

Nuclear and Radiation Safety in Mongolia

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Abstract. The main purpose of the paper is to assess legal environment of Mongolia for development of nuclear and radiation safety and security. The Nuclear Energy Agency, regulatory agency of the Government of Mongolia, was founded in the beginning of 2009. Since then, it has formulated the State Policy for Utilization of Radioactive Minerals and Nuclear Energy and the Nuclear Energy Law, regulatory law of the field. The State Great Khural of Mongolia has enacted these acts. By adopting the State Policy and Nuclear Energy Law, which together imported the international standards for nuclear and radiation safety and security, it is possible to conclude that legal environment has formed in Mongolia to explore and process radioactive minerals and utilize nuclear energy and introduce technologies friendly to human health and environment.

1. Introduction

Mongolia is a land-locked country in the Central Asia with large area of approximately 1.5 million square kilometers territory and a population of 2.8 million people. Our country borders with Russia and China. Mongolia is developing country without nuclear power. Economic development in Mongolia has been limited by the harsh climate, scattered population and sizeable expanses of unproductive land. The infrastructure is not well developed, vehicular transport is slow. But our country is rich in mineral resources. Soviet and Mongolian geologists began exploring for uranium in Mongolia in the 1940's. Mongolia is set to emerge as South east Asia's number 1 uranium explorer. The uranium industry in Mongolia was very important in the our economy. Nuclear power plants currently cost more to build than power plants using coal or gas. This difference is narrowing. Today nuclear energy provides 16% of world electricity. The world's power reactors, with combined capacity of some 370 GWe, require about 68,000 tones of uranium from mines each year. The annual uranium demand will grow only slightly to 2010. The nuclear power industry is preparing a new generation of reactors. Simpler, standardized designs will expedite licensing and reduce the time and cost of construction - even while maintaining the highest standards of protection against accident, earthquake or terrorist attack. Advanced reactors will also cost even less to operate, and produce less waste. Around the world, scientists in more than 50 countries use nearly 300 research reactors to investigate nuclear technologies and to produce radioisotopes for medical diagnosis and cancer therapy. Many countries have a strong commitment to nuclear power. Mongolia is a non-nuclear country, since there are no nuclear power plants and research reactors. Currently, radiation sources and radioactive materials are used in the following social and economical sectors of the country:

Medicine (radiotherapy and medical diagnostics); Animal husbandry and Agriculture; Industry, Geology and Mining; Science and Education; Natural Environment.

2. Competent Authority-The Nuclear Energy Agency, Government of Mongolia

The Nuclear Energy Agency (NEA) under the auspices of the Government is responsible for development of policy for the activities relating to development of nuclear research and technology, radiation protection and safety, use of radiation sources and coordination of uranium mining activity with other relevant organizations.

The Nuclear Energy Agency attached to the Prime Minister office is the national focal point for dealing with IAEA. Its main functions include co-ordination of nuclear research activities in the country and to implement the nuclear regulatory activities.

The NEA of the Government of Mongolia was established in 2009. NEA is responsible for development of national policy for the activities relating to development regulating relations pertaining to exploitation of radioactive minerals, nuclear energy and nuclear technology on the territory of Mongolia for peaceful purposes, ensuring nuclear and radiation safety, and protecting population, society and environment from negative impact of ionizing radiation. NEA is revising and expanding standards : Radiation safety standards (2010) based on IAEA Basic safety standards (BSS-2009) Basic regulation on radiation sanitation (2010), Transport regulation for radioactive sources (2010) based on IAEA regulation. Draft of updated regulations has been prepared.

