



**State Nuclear Regulatory Committee of  
Ukraine**



**Prevention, Detection and Response  
System  
for Inadvertent Radioactive Material  
in the Scrap Metal in Ukraine**

**Olga Makarovska,**

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Management of Inadvertent Radioactive  
Material in Scrap Metal,**

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# Comprehensive program

- Prevention
- Detection
- Response



# Prevention

The key element of prevention of inadvertent radioactive material in the scrap metal is state regulatory system that includes:

- State system of licensing and supervision in the sphere of radioactive material use
- State system for inventory, registration and control of radiation sources - State Register
- State programs for gaining and regaining control over vulnerable and orphan radioactive sources



## Prevention.

### State system of licensing and supervision

There are 3804 users of RS in Ukraine (2837 - medical use and 967 non medical), 549 of them use sealed radioactive sources.

- State regulatory system operates all main regulatory instruments:
  - establishment of regulatory requirements,
  - permissive activity,
  - inspections and enforcement.
- Permissive activity includes registration in State Register of Ionizing Radiation Sources and licensing of radioactive sources



# Prevention.

## State system of licensing and supervision

- State Nuclear Regulatory Committee of Ukraine is Ukrainian regulatory authority that is competent, in particular, for radioactive sources safety and security regulation.
- SNRCU is responsible for coordination of all executive authorities and institutions that have competence in radiation safety and radiation protection.



## Prevention.

### **State system of licensing and supervision**

#### *Security*

- Compliance with security requirements is necessary condition for issuing of any authorization in the sphere of nuclear energy use
- One of the obligatory parts of emergency plans is prompt reporting to regulatory body and other relevant authorities about decontrolled, lost, stolen or missing RS.



## Prevention.

# State system of licensing and supervision

*Security (continued)*

- Applicant shall have available:
  - security assessment and implemented physical protection measures for RS;
  - accounting system with yearly inventories and registration in State Register;
  - manager and personnel trustworthiness check positive results;
  - administrative measures;
  - emergency plan and suitable material resources and trained response personnel;
  - financial capabilities to reimburse cost for management of disused sources and damages in case of radiation accident.



# Prevention. State system for control of radiation sources - State Register

## *Accounting and control*

- Registration of RS is obligatory for all RS that are under regulatory control.
- State Register of Ionizing Radiation Sources (Register) is unified tracing computerized system of registration, accounting and control of radiation sources commissioned at 29.03.2007.
- The Register files data of all radiation sources in electronic form and trace RS starting from the moment of their appearance at the territory of Ukraine and till their removal from Ukraine or transfer to special enterprise on radioactive waste management (disposal). Now about 11 000 radioactive sources and 14 000 radiation generators are registered and controlled.





# Prevention. State system for control of radiation sources - State Register

## *Accounting and control (continued)*

- Interaction is kept running between the Register and State Custom Service of Ukraine, State Export Control Service of Ukraine, Radioactive Waste Register.
- Register is responsible for search of information about lost and found RS. Register provides annual report to regulatory bodies.
- Export and import of RS is allowed only after SNRCU authorization



## Prevention. State programs for vulnerable sources

### *Specific measures for vulnerable sources (1)*

- From point of view of inadvertent appearance in metal scrap two groups of sources are considered as vulnerable
  - spent RS
  - orphan sources.
- Special program of preventive measures exists for both groups.



## Prevention. State programs for vulnerable sources

*Specific measures for vulnerable sources (continued - 2)*

As for the security of disused RS - only those ways of management are allowed:

- Temporary secured storage at the facility (not more than 6 months)
- Return of RS to country of production according to the agreement with supplier
- Transfer of RS to special enterprises for radioactive waste management and disposal



## Prevention. State programs for vulnerable sources

*Specific measures for vulnerable sources (continued - 3)*

- According to international experience spent sources can give rise to accidents with inadvertent experience in metal scrap and following radiation injuries, melting or contamination such as accidents in Juarez, Mexico and Goiania, Brazil.
- To prevent potential accidents Ukrainian Government approved State Program “For Ensuring Safe and Secure Storage of Spent Highly Active Ionizing Radiation Sources”.



## Prevention. State programs for vulnerable sources

*Specific measures for vulnerable sources (continued - 4)*

State Program “For Ensuring Safe and Secure Storage of Spent Highly Active Ionizing Radiation Sources”

- The main task of the Program is to create infrastructure for storage of spent highly active sources in specialized storage facilities and fulfill all operations to transfer sources to these storages.
- Now program is under implementation.



