ROSATOM STATE ATOMIC ENERGY CORPORATION

AUTHORIZATION CERTIFICATE

Registration number 91 dated August 20, 2020

FOR PACKAGE DESIGN AND TRANSPORTATION

UKTIA-RT transport packages with radioactive materials

RUS/6368/A-96T (Rev.2)

Date of issue 20.08.2020

Valid till 20.08.2025

Deputy General Director for State Security Policy in the Use of Atomic Energy for Defense Purposes *[signature]* Y.V. Yakovlev

*[stamp: ROSATOM STATE ATOMIC ENERGY CORPORATION * (STATE ROSATOM STATE CORPORATION) OGRN [illegible]]*

No. 000704

Approval sheet

APPROVED BY

Deputy Head of the Federal Service for Environmental,
Technological, and Nuclear Supervision

/signature/ A.V. Ferapontov
10.08.2020
*/stamp: FEDERAL SERVICE FOR FEDERAL SERVICE FOR ENVIRONMENTAL, TECHNOLOGICAL, AND NUCLEAR SUPERVISION * OGRN /illegible/ /*

AUTHORIZATION CERTIFICATE

FOR DESIGN AND TRANSPORTATION

UKTIA-RT transport packages with radioactive materials

RUS/6368/A-96T (Rev.2)

Valid till 20.08.2025

Acting Head of the Department for Safety Regulation of Nuclear Fuel Cycle Facilities, Nuclear Power Plants of Ships and Radiation Hazardous Facilities of the Federal Service for Environmental, Technological and Nuclear Supervision

/signature/ E.G. Kudryavtsev
10.08.2020

Director for Special Transportation and Emergency Readiness – Director of the Department of Nuclear and Radiation Safety, Organization of Licensing and Authorization Activities of the Rosatom State Atomic Energy Corporation

/signature/ S.V. Raykov
29.07.2020

Applicant – JSC RITVERC.

Applicant's mailing address: 194223, St. Petersburg, Kurchatova Str., 10.

The motorway shippers and carriers of the packages are: JSC RITVERC, JSC V/O Izotop, JSC IRM, CJSC Kvant, LLC NII Doza, FGUP PO Mayak, LLC RIP, LLC Sibnuklon, LLC CMI, and JSC GNC NIIAR.

UKTIA-RT's developer (holder of the original detailed construction documentation) and manufacturer is JSC RITVERC.

The Authorization Certificate is issued to JSC RITVERC.

This Authorization Certificate confirms that the design of the packages, including transport packages UKTIA-RT according to Section 2, with radioactive material according to Section 3, and the conditions of transportation of these packages complies with the "Safety Rules for Transportation of Radioactive Materials" (NP-053-16) and the "Rules for Safe Transport of Radioactive Material" (rev. 2012 (SSR-6), IAEA, 2013).

According to NP-053-16, UKTIA-RT with radioactive material belongs to type A packages.

Designation of the transport packages: UKTIA-RT.

Packages identification: RUS/6368/A-96.

The package has the following UN numbers and shipping names:

2915, RADIOACTIVE MATERIAL, TYPE A PACKAGING, non-special form, non-fissile or fissile-excepted

3332, RADIOACTIVE MATERIAL TYPE A PACKAGING, SPECIAL FORM, non-fissile or fissile-excepted

Transport index, max.: 10.

Package category, max.: "III – YELLOW".

The transport index (TI) and the category of package are determined by the consignor before transportation according to clause 5.3.1 and clause 5.3.7 of the "Safety Rules for Transportation of Radioactive Materials" (NP-053-16), specified in the accompanying documents and on the label.

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1. Main purpose

UKTIA-RT is intended for transportation and temporary (transit) storage of sealed radionuclide sources (SRS), radioactive materials (RM) in solid and liquid phase. UKTIA-RT are single use (disposable) packages.

2. UKTIA-RT design

2.1. For transportation, 26 versions of UKTIA-RT are provided, which are similar to each other in terms of design, and differ mainly in the size of structural elements and the type of protective container.

14 versions of transport package (TP) with a small box (UKTIA-RT-M) have external dimensions of 220 × 220 × 230 (± 10) mm, and 12 versions are with a large box (UKTIA-RT-V) have external dimensions of 480 × 480 × 480 (± 15) mm.

In the version with small box, 7 versions of UKTIA-RT are intended for shipment of solid and liquid RM, and 7 versions – for SRS shipment.

In the version with large box, 6 versions of UKTIA-RT are intended for shipment of solid and liquid RM, and 6 versions – for SRS shipment.

For handling and lifting of UKTIA-RT-B that are heavier than 10 kg, gripping is used, i.e. the handles.

2.2. UKTIA-RT is a cardboard box. Inside, there are protective and auxiliary devices for accommodation of radioactive content. The main elements of TP (UKTIA-3-1RT-M version) are shown in Fig. 1.

UKTIA-3-1RT-M consists of a box (1), a tin can (3), a protective container (4) and a case (7).

Box (1), which is an outer container, is made of laminated corrugated cardboard P32 GOST R 52901 or other cardboard whose quality parameters as per GOST R 52901 or better.

As shock-absorbing liners (2), expanded polystyrene PSB-S-50 or PFM 50 manufactured according to TU 2244-003-48940758-2007 is used, or cardboard T23 GOST R 52901, or other cardboard with similar strength properties. Shock-absorbing cardboard liners are used only for transportation of UKTIA-(1,3,5,10,15,20)-2RT-V and UKTIA-(1,3,5,10,15,20)-1RT-V (Fig. 6), while the TP with a small box is placed into the outer container of large-box TP.

Main parameters and dimensions of various designs of UKTIA-RT are provided in Table 1.

Table 1 – UKTIA-RT main parameters and dimensions

TP version	Protective container type	Radiation protection thickness (lead), min., mm	TP overall dimensions. (L × W × H), mm		TP weight, max., kg	
			with small box -M	with large box - V	with small box -M	with large box -V
UKTIA-1-1RT	–	–	220×220×230 (±10)	480×480×480 (±15)	1.3	7.6
UKTIA-1-2RT						
UKTIA-3-1RT	KT1-3	3			1.3	7.6
UKTIA-3-2RT						
UKTIA-5-1RT	KT1-5	5			2.1	8.4
UKTIA-5-2RT						
UKTIA-10-1RT	KT1-10	10			2.7	9.0
UKTIA-10-2RT						
UKTIA-15-1RT	KT1-15	15			4	10.3
UKTIA-15-2RT						
UKTIA-20-1RT	KT1-20	20			5.8	12.1
UKTIA-20-2RT						
UKTIA-40-1RT UKTIA-40-2RT	KT1-40	40			9.5	–

As a tin can (3), a container Hodum 1 kg Dauerdose 99 × 119 mm is used. This container is manufactured according to TL8110 & 0051 BWB (Germany), or other tin container with similar design and dimensions.

For manufacture of protective container (4), lead S1 GOST 3778 is used, or other lead with similar physical and mechanical properties. For UKTIA-1-1RT and UKTIA-1-2RT design, a tin can is used, there is no protective container.

For manufacture of shock-absorbing liners (5), polystyrene foam PSB-S-50 or PFM 50 is used. This material is manufactured according to TU 2244-003-48940758-2007.

For manufacture of sealing gaskets (6), foam rubber ST-2236 or other material with similar physical and mechanical properties is used.

A case (7) used as secondary packaging is manufactured from any alloy of aluminum, brass, or stainless steel. Sealed glass ampoules or glass vials with a plastic or rubber cap are used as primary containers (8) for liquid- or solid-phase RM. For SRS, glass bottles, plastic bag, KTI cassette (for transporting sealed sources), or KPP coil (for transporting extended sources) are used.

2.3. UKTIA-(1,3,5,10)-1RT-M, UKTIA-(1,3,5,10)-2RT-M for transportation of solid and liquid RM is shown in Fig. 2.

UKTIA-(15,20,40)-1RT-M, UKTIA-(15,20,40)-2RT-M for transportation of solid and liquid RM is shown in Fig. 3.

UKTIA-(1,3,5,10)-1RT-V, UKTIA-(1,3,5,10)-2RT-V with expanded polystyrene liners for transportation of solid and liquid RM is shown in Fig. 4.

UKTIA-(15,20)-1RT-V, UKTIA-(15,20)-2RT-V with expanded polystyrene liners for transportation of solid and liquid RM is shown in Fig. 5.

UKTIA-(1,3,5,10,15,20)-1RT-V, UKTIA-(1,3,5,10,15,20)-2RT-B with cardboard liners for transportation of solid and liquid RM is shown in Fig. 6.

Tin can in UKTIA-1-1RT is shown in Fig. 7; tin can in UKTIA-1-2RT – Fig. 8; tin can in UKTIA-(3,5,10)-1RT – Fig. 9, tin can in UKTIA-(3,5,10)-2RT – Fig. 10; tin can in UKTIA-(15,20,40)-1RT – Fig. 11; tin can in UKTIA-(15,20,40)-2RT – Fig. 12.

3. Radioactive content

In UKTIA-RT, transportation and temporary (transit) storage of SRS is allowed, both compliant with the requirements to special form radioactive materials, and not compliant with the requirements to special form of radioactive materials, as well as RM in solid and liquid form.

