UNITED KINGDOM QUALITY ASH ASSOCIATION

10.1

# Technical Datasheet

# Complying with the Quality Protocol for PFA Grouting

PLEASE NOTE THE FOLLOWING PROCEDURE APPLIES TO PFA GROUTING CARRIED OUT IN ENGLAND, WALES AND NORTHERN IRELAND, E.G. IN THOSE COUNTRIES WHERE THE QUALITY PROTOCOL APPLIES. SCOTLAND'S ENVIRONMENT AGENCY (SEPA) HAVE THEIR OWN PROCEDURES.

*Note: This is the UKQAA interpretation of the requirements of the Quality Protocol for England, Wales and Northern Ireland. The UKQAA cannot accept any liability for any changes that may occur in the Quality Protocol or Regulatory Position taken by the Environment Agency - it is up to the user to ensure they have the latest information on the issue. Reference in the following text to the Environment Agency means either the Environment Agency for England and Wales OR the Environment Agency for Northern Ireland as appropriate.*

The requirements of the Quality Protocol (QP) "Pulverised Fuel Ash (PFA) - End of waste criteria for the production of pulverised fuel ash (PFA) and furnace bottom ash (FBA) for use in bound and grout applications in specified construction and manufacturing uses" result in PFA/fly ash being classified as a product. Care must be taken that the procedures as described in the QP are followed; otherwise this may result in the PFA/fly ash being considered a waste and ultimately result in a failure to comply with Duty of Care[i] regulations. This datasheet outlines the procedures required to demonstrate compliance for which there are two stages as follows;

## *Stage 1: The PFA to be used for grouting*

The Power Station should supply the PFA compliant with BS EN 12715:2000 "Execution of Special Geotechnical Works". The requirements of this standard are relatively simple, e.g. the PFA should be chemically compatible with other constituents and satisfy immediate and long term environmental requirements.

The Quality Protocol states that it may also be specified by the customer that the PFA is additionally compliant with BS3892 Part 3: 1997 "PFA for use in cementitious grouts" or BS EN13055-1 "Lightweight Aggregates for concrete, mortar and grout".

## *Stage 2: Carrying out the Environmental Risk Assessment*

The Quality Protocol requires a site specific risk assessment for each site to be carried out in accordance with BRE "Stabilising Mine Workings with PFA Grouts - Environmental Code of Practice, 2nd Edition, BR509". This document should be applied by the specifier/client/consultant/contractor as appropriate for the contract. While carrying out an environmental risk assessment may seem a daunting task, BR509 contains a three stage approach that simplifies this considerably;

**A Preliminary Risk Assessment procedure, Section 4 BR509**, is given which makes allowance for the size of the contract, the PFA being used and the local groundwater conditions. This requires a simple calculation of various source/path/receptor parameters resulting in a score for the contract. If this score is <=20 then the grouting may proceed. If the exact details of the PFA are unknown, then it is still possible to carry out the calculation using the PFA classification of V, see Table 4 BR509.

If a score of >20 is found then a **Simple Risk Assessment, Section 5 BR509,** has to be carried out. This requires knowledge of the leachates from the PFA, which would normally be available from the power station. If not, then the PFA should be tested. A calculation of dilution factors is carried out based on knowledge of whether the grout is above or below the groundwater table and the permeability and flow rate of the leachate. The resulting dilution factors of the leachate from the grout are then compared to the Water Quality Standard (WQS) in Table 8 or Environmental Quality Standard (EQS) as appropriate for the local conditions. *NB: There is a typographical error in this table - the WQS column is in fact in µg/l NOT in mg/l as stated*. If dilution is sufficient then again grouting may be carried out. However, if this assessment fails then a complex risk assessment shall be carried out as follows.

