



Overview of the Canadian National Nuclear Forensics Capability Project

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BACKGROUND

The following statement is from the Canada's National Progress Report, presented at the 2012 Nuclear Security Summit in Seoul, Republic of Korea:

"Canada is finalizing a strategy to enhance its domestic nuclear forensics capabilities, which will include efforts to improve the Canadian nuclear forensics laboratory network, creating a national library of nuclear and radiological signatures, and enhancing Canada's capacity to forensically process radiologically-contaminated evidence."

The Canadian National Nuclear Forensics Capability project, a Targeted Investment Project under the Canadian Safety and Security Program (CSSP), was initiated with the goal of providing these enhanced capabilities.

The project involves partners from eight federal departments and agencies: the Department of National Defence (Defence Research and Development Canada, Royal Military College of Canada, CANSOFCOM), the Royal Canadian Mounted Police (Operations and Forensics), Atomic Energy of Canada Limited, Canadian Nuclear Safety Commission, Health Canada, National Research Council, Public Safety, and Foreign Affairs, Trade and Development.

Figure 1. Project partners



MAIN OBJECTIVES

- To develop a coordinated, comprehensive, and timely national Nuclear Forensics Capability within Canada.
- Stream 1:** Establishment of a **National Laboratory Network** for comprehensive NF analysis, including a capability to perform classical forensic analysis on evidence contaminated with radioactive material.
- Stream 2:** Development of a **National Nuclear Forensics Library (NNFL)** cataloguing characteristics and signatures of RN materials under Canadian regulatory control.

METHODOLOGY

Stream 1 – National Laboratory Network

By mobilizing several government agencies with RN expertise and resources, the project will create a formal laboratory network. Led by AECL, the network will draw on existing knowledge, expertise, and facilities, taking advantage of the complementary capabilities of partner labs.

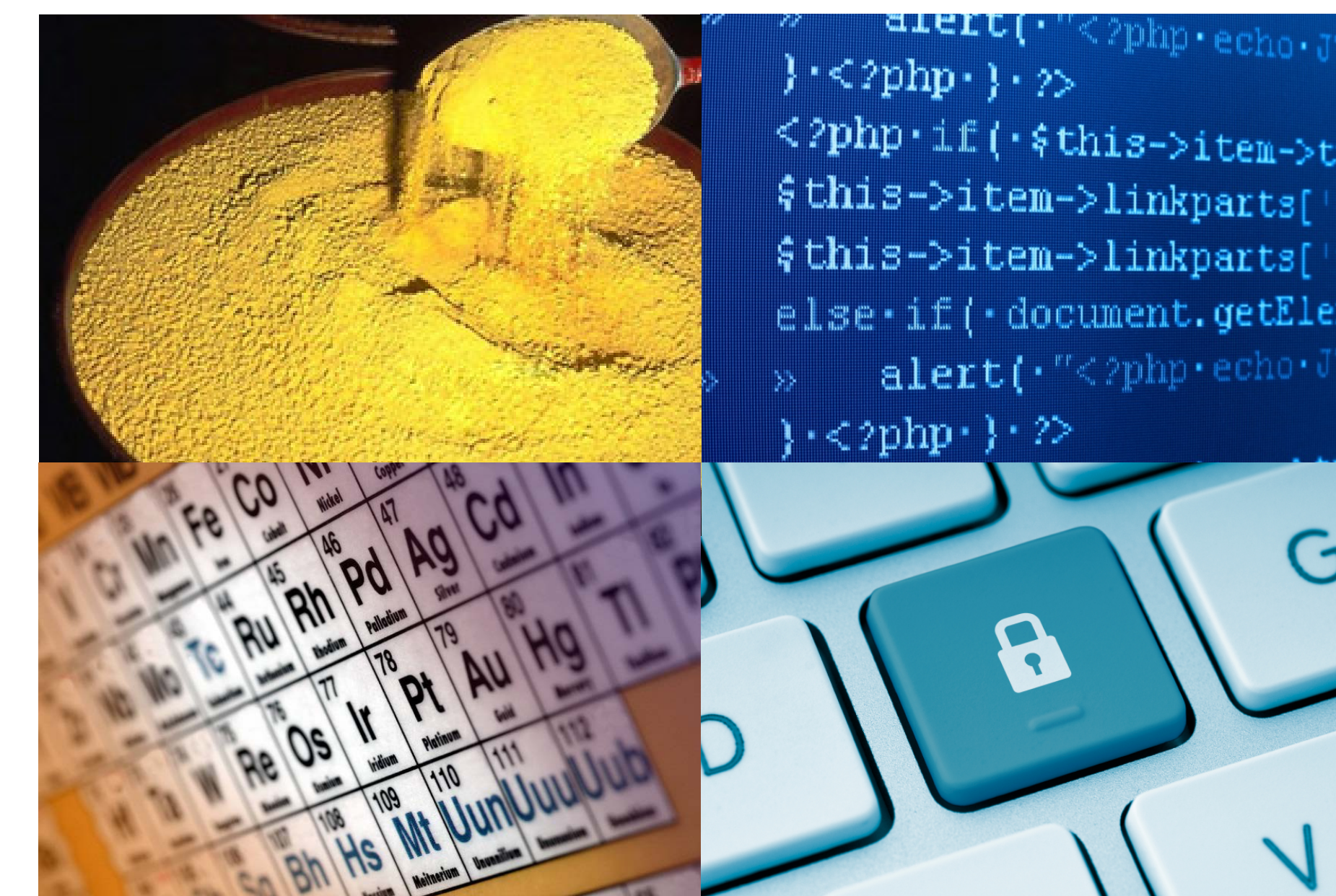
To ensure that the outputs are consistent with the requirements and expectations of the user community, law enforcement agencies and other federal departments are being engaged as partners, providing advice and guidance.

