

Abstracts Accepted
by the Peer-Review Committee
of
The 2011 International Radon Symposium
October 16-19, 2011 – Orlando, Florida

The following abstracts, listed in alphabetical order by the name of the lead author or research scientist, have been selected for either a poster session or a presentation at the 2011 International Radon Symposium, October 16-19, 2011 in Orlando, Florida. These authors have been invited to present their work at this annual international symposium on radon and have been also invited to submit a formal paper for acceptance and publication in the Symposium's Proceedings (Edited and Chaired by Dr. James Burkhart, Ph.D.) Upon confirmation (and within the next 40 days, a preliminary schedule and program listed the presenters and the dates and times of their presentations and poster sessions will be published.

Measurement of Radon Concentration Indoors in the villages Ayn-Jana, Ishtafena, Samta and Umm-Yanabe' in District of Ajloun, Jordan

Hasan M Al-Khateeb and Ala'a A Al-Qudah

ABSTRACT

We measured radon concentrations indoors in the villages of Ayn-Jana, Ishtafena, Samta and Umm-Yanabe' in the District of Ajloun, Jordan by using time-integrated passive radon solid-state nuclear track detectors (SSNTDs) utilizing the plastic allyl diglycol carbonate. Indoor radon concentration was measured as function of many factors such as ventilation rate (kinds of room), floor elevation and building materials. For Ayn-jana village only, the study revealed the average radon concentration decreases gradually with floor elevation. The highest concentration was in the ground floor (35.5 ± 8.6 Bq/m³) and the lowest in the second floor (22.9 ± 5.5 Bq/m³). Regarding ventilation rate effect on radon concentration in all villages, it was found that the highest radon concentration was in storage rooms (38.8 ± 8.4 Bq/m³) and the lowest in living rooms (33.8 ± 8.1 Bq/m³). Regarding the building material effect on the radon concentration in all villages, it was found that the highest radon concentration was in the homes made of clay (45.7 ± 6.3 Bq/m³) and the lowest was in homes made of block (33.9 ± 7.4 Bq/m³). In general, the average indoor radon concentration in Ajloun's district was 45.2 Bq/m³.

INDOOR RADON-222 CONCENTRATIONS IN SOME CITIES IN KASSALA STATE, EASTERN SUDAN

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ABSTRACT

An indoor radon survey was performed in Kassala State, Eastern Sudan. The radon survey utilized 290 measurements in the cities of Aroma, Khashm Algirba and Halfa Aljadida using passive integrated solid state nuclear track detectors containing allyl diglycol carbonate plastic detectors. The results indicate a radon concentration arithmetic mean of 91.5 ± 3.9 Bq/m³ in Aroma city, while in Khashm Algirba city the average was found to be 64.1 ± 6.1 Bq/m³. Lastly, the arithmetic mean of the concentration in Halfa Aljadida was 94.2 ± 14.2 Bq/m³. The annual average effective dose of the towns was estimated as 2.08 mSv/y and the relative lung cancer risk for radon exposure of the population indoors would be about 1.08 %. The distribution of the radon concentration is discussed as a function of several local parameters.

Seasonal Variation of Radon - 222 Concentration in Shops and Pharmacies of Alzarqa Town- Jordan.

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Abstract

The concentration of radon in pharmacies and shops of Alzarqa town – Jordan, was measured in 202 measurements during: summer, autumn, winter, and spring season through the period of (1999 - 2000). In this survey, passive calibrated solid state nuclear track detectors SSNTDs of type detectors SSNTDs of type allyl diglycol carbonate were used. The results of radon concentrations were found to range from 6.9 to 58.8 Bq/m³, with an arithmetic mean of 18.2 ± 4.1 Bq/m³, in pharmacies, while it was found to be from 10.2 to 38.7 Bq/m³ in shops, with an average of 16.6 Bq/m³ during summer season. During autumn season the concentrations were ranging between 16.5 and 68.3 Bq/m³ in pharmacies, with an arithmetic mean of 32.5 Bq/m³; the results were found to be from 16.7 to 113.1 Bq/m³ in shops, with an arithmetic mean of 42.6

