ITWG
Nuclear Forensics
International Technical Working Group

ITWG
NUCLEAR FORENSICS
UPDATE

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CHAIRPERSONS' ADDRESS

Welcome to the 25th edition of the Nuclear Forensics International Technical Working Group (ITWG) newsletter. Aptly for the 25th edition, this newsletter will review the 25th annual meeting held on 21–24 June in Pleasanton, California, United States. This anniversary meeting was special in many ways—not only because it was held two years after its original date due to the Covid-19 pandemic but also because it was the first meeting of the 'new normal', i.e. it was hybrid. It was delightful to see that so many ITWG members were again allowed to travel and made the effort to participate in person. This was definitely worth it and a big thanks goes to the organizers of the meeting, such as Mike Kristo and Naomi Marks as well as to their colleagues from Lawrence Livermore National Laboratory. Another anniversary will also be celebrated in this edition, namely 10 years of Galaxy Serpent (GS) exercises. Galaxy Serpent is a virtual exercise series that has now delivered four 'versions', and the fifth is just about to start. While they do not involve the thrill of working hands-on with radioactive materials like the Collaborative Material Exercises (CMX), Galaxy Serpent exercises have many other advantages: everyone can participate, i.e. no nuclear laboratory is needed; there is greater participation from the ITWG community because multiple teams per country are allowed; and no time consuming and expensive radioactive transport is required, which also allows the exercises to use very highly radioactive materials (e.g. high active sources), to mention but a few. Another highlight of the 25th edition is the conclusion of CMX-7 and the subsequent Data Review Meeting (DRM) that gathered about 50 participants from 15 participating laboratories on 10–14 October in Prague, Czechia. CMXs have long been at the centre of ITWG, and the DRMs magnify their outcomes by enabling an open exchange of analytical results and methods in a 'closed' environment (Chatham House Rule). The CMX-7 DRM was a great success and thanks go, firstly, to the Exercise Task group co-leads Olivia Marsden and Jon Schwantes, in conjunction with the Evidence and Testimony Task Group co-leads Jim Blankenship and Jens-Tarik Eisheh for designing an excellent scenario and, secondly but no less importantly, to the Czech host for great hospitality. Enjoy reading!

With best regards,

Michael Curry and Maria Wallenius

ITWG HOLDS 25TH ANNUAL MEETING IN CALIFORNIA

MICHAEL CURRY AND KLAUS MAYER

As befitting its 25th annual meeting, the Nuclear Forensics International Technical Working Group (ITWG) returned to California, where the group was created by experts from the Group of Seven (G7) countries to counter nuclear smuggling. Lawrence Livermore National Laboratory (LLNL) hosted that early meeting—colloquially known as ITWG-0—in 1995. In June 2022—delayed two years by Covid-19, it hosted ITWG-25 with support from the United States Department of Energy (National Nuclear Security Administration) and Department of State along with the Canadian Nuclear Safety Commission (CNSC). As in past years, the annual meeting featured updates from key international stakeholders and discussion of outcomes from recent exercises and identified topics for new guidelines. Perhaps the biggest news, however, involved changes in ITWG leadership positions, including Klaus Mayer's transition of co-chair responsibilities to Maria Wallenius.

The meeting featured extensive technical content in the form of a substantial ITWG Nuclear Forensics Laboratories (INFL) session organized by Naomi Marks (LLNL) and Maria Wallenius (Joint Research Centre, JRC-Karlsruhe). INFL presentations covered topics ranging from isotope ratio measurements to morphology studies to at least three distinct types

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ITWG holds 25th Annual Meeting in California... *continued from page 1*

of mass spectrometry (LA-QQQICP-MS, LG-SIMS and FIB-SEM-TOF-SIMS). There were also technical presentations on nuclear security policy tools such as the use of taggants in nuclear fuels and the construction, maintenance and application of national nuclear forensics libraries (NNFLs). The INFL session discussed a range of real-world case studies and updates on forensics activities in specific countries, such as Armenia, Azerbaijan, Bulgaria, Italy and Tajikistan. Zsolt Varga (JRC-Karlsruhe) will replace Maria Wallenius as co-chair of the INFL. ITWG-25 also featured two professional development sessions: one on laboratory contamination control and the other on accelerator mass spectrometry.

