THE FEDERAL STATE UNITARY ENTERPRISE
«NATIONAL OPERATOR FOR RADIOACTIVE WASTE MANAGEMENT»

Development of Nizhnekansky massif underground research laboratory construction project

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NO RWM, FSUE

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NO RWM

Underground research laboratory (URL) location and the aims of creation

Location of the URL:

- Nizhnekansky rock massif , Krasnoyarsk Territory,
- 4.5 km from the Yenisei River, 6 km from the industrial part of Zheleznogorsk,
- Depth of underground constructions is 450-525 m.

The aims of the URL creation:

- Detailed research of host rock specifications, verification of the rock mass suitability for long-lived HLW and ILW safe deep geological disposal,
- Research and verification of engineering barriers isolating properties,
- Testing of technical solutions and transport-technological schemes for the future RW final disposal facility construction and operation.

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Early URL and disposal facility site-suitability evaluation

Based on the results of research carried out in 1992-2011 there were gained the following characteristics for the rock mass on the Yeniseiskiy :

- structural and tectonic rock mass characteristics are suitable for long-lived RW final disposal facility creation. The category of rock varies from medium - to high - strength.;
- identified fractured zones are low-angle, sloping down-ward, filled with carbonate, feldspathic materials, quartz or argillaceous rock, and do not pass water;
- underground facilities on the site are located deeper than the local base level of drainage - the bed of the Yenisei River, which precludes uptake of ground waters into surface water bodies;

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Work status and future plans

- **There was developed and approved project documentation:**
  "Declaration of Intention" **(2008)** and " Justification of investment" for RW disposal facility construction **(2011)**

- Federal Agency on Subsoil Usage favorable expert opinion on the suitability of the site for RW disposal facility construction **(2012)**

- Positive conclusion of the public hearings in the region regarding the disposal facility environmental impact analysis **(2012)**

- Currently design and survey works for disposal facility and URL construction are carried out, the term is **2014,**
- Starting construction of the URL as the initial phase for the disposal facility construction - from **2016**

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URL main infrastructure

- Three vertical wells 500 m deep, 6.0m in section,
- Surface infrastructure including land-building facilities and near-well constructions,
- Horizontal capital-mining excavations with total length of 5000 m, 20 m in section,
- Four horizontal excavations 40-60 m in section with total length of 600 m and four vertical excavations 75 m deep.

