**Record 1 of 474**

**Author(s):** Boice, JD (Boice, John D., Jr.); Mumma, MT (Mumma, Michael T.); Blot, WJ (Blot, William J.)

**Title:** Cancer Incidence and Mortality in Populations Living Near Uranium Milling and Mining Operations in Grants, New Mexico, 1950-2004

**Source:** RADIATION RESEARCH, 174 (5): 624-636 NOV 2010

**Abstract:** In a previous cohort study of workers engaged in uranium milling and mining activities near Grants, Cibola County, New Mexico, we found lung cancer mortality to be significantly increased among underground miners. Uranium mining took place from early in the 1950s to 1990, and the Grants Uranium Mill operated from 1958-1990. The present study evaluates cancer mortality during 1950-2004 and cancer incidence during 1982-2004 among county residents. Standardized mortality (SMR) and incidence (SIR) ratios and 95% confidence intervals (CI) were computed, with observed numbers of cancer deaths and cases compared to expected values based on New Mexico cancer rates. The total numbers of cancer deaths and incident cancers were close to that expected (SMR 1.04, 95% CI 1.01-1.07; SIR 0.97, 95% CI 0.92-1.02). Lung cancer mortality and incidence were significantly increased among men (SMR 1.11, 95% Cl 1.02-1.21; SIR 1.40, 95% CI 1.18-1.64) but not women (SMR 0.97, 95% CI 0.85-1.10; SIR 1.01, 95% CI 0.78-1.29). Similarly, among the population of the three census tracts near the Grants Uranium Mill, lung cancer mortality was significantly elevated among men (SMR 1.57; 95% CI 1.21-1.99) but not women (SMR 1.12; 95% CI 0.75-1.61). Except for an elevation in mortality for stomach cancer among women (SMR 1.30; 95% CI 1.03-1.63), which declined over the 55-year observation period, no significant increases in SMRs or SIRs for 22 other caners were found. Although etiological inferences cannot be drawn from these ecological data, the excesses of lung cancer among men seem likely to be due to previously reported risks among underground miners from exposure to radon gas and its decay products. Smoking, socioeconomic factors or ethnicity may also have contributed to the lung cancer excesses observed in our study. The stomach cancer increase was highest before the uranium mill began operation and then decreased to normal levels. With the exception of male lung cancer, this study provides no clear or consistent evidence that the operation of uranium mills and mines adversely affected cancer incidence or mortality of county residents. (C) 2010 by Radiation Research Society

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**DOI:** 10.1667/RR2180.1

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**Record 2 of 474**

**Author(s):** Udalov, IV (Udalov, I. V.)

**Title:** ACTIVATION OF RADON RELEASE ON "WET" CONSERVATION OF COIL MINES

**Source:** PROBLEMS OF ATOMIC SCIENCE AND TECHNOLOGY, (5): 126-129 2010

**Abstract:** The role of natural radioactive gas - radon in a population irradiation total dose, due to shut down of coil mining's of Lugansk district is described. The ways of radon distribution are shown. The situation resulting to radon accumulation in dangerous concentration, are considered.

**ISSN:** 1562-6016

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**Record 3 of 474**

**Author(s):** Gillmore, GK (Gillmore, G. K.); Crockett, RGM (Crockett, R. G. M.); Przylibski, TA (Przylibski, T. A.)

**Title:** "IGCP Project 571: Radon, Health and Natural Hazards" Preface

**Source:** NATURAL HAZARDS AND EARTH SYSTEM SCIENCES, 10 (10): 2051-2054 2010

**ISSN:** 1561-8633

**DOI:** 10.5194/nhess-10-2051-2010

**Record 4 of 474**

**Author(s):** Talha, SA (Talha, S. A.); de Meijer, RJ (de Meijer, R. J.); Lindsay, R (Lindsay, R.); Newman, RT (Newman, R. T.); Maleka, PP (Maleka, P. P.); Hlatshwayo, IN (Hlatshwayo, I. N.)

**Title:** In-field radon measurement in water: a novel approach

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (12): 1024-1031 DEC 2010

**Abstract:** This paper presents a novel approach of measuring radon in-water in the field by inserting a MEDUSA gamma-ray detector into a 210 L or 1000 L container. The experimental measurements include investigating the effect of ambient background gamma-rays on in-field radon measurement, calibrating the detector efficiency using several amounts of KCl salt dissolved in tap water, and measuring radon in borehole

water. The results showed that there is fairly good agreement between the field and laboratory measurements of radon in water, based on measurements with Marinelli beakers on a HPGe detector. The MDA of the method is 0.5 Bq L-1 radon in-water. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 7 of 474**

**Author(s):** Meslin, PY (Meslin, Pierre-Yves); Adler, PM (Adler, Pierre M.); Sabroux, JC (Sabroux, Jean-Christophe)

**Title:** Diffusive Transport of Gases in Wet Porous Media. Application to Radon

**Source:** SOIL SCIENCE SOCIETY OF AMERICA JOURNAL, 74 (6): 1871-1885 NOV-DEC 2010

**Abstract:** The prediction of macroscopic diffusion coefficients in dry and wet porous media still strongly relies on measurements, and numerous semi-empirical correlations have been proposed over the years to replace burdensome experimentations, but the range of validity of these correlations can be limited and is not even well-defined. Here, we present ab initio numerical calculations of the diffusion coefficient of two classes of porous media, namely consolidated and unconsolidated soils, where the water phase distribution is obtained by a lattice Boltzmann technique incorporating interfacial tension and wetting. We show that these reconstructed media can well represent two categories of soils generally encountered, namely undisturbed and repacked soils, whose diffusivities, to first order, exhibit two distinct dependencies on porosity under dry conditions, but a similar dependence on the water saturation level. We provide a theoretical support to the popular Buckingham law for dry undisturbed soils in the 0.2 to 0.45 porosity range investigated here. This semi-empirical correlation also compares well with our results on wet consolidated soils, although the dependence of the diffusion coefficient on the water saturation level does not seem to be a simple power law. These results, supported by available experiments on gases such as oxygen, hydrogen, or carbon dioxide, appear to be representative of large classes of porous media. The data and their correlations relative to radon are discussed. Finally, some discrepancy with experimental data regarding the value of the percolation threshold remains, which should be investigated further in the future.

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**Record 8 of 474**

**Author(s):** McLaughlin, J (McLaughlin, J.)

**Title:** An overview of thoron and its progeny in the indoor environment

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 316-321 Sp. Iss. SI OCT 2010

**Abstract:** An account is given of the behaviour of thoron and its progeny in the indoor environment. Emphasis is placed on the spatial distribution of these radionuclides in room air and on their interactions with indoor aerosols. How these aspects of thoron and progeny behaviour give rise to special problems for measuring them and assessing their radiological impact are described. Descriptions and comparisons are given of a range of thoron and progeny measurement techniques both passive and active. Recent progress in thoron dosimetry is described as well as compared with radon dosimetry. The results of some indoor thoron and progeny surveys carried out in different countries in recent years are given. As an example of this a summary account is presented of a recently concluded survey of thoron and its airborne progeny in over 200 houses in Ireland.

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**Record 9 of 474**

**Author(s):** Chen, J (Chen, J.); Dessau, JC (Dessau, J. C.); Frenette, E (Frenette, E.); Moir, D (Moir, D.); Cornett, RJ (Cornett, R. J.)

**Title:** Preliminary assessment of thoron exposure in Canada

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 322-327 Sp. Iss. SI OCT 2010

**Abstract:** Radon has been identified as the second leading cause of lung cancer after tobacco smoking. Rn-222 (radon gas) and Rn-220 (thoron gas) are the most common isotopes of radon. In this study, thoron exposure in Canada was assessed based on three community radon/thoron surveys conducted recently. It was confirmed that thoron was detectable in most homes and thoron progeny were present in every home

surveyed. Results demonstrated that thoron concentrations varied more widely than radon. No clear correlation between Rn-222 and Rn-220 concentrations was observed in simultaneous measurements. It is estimated that thoron contributes to about 7 % of the radiation dose due to indoor radon exposure based on measurements in about 260 individual homes. Because indoor measurements and geological gamma-ray surveys did not support a reasonable association between Rn-222 and Rn-220, thoron concentrations could not be predicted from widely available indoor radon information. In order to better assess thoron exposure in Canada and thoron risk to the Canadian population in various geographic locations, more thoron progeny measurements are required.

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**Record 10 of 474**

**Author(s):** Kovacs, T (Kovacs, T.)

**Title:** Thoron measurements in Hungary

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 328-334 Sp. Iss. SI OCT 2010

**Abstract:** In this study, several Hungarian dwellings and working places were surveyed using passive radon- and thoron-measuring devices (Radopot((R)) and Raduet((R))) from 2003 to 2008. The detectors were placed 15-30 cm from the wall throughout the 1- to 3-month period. In dwellings, the presence of thoron, similar to 100 Bq m(-3), was detected almost in all cases, ; however, in the cellars of these buildings, a value similar to 200 Bq m(-3) was typical. In the cases of manganese and bauxite mines, the concentration of thoron was mainly 200 and 500 Bq m(-3), respectively. In caves, it was 1000 Bq m(-3), whereas in the radon bath it was similar to 100 Bq m(-3). As in many cases, the ratio between thoron and radon concentrations was > 0.25 and the dose contribution from thoron and its progeny was not negligible. Therefore, further investigation on the thoron progeny will be necessary for an accurate dose estimation.

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**Record 11 of 474**

**Author(s):** Tokonami, S (Tokonami, S.)

**Title:** Why is Rn-220 (thoron) measurement important?

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 335-339 Sp. Iss. SI OCT 2010

**Abstract:** New scientific findings based on the latest epidemiological analyses for lung cancer risk due to radon have been demonstrated. The residential radon concentration is mainly measured by passive radon detectors. Although the passive radon detector is usually designed to detect radon efficiently and exclusively, several types of them can detect thoron together with radon. In this case, these detector readings may include both radon and thoron signals. If the readings are overestimated, the lung cancer risk will be given as a biased estimate when epidemiological studies are carried out. In our experience, there seem to be no correlation among radon, thoron and thoron progeny concentrations. Therefore, one parameter cannot be estimated by the other. This study presents the importance of thoron measurement throughout results we have obtained in field and in laboratory so far.

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**Record 12 of 474**

**Author(s):** Tommasino, L (Tommasino, L.); Tokonami, S (Tokonami, S.); Tommasino, PM (Tommasino, P. M.)

**Title:** The measurements of thoron, radon and their decay products thanks to Pinocchio, Tengu and Trolls

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 340-345 Sp. Iss. SI OCT 2010

**Abstract:** In the present paper, the long noses of Pinocchio, Tengu and Trolls are used to measure, respectively, radon, thoron, and their decay products both by track-etch detectors and by Geiger-Muller (G-M) counters. Just recently, four new passive samplers (termed quatrefoil) have been developed which greatly simplify the detection of all airborne radionuclides by using either passive or real-time detectors. In particular, surface-deposited radon (thoron) decay products are sampled by films with large area and small surface density (0.1-1 mg cm(-2)). Once exposed, these films are stacked together for their detection by a pancake G-M counter. For the measurements of radon and thoron in soil, 25-cm-long tubes with sampling films along their internal surfaces can be successfully used. Once exposed, these films can be counted by a pancake G-

M for the selective measurement of radon and thoron.

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**Record 13 of 474**

**Author(s):** Zunic, ZS (Zunic, Z. S.); Celikovic, I (Celikovic, I.); Tokonami, S (Tokonami, S.); Ishikawa, T (Ishikawa, T.); Ujic, P (Ujic, P.); Onischenko, A (Onischenko, A.); Zhukovsky, M (Zhukovsky, M.); Milic, G (Milic, G.); Jakupi, B (Jakupi, B.); Cuknic, O (Cuknic, O.); Veselinovic, N (Veselinovic, N.); Fujimoto, K (Fujimoto, K.); Sahoo, SK (Sahoo, S. K.); Yarmoshenko, I (Yarmoshenko, I.)

**Title:** Collaborative investigations on thoron and radon in some rural communities of Balkans

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 346-350 Sp. Iss. SI OCT 2010

**Abstract:** This paper deals with the results of the first-field use in the Balkans, i.e. Serbia and Republic of Srpska (Bosnia and Hercegovina), of a passive polycarbonate Mark II type and poliallyldiglycol carbonate (Cr-39) alpha track detectors sensitive to thoron as well as to radon. Both types of solid state nuclear track detectors were designed and supplied by National Institute of Radiological Sciences (NIRS), Chiba, Japan. The commercial names for these detectors which all have been field tested in Balkan rural communities are known as: UFO and RADUET passive discriminative radon/thoron detectors. No database of thoron and thoron progeny concentrations in dwellings in Serbia or Balkans region exist, and as a result, the level of exposure of the Serbian population to thoron and its progeny is unknown so far.

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**Record 14 of 474**

**Author(s):** Chambers, DB (Chambers, D. B.)

**Title:** Thoron and decay products, beyond UNSCEAR 2006 Annex E

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 351-356 Sp. Iss. SI OCT 2010

**Abstract:** Uranium and thorium series radionuclides are present in all soils and rocks. Thus, radon and thoron, the radioactive noble gases originating in the uranium (U-238) and thorium (Th-232) decay chains is ubiquitous and everyone is exposed to both radon and thoron gases and their particulate radioactive decay products. As described in UNSCEAR Annex E (2006), radon and its decay products have been recognised for many years as a hazard to underground miners. More recently, the risks from exposure to residential radon have been demonstrated through residential case-control epidemiological studies. However, as discussed by UNSCEAR, exposures to thoron and its decay products have often been relatively ignored. Moreover, unlike radon the effects of exposure to thoron and its decay products are not available from epidemiology and thus, a dosimetric approach is required to assess risks. UNSCEAR continues to recommend the use of a dose conversion factor for thoron decay products of 40 nSv (Bq h m(-3))(-1). UNSCEAR Annex E suggests there is an emerging problem, namely, that the contribution of Rn-220 (thoron) gas to the Rn-222 (radon) gas measurement signal is not well known. Until recently, this has largely been ignored. This is an important consideration as measurements at work and homes are the basis for investigating lung cancer exposure-response relationships. Based on UNSCEAR Annex E, this paper provides an overview of the sources and levels of thoron and its associated decay products at home and work. In addition, this paper provides an overview of the thoron dosimetry considered by UNSCEAR Annex E and some recent results.

