

APPENDIX 1

**ABSTRACTS OF OTHER ORAL AND POSTER PRESENTATIONS
FROM THE
15TH EIG CONFERENCE, CARDIFF,
25TH-28TH JUNE 2008**

ENHANCING PREDICTION OF IGNEOUS INTRUSIVE ROCKS FROM HIGH-RESOLUTION GEOPHYSICAL SURVEY

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The Central Belt of Scotland is a region with a long history of coal abstraction by subsurface workings and open-cast mining. The presence of unrecorded minor igneous intrusions concealed beneath superficial deposits is a significant risk during coal abstraction.

A high-resolution airborne geophysical survey (Hi-RES) was acquired over part of Ayrshire, Scotland by the British Geological Survey. The geophysical data sets comprise magnetic, electromagnetic and radiometric data. A qualitative interpretation and selected modelling of the dykes from the magnetic data was undertaken. The region has experienced a number of phases of volcanic activity. Dykes of differing geological age can be distinguished by their contrasting magnetic character. The width of the dykes cannot be measured directly but an appraisal of dyke width can be obtained by modelling of the magnetic anomaly. Recognition of the dykes depends upon width, depth and magnetic characteristics. Dykes that are wide and shallow will be more readily identified than narrower dykes at greater depths. A Permo-Carboniferous dyke of 1 m width at depths of 5 m and 20 m should be detectable although probably not distinguishable at 100 m depth. Detection of dykes of Tertiary age would be similar. Volcanic vent rocks have a distinctive bipolar magnetic character that indicates their presence where previously they have not been mapped in areas where bedrock is entirely concealed beneath superficial deposits. Acquisition, interpretation and modelling of Hi-RES data would greatly enhance prediction of igneous intrusions in areas of coal abstraction.

NEW 3D SUB-SURFACE MODELLING TECHNIQUES FOR INVESTIGATING SAND AND GRAVEL DEPOSITS: AN EXAMPLE FROM THE BYTHAM RIVER TERRACE OF EASTERN ENGLAND

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We describe a study in which 3D electrical resistivity tomography (ERT) and 3D geological modelling, using GSI3D, were applied to the evaluation of a complex sand and gravel deposit. By combining these techniques we were able use high-resolution 3D ERT images to refine a 3D geological model of the site, which was generated in the first instance using only borehole data. We illustrate our approach using a case study from a quarry extension site at Ingham, Suffolk. The site comprises heterogeneous river terrace sand and gravel deposits of variable thickness, which are partially overlain by glacial till.

The bedrock consists of Chalk, the upper surface of which displays significant topographical variations. The Ingham 3D ERT survey provided a high quality ground/mineral model that revealed significant geological structures, such as channel features, which were not apparent from the borehole data alone. In retrospect, it is clear that a 3D ERT survey in the initial stages of site investigation could have reduced the number of boreholes needed for the resource assessment, and would have allowed boreholes to be targeted more effectively. The refined 3D geological model, which incorporated smaller scale features identified from the ERT data, provided a high-resolution 3D representation of the deposit from which overburden and mineral volumes could be directly determined. Furthermore, we have illustrated how surfaces such as 'bedrock' and 'base of overburden' can be exported from GSI3D in a format that can be directly imported into industry standard terrain modelling packages such as LSS.

THE DEVELOPMENT OF 2D AND 3D ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) FOR SAND AND GRAVEL DEPOSIT EVALUATION

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ERT is a ground imaging technique that can be used to visualise subsurface geological structure, groundwater levels and lithological variations. It is increasingly being used for environmental and engineering site investigations, but despite its suitability and potential benefits ERT has yet to be applied by the minerals industry to sand and gravel resource assessment and quarry planning. The principal benefits of ERT are that it is a cost-effective non-invasive method that can provide fully 3D spatial models of the subsurface at the site scale.

In this study we assess the suitability of ERT for UK sand and gravel deposit assessment. To this end we have reviewed the characteristics of deposits in terms of geological setting, thickness and heterogeneity to inform our survey design strategy. We have collated existing data on the electrical properties of UK sand and gravel, and have undertaken detailed geophysical studies at seven potential or active sand and gravel extraction locations in East Anglia and the East Midlands. Results from the field studies and previous investigations have shown that in all the cases considered, ERT has been an effective means of differentiating between overburden, mineral and bedrock. More specifically, this study has demonstrated that ERT is a powerful tool for sand and gravel assessment that can provide information of the thickness of overburden and mineral, and reveal quality variations within the body of the deposit. We believe that ERT will be most effective for complex deposits where significant lateral variations are difficult to identify using conventional drilling.

