

REPORT ON GEOLOGICAL SURVEY
OF THE SULTANATE OF OMAN
(SUR AREA)

PHASE III
MAY, 1983

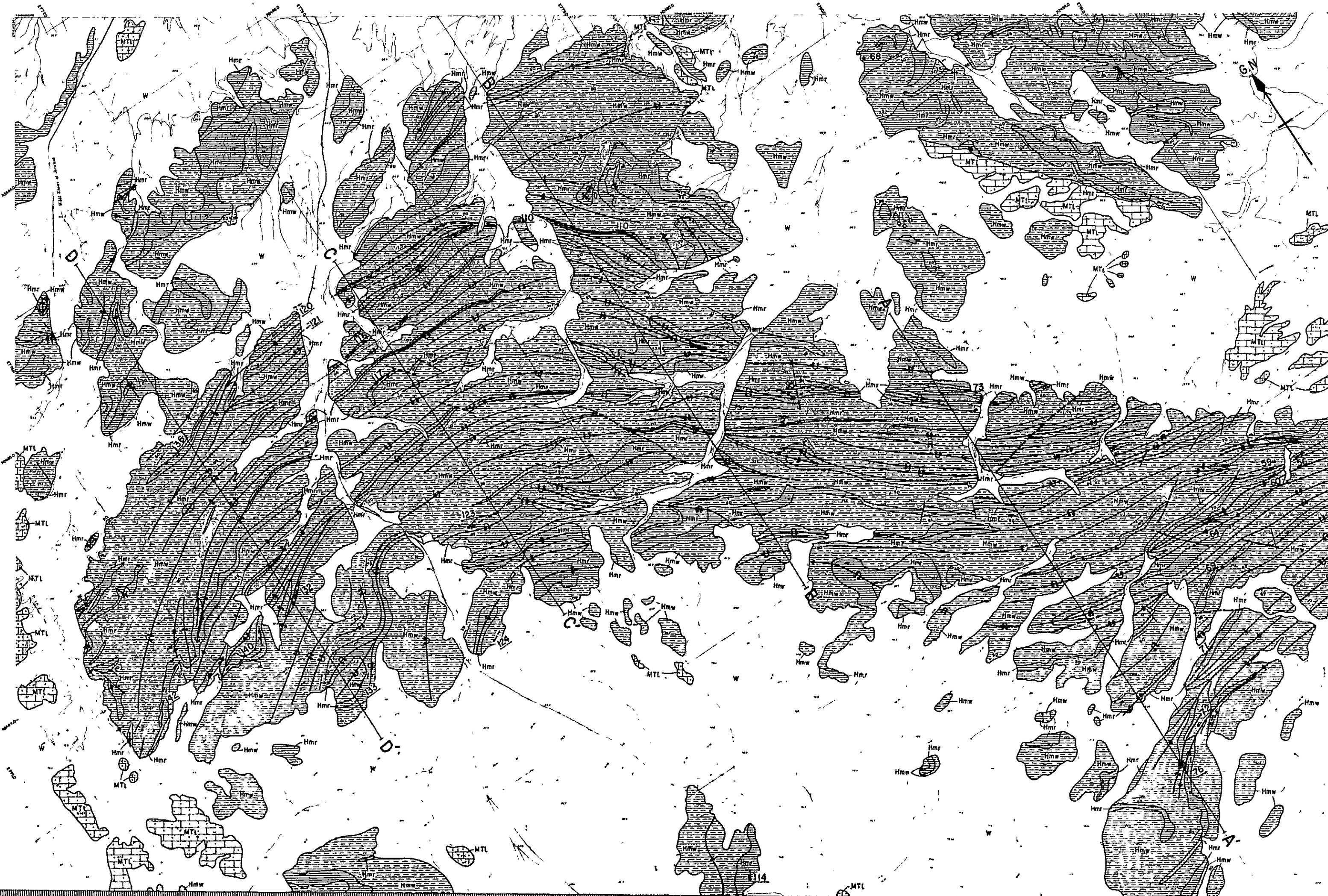
JAPAN INTERNATIONAL COOPERATION
METAL MINING AGENCY OF JAPAN

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MPN



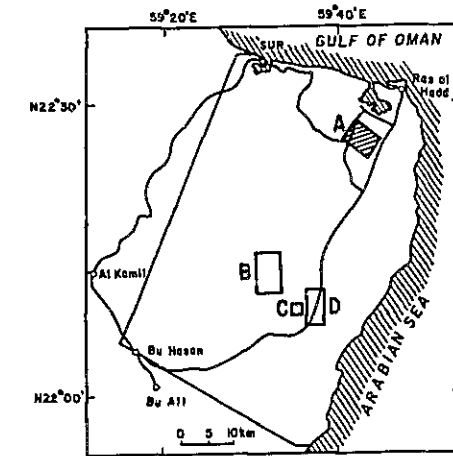
3/10
1966
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国際協力事業団	
入庫番号 8411228	3/10
発行番号 R0387A	1966
MPN	MPN



GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

Geological Map and Profile
of the Area A



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

March 1983

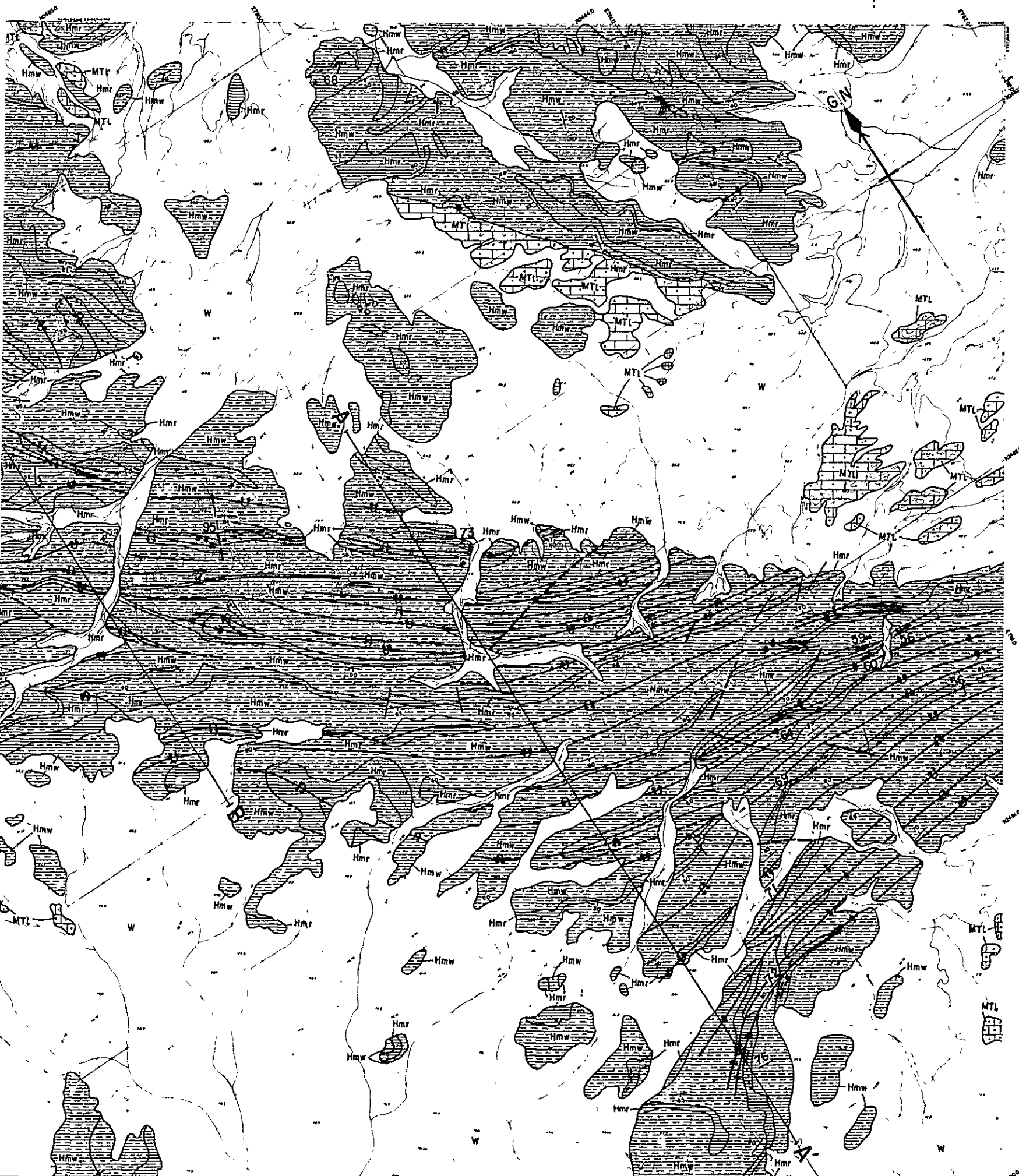
Prepared by Bishimetal Exploration Co., Ltd.

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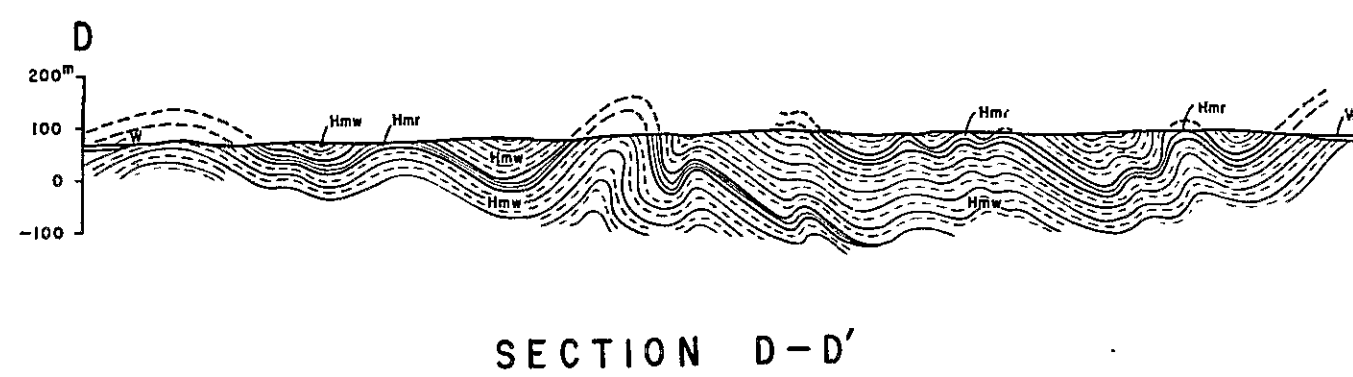
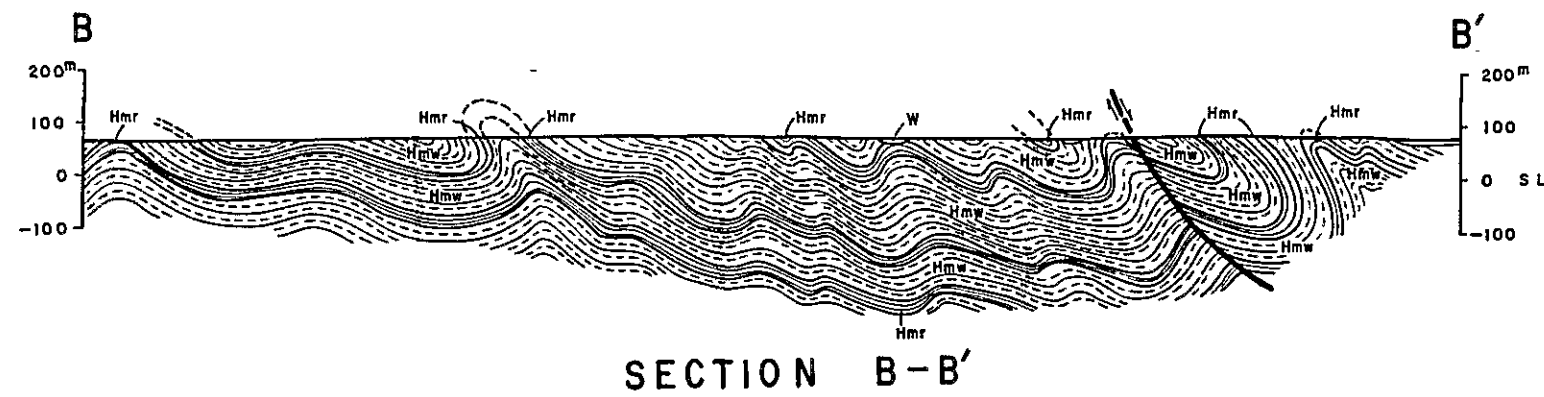
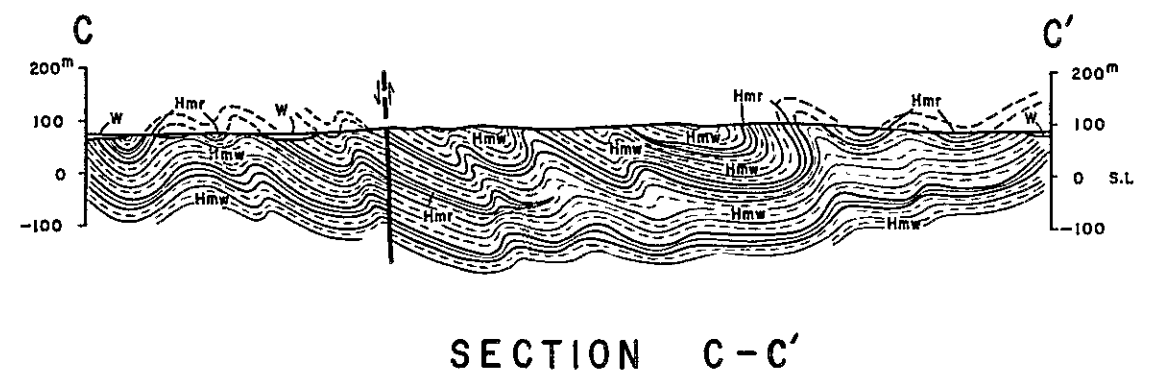
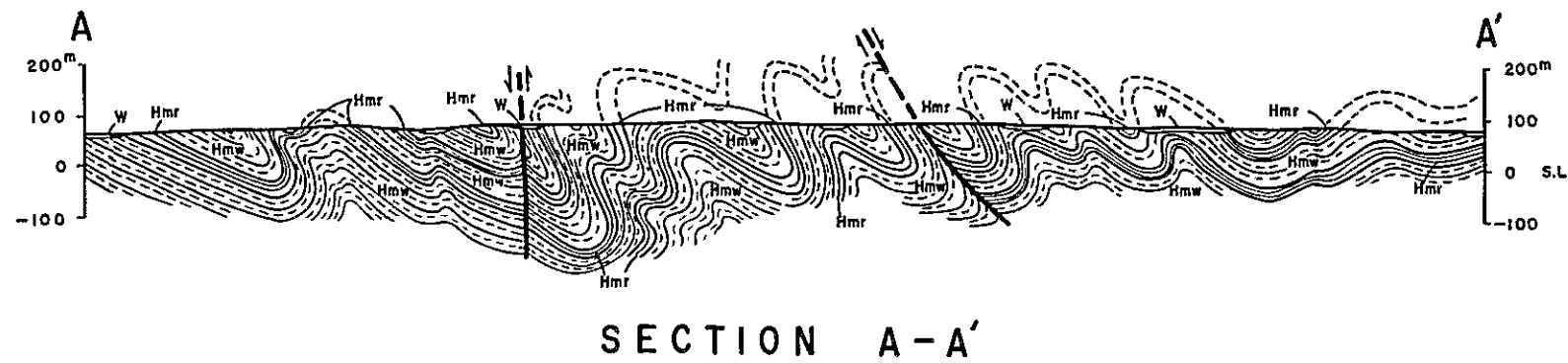
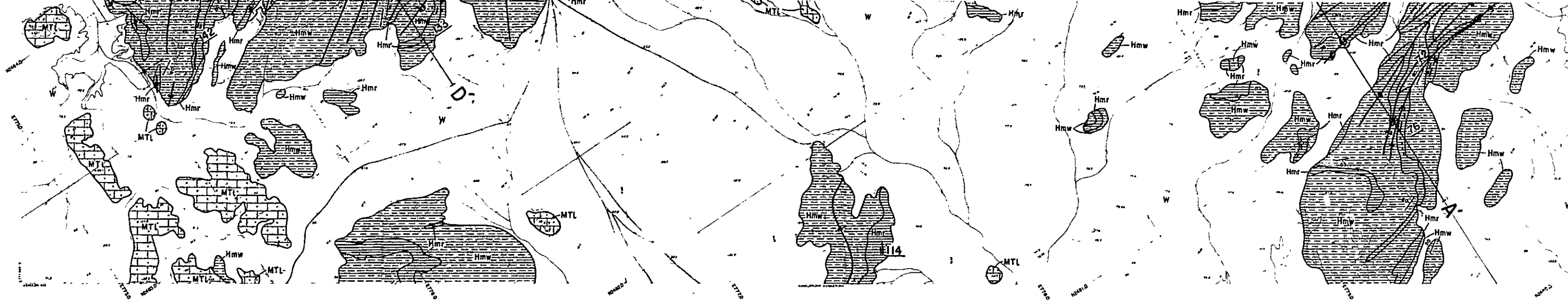


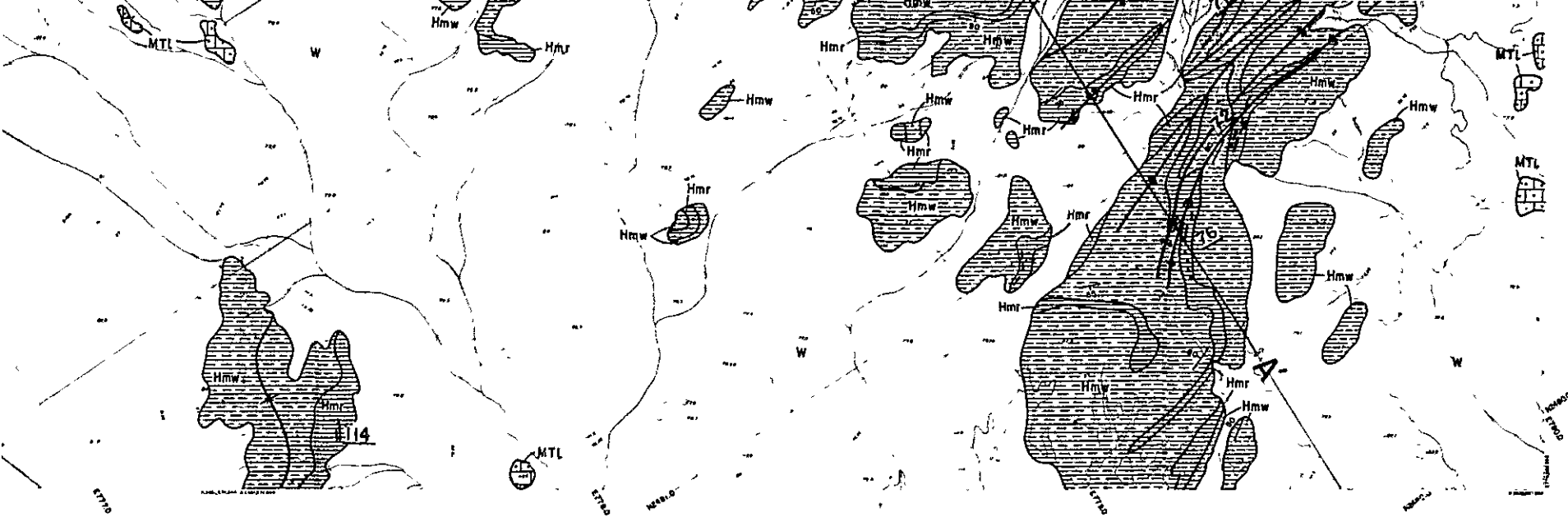
LEGEND

Quaternary	w	wadi sediments
	tl	talus sediments
	t2	terrace deposits (higher)
	t1	terrace deposits (lower)
Late Cretaceous ~ Middle Tertiary Maastrichtian Tertiary Limestone	MTb	basalt lava
	MTl	sandy limestone, calcareous sandstone

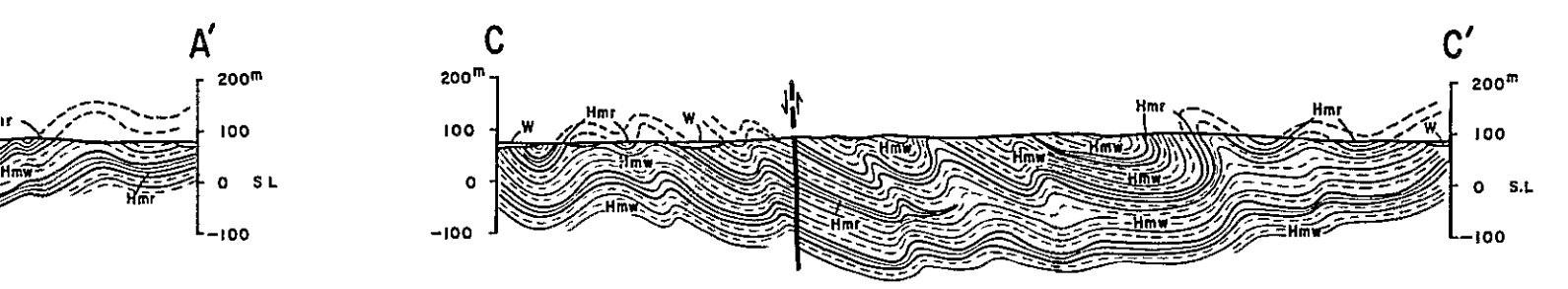


alternating bed of white chert

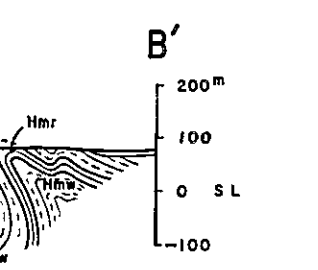
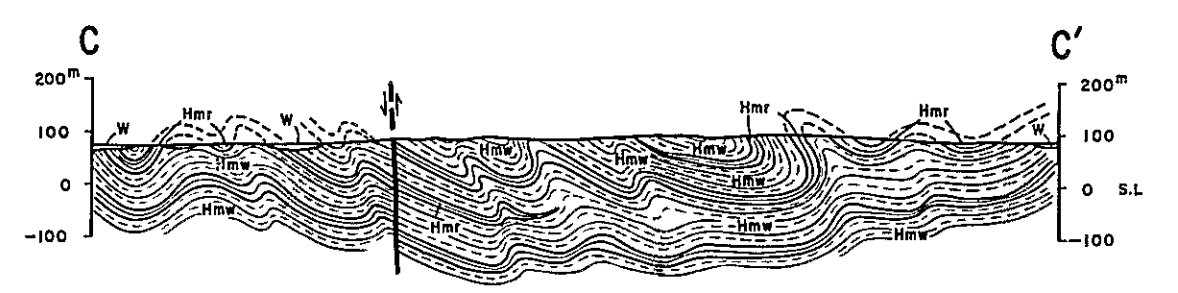




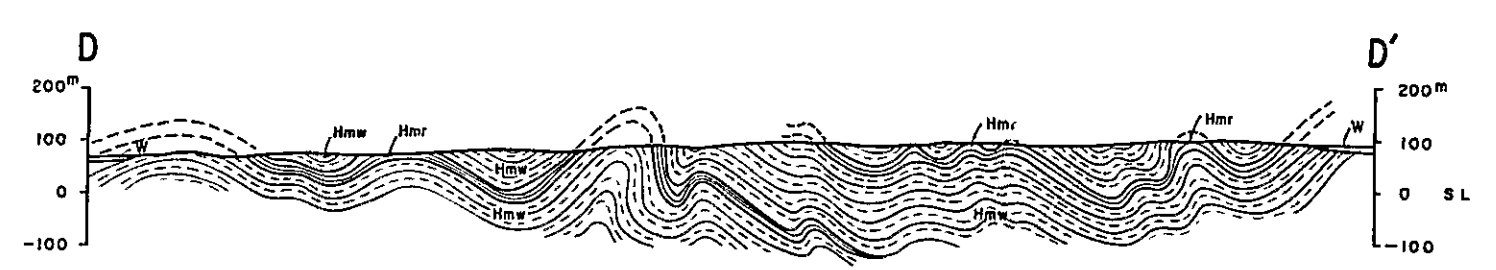
Quaternary	W	□	wadi sediments		
	tl	△ △ △	talus sediments		
	t2	○ ○ ○	terrace deposits (higher)		
	t1	● ● ●	terrace deposits (lower)		
Late Cretaceous ~ Middle Tertiary	Maastrichtian ~ Tertiary Limestone	Lower	MTb	▲ ▲ ▲	basalt lava
		MTL	□	sandy limestone, calcareous sandstone	
Triassic ~ Early Cretaceous (Hawasina Sediments)	Halifa Formation	Upper	Hus	□	alternating bed of white chert < light gray shale
		Middle	Hmr	▨	alternating bed of reddish brown chert, muddy chert and reddish brown shale
			Hmw	▨	alternating bed of white chert and light gray to reddish brown shale
		Lower	Hms	▨	alternating bed of white chert < light gray shale
Hls	▨		alternating bed of white chert, limestone < light gray shale		
Intrusive rock	do	▲ ▲ ▲	dolerite		



SECTION C-C'



SECTION D-D'



- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- 150 manganese bed & outcrop No
- fault (certain, conjectural)
- strike and dip
- A-A' profile line



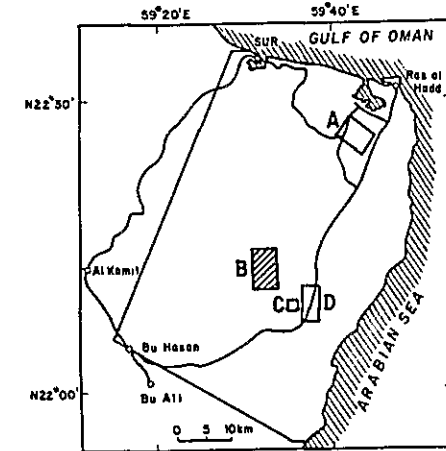
N2463
E7580

N2463.5
E7635



GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

Geological Map and Profile
of the Area B



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March 1983

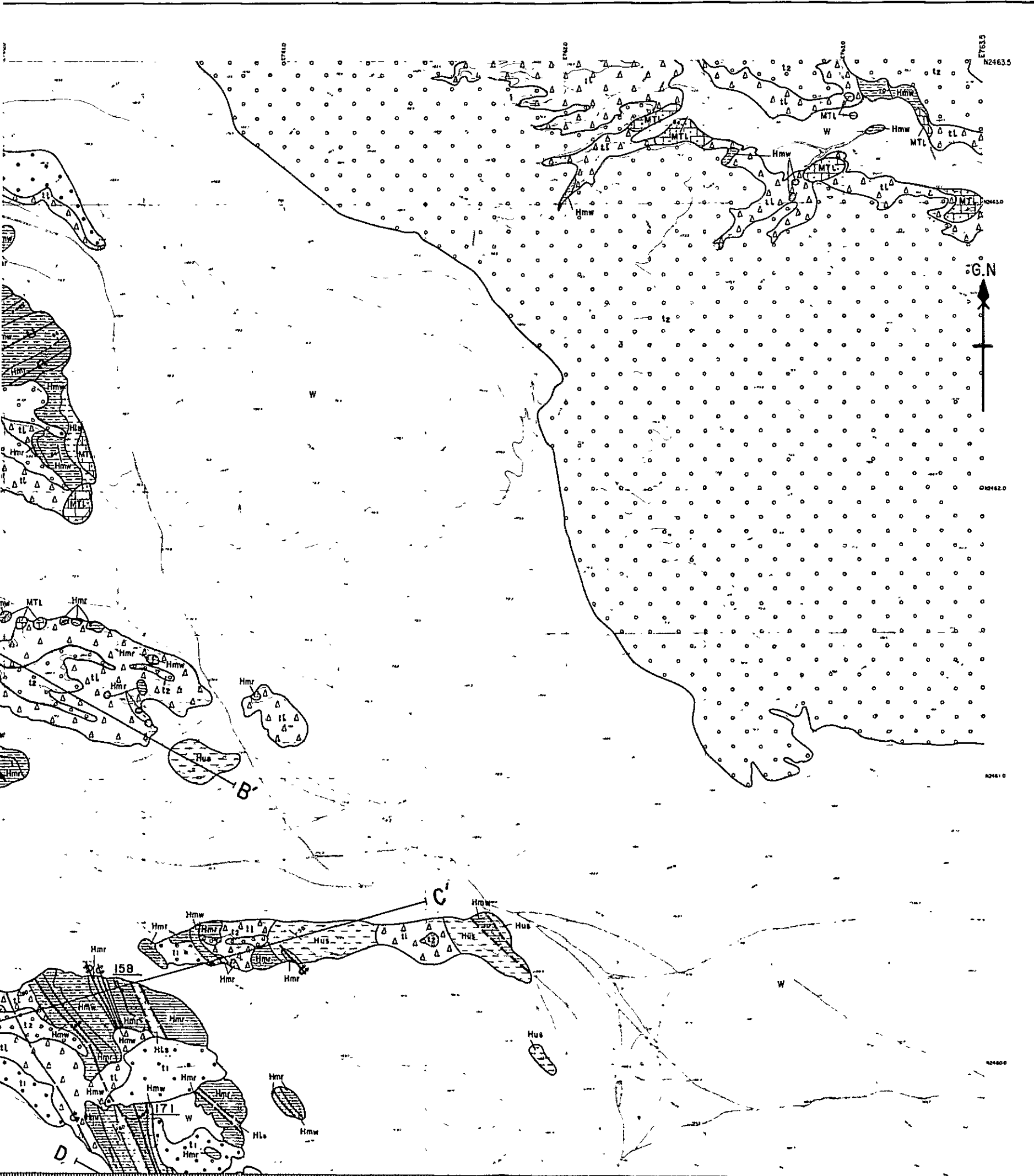
Prepared by Bishimetal Exploration Co., Ltd.

