12 th Radiation Physics and Protection Conference
27-29 October 2018 - Cairo

Under the Auspices of

Prof Mohamed Shaker
Minister of Electricity and Renewable Energy

And

Prof Atef Abdel Hamid Abdel Fattah
Chairman of

Egyptian Atomic Energy Authority (EAEA)

And
National Network of Radiation Physics (NNRP)

Conference Chairman
Prof Mohamed Ahmed Mahmoud Gomaa
invite you to attend 12th Radiation Physics and protection conference that shall be held at EAEA Headquarter, Nasr City, Cairo, Egypt from 27-29 October 2018 .

IAEA Approach on Safety Enhancement of Research Reactors

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Abstract

The IAEA, through its programmes and activities, continues to contribute to enhancing the safety of research reactors worldwide. These programmes and associated activities are continuously adapted to address the needs of Member States, issues and trends, and challenges facing the research reactor community. The overall objective of the IAEA sub-programme on research reactor safety is to support Member States in achieving and maintaining a high level of safety in all activities and stages of the facilities' lifetime. The strategy of implementation of this sub-programme is to support Member States in the effective application of the Code of Conduct on the Safety of Research Reactors and the IAEA safety standards, conduct of peer reviews based on these standards, support capacity building, disseminate operating experience, and promote information networks and exchange of operating experience. The implementation of the sub-programme resulted in a significant progress in enhancing the safety of research reactors worldwide. However, further improvements are needed in a number of areas and efforts are still needed to address emerging challenges, including enhancing regulatory supervision, improving operational safety in the areas of ageing management, operational radiation protection, and preparation for decommissioning as well as in establishing adequate national infrastructure for countries building their first research reactor. This paper discusses the safety issues and challenges for research reactors and the IAEA activities to support Member States in addressing these issues and challenges, together with the recent progress and achievements, and areas of future focus to continue enhance the safety of these facilities.

Keywords: IAEA Safety Programme, Research Reactors, Nuclear Safety

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

Mohamed Gomaa* and Ferid Shannoun#

***UNSCEAR Council member (2008-20011)**

 # Acting UNSCEAR Scientific Secretary

Abstract

UNSCEAR was established by UN General Assembly (GA) resolution in 1955

UNSCEAR aims is

To Assess levels, effects & risks of ionizing radiation

To Identify emerging issues

To Improve knowledge

To Identify areas for future research

And to Disseminate findings to UN GA, scientific community & public

In the presentation attention shall be paid to

- **Background and Egyptian participation**
- **Sources and levels of exposure**
- **Concluding remarks**

Latest Arabic broacher shall also reviewed

IRPA History and RADIATION Protection Challenges in Africa

M A Gomaa

IRPA- Egypt

Abstract

The History of IRPA International begins officially in 1967. Efforts to form it starts after the formation of Health Physics Society In USA in 1955.IRPA international conducted 14 International Congresses all over the world. The last one was in South Africa in 2016. Among IRPA international activated is to support Regional congresses. The Last IRPA Africa Congress was held in Tunis in September 2018. Several challenges face Radiation Protection community in Africa. The present work is to point out to these challenges.

Medical Physics Education and Training in MEFOMP Countries

Ibrahim Duhaini
Chief Medical Physicist & Radiation Safety Officer,
Rafik Hariri University Hospital,

Abstract

The Education and Training of medical Physics in MEFOMP countries have been evolved since the last decade to better suit the demand and fulfill the market need of physicists in our region. The programs of Medical Physics will be reviled for some countries in our region.
The mission of MEFOMP Educational and Training Committee (ETC) is to promote activities related to education and training of medical physicists for the purpose of improving the quality of medical services for patients in the region through advancement in the practice of physics in medicine. ETC helps and provides support for all medical physics trainee in all member countries to understanding of different levels of learning, and the types of knowledge required for higher level functions such as problem solving, creative innovations, and applied clinical applications.
Medical physics education can be much more effective and efficient when all regional chapters of IOMP share their knowledge and experience to enhance the outcome with coordination of highly qualified experts of medical physics professionals.

Improving Access to Quality Cancer Management through Sustainable Capacity Building
RAF/6/050

1 January 2016 – 31 December 2017

1 January 2018 – 31 October 2018

Khaled M. El Shahat Ph .D

National Coordinator of Medical Physics in Support of Cancer Management (RAF/6/031)

Prof .of Medical Radiation Physics , Clinical Oncology and Nuclear Medicine Department

Al -Azhar University ,International Medical Center

***National Conference in Egypt for Medical Physicists*:-**

- Three Conferences held in Egypt in Last year have a part for medical physicists, with effectively sharing in these conferences

RECOMMENDATIONS for Project: -

- **Strengthen the workforce of radiotherapy through training and continuous education of radiation oncologists, medical physicists and radiotherapists.**
- ***Arrangement of workshops for medical physicist and radiotherapists to cope with the development in Radiotherapy machines and new techniques like IMRT, S BRT …. etc***
- ***The audit program must have a clear section on dosimetry after radiation oncology departments are evaluated. the TRS398 Dosimetry protocol and the outcome of the evaluation should be reported to Project Coordinators for appropriate action for new linear accelerator technology.***
- ***Monte Carlo Simulation Workshop is very useful for medical physicists to cope with development in Radiotherapy field***
- ***Web-communication between Medical Physicists in large centers and those in small centers for education and improving quality of the specialty.***

NATIONAL PRIORITIES FOR RADIOTHERAPY AND MEDICAL PHYSICS IN 2019

Radiation oncology: priority for training course IMRT, IGRT and Advanced clinical trials

Medical physics: QA for Advance Radiotherapy Techniques and Dosimetry and Vivo dosimetry for new techniques and New linear accelerator (FFF)

Khaled M .El Shahat PhD, RSE ,National Coordinator of Egypt – Medical Physic Project RAF/6/050

Direct mathematical calculation of the solid angle subtended by a circular detector at linear sources

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Abstract

Knowledge of the geometrical solid angle is essential in all absolute measurements of the strengths of radioactive materials and to calibrate detectors. A direct mathematical formalism for the determination of the geometrical solid angle and the geometrical efficiency of a circular detector and arbitrarily positioned line sources is deduced. The results have been compared with previous computational treatments. The comparison shows a very satisfactory agreement in all cases.

