MITRE GEOPHYSICS PTY LTD
MINERAL EXPLORATION AND ENGINEERING CONSULTANTS
BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

A RE-EVALUATION OF THE GEOPHYSICAL SURVEYS OVER THE FEDERAL-BASSETT FAULT TO THE WEST OF THE MINE LEASE

for

Renison Ltd

by

Dr J.R. Bishop

RN/MG87/04
August 1987

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FIGURES

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Figure 1(b). Sketch showing alternative interpretation for the Federal-Bassett Fault within the Crimson Creek grid.

Figure 2. Grids and present interpreted position of the Federal-Bassett Fault (1:10,000 scale).

Figure 3. Magnetic profiles (1:10,000 scale).

Figure 4. Chargeability profiles (1:10,000 scale).

Figure 5. Resistivity profiles (1:10,000 scale).

Figure 6. Geophysical compilation (1:10,000 scale).

Figure 7. Magnetic models for line 135W.

Figure 8. Interpreted structure (1:10,000 scale).

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SUMMARY

Examination of the results from IP and magnetic surveys over the Crimson Creek grid indicate that there is some support for the hypothesis that there is a sub-parallel shear to the south of the (relocated) Federal-Bassett Fault. However the line to line correlations are poor for all parameters and no confident interpretation can be made. VLF surveying over a more detailed grid is recommended.

INTRODUCTION

Renison Ltd's chief geologist, R. Morland, has noted that there are a number of shears which leave the Federal-Bassett Fault at regular intervals and at steep angles to the south; they then 'turn' and become sub-parallel to the Federal Fault (Morland, pers. comm.). A sketch illustrating this is given in Figure 1(a). Morland has suggested that the (interpreted) embayment in the Federal-Bassett Fault immediately to the west of the mine lease boundary may in fact be another shear leaving the Fault as is shown in Figure 1(b). This report re-evaluates the geophysical data over the area to see if there is any geophysical support for this hypothesis.

GRIDS

The area of interest is covered by the Crimson Creek grid. This is a regional grid with lines spaced at a nominal separation of 300m. Different maps show somewhat different positions for some of the lines and there is some uncertainty about their true positions. The north-western half of the Fault is covered by the detailed 'Mines Dept' grid. This was probably surveyed in by theodolite and is shown as an orthogonal grid in Bishop (1983). The position of the Federal-Bassett Fault as presently interpreted is shown in Figure 2, together with the grid lines, access tracks and diamond drill hole locations.

GEOPHYSICAL SURVEYS

The results from total field magnetics and a gradient array IP survey over the Crimson Creek grid and from self potential (SP) over the Mines Dept grid have been used for the evaluation. Details of these surveys are given in Bishop (1983).

INTERPRETATION

Profiles of the magnetics, chargeability and resistivity are given in Figures 3, 4 and 5 respectively. There are no well-defined consistent trends traversing all of the grid in any of the plans. A compilation of the interpreted trends is given in Figure 6. Examination of the profiles shows that the line to line correlations (over distances of the order of 300m) are generally poor for all three parameters. Further, since there is no correlation between the magnetic anomalies and the chargeability highs*, pyrrhotite is not the source for either set of responses.

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* There is some correspondence between chargeability and a magnetic low between lines 115W and 135W. It is suggested later that the low may be due to remanence. Thus the possibility exists that this section of the Fault contains pyrrhotite.

The magnetic anomalies are probably due to disseminated magnetite within the Crimson Creek sediments. This could be verified by measuring the magnetic susceptibilities of the core from one or more of the diamond drill holes in the area (see Figure 2). The responses on lines 135W and 145W suggest a large, buried, west-dipping body with some near-surface material beneath line 145W. Simple modelling assuming induced fields only, produced reasonable fits to the data, but the 'trough' in the profiles was not matched, suggesting that remanence is important. Two different models for line 135W are given in Figure 7; the multiple body model (Figure 7b) being derived from modelling of the line 145W profile (results not included here).