The ITWG task groups were also active during the annual meeting. The Exercise Task Group (ETG), co-led by Jon Schwantes (Pacific Northwest National Laboratory) and Olivia Marsden (United Kingdom Atomic Weapons Establishment, AWE) highlighted a two-part publication in the journal *Forensic Chemistry* reporting the results of the sixth Collaborative Materials Exercise (CMX-6, Celestial Skónis). The group also delivered updates on CMX-7, which was conducted between September 2021 and May 2022 and involved the participation of 21 laboratories from around the world. The Czech Research Centre Řež (CVŘ) hosted the CMX-7 Data Review Meeting in Prague in October 2022. The task group reported on the results of a CMX-focused survey of participants' interests in future CMX techniques (bulk trace element analysis, bulk isotope analysis and radiochronometry), materials (uranium ore concentrates, highly enriched uranium oxides/metals and plutonium oxides/metals/solutions) and traditional forensics topics (DNA, toolmarks and fingerprints). CMX-8 is scheduled to begin in the autumn of 2024 and is likely to contain both 'Crime-Scene-in-a-Box' (CSIAB) and NNFL components.

The Evidence and Testimony Task Group (ETTG), co-led by Jim Blankenship (Federal Bureau of Investigation) and Jens-Tarik Eisheh (Germany's Federal Office of Radiation Protection), addresses the needs and priorities of law enforcement and technical experts related to the collection, preservation and handling of evidence from a radiological crime scene. In 2022, the ETTG co-chairs reported on proposed updates to the Evidence Collection Guidelines and on the potential development of quick-reference pocket cards for law enforcement personnel and other non-scientist nuclear forensics stakeholders. The ETTG also predicted continuing engagement with the ETG on the inclusion of optional CSIAB conventional forensics elements in the CMX series. These conventional forensics elements, which are non-radioactive and can therefore be 'played' separately from the nuclear and other radioactive material (R/N) phase of the exercise, significantly improve the utility of CMX modules to law enforcement personnel.

The Guidelines Task Group (GTG), co-chaired by Mike Kristo (US LLNL) and Zsolt Varga (JRC-Karlsruhe), develops guidelines on all aspects of a nuclear forensics investigation. In 2022, the GTG co-chairs announced the recent approval of two new guidelines: on laser ablation-inductively coupled plasma mass spectrometry (LA ICP MS), developed by Slobodan Jovanovic at the CNSC; and on Isotope Dilution MS, developed by Amy Gaffney at the LLNL. They also discussed other guidelines in the process of development and the need to review existing guidelines at five-year intervals to ensure that they remain up to date and fit for purpose. The Canadian Nuclear Laboratory (CNL) announced two forthcoming guidelines: *Characterization of Particle Morphology via Microscopic Techniques* (Dan Cliff and Ike Dimayuga, CNL) and *In-beam Active Neutron Interrogation Techniques for Analysis of Special Nuclear Materials* (Ghaouti Bentoumi and Ron Rogge, CNL). Jeremy Gribble (UK AWE) gave a detailed presentation on the draft Graded Decision Framework (GDF) guidelines document, which was used by CMX-7 participants to interpret and communicate analytic results. GTG co-chairs look forward to reviewing feedback on the utility of the GDF that was discussed at the CMX-7 Data Review Meeting (DRM). Jovana Nikolov (University of Novi Sad, Serbia) will serve as co-chair of the GTG, replacing Zsolt Varga.

