

Environmental radiation monitoring on the
territory and vicinity of the National
Centre for Nuclear Research, Poland

Grzegorz Krzysztozek, Jakub Ośko

ŚWIERK Nuclear Centre

Otwock

30 km from Warsaw

SE direction





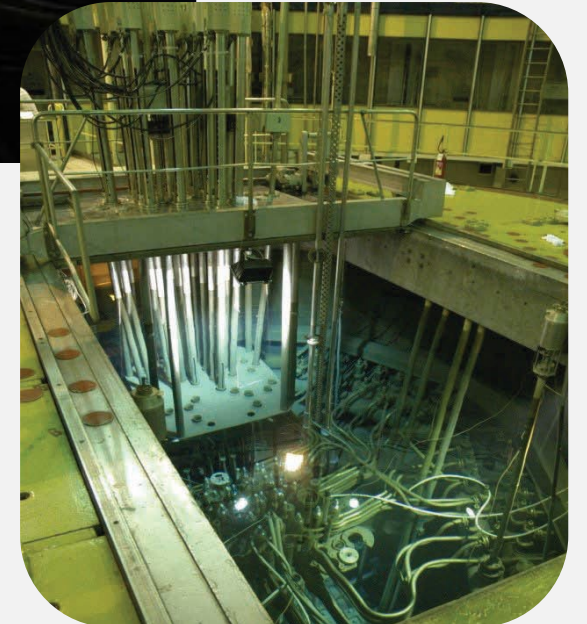
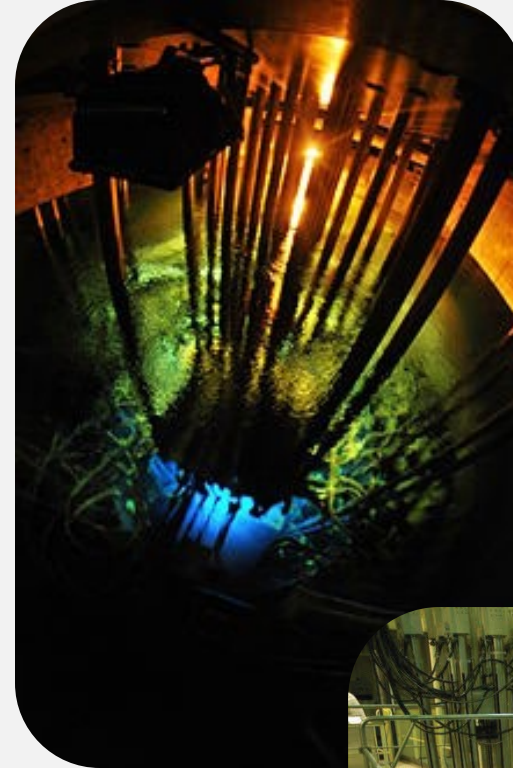
National Centre for Nuclear Research



Radioactive Waste Management
Plant

Nuclear facilities at Świerk NC

- **MARIA research reactor** (along with technological pool where spent nuclear fuel is stored) at the National Centre for Nuclear Research (**NCBJ**)
- **EWA research reactor under decommissioning** (the first research reactor in Poland operated in the years 1958-1995) (**ZUOP**)
- **spent fuel storages** at the Radioactive Waste Management Plant (**ZUOP**)



None-nuclear facilities in Świerk NC

- **POLATOM Radioisotope Centre** – manufacturer and distributor of isotopes used in medicine, science, industry and environmental protection
- **Other laboratories**
 - sealed and unsealed isotopes laboratories
 - accelerators