The list of radionuclides, as well as the limit values of activity in UKTIA-RT-M of various versions are provided in Table 2, and for UKTIA-RT-V – in Table 3.

Table 2 – List of radionuclides transported in UKTIA-RT-M and their maximum activity

Radionuclide	Limit activity in UKTIA ... M, various versions, GBq (Ci)						
	-1-RT-M	-3-RT-M	-5-RT-M	-10-RT-M	-15-RT-M	-20-RT-M	-40-RT-M
Tritium	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)
Carbon-14	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)
Sodium-22	0.08 (0.002)	0.1 (0.0027)	0.11 (0.003)	0.16 (0.0043)	022 (0.006)	0.31 (0.0084)	0.9 (0.024)
Phosphorus-32	17 (0.46)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Phosphorus-33	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Sulfur-35	37 (1)	37 (1)	37 (1)	“37 (T)	37 (1)	37 (1)	37 (1)
Chlorine-36	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Potassium-40	1.2 (0.032)	1.4 (0.038)	1.5 (0.041)	1.8 (0.049)	2.3 (0.062)	2.7 (0.073)	6.6 (0.178)
Calcium-45	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Scandium-46	0.08 (0.0022)	0.1 (0.0027)	0.11 (0.003)	0.15 (0.004)	0.2 (0.0054)	0.27 (0.0073)	1 (0.027)
Titanium-44 + scandium-44	0.07 (0.0019)	0.111 (0.003)	0.14 (0.0037)	0.2 (0.0054)	0.3 (0.008)	0.48 (0.0129)	2 (0.054)
Vanadium-49	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Chrome-51	4.6 (0.124)	10 (0.27)	25 (0.68)	50 (1.35)	300 (8.1)	1000 (27)	30000 (810)
Manganese-52	0.047 (0.0013)	0.058 (0.0015)	0.067 (0.0018)	0.085 (0.0023)	0.11 (0.003)	0.15 (0.004)	0.47 (0.013)
Manganese-54	0.19 (0.005)	0.25 (0.0068)	0.27 (0.0073)	0.38 (0.0103)	0.55 (0.015)	0.84 (0.023)	4 (0.108)
Iron-55	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)

Radionuclide	Limit activity in UKTIA ... M, various versions, GBq (Ci)						
	-1-RT-M	-3-RT-M	-5-RT-M	-10-RT-M	-15-RT-M	-20-RT-M	-40-RT-M
Iron-59	0.148 (0.004)	0.166 (0.0045)	0.19 (0.0051)	0.24 (0.0065)	0.3 (0.0081)	0.4 (0.011)	1.2 (0.032)
Cobalt-56	0.05 (0.0014)	0.06 (0.0016)	0.067 (0.0018)	0.087 (0.0024)	0.12 (0.0032)	0.15 (0.0041)	0.42 (0.011)
Cobalt-57	1.8 (0.049)	160 (4.3)	180 (4.9)	300 (8.1)	500 (13.5)	820 (22.1)	7000 (189)
Cobalt-60	0.07 (0.0019)	0.08 (0.0021)	0.09 (0.0024)	0.11 (0.00 3)	0.14 (0.0038)	0.175 (0.0047)	0.525 (0.014)
Nickel-63	370 (10)	370 (10)	370 (10)	370 (10)	370 (10)	370 (10)	370 (10)
Copper-64	0.74 (0.02)	1.295 (0.035)	1.7 (0.0046)	3.4 (0.092)	6.8 (0.184)	13.5 (0.365)	120 (3.24)
Zinc-65	0.3 (0.008)	0.32 (0.0086)	0.33 (0.009)	0.48 (0.013)	0.63 (0.019)	0.85 (0.023)	2.8 (0.076)
Gallium-67	1 (0.027)	6.3 (0.17)	12 (0.32)	48 (1.3)	130 (3.5)	280 (7.6)	2000 (54)
Germanium-68	0.167 (0.005)	0.296 (0.008)	0.392 (0.011)	0.81 (0.022)	1.66 (0.045)	3.36 (0.091)	35 (0.94)
Selenium-75	0.4 (0.011)	2.3 (0.062)	5 (0.135)	27 (0.73)	100 (2.7)	320 (8.6)	3000 (81)
Krypton-85	65 (1.75)	110 (2.97)	140 (3.78)	300 (8.1)	600 (16.2)	1300 (35.1)	10000 (270)
Strontium-85	0.3 (0.0081)	0.48 (0.013)	0.62 (0.017)	1.3 (0.035)	2.7 (0.073)	5.5 (0.15)	130 (3.51)
Strontium-89	3.7 (0.1)	3.7 (0.1)	3.7 (0.1)	3.7 (0.1)	3.7 (0.1)	3.7 (0.1)	3.7 (0.1)
Strontium-90 + yttrium-90	0.37 (0.01)	1.85 (0.05)	20.4 (0.55)	36.7 (0.99)	59.4 (1.6)	92 (2.5)	300 (8.1)
Yttrium-87	0.33 (0.009)	0.55 (0.015)	0.74 (0.02)	1.66 (0.045)	4 (0.11)	9 (0.24)	270 (7.3)
Yttrium-88	0.07 (0.0019)	0.075 (0.002)	0.08 (0.0022)	0.1 (0.0027)	0.13 (0.0035)	0.17 (0.005)	0.44 (0.012)
Yttrium-91	47 (1.27)	55 (1.49)	60 (1.6)	70 (1.9)	95 (2.6)	130 (3.5)	360 (9.73)
Zirconium-88	0.37 (0.01)	0.8 (0.0216)	1.3 (0.035)	4.4 (0.12)	15 (0.41)	50 (1.35)	3000 (81)
Zirconium-89	0.14 (0.0038)	0.18 (0.00486)	0.2 (0.0054)	0.3 (0.0081)	0.42 (0.011)	0.6 (0.016)	2.7 (0.073)
Zirconium-95 + niobium-95t	0.22 (0.0059)	0.26 (0.007)	0.31 (0.0084)	0.45 (0.012)	0.71 (0.019)	1.1 (0.03)	7.6 (0.205)
Niobium-95	0.21 (0.0057)	0.25 (0.0068)	0.3 (0.008)	0.42 (0.011)	0.65 (0.018)	1 (0.027)	6.3 (0.17)
Molybdenum-99 + Technetium 99m	0.54 (0.015)	1.4 (0.038)	1.8 (0.049)	2.5 (0.067)	4.2 (0.114)	6.5 (0.176)	40 (1.08)
Technetium-99	7 4 (2)	74 (2)	74 (2)	74 (2)	74 (2)	74 (2)	74 (2)
Ruthenium-103	0.3 (0.0081)	0.52 (0.014)	0.68 (0.018)	1.4 (0.038)	3.1 (0.084)	6.6 (0.178)	14 (0.378)
Ruthenium-106 + Rhodium-106	0.7 (0.019)	1.1 (0.03)	1.3 (0.035)	2.2 (0.059)	3.9 (0.105)	6 (0.162)	32 (0.865)

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Radionuclide	Limit activity in UKTIA ... M, various versions, GBq (Ci)						
	-1-RT-M	-3-RT-M	-5-RT-M	-10-RT-M	-15-RT-M	-20-RT-M	-40-RT-M
Palladium-103 + Rhodium-103	840 (22.7)	3020 (81.6)	4600 (124)	13180 (356)	36990 (1000)	40000 (1080)	40000 (1080)
Silver-110m + Silver-110	0.06 (0.0016)	0.07 (0.0019)	0.03 (0.0022)	0.11 (0.003)	0.16 (0.0043)	0.23 (0.0062)	0.9 (0.0243)
Cadmium-109	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Indium-111 + Cadmium-111m	0.4 (0.011)	5 (0.135)	19 (031)	37 (1)	37 (1)	37 (1)	37 (1)
Tin-113 + Indium-113m	0.57 (0.015)	1.3 (0.035)	2 (0.054)	6.7 (0.181)	23 (0.621)	75 (2.03)	2000 (54)
Tin-117m	1.1 (0.03)	2.4 (0.065)	4 (0.11)	10 (0.27)	52 (1.4)	130 (3.5)	400 (10.8)
Tin-119m	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Tin-121m	66.6 (1.8)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Antimony-124	0.09 (0.0024)	0.11 (0.003)	0.13 (0.0035)	0.17 (0.0046)	0.22 (0.0059)	0.3 (0.0081)	0.95 (0.0257)
Antimony-125 + Tellurium-125m	0.35 (0.0094)	0.6 (0.0162)	0.8 (0.0216)	1.5 (0.041)	2.9 (0.078)	5.6 (0.151)	68 (1.84)
Tellurium-125m	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Iodine-124	-	-	0.26 (0.007)	0.37 (0.01)	0.555 (0.015)	0.81 (0.022)	2.6 (0.07)
Iodine-125	24 (0.649)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Iodine-129	11 (0.3)	90 (2.43)	90 (2.43)	90 (2.43)	90 (2.43)	90 (2.43)	90 (2.43)
Iodine-131	0.4 (0.0108)	0.9 (0.0243)	1.4 (0.038)	3.7 (0.1)	8.7 (0.235)	16 (0.43)	170 (4.59)
Cesium-134	0.1 (0.0027)	0.13 (0.0035)	0.15 (0-004)	0.25 (0.0068)	0.39 (0.0105)	0.6 (0.016)	3.6 (0.097)
Cesium-137	027 (0.0073)	0.38 (0.01)	0.44 (0.012)	0.74 (0.02)	1.2 (0.032)	2 (0.054)	17 (0.46)
Barium-133	0.38 (0.01)	1.2 (0.032)	2.2 (0.06)	10 (0.27)	43 (1.16)	180 (4.86)	3000 (81)
Barium-140 + Lanthanum-140	0.07 (0.0019)	0.09 (0.0024)	0.1 (0.0027)	0.13 (0.0035)	0.16 (0.0043)	0.22 (0.006)	0.61 (0.0165)
Cerium-139	0.6 (0.016)	3 (0.081)	12 (0.324)	120 (3.24)	2000 (54)	2000 (54)	2000 (54)
Cerium-141	1.9 (0.051)	22 (0.6)	135 (3.65)	600 (16.2)	600 (16.2)	600 (16.2)	600 (16.2)
Cerium-144 + Praseodymium-144	3 (0.081)	7 (0.189)	7.5 (0.203)	10 (0.27)	13 (0.35)	15.6 (0.42)	30 (8.1)
Promethium-147	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Samarium-145	0.9 (0.024)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Samarium-151	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)
Europium-152	0.14 (0.0038)	0.2 (0.0054)	0.22 (0.006)	0.29 (0.0078)	0.39 (0.011)	0.5 (0.0135)	1.6 (0.0432)
Europium-154	0.12 (0.0032)	0.16 (0.0043)	0.18 (0.0049)	0.24 (0.0065)	0.31 (0.0084)	0.41 (0.011)	1.2 (0.032)
Europium-155	1.6 (0.043)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)	740 (20)

