NUCLEAR SECURITY CULTURE DEVELOPMENT FOR NEW COMERS

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Abstract

Building safety and security culture in new comers are one of the priority issues starting from the preoperational phase. In recognition the vital importance of the safety, security and safeguards (3S) aspects of nuclear reactors and the interface between them, a progressive training programme is designed by NUTEK Energy for Turkey and other embarking countries. The aim of the programme is to support state's nuclear infrastructure development activities during the localization as well as strengthening public awareness on the safety and security. The second phase of the 3S programme, the nuclear security culture development for new comers (NUSEC) is presented.

1. INTRODUCTION

Although safety, security and safeguards (3S) issues are advanced concepts for countries with long operating experience of NPPs, they are challenging issues for newcomers starting with the nuclear energy infrastructure development period. 3S issues are mainly under the responsibility of the government and official organizations. However, the policy changes of 3S framework in recent years have indicated the strong emphasis and the need for safety and security culture development, transparency and the information sharing between the stakeholders in embarking countries.

2. NUCLEAR POWER DEVELOPMENT IN TURKEY

Republic of Turkey is a dynamic newcomer country. Turkish government is planning to build three nuclear power plants to meet the growing electricity demand. The share of nuclear is expected to cover 10 % of the total electricity generation of the country in short term.

The country's first nuclear power plant is under construction at Akkuyu site, on the eastern Mediterranean coast. Akkuyu is being developed on build-own-operate (BOO) model. The Akkuyu power plant, will feature four Generation III+ VVER-1200 reactor units with a total installed capacity of 4.8 GW [1–2].

Turkey has no nuclear power plant operating experience yet but had a long-lasting plan for implementation of NPP in a national energy strategy. Turkey has undergone through various NPP bidding processes in the past. Although past projects failed, they provided a valuable experience for the introduction and implementing of a nuclear power programme. On the other hand, Turkey has operating experience of research reactors since 1960s and nuclear research laboratories that have provided an experience to build basic nuclear infrastructure including 3S. Legal framework and the regulatory approaches are well defined and structured in Turkey with the recent establishment of the independent nuclear regulatory authority.

3. SAFETY AND SECURITY CULTURE IN NEWCOMERS

Safety and security culture development programs became increasingly important following the post Fukushima safety review meetings of the IAEA and the member countries. Although organizational and human aspects of safety and security culture have major areas of concern for all nuclear countries and utilities with NPPs under operation, these are especially critical issues for new comers starting from pre operational phase.

There are several other nuclear infrastructure issues to be covered by countries embarking on a new nuclear programme. Milestone approach of the IAEA underlines 19 nuclear infrastructure issues to be developed including 3S; safety, security and safeguards [3].

Building a safety and security culture in Turkey and in other new comers are challenging issues with various important aspect from the point of view of the official organizations as well as from the point of view of the major stakeholders. It is one of the top priorities of NUTEK Energy to provide services to both public and private sector in development of major infrastructural issues including 3S training programmes.

NUTEK's infrastructure support programmes are designed by the development of the logic trees first on the need and requirements of the newcomers based on the insights gained and the in-depth experience of the experts. Then the framework of the programmes, the road map, stakeholder's involvement and optimisation are prepared for implementation to meet the foreseen needs.

Major questions and debates for new comers on how to start from and how to build safety and security are as followings:

- How to assess factors influencing safety and security culture?
- How to implement program by utilizing the experience of nuclear industry in the nuclear power countries?
- How to assess the lessons learnt from major nuclear accidents, incidents, illicit trafficking?
- What is the best practice for creating a strong, positive, reliable, manageable, sustainable safety and security culture?
- How to handle "faith versus safety" and "faith versus security" issues?

The aim of the safety, security and safeguards training program designed by NUTEK Energy is threefold:

- to contribute to improve industrial safety and occupational health status in newcomers by building a «safety and security culture training » along with the «localization activities» starting from the pre-operational phases of NPP projects.
- to support embarking country's nuclear infrastructure development during the localisation activities.
- to create public awareness and confidence in nuclear energy and NPP implementation by assuring the availability of tools for safety, security and safeguards systems.

