Peaceful application of nuclear energy in the Republic of Azerbaijan

Ibrahim Gabulov and Adil Garibov
Deputy Director and Director of the Institute of Radiation Problems of Azerbaijan National Academy of Sciences,
B.Vahabzadeh street, 9, Baku, AZ 1143, Azerbaijan,
ibrahim_gabulov@yahoo.com
OUTLINE

- Background Information
- Legislation – Regulations – Standards
- Radiation Infrastructure in the Republic of Azerbaijan
- Achievements of peaceful application of nuclear energy
- Issues during the peaceful application of nuclear energy
Azerbaijan is a developing and transit country in the South Caucasus, connecting East and West.

The Republic of Azerbaijan has a surface of 86,600 square km and land borders with Armenia, Georgia, Islamic Republic of Iran, Russian Federation, and Turkey.

The length of land boundaries is 2,646 km.

Borders with neighboring Countries: Armenia - 1007 km, Georgia - 480 km, Iran - 756 km, Russia - 390 km, Turkey - 13 km

The length of sea boundaries (the Caspian Sea) is about 800 km.

Azerbaijan has a sea borders with Turkmenistan, Russia, Iran and Kazakhstan.

Azerbaijan has a population about 9.1 millions and the capital is Baku.
Legislation – Regulations – Standards

- There is one basic law in the field of the use of nuclear energy in force in the Republic of Azerbaijan. It is the law on the Radiation Safety of the Population of December 30, 1997. This law stipulated the State Committee for Industrial Safety and Mining Supervision (GOSGORTEHNADZOR), presently State Agency on Nuclear and Radiation Activities Regulation (SANRAR) of the Ministry of Emergency Situations, the Ministry of Public Health and the Ministry of Ecology and Natural Resources as the regulatory and control bodies for all nuclear and radiation related activities in Azerbaijan. Specific cases are regulated under the Criminal Code of 2000, the Administrative Code, the Health Safety Law of 1999, the Technical Safety Law of 1999, the Civil Code Law of 1998, by the Presidential decree No. 758 of 1998 and by acts of the Government.
• The standards and regulations are elaborated in the Former Soviet Union and Russia are still used in Azerbaijan. These are Radiation Safety Standards 96, Health Regulations for Radioactive Waste Management (SPORO), General Safety Regulations (OPB) and etc.

• Presently, the Standards and Regulations for radiation Protection as foreseen by the Law “On Radiation Safety of Population” is being developed following to the IAEA recommendations, namely Basic Safety Standards as well as the international practice and experience.
Radiation Infrastructure in the Republic of Azerbaijan

COMPETENT AUTHORITIES

- The Cabinet Council is responsible for State control in the field of radiation safety and nuclear security. The Prime Minister or his deputies sign authorizations to import of radioactive sources.
Diagram on state radiation safety management and control

- Ministry of Emergency Situations, SANRAR
- Ministry of Health, National Centre for Hygiene and Epidemiology
- Ministry of Ecology and Natural Resources
• Ministry of Emergency Situations, SANRAR – is according to the Law, the regulatory body responsible for independent state safety supervision of transport, storage and use of nuclear and other radioactive materials and the sources of ionizing radiation, inventory of sources as well as for all kind of activities in the area of radiation safety and nuclear security in the country. The Ministry is responsible for civil defense and emergency prevention and management. This regulatory body issues authorizations for use, storage and transportation of the sources.
Ministry of Emergency Situations, SANRAR

- To issue special permissions for the use of radioactive sources
- To issue special permissions for transportation of radioactive sources
- To issue special permissions for storage of radioactive sources
- To define special control measures on radiation safety implementation in the organizations
- To approve special guides for safety measures
**Ministry of Health, National Centre for Hygiene and Epidemiology** – is, according to the Law, the regulatory body for sanitary inspection and the regulatory control of ionizing radiation, sources and radiation installations in the country, supervises radiation safety (health and hygiene aspects), ensures in conjunction with the Ministry of Emergency Situations the inventory of sources. In addition, this regulatory body issues Sanitary Passports and has regional branches in all regions of the country.
Ministry of Health, National Centre for Hygiene and Epidemiology

