



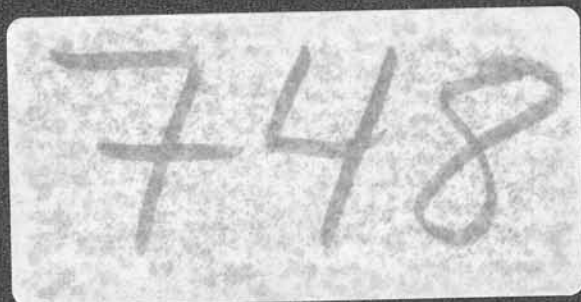
MOUNT KLAPPAN  
ANTHRACITE PROJECT

GEOLOGICAL REPORT  
1988

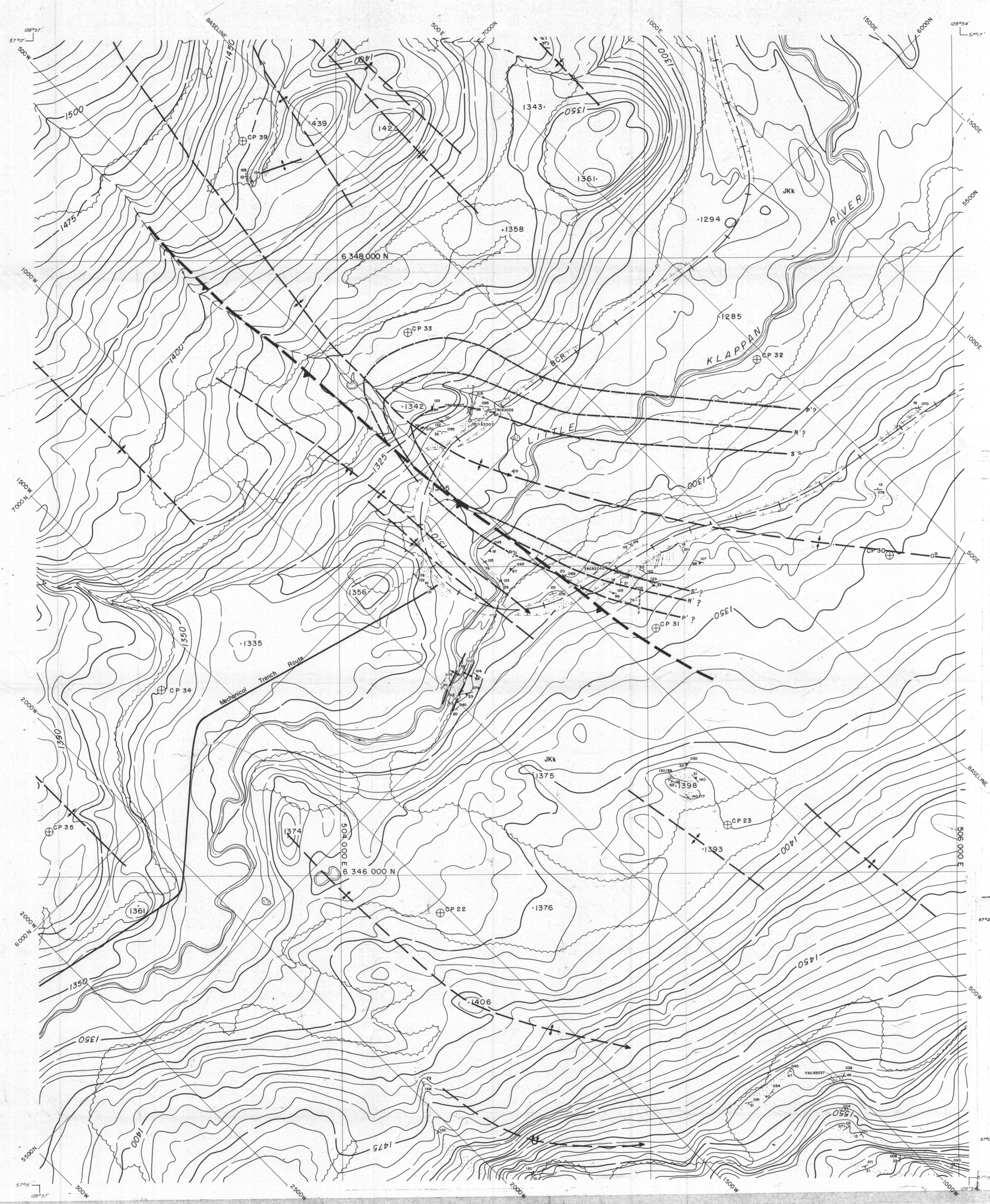
APPENDIX III

SUMMIT AREA

1:5000 AND 1:10000 SCALE  
MAPS AND CROSS SECTIONS



GULF CANADA RESOURCES LIMITED  
COAL DIVISION



LEGEND

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

NOTES

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

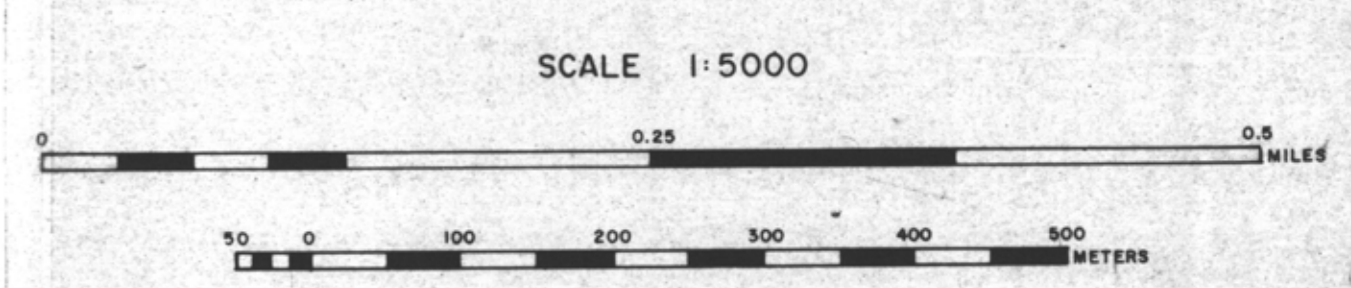
CONTOUR INTERVAL: 10 M, WITH FORM LINES INTERVAL: 5 M

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

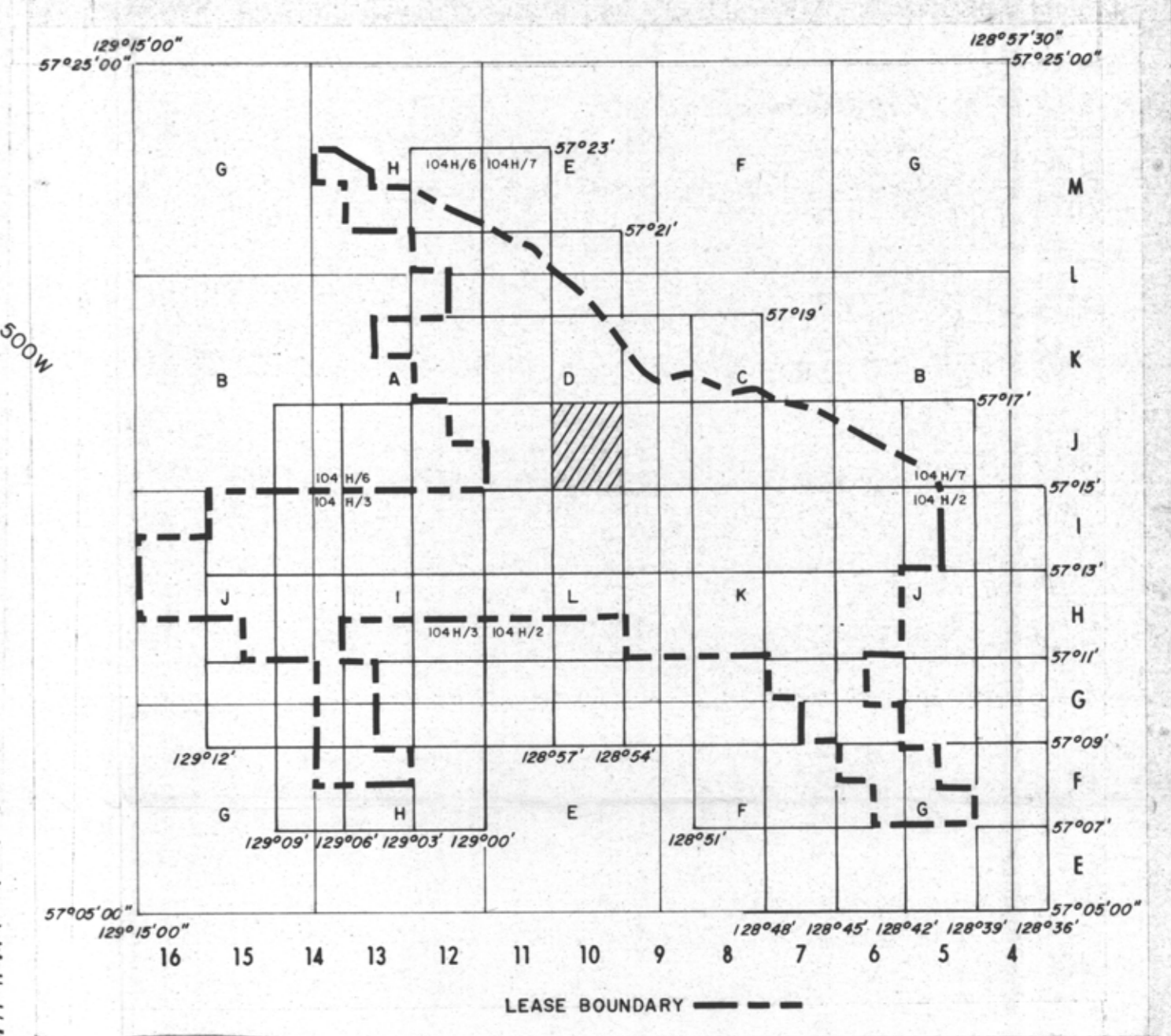
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT/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 1:60,000 (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.

