

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

HANDLING, STORAGE, AND DISPOSAL OF
 ARMY AIRCRAFT COMPONENTS
 CONTAINING RADIOACTIVE MATERIALS

Headquarters, Department of the Army, Washington D.C.
 2 February 1979

REPORTING OF ERRORS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedure, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MTPS, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished to you.

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Section I. INTRODUCTION

1. Purpose.

This bulletin provides guidance for safe handling, storage, and disposal of aircraft self-luminous instruments and markers, aircraft engine parts, and assemblies (bearing supports, gearbox housings, gear assemblies, engine exciter units and etc.) containing radioactive materials.

2. Descriptive Data.

- a. *Self-luminous Aircraft Instruments.* Self-luminous aircraft instruments are indicators, altimeters, gages, and thermometers which may contain one of the following radioactive isotopes: radium (Ra-226), promethium (Pm-147), or tritium (H-3).
- b. *Aircraft Engine Parts and Assemblies.* Typical aircraft engine parts and assemblies containing radioactive materials are as follows:

(1) Aircraft engine ignition exciter units used in T-53 and T-55 aircraft engines contain radioactive isotopes in the spark gaps. Bariumcesium 137 multiple isotope, hereafter referred to as cesium 137 or krypton 85, is sealed inside the spark gap within the ignition unit.

(2) Engine assemblies, such as gearbox housings, front housing covers, bearing support shafts, etc., are composed of a metal known as magnesium-thorium (natural) (TH-227, 228, 229, 230, and 232) alloy.

NOTE

The thorium component is radioactive.

3. Definitions.

For the purpose of this bulletin, the following definitions apply:

- a. *Alloy.* A substance composed of two or more metals or a metal and nonmetal intimately united or dissolved in each other.
- b. *Alpha Particle.* A charged particle emitted from the nucleus of an atom, having a mass and charge equal in magnitude to a helium nucleus (two protons and two neutrons).
- c. *Curie.* A unit of activity defined as a quantity of radioactive material in which the number of disintegrations per second (dps) is 3.7×10^{10} . A millicurie is 1/1,000 of a curie. A microcurie is 1/1,000,000 of a curie.
- d. *Fluorescence.* The production of visible light (white or colored) or other radiation by a substance as the result of exposure and absorption of other radiations of different wave lengths. Those substances having this property are known as phosphors.
- e. *Gamma Ray.* Short wave length electromagnetic radiation emitting from the nucleus of an atom, somewhat similar to X-ray.
- f. *Phosphor.* A substance, such as calcium tungstate or zinc sulfide, which will emit visible light when irradiated with ionizing radiation.
- g. *Phosphorescence.* A fluorescence that continues for more than a very short time -after the exciting radiation is stopped.
- h. *Radiation.* The emission and propagation of energy through space or through a material medium in the form of waves.
- i. *Radiation Controlled Area.* A defined area in which the exposure of personnel to radiation or radioactive material is supervised. A controlled area requires that access, occupancy, and work conditions be controlled for purpose-of radiation protection.
- j. *Radioactive Waste.* Unwanted radioactive material or material contaminated with radioactive isotopes. Radioactive waste includes property which originally was nonradioactive but has been contaminated to such an extent that it is economically unsound to decontaminate or contamination cannot be reduced to a safe level. Decontamination procedure are in TM 3-220.
- k. *Radioisotope.* A radioactive form of an element, such as promethium (Pm-147), thorium (TH-228 or TH-230), or tritium (H-3).
- l. *Radiological Protection Officer (RPO).* An individual designated by the commander to provide consultation and advice on the degree of hazards associated with radiation and the effectiveness of measures to control these hazards.

This individual shall be qualified technically by

virtue of his education, military training, or professional experience to assure a capability commensurate with the assignment. The term radiological protection officer is a functional title and is not intended to denote a commissioned status or a job classification within the Army.

m. Sealed Source. Radioactive material that is encased in a container designed to prevent escape or leakage of the radioactive material or its disintegration products.

4. General.

Items described in paragraph 2 all are sealed, except the magnesium-thorium alloy, to prevent leakage of radioactive material. Do not attempt disassembly. These items present no radiation hazard to personnel unless bulk quantities of items are involved; or the sealed source is broken, due to aging, accident, or faulty manufacture, and the radioactive material otherwise is exposed; or magnesium-thorium alloy is worked mechanically or thermally in any way to produce dust or fumes. Precautions contained in this bulletin should be observed in usage, handling, bulk storage, and disposal of radioactive items. All radioactive items are used on Army aircraft under the authority of US Nuclear Regulatory Commission (NRC) licenses and Department of Army authorization issued to Commander, US Army Troop Support and Aviation Materiel Readiness Command (TSARCOM). Information concerning specific items is as follows:

a. Instruments covered by this bulletin contain radium (Ra-226), promethium (Pm-147), or tritium (H-3). These isotopes emit radiation which impinges on phosphorescent pigments to produce light. Promethium or tritium exciters are specified for new procurement of self-luminous instruments. If self-luminosity is not required, the radioactive components are being replaced with nonradioactive components.

b. Ignition exciter units covered by this bulletin contain one to five microcuries of cesium 137 or krypton 85 which emit beta gamma radiation.

c. Some aircraft parts and assemblies, such as engine housings, gearbox housings, and bearing supports, are made of magnesium-thorium alloy. The thorium (natural) (TH-227, 228, 229, 230, 232) emits alpha and gamma radiation. The alloy is used for high temperature applications. This alloy is made of thorium oxide (thoria), a refractory oxide dispersed in magnesium, which can withstand heat without physical damage. The external alpha and gamma radiation from an alloy containing less than 4% thorium is not considered a health hazard; but when alpha particles enter the body by inhalation, ingestion, or through an open wound, a health hazard may result. Repeated exposure to dust or fumes from grinding, welding, or similar operations with thorium alloys can be harmful to the body.

