# MOUNT KLAPPAN
# ANTHRACITE PROJECT
# SUMMIT - NASS - SKEENA AREA
# GEOLOGICAL REPORT
# 1987

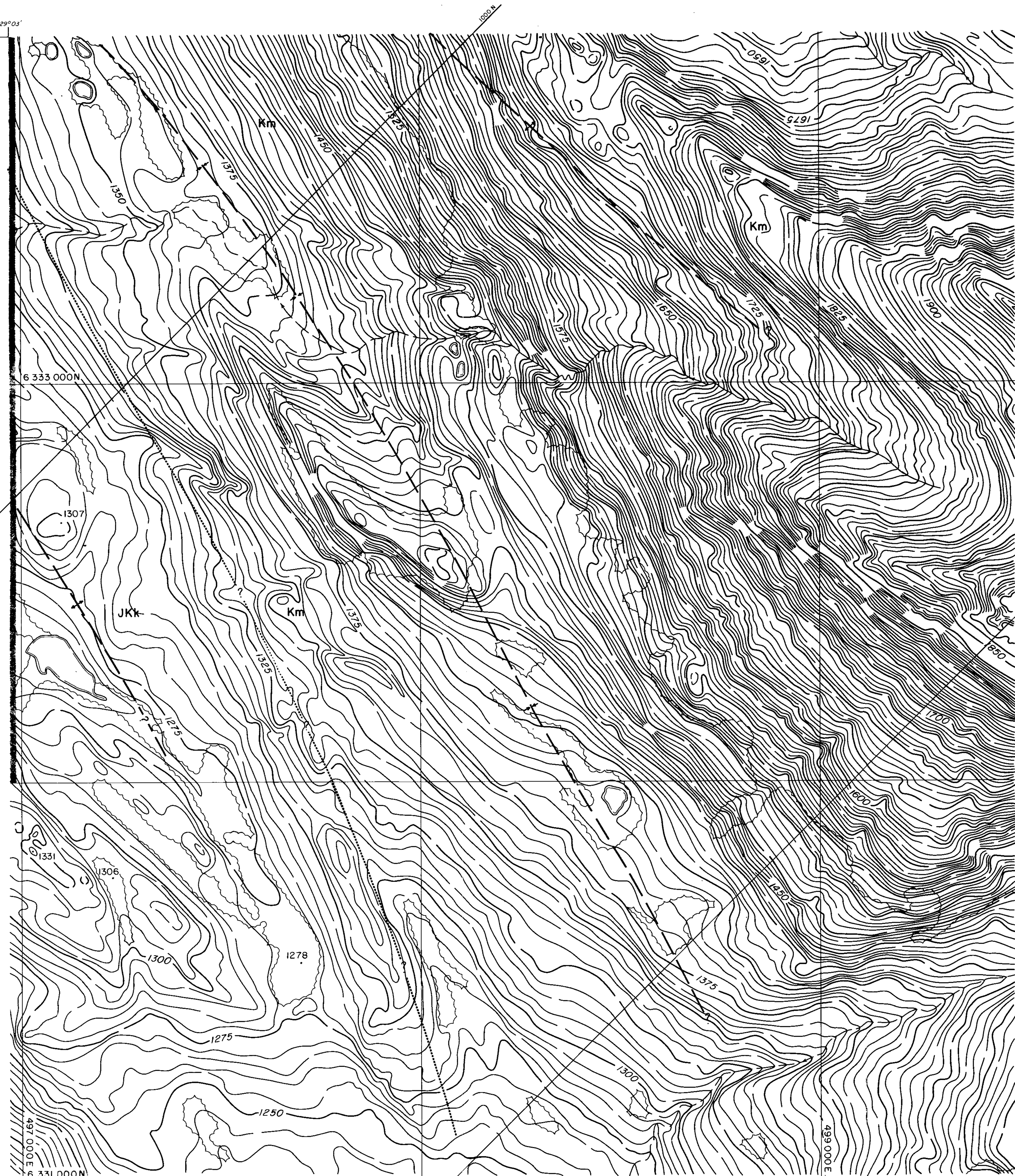
## APPENDIX II

### GEOLOGICAL MAPS
### AND
### CROSS - SECTIONS
### 1 :5 000
### 1 :10 000



GULF CANADA RESOURCES LIMITED

COAL DIVISION




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
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 - ±5·0 METERS FOR GROUND NOT OBSCURRED 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.

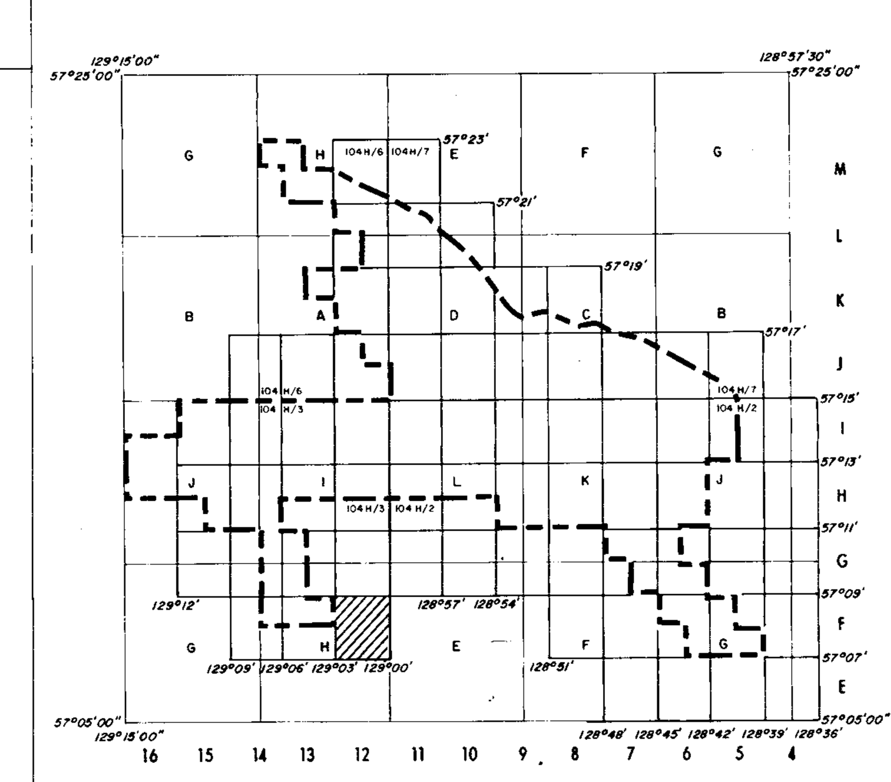
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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

**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.

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## LEGEND

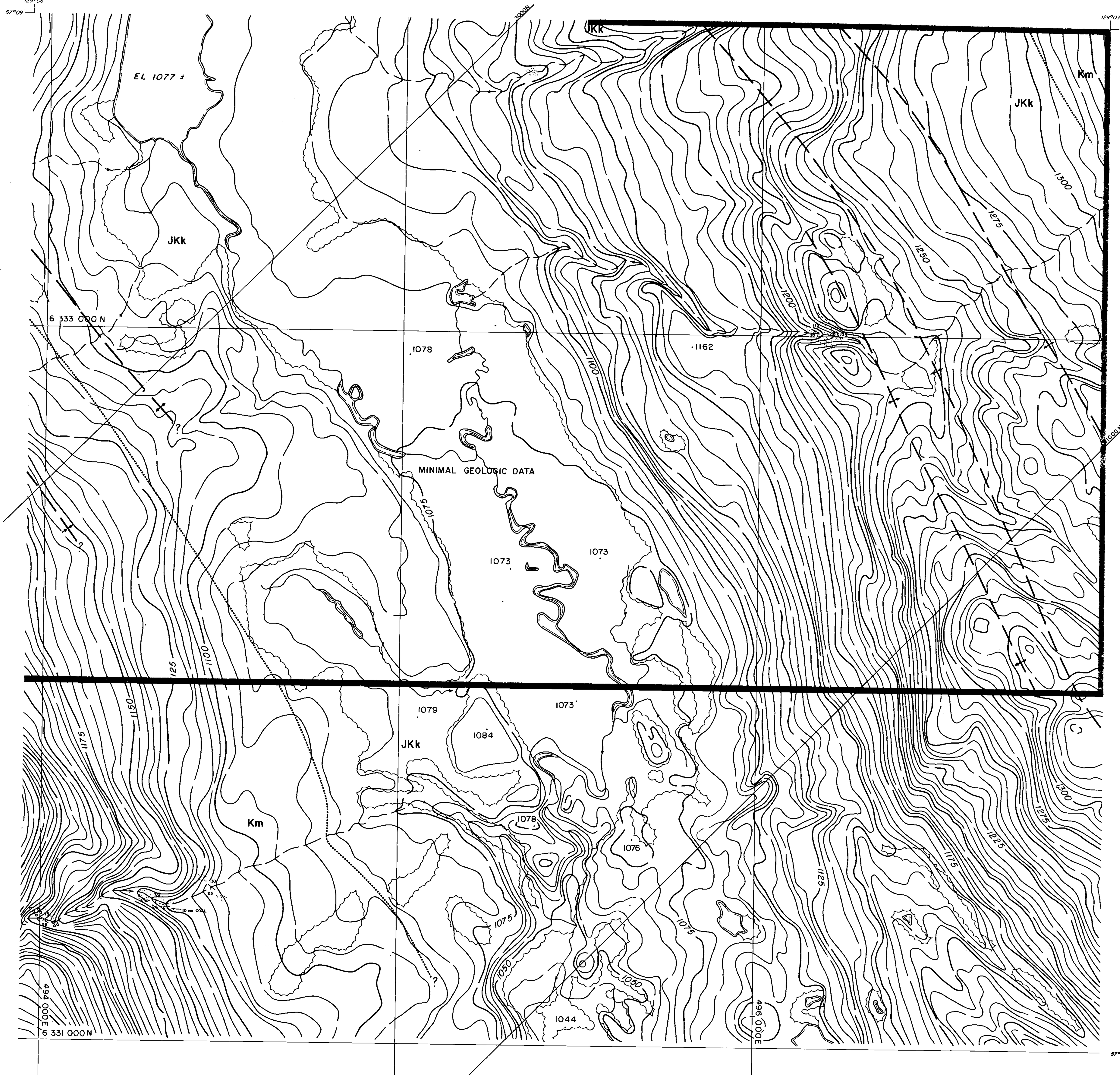
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST SIDE
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE — U D
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL — TRC84001 — SP
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION) — DDH RDH WKD
MEASURED SECTION — OTC 84001
SURVEY CAIRN — SC-17
CROSS SECTION LINE — 3000 N

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP F-12

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-01 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
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RAILROAD BED
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STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
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TREE LINE
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INTERMEDIATE
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APPROXIMATE
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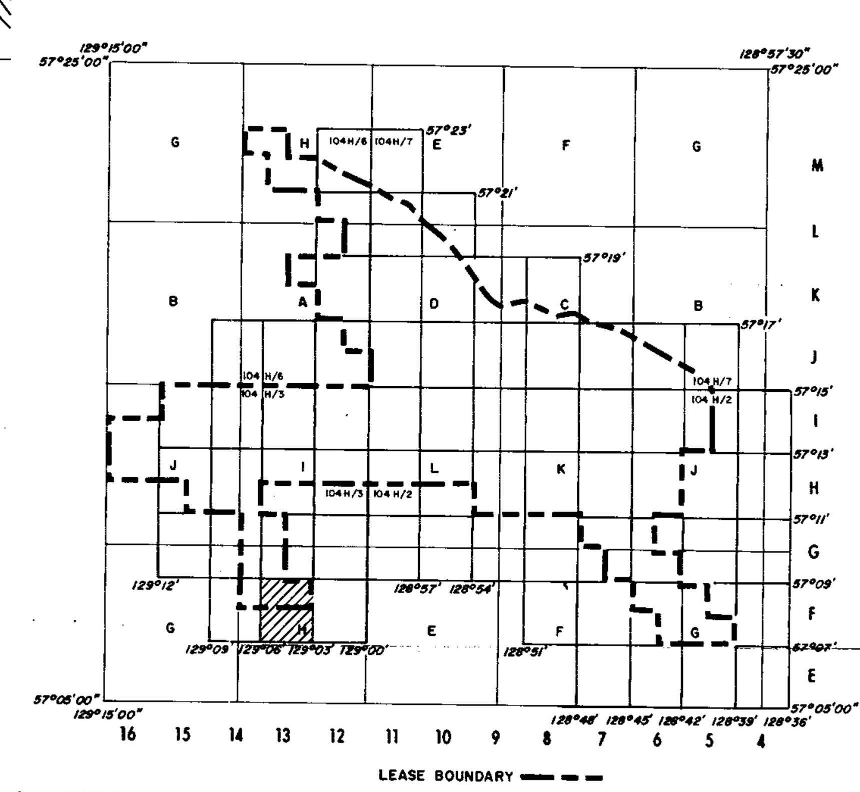
SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP

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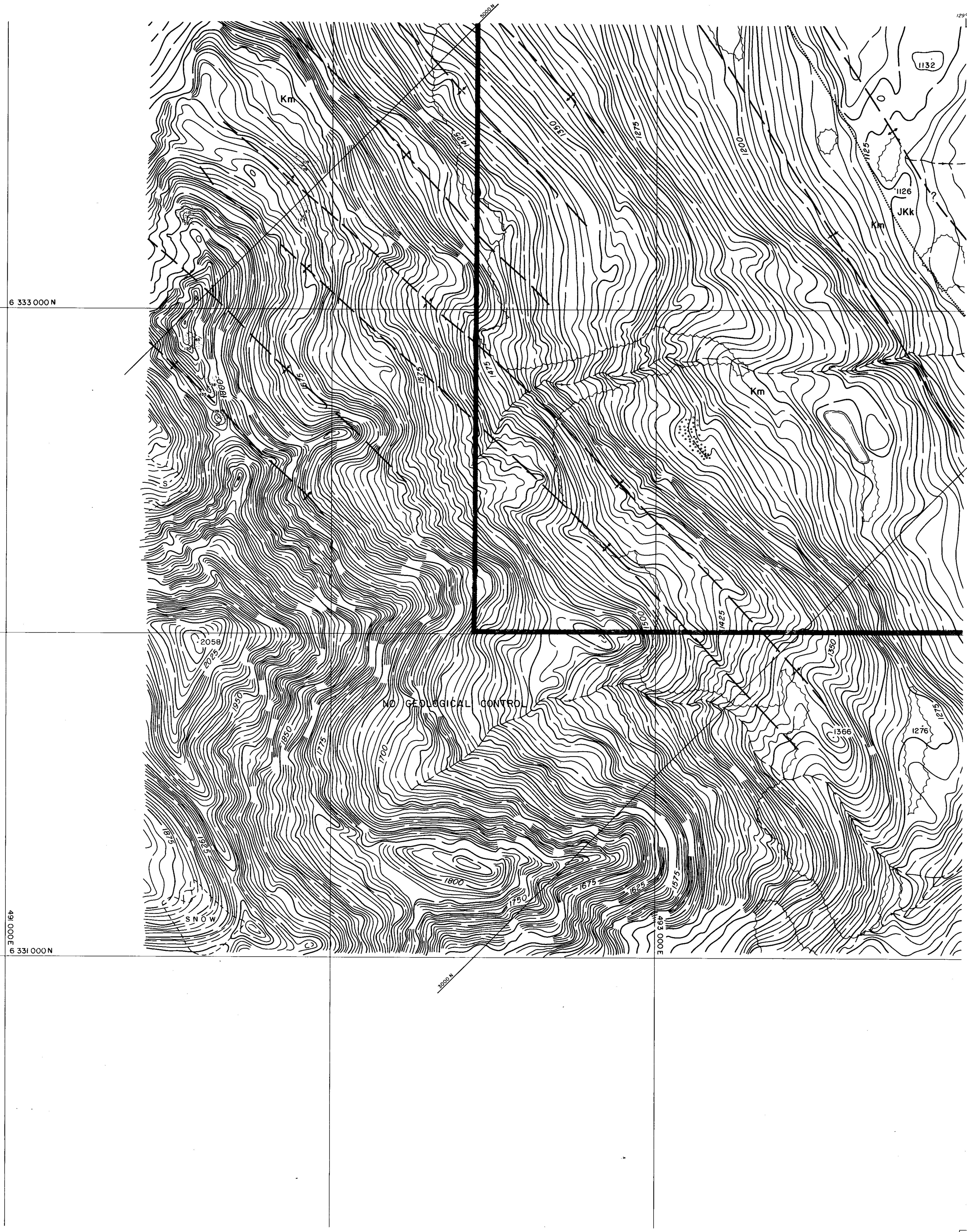
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP F-13

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-02 |




LEGEND

BUILDING
ROAD, HARD SURFACE
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STREAM, DEFINITE
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WATER LEVEL
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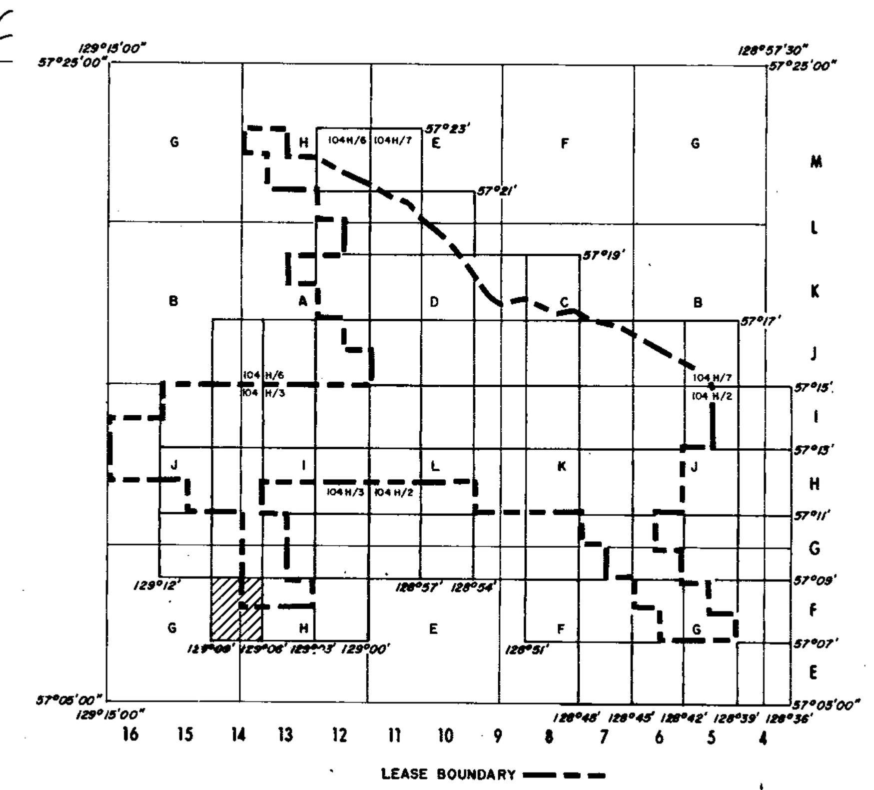
SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP

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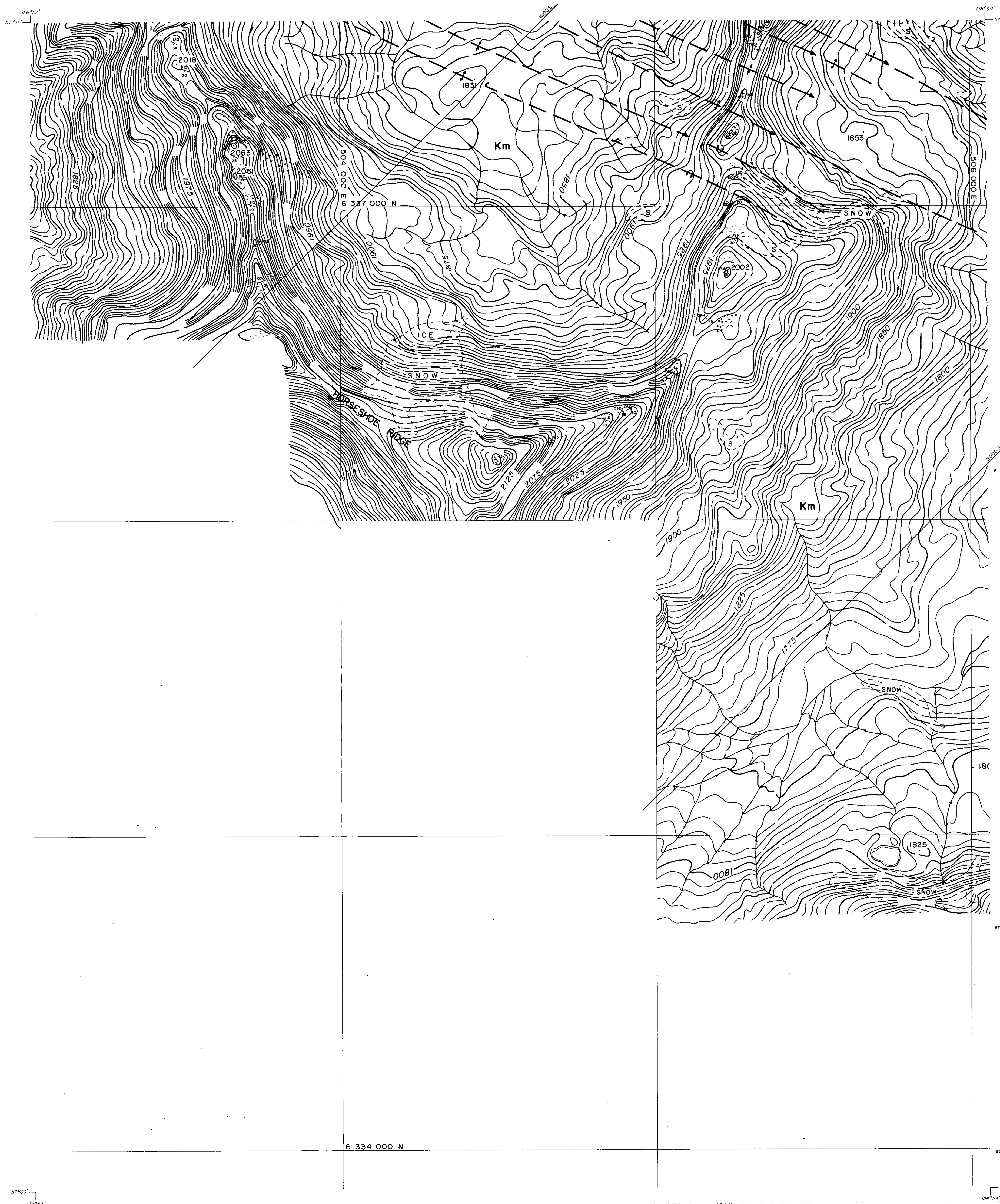
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

GULF CANADA RESOURCES LTD.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP F-14

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-03 |




LEGEND

BUILDING
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NOTES

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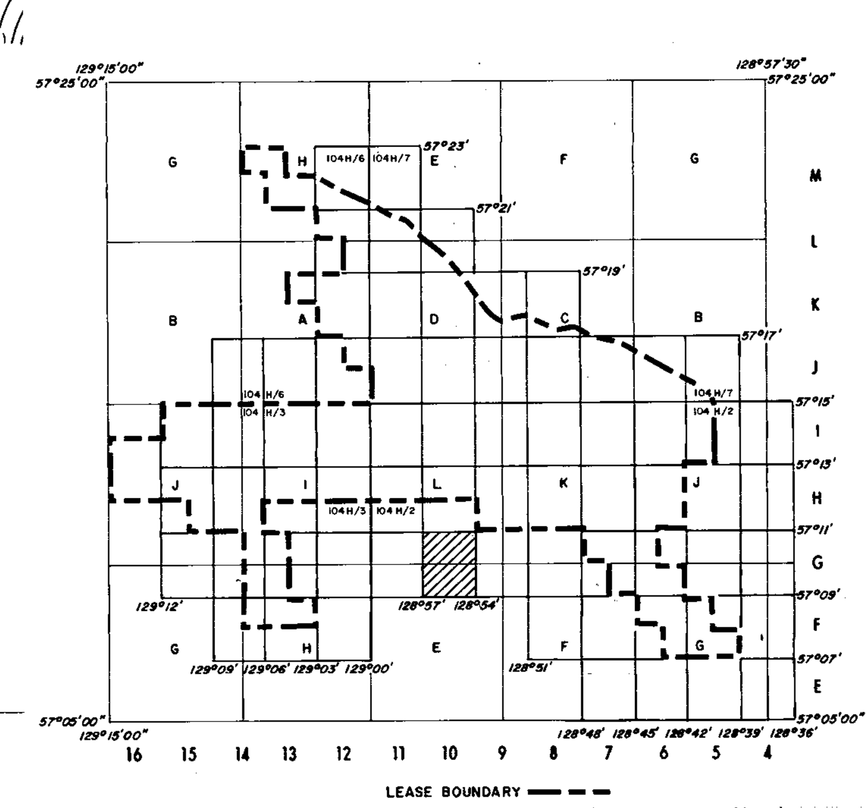
SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP

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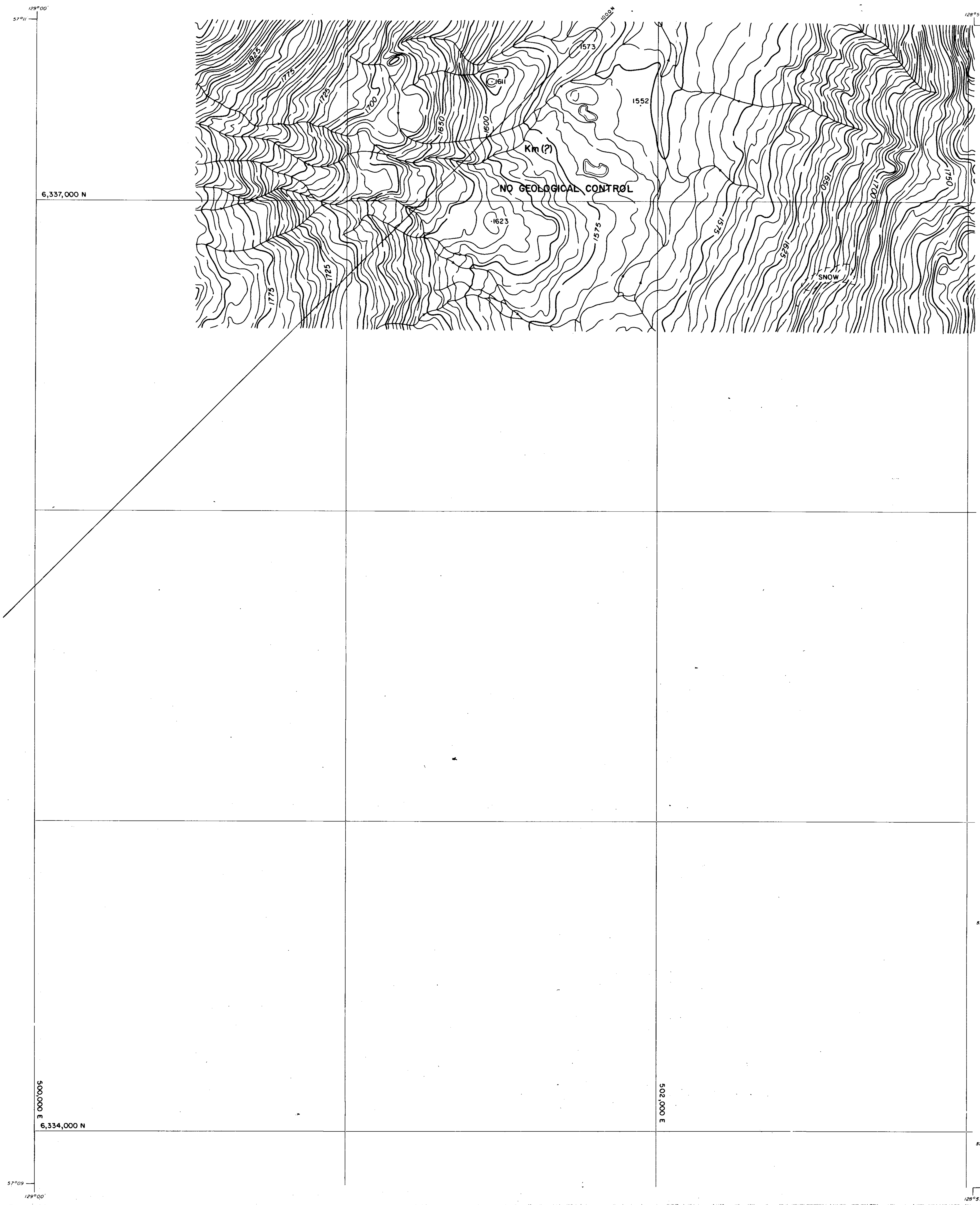
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

| GULF CANADA RESOURCES LTD.<br>Coal Division<br>CALGARY ALBERTA | Gulf |
|---|---|
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>NASS AREA<br>MAP G-10 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-04 |




LEGEND

BUILDING
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MT. KLAPPAN AREA

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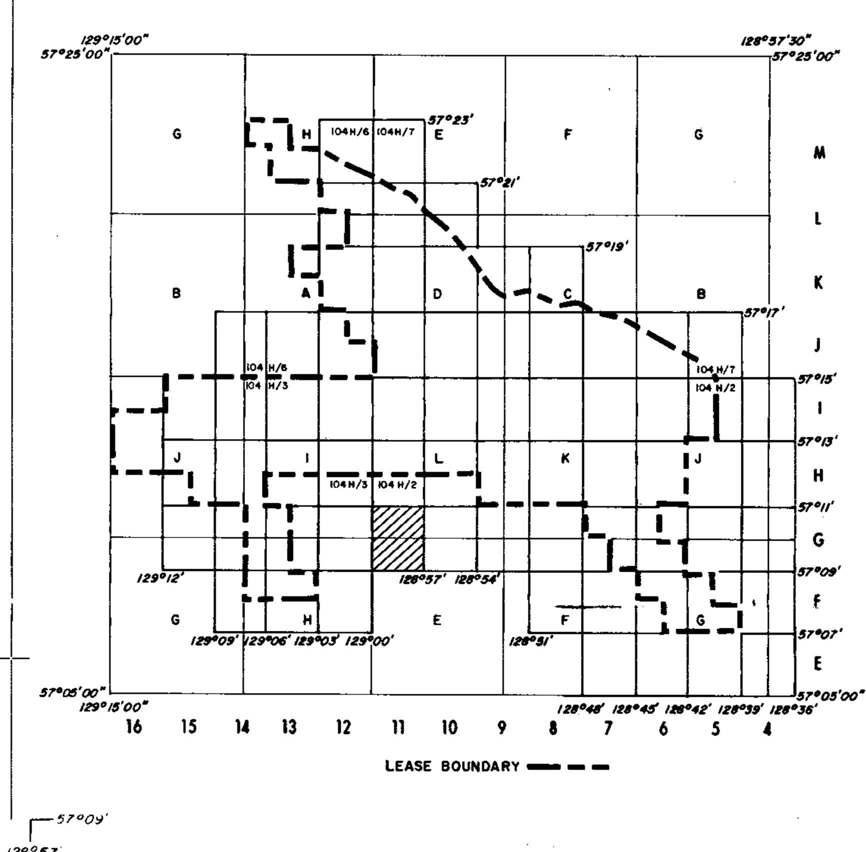


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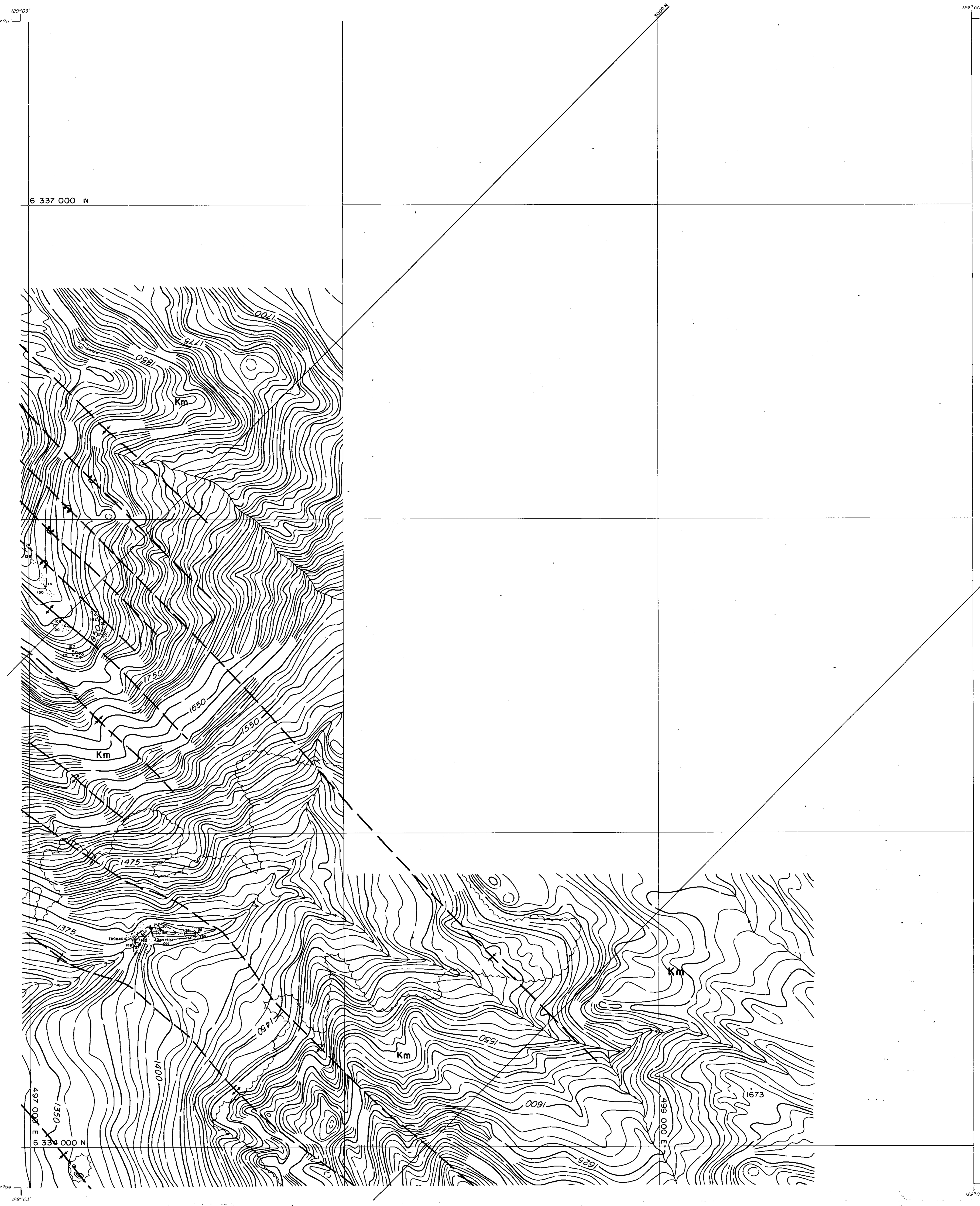
741

| | |
|---|---|
| GULF CANADA RESOURCES LTD. Coal Division CALGARY ALBERTA | Gulf |
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP NASS AREA MAP G-11 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87 NA-05 |




## LEGEND

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RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL
SWAMP
BEAVER DAM
TREE LINE
CUT LINE
CONTOURS, INDEX
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION · 7654
FORM LINES
CUT/FILL
FIELD CONTROL PT. CP 121
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 – ±5·0 METERS FOR GROUND NOT OBSCURRED 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 McLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60 000 (APPROXIMATE).

