ITWG Nuclear Forensics International Technical Working Group

ITWG NUCLEAR FORENSICS UPDATE

No. 7 June 2018

COMMENT FROM THE CO-CHAIRS

Welcome to the seventh ITWG Update newsletter which highlights activities in the field of nuclear forensics. This edition contains a preview of the upcoming ITWG annual meeting, an article describing the role of the Netherlands Forensics Institute in nuclear security as well as impressions from a recent nuclear forensics workshop organized by the Institute of Nuclear Materials Management. In addition, it spotlights the nuclear forensics calendar to include upcoming IAEA trainings and other international events to feature nuclear forensic exercises, national nuclear forensic libraries, and links to traditional forensics disciplines. We hope you find this edition useful and look forward to seeing you at the annual meeting.

With best regards,
Klaus Mayer and Michael Curry

ANNUAL MEETING OF THE NUCLEAR FORENSICS INTERNATIONAL TECHNICAL WORKING GROUP

MICHAEL CURRY AND KLAUS MAYER

The Nuclear Forensics International Technical Working Group (ITWG) has met each year since 1995 to review its efforts to identify and socialize best practices in the field of nuclear forensics. This year the ITWG will meet in Schwarzenburg, Switzerland, on 5–7 June 2018. As in past years, the annual meeting will be structured to provide updates from key stakeholders, discuss plans for upcoming exercises and develop guidelines.

The International Atomic Energy Agency (IAEA), INTERPOL and ITWG co-chairs will provide updates, which will include a briefing with case studies by the IAEA Incident and Trafficking Database programme. There will be technical sessions with briefings on nuclear forensics techniques, as well as professional development seminars on laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) and lifting latent fingerprints from radioactively contaminated evidence. In addition, there will be breakout sessions for the ITWG's five task groups as described below. Finally, in addition to an official dinner at Lake Murten, our Swiss hosts from the Federal Office of Civil Protection are offering an optional half-day tour of the Spiez Laboratory.

The **Exercise Task Group** will review preparations for the ITWG's sixth collaborative material exercise (CMX-6), which is scheduled to begin this autumn, and review a draft after-action report from CMX-5.

The **National Nuclear Forensics Libraries Task Group** will review the outcomes from the recently completed Galaxy Serpent exercise (GSv3) and discuss the anticipated scenario for the next exercise. In addition, several participants in GSv3 will share their experiences and describe the data analysis tools used to successfully complete the exercise.

The **Evidence Task Group** plans to finalize several new documents, such as guidelines on the chain of custody and on documenting case work. The task group will also discuss the possibility of creating a new table top activity that will focus on how to interpret and present nuclear forensic results in a way that is tailored to law enforcement, public messaging or decision makers.

The **Guidelines Task Group** develops consensus guidelines that enable the comparison of results among nuclear forensics practitioners, which will provide additional credibility when presenting information to legal authorities. At ITWG-23, the task group will discuss the latest revision of the Graded Decision Framework Guideline, while also reviewing other guidelines in process development and soliciting production of new guidelines.

The **Outreach and Training Task Group** will focus on further technical revisions of the nuclear forensics training matrix (tasks vs practitioner) and the content of future editions of the ITWG Update newsletter. •

UPCOMING TRAININGS AND MEETINGS

- ITWG Annual Meeting (ITWG-23), Schwarzenburg, Switzerland, 5–7 June 2018
- GICNT Implementation and Assessment Group Meeting, Helsinki, Finland, 11–12 June 2018
- 2nd KINAC-SIPRI Nuclear Non-Proliferation and Security Seminar: State Implementation of the National Nuclear Forensic Libraries, Stockholm, Sweden, 13-14 June 2018
- Australia–New Zealand Forensics Science Without Borders Conference, Perth, Australia, 9–13 September 2018
- IAEA Regional Training Course on Introduction to Nuclear Forensics (Spanish Speaking), Buenos Aires, Argentina, 10–13 September 2018
- IAEA General Conference, Vienna, Austria, 17–21 September 2018
- ITWG 6th Collaborative Materials Exercise (CMX-6), begins September 2018
- IAEA International Training Course on Practical Introduction to Nuclear Forensics, Budapest, Hungary, 1–5 October 2018
- IAEA Regional Training Course on Introduction to Nuclear Forensics (French Speaking), Dakar, Senegal, 13–16 November 2018

