Table of Contents

Organic Technologies

COMMENTS ON CONSULTATION PAPER
Substitute Fuels Protocol for use on Cement and Lime Processes

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EXECUTIVE SUMMARY

The Environment Agency (EA) issued a Consultation Paper for the "Substitute Fuels Protocol for use on Cement and Lime Kilns" (Draft Protocol) on 29 January 1998. This Draft Protocol has major differences from the Bedford Protocol issued in 1994. Most importantly, the Draft Protocol proposes increased public consultation, new specifications for substitute fuels (SF), requirements for sampling and analysis of SF, and significantly increased testing for fuels Trials. Organic Technologies Limited (OTL) fully supports the EA's efforts to produce a standard protocol for use of SF in cement and lime kilns. However, the Draft Protocol raises a number of concerns which are summarised below.

Organic Technologies Limited (OTL) applauds the EA's call for greater public participation in the authorisation process. We believe it is essential to solicit public input early in the process. Any community outreach program must be interactive and seek to involve a broad range of representatives from the community. During the design, careful consideration must be given to criteria for timing, mechanisms for communication with the public, and an information repository. OTL encourages the EA to develop a baseline set of standards for a public consultation policy that allows the applicant to design a program that addresses the specific needs of a community and the company.

The proposed authorisation process in the Draft Protocol essentially requires two applications with corresponding consultation periods. This is true even if a kiln operator chooses to use the "two-staged" application procedure.

OTL's primary concern with the proposed consultation is the intent to accommodate comments beyond the 28 day period. This may result in delaying decisions past one or

both of the 4 month determination periods if comments are received close to the deadline. Any delays in the authorisation can greatly increase kiln operators' costs. Environmental benefits from use of SF are also delayed. The proposed process requires two 28 day comment periods, two 4 month decision periods and a Trial test resulting in at least a year before a kiln operator will be able to continuously use SF. Further delay should not be allowed. OTL believes a firm cut-off for comments is appropriate. We suggest that the comments period be extended to 45 days with a firm cut-off.

Clearly, some wastes such as radioactive substances and explosives are not suitable for use as SF and should be excluded. However, the Draft Protocol excludes some wastes that are perfectly acceptable for use as SF. There is no reason to exclude pharmaceuticals as a broad classification. Organic based pharmaceuticals can easily and safely be managed in kilns.

Similarly, there is no reason for limiting the solids content in liquid SF (LSF) to 20%. Many organic solids are well suited for use as SF. Solids contents up to 30% and greater are very common at kilns in other parts of the world. Some kilns in the United States (US) routinely use 50-60% solids in LSF. The Protocol should focus on acceptable releases, not specific constituents of SF.

The Draft Protocol seems to prohibit iodine compounds from SF. A complete exclusion of iodine is not appropriate. Thermal treatment of organic wastes with low levels of iodine is preferable to landfill. OTL acknowledges that there are legitimate concerns with high feed rates for iodine compounds in cement kilns, lime kilns, and hazardous waste incinerators. However, concentrations <0.1% can be safely managed in many kilns. Both incinerators and kilns should have low limits on iodine feed rates, but these limits should be determined on site-specific basis, not an overall exclusion.

NAMAS accreditation for laboratories conducting analysis of inputs and outputs is mentioned several times in the Protocol. Accredited procedures for testing of SF are not available. The use of well trained employees, appropriate test methods, and good quality assurance and quality control (QA/QC) programs can ensure accurate results. Records of analysis and QA/QC should be maintained by operators and fuel blenders for review by inspectors. References to NAMAS accreditation should be removed because it is not appropriate.

The Draft Protocol also requires the use of laboratory intercomparison analysis. There are several unanswered questions regarding how this is implemented and data interpreted. The frequency of this practice is not clear but potentially could double the costs for analysis. The value of inter-laboratory testing must be carefully considered against the increased costs and use of other more commonly accepted QA/QC procedures.