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**Record 15 of 474**

**Author(s):** Harley, N (Harley, N.); Chittaporn, P (Chittaporn, P.); Medora, R (Medora, R.); Merrill, R (Merrill, R.)

**Title:** Measurement of the indoor and outdoor Rn-220 (thoron) equilibrium factor: application to lung dose

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 357-362 Sp. Iss. SI OCT 2010

**Abstract:** A miniature four-chamber alpha track detector was developed that measures both Rn-222 (radon) and Rn-220 (thoron), in duplicate. Using this detector and the previous long-term measurements of the Rn-220 decay products Pb-212, and Bi-212, an equilibrium factor, F-eq, is derived for both outdoor and indoor Rn-220 environments (0.004 +/- 0.001 outdoors and 0.04 +/- 0.01 indoors). The lung airway dose can then be calculated from a dose factor from UNSCEAR that requires the equilibrium equivalent thoron concentration (EEC), i.e. the product of F-eq and the Rn-220 gas concentration. The lung dose from thoron in domestic or

occupational surveys is often overlooked. The values of F-eq for thoron in several published studies are in general agreement with the values reported here. Thus, a long-term alpha track measurement of thoron multiplied by an appropriate indoor or outdoor equilibrium factor yields the EEC, which can be used to assess bronchial lung dose.

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**Record 16 of 474**

**Author(s):** Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Janik, M (Janik, M.); Tokonami, S (Tokonami, S.)

**Title:** Quality assurance and quality control for thoron measurement at NIRS

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 367-370 Sp. Iss. SI OCT 2010

**Abstract:** The National Institute of Radiological Sciences (NIRS) has developed passive radon (Rn-222)-thoron (Rn-220) discriminative detectors for a large-scale survey and has established a thoron chamber to calibrate such detectors. In order to establish quality assurance and quality control for the Rn-220 measurement at NIRS, intercomparison studies have been carried out. The intercomparisons using a scintillation cell method, which has been used as a standard for Rn-220 measurement at NIRS, were conducted at New York University (NYU, USA) and Physikalisch-Technische Bundesanstalt (PTB, Germany). As a result, it was found that the result from the NIRS was in good agreement with that from the NYU. On the other hand, it was observed that the relative discrepancy between the Rn-220 concentrations from the NIRS and PTB monitors was, on average, > 50 %. Using the NIRS Rn-220 chamber, the international intercomparison experiment for passive Rn-220 detectors started in 2008.

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**Record 17 of 474**

**Author(s):** Zhang, L (Zhang, L.); Guo, Q (Guo, Q.); Zhuo, W (Zhuo, W.)

**Title:** Measurement of the Pb-212 particle size distribution indoors

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 371-373 Sp. Iss. SI OCT 2010

**Abstract:** A new device has been developed for the measurement of the Pb-212 particle size distribution indoors. This device consists of two wire screens and a back-up filter with a diameter of 2.0 cm. The sampling flow rate is typically 3.0 l min(-1). After 3-h sampling time and 6-h waiting time, a CR-39 detector is used for the registration of the alpha particles from the Pb-212, deposited on the wire screens and the filter, respectively. It appears clear from field measurements that there are no appreciable differences among the particle size distributions from different dwellings within the same location and under the same climate conditions. However, the Pb-212 particle size distributions from the countryside dwellings have different results from those of the city dwellings.

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**Record 18 of 474**

**Author(s):** Chanyotha, S (Chanyotha, S.); Burnett, WC (Burnett, W. C.); Taniguchi, M (Taniguchi, M.); Kritsananuwat, R (Kritsananuwat, R.); Sriploy, P (Sriploy, P.)

**Title:** Experience in using radon and thoron data to solve environmental and water problems

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 374-378 Sp. Iss. SI OCT 2010

**Abstract:** This study aims to introduce thoron (Rn-220), a naturally occurring isotope, as a new groundwater tracer for detecting groundwater seepage into Bangkok canals. Previous studies by the group using radioactive radon (Rn-222) and conductivity as groundwater tracers suggested that there is shallow groundwater seeping into the man-made canals ('klongs') around Bangkok. Furthermore, the groundwater was shown to be an important pathway of nutrient contamination to the surface waters. Thoron is a member of the natural Th-232 decay chain, has exactly the same chemical properties as radon, but has a much shorter half-life (56 s) than radon (3.84 d). By using its advantage of rapid decay, if one detects thoron in the environment, there must be a source nearby. Thus, thoron is potentially an excellent prospecting tool. In the case of measurements in natural waters, sources of thoron should indicate the point of groundwater discharges more precisely than radon. During the surveys in the canals of Bangkok, thoron was successfully measured and its distribution was more variable than that of radon, suggesting that seepage into the canals is

not uniform.

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**Record 19 of 474**

**Author(s):** Ramola, RC (Ramola, R. C.); Prasad, G (Prasad, G.); Gusain, GS (Gusain, G. S.); Rautela, BS (Rautela, B. S.); Choubey, VM (Choubey, V. M.); Sagar, DV (Sagar, D. Vidya); Tokonami, S (Tokonami, S.); Sorimachi, A (Sorimachi, A.); Sahoo, SK (Sahoo, S. K.); Janik, M (Janik, M.); Ishikawa, T (Ishikawa, T.)

**Title:** Preliminary indoor thoron measurements in high radiation background area of southeastern coastal Orissa, India

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 379-382 Sp. Iss. SI OCT 2010

**Abstract:** This paper presents the preliminary results of radon and thoron measurements in the houses of Chhatrapur area of southeastern coast of Orissa, India. This area is one of the high radiation background radiation areas in India, which consists of monazite sand as the source of thoron. Both active and passive methods were employed for the measurements. Radon and thoron concentrations were measured in the houses of Chhatrapur area using twin cup radon dosemeters, RAD7 and radon-thoron discriminative detector (Raduet). Thoron progeny concentration was also measured in the houses using deposition rate measurements. Radon and thoron concentrations in the houses of study area were found to vary from 8 to 47 Bq m(-3) and the below detection level to 77 Bq m(-3), respectively. While thoron progeny concentration in these houses ranges between 0.17 and 4.24 Bq m(-3), preliminary investigation shows that the thoron concentration is higher than radon concentration in the houses of the study area. The thoron progeny concentration was found to be comparatively higher, which forms a base for further study in the area. The comparison between the results of various techniques is presented in this paper.

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**Record 20 of 474**

**Author(s):** Vaupotic, J (Vaupotic, J.); Kavasi, N (Kavasi, N.)

**Title:** Preliminary study of thoron and radon levels in various indoor environments in Slovenia

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 383-385 Sp. Iss. SI OCT 2010

**Abstract:** Using the Raduet discriminative radon-thoron solid-state nuclear track detectors, a limited number of measurements were recently carried out about 1 m away from any wall and 1.5 m above the floor in different environments in Slovenia. The following thoron and radon ranges were obtained, respectively (Bq m(-3)): 33-700 and 25-4900 in 2 dwellings, 11-215 and 22-422 in 5 kindergartens, 21-368 and 40-4609 in 35 elementary schools, 47-1361 and 92-3280 in 4 hospitals, 4-37 and 10-153 in 9 spas and 800-880 and 4060-6870 in 1 karst cave (2 places). In case of thoron and radon concentrations lognormal distribution was confirmed, while the statistical relationship between them was weak.

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**DOI:** 10.1093/rpd/ncq251

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**Record 21 of 474**

**Author(s):** Kotrappa, P (Kotrappa, P.); Steck, D (Steck, D.)

**Title:** Electret ion chamber-based passive radon-thoron discriminative monitors

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 386-389 Sp. Iss. SI OCT 2010

**Abstract:** Electret ion chambers (EICs), commercially available under brand name E-PERM (R), are widely used for measuring indoor and outdoor Rn-222 concentrations in air. These are designed to respond only to Rn-222 and not to Rn-220 by restricting diffusional entry area. Such radon EIC (R EIC) monitors are modified by increasing the entry area to allow Rn-220, in addition to Rn-222. Such modified units are called RT EIC. When a set of R and RT EICs are collocated, it is possible to discriminate and measure both radon and thoron concentrations, using appropriate calibration factors (CFs) and algorithms. The EICs come in different volumes, providing different sensitivities. The thoron CFs for 58-, 210- and 960-ml volume R and RT pairs are, respectively, 2.8-, 18.7- and 89-V drop per (kBq m(-3) d ), respectively. These provide much wider sensitivities and ranges compared to alpha track-based passive radon-thoron discriminative monitors.

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**DOI:** 10.1093/rpd/ncq231

**Record 22 of 474**

**Author(s):** Chalupnik, S (Chalupnik, S.); Meisenberg, O (Meisenberg, O.); Bi, L (Bi, L.); Wang, J (Wang, J.); Skubacz, K (Skubacz, K.); Tschiersch, J (Tschiersch, J.)

**Title:** Application of LSC and TLD methods for the measurement of radon and thoron decay products in air

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 390-394 Sp. Iss. SI OCT 2010

**Abstract:** Liquid scintillation counting (LSC) is a measuring technique, broadly applied in environmental monitoring. One of the possible applications of LSC is the measurement of radon and thoron progeny. Such a method can be stated as an absolute one. For long-term measurements, a different technique can be applied-monitors of potential alpha energy concentration (PAEC) with thermoluminescent detectors (TLDs). Such solution enables simultaneous measurements of PAEC and dust content. Moreover, the information which is stored in TLD chips is the energy of alpha particles and not the number of counted particles. Therefore, the readout of TL detector directly shows the potential alpha energy, with no dependence on equilibrium factor, etc. This technique, which had been used only for radon progeny measurements, was modified to allow simultaneous measurements of radon and thoron PAEC.

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**DOI:** 10.1093/rpd/ncq223

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**Record 23 of 474**

**Author(s):** Tschiersch, J (Tschiersch, J.); Meisenberg, O (Meisenberg, O.)

**Title:** The HMGU thoron experimental house: a new tool for exposure assessment

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 395-399 Sp. Iss. SI OCT 2010

**Abstract:** A thoron experimental house was constructed in a laboratory room of Helmholtz Zentrum Munchen to perform exposure studies of thoron and its decay products under controlled conditions. The single room house (7.1 m(3)) was built from unfired clay stones and clay plaster. For the plaster of the inner side, the clay was mixed with granite powder enriched with Th-232. The thoron inventory increased by this means to about 1700 Bq and the progeny potential alpha energy to 130 mu J inside the room. The instrumentation of the experimental house includes active and passive devices for thoron and thoron decay product measurement including attached and unattached progeny, for aerosol particle number and size measurement and characterisation of the climatic conditions. Various parameters as ventilation rate and aerosol concentration can be adjusted. Experiments performed in the experimental house demonstrate the experimental power of this new tool for indoor thoron exposure assessment.

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**Record 24 of 474**

**Author(s):** Mehra, R (Mehra, R.); Kansal, S (Kansal, S.); Singh, NP (Singh, N. P.)

**Title:** Measurement of thoron and radon progeny in outdoors of Sirsa, India, using defined solid angle absolute beta counting

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 400-403 Sp. Iss. SI OCT 2010

**Abstract:** Defined solid angle absolute beta counting technique is used to measure the equilibrium equivalent concentration (EEC) of radon and thoron from the filtered aerosol samples collected at Sirsa, India, in the months of September-October 2009. The value of Rn-220 EEC determined during the same measurements varies from 0.98 to 3.27, minimum for afternoon and maximum for morning. An effective equivalent dose outdoor of 0.023 mSv y(-1) due to the average EECTh of 1.65 Bq m(-3) was calculated with a conversion factor of 10 nSv Bq(-1) h(-1) m(-3) and an occupancy factor of 0.2. For EECRn with an average value of 13.02 Bq m(-3), the effective equivalent dose calculated using the conversion factor of 9 nSv Bq(-1) h(-1) m(3) and the occupancy factor of 0.2 was 0.164 mSv y(-1). The world average inhalation effective dose due to radon and its progeny is 1.2 mSv y(-1) as recommended by UNSCEAR, which reveals that the studied area is safe from health hazards.

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**Record 25 of 474**

**Author(s):** Choi, VWY (Choi, V. W. Y.); Ng, CKM (Ng, C. K. M.); Lam, RKK (Lam, R. K. K.); Janik, M (Janik,

M.); Sorimachi, A (Sorimachi, A.); Kranrod, C (Kranrod, C.); Nikezic, D (Nikezic, D.); Tokonami, S (Tokonami, S.); Yu, KN (Yu, K. N.)

**Title:** Long-term determination of airborne radon progeny concentrations using LR 115 detectors and the effects of thoron

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 404-407 Sp. Iss. SI OCT 2010

**Abstract:** The 'proxy equilibrium factor' (F-p) method has been developed for long-term determination of airborne radon progeny concentrations using LR 115 solid-state nuclear track detectors. In this paper, the effects of Rn-220 on the F-p method have been studied. The correction to the track density was related to a parameter alpha which was the ratio of the sum of activity concentrations of alpha-particle emitting radionuclides in the Rn-220 decay chain to the activity concentration of Rn-220 alone. Under commonly encountered circumstances, alpha could not be smaller than 2. An attempt was made to verify this using the exposure chamber at the National Institute of Radiological Sciences (NIRS), Chiba, Japan. A most interesting observation of alpha < 2 for very high Rn-220 concentrations and very low equilibrium factors for Rn-220 in the exposure chambers was made. A possible explanation was the substantial deposition of Po-216 under the extreme conditions inside the exposure chambers.

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**Record 26 of 474**

**Author(s):** Zhuo, W (Zhuo, W.); Chen, B (Chen, B.); Wei, M (Wei, M.)

**Title:** Estimation of indoor Rn-220 progeny concentrations with Rn-220 measurements

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 408-411 Sp. Iss. SI OCT 2010

**Abstract:** For estimating indoor thoron (Rn-220) progeny concentrations with Rn-220 measurements, both theoretical studies and field measurements were carried out in this work. Based on the theoretical study, it was found that the exhalation rate of Rn-220 (E-Tn) could be optimally assessed with the Rn-220 concentration measured at a point of 50 cm far from the source wall, and the equilibrium equivalent thoron concentration (EETC) could be further estimated with the E-Tn and the area of wall surface as well as the room volume. Field measurements testified that the estimated EETCs were in general agreement with the directly measured results with an average ratio of 0.87 +/- 0.12. The new method developed in this study is thought to be preferable for long-term and large-scale surveys of indoor EETC.

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**Record 27 of 474**

**Author(s):** Yasuoka, Y (Yasuoka, Y.); Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Hosoda, M (Hosoda, M.); Tokonami, S (Tokonami, S.); Fukuhori, N (Fukuhori, N.); Janik, M (Janik, M.)