To issue sanitary passports

To define special control measures on radiation safety implementation in the organizations

To approve sanitary-hygienic standards and to control of its implementations
Ministry of Ecology and Natural Resources has responsibility for developing and managing environmental protection programmes. According to the decree of November 29, 2001, a National Monitoring Service has been established that is responsible for monitoring of whole environment in Azerbaijan, including radiation monitoring in water, air and on land. In addition, the Ministry issues authorization for radioactive waste management.
Ministry of Ecology and Natural Resources

To ensure the implementation of radiation safety and protection measures in the environment

To issue special permissions for storage and burial of radioactive waste

To carry out daily radiation background monitoring in the environment
• **Ministry of National Security** is the State authority that is responsible for physical protection of nuclear and other radioactive materials, providing operational support by transfer of them and assuring measures for preventing illicit trafficking and any activities against the law with the nuclear and other radioactive materials in the country.
• **State Customs Committee and State Body Guard Service** are responsible for prevention of illicit trafficking of radioactive materials across the borders of Azerbaijan and assures technical measures for the control at border control checkpoints.
• Azerbaijan has an efficient regulatory authority.
• Review and improvements of the radiation protection law and regulation for adequate performance by the regulatory authorities is considered essential.
• The strengthening of an adequate and efficient national regulatory infrastructure that can carry out its functions as an independent regulatory authority is very important point.
• This will enable the country to fully implement the Basic Safety Standards and other relevant international requirements, in particular with regard to radiation safety, control of radiation sources, border control for illicit trafficking in nuclear and radioactive materials in line with internationally accepted practice and standards.
The Republic of Azerbaijan has no nuclear facilities or nuclear materials. Its nuclear activities are limited to typical peaceful applications such as oil industry, medicine, agriculture, scientific researches and etc. It is estimated that currently about 56 organizations use sealed sources within the country and estimates 800-2000 devices excluding smoke detectors and x-ray equipment are believed to be present.

We have only one institution in Azerbaijan dealing with radioactive sources. It is the Institute of Radiation Problems of Azerbaijan National Academy of Sciences.
DIRECTORS
1969  Mirkazim Melikzadeh
1969  Rustam İsmailov
1970  Mirkazim Melikzadeh
1976  Vasif Rustamov
1976  Arif Guliev
1977  Mammadamin Bekirov
1984  Mahmud Kerimov
2001  Adil Garibov

SCIENTIFIC PUBLICATIONS (1969-2011)
2800 scientific articles
15 monographs
215 patents and authorship certificates

STAFF
Doctor of Sciences  18
Ph. D.  85
Postgraduate students  19
Researchers  132
Technical worker  142
GROWTH DYNAMICS OF THE INSTITUTE OF RADIATION PROBLEMS

In 1969-1975 years  8 laboratories

In 1976-1990 years 11 laboratories

In 1990-2009 years 17 laboratories,

2009-2011 years 15 laboratories, 3 centers
In IRP 3 centers have been formed:

• “Center of Physics and Chemistry of Environment” - has been formed on the basis of NATO programs, SRDF foundation of the USA;
• “International Nuclear Information Center” – has been established with the support of IAEA;
• “Nuclear Security and Radiation Safety Examination” – has been established on the basis of the projects are funded by the US Department of Energy
FUNDAMENTAL AND APPLIED RESEARCH FIELDS

Peaceful use of Nuclear energy:

• Use of nuclear energy in chemical and petrochemical processes;

• Use of nuclear energy in modification of physical, physicochemical properties of metals, semiconductors and dielectric materials;

• Use of nuclear energy in production of new materials, polymers, and oxide materials;

• Use of nuclear energy in solution of ecological problems;

