By

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An internship report was submitted to the Chief Geologist and Senior Project Geologist of Piedmont Lithium for the fulfillment of the field course *Strategic Minerals.*

Internship Experience

As an intern for Piedmont Lithium, I was exposed to various methods of gathering geologic information, such as field mapping, core logging, soil samples, and drill rig operations. Transitioning from undergraduate studies to the exploration industry was a smooth transition with a steep learning curve. This internship is unique for the fact that I was given many responsibilities to aid in the overall development of this exploration project. All these responsibilities provided new challenges that developed tools that are integral parts of understanding what it takes to build/add value to a resource.

I was given daily tasks of core logging, core cutting, soil sampling, and field mapping. Over time I was granted extra tasks including community engagement, prepping/scouting pads, reclamation, and helping manage drill rigs. Many other internships and entry-level positions constrain duties to few aspects of the exploration process. At Piedmont Lithium, my professional and geologic growth was not limited to growth by performing a single task. Instead, I was allowed to learn many roles, catering to my strengths and strengthening my weaknesses.

The broad, full-scope nature of being an intern at Piedmont Lithium makes this internship a fast-paced work environment that forced me to apply and understand the application of my knowledge. This was naturally accomplished by completing the day-to-day task, building on previous knowledge. Simultaneously, this developed new skills that taught me how to build/add value to a resource, as well as how to determine if a project is worth further investment.

Background

Exploration geology is a branch of geology that combines business with geology. This business model incorporates theoretical geology, field geology, and economics to build a resource around a commodity. This model is dependent on geologic knowledge and to gather this information geologists perform work in remote areas, surrounded by heavy machinery and long hours. The work done by the geologist and other parties involved aims to build or increase the value of a resource. The business model works by identifying a resource and increasing the value of that resource to a point that the resource can be exploited, or the project can be sold at a profit. The end goal is to take the resource into the mining production; however, it is common for the company or principal investigator to not be successful. Exploration geology is tasked with advancing a resource and growing its value to at minimum sell the project for profit.

Building and adding value to a resource is not solely dependent on the quality of work by exploration geologists. There are a lot of external factors that can negatively impact the process. These factors can involve public opinion, environmental impacts, political influence, and the form of the resource. To mitigate or resolve these factors, there must be data to prove a potential resource to be profitable and feasible. Another factor includes the ground itself, a geologist cannot change what is in the ground and there is no mitigation of the absence of a deposit.

Through a project, there is constant data gathering to improve confidence in a resource. This data is sometimes hard to come by as it takes large financial investments to become confident in a potential resource. If data does not support further investment, projects will follow one of three paths. The project will either end, pause, continue. pause until there is more potential for profit or it is sold. Over generations, these paths could change. There is no definite timeline in exploration, some challenges take time to overcome while others are impossible to overcome.

Intro

The first step to any exploration program is preliminary research, by way of literature review and/or GIS data. Through this preliminary research, the geology of a region can be mildly understood. Field mapping is commonly the next step in efforts to ground truth and identify potential resources for sample collection and sample testing. Field mapping, along with the subsequent steps can be done simultaneously in an open feedback loop. Results from field mapping and sample testing could lead to doing, geochemical data collection, geophysical data collection, as well as resource definition (and infill) drill programs and vice versa. Adversely, if the results of field mapping and sample testing are not promising it could lead to the closure of a project.

It is important to remember, everything in the exploration industry costs money and has limitations of its practicality. In some exploration programs, it is logical to do things in a low-cost manner, for example, the initial steps mentioned above, beginning from desktop research then transitioning to field mapping. In the early stages of exploration, there is heavy reliance on your field mapping skills to ground truth and define the local geology. If a potential resource is identified, it is the geologist's job to take their surface data and interpret the subsurface. A low-cost method of interpreting the subsurface is creating cross-section sketches based on field mapping and other valuable data sets. More accurate interpretations can be made with the use of geophysical surveys. However, these geophysical methods are more costly than drawing cross-sections. The methodology is directly related to budget and application, if the potential value outweighs the cost for a certain method, it is useful to be as accurate as possible.

Multiple types of geophysical tests are used to determine surface structures and alterations. These tests are commonly used for deeper applications and if the proxy signals all overlap it can be taken as a moderate confidence method of "proving" the subsurface. However, drilling is the ultimate test to define the subsurface. Drill holes are designed to hit pierce points and define the stratigraphy and orientation of a potential resource. The rock that is drilled is brought up to the surface and logged, noting details on rock type, mineralogy, and geotechnical properties. After logging, intervals with the potential resource of interest are sampled and sent for further chemical analysis to quantify the grade of the resource. Drilling, core logging, and sampling provide data to define the subsurface. The drill hole data can be manipulated and modeled in 3-D through GIS software to understand and further grow a resource. Completing multiple drill holes will confirm or deny the interpreted subsurface providing tangible subsurface data.

Along with subsurface interpretations, there can also be geochemical and geophysical properties of the surface that aid in defining a resource. There are geochemical and geophysical tests that can define the surface geology of a region. These geochemical and geophysical tests provide data that serves as a proxy for mapping the extent of the potential resource. These methods of data collection are more expensive than initial research and field mapping, but they interpret the potential existence of a resource by its surface expression as well as, the physical and chemical properties at depth.

There are many branches of geology that are involved in the exploration business. As an exploration geologist, it is important to know that there is no single way to carry out an exploration project. Additionally, there is no single way to complete any task involved in an exploration project. It is equally important to know more ways to do every task. Some exploration projects may have a preferred method or will not offer certain methods of data collection. At a minimum, exploration projects will require preliminary research, field mapping, and sample testing. The results from those initial steps will drive the subsequent steps of an exploration project. The results from each of the following steps influence what will be done next. To be successful in the exploration industry, in a variety of projects, it is essential to understand the processes and applications of data collection and how it can create or add value to a resource.

