# The proposed drafting process for nuclear security regulations: Egyptian case study

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**Abstract:** Egypt's concern is to enhance, maintain and improve the national nuclear security regime, including the legislative and regulatory framework. Egypt believes that a nuclear security legislative and regulatory framework better enables the State to prevent, detect and respond effectively to criminal and other unauthorised acts involving nuclear and other radioactive materials. In this work, the proposed drafting process for nuclear security regulations in Egypt will be presented taking into consideration the International Atomic Energy Authority model regulations and guidance as well as the nuclear security regulations of some selected countries to show the relationship between the evolution of nuclear and radiation activities and their national regulations. This study presents four different nuclear security regulations to be drafted by the Egyptian nuclear and radiological regulatory authority covering security of nuclear and radiation facilities as well as nuclear and other radioactive material during handling, use, storage, import, export and transport.

**Keywords:** legislation; nuclear security; Egypt; drafting process.

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**Biographical notes:** Walid I. Zidan is Vice Chairman of the Nuclear and Radiological Regulatory Authority (ENRRA). He has been an Associate Professor in ENRRA, nuclear safeguards and physical protection department, since 2010 until now. He received his PhD in chemical engineering from Alexandria University (2005). His working experience covers nuclear security related issues on national, regional and international levels. It also covers life cycle of the fuel fabrication facilities as well as many regulatory aspects, in particular licensing process, inspection and enforcement practices.

## 1 Introduction

The International Atomic Energy Authority (IAEA) Advisory Group on Nuclear Security (AdSec) has defined nuclear security as "the prevention, detection of and response to theft, sabotage, unauthorised access, illegal transfer or any other malicious acts and activities involving nuclear material, other radioactive substances or their associated facilities and activities" (Malcolm, 2012).

The threat of nuclear terrorism is real as nuclear and radioactive materials present a risk if they are unsecured. Individuals and groups could acquire and use nuclear and other radioactive materials with malicious intent, which is regarded as a serious threat to international peace.

The responsibility for nuclear security rests entirely in the hands of the State. The objective of a State's nuclear security regime is to protect persons, property, society and the environment from harmful consequences of a nuclear security event. With the aim of achieving this objective, every State should take the appropriate measure to ensure that all the nuclear and radioactive materials, facilities and equipment within its territory or under its jurisdiction or control are securely protected during their useful lives and at the end of their useful lives and the promotion of security culture (IAEA, 2011a). States should establish, implement, maintain and sustain an effective, appropriate and comprehensive nuclear security regime, including effective legislative framework, to prevent, detect and respond to such nuclear security events.

The present work provides a proposed drafting process of nuclear security regulations by Egyptian Nuclear and Radiological Regulatory Authority (ENRRA) pursuant to the Egyptian nuclear and radiation Law no. 7 of 2010 (hereinafter 'the Law'), the IAEA Model Regulation for the security of radioactive sources and the regulations of selected countries. The number of nuclear security regulations which are needed to be drafted, as well as their contents and drafting approach, are discussed.

## 2 Legal hierarchy

The legal norms for the regulations of nuclear energy are part of a State's general legal system. Nuclear law must take its place within the normal legal hierarchy. The hierarchy consists of several levels. The first, the constitutional level, establishes the basic institutional and legal structure governing all relationships in the state. The second is the statutory level, at which specific laws are enacted by a parliament in order to establish other necessary bodies and to adopt measures relating to the broad range of activities affecting national interests. The third, regulations level, regulations specified by statutory instrument. Owing to their special character, such rules are typically developed by expert bodies empowered to oversee specific areas of national interest and are promulgated in accordance with the national legal framework. The fourth level, non-mandatory guidance instruments, which contain recommendations is designed to assist persons and organisations in meeting the legal requirements (IAEA, 2003).

## 3 Regulations

Development of regulations requires a power for regulations to be made to be conferred in primary legislation and generally, the subject matter of the regulations is limited by reference to primary legislation. Regulations are legally binding instruments and they are usually more detailed and prescriptive than the primary or principal legislation. In an area such as nuclear security, technical requirements tend to be set out in regulations rather than in the primary legislation. Regulations are more amenable to amendment or revision than primary legislation and may be updated and revised more regularly than primary legislation.

