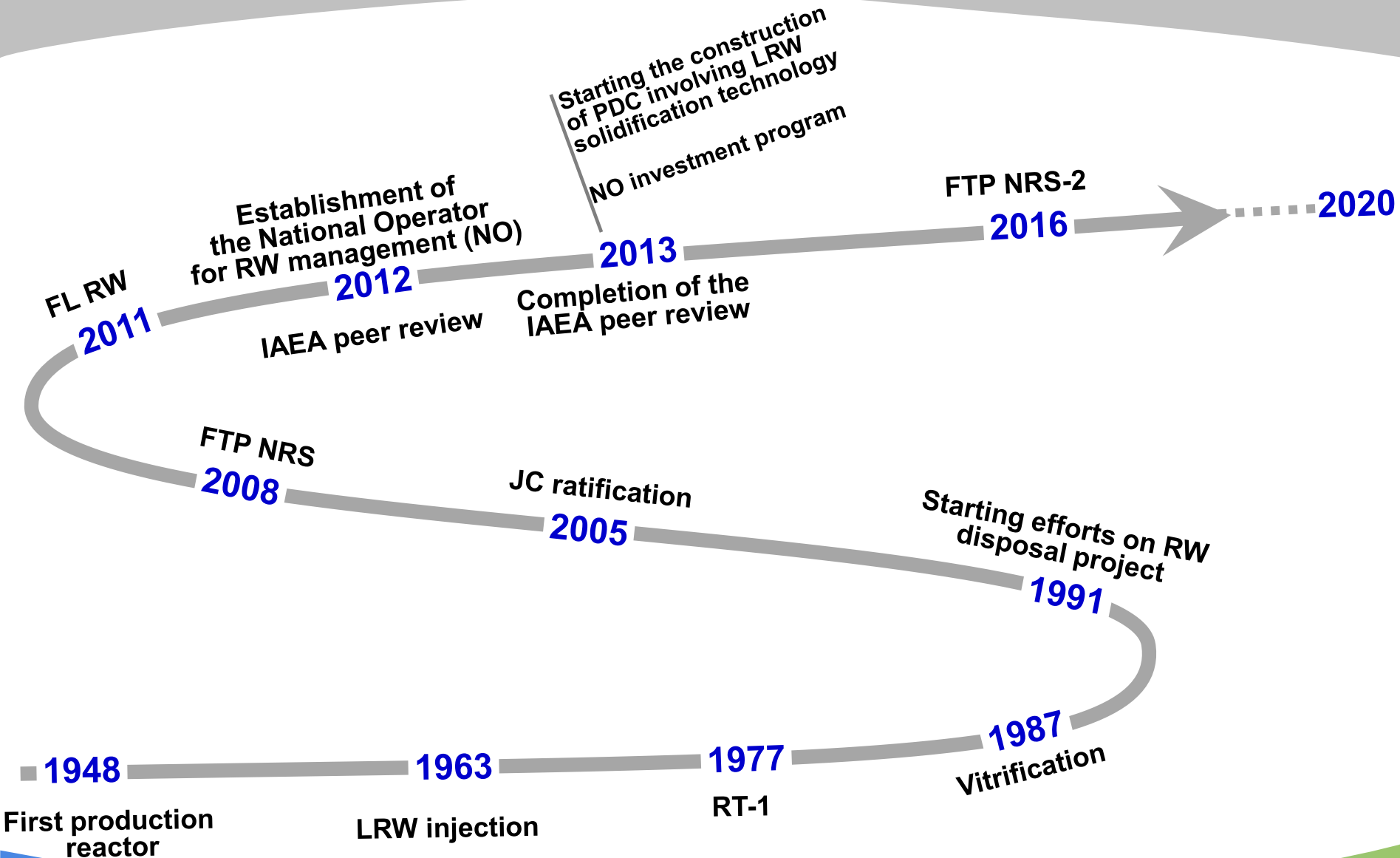


Applicability of Russian Experience in the Establishment of RW Disposal Regulatory Model in Countries Planning the Development of Atomic Energy

Utkin S.S.
Head of Department, PhD

Major Milestones and Decisions on RW Requiring Geological Disposal



1950's-1980's – Simplified Decisions on RW

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- **Radically different facilities:**
 - surface water reservoirs for LRW storage,
 - off-design repositories,
 - LRW deep well injection facilities.
- **Various periods of potential hazard:** from hundreds to tens of thousands of years.
- The regulatory practice based on **ad hoc decisions**.
- RW management was not considered as an **integrated challenge** in comparison with the existing scientific and practical issues in the field of nuclear weapon and nuclear energy.

