XXI riunione mensile

16 novembre 2020

ore 12.00 – 13.00

Modalità telematica

Presenti (skype):

V. Di Lecce (responsabile scientifico)
A. Di Roma
C. Marzocca
D. Palagachev
T. Politi
M. Popolizio

A. Scarcelli

Riepilogo a 22 mesi
Periodo di riferimento: 17/01/2019 - 15/11/2020

Nominativo	2019	Gen	Feb	Mar	Apr	Mag	Giu	Lug	Ago	Set	Ott	Nov	Totale
Di Lecce Vincenzo	504	22	22	25	11	65	9	28	18	30	22	4	**760**
Di Roma Annalisa	34	1	-	-	-	-	-	-	-	1	1	-	**37**
Guaragnella Cataldo	259	-	-	-	-	-	-	-	-	-	-	-	**259**
Marzocca Cristoforo	325	-	2	1	4	2	1	1	-	1	-	-	**337**
Palagachev Dian	358	9	8	14	48	54	41	32	-	23	5	-	**585**
Politi Tiziano	293	35	17	24	-	80	13	1	-	1	1	-	**465**
Popolizio Marina	152	42	29	33	6	55	95	27	24	40	44	14	**561**
Rizzi Marisa	203	-	-	-	5	-	-	-	-	-	-	-	**208**
Borzone Roberta	1238	153	X	X	X								**1391**
Di Gioia Michele	1072	186	165	198	147	152							**1920**
Esposito Flavia	1170	133	X	X	X								**1303**
Scarcelli Alessandra	897	155	163	178	177	175	176	176	89	178	173	82	**2450**
Amato Alberto	272	30	30	30	30					3			**395**
Digioia Emanuele	131	8	4	6	3	1							**153**
Uva Jessica	172	23											**195**
Camassa Patrizia		14	17	-	-	-	-						**31**
Terlizzi Michele		56	66	116	87	90	39						**454**

Gantt ante-proroga

ATTIVITA'	SCADENZE																	
	17/01 14/02	15/02 15/03	16/03 13/04	14/04 12/05	13/05 10/06	11/06 08/07	09/07 05/08	06/08 03/09	04/09 02/10	03/10 31/10	01/11 29/11	30/11 27/12	28/12 24/01	25/01 22/02	23/02 22/03	23/03 20/04	21/04 19/05	20/05 17/06
Analisi e comprensione dell'Utenza Finale anche attraverso specifiche fasi di coprogettazione			D1															
Definizione del modello di interazione tra i diversi attori coinvolti								D2										
Prototipazione e personalizzazione delle soluzioni									D3									
Test e sperimentazione di nuove tecnologie in applicazioni reali rispondenti al fabbisogno effettivo dell'Utenza Finale									D4 D5		D6	D7 D8 D9		D10 D11		D12	D13 D14	
Dimostrazione e presentazione in modalità demo lab pubblico delle soluzioni prototpilai sviluppate, anche al fine di renderle fruibili da parte di ulteriori comunità di utenti																		D15 D16
Analisi per la valorizzazione economia dei risultati ottenuti nella sperimentazione																		D17
Milestone		M		M		M		M		M		M		M		M		M
Open Workshop			W			W			W			W			W			W

	18/08	18/12	17/05
	SAL INTERMEDIO 40%	SAL INTERMEDIO 60%	

Deliverables

D1	Piattaforma Web di discussione
D2	Simulacri e modelli throw-away
D3	Sistema diffusione odore percettibile
D4	DB per servizi di storage con geolocalizzazione dati (step 1)
D5	Sensore monitoraggio radon (step 1)
D6	Attuatore ricambio aria (step 1)
D7	DSS (step 1)
D8	Web Gis (step 1)
D9	Communication machine (step 1)
D10	DB per servizi di storage con geolocalizzazione dati (step 2)
D11	Sensore monitoraggio radon (step 2)
D12	Attuatore ricambio aria (step 2)
D13	Web Gis (step 2)
D14	Communication machine (step 2)
D15	Documentazione attività svolta
D16	Pubblicazioni scientifiche/industriali
D17	Produzione manualistica e sistemi di interfaccia

Milestones
Organizzate con cadenza bimestrale

Open Workshop
Organizzati con cadenza trimestrale

Riepilogo Attività

In relazione alle attività, si sta seguendo lo schema di Gantt proposto con proroga a dicembre. Anche in questo mese il team di ricerca del Poliba ha svolto le proprie attività in smart-working, secondo le indicazioni nazionali e seguendo le direttive del Politecnico.

