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DSRS Management in Russia

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The legal basis of the RF policy in the field of the RW management is

- the Constitution and legislation of the Russian Federation

- norms of the international law and provisions of international agreements

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The legislation of the Russian Federation in the field of RW management is regulated by the Constitution of the Russian Federation and includes:

- the Federal Law “On the Use of Atomic Energy”
- the Federal Law “On the Radiation Safety of the Public”
- the Federal Law “On the Sanitary and Epidemiological Well-Being of the Public”
- the Federal Law “On the Environmental Protection” and other legislative and regulatory acts

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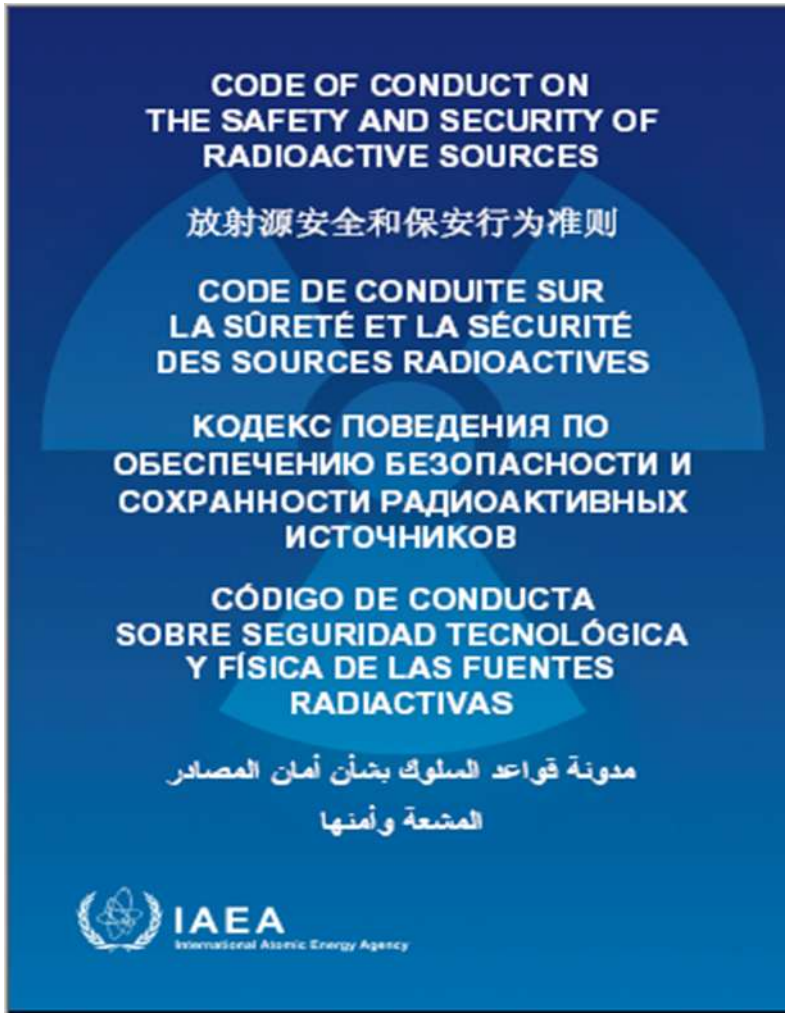
Norms of the international law and provisions of international agreements include:

- Joint Convention
- Code of Conduct
- Guidance on the Import/Export…

+ recent IAEA Safety Standards, including RS-G-1.9



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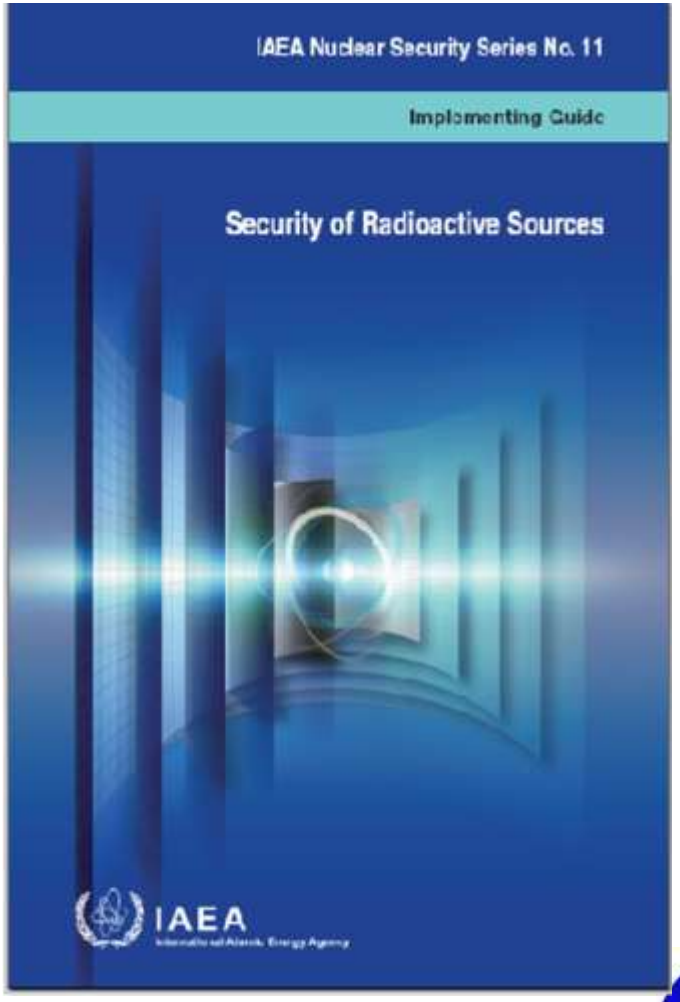

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Revision of existing documents:

- NP-38-02 General Provisions for Ensuring Safety of Radiation Sources
- NP-39-02 Requirements on Contents of Safety Assessment for Radiation Sources
- RD-10-04-2006 Guidance on Surveillance for RTG

МИНИСТЕРСТВО ПРИРОДНЫХ РЕСУРСОВ И ЭКОЛОГИИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНЫЕ НОРМЫ И ПРАВИЛА
В ОБЛАСТИ ИСПОЛЬЗОВАНИЯ АТОМНОЙ ЭНЕРГИИ

УТВЕРЖДЕНЫ
приказом Министерства
природных ресурсов и экологии
Российской Федерации
от _____20__ г.
№ __

ОБЩИЕ ПОЛОЖЕНИЯ ОБЕСПЕЧЕНИЯ БЕЗОПАСНОСТИ
РАДИАЦИОННЫХ ИСТОЧНИКОВ
(Проект окончательной редакции изменений к НП-038-02)