NOTE

Thorium alloys should not be machined until the operating procedures in section II are understood and followed.

d. Aircraft engines or commodities containing thorium alloys will not be released to a contractor for overhaul or repair until it is ascertained that the contractor is capable of performing the operation safely without creating a health hazard to his employees. The contract shall state that the aircraft engines or commodities (exact part noted) contain thorium alloys and what safety cautions to exercise. Copies of this bulletin must be furnished with the contract to the contractor.

e. Table 1 lists current items containing or suspected of containing radioactive material, such as radium (Ra-226), promethium (Pm-147), or tritium (H-3). It also lists current assemblies of T-53, T-55, and T-63 engines suspected of containing radioactive material, such as magnesium-thorium (natural) (TH-227, 228, 229, 230, and 232) alloy.

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
1560-00-022-9002	None	Marker, Self Luminous	Kr 85	50 mCi	B17	*9905-00-089-6286
1660-00-244-1774	None	Scroll Assembly	Th(nat.)	2%	B17	*2840-00-244-1774
1660-00-940-9414	None	Scroll Assembly	Th(nat.)	2%	B17	*2840-00-244-1774
2840-00-107-4543	None	Housing Assembly	Th(nat.)	2%	B17	*2840-00-187-5726
2840-00-134-4739	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-187-5726	None	Case, Compressor	Th(nat.)	2%	B17	
2840-00-198-8644	None	Support Assy, Rear	Th(nat.)	2%	B17	
2840-00-220-5289	None	Support Bearing, Shaft	Th(nat.)	2%	B17	
2840-00-229-6682	None	Housing Assembly Inlet	Th(nat.)	2%	B17	
2840-00-244-1774	None	Scroll Assembly	Th(nat.)	2%	B17	
2840-00-247-0425	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-314-7874	None	Case Compressor, Rot.	Th(nat.)	2%	B17	*2840-00-187-5726
2840-00-677-1732	None	Housing Assembly	Th(nat.)	2%	B17	*2840-00-134-4739
2840-00-739-6925	None	Housing, Gearbox	Th(nat.)	2%	B17	
2840-00-766-8625	None	Housing, Gearbox	Th(nat.)	2%	B17	*2840-00-789-7805
2840-00-779-4165	None	Housing, Inlet, Turbine	Th(nat.)	2%	B17	2840-00-937-5617
2840-00-789-7805	None	Housing Reduction	Th(nat.)	2%	B17	
2840-00-860-7459	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-860-9503	None	Housing Studding	Th(nat.)	2%	B17	
2840-00-886-6018	None	Carrier & Gear Assy	Th(nat.)	2%	B17	
2840-00-902-4637	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-902-4644	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-915-5932	None	Cover Front Housing	Th(nat.)	2%	B17	*2840-00-954-6117
2840-00-924-8635	None	Cover & Gear Assembly	Th(nat.)	2%	B17	*2840-00-915-2864
2840-00-925-3299	None	Adapter Assembly	Th(nat.)	2%	B17	
2840-00-925-4186	None	Housing Assy Inlet	Th(nat.)	2%	B17	
2840-00-937-5617	None	Housing, Inlet Turbine	Th(nat.)	2%	B17	*2840-00-779-4165
2840-00-940-9414	None	Scroll Assembly	Th(nat.)	2%	B17	*2840-00-244-1774
2840-00-954-6117	None	Cover Front Housing	Th(nat.)	2%	B17	
2840-00-957-2864	None	Carrier & Gear Assy	Th(nat.)	2%	B17	

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material (Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
2840-00-975-0253	None	Housing Assembly	Th(nat.)	2%	B17	
2840-00-976-9302	None	Housing Reduction	Th(nat.)	2%	B17	*2840-00-789-7805
2840-00-980-9471	None	Support Assy Front	Th(nat.)	2%	B17	
2915-00-976-9308	None	Adapter Assy, Bleed	Th(nat.)	2%	B17	
2925-00-064-9435	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	
2925-00-444-1186	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	
2925-00-856-7562	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	*2925-00-064-9435
2925-00-939-5285	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	*2925-00-444-1186
2925-00-950-2516	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	
2925-00-972-8180	None	Exciter, Ignition/Igniter	Cs 137 or Kr 85	5.0 uCi	B17	*2925-00-064-9435
5960-00-967-3406	OA2	Electron Tube (Ray)	Co-60	0.2 uCi	B17	
6605-00-055-7658	None	Tester, Master Compass	H3	50,000 uCi	A-12	*6605-00-129-6330
6605-00-129-6330	None	Tester, Master Compass	H3	50,000 uCi	A12	
6605-00-807-2969	None	Tester, Master Compass	H3	50,000 uCi	A-12	*6605-00-129-6330
6605-00-515-5637	None	Compass, Magnetic	Suspect Ra226	00.0004 uCi	B17	
6605-00-526-7252	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	*6605-00-551-8187
6605-00-551-8187	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	AF	
6605-00-663-8511	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	
6605-00-663-8512	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	
6605-00-663-8514	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	
6605-00-663-8523	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	
6605-00-663-8526	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	*6605-00-551-8187
6605-00-805-4165	None	Compass, Magnetic	Suspect Ra226	1-15 uCi	B17	
6610-00-111-3159	None	Indicator, Vertical	Suspect Ra226	.002 uCi	B17	
6610-00-169-1489	None	Indicator, Turn & Bank	Suspect Ra226	1-15 uCi	B17	
6610-00-190-1377	None	Indicator, Altitude	Suspect Ra226	.02 uCi	B17	
6610-00-190-1378	None	Indicator, Altitude	Suspect Ra226	0.032 uCi	B17	