ATTIVITA'	17/01 14/02	15/02 15/03	16/03 13/04	14/04 12/05	13/05 10/06	11/06 08/07	09/07 05/08	06/08 03/09	04/09 02/10	03/10 31/10	01/11 29/11	30/11 27/12	28/12 24/01	25/01 22/02	23/02 22/03	23/03 20/04	21/04 19/05	20/05 17/06	18/6 17/7	18/7 17/8	18/8 17/9	18/9 17/10	18/10 17/11	18/11 17/12
Analisi e comprensione dell'Utenza Finale anche attraverso specifiche fasi di coprogettazione			D1																					
Definizione del modello di interazione tra i diversi attori coinvolti							D2																	
Prototipazione e personalizzazione delle soluzioni								D3																
Test e sperimentazione di nuove tecnologie in applicazioni reali rispondenti al fabbisogno effettivo dell'Utenza Finale						D4 D5					D6	D7 D8 D9		D10 D11		D12						D13	D14	
Dimostrazione e presentazione in modalità demo lab pubblico delle soluzioni prototipali sviluppate, anche al fine di renderle fruibili da parte di ulteriori comunità di utenti																								D15 D16
Analisi per la valorizzazione economia dei risultati ottenuti nella sperimentazione																								D17
Milestone		M		M		M		M		M		M		M			M			M				M
Open Workshop			W				W		W			W										W		W

18/08
SAL INTERMEDIO 40%

18/12
SAL INTERMEDIO 60%

Deliverables

D1	Piattaforma Web di discussione
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D14	Communication machine (step 2)
D15	Documentazione attività svolta
D16	Pubblicazioni scientifiche/industriali
D17	Produzione manualistica e sistemi di interfaccia

prolungamento / anticipo di attività per necessità di arruolamento personale

periodo (presunto) con limitazione di accesso ai laboratori e di confronto con l'utenza

Milestones
Organizzate con cadenza bimestrale

Open Workshop
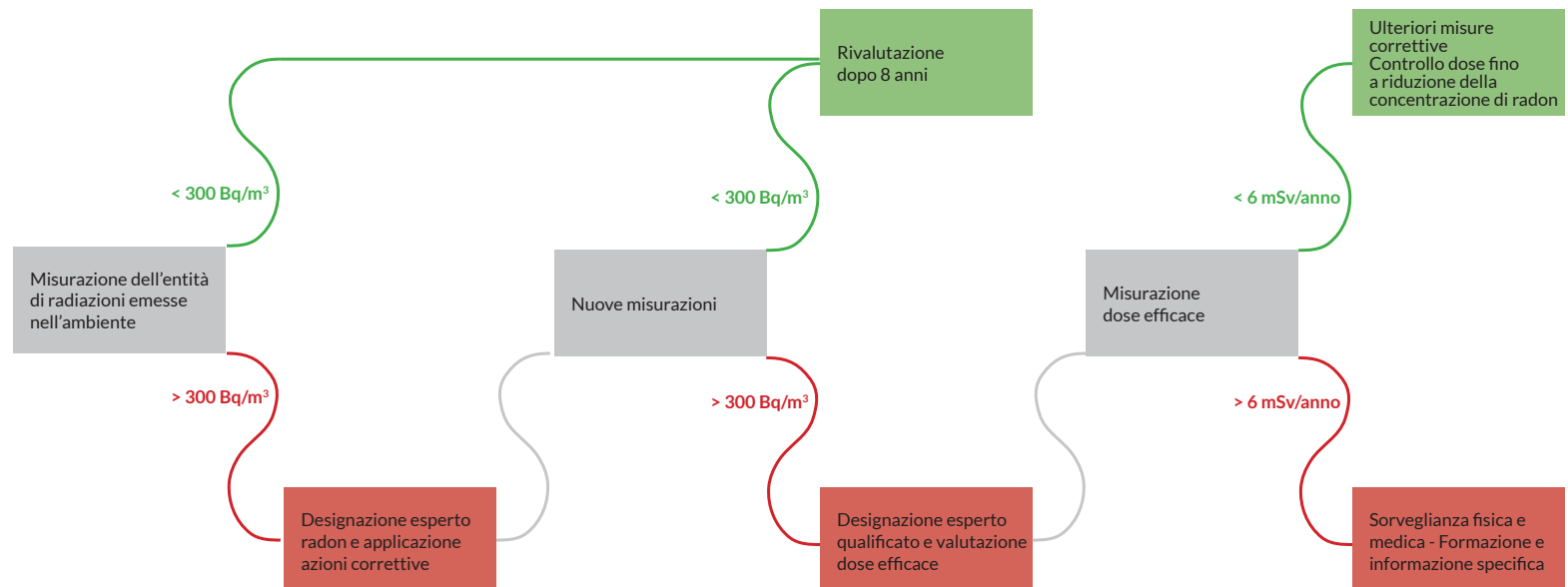Organizzati con cadenza trimestrale