THE HEMERDON TUNGSTEN MINE – A NEW PARADIGM FOR THE UK MINERAL INDUSTRY OR WHAT?

JOHN COWLEY

In 1986 permission was given for the extraction of tungsten ore from Hemerdon in Devon on the edge of the Dartmoor National Park (although not in the Park) between Dartmoor and Plymouth. The proposal was for a modern open-pit mine with the disposal of waste on an adjacent area. Subsequently the price of tungsten fell and the operation stalled. The 'China' effect has re-invigorated demand and Wolf Minerals of Australia are progressing plans to bring the operation on line as soon as possible. The production from this one mine would make the UK the second largest supplier of tungsten in the World and the largest in the West. The author has been appointed to oversee progress through the remaining regulation stages of this development, which will be described.

The renewed interest in Hemerdon is a reflection of a global shift which may have significant impacts on the mineral industry of the UK. This new paradigm flows from:

- the global demand for resources as the BRIC and other countries develop.
- that the West, and particularly countries like the UK, will not (and indeed should not) be able to rely on supply from the BRIC and other countries for certain minerals.
- that the West, and particularly countries like the UK, will not (and indeed should not) be able to rely on 'dumping' supply problems on other environments.

The issue of concern is that the UK policy approach to a range of important industrial and metal minerals has relied, for at least the last 40 years, on the assumption that the market will supply (from somewhere else luckily). There was, therefore, no need to have an indigenous minerals policy. That approach may no longer apply, at least at the economically advantageous rates previously available, and the development of whatever 'USPs' we have, may be of importance in the economic stability of the UK. How we develop policy and balance the impacts are issues needing very serious consideration now: or perhaps not?

MINING IN NAMIBIA

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Namibia contains a wide variety of bedrock geology from Achaean to Jurassic, plus extensive Tertiary to Recent sediments of the Namib and Kalahari deserts. Major mining activity includes uranium at Rossing, gold at Navachab, small scale tantalum at Uis, fluorite at Okorusu, zinc at Skorpion and Rosh Pinah, and not least, placer diamonds in the area around Oranjemund. There are other small scale mining operations of dimension stone and a few other industrial minerals. This poster provides an illustrated overview of the mining assembled from visits made during March-April 2008 as part of the author's MSc course.

QUARRY RESTORATION AND AFTER USE OPTIONS

GEORGE ELLIOTT

Tarmac Limited

What is the public perception of the extractive industry? What is the real level of knowledge? A large proportion of modern Planning Conditions are directly or indirectly concerned with the restoration and long term management of land post-extraction. What is the industry's record on restoration and after-use? Have we told our story well enough to the public? Should the industry, as a whole, be more open and tell the public what we are achieving? What are we achieving? Do we have a story to tell? This paper gives two recent examples of works carried out by Tarmac – Midlands Area, and may well go some way to answering the questions posed.

Dene is a Carboniferous limestone quarry south of Matlock, Derbyshire and right on the edge of the Peak District National Park and also in very close proximity to the World Heritage Site of Cromford. The late 1990s found the quarry running short of consented reserves and with no real restoration plan to deal with the existing main quarry void. A plan was drawn up for extensions both to the north and south of the quarry. The plan included the removal of a previous quarry tip area and the use of these tipped materials to fill part of the existing quarry void and deliver a vastly improved final landform, blending into the Derbyshire Dales landscape. High value calcareous grasslands had been identified within the proposed northern extension. As part of the planning application proposals, Tarmac agreed on a programme of turf translocation. This work was undertaken and successfully completed within the initial development phases of the quarry extension. The illustrated paper will look at the techniques used in these innovative infill and translocation projects.

