

FEEDBACK EXPERIENCE FROM THE IAEA MISSIONS WITH RESPECT TO NUCLEAR SECURITY OF BARAKAH NPP IN THE UNITED ARAB EMIRATES

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Abstract

This paper presents the benefits, to the development of the nuclear power programme in the United Arab Emirates (UAE), of the different missions performed by the International Atomic Energy Agency (IAEA) in regards to nuclear security for nuclear power plant. At the very beginning of the implementation of the nuclear power programme, the IAEA, on demand of the UAE, conducted an Integrated Nuclear Infrastructure Review (INIR) in January 2011. This INIR mission has a broad scope than nuclear security, to check the completion of the nuclear infrastructure for each of three phases (Phase 1: before the decision to launch a nuclear power programme is taken; Phase 2: before to invite bids for the first nuclear power plant; Phase 3: before the commissioning and operating of the first nuclear power plant). The INIR mission was initiated for the first two phases and the UAE has prepared, before, a detailed self-evaluation report on the activities they have already done. Chapter 15 – security and physical protection – described the legislative and regulatory framework for nuclear security developed and to be developed, and the design basis threat (DBT) to be established as well as the protection of sensitive information. During this mission, the exchange between the IAEA team and the security team in both FANR, ENEC and CNIA was really fruitful for the development of the programme. The INIR 3 mission was conducted in July 2018 and, as a result, for the Chapter 15 – nuclear security –, IAEA proposed suggestions for ENEC and good practice for FANR to be detailed in the present paper. In March 2014 at the Nuclear Security Summit (The Hague, the Netherlands), the UAE stated in its progress report that an International Physical Protection Advisory Services (IPPAS) mission will be provided to the UAE by the IAEA in 2016. The UAE requested by letter to the IAEA dated 3 February 2015 that the IAEA arrange an IPPAS mission in 2016 to assess the nuclear security programme of the UAE. From 29 October to 10 November 2016, the IAEA performed an IPPAS in the UAE. IPPAS is a peer review by IAEA expert on implementing relevant international instruments, in particular the CPPNM, its 2005 Amendment, and IAEA Nuclear Security Series publication, in order to assist member state in the establishment and maintenance of their national nuclear security regime. It was the first time at the AIEA that such mission is conducting during construction of unit. In this case, the scope of the mission was relatively narrowed to only focus on module 1 – national review of nuclear security regime for nuclear material and nuclear facilities; module 2 - nuclear facility review and module 4 - security of radioactive material and associate facilities and associated activities. The construction of Unit 1 & 2 of Barakah NPP was reviewed regarding these items. The UAE provided an Additional Information Package (AIP), which included relevant legal and regulatory documents, licensing and inspection procedures, facility specific information and a list of all documents relevant to nuclear security one month prior to the mission. The package was prepared involving all stakeholders in the nuclear security domain. The IAEA final report contained recommendations, suggestions and good practices, which will be used for the enhancement of the nuclear power programme in regards with the nuclear security. The IAEA, on demand of the UAE, has also performed other missions in the UAE such as Integrated Regulatory Review Service (IRRS), International SSAC Advisory Service (ISSAS), Emergency Preparedness Review (EPREV), which have little input in nuclear security. However, the IAEA advised and helped the UAE to build its nuclear security programme for nuclear power plant, by implementing the Integrated Nuclear Security Support Plan (INSSP) as well as the Integrated Master Work Plan (IWP) covering the nuclear sector. These plans provided national trainings and activities to be implemented in the security domain of the nuclear power plant. From 2011 until this year, the UAE, with the help of the IAEA nuclear security division, has worked in nuclear security and finally achieved this task with the issuance of the licence of Unit 1 of Barakah Nuclear Power Plant.

1. INTRODUCTION

This paper aims to presents the benefits for the development of the nuclear power programme in the United Arab Emirates (UAE), of the different missions performed by the International Atomic Energy Agency (IAEA) in regards to nuclear security.

Firstly, the inputs of the IAEA Integrated Nuclear Infrastructure Review (INIR) missions will be described regarding nuclear security. The main benefits will be presented for the mission in 2011.

Secondly, the International Physical Protection Advisory Services (IPPAS) mission, conducted in 2016, has a great impact on the nuclear security regime inside the UAE. This mission will be described in details as well as the feedback experience gained of it.

Thirdly, many other programmes/missions may also constitute an improvement of the UAE nuclear security regime. The results of their implementation will be detailed in this paper.

Finally, this paper will conclude with the great improvement of the nuclear security regime in the UAE based on the different missions performed by the IAEA on the nuclear power programme.

2. THE NUCLEAR POWER PROGRAMME IN THE UAE AND ITS SECURITY ORGANIZATION

In April 2008, the UAE government published the “*Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy*”, which outlines the government’s fundamental principles for its work in the nuclear field.