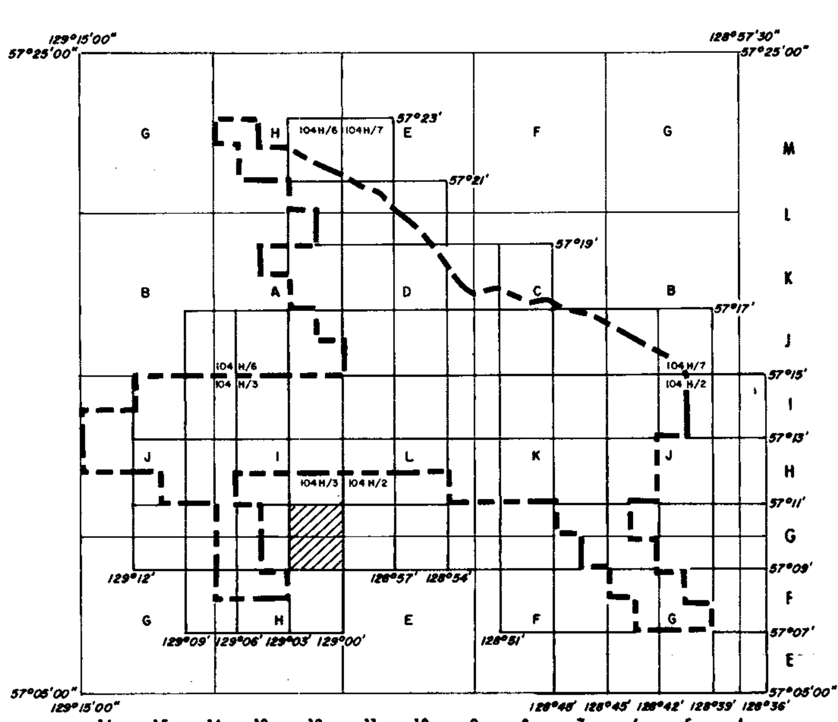
SCALE 1:5000

0 0.25 0.5 MILES

50 0 100 200 300 400 500 METERS

## MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

### 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

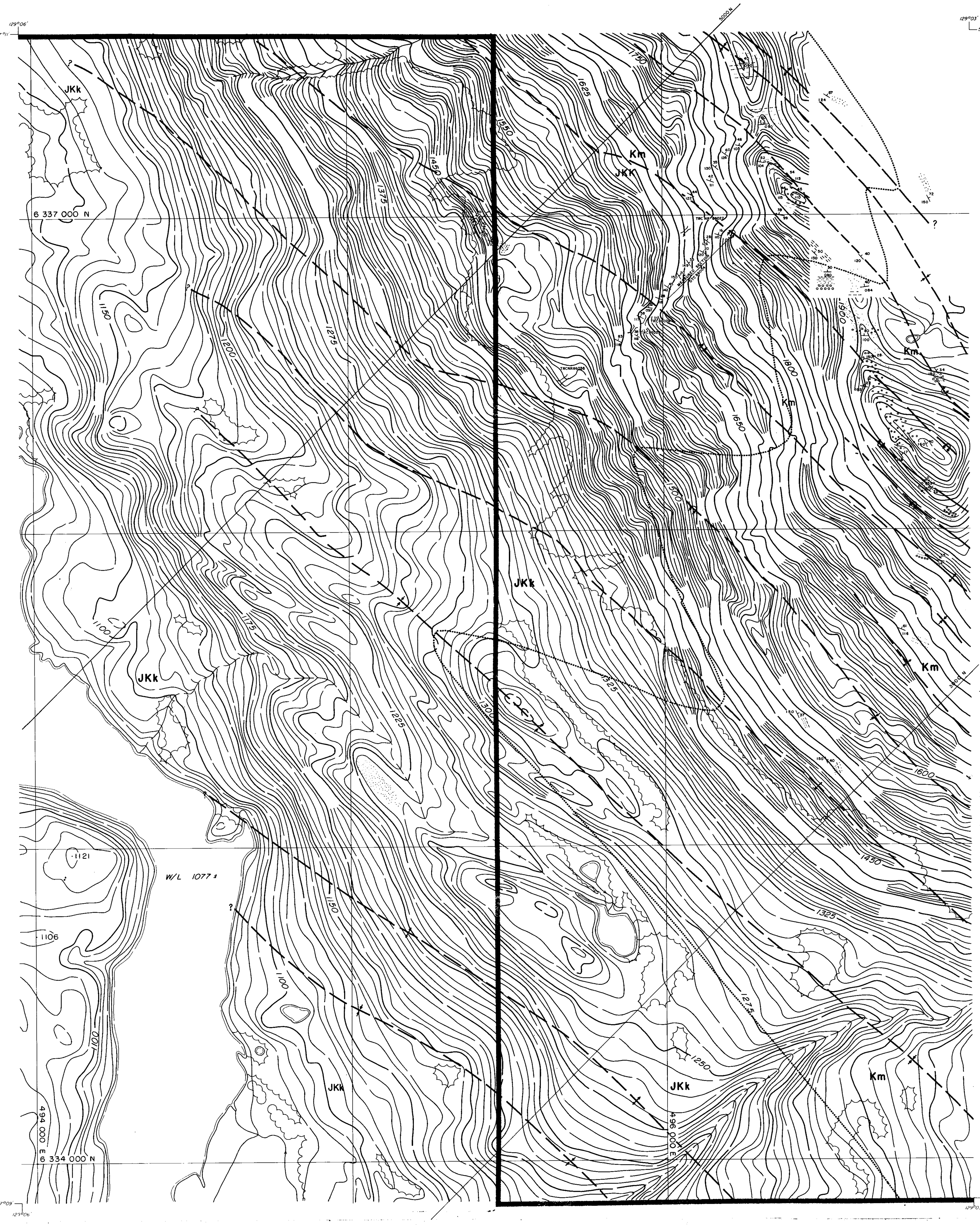
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST SIDE
U D FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP G-12

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-06 |




## LEGEND

BUILDING

ROAD, HARD SURFACE

LOOSE SURFACE

CART TRACK

TRAIL

RAILROAD BED

RIVER

STREAM, DEFINITE

APPROXIMATE

SPLIT

LAKE

WATER LEVEL — EL 505±

SWAMP

BEAVER DAM — B.D. B.D.

TREE LINE

CUT LINE

CONTOURS, INDEX — 1750

INTERMEDIATE

DEPRESSION

APPROXIMATE

SPOT ELEVATION — ·7654

FORM LINES

CUT/FILL

FIELD CONTROL POINT — CP 121

COAL LICENCE

## NOTES

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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 GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60 000 (APPROXIMATE)

N

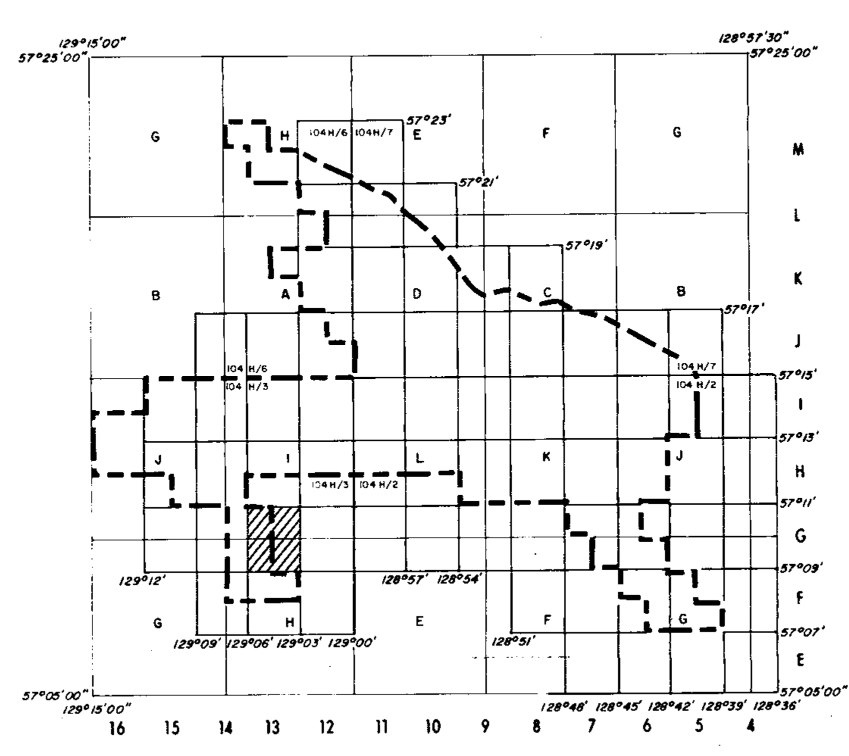
SCALE 1:5000

0 0.25 0.5 MILES

50 0 100 200 300 400 500 METERS

## 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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## LEGEND

LICENCE BOUNDARY

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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 UPTHRUST SIDE

U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE

FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT

TRC84001 SP — ADIT TRENCH COAL SPOIL

DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)

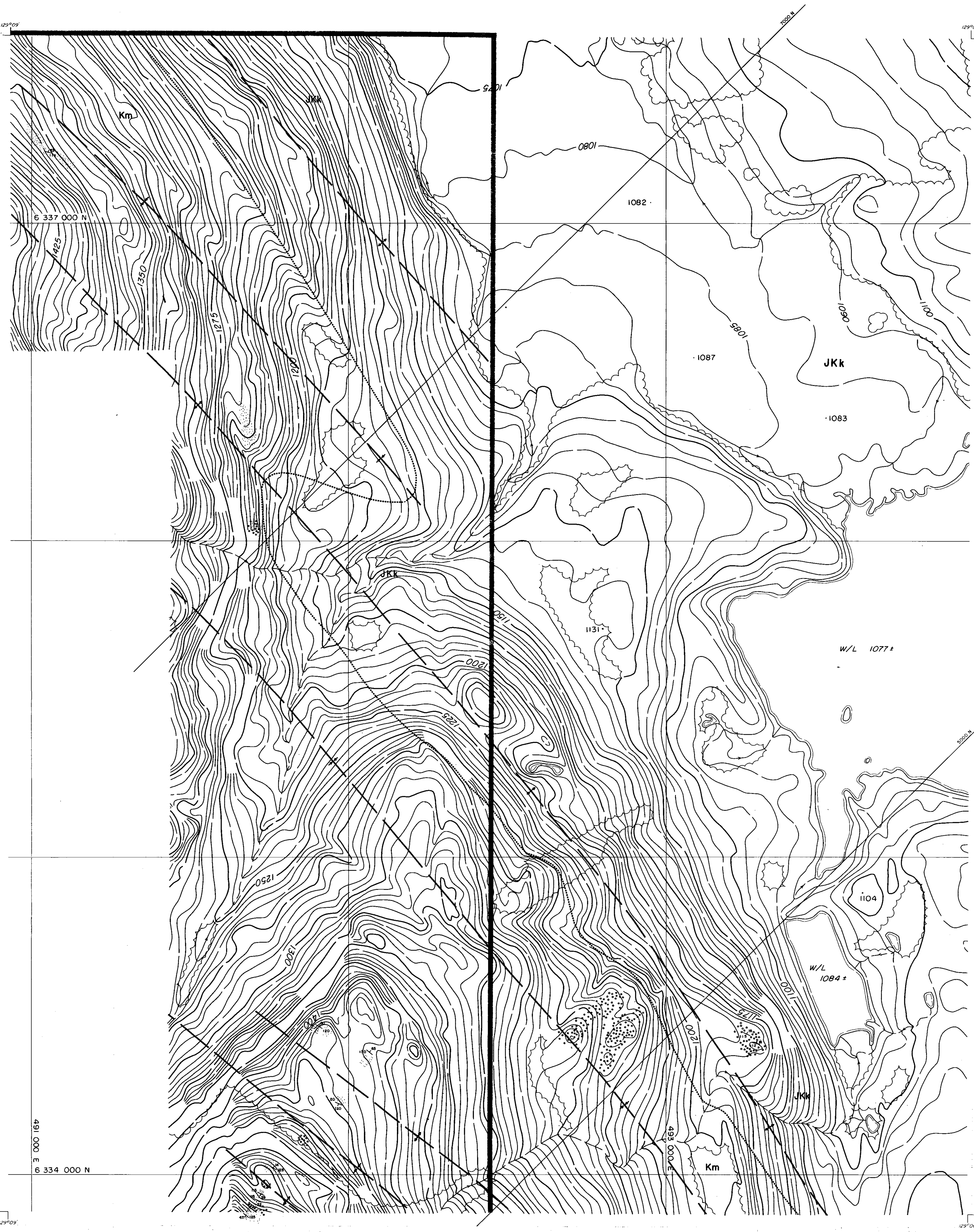
OTC 84001 — MEASURED SECTION

SC-17 — SURVEY CAIRN

3000 N — CROSS SECTION LINE

741

| GULF CANADA RESOURCES LTD.<br>Coal Division<br>CALGARY ALBERTA | Gulf |
|---|---|
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>NASS AREA<br>MAP G-13 | |
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-07 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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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 GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60 000 (APPROXIMATE)

N

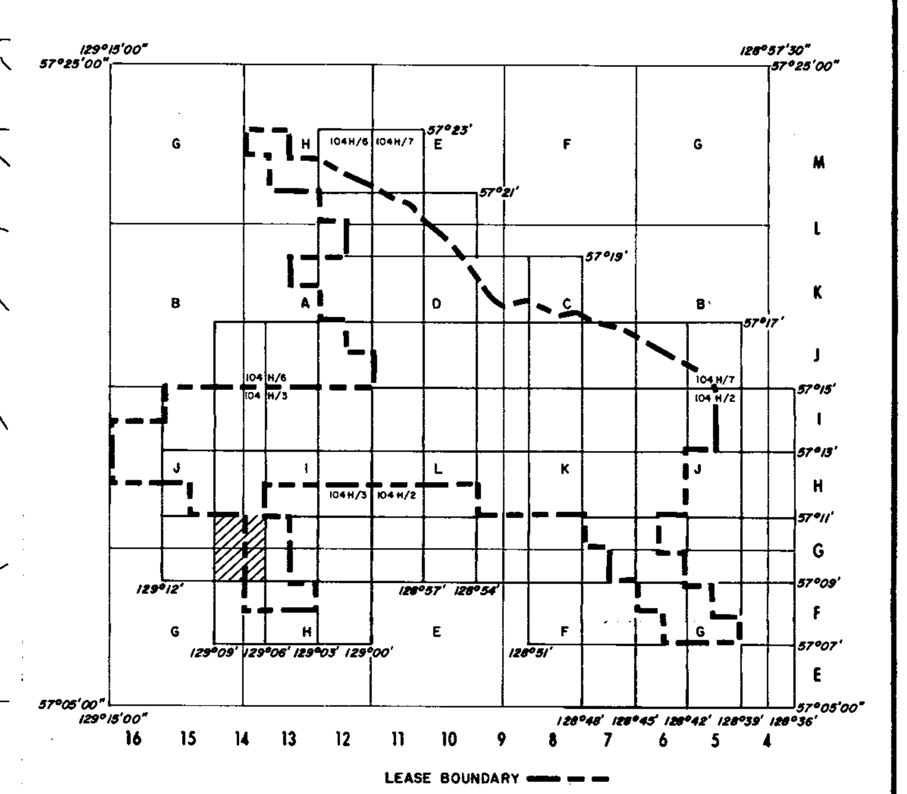
SCALE 1:5000

0 — 0.25 — 0.5 MILES

50 0 100 200 300 400 500 METERS

## MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

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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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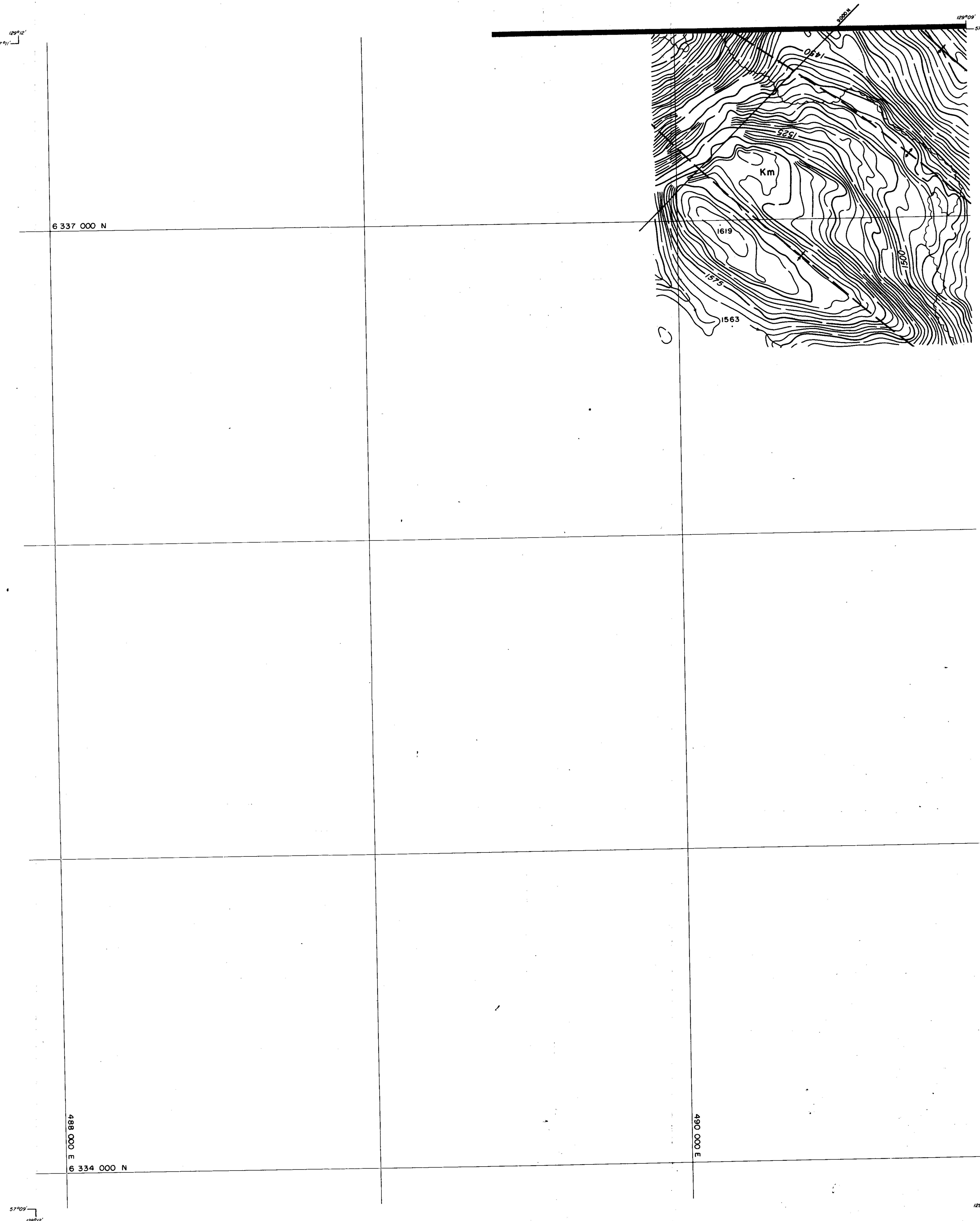
U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 — SP — ADIT TRENCH COAL SPOIL
DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
2000 N — CROSS SECTION LINE

741

| | |
|---|---|
| **GULF CANADA RESOURCES LTD.** Coal Division — CALGARY, ALBERTA | Gulf |
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>NASS AREA<br>MAP G-14 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR.1988 | DRAWING No. KPN87NA-08 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505'
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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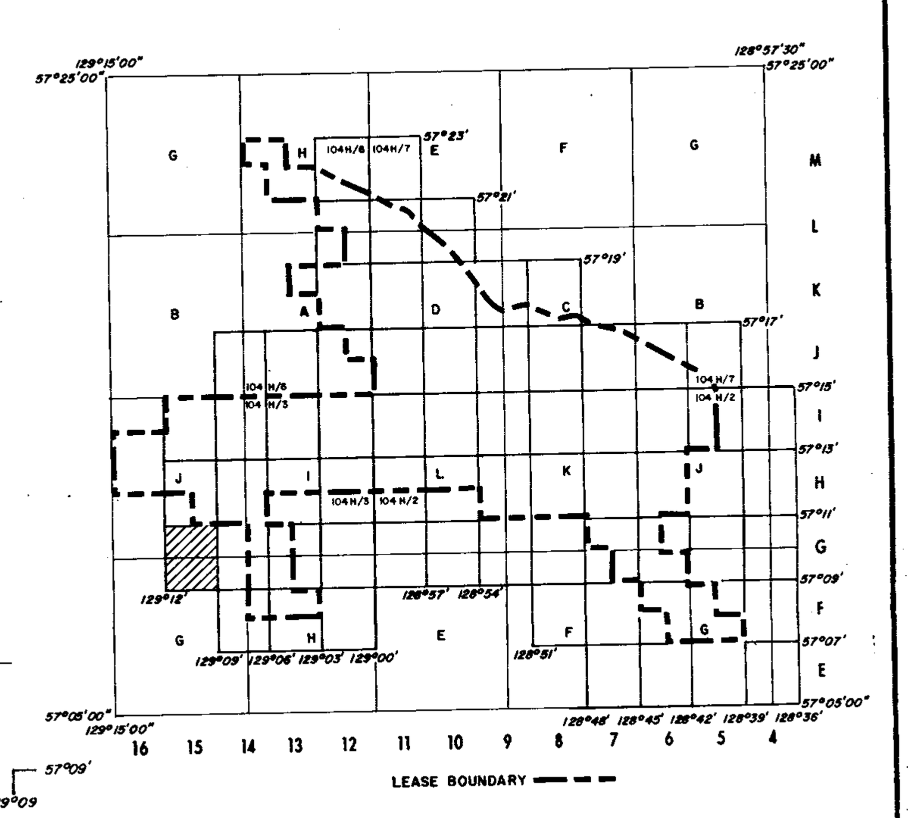
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL 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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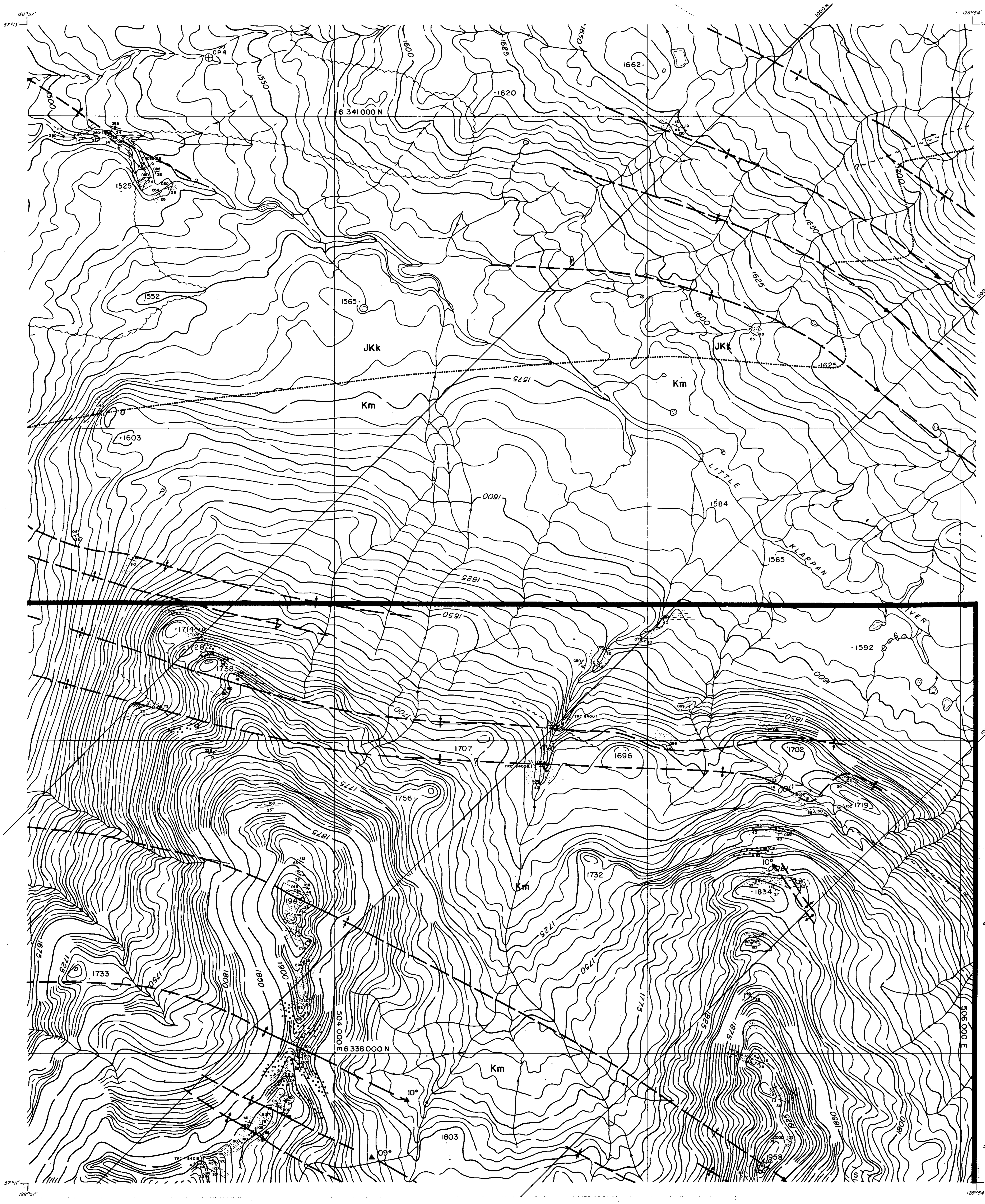
LEGEND

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 UPTHRUST 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

741

| GULF CANADA RESOURCES LTD. Coal Division CALGARY ALBERTA | |
|---|---|
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP NASS AREA MAP G-15 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR.1988 | DRAWING No. KPN87NA-09 |




## LEGEND

- BUILDING
- ROAD, HARD SURFACE
  - LOOSE SURFACE
  - CART TRACK
  - TRAIL
- RAILROAD BED
- RIVER
- STREAM, DEFINITE
  - APPROXIMATE
  - SPLIT
- LAKE
- WATER LEVEL — EL 505
- SWAMP
- BEAVER DAM — B.D.
- TREE LINE
- CUT LINE
- CONTOURS, INDEX — 1750
  - INTERMEDIATE
  - DEPRESSION
  - APPROXIMATE
- SPOT ELEVATION — ·7654
- FORM LINES
- CUT/FILL
- FIELD CONTROL POINT — CP 121
- COAL LICENCE

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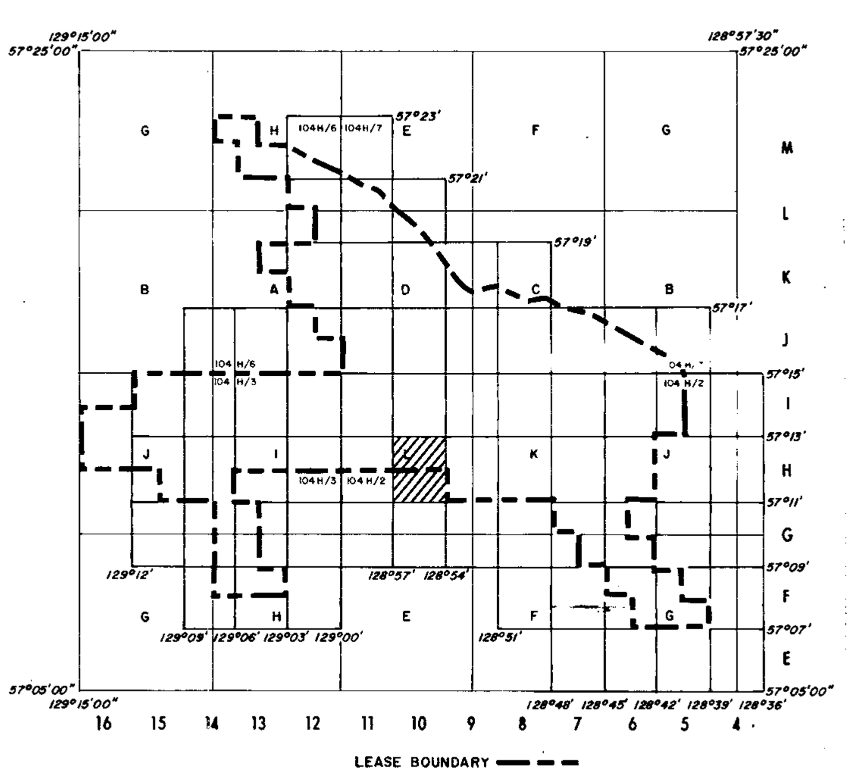
SCALE 1:5000

### MT. KLAPPAN AREA

INDEX MAP




## 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 UPTHRUST SIDE
- FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE — U / D
- FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
- ADIT — TRENCH (TRC84001) — COAL SPOIL (SP)
- DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION) — DDH RDH WKD
- MEASURED SECTION — DTC 84001
- SURVEY CAIRN — SC-17
- CROSS SECTION LINE — 3000 N

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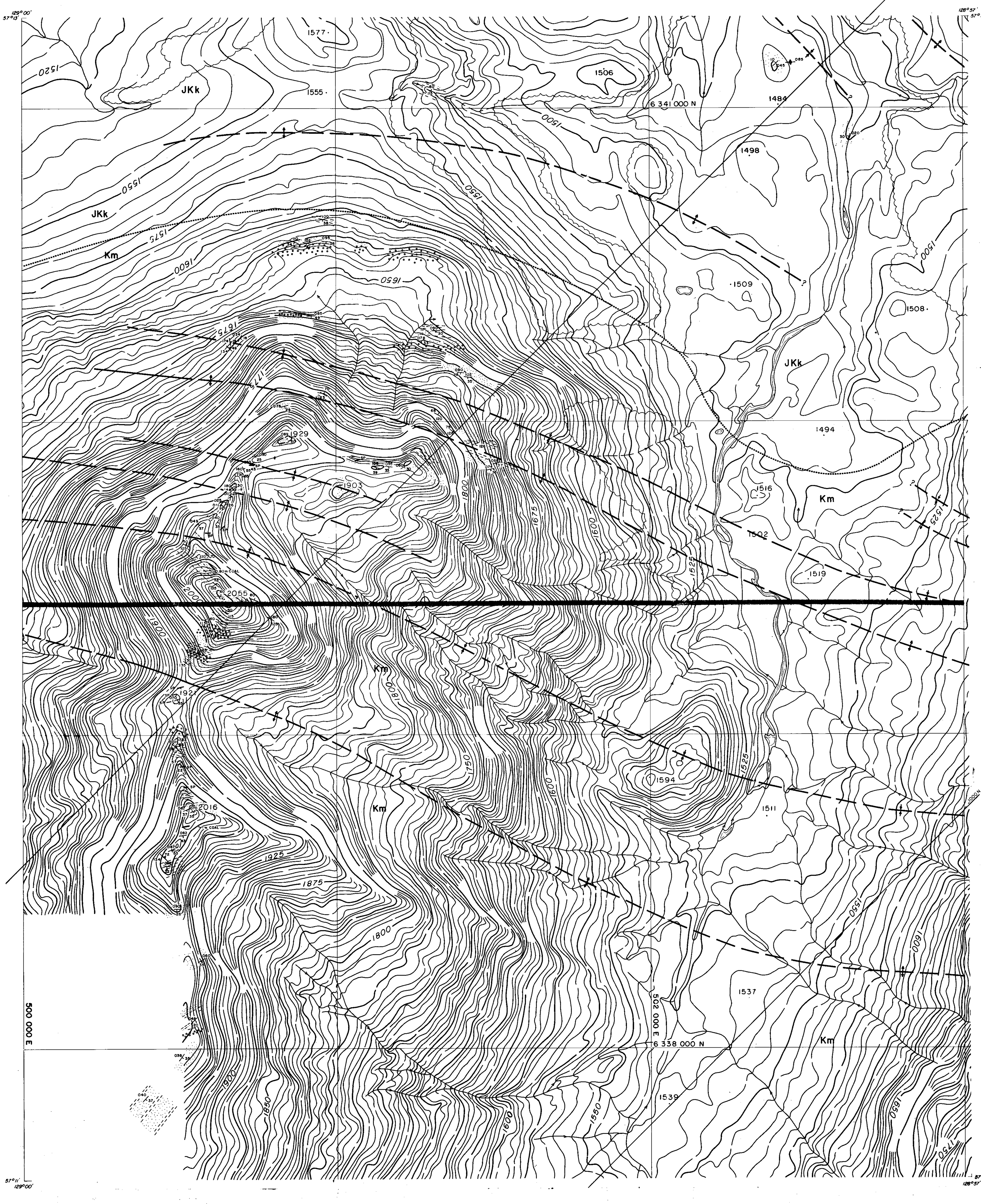
741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP H-10

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-10 |




## LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D. B.D
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP(2)
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 - ±5.0 METERS FOR GROUND NOT OBSCURED 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 McLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUG. /67 AT A SCALE OF 1:60 000 (APPROXIMATE).

