



MOUNT KLAPPAN
ANTHRACITE PROJECT
LOST - FOX AREA
GEOLOGICAL REPORT

1986

APPENDIX III

1 :2000

GEOLOGICAL MAPS

AND

CROSS - SECTIONS

1 :5000

GEOLOGICAL MAPS

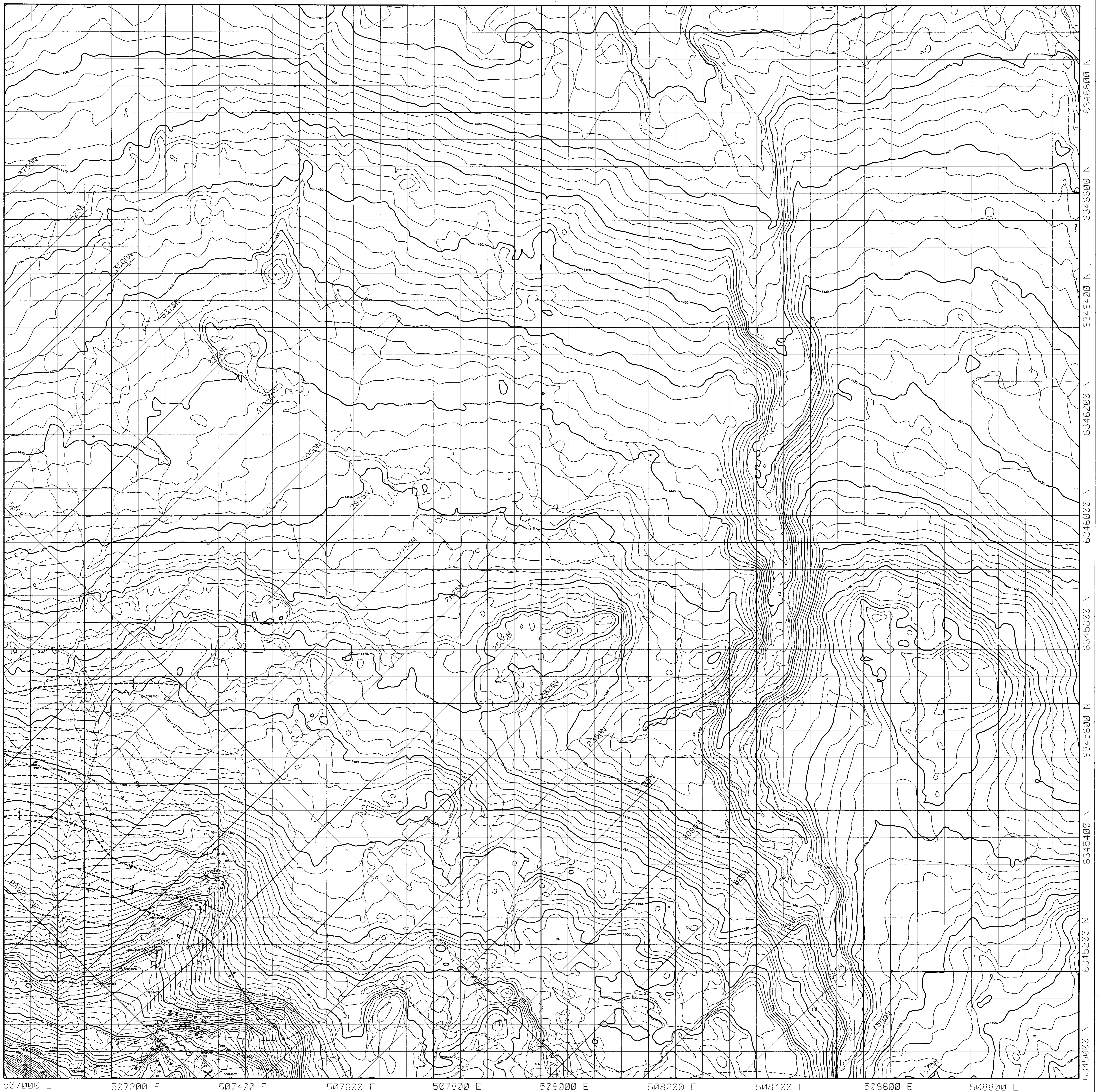
AND

CROSS - SECTIONS



GULF CANADA CORPORATION

COAL DIVISION

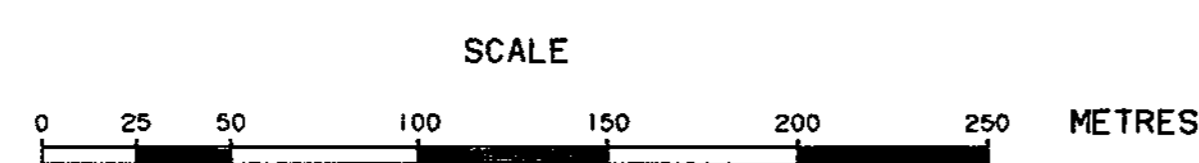


507000 E 507200 E 507400 E 507600 E 507800 E 508000 E 508200 E 508400 E 508600 E 508800 E

6345000 N 6345200 N 6345400 N 6345600 N 6345800 N 6346000 N 6346200 N 6346400 N 6346600 N 6346800 N

INDEX

9								6346000
8								6345800
7	19	13	12	11	10			6345600
6	20	14	6	9				6345400
5	21	15	3	4	8			6345200
4	22	16	2	1	7			6345000
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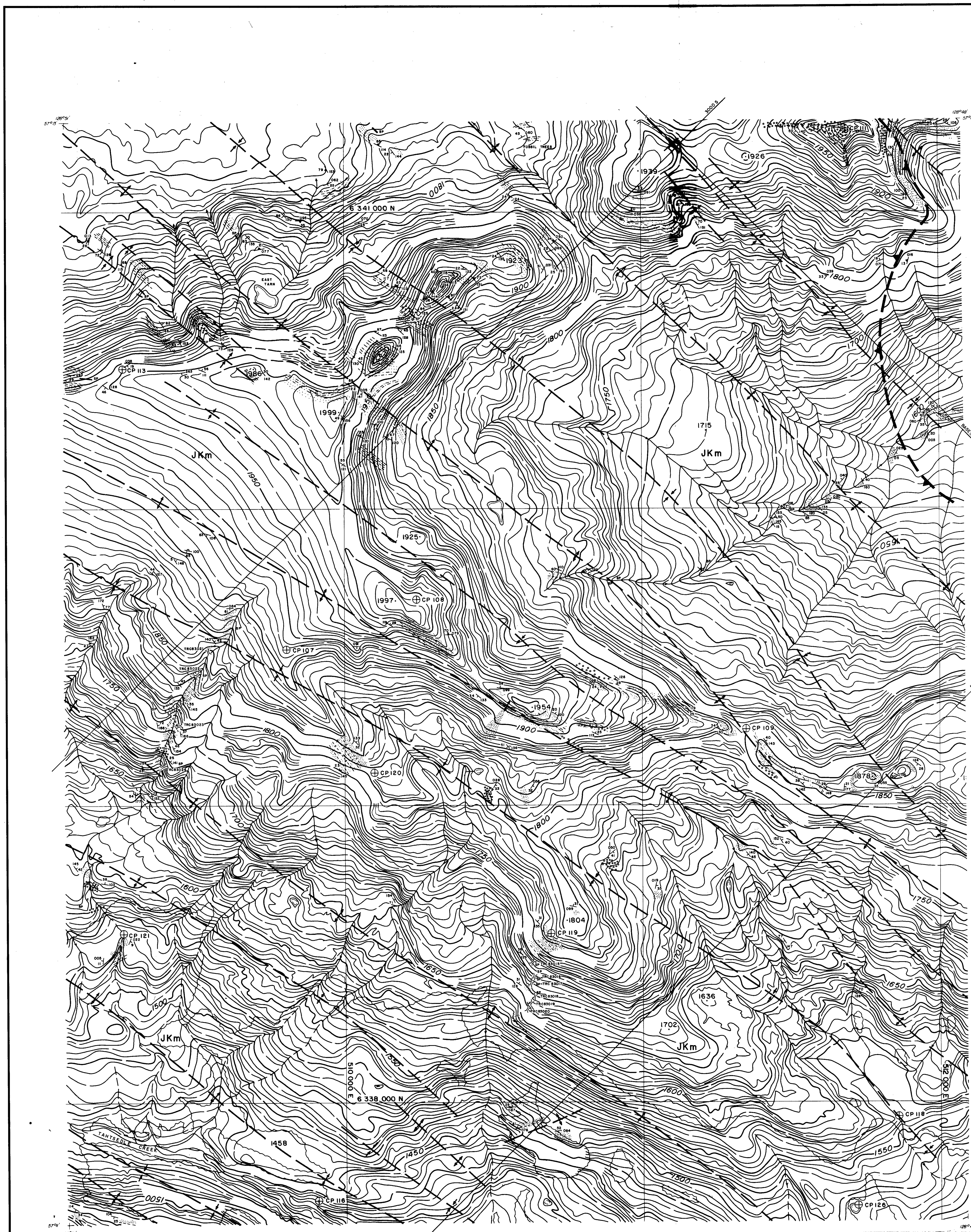


LEGEND

	LICENCE BOUNDARY
	GEOLOGICAL BOUNDARY (ARBITRARY, ASSUMED)
	COAL SEAM (DIP INDICATED, APPROXIMATE, ASSUMED)
	GEOSYNCLINE (HORIZONTAL, INCLINED, VERTICAL, UPRIGHT, OVERTURNED)
	CLEAVAGE (STRIKE AND DIP)
	FOLDING (HORIZONTAL, INCLINED, VERTICAL, SECOND GENERATION)
	LINEATION (HORIZONTAL, INCLINED, VERTICAL)
	LINEATION (HORIZONTAL, INCLINED, VERTICAL) (ARROW INDICATES DIRECTION AND PLUNGE)
	MINOR FOLDS WITH AXIAL ATTITUDE
	ANTICLINE (DIP INDICATED, APPROXIMATE, OVERTURNED)
	SYNCLINE (DIP INDICATED, APPROXIMATE, OVERTURNED)
	ANTICLINE (DIP INDICATED, APPROXIMATE, OVERTURNED) (ARROW INDICATES PLUNGE DIRECTION)

	THRUST FAULT (OLD FIELD, ASSUMED, TEETH ON UPHRUST SIDE)
	NORMAL FAULT (DIP INDICATED, ASSUMED, WITH DOT ON DOWNTHROWN SIDE)
	FAULT (SHOWING RELATIVE MOVEMENT AND ATTITUDE)
	TRENCH (SHOWING COAL-CENTERED BAR WHERE KNOWN)
	CON. SPIRE (WITH BEAM DESIGNATION WHERE KNOWN)
	OUTCROP AREA, OUTCROP, PROBABLE OUTCROP, FLAT
	GLACIAL SERIES (DIRECTION OF RELATIVE MOVEMENT KNOWN, UNKNOWN)
	SHADED RELIEF (WITH SURFACE PROJECTION)
	MEASURED SECTION
	CROSS SECTION LINE (SHOWING CHART)
	FOSSIL LOCATION (WITH CATALOGUE NUMBER)
	SURVEY STATION, SURVEY CAIRN
	SWAMP
	WATER HORIZON
	ELEVATION (DOTTED, SHADED)

723



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
ROAD, LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
STREAM, APPROXIMATE	---
SPILT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
CONTOURS, INTERMEDIATE	---
CONTOURS, DEPRESSION	---
CONTOURS, APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES

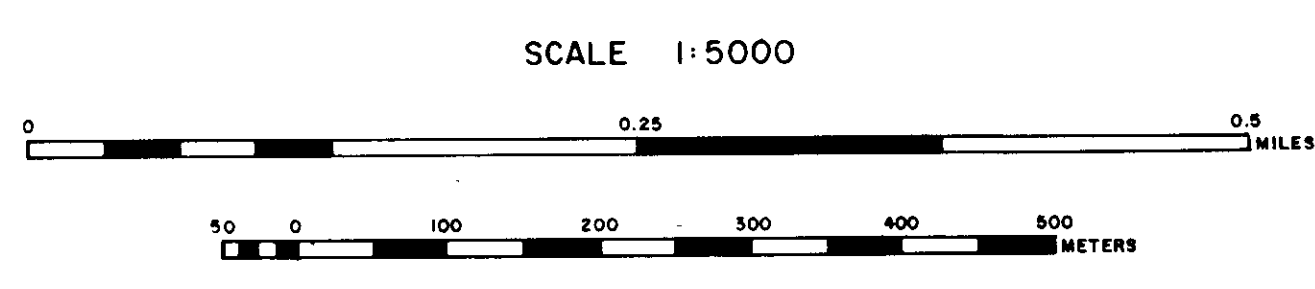
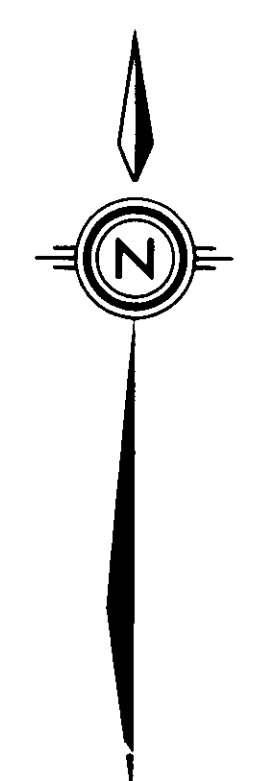
CONTOUR INTERVAL: 10 M, WITH FORM LINES INTERVAL: 5 M

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS - 15.0 METERS FOR GROUNDS NOT OCCURRED BY TREES OR VEGETATION.