Bellmoor Quarry lies in the River Idle valley just north of Retford in Nottinghamshire. Extensive sand and gravel extraction has taken place in the surrounding area for many years and in 2002 English Nature (now Natural England) notified an area of over 300 hectares as the "Sutton and Lound Gravel Pits SSSI". A small un-worked deposit of sand and gravel was identified adjacent to the final phase of working at Bellmoor Quarry. This area lay within the area designated as SSSI. Discussions took place between English Nature, the Nottinghamshire Wildlife Trust and Nottinghamshire County Council to ensure that sand and gravel extraction within this part of the SSSI could be used as a positive SSSI enhancement and management tool. The paper illustrates this novel approach and shows how biodiversity and conservation gain can result from such progressive co-operation and partnership.

COST EFFECTIVE MULTI-PURPOSE WATER ENVIRONMENT MONITORING FOR AGGREGATE QUARRIES

TOBY GILL

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The Water Framework Directive (WFD) has major implications for the hydrological and hydrogeological monitoring requirements associated with both existing and proposed quarrying activities, placing particular emphasis on the ecological status of habitats and ecosystems that are dependent on groundwater and surface water regimes. Similar but different requirements for monitoring water quality and

water levels may be associated with other potential impacts, such as those on water resources, ground stability and the preservation of buried archaeological remains. All of these requirements are likely to become more detailed and potentially more onerous in the years ahead. In order to minimise the regulatory burden involved, and to minimise unnecessary duplication of effort, the work described in this paper has sought to develop a unified protocol for hydrological and hydrogeological monitoring that would enable all such requirements to be met through the implementation of a single, cost-effective, monitoring strategy.

The various regulatory and policy requirements are reviewed and case studies are presented relating to existing multi-purpose monitoring schemes associated with quarrying activities. Practicalities relating to the integration of differing requirements are discussed and a generic solution is developed which should allow for the optimal use of hydrological and hydrogeological monitoring networks whilst maintaining the flexibility to adapt to site-specific and unforeseen circumstances. The suggested protocol aims to optimise the ways in which monitoring data is not only collected but also reported, interpreted and shared amongst different stakeholder groups, so as to foster an enhanced, shared understanding of the inter-relationships between quarrying, natural processes and the natural, historic and built environments.

EXPERIMENTAL EVIDENCE FOR THE EFFECTIVENESS OF RECHARGE TRENCHES: MITIGATING THE EFFECTS OF QUARRY DEWATERING IN SAND AND GRAVEL DEPOSITS

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Artificial recharge is one of a number of mitigation options that can be used to reduce the extent of the 'drawdown' (i.e. artificial lowering of the water table) associated with quarry dewatering in sand and gravel deposits. This paper reports on two phases of experimental work to monitor the effectiveness of recharge trenches in controlling the extent and depth of drawdown within a typical floodplain sand and gravel deposit in southern England, prior to mineral extraction.

In both experimental phases, localised zones of dewatering influence were created by pumping from a temporary abstraction well, discharging (initially) into nearby watercourses. In each case, while the abstraction continued, some of the water was then discharged into different configurations of experimental recharge trenches to test the effectiveness of each one in reducing the drawdown. Lessons learned from the initial Phase 1 trial were applied to the design of the second phase of experimental work, which involved larger trenches and longer term pumping.

Comparisons between the different sizes, shapes and locations of trenches revealed a number of practical design considerations that are important in terms of optimising the performance, longevity and stability of recharge trenches. The research also helped to identify both the benefits and the limitations of numerical groundwater modelling in the design and predictability of using recharge trenches to mitigate the effects of dewatering. Most importantly of all, however, the experiments demonstrated that the technique of artificial recharge can be effective in both an operational sense (by returning a larger proportion of the abstracted water to the groundwater system) and in controlling the dewatering impacts to a sensitive feature to within acceptable limits.

MANAGING AGGREGATES – HOW BEST TO ENSURE ECONOMIC GROWTH IS NOT CONSTRAINED BY A SHORTFALL IN AGGREGATES SUPPLY?