**Title:** Separately measuring radon and thoron concentrations exhaled from soil using alphaguard and liquid scintillation counter methods

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 412-415 Sp. Iss. SI OCT 2010

**Abstract:** It was shown that radon and thoron concentrations exhaled from soil were separately measured using the AlphaGUARD and liquid scintillation counter (LSC) methods. The thoron concentrations from the RAD 7 were used to create the conversion equation to calculate thoron levels with the AlphaGUARD. However, the conversion factor was found to depend on the air flow rate. When air containing thoron of similar to 60 kBq m(-3) was fed to the scintillation cocktail, thoron and thoron progeny could not be measured with the LSC method. The radon concentration of about 10 kBq m(-3) was measured with three methods, first with the LSC method and then with two AlphaGUARDs (one in the diffusion mode and the other in the flow mode (0.5 l min(-1))). There were no significant differences between these results. Finally, it was shown that the radon and thoron concentrations in air could be measured with the AlphaGUARD and LSC methods.

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**Record 28 of 474**

**Author(s):** Hosoda, M (Hosoda, M.); Tokonami, S (Tokonami, S.); Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Sahoo, SK (Sahoo, S. K.); Furukawa, M (Furukawa, M.); Shiroma, Y (Shiroma, Y.); Yasuoka, Y (Yasuoka, Y.); Janik, M (Janik, M.); Kavasi, N (Kavasi, N.); Uchida, S (Uchida, S.); Shimo, M (Shimo, M.)

**Title:** Influence of soil environmental parameters on thoron exhalation rate

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 420-423 Sp. Iss. SI OCT 2010

**Abstract:** Field measurements of thoron exhalation rates have been carried out using a ZnS(Ag) scintillation detector with an accumulation chamber. The influence of soil surface temperature and moisture saturation on the thoron exhalation rate was observed. When the variation of moisture saturation was small, the soil surface temperature appeared to induce a strong effect on the thoron exhalation rate. On the other hand, when the variation of moisture saturation was large, the influence of moisture saturation appeared to be larger than the soil surface temperature. The number of data ranged over 405, and the median was estimated to be 0.79 Bq m(-2) s(-1). Dependence of geology on the thoron exhalation rate from the soil surface was obviously found, and a nationwide distribution map of the thoron exhalation rate from the soil surface was drawn by using these data. It was generally high in the southwest region than in the northeast region.

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**Record 29 of 474**

**Author(s):** Kranrod, C (Kranrod, C.); Ishikawa, T (Ishikawa, T.); Tokonami, S (Tokonami, S.); Sorimachi, A (Sorimachi, A.); Chanyotha, S (Chanyotha, S.); Chankow, N (Chankow, N.)

**Title:** Comparative dosimetry of radon and thoron

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 424-427 Sp. Iss. SI OCT 2010

**Abstract:** There is a well-known discrepancy between dosimetrically derived dose conversion factor (DCF) and epidemiologically derived DCF for radon. As the latter DCFs, International Commission on Radiological Protection (ICRP) recommends a value of similar to 6.4 nSv (Bq h m(-3))(-1) and 7.9 nSv (Bq h m(-3))(-1) for radon decay products (RnDP) in dwellings and workplaces, respectively. On the other hand, the dosimetric calculations based on the ICRP-66 respiratory tract model derived a DCF of 13 nSv (Bq h m(-3))(-1) and 17 nSv (Bq h m(-3))(-1) for RnDP in dwellings and workplaces, respectively, and 83 nSv (Bq h m(-3))(-1) for thoron decay products (TnDP) in dwellings. In addition, the DCFs derived from both approaches and UNSCEAR were applied to comparative dosimetry for two thoron-enhanced areas (cave dwellings in China and dwellings at a spa town in Japan), where the equilibrium equivalent concentration of radon and equilibrium equivalent concentration of thoron have been measured. In the case of the spa town dwellings, the dose from TnDP was larger than the dose from RnDP.

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**Record 30 of 474**

**Author(s):** Nikezic, D (Nikezic, D.); Markovic, VM (Markovic, V. M.); Krstic, D (Krstic, D.); Yu, PKN (Yu, P. K. N.)

**Title:** Doses in human organs due to alpha, beta and gamma radiations emitted by thoron progeny in the lung

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 428-431 Sp. Iss. SI OCT 2010

**Abstract:** This work consists of two parts. In the first part, the doses in the human lung per unit exposure to thoron progeny, the dose conversion factor (DCF), was calculated. Dependence of the DCF on various environmental and subject-related parameters was investigated. The model used in these calculations was based on ICRP 66 recommendations. In the second part, the human lungs were considered as the source of beta and gamma radiation which target the other organs of the human body. The DCF to other organs was obtained as 20 mu Sv WLM-1, which is larger than the DCF for radon progeny, which was 13 mu Sv WLM-1. This is a consequence of the longer half-life of the relevant thoron progeny than that of the radon progeny. It is interesting to note that after the lungs, where the radiation source is actually located, muscle tissue receives the largest dose.

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**Record 31 of 474**

**Author(s):** Kavasi, N (Kavasi, N.); Vigh, T (Vigh, T.); Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Tokonami, S (Tokonami, S.); Hosoda, M (Hosoda, M.)

**Title:** Effective dose of miners due to natural radioactivity in a manganese mine in Hungary

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 432-435 Sp. Iss. SI OCT 2010

**Abstract:** In this study, short-term radon (RnDP) and thoron (TnDP) progeny measurements and dose estimation were carried out in winter and summer in a manganese mine, Hungary. Gamma-ray dose rate

originating from external sources and Rn-222 and Ra-226 contents of spring-water from a mine was also measured. During working hours RnDP and TnDP concentration values changed between 12.1-175 and 0.14-0.42 Bq m(-3), respectively. The Rn-222 and Ra-226 concentration values in the karst spring-water were similar to 6 Bq dm(-3) and 16 mBq dm(-3), respectively. The radiation dose resulting from the consumption of karst spring-water was negligible. The doses from the inhalation of TnDP and external gamma radiation were of the same magnitude, similar to 0.1 mSv y(-1), which was rather negligible related to the estimated radiation dose of 5 mSv y(-1) from RnDP.

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**Record 32 of 474**

**Author(s):** Janik, M (Janik, M.); Tokonami, S (Tokonami, S.); Kranrod, C (Kranrod, C.); Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Hassan, NM (Hassan, N. M.)

**Title:** International intercomparisons of integrating radon/thoron detectors with the NIRS radon/thoron chambers

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 436-439 Sp. Iss. SI OCT 2010

**Abstract:** Intercomparisons of radon/thoron detectors play an important role not only for domestic radon/thoron survey but also for international or interregional discussion about radon/thoron mapping in dwellings as well as that in the soil. For these purposes, it is necessary to improve and standardise technical methods of measurement and to verify quality assurance by intercomparisons between laboratories. Therefore, the first thoron international intercomparison was provided at the NIRS (National Institute of Radiological Sciences, Japan) thoron chamber with a 150 dm(3) inner volume. In addition, a second intercomparison of radon detectors was conducted at NIRS with a 24.4 m(3) inner volume walk-in radon chamber. Only etched-track detectors were used during thoron intercomparison as well as three types for the radon intercomparison: etched-track, charcoal and electret. In general, 45 % results for thoron experiment do not differ more than 20 % from the reference value of thoron concentration and 69 % for radon.

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**Record 33 of 474**

**Author(s):** Jobbagy, V (Jobbagy, V.); Bety-Denissa, B (Bety-Denissa, B.)

**Title:** Solid thoron source preparation in a porous mineral matrix

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 440-443 Sp. Iss. SI OCT 2010

**Abstract:** Thoron and progeny are decay products of Th-232 with a great impact on human health. The release of thoron gas from the mining and milling of thorite, monazite and other major thorium ores has been recognised as a potential radiological health hazard. For precise measurements, calibration is a very important factor. This paper describes a cheap and easy way of producing a stable thoron source made of thorium nitrate packed in a porous clay mineral matrix used as Rn-220 generator. The source should have a small spherical shape and be fired at 600 degrees C; this will lead to a great pore volume, necessary for the thoron gas. High importance should be given to the water uptake. The exhalation power of Rn-220 was measured using a Lucas scintillation cell. Experimental efficiency values obtained ranged between 0.16 and 1.44 %.

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**Record 34 of 474**

**Author(s):** Zhao, C (Zhao, C.); Zhuo, W (Zhuo, W.); Chen, B (Chen, B.); Zhang, H (Zhang, H.)

**Title:** Characteristic and performance of a simple thoron chamber

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 444-447 Sp. Iss. SI OCT 2010

**Abstract:** For calibration and intercomparison experiments, a thoron chamber with an inner volume of 300 l was designed based on a programmable constant temperature and humidity testing device in this work. The commercial lantern mantles enriched with Th-232 were used as the Rn-220 source and the mantles were set in 3x3x3 points of lattice style inside the chamber. Experimental studies showed that Rn-220 concentrations in the chamber could be easily controlled and adjusted from about 0.5 to 80 kBq m(-3) through manual settings of the relative humidity and temperature, and the spatial distribution of Rn-220 in the chamber was fairly homogeneous.

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**Record 35 of 474**

**Author(s):** Tang, F (Tang, F.); Zhuo, W (Zhuo, W.); Zhao, C (Zhao, C.); Chen, B (Chen, B.); Xu, Y (Xu, Y.); He, L (He, L.)

**Title:** A theoretical study on accurate measurements of thoron with airflow-through scintillation cell method

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 448-451 Sp. Iss. SI OCT 2010

**Abstract:** For accurate measurements of Rn-220 concentration with airflow-through scintillation cell method, a theoretical study was performed for discussing the influences of sampling flow rate, volumes of sampling tube and scintillation cell on the measurements. It is found that a high flow rate and a large inner volume of scintillation cell as well as a small inner volume of sampling tube are not only preferable for measuring low levels of Rn-220, but also helpful for enhancing the measurement accuracy. In calibration experiments, both the sampling flow rate and the sampling tube volume should be noted. The variations of the flow rate and tube volume should be considered for accurate measurements in the fields.

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**Record 36 of 474**

**Author(s):** Ishimori, Y (Ishimori, Y.)

**Title:** Time-integrated monitoring of thoron progeny concentration around closed uranium mine sites in Japan

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 452-456 Sp. Iss. SI OCT 2010

**Abstract:** Thoron progeny concentrations were determined using the time-integrated method around closed uranium mine sites in Japan. Because the time-integrated radon progeny monitor developed by the authors has the function to detect Po-212, time-integrated monitoring of thoron progeny concentration is also available with the monitor. Assuming that contribution of Po-216 is negligible, equilibrium equivalent concentration of thoron (EECTn) is theoretically calculated from the etch-pit counts by Po-212. The annual averages of EECTn observed in the investigation area were about 0.2 Bq m(-3), and they had no remarkable differences from one another.

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**Record 37 of 474**

**Author(s):** Shiroma, Y (Shiroma, Y.); Isa, N (Isa, N.); Hosoda, M (Hosoda, M.); Sorimachi, A (Sorimachi, A.); Ishikawa, T (Ishikawa, T.); Tokonami, S (Tokonami, S.); Furukawa, M (Furukawa, M.)

**Title:** In situ measurements of thoron exhalation rate in Okinawa, Japan

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 457-461 Sp. Iss. SI OCT 2010

**Abstract:** Thoron exhalation rates from the ground surface were measured at 57 sites on Okinawa Island, Japan, using a ZnS(Ag) scintillation detector equipped with photomultiplier. The arithmetic means +/- SD, median +/- SD, minimum and maximum of the rates (unit: Bq m(-2) s(-1)) were estimated to be 1.9 +/- 1.4, 1.6 +/- 0.3, 0.04 and 6.2, respectively. The soils distributed on the island are generally classified into dark red soils, residual regosols, as well as red and yellow soils. While it was assumed that the soils were originated from the bedrock, recent studies suggested that the main material of dark red soils is the East Asian eolian dust. In the dark red soils area, the exhalation rate is relatively higher than that in the other areas. This suggested that the eolian dust was an enhancer for the environmental thoron concentration on Okinawa Island.

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**Record 38 of 474**

**Author(s):** Sciocchetti, G (Sciocchetti, G.); Sciocchetti, A (Sciocchetti, A.); Giovannoli, P (Giovannoli, P.); DeFelice, P (DeFelice, P.); Cardellini, F (Cardellini, F.); Cotellessa, G (Cotellessa, G.); Pagliari, M (Pagliari, M.)

**Title:** A new passive radon-thoron discriminative measurement system

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 462-467 Sp. Iss. SI OCT 2010

**Abstract:** A new passive radon-thoron discriminative measurement system has been developed for monitoring radon and thoron individually. It consists of a 'couple' of passive integrating devices with a CR39 nuclear track detector (NTD). The experimental prototype is based on the application of a new concept of NTD instrument developed at ENEA, named Alpha-PREM, acronym of piston radon exposure meter, which allows controlling the detector exposure with a patented sampling technique (Int. Eu. Pat. and US Pat.). The 'twin diffusion chambers system' was based on two A-PREM devices consisting of the standard device, named NTD-Rn, and a modified version, named NTD-Rn/Tn, which was set up to improve thoron sampling efficiency of the diffusion chamber, without changing the geometry and the start/stop function of the NTD-Rn device. Coupling devices fitted on each device allowed getting a system, which works as a double-chamber structure when deployed at the monitoring position. In this paper both technical and physical aspects are considered.

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**Record 39 of 474**

**Author(s):** Calamosca, M (Calamosca, M.); Penzo, S (Penzo, S.)

**Title:** The ENEA-IRP thoron calibration facility

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 468-472 Sp. Iss. SI OCT 2010

**Abstract:** To check the consistency of a Rn-220 measurement, performed by passive alpha track detector (ATD), the use of an accurate Rn-220 exposure calibration facility is mandatory. The ENEA Radon Service developed a new CR-39 ATD-Tn, coupled to the radon ATD-Rn and, to assess its sensitivity, had to design a small calibration facility, which has been recently modified to improve the spatial homogeneity exposure conditions inside the chamber, to get a continuous monitoring of the Rn-220 concentration and to reduce radon contamination. A better knowledge of the circuit response allowed selecting the best-operating conditions and how to regulate the thoron concentration. The active thoron monitor has been changed to serve as a continuous sampling and measuring device rather than a grab one; particular care has been devoted to assess the Po-216 losses on the device's inner surfaces and to evaluate the chamber transit time correction factor.

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**Record 40 of 474**

**Author(s):** Shimo, M (Shimo, M.); Ishimori, Y (Ishimori, Y.); Hosoda, M (Hosoda, M.); Tokonami, S (Tokonami, S.)

**Title:** Thoron exhalation rates in areas of Japan

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 473-476 Sp. Iss. SI OCT 2010

**Abstract:** Thoron exhalation rates were measured with a newly made portable instrument at 33 areas in 7 prefectures of Japan. Thoron exhalation rates ranged from 49 to 4890 mBq m(-2) s(-1). Radon exhalation rates were also measured in many of the areas at the same time and ranged from 2.1 to 11 mBq m(-2) s(-1). Thoron exhalation rates showed a rough correlation with radon exhalation rates. Both exhalation rates also showed a rough correlation with geological features.

