REGULATORY APPROACHES FOR SOLID RADIOACTIVE WASTE STORAGE IN RUSSIA

Andrew Griffith,[1] Stanislav Testov, [2] Alexander Diashev,[3] Ashot Nazarian,[4] Andrei Ustyuzhanin[5]

[1]U.S. Department of Energy
[2]Russian MOD, Nuclear Safety Department
[3]Western Services Corporation, Russia
[4]Science Applications International Corporation, USA
[5]Technology Management Corporation, USA

ABSTRACT

The Russian Navy under the Arctic Military Environmental Cooperation (AMEC) Program has designated the Polyarninsky Shipyard as the regional recipient for solid radioactive waste (SRW) pretreatment and storage facilities. Waste storage technologies include containers and lightweight modular storage buildings. The prime focus of this paper is solid radioactive waste storage options based on the AMEC mission and Russian regulatory standards. The storage capability at the Polyarninsky Shipyard in support of Mobile Pretreatment Facility (MPF) operations under the AMEC Program will allow the Russian Navy to accumulate/stage the SRW after treatment at the MPF. It is anticipated that the MPF will operate for 20 years.

This paper presents the results of a regulatory analysis performed to support an AMEC program decision on the type of facility to be used for storage of SRW. The objectives the study were to:

- analyze whether a modular storage building (MSB), referred in the standards as a lightweight building, would comply with the Russian SRW storage building standard, OST 95 10517-95,
- analyze the Russian SRW storage pad standard OST 95 10516-95, and
- compare the two standards, OST 95 10517-95 for storage buildings and OST 95 10516-95 for storage pads.

Generally a storage facility for SRW in Russia is envisioned as a heavy reinforced concrete building with a service life of up to 50 years. However, after a thorough review of all appropriate Russian storage standards it was concluded that modular (lightweight) storage buildings are also allowed by the standards and could be licensed. Furthermore, the review has also shown that there is a third alternative– a storage pad. Storage pads are widely used in Russia (e.g., for spent nuclear fuel storage at Zvezdochka Shipyard and RTP Atomflot) and may include a cover/structure to protect the waste from the weather.

I. INTRODUCTION

The Russian Navy under the AMEC Program has designated the Polyarninsky Shipyard as the recipient for solid radioactive waste (SRW) pretreatment and storage facilities. The integrated radioactive waste treatment and storage complex (abbreviated PPP RAO from the Russian language) is planned as a combination of AMEC Projects. Waste storage technologies include metal (and possibly concrete) containers and lightweight modular storage buildings. The prime focus of this report is solid radioactive waste storage options based on the AMEC mission and the Russian standards. The storage capability at the Polyarninsky Shipyard in support of MPF operations under the AMEC Program will

allow the Russian Navy to accumulate/stage the SRW after treatment at the MPF. The PST 1A-6 transport containers will be used to store treated waste and will be ready to be shipped for further treatment or disposal. It is anticipated that the MPF will operate for 20 years.

Our preliminary discussions and consultation with the Russian experts indicated that generally a storage facility for SRW in Russia is envisioned as a heavy concrete building with a service life of up to 50 years. However, after a thorough review of all appropriate Russian storage standards it was concluded that modular (lightweight) storage buildings are also allowed by the standards and could also be licensed. Furthermore, the review has also shown that there is a third alternative– a storage pad. Storage pads are widely used in Russia (e.g. at Zvezdochka Shipyard and at RTP Atomflot for spent nuclear fuel storage) and may include a cover/structure to protect the waste from the weather.

II. OBJECTIVES

1. Analyze whether a modular storage building (MSB), referred in the standards as a lightweight building, would comply with the Russian SRW storage building standard, OST 95 10517-95.
2. Analyze the Russian SRW storage pad standard OST 95 10516-95.
3. Compare OST 95 10517-95 (Storage Building) and OST 95 10516-95 (Storage Pad).

Excerpts from the two most important Russian Standards are presented in Attachments 1 and 2.

III. STORAGE BUILDING STANDARD, OST 95 10517-95

This standard addresses all requirements for the design, construction, operation, modification, and decommissioning of solid radioactive waste storage facilities. The storage facility (SF) should provide radiation protection for the workers, the public, and the environment based on multi-barrier principles, during the handling of SRW and should mitigate the radiological hazards in case of design basis accidents.

