

# Security problems related to uncontrolled radioactive sources in Georgia (Lessons learned)



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# Outlines

**1. Introduction**

**2. Preventions**

**3. Detection**

**4. Response**

**4. Conclusion**



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# Introduction

- **Georgia has not any NPP. The research reactor IRT- M is under decommissioning procedure. All facilities according to GS-R-2 belong to III, IV and V threat categories**
- **The Country had problems with s.c. “orphan” radioactive sources. There were found and recovered 287 of such sources. The number of people were overexposed. The lethal events are also fixed.**



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# Introduction

- **Orphan source origin: military and civil**

- ✓ **Military**

**Due to**

**weakening control within troops at their withdrawal**

**temporary absence of regulatory control**

- ✓ **Civil**

**Due to**

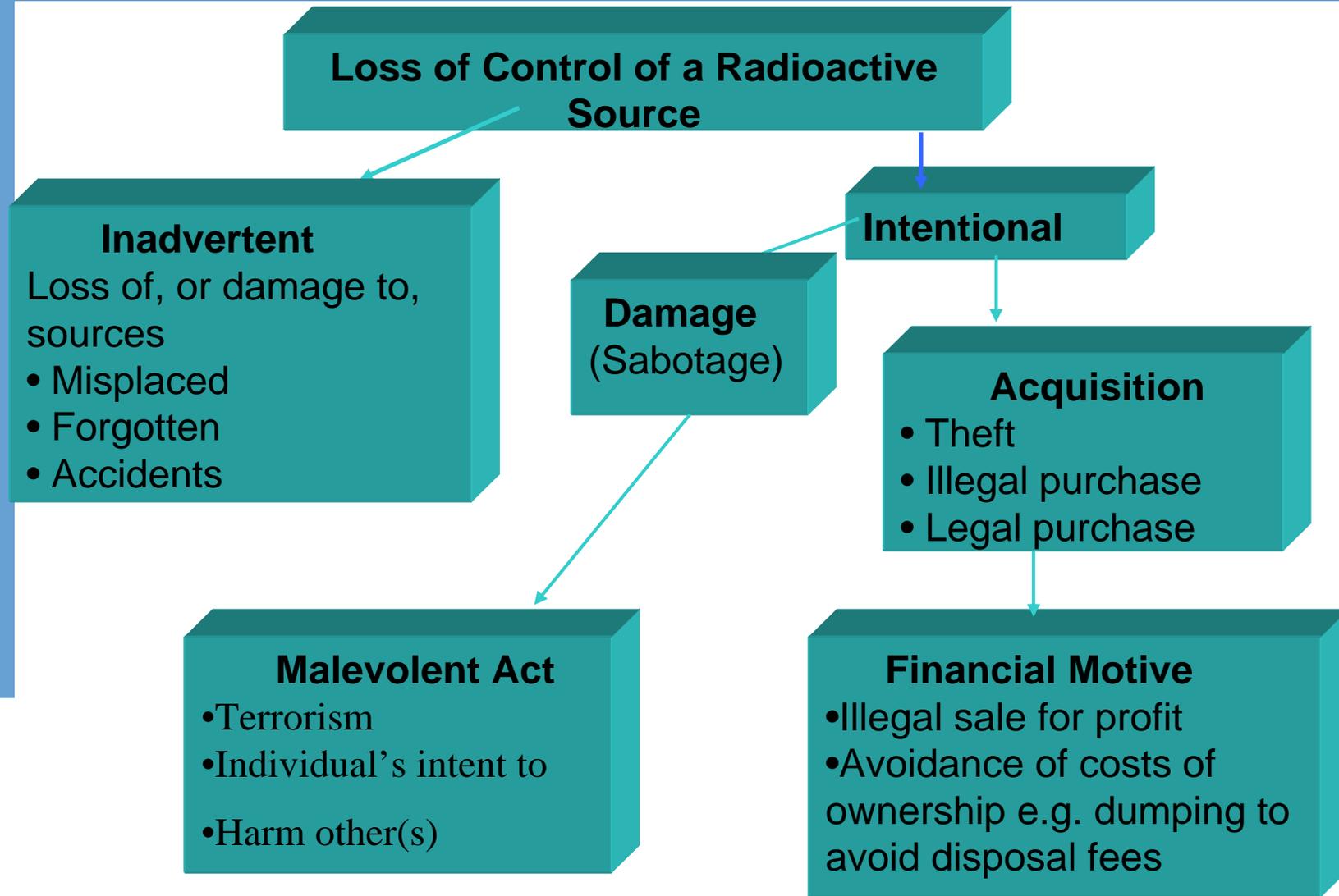
**Closing of enterprises (or changing of their profile)**

