



U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Regulatory Basis – Transportation Theft & Diversion

Gerard Jackson, Security Specialist-Transportation
Office of Nuclear Security & Incident Response
Division of Security Policy

April 09, 2014



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			
	Attractiveness Level	Cat I	Cat II	Cat III
Nuclear Material				
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	IMPORT	
SOURCE MATERIAL				
Ore or Ore Residue	NONE	NONE	NONE	NONE
> 500 kg Natural U	NONE	40.66(a) (NSIR/DSP)	40.67(a) ¹ (NSIR/DSP)	40.23(b)(1) (NSIR/DSP) 40.23(b)(2)(ix) ² (NSIR/DSP)
BYPRODUCT MATERIAL (RAMQC)				
category 1	37.77 (NSIR/DSP)	37.77 (NSIR/DSP) 110.50(b)(3)(i) ³ (OIP) 110.50(c)(4) (HOO & gov't of importing country)	110.50(c)(4) (HOO)	
category 2	NONE			
SPECIAL NUCLEAR MATERIAL ⁴				
Low Strategic Significance (Cat III)	NONE	73.73(a)(1) (NSIR/DSP) 73.73(b) (HOO)	73.74(a)(1) ¹ (NSIR/DSP) 73.74(b) ¹ (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)	73.72(a)(1) (NSIR/DSP) 73.72(a)(4) & (a)(5) (HOO) 110.27(3)(d) (NSIR/DSP)	
IRRADIATED REACTOR FUEL (Spent Nuclear Fuel)	73.72(a)(1) (NSIR/DSP)		73.72(a)(4) & (a)(5) (HOO)	
> 100 grams and > 1 Gy/hr at 1 m, unshielded				
> 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)		
ANY LICENSED MATERIAL (Where DOT transport regulations are not applicable - rare)		(NSIR/DSP, whenever DOT would have been notified)		
				71.5(b)
REQUIREMENTS FOR ADVANCE NOTIFICATION				
OF MATERIAL SHIPMENTS TO NRC UNDER PART 75 (USIAEA AGREEMENT)				
SOURCE AND SPECIAL NUCLEAR MATERIAL				
effective kg ⁵	> 1	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



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

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



Potential Changes-Strategy

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



Potential Changes-Strategy

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



Potential Changes-Strategy

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



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?