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**Record 41 of 474**

**Author(s):** Akiba, S (Akiba, S.); Tokonami, S (Tokonami, S.); Bochicchio, F (Bochicchio, F.); McLaughlin, J (McLaughlin, J.); Tommasino, L (Tommasino, L.); Harley, N (Harley, N.)

**Title:** Thoron: its metrology, health effects and implications for radon epidemiology: a summary of roundtable discussions

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (4): 477-481 Sp. Iss. SI OCT 2010

**Abstract:** A roundtable discussion was made at the end of the workshop. All the presentations were summarised in this discussion. It involved measurement techniques, quality assurance and dose assessment and health effects of thoron and its progeny. In particular, major epidemiological studies may be affected by thoron interference in radon measurements. Since their data are not sufficient when compared with that of radon, further efforts in thoron studies will be needed.

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**Record 42 of 474**

**Author(s):** Cornett, RJ (Cornett, R. Jack); Kramer, GH (Kramer, Gary H.)

**Title:** Health Canada's approach to manage risks to populations at risk during a radiological emergency

**Source:** RADIATION PROTECTION DOSIMETRY, 142 (1): 33-35 NOV 2010

**Abstract:** The approach that Health Canada uses to manage risks to individuals and to populations who might be exposed to ionising radiation is based upon the risk management paradigm. The paradigm differs little between an emergency and a non-emergency situations. In both events, technical experts assess the risk by determining the exposure to the source of radiation. They usually calculate the radiation dose and then assess the potential for any health effects. The initial technical assessments often use scoping calculations. The calculations for children recognise that they are smaller and have different metabolic rates and different behaviour from adults. However, most rigorous quantitative models for dosimetry do not differentiate between children and adults. The risk assessments that were conducted to evaluate the contamination of Canadians who were in London during the Litvenenko poisoning are a good example to illustrate this general approach. The scoping risk assessment concluded that the risks to children and adults were low. No Canadian children were exposed to polonium during this event and, to date, there have been no radiation emergencies in Canada where children have been exposed to a significant source of radiation. Therefore, the comparisons between theory and practice are very limited and conclusions are drawn from international experience and other incidents or sources of radiation exposure such as radon and medical exposures.

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**Record 43 of 474**

**Author(s):** Roy, JW (Roy, J. W.); Ryan, MC (Ryan, M. C.)

**Title:** In-Well Degassing Issues for Measurements of Dissolved Gases in Groundwater

**Source:** GROUND WATER, 48 (6): 869-877 NOV-DEC 2010

**Abstract:** Measurement of dissolved gases in groundwater is becoming increasingly common and important. Many of these measurements involve monitoring or sampling within wells or from water pumped from wells. We used total dissolved gas pressure (TDGP) sensors placed in the screened section of various wells (4 to 72 m deep) to assess the dissolved gas conditions for open wells compared to the conditions when sealed (i.e., isolated from the atmosphere) with a hydraulic packer (one well) or when pumped. When the packer was installed (non-pumping conditions), TDGP rose from <1.7 to >3.1 atm (<172 to >314 kPa), with declines noted when the packer was removed or deflated. While pumping, TDGP measured in many of the wells rose to substantially higher levels, up to 4.0 atm (408 kPa) in one case. Thus, when groundwater is gas charged, the background aquifer TDGP, and likewise the dissolved gas concentrations, may be substantially higher than initially measured in open wells, indicating significant in-well degassing. This raises concerns about past and current methods of measuring the dissolved gases in groundwater. Additional procedures that may be required to obtain representative measurements from wells include (1) installing in-well hydraulic packers to seal the well, or (2) pumping to bring in fresh groundwater. However, observed transient decreased TDGPs during pumping, believed to result from gas bubble formation induced by drawdown in the well below a critical pressure (relative to TDGP), may disrupt the measurements made during or after pumping. Thus, monitoring TDGP while pumping gas-charged wells is recommended.

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**Record 44 of 474**

**Author(s):** Sathish, LA (Sathish, L. A.); Nagaraja, K (Nagaraja, K.); Ramanna, HC (Ramanna, H. C.); Nagesh, V (Nagesh, V.); Sundareshan, S (Sundareshan, S.)

**Title:** Concentration of radon, thoron and their progeny levels in different types of floorings, walls, rooms and building materials

**Source:** IRANIAN JOURNAL OF RADIATION RESEARCH, 7 (1): 1-9 SUM 2009

**Abstract:** Background: Radon, thoron and their progenies are the most important contributions to human exposure from natural sources. Radon exists in soil gas, building materials, Indoor atmosphere etc. Among all the natural sources of radiation dose to human beings, inhalation of radon contributes a lot. The work

presented here emphasizes the long term measurements of radon, thoron and their progeny concentrations in about 100 dwellings using solid state nuclear track detectors. Materials and Methods: Measurements were made using dosimeters and the concentrations were estimated by knowing the track density of films through spark counter, and sensitivity factor for bare, filter and membrane films. Results: Presence of radon and thoron in houses is the effect of several aspects such as the activity concentrations of uranium, radium and thorium in the local soil, building materials, ventilation of houses and also entry of radon into houses through the cracks in floor/wall. Conclusion: The observations reveal that the concentrations of radon and/or thoron are relatively higher in granite than in concrete, cement and bricks. In continuation to this the concentration observed in bathrooms is more compared to kitchen, bedroom and living rooms. This study discloses that the residential rooms of good ventilation will avoid the health hazards due to radon and its rich materials. Iran. J. Radiat. Res., 2009; 7 (1): 1-9

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**Record 45 of 474**

**Author(s):** Kant, K (Kant, K.); Rashmi (Rashmi); Sonkawade, RG (Sonkawade, R. G.); Sharma, GS (Sharma, G. S.); Chauhan, RP (Chauhan, R. P.); Chakarvarti, SK (Chakarvarti, S. K.)

**Title:** Seasonal variation of radon, thoron and their progeny levels in dwellings of Haryana and Western Uttar Pradesh

**Source:** IRANIAN JOURNAL OF RADIATION RESEARCH, 7 (2): 79-84 FAL 2009

**Abstract:** Background: Radon and thoron are invisible, odorless, heavy and radioactive gases which are ubiquitously present in dwellings and in the environment. In the present work, seasonal variation of indoor radon, thoron and their progeny concentrations has been studied in the dwellings of industrially polluted cities in District Faridabad, Haryana and District Mathura in Uttar Pradesh. Materials and Methods: LR -115, Type-II (Kodak Pathe, France), peelable, plastic track detectors commonly known as solid state nuclear track detectors (SSNTDs) were used to measure the radon thoron concentration over long integrated times. The measurements were carried out in the mixed field of radon and thoron and the detectors were exposed for about 90 days. Results: The average value of radon and thoron concentration in the dwellings varied from 23.5 Bq/m(3) to 65.2 Bq/m(3) and 9.8 Bq/m(3) to 18.7 Bq/m(3) respectively in different seasons. The average annual exposure and annual effective dose in living rooms due to radon and thoron progeny was estimated to be 0.195 WLM (working level month) and 0.74 mSv respectively. The average life time fatality risk of lung cancer from the chronic radon and thoron progeny exposure was estimated to be 5.8 10(-3) (0.58%). Conclusion: The seasonal variations of measured radon levels in the environment of LPG bottling plant, radon-thoron levels and inhalation dose due to radon and thoron and their progeny in dwellings indicate that the levels were higher in winter (October to January) than in summer (April to July). Iran. J. Radiat. Res., 2009; 7 (2): 79-84

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**Record 47 of 474**

**Author(s):** Dertinger, H (Dertinger, Hermann); Andrassy, K (Andrassy, Konrad)

**Title:** Radon in Drinking Water

**Source:** DEUTSCHES ARZTEBLATT INTERNATIONAL, 107 (41): 730-731 OCT 15 2010

**ISSN:** 1866-0452

**DOI:** 10.3238/arztebl.2010.0730b

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**Record 48 of 474**

**Author(s):** Eising, E (Eising, Ernst)

**Title:** Risk Associated With Radon Is Overestimated

**Source:** DEUTSCHES ARZTEBLATT INTERNATIONAL, 107 (41): 731-731 OCT 15 2010

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**Record 49 of 474**

**Author(s):** Ota, M (Ota, Masakazu); Yamazawa, H (Yamazawa, Hiromi)

**Title:** Forest floor CO2 flux estimated from soil CO2 and radon concentrations

**Source:** ATMOSPHERIC ENVIRONMENT, 44 (36): 4529-4535 NOV 2010

**Abstract:** Having a quantitative understanding of the carbon cycle in forests is of great importance for predicting global warming issues. Carbon dioxide production in soil is the largest CO2 source in forests, and exhibits large temporal and spatial variations. Continuous observation of soil CO2 flux at many sites over a forest is therefore necessary to obtain representative soil CO2 fluxes for the forest. In this study, a gradient method to measure soil CO2 flux indirectly from soil radon and CO2 measurements was theoretically modified to conveniently measure the soil CO2 flux from soil radon and CO2 concentrations measured at one soil depth. To experimentally test the modified method, a field observation was conducted continuously in a forest over a 31-day period.
Since changes in the soil water content near the soil surface were small throughout the observation, a constant effective diffusivity for CO2 was assumed for the soil CO2 flux estimation. The soil CO2 flux was then calculated as the product of the effective diffusivity and the gradient of the soil CO2 concentration, each calculated from soil radon and CO2 concentrations. The estimated flux ranged from 1.9 to 5.8 mu mol m(-2) s(-1), and, correlating well with the reference value, measured with a conventional ventilated-chamber method.. We therefore conclude that the modified gradient method based on the measurement of soil CO2 and radon concentration at one depth is reliable, at least under conditions where the change in the soil water content is small. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 50 of 474**

**Author(s):** Kada, W (Kada, Wataru); Dwaikat, N (Dwaikat, Nidal); Datemichi, J (Datemichi, Jun); Sato, F (Sato, Fuminobu); Murata, I (Murata, Isao); Kato, Y (Kato, Yushi); Iida, T (Iida, Toshiyuki)

**Title:** A twin-type airflow pulse ionization chamber for continuous alpha-radioactivity monitoring in atmosphere

**Source:** RADIATION MEASUREMENTS, 45 (9): 1044-1048 OCT 2010

**Abstract:** A simple and inexpensive twin-type airflow pulse ionization chamber was developed for the continuous monitoring of alpha-radioactivity in atmosphere under high humidity condition. The symmetrical structure of the twin-type ionization chamber was effective in the improvement of the ratio of signal to noise in the measurement of pulses induced by alpha-rays. Outdoor alpha-ray measurement was well performed with this ionization chamber by applying sufficiently high bias voltage to the electrodes, except for at very high humidity conditions. It was confirmed that the declination of the counting efficiency due to wetting was easily recovered by the dry-up of the inside of the chamber. Alpha-radioactivity from radon and other alpha-emitting radionuclide in atmosphere was satisfactorily monitored by the detector. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 51 of 474**

**Author(s):** Kuo, T (Kuo, T.); Su, C (Su, C.); Chang, C (Chang, C.); Lin, C (Lin, C.); Cheng, W (Cheng, W.); Liang, H (Liang, H.); Lewis, C (Lewis, C.); Chiang, C (Chiang, C.)

**Title:** Application of recurrent radon precursors for forecasting large earthquakes (M-w > 6.0) near Antung, Taiwan

**Source:** RADIATION MEASUREMENTS, 45 (9): 1049-1054 OCT 2010

**Abstract:** Radon anomalies in groundwater were recorded prior to three major earthquakes - (1) 2003 M-w = 6.8 Chengkung, (2) 2006 M-w = 6.1 Taitung, and (3) 2008 M-w = 5.4 Antung. The epicenters were located 24 km, 52 km, and 13 km, respectively, from the Antung radon-monitoring station. Prior to the three major earthquakes, radon decreased from background levels of 29.3 +/- 1.7, 28.2 +/- 2.1, and 27.2 +/- 1.8 Bq dm(-3) to minima of 12.1 +/- 0.3, 13.7 +/- 0.3, and 17.8 +/- 1.6 Bq dm(-3), respectively. Based on the radon precursory data, this paper correlates the observed radon minima with earthquake magnitude and precursory time. The correlations provide a possible means for forecasting local disastrous earthquakes in the southern segment of coastal range and longitudinal valley of eastern Taiwan. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 52 of 474**

**Author(s):** Manousakas, M (Manousakas, M.); Fouskas, A (Fouskas, A.); Papaefthymiou, H (Papaefthymiou, H.); Koukouliou, V (Koukouliou, V.); Siavalas, G (Siavalas, G.); Kritidis, P (Kritidis, P.)