**temporary absence of regulatory control**



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# Introduction



# Introduction

- **The main aspect provoking appearing of orphan sources - *Financial Motive.***
- **The main causes for appearance of orphan radioactive sources in Georgia:**
  - ***Temporary absence of regulatory system;***
  - ***Absence of radioactive waste management system;***
  - ***Difficult economical situation.***



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# Accidents

- **Several radiological accidents have been developed in Georgia since 1997:**
- ✓ **The first great radiological accident - at the military base in Lilo, when 11 soldiers were irradiated by  $^{137}\text{Cs}$  (orphan  $^{60}\text{Co}$  and  $^{226}\text{Ra}$  sources also were found).**
- **In the scope of IAEA TC project GEO/9/004 “Radiological Emergency Assistance to Georgia” some analytical and monitoring equipment was provided to Georgian specialists to enable them to locate any additional sources left behind by the former Soviet Army on the territory of Georgia.**

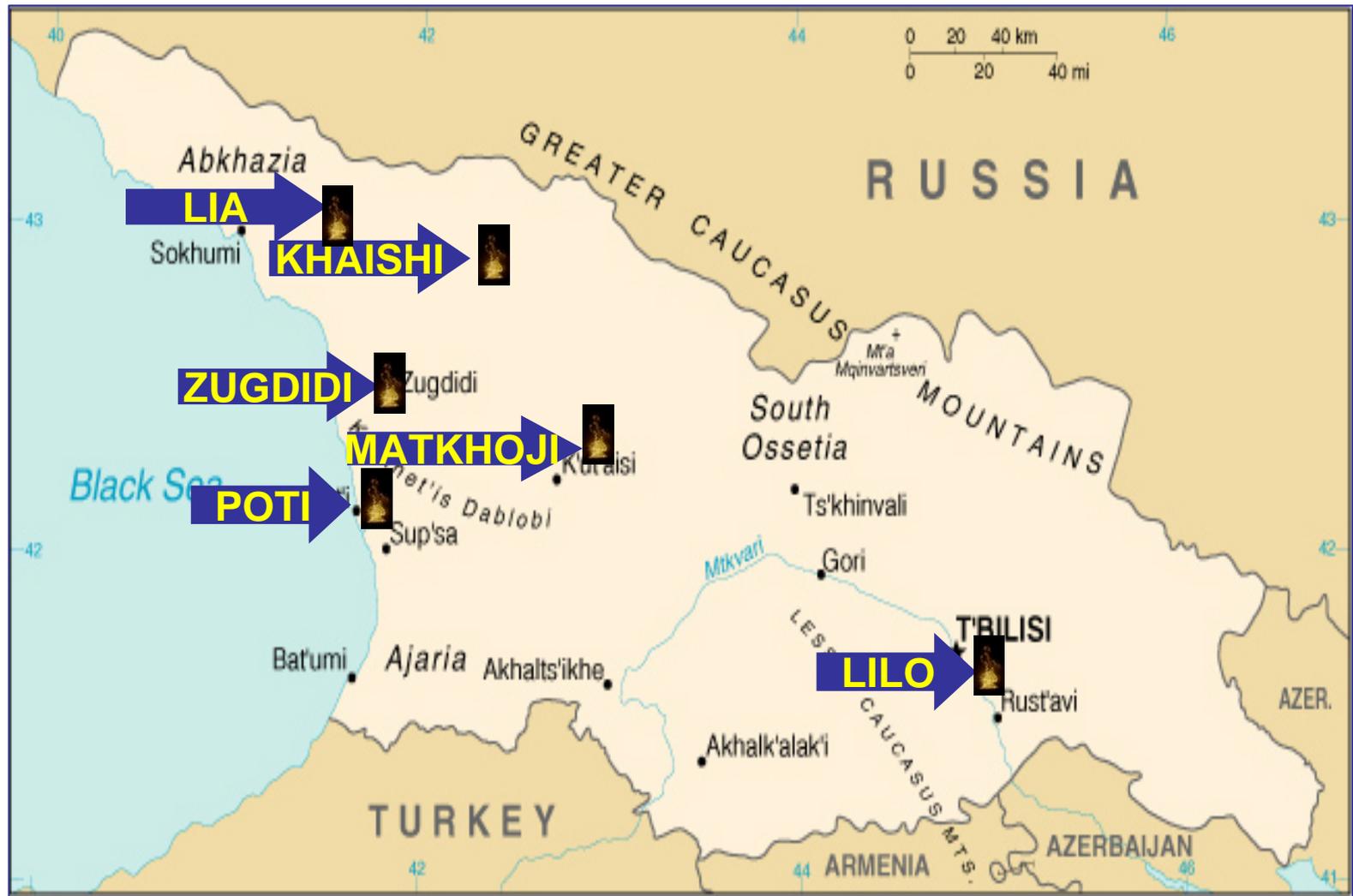


# Accidents



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# Accidents



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# Accidents

- The next great accident - Matkhoji (August 1998) when three powerful  $^{137}\text{Cs}$  and one  $^{60}\text{Co}$  were found. The same type sources are found in different regions of Georgia.
- The last orphan sources were found in western Georgia near village laneti (four  $^{137}\text{Cs}$  sources) during at February 2009.
- Notable cases refer to thermoelectric generators based on  $^{90}\text{Sr}$ . Initial activity each of them was 1 295 TBq. There were found and safely stored six such sources. All these sources maybe used for terrorist purposes.



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# Prevention

- **Simultaneously with strengthening of state regulatory system, one of the effective methods to prevent any accident related to orphan radioactive sources is conducting of searching operations.**
- **Types of searching operations:**
  - ✓ **Administrative searching**
  - ✓ **Physical searching:**
    - **Airborne Survey;**
    - **Car Survey;**
    - **Pedestrian survey.**