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

PARTICIPANT'S IMPRESSIONS FROM THE INTERNATIONAL NUCLEAR FORENSICS METHODOLOGIES TRAINING COURSE

ANDREA SERBAN

As a young nuclear forensics researcher and a Masters student in nuclear physics, the IAEA international training course on Nuclear Forensics Methodologies hosted by the United States represented a learning experience that will define my scientific career. I am constantly reminded of the words of Dr Klaus Mayer: 'the thing that matters most is people: make sure you work with dedicated ones'. Being surrounded by people who have chosen a career in nuclear forensics changed my perspective in many different ways.

On 23 April to 4 May 2018, the Department of Energy's Pacific Northwest National Laboratory (PNNL) hosted representatives from China, Estonia, Georgia, Moldova, Morocco, Romania, Singapore, Tajikistan, Thailand and the United Arab Emirates, as well as international nuclear forensics experts from the European Commission's Joint Research Centre at Karlsruhe, the Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the Swedish Defense Research Agency, the Atomic Weapons Establishment in the UK, the US Department of State and the Federal Bureau of Investigation for the IAEA International Training Course on Nuclear Forensics Methodologies. Participants spent several days working in laboratories on the PNNL campus, although the majority of the course was held at the Hazardous Materials Management and Emergency Response Training and Educational Center (HAMMER).

PNNL organized a scenario-based exercise involving a fictitious case of illicit trafficking of nuclear materials. A realistic simulation of the identification of nuclear materials found during radiation monitoring at a border control point was followed by crime scene management, and participants being introduced to non-destructive analysis. Along with the theoretical aspects of each specific measurement, participants were organized in teams and guided by international experts through the practical nuclear forensics process. Each technique was presented and explained in detail at every stage of the scenario, emphasizing the importance of having the knowledge to conduct a specific measurement at a

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NUCLEAR FORENSICS PROMINENTLY FEATURED AT INSTITUTE FOR NUCLEAR MATERIALS MANAGEMENT REGIONAL WORKSHOP 'NUCLEAR MATERIALS SCIENCE: PROCESSING AND SIGNATURE DISCOVERY'

JON SCHWANTES

The US Department of Energy Pacific Northwest National Laboratory hosted around 100 nuclear security experts in Richland, Washington, USA on 1–2 May 2018 for the International Nuclear Materials Management (INMM) Regional Workshop 'Nuclear Materials Science: Processing and Signature Discovery'. The two-day workshop focused on five areas: (*a*) nuclear materials processing and nonproliferation; (*b*) signature science; (*c*) nuclear materials science and its relevance to treaties and policies; (*d*) developing the next generation of experts; and the longest session of the workshop (*e*) nuclear forensics.

The workshop was opened by the former US Ambassador to the United Nations and the International Atomic Energy Agency (IAEA), Laura Holgate, who is the former US Ambassador to the United Nations in Vienna and currently Vice President for Material Security and Minimization at the Nuclear Threat Initiative (NTI). She set out her international vision of nuclear security—proselytizing security through the global coordination of professionals, a 'nuclear village' of sorts, devoted to countering nuclear proliferation and terrorism. David Smith from the Division of Nuclear Security at the IAEA and Michael Curry, the Coordinator for Nuclear Forensics Cooperation at the US State Department, each reinforced Ambassador Holgate's message, describing the landscape of multinational efforts, initiatives, agencies and groups such as the Global Initiative to Combat Nuclear Terrorism (GICNT), the IAEA and the Nuclear Forensics International Technical Working Group (ITWG), as well as the robust worldwide network of nuclear forensics policies, legal frameworks, training and practitioners needed to respond to security events involving nuclear or radioactive material out of regulatory control (MORC).

