



U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Regulatory Basis – Transportation Theft & Diversion

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Objectives

- **Improve consistency and clarity;**
- **Make generically applicable security requirements similar to those imposed on fuel cycle;**
- **Consider risk insights, operational oversight and inspection activities, and international guidance;**
- **Use a risk-informed and performance-based structure.**



Considerations: Variables

- Understanding unlike fixed sites, the transportation environment is extremely dynamic and subject to numerous variables;
- Variables include: Weather, Physical roadway conditions, Unexpected hazards occurring in the Maritime Transportation System (MTS), Railway system interruptions, Vehicle material conditions.



Material Attractiveness – U-235

		Uranium-235		
Nuclear Material	Attractiveness Level	Cat I	Cat II	Cat III
High-Grade Materials Metals and compounds (≥ 20 wt %), solutions (≥ 25 g/l)	A	≥ 5 kg	≥ 1 kg <5 kg	\geq RQ <1 kg
Low-Grade Materials Metals and compounds (≥ 1 wt % and < 20 wt %); solutions (≥ 1 g/l and < 25 g/l)	B	N/A	≥ 25 kg?	\geq RQ <25 kg?
All Other Materials Uranium (< 10% U-235); highly irradiated material (≥ 1000 R/h @ 1 m); metals and compounds (< 1 wt %); solutions (< 1 g/l)	C	N/A	N/A	\geq RQ

RQ = Reportable Quantities



Material Attractiveness – Pu & U-233

		Plutonium and Uranium-233		
Nuclear Material	Attractiveness Level	Cat I	Cat II	Cat III
High-Grade Materials Metals and compounds (≥ 20 wt %); solutions (≥ 25 g/l)	A	≥ 2 kg	≥ 0.4 kg < 2 kg	$\geq RQ$ < 0.4 kg
Low-Grade Materials Metals and compounds (≥ 1 wt % and < 20 wt %); solutions (≥ 1 g/l and < 25 g/l); Pu (≥ 80 % Pu-238)	B	N/A	≥ 10 kg?	$\geq RQ$ < 10 kg?
All Other Materials Uranium (< 6 % U-233); highly irradiated material (≥ 1000 R/h @ 1 m); metals and compounds (< 1 wt %); solutions (< 1 g/l)	C	N/A	N/A	$\geq RQ$



Potential Changes-General

- **Change in terminology**
 - **Formula Quantity of Strategic SNM to Category I**
- **Change in structure**
- **Use of performance based requirements (similar to 73.55)**
- **Reporting requirements for shipments**