• Use of nuclear energy in nanotechnology.
In the field of radiation material science:

• Production of semiconductor, ferroelectric, oxide, and polymer dielectrics by radiation method and study of influence mechanisms of radiation on properties of these materials;

• Increasing of radiation resistance of materials;

• Increasing of corrosion resistance of metals and metal alloys with radiation methods.
Scientific problems of radiation safety:

- Condition of radiation background in the territory of Azerbaijan Republic, research of natural and artificial radionuclides in soil;
- Discovering distribution regularities of radionuclides in soil, water basins and air;
- Research of the condition of radioecological and ecological problems concerning with oil and gas and other industrial fields and working out the methods of their elimination;
- Estimation the impact of different types and levels of radioactivity contamination on environment, research of effects on biological environment.
- Study of radioactivity contamination and biological indication methods of ionizing rays;
- Studing the protection methods and ways of living-beings from radiation.
Physicochemical problems of energy transformation and use of alternative energy:

• Working out effective methods of wind and solar energy transformation and their use;

• Application of wind and solar energy in small-scale power-intensive technological processes;

• Research of transform-transfer mechanisms of different type of ionizing rays and plasma energy;

• Research of alternative energy source potentials in Azerbaijan and working out effective ways of their use.
THE MAIN EXPERIMENTAL BASIS OF THE INSTITUTE OF RADIATION PROBLEMS

• THE COMPLEX OF IONIZING RADIATION

• ELECTRON ACCELERATOR
THE MAIN SCIENTIFIC DIRECTIONS OF THE INSTITUTE

• Peaceful use of nuclear energy

• Radiation material science

• Scientific basis of radiation safety (radioecology, radiobiology)

• Practical aspects of nuclear physics

• Use of alternative and nonconventional energy sources, energy transformation processes, fundamental problems of safe and ecologically clean energetics
INTERNATIONAL PROJECTS OF THE INSTITUTE OF RADIATION PROBLEMS

1. First projects of the Institute of Radiation Problems were on the following directions that include to over Union programs of former USSR:
   • Peaceful use of nuclear energy
   • Priority directions of energetics
   • Atom-hydrogen energetics
   • Nuclear energetics security
   • Military aimed researches

At that time a great amount of investments for carrying out the shown works were received from Union scaled organizations.

1. International project on NATO and CRDF (till 2009)
2. International Atomic Energy Agency (IAEA) – (establishment of Nuclear Information System) INIS
1. IAEA – enlargement of monitoring system of radioactive substances in Azerbaijan (National Project)
4. Regional projects of IAEA – 10 regional projects is being participated
5. In the frame of European Union TACIS program a regional project is being completed.
1. US Department of Energy, 
   1. Physical protection of radioactive sources 
   2. Arranging trainings for employees of appropriate organizations 
   3. Preparing reference book and visual aids on radioactive, nuclear and dual-purpose materials 
   4. Establishing the examination laboratories of nuclear, radioactive and dual-use materials in Azerbaijan 
   5. Search of the orphan sources 
   6. Establishment special storage for high level radioactive sources 
   7. Carrying out technical service and calibration of radiation detection systems at the country borders
There are the following main achievements of TC National Project on Feasibility Study for further RR implementation in the Republic of Azerbaijan

1. IAEA export missions in the country

2. IRP staff fellowships

3. IRP management scientific visits

4. Government allocated to IRP special space for the establishment of scientific research complex, including industrial irradiator.
There are the following main issues of TC National Project on Feasibility Study for further RR implementation in the Republic of Azerbaijan

- up today there is not understanding why is it necessary to have RR in the country?

- Up today there is not political decision about RR

- We need to have access to RR for scientific reseraches
We hope that current issues will be solved and possible involvement of international organizations in addressing these issues in cooperation with the interested partners may become real.

We have to broaden our cooperation across the whole spectrum of safety and security issues and deepen it in practical ways that really meet the concrete interests