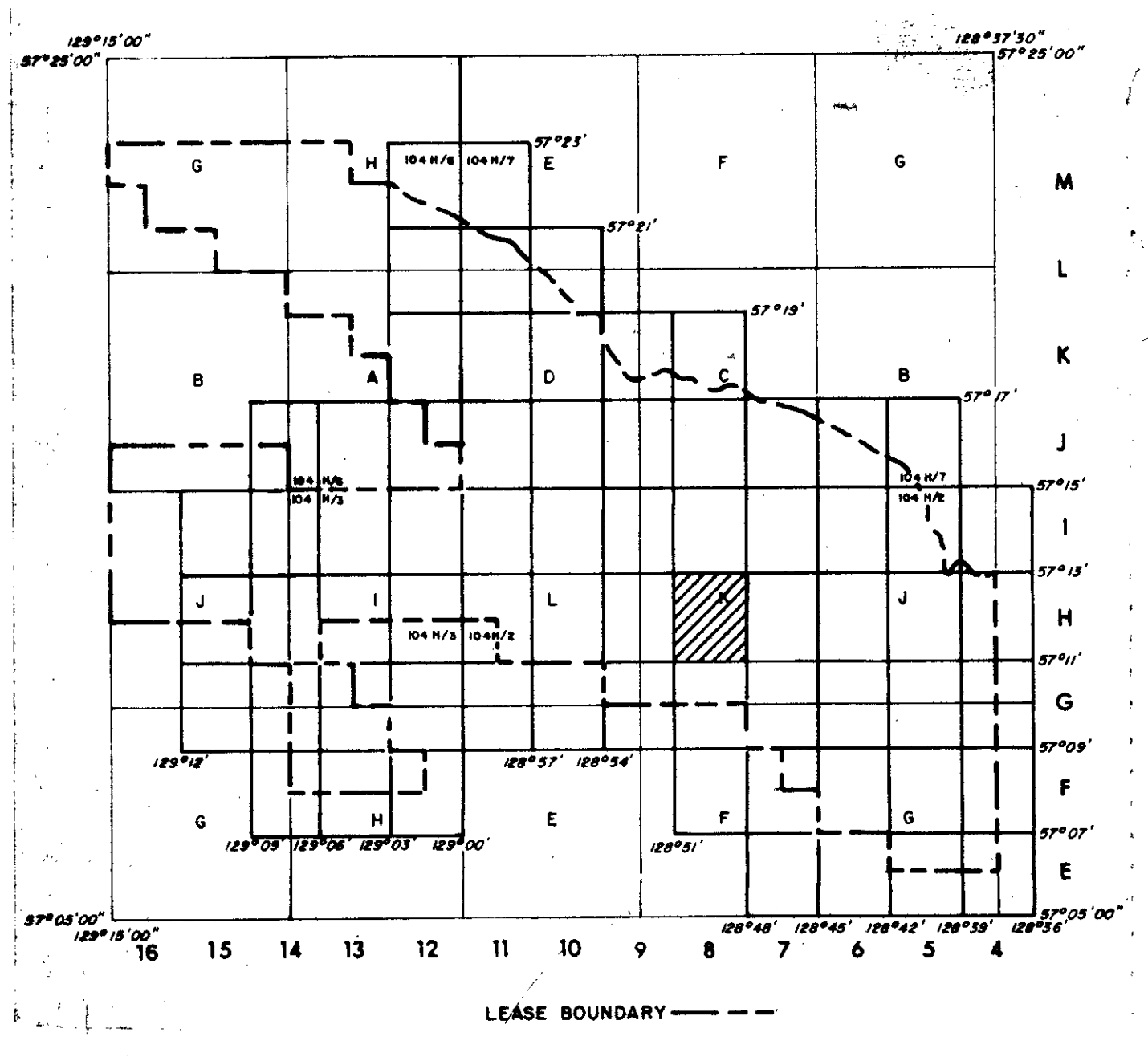
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MARKING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT./62 AERIAL PHOTOGRAPHY

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLEN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:80,000 (APPROXIMATE)



MT. KLAPPAN AREA INDEX MAP



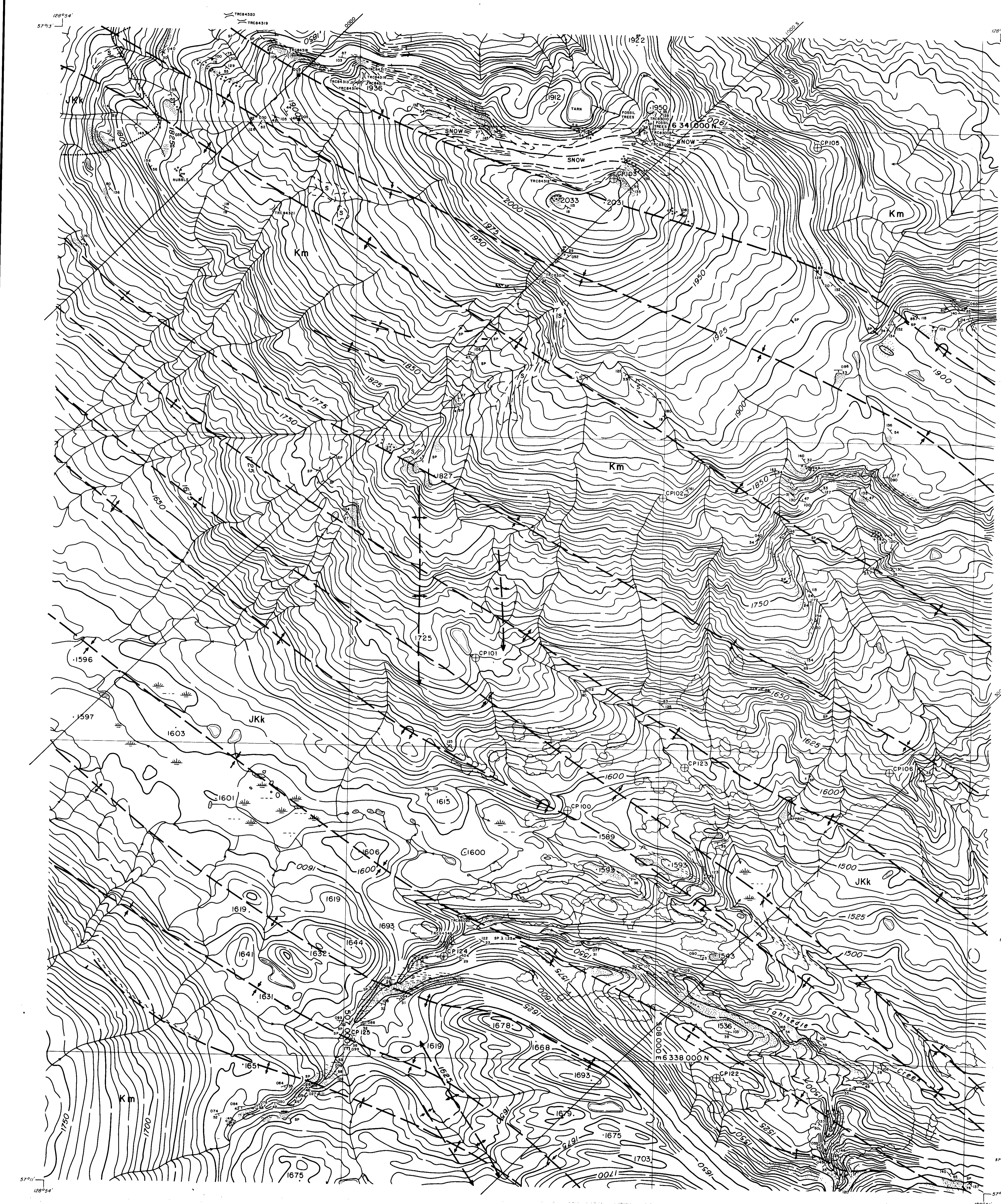
- RHONDDA SEQUENCE**
- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of the sequence.
- MALLOCH SEQUENCE**
- Km** Thick interbeds of mudstones, argillaceous siltstones, fine grained sandstones and thin interbeds of orange weathering nodular siltstones. Many conglomerate beds display large scale cross bedding and tend to be laterally discontinuous. Thick clean sandstone beds and thin coal seams increase in abundance towards the basal gradational contact. Twenty-three species of plant fossils occur within the sequence.
- KLAPPAN SEQUENCE (main coal-bearing unit)**
- JKk** Fine to coarse grained sandstones interbedded with mudstones, siltstones, occasional thin bands of orange weathering calcareous siltstones, conglomerates and abundant coal seams. Conglomerate beds grade laterally into sandstone. Sandstones often display tabular or trough cross bedding. Rhythmites occur in the middle of the sequence. Twenty-three species of bivalves and up to twenty-five species of plants occur throughout. Petrified wood and rare coquina may be present towards the upper contact.
- SPATSIZI SEQUENCE**
- Jb** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Selenite are rare. Plant debris may occur near the upper gradational contact.

LEGEND

LICENCE BOUNDARY	---
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)	---
COAL SEAM (DEFINED, INFERRED)	---
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION	---
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION	---
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)	---
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)	---
MONOCLINE (DEFINED, APPROXIMATE)	---
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)	---
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)	---
JOINTS (INCLINED, VERTICAL, HORIZONTAL)	---
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UP THRUST SIDE	---
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE	---
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT	---
ADIT TRENCH COAL SPOIL	---
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)	---
MEASURED SECTION	---
SURVEY CAIRN	---
CROSS SECTION LINE	---

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GULF CANADA CORPORATION	
CALGARY	ALBERTA
MT. KLAPPAN COAL PROPERTY	
1986	
GEOLOGY MAP	
LOST-FOX AREA	
MAP H-8	
PREPARED BY: E.S.	SCALE 1:8000
APPROVED BY: E.S.	DATE: MAR. 1987 DRAWING NO. HPH041F-G1



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
ROAD, LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
STREAM, APPROXIMATE	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOUR, INDEX	---
CONTOUR, INTERMEDIATE	---
CONTOUR, APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES

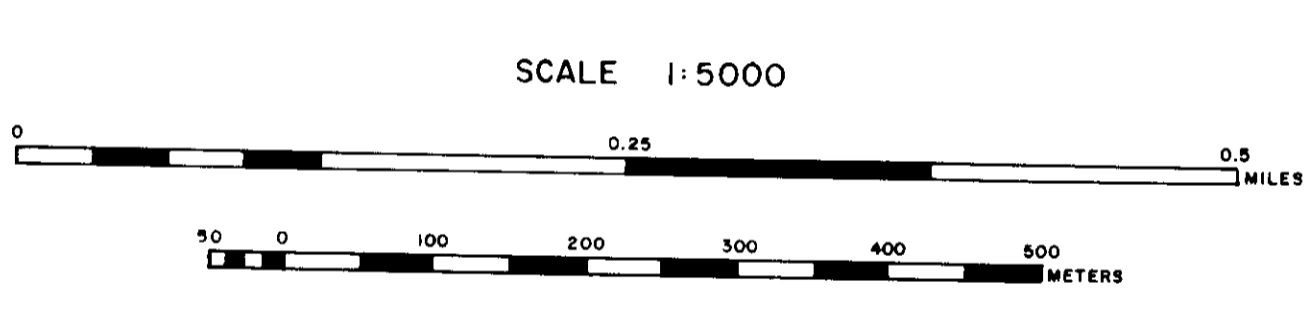
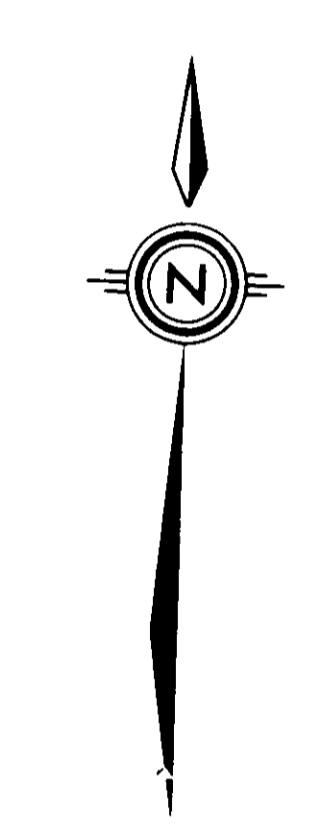
CONTOUR INTERVAL - 10 M, WITH FORM LINES INTERVAL - 5 M.

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS - 45 G METERS FOR GROUND NOT OCCURRED BY TREES OR VEGETATION.