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Aggregates are essential for creating, maintaining and enhancing our built environment and the infrastructure on which our quality of life depends. Without aggregates we would be able to build very little; they are the raw materials of the construction industry, which is an important sector of the UK economy. Adequate supplies of aggregates are also essential to the delivery of the Government's objectives of affordable housing, Sustainable Communities and major, high profile regeneration and construction projects, such as the Thames Gateway, the 2012 Olympics and Crossrail. However, the distribution of resources suitable for crushed rock aggregates is determined by geology. Accordingly, in England these are concentrated in the north and west of the country whereas the largest demand centres are located in the south and east. As a result of this uneven distribution of resources, a system of "managed aggregates supply" has existed in the UK since the 1970s. This is intended to ensure that sufficient quantities of primary aggregates are provided by resource-rich areas for the resource-poor areas that require them. Research recently undertaken by the British Geological Survey on behalf of the Department for Communities and Local Government has examined how well the current managed aggregate supply system works and whether it is still appropriate in the 21st century. Alternative options for ensuring that society's need for aggregate minerals are met have also been assessed in this study.

NATURE AFTER MINERALS: WORKING TOGETHER FOR EXCELLENT RESULTS

ALICE HARDIMAN

The RSPB, Sandy

Mineral sites are ideal places to create many types of wildlife habitat, from heathlands and grasslands to wetlands and woodlands. Across England, mineral sites offer the potential to exceed Government targets for the creation of many priority habitats in the UK Biodiversity Action Plan (UK BAP). Many excellent examples of important habitat already exist. Some of these are the result of active restoration, and others are historical sites where nature was left to take its course. Important lessons can be learnt from both. When compared to conventional methods of restoration, such as to agriculture or forestry, best-practice techniques for habitat creation are less well established. Knowledge and expertise is scattered, and there is a need for a 'hub' to bring all this information together and ensure it is readily available.

In October 2007, Natural England and the RSPB formed a partnership called the Nature After Minerals programme. Since then, the partnership has been working closely with industry and mineral planners aiming to support and facilitate delivery of more priority BAP habitat that is appropriate, high-quality and sustainable. One of the core activities of the programme is to collate information on restoration techniques involved in the creation of high quality wildlife habitat on mineral sites, and use

this to generate best-practice advice. This paper will look at how the Nature After Minerals programme is working with others to achieve this, and look at how best-practice advice is being disseminated to key audiences.

CASE STUDIES OF THE USE OF A WHOLE-SITE FIRST-ASSESSMENT TOOLKIT FOR COMBINED MINERAL RESOURCE AND ARCHAEOLOGICAL ASSESSMENT IN SAND AND GRAVEL DEPOSITS

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This ALSF-funded project has created an evidence base to demonstrate the advantages of integration of first-assessment ground investigations for both mineral assessment and archaeological evaluation, using a combination of rapid survey methods. Developing technology is producing novel, precise, densely sampled data through airborne survey (notably LIDAR and hyper-spectral methods) and ground-based follow-up using a multi-sensor geophysical survey platform. The advantage of this approach is the ability to cover large areas and assess the different data sets rapidly, providing information early in the development cycle to mitigate the impact of mineral extraction on the historic environment. Furthermore, the detailed early assessment of a site allows issues such as geodiversity, habitat, and maintenance of soil function, flood risk, and groundwater resource to be addressed in the interests of both planning authority and developer.

Two sites in the Trent valley, UK, have been used as case studies. Each has a combination of sand and gravel mineral resource and archaeological remains which have been proved by conventional direct sampling. All available existing data sources such as surface mapping, topography, geology, conventional aerial photography, and direct sampling have been compiled into a GIS database. Lidar, hyperspectral imaging and multisensor surface geophysics were acquired and added to this database. An overview of the data compilation will be presented contrasting some of the insights provided by the combination of densely sampled remote sensing data, in comparison to what might be revealed by a more conventional assessment, and to the established features of each site.

UK GLASS SAND: WHERE ON EARTH WILL IT COME FROM? A 2020 VISION

ALAN REYNOLDS
Consultant

Although the end is not yet nigh, we can now visualise a time when some current sources of UK glassmaking sand will no longer be available. Large resources of potential high quality glass sand are known at Blubberhouses in Yorkshire and in Cheshire, but Scotland probably contains the largest known in the UK, at Loch Aline, in Fife and in the Lothians. Are these

known reserves and resources of the right quality? Can they be developed and the products delivered to the glass industry with quality and prices comparable to those ruling today? Or, will the industry have to accept higher prices and/or lower quality? Will planning legislation and environmental factors allow these deposits to be developed or will there be too many restrictions placed on them to be operated economically? What of the logistics? Transport and handling costs are major components of the final delivered price. Will UK glassmakers have to look instead to European sources, or will planning restrictions there also prove to be too restrictive for economic delivery, thus forcing them to look even further afield? Perhaps, after all, with increased recycling, the end is nowhere near nigh and in 2020 we will still be asking the same questions.