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material(Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
6610-00-190-1379	None	Indicator, Altitude	Suspect Ra226	04 uCi	B17	
6610-00-190-1382	None	Indicator, Altitude	Suspect Ra226	0.045 uCi	B17	
6610-00-190-1384	None	Indicator, Altitude	Suspect Ra226	006 uCi	B17	(* 6610-00-190-1378)
6610-00-190-1386	None	Indicator, Altitude	Suspect Ra226	8.0 uCi	B17	(* 6610-00-190-1392)
6610-00-190-1425	None	Indicator, Vertical	Suspect Ra226	0.027 uCi	B17	
6610-00-213-8544	None	Pointer & Pivot Assy	Suspect Ra226	1-15 uCi	B17	
6610-00-222-1392	None	Indicator, Altitude	Suspect Ra226	0.2 uCi	B17	
						(*6610-00-190-1378)
6610-00-222-1393	None	Indicator, Altitude	Suspect Ra226	0.077 uCi	B17	(* 6610-00-190-1382) (* 6610-00-222-1392)
6610-00-222-3986	None	Indicator, Direction	Suspect Ra226	0.039 uCi	B17	*6610-00-224-3915
6610-00-222-3987	None	Indicator, Direction	Suspect Ra226	0.060 uCi	B17	*6610-00-224-3915
6610-00-222-3988	None	Indicator, Direction	Suspect Ra226	0.075 uCi	B17	*6610-00-224-3915
6610-00-222-3989	None	Indicator, Direction	Suspect Ra226	0.0006 uCi	B17	*6610-00-224-3915
6610-00-224-1278	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-224-3915	None	Altimeter, Pressure	Suspect Ra226	0.032 uCi	B17	
6610-00-224-8820	None	Indicator, Altitude	Suspect Ra226	44.0 uCi	B17	*6610-00-224-3915
6610-00-232-9475	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-232-9485	None	Altimeter, Pressure	Suspect Ra226	0.48 uCi	B17	
6610-00-241-0732	None	Indicator, Airspeed	Suspect Ra226	2.2 uCi	B17	
6610-00-247-9350	None	Indicator, Turn	Suspect Ra226	0.02 uCi	B17	*6610-00-169-1489
6610-00-251-0366	None	Altimeter, Pressure	Suspect Ra226	0.0003 uCi	B17	6610-00-179-5242
6610-00-251-0374	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-255-2713	None	Indicator, Altimeter	Suspect Ra226	.01 uCi	B17	
6610-00-388-0030	None	Altimeter, Pressure	Suspect Ra226	0.004 uCi	B17	6610-00-179-5242
6610-00-388-0048	None	Indicator, Altitude	Suspect Ra226	0.001 uCi	B17	*6610-00-738-2571
6610-00-388-0049	None	Indicator, Altitude	Suspect Ra226	0.007 uCi	B17	*6610-00-738-2571
6610-00-388-0068	None	Indicator, Turn & Slip	Suspect Ra226	14.0 uCi	B17	*6610-00-169-1489
6610-00-398-0059	None	Indicator, Turn & Slip	Suspect Ra226	0.002 uCi	B17	
6610-00-514-4178	None	Altimeter, Pressure	Suspect Ra226	.005 uCi	B17	
6610-00-514-4183	None	Altimeter, Pressure	Suspect Ra226	.005 uCi	B17	6610-00-179-5242
6610-00-514-4953	None	Indicator, Altimeter	Suspect Ra226	0.004 uCi	B17	*6610-00-738-2571

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material (Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
6610-00-514-6171	None	Indicator, Direction	Suspect Ra226	0.23 uCi	B17	*6610-00-224-3915
6610-00-515-5249	None	Indicator, Directional, Gyro	Suspect Ra226	0.026 uCi	B17	*6610-00-224-3915
6610-00-515-5393	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-515-5824	None	Indicator, Altitude	Suspect Ra226	0.0005 uCi	B17	*6610-00-738-2571
6610-00-515-5843	None	Indicator, Turn & Slip	Suspect Ra226	1.5 uCi	B17	*6610-00-169-1489
6610-00-515-5845	None	Indicator, Turn & EP	Suspect Ra226	004 uCi	B17	*6610-00-169-1489
6610-00-515-5846	None	Indicator, Turn & EP	Suspect Ra226	1-15 uCi	B17	
6610-00-515-5847	None	Indicator, Turn & EP	Suspect Ra226	1-15 uCi	B17	
6610-00-526-4716	None	Indicator, Turn	Suspect Ra226	0.003 uCi	B17	*6610-00-169-1489
6610-00-526-4717	None	Indicator, Altitude	Suspect Ra226	006 uCi	B17	*6610-00-738-2571
6610-00-526-4785	MS28044- 61A	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-526-4794	None	Indicator, Turn & EP	Suspect Ra226	1-15 uCi	B17	
6610-00-526-5761	None	Altimeter, Pressure	Suspect Ra226	0.050 uCi	B17	
6610-00-526-5913	None	Indicator, Altitude	Suspect Ra226	0.01 uCi	B17	*6610-00-738-2571
6610-00-526-6028	None	Indicator, Turn & EP	Suspect Ra226	03 uCi	B17	
6610-00-526-6082-	None	Altimeter, Pressure	Suspect Ra226	026 uCi	B17	
6610-00-526-6083	None	Altimeter, Pressure	Suspect Ra226	03 uCi	B17	
6610-00-526-6085	None	Altimeter, Pressure	Suspect-Ra226	01 uCi	B17	
6610-00-526-6765	None	Indicator, Altitude	Suspect Ra226	001 uCi	B17	*6610-00-738-2571
6610-00-530-0028	None	Indicator, Vertical	Suspect Ra226	001 uCi	B17	
6610-00-551-0358	None	Altimeter, Pressure	Suspect Ra226	32 uCi	B17	
6610-00-557-0891	None	Indicator, Position	Suspect Ra226	1-15 uCi	AF	
6610-00-557-3101	None	Indicator, Altitude	Suspect Ra226	006 uCi	B17	*6610-00-738-2571
6610-00-557-3114	None	Indicator, Turn	Suspect Ra226	002 uCi	B17	
6610-00-557-3406	None	Indicator, Altitude	Suspect Ra226	06 uCi	B17	
6610-00-557-3410	None	Indicator, Vertical	Suspect Ra226	1-15 uCi	B17	
6610-00-566-9684	None	Altimeter, Pressure	Suspect Ra226	17 uCi	B17	
6610-00-585-1145	None	Indicator, Turn	Suspect Ra226	1-15 uCi	B17	*6610-00-169-1489