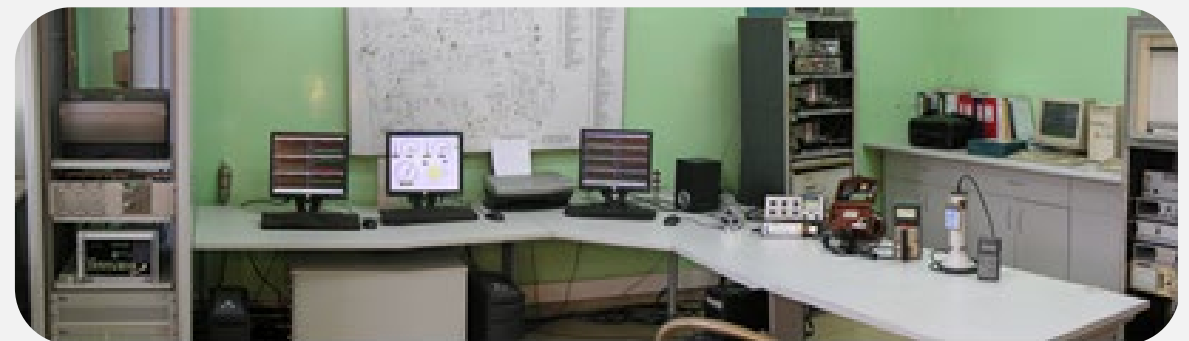
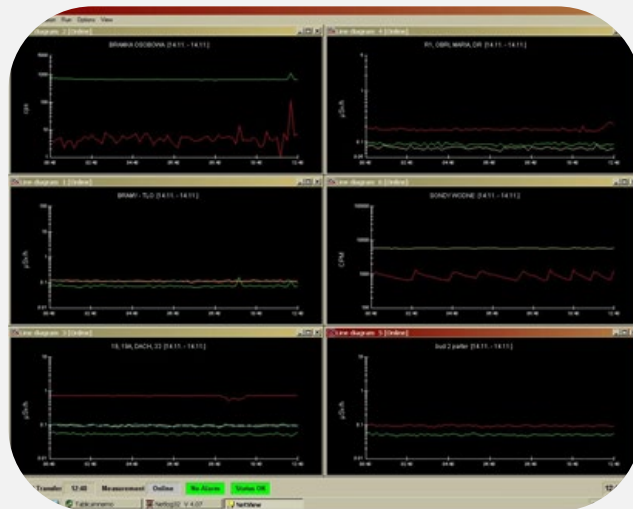
Świerk NC radiation monitoring

- Environmental monitoring on the territory and vicinity of Świerk NC is performed by **Radiation Protection Measurements Laboratory NCBJ** (online and offline monitoring)
- Radiation monitoring at MARIA Reactor is performed by **MARIA Reactor Radiation Protection Department**
- Additionally measurements in the close vicinity of the site are performed by another institution commissioned by **National Atomic Energy Agency** (regulator)

Online monitoring

Control of:

- gamma radiation fields in selected places on the premises of the Nuclear Centre,
- radioactive concentration in the utilities released to the environment (sanitary sewage, drainage water),
- atmospheric aerosols with regard to alpha, beta and gamma isotopes content.

