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NEW TOOL TO HELP PLAN RESEARCH REACTOR DECOMMISSIONING

新工具幫助研究型反應器除役

Planning and estimating the cost of research reactor decommissioning will become easier with the help of the educational and training material to be developed by the IAEA, the Slovak University of Technology (STU) and Technical University Vienna-Atominstitut (ATI), under an agreement signed last week.

The tools and materials will be developed using

報告摘要(KEY INFORMATION)

1. 在使用國際原子能總署、斯洛伐克理工大學（STU）及維也納 - 阿姆斯特科技大學（ATI）簽署協議下所研發的數據開發工具，規劃和估算研究型反應器退役的成本將變得更加容易。
2. 斐濟(Fiji)正計畫增加其水果和蔬菜的國際市場出口量，並提出了一項與國際原子能總署的技術合作項目，以支持 2018 - 2019 年期間的食物輻射檢測。
3. 意識到剩餘包裝對環境的危害以及回收相關的限制，加拿大正在研究使用輻射技術開發可生物分解的環保食品包裝。
4. 國際原子能總署慶祝「世界圖書年」和「版權日」，強調核訊息共享的重要性，並促進獲取最新的核文獻和訊息資源。
5. 來自 16 個國家的專家們在摩納哥的國際原子能總署實驗室舉行會議，審查了最新的方法來檢測海洋石油和石蠟洩漏的原因。
6. 國際核能合作框架（The International Framework for Nuclear Energy Cooperation）匯集了 34 個參與國、31 個觀察員國家和 4 個觀察員組織，探討互惠互利的做法以確保和平地、有效率地使用核能。
7. 核能署放射防護和公共衛生委員會（CRPPH）舉行了會議，與會者認為，放射防護工作缺乏明確的職業發展路徑，在國際上應促進職業的認證並成為未來幾年人力資源管理的重點。

data from ATI's TRIGA-type research reactor and can be adapted to other types of research reactors. They will be shared among IAEA Member States free of charge.

The work done under the agreement will contribute to the IAEA's collaborative project for Data Analysis and Collection for Costing of Research Reactor Decommissioning (DACCORD), which supports research reactors all over the world in developing a robust approach to estimate the cost of future decommissioning.

Within DACCORD, the IAEA conducted a workshop at the site of the HIFAR research reactor in Sydney, Australia in March. The workshop was hosted by ANSTO, the Australian Nuclear Science and Technology Organisation, and involved participants from more than 20 Member States. It addressed the fundamentals of research reactor inventory characterization and management, including the use of inventory information for the preparation of cost estimates for decommissioning. By analysing case studies, including the HIFAR reactor itself, participants gained knowledge which they may apply directly to the planning and costing the decommissioning of their own reactors.

"The IAEA has many ongoing activities to assist Member States in planning and operating research reactors, including their decommissioning," said Christophe Xerri, Director of the IAEA's Division of Nuclear Fuel Cycle and Waste Technology. "The agreement we signed today will contribute to the development of appropriate tools for planning and cost estimation based on a well-established physical and radiological inventory of the materials that need to be managed. Planning well in advance for the comprehensive cost of decommissioning, including timeliness of the work and final waste disposal path, is a recommended good practice."

Under the Practical Arrangements signed last week, the TRIGA research reactor in Vienna will serve as a reference facility to demonstrate the effectiveness of the decommissioning planning and costing model.

"We are happy that the Austrian TRIGA reactor is part of this cooperation," said Arno Rauschenbeutel, Director of the Atominstitut.

" Slovak experts have gained extensive experience on decommissioning planning, costing and implementation," said Robert Redhammer, Rector of the Slovak University of Technology. "We hope to build on this experience and have it widely available for decommissioning projects around the world."

