



РОСЭНЕРГОАТОМ

ЭЛЕКТРОЭНЕРГЕТИЧЕСКИЙ ДИВИЗИОН РОСАТОМА

Licensing of Lifetime Extension for NPP Units

Shchigoleva Elena Andreevna,
Chief Specialist of Licensing Management

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www.rosenergoatom.ru

Definition

Licensing - activity of the licensing authority on license granting with determination of terms and conditions of their validity, reissue of licenses, making changes in license validity conditions, suspension, renewal, termination and cancellation of licenses, forming and keeping of license registry, as well as providing of information on licensing issues in accordance with the established procedure

Licensing of Nuclear Facilities of Russian Nuclear Power Concern JSC - measures associated with receiving of licenses from the regulatory authorities (Rostekhnadzor) for performance of the activity by Russian Nuclear Power Concern on arrangement, designing, construction, commissioning, operation and decommissioning of NPP power units and fulfilment of the license validity conditions

Legislative and normative base for licensing in the area of nuclear energy use

- Federal Law No. 170-FZ “ABOUT NUCLEAR ENERGY USE” dated November 21st, 1995

- Order of the Government of the Russian Federation No. 280 “ABOUT LICENSING IN THE AREA OF NUCLEAR ENERGY USE” dated March 29th, 2013.

“PROVISION ABOUT LICENSING OF ACTIVITY IN THE AREA OF NUCLEAR ENERGY USE” is approved by Order No. 280 dated March 29th, 2013.

Guideline Documents of Rostekhnadzor

- “Administrative Regulation for Rendering of State Service on Licensing of the Activity in the Area of Nuclear Energy Use by Federal Service for Environmental, Technological and Nuclear Supervision approved by Order of Rostekhnadzor No. 453 dated October 8th, 2014, registered in Ministry of Justice of Russia No. 36496 dated March 20th, 2015

Administrative regulation determines the procedure for granting of state service on activity licensing and contains the requirements for composition of the set of documents substantiating assurance of nuclear and radiation safety for the declared activity.

- “Recommendation for Content of the Report on In-Depth Safety Assessment for Operating Power Units of Nuclear Power Plants RB-001-05” approved by Order of Rostekhnadzor No. 8 dated November 22nd, 2005

Recommendations specifies the requirements contained in para. 4.1.18 of Federal Rules and Regulations “General Provisions for Safety Assurance of Nuclear Power Plants” (NP-001-15) and para. 5.5 of Federal Rules and Regulations “Basic Requirements for Lifetime Extension of Nuclear Power Plant” (NP-017-2000) with regard to drawing up the report on in-depth safety assessment of operating NPP power units.

Guideline Documents of Russian Nuclear Power Concern JSC

Company Standard STO 1.1.1.03.004.0179-2013 “Provision about Licensing Activity” approved by Order of Russian Nuclear Power Concern JSC No. 9/1194-П dated December 11th, 2013.

- STO determines the procedure for licensing material preparation and passing and covers the following procedures:
 - preparation of license applications for submission to Rostekhnadzor;
 - receiving of licenses and changes of license validity conditions;
 - control for fulfilment of the licenses validity conditions.
- STO distributes functions between divisions of the Central Office of Russian Nuclear Power Concern and branches of the Concern - operating NPP.

Set of license documents in accordance with the Provision about Licensing of Activity in the Area of Nuclear Energy Use

For license receiving the operating organization shall submit the following:

- Application about license issue;
- Copies of constituent documents of legal person;
- 3 sets of documents substantiating assurance of nuclear and radiation safety for nuclear installation;
- List of the attached documents;
- Data about recognition of the licence applicant to be suitable for nuclear installation operation by the appropriate regulatory authority of Nuclear Energy Use Management;
- Copy of document confirming that the licence applicant has nuclear materials, nuclear installations, radiation sources, storage facilities, radioactive substances and radioactive wastes on the right of ownership or other legal basis;
- Data about approval of the favourable conclusion from the State Environmental Expertise (to be submitted by the license applicant on its own initiative);

Set of license documents in accordance with the Provision about Licensing of Activity in the Area of Nuclear Energy Use (contrinuation)

