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Assessment of magnetic data, Lynchford–Whip Spur area, Western Tasmania

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INTRODUCTION

Aeromagnetic data in the Lynchford–Whip Spur area south of Queenstown and west of Mt Owen have been inspected and corrected. The magnetic response of the volcanic rocks in the Whip Spur area was identified as inconsistent by Leaman (1988), and was recommended for further examination. The volcanic rocks north of the Huxley Track, in particular, were considered anomalous (see fig. 1).

This report reviews and assesses the available data and the nature of the responses recorded, in order to determine if the site may possess exploration significance and whether further work is justified.

AEROMAGNETIC DATA

The compilation of the magnetic field used in previous work is shown in Figure 1. It was presented by Geoex Pty Ltd for the 1981 Department of Mines survey of western Tasmania. Nominal specifications included a 500 m line spacing and a terrain clearance of 150 m. Figure 2 presents the actual flight paths in the Lynchford–Whip Spur area, with some annotations relating to flight clearance.

The complete survey, its results, value and regional interpretation have been provided elsewhere (Corbett *et al.*, 1982; Leaman, 1986). Some of the conclusions of Leaman (1986) concerning the quality and limitations—and correction needs—are of particular relevance to this review. Such concerns demand that the first stage in confirmation of any 'anomalous' feature must be careful review and, if necessary, correction of the actual observations.

ANOMALOUS FIELD RESPONSE

Figure 1 suggests that an area of volcanic rocks presents an anomalous response. The magnetic field is enhanced with respect to the volcanic rocks south of the Huxley Track on Whip Spur and reduced north of it. The change in character at, and north of, 5 338 000 mN can be related to change in lithology (mafic intrusive rocks). No such change, or change of any type, has been mapped near the Huxley Track at the easting of 382 400 mE (see base map for Figures 2 to 4 from Corbett, 1979).

The question posed by Leaman (1988) was "does the change represent an alteration of the volcanics north of the track?" If so, the locality might have exploration significance. Drilling by Consolidated Goldfields (Huxley 1—see Figure 1) [383 029, 5 337 018] did indicate traces of mineralisation at the southern fringe of the 'anomalous' area.

Before this question can be answered, and detailed surface work or drilling undertaken, a second issue must be resolved. Is the field response presented in Figure 1 an illusion due to poor line coverage, faulty line correlation, or extreme terrain clearance, i.e. failure to meet survey specifications?

DATA ASSESSMENT

Assessment has been based on review of aircraft analog records, checking of flight clearance and data quality, and recalculation to uniform drape conditions. The calculated drape was then compared with the original Geoex presentation.

The analog records show that nearly all anomalies are simple and of high amplitude. Sources are not complex and relatively few. Most units contribute little to the responses. Compound character was noted on line 775 east of fiducial 2789, and on line 785 near F4915. Most anomalous behaviour is directly related to tuffs in the Lynchford area and on Whip Spur. Some minor responses can be correlated to more mafic tuffs east and west of Miners Ridge.

Consideration of flight coverage (fig. 2) and the terrain clearances reveals serious problems in the survey of this region. Many lines are discontinuous. The region has been used by the contractor as a zone of convenience. Unfortunately there are gaps between line segments, and many short segments do not cross tie lines. Note that tie line 9065 does not cross lines such as 795. This is very bad practice.

Worse still, many of those segments were observed beyond the range of the radar altimeter (approximately 1700 feet). Thus extensions such as lines 765, 775, 785 and 795 often neither overlap other line segments and terminations, nor do so with comparable observations, as the 'continuation' of the line begins at a very different elevation. If flight crew intend to descend to specification then they should ensure that the flight curve is completed before the point of continuation, not up to 3 km later as has happened here. Flight crew have been clearly intimidated by the West Coast Range and have ramped down onto the range crest rather than up to it. Short line segments have only exacerbated the problems.

In detailed retrospect, this part of the survey should not have been accepted.

Terrain clearances range from 80 m to more than 550 m across the study area. The presentation in Figure 1 does not approximate the specified nominal 150 m drape, nor indicate where the data is suspect.