The Libraries Task Group (LTG), co-led by Steve LaMont (US Los Alamos National Laboratory) and Chris Cochran (CNSC), addresses technical questions related to establishing, populating and using NNFLs in support of nuclear forensics data interpretation. In 2022, the LTG co-chairs provided an overview of how NNFLs contribute to the success of an investigation and updated ITWG members on the continuing Galaxy Serpent (GS) exercise series. The GS exercises illustrate the value of NNFLs by providing participants with web-based investigative scenarios paired with fictional nuclear forensics libraries that participants use to answer exercise questions. The fourth GS exercise (GSv4) ran from

August 2019 to August 2020 and 38 teams (and 205 experts) participated on a rolling basis. GSv5 is scheduled to begin in December 2022, and to run until approximately May 2023. Exercise play is flexible and typically takes between a few weeks and a few months. A highlight of the LTG session was a spirited discussion among GSv4 participants about how to identify how many samples should be the subject of forensics examination and the ability to technically defend those choices.

The Outreach and Training Task Group (OTTG), co-chaired by David Smith (US LLNL) and Ed van Zalen (Netherlands Forensics Institute), strives to foster an active association with practitioners in nuclear forensics. The OTTG supports the ITWG by promoting international efforts to advance nuclear forensics, cooperating and coordinating with other nuclear forensics stakeholders, and optimizing training and human resource development. In 2022, the OTTG updated ITWG members through this quarterly newsletter on work to refine and operationalize a nuclear forensics lexicon and on plans to analyse and address emerging training needs in the ITWG community. Liz Dallas (US Oak Ridge National Laboratory) will serve as co-chair of the OTTG, replacing David Smith.

In addition to robust technical content, ITWG-25 included reflections on the origins of the ITWG by Sid Niemeyer, one of the group's original co-chairs; remarks by Kim Budil, LLNL Director, on the laboratory's work and relationship with the international nuclear forensics community; and an interview with Klaus Mayer about his many nuclear forensics firsts. This content will be made available on the ITWG members' website. •

TEN YEARS OF GALAXY SERPENT

JAMES BORGARDT

This year marks a decade of the ITWG Libraries Task Group (LTG) facilitating virtual, web-based nuclear forensics library tabletop exercises designed to develop the concept of national nuclear forensics libraries (NNFL) and demonstrate their efficacy as a valuable tool in support of an investigation involving nuclear and other radioactive material (R/N) found out of regulatory control. Named 'Galaxy Serpent', these exercises are designed to raise awareness of the technical aspects of developing and applying NNFLs. Each exercise has focused on a different type of nuclear or radioactive material in order to test the diversity of participants' skills and expertise and illustrate the material-specific aspects of developing and using an NNFL for provenance assessments.

Now in its fifth iteration, Galaxy Serpent was the first exercise series to leverage a virtual interface and offer global participation in a nuclear forensics exercise. The exercise has been the lead effort of the LTG for the past decade and has advanced the collective understanding of this tool, leading many teams from participant countries to develop their own indigenous NNFL. Galaxy Serpent does not just exercise the technical aspects of NNFLs. It can also assist with clarifying organizational roles and responsibilities and demonstrate the value of an NNFL in supporting nuclear forensics investigations. This is accomplished through thoughtful exercise design that requires teams to develop data organization and analysis skills and to practice query and response communications.

The use of a realistic dataset is critical to producing a virtual tabletop exercise that is both meaningful and beneficial to participants. Designing a Galaxy Serpent exercise poses several challenges, not least the need to develop a realistic dataset that is interesting, neither sensitive nor proprietary and can easily be shared with any team that wishes to participate in the exercise. In addition, the exercise should ideally be engaging and non-trivial for a diverse set of exercise teams with a wide range of experience in the development and use of NNFLs, nuclear and radioactive material signatures and comparative analysis.