A heavy reinforced concrete structure as is frequently envisioned for a storage building would be easy to license and could store low-, medium-, and high-activity SRW for up to 50 years. However, based on our analysis of the OST 95 10517-95 standard, it is apparent that a lightweight structure such as an MSB could meet Russian regulatory requirements for storing low- and medium-activity (non-biological) SRW. The service life of this structure, according to Section 6.6 of the standard, may not exceed 20 years.

Furthermore, usage of PST 1A-6 transport/storage containers for waste coming out of the MPF may simplify the design (type and function) of the SRW storage facility. For instance, Section 10.3 of OST 95 10517-95 requires having a pad/space inside of the SRW storage facility for loading SRW into transport containers. Generally, such space will be not needed in our case because the waste, according to MPF technical assignment (TZ) should be loaded into certified transport containers before it leaves the MPF.

Generally, storage buildings for SRW should meet "Nuclear Safety Class II" and other general requirements for premises containing radioactive substances (OSPORB 99, "Basic Sanitary Rules for Assuring Radiation Safety"). Consequently, some of the elements of a storage building include:

- Special ventilation system;
- Decontamination solutions;
- Low-sorption coating on the floor and walls capable to withstand usage of decontamination solutions;
- Wash-out/dress-out area (sanitary pass), including showers, lockers, portal monitors, etc.
- Hot and cold water supply;
- Special sewerage system;
- Radiation monitoring system;
- Set of hand-held instruments for monitoring of containers; and
- Worker dosimetry system.

The radiation monitoring system is covered under AMEC Project 1.5-1, however; a set of hand-held instruments for monitoring of containers and workers dosimetry system are in addition to radiation monitors from AMEC Project 1.5-1.

The recommended types of SRW storage facility are presented in Table 2 (see Attachment 1). The waste stream from the MPF is expected to be low- to medium-activity, non-biological radioactive waste packaged in drums that will be placed in PST 1A-6 containers. Using the same terms used in the table, one can conclude that it is "appropriate" to store the containerized, treated waste from the MPF in a lightweight structure.

IV. STORAGE PAD STANDARD, OST 95 10516-95

The regulations governing storage pads generally call for the design, construction, and operation of pads that will provide protection of workers, the public, and the environment.

Storage pads are generally intended for staging and short-term storage of SRW. The waste will ultimately be shipped away for treatment, further storage, or disposal. Russian regulations dictate that storage pads should be designed as an integral part of any SRW handling/management complex. The purpose of the pad is storage of SRW for no more than 6 months, after which the SRW should be shipped for treatment, storage, or disposal in accordance with Section 3.4 of SPORO-85 (Russian Sanitary Rules for Handling SRW). However, the service life of the pad should be equal to or greater than the life of the facility where the SRW is to be generated. Storage pads may include a cover/structure to protect the waste containers from the weather.

Design requirements for a storage pad are minimal. The key features of the design include:

- surfaces and curbing that prevent the runoff of potentially contaminated liquids;
- a radiation monitoring system.

The radiation monitoring system required by this standard is a simple dose rate measurement system.

Although storage pads are contemplated for short-term storage, experience in Russia indicates that it is possible to justify longer-term uses (e.g., storage of spent fuel in casks on a storage pad at the

Zvezdochka Shipyard and RTP Atomflot). The design requirements for storage pads are rather general which leaves design flexibility in developing storage capability that protects workers, the public and the environment.

V. COMPARISON

Given that a concrete structure is not feasible due to the extremely tight construction schedule and costs, there are only two remaining options. These are options A and B, which are based on OST 95 10517-95 and OST 95 10516-95, respectively.

Option A: A lightweight structure constructed in accordance with the storage building standard, OST 95 10517-95 could provide this function. Design and construction of such a storage building entails compliance with a large number of prescriptive requirements. Considering the complexity of the current Russian regulatory process, constructing a lightweight structure under the storage building standard would be costly and time consuming.

Option B: Storage pads, constructed in accordance with OST 95 19516-95, are widely used in Russia (even for spent nuclear fuel storage) and may include a cover/structure to protect the waste containers from the weather. A storage pad would be a simpler project because there are fewer prescribed component elements. Selecting a pad would require getting a waiver from the regulatory requirement that limits storage on a pad to 6 months. Based on the mission and objectives in AMEC and given the complexity of the current Russian regulatory standards, a storage pad could be a more cost-effective and timely solution for SRW storage.