Keywords: **Geometrical solid angle; Geometrical efficiency; linear sources; Circular detector.**

GeoEfficiency Software Package Usage Tutorial

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Abstarct

GeoEfficiency is an open source software written in the Julia programing language and is devoted to accurately calculate the geometrical efficiency (GE) of a source – detector system. This software can be used to calculate the geometrical efficiency (GE) for many common source – detector geometries. The package is based on advanced feature incorporated in the fast-developed well-maintained Julia programing language, allowing run of the package out of the box in Windows-based and Unix-based PC and even in browser without any local instillation.
This current work is devoted to the very point of describing in general how to use the package (from insulation to building up to general usage).
Contact: DrKrar@gmail.com

CT Isotope Imaging Using Nuclear Resonance Fluorescence for Future Nuclear Safeguards: Monte Carlo Simulation of Prototype Experiment with Pb-208

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Abstract:

Secure nuclear energy and its peaceful utilization demand capabilities to prevent illegal dealing of nuclear materials. Also, there is a strong demand for technology that is capable of imaging isotopic distribution, especially for 239Pu in spent nuclear fuel (SNF), for nuclear safeguards. To address these demands, isotope imaging technique, based on NRF-CT (Nuclear Resonance Fluorescence - Computed Tomography) was studied. This technique is based on NRF transmission method. Experiment with a prototype of NRF-CT was carried out a tUVSOR-III facility, which could provide the laser Compton scattering (LCS) γ-ray beam ,whose maximum energy so far is 5.4 MeV. Natural lead was used as a tested CT-target to demonstrate the efficacy of this technique. In this paper, Monte Carlo particle transport simulation, using GEANT4, was carried out for further understanding of the experimental results and the NRF events distribution in the target and the witness-foils. In addition, the simulation calculation was implemented for additional configuration, beyond the experimental setup. A clear CT-isotope image (CTII) for Pb-208 was constructed from the experimental results and the simulation outcome validated.

Keywords: CT isotope imaging, special nuclear material, Nuclear Resonance Fluorescence, LCS γ-ray, Monte Carlo Simulation - GEANT4.

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Limiting Exposure to Children to gamma radiation from released patients treated with I-131

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Abstract

Due to the widespread use of radionuclide's in diagnosis and radiotherapy patients undergoing treatment in general and treatments with I-131 in particular are usually released few days after administration. Families of the patients in general and well educated families express their anxiety.
In the present study different responses were received in the families as a result of discharge patients on one hand careless and on anther hand fear.
Among the current activity for patients before and after release from the nuclear medicine department of a hospital is monitoring both area and personnel.
Radiation Measurement using gamma ray dose rate measuring device around several patient ,grandmothers and House wifes, where each received 3.7 GBq.
In one case , three weeks after patient discharge , the dose rate at one meter from the patient was 6 uSv/h.. A reduction factor of 12 is needed to reduce dose rate to 0.5 uSv/.h, which could be achieved by separation distance of 3 to 4 meters separation distance ,alternately, lead screen can be used..
As a result of monitoring patient homes, members of the families in general and children in particular are advised to limit their exposure to gamma rays from I-131 by distance... Limiting exposure to children can be applied using ALARA principal and dose reaction techniques. Such as time, distance and shield .
Applying 2007 ICRP recommendations remaining dose constrains to members of the public of 300 micro Sivert per year. This leads to Limiting exposure to children to less than 0.2microSiveret per hour

Breast Cancer: From Diagnosis to Therapy

Ibrahim Duhaini

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Abstract

Breast cancer screening techniques and treatment methods especially external beam radiation therapy and mastectomy increased the survival rate for patient with breast cancer. The early detection of breast cancer helps in the management progression and lessens the complications involved in the treatment modalities used like surgery, chemotherapy, radiation therapy, and other non-traditional therapies. Many countries in the world are performing breast screening campaigns that encourage women above the age of 45 to do mammography at least once every year. Clinicians depend on the progress of tumor in case found to give the best treatment options which could be a mixture of many modalities mentioned above. The most prominent method is using Radiation Therapy approach. Many techniques has been developed from 2D planning, 3D planning, IMRT, Brachytherapy using Mammosite techniques and others will be revealed.

Egyptian Association for Medical Physics, (EAMP) from 1998 - 2018

Historical overview, present activities and international position

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Historical overview:

(EAMP) is declared Egyptian Association for Medical Physics the founding of Assembly under no. 388 dated 15/02/1998 and the headquarter Kasr Al-Aini Oncology and Nuclear Medicine Center (NMROCK) as delegated Constituent Assembly. The first international conference of ***Medical Physics in Radiotherapy*** on 10 - 14.05.1998 Hold at (NMROK) and National Cancer Institute (NCI) after logging Assembly of the International Federation of Medical Physics IOMP in conjunction with the AAPM. The first scientific symposium was held at the National Institute for standards and Calibration (NIS) in 11/26/1998. The second scientific symposium held at Oncology and Nuclear Medicine Center, Hussein hospital, Al-Azhar University on April 18.4.1999. Assembly headquarters was moved to Agouza – Dokki, Giza. The second international conference of ***Advances in diagnostic radiology, nuclear medicine physics and radiation protection*** was held at the Nasser Institute Hospital Hall, Nile Corniche on 23 - 27 February 2003 under the auspices of both the International Federation of Medical Physics IOMP and AAPM. The general meeting of the Assembly adjusts the positions according to the new Law no. 84 of 2002 on 25/11/2004. It has been approved by the Board of Directors on trying to purchase a permanent headquarters for the association. The account established for Egyptian Association for Medical Physics on Facebook and website on internet as eamp-eg.org.

Present Activities and International Position:

The Board of Directors at 5th May 2014 restore activities of the association and appointed general secretary of the Association date up to date. Establish a website of the Association for one year from 11/2014 to 11/2015 as the ***eamp-org.eg***. It has been addressed both the African Federation for Medical Physics Organization FAMPO and the International Federation of Medical Physics IOMP and the International Atomic Energy Agency IAEA to introduce the EAMP to the return of the Assembly 's activities in 2014 and received congratulatory them to do so and promised to strengthen and supporting EAMP activities in the Assembly, and has been paid $ 3 for 200 member of the Assembly of the International Federation of Medical Physics IOMP for the three years of 2014, 2015, 2016, 2017 and 2018. It has been preparing a draft law to practice the profession of medical physics and presentation on the Supreme Committee for radiation oncology of the Ministry of Health and directed to the Central Agency for Organization and Management through the General Secretariat of specialized medical centers affiliated to the Ministry of Health.

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Evaluation of Anthropogenic and Geogenic Impacts on Marine Sediments of Egyptian Sector of the Red Sea by NAA and ICP-MS

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Abstract:

The present study was conducted to assess the possible impacts of human activities and naturally occurring on the marine sediments, to test for anomalous enrichments in metals. A total of 32 marine sediments samples collected from 12 coastal areas of the Egyptian Red Sea analyzed using different analytical techniques. The analysis explored 43 elements for the marine sediments. Principal component analysis and multivariate statistics were implemented on the data. The extent of pollution was quantified for selected 6 pollutants using the geoaccumulation indices (Igeo), enrichment factor (EF), metal pollution index (MPI), contamination factor (Cf), and degree of contamination factor (Cd). The associated risk using potential ecological risk factor (PER), and risk index (RI) was calculated. The data was interpolated using ArcGIS technology to construct the spatial distribution maps of the selected 6 pollutants along the coastal areas of the Egyptian Red Sea. The data was normalized and the peak values were observed for Ca (13.6%) > Na (1.9%) > Mg (1.6%) > Br (41.1 ppm). The obtained findings were compared with other local and regional data shows that the metal enrichment in studied areas is in line and anomalous enrichments in metals were not evidenced. Even though out of 12 studied areas 2 areas viz., Sharam El-Bahari in the middle of the coast and downwards to the southern Marsa Hemira area found to have peak values of metals, however still show a good agreement with results with other data. Moderate enriched sediments with Cr were noticed. It could be stated that comparison of the gained data from this study with others clearly indicates that nearly the metal concentrations were in the natural unpolluted sediments range.

