The Hazel Prichard Student Bursary

GroupEleven Placement

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UCD

Introduction & Placement Background

The Hazel Prichard Bursary provided me with 3,000 euro to further my knowledge in the field of mineral exploration and economic geology. This fund went towards accommodation located near the GroupEleven core shed in Co. Limerick, securing my placement application on site.

GroupEleven is an organization specialized in locating massive sulphide deposits in southern Ireland, during my time there they located copper mineralization in the dolomitized Waulsortian basin.

This report summarizes the activities undertaken during my bursary-funded placement period. It also includes general site information, geological findings, relevant core logs and an assessment of how the bursary has aided me.

Geological Setting & Objectives

Southern Ireland lithologies are dominated by organic rich limestones, these limestones are identified by their mud grade, bioclast concentration and location/depth on the seabed.

The Waulsortian, Ballynash and Ballysteen limestones were the main lithologies at the core shed and were deposited in southern Ireland during the Early Carboniferous period.

Waulsortian Limestone: Mud-rich facies formed in deep, quiet marine conditions dominated by micrite and organic-rich beds. (~200-310m)

Ballynash Limestone: Transitional, moderate energy facies representing slope conditions, with higher concentrations of bioclasts with interbedded shales.

Ballysteen Limestone: Shallow-marine and high-energy environments, bioclasts rich (micrite to wacke) with large, interbedded shales (~30cm)

These facies represent sea-level change in southern Ireland and the conditions of the Early Carboniferous oceans.

The organization's objectives are as follows:

- Analyse bedrock and geophysical attributes.
- Locate and predict mineralization using structural data.

Once mineralization is found, mineral grade is processed and recorded for future reference.

Field Work & Core logging

Prior to drilling, soil sampling is required in order to locate the next drill site. This is done with permission from landowners in the Limerick area. A map is generated with the sample locations and the workforce heads to the sample points with GPS routes and samples the soil. The soil is then sent for lab analysis to detect the presence of minerals in the surface till.

When the core is drilled and extracted, it is taken to the core shed and stored to be prepared and logged. Core is first rearranged, cleaned and meterage is marked, then the logging process begins (Figure 1.).

Key features when logging include:

- Depth and transitions zones
- Mineralization
- Visual attributes (colour, texture, grain size etc.)
- Alteration
- Structural features and major veins.

The last step is to flag and split samples from core with significant mineralisation to be weighed and sent to the laboratory in order to determine grade and concentration.

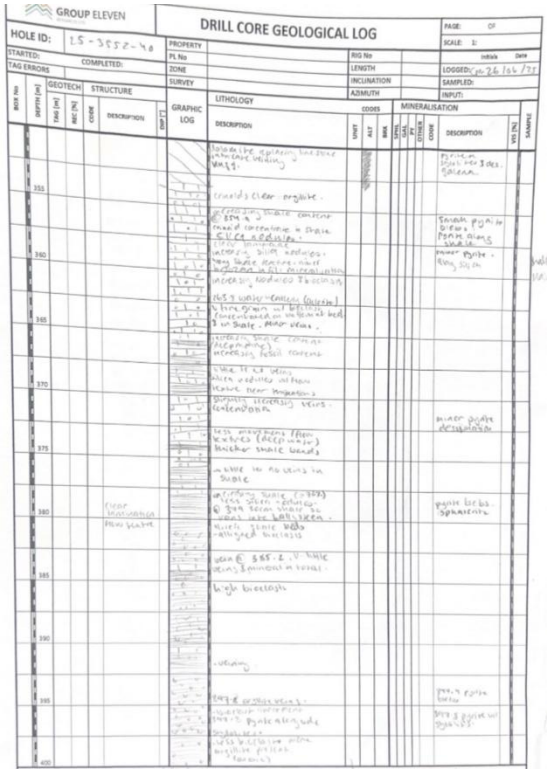

Figure 1. Log completed by my supervisor and I on core with significant mineralisation.

Geological Findings

During the placement period, I suggested a project to be conducted on one of the drill holes with high mineralisation. We used the handheld PXRF to see if there were any elemental correlations between the different vein types and the massive sulphide mineralisation. Thinks to note:

- High CaO = Calcite ($CaCO_3$)
- High CaO + significant MgO = Dolomite ($CaMg(CO_3)_2$)
- Lower CaO + high MgO = Magnesite ($MgCO_3$)
- Elevated FeO = Siderite ($FeCO_3$) or Fe-rich dolomite/calcite
- Elevated MnO = Rhodochrosite ($MnCO_3$) or Mn-bearing calcite

Element results were recorded and a significant spike in Cu, Zn, Sr, S and As values were seen at the base of the Waulsortion limestone, all of which were adjacent to thick shale beds and large scale faults and heavy veining in the drill core. The massive sulphide zone reflects heavily fracture-controlled mineralisation in the Bally wire zone just beneath the 'grey' dolomite.

