
Environmental impact of nuclear R&D activities

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Established in 1971 and known for several years as "**Institute for Nuclear Technologies**" (ITN-1971), "**Institute for Nuclear Power Reactors**" (IRNE - 1977), presently "**The Institute for Nuclear Research**" (ICN - 1990) becomes, in 1998, SCN - Pitești subsidiary of the Romanian Authority for Nuclear Activities (RAAN). The institute always had and still has as a main task to sustain research and other activities related to the peaceful utilization of nuclear energy.

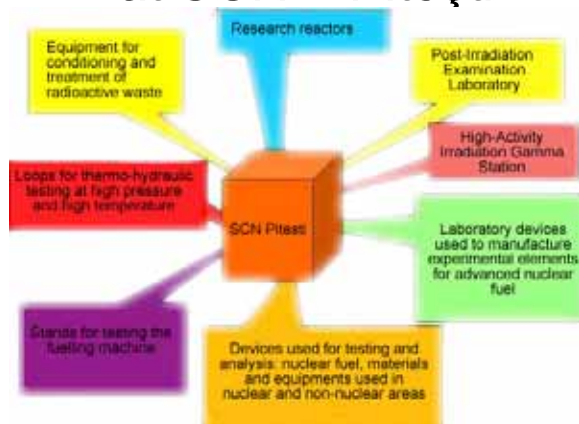
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During its **38 years of activity**, the Institute has developed methods, computer codes, and its own **experimental infrastructure** directed towards the making of end-products, technologies or services with applications in the nuclear power plants area. Involved in the development of nuclear energy, the Institute represents the **technical support for the safe and economical operation of nuclear power plants**, in accordance with international agreements on the safety of nuclear installations.

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Nuclear installations at SCN – Pitești



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Radiation protection, environment protection

Objectives:

- Providing radiation and environment protection for its own nuclear facilities;
- Sustaining an R&D program intended to increase proficiency in human and environment protection against radiation-associated risks.

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Radiation protection, environment protection

Activities:

- Occupational radiation protection;
- Management of environmental releases;
- Environmental radioactivity monitoring;
- Computer codes development;
- Emergency planning and preparedness;
- Emergency radioactivity monitoring.

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Main potential radioactive polluters

- TRIGA reactors (SSR 14MW and ACPR)
- Hot Cells Laboratory
- Radioactive Waste Treatment Facility
- Nuclear Fuel Factory*

* It is located on the same site but it is not under the authority of SCN

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Emission pathways

- airborne and gaseous effluents from TRIGA reactors and Hot Cells laboratory stack released into the atmosphere
- liquid effluents from nuclear installations collected and treated at the purifying station released into Doamnei – Argeş River – Reservoir system

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Objectives

- Limitation and optimisation of radioactive effluents release into the environment for public health and environment protection, today and in the future
- Environmental Radioactivity Monitoring Program around SCN - site

Annual dose constraint

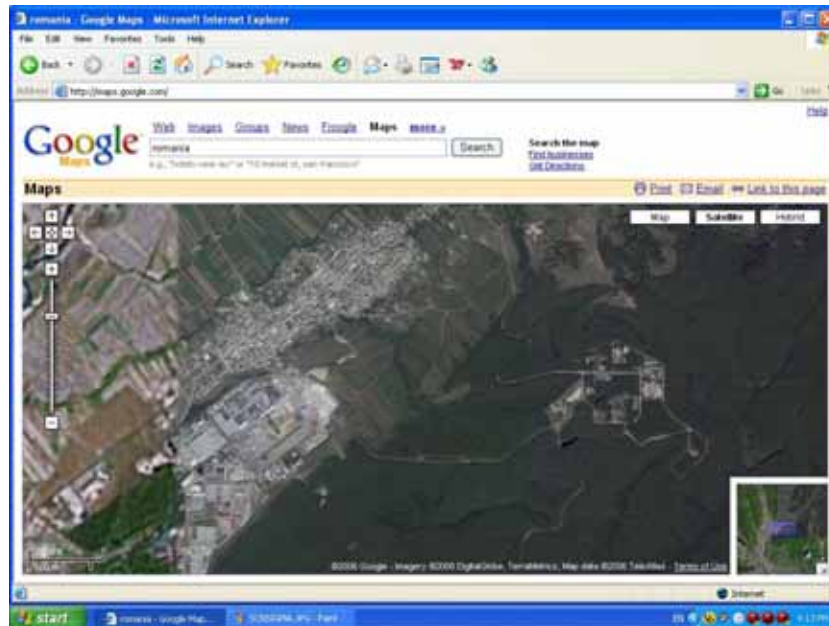
- Includes the annual effective dose from external exposure and the annual committed dose from intake by individuals from the existing or hypothetical critical groups, for all relevant exposure pathways.
- For SCN nuclear installations:

