



## INTERNATIONAL CENTRE FOR ENVIRONMENTAL AND NUCLEAR SCIENCES (ICENS)

**Professor Charles Grant**, MSc, *University of Surrey*, *Fellow of the Institute of Physics (FInstP)* – **Director General**

The International Centre for Environmental and Nuclear Sciences (ICENS) had several highlights throughout the year. The year kicked off with Professor Grant brokering a memorandum of understanding between the North-Western University in South Africa and the UWI. Throughout the year the theme of nuclear energy elevated ICENS' profile in the local media, culminating in the ICENS open day and media tour on November 29<sup>th</sup>, 2022. This media activity also continued following the Prime Minister and Ministers of Science, Energy and Technology (at that time) mentioning nuclear energy and the ICENS role in the feasibility research during the sectoral presentations in Parliament. The progress of JAM 5014 – Establishing a Self-Contained Gamma Irradiation Facility for the Introduction of Sterile Insect Technique and Experimental Mutagenesis and Diagnostic Technologies was also a highlight with the project approaching the phase of installation. Towards the end of the year, several of ICENS' publications were recognized as outstanding by the University.

## ACCESS

### STUDENTS

The ICENS is a research institution that is a joint venture between the University of the West Indies, Mona Campus, and the Government of Jamaica, under the science portfolio of the Ministry of Science, Energy, Telecommunications and Transport (MSETT). The Centre is involved in several initiatives that have a direct impact on current and prospective students of UWI. Academically Professor Charles Grant, the Director General, continued his supervisory role of post-graduate students including thesis and viva reviews. Mr. Haile Dennis, Reactor Manager, also continued his role as an adjunct lecturer in Electrical Power Engineering (Nuclear) in the

Faculty of Engineering. Dr. Adrian Spence, head of the Atomic Spectroscopy and Wet Chemistry Laboratory and Mr. Johann Antoine, head of the Nuclear Analytical Laboratory, continued their service to the MSc programme in Forensic Science in the Department of Basic Medical Sciences, Faculty of Medical Sciences. Dr. Spence supervised the thesis of Ms. Daltonette Crawford while Mr. Antoine supervised the research of Mr. Wray Williams and Ms. Tamara Lobban, while also serving as an examiner for Ms. Crawford in the oral presentation of her thesis. ICENS also participates in outreach activities that introduce students to UWI and the work of ICENS. One of the major activities was the pilot edition of the Jamaica Nuclear Engineering Bootcamp, organized by Dr. Charlyne Smith of the Breakthrough Institute, USA. The Nuclear Bootcamp, held from July 24–28, 2023, took students from St. Catherine High School through the basics of nuclear power and reactor engineering which included a visit to ICENS where Mr. Antoine gave a lecture and then along with Mr. Dennis gave tours and further information about the JM-1 SLOWPOKE-2 reactor [https://www.youtube.com/watch?v=\\_FYRskxHm5s](https://www.youtube.com/watch?v=_FYRskxHm5s).

Early in the year (September 11<sup>th</sup>–14<sup>th</sup>) Professor Charles Grant visited the North-Western University (NWU) in South Africa where he was invited to serve on a panel for external review of the Unit for Environmental and Sciences Management. Professor Grant also visited the Centre for Applied Radiation and Technology (CARST) at the invitation of the Vice Chancellor and Principal of the NWU, Prof. Bismark Tyobeka, to sign a Memorandum of Understanding (MoU) between CARST and ICENS. The MoU will be signed on February 12, 2024, with a delegation from the NWU visiting the major UWI campuses. Among the areas of cooperation will include student and faculty exchange and collaborative research. Following discussions with the Vice-Chancellor Sir Hilary Beckles the scope of the MoU was extended to be one of cooperation between the NWU and the UWI. The academic year of 2022/2023 saw the ICENS profile significantly enhanced with increased talk of Jamaica considering the addition of nuclear power to its energy mix as well as the project that would bring a multi-purpose gamma irradiator to Jamaica to help fight mosquito-borne diseases using the sterile insect technique (SIT) and to induce beneficial traits in crops. Highlights of the year in this regard included Professor Charles Grant's feature in the Gleaner on Nuclear Energy (<https://jamaica-gleaner.com/article/news/20221106/jamaica-moving-towards-nuclear-energy>), Mr. Johann Antoine's appearance on CVM-TV (<https://www.cvmtv.com/panel-discussion/jamaicas-nuclear-energy-ambitions>), ICENS' Open Day and Media Tour being featured on TVJ and JIS (<https://jis.gov.jm/photos-icens-open-day-and-media-tour/>) and Mr. Antoine being featured in the Observer related to the gamma irradiator (<https://jis.gov.jm/photos-icens-open-day-and-media-tour/>). Following Prime Minister Andrew Holness' statement on April 28<sup>th</sup>, 2023 about exploring nuclear power and Minister Daryl Vaz's sectoral presentation, on May 10, 2023, which mentioned Professor Grant by name there was another flurry of activity. This included an

