



Improving radiation protection

CASE STUDY

Radiation Protection

Ensuring the safety of radiation workers within the nuclear industry is paramount. The ability to quickly and accurately characterise complex radiation environments is vital to keep workers safe and industry functioning.

THE CHALLENGE

SPATZ is a neutron reflectometer at the Australian Centre for Neutron Scattering (ACNS). For researchers, scientists, and workers using SPATZ, it is imperative that dose rates are tightly controlled outside the instrument enclosure.

During the SPATZ commissioning, elevated gamma dose rates were measured outside the enclosure. Using conventional methods to collect dose rate survey information to determine the origin was not viable, as access is restricted inside the enclosure when the beamline is in operation. Without the high dose rate areas being localised and shielded, the neutron flux would need to be reduced, degrading the performance of the instrument and limiting research capabilities.

THE SOLUTION

The CORIS360[®] advanced radiation imaging technology was deployed inside the SPATZ enclosure during operation of the beamline. CORIS360[®] quickly identified the source and location of the high dose rate region within the neutron beam enclosure. This was caused by the neutron beam interacting with the boron shielding within the beamline, inducing prompt gamma emissions.

The image obtained provided the exact location and energy of the boron prompt gamma emissions. Using this information, the beamline engineers:

- Optimised shielding (steel) for a 478keV gamma emission, reducing the need for more expensive and labour intensive lead shielding.
- Developed a shielding enclosure for the beam tube to attenuate the prompt gamma emissions, effectively reducing the dose rate by a factor of 3.

Follow-up imaging identified further radiation emanating from the neutron beam stop. This too was contributing to the elevated dose rates. An additional beam chopper was utilised which brought the dose rates in line with the required levels.



Better data improves decision making

CORIS360[®] can quickly and precisely localise gamma signatures across a broad energy range. With a 360° × 90° field of view, CORIS360[®] delivers improved operational decision making for anyone working in radioactive environments helping to keep workers safe.

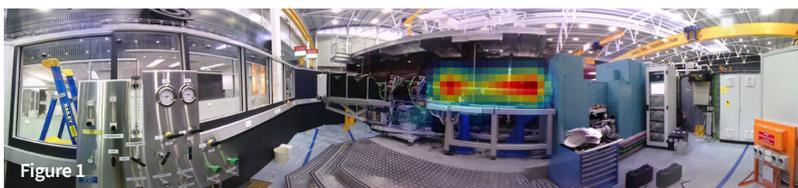


Figure 1. Image of the neutron beam line prompt gamma emissions that were causing dose rates above acceptable limits.

Figure 2 and 3. Following localisation of the gamma emissions, appropriate shielding was implemented to reduce the dose rate environment to within operational limits.



CASE STUDY

Radiation Protection

CORIS360® Benefits

- 360° × 90° gamma ray imaging allows for a quick accurate assessment of unknown radiological environments
- Identification and imaging of multiple isotopes from single data acquisition
- Remote operation
- Easy to use interface
- Initial survey of the radiation scene allows for an optimised radiation assessment plan based on knowledge gained from imaging
- Operates in low and high dose environments, 0.5 µSv/h - 40 mSv/h for ¹³⁷Cs
- Images full energy range, 40 keV to >3 MeV
- Verification that the radiation source has been removed

CORIS360® delivers value. Better data improves decision making for anyone working in radioactive environments.



Intelligent

Optimised sampling to identify and localise radiation sources



Fast

Compressed sensing delivers faster results



Full energy range

Image across the full energy range. Ability to detect presence of neutrons



Large field of view

See more in one acquisition



Precision

Better data for improved decision making



Safe

Remote operation reduces worker exposure



User-friendly

Easy to interpret and versatile with customisable detectors



Cost effective

Faster imaging saves time and resources



Contact us

For further information on CORIS360® including case studies and technical reports please visit:

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Australian Government



CORIS360® is a product of ANSTO, the Australian Nuclear Science and Technology Organisation, with over 60 years of experience in meeting the nuclear needs of industry.

