response to JRC-ITPS consultation on 'Technical report for End-of-waste criteria on Biodegradable waste subject to biological treatment', 2nd draft working document

1 Introduction

The current process of establishing, at European Community level, End of Waste criteria for biodegradable waste subject to biological treatment (compost and digestate) is at an advanced stage. The scope has been set, the major points of discussion have been clarified and the Joint Research Council's Institute for Prospective Technological Studies (JRC-ITPS) has published the second working draft of its 'Technical report for End-of-waste criteria on Biodegradable waste subject to biological treatment'. This document proposes end of waste criteria for composts and digestates that will be considered by the European Commission, with intention of establishing a 'Commission Decision' on this subject.

In November 2011, JRC-ITPS requested additional information from stakeholders on;

a) items that would merit additional information and numerical data,
b) specific questions that remained open during the drafting of the second working document,
c) new questions raised following publication of its 2nd draft technical report.

See section 3.1 'JRC-ITPS documents' for an outline of invited feedback. The invitation included that: 'If you esteem that important parts of information are lacking, which have not been dealt with in this questionnaire, you may provide additional feedback in a separate document, thereby clearly indicating which section of the Second Working document you are referring to (section title, paragraph or page number). However, given that the most important issues have already been discussed during the two workshops and general feedback has been acquired during the previous stakeholder consultations, the aim of the current consultation is not to reopen the discussion on core issues that have been settled in the working document.

2 Association for Organics Recycling

The Association for Organics Recycling (AfOR) is the United Kingdom's membership organisation committed to the sustainable management of biodegradable resources. It promotes the benefits of composting, digestion, and other biological treatment techniques and the use of biologically treated materials for the enhancement of the environment, business and society. See www.organics-recycling.org.uk for more information.

AfOR currently has approximately 400 members including composting, anaerobic digestion, thermophilic aerobic digestion and mechanical biological treatment operators, local authorities,

consultants, technology suppliers, compost users, academics, other membership organisations and individuals.

3 Documents

3.1 JRC-ITPS consultation documents

Adobe Acrobat file **'Stakeholder input request following EoW Biodegradable waste WS2'** containing 24 specific questions and invitation to raise any other issues.

Spreadsheet file **'Positive lists and provision on information input'** with:

a) a proposal for two positive lists, one for compost and one for digestate. Stakeholders were requested to provide specific input on the different items on the list; it could be proposed to exclude items, to modify their definition or to add new items. (Some sections are for response from the Member State only, not any other kind of stakeholder.)

b) a worksheet on the **provision of information**, where input can be provided on which parameters to declare for compost and/or digestate and what information to deliver with the compost/digestate in a statement of conformity or otherwise.

3.2 AfOR response and documents

AfOR has consulted with its members with regard to this consultation and would welcome the opportunity to discuss with JRC-ITPS any aspect of this response.

AfOR's response comprises Adobe Acrobat file '20120110_AfOR_response_JRC-ITPS_EoW' (this document) and Excel spreadsheet files '20120120_AfOR_positive_lists_&_provision_of_information'.

Feedback on topics additional to those covered by JRC-ITPS's 24 questions is provided in section 8 of this document; this is simpler than providing another, separate document.

As requested by JRC-ITPS, AfOR's response aims to *'follow the 4 basic conditions for End of Waste as defined in the Waste Framework Directive (Directive 2008/98/EC), rather than e.g. specific national concerns or industrial interests:*
Certain specified waste shall cease to be waste within the meaning of point (1) of Article 3 when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

(a) the substance or object is commonly used for specific purposes;
(b) a market or demand exists for such a substance or object;
(c) the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
(d) the use of the substance or object will not lead to overall adverse environmental or human health impacts.

The criteria shall include limit values for pollutants where necessary and shall take into account any possible adverse environmental effects of the substance or object.'

4 Responses to Chapter 2 questions: Background information on compost and digestate

Question 1

Please provide additional information on digestate production from biodegradable waste in every Member State, split in biodegradable waste from municipal solid waste, biodegradable waste from agriculture, biodegradable waste from industry, manure, sewage sludge. Figures on digestate production from energy crops not used in a waste treatment operation are also welcome but should be clearly marked as such. Especially data from the EU-12 would be very welcome.

Type of digestion system	**Municipal*** (input tonnes per annum)	**Non municipal** (input tonnes per annum)	**Unclassified** (input tonnes per annum)
Anaerobic Digestion	25,351	19,759	60,000
Thermophilic Aerobic Digestion	2,346	14,360	-
MBT **	403,580	34,431	-
TOTAL	**431,277**	**68,550**	**60,000**

* These tonnages will include some animal by-products

** Figures for 'MBT' comprise treatment processes of Mechanical Heat Treatment (MHT), MBT using composting for the biological treatment phase, and MBT using anaerobic digestion for the biological treatment phase.

Source: A study of the UK organics recycling industry in 2009, A report on the structure of the UK organics processing/recycling sector and the markets for its outputs, RES147, November 2011, WRAP, Banbury, ISBN 1-84405-454-3.

In analysis of the types of waste digestes, the survey reported the following types and tonnages of biodegradable waste as having been digested in 2009:

Food processing by-products (tonnes per annum)	**Manure** (tonnes per annum)	**Energy crops** (tonnes per annum)
43,000	6,050	151

Question 2

Please provide additional information on gate fees charged for anaerobic digestion of biodegradable waste in every MS. Especially data from the EU-12 would be very welcome.

Findings of gate fees survey carried out carried out during December 2010 and January 2011:

Municipal Biowaste (includes kerbside collected and civic amenity site collections)	**AD** (Anaerobic Digestion of food waste)	**IVC** (in-vessel composting of food & garden waste)	**OAW** (open air windrow composting)	**MBT** (Mechanical and Biological Treatment of residual waste)
£/tonne input	£36 to £64	£29 to £82	£6 to 51	£57 to £100

range				
£/tonne median	£43	£43	£24	£84

Source: Gate Fees Report, 2011, Comparing the cost of alternative waste treatment options, Waste and Resources Action Programme, July 2011.
http://www.wrap.org.uk/downloads/Gate_Fees_Report_20112.8c582fc7.11009.pdf

Question 3
Please provide additional information on digestate sales prices in every MS. Especially data from the EU-12 would be very welcome.

Digestate, fibre and liquor distribution and value
The majority of material (39%) was distributed with only a charge levied to cover transport costs (Table 5.16). Notably, a similar proportion (37%) was used on land owned by the business, which is in line with four of the eight sites identified as being located on a farm (three stand-alone and one co-located).

Excerpt from most recent survey; **Table 5.16:** Distribution of digestate, fibre and liquor in 2009

Distribution route	Reported digestate quantity (tonnes)	Digestate %	Fibre, liquor and unaccounted separated products		Grossed-up quantity (t)
			Reported quantity (t)	Reported quantity %	
Distributed free of charge	14,700	12.1	0	0.0	19,159
Only charged for distribution	47,000	38.6	0	0.0	61,257
Sold directly	0	0.0	0	0.0	0
Sold to third part	14,700	12.1	0	0.0	19,159
Used on own land	45,233	37.2	1900	100.0	61,431
Other	0	0.0	0	0.0	0
Total	**121,633**	**100.0**	**1900**	**100.0**	**161,006**

Source: operator survey (permitted sites, n = 5). Grossed-up quantity differs from Table 5.15 due to rounding.

It was estimated that 12% (just under 15kt) was sold to a third party, where a fee of £3/t was charged.

Source: A study of the UK organics recycling industry in 2009, A report on the structure of the UK organics processing/recycling sector and the markets for its outputs, RES147, November 2011, WRAP, Banbury, ISBN 1-84405-454-3.

This survey also found that the majority of compost and digestate was applied to cereals and other combinable crops in both 2009 and 2008/09. The majority of compost was applied applied to cereals and other arable crops, although this contrasted with digestate, the majority of which was applied to grassland. This may reflect the differing business models adopted by compost and digestate producers.

Question 4
Please provide additional information on market outlooks for digestate in every MS, such as planned new anaerobic digestion for biodegradable waste capacities and expected evolution of digestate sales. Especially data from the EU-12 would be very welcome.

In this answer AfOR's response is the same as from the UK Member State representative:

'The data below is extracted from the baseline report for AD in the UK that was forwarded to the JRC on the 2.1.12. It provides information on the potential number of AD plants that are in the planning system in the UK. However, the data needs to be viewed with caution. as the numbers of plants progressing from planning to operation is in fact quite low. Going forwards this data is being recorded so that the rate of success of planning applications leading to new plant development can be established.

Planning - September 2011

- There are currently 78 waste fed plants which have received planning consent in the UK;
- There are a further 27 farm fed plants which have received planning consent in the UK;
- Additionally there are another 80 plants within the planning system awaiting the outcome of their application.'

The following excerpts from the survey referred to in AfOR's response to question 3 provides less recent data on plans for new anaerobic digestion sites:

Table 3.22: Summary of planning applications and planning appeals in Great Britain, 2009

Facility type	Planning consent granted		Consent deferred / refused / appeal dismissed	Total number of sites
	New sites	Existing		
IVC	6	0	1	7
OAW	4	4	3	11
AD	10	0	0	10
AD & IVC	1	0	0	1
MBT	8	0	1	9
Total	**29**	**4**	**5**	**38**

Source: *Waste Planning Issues 74 (2009), 75 (2009), 76 (2009), 77 (2009), 78 (2009) & 79 (2010)*

Three of the MBT plants cited in Waste Planning stated that they would have an AD stage.

Survey excerpt:

4.9.1 Planned development

A number of respondents to the survey indicated that they had plans to expand or develop their site (Table 3.23). A third of the responding composting sites indicated that they had plans to diversify their operations, whilst 22% stated that they wished to increase capacity. Of the AD sites, 63% indicated that they wished to develop new sites (compared with only 10% of composting sites). This illustrates the emergence of the AD sector whose growth was through the establishment of new sites, whilst composters were attempting to diversify and expand their existing operations.

Table 3.23: Respondents' plans to expand or develop organics recycling sites beyond 2009

Proposed development	Proportion of respondents operating different organics recycling sites (%)		
	Composting	AD	MBT
Develop new site(s)	9.0	62.5	0.0
Diversify operations at site e.g. include anaerobic stage, biomass	33.1	12.5	50.0
Increase capacity	20.7	50.0	50.0
Other*	7.6	0.0	0.0
None	15.9	12.5	0.0
Unspecified	32.4	25.0	0.0
Number of responding sites**	**145**	**8**	**2**

Source: Operator Survey (permitted sites) (n = 155, CI = +/-5%)
* Included where operators were unsure of planned development, and others planning to the blending of composts to manufacture top soils
Data were not obtained from the T AD site
** Numbers do not sum as multiple answers were allowed

5 Responses to Chapter 3 questions: JRC Sampling and analysis campaign

Question 5
Please provide recent information (no more than 5 years old) on organic pollutant concentrations (including details on sampling and measurement) for compost, digestate, sewage sludge and manure.

Available data for composts, digestates, sewages sludges and manures has been provided in the UK Member State response.

Question 6
Please provide information on organic pollutant limit values in the different EU-27 Member States for compost, digestate and other biodegradable waste materials destined for use in agriculture, by preference expressed on dry matter value.

UK Member State response has confirmed that: 'We currently have no limit values for materials applied to soils'.