While the keynote speakers at the workshop provided an overview of a vision of global nuclear security supported in part by nuclear forensics, the Nuclear Forensics session, co-chaired by myself and Dr Maria Wallenius of the European Commission's Joint Research Centre at Karlsruhe, offered a ground-level view of efforts by law enforcement agencies and researchers to develop and enhance nuclear forensic tools for the practitioner. The co-chairs opened the session with real-world examples from the recent arrests in Moldova and the polonium-210 case in the UK in 2006—to remind the audience that nuclear forensics is an important tool called on to respond to real-world nuclear security events involving MORC.

During the nuclear forensics session, 10 representatives from academia, the national laboratories and law enforcement agencies provided summaries of how their daily efforts in nuclear forensics on the ground contribute to nuclear security on a global scale. The operational communities from Canada, the UK and the United States were well represented. James Blankenship, who at the time was the FBI's only nuclear forensic examiner (there are now two!) began the session by summarizing US capabilities when processing a nuclear forensic investigation, including their unique radiological evidence examination facility (REEF) and the group of examiners that works there, the Hazardous Evidence Analysis Team (HEAT). Kristin Leeder from the Canadian Nuclear Laboratories (CNL) described the Canadian National Nuclear Forensics Capability Project (CNNFCP), establishing the country's National Nuclear Forensic Library and Canada's whole-of-government approach to a nuclear forensic investigation.

The CNNFCP, which began in 2012, has established a National Laboratory Network made up of six science and technology organizations, with participation and guidance provided by law enforcement, military and public safety agencies. She also summarized a recent exercise in which the laboratory network responded to a radioactive sealed source found outside of regulatory control. The event was a model demonstration to the world of multi-agency and multi-facility cooperation, working in concert to execute a nuclear forensic investigation—complete with the collection of traditional forensics fingerprint and DNA swab evidence conducted inside a hot cell! Paul Thompson of the Atomic Weapons Establishment in the UK and a self-proclaimed historian of the ITWG (he has the distinction of being the longest-serving participant in the 23-year old group) shared a truly engaging summary of over 40 years as a radiochemist

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IAEA NUCLEAR FORENSIC SCIENCE TRAINING PROGRAMME: FOCUS ON IMPLEMENTATION

JERRY DAVYDOV, DAVID SMITH AND TIMOFEY TSVETKOV

The International Atomic Energy Agency (IAEA) assists states, on request, in their efforts to establish effective and sustainable national nuclear security regimes to prevent, detect and respond to nuclear security events. Since the 1970s, the IAEA has provided ad hoc training courses on the physical protection of nuclear material. In the four subsequent decades, the IAEA has continued to emphasize that an enduring human resource development (HRD) training programme is a key component of a robust and sustainable national nuclear security regime.

Key to its nuclear security objectives and as part of its ongoing programme in nuclear forensic science, the IAEA assists states to develop, sustain and advance nuclear forensic science capabilities through a nuclear forensics HRD training programme. The IAEA does not conduct nuclear forensic examinations but instead focuses on preparing states to use nuclear forensics to prevent and respond to nuclear security events.

Through national, regional and international classroom-based and applied laboratory-based training, as well as dedicated three-month residential assignment opportunities, the IAEA provides training for states on conducting their own examinations using existing infrastructure and subject matter expertise by emphasizing awareness and the practical applications of nuclear forensic science. Using a sequential technical progression (introductory to advanced) of training, in partnership with leading nuclear forensic science laboratory and law enforcement experts and facilities, the IAEA utilizes the published guidance Nuclear Security Series 2-G (Rev. 1), Nuclear Forensics in Support of Investigations, and other international guidance to inform its curriculum.