- Data about receipt of the decision about arrangement, construction of nuclear installations (to be submitted by the license applicant on its own initiative);
- Data about receipt of the sanitary-epidemiological conclusion with reference to the activity in the area of nuclear material and radioactive substance management (to be submitted by the license applicant on its own initiative);
- Documents confirming that the license applicant has financial security of civil responsibility for losses and harm caused by the radiation effect;
- Document confirming the possibility to transfer radioactive wastes produced or being in temporary storage (in case of their production when performing the licensed activity type) for burial;
- Report about availability of fire protection for the nuclear facility during its operation;
- documents confirming that the license applicant has financing sources for works on nuclear installation decommissioning



Set of license documents in accordance with Appendix 3 of the Administrative Regulation of Rostekhnadzor

Set of documents substantiating assurance of nuclear and radiation safety for nuclear installation:

- Report on safety demonstration (technical safety appraisal of NPP, technical safety appraisal of reactor plant, safety demonstration report, during lifetime extension - report on in-depth safety assessment).
- Process regulation of NPP power unit operation.
- Probabilistic safety analysis of the first level.
- Probabilistic safety analysis of the second level.
- Passport for reactor plant of NPP power unit.
- Instruction of Accident Elimination in NPP Power Unit
- Manual on Control of Beyond Design Basis Accidents in NPP Power Unit.
- Plan of measures on personnel protection in case of accident at NPP.
- Quality Assurance Program during NPP power unit operation.
- Measures compensating deviations from the requirements of rules and regulations in the area of nuclear energy use.

Set of license documents in accordance with Appendix 3 of the Administrative Regulation of Rostekhnadzor (continuation)

- Work program on elimination of deviations from the requirements of rules and regulations in the area of nuclear energy use.
- Information about selection, preparation, maintaining of qualification and permit for NPP power unit employees to independent work.
- The results of observations for buildings and constructions relating to the I and II categories on influence on safety for the whole period of observations (for example, settlements, tilts).
- Instruction of nuclear safety assurance during storage, transportation and reloading of nuclear fuel.
- Instructions, programs and schedules for maintenance, repair, tests and check of the systems being important to safety.
(to be submitted by the request of Rostekhnadzor after submission of the application about license granting for NPP power unit operation).
- Standard programs (regulations) on operating control for state of main metal and welded connections for equipment and pipelines of the systems to be important to safety.

