



INTERNATIONAL CENTRE FOR ENVIRONMENTAL & NUCLEAR SCIENCES

Departmental Report August 2020 - July 2021

Professor Charles Grant · **Director General**

MSc, University of Surrey, Fellow of the Institute of Physics (FInstP)

OVERVIEW

The International Centre for Environmental and Nuclear Sciences (ICENS) entered the year with the COVID-19 pandemic impacting all aspects of operations of the Centre. Nonetheless there were highlights, achievements and continued progress. On September 30, 2020, the Director General was officially promoted to the rank of Professor of Applied Nuclear Sciences, recognizing his many years of contribution to academia and national development using nuclear technology. He was also awarded the Vice Chancellors Award for Excellence in Public Service. Dr. Adrian Spence was awarded the Principal's award for the research project with the greatest business potential. Mr Oshane Hamilton, scientific officer, was awarded a Chevening Scholarship to pursue his MSc in the Physics and Technology of Nuclear Reactors at the University of Birmingham. Under this new paradigm the Centre continued to meet its project targets where possible, including using the virtual space to commission equipment.

ACCESS

Students

The ICENS, has several staff members involved in student development and teaching, though the Centre is not an academic department. Throughout the period in review Mr. Haile Dennis continued his duties as an adjunct lecturer of Electrical Power (Nuclear) Engineering in the Faculty of Engineering. Due to the COVID-19 pandemic lectures and practical laboratory sessions were held virtually. As has been the case for several years, both Mr Johann Antoine of the Nuclear Analytical Laboratory and Dr Adrian Spence of the Atomic Spectroscopy and Wet Chemistry Laboratory supervised student interns for the

Department of Chemistry's work-study programme. The marketing activities of the Centre have included a mixed strategy of upgrading the Centre's website, increasing our presence on social media and where appropriate, the traditional print media. During Nuclear Science Week, October 26-30, 2020, the ICENS had features in both the Jamaica Gleaner and Jamaica Observer. The Gleaner had the more extensive display with an infographic on the impact of the ICENS' work and the opportunity for careers in the nuclear field. This also extended to the activities put on by the Centre for International Day for Women and Girls in Science. Virtual sessions were held with the female scientists at ICENS with students at the primary and high school level. It was also an inclusive event with a few young men joining in and asking questions as well. Students were allowed to submit questions for our 'ask a scientist' session and ICENS scientists responding. Students were also encouraged to look at the Centre's nuclear science workbook.

Publications

The ICENS has continued its strategy of increasing research output by maximizing the collaboration. This can be seen in two of the publications during the year in review that include colleagues from other departments at The UWI, Mona as well as international partners. This strategy also helps to improve the quality of the research by presenting multi-disciplinary research and publishing these manuscripts in high impact journals.

Refereed Journal articles

Jhénelle A. Williams, Johann Antoine. "Evaluation of the elemental pollution status of Jamaican surface sediments using enrichment factor, geoaccumulation index, ecological risk and potential ecological risk index" Marine Pollution Bulletin, Volume 157, August 2020, 111288 Francesco Saverio Romolo, Mehmet Sarilar, **Johann Antoine**, Serena Mestria, Sabina Strano Rossi, Matteo Davide Gallidabino, Guilherme Maurício Soares de Souza, Paola Chytry, Johnny Ferraz Dias, "Ion beam analysis (IBA) and instrumental neutron activation analysis (INAA) for forensic characterisation of authentic Viagra® and of sildenafil-based illegal products", Talanta, Volume 224, 1 March, 2021, 121829.

Donovan Campbell, Alex A. Moulton, David Barker, Tashana Malcolm, Lance Scott, **Adrian Spence**, Jhannel Tomlinson, **Tiffany Wallace.** "Wild Food Harvest, Food Security, and Biodiversity Conservation in Jamaica: A Case Study of the Millbank Farming Region." Frontiers in Sustainable food Systems, Volume 5, 19 May 2021.

ALIGNMENT

The ICENS' programmes and research projects have always endeavoured to support the needs of the Government of Jamaica and related industries. This has been reflected in IAEA National Project: Establishing a Self-Contained Gamma Irradiation Facility for the In-

roduction of Sterile Insect Technique and Experimental Mutagenesis and Diagnostic Technologies (JAM5014). This directly addresses Jamaica's Vision 2030 strategic development plan. It has already resulted in the accepted manuscript, "Challenges in the control of neglected insect vector diseases of human importance in the Anglo-Caribbean" for which Professor Grant is an author and which will be published outside of the review period. In 2021 Dr. Spence was awarded the Principal's award for the 2020 research, "Assessment and Economic Valuation of Coastal Protection Services" for the project with the greatest business potential. Both projects are collaborative in nature and address the interface of the environment and the Centre's core competencies with government and business interests. The Centre's sargassum work seeks to address the nuisance blooms that affect coastal activities including fishing and tourism with a view to determining potential uses for the macroalgae, including as animal feed, fertilizer and biofuels. The response to the global pandemic reduced the number of major conferences during the period of review.

Papers Presented

Charles Grant. "Recent Research Activities at ICENS." 23rd Meeting of COMSATS Coordinating Council, virtual meeting, November 17, 2020.

Leslie Hoo Fung. "Food loss and waste in Jamaica in the context of Climate Change and COVID-19." COMSATS Centre for Climate and Sustainability /Uganda National Council for Sciences and Technology (UNCST) Webinar -Challenge of Reducing Food Loss and Waste to Improve Food Security in the Global South on November 30, 2020

Johann Antoine "Marketing and outreach, PR, cost analysis: The JM-1 SLOWPOKE Experience" Virtual Training Workshop on the Optimization of Performance and Processes in Neutron Activation Analysis from November 30- December 4, 2020.

