

**DEVELOPMENT OF NPP PERSONNEL TRAINING SYSTEM IN UKRAINE**

V. Tarykin  
KhNPP, Ukraine

*Email address of main author:* tarykinv@ukr.net

**Introduction**

Nuclear power occupies one of the most prominent places in the Ukrainian economy.

The industry employs about 38 thousand people.

For recent years, having only 22.8% of the installed capacity, nuclear power plants during autumn and winter maximum loads generated almost 50% of the country's electricity, At the same time, share of nuclear electricity generation grows annually: in 1996 it was 43.8 %, in 2000 - 45.3%, respectively, currently there are 13 operating power units at Ukrainian NPPs, including 11 units with VVER 1000, 2 units with VVER 440 new generation).

At the national level a number of measures have been taken to complete construction of two power units at Rivne and Khrnelnitsky NPPs, which are 85-90% ready. Reactors installed at the new units, namely: Kh-2/R-4, belong to a modern series of VVER-1000 reactors (pressurized water reactor type). About 60 % of the nuclear reactors in the world operate on the basis of the similar principle.

Ukraine is the 8th in the world and the 5th in Europe for the number of reactors and their total capacity.

**Personnel training system in Ukraine**

Modern personnel training and retraining system is a guarantee of NPPs safe reliable operation.

To achieve and maintain high safety standards NPP should be staffed by a team of highly qualified and experienced personnel who have the proper knowledge of the technical and administrative requirements for safety and motivation to adopt a positive attitude to safety culture.

Ukraine's NPP personnel training system is the totality of organizations, enterprises, state administrative and regulating bodies which have the functions and conditions of their performance and cooperate with each other to attain the objectives of training.

Department on personnel training and licensing of NAEK "Energoatom" carries out common organization of works on creating and upgrading of Ukraine's NPP personnel training system.

Only qualified persons should be entrusted with functions important to safe supervision, operation and maintenance of an NPP.

People who are willing to achieve appropriate educational level must graduate from a university or a institute.

Before independents of Ukraine personnel training for Ukrainian NPPs mainly was held in the educational institutions outside Ukraine (mainly in Russia).

Ukraine's NPP needs analysis let us draw a conclusion about the necessity of creation of Ukrainian national system of human resources training to provide the development of educational institutions which would train specialists for the enterprises and organizations of nuclear power engineering and industry of Ukraine and to provide their technical and material base.

To solve the problem of the nuclear power engineering and industry of Ukraine enterprises and organizations staffing according to the Decree of Cabinet of Ministers №884 from 02.08.96. Sevastopol institute of nuclear energy and industry was found. Nuclear power engineering enterprises funds provide financing the work of the institute.

Natural turnover of personnel at the NPPs of Ukraine (retirement, change of trade and so on) is about 5%. NPP personnel needs analysis for the period to the year 2005 was the basis to determine young specialists training order in the higher educational institutions of the Ministry of education of Ukraine.

The future NPPs personnel's training is conducted at Kyiv and Odessa Polytechnic universities, Sevastopol National Institute of Nuclear Energy and Industry.

Moreover, various institutes of Ukraine provide technical professions of the wide range of specialists training (electrician, computer engineering and automation, chemistry, physics specialists and so on).

Nuclear power engineering colleges provide personnel of middle level training (about 10 nuclear power engineering colleges).

To provide timely staffing of NPP with specialists, NPPs encourage school pupils professional orientation to choose nuclear power engineering as related to their future professions.

NPPs provide work for acquaintance with the future trades. It is carried out advise and distribution of directions in power engineering colleges and institutions for purchase of a specialty, financed training.

All these measures promote NPP sufficient and effective recruitment and staffing.

Education provides general knowledge and develops intellectual skills. It provides the basis for the further knowledge and skills required to develop the necessary competence for safety operation of NPP.

#### Training Centers

Since the time when independence of Ukraine was proclaimed personnel training system was created directly at NPPs. This system is based on the latest legislation framework, developed subject to IAEA recommendations, gained international experience in the field of personnel training in view of increased demands to personnel qualification including methodology of Systematic Approach to Training (SAT). The SAT serves as a management tool to support the effective development, delivery, and evaluation of training.