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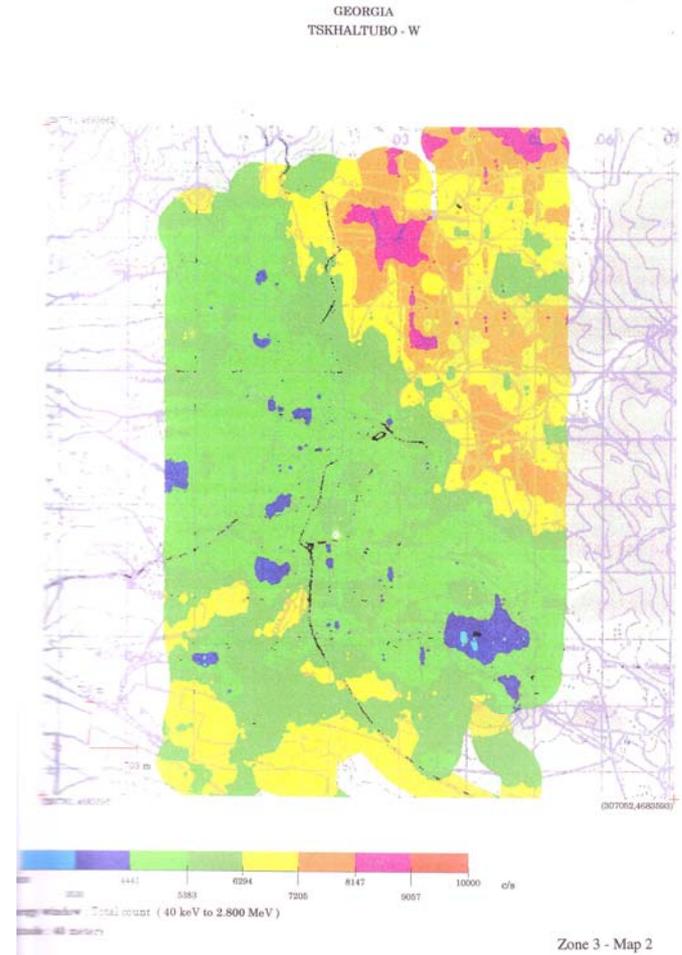
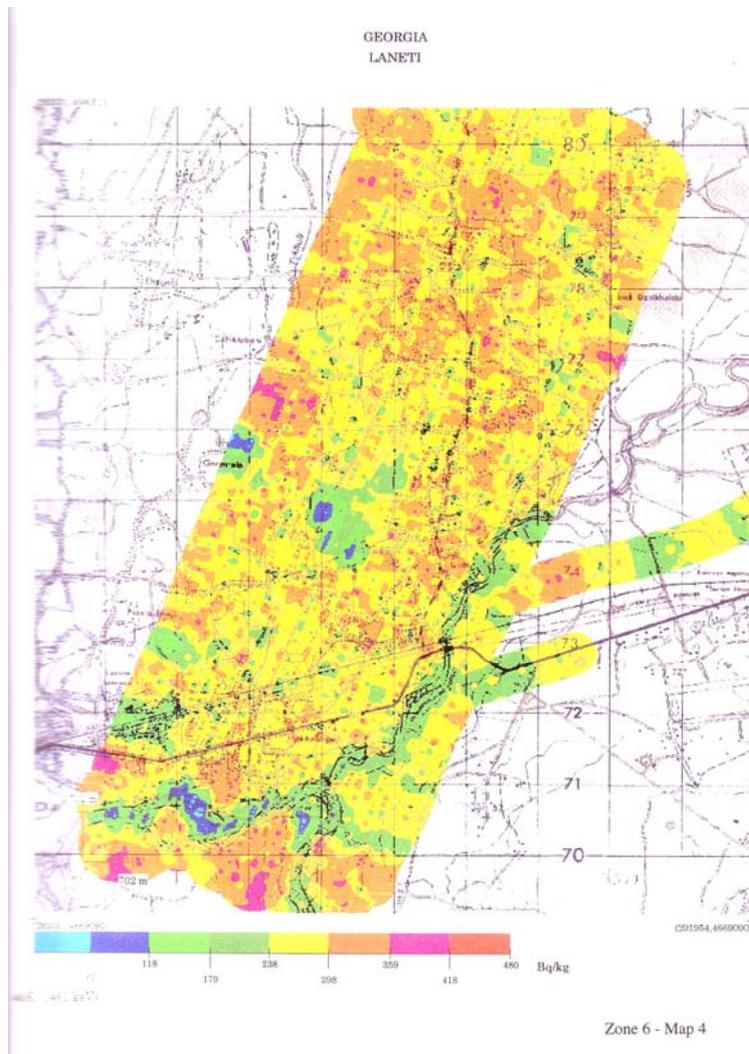
# Prevention

- ***Airborne Survey***
  - ✓ **The most effective to quickly find and identify sources or land contamination.**
  - ✓ **Difficulties: Required expensive equipments  
Not applicable for mountain regions**
- **The survey was carried out in Georgia within the scope of IAEA TC project GEO/9/006 “Assistance for safe disposal of <sup>90</sup>Sr the thermogenerators” when 56 hours of airborne gamma survey of a large territory of the western part of Georgia and around Tbilisi was carried out at 2000.**