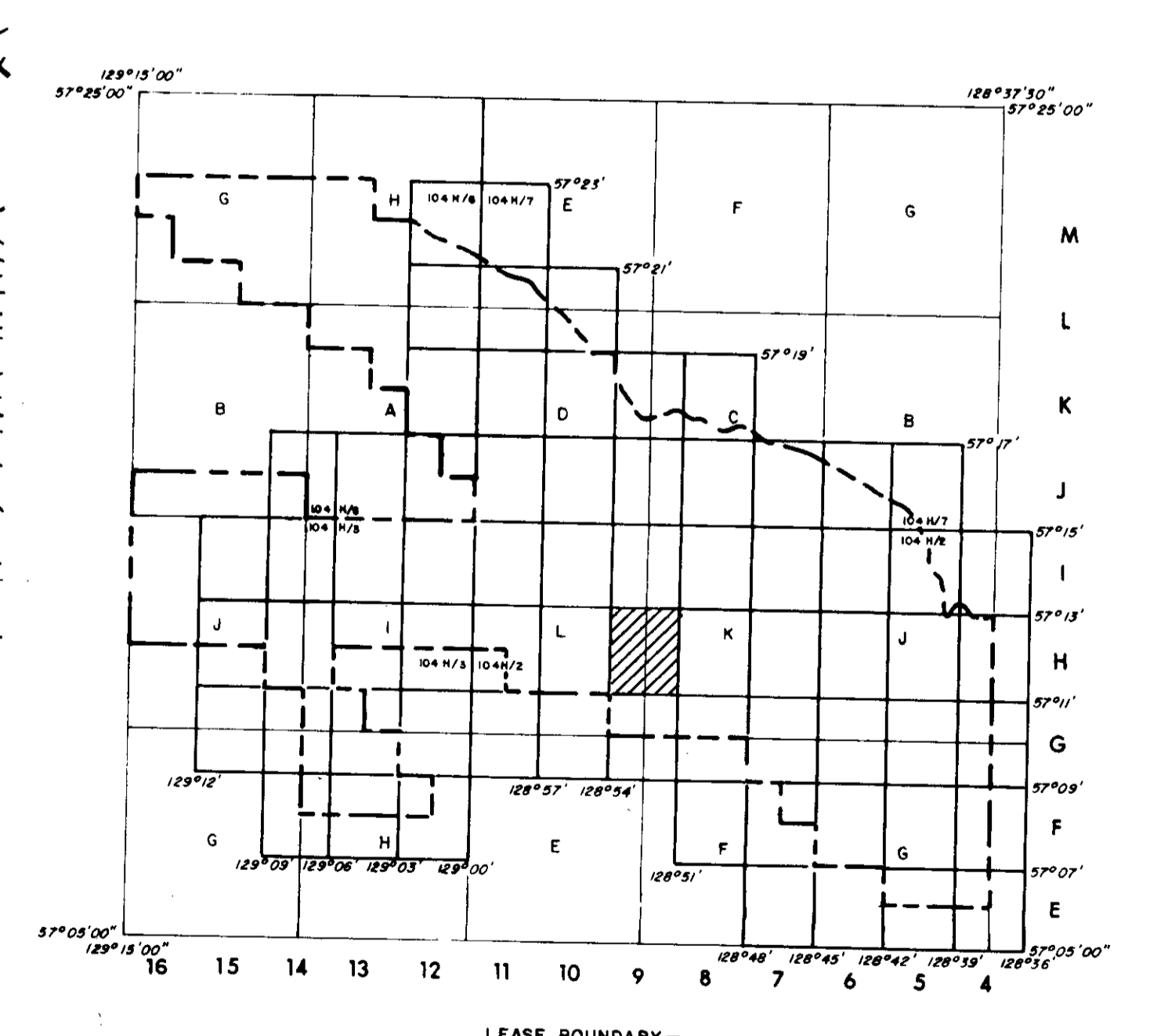
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RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MUELLER LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY TAKEN IN AUGUST/81 AT A SCALE OF 1:6000 (APPROXIMATE).



MT. KLAPPAN AREA
INDEX MAP



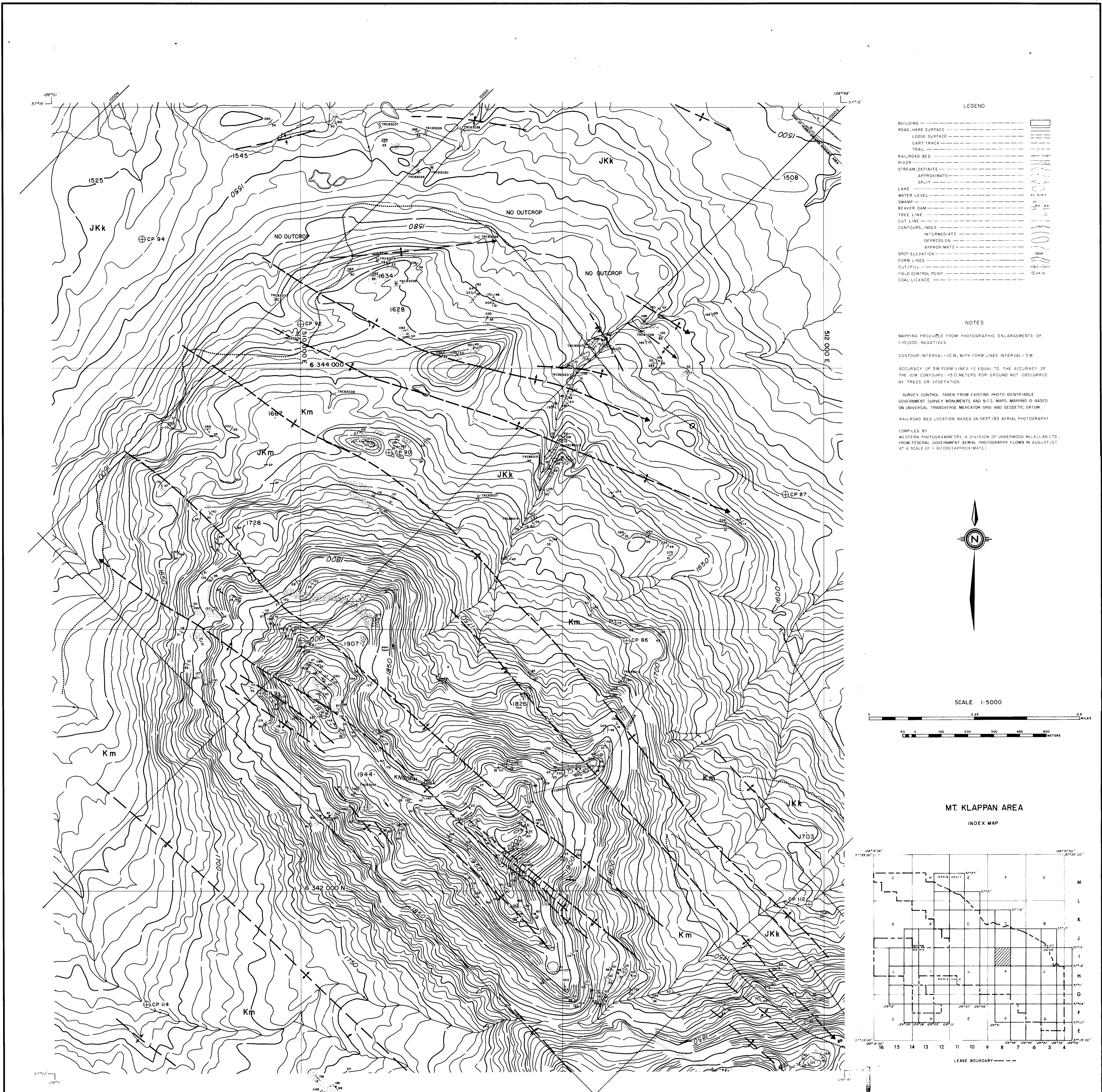
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- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of the sequence.
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- JKk** Fine to coarse grained sandstones interbedded with mudstones, siltstones, occasional thin bands of orange weathering calcareous siltstones, conglomerates and abundant coal seams. Conglomerate beds grade laterally into sandstone. Sandstones often display tabular or trough cross bedding. Rhythmites occur in the middle of the sequence. Twenty-three species of bivalves and up to twenty-five species of plants occur throughout. Petrified wood and rare coquina may be present towards the upper contact.
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LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
---	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
---	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
---	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
---	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
---	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
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---	FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
---	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
---	ADIT TRENCH COAL SPOIL
---	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

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GULF CANADA CORPORATION	
CALGARY	ALBERTA
MT KLAPPAN COAL PROPERTY	
1986	
GEOLOGY MAP	
LOST-FOX AREA	
MAP H-9	
PREPARED BY: E.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: MAR. 1987 DRAWING No. KPN86LF-62



LEGEND

BUILDING	[Symbol]
ROAD, HARD SURFACE	[Symbol]
ROAD, LOOSE SURFACE	[Symbol]
CART TRACK	[Symbol]
TRAIL	[Symbol]
RAILROAD BED	[Symbol]
RIVER	[Symbol]
STREAM, DEFINITE	[Symbol]
STREAM, APPROXIMATE	[Symbol]
SPLIT	[Symbol]
LAKE	[Symbol]
WATER LEVEL	[Symbol]
SWAMP	[Symbol]
REVER DAM	[Symbol]
TRELL LINE	[Symbol]
CUT LINE	[Symbol]
CONTOURS, INDEX	[Symbol]
CONTOURS, INTERMEDIATE	[Symbol]
CONTOURS, APPROXIMATE	[Symbol]
SPOT ELEVATION	[Symbol]
FORM LINES	[Symbol]
CUT FILL	[Symbol]
FIELD CONTROL POINT	[Symbol]
COAL LICENCE	[Symbol]

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES.

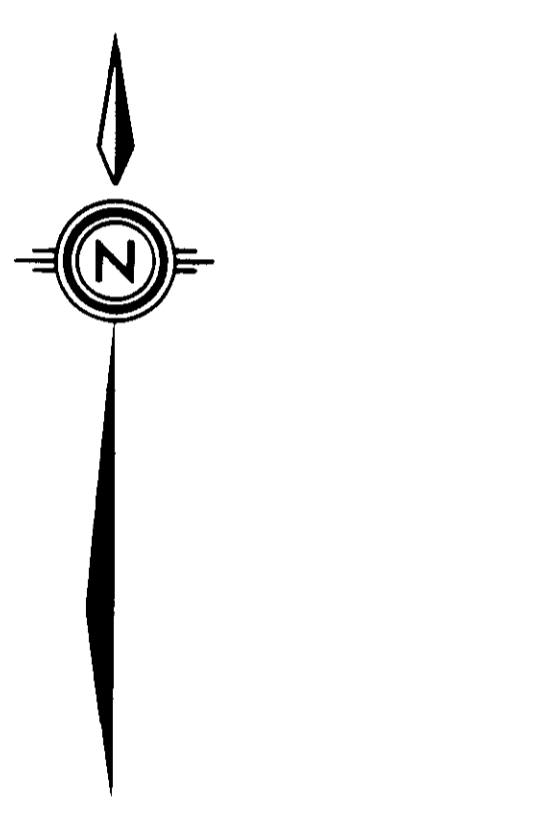
CONTOUR INTERVAL - 10 M., WITH FORM LINES INTERVAL - 5 M.

ACCURACY OF 5 M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10 M CONTOURS - 15.0 METERS FOR GROUND NOT OCCURRED BY TREES OR VEGETATION.

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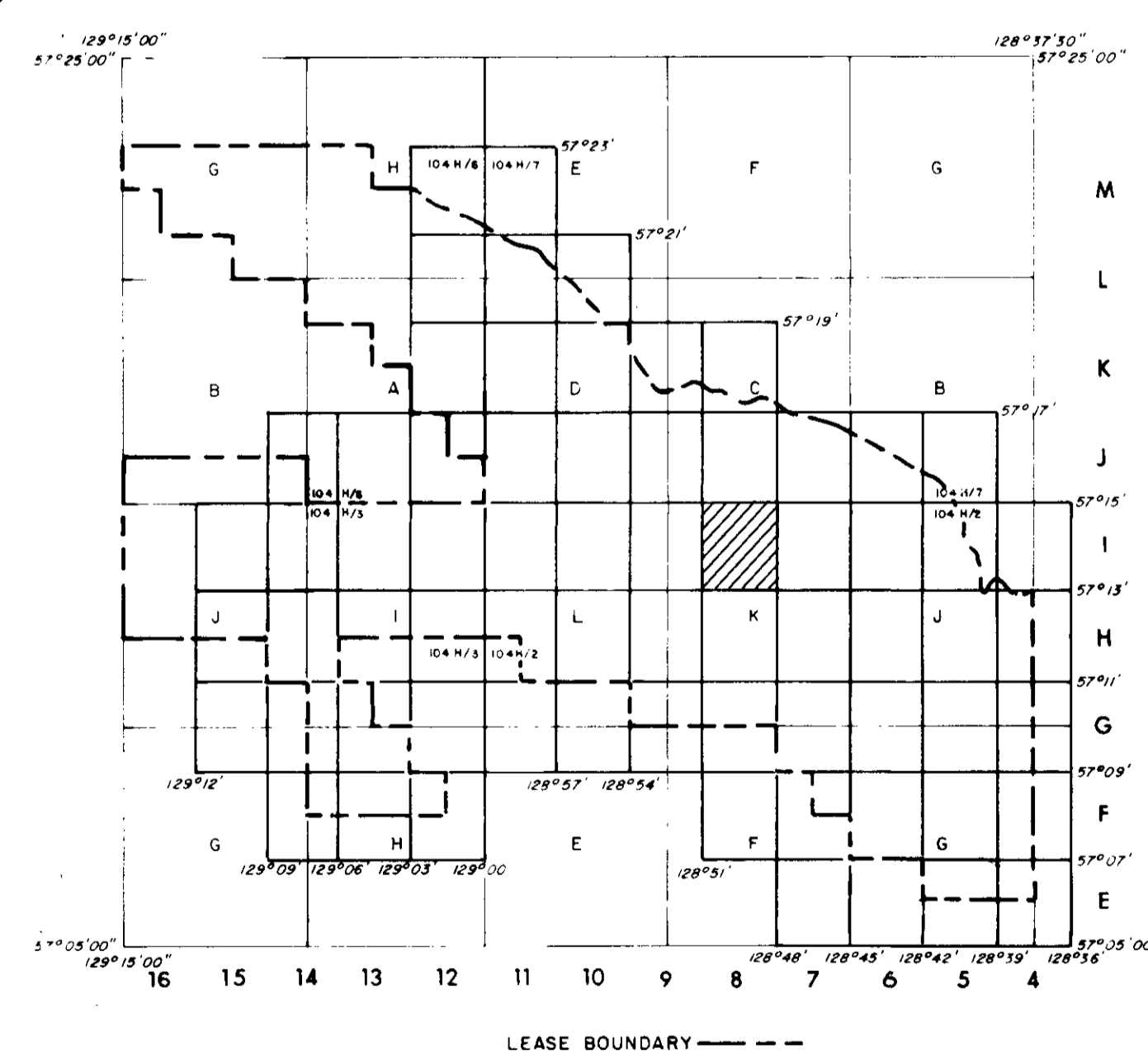
RAILROAD BED LOCATION BASED ON SEPT./92 AERIAL PHOTOGRAPHY.