Starting with the classroom-based *Introduction to Nuclear Forensics*, the IAEA provides the specialists involved in responding to and investigating nuclear security events with an awareness and understanding of the scope and application of nuclear forensics. Through a combination of lectures and table top exercises covering the fundamentals of nuclear forensics, instructors are able to introduce participants to the various considerations that should be taken into account when responding to a nuclear security event, such as the need to include an overview of radiological crime scene management, the determination of nuclear security implications and the risks posed by the seized material to first responders, law enforcement personnel and the public, the development of an analysis plan, the subsequent analysis of the nuclear or other radioactive material in a designated nuclear forensics laboratory and the interpretation of the resultant data from the analysis by an investigating authority. As nuclear forensics leverages the expertise and technical capabilities of various stakeholders, participants are encouraged to present information on the nuclear forensic capabilities that currently exist in their state that could contribute to a nuclear forensic examination. This training is offered in English, Spanish, French and Russian.

Building on the classroom-based *Introduction to Nuclear Forensics*, the IAEA invites states to participate in a week-long laboratory-based *Practical Introduction to Nuclear Forensics*. Through laboratory exercises, demonstrations and tours, augmented by technical lectures, this training course provides those involved in the analysis of nuclear and other radioactive material with applied instruction on analytical measurements relevant to nuclear forensic examinations. Utilizing the expertise and capabilities residing in leading nuclear forensics laboratories, participants are introduced to current scientific methods and analytical techniques for nuclear forensic analysis, such as gamma ray spectrometry, scanning electron microscopy and inductively coupled plasma mass spectrometry, and for the processing of traditional evidence that has been contaminated with radionuclides.

The most advanced applied nuclear forensics training provided is a two-week long laboratory-based *Nuclear Forensics Methodologies* course (see companion article this issue). Building on the lessons taught in the *Introduction to Nuclear Forensics* and the *Practical Introduction to Nuclear Forensics* courses, the *Nuclear Forensics Methodologies* course offers a programme where participants are challenged to apply nuclear forensics state-of-the-art practice in a realistic and applied training environment, starting from the detection of a nuclear material out of regulatory control, to the receipt of samples at a designated nuclear forensics laboratory, the development of an analytical plan, material analysis, the application of a national nuclear forensics library and formulating findings in support of criminal proceedings in a court of law. The course prioritizes the use of collaborative technical activities, demonstrations and laboratory tours to exercise applied methods and analytical

Figure 1. Measuring nuclear and radioactive material signatures under controlled conditions in the teaching laboratory

Figure 2. Practicing how to collect evidence that contributes to the success of a nuclear forensics examination

techniques that can be used to identify a nuclear or other radioactive material encountered out of regulatory control and make determinations on its origin and history.

The capstone applied nuclear forensics HRD opportunity offered by the IAEA is a *Residential Assignment for Human Capacity Building in Nuclear Forensics Analytical Measurements*. The purpose of the assignment is to place a scientist with current or future responsibility for nuclear forensics and with prior academic knowledge and demonstrable skills in nuclear material analysis in a leading nuclear forensics laboratory to improve their skills, knowledge and abilities in the conduct of a nuclear forensics examination. Under the mentorship of senior nuclear forensics scientists, participants pursue a research programme specifically tailored to the interests of the selected candidate, and which could involve, inter alia, non-destructive nuclear analysis, radiochronometry, mass spectrometry methods and electron imaging methods.

Moving forward, the IAEA, in partnership with international assistance providers, has embarked on a process of applying objective development and execution to its training using the principles of instructional systems design. With the goal of reinforcing and enhancing the instructional experiences of the beneficiaries of its technical training, the IAEA has begun a review of its existing curriculum with a focus on better understanding the capability and needs of the learner, defining the end goal of instruction and creating more robust mechanisms for evaluating the effectiveness of the training.