Bq/m³. In winter season the concentrations were found to vary from 37.2 to 86.3 Bq/m³ in pharmacies, with an average of 50.0 Bq/m³; from 34.8 to 63.7 Bq/m³ in shops, with an arithmetic mean of 45.1 Bq/m³. Finally, during the spring season the concentrations ranged from 14.7 to 55.2 Bq/m³ in pharmacies, with an average of 27.1 Bq/m³, and from 17.0 to 27.1 Bq/m³ in shops, with an arithmetic mean of 22.40 Bq/m³. The annual average radon concentration for both pharmacies and shops was found to be with similar values, (31.97 Bq/m³ in pharmacies and 31.66 Bq/m³ in shops), which is relatively low and not causing serious radiation risks.

Water by-pass and ice blocking device with clean-out port to protect outdoors radon fans

Wayne E. Bailey, Dominion Radon LLC

ABSTRACT

Protecting an outdoor radon fan from water and ice damage is key to the extended life of the outdoor radon mitigation system. With winter freezing conditions, the radon fan may be exposed to back draining of condensate and falling ice. Water by-pass devices are a defense against condensate back flowing through the fan housing. Diverta Drain is a system that protects the fan from water condensate and ice that may dislodge from the exhaust pipe and fall into the fan. Additionally, the Diverta Drain includes a port which allows visual inspections and air flow testing,

all of which can be performed without climbing on the roof or entering the residence. The ice screen located inside the Diverta Drain can eliminate the need of a critter screen at the top end of the exhaust pipe. Traditionally the critter screen at the top end of the exhaust pipe has been a factor in ice build-up. The Diverta Drain clean-out port allows debris removal at ground level.

The product discussed in this abstract is a commercial product sold by Dominion Radon LLC which is owned by the author.

A Semi-Automated Nuclear Track Etch Counting System for CR-39 Dosimeters

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ABSTRACT

A semi-automated nuclear track etch counting system (SANTECS) has been developed at the Australian Radiation Protection And Nuclear Safety Agency (ARPANSA) for the assessment of polycarbonate CR-39 radon and neutron dosimeters. The system consists of a high-resolution flatbed optical scanner and commercially available image processing software. The system has been evaluated for efficiency and accuracy when compared to a conventional optical processing system. Quality Assurance procedures have been developed to ensure accuracy and reproducibility. The system has been validated using dosimeters exposed to known concentrations of radon and doses of neutrons. The system is being evaluated by a radon measurement facility.

Current State of the Art in Measuring Environmental Radon

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ABSTRACT

According to the US EPA, radon is the leading cause of lung cancer among non-smokers and the second leading cause overall. Data from several epidemiological studies show definitive evidence of the association between indoor radon exposure and lung cancer.

In the past 30 years, emphasis has been on measuring radon rather than radon progeny concentrations because of the simplicity, convenience and cost effectiveness of radon measuring instruments and methods. Using an equilibrium ratio between radon and radon progeny of 0.4-0.5, radon concentration measurements can be converted to working level and to exposure in working level month. In recent years, over 1 million short-term measurements for radon were made annually using grab sampling, integrating and continuous radon devices. As a result of these short-term measurements more than 800,000 residences with elevated radon levels were identified and were mitigated successfully. This paper will emphasize the current development of different instruments and methods, their sensitivities, practicality and cost effectiveness for making short-term measurements of environmental radon. More than 99% of indoor measurements involve radon only. Radon progeny used mostly in research and diagnostics will not be discussed.