Data gathering

The initial step to any geologic project is data gathering. Before investing time and money into a project, it is critical to understand where a project is located, what is the local culture, and what is the feasibility of building or adding a resource. To understand all this information, the data gathering process relies on previously published data and public records. Data gathering puts regional geology into perspective and lays the groundwork for potential exploration.

Through data gathering, there is the assessment of the locality of a potential resource. Through previously published geologic literature, where the geology is defined, it is relatively easy to determine the existence of preferential host rocks for resource types. The abundance of the potential resource is often not defined. Where the resource is not defined, exploration geologists must build a resource. In other regions, such as preexisting mines, the potential resource is defined and the purpose of data gathering becomes to grow that resource. There are other cases where economic geology literature attempts to quantify resources in a specific area.

Initial research may also use large-scale chemical and geophysical surveys of the region that may be helpful to locate potential resources. A helpful resource in gathering data on a region is the local or state GIS library/clearinghouse where the GIS data of a region is kept. The USGS and state government geologic services may also provide data that may not be found on the GIS clearinghouse. Other initial data sets involve defining the proximity of infrastructure. A great deposit can be found but if it costs too much for extraction then the project is not economic. Often, the success of exploration projects depends on pre-existing infrastructure. The steps in conducting an exploration project aim at taking public information and, through continued research, improving confidence levels that a resource is present and economically abundant.

Field mapping

Field mapping is perhaps the single most important skill in exploration geology. By field mapping, geologic units on the surface are identified. Field mapping allows interpretation of the subsurface based on surface expressions of geologic units. The interpretation of rock units could lead to the growth and/or the discovery of a potential resource. There are many mapping techniques, but it is common practice in the exploration industry to map using hand-drawn anaconda-style mapping and GPS-based device. They can be used stand-alone, but it is useful to understand and rely on both. The focus of all mapping techniques is to document structures and their orientations, lithologies, contacts, alterations, soil characteristics and define the extent of each onto a base map. The Quality of field mapping is dependent on, preliminary research, proficient mapping skills, and application of geologic knowledge.

Drilling Programs

Understanding how drill programs work is a very important factor for upward growth in the exploration industry as a geologist. Drilling is the most cost-efficient way to prove what is in the subsurface definitively. Other methods are usually more costly and/or less environmentally friendly (include trenching, adit/exploration tunnels, and test pits). In America, the most common practice is to conduct drill programs. The goal of a drill program is to prove as much as you can in the most cost-efficient manner. Drill holes can vary in price anywhere between $100-2500 per meter depending on hole depth, hole size, and downhole tests. Drilling can provide shallow surface Geochem data as well as defining the geology at depth. Considering the costly nature of drilling and the need to accurately define a resource, it is imperative that the drilling is well planned, and all associated data is collected.

Based on the previous data, drill holes are planned to target potential resources and define the subsurface stratigraphy. Drill holes are planned at a specific depth and orientation given by azimuth and dip. In this orientation, the hole aims at the pierce points to define the orientation and magnitude of rock units. These holes are planned based on surface expressions of rock units and other previously collected data. Each hole gives the following information about the stratigraphy downhole: estimated ore grades, length of rock units, bulk density, deformation, and geotechnical properties. To understand the extent of a potential resource, multiple drill holes are completed.

As the size of a drill hole increases so does the cost per unit length. The size of a drill hole is often based on the type of deposit and the competency of the rocks in the subsurface. In deposits that have a stratigraphic regularity like a dike/sill or coal seams, smaller drill bits can accurately define the subsurface. In some gold deposits where there is a nugget effect, bigger holes are drilled to lower the sampling bias of drilling into areas that are concentrated with an orebody. Hole size is also influenced by the competency of the rock and the type of orebody. Competent rock can be drilled with smaller-sized drill bits and the rock remains competent as it is brought to the surface. Less competent rock is drilled with bigger-sized drill bits that have a larger diameter to increase recovery.

One overlooked portion of running a drill program is the logistics of drilling. Drill rigs, like any other heavy equipment, require complex mechanisms and highly trained operators. As a geologist in exploration, it is quite beneficial to understand the types of drills, the mechanics of a drill, and how the drilling process interacts with the subsurface. Many types of drill rigs operate based on different mechanics and have different limitations (for example a sonic drill vs diamond drill or truck-mounted vs track mounted). When planning drill holes and drill hole sequences it is important to consider the purpose, location, and timing of each drill hole. Good planning will increase the efficiency of drilling and in turn, free money to do more exploration.

To prove the accuracy and extract more information from a drill hole some tests can be used in supplement with drilling. A common test is surveying the drill hole downhole to determine if there was any deviation downhole from the planned. This test provides the true downhole orientation through the entirety of the hole. This is a common test because the mechanics of diamond drills interacting with rocks at depth can naturally force a drill hole to deviate from a distinct path. For example, drill holes tend to droop at depth due to gravity and tension on drill rods. Another common deviation is drifting due to the spinning of the drill, termed "right-hand drift". Diamond drill rigs operate by spinning a bit, usually, in a clockwise direction cutting and extracting rocks at depth. The drill bit spinning clockwise combined with downward force will naturally cause a deviation to the right (or vice versa for counterclockwise). These natural deviations can influence inaccurate data, resulting in inaccurate resource models. For this reason, the downhole survey makes the hole data an accurate representation of the subsurface

Other tests can be performed to gather more information from drilling. Some tests are more practical for specific ore bodies. For example, in deposits where there must be a fluid to induce mineralization, there may be permeability and porosity tests. For a continuous ore body, there may be an orientation test. These oriented drill holes are done in exploration programs, where there is limited data of the subsurface, holes may be oriented to accurately define the orientation of rock units without drilling multiple holes. Orientated holes define the "up" direction on the core and through trigonometric calculations, the orientation of the rock units can be defined without drilling multiple drill holes.

