Granular Resources Inventory
- Mackenzie Valley -
Norman Wells - 96 E
- Addendum -

GRANULAR RESOURCE INVENTORY - MACKENZIE

NORMAN WELLS ADDENDUM

NTS 96E

D.E. Lawrence

F.G. Shnay

D.F. VanDine

For: Department of Indian Affairs
and Northern Development

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NORMAN WELLS, ADDENDUM

INTRODUCTION

Field work carried out during July and August 1972 has necessitated a re-evaluation of the granular resources inventory of the Norman Wells map area. The most critical area for reappraisal lies between the Mackenzie River and the Norman Range of the Franklin Mountains. In the initial appraisal, glaciofluvial deposits, eskers and coherent bedrock were considered as the only sources of granular material. It has been found that most of the eskers are small and generally fine grained. Also the Kee Scarp Limestone when crushed, produces a considerable amount of fines which may restrict its use as a construction material. Glaciolacustrine beach ridges, glaciofluvial terraces, alluvial fans, eolian sand dunes and talus material may also be included in the inventory.

Also included in this addendum are some general guidelines for the exploration of sand and gravel materials in the Norman Wells map area.

Beach Ridges

During deglaciation of the Mackenzie Valley, the water of the resulting glacial lake stood at various levels. At each level, glaciolacustrine beach deposits were formed. Due to wave action most of the glaciolacustrine silts and clays were washed away leaving lag sands and gravels. The beach ridges average 50' in width, several miles in length and for the most part are parallel to the contours of the valley. Frequently they are cut by post glacial and present stream channels.

The glaciolacustrine beach ridges differ from the eskers fournd in the map area in their cross-sectional profiles, size, composition, grain size and orientation. The two geomorphologic forms are covered by similar vegetation and have similar drainage. Table I compares the two forms.

Glaciofluvial Deposits

Glaciofluvial units are variable in size, texture and material type but for the most part are as reported previously. As the areal extent of a glaciofluvial unit decreases, the thickness of the deposit and the grain size also decrease. Some of the units such as those found at Oscar Creek Gap, and at the foot of Mount Thomas and Mount Brokenoff are variable: some strata are sandy; others are much coarser. It is believed that these glaciofluvial units and others between the mountains and the river were formed as deltas when the water levels of the glacial lake were at these respective elevations. When the water level dropped the rivers cut through these deposits and formed successive deltas at lower elevations. They now appear as glacio-fluvial terraces.

Fluvial Fans

Present day fluvial fans are forming where river courses have a break in slope; examples of this are at the mouth of the Francis and Christina Creeks and in the rivers northeast of Kee Scarp. The grain size of the material is inversely proportional to the distance of transport. Because the source of the fan material is the Mackenzie Mountains, as one approaches the Mackenzie River the material becomes finer in texture.

Eolian Sand Dunes

Fine and medium sand deposits are found to the northeast of Norman Wells. These are the result of wind reworking earlier sand and gravel deposits.

Talus

The accumulation of broken material at the base of steep rock faces forms talus slopes. These slopes, found northeast of Norman Wells, consits of various sized limestone blocks. Some of the material would have to be crushed further for construction uses but much of the material is fine enough to use without crushing.

Bedrock Material

The only bedrock material which has been used as construction material in the Norman Wells area is the Kee Scarp limestone. This material was crushed for use as sub-base, base course and surface course for the runway at Norman Wells (John Williams, personal communication, 1972). The same material has also been used as surfacing material for work yards, parking areas and on some roads in the town site.

Both crystalline and fossiliferous limestones are exposed at the quarry approximately 4 miles northeast of Norman Wells. The thickness of beds ranges from 1 inch to 3 feet or more; the fossiliferous beds at the southeast end of the quarry being thinner. Exposed at the northwest end of the quarry is a red and black fissile limey shale.

It was reported that the limestone, when crushed, for aggregate produces large quantities of chalky fines. In one section of road where crushed limestone was used as surfacing material the chalky nature of the road was observed. This may indicate the poor durability of this material as aggregate.

Guidelines for Exploration of Construction Material

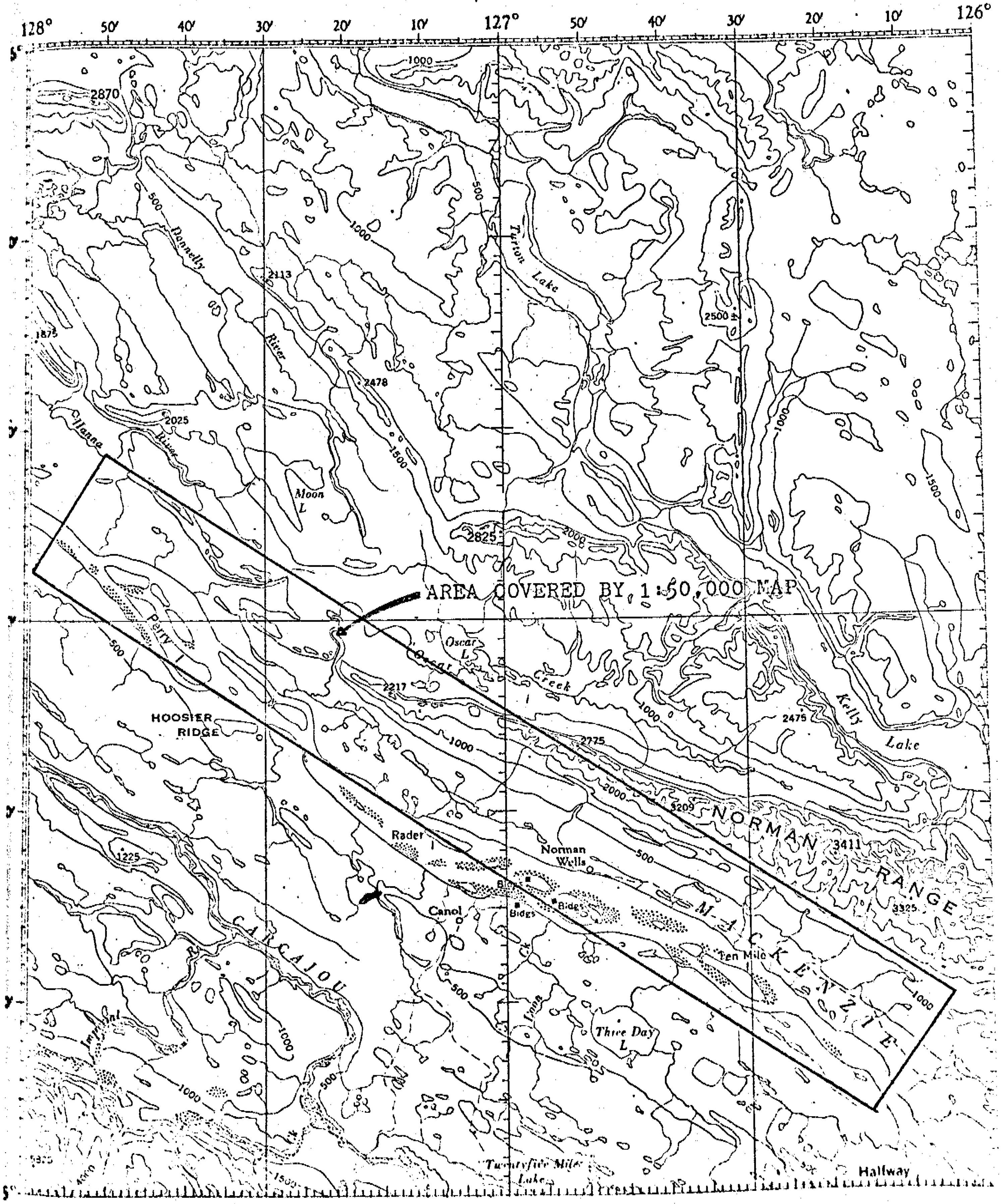
Since most of the expoloration for construction materials is done by air photo interpretation followed by a helicopter oriented field checking program, this section is directed toward aerial exploration.

There are four main geomorphologic forms in which sand and gravel deposits occur: beach ridges, eskers, fluvial fans and deltas, and fluvial plains. The first three are positive topographic forms; the latter usually is in the valley of a high energy stream.

The grain size of the material usually determines the drainage and vegetation characteristics of the deposit hence, by observing the drainage and vegetation of each deposit a rough idea of the texture of the unit can be concluded. For the most part sand and gravel deposits are dry (because of high permeability), do not have any free water on the surface and do not exhibit features characteristic of permafrost. Due to the texture and drainage of the soil, the vegetation on sands and gravels is taller than than on surrounding wetter soils, the trees are more widely spaced and poplar and birch as well as spruce are common. Deciduous trees are usually not found in the wetter silt, clay and till soils. As the grain size increases, vegetation thins to a point such as found on some fluvial plains where coarse grained alluvial deposits support no vegetation.

Another method to determine the approximate location of surficial deposits, is to study the sequence of events - geological, glacial, and post glacial - leading up to the present geological and gemorphological setting.

Examples of how the geologic history of an area helps in the exploration for sand and gravel is shown in the discussion of glacio-lacustrine beach ridges and glaciofluvial deltas and terraces.



SCALE 1:500,000

INDEX MAP

APPENDIX Ia

TEXTURAL DATA FOR NORMAN WELLS AREA
1:50,000
(see map in pocket)

The textural data presented in this appendix was gathered during the summer of 1972 when spot checking of surficial and bedrock sources of granular materials was carried out. Although there grain size curves were collected from test results of single samples, it is believed that the samples are representative of the deposits tested.

Reference to samples are by station and sample number. Cross reference with the "Tabular Summary" and UTM grid is included so that location of data on the Norman Wells 1:125,000 scale map can be established (see table below).

NORMAN WELLS NTS 96E

SAMPLE LOCATIONS

STATION NUMBER	SAMPLE NUMBER	TABULAR SUMMARY Reference Area	Unit	Corid Reference UTM
14	LV16a-72	I	Esker	XC159386
	LV16b-72	I	Esker	XC159386
15	LV17-72	I	Gf	XC219360
18	LV19-72	I		WC997468
19	LV20a-72	II	Gf	WC857607
	LV20b-72	II	Gf	WC857607
20	LV21-72	VII	E	XC113277
21	LV22-72	VI	Esker	WC948252
22	LV23-72	IV	Gfc	WC781136
33	LV32-72	I	Esker	XC036440
34	LV33-72	I	Beach Ridge	XC116350
36	LV35-72	I	Beach Ridge	SC193335
37	LV36a-72	I	Beach Ridge	XC208319
	LV36c-72	I	Beach Ridge	XC208319
38	LV37-72	I	Ft?	XC211318
39	LV38-72	I	Esker	XC406268
126	LV111-72	I	Ft.	XC065400

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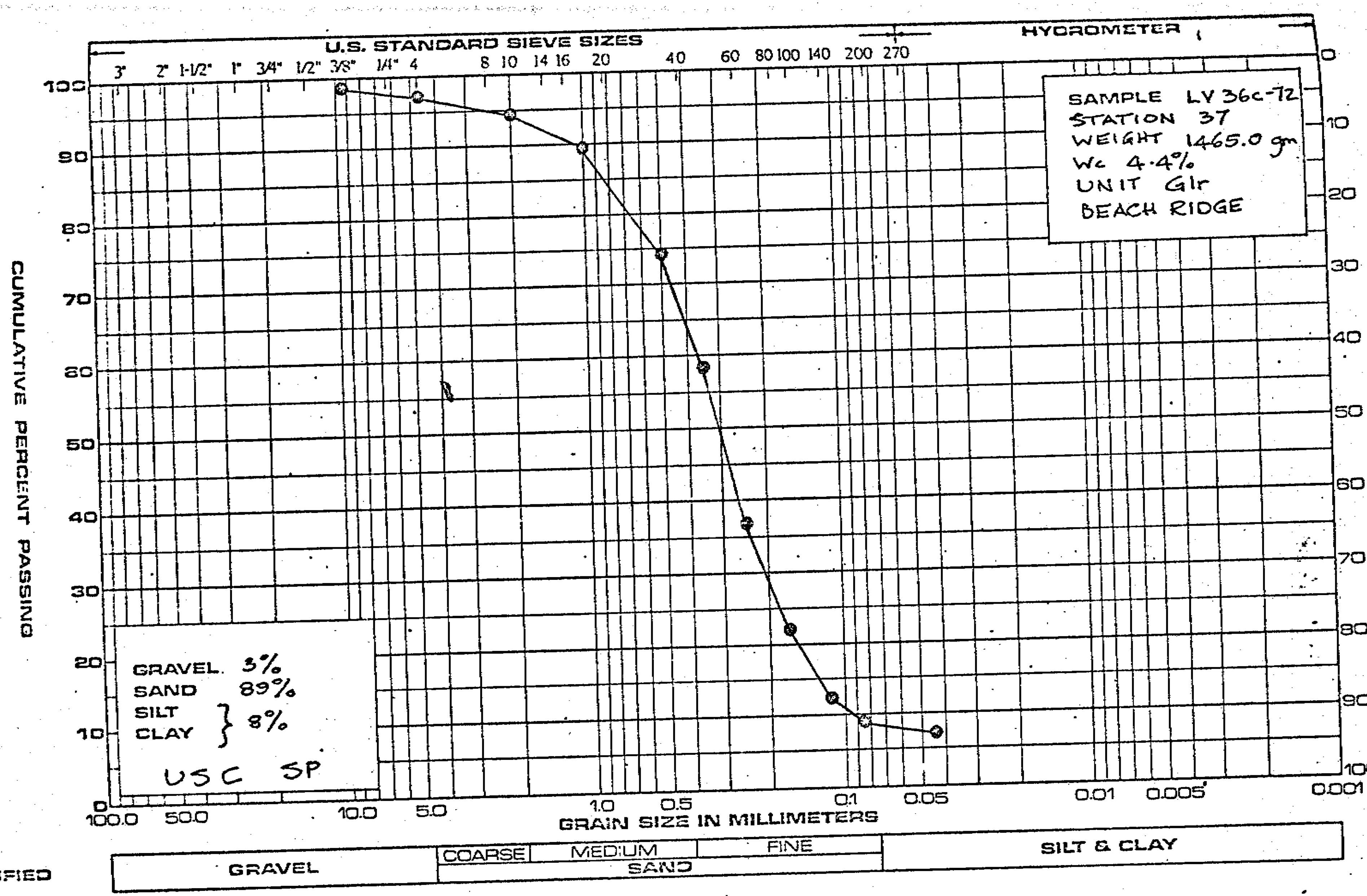
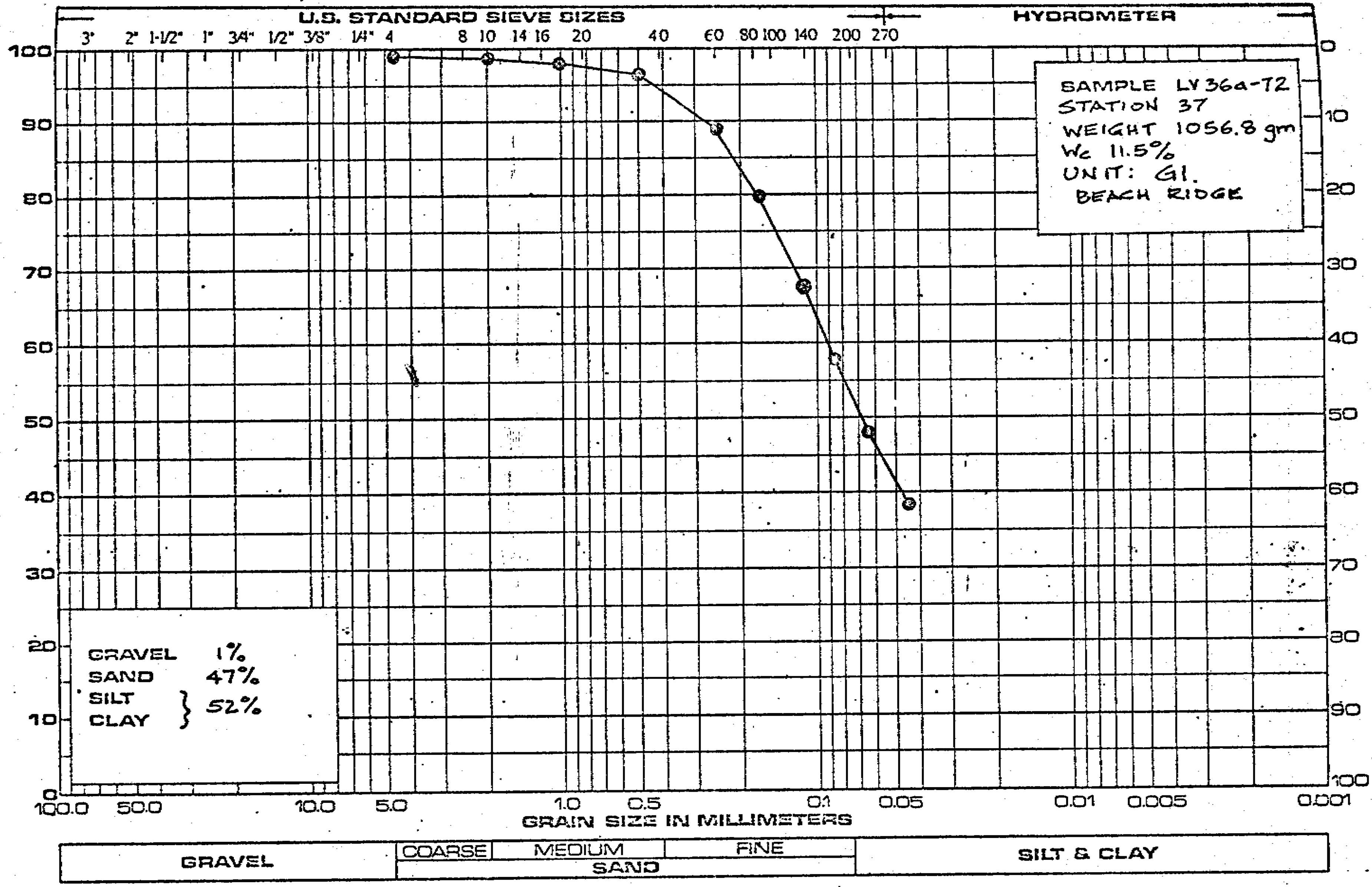


