HARTZ RANGE MINES PTY LTD
ACN: 084 999 413

EL 25886

RELINQUISHMENT AND FINAL REPORT

FOR THE PERIOD ENDING
17th September 2009

Submitted By
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Date: 17th September 2009

CALVERT HILLS SE5308
Northern Territory, Australia
ABSTRACT

Hartz Range Mines Pty Ltd ("HRM") has commenced work on EL25886. The work over this tenement has comprised of Reconnaissance Transient Electro Magnetic Survey carried out by Alpha GeoScience in the first year. After analysing these results it was decided that this tenement would be relinquished in full.

KEYWORDS: NT, McArthur Basin, Wollogorang Copper Project, copper, uranium, diamond, stream sediment, transient electromagnetic survey.
TABLE of CONTENTS

INTRODUCTION .................................................. 4
TENEMENT DETAILS ........................................... 4
REGIONAL GEOLOGY ........................................... 4
EXPLORATION CONDUCTED .................................. 7
PROPOSED EXPLORATION .................................... 7
CONCLUSION .................................................... 7
EXPENDITURE .................................................... 7
REFERENCES .................................................... 7

LIST of FIGURES

Figure 1 Location Map – Projects and Tenements
Figure 2 Regional Geological Setting

LIST of APPENDICES

Appendix 1 Alpha GeoScience TEM Report
INTRODUCTION

Hartz Range Mines Pty Ltd ("HRM") holds four Exploration Licences, EL25886, 10335, 22579, and 24358 in the Northern Territory. These four exploration licences form the Wollogorang Project.

TENEMENT DETAILS

This tenement was granted 16 September 2007 for 6 years.

<table>
<thead>
<tr>
<th>LICENCE</th>
<th>APPLICATION</th>
<th>GRANTED</th>
<th>BLOCKS</th>
<th>AREA (km²)</th>
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<td>EL25886</td>
<td>11 Jan 2007</td>
<td>16 Sept 2007</td>
<td>16</td>
<td>52.45</td>
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</table>

REGIONAL GEOLOGY

The project area is located within the Wearyan Shelf tectonic domain of the south-eastern parts of the Pelaeoproterozoic McArthur Basin. The McArthur Basin is a succession of essentially unmetamorphosed sedimentary and lesser volcanic rocks, deposited largely in shallow marginal marine and lacustrine settings. The tenement covers a sequence of sediments and volcanics of the mid-Proterozoic Tawallah Group which flank the northern margin of the Lower Proterozoic Murphy Inlier. The Murphy Metamorphics are a sequence of isoclinally folded green schist facies metasediments which are unconformably overlain by a felsic volcanic/pyroclastic sequence (Cliffdale Volcanics), intruded by granite/adamellite of the Nicholson Granite Complex. The Tawallah Group overlies the igneous and metamorphic complexes of the Murphy Inlier with angular unconformity and disconformity. The Tawallah Group is the oldest group of the McArthur Basin sequence. The Westmorland Conglomerate is the oldest unit of the Tawallah Group and consists of a thick sequence (up to 1800m) of fluvial arkosic conglomerate and quartz arenite. The Seigal Volcanics conformably overlie the Westmorland Conglomerate and occurs as a series of tholeiitic basaltic lavas and minor tuffaceous interbeds along the southern margin of the project area. The McDermott Formation conformably overlies the Seigal Volcanics along the southern margin of the project areas and forms a narrow, poorly outcropping unit characterised by alternating beds of shallow-water marine arenites, shale and dolostone.

The carbonate rocks of the McDermott Formation are conformably overlain by the Sly Creek Sandstone sequence which grades upwards into glauconitic sandstone named the Aquarium Formation. The conformable units encompass the majority of the project area and are characterised by a series of open folds with north-east oriented axes.

