OREsome NORTH PENNINES PROJECT
Guidance notes on geological/mineralogical recording

Prepared by Brian Young – November 2016

WELCOME & DON'T PANIC!

Thank you for volunteering to join this project, and in particular thank you for taking an interest in the geological aspects of what promises to be a useful and hopefully very enjoyable programme of work. I very much look forward to working with all volunteers in the variety of tasks we will be setting ourselves. The project organisers do not expect volunteers to be trained or expert geologists, archaeologists or ecologists, so please don't be put off by repeated references to these - ologies!

As you may already appreciate, all of the topics we will be exploring have much to offer and can be extremely rewarding even if you have no formal training or experience in those fields. In particular, geology in all of its aspects is an exciting and rewarding pursuit, and one of the most accessible of all the natural sciences, where the interested amateur (I use the term 'amateur' here in its very best, and non-pejorative, sense) can still make valuable discoveries and contributions. It also has the huge advantage of taking us into the field to enjoy, and hopefully add to, the understanding of our natural and man-made landscapes in all their variety.

I hope we will all find this both enjoyable and rewarding.

In order to use our time to the best effect we might find the following guidance notes helpful. I realise that these might at first sight seem rather dry and prescriptive. That is certainly not their intention, but it is important to begin with a clear idea of our objectives and how we might best attain them. I stress they are for 'guidance': doubtless we will amend them between us as the project evolves.

INTRODUCTION

A key feature of this new project is its multidisciplinary approach to the recording, understanding and conservation of mining-related sites and landscapes within the Northern Pennine Orefield. In order to understand and conserve such sites fully three fields of interest are of fundamental importance. These are, in no particular order of importance, archaeology, geology and ecology. By adopting this inclusive approach the North Pennines AONB is breaking new ground: few if any similar attempts have ever been made in the UK to apply the full spectrum of relevant disciplines and interests in a project this sort.

Whereas the notes that follow are intended to serve as a guide to the geological element of the project, inevitably they will touch upon the other two main related areas of interest where relevant.

For the purposes of these notes 'geological' interest should be taken to embrace all features of Earth Science interest, including geology, mineralogy, landscape (geomorphology) and aspects of mining technology.

The sites to be considered all lie within the area known as the Northern Pennine Orefield. The essential features of this, together with introductions to its key geological and mineralogical features, have been outlined in a separate document (OREsome Geology Report No.2 A geological outline of the Northern Pennines).

GEOLOGICAL SUPPORT

As the geologist co-ordinating this element of the project I look forward to helping to investigate and interpret the geology of these sites with you the field. However, should you have any questions or problems over any part of the geology, whether something you read and need interpreting, or specimens that you need identifying, I am happy to discuss, help and advise on any aspect of these as the project progresses. I can be contacted by email (brian.young@hotmail.co.uk) or by 'phone (01434 682220).

A CLARIFICATION

Before outlining how we might proceed, let me begin by clarifying one important point. You may have seen, in some of the project proposals, that part of this project will be concerned with the 'geological surveying' of sites. This is rather an unfortunate and perhaps misleading expression, and one that may deter some from taking part. Geological surveying, or geological mapping, is a highly sophisticated and skilled process that involves gathering and analysing a huge range of field and other data, not all purely geological, and employing these to prepare a four dimensional interpretation of the range of geological features relevant to any area or site. This project does not expect its volunteers to embark upon any such task. Quite apart from the impracticality of attempting it, it is unnecessary for the purposes of the project.

The whole of the Northern Pennines is already covered by high quality geological maps at a variety of scales prepared by the world's oldest and most experienced state geological agency, the British Geological Survey. Although of various vintages, all of this mapping is perfectly adequate to serve the purposes of this project. More details of the available geological mapping are outlined in OREsome Geology Report No.2: A geological outline of the Northern Pennines.

SITE BOUNDARIES

Once a final selection of sites has been established it will be necessary to define the boundaries of those sites. Suitable base maps in appropriate formats will then be made available to the groups that will examine and record archaeological, geological and ecological features respectively.

Whereas each selected site will necessarily have a defined boundary, in some instances it may be appropriate for different fields of interest to examine and record only certain parts of that site, or in some instances to examine and comment upon areas outwith that formal site boundary.

NORTH PENNINE MINE SITES

A review and recording of mining sites in the Derbyshire Orefield is often cited as an example of the sort of work and output that might arise from the OREsome Project. This is certainly an impressive piece of work and may indeed be a useful model for us.

However, unlike the Derbyshire Orefield, in terms of geological and to a substantial extent mining information, our area has the benefit of an enormous technical archive upon which to base our work. This is chiefly in the form of a number of Geological Survey technical publications which deal in very considerable detail with the geology, mineralisation and mining activities within individual deposits and groups of deposits. As has already been noted, high quality geological maps are available for the whole area. Whereas 1:10 560 and 1: 10 000 scale geological mapping covers the whole orefield, maps at this scale are costly and for our purposes the readily available, and much less costly, 1:50 000 and locally 1:25 000 scale colour-printed maps will prove adequate. Geological Survey memoirs which describe the orefield's deposits (e.g. Cantrill et al, 1919; Carruthers and Strahan, 1923; Smith, 1923; Wilson et al, 1922: Dunham, 1952) were important early sources of information and, in some instances remain valuable sources of reference.