Riepilogo Attività

E' proseguita l'analisi del **DL 101_2020,** pubblicato in data 31 luglio 2020: Attuazione della direttiva 2013/59/Euratom, che stabilisce norme fondamentali di sicurezza relative alla protezione contro i pericoli derivanti dall'esposizione alle radiazioni ionizzanti, e che abroga le direttive 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom e 2003/122/Euratom e riordino della normativa di settore in attuazione dell'articolo 20, comma 1, lettera a), della legge 4 ottobre 2019, n. 117

Lo studio della normativa ha evidenziato una variazione nelle fasi di valutazione del rischio a opera del datore di lavoro, come descritto nello schema seguente.

Riepilogo Attività

DL 101_2020
Fasi di valutazione del rischio a opera del datore di lavoro

Rivalutazione dopo 8 anni		Ulteriori misure correttive Controllo dose fino a riduzione della concentrazione di radon

< 300 Bq/m³   < 300 Bq/m³   < 6 mSv/anno

Misurazione dell'entità di radiazioni emesse nell'ambiente	Nuove misurazioni	Misurazione dose efficace

> 300 Bq/m³   > 300 Bq/m³   > 6 mSv/anno

Designazione esperto radon e applicazione azioni correttive	Designazione esperto qualificato e valutazione dose efficace	Sorveglianza fisica e medica - Formazione e informazione specifica

Riepilogo Attività

Per quanto riguarda le attività di comunicazione con le scuole, sono stati predisposti dei questionari quantitativi per la popolazione studentesca universitaria, somministrati in questo periodo attraverso le modalità consolidate dei Google Form, e diffusi grazie alla collaborazione della comunità docente coinvolta nel progetto.

Si attendono i risultati per una valutazione dell'efficacia degli strumenti divulgativi scelti.

Riepilogo Attività

Prosegue l'attività di ricerca e aggiornamento bibliografico relativo alle pubblicazioni scientifiche. Nell'ultimo anno (da luglio 2019 a novembre 2020) sono stati pubblicati interessanti contributi, di cui si riporta l'abstract.

CPRD Supplied With Native Scintillator for Radon Gas Detection
Ayman M. Abdalla
For neutron detection and radioactive gas sensing, it is greatly beneficial to detect alpha (α) particles and gamma rays. In the present work, continuous passive radon detector (CPRD) has been constructed with native ZnS; AgCl scintillator. The detector has been supplied with highly efficient native nano particles scintillator for detection of α particles. One of the features of this scintillator, the energy resolution is comparable with or even better than commercial ZnS (Ag) scintillator. This study provides an alternative for the fabrication the native scintillator in the absence of costly scintillator available in the market. Moreover, results of scintillation characteristics, along with physical properties of the scintillator, are addressed and thoroughly discussed. For calibration, radon calibration system with dual radon monitor has been constructed in Najran University, Saudi Arabia. The experimental sensitivity of the passive CPRD cell for radon gas detection was constant with well-known data already published in the literatures. Radon emission from a natural sample has been measured by the fabricated CPRD cell.

