) * Indicates that test has been performed
and results are included in this report

FINER BY WEIGHT								ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY
U S STANDARD SIEVE NO						PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)	
	SAND				SILT OR CLAY		(pcf)	(kg/m ³)	(pcf)	(kg/m ³)										
/8"	4	10	40	100	200	.005	.001	LL	PL	PI										
											SM	115.7	1853	11.2	66.4	0.41				
100	54	60	73	44	27						SM	107.2	1717	18.3	86.2	0.57				
64	52	46	40	22	10						GM	106.7	1709	4.3	20.2	0.58				
95	80	62	38	27	23						SM	126.1	2020	1.3	10.3	0.34				
											GW-GM	140.2	2246	5.8	77.3	0.20				
63	41	24	11	7	6						GW-GM	140.0	2243	8.0	100.0	0.20				
73	55	38	21	12	9						SW-SM	140.7	2254	7.2	98.6	0.20				
69	54	40	27	18	14						GM			13.2						
85	78	69	62	44	38	13	8	40	12	10	SM	108.3	1735	14.8	71.9	0.54				
96	83	67	54	37	26						SM	123.0	1970	11.7	85.2	0.17				
99	96	94	92	85	72						ML	102.2	1637	17.5	72.7	0.65				
100	87	77	64	41	27					NP	SM									
76	65	54	41	31	23						SM									
92	90	86	64	39	29			30	21	9	SC									
97	93	86	62	40	28						SM									
		100	95	88	81	19	7				ML									
92	85	77	56	35	27						SM									
											SM									
95	93	83	58	27	19					NP	SM						128.0	2051	10.0	
92	86	81	67	32	22					NP	SM						127.2	2038	10.9	
100	94	86	60	31	21						SM									
77	60	44	28	17	14						SM						133.7	2142	7.9	
83	75	70	60	39	29					NP	SM						129.5	2074	9.0	
70	44	29	19	13	10						GP-GM						141.9	2273	6.0	
											SM									
88	77	69	50	30	22						SM									
					65			23	18	5	CL-ML									

2

ATTERBERG LIMITS (b)			USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
				DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
				(pcf)	(kg m ³)				(pcf)	(kg m ³)								
			SM	115.7	1853	11.2	66.4	0.41										
			SM	107.2	1717	18.3	86.2	0.57										
			GM	106.7	1709	4.3	20.2	0.58										
			SM	126.1	2020	1.3	10.3	0.34										
			GW-GM	140.2	2246	5.8	77.3	0.20										
			GW-GM	140.0	2243	8.0	100.0	0.20										
			SW-SM	140.7	2254	7.2	98.6	0.20										
			GM			13.2												
18	32	10	SM	108.3	1735	14.8	71.9	0.50										
			SM	123.0	1970	11.7	85.2	0.37										
			ML	102.2	1637	17.5	72.7	0.65										
			NP															
			SM															
			SM															
30	21	9	SC															
			SM															
			ML															
			SM															
			SM															
			NP	SM					128.0	2051	10.0							*
			NP	SM					127.2	2038	10.9							*
				SM														
				SM					133.7	2142	7.9							*
			NP	SM					129.5	2074	9.0							*
				GP-GM					141.9	2273	6.0							*
				SM													*	
				SM														
23	18	5	CL-ML															

SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MR SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE SAMSU

TABLE
9-1
3 OF 4

FUGRO NATIONAL, INC.

AFV-01

B-1	1.0-2.0	0.30-0.61
b-1	0.5-1.0	0.15-0.30
b-1	0.25-0.75	0.08-0.23
b-1	0.25-1.0	0.08-0.30
B-1	0.25-1.0	0.08-0.30
B-1	0.5-1.0	0.15-0.30
b-1	0.5-1.0	0.15-0.30
b-1	0.25-0.75	0.08-0.23
b-1	0.25-1.0	0.08-0.30
b-1	0.25-0.5	0.08-0.15
b-1	0.5-1.5	0.15-0.46
b-1	0.25-1.0	0.08-0.30
b-1	0.25-1.0	0.08-0.30
B-1	0.25-1.0	0.08-0.30
b-1	0.25-0.75	0.08-0.23
B-1	0.25-1.0	0.08-0.30
B-1	0.5-1.25	0.15-0.38
B-1	0.25-1.0	0.08-0.30

PERCENT FINER BY WEIGHT								ATTERBERG LIMITS (b)			USCS (c)	IN-SITU				COMPACTED		
U S STANDARD SIEVE NO						PARTICLE SIZE (mm)						DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY	
		SAND			SILT OR CLAY			(pcf)	(kg/m³)	(pcf)		(kg/m³)						
3/8"	4	10	40	100	200	.005	.001	LL	PL	PI								
98	94	89	61	34	24						SC							
											SM							
		100	99	99	97	20	2	37	29	8	ML							
	92	92	89	60	32	23					SM							
90	89	87	81	49	26	19					SM							
	86	78	71	46	21	14					SM							
	100	98	95	83	66	56		31	21	10	CL							
		100	93	77	62	5	5				ML							
											SM							
85	84	80	76	59	30	21					SM							
80	96	89	83	64	33	23					SM							
75	92	80	67	57	43	36					SM							
											SM							
70	87	76	68	57	37	28					SC							
65	71	50	36	24	14	11				NP	GP-GM							
60	72	58	44	36	27	23					GM							
											SM							
55	88	80	70	50	33	25		36	24	12	SC-SM							
	100	96	86	62	38	28					SC-SM					*		
	100	99	95	70	45	34		45	27	18	SC-SM					*		
											SC-SM							
50	93	88	80	49	34	29					SM							

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port

2

BERG S (b)		USCS (c)	IN-SITU					COMPACTED			SPECIFIC GRAVITY OF SOLIDS	TRIAxIAL (d)	UNCONFINED COMPRESSION	DIRECT SHEAR	CONSOLIDATION	CHEMICAL	CBR
			DRY UNIT WEIGHT		MOISTURE CONTENT (%)	SATURATION (%)	VOID RATIO	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE (%)							
			(pcf)	(kg/m³)				(pcf)	(kg/m³)								
		SC															
		SM														*	
9	8	ML															
		SM															
		SM															
		SM															
21	10	CL															
		ML															
		SM														*	
		SM															
		SM															
		SM															
		SM														*	
		SC															
	NP	GP-GM															
		GM															
		SM														*	
24	12	SC-SM															
		SC-SM						*									*
27	18	SC-SM						*									*
		SC-SM														*	
		SM															

SUMMARY OF LABORATORY TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

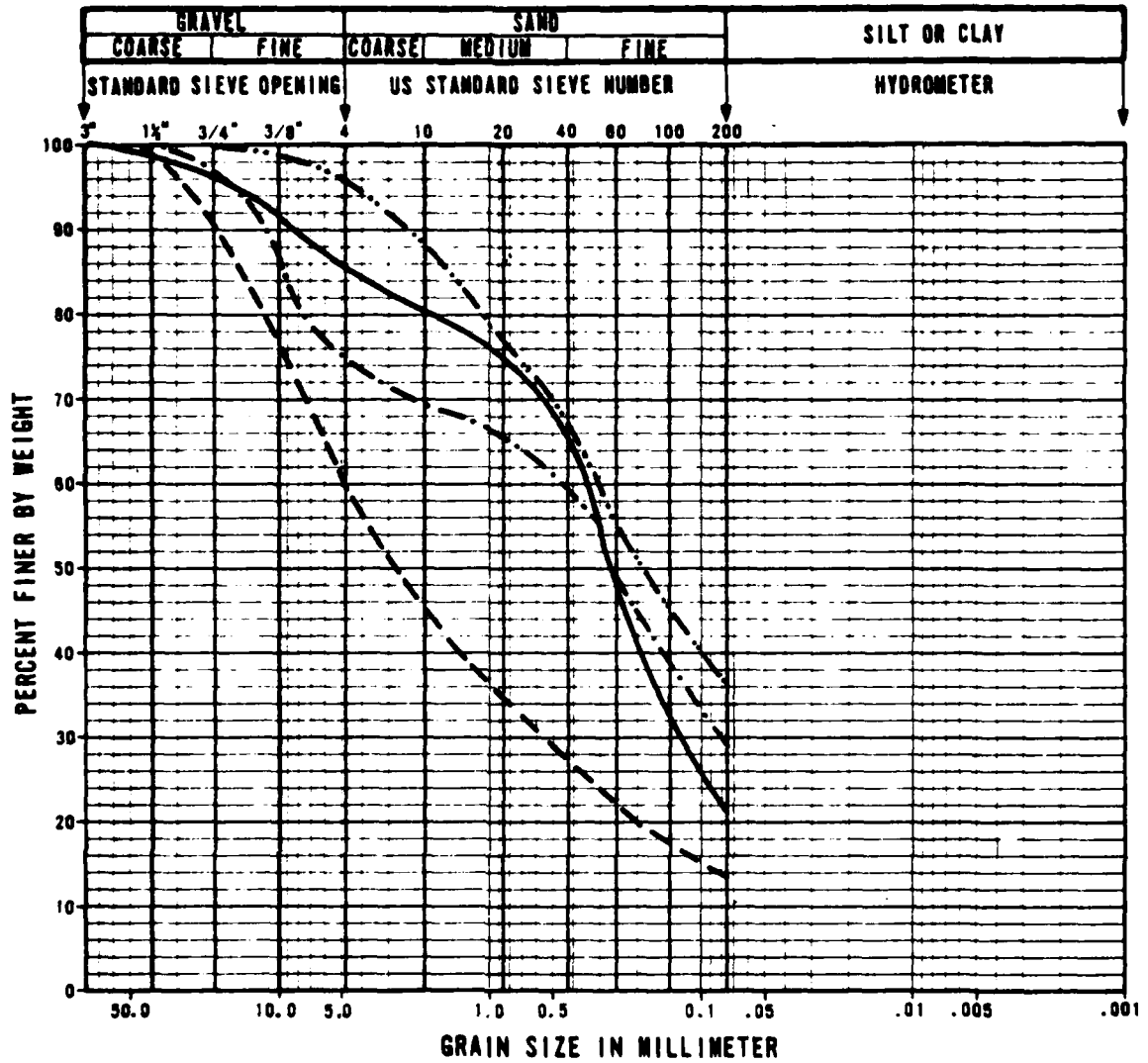
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
8-1
4 OF 4

FURRO NATIONAL INC.

APV-01

CHECKED BY _____ APPROVED BY _____



SYMBOL	COMPOSITE SAMPLE NUMBER	ACTIVITY NUMBER	SAMPLE INTERVAL		SOIL TYPE
			FEET	METERS	
—	A	HV-T-7	0.5-1.5	0.15-0.46	SM
- - -	B	HV-T-9	0.5-2.0	0.15-0.60	SM
- . - .	C	HV-T-10	0.1-1.5	0.03-0.46	SM
- . . -	D	HV-CS-51	0.5-1.2	0.15-0.38	SC-SM
		HV-CS-58	0.25-1.0	0.07-0.30	

GRAIN SIZE CURVES, CBR TESTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SANSO

FIGURE
9-2
1 OF 2

FURRO NATIONAL, INC.

[illegible]

**SUMMARY OF UNCONFINED COMPRESSION
TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY COP, NEVADA**

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

**TABLE
9-3**

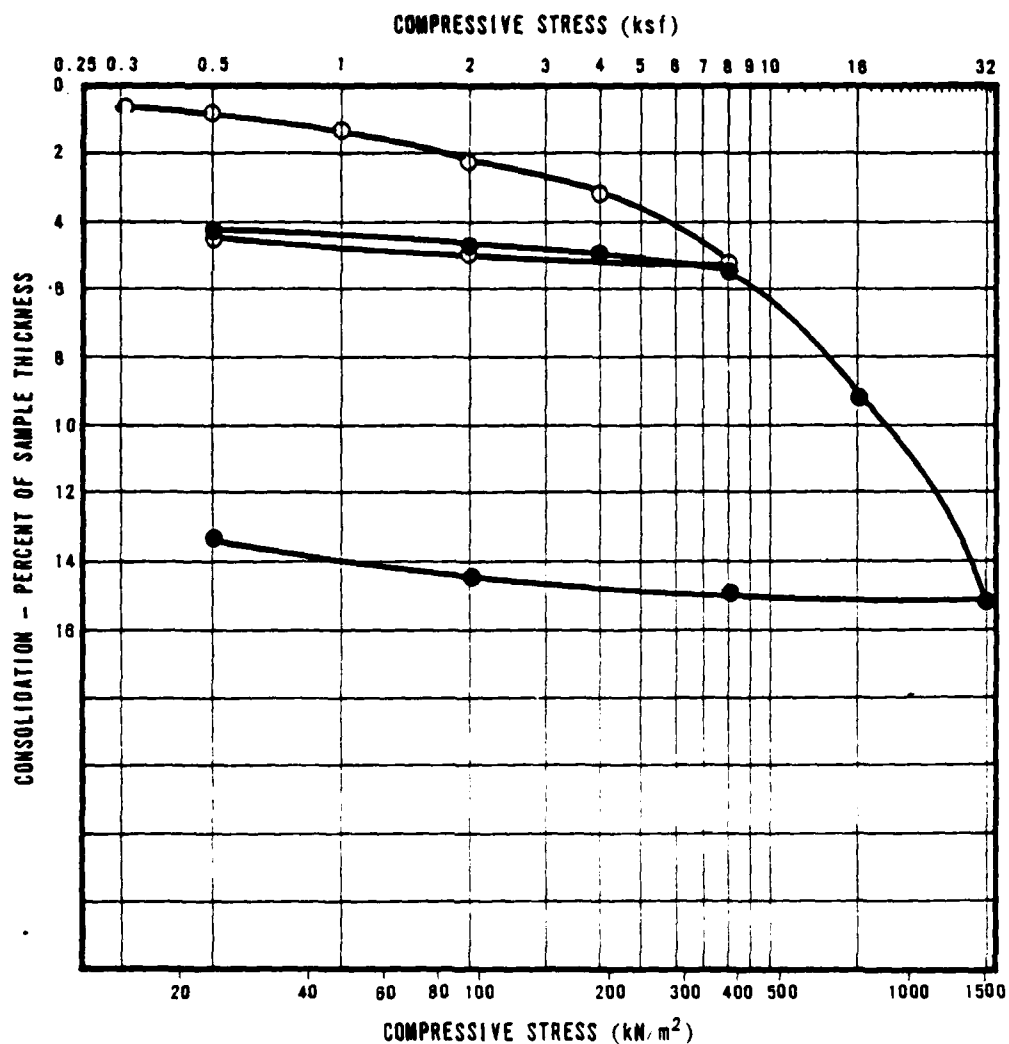
VERO NATIONAL, INC.

SUMMARY OF DIRECT SHEAR TEST RESULTS

VERIFICATION SITE, HAMLIN VALLEY COP, NEVADA

TABLE
2-4

FUGRO NATIONAL, INC.



SYMBOL	BORING NO.	SAMPLE NO.	SAMPLE INTERVAL		SOIL TYPE	INITIAL DRY DENSITY		INITIAL MOISTURE CONTENT (%)	INITIAL VOID RATIO	INITIAL DEGREE OF SATURATION (%)
			FEET	METERS		pcf	kg/m³			
○	HV-B-5	P-5	15.0-15.3	4.57-4.68	ML	79.2	1269	36.4	1.13	87.2

- AT FIELD MOISTURE
● AFTER ADDITION OF WATER
— COMPRESSION
--- REBOUND

CONSOLIDATION TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
9-5

FUGRO NATIONAL, INC.

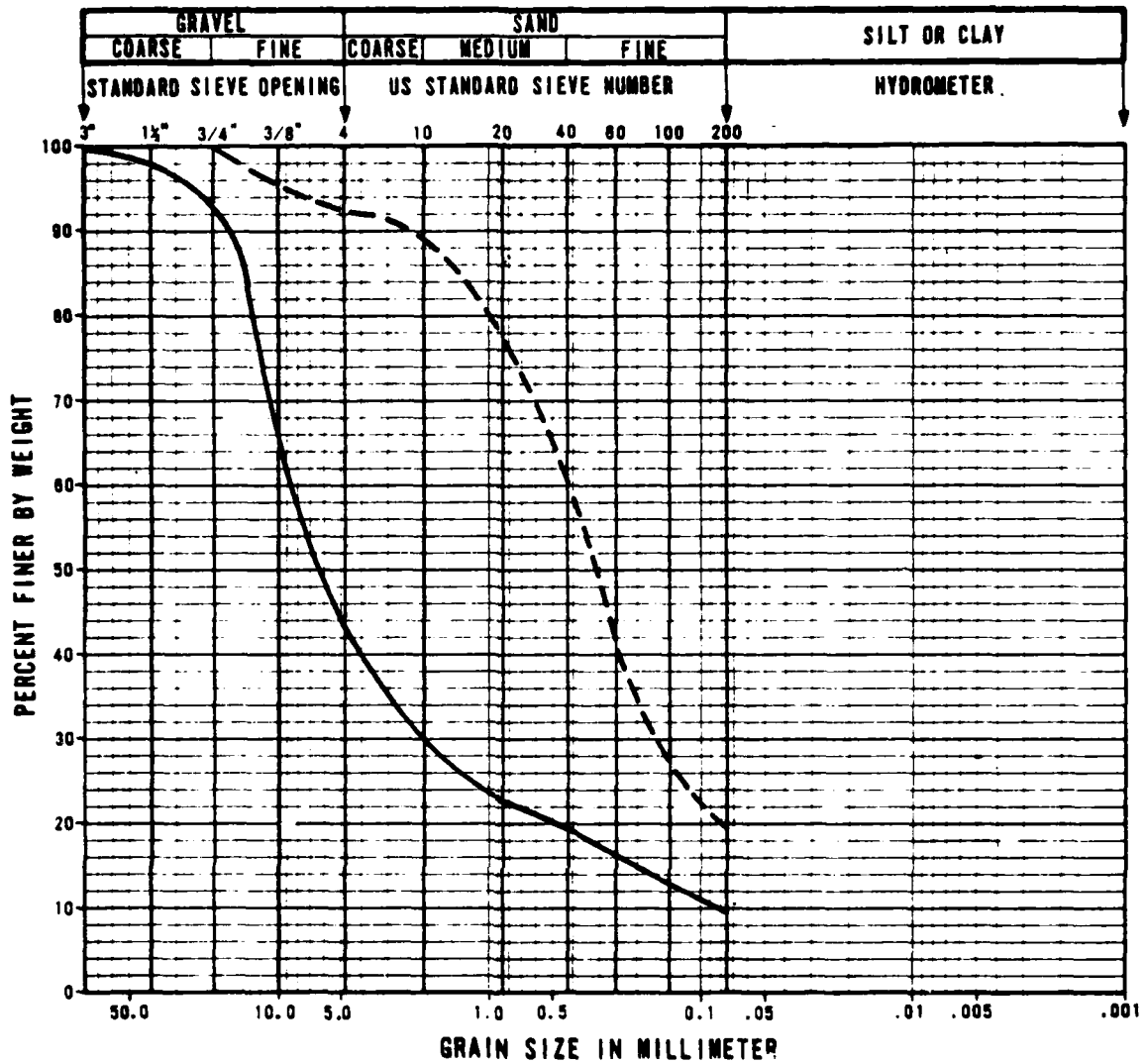
[illegible]

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMS0

**TABLE
9-6**

FUGRO NATIONAL, INC.

CHECKED BY _____ APPROVED BY _____



SYMBOL	COMPOSITE SAMPLE NUMBER	ACTIVITY NUMBER	SAMPLE INTERVAL		SOIL TYPE
			FEET	METERS	
—	E	HV-T-11	0.1-2.0	0.03-0.60	GP-GM
- - -	F	HV-T-8	0.5-1.5	0.15-0.46	SM

GRAIN SIZE CURVES, CBR TESTS
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

FIGURE
9-2
2 OF 2

FURRO NATIONAL INC.

2 JUL 79

AFV-12

CHECKED BY _____ APPROVED BY _____

COMPOSITE SAMPLE NUMBER	SOIL TYPE	PERCENT PASSING #200	ATTERBERG LIMITS		SPECIFIC GRAVITY	MAXIMUM DRY DENSITY		OPTIMUM MOISTURE	COMPACTED DRY DENSITY		COMPACTED MOISTURE	PERCENT OF MAXIMUM DRY DENSITY	CBR (%)
			LL	PI		pcf	kg/m ³		pcf	kg/m ³			
A	SM	22		NP				10.8	123.6	1980	10.3	87.2	90
									117.6	1884	10.1	92.5	32
						127.2	2038		109.9	1760	10.6	86.4	13
B	SM	14						7.9	124.1	1988	8.7	92.6	56
						133.7	2142						
C	SM	29		NP				8.0	121.7	1949	8.6	94.0	60
									117.0	1874	8.6	90.3	33
						129.5	2074		109.5	1754	9.7	84.6	8
D	SC-SM	38	37	12				13.5	111.5	1788	15.0	96.0	37
									103.1	1652	14.9	88.6	12
						116.1	1860		94.0	1506	14.8	81.0	3

CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
VERIFICATION SITE, HAMLIN VALLEY COP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

TABLE
9-7
1 OF 2

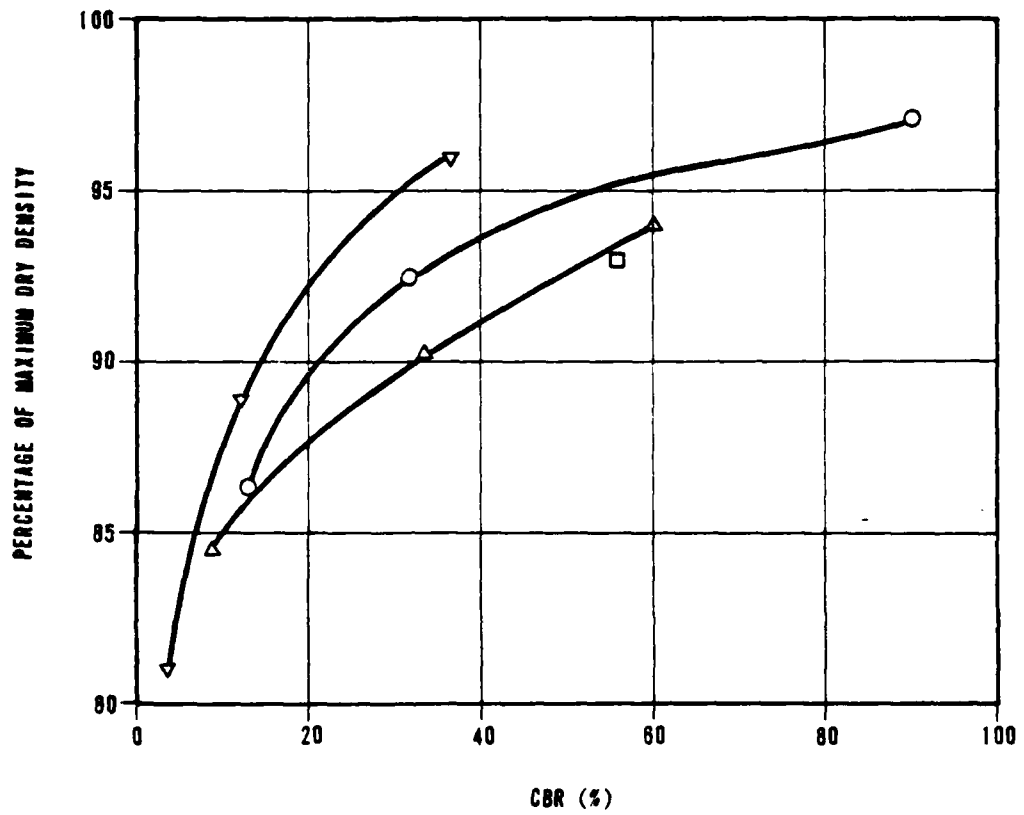
FUGRO NATIONAL, INC.

2 JUL 79

AFV-13

[illegible]

FURRO NATIONAL, INC.



SYMBOL	COMPOSITE SAMPLE NUMBER	SOIL TYPE
○	A	SM
□	B	SM
△	C	SM
▽	D	SC-SM

CALIFORNIA BEARING RATIO (CBR) CURVES
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

FIGURE
9-3
1 OF 2

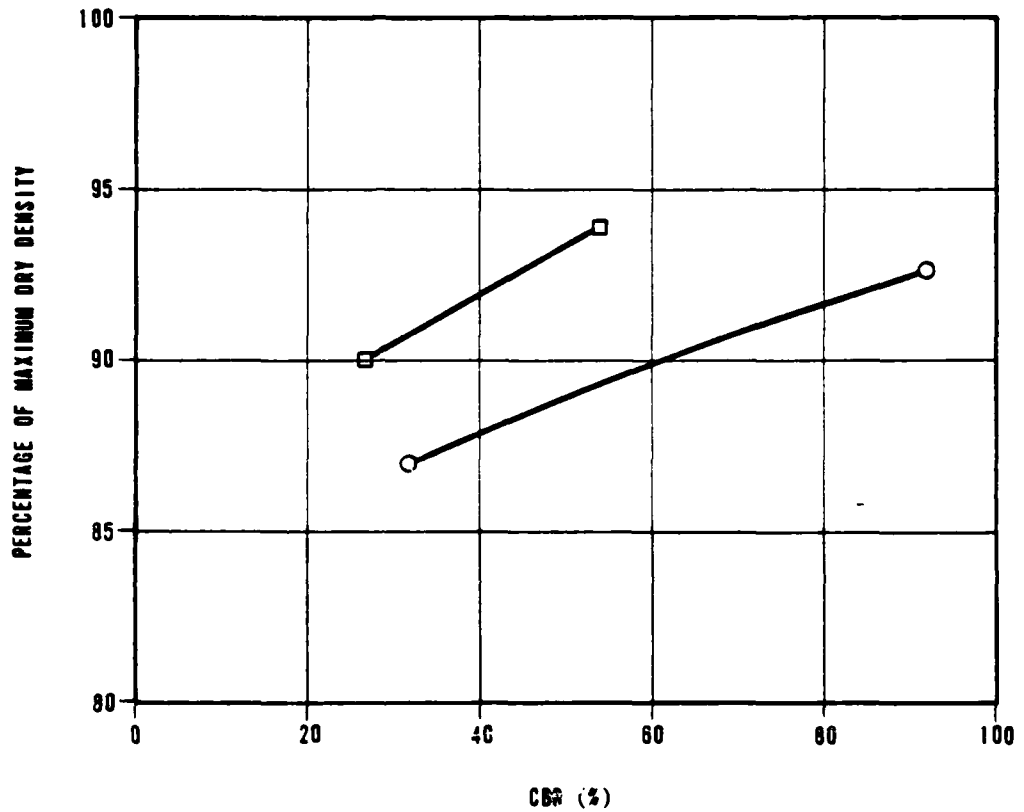
FUGRO NATIONAL, INC.

2 JUL 79

AFV-14

CHECKED BY _____ APPROVED BY _____

CHECKED BY _____ APPROVED BY _____



SYMBOL	COMPOSITE SAMPLE NUMBER	SOIL TYPE
○	E	GP-GM
□	F	SM

CALIFORNIA BEARING RATIO (CBR) CURVES
VERIFICATION SITE, HAMLIN VALLEY CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSQ

FIGURE
9-3
2 OF 2

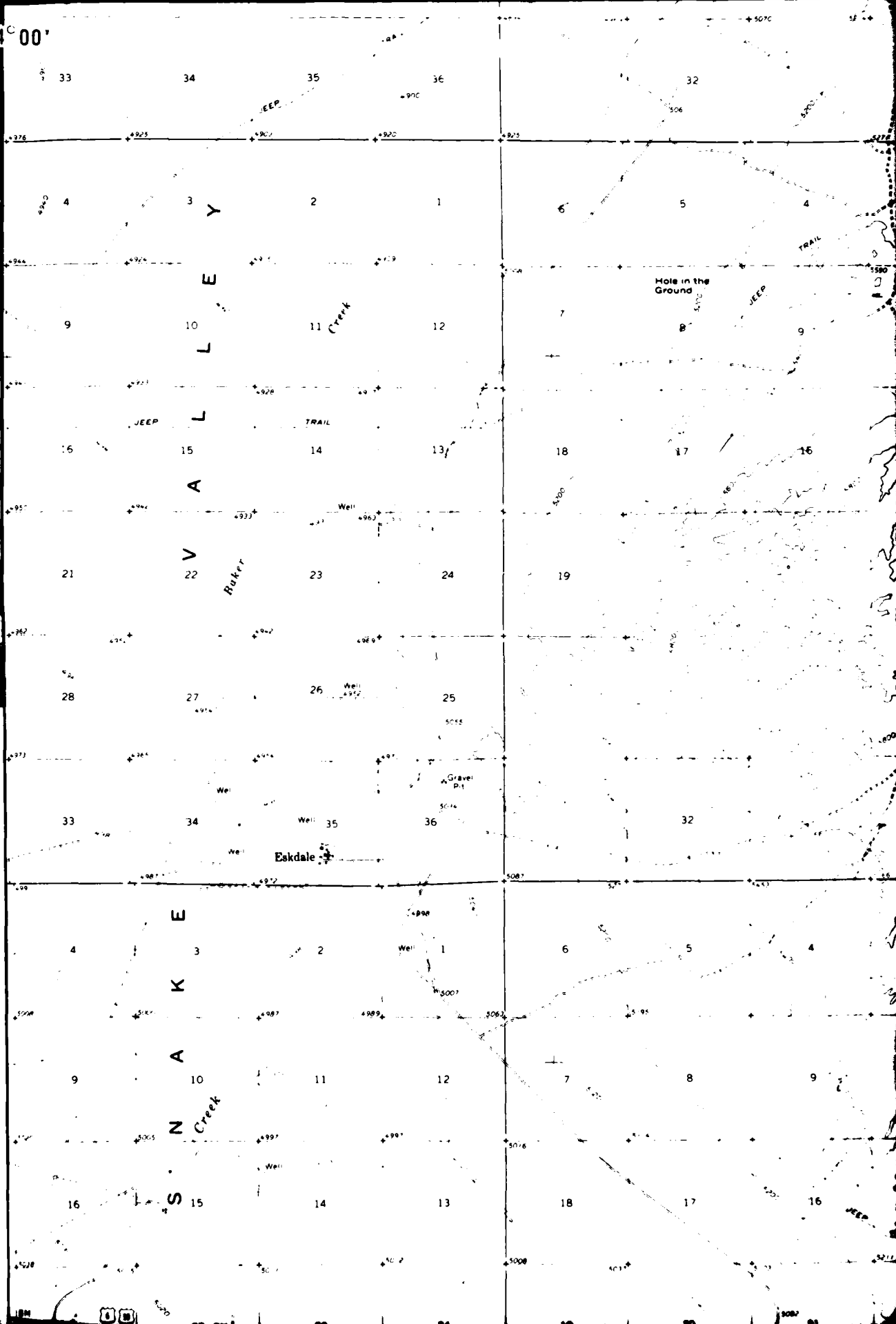
FUGRO NATIONAL, INC.

