DIAS AIRBORNE CASE STUDY

PROJECT
SHATFORD LAKE LITHIUM PROJECT
ACME Lithium Inc.
Manitoba, Canada

TECHNOLOGY
DIAS QMAG^T
Airborne Full-Tensor Magnetic Gradiometry

TARGET
LITHIUM

Shatford Lake Lithium Project, Manitoba, Canada

SITUATION

ACME's 100% owned Shatford-Birse project area in southeastern Manitoba, Canada, is within the southern limb of the Bird River Greenstone Belt. The project is immediately south of Sinomine's world-class Tanco Mine property, a Lithium, Cesium and Tantalum (LCT) producer since 1969. The region hosts hundreds of individual pegmatite bodies, many of which are classified as complex rareelement LCT pegmatites – known to account for a quarter of the world's lithium production. The Shatford – Winnipeg River structure, which extends through the project area, is analogous to the Bernic Lake high strain zone that is interpreted to be related to the Tanco pegmatite. One priority area for exploration, referred to as Shatford East, is part of an approximately 7 km long curvilinear structural feature with multiple observations of pegmatites containing anomalous lithium.

The Shatford Lake property has abundant overburden, but in the broad deformation zones where most of the pegmatites occur, outcrop is virtually non-existent. In these deformation zones, overburden cover ranges up to 30 m thick.LCT pegmatites generally do not contain any ferromagnetic minerals, so do not produce an anomalous magnetic response unless they occur in host rocks that are magnetic. The host rocks are usually also non-magnetic or have very low magnetization, so provide virtually no contrast to aid detection and delineation with conventional magnetic systems.

However, it is possible that a highly sensitive gradient magnetic system could detect weak contrasts, and image structures and folding within the host rocks. Through interpretation of structure and lithology, prospective targets for pegmatite emplacement could be determined.

SOLUTION

In the summer of 2022, ACME contracted Dias Airborne to complete a helicopter-borne QMAG^T full tensor magnetic gradiometry (FTMG) survey across the property. QMAG^T is the most advanced airborne magnetic system currently commercially available. The survey comprises 1,991 line-km with a line spacing of 65 m. The FTMG survey was designed to map and characterize the variation in magnetization throughout the survey area towards interpreting structure, lithology, and alteration. The QMAG^T system measures all independent tensor components of the magnetic field using low temperature SQUID (superconducting quantum interference device) sensors. The QMAG^T system provide greater sensitivity to weakly magnetic sources, higher resolution, and the directional information that allows for accurate modeling and detailed interpretation of the data sets.

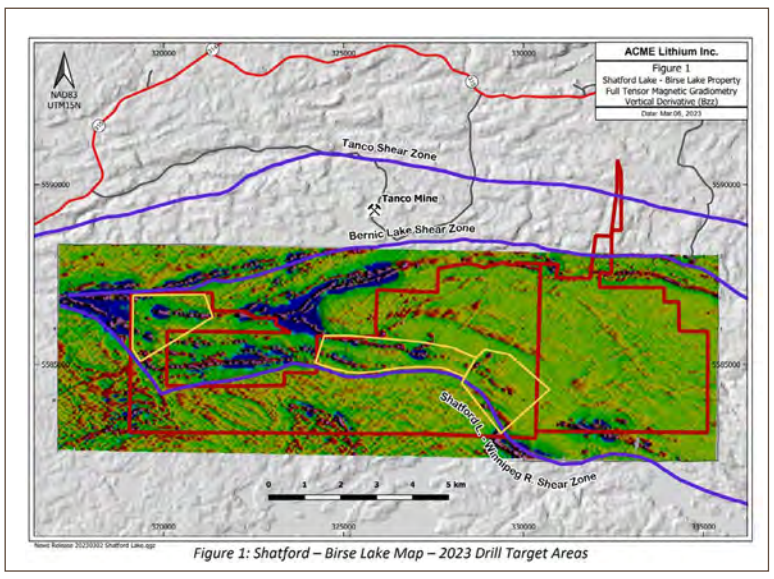

Figure 1: Shatford – Birse Lake Map – 2023 Drill Target Areas

ACME Drill Targeting

ACME designed its initial 2023 drill program using the basic responses in the vertical magnetic gradient of the vertical component (Bzz). Now, modelling confirms the initial targeting and delineates additional targets. Mira Geoscience Limited (Mira) performed modelling of the FTMG data. After a preliminary interpretation, Mira performed a computationally intense Magnetic Vector Inversion (MVI) integrated with ACME and regional geological data.