Feasibility of a Dual Screening Protocol and Risk Communication Intervention for Reducing Radon and Secondhand Smoke

Hahn, Rayens, Kerckmar, Adkins, Mason, Robertson, Rinker

ABSTRACT

A dual home screening protocol was tested to reduce risk of radon and second hand smoke (SHS). Parents of children at a pediatrics practice ($N=50$) received free home radon and SHS kits and completed baseline and follow up surveys. Radon and air nicotine results were shared using a risk communication intervention. Most were female (88%), Caucasian (94%), and married (91%), with an average age of 37.8 ($SD=7.9$). One-fifth were current smokers and nearly half (46%) had a smoker in the home. Of the returned kits, 26% indicated elevated radon (≥ 4.0 pCi/L) and 38% had high nicotine. Parents in nonsmoking homes were more likely to know the

combined risks than those in smoking homes. Of those with high radon, more than half had contacted a mitigation specialist or planned follow up. Of those with positive air nicotine, 75% had adopted smoke-free homes. A dual screening approach and brief risk communication intervention holds promise.

Reducing Community Exposure to Radon: A plan for community action

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ABSTRACT

CCAP-ERA is a non-profit community organization whose mission is to protect the health and quality of life of the residents of Southern Colorado and to promote environmental justice. Through grant funding the community's top four concerns, vulnerabilities, assets and needs for immediate action have been identified, the number one issue being exposure to radon gas. CCAP-ERA has combined funding sources to educate residents of the effects of radon gas, provide free radon test kits and provide funding for mitigation demonstration projects in low-income households, as well as to provide "Do-It-Yourself" radon mitigation classes and on-site consultations. Combining funds to achieve one goal has allowed this organization to reduce the effects of a once unknown invisible killer.

Characterization of ^{222}Rn concentration in Khartoum groundwater

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ABSTRACT

Measurements of ^{222}Rn in ground water have been performed in 72 samples collected throughout the Khartoum state during the period 15 May – 15 July 2007 using a low level γ -spectrometry equipped with HPGe-detector. ^{222}Rn concentration was found to vary from a minimum of 1.6 Bq/l to a maximum of 345 Bq/L with mean value 59 Bq/l. Comparing these values with global data indicates acceptable levels can be observed for most of those samples except 5 samples exceeded the maximum contaminant levels of 4000 pCi/L (148 Bq/L) proposed by the US EPA. In addition to the ^{222}Rn , water physicochemical parameters were investigated in 45 sites. No significant correlation between ^{222}Rn and these other water parameters was found. The overall annual effective dose due to radon ingestion is discussed in the light of WHO (1998) recommended dose level of 1 mSv-y⁻¹. 14 samples exceeded this recommended dose level.

DISTRIBUTION OF RADON PROFESSIONALS IN THE U.S.

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ABSTRACT

Measurement and mitigation professionals that are members of national radon organizations (NRSB, NEHA-NRPP, AARST) are unevenly distributed across the United States, leaving some areas underserved and others overserved (i.e., highly competitive). The addresses of members were spatially located, using a geographic information system, and service areas were extended to 50 and 100 miles in an effort to visualize areas in which it may be difficult to obtain professional radon services. A national map of EPA radon zones was overlain onto member service territories to identify areas of high radon potential that are underserved by radon professionals.

RADON EMANATION AND RADIONUCLIDE CONTENT OF SUBSLAB FILL

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ABSTRACT

Over a dozen samples of subslab fill (e.g., gravel) that were removed from below concrete slabs during installation of radon mitigation systems were analyzed for their radon emanation and radionuclide content. Radon levels were determined by placement of the fill material inside a small airtight chamber with a continuous radon monitor. Radionuclide content of the fill materials was determined using HPGe gamma-ray detectors. Radon emanation and radionuclide content of the measured fill materials varied over an order of magnitude. Results indicate that the quantity of fill material placed under a home (roughly 50 metric tons) can be the source of a substantial amount of radon.

