



Ensuring safety and sustainability in managing legacy and remediation radioactive waste

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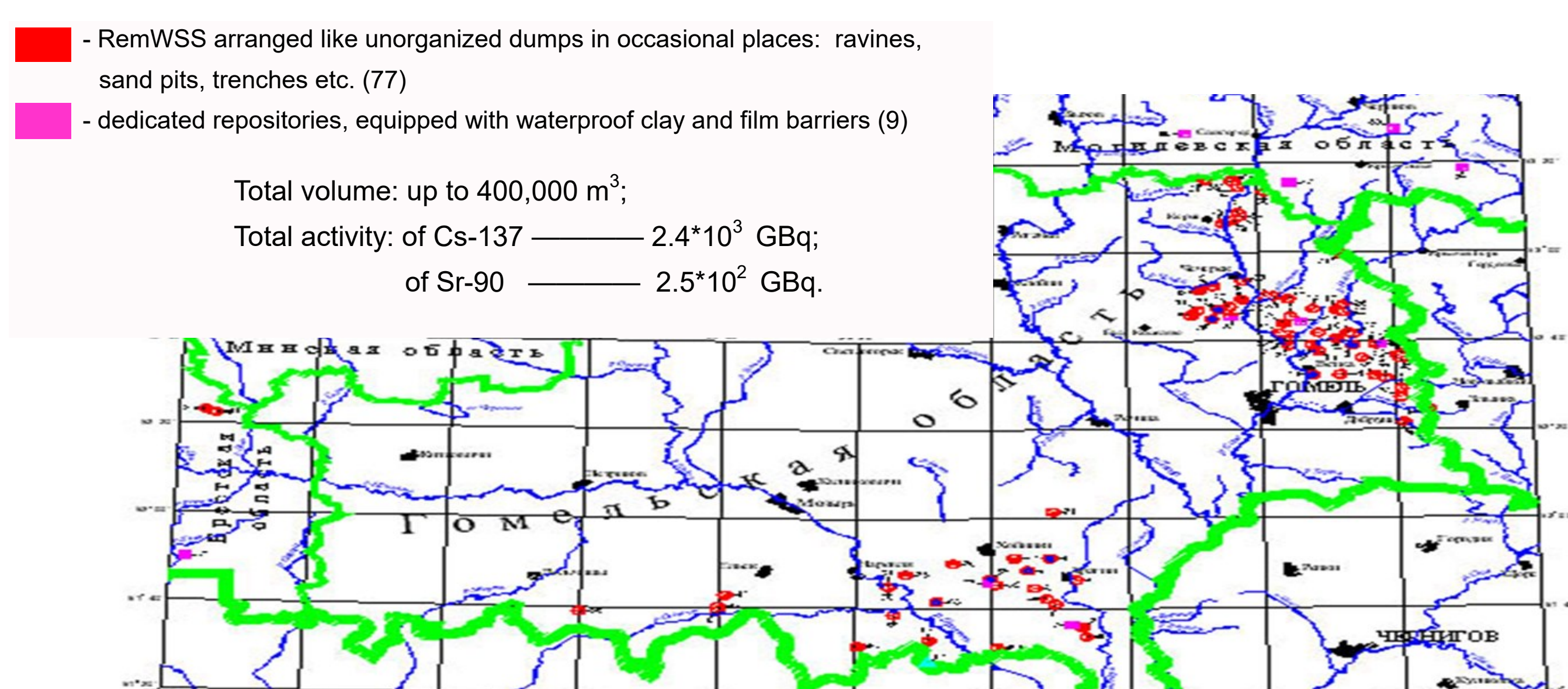
L. ROZDYALOUSKAYA

Scientific Practical Centre of Hygiene
Ministry of Health, Minsk, Belarus
Irozdyalouskaya@gmail.com

In the interests of consistency with the principles of sustainable development – of not passing undesirable burdens to future generations – it is essential that the national radioactive waste (RW) management system provides for long-term safety of all kinds of waste including legacy waste and waste generated during remediation activities (remediation waste – RemW).