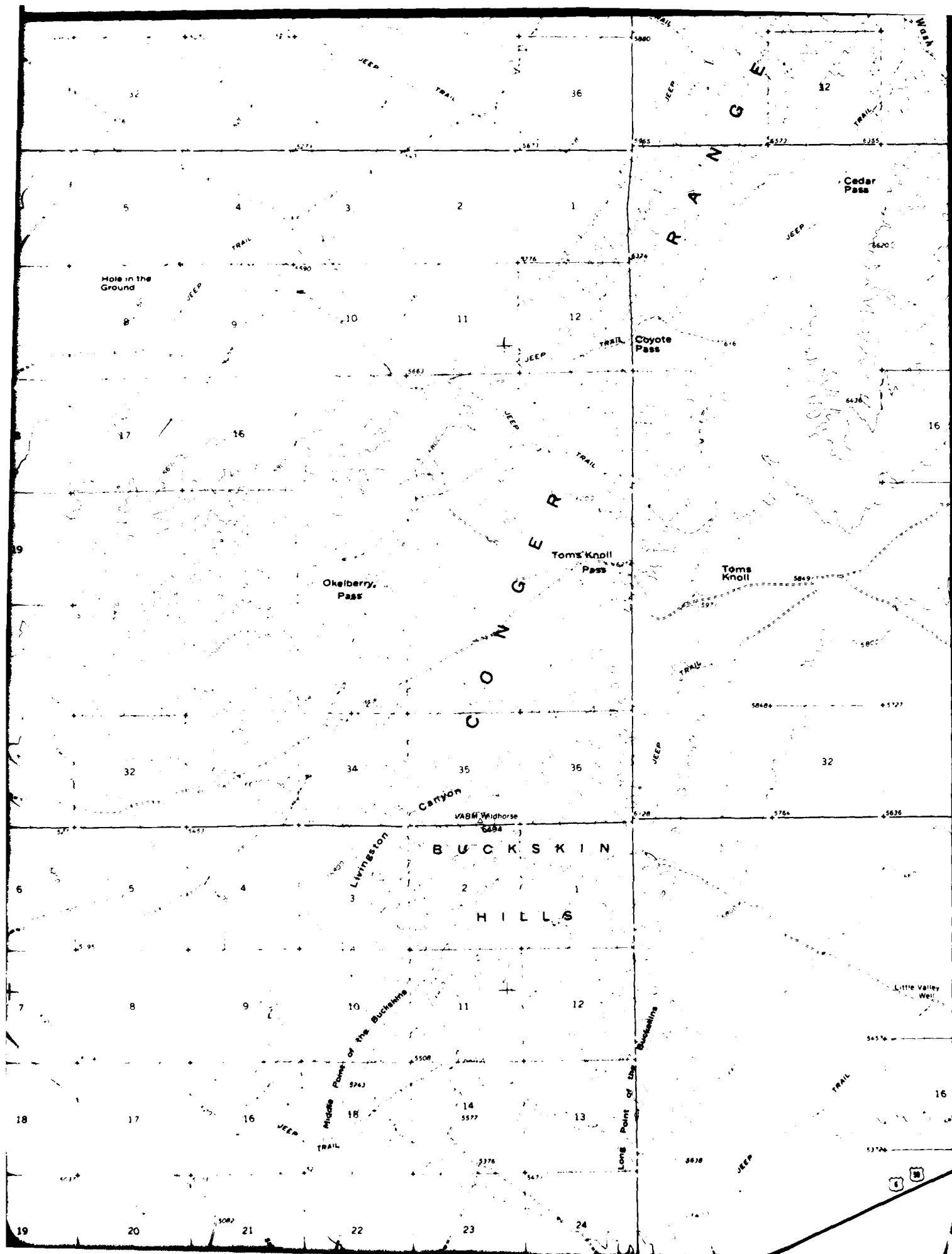
2 JUL 79

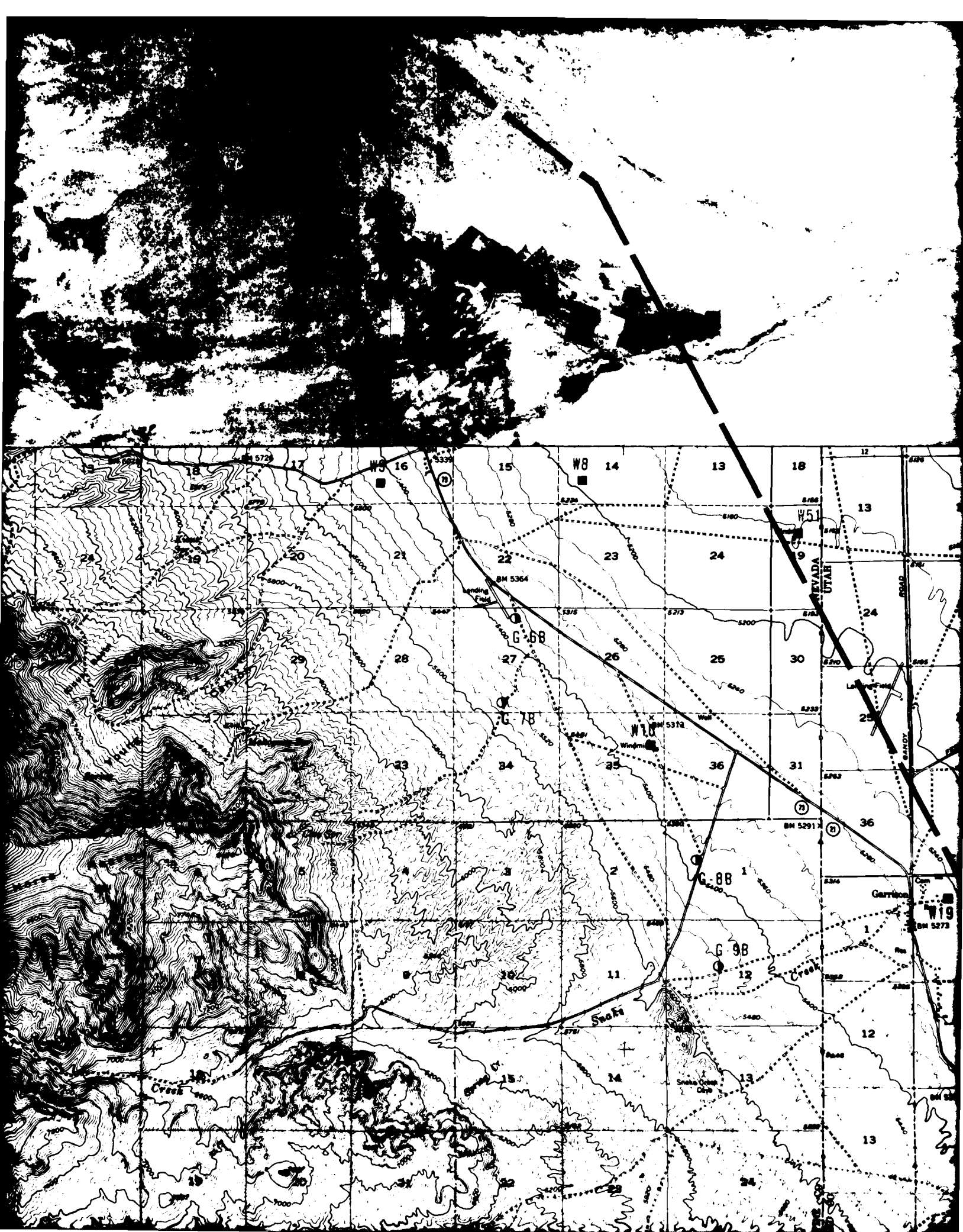
AFV-14

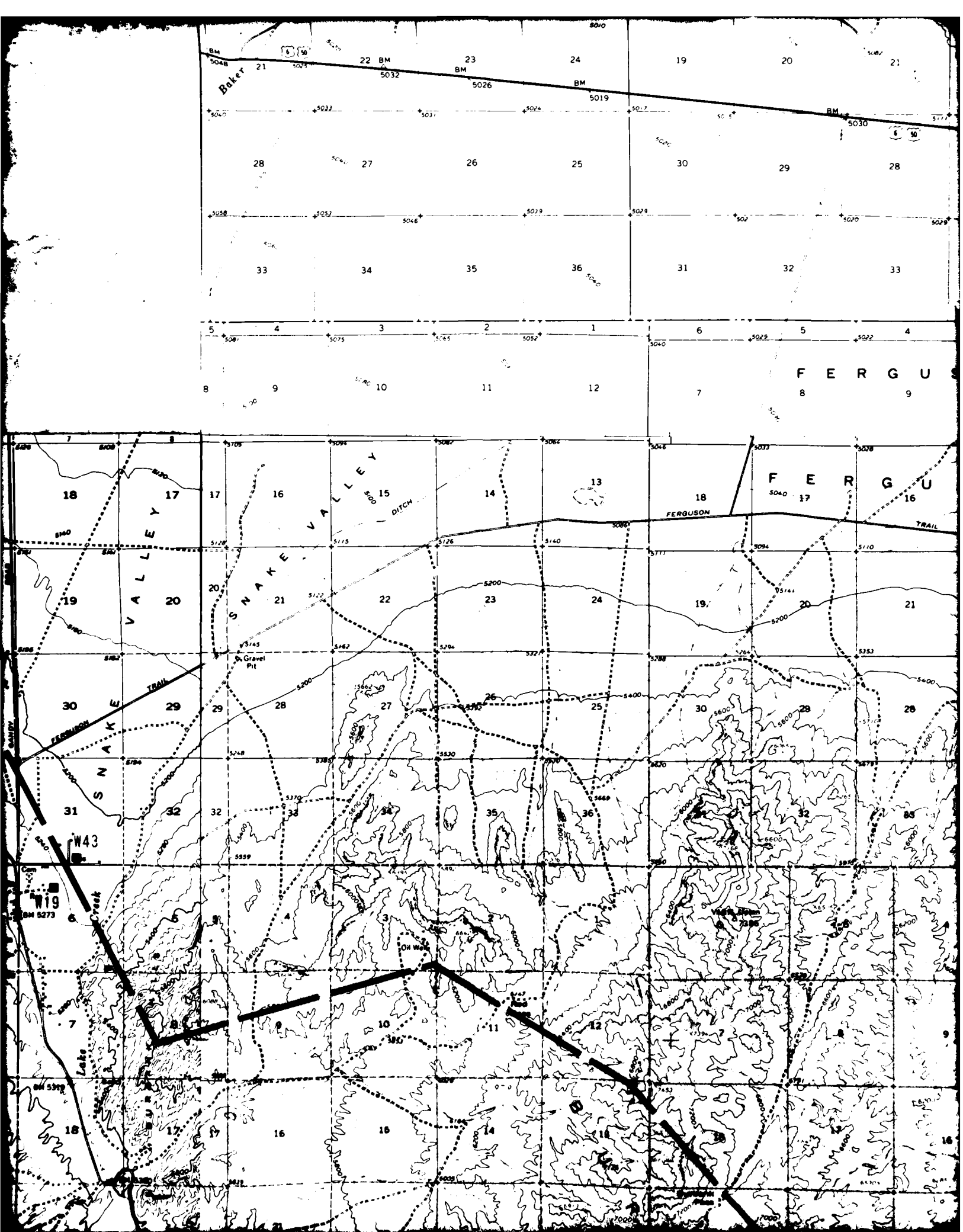


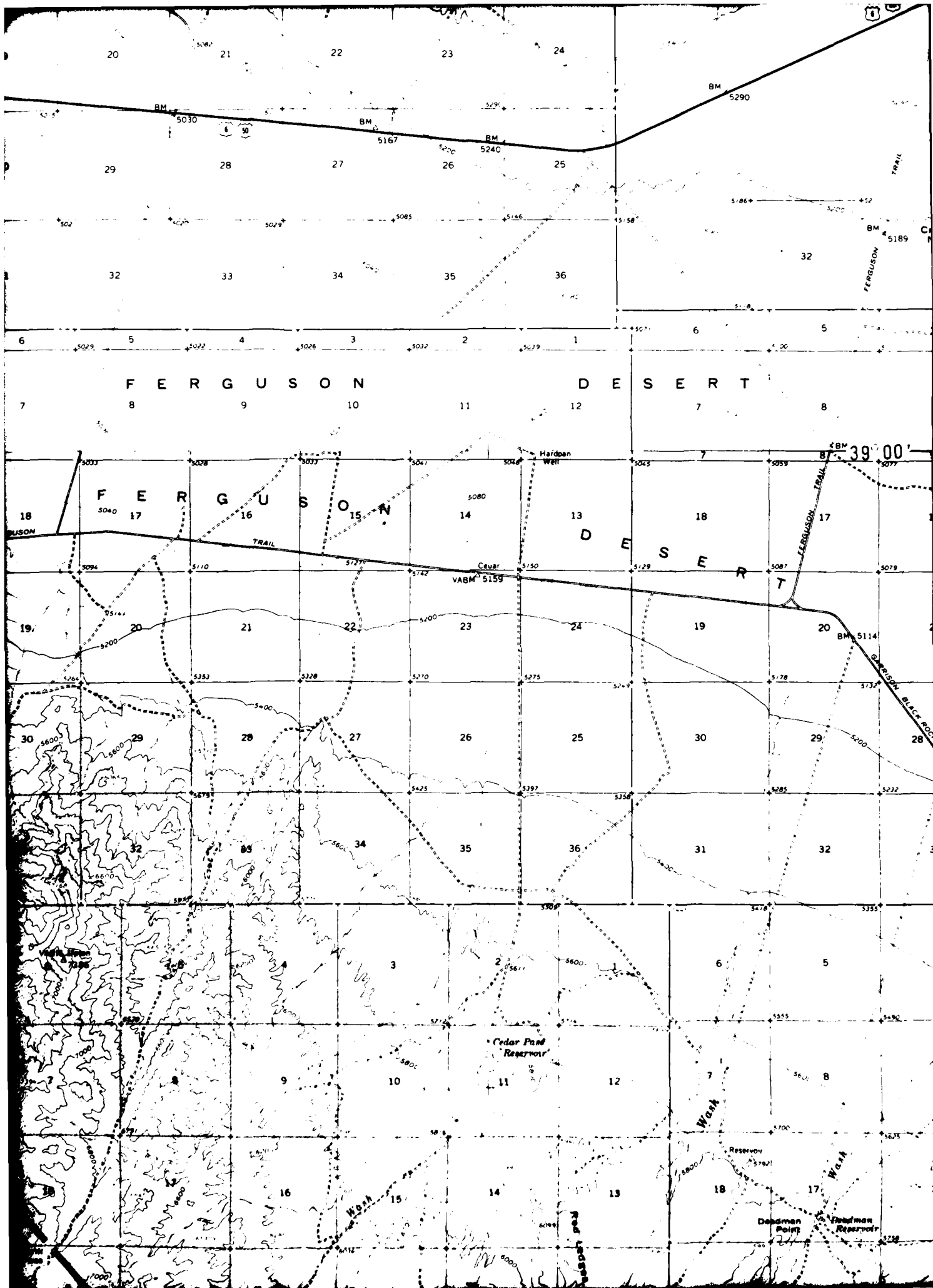
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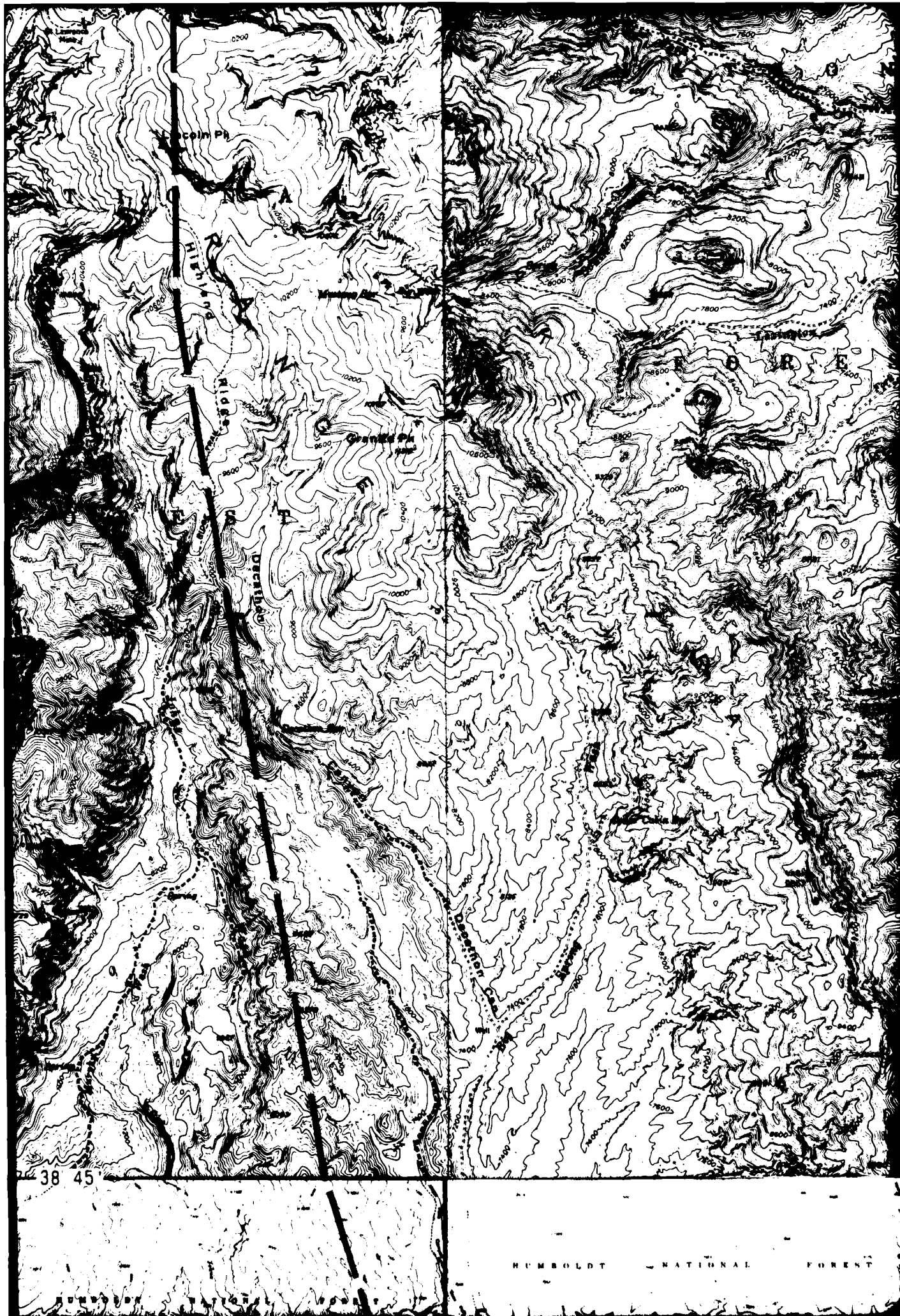