The IAEA continues to cultivate the next generation of nuclear forensics practitioners, scientific experts and non-technical collaborators by creating pathways for dedicated and multidisciplinary training opportunities to develop a sufficiently qualified nuclear forensics workforce. Through the IAEA's HRD training programme, stakeholders can evaluate their existing capabilities and determine their performance under realistic conditions, while also assessing roles and responsibilities, and information exchange pathways and mechanisms. The outcomes and findings from the training programmes are used by HRD beneficiaries to identify remedial action, optimize techniques and provide new ideas for improving the overall response to a nuclear security event. Through the implementation of training and residential assignments, the IAEA's HRD programme in nuclear forensics continues to promote the work of states to prevent and respond to nuclear security events.

For additional information see the IAEA website (www.iaea.org) and the IAEA nuclear security portal (www.nusec.iaea.org, note: registration required). •

Nuclear Forensics Prominently Featured at INMM *continued*

in support of nuclear security and nuclear forensic science—reminding us all that 'experience is what you get when you don't want it'.

The session closed with the academic and national laboratory communities reporting on recent advances in nuclear forensic science. Professor Luther McDonald at the University of Utah and Dr Daniel Ries and Dr Lav Tandon, from Sandia and Los Alamos National Laboratories, respectively, shared their ongoing efforts to exploit morphological and microstructural features as potential signatures of material process history. Dr Sivanandan Harilal of Pacific Northwest National Laboratory and Professor Kyle C. Hartig from the University of Florida summarized their efforts to exploit laser induced plasmas for nuclear forensics applications, from rapid isotopic analyses to stand-off detection of uranium. Dr Michael Kristo and Dr Maria Wallenius each discussed the ongoing efforts at their institutions to develop Resonance Ionization Mass Spectrometry (RIMS) and exploit Laser Ablation Multi-Collector Inductively Coupled Mass Spectrometry (LA-MC-ICP-MS), respectively, for nuclear forensics applications. Dr Kristo and Professor McDonald also reported on their research group's efforts to use oxygen isotopes as a 'pathways' signature for the geolocation of unknown actinide oxides.

The closing keynote remarks on the future of nuclear forensic science as it relates to nuclear security were provided by Dr Frank Wong, a Senior Scientist at Lawrence Livermore National Laboratory, who was Director of Nuclear Defense Policy at the National Security Council during the Obama Administration.

Abstracts from the workshop will be selected for a paper that will appear in a special issue of the *Journal of Nuclear Materials Management*. More details on the workshop can be found on the INMM website, at https://www.inmm.org/Events/PNNL-Discovery-Workshop. •

Participant's Impressions *continued*

certain time during the investigation in order to meet the requirements of the lead prosecutor.

Using an optical microscope, participants were able to identify morphological signatures from the seized nuclear material, which proved to be useful during the case investigation. High resolution gamma-ray spectrometry was used to determine the isotopic composition and the time that had elapsed since the last chemical separation of plutonium, giving the age of the sample. This method provided rapid and accurate results because it was used successfully at an early stage of the investigation. Destructive analyses such as alpha spectrometry and mass spectrometry were then used to provide a more complete and accurate characterization of the investigated samples.

As this was my first experience of a practical, scenario-based exercise, I was enthusiastic throughout. It was all very different from 'school-like' classes, and the lectures by international experts were certainly a source of motivation and inspiration. While attending the training, I became very conscious of a particular feature of all the teachers: how much they love their work. I have seen gurus of nuclear forensics with years of experience, each speaking with joy and pride about what they do on a daily basis.

During the training, participants were given a step-by-step introduction to the legal aspects of nuclear security and gained awareness of the importance of having a well-defined analytical response plan that is in accordance with national and international guidelines. These concepts can often seem vague to a young and inexperienced practitioner, but the guidance from the teachers gave participants a complete understanding of all aspects of nuclear forensics. Attentive, passionate and eager to share their knowledge, each of them contributed in a specific way to the experience, which I would warmly recommend to any nuclear forensics practitioner.

During the investigation, the concept of National Nuclear Forensics Libraries was presented as a key tool. In addition to subject matter expertise, participants had an opportunity to work with a database in order to solve the fictitious case of illicit trafficking. Fundamentally, each of the participants had a chance to play the role of Sherlock Holmes, and 'keep the world safe' as Dr Jon Schwantes put it many times during the course.