N

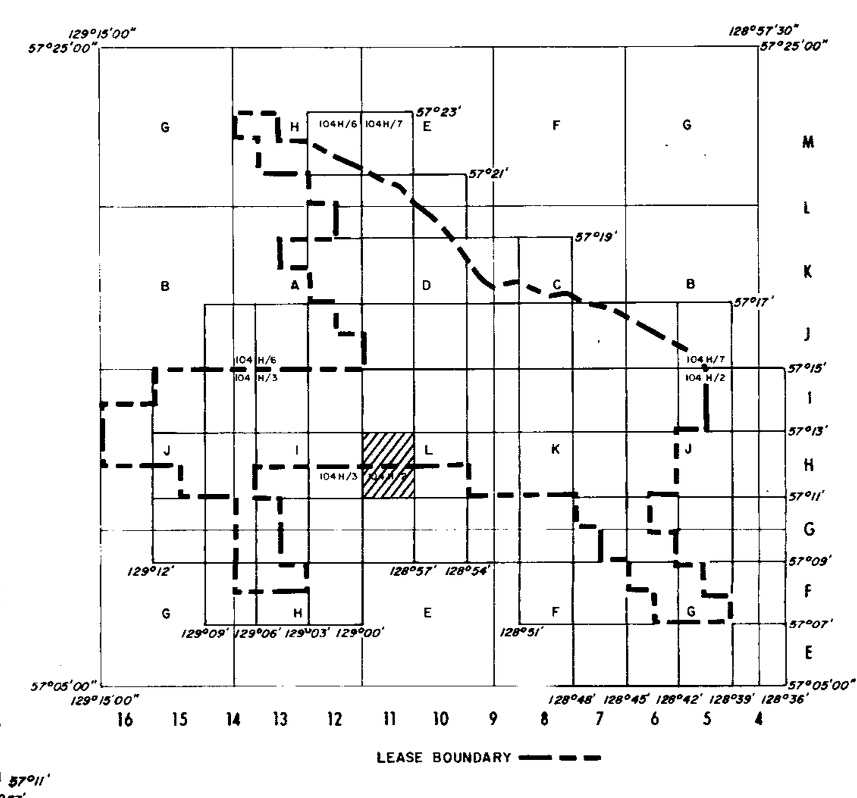
SCALE 1:5000

0 0.25 0.5 MILES

50 0 100 200 300 400 500 METERS

## MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

### 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

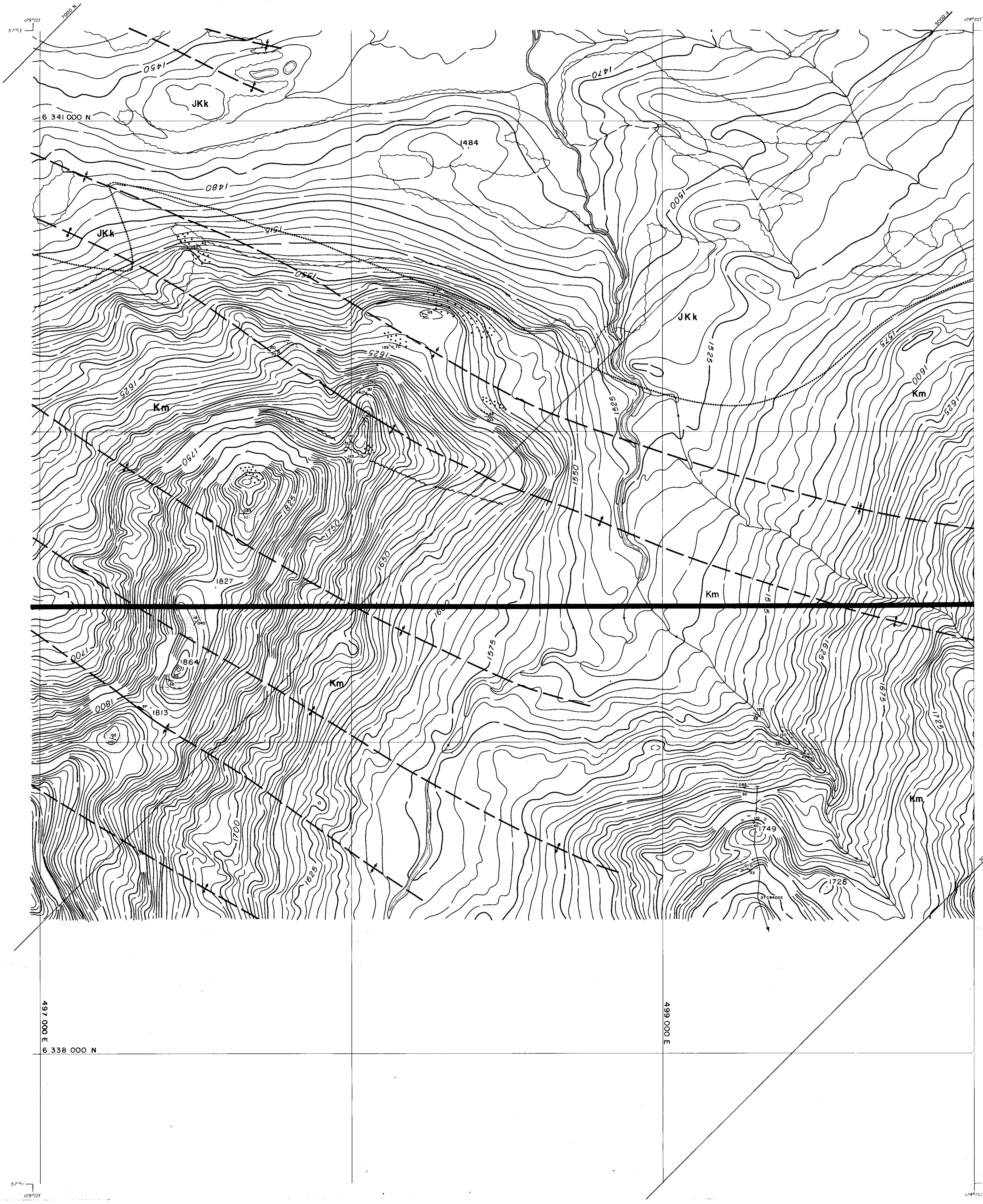
**Js** — Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are 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 UPTHRUST SIDE
U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP — ADIT TRENCH COAL SPOIL
DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
3000 N — CROSS SECTION LINE

741

| | |
|---|---|
| **GULF CANADA RESOURCES LTD.** Coal Division CALGARY ALBERTA | Gulf |
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP NASS AREA MAP H-11 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-11 |




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 — 7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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

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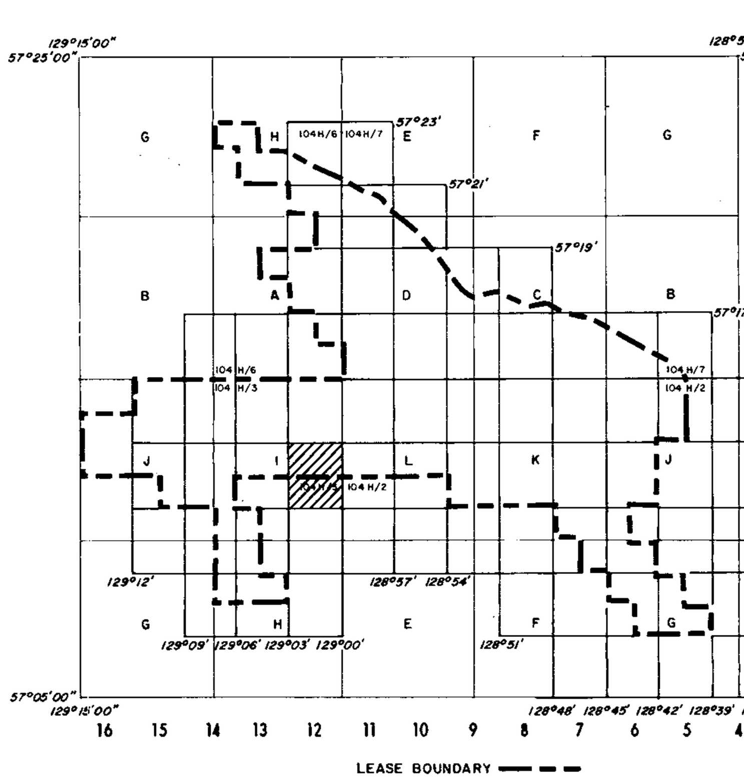
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL 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

**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.

SPATSIZI SEQUENCE

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LEGEND

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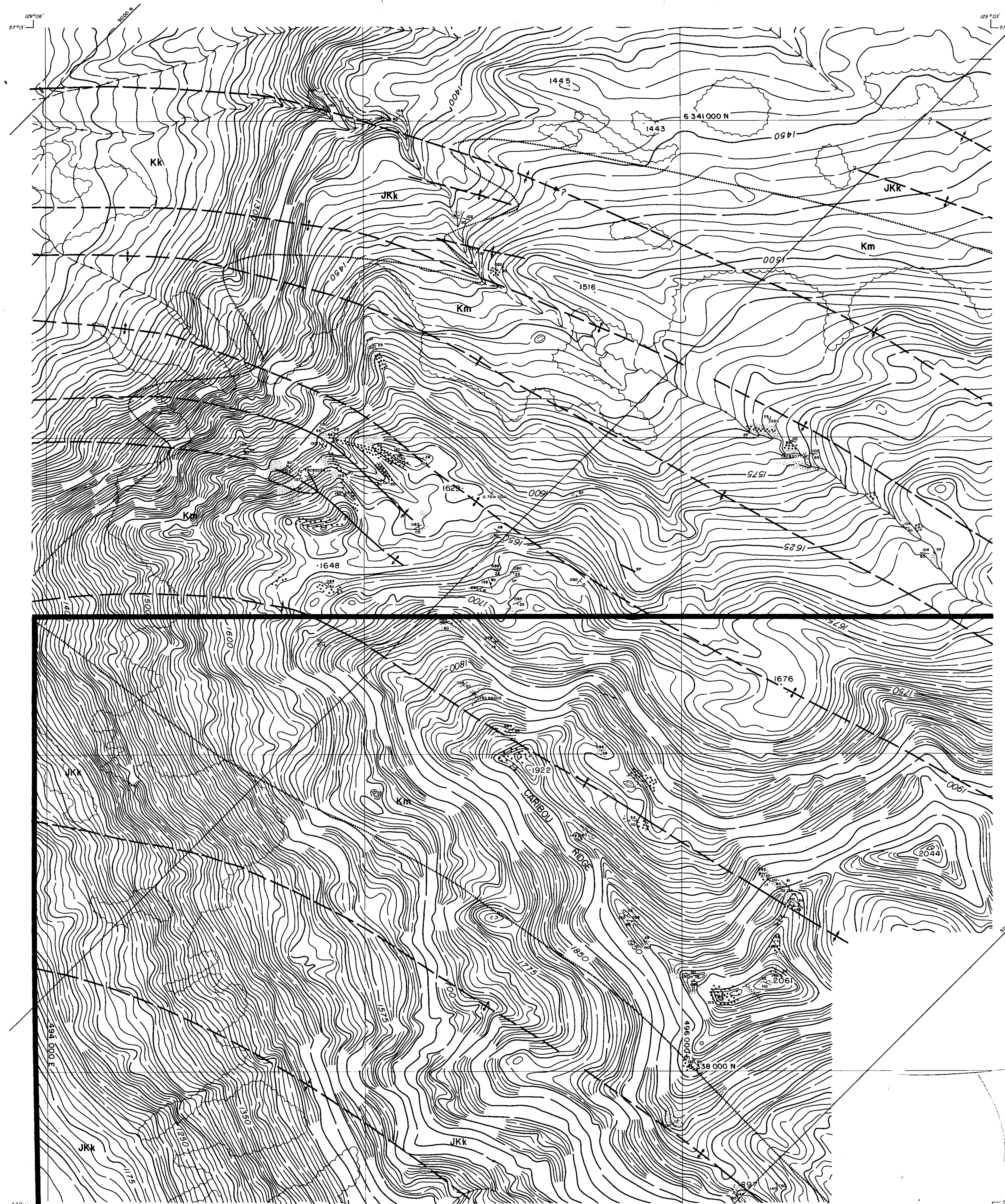
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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
3000 N CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP H-12

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-12 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
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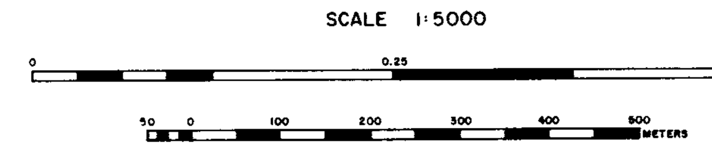
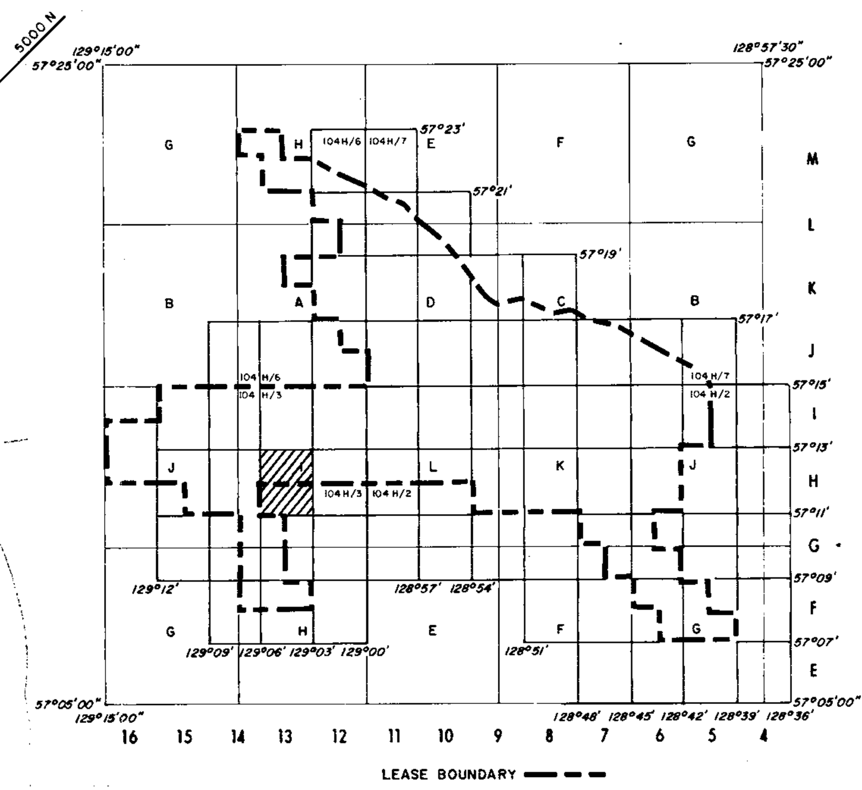
SCALE 1:5000




MT. KLAPPAN AREA

INDEX MAP

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LEGEND

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COAL SEAM (DEFINED, INFERRED)
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OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
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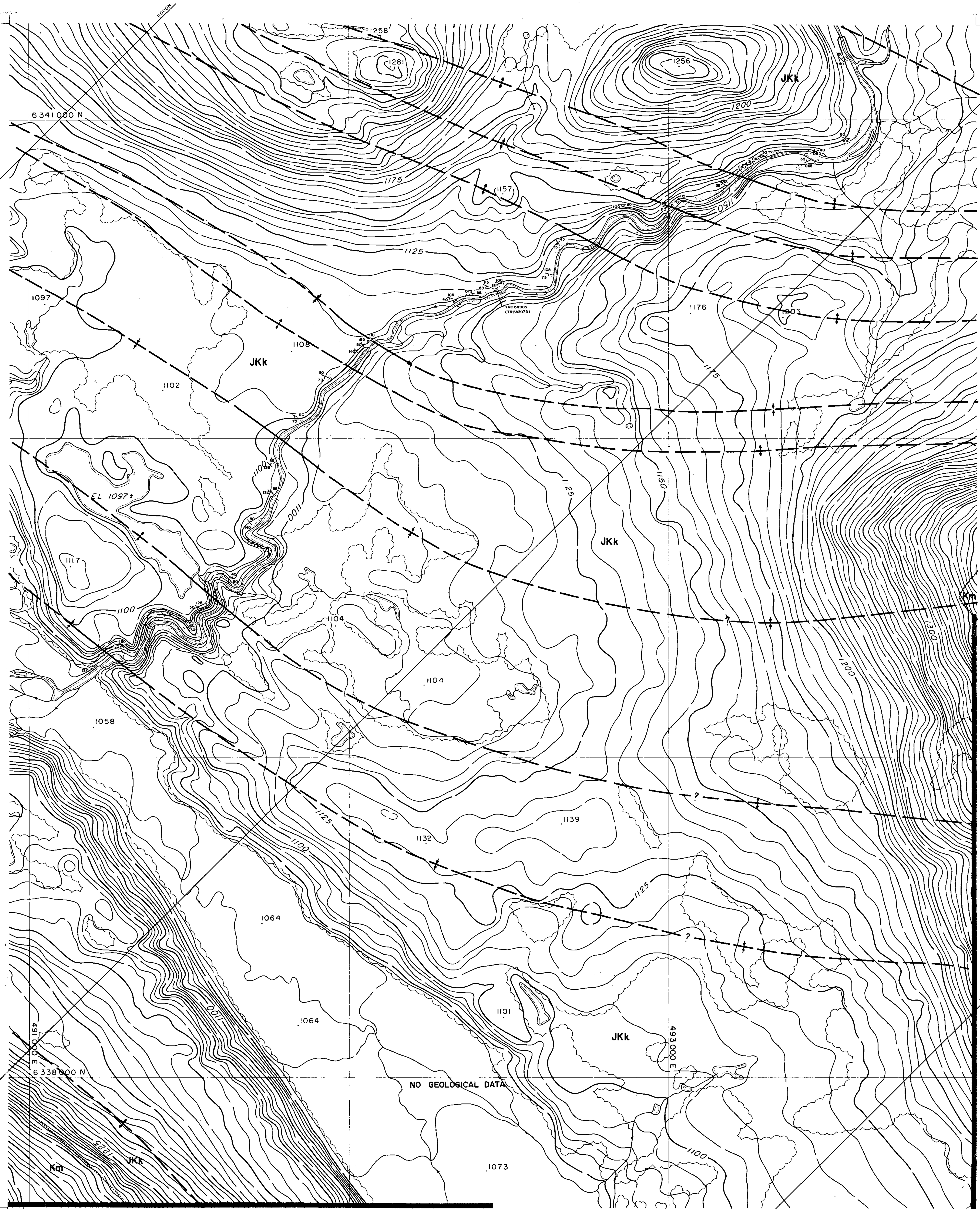
U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 — SP — ADIT TRENCH COAL SPOIL
DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
3000 N — CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP H-13

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-13 |




## LEGEND

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

## NOTES

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

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RAILROAD BED LOCATION BASED ON SEPT/82 AERIAL PHOTOGRAPHY

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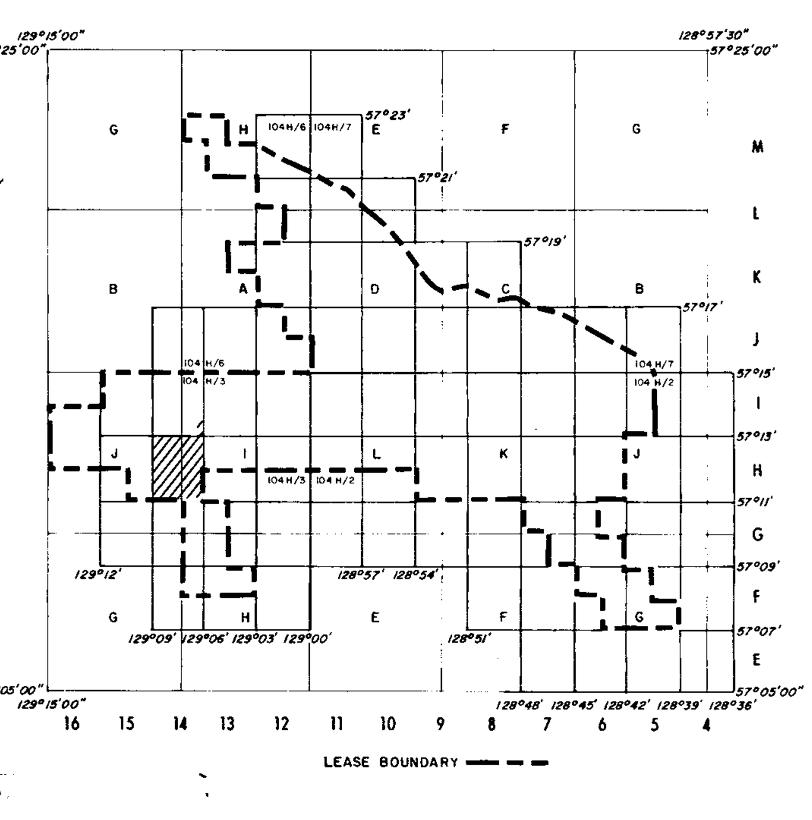
SCALE 1:5000

MILES

METERS

## MT. KLAPPAN AREA

INDEX MAP

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## LEGEND

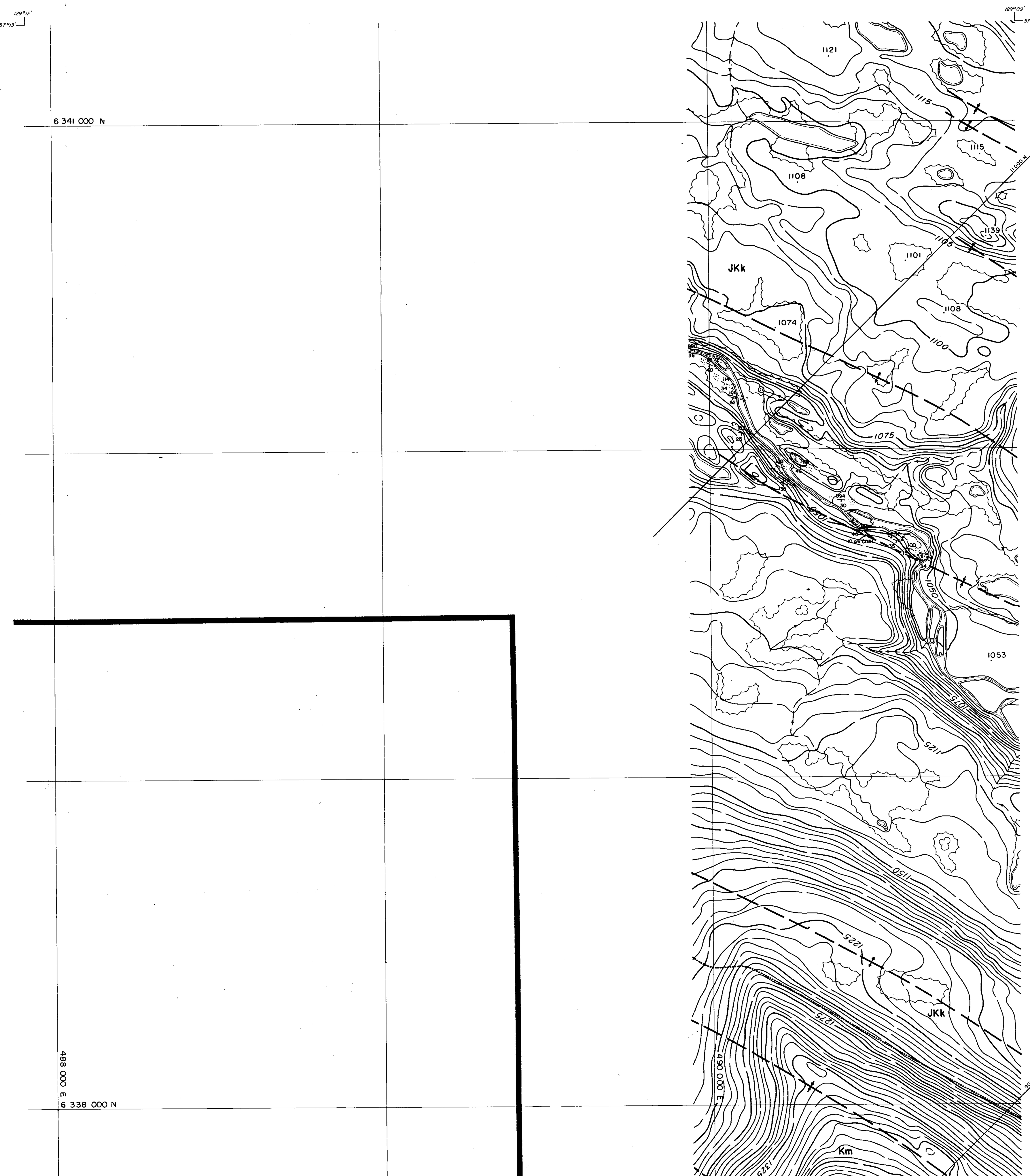
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST SIDE
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP H-14

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-14 |




## LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D. B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
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SPOT ELEVATION — ·7654
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## NOTES

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N

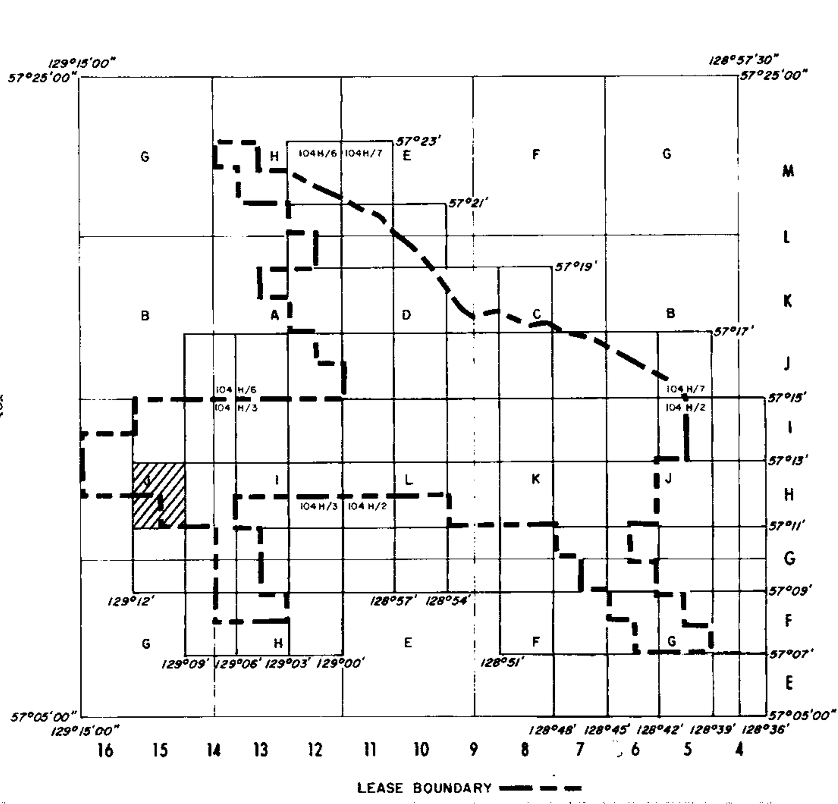
SCALE 1:5000

0 0.25 0.5 MILES

50 0 100 200 300 400 500 METERS

## MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

## 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)
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FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
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THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST SIDE
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL — TRC84001 — SP
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION) — DDH RDH WKD
MEASURED SECTION — DTC 84001
SURVEY CAIRN — SC-17
CROSS SECTION LINE — 3000 N

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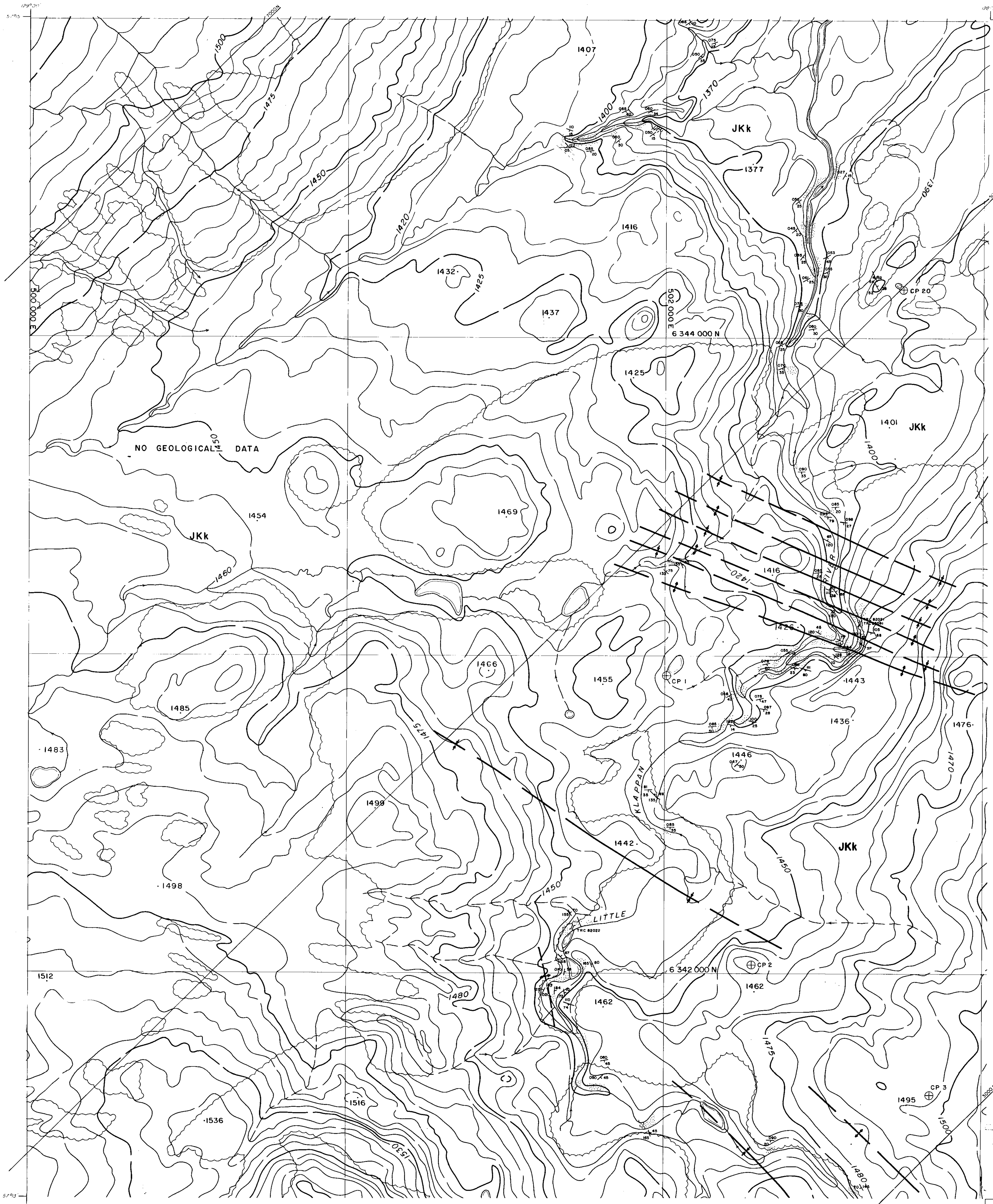
741

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

Gulf

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP H-15

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-15 |




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 - ±5.0 METERS FOR GROUND NOT OBSCURRED 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.

