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To discuss illicit nuclear trafficking

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The Illicit nuclear trafficking panel was conducted at the 4th Annual INMM workshop on Reducing the Risk from Radioactive and Nuclear Materials on February 2-3, 2010 in Washington DC. While the workshop occurred prior to the Nuclear Security Summit, April 12-13 2010 in Washington DC, some of the summit issues were raised during the workshop. The Communiqué of the Washington Nuclear Security Summit stated that "Nuclear terrorism is one of the most challenging threats to international security, and strong nuclear security measures are the most effective means to prevent terrorists, criminals, or other unauthorized actors from acquiring nuclear materials.[1]" The Illicit Trafficking panel is one means to strengthen nuclear security and cooperation at bilateral, regional and multilateral levels.

Such a panel promotes nuclear security culture through technology development, human resources development, education and training. It is a tool which stresses the importance of international cooperation and coordination of assistance to improve efforts to prevent and respond to incidents of illicit nuclear trafficking.

Illicit trafficking panel included representatives from US government, an international organization (IAEA), private industry and a non-governmental organization to discuss illicit nuclear trafficking issues. The focus of discussions was on best practices and challenges for addressing illicit nuclear trafficking.

Terrorism connection. Workshop discussions pointed out the identification of terrorist connections with several trafficking incidents. Several trafficking cases involved real buyers (as opposed to undercover law enforcement agents) and there have been reports identifying individuals associated with terrorist organizations as prospective plutonium buyers. Some specific groups have been identified that consistently search for materials to buy on the black market, but no criminal groups were identified that *specialize* in nuclear materials or isotope smuggling. In most cases, sellers do not find legitimate buyers; however, there have been specific cases where sellers did find actual terrorist group representatives. There appears to be a connection between terrorist groups engaged in trafficking conventional arms and explosives components that are also looking for both nuclear materials and radioisotopes. Sale opportunities may create additional demand for such materials.

Trends. As we can observe from Figure 1, many cases in the mid-90s involved kilogram quantities of material. There were smaller amounts of material moved in 2001, 2003 and 2006. While we have seen less trafficking cases involving Pu/HEU in recent years, the fact that it continues at all is troubling. The trafficking cases can be presented through their life cycle: Diversion of materials leads to Trafficker and then to Terrorist/Proliferator. Most of the information we have in trafficking cases is on the Trafficker. In 16 cases reported by the IAEA, there are 10 prosecutions of the involved trafficker. However, there

[1] Communiqué of the Washington Nuclear Security Summit. April Washington, DC.

are no confirmed diversions of material recorded in any of the 18 seizures. Most seizures were sting operations performed by law enforcement or security agents with no actual illicit end-user involved.

