Republic of Belarus Ministry of Energy
Republican Engineering Design and Research Unitary Enterprise BELNIPIENERGOPROM

ASSESSMENT OF ENVIRONMENTAL EFFECTS ASSOCIATED WITH CONSTRUCTION AND OPERATION OF BELARUSIAN NUCLEAR POWER PLANT

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Construction of NPP in the Republic of Belarus is motivated by factors as follows:

Necessity to raise energy security of the Republic

Need to diversify energy sources in the fuel-and-energy balance of the country

Permanent growth of hydrocarbon fuel prices

Construction of NPP in the Republic of Belarus will lead to:

Reduction of power production cost price

Reduction of greenhouse gas emissions

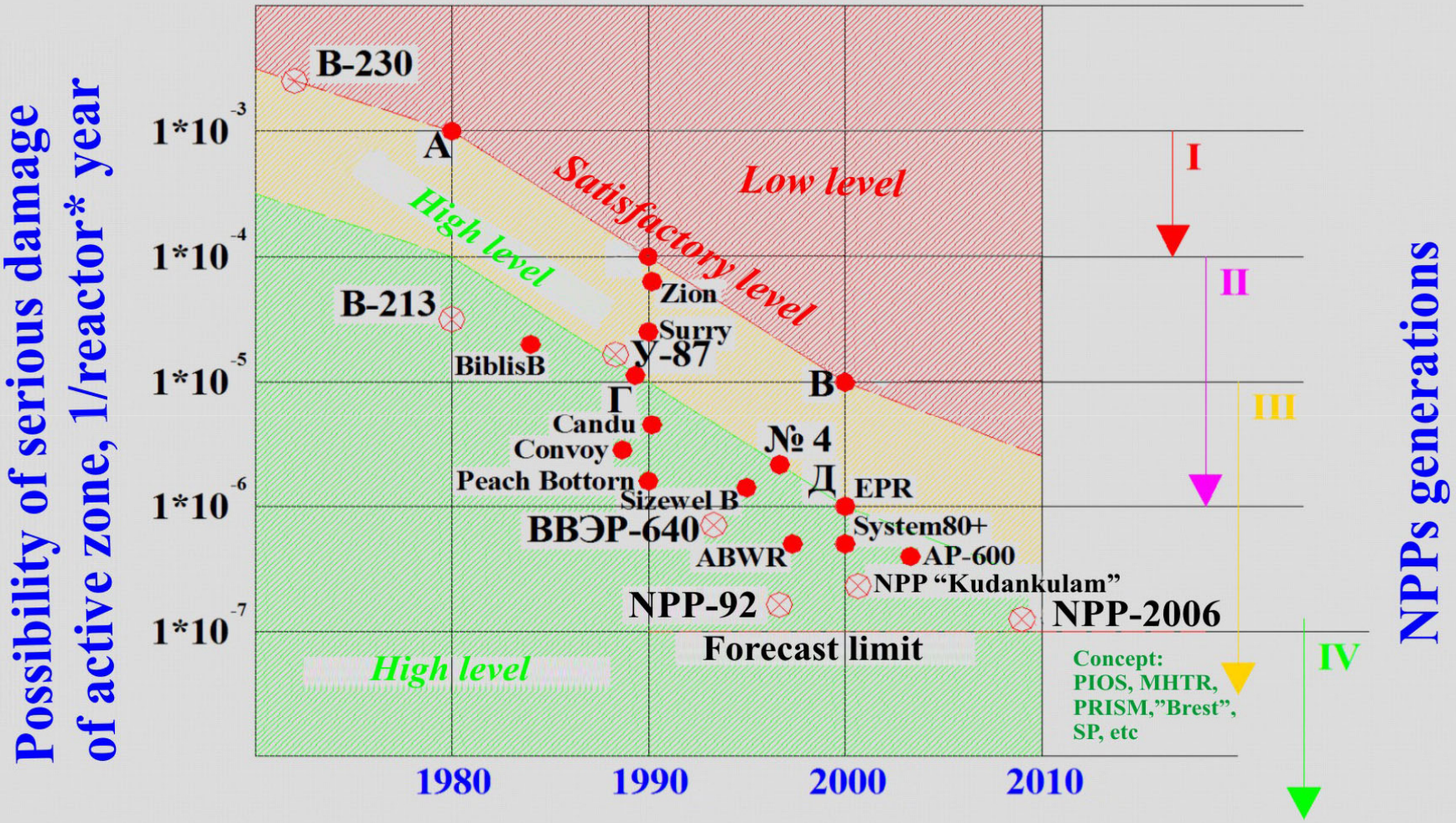
Putting out of operation outdated and low efficiency generating facilities