Radon Animation for Improving Radon Testing

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ABSTRACT

Previous research has indicated that rural, low-income Montana families are mostly unaware of the health consequences of radon and an estimated 10% have tested their homes for radon. Located in the Women Infant and Children Clinic waiting rooms of three Zone 1 designated counties, the aim of the Montana Radon Study is to increase radon knowledge and completed testing using digital signage technology. This presentation will share the research design, metrics, baseline data, and the digital signage intervention of this community-based trial with the medical and scientific community.

Radon Testing for Low-Income Montana Families

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ABSTRACT

This study analyzed survey data from rural, low-income families for the demographic and cognitive predictors of indoor radon testing. Participants ($n = 170$) lived in Zone 1 designated Montana counties. Logistic regression analyses tested a theoretically supported model in predicting radon testing. Half of the participants had never heard of the health effects of radon. Ninety percent of study participants had not tested their homes for radon. A model of five demographic and three cognitive variables were significant in predicting whether participants who had not tested their homes had ever heard of the health effects of radon ($\chi^2_{(8, 153)} = 21.07, p < .01$). Members of the scientific and medical community should not assume that low-income families understand radon risks. Interventions are needed to include this important group in ethical and comprehensive radon risk reduction efforts.

REVISITING RADON RISK COMMUNICATION

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ABSTRACT

Legislators respond to public perceptions and pressures. Government resources and aggressive protection programs go to hyped environmental health problems regardless of actual risk. For 25 years, government and radon stakeholders have spent a substantial amount of capital trying to explain the radiological risk posed by radon in structures. Radon is recognized as the principal public radiation exposure yet concern is apathetic when compared to other environmental health matters. The public still believes that the radiological risk from nuclear power, radwaste, and medical/dental is far greater than radon. Despite impressive campaigns, public concern and thus legislative action has failed to materialize. This presentation examines public attitudes and behaviors toward radon from the field practitioner's viewpoint since the public's radon information comes predominantly from home inspectors, realtors, radon testers and mitigators, during real estate transactions. Further examines: risk communication methods, successful radon awareness programs and ways to organize cohesive communicative initiatives.

Radiation dose due to indoor ^{222}Rn and ^{220}Rn levels in Bangalore city, India

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ABSTRACT

The ^{222}Rn and ^{220}Rn levels have been measured using solid state nuclear track detectors in various types of houses at 10 different locations around Bangalore city, India. The average values of more than 100 samples of ^{222}Rn and ^{220}Rn concentrations were found to be 33.4 ± 6.1 and 21.6 ± 2.5 Bq m⁻³, respectively. The dose rate received by the population of Bangalore ranged between 0.1 and 0.5 mSv y⁻¹ with the arithmetic and geometric mean of 0.2 ± 0.03 and 0.2 mSv y⁻¹ respectively. Overall, the result does not show much significant radiological risk for the inhabitants and the ^{222}Rn levels are well within the limits of global average concentration of 40 Bq m⁻³. However, the ^{220}Rn levels observed were higher than the global average of 10 Bq m⁻³. The details of results were discussed in detail regarding the types of houses and the variation of concentration.

AVERAGE INDOOR AIR RADON CONCENTRATION BEHAVIOR
WITH SYSTEM FLOW
FOR ASD AND ASP MITIGATION SYSTEMS

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ABSTRACT

The behavior of average indoor air radon concentration with the mitigation systems volumetric flow rate were measured for ASD and ASP systems. A theoretical model is given that includes the radon entry that is originating from the communication of the air inside the house with a large volume pocket under a sealed barrier with various sub-slab or sub-barrier fill materials and from other radon sources from above the barrier. The success of the modeling description supports the interpretation of the model parameters in the houses analyzed. Resulting consequence for the mitigation industry will be discussed. More specifically, from the detailed understanding of this behavior, the case can be made that it can not be expected that all new and existing houses can be remediated to below a given low fixed guidance level using the ASD radon mitigation technique alone.