**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) 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

748

**GULF CANADA RESOURCES LTD.**

Calgary Coal Division Alberta

**MT. KLAPPAN ANTHRACITE PROPERTY**

1988

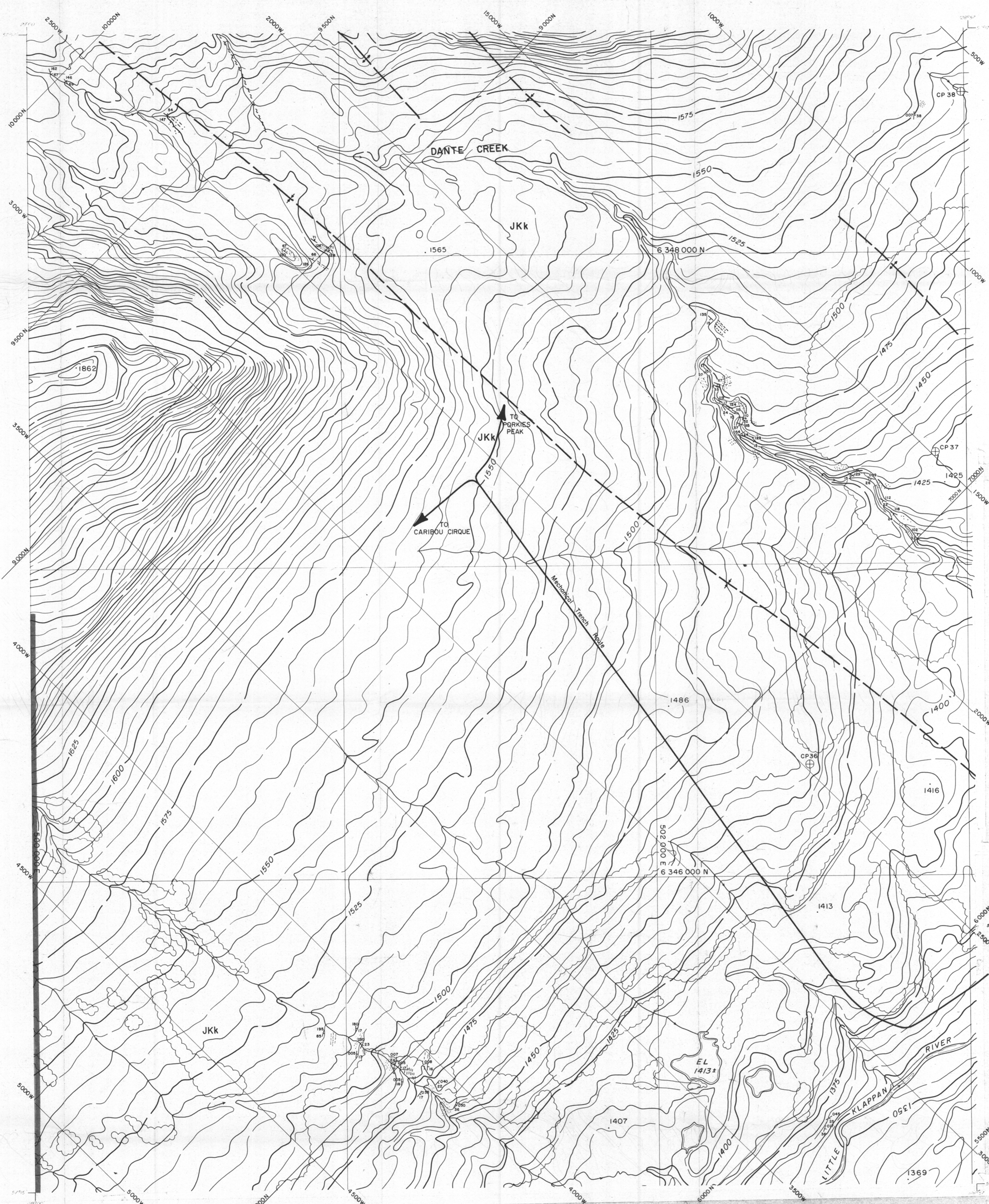
**GEOLOGY MAP**

**SUMMIT AREA**

**MAP J-10**

PREPARED BY: G.P./L.S. SCALE 1:5000

APPROVED BY: E.S. DATE: SEPT. 1988 DRAWING NO. KPN5A-01



LEGEND

BUILDING	[Symbol]
ROAD, HARD SURFACE	[Symbol]
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]
BEAVER DAM	[Symbol]
TREE LINE	[Symbol]
CUT LINE	[Symbol]
CONTOURS, INDEX	[Symbol]
CONTOURS, INTERMEDIATE	[Symbol]
CONTOURS, APPROXIMATE	[Symbol]
SPOT ELEVATION	[Symbol]
FORM LINES	[Symbol]
CUTFILL	[Symbol]
FIELD CONTROL POINT	[Symbol]
COAL LICENCE	[Symbol]

NOTES

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

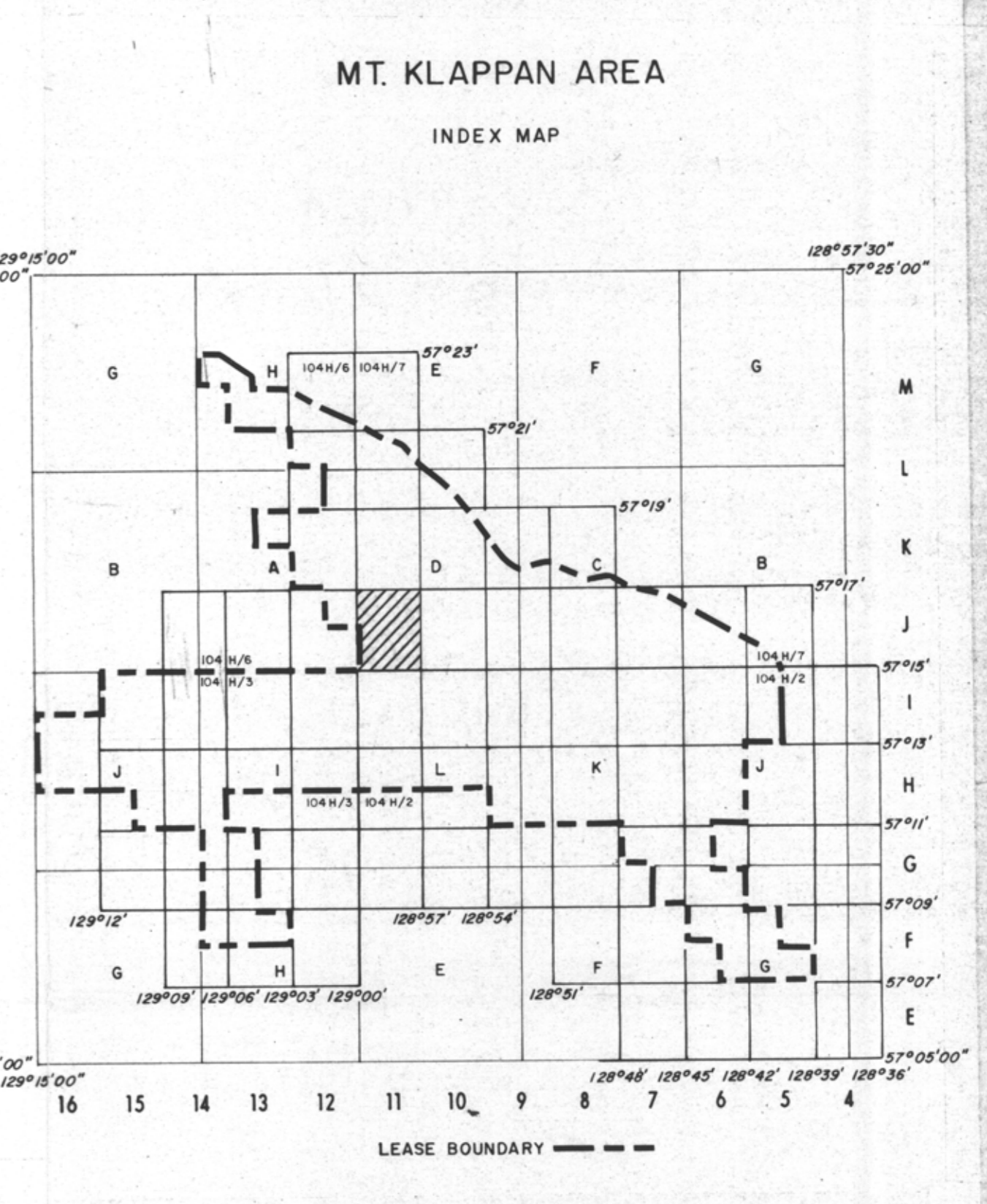
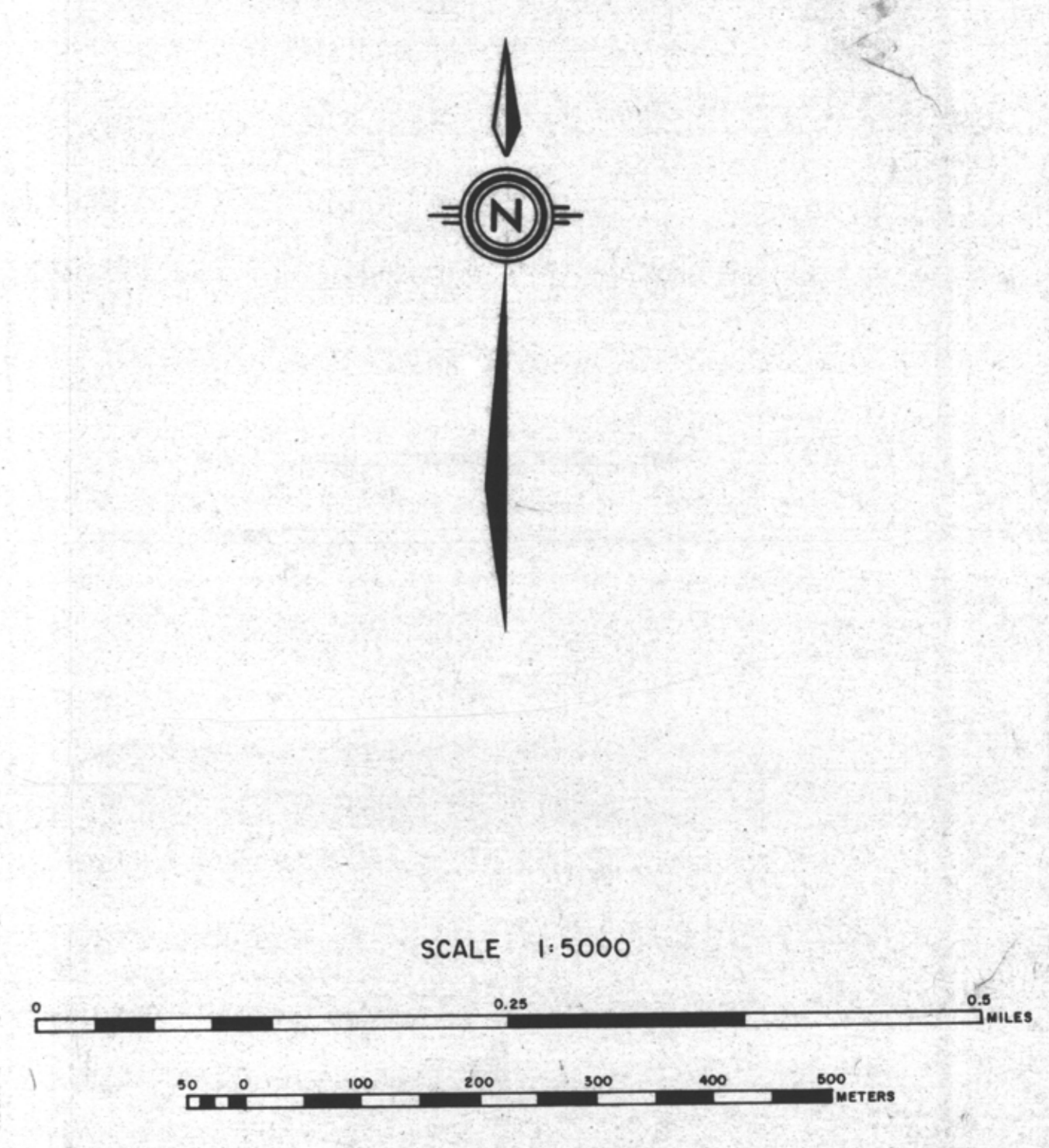
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RAILROAD BED LOCATION BASED ON SEPT. 782 AERIAL PHOTOGRAPHY

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST 76 AT A SCALE OF 1:60,000 (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**

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**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.

