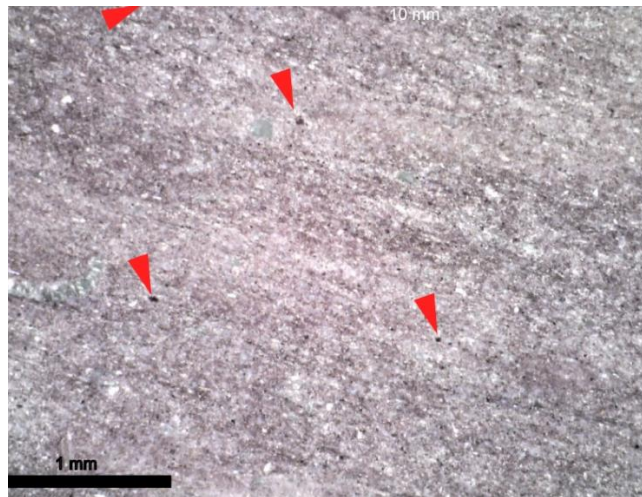


# VALENTIA SLATE, VALENTIA, CO KERRY, IRELAND

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## Laboratory Report on Material Analysis



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CARRIG  
conservation international

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## EXECUTIVE SUMMARY

This report was commissioned by Dr Aidan Forde of Valentia Slate Company Ltd, Valentia Island, County Kerry. Valentia Slate has a history of supplying excellent slate for roofing purposes and Valentia Slate was used on some iconic buildings in London in the early to mid- 19<sup>th</sup> century. This particular study concerns the testing of Valentia slate from the quarry for the presence of pyrite. Full geological analysis is available on Valentia's web site.

The climate plays a big part in the performance of roofing slate as they are a natural material. Some components react differently in different micro-climates. Metallic sulphides (e.g. iron pyrite or "pyrite") will expand and contract with the rise and fall of temperatures ranging from 0 to +40; this movement then allows voids to form where water will lodge. In colder cycles the water will freeze, causing physical forces to the surrounding materials, and in more temperate weather atmospheric oxygen and water will react with the iron content, resulting in corrosion jacking to its surrounding components. Later in the process, as the metallic sulphides expand to sometimes double their original size, they pop out, leaving a void which can quickly result in perforations and allow water to penetrate

A second side effect of metallic sulphides to the surface of a slate is the unsightly rust staining that occurs; this, as it cascades from the offending point, runs like tears ever widening over distance. If a slate is high in carbonates, this is another component for concern, as largely they are water soluble and with high rainfall will dissolve and reduce the thickness of the slate and in turn the protection to underlying metallic sulphides, ever increasing the decay mechanisms. If carbonates are unevenly distributed across an individual slate this can be more detrimental as high concentrations will attract higher volumes of water from the surrounding low porosity material and will dissolve more quickly. A high interstitial content, veins or nodules of carbonate, when dissolved, will undermine the structural integrity of a slate.

Colour and density of the material is also important: many grey slates fade in natural sunlight and in time turn a paler grey colour. Density determines the hardness and structural integrity of a slate product.

Most of the slate supplied into Ireland is from southern Europe and many contain high levels of both metallic sulphides and carbonates so one must be careful to evaluate the supply source of natural slate. Welsh slate on the other hand is a good product. Valentia Slate is an excellent product and is totally devoid of metallic sulphides, is low in carbonates and its apparent density of 2810 kg/t and an open porosity of 0.2% outperforms most other slates on the market.

## STANDARDS

The BS EN 12326-1 Slate & Stone Products for Roofing sets out the conformity requirements which are in the main established against a set of tests described in BSEN 12326-2. Under the rules for writing European Standards.

## 1 INTRODUCTION

This report was commissioned to establish the pyrite content of Valentia Slate - a large sample was supplied to the laboratory from the quarry on Valentia Island. A smaller sample was created from the larger sample for the purposes of the analysis and the details are shown in Table 1 below.

Lab Number	SAMPLE	DESCRIPTION
1	Valentia Slate	A sample of Valentia slate 40 x 15 x 10 mm, cut from a much larger sample was used for the purpose of the analysis

Table 1. Description of the sample of Valentia slate

This report consists of 5 sections, an Executive Summary, an Introduction, Macroscopic Description of Samples of Slate, Microscopic Analyses of Samples of Slate, and Conclusions.

## 2 MACROSCOPIC DESCRIPTION OF SAMPLES OF SLATE

The sample of slate was inspected under a low powered stereomicroscope.

1. Valentia Slate. The sample was examined both on cut and naturally fractured surfaces. Pyrite was not identified and the slightly purple colour of the slate on the fracture surfaces (Munsell 10R1/2) suggests that any iron present is in the form of haematite.