A detailed comparison of the two options/standards is presented in Table 1 below. The storage pad to support MPF operations at the Polyarninsky Shipyard may have a concrete pad with a lightweight structure for weather enclosure, have a 20-year service life (service life for MPF is also 20 years), and minimize the design scope/duration and approval processes. According to our preliminary information under the new Russian PVSR-2000 rules the pad could be licensed and re-licensed every 2 years by the Russian MOD Nuclear Safety Department ("Military GAN") and Minatom.

Table 1 Comparison of SRW Lightweight Storage Building (OST 95 19517-95) to Storage Pad (OST 95 19516-95) Requirements

Parameter	Lightweight Storage Building (OST 95 19517-95)	Storage Pad (OST 95 19516-95)	Comments
Allowed storage time	"Staging storage" associated with a treatment facility – up to 2 years; "Interim storage" is designed to collect and store SRW for processing or disposal at some point in the future – 20 to 50 years.	Up to 6 months	To build a pad will require obtaining a waiver from this requirement. MSB falls under the "short service life structure" category and OST 95 19516-95 limit its operation period to 20 years. So, design reviewers may decide that MSB is usable only as "Staging storage", which means 2 year storage time. In such a case it will require to re-apply for a license or get a waiver.
Types of SRW	Group I and II (low- and medium-activity wastes)	Group I, II and III (low-, medium-, and high-activity wastes)	Pad as opposed to an MSB allows storage of Cat. III wastes, though they must be kept in a specially designated and, if necessary, shielded enclosure equipped with a shed that protects the containers from direct sunlight and precipitation.
Establishment of maximum allowed emissions/effluents into environment	Required	Only monitoring of emissions/ effluents is required	Justified recommendations on total allowable emissions/effluents would be proposed at the pre-design stage of development of a storage building (OST 95 19516-95); then these limits should be approved by local environmental protection authorities upon concurrence from sanitary & epidemiological authorities and the nuclear regulator. Subsequently, in the Design Documentation for the storage building there must be very detailed calculations related to the emissions/effluents, dose loads, shielding, population protection measures, etc. (17 items total). OST 95 19516-95 for the pads requires only monitoring of emissions/effluents and staying within limits established by general regulatory documents. (A lot more design work for the storage building vs. storage pad)
Classification of all premises by fire hazard categories	Required	Not required	At a minimum, extra design work for the storage building. At a maximum - additional requirements for materials of construction and fire alarms and an extinguishing system (extra cost)
Classification of premises by accessibility for personal (continuous presence, periodic access, no access to premises)	Required	Not required	Additional design work, perhaps, additional requirements for the layout or equipment for a storage building.
Classification of premises by radioactivity Class	—	—	OSBORB-99 requires storage of radwastes to be conducted in specially designated pads or premises equipped in accordance with requirements of Class II, (dress-out/wash-out area, special sewerage system, certain requirements for heating system, special ventilation system, etc.). Although requirements are the same for a pad or storage building, it is logical to assume that for a pad "special ventilation" requirements will be waived, but for storage building they will definitely be enforced.
Insuring that storage area is covered from atmospheric precipitation	Required	Not required for Group I and II wastes	
Compliance with special reliability requirements set by GOST 26291	Required	Not required	There is a cost impact for storage building versus a storage pad.
Compliance with "Special conditions of delivery of equipment, instrumentation and products to nuclear power facilities"	Required	Not required	There is a cost impact for storage building versus a storage pad.

Parameter	Lightweight Storage Building (OST 95 19517-95)	Storage Pad (OST 95 19516-95)	Comments
Requirements for structural materials (high corrosion resistance, low sorption, coatings resistant to decontamination solutions, etc.).	Present	Absent	There is a cost impact for storage building versus a storage pad.
On-site dedicated decontamination system	Required	Not required	There is a cost impact for storage building versus a storage pad.
Compliance with "Rules of design & development of capital construction projects for nuclear plants with reactors of different types "PiN AE-5.6"	Required	Not required	There is a cost impact for storage building versus a storage pad.
Compliance with "Rules of design & development of seismically stable nuclear plants"	Required.	Not required	There is a cost impact for storage building versus a storage pad.

The above table shows that the design and approvals process for the Storage Building as opposed to Storage Pad is substantially more complicated. Meeting all OST 95 10517-95 requirements for a lightweight storage facility would very likely cost more that the lightweight structure itself.