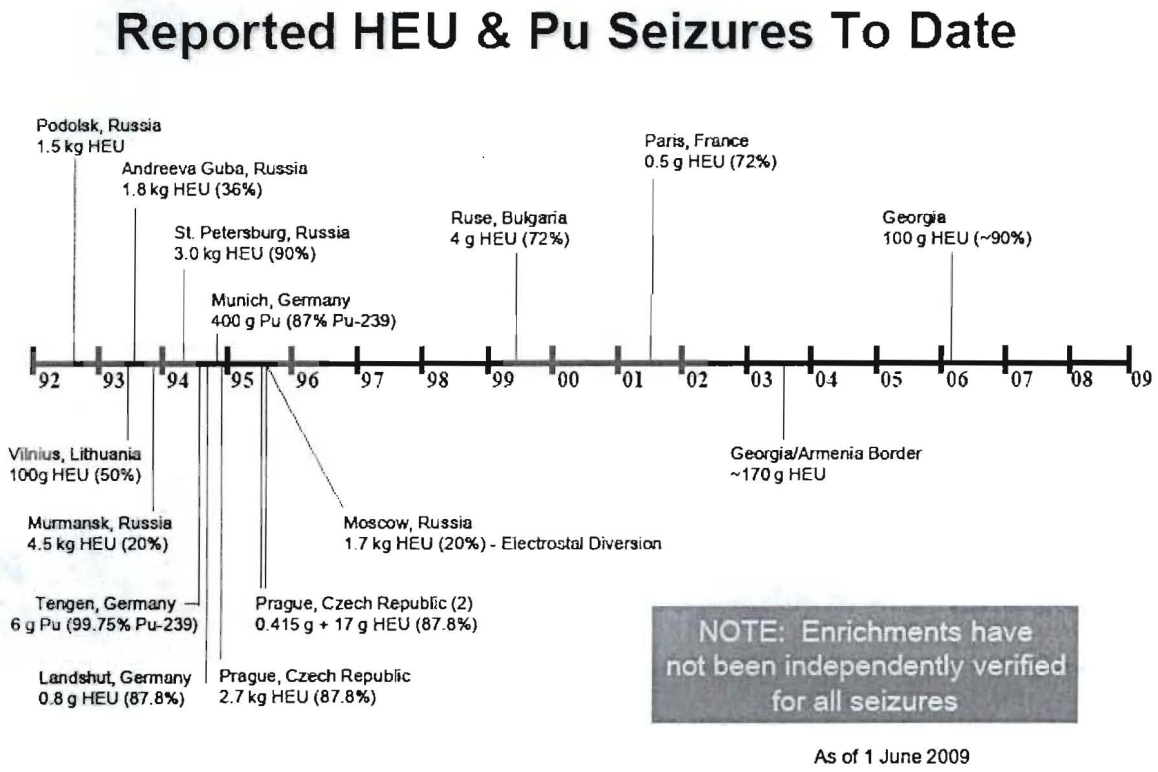

Figure 1. Trafficking trend for the past 15 years. Courtesy of Michael Curry, Department of State.

Theft, criminals. There have been reports of trafficking cases linked to criminals. In some instances the stolen materials that were confiscated from criminals were not reported missing at the relevant facilities. It was determined that some facilities have insufficient materials accounting policies and poor procedures to detect thefts in a timely manner. Thus, lack of reporting on thefts may not indicate lack of theft. Lack of good accounting procedures in many countries, and lack of independently verified inventories, makes it difficult to assess the amount of radioactive material that has been stolen. . Some estimate that up to 65% of materials lost or stolen have never been recovered. In some countries, a lack of basic education on nuclear material security has been observed in many individuals who are

responsible for material security or trafficking detection.. In the 1990s, many borders were not controlled as tightly as they are today. This historical lack of border control may account for the fact that that more material has been apprehended within countries than at border crossings.

The reported incidents of HEU/Pu trafficking cases involved seizures of small quantities of materials, which may indicate that these were just samples of a larger cache of available material.

For the past decade a drop in the number of LEU cases has been observed, possibly suggesting improved security for LEU.

It has also been observed that attempted sales tend to occur 10 years or more after the material was stolen.

Some materials are vulnerable at the facilities. Some risk is associated with inadequate regulatory control, poor control and accounting practices, or inadequate law enforcement. The facilities that are going through bankruptcy or going out of business demonstrate large vulnerabilities in their handling and protection of materials on site. Mobile sources are more frequently lost or stolen compared to stationary ones. The majority of incidents with sources include cases with type 4 or 5 sources rather than the more desirable (for RDD) type 1 or 2 sources; however, there have been several cases where category 4 or 5 sources were used to murder individuals.

Nuclear material physical protection (PP) practices are inconsistent between States. The Convention on Physical Protection of Nuclear Materials (CPPNM) and INFCIRC/225 only list general recommendations, but give no specific guidance. There is no internationally-recognized PP standard, and significant variations of PP requirements have been observed among different countries, even for comparable threat scenarios. There have been some calls to make INFCIRC/225 more specific regarding detailed requirements for delays, barriers, guard force composition and response team capabilities.

