Hi Jacqui,

The report prepared by CIBR reviewing the organic contaminants to consider incorporating in a revised organic waste guideline outlined the case to shift focus from traditional persistent organic contaminants to emerging organic contaminants. The various emerging organic contaminants referred to in the CIBR report were provided to demonstrate their relevance wrt biosolids and organic waste, the wide range of EOCs that are present in such wastes, and the prioritisation of EOCs promoted by different organisations and regulatory groups overseas.

The report didn't extend to making specific recommendations for priority EOCs to include in the modified guidelines as this was not specifically requested in the brief (refer to aims and approaches, page 2). At the time this report was produced we assumed that if the recommendations were adopted further input would be sought to identify priority EOCs of relevance to organic waste in NZ.

I only became aware of National Workshops promoting the modified guide until they had been completed. Consequently, I didn't have an opportunity to contribute/participate in any discussion regarding the suitability and/or justification of the selected organic contaminants.

Now that MBIE bidding is behind me I've had an opportunity to read the draft guideline documents and have the following comments to make.

The CIBR report was prepared almost three years ago and in this intervening period research and knowledge of EOCs has progressed considerably. As such I think it's advisable to take another look at the current state of knowledge regarding EOCs in biosolids and organic waste. This could extend to producing a list of high priority EOCs to include in the modified guideline if the Steering Group thought this appropriate.

I have a few specific comments to make on the Guide and have listed these below under the relevant sections of the guide.

4.2.3, 4.3.1 and 4.3.2 Risk from Organic contaminants

The potential contamination by EOCs of ground water used for drinking water, off-site migration of EOCS, and management practices minimising this risk should be mentioned. Many organic wastes contain a complex mixture of other non-toxic components, for example relatively labile and leachable DOC, which can significantly enhance the solubility or hydrophobic organic contaminants and facilitate the leaching and/or off-site migration of organic contaminants.

Table 5.5. Contaminant concentration limits

PFOS and PFOA

The analysis of PFOS and PFOA is going to be relatively expensive and only one laboratory in NZ currently provides this as a commercial service, so they'll be able to dictate pricing. PFOS and PFOA are present as a mixture of congeners. They've have been the subject of intense research over the three years since the CIBR report was prepared so it's likely a small number of high priority PFOS/PFOAs that are "representative" of the total can be specified for analysis. Reducing the total number of PFOS/PFOA to analyse should enable the cost of analysis to be reduced.

AOX

It's not clear why AOX has been included as a test parameter, particularly since the rationale of removing chlorinated POPs from the test contaminants has been accepted. AOX remains on the EU list, principally because of the presence of the chemical manufacturing industries within member states. The inclusion of AOX as a test parameter in the EU biosolid paper was highly contentious due to the reliability of the test when analysing biosolids. The inclusion of AOX is often justified by the argument it provides a cost effective proxy for chlorinated organic chemicals. If this is the intention of its inclusion in the Guide document, it would be logical to include recommendations for further follow-up investigations if the limit provided for AOX was exceeded. I assume this would be to analyse the material for OCPs and dioxins(?), which are no longer required to be tested, so why include AOX?

PAHs

PAHs are often listed as priority contaminants in biosolids in other countries where urban storm water is reticulated and directed into WWTPs for treatment, in which case the resulting biosolids accumulate high concentrations of PAHs (for example in the UK). In NZ I believe this is relatively uncommon, and storm water is typically kept separate from municipal waste water streams. This being so the concentration of PAHs entering WWTPs in NZ will be extremely low. This is confirmed by some recent analysis of PAHS in WWTP influents I've completed. The table below shows the range of concentrations of PAHs in the solids phase of influent and the resulting biosolids following treatment.

	Concentration (ug/kg, ppb)	
	Influent	**solids**
Sum of 59 PAHs	640-1550	395-762
Sum of 16 USEPA priority PAHs	128-311	26-168
Benzo[a]pyrene equivalents	15-39	0.05-20.5

The Guide specifies the sum of PAHs should be reported but I couldn't determine which individual PAHS to include in the sum, and PAHs were not included as a contaminant in the 2003 Biosolids Guideline. If we assume it's the usual 16 USEPA PAHs adopted by regulatory bodies the maximum concentration in typical NZ biosolids is less than 200 ppb which is 25x lower than the maximum limit in the Guide. Because of their inherent toxicity PAHs are often reported as Benzo[a]pyrene equivalents. If we assume the sum of PAHs is to be determined as BaPeqs, which is consistent with regulatory practise worldwide, the values I've measure are 2 to 5 orders of magnitude lower than the 5ppm in the guide.

