

THE EXPERIENCE OF EIMV AS ONE OF SLOVENIAN TSO

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Abstract

EIMV is one of the seventeen organisations in Slovenia which are, according to the Ionising Radiation Protection and Nuclear Safety Act, licensed by the Slovenian Nuclear Safety Administration (SNSA) as authorised experts for radiation and nuclear safety. In the Slovenian system they serve as Technical Support Organizations (TSOs) to Nuclear Regulatory Authority - SNSA and provide opinions with regards to specific issues related to radiation and nuclear safety. Operators of radiation or nuclear facilities are required to obtain such opinions as part of the administrative procedure in licensing and as part of the project documentation application. The Rules on authorized radiation and nuclear safety experts specifically determine the procedure of granting licenses for implementing the tasks of authorised experts, the criteria that must be fulfilled, specific fields of authorisation and the form and content of expert opinions.

The EIMV's license covers all related fields linked to nuclear safety and radiation protection of nuclear and radiation facilities and radioactive waste repositories. On the basis of extensive practical experience, the EIMV coordinates the expert opinion for refuelling and maintenance outage for the Krško NPP (NEK) where it organises the work of authorised institutions involved in the evaluation of implemented works during the outage. However, the EIMV also provides expert opinions for NEK in specific fields, such as the maintenance and changes related to the main and emergency diesel generators, power transformers, cables, HV motors and other equipment in the HV switchyard. The EIMV also prepares authorised expert opinions in collaboration with other institutions for activities conducted in various fields of expertise. Recently, the EIMV has been involved in the evaluation of licensing documentation for the radioactive waste repository in Slovenia.

In the paper the procedures on authorized experts for radiation and nuclear safety in Slovenia are presented and the main experience discussed.

1. INTRODUCTION

The Milan Vidmar Electric Power Research Institute (EIMV – Elektro inštitut Milan Vidmar) is the leading Slovenian engineering and scientific research organisation acting in the area of electric power engineering [1]. It has a long tradition in operation and, in 2018, it celebrates its 70th anniversary. The EIMV addresses the issues of generation, transmission and distribution of electricity from the technological, environmental and economic perspective. The experts at the institute prepare feasibility and implementation studies, expert reports, they implement technological, environmental and other analyses, inspect the quality and operation of electric power systems and facilities as required by electric power utilities, ministries and national as well as regional authorities. The institute also implements R&D projects on the EU (Horizon 2020) and regional levels, which are developed from idea to their realisation.

The EIMV is also one of the Technical Support Organisations (TSOs) licensed by the Slovenian Nuclear Safety Administration (SNSA), which performs the duties of a Nuclear Regulatory Authority (NRA) in Slovenia. Currently around 20 experts from the EIMV are involved in related activities. According to the Ionising Radiation Protection and Nuclear Safety Act [2], the TSO has to obtain a license to serve as an authorised expert for radiation and nuclear safety for selected areas. The operators of radiation or nuclear facilities must obtain the opinion from an authorised expert for radiation and nuclear safety with regard to specific issues related to radiation and nuclear safety. The opinion of an authorised expert is part of the licensing submittals for construction and operation of nuclear or radiation facility, and also has to be submitted in the case of any major changes which result in a significant impact on radiation or nuclear safety, contains substantial changes to the design bases or includes a change in the operating license.

2. LICENSE FOR AUTHORISED RADIATION AND NUCLEAR SAFETY EXPERT

According to the Nuclear Safety Act [2], the authorised experts for radiation and nuclear safety shall be legal entities who have obtained a license from the SNSA. The license is issued for individual fields or for a number of fields of radiation and nuclear safety together for a maximum period of five years. Authorized experts

for radiation and nuclear safety annually report about their work to the SNSA and more frequently upon the authority's request or if they notice events or conditions which impact nuclear safety. The same authority can withdraw the license if the conditions on the basis of which the license was issued no longer exist.

Legal entities can obtain a license for carrying out the work of an authorized expert for radiation and nuclear safety, when they nominate responsible specialists for each individual field and designate one of the specialists as the competent leader for the field of nuclear and radiation safety, and when they comply with the specified conditions for carrying out the work of an authorised expert. According to the information of the SNSA [3], there are currently 17 organisations in Slovenia and abroad that were granted such a license.