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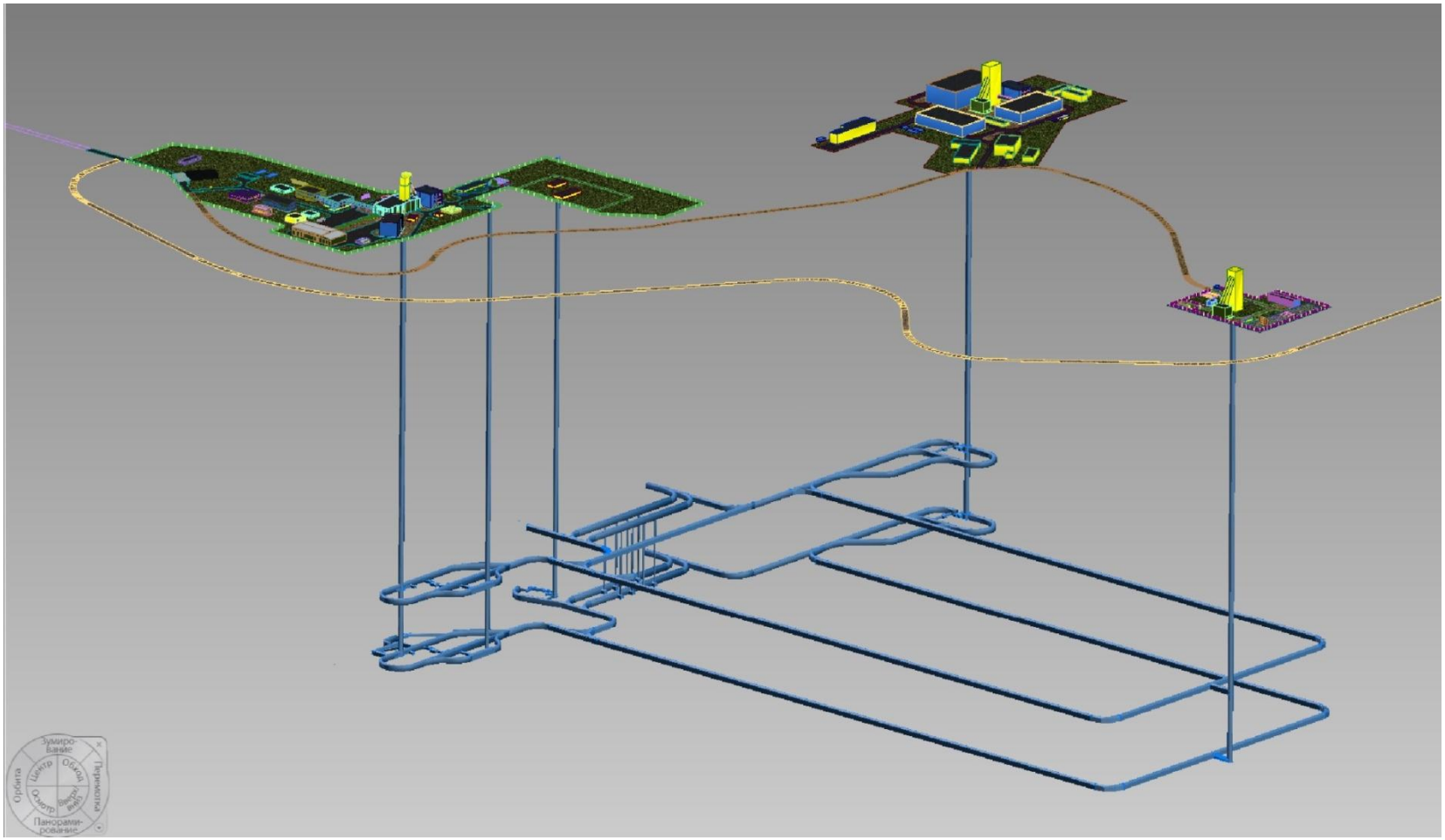
URL concept scheme within underground disposal facility project



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Key underground disposal facility characteristics

- **Underground facilities depth: 450-525 m**
- **Disposed RW volume:**
  - vitrified HLW of Class 1 – 4500 m^3 (7500 canisters),
  - ILW and HLW of Class 2 – 155 000 m^3
- **The facility full loading planned date – 2047**
- **ILW and HLW of Class 2 placement – in piles in horizontal excavations on the horizons of 450 m and 525 m**
- **HLW of Class 1 are placed in vertical wells 1.3 m in diameter and 75 m deep**