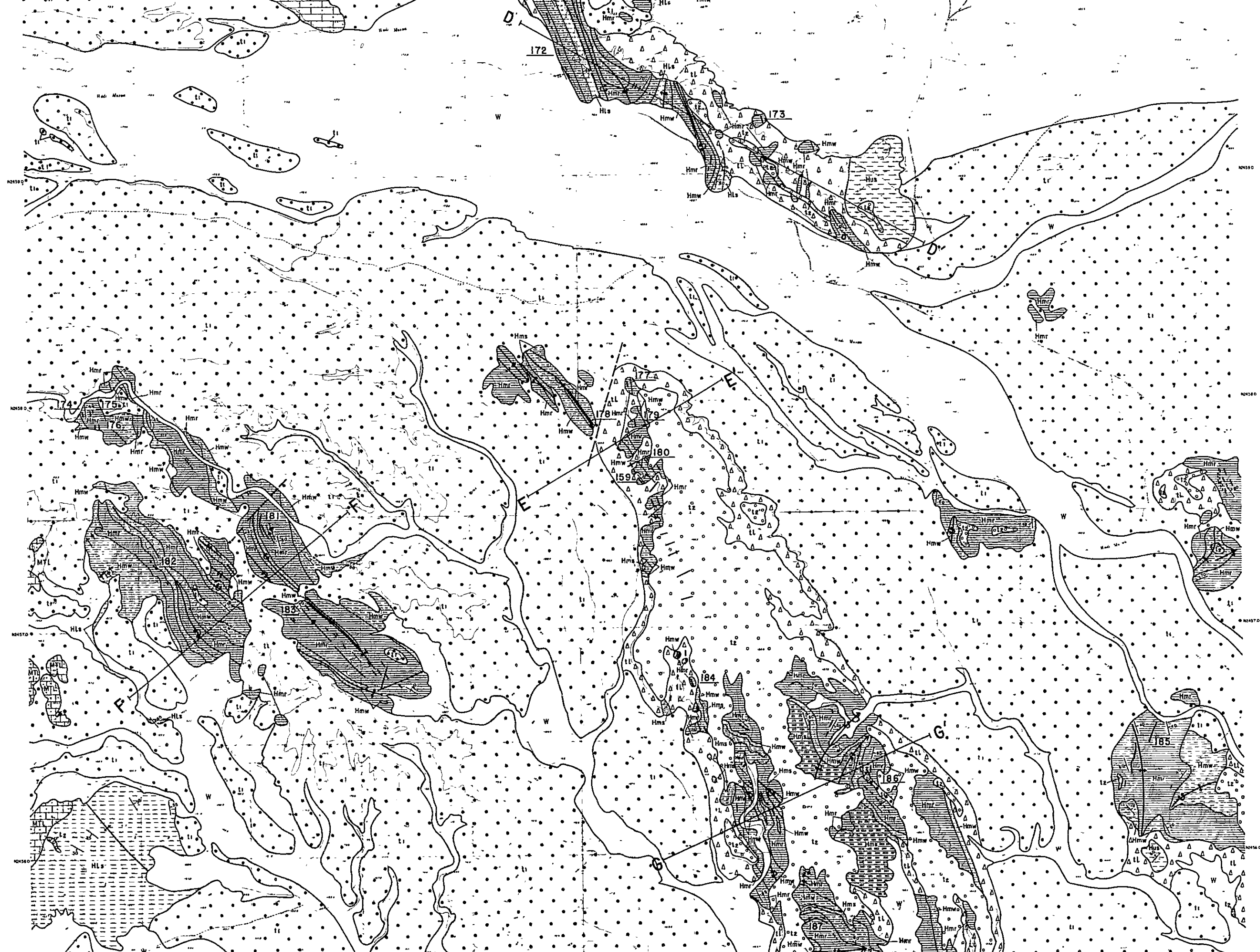
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LEGEND

Quaternary	W	wadi sediments
	t1	talus sediments
	t2	terrace deposits (higher)
	t1	terrace deposits (lower)
Lower Late Cretaceous ~ Middle Tertiary	MTb	basalt lava
	MTl	sandy limestone, calcareous sandstone
Upper	Hus	alternating bed of white chert < light gray shale





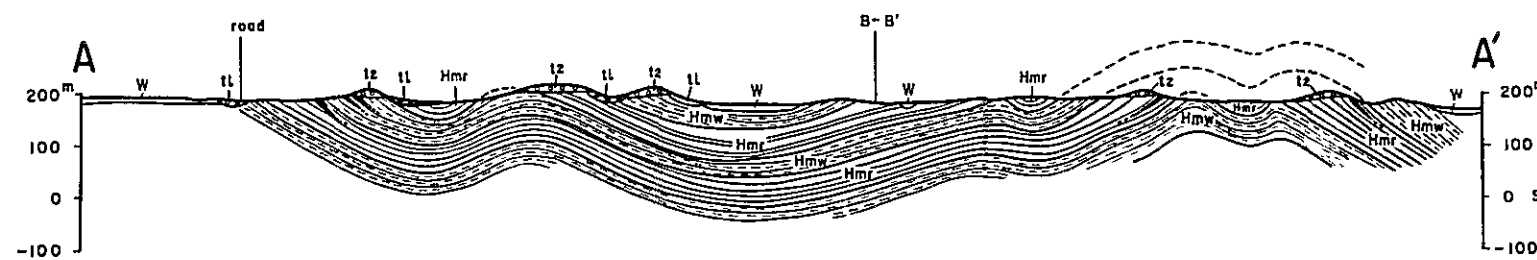
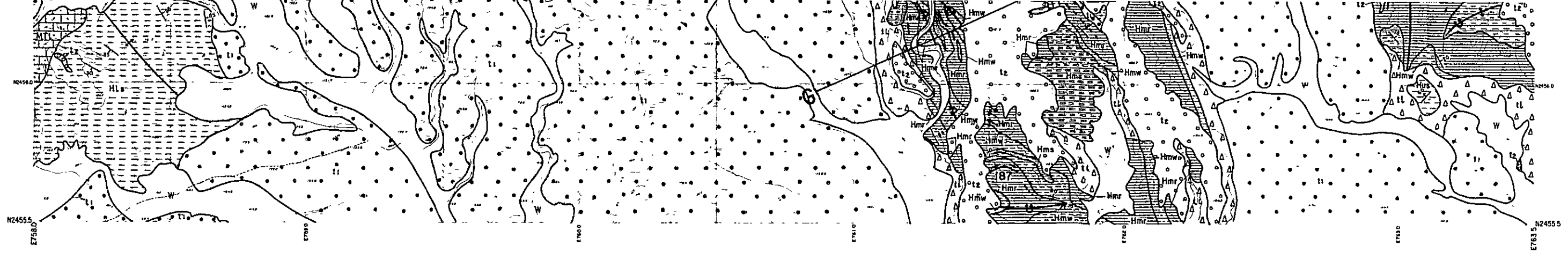


Triassic - Early Cretaceous (Hawasina Sediments)	Halfa Formation	Upper	Hus	alternating bed of white chert < light gray shale
		Middle	Hmr	alternating bed of reddish brown chert, muddy chert and reddish brown shale
			Hmw	alternating bed of white chert and light gray to reddish brown shale
		Lower	Hms	alternating bed of white chert < light gray shale
			Hls	alternating bed of white chert, limestone < light gray shale

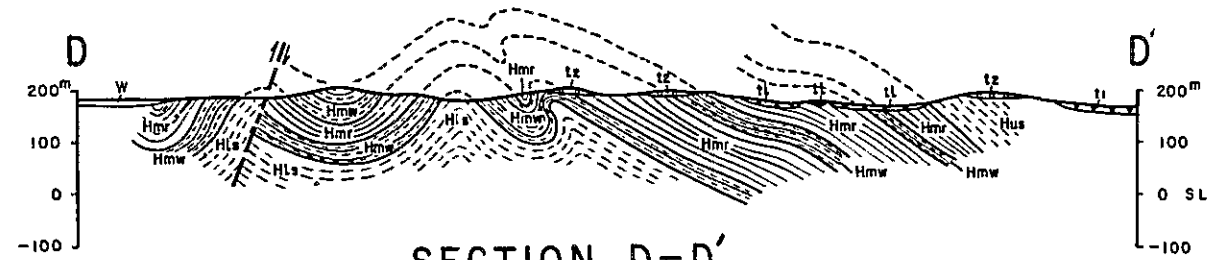
Intrusive rock do A A A A dolerite

- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- manganese bed & outcrop No 150
- fault (certain, conjectural)
- strike and dip
- A-A' profile line

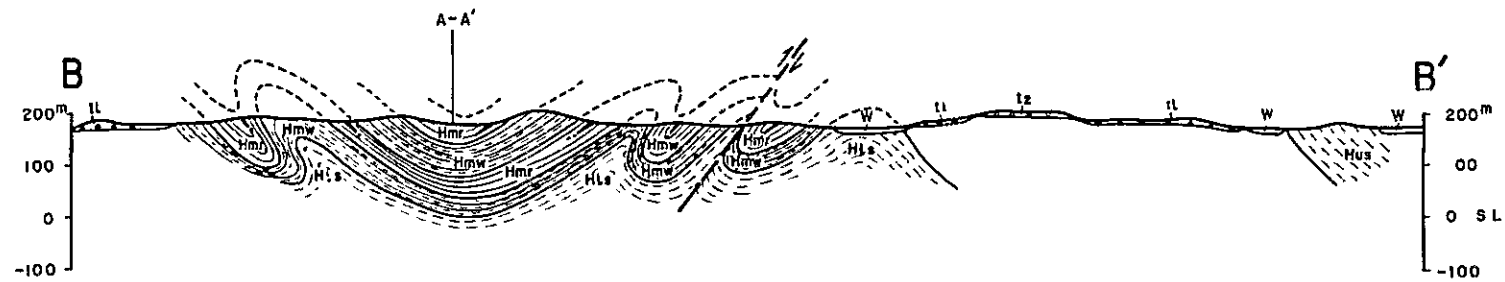




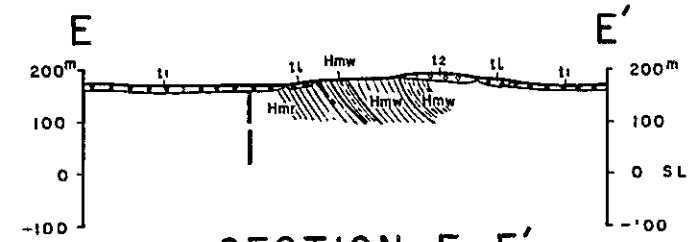
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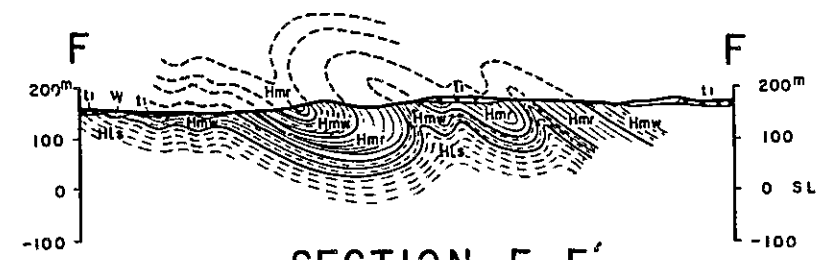
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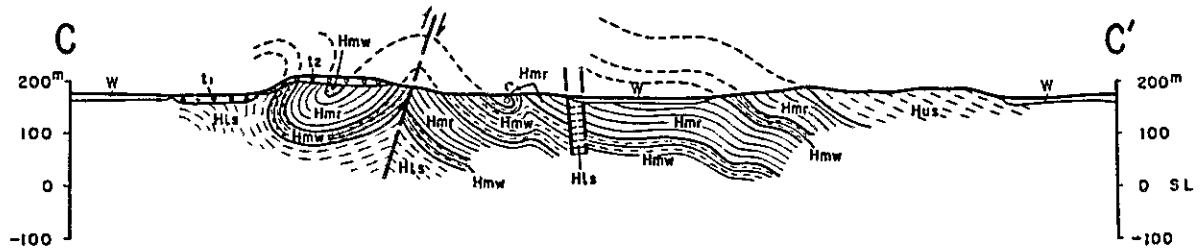
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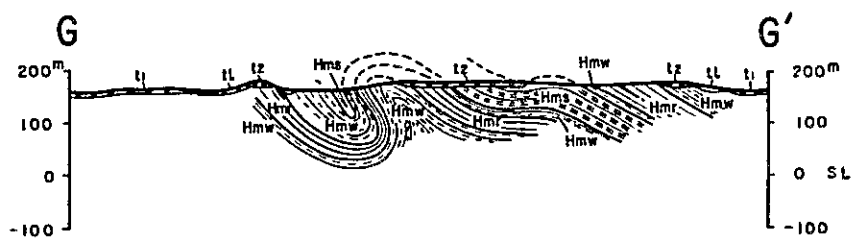
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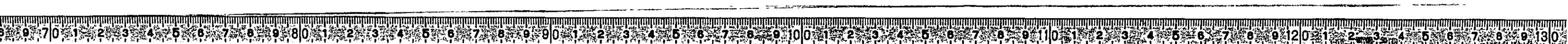
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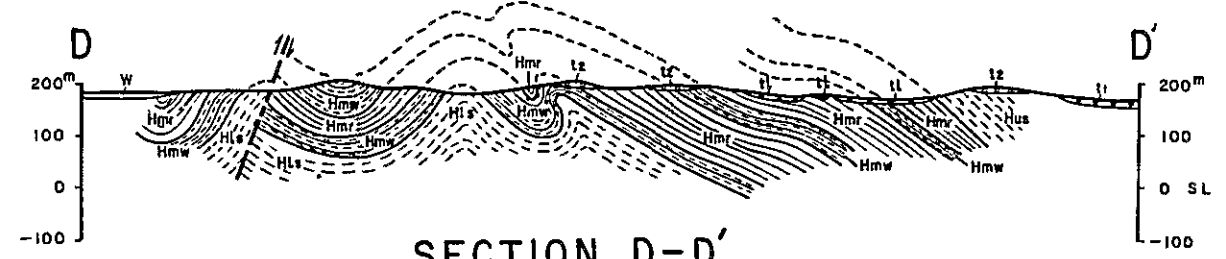
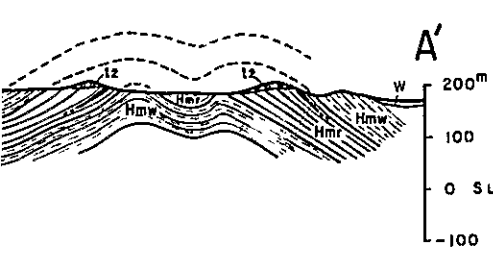
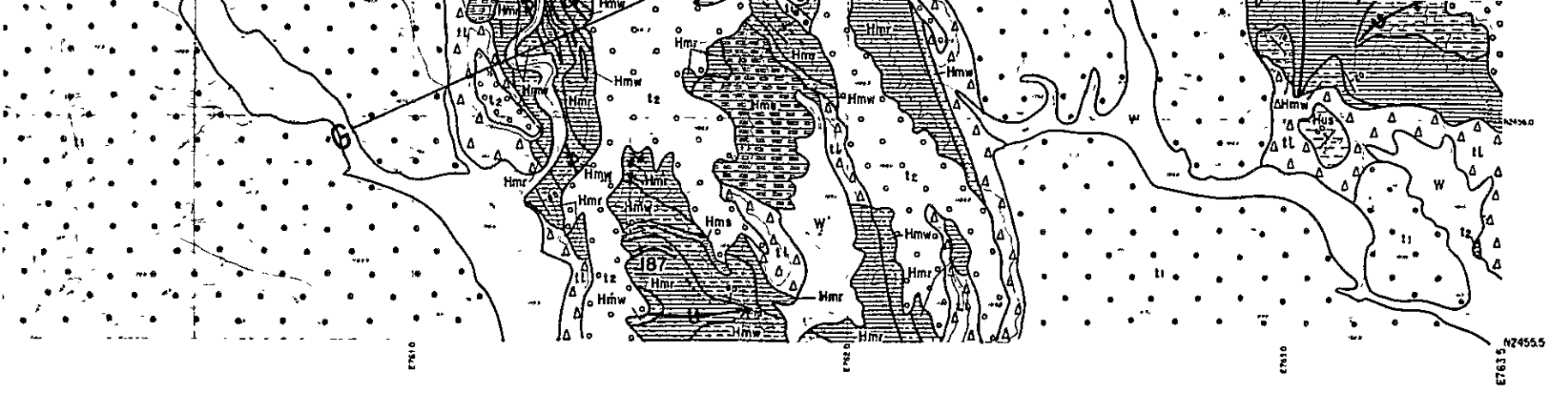


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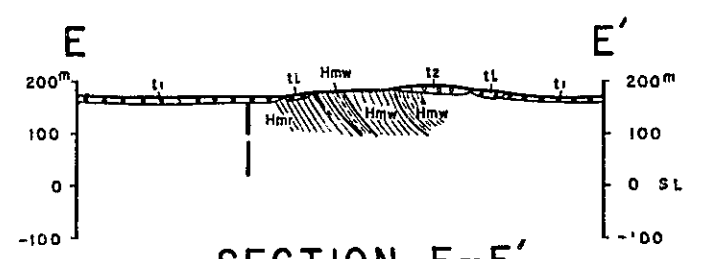
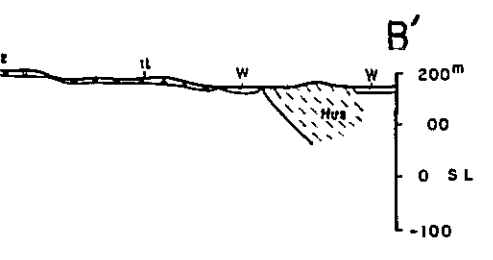


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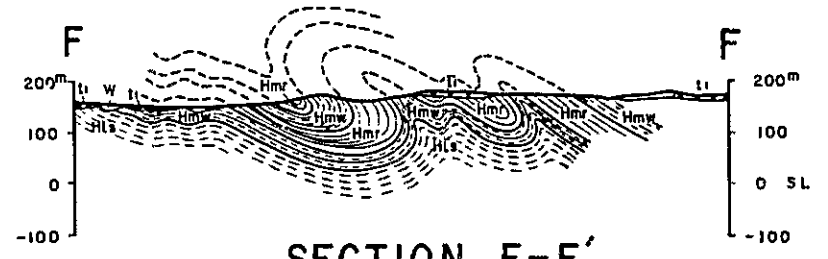




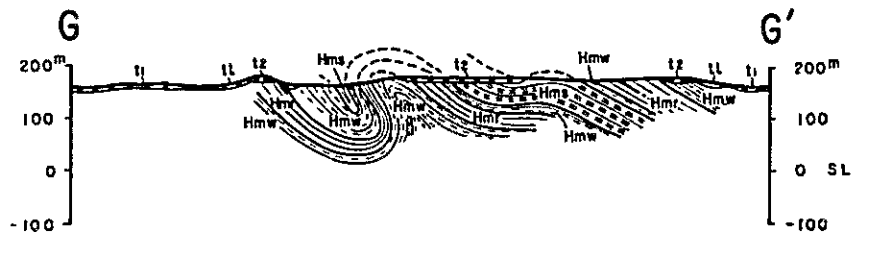
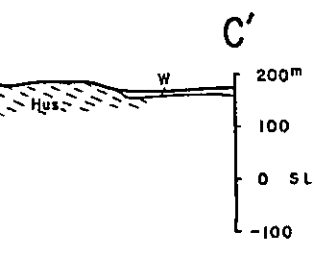
SECTION D-D'



SECTION E-E'



SECTION F-F'

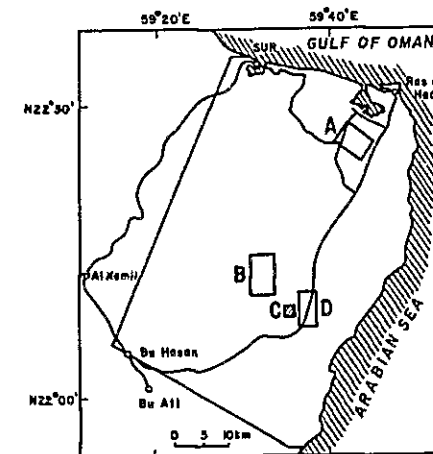


SECTION G-G'



GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

Geological Map and Profile
of the Area C



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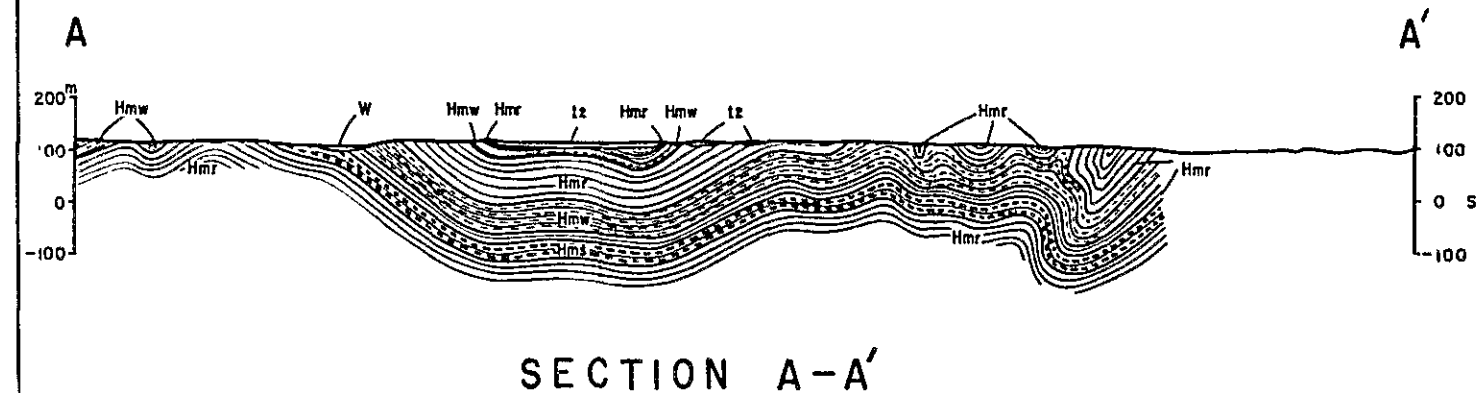
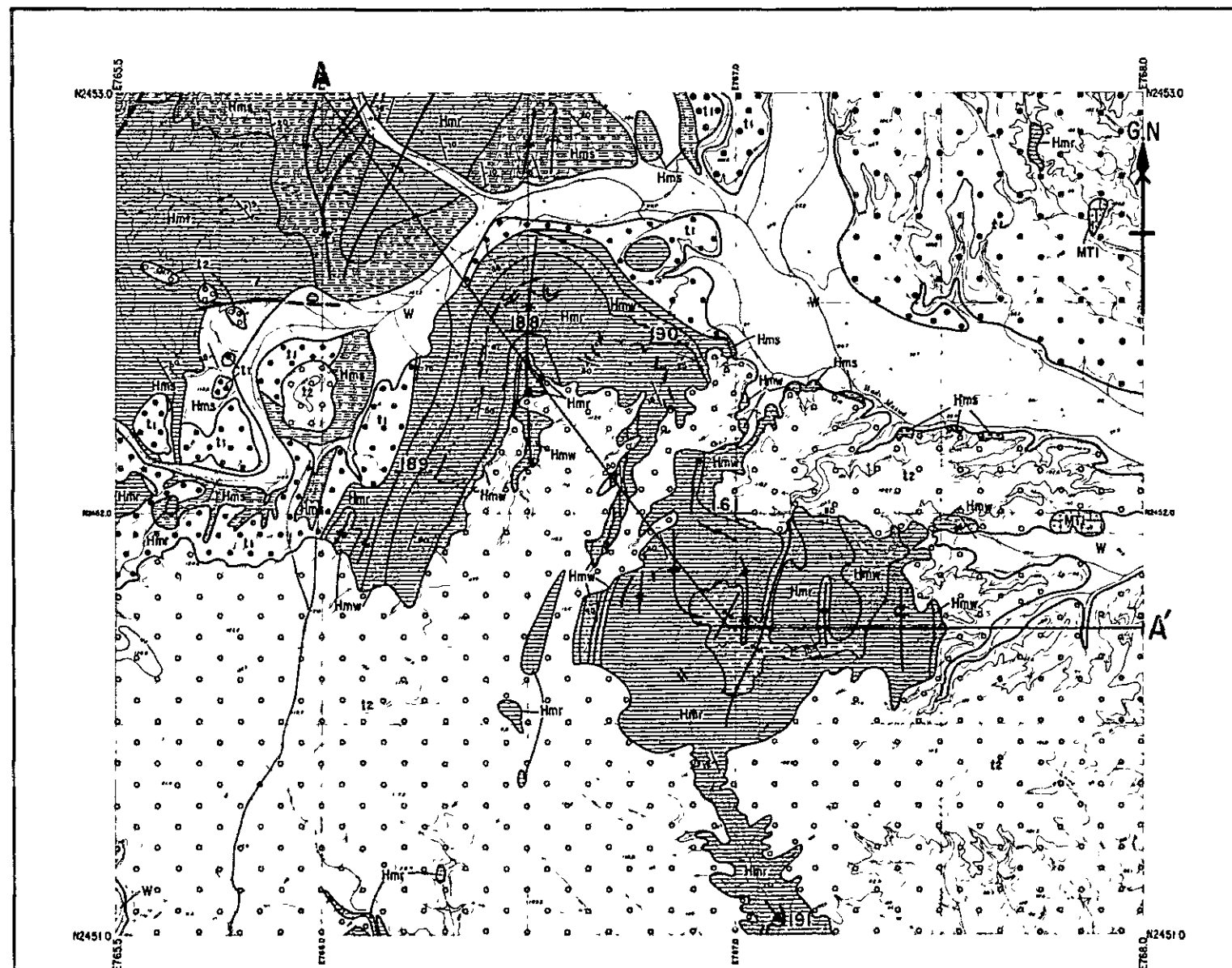
March 1983