The source of the chargeability responses is presumed to be pyrite. Where coincident with resistivity lows, more massive sulphides are indicated. Resistivity lows not associated with chargeability responses may indicate zones of weathering or, more pertinently, shear zones. This data was originally interpreted by Howland-Rose (1974) who suggested a (grid) south-west trending fault which offset the western section of the Federal-Bassett Fault. Whilst there is some support for this interpretation, particularly in the chargeability results, it is by no means conclusive.

The longest chargeability trend, from 110W to 165W, is near-coincident with (the presently interpreted position of) the Federal-Bassett Fault for much of its length. A coincident resistivity low can be interpreted over this distance (ie, other interpretations are certainly possible). This trend leaves the Fault at line 155W where the chargeability stops and is continued only by the resistivity low. Therefore an unmineralised continuation of a shear to the west is possible. The western end of the Federal-Bassett Fault coincides with a long SP anomaly. A chargeability high/resistivity low coincides with the SP on line 175W and then trends at a shallow angle to the west. The SP responses have been largely ascribed to black shales (Bishop, 1983). It is likely that the IP parameters have the same source and that the difference in position is due to miss-positioning of one or both grids. (The Federal-Bassett Fault may of course pass through, or along a contact of, the shales.)

CONCLUSIONS AND RECOMMENDATIONS

Although only poor trends can be interpreted from the IP and magnetics; coincident chargeability and resistivity anomalies overlie the eastern section of the Federal-Bassett Fault and SP (with position corrected) chargeability and resistivity overlie the western section. Thus there is some evidence to suggest that there are two structures. A (grid) southern structure defined by an IP high/resistivity low at its eastern end, which becomes un-mineralised to the west and is defined only by a poorly defined resistivity low, and a northern one probably associated with black shales at its western end and partially defined by a resistivity low, eastwards. This interpretation is shown in

Figure 8. It is emphasised that this interpretation has been 'pushed' in favour of Morland's hypothesis.

The above ignores that section of the presently interpreted Fault connecting the old workings (Success, Owen Meredith, Bon Accord & Success Extended; see Figure 2). These workings are all aligned and contain fault-associated mineralisation (Blissett, 1962). They provide good evidence for a fault, though not necessarily the Federal-Bassett Fault, through the Mines Dept grid according to the original interpretation. The two other workings shown on Figure 2, Murchison and Poseidon, are aligned with the rest and a postulated fault encompassing all of these prospects is shown in Figure 8.

To better locate the Federal-Bassett Fault and other structures, it is recommended that VLF be tried. This method is ideal for locating large scale, and possibly poor, conductors. The (true) north-westerly trends of the fault(s) should provide excellent coupling with the NWC transmitter in Western Australia. A more detailed grid than the old Crimson Creek grid is required to allow a more confident line to line correlation.

Although there is little evidence in this data for near-surface Renison style mineralisation, the ground at depth has not been effectively tested. The gradient array IP survey would have limited penetration and the magnetic response from a body buried at, say, 300m (see Bishop, 1985) or even shallower would be masked by the near-surface effects. If the existing drill-holes could be re-opened, down-hole EM surveys would be an effective way to test this area.

J.R. Bishop
August, 1987

REFERENCES

Bishop, J.R., 1983. A compilation of the geophysical surveys over the Renison mine lease and E.L. 42/71. Mitre Geophysics report 83/05 for Renison Ltd.

Bishop, J.R., 1985. Interpretation of the geophysical surveys over the Argent area of E.L. 42/71. Mitre Geophysics report 85/03 for Renison Ltd.

Blissett, A.H., 1962. Explanatory report for the Zeehan one mile geological sheet. Tas. Mines Dept.

Howland-Rose, A.W., 1974. Final report on IP surveys on the Crimson Creek grid. Scintrex report Tas-019C for Renison Ltd.