UNIFIED

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



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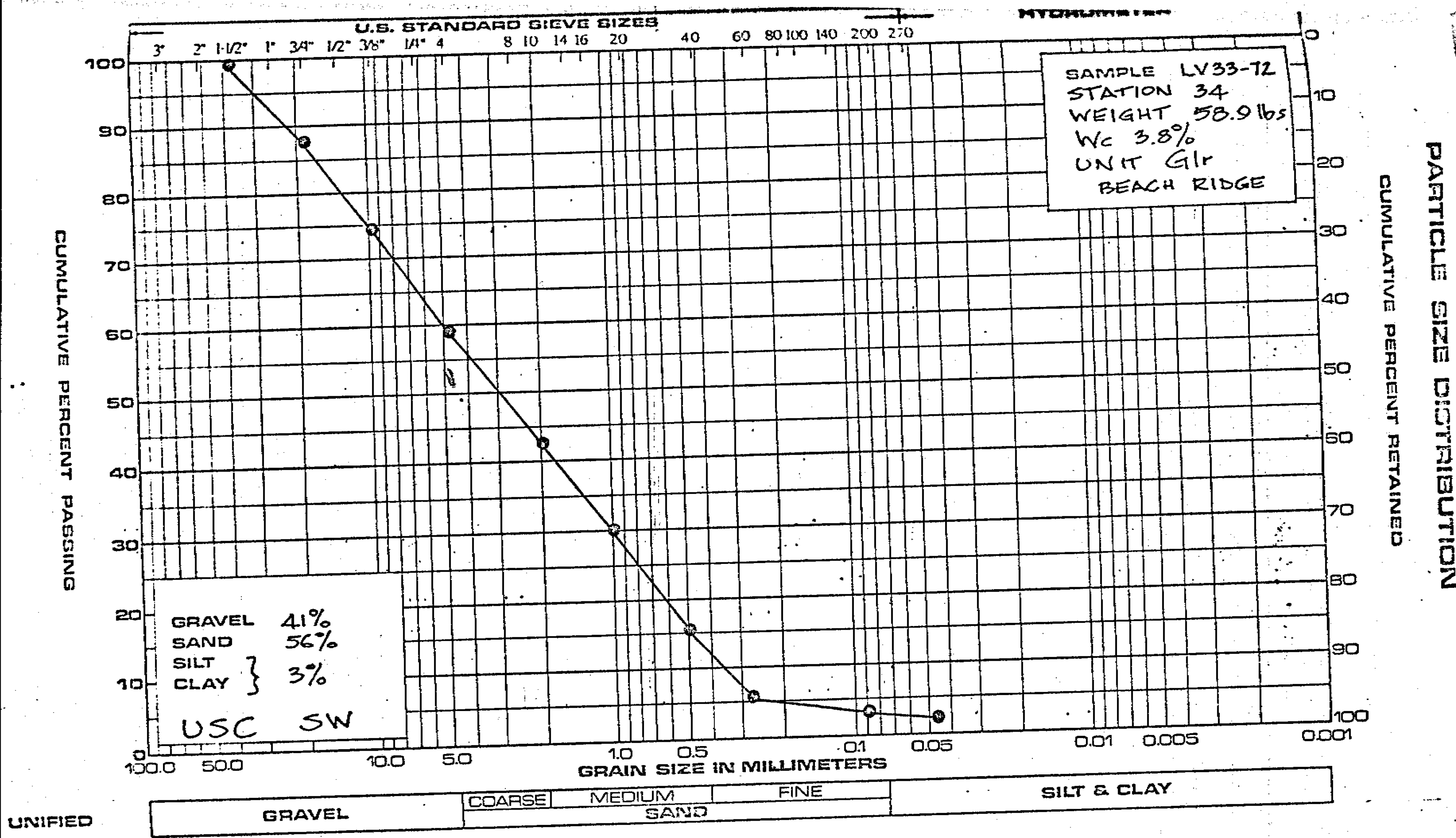
DEPARTMENT OF ENERGY, MINES AND RESOURCES



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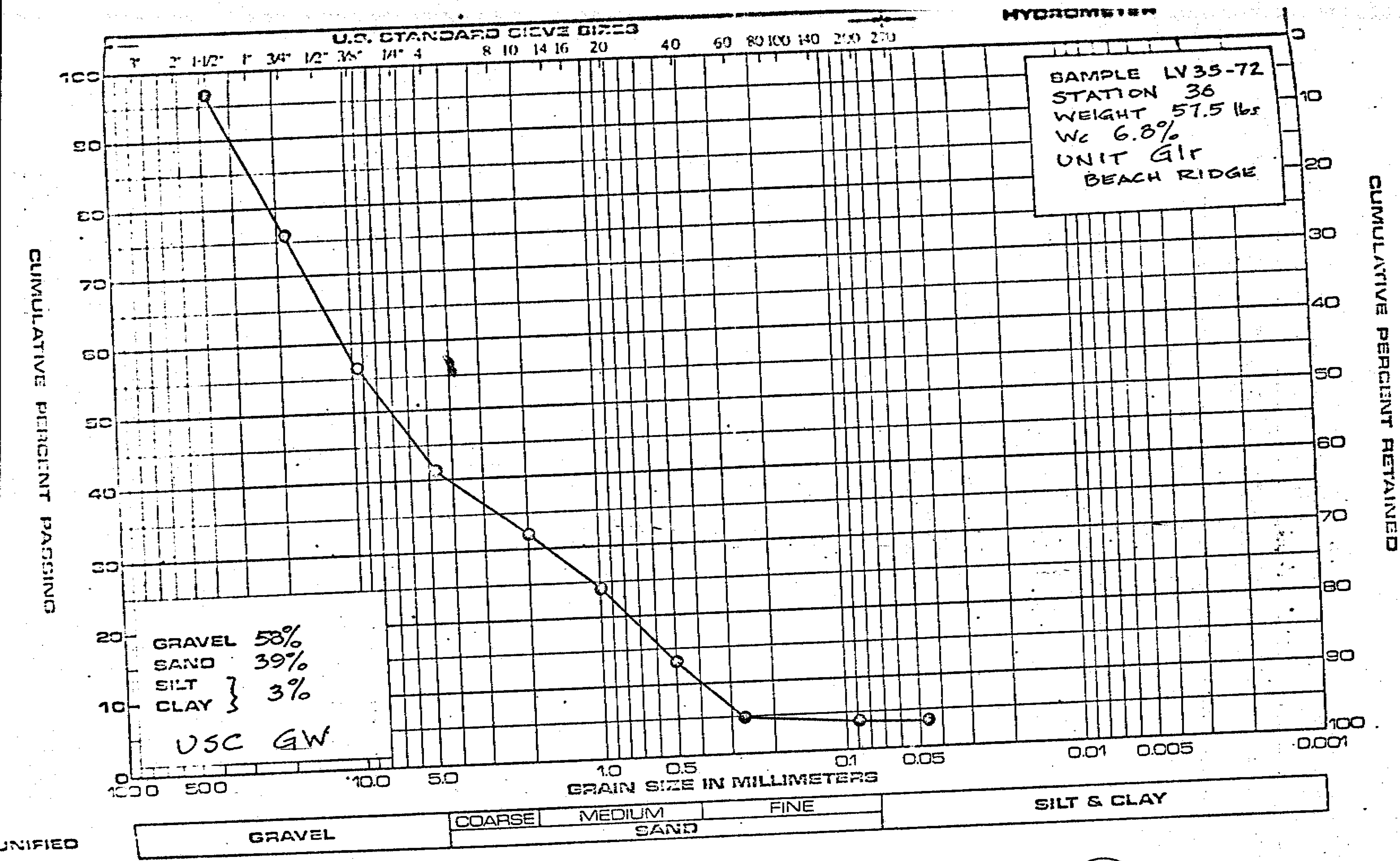

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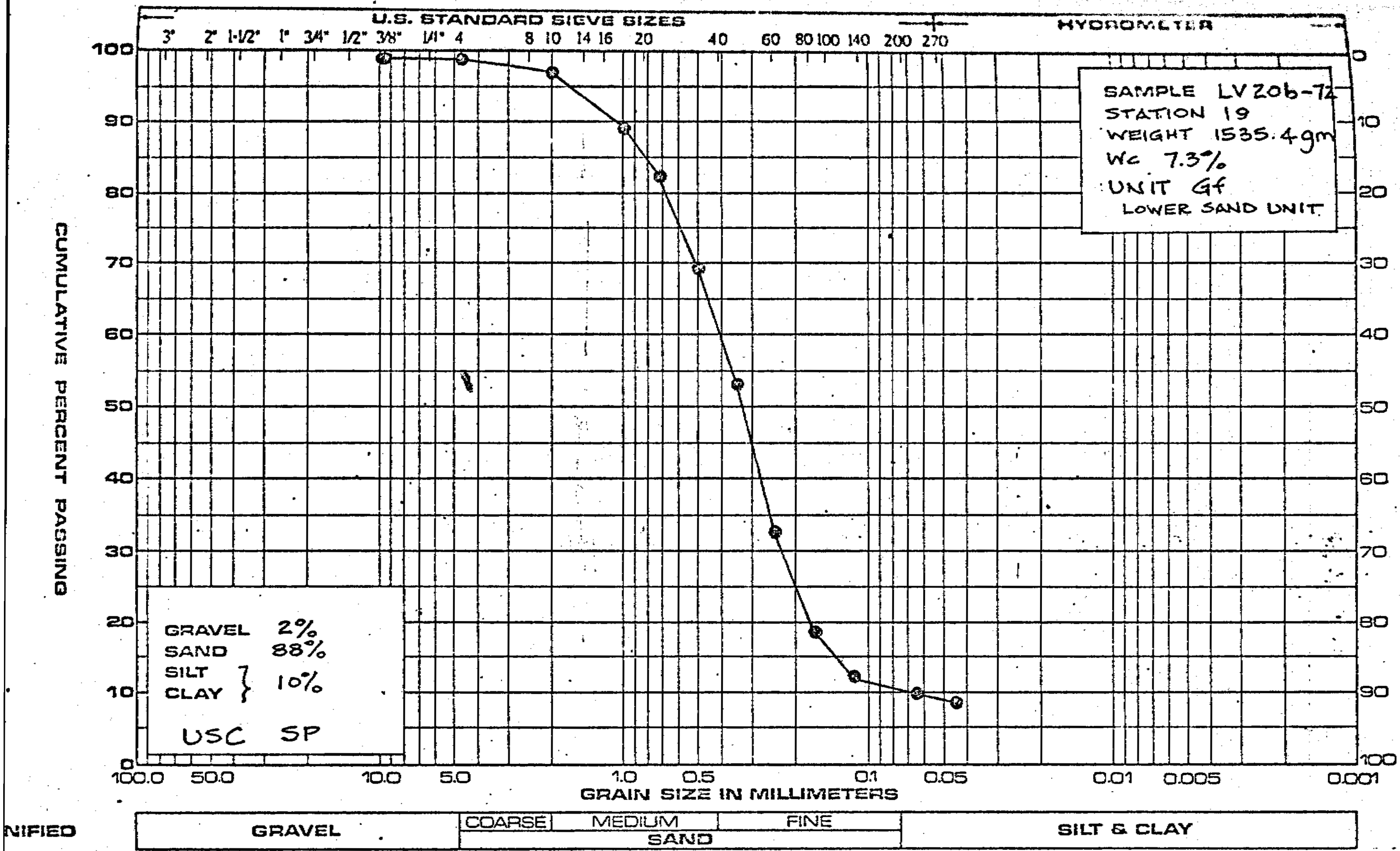

