# Gamma Activation Analysis for geo-sensing Phase 2

PROJECT P1-009

To progress conveyor belt based grade sensor using Gamma Activation Analysis (GAA) to TRL4-5.

After successfully demonstrating proof of concept of a conveyor belt based grade sensor using Gamma Activation for gold ores in phase 1, phase 2 was scoped out to progress the technology to TRL 4 and deliver a potential TRL5-ready outcome in the form of a buildable design for a pilot unit for deployment in WA, potentially as part of the proposed CRC ORE Kalgoorlie Hub.

If successful, this would lead directly to a field deployable unit.

invent. integrate. implement. introduce.

TRL 1 TRL 2 TRL 3 TRL 4 TRL 5 TRL 6 TRL 7 TRL 8 TRL 9
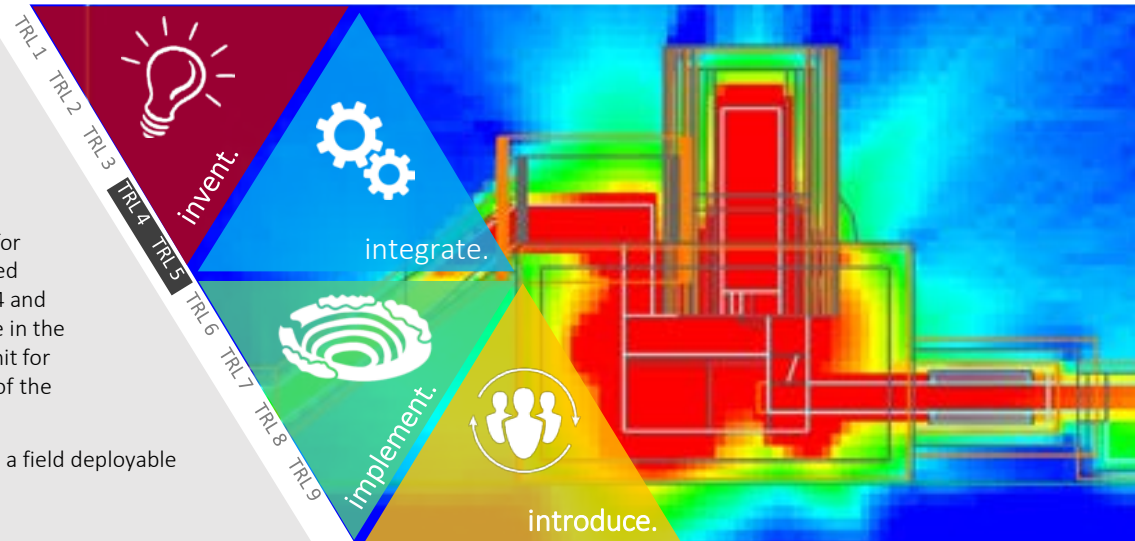
Research collaboration

CSIRO has extensive experience developing novel nuclear- based instrumentation for mining and mineral processing applications, from concept through to commercialisation. CSIRO also has extensive expertise in the use of computer modelling to design and optimise nuclear-based analysers and the development and construction of radiation detection systems and associated electronics and software.

For many gold operations, economic benefits from successful bulk gold sorting is projected to be highly significant, especially those that are approaching end of life with low grades and already established processing plants. Deploying on-belt GAA technology into gold operations may therefore significantly benefit the Western Australia gold industry. In recognition of this WA-based opportunity the current project will be allocated significant centre funding related to MRIWA's support for CRC ORE. Linkages will also be sort with the WA gold producers to supply samples and provide a site for testing.

Program Coordinator:	Dr Greg Wilkie, CRC ORE
Project Leader:	Dr Peter Coghill, CSIRO
Timing:	March 2017 – February 2019
Next stage on from:	Project 1.1
Participants:	CSIRO

Image: Picture from the shielding model, supplied by CSIRO

Background & aims

Bulk gold ore sensing and sorting provides an opportunity to make a large impact in a significant sector of the Australian and world-wide mining industry by using an integrated technology solution. Gold deposits have low head grade compared to base metal deposits and high grade heterogeneity. This provides a large opportunity for bulk sorting if the fundamental problem of measuring the low levels of gold can be overcome.

The aim of the Phase 2 project is to produce a buildable, costed design for a 60tph GAA on-belt gold ore sensing pilot facility that is validated by direct performance measurement of components and extensive modelling, and whose principal components Linac (high power X-ray source), detector array, radiation conveyor, and main shield could directly translate to a site based trial at a production ore feed rate.

Focus on outcomes

- Design a 60tph pilot scale GAA facility with the major components (Linac, Detector System, Primary Shield, and Irradiation Conveyor) able to transfer directly to on-site installations. This will include identification of suppliers, costing of components and design drawings.
- Validation of detector system performance.
- Validation of projected sensitivities with further tests at a Linac facility.
- Techno-economic assessment of bulk gold ore sorting economics including at least one real prospect with real world constraints and parameters.
- Commence as far as possible licensing documentation for pilot plant construction.