Taken together with the area geology, the priority areas for drilling are as follows (see Figure 1):

The Central Shatford area (left ellipse in the image below) is adjacent to the Tin Island pegmatite cluster. Through this area, subparallel NE trending magnetic low lineaments cross the Shatford Lake – Winnipeg Lake Shear Zone. Many prospective targets occur where NE lineaments cross the shear zone. Note the east-west, northeast and northwest trends in the batholith to the south. The Southeast Shatford area (right ellipse Fig. 2) encompasses a substantial flexure in the Shatford Lake – Winnipeg Lake Shear Zone. This area contains a broad zone of en-echelon magnetic responses, indicating splays and dilatant zones on the northeast side of the principal shear zone, representing highpriority exploration targets.

CONCLUSIONS

The extensive glacial till cover is transparent to the QMAG^T magnetic survey. The detailed FTMG data detects magnetite iron formation across the entire survey area and delineates the major G2 fold structures that envelope the Birse Lake pluton. A NE to ENE fracture set is evident across the entire span of the survey area, as detected in the Bzz tensor component in Figure 1.

Fine details in the vertical gradient (Bzz) adjacent to the Shatford Lake – Winnipeg River shear zone identify dilatant jogs and fold structures favourable for pegmatite intrusion. Magnetic low gaps in the high magnetic response of basalt and magnetite iron formation delineate probable pegmatite intrusion.

Vertical Derivative (Bzz) indicates that the path of the prolific Bernic Lake Shear Zone is more southerly than mapped in previous regional studies and more proximal to the Company's property.

Low contrast between the magnetic response of the pegmatites and their typical host lithologies limits the use of conventional magnetic surveys. ACME states that, "the sensitivity of Dias Airborne's QMAG^T system and Mira Geoscience's MVI modelling significantly alters this convention."

Drilling commenced at Shatford Lake in January 2023 based on findings from the Summer Exploration Program and the Winter 2023 Drill Program was completed in April 2023. Eight holes were completed totaling 3,280 m of diamond drilling. Drill targets from multiple sites identified include numerous pegmatites, some of which were undocumented prior to the Summer Exploration Program. 235 samples have been cut for assay, with results pending.

Pegmatites were encountered in 6 of 8 holes and previously unknown relatively fine-grained intrusive rocks indicate the possible occurrence of unexposed potential source plutons for lithium-bearing pegmatites. The drill program demonstrated QMAG^T magnetic survey mapped both stratigraphy and structure related to the LCT pegmatite targets.

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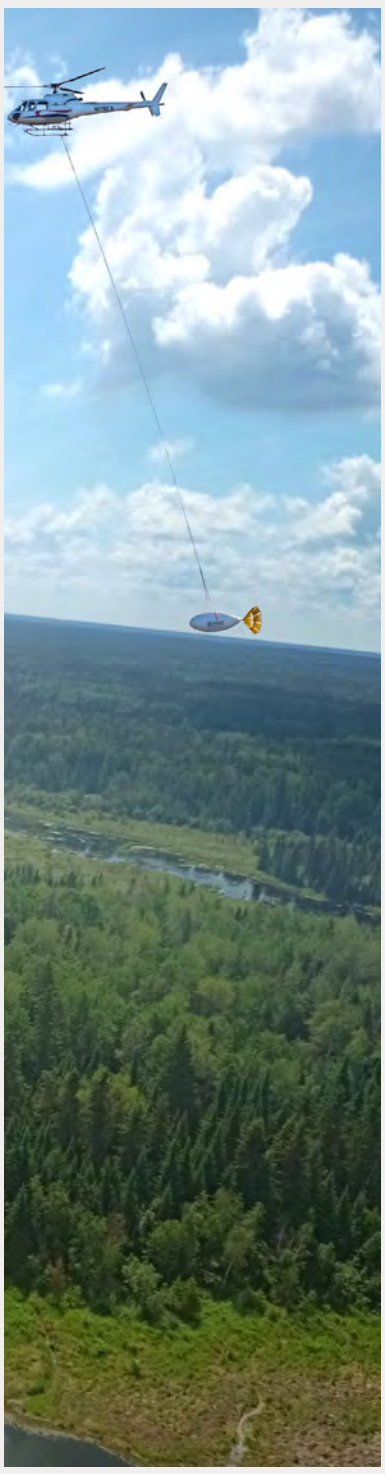