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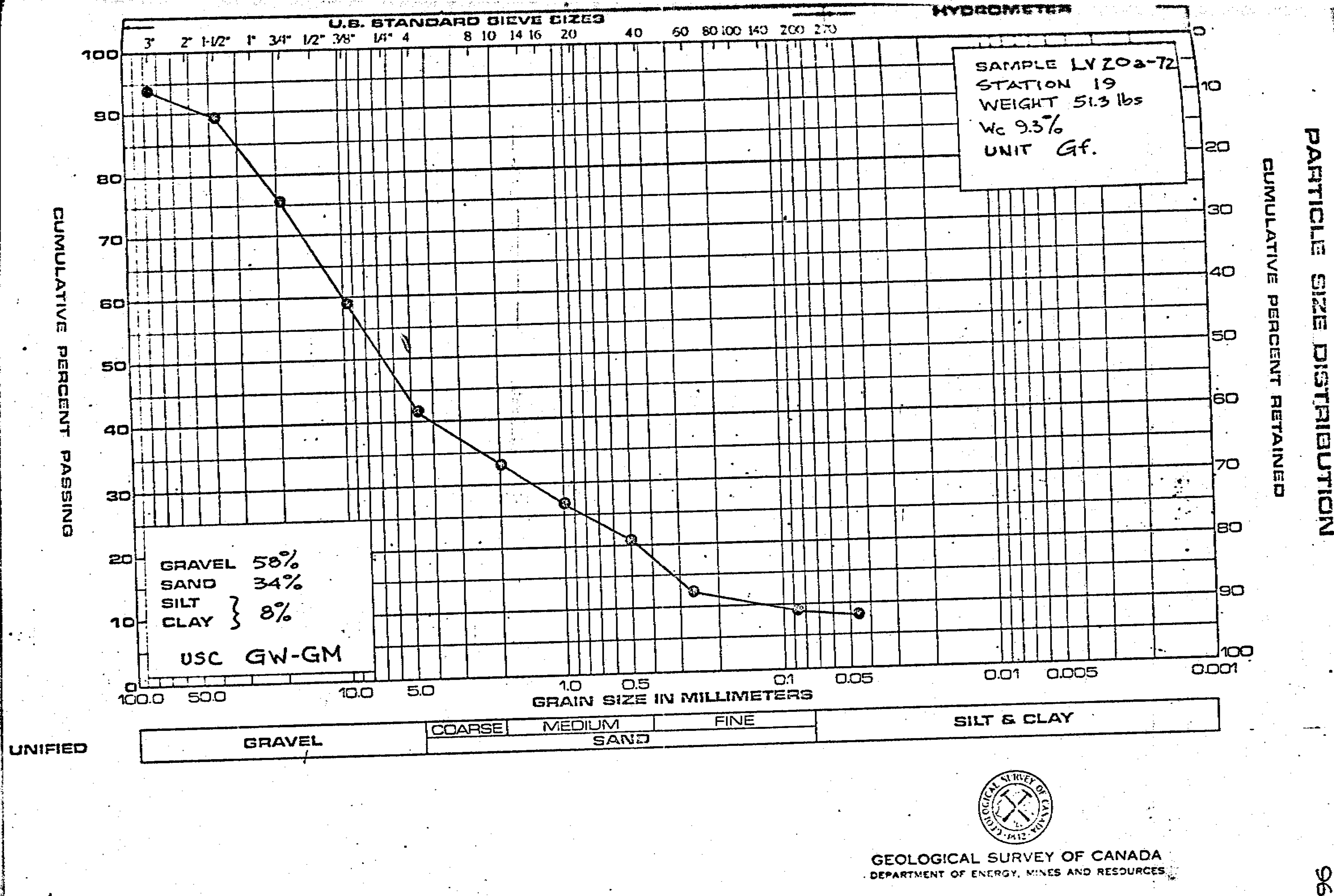
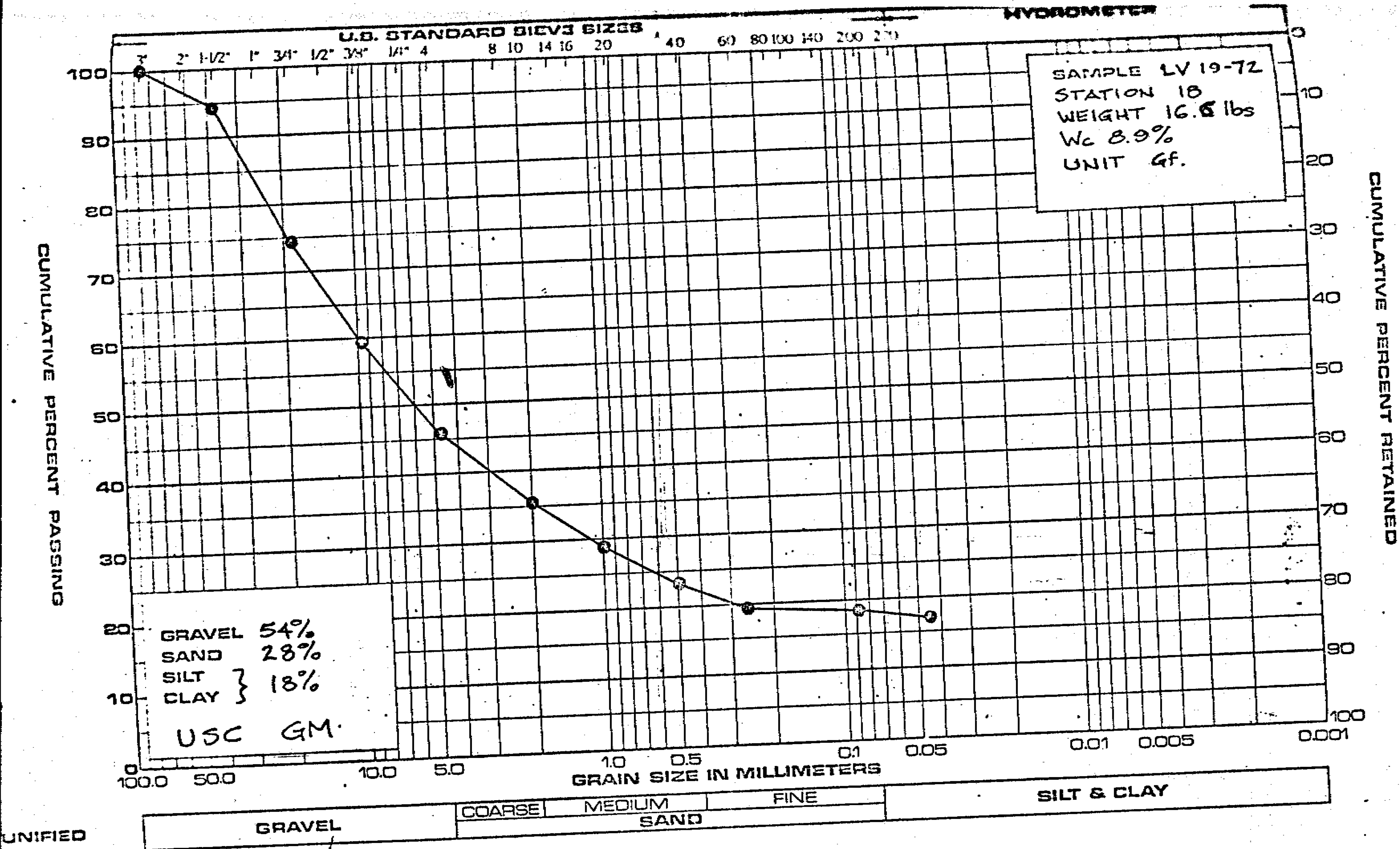
DEPARTMENT OF ENERGY, MINES AND RESOURCES


PARTICLE SIZE DISTRIBUTION
U.S. STANDARD SIEVE SIZES
HYDROMETER
3" 2" 1-1/2" 1" 3/4" 1/2" 3/8" 1/4" 4 8 10 14 16 20 40 60 80 100 140 200 270
SAMPLE LV 20a-72
STATION 19
WEIGHT 51.3 lbs
Wc 9.3%
UNIT Gf.
CUMULATIVE PERCENT PASSING
CUMULATIVE PERCENT RETAINED
GRAVEL 58%
SAND 34%
SILT
CLAY
8%
USC GW-GM
100.0 50.0 10.0 5.0 1.0 0.5 0.1 0.05 0.01 0.005 0.001
GRAIN SIZE IN MILLIMETERS
UNIFIED
GRAVEL
COARSE
MEDIUM
FINE
SAND
SILT & CLAY
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES
96E

PARTICLE SIZE DISTRIBUTION



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DEPARTMENT OF ENERGY, MINES AND RESOURCES

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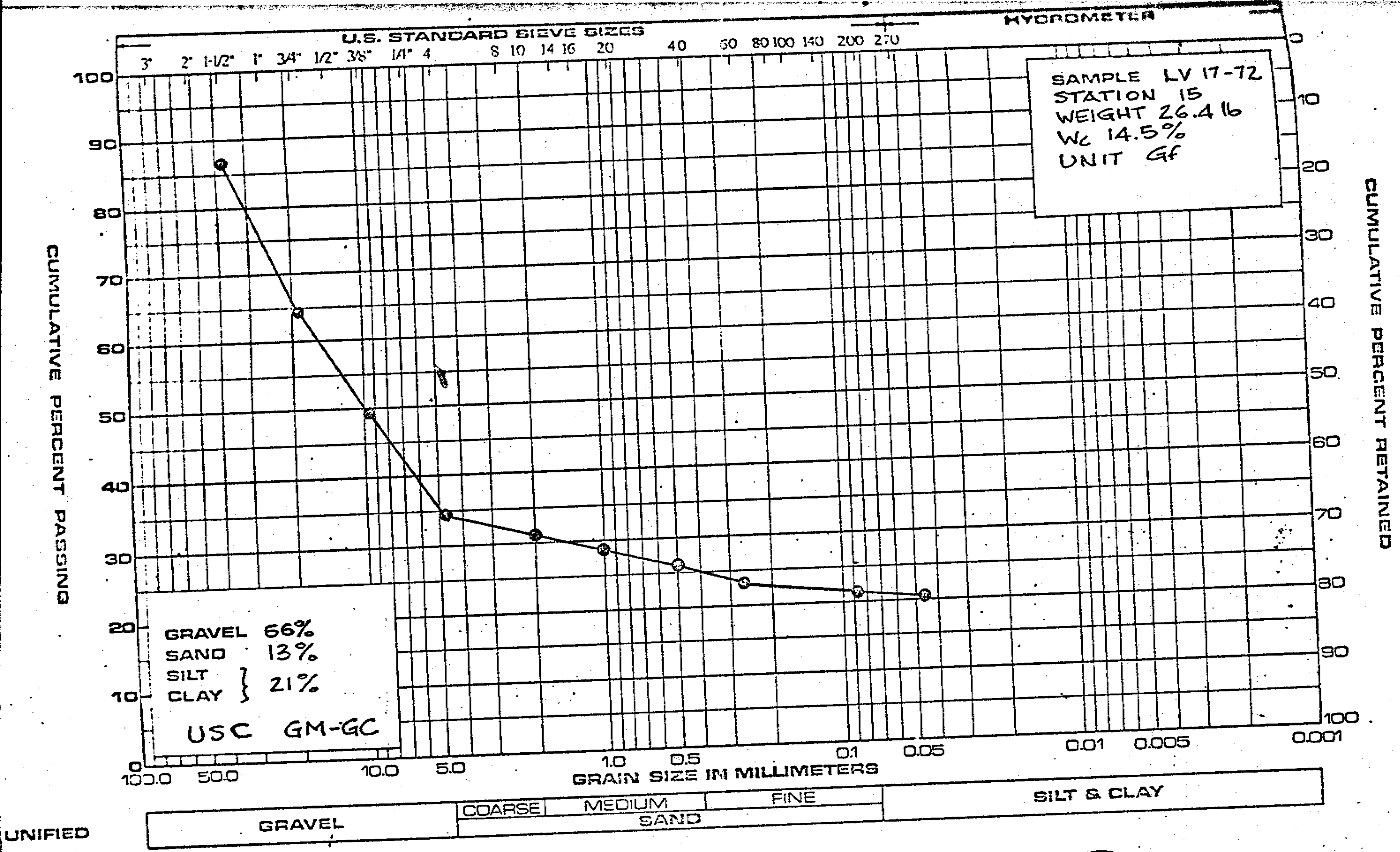

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96 E

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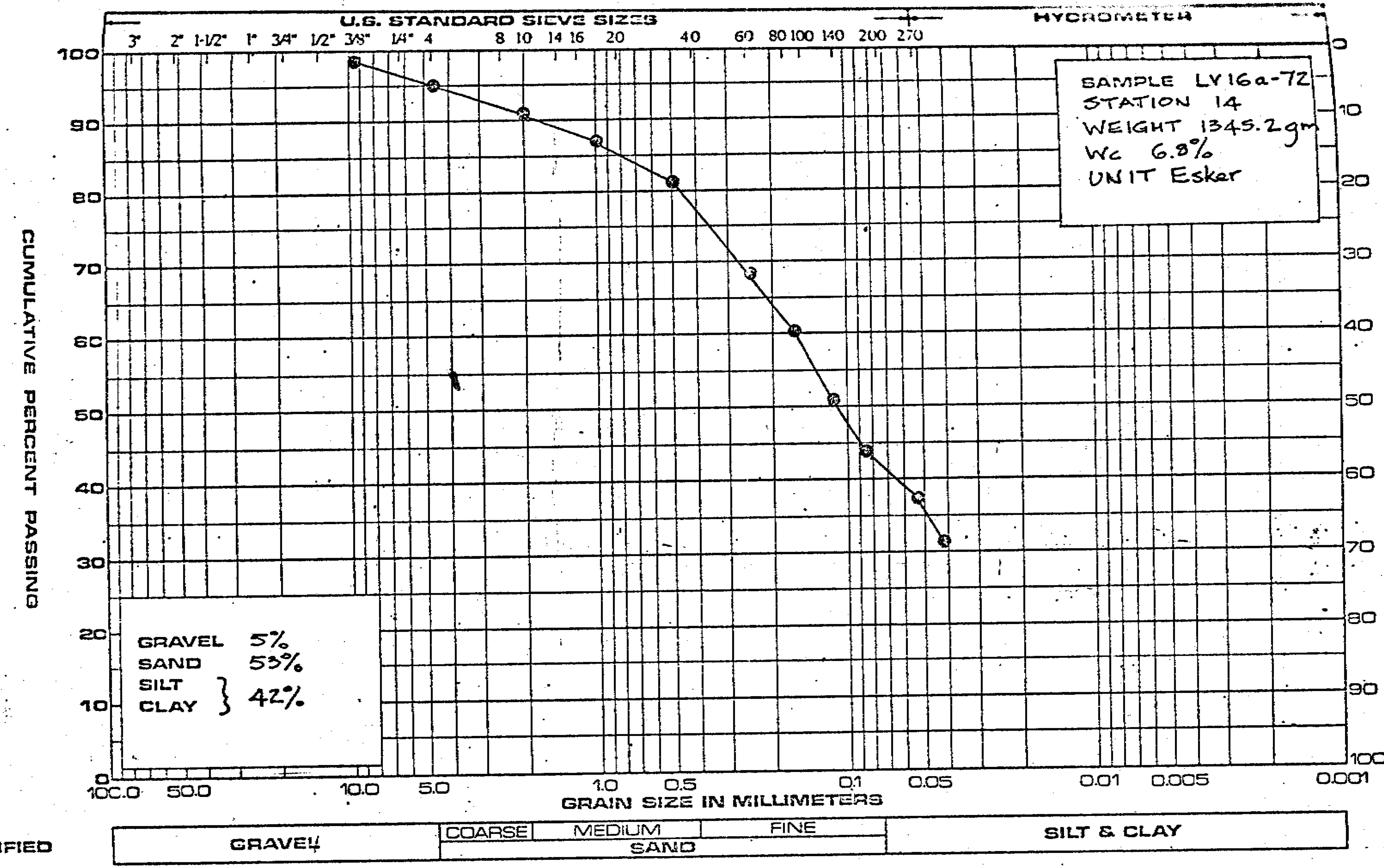