The first phase of the program that is; NUSAC (**NU**TEK **SA**fety **C**ulture Development Program) consists of various training modules for introducing and progressively developing human and organizational safety culture including evaluation of factors influencing safety culture, risk management, emergency preparedness and risk communication [4]. Safety leadership awareness issues are also addressed. Safety leadership lectures are prepared

During the implementation of the NUSAC, one of the main issues was to define and describe clearly the fine line between the safety and security terminology, related instruments and legal frameworks. Both safety and security words have exactly the same equivalent meaning in Turkish as in many other languages.

Few years after the initiation of this work, there has been a need to address both safety and security and the interface between the two. A new module of the 3S programme called NUSEC is introduced in order to fill the gap and to address the security issues in industrial facilities and the security aspects of NPPs from the preoperational phase.

4. NUCLEAR SECURITY CULTURE DEVELOPMENT (NUSEC) METHODOLOGY

Nuclear Security Culture development programme (NUSEC) which is at the preliminary application phase consist of in-depth training modules (surveys, lectures, workshops, debates) as well as talk through walk through processes to be implemented in 5 steps.

NUSEC learning modules are prepared to teach and train complex 3S issues and principles into practical tools and models. Our step by step process will ensure to support basic infrastructure development activities undertaken by authorities.

4.1. STEP 1: Introduction of risk concept and risk perception surveys. Safety, Security and Safeguards definitions and cultural aspects.

NUSEC training modules include detailed risk perception surveys applied to various group. Risk survey studies covered a wide range of questions starting from introducing risk concept, identification of every day, accidental and natural hazard risk factors to risk management and emergency risk management.

In order to introduce concept of security culture; security risk concept is introduced into the risk perception study. The security risk survey designed to investigate the what people think about safety and security before any lectures. Survey consist of risk factors in general, emergency communication issues and basic preliminary questions on nuclear safety and security.

Results have indicated that the audience that have knowledge on nuclear energy could easily describe the difference in between the two whereas others cannot. One of the most important yet difficult description is the identification of the interface between safety and security issues.

Security culture terminology in business and industry means addressing various items such as; fund management activities, insurance in business activities, in real estate activities, information security, cyber security as well as safe operation and protection. Therefore, it is a critical issue and has important implications in private sector. These factors would make security culture training valuable and attractive for industrial establishments and companies that are preparing to take part in the localization activities.

4.2. STEP 2: Risk concern from nuclear versus availability of 3S systems

Risk concern of public against the NPPs or any nuclear facilities and therefore the need to create awareness on the safe and secure operation are some of the main problems during the implementation of NPPs in newcomers. The “radiation risk” is found to be the major and most common concern against the NPPs and any nuclear applications, following our risk survey studies.

Fig 1. Illustrates the flowchart of interaction of 3S systems for radiation risk assessment utilized during training modules.