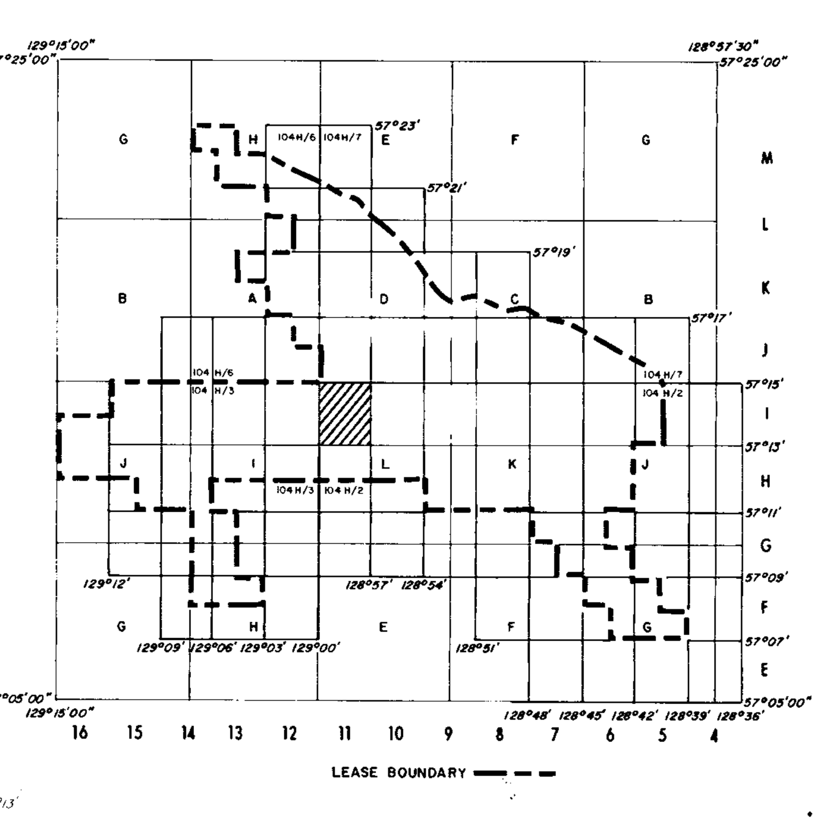
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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

**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

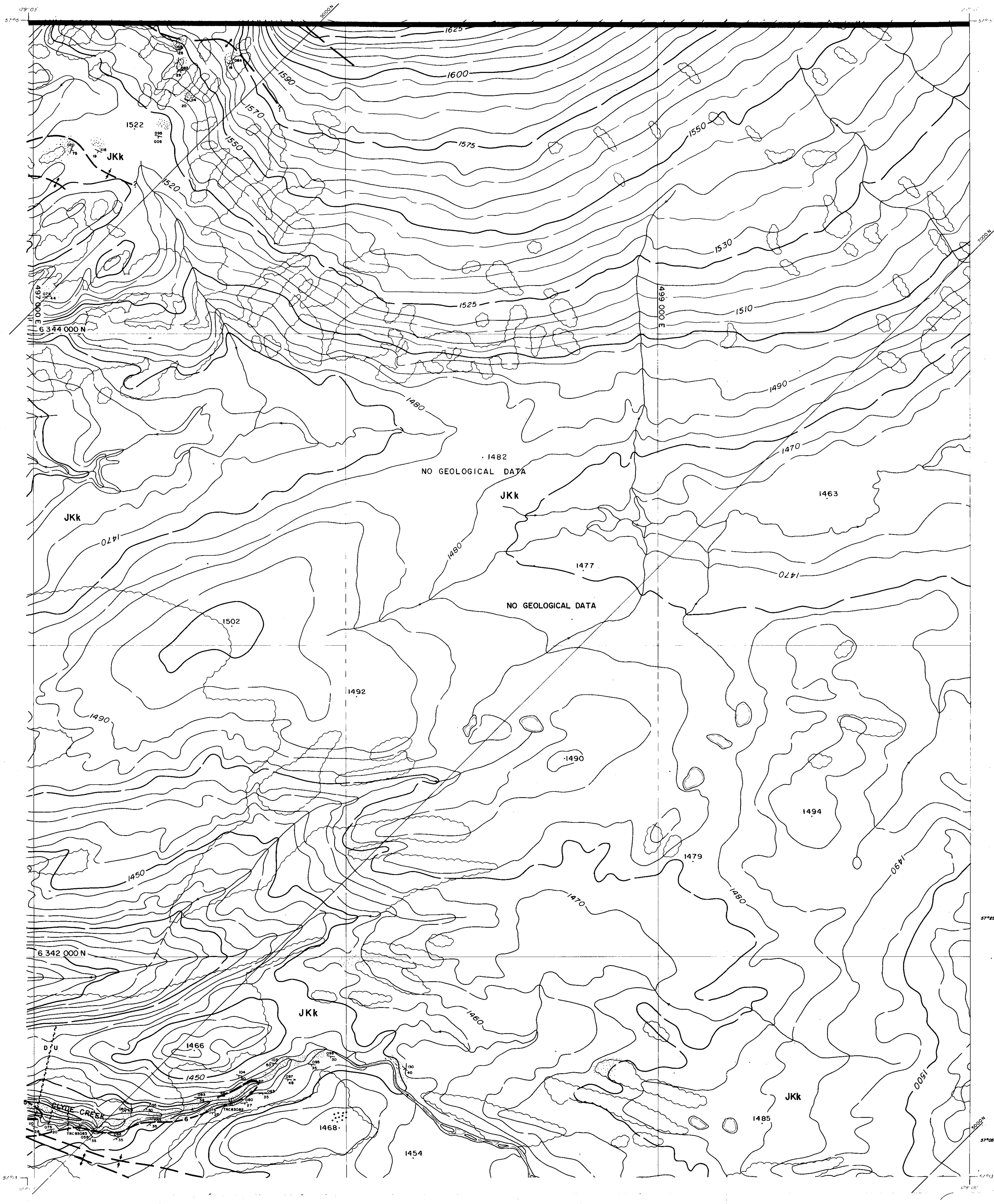
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare.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

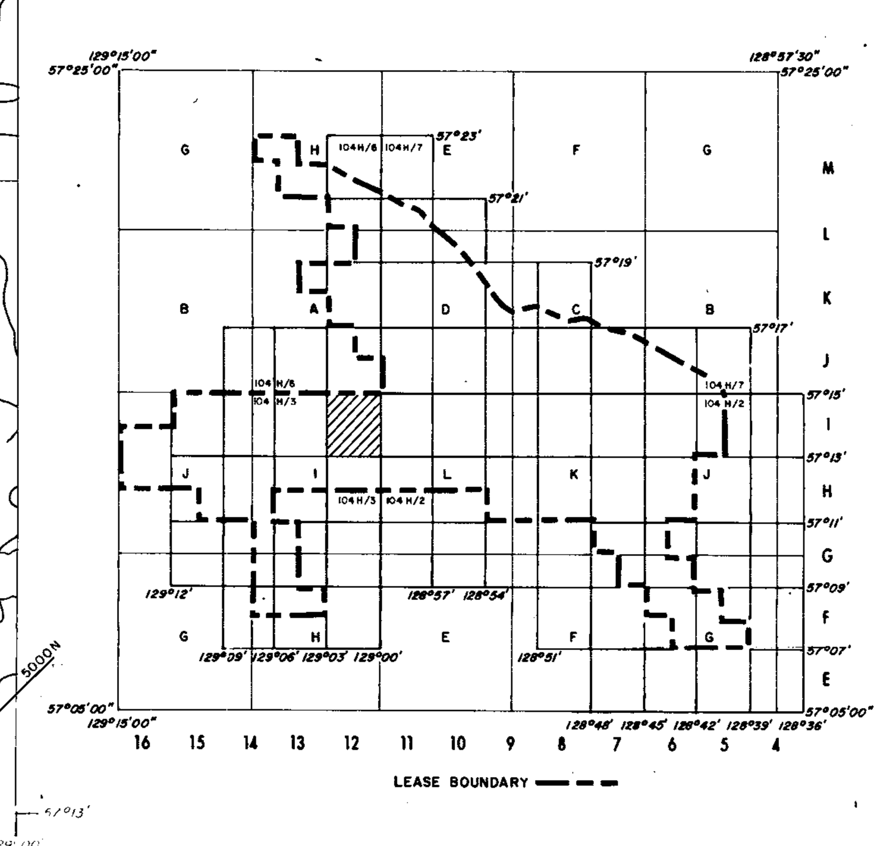
## LEGEND

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 UPTHRUST SIDE
U D FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

| GULF CANADA RESOURCES LTD. Coal Division CALGARY ALBERTA | |
|---|---|
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP NASS AREA MAP I-11 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-16 |




## 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 UPTHRUST 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

### 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.

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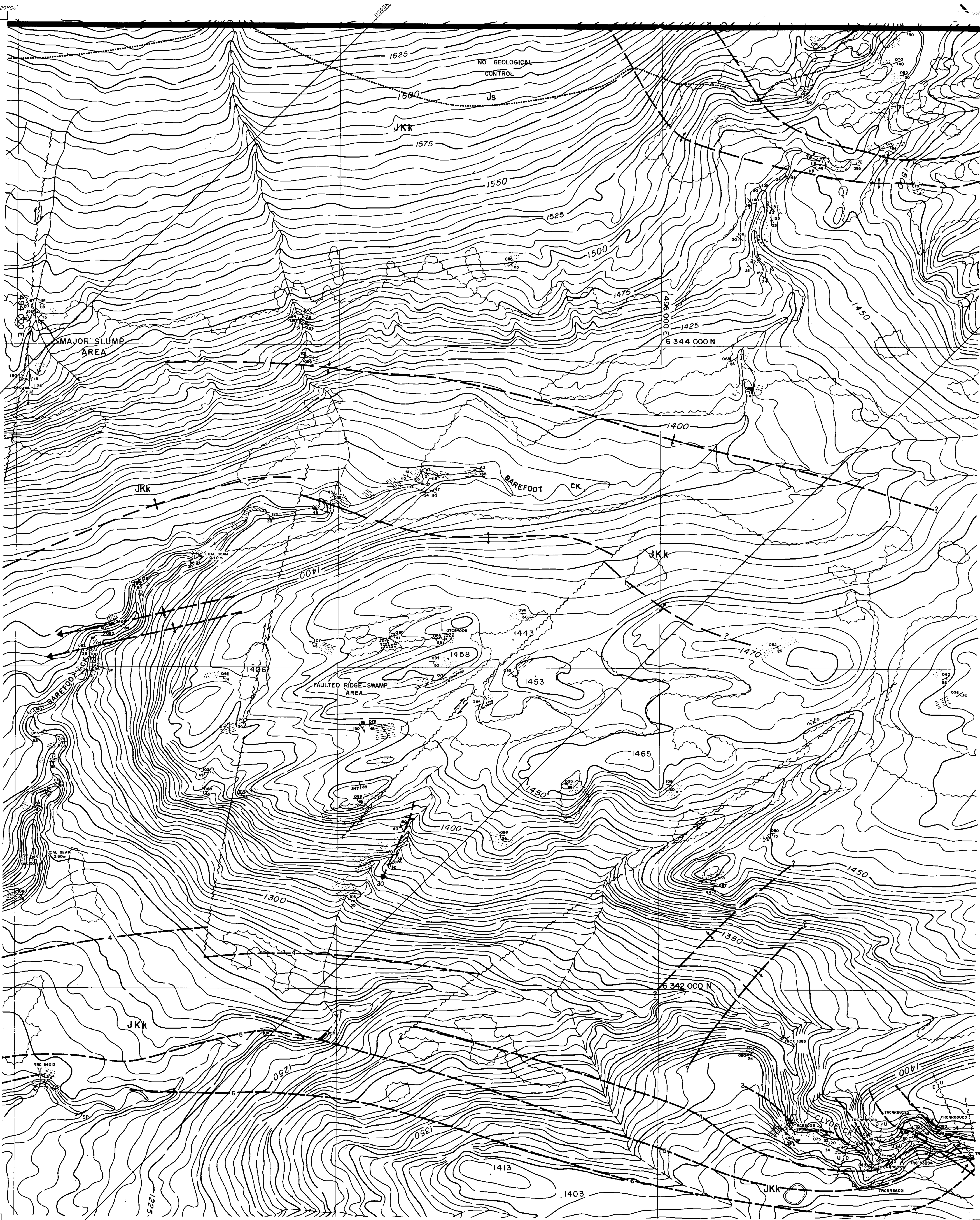
SCALE 1:5000

741

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

# MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP I-12

| | |
|---|---|
| PREPARED BY: S.M/L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-17 |




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 1:60 000 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 - ±5.0 METERS FOR GROUND NOT OBSCURRED 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 GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60 000 (APPROXIMATE)

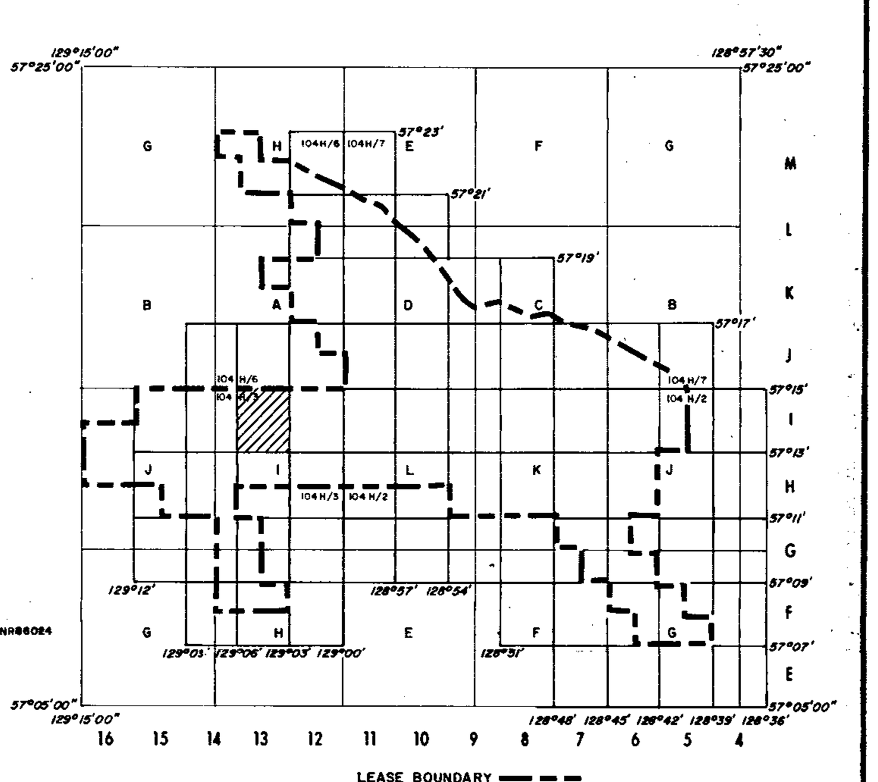
SCALE 1:5000

MILES

METERS

MT. KLAPPAN AREA

INDEX MAP




## RHONDDA SEQUENCE

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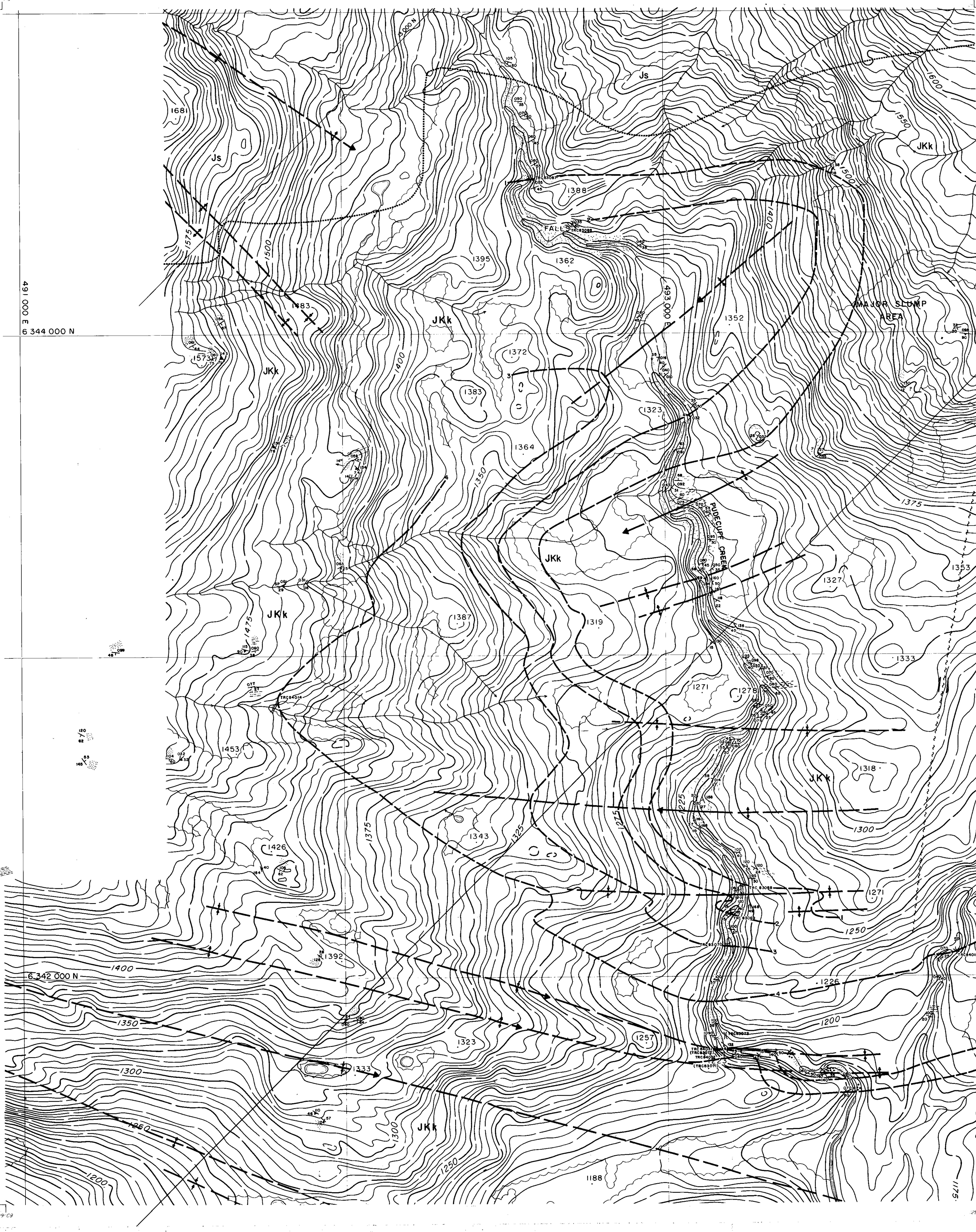
## LEGEND

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 UPTHRUST 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

741

| GULF CANADA RESOURCES LTD. Coal Division | |
|---|---|
| CALGARY | ALBERTA |
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>NASS AREA<br>MAP I-13 | |
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-18 |




NOTES

MAPPING PRODUCED FROM PHOTOGRAPHIC ENLARGEMENTS OF NEGATIVES.

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

ACCURACY OF 5M FORM LINES IS EQUAL TO THE ACCURACY OF THE 10 M CONTOURS ±5·0 METERS FOR GROUND NOT OBSCURRED BY TREES OR VEGETATION.

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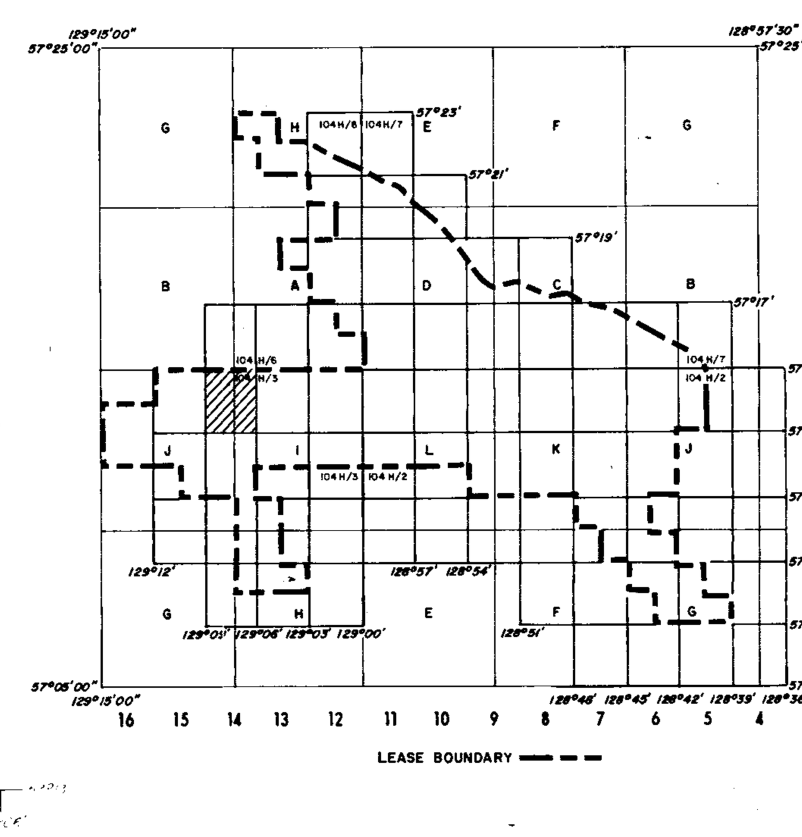
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

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

SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP




## 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 UPTHRUST 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

### 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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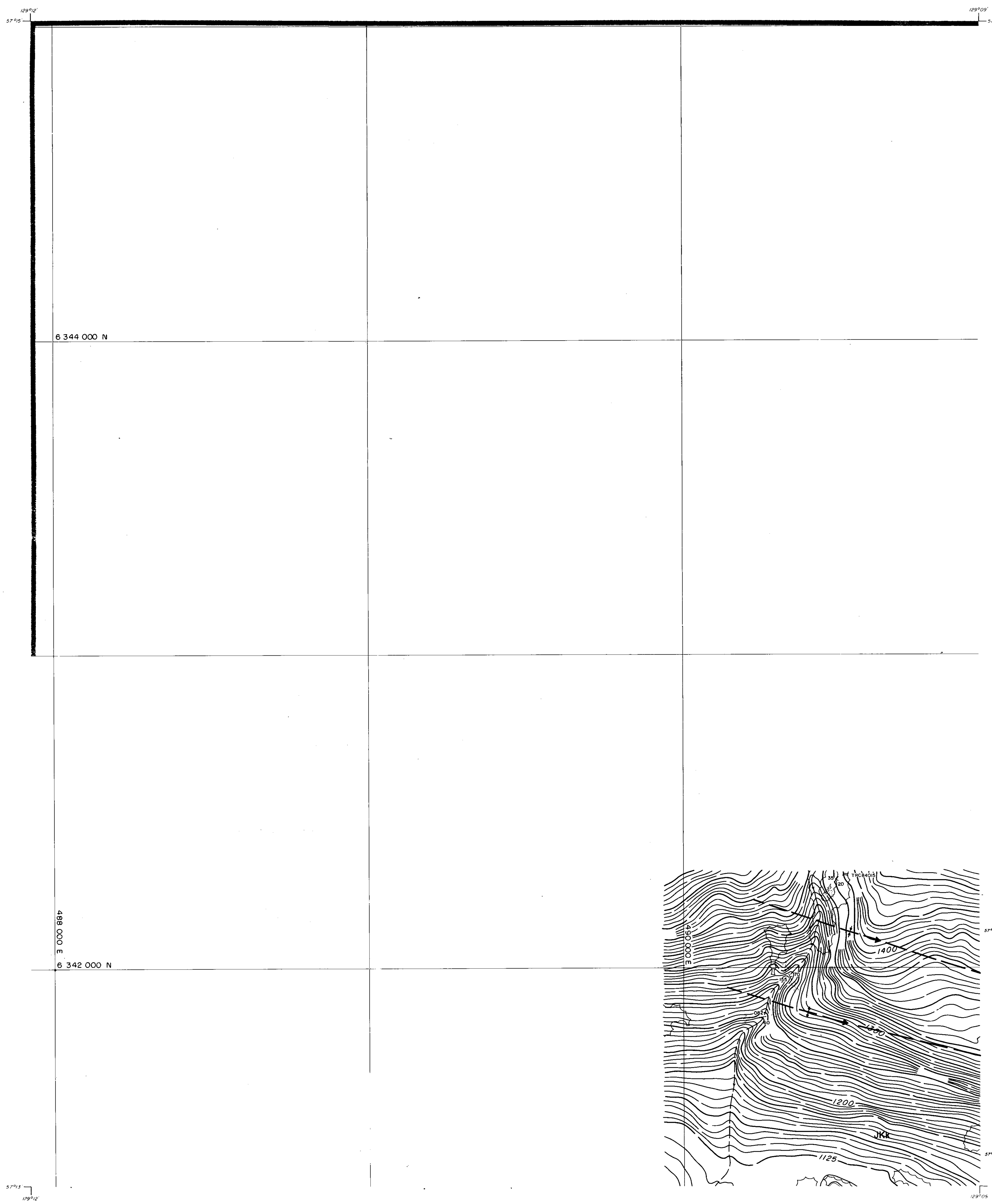
741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP I-14

| | |
|---|---|
| PREPARED BY: S.M. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-19 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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

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

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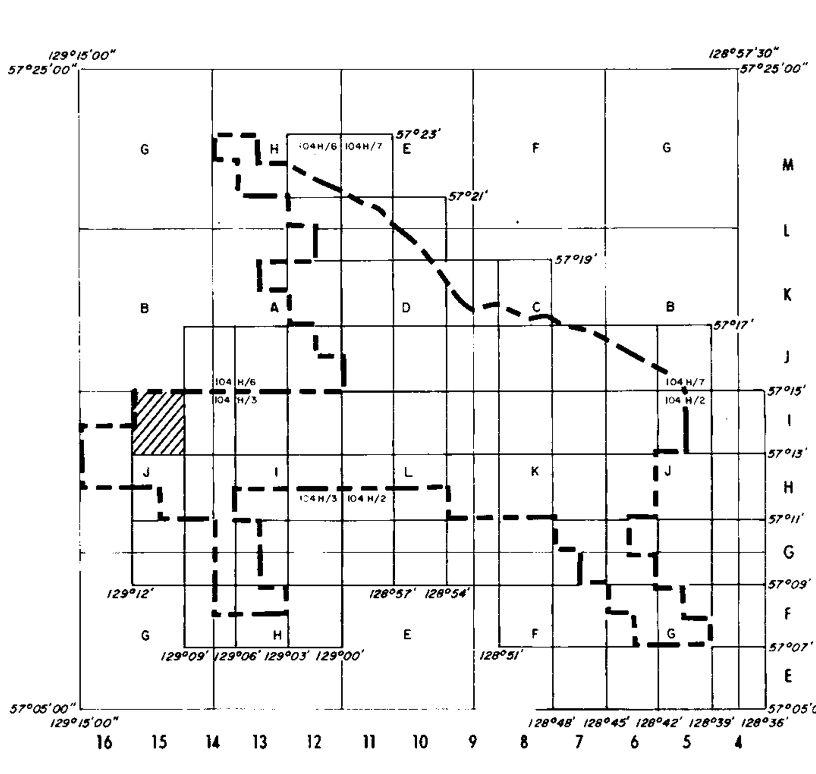
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60 000 (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
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
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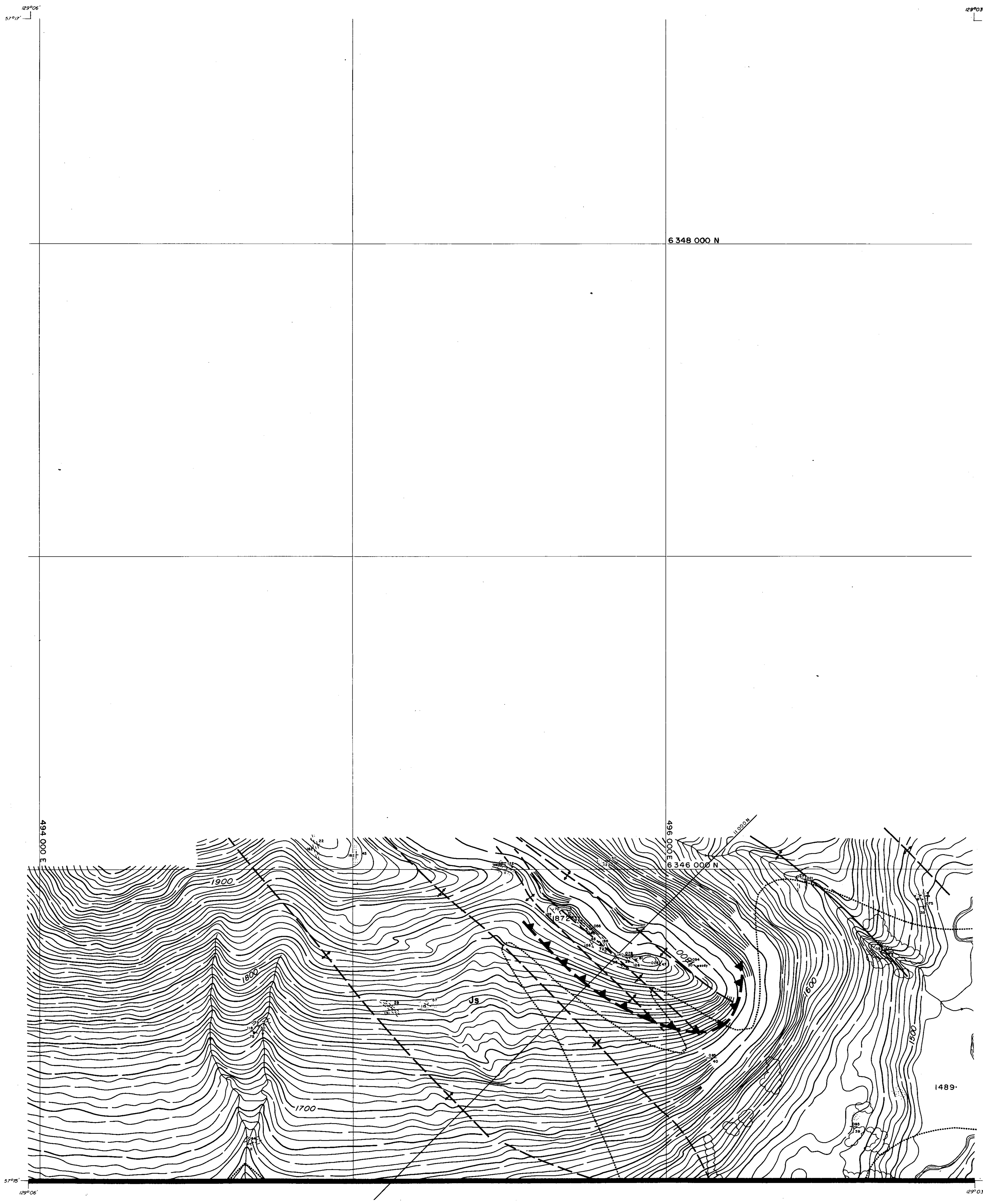
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST SIDE
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP I-15

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-20 |




## LEGEND

| | |
|---|---|
| BUILDING | |
| ROAD, HARD SURFACE | |
| LOOSE SURFACE | |
| CART TRACK | |
| TRAIL | |
| RAILROAD BED | |
| RIVER | |
| STREAM, DEFINITE | |
| APPROXIMATE | |
| SPLIT | |
| LAKE | |
| WATER LEVEL | EL 505± |
| SWAMP | |
| BEAVER DAM | B.D. B.D. |
| TREE LINE | |
| CUT LINE | |
| CONTOURS, INDEX | 1750 |
| INTERMEDIATE | |
| DEPRESSION | |
| APPROXIMATE | |
| SPOT ELEVATION | ·7654 |
| FORM LINES | |
| CUT/FILL | |
| FIELD CONTROL POINT | CP 121 |
| COAL LICENCE | |

## NOTES

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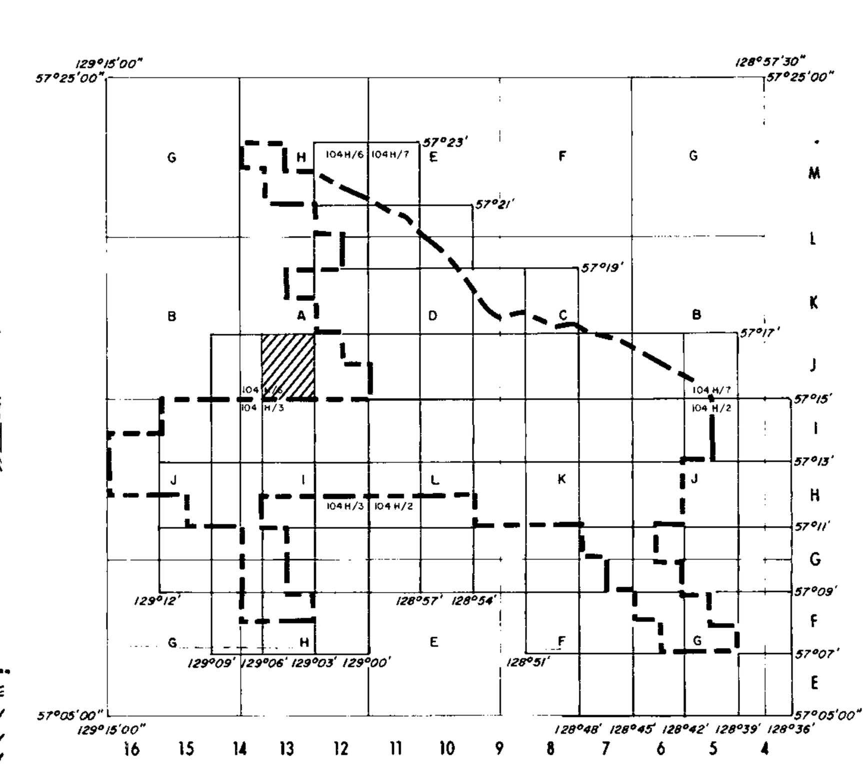
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

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

SCALE 1:5000

## MT. KLAPPAN AREA

INDEX MAP



LEASE BOUNDARY

### 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

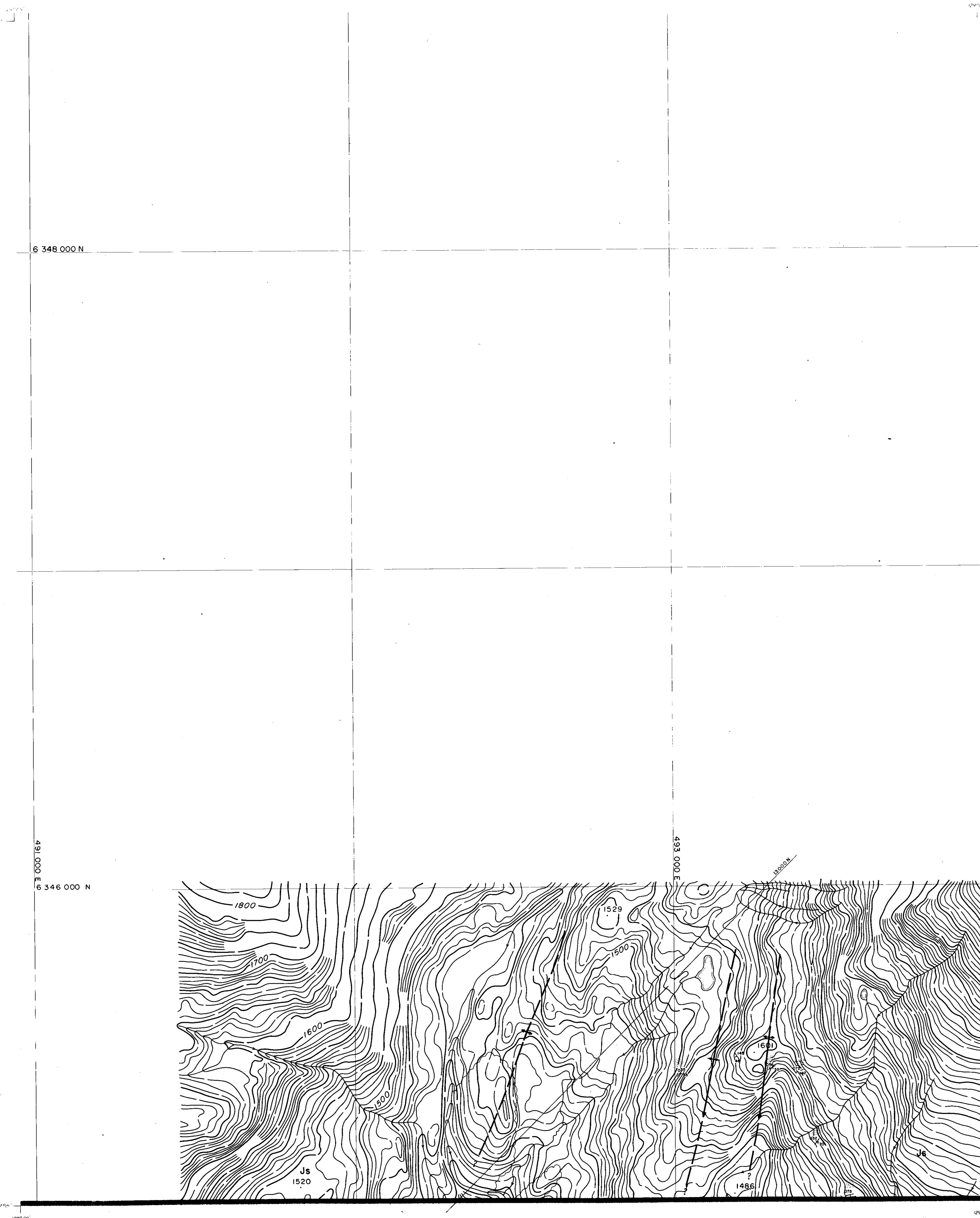
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP J-13

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-21 |




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 ±5.0 METERS FOR GROUND NOT OBSCURRED 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.

