

**REPORT ON VTEM SURVEYS ON BIGSTONE, BALSAM,  
and HANSON AREAS**

**BIGSTONE GROUP NORTH (63L11)**

**S-96220**

**S-99700**

**S-99701**

**S-107458**

**BIGSTONE GROUP SOUTH (63L11)**

**CBS 99699**

**HANSON-BALSAM GROUP (63L10)**

**S-96015**

**S-107466P**

**CBS 3239**

**CBS 3287**

**CBS 3678**

**CBS 3687**

**CBS 3707**

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**September 3, 2007**

## INTRODUCTION

Two airborne geophysical surveys were carried out by Geotech Ltd of Mississauga Ontario with their new VTEM system, in the early months of 2007 over the Bigstone Group North and the Bigstone Group South in the NTS area 63L11. Later a third survey was done over the Hanson-Balsam group in the NTS area 63L10.

The total kilometres of survey in each group were as follows:

Bigstone Group North 220 km.  
 Bigstone Group South 96 km.  
 Hanson-Balsam Group 409 km.

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 Total 725 km.

## GEOPHYSICAL SURVEY

### THE VTEM SYSTEM

The VTEM system is described in the report prepared for Foran by Geotech Ltd. This will not be repeated. However, there are some points to discuss about the interpretation of results.

#### **Two Types of Anomalous Response**

The main problem for someone picking anomalies for ground follow-up is that the VTEM system can respond in two ways to a conductive body.

I – If the target is relatively “thin” then its response is a trough in the profiles.

II – If it is relatively “thick” or if it is shallow dipping then its response is a peak in the profiles.

Occasionally one finds an anomaly that, over three lines, its responses are “trough, peak, trough”. For an isolated target this is not a problem but within clusters of anomalies it is difficult to sort out the continuities from one line to the next. The magnetic responses help this situation because they often show the rock trends in an area.

I have avoided laying out holes on targets that are composed entirely of peak profiles. They are still valid targets but do not have to be drilled right away.

## **H Field and B Field**

The H field is what most time-domain geophysical equipment measures. Recently ground equipment has become available which measures the B field. The B field equipment produces clearly superior results compared to the H field equipment. Geotechair have recently installed B field equipment in their newer helicopters. The B field system was used on the two Bigstone (North and South) blocks and the H field system was used on the eastern Hanson block.

## **System Decays**

The VTEM system is a time-domain system which means that a current pulse in the transmitter causes a current to flow in a conductive body in the ground. This current creates a “secondary” electromagnetic field in the receiver. This secondary field decays and is sampled at specific time intervals by the receiver. Each channel is sampled at specific time gates measured in milliseconds. The more conductive a target is, the more slowly it decays. This characteristic time of decay is called Tau and depends on the conductivity of the target. It is measured in milliseconds. Targets with Tau less than 1 millisecond are considered very poor. Any Tau more than 4.0 or 5.0 represents a target worth following up. Hence Tau can be used as a measure of the conductivity of a target. The VTEM profiles represent each of the channels. They are presented as profiles along each line on the map.

When I first became aware of VTEM data I wrote an Arcview program to measure Tau on the map. I do this by clicking on a point (usually a peak beside a profile trough) and the measured value is written in blue text below the base line flight path line. These numbers can then be used to help in the evaluation of a target.

## **Trough Widths**

The interpreter must pay attention to the width of a trough on a profile. Deeper targets have wider troughs and drill holes must be placed further back from them to intersect deeply enough. I usually plan for drill holes to be collared at  $-60$  to  $-70$  degrees. If they are laid out flatter than that they often difficulty in penetrating overburden. All of the holes laid out in this report are expected to be collared at  $-70$  degrees.

## **THE BIGSTONE GROUP NORTH Figures 1-4**

The overall VTEM survey superimposed on coloured magnetometer data is shown on Figure 1. On Figure 2, for clarity's sake, only the last 2 VTEM (my channels 4 and 5) are displayed without the coloured magnetometer data.

This B field data is a pleasure to deal with. Anomalies are very clear to see and noise levels are very low. I have laid out 10 proposed holes as shown on figures 3 and 4. The directions given for these holes are relative to UTM north.

DDH 1: Collar at 613283 E, 6059686 N. Direction S65W.  
 DDH 2: Collar at 614229 E, 6059002 N. Direction S70W.  
 DDH 3: Collar at 613985 E, 6058659 N. Direction N16W.  
 DDH 4: Collar at 614543 E, 6058081 N. Direction N70W.  
 DDH 5: Collar at 615989 E, 6059473 N. Direction N85E .  
 DDH 6: Collar at 616175 E, 6058337 N. Direction N85E.  
 DDH 7: Collar at 615623 E, 6057742 N. Direction N85E.  
 DDH 8: Collar at 614316 E, 6056766 N. Direction N70E.  
 DDH 9: Collar at 614313 E, 6056116 N. Direction N80E.  
 DDH 10: Collar at 612972 E, 6056075 N. Direction N80E.

### **THE BIGSTONE GROUP SOUTH** Figures 5,6

This area was also flown with B field equipment but the results are not as clear as on Bigstone North area because it can be seen in the results that there are thicker assemblages of Phanerozoic (post Precambrian) rocks in this area. This depth reveals itself in the profiles as wider troughs and wider peaks. Some, but not all of these width increases are due to the fact that the targets are now trending more to the southwest and therefore are at a flatter angle to the flight line directions.

There are, however very high tau values in this area. The picking problem does not lie in the quality of the targets but more on the fact that the actual location of a trough is sometimes poorly defined.

I have picked 5 hole locations as follows.

DDH 11: Collar at 614805 E, 6049089 N. Direction East  
 DDH 12: Collar at 615455 E, 6048743 N. Direction S66E  
 DDH 13: Collar at 613892 E, 6047851 N. Direction East  
 DDH 14: Collar at 613834 E, 6045956 N. Direction S45E  
 DDH 15: Collar at 612636 E, 6047069 N. Direction East

### **THE HANSON-BALSAM GROUP** Figures 7,8

This area appears to be underlain by deeper precambrian rocks. However, it was surveyed using the older H field system rather than the newer B field system. There is a scattering of 7 anomalies on the entire grid. I picked only one for drilling. That hole location is:

DDH 16: Collar at 647179 E, 6054753 N. Direction West



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