**SPATSZI SEQUENCE**

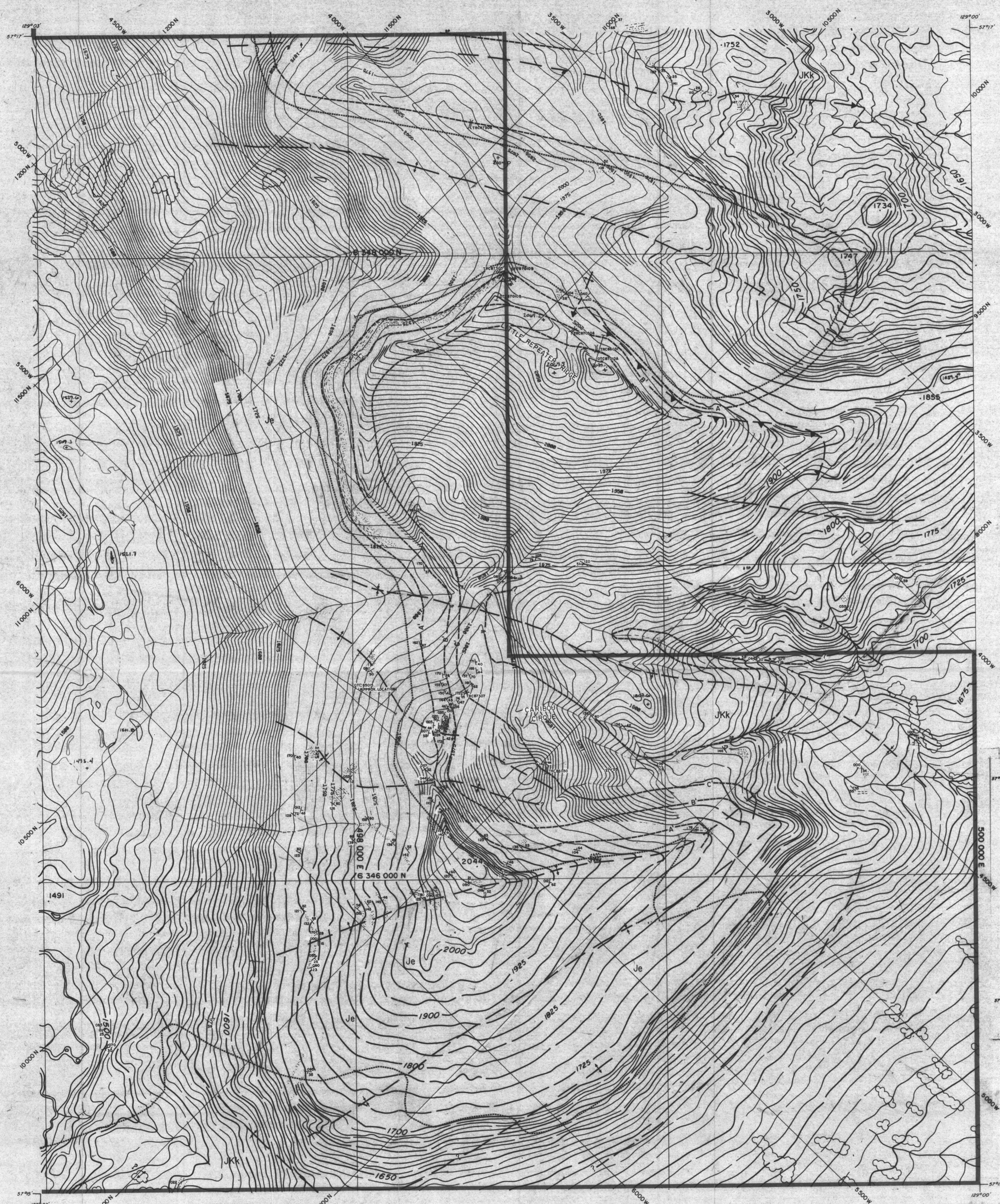
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare.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

LEGEND

[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)
[Symbol]	BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
[Symbol]	FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
[Symbol]	JOINTS (INCLINED, VERTICAL, HORIZONTAL)
[Symbol]	THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHROW SIDE
[Symbol]	FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
[Symbol]	FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
[Symbol]	ADIT TRENCH COAL SPOIL
[Symbol]	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
[Symbol]	MEASURED SECTION
[Symbol]	SURVEY CAIRN
[Symbol]	CROSS SECTION LINE

748

<b>GULF CANADA RESOURCES LTD.</b>	
CALGARY	ALBERTA
Coal Division	
<b>MT. KLAPPAN ANTHRACITE PROPERTY</b>	
1988	
<b>GEOLOGY MAP</b>	
<b>SUMMIT AREA</b>	
<b>MAP J-II</b>	
PREPARED BY: G.P./L.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: SEPT. 1988 DRAWING No. KPNSA-02



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	---
CONTOUR, INDEX	---
INTERMEDIATE	---
APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

NOTES

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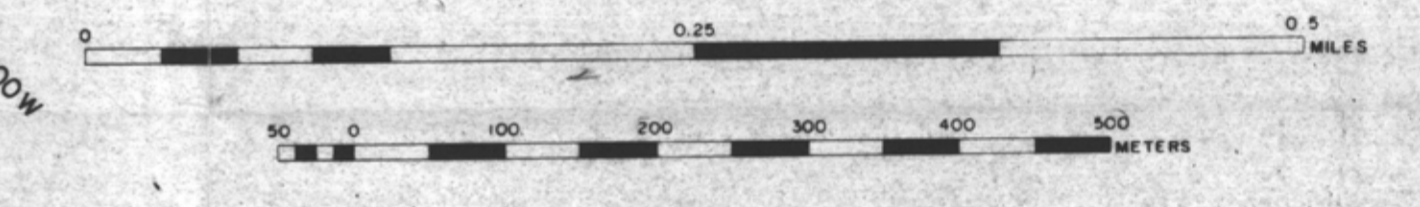
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RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

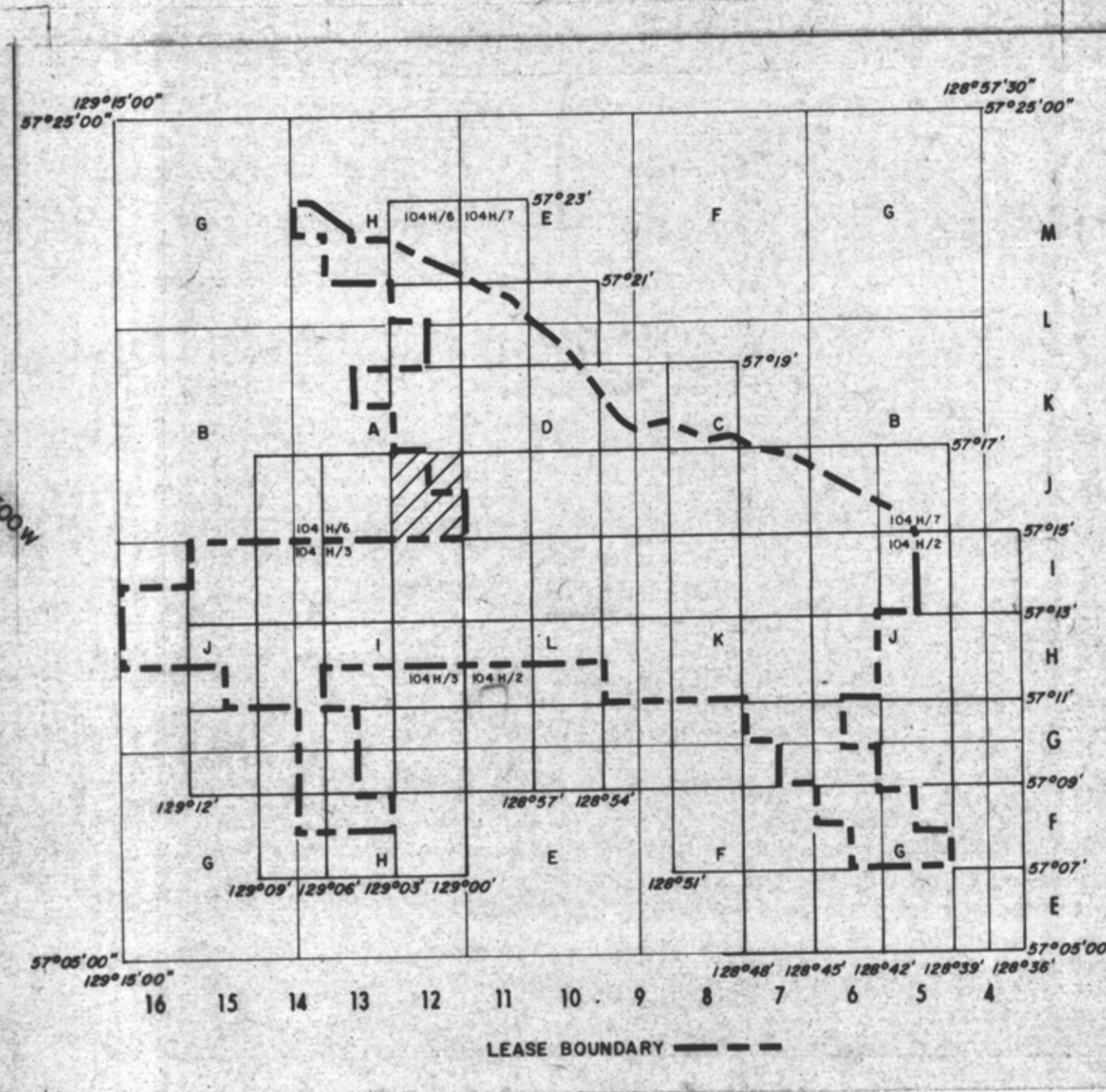
COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD. FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:80,000 (APPROXIMATE).



SCALE 1:5000



MT. KLAPPAN AREA INDEX MAP



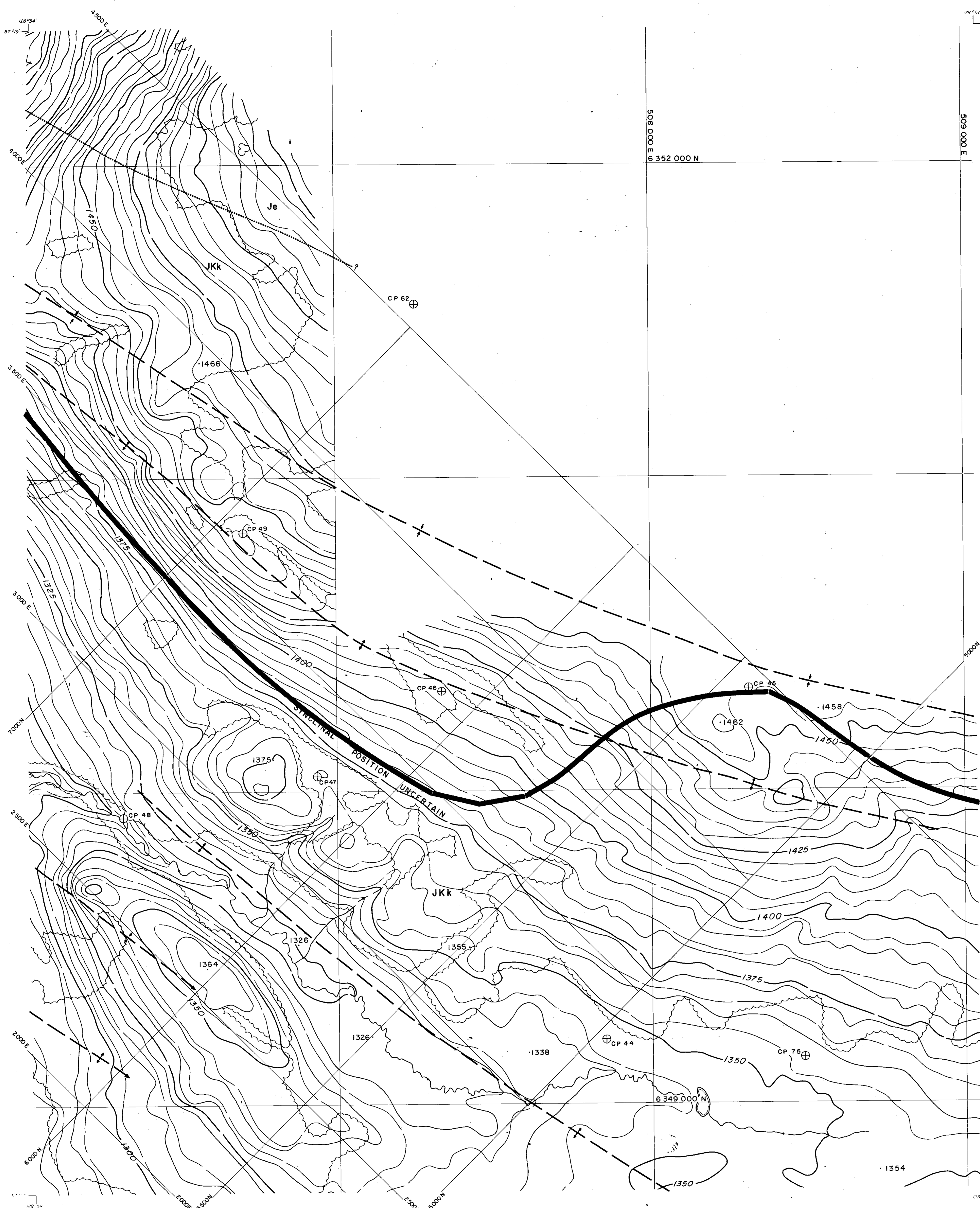
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LEGEND

---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
---	COAL SEAM (DEFINED, INFERRED)
←	ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
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⌒	OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
⌒	OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
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---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