There are three alternative approaches that the regulatory body may use for directing operators on how to demonstrate that they meet the security objectives (IAEA, 2009, IAEA, 2011b):

- A prescriptive approach which establishes specific security measures determined by the regulatory body to meet the security objectives for each security level. The prescriptive approach has the advantages of simplicity in implementation for both the regulatory body and operators and also ease of inspection and auditing. The disadvantage of this approach is its relative lack of flexibility to address actual circumstances.
- A performance based approach is one where the regulatory body allows flexibility for the operator to propose the particular combination of security measures that will be used to achieve the security objectives. The advantages of this approach are that it recognises that an effective security system can be composed of many combinations of security measures and that each operator's circumstances can be unique. The prerequisite for this approach is that it requires both the operator and the regulatory body to have relatively high levels of security expertise.
- A combined approach includes elements drawn from both prescriptive and performance based approaches. There are many possible versions of the combined approach. For example, the regulatory body may adopt a set of security measures from which the operator may choose, while requiring the operator to demonstrate that the security system as a whole meets the applicable security objectives. Alternatively, the regulatory body could use a performance-based approach for the radioactive sources with the highest potential consequences of malicious use and a prescriptive approach for lower consequence sources. Or, a set of prescriptive requirements could be supplemented with performance-oriented requirements addressing particular matters. The main advantage of the combined approach is the flexibility it allows.

## 4 Egyptian nuclear and radiation infrastructure

For more than 58 years, Egypt benefited from the peaceful uses of nuclear energy. Egypt has its nuclear and radiation facilities, activities and practices and it benefited from the peaceful uses of nuclear energy in research and development activities (Zidan and Kamara, 2013).

### *4.1 Egyptian nuclear facilities*

- First Research Reactor of Egypt (ETRR-1, 2 MWt).
- Second Research Reactor of Egypt (ETRR-2, 22 MWt).
- Nuclear Fuel Manufacturing Pilot Plant (FMPP).
- Radio-isotopes Production Facility (RPF).
- Research and development facilities in the field of nuclear fuel fabrication and hydrometallurgy.

### *4.2 Egyptian radiation facilities*

- Two Gamma Irradiators (one in operation up to 1,000,000 Ci $^{60}$Co and one in its commissioning stage; designed for 2,000,000 Ci $^{60}$Co).
- Electron beam accelerator for the production of wound-dressing hydrogel, production of heat-shrinkable materials and cross-linking of wire and cable insulators.

In addition, Egypt uses radiation sources in different applications such as the medical field (diagnosis and treatment), agriculture and industry (exploration of oil and gas).

In addition, Egypt announced in 2007 that it is going to embark on its Nuclear Power Plants (NPPs) Programme for electricity generation.

## 5 Egyptian legislative and regulatory frameworks

### *5.1 Egyptian nuclear and radiation Law no.7 of 2010*

The law was promulgated by presidential decree on 29 March 2010 to provide a legal and regulatory framework for conducting activities related to nuclear energy and ionising radiation in a manner which adequately protects individuals, property, society and the environment (Egypt, 2010).

The law established a single independent body to monitor all nuclear and radiation facilities, activities and practices, known as the Egyptian Nuclear and Radiological Regulatory Authority (hereinafter 'ENRRA' which has a juristic personality, reports to the prime minister and is centrally located in Cairo or nearby governorates.

ENRRA chairman, vice – chairman (Egypt, 2012a) and the board members (Egypt, 2012b) were nominated on 5 March 2012.

The law takes into account that ENRRA shall be structured in such a way that ensures it is capable of discharging its responsibilities and carries out its functions effectively, efficiently and independently.

In order to achieve the above mentioned goals, the law stipulates that ENRRA shall have an independent budget, to prevent unwarranted interference in its regulatory functions and the law states also that ENRRA shall carry out all regulatory and control functions related to the nuclear and radiation activities for peaceful use of atomic energy.

