MISSION REPORT

ON

THE INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW (INIR) - PHASE 2

Counterpart:

Nuclear Power Plants Authority (NPPA)

27 October – 6 November 2019

Cairo, Egypt

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EXECUTIVE SUMMARY

Egypt has about 55 000 MW(e) (2019) of installed electricity generating capacity. The growth in demand for electricity in recent years has been 6% to 8% per year, resulting in reduced reserve margins and increasingly common load shedding in the summer months.

Egypt included nuclear energy as an option in its long-term energy plan and is working on its nuclear power infrastructure. The Supreme Council and the Coordination Committee, under the Supreme Council, are coordinating the national infrastructure development. The Nuclear Power Plants Authority (NPPA) has been established by Law No 13/1976 as the Owner/Operator of nuclear power plants (NPPs) in Egypt. The Law on Regulation of Nuclear and Radiation Activities (Law No 7/2010, Nuclear Law) was enacted in 2010 and established the Egyptian Nuclear and Radiological Regulatory Authority (ENRRA) as an independent regulatory authority for safety, security and safeguards reporting to the Prime Minister.

In early 2015, Egypt decided to select a strategic partner for the implementation of its first commercial NPP at the El-Dabaa site (the 'El-Dabaa Project'). Following this decision, in November 2015, an Inter-Governmental Agreement between the Government of the Russian Federation and the Government of the Arab Republic of Egypt on Cooperation in Construction and Operation of the NPP on the Territory of the Arab Republic of Egypt (the 'IGA') was signed.

The IGA was followed by four commercial contracts signed by NPPA with Russian companies in December 2017: (1) Engineering, Procurement and Construction (EPC) Contract; (2) Nuclear Fuel Supply (NFS) Contract; (3) Operation, Support and Maintenance (OSM) Contract; and (4) Spent Nuclear Fuel Treatment (SNFT) Contract.

On 8 July 2018, Egypt requested the International Atomic Energy Agency (IAEA) to carry out a Phase 2 Integrated Nuclear Infrastructure Review Mission (INIR) in October 2019. The first version of the Self-Evaluation Report (SER) and supporting documents were submitted to the IAEA on 21 January 2019. A SER support mission was conducted from 5 to 7 March 2019 in Cairo and based on the mission suggestions, Egypt updated the SER and provided, in September 2019, a final version to the IAEA together with a set of updated supporting documents. A pre-INIR mission was conducted from 7 to 8 May 2019 in preparation for the main INIR mission.

The INIR mission and associated activities were funded through the IAEA Technical Cooperation project EGY2015 '*Developing Project Management for a Nuclear Power Programme During the Construction and Commissioning Phases'* and extra budgetary contributions.

The INIR mission was conducted from 27 October to 6 November 2019 in Cairo. Professor Amged Saeed El-Wakeel, Board Chairman of NPPA, and Mr Dohee Hahn, Director of the Division of Nuclear Power in the IAEA, participated in the opening session for the INIR mission. The INIR mission team was led by Mr Jose Bastos of the IAEA's Division of Nuclear Power, Nuclear Infrastructure Development Section, and consisted of staff from the IAEA's Department of Nuclear Energy, Department of Nuclear Safety and Security, Department of Safeguards and international experts recruited by the IAEA. Egypt's participation was led by Professor Amged Saeed El-Wakeel.

The INIR mission was conducted in a cooperative and open atmosphere. NPPA, ENRRA and several other governmental organizations involved in the nuclear power programme participated in the mission. Appendix 2 provides the full list of participants.

The INIR team concluded that Egypt has conducted extensive work to develop its nuclear power infrastructure for the construction phase of its nuclear power programme. The programme has strong support from the Government and a clear commitment to safety, security and non-proliferation. Egypt has established comprehensive national legislation, signed an Inter-Governmental Agreement and made contractual arrangements for the construction and operation of the first nuclear power plant. NPPA and ENRRA have been established and have the services of technical and other consultants to support the development of the infrastructure, including capacity building.

To assist Egypt in making further progress in its nuclear infrastructure development, the INIR team made 4 recommendations and 3 suggestions. The INIR team also identified 5 good practices that may benefit other countries considering the introduction of nuclear power.

Based on the recommendations and suggestions, the key areas for further action are summarized below:

- **Egypt needs to continue to develop its legal and regulatory framework**

Egypt has enacted a comprehensive nuclear law and is party to some international legal instruments. It has developed a plan for adherence to other relevant instruments that now needs to be implemented.

Egypt has established the basis for licensing its first nuclear power plant involving significant use of vendor country regulations and guides but should continue developing its own regulations and guides.

- **Egypt needs to finalize the preparatory work required for the construction phase and ensure sustainability of the key organizations**

Egypt has established an independent regulatory body and is developing the competencies that will be required for construction and operation. Legal, financial and administrative arrangements are in place to incentivize the recruitment and retention of qualified staff. Since ENRRA currently receives considerable support from external technical support organizations (TSOs), it should ensure it has a sufficient number of competent staff to manage the licensing and construction oversight and to make decisions taking into account the recommendations provided by TSOs. It is also important for ENRRA to finalize and implement its stakeholder involvement plan.

NPPA has defined a detailed organisational structure for the construction phase and for operation and has developed its training plans. ENRRA is finalising job profiles for the remainder of its technical staff which will be used to develop training plans. Both organisations need to implement their respective plans and ensure that they benefit from learning opportunities that will be available during construction and from working with TSOs.

Egypt is also establishing a supervising authority to consolidate national project management support for the NPP construction. NPPA needs to clarify its interactions with the supervising authority, particularly to ensure NPPA fulfils its licensee responsibilities.

1. INTRODUCTION

The Arab Republic of Egypt first considered a nuclear power programme in the early 1960s. At that time, the Government of Egypt (GoE) started developing its legal, regulatory and technical infrastructure. Following the Chernobyl accident in 1986, Egypt suspended its development. In October 2007 a decision was taken to re-start the programme. The Nuclear Power Plants Authority (NPPA) was established as the Owner/Operator of the first NPP in Egypt. The Supreme Council and the Coordination Committee, under the Supreme Council, are coordinating the national infrastructure development.