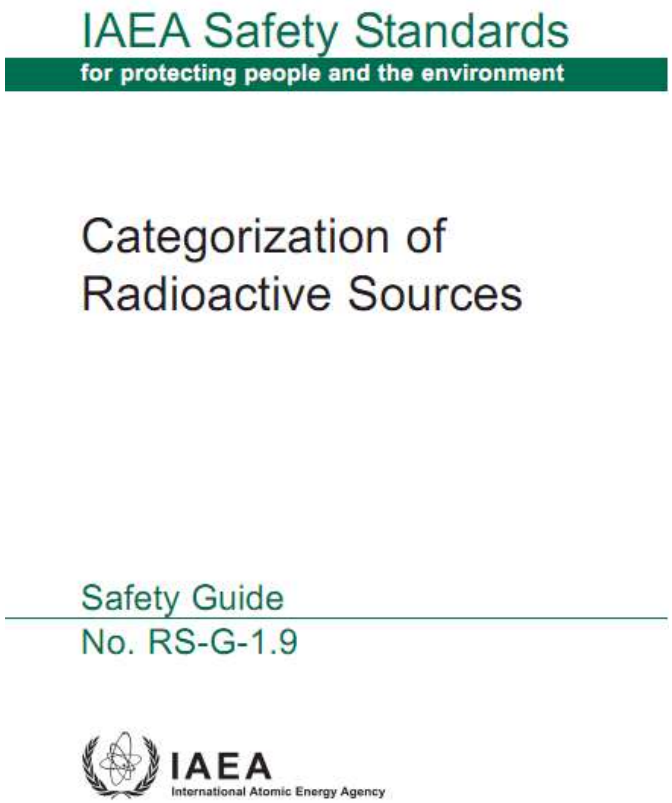
Введены в действие
с _____20__ г.

Москва, 2010

Revision of existing documents:

Introducing
and defining 5 categories of radioactive sources,

new waste classification and new ideas from the draft of Federal Low on RWM



using

RB-042-07 Methodology for DSRS Categorization on their potential hazard

RTG problem

Decommissioning of RTGs with expired life is a problem by itself

- Presently there are more than 700 RTGs in Russia in operation or subject to decommissioning
- In 10 – 15 years the planned operational life of all RTGs in operation presently will be over
- Rosatom has developed the routine for organization of works for decommissioning of RTGs and has determined the timeframe, when such works should be completed

Safe management of RTGs is complicated by the fact that the organizations performing the operation of RTGs, belong to different ministries and departments

RADON System

- The system of “Radon” enterprises was established in early 60s
  - Aim: collection, treatment and storage of LILW wastes, generated in medicine, research institutions, various branches of industry.
  - 35 “Radon” facilities in Soviet Union
  - 16 of them in Russian Federation

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RADON System

1 - Moscow «Radon» Facility
2 - Leningrad «Radon» Facility
3 - Volgograd «Radon» Facility
4 - Nizhny Novgorod «Radon» Facility
5 - Grozny «Radon» Facility
6 - Irkutsk «Radon» Facility
7 - Kazan «Radon» Facility
8 - Samara «Radon» Facility
9 - Murmansk «Radon» Facility
10 - Novosibirsk «Radon» Facility
11 - Rostov «Radon» Facility
12 - Saratov «Radon» Facility
13 - Sverdlovsk «Radon» Facility
14 - Bashkirskiy «Radon» Facility
15 - Chelyabinsk «Radon» Facility
16 - Khabarovsk «Radon» Facility

Disused Sealed Radiation Sources

- Form for the main part of the radionuclide activity at “Radon” facilities
- DSRS sources are radioactive waste with extremely high level of specific activity
- Average radionuclide composition:
  Cs-137 (40 %), Co-60 (25 %), Sr-90 (22 %), Ir-192 (8 %), Tm-170 (4 %).

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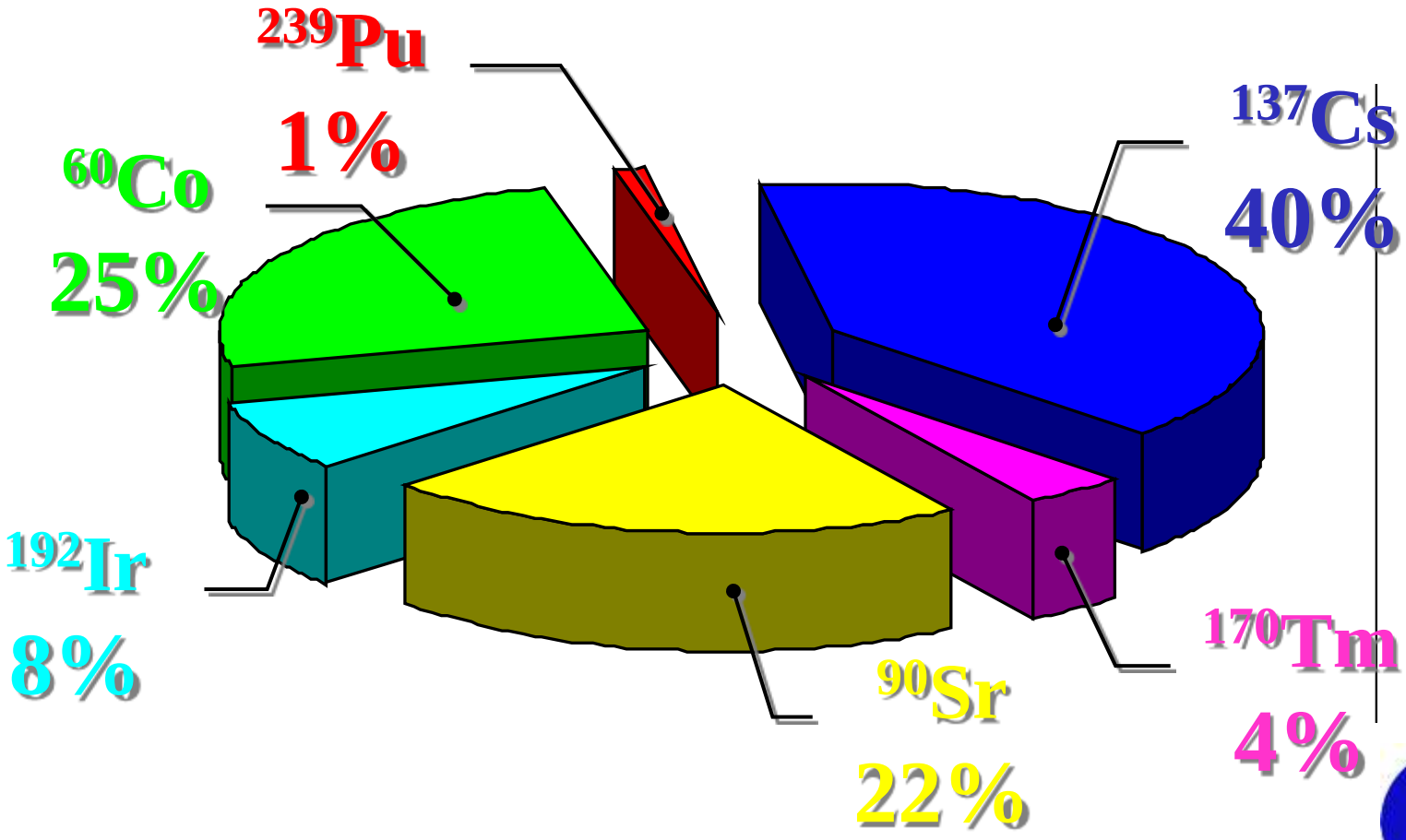
Disused Sealed Radiation Sources