The goals of the exercise have evolved over the past decade. Originally, the principal aim was to develop the concept of NNFLs by designing an exercise that allowed participating teams, when provided with real or synthetic R/N data and a hypothetical storyline involving recovery of material, to apply their subject matter expertise and use the information provided to answer questions about the material. Four exercises have been conducted to date and a fifth is currently under development. Each version of the completed exercise focused on a different material of interest: spent nuclear fuel, sealed sources, uranium ore concentrate and uranium pellets. The exercises sought to provide participants with robust and manageable datasets that mimic real world characteristics, such

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Ten Years of Galaxy Serpent *continued from page 3*

Table 1. A history of the Galaxy Serpent exercises over the past decade

Galaxy Serpent	Timeframe	Team (SMEs)	Hypothetical material for NNFL (provenance of provided data)	Exercise authors
Version 1 (GSv1)	Feb. 2013–Apr. 2014	17 (79)	Spent fuel (public domain—SFCOMPO)	Frank Wong (DHS in 2012)
Version 2 (GSv2)	June 2015–Jan. 2016	35 (186)	Sealed sources (synthetic—ANL)	Dave Chamberlain; Jodi Canaday (ANL)
Version 3 (GSv3)	June 2017–Feb. 2018	30 (133)	UOC (LLNL)	Naomi Marks (LLNL)
Version 4 (GSv4)	Aug. 2019–Aug. 2020	38 (205)	U fuel pellets (LLNL)	Naomi Marks (LLNL)

ANL = Argonne National Laboratory; DHS = United States Department of Homeland Security; LLNL = Lawrence Livermore National Laboratory; NNFL = National nuclear forensics libraries; SFCOMPO = Spent Fuel Isotopic Composition; and SME = Subject matter expert.

as missing data, signature covariance or isotopic compositions, to provide a realistic and informative experience. The summary of these exercises in table 1 demonstrates the growth in the number of participants and teams over time.

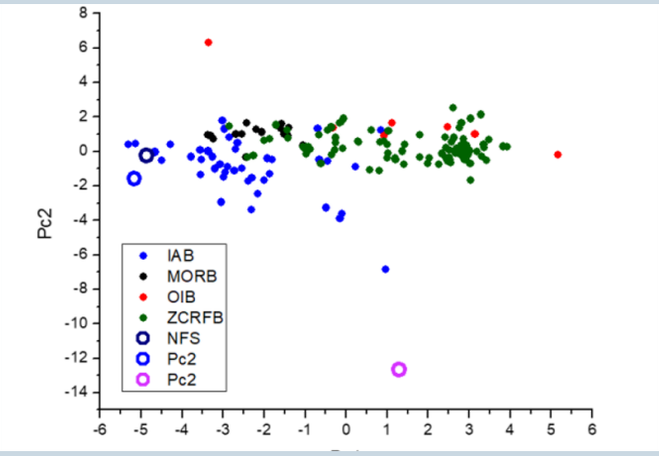

Figure 1. Sample plot employing a particular statistical technique, applied to a 17-element subset of the full data set for the four UOC classes (filled circles) and the three unknowns (open circles), suggesting that two of the unknowns are consistent with one of the classes and the third is inconsistent with all four of the classes.

The first version of the exercise benefited from the technical assistance of Frank Wong, then at the US Department of Homeland Security. The data for the exercise was sourced from Spent Fuel Isotopic Composition (SFCOMPO), a relational database designed to facilitate the search for and visualization of post-irradiation examination data on spent nuclear fuel. For the purposes of the exercise, the data was repurposed for an NNFL application, adding missing fields and uncertainties on various parameters. The participants were largely scientists associated with national—or, in one case, multinational—laboratories. Some teams added regulatory and law-enforcement members. The exercise culminated in a dedicated issue of the *Journal of Nuclear Materials Management* (JNMM), the quarterly, peer-reviewed journal of the Institute of Nuclear Materials Management (INMM). The JNMM kindly ceded editorial responsibilities to the author and the issue featured a lead article by Borgardt and Wong, accompanied by technical papers from nine participant teams detailing their experience and lessons learned.[1]

[1] Borgardt, J. and Wong, F., 'Galaxy Serpent: A web-based tabletop exercise using the concept of national nuclear forensics