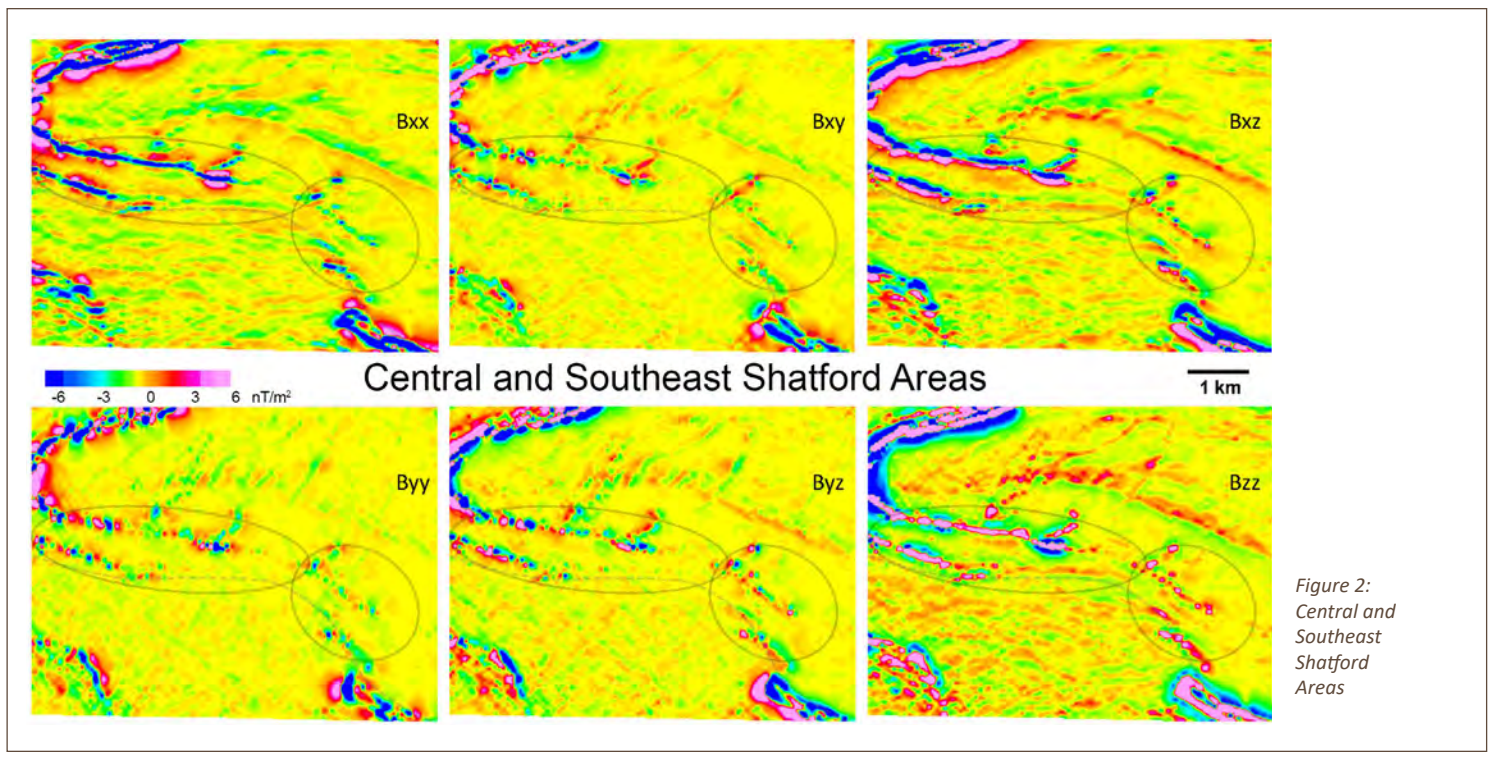

Figure 2: Central and Southeast Shatford Areas

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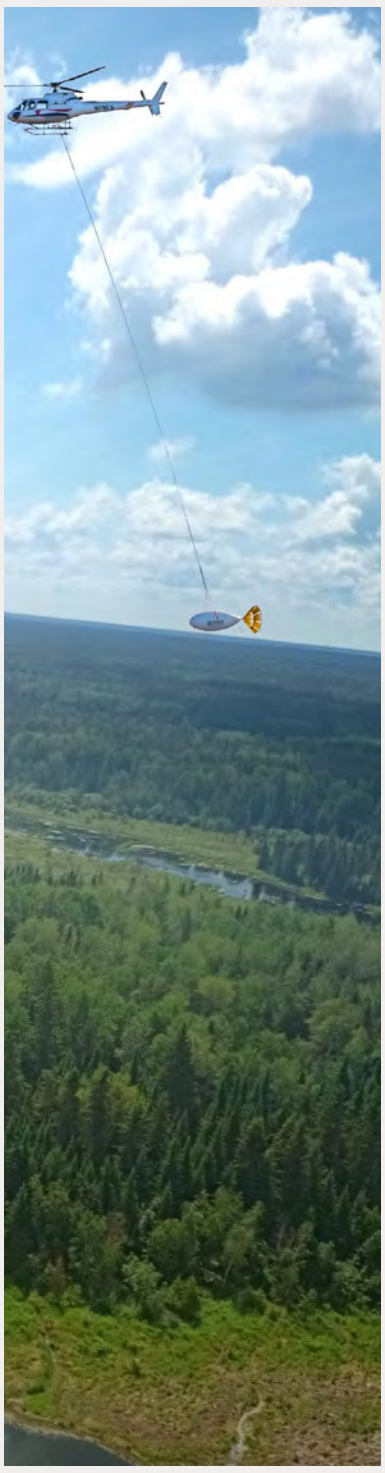

Little Nahanni Pegmatite Project, NT, Canada

SITUATION

Dias' QMAG^T system completed a survey over Lake Winn Resources' 100% owned Little Nahanni Pegmatite project in the Northwest Territories. The project covers 7,080 hectares that encompasses a 7 km long, and up to 500 m wide, lithium, tantalum, and tin pegmatite dyke swarm. Historical drilling and channel sampling on the Project confirms the presence of significant Lithium, Tantalum, Tin, and Cesium.

Historic drilling and channel sampling has proven numerous intervals of mineralized pegmatite grading >1% LiO2 over 1 m to 16.65 m intervals. Lake Winn reports that they believe that the QMAG^T system has successfully mapped the LCT pegmatite dyke swarm. Anomalies coinciding with the known dykes appear to coalesce into numerous larger anomalies which range from 10 m to 100 m widths and can be intermittently traced along strike for up to 7 km. The QMAG^T results are being integrated with other data sets to accelerate exploration through the project area.

QMAG^T System

The QMAG^T system is a helicopter-borne magnetic survey system utilizing a SQUID (superconducting quantum interference device) sensors that measure the complete gradient tensor of the Earth's magnetic field. The SQUID system was developed by Supracon AG of Jena, Germany. Operating within a liquid helium bath, the sensors measure the magnetic gradients with great sensitivity. The survey delivers 6 tensor components, each of which highlights different magnetic directions in the survey area.