748

<b>GULF CANADA RESOURCES LTD.</b>	
CALGARY	ALBERTA
<b>MT. KLAPPAN ANTHRACITE PROPERTY</b>	
1988	
<b>GEOLOGY MAP</b>	
<b>SUMMIT AREA</b>	
<b>MAP J-12</b>	
PREPARED BY: G.P./L.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: SEPT., 1988 DRAWING No. KPNSA-03



**LEGEND**

BUILDING	---
ROAD, HARD SURFACE	---
LOOSE SURFACE	---
CART TRACK	---
TRAIL	---
RAILROAD BED	---
RIVER	---
STREAM, DEFINITE	---
APPROXIMATE	---
SPLIT	---
LAKE	---
WATER LEVEL	FL 500'
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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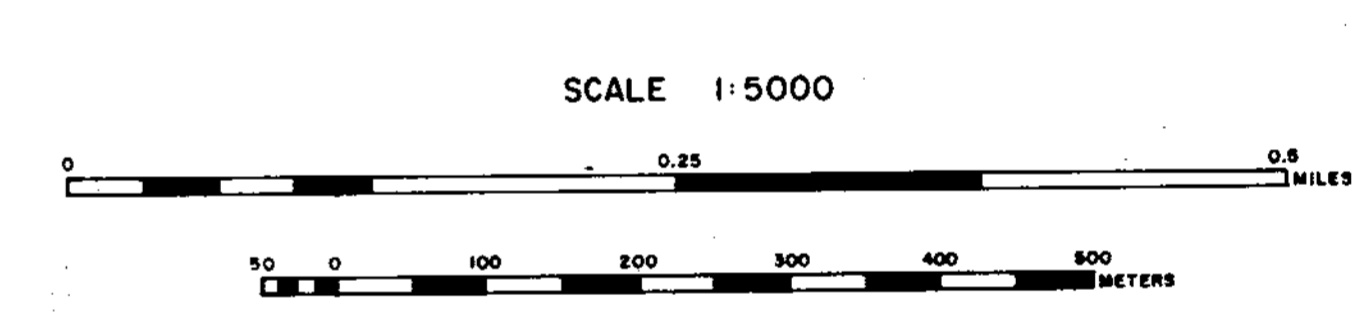
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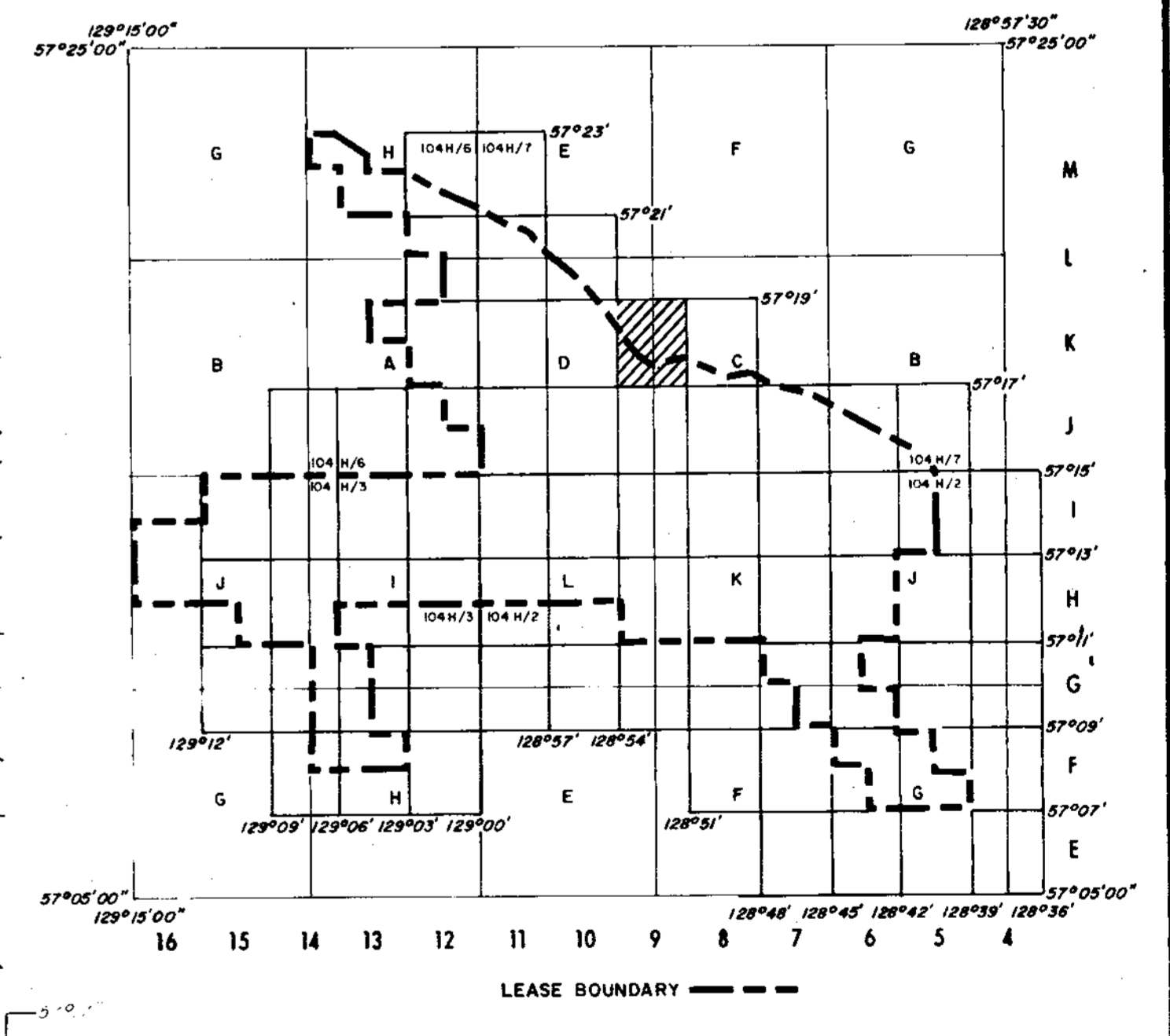
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**MT. KLAPPAN AREA**  
INDEX MAP



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**LEGEND**

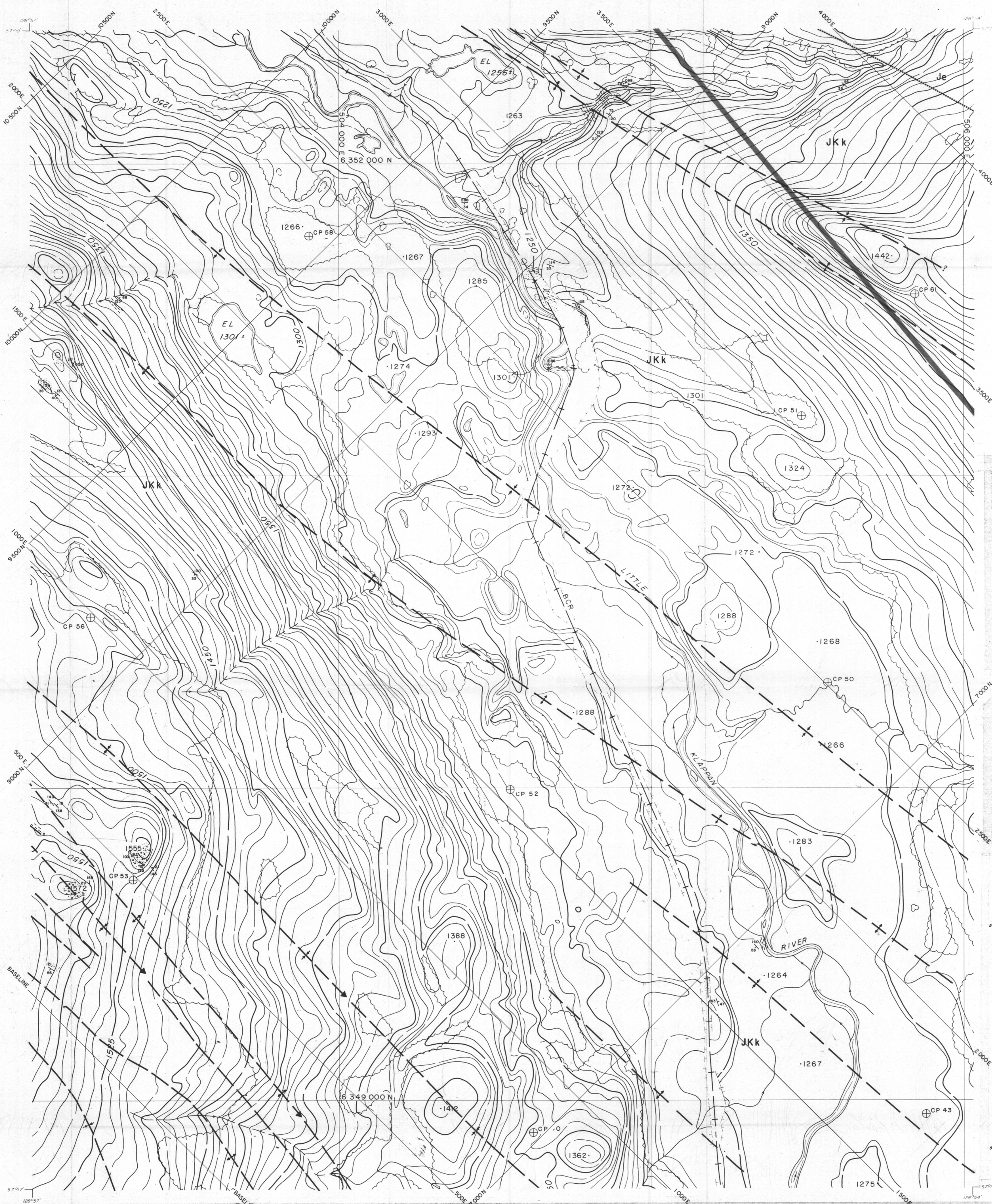
---	LICENCE BOUNDARY
---	GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
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---	CROSS SECTION LINE