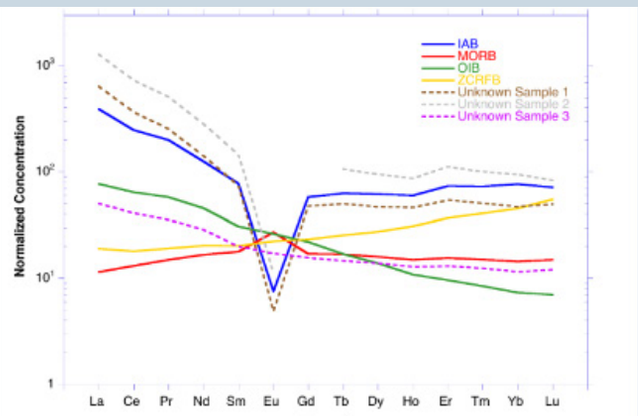

Figure 2. Sample plot of average concentrations of a subset of elements for the four UOC classes (solid lines) and the three unknowns (dotted lines).

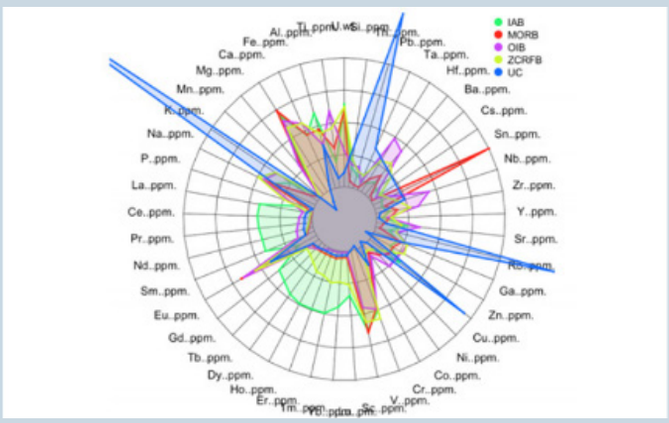

Figure 3. Plot submitted by a team showing a statistical assessment applied to the four classes of UOC data provided and the third unknown (in blue), providing evidence it is not consistent with material in the model NNFL.

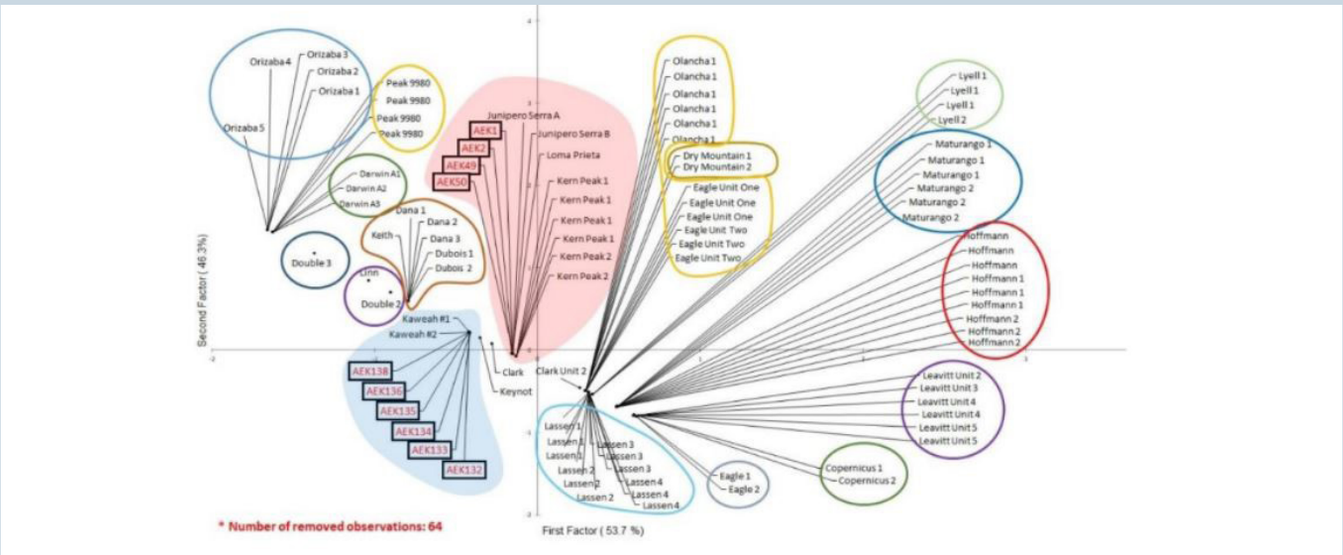

Figure 4. Pellet dimensions (height and diameter) discrimination using principle component analysis (PCA).