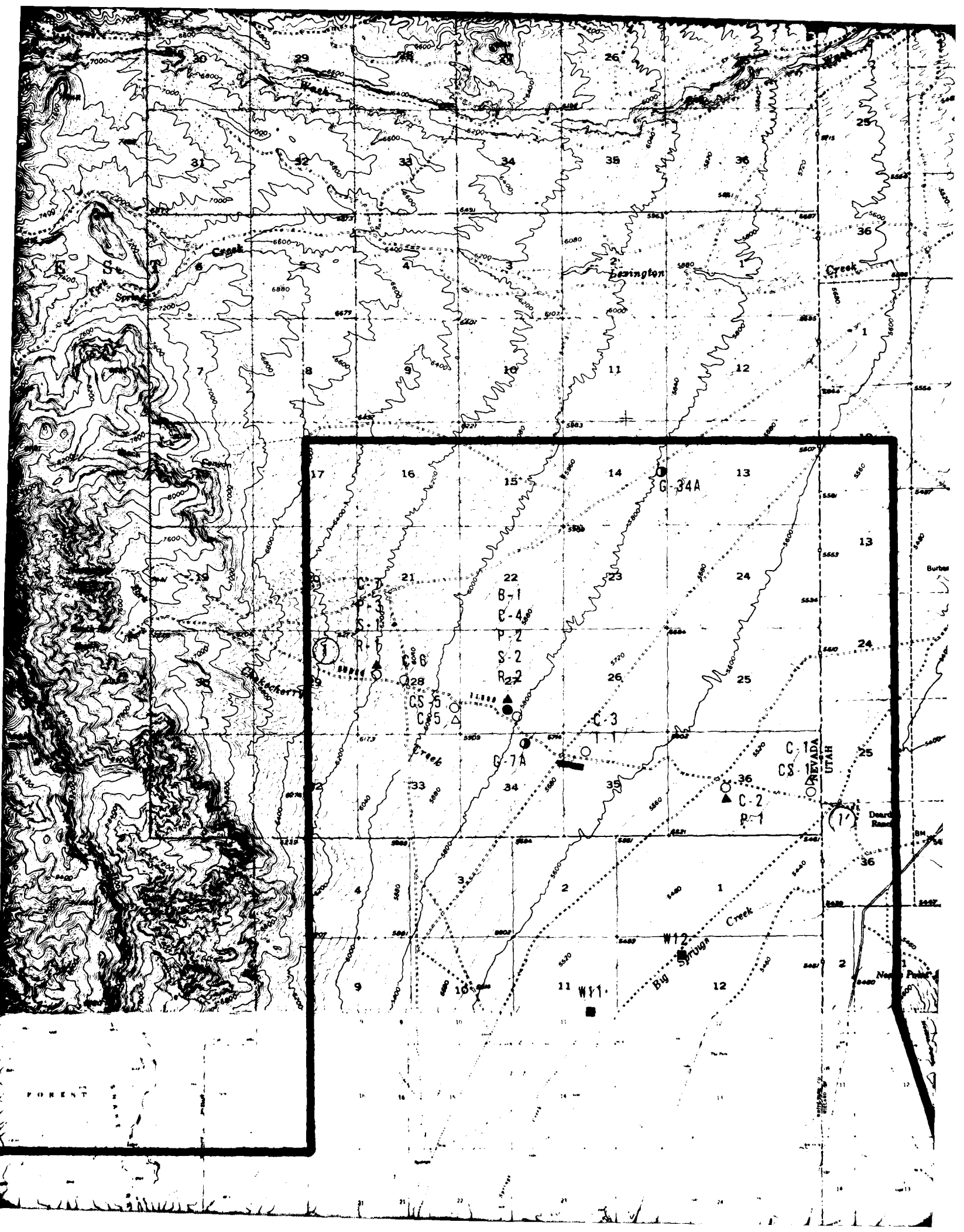


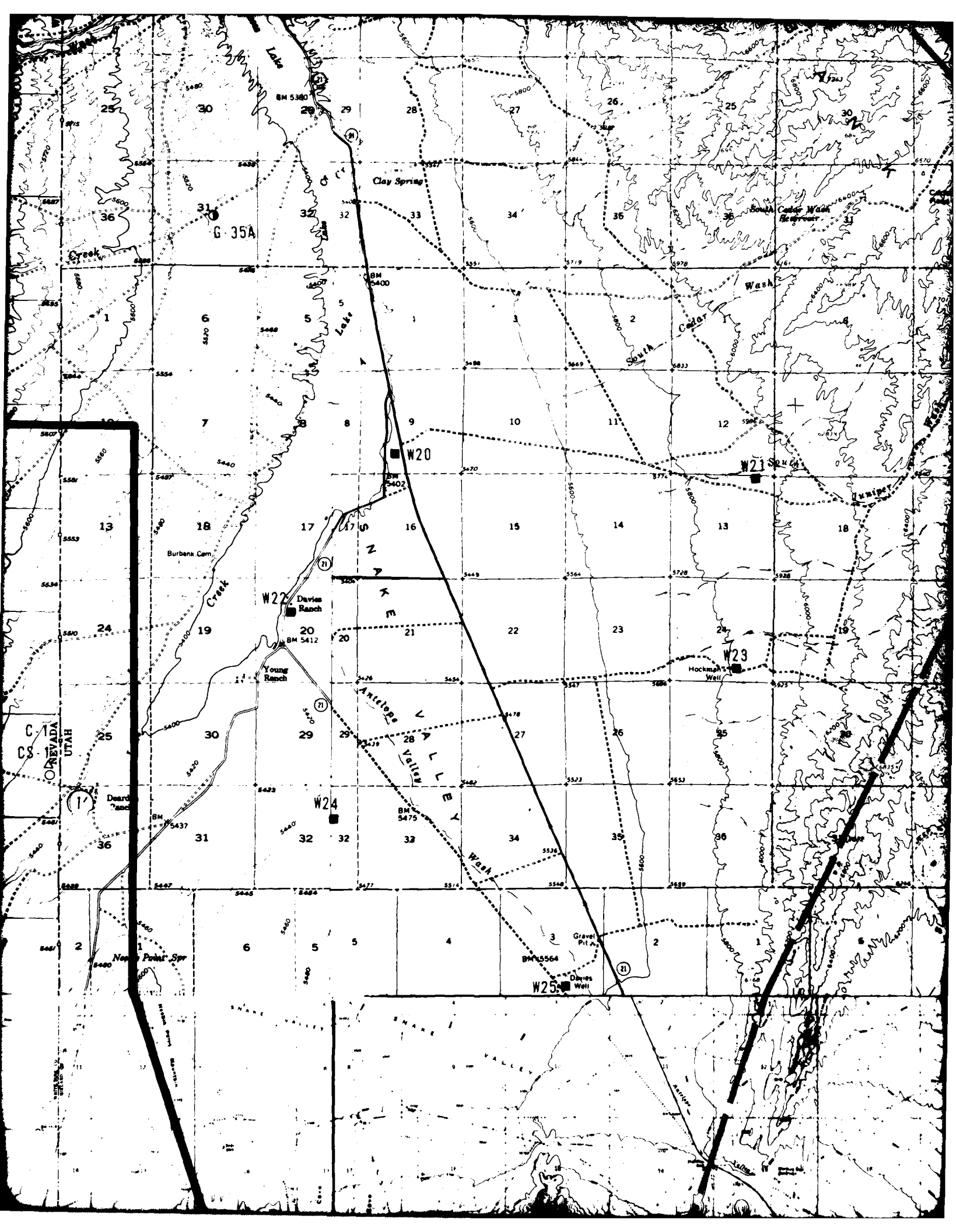


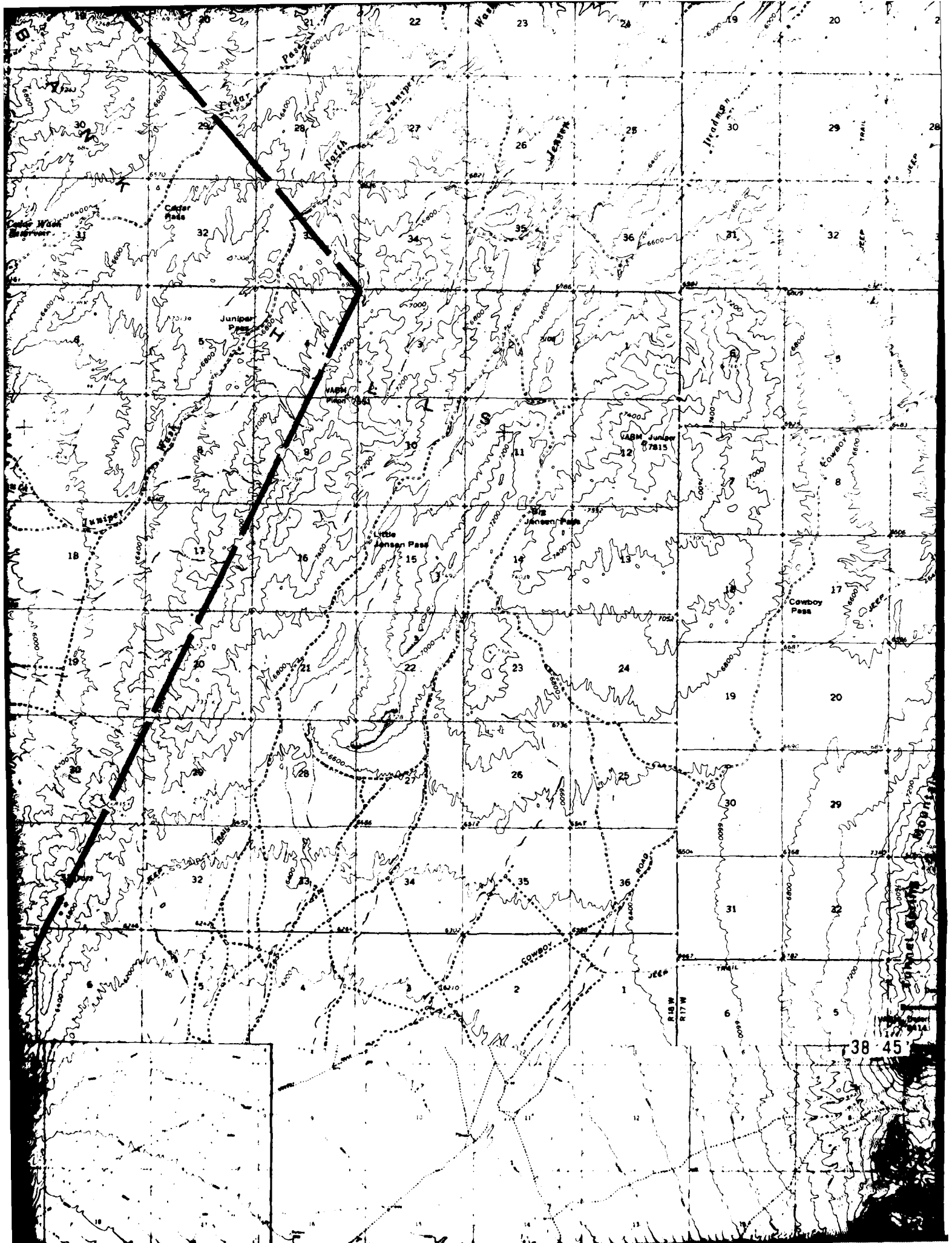












WHITE PINE CO
LINCOLN CO

WHITE PINE CO
LINCOLN CO

S-6
R-6

C-24
CS-24
G-5A

C-23
CS-23

S-5
R-5
C-27
CS-27

C-26
CS-26
C-25
P-6
S-4
R-4
G-23A

C-28
P-7

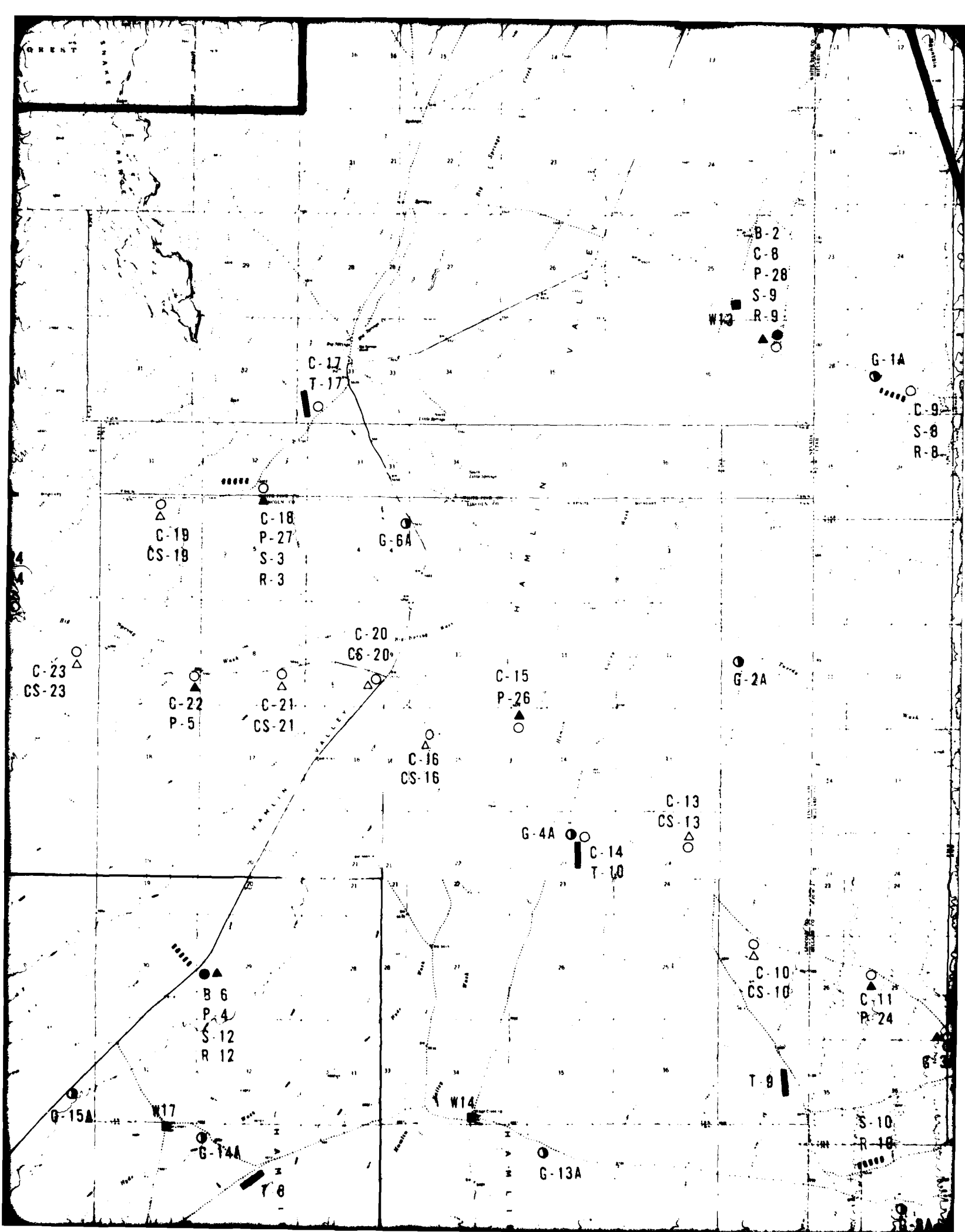
2

S-7
R-7

G-22A

G-15A

B-4
C-29
T-2



FOREST

C-17
T-17

B-2
C-8
P-28
S-9
R-9
W13

G-1A

C-9
S-8
R-8

C-19
CS-19

C-18
P-27
S-3
R-3

G-6A

C-20
CS-20

G-22
P-5

C-21
CS-21

C-15
P-26

G-2A

C-23
CS-23

C-16
CS-16

C-13
CS-13

G-4A
C-14
T-10

C-10
CS-10

C-11
P-24

B-6
P-4
S-12
R-12

T-8

S-10
R-10

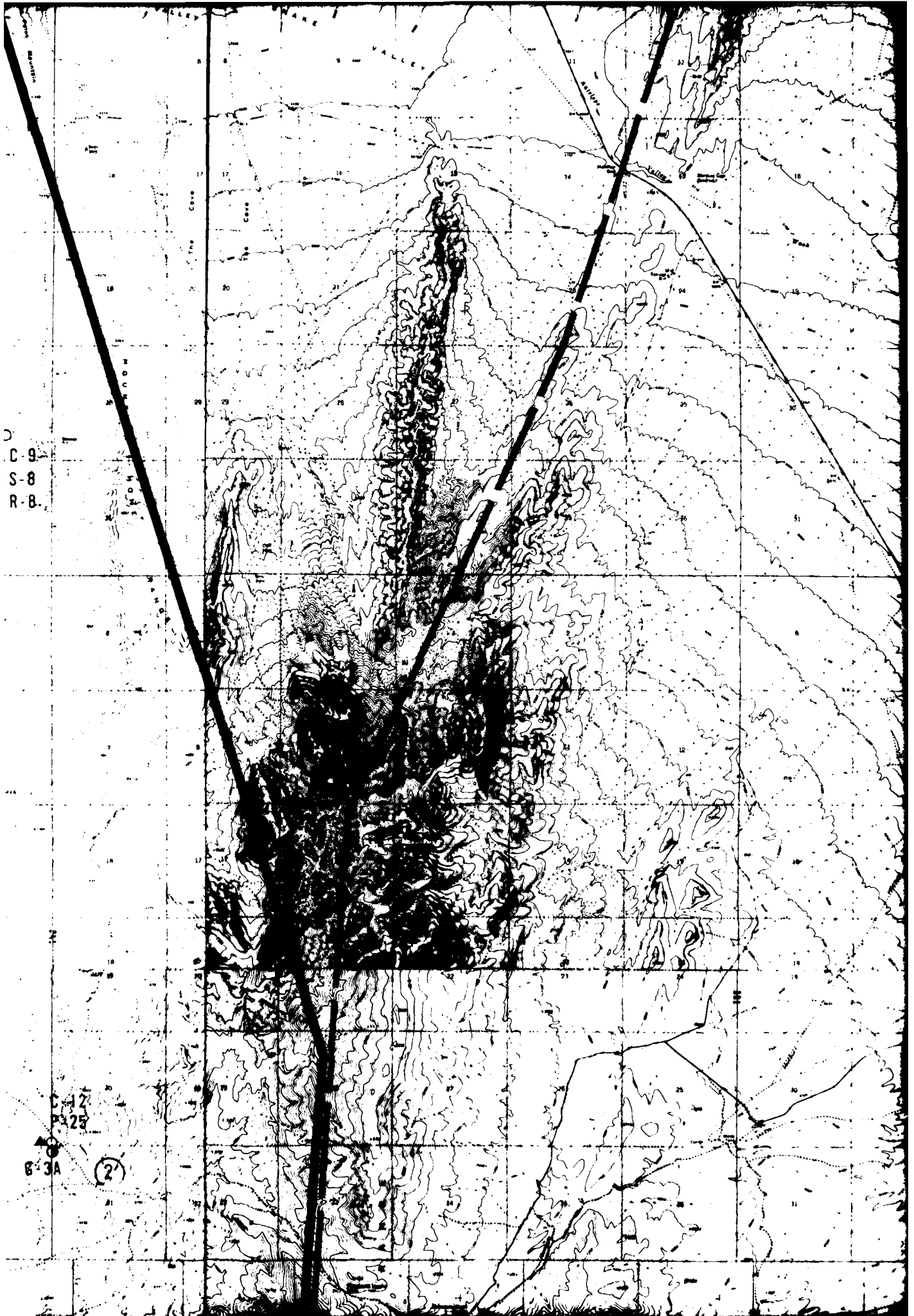
G-15A

W17

G-14A

W14

G-13A

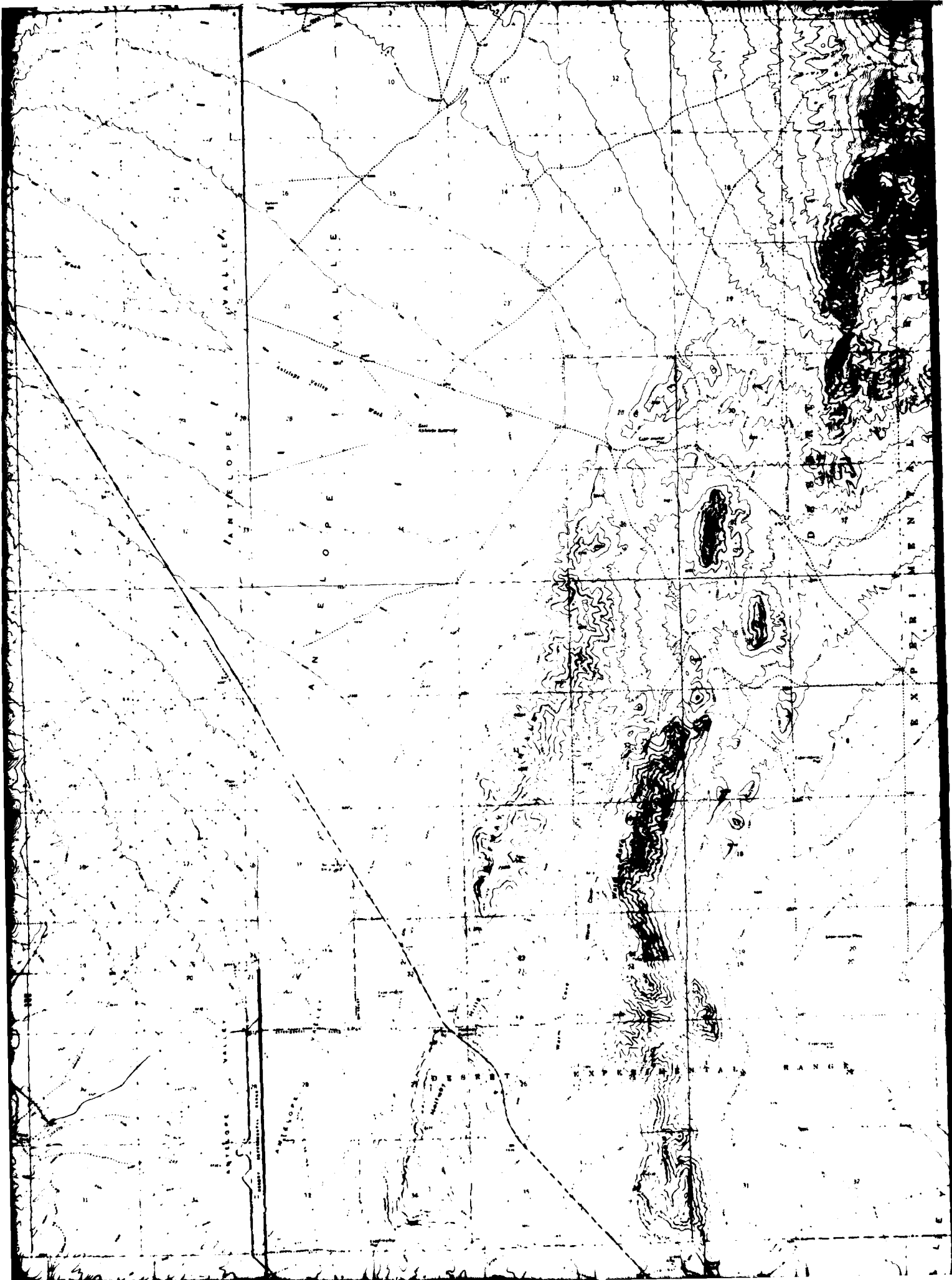


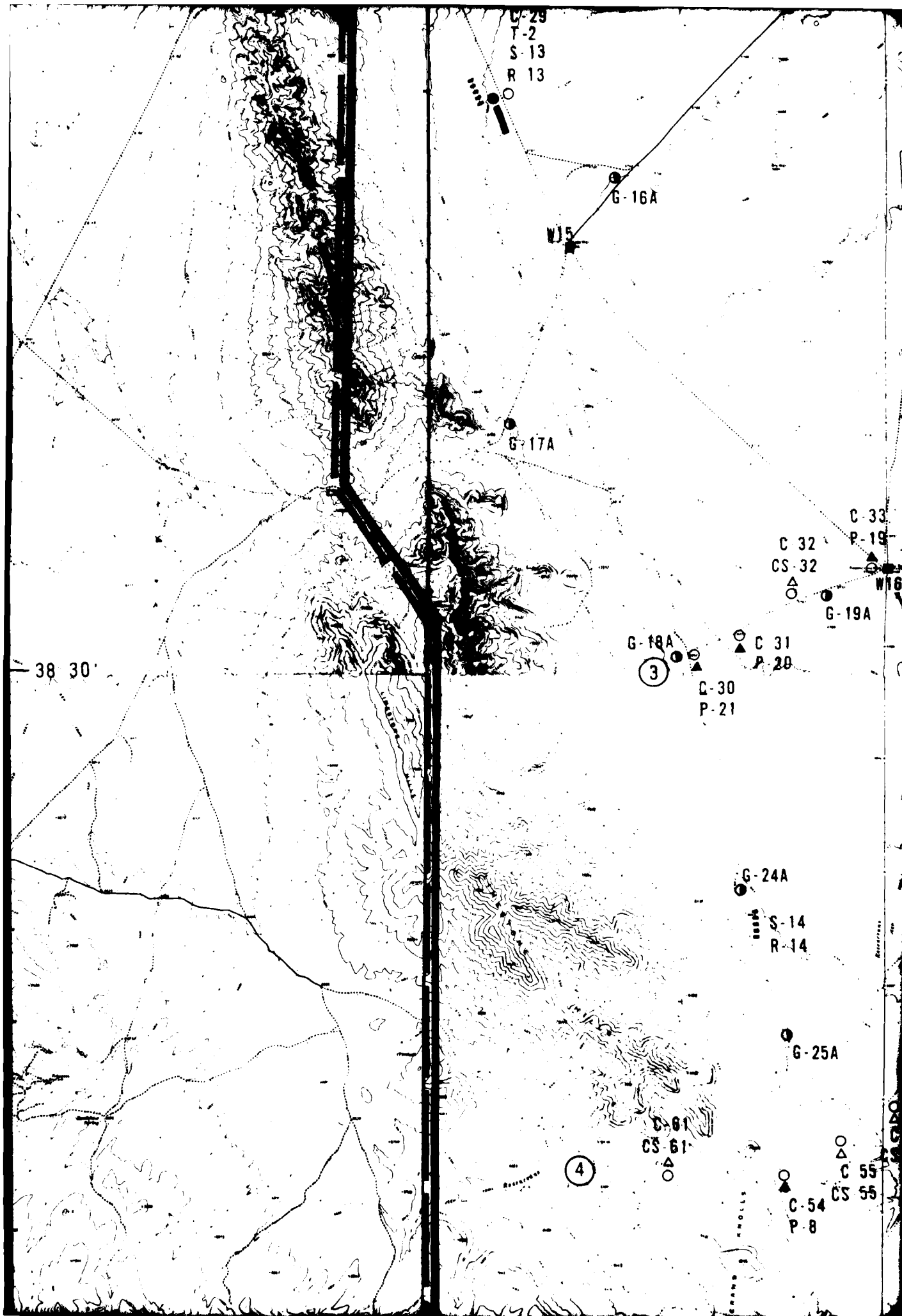
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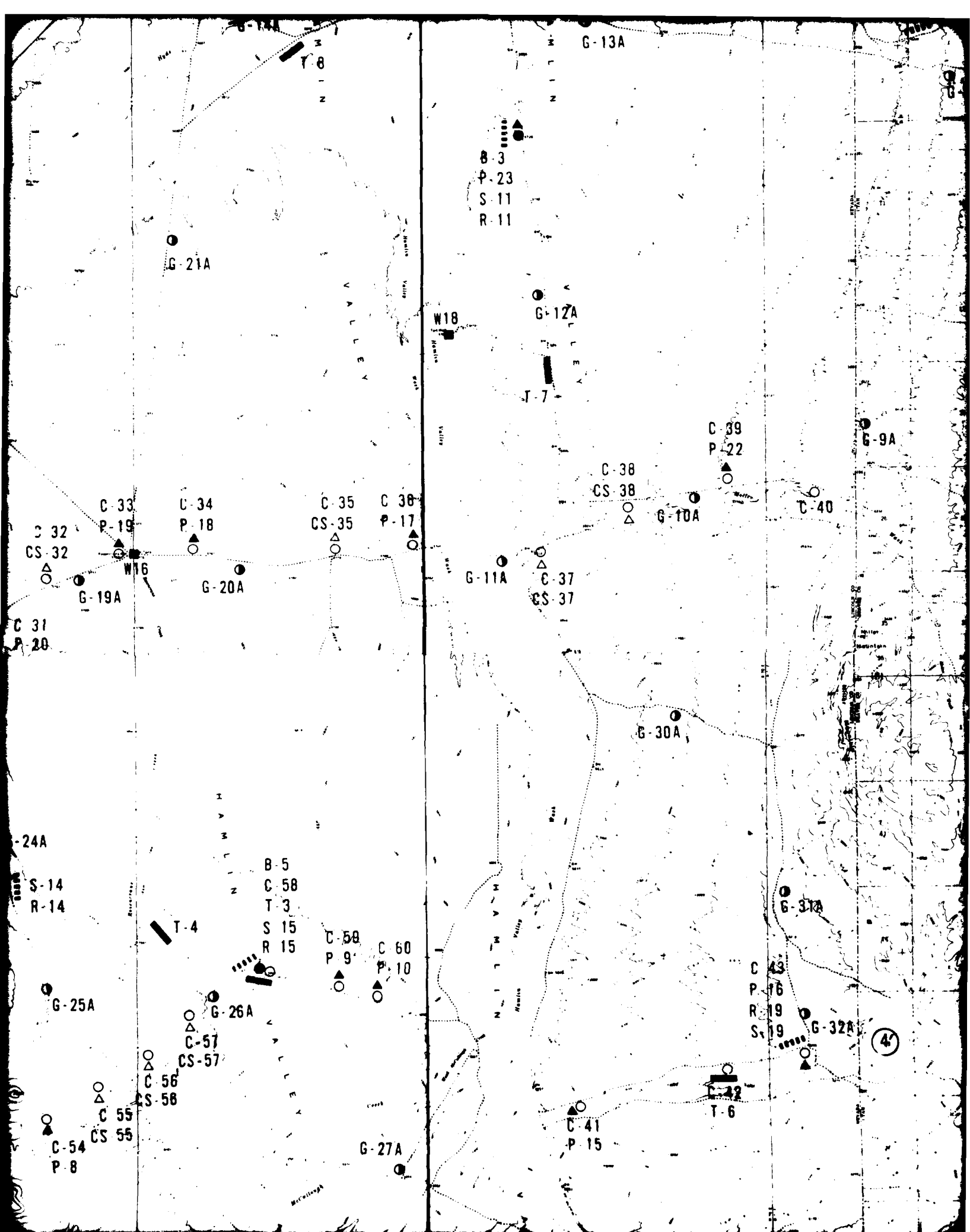
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P-25

B-3A

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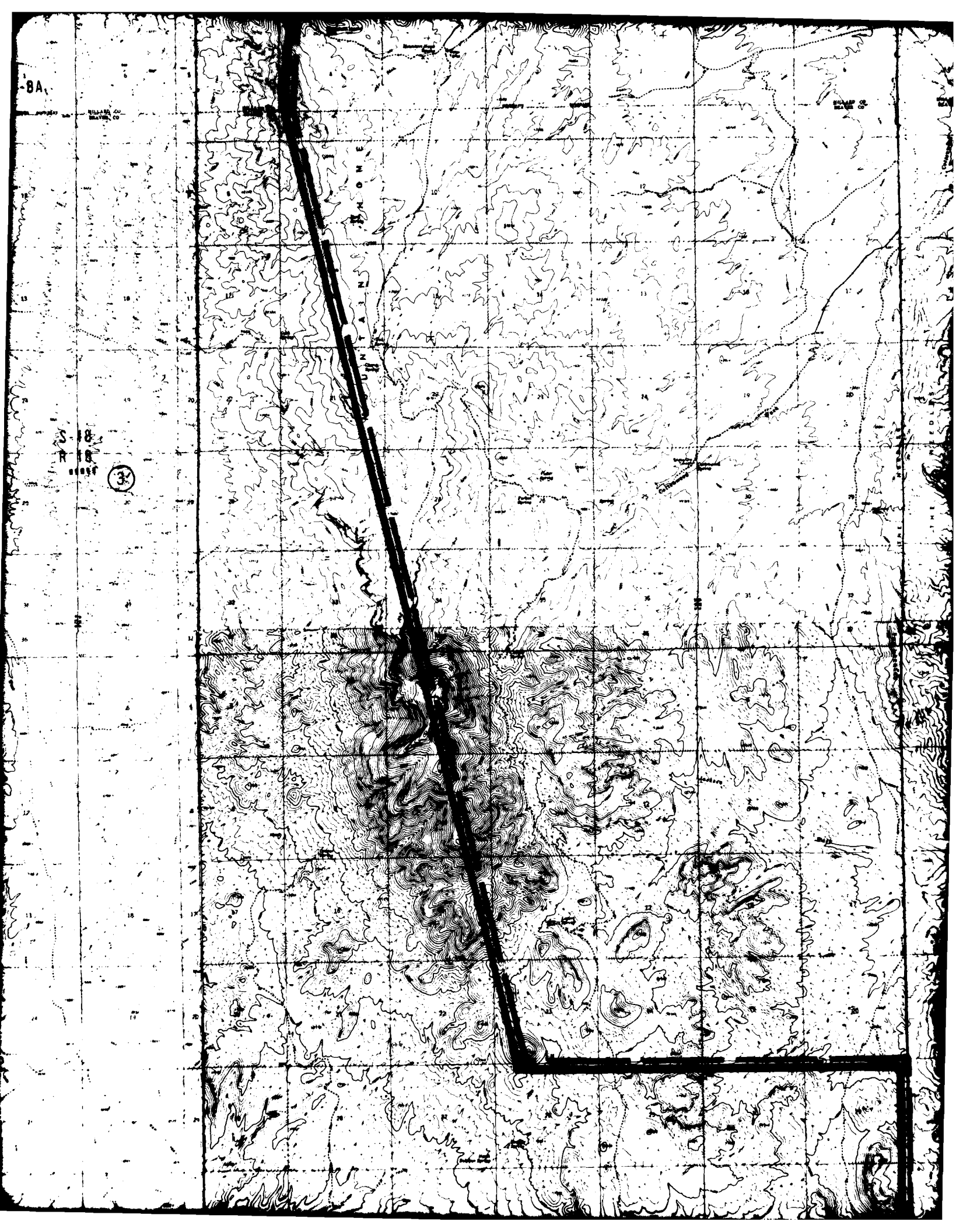


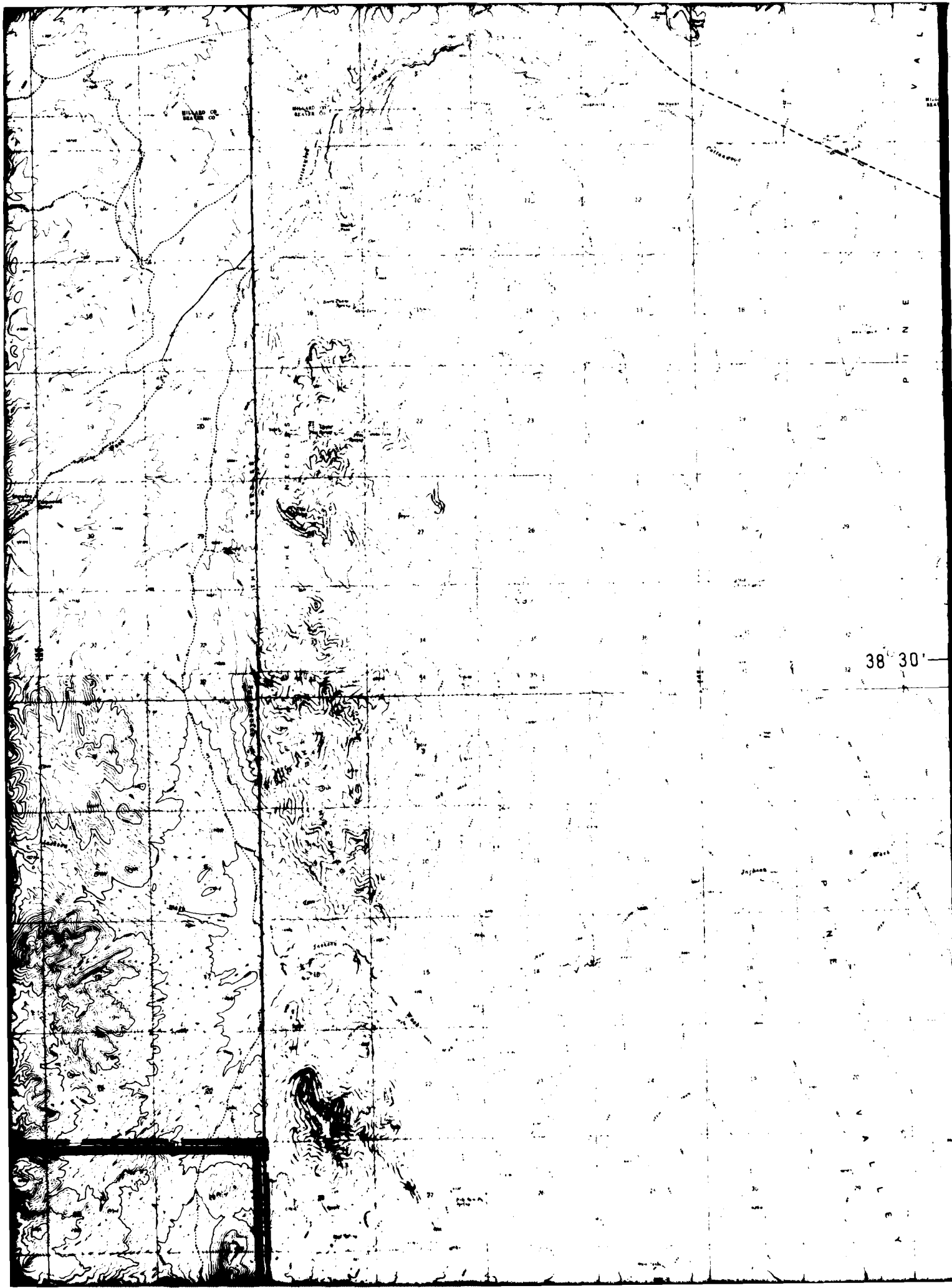
-8A

WILLIAM CO
MAY 1960

WILLIAM CO
MAY 1960

(32)