interview with Mr. Antoine in the Jamaica Observer, (<https://www.jamaicaobserver.com/business/icens-gives-technical-support-for-nuclear-energy/>) and a letter of the day in the Gleaner in June by Mr Dennis (<https://jamaica-gleaner.com/article/letters/20230622/letter-day-nuclear-power-could-provide-significant-benefits-jamaica>) and culminating in an article by scientific officer Oshane Hamilton in the July 30<sup>th</sup> Sunday Gleaner titled “The Potential of Nuclear Energy as Part of the Future Energy Mix in Jamaica.”



*Head of the Nuclear Analytical Laboratory at the International Centre for Environmental and Nuclear Sciences (ICENS), Johann Antoine (centre), explains the features of the nuclear reactor at the facility. Listening (from left) are Principal Director, Science Portfolio, Ministry of Science, Energy and Technology, Dr Natwaine Gardner; Director General, ICENS and Professor of Applied Nuclear Sciences, Professor Charles Grant; Chairman of ICENS, Dr. Parris Lyew-Ayee Jr. and ICENS Reactor Engineer, Assistant Research Scientist, Haile Dennis. The occasion was an Open Day and Media Tour of ICENS, which is located on the University of the West Indies (UWI) Mona Campus on Tuesday, November 29.*

## PUBLICATIONS

The year in review saw several awards being given for the UWI Mona’s recognition of outstanding researchers from 2020–2023. During this triennium, ICENS was recognized as having three outstanding publications: Best Research Publication for “Characterization of microplastics in the surface waters of Kingston Harbour” by Deanna Rose (formerly of ICENS) and Prof. Mona Webber awarded for 2020; Research Project with the Greatest Business/Economic/ Development Impact for “Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica” which included Dr Adrian Spence of ICENS as an author, also awarded for 2020; and Best Research Publication for “Challenges in the control

of neglected insect vector diseases of human importance in the Anglo-Caribbean” which included Prof. Charles Grant as an author, awarded for 2023. Another highlight was the award of the 2022 Gulbenkian Prize for Humanity to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) on October 13, 2022. Dr Adrian Spence was a contributing author of the IPCC’s 6<sup>th</sup> assessment cycle and shared in this award. These awards indicate not only the quality and relevance of ICENS research but also the fact that the strategy of collaboration has been very successful.

### Refereed Journal articles

- Spence, A., Wallace, T., Barracks E. “FT-IR spectroscopy analysis of HF-treated mineral soils, a direct approach for deciphering organo-mineral interactions” *MethodsX* 10, 102088 <https://doi.org/10.1016/j.mex.2023.102088>
- Romolo, F.S., Rossi, S.S., Odoardi, S., Mestria, S. Dias, J.F., Chiari, M., **Antoine, J.M.R.** “Nuclear techniques in forensic toxicology.” *Toxicologie Analytique et Clinique* (2022) 34 (3): S72-S73 <https://doi.org/10.1016/j.toxac.2022.06.100>

### Conference Publications

- Romolo, F.S., Rossi, S.S., Odoardi, S., Mestria, S. Dias, J.F., Chiari, M., **Antoine, J.M.R.** “Nuclear techniques in forensic toxicology.” The International Association of Forensic Toxicologists (TIAFT) 2022 Versailles, September 5–8, 2022.
- Hoo Fung, L.A.” ICENS: Applications for Consumer Safety, Trade and Business.” Scientific Research Council’s 7<sup>th</sup> Biennial Science and Technology Conference, Jamaica Pegasus Hotel, November 15–17, 2022.