Core logging

Most exploration programs should have a standard operating procedure (SOP) for core logging. Generally, a core logging SOP will give instructions on how to read depths and extract data corresponding to depth. In an SOP there may be instructions that are specific to an orebody, but the main idea is to note depth, rock protolith, large/small scale rock alterations, current mineralogy, and the orientation of structures. This provides data that is later used for strategizing a mine and calculating the profitability of the resource.

For organizational purposes, it is common practice to begin the core logging process by prepping and labeling core boxes. This is simply giving each box some sort of ID as well as the core's start depth and end depth within each box. The following steps are important and can make or break an exploration project. The following steps include gathering geochemical, geotechnical, lithological, structural, and bulk density data. In gathering this data there are repetitive steps that are structured to form a data repository that can be used to add value to the potential resource. This data repository can be revisited at any time to gain further understanding of the geology and extent of a resource.

Conclusion

The exploration industry works just like any other business model. To be successful there must be a demand for a potential resource, and it is the job of the exploration geologist to find and define the supply. The exploration geologist must consider all factors while doing preliminary research and determine, is there potential for a resource to be sold for profit. There are many ways to do this, some more accurate than others, and it all begins with preliminary research. A geologist can use whatever skill set they possess to build on their preliminary research. By building on preliminary research, they can raise money to conduct further research on a region. If promising information comes about, value is added to the potential resource. Getting to a point where the potential resource can be sold for profit is often based on extremely high demand or a high level of confidence.

Most easy deposits have been previously identified and the future of exploration depends on reassessing previously identified deposits. Further exploration in the deposits will be found at deeper depth or spread laterally. As an exploration geologist, it is imperative to understand how to take pieces of the information, grow on them, and increase levels of confidence with your work.

Appendix A *Mapping*

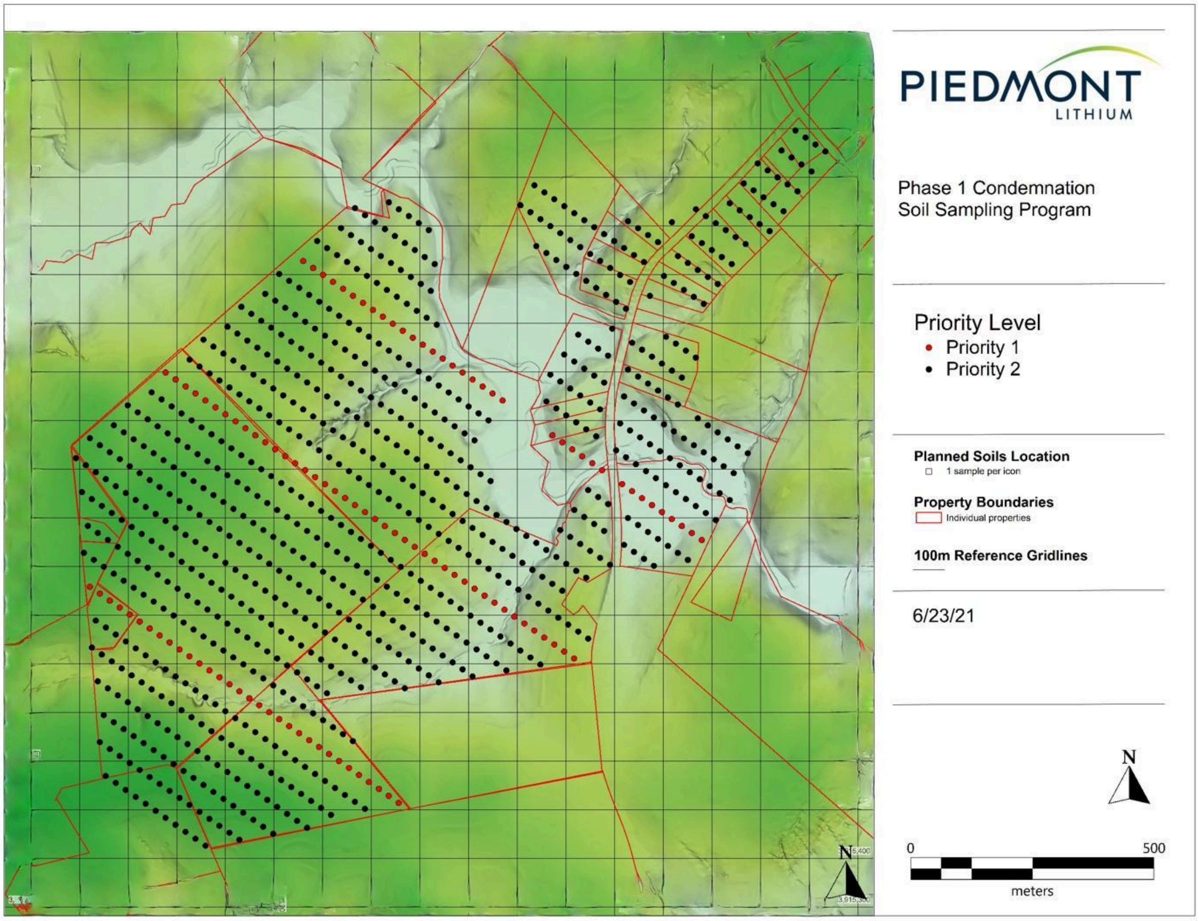

Figure 1 is a condemnation soils grid created in MapInfo. The grid is oriented perpendicular to a structure of interest. The line spacing is 50m (NE-SW) and the sample spacing is 25m (NW-SE). This grid orientation results in increased sample density going across the feature of interest. The soils at each point are collected and sent off for 4-acid digestion ICP-MS analysis. The soils are given an ICP-MS finish because it has a low detection limit. ICP-MS testing is more expensive and slower than the other finishing methods. This low detection limit proves useful in soils and weathering products, considering there may be only trace amounts of the element of interest remaining from a protolith.