748

**GULF CANADA RESOURCES LTD.**  
CALGARY Coal Division ALBERTA

**MT. KLAPPAN ANTHRACITE PROPERTY**  
1988  
GEOLOGY MAP  
SUMMIT AREA  
MAP K-9

PREPARED BY: G.P./L.S. SCALE 1:5000  
APPROVED BY: E.S. DATE: SEPT, 1988 DRAWING No. KPNSA-04



**LEGEND**

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

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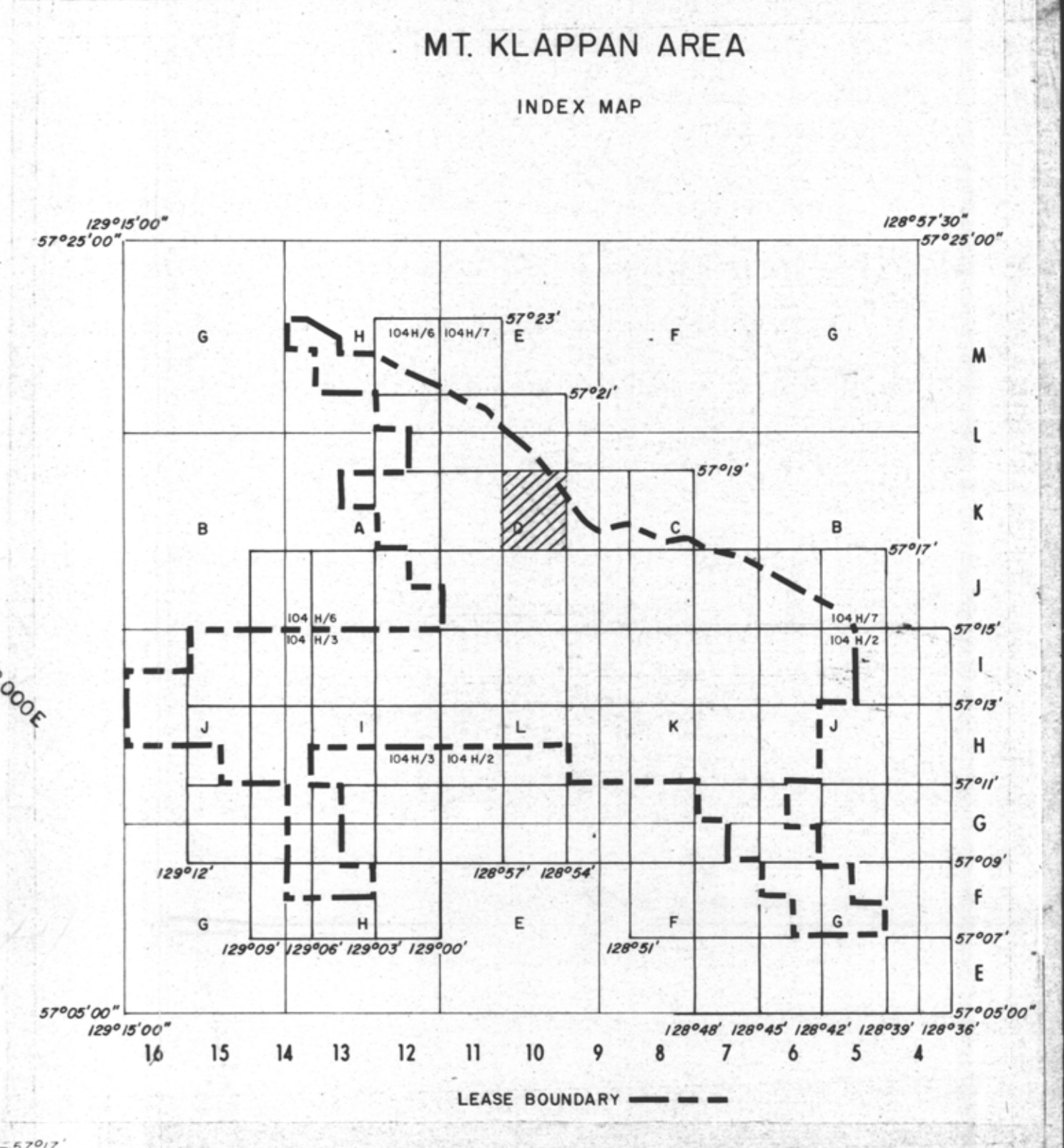
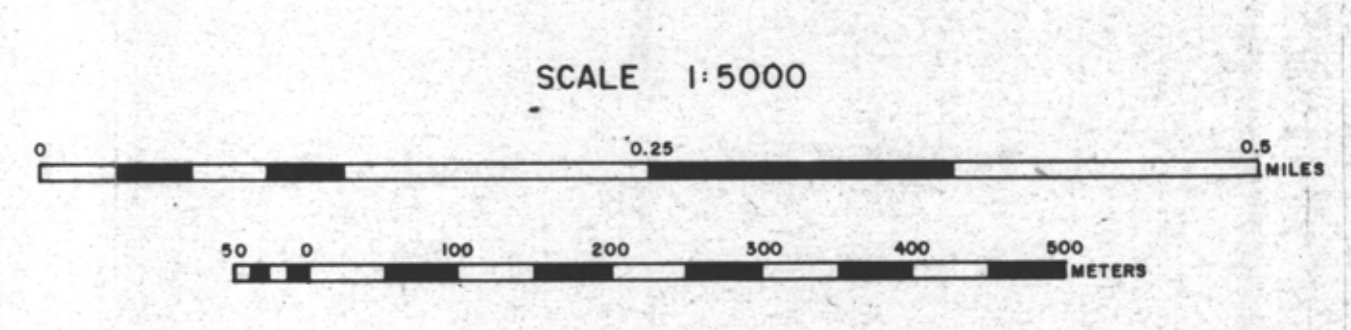
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**Km** Thick interbeds of mudstones, argillaceous siltstones, fine grained sandstones and thin interbeds of orange weathering nodular siltstones. Many conglomerate beds display large scale cross bedding and tend to be laterally discontinuous. Thick 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.

**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) UPTHROWN, 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

**GULF CANADA RESOURCES LTD.**

Calgary Coal Division ALBERTA

**MT. KLAPPAN ANTHRACITE PROPERTY**

1988

**GEOLOGY MAP**

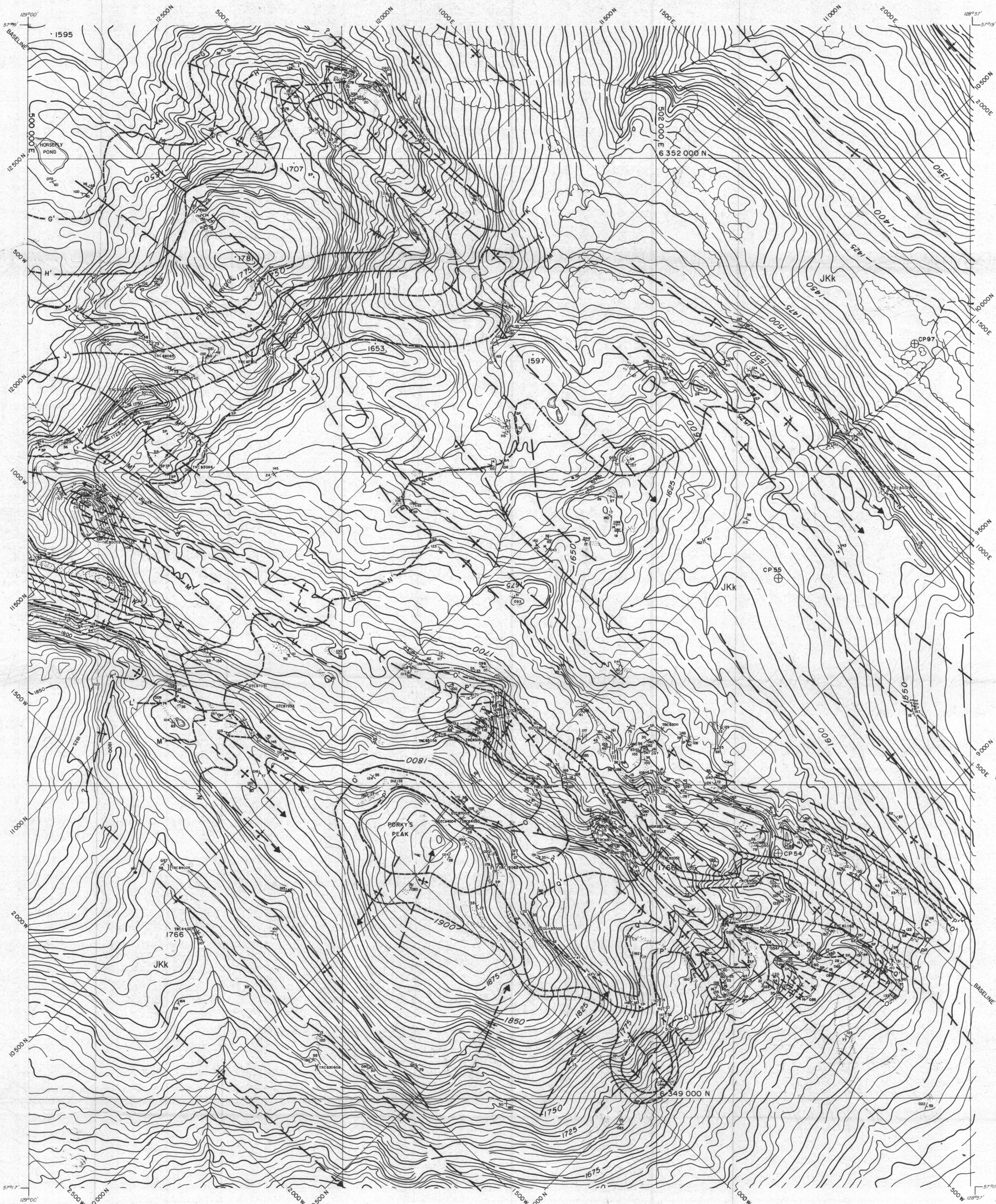
**SUMMIT AREA**

**MAP K-10**

PREPARED BY: G.P./L.S. SCALE 1:5000

APPROVED BY: E.S. DATE: SEPT. 1988 DRAWING NO. KPNSA-05

748



**LEGEND**

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

**NOTES**

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

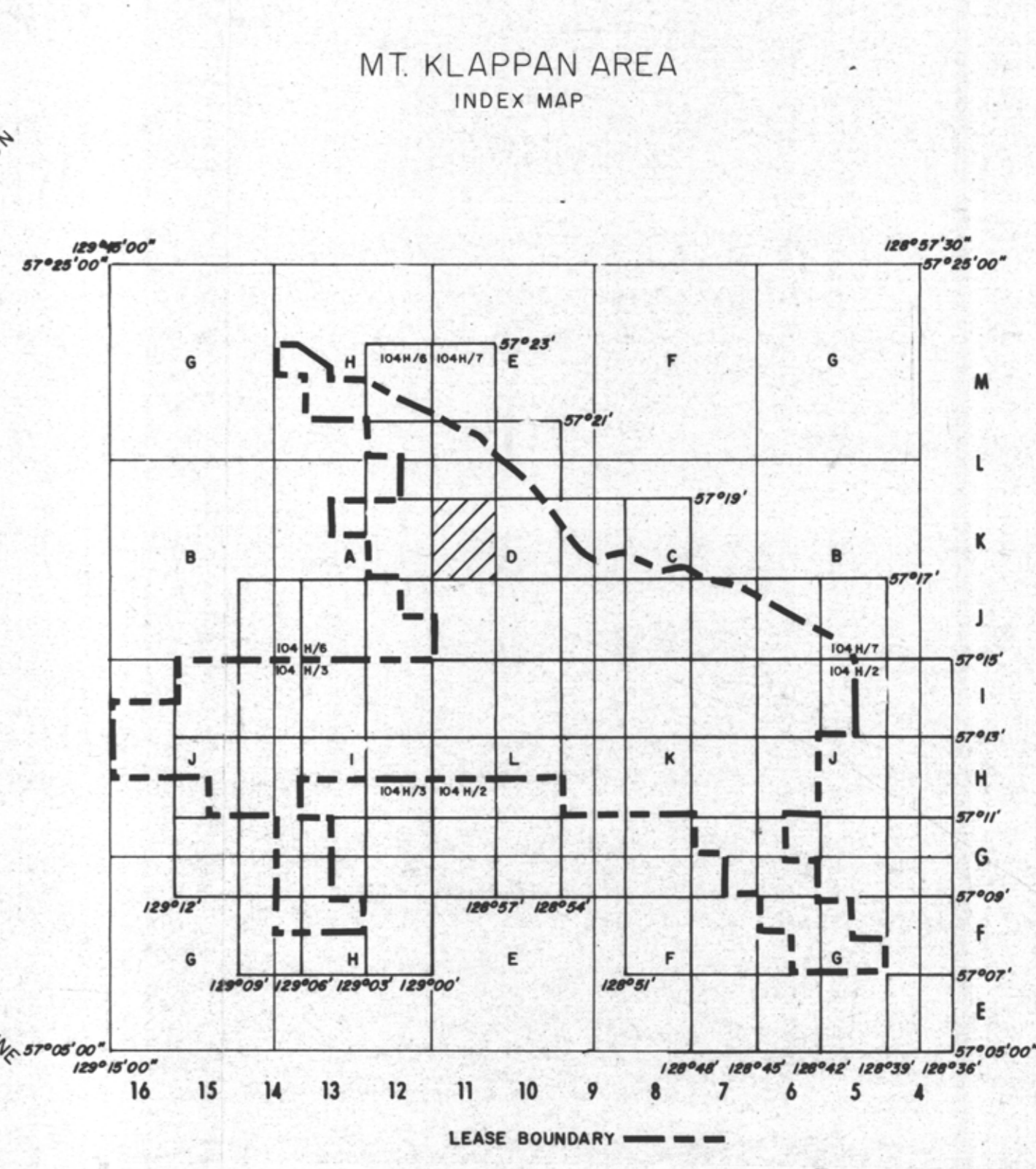
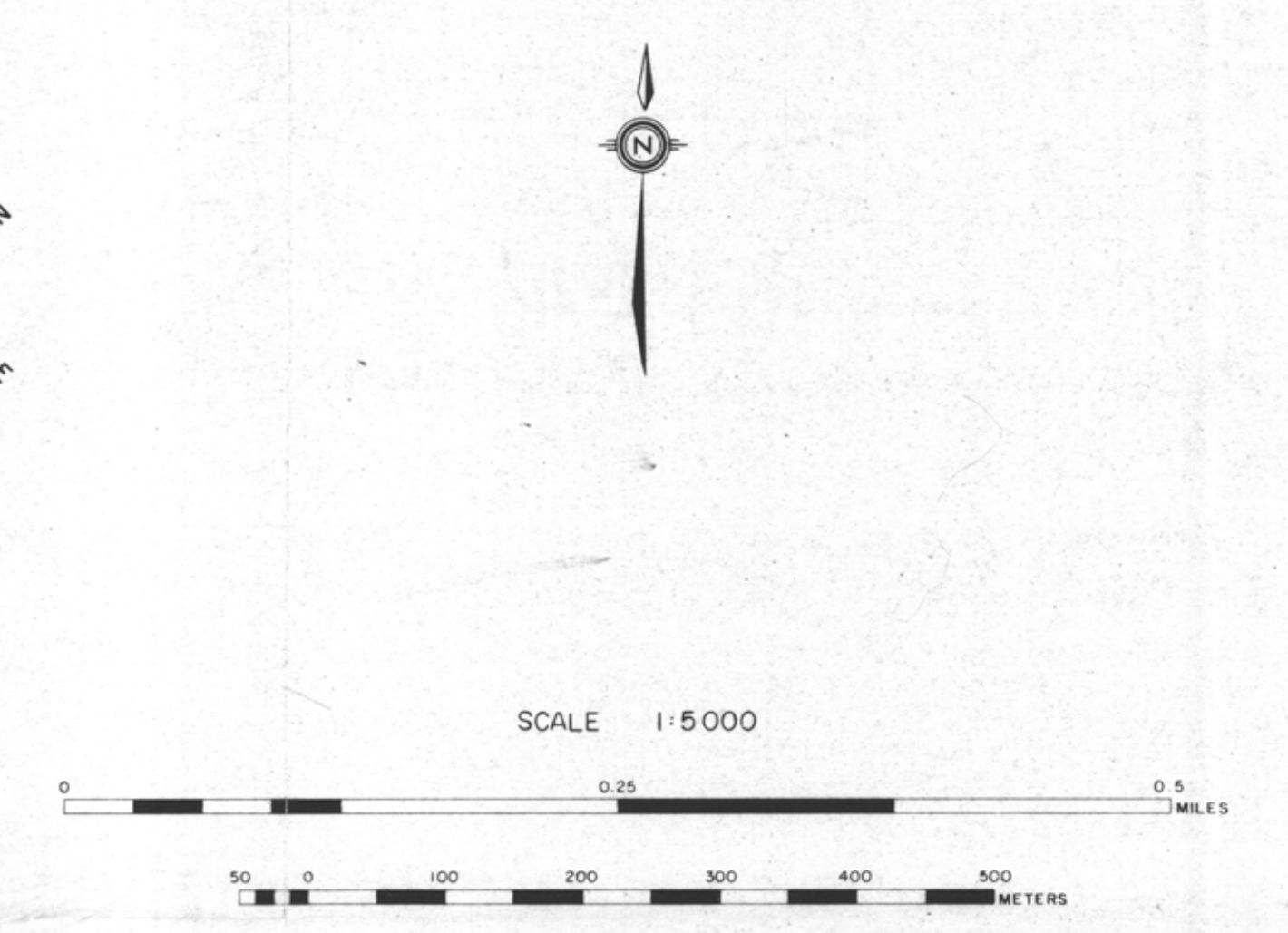
CONTOUR INTERVAL: 10 M, WITH FORM LINES INTERVAL: 5 M.