Location of NPP sites on the territory of the Republic of Belarus

Site selection process, including the Ostrovetskaya site:

- ***A large amount of surveying work was done at the sites concerned***
- ***The sites were found as meeting all the IAEA requirements***
- ***The Ostrovetskaya site was considered the most suitable***
- ***The final decision on the site selection will be taken after the state environmental expert examination has been conducted***

Progress of development, NPPs with WWER



А - Old NPPs
Б - IAEA 1988 (INSAG-3)
В - IAEA 1995
Г - EUR
Д - ОПБ-88/97

⊗ As per technical documentation

● As per literature sources

Description of the NPP in the Republic of Belarus

- ***nominal power unit capacity, min – 1150 MW (e)***
- ***number of power units – 2.***
- ***basic technology – 2 WWER-1200***
- ***length of power unit operation, min –50 years***
- ***power efficiency (net), min –33,7 %***
- **capacity factor, min – 90 %**
- ***mean annual power output for the two NPP power units* - around 17.5 bln. kW*h**
- ***NPP technology cooling system is a circulation water system with re-cooling towers***

NPP safety, security and safeguards

- ***By all its parameters, the Russian WWER-1200 NPP project meets the Agency and European Union SSS requirements***
- ***The NPP-2006 prototypes are NPP-92 and NPP-91/99***
- ***NPP-92 - EUR Club Certificate was issued on 24 April 2007***
- ***NPP-91/99 – expert examination results have been presented in the 9 IAEA reports***

Types of effects

- ***Thermal (emissions of heated steam-and-air mixture from cooling towers)***
- ***Chemical (draining of salt-containing waters into the NPP discharge canal and cooling towers salt fallout on soil)***
- ***Radiation (presence of radionuclides in the emitted air)***
- ***Electromagnetic (within reactor area)***

Brief information on the Client, Designer and EIA Contractors is presented below:

Client – ***State Enterprise "Directorate of NPP construction project"***

NPP General designer – ***Republican Unitary Enterprise "Belnipienergoprom"***

EIA Contractors:

Republican Unitary Enterprise "Central Research Institute of Complex Use of Water Resources"

"Republican Center of Radiation Monitoring and Control" - an entity under Ministry of Nature of the Republic of Belarus

"Republican Weather Center"

"Belarus Academy of Sciences Institute of Nature Management"

