



U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Potential Security Measures

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Security Regulations and Guidance

- 10 CFR Part 73 “Physical Security of Plants and Materials”
 - SGI Program: 10 CFR 73.21, 22, and 23; Regulatory Guide 5.79 (ML103270219); Order EA-06-203 (ML062350289)
 - Physical security of SNM: 10 CFR 73.60(f), 73.67; Regulatory Guide 5.59
 - Access Authorization: 10 CFR 73.57, 73.59, Order EA-07-074 (ML070750190)
 - Event Notification: 10 CFR 73.71 and 73 Appendix G
 - Draft final rule with commission (ADAMS No. ML16264A000)

Security Regulations and Guidance (continued)

- 10 CFR 73 Part 73 “Physical Security of Plants and Materials”
 - Transportation:
 - Fresh fuel: 10 CFR 73.67
 - Spent fuel: 10 CFR 73.37 and 38
 - Posting: 10 CFR 73.75
 - Cyber Security: No regulations for NPUFs, for information purposes only refer to Regulatory Guide 5.71 (ML18016A129); Effective Practice for RTRs (ML15253A060)

Approach

- Regulatory Basis for Rulemaking to Enhance Security of SNM
 - In ADAMS under ML14321A007
- Rule was discontinued, but approach remains
 - Graded approach
 - Risk informed
 - Based on the attractiveness of the material
 - Driven by the dilution of the material

Dilution Factor

- The weight of uranium-235, uranium-233 and plutonium divided by the total weight of the SNM material and non-SNM materials which are not mechanically separable from the SNM) for solids.
- Three Levels
 - Non-dilute
 - Moderately dilute
 - Highly dilute

Non-dilute

- Material with a dilution factor equal to or greater than 20 percent for uranium-235 and equal to or greater than 10 percent for uranium-233 and plutonium.
- Non-dilute materials include, for example, highly attractive HEU, uranium-233, and plutonium metals and compounds.

Moderately Dilute

- Material with a dilution factor equal to or greater than 1 percent but less than 20 percent for uranium-235 and equal to or greater than 1 percent but less than 10 percent for uranium-233 and plutonium.
- MOX and certain non power reactor fuels, for example, can be considered moderately dilute SNM.

Highly Dilute

- Material containing SNM but with a dilution factor less than 1 percent for uranium-235, uranium-233 and plutonium.
- HEU-contaminated processing waste, for which the recovery of SNM is uneconomic, is an example of highly dilute materials.

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

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 Security Measures

	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>Diversion Path Analysis</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 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>
Security Plan	<p>Physical Security Plan</p> <p>Safeguards Cont. Plan</p> <p>Training & Qual. Plan</p>	<p>Physical Security Plan</p> <p>Safeguards Cont. Plan</p> <p>Training & Qual. Plan</p>	<p>Physical Security Plan</p>	<p>Physical Security Plan</p>

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
Security Organization	Implement Program Management System Part 26 – except Subpart I & K Part 26, Subpart I – Manage Fatigue	Implement Program Management System	Implement Program Management System	Implement Program Management System
Physical Barrier	OCA Vehicle Barrier System/blast analysis Isolation Zone Protected Area Vital Area Material Access Area Locked Processes Vault Hardened CAS	Vehicle Barrier System Isolation Zone Protected Area Controlled Access Area Locked Processes Vault-type room Hardened CAS	 Controlled Access Area Locked Processes Vault-type room	 Controlled Access Area 12

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
Access Controls	Protected & Material Access Area Access Portals Limit unescorted access Part 11 Photo Badges Escort Requirements	Protected Area & Controlled Access Area Access Portals Limit unescorted access 73.57 Photo Badges Escort Requirements	Controlled Access Area Access Portals Limit unescorted access 73.57 Photo Badges Escort Requirements	Controlled Access Area Access Portals Limit unescorted access 73.57 Photo Badges Escort Requirements
Search Programs	OCA – vehicles Protected Area – entry (contraband) & exit (SNM – shielding) Material Access Area – entry and exit (SNM – shielding) Vault (weapons)	Protected Area – entry (contraband) & exit (SNM & shielding) Controlled Access Area – exit (SNM & shielding)	Controlled Access Area – entry (contraband) random exit (SNM & shielding)	None

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
Detection and Assessment	Protected Area & Material Access Area Intrusion Detection System with UPS Video Capture Central Alarm Station Secondary Alarm Station Surveillance Program – Protected Area & unoccupied Material Access Area Periodic Patrols of outside areas Two person rule in MAA Three person rule in Vault Illumination	Protected Area & Vault type room Intrusion Detection System with UPS Video Capture Central Alarm Station Secondary Alarm Station (on-site or off-site) Surveillance Program Periodic Patrols of outside areas Illumination	Vault type room Intrusion Detection System with UPS Central Alarm Station (CAS) Secondary Alarm Station (SAS) (on-site or off-site) Surveillance Program Periodic Patrols of outside areas	Surveillance Program Periodic Patrols of outside areas 14

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
Communication	<p>CAS/SAS two-way redundant communication with LLEA</p> <p>Continuous communication between CAS/SAS and on-site and off-site response force</p> <p>Non-portable equipment on UPS</p>	<p>CAS/SAS two-way redundant communication with LLEA</p> <p>Continuous communication between CAS/SAS and on-site and off-site response force</p> <p>Non-portable equipment on UPS</p>	<p>CAS/SAS two-way redundant communication with LLEA</p> <p>Continuous communication between CAS and on-site and off-site response force</p> <p>Non-portable equipment on UPS</p>	<p>Two-way redundant communication with LLEA</p> <p>Continuous communication among security force</p> <p>Non-portable equipment on UPS</p>
Response	<p>10 Tactical Response Team – interrupt and neutralize</p> <p>Deadly Force</p> <p>Armed Security Officers</p> <p>LLEA Liaison</p> <p>Heightened Security</p>	<p>Deadly Force</p> <p>Armed Security Officers – interrupt</p> <p>LLEA Liaison</p> <p>Heightened Security</p>	<p>LLEA Liaison</p> <p>Heightened Security</p>	<p>LLEA Liaison</p>

	Cat I	Cat I Mod Dilute Cat II	Cat II Mod Dilute	Cat I Highly Dilute Cat III
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

Commission Direction for Moly-99 Production

- Use supplemental security measures
 - Measures to supplement the regulation
 - Measures in past Orders apply
 - Apply as license conditions
- Site specific
 - Dependent on design, use, product, etc
- Graded approach
 - Accounts for type and quantity of material used