The notion of nuclear material "self-protection" must be revised in light of suicide terrorism. Spent Nuclear Fuel storage facilities require some protection measures, despite high radiation fields. A 2005 Oak Ridge National Laboratory (ORNL) study notes that the 1 Gy/hr (100 rads/hr) at 1 meter threshold for "self-protection" is not incapacitating and is only relevant for non-suicidal attacks. ORNL suggests that 100 Gy/hr (10,000 rads/hr) is needed to provide a serious impediment (e.g., minutes to incapacitation) to determined theft. In addition, most storage facilities do not routinely measure detailed radiation levels, and these levels do drop over time for spent fuel.

Developing best response measures to deal with illicit trafficking: *Cooperation on nuclear forensics.* It has been proposed to establish a system of national nuclear forensic libraries to include data on individual country's own nuclear and radiological materials and provide a national point of contact (POC) for cooperation on trafficking cases. Mechanisms to allow exchange of information and prosecution across state boundaries can be established with provisions to protect proprietary and national security information. Such a forensics database would help accelerate the process of identifying confiscated material and determine its origin and history. While the forensics issue was raised at the trafficking panel, the Washington Nuclear Security Summit considered nuclear forensics at a high political level,

and the countries are beginning to cooperate in this area. Having national nuclear forensics libraries as a framework for collaboration between countries will help to facilitate joint exercises, information exchange, build relations between POCs, coordinate preventive measures and support response actions.

The panelists also discussed *the existing measures and programs* in place to combat and prevent trafficking.

Nuclear Smuggling Outreach Initiative (NSOI). This US Department of State Initiative is based on identifying key countries of greatest risk and then engaging those countries in jointly reviewing opportunities for them to enhance anti-nuclear smuggling effectiveness. For each country a joint action plan/list of priority cooperation projects is developed that the US and other foreign donor countries will assist in implementing. Activities can range from anti-corruption measures to detection and prevention efforts. To date, there are 5 Joint Action plans in force, 4 Joint Action Plans being developed and 5 engagements proposed. Overall, there are 13 international partners to support this initiative and 40 projects have been fully or partially funded.. NSOI projects cover improvements in three major areas: material security, border security and effective response measures such as national response plans and strong anti-smuggling laws.

US Nuclear Regulatory Committee's (NRC) program on regulatory control over radiation sources in CIS. The NRC program includes establishment of facility inventories of radiation sources (including generation of inventory records, establishment of inventory procedures, on-site verification), establishment of a national registry of radiation sources, relocation of radiation sources, improvements to legislation and regulation (includingencouragement for an independent state regulatory authority), support for licensing procedures, inspection activities, and upgrades to physical infrastructure, and assistance with developing needed software tools and personnel training. The countries assisted and or approached include Armenia, Kazakhstan, Georgia, Kyrgyzstan, Uzbekistan, Tajikistan, Ukraine, Moldova, Azerbaijan and Turkmenistan.