The continental Settlement Creek Volcanics conformably overlie the Aquarium Formation and consist of a series of basaltic lava flows, sills and siltstone interbeds. Exposure of the volcanics is limited and is obscured by recent alluvium denoting the Settlement Creek valley. Minor siltstone and sandstone of the Early Cretaceous Mullaman Beds overlie the Tawallah Group sediments. Soils, alluvium and lateritic deposits of Tertiary and Quaternary age mask the underlying Proterozoic lithologies along the major watercourses. (after Jackson et al, 1987 and Ahmad & Wygralak, 1989)
Figure 1 – Tenement Location
Figure 2 – Regional Geological Setting
EXPLORATION CONDUCTED

There has been no further exploration carried out over EL25886. Exploration carried out on EL25886 during previous year consisted of a 3km Reconnaissance Transient Electromagnetic survey. The survey was carried out by Alpha GeoScience. The survey area on EL25886 consisted of one 3km line. Vegetation in this area was dense and topography was flat, with good access to the middle of line. Temperatures during the survey period exceeded 35°C with very high humidity. For full survey details please see detailed report in Appendix 1.

It has been decided to relinquish this tenement in full.

CONCLUSION

This tenement has been relinquished in full.

EXPENDITURE

Please see attached Expenditure Form

REFERENCES


Appendix 1

Alpha GeoScience TEM Report
PROJECT: GEOPHYSICAL SURVEY (Transient Electro-Magnetics)

AREA: Nabunga, Masterton Ridge and Calvert Hills Station, NT

CLIENT: Gulf Mines Limited

PROJECT NO: AG-193

FINAL REPORT
Geophysical Survey: Transient Electro-Magnetics near
Wollogorang Station, Including; Nabunga, Masterton Ridge and Calvert Hills Station, NT

For

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Date: 08 September 2008
TABLE OF CONTENTS

1. INTRODUCTION ................................................................. 1
2. AUTHORITY ........................................................................ 1
3. SURVEY RATIONALE ............................................................ 1
4. STAFF ................................................................................ 1
5. EQUIPMENT ........................................................................ 2

   5.1 Monash Geoscope terraTEM ............................................ 2
   5.2 SkyTEM Receiver Coil .................................................... 2
   5.3 GPS Positioning ............................................................... 2
6. SURVEY, DATA ACQUISITION AND PROCESSING ...................... 2

   6.1 Survey Area – Nabunga East and West Prospects .................. 2
   6.2 Survey Area – Masterton Ridge ......................................... 2
   6.3 Survey Area – Calvert Hills ............................................... 2
   6.4 Data Acquisition and Survey Parameters – Nabunga East and West Prospects 3
   6.5 Data Acquisition and Survey Parameters – Masterton Ridge ................... 3
   6.6 Data Acquisition and Survey Parameters – Calvert Hills ...................... 3
   6.7 Quality Assurance ............................................................ 4
7. COMMENTS ON RESULTS .................................................. 4

   7.1 Nabunga East and West - Data Inversion ............................... 4
   7.2 Masterton Ridge - Data Inversion ...................................... 4
   7.3 Calvert Hills - Data Inversion ............................................ 5
   7.4 TEMPlot Transform Spiker Algorithm .................................. 5
8. CONCLUSIONS ..................................................................... 5
9. LIMITATIONS OF REPORT .................................................. 5
10. REFERENCES ....................................................................... 6
11. APPENDIX 1 – Location of TEM Soundings at Nabunga West Diamond Prospects 7
12. APPENDIX 2 – Location of TEM Soundings at Nabunga East Diamond Prospect 8
13. APPENDIX 3 – Location of TEM Soundings at Masterton Ridge ..................... 9
14. APPENDIX 4 – Location of TEM Soundings at Calvert Hills ......................... 10
15. APPENDIX 5 – Profiles of Inverted Models for Nabunga West Diamond Prospects 11
16. APPENDIX 6 – Profiles of Inverted Models for Nabunga East Diamond Prospects 15
17. APPENDIX 7 - Profiles of Inverted Models for Masterton Ridge .................. 17
18. APPENDIX 8 - Profile of Inverted Models for Calvert Hills ......................... 18
19. APPENDIX 9 – TEMPlot Profile Contour Plots for Nabunga West .................. 19
20. APPENDIX 10 – TEMPlot Profile Contour Plots for Nabunga East ................. 25
21. APPENDIX 11 – TEMPlot Profile Contour Plots for Masterton Ridge ............. 28

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22. APPENDIX 12 – TEMPlot Profile Contour Plot for Calvert Hills ______________________29
23. APPENDIX 13 - Alpha GeoScience - Curriculum Vitae ____________________________30
1. **INTRODUCTION**

Alpha Geoscience Pty. Limited (Alpha), based in Sydney, NSW, was contracted by Gulf Mines Limited to undertake a geophysical survey acquiring Transient Electro-Magnetic (TEM) data at a number of sites near Wollogorang Station NT, including; three grids at Nabunga West, one grid at Nabunga East, two lines at Masterton Ridge and one line on Calvert Hills Station. The locations of the TEM soundings are plotted for each of the four sites in Appendices 1-4 respectively.