The law details the establishment of the Egyptian Nuclear Security System (hereinafter ENSS) within the organisational structure of ENRRA which is responsible for all activities related to nuclear security and has the objective to enhance nuclear security systems with coordination with other relevant authorities for nuclear and radiation facilities and activities, nuclear material, nuclear fuel and radiation sources including radioactive waste and spent nuclear fuel.

*In order to ensure achieving the above objective, ENSS shall enjoy all competences necessary, particularly:*

- Defining the anticipated threats that should be considered in the design of State nuclear security systems and may prescribe the adequate means to respond to such threats.
- Reviewing the design of nuclear security systems and evaluating their performance.

- Making classification of the nuclear materials and radiation sources from nuclear security perspective and procedures that must be provided for each type to protect such materials and sources.
- Approving on import and export operations involving nuclear materials and radiation sources.
- Monitoring measures and procedures that control illicit trafficking of nuclear materials and other radiation sources.
- Creating a database for all nuclear material and radioactive sources in all fields.
- Providing the necessary protection for nuclear and radiation facilities, as well as nuclear materials and radiation sources used, stored and transported by any means.

### *5.2 Executive regulation of the law*

The executive regulation of the law (Egypt, 2011) addressed the issue of nuclear security and states that:

> "ENSS shall ensure the availability of protection systems for nuclear and radiation facilities, as well as for nuclear material and radiation sources used, stored or transported domestically and/or internationally and to that end must review such systems and to perform field inspections".

*The executive regulation of the law also identified the responsibilities of the licensee with respect to nuclear security, as follows:*

- The licensee shall bear the primary responsibility for providing a security for nuclear facilities and nuclear activities, nuclear materials and radiation sources and nuclear fuel including radioactive waste and spent nuclear fuel.
- The licensee shall identify sources of threat, which has a harmful impact to the safety of individuals, property, facilities and the environment and to devise plans to counter such threats.
- The licensee shall develop systems and plans for nuclear security in the framework of a cost-benefit analysis to enhance security to counter expected threats.
- The licensee shall implement the system adopted by ENRRA to achieve security of any nuclear and radiation facilities and activities and to provide full protection.

### *5.3 Legally binding and non-binding international instruments*

#### *5.3.1 International legally binding instruments*

Egypt signed and ratified a number of legally binding international instruments for the purposes of enhancing the international cooperation in the field of nuclear security and strengthens the national nuclear security regime as indicated in Table 1.

**Table 1** Legally binding international instruments: Egyptian status

| *Abbreviation* | *Convention* | *Status* |
|---|---|---|
| NOT | Convention on Early Notification of a Nuclear Accident | Signature: 26-09-1986<br>Ratification: 06-07-1988 |
| ASSIST | Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency | Signature: 26-09-1986<br>Ratification: 06-10-1988 |
| NPT | Treaty on the Non-proliferation of Nuclear Weapons. | Signature: 01-07-1968<br>Ratification: 26-02-1981 |
| SG | Application of Safeguards in connection with the Treaty on the Non-proliferation of Nuclear weapons. | Signature: 07-10-1981<br>Ratification: 30-06-1982 |
| CPPNM | Convention on Physical Protection of Nuclear Materials | Egypt announced its intention to take the necessary measures to become a party to CPPNM as well as its amendment and it adopted the measures stipulated in the law and its executive regulation. |
| NTC | International Convention for the Suppression of Acts of Nuclear Terrorism. | Signature: 20 Sep 2005 |
| TBC | International Convention for the Suppression of terrorist bombings. | Ratification: 09-08-2005 |
| 1988 SUA Convention | International Convention for the Suppression of unlawful acts against the safety of maritime navigation. | Ratification: 08-01-0993 |

United Nations Security Council Resolutions (UNSCR) 1373 (2001) (UN press1 see http://www.un.org/News/Press/docs/2001/sc7158.doc) and 1540 (2004) (UN press2 see http://www.un.org/News/Press/docs/2004/sc8076.doc.htm) were adopted under Chapter VII of the UN Charter and are therefore binding on all States. Moreover, pursuant to Article 48(2) of the UN Charter, "such decisions shall be carried out by the Members of the United Nations directly and through their action in the appropriate international agencies of which they are members" (IAEA, 2011c).