Radon as an Environmental Justice Issue

Calvin Murphy
Allied Radon

ABSTRACT

To date radon awareness and risk reduction has occurred mainly in densely populated, non-economically challenged areas. The United States also has a sizeable population that lives in sparsely populated, economically challenged areas of the country. Due to limited resources, efforts to educate this group of the population have been very limited. This portion of the population generally is not aware of the health risk associated with elevated radon levels. If they become aware of the risk, the financial means of reducing the risk is oftentimes a challenge. This paper will look at the experience and strategies of a long-time mitigator that relocated his business to this type of environment. It will also discuss the importance of developing partnerships in order to achieve maximum returns on outreach, education, and obtaining funding to accomplish risk reduction goals.

Residential Radon Exposure and Multiple Sclerosis: A Pilot Study.

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ABSTRACT

Environmental risk factors for Multiple Sclerosis (MS) are not clearly understood, although vitamin D and sunlight exposure are thought to be protective. MS prevalence increases with increasing latitude, in a pattern similar to that of residential radon exposure, particularly in the U.S. To further study this relationship, a pilot study was conducted of ninety-seven MS patients and 51 non-MS patient controls. Patients had been diagnosed less than five years. An interview of the 148 patients included time spent on various living levels within the home as well as demographic, medical, residential, occupational, smoking, and other information. In a subset of the group who had lived in their homes for at least five years prior to diagnosis - 25 MS and 21 control patients - radon detectors were placed for six months on different living levels in their homes. Time weighted average levels of radon exposure were calculated. Statistical methods included the t-test, odds-ratios, and logistic regression. Weekly cumulative radon values averaged 13,802.48 Bq m⁻³ h for cases and 9,369.14 Bq m⁻³ h for controls. The adjusted odds-ratio for MS prevalence increased by 1.98 (95%CI = 0.98 to 3.98, p = 0.06) for each unit increase in the time-weighted average of the natural log of radon exposure. Although not statistically significant, a trend of an increase in the probability of MS prevalence with each unit increase in the time-weighted average of the natural log of radon exposure was found. No statistically significant protective effect was found for either reported sunlight exposure or vitamin D use. Discussion of the strengths and weaknesses of the study is provided, as are recommendations for future research. A small sample size is a limiting factor in our conclusions.

The Occurrence of Radon on the Tobique First Nation Reserve and its Implication for Radon Occurrence Along The Saint John River Valley

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ABSTRACT

A survey of 6 large public buildings on Tobique First Nation land in northern New Brunswick, showed five of them to be above the acceptable limit of 200 Bq/m^3 . As most of the 350 homes on the Reserve are located close to any one of these buildings, the concerns raised by the test results, and resulting anxiety for radon in their own homes by residents, was high. This was fuelled by the historic high incidence of cancer on the Reserve. While Health Canada recommends a 90 day test, this wait was unacceptable to the Chief and Council. Consequently, a two day residential radon test was conducted for each of the 350 homes on the Reserve as this was a relatively fast way to screen homes into three categories.

Over a period of three weeks, two E-Perms were installed in each of the 350 homes. In addition, several soil vapour monitor wells were constructed to assess the levels of radon in the soils near some of these homes. An analysis of Uranium content in soils was also undertaken. The results indicate that greater than 50 % of the homes have radon levels greater than 200 Bq/m^3 , with 13% of these showing levels greater than 600 Bq/m^3 . The paper will discuss the implications of the 2 day high density radon survey; its relationship to the 90 day test; the relationship of radon levels in homes to background levels in soil; and the implications for numerous other communities along the Saint John River Valley that potentially lie on the same sand and gravel deposits that lie beneath the reserve.

Is there a link between radon exposure and thyroid cancer incidence??

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ABSTRACT

Radon is a proven lung cancer carcinogen. Over the last years more and more evidence is showing up as to the role of radon in other diseases.