Attachment 1

Excerpts from the Russian Industry Standard "Storage Facilities for Solid Radioactive Wastes," OST 95 10517-95, Minatom of Russia

General Requirements

5. General Provisions

5.1 This standard establishes general requirements for technical solutions during the design, construction, operation, modification, and decommissioning of solid radioactive waste storage facilities (SRW SF). SRW SF should provide radiation protection for the workers, the public, and the environment based on multi-barrier principles, during the handling of SRW and should mitigate the radiological hazard in case of design basis accidents.

5.2 The SRW SF radiation safety is deemed sufficient when the technical and procedural measures in place would allow the facility to meet all the requirements of the Russian radiation safety standards: NRB-99, SP AS-88/93, and when they ensure that requirements of this standard as well as documents listed in Section 2 are met with regard to the dose rates on the workers and the public, and also radiological impact on the environment,

6. Classification of SRW SF.

6.1 SRW SF are classified as follows:

- Based on storage duration
- Based on deepness of storage (e.g., surface storage, below-grade storage, and deep underground storage)
- Based on location (on-site or regional)
- Based on type of structure (heavy permanent or lightweight temporary structure)

6.2 In SRW SF storage should be organized in an orderly fashion using packages (containers, drums, etc.). This will allow easy retrieval of SRW for subsequent treatment and/or disposal.

6.3 SRW SF are categorized based on the nuclear safety requirements for each type of waste and equipment functioning inside of the facility. Based on PiN AE-5.6 (p. 1.5; 1.5.2; 1.5.3) the SRW SF should be either Category II or III:

- Category II is for storage of high activity SRW (Group III)

– Category III is for storage of low and medium activity SRW (Groups I and II) and allows usage of temporary structures with an expected service life of no more than 20 years.

7. Requirements for selecting a site for SRW SF and general layouts of sanitary-protection zone and monitoring zone.

8. Requirements for protecting worker personnel and the public, and for preventing contamination of the environment.

9. Main requirements for engineered safeguards and radiation monitoring equipment at SRW SF

10. Requirements for operational buildings and rooms (Sections 10.1-10.18).

10.1 The restricted area should also include:

- Site for loading SRW in transport containers,
- Site for short-term storage of SRW,
- Decontamination facility for transportation and reusable containers.

11. Requirements for organizing technological operations and equipment.

12. Requirements for implementing maintenance and repair.

13. Decommissioning of SRW SF.

14. SRW SF types selection.

14.1 The process of selection of a SRW SF is based on storage duration, type of SRW, physical-chemical composition of waste (dispersity, leachability, fire and explosion hazards etc.) and also suitability for later treatment and disposal.

14.2 For selecting a SRW SF based on waste characteristics, activity, and methods of further treatment use of the data in Table B is recommended

14.3 Based on the activity level, the selected SRW SF could be on the surface or underground. The key is safely storing the SRW.

14.3.1 For low activity SRW, Group I, which will go for treatment, a Category III storage facility should be selected (on-site or regional, staging/ short-term or interim) with orderly storage of SRW (preferably containerized storage).

14.3.2 For medium activity SRW, Group II, some of which will go for decay storage and then for treatment and/or disposal a Category III storage facility should be selected with orderly storage of SRW.

14.3.3 For higher activity SRW a Category II storage facility should be selected with orderly storage of SRW and should provide safe protection from the different types of radiological effects on the public and environment.

14.4 A storage facility should be built in accordance with the technical design, which should be approved by State regulatory and oversight bodies.

Accepting or licensing a storage facility for operation, which has deviations from the approved technical design or has incomplete elements of construction is prohibited because this would aggravate sanitary- hygienic conditions and safety of worker personnel.

