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Enhancing the Safety and Security of Radioactive Sources

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Overview

- Goals of Enhanced Security in the U.S.
- NRC/DOE joint report on RDDs
- IAEA Code of Conduct: implementation & challenges
- NRC Licensing Process
- Interim database & the national source tracking system
- Orphan source initiative
- Import/export regulation changes
- Prioritization of high-risk radioactive materials
- Federal interaction: Draft Protective Action Guides for RDDs and INDs



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Goals of Enhanced Security in the U.S.

- Enhance existing controls to prevent unauthorized access
- Prevent theft/diversion for malevolent use
- Prompt detection, assessment, and reporting
- Prompt Local Law Enforcement Agency (LLEA) response
- Confirmation of shipping/receiving
- Additional security for radioactive materials in transit
- Import/Export controls
- Emphasis on prompt enhancement using practical measures
- Scope - high-risk sources (isotopes of concern) above threshold values in IAEA Code of Conduct



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NRC/DOE Joint Report on RDDs

Redacted report is posted on DOE Web Site (May 2003):

http://www.energy.gov/engine/doe/files/dynamic/96200392047_RDDRPTF14MAY.pdf

Report addresses 4 areas:

- Materials of Greatest Concern and Thresholds
- Tracking and Inventorying Sources
- Tagging and Monitoring
- Disposal of unsecured Sources

NRC has considered the Joint Report in developing actions to improve domestic and international security of sources including risk assessments for all



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An Abbreviated History of the IAEA Code of Conduct Development

- ❖ IAEA meeting in July 2003 produced the final draft of the Code.
- ❖ IAEA General Conference and Board of Governors Meeting in September 2003 resulted in adoption of the Code.
- ❖ Code of Conduct is not legally binding on Member States.
- ❖ Published in final form in January 2004



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Scope of the Code

- ❖ Scope covers all radioactive sources that may pose a significant risk to individuals, society, and the environment — specifically, the sources listed in Annex I of the Code.
- ❖ Annex I states that the Code applies to the top three source categories (the highest risk sources) of the five categories defined by IAEA TECDOC-1344
- ❖ Code's scope is further limited to Category 1 and 2 for the following:
 - National source tracking registry
 - Import/export provisions



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Annex I to Code of Conduct

TABLE 1. ACTIVITIES CORRESPONDING TO THRESHOLDS OF CATEGORIES

Radionuclide	Category 1 1000 x D		Category 2 10 x D		Category 3 D	
	(TBq)	(Ci)	(TBq)	(Ci)	(TBq)	(Ci)
Am-241	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Am-241/Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Cf-252	2.E+01	5.E+02	2.E-01	5.E+00	2.E-02	5.E-01
Cm-244	5.E+01	1.E+03	5.E-01	1.E+01	5.E-02	1.E+00
Co-60	3.E+01	8.E+02	3.E-01	8.E+00	3.E-02	8.E-01
Cs-137	1.E+02	3.E+03	1.E+00	3.E+01	1.E-01	3.E+00
Gd-153	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Ir-192	8.E+01	2.E+03	8.E-01	2.E+01	8.E-02	2.E+00
Pm-147	4.E+04	1.E+06	4.E+02	1.E+04	4.E+01	1.E+03
Pu-238	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Pu-239/Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Se-75	2.E+02	5.E+03	2.E+00	5.E+01	2.E-01	5.E+00
Sr-90 (Y-90)	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Tm-170	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02
Yb-169	3.E+02	8.E+03	3.E+00	8.E+01	3.E-01	8.E+00



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The Challenge of Code Implementation: World-Wide

- ❖ Some developing countries may lack the enabling legislation and/or regulatory infrastructure needed to fully implement the Code
- ❖ Situation presents challenge to developed countries who desire to export sources to nations who lack many of the elements of policy and programmatic controls for the safe/secure management of sealed sources



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NRC Licensing Process

- NRC and Agreement States issues licenses to possess, use, transfer, and own material
- Registration and Control are separate issues
- Registration means that the source
 - meets regulatory requirements
 - can be distributed by a manufacture to licensed entities
 - can be used by licensed entities if covered by conditions in a general or specific license
- Registration is done by NRC or the Agreement States
- Control is a licensee function



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Sealed Source & Device (SSD) Safety Evaluation Process

- Formalized
- Based on Written Guidelines
(NUREG-1556, Vol.3) and office procedures
- NRC receives about 100 application/year
- Typical process:
 - Vendor submits application to NRC
 - NRC conducts acceptance review
(within 10 days after receipt, 10% rejects)
 - NRC staff conducts safety review
(two reviewers are required)



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Sealed Source & Device (SSD) Safety Evaluation Process

Typical process (continued):

- NRC requests additional information (so called “deficiency letter”)
- Vendor provides response (10% rejects)
- NRC reviews response
- NRC issues registration certificate to vendor (Goal: within 180 days after receipt)
- NRC enters certificate into national Registry
- NRC distributes certificate to Agreement States