*Egypt as an active member of the international community is committed to regularly* reporting on steps taken to implement both resolutions 1373 and 1540. Egypt established a national committee to follow the implementation of Egypt's obligations under UNSCR 1540. In the context of Egypt's commitment to UNSCR 1540, it was stated in the law that:

> "the development, manufacturing, possession, transport, use or threat of use or ownership of nuclear weapons or nuclear explosive devices or any means of radiological dispersal is strictly prohibited. It is also prohibited to provide any assistance in performing the abovementioned actions, as well as attempt to commit or initiate any such actions" (consistent with paragraph (1) of the UNSCR 1540).

### *5.3.2 International legally non-binding instruments*

Egypt adopted the measures stated in the international legally non-binding instruments such as IAEA code of conduct on the safety and security of radioactive sources and the supplementary guidance on the import and export of radioactive sources.

### *5.4 Regulations issuance authority*

The Law No.7 of 2010 stated that ENRRA has the authority to draft and issue regulations such as: paragraph 4 of Article 17 of the law stipulates that:

"ENRRA board shall be the supreme authority dominating and running its affairs. Thereupon, it may adopt any resolution – in the framework of the State national plan – as it deems necessary to realise the goals for which the authority was established, particularly: to issue standards and limits in connection to the atomic power safe and secured peaceful uses in all fields, safety standards of the protection from ionising radiation and safety of radiation sources in conformity with the international standards and limits and safety and security standards issued by the relevant international organisations, given due regard to the safety standards related to establishment of nuclear or radiation facilities which are effective in the country of origin".

In addition to that, paragraph 3 of Article 2 of the executive regulation of the Law no. 7 of 2010 states that:

"ENRRA chairman of the authority shall assume the following competences alongside the competences set forth in article of the law:

Oversee the preparation of all regulations organising work at the authority".

## 6 Methodology of regulations drafting process

The methodology of drafting the national nuclear security regulations may be summarised in the following steps:

Step 1: Assessment of the current and planned nuclear programmes.

Step 2: Review the legislative and regulatory frameworks

Step 3: Study the international guidance and recommendation that are related to nuclear security.

Step 4: Input from stakeholders.

Step 5: Study the available nuclear security regulations for selected countries.

Step 6: Drafting the nuclear security regulations.

*Step 1: Assessment of the current and planned national nuclear programmes:*

The first step before starting drafting the nuclear security regulations is to assess the nuclear and radioactive activities in Egypt to guarantee that the nuclear security regulations will be consistent with the current and future activities.

*Step 2: Review the national legislative and regulatory framework:*

The national laws that govern the nuclear and radioactive activities in Egypt must be reviewed and studied before drafting the regulations to ensure that the regulations drafting is consistent with the national law and to identify the regulations that must be drafted pursuant the law

Other national laws and regulations that related to nuclear security must be reviewed such as the laws and regulations govern transport (land, sea or air) and the laws and regulations govern import and export, to ensure the nuclear security regulations consistent with the other related laws and regulations.

*Step 3: Study the international guidance and recommendations that are related to nuclear security:*

The international guidance and recommendations that are related to nuclear security shall be reviewed and studied, to ensure that the nuclear security regulations consistent with the international standards.

*Step 4: Input from stakeholders:*

ENRRA collaborate and coordinate with other national competent authorities in drafting nuclear security regulations, pursuant to Article 77 of the Law no. 7 of 2010.

*Step 5: Study the available nuclear security regulations for selected countries:*

ENRRA studied the nuclear and radioactive activities for selected countries and their nuclear security regulations for establishing a relationship between the evolution of nuclear and radiation activities and their nuclear security regulations. This was done in order to draft nuclear security regulations consistent with the Egyptian nuclear and radiation activities.

*Step 6: Drafting the nuclear security regulations:*

After finishing the abovementioned steps, the specialised committees start in drafting the proposed nuclear security regulations.