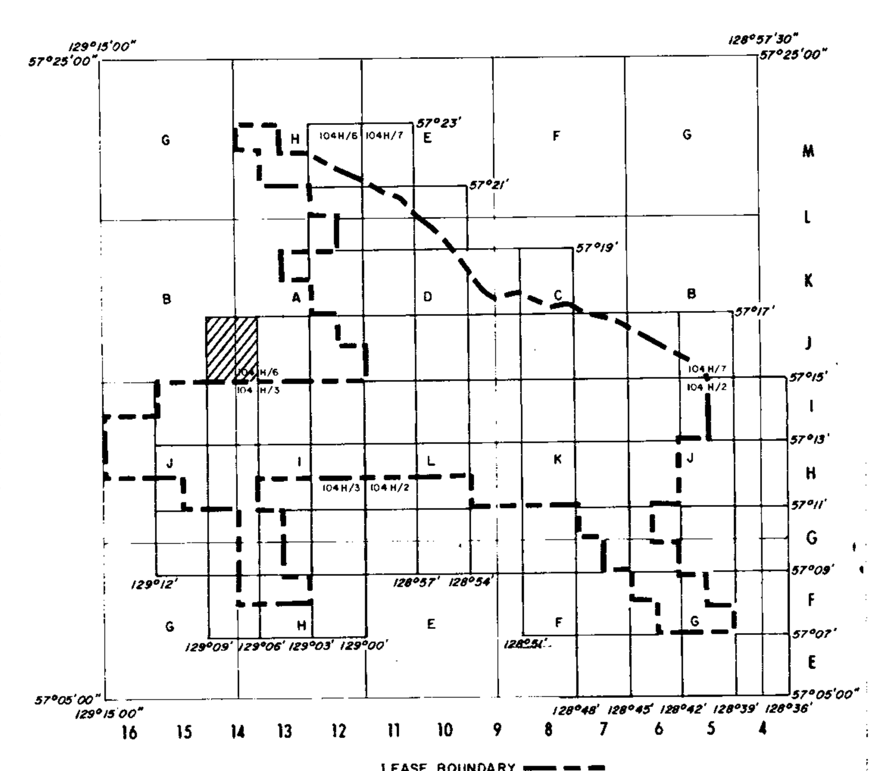
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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

LICENCE BOUNDARY
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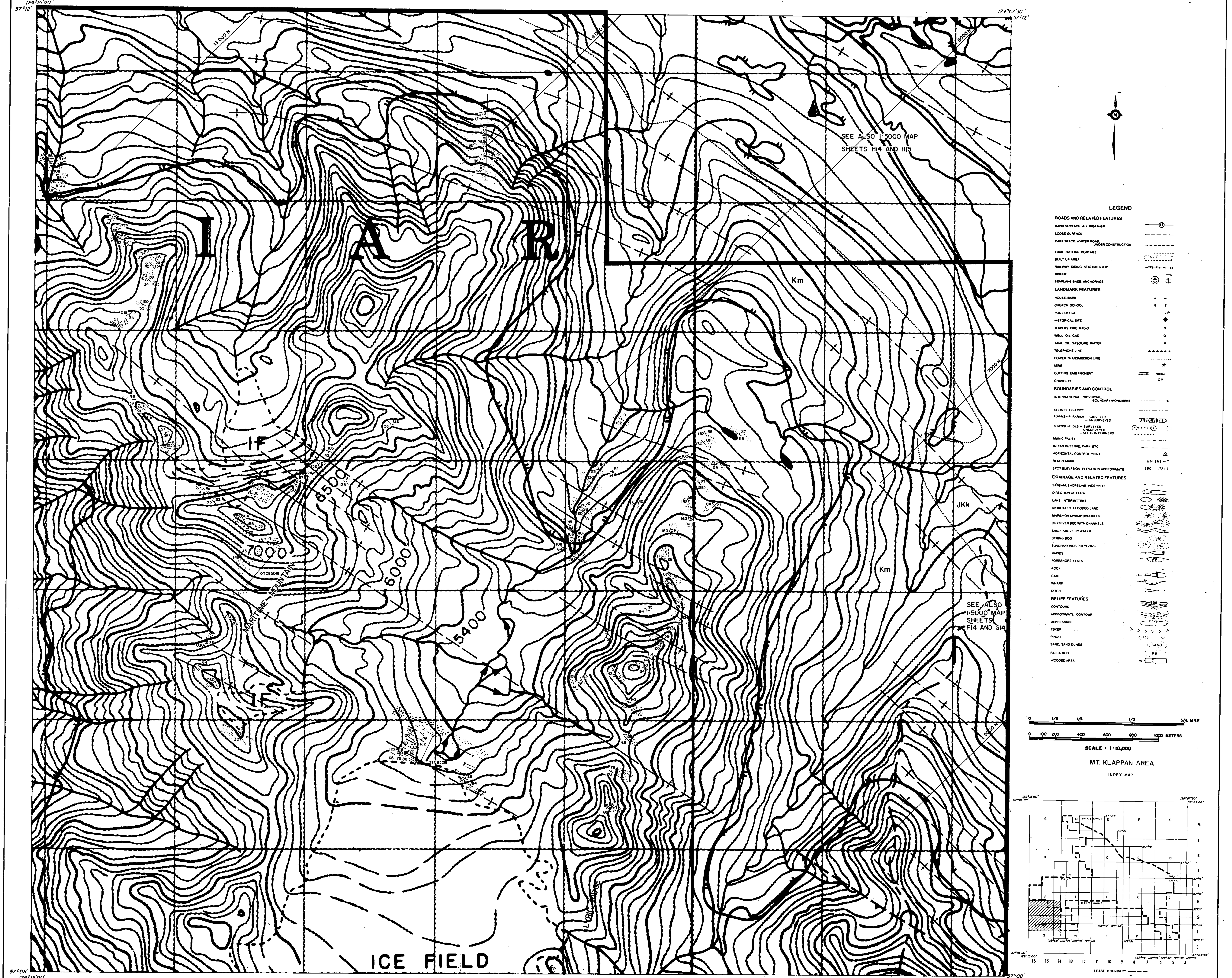
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED, WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP J-14

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-22 |

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LEGEND

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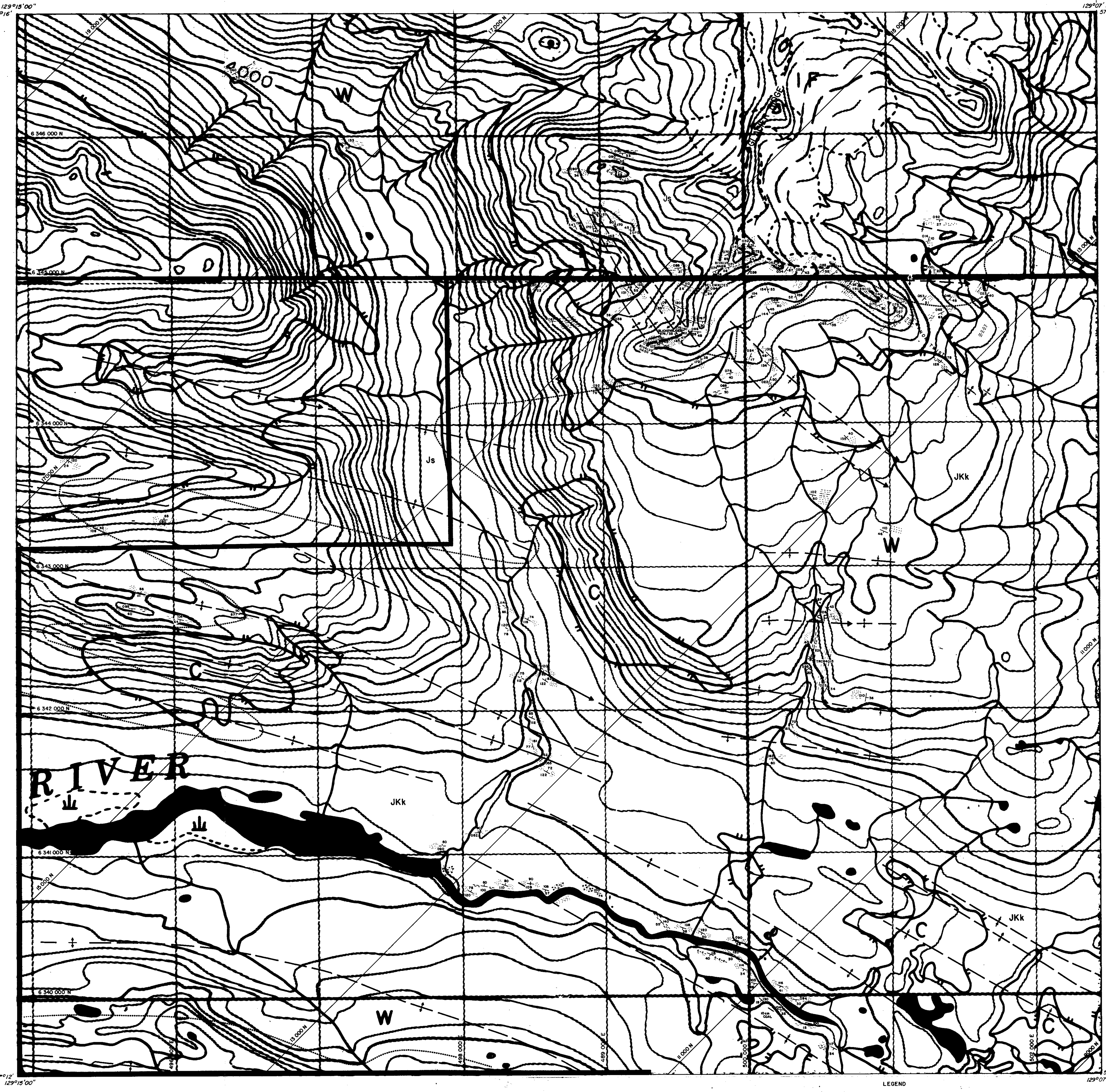
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP 104 H/3 G

| | | |
|---|---|---|
| PREPARED BY: S.M./L.S. | | SCALE 1:10,000 |
| APPROVED BY: E.S. | DATE: MAR. 1988 | DWG. No. KPN87NA-23 |




# LEGEND

**ROADS AND RELATED FEATURES**

HARD SURFACE, ALL WEATHER
LOOSE SURFACE
CART TRACK, WINTER ROAD, UNDER CONSTRUCTION
TRAIL, CUTLINE, PORTAGE
BUILT UP AREA
RAILWAY, SIDING, STATION, STOP
BRIDGE
SEAPLANE BASE, ANCHORAGE

**LANDMARK FEATURES**

HOUSE, BARN
CHURCH, SCHOOL
POST OFFICE
HISTORICAL SITE
TOWERS FIRE, RADIO
WELL OIL, GAS
TANK OIL, GASOLINE, WATER
TELEPHONE LINE
POWER TRANSMISSION LINE
MINE
CUTTING, EMBANKMENT
GRAVEL PIT GP

**BOUNDARIES AND CONTROL**

INTERNATIONAL, PROVINCIAL, BOUNDARY MONUMENT
COUNTY DISTRICT
TOWNSHIP PARISH – SURVEYED – UNSURVEYED
TOWNSHIP DLS – SURVEYED – UNSURVEYED – SECTION CORNERS
MUNICIPALITY
INDIAN RESERVE, PARK, ETC
HORIZONTAL CONTROL POINT
BENCH MARK BM 965
SPOT ELEVATION, ELEVATION APPROXIMATE ·390 ·721

**DRAINAGE AND RELATED FEATURES**

STREAM, SHORELINE INDEFINITE
DIRECTION OF FLOW
LAKE, INTERMITTENT
INUNDATED, FLOODED LAND
MARSH OR SWAMP (WOODED)
DRY RIVER BED WITH CHANNELS
SAND, ABOVE, IN WATER
STRING BOG SB
TUNDRA PONDS, POLYGONS TP PG
RAPIDS
FORESHORE FLATS FF
ROCK
DAM
WHARF
DITCH

**RELIEF FEATURES**

CONTOURS 500 350
APPROXIMATE CONTOUR 125 100
DEPRESSION 25
ESKER
PINGO 125
SAND, SAND DUNES SAND
PALSA BOG PB
WOODED AREA W C

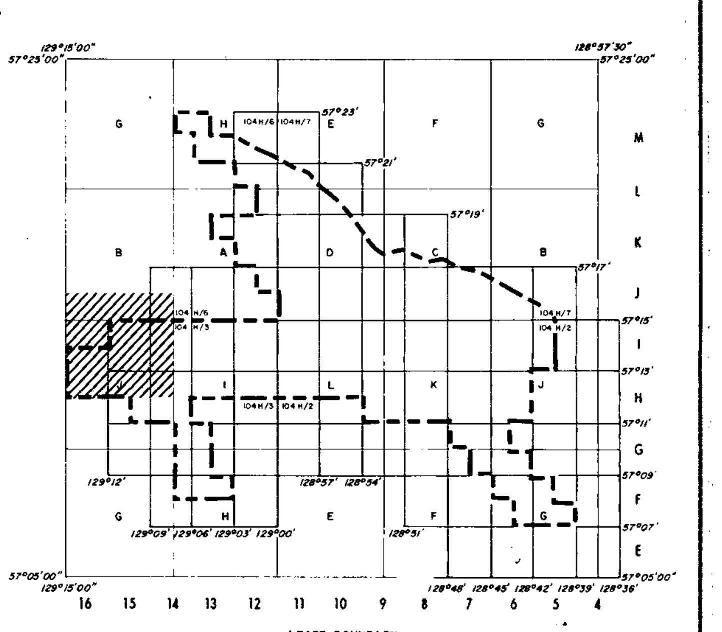
0 1/8 1/4 1/2 3/4 MILE

0 100 200 400 600 800 1000 METERS

SCALE 1:10,000

MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

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

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
NASS AREA
MAP 104 H/3 J

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:10,000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DWG. No KPN87NA-24 |


RHONDDA SEQUENCE

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LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
11000 N (WEST)

| | |
|---|---|
| PREPARED BY: A.P./L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-25 |


RHONDDA SEQUENCE

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LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

MOUNT KLAPPAN COAL PROPERTY

1987

GEOLOGICAL CROSS SECTION

NASS AREA

9000N (WEST)

| | |
|---|---|
| PREPARED BY: A.P. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-26 |

NO GEOLOGICAL DATA
AREA OF ABUNDANT MINOR FAULTING
NO GEOLOGICAL DATA
NO GEOLOGICAL DATA
METRES ABOVE SEA LEVEL
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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BEDFORM
BEDDING ATTITUDE
DDH 85001
DIAMOND DRILL HOLE WITH ATTITUDE CONTROL
741
METRES
0 50 100 150 200 250
GULF CANADA RESOURCES LTD.
Coal Division
CALGARY
ALBERTA
MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
7000 N (WEST)
PREPARED BY: A.P. / L.S.
SCALE 1:5000
APPROVED BY: E.S.
DATE: MAR. 1988
DRAWING No. KPN87NA-27


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BEDFORM
BEDDING ATTITUDE
DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
5000 N (WEST)

| | |
|---|---|
| PREPARED BY: A.P. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-28 |


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.

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

1987

GEOLOGICAL CROSS SECTION

NASS AREA

3000 N (WEST)

| | |
|---|---|
| PREPARED BY: A.P. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-29 |


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.

LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
1000 N (WEST)

| | |
|---|---|
| PREPARED BY: A.P. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-30 |


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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

1987

GEOLOGICAL CROSS SECTION

NASS AREA

1000 S (WEST)

| | |
|---|---|
| PREPARED BY: A.P. / L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-31 |


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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES
0 100 200 300 400 500

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
17000 N (WEST)

| | |
|---|---|
| PREPARED BY: E. S. | SCALE 1 : 10 000 |
| APPROVED BY: E. S. DATE MAR. 1988 | DRAWING No. KPN87NA-32 |


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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 100 200 300 400 500

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
15000N (WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-33 |


**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.

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 100 200 300 400 500

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

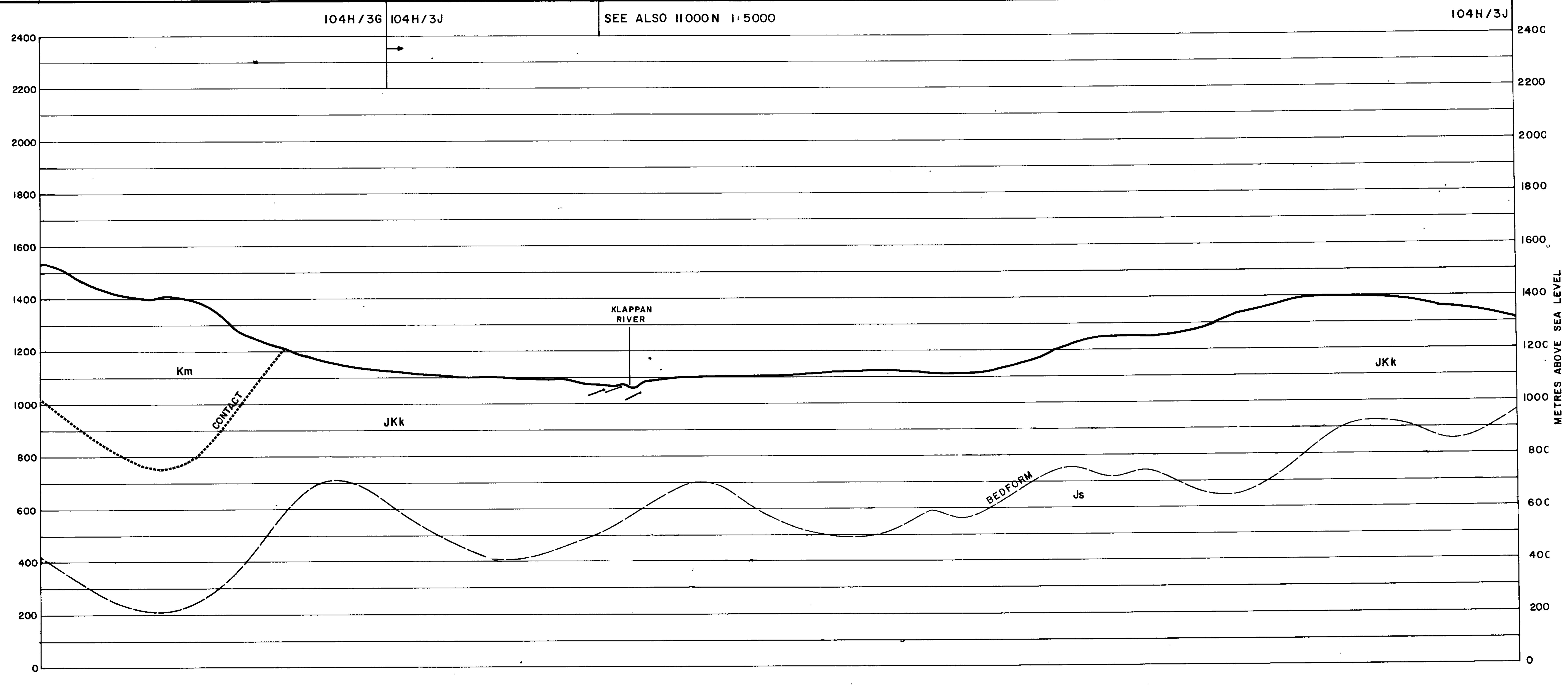
1987

GEOLOGICAL CROSS SECTION

NASS AREA

13000 N (WEST)

| | |
|---|---|
| PREPARED BY: E.S./A.P. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-34 |




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

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LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 100 200 300 400 500

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

MOUNT KLAPPAN COAL PROPERTY

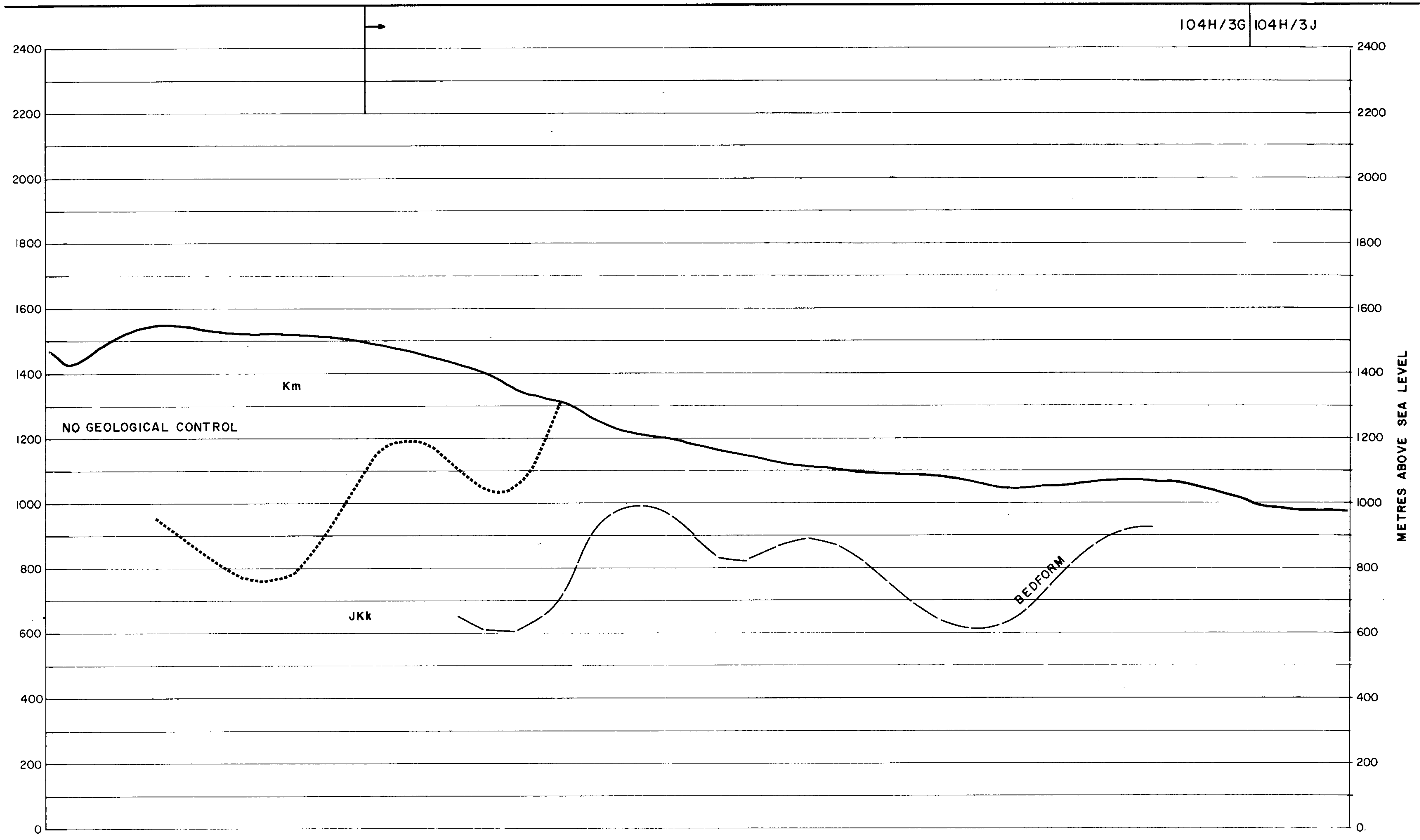
1987

GEOLOGICAL CROSS SECTION

NASS AREA

11000N (WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87NA-35 |




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

LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DDH 85001 DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

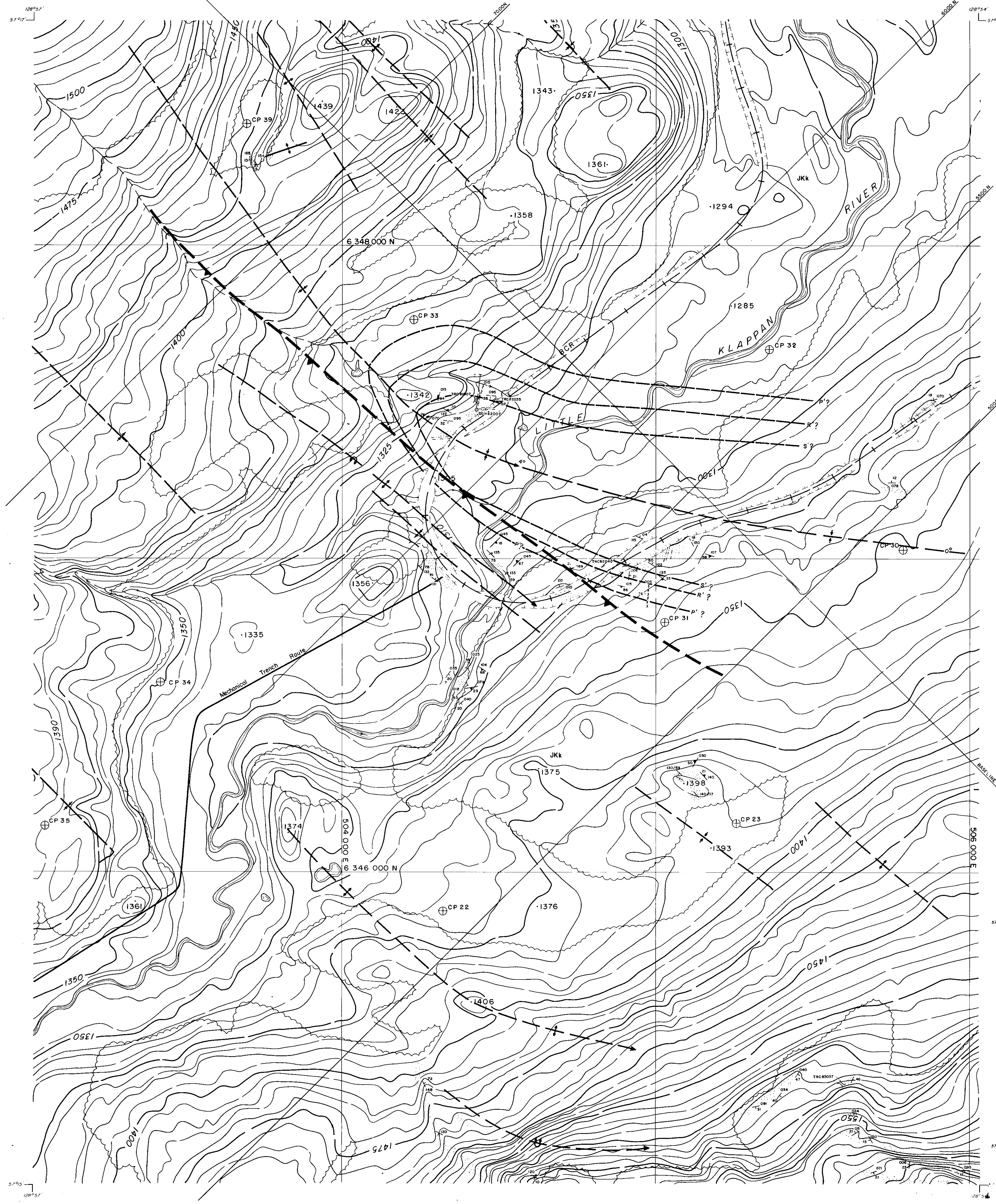
741

METRES
0 100 200 300 400 500

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
NASS AREA
9000N (WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87NA-36 |




## LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
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 - ±5.0 METERS FOR GROUND NOT OBSCURRED 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.

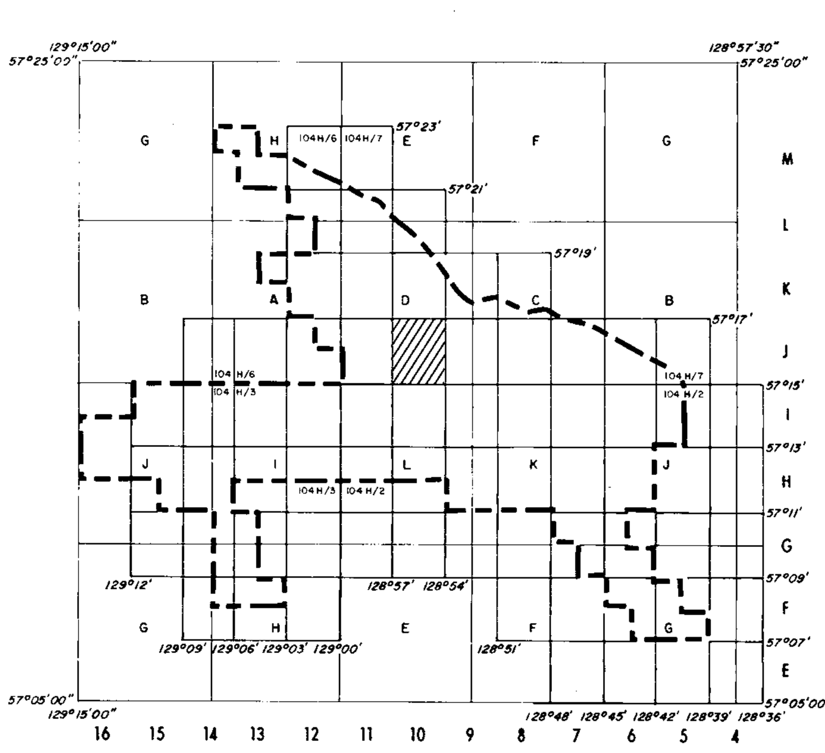
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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



LEASE BOUNDARY

### 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

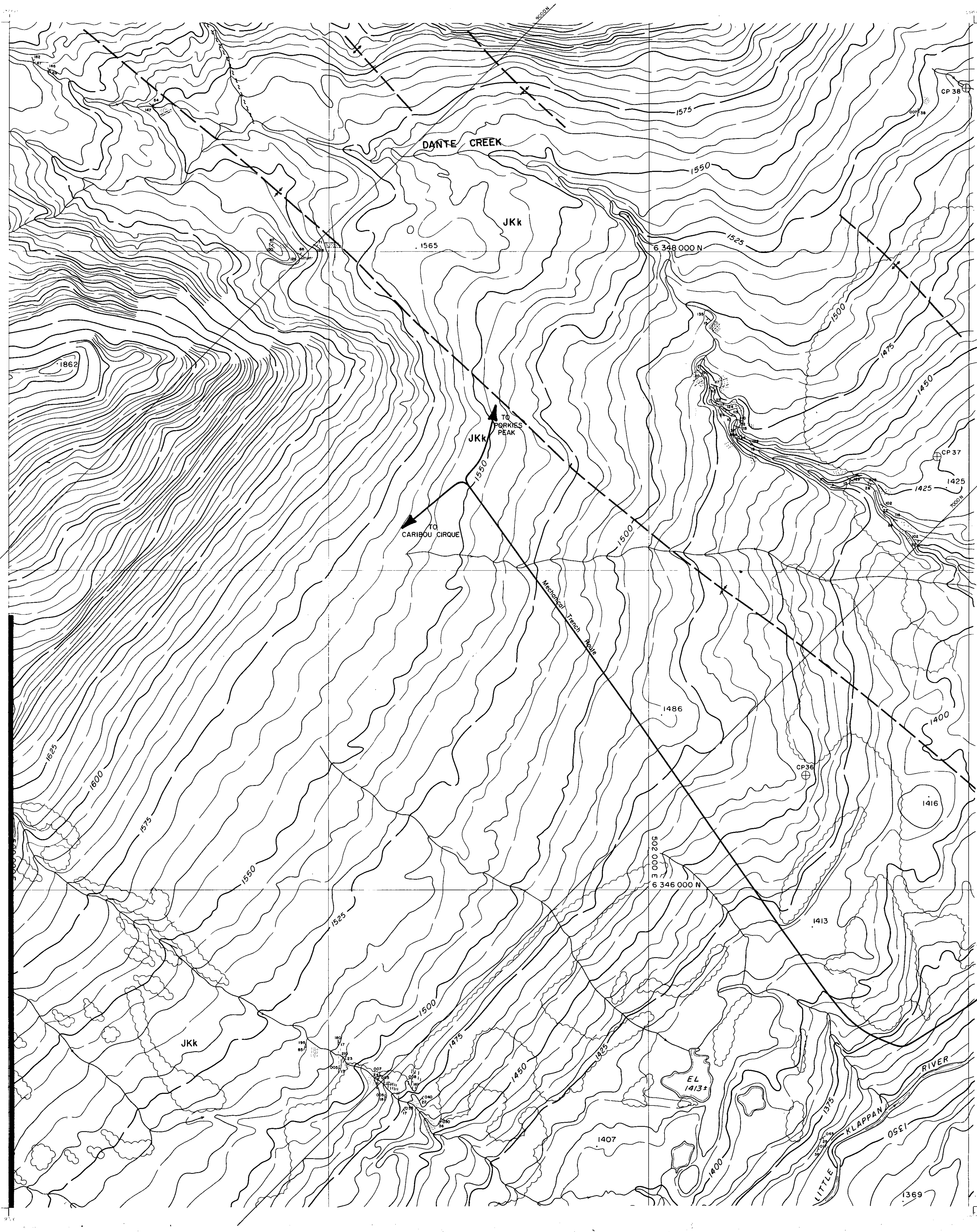
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare. 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 UPTHRUST SIDE
U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 — SP — ADIT TRENCH COAL SPOIL
DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
3000 N — CROSS SECTION LINE

741

| | |
|---|---|
| **GULF CANADA RESOURCES LTD.** Coal Division CALGARY ALBERTA | Gulf |
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>SUMMIT AREA<br>MAP J-10 | |
| PREPARED BY: E.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA:01 |




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 40,000 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 - ±5.0 METERS FOR GROUND NOT OBSCURRED 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.