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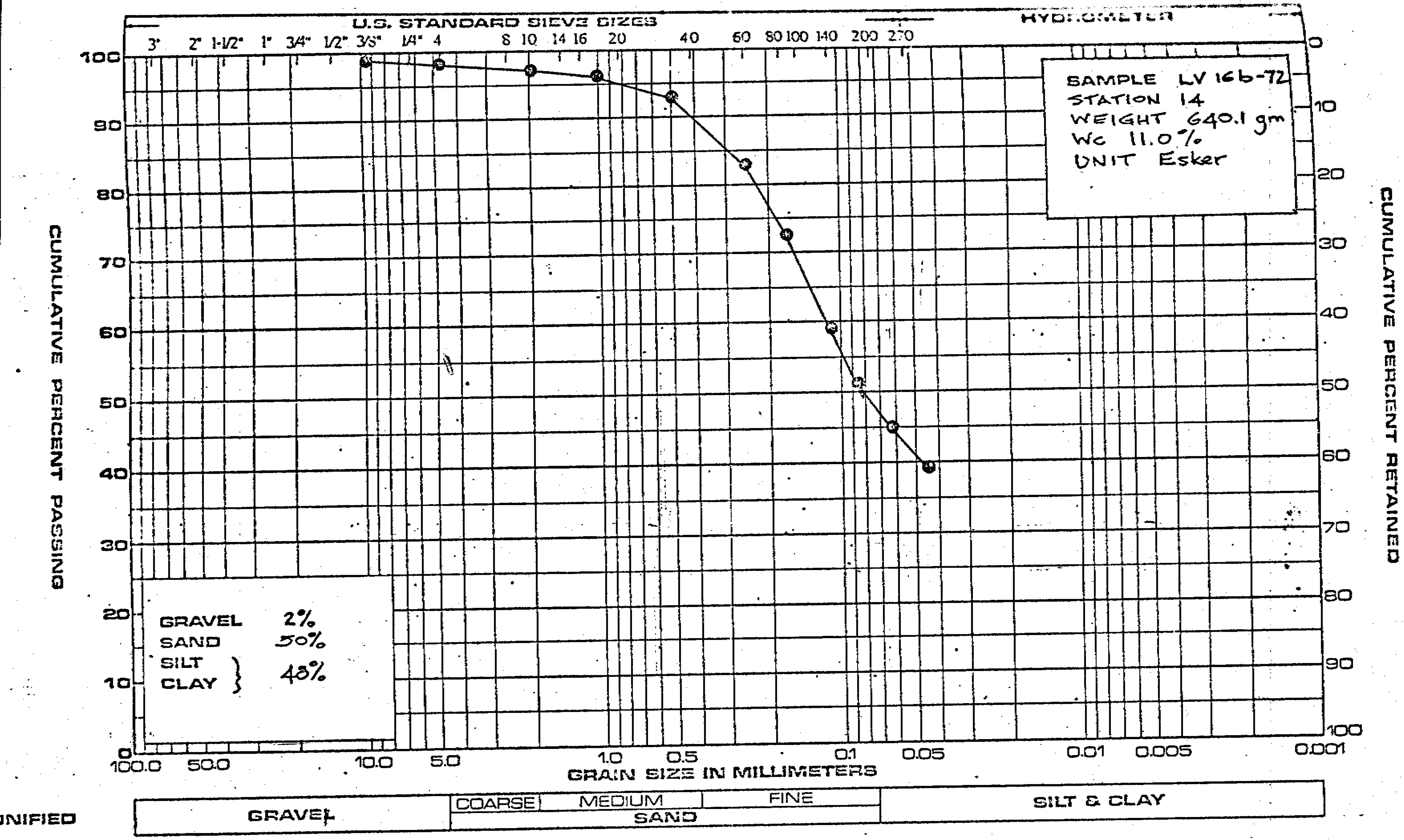

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DEPARTMENT OF ENERGY, MINES AND RESOURCES

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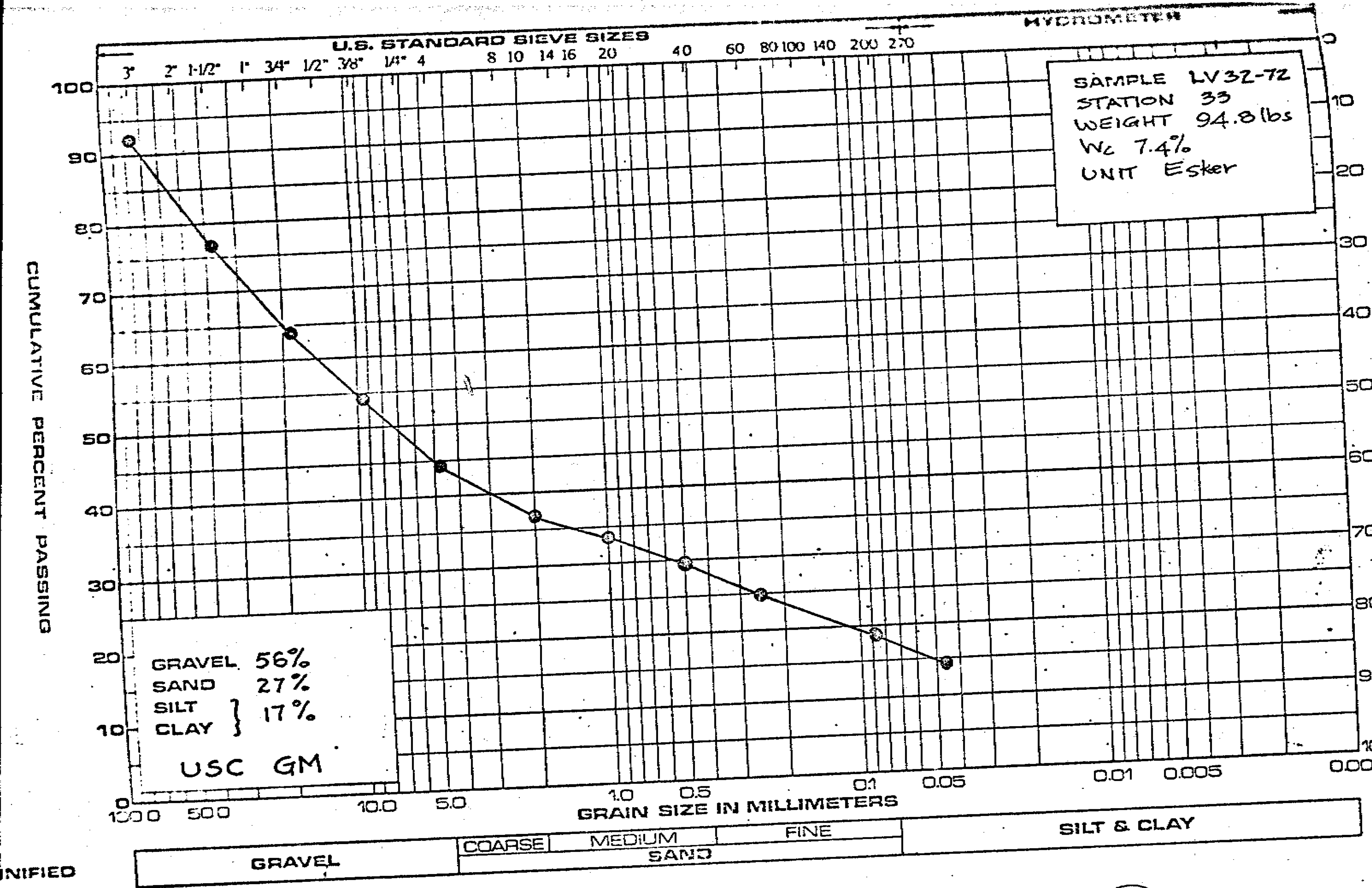

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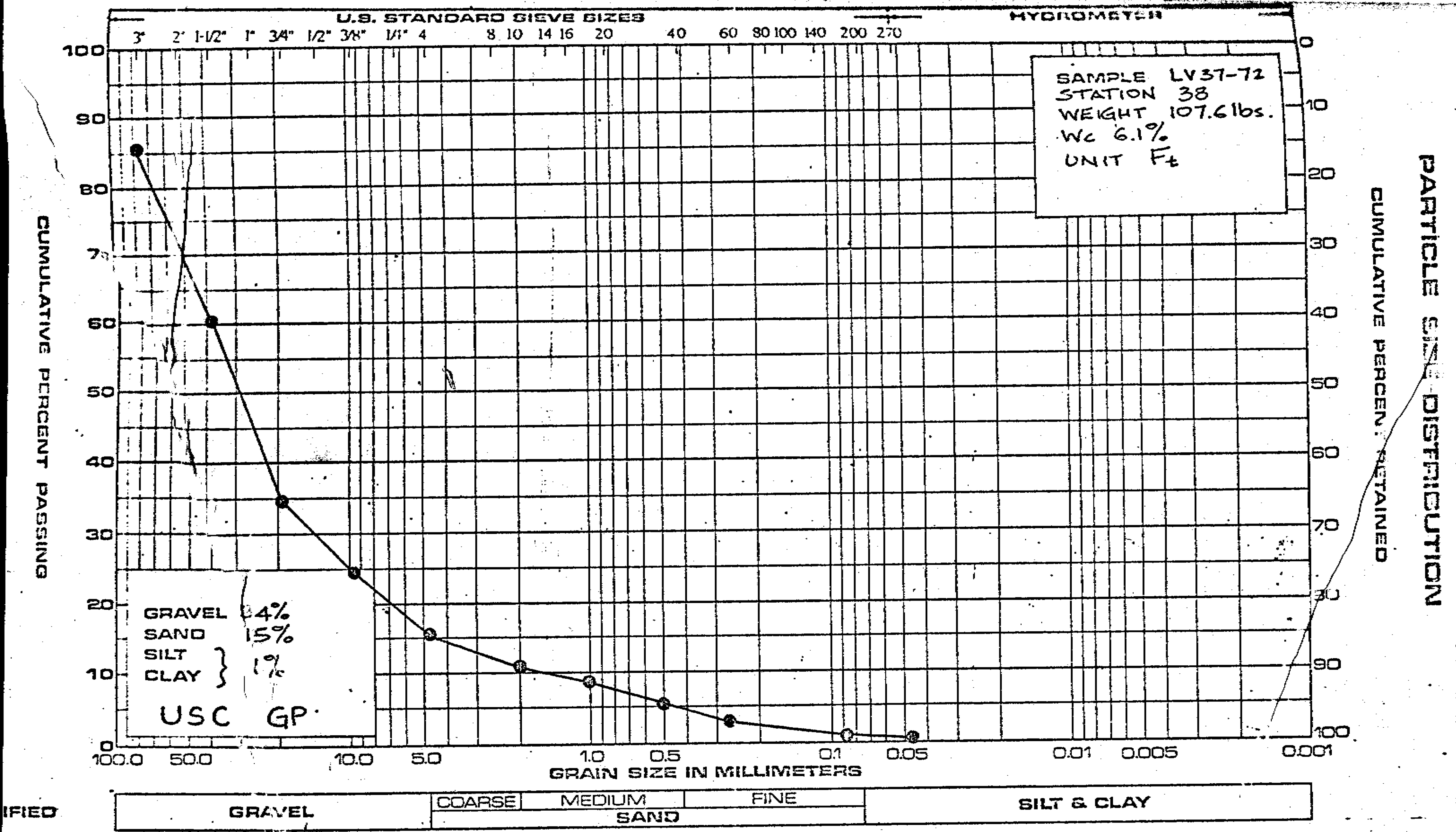

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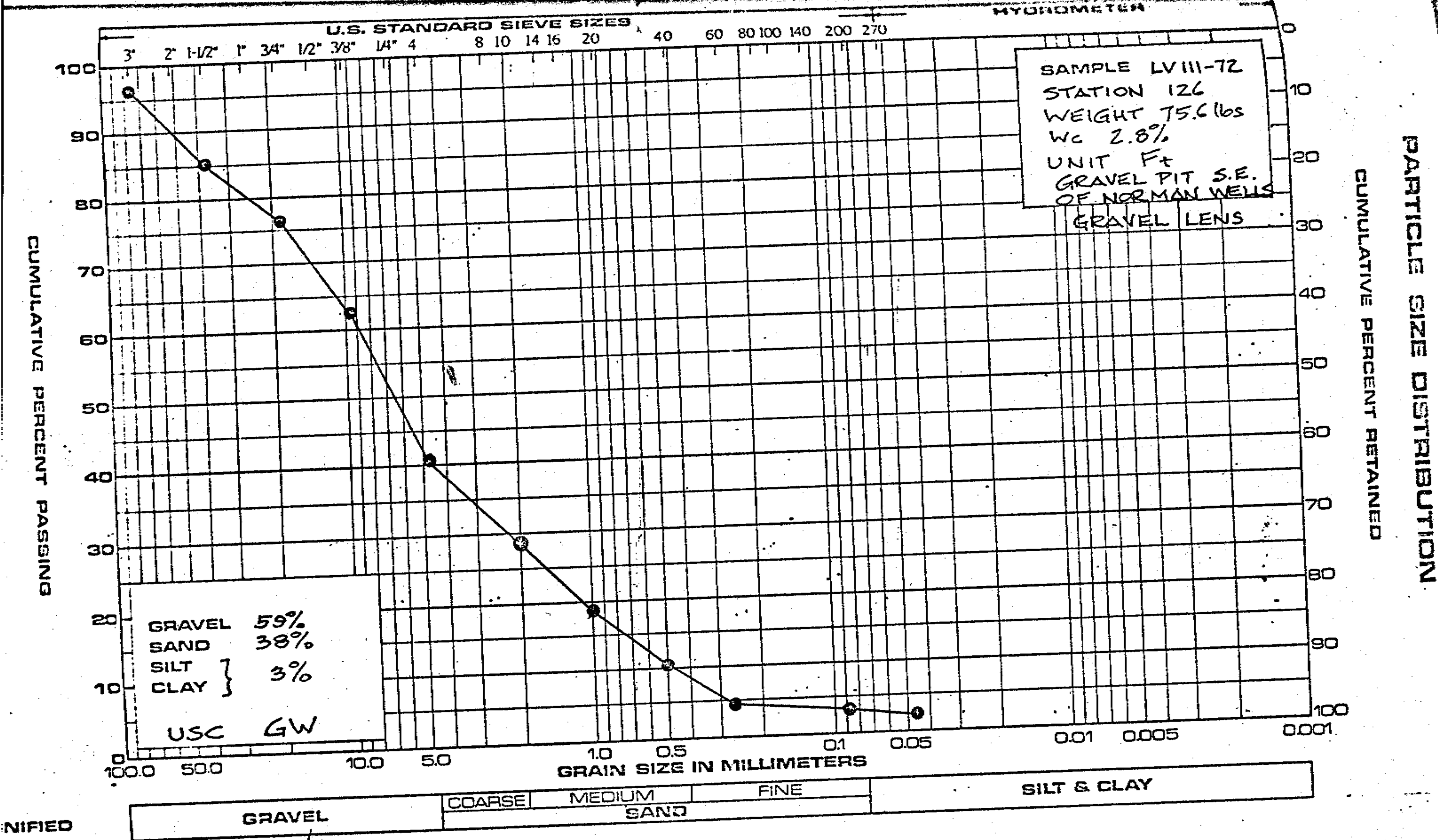
DEPARTMENT OF ENERGY, MINES AND RESOURCES