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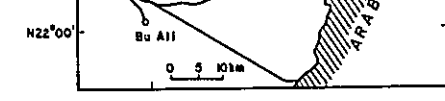
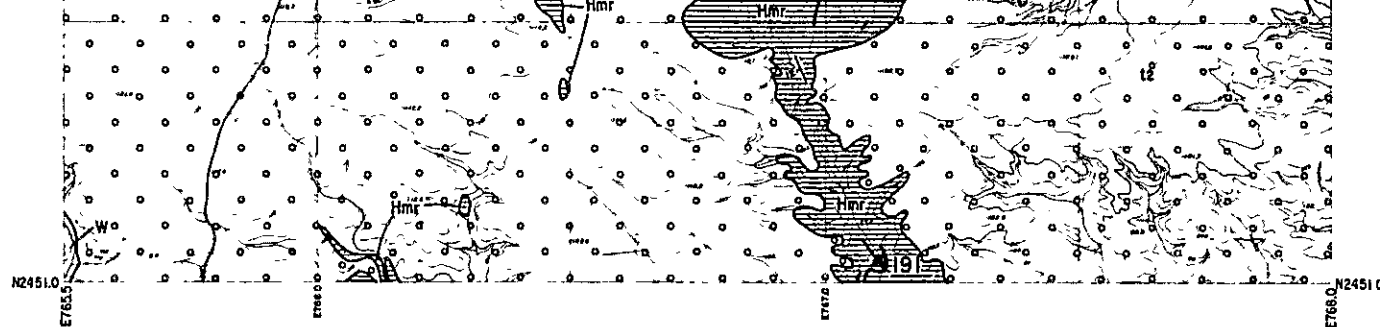
LEGEND

Quaternary	w	wadi sediments
	t1	talus sediments
	t2	terrace deposits (higher)
	t1	terrace deposits (lower)
Lower Late Cretaceous ~ Middle Tertiary Maastrichtian Tertiary Limestone	MTb	basalt lava
	MTL	sandy limestone, calcareous sandstone



SECTION A-A'

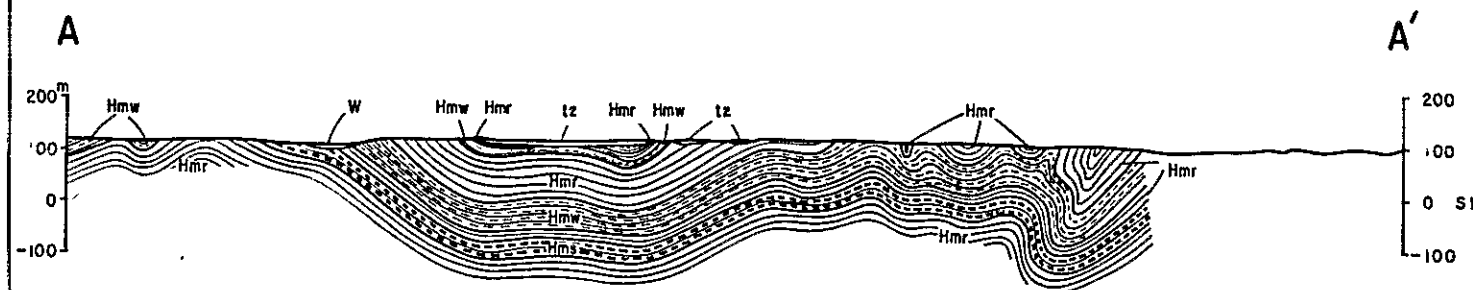




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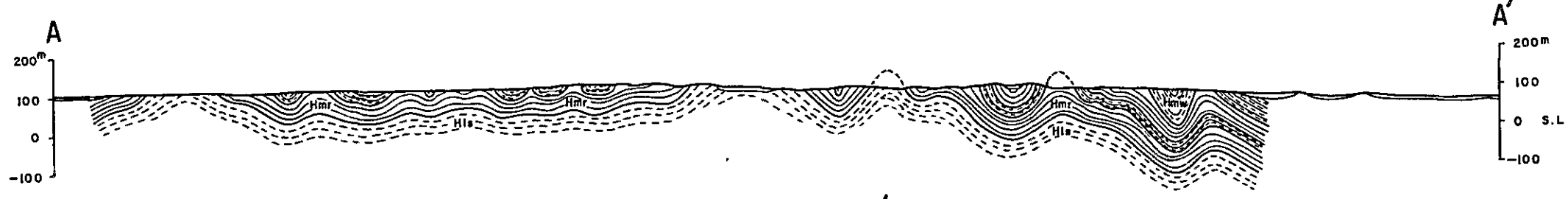
SECTION A-A'

LEGEND

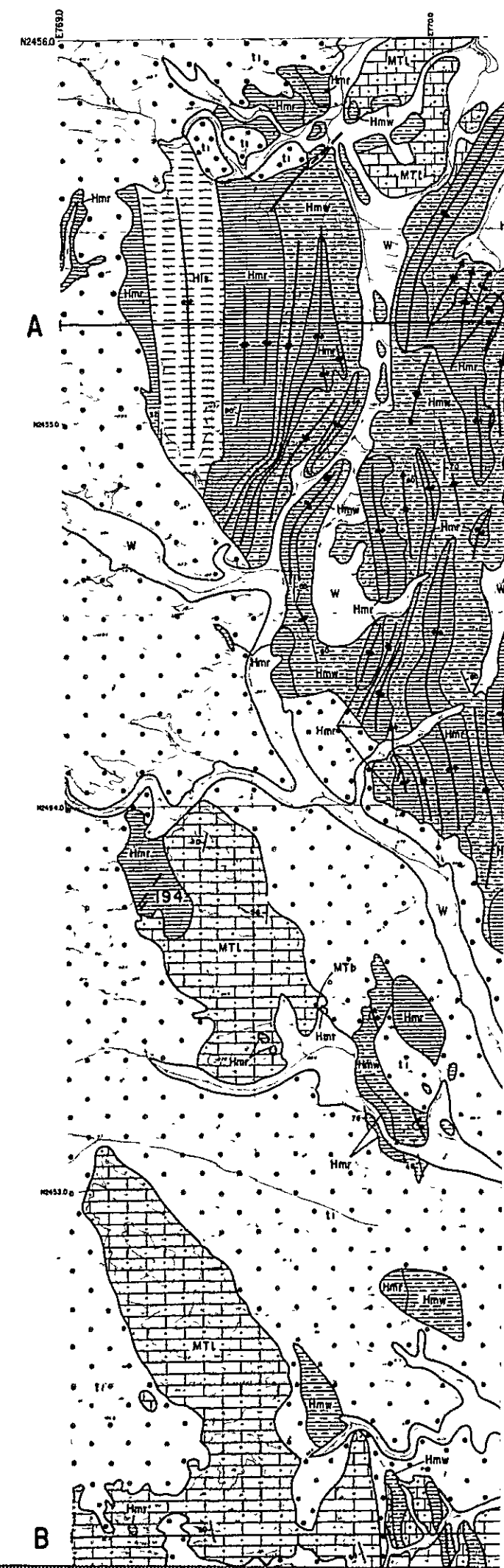
Quaternary	w	wadi sediments		
	tl	talus sediments		
	t2	terrace deposits (higher)		
	t1	terrace deposits (lower)		
Late Cretaceous ~ Middle Tertiary	Maastrichtian ~ Tertiary Limestone	Lower	MTb	basalt lava
			MTL	sandy limestone, calcareous sandstone
Triassic ~ Early Cretaceous (Hawasina Sediments)	Halfo Formation	Upper	Hus	alternating bed of white chert < light gray shale
		Middle	Hmr	alternating bed of reddish brown chert, muddy chert and reddish brown shale
			Hmw	alternating bed of white chert and light gray to reddish brown shale
		Lower	Hms	alternating bed of white chert < light gray shale
	HLs	alternating bed of white chert, limestone < light gray shale		
Intrusive rock	do	dolerite		

- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- manganese bed & outcrop No. 150
- fault (certain, conjectural)
- strike and dip
- A-A' profile line



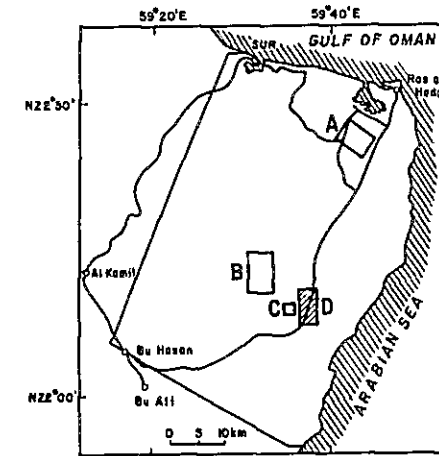


SECTION A-A'



GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

Geological Map and Profile
of the Area D



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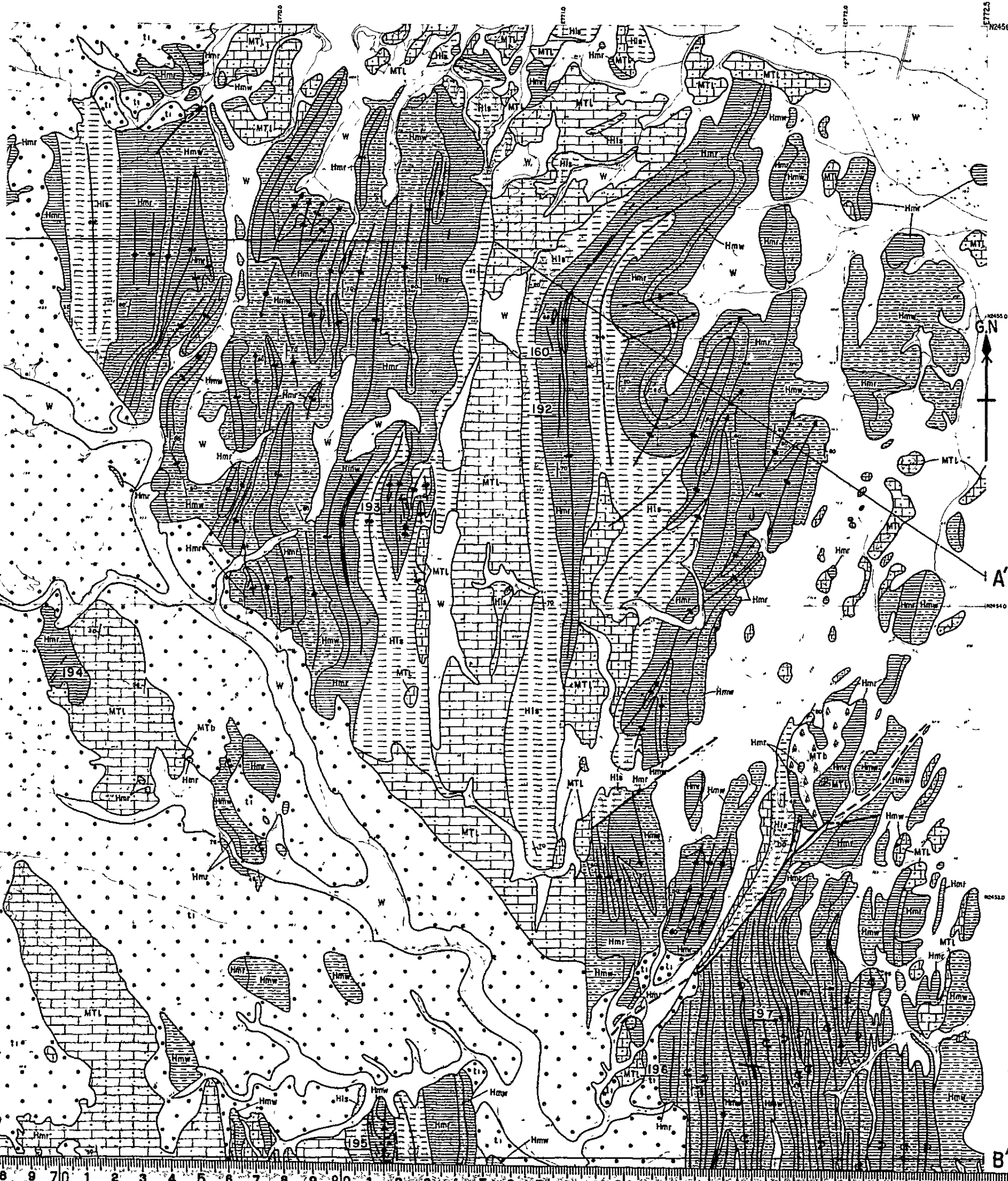
Prepared by Bishimetal Exploration Co., Ltd.

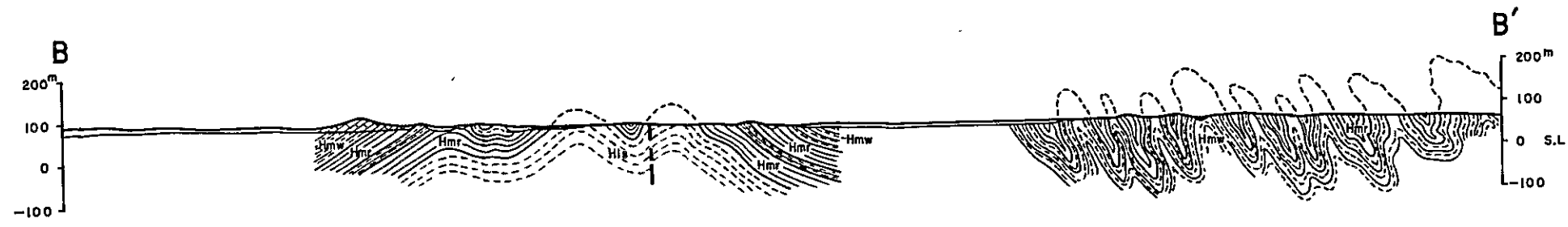
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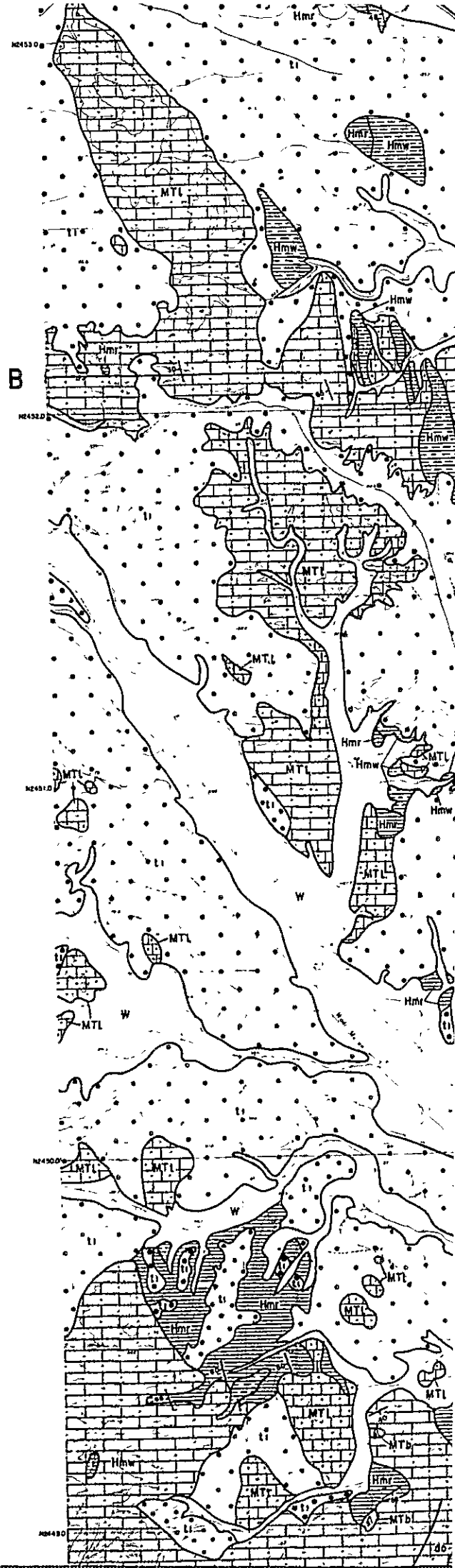
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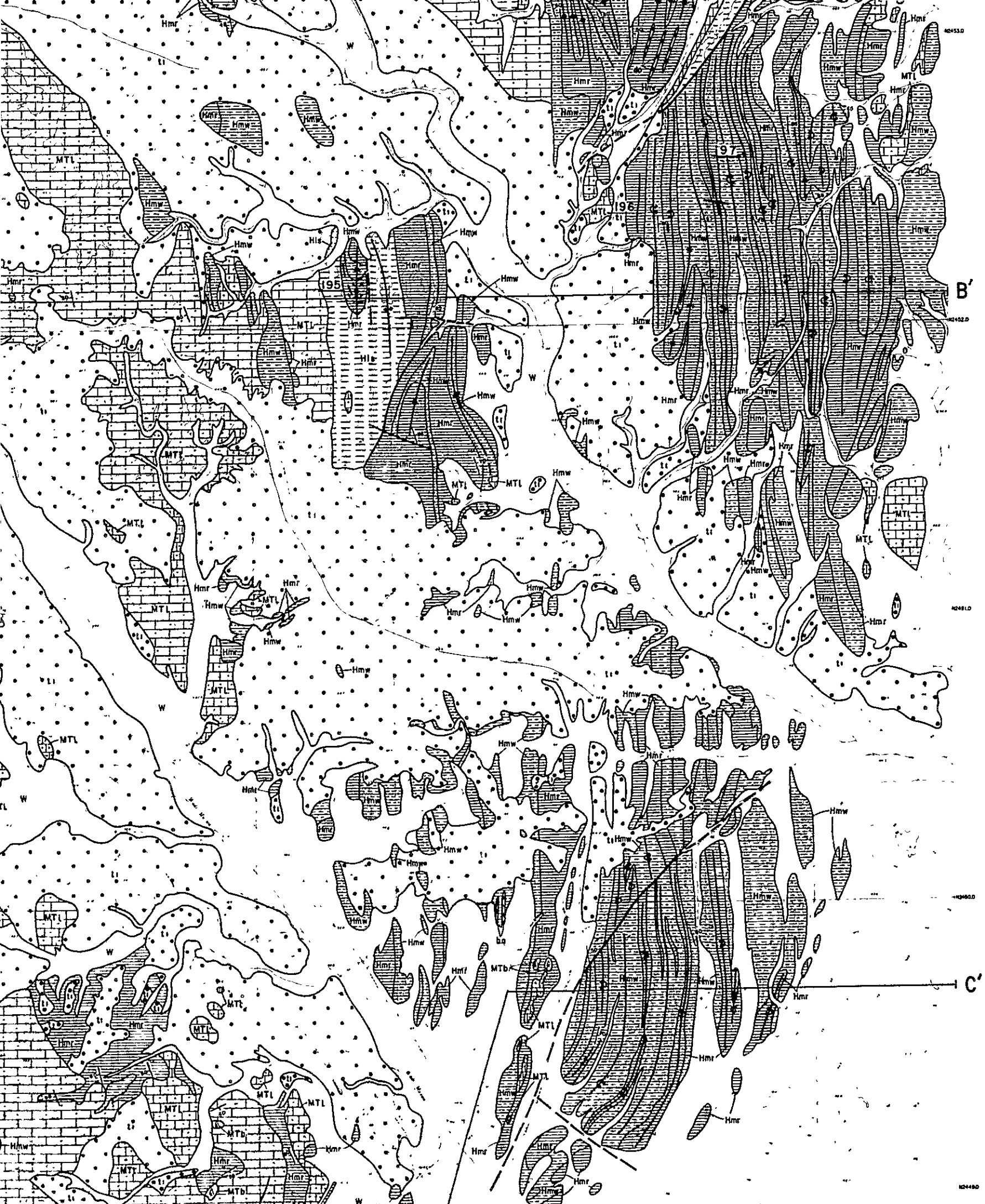
Quaternary	W	wadi sediments
	t1	talus sediments
	t2	terrace deposits (higher)
	t1	terrace deposits (lower)
Lower	MTb	basalt lava
	MTL	sandy limestone, calcareous sandstone
Upper	Hus	alternating bed of white chert < light gray shale
		alternating bed of reddish brown chert,





SECTION B-B'

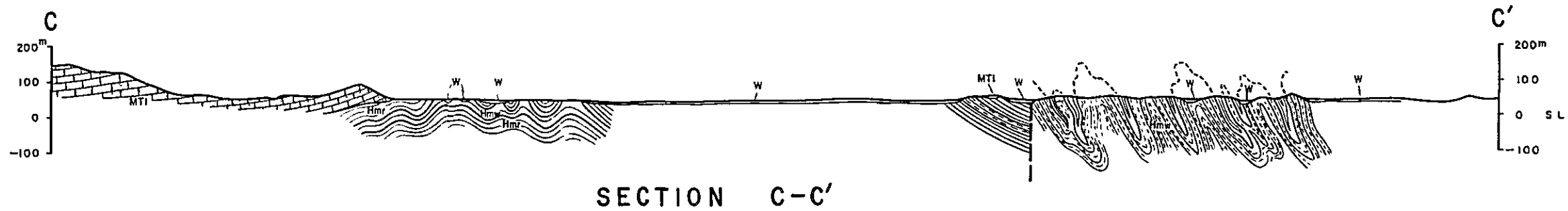




Quaternary	}	W	wadi sediments			
		tl	talus sediments			
		t2	terrace deposits (higher)			
		t1	terrace deposits (lower)			
Late Cretaceous ~ Middle Tertiary	}	Maastrichtian ~ Tertiary Limestone	Lower	}	MTb	basalt lava
					MTL	sandy limestone, calcareous sandstone
Triassic ~ Early Cretaceous (Hawasia Sediments)	}	Halifa Formation	}	Upper	Hus	alternating bed of white chert < light gray shale
				Middle	Hmr	alternating bed of reddish brown chert, muddy chert and reddish brown shale
					Hmw	alternating bed of white chert and light gray to reddish brown shale
				Lower	Hms	alternating bed of white chert < light gray shale
Hls	alternating bed of white chert, limestone < light gray shale					
Intrusive rock		do	dolerite			

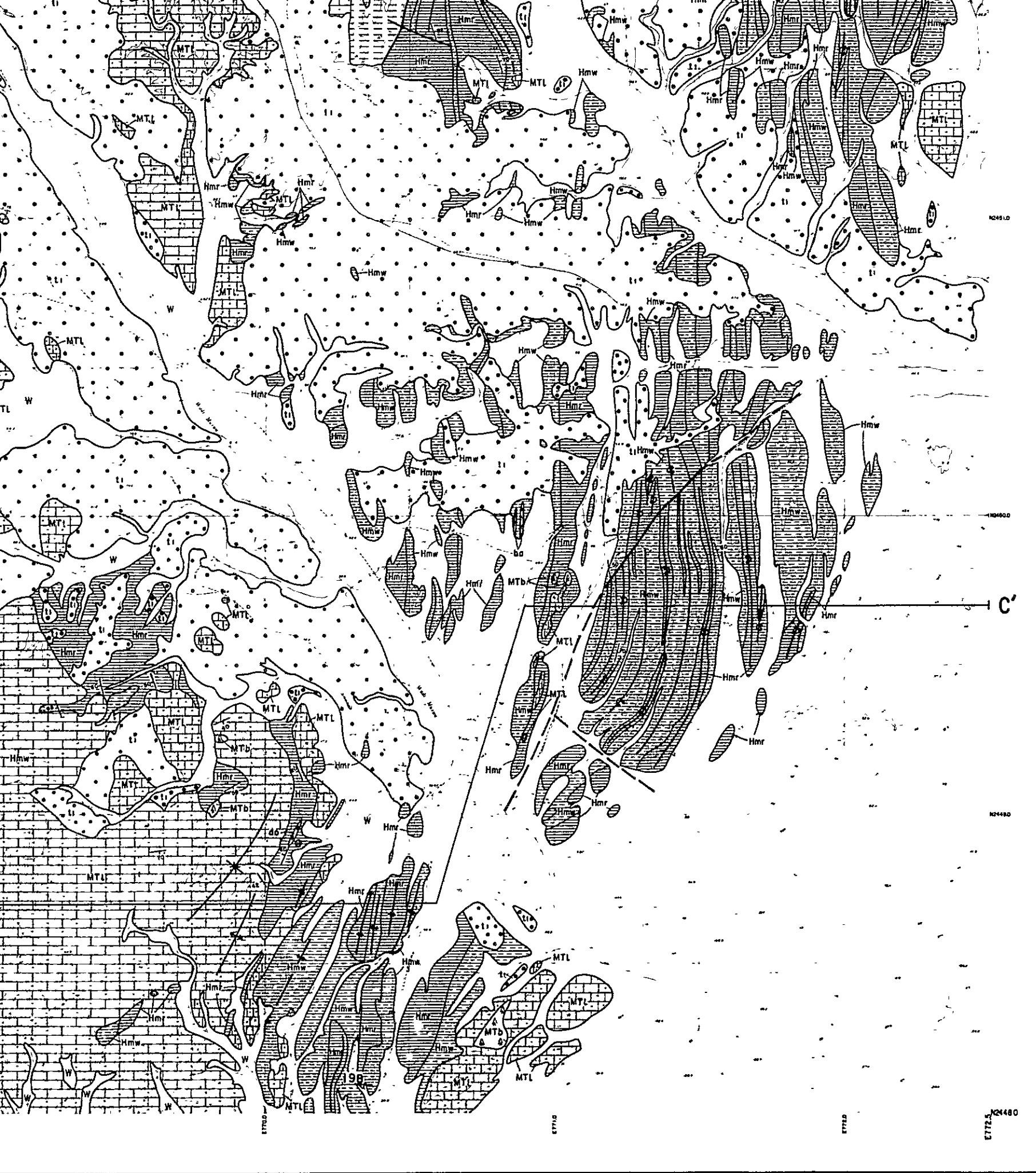
- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- manganese bed & outcrop No 150
- fault (certain, conjectural)
- strike and dip
- A-A' profile line