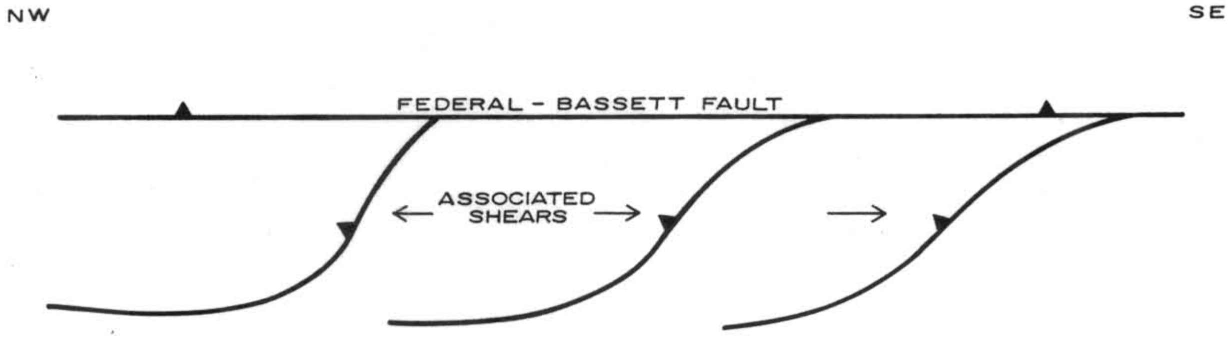
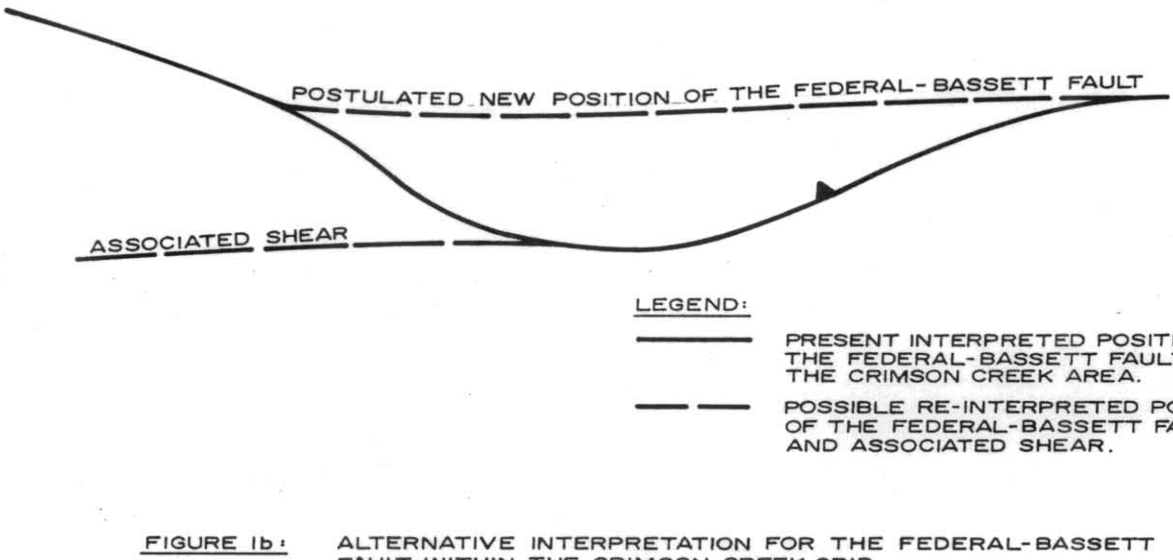


FIGURE 1a: IDEALISED SKETCH SHOWING SHEARS ASSOCIATED WITH THE FEDERAL-BASSETT FAULT.



LEGEND:

- (solid line) PRESENT INTERPRETED POSITION OF THE FEDERAL-BASSETT FAULT OVER THE CRIMSON CREEK AREA.
- (dashed line) POSSIBLE RE-INTERPRETED POSITION OF THE FEDERAL-BASSETT FAULT AND ASSOCIATED SHEAR.

FIGURE 1b: ALTERNATIVE INTERPRETATION FOR THE FEDERAL-BASSETT FAULT WITHIN THE CRIMSON CREEK GRID.