## 7 Results obtained from nuclear security regulations of the selected countries

Five countries were selected in order to study their nuclear security regulations namely: Canada (Canada, 2000), Russian Federation (Russia, 2000; Russia, 2002; Russia, 2007a; Russia, 2007b; Russia, 2011), Turkey (Turkey, 2000), UK (UK, 2003; UK, 2013) and USA (USA, 2014). The IAEA model regulation for the security of radioactive sources during manufacture, use, storage and transport (IAEA, 2012b) (hereinafter as 'Model Regulations') was also studied.

The number and types of the nuclear facilities in the previously mentioned countries are listed in Table 2. The nuclear security regulations of these countries were studied carefully and the key areas in these regulations as well as IAEA model regulation are listed in Table 3.

**Table 2** Number and types of the nuclear facilities in the selected countries

| *Country* | *Number of operating nuclear power plants* | *Number of nuclear power plants under constructions* | *Number of nuclear fuel cycle facilities* | *Number of reprocessing facilities* | *Number of research reactor* |
|---|---|---|---|---|---|
| Canada | 19 | 0 | 40 | 0 | 7 |
| Russia | 33 | 10 | 30 | 1 | 70 |
| Turkey | 0 | 0 | 5 | 0 | 0 |
| UK | 16 | 0 | 45 | 2 | 1 |
| USA | 100 | 5 | 158 | 0 | 43 |
| Egypt | 0 | 0 | 1 | 0 | 2 |

*Sources*: IAEA (2012a); IAEA (2008a); IAEA (2008b)

**Table 3** Key areas considered in the nuclear security regulations of the selected countries

| *Country* [a] | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model regulation | • | | | • | | • | • | • | • | • | • |
| Canada | | | | • | | • | • | | | • | |
| Russia | | | | • | • | • | • | • | • | • | |
| Turkey | • | • | • | • | • | • | • | | | • | |
| UK | | | • | | | • | • | | | • | |
| USA | | | • | | | • | • | • | • | • | |

Notes: [a] The succeeding column headings are as follows:

1 Nuclear security culture.
2 Nuclear security and safety interface.
3 Information security.
4 Categorisation of nuclear material and/or other radioactive material and sources.
5 Design basis threat.
6 Security of nuclear materials and facilities.
7 Security of transport of nuclear materials.
8 Security of other radioactive materials.
9 Security of transport of other radioactive materials.
10 Records and reports.
11 Security management.

This study was made on the available regulations of the mentioned countries, which means that there could be other regulations governing other areas of the nuclear security but these regulations are restricted and are not permissible for disclosure.

As can be indicated from Table 3 there are common elements in these regulations regardless of the activities in each State or the regulation developing approach. The most repeatable elements in these regulations are categorisation of nuclear material, security of nuclear materials and facilities, security of radioactive materials and security of transport

of nuclear materials and other radioactive materials, which indicates the importance of such elements. This was taken into consideration when deciding the nuclear security regulations that shall be drafted by ENRRA, while the other less frequently mentioned key elements will be considered in the contents of the proposed regulations. These findings as well as nuclear and radiological activities exist in Egypt and provisions of the Law no.7 and its executive regulation were the cornerstone in deciding number and contents of the proposed regulations. Finally, we concluded that four nuclear security regulations need to be drafted. The proposed four regulations titles as well as their proposed contents are listed in Table 4.