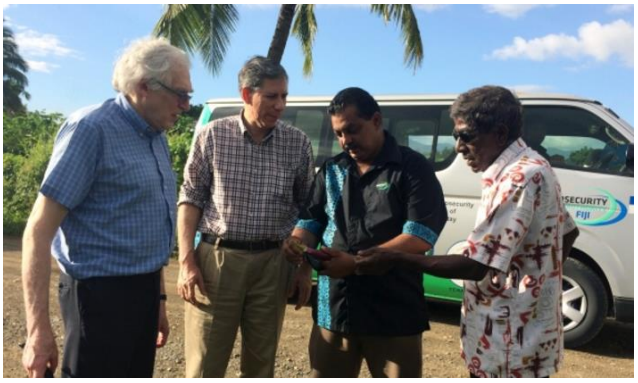
About 300 research reactors and critical assemblies have already been fully decommissioned throughout the world. Over 180 are permanently shut down, of which about 50 are currently undergoing decommissioning. Many of the 225 operating research reactors and critical assemblies are more than 40 years old and reaching the end of their operational lives.

Planning the decommissioning of research reactors, and associated costing, is a complex task that needs to take into account the history

and operating environment of each facility. Therefore, it is important to define the research reactor's inventory, and gain a good understanding of levels of radioactive contamination. This information will determine the optimal strategies both for dismantling and waste management.

FRUITFUL IRRADIATION: INCREASING FIJI'S FRUIT AND VEGETABLE EXPORTS WITH THE HELP OF A NEW FOOD IRRADIATION FACILITY

在新食品輻設施的幫助下，斐濟的水果和蔬菜出口量增加



Fiji is seeking to increase the exports of its fruits and vegetables to international markets, and has presented a proposal for an IAEA technical cooperation (TC) project to support food irradiation for the 2018–2019 cycle. To support the preparation of this project, the IAEA carried out a pre-project assistance mission from 3 to 7 April. The goal was to assess the scope of the project and to collect necessary information from national authorities. The mission was composed of IAEA staff, an expert in radiation technologies, and a specialist in quality infrastructure and value chains provided by the United Nations Industrial Development Organization (UNIDO).

Fiji's exports of fruit and vegetables are hindered by the presence of different species of fruit fly, which seriously affect the quality of Fijian export products such as okra, papaya, breadfruit, mango, eggplant and chili. To reduce the impact of insect pests, the country has been treating export products with High Temperature Forced Air (HTFA)1. Although an HTFA plant to treat fruit and vegetables was built in 1995 at Fiji's International Airport in Nadi, it has only provided a partial solution to the problem, as it cannot eliminate all the types of flies that affect Fiji's fruits and vegetables. To close the gap regarding safe fruit and vegetable exports, and in line with Fiji's Trade Policy Framework, the Government of Fiji government has decided to introduce irradiation to address the insect pest challenges facing the country's exports. The goal of the Trade Policy Framework, to enhance the Fijian economy for the period 2015 – 2025, will be supported by making exported products safer through food irradiation. The government's vision of a "Better Fiji for all" under the new framework will therefore be reinforced.

"In helping Fiji to introduce food irradiation to its economy, the IAEA's TC programme will contribute to the fulfilment of Fiji's Trade Policy Framework and thus to the government's vision of a Better Fiji for All," said Mr Faiyas Siddiq Koya, Minister for Industry, Trade and Tourism. He noted that the underlying motivation is to develop Fiji into a vibrant, dynamic and international competitive economy, serving as a hub of the Pacific.

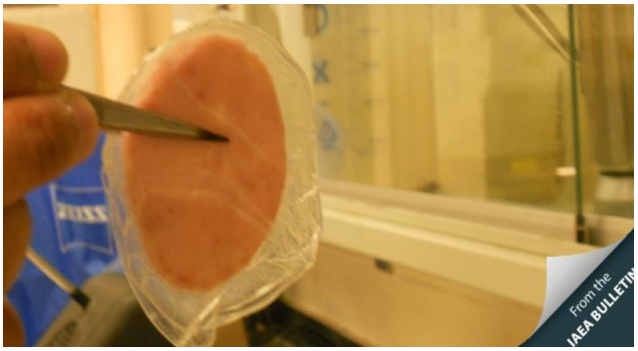
Mr Hillary Kumwenda, Chief Executive Officer of the Biosecurity Authority (BAF), who is leading the development of the new TC project, explained "At the moment the HTFA plant can treat a maximum of 3000 tons of fruits and vegetables per year. However, Fiji has capacity to significantly increase its exports, if a new technology such as food irradiation is introduced." This would especially benefit the 250 growers and 15 exporters of fruits and vegetables in the country, who are exclusively small farmers with an average of 2 to 4 hectares each.

