

**Speciation of elements in the feed coal and combustion residues  
from the Lingan Power Plant, Sydney, Nova Scotia**

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Systematic changes in mineralogy, enrichment and depletion of selected elements, mineralogical speciation of selected elements in fly ash and bottom ash samples from the Lingan Power Plant were compared to run-of-mine and pulverized feed coal from the Sydney coalfield, Nova Scotia. The analytical techniques used for this research were incident light microscopy, SEM-EDX, XRD, microprobe with EDS and WDS, INAA, and heavy liquid separation.

Three types of glasses (Fe/O-rich, Fe/Al/Si/O-rich, and Al/Si/O-rich) were identified in the combustion residues;

these glasses and neoformed minerals were evolved as a result of interaction between melted pyrite, carbonate, and phyllosilicates. Most priority elements (e.g., As, Pb, Cr, etc.) were concentrated in the fly ash and mostly in the noncrystalline phase of the Fe/O or Al/Si/O. X-ray mapping suggested that some of the priority elements such as arsenic are also associated with Fe/O and Fe/S crystalline phase in the bottom ash. The speciation of various elements indicates the possible leachability pathways.