However, our area benefits hugely from the highly detailed work Dunham in the comprehensive Geological Survey Memoir – Geology of the Northern Pennine Orefield Vol. 1: Tyne to Stainmore (Dunham, 1990). This, the second edition of a work originally published in 1948, incorporates very detailed descriptions of all deposits and their background geology up to the time of going to press in late 1989. Whereas reference to this text, together with the published geological maps, will provide very substantial portions of the background geological information for many sites, other works referenced by Dunham (1990) and publications subsequent to 1990 will need to be consulted where appropriate.

SITE RECORDING

To achieve the greatest understanding of any site the process of examination, recording and reporting will fall naturally into three stages:

1. Desk study

This is an essential precursor to any field examination or recording.

It is expected that the project will acquire, if it has not already done so, a set of all relevant 1:50 000 and 1:25 000 scale geological maps, together with a copy of Dunham's 1990 Geological Survey memoir. These will be available to volunteers.

In addition, through my continuing research interests in the area, I possess a comprehensive collection of other relevant maps and publications and can access others, where necessary, via Durham University Library.

All relevant geological and related features depicted on published geological maps, Dunham's memoir and other sources, will be plotted on base maps of sites provided by the project. Dunham

(1990) provides eight figure grid references for most key geological and mining features described: many other published sources do likewise.

In recent years I have prepared reports on some Northern Pennine mine sites which include details of site geology comparable with those required in this project. I am content to provide copies of these, where appropriate.

An essential facet of this review is to record any existing conservation or protection issues that relate to the site's geological interest, e.g. whether the site is notified as a Site of Special Scientific Interest (SSSI) or Geological Conservation Review (GCR) site. These are important statutory designations with protection enforceable in law. Other non-statutory designations, e.g. County Geological Site or Site of Nature Conservation Interest status, overseen by the county councils and wildlife trusts respectively, should be noted. Regionally Important Geological and Geomorphological Sites (RIGS) are not known to be currently relevant in the Northern Pennines.

Scheduling at whatever level for protection for archaeological and/or ecological interest will, no doubt be noted by those concerned with recording and reporting on those fields of interest within the project. It is, however, important to share all of these designations between all interest groups during the conduct of the project.

I suggest that we will discuss between ourselves how we apportion responsibilities for these desk-based studies.

2. Field survey

In undertaking field visits all geological features noted from desk studies will be sought and, where possible, identified. Mindful of the passage of time (in some instances considerable) since the published descriptions were made, a record will be made of whether the described features remain visible, and if so comments made on their current condition. It is important to note any previously described features that are no longer visible.

Geological or landscape features visible at the time of the field visit, but not recorded on previous descriptions of the site, will be recorded in appropriate detail. Records will be made as annotations on the base maps provided by the project. Wherever possible, grid references to eight figure accuracy should be recorded for all such features. Wherever possible, such features will be recorded as photographs, with the dates, positions and orientations of the images clearly recorded.

Whereas photographs obviously provide a good record of the overall nature of features at any site, they may not always offer the best means of recording geological details (e.g. relationships between or within beds of different lithologies, geological structures or mineral textures). In such cases simple field sketches or diagrams should be used. Such sketches need not, indeed should not, aspire to high artistic merit, but should simply record, as simply as possible, all relevant relationships. A few lines will often suffice. Sketches of this sort are almost always preferable to photographs. Remember, photographs are not always the best way of recording such features.

Geological features to be recorded include any exposures of geological materials, including bedrock, superficial deposits or mineralised features. Landforms, e.g. gullies or trench-like forms that may

comprise natural or man-made features, spoil heaps, shafts and adits (with a note of orientation), should also be recorded.

In recording any such features it is vitally important to separate **description** of what is visible, from any attempts at **interpretation** of those features. For example, a gully-like feature should be recorded and described simply as such: any attempt to assign it a likely origin as a natural or man-made feature should be recorded separately. That the gully exists is indisputable: by what process it was created is a matter of interpretation which may be open to challenge as more information becomes available. Always remember, the countryside abounds in supposedly man-made features that in reality are nothing of the sort, in consequence of not subjecting them to rigorous and relevant expert scrutiny!

With spoil heaps it is important to note their condition, e.g. whether they are wholly or partially vegetated and by what proportions. Where their composition can be seen, the overall nature of the constituent materials needs to be recorded. Precise proportions are not necessary, but some indication of the included rock types and the nature of any included mineralised material is essential. A list of obvious minerals should be made together with a rough estimate of their relative proportions. Relevant details of the most obvious characteristics of included minerals, e,g, whether any included fluorite is colourless, purple, green or yellow, should also be recorded. Significant relationships of minerals one with another would be useful. So too would any records of unusual minerals.

The comments offered here for spoil heaps apply equally to accumulations of tailings or crushed rock from sorting and/or dressing operations.

