

MEMORANDUM

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From:	Rosalind Flavell	Our Ref:	S1552-0700-0015RSF
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Subject:	AQ And Human Health PINS Response		

1 AIR QUALITY

1.1 Baseline conditions

A review of baseline air quality conditions was undertaken to support the S73 application for the Rivenhall Integrated Waste Management (IWM) Facility. Table 1 at the end of this memo presents the annual mean background concentration used in the 2009 Environmental Statement and the revised background concentration which was used as part of the S73 application. A number of additional pollutants have been considered in the S73 application. It is important to note that, since the 2009 application the Environment Agency has requested additional pollutants are considered in an application from this type of facility, including ammonia, Polychlorinated biphenyls (PCBs) and Polycyclic Aromatic Hydrocarbons (PAHs).

As shown in Table 1, the most recent concentration is lower than that assumed as part of the original application for the majority of pollutants, with the exception of particulate matter (as PM10), cadmium, nickel and dioxins and furans. For these pollutants we have analysed the results presented in the 2009 application to confirm that the conclusions of the 2009 assessment remain valid. In each case, the PEC (process contribution plus background) would be below the associated Environmental Assessment Levels (EALs) for the protection of human health. As such, the conclusions of the 2009 assessment remain valid using the more recent background data.

The 2009 application concluded that a specific limit would be included in the Environmental Permit for arsenic. This will not be the case; the Environment Agency will issue a permit with a total emission limit for a group of metals, because the Environment Agency's approach has changed since the 2009 application. To assist in undertaking the air quality work required for Environmental Permitting purposes, the Environment Agency has produced a guidance document which details metal emissions speciation from existing Energy from Waste (EfW) facilities. This speciation data is now used to quantify the likely impact of metal emissions from a proposed EfW to ensure the impact is acceptable. The Environment Permit will include a condition to require speciation of the emissions to be quantified, usually within the first year of operation, to ensure that the impact is acceptable.

1.2 Additional sensitive receptors

The 2009 assessment considered the impact of emissions from the Facility both at the point of maximum impact and at a number of existing sensitive receptors. The analysis showed that at the point of maximum impact the PEC would be below the associated EALs for the protection of human health. We have subsequently reviewed the Local Development Framework to identify any potential receptors which may be experiencing adverse air quality impacts as a result of emissions from the Facility. The closest allocated site is KELV 33 4 which is the Polish Site to the south-east of the IWMF. A receptor was included in the dispersion modelling to represent this site (D17 - Bumby Hall / The Lodge / Polish Site). Therefore, the impact at the closest allocated site has already been considered in the assessment. Analysis of the receptor locations, dispersion modelling plot files, and the location of the allocated sites (as shown in the Braintree local plan¹) shows that the impact at all of the allocated sites would be less than that predicted for existing receptors. As such the conclusions of the air quality assessment remain valid.

1.3 Cumulative developments

A review has been undertaken to identify any proposed developments which could have the potential for cumulative air quality impacts such as significant point source emitters. No such development proposals have been identified within 10km of the facility.

2 HUMAN HEALTH

2.1 Baseline conditions

Within a Human Health Risk Assessment, the background consumption rates of pollutants are derived from national studies based on typical concentrations in media and consumption rates. The background consumption rate is referred to as the Mean Daily Intake (MDI). The 2009 application extracted this data from the Environment Agency's Toxicological Reports. This data remains valid and was used as part of the S73 Human Health Risk Assessment. However, since both applications were made, the Environment Agency has withdrawn the TOX report relating to oral intake of nickel in light of scientific opinion from the European Food Safety Authority².

The EFSA reports that, for the UK, the mean oral intake for an adult (non vegetarian) is 2.2 – 2.8 µg/kg bw/day and the 95th percentile is 4.1 – 4.9 µg/kg bw/day. Population weighted dietary intake is not stated in the EFSA report. The 2006 FSA Total Diet Study gives dietary mean estimate of 1.49 – 1.63 µg/kg bw/day for an adult with the total population dietary exposure stated as 127 – 129 µg/day. Using the upper end of the range for a 70kg adult the ratio between the EFSA report and the FSA report is 1.131. Applying this to the upper end of the range from the EFSA report gives a calculated population dietary exposure of 221.9 µg/day. This is greater than the 130 µg/day assumed in the 2009 application.

¹ <http://maps.braintree.gov.uk/localviewweb/sites/localplancfs/#>

² European Food Safety Authority (2015) Scientific Opinion on the risks to public health related to the presence of nickel in food and drinking water.