The IAEA mission held useful discussions with relevant government authorities, and also undertook a field trip to the major fruit and vegetable production areas in Nadi, Sigatoka and Navua. Growers and exporters expressed their strong support for the Government's initiative to enhance infrastructure for the treatment of fruits and vegetables, as the establishment of a food irradiation facility will allow farmers to expand their exports to international markets such as Australia, New Zealand, the Middle East and the USA.

The next steps in Fiji's project preparation will include the drafting of a business plan in cooperation with the IAEA and UNIDO. A feasibility study will be carried out to further determine the specific technology that is suitable for Fijian needs, to identify the human resource and infrastructure capacities required, and to examine individual market factors to facilitate an integrated approach to helping Fiji enhance its exports of fruits and vegetables.

CANADA PURSUES MORE ECO-FRIENDLY FOOD PACKAGING FROM IRRADIATED NANOFIBRES

加拿大使用更多對環境友善的食品包裝來自受輻照後的奈米纖維



Across the globe, discarded food packaging is polluting public spaces and pushing already overloaded landfills to the brink. Recognizing the harm that this leftover packaging does to the environment and the limitations associated with recycling it, Canada is pursuing research into biodegradable, eco-friendly food packaging developed using radiation technology.

"The race to develop biodegradable packing material or eco-friendly 'active' food packaging is gathering momentum," said Monique Lacroix, Director of the Research Laboratories in Sciences Applied to Food (RESALA) and researcher at the Canadian Irradiation Centre (CIC). "Packaging based on natural polymers can help address the challenges of non-biodegradable food wraps and help reduce a major source of environmental pollution."

For over 15 years, scientists at RESALA and CIC have been using their training with the IAEA to research and develop biodegradable, 'active' packaging materials. They do this by taking raw renewable materials such as starch or proteins and combining them with nanocellulose, which is a natural polymer that contains nano-sized cellulose fibres and then irradiating them (see Irradiating polymers and nanocomposites). This combination leads to materials with improved properties compared to conventional materials in terms of durability, biodegradability and better water resistance.

"These polymers are not naturally very sturdy, but when you add nanocellulose and subject it to radiation, the polymers become tough and offer more reliable, sturdy coverage and protection of food," explained Lacroix. "Then when we add specific bioactive materials such as essential oils from thyme, the packaging is considered 'active' because these additions actively help to extend the shelf life of food and assure food safety."

A growing reliance on plastic

Production of plastic has surged over the past 50 years, from 15 million tonnes in 1964 to 311 million tonnes in 2014, with packaging accounting for around 26% of the total volume of plastics used worldwide, according to a 2016 World Economic Forum report on the future of plastics. The report projects that production will double in the next 20 years, as reliance on plastic grows. In Canada, for example, 9 to 15 billion plastic packages are used each year.

Most packaging material is made of materials like paperboard coated with wax and plastic because of their wide availability, relatively low cost, durability and strength. However, these packaging materials are often not biodegradable, and recycling them tends to be technologically impractical and economically unviable, due to contamination by food stuff and biological substances.