A strong QA/QC program is missing from the Draft Protocol. The Trial is subject to erroneous results without a strong QA/QC program for sampling and analysis of all the different media. Testing of samples by two laboratories or extending the Trial period will not create valid results. The validity of the results are dependent on the testing conditions and quality of the sampling and analysis.

The Draft Protocol proposes very restrictive requirements and recommendations for sampling and storage of LSF with "significant solids" content. Significant solids content is not defined. Obviously, representative samples of LSF must be obtained for valid results to be generated from the analysis. It is important that flexibility be maintained because each facility has unique conditions and equipment. The Protocol should not impose such restrictive conditions when other valid methods for sampling and storage can be used.

Flexibility for testing SF off-site and delivering in-specification fuels to kilns should also be allowed. OTL tests SF multiple times for numerous constituents before it is shipped to kiln operators. This multilevel analysis plan was intentionally designed to prevent the use of out-of-specification fuel. The Draft Protocol only needs to specify that representative samples be obtained and appropriate analytical techniques be used. The specific details for sampling and equipment should be resolved with the inspector during the permitting process.

A minimum six week Trial with a six week baseline study is proposed with a total of 24 samples required for most determinands. This is an extremely long period of time and large number of samples. No justification for this is given in the Draft Protocol. It appears arbitrary and seems to ignore the voluminous existing test results on the similar devices using the same type of SF. Data from test burns at kilns in the UK and other countries can be used to support shortened testing periods. Holding a kiln and all tests required systems at their maximums for six weeks does nothing to improve reliability of the data collected.

INTRODUCTION

Organic Technologies Limited (OTL) is a joint venture company between Sarp UK and ERAtech Environmental Limited that specialises in the blending of organic industrial wastes into substitute fuels (SF) for cement and lime kilns.

The partners of OTL have over twenty years of global experience with the management of hazardous wastes and use of SF in the manufacture of cement, lime, and light aggregate. The experience of each partner makes OTL uniquely qualified for the environmentally safe and efficient production of SF.

The OTL facility, located within Sarp UK's waste management site at Killamarsh, allows the best environmental solution to be applied to any waste shipped into Sarp's plant as alternative treatments (e.g. incineration or solvent recovery) can be applied where suitable.

OTL fully supports the Environment Agency's (EA) efforts to develop a protocol for use of substitute fuels and submits the following comments and suggestions to assist the EA with further development.

SPECIFIC COMMENTS

1. The public should be fully informed and educated on the risks and benefits of SF programmes during the consultation process. Such a process should attempt to involve a wide range of community members (e.g., local residents, pressure groups, industry, trade associations, local councils, etc.). OTL encourages the EA to develop a baseline set of standards for a public consultation policy that allows the applicant to design a program that addresses the specific needs of a community and the company. Such programs may include advisory councils, public displays, tours of works, and broad based notifications.

2.3 The draft Protocol requires that SF programs produce no net detriment to the environment. The scope of best practicable environmental option (BPEO) needs to be defined. Accounting for environmental impacts of energy recovery and movement of material up the waste management hierarchy will greatly affect any determination of net environmental impact. Kilns using SF have been observed to have reduced emissions of NOx and SOx[1]. Reduction of some metals emissions has even been observed at some kilns. The conservation of fossil fuels, reduced CO_2 emissions, and reduced emissions from coal mining should also be considered. Annex A to these comments includes a detailed discussion of the environmental benefits of SF programs. Risk to the local environment certainly needs consideration but, the global environmental impacts should receive appropriate weighting in an evaluation of risk and BPEO.

2.5 The Protocol proposes that some of the cost savings from LSF programs be used to tighten the improvement programme in the authorisation. The use of SF will likely result in environmental improvement when the overall view is considered. Statutorily imposed use of cost savings creates a disincentive for kiln operators

and may prohibitively increase the cost for treatment of the wastes in kilns. OTL is concerned that this practice may jeopardise future and existing SF programmes.

2.8 The pro-rata calculations for emissions are only allowed if the plant meets the PCDD/PCDF limit of 0.1 ng/m^3 (TEQ) for the whole flue gas. This needs clarification in subsequent drafts. The statement does not appear to be consistent with the Hazardous Waste Incineration Directive (HWID). It is not clear if this was an intentional deviation from HWID.