Training Centers, formed at each plant, form one of the main components of NPP personnel training. Training Centers was established to prepare and educate NPPs employees to prevent accidents and to maintain the highest standards of safety.

Total number of personnel at these centers is 436 persons, including 160 instructors.

The following measures are carried out to provide the development of NPP training centers:

- alteration of training centers structure and provision with needed number of personnel to organize and implement NPP personnel training;
- additional provision with needed technical aids of training;
- development of training and methodical materials.

Personnel's training at Training Centers is performed in accordance with standard programs.

At that, special consideration is given to maintaining qualification of the licensed personnel.

#### License requirements

NPP's operation licensing began in Ukraine in 1997.

According to the licensing process of certain activities the personnel is divided into the following groups:

- licensed personnel
- unlicensed personnel

The term "licensed personnel" includes three job positions: unit shift supervisor, reactor department shift supervisor and control room reactor operator (CRRO).

In general, there are several special requirements for licensed personnel:

- Education (university or institute degree, education background in engineering, reactor physics and nuclear technology is required).
- Experience (i.e. performance in previous jobs: more than 2-years experience as reactor department equipment self operation or more than 3-years experience as nuclear safety support).
- Health conditions (including drug and alcohol abuse testing, psycho-physiological characteristics).
- Security permission.

The candidates for license positions should satisfy these requirements.

The groups of shift personnel special positions and professions occupy special place within the personnel training system. Training for these groups must be performed on the basis of license or authorization of public regulating bodies of nuclear and radiation safety.

In 2000 Zaporizhzhya NPP obtained first license to initial and continuing training for operating personnel. Now all NPPs Training Centers have obtained similar licenses.

Simulator training

Simulator training base was created by joint efforts of specialists from the USA, Russia and Ukraine.

In 1993 the first in Ukraine full scope simulator of the main control room began to work at Zaporizhzhya NPP. The simulator is designed for acquiring by personnel of skills in reactor control under normal operation, off-normal conditions and emergency situations. In 2002 the second full scope simulator was put into operation at Zaporizhzhya NPP. Now the development of the third full scope simulator is on going.

In December 1997 a similar simulator was put into operation at Khmelnytsky NPP.

In May 2001 a full scope simulator for Rivne NPP unit № 3 personnel training was put into pilot operation. In 2002 one more VVER-440 simulator for units №1&2 was put into operation at Rivne NPP.

Activity of NNEGC "ENERGOATOM" in the field of personnel training

In Ukraine all the NPP's are consolidated into the operating organization - National Nuclear Energy Generating Company "ENERGOATOM" (NNEGC "ENERGOATOM"), which is the part of Ministry of fuel and energy.

Establishing manager training system and replacement reserves for NNEGC "ENERGOATOM" managerial personnel, including training program and training materials development, teachers' selection and training, is under way.

NNEGC "ENERGOATOM" tries to bring its personnel skills to the internationally accepted level through creation of all conditions for NPPs personnel training and qualification upgrading, scientific technical support of nuclear installation on the basis of National Academy of Sciences, ministries and departments.

NNEGC "ENERGOATOM" guarantees that the operating utility employs highly qualified staff appropriately educated and trained whose number is sufficient for the provision of safety of the nuclear power plants.

Company aims its activity at establishing adherence of the personnel to the safety tasks, their personal responsibility, and developing in them the main principles of the safety culture:

- Every manager and employee should understand the importance of their respective work for the safety;
- Boundaries of responsibilities and interfaces should be clearly defined;
- Work should be performed strictly in compliance with the appropriate requirement;
- Safety related activities should be assessed on a systematic basis;
- Staff training and development should be focused on the safety as a top priority, with clear understanding of failures impact on the safety.

NNEGC "ENERGOATOM" guarantees that any initiative of the utility's employees in part of safety assurance in the framework of the above stated policy will have support and be assessed in a proper way.