Key tasks:

- Establish requirements for nuclear forensics labs and facilities handling evidence contaminated with radioactive material
- Catalog current capabilities
- Identify gaps in current knowledge and capabilities and determine and implement actions to close gaps (e.g. protocol development, equipment upgrades)
- Develop and implement training plan for nuclear and classical forensics specialists
- Develop protocols for
 - Collection, packaging, and domestic transportation of RN materials to the labs
 - Handling of evidence at the labs
- Plan and execute operational exercise geared towards lab network implementation

Table 1. Capability inventory and gap analysis

Desired capabilities	Lab 1	Lab 2	Lab 3	Lab 4
Incident scene attendance	Capability 1: ■	Capability 1: ■	Capability 1: ■	Capability 1: ■
	Capability 2: ■	Capability 2: ■	Capability 2: ■	Capability 2: ■
Imaging	Capability 1: ■	Capability 1: ■	Capability 1: ■	Capability 1: ■
	Capability 2: ■	Capability 2: ■	Capability 2: ■	Capability 2: ■
Portable detection and ID				
Contaminated evidence analysis	Capability 1: ■	Capability 1: ■	Capability 1: ■	Capability 1: ■



Stream 2 – National Nuclear Forensics Library

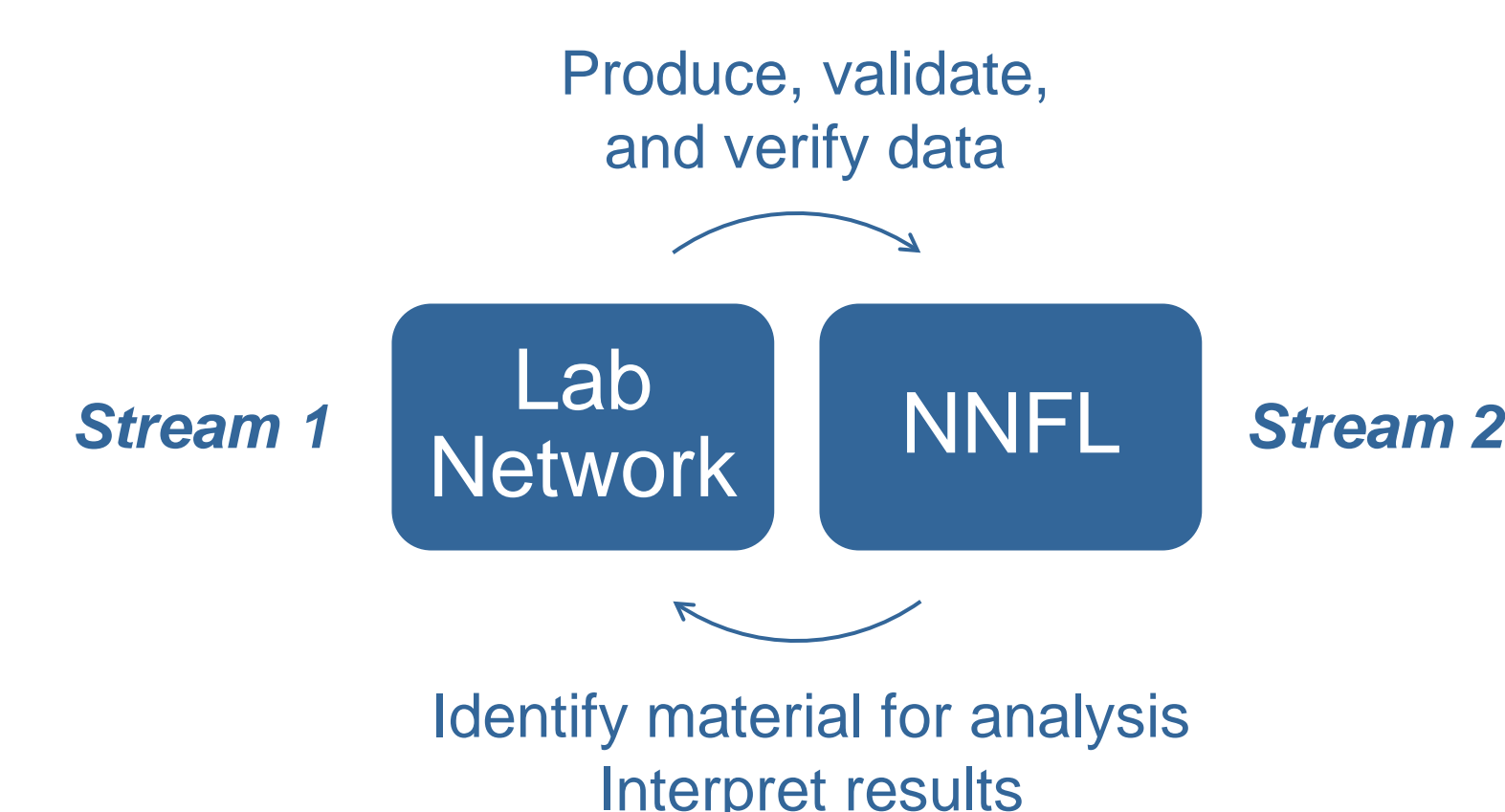
The NNFL has been identified as a critical component of Canada's NF capability. CNSC is leading development of the NNFL, which will consolidate information on all radiological and nuclear material under Canadian regulatory control in a manner that allows for sample/specimen attribution.

The NNFL will

- Consist of a database and a separate analysis utility, which will not be able to modify the database (to ensure data integrity)
- Be a tool to determine whether or not RN material found out of regulatory control is consistent with Canadian RN material holdings
- Be used in concert with current regulatory RN material databases and accounting systems
- Be structured to provide necessary assurances to CNSC licensees for the protection of commercially sensitive information

Uranium ore concentrate (UOC) has been selected as the material group to be used for database development purposes. Other material groups will be added following the development phase.

Figure 2. Interaction of project streams



SUMMARY

- Canada has initiated the National Nuclear Forensics Capability Project, taking a two-stream approach to develop a formalized lab network and a National Nuclear Forensics Library.
- The Lab Network as a whole will be capable of comprehensive NF analysis, including a capability to perform classical forensic analysis on evidence contaminated with radioactive material.
- The NNFL will be held, operated, and maintained by CNSC, and populated with the support of licensees and labs in the national network.
- The involvement of law enforcement will ensure that Canada is capable of analyzing both seized materials and contaminated evidence in a manner that supports the successful prosecution of crimes involving the misappropriation or misuse of RN materials.
- The project requires multi-departmental coordination of complementary S&T capabilities, and will establish strong collaboration among nuclear scientists, forensic experts, law enforcement, policy makers, and operational support specialists.

Figure 3. Evidence collection in a contaminated scene

