Security of Radioactive Sources in Ukraine
German contribution to the G8GP (~ US-$ 1,5 billion)

- **Project 1:** Disposal of nuclear submarine compartments (RF), EWN (Energiewerke Nord), (BMWi)

- **Project 2:** Destruction of chemical weapons (RF), BWB (Federal Office of Defense Technology and Procurement), (AA)

- **Project 3:** “German – Russian/Ukrainian co-operation in physical protection of nuclear material against proliferation of mass destruction weapons and material”

**Project management:** GRS
**Time frame:** 2003 – 2012
**Cost:** up to 170 Mio. € (AA)
G8GP Physical Protection – Site Locations

Russian Federation
- Bochvar
- Kurchatov
- Dimitrovgrad

Ukraine
- IZOTOP Storage Facility

Time Frame: 2003 - 2012
G8GP Projects in Ukraine – Status and Perspective

IZOTOP
Modernization of storage facility

TAP-RWEAST
Disposal of radioactive sources

RADON
Modernization of interim storage facilities
Lifecycle of radioactive sources in Ukraine

VEKTOR
- transportation to long-term storage

RADON
- transportation to interim storage

Producer of SRS
- China, USA, GB
- Import
- Export

IZOTOP

End-User

Radioactive Waste

Radioactive Sources
Transport und storage complex (TLK) of IZOTOP

IZOTOP
- established 1962
- part of ministry of industrial politics of Ukraine
- financed by projects
- 130 employees, 20 at TLK

Storage facility
- in operation since 1968
- 6 ha territory
- 1 km perimeter
Transport und storage complex (TLK) of IZOTOP
Main tasks

- **Modernization of the physical protection** of the transport and storage complex to prevent unauthorized access of radioactive sources

- **Establishment of a hot cell**
  - Reduction of transportation of radioactive sources within Kiev
  - Risk reduction concerning theft of radioactive material for misuse
Normative documents of Ukraine

- STATE COMMITTEE OF UKRAINE NUCLEAR REGULATORY, *Approval of physical security nuclear facilities and nuclear materials*, 2006 N 116

- LAW OF UKRAINE, *About physical defence of nuclear installations, nuclear materials, radioactive wastes, other sources of ionizing radiation With the amendments and supplements*, 2007 N 623-V

- STATE COMMITTEE OF UKRAINE NUCLEAR REGULATORY, *On approval of the general requirements for physical protection of nuclear facilities and nuclear materials and general requirements for physical protection systems nuclear materials during their transportation*, 2008 N 156
International Recommendations of IAEA

- The Physical Protection of Nuclear Material and Nuclear Facilities, INFCIRC/225/Rev.5
- Code of Conduct of the Safety and Security of Radioactive Sources, CODEOC/2004
- Categorization of Radioactive Sources, RS-G-1.9, 2005
- Security of Radioactive Sources, Nuclear Securities Series No. 11, 2009
## Categorization of radioactive sources and security levels

<table>
<thead>
<tr>
<th>Category</th>
<th>Source</th>
<th>Activity ratio</th>
<th>Security level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RITEG’s, Teletherapy sources</td>
<td>A/D ≥ 1000</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>Industrial gamma radiography sources</td>
<td>1000 &gt; A/D ≥ 10</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>Fixed industrial gauges that incorporate high activity sources, Well logging gauges</td>
<td>10 &gt; A/D ≥ 1</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>Low dose rate brachytherapy, X ray fluorescence (XRF) devices,</td>
<td>1&gt; A/D ≥ 0,01</td>
<td>Basic Safety Standards</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggregation</td>
<td>( \text{Aggregate} A/D = \sum_{i=1}^{n} \frac{A_{i,n}}{D_{n}} )</td>
<td>( A_{i,n} = ) activity of each individual source ( i ) of radionuclide ( n ). ( D_{n} = ) D value for radionuclide ( n ).</td>
<td></td>
</tr>
</tbody>
</table>
Security level A measures - IAEA

- **Deterrence**
  - Electronic intrusion and tamper detection system
  - Remote monitoring of CCTV
  - Rapid, dependable, diverse communication

- **Delay**
  - Multi-barrier system to delay the intrusion (at least two barriers: walls or fences)

- **Response**
  - Capability for immediate response with size, equipment and training to interdict

- **Security management**
  - Identification and verification, personnel background check
Transport und storage complex (TLK) – Hot Cell
Transport und storage complex – Hot Cell specification

- Internal dimension app. 2.5 x 2.5 x 4.1 m
- Wall thickness 1.5 m, reinforced concrete, density: 2.5 t/m³
- Total activity: 500 TBq $^{60}$Co
- Max. activity to be handled: 1850 TBq $^{60}$Co
- Technical equipment:
  - Manipulators
  - Lead window
  - Gate
  - Ventilation system
Project data

- **Contracts**
  - Contract UA 23/1 between GRS and IZOTOP from 30.08.2010; Time frame: 30.08.2010 - 30.09.2012

- **Financial frame**

<table>
<thead>
<tr>
<th></th>
<th>Financial frame</th>
<th>Status</th>
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<tbody>
<tr>
<td>Project development</td>
<td>192.000 €</td>
<td>111.604 €</td>
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<tr>
<td>Realization</td>
<td>4.708.000 €</td>
<td>0 €</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>4.900.000 €</strong></td>
<td><strong>111.604 €</strong></td>
</tr>
</tbody>
</table>
Summary and Outlook

- Successful implementation of the project „IZOTOP“ in Ukraine
- Modernization of the physical protection of the storage facility and the construction of a hot cell will make a significant contribution towards an improved security of radioactive sources in Ukraine
- Finalization of the project is scheduled for end of 2012

- Further need is stated e.g. by Ukrainian and Georgian government to extend the implemented global partnership program
- Implementation of new projects worldwide on the basis of the Kananaskis principles and guidelines beyond 2012