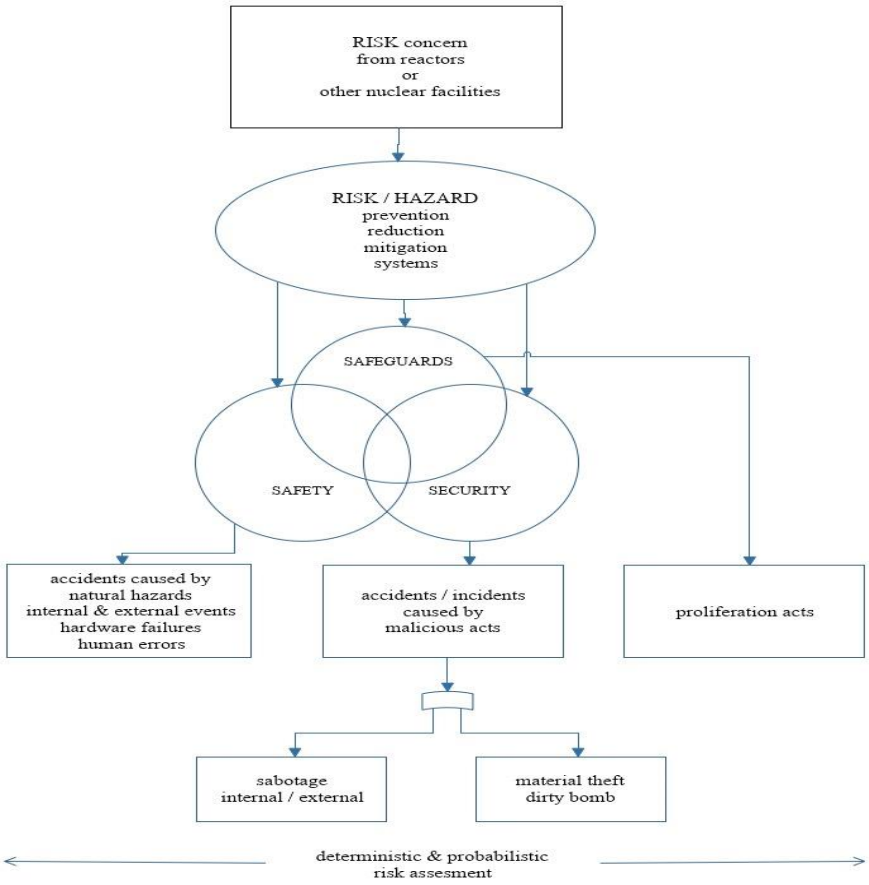

FIG 1. Interaction of 3S systems for radiation risk assessment

Step 2 activities starts with the presentations on the accumulated reactor operation experience worldwide followed by lectures and debates on risks and benefits of NPPs. Then in order to respond to risk concern, the availability of the 3S systems in nuclear industry is introduced to the audience. For the framework of NUTEK ‘s 3S programme; “RADIATION RISK” is chosen as the key words to describe the interface between safety, security and safeguards as illustrated in Fig.1.

4.3. STEP 3: Lectures and workshops

NUSEC is a flexible training programme that can be arranged according to the need and request of the stakeholders. Lectures and workshops cover a wide range of titles starting from introduction of safety, security, safeguards concept up to the more advanced technical levels as well as related socioeconomical, political and physiological aspects of NPPs. Number of lectures and the duration of the training is arranged according to the need, request, time allocation and the background knowledge of the trainees [6-10].

Some of the example of lecture titles are:

- Definitions & International Framework:
    - 3S philosophy.
    - Inter-relation between safety, security, safeguards.
    - Safety Culture Definition.
    - Security Culture Definition.
    - Difference between safety and security culture.
- Safety and Security Regimes.
- Role of national official organizations: Nuclear security policies, legal structure.
- Personnel compliance with rules, regulations.
- International instruments relating to nuclear safety and security.
- IAEA Nuclear Security Series documents, guides.
- Protecting information.
- Secrecy and the transparency of security information.
- Interactive discussions on “how safe is safe enough” and “how secure is secure enough”.
- Safety and Security leadership.

Interrelation between 3S Systems are summarized in Table 1.

Nuclear safety is aimed at preventing accidents while nuclear security is aimed at preventing intentional human acts that might cause accident in the nuclear facility. Consequently, safety is mainly a technical issue while security is mostly connected with intelligence.

The IAEA defines a strong safety culture as the “assembly of characteristics, attitudes and behaviours in individuals, organizations and institutions which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance.” the IAEA Safety Glossary [2]. Security culture has the same definition except for a focus on security issues. Similarly, the IAEA defines a strong security culture as the “assembly of characteristics, attitudes and behaviour of individuals, organizations and institutions which serves as means to support and enhance nuclear security.”