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material (Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
6610-00-641-3015	None	Indicator, Altitude	Suspect Ra226	002 uCi	B17	*6610-00-738-2571
6610-00-663-4115	None	Indicator, Turn	Suspect Ra226	02 uCi	B17	
6610-00-663-4132	None	Indicator, Turn	Suspect Ra226	1-15 uCi	B17	
6610-00-663-4136	None	Indicator, Turn	Suspect Ra226	004 uCi	B17	*6610-00-169-1489
6610-00-663-4138	None	Indicator, Vertical	Suspect Ra226	009 uCi	B17	
6610-00-663-4153	None	Indicator, Vertical	Suspect Ra226	002 uCi	B17	
6610-00-663-4156	None	Indicator, Vertical	Suspect Ra226	016 uCi	B17	
6610-00-663-8798	None	Indicator, Altitude	Suspect Ra226	001 uCi	B17	*6610-00-738-2571
6610-00-663-8800	None	Indicator, Altitude	Suspect Ra226	003 uCi	B17	*6610-00-738-2571
6610-00-663-8812	None	Indicator, Altitude	Suspect Ra226	001 uCi	B17	*6610-00-738-2571
6610-00-663-8813	None	Indicator, Altitude	Suspect Ra226	004 uCi	B17	*6610-00-738-2571
6610-00-691-0874	None	Altimeter, Pressure	Suspect Ra226	001 uCi	B17	6610-00-179-5242
6610-00-726-0247	None	Indicator, Indicating EP	Suspect Ra226	1-15 uCi	AF	*6610-00-133-7749
6610-00-738-2571	None	Indicator, Altitude	Suspect Ra226	001 uCi	B17	
6610-00-752-8632	None	Indicator, Trim Control	Suspect Ra226	1-15 uCi	B17	
6610-00-774-5656	None	Altimeter, Pressure	Suspect Ra226	003 uCi	B17	*6610-00-179-5242
6610-00-779-0728	None	Indicator, Altitude	Suspect Ra226	04 uCi	B17	
6610-00-804-2701	None	Indicator, Directional	Suspect Ra226	1-15 uCi	B17	*6610-00-224-3915
6610-00-826-7236	None	Indicator, Altitude	Suspect Ra226	1-15 uCi	B17	
6610-00-833-1232	None	Indicator, Vertical	Suspect Ra226	1-15 uCi	B17	
6610-00-892-5560	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	*6610-00-930-1249
6610-00-930-1249	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	
6610-00-933-5621	None	Point & Pivot Assembly	Suspect Ra226	1-15 uCi	B17	
6610-00-963-5783	None	Altimeter, Pressure	Suspect Ra226	1-15 uCi	B17	6610-00-179-5242
6620-00-179-1886	None	Indicator, Pressure	Suspect Ra226	1-15 uCi	B17	
6620-00-221-4914	None	Gage, Pressure, Dial	Suspect Ra226	0.31 uCi	B17	
6620-00-557-0267	None	Gage, Pressure	Suspect Ra226	001 uCi	AF	
6620-00-557-0405	None	Gage, Pressure, Dial	Suspect Ra226	1-15 uCi	B17	
6620-00-557-0582	None	Indicator, Pressure	Suspect Ra226	1-15- uCi	B17	6620-00-179-1886
6620-00-663-5844	None	Gage, Fuel, Pressure	Suspect Ra226	1-15 uCi	B17	

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material (Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
6620-00-757-1950	None	Gage, Pressure, Dial	Suspect Ra226	1-15 uCi	B17	
6620-00-772-5682	None	Indicator, Pressure	Suspect Ra226	1-15 uCi	B17	
6620-00-978-9560	None	Indicator, Pressure	Suspect Ra226	0.74 uCi	B17	
6680-00-609-8088	None	Indicator, Electrical	Suspect Ra226	1-15 uCi	B17	
6685-00-514-5327	None	Indicator, Temperature	Suspect Ra226	1-15 uCi	DGSC	
6685-00-514-5328	None	Indicator, Temperature	Suspect Ra226	.001 uCi	DGSC	
6685-00-515-5363	None	Thermometer, Indicating	Suspect Ra226	0.8 uCi	DGSC	
6685-00-557-0370	None	Indicator, Temperature	Suspect Ra226	1-15 uCi	DGSC	
6685-00-557-0373	None	Indicator, Temperature	Suspect Ra226	1-15 uCi	DGSC	
6685-00-557-5316	None	Thermometer, Self Indicating	Suspect Ra226	1-15 uCi	DGSC	
6685-00-640-9291	None	Indicator, Thermometer	Suspect Ra226	1-15 uCi	DGSC	
6930-00-099-9673	None	Simulator, Gyro Heading, Ind.	Suspect Ra226	.05 uCi	B17	
6930-00-301-0747	None	Indicator, Fuel Gage	Suspect Ra226	1-15 uCi	B17	
6930-00-322-6393	None	Indicator, Air Speed	Suspect Ra226	1-15 uCi	B17	
6930-00-396-6065	None	Indicator, Tachometer	Suspect Ra226	1-15 uCi	B17	
6930-00-443-9878	None	Indicator Fuel Pressure	Suspect Ra226	1-15 uCi	B17	
6930-00-497-8140	None	Indicator Oil Pressure	Suspect Ra226	1-15 uCi	B17	
6930-00-497-8143	None	Indicator, Oil Pressure	Suspect Ra226	1-15 uCi	B17	
6930-00-497-8145	None	Indicator, Suction Gage	Suspect Ra226	1-15 uCi	B17	
6930-00-512-2147	None	Indicator, Sensitive	Suspect Ra226	.002 uCi	B17	
6930-00-532-9229	None	Indicator, Vertical	Suspect Ra226	.007 uCi	B17	
6930-00-532-9235	None	Indicator, Radio	Suspect Ra226	.002 uCi	B17	
6930-00-613-4017	None	Indicator, Turn & Bank	Suspect Ra226	1-15 uCi	B17	
6930-00-613-4026	None	Indicator, Crosspointer	Suspect Ra226	.001 uCi	B17	6930-00-166-0229
9905-00-089-6286	None	Marker, Self-Luminous	H 3	40,000	B17	9905-00-617-7708
9905-00-178-5841	None	Marker, Self-Luminous	H 3	4,000,000	B17	9905-00-954-1238
9905-00-617-7708	None	Marker, Self-Luminous	H 3	40,000	B17	

Table 1. Listing of Items Containing or Suspected of Containing Radioactive Material (Continued)

National Stock Number	Type	Item Description	Isotope	Activity	NICP	NEW NSN - REPLACEMENT
9905-00-672-2192	None	Marker, Self-Luminous	H 3	40,000	B17	
9905-00-878-9153	None	Marker, Self-Luminous	H 3	40,000	B17	*9905-00-672-2192
9905-00-954-1238	None	Marker, Self-Luminous	H 3	4,000,000	GAO	

*Replacement item may be radioactive.