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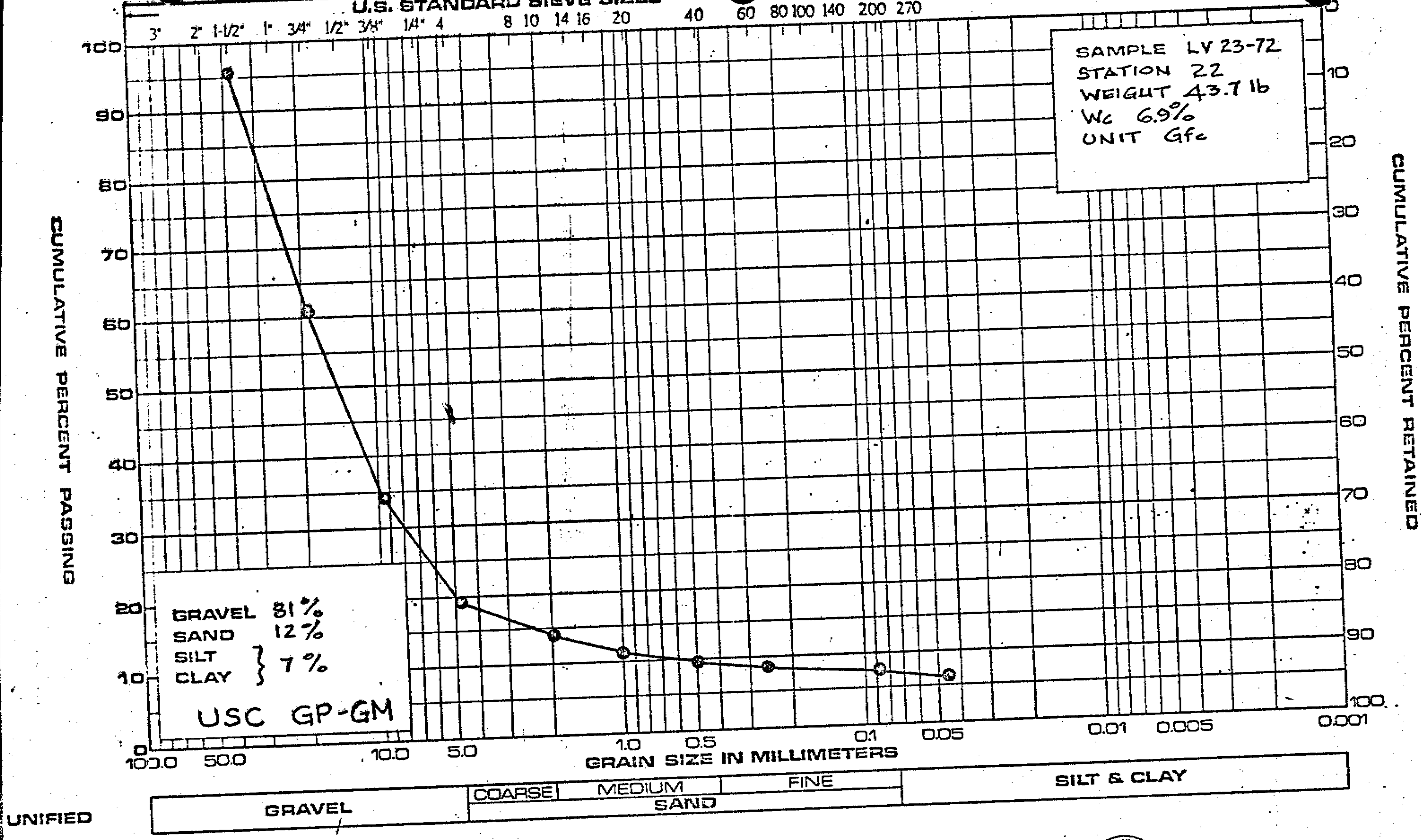
APPENDIX Ib

TEXTURAL DATA NORMAN WELLS MAP SHEET

(EXCLUDING NORMAN WELLS AREA)

PARTICLE SIZE-DISTRIBUTION



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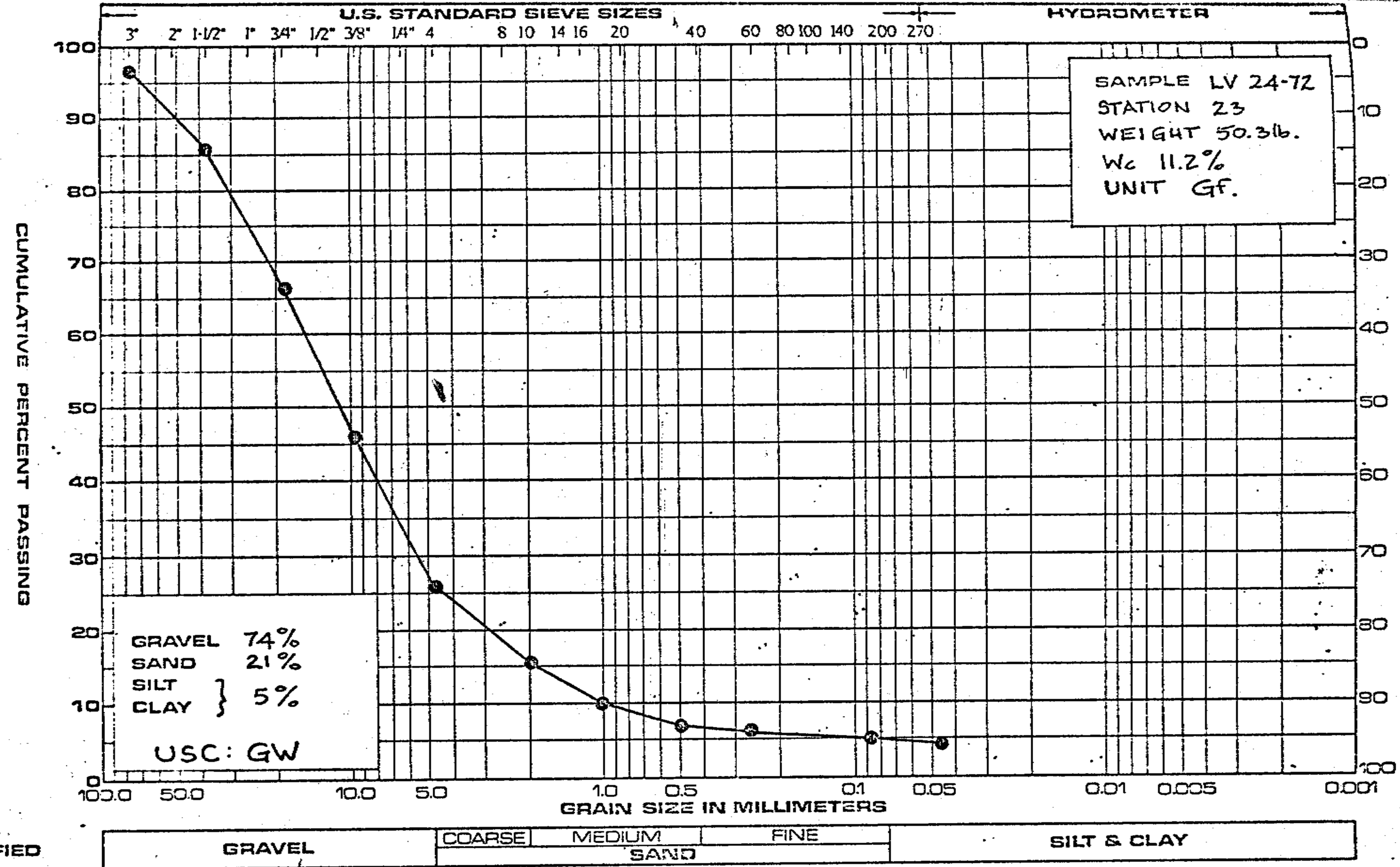

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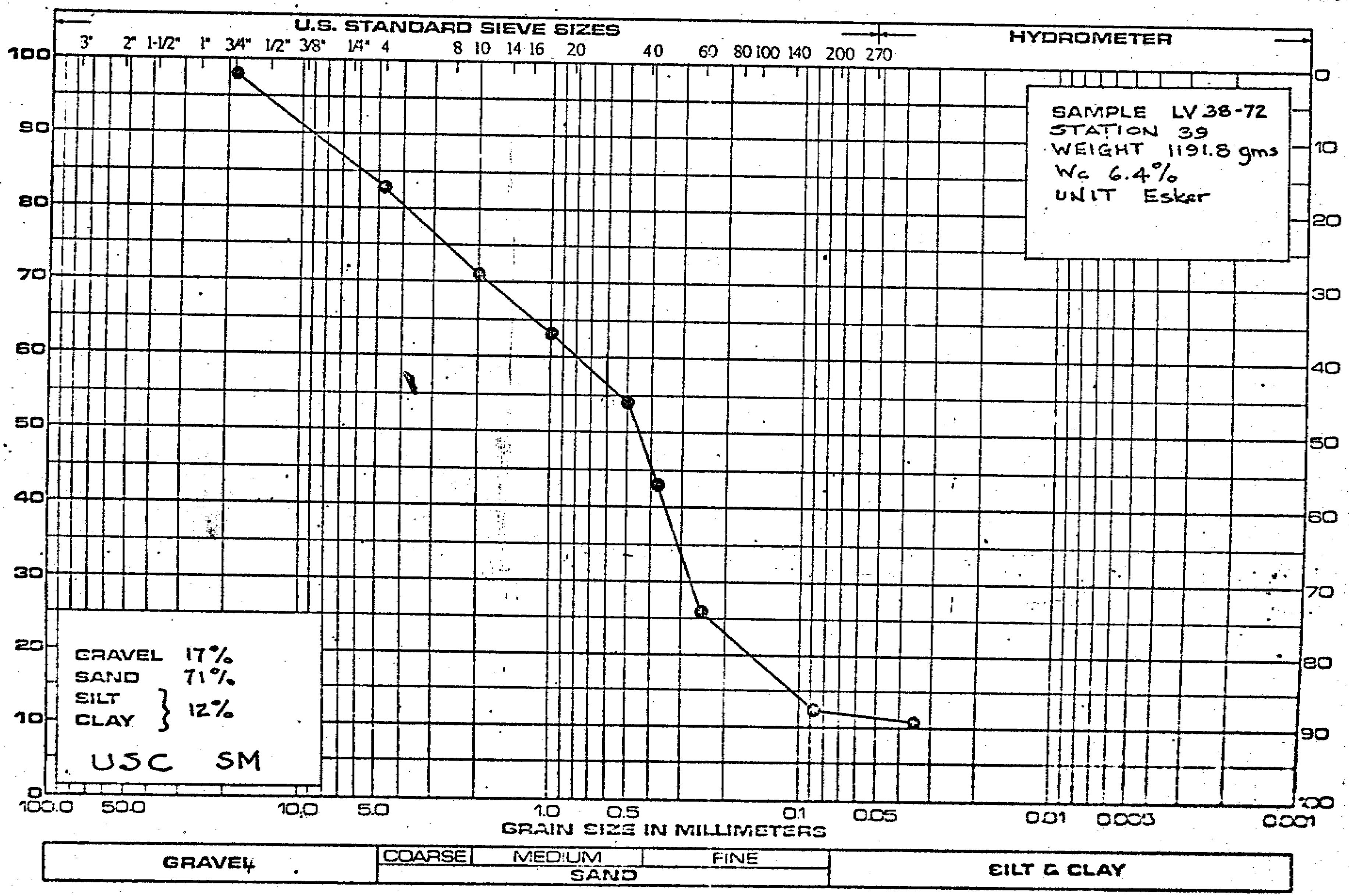

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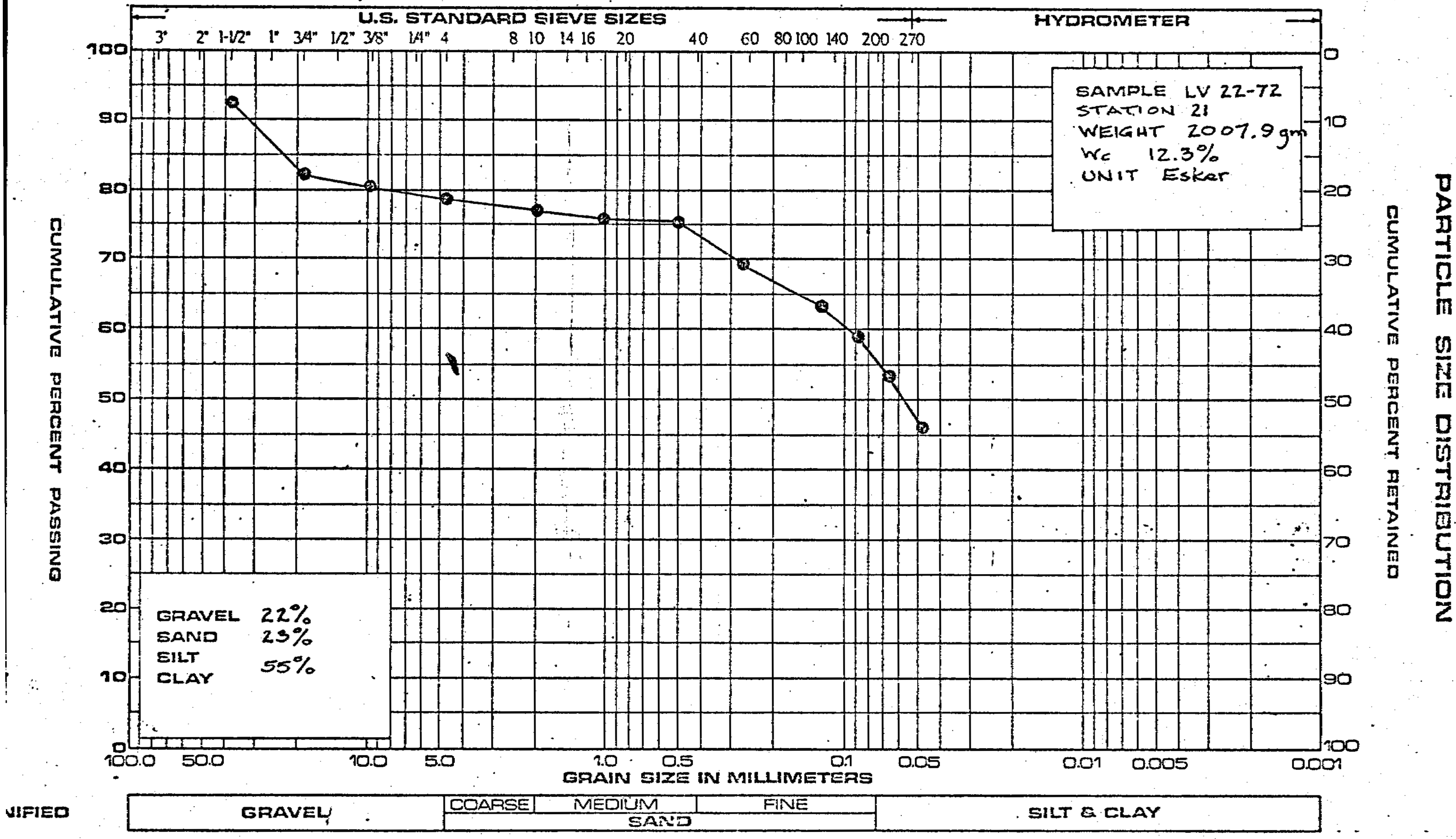