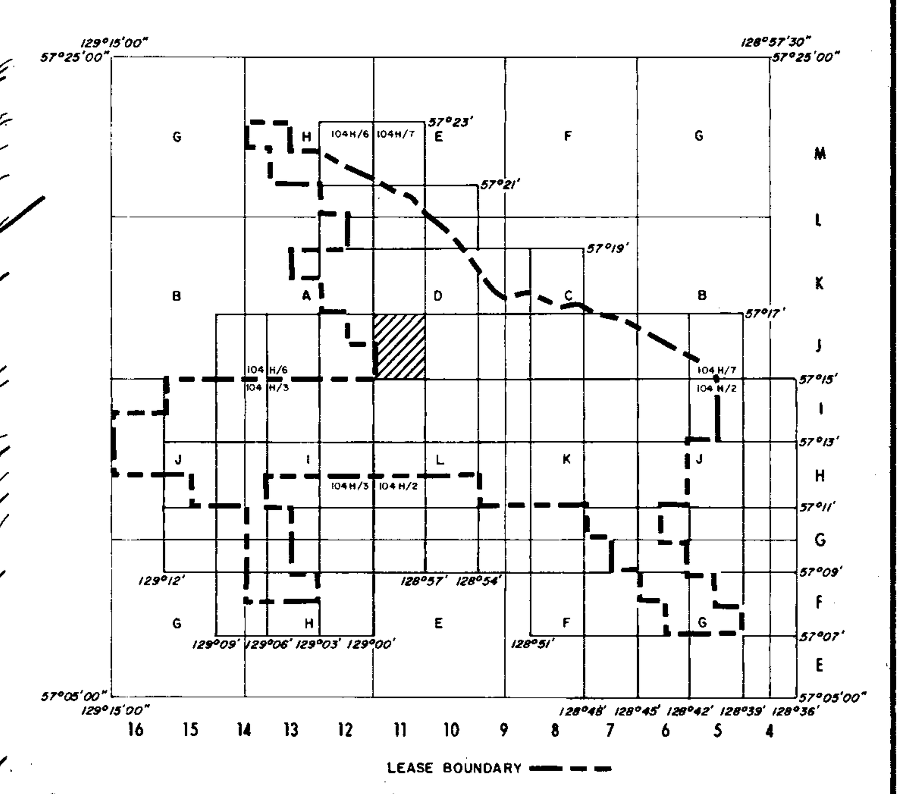
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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



LEASE BOUNDARY

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

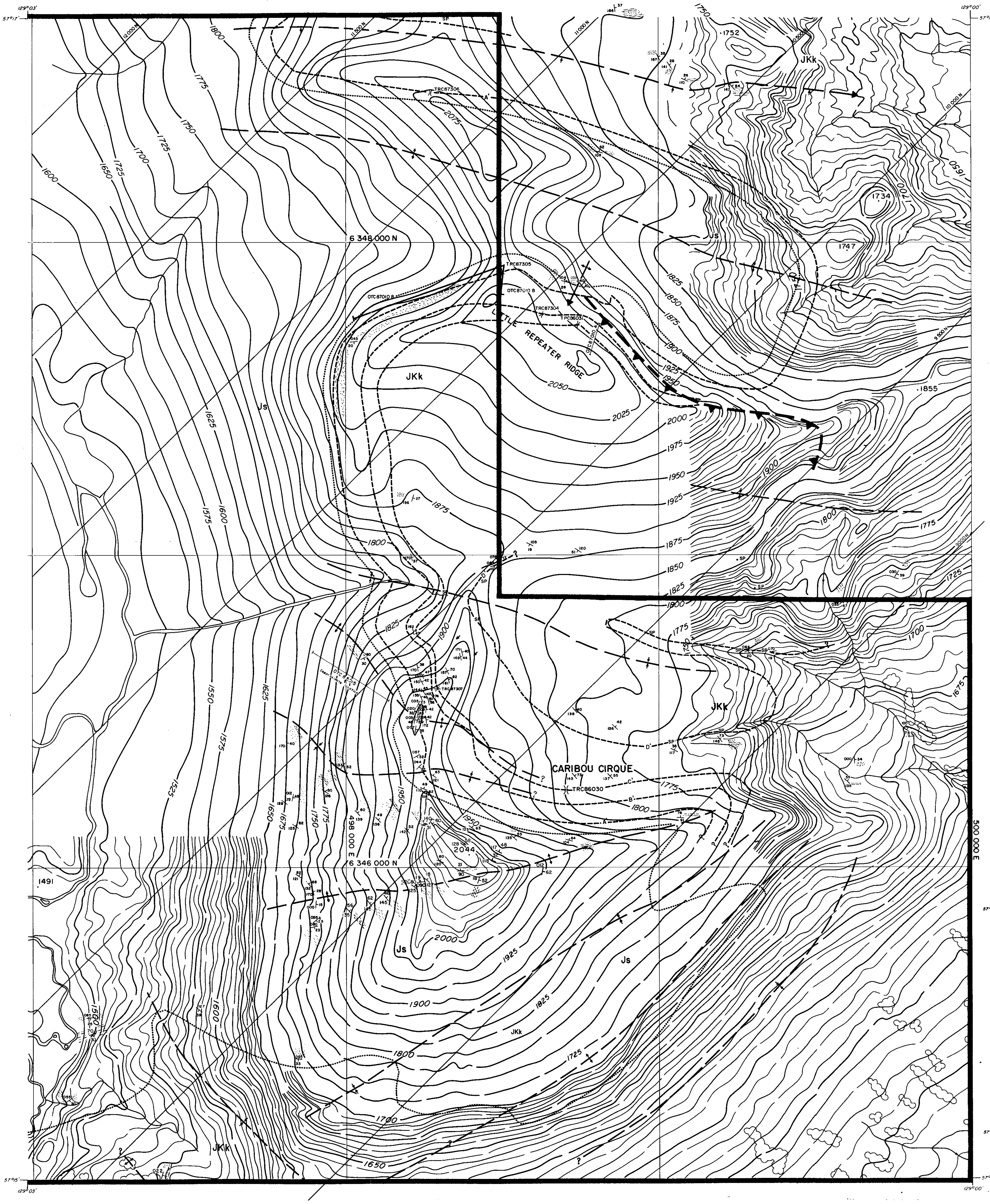
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare. 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 UPTHRUST SIDE
U D FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

| GULF CANADA RESOURCES LTD. Coal Division CALGARY ALBERTA | Gulf |
|---|---|
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP SUMMIT AREA MAP J-11 | |
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR.1988 | DRAWING No. KPN87SA-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
CONTOURS, INDEX
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION · 7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT CP 121
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 - ±5.0 METERS FOR GROUND NOT OBSCURRED 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.

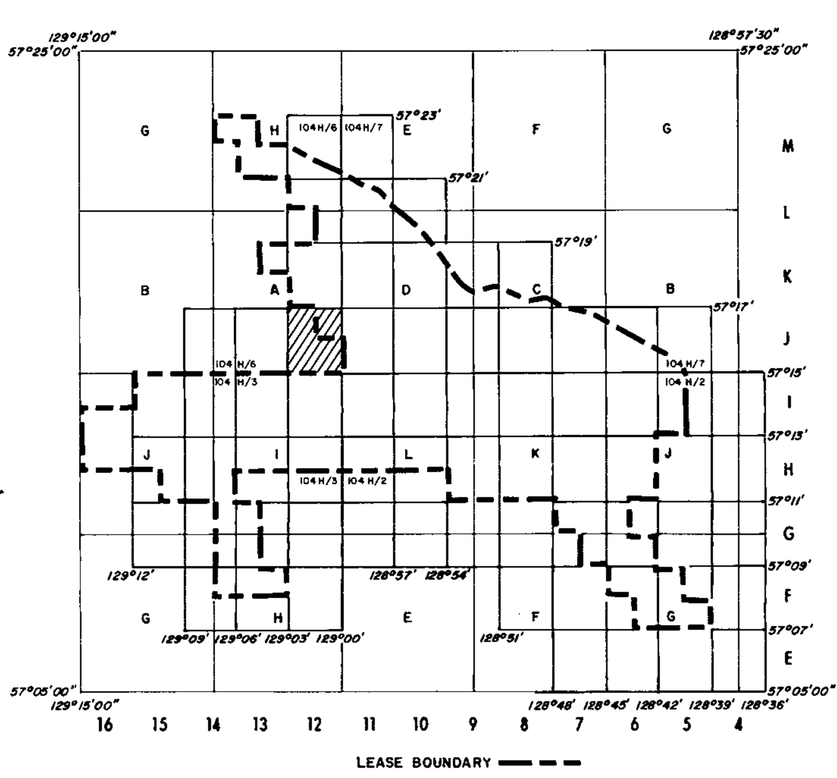
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN 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

**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

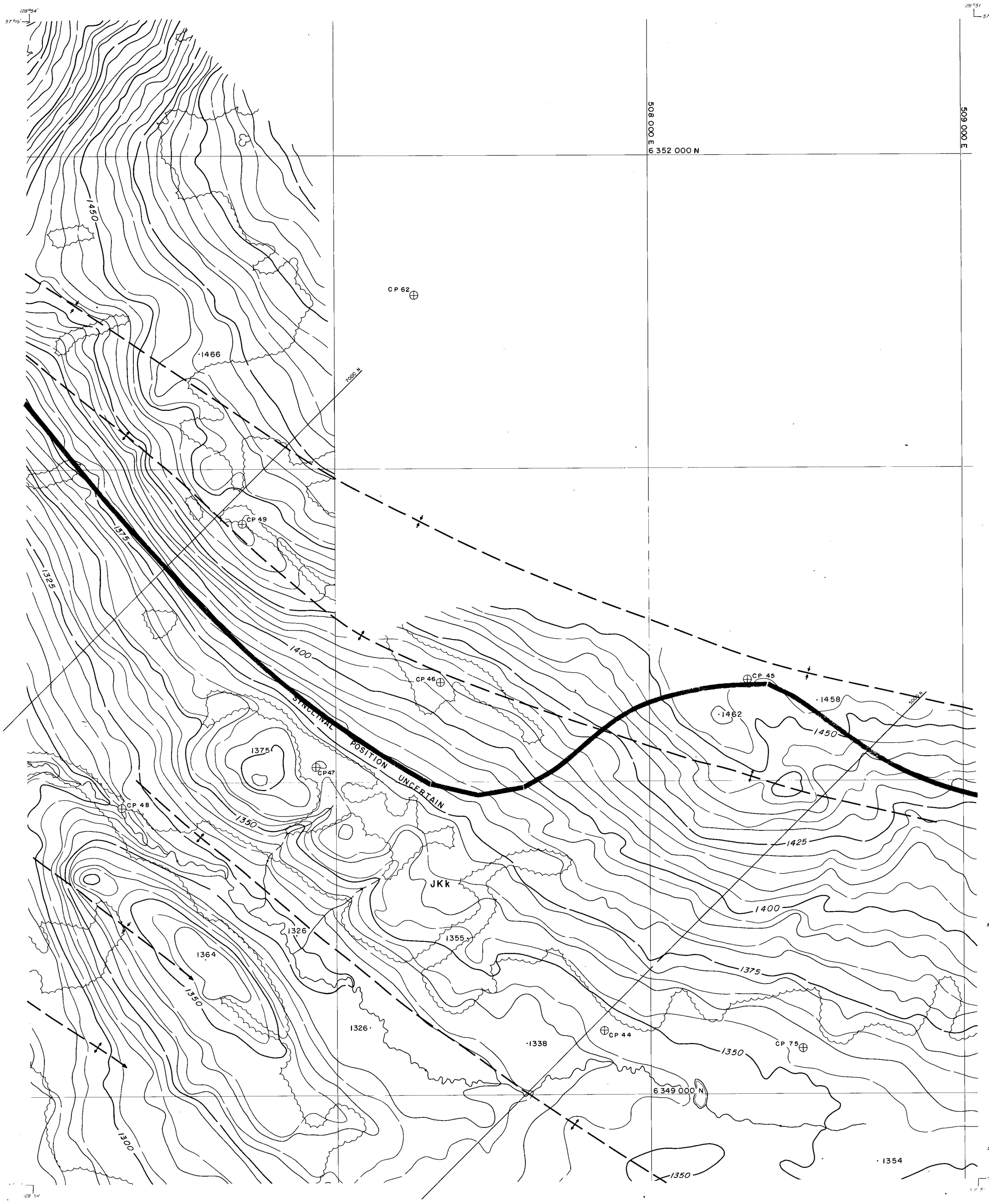
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare. 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 UPTHRUST SIDE
U D FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 SP ADIT TRENCH COAL SPOIL
DDH RDH WKD DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

| | |
|---|---|
| **GULF CANADA RESOURCES LTD.** Coal Division CALGARY ALBERTA | |
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>SUMMIT AREA<br>MAP J-12 | |
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-03 |




## 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 - ±5.0 METERS FOR GROUND NOT OBSCURRED BY TREES OR VEGETATION.

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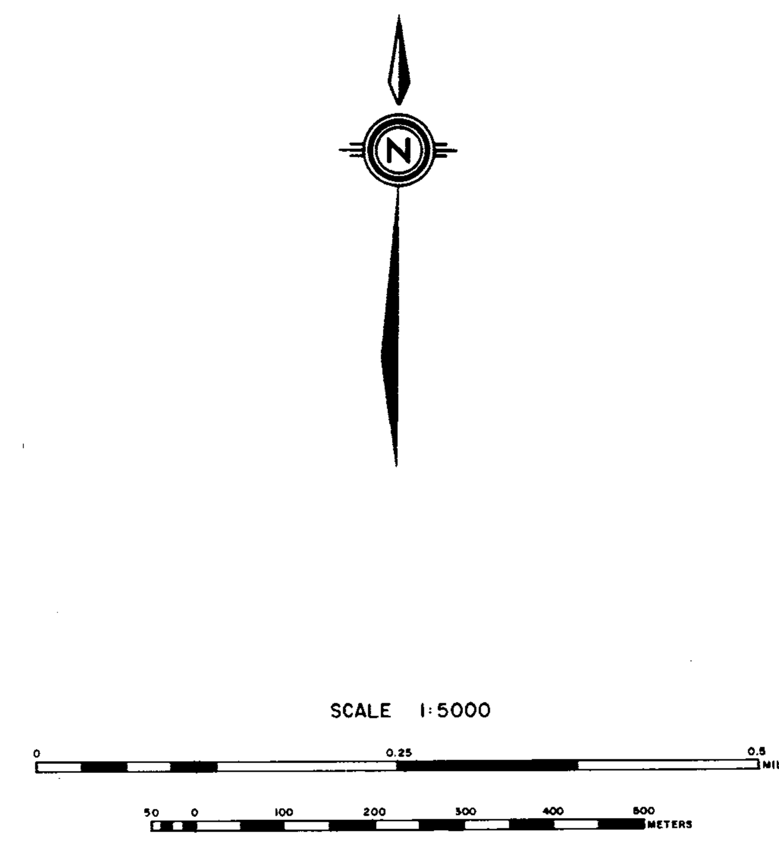
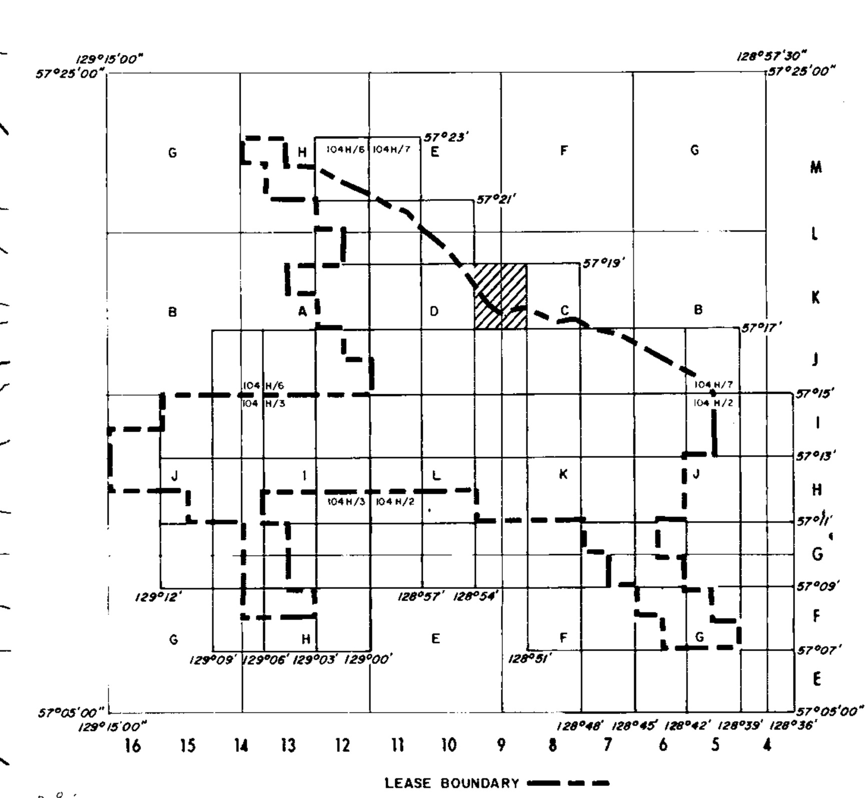
RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL 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

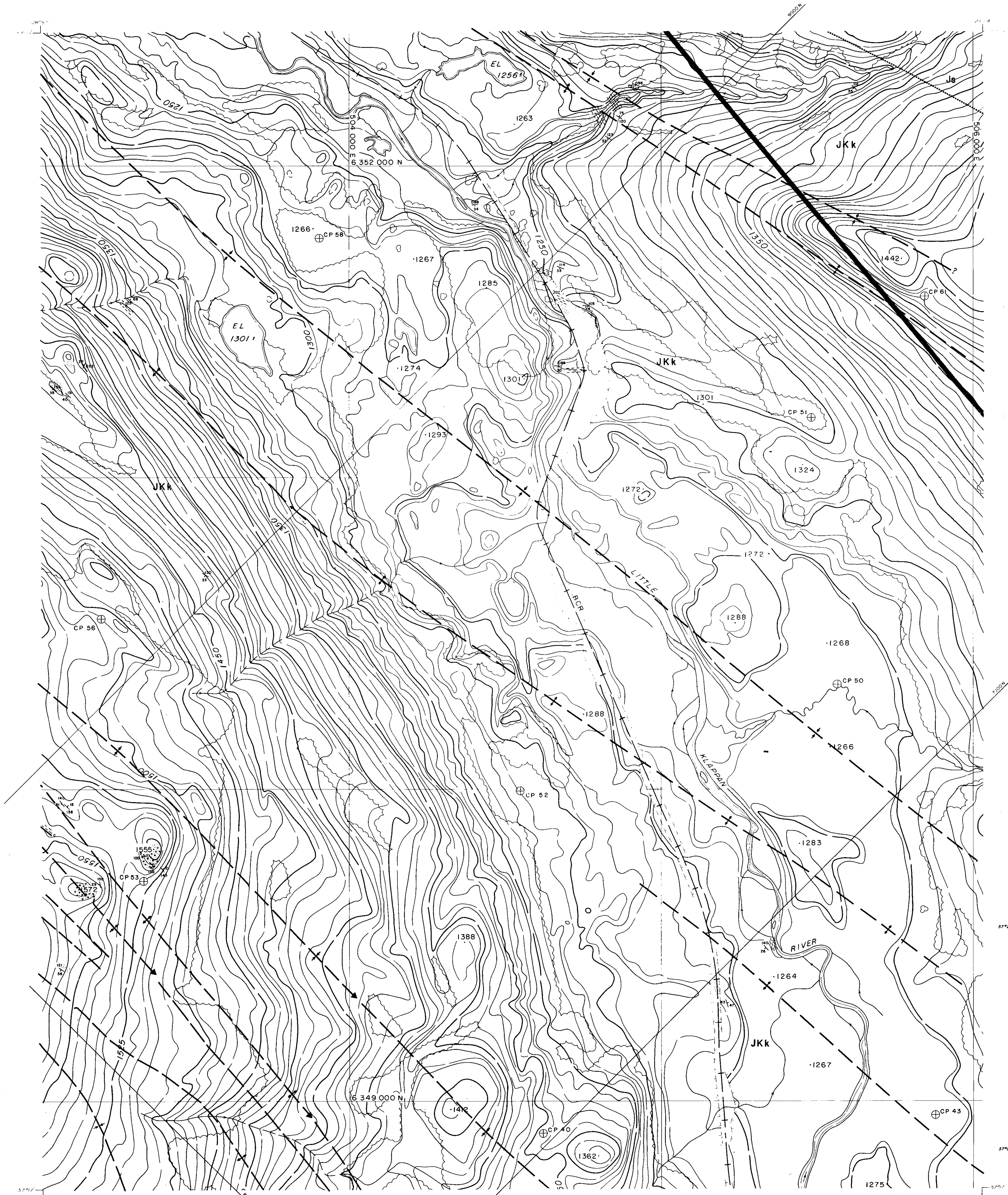
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP K-9

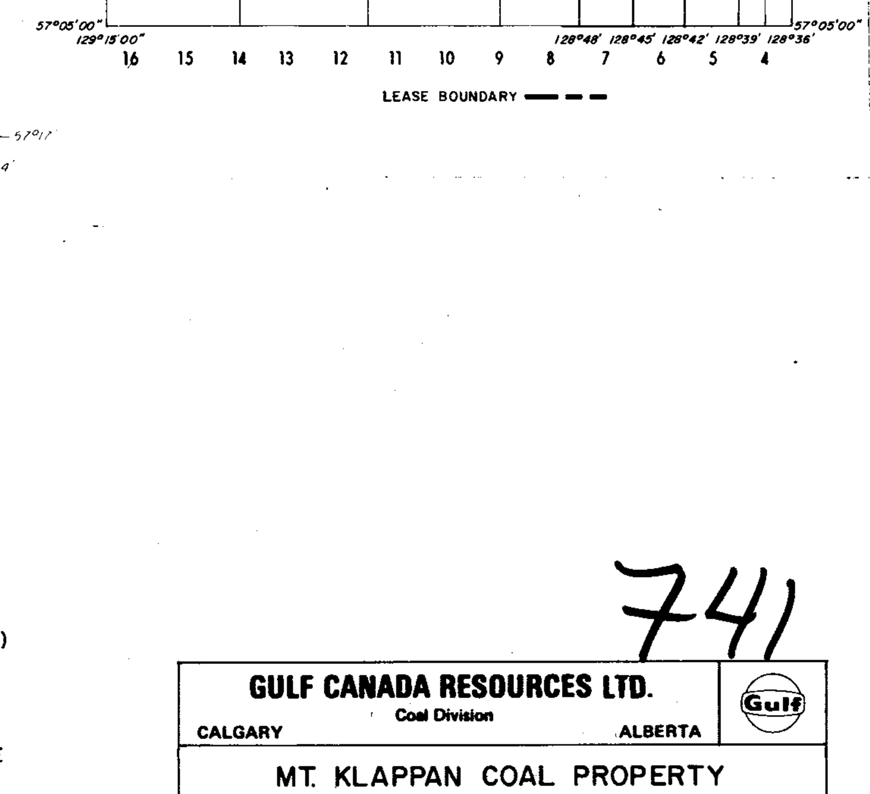
| | |
|---|---|
| PREPARED BY: L.S. / S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-04 |




SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP




## 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 UPTHRUST SIDE
FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL (TRC84001, SP)
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION) (DDH, RDH, WKD)
MEASURED SECTION (OTC 84001)
SURVEY CAIRN (SC-17)
CROSS SECTION LINE (3000 N)

### 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

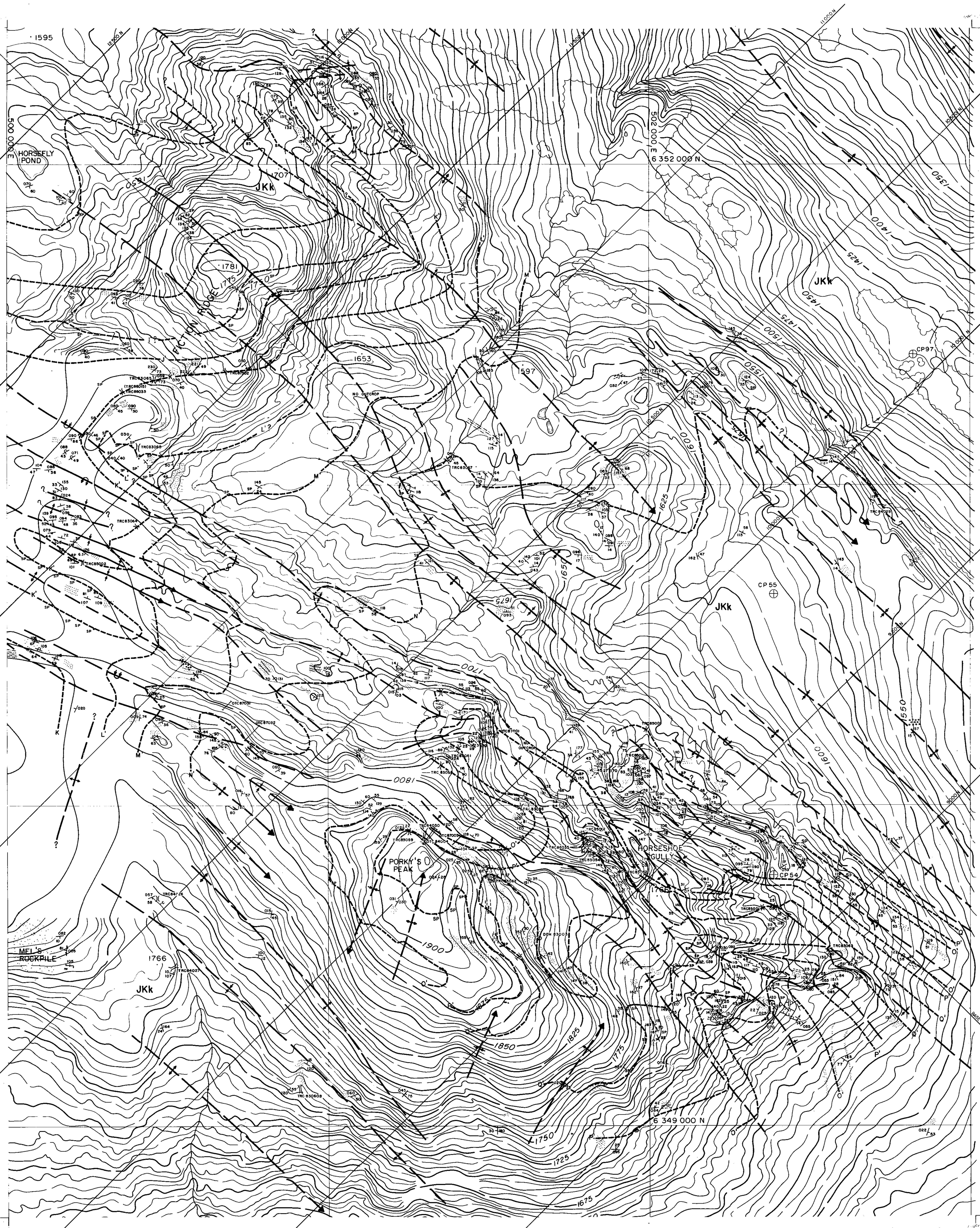
**Js** Predominantly a marine sequence of interbedded mudstones, siltstones, sandstones and conglomerates. Carbonaceous mudstones, coarsening upward sequences and chert pebble conglomerates are more abundant in the upper part of the sequence. Nineteen species of bivalves are present. Belemnites are rare.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

741

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

# MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP K-10

| | |
|---|---|
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR.1988 | DRAWING No. KPN87SA-05 |



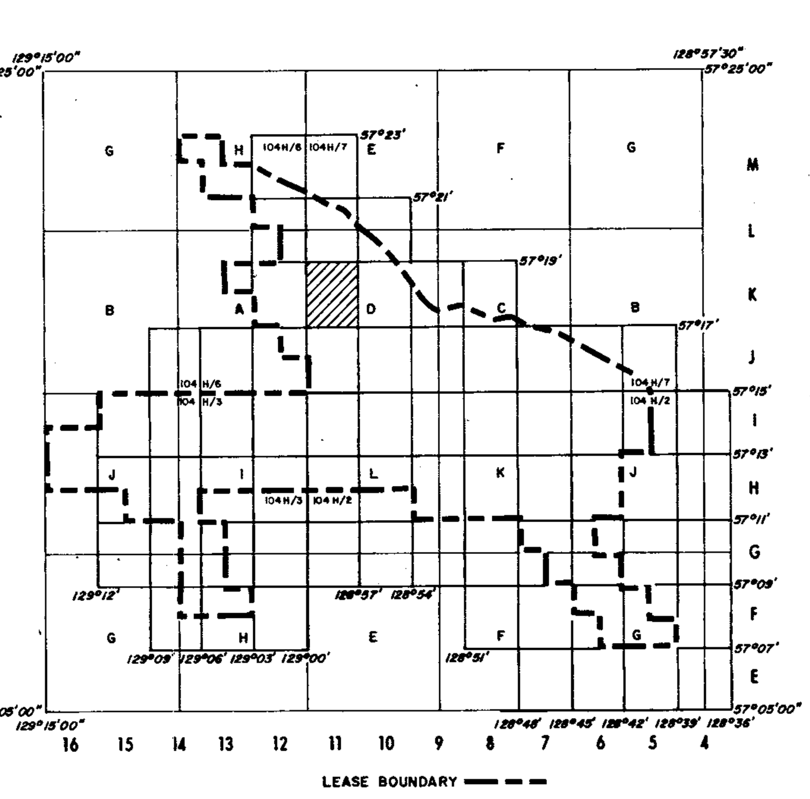

LEGEND

NOTES

SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP




# 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 UPTHRUST 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

## 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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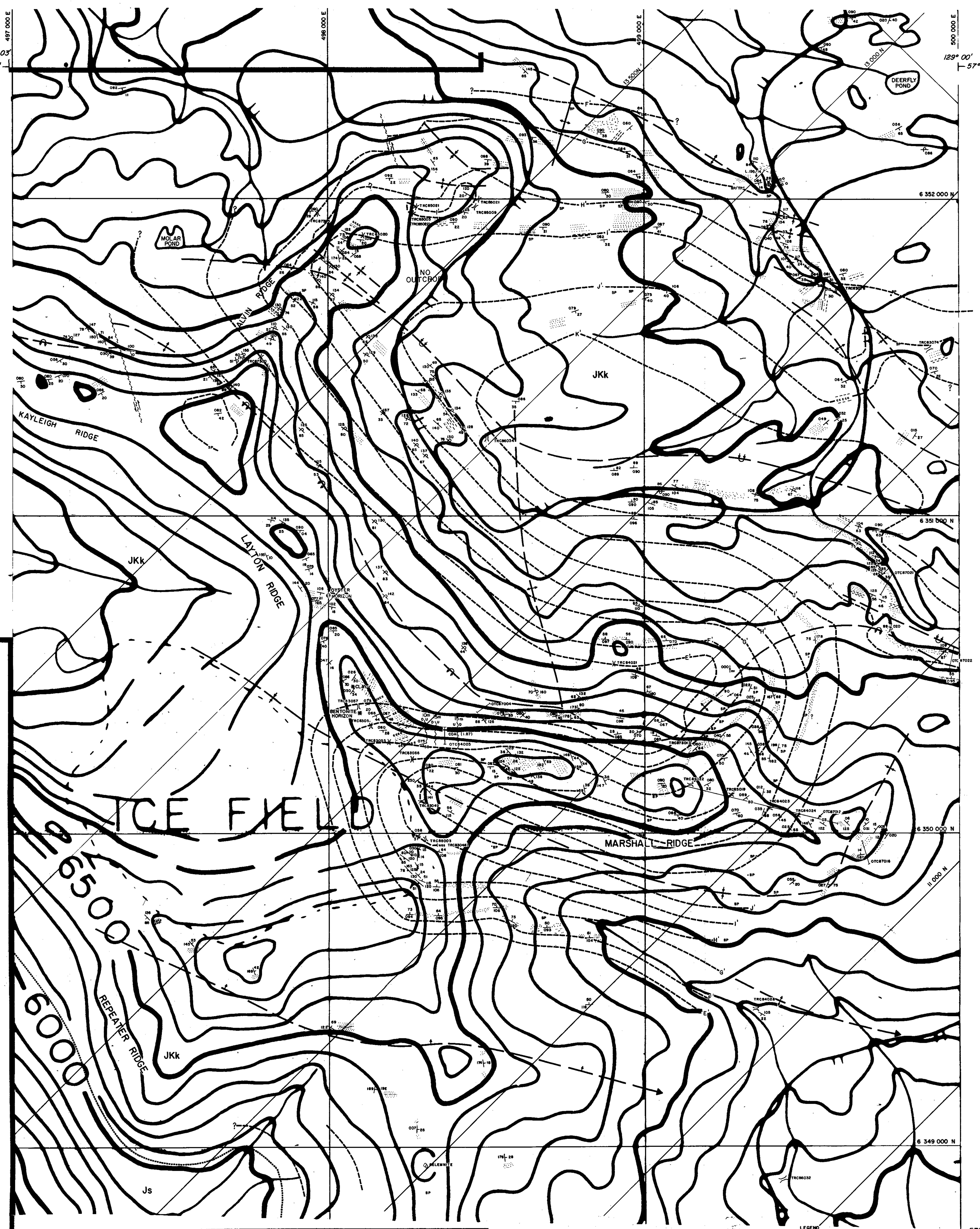
741

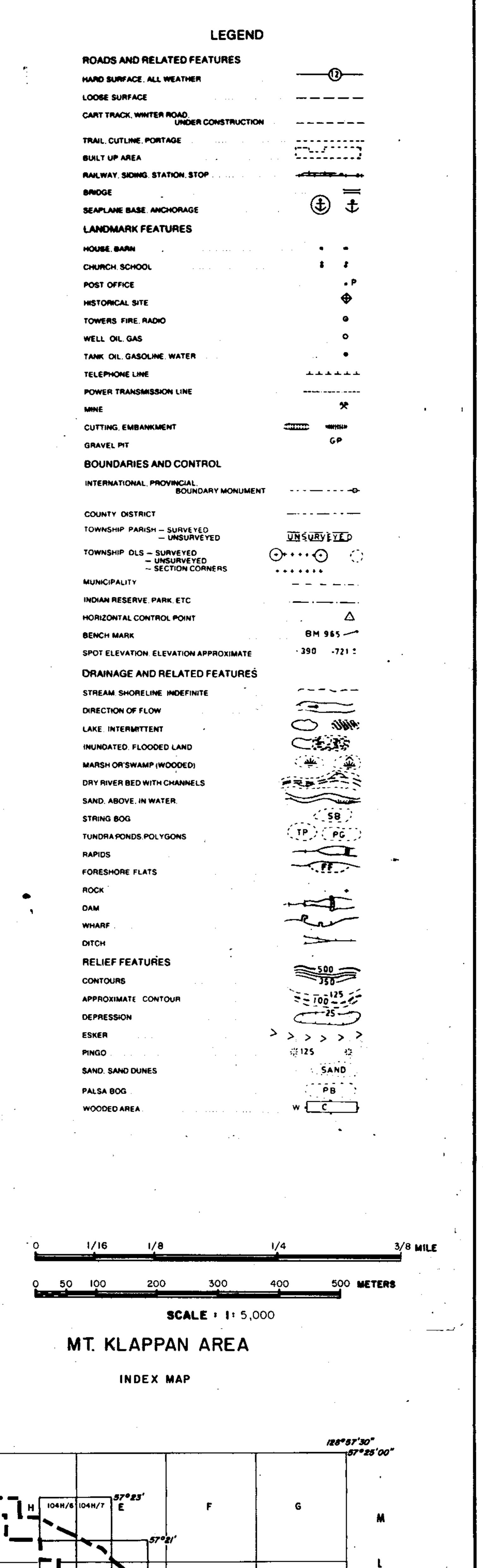
**GULF CANADA RESOURCES LTD.**
Coal Division
CALGARY ALBERTA