Riepilogo Attività_ Aggiornamento bibliografico

Calculation methods of Radon-222 radiological activity for NORM plant with ventilation

Pedro M. Dieguez-Elizondo - Paul Gerard - Tomas Gil-Lopez - Miguel Angel Gálvez

In this research a recommended procedure is proposed to determine the radiological activity of air present in the working area of a NORM (Naturally-Occurring Radioactive Materials) plant. This NORM plant is located in the United Arab Emirates. Substantial quantities of NORM waste will be present inside the enclosed plant facilities and will exhale significant amounts of the radioisotope gas, Radon-222 ($222Rn$) into the working environment. The continued inhalation of this gas and its progeny has been shown to cause lung cancer. In order to reduce the concentration level of the aforementioned gas to an acceptable regulatory value, the best solution is by means of mechanical ventilation. The two calculation methods used to analysis the relationship between the ventilation rate and the degree of radioactive contamination are considered: the first being ventilation by perfect dilution (commonly employed in industrial environments with radiological contamination) and which requires a very simple calculation approach where the plant volume is multiplied by a number of air change rates to determine the necessary fresh airflow rate, the second method of analysis is by means of a CFD (Computational Fluid Dynamics) which permits a more precise calculation of the required fresh air quantity and where the related spatial concentrations can be determined within the total volume of the plant, especially close to the emission source of radon and breathing zones. Validation was carried out in a small experimental plant, obtaining results reasonably approximated to those foreseen by computational analysis. The similarities and differences between the respective calculation methods and their respective fields of application are analysed. In order to determine the resulting levels of concentration of the studied gas, it is concluded that for natural ventilation and forced ventilation, both with very low air change rates required, the CFD analysis is the most appropriate method, to determine with precision the said concentrations. By contrast, when using a higher rate of outside air changes in the plant, the perfect dilution method should be sufficient enough to control the presence of radon. However increased ventilation rates will increase energy consumption and there is no guarantee that the spatial distribution is actually uniform as would be assumed in this case, with perfect dilution. Another important conclusion of the CFD study is that the fresh airflow rate estimated for the ventilation of the plant, will effectively remove the radon exhaled by the NORM waste. Both calculation methods consider the activity of radon and the activity of the most significant radioisotopes of its progeny.

Riepilogo Attività_ Aggiornamento bibliografico

Diffusion and transportation of the radioactive airborne pollutants: Challenges and progresses
December 27, 2019
https://doi.org/10.1177/1420326X19878908
Hanqing Wang, Hui Zhu, Chuck Yu

The Relationship between Multiple Sclerosis Prevalence and Density of Radon Gas in the Environment (Review)
December 2019 - Journal of Environmental Health and Sustainable Development 4(4)
DOI: 10.18502/jehsd.v4i4.2024
Monire Fallah Yakhdani - Zeynab Abaszadeh Fathabadi - Reza Fouladi-Fard - Ali Asghar Ebrahimi
Introduction: Radon (Rn) is a chemically inert gas with no odor, color, and taste. It is created from the decay of uranium in the soil and can penetrate the building through the interiors. As a result, Rn can enter the human body with the release of alpha radiation along with airborne dust and cause chronic illnesses such as lung cancer and multiple sclerosis. The Multiple Sclerosis disease, as a complex multifactor disease, is the most common widespread neurotic disorder among the young people. The purpose of this study was to collect and review the past studies published in this field since 1996. Materials and Methods: In this review, the related articles were searched and studied using key words such as "Radon, Action, Thoron, MS, MS Disseminated, and Sclerosis" using the PRISMA statement. Results: After reviewing the studies, several effective factors in the prevalence of MS were identified. Some of these factors were a result of the exposure to high levels of radon gas. Penetrations from the building cracks of floor, soil bed, and dwelling materials as well as the water resources are among the most important sources of Rn. Conclusion: According to the results, the amount of Rn and it's daughters in the environment are recognized as the risk factors for the MS prevalence.