1990's – Establishing Modern Regulatory Framework

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- **Key federal laws:**
 - On Subsoil (1991),
 - On Atomic Energy Use (1995),
 - On Radiation Safety of the Population (1996),
 - On Sanitary and Epidemiological Well-Being of the Population (1999),
 - On Environmental Protection (2002).
- **Convention on Nuclear Safety (1996)**



Conformity with the international practice – start for active harmonization

2000's – Switching Over to Plans and Programs

2003

Comprehensive Plan for addressing PA “Mayak” ecological challenges

**2004 –
2007**

Strategic Master Plan for dismantlement and environmental remediation of decommissioned nuclear-powered fleet facilities

2008

The First State Programme on Continental Nuclear Legacy

Implementation of the first stage (2011–2014) of the Unified State System for RW Management

Legislative and
regulatory framework



RW disposal tariffs



- All RW storage facilities located in the territory of the Russian Federation were put on a register (809).



- RW ownership right was specified.

2012

..

2013

.

2014.



HO PAO

FSUE "National
Operator for RW
Management"

<http://www.norao.ru>



RW disposal reserve fund.
6,1 bln. RUB have been
accumulated to date.

Territorial layout of planned
RW disposal facilities sites

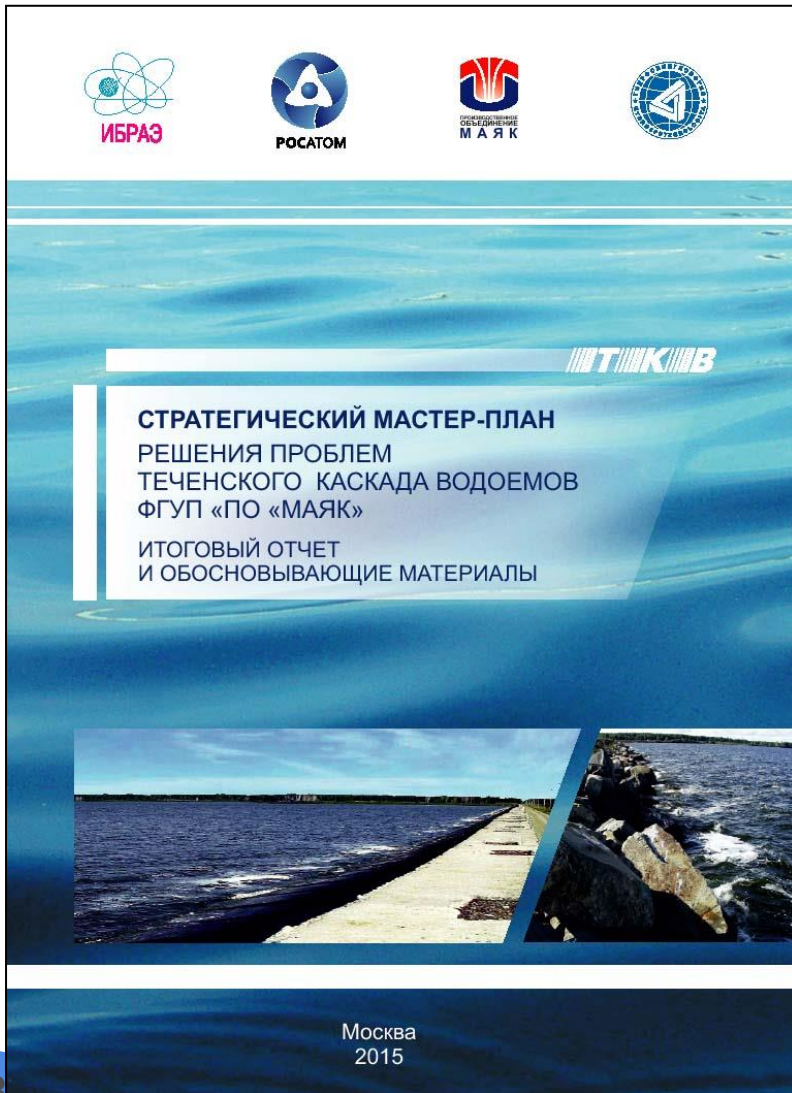
Components of the Experience on Establishing the Regulatory Framework