Reproduced from Standard OST-95, 10517-95

Table 2 Recommended Types of SRW Storage Facilities Based on the Type of SRW

			TYPE OF STORAGE FACILITIES FOR SRW																														
	Type of SRW by waste activity and treatment method		Storage duration									Deepness of storage									SRW SF location						Storage method						Type of facility structure					
			Staging/ Short-term (2-year)			Interim (20-50 year)			Storage for decay (20-50 year)			Surface			Subsurface/ Below-grade			Deep underground			On site			Central/ regional			Containerized			Without containers			Permanent/ Heavy			Temporary/ Lightweight		
	Type SRW by chem.-phys. composition		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Group I low	Could be decontaminated	nc	++	++		+	++		+	+		++	++		+	+		--	--		++	++		-	-		++	++		-	-		-	-		++	++	
	combustible	c	++	++	++	+	+	--	-	-	-	++	++	++	+	+	-	-	-	--	++	++	--	+	+	+-	++	++	++	--	--	--	-	-	--	+	+	--
	compressible	nc	++	++		+	+		+	+		++	++		+	+		-	-		++	++		+	+		++	++		-	-		-	-		+	+	
	Could be melted	nc	+	++		+	++		-	+-		++	++		+	+		-	-		++	++		+	=		++	++		--	+-		-	-		+	+	
	Non-treatable	c/nc	+	++		+	++		-	+-		++	++		+	+		-	-		++	++		+	+		++	++		--	+-		-	-		+	+	
Group II medium	Could be decontaminated	nc	++	++		+	++		+	+		+	+		++	++		+-	+-		++	++		+	+		++	++		--	-		+	+		++	++	
	combustible	c	++	++	++	+	+-	--	+-	+-	--	+	+	++	+	+	--	--	--	--	++	++	++	-	-	--	++	++	++	--	-	--	+	+	+	+	+	+
	compressible	nc	++	+		++	++		+	+		++	++		+	+		-	-		++	++		+-	+		++	++		--	-		+	+		+	+	
	Could be melted	nc	++	++		++	++		++	++		++	++		+	+		+-	+-		++	++		+-	+-		++	++		--	--		+	+		-	-	
	Non-treatable	c/nc	+	++		+	++		-	+-		++	++		+	+		-	-		++	++		+	+		++	++		--	+-		-	-		+	+	
Group III high	Could be decontaminated	nc	-	-		+	+		++	++		-	-		++	++		+	+		+	+		++	++		++	++		-	-		++	++		-	-	
	combustible	c	+	+	+	+	+	--	++	++	--	-	-	--	+	+	+-	++	++	--	+	+	++	+-	+-	--	++	++	++	-	-	--	++	++	++	-	-	-
	compressible	nc	+	+		++	++		+	+		-	-		+	+		++	++		+	+		++	++		++	++		--	--		++	++		-	-	
	Could be melted	nc	-	-		+	+		++	++		+-	+-		+	+		++	++		+	+		++	++		++	++		--	-		++	++		-	-	
	Non-treatable	c/nc	+	++		+	++		-	+-		++	++		+	+		-	-		++	++		+	+		++	++		--	+-		-	-		+	+	

Key for selection:

- ++ Most appropriate
- + Appropriate/allowable
- - Not appropriate
- -- Prohibited
- +- Customer's decision

Type of SRW based of physical-chemical compositions:

- 1 organic
- 2 inorganic
- 3 biological
- c combustible
- nc non-combustible
- c/nc combustible and non-combustible

Contact: Ashot Nazarian, SAIC, phone: 301-601-5620, fax: 301-428-0145, Email: Ashot.Nazarian@saic.com

Attachment 2

Excerpts from the Russian Industry Standard "Storage Pads for Staging and Short-term Storage of Solid Radioactive Wastes," OST 95 10516-95, Minatom of Russia

General Requirements

Definition: Storage pads for staging and short-term storage of solid radioactive wastes (SRW). The SRW will ultimately be shipped away for treatment or further storage.

4. General Requirements

4.1 Storage pads should be designed as an integral part of an SRW handling/management complex. The purpose of the pad is storage of SRW for no more than 6 months, after which the SRW should be shipped for treatment or disposal in accordance with Section 3.4 of SPORO-85 (Russian Sanitary Rules for handling SRW).

The service life of the pad should be equal or greater than the life of the facility where the SRW is to be generated.

At the end of this service life, the pad should be decommissioned in accordance with Russian Law for dealing with radioactive waste.

4.2 SRW stored on the pad should be sorted by:

- The level of specific (mass) activity,
- The origin of the materials,
- The method of the treatment.

4.3 Radiological hazards and environmental concerns during short-term storage depends on following parameters:

- The activity level,
- The concentration of radionuclides,
- The type and intensity of radiation,
- The toxicity of radioactive materials inside of waste,
- The decay half-life of the nuclides, and
- The type and condition of the containers.

4.4 The design process should consider sources of ionizing radiation that could affect the workers and the public. It should also address safety measures to keep the accumulative radiation dose, from all sources, below the level acceptable by sanitary rules (NRB-76/87, OSP-72/87).

4.5 The safe handling of SRW should be based on radiation and nuclear safety rules and regulations, NPB-76/87 and PBYa–06-00-88.

4.6 The general environmental requirements during the design of the pad are:

- Land use limitation,
- Water use limitation and prevention of contamination of surface and underground water, and Prevention of atmospheric pollution.

