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Radiological Decontamination of Indoor Building Surfaces

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The paper summarizes the results of radiological decontamination of several different types of indoor building surfaces, which were contaminated by radioactive suspension in two different contamination mixtures. The aim of the study was to develop techniques for application of the prepared contamination mixtures to various surfaces, which were then used for testing of selected decontamination solution.

The experiments were carried out in the Mobile Modular Laboratories, which were designed for decontamination procedures of NBC agents in The National Institute for Nuclear, Chemical and Biological Protection in Kamenná in the Czech Republic (SÚJCHBO, v. v. i.).

The radiological contamination was performed by the radionuclide La-140, which had been prepared by irradiation of isotopically natural lanthanum nitrate in 0.1M nitric acid solution in nuclear reactor LVR-15 in Research Centre Řež. Radiochemical purity of the final La-140 in nitrate solution was higher than 99 %.

The isotopic carrier lanthanum nitrate was added to the solution and then the lanthanum carbonate was precipitated by sodium carbonate or sodium hydrogen carbonate solutions. Using the precipitate, two contamination mixtures were prepared. The first one, lanthanum carbonate suspension in water, was applied onto the testing surface by spraying. The second contamination mixture was prepared of lanthanum carbonate mixed together with montmorillonite (i.e. aluminum pillared clay). In this case, the surface contamination was carried out mechanically using a special mould constructed in SÚJCHBO, v. v. i.

The surface activity of contamination and following decontamination levels were measured by hand held survey meter Colibri TTC with SABG 15+ alpha/beta/gamma probe made by Canberra Packard. In the decontamination experiments, various interior surfaces were tested to evaluate their suitability for decontamination together with selected decontamination solution. For decontamination tests, materials as plaster board covered with an interior paint (Primalex or Betex) on the surface, glass, floor and wall tiles, plastic materials, anti-slip aluminium sheets and floating floor were used.

The military decontamination solution ODS-5 distributed by Oritest was used for surface decontamination, which was provided by wetted pad three times in one direction and then with the same pad three times in the perpendicular direction.

The results show that for the first contamination mixture (the lanthanum carbonate suspension in water) applied, the radiological decontamination efficiency varied in range 81.6 - 99.9 %. For the second mixture, the decontamination efficiency between 67.6 - 99.7 % was achieved.

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Primary author: Mrs VOSAHLIKOVA, Iva (The National Institute for NBC Protection)

Co-authors: Mr NEMEC, Mojmir (The Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague); Mr OTAHAL, Petr (The National Institute for NBC Protection)

Presenter: Mrs VOSAHLIKOVA, Iva (The National Institute for NBC Protection)

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