In 2009, the nuclear power programme was launched with the construction of 4 Units in Barakah. The UAE has chosen an advanced third-generation light water reactor, known as APR1400, a design certified by the United States Nuclear Regulatory Commission. On 27 December 2009, it awarded a consortium led by Korean Electric Power Company (KEPCO) a contract to supply the UAE with four nuclear power reactors.

A decree of December 2009, established Emirates Nuclear Energy Corporation (ENEC), which is charged with implementing the UAE nuclear energy program. ENEC is committed to work closely with the IAEA, as well as the governments of responsible nations to adopt and implement best practices and guidelines for the development of a civil nuclear program.

The Critical National Infrastructure Authority (CNIA) was created in May 2007 with the mission to secure Abu Dhabi’s infrastructure and key assets. CNIA is responsible for protecting the Emirate’s vital facilities while working to maintain the highest standard of security to nurture the economic stability that comes from a safe and secure Abu Dhabi. The functions and responsibilities of CNIA have been transferred, in accordance with Abu Dhabi Law No. 1 of 2012, to the Critical Infrastructure and Coastal Protection Authority (CICPA) and General Headquarter of the UAE Armed Forces.

The Law on peaceful Uses of Nuclear Energy was made by Decree No. 6 of 2009 issued by the President of the UAE, H.H. Sheikh Khalifa Bin Zayed Al Nahyan, in September 2009. The Law establishes Federal Authority Nuclear Regulation (FANR) as the independent nuclear regulator and empowers FANR to determine all matters relating to the regulation, inspection, and oversight of the nuclear field with respect to nuclear safety, nuclear security, radiation protection and safeguards.

3. THE IAEA INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW (INIR)

IAEA Integrated Nuclear Infrastructure Review (INIR) mission focuses on the verification of the completion of the nuclear infrastructure for each of three following phases:

- Phase 1: before the decision to launch a nuclear power programme is taken;
- Phase 2: before to invite bids for the first nuclear power plant; and
- Phase 3: before the commissioning and operating of the first nuclear power plant.

The main objectives of the INIR mission were to evaluate the development status of the national infrastructure in the UAE to support the nuclear power programme according to the IAEA Nuclear Energy Series

publication entitled Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1, Revision 1) and the evaluation methodology described in the IAEA Nuclear Energy Series publication Evaluation of the Status of National Nuclear Infrastructure Development.

The decision to conduct an AIEA INIR mission (Phase 1 & 2) was taken by UAE at the very beginning of the implementation of the nuclear power programme in January 2011. Nuclear security was one of the 19 infrastructures to be assessed. During this mission, the exchange between the IAEA team and the security team in both FANR, ENEC and CNIA was really fruitful for the development of the programme.

On nuclear security, IAEA reviewed and insisted especially on the legislative and regulatory framework for nuclear security in the UAE and the design basis threat (DBT) as well as the protection of sensitive information. The legislative and regulatory framework was already developed in the UAE and the DBT was established after the self-assessment report made by the UAE. However, rules for managing sensitive information was not yet developed and implemented. It allowed the UAE to improve its nuclear security regime.

The IAEA performed another INIR mission (Phase 3) following the request by the UAE, in June – July 2018. The scope of the mission was to evaluate the development of the status of the national infrastructure and to identify areas needing further actions to reach Milestone 3 as well as provide recommendations and suggestions which can be used by the Government of the UAE and national institutions to prepare an action plan.

IAEA focussed on the Physical Protection Plan (PPP), including the Physical Protection System (PPS) and the contingency plan, and the implementation of a leadership and security culture. Finally, the license has been suggested to complete the PPP, including the PPS and the contingency plan. A good practice was recognized to FANR, technical reviews of which address the safety and security interfaces, especially in contingency and emergency plans. However, a recommendation was published on the legal framework (Infrastructure - 5), which was requesting the UAE to amend its legislation to fully reflect the provisions of the Amendment to the Convention on Physical Protection of Nuclear Material (CPPNM).

4. THE IAEA INTERNATIONAL PHYSICAL PROTECTION ADVISORY SERVICES (IPPAS)

International Physical Protection Advisory Services (IPPAS) is a peer review by IAEA expert on implementing relevant international instruments, in particular the CPPNM, its 2005 Amendment, and IAEA Nuclear Security Series publication, in order to assist member state in the establishment and maintenance of their national nuclear security regime.

In March 2014 at the Nuclear Security Summit (The Hague, the Netherlands), the UAE stated in its progress report that an IPPAS mission will be provided to the UAE by the IAEA in 2016. The UAE requested by letter to the IAEA dated 3 February 2015 that the IAEA arrange an IPPAS mission in 2016 to assess the nuclear security programme of the UAE. It was the first time at the AIEA that such mission is conducting in a country during construction of nuclear power plant but, for the UAE, it was time to correct, eventually if needed, the security programme.