The field work component comprised of two separate visits due to the failure of the SkyTEM receiver coil towards the end of the first visit. The first visit was from 06/10/07 to 11/10/2007 and the second visit was from 24/10/07 to 15/11/07.

2. **AUTHORITY**

William Paterson, Exploration Manager at Gulf Mines Limited provided the authority to proceed with the project by way of a Letter of Acceptance, dated 6th September 2007 to Jamie Speer.

3. **SURVEY RATIONALE**

The scope of the project was to carry out a Time Domain Electromagnetic (TEM) to delineate depth of basement material and confirm the presence of circular structures identified in a total field magnetic survey.

The specific targets for each site were: possible kimberlites around Nabunga, mineralisation at Masterton Ridge and mineralisation in the possible impact structure at Calvert Hills.

The basic principle of the TEM method is that a current flowing in a transmitter loop sets up a magnetic field which when switched off induces eddy currents to flow in any good electrical conductor in the ground. These eddy currents set up a secondary magnetic field which can be detected by a receiver loop as a time-dependant decaying voltage (Henderson & Pippett 2006).

The recording of the ‘transients’ is a means of detecting conductors in the ground. The decaying transient can be described by a number of measurement channels recording the voltage at various delay times (see figure below) during the “quiet time” between current pulses. The character of this decay (duration, amplitude, etc.) depends on the conductivity, shape, size, depth and attitude of the conductor and its position with respect to the receiver loop and can be used to provide information on all these factors. A particular advantage of transient EM systems over continuous waves systems is the fact that the measurements are taken when the transmitted fields are switched off. This means that the sensitivity of the receiver can be a maximum to record the transient voltages only without having to cope with the much greater signal strength of the transmission field. It also means that a greater variety of loop configurations can be used including having the receiver loop (coincident loop) in the same place as the transmitter loop for maximum signal reception (Henderson & Pippett 2006).

4. **STAFF**

The Senior Geophysicists for the project were Mads Toft and Jamie Speer. The Project Geophysicist for the survey was Jeremy Hill. Additional field assistance was provided by Gulf Mines Limited.

Data Processing and Inversion were undertaken by Mads Toft, Jeremy Hill and James Watton. Final Reporting was undertaken by Jeremy Hill.
5. EQUIPMENT

5.1 Monash Geoscope terraTEM

The terraTEM is a state of the art transient electromagnetic survey system designed and constructed in Australia. The unit features a 10 Amp transmitter and is powered by an external 24 V battery pack system allowing 6-8 hours of continuous operation. It also contains a 15-inch colour LCD panel with a touch-screen; data storage in the form of an expandable 1 gigabyte solid-state memory with transfer using a USB flash memory stick. System parameters are stored automatically with each sounding for post survey quality assurance. The included data reduction and processing software can generate on-site standard profile and decay plots, apparent conductivity pseudo-sections, and contour plan maps. An optional 12-channel, built-in GPS receiver can be mounted on the front panel, allowing location information to be automatically recorded with soundings.

5.2 SkyTEM Receiver Coil

The SkyTEM Receiver Coil is a state of the art receiver coil designed in Denmark. The receiver coil has an effective loop area of 105 square metres.

5.3 GPS Positioning

GPS Positioning of loop locations was provided by Gulf Mines Limited.

6. SURVEY, DATA ACQUISITION AND PROCESSING

6.1 Survey Area – Nabunga East and West Prospects

The survey areas at Nabunga consisted of four grids. The grids were named AW, BW, CW and AE and their locations and the locations of individual soundings are shown in Appendices 1 and 2. Access to the sites was generally non-existent and tracks had to be pushed through the vegetation using a four wheel drive supplied by Gulf Mines Limited. Vegetation was dense and topography was shallow. Temperatures regularly exceeded 40 ºC with very high humidity.