6 Responses to Chapter 4 questions: End of waste criteria

6.1 Product quality requirements

Question 7
It has been proposed that stability for compost and digestate should be regulated by market aspects rather than by putting a limit value as part of product quality requirements. At the same time, a European wide standard measurement method for this parameter seems to be lacking, especially in the case of digestate. Therefore it has been suggested to include stability as a parameter in the product declaration, rather than imposing a minimal value. Please provide your opinion on whether a limit value should be imposed on the stability for compost and digestate, based on the 4 basic Waste Framework Directive conditions for End

of Waste, including the exact limit value and the internationally recognized standard method for measurement.

COMPOSTS

There is not an internationally recognized standard method for measurement of compost stability, nor are there widely agreed limit values that correspond with fitness for use in different types of application (e.g. improving soil, ingredient in growing medium, ingredient in topsoil, suitability for use as mulch). Similarly, there is not a stability method harmonised by the European Committee for Standardisation (CEN), nor any method proposed by Project Horizontal.

It is desirable to have a mechanism to ensure that biodegradable wastes are adequately composted, so that there is not adverse impact on the environment when the compost is used (e.g. compost with C:N that is high can temporarily lock up plant-available forms of nitrogen in soil) or on human health (e.g. due to odour nuisance when compost is being spread/applied). However, because we do not yet have a harmonised compost stability test method and do not have evidence for which stability values correspond with fitness for use in soil improving, growing media, topsoil manufacturing, topdressing manufacturing and mulching applications, NO stability method and associated limit(s) should be set in the EC EoW criteria for composts.

It would be unwise to set an EC EoW compost stability limit without a good evidence base, as potential widespread non-compliance could mean that a Member State heavily-invested in composting nation does not meet its target to, by 2020, recycle at least 50 % of its annual household waste arisings.

Recommended solution:

EC EoW criteria should seek to ensure adequate composting by requiring that stability limit(s) and the method of test specified in the Member State's relevant standard(s) applies UNTIL the Commission Decision on EoW for biological treatment of biodegradable wastes is amended in future*. I.e. the stability method of test should continue to be the nationally used method until superseded in future by a harmonised European method.

We also suggest that section 4.5 of the second draft technical report is changed from requiring that '*When reaching end-of-waste status, the material must have undergone **those** minimum necessary treatment processes that make it fit for purpose*.' to requiring that '*When reaching end-of-waste status, the material must have undergone **all** necessary treatment processes that make it fit for purpose'*. *'Fit for purpose'* should be defined as: *'having all of the properties and characteristics necessary for its intended use(s)*'.

* Such amendment in future may specify minimum required stability (perhaps different values for different types of application), would refer to an appropriate harmonised method of test for stability, and maintain the requirement that: '*When reaching end-of-waste status, the material must have undergone all necessary treatment processes that make if fit for purpose'*.

DIGESTATES

Regarding the current situation and potential hazards, AfOR makes similar comments about digestate stability as it has for compost stability.

Recommended solution:

In the short- to medium-term, EC EoW criteria should seek to ensure adequate digestion by requiring that stability limit(s) and the method of test specified in the Member State's relevant standard(s) applies UNTIL the Commission Decision on EoW for biological treatment of biodegradable wastes is amended in future*.

The same as for composts, we also suggest that section 4.5 of the second draft technical report is changed from requiring that '*When reaching end-of-waste status, the material must have undergone **those** minimum necessary treatment processes that make it fit for purpose*.' to requiring that '*When reaching end-of-waste status, the material must have undergone **all** necessary treatment processes that make it fit for purpose'. 'Fit for purpose'* should be defined as: *'having all of the properties and characteristics necessary for its intended use(s)*'.

Background to the recommended solution

Analysis of anonymised UK data for digestates tested since publication of PAS 110 in February 2010: 33 samples of digestate (some samples whole digestate, some samples separated liquor) underwent gas chromatography 'volatile fatty acids' tests and were evaluated for compliance with the draft EC EoW limit of 1500 mg/l 'total organic acids'. (The current UK and BGK methods for organic acids determination may give similar results, although very little comparison has been done to date.) Fourteen out of 33 samples failed: 42 % failure rate, which is high and indicates that some UK AD operators would have to modify inputs or treatment to comply with the draft proposal of 1500 mg/l 'total organic acids' limit for EC EoW.

AfOR understands that in Germany there are between 5 to 10 AD plants where food waste is a very high proportion of the mixture fed into the digester; we do not have information on Organic Loading Rates, Hydraulic Retention Times and use of additives for process control, so it is not currently possible to comment on the potential impact of a 1500 mg/l 'total organic acids' limit on UK AD plants, particularly those digesting high proportions of food waste, or exclusively food waste. AfOR understands that the BGK's total organic acids limit was reduced from 4000 to 1500 mg/l due to digestate odour being unacceptably high in some cases.

It would be unwise to set an EC EoW digestate stability limit without a good evidence base; if the EC intends to set such a limit in future, please prioritise the necessary R&D.

Question 8

It has been suggested that Cu and Zn levels could be raised for compost and digestate as these are considered to be micronutrients. At the same time, it is argued that increasing these levels may lead to the use of more polluted input materials. Please provide scientific information on the need for either increasing these levels or lowering them. Please also indicate how Cu and Zn levels could be lowered in certain input materials in order to obtain lower concentrations in the compost/digestate materials produced, or why this may not be possible, to your opinion.

The European Compost Network's first two paragraphs in response to this question was: 'The only background that led to the proposal to increase the Cu and Zn limits was the frequent use of liquid manure from animal fattening and breeding premises in anaerobic digestion. Here, due to the mineral additives in the feeding ratio - to a certain extent needed by the animals - we find elevated background concentrations for Zn & Cu which would exclude eventually a high percentage of digestates produced (partly) from animal manure.

In composting of source separated bio- and green waste as well as waste from agricultural food processing the originally proposed limit values (Cu=100; Zn=400) would not provoke any problem. Therefore, and with the argument of Zn and Cu being micro nutrients, ECN prefers to keep a declaration threshold of Cu=100 and Zn=400 and delete a limit value for these elements.'

AfOR's data for UK composts made from source segregated biodegradable wastes shows that the 90th percentile value is 73.7 mg/kg dm for copper (from 551 samples) and 247.1 mg/kg dm for zinc (from 550 samples). These statistics indicate that most PAS 100 composts would comply with the proposed EC EoW upper limits for Cu and Zn, and recognising that these elements are micro nutrients and that in most field-scale applications Nitrate Vulnerable Zone rules and Codes of Good Agricultural Practice mean that compost application rates are low (typically 30 fresh tonnes per hectare for composts derived from garden plant tissue wastes), it is very unlikely that a receiving soil would accumulate Cu and/or Zn concentration(s) harmful to the environment or human health. AfOR supports the ECN preference to keep a declaration threshold of Cu=100 and Zn=400 and delete the proposed limit values for these elements.

Digestates

UK digestates								
		Cadmium	**Mercury**	**Nickel**	**Zinc**	**Copper**	**Lead**	**Chromium**
Digestate type	**Statistic / data type**	mg/kg dm	mg/kg dm	mg/kg dm	mg/kg dm	mg/kg dm	mg/kg dm	mg/kg dm
Separated liquor	90th %iles	1.47	0.20	17.53	458.71	208.02	16.16	17.63
Whole digestate	90th %iles	2.35	0.20	30.33	301.49	129.09	19.04	19.43
Separated fibre	90th %iles	0.74	0.14	13.53	565.13	106.95	19.64	38.37
EC EoW limit (proposed by JRC)		1.50	1.00	50.00	400.00	100.00	120.00	100.00
Separated liquor	number of failed samples	2 in 28	0 in 28	1 in 28	6 in 28	5 in 28	0 in 28	1 in 28
Whole digestate	number of failed samples	5 in 24	0 in 24	1 in 24	2 in 24	4 in 24	1 in 24	1 in 24
Separated fibre	number of failed samples	2 in 33	1 in 33	1 in 33	7 in 33	4 in 33	0 in 33	1 in 33
EC EoW limit proposed by ECN		none	none	none	600.00	300.00	none	none
Separated liquor	number of failed samples				2 in 28	1 in 28		
Whole digestate	number of failed samples				0 in 24	0 in 24		
Separated fibre	number of failed samples				2 in 33	2 in 33		

Statistical analysis of UK digestate test results (to the best of our knowledge those made from input material types allowed by PAS 110 and the AD Quality Protocol), the table above shows how many samples of separated liquor, whole digestate and separated fibre would fail the proposed EC EoW upper limits of 400 mg/kg dm zinc and 100 mg/kg dm copper. The table above also shows that for every digestate output type except whole digestate in terms of its zinc content, that their 90th percentile values exceed the proposed EC EoW upper limits for zinc and copper.

In terms of digestate, the ECN responded: 'With respect to the responsibility of the producer and to create a market for digestate we propose: either to completely delete a limit value or raise the levels for Cu and Zn to 300 mg Cu kg^{-1} dry matter and 600 mg Zn kg^{-1} dry matter. Zn and Cu levels to be declared if a threshold of Cu=100 and Zn=400 is exceeded (see example of Germany).' In AfOR's view either of these proposed solutions is preferable to EC EoW upper limits of 400 mg/kg dm zinc and 100 mg/kg dm copper.

Question 9

Some Horizontal standards, allow for the choice of different procedures. As such WI CSS99049 allows to measure impurities by either a sieve analysis without washing or with a bleach washing method

(http://www.ecn.nl/docs/society/horizontal/BT_TF151_WI_CSS99049_Impurities_1332007(E).pdf). Should a specific procedure be chosen in this case and if yes, which one? Please explain why, based on the 4 basic Waste Framework Directive conditions for End of Waste.

EoW criterion c) legislation and standards:

The proposed limit value of 0.5 % DM has been set in many national compost standards and regulations based on dry sieving analyses. We have not seen any data that compares dry sieving with bleach washing results for the same sample replicates.

In the UK, we prefer to wet sieve and then partially oven-dry digestate samples (dry to 10 to 15 % residual moisture content rather than completely dry, as some separated fibre samples have formed a hard cake when dried to very low % moisture, which is difficult to examine for impurities). Details about the UK method for enumerating physical contaminants in digestate can be requested from WRAP.

EoW criterion d) human health impacts:

Laboratories prefer sieve analysis without bleach washing; bleach use incurs health and safety restrictions, extra equipment/cabinets and space, and costs more.

EoW criterion d) environment impacts:

Most compost samples are sufficiently free-flowing after partial drying that they can easily be examined for physical contaminants. Bleach washing is unlikely to find any more impurities, so risk to the environment if there are any undetected impurities in compost are not likely to be significant.

Recommendation: The procedure specified in EC EoW document should be sieve analysis WITHOUT bleach washing. Please require laboratories' test results reports to include reference to the method of test used.

6.2 Input material requirements

Question 10
Is an update mechanism for the positive list feasible to be implemented in practice without generating too much administrative burden? If yes, please provide a concrete proposal for such an EU-wide update mechanism, likely to be acknowledged by the Commission and Member States, on how to evaluate exclusions of materials listed, inclusions of new materials or re-entries of formerly excluded materials.

European Compost Network replied: 'This should be done by standard comitology procedure. This means stakeholder have to apply for changes via TAC or via the Commission. The Commission officer would then forward those applications to the TAC standing committee which will debate and decide the changes. Since the End-of-Waste regulations are done under the comitology procedure no other by-pass should be considered. A reference procedure is the Standing Committee of the EU Biological Agriculture Regulation.'