Review Process is controlled by in-house tracking systems



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Interim Database

Initial Database

- NRC and AS licensees contacted November 2003 (approx. 2600)
- A 'snapshot' in time, update annual basis
- IAEA Category 1 and 2
- Aggregation considered so some Category 3 sources
- Data considered Official Use Only
- Collected basic data
- Data used to inform security advisories and orders and inform national source tracking system
- Updates



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Interim Database (Continued)

Updating of Database

- To be conducted in FY 05 and FY 06
- 25% of licensees contacted each quarter
- Joint NRC/DOE report on RDD recommends development of a national source tracking system



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National Source Tracking

- Joint NRC/DOE report on RDD recommends development of a national source tracking system
- IAEA Code of Conduct recommends establishment of a national register of radioactive sources
- US Government has made a non-legally binding commitment to the Code of Conduct
- NRC's commitment to Congress
- Will include sources from NRC and Agreement state licensees and DOE facilities



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Orphan Source Initiative

Two Aspects to Orphan Source Control:

- Keep sources from being orphaned by maintaining control of sources
 - Lost Source Enforcement Policy (2001)
 - General License Tracking System, GLTS (2002)
 - Proposed Rule on Portable Gauges (2003)
 - National Source Tracking System (2006)



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Orphan Source Initiative

(Continued)

Two aspects to orphan source control:

- Recover sources that become orphaned
 - DOE's Offsite Source Recovery Program (1990)
 - Guiding Principle in Staff Requirements Memorandum (April 13, 1998)
 - MOU with DOE on Management of Sources (June 1999)
 - CRCPD National Orphan Radioactive Material Disposition Program (2001)
 - Trilateral Initiative with US/Mexico/Canada (2002)



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IAEA Code of Conduct Import & Exports

- Recipient country has regulatory structure
- Recipient is authorized to receive/possess sources
- Prior notice of Categories 1 & 2 sources
- Prior consent for shipments of Category 1 sources
- Exceptional circumstances



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NRC's 10 CFR Part 110 Revisions Import & Exports

- ✓ Export licenses can be issued for multiple high-risk radioactive materials, multiple countries & recipients
- ✓ NRC is starting to contact known recipient countries of U.S. origin high-risk radioactive material
- ✓ NRC will be asking recipient countries to authorize release reports of IAEA missions that assess programs for controlling radioactive material
- ✓ NRC will provide verification of US recipient's authorization to possess material for NRC and Agreement State Licensees
- ✓ Proposed rule Fall 2004; Final rule effective Dec 2005



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Prioritization of Sources

- High priority- Panoramic Irradiators; Manufacturers / Distributors
- Medium priority – Medical and Research facilities, Radiography, Well Logging, Broad-scope licenses, self-shielded irradiators, open-field irradiators, and other licensees
- Low priority - Fixed gauges





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Security Measures for Radioactive Materials

- Security Zone
- Access Control
- Monitoring, Detecting, Assessing, and Responding to Intrusions
- Liaison with Local Law Enforcement Agencies
- Background Investigations
- Protecting Against Unauthorized Disclosure of Sensitive Unclassified Information
- License Verification
- Shipments and Transfers (Domestic)



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Security Measures for Radioactive Materials (Continued)

- Imports and Exports
- Protection of Pre-planning, Coordinating, and Reporting Information
- Maintenance of Documentation Retention
- Security measures issued for panoramic irradiators in June 2003
- Security measures issued for manufacturers and distributors in January 2004
- Work continues on remaining high-risk, medium priority licensees



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Federal Interaction on Protective Action Guides for RDDs and INDs

- During TOPOFF 2, no agreed upon recommended radiological contamination levels for cleaning up sites or implementing protective actions following a radiological incident
- DHS-led RDD/IND Preparedness Working Group
- Working Group consisted of representatives from DOE, NRC, EPA, CDC, FDA, OSHA, NIST, DTRA, and DHS/S&T
- State and local officials participated in a focus group, and comments incorporated.



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Protective Action Guides (continued)

- DHS draft based on EPA's 1992 *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400-R-92-001)*
- Guidance represent Federal consensus advice
- Early phase guidelines: 1 – 5 rem, with an understanding that doses above 5 rem may be unavoidable for first responders performing life saving missions.
- Intermediate phase: 2 rem first year
- Late phase, subsequent years: 500 mrem/yr projected dose



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Protective Action Guides (continued)

- The PAG uses an optimization process rather than setting a specific level for the late phase because clean up feasibility and economic and other tradeoffs will be highly dependent on the specifics of the situation.
- The next phase: publication in the Federal Register in Fall 2004 to obtain broad public distribution and input.
- A communications strategy has been developed to ensure maximum response to the Federal Register Notice.



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