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# Prevention



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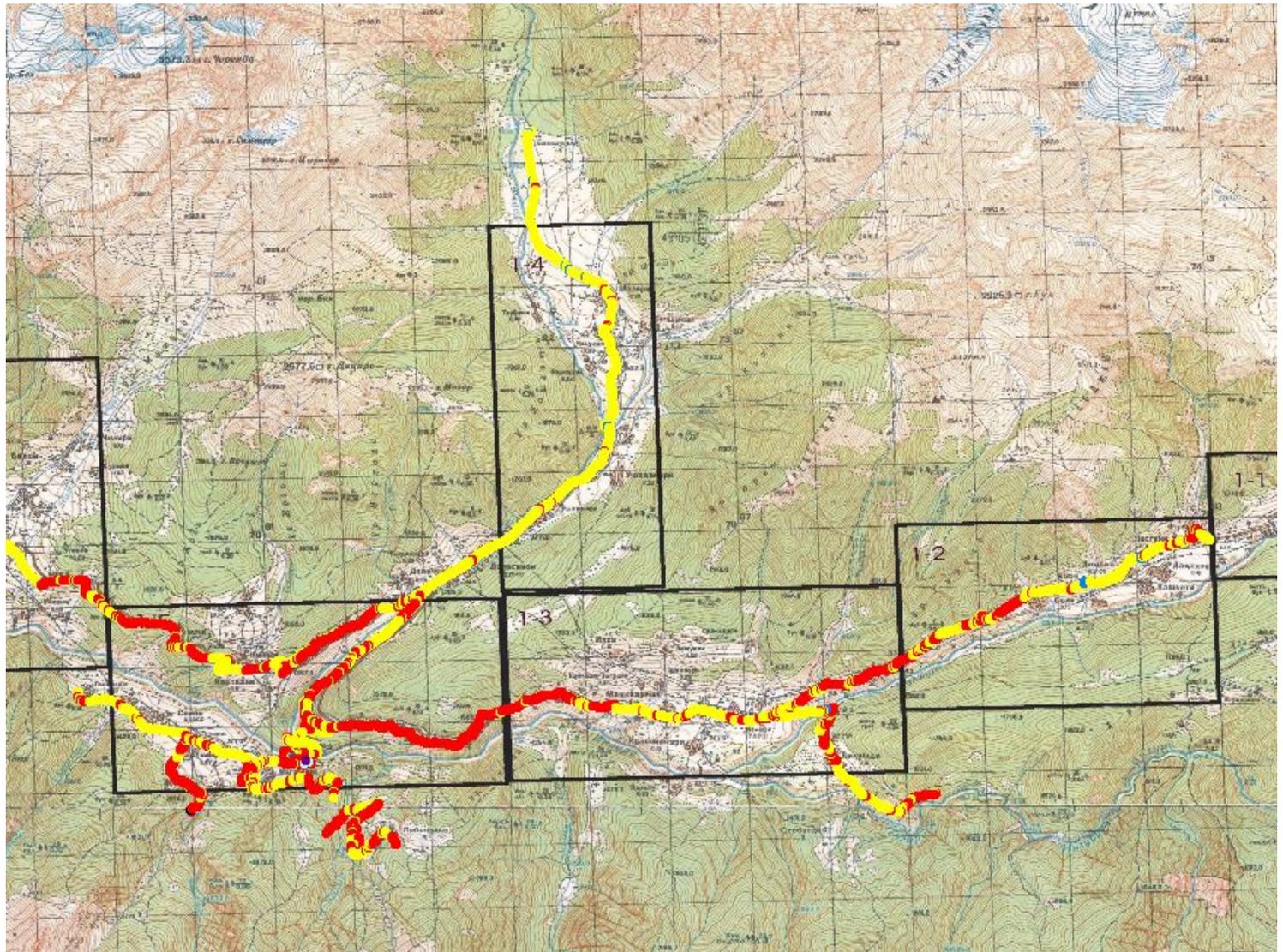
# Prevention

- **Car and pedestrian survey**
  - ✓ **Effective to allocate the source. Applicable for mountain relief**
  - ✓ **Difficulties: Cover large regions**
- **Airborne survey is not effective for mountain relief. So, taking into account high price for this activity, car and pedestrian searching also were conducted at 2002, 2003 and 2005. All these activity were actively supported by the Agency in close collaboration with USA, France, Indian and Turkish experts.**



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# Prevention



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# Prevention

- **Two types of recovery operations:**
  - ✓ **Recovery during searching operation**
  - ✓ **Large scale recovery**
- **Large scale recovery operations usually contains three phases:**
  - ✓ **Assessment**
  - ✓ **Identifying options for solution**
  - ✓ **Implementation**
- **Examples: Operations with RTG and sources found near laneti  $^{137}\text{Cs}$  sources (the last)**



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# Prevention



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# Prevention

- **Key element to prevent an accidents – state regulatory system**
- **The system is based on national legislation and includes:**
  - ✓ **System for inventory of ionization radiation sources and activities related to them**
  - ✓ **System for licensing and supervision of nuclear and radiation activities**