SECTION C-C'





(H) Lower nls < light gray shale

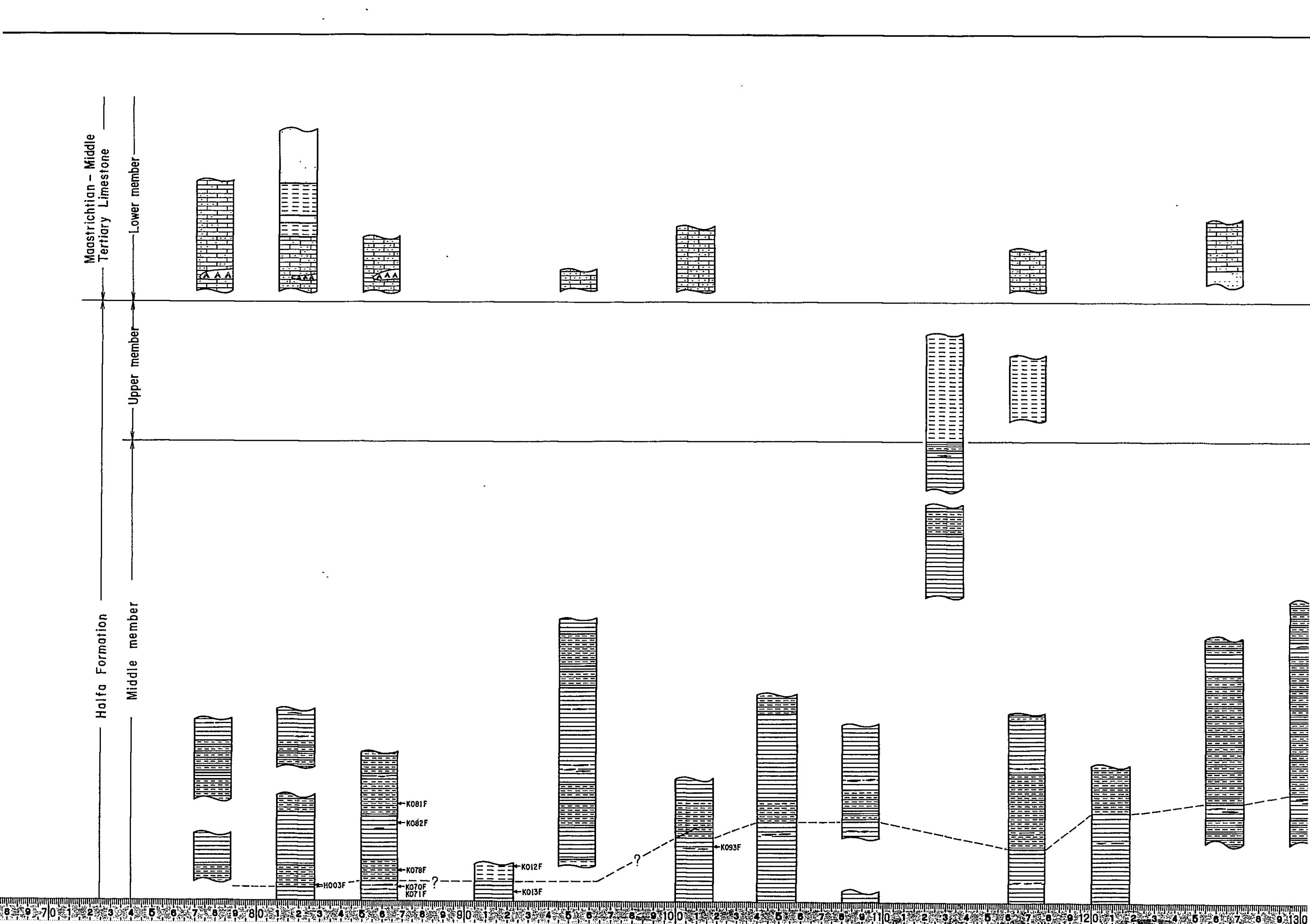
Intrusive rock do

A	A	A	A
A	A	A	A

 dolerite

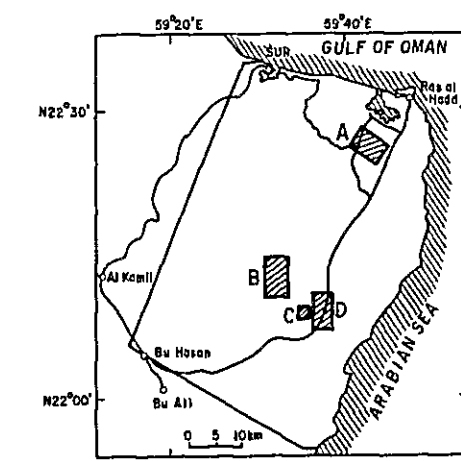
- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- 150 manganese bed & outcrop No
- fault (certain, conjectural)
- strike and dip
- A-A' profile line





GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

Geological Columnar Sections
of the Surveyed Areas

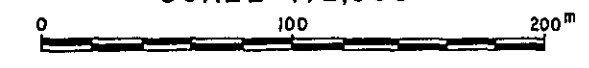


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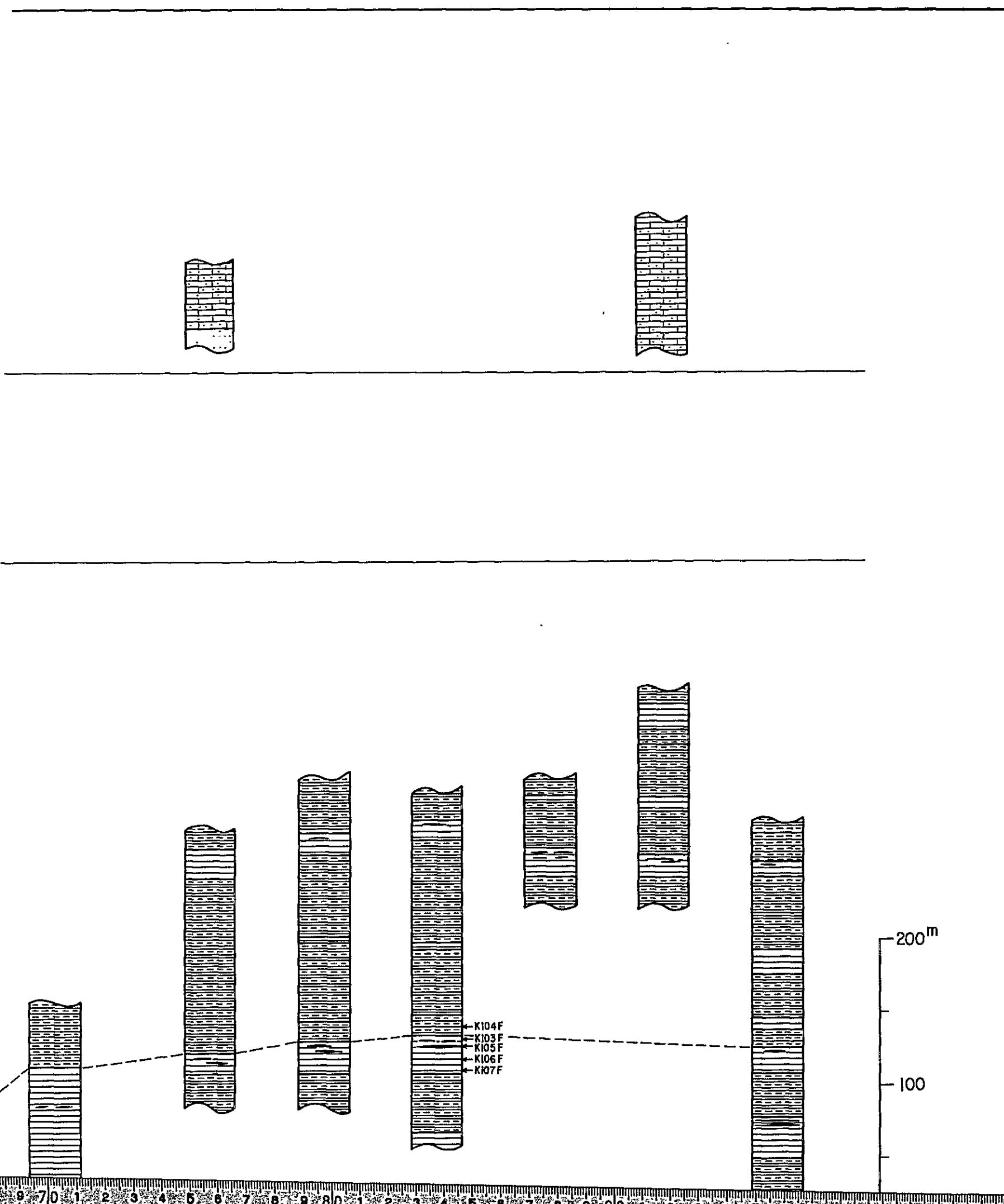
Prepared by Bishimetal Exploration Co., Ltd.

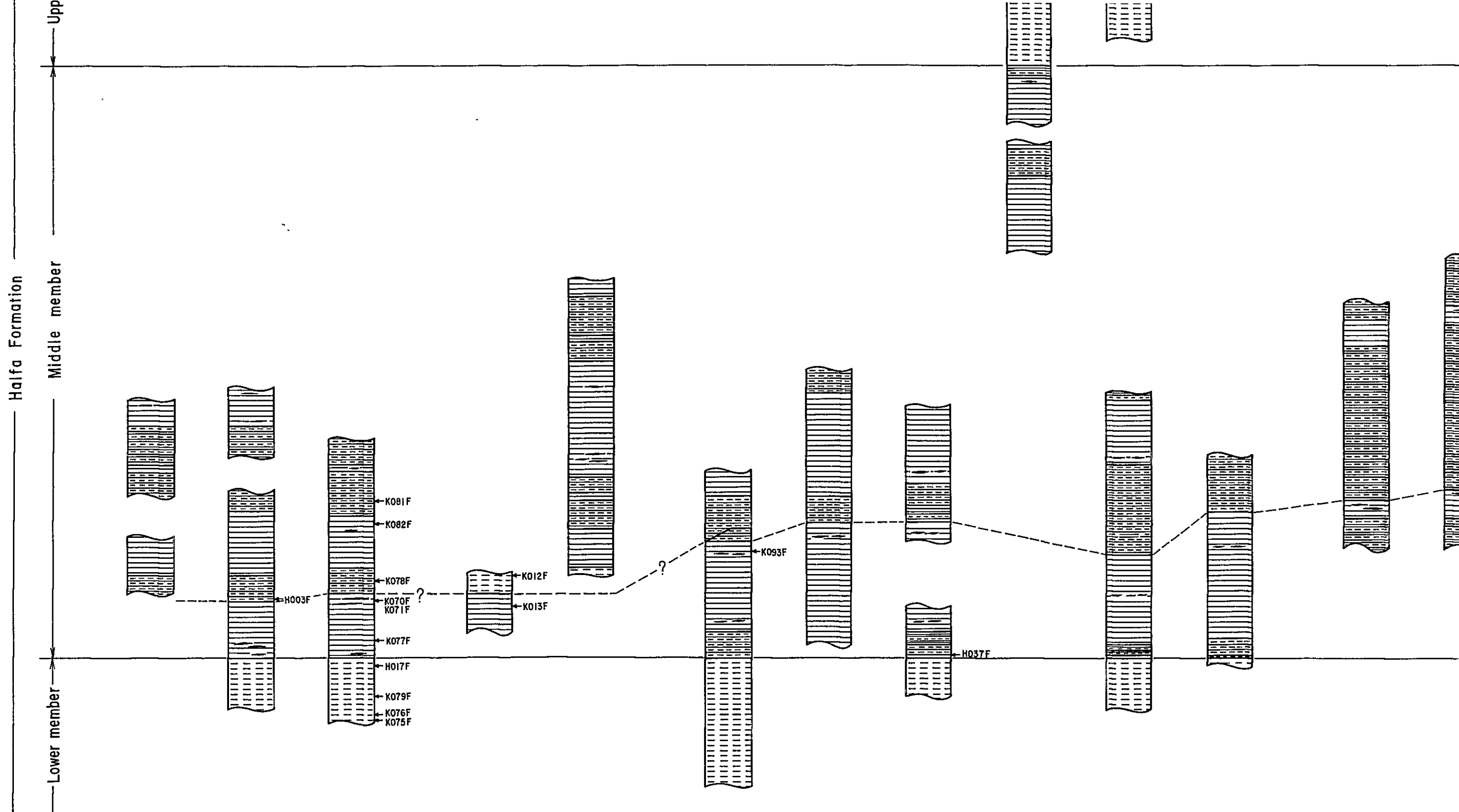
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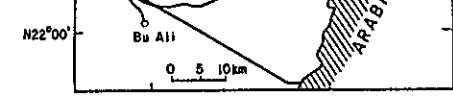


LEGEND

- sandy limestone, calcareous sandstone
- sandstone
- shale
- alternation of white chert and light gray shale
- alternation of white chert and reddish brown shale
- alternation of reddish brown chert, muddy chert and reddish brown shale





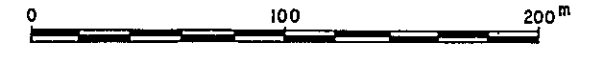


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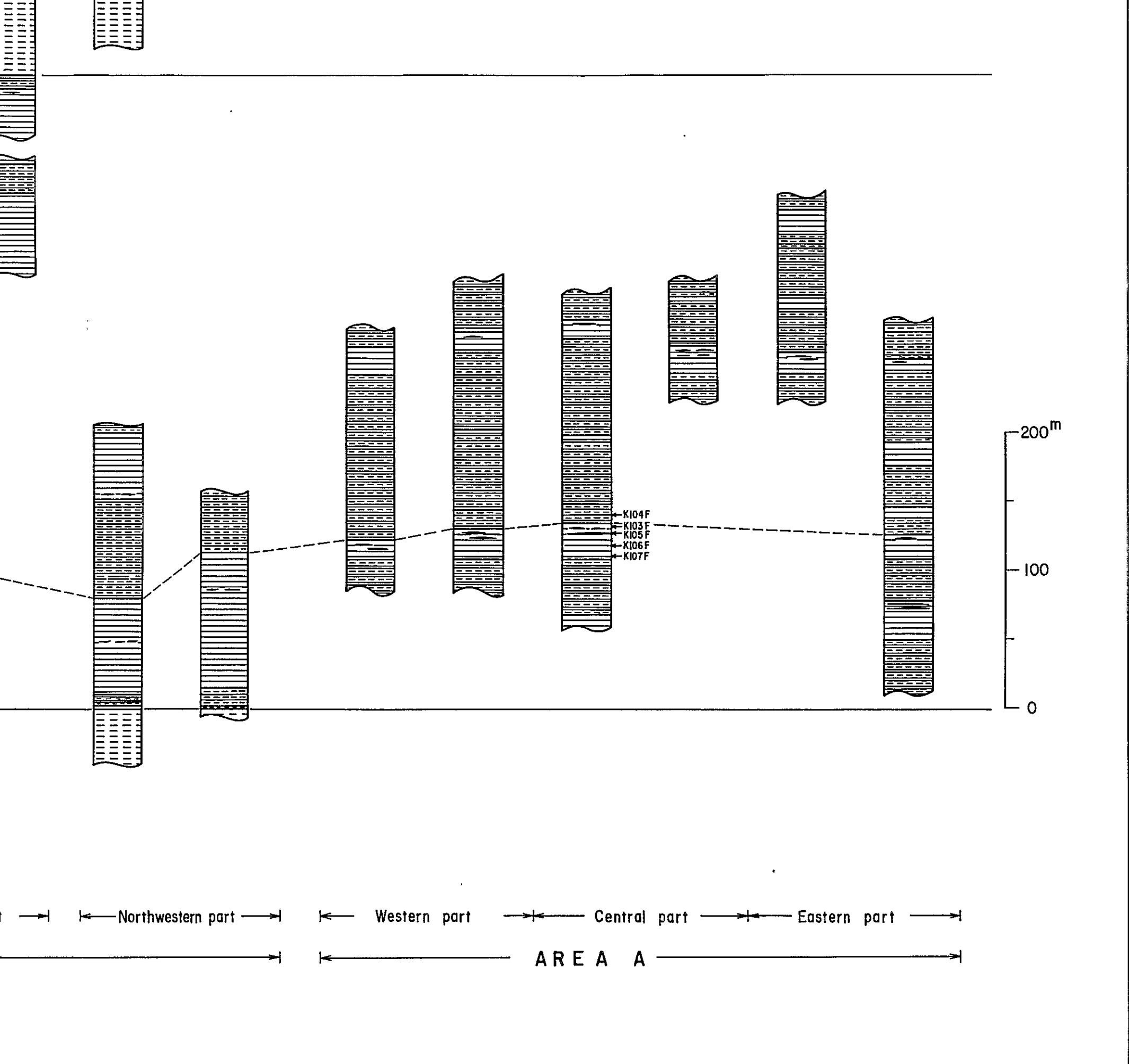
Prepared by Bishimetal Exploration Co., Ltd.

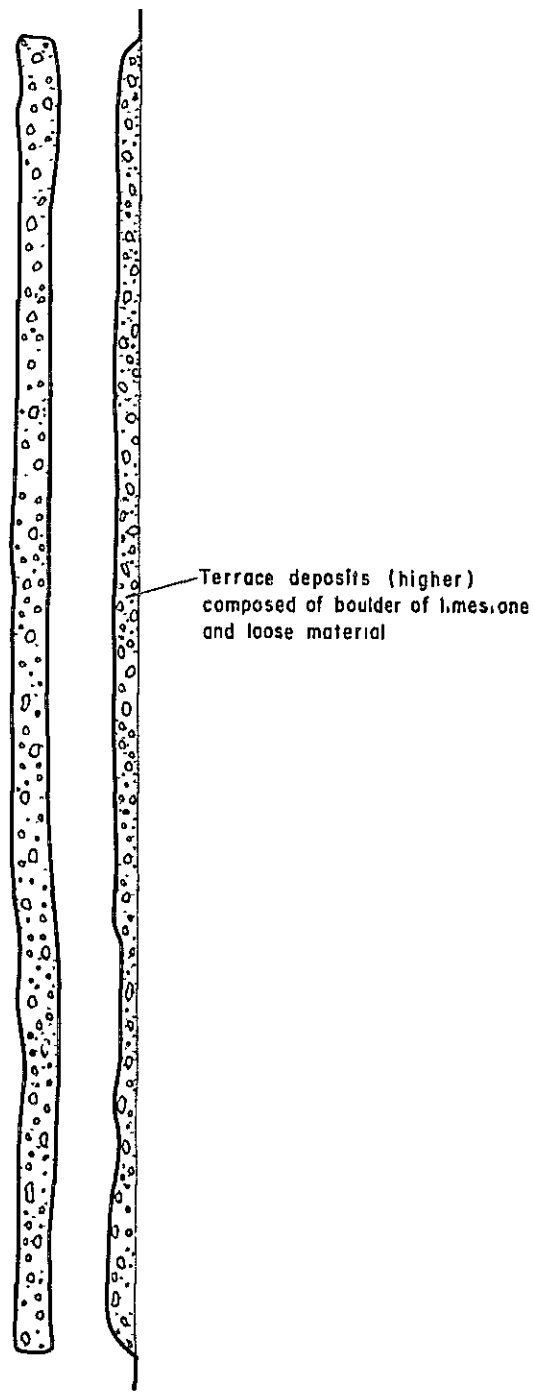
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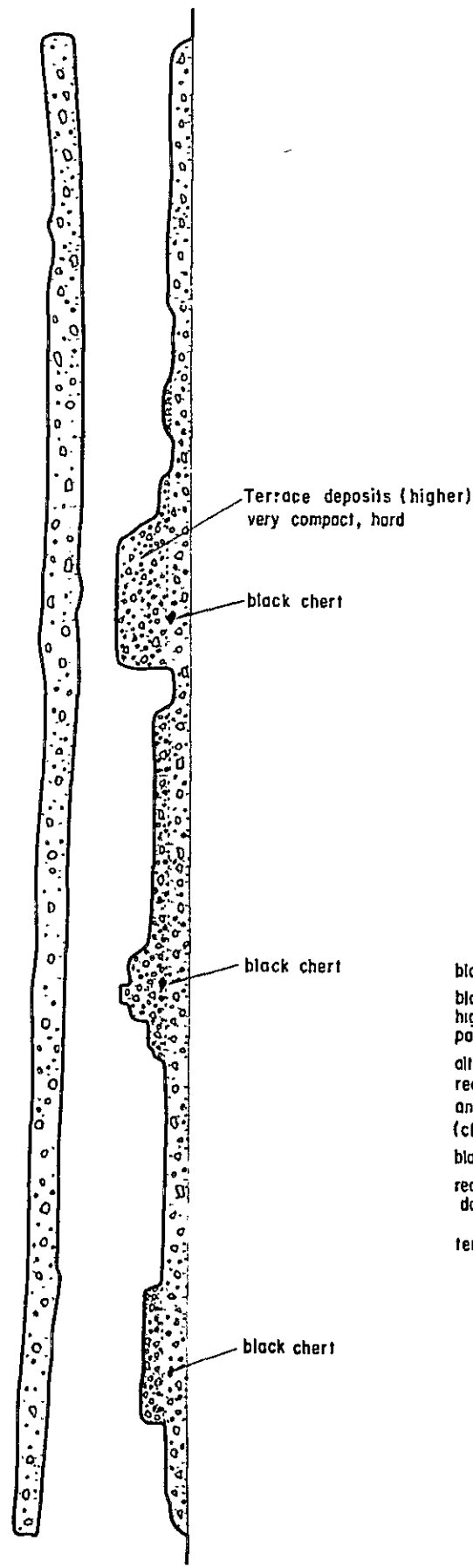
LEGEND

- sandy limestone, calcareous sandstone
- sandstone
- shale
- alternation of white chert and light gray shale
- alternation of white chert and reddish brown shale
- alternation of reddish brown chert, muddy chert and reddish brown shale
- basalt lava
- manganese bed
- ← K104F sample of determination of fossil

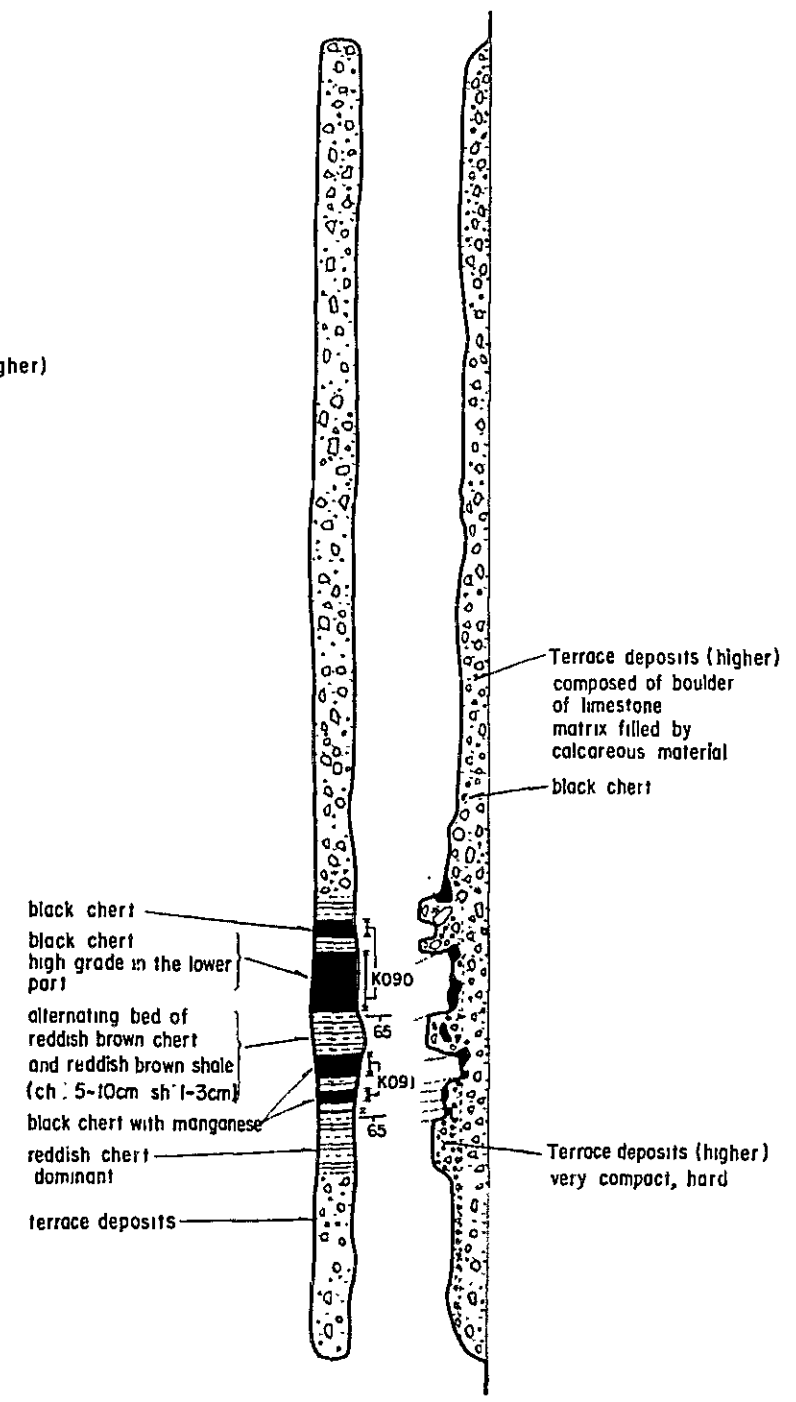




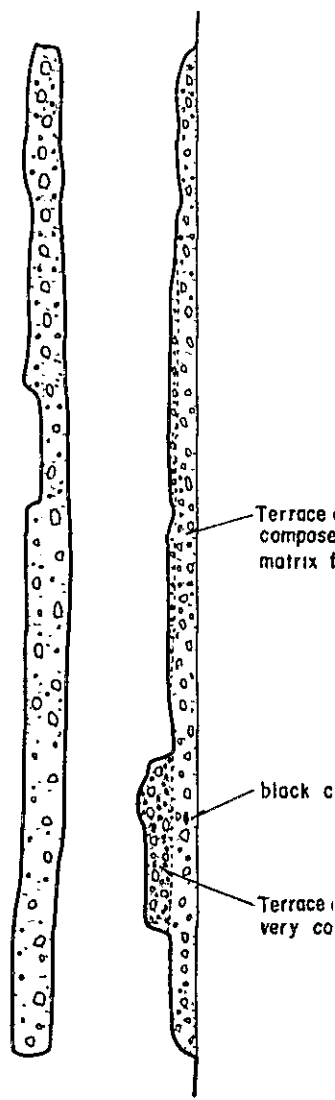
No. 5
(50m)