Keywords: **Red Sea/ ICP-MS/INAA/Marine Sediments/Major and Trace Elements/Contamination indices**

Analysis of Petroleum Sludge of Eastern Egyptian desert using an Instrumental Neutron Activation Analysis (INAA) and Inductively Coupled Plasma/ Optical Emission Spectroscopy (ICP/OES)

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Abstract:

Four Petroleum sludge samples from different sites of the eastern desert in Egypt have been irradiated using ETRR-2 reactor for 4 hours, and then left 14 days for decay and then elementally investigated using instrumental neutron activation analysis (INAA) and inductively coupled plasma/ optical emission spectroscopy (ICP/OES). The investigation revealed that 18 elements, named (Ca, Sc, Cr, Fe, Co, Zn, Br, Rb, Sr, Ag, Sb, Cs, Ba, Eu, Yb, Lu, Hf and Ta) were detected from INAA and 22 elements (Ba, Fe, Cr, Zn, Sr, Cs, Eu, Sc, Cu, Cd, Pb, Al, Na, K, Mg, Ni, Mn, Ce, Er, Gd, La and Tb)from (ICP/OES). Details of the samples preparations, analysis and results will be presented and discussed at the conference.

Deposition pattern of inhaled radon decay product (^{214}Pb and ^{214}Bi) in human lung for various levels of physical exertion.

A.A. Ahmed, A. Mohamed, Mona Moustafa, Sara Sakr

A B S T R A C T

In this work, the attached activity size distribution of 222 Rn progeny (214Pb and 214Bi) were measured indoor. The fraction of attached progeny was sampled using a low-pressure Berner cascade-impactor technique. Most of the attached activities for (214pb and 214Bi) progeny were associated with the aerosol particles of the accumulation mode. The active median aerodynamic diameter (AMAD) for 214pb was determined to be 422 nm with a geometric standard deviation (GSD) of 3.44 and for 214Bi the active median aerodynamic diameter (AMAD) was determined to be 410 nm with a geometric standard deviation (GSD) of 3.43. Given that dose estimation is sensitive to environmental conditions, an analytical method was introduced to compute the local energy deposition of (214Pb and 214Bi) by adult male for various levels of physical exertion.

Radiation Safety Training in Medicine

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Abstract

The use of radiation in Medicine has been on the rise in many countries. A lot of diagnostic and therapeutic procedures may expose patients and staff to high radiation dose which can be reduced to low levels to ensure the safety and protection against the harmful effects of radiation exposures. The objective of this presentation is to ensure the following:

1. Implementing an effective radiation safety strategy
2. Examining the role of the hospitals in creating a radiation safety program
3. Enforcing radiation safety practice for patients, staff, physicians and visitors.
4. Providing regular radiation safety education to concerned staff
5. Identifying opportunities to improve radiation safety performance
6. Using appropriate shielding devices and related materials

By adhering to the principles and doctrines of radiation safety set forth by international organizations, the safety culture among radiation workers will be enhanced and the productivity as well as performance of the protocols will be optimized.

Activities of Egyptian Atomic Energy Authority Training Centre

Ahmed El Mohamedy

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Abstract

The Training Centre of the Egyptian Atomic Energy Authority was established to provide specialized training programs in the various fields of peaceful uses of Atomic Energy. The Training programs cover courses in Medicine, industry ,Agriculture, Environmental Protraction , Physics, Radiation Protection ,Decontamination., Nuclear Safety and Security, , Waste management., and Quality Assurance . More than 70 training programs are conducted yearly.

Main Activities and Responsibilities in My Carrier's Life

Salahuddin M. Kamal

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This abstract introduce and analyses the experiences gained and motivations perceived during six phases of my carrier's life for extracting lessons to sustainability the scientific carrier.

- **Phases in My Carrere's Life:**

Phase(1): 1970-1983; ***Radiation Protection Technologist*** at Egyptian Atomic Energy Establishment; where I qualified from Al-Azhar Univ./1979 B.Sc. in Special Physics, and M.Sc. in Radiation Dosimetry/1983. Training on Environmental Radiation Control at Julich-Germany/1981. Publishing a Radiation Protection Book; with Prof. M. Gomaa.1983. **Phase(2):** 1983-1986; ***Assistant Lecturer*** - Physics Dept., Al-Azhar Univ.. Achievements were: registration for Ph.D. in Radiation Shielding and Dosimetry and Qualified as Health Physicist No.12/1984. **Phase(3):** 1986-1999; ***Rad. Phys. Lecturer*** at King Abdulaziz University (KAU) – University Rad. Safety Committee (URSC). Achievements were: Ph.D. in Rad. Shielding and Dosimetry/1988, Qualified Rad. Prot. Expert No. 37/1990, Member of Health Physics Society No.12844/1990. At KAU; design and operation interim waste storage room and design short and long term radioactive materials storage. **Phase(4):** 1999-2006; ***Assistant Professor***; at EAEA. Achievements were: Member of National Rad. Phys. Net, Member of Consultations Rad. Prot. Project, Antiterrorism Assistance Program - Int. Security Preparedness Training Program /1999, IAEA Int. Emergency Training Course, IAEA Training Course in Decommissioning- with Nomination for 6 years contract as a member of Research Reactor Decommissioning Demonstration Project (R^2D^2P).2006 and Member of Health & Safety Committee of Unused Sources, USA, Member of Methalfa accident. **Phase(5):** 2006-2018; KAU; ***Associate Prof.***: Tabouk Branch - Faculty of Sciences - Head of Physics Dept. & Q.C. Dept., Jeddah - Faculty of Applied Medical Sciences - Teaching Med. Health Phys Topics and Jeddah - Faculty of Sciences - Physics Dept., Med. Physics Division. Achievements were: Head of Highly Cited Project (Social Physics), Head of Med. Phys. Division and Promoted as Prof. Applied Rad. Physics. **Phase(6):**2018 –Present; *Prof Emeritus* at EAEA and Member of Rad. Phys. Net.