Nuclear forensics is about efficient communication and reliable measurement. During the course, the phrase 'you get out what you put in' was mentioned many times. I gained knowledge, developed awareness and confidence, and was motivated and inspired. You come home knowing you can help to change the world. •

THE NFI AND FORENSICS IN NUCLEAR SECURITY

ED VAN ZALEN

The Netherlands Forensic Institute (NFI) in The Hague is an agency of the Ministry of Justice and Security. It delivers forensic services and related products with the aim of strengthening national and international law and order. The foundations of the current NFI were laid by the Dutch government-in-exile in 1945, when it founded an institute to investigate war crimes committed during World War II. The Gerechtelijk Laboratorium, or Judicial Laboratory, became an independent part of the Ministry of Justice on 4 November 1948. The Laboratory of Forensic Pathology was established in 1952 and both institutes were merged in 1999 to become the NFI.

To its initial focus on war crimes were added crimes such as burglary, counterfeiting, murder and sexual assault. In the late 1980s methods of working involving DNA were developed, and in the mid-1990s digital forensics was introduced in all its aspects. In 2002, following the events of 11 September 2001, the Minister of Justice asked the NFI to develop a response capability to investigate major or high-impact incidents. This was later further developed into a chemical, biological, radiological and nuclear (CBRN) response capabilities.

Forensic investigations

The forensic process starts with an assessment of the questions asked and the seized materials linked to the case. Together with the investigative authority, a hypothesis for the investigation is determined and the laboratory investigator starts to select and collect traces to be further investigated in the laboratory. The laboratory work might focus on relating the traces to a person (DNA, fingerprints, handwriting, facial recognition) or an incident (gunshot residue, chemical identification and profiling of traces and materials, weapons and ammunition, explosives, or illicit and synthetic drugs). It could involve a suspect death (pathology and toxicology), digital investigations (of cell phones, hardware and software) and data analysis. The NFI takes an integrated approach to its case work that combines expertise areas to test the hypothesis that has been agreed with the investigating authority. It reports its findings to the investigative authority.

The NFI has a wide range of high-end technologies available for its forensic investigations, such as Scanning Electron Microscopy (SEM-XRF), Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS, and ICP-MS) and X-ray diffraction (XRD). These are able not only to identify particles and materials, but also to relate these particles and materials to their possible source. For illicit drugs, medicines and other chemicals in a wide range of matrices, technologies such as Ion-Trap Mass Spectrometry (Orbitrap-MS), Gas Chromatography–Mass Spectrometry (GC-MS) and Liquid Chromatography Mass Spectrometry (LC-MS/MS) can support investigations on request from law enforcement bodies.

For either human or non-human DNA traces, the NFI has robotized the isolation and extraction steps before polymerase chain reaction (PCR) and sequencing for DNA profiles. To enable objective forensic conclusions from the results of the laboratory work, the NFI has developed databases containing the characteristics of numerous materials such as paint, tape, glass and lubricants, as well as human and non-human DNA profiles. This enables an assessment of the likely accuracy of the forensic conclusions to be provided.

Enhancing nuclear security

The NFI Forensics in Nuclear Security programme focuses on the forensic science aspects of nuclear security. The programme seeks to exchange knowledge and expertise among decision makers, experts and first responders on a national scale. Improving methods and technologies is also an issue of paramount importance. The ultimate goal is to enhance the possibilities for addressing urgent questions with regard to what has happened and who is responsible. Answering these questions requires a combination of nuclear and traditional forensic science methods. From the perspective of case work on nuclear security incidents, the NFI has created a network in the Netherlands and cooperates closely with the Dutch National Institute for Public Health and the Environment (RIVM) and the Netherlands Organisation for Applied Scientific Research (TNO), as well as international organizations such as the European Commission's Joint Research Centre at Karlsruhe, the IAEA, INTERPOL and Europol. •

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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/