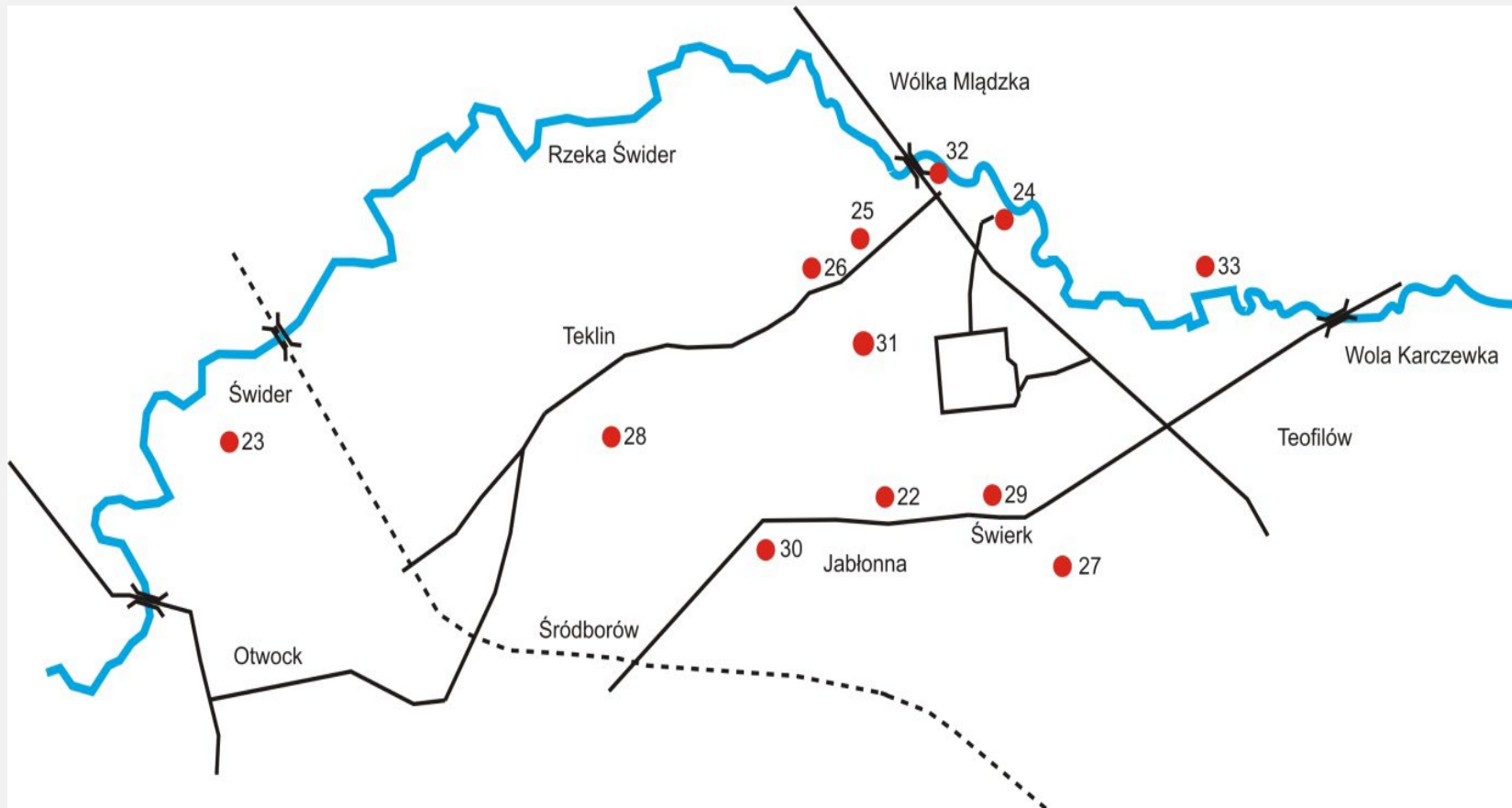


Online monitoring

- Dosimetry center
- Control of pedestrian and car traffic
- Control of pedestrian traffic at the main entrance
- Photon radiation measurements
- Meteo station



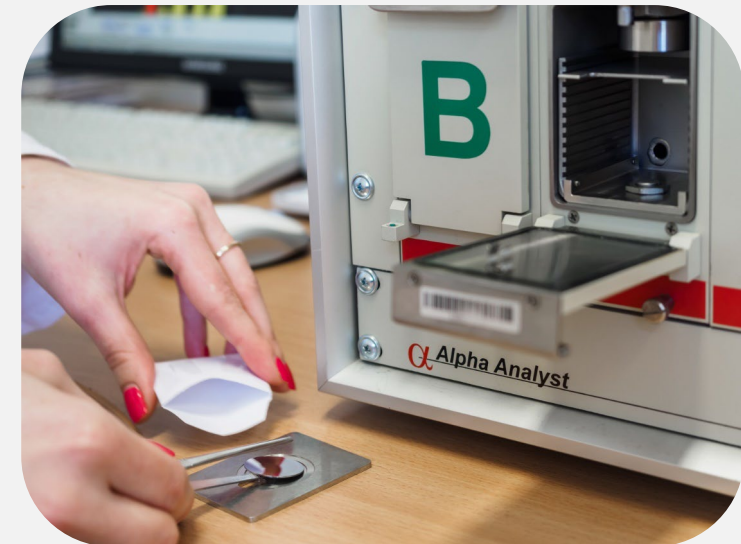
Dose monitoring (TLD)