1. Achieving sustainable management of RemW

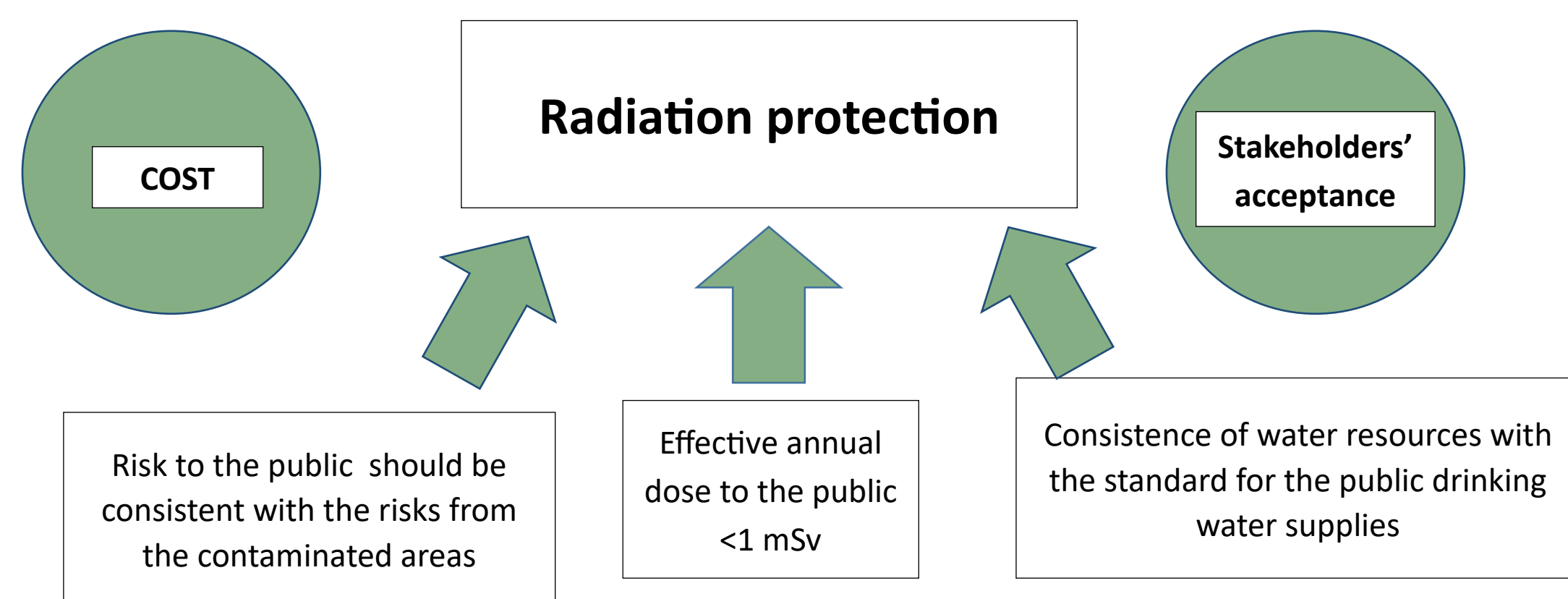
In Belarus more than 400 thousand tons of RemW were arisen from the clean-up activities in the areas, affected by the Chernobyl Accident. The waste was disposed in 90 (now 86) “emergency” storage sites (further RemWSS), most of which were arranged in ravines, sand pits, trenches and other occasional places.



Location of the RemWSS in the Belarus territory (2017)