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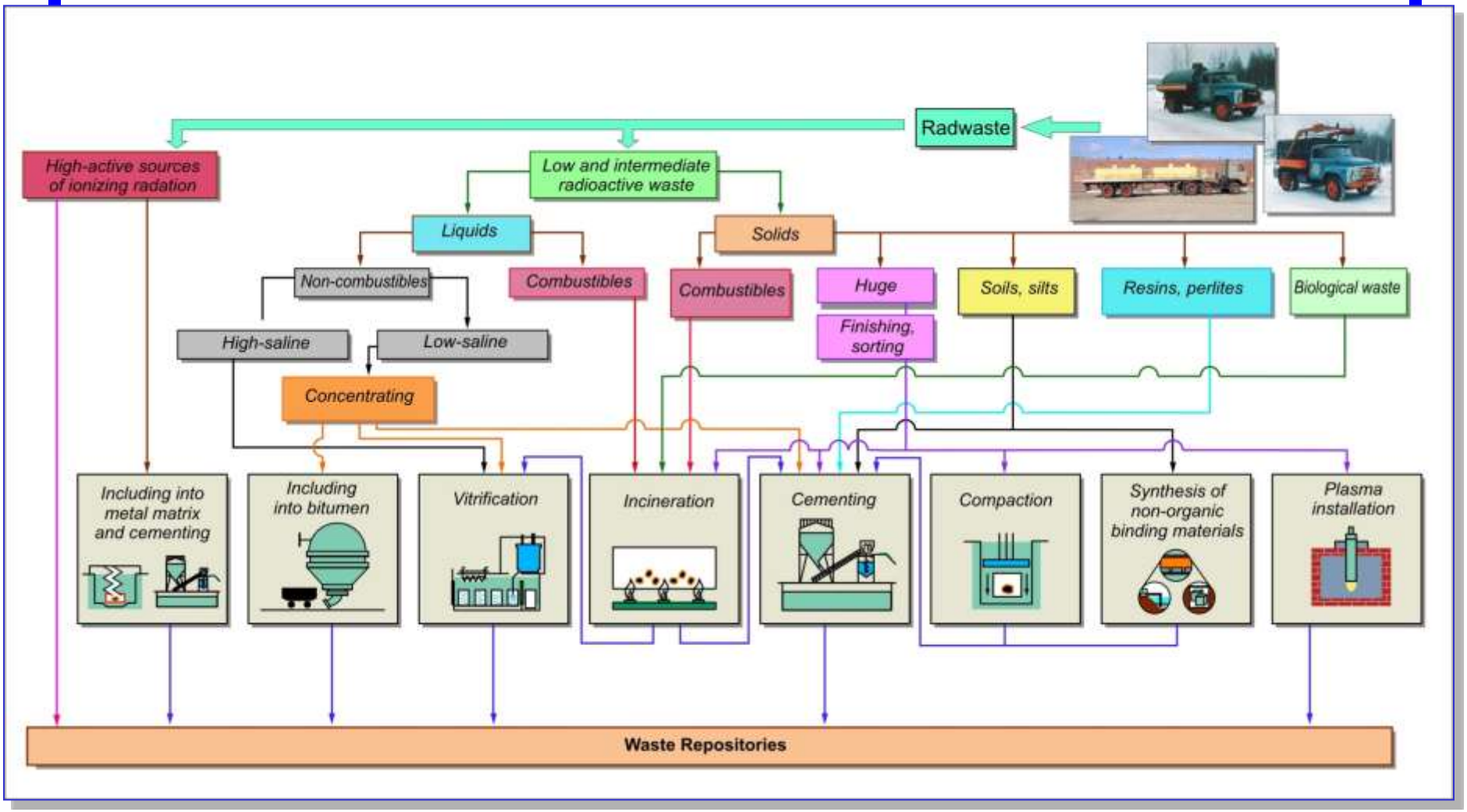
General Scheme of RAW Management



DSRS streams

Only 4 of 18 waste groups formed on the basis of the License and applied technologies:

