

**NRC ACTIVITIES:
ENHANCING THE SAFETY AND
SECURITY OF RADIOACTIVE SOURCES**

**Cynthia G. Jones, Ph.D.
Sr. Technical Advisor for Nuclear Security
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission**

**Presented at the
Russian Academy of Sciences Presidium
March 14, 2005**

Overview

- NRC Mission
- Goals of Enhanced Security in the U.S.
- NRC Licensing & Registration Processes
- Prioritization of High-Risk Radioactive Materials
- Endorsement of the IAEA Code of Conduct
- Interim Database & National Source Tracking
- Orphan Source Activities
- NRC Security Initiatives
- Conclusions

NRC Mission



To license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate

protection and common defense and security of of the public's health and safety.



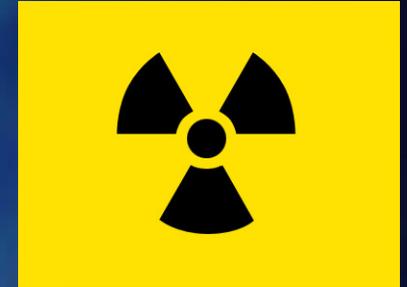


NRC Licensing & Registration
Processes for
Radioactive Materials

NRC Licensing Process

- NRC and 33 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 manufacturer 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

Sealed Source & Device Safety Evaluation Process



- Formalized
- Based on Written Guidelines
(NUREG-1556, Vol. 3) and office procedures
- NRC receives about 100 applications/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)

Sealed Source & Device Safety Evaluation Process

Typical process (continued):

- NRC may request additional information
- Vendor provides response (10% rejected)
- NRC reviews response
- NRC issues registration certificate to vendor
(Goal: within 180 days after receipt)
- NRC enters Certificate into National Sealed Source
& Device Registry
- NRC also distributes Certificate to Agreement States



Prioritization of “high-risk” radioactive materials

Goals of Enhanced Security

- Enhance existing controls to prevent unauthorized access
- Scope: High-risk radioactive sources & assess potential consequences
- Prevent theft/diversion for malevolent use
- Prompt detection, assessment, and reporting
- Prompt Local Law Enforcement Agency response
- Confirmation of shipping/receiving
- Additional security for radioactive materials in transit
- Import/Export controls

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 inventory of sources
- Tagging and monitoring
- Disposal of unsecured sources

Cradle to Grave

Radioisotope producer



Radioactive source manufacturer



Equipment manufacturer



User

Useful life of source



Recycling programs

Loss of control

- orphan source
- malicious intent

Controlled waste disposal arrangements

IAEA Code of Conduct

- ❖ Published in final form in January 2004
<http://www-pub.iaea.org/MTCD/publications/PDF/Code-2004.pdf>
- ❖ Covers radioactive sources that may pose a significant risk to individuals, society, and the environment — 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:
 - National source tracking registry
 - Import/export provisions

Selected Isotopes Corresponding to IAEA Category 1 Thresholds

Radionuclide	Category 1 Sources	
	<u>(TBq)</u>	<u>(Ci)</u>
Am-241/Be	60	2000
Cf-252	20	500
Co-60	30	800
Cs-137	100	3000
Ir-192	80	2000
Pm-147	40,000	1,000,000
Pu-238	60	2000
Pu-239/Be	60	2000
Sr-90 (Y-90)	1000	30,000

Industrial Sources



Actual Source 2mm x 2mm



Radiography "pigtails"



IAEA Code of Conduct Import & Exports

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

NRC Revisions: Import & Exports

- ✓ Export licenses can be issued for multiple high-risk radioactive materials, multiple countries & recipients
- ✓ NRC is contacting known recipient countries of U.S. origin high-risk radioactive material
- ✓ NRC will request recipient countries to authorize release of IAEA mission reports to USG that assess programs for controlling radioactive material
- ✓ NRC will verify US recipient's authorization to possess material for NRC and Agreement State Licensees
- ✓ Proposed rule Sept 2004; Final rule expected Dec 2005

