

The Missing Part of Nuclear Power Plant Regulations in Turkey: Occupational Health and Safety

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Abstract: The researches made on X-rays and radioactive minerals prove that high level exposure to radiation results clinical harm on human tissues. Therefore, specific standards are needed to be implementing for the protection of workers who are exposed to radiation especially in nuclear plants. Turkey is planning to activate its first nuclear power plant within couple of years. Accordingly, Turkey has signed a contract for building its first nuclear power plant in Akkuyu, Mersin with Russian RosAtom. It will have an installed capacity of 4.8 GW and expected to have a 5 per cent share in Turkey's electricity generation. In addition, an intensive regulatory work has been done by the Turkish Atomic Energy Authority. Most of them are in accordance with those of International Atomic Energy Agency. The analysis made in this study, however, shows that the occupational health and safety (OHS) of nuclear power plant workers is neglected so far. Specific regulatory suggestions are made in order to raise the standards to international level.

Key Words : occupational health and safety, nuclear power plant, regulations, law

1. Introduction

The researches made on X-rays and radioactive minerals prove that high level exposure to radiation results clinical harm on human tissues (USNRC, 2011; UNSCEAR, 2008). The long-lasting epidemiological analysis on radioactive exposure of Nagasaki and Hiroshima victims of WWII also proves that radioactivity causes some diseases that can be developed by time (Hall, 2007). It is also known by now that very high level of exposure is fatal. 4Gy doses of radiation would kill half of the adult race. Apart from that, it is found out that just working on such a dangerous condition is a source of stress that affects the health of the workers (Cam, 2004), and negatively affects reproductive health of female workers (Esin and Öztürk, 2005). Therefore, specific standards are needed to be implementing for the protection of workers who are exposed to radiation. Such exposure might be the result of, but not limited to, the production and uses of radioactive resources and materials, the management of nuclear waste. Nuclear plants are the typical examples for such a risky environment.

One might think where does the necessity to establish some standards come from? The protection of health is one of the basic human rights. Article 25 of the Universal Declaration of Human Rights clearly states that “*Everyone has the right to a standard of living adequate for the health...*”. This, however, is not the only statute that requires the countries’ makes internal regulations about the subject. In fact, this declaration is not bounding any way. Instead, the obligation for the countries to make regulations on protection of worker’s health comes from their internal regulations, also called as legislation, in which the constitutions are usually at the first place, as well as from international or multinational agreements. This fact is also true for Turkey.

Turkey is planning to activate its first nuclear power plant within couple of years. Accordingly, Turkey has signed a contract for building its first nuclear power plant in Akkuyu, Mersin with Russian RosAtom. It will have an installed capacity of 4.8 GW and expected to have a 5 per cent share in Turkey’s electricity generation. Therefore, there exists actually not a long time period for the Administration to complete the legal foundations about nuclear energy. This also includes the ones about the occupational health and safety.

This study should look into the current legislation enacted so far in Turkey. At first, it will try to explain why the States are under the obligation to make such legislative moves in order to protect the workers’ health. Then, the specific legal arrangements should be analyzed to see if the standards set forth by Turkey is in compliance with international standards.

2. International Sources of Occupational Health and Safety

1. The first international agreement one should note is United Nations’ International Covenant on Economic, Social and Cultural Rights. Article 7 of the Covenant requires States to create safe and healthy working conditions. The

States are also under the obligation to recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health (Article 12).