3. Nuclear Safety and security

In the field of nuclear safety and security, the priorities of the Mongolia are as follows:

- Adequate physical protection for all nuclear and radioactive material and facilities, and the transport of such materials;
- Strengthening of appropriate regulatory control of nuclear and radioactive materials;
- Implementation of an effective system for detecting and preventing illicit trafficking of nuclear and radioactive material;
- Preparation and enforcement of radiological emergency response;
- Strengthening of the State system of accounting and control of nuclear material (SSAC);
- Monitoring of radio nuclides in the environment: Monitoring of radio nuclides in the environment is current practice among users of nuclear techniques in Mongolia. The Mongolia has already acquired a mobile environmental protection laboratory which enables the control of: a/ radioactive sources in disposal; b/ naturally occurring radioactive material (NORM); and c/ individuals exposed in situ.
- Management of low and intermediate level radioactive waste: a feasibility study is being conducted on creating a central unit for the management of low and intermediate level radioactive waste.
- Nuclear and radiation safety: Mongolia is not at a critical stage in the development of a national infrastructure for nuclear and radiation safety.

An IAEA expert mission was implemented to help determine the needs as regards nuclear safety and security, human resources and the infrastructure needed for safe management of the nuclear and radioactive materials used in the country.

4. Legislative Framework

4.1 State Policy of Mongolia on Exploitation of Radioactive minerals and Nuclear energy has been enacted 25 June 2009. The purpose of the state policy of Mongolia on exploitation of radioactive minerals and nuclear energy is deeply explore radioactive minerals resources, to become one of the leading country on exploitation, processing and exporting for peaceful purposes, further the utilization of nuclear energy in economy and social sector in extensive range and producing power through the introduction of technology friendly to human health and environment.

4.1.1. Nuclear and radiation safety

- To take measures to develop national infrastructure and monitoring system for nuclear and radiation safety, meeting the requirements of international standard.

- To undertake the installation of safety system in accordance to pre-assessment international standard in the course of processing nuclear sources, recycling nuclear waste and developing security storage facility, and security for transportation and construction of nuclear facilities and industry.
- To ensure safety of radiation source, isotope and nuclear and radiation waste physical protection.
- To ensure the implementation of international treaty for the safety of nuclear and radiation, to which Mongolia is a part, and to establish national integrated system of database and registration and to supply necessary information to relevant international organizations in time.
- To implement quality supervision program in sector of nuclear and radiation protection and security activity.
- To develop and implement emergency national program of international standard for possible nuclear and radiation accidents.

4.2. Law of Mongolia on Nuclear Energy has been enacted 16 July 2009. Functions and powers of Regulatory Authority have been described in the state policy and Nuclear Energy law. The purpose of Nuclear Energy law shall be to regulate relations pertaining to exploitation of radioactive minerals and nuclear energy on the territory of Mongolia for peaceful purposes, ensuring nuclear and radiation safety, and protecting population, society and environment from negative impact of ionizing radiation. Functions and powers of Regulatory Agency-Nuclear Energy Agency, government of Mongolia have been described in the State Policy and Nuclear Energy Law. Nuclear energy is the sector of high intellectual potential and of high technology and developing dynamically in the world lately, exploitation of radioactive minerals and nuclear power is an important factor to ensure sustainable development and national security of Mongolia, to improve living standard of its people by producing low cost electricity and heat. Law of Mongolia on the Nuclear-Weapon-Free Status was enacted on 3 February 2000.

5. Environmental dose rate measurement

In addition at more than 23 places of meteorological station (see Fig.1), the dose rates are measured 3 times a day with portable dose rate meter and transmitted to the meteorological center in Ulaanbaatar twice a week.