RESOURCES FOR THE FUTURE OF BRITISH COAL

DAVID RICHARDSON
Kier Mining

Coal mining in the UK has long been in decline, and in recent years a combination of economic and political influences have appeared to accelerate the process even to the point where the survival of the surface mining sector was under threat. But are things changing? Recent interest in underground mining, better economics, successful planning outcomes and new power station proposals could point to the re-emergence of the industry. The historical context of the industry will briefly be addressed but the main focus will be on: reserves, their constraints and the impact on future supply; demand in a competitive and regulated market; alternatives to “dig and burn”; the perception of coal in a carbon aware society; and, is the UK fit to produce?

FORENSIC HYDROGEOLOGICAL TECHNIQUES IN DEFENDING QUARRY OPERATORS

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WSP Environmental, Newcastle upon Tyne

Quarry owners and operators are faced with a plethora of environmental legislation with which to comply and, whilst there are benefits in keeping on good terms with regulators, tensions can arise from a lack of understanding between the parties involved. This is particularly the case when the issues at stake arise in relation to groundwater processes that are highly regulated yet often not well understood and, until a problem arises, proceed below ground and out of sight. For these reasons, defending claims in relation to groundwater pollution events alleged to have been caused by quarrying activity can be a complex issue for the hard pressed quarry manager.

Using a number of case studies, this paper presents examples of forensic techniques that have been used to defend quarry operators against legal action arising from observations of pollution incidents. In each case the nature of the claim is explored in terms of the site's historical and environmental setting and within this context alternative hypotheses are presented in conjunction with the use of forensic techniques to raise reasonable doubt about the allegations in question. In exploring pollutant linkages in groundwater, the benefits and pitfalls of applying naturally present ‘tracers’ such as major and

minor ions, as well as the use of artificial tracers such as rhodamine and fluorescein, are reviewed and offered as potential tools for challenging prosecution evidence.

INDUSTRIAL MINERALS FOR GLASS MANUFACTURE: THEIR GEOLOGY, PROPERTIES AND RESOURCES

PETER W. SCOTT

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High purity quartz, limestone and soda ash are the major raw materials for glass. Others include feldspar, nepheline syenite, and dolomite. Silica sand is found in several geological settings including shallow marine, fluvial, aeolian and glacial sediments, most of which are represented in the UK's resources. Post-sedimentation diagenesis also makes a major contribution towards creating high purity silica sand from an otherwise valueless raw material. Where sands are not available quartzites may be a source of silica. Critical properties for silica are size distribution, iron oxide and heavy mineral content. Often extended processing is undertaken to meet the required specifications in the UK. High purity limestone suitable for glass is readily available in the UK, it often being one product from an integrated operation. High purity dolomite is more restricted in its availability worldwide. Deposits of dolomite are inherently more variable than limestone. Although in Europe soda ash is produced as a chemical product, elsewhere it may be a natural resource, occurring as trona or as a sodium bicarbonate-rich 'hydrothermal' fluid. Feldspar sources are pegmatites or arkoses. There are abundant European feldspar resources, although their composition and quality varies widely. Nepheline syenite is a rare alkali-rich rock with two major commercial deposits worldwide. It requires processing to remove ferromagnesian minerals. The presentation will review the geology, properties and availability of these raw materials in the UK and make comparisons with resources elsewhere.

GEODIVERSITY AND THE AGGREGATES INDUSTRY

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Geodiversity is an important part of Britain's natural heritage, and contributes to our cultural and historical identity. It is often linked with geoconservation, but should be considered in its own right. Active and former quarries are important sites for viewing geodiversity, and there are opportunities for the quarrying industry to contribute to environmental improvements through recognising and promoting geodiversity at all stages of the life cycle of a quarry.