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# Prevention

- **Computer based inventory of ionization radiation sources is established based on information collected due to site checking**
- **The inventory includes 784 sealed and 86 unsealed sources:**
  - Category I – 13**
  - Category II – 36**
  - Category III - 151**
  - Category IV – 169**
  - Category V – 415**



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# Prevention

- **License system provides:**
  - ✓ **Compliance with safety and security requirements**
  - ✓ **Control of source import-export**
  - ✓ **Control of source transfer**
  - ✓ **Information transfer for the inventory updating**
  - ✓ **Compliance with emergency preparedness for facility operators**
- **Regulatory control is conducted through inspection system supported by enforcement activities**



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# Prevention

- **First step for radioactive waste management - construction of the Centralized Storage Facility (CSF) is completed.**
- **The legislation basement for waste management is drafted.**
- **Task: Transfer all disused sources (kept under not proper control) to the CSF. By early 2009 NRSS relocated and stored 294 containers with around 520 sealed and 50 unsealed sources at CSF, with total current activity  $\approx 3\ 000\text{TBq}$**



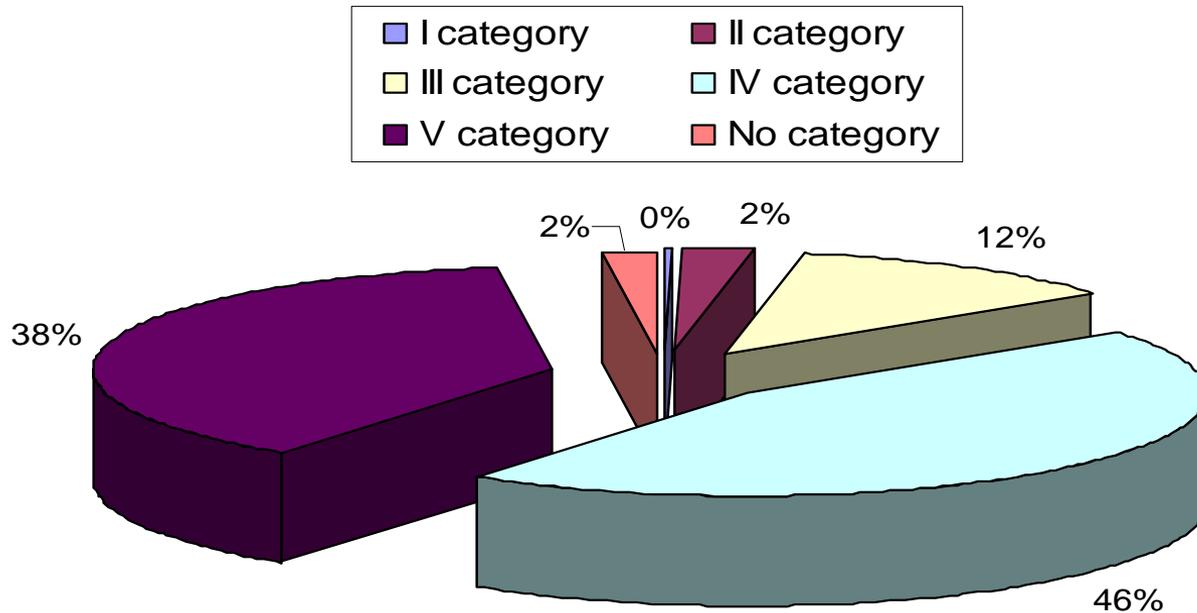
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# Prevention



