

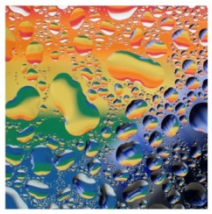

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2012 ESA IBA dataset

In 2012 twenty energy from waste (EfW) facilities monitored incinerator bottom ash (IBA) according to the Environmental Services Association Protocol (2010) for the sampling and testing of IBA, with a morning and an afternoon sample on a single day each month. Some facilities did not sample every month. This was either because they were taking samples on an alternate-month basis as specified in the ESA protocol for the second year of monitoring and agreed with their local Environment Agency officer, or because there was an outage at the facility that month (e.g. for maintenance)[1].

Table 1 presents the results of the hazard assessment and Table 2 presents key concentration data by facility. The dataset shows that:

- on the basis of the 2012 data, the IBA from the participating facilities would be characterized as 'non hazardous' according to the approach laid out in the ESA protocol (2010).
- thirteen facilities reported zero exceedances;
- no participating facility recorded seven or more exceedances, the level which would have triggered a hazardous classification.[2]
- eleven out of 447 samples were reported to exceed a threshold for a hazard property;

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1 Since January 2013 facilities have been collecting two samples on different randomly selected days per month to ensure better representation of input waste.

2 The ESA Protocol (2010) sets a threshold of seven exceedances to trigger hazardous status to take account of the inherent variability of IBA at the very small scale at which it is tested in the laboratory and takes into account the fact that some results will exceed the hazard thresholds purely by chance rather than being truly hazardous. This approach, authorised by the Environment Agency is explained in the explanatory note (ESA, 2012).

Conclusions

The 2012 dataset represents ash collected under the second twelve months of ESA's Sampling and Testing Protocol. The IBA from the participating facilities was characterized as 'non hazardous' according to the approach laid out in the protocol. Only eleven out of 447 samples were reported to exceed a threshold for a hazard property.

References

ESA (2010) A sampling and testing protocol for the assessment of hazard status of incinerator bottom ash. http://www.esauk.org/publications/reports/ESA_IBA_Sampling_and_Testing_Protocol.pdf

ESA (2012) IBA sampling and testing protocol for the assessment of hazard status of incinerator bottom ash. An explanatory note. July 2012. http://www.esauk.org/reports_press_releases/esa_reports/ESA_Sampling_and_Testing_Protocol_Explanatory_Note.pdf

WRc (2012) Assessment of Hazard Classification of UK IBA. WRc plc. December 2012. UC9213.05.

Table 1 IBA hazard assessment by facility for 2012 samples collected according to the ESA protocol (2010)

Key

√ = below relevant hazard threshold
NSO = no sample collected due to an outage.
NST = no sample taken due to the facility sampling in alternate months
H4, H7, H14 = sample exceeding thresholds for hazardous properties (H4 = irritancy, H7 = carcinogenicity, and H14 = ecotoxicity):
$\surd^1$ = taken immediately after outage
$\surd^2$ = planned September sample
$\surd^3$ = due to number of samples lost through outage an additional sample was collected to be included in 2012 database

Facility ID	No. of exceedances	Jan -12		Feb -12		Mar -12		Apr -12		May-12		Jun -12		Jul -12		Aug-12		Sep-12		Oct -12		Nov-12		Dec-12	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
A	0	√	√	√	√	NST	NST	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
B	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
C	0	√	√	NST	NST	√	√	√	√	√	√	√	√	NSO	NSO	NSO	NSO	$\surd^1$	$\surd^2$	$\surd^1$	$\surd^2$	NSO	NSO	√	√	√	$\surd^3$
D	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
E	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
F	1	H14	√	NST	NST	√	√	NST	NST	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
G	2	NST	NST	√	√	NST	NST	H14	H14	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
H	0	√	$\surd^3$	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
I	2	√	√	√	√	NST	NST	H14	H7 H14	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
J	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
K	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
L	0	√	√	√	√	NST	NST	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
M	1	√	√	NST	NST	√	√	NST	NST	√	√	NST	NST	√	H7	NST	NST	√	√	NST	NST	√	√	NST	NST
N	0	√	√	√	√	NST	NST	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
O	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
P	2	√	√	H4	√	√	√	√	√	√	H14	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Q	0	√	$\surd^3$	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
R	1	√	√	√	√	√	√	√	H14	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
S	2	H14	√	√	√	√	√	√	H14	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
T	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Table 2 Statistics of relevant determinand results for 2012 IBA dataset