In early 2015, Egypt decided to select a strategic partner for the implementation of its first commercial NPP at the El-Dabaa site (the 'El-Dabaa Project'). Following this decision, in November 2015, an Inter-Governmental Agreement between the Government of the Russian Federation and the Government of the Arab Republic of Egypt on Cooperation in Construction and Operation of the NPP on the Territory of the Arab Republic of Egypt (the 'IGA') was signed.

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2. OBJECTIVES OF THE MISSION

The main objectives of the INIR mission were to:

— Evaluate the development status of the national infrastructure to support the nuclear power programme according to the NE Series guide *Milestones in the Development of a National Infrastructure for Nuclear Power* (NG-G-3.1 (Rev. 1)) and the evaluation conditions described in NE Series technical report *Evaluation of the Status of National Infrastructure Development* (NG-T-3.2 (Rev. 1));

— Identify the areas needing further actions to reach Milestone 2: Ready to invite bids/negotiate a contract for the first nuclear power plant;

— Provide recommendations and suggestions which can be used by Egypt and national institutions to prepare an action plan.

3. SCOPE OF THE MISSION

The INIR mission evaluated the status of the infrastructure in Egypt covering all of the 19 infrastructure issues relative to the conditions identified in the above publications for Phase 2.

4. WORK DONE

Prior to the mission, the INIR team reviewed the self-evaluation report and supporting documentation that included relevant national laws, regulations, studies and reports. The INIR team sought input from IAEA staff members with relevant expertise working with Egypt. INIR team meetings were conducted prior to the mission in Vienna from 23 to 24 October 2019 and in Cairo on 26 October 2019.

The INIR mission was conducted from 27 October to 6 November 2019. The meetings were held at the Headquarters of the Nuclear Power Plants Authority (NPPA) in Cairo. The main interviews were conducted over 6 days. Egypt was well prepared for the mission. During the interviews, the Egyptian counterparts provided updates and more in-depth information on the current status of the infrastructure issues, and provided additional supporting documentation requested by the INIR team.

The preliminary draft report was prepared by the INIR team and discussed with the counterparts. The main mission results were presented to representatives of the Government in an exit meeting on 6 November 2019. The preliminary draft report was delivered to the counterparts during the exit meeting.

The results of the mission are summarized in Section 5 and presented in tabular form in Section 6 for each of the 19 infrastructure issues in Phase 2. Appendix 1 provides the evaluation results for each issue.

5. MAIN CONCLUSIONS

The INIR mission was conducted in a cooperative and open atmosphere. NPPA, ENRRA and several other governmental organizations involved in the nuclear power programme participated in the mission. Appendix 2 provides the full list of participants.

The INIR team concluded that Egypt has conducted extensive work to develop its infrastructure for the construction phase of its nuclear power programme. The programme has strong support from the Government and a clear commitment to safety, security and non-proliferation. Egypt has established comprehensive national legislation, signed an Inter-Governmental Agreement and made contractual arrangements for the construction and operation of the first nuclear power plant. NPPA and ENRRA have been established and have the services of technical and other consultants to support the development of the infrastructure, including capacity building.

To assist Egypt in making further progress in its nuclear infrastructure development, the INIR team made 4 recommendations and 3 suggestions. The INIR team also identified 5 good practices that may benefit other countries considering the introduction of nuclear power.

Based on the recommendations and suggestions, the key areas for further action are summarized below:

- **Egypt needs to continue to develop its legal and regulatory framework**

Egypt has enacted a comprehensive nuclear law and is party to some international legal instruments. It has developed a plan for adherence to other relevant instruments that now needs to be implemented.

Egypt has established the basis for licensing its first nuclear power plant involving significant use of vendor country regulations and guides but should continue developing its own regulations and guides.

- **Egypt needs to finalize the preparatory work required for the construction phase and ensure sustainability of the key organizations**

Egypt has established an independent regulatory body and is developing the competencies that will be required for construction and operation. Legal, financial and administrative arrangements are in place to incentivize the recruitment and retention of qualified staff. Since ENRRA currently receives considerable support from external TSOs, it should ensure it has a sufficient number of competent staff to manage the licensing and construction oversight and to make decisions taking into account the recommendations provided by TSOs. It is also important for ENRRA to finalize and implement its stakeholder involvement plan.

NPPA has defined a detailed organisational structure for the construction phase and for operation and has developed its training plans. ENRRA is finalising job profiles for the remainder of its technical staff which will be used to develop training plans. Both organisations need to implement their respective plans and ensure that they benefit from learning opportunities that will be available during construction and from working with TSOs.

Egypt is also establishing a supervising authority to consolidate national project management support for the NPP construction. NPPA needs to clarify its interactions with the supervising authority, particularly to ensure NPPA fulfils its licensee responsibilities.

Recommendations

R-5.1.1 Egypt should complete the ratification process of the CNS and become a party to the international legal instruments adopted under the IAEA auspices to which it is not yet a party.

R-7.1.1 ENRRA should ensure it has a sufficient number of competent staff to manage the licensing and construction oversight and to make decisions taking into account the recommendations provided by TSOs in all relevant technical areas.

R-10.2.1 ENRRA should finalize its staffing plan and training programme to meet the future requirements of the organization.

R-11.1.1 ENRRA should finalize and implement its stakeholder involvement plan.

Suggestions

S-3.3.1 ENRRA and NPPA are encouraged to finalise their management systems addressing all aspects of the construction phase.

S-3.3.2 NPPA and the future Supervising Authority are encouraged to clarify their roles and responsibilities for construction oversight.

S-7.2.1 ENRRA is encouraged to continue the development of national regulations and guides.

Good Practices

GP-7.1.1 ENRRA's new financial and administrative mechanisms, approved by the Government, will allow ENRRA to recruit and retain qualified staff to build a sustainable regulatory body.

GP-9.2.1 The early establishment of a working group composed of the NPP owner, national electricity company, national transmission company and Ministry of Electricity and Renewable Energy ensures alignment between the project needs and the grid enhancements.