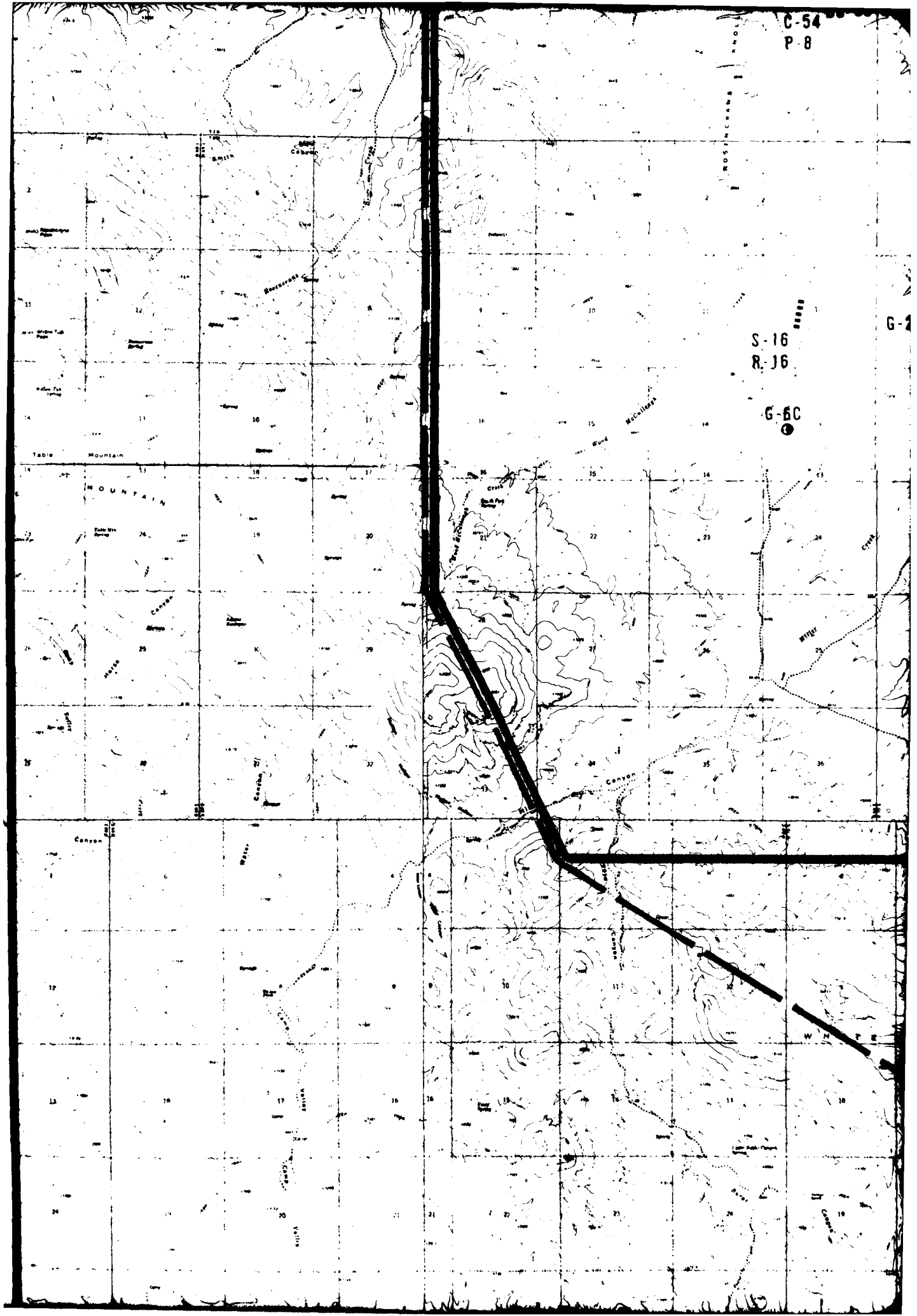


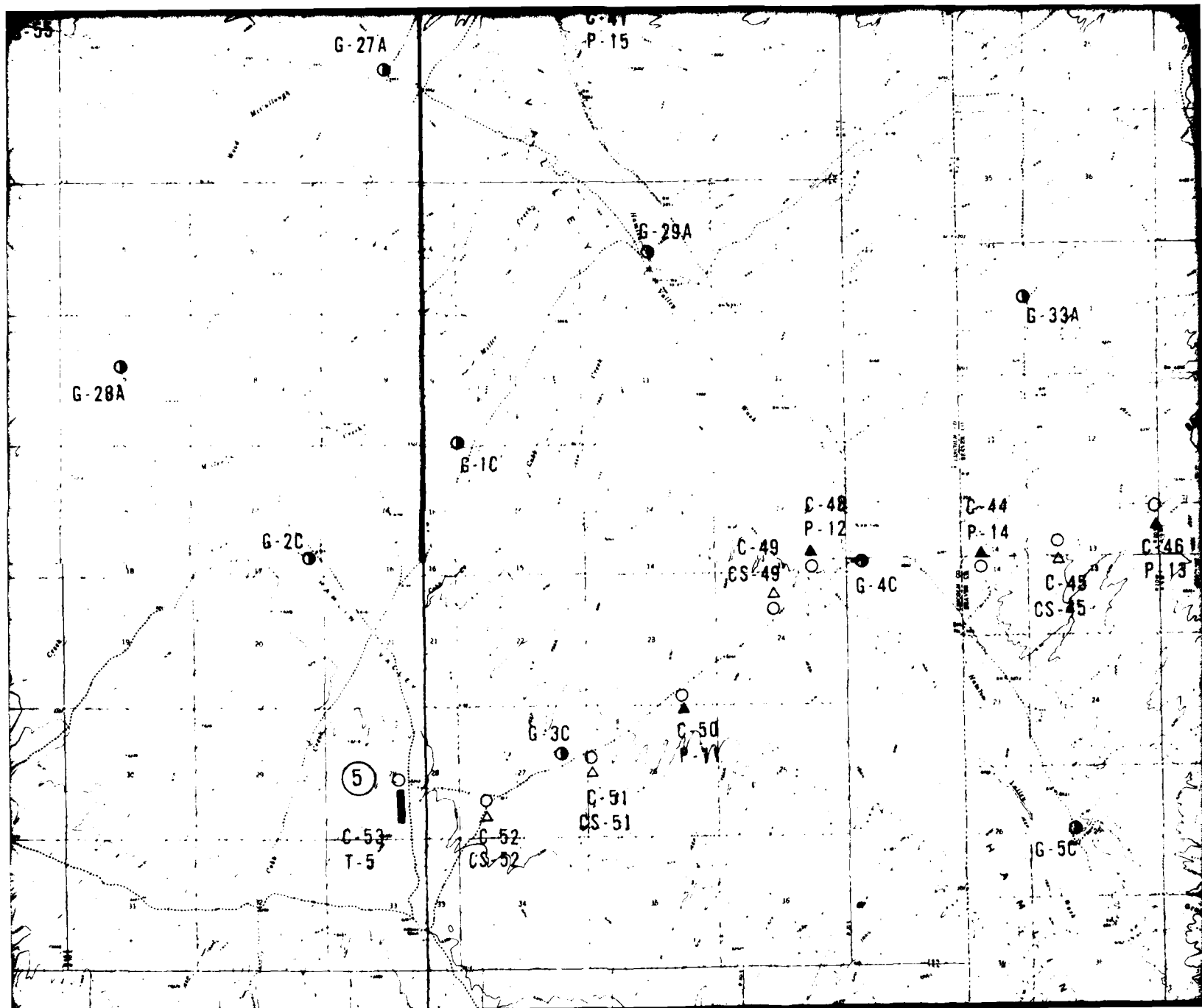
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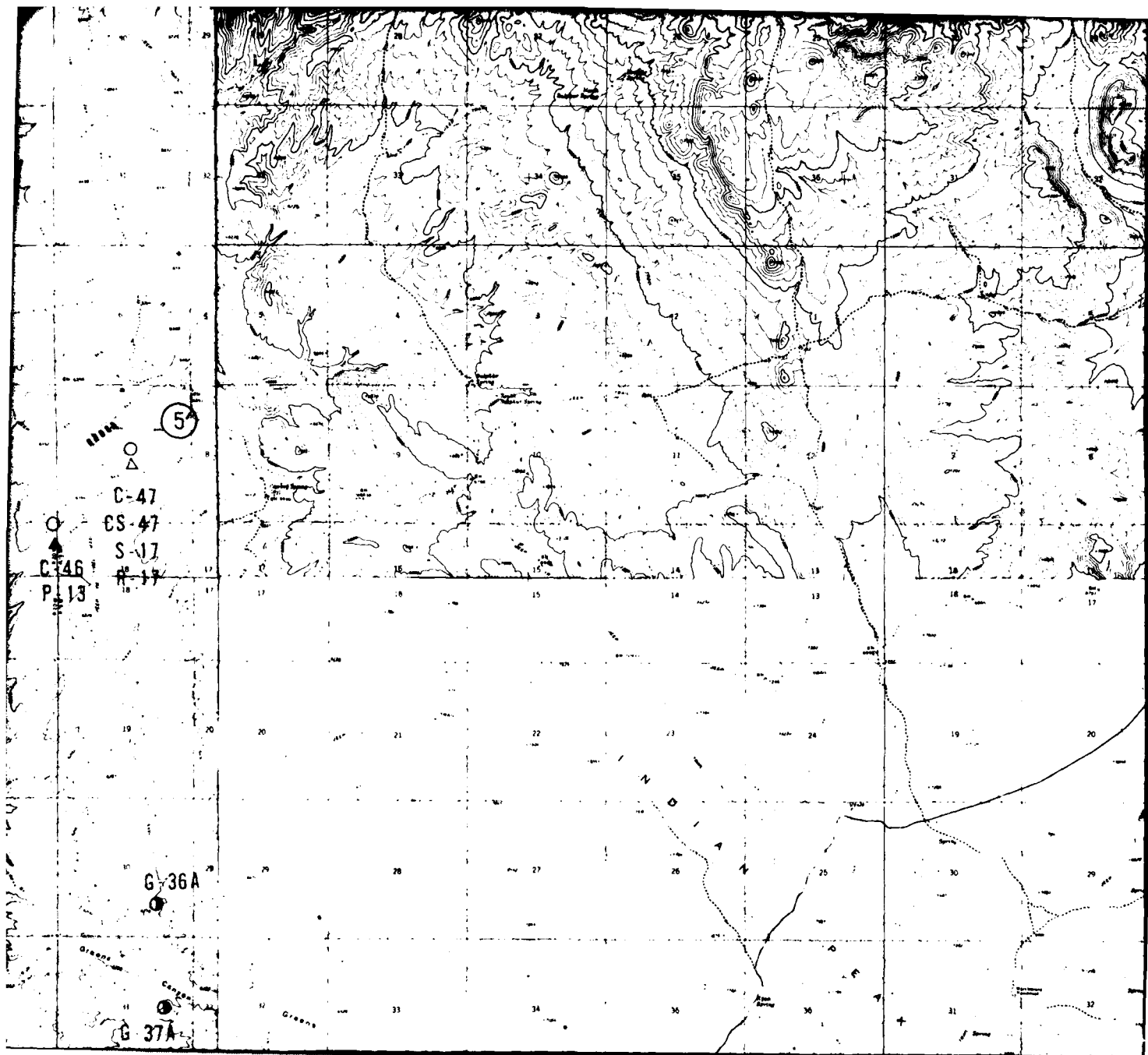
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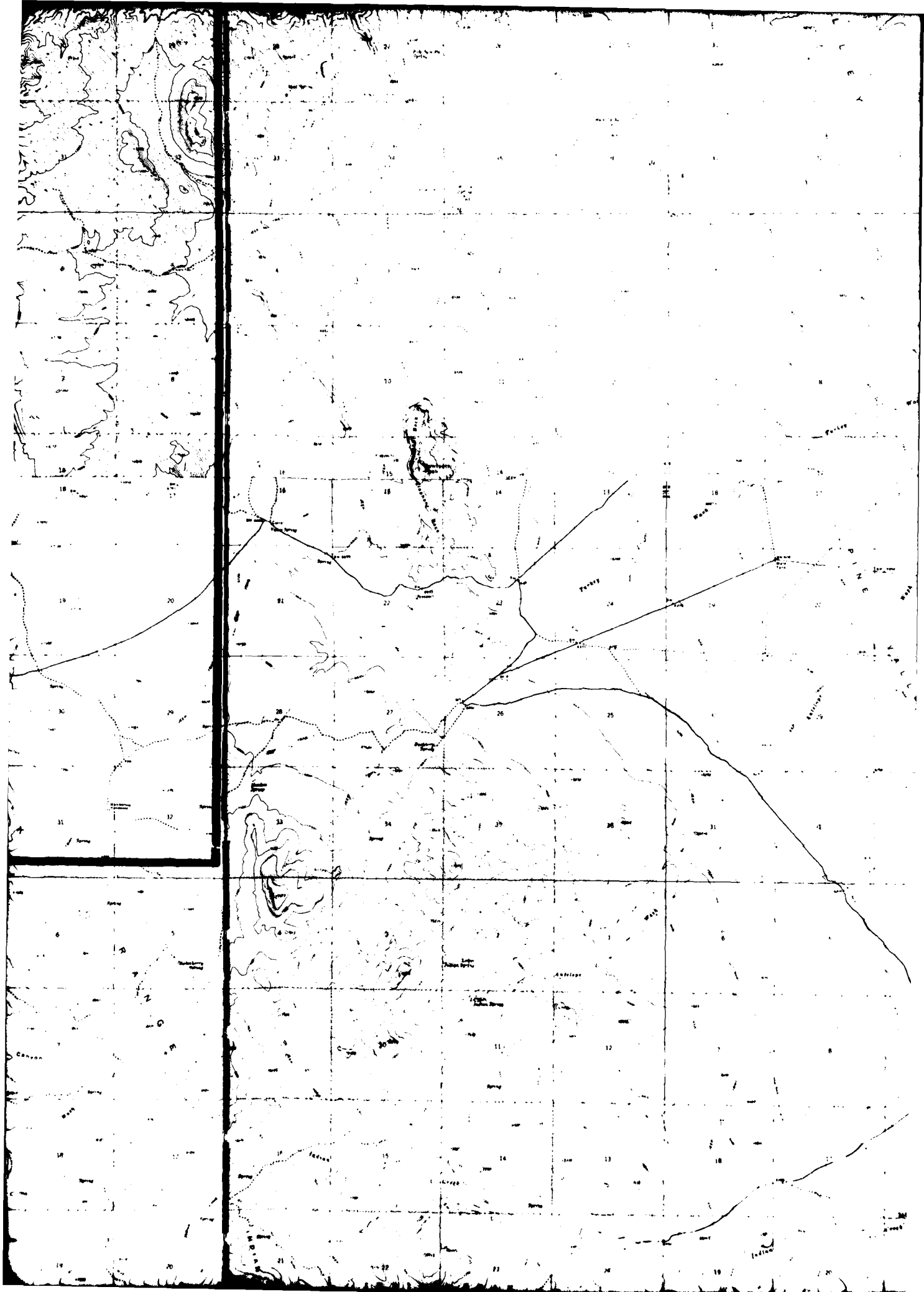
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R-16

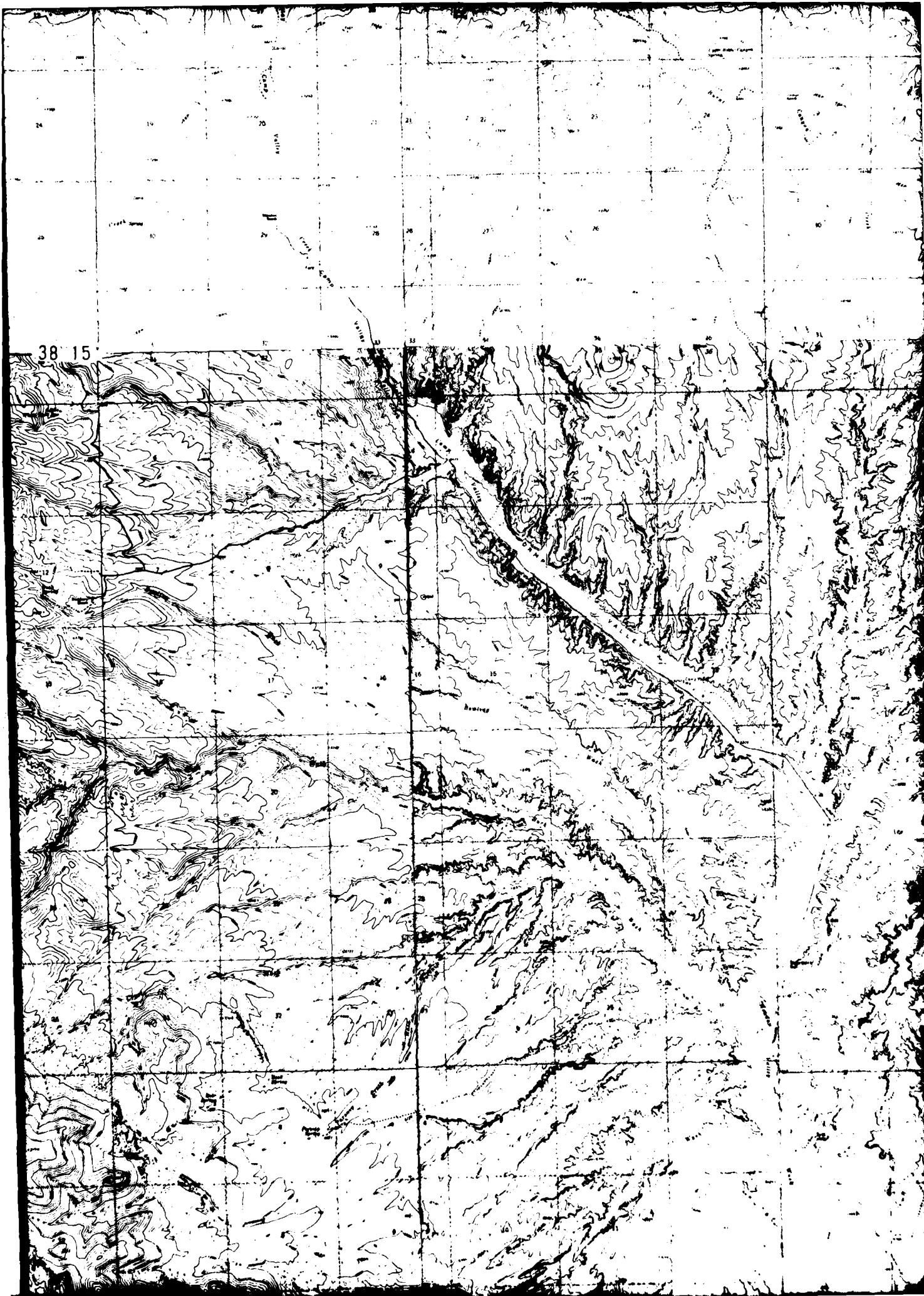
G-6C
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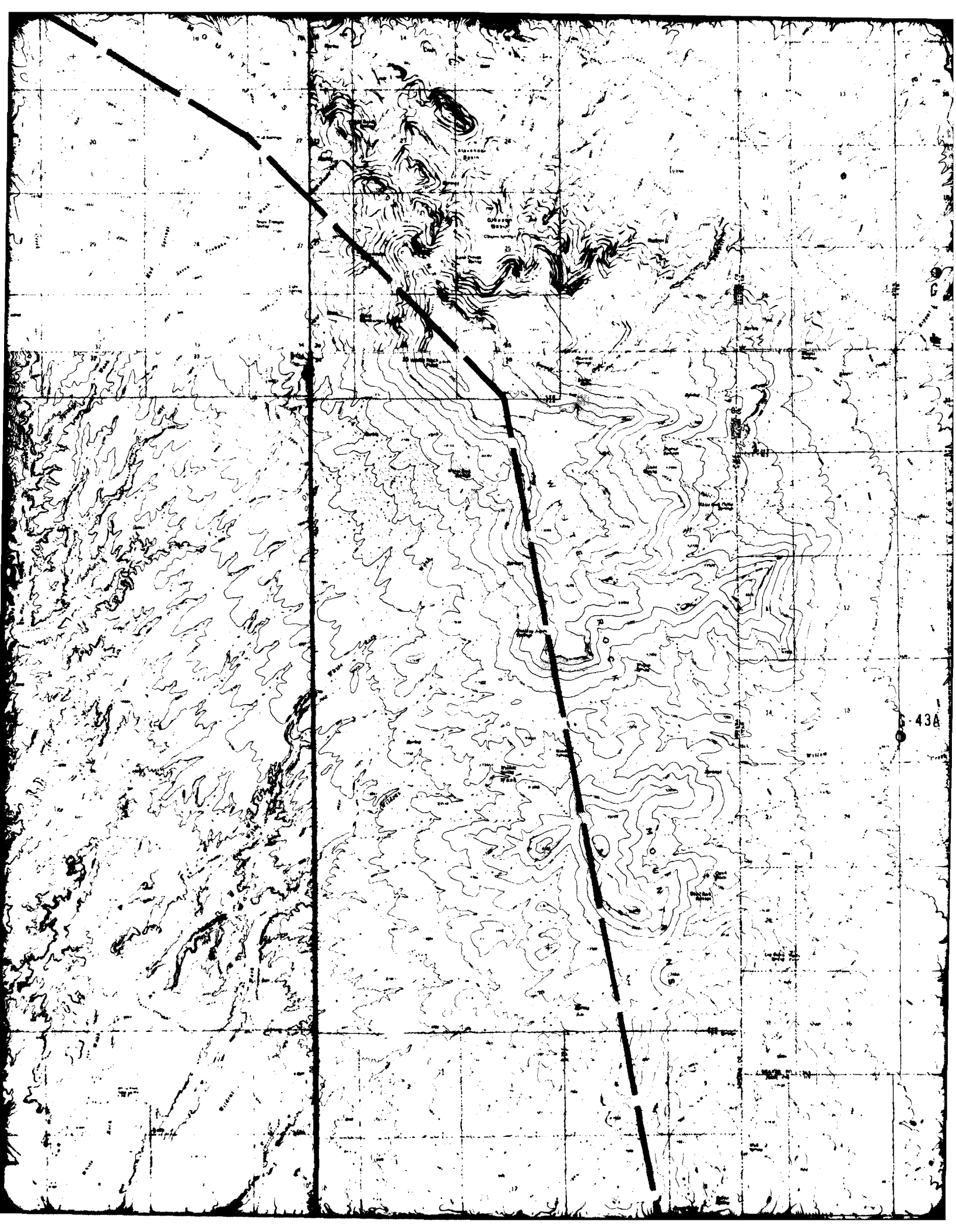