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MULLER LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60,000 (APPROXIMATE).



SCALE 1:5000

MT. KLAPPAN AREA
INDEX MAP



- RHONDDA SEQUENCE**
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LEGEND

[Symbol]	LICENCE BOUNDARY
[Symbol]	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
[Symbol]	COAL SEAM (DEFINED, INFERRED)
[Symbol]	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
[Symbol]	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
[Symbol]	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
[Symbol]	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
[Symbol]	MONOCLINE (DEFINED, APPROXIMATE)
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[Symbol]	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
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[Symbol]	FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHRON SIDE
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[Symbol]	ADIT TRENCH COAL SPOIL
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[Symbol]	SURVEY CAIRN
[Symbol]	CROSS SECTION LINE

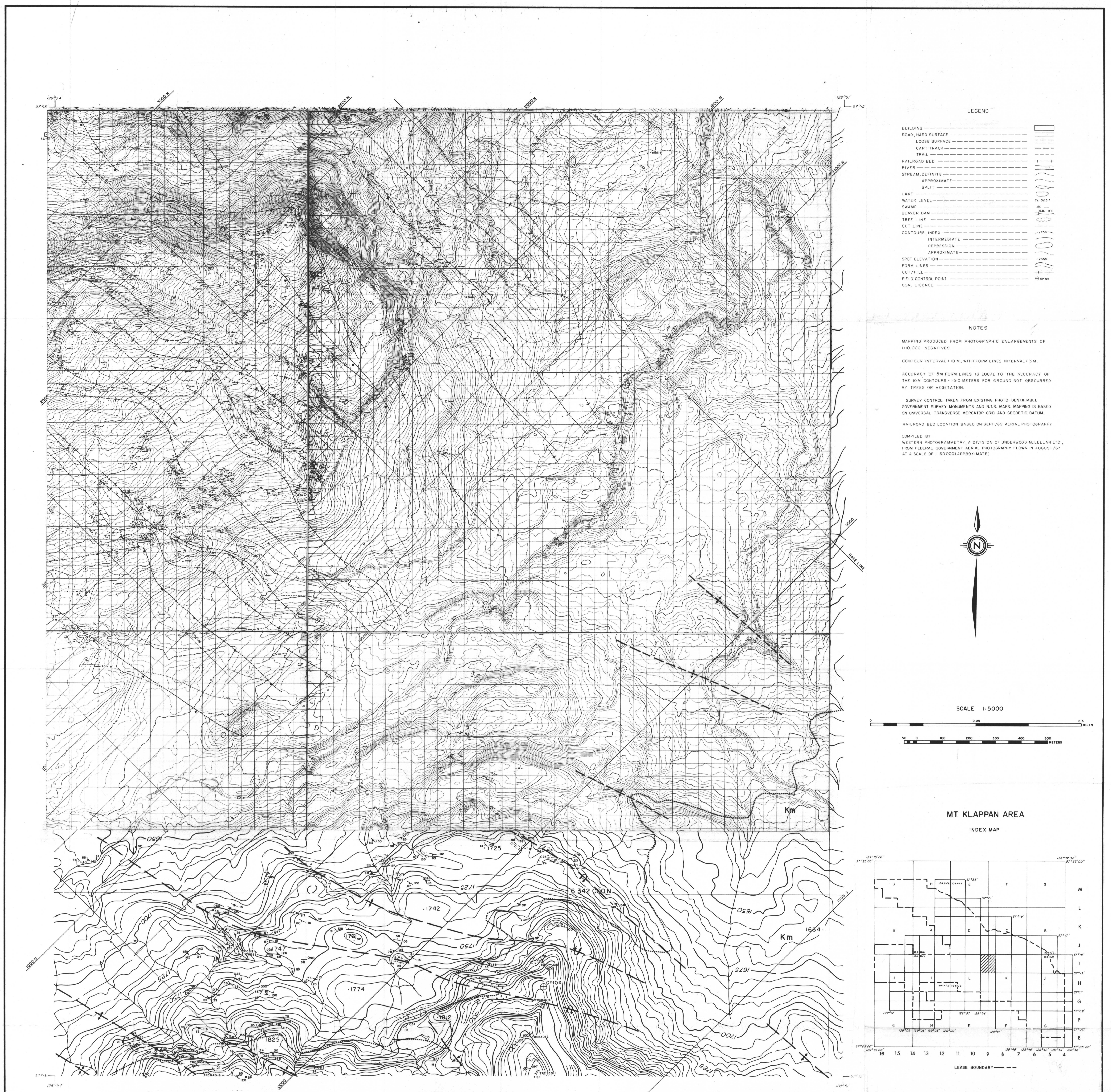
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GULF CANADA CORPORATION
Coal Division

ALBERTA

MT. KLAPPAN COAL PROPERTY
1986
GEOLOGY MAP
LOST-FOX AREA
MAP I-8

PREPARED BY: E.S. SCALE 1:5000
APPROVED BY: E.S. DATE: MAR. 1987 DRAWING NO. KPN86LF-63



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
INTERMEDIATE	---
DEPRESSION	---
APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

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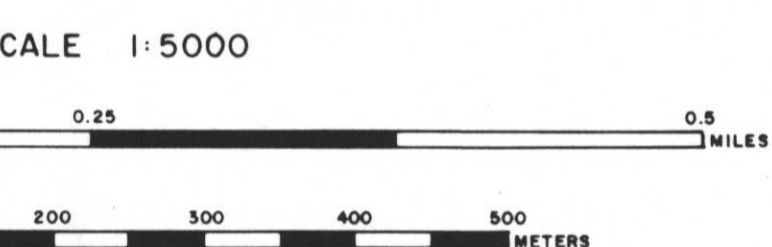
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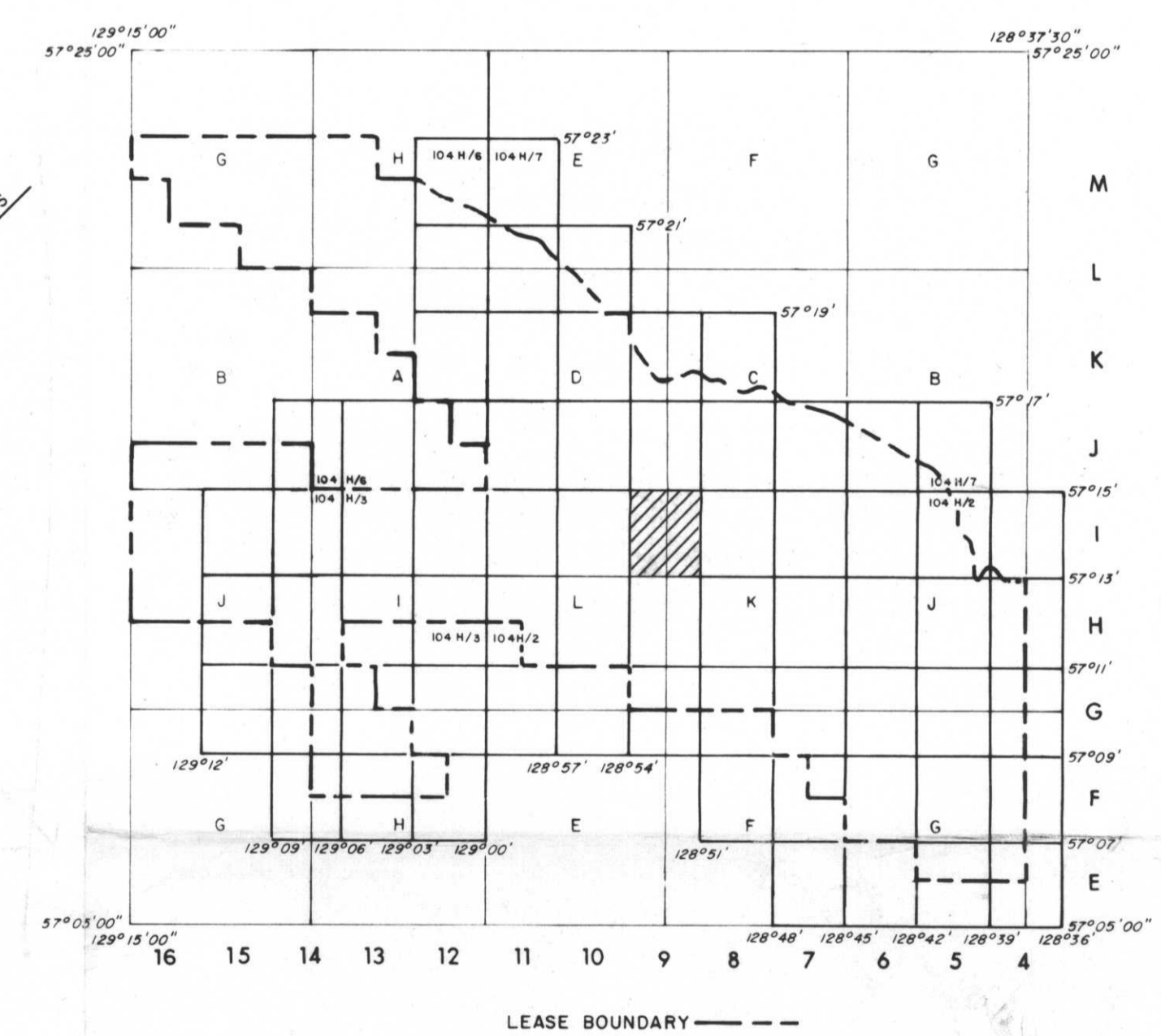
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COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FILMS IN AUGUST/82 AT A SCALE OF 1:60,000 (APPROXIMATE)



