

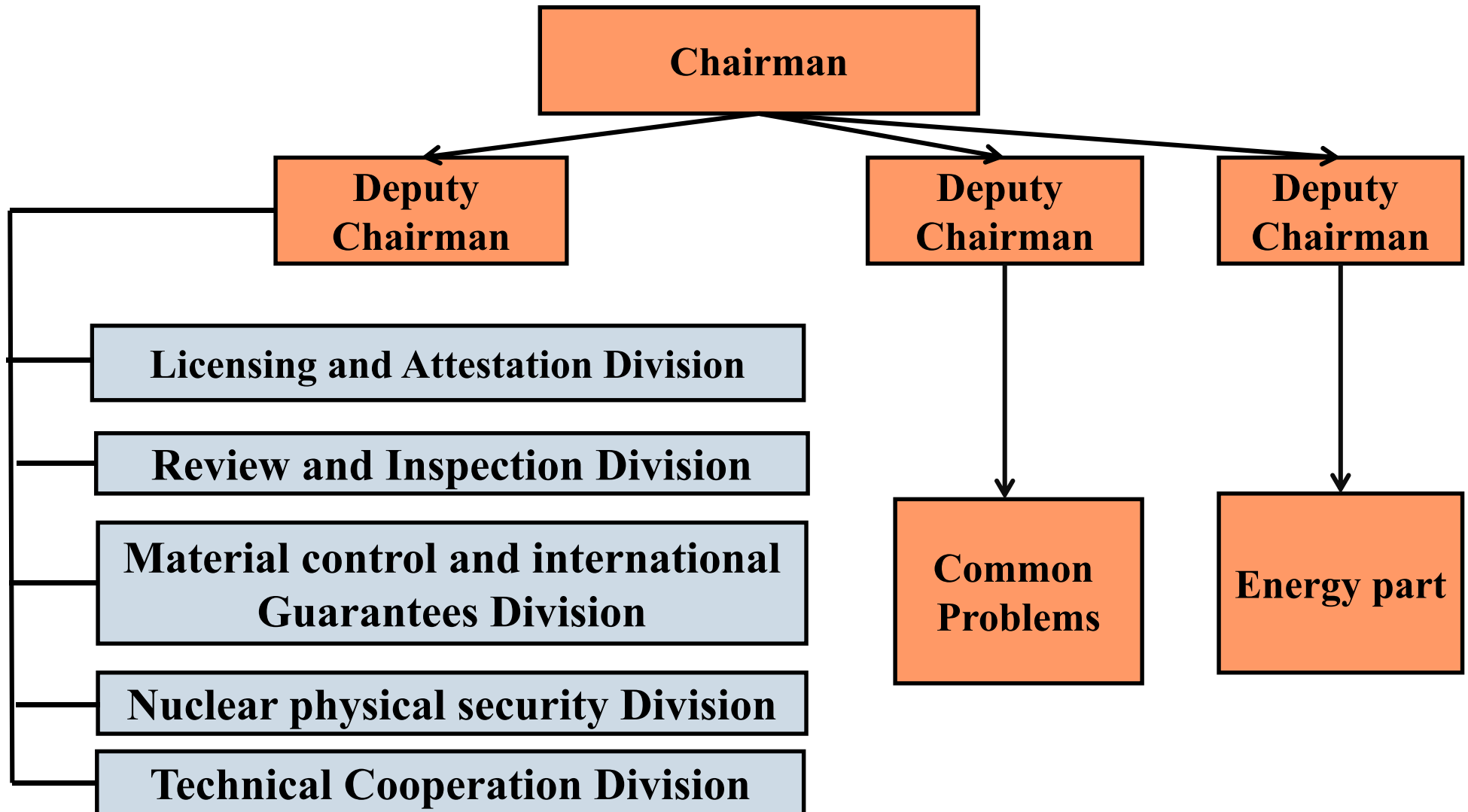
**Third Meeting of the Regional Advisory Safety Committee for
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Kazakhstan Presentation

**M. Tulegenov
Committee for Atomic and Energy
Supervision and Control of the
Ministry of Energy of the
Republic of Kazakhstan**