Johann Antoine "Challenges in Air Quality data in Jamaica." COMSATS Centre for Climate and Sustainability (C3SD). COMSATS Webinar- Air Quality under South-South Cooperation: What Works for Developing Countries, through the Lens of Science, Technology and Governance on December 22, 2020.

Public Service

Mr. Johann Antoine

Vice-chair, Chair, National Mirror Committee/ISO TC/93 Starch (including derivatives and by-products), Bureau of Standards Jamaica, 2019 to present.

Chair, Paint and Surface Coatings Technical Committee, Bureau of Standards Jamaica, 2021-

Mr. Charles Grant

Member of National Bioethics Committee;

- ARCAL National Coordinator (Jamaica), and member of the ARCAL;
- Technical Coordination Board (OCTA which oversees all ARCAL Projects);
- Member, Ministry of Energy Committee on Nuclear Energy as an option for Jamaica;
- Member, NEPA/UNDP Committee for renewable wave energy technologies for the generation of electric power in small coastal communities in Jamaica;
- National Coordinator for Incident Reporting system for Research Reactors;
- National Coordinator, IAEA Radiation Safety Information Management System; (RASIMS);
- Chair, Hazardous Laboratory Waste Ad-Hoc Committee (Ministry of Science, Energy and Technology/ National Commission on Science and Technology).
- Member, National Bioethics Committee
- Fellow, Institute of Physics

Ms. Leslie Hoo Fung

- Chair, National Food Standards Committee (ISO TC34 Mirror committee, convened by the Bureau of Standards, Jamaica)
- ISO/IEC 17025 Assessor, Jamaica National Agency For Accreditation
- Member, Codex Committee on Methods of Analysis and Sampling (subcommittee, Jamaica)
- Member/ Technical Advisor, Hazardous and Laboratory Waste Ad-Hoc Committee (HAL-WAC) - Treatment, Disposal and Laboratory Guidelines Subcommittee, National Commission on Science and Technology/Ministry of Science, Energy and Technology, Jamaica
- Royal Society of Chemistry, May 2012-Present
- AOAC International, April 2016-Present

Mrs. Sandra Hunter

- Fellow of the Institute of Chartered Accountants, Jamaica.

Mr. John Preston

- Member, Land Information Council of Jamaica;
- Independent Member, GOJ Telecommunications Appeals Tribunal.

Dr. Adrian Spence

- Member of the Geochemical Society;
- Member of the American Chemical Society;
- Member of the Royal Society of Chemistry;
- Chemistry Ambassador and Co- Advisor, American Chemical Society (ACS) Student Chapter, UWI.

AGILITY

Income Generation

The major commercial activity of the ICENS is the Thermoluminescent Dosimetry (TLD) service offered to various local and international clients. During the year of review eleven (11) new customers representing seventy-five (75) additional personnel were added to the system. The new enrollments included personnel from medical (private and public), bauxite and construction industries. The ICENS also offers several radiation protection services. During the period of review five (5) radiometric surveys were conducted at medical facilities, eight (8) radioactive sources from the construction and bauxite industries were tested for leaks and one (1) orphaned source was recovered from the bauxite industry and brought under regulatory control.

The ICENS also offers commercial analytical activities, particularly for regulated toxic elements in growth industries such as Cannabis. This was affected by the pandemic and reduced not only the number of samples submitted by the clients but also the throughput that the Centre could manage. This was particularly the case in March 2021, when there was an oxygen shortage that prevented the delivery of oxygen and other gases necessary for the operation of various analytical techniques. This was particularly deleterious for the use of the Direct Mercury Analyser (DMA) which uses oxygen. This impact was eventually eased and there was the resumption of near normal levels of samples and analytical throughput. The ICENS also continued to receive grant-funding through several projects, either entirely administered by the Centre or where the ICENS was the lead organization. These include:

- CRP J02006 – “Nuclear Security for Research Reactors – and Associated Facilities” running from December 9th, 2015 to December 8th, 2020 and receiving total funding of €14,000.
- CRP F11021 - “Enhancing Nuclear Analytical Techniques to Meet the Needs of Forensic Science” running from June 12th, 2017 to December 2021 (project extended from June 11th, 2020) and receiving total funding of €20,000.
- CRP D52042 - “Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims” running from March 2019 to March 2024 and earmarked to receive total funding of €35,000.
- JAM1001 – “Upgrade of Reactor Infrastructure at the University of West Indies SLOW-POKE Facility JM-1” – which had a start date of January 2016 and is on-going and the budget for this project is €810,000.00.
- JAM5014 – “Establishing a Self-Contained Gamma Irradiation Facility for the Introduction of Sterile Insect Technique and Experimental Mutagenesis and Diagnostic Technologies”, this national project approved in January 2020 with an initial budget €750,000.00.
- RLA0059 - “Strengthening Regional Cooperation” which commenced in January 2018 and is on-going with a total budget allocation of Total IAEA budget allocated for this

regional project to date is €190,575.00.

INT0093 -“Applying Nuclear Science and Technology in Small Island Developing States (SIDS) in Support of the Sustainable Development Goals and the SAMOA Pathway” is slated to run from January 2018 to January 2022 and has a total budget allocation of €828,806.25.