**Table 4** Titles and contents of the proposed nuclear security regulations

| | | |
|---|---|---|
| *First* | *Title* | *Regulations on security for transport of nuclear and other radioactive materials and the import and export of radiation sources* |
| | Contents | • Security for transport of radioactive sources<br>• Security for import and export of radioactive sources<br>• Security for transport of nuclear material<br>• Security of nuclear and other radioactive material during transit |
| *Second* | *Title* | *Regulations on security for handling and disposal of radiation sources* |
| | Contents | • Basic requirements for security of handling and disposal of all Category 1, 2 and 3 radioactive sources<br>• The administrative measures for security of handling and disposal of categories 4 and 5 |
| *Third* | *Title* | *Regulations on the physical protection of nuclear facilities and nuclear material* |
| | Contents | • Basic requirements for the physical protection of nuclear material category I, II and III in domestic use and storage and nuclear facilities<br>• License applications of Category I and Category II Nuclear Material<br>• License applications of Category III Nuclear Material<br>• General Obligations related to Category I, II or III nuclear material<br>• Requirements for high security sites (Design Basis Threat Analysis, Facility specific Threat and risk assessment)<br>• Requirements concerning protected, inner and vital areas<br>• Entry into protected, inner and vital areas (access Control)<br>• Nuclear Security Officers<br>• Inspection<br>• Protection arrangements, contingency plans and response force.<br>• Records |
| *Fourth* | *Title* | *Regulations on the security of radiation facilities* |
| | Contents | • Basic requirements for the security of radiation facilities |

## 8 The proposed nuclear security regulations

### *8.1 Number, titles and contents of regulations*

This study proposes the number and contents of nuclear security regulations that shall be drafted by ENRRA as shown in Table 4.

It is worth noting that these regulations based on ENRRA commitments by Law no.7 for example, it obliged ENRRA to put its standards for import and export of radiation sources (Article no. 55) and nuclear material (Article no. 77) and for the safe transport of nuclear materials and radiation sources (Article no. 56). The law also obliged ENRRA to make categorisation of nuclear materials and radiation sources (Article no.59 & 77). Categorisation is of great priority in order to identify appropriate security level and to provide a logical and transparent basis for a graded system of notification, registration, licensing and inspections. The law also obliged ENRRA to take the suitable measures in order to ensure the existence of physical protection measures for nuclear and radiological facilities, nuclear materials and radioactive sources (Article no. 77).

Drafting approach of the proposed nuclear security regulations will be combined approach, because of its flexibility, taking into consideration the Egyptian experience in the nuclear and radiation activities.

The proposed structure of nuclear security regulations will be as the following:

*Title:* The title of the regulations should be clear and reflect the subject matter and purpose of the regulations.

*Authority to issue regulations:* Reference to the relevant primary legislation shall be made as it is the authority to issue regulations.

*Date of entry into force:* Should be expressed clearly, as regulations are generally not retrospective and can only apply on and from their date of entry into force.

*Purpose:* Should be clearly expressed and should be consistent with the purpose expressed in the primary legislation cited.

*Scope of the regulations:* Should be clearly stated in the regulations, indicates the subject matter covered by the regulations and, should not go further than what primary legislation authorises.

*Definitions:* All relevant definitions, which are essential to the understanding of, interpretation of and consistent application of the regulations, should be included in the regulations. May limit or expand a term beyond its ordinary meaning and may translate a technical term into common language.

*Legally binding nature of regulations:* Regulations may include a statement that the regulations are legally binding on those that are subject to the regulations.

*Substantive provisions:*

- Topics within a regulation should be grouped together and organised in a manner that is logical to the target audience
- Assist each competent authority that has a role and responsibility defined in legislation to understand clearly the scope of its role and responsibilities.

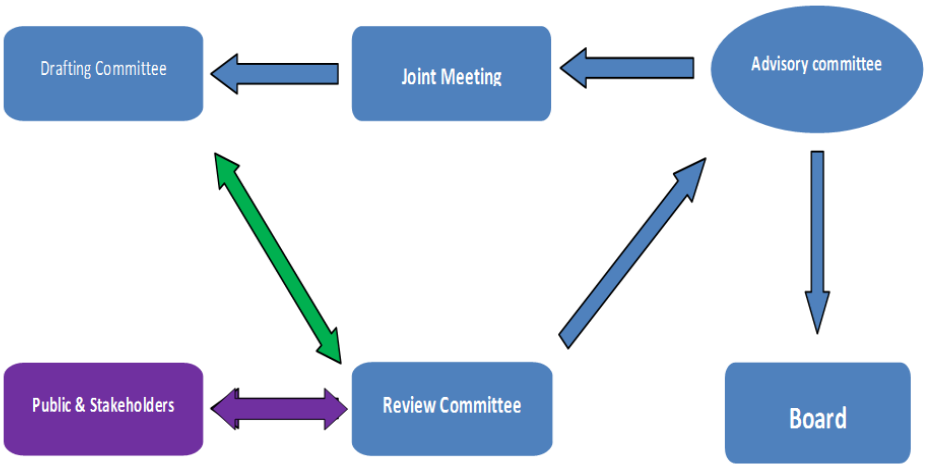
*Enforcement provisions:* provisions relating to enforcement may include sanctions: verbal/written notification, imposition of additional requirements, written warnings, penalties, fines, etc.