The testing begins with acid or base digestion to dissolve the sample material. The sample material can often require multiple different acids/bases to dissolve the sample sufficiently. This is done because only what is dissolved is turned into plasma then finished(tested). There are different suits of acid/base digestion that are used to dissolve specific mineral types. There are also different finishes that test for specific element suits as well as different concentrations. The different digestion, finish methods, and their practicality can be found in detail here.

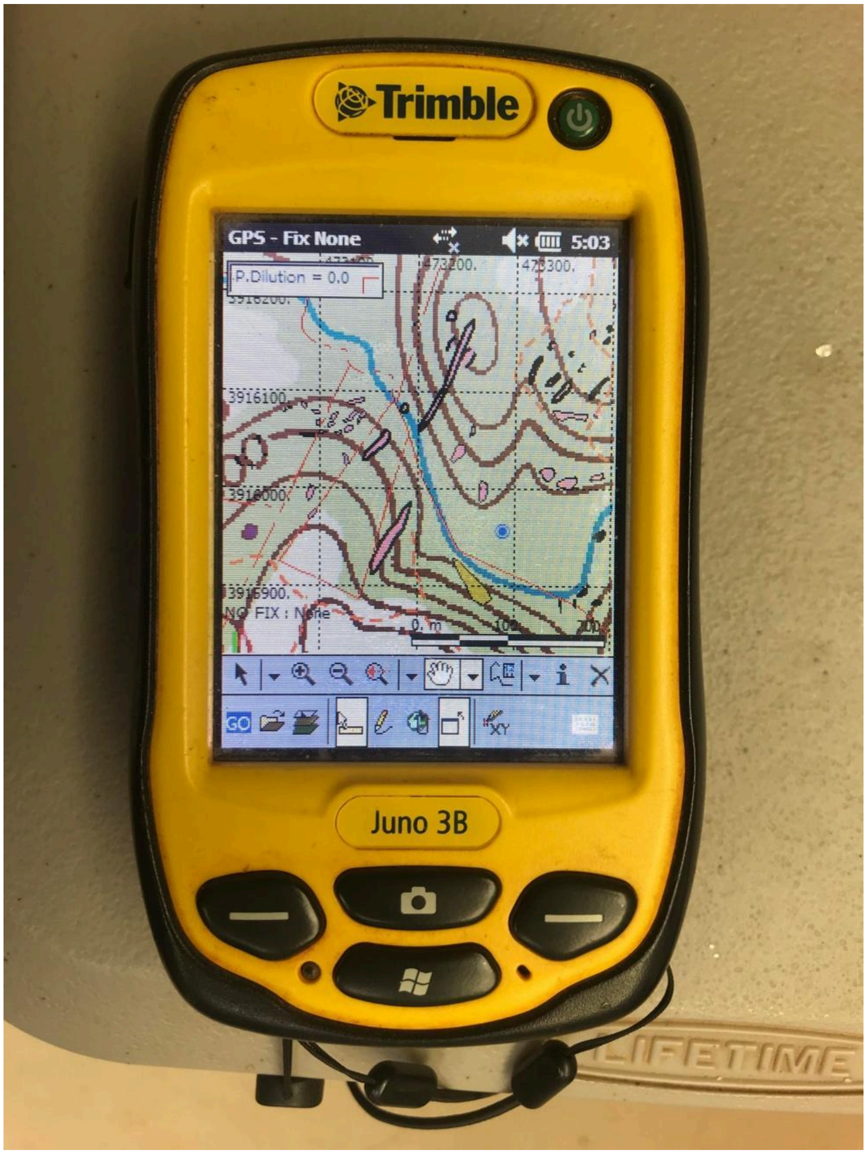

Figure 2 is a photograph of a Juno 3B by Trimble, a GPS based mapping device. This device imports maps and allows map edits while in the field. With the Juno, the metadata of map layers can be manipulated and later exported to the original mapping software. The metadata can be organized to classify structures and their orientations, lithologies, contacts, alterations, soil characteristics and define the extent of each onto the base map. The Juno can be used stand alone or in conjunction with grassroot field mapping practices.

Figure 3 is an orthophoto with 1.6-inch resolution taken from a *DJI-Mavic Pro* drone with the aid of *Drone Deploy* flight programing and processing software. The official drone deploy orthophoto report can be found [here](). This orthophoto was used for multiple purposes including supplementing field mapping as well as high accuracy topographic surface studies for water flow and mine engineering plans. There was an autonomous flight plan developed in *Drone Deploy* to create this orthophoto. The flight plan captured roughly 1000 pictures with 80% overlap (both front/back and side/side overlap of 80%) producing this orthophoto with a 1.6-inch resolution. Each image is taken with a recorded GPS point, camera azimuth, camera inclination, and GPS accuracy (X,Y,Z). There are external attachments that allow enhanced capabilities of the drone such as lidar, multispectral and hyperspectral imaging.

