

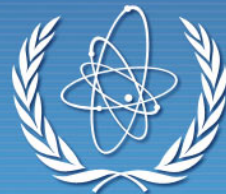
International Assistance in Nuclear Forensics to Strengthen a Nuclear Security Infrastructure

**David Kenneth Smith
Office of Nuclear Security**

Prepared for

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IAEA

International Atomic Energy Agency

International Atomic Energy Agency

- Specialised and autonomous agency within UN system
- Created in July, 1957; following US President Eisenhower's "Atoms for Peace" address to United Nations in 1953
 - 159 Member States (as of September 2013)



The IAEA is a technical organization

Safety and Security

Science and Technology

Safeguards and Verification



“Atoms for Peace”
The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies

A few words about the IAEA and the Nuclear Non-Proliferation Treaty and Additional Protocol



- Nuclear Non-Proliferation Treaty (NPT) was opened for signature in 1968; currently 178 countries are party to the NPT
- An international treaty to prevent the spread of nuclear weapons and weapons technology, to promote the peaceful uses of nuclear energy and to further the goal of achieving nuclear disarmament
- International safeguards - administered by the IAEA - are the technical means to monitor nuclear activities in compliance with the NPT
 - Material accountability - tracking in bound and out nuclear transfers
 - Physical security - restricting access
 - Containment and surveillance - seals, cameras to detect unauthorized movements
 - Comprehensive access

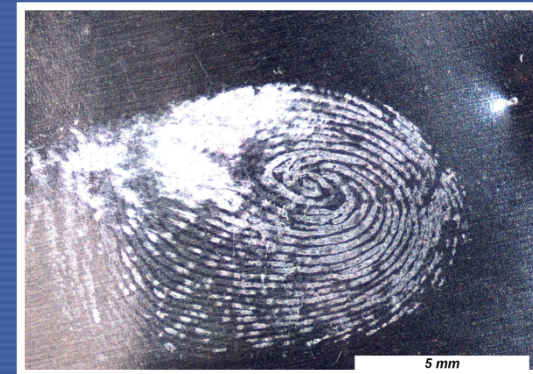
What is ...nuclear security??



Prevention



Detection



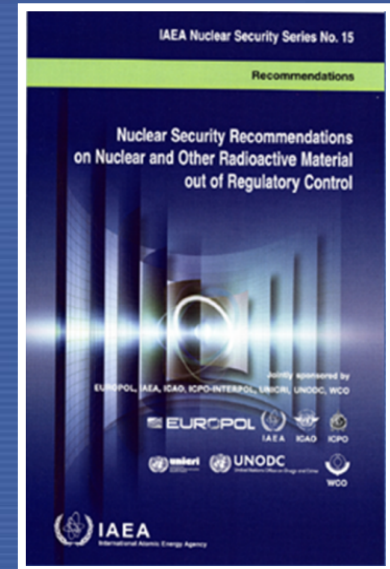
Response

... to theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities

The responsibility for establishment, implementation, and maintenance of nuclear security within a State rests entirely with that State

IAEA assistance to Member States

- Encouraging and facilitating adherence to international legal instruments
- Development of Nuclear Security guidance
- Peer reviews / Advisory services
- Training and technical assistance
- Information management and co-ordination
- Support to major public events
- Co-ordinated research projects
- Risk reduction



IAEA Incident and Trafficking Database Programme

- **Internationally recognized source of information established in 1995 to record and analyze confirmed incidents involving nuclear and other radioactive material out of regulatory control**
- **Network of over 125 ITDB Member States and International Organizations (as of September 2013)**
- **Voluntary reporting**
- **ITDB confirmed 2331 incidents reported by Member States from 1993 – December 2012**

Incidents confirmed by States 1993 through December 2012

- **419 incidents involved unauthorized possession and related criminal activities**
 - Over 130 of these incidents involved attempts to sell nuclear or radioactive materials.
 - In a few incidents tentative buyers been identified
 - 16 incidents involved HEU and Pu
- **615 incidents involved theft or loss of materials**
 - Involving Cs-137, 192-Ir, 60-Co, 241-Am sources
- **1244 incidents involved other unauthorized activities**
 - 50% of these cases involve materials detected at borders
 - Increased of nuclear and radioactive material in scrap metal

What is nuclear forensics??