- **Motivations in My Carrere's Life:**

(1) *Radiation Protection and Nuclear Safety*:Most experiences were from authorization as responsible for radiation protection and nuclear safety in my employer institutions. These experiences included protection of people and the environment from harmful effects of radiation through understanding risks, best practice regulation, research, regulations policy, and services.**(2) *Radiation Dosimetry:*** Mainly monitoring occupational exposures of institutions workers and the environment. Development, applied and analysis of thermoluminescent materials for many applications with distinguished topics in scientific conferences and papers.**(3) *Medical Health Physics Applications*:** Teaching topics of Medical Health Physics have been highlighted the importance of reform of syllabuses all levels, and demand for workshops for specialists**. (4) *Engaging with the community problems*:** experiences and lessons learned led to the significance of solving problems due to impact of nuclear energy applications; i.e. climate change.

Conclusions: To face innovative global changes, we needed to manage of quantitative and qualitative interdisciplinary seminars and training for sustainable promotion of our youths.

Acknowledgments: My acknowledge to all my supervisors, colleagues and employing institutions in Egypt and Saudi Arabia

From Chemical Physics To Physical Chemistry

Farid Abou El-Nour

Egyptian Atomic Energy Authority

Research work activities in the fields of both chemical physics and physical chemistry are almost the same.

Most chemical physics activities are related to spectroscopy branches , namely emission spectroscopy, atomic absorption spectroscopy, mass spectrometry ICB-spectroscopy …etc

On the other hand, most of the physical chemistry research activities are applied on solid state applications in nuclear chemistry as the use of catalysts in chemical exchange reaction of stable isotopes to produce heavy water .

One of the most important activities in both chemical physics and physical chemistry fields is the applications is the use of isotopic ratio as Finger Print for both elements and places.

In addition, some physical chemistry applications are directed to reaction mechanism, adsorption and absorption activities, crystal structure, solid state applications, ligand field theory and theoretical treatment of empirical equations etc.

Both fields require high mathematical basics for researchers

The Effects of Electromagnetic Fields on Human Health.

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Abstract

Since The beginning of the 20th century, we are overwhelmed by the increasing sources of the Electromagnetic Field (EMF) that is coming from telecommunication, electricity, appliances, medical equipment, and many other apparatus that we use in our daily life. Although these new technologies became inevitable and indispensable, the EMF they produce may cause health risks and hazards to human.

Some studies show a link between exposure to EMF and increased rate of Leukemia, cancer, brain tumors and other health problems. Also, there is some uncertainty remains as to the actual mechanisms responsible for these biological hazards and which type of fields magnetic or electric or both are of great concern.

It is needless to say that no matter the effects of these EMF be trivial or catastrophic, we should take all the necessary precautions to reduce our exposure to EMF as low as reasonably attainable. For this to occur, all those involved or affected by this exposure should follow the RF safety standards and guidelines set forth by the regulatory authorities like the IEEE, WHO, ICNIRP, and other likewise organizations.

Any failure in taking immediate actions to the above guidelines, the public would be at a high epidemic risk of potentially fatal diseases in the future.

Assessment of NORM in Waste Samples Associated with Oil Production Fields

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ABSTRACT

The present study introduces a radiometric and elemental characterization of hard/soft solid waste samples produced through oil production process. Alkaline earth elements, S, Fe, Zn, K and Pb were the major constituents in samples. Natural activity concentrations of the 238U and 232Th series and 40K have been determined by using high-resolution gamma-ray spectrometry. Mean natural activity concentrations ranged from 1512 to 19859 Bq/kg for 226Ra, from 544 to 10200 Bq/kg for 232Th and from undetectable level to 830 Bq/kg for 40K. Personal dosimetry for workers was investigated by using film badges (FBs). The mean value of workers effective doses over a month were less than 1 mSv. Results obtained are discussed and compared to the national and international exemption levels and those from other studies.

Key words: NORM, Scale, Oil production, HPGe, XRF, Personal dosimetry.

Present status of TENORM treatment technology

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Abstract

Many technical and regulatory developments concerning exposure to naturally occurring radioactive material (NORM) have occurred during the last decades. Particularly the progress made in identifying, quantify ingand managing the radiological risks associated with industrial processes involving NORM. One attempt to distinguish those materials that needed to be regulated had been to introduce the term TENORM, an acronym for technologically enhanced NORM. They were therefore all radio logically hazardous and in need of regulatory control. Resource of these materials in various industries and countries are reported. Considerable effort has now been devoted worldwide to identify and quantify the radiological risks to exposed individuals and thinking for find a suitable method to reduce and control these risks. Indeed, the achievement of a harmonized approach to the management of exposure to NORM is clearly an important goal, especially given that minerals (as raw materials are traded internationally) and the TENORM waste that generated with a certain industries on a very large scale. Therefore, an overview about different approaches of the management and/or the feasibility of chemical treatment for TE-NORM waste (case study that produced from oil and gas industry) to be safe and to protect our environment will be given. In the last ten years, we had a several efforts for make a bassline assessment of different area and types of TENORM waste were carries out. In addition, a numerous of published articles towards the physical and chemical approach of TENORM waste treatment were reported. Among of them, recently, the feasibility method using surfactants was investigated. Two surfactants, Triton X-100 and cetyltrimethyl ammonium bromide (TX100, CTAB) were investigated as the extracting agents. Combined extraction with nonionic and cationic surfactants produce synergistic effect in removing both Ra-226 and Ra-228. Removals of 84 % Ra-226 and 80 % Ra-228 were obtained using surfactants admixture. The developed chemical treatment process would enable to design of an appropriate TENORM sludge treatment strategy.

Strengthening Medical Physicists Capacities to Ensure Safety in Medical Imaging, with an Emphasis on Pediatric Imaging Safety

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National coordinator RAF 6/53 &; Professor of Medical physics; National Cancer Institute; Cairo University, Radiotherapy & Nuclear Medicine Department

Scope: Enhancing Capacity Building of Medical Physicists to Improve Safety and Effectiveness of Medical Imaging (AFRA).
Objective: To improve the overall safety and effectiveness of nuclear medicine and diagnostic radiology services in Africa through dose optimization and appropriate quality assurance program conducted by medical physicists.
There is an active academic and clinical training program for medical physicists in Egypt. Eighteenth governmental and a few private universities have undergraduate education in physics and biophysics and these are offered by the respective faculties of science. Some of these universities run academic postgraduate program in medical physics to deliver M.Sc. and Ph.D. degrees. There is no harmonized clinical training in medical physics and each center has its own manner of delivering this training depending on where the medical physicist is recruited (RTH, NM or DR).
Our Infrastructures are 815 CT units, 185 Mammography, about 3600 X-ray, 130 Gamma Camera, from 10 -15 SEPECT – CT and about 45 PET – CT including 5 under process. There are about 70 medical physicists in the nuclear medicine but there are not any medical physicists in the Diagnostic Radiology Departments {5-10 M.O.H}. No. of Qualified N.M approx. 100, No. of Qualified Radiologists approx.2000, No.Of non- Qualified Radiologists approx. 500, No. of Radiation expert approx. 250, No.Health physicists' approx.300, RTT approx. 12000, Radiographers approx. 1500. There is no legislation to employ qualified medical physicist(s) at Diagnostic Radiology Departments. The Nuclear Medicine (Hot Lab.) should be licensed under supervision of Radiation Safety officer not a Medical physicist.
The existing regulations do not make a clear distinction between a Clinical Medical Physicist and a "Radiation Protection Expert" or "Health Physicist". Quality assurance / quality control practices and equipment for nuclear medicine and diagnostic/interventional radiology. The diagnostic Reference Levels for Diagnostic Radiology are in place and these audited by the radiation protection office, Ministry of Health. Also there is a Reference Levels for the Nuclear Medicine audited by Nuclear and radiological Regulatory Commission, Atomic Energy Authority.