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# Prevention

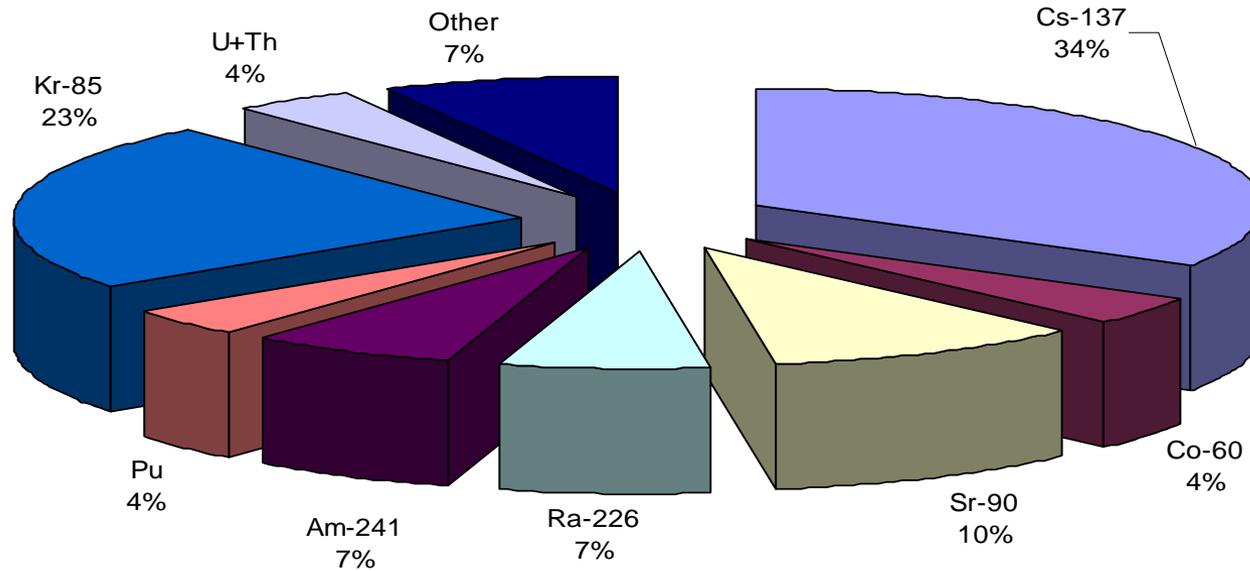


**Disused sources relocated to CSF (by total activities)**



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# Prevention



Disused sources into CSF



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# Detection

- **Detection at the borders**

**Some nuclear and radioactive materials seized at Georgian state borders**

- ✓ **At 20 September 1999 - 219 capsules containing 16% enrichment  $^{235}\text{U}$ , total weight 1000.7g**
- ✓ **At 21 April 2001 - 920g 3% enrichment  $^{235}\text{U}$**
- ✓ **At 18 July 2001 – 1 581g 5% enrichment  $^{235}\text{U}$**
- ✓ **16 July 1998 - Pu-Be source  $5 \cdot 10^6$  n/sec**
- ✓ **1 February 2006 – 110g 89,5% enrichment  $^{235}\text{U}$**
- ✓ **17 July 2006 – some package of  $^{137}\text{Cs}$**
- ✓ **9 June 2007 14 g low enrichment Uranium**