Today, the research of radon is one of the most important themes in nuclear physics and environmental source. Research in indoor air radon and outdoor air radon are very significant for hygiene. Outdoor air radon changes with geographical region, season, month and hours of day. And indoor air radon pertains from outdoor air radon, buildings material and ventilation. Experimental data of determination Rn^{222} by Scintillation method (SAC-4) in outdoor air, in premises of a microtron MT-22, other working rooms and inhabited houses (concrete, brick, wooden and Mongolian ger) are considered. With the purpose of research of radiation safety in indoor and outdoor of the microtron, we have developed a technique of determination radon and its short-lived decay product Po^{218} by the scintillation counter SAC-4. Concrete, brick, wooden, mongolian ger 4 buildings radon concentration in winter (November and December) of 3 years, measurements 200 points average to cause to out average and annual dose rate from radon are measured. Radon concentration has in outdoor air $18.7 (2.3 \div 38.8) \text{ Bq/m}^3$. Indoor air radon concentration has $26.0 (8.2 \div 42.6) \text{ Bq/m}^3$. Received dose rate annual to human of radon $0.8 (0.33 \div 1.26) \text{ mSv/year}$. Mongolian National Standard "Method of determination of radon concentration in air" (MNS5246:2003) is processed and certified.

The work is carried out at the Nuclear Research Centre of the National University of Mongolia.

ENVIRONMENTAL RADIATION MONITORING NETWORK OF MONGOLIA

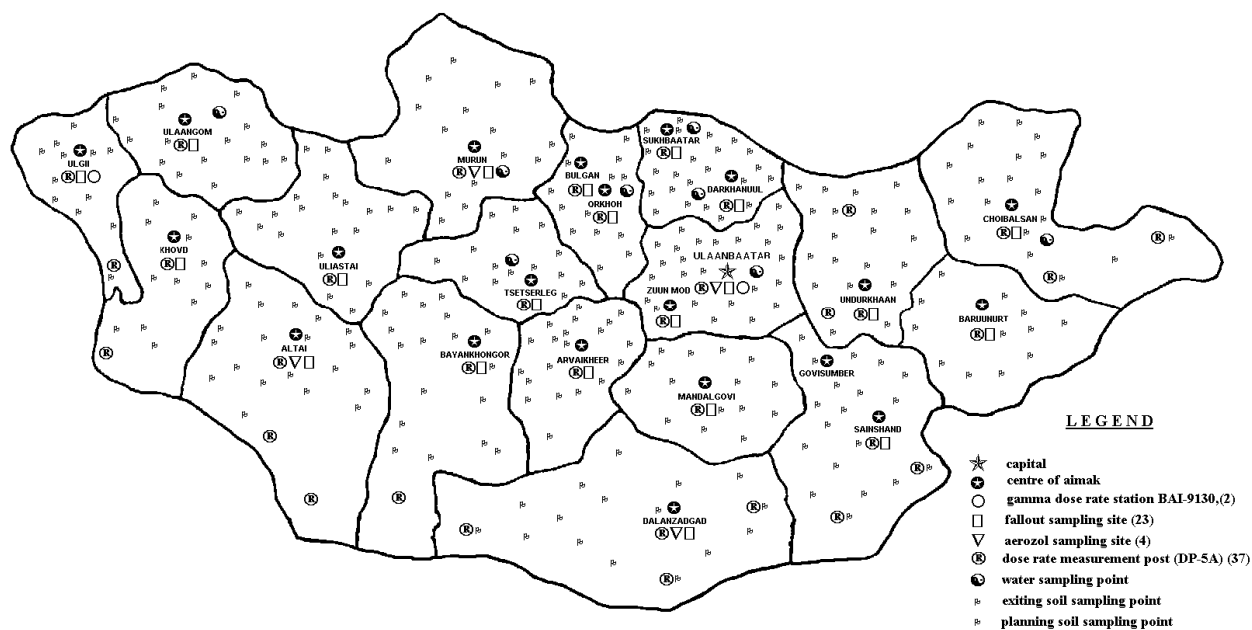


Fig.1

- [1] Nuclear Power Demand in Mongolia- in IJNSS /International Journal of Natural and Social Science/, B.Erdev, S.Enkhbat, ISSN 1916-1573, Canada Vol.1, Iss.1, p5-6, 2008
- [2] Uranium in Mongolia for the Future Nuclear Fuel Cycle S.Enkhbat, B.Erdev, International Conference Ensuring Safety for Sustainable Nuclear Development, Mumbai, India 17-21 November 2008, p.40-41
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