IAEA/WHO TLD POSTAL DOSE AUDIT SERVICE FOR HOSPITALS; RADIOTHERAPY LEVEL IN EGYPT

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The purpose of this dosimetry audit is to check the dose delivered by therapeutic machine. The audit is performed under the reference conditions for Co60 and megavoltage X-ray. In July, 2014, the IAEA/WHO TLD Postal Dose Quality Audit Service in Egypt is reactivated by general secretary and the representative of the Egyptian Association of Medical Physics (EAMP), taking the role of the TLD Country Co-ordinator for Egypt as National Coordinator and help with the coordination of the IAEA/WHO TLD Postal Dose Quality Audit Service for hospitals in Egypt. The IAEA Technical Co-operation invites radiotherapy hospitals in Egypt to participate in the IAEA/WHO TLD Postal Dose Quality Audit Service for radiotherapy beams every two years. Ten centers are participated in the postal dose audit service programme. TLD capsules, the Application Form and the "Principles of Operation" document forward to the eligible hospitals. The medical physicists should read the "Principles of Operation" document and provided they agree with those terms, irradiate the TLD capsules, fill out and return the Application Form after irradiate the TLD capsules by email to IAEA with a copy to the National Coordinator. Finally, the results (certificates) will be emailed directly to the medical physicists with a copy to National Coordinator through eight weeks after received the irradiated TLDs back. As of 2017, the IAEA/WHO postal dose audit programme for radiotherapy is using a new type of the dosimeter for the dosimetry audit. The radio photoluminescent dosimeter (RPLD) is replacing the thermoluminescent dosimeter (TLD) used in earlier dose audits of the IAEA/WHO postal dose audit programme. The new system is based on radio-photoluminescence dosimetry (RPLD) and will use glass dosimeters put in protective capsule in the form of small rods. Similarly to TLD, RPLD capsules are waterproof

Neutron Sources – Status and Prospects

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Abstract

Neutrons these magic neutral particles of nucleonic mass were discovered in 1934. From that day on they have found wide spread use in science, technology and applications. Neutrons can be produced using many techniques employing radioactive isotopes, fission reactors and accelerators. The article gives account on the most widely used methods for neutron production, their status and future prospects.

Recent Developments in the Operational Parameters in the Inductively Coupled Plasma Mass Spectrometer

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Abstract

In the last few years several new parameters were introduced to guarantee more efficiency in the inside the Inductively coupled plasma mass spectrometer. This includes interference between ions and in the improved precision of the isotopic ratios.
Technology of the following techniques namely collision and reaction cells, cooling of the torch and analysis of high total dissolved solids showed many changes that led to real improvements.

Dosimetry Calculation and Measurements around Radioiodine Contaminated Individual

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Abstract

Individuals during their working hours may be contaminated with radioactive iodine. Individuals working around the contaminated worker are exposed externally to ionizing radiation. This Study concern radiation protection around contaminated individual includes dose limit, dose assessment and the persons at risk. Also, it evaluates the potential radiation exposure dose to the general members of the public in contact with I-131 contaminated individual based on theoretical models and measurements. It is the aim of this study to through some light on total external dose D (∞) calculation to a co-worker, a family member and others around the contaminated individual. This study tries to decrease the confliction between the uses of the effective half-time for iodine-131 (3.02d) and physical half-life (8.02d).

Study on the Thermoluminescence Dosimetry of Standard and Prepared Materials

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Abstract

In the light of the scarcity of the dosimeters, their high cost and the monopoly of few companies of the sale and supply process in addition to the lengthy period required to obtain them, it has been mandatory to search for and attempt to produce an alternative glass matter.This study is an attempt to prepare and produce glass samples from lithium phosphate to be used as a dosimeter and compare it with standard dosimeter, namely TL-800. It is the lithium borate. A trace ratio of both magnesium and copper, as impurities was added to the manufactured crystal to serve as electron traps which perform the thermal scintillation. The addition was made by 10-3 % of weight with changing the concentration of lithium and phosphate till we reached the best results i.e. 70% lithium and 30% phosphate. We adopted the gradual irradiation of the prepared glass samples from 0.5 Kg Gray up to 20 Kg gray. It has been noticed that the diagrammatic relationship between the irradiated dose and the intensity of the thermoluminescence was in the range less than one 1KGy, which the linearity relationship, which the relationship in the range from one 1 K Gy up to 10 KGy was ultra linear. The range above 10 KGy was something like the irradiation state. The boosted elements (i.e. Mg & Cu) where used.The fading rate of the manufactured crystal was measured within 0, 15, 30, 60, 120 and 200 days so that the real radioactive dose value can be determined after the lapse of a period of time.By the end of the study, the activation energy of the substance used as a dosimeter within the range of 0.5 KGy up to 20 KGy was computed. Comparative radioactive measurements for the standard samples TL-800 were taken as it was irradiated for all the previous radioactive samples for all the previous radiation samples from 0.5 KGy up to 20 KGy on the prepared samples.According to the findings of this study, we can recommend as follows:* Perform more profound study for improving the properties of the reason substance matter with respect to,

A - Sensitivity. B - Efficiency. C - Fading rat

***The present study done during working in King Saud University , KSA**

Role of dosimetry in quality control of radiation processing

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Abstract:

Dosimetry is the science of absorbed dose measurement. A dosimeter is the device that can measure the absorbed dose with a precise limit. The use of ionizing radiation for sterilization of medical devices, the reduction of microbial loads in food or the modification of polymers is referred to radiation processing. It is deemed necessary to ensure that the required absorbed dose is applied correctly in each of a radiation process load. Dosimetry act as very essential part in the validation and quality control of the radiation process, and different requirements are placed on the dosimeters. The selected dosimeters must be utilized to achieve our tasksand to monitor the routine absorbed dose with the desired limit. In addition, uncertainty of absorbed dose measurement shall be specified for each selected dosimeter.

Radiation indicators may be labels, paper, inks, or packing materials that undergo a color change or become colored upon subjected to ionizing radiation. Radiation indicators cannot replace the dosimeters in radiation processing; they are used for qualitative indication for radiation processing. They are placed on the products during irradiation to differentiate the irradiated boxes from unirradiated ones and to indicate whether or not the product has been irradiated.