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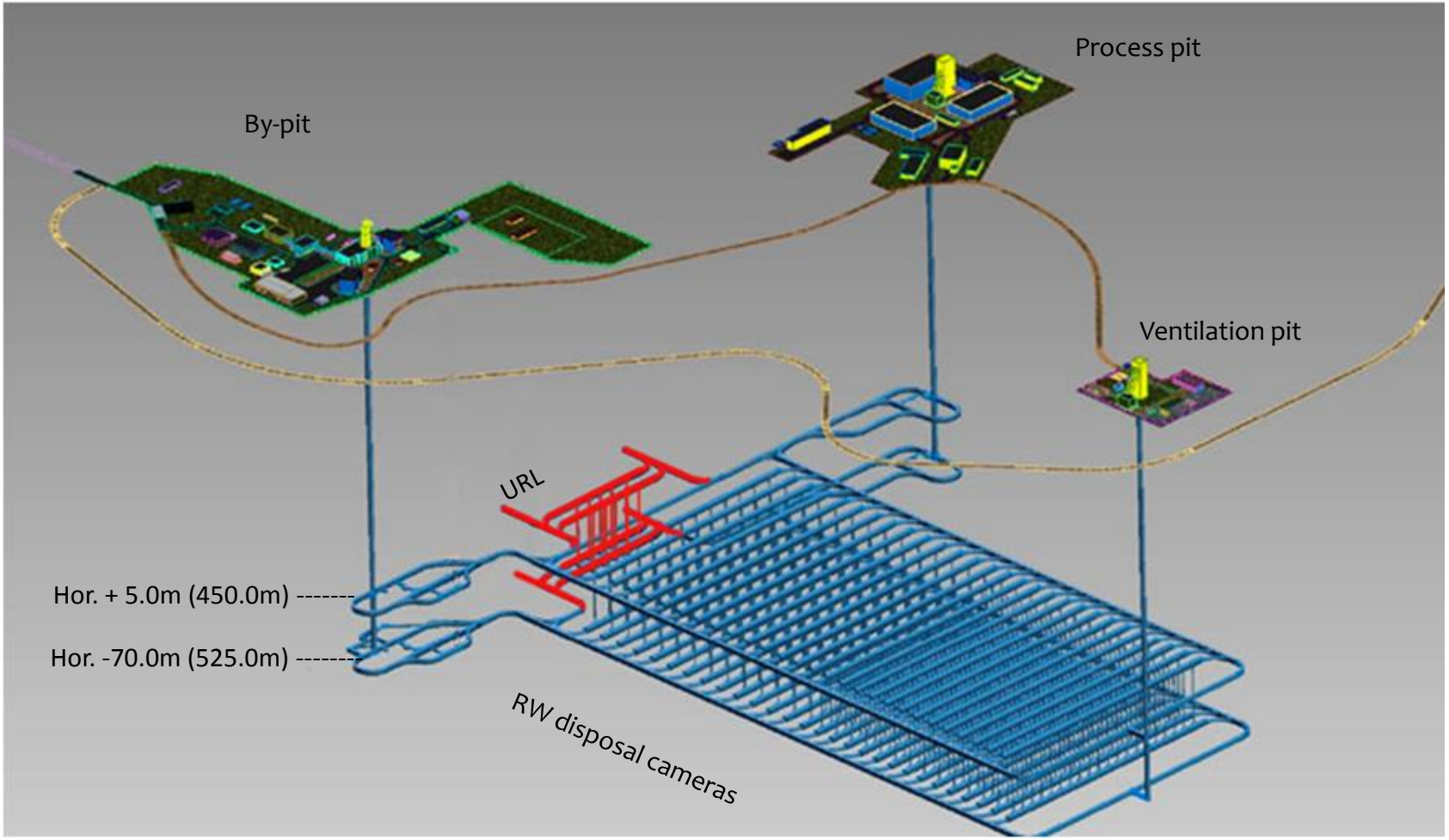
Underground disposal facility with URL concept scheme



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Fulfilled investigations

- Engineering-geological pros-pecting till the depth of 600 m for by-pit, process pit and ventilation pit construction
- Engineering-geodesic, including topography
- Engineering-hydrometeorological, Engineering-ecological
- Complex seismic investigations
- Laboratory studies of sorption-migration properties of rocks and engineered barriers are performed
- Exploration of groundwater for water supply purposes was initiated

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Disciplines

- Basic technical solutions
- Transport and technological schemes of RW management
- Design decisions on transport containers and irrevocable
- packages
- Technical solutions for the underground complex
- The main technological equipment of RW management buildings and overload trip
- Overall plan of the enterprise
- Architectural, structural and space-planning decisions of the surface complex objects
- Technical solutions for electricity, water and heat supply for facility
- Technical solutions for communication systems and fire safety
- Complex engineering - technical means of physical protection
- The development of the documentation for the external power supply networks and scheduling, it was started the development of construction documents and construction organization project

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Long-term safety case verification of the disposal facility

- Mathematical modeling of rock mass geological and hydrogeological characteristics in the disposal facility placement site
- Thermal and sorption-migration processes in the engineering barriers and the rock mass in the near and far zones
- Summary evaluation of long-term safety of long-lived HLW and ILW deep disposal facility

Thank you for attention!