Nuclear forensics is the examination of nuclear and other radioactive material, or other evidence that is contaminated by radioactive material, in the context of legal proceedings under international or national law related to nuclear security

- **Nuclear forensics helps to identify the origin and history of nuclear and radiological materials out of regulatory control**
- **Likely questions asked**
 - Was a law broken?
 - What are materials?
 - Who is responsible?
 - Is there more?
 - Where was material diverted?
 - What route did the material take?



IAEA perspective on nuclear forensics.....



- Focus on materials only
- Support criminalization for MORC
- Promote the existing State technical base
- Assist States while providing access to expertise regionally
- Elevate nuclear forensics as a key piece of States nuclear security infrastructure

Nuclear forensics sits at the centre of recommendations for nuclear and other radioactive material out of regulatory control

- Preventative Measures

“Deterrence”

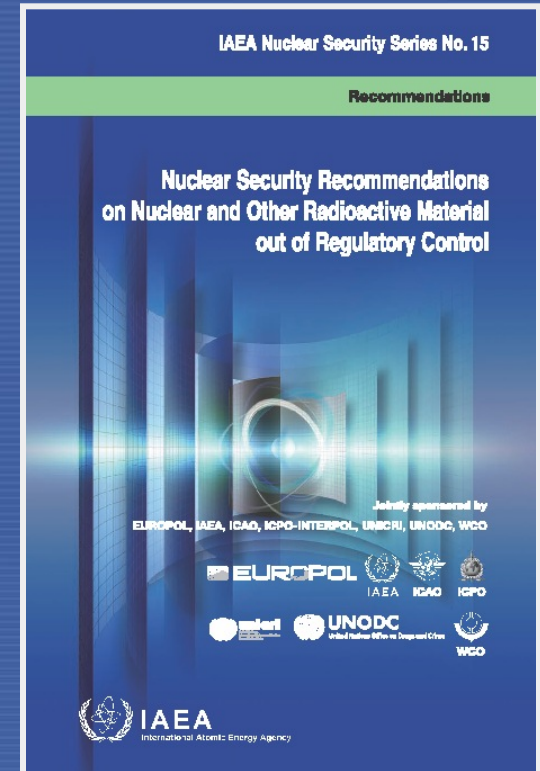
- Response Measures

“The State should apply nuclear forensic in its designated laboratories to seized material ... taking into account preservation of evidence. Seized materials should be categorized and characterized”

- International Cooperation

The State should apply nuclear forensics techniques to determine the source and route of transfer and to investigate loss of regulatory control...”

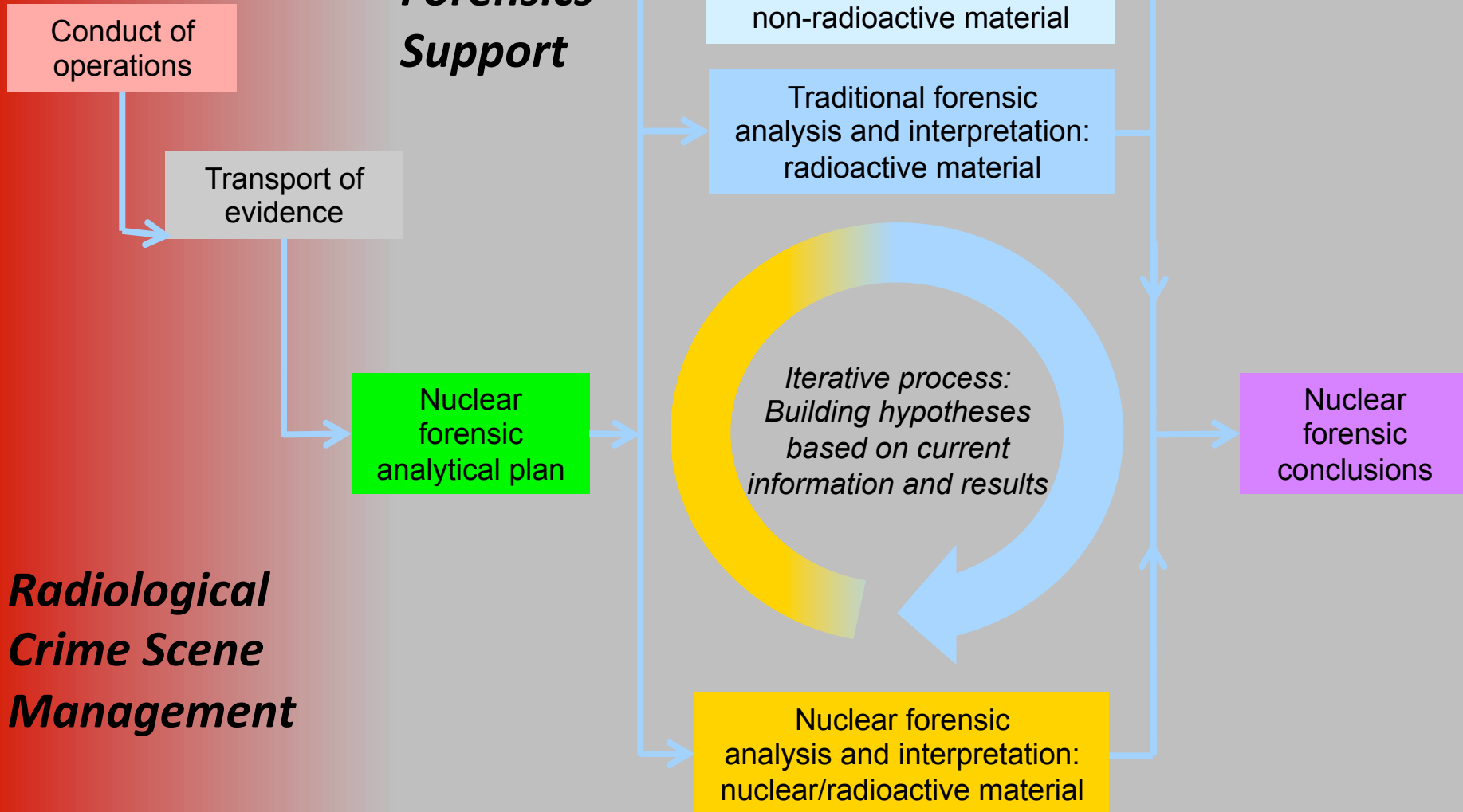
“States should assess its capabilities to perform nuclear forensics and potential needs for forensic support...”



