

FIGURE 5
Downhole EM-37 responses for QR1060A, loops 2 and 7. The loop 2 response can be seen to have a very large long wavelength response strongest at shallow depths from culture near the Que River Mine, which superimposes a large background on the response to depth. The loop 7 response is initially dominated by a negative response (current channelling) at about 1000 m. It undergoes a sign change, and is finally dominated by a broad positive peak (vortex flow).

To better understand the response, both holes were resurveyed with EM-37, and data was obtained from additional surface loops. Selected time channels from two of the loops are shown in Figure 5.

The early time capability and close channel sampling of the EM-37 system enable a thorough interpretation. In the loop 2 data, a strong broad cultural response can be seen clearly at early times shallow in the hole. In fact this cultural effect which decreases slowly down the hole imprints a large long wavelength background response on the data to late delay times even at depth. It is this background response that gives the apparently large half-width in both the EM-37 and Sirotem loop 2 data. Therefore loop 7 data, which has no cultural contamination is used for the interpretation. The signs of the responses are inverted for the loop 7 data because the loop position is on the opposite side of the conductor.

The major effect to be explained is the transition from a broad negative, centred at 975 m depth to a broad positive late in time. A similar effect has been noted by Asten *et al*, (1987) and ascribed to drive delay. However in rocks as resistive as these, this effect can be calculated (Silic, 1987) to die out by 0.1 ms. Another possibility is a change in the magnetic field from being current channelling dominated to vortex flow dominated as documented and reported as a possible effect at Thalanga (Irvine, 1987). This appears to explain the response very well in that from our experience in these volcanics, strong current channelling effects generally last to about 2 ms. In addition, at the changeover time, which in this case is between 1.77 ms and 2.21 ms, the response shows some characteristics of both channelling and vortex flow,

instead of just passing straight through zero. Since the channelling and vortex flow responses are of opposite polarity, the conductor is interpreted to lie above the drill hole as shown in Figure 6.

Discussion

Even in the most ideal terrains for electromagnetics, care and experience are necessary to not only ensure that drastic errors are not made in DHEM interpretation, but also to derive the maximum possible information from the data. In fact in these

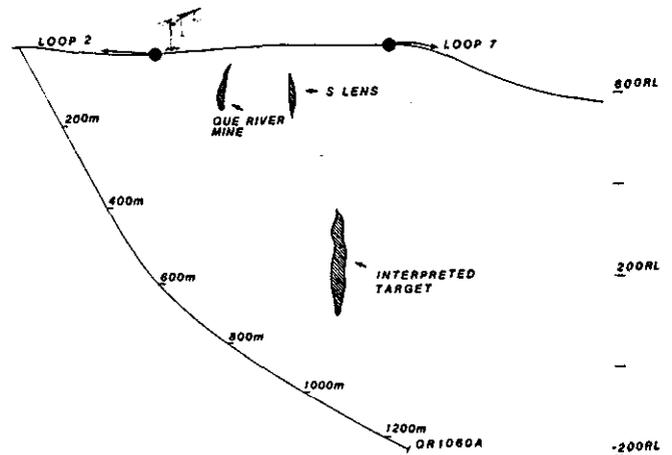


FIGURE 6
Location of drillhole QR1060A, transmitter loops, Que River Mine and interpreted conductor.