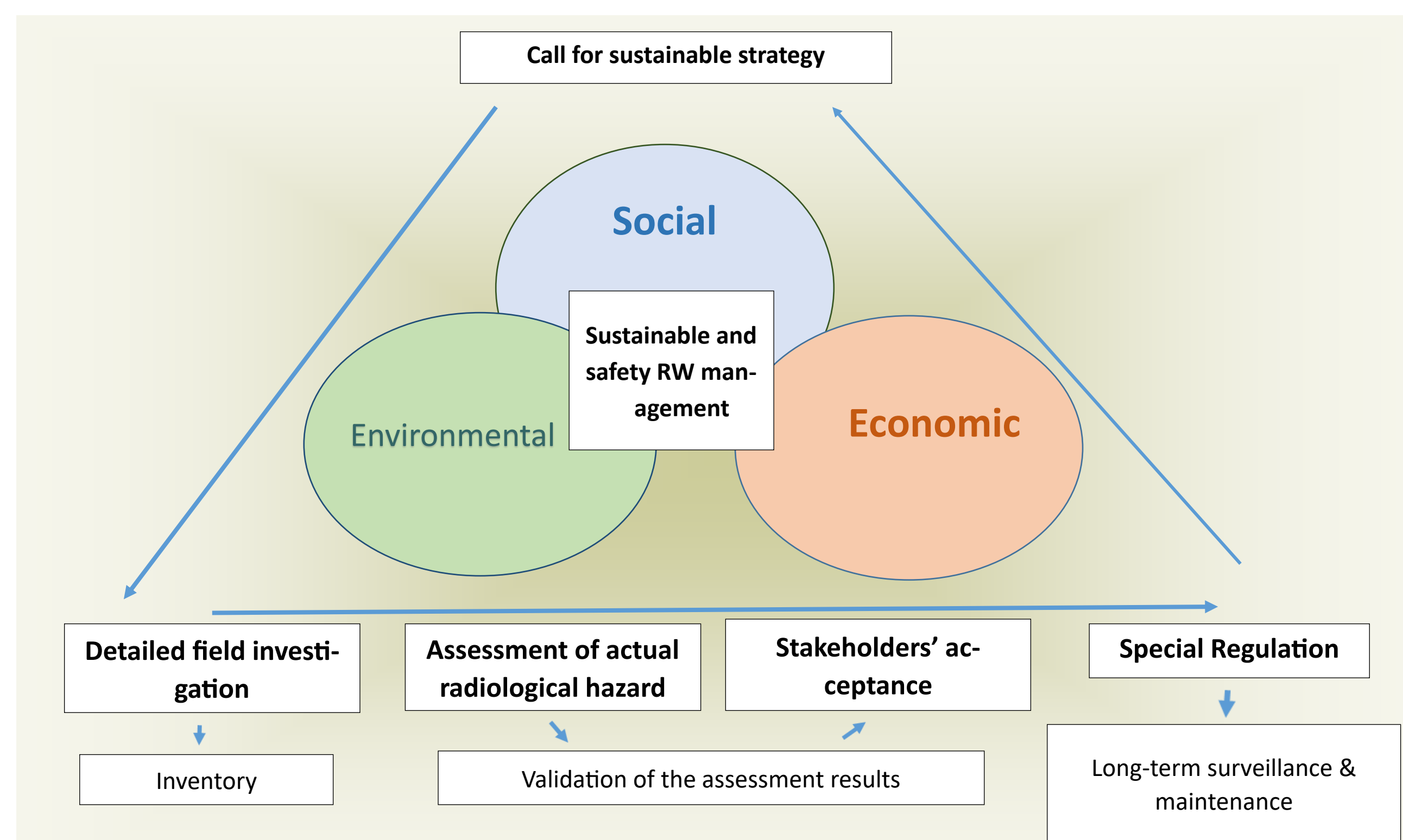
The stakeholders: the public, environment agencies, state authorities, mass media and others insisted strictly that the Government should take urgent measures for relocation of the RemW to dedicated concrete near surface facilities, according to that time adopted strategy and regulations. In real practice it was completely baseless solution given huge volumes, low activities and other specific features of the RemW.

The situation called for elaboration of an advanced management strategy that would explicitly linked to the goals of sustainable development and provided for a sufficient safety level of the RemW operation system. The elaboration process included detailed field investigation, development of radiological assessment criteria and assessment of the RemWSS potential radiological hazard, update of regulations, and “mutual learning” by and from all stakeholders.



Criteria for RemWSS radiological assessment

Eventually the Authorities abandoned the previously assigned task on the RemW re-entombment into concrete vaults, and a risk-based approach to management of the RemWSS was justified. From the regulatory point of view, the RemW was defined as a separate class of waste to be regulated by the special regulation, which established requirements to technical measurers, radiological monitoring, maintenance and operation conditions at the RemWSS with due account to the RemW peculiarities [1, 2].