AfOR adds to this reply that the decision-making committee should meet – or discuss by teleconference – reasonably quickly in response to requests to assess new input material types.

Industry seeks progress at fastest reasonable technical speed rather than having to wait for months to a) submit a request and b) receive a response. Please consider how the appropriate committee could work via teleconference and email (at least for the input material types likely to be straight-forward to assess), as this should be much faster than waiting for face-to-face meetings of the committee members.

Question 11

Are the below proposed categories for indication of the input materials adequate? If not, please provide alternative category descriptions.

a) *Separately collected biowaste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants*
b) *Garden and park waste*
c) Agricultural waste including manure (indicate animal species because needed for documentation in organic farming)
d) Agricultural waste without manure
e) *Food industry waste* – this category not necessary because it is included in the first category
f) *Other input materials (any specific material present in a quantity of more than 5% of the initial weight should be declared)*

Most users are not interested in the types of biodegradable waste from which the compost/digestate is made; they want to know the product characteristics relevant to how they intend to use it (e.g. its content of total N, P and K, and how quickly that becomes plant-available), and any legal restrictions on use.

It is not useful if the product declaration includes a long list of biodegradable waste types from which the compost/digestate is made; some facilities treat many biodegradable waste types over the course of a year and it would be impractical to keep varying the list when dispatching compost/digestate so that it reflects the waste types from which the particular consignment has been made. Similarly, stating all 'greater than 5 % of initial weight' biodegradable waste types the facility treats over a year would make management of a product declaration document or the packaging (e.g. a bag) easier, but it could comprise a long list that is not really a correct description of inputs to the compost/digestate supplied.

The ESSENTIAL information is that if the compost/digestate is made from any type of animal by-product, the recipient is informed that 'This compost/digestate is made from materials that include animal by-product' and made aware that its use must be recorded and any applicable grazing ban period must be complied with.

Recommendation: EC EoW document should require the composter/AD operator to inform the recipient of all information necessary to enable transportation, storage and use of the compost/digestate in a safe manner and without causing harm to human health or the environment. Guidance appropriate to the Member State on 'all information necessary' could be provided in a guidance document (or product information template), available from any accredited compost/digesate certification body and/or the National Quality Assurance Organisation.

The EC EoW document should also require that;

a) if the compost/digesate user* requests information about the type(s) input material and/or process additive used to make the compost/digestate, it is obligatory to supply the user

with such information,

b) if compost/digestate reaches the user via a supply chain, each organisation in the supply chain is responsible for supplying 'all information necessary' to the next organisation in the supply chain, until the user receives that information.

* This kind of information could be commercially sensitive, so it should not be obligatory that such information has to be provided to each organisation in a supply chain.

Question 12

Should the newly proposed additives be more clearly defined regarding content and allowed amounts? E.g. which polymers should be allowed for dewatering digestate and in which dose? Please explain why, based on the 4 basic Waste Framework Directive conditions for End of Waste.

Digestion systems

(The first and second paragraph of AfOR's response to question 12 is based on EBA's feedback to the European Compost Network.) Suggested EC EoW text: 'Additives for digestion systems shall only be used if they are necessary for improving the yields of useful process outputs and/or biogas quality, and do not make the digestate unfit for use. The maximum amount of each additive used shall not exceed 0.01 % w/w of the input material. Each additive shall only be used in the operator's digestion system if;

a) it has been assessed using a 'Hazard Analysis and Critical Control Points' approach, and
b) that assessment has been evaluated and approved by the independent certification body.

'Common additive material types are;

a) flocculation agents and flocculation aids,
b) trace elements,
c) precipitants,
d) enzymes,
e) free and immobilized archaeal, prokaryotic and eukaryotic biomass,
f) emulgators (e.g. tensides),
g) anti foam agents,
h) complexing agents,
i) antiscalants, and
j) macromolecules (Na, Mg, Ca, carbonate and phosphate).'

It should be clarified whether the 0.01 % in the EBA's information is on a weight or volume basis, unless the JRC-ITPS is comfortable to assume that each cubic metre of input material weighs 1 tonne; technically this would be reasonable for liquid input materials or if the percentage applied to the hydrolysed mixture of inputs ready for digestion or hygienisation.

Composting systems

Section 4 of Annex 9 of JRC's 2nd draft technical report lists: 'Additives for composting [added in minor quantities (up to 10 – 15 % at maximum) in order to improve the composting process, humification and maturation]'. For clarity, this should be revised to 'Additives for composting added at up to 15 % of the weight of the formed composting batch, in order to improve the composting process'.

Composting additive types listed in Annex 9 cover a limited list of waste types, which is too restrictive. AfOR requests that the composter's assessment of additive suitability is evaluated by competent certification bodies (or certification scheme owners), using a Hazard Analysis and Critical Control Points (HACCP) approach. This is what AfOR currently does (as a certification scheme owner) and we take account of reasons for use, ingredients in the additive, intended rate of application and frequency of application. Where necessary, we would ask for specific tests to be done on the additive and may ask for the compost to be tested before and after use of the addtitive, to check that compost quality remains adequate.

A number of process additives are products rather than waste status materials, based on non-genetically modified, non-antibiotic microbes and/or by-product nutrients from the manufacture of food and feedstuffs. Attempting to positively list in the EC EoW document every suitable type of allowed additive would be difficult, and it is unlikely that a list of 'types' would be an adequate safeguard. Additive-specific assessment is necessary.

Recommendation: The composter's HACCP assessment of a specific additive should be required to be evaluated by the certification body (or certification scheme owner, or Member State competent authority). When evaluated, the certification body would decide whether the composter can use the additive and inform him/her of that decision – in writing – with supporting reasons.

If the JRC-ITPS do not wish to recommend that EC EoW criteria require certification bodies/schemes or Member State competent authorities evaluate prospective additives, please create a suitable, technical and timely mechanism for additive assessment within the European Community framework.

6.3 Requirements on Processes and Techniques

Question 13
Could other time-temperature profiles be envisaged for anaerobic digestion than those presented in the working document, for both mesophilic and thermophilic processes?
Please provide clear information on time and temperature requirements and where they apply in the chain of the anaerobic digestion process.

The following draft text in JRC-ITPS second working document (criteria text within table's left-hand column, page 100) seems unnecessarily restrictive for digestion where there are no animal by-product inputs: 'In the case of anaerobic digestion for materials not containing any animal by-products, a time temperature profile of 55 ^{o}C during at least 24 hours and a hydraulic retention time of at least 20 days should ensure complete hygienisation.' Different combinations of temperature, time at the specified temperature, and hydraulic retention time are likely to achieve the minimum proposed quality in terms of pathogen indicator organisms.

The text suggested below would allow appropriate flexibility for mesophilic and thermophilic digestion processes.

Please note that in the UK we already have at least one AD operator whose hygienisation step comes after the digester rather than before it; please to NOT require that a hygienisation step must always occur before the digestion step!

Suggested EC EoW text for 'Anaerobic digestion of input materials that consist of or include animal by-products':

[first paragraph is about hygienisation according to standard conditions in ABP regulations]
'It must be demonstrated for each digestate batch that a suitable temperature-time profile, with appropriate maximum particle size, was followed during the digestion process for all material. For EC EoW purposes, standard processing methods provided in Commission Regulation (EU) No 142/2011, or in national animal by-products regulations relevant to the specific types of animal by-product covered by those regulations, are acceptable.'

[Paragraphs below in this subsection are about hygienisation according to 'novel' conditions, allowed for specified types of ABP and assessed by the Member State's competent authority]
'Alternatively for EC EoW purposes, pending the adoption of rules as referred to in Article 15(2)(a)(ii) of Regulation (EC) No 1069/2009, the Member State's competent authority may authorise the use of specific requirements other than those laid down in Chapter III of Commission Regulation (EU) No 142/2011, provided that they guarantee an equivalent effect regarding the reduction of pathogens, for:

(a) catering waste used as the only animal by-product in a biogas or composting plant; and
(b) mixtures of catering waste with the following materials:
(i) manure;
(ii) digestive tract content separated from the digestive tract;
(iii) milk;
(iv) milk-based products;
(v) milk-derived products;
(vi) colostrum;
(vii) colostrum products;
(viii) eggs;
(ix) egg products; and
(x) animal by-products referred to in Article 10(f) of Regulation (EC) No 1069/2009, which have undergone processing as defined in Article 2(1)(m) of Regulation (EC) No 852/2004.

The digestate producer shall decide at what stage in the production process the time-temperature profile and maximum particle size requirements are complied with, unless specified otherwise by the Member State's competent authority or in any update to EC or national animal by-products regulations in future.'
[It is likely that in this context the Member State's competent authority WOULD specify the stage in the production process where the time-temperature provide and maximum particle size requirements must be complied with, i.e. the hygienisation stage.]

Suggested EC EoW text for 'Anaerobic digestion of input materials that do NOT include any animal by-product(s)':

[First paragraph is about hygienisation according to the same standard conditions as those in ABP regulations. Few AD operators would be keen on this, but it's potentially quicker and easier to validate than by using non-standard time-temperature and max particle size.]
'It must be demonstrated for each digestate batch that a suitable temperature-time profile, with appropriate maximum particle size, was followed during the digestion process for all material. For EC EoW purposes, processing methods the same as the standard ones provided in

Commission Regulation (EU) No 142/2011, or in national animal by-products regulations relevant to the specific types of animal by-product covered by those regulations, are acceptable.'

[Paragraphs below in this subsection is about hygienisation according to 'novel' conditions, allowed for specified types of ABP and assessed by the Member State's competent authority]

'Alternatively for EC EoW purposes, the Member State's competent authority, an owner of an accredited certification scheme and/or an accredited certification body responsible for EC EoW compliance assessment and certification, may authorise 'non-standard' processing methods – in terms of time, temperature and maximum particle size - provided that an equivalent effect regarding the reduction of pathogens is proven at the digestion facility where those non-standard processing methods are used.

The digestate producer shall decide at what stage in the production process the time-temperature profile and maximum particle size requirements are complied with, unless specified otherwise by the Member State's competent authority, an owner of an accredited certification scheme, and/or an accredited certification body responsible for EC EoW compliance assessment and certification.'

Please note that although the suggested text above applicable to digestion of non-animal by-products includes reference to maximum particle size, AfOR suggests that it is not necessary to specify maximum particle size.

Question 14

What could be the mechanism for Member States to grant deviations from the proposed time-temperature profiles in the working document?

AfOR's proposes that similar provisions are made for composting as those made above in AfOR's response to question 13. We prefer that the granting of deviations from the proposed time temperature profiles in the working document is carried out by the Quality Assurance Organisation and/or Member State's competent authority rather than be required to utilise a comitology procedure managed by the European Commission and involving an expert group. In the case of 'novel' methods for composting animal by-products, the assessment and granting of deviations is already done by the Member State's competent authority, which in the UK's case is the Animal Health and Veterinary Laboratories Agency (AHVLA). The assessment work done by the AHVLA is considerable for each 'novel' process, is trusted and any additional comitology procedure required by EC EoW criteria would add unnecessary cost to an already costly 'EoW' alternative to placing composts / digestates on the market as 'waste' status materials.