To some extent the level of detail recorded here is dependent upon the experience and expertise of the observer. Whereas throughout our field work we will endeavour to introduce volunteers who may be unfamiliar with mineralogy to some of the area's more exotic species, the project is not intended to double as a course in field mineralogy! If in doubt about the identity of anything please collect a sample (remembering always to record where it was collected) and I'll arrange appropriate identification.

There is a potential useful 'spin-off' here. Despite the area's mines being crawled over by collectors over the years, it is remarkable how many new finds turn up when looking at such sites in any level of detail. Important finds are by no means always made by experienced geologists. I am aware of numerous important mineralogical discoveries in this country made by inexperienced, but interested, amateur observers simply being curious enough to recognise something as perhaps a little unusual. Within the last couple of decades the list of mineral species recorded from the Northern Pennines has grown remarkably, and is still growing. At least one such find in recent years enabled us to date very precisely the onset and precise temperature of Northern Pennine mineralisation – a valuable side effect of picking up an unusual looking lump of rock! Such finds are important and may prove publishable in their own right – perhaps your chance for claiming a place in posterity?!!

3. Site report

Having gathered and assimilated all available information on a site it will then be possible to provide a thorough and concise description and interpretation of the site.

In so doing the opportunity should be taken to highlight any factors of concern relevant to the site, e.g. whether a spoil heaps is threatened by stream erosion and, perhaps more significantly, whether this matters from a geological point of view.

In the event of interesting and/or important geological materials being recognised at a site, and if that site is perceived as being at risk from natural or man-made damage, recommendations might be suggested for possible rescue-collecting of the materials of interest, in collaboration with one or more appropriate institutions (e.g. museums or universities)

Suggestions for any improvements or remedial works that might preserve or enhance the geological interest of the site, e.g. for conservation of important interesting features, or for educational or research use, should be noted.

For the purposes of future monitoring, those features of importance, especially any that are perceived to be in any way vulnerable, should be highlighted and a strategy recommended for their ongoing review and reporting.

Suggestions for evaluation of a site's geological importance and the role of this in determining its future conservation and protection, arising from these studies, are discussed below.

SITE EVALUATION

As the project is primarily concerned with the protection of sites chosen for study, and mindful that this is intended to be underpinned by a multidisciplinary approach, in order to maximise the value of our geological input I propose that we employ an evaluation system for all sites. The purpose of this is twofold.

Firstly it is plainly important to assess, so far as is practicable, the overall importance of any site from a purely geological standpoint.

Secondly, it is important to inform considerations of that site's future in the light of its parallel interests in the fields of e.g. archaeology and ecology. In the world of site conservation it is not unknown for protection afforded by one field of interest to be erroneously interpreted as giving automatic protection to all associated interests. This is not so. The different fields of interest commonly differ very significantly in their aims and frequently are in obvious conflict one with another. It is no exaggeration to reflect that an otherwise apparently sound conservation strategy for a site's archaeological features may put its geological, and in some instances perhaps ecological, interests at real risk. Through its declared multidisciplinary aim, this project is uniquely placed to avoid these mistakes, examples of which abound in Northern England and more widely across the UK. By so doing the output of this project has the potential to be a fine exemplar of good practice to be followed by others.

It is important in determining a site's future, to establish comparative merits in **all** fields of interest. To cite a hypothetical example. If a site is recognised as merely one of a number of closely comparable sites of local archaeological or ecological importance, whilst being a unique site of national or international importance for its geological interest, it would plainly be absurd to compromise that geological importance in favour of its supposed, but obviously less valuable,

archaeological merits. I instance the relative merits of these fields of interest here in a purely arbitrary way for the purposes of illustration. It is equally possible that in other cases the archaeological interest and importance might perfectly reasonably outweigh the interests of the geologists and ecologists. If we are to attempt genuine conservation it is important to evaluate, so far as is possible, the relative merits in order to avoid conflict.

Accordingly, in the context of this project I suggest that we categorise the geological merits of the sites we review along the following lines:

HIGHEST PRIORITY: Sites of clear international importance, e.g. type locations for mineral species, or sites at which major geological features were originally described or interpreted.

HIGH PRORITY: Sites which at which the significant geological features present offer the best examples for illustration, study and research within the national (UK) context.

MEDIUM PRIORITY: Sites at which the geological features present, although of local significance, may be found at a number of other sites within the region.

LOW PRIORITY: Sites at which the geological features present although interesting, are widely present both within the region and beyond.

Clearly, here sites enjoy SSSI or GCR status this will be reflected in any evaluation we might offer.

I would venture to hope that the parallel archaeological and ecological reviews of these sites might adopt a similar approach to comparative evaluation.

CODA

As a tailpiece to these otherwise rather 'dry' notes, may I emphasize that they are not meant to be prescriptive, but are offered as a guide to how we might work together. Doubtless we will develop and adapt these ideas further as we go.

I repeat the project's thanks to you for volunteering and look forward to many happy and fruitful conversations both indoors and in the field in order to gain further understanding of a topic that we all enjoy.