One major international agreement that can be accepted as the source of occupational health and safety is European Social Charter. Turkey signed the Charter in 1961 and ratified in 1989. There are four specific articles on the right to health in Charter. Part 1.3 is directly related to worker's right ("*All workers have the right to safe and healthy working conditions*") whereas Part 1.11 is about general right to health. "*Everyone has the right to benefit from any measures enabling him to enjoy the highest possible standard of health attainable*". Article 3 of the Part 2 is specifically related to the right to safe and healthy working conditions. It states that;

"With a view to ensuring the effective exercise of the right to safe and healthy working conditions, the Parties undertake, in consultation with employers' and workers' organizations:

- 2. to formulate, implement and periodically review a coherent national policy on occupational safety, occupational health and the working environment. The primary aim of this policy shall be to improve occupational safety and health and to prevent accidents and injury to health arising out of, linked with or occurring in the course of work, particularly by minimizing the causes of hazards inherent in the working environment;*
- 3. to issue safety and health regulations;*
- 4. to provide for the enforcement of such regulations by measures of supervision;*
- 5. to promote the progressive development of occupational health services for all workers with essentially preventive and advisory functions."*

And last, the title of the Article 11 of Part 2 is "The right to protection of health" which obliges the State to take appropriate measures for ensuring the effective exercise of the right to protection of health.

Beside the European Social Charter that has been acted internationally, another important agreement that is about the radiation safety is the Radiation Protection Convention of International Labor Organization (ILO) (No. 115) that has been accepted in 1960 (Oğuz, 2011). Turkey has ratified the convention in 1968. The member states of the Convention undertake to take effective protection measures for the protection of workers against ionizing radiations (Alpar, 2003). The Convention brings regulations on protection methods, but instead of establishing strict rules about their applications, it chooses to let the implementation process flexible enough for the States' own choices. The main rule about the regulations to be prepared by the members is set out in Article 5. Accordingly, "*Every effort shall be made to restrict the exposure of workers to ionising radiations to the lowest practicable level, and any unnecessary exposure shall be avoided by all parties concerned*".

Following this article, the minimum level of methods about the precautions that is needed to be taken has set forth. For instance, the regulation made in article 6 requires members to fix maximum permissible doses of ionizing radiations which may be received from sources and maximum permissible amounts of radioactive substances which can be taken. Such maximum permissible doses and amounts shall be kept under constant review accordingly. The article 7 prohibits the employment of workers under 16 years old in the industry and requires the members to set maximum doses of exposure separately for workers who are 18 years old and older and under the 18 years old. Apart from that, appropriate levels shall be fixed for workers who are not directly engaged in radiation work, but who remain or pass where they may be exposed to ionizing radiations or radioactive substances according to the article 8. Article 9 is about the information right of the workers about the presence of hazards from ionizing radiations. The necessary measures and monitoring should be established and carried out in order to understand the real exposure levels of workers to ionizing radiations and radioactive substances (article 11). Article 12 has set out the medical examination obligation for workers who will be employed in such works. So, the member States are under the obligation to take such precautions, they will prepare the necessary internal regulations but will be free to determine their content.

The same year with the Convention, ILO has also accepted the Radiation Protection Recommendation. As it will be understood from the name, this is not a bounding statute. The Recommendation asks the States to fix the appropriate level of exposure stated in the Convention with due regard to the relevant values recommended from time to time by the International Commission on Radiological Protection; the employer to appoint a competent person to deal on behalf of the undertaking with questions of protection against ionizing radiations; that the methods of collective protection, both physical and operational, should be given priority in ensuring effective protection and personal protection should be applied where collective protection is not possible; that all protective devices, appliances and apparatus should be so designed or modified as to fulfill their intended purpose; that all emergency plans should be made in advance, etc.

One should note that, though, there are other ILO regulations made about occupational health and safety, this study limits the analysis towards their effect on radiation legislation on countries. Therefore, such other regulations made by ILO as well as other international organizations would not be mentioned hereunder.

3. National Sources of Occupational Health and Safety and Protection Against Radiation

3.1 The General Sources of Occupational Health and Safety

The right to health is regulated under three different articles of the Constitution of the Republic of Turkey. Article 56 of the Constitution states that *"everyone has the right to live in a healthy, balanced environment"*. This also includes working environment (Gerek, 2006). Accordingly, article 50 regulates that *"No one shall be required to perform **work unsuited** to his age, sex, and capacity. Minors, women and persons with physical or mental disabilities, shall enjoy special protection with regard to working conditions"*. And last, it is the duty of the *"State to take the necessary measures to raise the standard of living of workers, and to protect workers..."* (Article 49).