## Prevention. State programs for vulnerable sources

*Specific measures for vulnerable sources (continued - 5)*

- Special campaign is now under realization for users of spent radioactive sources that are bankrupt or insolvent. In 2009 spent sources from these users will be taken to the specialized enterprise for radioactive waste storage at the expenses of State Budget.
- To make spent sources less vulnerable draft regulation is prepared according to which transfer of spent sources to the specialized enterprise for radioactive waste storage will be paid from Radioactive Waste Management Fund. If user have no contract to return the source to the country of production, user shall pay to the Fund in advance, when buying the new source.



## Prevention. Orphan sources search

### *Passive physical search*

- Passive physical search for orphan sources is provided in Ukraine at nodal points
- Administrative search and active physical search for orphan sources is provided by: State Inspections on Nuclear and Radiation Safety of the State Nuclear Regulatory Committee of Ukraine and local State Sanitary Epidemiological Services of the Health Ministry of Ukraine.
- Draft program for orphan sources search is now discussed with competent state authorities.



# Prevention. Orphan sources search

## *International assistance*

- Inspectors of State Inspections on Nuclear and Radiation Safety are trained for the search and identification of RS and equipped using international assistance
- In the framework of international cooperation several projects to enhance physical protection of priority sites are implemented for 54 oncology clinics and for research institutions.
- USA continues its assistance to enhance physical protection for other sites with highly active RS in Ukraine.
- Germany continues its assistance for consolidation of spent sources from financial unable facilities to specialized facilities for radioactive waste management in Ukraine





## Prevention. Dissemination of information

*Dissemination of information on inadvertent radioactive material in metal scrap*

- Since 1997 information on inadvertent radioactive material in metal scrap is regularly sent to the IAEA Data Base Office on illicit trafficking (hereinafter – IAEA DB Office).
- SNRCU includes into the bilateral agreements items about the exchange of information about illicit trafficking incidents that can influence other party including cases with inadvertent radioactive material in metal scrap.



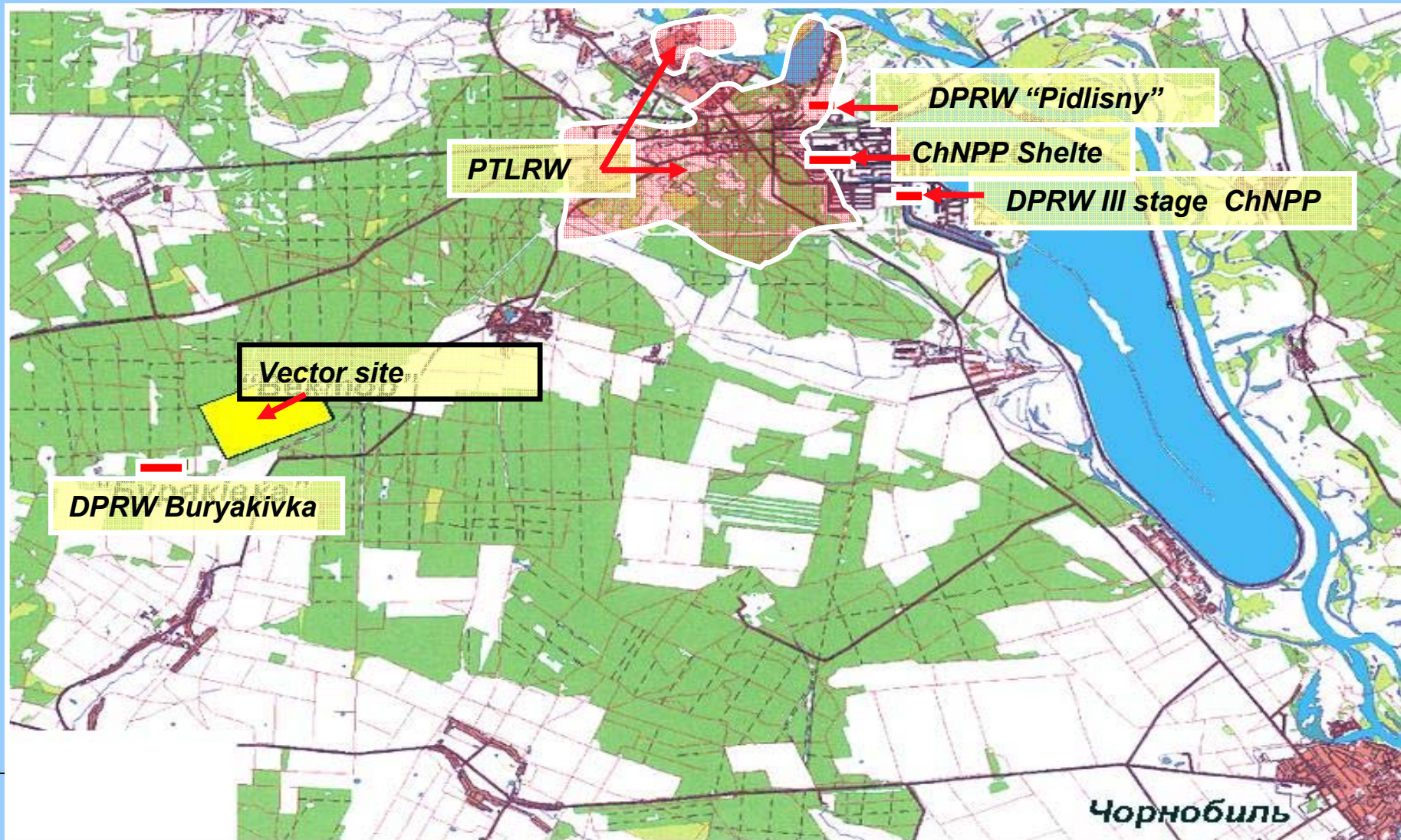
# Detection of cases with inadvertent radioactive material in the scrap metal