6.4 Requirements on the provision of information

Question 15

To your opinion, which information is really necessary to declare in order to meet the EoW conditions and which information may be optional? Please adduce arguments.

Please see worksheet titled 'Provision of information' in Excel document '20120120_AfOR_positive_lists_&_provision_of_information'.

ECN wrote: 'The information intended to be provided here are only those which are of interest for the customers. The fact that it is an end-of-waste product automatically implies that health

and safety (precautionary) requirements and thresholds are met, so no specification but a reference to "end-of-waste quality" is needed instead of a specific declaration of heavy metals, impurities or pathogens. When placing compost on the market the declaration parameter therefore can focus on the product properties which are relevant for application.' AfOR agrees with ECN view here, although highlights that if ECN's recommendations in response to question 8 are accepted, these included conditional declarations if Cu or Zn threshold values are exceeded.

* Recommended 'either to completely delete a limit value or raise the levels for Cu and Zn to 300 mg Cu kg-1 dry matter and 600 mg Zn kg-1 dry matter. Zn and Cu levels to be declared if a threshold of Cu=100 and Zn=400 is exceeded Cu upper limit is and Zn'

AfOR suggests that the following information be provided in connection with the compost/digestate product dispatched from the composting/digestion facility (whether the product is packaged or un-packaged), either included on the packaging or on product declaration sheets sent to the product recipient:

(a) the name and contact details of the compost/digestate producer OR if reaches user via a supply chain, name and contact details of the organisation responsible for sale or supply of the product to that user (in this latter scenario, the organisations in the supply chain must record and keep the information necessary to trace the compost/digestate back to its site of production);
(b) designation identifying the whether the compost or digestate is derived from feedstocks including ABP or not → see QU 11
(c) compost grade (particle size range / grain size range, e.g. 0 – 10 mm) OR digestate output type (i.e. whole digestate, separated fibre or separated liquor);
(d) code(s) of the batch(es) in the consignment;
(e) the quantity (in weight and/or volume);
(f) instructions for storage or reference to relevant good practice / regulations setting specific provisions for storage of compost or digestates
[Example of instructions: 'This compost keeps best when stored in a cool, dry place. If covered to prevent risk of contamination by wind-blown weed seeds and minimise gradual change in biological and chemical characteristics, it will keep best under a gas-permeable cover.'
Example of reference to relevant good practice: 'compost shall be stored according to the storage provisions set in the FMA's Code of practice: for the prevention of water pollution from the storage and handling of solid fertilisers'.]
(g) name(s) of suitable type(s) of use (e.g. soil improving, turf dressing, blending with other suitable non-waste materials to make manufactured topsoil or growing media);
(h) instructions for use and any restrictions on use (based on the compost/digestate's characteristics, with reference to relevant codes of good practice relevant to the type and context of use*, instruction to follow good practice, minimum grazing ban period if compost/digestate was made from animal by-products and reference to legally required records for use of animal by-products);
(i) quality characteristics relevant to the suitable type(s) of use (for each relevant characteristic, the value of the tested sample taken from part or all of the consignment, OR if the consignment was not sampled and tested, the 'typical' value of that compost grade / digestate output type) [see worksheet on 'Provision on information'];

(j) declaration of conformity with EC EoW criteria (e.g. 'This compost / digestate conforms with European Community End of Waste criteria for biological treatment of biodegradable wastes');
(k) significance of the conformity declaration, i.e. 'Production of this compost / digestate has converted the controlled biodegradable wastes from which it is made into a product, fit for the use(s) that accompany this declaration.';
(l) warning of implications if the compost/digestate is subsequently mixed with any controlled waste (e.g. 'If this compost / digestate is subsequently mixed with any waste, the entire mixture becomes waste and is thus subject to waste regulatory controls.';
(m) reference to any European Community and/or national regulations relevant to the supply, storage and use of the compost/digestate in the market;
(n) the name of the quality assurance scheme the product is certified with, the name and contact details of the Quality Assurance Organisation that issued the certificate of compliance, the QAO's certification mark and the product's certification code.

* Context of use is important because rate of application, extent (area treated), location(s) and timing of application are very different for amateur gardening than they are for agriculture and intensive horticultural crop production.

Please do NOT require declaration of 'the main input materials (those over 5 % by volume) from which the product has been manufactured', as was proposed. The customer can enquire this from the composter / digester if interested and appropriate instructions about how to use the product are included in item h) above, including obligation to state grazing restrictions applicable if compost / digestate was made from animal by-products and the associated legally required records that the user must make and keep.

Question 16
To your opinion, are all the proposed parameters to declare useful for all kinds of materials (e.g. grain size for liquid digestate)? Please adduce arguments.

Please see worksheet titled 'Provision of information' in Excel document '20120120_AfOR_positive_lists_&_provision_of_information'.

Most of the parameters we have said must be declared (see Excel document) are relevant to each compost grade / digestate output type for which EC EoW compliance is claimed. AfOR emphasises that there is an important exception, which is the plant response test. We believe that the tomato plant response test we use in the UK is the best well-defined method currently available for detecting synthetic auxin herbicide residues in compost samples. A 28-day test is necessary for noticing abnormal plant growth symptoms, and because of the duration of the test and that it must be carried out in a controlled growth environment, it is a relatively costly test (typically £150 to £200 per sample, excl VAT).

AfOR recommends that plant response testing should NOT be required for all compost grades for which EC EoW compliance is claimed; instead we suggest that this test is carried out ONLY for the 'worst case' compost grade (for example, the grade that is likely to have the highest amount of toxins e.g. that processed for the shortest timescale, which may still have residual amounts of volatile organic acids or other phytotoxic metabolites). It would be far too costly and unnecessary to request that this parameter is declared for all compost grades from a single composting process. We make the same points in terms of plant response testing applicable to digestate output types for which EC EoW is claimed.
Question 17

To your opinion, do certain parameters need to be added for specific materials (e.g. viscosity for semi-liquid materials)? Please adduce arguments.

Please see worksheet titled 'Provision of information' in Excel document '20120120_AfOR_positive_lists_&_provision_of_information'.

As specified in the spreadsheet, there are certain parameters that are appropriate for outputs in a liquid form and some other that are appropriate for outputs in a solid form. For example, the dry matter content should only be declared for liquid & semi-liquid materials (whole digestates and separated liquor), but it is not necessary for composts and digestate fibre fractions. This is because Dry Matter (DM) content may vary significantly during maturation and also during storage and transport; given that compost and digestate fibre will not be tested for every batch, typical results for the dry matter content may not be representative of the actual compost / digestate fibre consignment. We do warn though, that if any characteristic important to end use application rate is reported by the laboratory on a dry matter basis only, the user may need to ask the dry matter content (and thus the moisture content) in order to convert the result to a figure expressed on a fresh matter basis (because compost / digestate is applied on a fresh matter basis).

Declaration of water-extractable nitrogen should only be required for digestates. However for composts the water-extractable nitrogen content may change significantly during maturation and also during storage and transport; given that compost testing is not carried out for every batch, average test results provided for this parameter may not be representative of the actual compost consignment.

Additional parameters may have to be declared if demanded by specific customers (e.g. a potato grower may want to know the content of sharps or macroscopic impurities in the compost supplied).

It should not be necessary to require digestate (whole digestate and separated liquor) viscosity testing for EC EoW purposes. The prospective customer can ask if he/she is very concerned about its suitability for pumping out of transportation vehicles, into and out of storage tanks, and into and out of digstate spreading machinery.

Bulk density (on an 'as received' fresh basis) should be declared for compost and separated fibres fractions (volume per unit of fresh mass). It is generally assumed that 1 tonne/m^3 is near to the true fresh bulk density of liquid digestates (i.e. whole digestates and separated liquor), so it could be stated in the declaration that this can be assumed appropriate for the whole digestate / separated liquor supplied.

Question 18

To your opinion, what instructions on use /compliance with national regulations should be mentioned: those of the Member States of production or of the Member States where the product is purchased/used? Please adduce arguments.

Only those use instructions are necessary to add to tRegarding national regulations, the product declaration should refer to those regulations that are mandatory in the Member State(s) where the product is purchased and used [e.g. Nitrates Directive, Nitrate Vulnerable Zone Rules, the Water Framework Directive (ref soil phosphorus), agricultural cross-compliance schemes, fertiliser regulations (where applicable) and soil protection regulations].

Question 19

What items should be part of the core statement of conformity and what items are part of the more general information to be provided? Please adduce arguments.

A statement of conformity is simply a statement that the compost / digestate conforms with the EC EoW criteria for biological treatment of biowates. AfOR's interpretation of this question is that it's about what types of information in the 'Provision on information' document are very important to the compost / digestate recipient. ECN's response suggested that these are: the EoW conformity statement, declaration of the characteristic quality parameters (nutrients, organic matter etc.) [although this could be provided by supplying a copy of the laboratory's test results report for the sample if 'typical' values are not wanted] and recommendations on the proper use, indicating optimum range of quantities to be applied according to Good Practice in the diverse market sectors. This is a sensible list although AfOR highlights that not every market wants information about the same characteristic quality parameters.

Question 20
Should there be a time period imposed for the producer to store information regarding traceability? Please adduce arguments.

Normally the period of keeping documents / records is 5 years.

6.5 Requirements on quality assurance

Question 21
What EU-wide recognized quality assurance scheme could be proposed for digestate?

The UK already has quality assurance schemes in place for both compost and digestate, which are both in the process of becoming accredited by the United Kingdom Accreditation Service. Accreditation is sought that verifies scheme and certification body (QAO) compliance with EN 45011's 'General requirements for bodies operating product certification systems'. (This is an appropriate standard against which accreditation organisations assess QAOs in terms of their services to assess composters / digesters who produce EoW-compliant composts and digestates.)

Whilst it may make sense for a European Compost Network Quality Assurance Scheme to be provided for composters and digesters in Member States who do not yet have national QAOs, any requirement for participation in an ECN QAS or a a similar European scheme would undermine confidence in existing systems in the UK and harm the business of QAOs already providing quality assurance services for composters and digesters in the UK.

Please see AfOR's comments in section 8.11 for recommended EC EoW text regarding QAOs and their accreditation.

Question 22
To your opinion, what should be the requirements regarding spot monitoring of organic pollutants of compost/digestate in a quality assurance system?

The UK does not currently have any limit values for organic pollutants in composts and digestates. AfOR would not support their inclusion without considerable analysis of the current evidence base, including where ‚safe' concentration thresholds lie for soils and growing media used for growing a variety of crop types, including ready-to-eat crops. We highlight that spot

monitoring of organic pollutants is not needed as long as the positive list of allowed input materials is for source separated biodegradable waste materials (not residual wastes) and there is a suitable assessment and checking mechanism for process additives.

6.6 Application of end of waste criteria

Question 23
To your opinion, should imports of EoW compost/digestate from outside the EU (e.g. Switzerland, Norway, Ukraine,...) be allowed? If imports of EoW compost/digestate from outside the EU are to be allowed, what should be the requirements (e.g. quality management system audited externally by a quality assurance organisation acknowledged by a Member State authority)?

Recommendation:
'Any EoW compost/digestate from outside the EU – made from any materials that included controlled biodegradable wastes - shall be:

1) indepently certified compliant with the EC EoW criteria by an accredited QAO, or
2) indpendently certified compliant with a set of criteria approved 'equivalent' to EC EoW criteria by the Member State's competent authority or the European Commission, and the certification issued by an accredited QAO.