•- short lived radionuclides, high activity

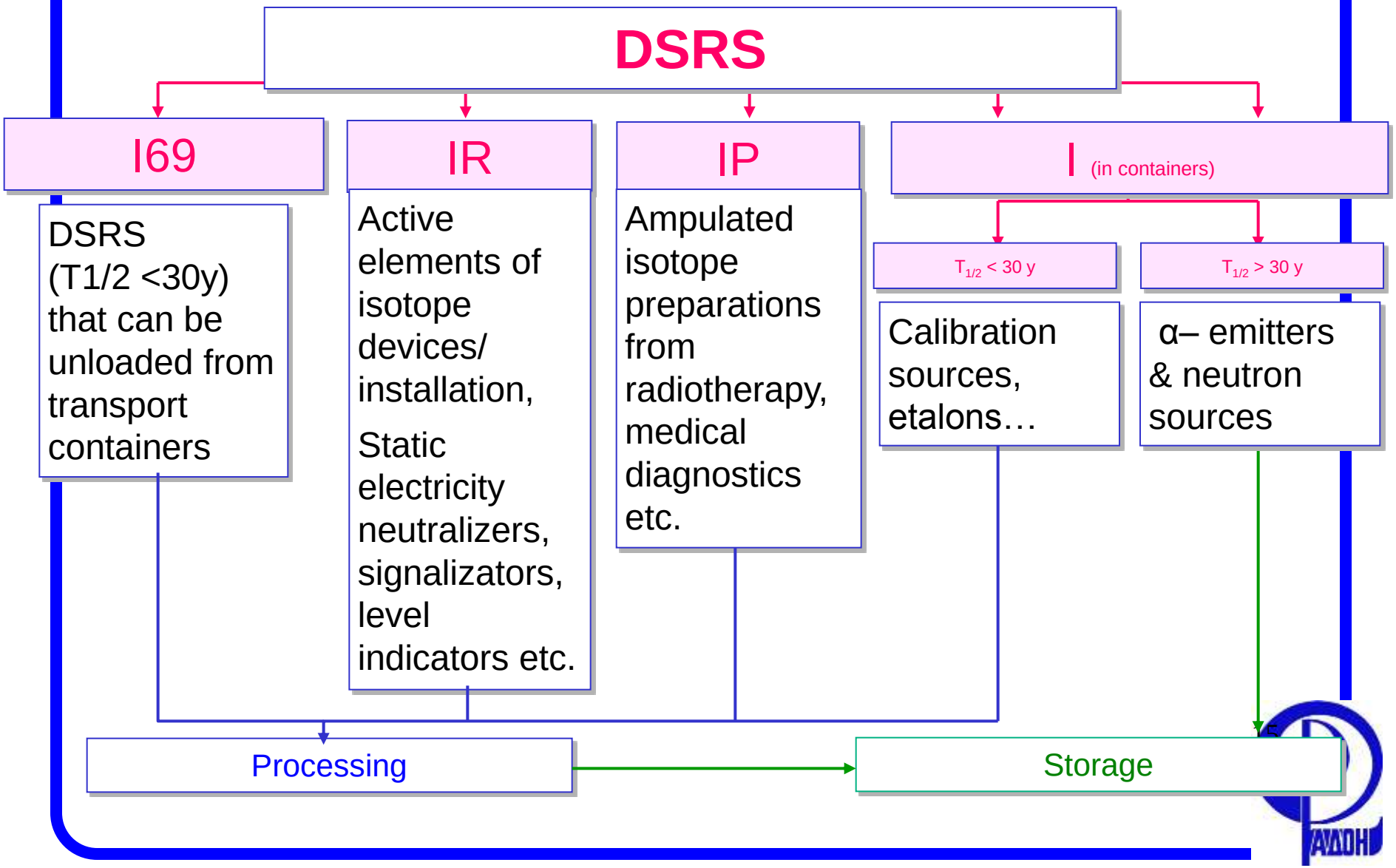
Co-60, Cs-137, Sr-90 etc.;

•- long lived and alpha-radiating sources:

- **Ra-containing sources**
- **Neutron sources (Pu-Be, Po-Be, Cf-252 etc)**

• - sources from smoke detectors and other radioisotopic devices

Statistical DSRS Types



DSRS Inventory

DSRS type	Radionuclides	Activity, Bq	Amount (number), ps
I69	**^{60}Co** ^{137}Cs ^{170}Tm ^{192}Ir ^{75}Se ^{152}Eu ^{226}Ra ^{144}Ce	$3\cdot10^{16}$ $2\cdot10^{15}$ $3\cdot10^{11}$	437 64 1
IR	^{63}Ni ^{239}Pu ^{147}Pm ^{241}Am **^{90}Sr** ^{238}U ^{226}Ra	$4\cdot10^{9}$ $3\cdot10^{11}$ $5\cdot10^{9}$ $7\cdot10^{11}$ $5\cdot10^{11}$ $3\cdot10^{4}$ $2\cdot10^{11}$	5 215 4 104 214 5 17
I	**^{137}Cs** ^{60}Co ^{144}Ce ^{210}Po	$8\cdot10^{13}$ $4\cdot10^{13}$ $1\cdot10^{13}$ $7\cdot10^{12}$	1505 189 4 1

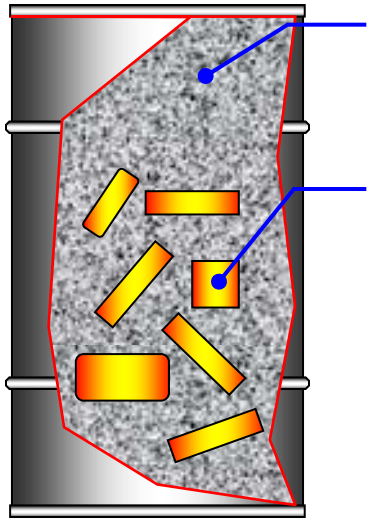
DSRS Management

DSRS type	Operations	Emplacement
I69	▪ Use of specific transport containers (KI-400, KTB-26-12, «model № 9308», UKT1V-250-5 & UKT1V-250-12) ▪ Unloading into special boreholes ▪ Immobilization using metal matrix	Facility 69 with special boreholes
I, IR, IP	▪ Conditioning ▪ Repackage & conditioning ▪ Conditioning in “drum-in-drum” package	Facility 103

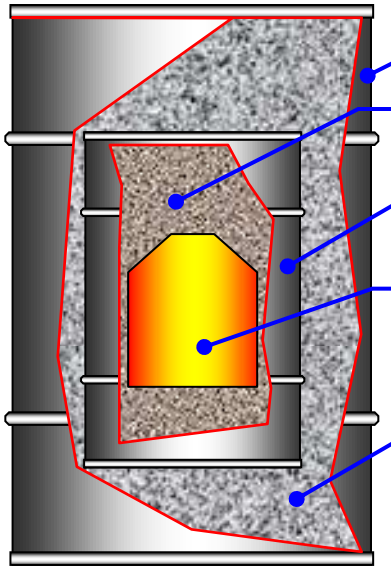
DSRS in containers ($T_{1/2}$ < 30 y)

Radioisotope devices

Management technology



Conditioning in “drum-in-drum” packages



“Drum-in-drum” pack is used for

Waste of different groups with α–radionuclides in amount close to acceptable limits

Neutron sources

Waste containing ^{3}H and/or ^{14}C more then $4 \cdot 10^{11}$ Bq per papackage

DSRS Conditioning

Cementing plant

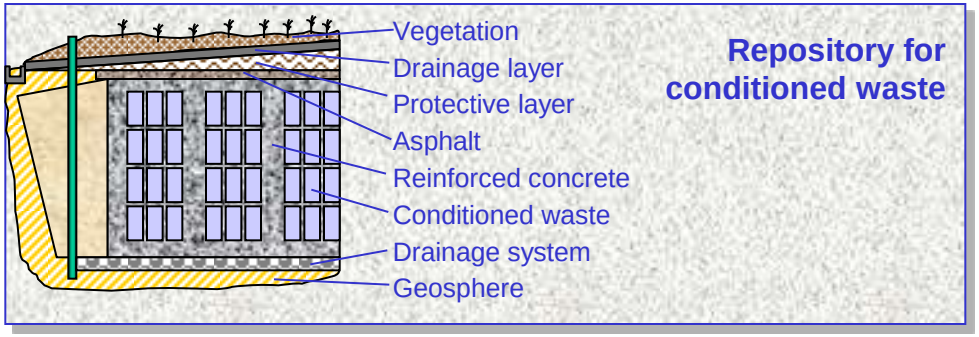
Cement compound control
(GOST P 51883-2002