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Structure of CAESC



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Kazakhstan Laws And Regulations

- Law of RK on Atomic Energy Use
- Law of RK on Radiation Safety of Population
- Sanitary Rules for Radiation Safety Assurance
- Ecology Code
- Law on Permissions and Notifications
- Qualification requirements for Activities related to usage of Atomic Energy
- On State control and supervision in the Republic of Kazakhstan
- On private enterprise
- Technical requirement “Nuclear and radiation safety”
- Technical requirement “Nuclear and radiation safety of NPP”
- Technical requirement “Nuclear and radiation safety of research nuclear facilities”

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International Conventions

- Convention on Physical Protection of Nuclear Material
- Amendment to the Convention on the Physical Protection of Nuclear Material
- Convention on Nuclear Safety
- Joint convention on the safety of spent fuel management and on the safety of radioactive waste management
- Convention on assistance in the case of a nuclear accident or Radiological Emergency
- Convention on early notification of a Nuclear Accident

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Licensing

- Law on Atomic Energy Use
- Law on Permissions and Notifications
- Qualification requirements for Activities related to usage of Atomic Energy
- On State control and supervision in the Republic of Kazakhstan
- On private enterprise
- Internal Committee's rules, procedures and etc.

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Kazakhstan Nuclear Installations



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IVG.1M Research Reactor

IVG.1M research reactor is an upgraded version of IVG.1 reactor used for tests of fuel assemblies (FA) and cores of high temperature gas-cooled reactors including nuclear jet propulsion (NJP) reactors and nuclear power propulsion plants (NPPP).



“Baikal-1” Reactor Complex



Reactor View from Reloading Machine Side



Reactor Control Room

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IGR Pulse Graphite Reactor

IGR research reactor is a pulse reactor on thermal neutrons with homogeneous uranium-graphite core of thermal capacity type.



Reactor Complex



Reactor Hall



Reactor Control Room

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WWR-K Reactor Complex**

A thermal neutron pool-type reactor. Coolant, moderator and reflector - desalted water.

It was commissioned in 1967, operated at thermal power of 10MW till 1988 without deviations from standard modes.

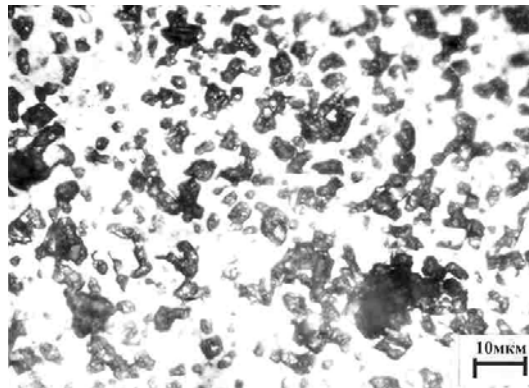
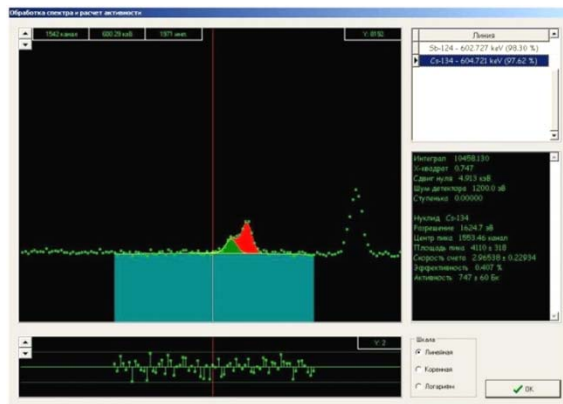
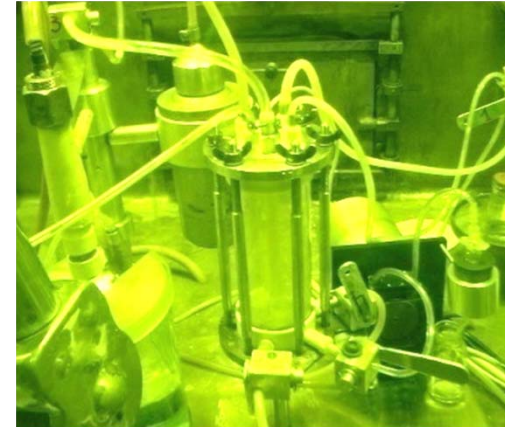
In period 1988 to 1998 the work was performed to enhance safety under high seismicity conditions (calculations and validations, structure strengthening, doubling of safety-related systems, execution of new documentation). Since the core configuration was changed the thermal power was reduced to 6 MW without loss of neutron flux.