Taking all of this into consideration I conclude PAHs can be removed from the list of contaminants in the Guide. This will have an added advantage of reducing the testing cost for producers of organic wastes.

Nonylphenols and LAS

As per the point I made regarding the analysis of PFOS/PFOA further recommendation on the specific isomers/congeners should be provided for NPs and LAS. Wrt NPs it is essential to specify they are analysed as equivalents of the technical industrial mixtures of NPs, rather than the single 4-n-nonylphenol isomer. Similarly for the mono- and di-ethoxylates if these are to be included in the sum of NPs as is typical in other countries.

Other EOCs.

The CIBR report on EOCs in organic wastes included many other EOCs that have not been included in the Guide, some of which are under the regulatory spotlight in Europe and the USA.

For example, Hexabromocyclododecane, a common brominated flame retardant, is now listed in Annex A of the Stockholm convention to which NZ is a signatory.

Triclosan is the subject of intense debate and review worldwide and has been banned in many jurisdictions.

Regarding phthalate esters there is increasing concern about the environmental and human health impacts of di-isononyl- and di-isodecylphthalates which have been produced to replace DEHP.

A valid case can be made to include a number of other "priority" EOCs as contaminants within the Guide.

6.5 Sampling Regimes

Bottom of table 6.2.

For the purpose of determining compliance the age of the data set for organic contaminants should be no older than one year, reflecting how rapidly this can change for organic contaminants in comparison to pathogens and heavy metals.

The composite sample prepared for routine sampling (every two months) is recommended to be made up from daily composites, so potentially up to 60 individual samples. While this is robust I wonder if this level of resolution is necessary. If it's based on recommended practise then leave it as it is, otherwise it could be reduced to weekly sampling without a significant reduction of the value of information (n=8).

6.7 Contaminant Grade Sampling

The description that composite samples should be made up of a number of grab samples taken from different locations and/or different times is too obtuse and should be more specific for the type of material being sampled.

Presuming the material will be processed or stockpiled recommendations on appropriate methods to sample "piles" of material should be made. For example, if processed biosolids or composts are accumulating in a cone shaped pile below a transfer conveyor belt the grab samples should be obtained from the top fresh portion of the pile. Otherwise operators will tend to sample at the most convenient point which is the edges of the pile.

There are a number of recommended sampling protocols methods specific to waste materials/piles and reference to these should be provided.

6.9.7 Sample preservation

Samples intended for analysis of heavy metals and organics should be frozen ASAP after sampling. The degradation of organic contaminants is enhanced by the introduction of air/oxygen occurring during sampling, mixing, and transfer to containers. Similarly, changes to the redox potential of organic waste induced by sampling and mixing can alter the speciation of heavy metals which in turn influences their extractability, the extent and relevance of which depends upon the specific method of analysis requested by the client and/or applied by the laboratory. For example, different acids and conditions are employed to extract "total" heavy metals versus "total recoverable" heavy metals. Therefore, it would make sense to specify which specific extraction method/test should be used for the analysis of HM residues in organic wastes.

As a minimum the samples should be chilled and stored on ice up to the point of and during transport to the laboratory. This becomes redundant if the samples are instead frozen, but they should be transported in a manner that prevents them thawing before receipt at the testing laboratory.

Schedule 2: Recommended Test Methods for EOCs

Not all of the EOCs listed in Table 5-5 can be analysed by GCMS as they are currently described. Only a limited selection of PFOAs/PFOS can be analysed by GCMS and LCMS is more commonly used to analyse these chemicals due to the extended range of the 95 related chemicals that can be analysed (comprising individual congeners and different salts).

AOX cannot be analysed by GCMS and requires a specific dedicated instrument.

Nonylphenol ethoxylates and LAS can also be analysed by LCMS.

LAS can also be analysed by a colorimetric methylene blue assay to obtain total anionic surfactant content but this will have limited application to organic wastes due to the myriad of interferences it is subject to. Therefore, the Guide should state this test method should not be used.

I think the statement provided for EOCs is too limited in scope to be of much use to those seeking information and recommendations. Someone with relevant experience should be employed to advise on this matter.

Kind regards, Grant

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