The Rules on authorised radiation and nuclear safety experts (JV 3) [4] prescribe the procedure of granting licenses for implementing expert tasks, criteria, fields of authorisation, form and content of expert opinion and all other related issues. A license may be granted for activities described in individual fields (13 in total and an additional one, which shall be specified) for three different types of facilities as shown in Table 1:

- Nuclear, radiation or less important radiation facility;
- Radioactive waste (RW) and spent fuel (SF) repository;
- Mines and disposal for tailings.

TABLE 1. GENERIC LIST OF FIELDS OF RADIATION AND NUCLEAR SAFETY FOR WHICH THE LICENSE IS GRANTED

Field
1. Management of facility and safety culture
2. Safety report, procedures, technical specifications and other documentation
3. Reactor physics and nuclear fuel
4. Construction and machine construction, strength analysis
5. Fluid/thermohydraulic systems
6. Electrical systems
7. Regulation, instrumentation and information equipment
8. Chemistry in a nuclear or radiation facility
9. Fire protection
10. Probabilistic and deterministic analysis of accidents, including internal and external events
11. Seismic safety
12. Radiation protection
13. Impact on the environment, including monitoring
14. Other individual areas which should be specified

In the application for a license the legal entity provides both legal information and the fields of radiation and nuclear safety for which the license is sought with relevant references and compliance with organisational, technical, technological and management requirements. It is important to assure that there is no business or financial dependence which could endanger the expert's decision-making process. The references provided as proof for technical qualifications have to originate from the fields of radiation and nuclear safety for the last five years and can include published contributions, research and educational activities, reports, opinions, evaluations and other certificates. The management system must be in place and shall fulfil the requirements from Rules on radiation and nuclear safety factors [5]. This also includes how to manage the work performed by a subcontractor of an authorised expert entity. The responsible manager in the field of radiation and nuclear safety must have the technical knowledge on the topics prescribed as the basics of radiation and nuclear safety, which are described in the rules [4].

The expert's opinion is provided in a pre-defined format: along with the information on the authorised expert entity and the team involved, it must also contain a description of the problem and performed tasks, safety objectives and requirements with safety criteria, the approach to development of expert opinion, the description of the opinion and conclusions including a clear and unambiguous assessment of acceptability of a document or activity (positive, conditionally positive or negative).

3. EXPERIENCE OF EIMV AS TSO

3.1. EIMV as the provider of expert opinions

EIMV obtained its license as an authorised expert organisation since 2006 (when the related Rules [4] were first adopted¹) and covers all relevant fields connected to nuclear safety and radiation protection of nuclear and radiation facilities and radioactive waste as well as spent fuel repositories. EIMV coordinates expert opinions for refuelling and maintenance outage for the Krško Nuclear Power Plant (NEK), where it directs the work of other institutions involved in the evaluation of implemented works during the outage from the start of NEK operation.

EIMV also provides, as the TSO, expert opinions for NEK in specific fields, such as maintenance and changes related to the main and emergency diesel generator, power and auxiliary transformers, cables, high voltage motors, control and protection systems and other equipment in the high voltage switchyard. EIMV likewise performs authorised expert opinions in collaboration with other institutions for activities which combine various topics (e.g. establishment of Emergency Control Room, Dry Storage for Spent Fuel, ...). Lately, EIMV has also been involved in the evaluation of licensing documentation for radioactive waste repository in Slovenia, which is developed by the national Agency for Radwaste Management (ARAO).

3.2. Challenges within the Slovenian system

The established system in Slovenia for authorised experts for radiation and nuclear safety faces several challenges. Slovenia has a relatively small nuclear programme with one NPP that has on-site RW and SF storages, one research reactor, one central interim storage facility for RW from small producers, uranium mine tailings disposals, RW repository that is currently pending the construction license, and several radiation facilities. 17 authorised experts with the granted license face extreme competition, because the operators of radiation and nuclear safety are obliged to select the best offer according to the Slovenian Public Procurement Act [6] which applies to all public entities, i.e. the majority of operators in Slovenia. As many authorised experts are licensed for all fields of radiation and nuclear safety, usually the only relevant criterion is the price. In their efforts of acquiring contracts, providers frequently lower the prices of bids, which can also potentially affect the quality of services. Lately, the costs of the bids for expert opinions have varied, sometimes even by a factor of 10 to 20.