The GSv2 leveraged technical expertise from David Chamberlain and Jodi Canaday from the US Department of Energy (DOE) Argonne National Laboratory. It focused on sealed radioactive sources. A design challenge for the teams required the creation of the database component of an NNFL from multiple disparate data streams, which included shipping manifests, vendor catalogues and laboratory analyses. Some states had multiple independent teams, which allowed them to compare processes and findings, while teams from institutions of higher education used the exercise for education and training. An article by the organizers describing the exercise was published in the *Journal of Radioanalytical and Nuclear Chemistry*.[2]

For the third and fourth versions of the exercise, Naomi Marks at the US DOE Lawrence Livermore National Laboratory added her geochemical expertise and led the development of the datasets. The third version of the exercise used surrogate uranium ore concentrate (UOC) data, which provided critical insights on repurposing and organizing existing data, identifying key discriminators and dealing with 'real world' data challenges such as sparse or incomplete data. The teams employed a variety of technical methods of varying degrees of sophistication to reach consistent conclusions (see figures 1–3). The fourth version (figure 4) saw additional growth in the number of participating teams and scientists, and greater use of the exercise as a teaching tool for graduate students in radiochemistry and forensics. Seven of the thirty-eight teams were associated with universities. Papers summarizing design considerations, the methodologies used and the findings of participating teams were published in the *Journal of Radioanalytical and Nuclear Chemistry*.[3]

The Galaxy Serpent exercises have formed the core of the LTG's outreach to ITWG members and many others whose professional work involves nuclear forensics. The exercises have been successful in raising global awareness of NNFLs. Around 600 different participants have taken part from over 50 research laboratories, institutions of higher education, regulatory agencies and international organizations. As the exercise has evolved over time, there has been an increased focus on ascribing confidence in reported findings using the Graded Decision Framework (GDF), as well as on collaborative interactions with a hypothetical investigative team on answering proposed questions. A fifth version of the exercise will utilize previously used datasets while introducing new aspects to challenge participants. The LTG and others involved with offering the exercises thank the ITWG community for their investment of time and effort in the success of the exercises and look forward to additional interactions through Galaxy Serpent in the coming years. •

libraries', *Journal of Nuclear Materials Management*, vol. 42, no. 4 (2014), pp. 4–11.

[2] Borgardt, J., Canaday, J. and Chamberlain, D., 'Results from the second Galaxy Serpent web-based table top exercise utilizing the concept of nuclear forensics libraries', *Journal of Radioanalytical Nuclear Chemistry*, vol. 311, no. 2 (2017), pp. 1517–24.

[3] Borgardt, J. D. et al., 'Results from the third Galaxy Serpent web-based tabletop exercise demonstrating the utility of nuclear forensics libraries in support of an investigation', *Journal of Radioanalytical Nuclear Chemistry*, vol. 322, no. 3 (Dec. 2019), pp. 1645–56; and Borgardt, J. D., Marks, N. and Lamont, S., 'Results from the fourth Galaxy Serpent web-based tabletop exercise demonstrating the concept of nuclear forensics libraries in an investigation', *Journal of Radioanalytical Nuclear Chemistry*, forthcoming.

THE SEVENTH COLLABORATIVE MATERIALS EXERCISE DATA REVIEW MEETING

JON SCHWANTES

The Seventh Collaborative Materials Exercise (CMX-7) of the ITWG recently came to a formal close at the conclusion of the Data Review Meeting (DRM) held at the Czech Technical University Congress Centre, Prague, on 10–14 October 2022. This DRM was the first time the ITWG had brought nuclear and conventional forensics experts together in one meeting to share best practices and their experiences of participating in the most recent CMX. In all, 57 participants attended, representing 15 nuclear forensics and 12 conventional forensics laboratories from 14 countries and the European Commission.