Appendix B *Drilling*

Figure 4_{a-b} are photographs of diamond core drill rigs. Figure 4_a is a truck mounted drill rig drilling at a steep angle, noted by the drill mast being near vertical. When the drill mast is down and not drilling, this rig has the mobility of most highway capable street legal vehicles which makes the rig easy to move and transport. However, the truck rig is not able to go into wet and swampy terrane because of the risk of being stuck. Sometimes the water used in normal drilling operations can get the rear tires of the rig stuck. Fig 4_b is a track mounted rig drilling at a moderate angle, which is not easily apparent due to the camera angle relative to the drill mast. When the mast is down and not drilling the tracks of the rig make its mobility limited in terms of speed but can get in and out of most any terrane. The tracks can be made of steel or rubber. Steel tracks produce further limitations as permits are needed to move steel tracks on or across public paved roads. Steel tracks last longer and are cheaper to maintain in the long term.

When managing and lining up the rigs, the 4-wheel drive system of the truck mounted rig causes challenges lining up the rig along azimuth. The truck rig cannot pivot like a track mounted rig, therefore, to change the azimuth, the truck must drive forward or backwards to be aligned with the azimuth and stay on azimuth as it approaches the collar. The track mounted drill rig can set up on a drill collar and can pivot around the center of the rig allowing the rig to change azimuth without changing the x and y position drastically.

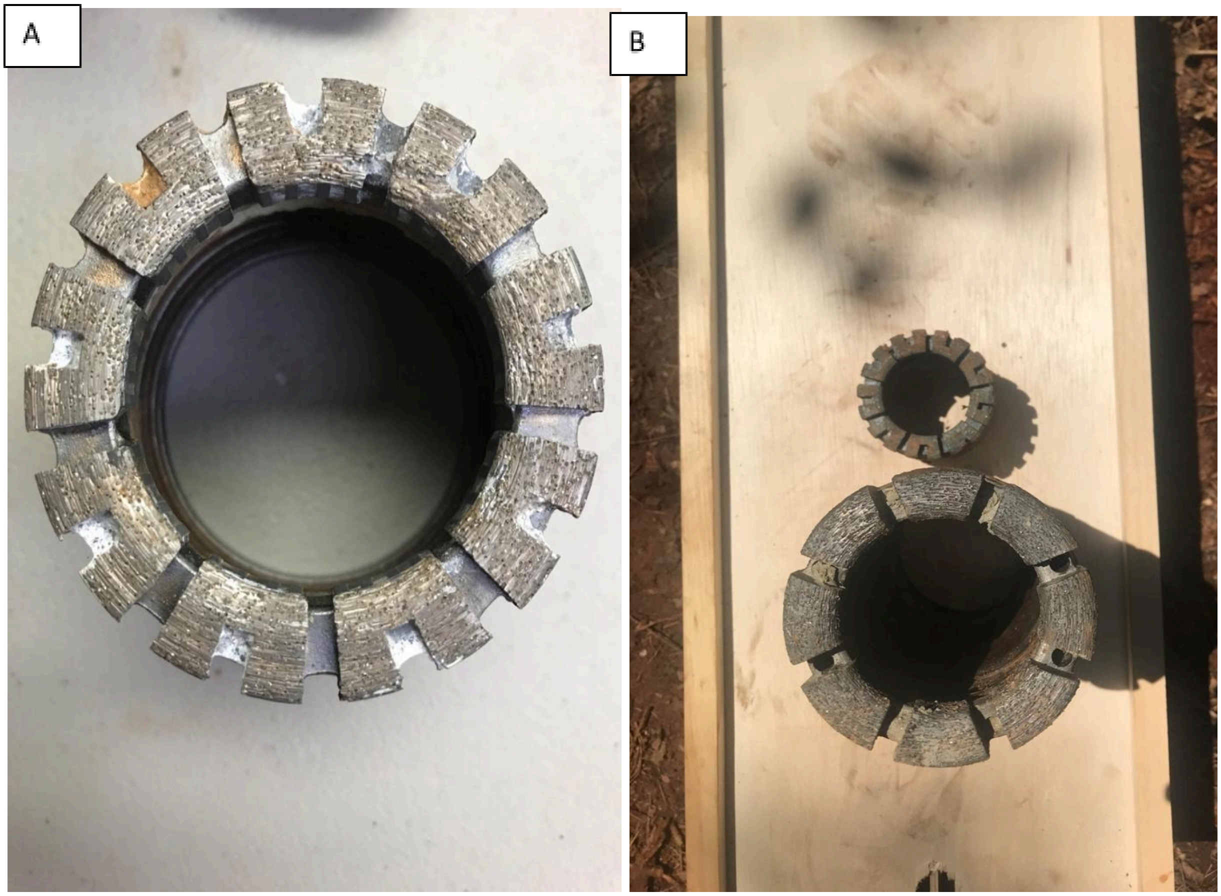

Figure $5_{a\text{-}b}$ are photographs of diamond core drill bits. These bits have small sand sized industrial diamonds evenly distributed through the steel tooth matrix. The combination of hundreds of these industrial diamonds working in tandem allow the drill bit to cut through the rock with general ease. This process allows the drill string (combination of bit and core rods) to slowly lower down into the rock capturing the cylindrical shape of diamond drill core within the core barrel. The grooves going around the bit function as water or "drill mud" vents. These allow the water or drill mud to flow between the teeth as a cooling medium as well as a lubricant for the rest of the drill string. As the drill mud cools the teeth of the drill bit, this allows the steel diamond matrix to stay cool rather than melt which would in turn release the cutting diamond teeth. This cooling allows the drill bit to last significantly longer when compared to an uncooled bit. Over time, the diamond teeth wear down, the steel is sheared or melted away and new diamond teeth are exposed further self-sharpening the bit. Figure 5_a is a nq sized diamond core drill bit which is better for drilling competent rock at depth. Figure 5_b is a hq drill bit next to an nq drill bit. The hq is a larger bit with a greater diameter and is suitable for drilling less competent rock. Often a larger core size bit is used to drill through less competent overburden/saprolite. Once the drill is a few runs into bedrock, the driller will reduce the drill bit size and set casing around the drill string in the ground to reduce the risk of clays swelling and stabilizing the hole from collapse. Smaller diameter drill bits are used at depth due to lower cost of parts and materials, less drill mud and water required, and faster drilling due to less material to remove. The combination of these decrease overall operating costs if nq core can be used.