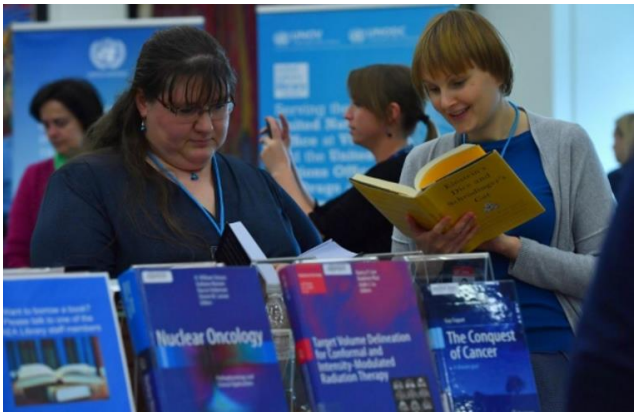
Global research for more eco-friendly material

Radiation processing is an attractive option for the food packaging industry worldwide. To build their skills and knowledge in this area, many researchers are turning to IAEA-supported projects as an avenue for collaborating with and learning from experts like the scientists at RESALA and CIC. Among these is a five-year IAEA project that began in 2013 and has brought together scientists from 14 countries: Algeria, Bangladesh, Brazil, Canada, Egypt, Italy, Malaysia, the Philippines, Poland, Romania, Thailand, Turkey, the United Kingdom and the United States. They are now sharing ideas and strengthening their skills in developing advanced packaging material for food products using radiation technology.

"Global research is focusing more and more on eco-friendly packaging material in response to new regulations where governments are making industries responsible for their use of plastic, including paying for the waste being generated because of plastic packaging," Lacroix said. "Irradiating natural polymers to make new materials is a promising avenue to further enhance product safety and contribute to the environmental goal of reducing food packaging waste."

NUCLEAR INFORMATION AT YOUR FINGERTIPS: IAEA CELEBRATES WORLD BOOK AND COPYRIGHT DAY

指尖上的核能資訊：國際原子能總署慶祝世界書籍版權日



Celebrating the annual World Book and Copyright Day, the IAEA highlighted the importance of nuclear information sharing and promoting access to trusted, up-to-date nuclear literature and information resources.

"Good education is firstly about finding information and secondly about understanding," said Mikhail Chudakov, IAEA Deputy Director General and Head of the Department of Nuclear Energy, on the occasion. "Young scientists working in the nuclear industry can use and benefit from the IAEA Library's collection through inter-library loans, as well as access a vast amount of material online through the International Nuclear Information System (INIS).

At a day-long exhibition yesterday, staff members and visitors to the Vienna International Centre had a chance to explore the IAEA's nuclear literature and electronic information services. Multimedia displays

showcased the Agency's scientific and technical publications, along with the history of the IAEA, which celebrates its 60-year anniversary.

In 1995, UNESCO proclaimed 23 April the World Book and Copyright Day, as it is on this date authors such as Cervantes, Shakespeare and Inca Garcilaso de la Vega passed away, and other prominent writers were born.

"The IAEA is proud to participate in this global celebration of the enduring value of books, knowledge, information, cultural awareness, and libraries," said Wei Huang, Director of the IAEA's Division of Planning, Information and Knowledge Management, during his opening remarks.

Yvonne Gimpel, Deputy Secretary General of the Austrian Commission for UNESCO and Head of Austrian Focal Point for the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions, added: "Books are our link between the past and the future, a bridge between generations and cultures." Gimpel emphasized that libraries and archives are centres for long-term preserving and making accessible any documentary heritage – be it books, manuscripts, traditional paper documents or audio-visual material.

The libraries of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), United Nations Office in Vienna (UNOV) and the United Nations Commission on International Trade Law (UNCITRAL), and the Corporate Communications and Media Relations Division of the United Nations Industrial Development Organization (UNIDO) also took part in this year's World Book and Copyright Day celebration.

IAEA LABORATORIES HOST MEETING ON HOW TO TRACK OIL AND PARAFFIN SPILLS IN OCEANS

國際原子能總署實驗室舉辦如何追踪海洋中洩漏的油和石蠟的會議

Experts from 16 countries are meeting at the International Atomic Energy Agency (IAEA) laboratories in Monaco this week to review the latest methods to detect the origin of oil and paraffin spills in the oceans, which pose a danger to marine life.