**Title:** Indoor radon measurements in a Greek city located in the vicinity of lignite-fired power plants

**Source:** RADIATION MEASUREMENTS, 45 (9): 1060-1067 OCT 2010

**Abstract:** This work presents indoor radon measurements in 42 dwellings in the city of Megalopolis, Southern Greece, located in the vicinity of 2 lignite-fired power plants and examines the effect of season, floor level and age of the dwellings on indoor radon concentration. The radon measurements have been carried out using the LR-115, type II and CR-39 alpha track detectors in "closed-can" geometry. The average annual indoor radon concentration (GM) was found to be 52 Bq m(-3), which is well below the recommended action level of the European Union. This value corresponds to an annual effective dose to the population of 1.3 +/- 0.4 mSv. Season and age of the examined dwellings represent factors that affected significantly the indoor radon in Megalopolis, while the effect of floor level appeared to be not significant. Radium activity concentration values, measured by gamma-ray spectrometry in 20 sub-samples of six soil cores (60-135 cm depth), collected from the surrounding area of the city, were found to be consistent with the Greek and world average values. Based on the results of this study, it is concluded that the effect of the lignite-fired power plants on indoor radon concentration in Megalopolis' dwellings was not significant. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 53 of 474**

**Author(s):** Kavasi, N (Kavasi, Norbert); Somlai, J (Somlai, Janos); Szeiler, G (Szeiler, Gabor); Szabo, B (Szabo, Balazs); Schafer, I (Schafer, Istvan); Kovacs, T (Kovacs, Tibor)

**Title:** Estimation of effective doses to cavers based on radon measurements carried out in seven caves of the Bakony Mountains in Hungary

**Source:** RADIATION MEASUREMENTS, 45 (9): 1068-1071 OCT 2010

**Abstract:** Nowadays, as the practice of extreme sports is spreading, potholing is becoming more and more popular. As a result, both the number of cavers and the time spent in the caves have been on the rise. There are some cavers known to have spent some 5000 h in caves over a span of 10 years. In poorly ventilated caves, radon exhalated from cave rocks and deposits may accumulate and cause significant doses to cavers. In this study, the radon concentration in seven caves in the Bakony Mountains, Hungary, was measured by continuous and integrated measurement devices. Measured values for the different caves were rather different, and varied between 50 and 24,000 Bq m(-3). The average radon concentration over the measurement period was approximately 10,000 Bq m(-3) in five of the seven caves inspected.
By assuming an average of 470 h year(-1) spent in caves, effective doses to cavers were estimated. The expected annual effective dose, in case of an equilibrium factor of 0.6, was 19.7 mSv. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 56 of 474**

**Author(s):** Mauerer, A (Mauerer, Andreas); Betz, RC (Betz, Regina C.); Pasternack, SM (Pasternack, Sandra M.); Landthaler, M (Landthaler, Michael); Hafner, C (Hafner, Christian)

**Title:** Generalized Solar Lentigines in a Patient with a History of Radon Exposure

**Source:** DERMATOLOGY, 221 (3): 206-210 2010

**Abstract:** A woman with generalized lentigines without associated non-cutaneous abnormalities is described. The patient showed brownish-pigmented flat or slightly elevated spots with a diameter of 1-5 mm. The histopathology of the lesions was compatible with a diagnosis of solar lentigines (SLs) or flat seborrhoeic keratosis. Unlike SLs, which develop typically on sun-damaged skin of the face, the dorsum of the hands and forearms, this patient showed the lentigines most prominently on the thighs and lower legs. Besides increased recreational UV exposure, the patient had a history of occupational radon exposure in a spa with radon-containing water. Genetic analysis identified a p. S249C FGFR3 hotspot mutation in 1 lesion, supporting the diagnosis of SLs. It remains elusive whether the occupational exposure to radon-containing water in addition to the recreational UV light exposure caused the unusual distribution of the SLs in this patient. Copyright (C) 2010 S. Karger AG, Basel

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**Record 57 of 474**

**Author(s):** Brauner, EV (Brauner, Elvira Vaclavik); Andersen, CE (Andersen, Claus E.); Andersen, HP (Andersen, Helle P.); Gravesen, P (Gravesen, Peter); Lind, M (Lind, Morten); Ulbak, K (Ulbak, Kaare); Hertel, O (Hertel, Ole); Schuz, J (Schuz, Joachim); Raaschou-Nielsen, O (Raaschou-Nielsen, Ole)

**Title:** Is there any interaction between domestic radon exposure and air pollution from traffic in relation to childhood leukemia risk?

**Source:** CANCER CAUSES & CONTROL, 21 (11): 1961-1964 NOV 2010

**Abstract:** In a recent population-based case-control study using 2,400 cases of childhood cancer, we found a statistically significant association between residential radon and acute lymphoblastic leukemia risk. Traffic exhaust in the air enhances the risk association between radon and childhood leukemia.
We included 985 cases of childhood leukemia and 1,969 control children. We used validated models to calculate residential radon and street NOx concentrations for each home. Conditional logistic regression analyses were used to analyze the effect of radon on childhood leukemia risk within different strata of air pollution and traffic density.
The relative risk for childhood leukemia in association with a 10(3) Bq/m(3)-years increase in radon was 1.77 (1.11, 2.82) among those exposed to high levels of NOx and 1.23 (0.79, 1.91) for those exposed to low levels of NOx (p (interaction,) 0.17). Analyses for different morphological subtypes of leukemia and within different strata of traffic density showed a non-significant pattern of stronger associations between radon and childhood leukemia within strata of higher traffic density at the street address.
Air pollution from traffic may enhance the effect of radon on the risk of childhood leukemia. The observed tendency may also be attributed to chance.

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**DOI:** 10.1007/s10552-010-9608-4

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**Record 58 of 474**

**Author(s):** Law, RM (Law, Rachel M.); Steele, LP (Steele, L. Paul); Krummel, PB (Krummel, Paul B.); Zahorowski, W (Zahorowski, Wlodek)

**Title:** Synoptic variations in atmospheric CO2 at Cape Grim: a model intercomparison

**Source:** TELLUS SERIES B-CHEMICAL AND PHYSICAL METEOROLOGY, 62 (5): 810-820 Sp. Iss. SI NOV 2010

**Abstract:** A 'TransCom' model intercomparison is used to assess how well synoptic and diurnal variations of carbon dioxide (CO2) and 222Rn (radon) can be modelled at the coastal site, Cape Grim, Australia. Each model was run with prescribed fluxes and forced with analysed meteorology for 2000-2003. Twelve models were chosen for analysis based on each model's ability to differentiate baseline CO2 concentrations from non-baseline CO2 (influenced by regional land fluxes). Analysis focused on non-baseline events during 2002-2003. Radon was better simulated than CO2, indicating that a spatially uniform radon land flux is a reasonable assumption and that regional-scale transport was adequately captured by the models. For both radon and CO2, the ensemble model mean generally performed better than any individual model. Two case studies highlight common problems with the simulations. First, in summer and autumn the Cape Grim observations are sometimes influenced by Tasmanian rather than mainland Australian fluxes. These periods are poorly simulated. Secondly, an event with an urban plume demonstrates how the relatively low spatial resolution of the input CO2 fluxes limits the quality of the simulations. Analysis of periods with below baseline concentration indicates the possible influence of carbon uptake by winter crops in southern mainland Australia.

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**DOI:** 10.1111/j.1600-0889.2010.00470.x

**Record 62 of 474**

**Author(s):** Hair, JM (Hair, Jessica M.); Terzoudi, GI (Terzoudi, Georgia I.); Hatzi, VI (Hatzi, Vasiliki I.); Lehockey, KA (Lehockey, Katie A.); Srivastava, D (Srivastava, Devika); Wang, WX (Wang, Weixin); Pantelias, GE (Pantelias, Gabriel E.); Georgakilas, AG (Georgakilas, Alexandros G.)

**Title:** BRCA1 role in the mitigation of radiotoxicity and chromosomal instability through repair of clustered DNA lesions

**Source:** CHEMICO-BIOLOGICAL INTERACTIONS, 188 (2): 350-358 Sp. Iss. SI NOV 5 2010

**Abstract:** Oxidatively-induced clustered DNA lesions are considered the signature of any ionizing radiation like the ones human beings are exposed daily from various environmental sources (medical X-rays, radon, etc.). To evaluate the role of BRCA1 deficiencies in the mitigation of radiation-induced toxicity and chromosomal instability we have used two human breast cancer cell lines, the BRCA1 deficient HCC1937 cells and as a control the BRCA1 wild-type MCF-7 cells. As an additional control for the DNA damage repair measurements, the HCC1937 cells with partially reconstituted BRCA1 expression were used. Since clustered DNA damage is considered the signature of ionizing radiation, we have measured the repair of double strand breaks (DSBs), non-DSB bistranded oxidative clustered DNA lesions (OCDLs) as well as single strand breaks (SSBs) in cells exposed to radiotherapy-relevant gamma-ray doses. Parallel measurements were performed in the accumulation of chromatid and isochromatid breaks. For the measurement of OCDL repair, we have used a novel adaptation of the denaturing single cell gel electrophoresis (Comet assay) and pulsed field gel electrophoresis with Escherichia coil repair enzymes as DNA damage probes. Independent monitoring of the gamma-H2AX foci was also performed while metaphase chromatid lesions were measured as an indicator of chromosomal instability. HCC1937 cells showed a significant accumulation of all types of DNA damage and chromatid breaks compared to MCF-7 while BRCA1 partial expression contributed significantly in the overall repair of OCDLs. These results further support the biological significance of repair resistant clustered DNA damage leading to chromosomal instability. The current results combined with previous findings on the minimized ability of base clusters to induce cell death (mainly induced by DSBs), enhance the potential association of OCDLs with breast cancer development especially in the case of a BRCA1 deficiency leading to the survival of breast cells carrying a high load of unrepaired DNA damage clusters. (C) 2010 Elsevier Ireland Ltd. All rights reserved.

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**Record 63 of 474**

**Author(s):** Aronowitz, JN (Aronowitz, Jesse N.)

**Title:** Don Lawrence and the "k-capture" revolution

**Source:** BRACHYTHERAPY, 9 (4): 373-381 OCT-DEC 2010

**Abstract:** PURPOSE: The practice of brachytherapy was in steep decline in the mid-20th century, largely because of safety issues. This article explores the innovations that revitalized brachytherapy with special attention to the introduction of low-enemy seeds for permanent implantation.
METHODS AND MATERIALS: Literature review; interviews; and the memos, records, and correspondence of Donald C. Lawrence.
RESULTS: Paul Harper first proposed the use of radionuclides that decay by k-capture in the 1950s. But it was the vision and tenacity of health physicist Donald Lawrence that led to the successful implementation of I-125 (in the 1960s) and Cs-131 (40 years later). (C) 2010 American Brachytherapy Society. Published by Elsevier Inc. All rights reserved.

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**Record 64 of 474**

**Author(s):** Boulon, J (Boulon, J.); Sellegri, K (Sellegri, K.); Venzac, H (Venzac, H.); Picard, D (Picard, D.); Weingartner, E (Weingartner, E.); Wehrle, G (Wehrle, G.); Coen, MC (Coen, M. Collaud); Butikofer, R (Buetikofer, R.); Fluckiger, E (Flueckiger, E.); Baltensperger, U (Baltensperger, U.); Laj, P (Laj, P.)

**Title:** New particle formation and ultrafine charged aerosol climatology at a high altitude site in the Alps (Jungfraujoch, 3580 m a.s.l., Switzerland)

**Source:** ATMOSPHERIC CHEMISTRY AND PHYSICS, 10 (19): 9333-9349 2010

**Abstract:** We investigate the formation and growth of charged aerosols clusters at Jungfraujoch, in the Swiss Alps (3580 m a.s.l.), the highest altitude site of the European EU-CAARI project intensive campaign. Charged particles and clusters (0.5 - 1.8 nm) were measured from April 2008 to April 2009 and allowed the detection of nucleation events in this very specific environment (presence of free tropospheric air and clouds). We found that the naturally charged aerosol concentrations, which are dominated by the cluster size class, shows a strong diurnal pattern likely linked to valley breezes transporting surface layer ion precursors, presumably radon. Cosmic rays were found not to be the major ion source at the measurement site. However, at night, when air masses are more representative of free tropospheric conditions, we found that the cluster concentrations are still high. The charged aerosol size distribution and concentration are strongly influenced by the presence of clouds at the station. Clouds should be taken into account when deriving high altitude nucleation statistics. New particle formation occurs on average 17.5% of the measurement period and shows

a weak seasonality with a minimum of frequency during winter, but this seasonality is enhanced when the data set is screened for periods when the atmospheric station is out of clouds. The role of ions in the nucleation process was investigated and we found that the ion-mediated nucleation explains 22.3% of the particle formation. The NPF events frequency is correlated with UV radiation but not with calculated H2SO4 concentrations, suggesting that other compounds such as organic vapors are involved in the nucleation and subsequently growth process. In fact, NPF events frequency also surprisingly increases with the condensational sink (CS), suggesting that at Jungfraujoch, the presence of condensing vapours probably coupled with high CS are driving the occurrence of NPF events. A strong link to the air mass path was also pointed out and events were observed to be frequently occurring in Eastern European air masses, which present the highest condensational sink. In these air masses, pre-existing cluster concentrations are more than three time larger than in other air masses during event days, and no new clusters formation is observed, contrarily to what is happening in other air mass types.

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**Record 65 of 474**

**Author(s):** Seideman, JH (Seideman, Jonathan H.); Shum, D (Shum, David); Djaballah, H (Djaballah, Hakim); Scheinberg, DA (Scheinberg, David A.)

**Title:** A High-Throughput Screen for Alpha Particle Radiation Protectants

**Source:** ASSAY AND DRUG DEVELOPMENT TECHNOLOGIES, 8 (5): 602-614 OCT 2010

**Abstract:** Alpha-particle-emitting elements are of increasing importance as environmental and occupational carcinogens, toxic components of radiation dispersal devices and accidents, and potent therapeutics in oncology. Alpha particle radiation differs from radiations of lower linear energy transfer in that it predominantly damages DNA via direct action. Because of this, radical scavengers effective for other radiations have had only limited effect in mitigating alpha particle toxicity. We describe here a simple assay and a pilot screen of 3,119 compounds in a high-throughput screen (HTS), using the alpha-particle-emitting isotope, Ac-225, for the discovery of compounds that might protect mammalian cells from alpha particles through novel mechanisms. The assay, which monitored the viability of a myeloid leukemic cell line upon alpha particle exposure, was robust and reproducible, yielding a Z' factor of 0.66 and a signal-to-noise ratio of nearly 10 to 1. Surprisingly, 1 compound emerged from this screen, epoxy-4,5-alpha-dihydroxysantonin (EDHS), that showed considerable protective activity. While the value of EDHS remains to be determined, its discovery is a proof of concept and validation of the utility of this HTS methodology. Further application of the described assay could yield compounds useful in minimizing the toxicity and carcinogenesis associated with alpha particle exposure.

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**Record 66 of 474**

**Author(s):** Sakoda, A (Sakoda, Akihiro); Nishiyama, Y (Nishiyama, Yuichi); Hanamoto, K (Hanamoto, Katsumi); Ishimori, Y (Ishimori, Yuu); Yamamoto, Y (Yamamoto, Yuki); Kataoka, T (Kataoka, Takahiro); Kawabe, A (Kawabe, Atsushi); Yamaoka, K (Yamaoka, Kiyonori)

**Title:** Differences of natural radioactivity and radon emanation fraction between constituent minerals of rock or soil (vol 68, pg 1180, 2010)

**Source:** APPLIED RADIATION AND ISOTOPES, 68 (12): 2452-2452 DEC 2010

**ISSN:** 0969-8043

**DOI:** 10.1016/j.apradiso.2010.04.025

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**Record 67 of 474**

**Author(s):** Stewart, PA (Stewart, Patricia A.); Coble, JB (Coble, Joseph B.); Vermeulen, R (Vermeulen, Roel); Schleiff, P (Schleiff, Patricia); Blair, A (Blair, Aaron); Lubin, J (Lubin, Jay); Attfield, M (Attfield, Michael); Silverman, DT (Silverman, Debra T.)