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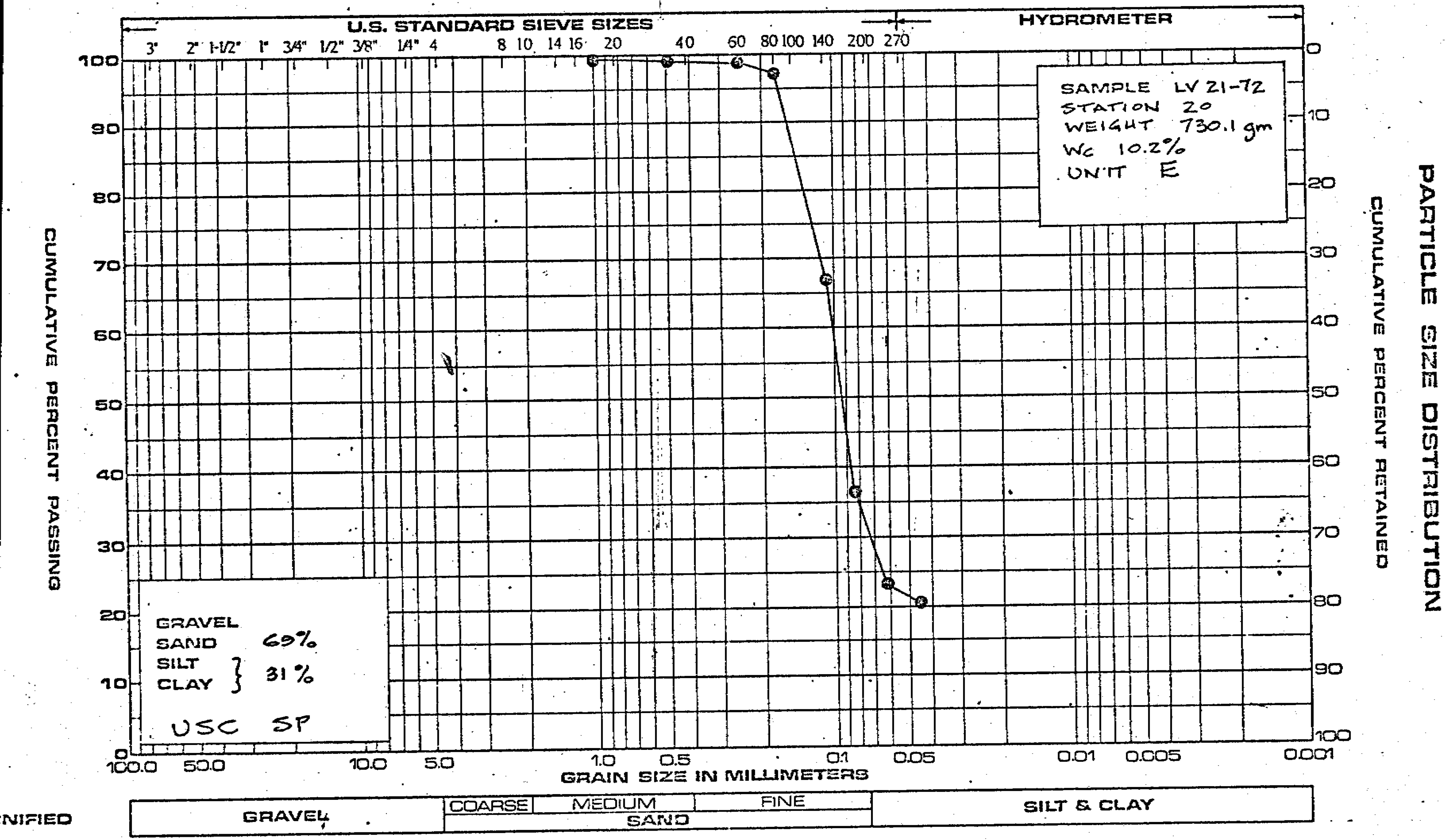
DEPARTMENT OF ENERGY, MINES AND RESOURCES



GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

96 E

GRANULAR RESOURCES

NORTHEAST OF MACKENZIE RIVER

NORMAN WELLS AREA

To accompany NORMAN WELLS -- Revision
SEPTEMBER 1972

SURFICIAL GEOLOGY P.T. HANLEY
D.E. LAWRENCE
D.F. VANDINE

SCALE 1:50,000

LEGEND

GLACIOFLUVIAL

coarse grained granular material; cobbles, pebbles, gravel; may be mixed with some coarse sand.

mixed or interbedded sand and gravel.

predominantly sand or sand with some fines.

GLACIOLACUSTRINE

mixed sand and gravel.

predominantly sand with some fines.

FLUVIAL

only sand and gravel fluvial deposits are patterned.

MORAINAL

predominantly till material

EOLIAN

usually fine and medium sands.

COLLUVIUM

only the coarse grained material is patterned.

SYMBOL

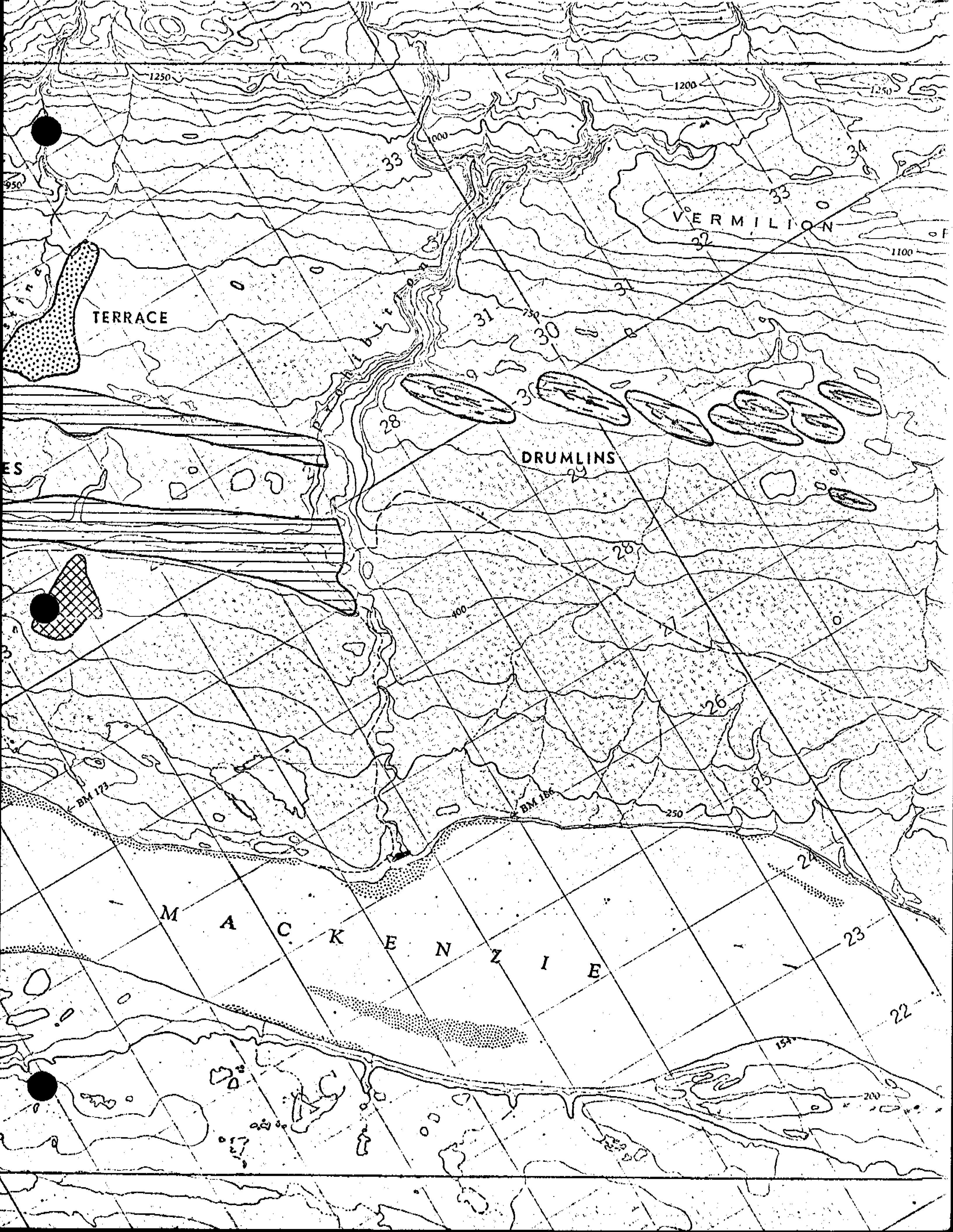
eskers

drumlins

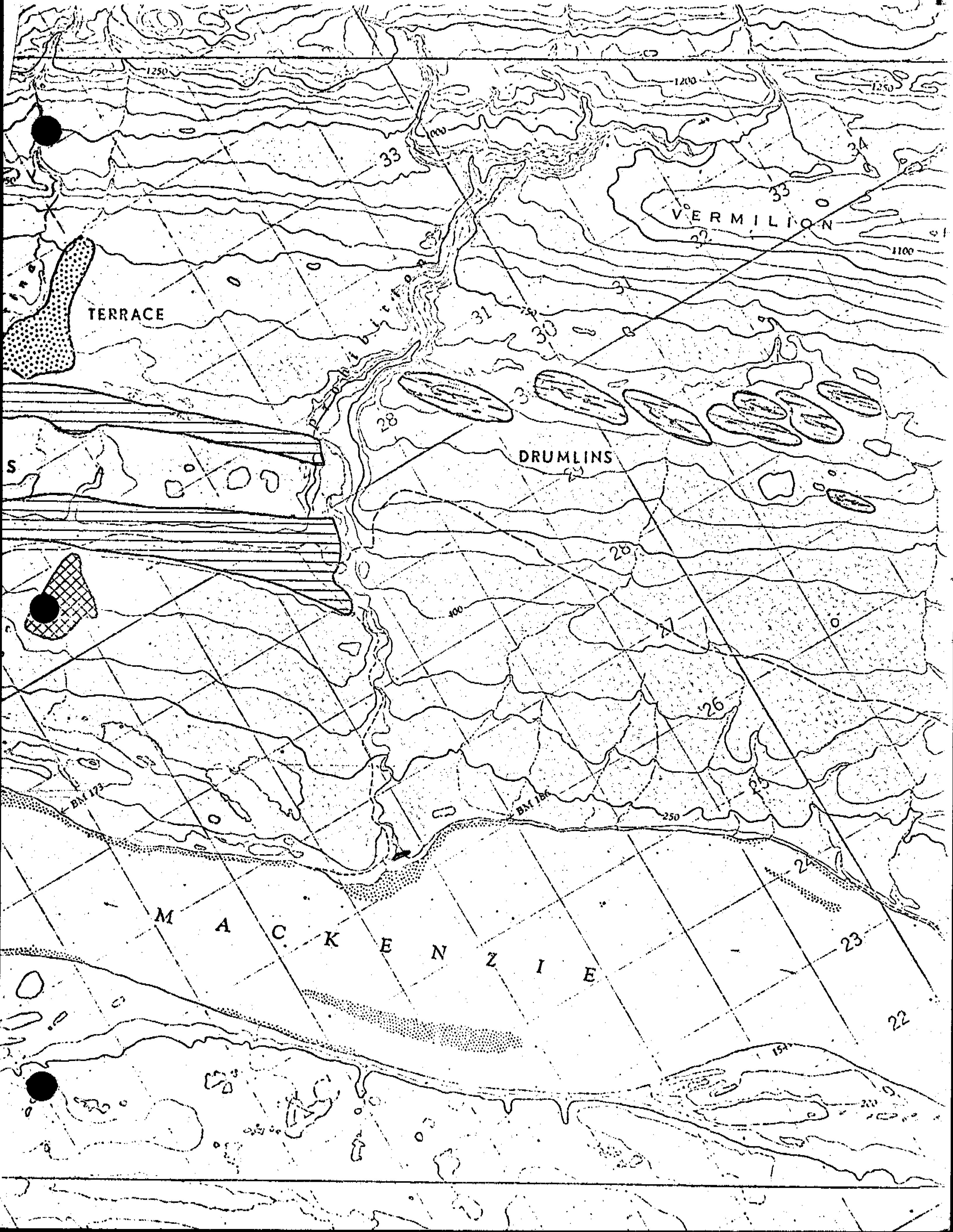
station number

35

quarry



TERRACE
VERMILION
DRUMLINS
M A C K E N Z I E
1250
1200
1100
1000
750
400
250
200
BM 173
BM 186
33
34
32
31
30
29
28
27
26
25
24
23
22