'This requirement does not apply to growing media that do not contain, or consist of, composted controlled wastes and/or digested controlled wastes.'

The last sentence above is suggested because in the case of growing media, common terminology for this in the UK is 'compost', even if the growing medium does not include any composted or digested material! E.g. peat growing media and coir growing media are available in product ranges, with generic product type names such as 'multi-purpose compost', 'planting compost', 'hanging-basket compost', 'seed compost', 'potting compost', and so on.

Work will be required to establish a process and mechanism for the necessary inport control systems to be put in place.

7. Responses to Chapter 5: Description of impacts

Question 24
Please provide information regarding the possible impacts when shifting compost/digestate from the waste status to end-of-waste status, for the current set of proposed end of waste criteria. Please also provide information on how the impacts could be affected in case the final end of waste criteria would become either more lenient or more strict than the current proposal. Please bear in mind that impacts should not be absolute but relative and hence only describe the effects that can be attributed to the shift from waste to product.

Please provide your impact assessment of shifting compost from waste to end-of-waste on following items:

- **Environmental and health impact**
- **Economic impact**
- **Market impact**
- **Legislative impact**
- **More strict or more lenient levels for the criteria**

AfOR's response to question 24 is short because we have spent considerable time and effort answering the preceding 23 questions, commenting about other 2nd draft EC EoW document issues in section 8 of this response, checking and proposing 'positive list' allowed inputs for composting and digestion, proposing 'Provision on information' criteria, and liaising with other UK and ECN contacts about JRC-ITPS's proposals.

In principle, AfOR supports the establishment of EC EoW criteria for the biological treatment of biodegradable wastes. In this document, we have commented on the 2nd working draft's details where we are concerned because they are unclear, are potentially problematic or seem to be silent on important issues. Generally, we have written about envisaged impacts in responses to specific questions and in section 8.

AfOR has read and largely agrees with ECN's responses to question 24. We add that there has not been time since JRC-ITPS invited responses to its 24 questions to fully impact assess the proposed EC EoW criteria for biological treatment of biodegradable wastes. AfOR will work with the UK Member State competent authority to carry on assessing envisaged impacts after the date when this reponse is submitted to JRC-ITPS.

8. Comments on additional subjects

8.1 Treatment process criteria for composts

Text in the left column in the table on page 100 states that: 'It must be demonstrated for each compost/digestate batch that a suitable time-temperature profile was followed during the composting/digestion process for all material contained in the batch. Annex 10 lists temperature-time profiles required by the Animal By-products Regulation (45) and national legislation and standards for composting plants. Based on the list in Annex 10, a set of three allowable time-temperature profiles could be proposed for materials subject to composting and not including ~~and~~ animal by-products:
65 °C or more for at least 5 days,
60 °C or more for at least 7 days,
55 °C or more for at least 14 days'.

AfOR's interpretation of the first sentence in the excerpt above is that the time-temperature profile does not have to be achieved simultaneously throughout the batch, i.e. all of it at or exceeding the minimum temperature at the same time, throughout the minimum duration.

Composting using open-air turned windrows: when a windrow is turned and for a short period afterwards, core temperatures will be less than those referred to above. Similarly, the surface zone of each windrow will not reach and sustain those temperatures in the UK climate.

Composting using uninsulated aerated static piles under positive pressure: In the UK climate, the base and lower sides of the surface zone of each aerated static pile is not likely to reach and sustain the temperatures referred to above.

Composting using uninsulated aerated static piles under negative pressure: In the UK climate, the surface zone of each pile is not likely to reach and sustain the temperatures referred to above.

Composting in a building (e.g. housed windrow): Surface zone temperatures may not reach and sustain the temperatures referred to above, and each time a windrow is turned its core

temperature is very likely to go below the temperatures referred to above, at least until the windrow has been reformed.

Recommendation: Please allow the QAO assess what is practicable and reasonable in terms of temperature zones, duration that each temperature zone spends continuously at or above the minimum temperature, and temporary cooling effects in systems that rely on turning/mixing of material. Please also review the quoted excerpt above as the current wording leaves little room for the QAO to decide what is reasonable, which could be a problem if the QAO has to gain accreditation from a national or European accreditation body.

PAS 100:2011's table 1 in section 8 and appendix B should be of help, and the UK approach is that the composter defines in his/her Quality Management System document(s) the time, temperature and duration criteria for the sanitisation phase, makes records of process monitoring and control, and checks that compost quality is adequate in terms of pathogen indicator organisms (*E. coli* and *Salmonella* spp). The QAO checks the production records and compost test results and that the process was controlled according to composter's criteria for sanitisation phase time, temperature and duration. This approach is working well for the range of different composting systems we have in the UK.

8.2 Minimum organic matter

Digestates

Median and mean statistics calculated from analysis of UK PAS 110 digestate test results shows that separated liquors and whole digestates contain very low concentrations of organic matter (determined using 'volatile solids' test method 'BS EN 15169, Characterization of waste – Determination of loss on ignition in waste, sludge and sediments'). The median for separated liquor is just 1% m/m on a dry matter basis and for whole digestate is just 2.95 % m/m on a dry matter basis. In contrast, most separated fibre samples contain much more organic matter than the JRC-ITPS's proposed minimum of 15 % m/m on a dry matter basis, having a median organic matter content of 72.31 % m/m on a dry matter basis. (A few separated fibre samples contained less than 15 % m/m dm organic matter, but it is possible that these were not correctly categorised in the laboratory's raw data.)

Digestate type	Statistic / data type	Volatile Solids % m/m dm	Number of failed samples
Separated liquor	Median	1.00	28 in 28
Separated liquor	Mean	4.50	
Whole digestate	Median	2.94	24 in 24
Whole digestate	Mean	2.79	
Separated fibre	Median	72.31	5 in 33
Separated fibre	Mean	62.36	
EC EoW minimum (proposed by JRC)		15.00	

JRC-ITPS included minimum organic matter to try to prevent the input materials that are significantly non-biodegradable. However, given that a positive list approach is preferred it should not be necessary to set a minimum organic matter contenta, especially for digestate output types 'whole digestate' and 'separated liquor'. It is likely that the solids in these types of

output are mostly sand, silt and clay size particles, because these particle types are so small that they are more easily suspended in liquid than most fractions of organic matter particles. It is not in the commercial interest of a digestate producer to accept quantities of input material that are not-biodegradable because such inputs will reduce biogas yield and are likely to settle and build up in the bottom of the digester. Digester drainage and removal of settled solids is very expensive, takes time for normal operating conditions to be regained and could be extremely problematic if it has to be done within the term of one or more contracts for accepting and treating biodegradable wastes.

Recommendation:
Preferred solution A: Require for whole digestate, separated fibre and separated liquor that organic matter content is determined and the result is included in information for customers. For all of these digestate output types, remove from the quality criteria the proposed organic matter minimum of 15 % m/m on a dry matter basis.

Less preferred solution B: Require only for separated fibre an organic matter minimum of 15 % m/m on a dry matter basis. Require for whole digestate and separated liquor that organic matter content is determined and the result is included in information for customers.

Composts

AfOR's data for composts indicates that most of them would comply with the proposed organic matter minimum of 15 % m/m on a dry matter basis. However, given that a positive list is intended for control of input materials and we have proposed a certification scheme / certification body assessment mechanism for additives, it seems unnecessary to set such a minimum organic matter requirement.

It is preferred that composts are required to undergo organic matter testing and that result(s) are required to be included in information supplied to the customer who receives the compost. If any very low values were reported, it would be within the certification body's duties to investigate the reason(s) and issue a non-compliance notice if any unacceptable practice has occurred.

8.3 Proposed lead limit ~ composts

Page 90, section 4.3, table setting minimum quality requirements in 2nd working document.

AfOR's Compost Quality Database, includes test results of 370 compost samples reported by AfOR Approved Laboratories between 2008 and 2011 – samples comprised certified and not yet certified composts made from source segregated biodegradable waste input materials, i.e. the types allowed in PAS 100 and the Compost Quality Protocol. Analysis of the data showed that 22 % of the compost samples (81 out of 370) exceeded 120 mg/kg dm, the proposed EC EoW upper limit for lead (Pb).

Statistics	Pb (mg/Kg dm)
Median	87.05
Mean	94.78
Standard deviation	69.64
Mean + 1 S.D.	164.42
Percentile (78th)	119.00
Percentile (90th)	151.10
Percentile (95th)	186.65
Number	370
JRC-IPTS 2nd draft EoW report limit	**120**
BSI PAS 100:2011 limit	**200**

AfOR's data shows that some samples from some of the composting plants participating in AfOR's Compost Certification Scheme would fail to comply with EC EoW requirements due to their Pb concentration. There has been insufficient time since JRC-ITPS's 2nd working document was made available to work out how many of those plants would comply with the 120 mg/kg dm upper limit for Pb on the basis of 'mean concentration [plus confidence interval at 95%] of the whole population of the compost sold' (the JRC's proposed approach for assessment of quality compliance).

The approach that JRC-ITPS seems to haven taken when proposing EC EoW minimum quality criteria is to set limits 'As Low As Resonably Achievable' (ALARA), taking account of Member States' existing standards for composts and digestes, and trying to arrive at an acceptable compromise limit level for each parameter for which Member States have set differing limits. So this is an exercise of compromise, on condition that each parameter's limit does not result in harm to the environment or human health.

In AfOR's data set, the 95th percentile value for lead concentration in UK composts made from source segregated biodegradable materials was 186.65 mg/kg dm. Previous review of compost quality data in Member States has found that composts made from urban sources of plant tissue wastes tended to have higher concentration of some Potentially Toxic Elements than composts made from rural sources of plant tissue waste. The use of lead in fuel was not banned in the UK until 1st January 2000; it is likely that there is a declining trend of lead concentration in plant tissues in the UK, which should also be mirrored in composts derived from plant tissues.

Effect on environment: Recent modelling of continuous compost application in terms of soil PTE concentrations[1] has predicted that it would take 120 to 125 years to reach a soil precautionary threshold based on the following assumptions; a precautionary threshold for multifunctional use of loamy soil with pH > 6 is 70 mg/kg dm, background concentration of Pb in the soil is 24.84 mg/kg dm, compost containing 200 mg/kg dm Pb is incorporated to 30 cm depth in the soil every year, at a rate of 9.2 t d.m. applied per ha. Furthermore, a Pb concentration of

[1] Effect of Continuous Sludge & Compost Application on the Heavy Metal Status of the Soil ~ A contribution to the experts discussion on the proposed limit values of the draft Working Document on SLUDGE and BIO-WASTE 21 September 2010; DG ENV C2/BZ/tb, Florian Amlinger, Compost Consulting & Development Austria, 19 October 2010.
(available at http://circa.europa.eu/Public/irc/env/rev_sewage/library?l=/comments_document_2010/other_stakeholders/amlinger_101019/_EN_1.0_&a=d)

70 mg/kg dm in soil was described as a 'precautionary threshold', so the actual safe threshold is likely to be a higher concentration. We note that iIn the Code of Practice for Agricultural Use of Sewage Sludge (applicable in the UK) the maximum permissible concentration of lead (Pb) in soil with pH 5.0 and above is 300 mg/kg dry solids, much higher than the precautionary threshold of 70 mg/kg dm.