4.7 In order to meet the above requirements, the sanitary rules and regulations (NPB-76/87, OSP-72/87) regulate the levels of radioactive materials emissions and releases into the sewer system and hydrosphere.

4.8 The safety measures during handling the radioactive waste (RW) should be based on different protective barriers such as:

- Bio-shielding,
- Air-tightness of storage containers, and
- Technical-procedural measures.

The protective properties of these barriers should provide all the necessary conditions for protecting the environment from the harmful affects of RW.

5. The Requirements for Pads Used for Short-term Storage of SRW

5.1 The site selection of the staging pads should be based on the Land Law of RF and other rules and regulations for handling RW (SPORO-85, TS TOB-AS-85).

5.2 During selection, design, and construction of the staging pads it is necessary have engineering protective measures from general operational failures, environmental and other effects in accordance with OPB-88 and PNAE G-03-33-93.

5.3 The pads should be built based on the design, which must be approved by Gosatomnadzor, Gossanepidemnadzor and state environmental expertise of RF.

An underground pad could be accepted if engineering solutions would satisfy all nuclear safety rules and regulations.

5.4 The pads should be restricted areas, having radiation hazard signs, guards, and alarm systems to prevent unauthorized access to the site.

Around the site should be a sanitary-protective monitored area. The size of the area in every specific case should be determined and approved by Gosstroy and Gosatomnadzor RF.

5.5 Radioactive contamination prevention beyond the restricted area should be achieved by procedural, sanitary, and technological measures, specifically:

- Sanitary area with a sanitary check-point,
- Sewer system,
- Fencing of the area,
- Use of protective coatings,
- Decontamination system for equipment and vehicles, and
- A floor plan that restricts workers access to contaminated area.

5.6 (Related to operation)

5.7 The pads should have equipment necessary for loading, unloading, storing, and transporting the incoming and outgoing wastes.

5.8-5.15 (Related to operation)

5.16 The pad should meet following requirements:

- It should have a fence,
- It should have reliable hydro-isolation,
- It should have asphalt-concrete cover with special waterproof coating, to prevent water transport of radioactive contaminates beyond of limits of the pad, and also should allow to do decontamination work,
- It should have concrete curb around the perimeter, with waterproof coating, to prevent contamination spreading,
- It should have concrete trench with internal dimensions at least 40-cm x 40-cm to prevent water flooding from surroundings,
- It should have monitoring wells along the edge of the pad,
- It should have intermediate monitored water collector for snow and rain water,
- It should have regular and special sewers,
- It should have easy road access with a firm surface,
- It should have lifting and transport equipment for loading and unloading work, and
- It should have fire safety equipment.

5.17 The minimal size of the pad should be sufficient to store at least 10 containers 1m wide and 1 m long, and also have room for access by transportation and lifting equipment.

5.18 The dose rate at outside wall of the building or at outside fence of the SRW storage site should not exceed 1 x 10^{-3} mSv/h (0.1 mrem/h). The dose rate of SRW containers on 1-m distance should not exceed 0.1 mSv/h (10 mrem/h).

5.19 Each pad should have limitation on the total activity allowed so when the total activity reaches this limit, the pad will not accept any additional SRW.

5.20 The radmonitoring system of the pad should address the general radiological situation and dose rates as well as the dose rates to which the workers will be exposed.

5.21 The radmonitoring process should include: scope, character, the frequency of detection, the process of data collection, the type of reports, the verification process, and the acceptable levels of monitored parameters.

The measurement/detection protocols should be certified in accordance with industry standards.

5.22 During operation of the pads, there should be individual radmonitoring of workers as well as other measurements:

- During loading and shipping of the containers,
- The dose rate for gamma radiation,
- The level of radcontamination of surfaces of equipment, skin and personal protective equipment,
- The radioactive materials release into atmosphere,
- Radmonitoring of rain and snow water runoff, radmonitoring of collection, decontamination, and removal of radioactive waste created during the operation, Monitoring of radioactive and hazardous chemical materials in underground waters, radmonitoring of the contamination level of vehicles, and radmonitoring of the contamination level of the surfaces during the decontamination work.

5.23 The design documents of the pad should specify the type of radmonitoring equipment, and address the type possible accidents.

5.24 The requirements for decontamination means are specified in OST 95 10131.

5.25 The secondary waste stream generated during decontamination operations should be handled according to established procedures at the facility.

There are also Attachments A and B in this standard, which present classifications of RW and SRW for reference purposes.