Cement (in solution)

Container with DSRS

Контроль качества кондиционированных РАО

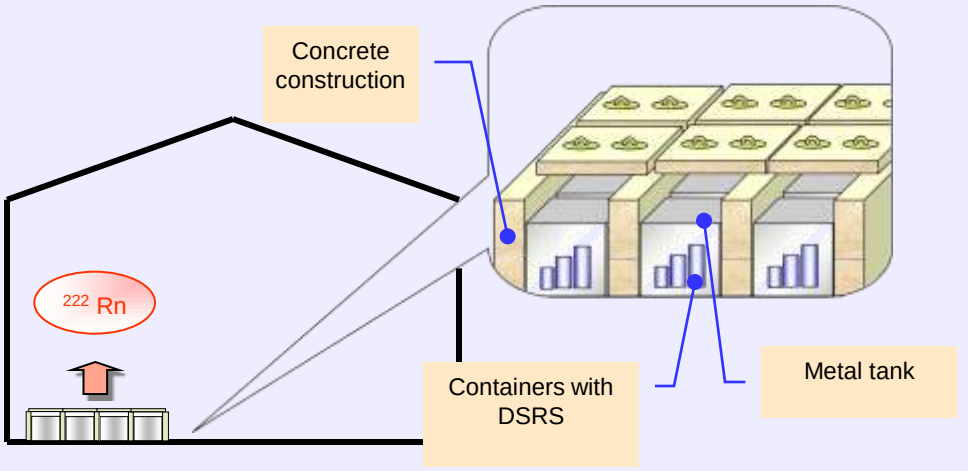
Solidification site



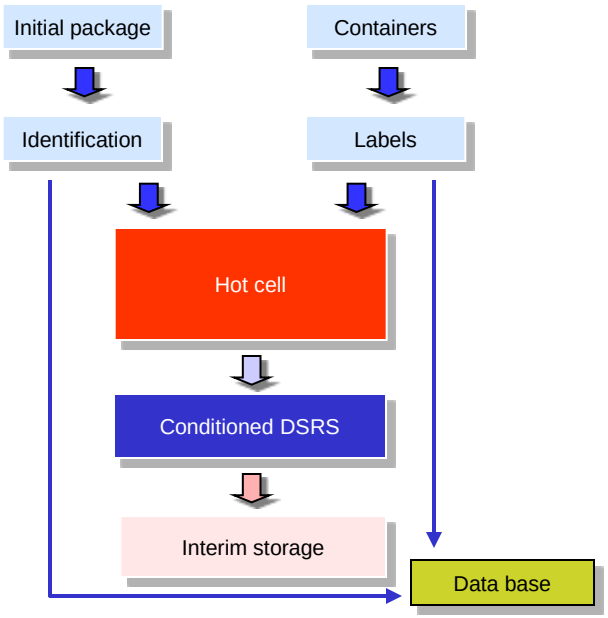
DSRS in containers ($T_{1/2}$ > 30 y)

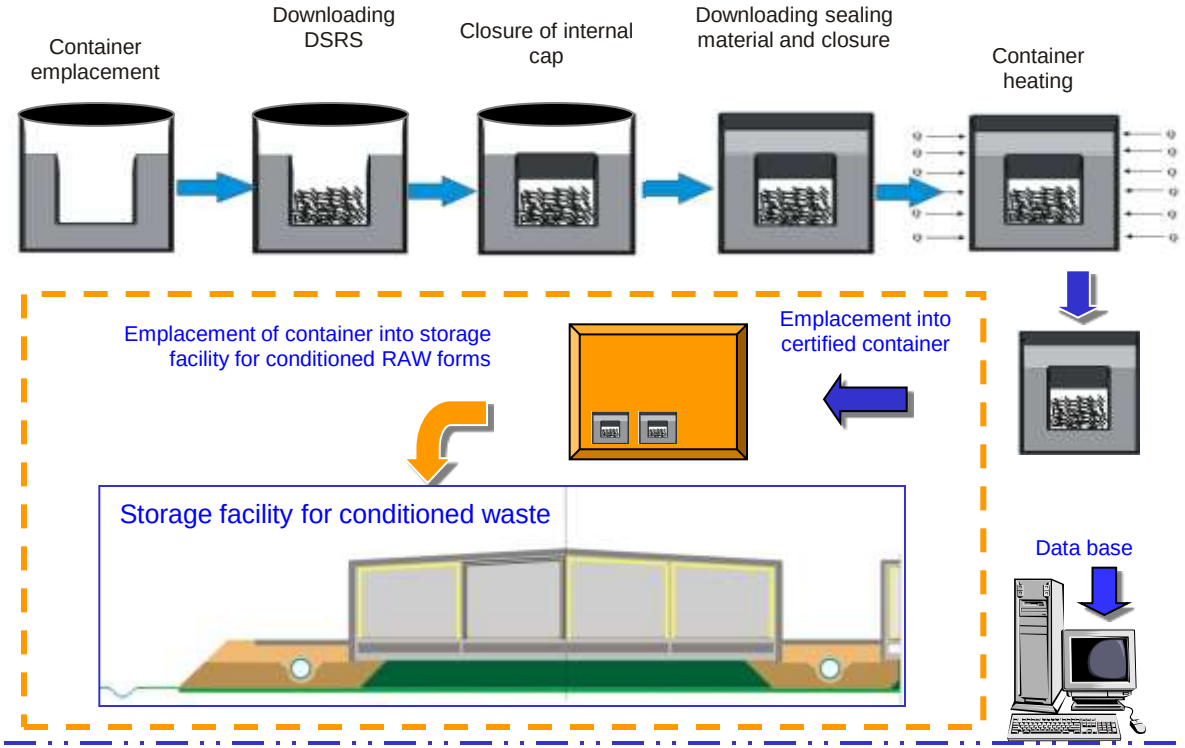
Storage of DSRS with long lived radionuclides