**Title:** The Diesel Exhaust in Miners Study: I. Overview of the Exposure Assessment Process

**Source:** ANNALS OF OCCUPATIONAL HYGIENE, 54 (7): 728-746 OCT 2010

**Abstract:** This report provides an overview of the exposure assessment process for an epidemiologic study that investigated mortality, with a special focus on lung cancer, associated with diesel exhaust (DE) exposure among miners. Details of several components are provided in four other reports. A major challenge for this

study was the development of quantitative estimates of historical exposures to DE. There is no single standard method for assessing the totality of DE, so respirable elemental carbon (REC), a component of DE, was selected as the primary surrogate in this study. Air monitoring surveys at seven of the eight study mining facilities were conducted between 1998 and 2001 and provided reference personal REC exposure levels and measurements for other agents and DE components in the mining environment. (The eighth facility had closed permanently prior to the surveys.) Exposure estimates were developed for mining facility/department/job/year combinations. A hierarchical grouping strategy was developed for assigning exposure levels to underground jobs [based on job titles, on the amount of time spent in various areas of the underground mine, and on similar carbon monoxide (CO, another DE component) concentrations] and to surface jobs (based on the use of, or proximity to, diesel-powered equipment). Time trends in air concentrations for underground jobs were estimated from mining facility-specific prediction models using diesel equipment horsepower, total air flow rates exhausted from the underground mines, and, because there were no historical REC measurements, historical measurements of CO. Exposures to potentially confounding agents, i.e. respirable dust, silica, radon, asbestos, and non-diesel sources of polycyclic aromatic hydrocarbons, also were assessed. Accuracy and reliability of the estimated REC exposures levels were evaluated by comparison with several smaller datasets and by development of alternative time trend models. During 1998-2001, the average measured REC exposure level by facility ranged from 40 to 384 mu g m(-3) for the underground workers and from 2 to 6 mu g m(-3) for the surface workers. For one prevalent underground job, 'miner operator', the maximum annual REC exposure estimate by facility ranged up to 685% greater than the corresponding 1998-2001 value. A comparison of the historical CO estimates from the time trend models with 1976-1977 CO measurements not used in the modeling found an overall median relative difference of 29%. Other comparisons showed similar levels of agreement. The assessment process indicated large differences in REC exposure levels over time and across the underground operations. Method evaluations indicated that the final estimates were consistent with those from alternative time trend models and demonstrated moderate to high agreement with external data.

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**Record 68 of 474**

**Author(s):** Cevik, U (Cevik, U.); Damla, N (Damla, N.); Kobya, AI (Kobya, A. I.); Celik, A (Celik, A.); Kara, A (Kara, A.)

**Title:** Radiation dose estimation and mass attenuation coefficients of marble used in Turkey

**Source:** ANNALS OF NUCLEAR ENERGY, 37 (12): 1705-1711 DEC 2010

**Abstract:** In this study the natural radioactivity in marble samples used in Turkey was measured by means of gamma spectrometry. The results showed that the specific activities of Ra-226, Th-232 and K-40 ranged from 10 to 92 Bq kg(-1), from 4 to 122 Bq kg(-1) and from 28 to 676 Bq kg(-1), respectively. The radiological hazards in marble samples due to the natural radioactivity were inferred from calculations of radium equivalent activities (Ra-eq), indoor absorbed dose rate in air values, the annual effective dose and gamma and alpha indexes. These radiological parameters were evaluated and compared with the internationally recommended values. The measurements showed that marble samples used in Turkey have low level of natural radioactivity; therefore, the use of these types of marble in dwellings is safe for inhabitants. Mass attenuation coefficients (mu/rho) were obtained both experimentally and theoretically for different marble samples produced in Turkey by using gamma-ray transmission method. Experimental values showed a good agreement with the theoretical values. 

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**Record 69 of 474**

**Author(s):** Ali, N (Ali, N.); Khan, EU (Khan, E. U.); Akhter, P (Akhter, P.); Khan, E (Khan, E.); Waheed, A (Waheed, A.)

**Title:** ESTIMATION OF MEAN ANNUAL EFFECTIVE DOSE THROUGH RADON CONCENTRATION IN THE WATER AND INDOOR AIR OF ISLAMABAD AND MURREE

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (2): 183-191 2010

**Abstract:** Different samples of water, indoor air and soil gas have been collected from Islamabad (33 degrees 38'N, 73 degrees 09'E, altitude of 1760 ft.), the capital of Pakistan and Murree (33 degrees 53'N, 73 degrees 23'E, altitude of 7323 ft.), lying on a geological fault line and are analysed for the estimation of mean effective dose through radon concentrations by using RAD-7, a solid state alpha-detector. The variation of radon concentration in water, indoor air and soil gas in Islamabad region ranges from 25.90-158.40 kBq m(-3),

43.26-97.04 Bq m(-3) and 17.34-72.52 kBq m(-3), having mean values 88.63 kBq m(-3), 70.67 Bq m(-3) and 45.08 kBq respectively. It ranges from 1.64-10.20 kBq m(-3), 18.48-42.08 Bq m(-3) and 0.61-3.89 kBq m(-3) with mean values 4.38 kBq m(-3), 28.63 Bq m(-3) and 1.70 kBq m(-3) respectively in Murree and its surroundings. The total mean annual effective doses from water and indoor air of Islamabad and Murree regions are 2.023 and 0.733 mSv a(-1), respectively. These doses are within the recommended limits of the world organisations.

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**Record 70 of 474**

**Author(s):** Campos, MP (Campos, M. P.); Pecequilo, BRS (Pecequilo, B. R. S.); Mazzilli, BP (Mazzilli, B. P.)

**Title:** Rn-222 AND Pb-212 EXPOSURES AT A BRAZILIAN SPA

**Source:** RADIATION PROTECTION DOSIMETRY, 141 (2): 210-214 2010

**Abstract:** Termas de Araxa spa is located in Araxa, State of Minas Gerais. In this region, several minerals rich in uranium and thorium are found. The mineral waters and mud from Termas de Araxa spa have been used for therapeutic and recreation purposes. In this study, the committed effective dose was evaluated for workers and patients at Araxa spa due to (RN)-R-222 and Pb-212 inhalation. Radon measurements were carried out through the passive method with solid state nuclear track detectors (Makrofol E) over a period of 21 months, with results varying from 258 +/- 20 to 1634 +/- 111 Bq m(-3). The Pb-212 air concentration was assessed through the modified Kusnetz's method, the results varying from 0.3 +/- 0.1 to 2.1 +/- 0.2 Bq m(-3). Doses received by the spa workers are below 20 mSv.y(-1), suggested by ICRP 60 as an annual effective dose limit for occupational exposure. The radiation doses for the patients are below the mean annual effective dose due to natural sources estimated to be 2.4 mSv.y(-1).

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**Record 71 of 474**

**Author(s):** Dwaikat, N (Dwaikat, Nidal); El-hasan, M (El-hasan, Mousa); Sueyasu, M (Sueyasu, Masto); Kada, W (Kada, Wataru); Sato, F (Sato, Fuminobu); Kato, Y (Kato, Yushi); Saffarini, G (Saffarini, G.); Iida, T (Iida, Toshiyuki)

**Title:** A fast method for the determination of the efficiency coefficient of bare CR-39 detector

**Source:** NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION B-BEAM INTERACTIONS WITH MATERIALS AND ATOMS, 268 (20): 3351-3355 OCT 15 2010

**Abstract:** A fast and simple method for the determination of the efficiency coefficient (eta) of bare CR-39 detector is presented and discussed. The efficiency coefficient of bare CR-39 detector is then calculated by different ways and the obtained values are found to be comparable to each other. The average value of eta of bare CR-39 is found to be 0.20 +/- 0.01 tracks cm(-2) day(-1) per Bq m(-3). 

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**Record 72 of 474**

**Author(s):** Tsai, TL (Tsai, Tsuey-Lin); Lin, CC (Lin, Chun-Chih); Wang, TY (Wang, Tsung-Yuan); Wei, HJ (Wei, Hwa-Jou); Men, LC (Men, Lee-Chung)

**Title:** Application of ICP-QMS for the determination of ultratrace-levels of Ra-226 in geothermal water and sediment samples

**Source:** JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY, 286 (1): 145-154 OCT 2010

**Abstract:** A rapid, accurate and less labor intensive approach to determining Ra-226 in environmental samples was examined; this utilized quadrupole-based inductively coupled plasma mass spectrometry (ICP-QMS). The procedure used chemical separation by ion exchange chromatography to remove most of the matrices after coprecipitation with BaSO4. The average chemical recovery of the NIST SRM preparation method ranged from 60.5 to 85.9% using Ba-133 as internal tracer by gamma counting. This technique was capable of completing a Ra-226 measurement within 3 min. It did not require an in-growth period to allow radon and its progeny to achieve secular equilibrium with the parent Ra-226 as is needed for liquid scintillation analyzer (LSA). The method detection limits for the determination of Ra-226 in geothermal water and sediment samples were 0.02 mBq L-1 (0.558 fg L-1) and 0.10 Bq kg(-1) (2.79 fg g(-1)), respectively. The

results obtained with various natural samples and the suitability of the method when applied to various environmental matrices such as geothermal water and sediment are discussed. When ICP-QMS was compared to double-focusing magnetic sector field inductively coupled plasma mass spectrometry (ICP-SFMS), good agreement was obtained with a correlation coefficient, r (2) = 0.982.

**ISSN:** 0236-5731

**DOI:** 10.1007/s10967-010-0625-2

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**Record 73 of 474**

**Author(s):** Calin, MR (Calin, Marian Romeo); Calin, MA (Calin, Mihaela Antonina)

**Title:** Evaluation of the radon concentration in Ocna Dej salt mine, Romania

**Source:** JOURNAL OF RADIOANALYTICAL AND NUCLEAR CHEMISTRY, 286 (1): 169-173 OCT 2010

**Abstract:** Measurement of radon is of interest both for the health risk assessment and development of radon therapy in enclosed spaces like as caves, mines and spas. In Romania, radon therapy is not in use, yet. The development of this treatment method in mines from our country involves primarily, the evaluation of radon levels in the salt mines. In this paper, the results of radon gas measurement that were performed at Ocna Dej salt mine (Romania) are presented. The radon measurements were performed using two systems: radon monitor Pylon AB-5 system and CIS-P5M system. The average radon concentration was found to be between 9.14 +/- A 5.10 Bq/m(3) and 31.70 +/- A 2.76 Bq/m(3). These radon levels are lower in comparison to those reported for mines, caves or spas in other countries where radon therapy and speleotherapy is frequently in use. Radon concentration and environmental conditions from Ocna Dej salt mine are suitable for therapeutic applications.

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**Record 75 of 474**

**Author(s):** Moeller, DW (Moeller, Dade W.); Sun, LSC (Sun, Lin-Shen C.)

**Title:** CHEMICAL AND RADIOACTIVE CARCINOGENS IN CIGARETTES: ASSOCIATED HEALTH IMPACTS AND RESPONSES OF THE TOBACCO INDUSTRY, U.S. CONGRESS, AND FEDERAL REGULATORY AGENCIES

**Source:** HEALTH PHYSICS, 99 (5): 674-679 NOV 2010

**Abstract:** Po-210 and Pb-210 were discovered in tobacco in 1964. This was followed by detailed assessments of the nature of their deposition, and accompanying dose rates to the lungs of cigarette smokers. Subsequent studies revealed: (1) the sources and pathways through which they gain access to tobacco; (2) the mechanisms through which they preferentially deposit in key segments of the bronchial epithelium; and (3) the fact that the accompanying alpha radiation plays a synergistic role in combination with the chemical carcinogens, to increase the fatal cancer risk coefficient in cigarette smokers by a factor of 8 to 25. Nonetheless, it was not until 2009 that Congress mandated that the Food and Drug Administration require that the cigarette industry reveal the presence of these carcinogens. In the meantime, cigarette smoking has become not only the number one source of cancer deaths in the United States, but also a major contributor to heart disease and other health impacts. If the latter effects are included, smoking is estimated to have caused an average of 443,000 deaths and 5.1 million years of potential life lost among the U.S. population each year from 2000 through 2004. The estimated associated collective dose is more than 36 times that to the workers at all the U.S. nuclear power plants, U.S. Department of Energy nuclear weapons facilities, and crews of all the vessels in the U.S. Nuclear Navy. This unnecessary source of lung cancer deaths demands the utmost attention of the radiation protection and public health professions. Health Phys. 99(5):674-679; 2010

**ISSN:** 0017-9078

**DOI:** 10.1097/HP.0b013e3181df5439

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**Record 77 of 474**

**Author(s):** Damla, N (Damla, Nevzat); Cevik, U (Cevik, Ugur); Kobya, AI (Kobya, Ali Ihsan); Celik, A (Celik, Ahmet); Celik, N (Celik, Necati)

**Title:** Assessment of natural radiation exposure levels and mass attenuation coefficients of lime and gypsum samples used in Turkey

**Source:** ENVIRONMENTAL MONITORING AND ASSESSMENT, 170 (1-4): 457-466 NOV 2010

**Abstract:** The activity concentrations of Ra-226, Th-232, and K-40 in lime and gypsum samples used as building materials in Turkey were measured using gamma spectrometry. The mean activity concentrations of Ra-226, Th-232, and K-40 were found to be 38 +/- 16, 20 +/- 9, and 156 +/- 54 Bq kg (-aEuro parts per thousand 1) for lime and found to be 17 +/- 6, 13 +/- 5, and 429 +/- 24 Bq kg (-aEuro parts per thousand 1) for gypsum, respectively. The radiological hazards due to the natural radioactivity in the samples were inferred from calculations of radium equivalent activities (Ra-eq), indoor absorbed dose rate in the air, the annual effective dose, and gamma and alpha indices. These radiological parameters were evaluated and compared with the internationally recommended limits. The experimental mass attenuation coefficients (mu/rho) of the samples were determined in the energy range 81-1,332 keV. The experimental mass attenuation coefficients were compared with theoretical values obtained using XCOM. It is found that the calculated values and the experimental results are in good agreement.

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**Record 78 of 474**

**Author(s):** Marschalko, M (Marschalko, Marian); Juris, P (Juris, Peter)

**Title:** Task of engineering geology in land-use planning on the example of four selected geofactors

**Source:** ACTA MONTANISTICA SLOVACA, 14 (4): 275-283 2009

**Abstract:** The paper deals with an evaluation of four selected geobarriers (flood lands, radon hazard, undermining and slope movements) by means of geographic information systems that are geofactors endangering or limiting landscape and environment or make certain land use impossible. The objective is to improve the possibilities of their implementation in land use planning. The research was carried out in the area numbered 4, which is one out of five realized model areas in the future. It is located in Ostrava, the third largest agglomeration in the north-west of the Czech Republic, which has been most affected by anthropogenic industrial and mining activities among the Czech cities as well as in the European scope. The area is defined by a map sheet 15-43-09 in the town districts of Marianske Hory a Hulvaky, Nova Ves, Svinov, Trebovice, Hostalkovice, Moravska Ostrava a Privoz, Ostrava - Jih and Vitkovice.