2.10 The Protocol states that use of SF must pose "no risk to water, air, soil, or plants". Zero risk is impossible. There is an existing risk associated with the use of traditional fuel. The EA should determine what is an acceptable risk for cement kilns. All kilns, with or without SF, should operate at or below the acceptable risk level.

3.1.1 Although there is an option to submit one "two-staged" application, two applications are essentially required. Delays due to public notices and meetings are likely. If delays occur it will result in greater costs for fees, ads, consultation, etc.

OTL agrees that consultation following the Trial is needed to inform the public of the results. The acceptable emissions or risk should be made clear during the public consultation for the Trial. It should also be made clear to the public during the first consultation that the kiln operator must meet specific requirements; and that if the requirements are met, an authorisation will be granted. The second public consultation following the Trial should only be used to inform the public of the Trial results and address any new items raised as a result of the Trial. There is no need to go through all of the same issues covered in the first consultation.

3.1.4.v It is proposed that statutory consultees be expanded to include health authorities and parish councils. This issue, and similar ones in the Draft Protocol, might be better addressed in the EA's developing Pubic Consultation Policy than in this specific Protocol. If the Protocol is to address this issue, it should also include provisions for ensuring that a balance of information is considered. It is especially important that the technical merits, both risks and benefits, be evaluated. One way to promote this is to ensure that a balance of individuals are represented in any advisory group or council. In some cases, the use of an independent facilitator may be advisable for discussion groups, especially if there are strongly polarised opinions.

3.1.4.vii The consultation period appears to be open for the entire 4 month period, not just 28 days from the advertisement. The EA will invariably receive comments after the 28 days and this may result in delays in determination beyond 4 months. OTL is very concerned about lengthy delays in decisions on authorisations. A firm endpoint for comments needs to be communicated to the pubic. It is preferable to extended the comment period than accept comments indefinitely.

OTL requests that this section be changed to a 45 day comment period with a firm cut-off.

3.1.4.x It is not clear if the Decision Document will discuss economic factors. As noted in the Draft Protocol this will normally be considered confidential information and should not be included.

Another comment is made in this section about considering comments received past the 28 day consultation period. See comments for 3.1.4.vii.

3.2.3 It is proposed that the same consultation process used for the Trial be used the for continuous use. This means that at least one year is required before a decision is made regarding continuous use authorisation. Most of the issues in the second consultation will be the same. The continuous use consultation should be limited to presenting results of the Trial and discussion of only new, relevant information. Also see comments for 3.1.1.

4.1.1 It is proposed that a kiln must be operating within its authorisation to perform a Trial. Some kilns may have areas where improvement is required. In many cases, the use of SF improves emissions of SOx and NOx. There is very likely to be an environmental benefit from the use of SF even if the emissions remain the same. The overall BPEO and resultant emissions should be the determining factor, not the current emissions.

4.1.4 There is no reason for excluding pharmaceuticals. The EA should define pharmaceuticals and explain why they have been excluded. Organic based pharmaceuticals are safely managed in kilns throughout the world.

There is no reason for limiting the solids content to 20%. Solids contents up to 30% and greater are very common at kilns in other parts of the world. Some kilns in the United States (US) routinely use 50-60% solids in liquid SF (LSF).

The exclusion of iodine compounds from kilns but not incinerators is inequitable. Within the UK, neither has adequate abatement equipment for high feed rates of iodine. Although iodine does not combine as well with the alkali materials in cement and lime kilns as other halogens, a complete exclusion of iodine to no detectable level is not appropriate. Thermal treatment of organic wastes with low levels of iodine is preferable to landfill. Iodine concentrations <0.1% can be safely managed in kilns. Iodine feed rates for both incinerators and kilns should be determined on a site-specific basis.