I have taken the data, as adjusted for the IGRF by Geoex, and compensated for the variable terrain clearances. The wide observed range has meant that recovery of a 150 m drape is not possible due to the instability in some of the downward continuations required. Consequently, a compromise drape has been calculated—at 250 m. Even this was not found to be completely stable but is the highest level which can retain the fine detail in the survey and be reasonably compensated. The importance of taking the envelope clearance specifications seriously cannot be overstressed (100–250 m in this case).

Line 785 could not be recovered because the relevant segment was entirely off scale of the radar altimeter. Only minimum values can be derived. The aircraft could have been anywhere! Lines 765, 775, 795 and 796 could not be fully recovered due to extreme clearances, some virtually off scale. The reliability of the compensation along these lines is uncertain.

Comparison of Figures 1 and 2 shows that the anomalous area north of Whip Spur correlates directly with the suspect line group. The values plotted are lower, reflecting observations more distant from the terrain and sources.

Because of the data problems no attempt was made to calculate the magnetic field at some fixed elevation. The effort could not be justified. Upward continuation would lower all values, make differences smaller, and as the low values observed on line 785, for example, come from an unknown spatial position no reliable comparison in the critical area can ever be possible.

The recovered 250 m drape is presented in Figure 3. Broken contours reflect, in some small measure, the reliability of the results and coverage.

The new map has been hand-contoured in order to appraise data quality and placement and to avoid any risk of problems due to gridding or filtering such widely-spaced data.

DISCUSSION

It is clear that the original presentation is biased with respect to the region identified as anomalous in Figure 1. The Geoex compilation makes no allowance for their poor survey and failure to meet specifications. Figure 1 is therefore quite misleading.

Comparison with the newly calculated true drape suggests that the situation is not so simple. The anomalous effect is partly retained. It is not clear how much this conclusion is affected by the failure to reliably recover crucial line 785. However, review of the actual response shapes and patterns, as displayed in the analog records, indicates that the character of the volcanic rocks does change north of 5 337 250 mN.

Some other changes are also evident. The central depression in the magnetic field north of Miners Ridge approaches background and reflects absence of magnetic sources in the region. Relative shallowness of basement (Leaman, 1988) probably contributes to the effect.

Some other changes in character may also be relevant. These are indicated in Figure 4. The fault mapped by Corbett (1979) is not magnetically significant. The anomaly spine north of the King River mine follows a topographic depression but has no apparent geological expression. It lies within mafic materials which are generally of low magnetic contrast compared to the Lynchford Tuff further west and north.

The ENE trend inferred in Figure 1 is supported by the present treatment, within the limits imposed by the line spacing. Some other trends are indicated in Figure 4; NE-SW and NW-SE. The presence of a broad anomaly shoulder NW of Whip Spur, although based on some dubious data, may be important, and part of the explanation for the anomalous volcanic rocks north of Whip Spur.

The relatively subtle variations in anomaly character noted within the mafic and mafic-derived materials east of the King River mine are perhaps more important, as these may represent local alteration.

RECOMMENDATIONS

Some uncertainty persists concerning the state of the volcanic rocks north of Whip Spur. Rock property evaluations are advised along Whip Spur and north of the King River mine. These will show whether there is any systematic variation in surface properties in the local materials. The Whip Spur property study should be supported by some surface magnetic traverses, both on and off the questionable zone.

If the inference of reduced contrast can be locally sustained then the volcanic rocks exhibiting the lowest contrast should be drilled.

REFERENCES

CORBETT, K. D. 1979. Stratigraphy, correlation and evolution of the Mt Read Volcanics in the Queenstown, Jukes-Darwin, and Mt Sedgwick areas. *Bull. geol. Surv. Tasm.* 58.

CORBETT, K. D.; RICHARDSON, R. G.; COLLINS, P. L. F.; GREEN, G. R.; BROWN, A. V. 1982. The 1981 West Coast aeromagnetic survey : summary of information and results. *Unpubl. Rep. Dep. Mines Tasm.* 1982/39.