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Radionuclide	Limit activity in UKTIA ... M, various versions, GBq (Ci)						
	-1-RT-M	-3-RT-M	-5-RT-M	-10-RT-M	-15-RT-M	-20-RT-M	-40-RT-M
Gadolinium-153	0.66 (0.018)	25 (0.68)	250 (6.8)	740 (20)	740 (20)	740 (20)	740 (20)
Ytterbium-169	0.27 (0.007)	12.9 (0.35)	37 (1)	314.5 (8.5)	1000 (27)	1000 (27)	1000 (27)
Thulium-170	13 (0351)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)	37 (1)
Tantalum-182	0.13 (0.0035)	0.2 (0.0054)	0.22 (0.0059)	0.29 (0.0078)	0.39 (0.0105)	0.51 (0.0138)	1.8 (0.049)
Iridium-192	0.18 (0.0049)	0.4 (0.011)	0.6 (0.016)	1.6 (0.043)	3.4 (0.092)	7 (0.19)	30 (0.81)
Mercury-203	0.6 (0.016)	3.4 (0.092)	9 (0.243)	100 (2.7)	900 (24.3)	900 (24.3)	900 (24.3)
Thallium-204	70 (1.9)	500 (13.5)	500 (13.5)	500 (13.5)	500 (13.5)	500 (13.5)	500 (13.5)
Lead-210	7.4 (0.2)	7.4 (0.2)	7.4 (0.2)	7.4 (0.2)	7.4 (0.2)	7.4 (0.2)	7.4 (0.2)
Polonium-210	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)
Bismuth-207	0.1 (0.0027)	0.12 (0.0032)	0.13 (0.0035)	0.2 (0.0054)	0.26 (0.007)	0.35 (0.0095)	0.6 (0.0162)
Radium-223	0.485 (0.013)	1.53 (0.041)	2.37 (0.064)	5.83 (0.157)	7 (0.19)	7 (0.19)	7 (0.19)
Radium-224	0.117 (0.00316)	0.157 (0.00423)	0.172 (0.00466)	0.216 (0.00584)	0.272 (0.00736)	0.34 (0.0092)	0.787 (0.0213)
Radium-226	0.1 (0.0027)	0.13 (0.0035)	0.15 (0.0041)	0.19 (0.0051)	0.24 (0.0065)	0.32 (0.0086)	0.55 (0.0149)
Radium-228	0.17 (0.0046)	0.24 (0.0065)	0.27 (0.0073)	0.365 (0.01)	0.491 (0.013)	0.665 (0.018)	2 (0.054)
Radium-228 in the form of SFRM	0.17 (0.0046)	0.24 (0.0065)	0.27 (0.0073)	0.365 (0.01)	0.491 (0.013)	0.665 (0.018)	2.3 (0.061)
Thorium-227	1.35 (0.036)	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)
Thorium-228	0.12 (0.0032)	0.16 (0.0042)	0.172 (0.0047)	0.216 (0.0058)	0.272 (0.0074)	0.34 (0.0092)	0.787 (0.0213)
Thorium-230	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Thorium-232	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)
Actinium-227	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)
Protactinium-231	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)
Uranium-232	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Uranium-233	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g
Uranium-234	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)
Uranium-235	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g
Uranium-236	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)

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Radionuclide	Limit activity in UKTIA ... M, various versions, GBq (Ci)						
	-1-RT-M	-3-RT-M	-5-RT-M	-10-RT-M	-15-RT-M	-20-RT-M	-40-RT-M
Uranium-238	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)
Natural uranium	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)
Neptunium-235	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Neptunium-237	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)
Plutonium-236	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)
Plutonium-238	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-238 in the form of SFRM	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)
Plutonium-239	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g
Plutonium-239 in the form of SFRM	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g
Plutonium-240	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-241	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)
Plutonium-242	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-244	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-241	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-241 in the form of SFRM	2.6 (0.071)	2000 (54)	2000 (54)	2000 (54)	2000 (54)	2000 (54)	2000 (54)
Americium-242t	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-243	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0?027)	1 (0.027)
Curium-242	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)
Curium-243	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Curium-244	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)
Curium-244 in the form of SFRM	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)
Curium-245	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)
Curium-246	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)
Californium-252	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)

Table 3 – List of radionuclides transported in UKTIA-RT-V and their maximum activity

Radionuclide	Limit activity in UKTIA ... V, various versions, GBq (Ci)					
	-1-RT-V	-3-RT-V	-5-RT-V	-10-RT-V	-15-RT-V	-20-RT-V
Tritium	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)	3700 (100)
Carbon-14	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)
Sodium-22	0.38 (0.01)	0.383 (0.01)	0.64 (0.017)	0.92 (0.025)	1.27 (0.034)	1.73 (0.047)