NOTES:

1. Instruments listed as suspect Ra226 may have radium paint on pointers and dials.
2. NSN 9905 Markers, Self-Luminous NICP, B17 have been phased out of the Army supply system.
3. The NICP Codes and abbreviations used in this table are explained as follows: A-12, formerly TROSCOM, now TSARCOM; B17, formerly AVSCOM, now TSARCOM; AF, Air Force; DGSC, Defense General Supply Center.

Section II. OPERATING PROCEDURES

5. Handling and Processing.

The following rules will be observed by personnel engaged in handling, storing, installing, or processing markers, instruments, and exciter units; or sanding, grinding, welding, casting, drilling, milling, or sawing of magnesium-thorium alloy.

- a. Initially, prior to performing any of the above operations, the RPO must inspect the work area and give written permission.
- b. Personnel will be instructed in safe work practices, the hazards involved, and how to guard against hazards.
- c. Areas where the above operations are performed will be surveyed periodically for radiation with appropriate survey instruments, such as an AN/PDR27 or AN/PDR-60 radiometer or equivalent. Records of these surveys, including corrective action, will be maintained.
- d. Persons under 18 years old, females known to be pregnant, and persons having cuts, abrasions, or open sores will not be permitted to enter or work in the controlled area.
- e. Film badges will be worn by all personnel entering the controlled area.
- f. Storage or use of food, beverages, tobacco, and cosmetics in area where radioactive items are stored or processed is prohibited.
- g. Personnel will not tamper with radioactive items or deliberately expose the radioactive materials in any way.

WARNING

If an item is broken or becomes unsealed, immediately notify the RPO who will advise of proper follow-up actions. Avoid personal contact with contaminated items. If the item must be moved prior to arrival of the RPO use forceps. Place the material in a plastic bag, seal the bag, and dispose of it as radioactive waste in accordance with AR 755-15 and TM 3-261. Do not stir up dust, as this may cause the radioactive material to permeate the atmosphere. Although the amount of radioactive material in the atmosphere is negligible, it is preferred that no radioactive material be inhaled. Decontamination of the area should be in accordance with TM 3-220.

- h. Defective instruments or exciter units not listed as repairable in the applicable manual will be disposed of as radioactive waste in accordance with AR 755-15 and TM 3-261. Defective units listed as repairable in the applicable manual will be shipped to installations authorized in AR 700-52 to perform repair in accordance with TB MED 232.
- i. Personnel will not carry radioactive items in pockets of their clothing.
- j. Persons who handle defective or broken items should be monitored prior to leaving the controlled area (TM 3-261 and TB MED 232). If contaminated, the hands, skin, and nails will be cleaned and scrubbed. Monitoring will be accomplished with an ultraviolet light and a radiometer (AN/PDR-27 for Pm-147, AN/PDR-54 or AN/PDR-60 for Ra-226, or equivalent). An equivalent instrument should be capable of detecting the presence of 100 dpm/100 cm² alpha, beta, or gamma radiation (one microcurie equals 2.22 x 10⁶ disintegrations per minute (dpm)). The survey meters will be used with earphones to permit aural indication to supplement needle response. Since tritium should be measured by liquid scintillation counting techniques which are unavailable to most Army installations, the ultraviolet light is used to indicate contamination by tritium-activated paint. The ultraviolet light should be used in a dimly lit area. It will identify contamination by causing the tritium paint to glow. Clothing may be reworn if contamination levels do not exceed permissible limits shown in table 2. Clothing suspected of being contaminated with tritium will be removed as soon as contamination occurs. Special laundry facilities are required for contaminated protective clothing if contamination levels exceed permissible limits shown in table 2.
- k. If an individual is found to be contaminated, he will be accompanied to a decontamination area by another individual with an appropriate radiometer (TM 3-261). The second

Table 2. Radioactive Contamination Guides.

	Fixed or Removable	Contamination Level				Method of Measurement
		Alpha Dpm per 100 cm ²	Alpha Dpm per 100 cm ²	Beta-gamma 1/ mr/hr @ 1 In.	Beta-gamma 1/ Dpm per 100 cm ²	
1. Clothing, including shoes:						
a. Personal. Should be replaced, decontaminated or stored for decay if above.	F R	200	None	0.2	None	Probe Smear**
b. Anti-contamination.						
(1) General. Should be replaced and/or decontaminated if above.	F R	1000	200	0.2	1000	Probe Smear**
(2) Laundry. Should not be released to public laundry if above.	F R	200	50	0.2	200	Probe Smear**
(3) Respirators. Should be decontaminated after use if above.	F R	200	None	1.0	None	Probe Smear**
2. Containers. Prior to non-radioactive use, should be decontaminated if above.	F R	200	None	0.2	100	Probe Smear**
3. Laboratories and Work Areas:						
a. Uncontrolled Area. Require controls and posting or decontamination if above.	F R	200	20	0.20	100	Probe Smear**
b. Controlled Areas:						
(1) Hoods	F R	1000	200	2.0	2000	Probe Smear**
(2) Glove Boxes	F R	5000	1000	2.5	5000	Probe Smear**
(3) Work Bench Surface	F R	1000	200	0.5	400	Probe Smear**
4. Skin:						
a. Body. Continue decontamination if above.	F R	200	None	0.06	None	Probe Smear**
b. Hands. Continue decontamination if above.	F R	400	None	0.06	None	Probe Smear**
5. Equipment***						
a. Used in controlled area. Should be decontaminated if above.	F R	5000	1000	2.0	10,000	Probe Smear**
b. Used in non-controlled area. Should be decontaminated above.	F R	500	100	0.2	1000	Probe Smear**

1/ Measured through not more than 7 milligrams per square centimeter of total absorber and averaged over not more than 1 square meter.

F Fixed
R Removable

* In contact with any outside surface of the mask.