6.2 Survey Area – Masterton Ridge

The survey area at Masterton Ridge consisted of two lines, the location of these lines and the individual soundings is shown in Appendix 3. The survey area at Masterton Ridge had no vehicle access and no tracks could be made as the ground conditions were too rocky and steep for any safe 4WD access. Vegetation was dense and topography was steep. Temperatures regularly exceeded 45 ºC with very high humidity. Data acquisition was limited to four to six hours per day as temperatures were so high that it was impossible to carry enough water to sustain personal hydration for longer periods. The walk in to the lines generally took about one hour.

6.3 Survey Area – Calvert Hills

The area surveyed at Calvert Hills consisted of one line. The location of the line and TEM soundings is shown in Appendix 4. Access to the middle of the line was good. Vegetation was dense and topography was flat. Temperatures exceeded 35 ºC with very high humidity.
6.4 Data Acquisition and Survey Parameters – Nabunga East and West Prospects

A number of different loop configurations and current amplitudes were tested at two different locations in the survey area of the BW grid. The loop configuration found to yield the highest resolution at early times as well as yielding the desired resolution in the late times was a 25m x 25m transmitter loop with the Skytem receiver coil (effective loop area 105 square metres) in the centre of the transmitter loop.

A transmitter loop current of approximately 2.3 Amps was obtained by adding external resistance to the transmitter loop. Low current amplitude was necessary for obtaining high resolution in the early time data. Because low current amplitudes result in faster shut-off times. Late time data was generally good to after 1 ms.

The number of stacks required was usually 4096 stacks and the optimum gain setting for increasing the signal to noise ratio was 32.

The same settings were found to produce similar results across all of the four separate grids at Nabunga.

Soundings were collected at 50m spacing; see Appendices 1 and 2 for location of soundings.

6.5 Data Acquisition and Survey Parameters – Masterton Ridge

A number of different loop configurations and current amplitudes were tested at two different locations in the survey area at Masterton Ridge. The loop configuration was chosen to yield the highest quality late time data because the required target depth was believed to be greater than 200m. A 100m x 100m coincident loop configuration with 5m loop offset was chosen so as to maximise the sounding depth and signal reception.

A transmitter loop current of approximately 6.5 Amps was obtained without adding any external resistance to the transmitter loop. High current amplitude was necessary for obtaining data in the latest times possible. The number of stacks required was usually 1024 stacks and the optimum gain setting for increasing the signal to noise ratio was 16.

Soundings were collected at 100m spacing; see Appendix 3 for location of soundings.

6.6 Data Acquisition and Survey Parameters – Calvert Hills

The loop configuration was chosen to yield the highest quality late time data because the required target depth was believed to be greater than 100m. A 100m x 100m coincident loop configuration with 5m loop offset was chosen.

A transmitter loop current of approximately 6.5 Amps was obtained without adding any external resistance to the transmitter loop. High current amplitude was necessary for obtaining data in the latest times possible. The number of stacks required was usually 1024 stacks and the gain setting was 1. Higher gains made no improvement to the data.

Soundings were collected at 100m spacing; see Appendix 4 for location of soundings.

The following steps were taken in the data processing and imaging of the Transient Electro-Magnetic data collected at Nabunga, Masterton Ridge and Calvert Hills:

- TEM data was exported from Templot software in TEM format. Soundings were assigned DGPS positions manually and re-imported to Templot.

- TEM data was filtered using a spiker algorithm using Templot processing software.
• Data from the ramp was trimmed using Templot processing software.
• TEM data was transformed to produce profiles.
• TEM data was exported as USF (Universal Sounding Format) using Templot.
• Noise was removed from each sounding individually using Sitem-Semdi editing software.
• Individual soundings were inverted using Sitem-Semdi inversion software. Data was inverted using 2-5 layer models for Masterton Ridge and as 16 layer (multi-layer) models for selected lines at Nabunga and Calvert Hills.
• Profiles of the inverted models were generated and where possible, corrected for topography, using Aarhus Workbench Software. The profiles of inverted models are shown in Appendices 5 – 8.

