

# **HEU MINIMIZATION AT INSTITUTE OF NUCLEAR PHYSICS, UZBEKISTAN**

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**International Symposium on Highly Enriched Uranium Minimization  
Vienna, January 23 – 25, 2012**

# LEGAL FRAMEWORK

- 1994 - Joined IAEA and signed the Non-Proliferation treaty
- 1993 - Initiated the treaty to create nuclear weapon free zone in Central Asia (signed in Semipalatinsk, September 8, 2006)
- 1998 - Ratified the Convention on physical protection of nuclear materials and facilities.
- 1998 - The IAEA Additional Protocol
- 2004 - Signed Code of Conduct on protection and safety of radiation sources
- 2008 - Ratification of Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

# LEGAL FRAMEWORK

- 1997-** Intergovernmental Agreement between the Russian Federation and the Republic of Uzbekistan about scientific and technical cooperation in the field of peaceful uses of atomic energy
- 2001-** Intergovernmental Agreement between the USA and the Republic of Uzbekistan concerning cooperation in the area of the promotion of defense relations and prevention of proliferation of weapons of mass destruction
- 2002-** Agreement between the Department of Energy of the USA and the Ministry of Foreign Affairs of Uzbekistan concerning cooperation in the area of prevention of proliferation of nuclear materials and technologies

# NUCLEAR AND RADIATION FACILITIES

- Institute of Nuclear Physics, Tashkent
- Foton Enterprise
- Institute of Applied Physics, Tashkent
- Nuclear Laboratory of Samarkand State University
- Physical Technical Institute, Tashkent
- 16 Oncology Centers
- Biological research institutes
- Uranium mining facilities (annually more than 2100 tons of  $U_3O_8$ )
- Industrial facilities

# FACILITIES AT INP



**Cyclotron U-115**



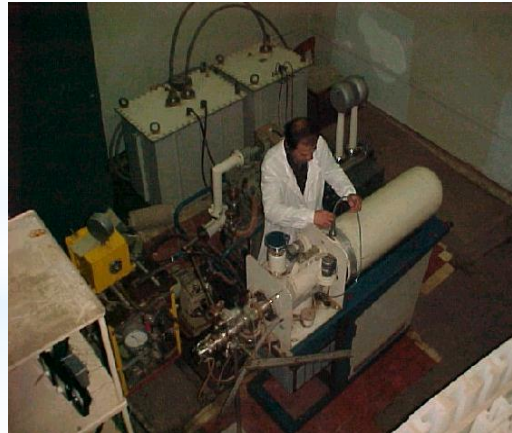
**WWR-SM Reactor**



**Gamma facility**



**Cyclotron U-150**



**Neutron Generator**



**A new Electron  
accelerator U-003**

# REACTOR UPGRADE UNDER IAEA PROJECTS

- 2006** - Upgrade of Reactor Radiation safety system (TC Project UZB/9/004)
- 2009** - Project on manufacturing, delivery and commissioning of Complex of Instrumentation and Control System (TC Project UZB/9/005)
- 2011** - Enhancing of Reactor Emergency Cooling System
- 2013** - Launch of the UZB/1001 Project “Strengthening Nuclear Safety and Improving Use of the Research Reactor at the Institute of Nuclear Physics”

# REACTOR CONVERSION

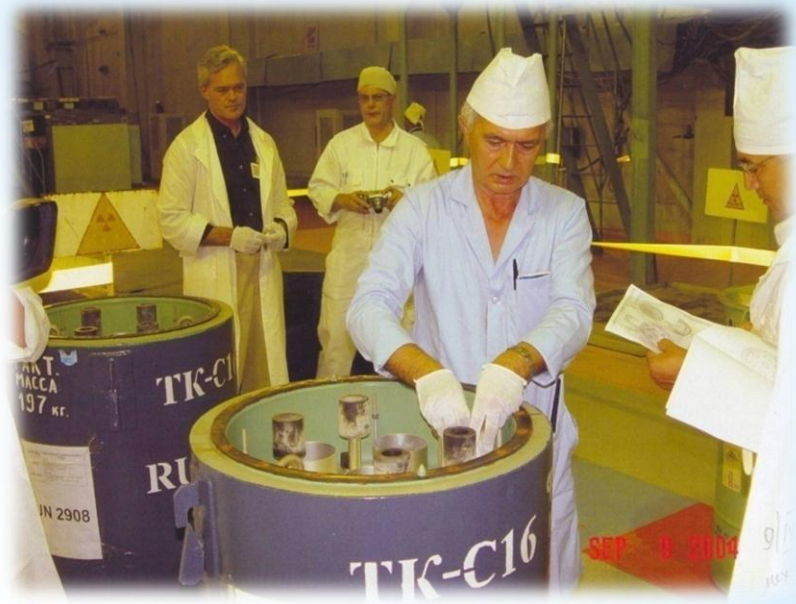
## 1<sup>st</sup> stage:

- 1988-1989 - Life testing of new FA type IRT-3M with 36% enrichment at WWR-SM reactor
- 1998-1999 - Conversion of the WWR-SM Research reactor use from HEU fuel (90 % enrichment) to LEU fuel (36%)