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Radionuclide	Limit activity in UKTIA ... V, various versions, GBq (Ci)					
	-1-RT-V	-3-RT-V	-5-RT-V	-10-RT-V	-15-RT-V	-20-RT-V
Phosphorus-32	66 (1.8)	500 (13.5)	500 (13.5)	500 (13.5)	500 (13.5)	500 (13.5)
Phosphorus-33	1000 (27)	1000 (27)	1000 (27)	1000 (27)	1000 (27)	1000 (27)
Sulfur-35	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)
Chlorine-36	600 (16)	600 (16)	600 (16)	600 (16)	600 (16)	600 (16)
Potassium-40	6.1 (0.166)	6.5 (0.175)	6.7 (0.161)	10.7 (0.29)	13.3 (0.36)	16.7 (0.45)
Calcium-45	1000 (27)	1000 (27)	1000 (27)	1000 (27)	1000 (27)	1000 (27)
Scandium-46	0.44 (0.012)	0.63 (0.017)	0.71 (0.019)	0.95 (0.026)	1.29 (0.035)	1.77 (0.048)
Titanium-44 + scandium-44	0.35 (0.009)	0.77 (0.021)	0.92 (0.025)	1.42 (0.038)	2.13 (0.058)	3.13 (0.085)
Vanadium-49	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)
Chrome-51	22 (0.58)	136 (3.66)	277 (7.48)	1700 (46)	10560 (285)	30000 (810)
Manganese-52	0.24 (0.0066)	0.26 (0.007)	0.41 (0.011)	0.54 (0.015)	0.72 (0.02)	0.96 (0.026)
Manganese-54	1 (0.027)	1.09 (0.029)	1.12 (0.03)	2.66 (0.072)	3.9 (0.105)	5.8 (0.15)
Iron-55	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)	40000 (1080)
Iron-59	0.76 (0.021)	1.06 (0.029)	1.16 (0.031)	1.5 (0.04)	1.93 (0.052)	2.54 (0.069)
Cobalt-56	0.26 (0.007)	0.29 (0.008)	0.43 (0.012)	0.57 (0.015)	0.74 (0.02)	0.96 (0.026)
Cobalt-57	3.96 (0.11)	1130 (31)	1430 (38)	2320 (63)	3820 (103)	6310 (170)
Cobalt-60	037 (0.01)	0.39 (0.01)	0.4 (0.011)	0.69 (0.019)	0.88 (0.024)	1.14 (0.031)
Nickel-63	30000 (810)	30000 (810)	30000 (810)	30000 (810)	30000 (810)	30000 (810)
Copper-64	3.92 (0.106)	4.16 (0.112)	4.55 (0.123)	25.9 (0.7)	51.8 (1.4)	101 (2.7)
Zinc-65	1.53 (0.041)	1.62 (0.044)	2.4 (0.065)	3.14 (0.085)	4.16 (0.112)	5.6 (0.15)
Gallium-67	3.6 (0.1)	53.1 (1.44)	100 (2.7)	368 (9.9)	950 (25.5)	1920 (52)
Germanium-68	0.8 (0.022)	0.85 (0.023)	0.93 (0.025)	5.5 (0.15)	11.4 (0.31)	23 (0.62)
Selenium-75	1.4 (0.04)	20.6 (0.557)	45.2 (1.22)	159 (4.3)	692 (18.7)	2560 (69)
Krypton-85	170 (4.7)	795 (21.5)	1080 (29)	2300 (62)	4980 (134)	10000 (270)
Strontium-85	1.5 (0.04)	1.6 (0.042)	4.9 (0.13)	10.3 (0.28)	21.8 (0.59)	47.1 (1.27)
Strontium-89	38 (1)	507 (13.7)	600 (16)	600 (16)	600 (16)	600 (16)
Strontium-90 + yttrium-90	183 (0.5)	113 (3.1)	148 (4)	261 (7.1)	300 (8.1)	300 (8.1)
Yttrium-87	1.63 (0.044)	1.74 (0.047)	5 (0.16)	13.7 (0.37)	31.5 (0.85)	73.4 (2)
Yttrium-88	0.36 (0.0097)	0.38 (0.0102)	0.52 (0.014)	0.65 (0.018)	0.83 (0.022)	1.05 (0.028)
Yttrium-91	252 (6.8)	344 (9.3)	378 (10.2)	482 (13)	600 (16.2)	600 (16.2)
Zirconium-88	1.8 (0.05)	6.9 (0.19)	11 (0.3)	36.3 (0.98)	122 (3.3)	416 (11.2)
Zirconium-89	0.72 (0.019)	0.76 (0.021)	1.38 (0.037)	2 (0.054)	2.92 (0.079)	4.24 (0.114)
Zirconium-95 + Niobium-95m	1.05 (0.028)	1.11 (0.03)	2 (0.054)	2.9 (0.079)	43 (0.12)	6.6 (0.18)
Niobium-95	1.07 (0.029)	1.8 (0.049)	2.1 (0^7).	3.2 (0.087)	4.9 (0.13)	7.6 (0.205)
Molybdenum-99 + Technetium-99m	2.34	5.2 (0.14)	6.4 (0.17)	17.2 (0.46)	25.9 (0.7)	39.2 (1.06)
Technetium-99	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)

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Radionuclide	Limit activity in UKTIA ... V, various versions, GBq (Ci)					
	-1-RT-V	-3-RT-V	-5-RT-V	-10-RT-V	-15-RT-V	-20-RT-V
Ruthenium-103	1.56 (0.042)	4 (0.108)	5.36 (0.145)	11.4 (0.309)	24.6 (0.665)	53.4 (1.44)
Ruthenium-106 + Rhodium-106	3.86 (0.104)	8.47 (0.23)	10.7 (0.29)	19 (0.51)	32.8 (0.88)	54.6 (1.47)
Palladium-103 + Rhodium-103	4580 (124)	6540 (177)	33300 (900)	40000 (1080)	40000 (1080)	40000 (1080)
Silver-110m + Silver-110	0.31 (0.0085)	0.51 (0.014)	0.59 (0.016)	0.84 (0.0227)	1.2 (0.0324)	1.69 (0.0457)
Cadmium-109	114 (3.1)	2000 (54.1)	2000 (54.1)	2000 (54.1)	2000 (54.1)	2000 (54.1)
Indium-111 + Cadmium-111m	1.57 (0.042)	48.2 (1.3)	184 (4.9)	3000 (81)	3000 (81)	3000 (81)
Tin-113 + Indium-113m	2.7 (0.073)	10 (0.27)	15.9 (0.43)	50.7 (1.37)	164 (4.45)	538 (14.5)
Tin-117m	3.9 (0.106)	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)	400 (10.8)
Tin-119m	10950 (296)	30000 (810)	30000 (810)	30000 (810)	30000 (810)	30000 (810)
Tin-121m	600 (16.2)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)
Antimony-124	0.5 (0.0136)	0.79 (0.0214)	0.9 (0.0243)	1.23 (0.0332)	1.65 (0.0447)	2.2 (0.059)
Antimony-125 + Tellurium-125m	1.78 (0.048)	4.8 (0.13)	6.4 (0.17)	12.8 (0.34)	25.2 (0.68)	48.7 (1.31)
Tellurium-125m	281 (7.6)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)	900 (24.3)
Iodine-124	-	-	1.66 (0.045)	2.47 (0.067)	3.54 (0.096)	4.95 (0.134)
Iodine-125	320 (8.6)	3000 (81)	3000 (81)	3000 (81)	3000 (81)	3000 (81)
Iodine-129	90 (2.4)	90 (2.43)	90 (2.43)	90 (2.43)	90 (2.43)	90 (2.43)
Iodine-131	1.74 (0.047)	5.96 (0.16)	8.86 (0.24)	22.7 (0.61)	53.1 (1.4)	112 (3)
Cesium-134	0.51 (0.014)	0.54 (0.015)	1.12 (0.03)	1.76 (0.047)	2.74 (0.074)	4.37 (0.118)
Cesium-137	1.39 (0.037)	2.68 (0.072)	3.25 (0.088)	5.39 (0.146)	9.06 (0.245)	15.3 (0.415)
Barium-133	1.62 (9’044)	2.1 (0.057)	13.2 (0.06)	44.3 (1.2)	147 (3.9)	484 (13.07)
Barium-140 + Lanthanum-140	0.37 (0.01)	0.39 (0.011)	0.65 (0.18)	0.86 (0.023)	1.11 (0.03)	1.43 (0.039)
Cerium-139	4 (0.108)	1950 (52.7)	2000 (54)	2000 (54)	2000 (54)	2000 (54)
Cerium-141	7.2 (0.19)	600 (16.2)	600 (16.2)	600 (16.2)	600 (16.2)	600 (16.2)
Cerium-144 + Praseodymium-144	13 (0.35)	30 (0.81)	52 (1.4)	68 (1.84)	87 (2.35)	111 (3)
Promethium-147	2000 (54)	2000 (54)	2000 (54)	2000 (54)	2000 (54)	2000 (54)
Samarium-145	8 (0.21)	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)
Samarium-151	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)
Europium-152	0.72 (0.0195)	1.3 (0.035)	1.47 (0.04)	1.96 (0.053)	2.61 (0.071)	3.5 (0.094)
Europium-154	0.65 (0.0176)	0.76 (0.02)	1.16 (0.031)	1.52 (0.041)	2.02 (0.054)	2.67 (0.072)
Europium-155	6.6 (0.178)	3000 (81)	3300 (81)	3000 (81)	3000 (81)	3000 (81)
Gadolinium-153	4.1 (0.111)	9000 (243)	9000 (243)	9000 (243)	9000 (243)	9000 (243)
Ytterbium-169	1.32 (0.036)	104.2 (2.82)	300 (27)	1000 (27)	1000 (27)	1000 (27)
Thulium-170	62 (1.7)	600 (16.2)	600 (16.2)	600 (16.2)	600 (16.2)	600 (16.2)

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Radionuclide	Limit activity in UKTIA ... V, various versions, GBq (Ci)					
	-1-RT-V	-3-RT-V	-5-RT-V	-10-RT-V	-15-RT-V	-20-RT-V
Tantalum-182	0.68 (0.018)	1.25 (0.034)	1.4 (0.038)	1.87 (0.051)	2.53 (0.069)	3.47 (0.094)
Iridium-192	0.84 (0.023)	0.96 (0.026)	1.18 (0.032)	12.15 (0.328)	25.6 (0.693)	52.4 (1.4)
Mercury-203	2.6 (0.071)	29.1 (0.79)	76.6 (2.07)	880 (23.7)	1000 (27)	1000 (27)
Thallium-204	150 (4.1)	700 (18.9)	700 (18.9)	700 (18.9)	700 (18.9)	700 (18.9)
Lead-210	50 (1.4)	50 (1.4)	50 (1.4)	50 (1.4)	50 (1.4)	50 (1.4)
Polonium-210	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)	20 (0.54)
Bismuth-207	0.51 (0.014)	0.6 (0.016)	1.08 (0.029)	1.56 (0.042)	2.23 (0.06)	3.17 (0.086)
Radium-223	2 (0.055)	7 (0.19)	7 (0.19)	7 (0.19)	7 (0.19)	7 (0.19)
Radium-224	0.25 (0.007)	0.36 (0.0096)	0.39 (3.0105)	0.49 (0.0133)	0.61 (0.0165)	0.75 (0.02)
Radium-226	0.49 (0.013)	0.83 (0.022)	0.94 (0.025)	1.27 (0.034)	1.66 (0.045)	2.16 (0.058)
Radium-228	0.85 (0.023)	1.43 (0.039)	1.62 (0.044)	2 (0.054)	2 (0.054)	2 (0.054)
Radium-228 in the form of SFRM	0.85 (0.023)	1.43 (0.039)	1.62 (0.044)	2.19 (0.059)	2.79 (0.08)	4.05 (0.109)
Thorium-227	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)	5 (0.135)
Thorium-228	0.57 (0.015)	0.67 (0.018)	0.73 (0.02)	1 (0.027)	1 (0.027)	1 (0.027)
Thorium-230	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Thorium-232	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)	$8\cdot10^{-4}$ ($2.2\cdot10^{-5}$)
Actinium-227	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)	0.09 (0.0024)
Protactinium-231	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)	0.4 (0.0108)
Uranium-232	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Uranium-233	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g	0.72 (0.02) 2 g
Uranium-234	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)
Uranium-235	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g	$0.16\cdot10^{-3}$ ($0.43\cdot10^{-5}$) 2 g
Uranium-236	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)	6 (0.162)
Uranium-238	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)
Natural uranium	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)	$2.5\cdot10^{-3}$ ($6.8\cdot10^{-5}$)
Neptunium-235	463 (12.5)	40000 (1081)	40000 (1081)	40000 (1081)	40000 (1081)	40000 (1081)
Neptunium-237	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)	0.39 (0.0106)
Plutonium-23b	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)	3 (0.081)
Plutonium-238	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-238 in the form of SFRM	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)	10000 (270)
Plutonium-239	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g	1 (0.027) 0.43 g