Facility ID	Determinand	pH	Alk Res	Al	Cd	Cr	Cu	Pb	Mg	Ni	P	K	Zn	TPH >C5-C44
			g/100g	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}
All facilities	**Average**	**11.7**	**0.39**	**20693**	**13.3**	**288**	**1995**	**855**	**6811**	**153**	**4502**	**3398**	**2090**	**86**
	95th Percentile	**12.7**	**1.30**	**32420**	**35.0**	**963**	**3265**	**1629**	**9829**	**364**	**6915**	**5393**	**3587**	**145**
	Maximum	**13.0**	**2.72**	**53825**	**384.6**	**1405**	**26346**	**2727**	**12354**	**2049**	**8283**	**7312**	**9635**	**154**
A	Average	11.9	0.18	24045	9.54	81.9	1890	586	7801	76.8	5775	4536	2375	
	95th Percentile	12.7	0.49	27841	15.5	104	2805	871	9270	120	7046	5382	3019	
	Maximum	12.8	0.55	35553	31.1	115	2995	1966	9583	122	7365	5584	3912	
B	Average	12	0.12	13239	7.82	133	2503	315	5065	125	2496	1928	2106	
	95th Percentile	13	0.27	20616	29.6	204	3557	1163	8304	233	3904	2652	3719	
	Maximum	13	0.47	31090	50.3	272	5654	1554	11145	278	7272	5990	4101	
C	Average	12	0.18	26753	27.4	90.4	2572	676	9162	95.0	5947	4344	2389	
	95th Percentile	13	0.66	35338	72.6	124	3595	1165	11904	151	8100	5530	2770	
	Maximum	13	0.98	41000	385	132	3834	1200	12354	162	8283	5556	2851	
D	Average	12	0.15	11336	18.3	710	1458	1395	4232	305	610	1204	1432	100
	95th Percentile	13	0.42	15569	38.4	1006	1801	1635	5663	451	1114	1566	1864	147
	Maximum	13	0.42	15802	47.2	1115	1895	1884	6132	452	1246	1744	1992	154
E	Average	11	0.34		20.2	714	1342	1310		207			1468	
	95th Percentile	12	1.00		56.6	1240	1685	1593		332			1867	
	Maximum	12	1.08		60.0	1405	1835	1722		336			2033	
F	Average	12	0.22	21243	7.14	66.1	2293	469	5592	59.6	5137	3038	2090	
	95th Percentile	13	0.59	27410	14.8	99.0	5012	857	6964	109	6232	4674	2884	
	Maximum	13	0.74	32718	30.8	106	15085	1097	7980	150	6307	4839	9635	
G	Average	12	0.42	28449	10.1	100	3204	696	7170	104	5062	3147	2992	
	95th Percentile	13	0.69	46701	31.1	126	10037	1377	8823	183	6869	3928	4069	
	Maximum	13	0.78	47938	44.3	157	22598	1662	8957	202	7371	4158	5046	
H	Average	10	0.10		13.2	655	1167	1187		282			1251	
	95th Percentile	11	0.36		24.8	970	1449	1527		450			1463	
	Maximum	11	0.50		30.6	1160	1459	1680		461			1576	
I	Average	12	0.29	27477	9.94	85.6	3567	506	7540	180	5473	4035	2245	
	95th Percentile	13	0.66	42935	25.9	135	7517	947	8936	264	6616	5778	3563	
	Maximum	13	0.80	53825	54.1	180	26346	1196	8993	2049	6625	6214	3945	

Facility ID	Determinand	pH	Alk Res	Al	Cd	Cr	Cu	Pb	Mg	Ni	P	K	Zn	TPH >C5-C44
			g/100g	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}	mg kg^{-1}
J	Average	10	0.15		18.1	644	1357	1285		243			1427	
	95th Percentile	11	0.59		34.7	1169	1741	1532		408			1772	
	Maximum	11	0.62		39.0	1343	1820	1653		481			1888	
K	Average	11	0.34		18.1	631	1324	1330		212			1421	
	95th Percentile	12	2.10		50.4	1059	1705	1774		332			1875	
	Maximum	12	2.38		57.0	1187	1942	1951		433			2052	
L	Average	12	0.26	24279	14.1	86.9	2141	607	7903	79.2	5261	3872	2280	
	95th Percentile	13	0.54	30086	24.2	126	3000	1557	9368	136	6689	5140	3089	
	Maximum	13	0.55	31622	155	167	5168	1923	10144	157	7093	5374	3243	
M	Average	12	0.22	27660	9.9	92.1	1976	720	7769	90.0	6201	4237	2877	
	95th Percentile	13	0.70	36514	14.9	115	2940	1953	9140	145	7070	4789	3705	
	Maximum	13	0.79	37661	15.3	126	3392	2072	9495	146	7149	4848	4150	
N	Average	12	0.21	26397	8.46	120	2076	600	8053	125	4798	4534	2459	
	95th Percentile	13	0.53	31427	15.0	150	2928	1017	9301	193	5777	5866	3643	
	Maximum	13	1.01	31958	28.4	155	3577	1417	10280	197	6348	7312	3678	
O	Average	12	0.65	13127	20.8	757	1423	1416	4231	292			1536	67
	95th Percentile	13	2.05	16392	41.5	1117	1802	1785	5256	475			1997	90
	Maximum	13	2.72	16423	59.0	1266	1943	1866	5320	515			2010	100
P	Average	12	1.13	15597	15.5	89.2	1848	730	5404	113			2128	
	95th Percentile	13	1.90	20183	31.7	103	2218	944	7342	172			2620	
	Maximum	13	2.40	21000	38.0	113	2400	2609	8400	204			4400	
Q	Average	12	1.05	17126	6.75	70.6	1800	689	7407	75.7			2266	
	95th Percentile	13	1.50	22233	16.2	91.4	2542	1669	10042	145			2897	
	Maximum	13	1.60	32333	18.3	94.3	2867	1882	10600	200			3391	
R	Average	12	0.73	16044	8.82	74.6	1906	742	7807	98.9			2728	
	95th Percentile	13	1.19	21667	27.7	123	3155	1315	10572	154			5181	
	Maximum	13	1.70	24000	36.3	137	3667	2727	11000	173			5482	
S	Average	12	0.27	23323	9.84	101	2526	783	7414	110	4229	3313	2791	
	95th Percentile	13	0.57	28909	17.4	119	3559	1387	8945	235	5853	4910	5029	
	Maximum	13	0.58	38473	20.0	327	13245	1570	10624	278	7194	5500	5383	
T	Average	12	0	15408	15	76	865	628	4608	42		4522	2776	622
	95th Percentile	13	1	15408	28	107	1486	941	4608	56		4522	4858	622
	Maximum	13	1	15408	31	116	1592	977	4608	61		4522	5209	622

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