Overview of International Cooperation in Europe in DSRS Management

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National Institute for Radioelements -IRE

- Public Utility Foundation
- 125 employees
- Mission
  - To promote health
    - Production of radioelements used in nuclear medicine for diagnosis and therapy
  - To protect environment
    - Development of radiological monitoring equipments
    - Measurements of radionuclides in the environment
Three main activities

Radiochemical

Radiopharmaceutical

Services

$^{99}\text{Mo}/^{99\text{m}}\text{Tc}$

$^{131}\text{I}$

$^{188}\text{W}/^{188}\text{Re}$

$^{90}\gamma$
IRE as a worldwide leader

- Major producer of I-131 and Mo-99
- Active Pharmaceutical Ingredients
- IRE’s production of Mo-99
  - 6 millions of exams in the world
  - 4 millions of exams in Europe
    - 50% of the European needs
- 95% of exportation
  - Europe, USA, Japan and Latin America
IRE ELiT as radiopharmaceutical producer

- Strategic development
- Drugs directly injected to the patients
  - Yttrium-90
  - Rhenium-188
- Therapy of cancers in nuclear medicine
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The IRE was a manufacturer of SRS

- Industrial sources
  - Ir-192
  - Co-60
  - Kr-85
  - ...

- Smoke detectors
  - Am-241

- Lightning rods
  - Kr-85
The IRE has the adequate facilities for the dismantling of DSRS

- Laboratories for low irradiating sources
  - Glove box, fume hoods, shielded containers

- Hot cell for medium activities
  - 50 cm concrete
  - 10 tons crane
  - Access to shielded storage (300 drums of 200 L)

- Hot cell for high activities
  - 1.2 m heavy concrete
  - up to 100 TBq Co-60
  - Shielded storage of 800 containers of 10 L
Dismantling and conditioning of SSRS for NIRAS-ONDRAF

- Industrial and medical sources
  - ~500 over the last 3 years
  - Co-60, Cs-137, Sr-90, Am-241, ...

- Smoke detectors
  - 31 000 over the last 3 years
  - Am-241
  - Repackaging without dismantling of Ra-226

- Lightning rods
  - 600 over the last 3 years
  - Am-241, Kr-85
Services supplied

- Consultancy and technical assistance projects
- Characterization, dismantling and reconditioning of radioactive source
- Characterization, segregation and reconditioning of radioactive waste
- Monitoring of liquid and gaseous effluents
- Design of radiological monitoring equipment
- Monitoring of the radioactivity level in the environment and in the food chain
The Business Unit expertise in projects of technical assistance

- Management of institutional radioactive waste
  - Analysis of legislation and regulations
  - Analysis of management system
  - Characterization
  - Sorting – repackaging
  - Storage
  - Recommendations

- Management of DSRS
  - Source dismantling and/or reconditioning
European Projects

- Funded from:
  - EC
  - Belgian Federal Public Service Economy and Energy
  - Costumer

- Sometimes in collaboration with:
  - Tractebel, GDF SUEZ
  - Tecnubel, Leniko, Institute Joseph Stephan (SLO)
Environmental Radiological monitoring

- Monitoring for food industry
- Monitoring of effluent for nuclear industry
  - Sébou river (Morocco)
  - Danube (Bulgary)
- River monitoring
  - Hydroteleray (France)
  - The Netherlands (Meuse and Rhin)
  - Détroit de Gibraltar
- Water station (Belgium, France, Romania)
Radiological monitoring of the environment

- Air Monitoring from nuclear industry
  - I, Xe
  - $^{135}$Xe, $^{133}$Xe
- Air Monitoring in Cernavoda and Bechet (Romania)
  - 48 stations (dose rate)
  - 1 central station in Bucarest
- Review of radiological surveillance program in Novi Han (Bulgaria)
Puspokszilagy disposal facility

- Feasibility study: conversion of unused building into an interim storage
- Analysis of constraints
  - regulatory requirements, building state, operating procedures
- Critical review of possible designs
- Definition of specifications
  - Building layout
  - Spent sealed Sources storage
  - Operating procedures
- Cost estimates
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Upgrading of Sergiev Posad department of Moscow NPO Radon

- Critical analysis
  - Identification of weak points
  - Recommendations

- Assistance for the procurement of a fully automated gamma spectrometry characterization system
  - Basic design
  - Technical specifications
  - Tender evaluation
Management of medical radioactive waste

- Bulgaria, Croatia and Romania
- Albania, Bosnia Herzegovina, Macedonia, Kosovo, Montenegro and Serbia
- Assessment of regulations
- Evaluation of management practices
- Inventories
- Comparison with EU Member States
- Suggestions for improvement
- Technical seminar
Bilateral cooperation to improve nuclear safety

- Funded by the Belgian Ministry of Economy
- Bulgaria
  - State Enterprise Radioactive Waste (SERAW)
  - Novi Han storage facility
- Hungary
  - Public Agency for Radioactive Waste Management (PURAM)
  - Püspökszilàgy disposal facility
- Slovenia
  - Agency for Radioactive Waste Management (ARAO)
  - Central Interim Storage Facility in Brinje
Management of spent sealed radioactive sources (DSRS) in Bulgaria

- Assessment of a new DSRS interim storage facility at Novi Han
  - Critical review of technical proposal
  - Recommendations

- Assistance to the Bulgarian Nuclear Regulatory Agency to improve the management of highly-active DSRS
  - Enhance the safety of the management system
    - service life time
    - disused sources
    - orphan sources
Evaluation of the management of DSRS produced and sold in the Russian Federation

- Analysis of regulatory framework and management practices
- Visit of manufacturers, main users and disposal sites (RADON centres)
- Comparison with Western Europe
- Recommendations
The IRE conducted two projects in Slovenia

- Improvement of the management of institutional radioactive waste
- 2004-2005
  - 77 drums
  - 8300 smoke detectors (Am-241, Ra-226)
  - 219 packages of SSRS
    - lightning rods with Eu-152/154
- 2008
  - 125 drums
  - 188 bulky items
  - 313 packages of SSRS
Improvement of the management of institutional radioactive waste
The projects were implemented on site

- On-site operations
  - Central Interim Storage Facility
  - Jozef Stefan Institute
    - ventilated tent
    - shielded cell

- Authorisation from regulatory bodies
  - Actions plans
  - QA program
  - Technical specifications of new packages and drums
Waste processing (1/2)

- Waste characterisation
  - Contamination and dose rate
  - Gamma spectrometry (ISOCS)

- Waste treatment
  - Dismantling
    - Smoke detector and SSRS
  - Sorting
    - Contaminated/non-contaminated
    - Combustible/compactable/non-compactable
  - Repackaging in new packages
Waste processing (2/2)

- Waste characterisation
  - Candidates for clearance
- Re-arrangement of storage facility
  - Increase storage capacity
  - Improve arrangement
  - Improve package identification
Conclusions

Regulatory bodies need help concerning:

- Inventory of radioactive Waste and Sources
- Acceptance criteria (conditioning, storage, disposal)
- Financing of Waste management
- Disposal and Storage availability
- Orphan Sources financing
- Environmental monitoring
- Transport of sources
  - Lack of type B containers for old sources
  - Preparation of the source
    (dismantling and conditioning)

- Recycling of the Sources
Thank You!