$$D_{\max} = 0.1 \text{ mSv/year}$$

Site and population data

- SCN is located in the Argeş county, approximately 12 km North-East from Piteşti, on the Mioveni town territory;
- The land is largely covered by forest and it is used very little for agriculture, especially for dairy farming;
- The nearest populated area is located at 2 km distance from the stack

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Sources of airborne effluents

- The 60-m TRIGA and Hot Cells Stack
(exhaust air from TRIGA reactors and Hot Cells buildings)
- Considered radionuclides:
 - Ar – 41; Xe – 133; Kr – 88;
 - I – 131;
 - Cs – 137

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Sources of liquid effluents

- Activation and fission products from experiments contained in liquid wastes.
- Activated corrosion products from the cooling water of primary circuit or liquid wastes resulted from different processes
- Natural uranium from experiments or nuclear fuel fabrication.

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Dose calculation for airborne effluents

Radionuclide	Annual effective dose per unit of released activity (mSv/y per Bq/y)
Ar – 41	6.85×10^{-17}
Xe – 133	1.48×10^{-18}
Kr – 88	1.03×10^{-16}
I – 131	3.72×10^{-11}
Cs – 137	1.96×10^{-12}

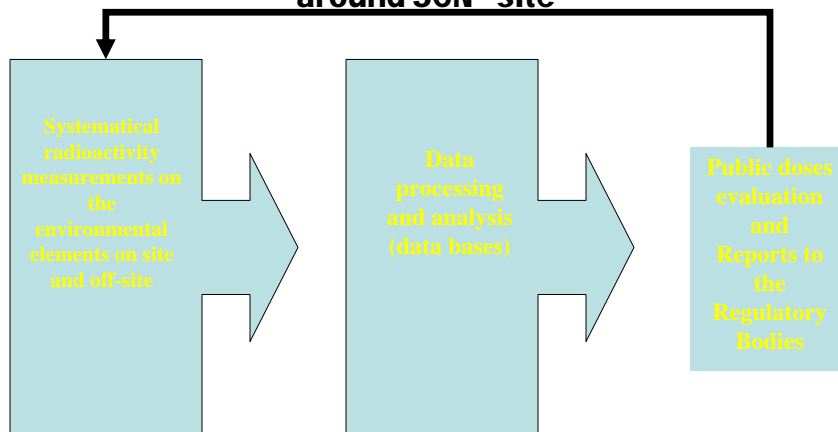
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Dose calculation for liquid effluents

- Exposure pathways:
 - Internal exposure due to human consumption of contaminated water;
 - Internal exposure due to human consumption of contaminated animal products;
 - Internal exposure due to human consumption of contaminated fish;
 - external exposure resulting from immersion in contaminated water;

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Environmental Radioactivity Monitoring Program around SCN - site



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Conclusions

- Source term is very well characterized;
- Uncertainties associated to used models were well covered by conservatism;
- radioactivity monitoring program results confirm that Derived Emission Limits are adequate (no artificial radioactivity was detected in the environment).

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Thank you



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