Riepilogo Attività_ Aggiornamento bibliografico

MULTI-SCALE TEMPORAL PATTERNS IN SOIL RADON GAS DATA SERIES
January 2020 - Carpathian journal of earth and environmental sciences 15(2):533-546
DOI: 10.26471/cjees/2020/015/150
Gyozo JORDAN - Silvana Beltran
This paper reports on the applicability of wavelet analysis to the study of multi-scale temporal patterns in soil radon gas compared to the conventional time series analysis (TSA). Both methods delivered good modeling results for the studied 15 minutes sampled time series. The main achievement of the wavelet method is the identification and numerical characterization of the subtle semi-diurnal (12 h) periodicity. Unlike the other time series components (cycle, diurnal periodicity etc.), the semi-diurnal periodicity is the only temporal feature which is the same in the studied July (summer) and December (winter) time series.

Design of Radon Gas Monitor for Building Materials
January 2020
Rasito Tursinah
Monitoring the concentration of radon gas in the air of the house (indoor) and its release rate from various types of building materials is important to be carried out in the framework of radiation protection and safety. Radon gas monitor has been designed based on detection of alpha particle with the ZnS(Ag) scintillator type of detector material. The principle of measurement is to drain released radon gas from building materials into the detector chamber. Inside the detector chamber, radon gas is detected based on the pulse of the light resulting from the interaction of the alpha particles with the detector material. Detectors which equipped with photomultiplier tubes converts light into electrical charges and are then converted into voltage pulses while being reinforced by a charge sensitive type of pre-amplifier. The number of voltage pulses generated is calculated using Arduino electronic circuit and displayed graphically by pre-installed LabView software in a computer. The concentration of Radon gas is proportional to the voltage pulse multiplied by the efficiency of the detector chamber. Test on zirconum samples showed that the monitor worked properly, and it therefore can be used to measure released radon gas from building materials.

Riepilogo Attività_ Aggiornamento bibliografico

Radon Gas Profiles and Exposure Estimates in the Perama Cave, Greece
February 2020 HNPS Advances in Nuclear Physics 13:120
DOI: 10.12681/hnps.2951
C. A. Papachristodoulou - K. G. Ioannides - Kostas C. Stamoulis – S. B. Pavlides
An investigation of atmospheric radon levels in the Perama Cave, North-western Greece, has been carried out using CR-39 detectors. The detectors were placed at various locations along the guided cave pathway and exposed during different sampling periods. Mean concentrations amounting to 925±418 and 1311±352 Bq m-3 were recorded in the summer and winter months, respectively. The quantification of effective doses from radon daughters' inhalation was important, as the Perama Cave is one of the most popular in Greece, attracting more than 85,000 tourists per year. Due to the short duration of the guided tour along the cave, exposure of tourists was found to be insignificant, lying below 5.1 μSv per visit. Permanent cave guides receive doses ranging from 4.2 to 5.9 mSv y-1. Considering the ICRP-65 recommendation that action levels in dwellings and workplaces should be set between 3 and 10 mSv y-1 untertaking remedial measures to reduce the exposure of cave staff may be appropriate.

Evaluation the Radon Gas Adsorption in Leaves of some Silhouette Plants
February 2020
Athraa Naji - Nada Farhan Kadhim - Ali Abdulwahab Ridha

Riepilogo Attività_ Aggiornamento bibliografico

Numerical investigation of radon dispersion and dose assessment for typical ventilation schemes with an air purifier

Dong Xie - Chenhua Wang - Chuck Yu - Hanqing Wang

Radon is a radioactive pollutant that could pose hazards to the surrounding environment and people due to its radioactive decay progenies. In this study, numerical simulations of radon dispersion were conducted under natural and mechanical ventilation with an air-purifier for radon. Factors such as the air supply speed, position and air supply angles of the purifier were considered. Results showed that the increase in the air supply speed from the purifier was an effective solution to reduce indoor radon pollution. The effect was better when the purifier was in the middle of the room. The purification effect was similar when the air supply changed under natural ventilation, while purification function was more effective when the air supply angle was 60° under the mechanical ventilation condition. An effective dose estimation involving typical ventilation schemes with radon purifier was evaluated. Using this approach, the radiation effect on occupants was computed. The calculated effective dose was 0.9 mSv y^{-1} when the air supply speed of the purifier was 0.2 m s^{-1} under natural ventilation. As a result, the effective dose calculated was under the annual effective dose limit of 3–10 mSv y^{-1} recommended by the International Commission on Radiological Protection (ICRP) for public exposure.

