

**Pollution Prevention and Control Regulations 2000**

**Environment Agency**

**SUBSTITUTE FUELS PROTOCOL  
FOR USE ON CEMENT AND LIME KILNS**

### Document Changes

Version	Date	Change
1	11 Aug 1999	Protocol issued
2	15 Nov 1999	Clarification issued on the monitoring requirements for dioxins, furans and PCBs.
3	21 Nov 2001	Supplementary note to SFP " <i>Tyres Protocol for use on cement kilns</i> "
4	27 June 2003	Protocol amended to reflect the implementation of the Pollution Prevention and Control regime and amalgamate revised procedures and guidance for determining applications for use of substitute fuels. Tyres Protocol consolidated back into " <i>Substitute Fuels Protocol</i> ".

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**SUBSTITUTE FUELS PROTOCOL**

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**FOR USE ON CEMENT AND  
LIME INSTALLATIONS**

**SUBJECT TO REGULATION UNDER THE  
POLLUTION PREVENTION AND CONTROL REGULATIONS 2000**

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# SUBSTITUTE FUELS PROTOCOL

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## 1. INTRODUCTION AND PURPOSE

This document sets out for the benefit of Environment Agency (“Agency”) Officers, Industry, statutory consultees and the general public, Agency guidance on the procedures to be followed and the considerations to be given to the use of substitute fuels in cement and lime manufacturing installations. In this document substitute fuel(s) means any material proposed for use as fuel in cement and lime manufacture which replaces conventional fuel(s) such as coal, petroleum coke, natural gas or oil. The document builds upon the experiences gained by both the Agency and other stakeholders in the consideration of applications for the use of substitute fuels in cement and lime kilns. As guidance which supplements the Agency's internal procedures, it covers a range of substitute fuels and a variety of cement or lime-making installations. Moreover, it cannot be totally prescriptive, so where Officers are unsure of the most appropriate course of action, they should seek advice from Agency's Process Management function.

The Protocol is based on the premise that it is necessary for an Operator proposing to use substitute fuel(s) to undertake a programme of rigorous trials in order to establish scientifically the facts about the possible environmental impacts of its proposals on the area around the site in question. The results of such trials will ensure that the Agency is able to make sound judgements as to whether or not the permanent use of substitute fuel(s) should be permitted and, if so, under what conditions. The Protocol sets out arrangements for public consultation extending beyond statutory requirements, in order to facilitate a wider and better informed determination process. The aim is to demonstrate to all stakeholders that a thorough and scientific consideration of the issues has been undertaken, and that a sound and lawful determination of each application has resulted.

This Protocol covers only the use of materials that substitute for conventional fuels in kilns; it does not cover the substitution of any other materials in the process of making cement or lime.

## 2. MAIN ASPECTS OF APPROACH TO ASSESSMENT

- 2.1 This Section emphasises some of the main aspects of the Agency's approach to assessing applications for the use of substitute fuels in cement and lime kilns. It is not intended to be an exhaustive or precise statement of the legal duties of the Agency in the present context. If Officers are in any doubt, they should consult their relevant legal adviser.
- 2.2 Any permit granted by the Agency which allows the use of substitute fuel(s) must, in particular, include conditions which the Agency considers ensure that the installation will be operated in such a way that all appropriate preventative measures are taken against pollution, and that no significant pollution is caused, and which ensure that the other requirements of the Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended) (SI 2000 No. 1973) (the "PPC Regulations"), (see in particular Regulations 11 and 12), and of other applicable legislation, are taken into account. These conditions will normally be based on the use of 'Best Available Techniques' (BAT), which balance the costs to the Operator against benefits to the environment in seeking to prevent, and where that is not practicable, generally to reduce emissions and the impact on the environment as a whole.
- 2.3 The Agency ensures that BAT are at all times used in existing cement and lime installations by enforcing the conditions of the existing permit for each installation (including the improvement conditions, which require (where indicative BAT for the sector is not currently achievable at the installation) that the Operator introduces environmental improvements as soon as practicable). For applications to vary a permit to allow the use of substitute fuel(s), the Officer must, as a minimum, ensure:
- (i) that the change will not (barring any material change in the economics of the sector) produce any net detriment to the environment; and
  - (ii) that the requirement on the Operator to achieve the largest achievable environmental improvements on an economically and technically sustainable basis is in no way compromised.
- 2.4 On a permit variation, it will not normally be necessary to review all aspects of BAT at the installation. However, in certain cases (e.g. where the permit is approaching a statutory review, or where there is some reason to think that operating techniques in general may no longer be BAT), the Officer may consider it appropriate to carry out a more wide-ranging review of the conditions of the permit (including the improvement programme) as part of determining the application to use substitute fuel(s). In such cases, the Officer will require a more general appraisal of available process techniques and abatement options in order to be satisfied that BAT continues to be used when substitute fuel(s) is(are) introduced.
- 2.5 In assessing BAT where an Operator proposes to use substitute fuel(s), the Officer will also to some extent have regard to the economic consequences for the Operator (although in general only sectoral affordability is at issue when determining whether a technique is too expensive). To the extent that cost savings will result from the use of substitute fuel(s), it may be appropriate to include this factor in the review of BAT for the installation, although if the cost savings can be established only in light of operational experience, it will be appropriate to include the BAT review in the improvement programme.

- 2.6 A permit or variation permitting the use of substitute fuel(s) must include conditions containing:
- a) a substitute fuel(s) specification;
  - b) requirements for on-site storage and handling of substitute fuel(s);
  - c) requirements for monitoring and sampling to ensure that out-of-specification substitute fuel(s) is(are) not burned in the kiln;
  - d) a range of other requirements ensuring adequate control of the process;
  - e) emission limits for pollutants likely to be emitted in significant quantities; and
  - f) requirements for monitoring and reporting emissions.
- 2.7 When considering an application for the burning of substitute fuel(s), Officers should have regard not only to the IPPC Sector Guidance Note (S3 3.01)<sup>(a)</sup> Cement and Lime Sector, but also (where applicable) to the IPC Sector Guidance Note for Waste Incineration (S2 5.01)<sup>(b)</sup> and/or Amplification Note No.1 for Animal Remains Incineration<sup>(c)</sup>. If the substitute fuel(s) is “waste” Officers will be constrained by the requirements of the Hazardous Waste Incineration Directive (HWID)<sup>(h)</sup>, Municipal Waste Incineration Directive<sup>(i)</sup> (MWID) and the Waste Incineration Directive<sup>(q)</sup> (WID) (subject to transitional arrangements), when setting conditions of a permit which allow the use of substitute fuel(s) in kilns. Each of the above Directives has been considered in turn below:
- 2.8 The HWID<sup>(h)</sup> provides for the burning of hazardous wastes in plants not intended primarily for that purpose such as cement and lime kilns. The Directive sets down operational standards that must be reflected in the permit conditions. The Directive rules include, in particular, limits on emissions of prescribed substances and requirements in respect of emissions monitoring. Where thermal substitution of conventional fuel(s) by substitute fuel(s) which is Directive hazardous waste is less than 40%, the Directive's emission limits are pro-rated to apply only to that part of the volume of the exhaust gas resulting from burning substitute fuel(s). Above 40% substitution the emission limits apply in full. A Regulatory Guidance Note was issued on 14 July 1999<sup>(p)</sup> which provides detailed guidance on the Directive's requirements. Officers should note that the hazardous waste list has been revised (ref: 2000/532/EC), which may have the effect of extending the scope of the HWID. This amended list took effect on the 1 January 2002.
- 2.9 Plants will need to meet the requirements of the MWID if the substitute fuel being used falls within the definition of municipal waste in the Directive, "Municipal waste means domestic refuse, as well as commercial or trade refuse and other waste which, because of its nature or composition, is similar to domestic waste". As there are no pro-rata provisions, the full requirements of this Directive apply.
- 2.10 The WID incorporates, updates and extends the requirements of the MWID and the HWID, forming a single Directive on waste incineration. To transpose the WID, the Waste Incineration Regulations<sup>(r)</sup> came into force on 28 December 2002 accompanied by Secretary of State's Directions under both Part I EPA 1990 and the PPC Regulations, using IPC and PPC to deliver implementation.

The WID applies to the incineration and co-incineration of hazardous and non-hazardous waste except in those plants that are treating only wastes excluded from the scope of the Directive. HWID and MWID will be repealed by the 28 December 2005 (at the end of the WID transitional period). Defra have issued guidance<sup>(s)</sup> on the WID. In due course the Agency will also provide supplementary guidance.

Transitional provisions for the WID are:

- “new” plant must comply with WID technical requirements from 28 December 2002
- “existing” plant must comply with WID technical requirements by 28 December 2005
- Plants which start co-incinerating waste (subject to a “relevant approval”) not later than 28 December 2004, are to be regarded as existing co-incineration plants.

Operators may wish to comply with the WID requirements early. In such a case, the Operator may agree with the Agency to submit the WID application information specified in paragraph 1B of Schedule 4 to the PPC Regulations as part of its application to burn substitute fuels. The Agency may then exercise the power which is provided in the Directions to regulators, to include conditions which meet the requirements of the Directive ahead of the time at which they would otherwise need to be included in the permit. If this occurs, the Agency will be able to accept a variation application (under regulation 3(1) of the Waste Incineration Regulations), which simply records that the WID requirements have already been met by way of the determination of that previous application.

2.11 The Agency also considers that the use of any waste as substitute fuel(s) in cement and lime kilns is a recovery operation for the purposes of the Waste Management Licensing Regulations 1994<sup>(i)</sup> ("WMLR"). This means that, in determining an application for a permit to use substitute fuel(s) which is(are) “waste” the Agency must, in addition to meeting the requirements of the PPC Regulations, also do so with the “relevant objectives” set out in Schedule 4 to the WMLR. This means that the Agency must aim to ensure that burning substitute fuel(s) poses no risk to human health, water, air, soil, plants or animals. In addition, the Agency must aim to ensure that burning substitute fuel(s) will not cause nuisance from odours or noise and will not adversely affect the countryside or places of special interest. Normally, these matters will be taken care of by ensuring that appropriate emission limits for pollutants likely to be emitted in significant quantities are imposed in accordance with the PPC Regulations. However, where there have been complaints of odours or noise from local residents, or where vegetation in a nearby Site of Special Scientific Interest or European Natura 2000 Sites may be vulnerable to releases attributable to the burning of substitute fuel(s), Officers should give these issues particular consideration.

2.12 Before a listed activity involving waste is allowed to be carried on under a PPC permit, where planning permission is, or will be, in force relating to changes in the process connected with the proposed use of substitute fuel(s), "amenity" issues (such as noise, or any effect of the change in process on the natural beauty of the area) will generally have been covered by the local planning authority. In all cases, however, close consultation with the local planning authority is advised. Where the local planning authority has already addressed the issues the information may be of use to the Agency in making its own determination. The Agency will still need to consider these issues independently. Where such issues have not been/will not be covered by the local planning authority, the Agency should examine these issues directly, in particular aiming to ensure that burning substitute fuel(s) will lead to no adverse effect on the countryside or places of special interest.



- 2.13 In deciding whether to grant a permit allowing the use of substitute fuel(s), or on what terms, Officers should also aim to implement (a) any relevant requirements of the Government's Waste Strategy 2000<sup>(u)</sup> and (b) any relevant provisions in plans made by the local authorities for the area in which the plant is located (e.g. waste local plans, waste disposal plans, structure plans, local plans).
2. 14 Whilst having no direct effect on the PPC permit itself, Officers should be aware of the Special Waste Regulations 1996<sup>(k)</sup> and proposals to amend them. These regulations require the use of consignment notes to pre-notify, accompany and record movements of "special waste" between the producer, carrier and final user. The categorisation of "special waste" derives from the term "hazardous waste" as used in the Hazardous Waste Directive <sup>(l)</sup> ("HWD"). Defra has said it will amend the Regulations to address inconsistencies in the definition of hazardous waste and implement the recently agreed changes to the European Waste Catalogue (2000/532/EC, effective 1 Jan 2002) incorporating the Hazardous Waste List (94/904/EC). It is anticipated the term "special waste" will be replaced with "hazardous waste", defined in accordance with the European Hazardous Waste Directive (91/689/EEC) and List.

### 3. PROCEDURAL REQUIREMENTS

- 3.1 No burning of substitute fuels in cement and lime kilns will be allowed without making an application to the Agency and obtaining its permission. In the case of new activities or transition of existing IPC activities into IPPC, this may be done as part of the application for a PPC permit. It may also be done as a variation to a PPC Permit.
- 3.2 In the case of an application for variation of a PPC permit to allow the use of substitute fuel(s), Officers must also decide whether or not a substantial change is involved. Where a substantial change is concerned, the PPC Regulations impose additional consultation requirements. According to the PPC Regulations a “**substantial change**” means “in relation to an installation, a change in operation which, in the opinion of the regulator, may have significant negative effects on human beings or the environment”. Whilst each case must be decided on its merits in accordance with the statutory criteria, it is considered unlikely that such applications will entail a substantial change. However, the Agency has as a matter of policy determined that variation applications which come within the scope of this Protocol will be subject to the same statutory consultation arrangements as if a substantial change were in fact involved (using its powers under paragraph 4(2), Part 2 of Schedule 7 to the PPC Regulations).
- 3.3 There are two distinct procedures for determining an application to burn substitute fuel(s) in cement kilns:

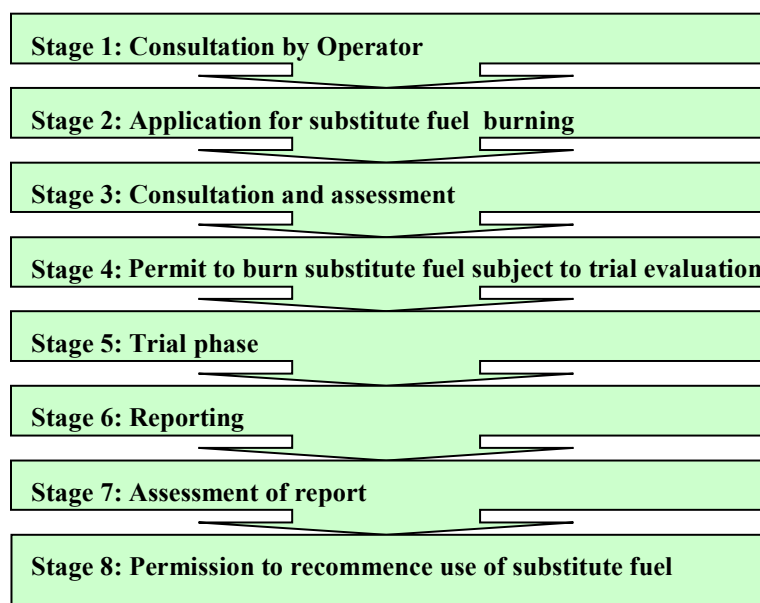
**Procedure 1**, covering applications for new substitute fuel(s); and  
**Procedure 2**, covering applications for substitute fuel(s) on kilns where the use of substitute fuel(s) has previously been permitted for continuous use and the Operator wishes to increase the substitution rate

The requirements of procedures 1 and 2 are described in sections 3.4 and 3.5 and are outlined in Figures 1 and 2, respectively.