The Challenge of Code Implementation: World-Wide

- ❖ Some 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

Interim Database

Initial Database

- ~2300 NRC and Agreement State licensees contacted Nov 2003
- A 'snapshot' in time, update on annual basis
- IAEA Category 1 and 2
- Aggregation considered so some Category 3 sources are included
- Data considered *Official Use Only*
- Collected basic data
- Data used to inform security Orders, advisories, & inform national source tracking system
- Will be periodically updated

National Source Tracking

- Joint NRC/DOE report on RDD recommended 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
- Will include sources from NRC and Agreement State licensees and DOE facilities
- Proposed rulemaking Spring 2005
- Final rulemaking July 2006
- Phased implementation Fall 2006

Orphan Source Activities

Two Aspects to Orphan Source Control:

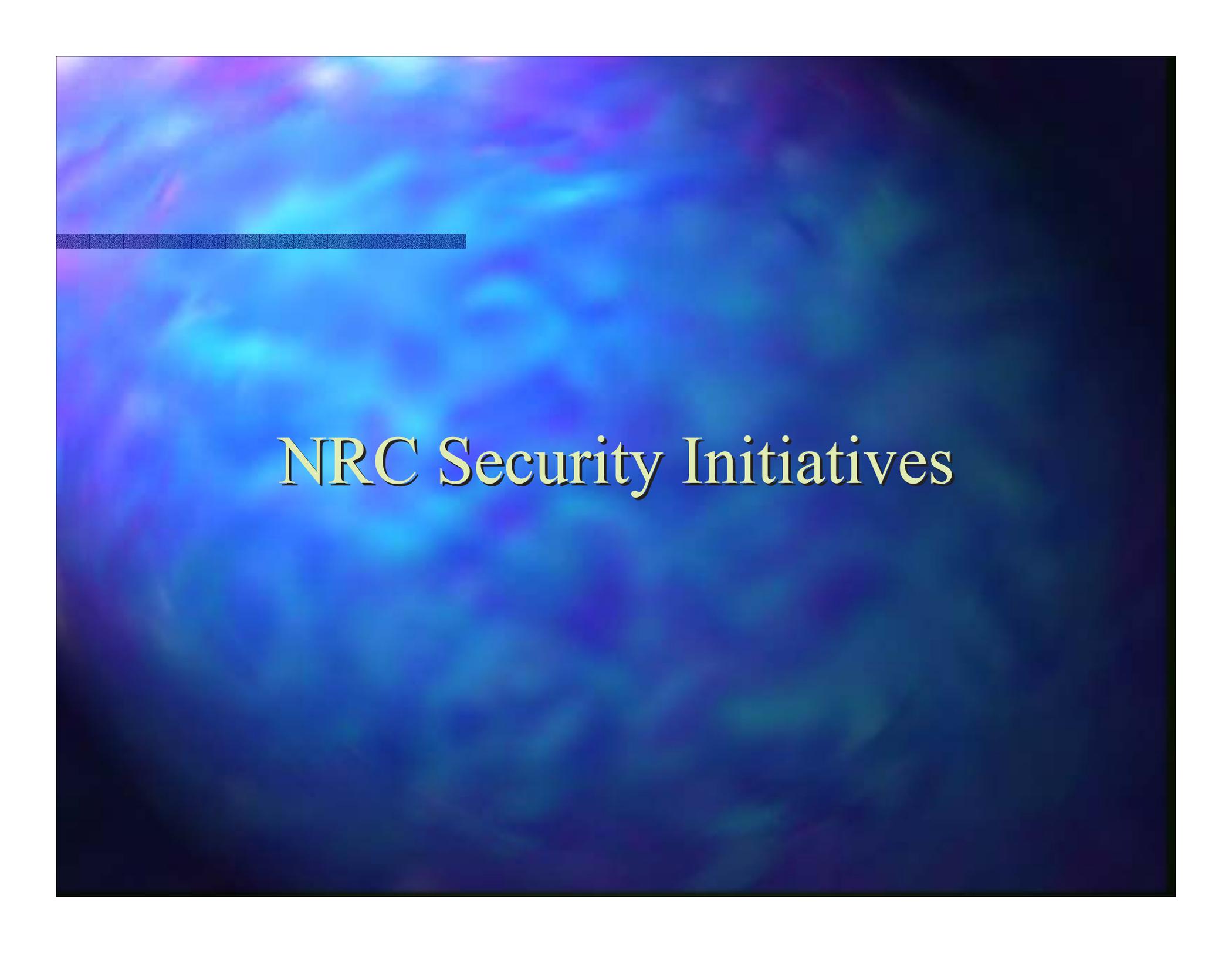
1. Keep sources from being orphaned by maintaining control of sources
 - Lost Source Enforcement Policy (2001)
 - General License Tracking System (2002)
 - Proposed Rule on Portable Gauges (2003)
 - National Source Tracking System (2006)

