

Environmental Legislation and by product materials – The UK perspective

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Abstract

Fly ash, or Pulverised Fuel Ash (PFA) as its known in the UK, has a long history of usage in Britain as far back as the 1950's. It has been used in a variety of applications including as an addition to cement and concrete, for grouting mines and caverns, as a fill material for embankments, as a road construction binder, etc. Furthermore, the UK power generation industry has carried out a wealth of research over the years into new applications and the potential environmental impacts of the use of PFA. Because of this history and a complete understanding of the material, there has never been a reported environmental incident associated with the use of PFA. However, in recent years due to a number of European Directives and subsequent changes in UK law, problems have arisen in obtaining Environment Agency approval in a timely manner to use PFA. It appears the regulatory framework is working against the governments sustainability targets.

UK environmental legislation is empowered by regional 'Environment Officers', who effectively have control over whether a material is or is not used. There is a lack of a central direction, which means these officers have to make decisions without guidance. These officers may originate from many environmental disciplines and may have only minimal knowledge in the use of construction materials. As a result, many eminently suitable by-product materials will not be used for a particular construction application, because either they have been wrongly rejected on environmental grounds or approvals have been delayed for so long that naturally occurring materials have been used. Additionally, when materials become known as 'wastes', either by perception, by ruling of the Environment Agency or by law this adds considerably to the construction site problems. As a result there is increasing reluctance by construction sites to use industrial by-products such as PFA in some applications, due to the additional problems associated with environmental monitoring, liaison with the Environment Agency, raised awareness by the local public, etc.

The large number of European standards and directives that impact on the many so-called 'waste' materials, including PFA, how they are being implemented within the UK and the predicted increased environmental impacts are considered. The industry concludes that the way environmental legislation is being applied may be having a significant negative affect on the use of by-product materials like PFA. This is resulting in more naturally occurring materials being used to the overall detriment to the environment.

Fly ash usage in the UK

The first recorded uses of coal fly ash, or Pulverised Fuel Ash (PFA) as it's known in the UK, from power stations within the UK was in the 1950's when it was used as a fill material and as an addition to concrete. Subsequently PFA has been widely used for numerous applications and yet there has never been a reported environmental incident resulting from its use. A considerable amount of research has been carried out over the years with more than 10,000 papers being published about PFA. Figure 1 indicates the proportions of UK coal fired power station products used in construction products.

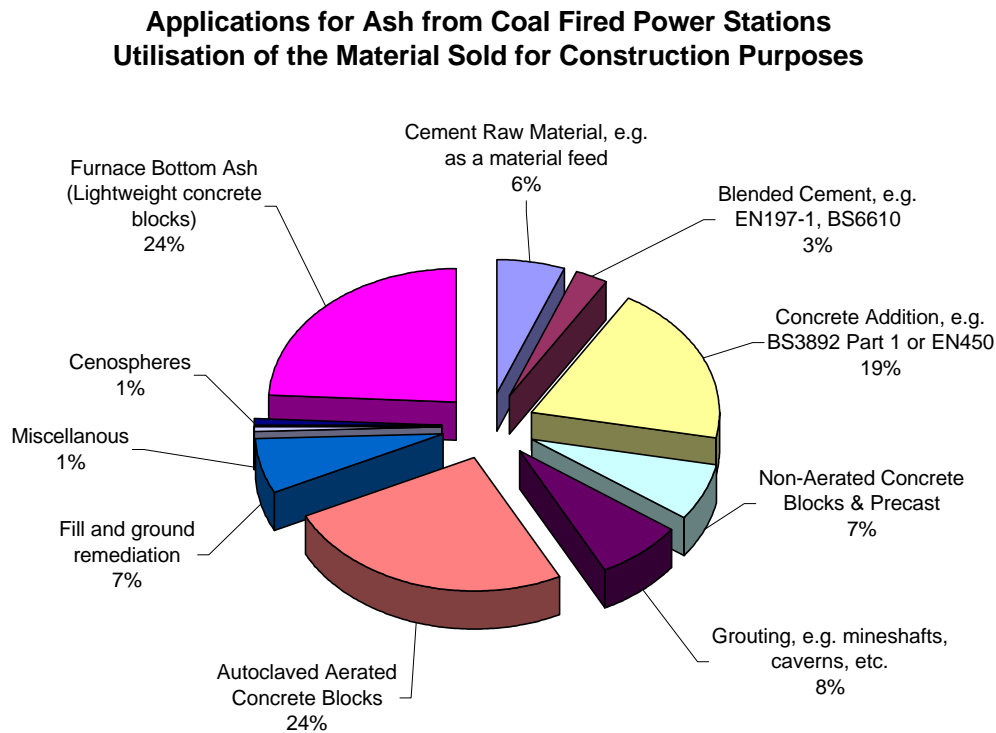


Figure 1 – UK usage of coal fired power station products - 2001

PFA is an inherently safe environmentally, for even though it contains a wide range of trace elements these are mainly held in the glassy matrix of the particles. Of the soluble material, the majority are water-soluble calcium salts, mainly calcium sulfate or gypsum – which is a naturally occurring material.