Figure $6_{a\text{-}b}$ are photographs of down hole testing tools. Figure 6_a is a down hole survey pad. The survey pad is used down hole to define the orientation of the drill trace. The survey pad measures and plots the 3D path of the drill trace. The tool works by magnetic sensors or gyroscopic sensors. The survey pad in figure 6_a works sending a magnetic reading down hole and noting the azimuth and dip along the drill trace. In a system that does not have an abundance of magnetic material, the magnetic survey is more cost efficient. If there is an abundance of magnetic material, the north-seeking Gyroscopic (N-seeking gyro) sensors are best, as they will not be disturbed by the magnetic field. Figure 6_b is an orientation tool which is used determine the "up" direction of the drill core. Down hole, there is a core barrel extender (top) that defines the "up" by an optical sensor down hole that notes the degree of rotation as the drill spins. When the run is brought up to surface, the orientation remote (bottom) is inserted into the core barrel extender extension. Then the orientation remote gives a reading of "OKAY", or a set of arrows denoting a clockwise or counterclockwise rotation to align the cores "up" direction with the up direction reading of the rod extension. Once the core is in line with the "up" direction, it is leveled and marked going along the cores up" direction.

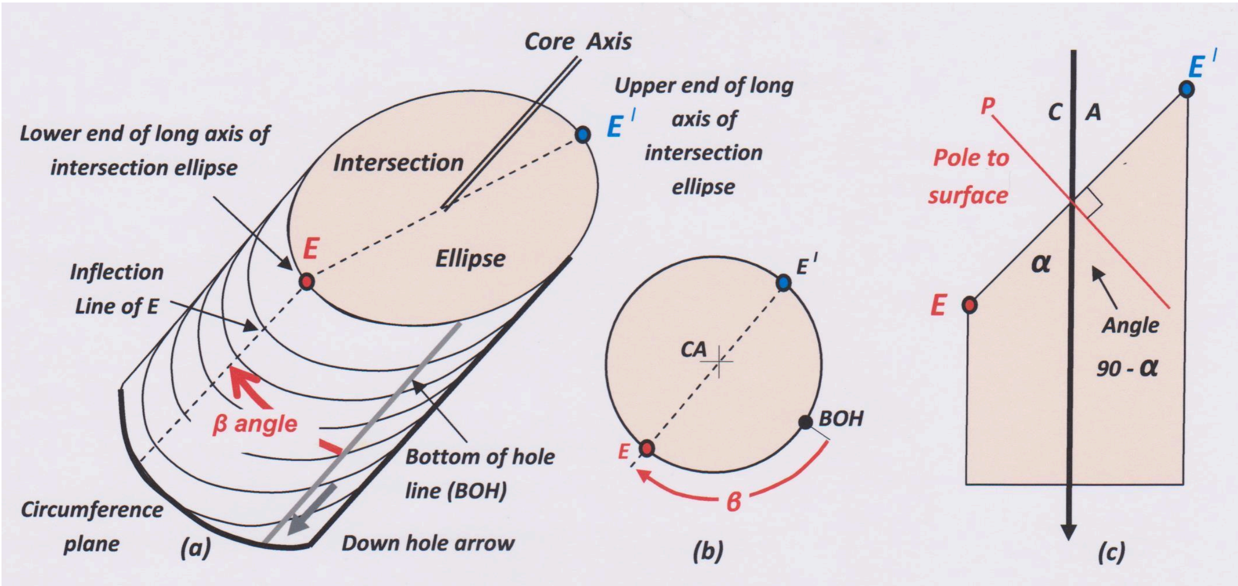

Figure 7 is a schematic diagram of oriented core that illustrates the axis which the core is oriented. On orientated core, there is a line that marks the "up" direction of the core that gives the core an orientation throughout the hole. The structures in the core can be determined by reorienting the core using a bucket of sand (or other more complex orientation methods) and structures can be measured like an outcrop. Another method is to measure several angles on the core and use software or stereonets to calculate the true orientation. The two core measuring conventions are alpha (α) and beta (β) angles. The alpha angle is the acute angle between the core axis and the axis of the elliptical cross-section of the core (0-90). The beta angle is the angle between the "up" reference line and the intersection with the furthest down hole edge of the apical trace of the core's elliptical cross-section measured in a clockwise direction around the core (0-360).