NAMAS accreditation for laboratories conducting analysis of inputs and outputs is mentioned several times in the Protocol. Accredited procedures for testing of SF are not available. The use of appropriate test methods by well trained plant employees, combined with good QA/QC practices, will ensure accurate results. To verify this, records of the QA/QC should be maintained at testing laboratories for inspection by EA.

There is a requirement in this section for liquid SF with significant solids content to be continuously mixed when sampling. Representative samples of SF must be obtained for analysis. In the case of tankers, this can be accomplished with core samples if they are collected properly. It is also possible to obtain representative samples from tanks by sampling multiple levels and preparing a composite sample. Such severe restrictions on operating conditions should not be written into a protocol.

The Protocol should also allow flexibility for testing SF off-site and delivering in-specification fuels to the kilns. OTL utilises a multilevel analysis plan for SF. This results in testing of SF numerous times before it is used as fuel. Our rigid QA/QC practices, together with multiple analysis, was intentionally designed to prevent the use of out-of-specification fuel. The Protocol only needs to specify that representative samples be obtained and appropriate analytical techniques with proper QA/QC be used. The specific details for sampling, analysis, and storage of SF should be resolved with the inspector during the authorisation process. Unduly restricting these by protocol severely limits the options available to kiln operators and may give some a competitive advantage over others.

4.1.5 The purpose of monitoring the sulphur/alkali ratio is not clear. OTL is not aware of any purpose this will serve. This ratio is more likely to be affected by the raw materials than SF. The relationship to stable operating conditions or environmental impact needs clarification. Why this is important only for kilns using SF also needs clarification.

A minimum six weeks Trial with a six week baseline study is proposed. This is an extremely long period of time and costs would be excessive. This does nothing to improve the reliability of the data collected.

The use of SF in kilns is not new technology. In the US, Trial tests have normally been completed with just three runs per condition with three conditions over the course of approximately four test days. The conditions are generally described as a maximum hot, maximum cold, and a normal operating condition. Two test days are often taken for the hot condition, one day for the cold condition, and one day for the normal condition. These three different conditions give Trial data for the range of conditions expected. At least 50 Trial tests have been conducted at 24 cement plants in the US. Other test have been conducted in Europe, including the UK. This technology has been used for 20 years throughout the world and extensive data is available. Data from this testing can be used to support shortened testing periods.

It is not explained in the Draft Protocol how feed rate limits will be established for inorganics. This should be clearly defined so that operators can fully understand the process for planning purposes. The Draft Protocol requires testing to be done at the maximum substitution requested. Presumably, it is the feed rates of metals and other inorganic constituents during the maximum substitution that will be used to establish authorisation limits. If this is the case, it may be necessary

to spike some of these constituents into SF for the kiln operators to obtain authorisation limits that are practical.

It is virtually impossible to prepare a blend of SF that has the maximum concentrations of all constituents for a fuels Trial. The raw material for SF is waste coming from many different sources. Although the wastes have similar characteristics, there is considerable variation of constituents that require blending. The blend of SF available for a trial is dependent on the available waste at that time. The establishment of a low limit for a single constituent can severely restrict the use of SF. This should not be dictated if it can be demonstrated that a higher feed rate for a constituent has no unacceptable impact on environmental performance. For this reason, the Protocol should allow kiln operators the option to spike constituents into SF during Trials.

However, because spiking reagents are very costly, more hazardous, and produces higher emissions during trials, it is also recommended to provide for other means of setting the metals limits. It has been observed that system removal efficiencies for most metals either remain the same or improve with increased feed rates[2]. This permits the calculation of appropriate extrapolated feed rates or concentrations limits from the system removal efficiencies obtained during the Trial test. Allowing this extrapolation would eliminate the need for expensive metals spiking to achieve flexible operating conditions, but still establish safe metals feed rates or concentrations limits. The US Environmental Protection Agency (USEPA) has acknowledged the validity of this technique, and provided calculation methods to do this in section 10.5 of the Boiler and Industrial Furnace Technical Implementation Document.

A detailed discussion of the fate of metals in cement kilns can be found in Annex A.

