Gamma Cave Description

Description
The Gamma Cave facility (Fig. 1) is a dry ventilated irradiation room located on the experimental level of the UMLRL reactor containment building. It has an 15 m³ volume to accommodate experimental apparatus of various sizes. Inside the Gamma Cave, a 2.7 m² opening in the pool wall tapers inward to the 0.356 m² source window. Several small ports penetrate one shielding wall to provide access for instrumentation cables. The attached dimensional drawing provides more detail.

The cobalt-60 sources used for gamma irradiations are located inside the water-filled bulk-irradiation pool at the UMLRL. The sources are configured into 25 cm x 36 cm frames to produce a planar source geometry. When an irradiation is performed, the source frame is positioned onto a wall mounted rack inside the pool. For the Gamma Cave, the rack is located in front of a 12.7 mm thick aluminum source window through which the Cobalt-60 gamma photons enter the Gamma Cave. A wide range of dose rates are achievable by varying the source activity and the centerline distance of the sample from the source window. The highest dose is obtained up against the window and decreases exponentially with distance from the window. Refer to the attached dose-rate curve to determine the dose-rate versus distance.

The following dimensions may be useful for designing an experimental apparatus for use in the Gamma Cave (refer to the attached dimensional drawing). The window shelf is 40.6cm from the floor and extends 90cm to the window. The shelf width tapers from 60cm at the window to 165cm at the end of the shelf. The window is 60cm x 60cm. The centerline of the source at the window is 30cm from each edge and the centerline is 70.5cm above the floor.

Fig. 1. Top-angled 3-D View of the Gamma Cave Facility (top removed for clarity)