This Protocol may also be used as guidance for Officers when assessing and determining applications from Operators for previously unauthorised (i.e. new) kilns, designed to burn substitute fuels. Under these circumstances, the Operator must demonstrate within the application that the use of substitute fuels represents BAT for the new kiln(s). Also, the Officer must require the Operator to follow the technical requirements, as laid out in Section 4 of this Protocol, during the commissioning phase for the new kiln(s). A comprehensive commissioning report will be required by permit conditions to be submitted to the Agency to demonstrate compliance with the permit and Critical Success Factors. This report will be put on the public register.

3.4 **Procedure 1:** Applications for new substitute fuel(s);

The procedure for permitting is outlined in Figure 1 and described through the following eight stages.



**Figure 1 Procedure 1**

**Stage 1 Consultation**

The Agency considers that pre-application consultation, while not a statutory requirement, is vital in order that the public in the affected area are better able to appreciate fully the issues surrounding the Operator’s proposals and therefore to make informed representations to the Agency during the formal consultation on the application. Therefore, the Officer should encourage the Operator to engage with, and inform, the local public to the greatest practicable extent, outlining its intentions to use substitute fuel(s). Within this process the Operator should present as much information as is possible on the strategy for using **all** substitute fuels at that site, although a clear distinction should be drawn to enable the public to understand exactly what is being proposed at that time. This should be concluded before an application for a permit is submitted to the Agency. As a result, the Operator should then be able to address within the application the concerns raised by the public. This consultation exercise should help the Operator to propose appropriate Critical Success Factors (CSFs) - the specific factors or benchmarks by which the success of using substitute fuel(s) can be judged. As the use of some substitute fuels is potentially highly controversial, the Operator should be encouraged to view this process as a sound investment of time and resources, which may (although no guarantees are possible) pay a dividend both in terms of a smoother determination and a reduced risk of legal challenge.

**Stage 2 Application for substitute fuel(s) burning**

Should the Operator wish to pursue the use of substitute fuel(s) then an application shall be submitted to the Agency, detailing the proposals for substitute fuel(s) burning. However, permission to burn substitute fuel(s) continuously will be subject to satisfactory completion of a trial. Only after the Officer is satisfied that the kiln can be operated satisfactorily using substitute fuel(s) can permission to burn continuously be given.

The application should clearly address issues highlighted in the initial consultation exercise. Sufficient information should be supplied for Officers to determine the application in accordance with the guidance provided in this Protocol and in particular to demonstrate that BAT will be applied.

The kiln to be used must be clearly identified and must be operating within the limits set out in its permit (where applicable). In cases where there is more than one kiln on the site, and the Operator is applying to burn the same substitute fuel(s) on other kilns at the same site, there would normally be a need for a trial on one kiln only. However, in deciding whether to allow this, Officers should compare the kilns on the basis of the raw materials used, process techniques, emissions data, operating regime and management controls. Should the Officer allow continuous substitute fuel(s) burning on other kilns on the site, it is important that permission is given conditional on demonstrating adequate performance by those other kilns. Therefore, in these cases, the Officer should require, as a condition of the permit, the Operator to submit a report within 3 months of commencing continuous substitute fuel(s) burning, detailing kiln performance. This report must contain information on the level of emissions of those substances detailed in Annex 3. The Officer may also require other substances to be monitored depending on the outcome of the original trial.

The Operator should submit a proposed programme for the trial and the Officer will determine if the programme is acceptable. This may involve agreeing a trial programme that allows setting up and optimisation as well as incremental increases in substitution rates up to the maximum rate applied for. It may also be appropriate for the Operator to stage the tests e.g. trials at different substitution rates are interspersed with periods of operation at baseline conditions. Whilst the trial programme should normally be completed within a period of six months the Officer may decide in appropriate circumstances that an extension is acceptable in order to allow the programme to be completed.

### **Stage 3 Consultation and Assessment**

- The Officer will consider the application and define or accept draft Critical Success Factors (CSFs), which should include for example:
- Compliance with existing emission limit values;
- The amount of waste produced when burning substitute fuel(s) will not increase significantly and will be within normal variations. The waste in this case includes materials recycled and reworked clinker;
- There will be no net environmental detriment to the local environment resulting from a change in emissions caused by substitute fuel(s) burning. This assessment will be based on the H1 methodology and will take into account other benchmark criteria established to protect the environment;
- Inspections by Agency Officers of the substitute fuel burning operations will all receive acceptable assessments in line with current Agency compliance assessment methodologies;

- There will be no increase in abnormal operations as a result of substitute fuel burning.

Whether or not the application is determined to involve a substantial change as defined by the PPC Regulations, the Agency has decided that statutory consultation is still required, using its powers in Schedule 7 to the Regulations. The Officer will also consider whether, and to what extent, extended public consultation (i.e. going beyond statutory requirements) should also be undertaken. (This will also be the case for applications for new installations, where there is already a statutory consultation requirement.) If it is decided that extended public consultation should also be undertaken then the Officer should refer to the consultation mechanisms outlined in Annex 1. However, the Officer should focus any consultation on the CSFs. In parallel with these activities, the Operator should be encouraged to continue consulting with a wider audience. Officers should take care in making clear that this may be the only formal opportunity for the public to make representations on the application.

#### **Stage 4 Permit to burn substitute fuel(s), subject to trial performance**

Once the CSFs have been finalised, having taken account of representations made during consultation, the Officer may permit the Operator to burn substitute fuel(s), conditional on satisfactory performance of a trial. The trial will be for a fixed duration specified in terms of operational hours, with a tolerance of about 5% to ensure flexibility at each stage of the trial.

Irrespective of whether the application for substitute fuel(s) burning is granted or refused, the Agency will produce a clear explanation of its reasons for the decision, including its response to all the relevant issues raised in the consultation process, in a "Decision Document". If representations are made raising issues relevant to the decision but outside the scope of the Agency's expertise or remit (e.g. issues regarding safety of plant operatives), they should be referred to an appropriate organisation for comment. Comments from that organisation will be incorporated, as appropriate, in the Agency's explanation of its decision (although care must be taken to base the decision solely on the relevant considerations). It will also be appropriate to demonstrate how each point has been dealt with by reference to conditions in the permit or variation notice.

It is important to ensure that the Agency's decision on the application is properly documented and recorded. A Decision Document summary will be made widely available, with copies placed at accessible points, such as the Agency's public registers, libraries and council offices. The Decision Document should be non-technical wherever possible, easy to read, and should relate the Agency's decision clearly and unambiguously to the Agency's legal duties and the key material issues raised by the consultation.

#### **Stage 5 Trial Phase**

Throughout the duration of the trial the Operator should again be encouraged to keep the public informed on the progress of the trial e.g. newsletters, weekly reports etc. In addition, the Operator should gather evidence for reporting on the performance of the trial against the CSFs. The trial must stop if, at any stage, non-conformance with CSFs becomes apparent. Under such circumstances the Officer will have to decide whether the trial can recommence and, if so, whether more consultation should be undertaken in light of the suspension. In some cases the permit allowing the trials may need to be

further varied: the Officer will need to show in the Decision Document that all the relevant issues have been considered at each stage.

Once the trial is complete the Operator must stop burning the new substitute fuel(s) and shall not recommence until the Officer gives written approval.

### **Stage 6 Reporting**

The Operator must submit a report of the trial to the Agency. This report must contain an evaluation of performance against the CSFs. The Operator should be encouraged to discuss the draft report publicly before submitting it to the Agency. In this way, once again, the Operator can address in the report any concerns the public may have, prior to submission to the Agency, and the public will be able to make informed representations.

### **Stage 7 Assessment of Report**

On receiving the report the Officer will ensure that it is placed on the public registers. At this stage, the Officer should ensure that all CSFs have been achieved and be fully satisfied that the Operator is capable of operating the kiln using substitute fuel(s) in accordance with the conditions in the permit. All material representations made by the public and the Operator's responses should be clearly highlighted in the report. Consultees, including statutory consultees, should be given an opportunity to raise any concerns still outstanding with the CSFs and the Officer should be satisfied that such concerns have been addressed before allowing further substitute fuel(s) burning.

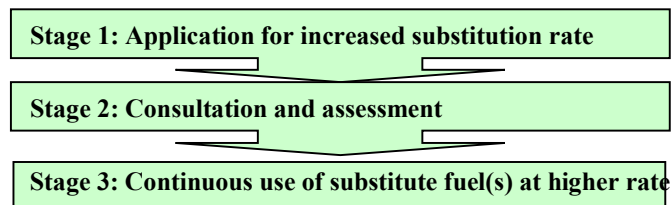
### **Stage 8 Permission to recommence use of substitute fuel(s)**

Subject to satisfactory performance against the CSFs, and providing all material representations from consultees are adequately addressed, the Agency would then normally agree, in writing, to the continuous use of substitute fuel(s). The time from receiving a satisfactory report on the trial, to deciding whether or not to permit continuous use of substitute fuel(s) should not normally exceed 8 weeks.

Key stakeholders should be notified, in writing, of the Agency's decision in conjunction with a subsequent press release. Also, the Officer should produce a document explaining the Agency's decision to allow the Operator to recommence substitute fuel(s) burning.

- 3.5 **Procedure 2:** Applications for substitute fuel(s) trials at an increased substitution rate on kilns where the use of substitute fuel(s) has previously been permitted for continuous use.

The procedure for permitting is outlined in Figure 2 and described through the following three stages.



**Figure 2 Procedure 2**

### **Stage 1 Application for increased substitution rate**

Following permission to burn substitute fuel(s) at a given substitution rate, for example 10%, an Operator may wish to increase the substitute fuel(s) feed rate. In this case, the

Operator should submit an application for a variation to increase the substitution rate. The Officer should take a view on whether to pursue this Procedure or Procedure 1, depending on the incremental increase applied for. However, as a general rule the Officer should use this Procedure provided the requested increase is less than, or equal to, a 10% increment (e.g. 10 to 20% or 15 to 25%). Any greater increase will, in the Agency's view, constitute such a significant change in operations as to merit being treated as an application to use substitute fuels for the first time.

### **Stage 2 Consultation and Assessment**

On receipt of an application the Officer will consider the application and define or accept CSFs as outlined above. However, for this type of application, a lot of information will already be available on the performance of substitute fuel(s) in the kiln, as well as the views of consultees.

Whether or not the application is determined to involve a "substantial change", the Agency has decided that statutory consultation will still be required, under its powers in Schedule 7 of the Regulations. Furthermore, the Officer should consider if, and to what extent, to undertake wider public consultation. The mechanisms available for undertaking extended public consultation are outlined in Annex 1. The Operator should be proactive in informing local residents of the request to increase the substitution rate.

### **Stage 3 Continuous use of substitute fuel(s) at higher rate.**

Subject to the Officer being satisfied with the application and, where appropriate, providing all consultee representations are adequately addressed, the Officer may permit the continuous use of substitute fuel(s) at the new increased substitution rate, subject to satisfactory completion of the trial. Again, a decision document must be written, which will be made widely available, with documents placed at accessible points, such as the Agency's public registers, libraries and council offices. The decision document should be non-technical wherever possible, easy to read, and should relate the Agency's decision clearly and unambiguously to the Agency's legal duties and the key material issues raised by the consultation.

The Officer should require the Operator, as a condition of the permit, to submit a report after a period of substitute fuel(s) burning (e.g. 3 months) outlining the kiln performance. This report must be made available to the public in order that they can comment on the outcome of the trial. Therefore, in addition to placing it on the public registers, key stakeholders should also be notified about the availability of the report. The Operator should also be encouraged to engage with the local community on the findings of this report.

## **4. TECHNICAL REQUIREMENTS**

This section outlines the information that the Operator must include in any application and/or report concerning the use of substitute fuel(s).

### **Pre-trial requirements**

#### **4.1 Application for Substitute Fuel(s) Trials**

In the formal application to permit trials with substitute fuel(s), the Operator should demonstrate to the satisfaction of the Officer that the baseline operation is properly controlled and that there are safeguards against potential environmentally damaging abnormal operations. Sufficient information should be supplied for Officers to determine the application in accordance with the guidance provided in this Protocol and other material guidance. As part of an application Operators must include evidence to demonstrate that dispersion of emissions to air from combustion sources under baseline conditions is adequate.