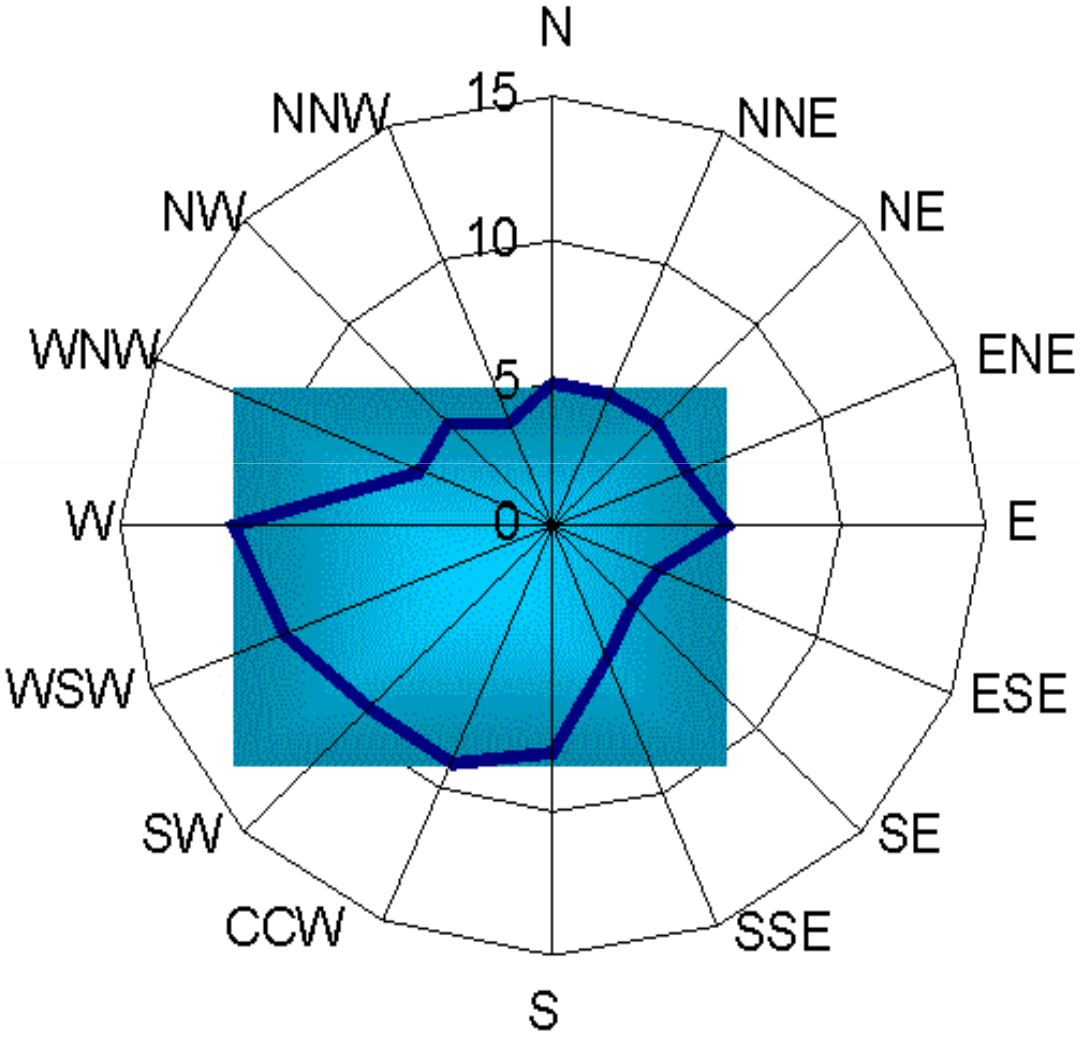
The Research Department of the Chief Research Directorate of the Belarusian State University

Research Center "Hygiene" of the Republic of Belarus Ministry of Health

Republican Research Enterprise "Institute of Radiology"

"Research Institute of Fire Safety and Emergency Issues" under the Republic of Belarus Ministry of Emergency Situations

Wind rose



Possible effects of the Belarusian NPP.

Country	Distance to, km	Ways of affecting		
		Surface water	Ground waters	Air transport
Lithuania	22	Yes	No	Yes
Poland	180	No	No	Yes
Latvia	110	No	No	Yes
Russia	200	No	No	Yes
Ukraine	318	No	No	Yes

Mathematical models used

Description	Model used
Atmospheric air	Automated Radiation Evaluation and Forecasting System RECASS NT (Production Association "Tichoon", Russia.)
Surface water *Thermal pollution* *Chemical pollution*	Frolov – Rodziller method and Recommendations of Rosgidromet [1]. Frolov-Rodziller formula, eddy diffusion coefficient D was calculated following A. Karaushev's method [1]
Ground waters	Unified generalized mixed cell multi-box model (MULTIBOX).
Agricultural products	Mathematical compartment models based on the method of systemic analysis [2, 3].
Population	INTERRAS Package (The International Radiological Assessment System), [4]. (ST-DOSE - Source Term To Dose) [5].

Beyond design accident effects for Ukraine

Environment component	Effects or effect mitigation activities
Population's health	No effect
Soil	Possible density of contamination ^{137}Cs at the global fallout level ^{137}Cs 1,7 kBq/m^2 Density of contamination ^{40}K 173 kBq/m^2
Agricultural products	No effect
Waters: surface and ground	No effect
Flora and fauna	No effect
Protection activities emergency planning area	No effect

Assessment of serious accidents made by Finnish experts

Reference isotope volume of emissions	**100 TBq ^{137}Cs** **1500 TBq ^{131}I**
High altitude emissions	**24 hours after the accident**
Possible need for population evacuation	**Within not more than 10 km radius area**
Possible need for iodine therapy	**Within 100 km radius area**
Possible short-term restriction for consumption of locally produced food	**Within 1000 km radius area**
Possible long-term restriction for consumption of certain types of food	**Within 300 km radius area**

The minimum dose affecting the thyroid in children and requiring iodine therapy is 10 mGy for Finland and 100 mGY for Belarus (level A as per Annex 6 of Radiation Safety Standards-2000 [12]).

- THANK YOU