

Radiation Physics and Shielding

Data Sheet 9



The Radiation Physics and Shielding Department has overall responsibility for the design and safety assessment of the Secondary Shielding on all RN nuclear submarines. The department has the capability to assess the performance of shield designs and to validate for design, manufacture and installation.

Key Skills

This unique team provides the highly specialist capabilities associated with Nuclear Engineering:

Secondary Shielding System - Design & Safety Justification

- Gamma and neutron secondary shield design and shield optimisation in accordance with ALARP principles.
- Secondary shielding safety justifications.
- Post Loss of Coolant Accident (LOCA) dose rate predictions to support Site Safety Justifications.
- The pursuance of MoD-sponsored R&D to improve all aspects of shield design and radiation measurement.

Secondary Shielding System - Experimental Validation

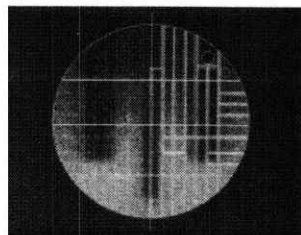
- The organisation and performance of detailed radiation surveys (includes measurement of gamma and neutron dose rates both inside and outside the Reactor Compartment).
- On-board trials to examine personnel dose uptake as a function of operational occupancy.
- Assessment of the performance of the submarine shield through life by the analysis of crew dosimetry returns.
- Development of new radiation measurement techniques.

Recent Projects

- Core H backfit in Vanguard Secondary Shielding Safety Justification.
- Radiation Survey at the Submarine Test Facility - Downreay.
- Accident dose rate calculations to support the Site Safety Justification at Devonport.
- Design of the Astute Class Secondary Shield.

Current Projects

- The Astute Class Secondary Shielding Safety Justification.
- MoD funded R&D contract.



Calculation of Neutrons Emerging from a Radiation Shield

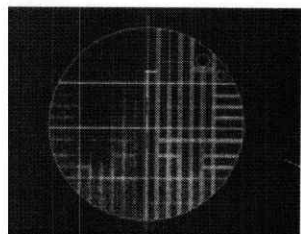
Red
14.0 - 4.72 MeV

Yellow
4.72 - 0.60 MeV

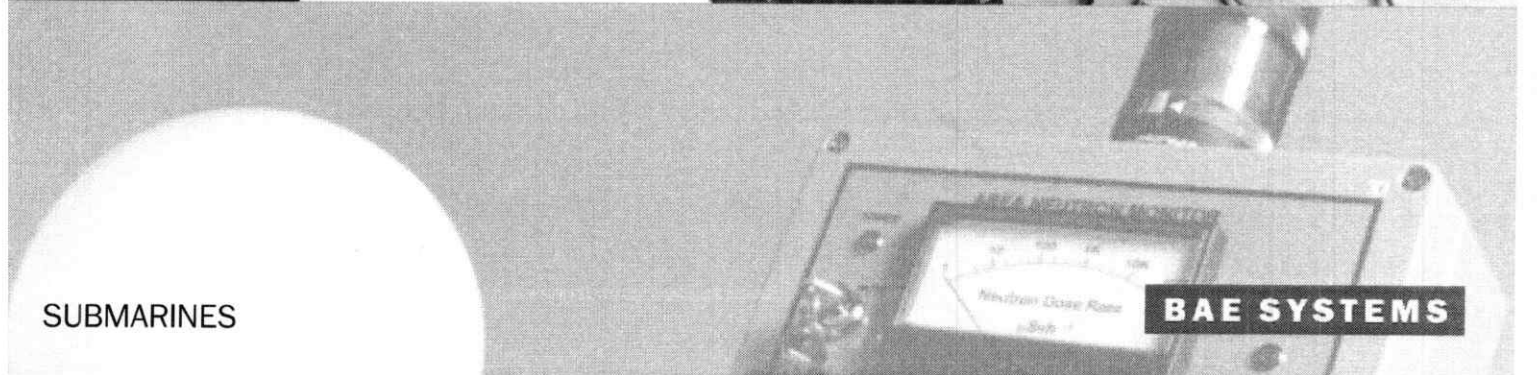
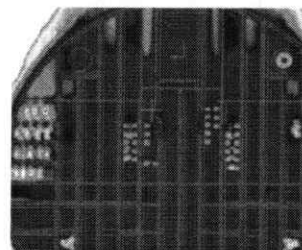
Green
600 - 67.4 keV

Blue
67.4 - 9.12keV

Purple
9.12keV - Thermals



Spectral Plot of Calculated Gamma Doserates on a Submarine Bulkhead



SUBMARINES

BAE SYSTEMS