The first day of the five-day event was devoted to an examination of the range of conventional forensics evidence included in CMX-7, such as fingerprint, DNA, trace, digital and torn edge comparisons. The third and fourth days were devoted to an in-depth discussion of the analysis and evaluation of the four exercise materials: a depleted uranium-vanadium alloy, a depleted uranium metal, uranyl nitrate created from the uranium metal and a uranium oxide created from the uranyl nitrate. Day two brought both communities together in an opportunity to demonstrate the science behind conventional forensics evidence examination and nuclear forensics evidence examination, and to share experiences of coordinating with law enforcement. An optional tour of the Řež Research Centre was offered on the third and fifth days to conventional forensics and nuclear forensics practitioners, respectively.

The meeting and the exercise led to many notable outcomes. CMX-7 is the second occasion on which conventional forensics evidence has been integrated into the exercise. A number of participants had provided conventional forensics support during CMX-6, but few of the examinations completed by participants were considered state-of-practice for the community, in which half or more of the participating laboratories demonstrated a particular examination technique. During CMX-7, however, nearly all of the conventional forensic examinations performed by participants reached state-of-practice status. Among these techniques were photography, trace evidence collection, torn edge comparisons, indented writing, digital evidence examinations, DNA collection and latent print development on non-porous surfaces. Several laboratories also identified trace and fingerprint evidence that was not part of the planned exercise scenario.

NOTABLE PUBLICATIONS ABOUT THE WORK OF THE ITWG, NUCLEAR FORENSICS AND RELATED DISCIPLINES

- Denton, J. S. et al., 'Improved methods to age-date uranium certified reference materials for nuclear forensics using the 231Pa/235U radiochronometer', *Journal of Radioanalytical and Nuclear Chemistry*, Nov. 2022.
- Prabnath, R. K. et al., 'Development of a simple non-destructive method to quantify low Z elements in ore samples using tantalum as an external current normalizer in external (in-air) PIGE method for Nuclear Forensic applications', *Journal of Radioanalytical and Nuclear Chemistry*, vol. 331, no. 10 (2022), pp. 4369-76.
- Corcho Alvarado, J. A. et al., 'Integrating the theory of sampling into a nuclear forensic investigation', *Applied Radiation and Isotopes*, vol. 190 (Dec. 2022).
- Glennon, K. J. et al., '3D printed field-deployable microfluidic systems for the separation and assay of Pu in nuclear forensics', *Lab on a Chip*, 15 Sep. 2022.
- Marchetti, M. et al., 'Classification of uranium ore concentrates applying support vector machine to spectrophotometric and textural features', *Applied Geochemistry*, vol. 146 (Sep. 2022).
- McLain, D. R. et al., 'Radiochronometric analysis of an historic Cs-137 activity standard', *Journal of Radioanalytical and Nuclear Chemistry*, vol. 331, no. 11 (Oct. 2022), pp. 4745–51.
- Shao, X. et al., 'Origin assessment of uranium ores using multivariate statistical method based on their rare-earth elemental parameters', *Nuclear Analysis*, vol. 1 (Aug. 2022).

Figure 6. Participants at the Data Review Meeting for CMX-7, held at the Czech Technical University Congress Centre, Prague, on 10–14 October 2022.

Participants observed and discussed several interesting outcomes from the analysis of nuclear forensics evidence. First, all the laboratories were able, from the examinations they did complete, to correctly arrive at the correct forensics conclusions presented in the scenario. Second, a few areas for improvement were identified as well. Non-destructive assay had limited ability to distinguish between the two groups of exercise materials in the early stages of CMX-7. Facilitated in most instances by destructive assay using mass spectrometry, however, all the participants were able to successfully distinguish between the two distinct groups of materials. Trace element analysis and optical spectroscopies (IR, Raman) offered clues to the process history of the uranyl nitrate and oxide but more research is needed to elucidate the order in which these materials were created. More research on radiochronometric measurements is needed to make sure that the model ages calculated from the measurements are congruent with actual process ages. Overall, CMX-7 was a success that also identified areas for further improvement. •