4.4. STEP 4: Safety and security leadership

For safety and security culture to be successful it needs to be supported by the top managers and administrators. In recognition the fact that leaders/executives have a significant role in the establishment of rules and values in an official organization and industrial establishments in embarking countries; safety and security leadership modules are also included in NUSEC as an integral part of the programme. Characteristics of effective safety and security leadership styles that can result in safety and security culture excellence are emphasised.

4.4 STEP 5: Evaluation and feedback for the further work

Insights gained from the practice of NUSEC with different groups of interests and stakeholders are to be evaluated for use as a feedback for further steps.

TABLE 1. INTER-RELATION BETWEEN 3S SYSTEMS

	SAFEGUARDS	SECURITY	SAFETY
Definition	Safeguards focus on restraining activities by states that could led to acquisition of nuclear weapons or explosives. It concerns mainly materials and equipment in relation to clandestine actions.	Security focuses on the intentional misuse of nuclear or other radioactive materials by non-state parties to cause harm. It relates mainly to external threats to nuclear materials or facilities.	Safety focuses on unintended conditions or events leading to radiological releases from authorized activities. It relates principally to intrinsic problems or hazards.
Purpose	Timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons and/or other nuclear explosive devices for unknown purposes. Deterrence of such diversion by the risk of early detection.	Detection of unauthorized transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities. Deterrence of such unauthorized and illegal activities by the risk of early detection.	Achievement of proper operating conditions. Prevention of accidents or mitigation of accident consequences. Prevention of accidents or mitigation of accident consequences. Protection of workers, the public and the environment from undue radiation hazards.
Principal IAEA Docs.	Comprehensive safeguards: IAEA - INFCIRC/153(corrected)[1] and INFCIRC/540 (corr.)[2].	Nuclear security recommendations on physical protection of nuclear material and nuclear facilities: IAEA - INFCIRC/225 /Rev. 5.	IAEA Safety Standards consists of 3 sets of publications: The Safety Fundamentals, The Safety Requirements and The Safety Guides.

"HANDBOOK ON NUCLEAR LAW"

5. CONCLUDING REMARKS

Building nuclear safety and security culture in Turkey and in other new comers through all types of stakeholders is a dynamic and challenging issue.

NUTEK Energy[3], having access to a technical knowledge and experience in nuclear technology with its core team and members of network, intends to use this valuable knowledge for Turkey and other embarking countries through developing 3S programme. This multidisciplinary flexible programme can be adopted by authorities as well as industrial establishment in the localization activities.

NUSEC is the second phase of the 3S programme which is designed following the safety culture programme NUSAC and its applications. Some of the highlights of the second phase of the ongoing programme is presented briefly.

The framework of the 3S programme is established, and the feedback is obtained on the safety and security culture training modules. 3S programme, has short, medium- and long-term objectives and will be implemented in accordance with the progress of the embarking country's national NPP projects.

[1] The structure and content of agreements between the Agency and the states required in connection with the treaty on the non-proliferation of nuclear weapons.
[2] Model protocol additional to the agreement(s) between state(s) and the International Atomic Energy Agency for the application of safeguards.
[3] www.nutekinc.biz

The first two modules of the programme (NUSAC and NUSEC) stipulates the cooperation with key authorities and stakeholders; ministries, regulatory authority, private sector, industrial chambers, universities and related NGOs and public.

Effective safety/security culture depends on the individuals as well as the effective cooperation and communication between members of the different departments and different organizations. The effective role of safety/security leaderships is integrated into the programme

Comprehensive approach in the interaction of safety and security between the (component authorities and the stakeholders involved is essential for the further development of the NUSEC. On the other hand, addressing the safety and security culture and the interface between them has important aspects from the point of view of the public acceptance.

Development of strong safety and the security culture, starting from the preoperational phase of the NPPs for new comers will help to build public awareness as well as public confidence towards the implementation of NPPs in newcomer countries. Public should be informed on every occasion that the safety and security are the key issues of acquiring the NPP in the country.

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