The Protocol suggests that 2 to 3 days may be required for a kiln to stabilise. If a kiln is coming up from a cold start, 2 to 3 days may be appropriate. Kilns changing from normal operating conditions to maximum operating conditions, even with spiking, would not need this length of time. The spiking of metals into SF done in the US by kilns conducting compliance trials has yielded a wealth of information on the behaviour of metals in cement kilns. Equilibration times were found to be much faster than expected. Generally, kilns that do not recycle CKD come into equilibration in about 2 to 6 hours while kilns that recycle CKD generally take less than 12 hours[3]. The equilibration time is largely dependant on the amount of CKD recycled and how long recycled CKD takes to return to the kiln. More data to support this can be provided if requested.

4.1.6 The Protocol states that at least 2 tanks for storage/feed are preferred. This should not be necessary if materials are delivered according to specification or sampling can be done before tankers are unloaded. This is another case where undue restrictions may be placed on a particular kiln operator. Also see comments for 4.1.4.

4.1.7 A reference to NAMAS is made. See comments for 4.1.4.

4.2.2 A reference to NAMAS is made. See comments for 4.1.4.

The protocol states that poor analytical agreement between the Operator results and independent monitoring may require further monitoring. How the independent testing will be implemented and evaluated should be clarified. Is simultaneous sampling or analysis of split samples is intended? The phrase "poor agreement" needs to be defined. Comparisons may be very poor depending on the perspective. Normal errors may be several hundred percent on low level concentrations of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF).

There should also be concern over what separate labs may get for results. All chemical measurements are subject to errors, both predictable and random. The EA must consider what is acceptable variation between lab results. This must be done for use of the same method and different methods for each parameter because some methods have a higher degree of accuracy than others. High and low concentrations must be considered because virtually all analytical methods are less accurate near the method detection limits. It is not appropriate to arbitrarily choose an acceptable error and apply it to all parameters and all methods at all concentrations.

It is not clear why the EA believes that two labs provide better information than one lab following strong, specific QA/QC procedures, with a review of their work. The variability of results between two test firms will always occur. This variability may be difficult to resolve and provide an area for outside debate. This would without question lead to contentious comparisons of the results as to whether they were in "poor agreement" or not.

What is missing from this protocol is a QA/QC program. Without a strong QA/QC of the sampling and analysis of all the different media, the twelve weeks of testing is not only excessive, it is also subject to erroneous results. Extension of the testing period and analysis of samples by two laboratories will not create valid results. The validity of the results are dependent on the test conditions and quality of the sampling and analysis.

There appears to be a typographical error in this section. Annex 2 is given as reference for minimum frequency of testing for each determinand. This may have been intended to be Annex 3, Table 2.

4.2.3 Sampling of emissions are required to meet the standards stipulated in HMIP Technical Guidance Note M1. Alternatives need to be available if a plant cannot physically provide sampling locations according to M1.

4.2.4 Reference is made to 12 weeks of testing. See comments for 4.1.5.

According to the Protocol, continuous emissions monitors (CEMs) should be used where possible for TOC, HCl and HF. To OTL's knowledge, only TOC CEMs have been demonstrated to be reliable on cement kilns, not HCl or HF CEMs. Cement kilns in the US that have attempted to install HCl CEMs for routine operational monitoring have all removed them because they were not able to be maintained or hold calibrations on a long term operational basis. These installation efforts were experiments to confirm the viability of the current technology in cement kilns.

The Portland Cement Association, a US trade association, in conjunction with the USEPA has recently been conducting a program of testing CEMs at cement operations. This testing included various CEM systems and was conducted in parallel with normal sample train stack sampling methods. Infrared CEM systems seem to produce comparable results to normal methods, but maintaining the functioning of the CEM systems has proven to be difficult for an ongoing operation. Independent tests conducted at other cement plants have produced similar failures.

The problems with these CEM systems are varied, but the sample conditioning component of all the HCl methods seems to be the main point of failure. Gas sampling is more difficult in cement kilns because of the high alkali, high moisture, condensable species, high heat, quenching of gases, turbulence, and large input of raw materials.