Riepilogo Attività_ Aggiornamento bibliografico

Indoor radon and thoron from building materials: Analysis of humidity, air exchange rate, and dose assessment
Ahmad Ciptadi Syuryavin - Seong Jin Park - Muttaqin Margo Nirwono - Sang Hoon Lee
Building materials contribute significantly to the indoor radon and thoron levels. Therefore, parameters that influence the exhalation rates of radon and thoron from building material need to be analyzed closely. As a preliminary study, the effects of humidity on exhalation rates were measured using a system with an accumulation chamber and RAD7 detector for Korean brick, Korean soil, and Indonesian brick. Resulting doses to a person who resides in a room constructed from the building materials were assessed by UNSCEAR method for different air exchange rates. The measurements have revealed that Korean brick exhaled the highest radon and thoron while Indonesian brick exhaled the lowest thoron. Results showed that for a typical low dense material, radon and thoron exhalation rate will increase until reached its maximum at a certain value of humidity and will remain saturated above it. Analysis on concentration and effective dose showed that radon is strongly affected by air exchange rate (ACH). This is showed by about 66 times decrease of radon dose from 0.00 h^{-1} to those of 0.50 h^{-1} ACH and decrease by a factor of 2 from 0.50 h^{-1} to those of 0.80 h^{-1}. In case of thoron, the ACH doesn't have significant effects on effective dose.

Riepilogo Attività_ Aggiornamento bibliografico

Rabi Rabi; Oufni Lhoucine; Badry Hamza

This study aimed to numerically investigate the radon (222 Rn) dispersion in a ventilated room. The Reynolds-averaged Navier-Stokes (RANS) equations supplemented with equation of energy and radon concentration are solved using the FLUENT code. We are targeting primarily the ventilation effectiveness (εc) and the index of indoor air quality (I IAQ). Different displacement and mixing ventilation modes are investigated in isothermal conditions. Computations have been performed with Reynolds numbers between 5 10 2 and 4 10 4 , and different Rayleigh numbers between 9.33 10 8 and 4.66 10 9 , in order to suggest effective ventilation that can ensure a good indoor air quality. The simulation results indicate that the ventilation effectiveness to remove a contaminant of radon 222 Rn and the index of indoor air quality are substantially influenced by the ventilation mode and the location of outlet air. From this study, it appears that the air flow and radon dispersion in a ventilated room can be typically predicted or evaluated by computer simulations.

Riepilogo Attività_ Aggiornamento bibliografico

Modelling dispersion of radioactive aerosols and occupational dose assessment of workers in a large nuclear plant industrial workshop with a stratified air conditioning system

Dong Xie - Chenhua Wang - Wei Ding - Hanqing Wang

Numerical simulations of radioactive aerosols dispersion were conducted to determine the potential radiation hazard on occupants due to radioactive aerosols emitted from the workbench in a large nuclear plant industrial workshop with a stratified air conditioning system. Different air organization schemes were evaluated based on the position of the workbench under the initial, mainstream and end locations of the jet stream. The two air distributions of "unilateral nozzle air supply" (UNAS) and "bilateral nozzle air supply" (BNAS) were considered based on experimental measurements. Results show a high removal efficiency of radioactive aerosols when the pollution source was in the main jet stream under "BNAS". Both air distributions worked well when the pollution source from the workbench was in the initial and end section of the jet air stream. In addition, increasing the local exhaust velocity was an effective solution to remove the radioactive aerosols. The maximum effective dose rate calculated for workers' exposure to radioactive aerosols was 14.39mSv y^{-1} when the local exhaust system was operating normally in the work area, in the main jet stream under "UNAS". Therefore, the average effective annual dose was under the International Commission on Radiological Protection (ICRP)'s recommended limit of 20.0mSv y^{-1}.