ACCURACY OF 5 M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10 M CONTOURS - 15.0 METERS FOR GROUND NOT 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. 1922 AERIAL PHOTOGRAPHY.

COMPILED BY WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD MCELLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST 1977 AT A SCALE OF 1:60,000 (APPROXIMATE).



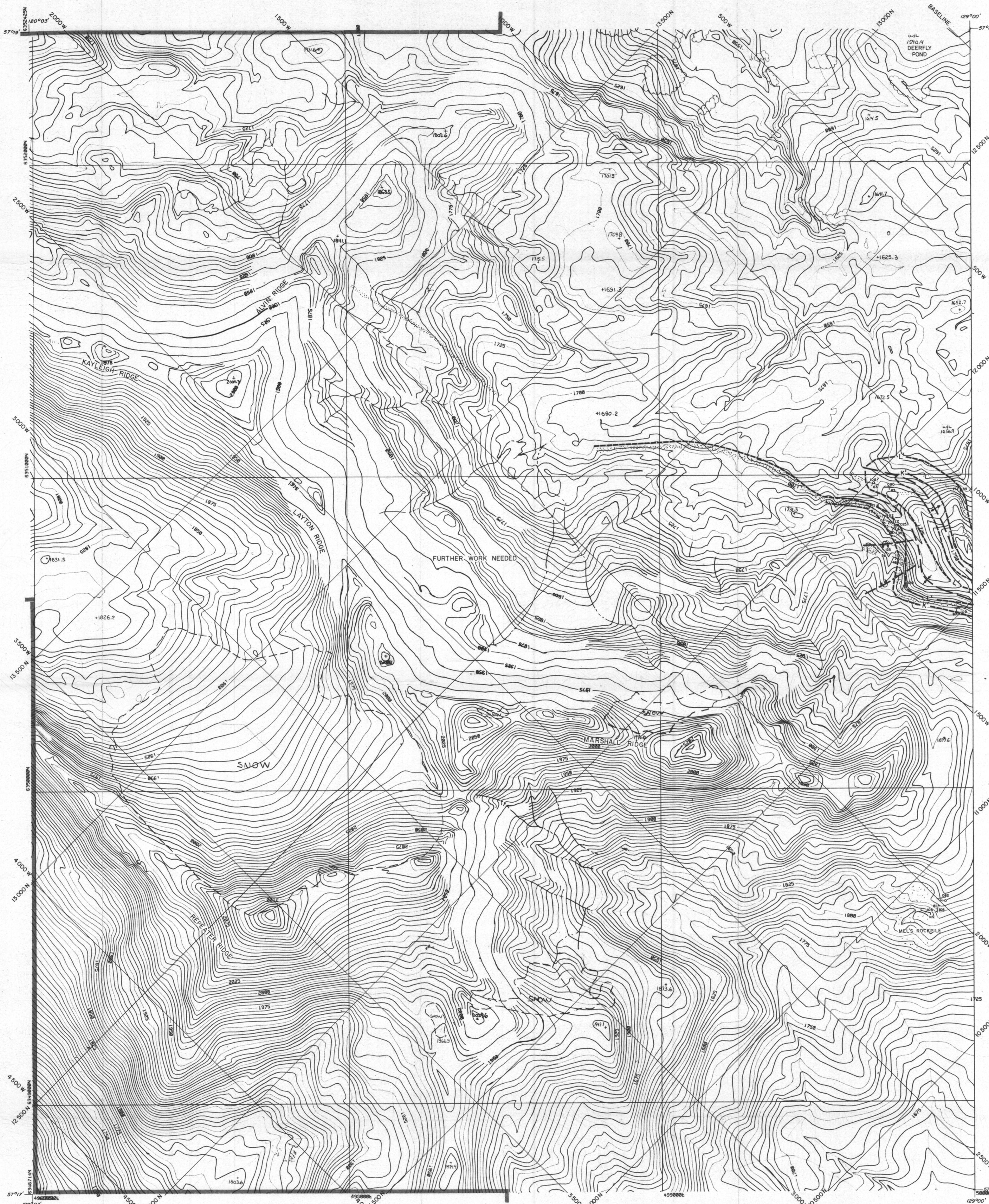
- RHONDDA SEQUENCE**
- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of 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) UPTHROWN, 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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<b>GULF CANADA RESOURCES LTD.</b>	
CALGARY	ALBERTA
<b>MT. KLAPPAN ANTHRACITE PROPERTY</b>	
1988	
<b>GEOLOGY MAP</b>	
<b>SUMMIT AREA</b>	
<b>MAP K-11</b>	
PREPARED BY: G.P./L.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: SEPT, 1988 DRAWING NO. KPNSA-06



LEGEND

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

Notes

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10000 NEGATIVES.

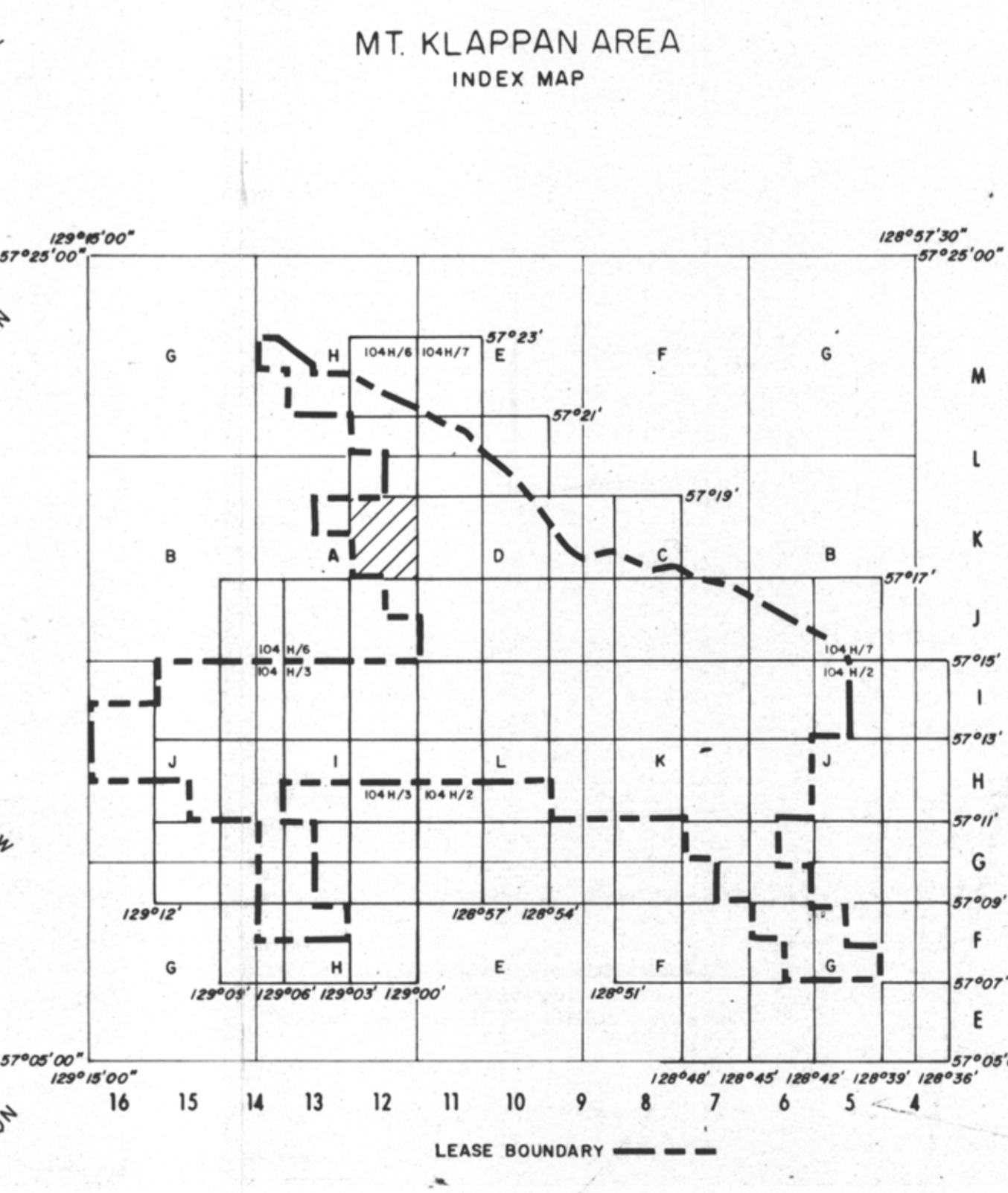
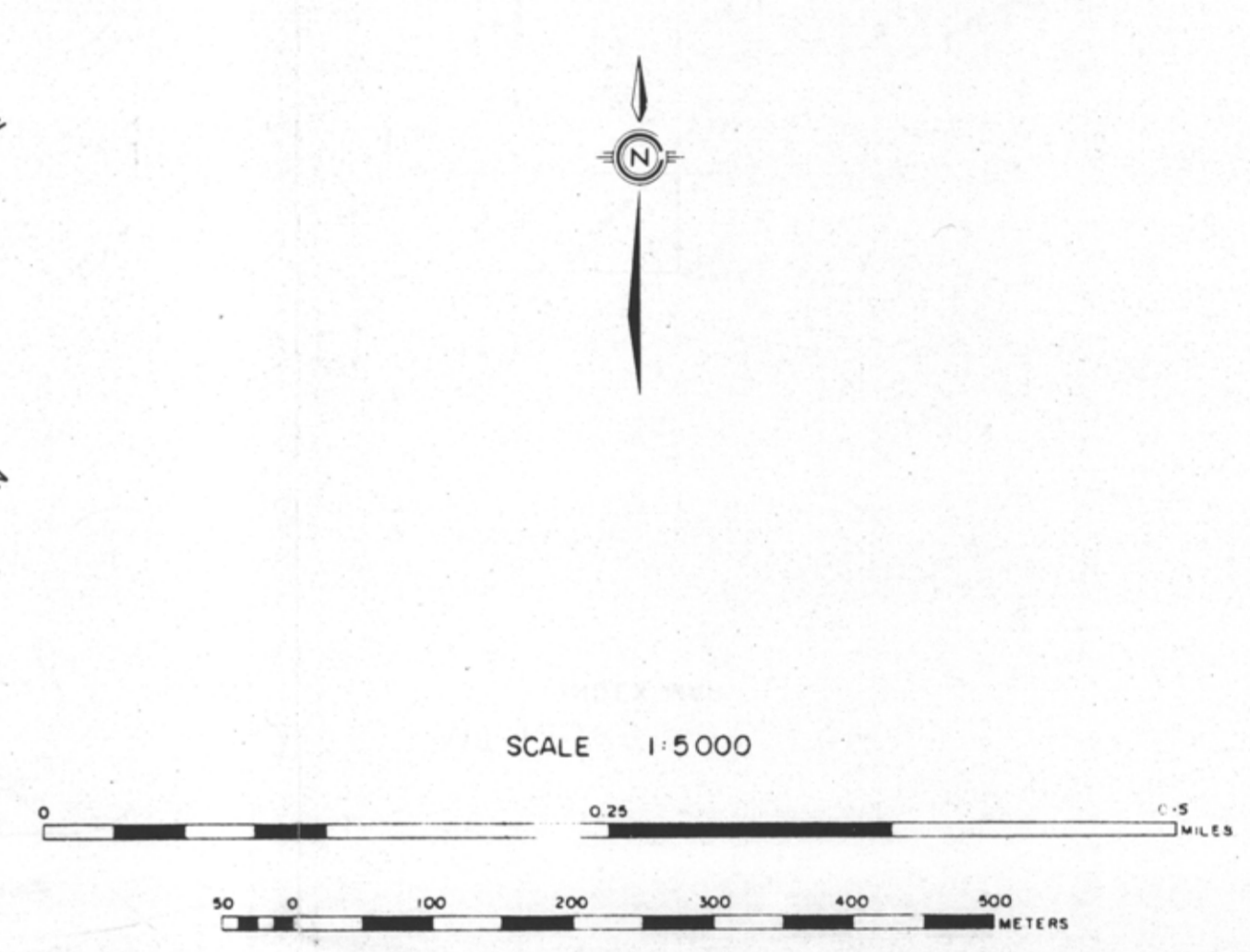
SM FORM LINE