LEAMAN, D. E. 1986. Interpretation and evaluation report. 1981 West Tasmania Aeromagnetic Survey. *Geophys. Rep. Mt Read Volcanics Project Dep. Mines Tasm.* 1

LEAMAN, D. E. 1988. Review of stratigraphic–structural implications of geophysical data, Lynchford area, western Tasmania. *Unpubl. Rep. Dep. Mines Tasm.* 1988/2.

[February 1988]

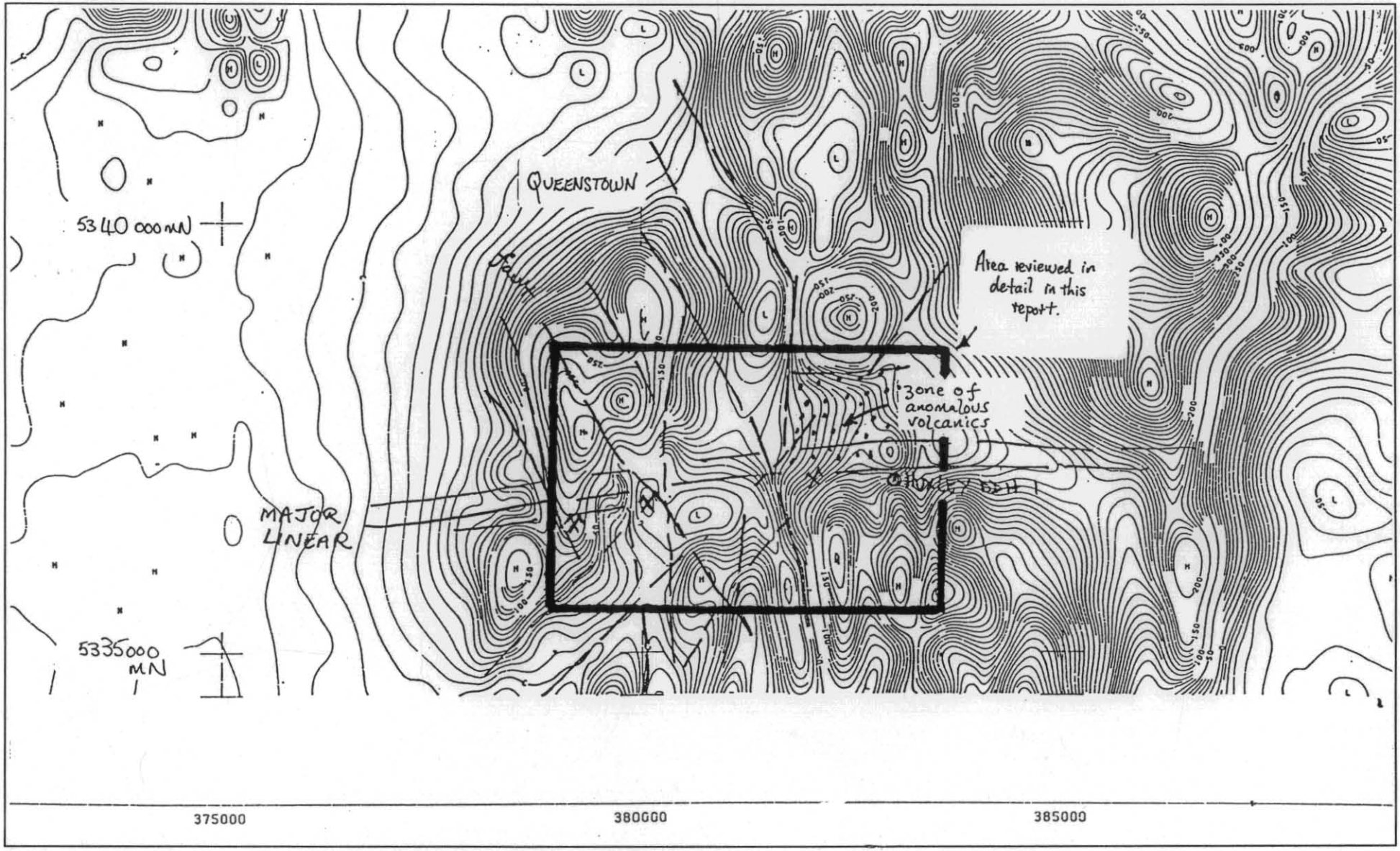

Figure 1. Magnetic field, linears and mineralisation, Lynchford area. 1981 Department of Mines survey.