QMAG^T Results and Interpretation

Figure 1 shows a colour image of the Bzz data channel from the survey. The colour palette is reverse, so the zones of low gradient are the "hot" red colors and the high gradients are the cold colours (blue). The current thinking is that the LCT pegmatites have very little magnetic response, so they should image as zones of low gradient. However, when they were intruded into the surrounding sandstones, a hornfels was formed causing the relatively high vertical gradient response. Therefore, the red colors (magnetic low response) is thought to map directly the LCT pegmatite dykes. This is an exciting result.

The other QMAG^T tensor images (like Bxy, not shown) support this interpretation with coincident anomalies matching the linear features in the Bzz image. The results show a dense swarm of pegmatites, tens of metres across near the northern drill holes. Drill hole MAC06 encountered 17.96 m of LCT pegmatite grading 1.03% LiO2 and drill MAC07 drilled from the same site at a 60° dip encountered 10.94 m of LCT pegmatite grading 1.47% LiO2 (Figure 2). Figure 1 also illustrates an 80 m to 100 m wide magnetic signature that traverses the entire data set for several kilometers. This anomaly has been named Alpha Prime. Close inspection of nearby historic collars suggest they drilled near, but did not test this target. Lake Winn plans to ground truth these anomalies in the summer of 2023.

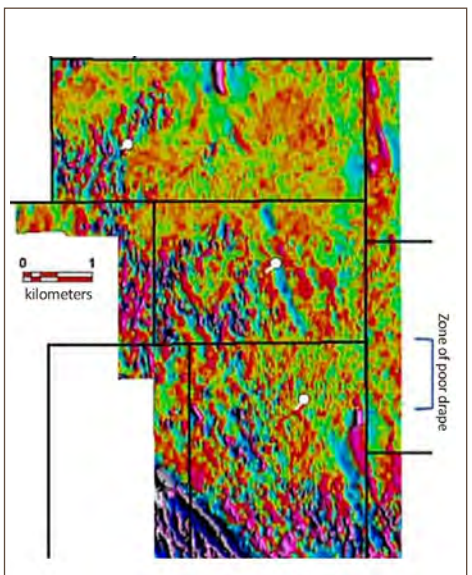

Figure 1: Bzz tensor image (measured vertical gradient of the vertical component) flown over the central portion of the LNPG project. Historic drilling is shown in white. Colours are reversed with low magnetic response in reds and high magnetic response in blue.