No. 4



No. 3
(50m)

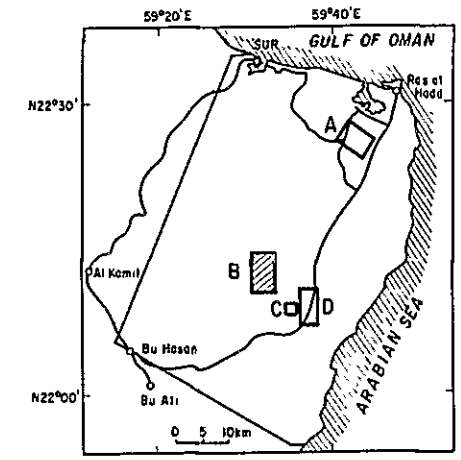


No. 2
(39m)



GEOLOGICAL SURVEY OF THE SULTANATE OF OMAN (SUR AREA) PHASE III

Geological Sketch of Trenches

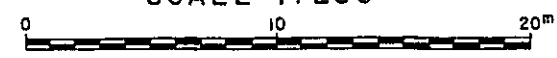


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METAL MINING AGENCY OF JAPAN

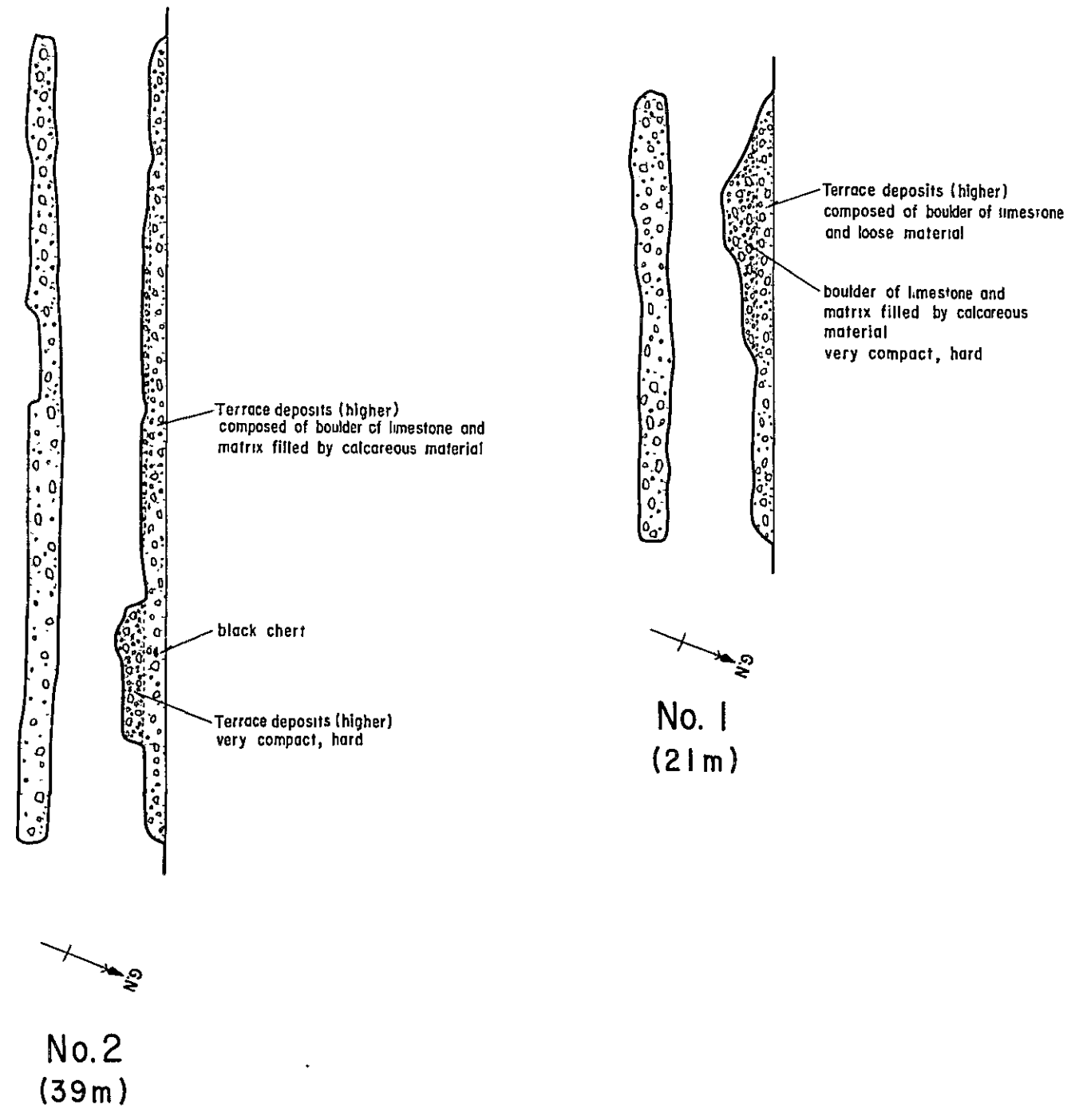
March 1983

Prepared by Bishimetal Exploration Co., Ltd.

SCALE 1:200



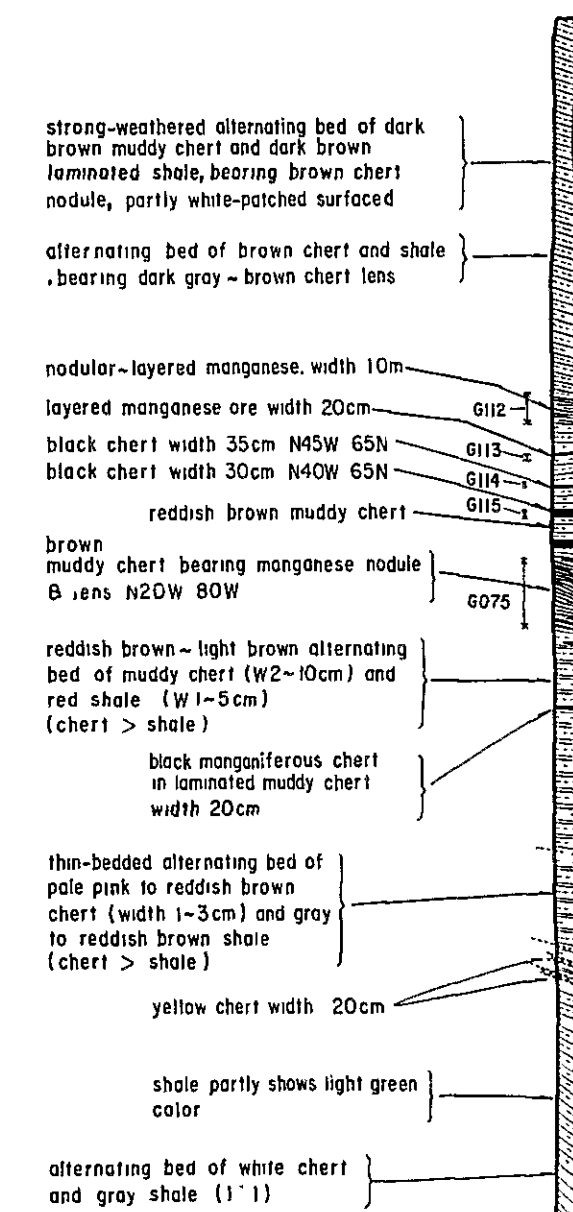
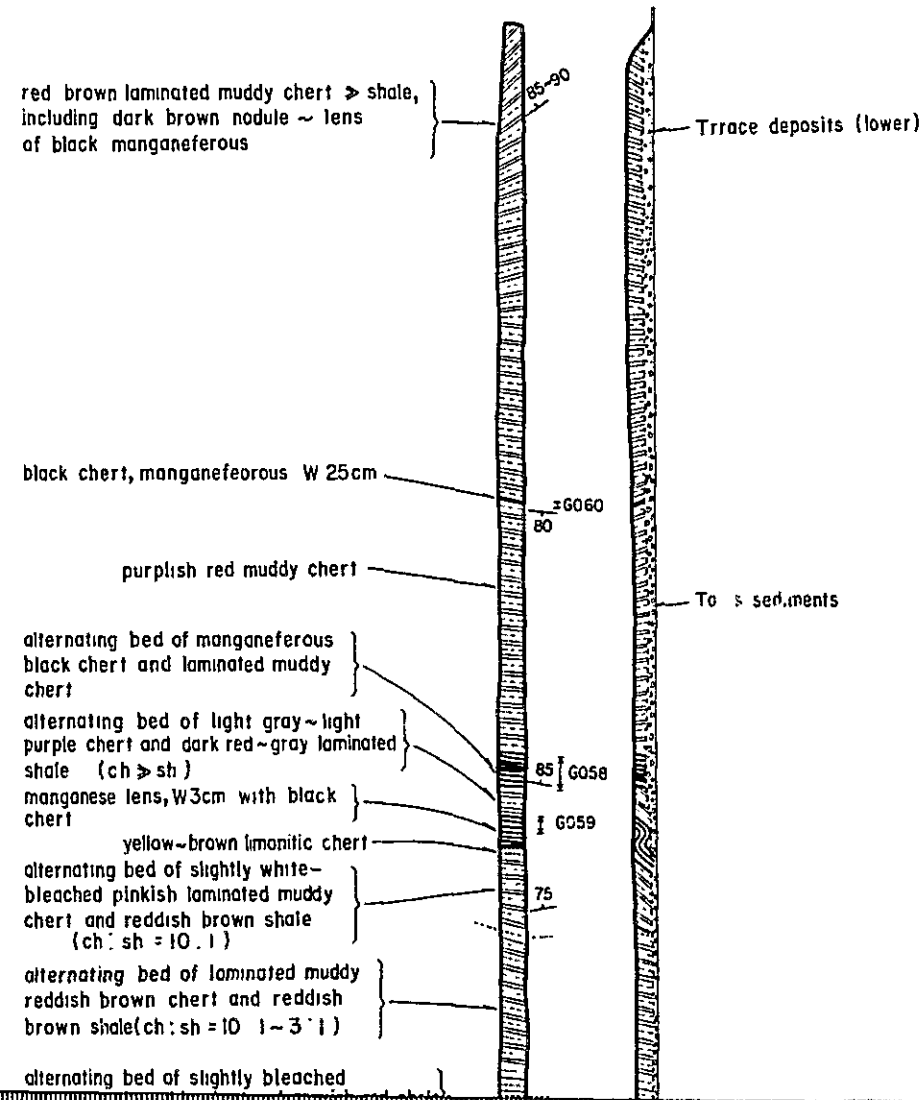
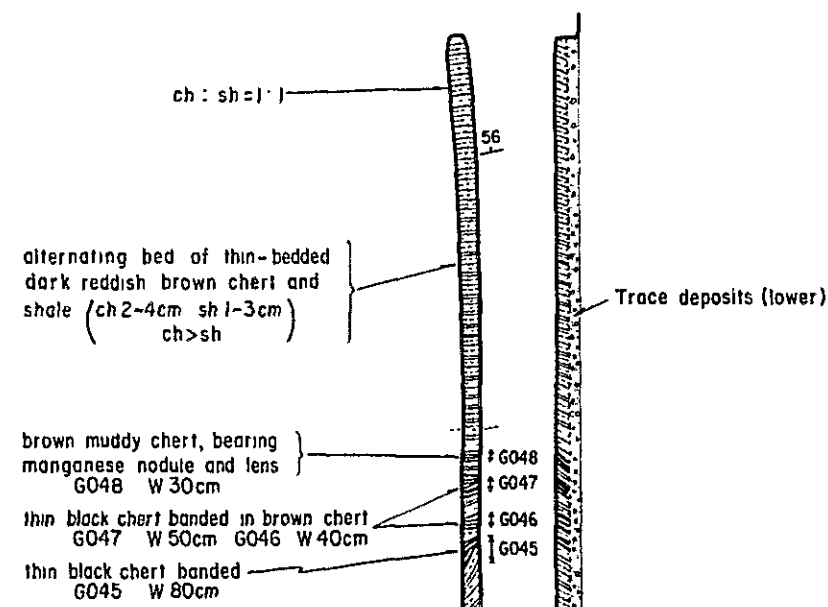
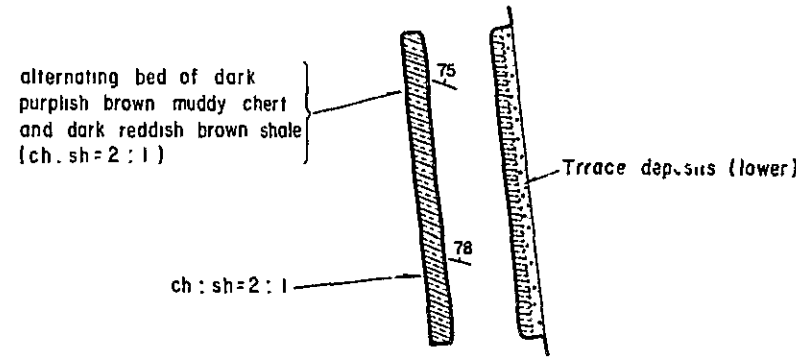
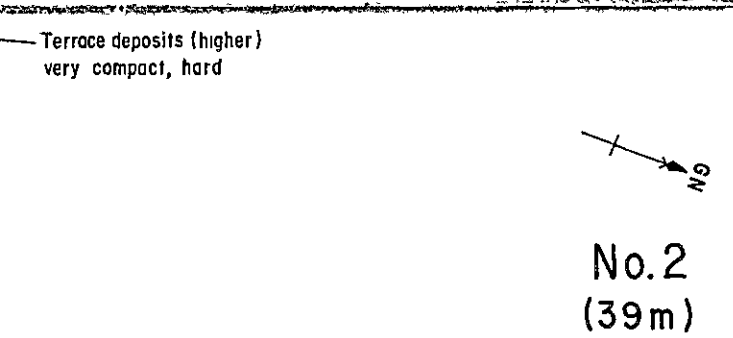
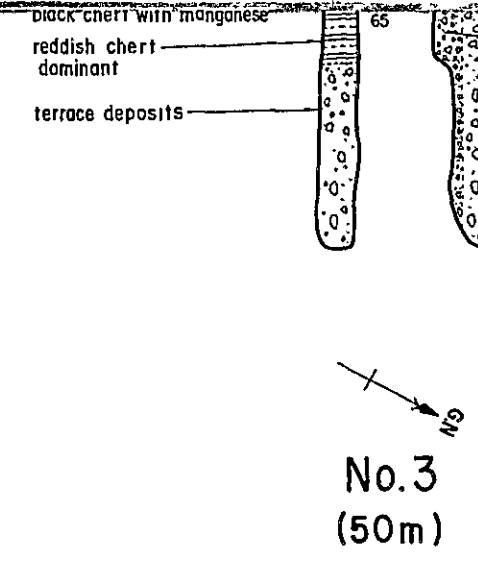
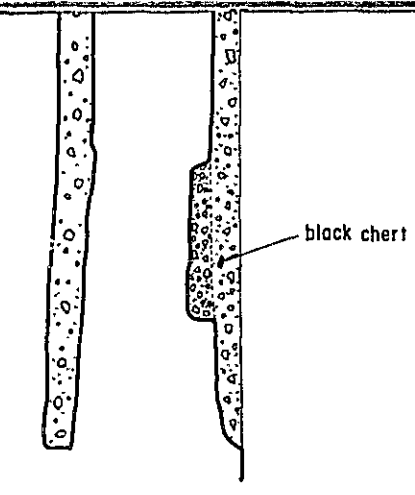
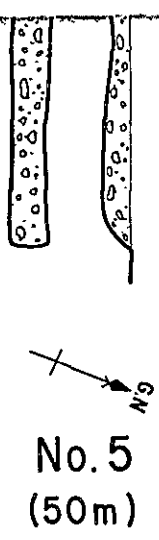
Index Map



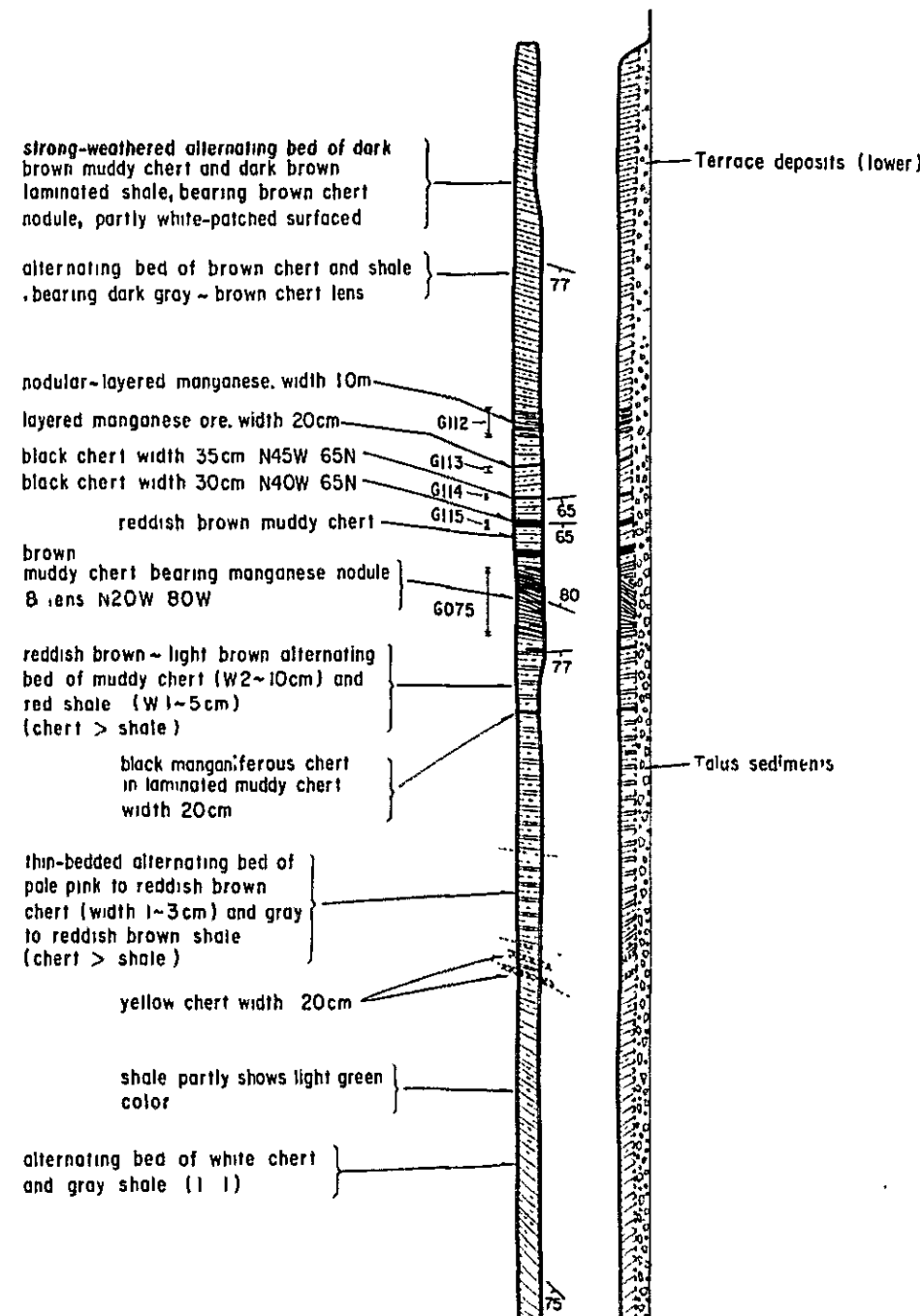
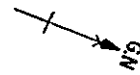
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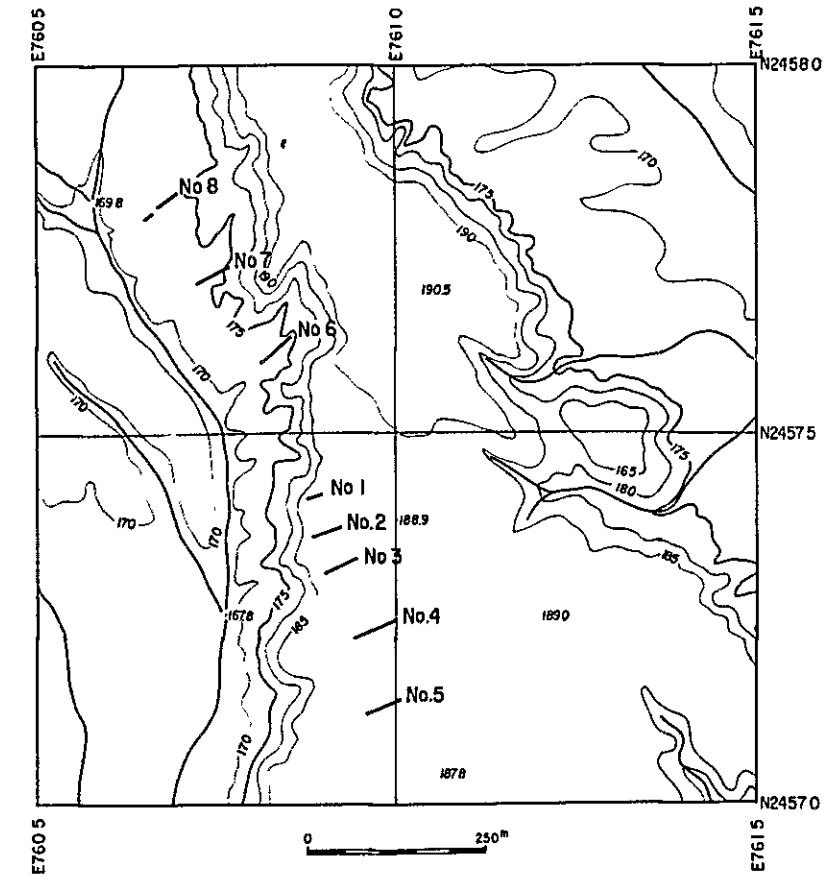


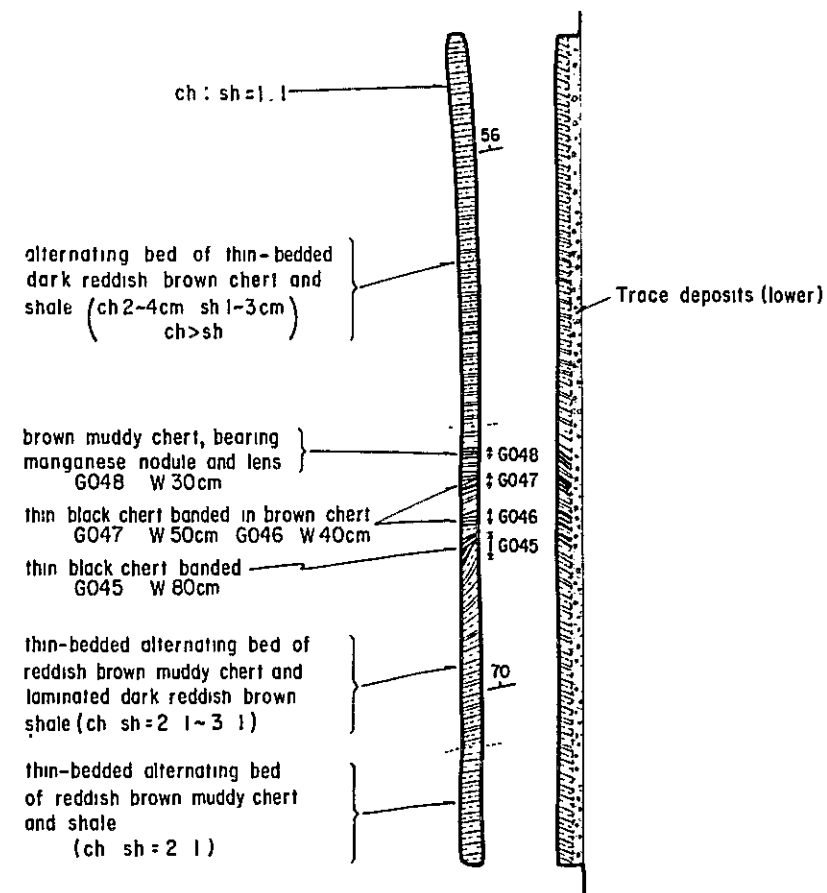
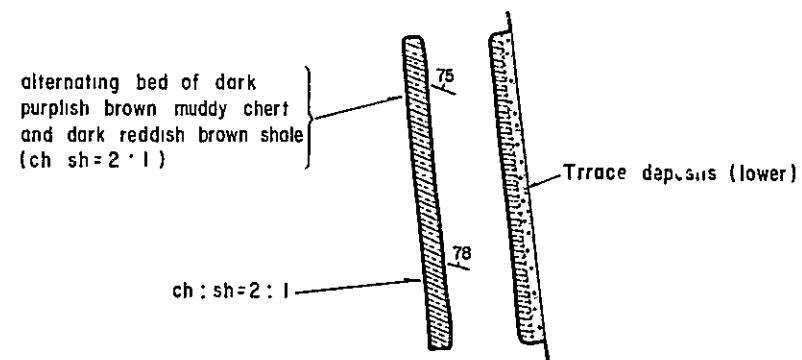