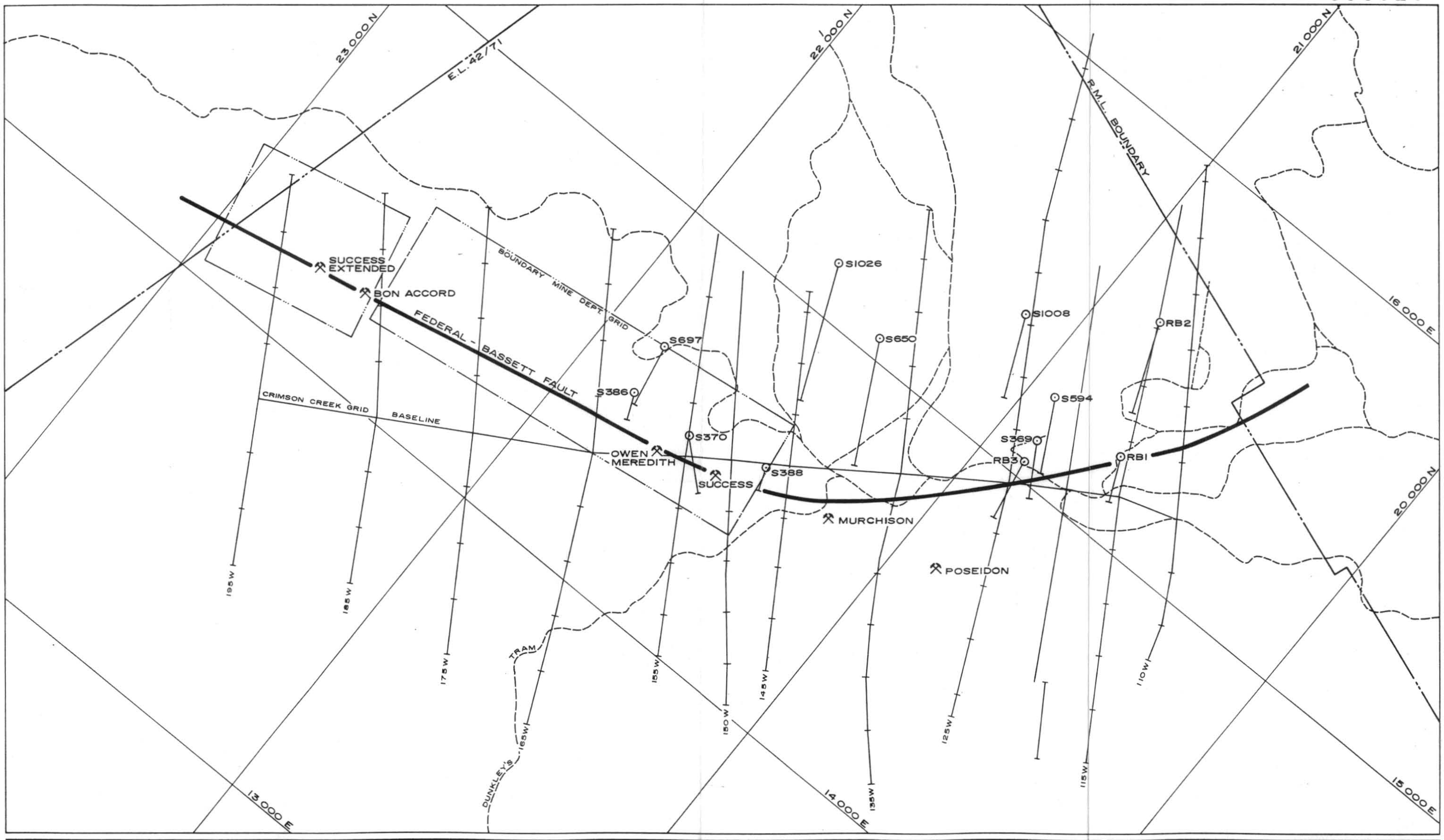
5 cm

RENISON LIMITED

SCALE N.T.S.