MT. KLAPPAN AREA
INDEX MAP



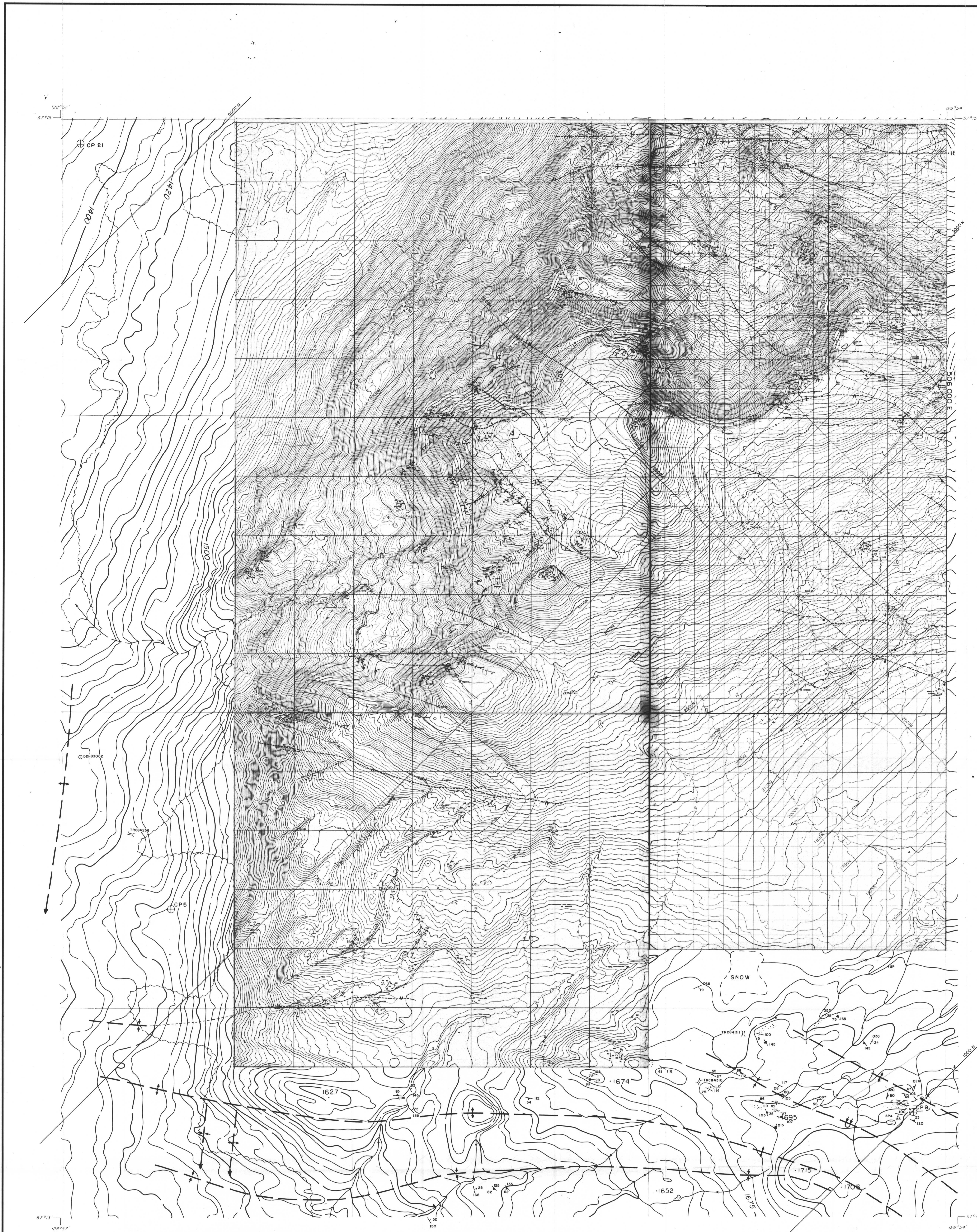
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LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
↑	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
↓	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
↑	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
↓	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
⊕	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
⊖	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
⊕	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
↑	THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHROW SIDE
↓	FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTROWN SIDE
---	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
---	ADIT TRENCH COAL SPOIL
○	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

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GULF CANADA CORPORATION	
CALGARY	ALBERTA
MT. KLAPPAN COAL PROPERTY	
1986	
GEOLOGY MAP	
LOST-FOX AREA	
MAP I - 9	
PREPARED BY: E.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: MAR. 1987 DRAWING No. KPN86LF-64



LEGEND

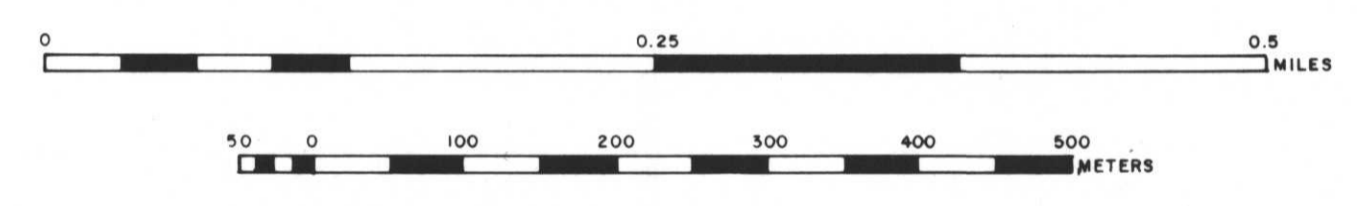
BUILDING	---	---
ROAD, HARD SURFACE	---	---
ROAD, LOOSE SURFACE	---	---
CART TRACK	---	---
TRAIL	---	---
RAILROAD BED	---	---
RIVER	---	---
STREAM, DEFINITE	---	---
STREAM, APPROXIMATE	---	---
LAKE	---	---
WATER LEVEL	---	---
SWAMP	---	---
BEAVER DAM	---	---
TREE LINE	---	---
CUT LINE	---	---
CONTOURS, INDEX	---	---
CONTOURS, INTERMEDIATE	---	---
DEPRESSION	---	---
SPOT ELEVATION	---	---
FORM LINES	---	---
CUT/FILL	---	---
FIELD CONTROL POINT	---	---
COAL LICENCE	---	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES
 CONTOUR INTERVAL - 10 M., WITH FORM LINES INTERVAL - 5 M.
 ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS - 15.0 METERS FOR GROUND NOT OBSCURED BY TREES OR VEGETATION
 SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND U.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.
 RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY
 COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLEAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:50,000 (APPROXIMATE)

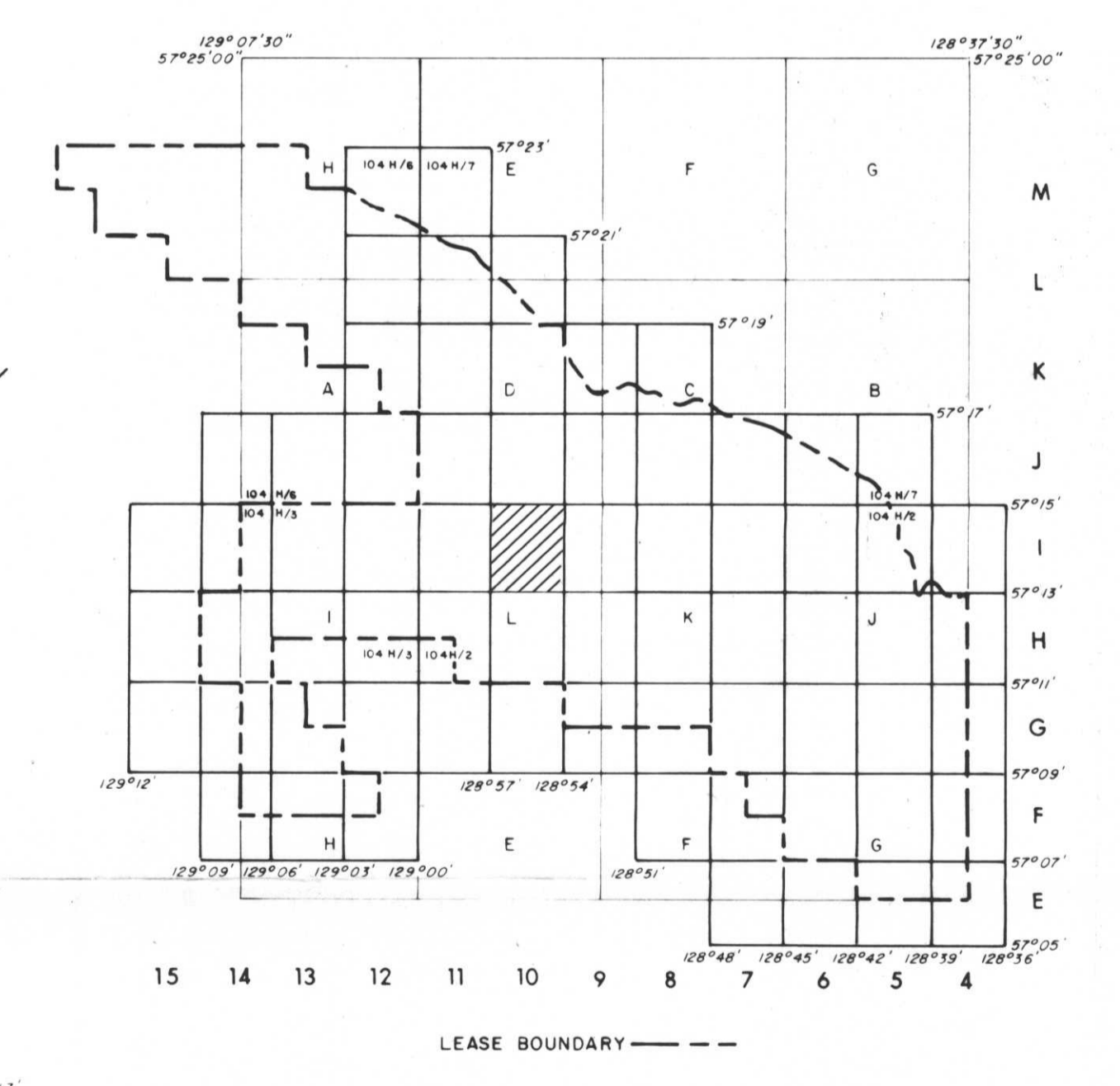


SCALE 1:5000



MT. KLAPPAN AREA

INDEX MAP



RHONDDA SEQUENCE

Kr Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of the sequence.

MALLOCH SEQUENCE

Km Thick interbeds of mudstones, argillaceous siltstones, fine grained sandstones and thin interbeds of orange weathering nodular siltstones. Many conglomerate beds display large scale cross bedding and tend to be laterally discontinuous. Thick clean sandstone beds and thin coal seams increase in abundance towards the basal gradational contact. Twenty-three species of plant fossils occur within the sequence.

KLAPPAN SEQUENCE (main coal-bearing unit)

JKk Fine to coarse grained sandstones interbedded with mudstones, siltstones, occasional thin bands of orange weathering calcareous siltstones, conglomerates and abundant coal seams. Conglomerate beds grade laterally into sandstone. Sandstones often display tabular or trough cross bedding. Rhythmites occur in the middle of the sequence. Twenty-three species of bivalves and up to twenty-five species of plants occur throughout. Petrified wood and rare coquina may be present towards the upper contact.

SPATSIZI SEQUENCE

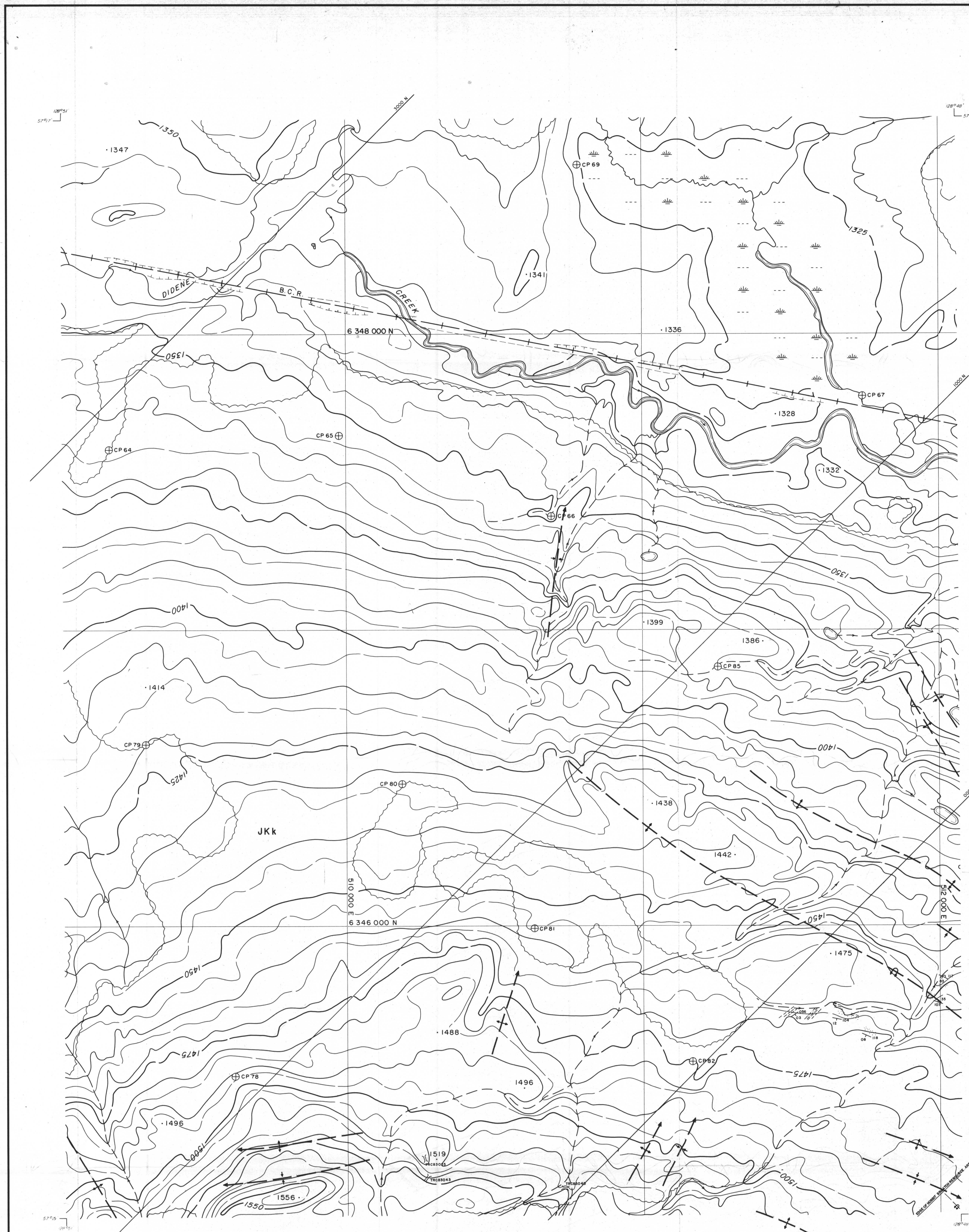
Js Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare. Plant debris may occur near the upper gradational contact.

LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
---	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
---	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
---	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
---	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
---	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
---	THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHURST SIDE
---	FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTOWN SIDE
---	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
---	ADIT TRENCH COAL SPOIL
---	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

723

GULF CANADA CORPORATION
 CALGARY Coal Division ALBERTA GULF
 MT. KLAPPAN COAL PROPERTY
 1986
 GEOLOGY MAP
 LOST-FOX AREA
 MAP I-10
 PREPARED BY: E.S. SCALE 1:5000
 APPROVED BY: E.S. DATE: MAR 1987 DRAWING No. KPN86LF-65



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
ROAD, LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
STREAM, APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
CONTOURS, INTERMEDIATE	---
CONTOURS, DEPRESSION	---
CONTOURS, APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES.

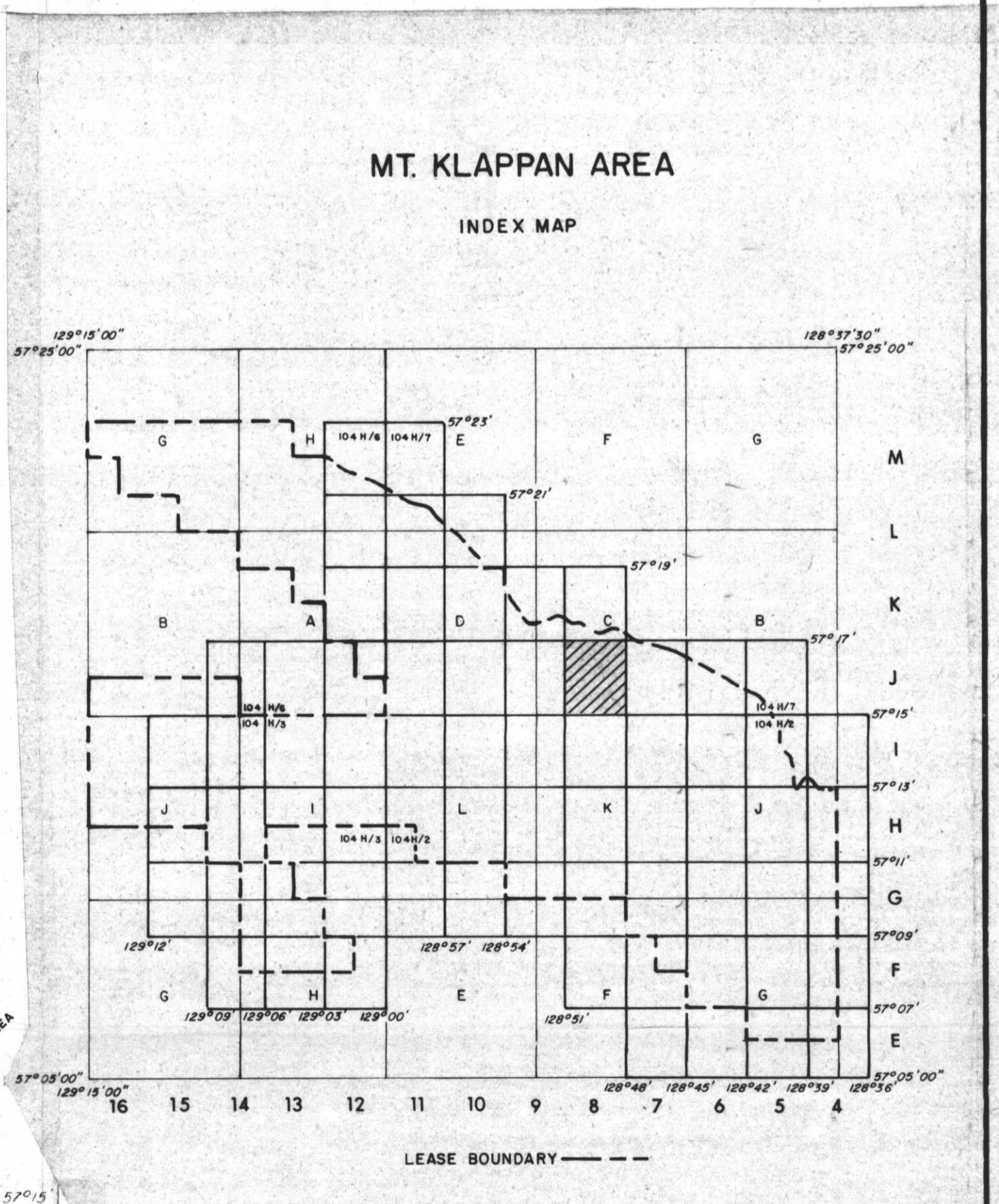
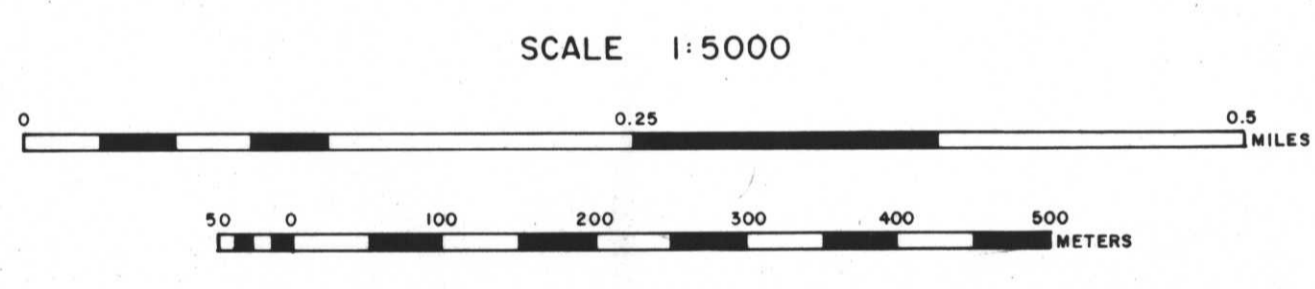
CONTOUR INTERVAL: 10 M., WITH FORM LINES INTERVAL: 5 M.

ACCURACY OF 5 M. FORM LINES IS EQUAL TO THE ACCURACY OF THE 10 M. CONTOURS - 15.0 METERS FOR GROUND NOT OBSERVED BY TREES OR VEGETATION.

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD.,
FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67
AT A SCALE OF 1:60,000 (APPROXIMATE).



- RHONDDA SEQUENCE**
- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of the sequence.
- MALLOCH SEQUENCE**
- Km** Thick interbeds of mudstones, argillaceous siltstones, fine grained sandstones and thin interbeds of orange weathering nodular siltstones. Many conglomerate beds display large scale cross bedding and tend to be laterally discontinuous. Thick clean sandstone beds and thin coal seams increase in abundance towards the basal gradational contact. Twenty-three species of plant fossils occur within the sequence.
- KLAPPAN SEQUENCE (main coal-bearing unit)**
- JKk** Fine to coarse grained sandstones interbedded with mudstones, siltstones, occasional thin bands of orange weathering calcareous siltstones, conglomerates and abundant coal seams. Conglomerate beds grade laterally into sandstone. Sandstones often display tabular or trough cross bedding. Rhythmites occur in the middle of the sequence. Twenty-three species of bivalves and up to twenty-five species of plants occur throughout. Petrified wood and rare coquina may be present towards the upper contact.
- SPATSIZI SEQUENCE**
- Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare. Plant debris may occur near the upper gradational contact.

LEGEND

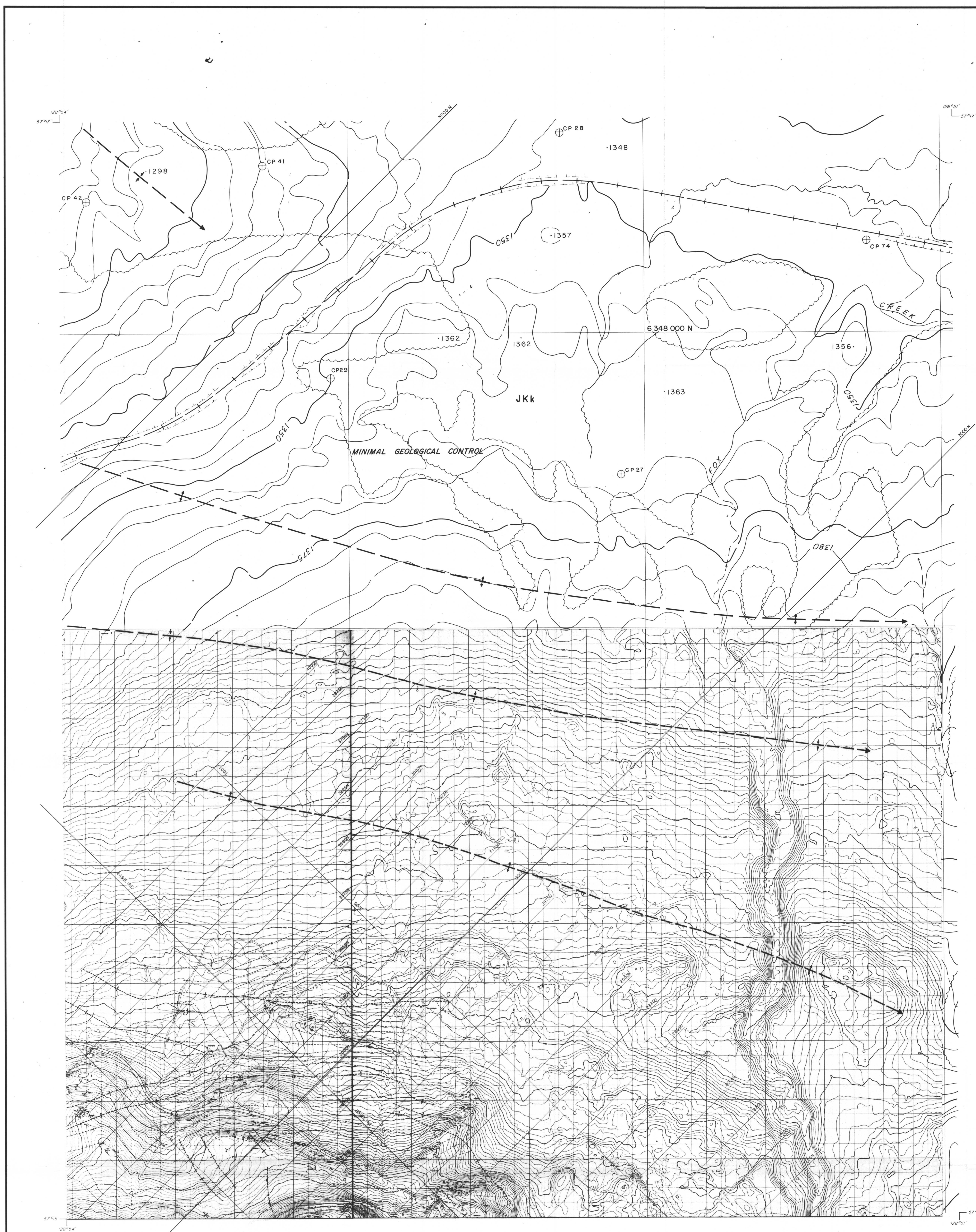
---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
---	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
---	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
---	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
---	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
---	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
---	THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UP THRUST SIDE
---	FAULT (DEFINED, APPROXIMATE) UP THROWN, DOWN THROWN SIDE
---	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
---	ADIT TRENCH COAL POOL
---	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

723

GULF CANADA CORPORATION
CALGARY Coal Division ALBERTA

MT. KLAPPAN COAL PROPERTY
1986
GEOLOGY MAP
LOST-FOX AREA
MAP J-8

PREPARED BY: E.S. SCALE 1:5000
APPROVED BY: E.S. DATE: MAR. 1987 DRAWING NO. KPN86LF-66



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
INTERMEDIATE	---
DEPRESSION	---
APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES

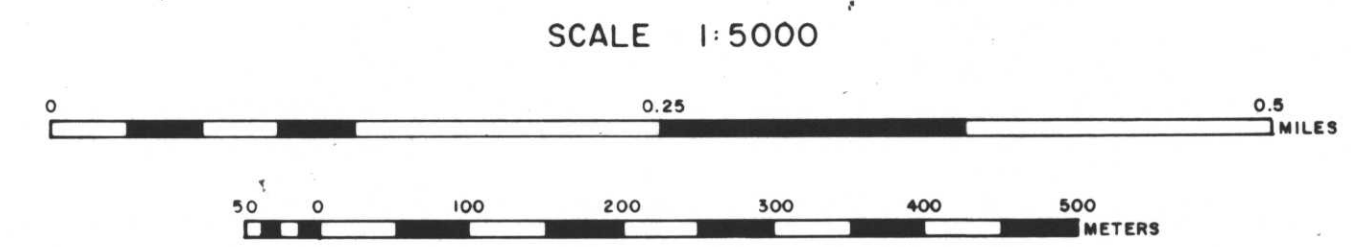
CONTOUR INTERVAL - 10 M., WITH FORM LINES INTERVAL - 5 M.