The preparation for receiving that IAEA mission was relatively long and very busy. Firstly, the scope of the mission was defined focusing on module 1 – national review of nuclear security regime for nuclear material and nuclear facilities; module 2 - nuclear facility review and module 4 - security of radioactive material and associate facilities and associated activities. It was decided not to deal with modules 3 (transport review) and 5 (information and computer security review). Because for FANR, the regulatory body, the process to review the transport security plan has to take place in 2016 and has not to be disturbed. For cyber security, it has seemed too early to review it in 2016.

At the beginning, all the entities involved in the nuclear security, including FANR, CICPA, ENEC and NCEMA, gathered for discussing administrative and logistical aspects of the mission and for preparing the

information to be provided to the IAEA. The IAEA organized a workshop on IPPAS with all entities involved in nuclear security (22-24 November 2016) and a meeting for scheduling the date of the mission (25 November 2015).

One month prior to the scheduled IPPAS mission in the UAE, Additional Information Package (AIP) was provided to the IAEA, which included relevant legal and regulatory documents, licensing and inspection procedures, facility specific information and a list of all documents relevant to nuclear security. The package was prepared involving all stakeholders in the nuclear security domain.

From 29 October to 10 November 2016, the IAEA performed an IPPAS in the UAE with visits to Barakah Nuclear Power Plant as well as licensees for security of radioactive sources. The IAEA final report was discussed with the relevant entities in the nuclear security domain and published with recommendations, suggestions and good practices.

For the Barakah NPP, only one recommendation relevant to the physical protection was issued. It was the same as for INIR Phase 3 mission regarding the full implementation of Amendment of the CPPNM. Then, 11 suggestions were proposed by the IAEA for the construction of Barakah NPP. Based on these 11 suggestions, a plan of actions was build and implemented in the UAE.

The UAE is ready to request a follow-up IPPAS mission in the future.

5. THE OTHER IAEA ADVICES FOR BARAKAH NUCLEAR POWER PLANT

The IAEA, on demand of the UAE, has also performed other missions in the UAE such as Integrated Regulatory Review Service (IRRS), International SSAC Advisory Service (ISSAS) and Emergency Preparedness Review (EPREV), which have little input in nuclear security for Barakah NPP.

However, the UAE has requested the help of the IAEA for building an Integrated Nuclear Security Support Plan (INSSP). INSSP is a practical framework for implementing nuclear security measures over a specified period of time in a State by cooperation and coordination with bilateral support programmes. INSSP is structured in 4 chapters: legal and regulatory framework, prevention, detection and response. The INSSP for UAE was signed on August 2012 between the UAE and IAEA covering a three years period until August 2015 and FANR is in charge of its implementation. A plan of actions together with the relevant entities involved was established based on this INSSP and implemented within the UAE.

Especially, the UAE requested the IAEA to develop and Integrated Master Work Plan (IWP) covering the nuclear power infrastructure in the UAE. The implementation of a first IWP for the period of 2013-2017 was signed with the IAEA and, then, the IWP was prolonged. The IWP mainly provided national the training of personnel regarding different topic related to nuclear power plant. In particular for nuclear security, several trainings regarding the cyber security has been performed in the UAE.

6. CONCLUSION

All these missions and advices provided by the IAEA on the nuclear security for Barakah NPP have served to improve and enhance the nuclear power programme within the UAE.

Finally, the UAE, with the constant help and advice from the IAEA, has built a strong nuclear safety and security regime. Then, the UAE was able to issue the licence of Unit 1 of Barakah Nuclear Power Plant.

REFERENCES

- [1] Convention on the Physical Protection of Nuclear Material, INFCIRC/274/Rev. 1, IAEA, Vienna (1980).
- [2] Amendment to the Convention on the Physical Protection of Nuclear Material, GOV/INF/2005/10-GC(49)INF/6, IAEA, Vienna (2005).
- [3] Federal Law by Decree No. 6 of 2009 concerning the Peaceful Uses of Nuclear Energy issued by the President of the UAE, H.H. Sheikh Khalifa Bin Zayed Al Nahyan, in September 2009.
- [4] IAEA - INTERNATIONAL ATOMIC ENERGY AGENCY, Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev.5), Nuclear Security Series n° 13 (2011).
- [5] IAEA - INTERNATIONAL ATOMIC ENERGY AGENCY, Milestones in the Development of a National Infrastructure for Nuclear Power, NG-G-3.1. Revision 1, Vienna (2015).
- [6] IAEA - INTERNATIONAL ATOMIC ENERGY AGENCY, International Physical Protection Advisory Services (IPPAS) Guidelines, Services Series 29, November 2014.