This is the major regulation in Turkey that obliges the State to take preventive steps and build the standards towards protection against any risk including the radiation. The country's such obligation also arises from its occupational health and safety duty. The current Code of Obligation no. 818 of Turkey requires the employers to take necessary precautionary steps against any dangers the workers might confront during their employment (art. 332) (Centel, 2005). The new Turkish Code of Obligation no. 6098 that will be put into effect starting from July 1, 2012 includes a similar article (art. 417).

Chapter 5 of the Labor Act No. 4857 is on occupational health and safety (Mollamahmutoğlu, 2008). With a view to ensure occupational health and safety in their establishments, employers shall take all the necessary measures and maintain all the needed means and tools in full; and employees are under the obligation to obey and observe all the measures taken in the field of occupational health and safety (Güler, 2011).

In order to ensure compliance with and supervision of the measures taken for occupational health and work safety at the establishment, the employer must inform the employees of the occupational risks and measures that must be taken against them as well as employees' legal rights and obligations and, in this connection, he must provide the employees with the necessary training on occupational health and safety (art. 77). The Ministry of Labour and Social Security, after taking the opinion of the Ministry of Health, shall issue bylaws and regulations, with a view to ensure the adoption of occupational health and safety measures in the establishments (art. 78). Such regulation exists in Turkey (Occupational Health and Safety Regulation). The first two parts of the regulation is about the general requirements that should be applied in every industry and business (Süzek, 2006). The third part however regulates specific requirements taking into account the risk factors. Chapter 5 of the third part is about the special precautions to be taken against occupational disease that can arise from physical and mechanical reasons. Article 83 of the bylaw states the measures to be taken on works done by natural and artificial radioactive and ionizing radiation materials or other sources of corpuscular emanation are:

- Minimum harmful doses of the radioactive material shall be used;
- A reasonable distance between the workers and the source should be provided;
- The work shall be set out so that the workers shall stay close to the source as little as possible;
- A cover shall be placed between the source and the workers. This screen shall be made from lead/concrete for gama and X rays and from plastics and similar materials for beta rays and neutrons.
- The amount of radiation received by each worker shall be measured by special gadgets and analysed at least once a month. If the amount of the radiation received by any worker exceeds the allowed doses, the worker shall be removed from its duty;
- A suitable aspiration system shall be set up. The air that has been emptied shall be filtered from radiation and special masks shall be used during the cleaning process. A special attention shall be paid to the cleanliness of the workplace and the workers. Radiactive waste shall be eliminated accordingly.
- Mobile radioactive materials shall be put in suitable and special boxes.
- The workers who will be employed for such a risky business shall be passed from medical examination prior to their employment and periodically. The nerve, blood and blood-forming systems of the workers shall especially monitored and those who have disorders related to blood disease shall not be employed.

Apart from this Regulation, the Ministry has also enacted Bylaw of Heavy and Dangerous Works in which the radiological works and works done by all kinds of radium and radioactive materials and radiation-emitting device are accepted as heavy and dangerous works. This bylaw, however, does not contain any special provision about the occupational health and safety of the workers who are employed in such works. Any worker under the age of 16 is forbidden to be employed in heavy and dangerous works according to article 4 of the bylaw. Moreover, young workers who are less than 18 years old but older than 16 are also banned to be employed in works that expose radiation and/or include radioactive materials. One might wonder if there exists any special prohibition for female workers. The only regulation made in bylaw about female workers is their right of leave for 5 days during their menstruation. The bylaw also requires the periodical and prior-employment medical examinations of the workers and forbids the employment of any worker who does not have such a medical examination report. One may wonder the sanction of not obeying such restriction. The Labor Act no. 4857 sets forth administrative fine for that one. The amount of the fine for the violation of the regulation that prohibits the employment of a worker under the age of 16 is 1.358 Turkish Lira (TRY) / worker (about 570 Euro), and the amount of the fine is 270 TRY / worker (about 113 Euro) for the violation of the rule that requires the medical examination.