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS - 15.0 METERS FOR GROUND NOT OCCURRED BY TREES OR VEGETATION

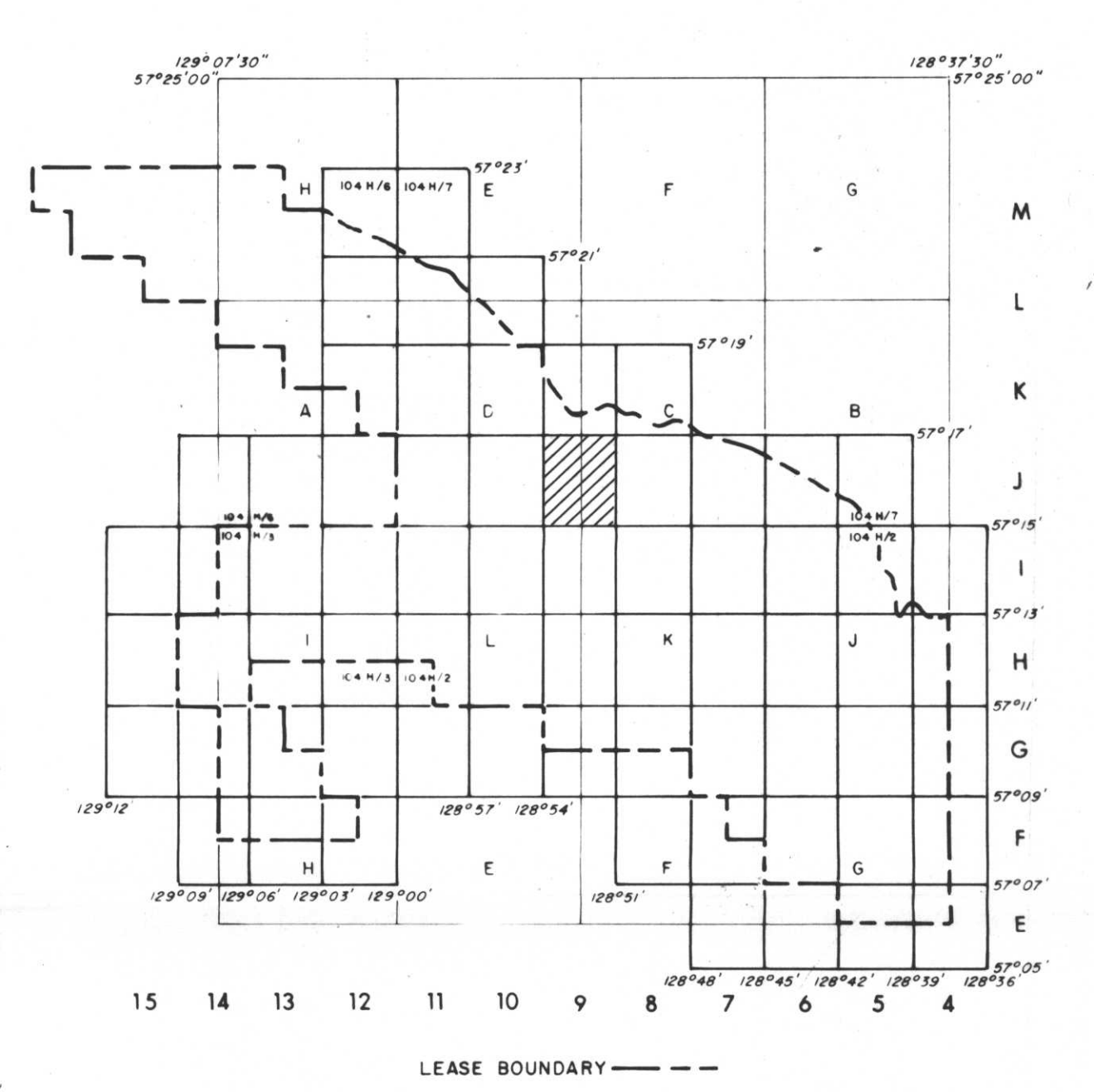
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT./92 AERIAL PHOTOGRAPHY

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MULLER LTD.,
FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67
AT A SCALE OF 1:60,000 (APPROXIMATE)



MT. KLAPPAN AREA
INDEX MAP

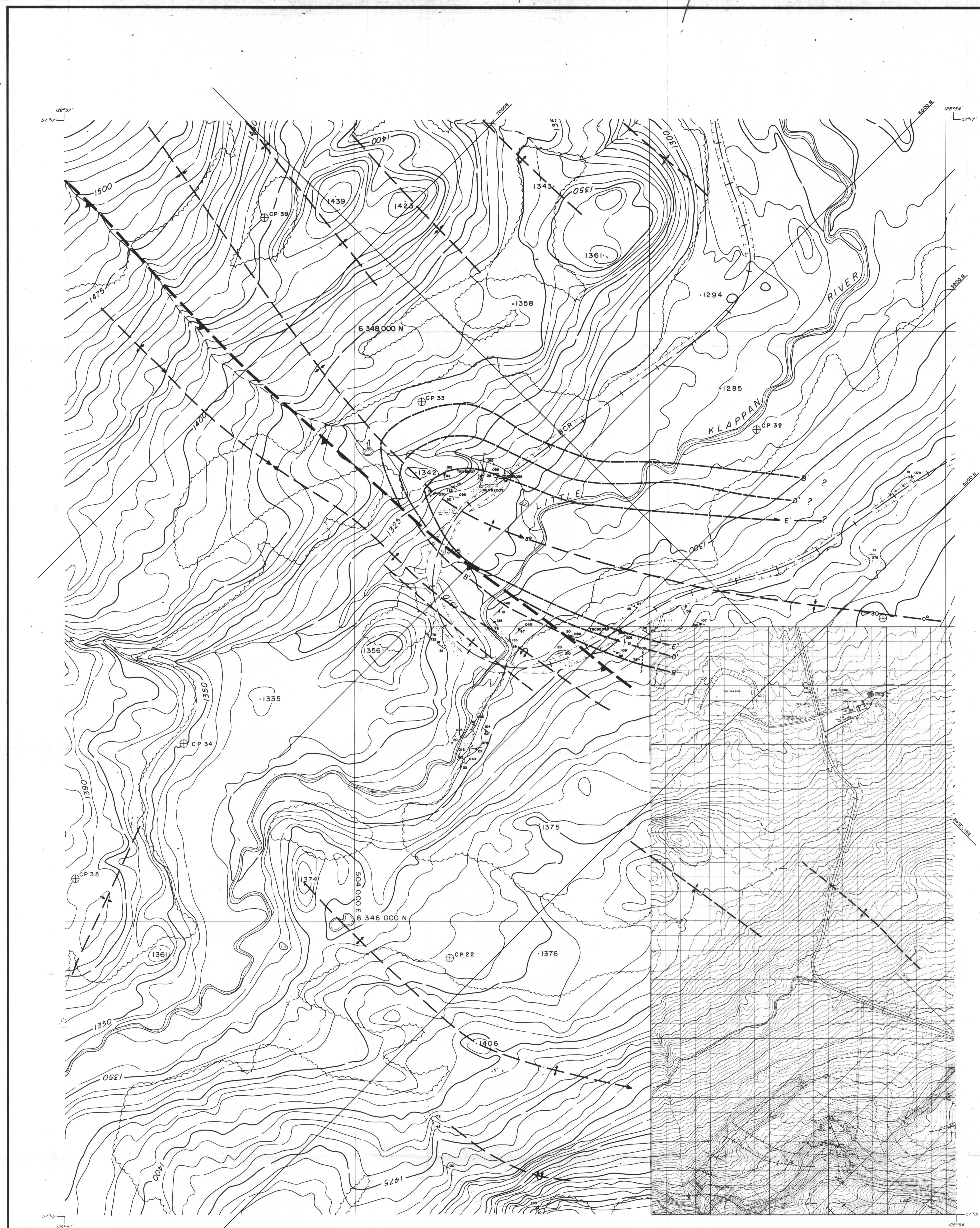


- RHONDDA SEQUENCE**
- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of the sequence.
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- Km** Thick interbeds of mudstones, argillaceous siltstones, fine grained sandstones and thin interbeds of orange weathering nodular siltstones. Many conglomerate beds display large scale cross bedding and tend to be laterally discontinuous. Thick clean sandstone beds and thin coal seams increase in abundance towards the basal gradational contact. Twenty-three species of plant fossils occur within the sequence.
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- LEGEND**
- LICENCE BOUNDARY
 - GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
 - COAL SEAM (DEFINED, INFERRED)
 - ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
 - SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
 - OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
 - OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
 - MONOCLINE (DEFINED, APPROXIMATE)
 - BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
 - FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
 - JOINTS (INCLINED, VERTICAL, HORIZONTAL)
 - THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHURST SIDE
 - FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTROWN SIDE
 - FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
 - ADIT TRENCH COAL SPOIL
 - DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
 - MEASURED SECTION
 - SURVEY CAIRN
 - CROSS SECTION LINE

723

GULF CANADA CORPORATION	
CALGARY	ALBERTA
MT. KLAPPAN COAL PROPERTY	
1986	
GEOLOGY MAP	
LOST-FOX AREA	
MAP J-9	
PREPARED BY: E.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: MAR. 1987 DRAWING No. KPN86LF-67



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
INTERMEDIATE	---
DEPRESSION	---
APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES

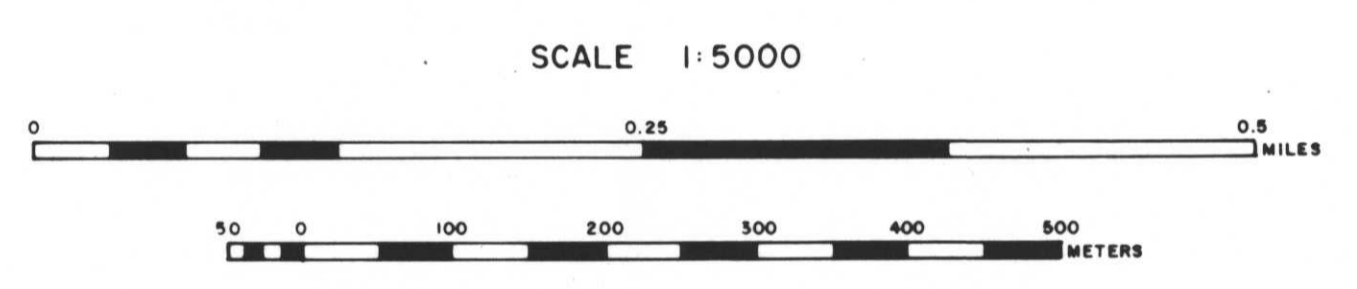
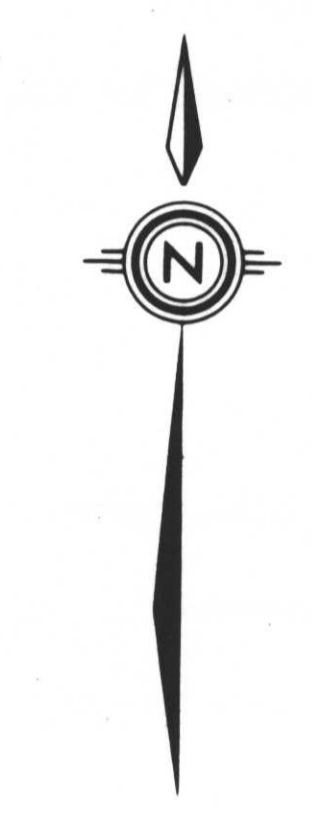
CONTOUR INTERVAL: 10 M, WITH FORM LINES INTERVAL: 5 M

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS - 15.0 METERS FOR GROUND NOT OBTAINED BY TREES OR VEGETATION

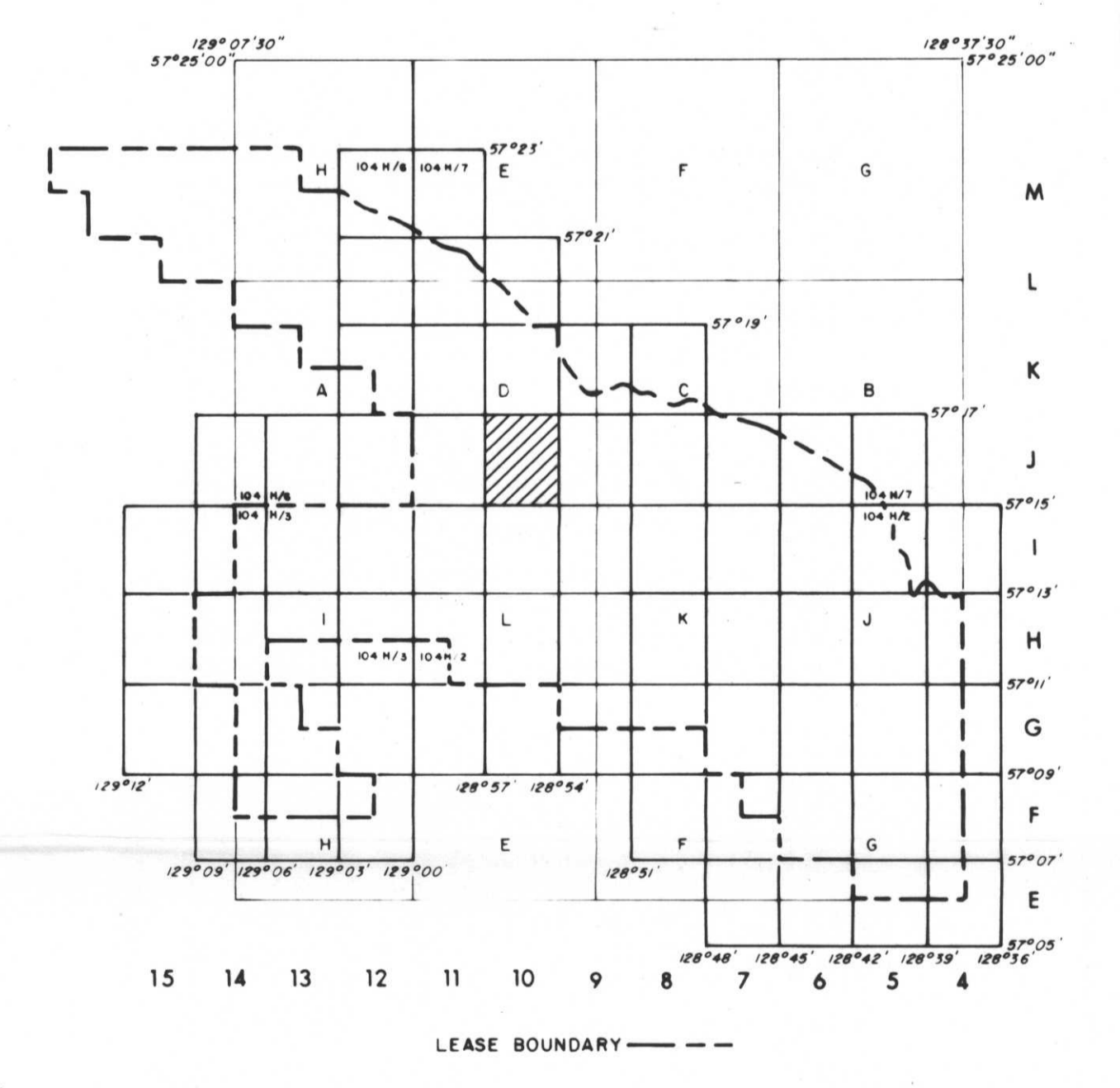
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/76 AT A SCALE OF 1:50,000 (APPROXIMATE)