Appendix C *Core Logging and Sampling*

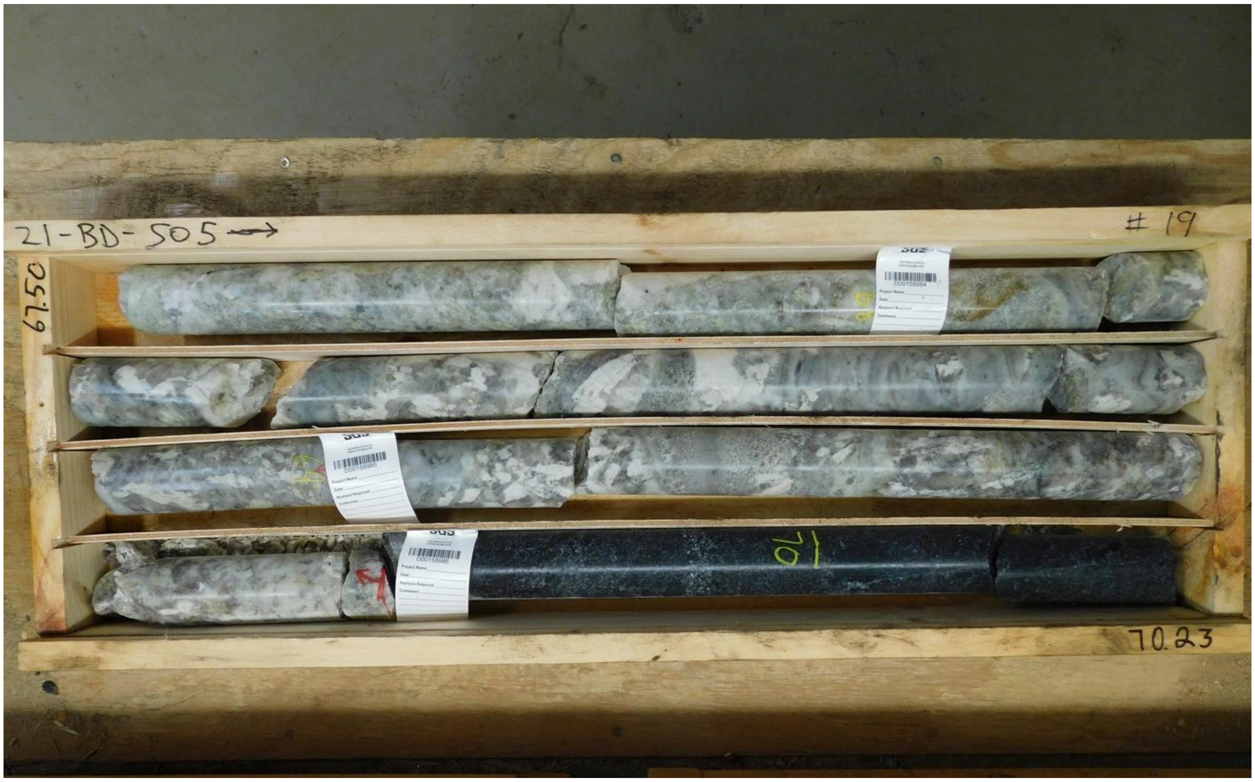

Figure 8 is a photograph of box #19 of a hole 21-BD-505. This hole has gone through the entire logging process up to being cut for sample testing. The hole has been box prepped, logged, sampled, and imaged multiple times. Note the labels on the box marking the hole ID (21-BD-505), the box ID (#19), the box's start depth (67.50m), and end depth (70.23m). The yellow lines mark 1-meter intervals. Although not shown in this image, there are small wooden blocks spaced every 3 meters. These blocks are placed at the end of each drill run, which is ≈ 3m in solid rock at depth (drill runs in shallow weathered lithology are shorter ≈ 1-2m). The drill run that is in this box begins at 68m and ends at 71m, which goes into the sequential box #20. The lithology changes at 69.73m from coarse grain 19% spodumene pegmatite (SPEG) to massive fine grain amphibolite. The next step is for sampled intervals in this box to be cut. The white tags are sample tags, which are stapled at the beginning of each sample interval.

Figure 9 is a photograph of box #19 of hole 21-BD-505 after it has been cut, sample and archived. The Spodumene pegmatite was sampled as well as a 1m shoulder (buffer) above and below the pegmatite interval. The sampled core is half core. One half of the core is put back in the box to serves as permanent record of the drill hole. The other half is bagged and sent to a geochemical testing and certification company for 4-acid digestion ICP-OES analysis. This analysis is very similar to the analysis required for soils, but OES has a higher detection limit for multi-element analysis. The analysis can be customized for a specific deposit to test for specific mineral suites. In the early stages of a project ICP-MS is more practical as it is more accurate although more expensive. For precious metals, the most accurate form of ICP analysis is finished by fire. Often, multiple finishes can be done for the same sample for QA/QC. This is done in high grade zones by duplicating the sample. The samples can also be duplicated by quarter core samples, where the core is cut in half, then the sampled half core is cut in half producing a quarter core cut sample. The two quarters are divided into 2 separate samples which should produce nearly identical ICP results. If the duplicate samples show different results, it could be due to issues in the test processing or potential nugget effect of the material in question.

https://drive.google.com/file/d/1MQC_YoTDN5BNKLoSxFy6H8a47Z5r2r1B/view?usp=sharing

PIEDMONT LITHIUM

GeoSpark: Drill Hole Report

Project: PDL

Hole: 21-BD-505

Prospect:		**Survey Type:**	GPS	**Logged By:**	E. McKenzie	**Hole Type:**	DDH
UTM Grid:	NAD83_17N	**Survey By:**		**Date Started:**	6/25/2021	**Core Size:**	HQ
UTM East:		**Azimuth:**	310	**Date Completed:**		**Casing?:**	☐
UTM North:		**Dip:**	-55	**Drill Company:**	Login	**Casing Depth (m):**	
UTM Elevation (m):		**Length (m):**	235	**Drill Rig:**	Rig 2	**Reduced (m):**	35
LIDAR Elevation		**Hole Status:**	Drilling	**Drill Started:**	6/24/2021	**Reduceed Size:**	NQ
Best Elevation		**Hole Purpose:**	RESOURCE	**Drill Completed:**		**Oriented?:**	☐
Local Grid:							
Local East:		**Comments:**					
Local North:							
Local Elevation (m):							

Figure 10 is the drill collar data of the drill hole report for hole 21-BD-505. The collar information is the first page of the report giving information to identify the drill hole. The full report contains all the data that has been documented for this hole. The full report can be viewed through this link. This report does not have assay data associated with its samples. Once the assays return from the lab, that data is added to the drill hole information and would also show in the logging report.