##### **4.1.1 The Kiln and associated plant**

The kiln to be used in the trials must be clearly identified and must be operating within the limits set out in its permit. Evidence of compliance should be supported by sufficient established emissions data. Officers may accept historical data if:

- i) the monitoring and analytical methods employed meet current standards and do not differ significantly from those proposed for the trials; and
- ii) the process and operational conditions are not significantly changed.

Data must be provided on the operation of the process to demonstrate that the process is capable of sufficiently stable operation to enable meaningful test results to be obtained during the trial period, e.g. 'mean time between stoppages', number, duration and cause (e.g. high CO) of EP trips per year. Operators should provide data demonstrating that the number and duration of CO trips has been minimised. Officers will then need to consider whether each of the current conditions in the permit is appropriate for the trials, especially if trials are proposed for substitute fuel(s) derived from waste streams which have not been trialled before in UK kilns or whether new conditions need to be devised.

##### **4.1.2 Agency advice to Operators**

It is important that Officers understand the Operator's intentions before the application for trials is submitted so that advice can be offered on the extent of the programme required (see 4.1.5). This advice will include, in particular, monitoring requirements and identification of any EU Directives (and consequential release limit values and operational constraints) and other statutory requirements which are likely to apply. Officers should seek guidance on these issues from the Agency Process Management function as appropriate.



#### 4.1.3 Best Available Techniques (“BAT”)

Operators will need to demonstrate in particular that the use of substitute fuel(s) meets the requirements of Regulations 11 and 12 of the PPC Regulations.

#### 4.1.4 Specification and Testing of Substitute Fuel(s)

Only substitute fuel(s) that can meet a specification agreed in advance with the Agency will be permitted to be trialled. No substitute fuels to which the following substances have been deliberately added should be trialled:

- PCBs;
- PCP;
- radioactive material or radioactive waste;
- pharmaceuticals;
- pesticides;
- biocides;
- explosives; and
- iodine compounds.

Although each case must be considered on its merits, trials of substitute fuel containing the following substances should not be permitted:

- i) radioactive material or radioactive waste as defined in Sections 1 and 2 respectively of the Radioactive Substances Act 1993; and
- ii) explosives including: propellants, cartridges, or bombs, or explosive material extracted from them or explosive-contaminated material from their manufacture or decommissioning.

Officers should seek to avoid the blending of waste streams into substitute fuel which do not contribute to its performance as a fuel. In addition, for SLF, solids content should generally be less than 20%.

Operators should propose a specification for substitute fuel to be burned in the trials and this should cover at least the following parameters:

- calorific value (gross and net);
- moisture content;
- content of individual halogens;
- sulphur content;
- heavy metals content (as defined in Annex 5);
- suspended solids content (for SLF);
- ash content; and
- physical characteristics e.g. boiling point, flash point, size range etc.

Operators must have installed facilities to enable representative sampling of substitute fuel(s) to be undertaken. Officers should be satisfied that proposed sampling and testing arrangements allow for representative substitute fuel(s) samples to be obtained at an appropriate frequency throughout the trial periods. The composition of all substitute fuel(s) must be known before burning. Details of proposed sampling and analytical methods should be provided in the application. The Agency requires that organisations undertaking the sampling and analytical work have UKAS certification (or an internationally agreed equivalent) for the relevant determinands. QA/QC records should be kept by the organisations involved in this work. The Officer will determine the suitability of the substitute fuel(s) specification and the sampling and analytical methods. Officers and Operators should take account of the inherent difficulties in sampling and analysing solid substitute fuels or SLF with a significant solids content. The Officer will assess and approve the suitability of the means proposed for obtaining such samples. Examples of suitable methods for obtaining representative samples of SLFs containing solids include:

- (i) periodically taking incremental samples whilst the SLF is being continuously mixed; and
- (ii) periodically taking flowing incremental samples at different tank levels.

An example of representative sampling of solid substitute fuels is to take periodic incremental samples from falling or flowing streams. It should be noted that the size of each increment is important for ensuring that representative samples are obtained for substitute fuel.

For solid waste streams that are not easily sampled there may be good generic analytical data already available e.g. composition of commercial and passenger vehicle tyres. In such cases it may be appropriate to estimate pollutant inlet burdens from the generic analysis and the measured feed rate. Taking the example of tyres, Officers should be aware that commercial vehicle tyres exhibit significantly different compositions to those of car tyres for some important components (e.g. iron and zinc content). Only tyres that can meet a specification agreed in advance with the Agency will be permitted to be trialled. Consequently, Officers should require Operators to notify the Agency concerning the mix of tyres to be trialled. Only the same mix (or one that is demonstrably less polluting) should be specified for continuous burning if approved.

#### 4.1.5 Proposed Trial Programme

The Operator should submit a proposed programme for the trial and the Officer will subsequently determine if the programme is acceptable. Whilst the trial programme should be completed within a maximum of six months, for a test, a data set gathered over a six week period is likely to be the minimum required for a satisfactory assessment. Operators may prefer a staged programme so that they can check on product quality before committing themselves to a particular substitution rate. Where the proposed substitute fuel(s) has already been trialled/is in use elsewhere in the UK the length and scope of the proposed trial may be reduced at the discretion of the Officer depending on supporting evidence being submitted from previous trials. The Officer must be satisfied that the data from elsewhere is applicable to the installation in question. However, from an environmental point of view, it is vital that most sampling is undertaken at the maximum rate of substitution. This will allow comparison with a similar number of valid results obtained over a comparable operational period under baseline conditions (see 4.2 and Annex 3). It is important that the tests are carried out under comparable operating

conditions (e.g. similar coal/coke quality and mesh size, kiln and abatement operation including recycle rates, back end oxygen and temperature, alkali metal/sulphur ratio etc). It is also important that kilns should be allowed to stabilise before attempting any testing. It should be noted that whilst stabilisation from cold start may take 2 or 3 days, stabilisation periods from one operating condition to another may be considerably shorter. In general, 24 hours should be allowed for stabilisation between different trial conditions.

Annex 3, Figure 1 presents a flowchart for determining the minimum stack sampling requirements and the minimum number of valid results which are required. For substances such as dioxins this may mean that more than six samples will need to be taken to ensure six valid results. In exceptional circumstances, Officers may accept fewer valid results if, for example, a high number of invalid dioxin results are obtained following analysis of all samples. Annex 3, Figure 2 shows the relationship between 'trial' and 'test'. Where a substitute fuel has not previously been trialled/used, the trial must include testing at the baseline condition and at the maximum substitution level (illustrated in Figure 2, Trial 1).

Following permission to burn a particular substitute fuel(s) at a given substitution rate, for example 20%, an Operator may subsequently wish to increase the substitution rate and therefore a further trial will be required. In these circumstances the Officer may specify less testing under baseline conditions (as illustrated in Figure 2, Trial 2) as the baseline could be considered to be the previously tested and licensed substitution rate. However, in determining if less monitoring than would normally be required for a baseline is justified, the Officer must be satisfied that no significant changes to the process have been made since the previous trial. Criteria to be used in determining if less monitoring is justified include:

- no significant changes being made to the process plant (e.g. change of abatement plant or conventional fuel and/or substitute fuel(s) mix);
- no significant changes being made to process control (e.g. change of Operator or operating software);
- no significant changes to the sampling methods, protocols or sampling contractor;
- no significant changes to the installed plant continuous emission monitors;
- no significant differences in results from the installed plant CEMs during the previous substitute fuel(s) trial and the results from the same CEMs in the intervening period since permission to burn substitute fuel(s) (see Figure 2, Trial 2); and
- the time period between the previous trial and proposed trial is not excessive.

Nevertheless, if the Officer decides that less extractive monitoring can be allowed, the Operator will still be required to demonstrate that baseline emissions data are still valid by way of some extractive sampling and analysis.

If significant changes have been made to the process since the previous trial then the Operator must undertake a trial including new baseline testing (as demonstrated in Figure 2, Trial 3).

#### 4.1.6 Storage, Handling and Control of Substitute Fuel(s)

Operators should demonstrate in the application that they will put in place measures for safe and environmentally secure storage and unloading of substitute fuel(s) which prevent or minimise releases to all media. The design of the installation should be discussed with the HSE and Fire Service, as appropriate. For trials involving SLF, temporary storage to an agreed standard may be acceptable (but for continuous burning, banded permanent storage is required with at least two tanks preferred). Operators must also be able to demonstrate that they can control the feed of substitute fuel(s) to the kiln and that there are safety cut-offs and fail-safe features in the event of kiln problems or emergencies. Particular attention should be paid to fire and explosion risks, suppression of fugitive gaseous emissions (both at the storage area and at the plant), and to the arrangements for preventing substitute fuel(s) flow in the event of plant failure such as EP de-energisation. Details of how the thermal substitution rate is to be determined and monitored should be provided so that Officers can ensure that there will be facilities and procedures in place to allow thermal input to be monitored, preferably by flow. The Operator will also need to confirm the circumstances which will lead to the cessation of substitute fuel(s) feed, e.g. duration of electrostatic precipitator outage.

For Operators wishing to use liquid substitute fuels, additional requirements, as follows, should be considered:

- i) Hazard and operability (HAZOP) studies undertaken during the design phase of the project and prior to implementation of any operational or plant modifications;
- ii) All plants shall be designed and operated to prevent fugitive emissions to air;
- iii) All installations shall be designed to prevent contamination of groundwater or surface water; and
- iv) Provision of a safety management plan for the storage and use of SLF including provisions to train staff. An emergency plan should also be in place before trials commence.

#### 4.1.7 Monitoring Arrangements

Operators must provide details of continuous monitoring instrumentation and monitoring methods to be used to monitor inputs and outputs from the process as detailed in Section 4.2. The Operator must monitor all significant inputs (including fuels, raw materials, recycled material) and significant outputs (including releases to all media, CKD and products) using, where possible, approved (e.g. UKAS certified) sampling and analysis contractors.

The general testing and monitoring regime is detailed in Section 4.2 and Annex 3, but the actual monitoring programme must be agreed with the Officer and may contain additional or modified requirements depending on the site and the substitute fuel being proposed. Operator monitoring will be audited by the Agency on an unannounced basis.

Operators will propose a dispersion modelling programme, acceptable to the Agency, to be used in their assessment of environmental impact of emissions to air from the installation process. Where concerns are raised about ambient levels of air pollutants, the Officer will

need to consider if ambient air monitoring is appropriate, in consultation with the relevant local authority. Ambient monitoring should be carried out to national network standards (see Defra guidance) with data compared with relevant air quality standards (see Section 4.2.9).

#### 4.1.8 Assessment of Results

Operators should supply details in the application of how they propose to assess the results of the trials. This should explain how they would demonstrate:

- i) the comparability between baseline and substitute fuel(s) (inputs and outputs); and
- ii) the environmental benefits (including air dispersion assessments and an assessment of environmental impacts using a suitable methodology e.g.H1<sup>(o)</sup>).

## 4.2 Monitoring Requirements During Substitute Fuel(s) Trials

Wherever possible, and in accordance with the relevant EU Directives, the following requirements will be specified in a permit authorising trials and will be enforced accordingly.

### 4.2.1 The Trials Programme

The Operator should keep to the agreed trials programme as much as possible but if there are unavoidable disruptions the Agency must be informed, and agreement sought to extend the programme. Where substitute fuel is classified as a hazardous waste under the HWID, special monitoring requirements have to be followed, refer to the HWID Regulatory Guidance Note for details. Should an application for substitute fuel burning be made under the WID, the Defra guidance on WID implementation should be referred to.

### 4.2.2 Monitoring Requirements - General Considerations

All Operator monitoring detailed in this section must be carried out at the maximum substitution rate and at baseline conditions as a minimum. Most testing of emissions when burning substitute fuel(s) will be carried out at maximum substitution rate. The minimum frequency of testing for each determinand is shown in Annex 3, but actual frequencies will be set by the Agency dependent upon the characteristics of the substitute fuel(s) to be trialled. If there are several tests within the trials programme each test should be long enough to stabilise operating conditions for sufficient time (normally 24 hours) to ensure that test results are as representative as possible.

The trials will principally involve monitoring by the Operator of all significant inputs (including fuels, raw materials, recycled material) and all significant outputs (including releases to all media, waste generated and products where appropriate). CEN methods shall be used where available. If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality, as agreed in writing with the Agency, shall apply. The Agency requires that UKAS (or equivalent) certified sampling and analysis contractors are employed. All sampling and analysis must be representative. Operators and their contractors should use the appropriate methods and standards as specified in M2.

A smaller programme of check monitoring commissioned by the Agency, with costs re-charged to the Operator, will provide independent data. This independent testing should include monitoring of emissions at least at one level of substitution (preferably at the maximum rate). Where poor agreement is obtained between the Operator results and the independent monitoring further monitoring may be necessary to provide increased confidence in the monitoring data.

Both the Operator and Agency contractor monitoring programmes should also be subjected to site and laboratory audit by the Agency.

All monitoring data gathered by the Operator and Agency monitoring programmes will be placed on the Public Register, except for those items for which commercial confidentiality has been agreed by the Agency.

#### 4.2.3 Testing and Monitoring Facilities

Sampling locations (for releases into air and water, wastes or products and raw materials/fuels) and procedures to ensure representative sampling should take account of the appropriate sampling standards and must be agreed with the Officer.

Facilities for the sampling of emissions to air should at least meet the standards stipulated in Agency Technical Guidance Note M1<sup>(d)</sup>. Additional guidance can be found in the Source Testing Association's booklet "Hazards, Risks and Risk Control in Stack Test Operations", contact: [www.s-t-a.org](http://www.s-t-a.org).