The potential link between thyroid cancer and radon was first formulated by J. Burkhart and colleagues at the 2007 AARST meeting in Jacksonville, following the observation of an increased incidence of thyroid cancers and non-malignant nodules of the thyroid in Colorado Springs.

Comparing the general map of the distribution of radon and the incidence of thyroid cancer in Belgium a striking resemblance is noticed. Based upon this observation a descriptive study was launched in an area called the "Geological Ardennes". In this area, considered as a radon risk area with radon exposures ranging from 20 Bq/m³ to over 2000 Bq/m³, the detailed available radon information was compared to the data about the incidence of thyroid cancer (code ICD 10 C73) for the period 2004-2008 from the Belgian National Cancer Registry.

RESULTS OF AN INTERNATIONAL INTERCOMPARISON EXERCISE ON NATURAL RADIATION MEASUREMENTS UNDER FIELD CONDITIONS

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ABSTRACT

The strict correlation between natural exposure and potential health hazard to population is well known. For this, the calibration of devices used in the measurements is absolutely necessary. Normally, this takes place in accredited laboratories under very well controlled conditions. Since 2010, we have available a new laboratory and in May, 2011, we developed an international intercomparison, sponsored by the Spanish Nuclear Safety Council, that included the study of the response of devices used for the measurement of: external gamma radiation; radon indoor and outdoor, radon in soil gas, exhalation rate from soil and building materials and radon in water. In this exercise more than 30 laboratories coming from different countries have tested their devices under field conditions, that is, under similar conditions as is found in the living situations of the general population. In this paper we shown the main results of the intercomparison and conclusions for the future.

220Rn in indoor environment and work places: A Review

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ABSTRACT

It is estimated inhalation of ^{222}Rn , ^{220}Rn and their short lived progenies contribute more than 54% of the total natural background radiation dose received by the general population. Due to this it was necessary to supplement the external component with inhalation component. This component is not adequately estimated for India at national level. Information on ^{220}Rn in indoors and workplace environment is scarce and subsequently its contribution to the total inhalation dose is ignored compared to other significant sources of natural radiation. In India, electric bulbs that compose of thoriated gas mantles are being used for indoor and outdoor lighting, contribution to the inhalation dose to workers due to the usage of thorium nitrate that emits ^{220}Rn may also be quite significant. In this paper current status of ^{220}Rn levels in the indoor environment and workplaces as well as in other industries where large amount of ^{232}Th is being used is discussed.

From Decontamination to Depressurization – the Evolution of Radon

Mitigation

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ABSTRACT

In 1974 the cause of elevated radon in houses was generally believed to be elevated radium materials from uranium milling and refining wastes and phosphate production. This was limited to a few known areas, and removal of the source was the preferred mitigation method. By 1984, it was understood that elevated radon could be caused by the levels of radium in natural soils, that large areas were radon-prone, and sub-slab depressurization was the preferred mitigation method. This presentation reviews some “radon reduction” projects from that era, and the work that lead to changes in understanding and development of current mitigation methods.

220Rn and its progeny level distributions in a dwelling of Bangalore, India

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ABSTRACT

The effective doses due to inhalation of 222Rn and its progeny account on average for about one-half of all natural sources of radiation. However, recently the indoor surveys in Asia revealed that the dose contribution from 220Rn and its progeny can be equal to or even exceed that of 222Rn and its progeny. In view of this an attempt has been made to observe the distribution of 220Rn levels for Bangalore, India. Dosimeters were installed at a constant distance from the wall, ceiling and flooring of the room. All the windows and doors were closed for 90 days to study the variations with respect to the distance. Dosimeters were also deployed in upper and lower parabolic fashion. Higher concentrations were observed at the wall, ceiling and flooring of the room and it reduces as the detector is moved away from them. Results are discussed in detail.