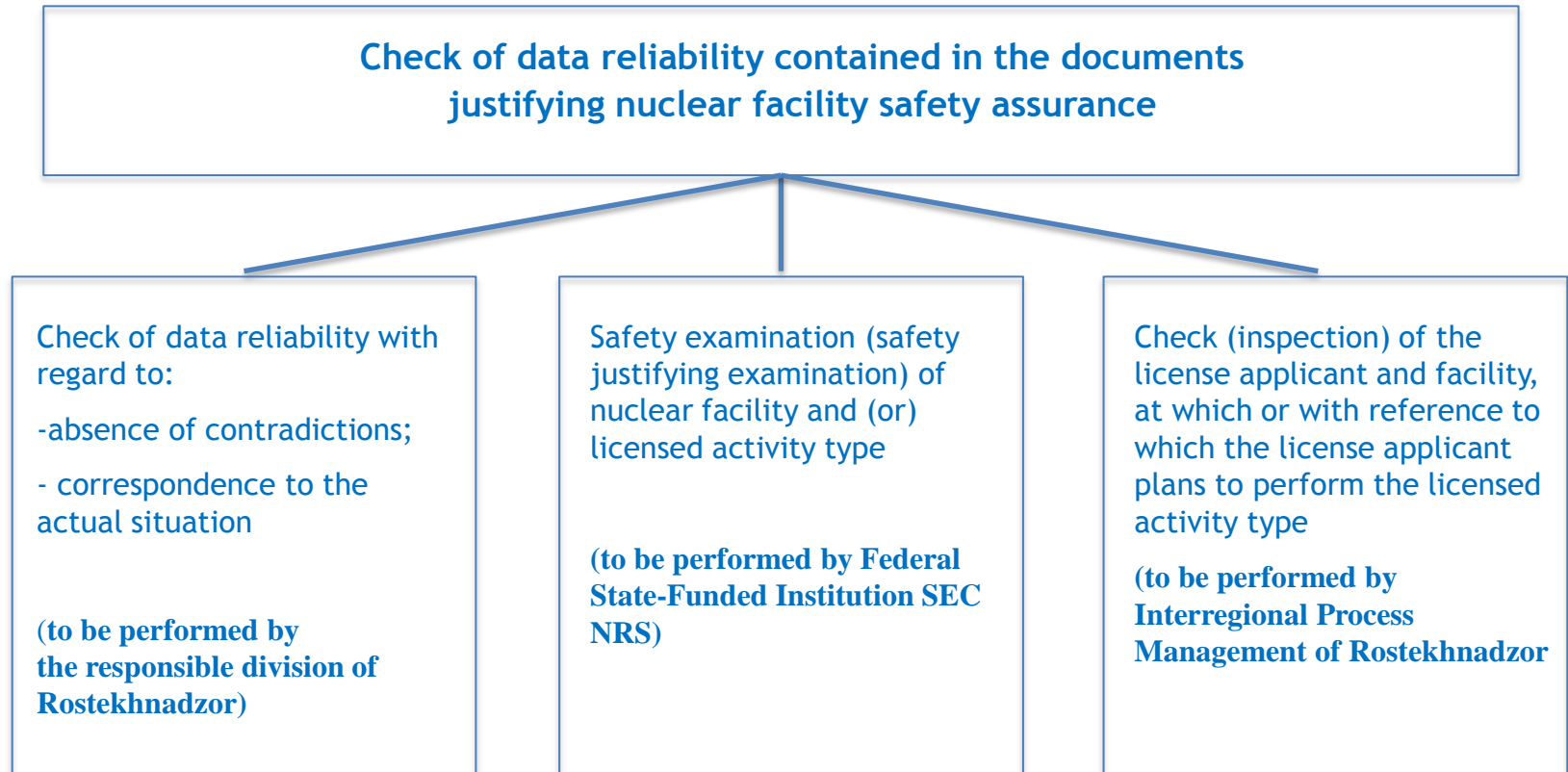
Set of license documents in accordance with Appendix 3 of the Administrative Regulation of Rostekhnadzor (continuation)

- Statement on assurance of monitoring for nuclear materials, radioactive substances and radioactive wastes
- Statement on assurance of physical protection for power unit
- Regulations for operation of radioactive waste management systems.
(to be submitted by the request of Rostekhnadzor after submission of the application about license granting for NPP power unit operation).

Documents submitted additionally only when extending NPP power unit lifetime:

- Program for NPP power unit preparation for lifetime extension and statement about its progress
(to be submitted when filing the application for license granting for operation of running NPP power unit during additional term)
- Report about the results of integrated survey for NPP power unit *(to be submitted when filing the application for license granting for operation of running NPP power unit during additional term)*
- Regulation for control of NPP element technical state revised considering the aging factors *(to be submitted when filing the application for license granting for operation of running NPP power unit during additional term)*
(the Regulation is allowed to be submitted after determining a new operating lifetime for NPP power unit)

Considering of license application documents in Rostekhnadzor



Period of Operation for Russian NPP

| NPP | Power Unit No. 1 | Power Unit No. 2 | Power Unit No. 3 | Power Unit No. 4 | Power Unit No. 5 |
|--|-----------------------------|-----------------------------|------------------|------------------|------------------|
| NPP with WWER reactors | | | | | |
| Balakovo NPP | Additional Term | Design Term | Design Term | Design Term | - |
| Kalinin NPP | Additional Term | Design Term | Design Term | Design Term | - |
| Kola NPP | Additional Term | Additional Term | Additional Term | Additional Term | - |
| Novovoronezh NPP | Decommissioning | Decommissioning | Additional Term | Additional Term | Additional Term |
| Rostov NPP | Design Term | Design Term | Design Term | - | - |
| NPP with channel-type and fast reactors | | | | | |
| Beloyarsk NPP | Stopped for decommissioning | Stopped for decommissioning | Additional Term | Design Term | - |
| Bilibino NPP | Additional Term | Additional Term | Additional Term | Additional Term | - |
| Kursk NPP | Additional Term | Additional Term | Additional Term | Additional Term | - |
| Leningrad NPP | Additional Term | Additional Term | Additional Term | Additional Term | - |
| Smolensk NPP | Additional Term | Additional Term | Design Term | - | - |