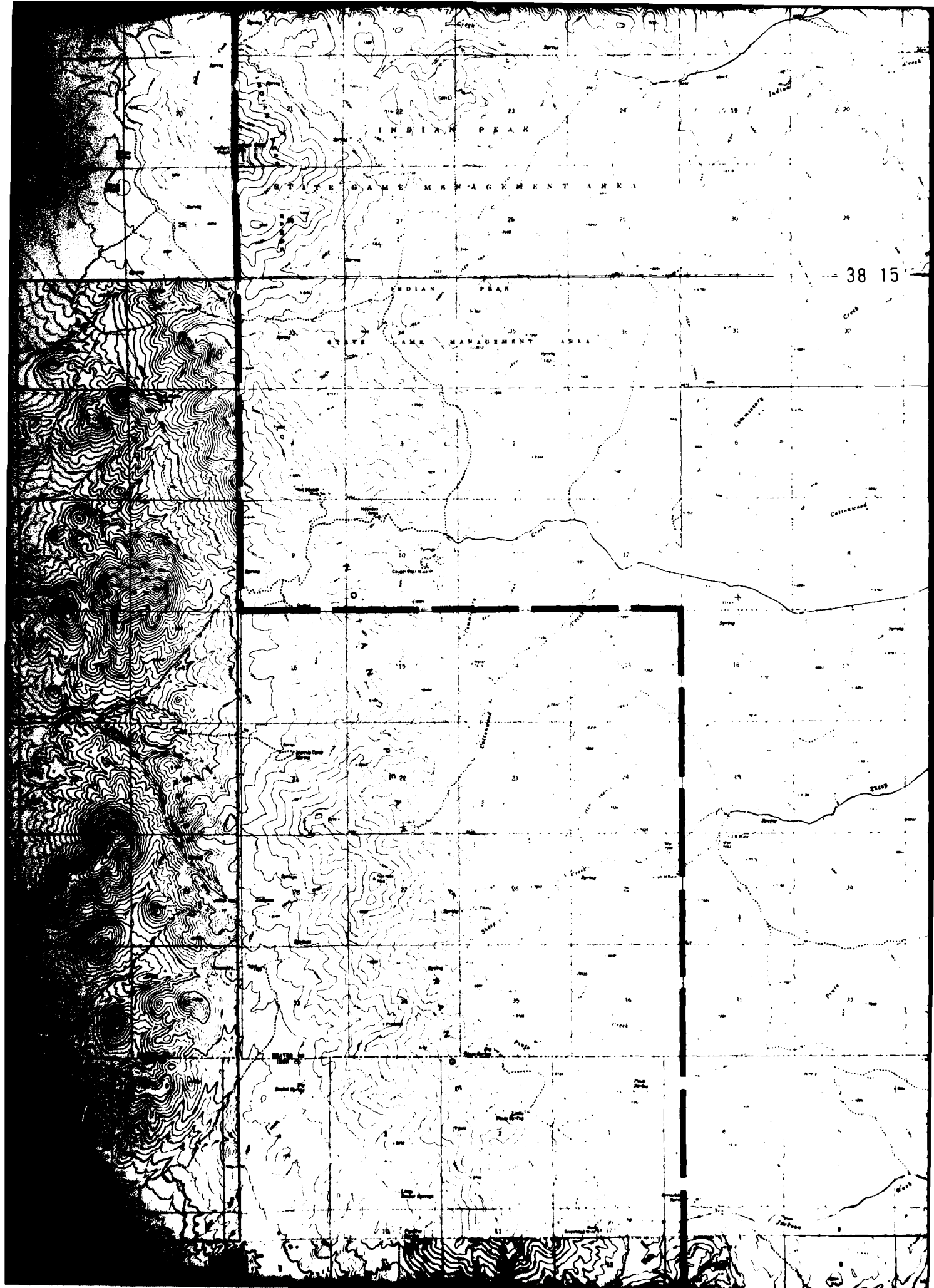


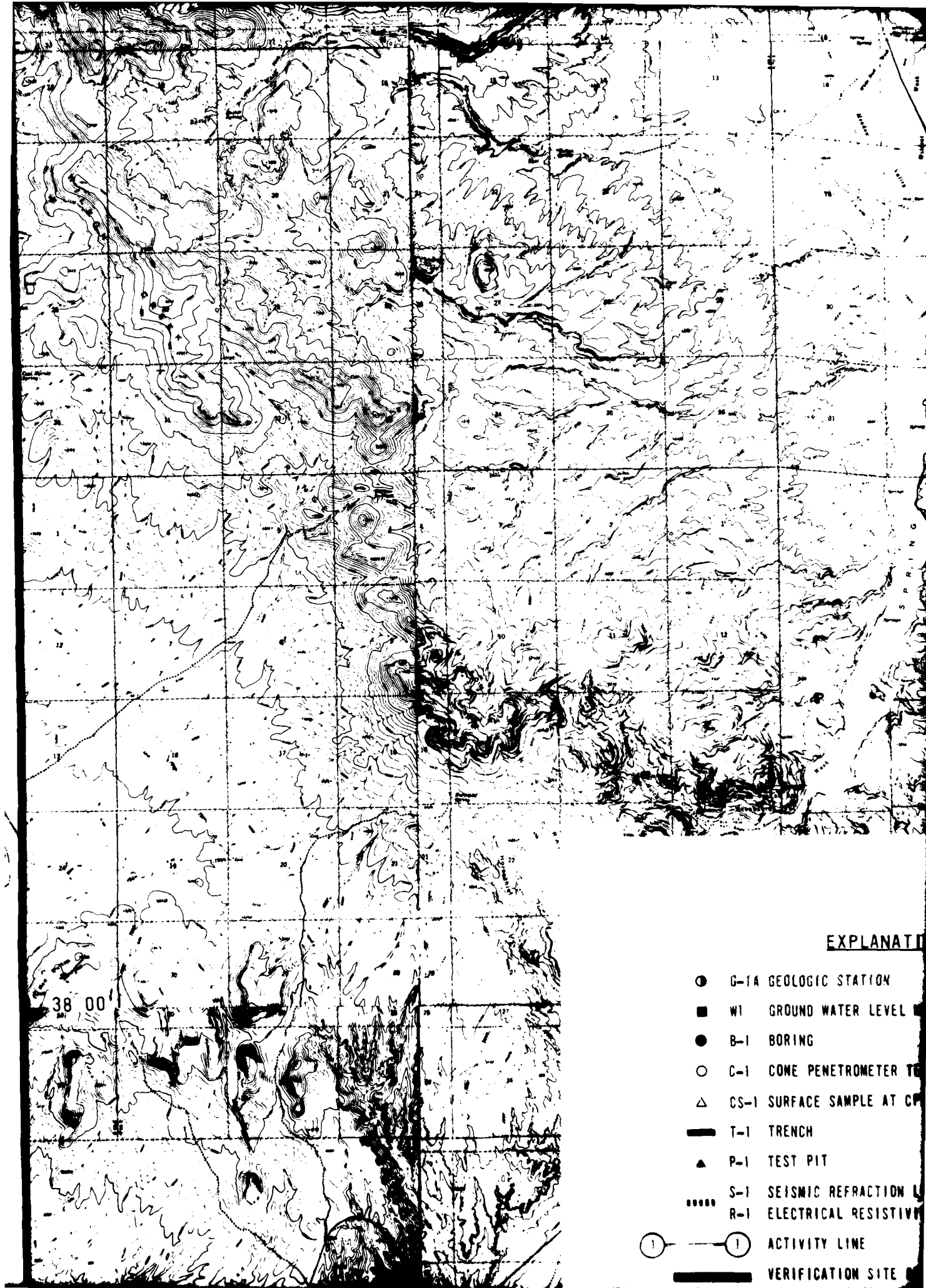






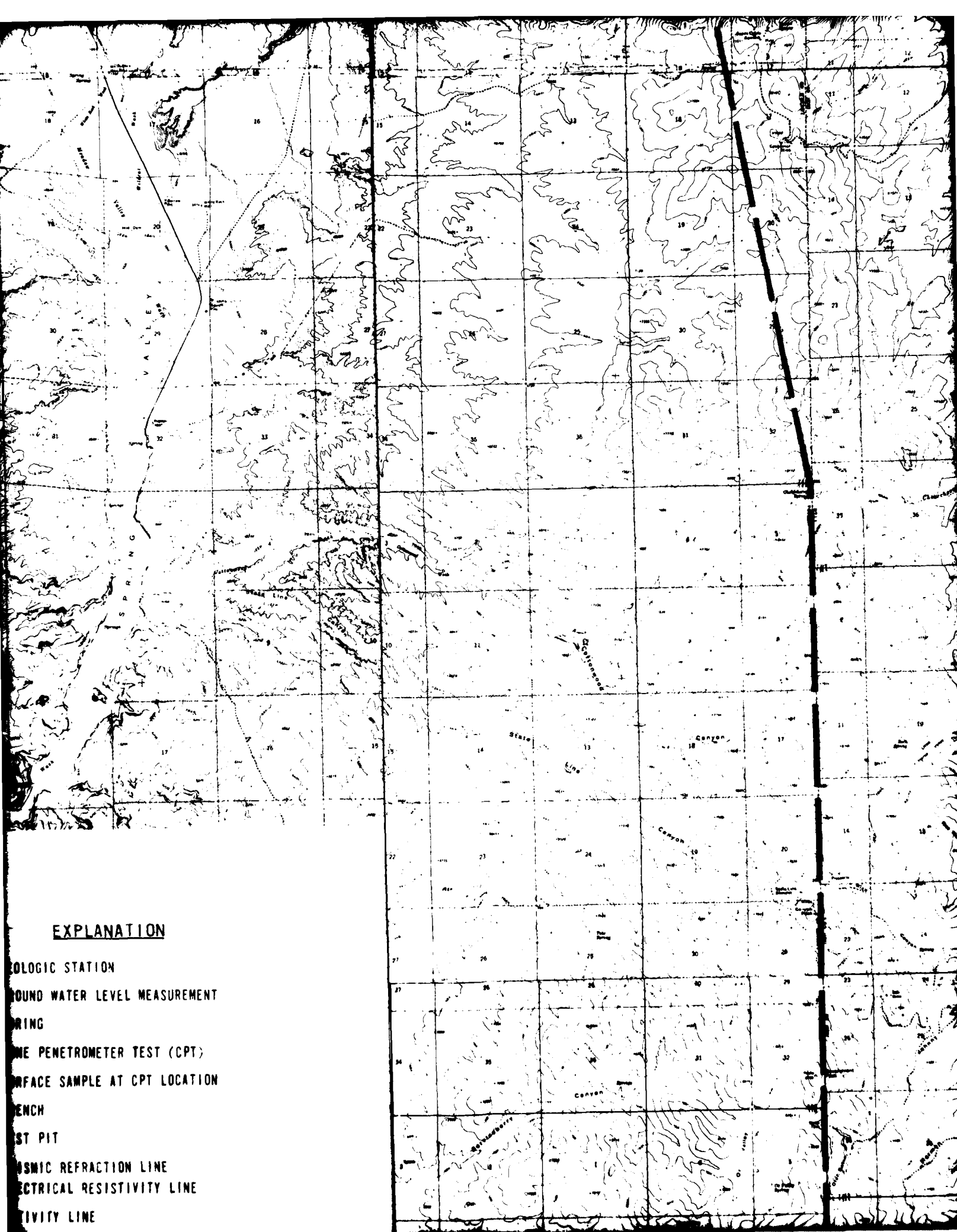






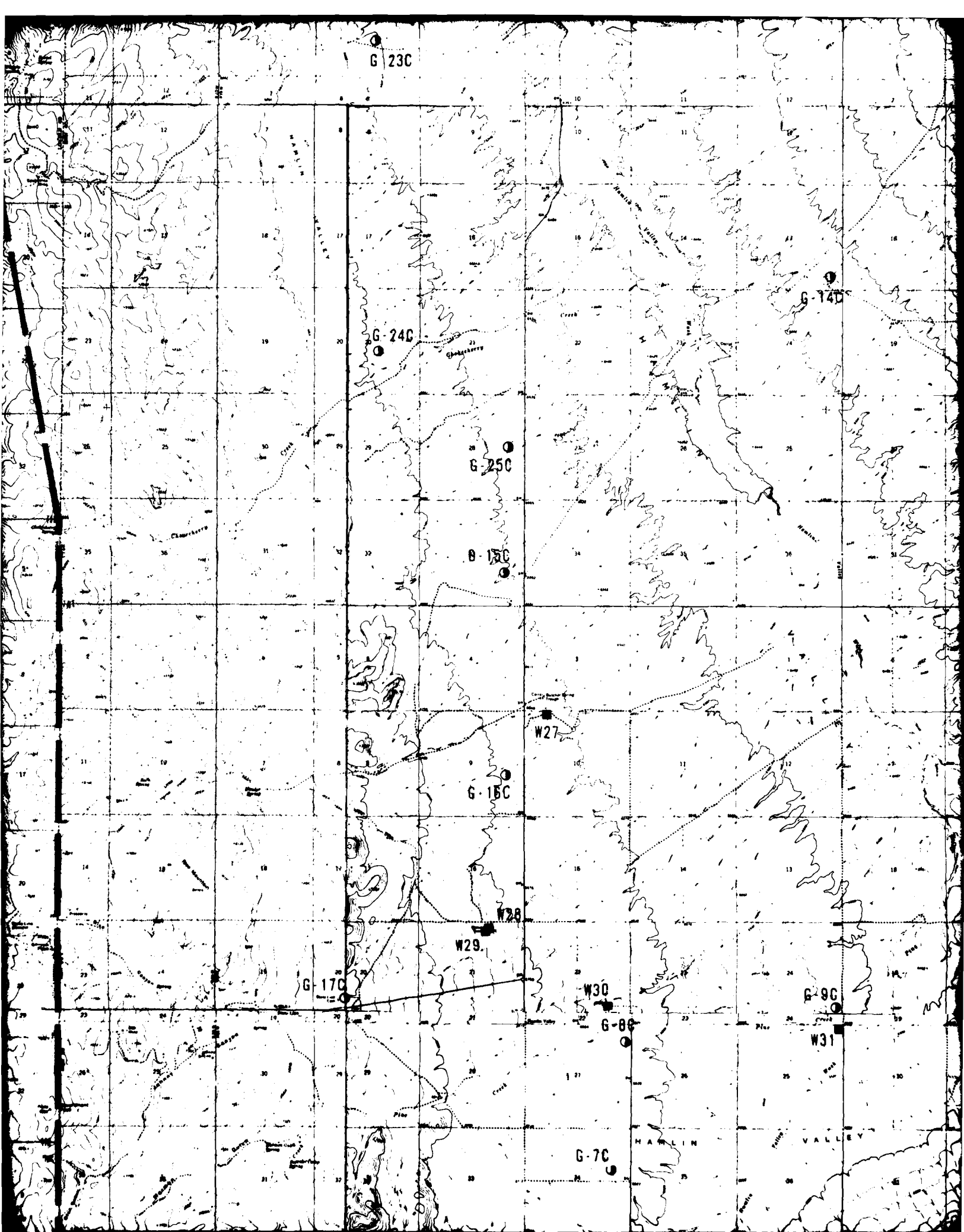
EXPLANATION

- G-1A GEOLOGIC STATION
- W1 GROUND WATER LEVEL
- B-1 BORING
- C-1 CONE PENETROMETER TEST
- △ CS-1 SURFACE SAMPLE AT CP
- T-1 TRENCH
- ▲ P-1 TEST PIT
- S-1 SEISMIC REFRACTION LINE
- R-1 ELECTRICAL RESISTIVITY
- ① — ① ACTIVITY LINE
- VERIFICATION SITE



EXPLANATION

- GEOLOGIC STATION
- BOUND WATER LEVEL MEASUREMENT
- SPRING
- △ CONE PENETROMETER TEST (CPT)
- ◇ SURFACE SAMPLE AT CPT LOCATION
- BENCH
- TEST PIT
- SEISMIC REFRACTION LINE
- ELECTRICAL RESISTIVITY LINE
- RESISTIVITY LINE



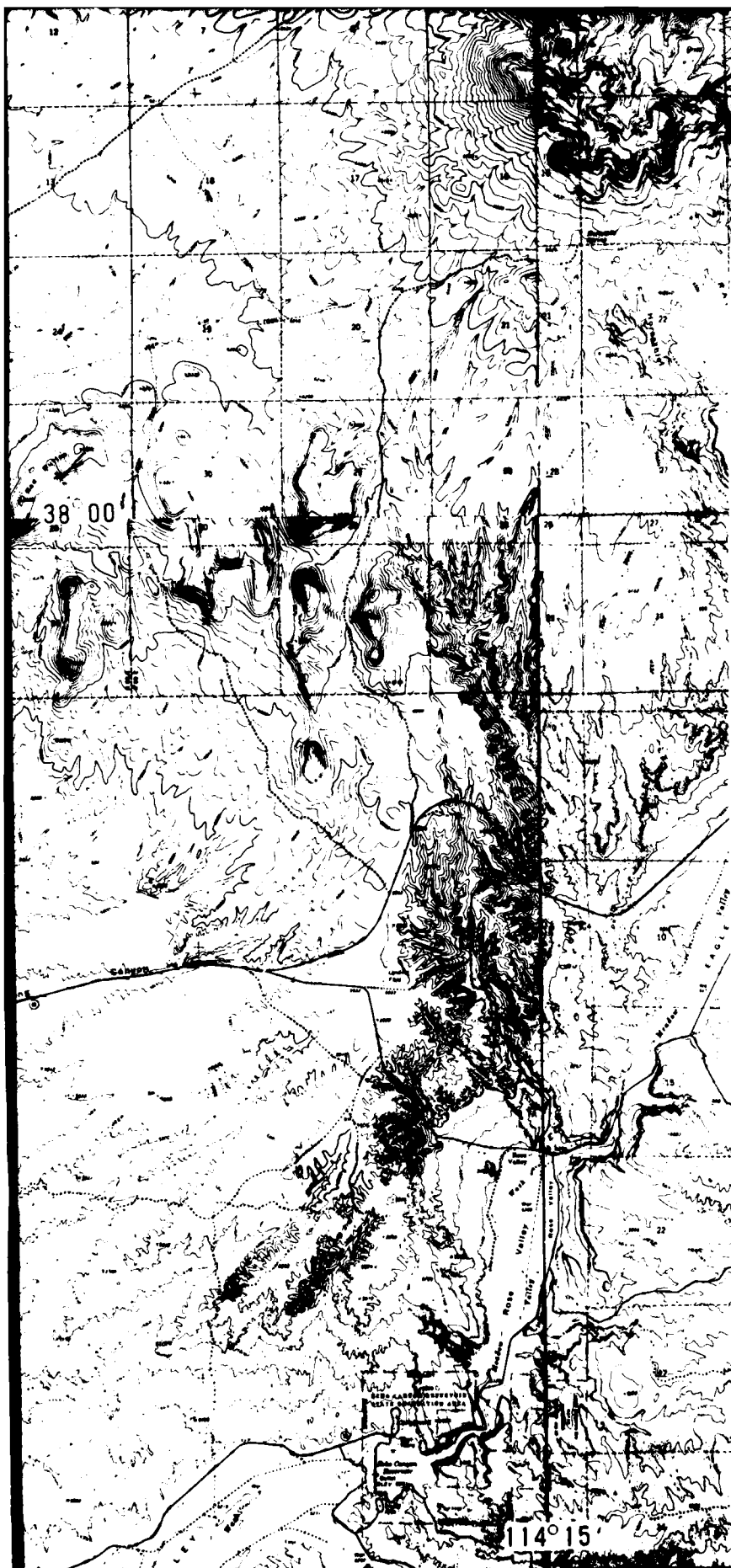
G-13C

G-12C

G-11C

G-10C

38 00

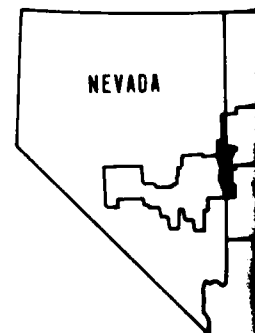


EXPLANATION

- G-1A GEOLOGIC STATION
- W-1 GROUND WATER LEVEL
- B-1 BORING
- C-1 CONE PENETROMETER TEST
- △ CS-1 SURFACE SAMPLE AT CPT
- T-1 TRENCH
- ▲ P-1 TEST PIT
- S-1 SEISMIC REFRACTION LINE
- R-1 ELECTRICAL RESISTIVITY
- ① — ① ACTIVITY LINE
- VERIFICATION SITE BOUNDARY
- CANDIDATE DEPLOYMENT

NOTE: Where multiple activities were performed, the correct location is designated by the symbol or by the CPT symbol if applicable.

LOCATION



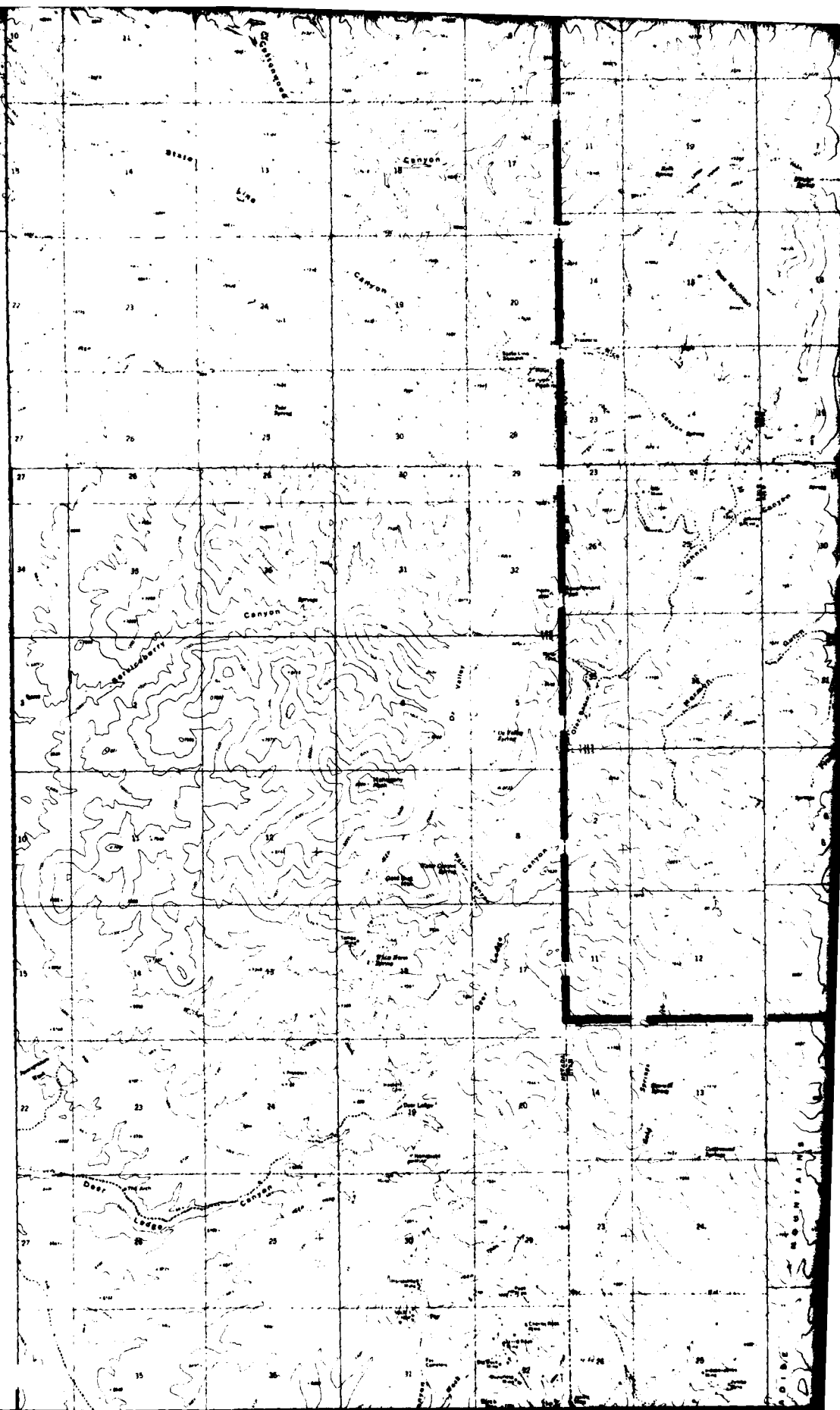
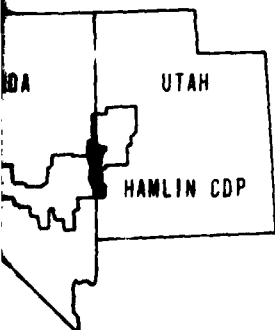
EXPLANATION

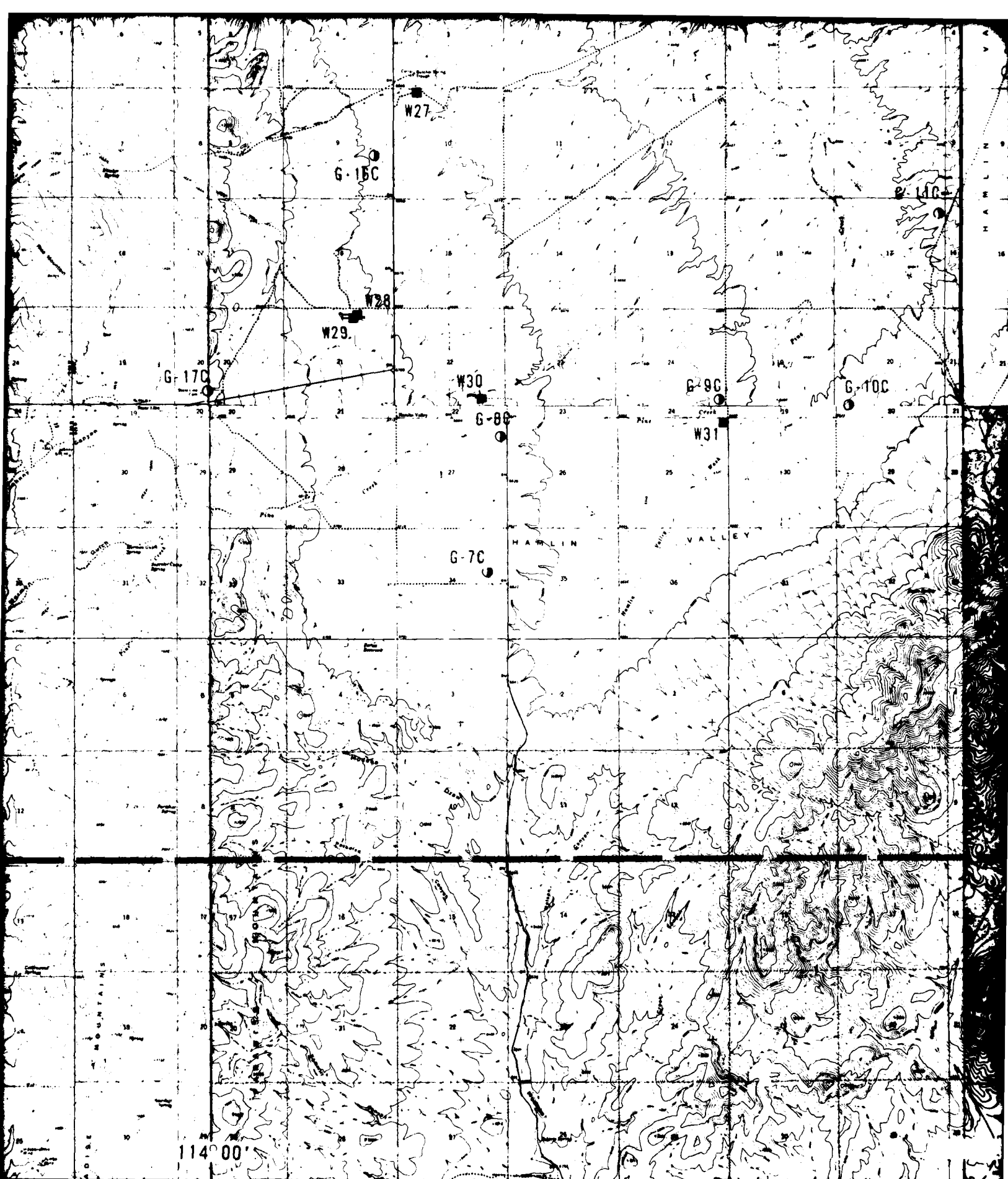
LOCATION
 LEVEL MEASUREMENT
 METER TEST (CPT)
 SAMPLE AT CPT LOCATION

SECTION LINE
 RESISTIVITY LINE
 SITE BOUNDARY
 DEPLOYMENT PARCEL (CDP) BOUNDARY

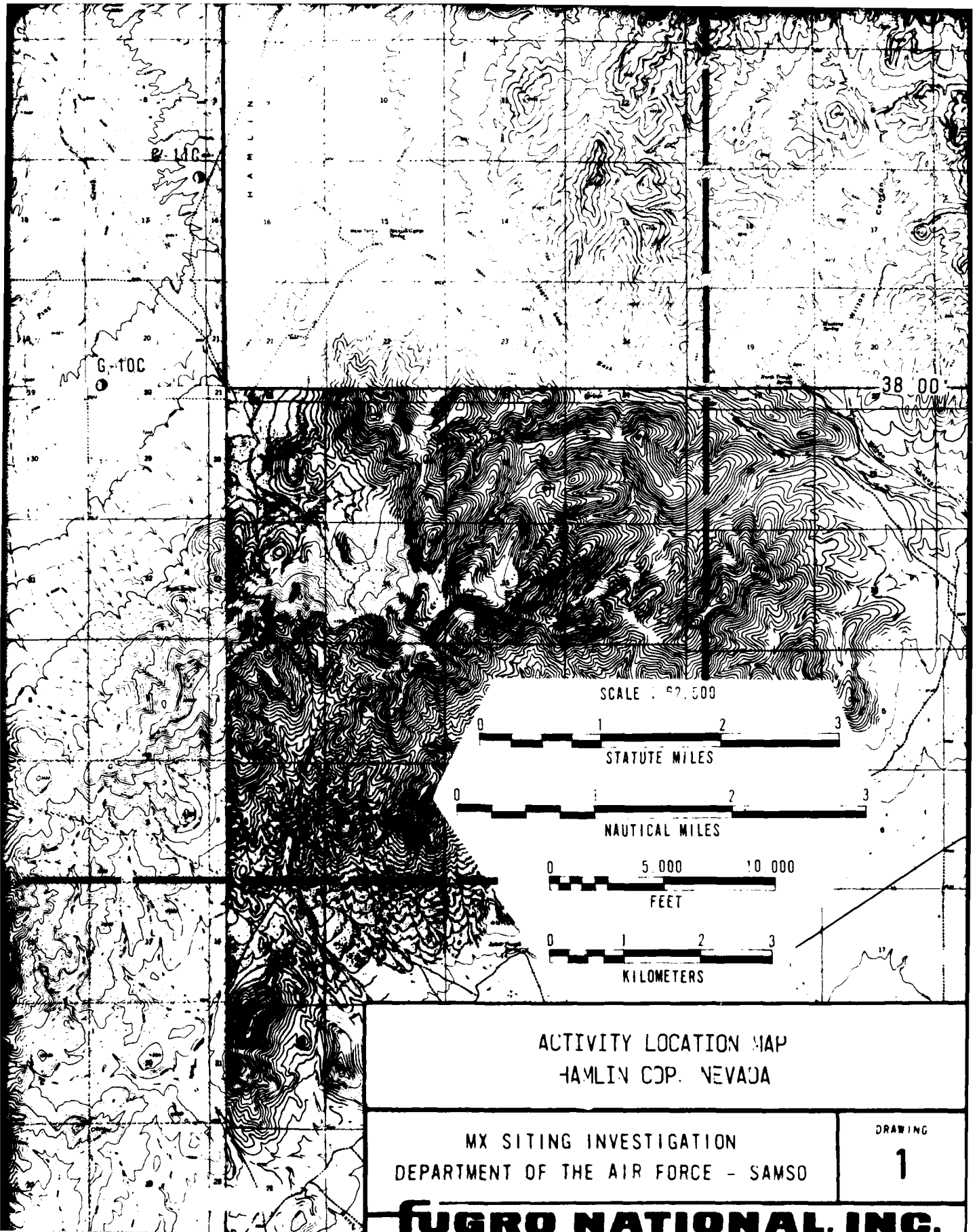
Notes were performed at the same location
 is designated by either (X) the boring
 symbol, if no boring was drilled

LOCATION MAP





114°00'



ACTIVITY LOCATION MAP
HAMLIN COP. NEVADA

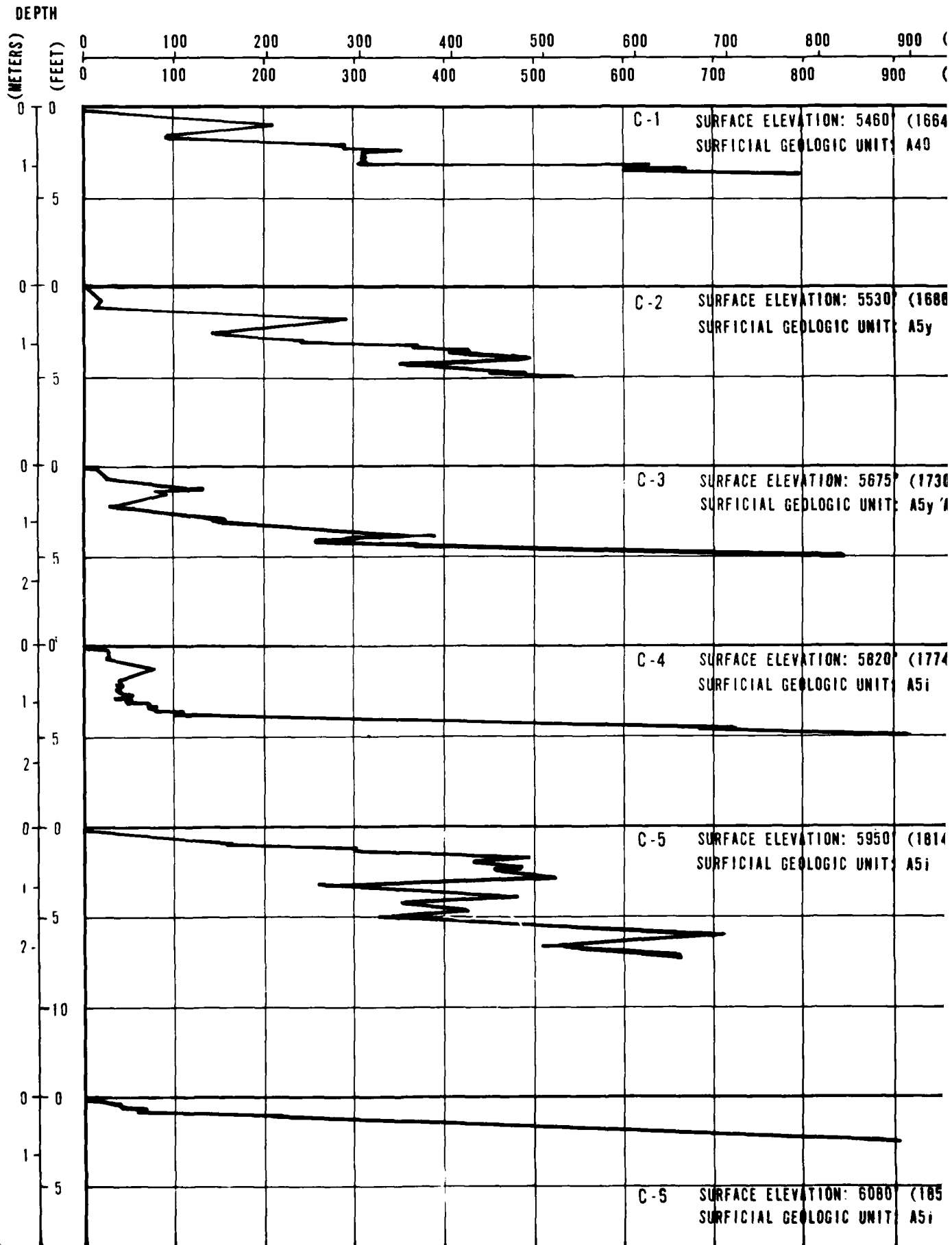
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING

1

FUGRO NATIONAL, INC.