There are many environmental benefits from using PFA and the other products from coal fired power stations. It is estimated that some 1,000,000 tonnes of CO₂ emissions per annum and 3,200,000 tonnes of natural aggregates are currently avoided using these by-products. However, with the advent of numerous environmental European Directives and the associated UK regulations, utilising such by-product materials like PFA is proving ever more difficult.

European and UK Legislation

In the UK, many applications have been exempt from Waste Management Licensing under DOE Circular 11/94. This has actively promoted the use of by-products and recycled materials. However, the introduction of new European Legislation and the uncertainty over its interpretation in the UK has led to by-products being treated as 'waste' by specifiers, users and regulators as a precaution against legal non-compliance. Notwithstanding the fact, the DOE circular 11/94 is still a current document.

It appears that the key to whether a material is classified as a waste is simply whether it appears in the European Waste Catalogue and Hazardous Waste Listⁱ. Therefore, PFA is classified as a non-hazardous waste and as a result, the following regulations apply:

- 1 The Landfill Directiveⁱⁱ - this affects the control of PFA disposal at a number of power stations, which would be subject to the IPPC regulations.
- 2 The European Waste Framework Directiveⁱⁱⁱ
- 3 Drinking Water Directive^{iv}
- 4 Construction Products Directive^v
- 5 UK Groundwater regulations 1998 – these were introduced to protect groundwater from contamination.
- 6 UK Waste Management Licensing Regulations 1994 – for handling and disposing of the PFA.
- 7 UK Special Waste Regulations 1996 - the licensing system and procedures for disposing of special waste.
- 8 UK Carriage of Dangerous Goods Regulations – would have to be considered when taking the material to site.
- 9 UK Control of Pollution (Registration of Carriers and Seizure Vehicles) Regulations 1991 (as amended) (SI 1624).
- 10 UK Environmental Protection (Duty of Care) Regulation 1991 (as amended) (SI 2839).
- 11 UK Producer Responsibility Obligations Regulations.

Under the UK Environmental Protection (Duty of Care) Regulations, decisions as to whether a 'waste' material can be utilised are made by the Environment Agency on a case-by-case basis. Contractors wishing to use PFA have to submit their proposals for approval, which should include an Environmental Risk Assessment (ERA). Thereafter, the local Environment Agency officer will approve or disapprove of the use. There are at least 38 European standards relating to characterising waste materials, being prepared by TC292. A considerable proportion of these can be called upon by the Environment Agency to form part of the ERA document. As approvals are given on an individual basis a full programme of environmental testing could take a considerable amount of time and expense. Surprisingly, to date there are no national guidelines for the local Environment Agency officer and as many have not had any experience with PFA, this makes their task extremely difficult. Because of this system, this process can take a considerable period before an answer is forthcoming.



Figure 2 – Will the use of PFA of as a fill material become too difficult for contractors?

Even when approval is given there remain problems with appropriate licences and documentation. Clearly, the ‘waste’ should be transported using registered waste carriers. As the construction site is using a waste, in principal it should require waste licensing as a landfill site. The landfill regulations require continual monitoring of the disposed materials, leachates testing, etc. Experience to date suggests that only parts of these requirements are being applied and there lacks consistency.

The effects of these changes in Environmental Legislation and how they are being implemented on the utilisation of a useful by-product like PFA has lead to a reduction in use. The reason is the system is simply too complex, expensive and time consuming. The only alternative contractors have is to use naturally occurring materials that do not suffer from the blight of the Environmental Legislation. However, it is becoming clear that many natural occurring materials have significant levels of trace elements that are equally, potentially toxic.

It is known that approximately 100,000 tonnes of PFA in the last two years has been substituted by natural aggregates to date for these reasons. Should the use of PFA become too difficult, the resulting increase in the use of naturally occurring aggregate use could equate to 200,000 tonnes per annum.



Figure 3 – Reclaimed land using PFA – Llanelli, South Wales, UK

Conclusions

This short paper can only give an overview of the problems the application of emerging environmental legislation has on the use of by-products materials like PFA. Numerous other materials could fall into category of ‘wastes’ and similarly be affected by this complex legislation. Examples of such secondary and by-product materials would be iron and steel slags, bitumen, recycled aggregate, some admixtures, etc all of which could be affected. However, there is no evidence that PFA has caused any pollution problems.

We believe it would be more sensible to tackle the real sources of risk, such as pollution from cars and trucks, sewage discharges, nitrate contamination from fields, industrial chemical leaks, etc. We would question why is it necessary to apply draconian legislation to products that have a good environmental record?

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- i European Waste Catalogue and Hazardous Waste List, valid from 1 January 2002, ISBN 1-84095-083-8.
 - ii Council Directive 1999/31/EC on the Landfill of Waste.
 - iii Council Directive 75/442/EEC – The European Waste Framework Directive as amended by 91/156/EEC.
 - iv Council Directive on Drinking Water, 98/83/EEC – December 1998.
 - v Council Directive on Construction Products, 89/106/EEC – February 1989.