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Radionuclide	Limit activity in UKTIA ... V, various versions, GBq (Ci)					
	-1-RT-V	-3-RT-V	-5-RT-V	-10-RT-V	-15-RT-V	-20-RT-V
Plutonium-239 in the form of SFRM	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g	4.6 (0.124) 2 g
Plutonium-240	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-241	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)	60 (1.62)
Plutonium-242	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Plutonium-244	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-241	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-241 in the form of SFRM	13 (0.35)	2000 (54)	2000 (54)	2000 (54)	2000 (54)	2000 (54)
Americium-242t	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Americium-243	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Curium-242	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)	10 (0.27)
Curium-243	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)	1 (0.027)
Curium-244	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)	2 (0.057)
Curium-244 in the form of SFRM	1600 (43)	1600 (43)	1600 (43)	1600 (43)	1600 (43)	1600 (43)
Curium-245	0.9 (0’024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)
Curium-246	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)	0.9 (0.024)
Californium-252	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)	$2\cdot10^{-2}$ ($5.4\cdot10^{-4}$)

4. Nuclear safety

4.1. There are no requirements for nuclear safety.

5. Radiation safety

5.1. Radiation safety is ensured according to NP-053-16.

5.2. UKTIA-RT with radioactive content belongs to the package category "III – YELLOW" (transport index max. 10), while the radiation level from the package at the maximum charge with radioactive content does not exceed, mSv/h (mrem/h):

– at any point on the outer surface – 2.0 (200);
– at a distance of 1 m from the outer surface – 0.1 (10).

6. Vehicles and operating conditions

6.1. UKTIA-RT with radioactive content can be transported by all types of transport subject to the safety rules for the transportation of class 7 dangerous cargo according to GOST 19433-88 for each type of transport, requirements of NP-053-16, and if the carrier/shipper has a corresponding Rostekhnadzor license.

6.2. Total number of packages placed on the vehicle must be such that the max. TI does not exceed 50. In this case, the radiation level should not exceed 2.0 mSv/h (200 mrem/h) on the outer surface of the vehicle, and 0.1 mSv/h (10 mrem/h) at a distance of 2 m from this surface.

The number of packages on the transport (aircraft, ship) must be controlled by the respective carriers/shippers.

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6.3. Total amount of fissile material in the cargo on the vehicle shall not exceed 15 g.

6.4. Operation of UKTIA-RT shall comply with "Technical Specifications TU 25.30.22-003-23102128-2017 (Identical to TU 6968-003-23102128-2012). UKTIA-RT Transport Packages" (Section 5 (Transportation and Storage), Section 6 (Use Instructions), and Appendix B of the Data Sheet Template (Section 6 – Operating Instructions)).

7. Emergency conditions

In case of emergency during the course of UKTIA-RT transportation with radioactive content, promptly report to:

– dispatcher of the JSC Atomspetstrans Operative Specialized Dispatch Office (24/7), tel. 8 (499) 262-31-08, 8 (495) 657-86-07;

– Private Institution Rosatom's Crisis Management Center, tel. 8 (495) 933-60-44, fax – 8 (495) 933-60-45, 8 (499) 949-24-35;

– dispatcher of JSC Rosatom's Emergency and Technical Center (24/7), tel. 8 (812) 702-19-00, fax – 8 (812) 591-53-33;

– Rostekhnadzor's operative officer on duty 8 (495) 532-15-08, fax – 8 (495) 532-15-10,

and also be guided by Emergency Chart No. 701, requirements of Section 7, NP-053-16, and requirements of the "Rules for Investigation and Accounting of Violations during Operation and Decommissioning of Radiation Sources, Storage Facilities for Radioactive Substances and Radioactive Waste, and Management of Radioactive Substances and Radioactive Waste" (NP-014-16), Work Plans for elimination of consequences of accidents of shippers provided in Section 10 herein.

8. Quality assurance

8.1. The quality during transportation of UKTIA-RT with radioactive content is assured according to the consignors' Quality Assurance Programs.

8.2. Shippers' quality assurance programs comply with NP-090-11.

8.3. Control over the technical condition of UKTIA-RT, routine maintenance, and elimination of defects arising during the course of the packages operations is arranged according to the "Technical Specifications TU 25.30.22-003-23102128-2017 (Identical to TU 6968-003-23102128-2012). UKTIA-RT Transport Packages" (Section 5 (Transportation and Storage), Section 6 (Use Instructions), and Appendix B of the Data Sheet Template (Section 6 – Operating Instructions)).

9. Normative and guiding documents

9.1. "Safety Rules for Transportation of Radioactive Materials", NP-053-16, Rostekhnadzor, 2016

9.2. "Safety Rules for Safe Transport of Radioactive Materials" (ed. 2012 (SSR-6), IAEA, 2013), 2012

9.3. "Radiation Safety Standards" (NRB-99/2009), Sanitary Rules and Regulations SanPiN 2.6.1.2523-09, 2009

9.4. "Basic Sanitary Rules for Ensuring Radiation Safety" (OSPORB-99/20Y), Sanitary Rules SP 2.6.1.2612-10, 2010

9.5. "Rules for Investigation and Accounting of Violations during Operation and Decommissioning of Radiation Sources, Storage Facilities for Radioactive Substances and Radioactive Waste, and Management of Radioactive Substances and Radioactive Waste" (NP-014-16). Rostekhnadzor, 2016

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9.6. "Requirements for Nuclear Facilities' Quality Assurance Programs" (NP-S90-11). Rostekhnadzor, 2012

9.7. Emergency Chart No. 701. Rosatom State Corporation, 2011

10. Documentation being the basis for this Authorization Certificate

10.1. Application by JSC Rosatom's Emergency and Technical Center for issuance of a new version of the Authorization Certificate RUS/6368/A-96T (Rev.l), ref. No. 218-01/21-1133, dated 14.07.2020 (according to the JSC RITVERC's power of attorney, ref. No. 276, dated 14.05.2020).

10.2. Expert Opinion AE 1905, JSC Rosatom's Emergency and Technical Center, 2020

10.3. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation by JSC RITVERC, 2019

10.4. Contract No. 218-01/26-01/20-31, dated 06.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and JSC RITVERC, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.5. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation by LLC NPP Doza, 2018

10.6. Contract No. 218-01/26-01/20-36, dated 06.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and LLC NPP Doza, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.7. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation (P-23.261/04, rev. 3.0) JSC IRM, 2019.

10.8. Contract No. 218-01/26-p/20-30/61/3140-D, dated 04.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and JSC IRM, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.9. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation by LLC RIP, 2020

10.10. Contract No. 218-01/26-01/19-55, dated 18.11.2019, concluded between JSC Rosatom's Emergency and Technical Center and JSC RIP, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.11. Expert opinion AE 1886 for FGUP PO Mayak. Based on this opinion, the Authorization Certificate RUS/6514/X was issued, JSC Rosatom's Emergency and Technical Center, 2020

10.12. Contract No. 218-01/26-1/20-29, dated 25.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and FGUP PO Mayak, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.13. Work plan to eliminate the consequences of accidents during the course of radioactive materials transportation by special vehicles by JSC V/O Izotop (inv. № 90), 2015.

10.14. Contract No. 18-01/26-P/20-38/53/13654-D, dated 19.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and JSC V/O Izotop, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

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10.15. Work plan to eliminate the consequences of accidents during the course of radioactive substances transportation by CJSC Kvant, 2017.