## *Radiation monitoring at the borders*

- Radiation monitoring at the borders is provided.
- Special program of improvement radiation monitoring at the border is implemented by State Border Administration.



# Exclusion Zone







# Detection of cases with inadvertent radioactive material in the scrap metal

## *Radiation monitoring at the border of Exclusion Zone*

- Exclusion Zone is a territory around Chernobyl NPP that is contaminated after the Chernobyl accident in 1986 and where no population and no activities are allowed except activities aimed at radiation and ecological safety. Exclusion Zone has guarded perimeter.
- Only cleared material with radiation certificates is transported out of the Zone.
- Removed material is additionally monitored at Zone perimeter cross points.



# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

- Activities with metal scrap are licensed by the Ministry of Industrial Policy (2400 licensed scrap dealers).
- The license is granted if licensee provides for licensing conditions -availability of radiation control of the scrap by trained personnel.
- Regulations “Licensing conditions for the activities of stocking up, processing, metallurgical processing of metal scrap of ferrous and nonferrous metal” for metal scrap management radiation safety are obligatory and if violated license can be withdrawn.



# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

- Some radioactive material slip through monitoring system at metal scrap yards
- This material is detected during input control at metallurgical facilities that are equipped with portal monitors.



## Detection of cases with inadvertent radioactive material in the scrap metal

### *Activities with metal scrap*

- During 2004-2008 the most contaminated lot had dose rate 3000  $\mu\text{R}/\text{hour}$  on the surface.

Inadvertent radioactive material	2004	2005	2006	2007	2008
Contaminated with NORM metal scrap	18	23	14	15	11
RS in metal scrap	2	-	-	5	1



# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

- State supervision of the operations with metal scrap is provided by Ministry of Industrial Policy, Ministry of Health and Ministry of Environmental Protection.
- In 2008 there were made 16 prescriptions for metal scrap dealers to eliminate violations and 2 licenses were withdrawn.
- Radiation monitoring that is provided by metal scrap dealers needs to be improved.





# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

SNRCU together with Ministry of Industrial Policy and professional associations decided that the main areas for improvement shall be:

- training of the staff;
- metrological supervision of dealer's radiation monitoring systems;
- revision of "Licensing conditions for the activities of stocking up, processing, metallurgical processing of metal scrap of ferrous and nonferrous metal";
- equipping all metallurgical plants with input/output portal monitoring systems;
- working out of national strategy according to UNECE Recommendations on Monitoring and response procedures for radioactive scrap metal (ECE/TRANS/NONE/2006/8).



# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

- To improve training of personnel that deals with metal scrap that can inadvertently include radioactive material SNRCU prepared reference booklet about the radioactive material that can be found in metal scrap.
- This booklet includes pictures and supplementary information that is important from the safety point of view.
- [Booklet](#) is disseminated in electronic form for scrap dealers and metallurgical facilities.

## Slide 26

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**O1** OMK, 2009-02-21

**O2** OMK, 2009-02-21



## Detection of cases with inadvertent radioactive material in the scrap metal

### *Activities with metal scrap*

- Specific and more severe standard exists for the export of metal scrap.
- Export consignments are followed by certificate that proves radiological safety of metal.