It should also be noted that there may be problems with the across the stack sampling technology for HCl CEM systems. This method by-passes the need for use of an extractive component to the procedure. However, this technology may present problems with adequate calibration. The calibration on an across the stack monitor is done indirectly using testing of the individual components and may not account for the actual stack gas HCl concentrations.

The use of CEMs for HCl and HF should be a demonstrated, reliable technology before it is included in any protocol.

No justification is given for the list of parameters to be monitored by CEMs which also includes SO_2, NOx, CO, particulates, O_2, moisture, temperature, and pressure. The importance of these parameter should be explained to ensure that data is properly used.

Requirements to calibrate CEMs before and after each Trial may far exceed manufacturers requirements. The justification for this should be explained.

4.2.5.v USEPA Method 26 required for halogen testing is very suspect as the USEPA admits. Interference from metallic chloride salts is likely. In addition, there is recent data suggesting that HCl may actually be forming in the sampling train. Therefore, any HCl emission data for cement kilns must be considered as likely biased high. More detailed information on possible interferences is given in Annex B.

4.2.5 Manual testing is required on six occasions. It is not clear if this means six different days or six different runs. The term occasion should be defined.

4.2.5.ii The requirement for heavy metals testing is not clear about the total number of samples. The term "two consecutive samples" needs to be defined. The EA should explain why metals must be reported separately for gaseous and particulate phases.

4.2.6 The purpose for testing the CKD for PCDD/PCDFs is not clear. PCDD/PCDFs are known to be prevalent in nature, including the raw materials used for cement and lime manufacturing. Thus, if the analysis is for the purpose of attributing PCDD/PCDFs in the CKD to the use of SF, it would be subject to error because the contribution from the raw feed can be significant. It may be more correct to suggest that "kiln feed and CKD" be tested for PCDD/PCDFs depending on the purpose of the analysis. In any case, the exact purpose for this and any of the testing should be stated to ensure accurate use of the test data.

4.2.7 A reference to NAMAS is made. See comments for 4.1.4.

Again the use of laboratory intercomparison exercises is mentioned. See comments for 4.2.2. The procedure needs clarification if intercomparison exercises are used. It is not clear if sampling and analysis are to be duplicated or only split samples analysed by two laboratories. The frequency of this activity needs to be defined.

4.2.7.ii This section requires suppliers of SF to keep records of the original source materials for at least two years. OTL supports EA's efforts to increase the quality of analysis and record keeping.

4.2.7.iv Sampling of SF at the kiln and analysis prior to burning is required. This may create competitive advantages for some kiln operators. Most kilns do not have on-site laboratories and some may have only one tank. Intermittent use of SF would be necessary under this restriction. Even facilities that normally operate with two tanks will encounter problems when periodic maintenance and unpredictable repairs are performed. There are other safe and valid alternatives which should be allowed. Specifically, delivery of in-specification fuel should be allowed. See comments for 4.1.4 and 4.1.6.

The authorisation process, testing, and construction of a storage facility is a significant investment by a kiln operator and they are entitled to maximise their use of SF. For many reasons, it is also in the best interest of the UK for kilns to maximise use of SF (i.e. conservation of fossil fuels, reduced CO_2 emissions, reduced SOx and NOx emissions, reduced methane emissions from coal mining, movement of waste up the hierarchy, more globally competitive cement and lime industry).

4.2.7.vii This section mentions that techniques used for metals analysis must ensure effective digestion of samples. It should be recognised that one method of metals analysis by X-ray fluorescence does not require digestion.

Reference is made to sampling from a continuously flowing line. This should only be given as one example and not implied that this is the most likely method. Sampling from valves on well mixed tanks, core samples from tankers and multiple level sampling can all provide representative samples.

4.2.8 Monitoring of silver is required for waste photographic emulsions. Silver, being a precious metal, is normally recovered from such wastes. If monitoring of the SF determines that insignificant quantities of silver are present, it is not necessary to monitor emissions for silver. This same logic applies for the SF that potentially contains zinc.