In some cases, depending on the type of substitute fuel(s) to be trialled, it may be prudent to check background levels of dioxins/furans, dioxin-like PCBs and heavy metals in soils in the vicinity of the installation before trials commence. In these cases, soil and vegetation samples should, as a minimum, be taken (as indicated in Annex 4) downwind of the stack, and at least in the area calculated to have the maximum ground level concentration. The sampling sites and the pollutants to be monitored should be agreed with the Officer.

#### 4.2.4 The Operator's Permanently Installed Continuous Emission Monitoring Systems (CEMs)

Continuous stack monitoring should take place over a period of at least 6 weeks at each of the baseline and maximum substitution conditions in accordance with the requirements of Annex 3.

Continuous emission monitoring systems for gases should be fully calibrated immediately before and after each trial and at three monthly intervals if trials continue beyond this period of time. The Agency should be notified in advance and given the option of witnessing such calibrations. Where possible the CEMs for gases should also be subject to daily zero and span checks using, for example, certified gas standards.

Calibration for gas monitors should follow CEN or British/international standards. An Agency audit of the Operator's continuous monitoring should also be undertaken, and to include real time comparison of Operator's continuous monitoring data with extractive data and an evaluation of the Operator's data logging facility.

Continuous particulate monitors must be calibrated against a standard extractive gravimetric method calibrated, in accordance with the requirements of BS ISO 10155, before and after each trial, and at least every 6 months.

#### 4.2.5 Periodic Extractive Sampling of Emissions

Periodic extractive sampling will be required in addition to any continuous emission measurements using permanently installed instruments. This could be undertaken using temporary installed extractive instrumental monitoring systems or by employing manual extractive monitoring methods. Annex 3 summarises the substances which must be sampled, by the Operator, and their sampling frequencies.

Periodic extractive testing should be spread out evenly over each of the baseline and maximum substitute fuel(s) trial periods. All periodic manual sampling should be undertaken during steady state operation of the kiln. Where periodic extractive instrumental monitoring systems are employed, these should be fully calibrated immediately before and after each trial. Also, as a minimum, these systems must be spanned and zeroed immediately before and after each sample period using certified standard gas mixtures.

Sampling and analysis should follow British/internationally recognised standards. Further guidance will be found in Technical Guidance Notes (Monitoring) e.g. M1<sup>(d)</sup>, M2<sup>(e)</sup>, M3<sup>(f)</sup> and M4<sup>(g)</sup>. However, Officers and Operators should be aware that CEN (the European Standards Organisation) is currently producing harmonised emission monitoring methods on behalf of the European Commission. Therefore, Officers and Operators need to keep abreast of the Agency's developing policy on the use of approved methods.

Calibration gases shall be certified in conformance with BS 4559 Part 4 (ISO 6141). Operators and monitoring contractors shall procure calibration gases from suppliers having UKAS (or equivalent) certification for the analysis of gases.

In accordance with BS 4559, each calibration gas cylinder shall have a full certificate of analysis, and a certificate of minimum requirements (extracted from the full certificate of analysis) which shall be attached to the container of calibration gas.

Stack gas testing should meet the following minimum requirements and each of the parameters detailed below should be monitored under baseline conditions and at maximum substitution rate.

##### i) Total Particulate Matter and PM<sub>10</sub>

Periodic extractive samples for total particulate matter should be taken under isokinetic conditions in compliance with BS EN 13284-1. Deviations of sample points from BS EN 13284-1 requirements must be reported by the Operator in advance of the trials so that the effect on monitoring accuracy can be assessed by the Agency before trials commence.

Even though no limits are applied, PM<sub>10</sub> levels (particulates with a mean aerodynamic diameter of less than 10 micrometers) in emissions are of particular interest in view of the adoption of PM<sub>10</sub> as an air quality standard by the Expert Panel on Air Quality Standards, and as part of the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (as amended)<sup>(h)</sup>. Periodic extractive

measurement of PM<sub>10</sub> in emissions to air should be undertaken either as an integral part of sampling for total particulates or as a separate test. PM<sub>10</sub> sampling may be either isokinetic (e.g. EPA method 201) or non-isokinetic (e.g. EPA method 201A).

ii) Heavy Metals

Two consecutive samples should be taken and analysed for those heavy metals listed in Annex 5. They must be sampled in both the gaseous and particulate phases simultaneously in the same sampling system. The minimum sampling time should be 1 hour and a suitable analysis technique should be employed to ensure sufficient sensitivity is achieved. For trials involving some categories of substitute fuel (see 4.2.8), zinc should also be analysed. Levels of each metal should be reported individually as well as in totals for the groups specified in the guidance. Results should also be reported separately for material collected from the gaseous and particulate phases.

With the exception of mercury, sampling and analysis for heavy metals should be conducted according to US EPA Method 29 (a similar approach is expected from CEN in due course).

Sampling and analysis for mercury should be conducted according to BS EN 13211:2001

iii) Dioxins, Furans and Dioxin-like Polychlorinated Biphenyls

For each determinand, duplicate samples of stack gas should be taken and analysed for the congeners specified in Annex 7 in the gaseous and particulate fractions of the sample.

Each sample should be collected for a minimum of 6 hours in accordance with sampling standard BS EN 1948 Part 1 or an equivalent. Ideally the time between samples should be minimised. Two sample runs on consecutive days would be considered acceptable unless there were significant changes in the way the kiln was being operated that would obviously compromise the results. Extraction /clean up and analysis of dioxins and furans should be in compliance with BS EN 1948 Parts 2 and 3 (or equivalent). Although there is no currently agreed international sampling standard, determination of dioxin-like PCBs concentration should be in accordance with the principles and procedures in BS EN 1948. Operators are advised to take more samples than are intended to be analysed due to the possibility of obtaining void results.

Dioxins and furans are to be reported using the I-TEQ reporting convention to assess compliance with emission limits specified in HWID and WID (0.1ng/Nm<sup>3</sup> I-TEQ). In addition, the WHO-TEF values for both dioxins and dioxin-like PCBs should be specified for monitoring and reporting purposes. This will enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by the UK's independent health advisory committee - Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment.



Officers need to specify in permits, dioxin/furan emission limits based on I-TEF (1990) values but with additional monitoring/reporting requirements for dioxin/furan and dioxin-like PCBs using WHO-TEF (1997/98) factors (see Annex 7).

iv) SO<sub>2</sub>, NO<sub>x</sub>, CO

Periodic extractive instrumental sampling must be undertaken via a heated filter and heated line for the above gases.

Parameter	Method/ Specification
SO <sub>2</sub>	BS ISO 11632: 1989/Corr 1998 or BS ISO6069-4.1: 1990 (ISO 7934)
NO <sub>x</sub>	BS ISO 11564 : 1998/Corr2000
CO	CO should be in accordance with VDI 2459

Measurements may be made using some or all of the following instrumental techniques: infra-red absorption, ultra-violet absorption, fluorescence spectrophotometric or chemiluminescence analysers.

Total oxides of nitrogen (NO<sub>x</sub>) should be analysed as NO and NO<sub>2</sub> but reported both separately and together (as NO<sub>2</sub> equivalent) to provide full information on kiln combustion performance.

On each test day, sampling should be continuous for a period of at least 12 hrs. Data should be recorded/logged as one-minute means but the instrumental systems should subsequently report in accordance with Annex 3 for comparison with permanently installed CEMs.

Additional backup data may be provided using manual impinger/absorber trains but these should not be used as the sole source of data for these determinands.

v) HCl, HF (HBr, HI as appropriate depending on type of substitute fuel(s))

Continuous analysers should be employed, where appropriate, with sampling and data logging requirements as detailed in section (iv) above. At present there are no standards for instrumental measurement techniques for HF but there are at least two VDI standards (VDI 3480; Parts 2 and 3) for instrumental HCl or inorganic chloride compound measurement.

Alternatively, two consecutive extractive samples should be collected in impinger/absorber trains and levels determined by a technique such as ion chromatography, ion selective electrodes, colorimetry or titrimetry. Recognised standard procedures should be used. This would include BS EN 1911:1998, parts 1-3 for hydrogen chloride and US EPA Method 26A for HF, HBr and HI. Officers should be aware of the possible interference between hydrogen halides and other halide species when using these systems.

vi) Volatile Organic Compounds (VOCs)

VOCs should be measured using instrumental systems. Reporting of averages/standard deviations etc are as detailed in section (iv) above, and should be reported as total organic carbon (TOC). An acceptable standard monitoring methodology is given in BS EN12619: 1999.

Speciated VOC sampling may be required for certain substitute fuel trials in order that the full H1 environmental assessment methodology might be applied. Refer to M2 guidance to select appropriate methods for sampling and analysis.

vii) Other Organic species

Section 4.2.8 details additional organic species which should be monitored during trials involving specific types of substitute fuel. Under baseline and maximum substitution conditions, two consecutive samples of the stack gas, samples of electrostatic precipitator/ kiln dust and clinker or other kiln product should be analysed for specific additional species. Duplicate samples of the batch of substitute fuel burned during the stack gas sampling should also be analysed.

viii) Oxygen, Moisture, Pressure, Temperature and Flow

Oxygen and moisture levels in the stack gas, together with gas flow rate must be measured at appropriate times during sampling for analysis of other substances concerned. Appropriate temperature and pressure measurements should also be undertaken to allow correction of sampling data to reference conditions.

Oxygen should be measured using instrumental systems. Samples should be taken during the extractive stack sampling periods for all the above stack gas determinands. US EPA Method 3A or equivalent should be employed.

Moisture levels in the stack gases should be measured using periodic manual methods. Samples should be taken during the extractive stack sampling periods for all the above stack gas determinands. US EPA Method 4, or equivalent, should be employed.

Stack flow rate measurements must be taken immediately before and immediately after all sampling exercises, in accordance with a recognised standard such as BS1042, unless the equipment used is capable of monitoring duct gas flow continuously during sampling. The flow rate data should be reported at stack conditions, at any other standard condition in accordance with statutory requirements, and at the reference condition of STP, dry, 10% oxygen for cement kilns and 11% O<sub>2</sub> for lime kilns. The latter should be used to convert all measured emission concentrations (at the same reference conditions) to mass emissions. Reports should quote all measured emissions in terms of mass emission rates as well as concentrations.

#### 4.2.6 Testing of Inputs, Products and Material Collected in Abatement Equipment

Testing of feeds, all fuels (excluding tyres), material collected in abatement equipment, waste generated and products is required under baseline and substitution conditions in accordance with Table 2 Annex 3.

Representative sample increments should be taken once per hour during the test periods and accumulated to provide a bulk aggregated sample. Where practicable, sample increments should be taken from falling or flowing streams. For solids, any material above 5 cm in size in the bulk aggregate sample should be crushed, then the sample should be mixed and progressively sub-divided (e.g. by cone and quartering) to provide a single representative sub-sample (around 5 kg) for each test period. For liquids, the bulk aggregate sample will need to be mixed and a suitable sized sub-sample obtained (e.g. by dip sampling); again a single representative sub-sample will be required for each test period.

Under baseline and maximum substitution conditions, samples of the un-recycled cement kiln dust and clinker should be analysed for the specified additional species set out in Section 4.2.8 when stack gas samples for those additional species are being taken. Samples of the substitute fuel burned during the stack gas sampling should also be analysed.

Annex 3 summarises the substances to be sampled for and the sampling frequency.

#### 4.2.7 Testing of Substitute Fuel(s)

There must be rigorous arrangements for sampling and analysis of the substitute fuel(s) used during the trials programme to provide assurance that all supplies of substitute fuel(s) meet the agreed specification. Representative substitute fuel(s) sample increments should be taken during each of the substitution test periods, as described in 4.2.6, and analysed in duplicate. In this way, a representative substitute fuel sub-sample is to be obtained for each substitution test period and duplicate analyses performed. Sampling and analysis should be carried out, where possible, by certified (UKAS or equivalent) organisations using protocols acceptable to the Agency. Accuracy and consistency of substitute fuel(s) testing should be confirmed by laboratory intercomparison exercises involving all participating parties, including Agency contractors.

Annex 3 summarises the substances to be sampled and analysed in the substitute fuel(s), along with the frequency of sampling. In some instances Officers may decide that sampling of a particular substitute fuel material would be impractical or dangerous. In these circumstances the Officer may decide, at his/her discretion, to accept an alternative approach. For example, the errors associated with sampling and preparation of tyres for analysis are likely to be very large and the sampling exercise may be unrepresentative. Therefore, because good generic analytical data are already available, it would be better to estimate pollutant inlet burdens from the generic analysis and the measured input substitute fuel rate. General guidance on generic tyre analysis can be found in the Agency report entitled "Tyres in the Environment". Officers should be aware that commercial vehicle tyres exhibit significantly different compositions to those of car tyres for some important species (e.g. iron and zinc contents). Consequently, Officers should require Operators to notify the Agency concerning the mix of tyres to be trialled. The mix should be confirmed at least once during each trial period.

The analyses of substitute fuels should comprise the determinands specified in Table 2 Annex 3.

During periods of maximum thermal substitution by substitute fuel(s), samples will be taken under Agency supervision so that comparative analyses can be undertaken by the

Operator's and the Agency's contractors. The Agency's costs will be recharged to the Operator.

For SLF the following additional requirements will need to be met:

- i) Copies of senders' and receivers' weighbridge documents, fuel batch reference numbers (i.e. the reference given to a discrete quantity of substitute fuel produced by a supplier) and chemical analyses must be kept by the Operator and the fuel supplier for a minimum of four years;
- ii) All waste streams used by the suppliers of substitute fuel must be traceable back to their source, with records of the original source materials being kept by the fuel supplier for at least four years;
- iii) Operators should institute systems to audit the fuel manufacturer's procedure to ensure that no materials other than those approved can be introduced into the fuel;
- iv) Representative samples must be taken at the cement or lime works to confirm fuel quality and specification prior to burning and during the period of the trials in accordance with Table 2 Annex 3;
- v) Quality assured procedures must cover acceptance of the fuel including its reception, unloading, sampling, testing and record keeping, and the procedures will be included in the application;
- vi) Fuel delivery paperwork must include a compliance certificate clearly showing the batch identification code; and
- vii) Provision must be made for representative inclusion of all phases, including any solids, in samples and aliquots for analysis. This will probably mean continuous circulation of stocks and sampling from a flowing line where the solids are in suspension equilibrium. Similarly, techniques used for metals analysis must ensure effective digestion of representative quantities of solids components, where digestion is a requirement of the analytical method.