info	Reading #	MgO	Al2O3	CaO	TiO2	Fe2O3t	MnO	Cu	Zn	Sr	Y	Zr	S	As
Standard-2711A	1	1.59213456	13.7066101	8.60703964	0.57530536	3.75707749	0.06972682	157	373	205	28	262	1967	77
Standard-2711A-1	2	1.85082948	10.023033	3.18176583	0.59232425	3.81598513	0.08276832	164	442	225	32	287	961	112
Standard-2711A-2	3	1.68383859	10.2304999	3.35301957	0.56462684	3.86559908	0.08535079	182	419	233	29	280	965	100
Standard-2711A-3	4	1.4831842	10.7684401	3.39947075	0.55311406	3.91378324	0.07811986	176	435	224	33	297	1081	115
Standard-553-1	5	7.88522012	5.2450585	8.33252996	0.36857585	1.78410066	0.22441706	6297	47	59	23	106	1972	10
Standard-553-2	6	8.33146885	5.31345834	8.34820024	0.35222437	1.7845296	0.22196371	6162	57	57	21	107	1988	8
Standard-553-3	7	8.18205596	5.06820145	8.24984127	0.40978827	1.75707749	0.22118897	6143	64	55	20	104	1921	9
Blank	8	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
25-3552-44-396.25	9	14.0987072	14.7053989	4.24132841	0.69493817	18.5311696	0.01717346	26129	2862	33	<LOD	<LOD	81636	139913
25-3552-44-396.20	10	16.9431905	9.20336861	10.6763557	0.52024423	19.0051473	0.03550903	105903	11222	37	<LOD	<LOD	130395	178634
25-3552-44-396.15	11	31.6143432	5.45649336	3.48187962	0.36457141	30.5014298	0.02427526	28101	2828	<LOD	<LOD	<LOD	156488	244652
25-3552-44-408.5	12	39.1916169	0.97460325	4.30554856	0.33236899	0.13211324	0.01342887	306066	319	<LOD	<LOD	<LOD	139039	260007
25-3552-44-408.45	13	#VALUE!	#VALUE!	55.7488298	#VALUE!	0.5021447	0.32500445	216	13	201	12	<LOD	<LOD	405
25-3552-44-408.65	14	#VALUE!	0.82608868	50.6063206	0.07842039	0.51186731	0.0489379	154	37	466	8	11	1032	1147
25-3552-44-365.5	15	4.57375933	#VALUE!	6.28406096	0.19822006	23.7472119	0.01962681	2206	293096	<LOD	<LOD	<LOD	316181	41129
25-3552-44-365.0	16	1.7599546	0.59197984	10.3181779	#VALUE!	44.4019159	0.02763248	471	59985	73	<LOD	<LOD	305327	5877
25-3552-44-365.0-2	17	8.35203178	0.56288156	18.3311462	#VALUE!	50.3986274	0.03034408	194	3745	126	<LOD	<LOD	292340	65298
25-3552-44-364.5	18	2.07154931	0.47823203	11.1945942	#VALUE!	38.3980555	0.02324227	471	139030	73	59	<LOD	317767	15680

Figure 2. Assay results for G11-3552-44 (selected elements)

The elevated Cu, Zn, Sr, S and As values at the base Waulsortion indicates a web of enriched hydrothermal fluid flow along veins and faults. The fluid made contact with thick shale beds that trapped the enriched fluids at this horizon (364m-408m). This suggests fluid-driven alteration occurred alongside localised sulphide mineralization controlled by structural and stratigraphic attributes in the lithology.

Skills & Professional Development Gained

This process was extremely helpful in my career development; it showed me a route I can progress in post-degree and demonstrated the work needed to be an economic geologist in southern Ireland. It enriched me with the following.

Technical Skills:

- Advanced core logging & lithological identification
- Mineral identification, specifically sulphide and alteration minerals
- The use of geological software for data visualisation (leapfrog & stereonet generator)
- Advanced use of the GPS
- Geological history of the Bally wire area
- Drill Rig operation
- P-XRF use
- Vein vectoring and paragenesis

As well as Soft Skills:

- Teamwork & collaboration with geologists

- Effective communication of technical findings to colleagues
- Project management and time management skills in a professional environment

I believe this placement alone has convinced me that economic geology is the career I want to pursue.

Acknowledgement

This bursary helped establish my knowledge in economic geology as well as insights as a geologist in the working field. It also taught me many characterises about the job market and how to maneuverer carers as a geologist. It supported my development in many ways that I wouldn't have imagined a few years ago.

A big thank you to Hazel Prichard's Family, the funding team and the Hazel Prichard organization.

Financial Statement

Travel to/from Limerick (3 round trips) €300

Commuting costs €100

Accommodation near core shed (6 weeks) €2000

Subsistence costs €1200

Total EUR €3600

Total GBP £3000