South Wales RIGS Group Site Record
RIGS Description

SECTION A

General	South Wales
Site Name: Pwlldu Bay	**File Number:** Site_MineScan_5
RIGS Number:665	**Surveyed by:** Russell Society
Grid Reference: SS 5760 8700	**Date of Visit:** 24th July 2011
RIGS Category: Scientific	**Date Registered:**
Earth Science Category: Mineralogical	**Owner:** Unknown **Planning Authority:** Swansea City Council
Site Nature: Open beach, pebbles and sand	**Documentation prepared by:** Russell Society
Unitary Authority: Swansea City Council	**Documentation last revised:** 23rd Jan 2012
OS 1:50,000 Sheet: 159	**Photographic Record:** Attached
OS 1:25,000Explorer Sheet: 164	
BGS 1:50,000 Sheet: E247	

RIGS Statement of Interest:

Pwlldu Bay is proposed as a RIGS on account of the occurrence of the uncommon mineral wavellite in pebbles on the beach.

Wavellite has been described as an “uncommon but locally abundant mineral” (Tindle 2008). There are three such “locally abundant” localities in England and only one in Wales, namely on Gower (four key localities) with Pembrokeshire (two key localities).

Within the area of the South Wales RIGS project, ie on Gower, only two of the four key classic localities are both accessible and have wavellite that can still be found. As these two occur in contrasting geological environments, both are recommended as RIGS; they are Pwlldu Bay and Cil Ifor Top (qv).

In recent years, other rare minerals have been recognised associated with wavellite from this beach, namely cacoxenite, crandallite and varisicite.

At Pwlldu, the wavellite occurs in some of the occasional chert pebbles on the beach. The host to this assemblage is considered to be the Carboniferous Limestone as seen at outcrop in the cliffs to the west, particularly in old quarries.

Bevins and Mason (2000) highlighted other features of interest around the Bay as part of their RIGS recommendation, including the “regional nature of haematisation and MVT calcite-baryte veining across the South Wales limestone outcrop”, also “karstic aragonite flowstone” in situ at the western end of the beach.

Geological setting/context:

Pwlldu Bay is noted for the occurrence of wavellite in some of the pebbles on the beach. Most of the pebbles are of Carboniferous Limestone, but some are of chert (including masses of brecciated chert), within which the wavellite occurs as green to white radiating aggregates up to a few mm in diameter. The chert pebbles can be found anywhere on the beach, in both the storm beach at its upper end and the lower part which is more affected by the tide.

On the site visit, as on previous visits, the chert pebbles were not very frequent, but with a keen eye and patience wavellite bearing pebbles are still to be found. They usually need to be broken open to see the full extent of any wavellite present.

Wavellite, a relatively uncommon mineral, is known over quite an area in Gower in Carboniferous sedimentary sequences, including the top of the cliffs just to the west-south-west of the Bay, which were formerly quarried. It is thought that the pebbles in Pwlldu Bay may have come from material derived from these quarries, where there is mention in old documents of the wavellite being associated with “rottenstones” towards the top of the Carboniferous Limestone sequence, although this provenance is not proven.

The quarries at the top of the cliffs are usually referred to as “Pwlldu Head” although they are actually around 500m north of the Head, about 300m west-south-west of the west end of Pwlldu Bay, estimated at SS57228682. Visited in 1998, this site was overgrown, difficult to find and difficult to access, however some wavellite was found. In 2001 (Plant and Jones) it was described as “no longer accessible”.

Bevins and Mason (2000) extended the area of their recommended Pwlldu Bay RIGS site to cover the wavellite occurrences north of Pwlldu Head. However, given that these are now inaccessible, it is difficult to make a case to extend the RIGS area to the west of the Bay.

At the other wavellite occurrence recommended for RIGS status, Cilifor Top, the wavellite occurs in sandstone in Millstone Grit, a quite different host rock to the Pwlldu Bay wavellite.

In the pebbles on Pwlldu beach, in recent years other rare minerals have been recognised associated with the wavellite, namely cacoxenite, crandallite and variscite; these minerals have only rarely been reported from the other wavellite sites.

Wavellite is a basic hydrated aluminium phosphate. Although Plant and Jones (2001) attempt to give a synopsis of how it might have formed here, there has been no specific research on this mineral on Gower and further work is indicated.

References:

BEVINS, R E and MASON, J S. 2000. Results of a mineralogical site survey of Glamorgan and Gwent compiled by the National Museums & Galleries of Wales.

Welsh metallophyte and metallogenic evaluation project, CCW

DEAN, A and COTTERELL, T. 2003. Cacoxenite and crandallite from Pwlldu beach, Bishopston, Gower, Swansea, South Wales: the first Welsh occurrence, J Rus Soc vol8 pt 1, p30-32.

Mineralogy of Wales website (ongoing) Amgueddfa Cymru – National Museum of Wales www.museumwales.ac.uk/en/mineralogy/database/

PLANT, S. 1998. The Gower Peninsula, South Wales. Russell Society Newsletter number 32, April 1998, p21-23.

PLANT, S P and JONES, I E. 2001.Wavellite and variscite on Gower, Swansea, South Wales, J Rus Soc vol 7 pt 2, p79-81.

TINDLE, A G. 2008. Minerals of Britain and Ireland, Terra Publishing, p529-531.

PRACTICAL CONSIDERATIONS:
Please score Accessibility and Safety Red Amber or Green

Accessibility:			X
Comment: Can be reached by public footpath from several directions			
Safety:			X
Comment:			

Conservation status:

AONB. This part of the Gower coast is understood to be an SSSI for its coastal morphology

OWNERSHIP/PLANNING CONTROL:

Owner/tenant: Unknown

Planning Authority: Swansea City Council

Planning status/constraints/opportunities:

AONB. This part of the Gower coast is understood to be an SSSI for its coastal morphology

CONDITION, USE & MANAGEMENT:

Present use: Open public beach

Site condition: Excellent, pebbles and sand

Potential threats: Overcollecting?