No.2
(39m)

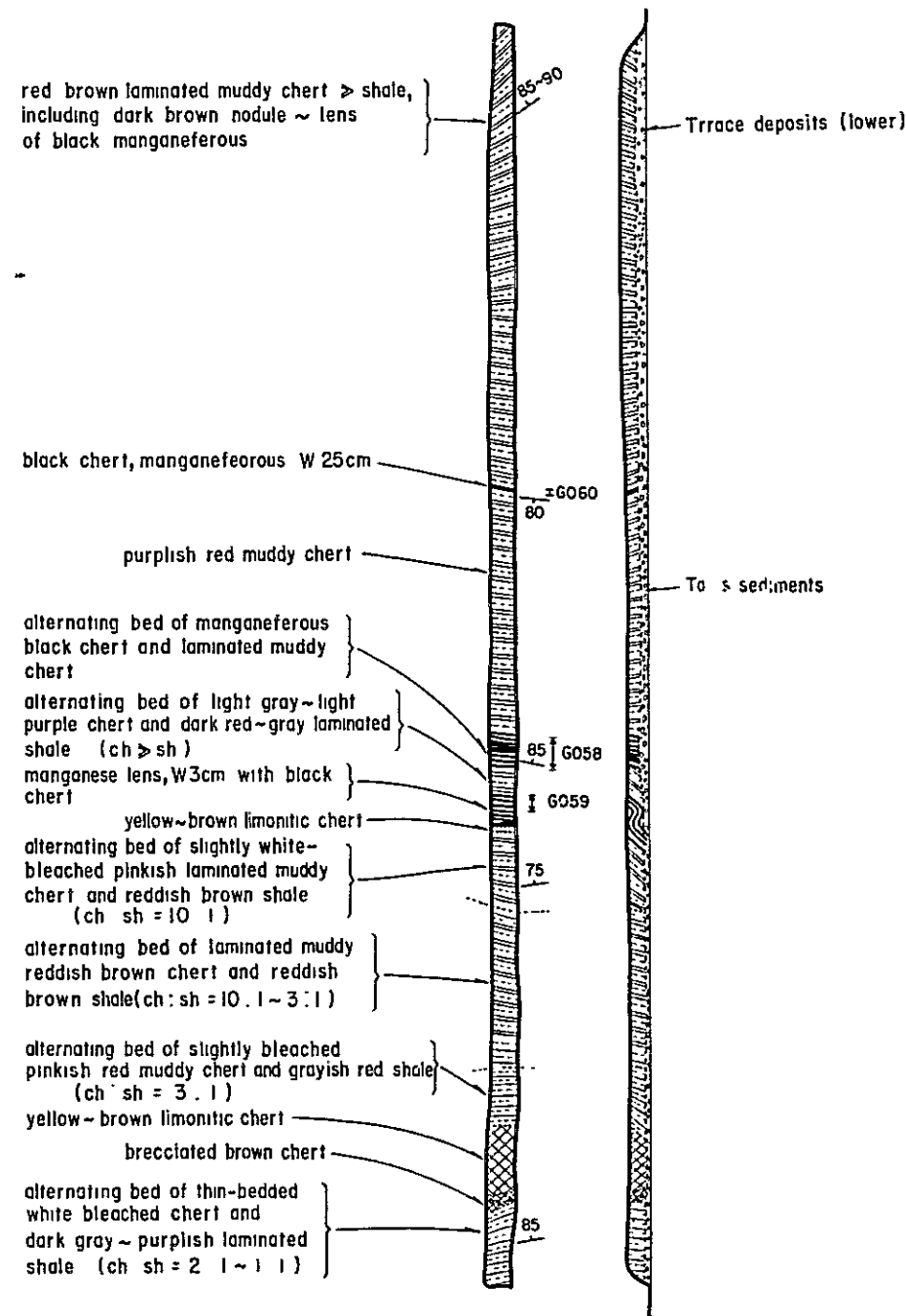


Index Map

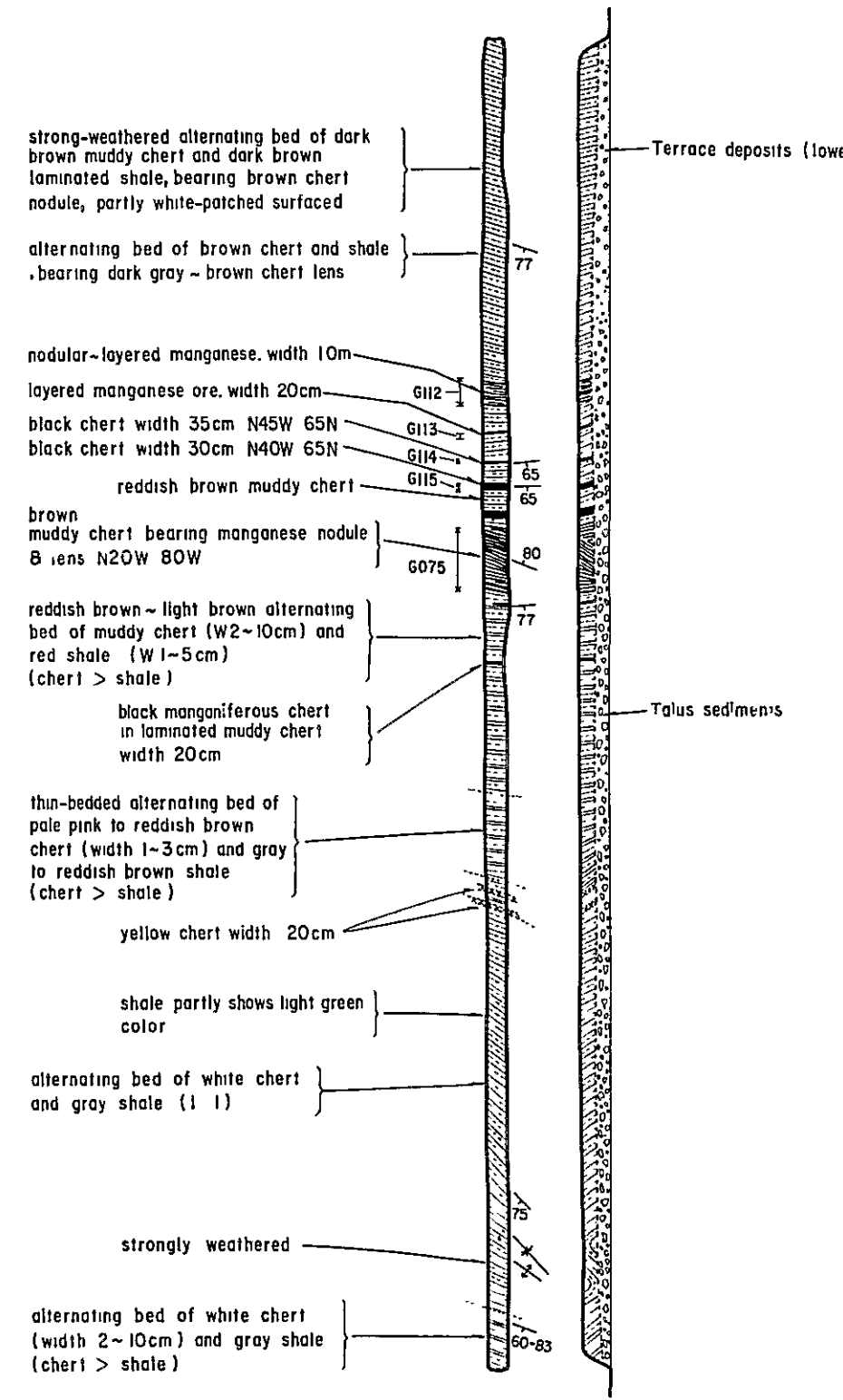




No. 8
(44 m)



No. 7
(50 m)



No. 6
(56 m)





strong-weathered alternating bed of dark brown muddy chert and dark brown laminated shale, bearing brown chert nodule, partly white-patched surfaced

alternating bed of brown chert and shale, bearing dark gray - brown chert lens

nodular-layered manganese, width 10m

layered manganese ore, width 20cm G112

black chert width 35cm N45W 65N G113

black chert width 30cm N40W 65N G114

reddish brown muddy chert G115

brown muddy chert bearing manganese nodule
lenses N20W 80W 6075

reddish brown - light brown alternating bed of muddy chert (W2~10cm) and red shale (W1~5cm) (chert > shale)

black manganiferous chert in laminated muddy chert width 20cm

thin-bedded alternating bed of pale pink to reddish brown chert (width 1~3cm) and gray to reddish brown shale (chert > shale)

yellow chert width 20cm

shale partly shows light green color

alternating bed of white chert and gray shale (1:1)

strongly weathered

alternating bed of white chert (width 2~10cm) and gray shale (chert > shale)

Terrace deposits (lower)

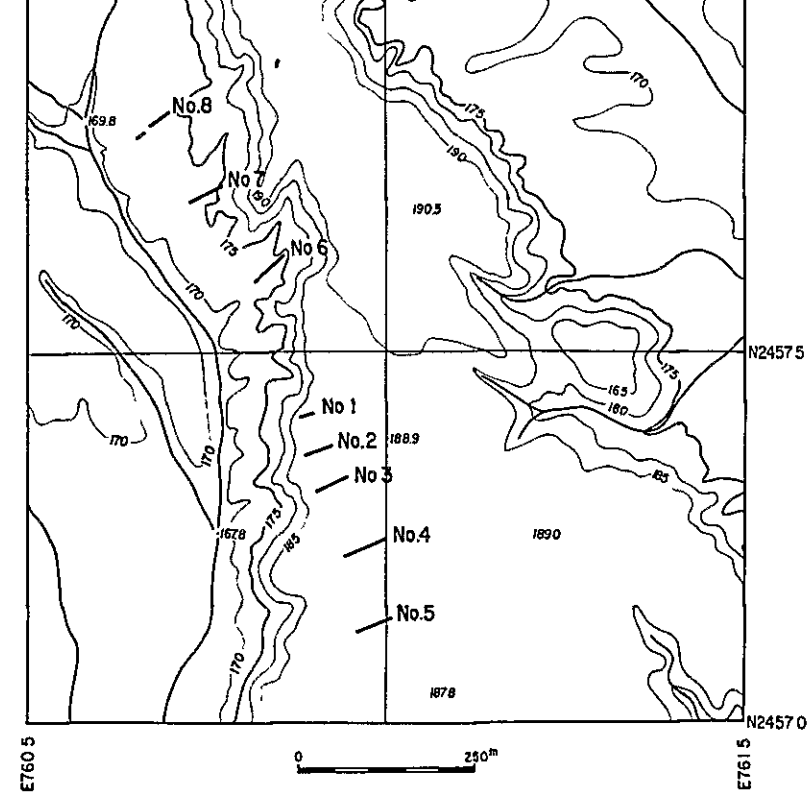
Terrace deposits (lower)

Talus sediments

Talus sediments



No. 6
(56 m)

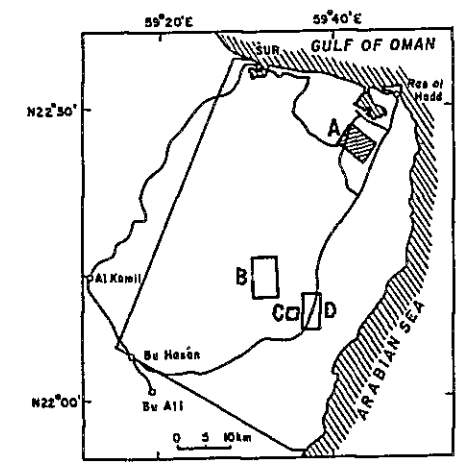


7
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GEOLOGICAL SURVEY OF THE SULTANATE OF OMAN (SUR AREA) PHASE III

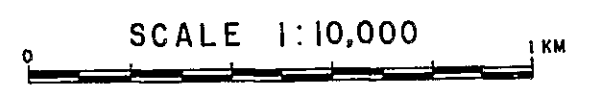
Location Map of the Tested Samples in the Area A



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

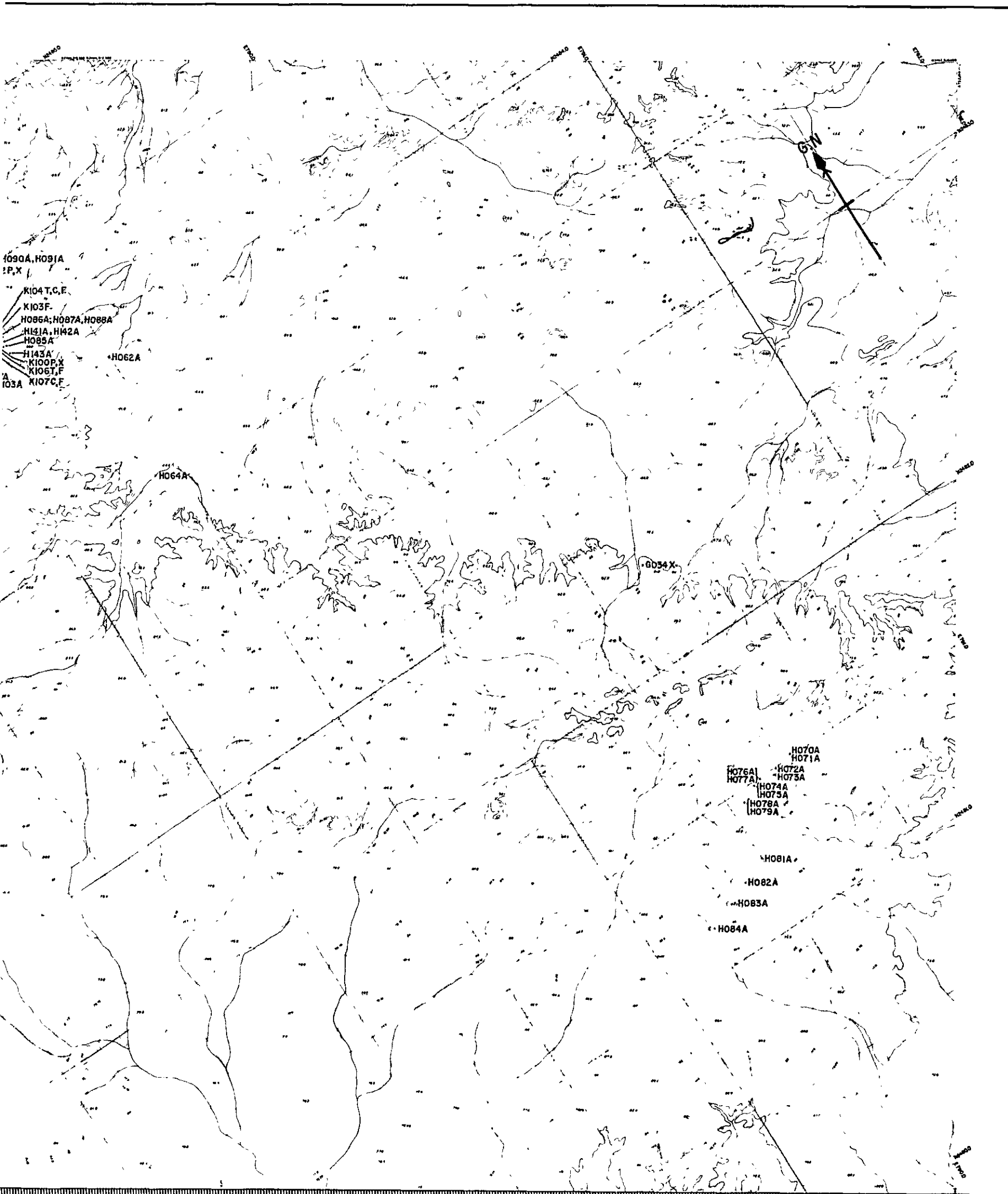
March 1983

Prepared by Bishimetal Exploration Co., Ltd.



LEGEND

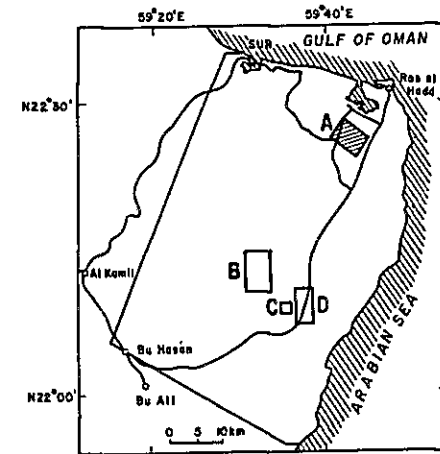
- A001T sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis





PHASE III

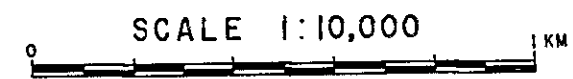
Location Map of the Tested Samples
in the Area A



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

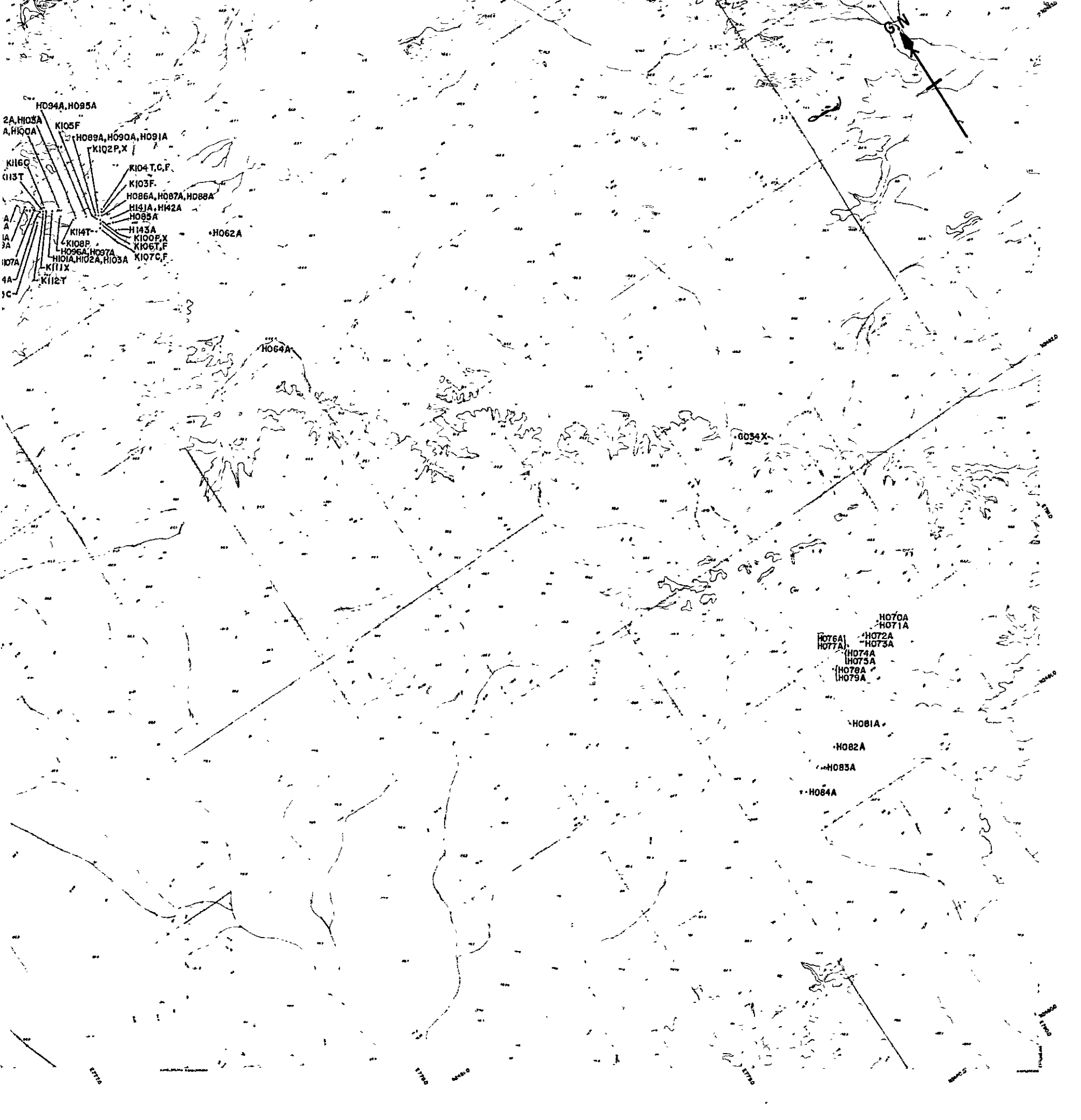
March 1983

Prepared by Bishimetal Exploration Co., Ltd.

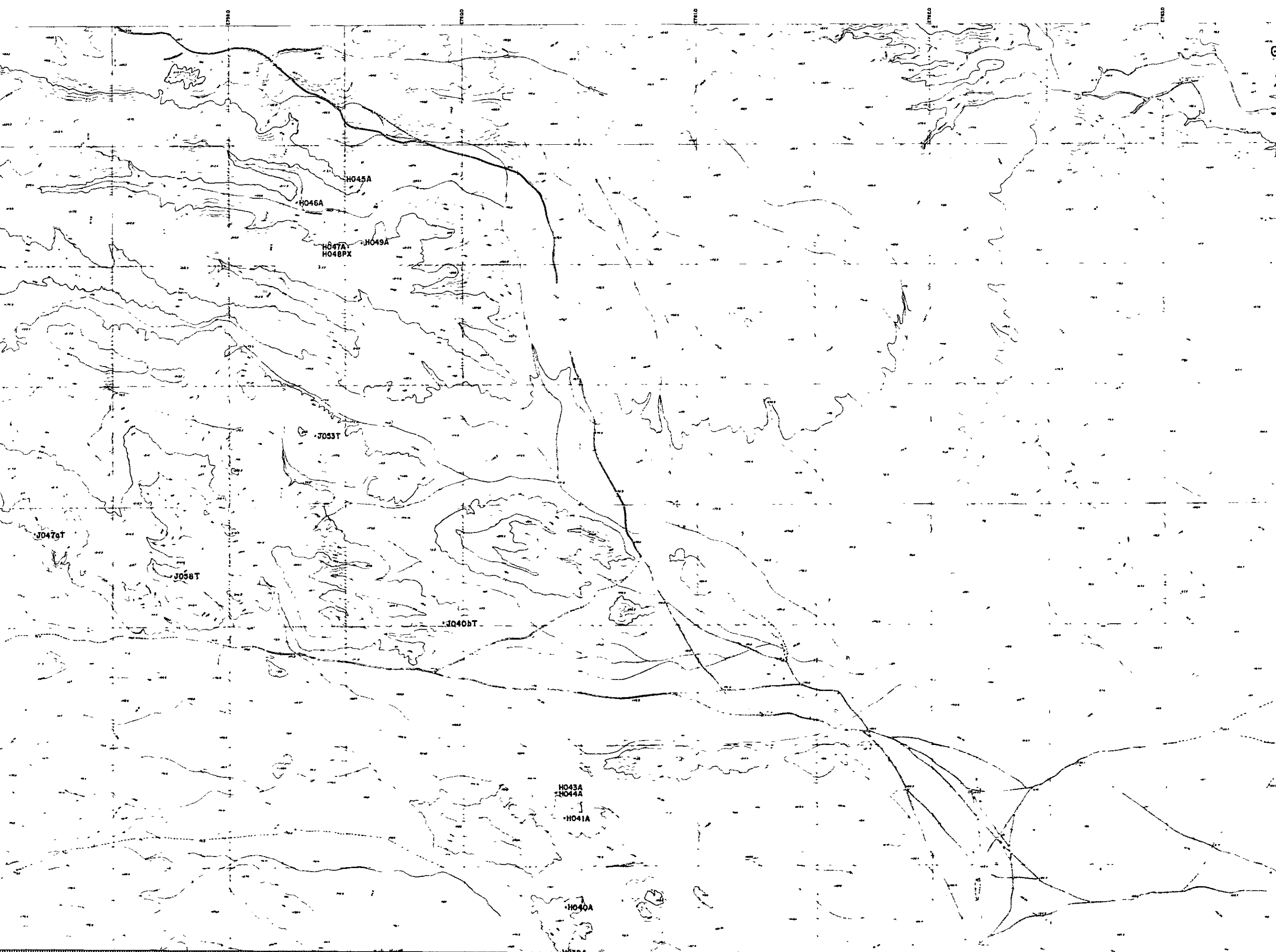


LEGEND

- AOOIT sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis



N2463.0
N2463.0
N2462.0
N2461.0
N2460.0
N2459.0

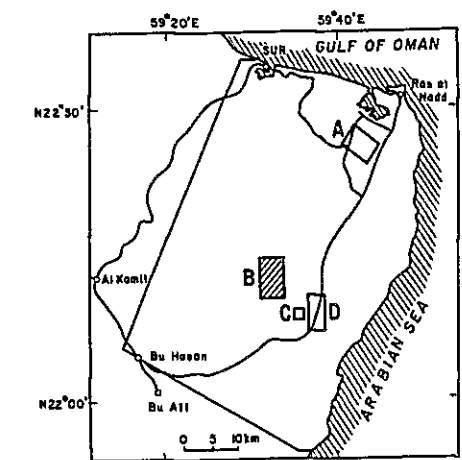


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9 70 1 2 3 4 5 6 7 8 9 80 1 2 3 4 5 6 7 8 9 90 1 2 3 4 5 6 7 8 9 100 1 2 3 4 5 6 7 8 9 110 1 2 3 4 5 6 7 8 9 120 1 2 3 4 5 6 7 8 9 130

GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

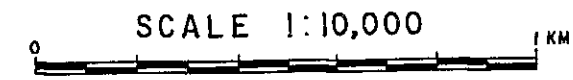
Location Map of the Tested Samples
in the Area B