5 cm

3/6

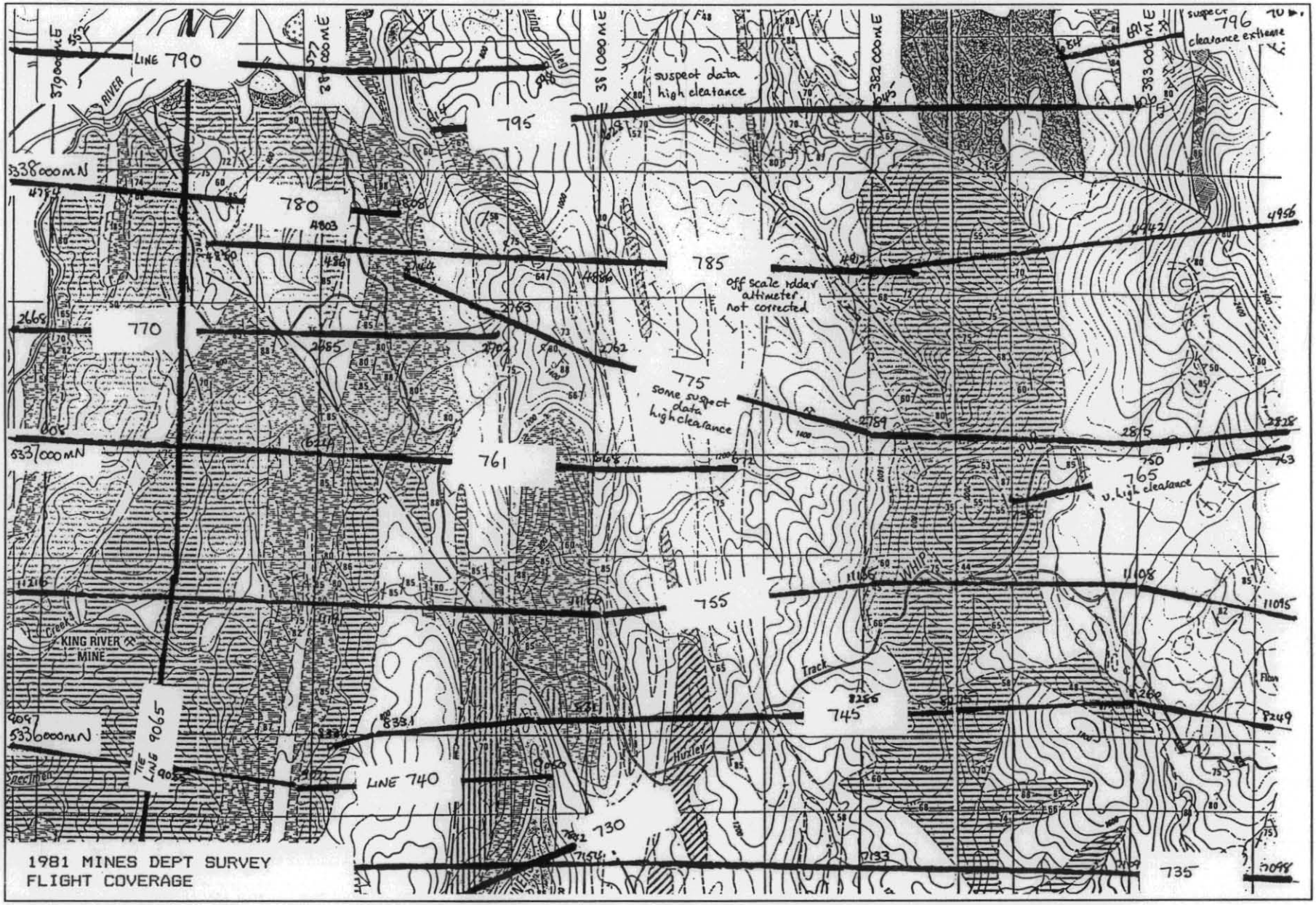

Figure 2. 1981 Department of Mines survey. Flight coverage.

