



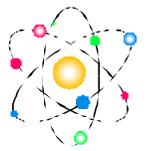
WPAFB RADIATION SAFETY OFFICE

88 ABW/EMB

Wright-Patterson AFB, OH 45433-5332

IAEA Safety Standards Series Requirements ST-1 (1996)

http://www.abwem.wpaafb.af.mil/em/emb/



EXCEPTED PACKAGES

July 2001

Date: _____ Shipper: _____ Destination: _____

Table with 5 columns: Item Description, Radionuclide, Activity Each, Number of Items, Total Activity

Radiation Package Survey Results: surface _____ mrem/hr 1 meter _____ mrem/hr

Instrument Used: Mfgr: _____ Model: _____ S/N: _____ Cal Date: _____

Person Completing Checklist: _____ Signature: _____

PACKAGES and PACKAGING (General Requirements (§ 606-616))

- YES NO checkboxes for 7 items regarding mass, volume, shape, securing, lifting attachments, decontamination, water prevention, and securing devices.

CONTENTS LIMITS FOR EXCEPTED PACKAGES

- YES NO checkboxes for 2 items regarding material enclosure and content limits (radiation level, marking, item limit, package limit).

REQUIREMENTS AND CONTROLS FOR EXCEPTED PACKAGES

- YES NO checkboxes for 5 items regarding marking, dangerous properties, radiation level, contamination, and transport document.

COMMENTS

QUANTITIES FOR SELECTED RADIONUCLIDES

(IAEA Safety Standards Series No. ST-1, Section IV, Table I)

Radionuclide	A ₁ (TBq)	A ₂ (TBq)	Exempt Exempt Concentration (Bq/gm)	Exempt Activity (Bq)
²⁴¹ Am	10	0.001	1	10000
¹⁴ C	40	3	10000	1E7
⁵⁷ Co	10	10	100	1E6
⁶⁰ Co	0.4	0.4	10	1E5
¹³⁷ Cs	2	0.6	10	10000
³ H	40	40	1E6	1E9
¹²⁵ I	20	3	1000	1E6
¹⁹² Ir	1	0.6	10	10000
⁸⁵ Kr	10	10	1E5	10000
⁶³ Ni	40	30	1E5	1E8
²¹⁰ Po	40	0.02	10	10000
²³⁹ Pu	10	0.001	1	10000
²²⁶ Ra	0.2	0.003	10	10000
¹⁸⁷ Re	Unlimited	Unlimited	10000	1E7
⁹⁰ Sr	0.3	0.3	100	10000
²³² Th	Unlimited	Unlimited	10	10000
Th (Nat)	Unlimited	Unlimited	1	1000
²³⁸ U	Unlimited	Unlimited	10	10000
U (depleted)	Unlimited	Unlimited	1	1000
U (Nat)	Unlimited	Unlimited	1	1000

Activity Limits For EXCEPTED PACKAGES

(IAEA Safety Standards Series No. ST-1, Section IV, Table III)

PHYSICAL STATE OF CONTENTS	INSTRUMENT & ARTICLES		MATERIAL S
	Item Limits*	Package Limits*	Package Limits*
SOLIDS			
Special Form	10 ⁻² A ₁	A ₁	10 ⁻³ A ₁
Other Form	10 ⁻² A ₂	A ₂	10 ⁻³ A ₂
LIQUIDS			
Liquids	10 ⁻³ A ₂	10 ⁻¹ A ₂	10 ⁻⁴ A ₂
GASES			
Tritium	2x10 ⁻² A ₂	2x10 ⁻¹ A ₂	2x10 ⁻² A ₂
Special Form	10 ⁻³ A ₁	10 ⁻² A ₁	10 ⁻³ A ₁
Other From	10 ⁻³ A ₂	10 ⁻² A ₂	10 ⁻³ A ₂
NOTES:			
* For mixture of Radionuclides, see §404-406			

PACKAGE RADIATION LEVEL LIMITS

(IAEA Safety Standards Series No. ST-1)

LIMITED QUANTITY = ≤ 0.5 mrem/hr on any surface.

INSTRUMENTS & ARTICLES = ≤ 0.5 mrem/hr on any surface. ≤ 10 mrem/hr at 4 inches from external surface of instrument.)

OTHER DEFINITIONS

COSIGNEE – shall mean any person, organization or government which receives a consignment.

CONSIGNMENT – shall mean any package or packages, or load of radioactive material, presented by a consignor for transport.

CONSIGNOR – shall mean any person, organization or government which prepares a consignment for transport, and is named as consignor in the transport documents.

LOW TOXICITY ALPHA EMITTERS – natural uranium; depleted uranium; natural thorium; uranium-235 or uranium 238; thorium 232; thorium-228 and thorium –230 when contained in ores or physical and chemical concentrates; or alpha emitters with a half-life of less than 10 days.

**REMOVABLE EXTERNAL PACKAGE
CONTAMINATION LIMITS**

(averaged over 300 cm²)

(IAEA Safety Standards Series No. ST-1, §508)

External Surfaces

EXCEPTED PACKAGES	Bq/cm²	dpm/cm²
Beta and gamma emitters and low toxicity alpha emitters	4	22.0
All other alpha emitting radionuclides	0.4	2.2

WORKSHEET

Item Activity _____ μCi X 0.037 MBq/μCi = _____ MBq

Item Activity _____ MBq X 10⁻⁶ TBq/MBq = _____ TBq