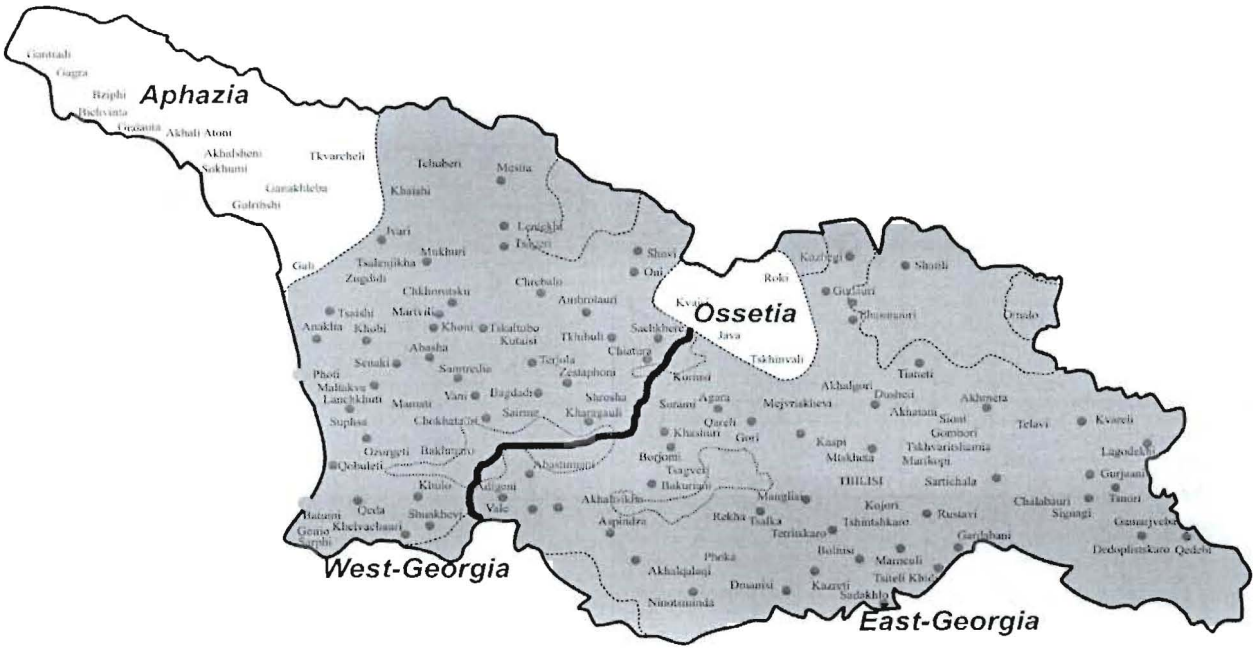

Figure 2. The scope of inventory-taking activities in Georgia. Courtesy of Sergey Katsenelenbogen, AdSTM, Inc.

Technical support for anti-trafficking activities. The Finnish Government is upgrading radiation monitoring systems at Finnish entry points (note: some observers consider the Finnish oversight and monitoring system to be the best in the world). Finland experienced a large number of source trafficking cases in the mid-1990s from Russia to Finland, so Finland decided to install equipment for radiation monitoring at the Helsinki airport and the Eastern border with Russia. Currently very few incidents are detected, perhaps owing to improved monitoring on Russia borders and airports. Deployment of technical systems, while highly advantageous, also creates its own problems; for example, in 2005, the Rotterdam Seaport encountered 2,200 alarms for 875,000 passages, but 99% of all alarms were "innocent." Finland's experience leads them to believe that advanced spectroscopic portals are necessary. Finland has detected very few, if any, actual threats, but many false alarms (medical alerts predominate in pedestrian portals)Portal devices are needed with the ability to resolve false alarms, and triage and reachback activities must be carefully coordinated. Finland uses the LINSS database developed by the Comprehensivev Testban Treaty Organization (CTBTO) to manage HPGe gamma spectra from material measurement systems. It was also noted that for Finland, which is a relatively small country with a highly developed infrastructure, such an extensive hi-tech monitoring system may be a more effective solution than for some other countries. In addition, the success of this system depends on good cooperation established between various agencies, including STUK (Radiation and Nuclear Safety Authority), Finnish Customs, police, border guards, defense forces and other relevant governmental agencies.

Training of all involved parties in case of a trafficking incident. The European Union (EU) has decided that its member states should develop an adequate and sustainable training program at the EU level for front line organizations, including the law enforcement community and customs agents. This program covers hands-on training in the process of detecting radioactive/nuclear materials with various types of detection equipment. The training covers a variety of simulated locations and scenarios, as well responding to incidents involving such materials.

An intriguing question that was raised was, "At what dose level of radioactive materials should emergency procedures be initiated?" While there is no simple answer to this question, some experts suggest that adverse health effects are only noticeable above 100 mSv (10 rem), with no scientific justification for assuming a linear dose-effects extrapolation from known larges exposures down to small exposures. The suggestion was voiced to reconsider public exposure limits and trigger emergency procedures only if the equivalent annual dose rate exceeds 100 mSv (10 rem). For example, areas with equivalent annual dose rates of 1-5 mSv (100-500 mrem) could be considered for monitoring only, areas with 5-10 mSv (0.5-1 rem) could be considered for minimal mitigation, areas with 10-100 mSv could be considered for strong mitigation, and only areas above 100mSv (10 rem) targeted for emergency action.