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# Detection



110g 89,5% enrichment  $^{235}\text{U}$



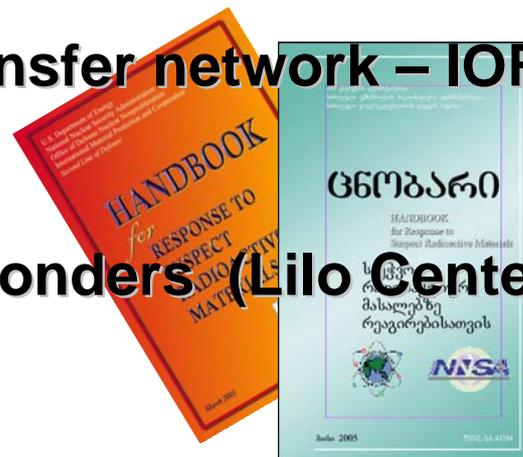
Pu-Be source



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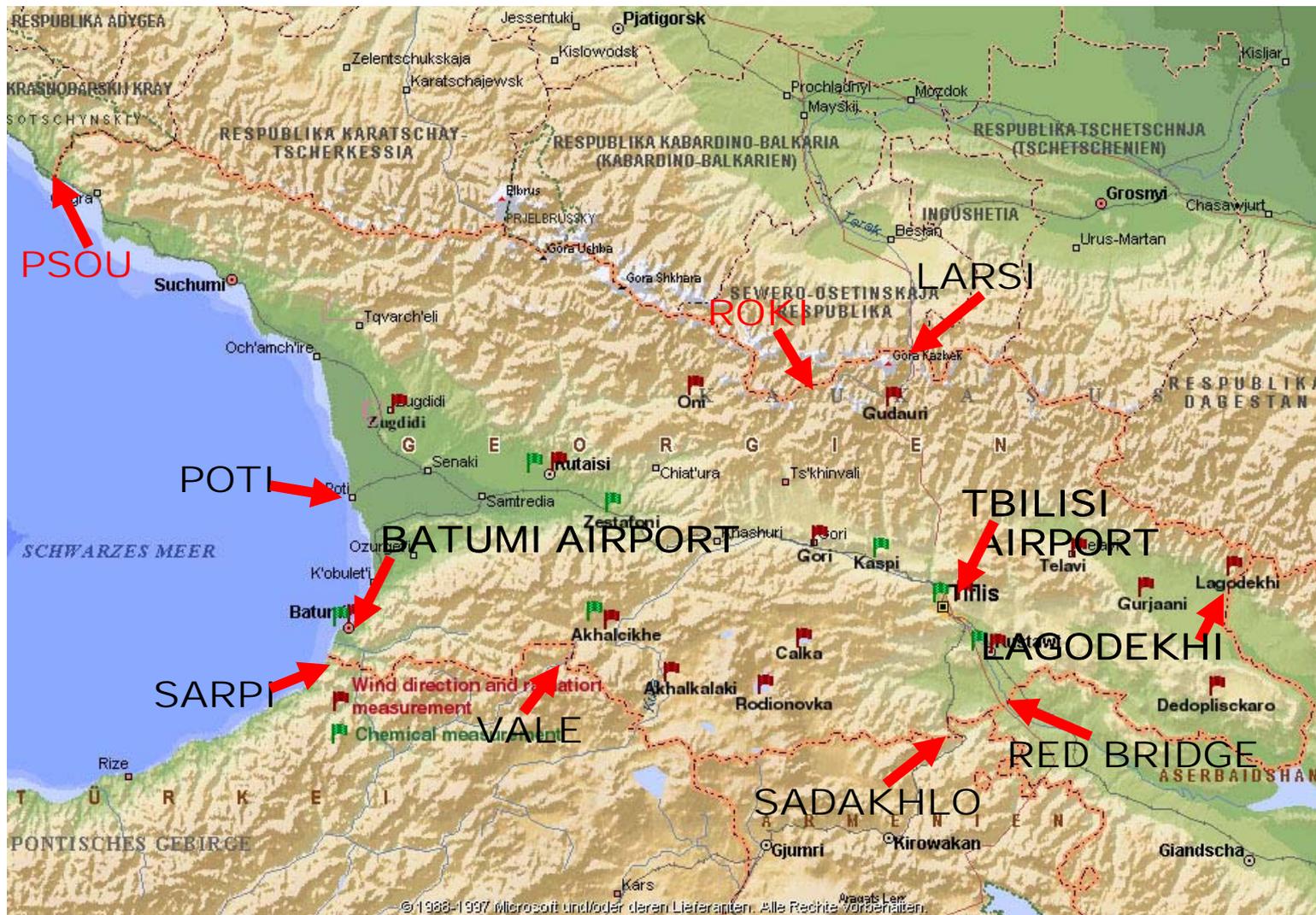
# Detection

- Main border crossing points (4 of them) currently equipped fully – dual channel monitors, hand held, guidelines, protocols and instructions, training – SLD programme;
- Border check points in Poti and Batumi sea port are equipped with monitoring equipment;
- Mobile monitoring systems are provided by SLD
- Notification and information transfer network – IORI2;
- Training programs for first responders (Lilo Center)



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# Detection



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# Response

- **In case of finding of orphan radioactive source – Nuclear and Radiation Safety Service (RB) acts as a CA**
- **The National Emergency Response Plan - National Response Plan on Natural and Man Made Emergency Situations , Order of President N415 approved on 26 August 2008**
- **NRSS is responsible for elaboration of special plan.**
- **The recovery activity conductors – NRSS and Emergency Management Department of Ministry of Internal Affairs**



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# Conclusion

- **Georgia had received hard heritage related to orphan radioactive sources**
- **The great activity was conducted to prevent in future any accident with orphan radioactive source**
- **The country develops its capability to detect any lost source and carry out correspond response on any emergency situation**



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# Questions?



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