Licensing of operation for Balakovo NPP power units within additional term

Balakovo NPP

| | Unit 1 (B-320) | Unit 2 (B-230) |
|---------------------------------------|--|--|
| Commissioning | 1985 | 1987 |
| Design operating lifetime | 30 years (till December 29th, 2015) | 30 years (till October 17th, 2017) |
| Additional operating lifetime | 30 years (till December 18th, 2045) | The application has been submitted to Rostekhnadzor to receive the license for power unit operation during additional period - for 30 years (till October 17th, 2047) |
| Rostekhnadzor license being valid now | No. ГН-03-101-3116 dated December 18th, 2015 (with validity term till December 18th, 2045) | No. ГН-03-101-2332 dated March 30th, 2010 (with validity term till October 17th, 2017) |

Licensing of operation for Kalinin NPP power units within additional term

Kalinin NPP

| | Unit 1 (B-302) | Unit 2 (B-302) |
|---------------------------------------|--|---|
| Commissioning | 1984 | 1986 |
| Design operating lifetime | 30 years (till June 28th, 2014) | 30 years (till November 25th, 2016) |
| Additional operating lifetime | 30 years (till June 28th, 2044) | The application has been submitted to Rostekhnadzor to receive the license for power unit operation during additional period - for 30 years (till November 25th, 2046) |
| Rostekhnadzor license being valid now | No. ГН-03-101-2897 dated June 27th, 2014 (with validity term till June 28th, 2025) | No. ГН-03-101-2333 dated March 30th, 2010 (with validity term till November 25th, 2016) |

Licensing of operation for Kola NPP power units within additional term

Kola NPP

| | Unit 1 (B-230) | Unit 2 (B-230) | Unit 3 (B-213) | Unit 4 (B-213) |
|---------------------------------------|--|---|---|---|
| Commissioning | 1973 | 1974 | 1981 | 1984 |
| Design operating lifetime | 30 years (till July 6th, 2003) | 30 years (till December 20th, 2004) | 30 years (till April 3rd, 2011) | 30 years (till September 26th, 2010) |
| Additional operating lifetime | 15 years (till July 6th, 2018) | 15 years (till December 20th, 2019) | 25 years (till March 31st, 2036) | 25 years (till December 7th, 2039) |
| Rostekhnadzor license being valid now | No. ГН-03-101-2273 dated February 5th, 2010 (with validity term till July 6th, 2018) | No. ГН-03-101-2272 dated February 5th, 2010 (with validity term till December 20th, 2019) | No. ГН-03-101-3160 dated February 5th, 2010 (with validity term till December 31st, 2026) | No. ГН-03-101-2940 dated October 8th, 2014 (with validity term till December 7th, 2039) |

Licensing of operation for Novovoronezh NPP power units within additional term

Novovoronezh NPP

| | Unit 3 (B-179) | Unit 4 (B-179) | Unit 5 (B-187) |
|---------------------------------------|--|--|---|
| Commissioning | December 29th, 1971 | December 20th, 1972 | September 26th, 1980 |
| Design operating lifetime | 30 years (till December 29th, 2001) | 30 years (till December 20th, 2002) | 30 years (till September 26th, 2010) |
| Additional operating lifetime | 15 years (till December 29th, 2016) | 15 years (till December 29th, 2017) | 26 years (till September 26th, 2036) |
| Rostekhnadzor license being valid now | No. ГН-03-101-2285 dated February 5th, 2010 (with validity term till December 29th, 2016) | No. ГН-03-101-2284 dated February 5th, 2010 (with validity term till December 29th, 2017) | No. ГН-03-101-3079 dated September 25th, 2015 (with validity term till September 25th, 2025) |

Licensing of operation for Novovoronezh NPP power unit No. 3 within additional term

