Contribution ID: **58** Type: **Poster**

Analysis on characteristics of occupational radiation source items during AP1000 unit overhaul

According to the physical characteristics of Chinese adult male reference person (170cm, 70kg), the digital model of Chinese adult male reference person (CRAM) was surface-sourced and simply modified, and then segmented by horizontal slicing. The lower side of the seventh cervical vertebra C07 has been selected as the segmentation baseline, which was segmented upward and downward respectively, with the layer thickness of 2.5cm and 3cm. This model contained layered arms and legs.After repairing the sliced digital mode, FDM 3D printing rapid prototyping was performed on organs of each layer, including whole-body bones (excluding metacarpal bones and fingers / phalanges bones), skin, brain, eye crystals, left and right lungs, heart, liver, large and small intestines, left and right kidneys, etc. With these rapid forming layer cutting organs as the mold type, the silicone outer mold and glass fiber reinforced plastic sleeve mold were turned out respectively, and more than 200 sets of various molds were produced. Finally, the radiation tissue equivalent materials were used for layered pouring. The palms, soles, fingers, and toes of the model only contained soft tissues without bones. Different organs were stained with different stains.Each layer of the model was drilled by a CNC machine, with hole diameter of 5 mm and hole spacing of 2.5 cm and 3 cm.
Four self-developed radiation tissue equivalent materials were used in this model: soft tissue (muscle tissue with 10% fat), lung, cartilage and hard bone. The soft tissue and lung materials were based on polyurethane (TPU), and the bone materials were based on epoxy resin (E). Compared with ICRP-23 standard model, ICRU-46 standard model and tissue equivalent gas, the relative deviation of density and effective atomic number of soft tissue materials is less than 10%, and the relative deviation of electron density is less than 2%. Compared with the results of the line fading coefficients calculated by the relevant recommended values in ICRP-23, the deviation of the line fading coefficients is less than 5% for the 241Am γ rays of 59.54KeV and 17.61KeV.

Name of Member State/Organization

CHINA

Speakers affiliation

China Institute for Radiation Protection

Speakers email

bspanda@foxmail.com

Author: Mr XIONG, Wanchun

Co-author: Mr LIU, Yicong

Presenter: Mr XIONG, Wanchun

Session Classification: Session 2. Monitoring and dose assessment of occupational radiation exposures

Track Classification: 3. Monitoring and dose assessment of occupational radiation exposures