ACCURACY OF SM FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS + 5.0 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. 82 AERIAL PHOTOGRAPHY.

COMPILED BY THE OFFICE/SHOP FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHS 1:15 FLOWN IN AUGUST/67 AT A SCALE OF 1:60000 (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.

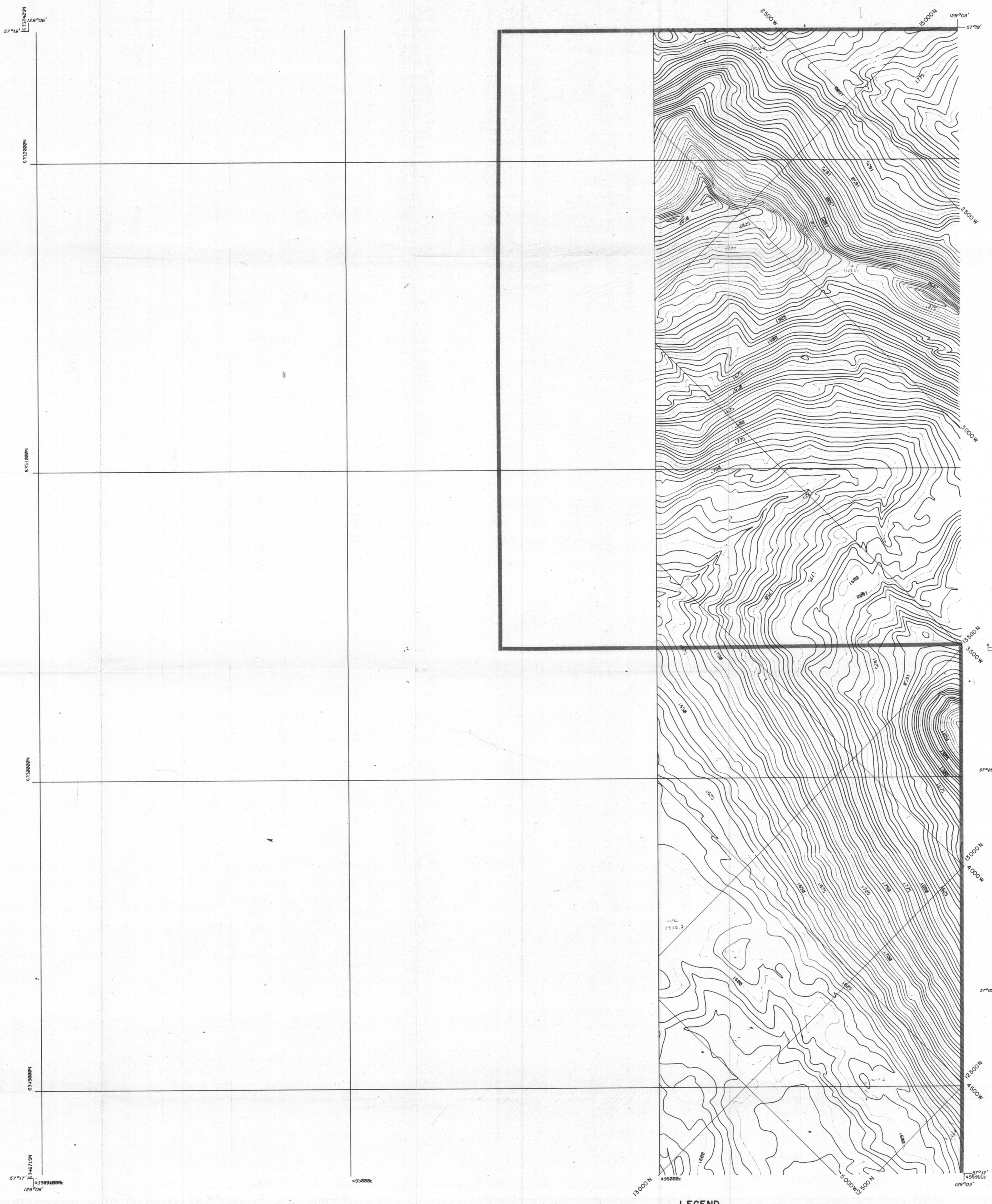
LEGEND

---	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 SPOIL
⊕	DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
---	MEASURED SECTION
---	SURVEY CAIRN
---	CROSS SECTION LINE

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<b>GULF CANADA RESOURCES LTD.</b>	
Calgary	Alberta
<b>MT. KLAPPAN ANTHRACITE PROPERTY</b>	
1988	
<b>GEOLOGY MAP</b>	
<b>SUMMIT AREA</b>	
<b>MAP K-12</b>	
PREPARED BY: G.P./L.S.	SCALE 1:5000
APPROVED BY: E.S.	DATE: SEPT, 1988 DRAWING No. KPN SA-07





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	---
CONTOURS, DEPRESSION	---
CONTOURS, APPROXIMATE	---
SPOT ELEVATION	---
FORM LINES	---
CUT/FILL	---
FIELD CONTROL POINT	---
COAL LICENCE	---

Notes

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF 1:10000 NEGATIVES.

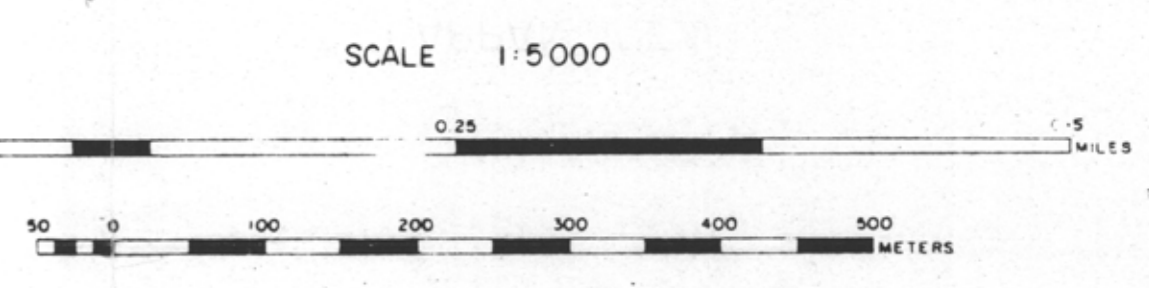
5M FORM LINE

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10M CONTOURS ± 5.0 METERS FOR GROUND NOT OCCUPIED BY TREES OR VEGETATION.

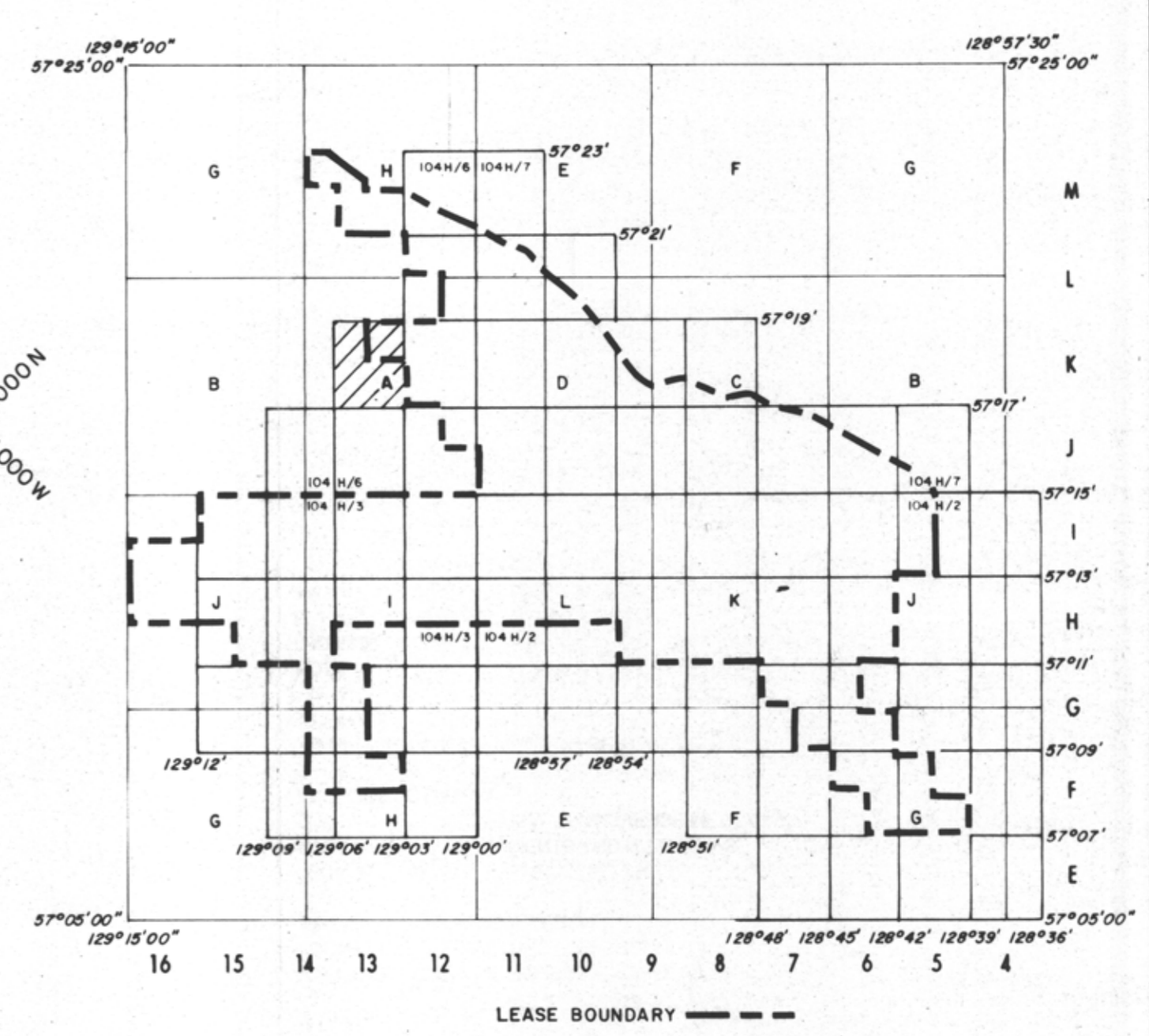
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT. 82 AERIAL PHOTOGRAPHY.