Site Management: Periodic check for the presence of chert pebbles. More general beach maintenance is presumed to be ongoing by other bodies?

SITE DEVELOPMENT:

Potential use (general):

Potential use (educational): Good site for those interested in wavellite and the associated minerals, and their significance: little has been researched on this aspect of the wavellite.

Other comments:

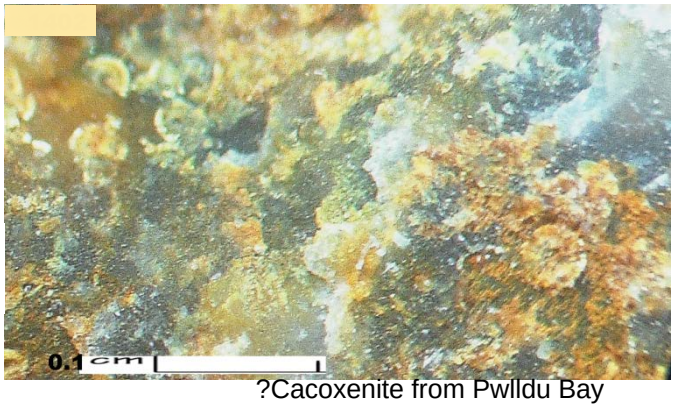
It is generally considered that the best time to visit the beach is after winter storms, when the pebbles have been redistributed and new pebbles have perhaps been washed up the beach. However, one cannot but wonder if this is a limited resource and that collecting is slowly diminishing it.

Pwlldu Bay, looking west, mid tide, 1998.
(The quarries north of Pwlldu Head can be seen on the left)

The storm beach, 2011. View south-east on left, view north on right

Wavellite from Pwlldu Bay
(further photos of wavellite and associated minerals can be found on the Mineralogy of Wales website)

Field of view 7cm



?Cacoxenite from Pwlldu Bay

GCR REVIEW OF METAL MINES AND MINERAL SITES in GLAMORGAN/GWENT
SITE CITATION

SITE NAME: Pwlldu Bay
MINESCAN REF No: OC 5

1:50000 OS map no Landranger 159
1:25000 OS map no Outdoor Leisure 10
NGR: SS 576 870

LOCATION: Gower Peninsula, South Wales
TYPE of SITE: Coastal exposures and storm-beach

SITE SCORE: 210
RANKING: RIGS

SITE INSPECTION:
DATE: Jan 2000

SURVEYED BY:
J.S. MASON for Dept of Geology, NMGW

RIGS STATEMENT OF INTEREST:
Pwlldu Bay is the best remaining site at which to study and collect samples of wavellite mineralisation, with rare associated variscite, ocurring in Carboniferous cherts and sandstones. Although both species (and particularly variscite) are hard to find in blocks along the storm-beach, some fine specimens have been collected. This type of mineralisation is common on the Gower Peninsula, but has only been studied in much detail relatively recently. Additionally, exposures of Carboniferous limestone in the bay reveal the regional nature of hematisation and MVT calcite-baryte veining across the South Wales limestone outcrop.

GEOLOGICAL/MINERALOGICAL DETAILS:
GEOLOGICAL SETTING AND PRIMARY MINERALOGY:
The Carboniferous of the Gower Peninsula is here represented by a Lower to Middle Carboniferous sequence of limestones passing up into cherty facies interbedded with sandstones and shaly rocks. The cherts outcrop high on Pwlldu Head, where the limestones were formerly quarried. Exposures, however, are overgrown and obscured by slipped material. Fortunately, similar rocks, some representing quarry spoil, make up much of the large storm-beach at Pwlldu Bay. Exposures either side of the storm-beach reveal limestones which are locally hematised in the typical South Wales pattern, with small goethite concentrations in places. Veins of calcite and pink baryte occur in places and are well-exposed. Karstic aragonite flowstone occurs *in situ* at the western end of the beach, and is common in the beach itself. Subangular blocks of grey chert and brecciated sandstone carry wavellite as open-space join and cavity fillings, forming attractive white to sea-green spheres exceptionally to >20 mm. Early quartz is sometimes present. The wavellite rarely includes minute (1-2 mm) spheres of less vitreous, silky-white variscite. These are more frequent in the sandstone breccias.

GEOLOGICAL/MINERALOGICAL DETAILS (CONTINUED)

SECONDARY MINERALOGY:

Limonite is common in the sandstone breccias; its precursor is uncertain. Malachite and cuprite may be found on the storm beach, but the vescicular matrix is actually waterworn copper-smelter slag, and unrelated to the natural processes causing the interesting mineralisation for which the site is highlighted.

PRACTICAL CONSIDERATIONS:

ACCESSIBILITY:

The site is reached by a pleasant walk from Bishopton (car parking may be awkward in the height of the holiday season), *via* a choice of public footpaths.

SAFETY:

There are no unusual safety factors here and it can be treated as a standard coastal site.

CONSERVATION STATUS:

The site continues to produce wavellite specimens. It is best visited after winter storms have turned the pebbles over to reveal new material: in any case early in spring it is quieter and parking easier, so this is an advantageous time to visit.

RECOMMENDATION:

A useful addition to the RIGS network; the site is another example of this type of mineralisation which is also very well-developed in northern Devon, for instance at the type locality for this type of mineralisation at High Down Quarry GCR site.

RIGS site as proposed by Bevins and Mason (2000). It is now recommended that this be restricted to Pwlldu Bay