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

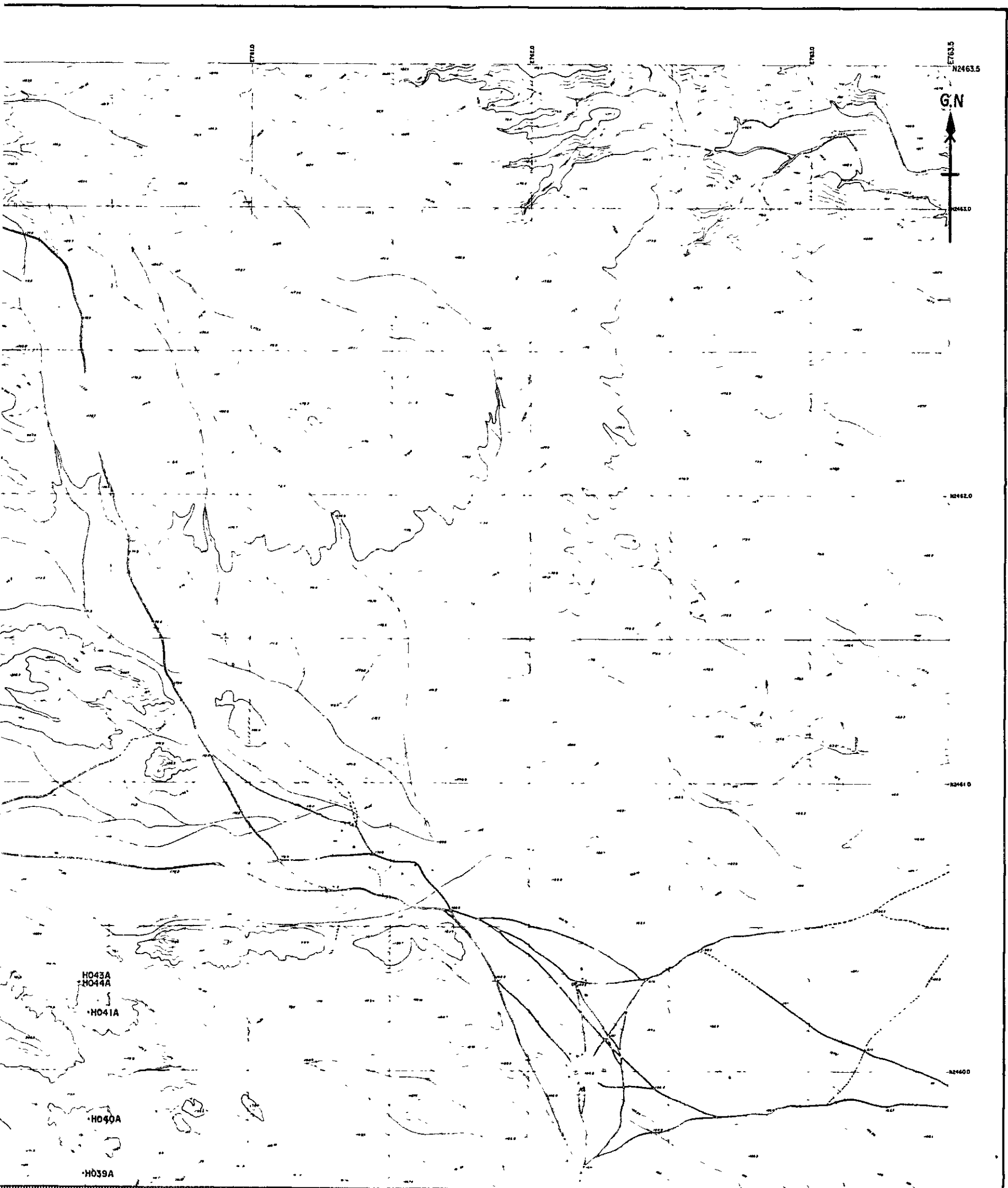
March 1983

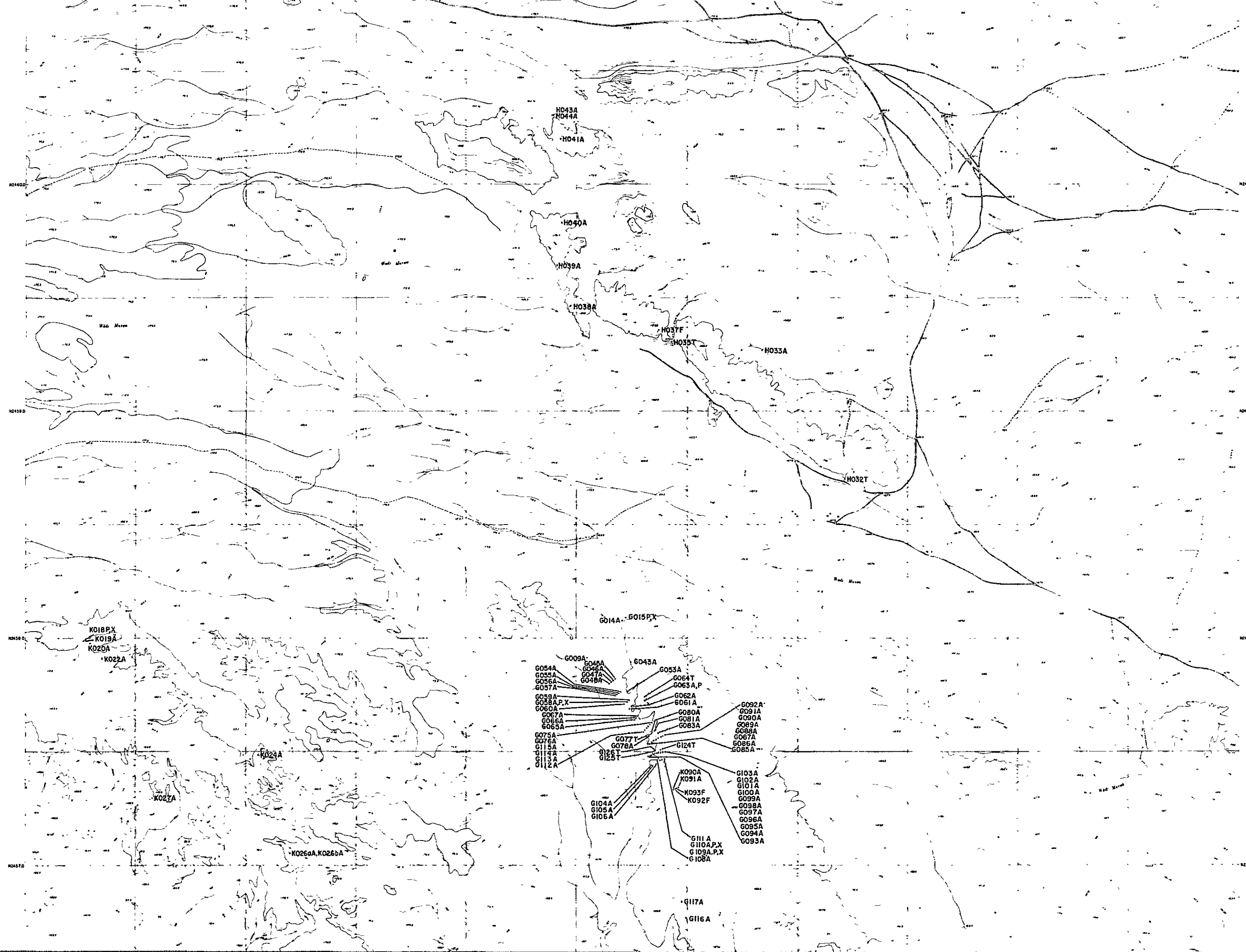
Prepared by Bishimetal Exploration Co., Ltd.

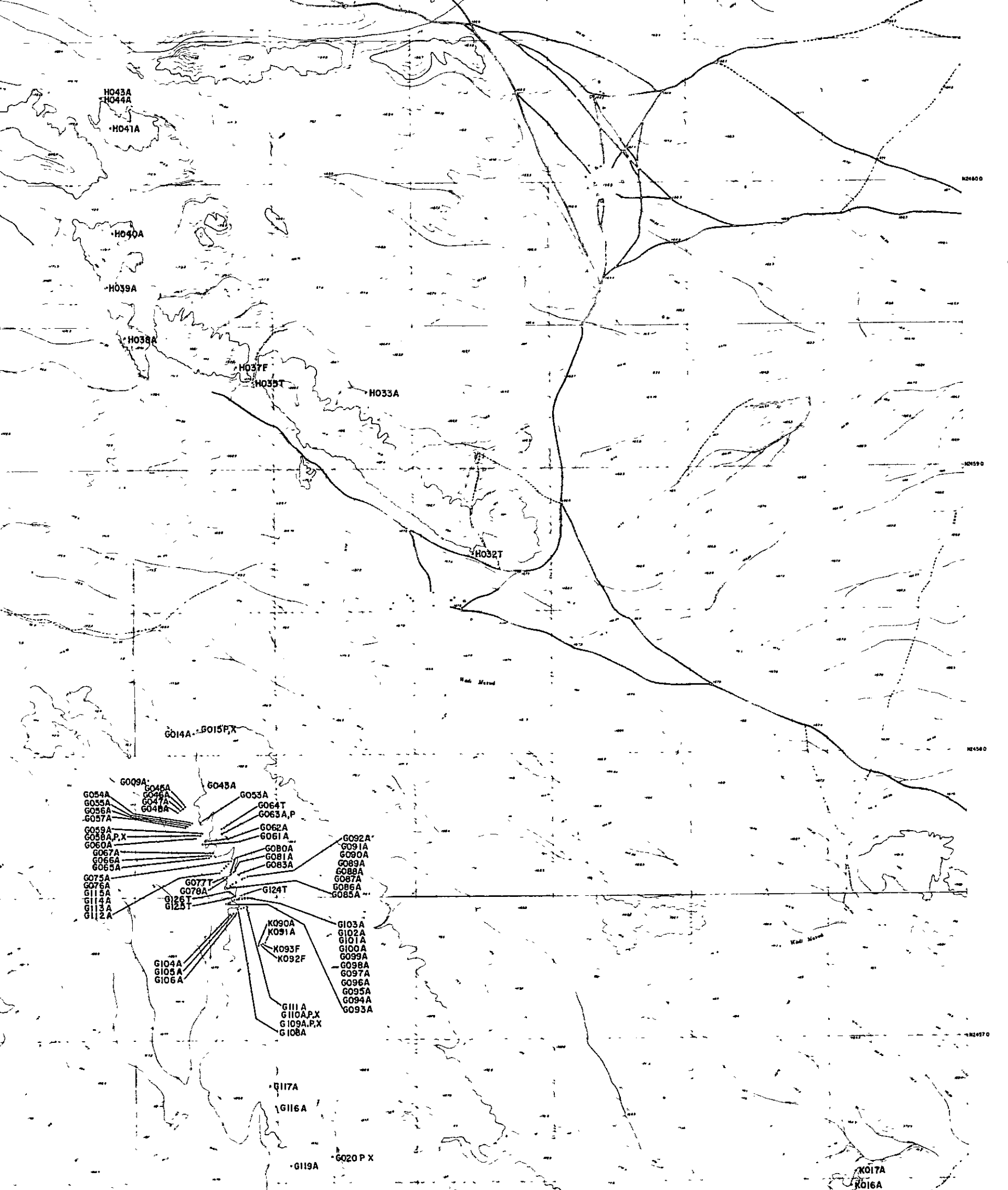


LEGEND

- A001T sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis

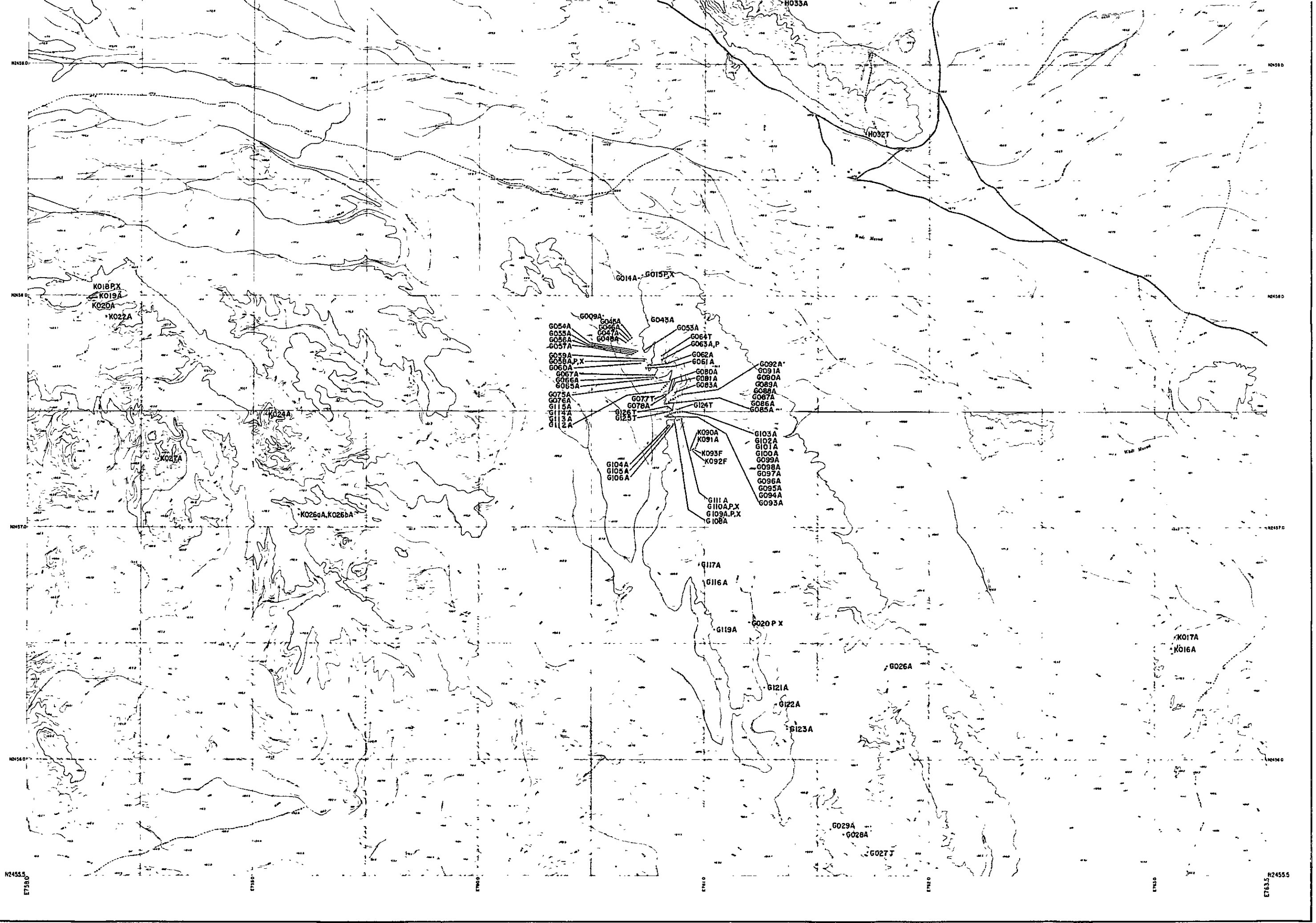


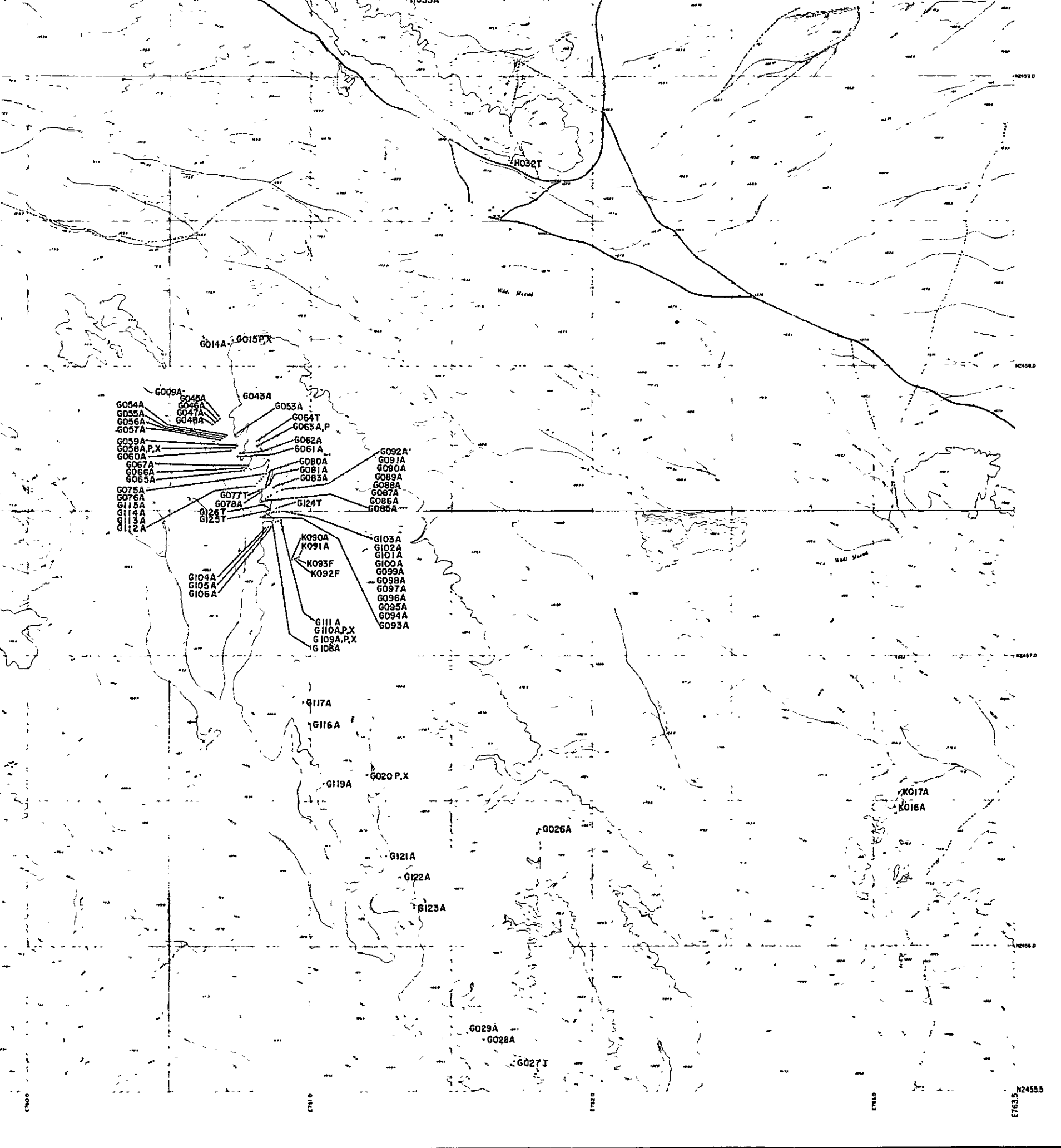




- A00IT sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis

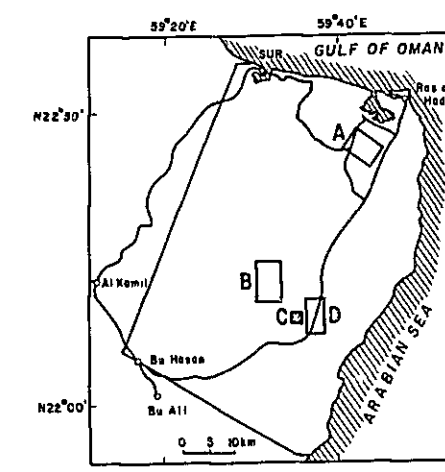






GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

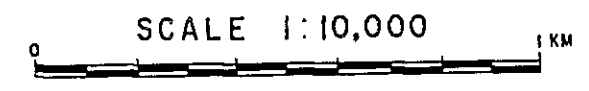
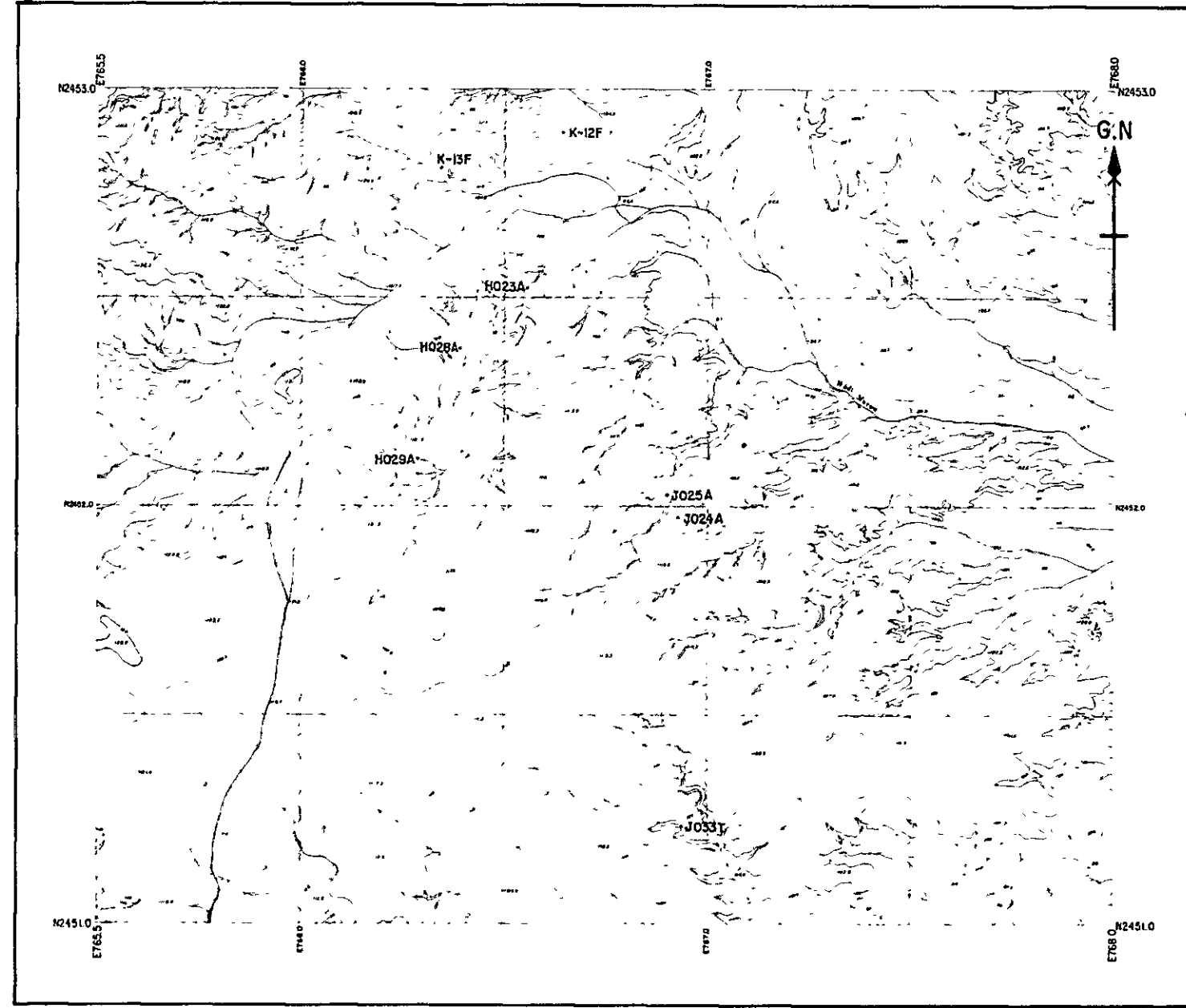
Location Map of the Tested Samples
in the Area C



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

March 1983

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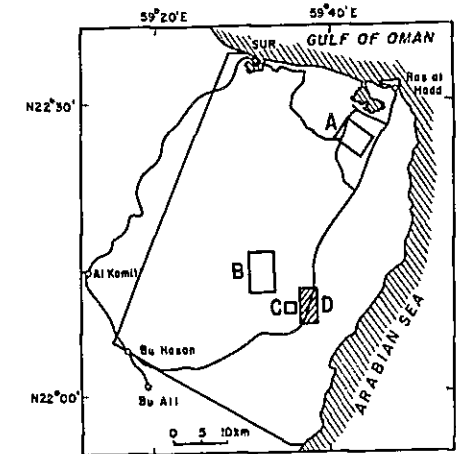
LEGEND

- AOOIT sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis



GEOLOGICAL SURVEY OF THE SULTANATE OF OMAN (SUR AREA) PHASE III

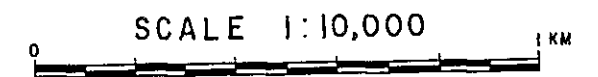
Location Map of the Tested Samples in the Area D



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

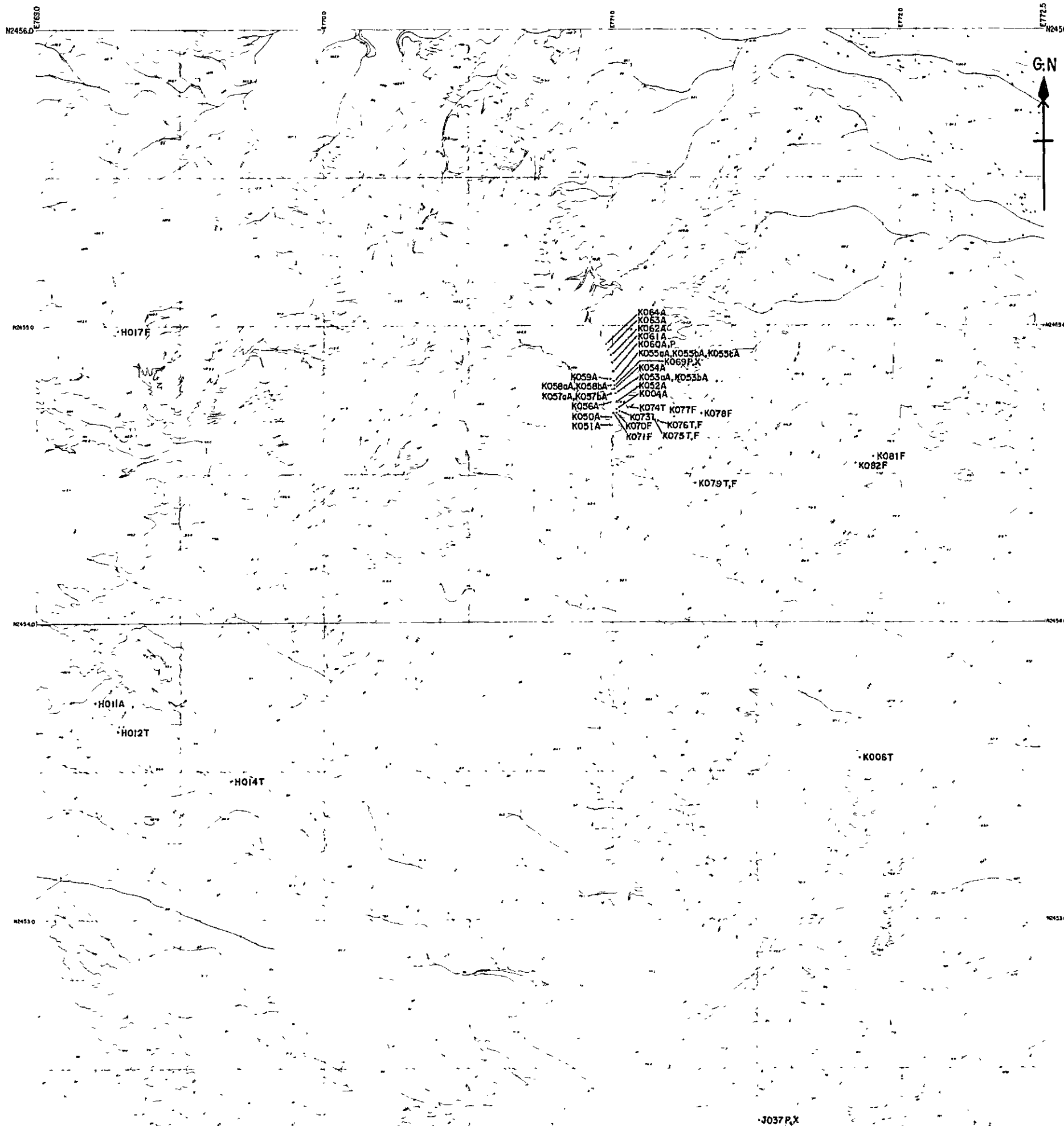
March 1983

Prepared by Bishimetal Exploration Co., Ltd.