3.2 The Special Legislation of OHS Related to Radiation

These are, so far, the general regulations made on occupational health and safety in Turkey that is related to radioactive works. Apart from them, Turkish Atomic Energy Authority (TAEA) that is established in 1982 by the law no. 2690 is given a special power to make regulations on subject. Article 4 of the said law emphasizes, among the duties and powers of the Authority, the determination of the limits of the principles and measures and legal responsibility that provide protection against the harms of the ionizing radiation which can be arisen from radiation equipment, radioactive materials and the use of similar ionizing radiation sources. Taking its power from this main act, the Authority has enacted some legal arrangements which also include norms about occupational health and safety.

The first arrangement this study will mention, according to the hierarchy of norms, is Radiation Safety Regulation of 1985. The first article of the Regulation drove its scope. Accordingly, the rules that should be applied by public and private institutions, organizations and as well as persons who use, manufacture, import and export, sell, carry and store ionizing radiation sources shall be set forth by the Regulation. Nuclear energy plants are obviously among them. The Regulation, for instance, precise that the protection unit used in biologically equivalent dose of radiation is Rem (art. 2). The radiation fields are divided to two. Radiation field A is the field in which the workers shall be exposed to radiation and yearly radiation level may pass three tenth of the dose equivalent limits; whereas, radiation field B is the field where the yearly radiation level shall stay under that rate. A special Radiation Health and Safety Authority is established by the Regulation. Determination and enforcement of radiation safety principles, legislation, standards and measures; and, taking necessary measures in order to protect the workers who work with the sources of radiation and the community are among the duties of this Authority.

After these general arrangements, Regulation sets forth the basic standards for the radiation levels. So that,

- Annual dose, a person who works with the radiation sources or who are exposed to radiation according to his duty, shall not exceed 5 Rem;
- Annual dose of all remaining persons shall not exceed 0,5 Rem.

The Regulation, in harmony with the Heavy and Dangerous Works Regulation prohibits the employment of workers who are less than 18 years old. Though the occupational health and safety rules of the Regulation are limited to those of the previous paragraphs, this study wants to underline the article about sanctions. It is important to note that the sanction will also be applied to situations like not obeying to the precised maximum radiation doses level and employing workers under the age of 18. According to article 13, with the title "cancellation of license", a report shall be issued once a non-compliance with licensing conditions and/or radiation safety legislation is identified by experts during regular audits. This report shall be evaluated by Radiation Health and Safety Office. If the issues identified in the report are accepted by the Office, a period of time shall be given to the licensee to remedy the shortcomings during which the license would be temporarily canceled. If the problems stated in the report are solved during this time, the temporary cancelation decision shall be removed. The aforementioned license is the one that is compulsory to possess, use, manufacture, import and export, purchase, sale, transport, store and/or work with any radiation sources.

Another legal arrangement made by TAEA is Radiation Safety Bylaw of 2000. It is seen in the bylaw that the amount of the exposure dose to radiation is set forth in detail and according to international standards. For instance, according to article 10, consecutive five year's average of effective radiation dose for radiation workers shall not exceed 20 mSv (millisievert), and it shall not be more than 50 mSv for any year. This standard is the same with that of International Atomic Energy Agency (IAEA). Unfortunately, the scope of the Bylaw was changed in 2010 and nuclear plants, nuclear

fuels, nuclear substances and activities related to radioactive waste from nuclear facilities were put out of the application of the bylaw. The reason for such change is unknown up to date. It can be concluded that such international standard is now inapplicable for nuclear plants' workers, so there exists an emptiness in law.