- December 29th, 2001 - completion of design operating lifetime of power unit No. 3 of NVO NPP
- By 2001 “Program on Preparation of Power Unit No. 3 at Novovoronezh NPP for Operation in Excess of the Specified Lifetime” has been completed:
 - unit safety within additional operating lifetime is justified;
 - economic efficiency for lifetime extension is justified;
 - power unit is modernized for safety increase;
 - remaining life of the unit elements being important to safety for the next 15 years of operation is justified;
 - report on in-depth safety assessment is developed.
- The decision of the Ministry of the Russian Federation for Nuclear Energy about operation continuation for power unit No. 3 of NVO NPP at power within the term (for 15 years) justified with the performed works is taken.
- The application for license granting for the period since lifetime completion (December 29th, 2001) till completion of power unit additional operating lifetime till December 29th, 2016 inclusively is directed to Rostekhnadzor.
- Based on the conclusions of examination for justifying documents in Federal State-Funded Institution SEC NRS and the results of inspection of Don Interregional Territorial Administration the license for operation of power unit No. 3 at NVO NPP is received for 5 years.
- In 2006 by the application of the operating organization Rostekhnadzor issued new license for operation of power unit No. 3 at NVO NPP till completion of additional power unit operating lifetime till December 29th, 2016 inclusively.
- Now the decision of Rosatom State Nuclear Energy Corporation is taken about final stop of power unit No. 3 at NVO NPP for decommissioning since December 30th, 2016. The application for license receipt for operation of the power unit stopped for decommissioning for term till December 31st, 2041 has been submitted to Rostekhnadzor.

Licensing of operation for Novovoronezh NPP power unit No. 4 within additional term

December 29th, 2002 - completion of design operating lifetime of power unit No. 4 of NVO NPP

- By 2002 “Program on Preparation of Power Unit No. 4 at Novovoronezh NPP for Operation in Excess of the Specified Lifetime” has been completed:

- unit safety within additional operating lifetime is justified;
- economic efficiency for lifetime extension is justified;
- power unit is modernized for safety increase;
- remaining life of the unit elements being important to safety for the next 15 years of operation is justified;
- report on in-depth safety assessment is developed.

- The decision of the Ministry of the Russian Federation for Nuclear Energy about operation continuation for power unit No. 4 of NVO NPP at power within the term (for 15 years) justified with the performed works is taken.

- The application for license granting for the period since lifetime completion (December 29th, 2002) till completion of power unit additional operating lifetime till December 29th, 2017 inclusively is directed to Rostekhnadzor.

- Based on the conclusions of examination for justifying documents in Federal State-Funded Institution SEC NRS and the results of inspection of Don Interregional Territorial Administration the license for operation of power unit No. 4 at NVO NPP is received for 5 years.

- In 2007 by the application of the operating organization Rostekhnadzor issued new license for operation of power unit No. 4 at NVO NPP till completion of additional power unit operating lifetime till December 29th, 2017 inclusively.

- After 2017 continuation of power unit No. 4 at NVO NPP is planned; in December, 2016 application for licence receipt for operation of power unit till the end of 2032 (for 15 years) is planned to be submitted to Rostekhnadzor.

Licensing of operation for Novovoronezh NPP power unit No. 5 within additional term

- September 26th, 2010 - completion of design operating lifetime of power unit No. 5 of NVO NPP
- Modernization of systems and equipment for power unit No. 5 at NVO NPP was planned for the period of Preliminary Work Program in 2010-2011, i.e. after design lifetime completion.
- On October 27th, 2009 the application for license receipt for the period since lifetime completion (September 26th, 2010) till completion of additional power unit lifetime (September 26th, 2036 inclusively) was directed to Rostekhnadzor in accordance with the “Preliminary Work Program on Preparation of Lifetime Extension of NPP Power Units of the Second Generation” of Ministry of the Russian Federation for Nuclear Energy dated October 31st, 2002 and attached justifying materials about the possibility and conditions for further operation of noninterchangeable elements
- According to the results on examination of justifying documents in Federal State-Funded Institution SEC NRS of Rostekhnadzor conclusions about sufficiency of submitted justifications for modernization of power units within the Preliminary Work Program in 2010-2011 were made. Moreover, deviations from the requirements of Federal rules and regulations in the area of nuclear energy use preventing operation of power unit at energy power levels were detected.
- Rostekhnadzor issued the license No. ГН-03-101-2427 dated September 26th, 2010 for operation of power unit No. 5 at NVO NPP (with validity term till September 26th, 2015) with restrictions in Section 6 of license validity conditions:
 - “6.1 The Enterprise is allowed to operate the reactor for power unit No. 5 at NV NPP within additional lifetime in accordance with the “Process Regulation for Safe Operation of the 5th Unit at NV NPP” in all operating states of the power unit except for state: “operation at energy power levels.”