Specially equipped separate building with strong physical protection



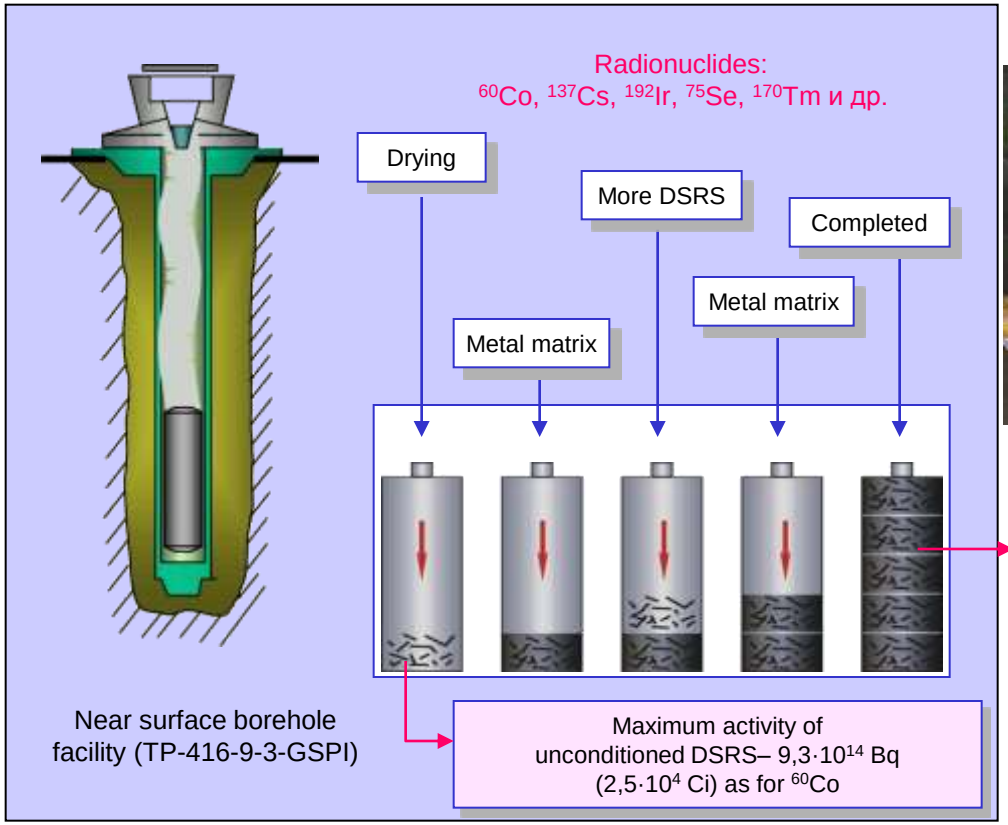
Proposes conditioning scheme





DSRD unloaded from containers

Including DSRS into metal matrix

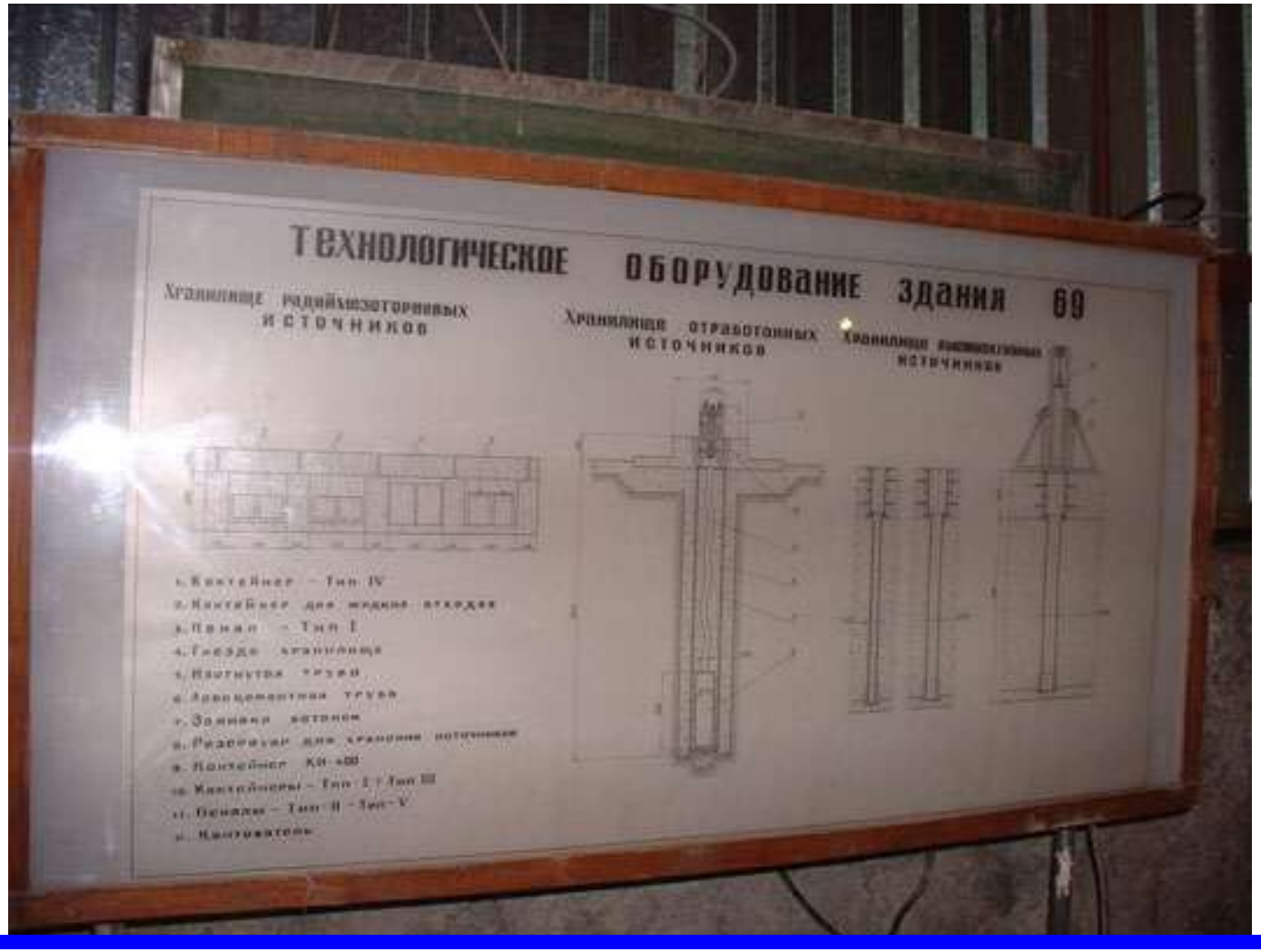


Maximum activity of conditioned DSRS – 6,6·10^{15} Bq (1,8·10^{5} Ci) as for ^{60}Co