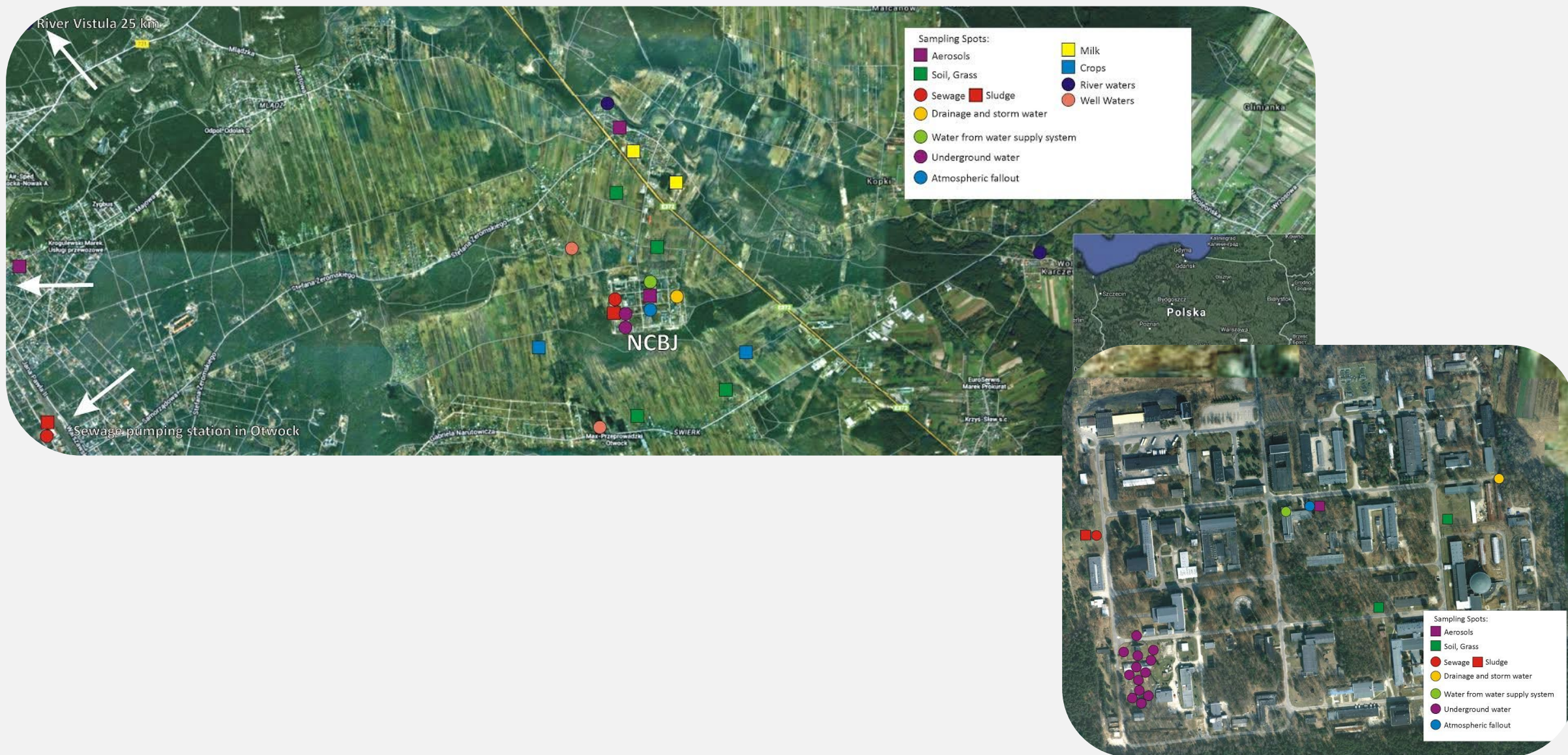
Offline monitoring

Measurements of:

- activity concentration of alpha, beta and gamma radionuclides in environmental samples (~1000 analyses annually)



Sampling spots



Sampling methods



grass



soil



surface water



ground water

Radioactive releases through the MARIA reactor stack

MARIA Reactor Dosimetry

The control set utilize several lines for continuous measurement of gaseous and volatile radioactive substances discharged through the reactor stack :

- 1SG line measuring the **activity of radioactive noble gases** – measuring gauge FHT 671 S4; detector 51 B51/2M NaI(Tl)
- 2SG line measuring gamma **dose rate in the stack** – measuring gauge FHT 191 N; detector - ionization chamber
- 1SA1 line measuring the **activity of iodine isotopes** – measuring gauge FHT 671 S4; detector 51 B51/2M NaI(Tl)
- 1SA2 line measuring the **activity of aerosols** – measuring probe FHT 671 S4; detector SBB 31.