GEOLOGIST: J.R.B.	FEDERAL-BASSETT FAULT GEOPHYSICAL SURVEYS
DRAUGHTSMAN: R.F.	
CHECKED:	INTERPRETATION OF FEDERAL-BASSETT FAULT (after Morland, pers.comm.)
DATE: JUL., 1987	
REF. RN/MG87/04	FIG.No. 1

696010

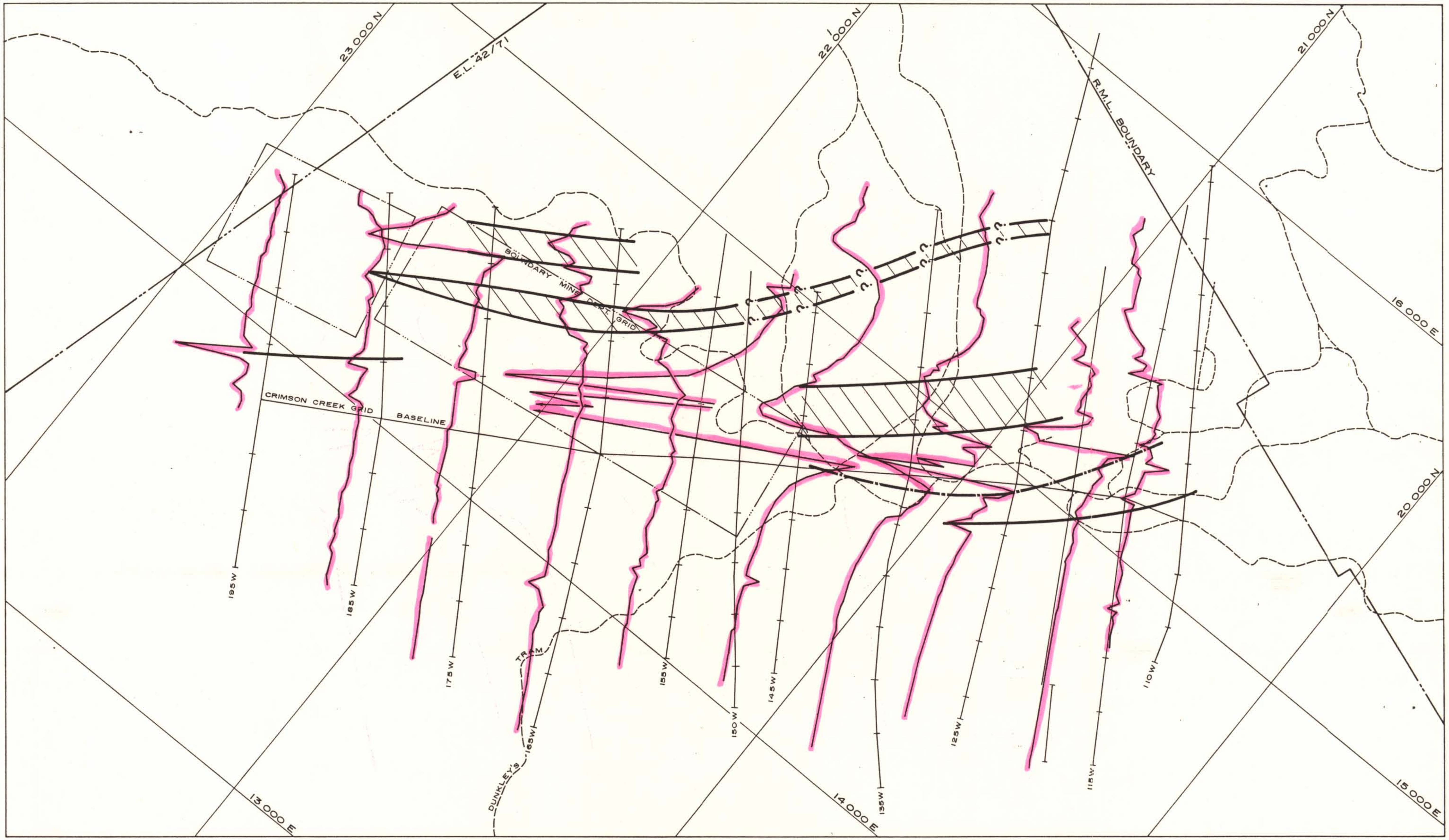


POSITION OF GRID LINES APPROXIMATE

5 cm

RENISON LIMITED	
SCALE 1:10000	
GEOLOGIST: J.R.B.	FEDERAL - BASSETT FAULT GEOPHYSICAL SURVEYS
DRAUGHTSMAN: R.F.	
CHECKED:	GRIDS, ACCESS AND PRESENT INTERPRETED POSITION OF THE FEDERAL - BASSETT FAULT
DATE: JUL., 1987	
REF. RN / MG87/04	FIG. No. 2