Measures on modernization and elimination of deviations from the requirements of the Federal Rules and Regulations detected during examination for power unit No. 5 of NVO NPP

- In order to eliminate restrictions of Rostekhnadzor for operation of power unit No. 5 at NVO NPP and implementation of measures on elimination of power unit deviations from the requirements specified in the Federal Rules and Regulations in the area of Nuclear Energy Use the Program providing the following is prepared:
 - set of certain measures, which shall be implemented till power unit transfer into state “operation at energy power levels” (1 stage) - with Preliminary Work Program execution term - 2011, including:
 - Introduction of preheating systems for tanks Б-1, Б-8/1,2,3 and ECSS vessels.;
 - Replacement of overaged equipment in safety systems;
 - Construction of detached diesel-generator station for EPSS 2nd channel;
 - Creation of EPSS 2nd channel in the detached safety building;
 - EPSS channel and sprinkler device system physical separation, installation of fire division walls;
 - Creation of new system for emergency feedwater supply into steam generator in the detached safety building;
 - Power unit equipping with double emergency protection system;
 - Equipping of containment of the 5th unit with passive catalytic hydrogen recombiner system;
 - Mounting of new high pressure boric acid injection system;
 - Introduction of improved reliability program technical equipment in the control systems of safety and normal operation of reactor compartment, turbine compartment (safety assurance system-I, safety assurance system-II, safety assurance system-III, automatic programming system, protections and interlocks, technological signal of reactor and turbine compartments, automatic regulation in reactor compartment;
 - Implementation of measures on assurance of automatic operation for pumps of HP ECCS from tanks 8/1-3 and sealed shell sump;
 - Introduction of the industrial aseismic protection system;
 - Revision of the in-depth safety assessment report and the Program on preparation of power unit No.5 of Novovoronezh NPP for additional operating lifetime.

License support of measures on modernization, elimination of examination and deviations of power unit No. 5 of NVO NPP from the requirements specified in the Federal Rules and Regulations

- set of major measures and development projects, which shall be implemented within midterm (2nd stage) - with execution term for Preliminary Work Program - 2012, for Preliminary Work Program - 2013:

Modernization of ventilation systems for emergency control room, unit control room with installation of filters ensuring survivability and habitability for unit control room at design basis accident and beyond design basis accident;

Performance of check calculations for seismic resistance of buildings, constructions, civil structures and equipment of the 5th unit of Novovoronezh NPP;

Revision by comments of the in-depth safety assessment report examination.

- Within the Preliminary Work Program period in 2010-2011 5 application for change of license conditions for operation of power unit No. 5 at NVO NPP was prepared and sent to Rostekhnadzor.
- Based on the reporting materials on performance of the 1st stage of the Program in September, 2011 Rostekhnadzor made changes in the validity conditions of the specified license eliminating severe restrictions and allowing operation of power unit No. 5 of NVO NPP till completion of Preliminary Work Program-2012 in all operating states in accordance with the process regulation including state “Operation at Energy Power Levels”.
- Based on the reporting materials on performance of the 2nd stage of the Program Rostekhnadzor made changes in the validity conditions of the specified license eliminating severe restrictions and allowing operation of power unit No. 5 of NVO NPP after Preliminary Work Program-2012 in all operating states in accordance with the process regulation including state “Operation at Energy Power Levels”.

Now new license No. ГН-03-101-3079 dated September 25th, 2015 for operation of power unit No. 5 of Novovoronezh NPP with validity term till September 25th, 2025 is received.