Recommendation:

Preferred solution A: Set in EC EoW criteria an upper limit of 190 mg/kg dm for Pb.

Less preferred solution B: Set in EC EoW criteria an upper limit of 120 mg/kg dm for Pb and provide a derogation which allows until 1st January 2019, an upper limit of 190 mg/kg dm for Pb if the compost/digestate is made in a Member State that banned the use of lead in fuel on or after 1st January 2000. If necessary, the composter/supplier could be required to declare the compost's Pb concentration, in writing, to the recipient if it is greater than 120 mg/kg dm.

Brief statement of supporting reasons for recommenation (solution A or B):

(a) *the substance or object is commonly used for specific purposes;* 190 mg/kg dm Pb limit proposed by AfOR is not expected to reduce the common use of compost that complies with this limit. It might influence trade of compost across borders between EU Member States, but the market/users can decide whether they want to use the lowest Pb compost available or a different EC EoW compost with a higher Pb concentration.

(b) *a market or demand exists for such a substance or object;* see answer to (a).

(c) *the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products;* 190 mg/kg dm Pb limit proposed by AfOR is less than the current 200 mg/kg dm Pb limit specified in PAS 100 (current UK EoW criterion for Pb in compost).

(d) *the use of the substance or object will not lead to overall adverse environmental or human health impacts;* soil with a background Pb concentration of 24.84 mg/kg dm would take 120 to 125 years for this concentration to increase to the precautionary threshold of 70 mg/kg dm. So it is unlikely that solutions A or B would result in lead exceeding that threshold in soil that receives EC EoW compost within 120 years and over this timescale we expect Pb concentrations in such EC EoW composts to become lower. The intended positive list is expected to restrict inputs to source segregated biodegradable wastes and concentrations of lead in plant tissues are expected to become lower due to bans on putting lead in fuels.

8.4 Compost stability

Item 2 in table on page 90 of 2nd draft working document.

Current situation

JTC-ITPS proposal: upper limt of 15 mmol O2/kg organic matter / hr, determined using method CEN / TC 223 pr WI Aerobic Biological Activity, Part I Oxygen uptake rate.

UK's PAS 100 specification for composted materials: upper limit of 16 mg CO2 / g organic matter / day, determined using method ORG0020, Standardised method for the determination of compost stability by measurement of evolved carbon dioxide, Waste & Resources Action Programme.

Comments

We believe that the proposed compost stability limit of 15 mmol O_2/kg organic matter/hr is a lower limit than the 16 mg CO_2/g organic matter/day set in the UK's PAS 100 specification for composted materials. We have heard from a contact involved in prodution and testing of composts and growing media that 10 mmol O_2/kg organic matter/hr is thought to be equivalent to 8 mg CO_2/g organic matter/day.

We do not know what the proposed EC EoW requirement for compost stability not to exceed 15 mmol O2/kg organic matter/hr translates to in terms of number of mg CO_2/g organic matter/day (according to the compost stability test method used in the UK). It will be less than 16 mg CO_2/g organic matter/day but we do not know how much less and we do not currently run the Oxygen Uptake Rate method in most UK laboratories.

The potential impact proposed EC EoW requirement for compost stability is that materials would need to be composted for longer, which is likely to be commercially difficult at facilities near to or already at their maximum capacity. We ask what rationale was used by JRC-ITPS when deciding to propose that the stability limit for compost be 15 mmol O_2/kg organic matter/hr and would we be expected to move to using the draft, non-harmonised CEN method referred to above? We note that BT/TF 151 & CEN TC400 are not doing work towards harmonising a method for compost stability.

We need more time to assess the impact of the proposed limit on the UK composting industry.

Recommendation

Given the current lack of a harmonised method for compost stability and insufficient time to assess the likely impact of a 15 mmol O_2/kg organic matter/hr limit on the UK composting industry, we propose the following solution.

EC EoW criteria should seek to ensure adequate composting by requiring that stability limit(s) and the method of test specified in the Member State's relevant standard(s) applies UNTIL the Commission Decision on EoW for biological treatment of biodegradable wastes is amended in future*. I.e. the stability method of test should continue to be the nationally used method until superseded in future by a harmonised European method.

We also suggest that section 4.5 of the second draft technical report is changed from requiring that 'When reaching end-of-waste status, the material must have undergone those minimum necessary treatment processes that make it fit for purpose.' to requiring that 'When reaching end-of-waste status, the material must have undergone all necessary treatment processes that make it fit for purpose'. 'Fit for purpose' should be defined as: 'having all of the properties and characteristics necessary for its intended use(s)'.

* Such amendment in future may specify minimum required stability (perhaps different values for different types of application), would refer to an appropriate harmonised method of test for stability, and maintain the requirement that: 'When reaching end-of-waste status, the material must have undergone all necessary treatment processes that make if fit for purpose'.

8.5 Plant response test

Relevant parts of the 2nd draft document:

1) Page 201, table's left hand column about compost / digestate criteria for declaration, which includes: 'Biological properties: Stability/maturity, Plant response, Contents of germinable seeds and plant promulgates.

2) Page 167, 'Annex 11: Product property parameters that need to be declared when placing compost on the market (Proposal from first working document)' which includes ‚Biological properties: Stability/maturity, Plant response, Contents of germinable seeds and plant promulgates'.

3) Page 178, in Annex 13 reference to method of test 'CEN/TC 223 prWI plant response' with the following description: This pre-standard specifies procedure to test the plant response on the following materials used as growing media, growing media constituents or soil improvers: Compost, peat, wood fibres, rice hulls, coir, cocoa hulls, clay, clay minerals, expanded clay, perlite, vermiculite, rock wool, sand, pumice, lava, bark and readily mixed growing media. To test the plant response directly using the test material, the test sample is filled into plant containers. Seeds of the respective species are evenly distributed on the surface of the test material. For Chinese cabbage, 15 seeds, for barley, 20 seeds per container have to be used. Then, the plots. are kept at a temperature suitable for plant germination. The plant response of the material can be evaluated by the germination rate and growth of the plants.'

4) Page 178 in Annex 13, no EU Project Horizontal (BD/TF 151 & CEN TC400) work is identified with regard to future harmonisation of a plant response test for composts (and perhaps digestates).

5) Page 174 in Annex 13, which states 'Until horizontal standards elaborated under the guidance of CEN Task Force 151 become available, testing and sampling shall be carried out in accordance with test methods developed by Technical committee CEN 223 'Soil improvers and growing media'. Other test methods may be used if their equivalence is accepted by National Member states. For instance, if other consolidated and approved test methods for soil improvers and fertilisers are used in Member States or third countries, they may substitute some of those set by CEN. Where required testing is not covered by CEN standards or CEN standards in progress of approval, other test methods are pointed out in the annex. These methods are indicative by nature and, as stated above, may be substituted by other methods in use.

AfOR's interpretation of the 2nd working document's text excerpts above is that the proposals for EC EoW would require that composts and digestates are tested in terms of plant response and the results included or cross-referenced in the compost / digestate declaration supplied to the product recipient. We have a number of concerns about these draft requirements, written below in this section.

Many prospective professional users of EC EoW compost / digestate are unlikely to know whether the plant response test results show that the compost / digestate is fit for its intended uses and most amateur users (hobby gardeners / amateur horticulture) would not know how to interpret such results. **Recommendation:** Results of plant response testing must be available to the QAO for assessment of compliance with EC EoW criteria, but it should not be obligatory for this test's results to be included in the compsoter's / digester's information about the product (supplied to the product recipient).

Substances of potential concern

In the future we would like there to be a harmonised plant response method of test proven valid for detection of: harmful residues of the herbicide active ingredients that are toxic to sensitive plant species at low concentrations; and volatile organic acids that indicate degree of biodegradation acheived and which may exert toxic effects on sensitive plant species and germinating seeds if present in significant concentration(s).

Summary of research / reviews to date on herbicide residues in composts

WRAP has supported research and published a report which investigated clopyralid and aminopyralid in commercial composting systems[2]. This project reviewed existing research on the occurrence, fate and management of residual risks from the herbicides clopyralid and aminopyralid during BSI PAS 100: 2005 green waste composting processes and subsequent application of composts to susceptible agricultural crops. The project also reviewed previous examples where residual risks from these herbicides had been realised and managed elsewhere in the world; this information was collated and options were identified for managing residual risks from these herbicides to sensitive crops.

Research and development subesquently supported by WRAP has investigated a selection of plant species known or thought to be sensitive to aminopyralid, clopyralid, picloram, dicamba, MCPA and 2-4D. These were, respectively, dahlia; field bean, lentil and pea; and tomato (current PAS 100:2011 growth test species). Chinese cabbage (a standard European test bioassay subject species [one of the two species used in method CEN/TC 223 prWI plant response]) was also included, but as a member of the *Brassicaceae* (*Cruciferae*) family it was not expected to be as sensitive to the target herbicides; it proved less sensitive than the other plant species investigated.

AfOR also highlights that grass or graminaceous species (such as barley) are not species sensitive to aminopyralid and clopyralid as the herbicide products containing those active ingredients are for controlling weeds in graminaceous species crops. Barley is the second plant species used in method CEN/TC 223 prWI plant response', so our key message is that this method of test will not detect residues of the herbicide active ingredients referred to above, which can cause damage to sensitive plant species at low concentrations. I.e. This CEN method does not seem fit for purpose.

Recommendation:
For EC EoW testing purposes, AfOR recommends that the UK laboratories continue to use the integrated plant response and weed seeds/propagules test specified in PAS 100:2011. (It's method code is ‚OFW004-006, title ‚Plant response and weeds test for composted material', published by WRAP, Banbury. Latest version at the time of writing this response is version 1.0, dated 6th September 2010.) In future, we may seek to move to a test species more sensitive than tomato, as some residual herbicides can damage sensitive crop species if present in composts at low concentrations and the compost comprises a significant proportion of the

[2] A review of existing research on the occurrence, fate and management of residual risks from the herbicides clopyralid and aminopyralid during PAS 100 green waste composting processes and subsequent application of composts to susceptible agricultural crops. October 2010, OAV031-002, WRAP, Banbury. Available at http://www.wrap.org.uk/downloads/Clopyralid_report_FINAL1.ee5c36e0.9967.pdf

growing medium or plant root zone medium. If you seek further information on this topic, please contact AfOR.

In addition, existing methods of plant response test for digestates in liquid form (whole digestate and separated liquor) may need to be modified so they become suitable for testing liquid-type samples; modification would be in the method's section for 'sample preparation'.

8.6 Forms of digestate the quality criteria apply to

Page 90, section 4.3, Table of quality criteria for composts and digestates in 2nd working document.