6.7 Quality Assurance

The following steps were taken to ensure the delivery of a high quality data set.

• Extensive testing was conducted to ensure the optimal instrument and survey parameters were selected to suite the physical conditions of the site.
• Each sounding was checked for integrity in the field and reacquired if necessary.

7. COMMENTS ON RESULTS

7.1 Nabunga East and West - Data Inversion

Due to a lack of a priori information, parameters for the 2-5 layer models could not be constrained with any level of certainty. For this reason a 16 layer multi-layer model code was used for the inversion of all lines requested for inversion. The vast majority of the resultant models had residual errors of less than 1 meaning the modelled curves fitted well with the data.

The multi-layer models are useful for providing an indication of the general form of the conductivity profile of a sounding. However, no discrete depths to layer boundaries are possible because the thickness of each layer is fixed in the model parameters. For this reason, the multi-layer models can only be used as indicators to relative depths between models.

The profiles of the inverted models for Nabunga are shown in Appendix 1.

7.2 Masterton Ridge - Data Inversion

Due to the high current amplitude employed for acquisition, the early time data was clipped to past 1ms. It was noted during the inversion process that the data may have been affected by Super Parra-Magnetics (SPM) in the surficial layers of the geological profile. This resulted in the Sitem software rejecting a large proportion of the late time data. A priori information of expected depths and resistivities of layers was provided by Gulf Mines Limited. The Semdi 2-5 layer, 1Dimensional layered earth inversion code was used with some success. However, with such a small proportion of the transient decay not lost to clipping or SPM all parameters obtained from modelling this data were poorly constrained.

The profiles of the inverted models for Masterton Ridge are shown in Appendix 2.
7.3 Calvert Hills - Data Inversion

Due to a lack of a priori information, parameters for the 2-5 layer models could not be constrained with any level of certainty. For this reason a 16 layer multi-layer model code was used for the inversion of the data collected at Calvert Hills. The vast majority of the resultant models had residual errors of less than 1 meaning the modelled curves fitted well with the data.

The multi-layer models are useful for providing an indication of the general form of the conductivity profile of a sounding. However, no discrete depths to layer boundaries are possible because the thickness of each layer is fixed in the model parameters. For this reason, the multi-layer models can only be used as indicators to relative depths between models.

The profile of the inverted models for Calvert Hills is shown in Appendix 3.

7.4 TEMPlot Tansform Spiker Algorithm

Profile Contour Plots for each line of data collected during the survey were generated using TEMPlot software’s Tansform Spiker Algorithm. The profiles for all lines at: Nabunga West, Nabunga East, Masterton Ridge and Calvert Hills are presented in Appendices 9 - 12 respectively.

8. CONCLUSIONS

A geophysical survey was successfully undertaken using TEM at a number of sites near Wollongorang Station NT, including; three grids at Nabunga West, one Grid at Nabunga East, two lines at Masterton Ridge and one line at Calvert Hills Station.

Raw data was provided upon completion of the survey. Processed data and Inverted profiles were provided upon completion of processing for interpretation by Gulf Mines Limited.

9. LIMITATIONS OF REPORT

This report has been prepared for the use of Gulf Mines Limited in accordance with general accepted Consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for the use by parties other than the client, the owner and their respective consulting advisors. It may not contain sufficient information for purposes of other parties or for other uses.

This report was prepared on completion of the field work and is based on conditions encountered and reviewed at the time of preparation. Alpha Geoscience disclaims responsibility for any changes that might have occurred after this time.

The interpreted locations and depths noted in this report should be taken as an indication only, and no decision should be based solely on these results.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, conditions on the site (including the depositing and removal of contamination) can change in a limited time. This should be borne in mind if the report is used after a protracted delay.
10. REFERENCES

11. APPENDIX 1 – Location of TEM Soundings at Nabunga West Diamond Prospects

![Diagram showing the location of TEM soundings at Nabunga West Diamond Prospects]
12. **APPENDIX 2 – Location of TEM Soundings at Nabunga East Diamond Prospect**

![Diagram showing the location of TEM soundings at Nabunga East Diamond Prospects.](image-url)
13. APPENDIX 3 – Location of TEM Soundings at Masterton Ridge