Licensing of operation for Kola NPP power unit No. 3 within additional term

- April 3rd, 2011 - completion of design operating lifetime of power unit No. 3 of Kola NPP
- On April 26th, 2010 the application for license granting for the period since design lifetime completion till completion of power unit additional operating lifetime till March 31st, 2036 (for 25 years) was directed to Rostekhnadzor.
- According to the results on examination of justifying documents in Federal State-Funded Institution SEC NRS of Rostekhnadzor deviations from the requirements of Federal rules and regulations in the area of nuclear energy use preventing operation of power unit at energy power levels were detected.
- Rostekhnadzor issued the license No. ГН-03-101-2503 dated April 2nd, 2011 for operation of power unit No. 3 at Kola NPP for 5 years (with validity term till February 7th, 2016) with restrictions in Section 6 of the license validity conditions:

“6.1. In accordance with the requirements of para. 4.1 of NP-017-2000 the Enterprise is allowed to operate the reactor for power unit No. 3 at Kola NPP within additional lifetime according in all power unit operating states specified in the “Process Regulation for Operation of the 3rd Power Unit at Kola NPP with WWER-440 Reactor (B-213)” except for state: “reactor is critical” and “operation at energy power levels.

Licensing of operation for Kola NPP power unit No. 3 within additional term (continuation)

- In order to eliminate restrictions of Rostekhnadzor for operation of power unit No. 3 at Kola NPP and implementation of measures on elimination of power unit deviations from the requirements specified in the Federal Rules and Regulations in the area of Nuclear Energy Use the Program providing the following is prepared:
 - set of certain measures, which shall be implemented till power unit transfer into state “operation at energy power levels” (1 stage) - with Preliminary Work Program execution term - 2011, including:
 - Justify fulfilment of the requirements specified in para. 5.24 of SP AS-03 (non-exceedance of “Б” level by population exposure dose specified in NRB-99/2009, at design basis accident with rupture Dn500) at the boundary of the sanitary-protective area.
 - Eliminate defects of sealed shell of containment for power unit No. 3. Testing of containment for tightness.
 - Implement compensational measures before installation of tightening parts on joints for welding of communication pipeline with pressurizer and LP ECCS to main coolant pipeline
 - Control butt joints for welding of LP ECCS pipelines to nozzles of hot and cold strings of main coolant pipeline, control of butt joints for welding of pipelines for connection volume control system to main coolant pipeline nozzles.
 - Mount pipeline for filling of clean condensate reserve tanks of additional emergency make-up system from external independent water supply source. Include the procedure for tank filling into operating documentation.
 - Revise the in-depth safety assessment report.

Licensing of operation for Kola NPP power unit No. 3 within additional term (continuation)

- set of major measures and development projects, which shall be implemented within midterm (2nd stage) - with execution term 2012 - 2015 including:

Revise the in-depth safety assessment report and process regulation for operation with reference to specifying safe operating conditions, state of units in case of additional emergency make-up system failure, state of the unit for various cases of nonoperability for separate safety elements (systems, system channels), requirements for fuel storage and handling.

Complete the justifying materials, based on which the decisions about the possibility and conditions of power unit equipment operation were taken with regard to the following:

exclusion of cold hydrostatics test for reactor vessel during accident with spontaneous opening of pressurizer primary circuit

assurance of strength for fuel basket in case of rupture of main coolant pipeline cold string

assurance of strength for reactor concrete console bellows in case of accident with rupture of main coolant pipeline

assurance of conformity of SG collector steel properties in the primary circuit with the requirements of PNAE G-7-002-86

Implement the project for containment density increase.

Analyze radiation consequences of beyond design basis accidents

Justify sufficiency of available organizational and technical measures on control of beyond design basis accident with full drying of fuel storage pond

Develop the procedure for assessment of life characteristics for reactor plant equipment. Complete the justification for strength and life of the reactor plant equipment.

Complete the justification for seismicity (design earthquake and design basis earthquake levels) for Kola NPP site

Licensing of operation for Kola NPP power unit No. 3 within additional term (end)

- Based on the reporting materials on performance of the 1st stage of the Program in June, 2011 Rostekhnadzor made changes in the validity conditions of the license eliminating severe restrictions and allowing operation of power unit No. 3 of Kola NPP in all operating states in accordance with the process regulation including state “Operation at Energy Power Levels”.
- Performance of measures in accordance with the II stage of the Program continued within 5 years till receiving a new license.
- **Now new license No. ГН-03-101-3160 dated February 5th, 2016 for operation of power unit No. 3 of Kola NPP for term till December 31st, 2026 is received.**

Thank you for your attention!