1SA1 probe in filter can with charcoal filter

Release limits set by the President of the National Atomic Energy Agency (PAA):

- For iodine isotopes - 5×10^9 Bq annually
- For noble gases – 10^{15} Bq annually

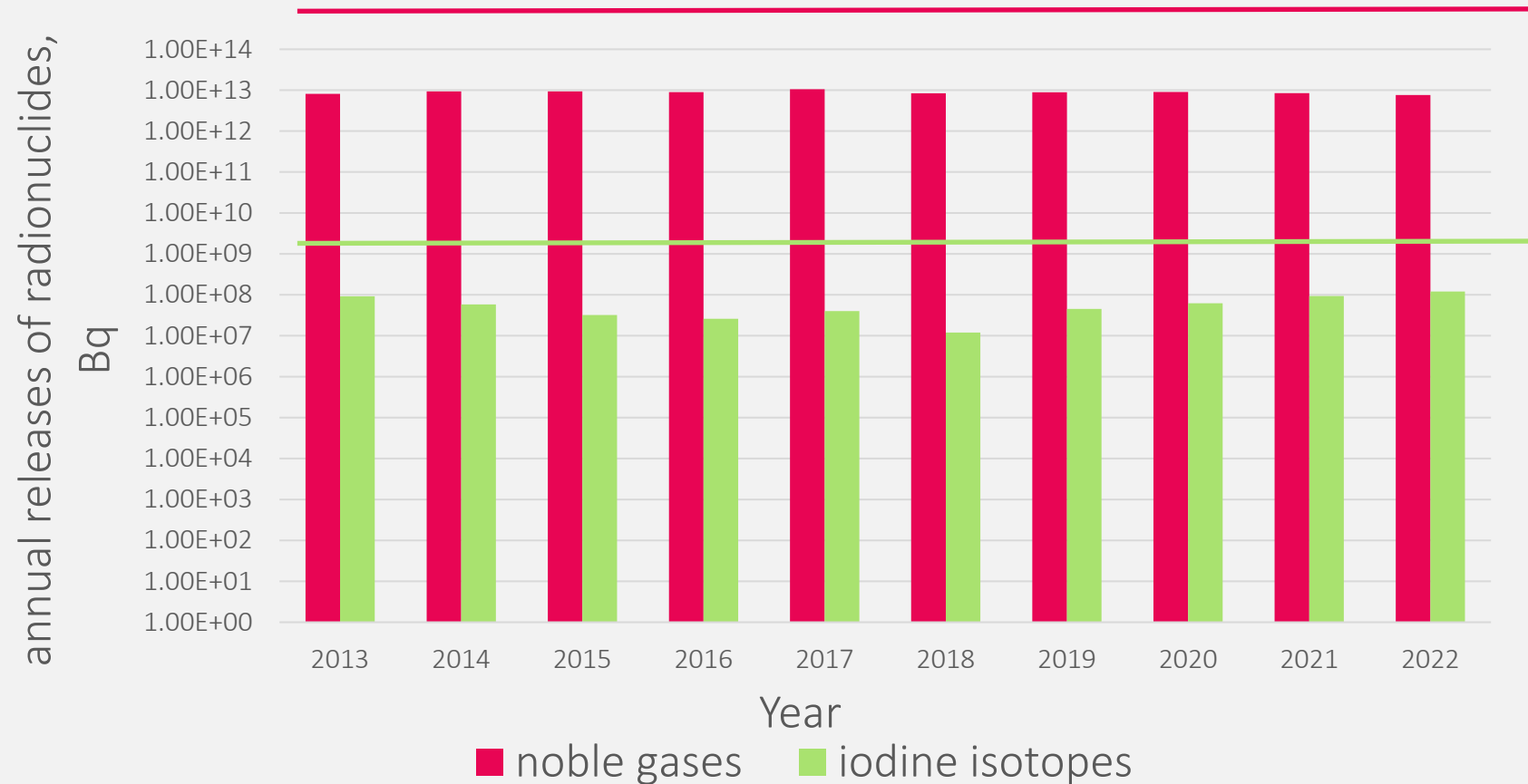


HPGe spectrometric set

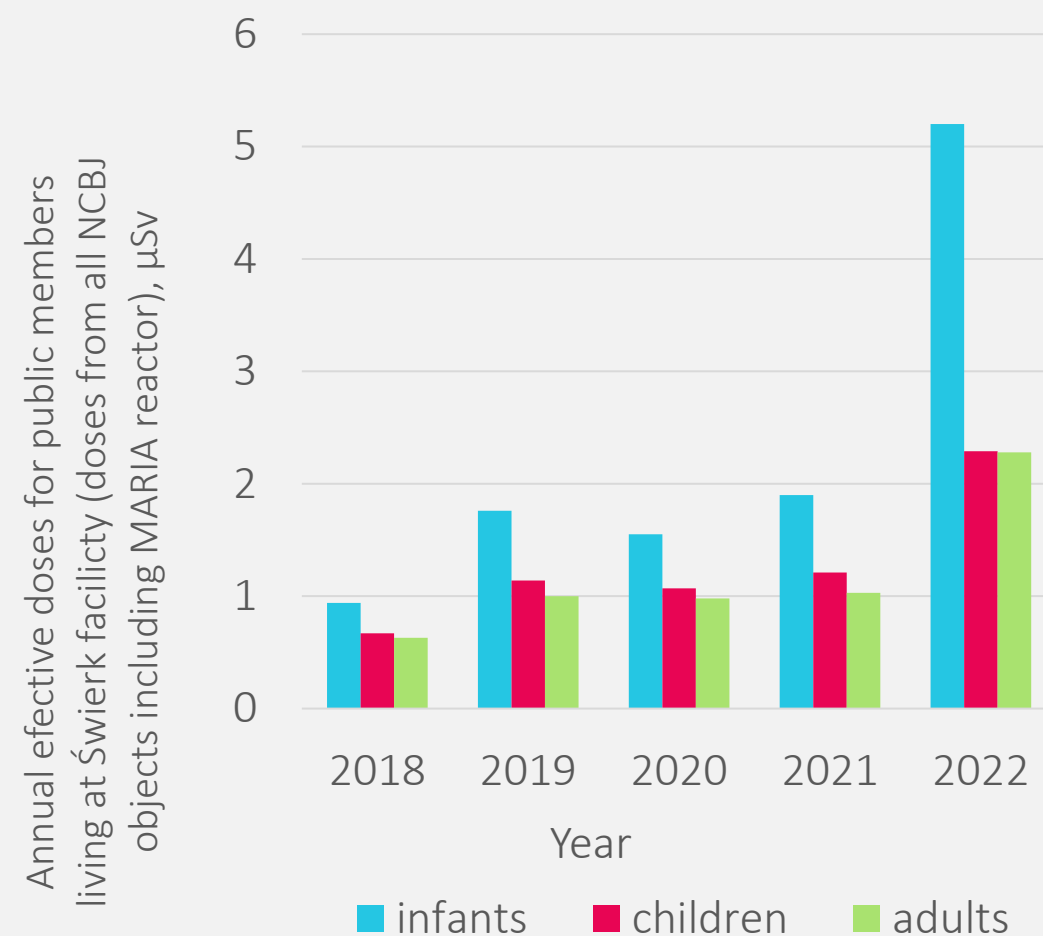
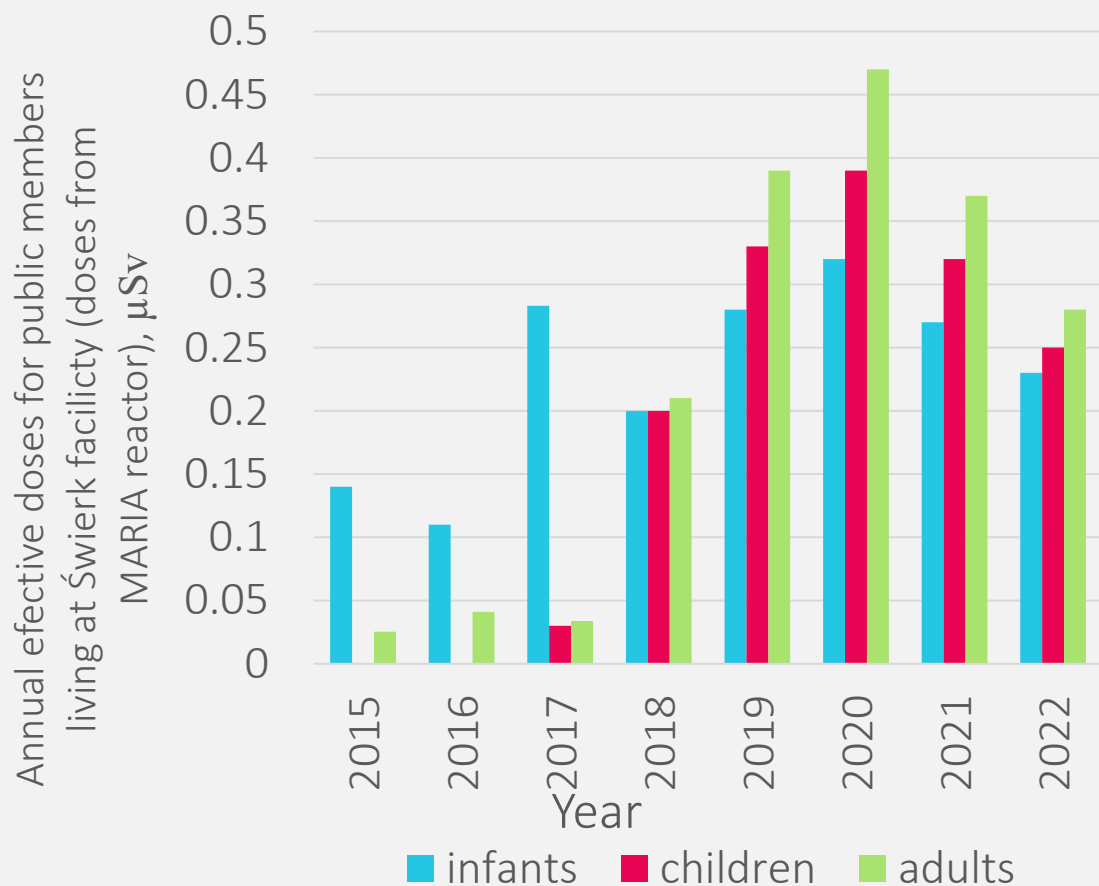