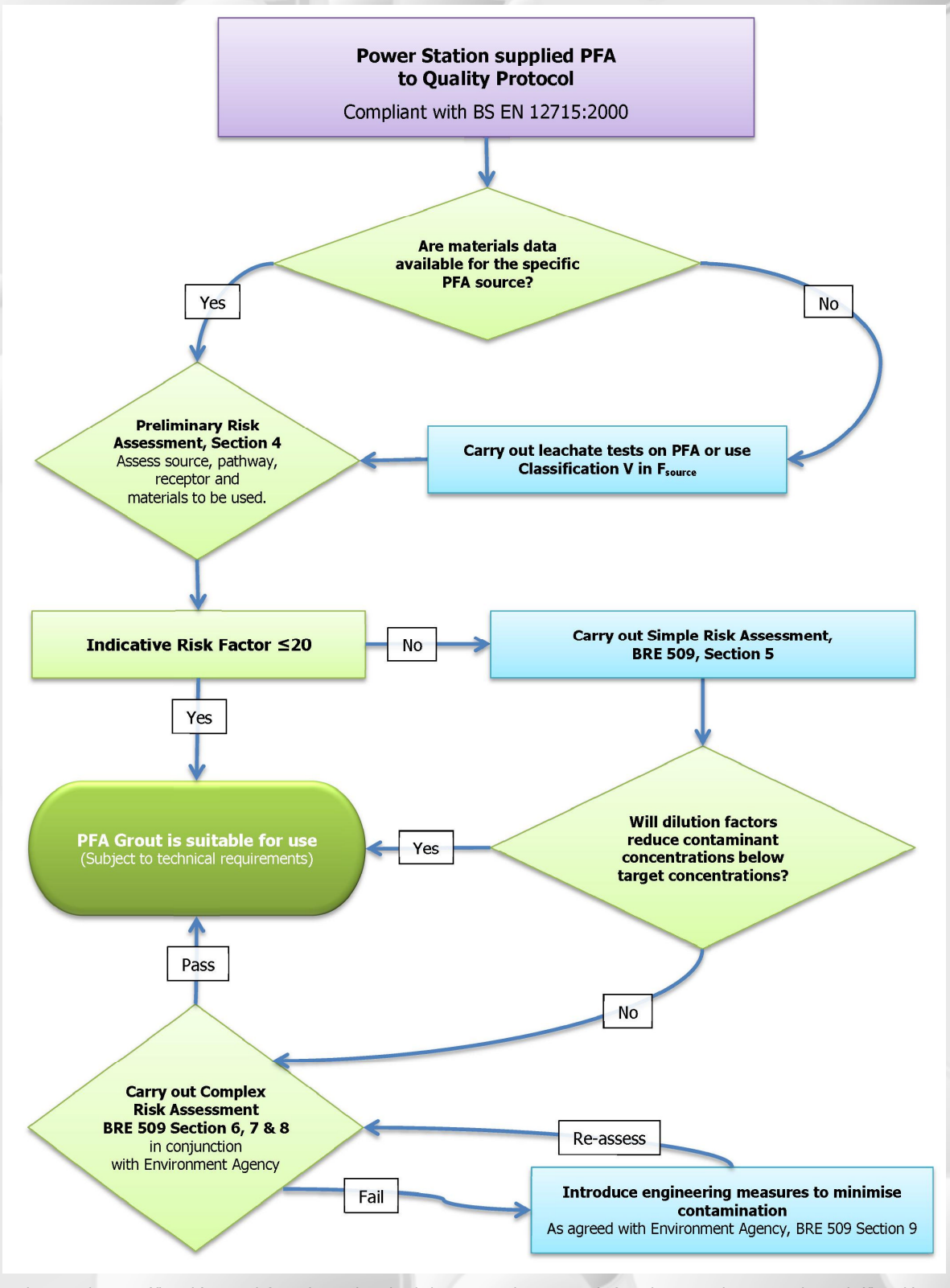
**Complex Risk Assessment, Sections 6, 7 & 8 BR509.** Here a full environmental risk assessment is required taking into account all the factors, such as the volume of PFA grout, the water table, groundwater quality, hydraulic gradient and conductivity, etc. This would normally be done in conjunction with the agreement of the Environment Agency's local officer. The grout mix design, the source and type of PFA (lagoon, stockpile or freshly conditioned), cement source, etc have a bearing on the results and may be adjusted to achieve suitable performance characteristics from the grout. Finally, if none of these result in an acceptable environmental risk scenario, engineering measures could be adopted for minimising the potential contamination of the ground water.

RED TEXT indicates involvement of the Environment Agency is required with this stage

## *Compliance*

If the above procedures have been followed exactly, e.g. the PFA is compliant with BS EN 12715, the appropriate preliminary or simple risk assessment has been carried out and it has been found to be acceptable, then grouting may proceed. Where the Complex Risk Assessment is proven to be necessary, this should always be carried out to the satisfaction of the Environment Agency's local officer. Records should be retained of the risk assessment for at least two years and the decisions made fully documented.

# Flow chart of assessment procedure




In general usage the term 'fly ash' is used for pulverized coal ash but it can also cover ash from burning other materials. Such 'fly ash' may have significantly differing properties and might not offer the same advantages as ash from burning pulverized coal. UKQAA datasheets only refer to PFA / fly ash produced from the burning of predominantly coal in power stations.





[i] "The Environmental Protection (Duty of Care) Regulations 1991"