For the authorised expert entities, it is also difficult to sustain and increase the competences as even small nuclear programmes require complete expertise in the subject fields. The nuclear and radiation areas are changing constantly with new standards, approaches, technical solutions and similar. Therefore, continuous education and training are necessary to maintain and increase the knowledge of the expert organisation. This is particularly difficult in small countries, since such specific topics and areas of expertise are not well evolved in nationally available systems.

Another challenge of the small nuclear community in Slovenia is the fact that it is very difficult to stay completely independent from operators. In many cases authorised experts are also working with nuclear and radiation operators providing different services or developing projects. The approach which is prescribed in the Rules [4] specifies that the staff preparing the expert opinion shall not be involved in the development of the same project. This requirement can be controlled on paper; however, it is also true that the unofficial connections cannot be effectively controlled. The complexity of the development of some expert opinions, e.g. for refuelling and maintenance outage, requires that almost all authorised experts in Slovenia are involved in such a task.

The operators of nuclear and radiation facilities have also recognised the need for a good expert opinion, but at the end, they need an opinion which states that the activity or project is acceptable (positive expert opinion). Therefore, they have adopted specific procedures to develop the expert opinion in which they introduce several steps: the preliminary independent evaluation report (PIER) and the final independent evaluation report (FIER). As the relation between the contracting parties is very formal and only between them, most of the information in the PIER, which usually points out important nuclear and radiation safety inconsistencies and remarks, is mostly not available to the NRA, as it only receives the FIER which is normally positive (as the clearance of

¹ Before the adoption of specific Rules [4], the system of licenses' granting for expert and research entities was based on the Law on protection against ionising radiation from 1980 in which the responsibilities for authorisation was given to Republic committee for energy, industry and construction (http://www.ursjv.gov.si/fileadmin/ujv.gov.si/pageuploads/si/Zakonodaja/zgodovina_jedrskega_prava/ZVIS-76/ZIVIS-80/Odlocba_o_imenovanju_pooblastenih_organizacij_32-80.pdf). EIMV was one of the institutions with the granted licence already from 1980.

inconsistencies is reiterated so long that all remarks and recommendations are solved). Such procedures do not allow the NRA to be aware of important safety issues raised by authorised experts in PIER and to pay attention to the exposed issues and directions which are resolved in FIER.

3.3. Possibilities for improvements

Based on the experience of EIMV, which has been an authorised expert for radiation and nuclear safety for a very long time, there are several possibilities for improving the system.

First of all, authorised experts should be directly contracted by the regulatory authority to provide the services without official contracts with the operators. This would enable the NRA to obtain all safety relevant information to perform its regulatory function. For now, such a solution is not possible due to the above mentioned Public Procurement Act; however, the Slovenian Government should find a way and suitably address this systematic problem.

The fragmentation of nuclear and radiation expertise among so many institutions pose challenges for authorised experts maintaining the expertise and competences. In a small country, opportunities available for acquiring further knowledge are limited. International collaborations and the involvement in international projects are of key importance. The opportunities, offered by different international organisations on education and training, should support the national TSOs and should be utilised.

As described above, there is unhealthy and counterincentive competition among the authorised expert organisations, partly due to the current stagnation of nuclear business, which could have important impacts on the quality of services. The mechanisms to reduce such influences should be investigated on a national level and good practice from other countries should be conveyed and transposed to Slovenian system.

4. CONCLUSIONS

Slovenia has adopted a regulatory framework in which technical support organisations perform a clear supportive role to the nuclear regulatory authority in the licensing process for radiation and nuclear facilities including the changes of the obtained licenses. The authorised expert license acquisition procedure is in general prescribed in the Nuclear Safety Act and further specified in particular rules, effective from 2006. The authorisation process was in place already before the commissioning of NPP in 1980's; therefore, during the past years of implementation many experiences have been gained, by TSOs and the NRA, and also by the operators.

It is recognised that such an approach in which all the licensing documentation and changes are scrutinised thoroughly by a knowledgeable organisation may scientifically improve the radiation and nuclear safety of facilities and activities. The documentation is assessed systematically and considering all different requirements set in the legislation. However, in a country with a small nuclear programme and related activities, the established system also faces some difficulties. Among them, the most challenging difficulties include the maintenance of competences within TSOs and a large number of authorised legal entities in a very small nuclear programme. Some possibilities for improving the system have been presented in the paper. It would be beneficial, if the IAEA as the central international organisation introduces even more relevant knowledge management programmes.

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