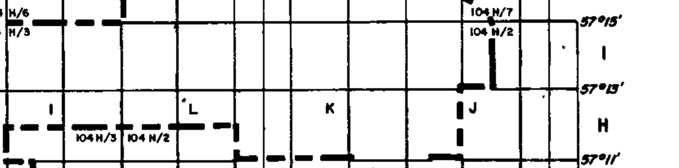
Gulf

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP K-11

| | |
|---|---|
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-06 |

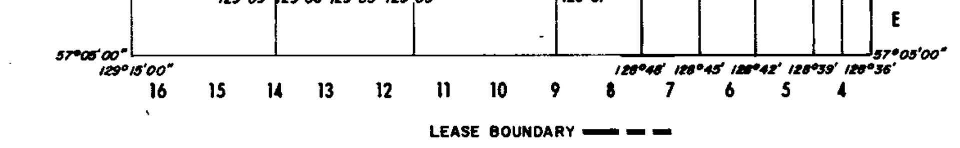



MT. KLAPPAN AREA

INDEX MAP




LEASE BOUNDARY

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)

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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 UPTHRUST 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

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

MT. KLAPPAN COAL PROPERTY

1987

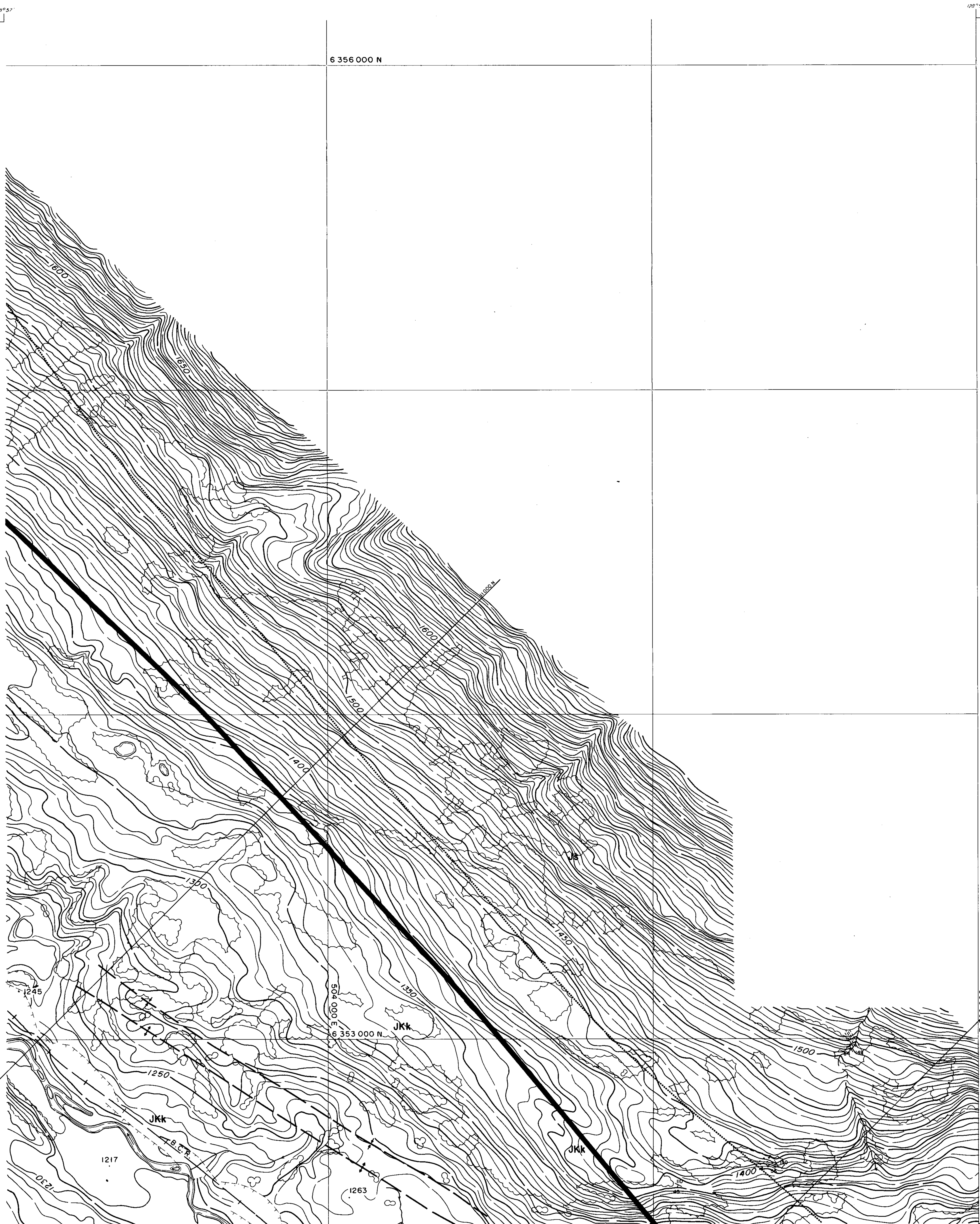
GEOLOGY MAP

SUMMIT AREA

MAP K-12

741

| | |
|---|---|
| **PREPARED BY:** S.M. / L.S. | |
| **APPROVED BY:** E.S. **DATE:** MAR. 1988 | DWG. No. KPN87SA-07 |




## LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT / FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

## NOTES

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

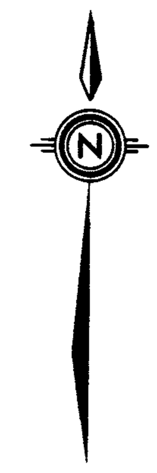
CONTOUR INTERVAL = 10 M, WITH FORM LINES INTERVAL = 5 M.

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

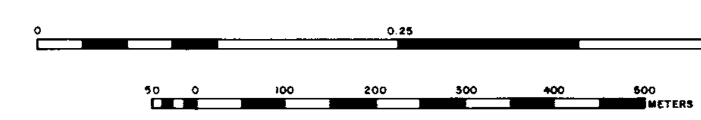
SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

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

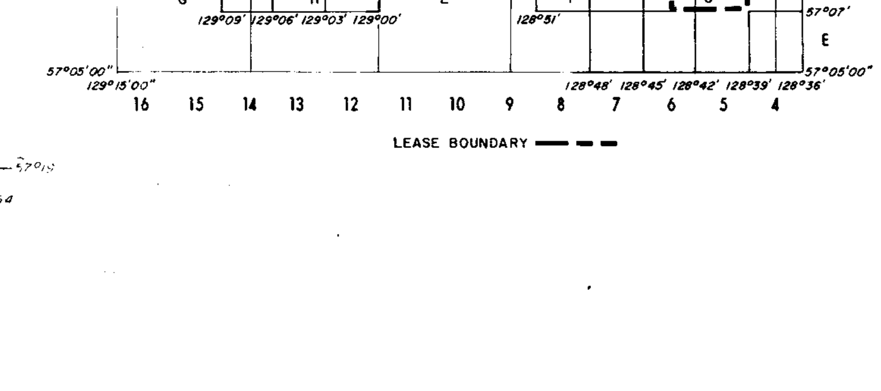



SCALE 1:5000




MT. KLAPPAN AREA

INDEX MAP




### RHONDDA SEQUENCE

**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

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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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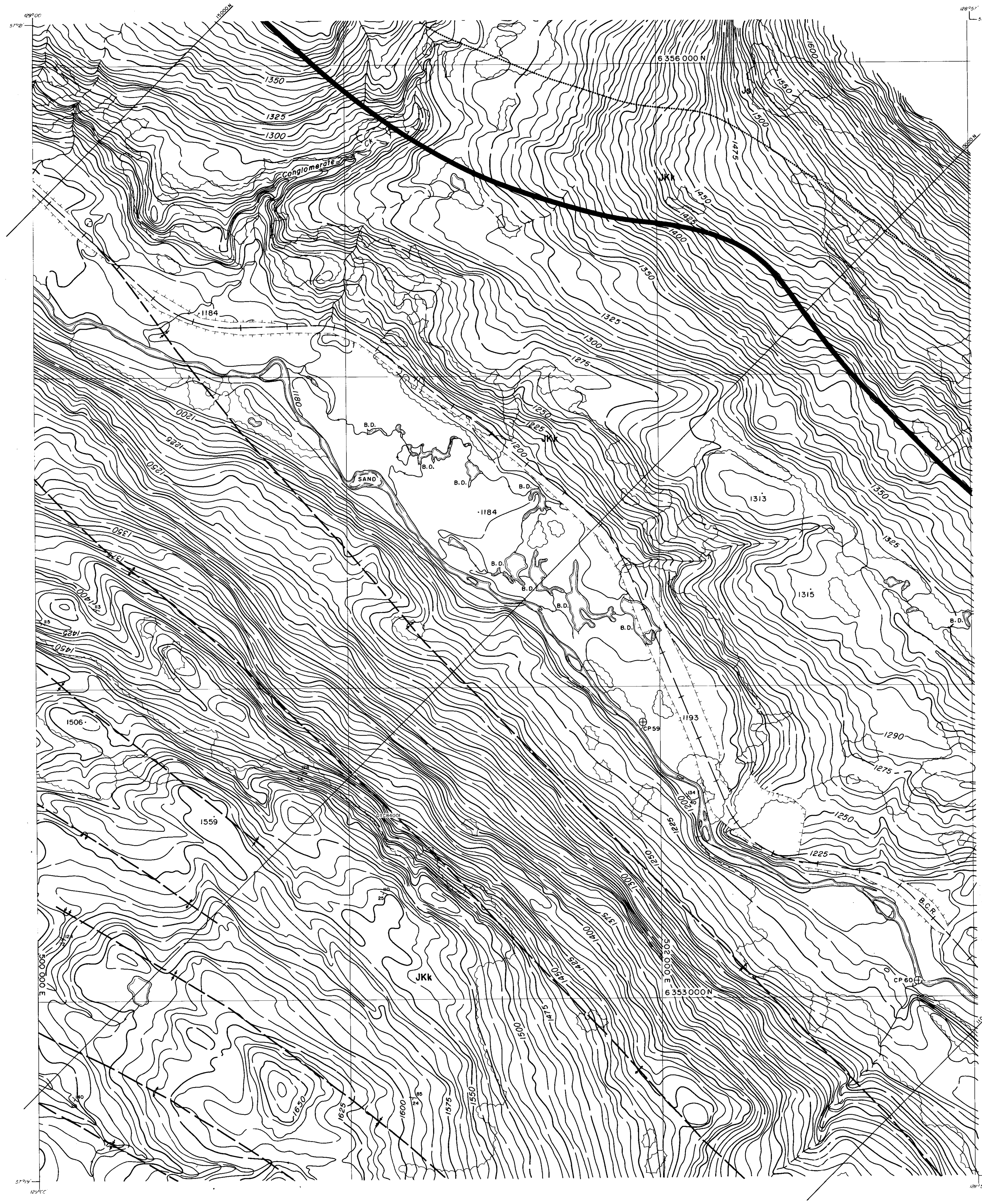
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP L-10

| | |
|---|---|
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-08 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505±
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FORM LINES
CUT/FILL
FIELD CONTROL POINT — CP 121
COAL LICENCE

NOTES

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

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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 GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1:60 000 (APPROXIMATE).

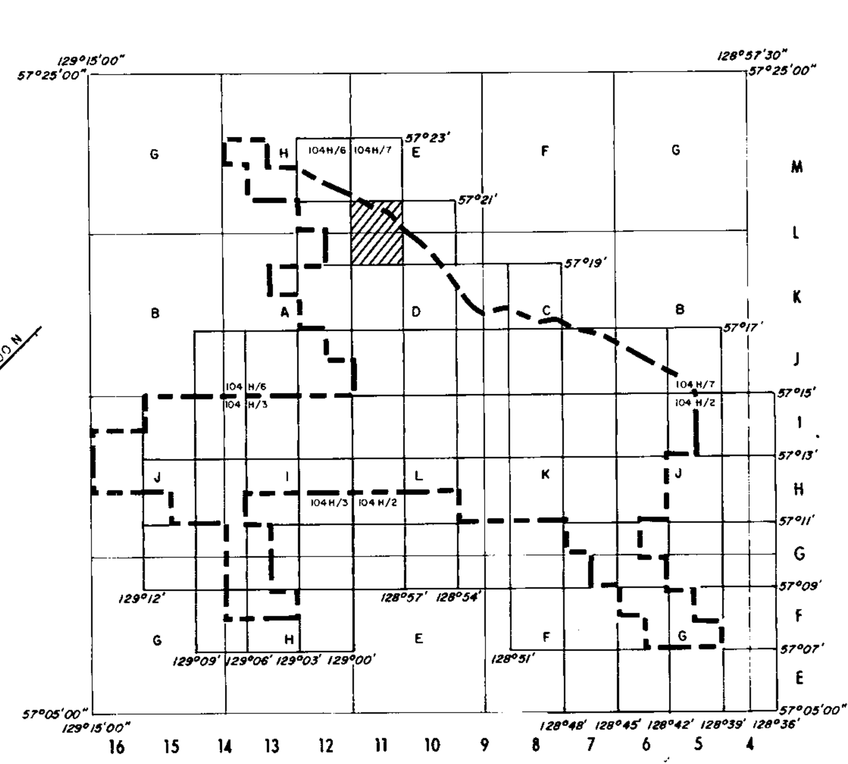
SCALE 1:5000

0 — 0.25 — 0.5 MILES

50 0 100 200 300 400 500 METERS

MT. KLAPPAN AREA

INDEX MAP



LEASE BOUNDARY

## RHONDDA SEQUENCE

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## LEGEND

LICENCE BOUNDARY
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COAL SEAM (DEFINED, INFERRED)
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MONOCLINE (DEFINED, APPROXIMATE)
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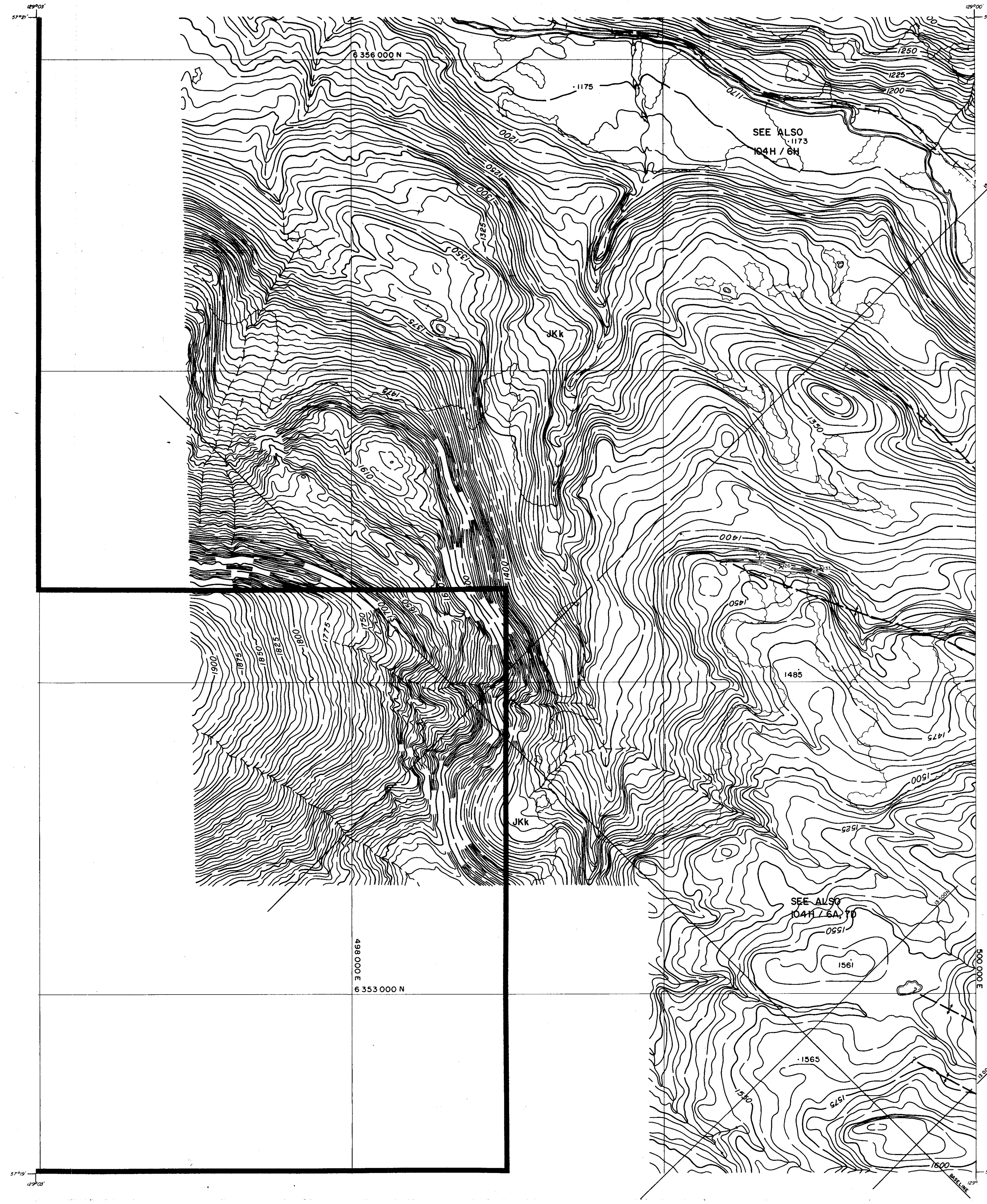
U D — FAULT (DEFINED, APPROXIMATE) UPTHROWN, DOWNTHROWN SIDE
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
TRC84001 — SP — ADIT TRENCH COAL SPOIL
DDH RDH WKD — DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
3000 N — CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP L-11

| | |
|---|---|
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR.1988 | DRAWING No. KPN87SA-09 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505*
SWAMP
BEAVER DAM
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
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NOTES

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RAILROAD BED LOCATION BASED ON SEPT./82 AERIAL PHOTOGRAPHY

COMPILED BY
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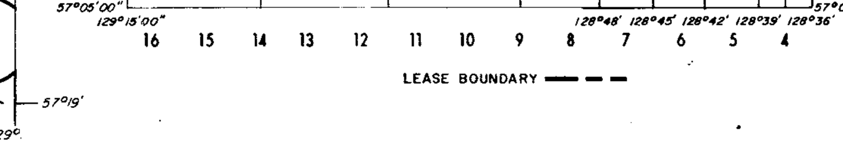
SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP

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OTC 84001 — MEASURED SECTION
SC-17 — SURVEY CAIRN
3000 N — CROSS SECTION LINE

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP L-12

| | |
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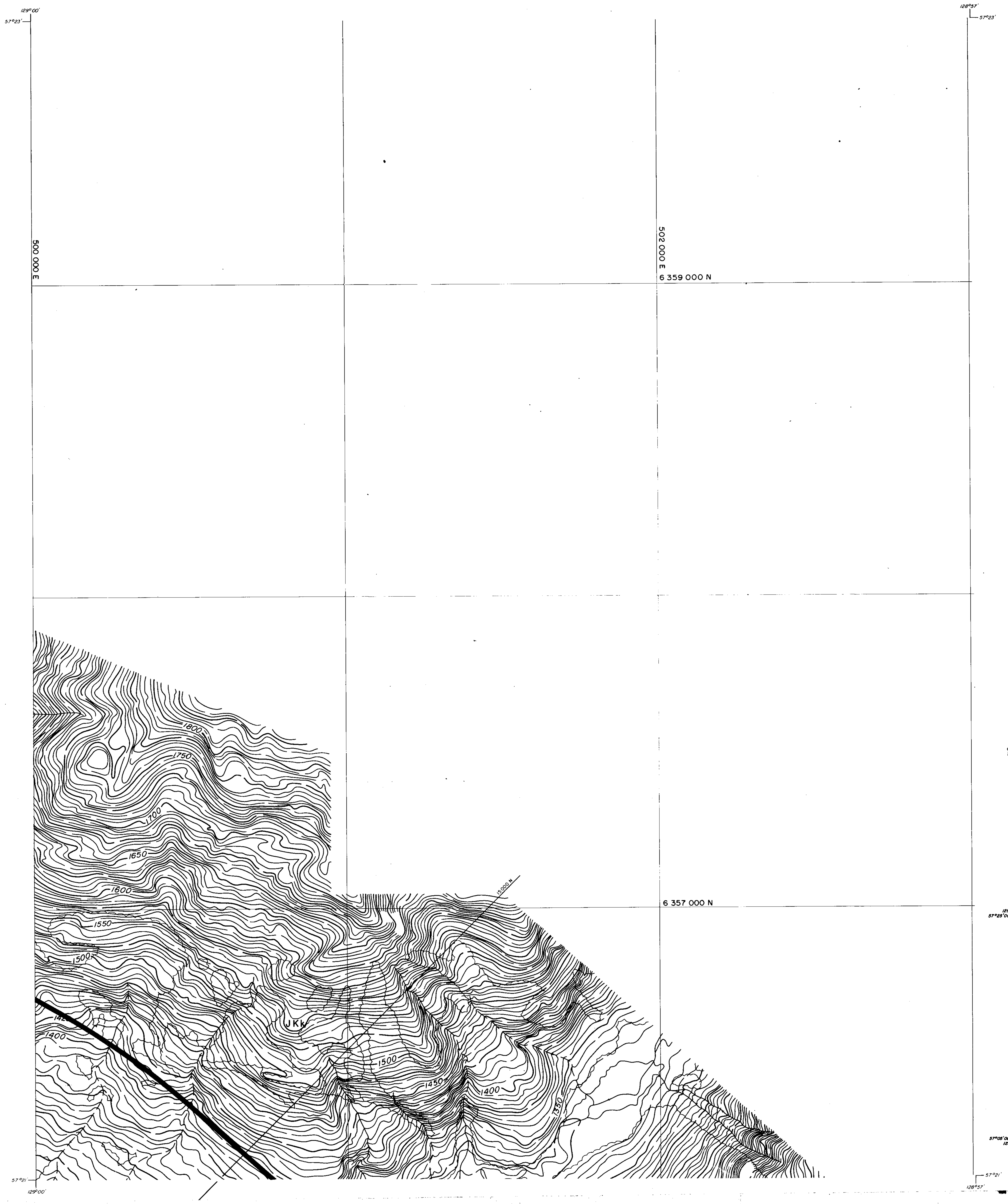
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-10 |




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
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COMPILED BY:
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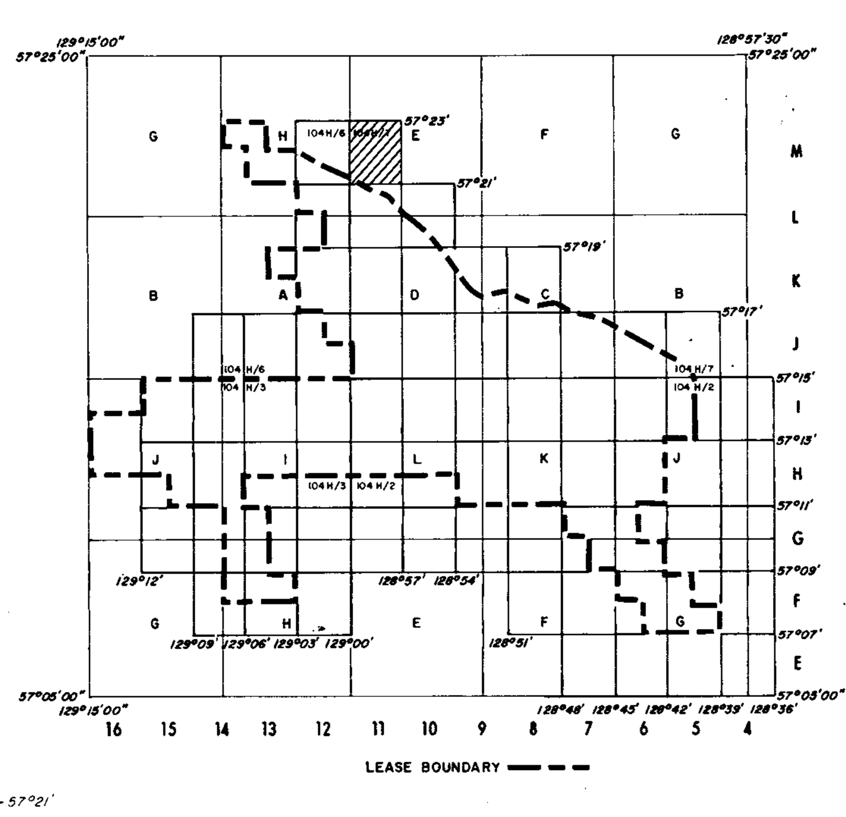
SCALE 1:5000

MT. KLAPPAN AREA

INDEX MAP

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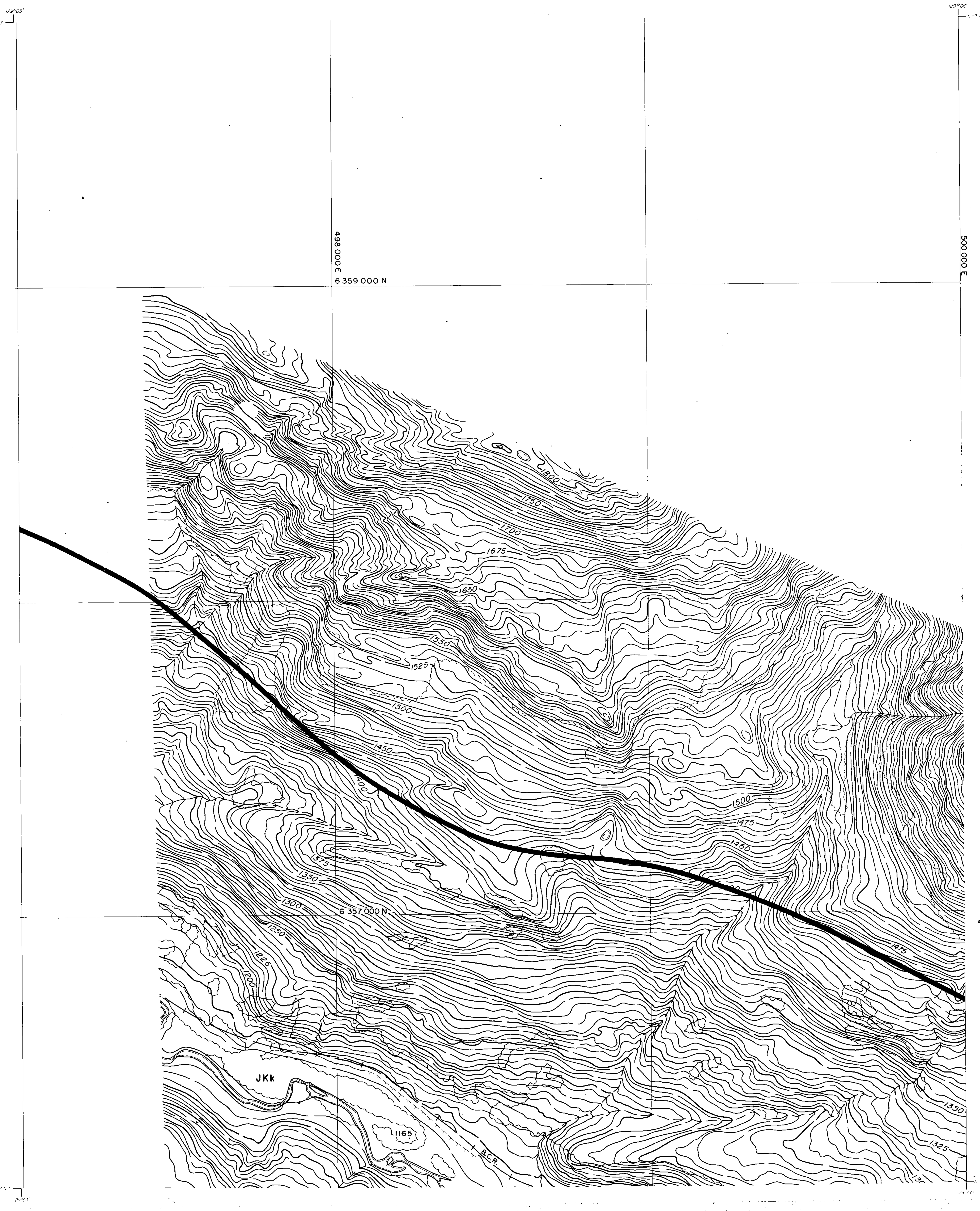
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE

741

| GULF CANADA RESOURCES LTD. Coal Division | |
|---|---|
| CALGARY | ALBERTA |
| MT. KLAPPAN COAL PROPERTY<br>1987<br>GEOLOGY MAP<br>SUMMIT AREA<br>MAP M-11 | |
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-11 |




LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
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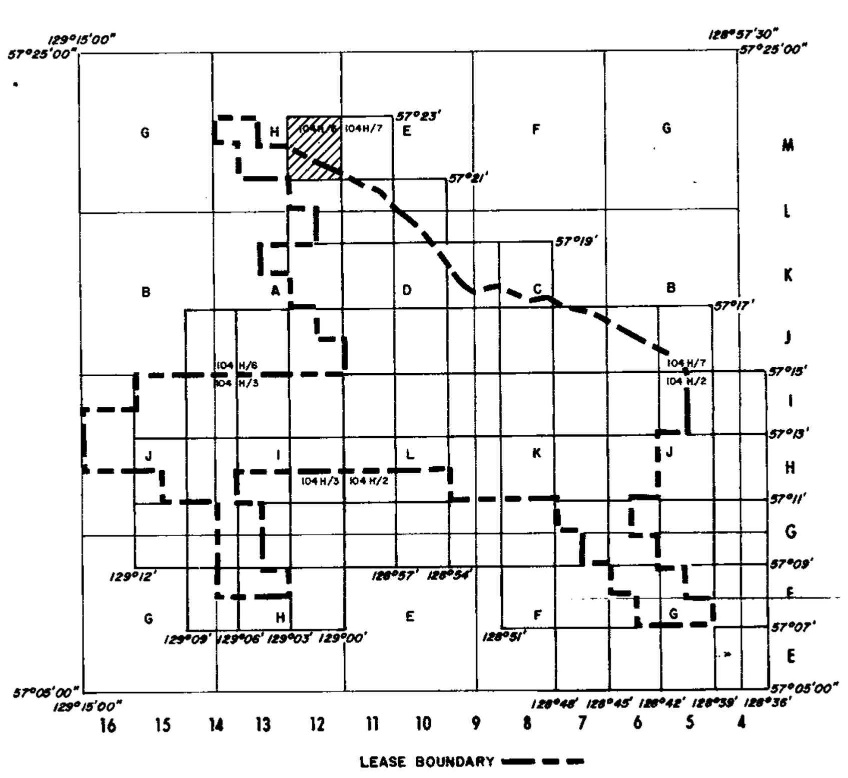
SCALE 1:5000

0 0.25 0.5 MILES

50 0 100 200 300 400 500 METERS

MT. KLAPPAN AREA

INDEX MAP

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MONOCLINE (DEFINED, APPROXIMATE)
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TRC84001 SP ADIT TRENCH COAL SPOIL
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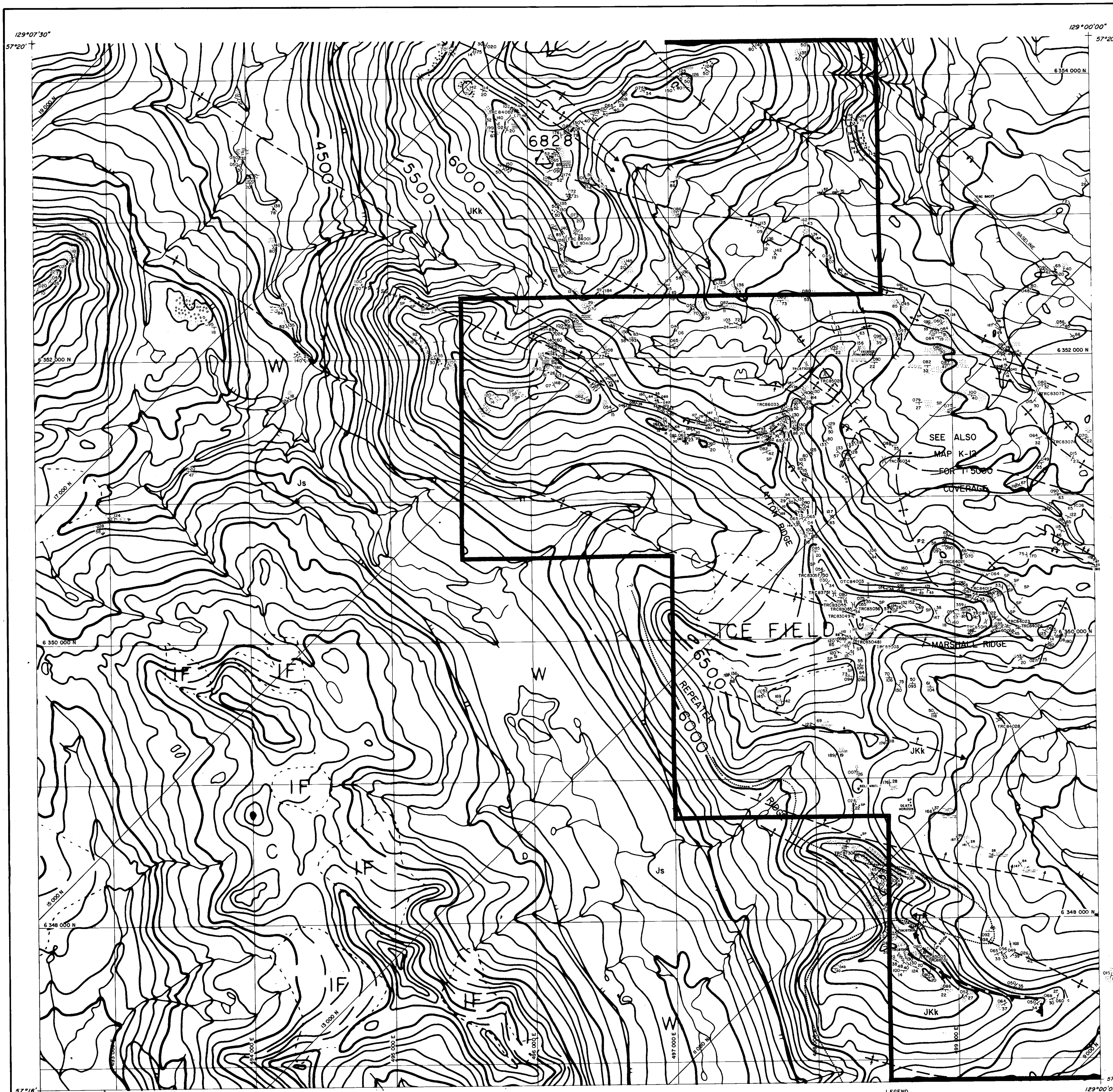
OTC 84001 MEASURED SECTION
SC-17 SURVEY CAIRN
3000 N CROSS SECTION LINE