Conditioning plants

Borehole Type Repositories

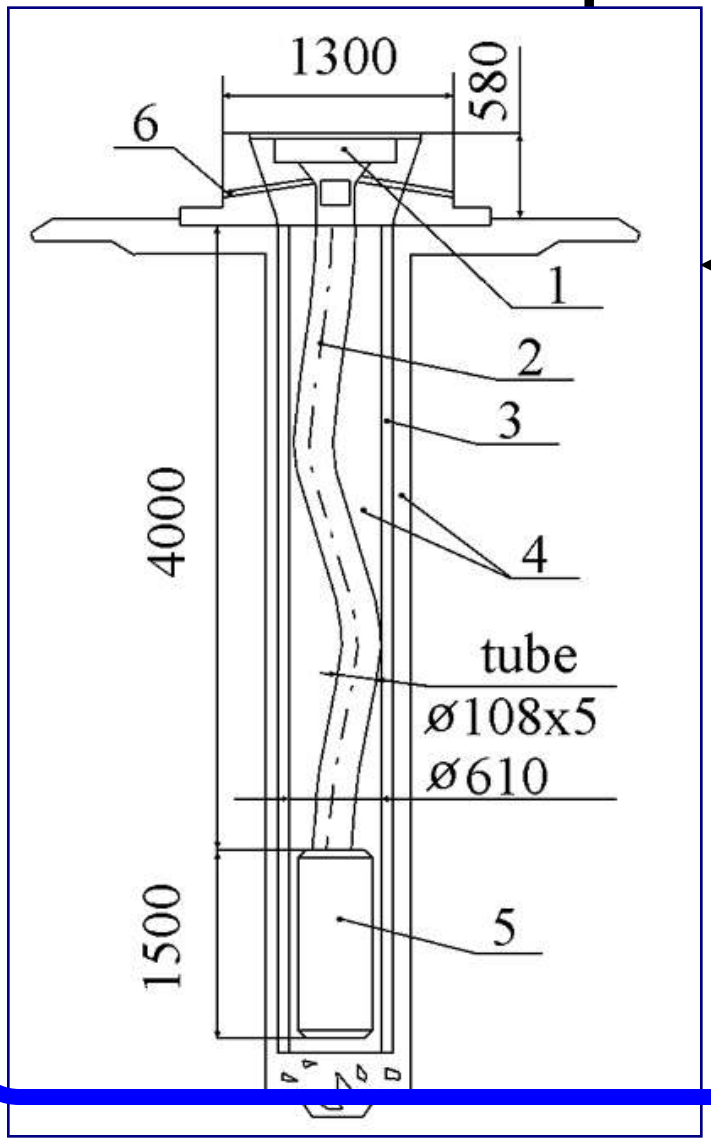
Borehole Type Repositories



Implementation

- **The technology of encapsulation of spent sources into lead matrix has been used since 1986 at MosSIA RADON.**
- **Since 1990 a new technique has come into use at the regional centers of radioactive waste disposal such as Volgograd, Nizhny Novgorod and Sverdlovsk regional repositories.**