KeyWords:Dosimetry, Radiation dosimeter, Radiation indicators, Radiation processing, Quality control

Radon Emanation Coefficients of Some Egyptian Rocks

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Abstract

Thirty three samples were collected from four different areas at the Southeastern Desert of Egypt to estimate the values of the radon emanation coefficient of the rocks at these areas. The chosen areas are; Abu Dabbab, Abu Rusheid, Nuweibi and Um Naggat. CR-39 SSNTD fixed at the top of a radon chamber with the crushed sample at the bottom was employed to achieve this work. The results averaged the values of the emanation coefficient into two categories; one includes the rocks from Abu Dabbab and Nuweibi with a value of 0.027 and the otherwith a value of 0.008.The difference in the values of the emanation coefficient may be ascribed to the difference in the other properties of the rock grains.

Key words: Radon gas; Emanation Coefficient; SSNTD.

CPRD Supplied With Native Scintillator for Radon Gas Detection

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Abstract

For neutron detection and radioactive gas sensing, it is greatly beneficial to detect alpha (α) particles and gamma rays. In present work, continues passive radon detector (CPRD) has been constructed with native ZnS; Ag.Cl scintillator. The detector has been supplied with high efficient native nano particles scintillator for detection 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 fabrication the native scintillator in 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 know data already published in the literatures. Radon emanation from natural sample has been measured by the fabricated CPRD cell.

Keywords: Radon gas detection/ Calibration chamber/ Sensitivity/ ZnS; Ag.Cl scintillator

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Calculation of the indoor radon concentrations due to the public use of some Egyptian rocks

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Abstract

This work calculates the indoor radon gas concentrations assuming an exact configuration of radon diffusion. The rocks from Abu-Rusheid, Abu-Dabb, Um Naggat and Nuweibi areas at the Southeastern Desert of Egypt were assumed to be used as slabs of a thickness 2cm, 3cm, 5cm or 10cm to cover the walls and floors inside the buildings.

Assuming a ventilation rate of unity, the average values of the additional radon concentrations in the air inside a building uses one of the studied rocks were found to be lower than the minimum detection limit of (2Bq/m^3) of radon monitors. The higher indoor radon concentrations were obtained for the Abu-Rusheid samples to have average values of 1.7 (Bq/m^3), 2cm slabs, and 2.54 (Bq/m^3), 4cm slabs, for the walls and 0.94 (Bq/m^3), 5cm slabs 1.89 (Bq/m^3), 10cm slabs, for the floors. The maximum of total radon concentrations were 5.95 and 9.98 (Bq/m3), 2cm walls&5cm floors and 3cm walls&10cm floors, respectively. The annual effective doses received by the public members should use these rocks must be estimated.

Key Words: Radon, Diffusion, Indoor, Outdoor.

Medical Preparedness and Response in Nuclear and Radiological Accident

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ABSTRACT

The risks associated with radioactive sources have been the subject of increasing attention during the last decade. A radiological accident is an unintended or unexpected event occurring with a radiation source or during a practice involving ionizing radiation, which may result in a significant human exposure and/or material damage.Additionally, the world's rising use of radioisotopes in medicine, research and industry and the growing reliance on nuclear power increase the likelihood of accidental situations.Although radiological accidents in industry, medicine, research, teaching or agriculture are more limited in their environmental impact, they occur much more frequently than reactor accidents and can have serious health consequences. However, accidental events that expose people to ionizing radiation are not frequent.Radiation emergencies may involve facility, hospital and other personnel, emergency workers, medical patients, and members of the public.Nuclear emergencies, with Chernobyl as a dramatic example, may result in significant public overexposure. Moreover, the general public and also emergency workers could be exposed to radiation or be contaminated as a consequence of malicious acts involving radioactive material. This represents a new challenge for emergency responders in some aspects of response. ***The aim*** is to provides generic response procedures for medical personnel responding to different types of radiation emergencies and to provide practical guidance to the medical community for medical emergency preparedness and response, describing the tasks and actions of different members of an emergency medical response organization.***Conclusion:***Experience has shown that in many radiation emergencies, the severity and extent of the medical consequences could be restricted by effective general and, in particular, medical response. Therefore, the preparedness for medical response to radiation emergencies

should be in place in all countries.Without adequate preparedness of the medical community for such radiation emergencies, medical management of the situation could be ineffective.

الآليات القانونية لمواجهة حالات الطوارئ النووية والإشعاعية في مصر

د. نجوى رياض
هيئة الرقابة النووية والإشعاعية

ملخص

- أصبح اللجوء إلى الطاقة النووية في مجال الاستخدام السلمي ضرورة حتمية لكل دولة ، باعتبارها مصدراً من مصادر الطاقة .
- تتعدد الاستخدامات السلمية للطاقة النووية ،إذ أنها أصبحت جزءا هاما وضروريا في كافة مجالات التنمية الاقتصادية والعلمية والاجتماعية في الواقع الدولي المعاصر .
- وتحرص كل دولة على تحقيق خطط التنمية لرفاهية الشعب مع ضمان عدم تعرضه لأية مخاطر انطلاقا من مسئوليتها الوطنية والدولية في المحافظة على صحة وأمان شعبها والبيئة التي يعيشون فيها من الأضرار المحتملة من الاستخدامات السلمية المتعددة للمصادر المشعة .
- ولأن هناك التزام دولى على كافة الدول بمثابة قاعدة مستقرة مقتضاها التزام كل دولة بضمان عدم حدوث أضرار من الأنشطة التى تسمح بها فى نطاق ولايتها أو سيطرتها الإقليمية .
- ولضمان تنفيذ هذا الالتزام فإنه يجب على كل دولة تسمح بنشاط مشروع دوليا ، أى غير محظور (كالاستخدامات السلمية للطاقة النووية) أن تتخذ كافة التدابير اللازمة تشريعيا ورقابيا بما يضمن عدم وقوع أية أضرار تصيب الإنسان أو الممتلكات أو البيئة .
- ولأن الاستخدامات السلمية للطاقة النووية لها وجهان :

الأول : يلبي حاجة المجتمع ككل لهذه الطاقة لما لها من منافع عديدة للإنسانية ؛

والثاني : يحتاج إلى وجود ضوابط قانونية لتنظيم ومراقبة أوجه استخداماتها السلمية حماية من أضرارها الجسيمة على الأفراد والممتلكات والبيئة .