## 3 MICROSCOPIC ANALYSES OF SAMPLES OF SLATE

A plaquette, suitable for production of a thin section, was cut from the sample using a diamond saw, and was cold mounted on a glass slide, reduced in thickness to 30µm and polished. The polished thin section was examined in both transmitted and reflected light using a conventional petrographic microscope with a reflected light source and with Dinolite digital microscope. Illustrations were composed in Adobe Illustrator.

Sample 1 Valentia Slate (Figure 1): The thin section shows silt and clay grade silicate minerals. The section was systematically scanned in transmitted light to identify any opaque grains that could have been pyrite (Figure 1a). The opaque grains were then observed in reflected light (Figure 1b). None of them exhibited the high reflectance and characteristic colour of pyrite.

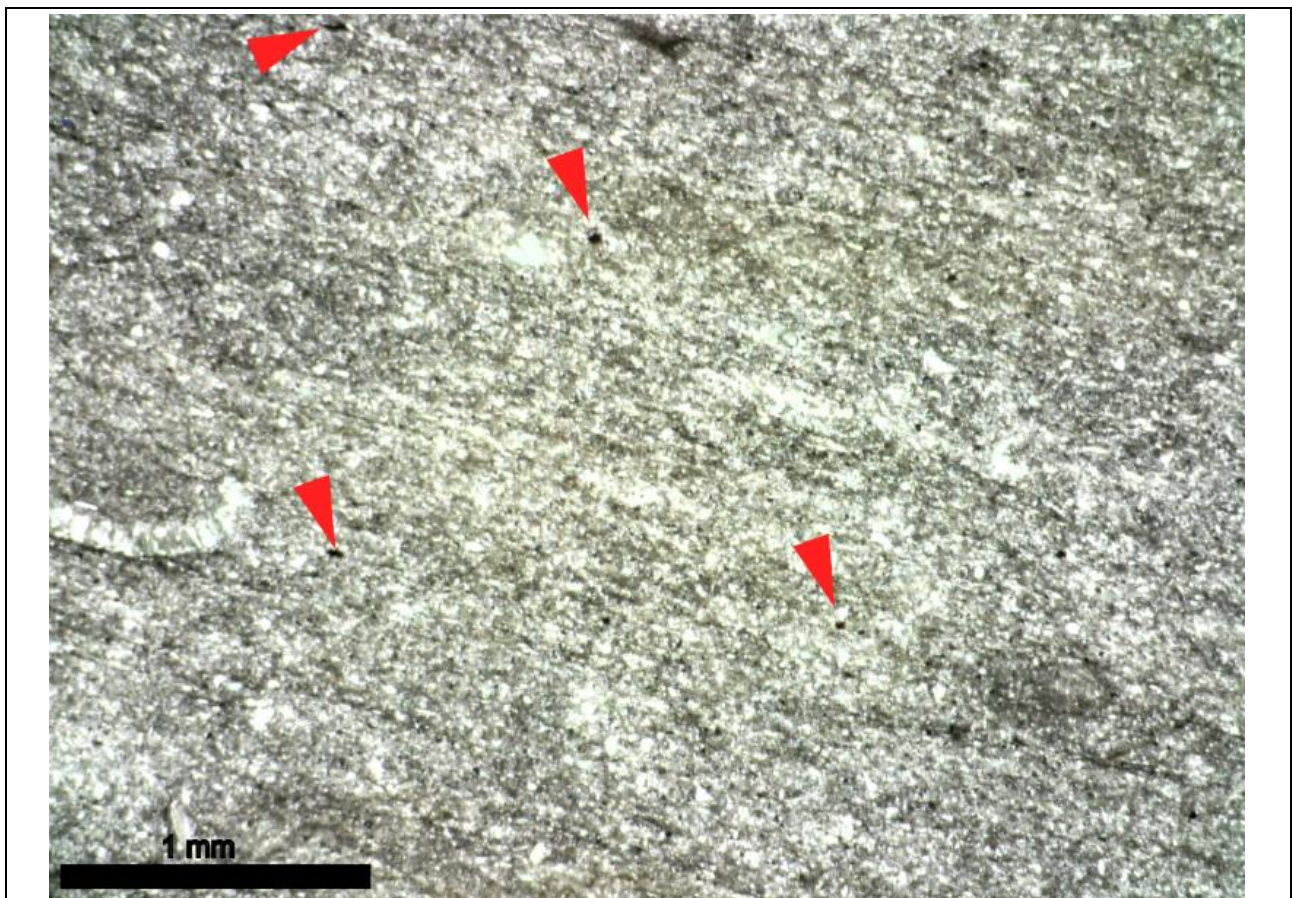
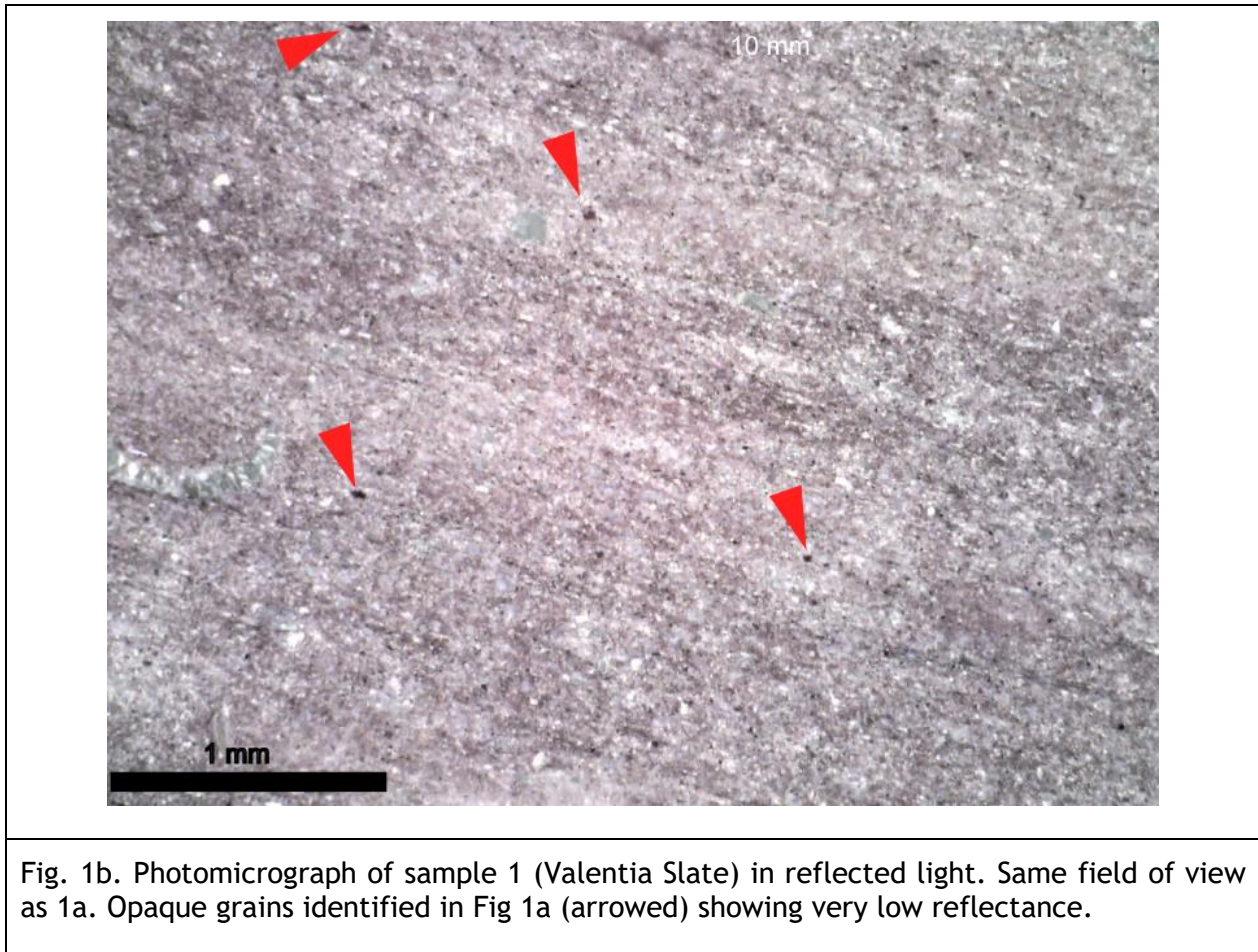


Fig. 1a. Photomicrograph of Sample 1 (Valentia Slate) in transmitted light. Examples of opaque grains arrowed.





#### 4 CONCLUSION

Following much testing of Valentia Slate by Sandberg's and Trinity College Dublin Geology Department there is no doubt that Valentia Slate is an excellent product for multi-purpose use in the construction industry. This includes load bearing and non-load bearing applications.

As a roofing slate it was used extensively in the 19<sup>th</sup> century across many countries but is best known for supplying paving and roofing slabs to the Houses of Parliament, London, Westminster Abbey and many other iconic buildings in London and across Europe.

The quarry closed in the early 20<sup>th</sup> century due to a rock fall, it reopened in the late 1990's for minor extraction and in 2018 the present owner extended the extraction and production facility to now include the potential for large scale product development.

Valentia Slate as a roofing slate is highly recommended.