GP-11.1.1 The establishment of a vocational school near the El-Dabaa site will increase public awareness about the nuclear power programme and will support the development of future technicians for the project.

GP-15.4.1. At the commencement of technical and administrative meetings a NPPA staff provides a 5-10 minutes awareness talk on a relevant nuclear security or nuclear safety topic. This practice reinforces the building of a nuclear security and safety culture.

GP-18.1.1 NPPA is involved in a joint committee with the EPC contractor that works actively in promoting, facilitating, planning and auditing the preparation of the national industry for the supply chain of the NPP project. This committee facilitates the achievement of the localization targets.

6. EVALUATION RESULTS FOR PHASE 2

For the purposes of the INIR mission results, the following definitions are used:

Significant* actions needed:

The review observations indicate that important work still needs to be initiated or completed to meet the condition.

Minor* actions needed:

The review observations indicate that some additional work or steps are needed to meet the condition or that plans for the next phase need to be enhanced.

No actions needed:

The available evidence indicates that all the work to meet the condition has been completed.

*The judgment whether the actions are significant or minor is based on the importance of the work to the overall programme and/or the resources needed to complete it. The classification is done through a consensus of the INIR team, and is not based solely upon the judgment of any individual team member.

Recommendations:

Recommendations are proposed when the expectations of the condition have not been met. A recommendation should:

- Emphasize 'what' needs to be done, not 'how';
- Be based on the IAEA Milestones Approach/Evaluation Methodology;
- Be succinct, self-explanatory and achievable;
- Be supported by the Review Observation text—a 'gap' must be identified; already planned work can still be a recommendation if it is required to reach the milestone.

Suggestions:

Suggestions propose the consideration of new or different approaches to develop infrastructure and enhance performance, or to point out better alternatives to current work. A suggestion:

- Should be clear and self-explanatory;
- Should be supported by the Review Observation text;
- May relate to work already under consideration for the next phase.

Good practices:

A good practice is identified in recognition of an outstanding practice or arrangement, superior to those generally observed elsewhere. It is more than fulfilment of the conditions or expectation, and worthy of the attention of other countries involved in the development of nuclear infrastructure as a model in the drive for excellence.

It should be noted that the results summarized in the following tables neither validate the country actions and programmes, nor certify the quality and completeness of the work done by a country.

1. National position	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
1.1. Government support role defined and effective			**X**
1.2. Overall strategic approach established for contracting for the NPP			**X**
1.3. Commitments and obligations of owner, operator and regulatory body established			**X**
2. Nuclear safety	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
2.1. Safety responsibilities of key organizations recognized			**X**
2.2. Expectations for relationship with suppliers established			**X**
3. Management	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
3.1. Contract specifications and evaluation criteria determined			**X**
3.2. Owner/operator competence for procuring and managing the NPP contract evident and plans to develop operator competence available			**X**
3.3. Management systems established		**X**	
4. Funding and financing	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
4.1. Funding plan available			**X**

4.2. Means of financing established and strategy for management of financial risks available			**X**
5. Legal framework	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
5.1. Adherence to all international legal instruments governing nuclear activities		**X**	
5.2. A comprehensive nuclear law enacted			**X**
5.3. All other legislation affecting the nuclear power programme reviewed			**X**
6. Safeguards	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
6.1. Strengthening of the SSAC underway			**X**
6.2. SSAC requirements for the NPP recognized and addressed			**X**
6.3. Design information requirements for safeguards recognized			**X**
7. Regulatory framework	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
7.1. Competent, effectively independent nuclear regulatory body established		**X**	
7.2. Regulatory framework developed		**X**	
8. Radiation protection	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
8.1. Development of radiation protection programmes and expansion of appropriate infrastructures planned			**X**

9. Electrical grid	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
9.1. Detailed studies undertaken to determine grid enhancements			**X**
9.2. Plans, funding and schedule for grid enhancement available			**X**
10. Human resource development	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
10.1. Knowledge and skills needed in organizations for Phase 3 and operational phase identified			**X**
10.2. A plan available to develop and maintain human resources		**X**	
10.3. An integrated national strategy developed			**X**
11. Stakeholder involvement	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
11.1. Stakeholder involvement plans being implemented		**X**	
11.2. Stakeholder involvement plans coordinated			**X**
12. Site and supporting facilities	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
12.1. Detailed site characterization completed			**X**
12.2. Plans in place to prepare site for construction			**X**

13. Environmental protection	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
13.1. Environmental impact assessment performed			**X**
13.2. Environmental characteristics provided			**X**
13.3. Clear and effective regulation of environmental issues established			**X**
14. Emergency planning	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
14.1. Responsibilities of each organization clearly defined and approach for emergency planning being developed			**X**
15. Nuclear security	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
15.1. Required physical protection measures developed			**X**
15.2. Programmes in place for the management of sensitive information			**X**
15.3. Programmes in place for the trustworthiness of personnel			**X**
15.4. Programmes in place for promotion of nuclear security culture			**X**

16. Nuclear fuel cycle	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
16.1. Front end fuel cycle strategy defined			**X**
16.2. Back end fuel cycle strategy defined			**X**
17. Radioactive waste management	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
17.1. Handling the burdens of radioactive waste considered			**X**
17.2. Preliminary decommissioning plan requested			**X**
18. Industrial involvement	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
18.1. National capabilities assessed and plans to enhance capability defined			**X**
19. Procurement	**Phase 2**		
Condition	**Actions Needed**		
	SIGNIFICANT	**MINOR**	**NO**
19.1. Procurement capability available			**X**