LEGEND

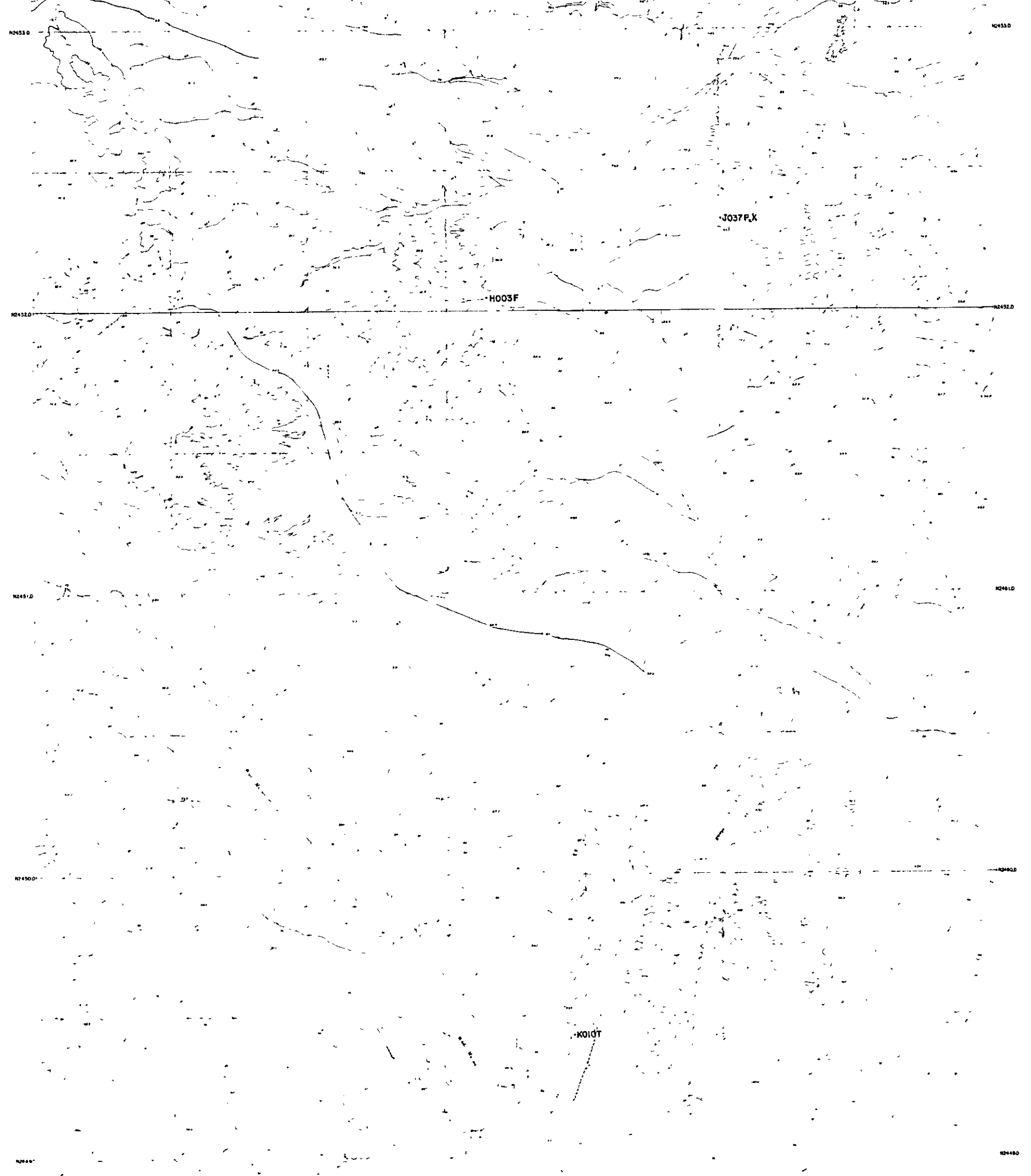
- A001T sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis

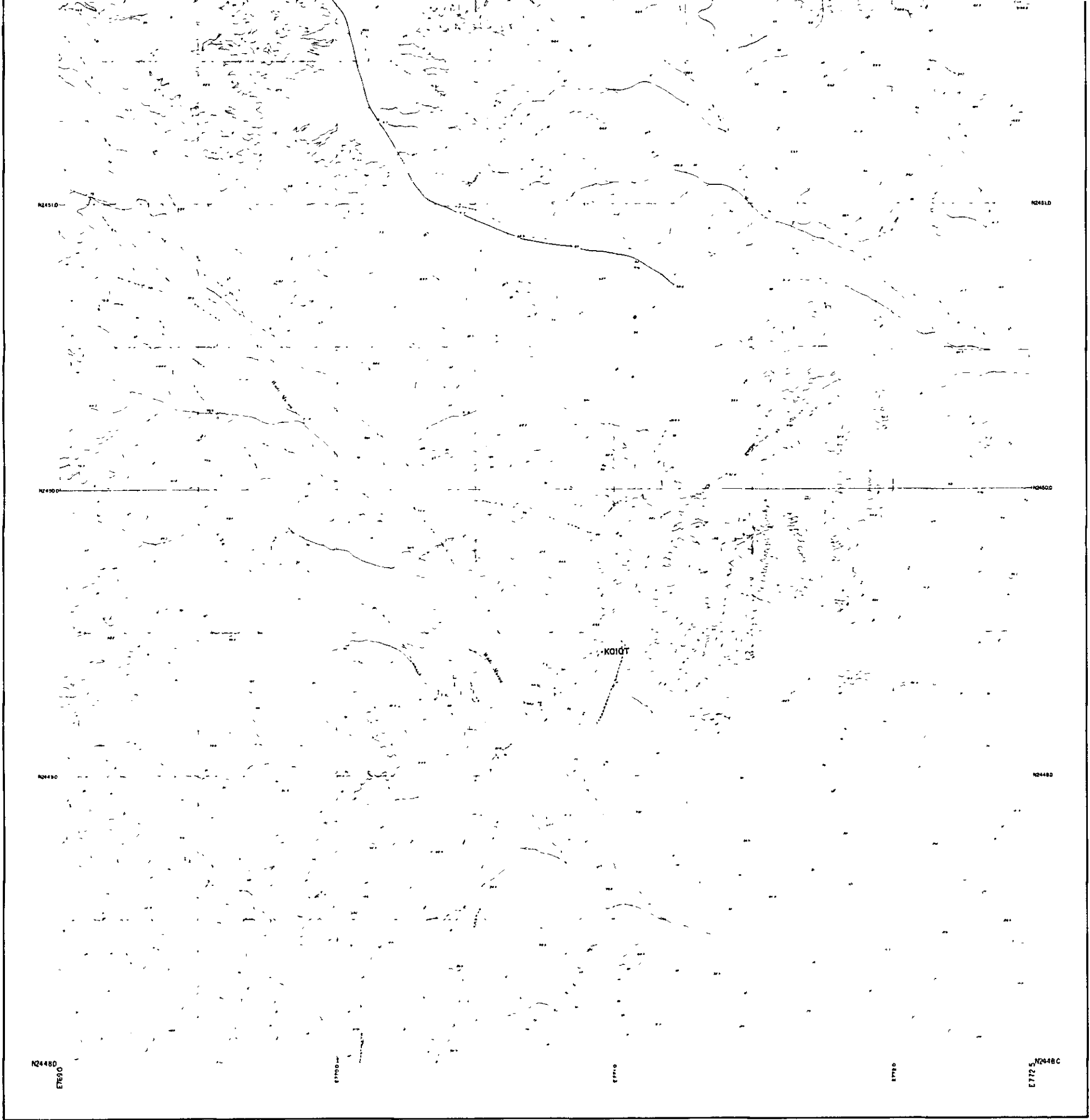


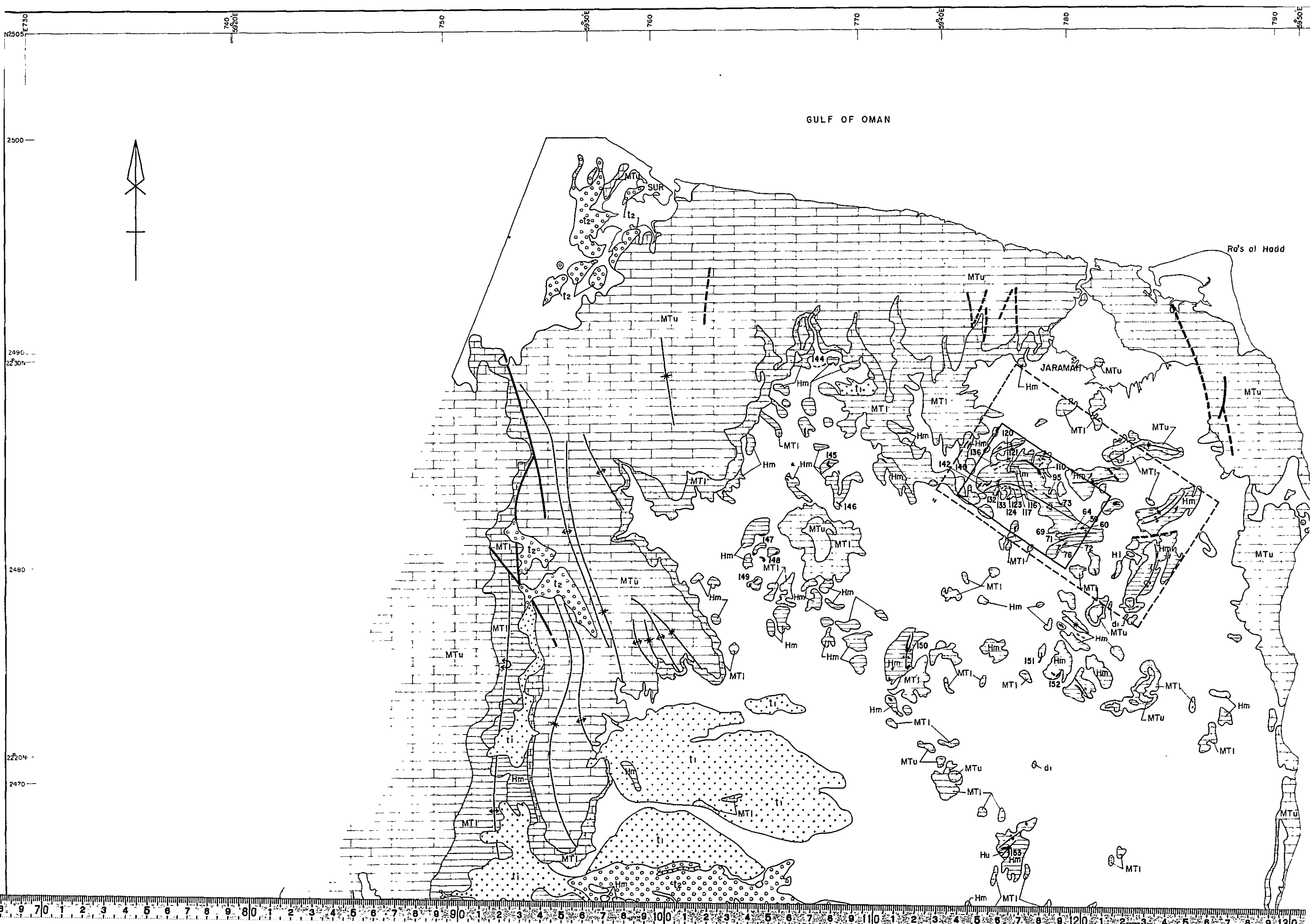
J037 P,X



- A00IT sampling site & sample number
- P polished section
- T thin section
- A chemical analysis of ore
- C chemical analysis of rock
- F fossil identification
- X x-ray diffractive analysis

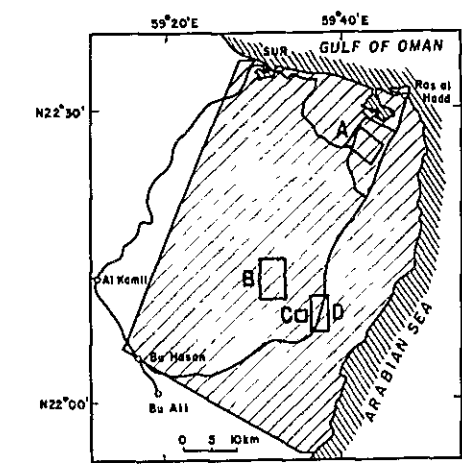






GEOLOGICAL SURVEY OF
THE SULTANATE OF OMAN
(SUR AREA)
PHASE III

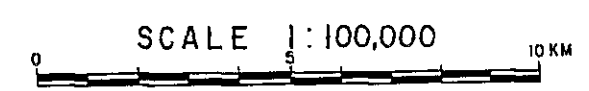
Distribution Map of Mangane Outcrops
of the Sur Area



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

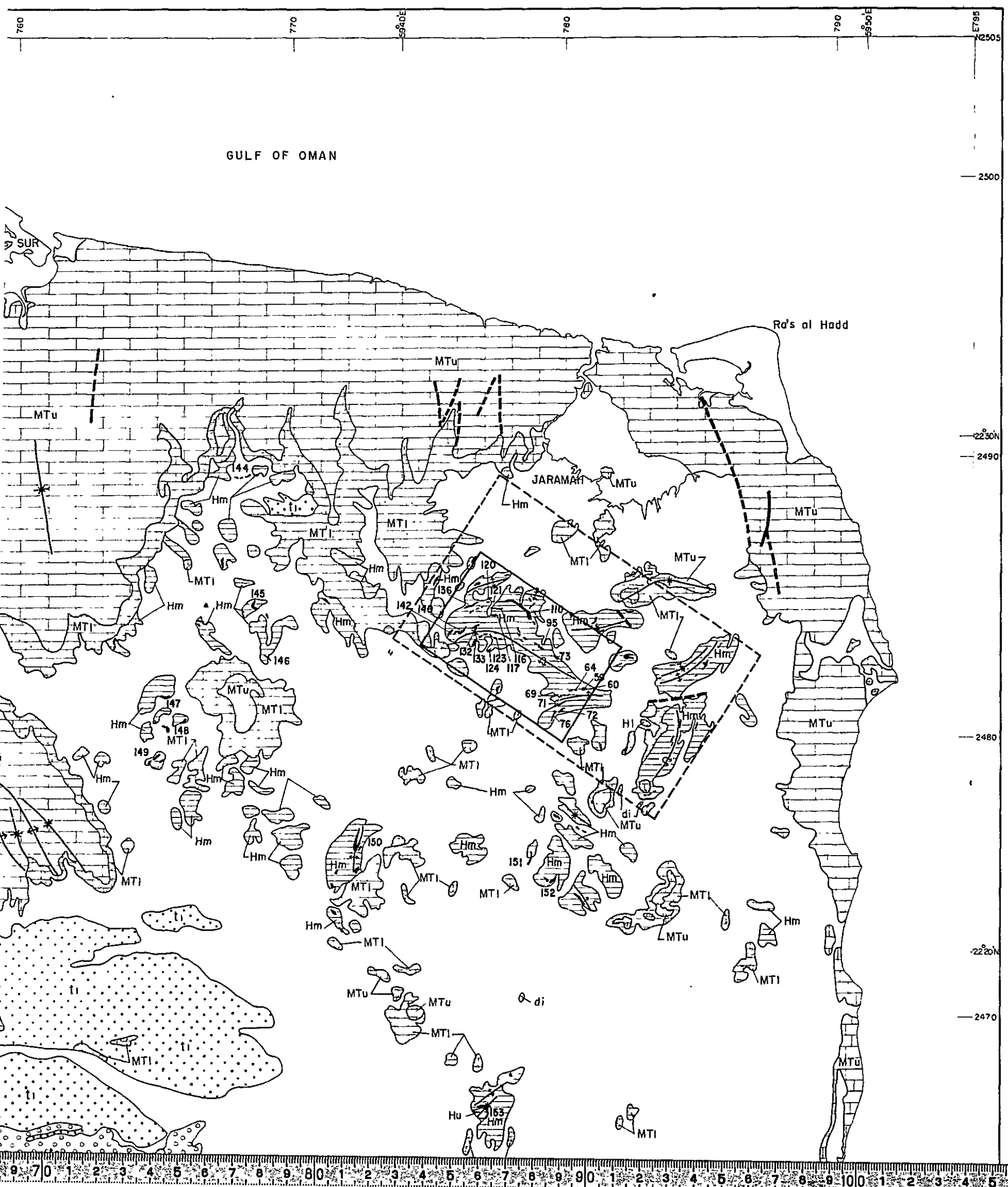
March 1983

Prepared by Bishimetal Exploration Co., Ltd.



LEGEND

Quaternary	W	wadi sediments and talus sediments
	t ₂	terrace deposits (higher)
	t ₁	terrace deposits (lower)
Maastrichtian ~ Tertiary Limestone	Upper MTu	limestone
	MTb	basalt lava
	Lower MTl	sandy limestone, calcareous sandstone
Triassic ~ Early Cretaceous (Lower Tertiary) Halifa Formation	Upper Hu	alternation of shale and limestone
	Middle Hm	alternation of chert and shale
	Lower Hl	alternation of chert and shale (chert < shale)



22°20'N
2470
2460
22°10'N
2450
2440
22°00'N

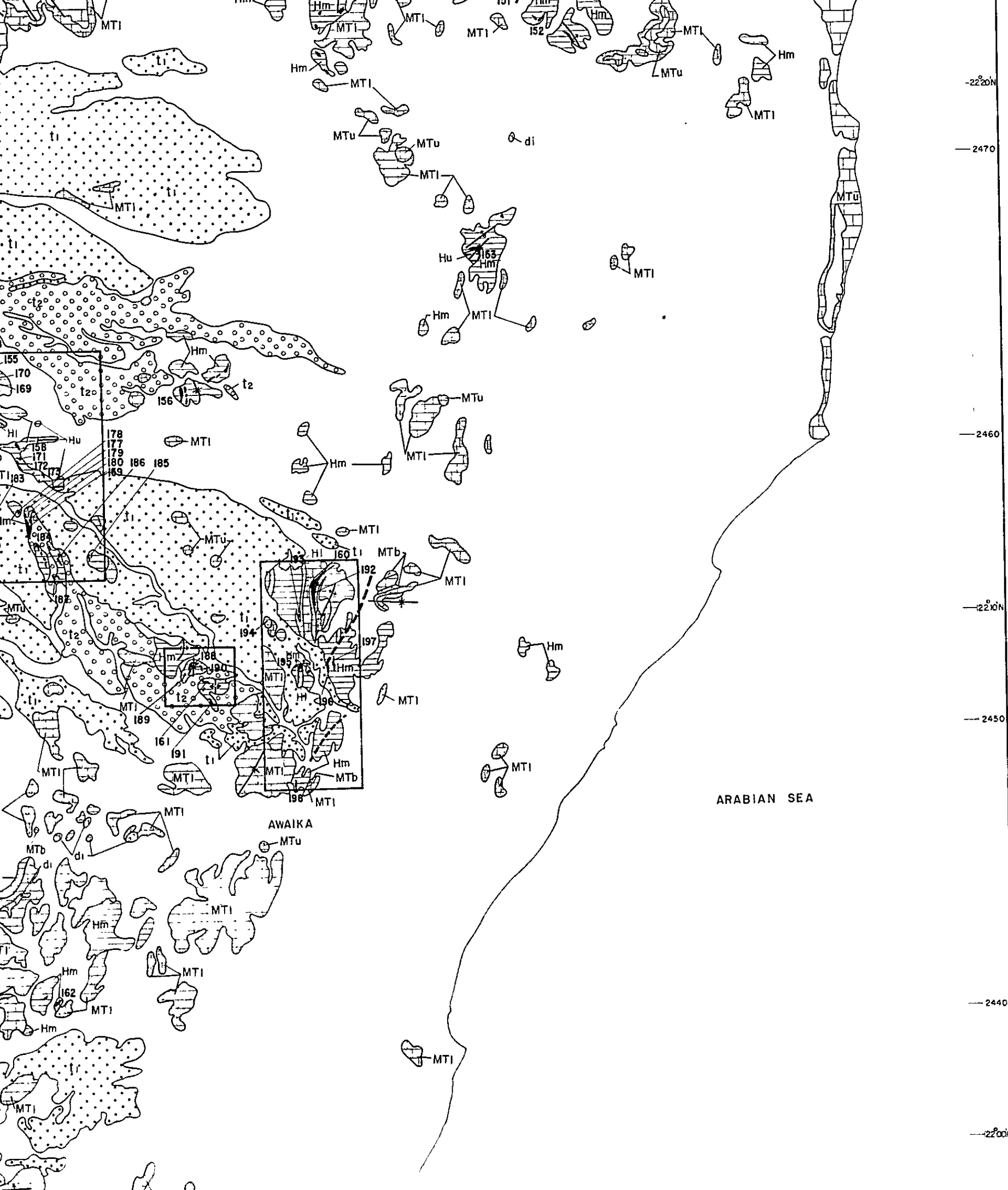


ARABIAN SEA

BU HASAN

AWAIKA



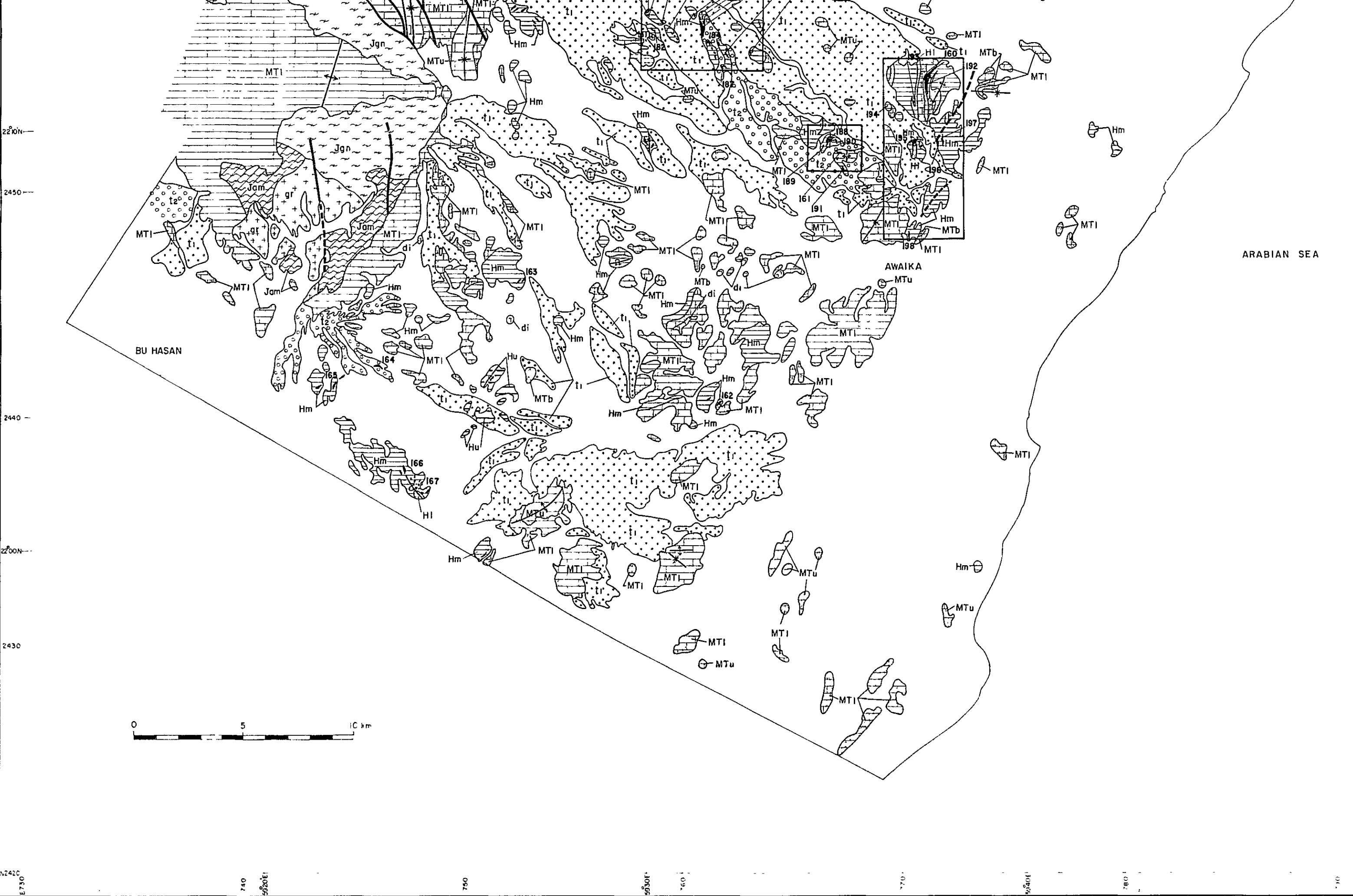


-22°20'N
-2470
-2460
-22°10'N
-2450
-2440
-22°00'N

Quaternary		W	wadi sediments and talus sediments	
		t ₂	terrace deposits (higher)	
		t ₁	terrace deposits (lower)	
Triassic ~ Late Cretaceous ~ Middle Tertiary (Hawasina sediments)	Maastrichtian ~ Tertiary Limestone	Upper	MTu	limestone
		Lower	MTI	sandy limestone, calcareous sandstone
	Halfa Formation	Upper	Hu	alternation of shale and limestone
		Lower	Hl	alternation of chert and shale (chert < shale)
Pre-Cambrian	Jaan Basement	Jam	amphibolite	
		Jgn	gneiss	
Intrusive rocks	younger	di	diorite, dolerite, diorite porphyrite	
	older	gr	granite	

- synclinal axis
- anticlinal axis
- overturned synclinal axis
- overturned anticlinal axis
- manganese bed & outcrop No
- fault (certain, conjectural)
- Phase II Semi-detailed surveyed area
- Phase III Detailed surveyed area





ARABIAN SEA

