

## **Urban geochemistry in the Australian Capital Territory: Natural vs anthropogenic anomalies**

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### **Introduction**

The Australian Capital Territory (ACT) covers 2358km<sup>2</sup> of SE Australia and contains the city of Canberra, the national capital. Canberra is a planned city established in 1913 and largely constructed since 1920. The current urban area is 814km<sup>2</sup> within the NE corner of the ACT. The development of Canberra is an example of a mostly well recorded, staged transition from rural to urban environment without heavy industry. This provides an opportunity to examine progressive changes in the urban geochemistry.

### **Identifying and Understanding Anomalies**

Numerous geochemical anomalies have been detected in the Canberra urban area. Of particular interest are soils with high concentrations of arsenic and elevated levels of base metals. Some anomalies, particularly of arsenic, have been ascribed to anthropogenic sources, but recent investigation has shown that natural mineralisation and certain pedogenic processes are common sources.

Disseminated sulphides, small mineralised veins and skarn deposits are associated with Silurian felsic volcanic rocks and Devonian granites. Where these are exposed or intersected by the weathering front there has been hydromorphic and mechanical dispersion of contained elements into surrounding soils. Formation of ferruginous (hematite-goethite) nodules is a feature of some soil profiles and these nodules have elevated Mn (720-3600 ppm), As (40-320 ppm) and Ba (60-300 ppm), representing a second stage accumulation from primary sources. Investigation of the nodules and exposed ironstones indicates low arsenic bioavailability (0.1% by ASLP).

Findings highlight the need to distinguishing natural from anthropogenic anomalies in the urban environment. For appropriate, cost effective remediation it is particularly important to understand the different dispersion processes and histories, element speciation and mineral hosts.

Despite good planning there is no systematic, baseline geochemical data base for the ACT. It is planned to remedy this deficiency..