- لأنه في حالة الحوادث – لاقدر الله – فإن تأثير أضرارها لن يقتصر على المناطق التي تقع بها فقط ، بل إن التأثيرات الضارة لها قد تنتقل عبر الهواء أو الماء إلى المناطق القريبة وحتى البعيدة عنه .
- وقد يتسبب عنها أضرار لمسافات طويلة عبر أراضي وأجواء دولاً أخري ، لذلك :

1- من المهم معرفة وتحديد حالات الطوارئ قبل حدوثها ، لتقييم الوضع بالسرعة والكفاءة الواجبة ، والتنبؤ بتداعياتها وعمل تصنيف مبدئي لها ؛

2- وضع إجراءات خطة الطوارئ – الموضوعة سلفاً – موضع التنفيذ وإبلاغ جميع الأشخاص والجهات المعنية بتنفيذها والتصدي للوضع في وقت مناسب ؛

3- لتقليل تعرض الأشخاص داخل وخارج الموقع الذي حدثت به الحالة لأقصى درجة ممكنة ، وبصفة خاصة لمنع التعرض لجرعات أعلى من الحد المسموح به .

4- تطبيق الإجراءات اللازمة لحماية الإنسان والممتلكات والبيئة من الأضرار التي قد تنجم عن هذه الأنشطة .

Concepts of Radioactive Decontamination After Radiation Accident and Emergency Planning and Environmental Monitoring

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Abstract

The presented work reviews and summarizes some concepts regarding the management of radioactive contamination, decontamination, after radioactive accident. The objective of the radiological planning is explained. The emergency planning and the classification of the accident levels are discussed. The required emergency planning areas are explained. In addition, the monitoring estimation of radiation levels and radioactivity of the radioactive contamination in the environment are explained. Procedures of sampling and analysis (radiologically) of the different constituents of the environment (air, water, suspended aerosols, soil, aquatic biota and food stuff) are explained. The techniques of environmental sampling are explained.

Experience Gained in Transport waste disposal and decontamination and Environmental Radioactive Pollution

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1- In the field of Environmental pollution, through research projects with IAEA about fate of radionuclides released into the aquatic ecology of Ismailia Canal and North coast of Egypt. Also through Environmental Resources Center of Georgia Institute of Technology Projects financed by USA Nuclear Regulatory Commission.
2- In the field of radioactive material transportation, supervision of large sources from Cairo Airport, Alex and Port-Said Ports to different users. As well as ships carrying radioactive materials on board and crossing the Suez Canal according to national and International transport regulations .
3- In the field of waste management, supervisor of collecting radioactive wastes from different sites to the treatment and storage facilities at EAEA according to local and international transport regulations.
Reviewing books about Nuclear Wastes Management, the Ocean Alternative and Impacts of Marine Pollution on Society.

4- In the field of decontamination, experience is gained for workers, equipments and surfaces used in laboratories using open radioactive sources.
5- In the field of Training, participate in and execute of several local and regional Radiation Protection and Safe transport courses for radiation and transportation workers at different fields (industry, nuclear medicine and research)-Training is also directed to state systems of Accounting and for control of nuclear materials (SSAC).
6- Advanced experience in the field of radiation protection aspects in the Oil and Gas industry.

Radiation Dose Measurements in Nuclear Medicine Hot Lab

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ABSTRACT

The hot lab is used to receive, store, and/or prepare radiopharmaceuticals that are administered to patients for studies. Hot lab is a specially designed room in nuclear medicine units in hospital; ^{99}Mo/^{99m}Tc-generator is the major source used for various medical imaging. It is important to maintain a standard for hot lab procedures to optimize the patient care and minimize radiation exposure to all personnel, patients, public, as well as environment.

The radiation doses in the hot lab were measured by GM and NaI Detectors for about 12 months. Package surface doses and generator surface doses were also measured. An increase in the counted rate above background was considered for the study. A constant distance was made in every step.

At the receipt date, the ^{99}Mo/^{99m}Tc-generator surface dose (1.09±150 mSv/h) found to be nearly six times higher than the package surface dose (240±20 μSv/h). The dose rate at the outer surface of the fume-hood glass found to be 240±15 μSv/h in the 1st day of generator placement, whereas at the 2nd day it was 210±12 μSv/h; showing a gradual decline in dose rate during 3rd (150±10 μSv/h), 4th (120±9 μSv/h), 5th day (90±6 μSv/h) and 6th day (75±4 μSv/h).

In the 1st day of a generator storing in the hot lab, the dose rate found to be 3-4 times higher than the 6th days. The dose rate at various places indicated poor performance of the fume-hood glass. The study emphasizes on the need of growing awareness among all the radiation workers and encouraging the safe working practices in radiation.

Keywords: ^{99}Mo/ ^{99m}Tc-generators, radiation survey meters, hot lab, radioisotope.

Development of Criteria for NORM Management In Existing Exposure Situations

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National developments of the country frame work of NORM management are needed. The occupational and public effective dose limit for every practice should be revised. These include, mining, extraction, processing, transportation, production and waste
management operations. Because of the difficulty in applying one code to all NORM industries, nuclear and radiation safety organizations are now establishing separate
code, guideline and/or recommendations for each NORM activity e.g. building materials, oil and gas production, phosphate industry, aluminum industry, metal extraction and processing, coal mining, mineral sand and rare earth elements extraction, water treatment"..etc. We are also in urgent need to issue a clear list of the excluded and Exempted NORM containing items and products.
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PROPSED REGULATIONS FOR HANDLING RADIOACTIVE CADAVER

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ABSTRACT

Handling a radioactive cadaver may expose handlers to overexposure of ionizing radiation exceed dose limit to handlers.
This review will suggest steps to deal with the cadaver in preparing for washing. As well as how to wash the body of the cadaver.In externally contamination, how to deal with the water of washing. Furthermore, types of burial in Moslem's religion. Shields if the activity is higher than dose limits.
Regulations to avoid harm of population or environment. Several countries had regulations for these cases while Moslem countries have different religious ceremony and habits.
The aim of this paper is to propose suggestions for regulation for handling Moslem radioactive cadaver.
Key words: Moslem Cadaver, Radioactive, Burial, Funeral Ceremony

Role of Ministry of Health as Radiation Regulatory Body according to Egyptian Laws

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Egypt as a pioneer state gives a special concern to the peaceful uses of nuclear & radiological energy hence, laws and regulations have been issued to control these activities.The regulatory authorities have passed through three different stages, the first stage, which starts with issuance for Law 59 /1960 and then it's Executive Regulations in 1962, which divided the regulatory bodies into two bodies. The first is the National Center for Nuclear Safety and Radiation Control - EAEA which regulates work for open isotopes, reactors, grants the necessary licenses for it, and also organizes all activities under control of EAEA. The second is the Executive Office for Radiation Protection (EORP) in Ministry of Health (MOH) which gives the necessary licenses ownership and use of X-ray machines, LINAC and sealed radioactive sources. Organization of work with sealed radioactive sources and protection from its hazard. Then two ministerial decrees were issued no 265 /1989 and no 204/ 2000 (for industrial radiography). The functions for EORP are: - Periodic inspection - issuing licenses for personal and bodies - radiation personal doses for occupational worker and follow-up medical examinations for them – Monitoring and recording the radioactive sources. The second stage begins with issuance of Law 7/2010 and then the executive regulations in 2012, which established ENRRA as an independent regulatory body that follows the Prime Minister and gave it all specialties except X-ray uses in the medical field only for EORP. Advantage this law, ENRRA is independent regulatory body on the other hand there are same devices under controlling of two regulatory bodies such as (Pet CT - Spect CT - PEM). Third stage begins with the issuance of Law 211/2017, which is modulating for law 10/2010; it is a future stage because the executive regulations have not issued until now. It divided the regulatory bodies according to application field; it gave EORP all using for ionizing radiation in medical field and ENRRA for nonmedical filed. In this case, there is no any overlap between EORP &ENRRA and any medical facility is issued one license from one side only instead of the extracting two licenses from two sides of the same facility. I think that the regulatory body must be independent, possess the upper hand and there is no any overlap between it and other regulatory body.Optimal case is one regulatory body.