APPENDIX 1: REVIEW OBSERVATIONS, RECOMMENDATIONS AND SUGGESTIONS FOR PHASE 2

1. National Position **Condition 1.1: Government support role defined and effective**	**Phase 2**
Summary of the condition to be demonstrated	The government has approved a specific nuclear power programme, with a clear commitment to safety, security and non-proliferation. The NEPIO continues to ensure that the work to develop the nuclear infrastructure is coordinated and a government ministry has been assigned the responsibility to support the development of the programme to ensure that: (a) All the government actions needed to support the programme are monitored and coordinated with the project schedule; (b) A policy for nuclear fuel cycle, radioactive waste management and decommissioning is established; (c) Safety, security and safeguards responsibilities are formulated and understood by all relevant organizations; (d) Appropriate support and encouragement of knowledge transfer from States that have experience with a nuclear power programme are available through bilateral agreements; (e) The State fully participates in all the activities associated with the global nuclear safety and security and non-proliferation regime.
Examples of how the condition may be demonstrated	(1) Evidence that an ongoing government role for nuclear power programme implementation has been clearly defined and established within a government agency (e.g. energy or industry) (2) Evidence that the required government actions are monitored and coordinated with the project schedule *(3)* Appropriate bilateral agreements in place with vendor countries (e.g. an intergovernmental agreement) *Note: These may not be complete at the end of Phase 2 or subject to review given that the detailed contract may still need to be agreed* (4) A defined responsibility for formulating a strategy for fuel cycle and radioactive waste management (5) Examples of how the State participates in the global nuclear safety and security regime
Observations In 2015 Egypt issued a report entitled *Integrated Sustainable Energy Strategy to 2035*. The document provides a justification for the nuclear power programme. [See Condition 1.2] The Law No. 7/2010 (Nuclear Law) establishes the Nuclear and Radioactive Control Authority (known as the Egyptian Nuclear and Radiological Regulatory Authority or ENRRA) as the independent authority responsible for the regulation of safety, security and safeguards. Law 13/1976, as amended by Law 210/2017,identifies NPPA as the authority responsible for constructing and operating nuclear power plants. It is stated that NPPA shall execute nuclear power	

plant projects taking into account the latest scientific, technological and safety measures, either by itself or through a third party.

Egypt is using IAEA assistance to support capacity building in the areas of safety, security and safeguards.

The NEPIO function is carried out by the Supreme Council and the Coordination Committee. The Supreme Council is headed by the President of the Republic and its members include the Prime Minister and several ministers. The Minister of Electricity and Renewable Energy (MOERE) provides the secretariat for the Supreme Council.

The Supreme Council approves national strategies and plans, promotes international cooperation, and issues decisions to establish or restructure bodies and agencies. The Supreme Council meets once a year or more frequently, if needed.

The Coordination Committee is under the Supreme Council and is headed by the MOERE. Members of the Coordination Committee includes staff from relevant ministries, state agencies, and technical staff working to oversee the infrastructure development in different areas. The Coordination Committee meets monthly and as necessary.

As an example of how the NEPIO function works, the INIR team was informed that the strategy on spent nuclear fuel, radioactive waste and decommissioning was developed by a working group, reviewed by the Coordination Committee and approved by the Supreme Council. The strategy was then used to finalise the negotiations for the nuclear fuel supply contract with the technology provider.

There is a monthly meeting (or more, if needed) between the chairmen of the Coordination Committee and the Supreme Council to discuss the El-Dabaa project's implementation issues. Topics related to safety, security and safeguards were discussed on several occasions.

The Supreme Council encourages knowledge transfer through bilateral agreements with countries with experience in nuclear power.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

1. National Position **Condition 1.2: Overall strategic approach established for contracting for the NPP**	**Phase 2**

Summary of the condition to be demonstrated	The State has a clear justification for its nuclear power programme and has established a strategy for developing contract arrangements for the NPP (e.g. build–own–operate, build–own–operate–transfer, strategic partnerships, and turnkey and multiple contracts) and has a

	rationale supporting the decision. The strategy may include requesting bids for more than one option.
Examples of how the condition may be demonstrated	(1) A document reviewing contracting strategies and justifying the chosen approach with evidence that the chosen strategy is consistent with national legislation and has been agreed to by all relevant stakeholders (2) Implications recognized, and a plan to fulfil necessary requirements in place; a document setting out responsibilities of key national organizations and intended contracting strategy

Observations

The executive summary of the document entitled *Integrated Sustainable Energy Strategy to 2035* provides a justification for the nuclear power programme and considers several scenarios involving a total contribution from nuclear power of 4800 MW by 2030. The goals of the programme include the need to diversify the energy mix and ensure the security of supply. An increase in the percentage of renewables as well as natural gas in the mix of sources are envisaged together with nuclear energy.

Egypt issued bid invitation specifications (BIS) in 2011. After submissions from vendors, Egypt decided to enter into negotiations with the Russian Federation. An IGA between the Governments of Egypt and Russia was signed in November 2015 and subsequently NPPA signed an EPC Contract as well as contracts for nuclear fuel supply, spent nuclear fuel treatment, and for operation, support and maintenance.

The INIR team was informed that the reference plant for the contract is the Leningrad 2 NPP (AES 2006 design), as modified to meet Egyptian requirements and El-Dabaa site conditions.

NPPA has also contracted the support of an owner's engineer. The scope of work of the contract includes project management, cost control, training NPPA personnel, licensing support, etc.

The INIR team was informed that the current EPC Contract proposes pouring of the first concrete, for the first unit, in the middle of 2020 with fuel loading in 2026.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

1. National Position **Condition 1.3: Commitments and obligations of owner, operator and regulatory body established**	**Phase 2**
Summary of the condition to be demonstrated	The owner, operator and regulatory body have been established and the responsibilities of each organization have been clearly defined and understood, including their safety, security and safeguards responsibilities. The role of any national supporting organization (e.g. a technical support organization) has been clearly defined, as has any significant role for non-national organizations (e.g. vendor

	or other regulator). The latter is clearly defined in the contracting strategy.
Examples of how the condition may be demonstrated	(1) Roles and responsibilities clearly defined with respect to nuclear safety, security and safeguards in the operating, regulatory and technical support organizations. (2) Definition of the organization that will be the licensee of the NPP and evidence of adequate resources to comply with licence requirements. Definition of the roles and responsibilities of the owner if different from the operator. (3) Definition of any intended regulatory collaboration.