741

| | |
|---|---|
| GULF CANADA RESOURCES LTD. Coal Division CALGARY ALBERTA | Gulf |
| MT. KLAPPAN COAL PROPERTY 1987 GEOLOGY MAP SUMMIT AREA MAP M-12 | |
| PREPARED BY: L.S./S.M. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-12 |




## LEGEND

### ROADS AND RELATED FEATURES
HARD SURFACE, ALL WEATHER
LOOSE SURFACE
CART TRACK, WINTER ROAD, UNDER CONSTRUCTION
TRAIL, CUTLINE, PORTAGE
BUILT UP AREA
RAILWAY, SIDING, STATION STOP
BRIDGE
SEAPLANE BASE, ANCHORAGE

### LANDMARK FEATURES
HOUSE, BARN
CHURCH, SCHOOL
POST OFFICE
HISTORICAL SITE
TOWERS FIRE RADIO
WELL OIL, GAS
TANK OIL GASOLINE, WATER
TELEPHONE LINE
POWER TRANSMISSION LINE
MINE
CUTTING, EMBANKMENT
GRAVEL PIT

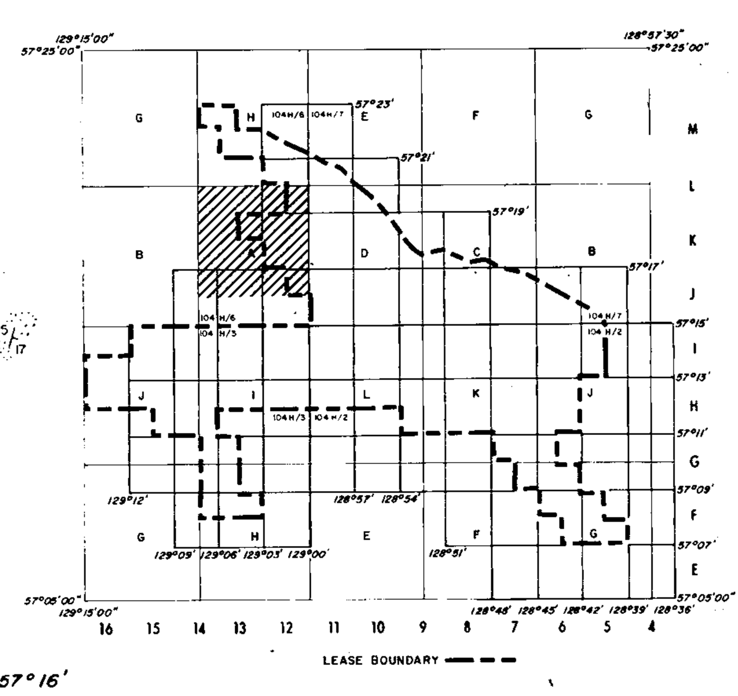
### BOUNDARIES AND CONTROL
INTERNATIONAL, PROVINCIAL, BOUNDARY MONUMENT
COUNTY DISTRICT
TOWNSHIP PARISH – SURVEYED – UNSURVEYED
TOWNSHIP DLS – SURVEYED – UNSURVEYED – SECTION CORNERS
MUNICIPALITY
INDIAN RESERVE, PARK, ETC
HORIZONTAL CONTROL POINT
BENCH MARK — BM 965
SPOT ELEVATION, ELEVATION APPROXIMATE — ·390 ·721

### DRAINAGE AND RELATED FEATURES
STREAM, SHORELINE INDEFINITE
DIRECTION OF FLOW
LAKE, INTERMITTENT
INUNDATED, FLOODED LAND
MARSH OR SWAMP (WOODED)
DRY RIVER BED WITH CHANNELS
SAND, ABOVE, IN WATER
STRING BOG — SB
TUNDRA PONDS, POLYGONS — TP PG
RAPIDS
FORESHORE FLATS — FF
ROCK
DAM
WHARF
DITCH

### RELIEF FEATURES
CONTOURS — 500 350
APPROXIMATE CONTOUR — 125 100
DEPRESSION — 25
ESKER
PINGO — 125
SAND, SAND DUNES — SAND
PALSA BOG — PB
WOODED AREA — W C

0 1/8 1/4 1/2 3/4 MILE
0 100 200 400 600 800 1000 METERS
SCALE 1:10,000

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

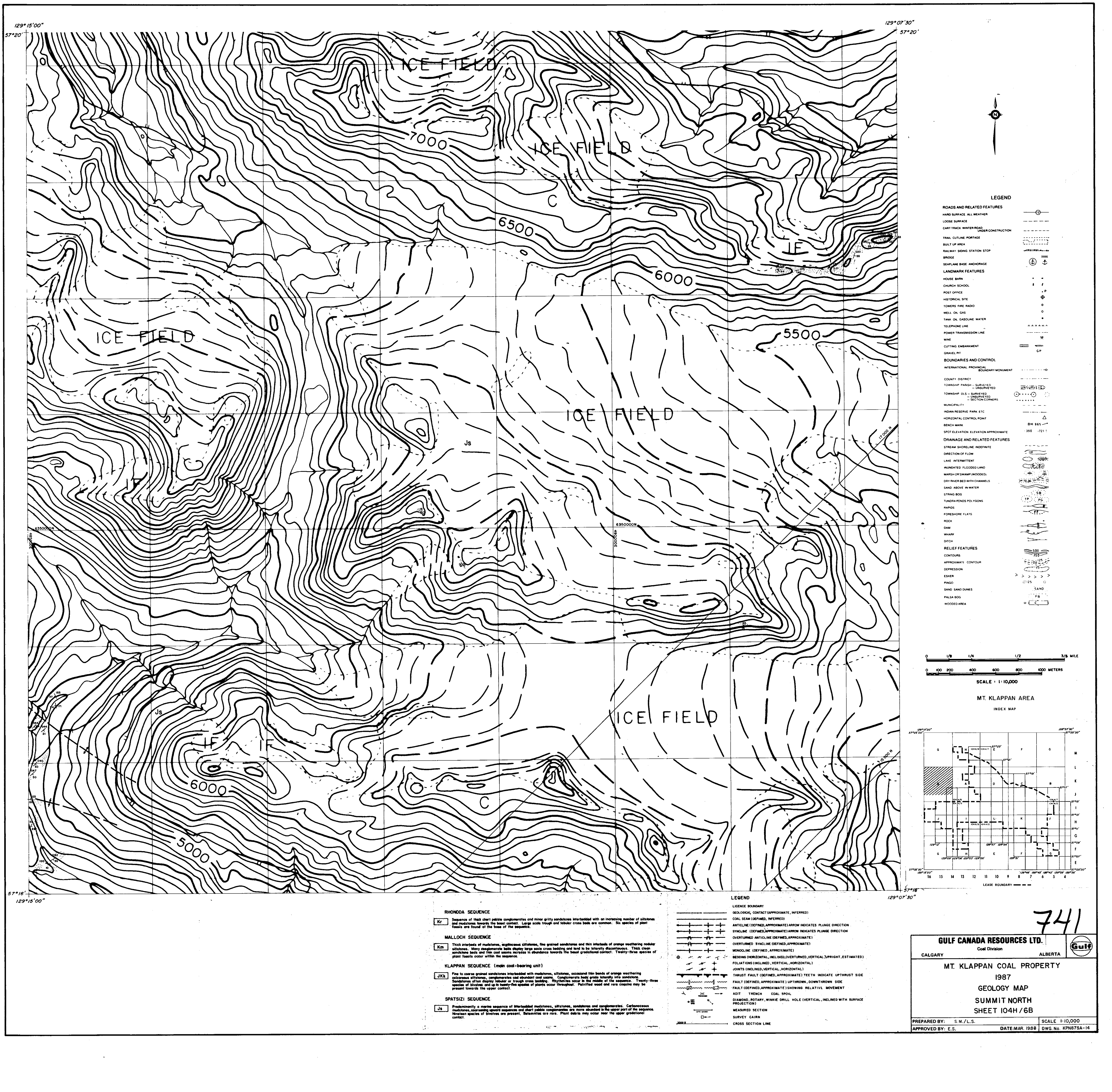
LICENCE BOUNDARY
GEOLOGICAL CONTACT (APPROXIMATE, INFERRED)
COAL SEAM (DEFINED, INFERRED)
ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
MONOCLINE (DEFINED, APPROXIMATE)
BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL, UPRIGHT, ESTIMATED)
FOLIATIONS (INCLINED, VERTICAL, HORIZONTAL)
JOINTS (INCLINED, VERTICAL, HORIZONTAL)
THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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

741

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

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP 104 H/6 A 104 H/7 D

| | |
|---|---|
| PREPARED BY: S.M./L.S. | SCALE 1:10,000 |
| APPROVED BY: E.S. DATE: MAR 1988 | DWG. No KPN87SA-13 |


129°15'00"
57°20'
129°07'30"
57°20'
ICE FIELD
7000
ICE FIELD
C
6500
IF
6000
ICE FIELD
5500
ICE FIELD
Js
IF
6350000N
ICE FIELD
Js
IF
IF
6000
C
5000
57°16'
129°15'00"
57°16'
129°07'30"
LEGEND
SCALE 1:10,000
MT. KLAPPAN AREA
INDEX MAP
LEASE BOUNDARY
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
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KLAPPAN SEQUENCE (main coal-bearing unit)
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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.
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COAL SEAM (DEFINED, INFERRED)
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SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
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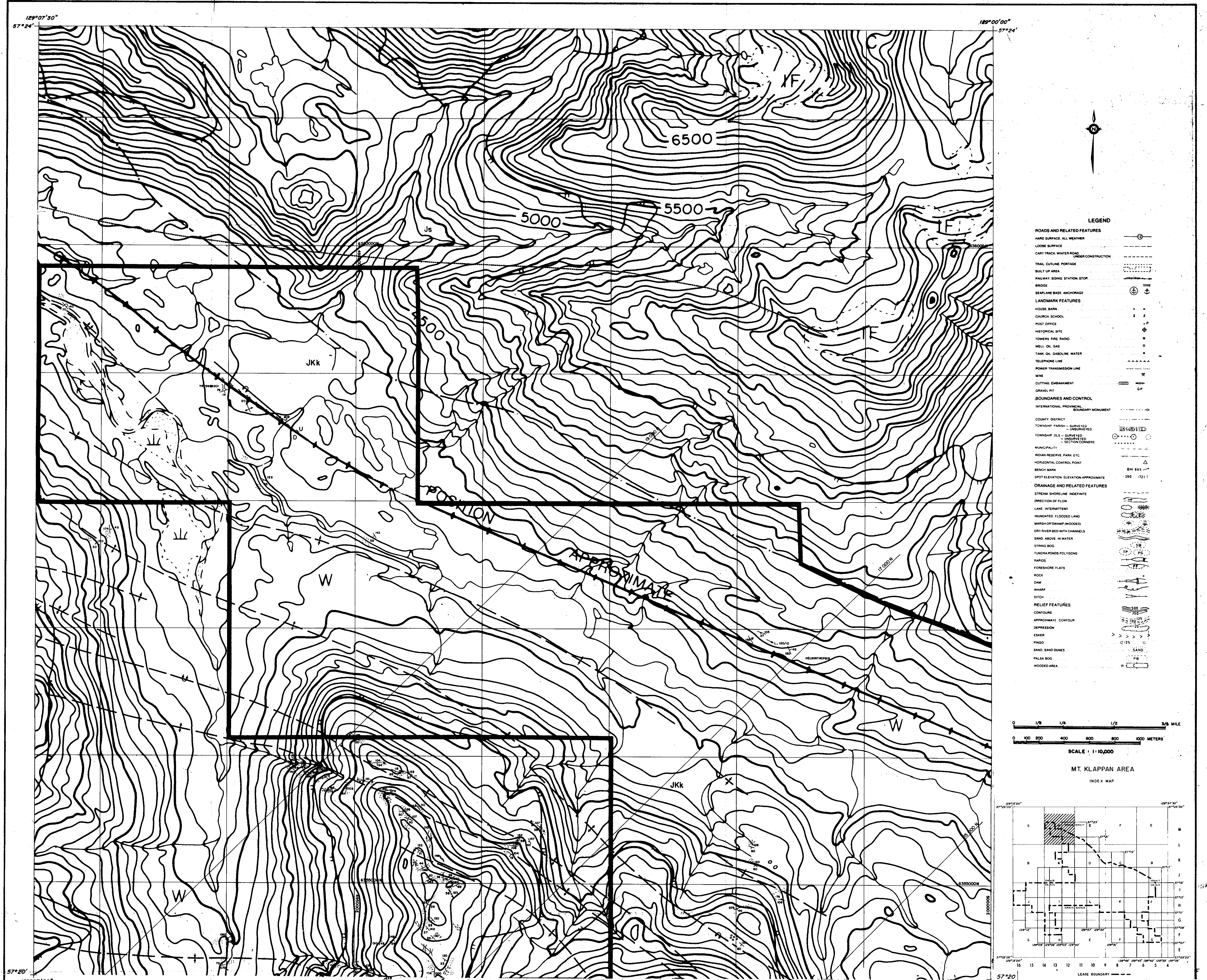
FAULT (DEFINED, APPROXIMATE) SHOWING RELATIVE MOVEMENT
ADIT TRENCH COAL SPOIL
DIAMOND, ROTARY, WINKIE DRILL HOLE (VERTICAL, INCLINED WITH SURFACE PROJECTION)
MEASURED SECTION
SURVEY CAIRN
CROSS SECTION LINE
741
GULF CANADA RESOURCES LTD.
Coal Division
CALGARY
ALBERTA
Gulf
MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT NORTH
SHEET 104H/6B
PREPARED BY: S.M./L.S.
SCALE 1:10,000
APPROVED BY: E.S.
DATE: MAR. 1988
DWG. No. KPN87SA-14




741

**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.

**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**

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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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- THRUST FAULT (DEFINED, APPROXIMATE) TEETH INDICATE UPTHRUST 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

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

Gulf

MT. KLAPPAN COAL PROPERTY
1987
GEOLOGY MAP
SUMMIT AREA
MAP 104 H/6 H

| | |
|---|---|
| PREPARED BY: S.M. / L.S. | SCALE 1:10,000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DWG. No. KPN87SA-15 |


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, carbonaceous 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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LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
13500N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A. P. | SCALE 1:5000 |
| APPROVED BY: E. S. DATE MAR. 1988 | DRAWING No. KPN87SA-16 |


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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COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
13000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: L.S./A.P | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-17 |


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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LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
12500N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A. P. | SCALE 1:5000 |
| APPROVED BY: E. S. DATE: MAR. 1988 | DRAWING No. KPN87SA-18 |


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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COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX)
BEDFORM
BEDDING ATTITUDE
DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
12 000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A. P. | SCALE 1:5000 |
| APPROVED BY: E. S. DATE: MAR. 1988 | DRAWING No. KPN87SA-19 |


RHONDDA SEQUENCE

[Kr] Sequence of th[illegible]k chert pebble conglomerates and minor gritty sa[illegible]dst[illegible]nes interbedded with an increasing number [illegible]f s[illegible]ltstones and mudstones t[illegible]wards the basal contact. Large scale trough an[illegible] ta[illegible]ular cross beds are common. Six species [illegible]f plant fossils are found at the base of the sequence.

MALLOCH SEQUENCE

[Km] Thick interbeds [illegible] mudstones, [illegible]rg[illegible]laceous siltstones, fine graine[illegible] s[illegible]ndstones and thin interbeds of orange weather[illegible]ng nodular siltstones. M[illegible] [illegible]nglomerate beds display large scale cross be[illegible]ding and tend to be laterally discontinuous. Thick clean sandstone be[illegible]s [illegible]nd thin coal seams increase in abundance tow[illegible]ds the basal gradational contact. Twenty three species of plant fossils [illegible] within the sequence.

KLAPPAN SEQUENCE (main coal-bearing unit)

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SPATSIZI SEQUENCE

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COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
11500 N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A. P. | SCALE 1:5000 |
| APPROVED BY: E. S. DATE MAR. 1988 | DRAWING No. KPN87SA-20 |


RHONDDA SEQUENCE

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COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
11000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: L.S. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-21 |


REPEATER RIDGE
CREEK
CONTACT
JKk
Js
AREA OF NO GEOLOGICAL CONTROL
METRES ABOVE SEA LEVEL
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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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.
LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DDH 85001
DIAMOND DRILL HOLE WITH ATTITUDE CONTROL
741
METRES
0 50 100 150 200 250
GULF CANADA RESOURCES LTD.
Coal Division
CALGARY ALBERTA
Gulf
MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
10 500N (EAST & WEST)
PREPARED BY: L.S.
SCALE 1:5000
APPROVED BY: E.S.
DATE MAR. 1987
DRAWING No. KPN 87SA-22


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.

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
10 000 N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: L.S./A.P. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-23 |


J12 | J11
J11 | K11
CARIBOU CIRQUE
JKk
Js
LIMITED GEOLOGICAL CONTROL
CREEK
BEDFORM
DDH83003
TRC83054
TRC85012
Q'
P'
O'
N'
M'
METRES ABOVE SEA LEVEL
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
RHONDDA SEQUENCE
MALLOCH SEQUENCE
KLAPPAN SEQUENCE (main coal-bearing unit)
SPATSIZI SEQUENCE
LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX., INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DIAMOND DRILL HOLE WITH ATTITUDE CONTROL
741
METRES
GULF CANADA RESOURCES LTD.
Coal Division
CALGARY
ALBERTA
Gulf
MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
9500N (EAST & WEST)
PREPARED BY: L.S./A.P.
SCALE 1:5000
APPROVED BY: E.S.
DATE: MAR.1988
DRAWING No. KPN87SA-24


RHONDDA SEQUENCE

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

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)

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

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.

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

1987

GEOLOGICAL CROSS SECTION

SUMMIT AREA

9000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A. P. | SCALE 1:5000 |
| APPROVED BY: E. S. DATE MAR. 1988 | DRAWING No. KPN87SA-25 |


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.

LICENCE BOUNDARY
COAL SEAM TRACE (DEFINED, INFERRED)
GEOLOGICAL CONTACT (APPROX, INFERRED)
FAULT TRACE (DEFINED, APPROX.)
BEDFORM
BEDDING ATTITUDE
DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

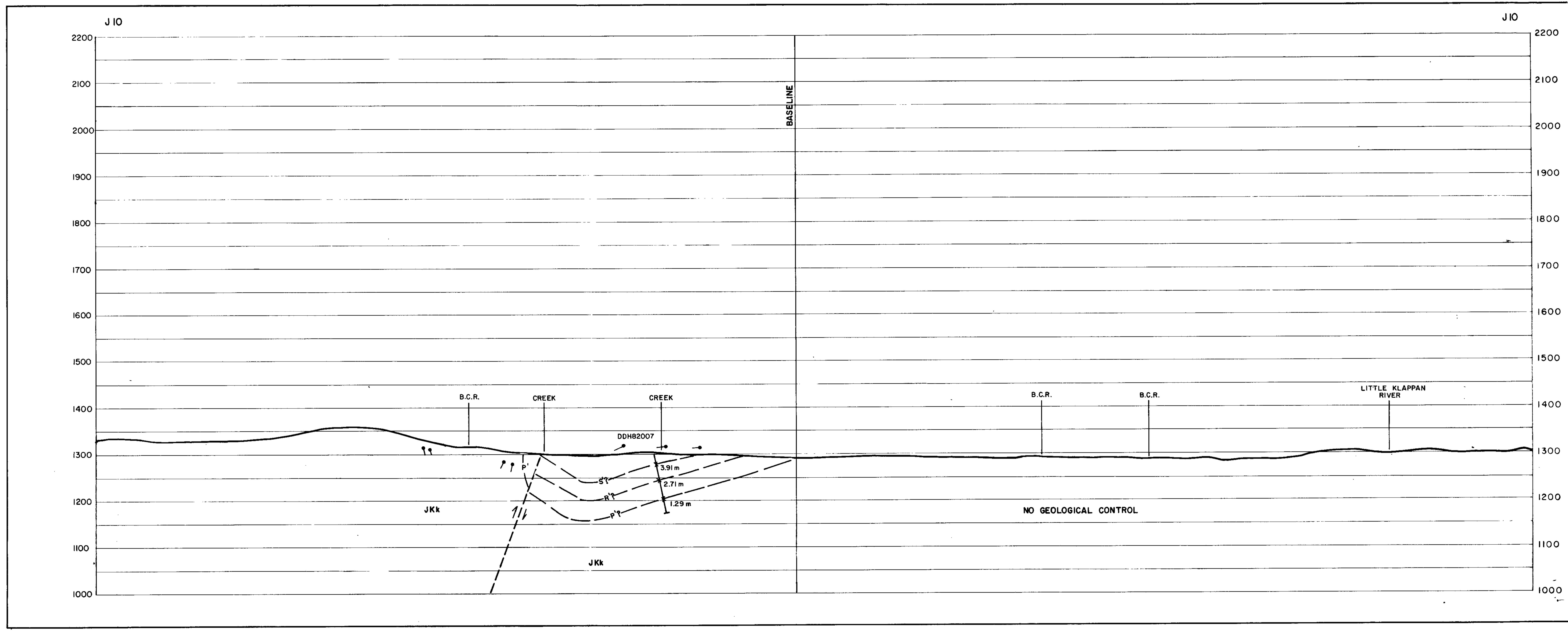
741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
7000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: A.P. | SCALE 1:5000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-26 |




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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

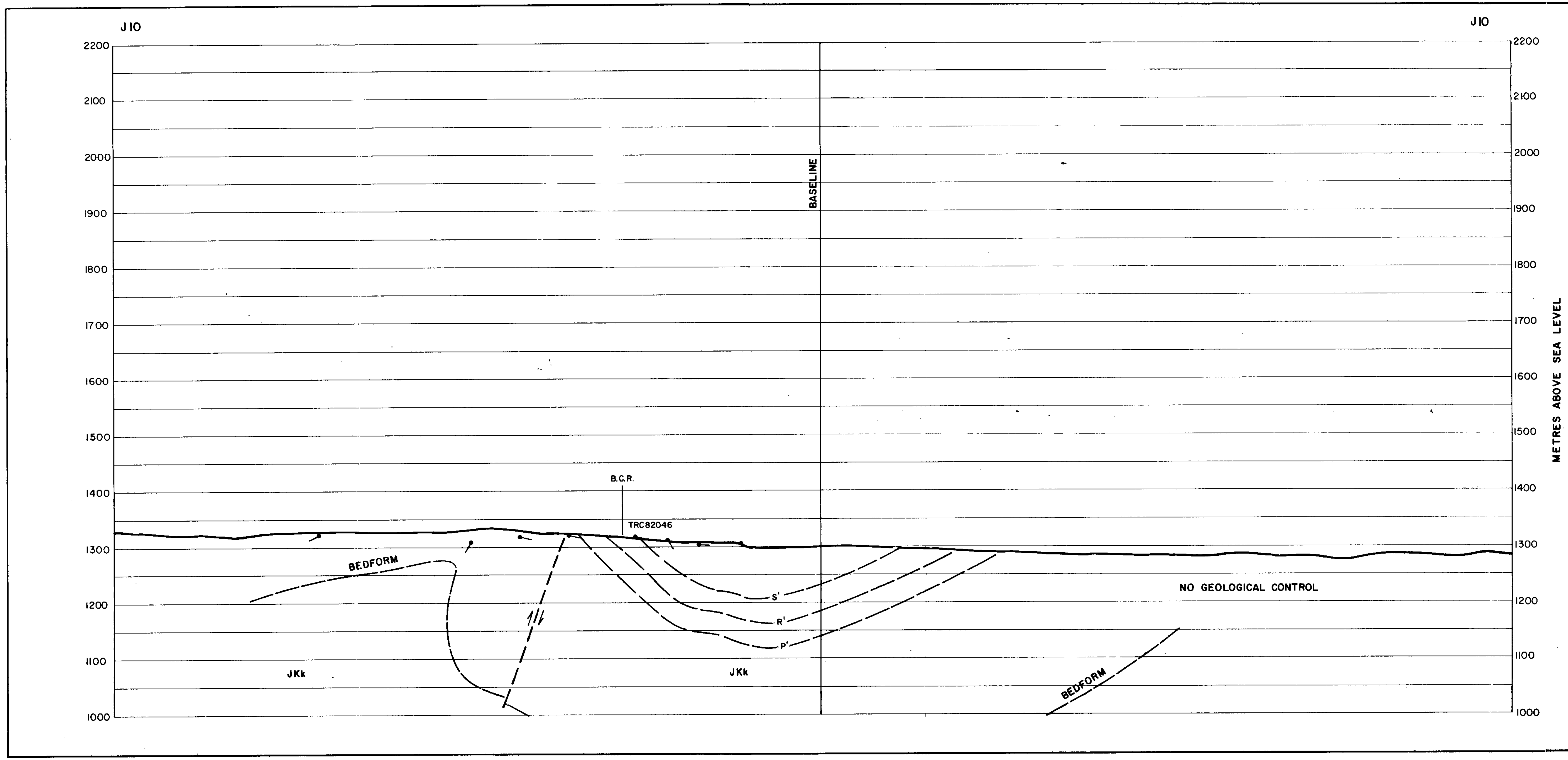
741

METRES
0 50 100 150 200 250

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
6000N (EAST & WEST)

| | | |
|---|---|---|
| PREPARED BY: A. P. | | SCALE 1:5000 |
| APPROVED BY: E. S. | DATE: MAR. 1988 | DRAWING No. KPN87SA-27 |




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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 50 100 150 200 250

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
5500 N (EAST & WEST)

| | | |
|---|---|---|
| PREPARED BY: A. P. | | SCALE 1:5000 |
| APPROVED BY: E. S. | DATE: MAR. 1988 | DRAWING No. KPN87SA-28 |


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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 100 200 300 400 500

**GULF CANADA RESOURCES LTD.**

Coal Division

CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

1987

GEOLOGICAL CROSS SECTION

SUMMIT AREA

17000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE MAR. 1988 | DRAWING No. KPN87SA-29 |


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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

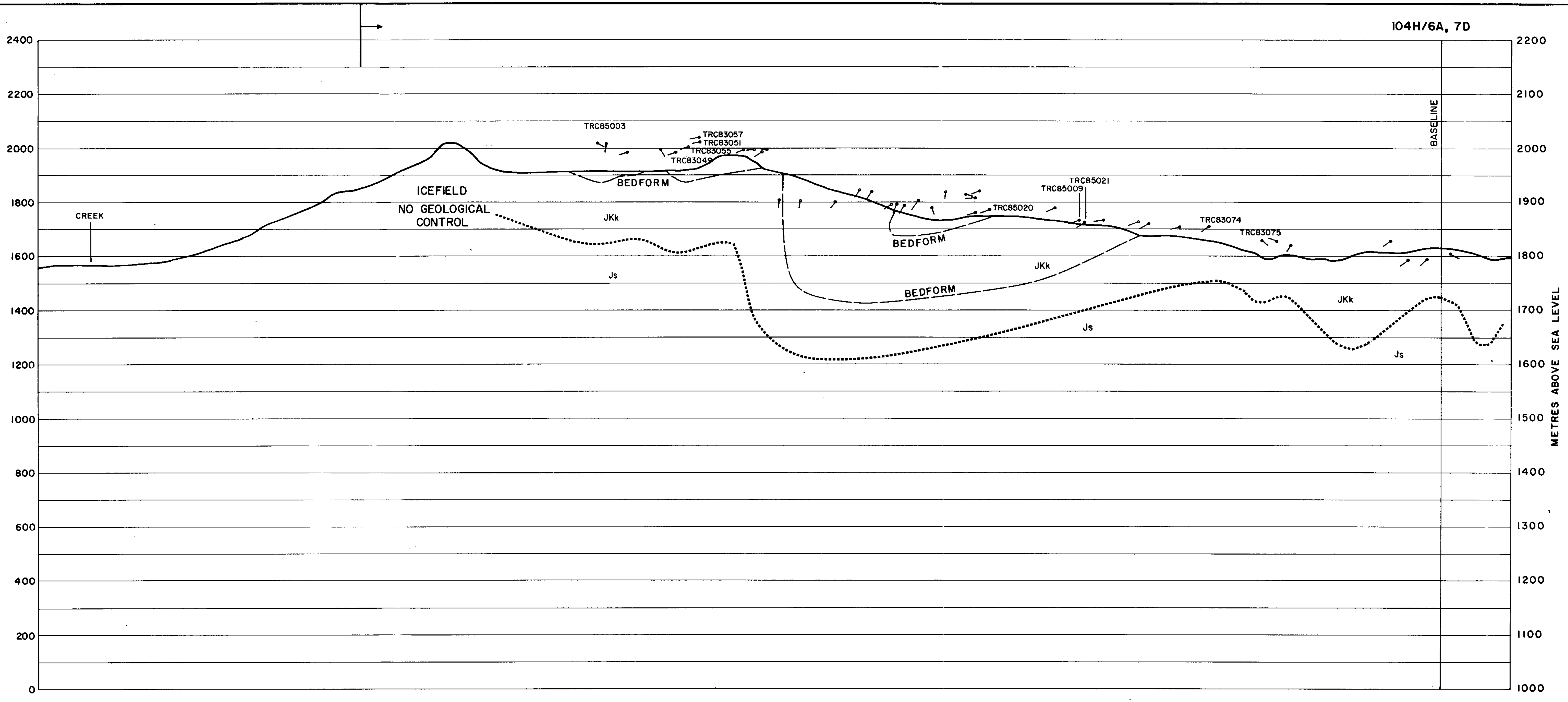
METRES

0 100 200 300 400 500

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

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
15 000N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: E. S. | SCALE 1:10 000 |
| APPROVED BY: E. S. DATE MAR. 1988 | DRAWING No. KPN875A-30 |




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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

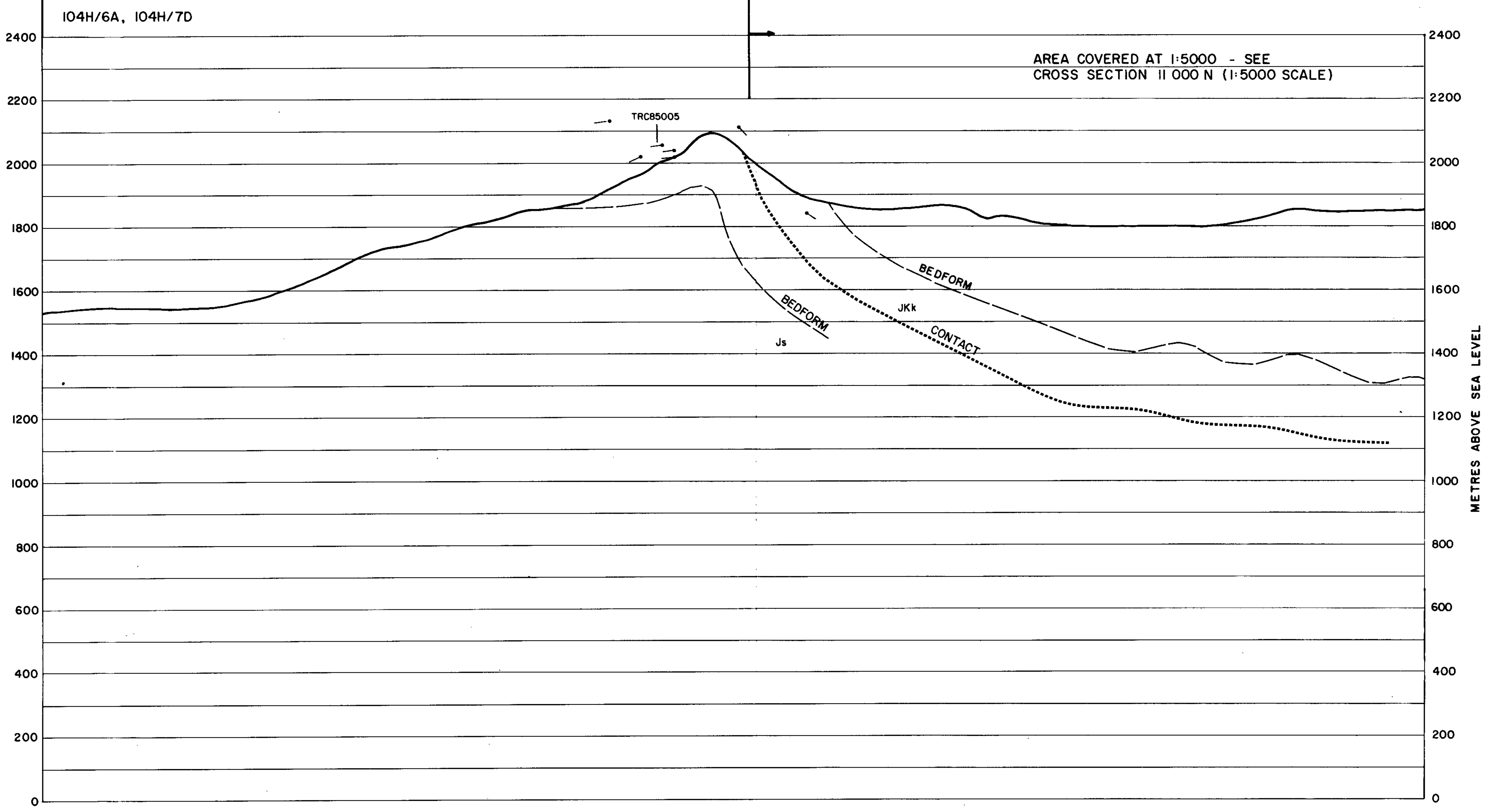
0 100 200 300 400 500

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
13 000 N (EAST & WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-31 |




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

LICENCE BOUNDARY

COAL SEAM TRACE (DEFINED, INFERRED)

GEOLOGICAL CONTACT (APPROX, INFERRED)

FAULT TRACE (DEFINED, APPROX.)

BEDFORM

BEDDING ATTITUDE

DDH 85001 — DIAMOND DRILL HOLE WITH ATTITUDE CONTROL

741

METRES

0 100 200 300 400 500

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

Gulf

MOUNT KLAPPAN COAL PROPERTY
1987
GEOLOGICAL CROSS SECTION
SUMMIT AREA
11000 N (WEST)

| | |
|---|---|
| PREPARED BY: E.S. | SCALE 1:10 000 |
| APPROVED BY: E.S. DATE: MAR. 1988 | DRAWING No. KPN87SA-32 |