Published in 2011

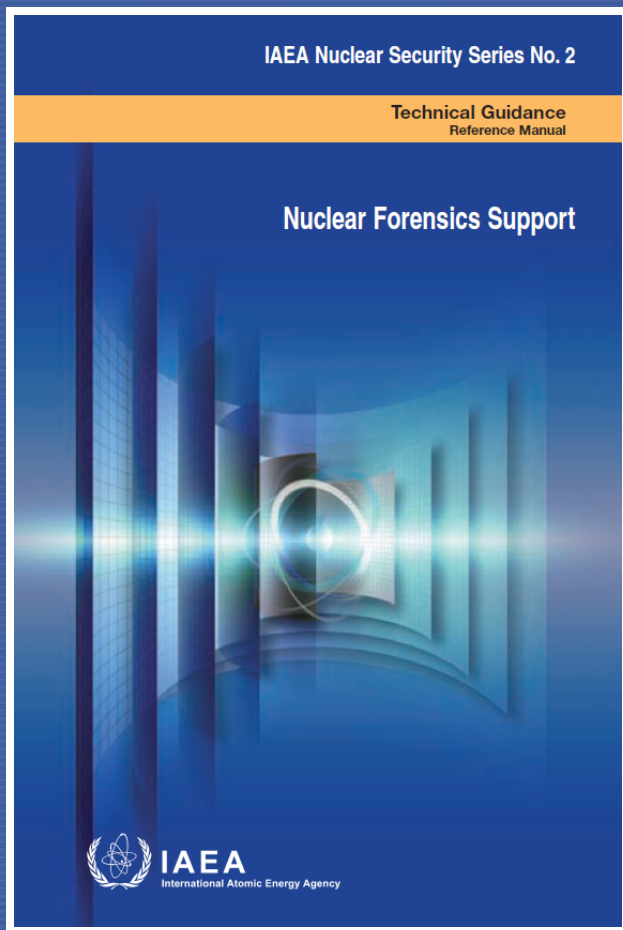
Model Action Plan (MAP)

Nuclear Forensics Support



Radiological Crime Scene Management

Documentation of Model Action Plan



- The Nuclear Forensics International Technical Working Group (ITWG) formulated the “Model Action Plan”
- Published by the IAEA as Nuclear Security Series #2, *Nuclear Forensics Support* in 2006
- Nuclear Security Series #2 currently under review and revision as: “Nuclear Forensics In Support of Investigations”