Observations

The Nuclear Law established the regulatory authority defining its main roles and responsibilities. The regulatory body reports directly to the Prime Minister and is responsible to carry out regulatory control related to nuclear and radiological activities and facilities in Egypt.

Law 13/1976, as amended by Law 210/2017, designates NPPA as the sole utility in Egypt responsible for the construction and operation of nuclear power plants for electricity production and desalination. Article 2 of this Law states that NPPA shall execute nuclear power plant projects, operate and maintain the nuclear power plant in accordance with the latest scientific, technological and safety measures, develop human resources, and establish joint stock companies.

Law No. 209/2017 establishes the Executive Authority for Supervising the Construction of nuclear power plants for the generation of electricity (supervising authority). This supervising authority is under development and is expected to have a significant project management capability for large scale engineering and construction projects. Among other things, the supervising authority has the responsibility to plan, prepare and implement supervisory activities, report progress to NPPA and to MOERE, and document and communicate its observations. The Law states that the regulations of the supervising authority will define the cooperation between the authority and NPPA. The Law also states that the Prime Minister shall issue a decree appointing members of the Board of Directors for a period of 4 years.

The INIR team noted that NPPA can delegate oversight activities to the supervising authority. However, for activities related to safety and security NPPA needs to retain the overall responsibility. This includes reviewing the significance of any non-compliances observed and reporting to ENRRA as required. It is important for NPPA to have ownership of the construction oversight programme and its findings.

The INIR team was informed that NPPA will use the supervising authority as a ‘consultant’ and that it will largely be resourced from staff working in NPPA. There had been considerations about having the supervising authority within NPPA or as a separate organization and the final decision was to have it as a separate organization. NPPA recognises the need to define and implement clear mechanisms for interaction with the supervising authority to ensure that NPPA discharges its responsibilities as the licensee. (see Issue 3.3).

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None
GOOD PRACTICES
None

2. Nuclear Safety Condition 2.1: Safety responsibilities of key organizations recognized	Phase 2
Summary of the condition to be demonstrated	The government has expanded its nuclear safety policy and strategy to include nuclear power. The owner/operator and the regulatory body have a detailed understanding of safety standards and have begun the task of understanding the safety basis of an NPP. Senior positions in the owner/operator and the regulatory body have been filled for some time and the leadership of both the owner/operator and the regulatory body have initiated programmes and practices to build a safety culture in their respective organizations. They have also agreed on a protocol for communication between the owner/operator, the regulatory body and the vendor that covers correspondence, meetings and actions, among other things. The regulatory body has specified requirements on how the competence of owner/operator staff in positions related to safety is ensured. The owner/operator, the regulatory body and technical support organizations, as appropriate, have the expertise to prepare for the review of safety assessments supplied by the vendor.
Examples of how the condition may be demonstrated	(1) Nuclear safety principles and requirements developed by the regulatory body and the owner/operator; (2) Appropriate training for regulators, owner/operators and technical specialists carried out; (3) Knowledge of international experience that is relevant to NPP designs being considered; (4) For key leadership positions, a summary of NPP safety related experience and development; (5) Programmes to promote safety culture through leadership; (6) Protocol agreed for interactions between owner/operator, regulator, vendor and technical support organizations; (7) Process and responsibilities defined for review and understanding of information supplied by the vendor during construction.

Observations

ENRRA organizational structure was revised in 2019 and its Board was expanded to include 5 experts in the field of nuclear and radiological safety. The INIR team was informed that these new members have been appointed and have experience in these fields.

NPPA organizational structure has been defined and its Board has been appointed with 4 members that are specialized in the field of atomic energy

The INIR team was informed that ENRRA will assess the competence level of NPPA staff as part of its inspection programme.

ENRRA is planning to develop a programme to promote safety culture through leadership which will be supported by Russian TSO in Q4 2020. ENRRA management participated in several events on safety and security culture and has invited relevant stakeholders, including NPPA.

The INIR team was informed that NPPA is developing its internal safety culture programme and has a dedicated section to follow up on its implementation. Induction courses, mandatory for new employees in both ENRRA and NPPA, also include safety culture.

Both organizations are committed to acquire competencies and knowledge through capacity building programs. ENRRA will be supported by the Russian regulatory body through an MoU signed in 2015, by the Russian TSO through a contract signed in 2019 and by another international TSO that will soon be contracted. ENRRA also benefits from support from regulatory bodies in countries operating NPPs. ENRRA will be working with its TSOs in the review of the licensing documents.

NPPA has a specific nuclear safety unit in PMU structure as well as other sections providing engineering and licensing expertise. NPPA, through the EPC contract, is receiving training in several areas including design, construction, operation and maintenance. NPPA's consultant is complementing the training in areas not covered by the EPC contract. NPPA is also engaged with international organisations and is considering becoming a member of WANO. NPPA has arrangements in place, including the support from its consultant, to review and approve the PSAR prior to submittal to ENRRA.

The interaction and communication between NPPA and ENRRA take place through technical and coordination meetings, in accordance with the NPPA and ENRRA Communication Matrix in addition to peer to peer discussions.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

2. Nuclear Safety **Condition 2.2: Expectations for relationship with suppliers established**	**Phase 2**

Summary of the condition to be demonstrated	Future role of the vendor, or other bodies, in supporting safe operation has been defined by the owner/operator (e.g. any design authority role or support role in managing emergency situations). Training requirements from the vendor or other bodies have also been defined.

Examples of how the condition may be demonstrated	Statements defining the required levels of support from the vendor and other bodies and mechanisms for information exchange, training and technical support, among other things.

Observations

NPPA signed 4 major contracts to get support for the construction and future operational phase: (1) the EPC Contract, (2) the NFS Contract, (3) the OSM Contract and (4) the SNFT Contract.

In 2016, NPPA signed an EPC contract for the construction of 4 VVER AES 2006 units of 1200 MW electrical each. Extensive training of NPPA personnel is considered in the contract, including classroom training as well as on-the-job training in technology, design, construction, operation, commissioning and maintenance areas.