## 2<sup>nd</sup> stage:

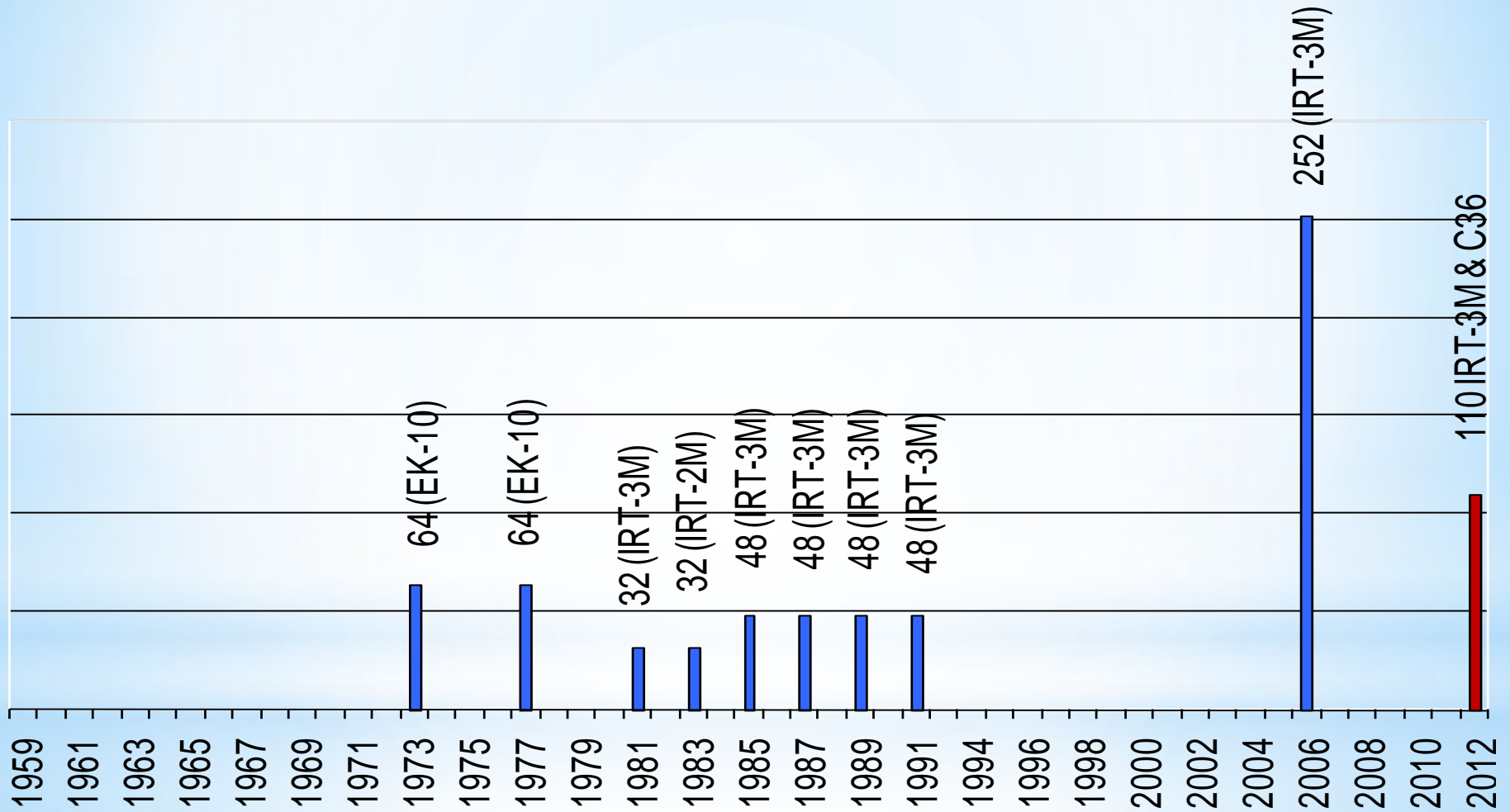
- 2000-2002 Life testing of new LEU FA IRT-4M type with 19,7% enrichment at WWR-SM reactor
- 2008-2009 Conversion of the WWR-SM reactor core from HEU fuel (36%) to LEU fuel (19,7%) on the basis of received information

# SHIPMENT OF FRESH FUEL IN 2004





# SPEND FUEL SHIPMENT SCHEDULE



# TYPE AND QUANTIFY OF SHIPMENT

Years	EK-10	C-36	IRT-2M	IRT-3M 90%	IRT-3M 36%	Subtotal
Until 1991	128	0	32	224	0	384
2006	0	0	0	210	42	252
2012 (plan)	0	2	0	0	108	110
<b>Total</b>	<b>128</b>	<b>2</b>	<b>32</b>	<b>434</b>	<b>150</b>	<b>746</b>

# FOTON RESEARCH REACTOR

Thermal Power, kW	15
Fuel	UO <sub>2</sub> SO <sub>2</sub>
Fuel type	Liquid
<sup>235</sup> U loading, kg	4.2
Enrichment <sup>235</sup> U, %	90
Reactor vessel height, cm	250
Reactor vessel diameter, cm	43
Fast neutron flux density	$1 \times 10^{12}$ n/(cm <sup>2</sup> s)



# FOTON RESEARCH REACTOR

- Reactor is not applicable to be converted to LEU fuel
- DOE offers to support in shipping HEU fuel to Russia
- Government is on the stage of approval of the decommission order and shipment of HEU fuel
- Development of Decommission Plan is required



# SUMMARY

- Legal framework and regulatory basis
- Support and willingness of the Government
- International cooperation
- Qualified international and national team of experts
- IAEA role in non-proliferation programs

**THANK YOU!**