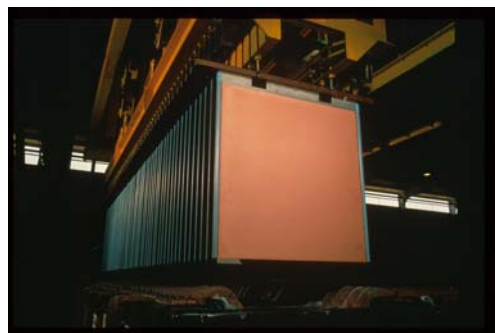


NORM Analysis

Naturally Occurring Radioactive Material

Naturally occurring radioactivity in ores, concentrates and processing intermediates and products is analysed at ANSTO Minerals by techniques developed over a considerable time. Some techniques involve the use of a research nuclear reactor.

Ores and concentrates are said to be in 'secular equilibrium' when a radionuclide parent has the same concentration as each radionuclide in the decay chain. Thermal and/or chemical processing of ore, concentrate or an intermediate product can result in a break in the secular equilibrium, as the progeny radionuclides redistribute in the processes according to their own physical and/or chemical properties.



Regulatory processes now require individual radionuclide concentrations rather than only the parent assays or only a total contained radioactivity concentration. The techniques used by ANSTO Minerals are summarised in the following table:

Analytical Method	Assay	Sample Size (g)	Estimated Analysis time (weeks)
Delayed neutron counting (DNA)	Parent U	10	2
Neutron activation analysis (NAA)	Parent Th	19	4
Gamma spectrometry	Progeny + ⁴⁰ K	100	8
Alpha spectrometry	²¹⁰ Po	5	4
Beta counting	²¹⁰ Pb	5	6

It is assumed that samples are supplied dry and pulverised. An additional charge would be otherwise made for sample preparation. Work would be carried out under ANSTO Minerals standard terms and conditions.

ANSTO Minerals can also provide:

- consulting advice in interpretation of the assay results
- a complete table of contained radionuclides and total radioactivity concentration
- advice and testwork facilities to better understand the behaviour of radioactivity in chemical processing