A multi-pronged ONS effort in nuclear forensics during CY2013

- 1) **Revise Nuclear Security Series No. 2 “Nuclear Forensics Support”**, develop guidance on a baseline nuclear forensics capability, and continue implementation of a ‘model action plan’ for nuclear forensics
- 2) **Pursue research and development - through the mantle of the Coordinated Research Program - to address key technical challenges including the ‘science of signatures’, and promote confidence by practitioners**
- 3) **Promote nuclear forensics implementation through training and education programmes that key understanding, awareness, sustainability, and the availability of qualified experts**
- 4) **Lead the development of a national nuclear forensics library and an international directory through technical guidance**
- 5) **International conferences in 2013 and 2014**

Active nuclear forensics CRP

“Identification of High Confidence Nuclear Forensic Signatures for the Development of National Nuclear Forensics Libraries” (J02003)

CRP Objective

- To develop peer-reviewed nuclear forensic isotopic, chemical, and physical signatures corresponding to stages of the nuclear fuel cycle and manufacture of radioactive sources that enable comparative analysis between “unknowns” and “knowns” using a national nuclear forensics library**
- Will run: 2013 -2016**
- Six proposals approved**

**Submit proposals to:
www-crp.iaea.org**



J02003 CRP contracts and agreements in place

| Member-State | PI | Title |
|---------------------|-----------------------|---|
| Brazil | J. De Souza Sarkis | Identification of Nuclear Forensics Signatures in Environmental Samples |
| Canada | F. Dimayuga | Nuclear Forensics Signatures of Irradiated CANDU Fuel |
| European Commission | M. Wallenius | Propagation of Nuclear Forensics Signatures at the Front-end of the Nuclear Fuels Cycle |
| Greece | G. Nikolaou | Parameterization of Unknown Spent Nuclear Fuel from Nuclear Reactors in View of Identifying its Origin |
| Hungary | E. Kovacs- Szeles | Establishment of a National Library for Nuclear Forensics in Hungary |
| Indonesia | B. Briyatmoko | Identification of High Confidence Nuclear Forensic Signatures for UO ₂ from a Nuclear Fuel Fabrication Process |

Have also received a proposal from Australia

A fundamental requirement for the development of a national nuclear forensics library

- If nuclear material is found outside of regulatory control anywhere in the world, then each country should be able to answer the question:

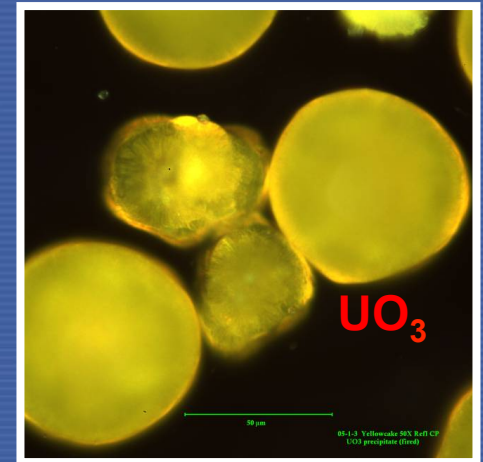
“Is it ours?”

A national nuclear forensic library, and associated material databases, is valuable for answering this question with timeliness and confidence

The national nuclear forensics library concept

- National nuclear forensics libraries and associated materials databases

- Are compilations of nuclear material characteristics (measured and modeled)
- Enable comparative analysis
- Rapidly accessible when needed
- *Complexity tailored to each State's situation*



- The national library is under control of the State at all times
- Protects proprietary and sensitive nuclear materials characteristics and inventories
- Does not obligate the State to share information

IAEA nuclear forensics training

“Introduction to Nuclear Forensics”

- Awareness and understanding
- Orientation to model action plan
- Applied tabletop exercise
- Case studies

“Nuclear Forensic Methodologies”

- Technical instruction for practitioners on the conduct and sequencing of nuclear forensic analyses
- Conducted at Pacific Northwest National Laboratory USA with state of practice nuclear forensic capabilities







New nuclear forensic partnerships: Latin America

- **IAEA-AMERIPOL Coordination Meeting on Nuclear Forensics conducted 1 - 3 October 2013 and hosted by Mexican Federal Police in Mexico City**
- **November 2012 “Introduction to Nuclear Forensics” conducted in Santiago, Chile**