The OSM contract ensures 12 years of support from the contractor to NPPA in the areas of operation and maintenance of the 4 units starting from 2 years prior to the Scheduled Provisional Take-Over Date for the first unit to be commissioned. It includes the construction of a full scope simulator, maintenance of safety/non-safety classified equipment and provision of spare parts.

The NFS contract ensures fuel supply to El-Dabaa for the plant life-time. The supplier will provide extensive services to NPPA under the NFS Contract including nuclear fuel design and in-core fuel management services for the first core and a certain number of reloads, as well as ongoing technical assistance and scientific support for various activities related to fuel supply, handling and in-core management, as needed. Training included in the NFS Contract covers areas of in-core management and nuclear design, start-up physics testing, incoming inspection and fuel handling and evaluation of fuel operational data.

The SNFT Contract provides support for the management of spent fuel. The contract includes the design and construction of a dry storage facility.

The INIR team was informed that NPPA would be provided with all design basis information. NPPA informed the team that the roles of a design authority are being performed by the existing NPPA departments but that NPPA may consider establishing a separate group if needed.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

3. Management Condition 3.1: Contract specifications and evaluation criteria determined		Phase 2
Summary of the condition to be demonstrated	If competitive bidding for an NPP is being undertaken, a detailed bid invitation specification (BIS) has been completed, together with the criteria that will be used to evaluate the bids. If the vendor has already been selected (e.g. by an intergovernmental agreement), the owner/operator has included its requirements in the specifications for negotiating with a sole supplier. Negotiating strategy and criteria have also been developed.	
Examples of how the condition may be demonstrated	(1) Documented BIS available and evaluation criteria clearly defined; (2) Description of the negotiating strategy defined by the NPP owner/operator.	

Observations

Egypt has expertise in developing bid specifications from previous considerations of nuclear power. The updated BIS prepared in 2011 took account of developments in technology, IAEA guidance documents and the European Utility Requirements (Rev. D) documents. Subsequently, additional requirements arising from a review of the Fukushima Daiichi accident were also included in the BIS. The BIS contained 5 parts covering: scope of supply and services, general conditions (including site conditions and infrastructure), technical requirements, financial, commercial and legal requirements, and project implementation requirements.

Three vendors submitted detailed proposals and negotiations commenced.

In early 2015, Egypt decided to select a strategic partner for the implementation of its first commercial NPP. The contractual negotiations took place between 2015 and 2017 and were conducted by dedicated NPPA negotiating teams supported by technical, financial, legal and insurance advisors.

Differences between the vendor's offer and the BIS were resolved through working groups for specific issues. These working groups reported to a steering committee and ultimately to the Coordinating Committee. The resulting technical requirements were included in the EPC Contract which entered into force on 11 December 2017.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None	
3. Management **Condition 3.2: Owner/operator competence for procuring and managing the NPP contract evident and plans to develop operator competence available**	**Phase 2**
Summary of the condition to be demonstrated	The owner/operator is competent to manage the procurement requirements and to ensure the contract requirements are fully met. This will include verification of project progress and quality requirements. This may include the appointment of the owner's engineer to support the owner organization. If this involves a split package or multipackage procurement approach, a significantly greater level of competence will be required. The owner/operator needs to have plans to develop the capability for safe and secure operation, including: (a) Recruiting and training staff; (b) Procedures to ensure that knowledge critical to safe and secure operation will be preserved; (c) Procedures to create the required awareness with regard to the risk of proliferation of nuclear weapons through export or import.
Examples of how the condition may be demonstrated	(1) Description of the organization, including roles and responsibilities of departments and individuals with respect to bid assessment, supervision of construction, development of knowledge base, and understanding of operating and maintenance requirements. (2) Evidence of a suitably qualified and experienced team with competence in all required areas, including: (a) Bid requesting and bid evaluation; (b) Awarding, and issuing purchase orders; (c) Financing, letters of credit and taxes; (d) Quality programmes, including inspection of items under manufacturing, testing and receipt of goods and non-conformance procedures; (e) Transport, insurance and customs clearing; (f) Types of proven design of NPP and potential suppliers; (g) Main technical characteristics of potential plants; (h) Codes and standards; (i) Contracting methodologies; (j) Project management, manufacturing schedule and delivery time. (3) Plans to develop: (a) Project reporting mechanisms; (b) Acceptance procedures and criteria; (c) Commissioning skills;

	(d) The organization that will be required for commissioning and operating the NPP; (e) Commissioning, operating and maintenance procedures. (4) Interfaces with other organizations defined and agreed. (5) Evidence that appropriate staff have gained experience from operating plants similar to those being considered. (6) Plans to participate in appropriate owner's groups.

Observations

The NPPA includes a Project Management Unit tasked to follow-up on the execution of the project entitled – Central Administration for Projects and Technical Affairs. In addition to the functions for administration of the contracts, the Central Administration monitors and controls the quality of the contractors' technical documents through the Engineering Administration (specialized department) and will supervise the construction when the construction work starts. NPPA has developed a detailed organizational structure for this Project Management Unit, together with roles, responsibilities and competence requirements. Currently the PMU has 80 staff in place with a further 30 staff undergoing qualification. Further staff will be recruited over the next two years, leading to a total number of staff of 288.

The PMU structure has been developed based on experience with other major projects and the experience of other newcomer countries in Phase 3. It has also been designed to 'mirror' the organization of the EPC contractor enabling clear interfaces between the PMU and the EPC contractor.

NPPA has established a Project Management Manual (PMM) to manage all project supervision activities including procedures for project reporting mechanisms, acceptance procedures and communication with the EPC contractor.

The Project Management Manual covers 14 different areas including the topics of Project Scope Management, Cost Management, Variation Management, Communication Management, Information Management, Procurement, Licensing and Permitting Management, and Safety Management.

The EPC contract is a turnkey contract containing detailed technical requirements in a series of Appendices which will be the basis for review by the PMU.