#### 4.2.8 Additional Monitoring Requirements Specific to Particular Fuel Types

Specific additional determinands are required in relation to trials involving particular substitute fuel types, as detailed below. In general, this is because of the possible presence of particular substances in such fuel inputs, and the need to demonstrate their fate in the process. These substances should be measured in the substitute fuel and in the representative samples of all outputs (unless stated otherwise) under baseline conditions and at least at the maximum proposed substitution level.

<b>Substitute Fuel</b>	<b>Additional Monitoring</b>
Substitute liquid fuel	Pentachlorophenol Hexachlorocyclohexane (all isomers)

	DDT (all isomers)
Tyres (whole or chipped) (or detailed specification)	Zinc Polycyclic Aromatic Hydrocarbons (Annex 6) Benzene Butadiene Styrene, HBr, Chloromethane (all - stack emissions only)
Refuse-derived fuel	Zinc
Wood chips and sawdust	Pentachlorophenol Hexachlorocyclohexane (all isomers) Tributyl tin compounds
Dried sewage sludge pellets	Zinc
Dried sewage sludge	Zinc
Waste photographic emulsions e.g. X-ray film	Silver
Commercial (paper, cardboard, rags etc)	Zinc
Any material containing organophosphates	Total phosphorus compounds
OTMS Tallow	Refer to OTMS Tallow Protocol <sup>(v)</sup>
MBM	Refer to IPC Technical Guidance Note S2 5.01, Amplification Note No.1, Animal Remains Incineration

#### 4.2.9 Environmental Monitoring

Where there are specific justifiable concerns, a long term programme of ambient air monitoring may be required to monitor the environmental impact from the plant, and to ensure that a high level of protection of the environment is maintained, consistent with the Agency's statutory duties. Account should be taken of the Agency's guidance on the monitoring of ambient conditions set out Technical Guidance Notes M8<sup>(m)</sup> and M9<sup>(n)</sup>.

This should assess environmental levels of key pollutants identified as a priority for control. The number of stations required will depend, amongst other things, on local topography and variability of prevailing winds. The arrangements should include control and downwind locations, including the area of maximum ground level deposition from stack emissions. A meteorological station should be provided for the duration of the ambient sampling exercise in a location free of significant interference from buildings or other structures.

Where there are specific justifiable concerns, a programme of soil monitoring of dioxin/furan, dioxin-like PCBs and/or heavy metal levels should be agreed (see Annex 4) for trials, and should be considered for on-going assessment of long term trends. Background control sampling points should be included. The Officer will need to be satisfied that there is an appropriate monitoring programme with suitable sites, sample collection and analytical facilities. Officers are recommended to arrange for sampling of soil in advance of trials if possible.

#### 4.2.10 Recording of Process Parameters

Plant process conditions should be recorded during the baseline and substitute fuel burning periods of all trials, and should be included in all monitoring reports. As a typical minimum requirement, this should include readings of the following parameters (example for dry cement kilns) and any other parameters Agency considers appropriate:

- cyclone pre-heater temperatures;
- primary and secondary air temperatures;
- clinker cooler temperatures;
- kiln exit temperatures;
- kiln throughput;
- fuel quality and input rates (including substitute fuels when being burned);
- abatement operation (including details of abnormal operation and times);
- kiln exit CO and oxygen concentrations;
- CKD recycle rate;
- clinker free lime content; and
- alkali metal/sulphur ratios.

## 4.3 Reporting of Substitute Fuel(s) Trials

### 4.3.1 Content of Report

To enable an Officer to evaluate the results of substitute fuel(s) trials it will be necessary to submit a comprehensive report, which is complete in its own right. It should not make reference to documents elsewhere or to ones that have been submitted to the Agency on some earlier occasion. Therefore, the report should include the following:

- a) Covering letter explaining what has been submitted and a synopsis of the Operator's findings;
- b) A separate discussion with supporting information demonstrating the performance and degree of achievement against each of the CSFs;
- c) Comparative data for both baseline testing and trials testing at the maximum substitution rate, comprising results from all process measurements and analysis, measurements and analyses for all inputs and outputs from the process, and mass balances where possible;
- d) All other relevant testing and monitoring including environmental sampling and analyses;
- e) Information regarding issues raised during consultation and how they have been addressed;
- f) Conclusions and recommendations including justification; and
- g) Non-technical summary of the application.

### 4.3.2 Reporting of Monitoring Data

Monitoring results must be reported on Environment Agency standard report forms (where available) for monitoring of emissions to atmosphere. All reports shall include the following features, as a minimum requirement:

- Details of all methods employed for sampling and analysis, including reference to standard methodologies;
- Details of plant layout, sampling ports and plans with diagrams;
- Limits of detection, accuracy and precision on an individual basis for all samples;
- How the limits of detection, accuracy and precision of measurements have been determined;
- Plant operating conditions - any abnormalities should be highlighted (with timings) for the period of the trials;
- Summary tables of all monitoring results;
- Start and end times of all sampling;
- Full presentation of pitot and temperature traverses taken before, during and after sampling, along with gas flow rate results;

- Full raw monitoring data in appendices, including all laboratory measurements and test variables;
- Presentation of calculations of concentrations, flows and mass emissions;
- Details of any non-compliance with standards employed;
- Dioxin/furan and dioxin-like PCB test reports should include determined levels of all congeners and full tabulation of spike recoveries by congener;
- Metals test reports for stack emissions should tabulate each metal measured in both particle and vapour phases. The combined emission should be reported for each metal. The mass of each determinand collected in the particle phase, the bulked impinger solutions (excluding the final impinger solution) and the final impinger solution must be measured and reported separately; and
- Derivation of monitoring results used for air dispersion, dioxin trail and H1 assessment.

#### 4.3.3 Content of Permit for Continuous Use of Substitute Fuel(s)

The Agency will follow its own procedures for issuing a PPC permit or variation notice which will contain, as a minimum, conditions addressing:

- Specification for the substitute fuel(s) composition and substitution rate. (This shall be consistent with that actually used in the trials, i.e. the rate of substitution and range of composition of the substitute fuel(s) actually used during the trials will limit the allowable substitute fuel(s) specification);
- Circumstances under which substitute fuel(s) cannot be used;
- Handling, storage, controls for and sampling of substitute fuel(s);
- Release limits for baseline and when using substitute fuel(s);
- Detailed compliance monitoring requirements;
- Reporting requirements; and
- Maximum and minimum values for any parameters as specified in Article 3.4 of HWID or Article 4.4 of WID if appropriate.



## 5. REFERENCES

- (a) Draft Environment Agency IPPC Guidance Note S3 3.01 Cement and Lime Sector, May 2001, available from the Agency website: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk).
- (b) Environment Agency IPC Guidance Note S2 5.01 Waste Incineration, October 1996, ISBN 0-11-310117-1
- (c) Environment Agency IPC Guidance Note S2 5.01 Amplification Note No.1, Version 2, Animal Remains Incineration, December 1997
- (d) Technical Guidance Note M1 Sampling facility requirements for the monitoring of particulates in gaseous releases to atmosphere, 2002, Environment Agency
- (e) Technical Guidance Note M2 Monitoring of stack emissions to air, 2003, Environment Agency
- (f) Technical Guidance Note M3 – Currently being revised
- (g) Technical Guidance Note M4 – Currently being revised
- (h) Council Directive 94/67/EC of 16 December 1994 on the incineration of hazardous waste.
- (i) Council Directive of 8 June 1989 on the prevention of air pollution from municipal waste incineration plants (89/369/EEC).
- (j) SI 1994, No 1056 Environmental Protection. The Waste Management Licensing Regulations 1994.
- (k) SI 1996, No 972 Environmental Protection. The Special Waste Regulations 1996.
- (l) Council Directive 91/689 of December 12, 1991 On Hazardous Waste.
- (m) Environment Agency Technical Guidance Note M8 – Environmental Monitoring Strategy- Ambient Air. ISBN 0-11-310175-9
- (n) Environment Agency Technical Guidance Note M9 - Monitoring Methods for Ambient Air. ISBN 0-11310176-7
- (o) Environment Agency Horizontal Guidance Note H1: IPPC Environmental Assessment and BAT Appraisal methodology (the consultation version, available on the website should be used until final version is published).
- (p) HWID: Regulatory Guidance Note issued 14 July 1999
- (q) Council Directive 2000/76/EC of December 4, 2000 on incineration of waste.
- (r) WID Regulations (SI 2002 No 2980 – The Waste Incineration (England and Wales) Regulations 2002 – ISBN 0-11-044174-5)

- (s) Defra Guidance on Directive 2000/76/EC on the incineration of waste.  
[www.defra.gov.uk](http://www.defra.gov.uk)
- (t) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.  
Working Together for Clean Air. January 2000 and 2003 Addendum.  
[www.defra.gov.uk](http://www.defra.gov.uk)
- (u) The Waste Strategy 2000: *England and Wales*, May 2000. [www.defra.gov.uk](http://www.defra.gov.uk)
- (v) Draft OTMS Tallow Protocol, June 2003

## ANNEX 1:

### Arrangements for extended public consultation

1. Subject to any future Agency policy on extended public consultation procedures, the following key stages have been identified for engagement with the public for applications to use substitute fuel(s):
  - i) Pre-application consultation by the Operator;
  - ii) Consultation on the application by the Agency; and
  - iii) Publication of the Agency's decision, with explanation.
2. Operators have no obligation to undertake anything beyond statutory requirements. However, the Agency will encourage their involvement but would, in most cases, still proceed with Stages ii) and iii) even if an Operator refused to carry out Stage i).
3. Application of the extended public consultation arrangements needs to be flexible if it is adequately to reflect the specific circumstances of each case. The particular approach adopted at each of the above stages will therefore vary according to the circumstances of the application.
4. The procedural requirements for a staged consultation are detailed in Section 3.3, **Procedures 1 & 2**. The following sections provide advice on various aspects of a consultation organised by the Agency.
5. The Stage i) consultation provides an opportunity for Operators to explain what they intend to do and engage with the public to listen and understand their comments and concerns. It will enable the Operator to be proactive and address the concerns of the public in the application.
6. The Stage ii) consultation provides an opportunity for the Agency to explain its role. The Agency will not, at this stage, be in a position to advise on whether a permit or variation notice will be granted or the specific conditions that might be imposed.

### Content of advertisement of an application

7. The advertisement of an application by Public Notice will be expanded to clarify the process change being proposed, and will include the anticipated length of trials and percentage substitution and type of substitute fuel(s) to be used. The Public Notice should refer specifically to the waste type, e.g. municipal waste or hazardous waste, as appropriate. In particular, the advertisement will also explain the Agency's proposed consultation methods, including the date of any public meetings and/or discussion surgeries, and explain the availability of a consultation document prepared by the Agency, to provide easily understandable information about the process and the application. Operators will be given a pro-forma to enable them to incorporate the new requirements into their statutory advertisement. It is not expected that the advertisement will be a great deal longer than that required by statute. The format of a typical advertisement is given at the end of this Annex.
8. Where appropriate, the Operator will be expected to place adverts in more than one local newspaper reasonably identified as circulating in the vicinity of the process and the *London Gazette*. Agency press releases outlining the content of the advertisement will be issued with a view to encouraging press coverage beyond the advertisements section.

### Additional Notification and Consultation

- a) Statutory consultees include the relevant Primary Care Trust/Health Board, the Food Standards Agency (FSA), relevant Local Authority, English Nature/Countryside Council for Wales (if the emissions may affect a site of special scientific interest or a European site), and the HSE (for COMAH sites).

Councils and Parish Councils in the area of the relevant local authority should also be consulted. In particular, FSA will be consulted regarding its role of assessing the potential for adverse effects on the safety of the food chain, and for public health issues the advice of the relevant Primary Care Trust/Health Board will be sought.

9. Other possible consultees include MPs, MEPs, local resident associations, special interest groups, local chambers of commerce and trade, and local businesses. Local liaison committees are often a very successful means of dealing with local concerns relating to the potential effect of site operations on the surrounding neighbourhood. However, in a number of cases the potential effects associated with an application may not just be local. It is also important to recognise that the views of local residents may not coincide with those of the wider public, and all material issues must be given fair and equal consideration in reaching the determination. Where appropriate we consult one of our statutory committees - the Regional Environment Protection Advisory Committee (REPAC), the members of which include representatives from local authorities, industry, local communities and representatives from other interest groups. We may also consult Area Environment Groups, which are non-statutory committees with a similar membership to REPACs.
10. It is important both to select appropriate consultation mechanisms and to ensure that all potentially interested or affected parties are given the opportunity to make representations. This will require a careful consideration by the Agency of the material issues raised by a substitute fuel(s) application, the people likely to be directly affected, and groups and organisations likely to have a particular interest or relevant expertise.
11. The role of specialist consultees should be agreed at an early stage. If a public meeting is to be held, representatives should be encouraged to attend and asked to participate in discussions relating to their areas of expertise.