This review discusses the research and other activities involving geodiversity undertaken recently, particularly the projects supported by the Aggregate Levy Sustainability Fund (ALSF) through the Minerals Industry Sustainable Technology (MIST) and Sustainable Land-Won and Marine Dredged Aggregate Minerals Programmes (SAMP) of MIRO. Further

projects have been funded by the English Nature / Natural England Grant Scheme. MIST and SAMP projects have developed methodologies and procedures for recognising and managing geodiversity through demonstration in several areas, particularly those with a large number of active aggregate quarries. The projects have included:

- Undertaking comprehensive geodiversity audits at active quarries
- The preparation of a geodiversity audit and development of a geodiversity action plan for an area or region, along with some implementation
- The production and publication of attractive materials promoting geodiversity using different media (published books, DVD, internet sites)
- Establishing procedures for the development of geodiversity action plans by aggregate companies, known as cGAPs
- Development of a procedure for assessing the value of geodiversity at a geological site
- Assessing the issues associated with gaining access and safety at geological sites, particularly quarries

Future work in geodiversity should be directed, amongst others, towards addressing the uneven geographical distribution; supporting the undertaking of an audit before an action plan; promoting geodiversity so it is represented in local government; creating a land fund to purchase key sites; encourage other sectors of the extractive industry to develop action plans; and, assessment of the economic and social value of geodiversity.

COPING WITH THE ISSUES SURROUNDING FUTURE MARINE SAND SUPPLY IN SOUTH WALES: POLITICAL, ECONOMIC, ENVIRONMENTAL AND GEOLOGICAL ISSUES

IAN SELBY

Hanson Aggregates Marine Ltd. and

ANDREW BELLAMY

British Marine Aggregate Producers Association

Over 1.5 million tonnes of marine sand are supplied each year from the Bristol Channel to South Wales and SW England. This comes from eight dredging licence areas located along the whole length of the Bristol Channel between Chepstow and the Gower Peninsula. South Wales lacks terrestrial sources of natural sand and so almost all of the sand needed for the construction industry in the region comes from the seabed. This dependence on marine supply has been the case historically and is likely to continue into the future but the sources of the sand are changing.

The two traditional sources of sand for the region are the Holm Sands off Cardiff and the Nash Bank off Porthcawl. These sites have provided almost all the marine sand for South Wales and SW England for much of the last century. However, reserves on the Holm are approaching economic exhaustion and the extraction licence for Nash Bank will terminate in early 2010. Over the past ten years, several aggregate dredging

companies have applied for licence renewals and replacement dredging permissions to the Welsh Assembly Government and DEFRA's Marine and Fisheries Agency and, although some new licences have been granted, there remains a serious shortfall in the tonnage required due to difficulties and delays in the permissions process. Delays have arisen from the need to resolve environmental concerns, political opposition to dredging and the lack, until very recently, of a statutory regulatory framework for the industry.

The Industry has succeeded in locating substantial sand resources in the Bristol Channel which will secure supply for many decades to come, but this potential will only be realised if industry invests and regulators issue long term permissions for new licences, something which to date has failed to materialise.

A CASE STUDY: TOWER COLLIERY – THE SUCCESS STORY

TONY SHOTT

Director, Tower Colliery Limited

This paper will focus on the initiatives and determination of the private enterprise workforce and management in successfully developing and sustaining coal production and markets despite numerous geological and other technical setbacks from acquisition of the mine in 1994 through until premature closure in 2008.

A SHALE OR NOT A SHALE? INDEPENDENT EVALUATION FOR HMRC OF POTENTIAL EXEMPTIONS FROM THE AGGREGATES LEVY

LUKE SMITH

Capita Symonds Limited, East Grinstead, and

PETER DOYLE

Independent Consultant

The Aggregates Levy was introduced in 2002 with the aim of reducing the environmental impacts of quarrying by encouraging the use of alternative materials as aggregates. The legislation states that (alongside coal, lignite, clay and slate), 'shale' is exempt from the Levy, as are any mixed products where shale (or any other individually exempt material) constitutes more than 50% of the product.