Besides these legal arrangements, TAEA's legislation towards radioactive activities and nuclear plants is abundant and detailed. One of them, Regulations on Licensing of Nuclear Facilities should be mentioned here alongside with the Directive on the Principles for Nuclear Power Plants licensed. Though, there is no specific article on occupational health and safety in the Regulation, the Article 6 of the Directive makes an indirect reference, stating that, apart from the legislation of Republic of Turkey, "The Basics" and "Requirements" categories for the IAEA's Safety Standards should also be met for licensing. It means that the employers, prior to their licensing should certificate that they took necessary precautions including those of occupational health and safety. There is no specific sanction enacted by this Directive. It is obvious that if the unconformity happens prior any licensing, the Authority should not issue a license for the company. It is not clear, though, what will happen if the unconformity arises later. The Regulation, on the other hand, states that if there exists an unconformity with the legislation, the license shall be temporarily or permanently canceled.

This raises a question in law. Is the administration's decision on cancellation of the license because of the employer's (company's) incompliance with the standards set forth in "The Basics" and "Requirements" categories of the IAEA's Safety Standards a legally valid action?

To answer this question, we should first answer two separate questions. The first one is: Can "The Basics" and "Requirements" categories of the IAEA's Safety Standards be accepted as a part of legislation? The term "legislation" is not legally defined. In its simplest form, the legislation is defined as the law which has been promulgated. In Turkey, the legislation is accepted as the whole of the laws, statutes, regulations, etc. that is in force in a country (TDK, 2012). So in both type of the definition, one might point out that enactment is a necessary condition for legal arrangements to be accepted as legislation. IAEA is an independent international organization related to the United Nations system. The standards created or accepted by this organization will not be accepted as enacted legal arrangements in a country. Therefore, it is not possible to accept these standards as legislation.

The second question to answer is: Does the Administration, by referring, not to some international legal norms, but to some norms created by international organization can make them a part of local legislation? The answer will not be changed if the referred rules would be international legal rules. The Constitution of the Republic of Turkey, with its article 90, states which and how the international agreements would be ratified (Türmen, 2000). It can be inferred that only treaties and international agreement may be the subject of any ratification procedure. That means the standards of an independent organization cannot be ratified and bear the force of law.

The answers of these two questions actually provide the answer of the main question. The application of "The Basics" and "Requirements" categories of the IAEA's Safety Standards by any Administration of Turkey, including TAEA, and the sanctions that shall be applied to companies because of their incompliance to said rules would be legally invalid. Obviously, this comment is not only valid about occupational health and safety rules but all other safety issue as well.

4. Conclusion

The occupational health and safety regulations in Turkey are limited to those of this study mentioned in previous paragraphs. The Turkish Atomic Energy Authority is established as the main Administrative organ with the duty of determination of the limits of the principles and measures and legal responsibility that provide protection against the harms of the ionizing radiation which can arise from radiation equipment, radioactive materials and the use of similar ionizing radiation sources. Taking its power from this main act, the Authority has enacted some legal arrangements which also include norms about occupational health and safety. A big part of the standards set forth by TAEA about the occupational health and safety are created by a reference given to "The Basics" and "Requirements" categories of the IAEA's Safety Standards in regulations. Unfortunately, due to reason explained above, the standards set by IAEA on this issue would not be applied in the country. Therefore, this study concludes that it exists emptiness about occupational health and safety of the workers who are/will be employed in nuclear facilities in Turkish legislation. There are some general rules that will be applied to broad industrial area, but specific legislation about nuclear power plants are missing. It should be also noted that the limitation of the scope of Radiation Safety Bylaw of 2000 in 2010 causes incompliance with international standards especially on the maximum exposure level.

This should not be understood as that this study finds the standards set by IAEA as bad ones or should not be applied by Turkey. Rather, the works done by IAEA is, probably, the most effective ones made globally. This study suggests the application of the same standards by Turkey. But, doing that, the flaws in the legislation procedure that will create legal

emptiness should be avoided. The standards set forth by IAEA should be transformed to national legal rules in accordance with the procedure of the Turkish Constitution.

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