CONE RESISTANCE



2

CONE RESISTANCE

900 (kg/cm²)

900 (tsf)

SOIL COLUMN

80 (1664m)
BT: A40

CS-1

SM

80 (1686m)
BT: A5y

P-1

SM

GM

75 (1730m)
BT: A5y A5i

T-1

SM

GM

20 (1774m)
BT: A5i

B-1

SM

SP-
SM

80 (1814m)
BT: A5i

CS-5

SM

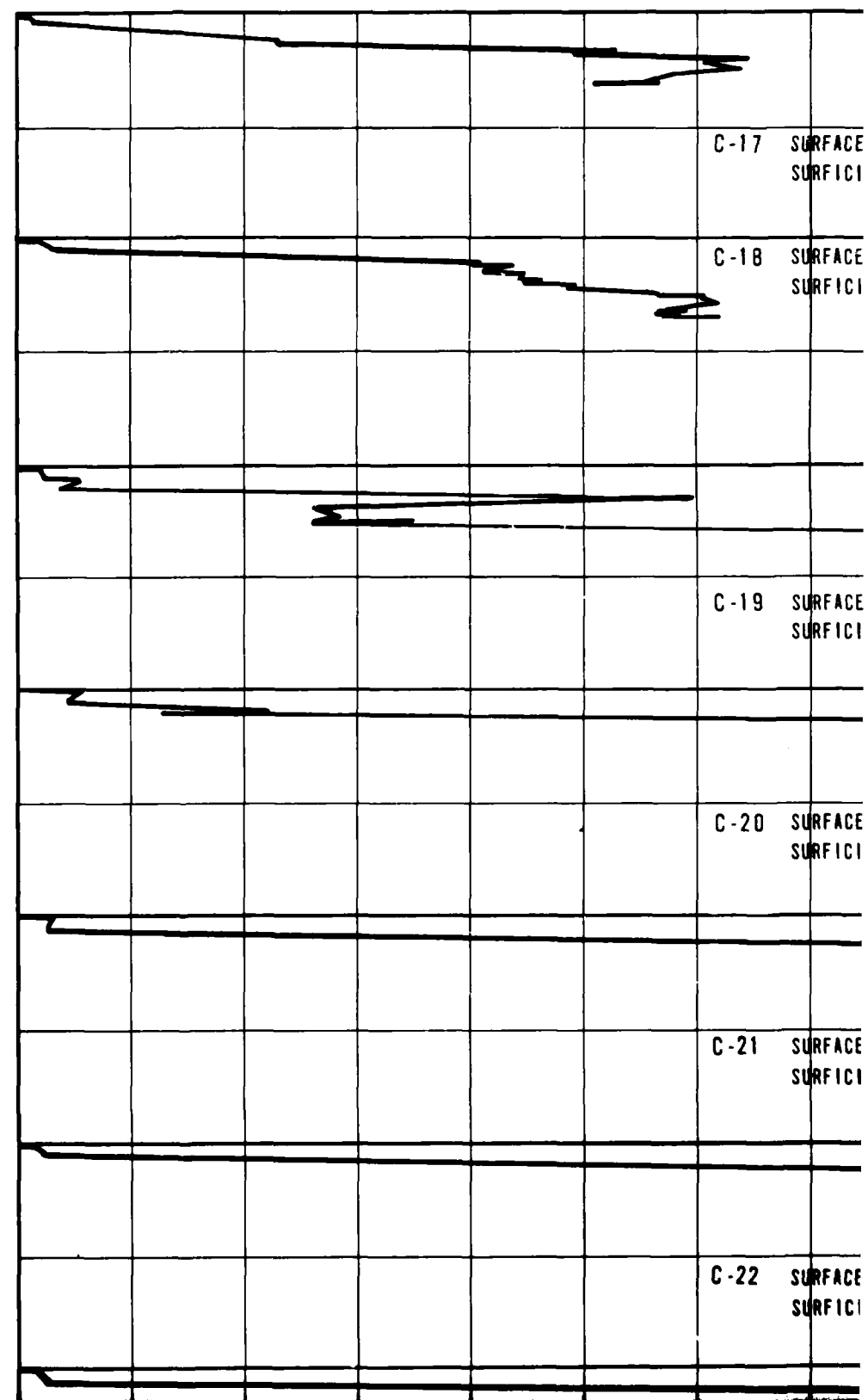
GP

(1853m)

DEPTH

(METERS)
(FEET)

0 100 200 300 400 500 600 700
0 100 200 300 400 500 600 700



AD-A113 326

FUGRO NATIONAL INC LONG BEACH CA

F/6 8/12

WX SITING INVESTIGATION. GEOTECHNICAL EVALUATION. VOLUME IV. NE--ETC(U)

AUG 79

F04704-78-C-0027

UNCLASSIFIED

FN-TR-27-VOL-4

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8 - 8

9 - 9

10 - 10

11 - 11

12 - 12

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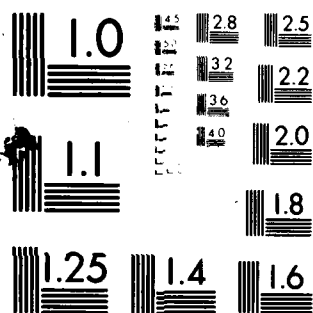
END

DATE

FILED

5-82

DTIC



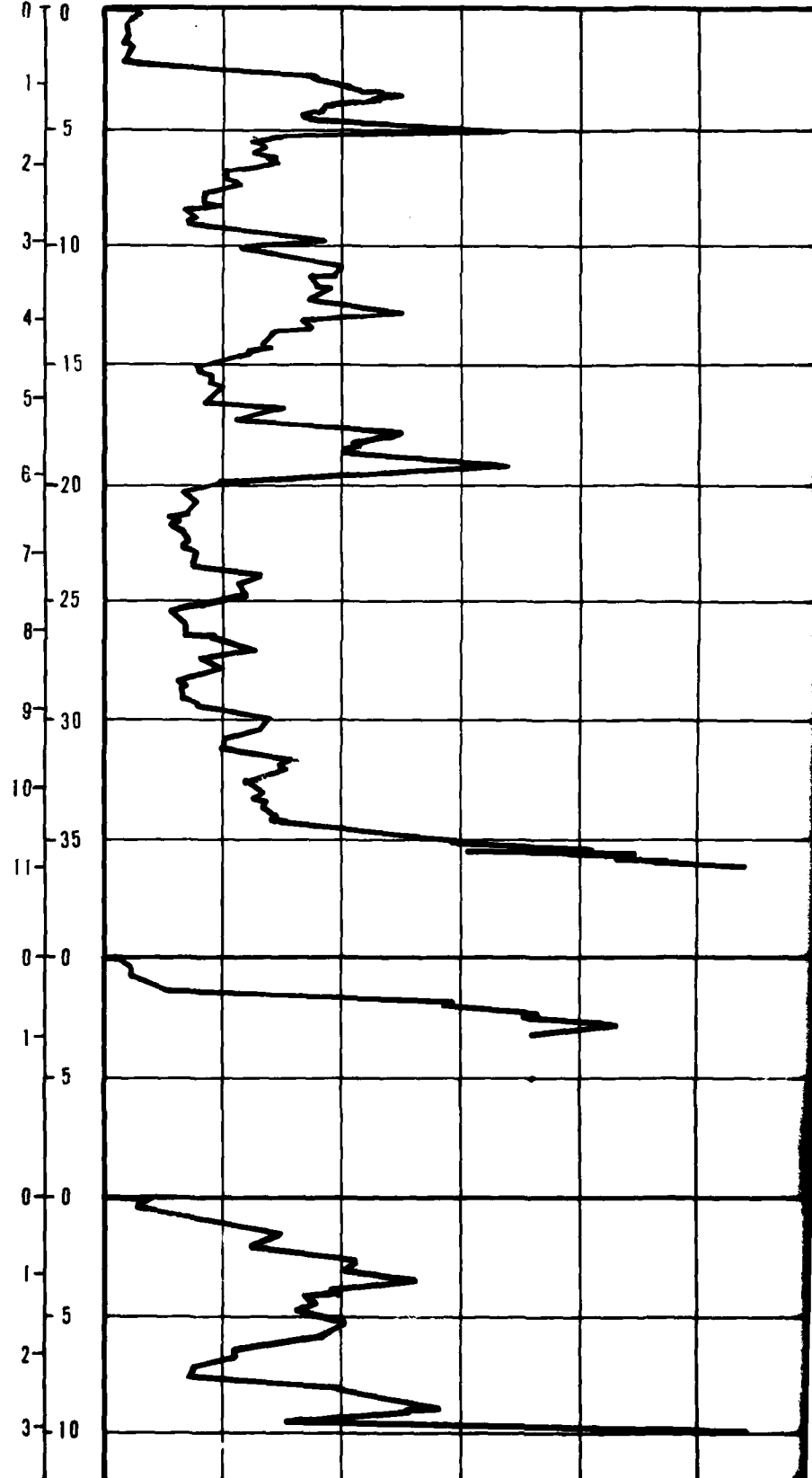
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

CONE RESISTANCE

DEPTH

(METERS)
(FEET)

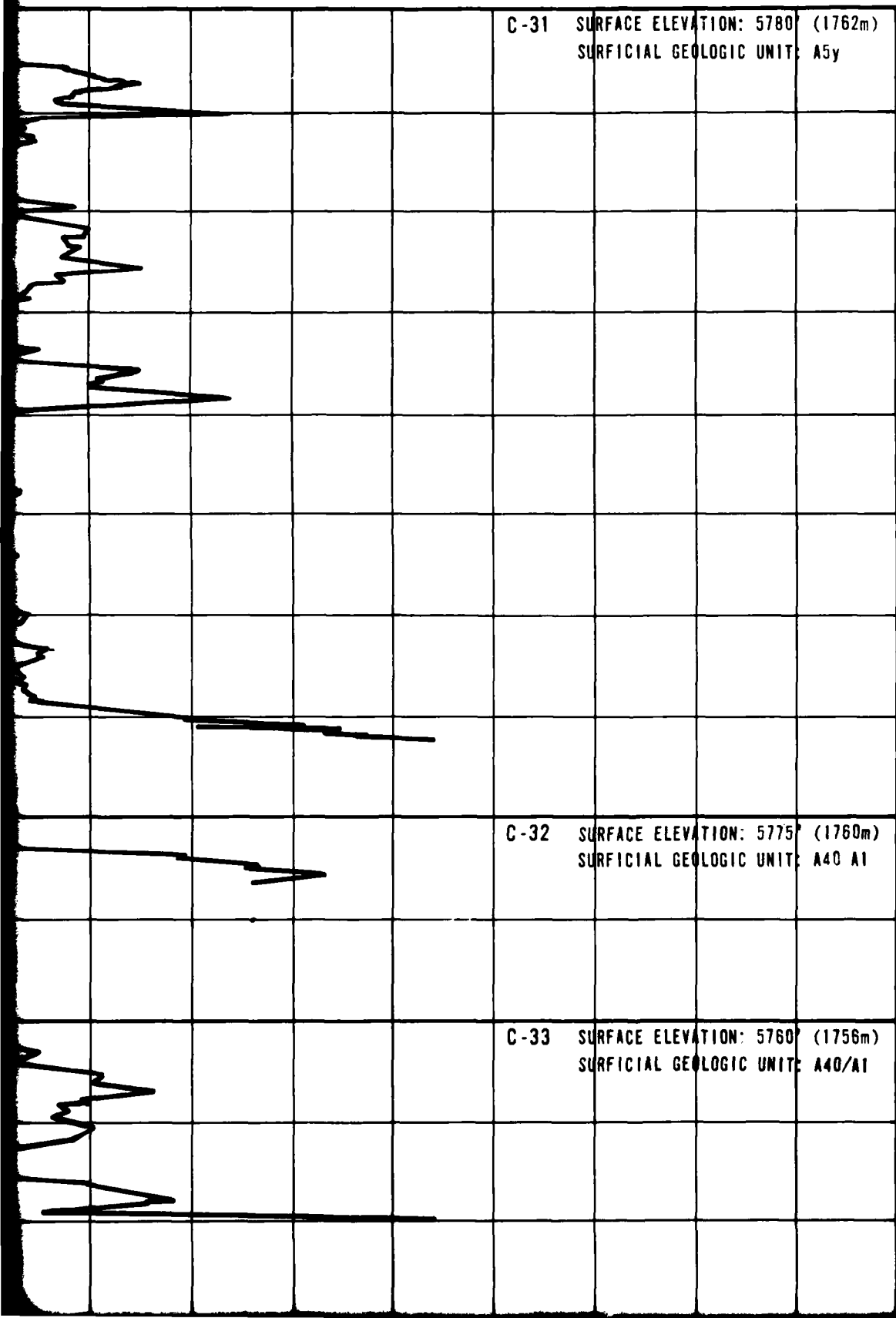
0 100 200 300 400 500 600



4

CONE RESISTANCE

200 300 400 500 600 700 800 900 (kg/cm²)
 200 300 400 500 600 700 800 900 (tsf)



C-31 SURFACE ELEVATION: 5780' (1762m)
 SURFICIAL GEOLOGIC UNIT: A5y

C-32 SURFACE ELEVATION: 5775' (1760m)
 SURFICIAL GEOLOGIC UNIT: A40 A1

C-33 SURFACE ELEVATION: 5760' (1756m)
 SURFICIAL GEOLOGIC UNIT: A40/A1

SOIL COLUMN



ML

GM-SM

P-20



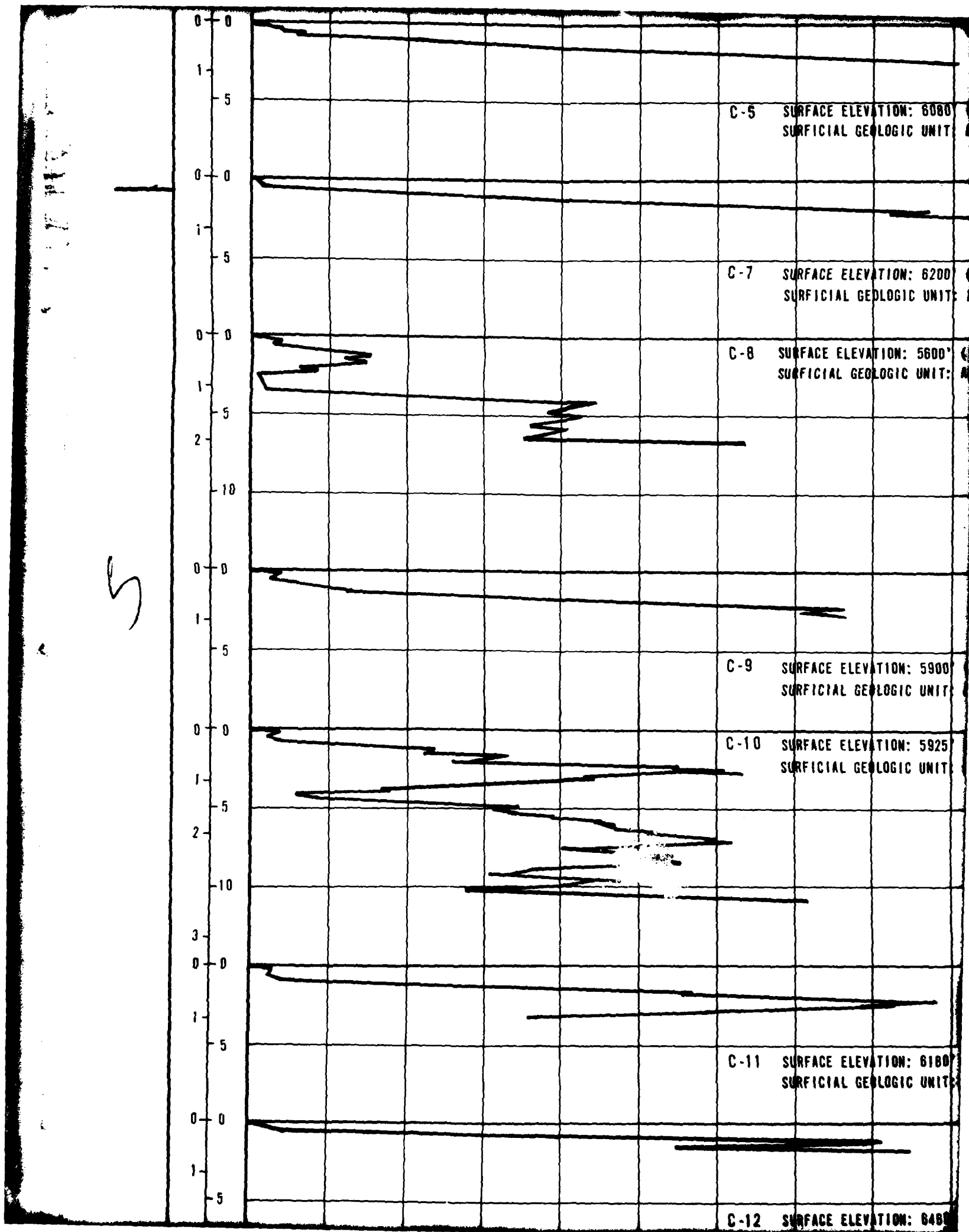
SC

CS-32



SM

P-19



ELEVATION: 6080' (1853m)
GEOLOGIC UNIT: A5i

ELEVATION: 6200' (1890m)
GEOLOGIC UNIT: A5i

ELEVATION: 5600' (1707m)
GEOLOGIC UNIT: A5i

ELEVATION: 5900' (1798m)
GEOLOGIC UNIT: A5i

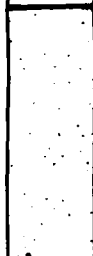
ELEVATION: 5925' (1806m)
GEOLOGIC UNIT: A5y/A5i

ELEVATION: 6180' (1884m)
GEOLOGIC UNIT: A5i



P-3

GM



B-2

SM



CS-10

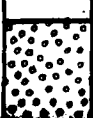
SM



P-24

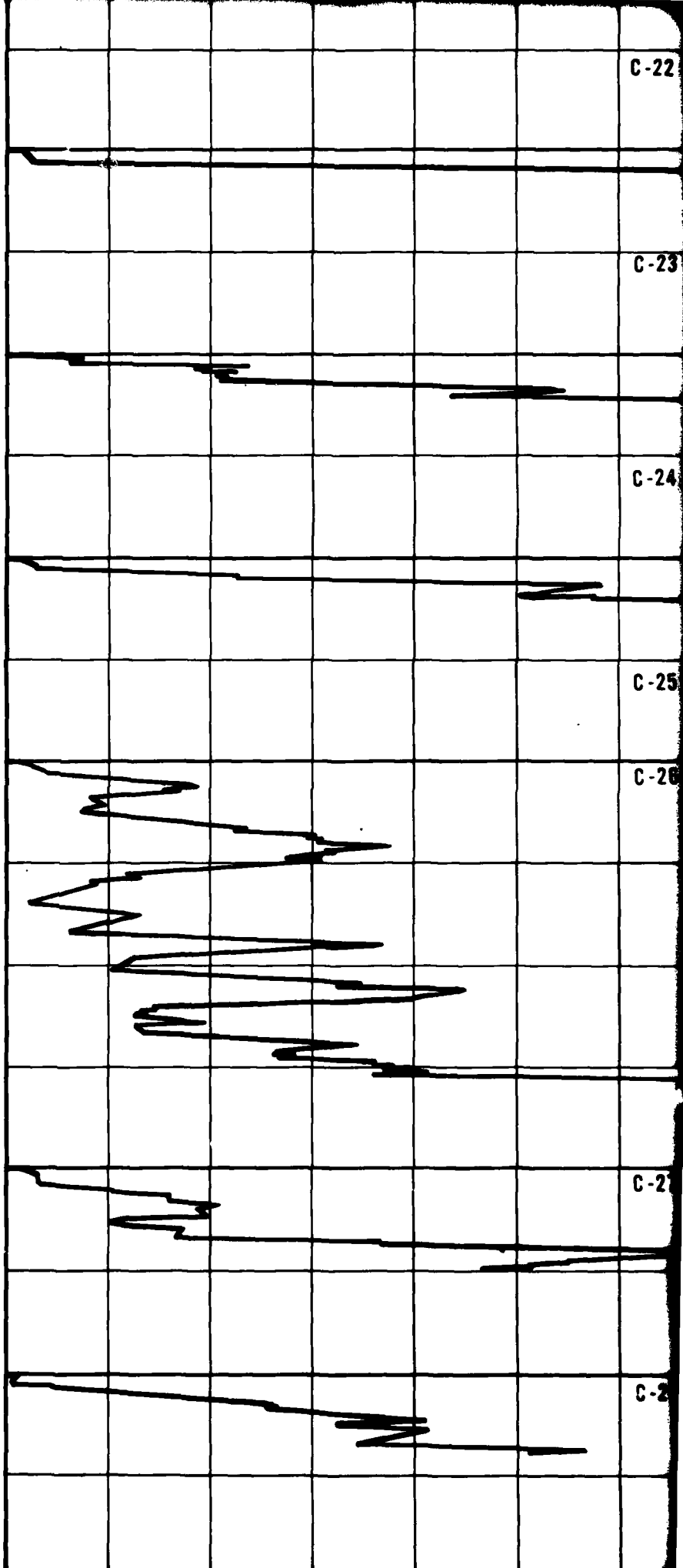
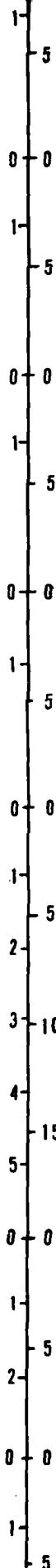
SM

GM



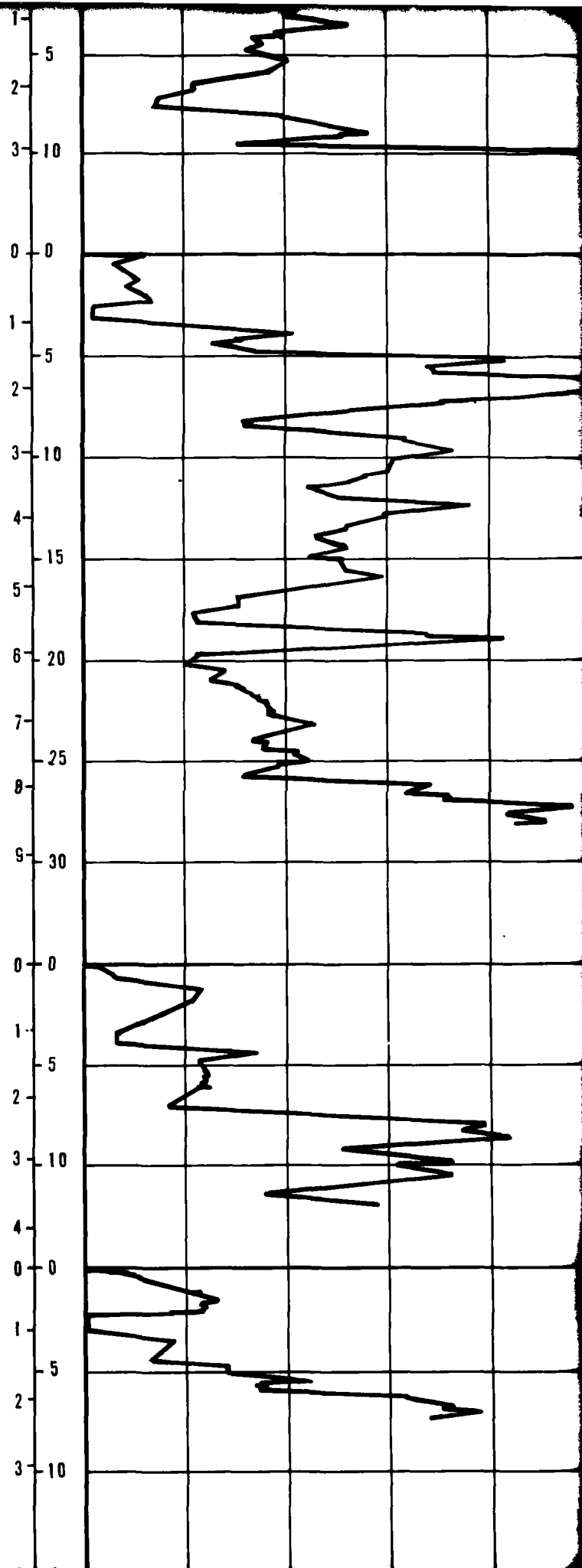
SM

GM



C-22	SURFACE ELEVATION: 5970' (1781m) SURFICIAL GEOLOGIC UNIT: A5y A5i	
C-23	SURFACE ELEVATION: 6120' (1865m) SURFICIAL GEOLOGIC UNIT: A5i	
C-24	SURFACE ELEVATION: 6210' (1893m) SURFICIAL GEOLOGIC UNIT: A5o	
C-25	SURFACE ELEVATION: 6120' (1865m) SURFICIAL GEOLOGIC UNIT: A5o	
C-26	SURFACE ELEVATION: 6120' (1865m) SURFICIAL GEOLOGIC UNIT: A5o	
C-27	SURFACE ELEVATION: 6120' (1865m) SURFICIAL GEOLOGIC UNIT: A5i	
C-28	SURFACE ELEVATION: 6070' (1850m) SURFICIAL GEOLOGIC UNIT: A5y	