TERRACE
VERMILION
DRUMLINS
M A C K E N Z I E
1250
1200
1100
750
400
250
BM 173
BM 186
33
34
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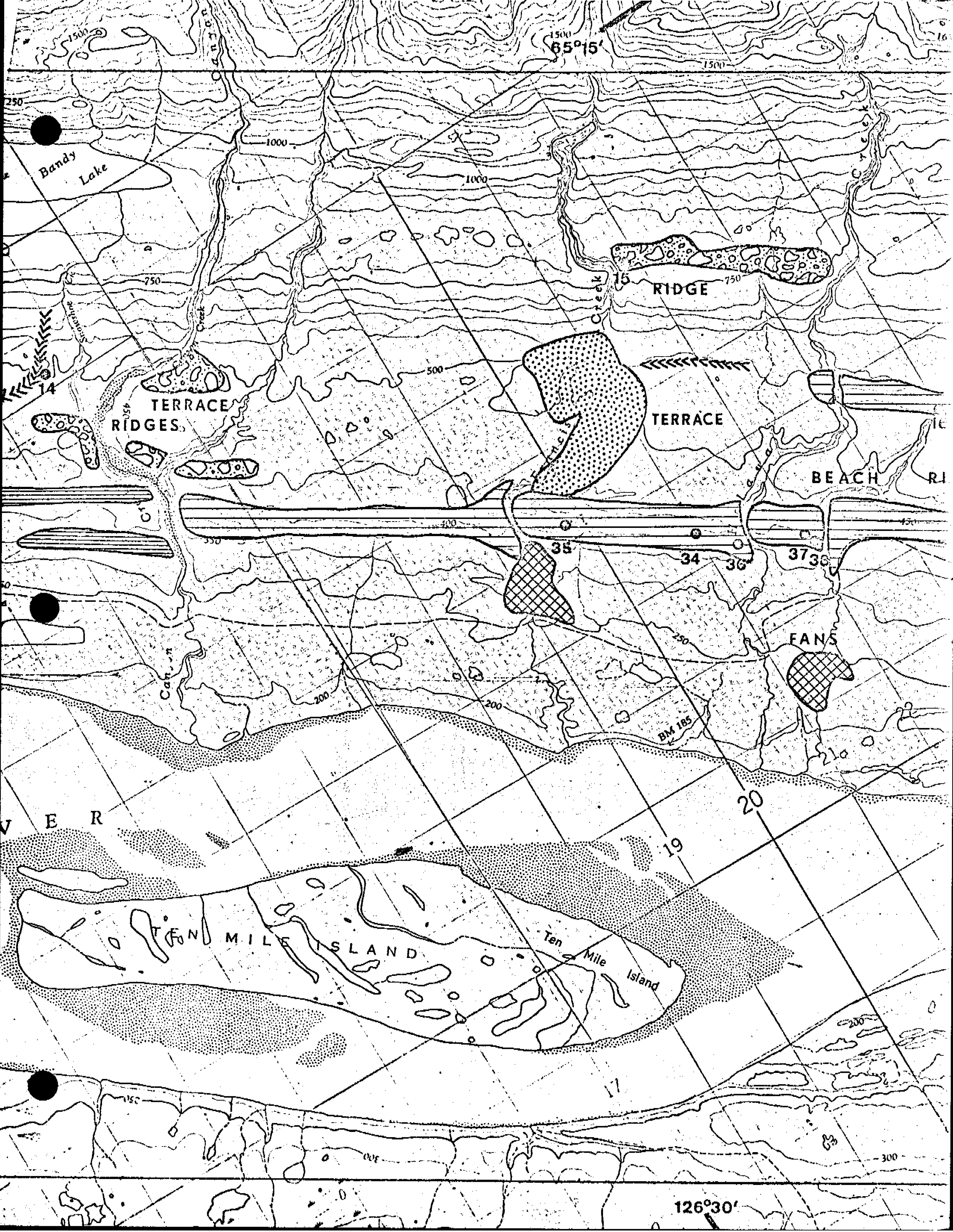
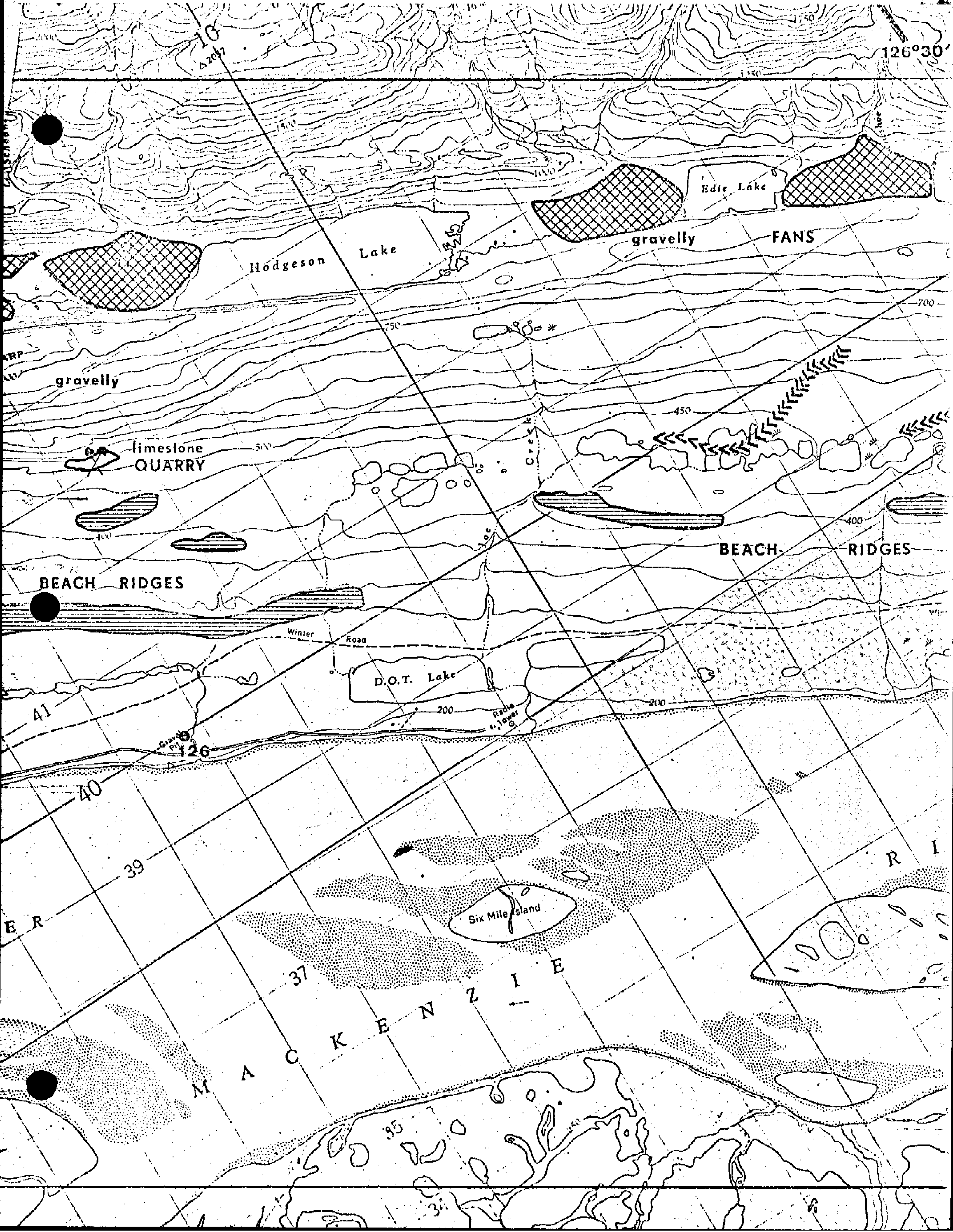
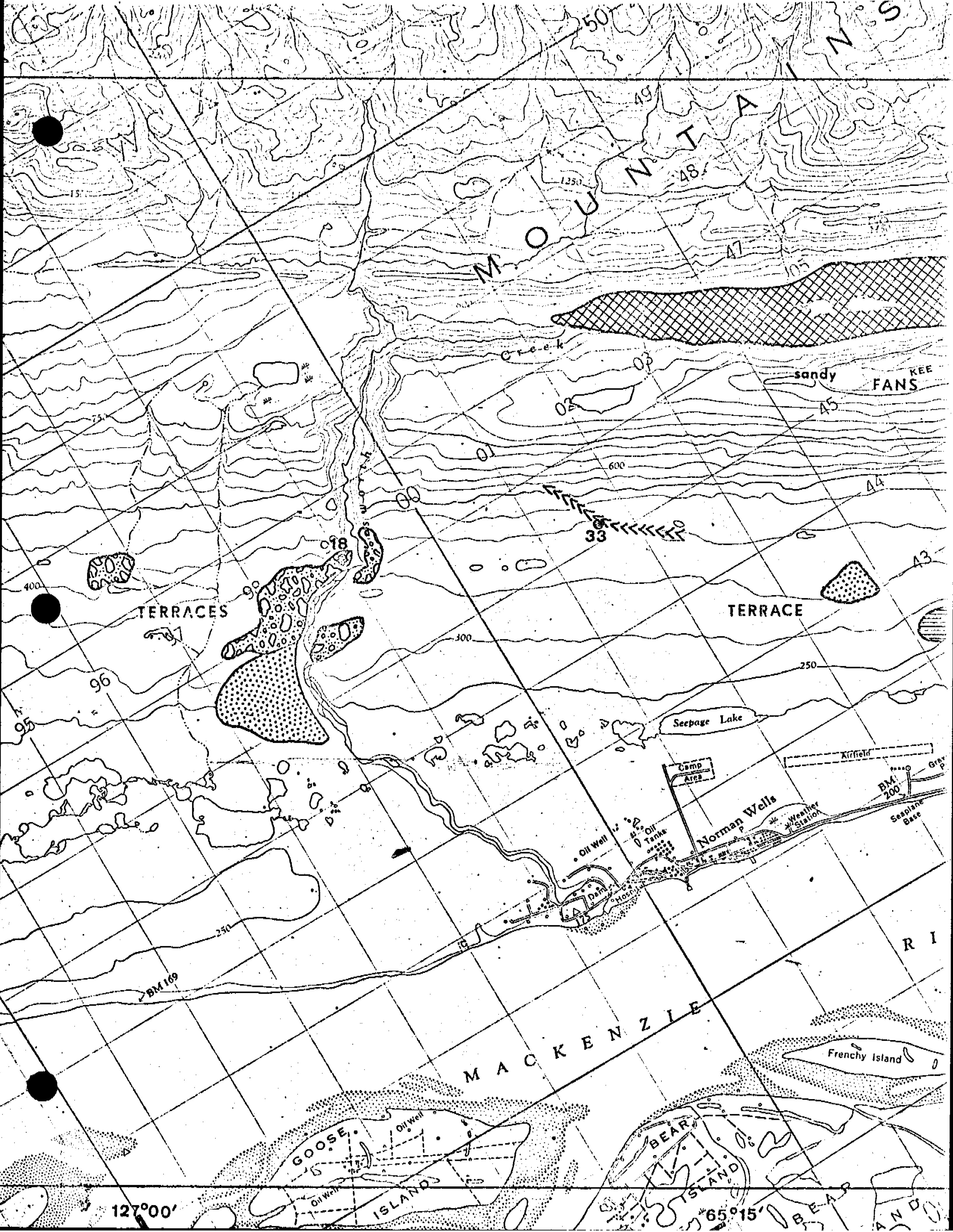
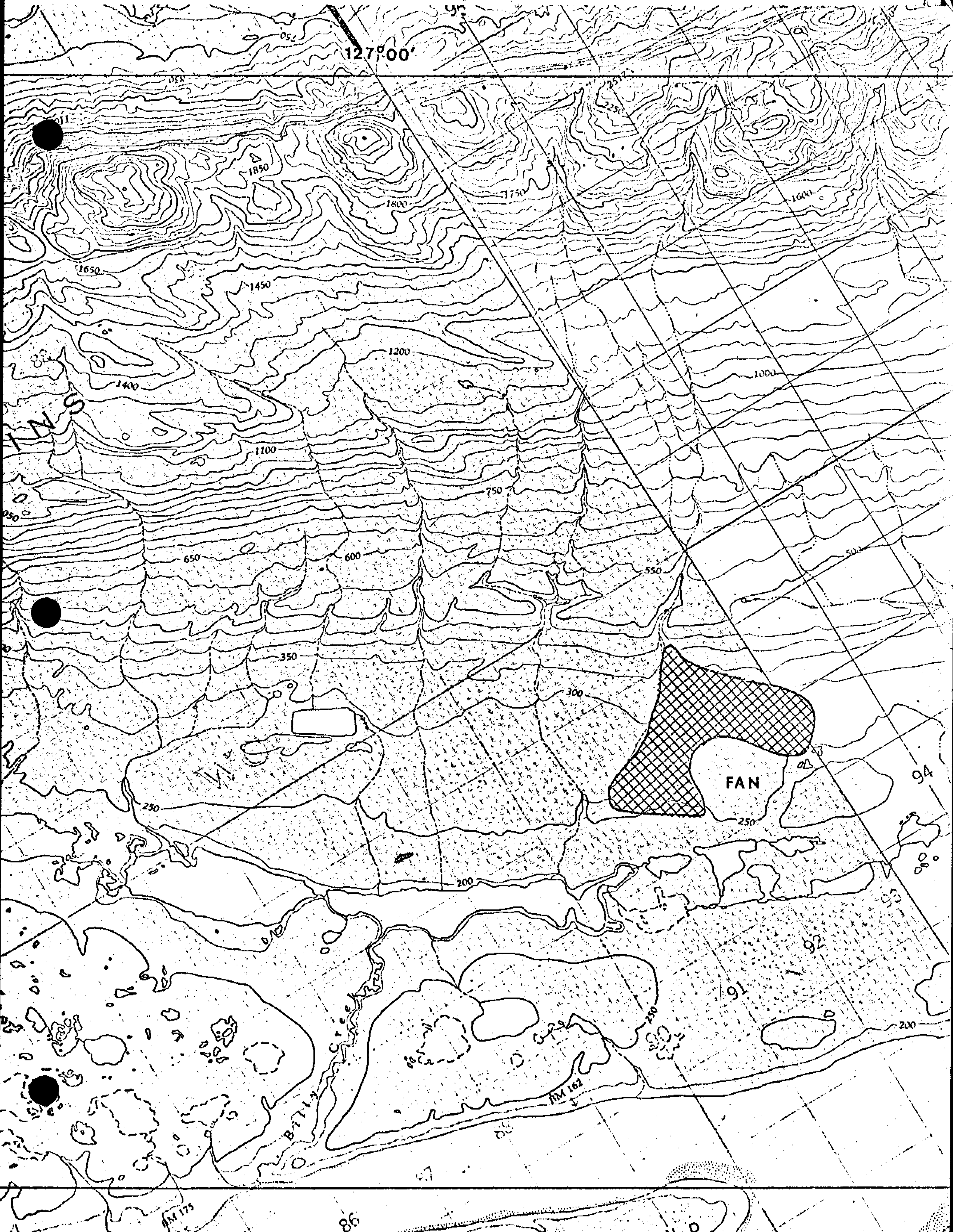

65°15′
Bandy Lake
RIDGE
TERRACE
RIDGES
TERRACE
BEACH
FANS
14
15
35
34
36
37
38
BM 185
19
20
17
V E R
TEN MILE ISLAND
Ten Mile Island
126°30′



126°30'
Edie Lake
gravelly FANS
Hodgeson Lake
gravelly
limestone QUARRY
Creek
BEACH RIDGES
BEACH RIDGES
Winter Road
D.O.T. Lake
Radio Tower
Gravel Pit
Six Mile Island
MACKENZIE RIVER



MOUNTAINS
Creek
sandy FANS
TERRACES
TERRACE
Seepage Lake
Airfield
Camp Area
Oil Well
Oil Tanks
Norman Wells
Weather Station
Seaplane Base
Dam
Hospital
BM 200
BM 169
MACKENZIE
RI
Frenchy Island
GOOSE ISLAND
BEAR ISLAND
127°00′
65°15′



