

Coal Ash Material Safety

A Health Risk-Based Evaluation of USGS Coal Ash Data from Five US Power Plants



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A Health Risk-Based Evaluation of USGS Coal Ash Data from Five US Power Plants

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Table 1
Selection of USGS CCP Datasets for Risk-Based Evaluation
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Power Plant Location	Coal Used	Coal Ash Data Available from (a)	Material Selected for Risk-Based Evaluation (b)	Rationale
Alaska	Nenana Coal Province	Fly Ash Hopper		Information obtained from the Alaska Power Plant indicates that the coal ash from the silo (combined fly ash/bottom as) is the material put into beneficial use (b).
		Fly Ash Before Last Ash Hopper		
		Fly Ash After Boiler		
		Bottom Ash		
		Fly Ash Silo (Includes both Fly Ash and Bottom Ash)	X	
Indiana	Illinois	Bottom Ash	(c)	From the Indiana Power Plant schematic (b), it was concluded that the economizer fly ash and air preheater ash represent intermediate steps in fly ash production. It is assumed that the bottom ash and fly ash represent materials that could be beneficially used.
		Economizer Fly Ash		
		Fly Ash	X	
		Air Preheater Ash		
		Gypsum	(c)	
		Sludge	(c)	
New Mexico	San Juan	Bottom Ash	X	From the New Mexico Power Plant schematic (b), it was concluded that the fly ash north and fly ash south materials represent intermediate steps in fly ash production. It is assumed that the material labeled fly ash (product) and bottom ash represent materials that could be beneficially used.
		Fly Ash North		
		Fly Ash South		
		Fly Ash Coarse		
		Fly Ash (Product)	X	
Ohio	Appalachian	Bottom Ash	X	From the Ohio Power Plant schematic (b), it was concluded that the economizer fly ash represents an intermediate step in fly ash production. It is assumed that the bottom ash and fly ash represent materials that could be beneficially used.
		Economizer Fly Ash		
		Fly Ash	X	
Wyoming	Powder River	Bottom Ash	X	From the Wyoming Power Plant schematic (b), it was concluded that the economizer fly ash represents an intermediate step in fly ash production. It is assumed that the bottom ash and fly ash represent materials that could be beneficially used.
		Economizer Fly Ash		
		Fly Ash	X	

Notes:
(a) - Data from USGS. 2011. Geochemical Database of Feed Coal and Coal Combustion Products (CCPs) from Five Power Plants in the United States. Data Series 635. Available at: http://pubs.usgs.gov/ds/635/
(b) - Power plant schematics and coal ash sample collection locations are provided in Appendix A.
(c) - There is only one sample result for this material from the Indiana Power Plant, so the material was not included in the evaluation.

Table 7
Summary Statistics - Wyoming Power Plant Fly Ash
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Wyoming Power Plant Summary Statistics for Fly Ash (a) (b)								
Constituent	FOD	Minimum Detect	Maximum Detect	Mean Detect	Median	10%ile	50%ile(Q2)	90%ile
Antimony	15:15	1.65	2.11	1.917	1.91	1.67	1.91	2.088
Arsenic	15:15	14.6	22	19.41	20	17.22	20	20.9
Barium	15:15	2980	3370	3174	3170	3110	3170	3256
Beryllium	15:15	2.07	3.1	2.706	2.74	2.456	2.74	2.876
Cadmium	15:15	0.699	0.895	0.804	0.814	0.74	0.814	0.89
Chromium	15:15	54.1	102	83.64	82.4	77.6	82.4	93.28
Cobalt	15:15	31.4	43.5	38.72	39.4	36	39.4	42.26
Copper	15:15	118	171	148.9	144	138.4	144	166
Lead	15:15	25	33.1	28.37	28.2	26.22	28.2	30.46
Lithium	15:15	21.8	32.9	29.17	29	27.4	29	32.2
Manganese	15:15	145	283	214.9	229	156.6	229	254.4
Mercury	15:15	0.0212	0.971	0.604	0.695	0.0719	0.695	0.947
Molybdenum	15:15	4.95	6.09	5.689	5.78	5.364	5.78	5.966
Nickel	15:15	106	180	157.6	158	148.4	158	170.6
Selenium	15:15	11.2	13.5	12.35	12.3	11.5	12.3	13.16
Strontium	15:15	2180	2400	2293	2290	2230	2290	2364
Thallium	15:15	0.472	0.747	0.594	0.593	0.517	0.593	0.668
Uranium	15:15	7.29	11.2	8.748	8.45	7.656	8.45	10.41
Vanadium	15:15	218	376	312.3	317	247.2	317	365.4
Zinc	15:15	87.9	186	135.2	136	112	136	167.4

Notes:
FOD - Frequency of Detection - Number of detected results: Total number of samples.
(a) - Statistics calculated using ProUCL version 4.1 (USEPA, 2011).
(b) - Data from USGS. 2011. Geochemical Database of Feed Coal and Coal Combustion Products (CCPs) from Five Power Plants in the United States. Data Series 635. Available at: <http://pubs.usgs.gov/ds/635/>

Table 11

Summary Statistics - Alaska, Indiana, New Mexico, Ohio and Wyoming Power Plants Fly Ash
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Five State Summary Statistics for Fly Ash (a) (b)								
Constituent	FOD	Minimum Detect	Maximum Detect	Mean Detect	Median	10%ile	50%ile(Q2)	90%ile
Antimony	76:76	0.982	22.4	3.947	2.88	1.695	2.88	8.595
Arsenic	76:76	7.3	93.8	27.21	20.95	14.55	20.95	57.95
Barium	76:76	336	5730	2372	1745	389	1745	5050
Beryllium	76:76	1.69	32.7	5.166	2.875	2.215	2.875	11.35
Cadmium	76:76	0.312	3.29	0.831	0.791	0.462	0.791	1.24
Chromium	76:76	33.7	984	180.5	100.6	36.1	100.6	360
Cobalt	76:76	14.5	264	32.1	28.65	15.35	28.65	41.25
Copper	76:76	55.1	692	134.2	139.5	64.6	139.5	186.5
Lead	76:76	14.4	293	43.66	33.8	23.65	33.8	64.85
Lithium	76:76	13.2	560	63.47	30.15	21.75	30.15	110.5
Manganese	76:76	105	966	379.8	217.5	158.5	217.5	908
Mercury	76:76	0.0127	1.15	0.276	0.128	0.0243	0.128	0.844
Molybdenum	76:76	4.95	90.5	15.67	8.705	5.755	8.705	35.25
Nickel	76:76	17.3	572	127.2	107	20	107	234.5
Selenium	76:76	1.03	22.5	7.208	6.09	2.175	6.09	12.55
Strontium	76:76	319	2400	1093	700.5	375	700.5	2290
Thallium	76:76	0.312	21	1.576	0.77	0.418	0.77	3.295
Uranium	76:76	0.682	34.1	7.422	7.37	0.848	7.37	12.7
Vanadium	76:76	106	1660	266.2	251	111.5	251	363.5
Zinc	76:76	33.1	848	121.8	106	51.55	106	184.5

Notes:

FOD - Frequency of Detection - Number of detected results: Total number of samples.

(a) - Statistics calculated using ProUCL version 4.1 (USEPA, 2011).

(b) - Data from USGS. 2011. Geochemical Database of Feed Coal and Coal Combustion Products (CCPs) from Five Power Plants in the United States. Data Series 635. Available at: <http://pubs.usgs.gov/ds/635/>