Aspect	International Experience	Russia
Accumulation of assets by the RW disposal fund	<ul style="list-style-type: none"> • Cost of kWh of electricity (U.S. - 0,001\$/kWh; Sweden - 2,0 €/MWh) • Forecasted amounts of RW generation (the United Kingdom, Finland, France) 	Tariffs – specific value (per m ³) depending on RW class (6, more classes are anticipated in the future)
Financial liability for accumulated and newly generated RW	Separation of financial responsibility for RW disposal between the State (accumulated RW) and operating organizations (newly generated RW)	
The time needed for establishing the state RW management system	U.S., the United Kingdom, France, Sweden – decades. As the result, accumulation of expertise and grave strategic, engineering and business mistakes committed	Since 2011 Favorable conditions for learning not only from success (U.S. remediation program), but also from failures (Yucca Mountain, Asse).
The aim of the RW management system	Nuclear weapons countries – legacy + commercial RW. Other – commercial RW only.	All types of RW, considering the unique nature of some “legacy” facilities (LRW DDF, TCR, V-9).

Computational Tool Kit for Unique Legacy Facilities

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«TCR-Prognoz»



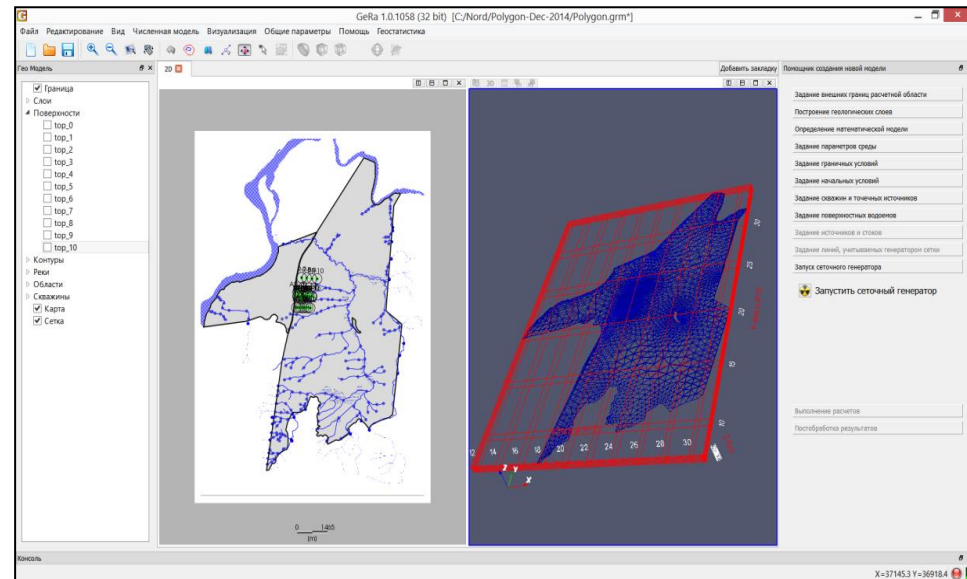
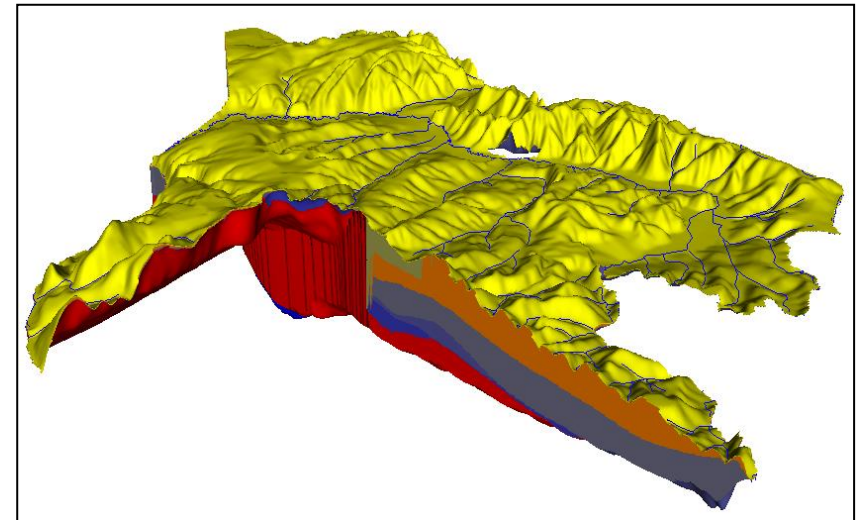
ИБРАЭ
РОСАТОМ
МАЯК