Please make clear which physical forms of digestate the EC EoW quality criteria apply to; whole digestate, separated liquor and/or separated fibre? AfOR suggests adding in conjunction to the table: '*The form of digestate placed on the market (whole digestate, separated fibre or separated liquor) shall not be claimed to comply with EC EoW requirements at any time when it does not have a valid certificate of compliance with those requirements, which include each criterion in the [minimum quality table].*'

Is the digestion process operator allowed to decide which physical forms of digestate are assessed for EC EoW certification or must all of the physical forms of digestate produced be assessed for EC EoW certification? E.g. if the operator makes separated fibre and separated liquor, can he/she choose to apply for certification of the fibre but not the liquor (the latter would be 'waste'? ***AfOR recommends that the operator is allowed to make the choice.***

Supporting reasons for the recommendation:

a) If one physical form of digestate from a digestion process complies with all EC EoW minimum quality criteria (applicable to digestates), it should not be assumed that a different physical form of digestate from the same digestion process will also comply with all EC EoW minimum quality criteria (applicable to digestates). [It would be interesting to allow that where validation data for a statistically significant number of samples shows that digestate physical form A complies with EC EoW criteria and is consistently higher quality than digestate physical form B, that physical form A only has to undergo quality tests on which it is at risk of failing, with condition that the input types, proportions and operating conditions remain the same as those validated. This would have to be assessed and approved by the certification body. Unfortunately we do not have sufficient digestate quality data and time to further elaborate this idea.]
b) It may be obvious to the operator that one of his/her two physical forms of digestate output will not comply with EC EoW minimum quality criteria, even after all efforts to improve the quality have been made. In this circumstance, it would be wasted money and effort to apply for EC EoW certification.
c) It is not practical for EC EoW to require that all physical forms of an operator's digestate output are certified compliant with EC EoW minimum quality criteria; if one output type were to fail (e.g. separated liquor), that would prevent that whole digestion system from placing even its EC EoW certified digestate output type on the market as 'product' (e.g. separated fibre).
d) The only fair approach to calculating tonnages of biodegradable wastes that count as 'recycled' (being done in a separate EC regulation) – where that biowaste has undergone a biological treatment process with at least one output type certified compliant with EC EoW criteria - is for the 'recycled' tonnes to be the quantity of the certified output type made during the period for which 'recycled' tonnes data is sought. If the 'recycled' tonnes

were to be the input tonnage to the biological treatment process during that period, Company A would have an unfair advantage over Company B, the scenario being that Company A makes EC EoW certified separated fibre but its separated liquor is not EC EoW certified so is spread on land as 'waste' under waste regulatory controls, YET, Company A claims that all input tonnage to its process has been 'recycled'. The scenario of Company B is that it makes EC EoW certified separated fibre and separated liquor, at higher cost than that incurred by Company A. This puts Company A at an advantage when bidding for recycling contracts with local authorities, as it could more easily afford to offer a lower gate fee.

Please note that AfOR's recommendation above in this section is made on assumption that plant response testing does not have limit levels applied in EC EoW criteria; it would be very expensive to test each EC EoW digestate output type in terms of plant response (UK lab costs are typically £150 to £200 per sample) and according to our method (for solids), any particles > 20 mm in the sample are removed by the laboratory when setting up the test because they are not conducive to tomato seed germination and growth.

8.7 Compost grades the quality criteria apply to

Page 90, section 4.3, Table of quality criteria for composts and digestates in 2nd working document.

AfOR raises the same issues as those made about digestate output types in section 8.6 above, and highlight that oversize material resulting from screening composts into different particle size ranges (referred to as 'grades' in PAS 100) is not usually assessed for compliance with EoW criteria because it tends to contain problematic concentrations of macroscopic impurities. (It is possible to substantially remove macroscopic impurities from oversize material, but not all composters find this cost-effective to do or have the on-site space available to do it.)

Recommendation:
Please make clear in proposed EC EoW criteria that the composter is allowed to choose which compost grades are assessed for compliance with these criteria. AfOR suggests adding in conjunction to the table: '*The grade of compost placed on the market shall not be claimed to comply with EC EoW requirements at any time when it does not have a valid certificate of compliance with those requirements, which include each criterion in the [minimum quality table].*'

Please note that this recommendation is made on assumption that plant response testing does not have limit levels applied in EC EoW criteria; it would be very expensive to test each EC EoW compost grade in terms of plant response (UK lab costs are typically £150 to £200 per sample) and according to our method, any particles > 20 mm in the sample are removed by the laboratory when setting up the test because they are not conducive to tomato seed germination and growth. We are not trying to assess the commercial performance of the test mixture; our key aim is to check that the compost sample does not contain plant-toxic residues of man-made substances or high levels of volatile organic acids (intermediate by-products of biodegradation under aerobic conditions).

8.8 Frequency of sampling for independent testing

Pages 91 and 92 of table beginning with text 'Requirements on product sampling', selected text in left and middle columns, in 2nd working document.

These are excerpts of the text that seems to cover topic of minimum frequency of sampling for independent testing:

Left-hand column text: 'The details of the sampling programme may be adjusted to the concrete situation of each compost / digestate plant. The competent authorities will, however, have to check compliance with the following requirements:…Probabilistic sampling should be chosen as the sampling approach and appropriate statistical methods used in the evaluation of the testing.'

Middle column text: 'In the case of metal concentrations, the probability that the mean value of the concentration in a sample exceeds the legal limit should be less than a certain percentage (a confidence level of 95 % is typically used). This implies that the mean concentration of the whole population of the compost/digestate sold plus the confidence interval needs to be below the legal limit…Usually, it will be impractical to sample from the total population and a subset of the overall population that can be considered typical of the whole population will have to be defined as part of the quality assurance process. Usually, the population will correspond to all the compost/digestate sold from a composting plant throughout a year or shorter periods of time). The scale of sampling needs to be chosen depending on the sales/dispatch structure of a composting/digestion plant.'

AfOR's interpretation of the above text is as follows:

1) for each Potentially Toxic Element parameter, sufficient samples must be taken such that the mean value plus 95 % confidence interval is less than the element's EC EoW upper limit;
2) for each quality parameter against which an upper limit is proposed in EC EoW (except Potentially Toxic Elements), sufficient samples must be taken such that statistical methods used are applied to a sufficient number of samples;
3) the number of samples tested during validation and afterwards are allowed to adjusted to take account of which compost grades / digestate output types are assessed for EC EOW compliance and certification, and this must be checked by the QAO (or Member State's competent authority), including any statistical methods used; and
4) not every batch of compost / digestate production has to be sampled and tested, i.e. batches sampled for testing may be selected ones but they must be typical of all batches produced.

If AfOR's interpretation is correct, we support 3) and 4) especially, and believe that 1) would be workable. However, we are concerned about 2) because it seems very open to different interpretations about what is a sufficient number of samples, and an approach relying on averaging of multiple sample's results will not work at all well with a parameter such as *E. coli*. In our experience, when *E. coli* is present in compost samples this can range from > 10 CFU/g to hundreds of thousands of CFU/g (e.g. 432,000 CFU/g). If compliance assessment relied on the averaging of samples' *E. coli* test results it could take a long time and very many extra samples tested for *E. coli* to bring the average result back down to 1000 CFU/g (the proposed limit for EC EoW criteria).

Please also note that the 2nd working draft's text (see excerpts above) appears insufficient in respect of each the number of samples that must be tested in terms of each 'declaration' quality parameter (i.e. those parameters whose results must be determined and reported to the compost / digestate recipient but no limit or minimum concentration applies, e.g. total nitrogen, phosphorus and potassium contents).

The ECN's response included a proposed sampling frequency on page 14 of it's response to the 'Additional operation and processing impacts' sub-section under question 24. It was written:

'**a). Sampling frequency**
Nothing is said in the document about the frequency of sampling and analysis. We recommend to use the formula from the ECN-QAS including the increased frequency for the first year of quality assurance, the so called recognition year. In the following years – during the regular monitoring procedure – the frequency of compost **and digestate** analyses and sample taking should be calculated on the basis of following equation as a minimum requirement:

Amount of input material / 10.000 [t] + 1 = Analyses per year,
***Per year12 at maximum and 2 at minimum.* A positive number behind the dot must be upgraded.**

Example: If input material is 10.500 per year that the calculated result of 2.05, must be rounded up to at least 3 samples in that year.'

In AfOR's view, ECN's proposed sampling frequency would need to be modified so that it is geared to:

1) in the case of composting, the quantity produced of each compost grade assessed for EC EoW compliance, or
2) in the case of digestion, the quantity produced of each digestate output type assessed for EC EoW compliance.

For more details about minimum sample taking and testing frequencies used in the UK for EoW composts, please see Table 2 in section 13 of PAS 100:2011, page 31.

For more details about minimum sample taking and testing frequencies used in the UK for EoW digestates after validation, please see Table 4 in section of PAS 110:2010, page 38. Requirements for validation are specified in section 11.2, see particularly clause 11.2.2.

Finally, we ask you to consider that a maximum of 1 sample test per month for each obligatory parameter applicable to the compost grade / digestate output type would be a reasonable maximum frequency for sampling and testing that grade / output type, PROVIDED that no result has exceeded its corresponding parameter limit set in EC EoW criteria.

Please carefully consider minimum sampling and testing requirements; we would be pleased to talk to you further about this challenging issue.

8.9 External, accredited and independent sampling

Page 90, sentence above table in 2nd working draft: 'There is also clear agreement on the requirement for external, accredited and independent sampling.'

This is not clearly agreed; AfOR commented at the Technical Working Group meeting in October 2011 that a requirement for every sample be taken from a composting / digestion facility by an external accredited and independent sample taker would add considerable costs to operator compliance with EC EoW criteria (currently £470 per sample in the UK, just for taking the sample, not including the test costs), which is an uncecessary burden upon the many

composters / digesters who take care to ensure that any compost / digestate sample sent for laboratory tests IS representative of the batch (or portion of production) from which it came.

We were rather surprised to learn that the Germany's BGK system which includes the proposed independent and accredited sampling requirement does not seem to ensure that only the very recently finished batch(es) of production are sampled; for most of the proposed EC EoW parameters against which limits have been set the most recently produced batches are the most likely to fail.

In addition, Germany's network of certified composters and digesters includes many sites, over a wide geographical area and has the economy of scale for a network of independent sample takers to be located reasonably near to the production sites, enabling lower costs per independent sample taken (350 to 400 euros). For Member States with few composters and digesters seeking end of waste certification, the same economies of scale cannot yet be realised and so the costs of independent sample taking will be considerably higher on a per sample basis than they are in Germany.

Recommendation:

Arranging appropriately timed sampling visits entails extra forward planning and cost; it would be reasonable and preferable for independent accredited sampling to be carried out on a random or stratified sampling basis (across all participating composting / digestion processes), and/or to focus 'spot sampling' visits on those production processes associated with any complaints from compost / digestate recipients about the quality of the product received (we suggest complaints received by the QAO within the most recent 12 months. QAOs in the UK must have complaints investigation procedures and these are also assessed when the QAO is being checked by the accreditation organisation).

Any QAO that believes that every sample taken for testing for EC EoW compliance must be taken by an external, accredited independent sample taker could write in it's own Quality Assurance Scheme Rules this exact requirement, i.e. it makes its own decision to set a more demanding requirement than the one in EC EoW on this subject.

8.10 Accreditation of laboratories

JRC-ITPS's final technical document should make clear;

a) which accreditation standard - if any - the laboratory must gain accreditation in the specific scope of compost and digestate sample analysis,
b) which test parameters the accreditation must cover (only those associated with upper limits and minimum content, or all test parameters?)
c) for each test parameter, whether the laboratory can wait to apply for accreditation until a harmonised CEN method has been published,
d) which accreditation organisations are acceptable, and
e) how long the laboratories will be given to obtain the necessary accreditation.

Alternatively, JRC-ITPS's final technical document could allow National Quality Assurance Schemes and/or Member State competent authorities to decide the laboratory accreditation criteria.