Achieving sustainable strategy for management of RemW

2. Sustainable strategy for management of the legacy institutional waste

In Belarus this waste category includes more than 1000 m³ of institutional RW, buried in 1963 – 1997 in the repositories of the centralized Radon-type near-surface facility Ekores. The waste include high activity spent sealed radioactive sources (SSRS) and long-lived waste, which were covered up in the vaults of 3 m deep without any segregation or waste processing.

In late 1990s, Belarus Authorities turned to advanced RW management solutions linked to the sustainable goals and Articles 12 and 28 of the Joint Convention. In 1997 the Government launched a national project for Ekores facility reconstruction, the design of which envisaged upgrading of the existing facility capabilities and construction of three new units: for storage of spent sealed sources, for waste pre- disposal treatment/conditioning and for storage of conditioned waste.

However, the realisation of the project was stopped due to the intense opposite reaction of the society and major experts, who found it unacceptable to extend lifetime of the radiation hazard facility located on the outskirts of the capital of Belarus (2mln city) .

In order to get the acceptance of the stakeholders the state authorities were forced to develop and approve an advanced conception of the Ekores reconstruction. It specified that the main goal of the reconstruction activity was the creating capacities for a flexible relocation of long-lived RW from the Ekores site to a new disposal/storage facility to be constructed in future. The new equipment and modern technologies were designed for segregation and conditioning of all waste, disposed in the Ekores vaults, including those, buried in 1960s –1980s, in order to make them acceptable for transfer to and disposal at the new facility.

Creating new processes and installations at the Ekores site took about 15 years due to often delays and breaks in the funding of the project. The next steps, relating to retrieval and processing of the legacy waste, have been recently specified in the National Strategy for management of RW approved by the Government on 25 February 2023. The reconstruction results and future activities scheduled in the National Strategy are summarized in the Table below.

The reconstruction results	Timing
Commissioning of:	
Storage facility for SSRSs equipped with 11 retrievable bore hole repositories & monitoring boreholes	2003
Laboratory engineering building equipped with installations and tools for waste processing and testing	2013
Storage facility for conditioned RW (3060 m ³)	2013
Future activities, scheduled in the National Strategy	
Develop a project for the retrieval of RW from the "Ekores" repositories	
Carry out an analysis and take decision with regard to the using the Ekores site as a logistics centre for processing the waste from small users before transferring to the new RW management facility for disposal	2022 – 2030
Commissioning of the first unit of the new near-surface RW disposal facility	2030
Retrieve RW from the Ekores repositories and bring them into consistence with the WAC for disposal in the new RW management facility	
Transfer the conditioned RW from the Ekores site to the new RW disposal facility	2030-2050

3. Lessons learned in incorporating the sustainability aspects in national RW management strategy

1. The unreasonable constraints in the regulatory framework can impede sustainable management of RemW. The establishment of suitable regulatory requirements with due account to the RemW peculiarities is an important component of policy and measures aimed to ensuring a sustainable RemW future.

2. The forecasting assessments of the potential radiological hazard associated with RemW is the obligatory tool to understand the situation. In determining the sustainable RemW management strategy the real radiation detriment should be assessed and weighed against the impacts in the other areas, such as the costs to society and its economy associated with the strategy realization.

3. If we are to attain the objectives of sustainable development, achieving acceptance of the public and other stakeholders is essential. A decision-making process should be set up step by step, and the taken solution must be socially and politically accepted.

4. Public attitudes and actions of key stakeholders can play a crucial role in setting the sustainable RW management system, which ensures safety of the environment and reduces to minimum risk for the public now and in the future.

References

- [1] Rozdyalouskaya L.F. Regulatory approach to management of radioactive waste generated during remediation activities in the Chernobyl contaminated areas. Annals of the ICRP. 2021;50(1_suppl):194-200. doi:10.1177/01466453211010855.
- [2] Resolution of the Chief State Medical Officer of the Republic of Belarus of November 23, 2004 No. 121 “On Approval of Sanitary Rules for the Management of Decontamination Waste Resulting from Works on Elimination of Consequences of Chernobyl NPP Catastrophe (SPOOD-2004)” 2.6.6.8-8-2004.