Borehole Repository



1 - carbon steel conical socket

2 - stainless steel loading channel

3 - steel-enforced concrete well

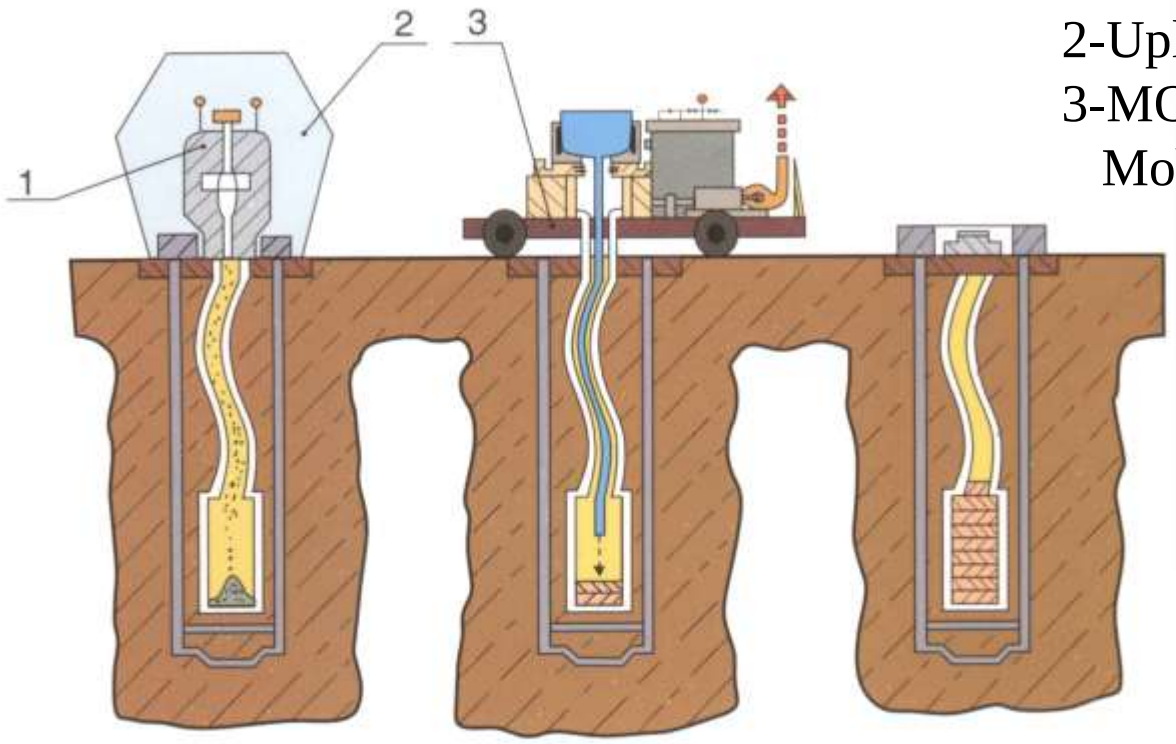
4 - concrete

5 - stainless steel cylindrical vessel

6 - drainage channel

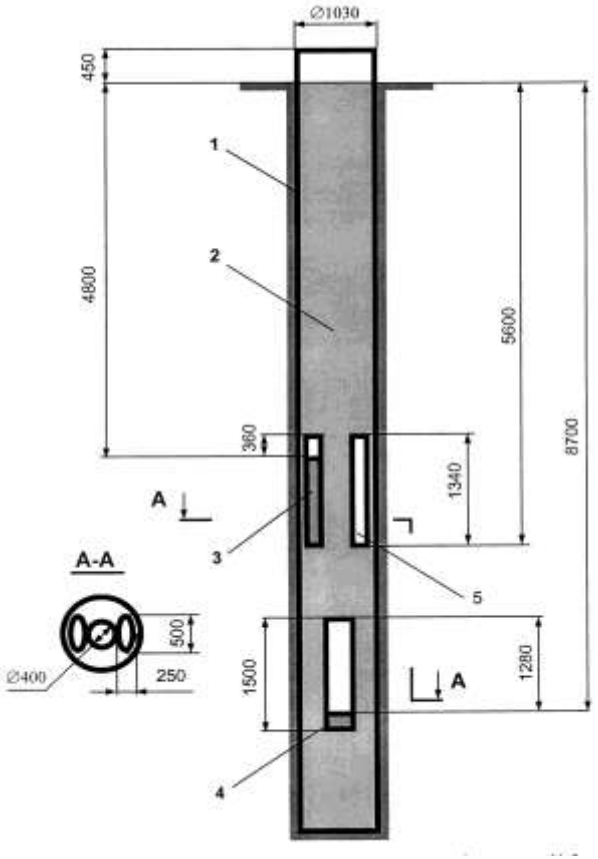
Immobilization Technology

1-Container;
2-Uploading Unit;
3-MOSKIT-T
Mobile Plant



Технология захоронения отработавших источников:
1 — Контейнер;
2 — Транспортно-перегрузочное устройство;
3 — Установка «Москит-Т»

Bore-hole Type Repository



Bore-hole Type Repository

- According to the operating practice and results of preliminary assessment upgrading technology of immobilization of SSRS using lead-based alloys in bore-hole repositories is an effective tool to increase safety of DSRS storage… or disposal?

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The Large Diameter Borehole type repositories:

- may range from 1 to 5 or 6 m in a diameter depending on drilling rig capabilities and performance parameters of the repository in whole

- the depth of the wells depends on geological and hydro-geological conditions of the site

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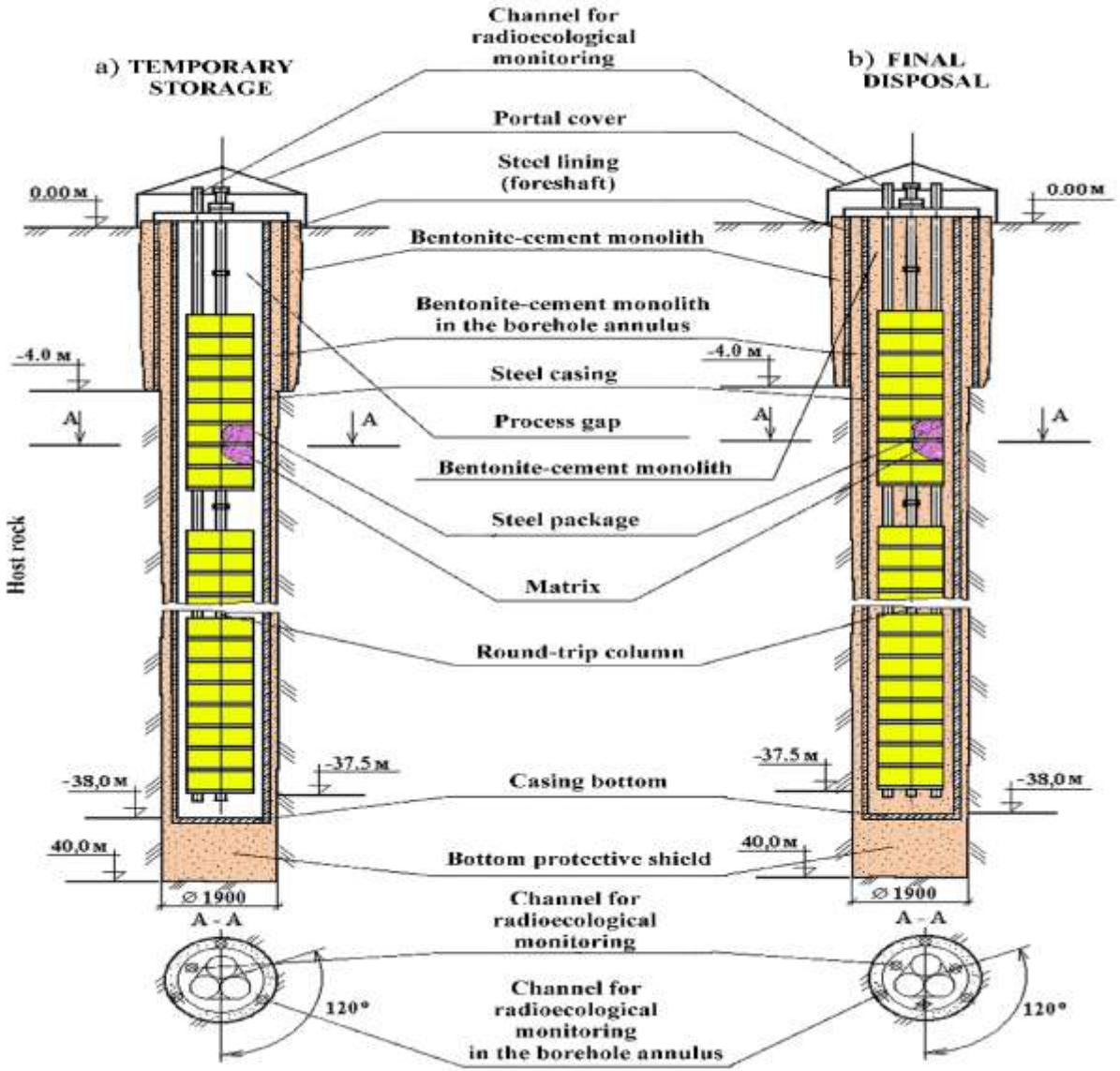

Large diameter Borehole for LILW storage (a) and final disposal (b).

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It is worth noting that the wells may be used both **for storage and disposal**. In the first case the LILW containers are stored in a dry well and may be recovered at any time. In the second case, the void space between the containers and casing pipe is filled with bentonite-cement mortar and the wastes are not subject to recovery.

Control of near field rocks and leakproofness of the repository is provided by a **monitoring system**. The system consists of wells equipped with a set of high resolution seismic gages and radiometric equipment for monitoring any possible radionuclide release out of the repository boundaries.

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Most critical issues:

Gaps in the National Legislation and Regulation, multiple regulation

Legacy DSRS

- Loss of regulatory control and responsibilities due to political changes, termination of defense and military programs and elimination of data records

Absence of final disposal facility (for DRSR)

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