4.2.9 This section details possible additional environmental monitoring. The ambient air monitoring for SO_2 does not seem to be justified since SF normally contains less sulphur than coal.

4.2.10 Another reference is made to alkali/sulphur ratios. See comments for 4.1.5.

4.3.1.vi BATNEEC assessments of the use of SF including economic data on cost savings on an annual basis with five year predictions are required. As noted in the Draft Protocol, this information may be statutorily protected. BATNEEC should be applied to techniques used and alternatives. General economic performance of operation should not be a direct factor in this. Sectoral affordability should be the yardstick. However, if such information is provided, provisions should be to allow operators to revise five year predictions.

4.3.2 This section lists the monitoring data requirements but a significant reporting component for mass balance should be included. Section 4.3.1.ii lists "mass balances where possible" as a required component of an application for continuous use of SF. The use of mass balances, and appropriate interpretation of the balance results, provide a defensible QA/QC for the testing protocols.

Annex 3 Criteria for sampling frequency indicates at least 24 samples for most sample types and creates a large database of results. However, there is no discussion as to the basis, such as a statistical or process, for requiring this large number of samples. It appears arbitrary and would seem to ignore the large amount of testing on the similar devices using the same type of SF in the US and other countries. Three runs under each condition, with strong QA/QC, has been deemed adequate for over 50 test at approximately 24 kilns in the US. See comments for 4.1.5.

Continuous monitors for HF and HCl have not been demonstrated. See comments for 4.2.4.

Annex 3, Table 1 for continuous monitoring, contains some incorrect claims. Only temperature is measured at the EP inlet, not oxygen and moisture. It may be more appropriate to reflect these monitoring points at the kiln exit.

Annex 3, Table 2 also lists clinker for PCDD/PCDF testing which is not mentioned in the text. There are obvious reason why PCDD/PCDFs resulting from SF are highly unlikely if not impossible in the clinker. This may be an error.

Annex 4 A provision should be made for analysis of field blanks. This will provide QA/QC on possible contamination of sampling equipment and possible contamination during the sample handling.

Annex 5 The discussion for continuous monitoring of halogens needs to be evaluated. CEMs for halogens have not been demonstrated as reliable for use on cement kilns. See comment for 4.2.4.

It should be noted that the requirement for 95% confidence intervals in Measurement Technique #4 may not be achievable for most tests. This is especially true for PCDD/PCDF testing. This has been found to be true in a recently published study in the US which examined approved USEPA test methodologies[4].

The definition of C_{proc} in has been omitted.

It should be noted that CO and other pollutants not resulting from the incineration of hazardous wastes or from the combustion of fuels (e.g. from raw materials for the production of products) shall not be taken into account under certain conditions. In the case of cement and lime kilns, this may include metals, halogens, and PCDD/PCDFs.

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Annex A

Evaluation of Waste-Derived Fuels

Use in Cement Kilns

Annex B

Suspected Interferences

USEPA Method 26

Annex C

Glossary of Terms

BATNEEC	Best Available Techniques Not Entailing Excessive Cost
BPEO	Best Practicable Environmental Option
CEM	Continuous Emissions Monitor
CKD	Cement Kiln Dust
CO	Carbon Monoxide
CO2	Carbon Dioxide
EA	Environment Agency
HCl	Hydrogen Chloride
HF	Hydrogen Fluoride
HWID	Hazardous Waste Incineration Directive
LSF	Liquid substitute fuels
NAMAS	National Advisory Measurement Accreditation Service
NOx	Oxides of Nitrogen
OTL	Organic Technologies Limited
O_2	Oxygen
PCDD/PCDF	Polychlorinated-p-dioxins and Polychlorinated Dibenzofurans
QA/QC	Quality Assurance and Quality Control
SF	Substitute Fuels
SOx	Oxides of Sulphur
TEQ	Toxic Equivalent Quotient
TOC	Total Organic Carbon
US	United States of America
USEPA	United States Environmental Protection Agency

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The next page is the cover sheet.

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