127°00'
1850
1800
1750
1600
1650
1450
1400
1200
1100
1000
750
650
600
550
500
350
300
250
FAN
250
94
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92
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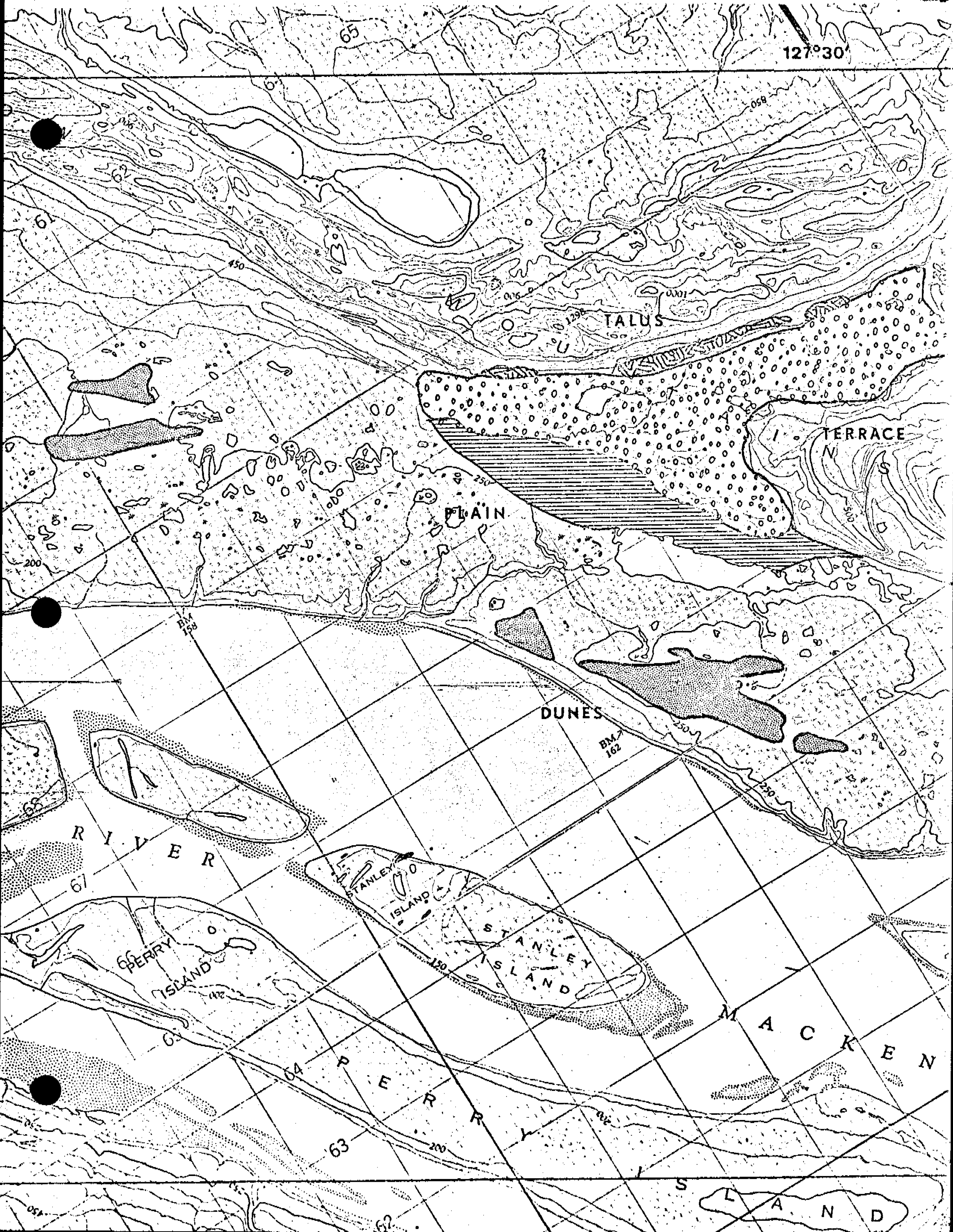
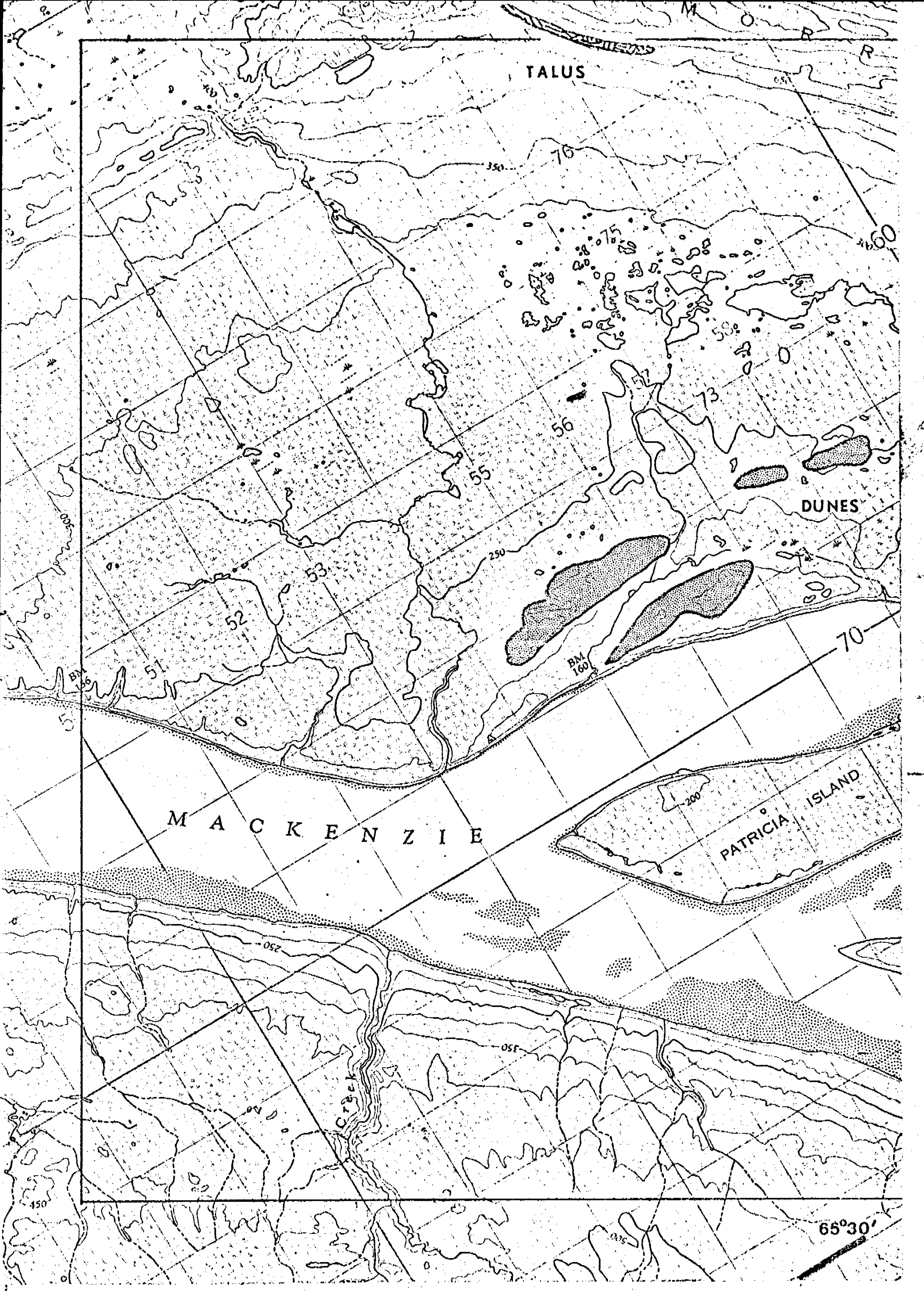
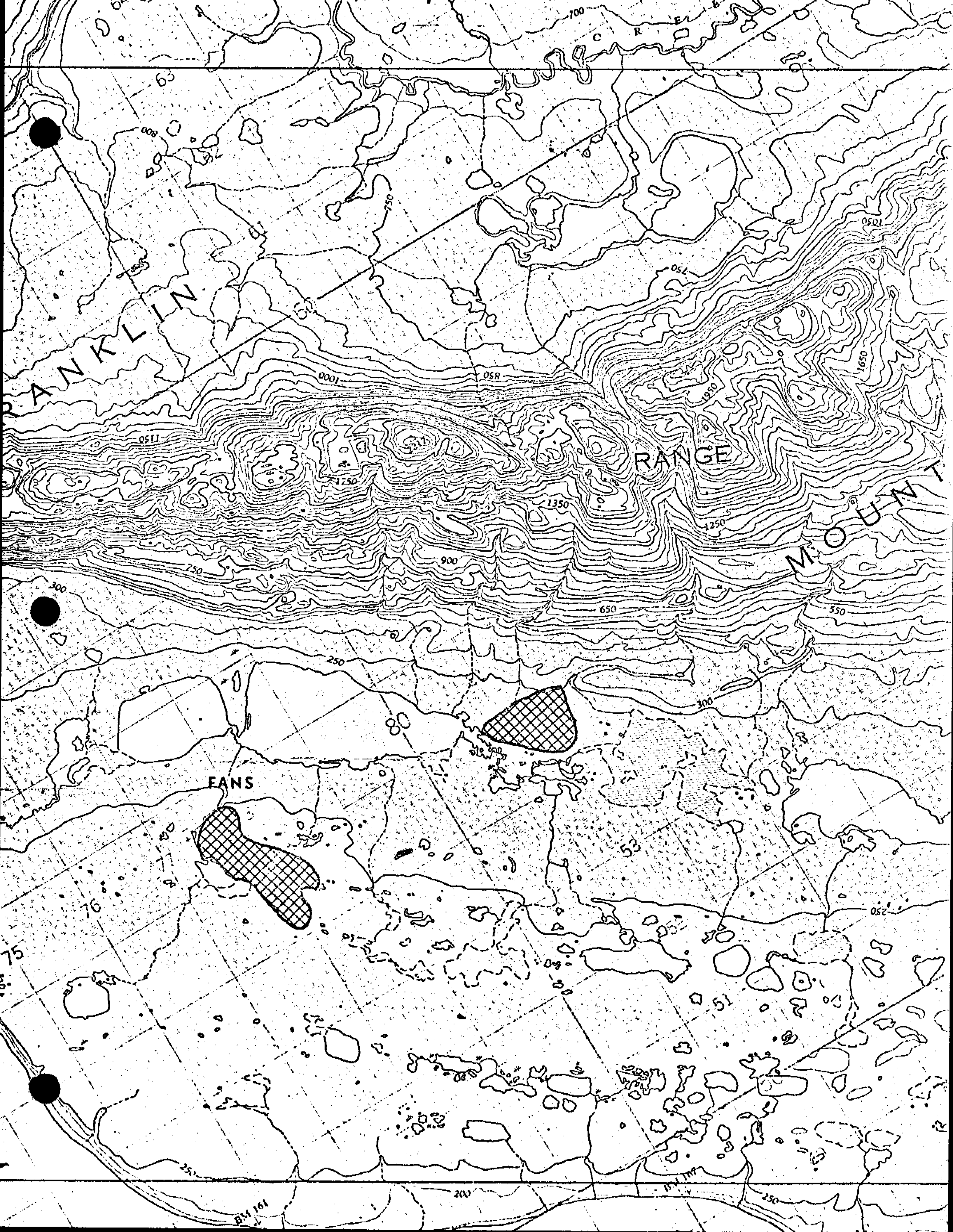
200
BM 162
97
86
BM 175


127°30'
TALUS
TERRACE
PLAIN
DUNES
BM 158
BM 162
RIVER
STANLEY ISLAND
PERRY ISLAND
MACKEN
PERRY ISLAND



TALUS
DUNES
MACKENZIE
PATRICIA ISLAND
Creek
BM 156
BM 160
350
250
300
200
76
75
73
70
60
58
57
56
55
53
52
51
65°30′


FRANKLIN
RANGE
MOUNT
FANS
1000
1150
1750
1350
1250
1950
1650
1050
750
850
900
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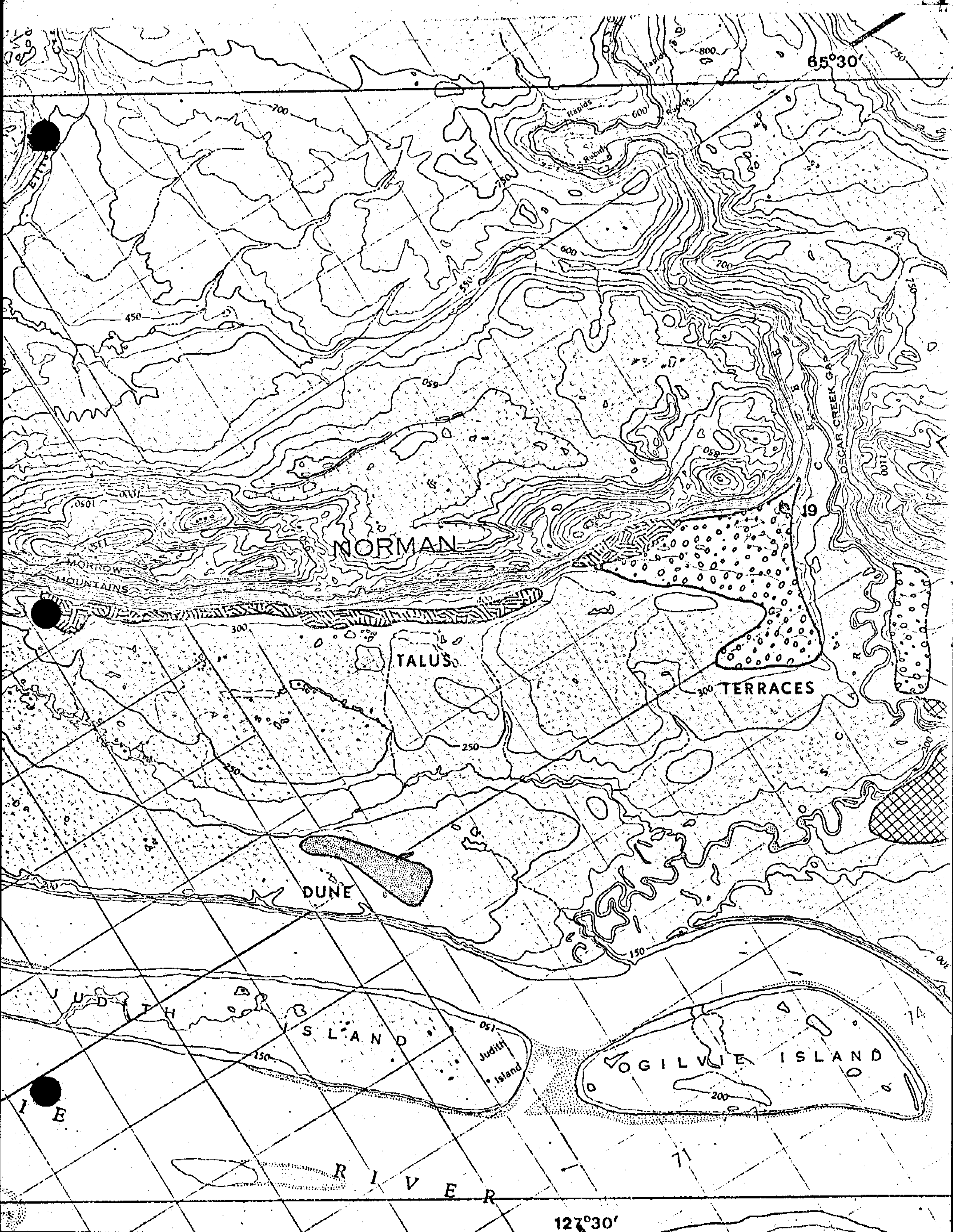
550
300
250
200
BM 161


65°30′
NORMAN
MORROW
MOUNTAINS
TALUS
TERRACES
DUNE
OSCAR CREEK GAP
O S C A R C R E E K
J U D I T H I S L A N D
Judith Island
O G I L V I E I S L A N D
R I V E R
127°30′
Rapids
700
600
750
550
450
650
850
1000
1050
1150
300
250
200
150
71
74
19