23/200 Canterbury Rd,
Bayswater, VIC 3153
Australia

61- (0)3 9729 6686
61- (0)3 9729 6656
info@laseranalysis.com

Spectrolaser Application

LOW-ASH LIGNITE ANALYSIS

Material *Low-ash lignite*

Gippsland Basin (Australia) lignite deposits have a characteristically high moisture content (50-70%) and a low ash yield (1-3%). The lignite is used extensively for domestic electricity production for which 50 Mt p.a is mined.

Test Method

Five crushed and blended lignite samples were prepared and chemically analysed using acid extraction / ICP-AES analysis. These samples were used to calibrate the Spectrolaser 1000M unit and then one of them subsequently presented as an unknown five times. Samples for analysis are prepared by placing approximately 10 g of the lignite samples in the sample holder and pressing to 0.3 tonne pressure – using a Labtech Essa hydraulic press.

The analysis time is 20 seconds (all elements) for each sample analysed.

Detectable Elements

Detectable elements include the principal coal components (C, H, O and N) in addition to the inorganic components Al, Ca, Fe, K, Li, Na, Mg,, Si, Ti

Detection Limits

Detection limits are determined from three times the standard deviation in multiple measurements of materials of samples with low analyte concentrations. The estimated detection limits for the principal impurities present in low-ash lignite are:

Element	Detection Limit*
Na	0.003 %
Ca	0.006 %
Mg	0.009 %
Fe	0.010 %
K	0.003
Ti	0.005
Al	0.009 %
Si	0.01 %

* expressed in % as-received (moist)

Multiple Analysis Test

All of the following results are expressed as % a.r. (as-received). The moisture content of the test sample is 60% in this case.

Sample	Al % 309 nm	Ca % 317 nm	Fe % 261 nm	K % 766 nm	Mg % 280 nm	Si % 288 nm	Na % 589 nm	Ti % 325 nm	*S %
1	0.056	0.068	0.060	0.003	0.12	0.11	0.084	0.001	0.39
2	0.048	0.064	0.060	0.003	0.07	0.08	0.072	0.001	0.38
3	0.044	0.060	0.056	0.003	0.09	0.09	0.076	0.0004	0.38
4	0.044	0.052	0.040	0.002	0.08	0.10	0.080	0.001	0.38
5	0.044	0.064	0.064	0.003	0.12	0.08	0.080	0.0004	0.40
Mean (SD)	**0.048 (0.004)**	**0.060 (0.004)**	**0.056 (0.01)**	**0.003 (0.0002)**	**0.10 (0.02)**	**0.09 (0.01)**	**0.080 (0.004)**	**0.001 (0.0005)**	**0.38 (0.01)**
Standard Analysis	**0.048 (0.004)**	**0.064 (0.004)**	**0.06 (0.002)**	**0.003 (0.002)**	**0.08 (0.005)**	**0.08 (0.005)**	**0.076 (0.006)**	**0.002 (0.0002)**	**0.39 (0.02)**

* sulphur is determined by chemometric correlation to the other detectable components.

Long-Term Performance

Spectrolaser 1000M instruments have been installed in commercial lignite-fired power plants and have been operated routinely over a two-year period. Comparison of the Spectrolaser 1000M performance to traditional acid-extraction AAS analysis has shown excellent agreement for lignite impurities such as Na, Al and Ca.

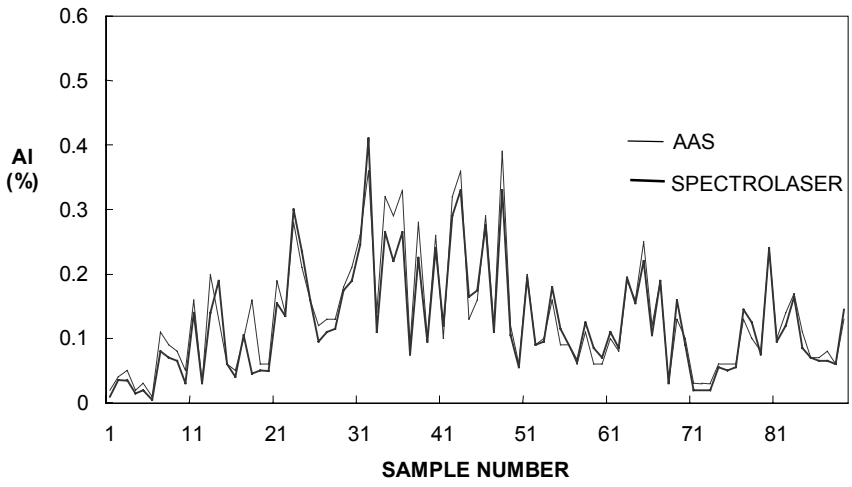

Figure Daily sampling over a one-month period showing the comparison between the concentration of aluminium measured in coal by AAS and Spectrolaser 1000M analysis.