Cost effectiveness of lung cancer prevention by radon mitigation in the Upper Midwest

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ABSTRACT

We have expanded and extended cost effectiveness analyses of lung cancer prevention through a proposed program of widespread radon mitigation in a radon-prone region. The analyses now includes: risk models based on occupational exposure (BEIR VI _EPA 2003) and another based on residential exposure in the Upper Midwest; an improved database of costs for radon mitigation installation, operation, and risk reduction effectiveness; an improved database for the costs and effectiveness of direct medical treatment of lung cancers that develop; and the Monte Carlo simulations to estimate the range and sensitivity of the cost per lung cancers prevented (or cured) and the cost per year of life extension by mitigation or direct medical treatment. The results of these two assessment metrics will be discussed from a public health perspective as well as a homeowner's perspective.

ASSESSMENT OF OCCUPATIONAL RADIATION EXPOSURE IN NON-URANIUM MINERS IN CHINA

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ABSTRACT

Keywords: Occupational radiation exposure, Non-uranium, Mining, China

Purpose: To assess the radiation exposures to the non-uranium miners. There are 400 thousands miners currently working underground in the non-uranium mines except coal mine.

Methods: We conducted a survey in selected 44 mines of 12 kinds in 12 province, interviewed 2836 miners. Radon and thoron levels in mines were determined by integrated detectors. External radiation levels were determined using 3-month environmental/personal monitoring and HP Ge gamma-ray spectrometry of 32 ore samples. Blood samples were taken in selected miners.

Results: 15% the measured points in mines were over 1000Bq m⁻³ of radon (national action level of radon in workplace), 7% over 3700 Bq m⁻³ of radon. The equilibrium factor was estimated to be ranged from 0.1 to 0.6. External doses were estimated to be lower than 1 mSv/a for most of the non-uranium miners. Scoring of chromosome aberrations of those miners exposed to high radon is presented. Lung cancer risk estimation of the miner is discussed.

Conclusion: Control of radon in non-uranium mines is a challenge to be taken up in the national regulation and control of occupational radiation protection in China.

The First Radon Potential Map of Canada

Alan Whitehead

ABSTRACT

Radon Environmental Management Corporation has completed the first Geologic Radon Potential Map of Canada. No national radon map currently exists for Canada, and the Company based its core methodology for development of the Canadian map on the US Geological Survey's approach for developing the Geologic Radon Potential Map of the USA. Radon Environmental

created the Radon Potential Map of Canada to address an existing gap in the information available to the public about the potential radon risk areas of Canada. Every Canadian, from architects, construction companies, urban planners, government agencies, realtors, health care professionals and the general public, benefits from access to information regarding the presence of radon.

MEASUREMENT OF INDOOR RADON AND THORON USING TWIN CUP DOSIMETERS WITH LR-115 TYPE II PLASTIC TRACK DETECTOR

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ABSTRACT

The measurements of indoor radon and thoron were made in 15 dwellings of Firozabad district of Northern India. Twin cup dosimeters with LR-115 type II plastic track detectors were used. The counting was done using an optical microscope at a magnification of 100X. The values of radon concentration ranges from 20.1 to 91.8 Bqm⁻³; thoron concentration ranges from 13.3 to 74.4 Bqm⁻³; concentrations of radon progeny ranges from 2.2 to 9.9 Bqm⁻³; concentrations of thoron progeny ranges from 4.8 to 27.0 Bqm⁻³; inhalation dose rate ranges from 0.18 to 1.27 mSv.y⁻¹; annual exposure (Rn + Tn) in terms of WLM ranges from 0.26 to 1.18; annual exposure (Rn + Tn) in terms of mjhm⁻³ ranges from 0.90 to 4.19; life time fatality risk of the residents of the study area ranges from 0.76 x 10⁻⁴ to 3.54 x 10⁻⁴ and annual effective dose ranges from 1.0 to 4.5 mSv.y⁻¹. The values of effective dose rate have been found lower than the action levels (3-10 mSv.y⁻¹) recommended by ICRP-65.

Keywords: Radon, Thoron, Twin cup dosimeters, Firozabad region

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