696011



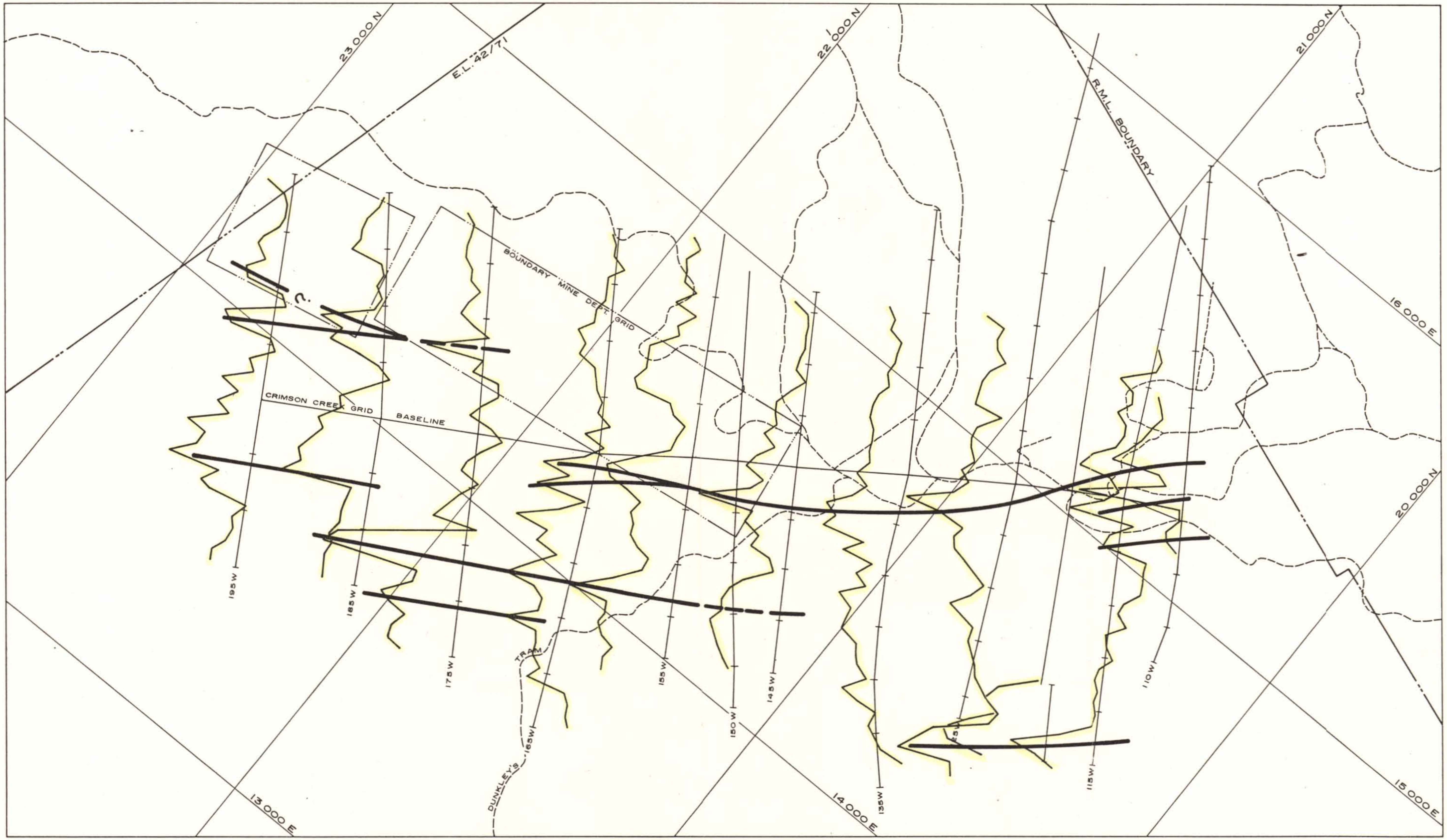
POSITION OF GRID LINES APPROXIMATE

5 cm

LEGEND:
LINE TO LINE CORRELATION
MAGNETIC HIGH
MAGNETIC LOW
VERT. SCALE 1cm ≈ 157nt
BASE LEVEL 1000nt

RENISON LIMITED	
SCALE 1:10000	
GEOLOGIST: J.R.B.	FEDERAL-BASSETT FAULT GEOPHYSICAL SURVEYS
DRAUGHTSMAN: R.F.	
CHECKED:	GROUND MAGNETIC PROFILES
DATE: JUL., 1987	
REF. RN / MG87/04	FIG. No. 3

696012



POSITION OF GRID LINES APPROXIMATE

5 cm

LEGEND:

LINE TO LINE CORRELATIONS

VERT. SCALE 1cm ≃ 16mVolt/Volt
BASE LEVEL 20mVolt/Volt

RENISON LIMITED

SCALE 1:10000

GEOLOGIST: J.R.B.
DRAUGHTSMAN: R.F.
CHECKED:
DATE: JUL.,1987

FEDERAL-BASSETT FAULT
GEOPHYSICAL SURVEYS

CHARGEABILITY PROFILES

REF. RN/MG87/04

FIG. No. 4

696013