Sample	WTG_G_WGH_KG_kg	Weight_ g	Li_GE_ICP92A50_ppm	Sum_GO_XRF72_ %	Certificate
531	2.38	2380	3966	99.11	BBM21-10592
532	2.91	2910	3077	99.27	BBM21-10592
533	0.79	790	3612	98.25	BBM21-10592
534	0.79	790	2881	98.82	BBM21-10592
535	2.59	2590	1588	99.14	BBM21-10592
536	2.13	2130	1747	98.04	BBM21-10592
537	2.25	2250	280	99.49	BBM21-10592
538	2.68	2680	1320	98.3	BBM21-10592
539	2.68	2680	1378	99.4	BBM21-10592
540	0.01	10	1848	98.5	BBM21-10592
541	2.17	2170	2363	99.12	BBM21-10592
542	1.53	1530	2282	98.69	BBM21-10592
543	1.44	1440	2097	98.29	BBM21-10592
544	1.16	1160	3116	98.99	BBM21-10592
545	2.67	2670	1233	99.56	BBM21-10592
546	2.73	2730	969	98.9	BBM21-10592
547	2.32	2320	1501	99.63	BBM21-10592
548	3.55	3550	1030	99.41	BBM21-10592
549	1.34	1340	5608	98.93	BBM21-10592
550	2.32	2320	1466	99.46	BBM21-10592
551	1.45	1450	572	99.29	BBM21-10592
552	2.12	2120	3191	99.04	BBM21-10592
553	2.05	2050	1684	99.23	BBM21-10592
554	1.87	1870	489	100	BBM21-10592
555	2.4	2400	4436	98.48	BBM21-10592
556	2.92	2920	2534	99.41	BBM21-10592
557	2.41	2410	9755	98.28	BBM21-10592
558	0.92	920	5473	98.99	BBM21-10592
559	0.87	870	4759	100	BBM21-10592
560	0.48	480	-10	56.91	BBM21-10592

Figure 11 is a report from the geochemical testing and certification company (SGS labs). The samples are tested through ICP-OES analysis for lithium. The ICP analysis denotes weight, a lithium value (ppm), as well as multi-element XRF data. For QA/QC measures, every 20 samples sent off will have known values or duplicate samples, which are later compared to the measured values from the lab. The lab results will be rejected or accepted based on their margin of error. If the results are 2 standard deviations outside the known values the data sets will be rejected for quality.

Appendix D *Modeling*

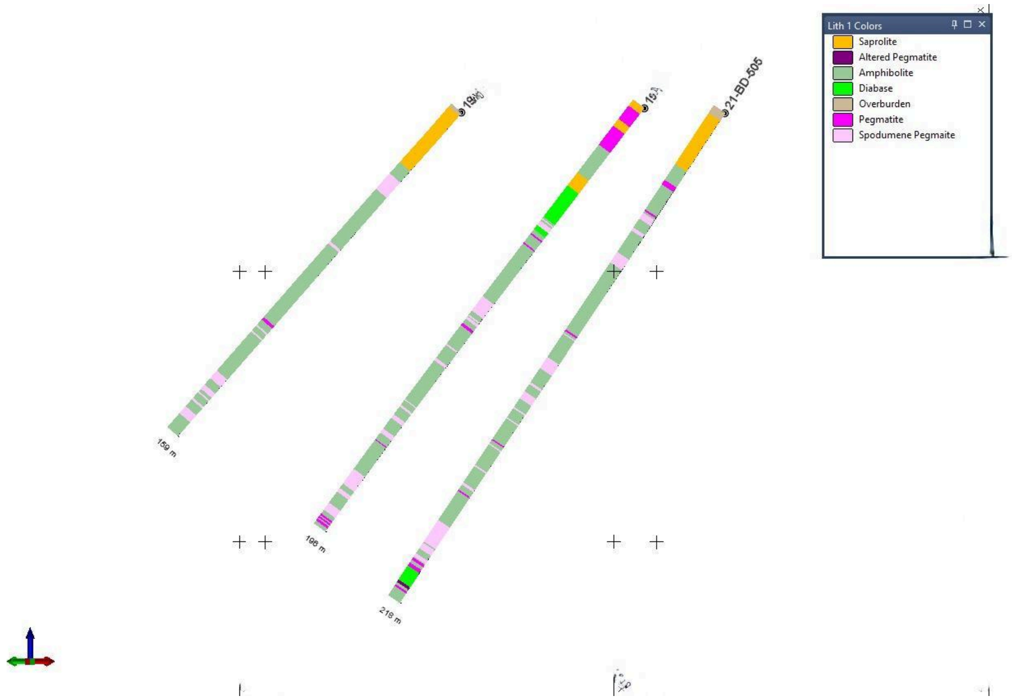

Figure 12 is an orientated cross section through multiple drill holes including 21-BD-505. The orientated cross section was created by GIS software Micromine. This cross section is defined by a point and a 40-degree rotation. To produce this cross section, the drill holes' UTM coordinates had to be rotated and reprojected. The holes were then used in conjunction with the downhole survey pad to de-survey the hole using simple raw tangent algorithm. Within the GIS software, the lithology and structure that have been logged are noted by different colors and orientation along the drill trace. The GIS software also calculates the length of lithologies as it expands or shrinks as the drill hole is oriented. Through the GIS software the extent of the dikes can be inferred as continuous all with consecutive hole hitting pierce points and testing proposed geologic models.