## ALIGNMENT

The year continued with projects aligned with Vision 2030 and the UN’s Sustainable Development Goals (SDG). Specifically, the national IAEA project JAM5014 – Establishing a Self-Contained Gamma Irradiation Facility for the Introduction of Sterile Insect Technique and Experimental Mutagenesis and Diagnostic Technologies addresses Sustainable Development Goal (SDG)#3 Good Health and Well Being and specifically target 3.3.3 and 3.3.5 which according to the WHO’s “Keeping the Vector Out” document includes vector-borne diseases such as Chagas disease, leishmaniosis, dengue, Zika and chikungunya. The crop mutagenesis component of the project addresses SDG #2 Zero Hunger specifically targets 2.3, 2.4, and 2.5 as well as 2a. On March 18<sup>th</sup>, 2023, Prof. Grant and 3 counterparts of the project went to Vienna for a scientific visit to the irradiation facility and to sign off on the delivery

of the multi-purpose gamma irradiator. ICENS work also continued to address the mitigation of the lead hazard through the work of the Paint and Surface Coatings Technical Committee chaired by Mr. Johann Antoine. This aligns with National Goals 1 and 4 of Vision 2030. This is also the case with Jamaica's representation at the Minamata Convention on Mercury where Ms. Leslie Hoo Fung participated at The Group of Technical Experts on Mercury Thresholds meeting in Geneva from February 16 to 18, 2023 in Geneva, Switzerland. This also aligns with the same National Goals. ICENS research into the feasibility of nuclear power in Jamaica, specifically as it relates to Small Modular Reactors (SMR) aligns with Vision 2030 goal #3 and specifically with national outcome 10: Energy Security and Efficiency.

## PAPERS PRESENTED

- **Antoine, J.** “Case Study: Testing of Lead in Paints in Jamaica” UNEP/PAHO/WHO/ Global Alliance to Eliminate Lead Paint/SAICM/ GEF Regional Workshop: Lessons Learned in promoting regulatory and voluntary actions to phase out lead paints in Latin America and the Caribbean, August 9–10, 2022, Panama City.
- **Antoine, J.** Country Case Study: Sampling and Sample Preparation Methods, Laboratory analysis of Lead in paints, Analysis of Lead in Paints with Portable XRF Spectrometers Standard for Paint Lead Testing for Latin America and the Caribbean, September 29<sup>th</sup>, 2022



Standing from L-R: Dr Charah Watson and Dr. Ryan Francis of the Scientific Research Council, Mrs. Sherine Huntley-Jones of the Ministry of Health and Wellness, Mr. Saul Perez, section Head, Division of Technical Cooperation for Latin American and the Caribbean (IAEA), Mr. Dineth Dissanayake, Procurement Officer, Department of Management (IAEA). Seated, Ms. Eunice Bepura, Acting Director, Procurement Services (IAEA), and Professor Charles Grant, Director General, ICENS, signing off on the delivery of the gamma irradiator.

## PUBLIC SERVICE

The Paints and Surface Coatings Technical Committee chaired by Johann Antoine won Technical Committee of the Year. The National Food Standards Technical Committee with member and former Chair Leslie Hoo Fung placed third.

### Mr Johann Antoine

- Chair, Paint and Surface Coatings Technical Committee, Bureau of Standards Jamaica, 2021 to present
- Vice-chair, Chair, National Mirror Committee/ISO TC/93 Starch (including derivatives and by-products), Bureau of Standards Jamaica, 2019 to present.

### Professor 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).
- Fellow, Institute of Physics

### Ms. Leslie Hoo Fung

- Member, 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 (HALWAC) – 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
- Member, National Water Quality Technical Committee

**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 ICENS generates income from four main sources: through its major commercial activity of Thermoluminescence Dosimetry (TLD) services, radiation survey and protection services, commercial analytical services, and grant funding through projects. As commercial activity continued to recover from the pandemic.

The ICENS, as mentioned, generates income through grant funding from several projects, either entirely administered by the Centre or where the ICENS is the lead or participating organization representing the member state. These include:

- 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 SLOWPOKE Facility JM-1” – which had a start date of January 2016 and is ongoing 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 was approved in January 2020 with an initial budget of €750,000.00.
- RLA1022 – “Improving the Satisfaction of Regional Demand for Products and Services of Nuclear Research Reactors (ARCAL CLXXX)” with a total budget allocation of total IAEA budget allocated for this regional project to date is €625,525.00.
- RLA5089 – “Evaluating the Impact of Heavy Metals and Other Pollutants on Soils Contaminated by Anthropogenic Activities and Natural Origin (ARCAL CLXXVII)” commencing in 2022 with a total budget of €1,393,800.00.
- RLA9087 – “Building Strength and Sustaining the National Regulatory Bodies” commencing in January 2020 and closing in December 2023.