СТРАТЕГИЧЕСКИЙ МАСТЕР-ПЛАН
РЕШЕНИЯ ПРОБЛЕМ
ТЕЧЕНСКОГО КАСКАДА ВОДОЕМОВ
ФГУП «ПО «МАЯК»

ИТОГОВЫЙ ОТЧЕТ
И ОБОСНОВЫВАЮЩИЕ МАТЕРИАЛЫ

Москва
2015

LRW DDF «Zheleznogorskiy» - «Geopolise»



Geola 1.0.1058 (32 bit) [C:\Nord\Polygon-Dec-2014\Polygon.grm]

Файл Редактирование Вид Численная модель Визуализация Общие параметры Помощь Гостастистика

Гео Модель

- Граница
- Слои
 - top_0
 - top_1
 - top_2
 - top_3
 - top_4
 - top_5
 - top_6
 - top_7
 - top_8
 - top_9
 - top_10
- Контуры
- Реки
- Области
- Скавлины
- Карта
- Сетка

Добавить закладку Помощник создания новой модели

- Задание внешних границ расчетной области
- Построение геологических слоев
- Определение нелогической модели
- Задание параметров скважины
- Задание граничных условий
- Задание начальных условий
- Задание скважин и точечных источников
- Задание поверхностных водотоков
- Задание источников и стоков
- Задание слоев, реализующих генераторов тепла
- Запуск сеточного генератора

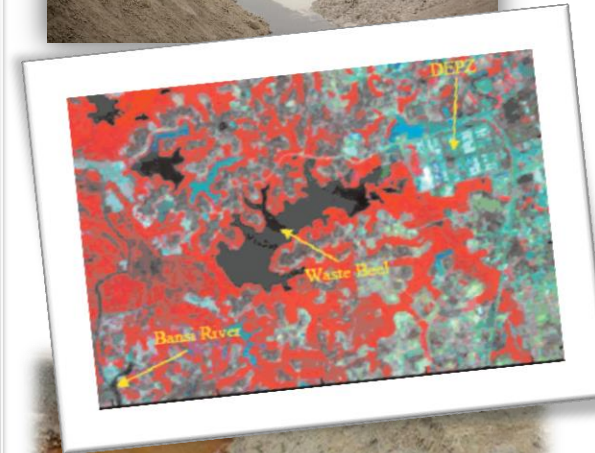
Запустить сеточный генератор

Выполнение расчетов
Постобработка результатов

X=37145.3 Y=36918.4

Non-Radioactively Contaminated Sites Abroad

Country	Region	Contaminated site	Type of contamination
India	Sukinda Valley (Jajpur District, Odisha) – the country's largest deposit of chromite ore	Contamination of the river Brahmani tributary (Dhamsala nala)	Hexavalent chromium
Vietnam	Dong Nai Province	Contamination of Siep Stream (tributary of the Dong Nai river)	Heavy metals and organic pollutants
Bangladesh	Dhaka Export Processing Zone (high-density industrial area – 91 industrial plant)	Waste Beel connected to the Bansi River	Heavy metals
China	Kudzhing, Yunnan Province	Enclosed water body Chachong	Unauthorized discharge of process waste contaminated with chrome (over 5,000 tones)
	Shanxi Province (coal industry)	Floodplain of the Sushui river	Lead, arsenic, sulfur dioxide, VOCs, etc..



Conclusions

- **Expertise.** Vast experience has been accumulated in addressing RW management challenges, including those associated with disposal.
- **Promptness.** If we do everything right from the start, the state support may be not required.
- **Consistency.** The regulatory framework can't be efficient without simultaneous efforts on the development of engineering and calculation basis for safety justification.
- **Reproducibility.** Applicability for hazardous production and consumption waste in the developing countries.