

## Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.2 June 2011

### Scope

This paper provides guidance to Applicants on how we will consider air quality impact assessments from Group 3 metals stack emissions from Incineration and Co-incineration Plant (including Energy from Waste) when we determine permit applications in respect of Schedule 1 activities under the Environmental Permitting Regulations 2010 (EPR).

### Background

In April 2010, the Environment Agency published revised Environmental Assessment Levels (EALs) for arsenic, nickel and hexavalent chromium Cr(VI) in our H1 Guidance ([H1 Environmental Risks Assessment](#)) The revised EALs are substantially lower than the former EALs:

- Arsenic – 3 ng/m<sup>3</sup>
- Nickel – 20 ng/m<sup>3</sup>
- Cr (VI) – 0.2 ng/m<sup>3</sup>

The EALs refer to that portion of the metal emissions contained only within the PM<sub>10</sub> fraction of particulates in ambient air.

Arsenic, nickel and (total) chromium are three of the nine Group 3 metals whose emissions are subject to a mandatory minimum emission limit by the Waste Incineration Directive (WID). WID sets an aggregate limit of 0.5 mg/m<sup>3</sup> for nine “Group 3” metals (Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)). Previous air dispersion modelling studies supporting permit applications typically made very conservative assumptions that emissions of each individual metal occurs at the WID aggregate limits. Such an analysis may conclude that there is a risk that the revised EALs might be exceeded. Where such a theoretical risk exists, a more detailed assessment is required to determine whether the impact of the release is acceptable.

### Our Assessment Methodology

1. **Step 1 - Screening scenario** – We will make predictions assuming each metal is emitted at 100% of the WID ELV (i.e. 0.5 mg/m<sup>3</sup>). We will assess whether the impact is within the following parameters:

- **Long-term EALs** - Predicted Environmental Concentration (PEC) <70%
- **Short-term EALs** - Process Contribution (PC) <20% of the headroom

where the headroom is the appropriate standard minus background concentration. For screening only, assume Cr(VI) comprises 20% of the total background chromium. Selection of all other background data should be justified

Where the impact is within these parameters, we will conclude that there is no risk of exceeding the EAL. We will proceed to Step 2 only for those metals that exceed the screening criteria relative to specific EALs.

2. **Step 2 - Worst case scenario based on currently operating plant** – We will make predictions assuming each metal comprises 11% of the total group (i.e. 0.5 mg/m<sup>3</sup> apportioned across the nine metals). Our check monitoring data confirms this assumption as a worst-case (see Appendix A). We will assume that the proportion of Cr(VI) to total chromium is 20% as suggested as a worst case by the Expert Panel on Air Quality Standards (EPAQS) paper on Metals and Metalloids<sup>1</sup>.

Where the impact is within the parameters given in Step 1, we will conclude that there is no risk of exceeding the EAL. We will proceed to Step 3 for those metals that exceed the screening criteria relative to EALs.

**Step 3 - Case specific scenario** – Where Step 2 indicates that there remains a risk of exceeding the EAL for one or more metals, we will require Applicants to justify their use of:

- percentages lower than 11% of the WID ELV,
- proportions of Cr(VI) of less than 20%, or
- background levels different from the screening levels for their Step 3 assessment.

We will assess Applicants' proposals for alternatives using their own data to identify whether they can achieve the levels proposed and whether that data can be justified as representative. Appendix B contains our own analysis data for Cr(VI) in APC residues and calculated Cr(VI) emissions data that applicants might wish to use if they can justify it as representative.

### **Appendices:**

**Appendix A** is a summary of the measured metals stack releases from a range of operating Municipal Waste Incinerators between 2007 and 2009, presented as a range and a mean of actual release and percentage of the WID ELV. This data in Appendix A should be considered as indicative only.

**Appendix B** shows the total Cr and Cr(VI) contents of APC residues collected from a range of Municipal Waste Incinerators. Measurement of Cr(VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and Cr(VI) in the Air Pollution Control (APC) residues collected upstream of the emission point for existing Municipal Waste Incinerators (MWI) and have assumed these to be similar to the particulate matter released from the emission point. We have also considered the measured metals concentrations for the same plant. These data are presented in Appendix B of this guidance.

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<sup>1</sup> Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health. EPAQS May 2009

## Appendix A – Monitoring Data from 20 Municipal Waste Incinerators between 2007 and 2009

	Measured Concentrations mg/m <sup>3</sup>			Percentage of WID Group 3		
	Mean	Max	Min*	Mean	Max	Min*
<b>Antimony</b>	0.0033	0.0115	0.0003	0.66%	2.30%	0.06%
<b>Arsenic</b>	0.0007	0.0030	0.0003	0.14%	0.60%	0.06%
<b>Chromium</b>	0.0109	0.0521	0.0004	2.17%	10.42%	0.08%
<b>Cobalt</b>	0.0003	0.0039	0.0002	0.06%	0.79%	0.04%
<b>Copper</b>	0.0077	0.0196	0.0025	1.53%	3.92%	0.50%
<b>Lead</b>	0.0158	0.0368	0.0003	3.16%	7.36%	0.06%
<b>Manganese</b>	0.0172	0.1184	0.0015	3.44%	23.68%	0.30%
<b>Nickel</b>	0.0220	0.1362	0.0000	4.40%	27.24%	0.00%
<b>Tin</b>	0.0024	0.0024	0.0024	0.48%	0.48%	0.48%
<b>Vanadium</b>	0.0002	0.0010	0.0001	0.05%	0.20%	0.02%
<b>Total</b>	<b>0.078</b>	<b>0.385</b>	<b>0.008</b>	<b>13.3%</b>	<b>38.8%</b>	<b>2.8%</b>

Values correspond to the distribution from all 20 plant (i.e. the maximum distribution does not correspond to any particular plant).

\* Minimum values correspond in some cases to the detection limit

## Appendix B – Chromium VI analysis from APC Residues

Measurement	Mean	Minimum	Maximum
Proportion of Cr(VI) to total Cr in APC residues (%)	0.7	0.03	2.1
Total Chromium concentration* (mg/Nm <sup>3</sup> )	0.0076	0.0016	0.033
Total Chromium emission rate (g/s)**	0.033	0.0016	0.007
Total CrVI emission rate (g/s)**	$2.9 \times 10^{-6}$	$3.4 \times 10^{-8}$	$3.4 \times 10^{-6}$

\*in-stack measurement as particle fraction concentration in the emission

\*\*calculated for each plant using site-specific normalised flow rates

These data are taken from ten MWI plant in England and Wales and we are in the process of gathering more data in an attempt to fully understand the implications of metals emissions.