Potential Changes-Notifications

REQUIREMENTS FOR ADVANCE NOTIFICATION OF MATERIAL SHIPMENTS TO NRC			
MATERIAL	TYPE OF SHIPMENT		TRANSIENT
	DOMESTIC	EXPORT	
SOURCE MATERIAL Ore or Ore Residue > 500 kg Natural U	NONE NONE	NONE 40.66(a) (NSIR/DSP)	NONE 40.23(b)(1) (NSIR/DSP) 40.23(b)(2)(ix) ² (NSIR/DSP)
BYPRODUCT MATERIAL (RAMQC) category 1 category 2	37.77 (NSIR/DSP) NONE	37.77 (NSIR/DSP) 110.50(b)(3)(i) ³ (OIP) 110.50(c)(4) (HOO & govt of importing country)	110.50(c)(4) (HOO)
SPECIAL NUCLEAR MATERIAL⁴ Low Strategic Significance (Cat III)	NONE	73.73(a)(1) (NSIR/DSP) 73.73(b) (HOO)	70.20b(f)(1) (NSIR/DSP) 70.20b(f)(2)(ii) & (iii) (HOO)
Moderate Strategic Significance (Cat II)		73.72(a)(1) (NSIR/DSP); 73.72(a)(4) & (a)(5) (HOO)	
Formula Quantity (Cat I)		73.72(a)(1) (NSIR/DSP) 73.72(a)(4) & (a)(5) (HOO)	
IRRADIATED REACTOR FUEL (Spent Nuclear Fuel) > 100 grams and > 1 Gy/hr at 1 m, unshielded	73.72(a)(1) (NSIR/DSP)		
> 100 grams and ≤ 1 Gy/hr at 1 m, unshielded		Same requirements as SNM Cat I, II or III, based on type, amount and unirradiated enrichment %	
≤ 100 grams and ≤ 1 Gy/hr at 1 m, unshielded		Same requirements as SNM Cat I, II or III, based on type, amount and unirradiated enrichment %	
≤ 100 grams and > 1 Gy/hr at 1 m, unshielded		73.35 & 37.77 (NSIR/DSP)	
WASTE Type B package, being sent to a disposal site, containing > 10 CFR 71.97(b)(3) quantity		71.97(c) (NSIR/DSP)	71.5(b)
ANY LICENSED MATERIAL (Where DOT transport regulations are not applicable - rare)		(NSIR/DSP, whenever DOT would have been notified)	
REQUIREMENTS FOR ADVANCE NOTIFICATION			
OF MATERIAL SHIPMENTS TO NRC UNDER PART 75 (USIAEA AGREEMENT)			
SOURCE AND SPECIAL NUCLEAR MATERIAL effective kg ⁵	NONE	75.43(b) ⁶ & (c)(1) (DCD) ⁷	75.43(c)(2) (DCD) ⁷
≥ 0.01 effective kg ⁵	75.43(d) ⁸ (DCD) ⁷	NONE	NONE NONE



Potential Changes-Strategy

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
Protective Strategy	<p>Protect against DBT of theft and diversion and radiological sabotage</p> <p>Prevent the removal of SNM and other unauthorized activities involving SNM</p> <p>DBT-based FOF testing</p>	<p>Immediately detect attempts to remove of SNM and provide sufficient delay through the use of barriers and/or armed responders to allow LLEA to promptly recover SNM</p>	<p>Promptly detect attempts to remove of SNM and notify local law enforcement agencies to allow recovery of SNM.</p>	<p>Timely detect attempts to remove of SNM and notify LLEA to recovery SNM</p>
Additional limitations		<p>No more than one shipment at any given time for Cat II</p> <p>Limit on Cat II high-grade Pu</p>	<p>No more than one shipment at any given time for Cat II</p> <p>Limit on high-grade Cat II LEU</p>	
Security Plan	<p>Physical Security Plan – Program</p> <p>Shipment specific security plan</p> <p>Safeguards Cont. Plan</p> <p>Training & Qual. Plan</p> <p>Response procedures to include loading, custody transfer, response to safeguards contingencies</p>	<p>Physical Security Plan - Program</p> <p>Shipment specific security plan</p> <p>Safeguards Cont. Plan</p> <p>Training & Qual. Plan</p> <p>Response procedures to include loading, custody transfer, response to safeguards contingencies</p>	<p>Physical Security Plan (can be part of fixed site)</p> <p>Response procedures</p>	<p>Physical Security Plan (can be part of fixed site)</p> <p>Response procedures</p>



Potential Changes-Strategy

<p>Security Organization</p>	<p>Implement Program Management System Fatigue (DOT)</p>	<p>Implement Program Management System Fatigue (DOT)</p>	<p>Implement Program Management System</p>	<p>Implement Program Management System</p>
<p>Route</p>	<p>Route planning Safe heavens Route survey/approval</p>	<p>Route planning Safe heavens Route survey/approval</p>	<p>Route approval</p>	<p>none</p>
<p>Notifications</p>	<p>Classified notifications Advance notification to NRC and receiver Receiver confirmation Notification of shipment to NRC and receiver Notification to QRF</p>	<p>Advance notification to NRC and receiver Receiver confirmation Notification of shipment to NRC and receiver Notification to LLEA</p>	<p>Advance notification to NRC and receiver Receiver confirmation Notification of shipment to NRC and receiver Notification to LLEA Receiver's notification of receiving</p>	<p>Advance notification to NRC and receiver Receiver confirmation Notification of shipment to receiver Receiver's notification of receiving</p>