UPCOMING TRAINING COURSES AND MEETINGS*

- ITWG Webinar: Gamma Spectrometry Techniques and Good Practices in RCSM and Nuclear Forensics, Virtual, 17 January 2023
- ITWG Webinar: CMX-7 Virtual Data Review Meeting, Virtual, 21 February 2023
- IAEA International Training Course on Nuclear Forensics Methodologies, Pacific Northwest National Laboratory, United States, 27 February–10 March 2023
- IAEA Regional Training Course on Introduction to Nuclear Forensics, Mauritius, 13–17 March 2023
- IAEA Regional Workshop on Radiological Crime Scene Management, Victoria, Seychelles, 27–31 March 2023
- Third International Conference on Radioanalytical and Nuclear Chemistry, Budapest, Hungary, 7–12 May 2023, <https://akcongress.com/jrnc-ranc/>
- IAEA Third Regional Exercise on Forensic Examination of Evidence and Trace Amounts of Nuclear Material from Radiological Crime Scenes, Moscow, Russia, 29 May–7 June 2023

*Please check directly with the event organizer on the status and dates for implementation of the individual events listed above.

Dates and locations of IAEA training courses and meetings will be officially confirmed with host member states; participation in IAEA training courses and meetings is by nomination and in accordance with established IAEA procedures.

CONTENTS

NUCLEAR FORENSICS

Nuclear forensics is an essential component of national and international nuclear security response plans to events involving radioactive materials diverted outside of regulatory control. The ability to collect and preserve radiological and associated evidence as material is interdicted and to conduct nuclear forensics analysis provides insights to the history and origin of nuclear material, the point of diversion, and the identity of the perpetrators.

THE NUCLEAR FORENSICS INTERNATIONAL TECHNICAL WORKING GROUP

Since its inception in 1995, the Nuclear Forensics International Technical Working Group (ITWG) has been focused on nuclear forensic best practice through the development of techniques and methods for forensic analysis of nuclear, other radioactive, and radiologically contaminated materials. The objective of the ITWG is to advance the scientific discipline of nuclear forensics and to provide a common approach and effective technical solutions to competent national or international authorities that request assistance.

ITWG PRIORITIES AND ACTIVITIES

As a technical working group, the priorities for the ITWG include identifying requirements for nuclear forensic applications, evaluating present nuclear forensic capabilities, and recommending cooperative measures that ensure all states can respond to acts involving illicit trafficking and unauthorized possession of nuclear or other radioactive materials. An objective of the working group is to encourage technical peer-review of the nuclear forensic discipline. These goals are met through annual meetings, exercises, and informal and formal publications.

Outreach is a primary goal of the ITWG. The working group disseminates recent progress in nuclear forensic analysis and interpretation with the broader community of technical and security professionals who can benefit from these advancements. Affiliated international partner organizations include the International Atomic Energy Agency (IAEA), the European Commission, the European Police Office (EUROPOL), the International Criminal Police Organization (INTERPOL), the Global Initiative to Combat Nuclear Terrorism (GICNT) and the United Nations Interregional Crime and Justice Research Institute (UNICRI).

ITWG MEMBERSHIP

Nuclear forensics is both a technical capability as well as an investigatory process. For this reason the ITWG is a working group of experts including scientists, law enforcement officers, first responders, and nuclear regulators assigned by competent national authorities, affiliated contractors, and international organizations. The ITWG is open to all states interested in nuclear forensics.

ITWG participating states and organizations recognize that radiological crimes deserve thorough investigation and, when warranted, criminal prosecution. The ITWG encourages all states to possess the basic capability to categorize nuclear or other radioactive materials to assess their threat. As an international group, the ITWG shares its expertise through its membership to advance the science of nuclear forensics as well as its application to nuclear security objectives.

http://www.nf-itwg.org/

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