### **Consultation Document**

12. The Agency will write a consultation document and ensure that it is available as soon as possible after receipt of the application so as to be available as soon as the Public Notice is issued. A typical layout is included at **Annex 2**, although this may be adapted to suit the circumstances of the application in question. The document should aim to contain the information listed below in non-technical language where practicable:
  - a) Brief description/history of the installation in question;
  - b) Brief description of the proposal. This should include a description of the waste to be used in the substitute fuel, e.g. hazardous waste;
  - c) Outline of the content of the application (e.g. for trials this will be the tests and monitoring programme proposed and for continuous use, proposed critical success factors, the assessment of the results of the trials);
  - d) Outline of the statutory framework applying to the proposal and in particular the procedural steps involved in processing the application with likely timescales;
  - e) Outline of main issues raised by the application and upon which comments are particularly invited. The main issues will be the risks involved, the safeguards being taken or being imposed, the proposed monitoring programme, proposed critical success factors and an indicative BAT case (including an outline, within the statutory framework, of the potential environmental consequences of using substitute fuel(s)); and
  - f) Process flow diagram outlining, e.g. critical temperatures, emission points etc.
13. The Agency will endeavour to take the opportunity to ensure that there is a wider knowledge of applications to burn substitute fuel(s), e.g. by letters to residents in the vicinity, use of local radio and articles in newspapers, and to engage the public and other interest groups in discussions on such applications.

14. There are various mechanisms for undertaking this second stage, and a non-exhaustive range of possible options is listed below. Whatever the mechanisms, the Agency will attempt to provide factual answers and facilitate the discussion. We will not take sides, either for or against the application, but will explain our role, listen to and record the public's comments, and attempt to ensure that we have fully understood any comments.

#### **Mechanisms for public consultation**

15. It is possible to consult the public in many different ways. Examples of current practice and other possibilities are listed below:

- Public meetings, where information can be provided by all participants. The Operator or the Agency would arrange them, with an impartial chair being arranged by the Agency. Meetings could, where appropriate, be held jointly with a local authority or council or other statutory consultee.
- Attendance at other meetings, for instance, local parish meetings where the application is an item on the agenda.
- Use of the discussion surgeries where members of the public can discuss issues with Agency staff.
- Exhibitions, to be toured to local libraries, schools, council offices, community centres and village halls.
- Direct mailing of consultation documents to interested parties, including details of the application and requesting written comments, for instance in answer to specific questions.
- Expanded advertisements or articles in the local press.
- Interviews on local radio and television.
- Press announcements that documents placed on the public registers will be made available in line with Agency customer charter standards.
- Letters, for example to residents, local groups, MPs, MEPs.
- Talks to local groups, either by way of information, or by participation in debates (the role of the Agency will need to be made clear).
- Publication of documents, explaining the role of the Agency in general; publication of specific documents explaining the technical issues and how they can be addressed.
- Distribution of posters to publicise public meetings/discussion surgeries.
- Publish key documents on the Agency website.

16. In addition to the dissemination of information the Agency would use these mechanisms in appropriate combination to encourage the submission of comments in writing.

17. Agency consultation can be carried out using any of the mechanisms above, alone or in combination. The choice will depend on the specific circumstances of each application.

18. Members of the public will be encouraged to make written submissions to the Agency. If a public meeting is held, it will be important to emphasise this point to ensure that all comments are properly

recorded. It would also be good practice to make a taped record of the meeting to ensure accuracy of representation. Discussion surgeries are less formal, consequently notes of discussions will be sufficient.

### **Consultation period**

19. Whilst responding within the statutory consultation period (28 days from the date of the advertisement) is strongly encouraged, and the public should be informed that only responses so received can be guaranteed to be considered, every effort should be made to consider any material representations received within a reasonable period before determination. It will be made clear in the advertisement that the application is required to be determined within four months of receipt, what that end-date is, and that representations received close to that date may be difficult to accommodate.

### **Further application information received during consultation**

20. Sometimes further information is requested from Operators (by means of a Notice) when the original application is lacking in some aspect, or additional material information may become available during the determination period. The Agency will endeavour to identify any shortcomings in the application and serve a notice on the Operator before the Operator places the advertisement, so that the advertisement itself and the consultation document are both able to indicate that further information will be forthcoming. In such situations, the advertisements will also give an approximate date by which the additional information can be expected to be available on the public registers. Where it has not been possible to serve a Notice requiring further information prior to the advertisement or in cases where further information becomes available, the Agency will publicise its receipt specifically as appropriate (particularly where the information is significant). Where further information is required, the Agency will endeavour to extend the determination period (in addition to the statutory provision for time to stop running until the Operator responds to the notice). All information constituting part of the application will be placed on the public register (subject to commercial confidentiality considerations), and the Agency will use its best endeavours to bring this to consultees' attention. Should the additional information have the potential to materially affect a statutory consultee's response (e.g. information relating to public health), that consultee may need to be given an additional period to make a supplementary response, and the Operator's agreement to an extension to the determination period should be obtained.

### **Acknowledging and considering representations**

21. All written representations received by the Agency will be acknowledged and placed on the public register unless they contain a request not to. All representations received within the statutory consultation period or otherwise within a reasonable time before determination will be considered in determining whether to allow the application to burn substitute fuel(s).
22. If the first two stages of the process indicate that the application did not raise issues of significant public concern, or if either stage was found adequately to address such concerns, then the Agency might decide to let the procedure lapse and interested parties would be informed. The application would thereafter be dealt with in accordance with normal procedures.
23. Ultimately, the Agency has to consider the information in an application, all material representations and then make a technical assessment. The Agency will then decide if the proposals should be permitted and, if so, what conditions to impose.

## **Publication of the Agency's decision with explanation**

24. Irrespective of whether a permit or variation notice is either granted or refused, the criteria set out in Section 2 of this Protocol will be used. There will be a clear explanation of the reasons for the decision and a response to all the relevant issues made in the consultation process. If representations are made raising issues that fall outside the scope of the Agency's expertise or remit, they should be referred to an appropriate organisation for comment and should not be considered in reaching the decision. Comments from that organisation will be incorporated, as appropriate, in the Agency's explanation of its decision. It will usually be appropriate to demonstrate how each material point has been dealt with by reference to conditions in the permit or variation notice.
25. On determination of an application, all those who responded to the consultation should be notified, either individually where the numbers are small, or by a formal announcement, e.g. in the local or national press.
26. It is important to ensure that the Agency's decision on the application is properly documented and recorded. A decision document will be made widely available, with documents placed at accessible points, such as the Agency's public registers, local libraries and council offices. The decision document should be non-technical wherever possible, easy to read, and should relate the Agency's decision to the key issues raised by the consultation.
27. It may be appropriate to hold further public meetings/discussion surgeries to explain Agency's decision.

## **Liaison with Local Authorities**

28. Officers are advised to liaise on a regular basis with local authority officers and members regarding the Agency's determination of applications to burn substitute fuel(s). In particular, local authorities may be able to advise on arrangements for public meetings/discussion surgeries and it may be appropriate for the local authority to chair the meetings where a planning permission is a prerequisite to the granting of a permit or variation notice. Joint activities will help the public gain a clearer understanding of the issues and the respective roles of the Agency and local authorities.
29. Town and parish councils, district, unitary and county councils can provide valuable input to the Agency in deciding when and to what extent we should consult local people, and if holding a public meeting/discussion surgery would be appropriate. Parish and town council meetings can often be the best public forum for discussions on issues of local concern, rather than separate public meetings organised by the Agency or the Operator.
30. Where an application is made within the same time frame as an application for planning permission, it is important that the Agency does not revisit the issues which are rightly part of the planning consultations, even where both processes have identified similar concerns. The planning and the pollution control systems are separate but complementary. Just as planning controls are not an appropriate means of regulating the detailed operational characteristics of cement or lime manufacturing installations, the PPC regime is not an appropriate way of regulating other aspects of a proposed development. Provided that the Operator is able and prepared to co-operate, a "parallel track" approach, as proposed by PPG Note 23<sup>1</sup>, will enable many issues to be dealt with concurrently. Additional benefits might also accrue, e.g. consultation with town and parish councils will allow linked issues to be considered at the same time.
31. In such circumstances, the process would be helped if the Agency's consultation on the application is carried out during consideration of the planning application. This will depend on the Operator

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1 Planning Policy Guidance Note 23: Planning and Pollution Control, Department of the Environment (DoE), July 1994. PPG 23 is now being updated following a consultation by Defra in 2002.

submitting the application at this stage. An Operator can be encouraged to do this but there are no powers to require it. However, such an approach would help inform the Agency's decision-making, enable us to comment better on Environmental Assessments, and provide opportunities for explaining the respective roles of the Agency and planning authorities.



## Typical advertisement for a PPC permit

### Public Notice

**PUBLIC NOTIFICATION OF AN APPLICATION MADE UNDER REGULATION 10  
OF  
THE POLLUTION PREVENTION AND CONTROL (ENGLAND AND WALES) REGULATIONS 2000  
*INTEGRATED POLLUTION PREVENTION AND CONTROL***

Notice is hereby given that "*name of applicant*" (the "Applicant") has submitted an application (the "Application") to the Environment Agency (the "Agency") for an Pollution Prevention and Control (PPC) permit to operate an installation involving the manufacture of *cement/lime*\* (the "Installation"). The Installation is located at "*site address*" in the *Borough/District* of "*Name of Borough or District*" in the County of "*Name of County*".

The Application contains a description of any foreseeable environmental effects of emissions from the Installation.

The Application involves proposals to use a substitute fuel(s) comprising [ ] in place of up to [\_%] of the conventional fuel(s) presently in use[*not appropriate if a new installation*], namely [ *coal, petcoke, gas, oil, other*]\*. Use of this/these fuel(s) on a permanent basis will be permitted only if a trial is successfully completed to the satisfaction of the Agency. The trial is expected to last for approximately [3 months]. The substitute fuel(s) proposed *is/contains*\* (*Directive-hazardous/municipal*\*) waste and is described more fully in the Application.

[It should be noted that the Agency has served a notice on the Applicant requesting further information, which should be provided by [date].]

Information relating to the Application for a permit to operate the Installation is held in registers at the following locations:

The Environment Agency  
"*Agency address as given*"

"*Borough or District Council and Address*"

[The Applicant's response to the notice requiring additional information will also be placed on the registers when it is received.]

Members of the public can inspect these registers free of charge at the above stated addresses during normal office hours. In addition, members of the public who wish to obtain a copy of the information contained in the registers can do so either when attending the public register office in person or on written request to the Environment Agency's address above. Copies may be subject to a payment of a reasonable charge to cover the cost of photocopying.

In addition, a consultation document outlining the content of the Application and other relevant matters will be available from the week commencing [ ] for inspection on the public registers at the locations given above, or on request to the Environment Agency at the above address, free of charge. Members of the public may, additionally, like to note that the Agency will be organising [a *public meeting*] [*and/or*] [*discussion surgery*] with regard to the Application to be held on [ ], the details of which will be available from the Agency's address above and will also be publicised.

Any representations in relation to the Application should be made in writing to the Agency at the address below, within 28 days from the date of this public notice.

The Environment Agency  
"*Agency address as given*"

Although the law requires only 28 days to be allowed for representations, the Agency will endeavour to consider material representations received beyond the 28 day period, until such time as the Agency makes its decision. However, it should be noted that the Agency is required to determine the Application by [ ]

Any representations will be entered into a public register unless the person making them requests in writing that the Agency does not do so, in which case the register will only state that there has been such a request.

## Typical advertisement for a change to a PPC permit

### Public Notice

**PUBLIC NOTIFICATION OF AN APPLICATION MADE UNDER REGULATION 17  
OF  
THE POLLUTION PREVENTION AND CONTROL (ENGLAND AND WALES) REGULATIONS 2000  
*INTEGRATED POLLUTION PREVENTION AND CONTROL***

Notice is hereby given that “*name of applicant*” (the “Applicant”) has submitted an application (the “Application”) to the Environment Agency (the “Agency”) for a variation to its Pollution Prevention and Control (PPC) permit No. XXX (the “Permit”) which governs the operation of an installation involving the manufacture of *cement/lime*\* (the “Installation”) at “*site address*” in the *Borough/District* of “*Name of Borough or District*” in the County of “*Name of County*”.

The Application involves proposals to use a substitute fuel(s) comprising [ ] in place of up to [\_%] of the conventional fuel(s) presently in use, namely [ *coal, petcoke, gas, oil, other*]\*. Use of this/these fuel(s) on a permanent basis will be permitted only if a trial is successfully completed to the satisfaction of the Agency. The trial is expected to last for approximately [3 months]. The substitute fuel(s) proposed *is/contains*\* (*Directive-hazardous/municipal*\*) waste and is described more fully in the Application.

[It should be noted that the Agency has served a notice on the Applicant requesting further information, which should be provided by [date].]

Information relating to the Application for a variation to the Permit is held on registers at the following locations:

The Environment Agency  
“*Agency address as given*”

“*Borough or District Council and Address*”

[The Applicant’s response to the notice requiring additional information will be placed on the registers when it is received.]

Members of the public can inspect these registers free of charge at the above addresses during normal office hours. In addition, members of the public who wish to obtain a copy of the information contained in the registers can do so either when attending the public register office in person or on written request to the Agency's address above. Copies may be subject to a payment of a reasonable charge to cover the cost of photocopying.

In addition, a consultation document outlining the content of the Application and other relevant matters will be available from the week commencing [ ] for inspection on the public registers at the locations given above, or on request to the Agency at the above address, free of charge. Members of the public may, additionally, like to note that the Agency will be organising [a *public meeting*] [and/or] [*discussion surgery*] with regard to the Application to be held on [ ], the details of which will be available from the Agency's address above and will also be publicised.

Any representations on the Application should be made in writing to the Agency at the address below, within 28 days from the date of this notice.

The Environment Agency  
“*Agency address as given*”

Although the law requires only 28 days to be allowed for representations to be made, the Agency will endeavour to consider material representations received beyond the 28 day period until such time as the Agency makes its decision. However, it should be noted that the Agency is required to determine this application by [ ].