** Smears analyzed with a calibrated counting system.

*** For U natural, U depleted, and U 238, levels for alpha contamination should be increased by a factor of 10.

individual will monitor the contaminated individual for decontamination progress and effectiveness.

l. If an individual receives a cut or skin abrasion while handling any radioactive item, or if radioactive material is inhaled or ingested, the medical officer will be given complete information as to radioisotope involved and conditions of exposure. See paragraph 9 for first aid instructions.

m. The local RPO will assure that instruments or markers are handled in a well-ventilated, controlled, area and that either he or a designated assistant will be present during handling operations.

n. Appropriate forms and signs required by AR 385-30 and AR 700-64 will be posted, and non-radiation workers will be denied access to the controlled area. The forms and signs include NRC Form 3 (Notice to Employee) and signs reading Caution Radioactive Material and Caution Radiation Area. NRC Form 3 may be obtained from US Nuclear Regulatory Commission (NRC), formerly US Atomic Energy Commission (AEC), Division of Materials Licensing, Washington, D.C., 20545.

o. The local RPO is responsible to the commander for radiological control and may implement requirements in addition to those stated above to insure adequate protection of personnel. He will inform all personnel who handle devices containing radioactive material of all changes to this bulletin or to local procedures.

p. The pickup of radioactive material will be accomplished as soon as practicable (within two or three hours) after receiving notification by the carrier that the material is available. A package arriving at the consignee facility during duty hours must be monitored for excessive leakage and contamination within three hours (monitoring at time of receipt is preferred). Packages arriving during non-duty hours must be monitored within 18 hours of receipt (monitoring at time of receipt is preferred). Each package must be monitored inside and out while it is being opened and before the packaging of the contents are moved away from the unpacked location. Only special weapons in packages containing radioactive material are exempt from the monitoring procedure. Also, all personnel involved in the monitoring procedure will be trained and have the proper equipment for monitoring the package.

6. Specific Processing of Magnesium-Thorium Alloy.

a. Machining or chemical testing of magnesium-thorium alloy in CONUS will be performed only by Army installation or contractors who possess an NRC source materials license. These same operations will be performed outside the United States or possessions only by Department of Army authorization.

b. Maintenance or manufacturing operations involved with drilling, filing, buffing, grinding, or sawing etching and etc., of magnesium-thorium alloy must follow procedures that control air contamination to eliminate possibility of breathing or ingesting magnesium-thorium particles and to prevent internal alpha particle contamination. Maximum permissible contamination of inanimate objects is shown-in table 2. See paragraph 5d.

c. Ventilation requirements for welding operations should be in accordance with American National Standards Institute (ANSI) Standard 249.1, Safety in Welding and Cutting. Welding ventilation duct should be four to six inches from the weld and exhaust at least 100 linear feet of air per minute.

d. Workers fabricating, machining, or performing similar operations, on magnesium-thorium alloy will observe the following work rules in addition to normal safe practices required for handling magnesium.

(1) Adhere to good hygienic practices, such as washing hands and face before eating or smoking.

(2) Do not scatter dust or filings during the operation on magnesium. Magnesium machining operations normally are done without a coolant or lubricant. If a coolant is used, a trap must be installed in the coolant recirculating system for collection of magnesium-thorium particles. Collected material in the trap must be disposed of before machining another metal. Clean up the chips with a brush and pan. Chips should be placed in a suitable, marked, covered, steel drum (MILSTD-1458) and disposed of in accordance with AR 755-15 and TM 3-261.

(3) Areas where alloys are to be processed will be well ventilated. A suitable respirator should be used if dust or fine particles cannot be eliminated. A dusty environment is a fire hazard and, therefore, a wet collector should be utilized.

Residue in dust collectors should be collected for ultimate disposal in accordance with AR 755-15 and TM 3-261.

(4) Aprons and clothing, including caps, should not have areas that may act as collection traps, e.g., trouser cuffs. At the end of the workday, aprons, clothing, and shoes should be vacuumed to remove magnesium-thorium residue. Be sure vacuum cleaners are filtered properly. Residue should be collected for ultimate disposal in accordance with AR 755-15 and TM 3-261.

(5) At the end of the workday or termination of operation on magnesium-thorium alloy, the machines, tools, and work area must be cleaned with brushes or wiped clean with rags. All rags and sweeping residue will be deposited in a suitable, marked, covered, Pteel drum (MIL STD-1458) and ultimately will be disposed of in accordance with AR 755-15 and TM 3-261. TM 3220 gives guidance on radiological decontamination.

e. Shops actively processing magnesium-thorium alloy and waste holding areas will be surveyed at least every month with an AN/PDR-60 survey meter. As a minimum, bench tops, floor around and under work benches, and any machines having large horizontal flat surfaces will be monitored. This is intended as a measure of airborne contamination deposited during the workday. Limits are shown in table 2.

7. Storage.

a. Items containing radium (Ra-226), promethium (Pm-147), or tritium (H-3) will be stored in controlled, ventilated, areas (continuous exchange of inside and outside air). Storage area temperature shall not exceed 1550F.

b. All radioactive items will be separated by at least one warehouse section (the area between two firewalls) from flammable materials and photographic film. Flammable materials are those with flash points of 140°F or less.

c. Film badges will be worn by all personnel entering storage area.

d. Eating, drinking, smoking, or use of cosmetics will be prohibited

e. Storage area will be marked as required by paragraph 5n.

f. Preservation, packing, marking, and quality control inspection will be carried out in storage area. Packaging and marking of items being reshipped will be at least equal to that for new items.

g. Devices containing sealed sources of radioactive material will remain packaged, marked, and packed while in storage. Packages and items will be marked in accordance with MIL STD-1458.

h. Written procedures will be published to restrict access to the area, to establish maximum occupancy times, and to set forth radiation precautionary measures.

i. On all floors where unsealed sources of radioactive items are stored the floors should have a smooth, crack-free, unbroken, surface that can be decontaminated easily.