Currently, Egypt through ENRRA experts is drafting the necessary fundamentals, recommendations and technical guidance that relate to nuclear security taking into consideration the IAEA's Nuclear Security Series (NSS) publications.

### *8.2 Proposed drafting process of the nuclear security regulations*

This study proposes a process for drafting the regulation in ENNRA, which is represented in Figure 1.

**Figure 1** The proposed drafting process of nuclear security regulations (see online version for colours)




1 The proposed process will start by establishing three committees within ENRRA namely; Advisory Committee (AC), Drafting Committee (DC) and Review Committee (RC) with the following duties:

*Advisory committee (AC)*

- Assessing the needs to decide the regulations which should be drafted in accordance with the Law no. 7 of 2010 and its executive regulation.
- Assessing the requests of stakeholders for drafting specific regulations.
- Reviewing the final draft to ensure that it does not contradict other regulations issued by ENRRA or other regulations in the State and then sending it to the board for endorsement.

*Drafting committee (DC)*

- Responsible for drafting the regulations' proposals, by reviewing the national laws, international guidance and regulations in different countries and for sending the final proposal to the RC.
- Addressing review committee as well as public and stakeholders' comments and/or amendments if present and then resending the amended version to RC.

*Review Committee (RC)*

- Reviewing the regulations' proposals and doing any necessary amendments.
- Sending the regulation proposal to all stakeholders for review and requesting public to send their comments on the regulation.
- Collecting the various drafts from stakeholders and the public, assessing their comments and then resending these comments to DC for addressing in the regulation final draft.
- Reviewing the final amended draft and ensuring that the regulation is conducted in an orderly and systematic manner with due attention to the approved action plan by Joint Meeting (JM) and then sending the final version to AC.

2 After establishing the previously mentioned committees and decision taken by AC about regulations to be drafted, JM will be held between DC and RC under heads of ENRRA chairperson, in order to put and approve the regulation action plan.

3 When regulation first version is drafted by DC and reviewed and amended by RC, it will be sent to the stakeholders and public asking for their comments. It is proposed that the involvement of stakeholders and public in the proposed drafting process will begin at this stage i.e. when first version is drafted except for the regulation that covers transport of nuclear and radioactive materials and radiation sources, in this regulation stakeholders' involvement will begin at earlier stage as there are many ways of transport (land, air or sea) and there are many standards issued by relevant international organisations which must be taken into consideration during regulation drafting such as International Civil Aviation Organisation (ICAO), International Maritime Organisation (IMO), United Nations Economic Commission for Europe (UNECE) and Universal Postal Union (UPU).

4 After addressing the necessary stakeholders and public comments by DC, the final version will be revised by RC and AC and then it will be sent to ENRRA board for endorsement.

5 The Board is the authority responsible for endorsing and issuing the regulation according to the law. After regulation endorsement by the board, ENRRA distributes the regulation on stakeholders and uploads the regulation on ENRRA website. The board may take a decision not to publish certain regulations for security reasons like some countries such as UAE.

## 9 Conclusion

In accordance with the Egyptian infrastructure and legislative and regulatory frameworks and from the study made on the available nuclear security regulations of five selected countries as well as IAEA model regulation, this study offers a proposal of the regulations that are considered necessary to be drafted in Egypt in order to govern the nuclear security for nuclear materials, other radioactive substances or their associated

facilities and activities. A proposal for the drafting process and steps that shall be taken by the Egyptian Nuclear and Radiological Regulatory Authority during drafting these regulations was also provided and discussed. The present study suggests drafting of four nuclear security regulations and provides their titles and contents.

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