10l chamber for noble gases sampling

Environmental radiation monitoring results



Environmental radiation monitoring results



Future perspective

New Polish regulations: Ordinance of the Council of Ministers on detailed requirements regarding the scope of the radiation monitoring program carried out by organizational units included in threats categories I and II (Journal of Law 2022/2058, 6th October, 2022).

Annual number of analyses according new regulation:
~5000

According new regulations NCBJ has to adjust environmental monitoring programme until 20th October 2025.



DZIENNIK USTAW RZECZYPOSPOLITEJ POLSKIEJ

Warszawa, dnia 6 października 2022 r.

Poz. 2058

**ROZPORZĄDZENIE
RADY MINISTRÓW**

z dnia 9 sierpnia 2022 r.

w sprawie zakresu programu monitoringu radiacyjnego środowiska opracowywanego i wdrażanego przez jednostki organizacyjne zakwalifikowane do I lub II kategorii zagrożeń¹⁾

Na podstawie art. 86o ust. 3 ustawy z dnia 29 listopada 2000 r. – Prawo atomowe (Dz. U. z 2021 r. poz. 1941 oraz z 2022 r. poz. 974) zarządza się, co następuje:

Future perspective




- atmospheric aerosols: Sr-90, Pu-238, Pu-239+240, global alpha, global beta, HTO
- air: HTO, C-14
- rainfall: C-14, Pu-238, Pu-239+240
- soil: Sr-90, Pu-238, Pu-239+240, HTO, C-14, U-238, U-234, U-235
- drink water: Rn-222, C-14, U-238, U-234, U-235, Th-232, Ra-228, Pb-210, Pu-238, Pu-239+240, Am-241
- sediments in groundwater: HTO, C-14, U-238, U-234, U-235, Th-232, Pu-238, Pu-239+240, Am-241, gross alpha, gross beta
- drainage water: C-14, Pu-238, Pu-239+240
- Fresh feed (including grass): Sr-90, HTO, OBT, C-14, Pu-238, Pu-239+240, Am-241
- sewage sludge: HTO, C-14, Ra-226, Pu-238, Pu-239+240, Am-241, gross alpha, gross beta
- Milk: Sr-90, OBT, C-14

Future perspective

- implementation of new procedures (10 matrices, 2 to 7 analysis for each matrix)
- purchase of new equipment
- staff training



Thank you for your attention 😊

 Jakub Oško
 jakub.osko@ncbj.gov.pl
 www.ncbj.gov.pl