NPPA has contracted a consultant to provide project management and technical support during the execution of the El-Dabaa Project. The scope of support services includes inter alia: Project Management; Planning and Scheduling; Cost Control; Quality Management; Procurement of Owner's Scope of Services; Contract Management; Design Review of Technical and Licensing Documentation; Document Control and Management; Inspection and Witnessing of Testing of Equipment and Materials and Construction Supervision.

At the same time, the consultant provides training to NPPA personnel to increase its project management and engineering capacity. This training follows the systematic approach to training (SAT) and includes on-the-job training.

As noted in Issue 1.3, a Supervising Authority is under development and is expected to have a significant project management capability for large scale engineering and construction projects. Among other things, the Supervising Authority has the responsibility to plan, prepare and implement supervisory activities, report progress to NPPA and to MOERE, and document and communicate its observations.

When the Supervising Authority is established it is expected that 25-50% of the PMU staff will be transferred to this Supervising Authority.

As noted under Issue 1.3, NPPA needs to retain overall responsibility for reviewing the significance of any non-compliances observed and have ownership of the construction oversight programme and its findings.

The INIR team also noted the importance of maximizing the learning opportunities for future NPP staff through involvement in activities during construction.

The INIR team was informed that NPPA management system will define the cooperation between the supervising authority and NPPA (see Condition 3.3).

NPPA has also developed an organizational structure for operation based on international practice and the plant manager will report directly to the chairman of NPPA.

Staff, including operators, will be trained by contractors: the EPC, NFS, OSM and SNFT contractor, as applicable. Under the EPC Contract and the OSM Contract, NPPA employees will also gain experience from operating plants similar to the Reference Plant for the El-Dabaa NPP.

The structure identifies 3284 staff, 2272 of whom will be trained under the contracts with the Russian suppliers. Staff will be recruited up until 2025, starting in 2019.

The NPPA is going to take the necessary steps to join the World Association of Nuclear Operators (WANO). The INIR team was informed that this will start as soon as possible as WANO now provides assistance to newcomer countries during the construction phase. NPPA is meeting with WANO in December 2019. NPPA is also considering joining other owners' groups, as appropriate.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

3. Management **Condition 3.3: Management systems established**	**Phase 2**

Summary of the condition to be demonstrated	Management systems have been defined for each of the three key organizations and include roles, responsibilities, organizational structure and processes (for Phase 2), including record keeping. The processes for Phase 3 are in place or planned to be produced before

	they are required. The management systems cover safety, nuclear security and safeguards, and are consistent with IAEA Safety Standards Series No.GSR Part 2, Leadership and Management for Safety. The systems promote a strong safety and security culture, include plans for self and independent evaluation, and include procedures to ensure that knowledge critical to the safe, secure and peaceful use of nuclear energy will always be preserved. For the NEPIO and the regulatory body, they also include mechanisms to monitor the programme for infrastructure development and to ensure it is consistent with the project schedule.
Examples of how the condition may be demonstrated	(1) For each organization, availability of the integrated management system manual, definition of key processes and responsibilities, and plans to produce required detailed documentation; (2) Mechanism for NEPIO to manage the infrastructure development programme.

Observations

Two decrees (Decree of the Supreme Council for Peaceful Uses of Atomic Energy and Decree of the Committee of the Coordination and Follow Up of Peaceful Uses of Atomic Energy) define the terms of reference of the NEPIO committees.

The Coordination Committee meets monthly and sets up ad hoc working groups as required to address issues that may arise.

ENRRA has drafted its Management System Manual. It includes ENRRA's vision, mission and policy, a description of the structure of the management system, a description of the main processes, the organisational structure and functions, the importance of leadership and safety culture, allocation of resources and training, and department objectives.

ENRRA's Process Map contains six core processes:

1. Regulation Development;
2. Inspection and Enforcement;
3. Licensing;
4. Review and Assessment;
5. Emergency Preparedness;
6. Capacity Building.

The INIR team was informed that each core process has been defined, together with a list of relevant procedures. For four of the processes the procedures have been written and Key Performance Indicators (KPIs) identified. The process owner is responsible for preparing the required procedures.

The INIR team was informed that each unit in ENRRA has a 'quality representative' whose role is to support the effective implementation of the management system within their unit.

The draft MS manual is under revision. ENRRA is going to finalise the manual, the core processes and supporting procedures with the support of its TSOs according to the agreed action plans.

ENRRA issued the Management System Requirements for Regulated Facilities and Activities in 2016. These include the requirements of IAEA Safety Standards Series publication entitled Leadership and

Management for Safety, General Safety Requirements, No. GSR Part 2, which was available in draft form at the time of preparation of the ENRRA regulation.

NPPA began the development of its management system in 2012. The process map has been developed and currently has two core processes: NPP Project Management and Operation and Maintenance. The Project Management Manual describes the processes and procedures for the Project Management core process.

The PMM describes the structure, content and general principles for the PMM relating to the EPC Contractor's and NPPA's responsibilities, including development, reviewing, approval, formatting, identification, coding and putting into effect respective PMM documents. For example, the Manual describes interfaces relating to design, procurement, construction, manufacturing, health and safety, scheduling, and information management system.

Under the PMM, over 30 documents have already been developed. The INIR team was informed that there is an action plan to complete the remaining documents by July 2020.

The INIR team was also informed that an initial internal audit of the PMM has already been undertaken.

The INIR team was informed that NPPA management system will define the cooperation between the supervising authority and NPPA.

The rest of the NPPA Management System is under development and will integrate programs for safety, health, environmental, security, quality, human-and-organizational-factor, societal and economic elements as specified in the IAEA's GSR Part 2.

Areas for further action	**Significant**	No
	Minor	Completion of Management Systems Interaction between the NPPA and Supervising Authority

RECOMMENDATIONS

None

SUGGESTIONS

S-3.3.1 ENRRA and NPPA are encouraged to finalise their management systems addressing all aspects of the construction phase.

S-3.3.2 NPPA and the future Supervising Authority are encouraged to clarify their roles and responsibilities for construction oversight.