Potential Changes-Strategy

<p>Configuration and Physical Barrier</p>	<p>Specially designed covered vehicle Containers and tie downs Immobilization device Vehicle's delay features to achieve performance Hardened transport vehicle cab</p>	<p>Covered transport vehicle or open conveyance with a heavy transport cask Containers and tied owns Immobilization device Hardened transport vehicle cab</p>	<p>Covered transport vehicle or open conveyance with a heavy transport cask Containers and tied owns</p>	<p>Covered transport vehicle or open conveyance with a heavy transport cask containers</p>
<p>Access Controls</p>	<p>Limit unescorted access Access authorization Photo Badges Search vehicles prior to departure Control of access to vehicles prior to departure Locks on vehicle/ key controls Control of access to SNM transfer points</p>	<p>Limit unescorted access Access authorization Photo Badges Search vehicles prior to departure Control of access to vehicles prior to departure Locks on vehicle/ key controls Control of access to SNM transfer points</p>	<p>Limit unescorted access Access authorization Photo Badges Search vehicles prior to departure Locks on vehicle/ key controls Control of access to SNM transfer points</p>	<p>Access authorization Locks on vehicle/ key controls Control of access to SNM transfer points</p>



Potential Changes-Strategy

<p>Detection and Assessment</p>	<p>MCC</p> <p>IDS inside vehicle enclosure (detection of boundary penetration – communicate to MCC)</p> <p>IDS on SNM package</p> <p>TID on vehicle enclosure</p> <p>TID on containers</p> <p>GPS</p> <p>Surveillance at stops</p>	<p>MCC</p> <p>IDS on vehicle enclosure or SNM container – communicate to MCC)</p> <p>TID on containers</p> <p>GPS</p> <p>Surveillance at stops</p>	<p>Continuously maintained POC (shipper, carrier, receiver)</p> <p>Periodic status-check communications (part 37 for language)</p> <p>Surveillance at stops</p> <p>TID on container</p> <p>GPS</p>	<p>TID on container</p> <p>GPS</p>
<p>Communication</p>	<p>Redundant, encrypted communications between MCC, QRF and convoy and within convoy</p>	<p>Redundant, encrypted communications between MCC and convoy and within convoy</p>	<p>Redundant, diverse communications between transport and LLEA, shipper/receiver/ carrier POC</p>	<p>Communications between transport and LLEA, shipper, receiver</p>



Potential Changes-Strategy

<p>Response</p>	<p>Armed escorts – interrupt and neutralize Hot pursuit and recovery Deadly Force Hardened escort vehicles QRF response Quarterly performance exercises for armed escorts</p>	<p>Armed escorts – delay (interrupt) and communicate Deadly Force Pre-arranged LLEA response (document via MOA) Annual exercises</p>	<p>LLEA Liaison Immediate investigation upon missed communication check</p>	<p>LLEA Liaison Immediate investigation upon non-arrival on time</p>
<p>Security Program Review</p>	<p>Annually Management Review CAP or event log</p>	<p>Bi-annually Management Review CAP or event log</p>	<p>Bi-annually Management Review CAP or event log</p>	<p>Bi-annually Management Review CAP or event log</p>
<p>Maintenance & Testing</p>	<p>Required In PSP</p>	<p>Required In PSP</p>	<p>Required In PSP</p>	<p>None In PSP</p>
<p>Compensatory Measures</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>
<p>Suspension of Security Measures</p>	<p>Required</p>	<p>Required</p>	<p>Required</p>	<p>Required</p>
<p>Alternative Measures</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>



Stakeholder Input

- Is this the right approach?
- Are there other approaches we should consider?
- What would be the potential impacts?
- Other things we should consider?



Questions?