j. Magnesium-thorium alloy is stored for both fire and radiation hazards. The National Fire Codes, Volume III, give storage guidance for control of fire hazard. Normally, there is no radiation problem until the alloy is fabricated or machined. Magnesium-thorium alloy should be restricted to ground floor level, void of a basement or room below the floor level. Magnesium thorium alloy in storage should be isolate from combustible material. All parts placed in storage should be clean and free from chips or fine particles. Partial storage area should be limited to 1250 cubic feet in any one warehouse section.

k. The room for storage should have appropriate forms and signs required by AR 385-30 and AR 700-64. Chips and dust should not be mixed with regular floor sweepings. Scraps should be stored in clean, steel, drums with rounded edges to accommodate covers marked with radiation signs in accordance with MIL-STD-1458 and stenciled with letters magnesium-thorium. Chips should be free from water or coolants containing fatty acids. Moisture and oxidizing agents with magnesium present dangerous fire and explosive hazards. Scrap containers should be collected daily and transported to a fire-resistant building that has explosion vents equal in area to at least one square foot for each 5 cubic feet, by room volume.

l. Radiation surveys of storage area will be conducted at quarterly intervals or upon receipt of shipment of radioactive items. TM 3-220 gives guidance on radiological decontamination, and AR 755-15 gives disposal procedures for defective radioactive items and contaminated waste. In case of extensive contamination or

other radiation problems which cannot be resolved locally, obtain additional guidance from RPO, US Army Troop Support and Aviation Materiel Readiness Command. Personnel will avoid direct contact with radioactive luminous material. Gloves, coveralls, and respiratory protective equipment will be worn.

m. Additional information can be found in Tables 3 and 4.

8. Disposal.

a. Disposal in CONUS.

(1) Unserviceable radioactive items will be disposed of in accordance with AR 755-15 and TM 3-261. Local disposal of items is not authorized except in combat zones.

(2) Surplus radioactive items will be reported to Safety Office, US Army Troop Support and Aviation Materiel Readiness Command, to prevent shipment to unauthorized personnel.

(3) Uninstalled items (components, parts, assemblies) containing radioactive material should not be sold or donated unless specifically authorized by the DARCOM Safety Office in accordance with AR 700-52. Damaged items will be removed from aircraft that are transferred or sold to non-Army agencies.

(4) Packaging and marking of items being disposed of will be at least equal to that for new items. If radioactive material is exposed, carefully wrap these items, seal all joints in wrapping, and package or seal in a plastic bag to insure no leakage.

(5) If quantity of damaged items or exposed material is such that the RPO deems it inadvisable to wrap units individually, it should be placed in a labeled, sealed, container and stored in an isolated area. Contact Aviation and Safety Office, US Army Troop Support and Aviation Materiel Readiness Command, for guidance.

b. Disposal in Areas of Combat. In combat, Army units are authorized to use the most expeditious means of disposal, including abandonment, for all radioactive items covered by this bulletin. Use of fire is recommended to destroy items containing tritium (H-3). To facilitate decontamination when the area is recovered, commanders will record location and action taken in an appropriate report to higher headquarters.

c. Disposal in Combat Zones. Combat zone commanders may elect to dispose of unwanted radioactive material by one of the following methods: (1) Establishment of a radioactive material disposal facility to process radioactive material for ultimate disposal in accordance with AR 75515 and TM 3-261 or the host nation's regulations.

(2) Transfer to an Army radioactive material disposal facility outside the combat zone.

9. Emergency Procedures.

Installations and activities storing more than 500 instruments or 100 exciter units within a building will prepare written emergency procedures. The RPO will keep key emergency personnel currently informed on procedures, storage sites, and quantities stored at each location. Emergency procedures should be tested at least once each year.

a. Fire or Explosion in Storage or Controlled Work Areas.

(1) Notify the RPO and fire department immediately.

(2) Wear self-contained breathing apparatus while in inclosed areas or remain upwind of the fire.

(3) Use carbon dioxide to prevent widespread contamination, which would result if water were the extinguishing agent. If water is necessary, it should be used as fog. Approved dry powder chemical should be used on magnesium-thorium fires.

(4) Keep persons not engaged in fire-fighting or rescue work upwind and at least 100 yards from the scene.

(5) Prohibit entry into the area, except for rescue purposes or other valid reasons. The area should be roped off 100 feet from the debris fallout perimeter. Those entering the area during a fire should wear self-contained breathing apparatus.

(6) Monitoring by the RPO for contamination will assure that emergency workers and equipment are protected.

(7) Declare the area off limits and have it surveyed by the RPO immediately after an explosion or after the fire has been extinguished.

Table 4. TSARCOM Aviation Items.

Isotope and Activity	Storage Criteria			
	Maximum Items/1000 Cu Ft		Maximum Items/Storage Area	
	Unrestricted Area	Controlled Area	Unrestricted Area	Controlled Area
1. Aircraft Instruments				
Ra-226=less 1 uCi	10		15,000	100,000
=1-3 uCi	10		6,000	50,000
=15 uCi	4		400	7,000
*Store in ventilated area				
2. Engine exciters (Spark Gaps)				
CS-137=1-5 uCi	10		6,000	50,000
Kr-85=1-5 uCi	10		6,000	50,000

*Store in ventilated area

3. Magnesium-thorium alloy Hardware

Maximum storage 120.0 lbs. - Protect against magnesium fires or reactions with noncompatible chemicals and solvents.

*NOTE: Ventilated by a direct exchange of inside and outside air. Cross ventilation for at least one hour each workday. Forced ventilation may be used.

He will advise on radiological safety aspects of follow-up action.

b. First Aid Instruction. The following instructions are to be used for treating wounds caused by an item containing radioactive material, providing essential medical treatment will not be delayed or hindered.

(1) If the wound is a small cut or puncture, wash the wound with large amounts of clean water. Allow the wound to bleed freely for a short time, then place a small bandage over the wound.

(2) If the wound is a large cut or puncture, place a large absorbent bandage over the wound and evacuate the injured person to a medical facility. Monitoring for contamination from alpha or beta material in a wound that is bleeding or is 2 to 6 millimeters deep is not feasible. The bandage placed on this kind of wound should not be tight enough to stop the bleeding, unless it is arterial bleeding, which would be recognized by a squirting of blood from the wound, or involves a large area with rapid blood loss. These kinds of bleeding should be stopped with a normal pressure bandage.