**ISSN:** 1335-1788

**Record 80 of 474**

**Author(s):** Llerena, JJ (Llerena, J. J.); Cortina, D (Cortina, D.); Duran, I (Duran, I.); Sorribas, R (Sorribas, R.)

**Title:** Rn-222 concentration in public secondary schools in Galicia (Spain)

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (11): 931-936 NOV 2010

**Abstract:** In the framework of a Rn-222 screening campaign that was carried out in 58 public secondary schools in Galicia (NW Spain), the largest radon-prone area in the Iberian Peninsula, a positive correlation between indoor Rn-222 concentration and outdoor gamma exposure rate was obtained. A new approach to the data acquisition in screening surveys was tested, improving the performances of this type of study and gathering useful data for future remedial actions. Using short-period detectors (charcoal canisters) firstly, in order to detect places showing Rn-222 concentrations over 400 Bq m(-3), the number of locations to be measured with long-period detectors (etched track detectors) is reduced. In this screening campaign, 34% of the schools surveyed presented at least one site exceeding the 400 Bq m(-3) recommended action level established by the EU, and 15% had at least one site with Rn-222 values over 800 Bq m(-3). The maximum value recorded was 2084 +/- 63 Bq m(-3). These results are discussed and compared with data obtained in schools of several countries with similar geology. Seven schools were also studied for seasonal variations of Rn-222 activity concentration. The results were not conclusive, and no significant correlation between season and Rn-222 concentration was established. Finally, a continuous Rn-222 concentration monitor was placed in the secondary school exhibiting a mean value of the Rn-222 concentration very close to 400 Bq m(-3). Maximum Rn-222 concentration values were found to occur at times when the school was unoccupied. (C) 2010 Elsevier Ltd. All rights reserved.

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**DOI:** 10.1016/j.jenvrad.2010.06.009

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**Record 81 of 474**

**Author(s):** Mihci, M (Mihci, Metin); Buyuksarac, A (Buyuksarac, Aydin); Aydemir, A (Aydemir, Attila); Celebi, N (Celebi, Nilgun)

**Title:** Indoor and outdoor Radon concentration measurements in Sivas, Turkey, in comparison with geological

setting

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (11): 952-957 NOV 2010

**Abstract:** Indoor and soil gas Radon (Rn-222) concentration measurements were accomplished in two stages in Sivas, a central eastern city in Turkey. In the first stage, CR-39 passive nuclear track detectors supplied by the Turkish Atomic Energy Authority (TAEA) were placed in the selected houses throughout Sivas centrum in two seasons; summer and winter. Before the setup of detectors, a detailed questionnaire form was distributed to the inhabitants of selected houses to investigate construction parameters and properties of the houses, and living conditions of inhabitants. Detectors were collected back two months later and analysed at TAEA laboratories to obtain indoor Rn-222 gas concentration values. In the second stage, soil gas Rn-222 measurements were performed using an alphameter near the selected houses for the indoor measurements. Although Rn-222 concentrations in Sivas were quite low in relation with the allowable limits, they are higher than the average of Turkey. Indoor and soil gas Rn-222 concentration distribution maps were prepared seperately and these maps were applied onto the surface geological map. In this way, both surveys were correlated with the each other and they were interpreted in comparison with the answers of questionnaire and the geological setting of the Sivas centrum and the vicinity. (C) 2010 Elsevier Ltd. All rights reserved.

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**DOI:** 10.1016/j.jenvrad.2010.06.013

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**Record 82 of 474**

**Author(s):** Hirao, S (Hirao, Shigekazu); Yamazawa, H (Yamazawa, Hiromi); Moriizumi, J (Moriizumi, Jun)

**Title:** Inverse modeling of Asian Rn-222 flux using surface air Rn-222 concentration

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (11): 974-984 NOV 2010

**Abstract:** When used with an atmospheric transport model, the Rn-222 flux distribution estimated in our previous study using soil transport theory caused underestimation of atmospheric Rn-222 concentrations as compared with measurements in East Asia. In this study, we applied a Bayesian synthesis inverse method to produce revised estimates of the annual Rn-222 flux density in Asia by using atmospheric Rn-222 concentrations measured at seven sites in East Asia. The Bayesian synthesis inverse method requires a prior estimate of the flux distribution and its uncertainties. The atmospheric transport model MM5/HIRAT and our previous estimate of the Rn-222 flux distribution as the prior value were used to generate new flux estimates for the eastern half of the Eurasian continent dividing into 10 regions.
The Rn-222 flux densities estimated using the Bayesian inversion technique were generally higher than the prior flux densities. The area-weighted average Rn-222 flux density for Asia was estimated to be 33.0 mBq m(-2) s(-1), which is substantially higher than the prior value (16.7 mBq m(-2) s(-1)). The estimated Rn-222 flux densities decrease with increasing latitude as follows: Southeast Asia (36.7 mBq m(-2) s(-1)); East Asia (28.6 mBq m(-2) s(-1)) including China, Korean Peninsula and Japan; and Siberia (14.1 mBq m(-2) s(-1)). Increase of the newly estimated fluxes in Southeast Asia, China, Japan, and the southern part of Eastern Siberia from the prior ones contributed most significantly to improved agreement of the model-calculated concentrations with the atmospheric measurements. The sensitivity analysis of prior flux errors and effects of locally exhaled Rn-222 showed that the estimated fluxes in Northern and Central China, Korea, Japan, and the southern part of Eastern Siberia were robust, but that in Central Asia had a large uncertainty. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 83 of 474**

**Author(s):** Baldacci, AE (Baldacci, A. E.); Gattavecchia, E (Gattavecchia, E.); Kirchner, G (Kirchner, G.)

**Title:** Observations and modelling of thoron and its progeny in the soil-atmosphere-plant system

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (11): 992-1001 NOV 2010

**Abstract:** Samples of pasture vegetation, mainly Trifolium pratensis, were collected at the Botanic Garden of the University of Bologna during the period 1998-2000 and measured by gamma-spectrometry for determining thoron progeny. Concentrations of Pb-212 were between 1.5 and 20 Bq m(-2), with individual peaks up to 70 Bq m(-2). Soil samples were collected at the same location and physically characterised. Their chemical composition (particularly Th and U) was determined by X-ray fluorescence spectroscopy. Lead-212 on plants mainly originates from dry and wet deposition of this isotope generated in the lower atmosphere by the decay of its short-lived precursor Rn-220, which is produced in the upper soil layers as a member of the natural thorium decay chain and exhales into the atmosphere. Concentrations of Rn-220 in the atmosphere depend on (1) the amount of Th present in soil, (2) the radon fraction which escapes from the soil minerals into the soil pore space, (3) its transport into the atmosphere, and (4) its redistribution within the atmosphere.

The mobility of radon in soil pore space can vary by orders of magnitude depending on the soil water content, thus being the main factor for varying concentrations of Rn-220 and Pb-212 in the atmosphere. We present a simple model to predict concentrations of thoron in air and its progeny deposited from the atmosphere, which takes into account varying soil moisture contents calculated by the OPUS code. Results of this model show close agreement with our observations. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 84 of 474**

**Author(s):** Breitner, D (Breitner, D.); Arvela, H (Arvela, H.); Hellmuth, KH (Hellmuth, K. -H.); Renvall, T (Renvall, T.)

**Title:** Effect of moisture content on emanation at different grain size fractions - A pilot study on granitic esker sand sample

**Source:** JOURNAL OF ENVIRONMENTAL RADIOACTIVITY, 101 (11): 1002-1006 NOV 2010

**Abstract:** It is known that in soils and sediments moisture adsorbed on particle surfaces and in the pore system significantly affects the behaviour of recoiling radon (Rn-222) atoms after decay of parent Ra-226, leading to increased Rn-222 emanation. As a first step in an effort to characterize the Rn-222 source term in mineralised sediments in the present study, complementing previous studies in the area, granitic esker sand samples were collected in order to test how moisture content affects Rn-222 emanation at different grain size fractions. Emanation fractions measured for natural samples were compared with theoretical calculations. Six different grain size fractions were studied at 0%, 5% and 10% moisture contents relative to the mass of solids. In a further study necessary complementary information on the chemical and structural distribution of Ra-226 was gained by selective leaching experiments. The results showed that Ra-226 concentration increases from 50 Bq/kg at grain size 1-2 mm to 200 Bq/kg at grain size <0.063 mm. Respectively, the emanation factor increased from 0.12 to 0.30 at 5% moisture content. Both emanation factor and radium concentration increased significantly when grain size was below 0.125-0.250 mm. Above this fraction, the emanation fraction was approximately constant, 0.13 at 5% moisture content. In most of the grain size fractions, emanation reaches its maximum at 5% moisture content, being twice as high as in a dry sample. For the small particles (<0.063 mm) the Ra-226 distribution is rather complex and depends on the mineral composition compared to larger particles wherein emanation from the internal pore system and the adjacent matrix is dominating over the contribution from external surface. (C) 2010 Elsevier Ltd. All rights reserved.

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**Record 85 of 474**

**Author(s):** Kluge, T (Kluge, Tobias); Wieser, M (Wieser, Martin); Aeschbach-Hertig, W (Aeschbach-Hertig, Werner)

**Title:** Assessing the use of 3H-3He dating to determine the subsurface transit time of cave drip waters

**Source:** ISOTOPES IN ENVIRONMENTAL AND HEALTH STUDIES, 46 (3): 299-311 2010

**Abstract:** 3H-3He measurements constitute a well-established method for the determination of the residence time of young groundwater. However, this method has rarely been applied to karstified aquifers and in particular to drip water in caves, despite the importance of the information which may be obtained. Besides the determination of transfer times of climate signals from the atmosphere through the epikarst to speleothems as climate archives, 3H-3He together with Ne, Ar, Kr, Xe data may also help to give new insights into the local hydrogeology, e.g. the possible existence of a perched aquifer above a cave. In order to check the applicability of 3H-3He dating to cave drips, we collected drip water samples from three adjacent caves in northwestern Germany during several campaigns. The noble gas data were evaluated by inverse modelling to obtain recharge temperature and excess air, supporting the calculation of the tritiogenic 3He and hence the 3H-3He age. Although atmospheric noble gases were often found to be close to equilibrium with the cave atmosphere, several drip water samples yielded an elevated 3He/4He ratio, providing evidence for the accumulation of 3He from the decay of 3H. No significant contribution of radiogenic 4He was found, corresponding to the low residence times mostly in the range of one to three years. Despite complications during sampling, conditions of a perched aquifer could be confirmed by replicate samples at one drip site. Here, the excess air indicator Ne was about 10 %, comparable to typical values found in aquifers in mid-latitudes. The mean 3H-3He age of 2.1 years at this site presumably refers to the residence time in the perched aquifer and is lower than the entire transit time of 3.4 years estimated from the tritium data.

**ISSN:** 1025-6016

**DOI:** 10.1080/10256016.2010.503893

**Record 87 of 474**

**Author(s):** Salines, G (Salines, Georges)

**Title:** Epidemiology: Unfounded suspicions, real limitations

**Source:** ENVIRONNEMENT RISQUES & SANTE, 9 (5): 431-434 SEP-OCT 2010

**Abstract:** Epidemiology: Unfounded suspicions, real limitations This paper is a commentary of Andre Aurengo's article entitled "Epidemiology: the Age of Doubt", published in issue #4 (July-August 2010) of Environnement, Risques et Sante. The author affirmed in that article that epidemiology has flaws that tend to bias its results toward false-positive outcomes. He expressed concerns about consequences of this phenomenon on decision making and suggested as a possible solution the development of a scale of validity for epidemiological studies. This point of view appears to lack sufficient supporting arguments and examples. We offer a more balanced evaluation of epidemiology that points out the existence of methodological shortcomings that prevent conclusions that a risk exists, even when it actually does. The fear expressed by Aurengo that faulty decision making in public health matters will follow from isolated and biased studies seems exaggerated in relation to the current context and at odds with the real issues of risk perception and decision making in situations of uncertainty. Finally, the relevance of the proposed solution is discussed.

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**DOI:** 10.1684/ers.2010.0379

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**Record 88 of 474**

**Author(s):** Sathish, LA (Sathish, L. A.); Ramanna, HC (Ramanna, H. C.); Nagesh, V (Nagesh, V.); Nagaraja, K (Nagaraja, K.); Shobha, S (Shobha, S.); Sundareshan, S (Sundareshan, S.); Ramachandran, TV (Ramachandran, T. V.)

**Title:** EFFECTIVE RADIATION DOSE DUE TO INDOOR RADON AND THORON CONCENTRATIONS IN BANGALORE CITY, INDIA

**Source:** ARABIAN JOURNAL FOR SCIENCE AND ENGINEERING, 35 (2A): 201-208 JUL 2010

**Abstract:** Radon makes up approximately half of the total dose of radiation we receive naturally. The majority of it comes from the inhalation of the progeny of Rn-222 and is prominent in a closed atmosphere. The continuous measurement of the levels of Rn-222 concentration in different geographical areas is of great importance, particularly in living places. The radon and thoron concentrations have been measured in houses at 10 locations in different parts of Bangalore, India. Solid state nuclear track detectors were used for measuring the concentrations. The average value of radon and thoron concentrations in the studied area is found to be 33.4 +/- 6.1 and 21.6 +/- 2.5 Bq m(-3), respectively. The dose rate due to radon, thoron, and their progenies received by the population in the studied location ranged between 0.1-0.5 mSv y(-1). The arithmetic and geometric mean concentrations are 0.2 +/- 0.03 and 0.2 mSv y(-1), respectively. The results show no significant radiological risk for the inhabitants of Bangalore. The global average concentrations are 40 and 10 Bq m(-3), respectively.

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**Record 89 of 474**

**Author(s):** Sathish, LA (Sathish, L. A.); Ramanna, HC (Ramanna, H. C.); Nagaraja, K (Nagaraja, K.); Sundareshan, S (Sundareshan, S.)

**Title:** DISTRIBUTION OF INDOOR THORON AND ITS PROGENY LEVELS IN A DWELLING

**Source:** ARABIAN JOURNAL FOR SCIENCE AND ENGINEERING, 35 (2A): 209-218 JUL 2010

**Abstract:** A room of 31 m(3) in volume was selected and walls were classified as W, N, S, E, C, and F for west, north, south, east, ceiling, and flooring, respectively. Eighteen dosimeters were installed at a constant distance of 74 cm from the west wall, 533 cm from the east wall, 105 cm from the ceiling, and 191 cm from the flooring of the room. All the windows and doors were closed for 90 days to observe explicitly the variations of Rn-220 and its progeny levels with respect to the distance from walls, ceiling, and flooring. In addition, the dosimeters were also deployed in upper and lower parabolic fashion to see the variations. Higher concentrations were observed at the wall, ceiling, and flooring of the room but they were reduced as the detector was moved away from them. However, Rn-220 progeny concentration did not show appreciable variation with the distance.