5 cm

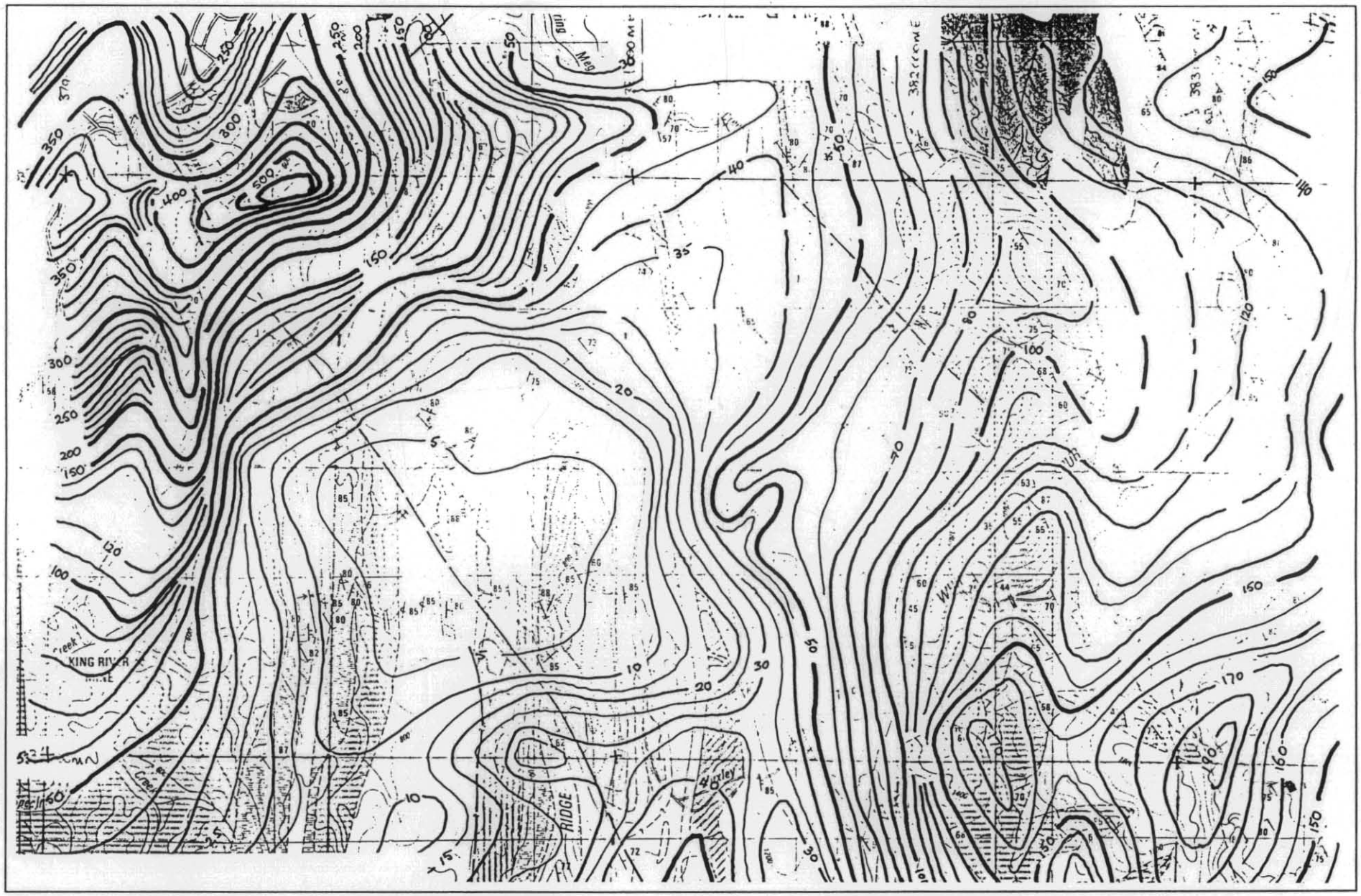

Figure 3. 1981 Department of Mines survey. Recovered drape at 250 m clearance.