POSITION OF GRID LINES APPROXIMATE

5 cm

LEGEND:

LINE TO LINE CORRELATIONS

RESISTIVITY LOW

RESISTIVITY HIGH

VERT. SCALE 1 Log cycle = 2·5cm
BASE LEVEL = 1000 ohm-m

RENISON LIMITED

SCALE 1:10000

GEOLOGIST: J.R.B.

DRAUGHTSMAN: R.F.

CHECKED:

DATE: JUL., 1987

FEDERAL-BASSETT FAULT GEOPHYSICAL SURVEYS

RESISTIVITY PROFILES

REF. RN / MG87/04

FIG. No. 5

696014

POSITION OF GRID LINES APPROXIMATE

5 cm

LEGEND:

- CHARGEABILITY
- SP (MINES DEPT. GRID)
- RESISTIVITY LOW
- RESISTIVITY HIGH
- MAGNETIC HIGH
- MAGNETIC LOW

RENISON LIMITED	
SCALE 1:10000	
GEOLOGIST: J.R.B.	FEDERAL - BASSETT FAULT GEOPHYSICAL SURVEYS
DRAUGHTSMAN: R.F.	
CHECKED:	CRIMSON CREEK GRID GEOPHYSICAL COMPILATION
DATE: JUL., 1987	
REF. RN / MG87/04	FIG. No. 6