GM	P-5
GP	CS-23
GP-GM	CS-24
SM	P-6
GM	CS-26
SM	CS-27
SM	P-7



SURFICIAL GEOLOGIC UNIT: A40/A1

SM

P 19

C-34 SURFACE ELEVATION: 5765' (1757m)
SURFICIAL GEOLOGIC UNIT: A40 A1

CL

GM

P-18

C-35 SURFACE ELEVATION: 5780' (1762m)
SURFICIAL GEOLOGIC UNIT: A40 A1

SM

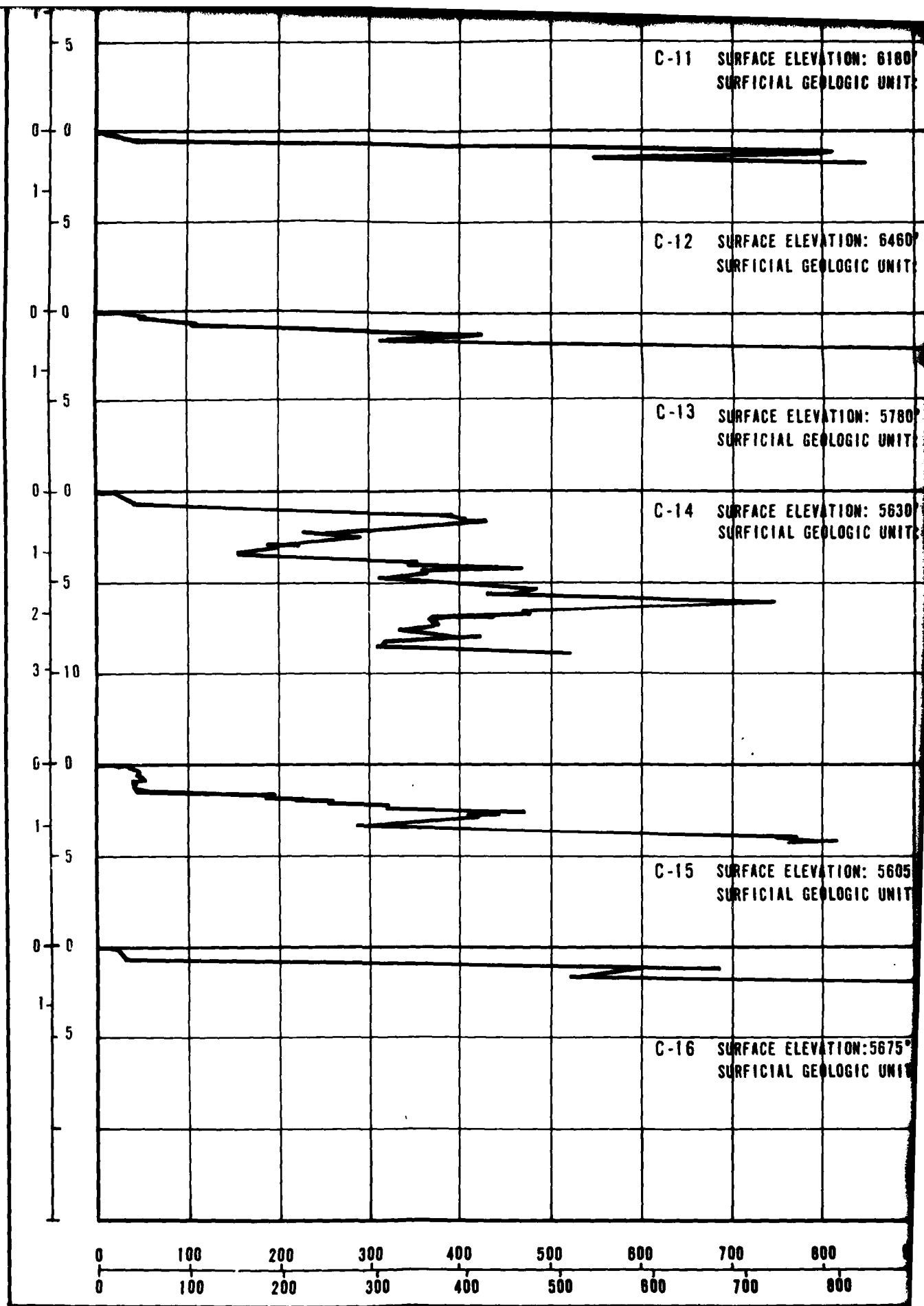
CS-35

C-36 SURFACE ELEVATION: 5780' (1762m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

SM

P-17

CHECKED BY _____ APPROVED BY _____

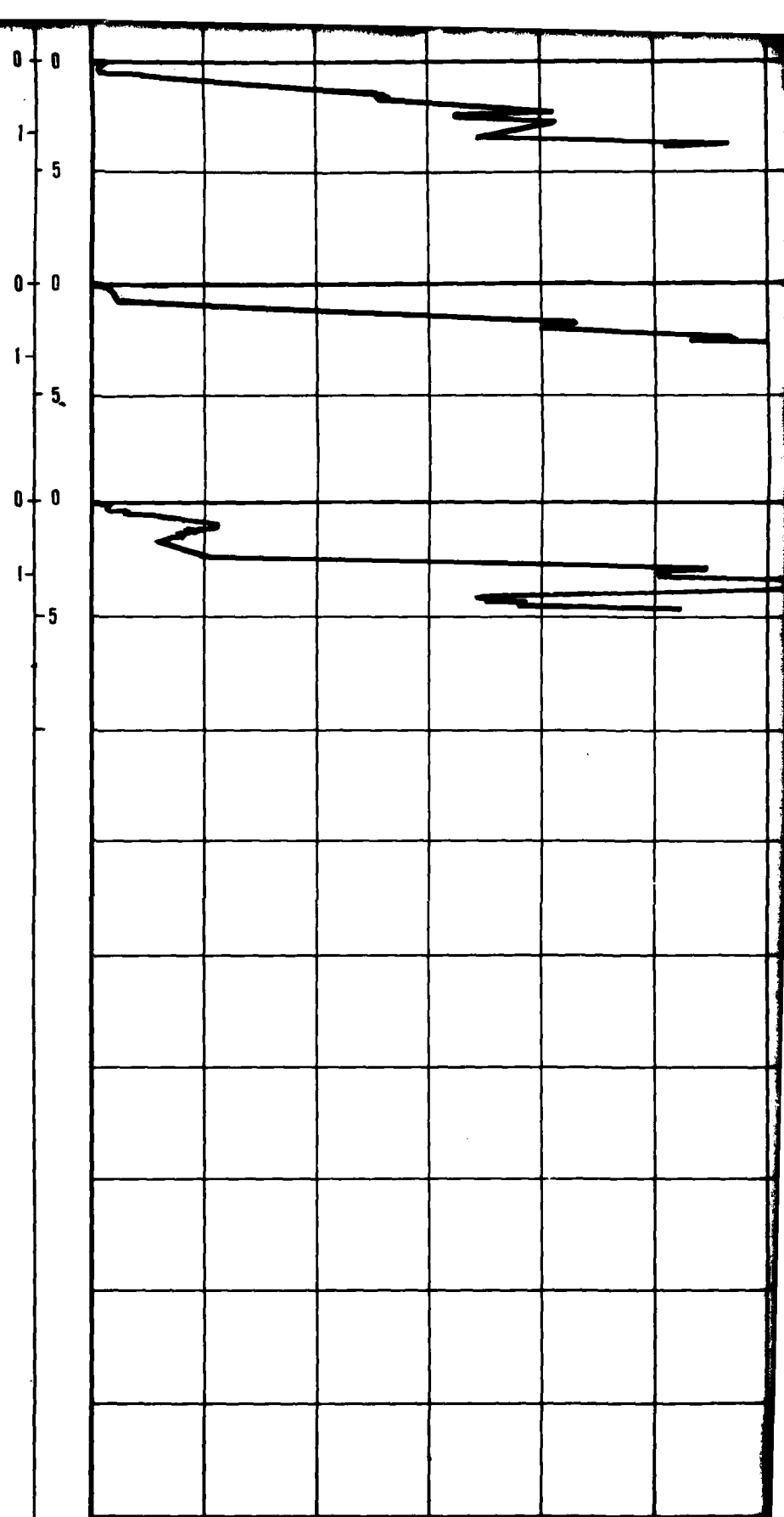


2 JUL 79

9

FACE ELEVATION: 6180' (1884m)	
ICIAL GEOLOGIC UNIT: A5i	
FACE ELEVATION: 6460' (1969m)	
ICIAL GEOLOGIC UNIT: A5i	
FACE ELEVATION: 5780' (1762m)	
ICIAL GEOLOGIC UNIT: A5i	
FACE ELEVATION: 5630' (1716m)	
ICIAL GEOLOGIC UNIT: A5+	
FACE ELEVATION: 5605' (1708m)	
ICIAL GEOLOGIC UNIT: A5y	
FACE ELEVATION: 5675' (1730m)	
ICIAL GEOLOGIC UNIT: A5y	

P-24	SM
	GM
P-25	SM
CS-13	
	SM
	GM
P-26	
	SM
	GP
CS-16	



800 900 (tsf)
800 900 (kg/cm²)

0 100 200 300 400 500
0 100 200 300 400 500

10

C-28 SURFACE ELEVATION: 6070' (1850m)
SURFICIAL GEOLOGIC UNIT: A5y

C-29 SURFACE ELEVATION: 5785' (1763m)
SURFICIAL GEOLOGIC UNIT: A5y A5i

C-30 SURFACE ELEVATION: 5860' (1786m)
SURFICIAL GEOLOGIC UNIT: A5i

P-7

SM

GM

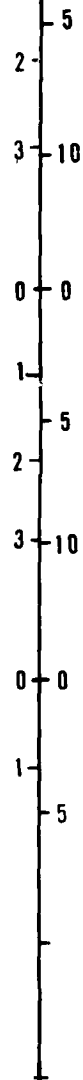
SM

B-4

SM

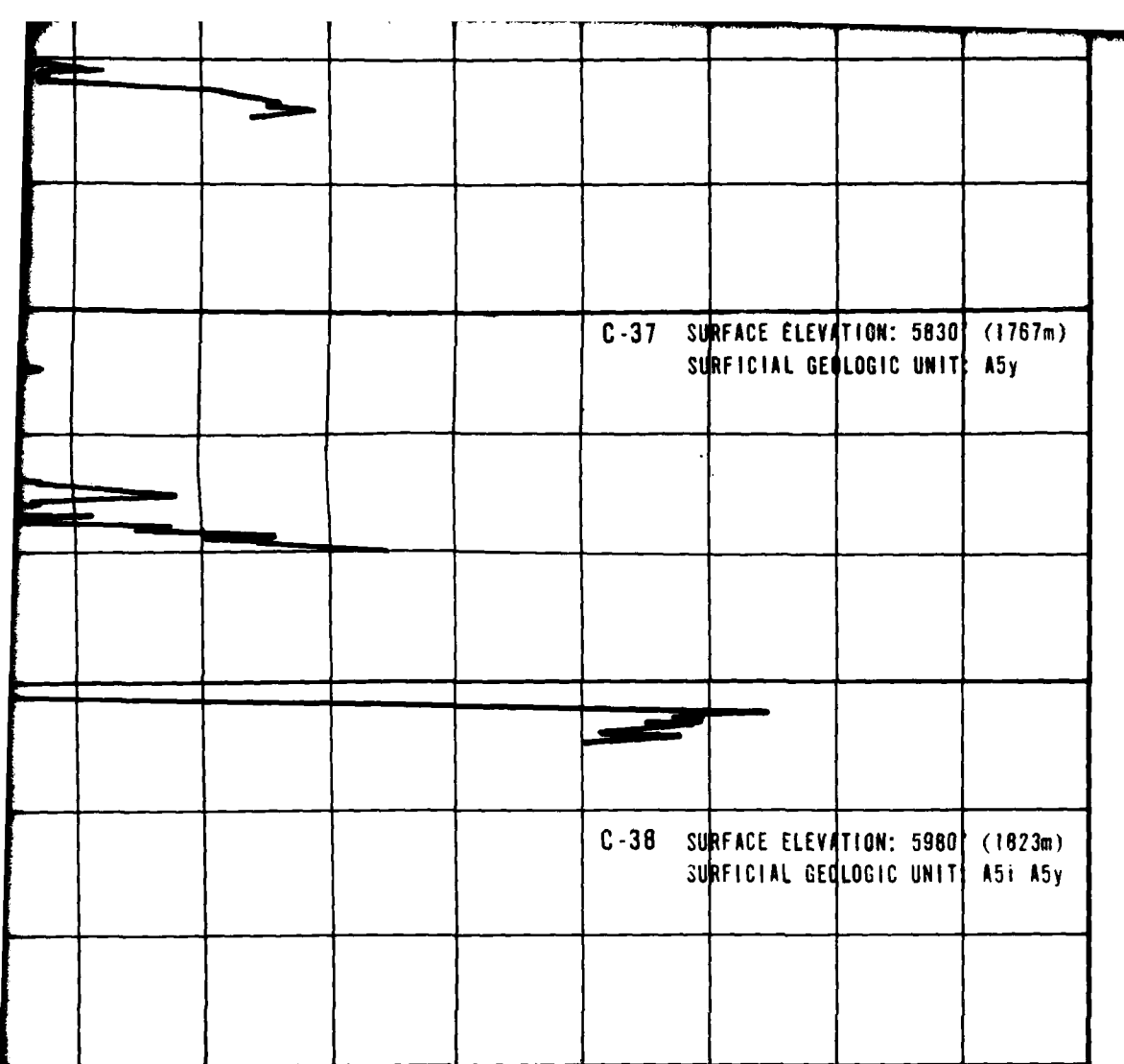
GM

P-21



0 100 200 300
0 100 200 300

500 600 700 800 900 (tsf)
500 600 700 800 900 (kg/cm²)



C-37 SURFACE ELEVATION: 5830 (1767m)
SURFICIAL GEOLOGIC UNIT: A5y

C-38 SURFACE ELEVATION: 5980 (1823m)
SURFICIAL GEOLOGIC UNIT: A5i A5y

P-17

SM
GP

CS-37

SM
GP

CS-38

200 300 400 500 600 700 800 900 (tsf)
200 300 400 500 600 700 800 900 (kg/cm²)

CONE PENETROMETER TEST RESULTS
VERIFICATION SITE
HAMLIN CDP, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING

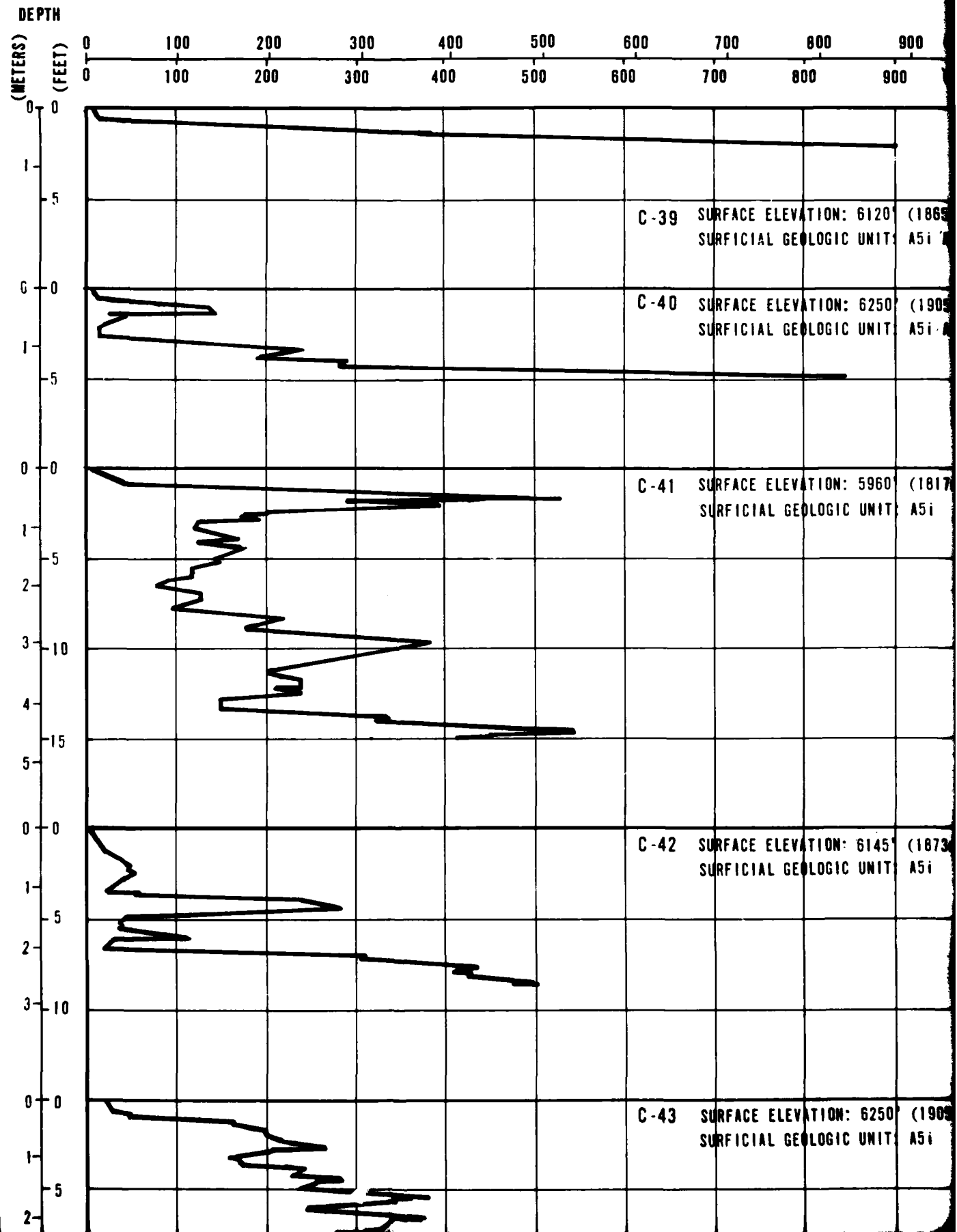
2

1 OF 2

FUGRO NATIONAL, INC.

12

CONE RESISTANCE



CONE RESISTANCE

DEPTH

(METERS)

0 0
1 5
2 10
3 20
4 25
5 30
6
7
8

C-50	SURFA
	SURFI

C-51 SURFAC
SURF 11

900 (kg/cm²)

900 (tsf)

**SOIL
COLUMN**

6120	(1865m)
UNIT:	A5i A5v

6250	(1905m)
UNIT	A5i A5y

5960	(1817m,
UNIT:	A5i

P-15'

SM

6145	(1873m)
UNIT	A5i

SM

SP-SM

T-6

6250	(1905m)
UNIT:	A5i

SM

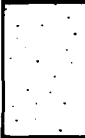
P-16

3

CONE RESIS

700 800 900 (kg/cm²)
700 800 900 (tsf)

SOIL
COLUMN



SM

P-11



SC-SM

CS-51

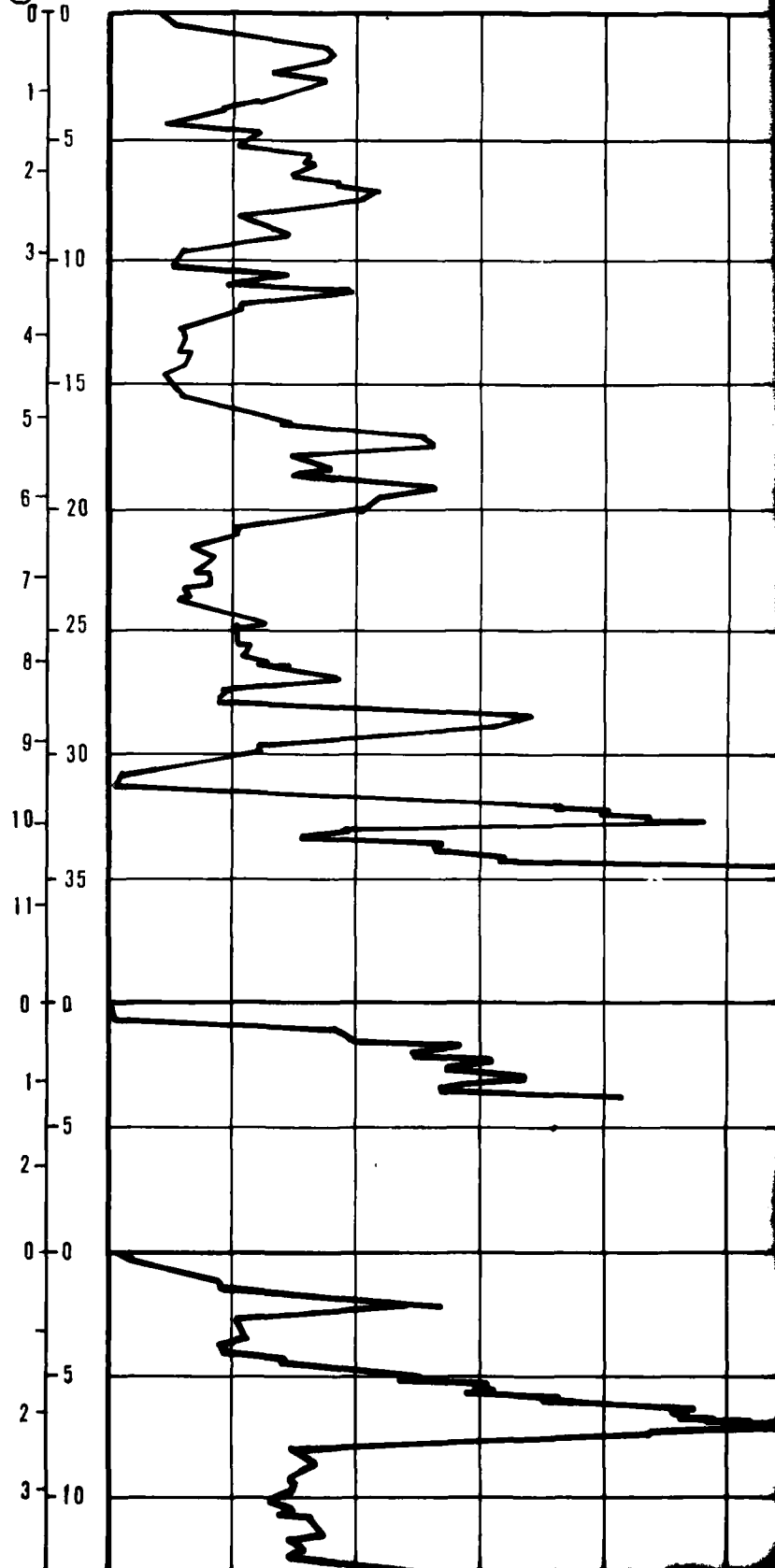
SURFACE ELEVATION: 6065' (1849m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

SURFACE ELEVATION: 6130' (1868m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

DEPTH

(METERS)
(FEET)

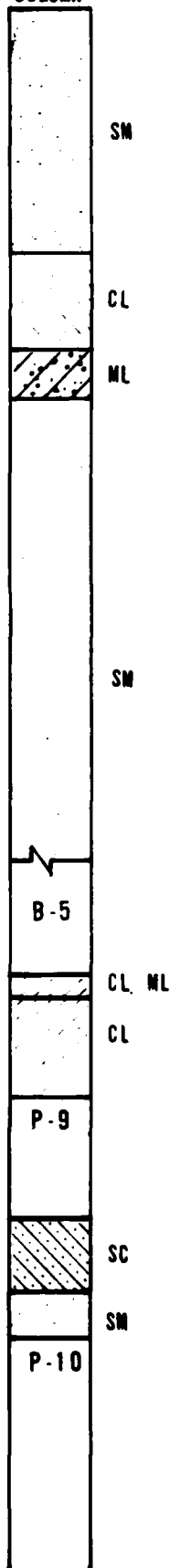
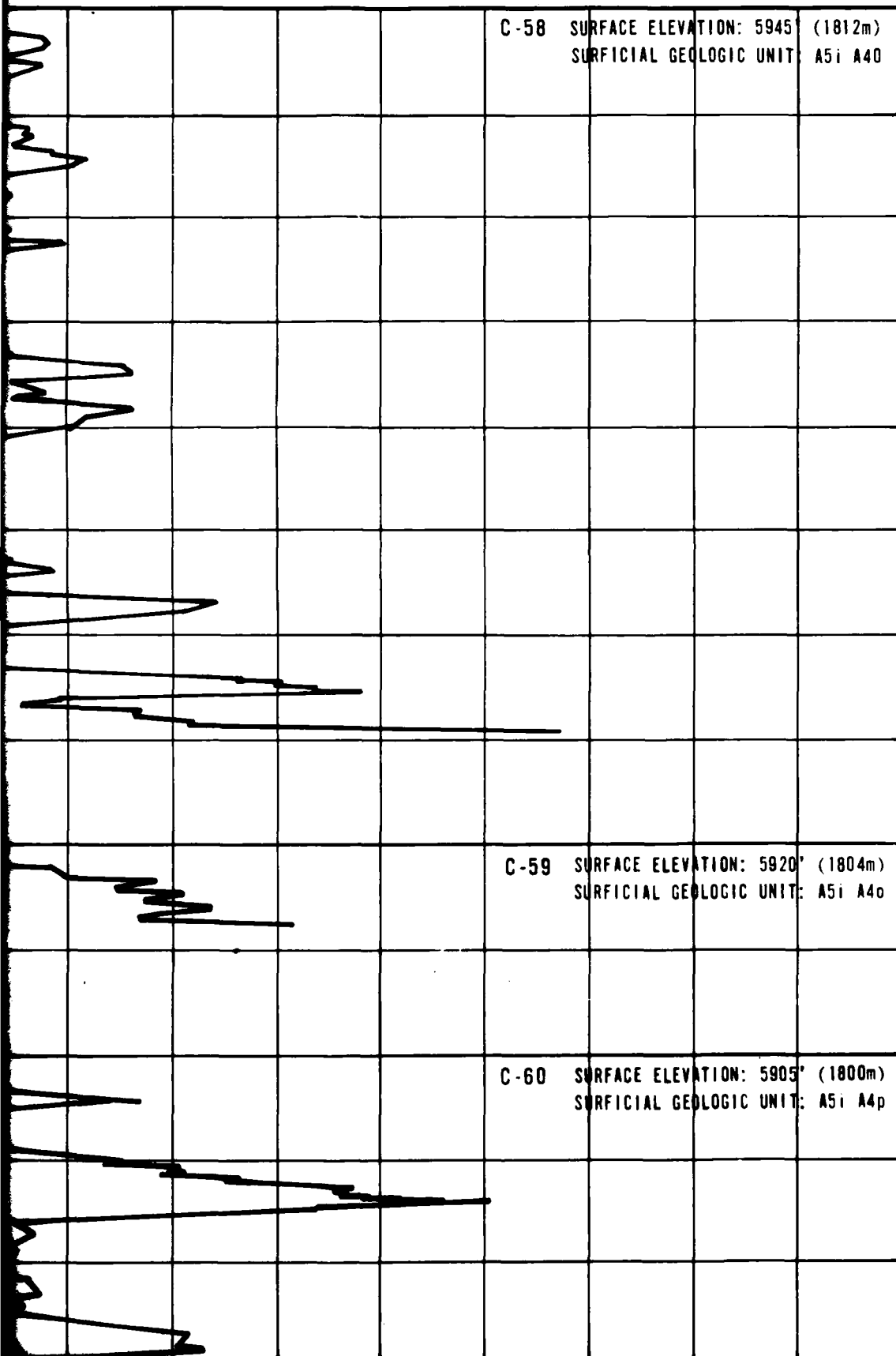
0 100 200 300 400 500
0 100 200 300 400 500



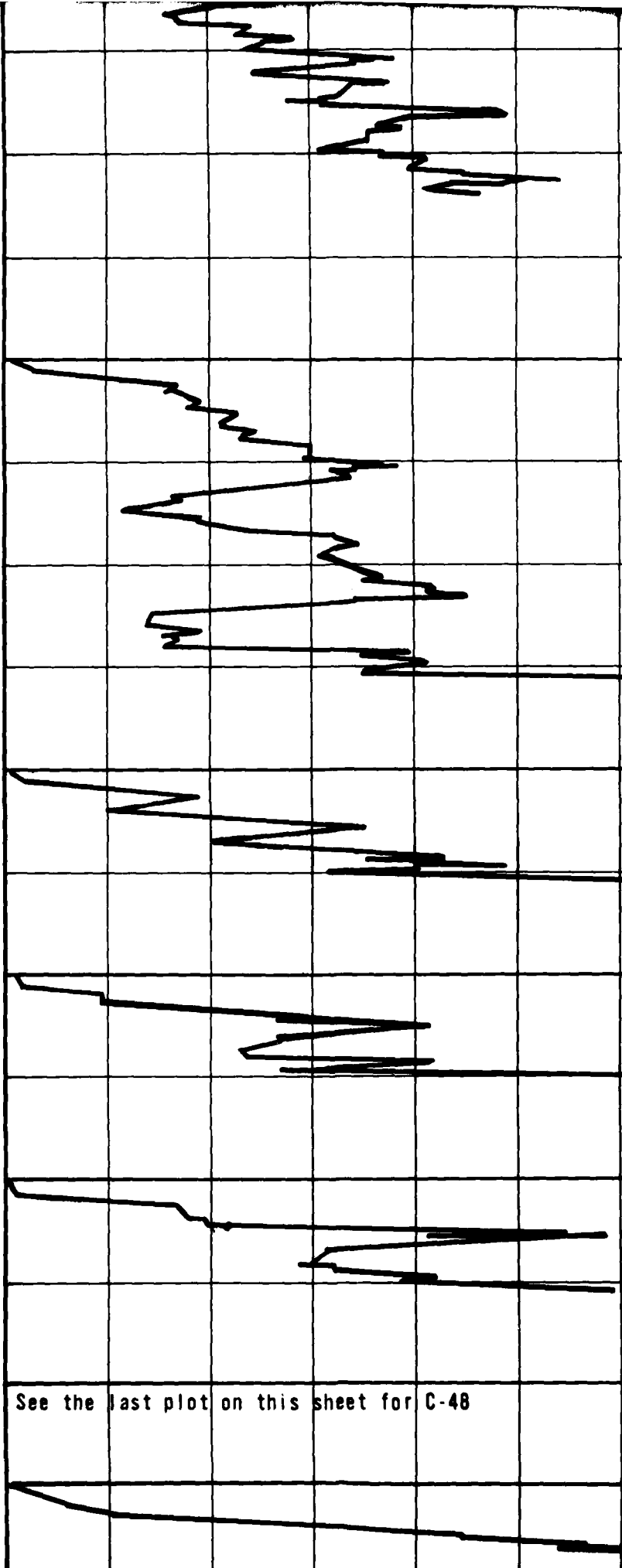
CONE RESISTANCE

200 300 400 500 600 700 800 900 (kg/cm²)
 200 300 400 500 600 700 800 900 (tsf)

