APPENDIX

VLF Anomalies and Survey Details

A VLF survey was carried out over the Black Hill and Carbine Hill grids in March, 1984 by the Freeman Bros. A Phoenix VLF-2 receiver was used to record dip and field strength: The NWC transmitter was used on both grids, and Japan was also read on the Carbine Hill grid. The dip angle direction recorded (ie; N, S or E, W -depending on the grid) was the direction in which the bottom of the receiver pointed (which is the direction in which the conductor lies). In the profiles, north and east dips have been plotted as positive: thus 'genuine' cross-overs go from positive to negative going north or east along the profiles. Readings were taken at a 25m station spacing, with some intermediate readings in anomalous areas. The data was processed (using the 25m spaced readings) and passed through a filter similar to that described by Fraser (1969). This filter produces a simple 'bell' shaped anomaly over a conductive source and thus makes the data more amenable to contouring. The algorithm used was:-

$$F_n = (2/3)X_{n-2} + (4/3)X_{n-1} - (4/3)X_{n+1} - (2/3)X_{n+2}$$

Where X_n is the recorded data, and F_n the filtered data, at station 'n'. (This algorithm calculates a value at the data stations, whereas Fraser's filter produces values at intermediate points.)

The filtered data was plotted and contoured (by Komyshan) at 1:5000 scale using stacked profiles (also at 1:5000) for correlation of the responses.

The stronger anomalies have been listed in the accompanying table. A depth and 'quality factor' is given for each anomaly, together with the associated field strength anomaly. The depth and quality parameter estimates assume a simple current line as the conductive source (Fraser, 1981). They must be used with some caution since surficial conductors can also give rise to VLF responses with high depth and quality values.
The formulas are:-

$$\text{Depth} = D(1-\sin P/2)/(2\cos P/2)$$

$$\text{Quality} = D\tan P/2$$

where P= peak to peak dip angle (degrees)
D= distance between peaks