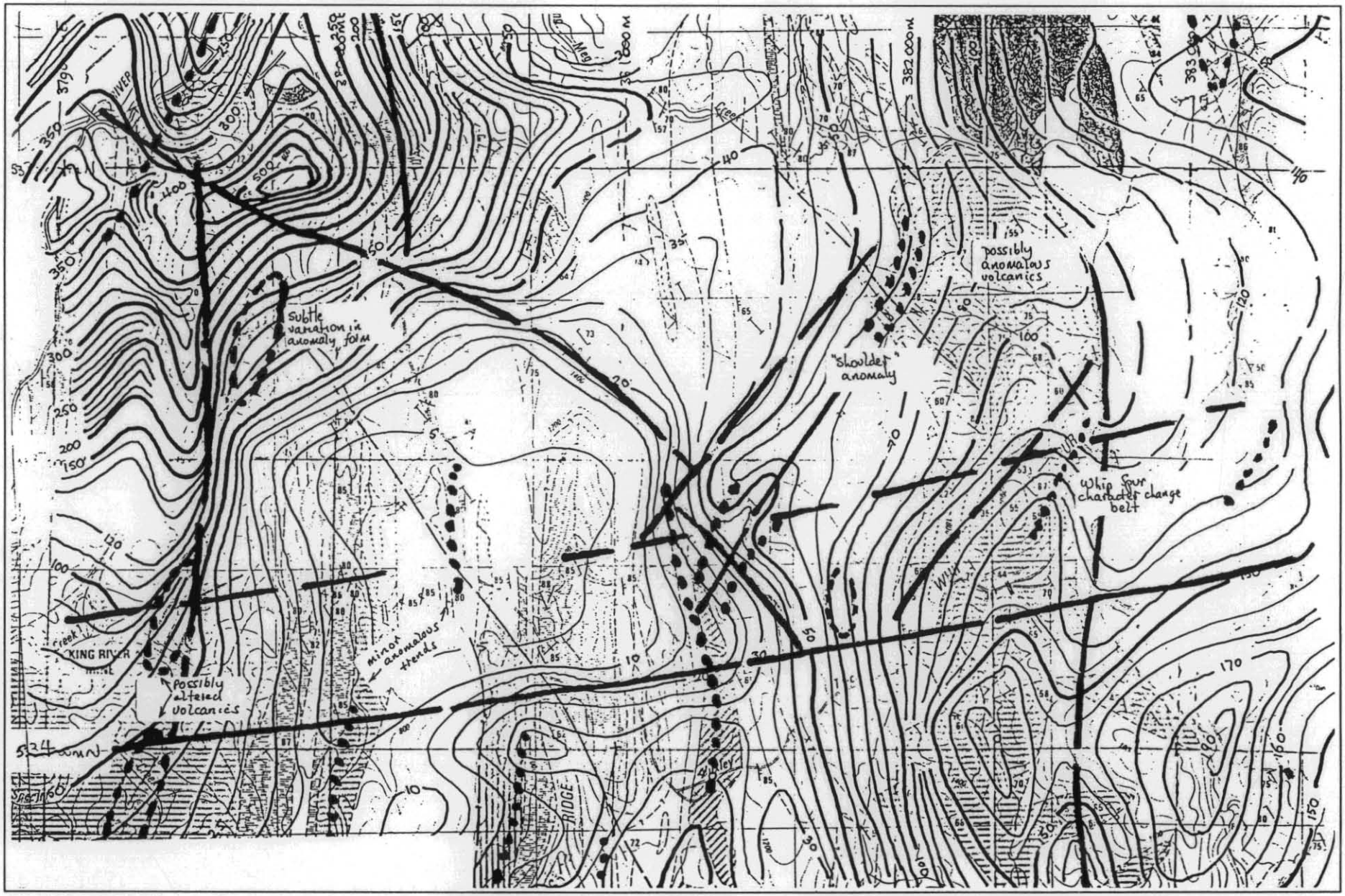

Figure 4. 1981 Department of Mines survey. Features in the recovered drape field.