10.16. Contract No. 218-01/26-01/20-71, dated 26.06.2020, concluded between JSC Rosatom's Emergency and Technical Center and CJSC Kvant, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.17. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation by LLC Sibnuklon, 2019

10.18. Contract No. 218-01/26-01/20-55, dated 26.03.2020, concluded between JSC Rosatom's Emergency and Technical Center and JSC Sibnuklon, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.19. Plan for arrangement of operations to eliminate the consequences of accidents during the course of transportation (shipment) of radioactive substances (radioactive materials cargo) according to Part 1, cl. 1.1, NP-074-06), by LLC CMI, 2018

10.20. Contract No. 218-01/26-01/20-25, dated 04.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and LLC CMI, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

10.21. Plan for arrangement of operations to eliminate the consequences of accidents during the course of radioactive materials transportation (inv. No. 1227) by JSC GNC NIIAR, 2019.

10.22. Contract No. 218-01/26-P/20-23/64/13373-D, dated 19.02.2020, concluded between JSC Rosatom's Emergency and Technical Center and GNC NIIAR, for prevention and elimination of consequences of accidents during the course of transportation of nuclear materials and radioactive substances.

11. General

11.1. Information about approval Authorization Certificate revisions:

RUS/6368/A-96T	Original Authorization Certificate. Issued on September 25, 2012, valid till September 25, 2015.
RUS/6368/A-96T (Rev. l)	Revision of the original Authorization Certificate. Issued on 21.09.2015, valid till 21.09.2020.

11.2. If you have any questions about the Authorization Certificate, please, contact:

– Department of Nuclear and Radiation Safety, Organization of Licensing and Authorization Activities of the Rosatom State Atomic Energy Corporation: 119017, Moscow, B. Ordynka Str., 24; tel. 8 (499) 949-29-27; fax 8 (499) 949-23-05;

– Federal Service for Environmental, Technological and Nuclear Supervision: 109147, Moscow, Taganskaya Str., 34, tel. 8 (495)532-13-48, fax 8 (495)532-13-46;

– JSC Rosatom's Emergency and Technical Center (194292, St. Petersburg, 3-rd Verkhniy Per., 2, Letter L, tel./fax 8 (812) 702-19-01 (main), 8 (812) 591-52-30 (reserve)).

11.3. For SFRM radioactive materials, transported in UKTIA-RT, the Authorization Certificate is valid only if there are valid authorization certificates available confirming the compliance of radioactive materials with the SFRM requirements.

11.4. Shipments according to this Authorization Certificate are permissible only if the shippers, carriers, and consignees have the appropriate licenses (authorizations) in the field of the atomic energy usage.

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11.5. Official documents are the original and copies of the Authorization Certificate, duly authorized.

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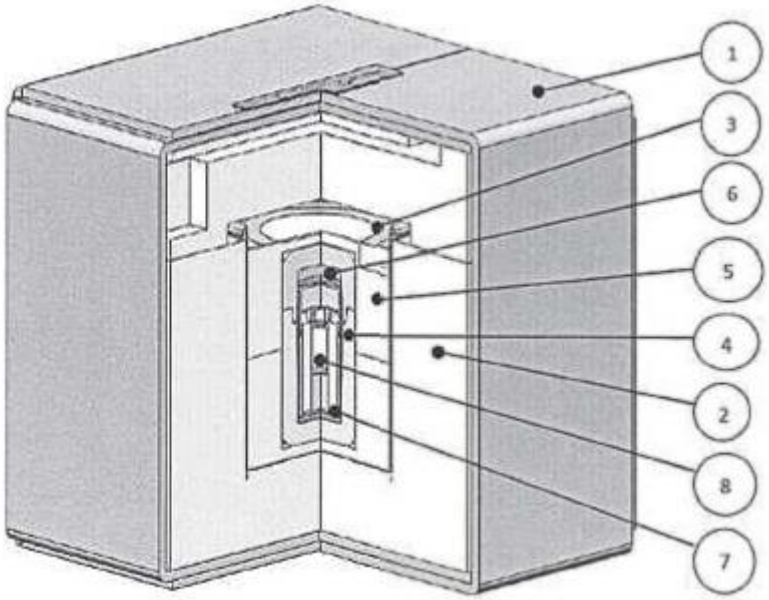
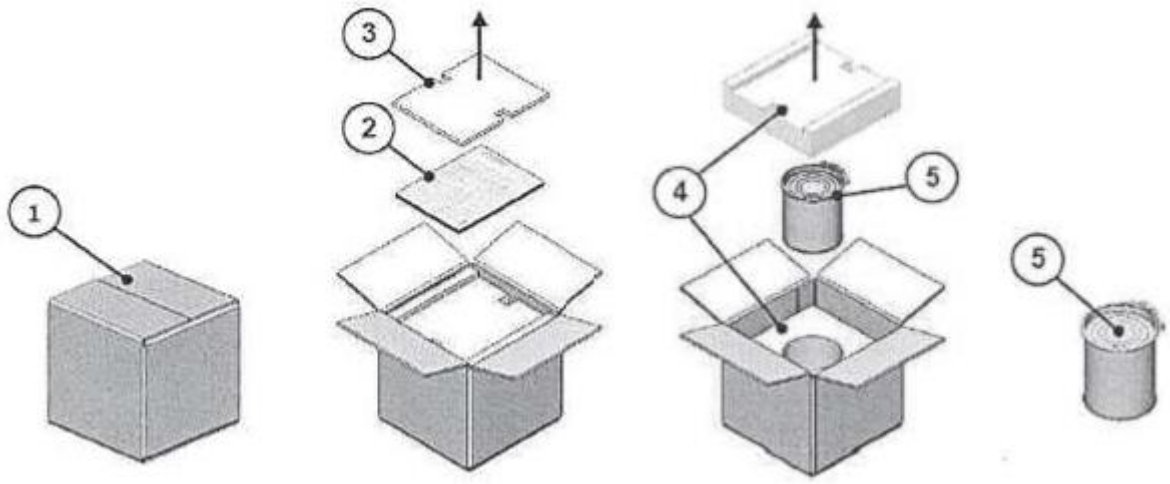


1 – box
2 – shock-absorbing liners
3 – tin can
4 – protective container
5 – shock-absorbing liners
6 – sealing gaskets
7 – case
8 – primary container

Fig. 1 – UKTIA-3-1RT-M



1 – TP in small box
2 – documentation
3 – polystyrene foam gasket
4 – shock-absorbing liners
5 – tin can with source

Fig. 2 – UKTIA-(1,3,5,10)-1RT-M, UKTIA-(1,3,5,10)-2RT-M

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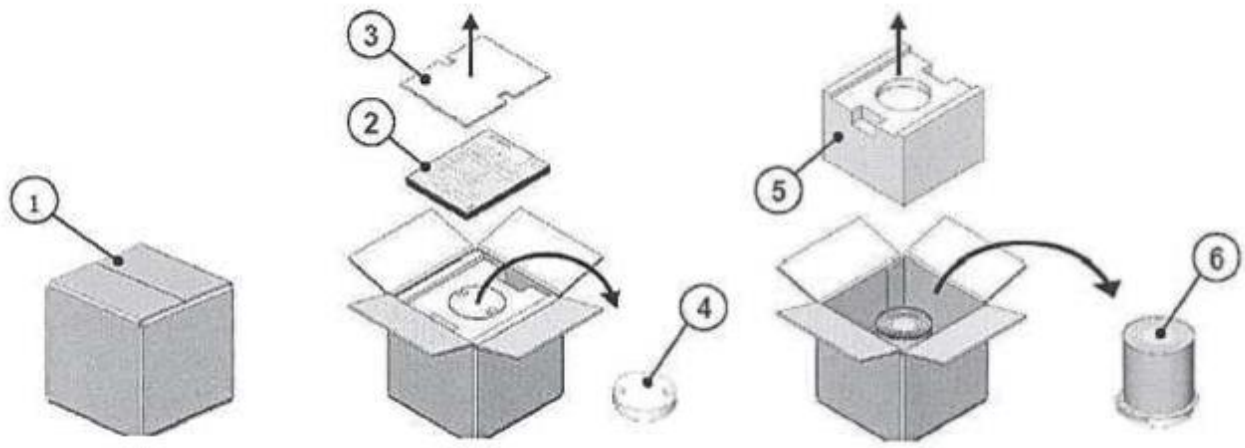
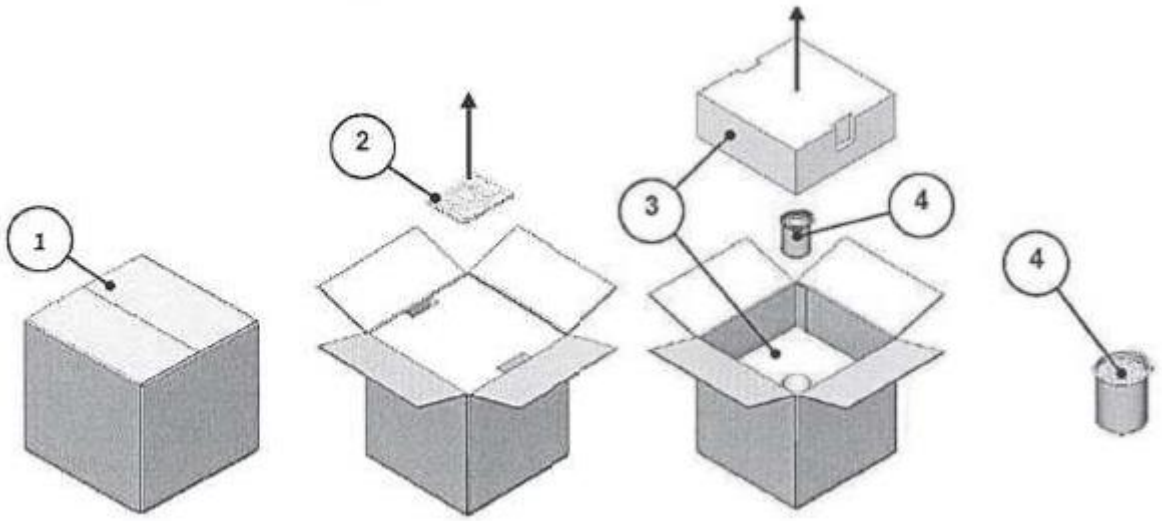


