



orano

# Shielding and Dose Assessment

## Shielding and Dose Assessment Capability

Orano Projects has extensive experience supporting the entire lifecycle of projects; from design to operation, modification and decommissioning. Our team of consultants has an excellent, practical understanding of current regulations, guidance and best industry practices relating to shielding design and dose minimisation. We have worked on complex projects involving neutron, gamma and beta radiation, as well as high-energy particle research facilities. Having invested in the best available shielding codes and supporting IT equipment, our shielding team has the tools, skills and experience to place them among the leading shielding teams in the UK.

### Shielding Design Basis

Orano can undertake reviews to identify all of the key assumptions and data to be used as a basis for all shielding and dose uptake assessments for a specific project. This includes outlining radiation dose criteria (regulatory and company dose limits), specific shielding design criteria (such as dose rate targets), source term generation (e.g. neutron and gamma radiation) and shielding material compositions.

### Dose uptake and ALARP Assessment

Our team is highly experienced in undertaking dose uptake and ALARP assessments for facilities during the design, operation or decommissioning phase. Dose uptake assessment is used to identify high dose tasks and recommend changes to process, operations and shielding provisions to ensure that overall dose up-take is both within the regulatory and company dose criteria and is ALARP.

## Shielding Assessments

Our shielding consultants work closely with plant operators, design engineers and Radiation Protection Advisors (RPAs) on a regular basis to develop and optimise cost effective shielding solutions. This often includes, but is not limited to, the following types of assessment:

### Bulk Shielding Assessment

This includes assessing the bulk shielding requirements for walls, floors, roof slabs, shielded windows, access labyrinths, gamma gates and shield doors for areas containing sources of radiation.

### Local Shielding Assessment

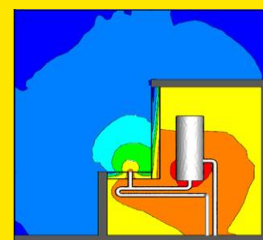
This considers the provision of local shielding to protect operators and/or equipment. This can include items such as shielded partitions, internal walls, mobile shields, workstations and glove boxes.

### Penetration Assessment

This considers the potential for radiation streaming through penetrations in the bulk shields such as gaps around doors, service ducts (eg: ventilation and electrical ducts), shield plugs, drive shafts and wall boxes.

### Skyshine

This considers the doses around facilities due to radiation scattering in the atmosphere, which can be a potential issue for storage facilities without shielded roofs. The team has extensive experience in providing advice on plant layout, storage strategies and shielding provisions to provide cost effective solutions for minimising skyshine doses.



### Transport

Shielding design advice for transport packages including assessment of dose rates and doses associated with the loading and movement of transport packages.

### Emergency planning

Criticality dose contour assessments and detector placement assessments for Criticality Incident Detection Alarm Systems (CIDAS).

### Safety Case Support

Assessment of dose rates and shielding under fault conditions. Assessment and optimisation of radiation monitor detector placements (e.g. gamma interlock monitors).

## Radiological Classification of Areas

Orano can conduct radiological classification of areas assessments in order to designate areas within the facility according to the level of hazard from external radiation and/or the potential for surface and airborne contamination. This assessment helps ensure compliance with the legal requirements, assists in the control of radiation dose uptake (both internal and external) and enables a consistent and efficient plant layout to be developed in the early stages of the design phase.

## Peer Review

We have experience undertaking peer reviews of shielding and dose assessments for a range of installations.

## Specialist software

We are specialists in industry standard radiation transport codes and are licensed to use the following:

**Attila** - a state of the art software suite used for fast and accurate solutions to radiation transport applications. Attila has full CAD integration and produces visual and quantitative results for informed design decisions.

**MCNP** - Monte Carlo N-Particle code for neutron, photon, electron or coupled neutron/ photon/ electron transport. MCNP facilitates detailed shielding calculations and provides a robust and independent cross check for Attila.

**Microshield®** - comprehensive photon/ gamma ray shielding and dose assessment programme for designing shields, estimating source strength from radiation measurements, minimising exposure to people and teaching shielding principles.

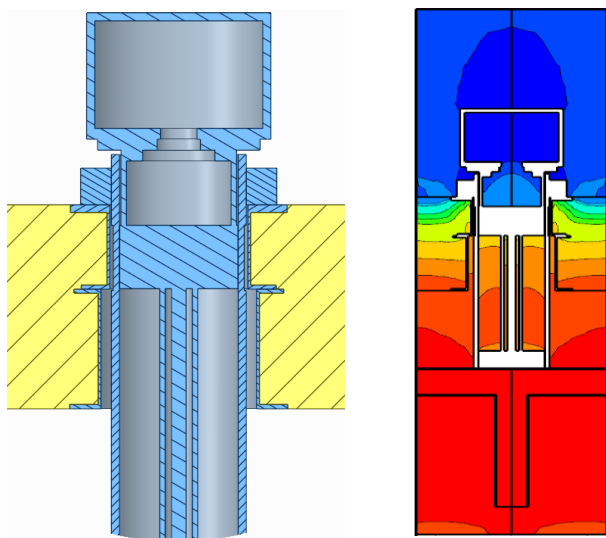
**ORIGEN-ARP** - isotopic depletion and decay analysis code for performing fuel depletion, activation and decay calculations, and producing neutron and gamma source terms.

# Why choose

# Orano Projects?

Orano Projects' expert shielding teams are equipped with the latest shielding software and the experience to address some of the most demanding shielding and dose assessment projects across the nuclear lifecycle. In addition to undertaking a wide range of shielding and dose assessments, we also offer technically astute peer review of assessments carried out for a range of facilities.

Our robust quality assurance systems and internal verification procedures ensure that all work is delivered to the highest possible standard of quality and fully meets the specified requirements.



**Orano Projects Limited is a wholly owned subsidiary of Orano, providing specialist technical consultancy and expert engineering services to the UK nuclear industry. With a track record of over 40 years operating in the UK, we combine unique knowledge and experience to offer the best value**

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