MT. KLAPPAN AREA
INDEX MAP



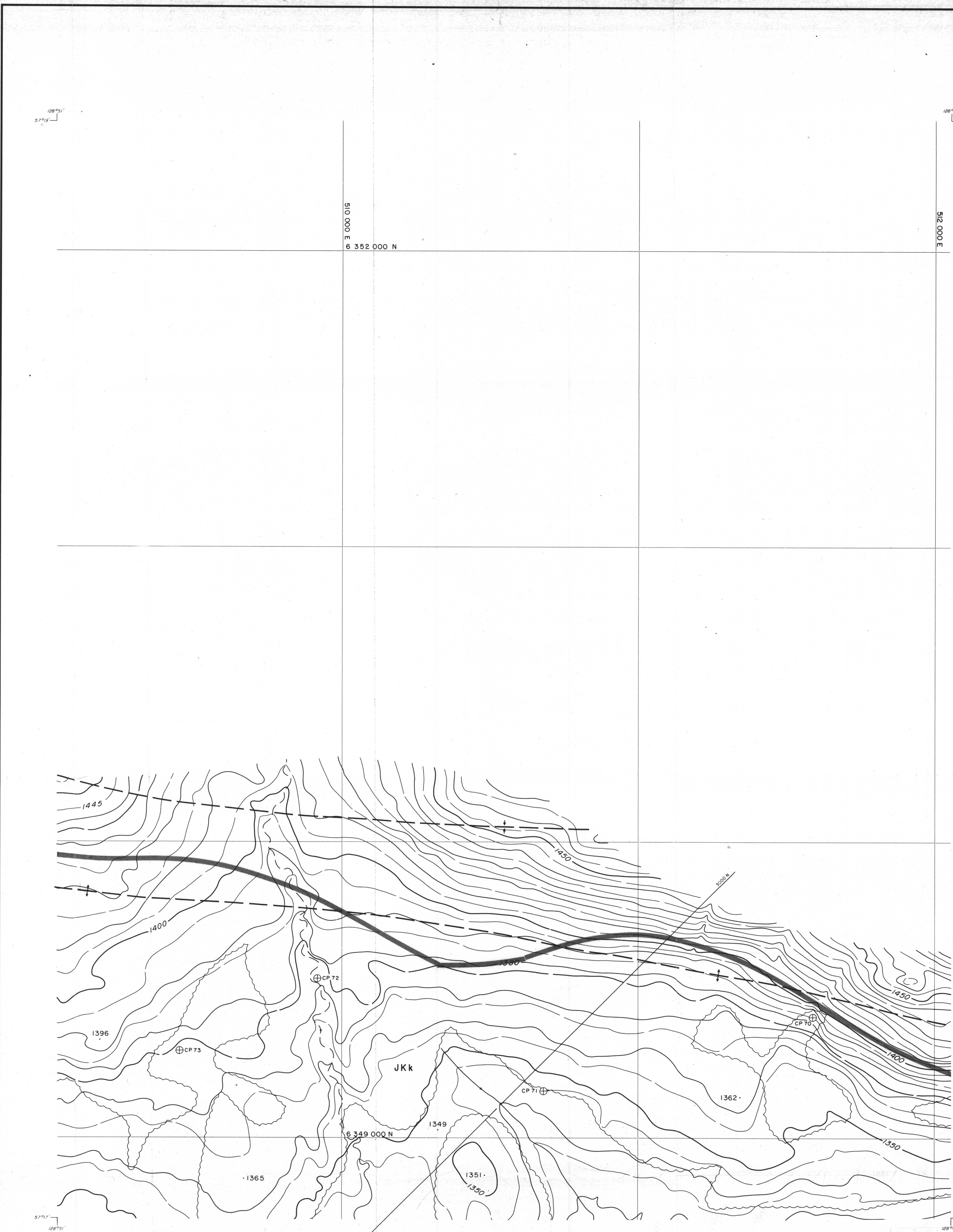
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LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
---	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
---	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
---	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
---	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
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---	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

723

GULF CANADA CORPORATION	
CALGARY	ALBERTA
MT. KLAPPAN COAL PROPERTY	
1986	
GEOLOGY MAP	
LOST-FOX AREA	
MAP J-10	
PREPARED BY: E.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: MAR. 1987 DRAWING No. KPN86LF-68



LEGEND

BUILDING	---
ROAD, HARD SURFACE	---
LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	---
SWAMP	---
BEAVER DAM	---
TREE LINE	---
CUT LINE	---
CONTOURS, INDEX	---
INTERMEDIATE	---
DEPRESSION	---
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CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10,000 NEGATIVES.

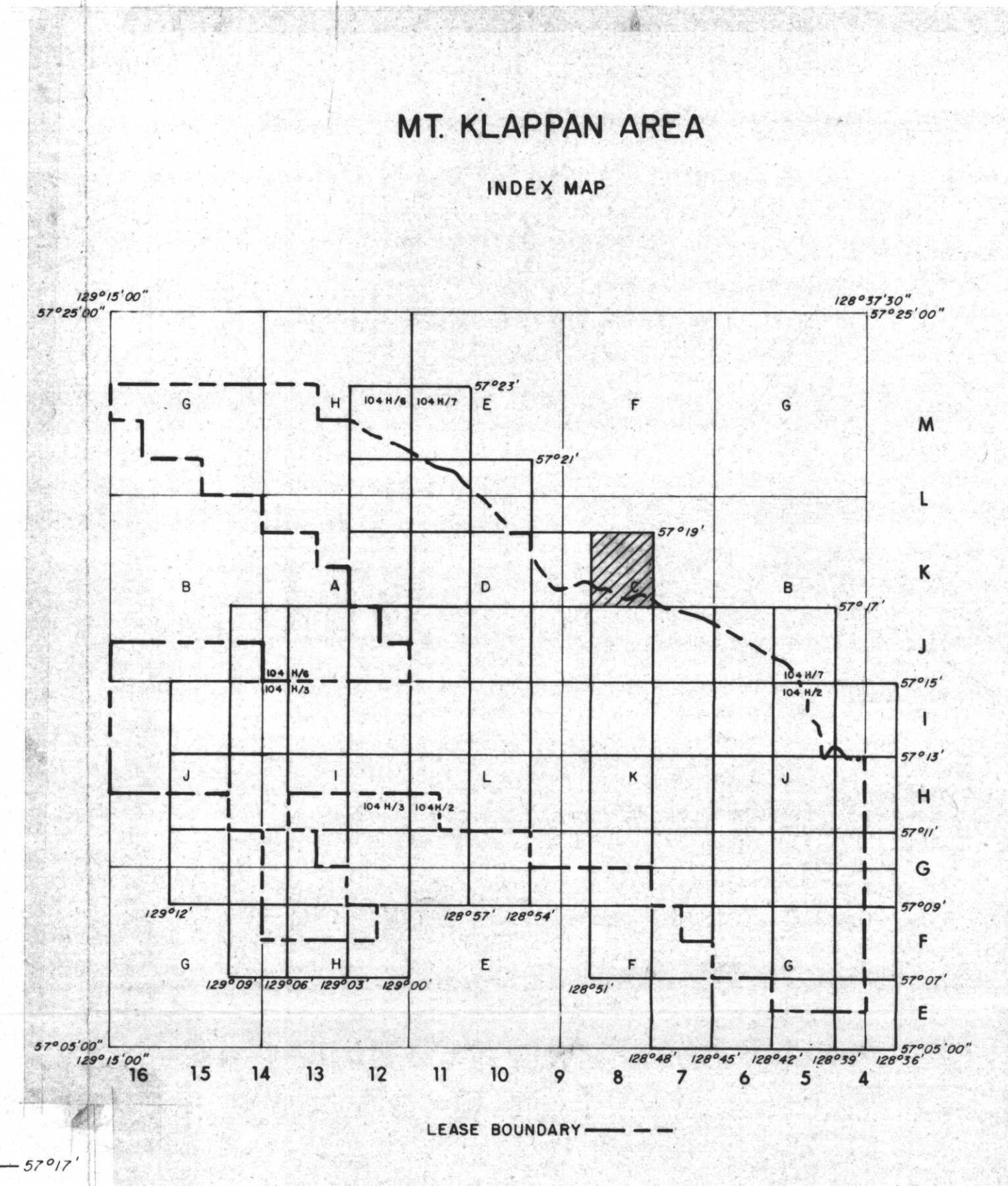
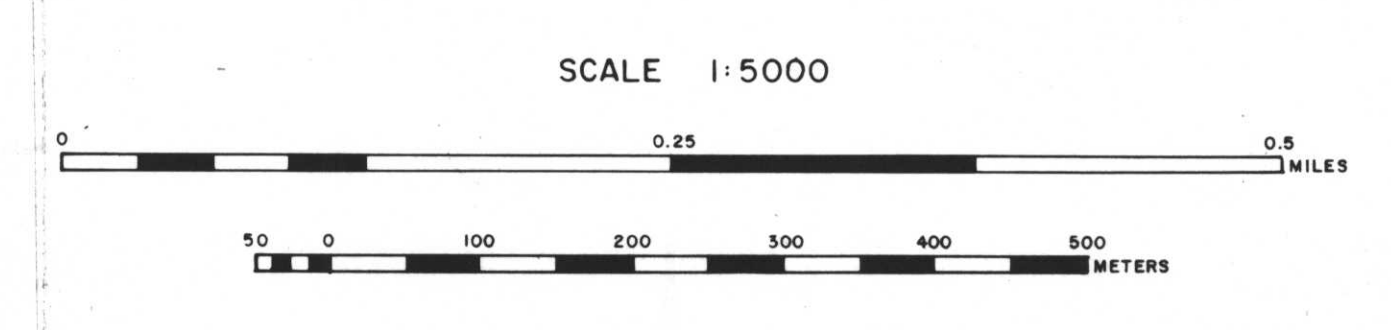
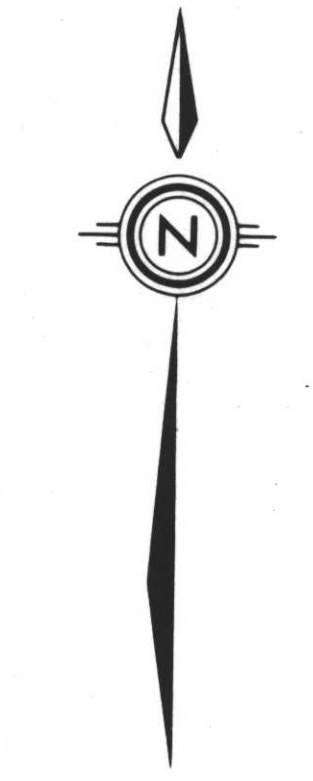
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LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
---	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
---	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
---	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
---	MONOCLINE (DEFINED, APPROXIMATE)
---	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
---	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
---	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
---	THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UP THRUST SIDE
---	FAULT (DEFINED, APPROXIMATE) UP THROWN, DOWN THROWN SIDE
---	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
---	ADIT TRENCH COAL SPOIL
---	DIAMOND, ROTARY WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

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GULF CANADA CORPORATION
CALGARY Coal Division ALBERTA

MT. KLAPPAN COAL PROPERTY
1986
GEOLOGY MAP
LOST-FOX AREA
MAP K-8

PREPARED BY: E.S. SCALE 1:5000
APPROVED BY: E.S. DATE: MAR. 1987 DRAWING No. KPN86LF-69