The ingestion Tolerable Daily Intake (TDI) recommended by the EFSA is significantly lower than that recommended by the WHO and used in the 2009 application. The EFSA explains that the TDI they propose is calculated using the Benchmark Dose (BMD) Analysis method. The WHO TDI was calculated using the No-Observed-Adverse-Effect-Level (NOAEL). The BMD approach makes extended use of dose-response data from studies to better characterize and quantify potential risk. The recommended TDI was derived from a BMDL₁₀ of 0.28 mg/kg bw calculated from the dose response analysis of the incidence of post-implantation loss in rats, applying the default uncertainty factor of 100 to allow for interspecies differences and human variability. The BMDL₁₀ is the level that is associated with a 10% extra risk of adverse effect in the exposed test animals. The revised ingestion TDI is 2.80 µg/kg bw/day.

To account for the change in TDI and MDI we have analysed the results to ensure that the conclusions of the 2009 assessment remain valid. If the daily exposure divided by the Health Criteria Value (HCV) is less than or equal to 1, exposure is unlikely to result in an unacceptable risk to human health, shown as "Pass" in the results of the 2009 assessment.

- If the MDI is greater than 50% of the TDI, the 2009 assessment took the HCV as 50% of the TDI. As detailed the revised ingestion MDI for an adult is 113% of the TDI. Therefore the revised HCV is 50% of the TDI or 1.4 µg/kg bw/day.
- The daily exposure does not change, as this is the contribution from the facility.
- For an adult the daily exposure is 0.17 µg/kg bw/day, therefore the daily exposure/HCV is 0.121 – Pass.
- For a child the daily exposure is 0.286 µg/kg bw/day, therefore the daily exposure/HCV is 0.204 – Pass.

In conclusion the TDI and MDI for nickel have changed since the original application. We have repeated the analysis from the 2009 application using the new information, which has shown that the conclusions of the 2009 application remain valid.

2.2 Additional sensitive receptors

The 2009 assessment considered the impact of emissions from the Facility both at the point of maximum impact and at a number of existing sensitive receptors.

The analysis showed that, at the point of maximum impact, the PEC would be below the associated EALs for the protection of human health. We have subsequently reviewed the Local Development Framework to identify any potential receptors which may be experiencing adverse air quality impacts as a result of emissions from the Facility. The closest allocated site is KELV 33 4 which is the Polish Site to the south-east of the IWMF. A receptor was included in the dispersion modelling to represent this site (D17 - Bumby Hall / The Lodge / Polish Site). Therefore, the impact at the closest allocated site has already been considered in the assessment. Analysis of the receptor locations, dispersion modelling plot files, and the location of the allocated sites (as shown in the Braintree local plan³) shows that the impact at all the allocated sites would be less than that predicted for existing receptors. As such, the conclusions of the human health risk assessment remain valid.

2.3 Cumulative developments

A review has been undertaken to identify any proposed developments which could have the potential for cumulative air quality impacts such as significant point source emitters. No such development proposals have been identified within 10km of the facility.

³ <http://maps.braintree.gov.uk/localviewweb/sites/localplancfs/#>

Table 1: Summary of Background Concentrations

Pollutant	Annual Mean Concentration – 2009 ES Addendum	Annual Mean Concentration – S73 Application	Units
Nitrogen dioxide	22.7	14.89	µg/m ³
Oxides of nitrogen	-	22.01	µg/m ³
Sulphur dioxide	11.95	3.65	µg/m ³
Particulate matter (as PM ₁₀)	16.5	19.58	µg/m ³
Particulate matter (as PM _{2.5})	-	12.47	µg/m ³
Carbon monoxide	-	267	µg/m ³
Hydrogen chloride	-	0.72	µg/m ³
Hydrogen fluoride	-	2.35	µg/m ³
Ammonia	-	1.48	µg/m ³
Benzene	-	0.35	µg/m ³
1,3-butadiene	-	0.14	µg/m ³
Mercury	1.7	1.38	ng/m ³
Cadmium	0.17	0.20	ng/m ³
Arsenic	0.95	0.81	ng/m ³
Antimony	-	-	ng/m ³
Chromium	5.3	1.32	ng/m ³
Cobalt	-	-	ng/m ³
Copper	47.6	4.44	ng/m ³
Manganese	11.3	3.49	2ng/m ³
Lead	17.3	8.38	ng/m ³
Nickel	1.3	1.43	ng/m ³
Vanadium	4.7	1.75	ng/m ³
Dioxins and furans	7.25	22.82	fg/m ³
Polychlorinated biphenyl (PCBs)	-	141.5	pg/m ³
Benzo(a)pyrene (PaB)	-	2.00	ng/m ³

Yours sincerely
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