SOIL COLUMN



1
5
2
3
4
0
1
2
3
4
5
0
1
2
3
4
5
0
1
2
0
1
2
0
1



C-44 SURFACE ELEVATION: 6140' (1
SURFICIAL GEOLOGIC UNIT: A5

C-45 SURFACE ELEVATION: 6240' (1
SURFICIAL GEOLOGIC UNIT: A5

C-46 SURFACE ELEVATION: 6350' (1
SURFICIAL GEOLOGIC UNIT: A5

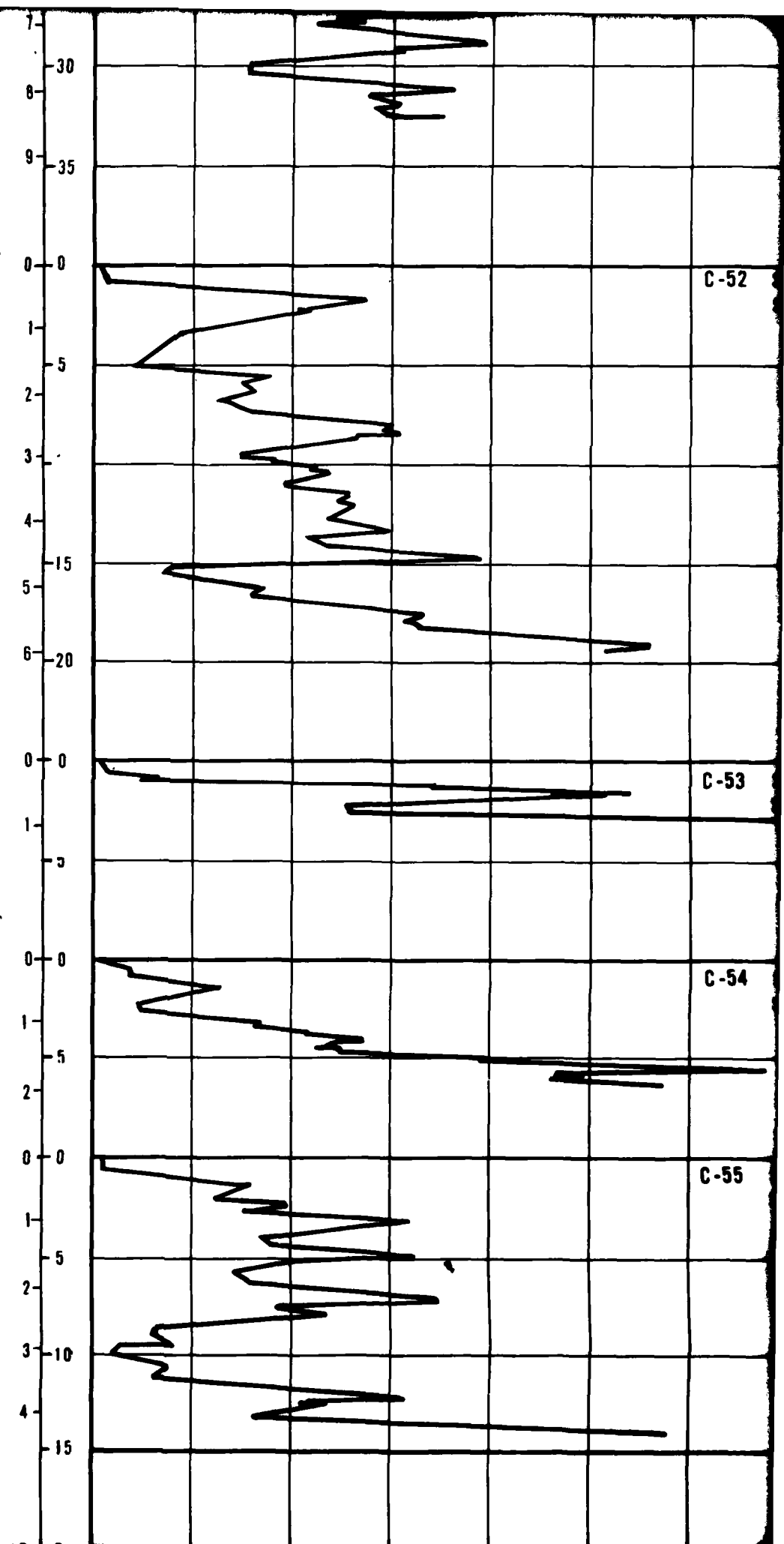
C-47 SURFACE ELEVATION: 6420' (1
SURFICIAL GEOLOGIC UNIT: A5

See the last plot on this sheet for C-48

C-49 SURFACE ELEVATION: 6050' (1
SURFICIAL GEOLOGIC UNIT: A5

ATION: 6140' (1871m)	LOGIC UNIT: A5i
ATION: 6240' (1902m)	LOGIC UNIT: A5i
ATION: 6350' (1935m)	LOGIC UNIT: A5i
ATION: 6420' (1957m)	LOGIC UNIT: A5i
ATION: 6050' (1844m)	LOGIC UNIT: A5i / A40

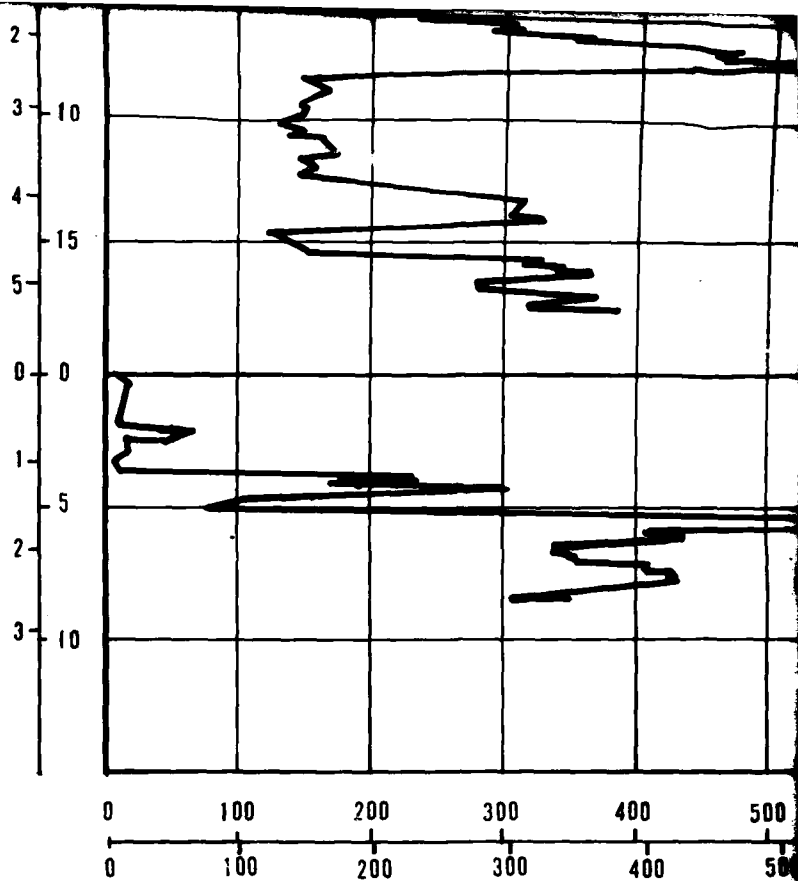
P-16	SM
P-14	SM
CS-45	SC
P-13	SM
CS-47	SM SP
CS-49	SC-SM GP



62 SURFACE ELEVATION: 6160 (1878m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

CS-52

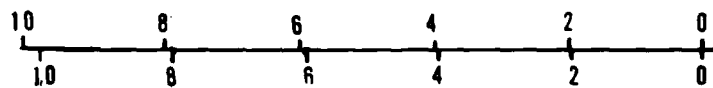
SM



63 SURFACE ELEVATION: 6240 (1902m)
SURFICIAL GEOLOGIC UNIT: A5i

T-5

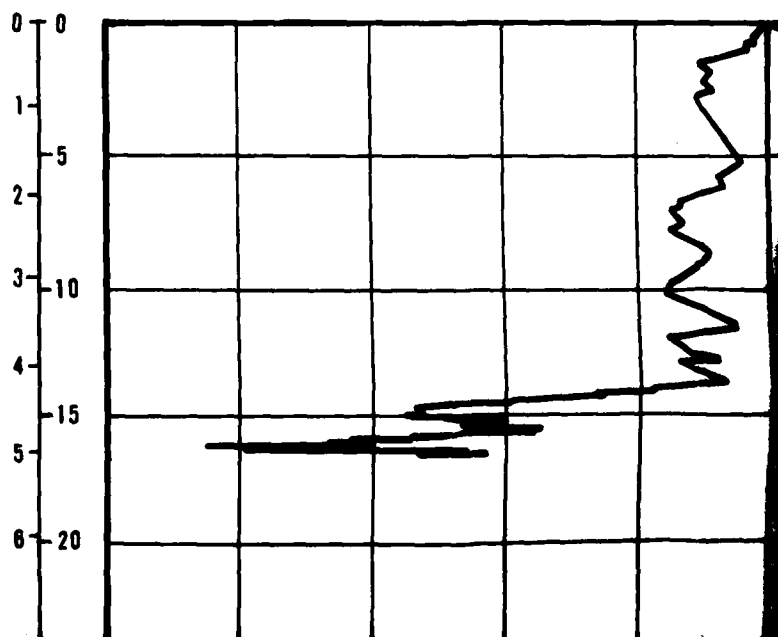
SM



64 SURFACE ELEVATION: 6170 (1881m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

P-8

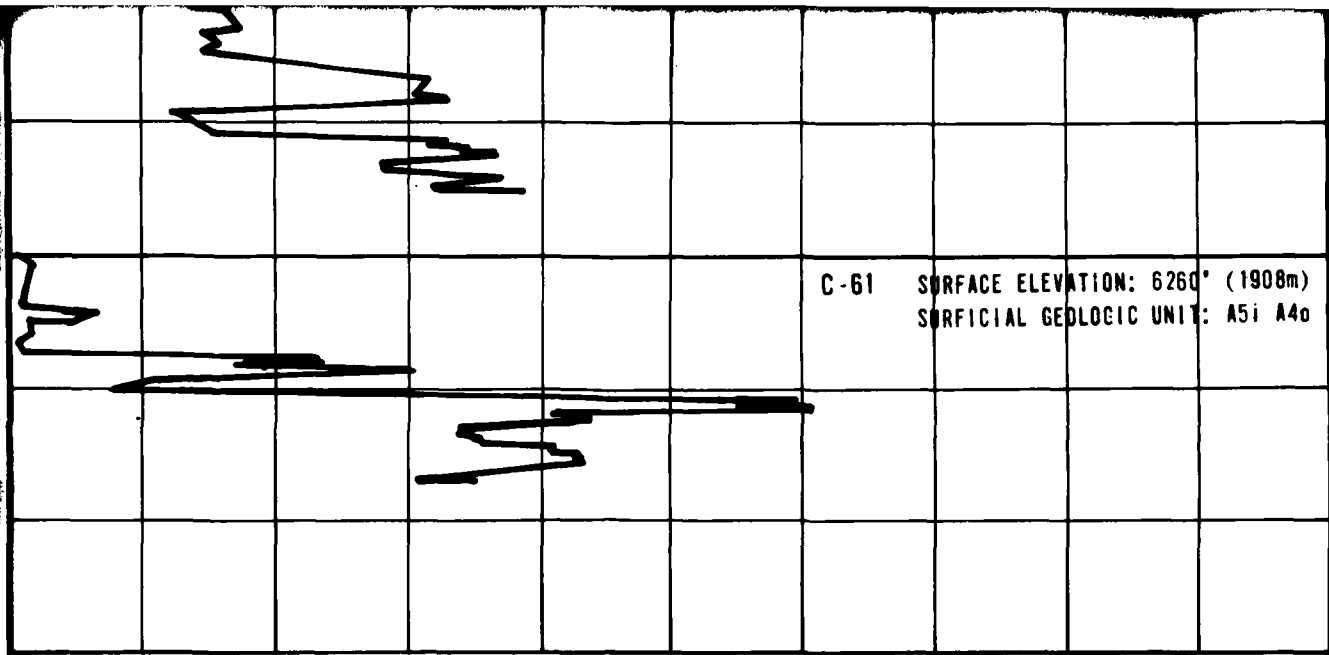
SM



65 SURFACE ELEVATION: 6120 (1865m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

CS-55

SM

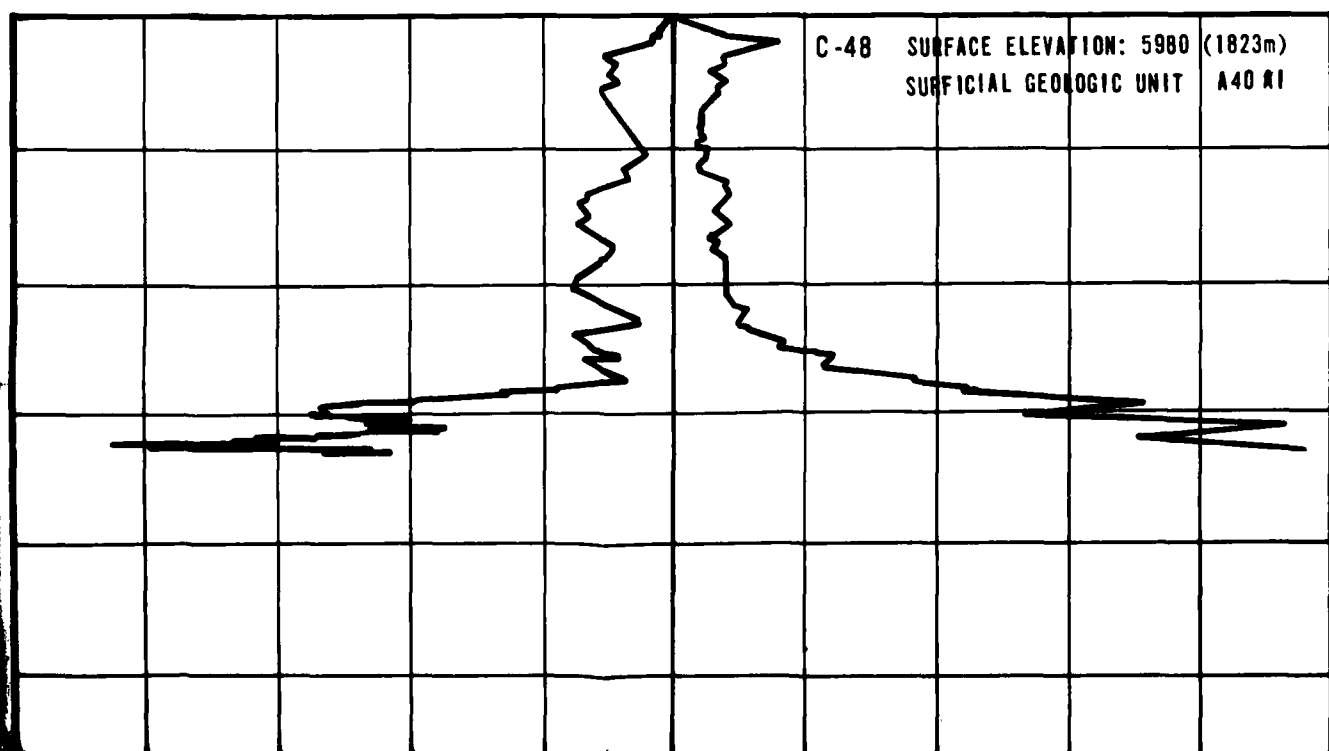


C-61 SURFACE ELEVATION: 6260' (1908m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

SC-SM
CS-61

0 100 200 300 400 500 600 700 800 900 (kg cm²)
0 100 200 300 400 500 600 700 800 900 (tsf)

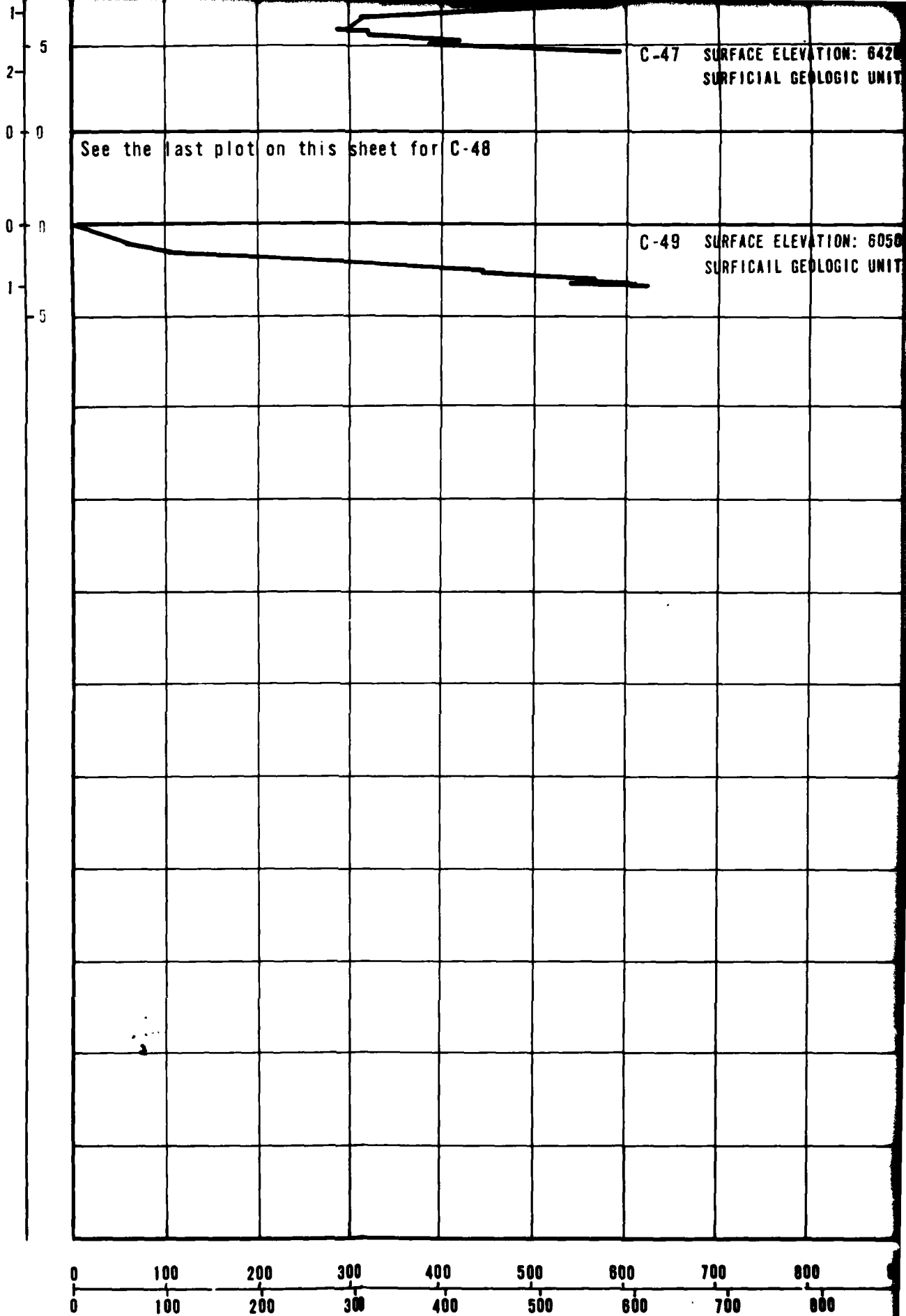
0 8 6 4 2 0 100 200 300 400 (kg cm²)
10 8 6 4 2 0 100 200 300 400 (tsf)



C-48 SURFACE ELEVATION: 5980' (1823m)
SURFICIAL GEOLOGIC UNIT: A40 R1

SM
ML
P-12

CHECKED BY _____ APPROVED BY _____



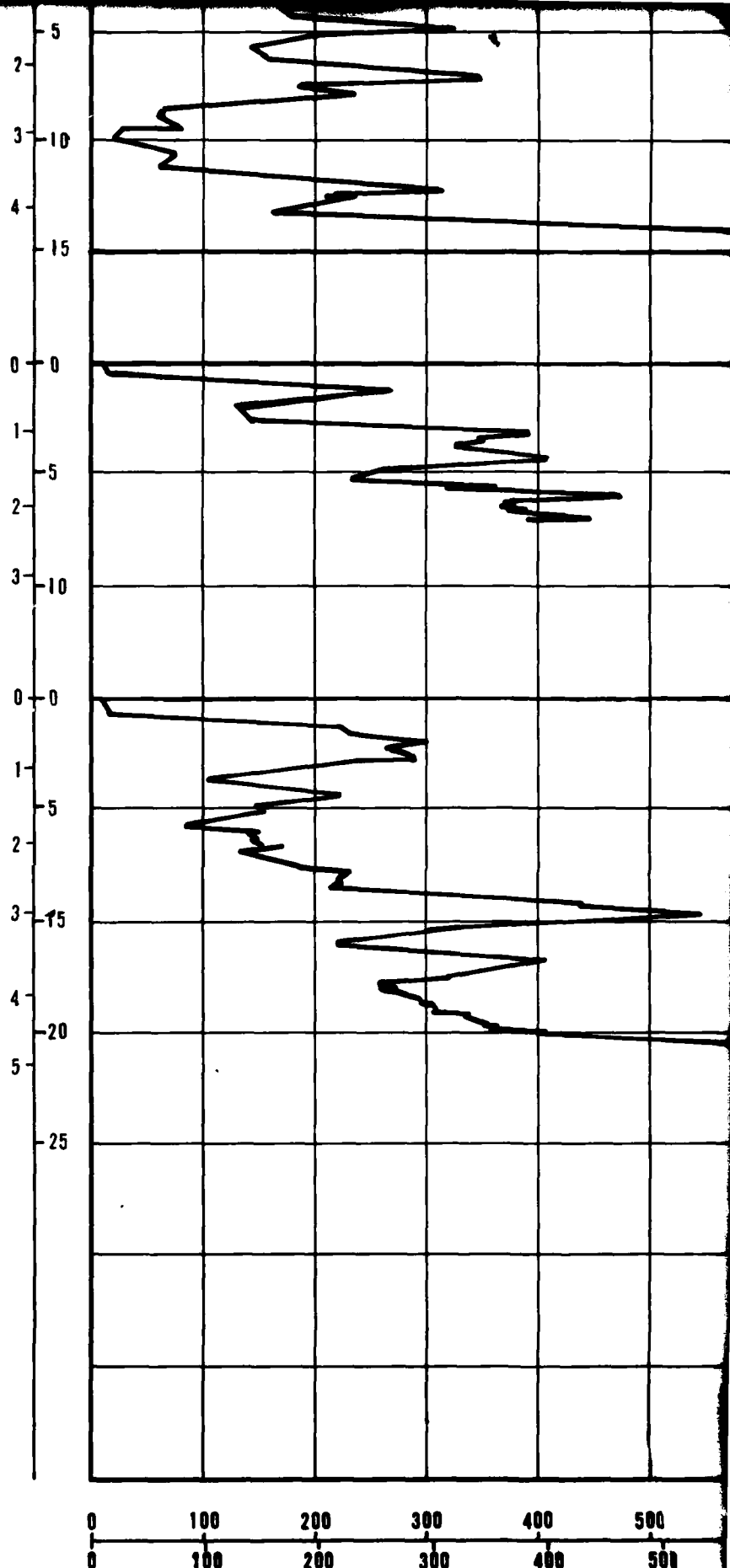
2 JUL 79

9

SURFACE ELEVATION:	6050'	(1844m)
SURFICAIL GEOLOGIC UNIT:	A5i	'A40

CS - 49

SC-SM
GP



C-56 SURFACE ELEVATION: 6060 (1847m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

CS-56

SC-SM

C-57 SURFACE ELEVATION: 6010 (1832m)
SURFICIAL GEOLOGIC UNIT: A5i A4o

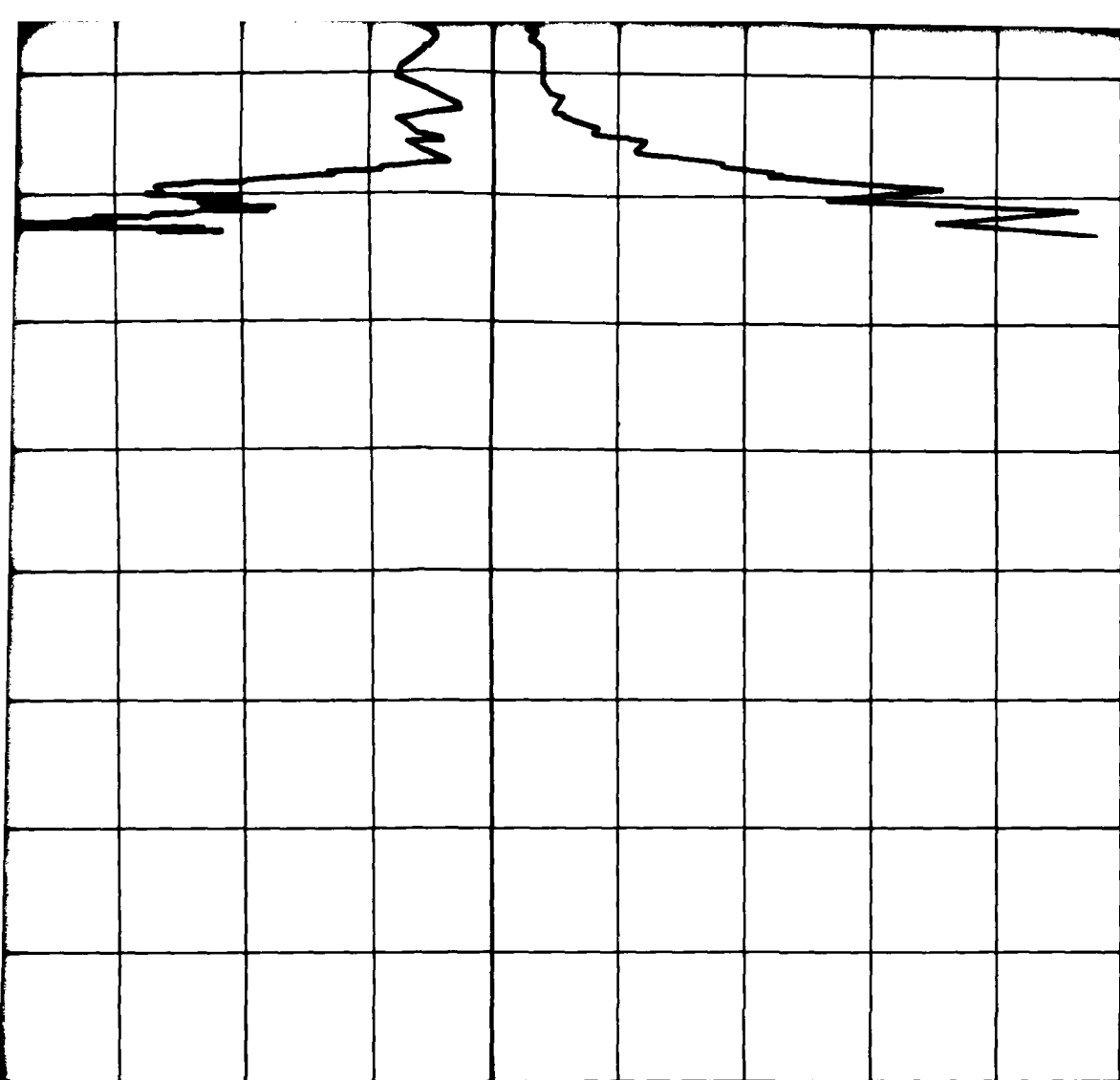
CS-57

SC-SM

3-10
4-15
5-20
6-20

10 8 6 4
10 8 6 4

500 600 700 800 900 (tsf)
500 600 700 800 900 (kg/cm²)



6 4 2 0 100 200 300 400 (kg cm²)
6 4 2 0 100 200 300 400 (tsf)

CONE PENETROMETER TEST RESULTS
VERIFICATION SITE
HAMLIN CDP. NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING

2
2 OF 2

FUGRO NATIONAL, INC.

DATE
FILMED
— 8