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Trace Elements in Australian Coals (Adopted 8/8/02)

The table below shows trace element contents of coals and fly ash. Also listed are averaged values for the earth's crust. A point of interest is the amounts of non-decaying heavy metals (As,Cd,Hg,Pb,TI) plus uranium and thorium released to the environment in coal fly ash.

The uranium content of 1-2 ppm in black coal represents enough energy (if burned in fast breeder reactors) to equal the useable energy of the coal itself. Thorium is another comparable energy resource.

	Black Coals		Brown Coals		Earth's	NSW&Qld.
Ele - ments	Coal	Fly Ash	Coal	Fly Ash	Crust	Coals
Na	570	4000	950	16400	28300	*
Al	28000	127000	3000	109000	81000	*
Cl	360	*	780	*	*	*
K	1800	13000	75	5750	26000	*
Ca	4000	11000	*	*	36000	*
Sc	5.1	19	0.4	12	22	3
Ti	1700	6400	400	4760	4400	*
V	32	130	3.5	120	135	20
Cr	12.5	50	2.2	96	100	6
Mn	120	630	21	870	950	150
Fe	8300	31000	1750	97000	50000	*
Co	5.9	16	0.60	224	25	4
Zn	27	110	3.5	600	70	25
Ga	6.5	35	*	*	*	4
As	2.4	5.1	0.17	80	1.8	3
Se	0.81	1.5	0.59	*	0.05	0.79
Br	3.6	*	12.8	*	*	*
Sr	140	280	82	740	375	100
Cd	*	*	*	*	*	0.1
Sb	0.84	3.4	0.08	2.2	0.2	*
Cs	1.2	4.8	0.04	6.3	3	*
Ba	210	520	63	2240	425	<100
La	12	62	1.30	77	30	10
Ce	23	110	10.3	140	60	*
Nd	11	40	1.78	35	*	*
Sm	2.3	11	0.32	11	6	*
Eu	0.41	2.2	0.055	2.4	1.2	*
Tb	0.34	1.7	0.08	1.6	0.9	*
Dy	2.2	*	0.22	11	*	*
Ho	0.43	*	*	*	*	*
Yb	1.2	7.8	0.15	5.7	3.4	*
Lu	0.23	1.1	0.028	0.7	*	*
Hf	2.2	12	0.25	5.0	3	*
Ta	0.27	1.5	0.12	1.2	2	*
W	2.5	5.5	0.45	3.5	1.5	<10
Au	0.005	0.01	*	*	*	*
Hg	*	*	*	*	*	0.1
Pb	*	*	*	*	*	10
Th	3.7	24	0.29	9.9	7.2	2.7
U	1.3	7.3	0.35	3.6	1.8	2
Ref.	a	a	a	a	a	b

Note: figures are arithmetic mean ppm,* = no value quoted.

Ref. a = "The Analysis of Coals and Fly Ash for Trace Elements and Natural Radioactivity", J.J. Fardy, G.D. McOrist and Y.J. Farrar, CSIRO, Presented at Australian Coal Science Conference 1984.
Ref b = Coal Geology and Coal Technology~ C.R. Ward Ed., Blackwell Sci. 1984.