Nuclear forensics international engagements

| | Members | Focus | Key Products |
|---|--|---|--|
|  <p>Nuclear Security Summit Seoul 2012</p> | 52 Heads-of-State (Invited) | Effective momentum to existing NF efforts | Nuclear Security Summit Work Plan, Communique |
|  <p>GICNT Global Initiative to Combat Nuclear Terrorism</p> | 85 Partner Nations (Volunteer) | Policy: NF capabilities awareness, best practices, TTXs | NF Fundamentals Document, <i>Iron Koala</i> , NF Information Sharing |
|  <p>IAEA</p> | 159 Member States | NF guidance and training for member states | Nuclear Security Series Documents, IAEA NF Training |
|  <p>ITWG Nuclear Forensics</p> | International scientific community (volunteer) | Technical forum and information exchange, analytical exercises, | Comparative Analysis Exercises; National NF Libraries TOR |

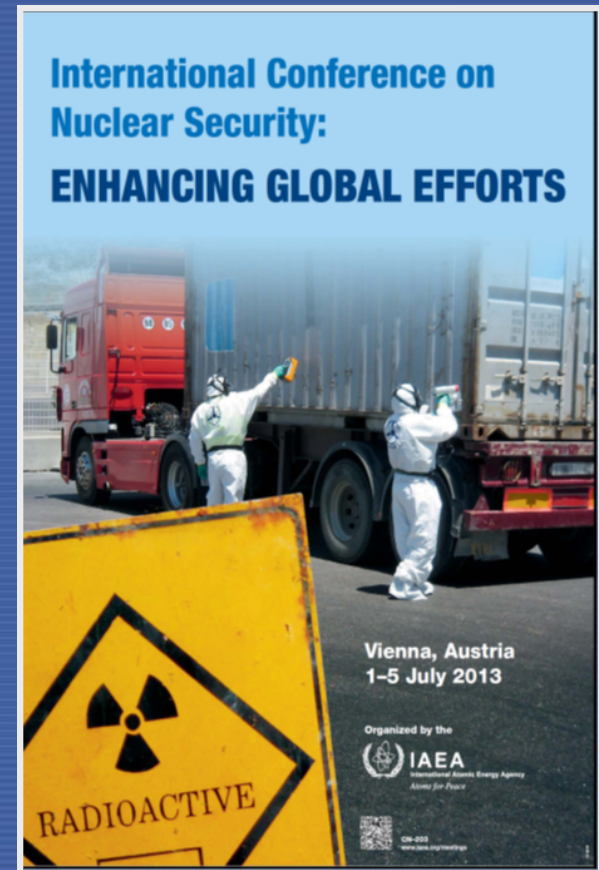
July 2013 IAEA International Conference on Nuclear Security

Enhancing Global Efforts

A global forum for policymakers, senior officials and experts from all areas of nuclear security to discuss all aspects of nuclear security

- Attracted 1300 participants from 125 Member States including 34 at the ministerial level
- Review experiences and achievements to date
- Provide input to the IAEA's Nuclear Security Plan for 2014-2017
- Successful nuclear forensics session

1-5 July, 2013
Vienna, Austria



2014 IAEA International Conference on Advances in Nuclear Forensics

7 - 10 July, 2014

A forum for nuclear scientists, law enforcement, nuclear security experts, legal specialists, policy and decision makers, and institutional leaders with responsibility for nuclear forensics

IAEA Headquarters
Vienna, Austria



**International Conference on
Advances in Nuclear Forensics:**
*Countering the Evolving Threat of
Nuclear and Other Radioactive Material
out of Regulatory Control*
7-10 July 2014, Vienna, Austria

The poster features a collage of images related to nuclear forensics: a yellow evidence bag, a person in a red protective suit, a laboratory setting with a person in a white lab coat, and a colorful grid of data points.

Organized by the
 IAEA
International Atomic Energy Agency
www.iaea.org/meetings

In cooperation with the
 Nuclear Forensics International
Technical Working Group
 Interpol
 ENTPC
 Global Initiative to Combat
Nuclear Terrorism

International Conference on Advances in Nuclear Forensics

Opening Session: The Historical Evolution of Nuclear Forensics

Conference Topics

1. Nuclear Forensics within a National Nuclear Security Infrastructure
2. Implementing Nuclear Forensics in Support of Criminal Investigations
3. Applications of Nuclear Forensics in Nuclear Security
4. Nuclear Forensic Science – An Emerging Discipline
5. Nuclear Forensics Findings
6. Nuclear Forensics Capacity Building
7. International and Regional Cooperation in Nuclear Forensics

Synopsis deadline: 12 December 2013

Questions: NuclearForensics2014@iaea.org



To conclude.....