Location of TEM Soundings for Masterton Ridge Prospect

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Final Report – Geophysical Survey: Nabunga, Masterton and Calvert Hills, NT.
Doc: 080810 JH AG193 Final Report (Sept-08)
APPENDIX 4 – Location of TEM Soundings at Calvert Hills Prospect

Location of TEM Soundings at Calvert Hills Prospect

760000 761000 762000 763000 764000 765000
8000000 8010000 8020000 8030000 8040000 8050000
APPENDIX 5 – Profiles of Inverted Models for Nabunga West Diamond Prospects
Final Report – Geophysical Survey: Nabunga, Masterton and Calvert Hills, NT.
Doc: 080810 JH AG193 Final Report (Sept-08)
16. APPENDIX 6 – Profiles of Inverted Models for Nabunga East Diamond Prospects
17. APPENDIX 7 - Profiles of Inverted Models for Masterton Ridge
APPENDIX 8 - Profile of Inverted Models for Calvert Hills
19. APPENDIX 9 – TEMPlot Profile Contour Plots for Nabunga West

AW Grid - Line 801312.5 E

AW Grid - Line 801712.5 E
BW Grid - Line 805412.5 E

BW Grid - Line 805812.5 E
CW Grid - Line 8079812.5 N
20. APPENDIX 10 – TEMPlot Profile Contour Plots for Nabunga East

AE Grid - Line 8079187.5N

AE Grid - Line 8079587.5N – First Half of Line Collected as Coincident Loop
AE Grid - Line 8079587.5N – Second Half of Line Collected as Centre Loop Configuration With Receiver Coil

AE Grid - Line 8079987.5N
21. **APPENDIX 11 – TEMPlot Profile Contour Plots for Masterton Ridge**

**Masterton Grid - Line 8101350 N**

![Contour Plot](image1.png)

**Masterton Grid - Line 8101750 N**

![Contour Plot](image2.png)
22. APPENDIX 12 – TEMPLot Profile Contour Plot for Calvert Hills

Calvert Hills - Line 762350 E
23. APPENDIX 13 - Alpha GeoScience - Curriculum Vitae

Alpha Geoscience was established in 1997 to offer high sensitivity geophysical tools and expertise as an alternative to intrusive investigations in the following areas:

- **Environmental Services** Including the mapping of buried structures, site assessments and the detection of chemical pollutants.

- **Ordnance Services** The location of buried unexploded ordnance (UXO), site assessments and sample surveys to determine extent of pollution. Alpha Geoscience is a member of the Defence UXO Panel.

- **Engineering Services** Assisting civil mining and construction engineers with subsurface investigations, especially where intrusive investigation is difficult and costly to undertake.

- **Forensic Geophysics** The location of buried gravesites and other buried objects for the police and other crime agencies.

- **Mining and Exploration** Assist mining and exploration companies with near surface investigations.

- **Training** Provides training courses in high-resolution magnetics, electro-magnetics, seismic refraction and ground-penetrating radar for clients who wish to undertake surveys themselves.

- **Project Management** Is an intricate part of all projects and Alpha Geoscience has expertise and experience in setting up, running and reporting on both major and minor projects worldwide.

- **Research and Development** Alpha Geoscience has been involved in running a number of research and development projects including the development of a multi-sensor geophysical instrumentation package for the horizon control of a coal-mining machine.

The types of techniques offered by Alpha Geoscience include high sensitivity magnetics, ground penetrating radar, time or frequency domain electro-magnetics, resistivity mapping and seismic refraction and reflection techniques. These services combined with the digital processing of the data to produce colour images of the site and the interpretation of the data gives high-resolution detail of the subsurface on the site. This data can be imported into Geographical Information Systems (GIS) for future reference and auditable documentation.

Alpha Geoscience also offers the services of processing and interpretation of data in Sydney with the data being downloaded from the field via the Internet.

Alpha Geoscience is based in Sydney Australia and is capable of mobilising to any part of the world with very short notice. We have experience in operations throughout Australia, North America, Europe and South East Asia.

Alpha Geoscience is offering its services and consultation so that the client obtains the best technology for the particular target being investigated. Whether it is ordnance items or environmental pollution plumes, it has the technical expertise to provide the right solution.