Orphan Source Activities

2. Recover sources that become orphaned
 - DOE's Offsite Source Recovery Program (1990)
 - MOU with DOE on Management of Sources (June 1999)
 - CRCPD National Orphan Radioactive Material Disposition Program (2001)
 - Trilateral Initiative with US/Mexico/Canada (2002)

NRC Research

- Evaluating consequences of inadvertent uses of radioactive materials since the early 1970s
- Casualties unlikely
- Contamination used as a surrogate indicator of potential consequences
- In 2002, NRC-DOE Joint RDD report specified & evaluated sources of greatest risk
- In 2003, USG work with IAEA further defined “high-risk” radioisotopes of concern



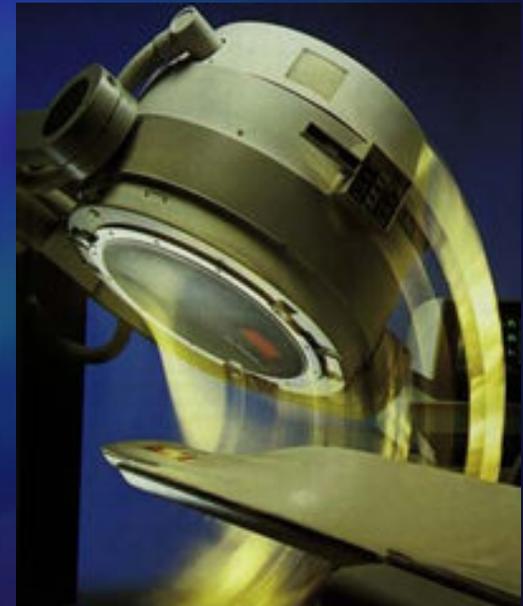
NRC Security Initiatives

Assessment of Threats



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 – Portable gauges



Security Measures

- 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)

Security Measures: Overall Program of Initiatives

- 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: radiographers, well-loggers, medical, research & development users

Security Measures: Overall Program of Initiatives

- Develop and implement revised inspection procedures for materials security
- Close collaboration with State Officials & licensees
- Reassess General License authorizations
- Conduct consequence assessment & security analyses for uses of radioactive sources and devices
- Revise import/export regulations
- Endorse the IAEA Code of Conduct and associated TECDOC-1344 high-risk isotopes and thresholds by revising regulations

Federal Interaction on Protective Action Guides for RDDs and INDs

- Prior to 2003, no agreed upon recovery criteria for sites following a radiological incident
- Department of Homeland Security-led RDD/IND Preparedness Working Group
- Working Group consisted of representatives from all major Federal U.S. Agencies
- State and local officials participated in a focus group, and comments incorporated.

Protective Action Guides for RDDs and INDs

- 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
- 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

Protective Action Guides for RDDs and INDs

- 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 Spring 2005 to obtain broad public distribution and input.
- A communications strategy has been developed to ensure maximum response to the Federal Register Notice.

Conclusions

- Improve and strengthen Regulatory Infrastructures worldwide
- Develop national database of high-risk sources
- Revise existing regulations for import, export and transshipment of radioactive material
- Develop revised security regulations to address malicious intent for high-risk radioactive sources
- Use a balanced approach – Benefits vs. prevention

Thank you!



Come visit us at www.nrc.gov