Any representations will be entered into a public register unless the person making them requests in writing that the Agency should not do so, in which case the register will only state that there has been a request.

## ANNEX 2

### Environment Agency

#### Consultation Document on the Proposed Use of [ ] at [ ] (based on an application for variation **xxxx**...)

#### 1. Introduction

[ ] (the “Applicant”) has applied to the Environment Agency (the “Agency”) for permission to use [ ] as a partial substitute fuel at its works in [ ] (the “Installation”). The Applicant has proposed to use [ ] as a substitute fuel(s) in place of up to [ ] of the conventional fuel(s), namely [ ].

This document sets out to:

- explain the proposal;
- summarise the procedures to be used by the Agency in determining this application; and
- highlight the issues involved.

#### 2. Existing Permission

[Details of any IPC Regulatory history, first PPC permit (the “Permit”), subsequent variations and, in particular, any previous substitute fuel(s) trials or permissions.]

#### 3. Process Description

[Technical details, amplified in Appendix A]

#### 4. The Application

The Applicant has made its application under the Pollution Prevention and Control Regulations. It has applied to use [ ] as a substitute fuel(s), subject to the satisfactory completion of a trial. The company plans to use up to [ ] fuel substitution. [Summary of trials programme and any monitoring requirements as set out in the application.] Comprehensive consultation will take place on the application. The procedures to achieve this are described below.

#### 5. Application Procedures

The Application (reference [ ]) has been placed on the public registers. The Application will be subject to full consultation before a decision is made by the Agency, so that the Agency is fully informed of all relevant issues in taking its decision. Specific statutory consultees are required to be consulted. In addition, the procedures are designed to encourage public comment. The arrangements for this are described below in the next few sections.

#### 6. Public Registers

The public registers containing information relevant to the Application are held at the following locations: [ ]

Any member of the public can view them, free of charge, between 9.30am and 4.30pm, Monday to Friday (except bank holidays), or may telephone or write for information.

The following information is required to be placed or held on the public registers:

- the Application;
- representations from statutory consultees;
- representations from members of the public unless they request that their response(s) is/are not placed on the public registers;
- the existing Permit, including limits for releases and details of any variation to the permit, or notice of transfer of company ownership;
- the Applicant's monitoring data required by the conditions of the permit and any Agency independent check monitoring results;
- a copy of the statutory advertisement placed by the Applicant in the local press and London Gazette;
- any formal request by the Agency for additional information and the Applicant's response;
- any enforcement action or prosecutions taken by the Agency against the Applicant;
- a copy of any notice of appeal;
- details of any direction given to the Agency by the Secretary of State; and
- a copy of any report published by the Agency, assessing the environmental consequences of carrying out a process under the installation permit.

## **7. Advertisement of Application**

The Applicant must place an advertisement in the local press and the London Gazette publicising the Application. The notice for the Application was published in the [ ] and the London Gazette on the [ ]. The public has 28 days from the date of the advertisement to make representations (although material representations received beyond this period will be considered as far as possible). All those who comment to the Agency will receive an acknowledgement letter within 10 working days. Any representations are placed on the public registers unless the correspondent requests otherwise.

## **8. Statutory Consultees**

There are a number of official bodies that must, by law, be consulted on the Application. The following bodies have been consulted: Primary Care Trust/Health Board, the Food Standards Agency, [*Health and Safety Executive, English Nature, Countryside Council for Wales, Sewage Undertakers*] and [ ] District Council. Consultees should respond within 28 days. If the consultees fail to respond, a reminder is issued allowing a further 14 days to comment. In light of consultee responses, the Agency may ask the Applicant for more information at this stage. The response will be placed on the public registers. If further information received is significant, the Agency will publicise its receipt to ensure consultees and the public are kept informed and given an opportunity to make further representations.

## **9. Additional Consultation**

With regard to this particular application, additional arrangements for consultation (going beyond statutory requirements) are planned as follows:

- a) The following parish and town councils: [ ] Copies of the application have been sent to each of these consultees for comment and they have been requested to respond within 28 days.
- b) To hear local views, **a public meeting and /or discussion surgery is being organised by the Agency. This is scheduled to take place at [ ] on [ ] from [ ]. The public meeting will be chaired by [ ].** If required
- c) Extended consultation is also being undertaken with [*insert name of extra consultees identified during extended consultation exercise, as appropriate*].

## 10. Decision on the Application

The Agency will carefully consider the Application and all material representations. When the Agency makes its determination, it will set out its reasoning in a decision document which will also address material representations received by the Agency. This is usually done on an issue-by-issue basis, although responses from statutory consultees may be more individually addressed. The decision document will be placed on the public registers and the statutory consultees will be notified. The decision will also be widely publicised.

## 11. Statutory Framework

The statutory framework governing the Agency's determination of this application is principally that contained in the Pollution Prevention and Control Regulations 2000. In summary, all PPC installations should be operated so as to ensure that all appropriate preventative measures are taken against pollution, and that no significant pollution is caused. Further information on the PPC regime can be found in "Integrated Pollution Prevention and Control: A Practical Guide" (ref.1) and Guidance on best available techniques for cement and lime manufacture is provided in the IPPC Guidance Note S3.01 (ref.2).

## 12. Issues Raised by this Application

Site specific issues for this application include:

- a) Will there be adequate safeguards for the trial? e.g. instrumentation, site security, release limits, hazard operability study etc;
- b) Is plume dispersion likely to be adequate for burning substitute fuel(s) on this site?;
- c) Are there adequate plans for start up, shutdown and contingencies?;
- d) Stability of kiln operation e.g. plant trips;
- e) Are there appropriate procedures and are personnel adequately trained?;
- f) The monitoring requirements will be specified by the Agency to provide sufficient information to enable a thorough evaluation of the process emissions. The monitoring regime will include measurement of the principal process emissions e.g. oxides of nitrogen, sulphur dioxide, carbon monoxide and particulate matter. Other emissions such as dioxins/furans and dioxin-like PCBs, particulate matter less than 10 microns (PM<sub>10</sub>), heavy metals, volatile organic compounds (VOCs), hydrogen halides etc. will also be measured;
- g) Environmental monitoring. e.g. for dioxin/furan and dioxin-like PCBs, soil sampling may be undertaken to check on trends; ambient air monitoring to assess local air quality
- h) On the issues associated with the food chain advice will be sought from the Foods Standards Agency (FSA). For public health issues the advice of the [ ] Primary Care Trust/Health Board will be sought.

**The Agency welcomes views on these and any further issues raised by this application.**

### **References**

1. Integrated Pollution Prevention and Control: *A Practical Guide* available from The Department of the Environment, Food, Rural Affairs, PO Box 236, Wetherby, West Yorkshire. LS23 7NB
2. Guidance on best available techniques for cement and lime manufacture is provided in the IPPC Guidance Note S3.01 which is available from the Agency website: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

**Appendix A** - Technical details of the process

## ANNEX 3

### Operator Monitoring of Inputs and Outputs

#### (I) Continuous Monitoring of Stack Emissions

The minimum criteria for continuous monitoring of emissions at baseline conditions and maximum substitution rate, using the Operator's installed continuous emission monitoring systems (CEMs) are given in Table 1.

It should be noted that all continuous emission monitoring will be required for a minimum period of 6 weeks for both baseline and maximum substitute fuel(s) substitution conditions. Data are to be logged/recorded as 1-minute means. In addition, maxima, minima, means, and standard deviations are to be reported for 15 minute, 30 minute, hourly means and daily averages.

**Table 1: Continuous Emission Monitoring Requirements (e.g. cement kiln stacks)**

Parameter	Testing required (Letters refer to Notes below)
Particulate matter	*
NO <sub>x</sub> (as NO <sub>2</sub> )	*
SO <sub>2</sub>	*
CO	*
HCl	* (a)
Oxygen, moisture, temperature and pressure	* (b)
HF	* (a)
VOCs (as TOC)	* (a)

#### Notes for Table 1

- \* An asterisk denotes that a determinand should be continuously monitored in accordance with section 4.2.4
- (a) Continuous monitoring of these parameters may be difficult but systems are now available and continuous monitoring should be conducted where appropriate
- (b) To be measured whenever other measurements are made

**(ii) Periodic Monitoring of Inputs and Outputs**

The minimum requirements for periodic monitoring of the input and output streams are given in Table 2. For the periodic stack emission monitoring Table 2 only indicates which parameters are to be monitored. To determine the various monitoring options and the minimum number of samples to be taken for stack monitoring, then those determinands indicated in Table 2 should be inserted (in turn) in the flow chart given in Figure 1.

**Table 2: Periodic Monitoring of Inputs and Outputs**

Parameter	Feeds (a)	Fuels (a) (c)	Substitute fuel(s) (a)	Kiln stack	CKD (a) (f)	Clinker (a)
Particulate matter				*		
PM <sub>10</sub>				*		
NO <sub>x</sub> (as NO <sub>2</sub> )				*		
SO <sub>2</sub>				*		
CO				*		
HCl				*		
HF				*		
VOC (as TOC)				*		
Heavy metals	*(e)	*(e)	*(b) (e)	*(e)	*(e)	*(e)
Total of each S, F, Cl, Br, I	*	*	*(b)		*	*
Dioxins, furans and dioxin-like PCBs				*	*	*
Moisture, temp., O <sub>2</sub>				*		
Flow	*(d)	*(d)	*(d)	*(d)	*(d)	*(d)
Calorific value (gross and net)		*	*			
Water content			*			
Solids and ash content			*(b)			
Free lime content, alkalinity, and pH of leachate					*	
Other species (including paragraph 4.2.8 requirements)			*	*	*	*

**Notes for Table 2**

- \* An asterisk denotes that a parameter is to be periodically monitored
- (a) At least two incremental samples to be taken over each test period (Officers have discretion as to how samples are to be bulked for analysis)
- (b) Sampling and analysis as appropriate depending on the type of substitute fuel(s)
- (c) Each fuel to be tested separately
- (d) Flows in kg/hr, except for stack flow which should be in m<sup>3</sup>/s
- (e) Specified in Annex 5
- (f) Sampling not required if 100% of the cement kiln dust is recycled during normal operation.

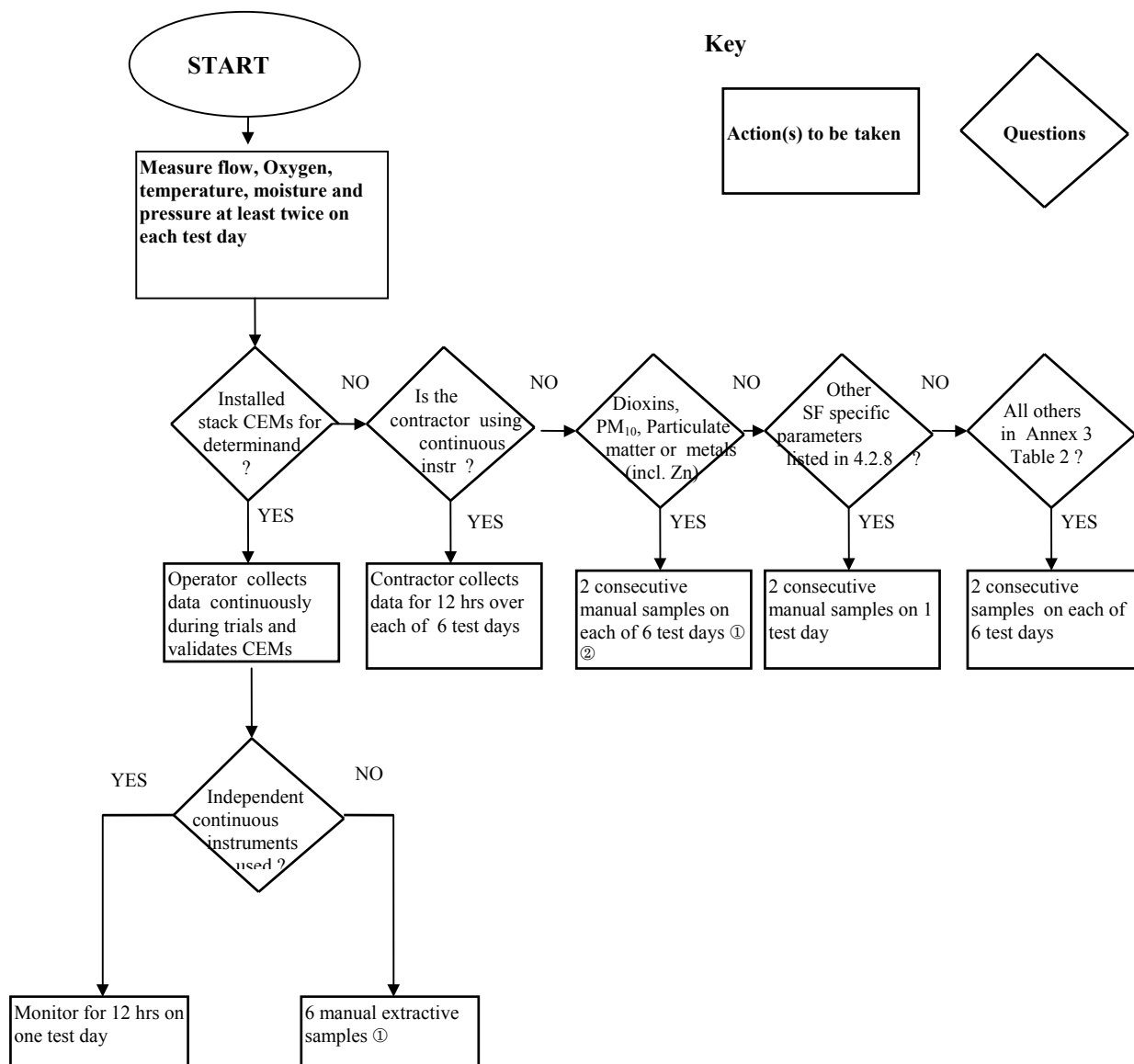


**FIGURE 1**  
**Flow Chart for determining minimum stack sampling requirements for an individual test**

**Notes on use**

To determine the various monitoring options and the minimum number of samples to be taken, determinands indicated in Table 2 should be inserted (in turn) in the flow chart given below.