Suggestions are made below:

a) **Relevant accreditation standard:** ISO 17025 or equivalent accepted by the National Quality Assurance Organisation or Member State's competent authority. An equivalent could be acceptable laboratory performance in a national or European Community laboratory test proficiency scheme.

b) **Test parameters for which accreditation must be obtained:** all parameters where EC EoW criteria set a minimum content or upper limit, provided that sufficient reference data is available for assessing laboratory competence (rather than for all 'limit' parameters and 'declaration' parameters specified)

c) **Version of test method for accreditation:** it can be difficult, time consuming and costly for laboratories to gain accreditation for a compost/digestate test method where reference data is lacking or deficient [see paragraph 'Reference data' after e) for further explanation]. Suggested EC EoW text: 'For each test parameter for which accreditation must be obtained, the laboratory is allowed 12 months from when the first, or latest, version of the European Committee for Normalisation's (CEN's) corresponding method is published. If reference data, against which laboratory performance will be assessed, is not available or deficient, the laboratory is allowed 18 months to gain accreditation for carrying out the corresponding method of test. Where CEN has not yet published a method of test for a parameter, it is recommended that the laboratory gain accreditation for carrying out the method of test that it currently uses for that parameter.'

d) **Time to obtain accreditation:** labs have estimated that for each relevant parameter, it would take 6 to 8 months to gain ISO 17025 accreditation from UKAS, assuming that the accreditation body has sufficient human resources to progress the application and assessment in a timely manner. Subject to 'same rate progress' and assessor availability it would be possible to assess a number of parameters during the same x-days visit to the laboratory.

e) **Acceptable accreditation organisation(s):** a European organisation recognised as competent by the European Commission, a national organisation recognised as competent by the Member State (e.g. United Kingdom Accreditation Service in the UK), or a National Quality Assurance Organisation responsible for a Laboratory Test Proficiency Scheme which, in the opinion of the EC or MS, is appropriate.

Reference data: For parameters such as stability, impurities, plant response and weeds there are not certified reference materials for laboratories to test and methods such as stability are not suitable for a 'spike recovery' approach for demonstrating competence to perform the test. Where reference data (e.g. repeatability and reproducibility values) from inter-laboratory trials or proficiency testing schemes is not available for the test method, the laboratory would seek advice from the accreditation body on how to demonstrate competence.

Estimated costs of obtaining ISO 17025 accreditation from UKAS

Estimate - taking account of a UK labs' existing scopes of accreditation - to provide quick estimate for a UK lab to obtain accreditation that may be required in EC EoW criteria. Estimates are fees payable to UKAS and do not include costs incurred in terms of lab equipment, consumables and lab staff time.

Parameter	Composts	Digestates	Comment
Organic matter	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Stability	£1,500	£1,500	difficult to accredit; lack of reference data
Salmonella	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Escherichia coli	£1,500		
Weeds	£2,000		difficult to accredit; lack of reference data
Impurities and stones	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
PTEs (except Hg)	nil		NB.: Only nil if UKAS regard change(s) to method of test as so minor that further data analysis is not necessary.
Mercury (Hg)	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Plant response	£2,000		difficult to accredit; lack of reference data
Alkaline effective matter	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Total nitrogen	£1,500		
Total P, K, Mg, S	nil		NB.: Only nil if UKAS regard change(s) to method of test as so minor that further data analysis is not necessary.
Mineralisable nitrogen	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Moisture / Dry Matter	£1,500		
Bulk density	£1,500		
Grain size	£2,000		difficult to accredit; lack of reference data
pH	£1,500		digestates must also be assessed; assume nil extra cost if method of test is same as for composts and assessed at same time
Electrical conductivity	£1,500		
Sub-total (excl VAT)	£27,000		
Estimated reduced total (excl VAT)	£6,333		Reduction based on estimate of 3 parameter methods assessed per day visit by UKAS, at £1000 per day. N.B.: Difficult to estimate because availability of suitable reference data unknown and test procedure differences not yet evaluated.

Comment about estimated costs: The estimated costs range from £6,333 to £27,000 (excl VAT), which is a large cost range. If accreditation costs turn out near the high end of that range, sample analysis will become concentrated in few laboratories and the JRC's intention to recommend that each sample is independently taken and sent to the laboratory will increase the cost burden on the compost/digeste producer (because distance to the laboratory has become greater from many production locations). Requiring lab accreditation for every EC EoW parameter would be another factor that favours production of EC EoW composts and digestates at medium- to large-scale facilities; many small scale producers do not put 'product' status composts on the market in the UK because the cost of gaining that status is higher than the costs associated with using the compost as 'waste' status material and/or finding outlets for its use as 'waste'.

8.11 Certification of composter's / digester's Quality Management Systems and Accreditation of Quality Assurance Organisations

Page 108, table's left hand column 'Criteria' and right hand column 'Reasons', text in bottom section about quality assurance sytems.

Criteria: 'The quality assurance system is audited externally by the competent authorities or by quality assurance organisations acknowledged by Member State authorities.'

Reasons: 'The reliability of product quality will be acceptable only if the quality assurance systems are audited by the authorities or an officially acknowledged third-party organisation.'

Request:

Please clarify what is required in prospective EC EoW criteria with regard to assessment of the composter / digester and assessment of the QAO.

Is it required that:

1) 'The composter / digester's quality management system shall be audited externally by the competent authority or by a Quality Assurance Organisation acknowledged by Member State authorities', and
2) The Quality Assurance Organisation's quality assurance system is accredited by an authority acknowledged to be competent by the Member State authority, by the European Commission or by the European Compost Network's quality assurance scheme for National Quality Assurance Organisations. Such accreditation shall be for complince with EN 45011's 'General requirements for bodies operating product certification systems' or a similar set of requirements accepted by the Member State's competent authority or the European Commission.'?

Item 1) is about the composter / digester being independently audited whereas option 2) is about assessment and verification of the QAO's competence (referred to in the UK as accreditation of the certification scheme / certification body). In AfOR's view, clarification of the text as per 1) and 2) would be appropriate, and workable in the UK context of already advanced EoW systems.

Terminology and difference between certification and accreditation:

Terminology: QAO's are normally referred to in the UK as certification schemes; each scheme has contracted certification bodies who assess composter / digester compliance with end of waste requirements and in accordance with the certification scheme rules.

When a QAO assesses a composter's / digester's Quality Management System and finds that it is producing compost / digestate that complies with end of waste criteria (and all requirements applicable to the composter / digester have been met), the QAO issues a certificate of conformance to the end of waste criteria and authorization to use the QAO's certification mark (for the duration that the certificate is valid).

In the UK, each QAO assessing composter / digester compliance with end of waste criteria is being assessed by our nationally recognised accreditation body, the United Kingdom Accreditation Service. Accreditation is sought that verifies scheme and certification body (QAO) compliance with EN 45011's 'General requirements for bodies operating product certification systems'. It is not unusual for it to take 18 months for a QAO to gain UKAS accreditation that covers a new scope of activity, such as EoW for composted and digested biodegradable wates.

8.12 Transition from UK EoW criteria to EC EoW criteria

AfOR is very concerned about the time it would take for composters and digesters already certified compliant with UK EoW criteria to obtain certification of compliance with EC EoW criteria. It take them time to make the necessary changes, generate the necessary evidence, be QAO assessed, and deal with any non-compliances that the QAO finds during the inspection visit and any other desk-based assessment of documents (e.g. extra sample test results).

In advance of being ready to assess composters / digesters for EC EoW compliance, the QAOs and laboratories will have to plan, change and implement revised systems and documents for carrying out assessments and issuing certificates. Similarly, if they are required to provide certification services that are independently assessed and accredited by an accreditation body (e.g. UKAS in the UK), this will take additional time (it cannot be achieved in parallel to changing/updaing the QAO's documents and procedures). In addition, each QAO's relevant staff and inspectors will need training relevant to EC EoW compliance assessment, and in the UK the owners of the relevant certification schemes (AfOR for composts, and Renewable Energy Assurance Ltd for digestates) will have to realign their procedures and documents to the EC EoW criteria.

AfOR also highlights that with 171 separate composting processes participating in AfOR's Compost Certification Scheme and two contracted QAOs carrying out compliance assessments, we will still not be able to assess all 171 composting processes for EC EoW compliance within just a few months from realigning the scheme and QAO's assessment services to those new criteria.

In the UK, we cannot understate how much we want to avoid a situtation where UK EoW certified composts and digestates have to revert to 'waste' status because insufficient transition time is allowed in the Commission Decision on EoW criteria for biological treatment of biodegradable wastes. Please talk to AfOR and REAL about a realistic period allowed for transition!

8.13 Aerobic Digestion

Page 6, section 1.3, scope definition, penultimate paragraph states: '*Finally, biodegradable materials that have not been subject to composting or anaerobic digestion are explicitly excluded from this study, such as raw sewage sludge or residues of crops that are ploughed in on farmland or textiles that are being reused.*'

Collated data on the quality of digestate produced by aerobic digestion of source segregated biodegradable wastes is not yet available in the UK but the already operating plants claim they can comply with all production and quality requirements in the PAS 110 standard for digestates; unfortunately they are currently excluded because of the wording in the scope of this document. It is true to say that '*Aerobic digestion is a process of controlled decomposition of biodegradable materials under managed conditions, predominantly aerobic and at temperatures suitable for mesophilic or thermophilic bacteria.*'

UK operators of aerobic digestion plants treat source segregated bioiodegradable wastes say that they are capable of producing the required quality for the digestate to qualify as 'product' and can comply with production requirements in PAS 110 (implying can also comply with similar production requirements in EC EoW criteria).

In AfOR's view, aerobic digestate samples should be suitable to undergo the same tests that anaerobic digestate samples undergo. Test results may be different, but the output types can be the same as for digestates made using anerobic digestion processes, i.e. whole digestate, separated fibre and separated liquor.

Findings of quick AfOR survey of aerobic digestion facilities in the UK:

Country	Tonnes per annum of waste treated	Biowase input types	Output format	Output use	Maximum permitted capacity (tonnes per annum)	Operational Status of Site	Process type category	Site Type	ABPR approved?
England	1,000	Commercial and municipally collected	Liquid slurry applied directly or combined with compost	Agricultural Soil Amendment	36,000	currently being expanded to 36,000 tpa	Mesophilic and thermophilic in series	Farm based TAD and Compost	Yes
England	2,500	Commercial	Liquid slurry applied directly or combined with compost	Agricultural Soil Amendment	58,400	6,000 tpa of capacity installed	Batch Thermophilic	TAD	Yes
England	20,000	Commercial	Liquid slurry applied directly or combined with compost	Agricultural Soil Amendment	78,000	circa 20,000 tpa	Mesophilic and thermophilic in series	Farm based TAD and Compost	Yes
England	?	Commercial	Centrifuged cake	Agricultural Soil Amendment	200,000	operating	Mesophilic and thermophilic in series	TAD	Yes
Total	**23,500**				**372,400**				
	Perhaps considerably higher tonnage per annum actually treated as missing the processing figure for the fourth site.								

Please include aerobic digestion within the scope of the EC EoW criteria – this is very important to a number of aerobic digestion plants already operating in the UK who are NOT treating sewage sludges / biosolids (they currently treat only source-segregated biodegradable wastes, some plants also including limited animal manures).

~ End of AfOR response ~