1 – TP in small box
2 – documentation
3 – polystyrene foam gasket
4 – liner/support
5 – shock-absorbing liner
6 – tin can with source

Fig. 3 – UKTIA-(15,20,40)-1RT-M, UKTIA-(15,20,40)-2RT-M



1 – TP in large box
2 – documentation
3 – shock-absorbing liners
5 – tin can with source

Fig. 4 – UKTIA-(1,3,5,10)-1RT-V, UKTIA-(1,3,5,1)-2RT-V with expanded polystyrene liners

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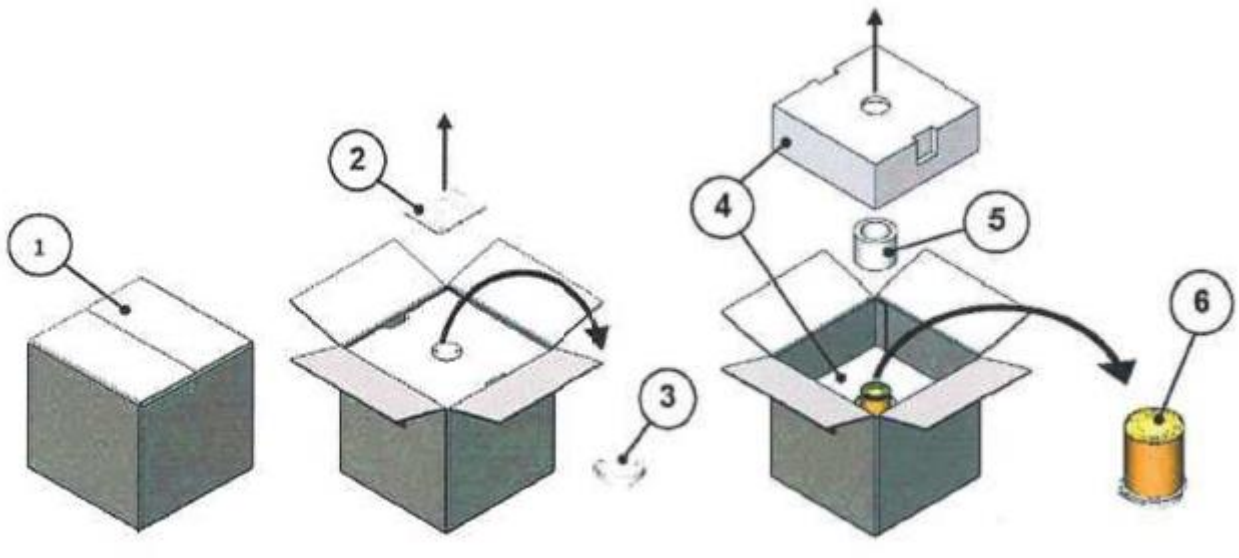
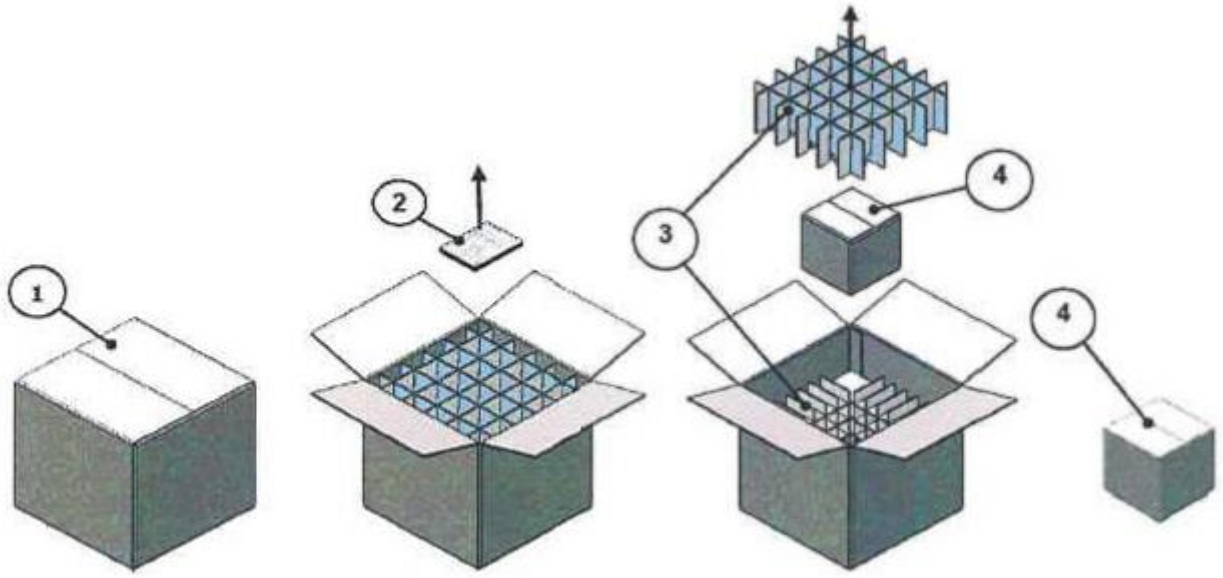


1 – TP in large box
2 – documentation
3 – liner/support
4 – shock-absorbing liners
5 – polystyrene foam liner
6 – tin can with source

Fig. 5 – UKTIA-(15,20)-1RT-V, UKTIA-(15,20)-2RT-V with expanded polystyrene liners



1 – TP in large box
2 – documentation
3 – shock-absorbing liners
4 – TP in small box

Fig. 6 – UKTIA-(1,3,5,10,15,20)-1RT-V, UKTIA-(1,3,5,10,15,20)-2RT-V with cardboard liners

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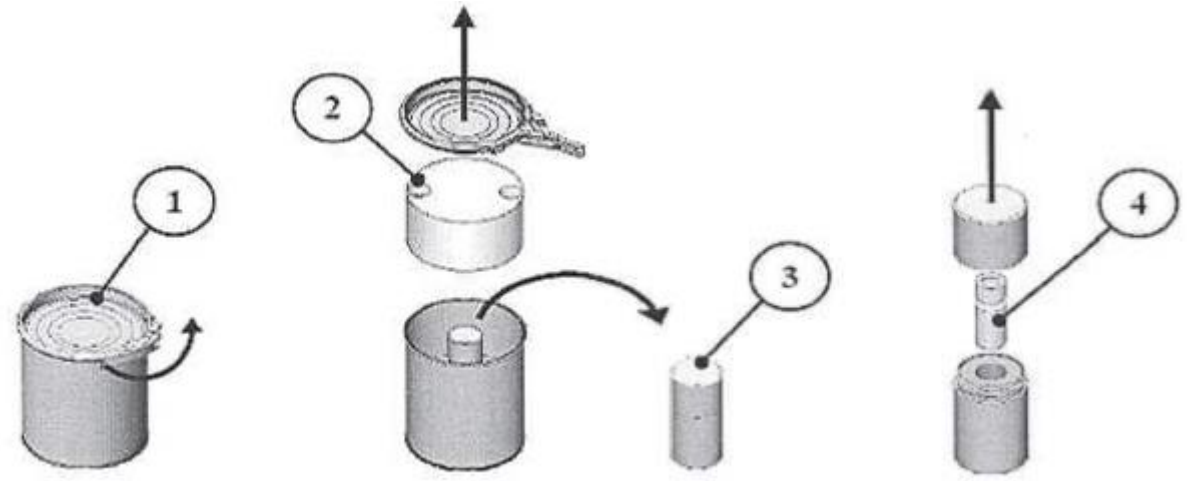
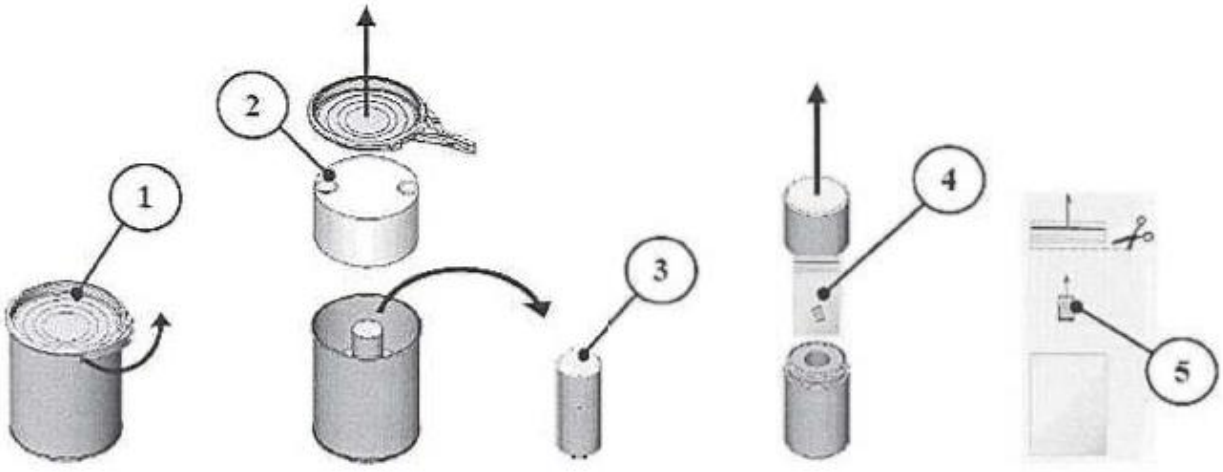