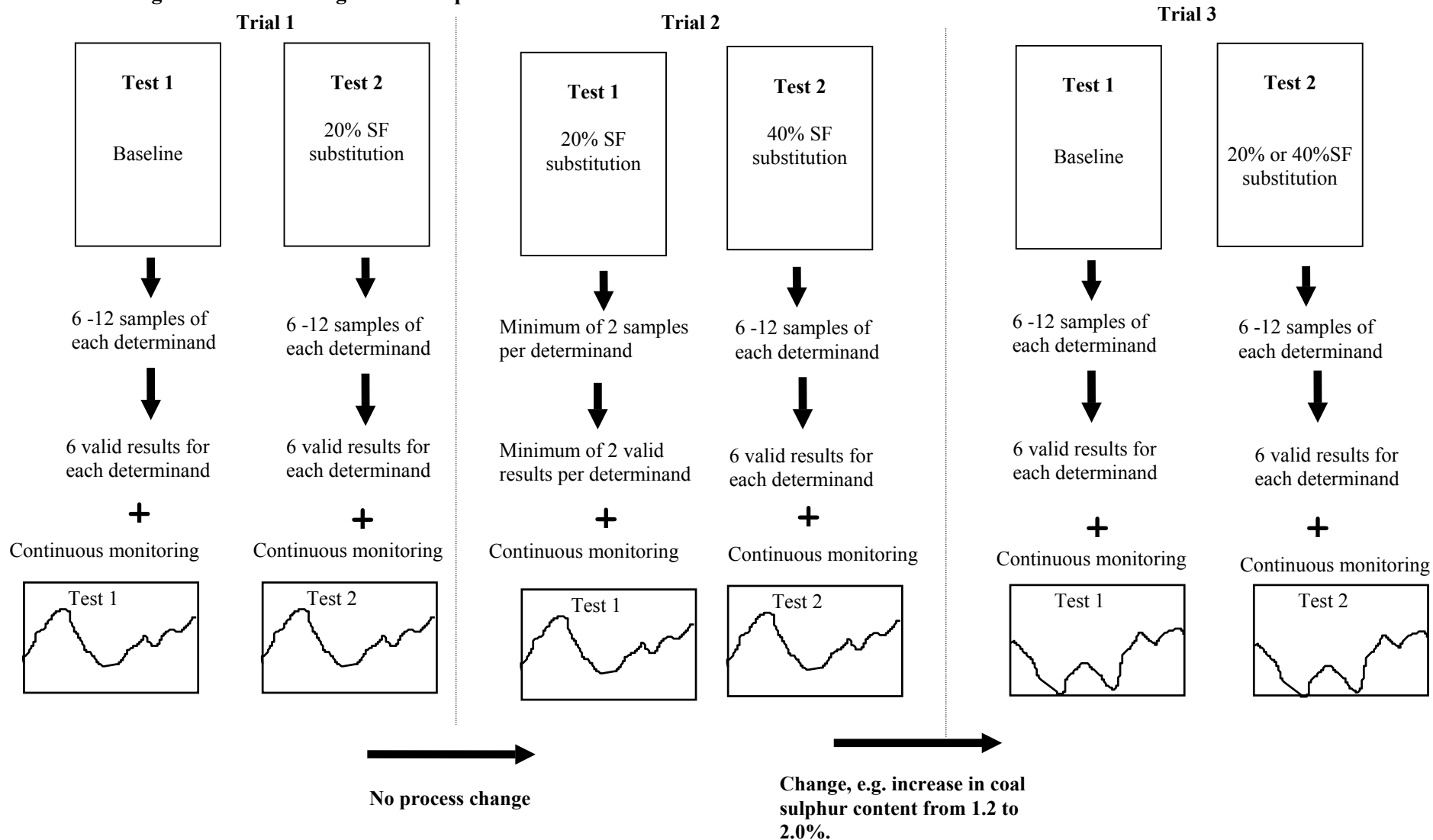
Officers should note that Table 2 and Figure 1 represent the ideal minimum number of samples that must be taken in order to provide the minimum number of valid results. However, in certain circumstances additional numbers of samples will be needed to ensure sufficient samples are available to secure the minimum number of valid results



① For particulate matter, if BS3405 is to be satisfied at least two consecutive samples will be required to obtain one valid result.

② In accordance with BS EN1948, a field blank will additionally be required.

**FIGURE 2: Diagram demonstrating relationship between trial and test**



## ANNEX 4

### Guidance for Soil Sampling

#### 1. The site

- a) Choose a site that is at least 100m from major roads and 500m from motorways or dual carriageways. Where possible, choose two sampling sites within the area of maximum predicted deposition.
- b) The land should preferably be common land owned by the council, (or belongs to a company or an individual who is prepared to give permission to sample) which can be resampled every year and will retain its habitat.
- c) The area to be sampled should be identifiable by Ordnance Survey Reference (8 figures) and should preferably be regularly mown grassland, but preferably not scrub or rough grazing land, or where there is a history of flooding or waterlogging. It is recommended that photographs of the sample site are taken to ensure future samples are taken from the same location.
- d) If possible the site should be remote from public interference and should not have been subject to sewage sludge spreading.
- e) The sample site should not be within 10 stack heights of any other combustion source. The site should not be near hedges or trees to avoid enhanced deposition from 'leaf litter'. The sample site should be at least 10m away from overhanging cables and the nearest overhanging branch.
- f) The site should be at the area of maximum ground level deposition from the trials chimney, which usually is in line with the prevailing wind.
- g) Recent pesticide/herbicide usage should be established to judge whether the use of chlorinated pesticides may have led to significant inputs of dioxins to the soil.
- h) Arable land is not suitable for this type of work as the mixing caused by ploughing will dilute any input of pollutants.

#### 2. The samples

- a) Where the site is grass, remove the majority of the grass and then a 8cm diameter turf should be removed which is deep enough to remove the roots (say about 5cm). Where the site is soil, an 8cm diameter core (5cm deep) should be removed.
- b) Four samples should be taken from each sampling site within 10 metres of each other and then bulked.
- c) Consideration may need to be given to splitting the samples (after sieving) and storing half in a sealed vessel in the dark for later comparison, if needed.
- d) Ensure that a field blank is taken for each trial if possible.

#### 3. Analysis

The sample should follow an established procedure, wherever possible, e.g.:

- a) Dry (at normal air temperature), grind and sieve the sample to remove stones etc;
- b) Use a Soxhlet apparatus or accelerated solvent extraction to extract organics, and spike sample. Care should be taken to ensure no cross contamination occurs;
- c) Analytical blanks should be taken;
- d) Then use gas-liquid chromatography - high resolution mass spectrometry; and
- e) If heavy metals are being investigated, the total metal plus the extractable fraction should be analysed, as should soil pH.

## ANNEX 5

### Heavy Metals

<b>Pollutant</b>	<b>HWID</b>	<b>WID</b>
Antimony and its compounds expressed as antimony (Sb)	✓	✓
Arsenic and its compounds expressed as arsenic (As)	✓	✓
Cadmium and its compounds expressed as cadmium (Cd)	✓	✓
Chromium and its compounds expressed as chromium (Cr)	✓	✓
Cobalt and its compounds expressed as cobalt (Co)	✓	✓
Copper and its compounds expressed as copper (Cu)	✓	✓
Lead and its compounds expressed as lead (Pb)	✓	✓
Mercury and its compounds expressed as mercury (Hg)	✓	✓
Manganese and its compounds expressed as manganese (Mn)	✓	✓
Nickel and its compounds expressed as nickel (Ni)	✓	✓
Thallium and its compounds expressed as thallium (Tl)	✓	✓
Tin and its compounds expressed as tin (Sn)	✓	-
Vanadium and its compounds expressed as vanadium (V)	✓	✓

## ANNEX 6

### **Polycyclic Aromatic Hydrocarbons (PAHs) to be monitored:**

Anthanthrene  
Benzo[a]anthracene  
Benzo[b]fluoranthene  
Benzo[k]fluoranthene  
Benzo(b)naph(2,1-d)thiophene  
Benzo(c)phenanthrene  
Benzo[ghi]perylene,  
Benzo[a]pyrene  
Cholanthrene  
Chrysene  
Cyclopenta(c,d)pyrene  
Dibenzo[ah]anthracene  
Fluoranthene  
Indo[1,2,3-cd]pyrene  
Naphthalene

## ANNEX 7

### Equivalence factors for dioxins/furans and dioxin-like PCBs

For the determination of the total concentration, the mass concentrations of each congener should be multiplied by the following equivalence factors before summing:

<b>TEF schemes for dioxins, furans and dioxin-like PCBs</b>				
<b>Congener</b>	<b>I-TEF(1990)</b>	<b>WHO-TEF (1997/8)</b>		
		<b>Human/ Mammals</b>	<b>Fish</b>	<b>Birds</b>
<b>Dioxins</b>				
2,3,7,8-TCDD	1	1	1	1
1,2,3,7,8-PeCDD	0.5	1	1	1
1,2,3,4,7,8-HxCDD	0.1	0.1	0.5	0.05
1,2,3,6,7,8-HxCDD	0.1	0.1	0.01	0.01
1,2,3,7,8,9-HxCDD	0.1	0.1	0.01	0.1
1,2,3,4,6,7,8-HpCDD	0.01	0.01	0.001	<0.001
OCDD	0.001	0.0001	-	-
<b>Furans</b>				
2,3,7,8-TCDF	0.1	0.1	0.05	1
1,2,3,7,8-PeCDF	0.05	0.05	0.05	0.1
2,3,4,7,8-PeCDF	0.5	0.5	0.5	1
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1	0.1
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1	0.1
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1	0.1
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1	0.1
1,2,3,4,6,7,8 HpCDF	0.01	0.01	0.01	0.01
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01	0.01
OCDF	0.001	0.0001	0.0001	0.0001
<b>Non-ortho PCBs</b>				
3,4,4',5-TCB (81)	-	0.0001	0.0005	0.1
3,3',4,4'-TCB (77)	-	0.0001	0.0001	0.05
3,3',4,4',5 - PeCB (126)	-	0.1	0.005	0.1
3,3',4,4',5,5'-HxCB(169)	-	0.01	0.00005	0.001
<b>Mono-ortho PCBs</b>				
2,3,3',4,4'-PeCB (105)	-	0.0001	<0.000005	0.0001
2,3,4,4',5-PeCB (114)	-	0.0005	<0.000005	0.0001
2,3',4,4',5-PeCB (118)	-	0.0001	<0.000005	0.00001
2',3,4,4',5-PeCB (123)	-	0.0001	<0.000005	0.00001
2,3,3',4,4',5-HxCB (156)	-	0.0005	<0.000005	0.0001
2,3,3',4,4',5'-HxCB (157)	-	0.0005	<0.000005	0.0001
2,3',4,4',5,5'-HxCB (167)	-	0.00001	<0.000005	0.00001
2,3,3',4,4',5,5'-HpCB (189)	-	0.0001	<0.000005	0.00001

## ANNEX 8

### Glossary of Terms

BAT	Best Available Techniques
Br	Bromide as bromine
CEN	Comité Européen de Normalisation (European standards committee)
CKD	Cement Kiln Dust (dust collected in air pollution control equipment)
Cl	Chloride as chlorine
Cl <sub>2</sub>	Chlorine
CO	Carbon monoxide
CSF's	Critical Success Factors
Defra	Department of Environment, Food and Rural Affairs
Dioxins	A series of polychlorinated dioxin and furan ring compounds numbering over 200. TEQ refers to a toxic equivalent rating which is usually applied to the seventeen 2,3,7,8 chloro-substituted congeners.
EIA	Environmental Impact Assessment
EP	Electrostatic Precipitator
EU	European Union
F	Fluoride as fluorine
FSA	Food Standards Agency
H1	Environmental assessment and BAT appraisal methodology
HBr	Hydrogen bromide
HCl	Hydrogen chloride
HF	Hydrogen fluoride
HSE	Health and Safety Executive
HWD	Hazardous Waste Directive

HWID	Hazardous Waste Incineration Directive
I	Iodide as iodine
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
MBM	Meat and Bone Meal
MWID	Municipal Waste Incineration Directive
NO	Nitrogen monoxide (nitric oxide)
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Total oxides of nitrogen (NO + NO <sub>2</sub> )
OTMS	Over Thirty Months (Slaughter) Scheme
O <sub>2</sub>	Oxygen
PCBs	Polychlorinated biphenyls
PCP	Pentachlorophenol
Sample	A small representative part of a material flow taken during a test period
S	Sulphur
SLF	Substitute Liquid Fuel
SO <sub>2</sub>	Sulphur Dioxide
Test	A period during which burning is carried out at a single condition (e.g. substitute fuel(s) substitution rate) and a number of samples are taken
TOC	Total Organic Carbon
Trial	A series of tests undertaken at different conditions (e.g. substitute fuel(s) substitution rate varies) with a specific objective
UKAS	United Kingdom Accreditation Service (now replaces NAMAS)
US EPA	United States Environmental Protection Agency
Valid Result	A monitoring result that is considered by the Agency to be acceptable for monitoring method applied and representative of the measured process parameter



VDI	Verein Deutscher Ingenieure
VOC	Volatile Organic Compounds
WID	Waste Incineration Directive
WHO	World Health Organisation