Published literature provides numerous definitions of shale, but the definition used by HMRC is that proposed by Stowe (1981), in which shale is defined as a fissile rock comprising more than 50% siliciclastic grains (i.e. grains of sediment made of silica) and in which more than 50% of all grains are less than 63 µm in size (i.e. silt and clay particles). By contrast, the quarrying industry has commonly applied the term 'shale' to any poor quality fissile or 'flaky' material, regardless of its precise lithology, and this often leads to unjustified claims for the exemption of such materials from the Levy.

Where claims have arisen, HMRC requires independent evaluations to be carried out to determine the true lithology (or lithologies) involved and the relative proportions of each lithology within the material being offered for sale. This paper, based on evaluations carried out for HMRC by the authors, will

discuss examples from across the UK, where stockpiles comprising over 50% of basalt, limestone, sandstone, tuff or granite have been claimed as being exempt from the Levy.

FROM VERNEY TO REGIONAL TECHNICAL STATEMENTS: THE MANAGED AGGREGATES SUPPLY SYSTEM IN WALES - EVOLUTION AND ISSUES

IAN THOMAS

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This paper briefly examines the extent to which the ground-breaking Verney Committee's report into aggregates planning in 1976 has been actioned over the ensuing 30 years, particularly within Wales. Consideration is given to which of the Committee's recommendations are still valid and what further proposals might have been appropriate, had Verney been reporting today. Paraphrasing Verney's own first conclusion, the object was to maintain the supply of aggregates at acceptable environmental, social and monetary costs. Whereas the basic principles of sound planning may not differ appreciably if at all, many of the contexts have changed radically. The influence of European legislation, the status of the environmental agenda and the overseas influences on company priorities are just a few.

Following devolution, the Welsh Assembly Government has begun to develop its own distinctive variation of the managed aggregate supply system, including the creation of new Regional Technical Statements as a framework for mineral planning authority decision-making in North and South Wales respectively. The author has been closely involved in the preparation of these documents, which pose a number of interesting issues relating to environmental sustainability, that may have resonances and lessons for the United Kingdom as a whole.

ESTABLISHING THE NEED FOR SPECIALIST SANDS AND CLAYS IN BEDFORDSHIRE

ALAN THOMPSON

Cuesta Consulting Limited

The Cretaceous Woburn Sands Formation in Bedfordshire contains a diverse range of silica sands together with thin, intra-formational deposits of fullers' earth (bentonite clay). The Woburn area had, until the end of the last century, been a very important source of bentonite, particularly for use in the paper industry, with 'Woburn Clay' being successfully marketed for this purpose throughout the world. In October 2001, following an appeal by Steetley Woburn Bentonite against the refusal of permission for new reserves, claims that the Woburn clay was needed because it had 'unique' properties were challenged at public inquiry. The first part of this paper briefly reviews the issues involved in that case.

The second part of the paper deals with more recent studies relating to the silica sands which make up the majority of the Woburn Sands Formation. These are not used for glass manufacture but are used for an increasingly diverse range of specialist applications, as well as for general purpose construction aggregates, including both 'soft' building sands and concrete products. This diversity of end uses, each with very different 'need' and 'availability' arguments, poses

considerable difficulties for the Mineral Planning Authority (Bedfordshire County Council) in assessing the justification for new reserves and site allocations within its emerging Minerals Development Framework.

BUILDING STONES OF WALES - PAST, PRESENT (OR LACK OF) AND POTENTIAL

DAVID WILLE

Welsh Stone Centre

This paper examines the history and future prospects of the quarrying of building stone in Wales. The major types of Welsh Building stone are briefly described and related to the regional geology. Local, regional, national and exported historical use of specific types of stone are then discussed to illustrate the historical size of this former major industry. The paper will then examine how and why building stone extraction has contracted to its present size – not least because of the rise in imports of cheaper stone from abroad. Set against this background of a declining industry, consideration will be given to the few specialist dimensioned building stone quarries still operating in Wales, to discover how these operators are innovating technological developments and working methods in order to remain profitable and competitive.

Looking ahead, the paper will examine whether there is a bigger market to be developed (or recaptured) by indigenous Welsh dimension stone, and whether there may be any gaps in the market which could be filled by some of the larger aggregate quarries. Consideration will be given to the difficulties created by health and safety and other legislation as a barrier to using the manual labour required to handle stone in the working quarry area, and to possible alternative working methods and partnerships which would allow building stone to be worked without hindering aggregate production.