1 – tin can
2 – polystyrene foam liner
3 – metal case
4 – bottle with solution

Fig. 7 – Tin can in UKTIA-1-1RT



1 – tin can
2 – polystyrene foam liner
3 – metal case
4 – SRS in plastic bag
5 – SRS

Fig. 8 – Tin can in UKTIA-1-2RT

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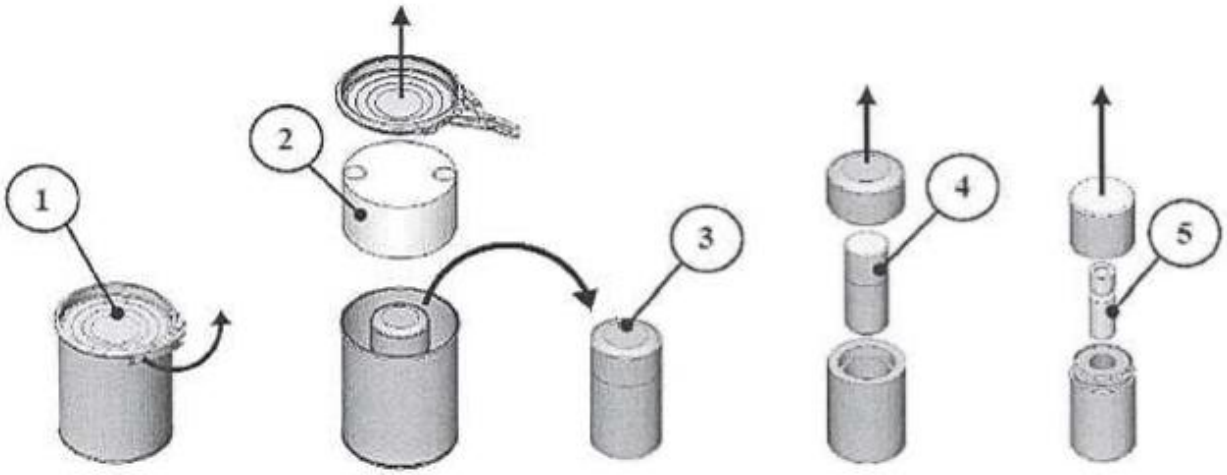
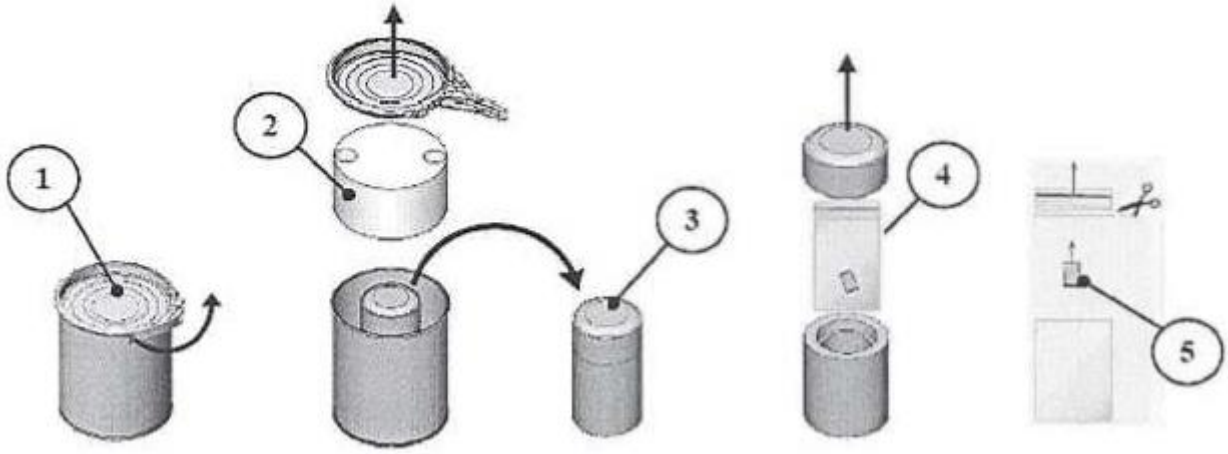


1 – tin can
2 – polystyrene foam liner
3 – protective container
4 – metal case
5 – bottle with solution

Fig. 9 – Tin can in UKTIA-(3,5,10)-1RT



1 – tin can
2 – polystyrene foam liner
3 – protective container
4 – SRS in plastic bag
5 – SRS

Fig. 10 – Tin can in UKTIA-(3,5,10)-2RT

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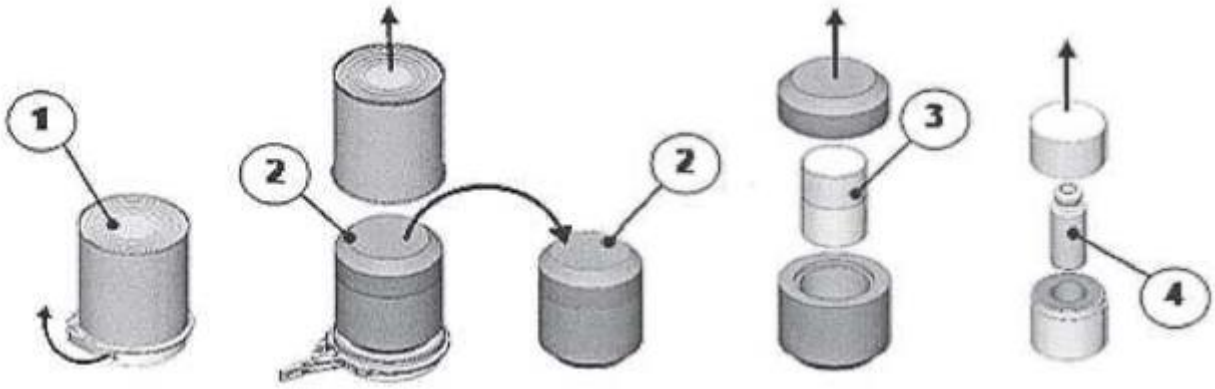
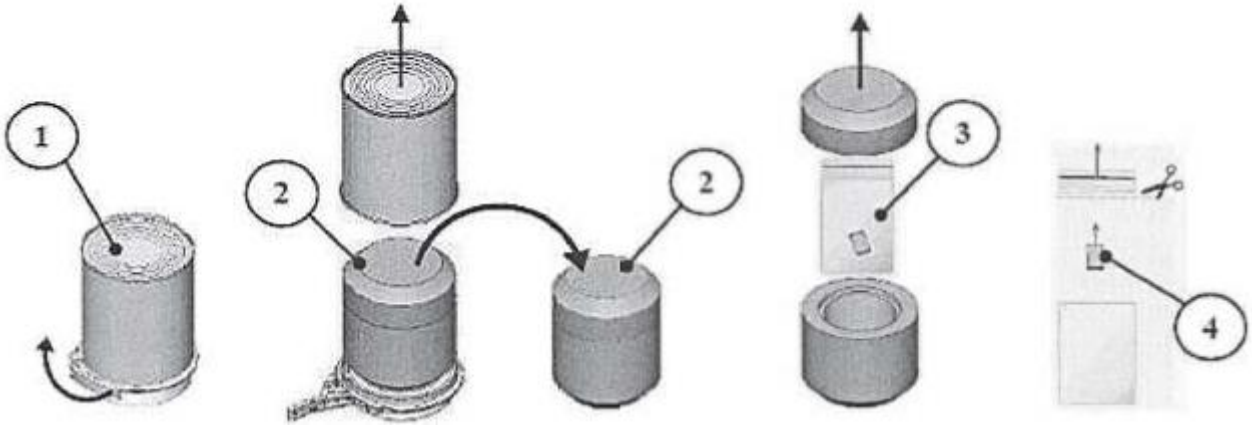


1 – tin can
2 – protective container
3 – metal case
4 – bottle with solution

Fig. 11 – Tin can in UKTIA-(15,20,40)-1RT



1 – tin can
2 – protective container
3 – SRS in plastic bag
4 – SRS

Fig. 12 – Tin can in UKTIA-(15,20,40)-2RT

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