Figure 2 illustrates the northern part of the surveyed area, around drill holes MAC 06 and 07, as a reverse-colored image and overlain by topographic contours. The interpreted LCT pegmatite dykes have been traced out with lines of white dots. They seem to get cut-off by the cirques, but Lake Winn knows from mapping that they persist in the cliff faces of the cirques. The apparent cut-off in the magnetic imaging is caused by the loss of sensitivity due to the increased height of the sensor. Signal drops off more rapidly with increased flight height because it is a gradient system. On the upper plateau, a swarm of anastomosing dykes can be interpreted, including the dyke that was sampled by drill holes MAC 06 & 07. This magnetic data will aid in guiding further drilling across these target pegmatites.

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Figure 3 shows the sampling results in relation to the Alpha Prime target. The trace of the Alpha Prime anomaly has a strong, coincident Li-in-soil anomaly.

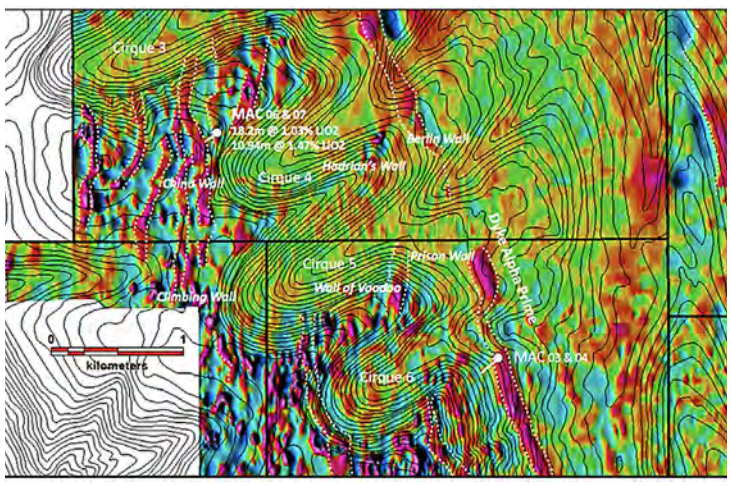

Figure 2: A zoomed in view of the Bzz data in reverse colour over the NW portion of the property. Topography contours are shown in black. The red linears are thought to map out the LCT pegmatite dykes.

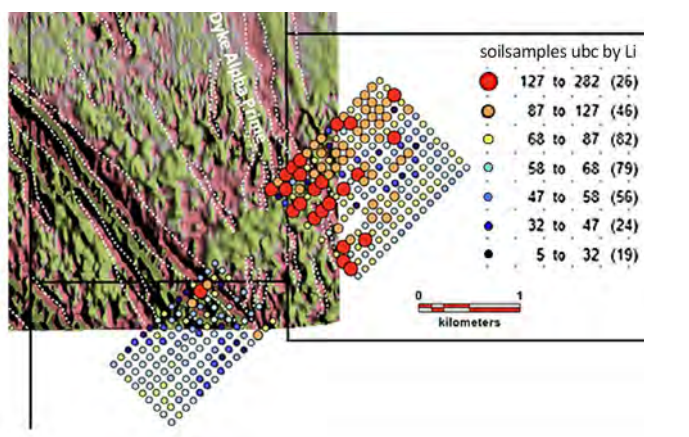

Figure 3 Southwest portion of the QMAG^T Bzz image in reversed pastel colours, with the Li in soil geo-chem results as colour symbols. The Alpha Prime dyke target is labeled.

CONCLUSIONS

The QMAG^T system appears to be effective in imaging an anastomosing series of LCT pegmatite dykes on Lake Winn Resources' Little Nahanni project. The dykes, as expected, are showing as low magnetic response. Weak magnetic high responses on the sides of these dykes are interpreted to be reflecting hornfels alteration during emplacement of the dykes in the sedimentary host rocks. The ability of the QMAGT system to detect very weak magnetic signals, and image complex directional patterns is very important to exploration for this type of challenging target.

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