**ISSN:** 1319-8025

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**Record 90 of 474**

**Author(s):** Wysocka, M (Wysocka, Malgorzata); Kozlowska, B (Kozlowska, Beata); Dorda, J (Dorda, Jerzy); Klos, B (Klos, Barbara); Chmielewska, I (Chmielewska, Izabela); Rubin, J (Rubin, Jan); Karpinska, M (Karpinska, Maria); Dohojda, M (Dohojda, Marek)

**Title:** Annual observations of radon activity concentrations in dwellings of Silesian Voivodeship

**Source:** NUKLEONIKA, 55 (3): 369-375 2010

**Abstract:** In the paper, results of year-long measurements of radon levels in dwellings on the premises of Silesian Voivodeship are presented. Track etched detectors with polymer CR-39 foils were used in the investigations. As the studied buildings were located in different regions of Silesian Voivodeship, therefore results of measurements were analysed due to possible influence of geological structure or effect of mining operations in places, where given dwellings were situated. Elevated concentrations of radon were measured mostly in dwellings located in areas, where permeable Triassic limestone and dolomite occur, as it has been predicted. On the other hand, the impact of mining activity such as disintegration of rock-body and activation of faults plays an important role, too, because it enables radon migration and its entry into buildings. Beside the analysis of seasonal variations of radon activity concentration, the impact of temperature and pressure on these fluctuations outdoor and indoor buildings has been analysed.

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**Record 91 of 474**

**Author(s):** Zagorski, ZP (Zagorski, Zbigniew P.); Giuszewski, W (Giuszewski, Wojciech)

**Title:** Thorium nuclear fuel - thoron aspect

**Source:** NUKLEONIKA, 55 (3): 407-408 2010

**Abstract:** The communication reports a serious complication connected with preparation, storage and transportation of fuel for thorium and uranium/thorium nuclear reactors. Whereas uranium fuel of any degree of enrichment is free from radium, which produces radon-222, thorium itself produces thoron (radon-220). Measurement of thoron by a routine ionization-chamber device around a small sample of 2 g thorium dioxide shows already the health endangerment situation. The presence of thoron is also confirmed by a typical solid state dosemeter (polymer CR-39), exposed to the air around ThO2 and etched afterwards with warm NaOH solution. The unavoidable presence of thoron can cause increase of price of production of nuclear fuel, demanding special approach to the method of manufacture.

**ISSN:** 0029-5922

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**Record 92 of 474**

**Author(s):** Turtiainen, T (Turtiainen, Tuukka); Salonen, L (Salonen, Laina)

**Title:** Prevention measures against radiation exposure to radon in well waters: analysis of the present situation in Finland

**Source:** JOURNAL OF WATER AND HEALTH, 8 (3): 500-512 2010

**Abstract:** Naturally occurring radioactive elements are found in all groundwaters, especially in bedrock waters. Exposure to these radioactive elements increases the risk of cancer. The most significant of these elements is radon which, as a gas, is mobile and dissolves in groundwater. In Finland, water supply plants are obliged to carry out statutory monitoring of the water quality, including radon. Monitoring of private wells, however, is often neglected. In this paper, we outline the problem by reviewing the outcomes of the studies conducted in Finland since the 1960s. We also summarise the development of legislation, regulations and political decisions made so far that have affected the amount of public exposure to radon in drinking water. A review of the studies on radon removal techniques is provided, together with newly obtained results. New data on the transfer of radon from water into indoor air are presented. The new assessments also take into account the expanding use of domestic radionuclide removal units by Finnish households.

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**DOI:** 10.2166/wh.2009.067

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**Record 93 of 474**

**Author(s):** Jiranek, M (Jiranek, Martin); Rovenska, K (Rovenska, Katerina)

**Title:** Limited applicability of cost-effectiveness and cost-benefit analyses for the optimization of radon remedial measures

**Source:** JOURNAL OF HAZARDOUS MATERIALS, 182 (1-3): 439-446 OCT 15 2010

**Abstract:** Ways of using different decision-aiding techniques for optimizing and evaluating radon remedial measures have been studied on a large set of data obtained from the remediation of 32 houses that had an

original indoor radon level above 1000 Bq/m(3). Detailed information about radon concentrations before and after remediation, type of remedial measures and installation and operation costs were used as the input parameters for a comparison of costs and for determining the efficiencies, for a cost-benefit analysis and a cost-effectiveness analysis, in order to find out whether these criteria and techniques provide sufficient and relevant information for improving and optimizing remediation. Our study confirmed that the installation costs of remediation do not depend on the original indoor radon level, but on the technical state of the building. In addition, the study reveals that the efficiency of remediation does not depend on the installation costs. Cost-benefit analysis and cost-effectiveness analysis lead to the conclusion that remedial measures reducing the indoor radon concentration from values above 1000 Bq/m(3) are always acceptable and reasonable. On the other hand, these techniques can neither help the designer to choose the proper remedial measure nor provide information resulting in improved remediation. 

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**DOI:** 10.1016/j.jhazmat.2010.06.051

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**Record 94 of 474**

**Author(s):** Marsh, JW (Marsh, James W.); Harrison, JD (Harrison, John D.); Laurier, D (Laurier, Dominique); Blanchardon, E (Blanchardon, Eric); Paquet, F (Paquet, Francois); Tirmarche, M (Tirmarche, Margot)

**Title:** DOSE CONVERSION FACTORS FOR RADON: RECENT DEVELOPMENTS

**Source:** HEALTH PHYSICS, 99 (4): 511-516 OCT 2010

**Abstract:** Epidemiological studies of the occupational exposure of miners and domestic exposures of the public have provided strong and complementary evidence of the risks of lung cancer following inhalation of radon progeny. Recent miner epidemiological studies, which include low levels of exposure, long duration of follow-up, and good quality of individual exposure data, suggest higher risks of lung cancer per unit exposure than assumed previously by the International Commission on Radiological Protection (ICRP). Although risks can be managed by controlling exposures, dose estimates are required for the control of occupational exposures and are also useful for comparing sources of public exposure. Currently, ICRP calculates doses from radon and its progeny using dose conversion factors from exposure (WLM) to dose (mSv) based on miner epidemiological studies, referred to as the epidemiological approach. Revision of these dose conversion factors using risk estimates based on the most recent epidemiological data gives values that are in good agreement with the results of calculations using ICRP biokinetic and dosimetric models, the dosimetric approach. ICRP now proposes to treat radon progeny in the same way as other radionuclides and to publish dose coefficients calculated using models, for use within the ICRP system of protection. Health Phys. 99(4):511-516; 2010

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**Record 95 of 474**

**Author(s):** Hofmann, W (Hofmann, Werner); Winkler-Heil, R (Winkler-Heil, Renate); Hussain, M (Hussain, Majid)

**Title:** MODELING INTERSUBJECT VARIABILITY OF BRONCHIAL DOSES FOR INHALED RADON PROGENY

**Source:** HEALTH PHYSICS, 99 (4): 523-531 OCT 2010

**Abstract:** The main sources of intersubject variations considered in the present study were: (1) size and structure of nasal and oral passages, affecting extrathoracic deposition and, in further consequence, the fraction of the inhaled activity reaching the bronchial region; (2) size and asymmetric branching of the human bronchial airway system, leading to variations of diameters, lengths, branching angles, etc.; (3) respiratory parameters, such as tidal volume, and breathing frequency; (4) mucociliary clearance rates; and (5) thickness of the bronchial epithelium and depth of target cells, related to airway diameters. For the calculation of deposition fractions, retained surface activities, and bronchial doses, parameter values were randomly selected from their corresponding probability density functions, derived from experimental data, by applying Monte Carlo methods. Bronchial doses, expressed in mGy WLM-1, were computed for specific mining conditions, i.e., for defined size distributions, unattached fractions, and physical activities. Resulting bronchial dose distributions could be approximated by lognormal distributions. Geometric standard deviations illustrating intersubject variations ranged from about 2 in the trachea to about 7 in peripheral bronchiolar airways. The major sources of the intersubject variability of bronchial doses for inhaled radon progeny are the asymmetry and variability of the linear airway dimensions, the filtering efficiency of the nasal passages, and the thickness of the bronchial epithelium, while fluctuations of the respiratory parameters and mucociliary

clearance rates seem to compensate each other. Health Phys. 99(4):523-531; 2010

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**Record 97 of 474**

**Author(s):** Downs, TJ (Downs, Timothy J.); Ross, L (Ross, Laurie); Mucciarone, D (Mucciarone, Danielle); Calvache, MC (Calvache, Maria-Camila); Taylor, O (Taylor, Octavia); Goble, R (Goble, Robert)

**Title:** Participatory testing and reporting in an environmental-justice community of Worcester, Massachusetts: a pilot project

**Source:** ENVIRONMENTAL HEALTH, 9: Art. No. 34 JUL 6 2010

**Abstract:** Background: Despite indoor home environments being where people spend most time, involving residents in testing those environments has been very limited, especially in marginalized communities. We piloted participatory testing and reporting that combined relatively simple tests with actionable reporting to empower residents in Main South/Piedmont neighborhoods of Worcester, Massachusetts. We answered: 1) How do we design and implement the approach for neighborhood and household environments using participatory methods? 2) What do pilot tests reveal? 3) How does our experience inform testing practice?
Methods: The approach was designed and implemented with community partners using community-based participatory research. Residents and researchers tested fourteen homes for: lead in dust indoors, soil outdoors, paint indoors and drinking water; radon in basement air; PM2.5 in indoor air; mold spores in indoor/outdoor air; and drinking water quality. Monitoring of neighborhood particulates by residents and researchers used real-time data to stimulate dialogue.
Results: Given the newness of our partnership and unforeseen conflicts, we achieved moderate-high success overall based on process and outcome criteria: methods, test results, reporting, lessons learned. The conflict burden we experienced may be attributable less to generic university-community differences in interests/culture, and more to territoriality and interpersonal issues. Lead-in-paint touch-swab results were poor proxies for lead-in-dust. Of eight units tested in summer, three had very high lead-in-dust (> 1000 mu g/ft(2)), six exceeded at least one USEPA standard for lead-in-dust and/or soil. Tap water tests showed no significant exposures. Monitoring of neighborhood particulates raised awareness of environmental health risks, especially asthma.
Conclusions: Timely reporting back home-toxics' results to residents is ethical but it must be empowering. Future work should fund the active participation of a few motivated residents as representatives of the target population. Although difficult and demanding in time and effort, the approach can educate residents and inform exposure assessment. It should be considered as a core ingredient of comprehensive household toxics' testing, and has potential to improve participant retention and the overall positive impact of long-term environmental health research efforts.

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**Record 98 of 474**

**Author(s):** Inomata, Y (Inomata, Yayoi); Igarashi, Y (Igarashi, Yasuhito); Yoshioka, K (Yoshioka, Katsuhiro); Tanaka, TY (Tanaka, Taichu Y.); Chiba, M (Chiba, Masaru)

**Title:** Temporal variation of Rn-222 at the summit of Mt. Fuji associated with the Asian continental outflow

**Source:** ATMOSPHERIC ENVIRONMENT, 44 (31): 3856-3865 OCT 2010

**Abstract:** Concentrations of Rn-222 were observed at the summit of Mt. Fuji (35.4 degrees N, 138.7 degrees E; 3776 m above sea level) in Japan from October 2002 to September 2003. These observations were analyzed using a global three-dimensional model. Daily Rn-222 concentrations varied from 0.2 to 2.5 Bq m(-3). The variation exhibited a slight seasonal cycle with high values in winter and summer. Day-to-day variation of Rn-222 concentrations in winter had a large amplitude, depending on differences in transport processes from the Asian continent. In winter, higher concentrations of Rn-222 were observed in an air mass with ascending motion advected from the middle latitudes of the eastern Asian continent where the Rn-222 concentration of the air mass was high. In contrast, a lower concentration was observed in the air mass in winter, with a descending motion advected from Siberia where the Rn-222 amount was low. The high amplitude of temporal variation of Rn-222 in summer was due to the alternation of air masses originated from the continent or the ocean. The relatively low amplitude of day-to-day variation during spring and autumn was a reflection of the vertically uniform distribution of Rn-222 in the air column over the Asian continent, where uniformity was produced by vertical mixing due to turbulence and thermal convection. The seasonal variation

was linked to the East Asian monsoon circulation, with the westerly jet shifted northward or southward depending on the season. The main export of Rn-222 was around 25 to 55 degrees N during the winter and into the spring, shifting northward to around 30-70 degrees N during the summer. 

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**Record 99 of 474**

**Author(s):** Caresana, M (Caresana, M.); Ferrarini, M (Ferrarini, M.)

**Title:** Performance evaluation of a new reading technique of LR115 cellulose nitrate track detectors

**Source:** RADIATION MEASUREMENTS, 45 (8): 911-915 SEP 2010

**Abstract:** LR115 cellulose nitrate SSNTD are routinely used for Radon detection. A reading technique with high resolution optical microscope coupled with a scanning system has been recently proposed.
In this technique, the efficiency correction that was formerly performed on the residual thickness of the detector is performed on the track area distribution. So all the information that is needed for the measurement is obtained directly during the scanning. This leads to a much simpler and faster reading procedure, when compared to the classical technique that required both spark counting and micrometer residual thickness measure.
A complete characterization and performance evaluation of the detector response is discussed, including a measuring range evaluation, a combined uncertainty theoretical calculation and a blind test validation at HPA. (C) 2010 Elsevier Ltd. All rights reserved.

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**Author(s):** De Francesco, S (De Francesco, S.); Tommasone, FP (Tommasone, F. Pascale); Cuoco, E (Cuoco, E.); Tedesco, D (Tedesco, D.)

**Title:** Indoor radon seasonal variability at different floors of buildings

**Source:** RADIATION MEASUREMENTS, 45 (8): 928-934 SEP 2010

**Abstract:** Indoor radon concentrations have been measured with the a track etch integrated method in public buildings in the town of Pietramelara, north-western Campania, Southern Italy. In particular, our measurements were part of an environmental monitoring program originally aimed at assessing the range of seasonal fluctuations in indoor radon concentrations, at various floors of the studied buildings. However, subsequent analysis of the data and its comparison with the meteorological data recorded in the same period has shown an unexpected pattern at the different floors. In this report we present data suggesting that, besides the well-known medium and longterm periodicity, there could also be a differentiation in major meteorological controlling factors at the different floors of the buildings, a fact that does not appear to have been reported previously. While the lower floors proved to be markedly affected by rainfall, for the upper floors, instead, a different behaviour has been detected, which could possibly be related to global solar radiation. (C) 2010 Elsevier Ltd. All rights reserved.

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