COMPILED BY THE ORTHOKOP FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST 87 AT A SCALE OF 1:50000 (APPROXIMATE).



MT. KLAPPAN AREA INDEX MAP



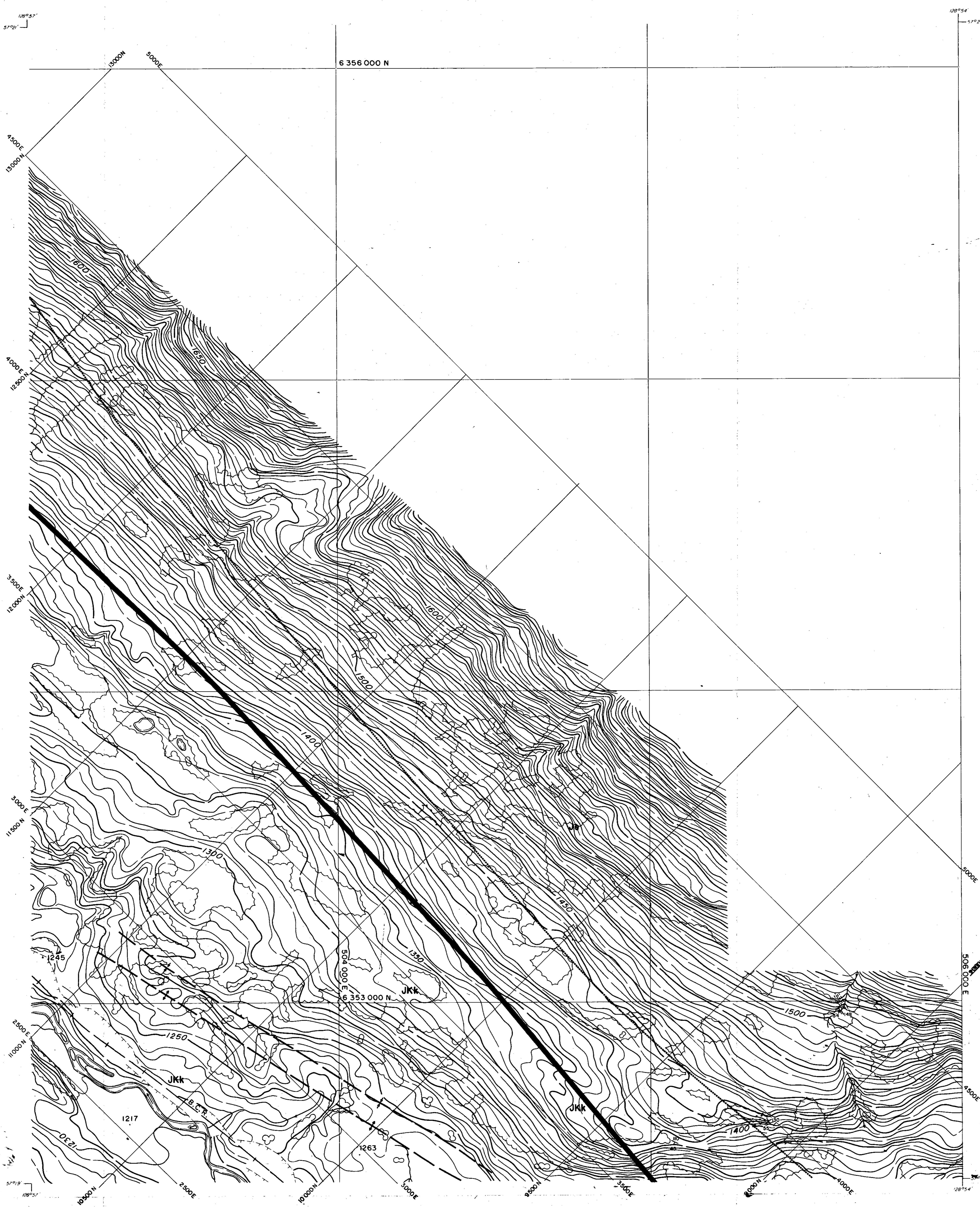
- RHONDDA SEQUENCE**
- Kr** Sequence of thick chert pebble conglomerates and minor gritty sandstones interbedded with an increasing number of siltstones and mudstones towards the basal contact. Large scale trough and tabular cross beds are common. Six species of plant fossils are found at the base of 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)**
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- SPATSIZI 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 UP THRUST SIDE
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⊕	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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<b>GULF CANADA RESOURCES LTD.</b>	
CALGARY	ALBERTA
<b>MT. KLAPPAN ANTHRACITE PROPERTY</b>	
1988	
<b>GEOLOGY MAP</b>	
<b>SUMMIT AREA</b>	
<b>MAP K-13</b>	
PREPARED BY: G.P./L.S. SCALE 1:5000	
APPROVED BY: E.S. DATE: SEPT, 1988 DRAWING No. KPN5A-8	



**LEGEND**

BUILDING	---	---
ROAD, HARD SURFACE	---	---
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	---	---
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

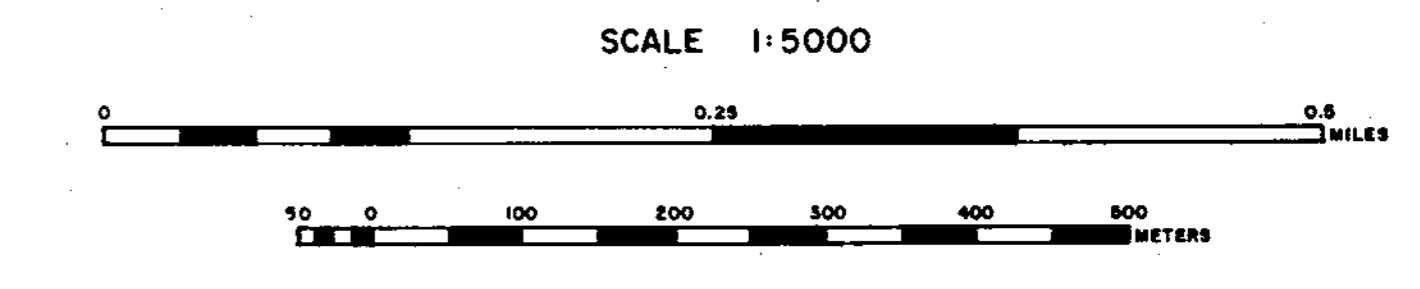
CONTOUR INTERVAL: 10 M., WITH FORM LINES INTERVAL: 5 M.

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

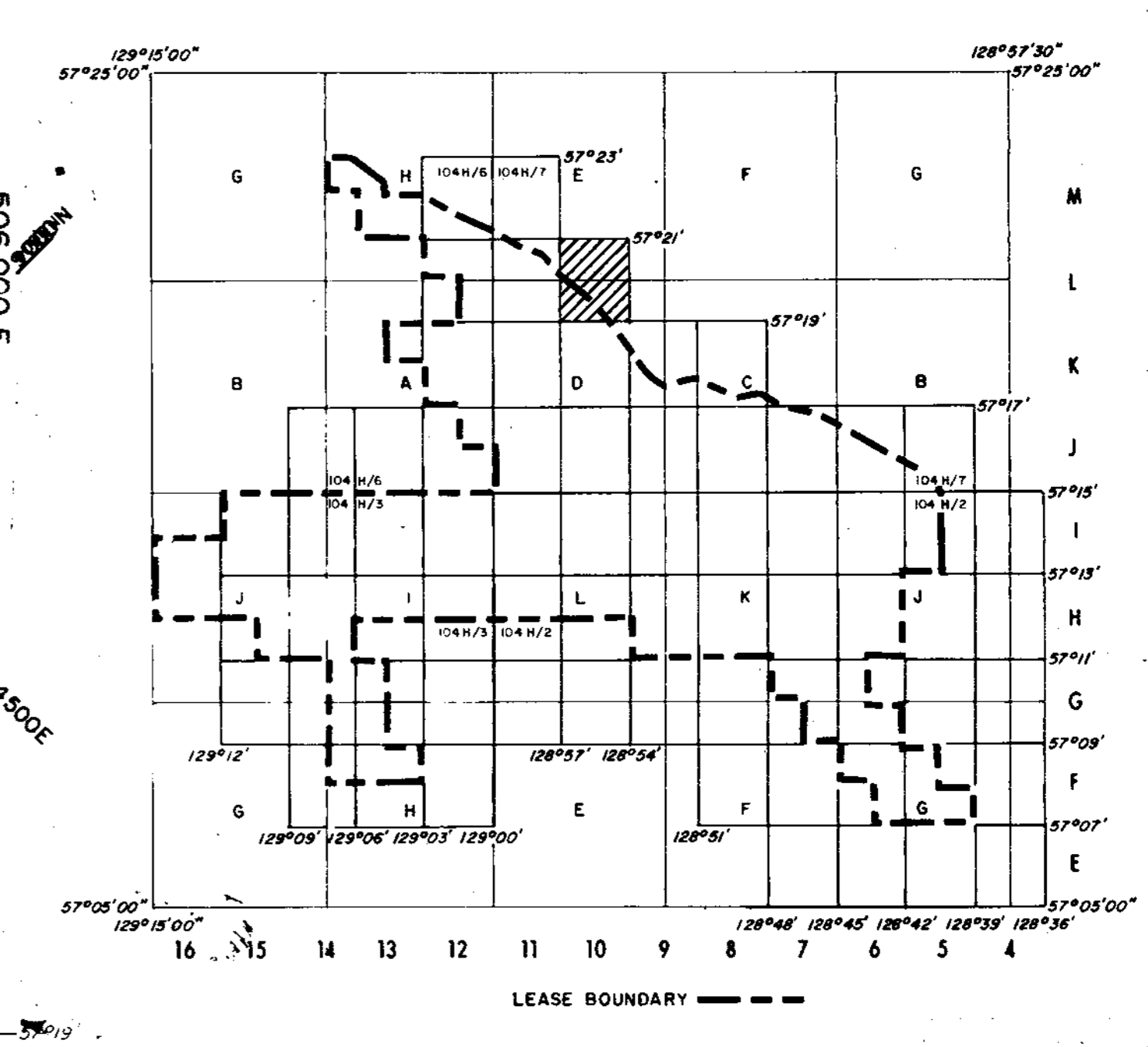
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RAILROAD BED LOCATION BASED ON SEPT/82 AERIAL PHOTOGRAPHY

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



**MT. KLAPPAN AREA**  
INDEX MAP



- RHONDDA SEQUENCE**
- Kf** 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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**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, 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 RESOURCES LTD.**  
Coal Division

CALGARY ALBERTA

**MT. KLAPPAN ANTHRACITE PROPERTY**  
1988  
**GEOLOGY MAP**  
**SUMMIT AREA**  
**MAP L-10**

PREPARED BY: G.P./L.S. SCALE 1:5000  
APPROVED BY: E.S. DATE: SEPT, 1988 DRAWING No. KPNSA-09