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WWR-K Reactor Complex

- Isotope production
 - For industry ^{192}Ir , ^{60}Co , ^{124}Sb , ^{204}Tl
 - For medicine $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$, ^{131}I
- Radiation tests of materials
- Neutron activation analysis
- Transmutation doping of Silicon
- The resource test various experimental devices



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Keeping Nonproliferation principles, Kazakhstan changes high-enriched uranium (HEU) fuel at research reactors and critical assembly in favor of low-enriched uranium (LEU) one in frame of the well-known RRRFR program.

Activities on conversion of the WWR-K research reactor at the Kazakhstan Institute of Nuclear Physics to LEU fuel are in progress. On the base of calculations, uranium dioxide in aluminum matrix of the uranium density 2.8 g/cm³, enriched in U-235 to 19.7%, was chosen as fuel composition; a new design of the eight-tube fuel assembly (FA) with thin-walled fuel elements (1.6 mm), named as VVR-KN, was developed.

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The critical assembly is the Kazakhstan first nuclear installation where HEU fuel has been changed to the fuel enriched to 19.7% in Uranium-235, so-called LEU fuel.

At present, new instrumentations and control system, CPS drives, control rods and radiation monitoring system are being fabricated, and the emergency cooling system is being upgraded.

In September 2014 a tripartite agreement was signed between TVEL-INP-IAEA. HEU fuel was shipped successfully from WWR-K research reactor to Russia. Also, November 28, 2014 foreign-trade contract was signed by INP and FCNRS, and shipment of spent HEU fuel was carried out by two parties.

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WWR-K research reactor spent fuel assembly return to Russia
consist of three stages:

Stage 1: December 2008 – May 2009. Railway shipping.

Stage 2: September 2014 - December 2014. Aircraft shipping.

Stage 3: Year 2017. Residual spent fuel assemblies shipping.

Startup of the WWR-K reactor with low-enriched fuel is
expected on end of 2015. This work is supported by the US
Department of Energy.

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The critical assembly of RR WWR-K

Moderator is desalinated water. Side reflector is desalinated water or beryllium. The upper and lower end reflectors are water.

It is intended for researches on safety case of the research reactors, various techniques of reactor testing, the verification of computer codes, and safety case of conducted dangerous nuclear experiments at the reactor WWR-K. Critical assembly of critical test facility can in some cases completely simulate the core of water-moderated reactor WWR-K. It is currently used for experiments on the safety case for reducing the enrichment of the core of the WWR-K.

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Specifications of critical assembly of RR WWR-K

Thermal power, MW	100 W (limited by biosecurity)
Fuel	UA1 ₄
Loading ²³⁵ U, kg	It varies depending on the experiment
Enrichment ²³⁵ U, %	36 и 19,7

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According to item 128 of Technical regulation “Nuclear and radiation safety” positive conclusion on preliminary SAR of regulatory body is an official permission for construction (modernization) of a nuclear facility.

According to the item 129 of the abovementioned Technical regulation positive conclusion on final SAR is a necessary requirement of license issue by regulatory body.

"Safety Analysis Report on critical assembly" had been approved by the Committee (AEC MINT RK) in 2012.

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The startup of the WWR-K reactor with low-enriched fuel consists of two stages.

Stage 1: Getting of positive conclusion on preliminary safety report on modernization of the WWR-K.

Stage 2: Getting of positive conclusion on final safety report final after modernization of the WWR-K for receiving of license.

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