696015

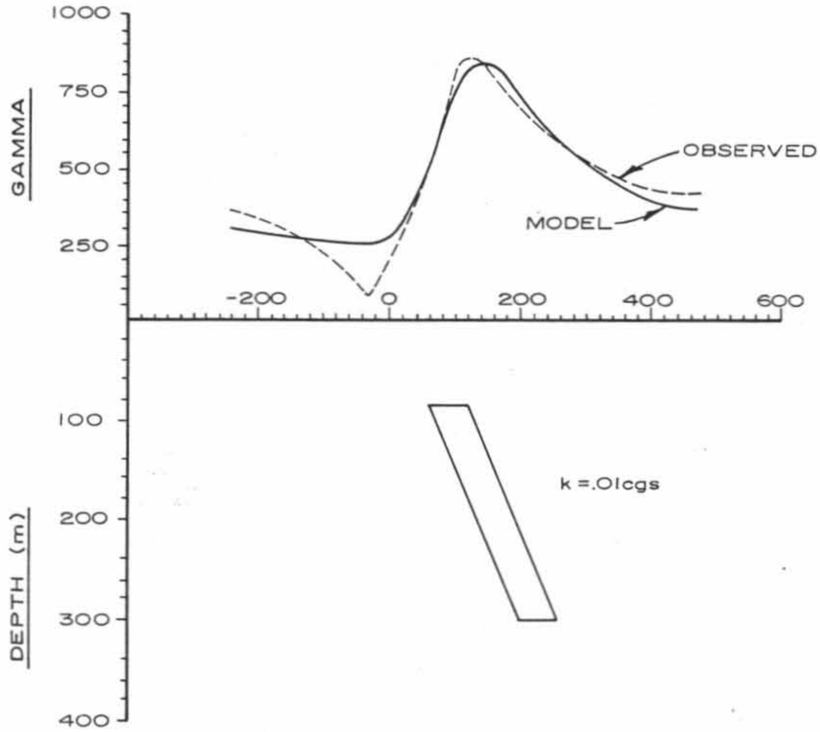


FIGURE 7a : SINGLE BODY MODEL

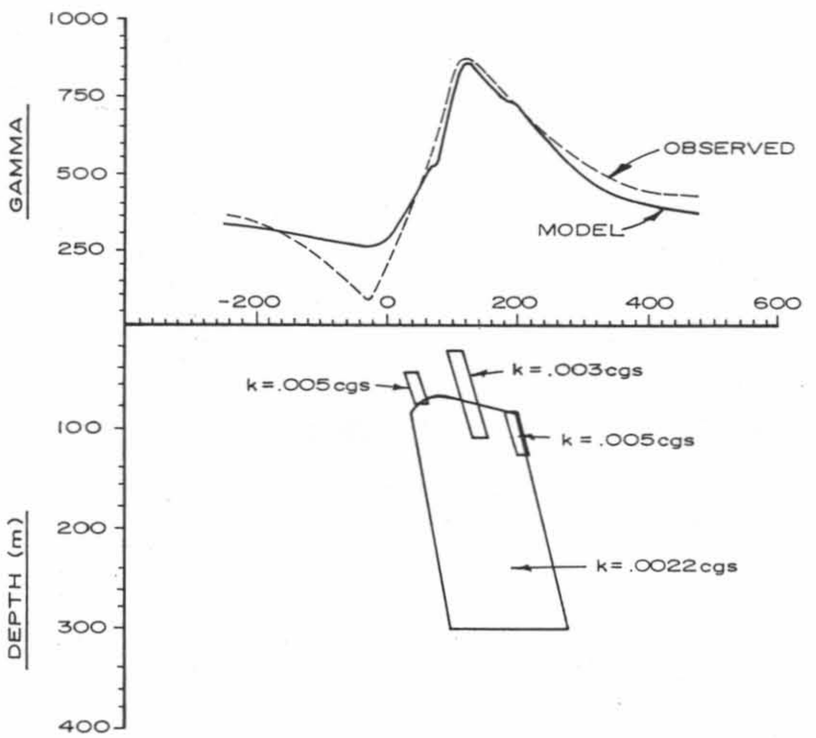


FIGURE 7b : MULTIPLE BODY MODEL

5 cm

RENISON LIMITED

SCALE N.T.S.

GEOLOGIST: J.R.B.	FEDERAL-BASSETT FAULT GEOPHYSICAL SURVEYS MAGNETIC MODELS FOR LINE 135W CRIMSON CREEK GRID
DRAUGHTSMAN: R.F.	
CHECKED:	
DATE: JUL., 1987	
REF. RN/MG87/04	FIG. No. 7

696016

POSITION OF GRID LINES APPROXIMATE

5 cm

LEGEND:

PRESENT INTERPRETED POSITION OF FEDERAL-BASSETT FAULT.

NEW INTERPRETED POSITIONS OF FEDERAL-BASSETT FAULT AND ASSOCIATED SHEAR.

MINERALISED SECTION OF STRUCTURE.

POSTULATED FAULT THROUGH OLD WORKINGS

RENISON LIMITED

SCALE 1:10000

GEOLOGIST: J.R.B.	FEDERAL-BASSETT FAULT GEOPHYSICAL SURVEYS
DRAUGHTSMAN: R.F.	
CHECKED:	INTERPRETED STRUCTURE
DATE: JUL., 1987	
REF. RN / MG 87/04	FIG. No. 8