**Slide 27**

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**O3** OMK, 2009-02-21

**O4** OMK, 2009-02-21



## Detection of cases with inadvertent radioactive material in the scrap metal

### *Activities with metal scrap*

- Ukrainian metallurgical plants shall provide input radiation control of metal scrap and output control of produced metal.
- Now specific standard for control of produced metal is drafted.
- Ukrainian legislation includes requirement to provide input radiation monitoring at metallurgical plants, but do not require installation of specific monitoring equipment with specific characteristics. That is why SNRCU encourage metallurgical plants to install and operate portal monitors for input control.

**Slide 28**

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**05** OMK, 2009-02-21

**06** OMK, 2009-02-21



# Detection of cases with inadvertent radioactive material in the scrap metal

## *Activities with metal scrap*

- Thus, there exists multi barrier system of metal scrap control:
  - Border and Exclusive Zone perimeter control;
  - Metal scrap dealers (input and output control, periodical control of site and storage facility);
  - Metallurgical plants (input control and output control of produced metal);
  - Export consignments radiological certification.



**Slide 29**

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**07** OMK, 2009-02-21

**08** OMK, 2009-02-21



## **Response for cases with inadvertent radioactive material in the scrap metal**

- To regain control over orphan RS “Procedure for interaction of executive authorities and involved legal entities in case of revealing of radiation sources in illegal use” was approved by the Cabinet of Ministers of Ukraine.
- This procedure exists till 1997 and now is under review.
- This Procedure provides measures to regain control over source.

**Slide 30**

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**O9** OMK, 2009-02-21

**O10** OMK, 2009-02-21



## Response for cases with inadvertent radioactive material in the scrap metal

*Securing found sources, intervention in the event of an inadvertent radioactive material in metal scrap*

- Secure storage is provided by local authorities of the Ministry for Emergencies of Ukraine and specialized enterprises of State Corporation “Ukrainian Association Radon” (“Radon”).

**Slide 31**

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**O11** OMK, 2009-02-21

**O12** OMK, 2009-02-21



## Response for cases with inadvertent radioactive material in the scrap metal

*Securing found sources, intervention in the event of an inadvertent radioactive material in metal scrap*

- “Radon” has 6 specialized enterprises for radioactive waste management which include:
  - specially trained emergency personnel,
  - necessary devices and equipment including radiometric and dosimetric devices for assessing radiation situation at an accident place,
  - necessary individual protection means, decontamination means, mobile communication facilities, transport and packing containers.

**Slide 32**

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**O21** OMK, 2009-02-21

**O22** OMK, 2009-02-21



## Response for cases with inadvertent radioactive material in the scrap metal

- Till now all incidents with inadvertent radioactive material in metal scrap did not involve contamination of industrial sites, facilities and environment.
- There were 2 incidents with the response actions that are just the same as in the case of RS melting.



**Slide 33**

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**O13** OMK, 2009-02-21

**O14** OMK, 2009-02-21



## Response for cases with inadvertent radioactive material in the scrap metal

- First one occurred in 2008 at the big metallurgical plant , where part of their own moisture measuring gauge with Am-Be source was melted. Radioactive material was generated in amount 3000 ton with average activity about 20 Bq/kg. This material is to be cleared with condition to use it only at the industrial site.

**Slide 34**

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**O15** OMK, 2009-02-21

**O16** OMK, 2009-02-21



## Response for cases with inadvertent radioactive material in the scrap metal

- Second one was detected in 2007 at the landfill, where a spot was found, contaminated with Cs-137 probably as a result of non authorized release of material that appeared as a result of melting of the source. The site is decontaminated now, near 100 ton of radioactive waste with the activity from  $10^5$  to  $10^7$  Bq/kg is stored at the specialized enterprise.
- Careful control of all users of Cs137 sources and melting facilities demonstrated that all sources are in place and facilities are not contaminated. It was concluded that we deal with old (historical) contamination.

**Slide 35**

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**O17** OMK, 2009-02-21

**O18** OMK, 2009-02-21



## Conclusion

- System to prevent, detect and response cases with inadvertent radioactive material in the scrap metal in Ukraine is based on state regulation of activities with radiation sources and state regulation of activities with metal scrap and metal production.
- This system is prescriptive, requires sufficient state resources for supervision and enforcement, is effective and is under constant revision for improvement.
- International cooperation for search and securing of the inadvertent radioactive material proved to be useful and effective tool.

**Slide 36**

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**O19** OMK, 2009-02-21

**O20** OMK, 2009-02-21



**I am open for your questions!**