Riepilogo Attività_ Aggiornamento bibliografico

The relationship of indoor radon gas concentration with multiple sclerosis: a case-control study

Zeynab Abaszadeh Fathabadi - Mohamad Hassan Ehrampoush - Masuod Mirzaei - Ali Asghar Ebrahimi

This case-control study aimed to investigate the relationship of indoor radon gas concentration and residential building characteristics with mental health with multiple sclerosis (MS) in Yazd City, Iran. The participants included 45 patients with MS and 100 healthy individuals. The participants' socio-economic status and residential building characteristics were investigated using a questionnaire. The radon gas concentration was also measured by CR-39 detectors over a 6-month period. Furthermore, the participants' mental health data were collected using General Health Questionnaire (GHQ-28). The mean concentrations of radon gas were 66.77 and 65.33 Bq/m3 in the homes of patients with MS and healthy individuals, respectively, but the difference was not significant (p = 0.882). However, the radon gas concentration had a significant relationship with the building's age (p = 0.038), ventilation (p = 0.053), and cooling system (p = 0.021). A significant difference was observed between the two study groups in terms of the mental health (p = 0.018), depression (p = 0.037), somatic symptoms (p ≤ 0.001), and physical activity (p = 0.030). Since the indoor radon gas concentration did not have any significant relationship with MS prevalence, more studies are required in this regard, especially in long-term exposure.

Riepilogo Attività_ Aggiornamento bibliografico

Chapter 18 Radon gas hazard

June 2020 - Geological Society, London, Engineering Geology Special Publications, 29, 433-456, 2020, https://doi.org/10.1144/EGSP29.18

J. D. Appleton, D. G. Jones, J. C. H. Miles and C. Scivyer

Radon (^{222}Rn) is a natural radioactive gas that occurs in rocks and soils and can only be detected with special equipment. Radon is a major cause of lung cancer. Therefore, early detection is essential. The British Geological Survey and Public Health England have produced a series of maps showing radon affected areas based on underlying geology and indoor radon measurements, which help to identify radon-affected buildings. Many factors influence how much radon accumulates in buildings. Remedial work can be undertaken to reduce its passage into homes and workplaces and new buildings can be built with radon preventative measures.

The estimation of radon gas measurement in grains in Samawah city markets using CRM-1029

November 2020 - Solid State Technology 63(6)

Rawaa Algareb

In this study, people and animals eat grains of cooking more especially with the big benefits of grains food types. Most studies of contained risky levels of Radon gas showed many places Samawah city. Radon contamination detected in many types grains which collected from various markets of city with twenty types of it selected. The Monitoring of radon (CRM-1029) detect the gas levels in the it. The highest reading recorded in Chard (Origin from Iraq) was (23.25 Bq/m3),and the lowest reading recorded were in Sesame(Origin from Egypt) was(5.95Bq/m3).The measuring were higher than known as normal levels because the radiological study shows that consumption of the studied for grains should not health with more than (7 Bq/m3) with samples of some it and another samples compare with the empty sample but when using it for cooking or meals, it is recommended to use 1-2 days during the month to obtain radioactive decay in the body depending on previous studies. It is recommended to study the gas concentrations in other types of grains, foods and locally grown. Keywords: radon contamination, radon levels, Continuous Radon Monitoring CRM-1029, Al Muthanna University, Muthanna province, Samawah city & Grains (an edible legume).

Riepilogo Attività

In attesa della pubblicazione del sito web del progetto, competenza specifica di uno dei partner industriali, sono proseguite le attività di popolamento documentale sulle pagine informative predisposte, secondo lo standard Living Lab, all'indirizzo:
http://www.aeflab.net/index.php?idx=220

In particolare è stato aggiunto:

20° Incontro Mensile - 16/10/2020

Attività svolte
dal personale di ricerca selezionato

assegni

Dott.ssa Arch. Alessandra Scarcelli - Phd in Progettazione architettonica

Attività svolta:

- schematizzazione delle fasi di valutazione del rischio a opera del datore di lavoro secondo la DL101/2020;

- ricerca bibliografica per aggiornamento delle reference di progetto e verifica con l'apparato bibliografico adottato;

- sistematizzazione materiale per stesura relazione finale;

- revisione documentazione di rendicontazione del progetto;

- partecipazioni a riunioni interne in modalità telematica.