Characteristics of Polyvinyl Alcohol/Tungsten Oxide Composite (PVA / WO3) for gamma-rays Shielding

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Abstract

Polymer composites have become attractive candidates for developing materials that can be designed to effectively attenuate photon or particle radiation. The sheets made of polyvinyl alcohol (PVA) polymer composites filled with nano-tungsten oxide (WO_3) particles of different concentration were fabricated in this study. The gamma-radiation shielding properties of these composites were evaluated by measuring the mass attenuation coefficient as a function of the additive percentage of WO_3 oxide using Cs-137 source at photon energy of 662 keV. The results show that addition of nano-WO3 to PVA polymer can enhance its gamma-ray mass attenuation coefficient. The reason is attributed to a higher probability of interaction between gamma-ray and nano-particles. Based on these experimental results, polymer composites reinforced with nano-WO_3 is believed to be a promising novel radiation shielding material.

Keywords: gamma-ray shielding, nano-composite, radiation protection

Some safety issues related to the VVER 1200/VR91 from the prospective of The WENRA Safety Objectives for new NPPs

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The Western European Nuclear Regulators' Association (WENRA) defined a common position on safety objectives for new NPPs in 2010. The WENRA safety objectives should ensure that new NPPs will fulfill higher standards across Europe, compared to the existing plants, especially through design improvements.
The WENRA Objectives O1-O7 cover the following areas:
O1. Normal operation, abnormal events and prevention of accidents
O2. Accidents without core melt
O3. Accidents with core melt
O4. Independence between all levels of Defense-in-Depth
O5. Safety and security interfaces
O6. Radiation protection and waste management
O7. Leadership and management for safety.
The WENRA safety objectives call for an extension of the safety demonstration for new plants, consistent with reinforcement of Defense-in-Depth. Some situations that are considered as "beyond design" for existing plants, such as multiple failures conditions and core melt accidents, are taken into account in the design of new plants.
WENRA considers that these safety objectives reflect the current state of the art in nuclear safety and can be implemented at the design stage using the latest available industrial technology of nuclear power plants.
However, since nuclear safety and what is considered adequate protection can never be static, these safety objectives may be subject to further evolution reflecting the need to strive for continuous improvement.
WENRA expects new nuclear power plants to be designed, sited, constructed, commissioned and operated in line with these objectives.
Egypt signed a contract with the Russian government to build 4 units of vver-1200/v491 type in Al Dabaa site.
The VVER-1200/v491 is a Russian PWR design. So it is of great importance to investigate the safety of this reactor type and the extent to which the design meets the WENRA objectives.
In this representation short description of the history, the design criteria and the main safety features of the VVER reactors are given.
Emphasis is concentrated on the improvement in the design to cope with the consequence after the FUKUSHIMA accident.
The VVER-1200 is a third-generation plus reactor, based on VVER technology. Forerunner types include VVER-440/V213 (e.g. Paks 1-4) and VVER-1000/V320 (e.g. Temelín 1-2).
There are two variants of the VVER-1200:
•VVER-1200/V392M, designed by Atomenergoproekt Moscow, 2 units under construction at the Novovoronezh-2 site
•VVER-1200/V491, designed by Atomenergoproekt St. Petersburg, 2 units under construction at the Leningrad-2 site V392M tends to depend more on passive safety systems, V491 more on active safety systems; there are a number of other design differences.
It appears that the VVER-1200/V491 is to be built at Paks. In Finland, there are plans to build a V491 at Hanhikivi.
The VVER 1200 reactor type is being built and is going to be built in Russia, Belorussia, Hungary, Egypt, Turkey and Bangaladesh.
the presentation is an attempt to explore the main safety features of the VVER1200/491 and test them against the WENRA objectives.

main safety features of the VVER1200/491 REACTOR
Below are described the specific features of the NPP design:
Service life of the main irreplaceable equipment of the RP is 60 years;
Application of horizontal type steam generators with a large water inventory and improved conditions of the primary-side natural circulation in comparison with the vertical-type steam generators;
Application of ECCS based on the principles of active and passive operation;
Application of double envelope concrete containment;
Application of the diagnostics systems for safety-related system equipment for periodic tests in shutdown power Unit.as well as for the operative monitoring of the operating reactor;
Application of enhanced reliability I&C with the self-diagnostics functions;
Reactor vessel manufactured of forged shells free from longitudinal welds with a diameter larger than the Generation III vessel, which ensures a minimum number of welds and hence reduces the time taken by inspection;
Reactor vessel is free from incuts and holes below the reactor main nozzles and respectively, below the upper mark of the core the way it has been made in all the VVER designs;
Application of passive components, isolation, restraints and discharge devices;
Usage of inertia coast-down of special rotating masses of RCP set to provide the required decrease in the flow rate through the core at loss of power the way it has been made in all VVER-1000 designs.

Environmental Impacts Assessment for Nuclear Power Plants & Spreading a culture of safety

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Egyptian Nuclear and Radiological Regulatory Authority

ABSTRACT

There is a need to increase the annual power generation capacity in many countries. Combining increased demographic pressures, urbanization, sustainable economic growth with electricity availability and the impacts of climate change exacerbate the need for ideal energy generation solutions. Nuclear power is one of the best choices among all generation options, which have proven to provide stability and predictability of electricity prices without atmospheric gas emissions. Therefore, the plan to build and develop nuclear power plants is an essential element in maintaining the future economic growth of countries.
The overall objectives of the Environmental Impact Assessment report are to assure compliance with laws and regulatory requirements; identify and analyze sensitive components of the existing environment; determine the type, nature and importance of probable environmental impacts during the entire lifetime of the Nuclear Power Plants; identify and recommend practical and cost effective mitigation measures; recommend a framework for an environmental and social management and monitoring plan for the project.
On the other hand, all organizations involved in nuclear activities have a common concern to sustain and improve safety. However, there is substantial diversity among organizations in their understanding of the concept of safety culture and of the actions necessary to influence it in a positive way. Therefore , Culture is the sum total of a group's learning and each nuclear station, because of the special characteristics and unique hazards of the technology—radioactive byproducts, concentration of energy in the reactor core, and decay heat—needs a strong safety culture.