

## USTUR Case 0102 Voxel Phantom for External Radiation Detector Response Simulation

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The United States Transuranium and Uranium Registries (USTUR) is a resource of human tissue voluntarily donated by past workers with documented occupational actinide exposures. This research focuses on case 102 (a substantial accidental intake of  $^{241}\text{AmO}_2$ ) which was the first whole body donation to USTUR (in 1979). Half of this skeleton is encased in tissue equivalent plastic and serves as a unique “human phantom” for the calibration of whole body counting systems at United States Department of Energy (USDOE) and other laboratories (<http://www.ustur.wsu.edu/voxel/index.html>). This paper reports progress in building a 3D voxel model of the case 0102  $^{241}\text{Am}$  phantom in order to simulate the experimental response of external planar germanium detectors variously positioned over the extremities (head, knee, ankle, and wrist). Segmentation of sequential CT-scan images and generation of surface rendered images of these parts of the case 0102 phantom are achieved using the 3D Doctor<sup>®</sup> Software package. The 3D surface model (Non-Uniformal Rational B-Spline, NURBS) is then voxelized using a MATLAB<sup>®</sup> code into a final computational phantom. This can be imported into a Monte Carlo code for radiation transport and detector response simulation.

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