(3) All such wounds should be bandaged, and the individual should be seen by a physician. The physician must be advised of the type of radioactive material that may be in the wound.

(4) In case of radioactive contamination of eye, nose, or mouth, prompt repeated rinsing with tap water should be performed by the usual techniques for contamination of the eye or mouth. The nose may be rinsed by alternately snuffing water from the cupped hand and then blowing and spitting it out.

(5) In case of an accident in which external radioactive contamination of personnel occurs, decontamination should be effected at the scene, if feasible. Procedures intended to save life or relieve undue suffering are not to be delayed. In these instances, decontamination procedures take second priority.

(6) All persons suspected of internal contamination with radioactive material after appropriate decontamination should be evacuated to a medical facility where appropriate medical evaluation may be obtained at the earliest practical time.

c. Notification. Within 24 hours of a fire, explosion, injury, or incident involving instruments containing radioactive material, the installation shall notify Commander, US Army Troop Support and Aviation Materiel Readiness Command, by electrical means of circumstances and actions taken. The notification has been determined exempt from reports control under paragraph 7-20, AR 335-15.

Section III. ADMINISTRATION AND SUPPORT

10. Records.

a. Disposal records will be maintained by each Army radioactive material disposal facility and furnished to Commander, US Army Troop Support and Aviation Materiel Readiness Command, when requested.

b. The RPO will maintain a current inventory of radioactive materials and physically will inventory all radioactive materials in accordance with AR 700-52 and AR 70044.

11. Radiation Control and Safety.

a. Guidance and assistance may be obtained from the local RPO or through channels from Safety Office, US Army Troop Support and Aviation Materiel Readiness Command.

b. The following radiation incidents will be reported to Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-XS, 4300 Goodfellow Blvd., St. Louis, MO 63120. telephone 314-2685473, AUTOVON 698-5473; non-duty hours telephone 314-263-2066.

(1) Exposure to personnel in excess of the limits established by AR 40-14 for and Code of Federal Regulations, title 10, part 20, for internal exposure. external exposure (2) Loss of one day or more in the operation of any facility affected or involved in a radiation incident.

(3) Damage to property in excess of \$1,000 (to include cost of decontamination) as the result of a radiation incident.

(4) Contamination of visiting persons or common carrier personnel or equipment.

12. Recoverability.

Ignition exciter units, aircraft instruments, and individual magnesium-thorium alloy parts are recoverable.

**APPENDIX
REFERENCES**

National Fire Codes, Vol III

Code of Federal Regulations, title 10, par 19 and 20, Standards for Protection
Against Radiation

Part 30, Rules of General Applicability to Licensing of By-product Material

Part 40, Licensing of Source Material

Title 49, Transportation

MILSTD-1458	Radioactive Material Marking and Labeling of Items, Packages, and Shipping Containers for Identification in Use, Storage, and Transportation
AR 40-14	Control and Recording Procedures Occupational Exposure to Ionizing Radiation
AR 55-55	Transportation of Radioactive and Fissile Materials Other Than Weapons
AR 335-15	Reports Control System
AR 385-30	Safety Color Code Markings and Signs
AR 385-40	Accident Reporting and Records
AR 700-52	Licensing and Control of Sources of Ionizing Radiation
AR 700-64	Radioactive Commodities in DOD Supply System
AR 755-15	Disposal of Unwanted Radioactive Material
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 3261	Handling and Disposal of Unwanted Radioactive Material
TB 43-0116	Identification of Radioactive Items in the Army Supply System
TB MED 232	Protective Measures Radioactive Material Used in Self-luminous Light Sources

By Order of the Secretary of the Army:

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

BERNARD W. ROGERS
General, United States Army
Chief of Staff

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Table 3. TSARCOM Aviation Items Transportation, Use and Storage Information

NAME	FSC	RADIOACTIVE MATL	AMT RADIOACTIVE MATL	USE & STORAGE LABEL**	DOT LABEL DA-SF-413 (I) White -SF-414 (II) Yellow -SF-415 (III) Yellow	DOT TRANSPORT GROUP	EXPOSURE RATES				Bulk Storage Configuration	
							Surface of Item	3 Feet From Unpackaged Item	Mr/Hr Surface of Packaged	***3 Feet From Packaged Item		
1. Aircraft Engine Exciters	2925	DA Auth. A24-12-2 Cesium - 137 (paint) or	1-5 Microcuries per device	Reference: MIL Std. 1458 Required	Reference: 173.391(b)	Title 49 Code of Fed. Reg. Exempt 0.5 mr/hr at surface of package Except up to 3 curies	III	(0-0.8)	(0-0.2)	(0-0.1)	(0-0.4)	(0-1.8)
		Krypton - 85 (gas) in glass envelope of metal enclosure	1-5 Microcuries per device	Required		III						
2. *Aircraft Instruments (Compasses, Indicators, Gages)	(6605 6610, 6620, 6930, 6680, 6685)	DA Auth. A24-12-3		Required	173.391(b)	Less 0.5 mr/hr at surface of package is exempt		(.01-2.2)	(0-0.8)	(0-0.2)	(0-0.1)	(.03-2.2)
		Radium - 226 (paint)	1-15 Microcuries per device	Non-exempt		0-0.5 mr/hr = white label I 0.5-10 mr/hr = yellow label II Over 10 mr/hr = yellow III	I					
*Only old items contain radium paint. Current procured items do not contain radioactive Material.												
3. Aircraft Housings, Gears & Support		DA Auth. A24-12-4 NRC Lic.: AQ5 = STB 1184 B52 = STB 1168						(0.13-2.0)	(.04-0.9)	(0.3-0.5)	(0.1)	(0.1-0.85)
		Assemblies in Aircraft Engines of Magnesium- Thorium Alloy	2840	Thorium-(Natural)	2% by Weight, Max.	Required	173.391(c)	Exempt 0.2 - 2.0 mr/hr at surface of alloy	III			

NOTE: DA Form 2791 (AR 55-55) is required to ship items containing radioactive material.

**License No. included on label.

***Exposure rate at 3 feet is the Transport Index for the packaged item.
The above exposure rates are average values. Actual readings should
be observed for valid exposure rates in each case.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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