The annual meeting of the Bonn Agreement Oil Spill Identification Network of Experts (OSINet) is taking place from 25 to 27 April at the IAEA Environment Laboratories for the first time. The event brings together 35 representatives from government institutions, private sector organisations and universities that work on oil spill identification to discuss different techniques for tracing the sources of such an environmental hazard.

The IAEA, which joined OSINet in 2014, provides expertise on a range of nuclear and isotopic techniques to gain a better understanding of ocean contaminants such as oil and paraffin. This helps countries to identify the source of spills and better plan remediation activities, and to determine where the responsibility for them lies.

"In the case of a collision or accidental release, governments need to know where oil or paraffin comes from," said Imma Tolosa, an organic research scientist at the IAEA. "The combination of chemical and isotopic fingerprinting provides a powerful forensic tool which can be used by Member States for legislative purposes."

The IAEA has worked for years on monitoring petroleum hydrocarbon and its derivatives in the oceans. It has developed methods based on stable carbon isotope and chemical signature analyses, which enable investigators to trace the origin of contaminants.

An emerging environmental problem, paraffin is widely present in everyday life: it is used in waxes covering cheese, chewing gum, skincare products and candles, among others. It is transported in bulk as a liquid in heated tankers. Small quantities can be discharged at sea as tankers are washed down with water.

In contact with cool waters, paraffin solidifies and can accumulate along beaches for several kilometres. In 2014 more than 50 tons washed ashore on the German island of Sylt in the North Sea. Varying in size from several millimetres to more than 25 centimetres in diameter, large paraffin deposits can pose a serious threat to wildlife.

OSINet was set up in 2005 to help countries identify oil spills and develop standards for their sampling and identification. The network provides a forum for experts to create and validate new methods, and exchange information to promote quality assurance and cooperation among institutes working in this area, such as the RWS Laboratory from the Ministry of Infrastructure and the Environment in the Netherlands and the Federal Maritime and Hydrographic Agency in Germany, among others.

NEA MONTHLY NEWS BULLETIN - MAY 2017

核能署每月新聞稿 - 2017 年 5 月

EFFICIENT AND SAFE USE OF NUCLEAR ENERGY FOR PEACEFUL PURPOSES

於和平的用途上有效和安全地使用核能

The International Framework for Nuclear Energy Cooperation (IFNEC) brings together 34 participant countries, 31 observer countries and four observer organisations, according to its Statement of Mission, "to explore mutually beneficial approaches to ensure the use of nuclear energy for peaceful purposes proceeds in a manner that is efficient and meets the highest standards of safety, security and non-proliferation". IFNEC has grown in size over its six years of existence, welcoming new countries and international organisations and expanding the depth and breadth of its work in order to accommodate its diverse membership. The Nuclear Energy Agency (NEA) is the most recent observer organisation to join IFNEC, having been officially recognised as a member in October 2014. The NEA became the Technical Secretariat to IFNEC in 2015, funded solely by voluntary contributions. Read more in the latest issue of the NEA News at oe.cd/NEA-34-2.

RADIOLOGICAL PROTECTION AND PUBLIC HEALTH

輻射防護和公眾健康

2017, the NEA Committee for Radiological Protection and Public Health (CRPPH) held its biannual meeting and discussed its strategic direction. Participants reviewed the projects nearing completion and continuing initiatives, including the NEA Expert Group on Legacy Management (EGLM), the NEA Expert Group on the Implications of ICRP Recommendations (EGIR) and the NEA Ad Hoc Expert Group on the Exclusion of Nuclear Installations Being Decommissioned from the Paris Convention (EGPC). A key highlight of the meeting was the topical session on "Health Protection in Nuclear Emergency and Recovery Management: Doing More Good than Harm", which underlined the need for a decision-making framework that takes radiological and psychological effects into account in order to optimise well-being in emergency and recovery cases. The meeting featured another topical session on strategic human resource management in radiological protection, during which participants identified as key issues the lack of a clear career path in radiological protection and the lack of recognition of professional certifications across borders. They also agreed that a framework to facilitate career mobility internationally should be a focal point for human resource management in the coming years.