GOOD PRACTICES

None

4. Funding and Financing Condition 4.1: Funding plan available	Phase 2
Summary of the condition to be demonstrated	The means by which costs that are not the fiscal responsibility of the owner/operator have been identified. Depending on the contracting model, these may include costs associated with legislation, setting up the owner/operator, education, training, research, government roles (e.g. environmental assessment process, stakeholder involvement), the regulatory body, emergency planning, spent fuel and radioactive waste management and decommissioning.
Examples of how the condition may be demonstrated	(1) Mechanisms established for funding the regulatory body, including technical support organizations; (2) Proposed means identified for funding spent fuel and radioactive waste management and decommissioning; (3) Phase 3 funding plan matched to NPP project plan including all national commitments for participation in construction, owner/operator costs, regulator costs, other stakeholders and emergency planning.

Observations

Egypt is aware of the main areas in the nuclear programme that needed to be funded (legal framework, regulatory body, siting and environmental emergency preparedness and response, education, training and research, etc).

Funding of state organizations is through the budgets of the GoE. This includes regulatory bodies, NPP operators, education and scientific programmes and technical support centres.

The Head of the Supreme Council is the President of Egypt who approves the budgets for each organisation.

The INIR team was informed that proposed budgets for each year of the project contracts that are funded by the intergovernmental credit agreement between Egypt and the Russian Federation (the 'CIGA') have been agreed with Russia. These estimates are used as an input to the review of the budget submissions of the organisations each year. MoF also holds a percentage of the budget as contingency to be released if required.

The INIR team was also informed that, in addition to the annual budget, NPPA has developed a rolling 5-year budget plan. Its budget is presented in 3 groups: Group 1 covers salaries and training costs, Group 2 covers expenses and maintenance costs, and Group 3 covers investment cost, mainly owner's scope of supply, consultants support, and interest during construction.

According to the Article 13 of Law 211 of 2017, ENRRA is funded through a number of mechanisms, including funds allocated in the general budget of the State and the revenues of permits and licenses fees issued by ENRRA. The budget from the GoE covers appointment of external TSOs and experts.

The law specifies a maximum fee for permits and operational licence fees. The INIR team was informed that this was derived from discussions and international comparisons but can be adjusted. The INIR

team was also informed that this does not limit the overall cost of assessing a licence application. The budget from the GoE will provide for the additional costs required.

The CIGA includes a financing component for the funding of ENRRA's Russian TSO support.

On 17 July 2017, the Supreme Council approved the Egyptian Strategy for the Management of Radioactive Waste, Spent Nuclear Fuel and Decommissioning NPPs.

Mechanisms for the establishment, management and review of the decommissioning and radioactive waste management funds are set forth in the Nuclear Law and its Executive Regulations. Article 27 of the Nuclear Law provides that ENRRA may not issue a license for a nuclear facility unless the licensee demonstrates it has sufficient financial resources to cover the costs related to the safe decommissioning of the facility, including handling the radioactive wastes resulting from the activity. Article 10 of the Executive Regulations provides that before obtaining a commissioning and testing permit, ENRRA shall verify the commitment of the applicant to provide enough financial resources for these costs. Article 10 further provides that the funds necessary to cover the costs of decommissioning shall be set aside, without being disbursed on any other purposes during the lifetime of the facility, in accordance with further guidance to be issued. Article 10 also requires that a re-estimate of the decommissioning costs is to be undertaken, based on the review of the decommissioning plan, to adjust the allocated amount, if necessary.

The INIR team was informed that the Supreme Council, or a dedicated committee, will approve the funding sources for the costs of decommissioning and radioactive waste and spent fuel management. Currently, the proposed form of funding such costs is in the form of a levy on the electricity price of US $0.001 per kWh for radioactive waste and spent fuel management, and an additional US $0.001 per kWh for decommissioning. NPPA has prepared cost estimates for electricity generation which includes an analysis of the costs of decommissioning and spent fuel and waste management. Working groups under the EPC and SNFT contract respectively have been established to determine the anticipated costs of decommissioning and spent fuel and waste management (to be approved by ENRRA as described above).

The INIR team was informed that Egypt's nuclear energy program has the strong commitment of the Egyptian state and as all main entities are government-owned the ultimate availability of financial resources for funding decommissioning and radioactive waste management is assured.

In the light of the long life time of the NPP and the magnitude of the funding that will be required, the INIR team encourages Egypt to review the current arrangements for the establishment, management and review of the decommissioning and radioactive waste management funds during Phase 3.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES	
None	
4. Funding and Financing **Condition 4.2: Means of financing established and strategy for management of financial risks available**	**Phase 2**
Summary of the condition to be demonstrated	A credible feasibility study has been finalized and realistic financing options for the NPP have been identified. An owner/operator financial team has been established and is competent to identify potential lenders and additional investors, evaluate and/or negotiate financing offers, analyse the extent of, and risks associated with, any State backed power purchase agreement and/or sovereign guarantees, and identify and analyse additional financial risks. A clear sense of what is acceptable to senior decision makers is available. The financial risks have been clearly identified and a strategy for negotiation and/or evaluation of key finance related proposals has been developed.
Examples of how the condition may be demonstrated	(1) A document identifying how the project will be financed and demonstrating financial viability of the project, including implications for electricity tariffs; (2) Risk management proposals identifying all the key financial risks, and how they can be addressed through contracts and/or guarantees. These need to cover operational difficulties, public liabilities, delays in construction, regulatory delays, government/public intervention and electricity price fluctuations. (3) A negotiating mandate and/or more detailed guidance based, for example, on the high-level terms in an intergovernmental agreement. *Note: There are likely to be constraints on how much of this specific information will be available but information needs to be available on the process that has been used to develop and underwrite the plan.*

Observations

On 19 November 2015, the CIGA was signed between the Egyptian and Russian Governments, stating that the GoE will obtain a loan from the Russian Government to finance the construction of the El- Dabaa NPP, under which Russia will provide a loan covering 85% of the foreign component of the EPC Contract and parts of the NFS and SNFT Contracts. Egypt will pay back the value of the loan for a period of 22 years from the date of actual production of electricity by the El-Dabaa NPP.

The CIGA provides guarantees that the funding will continue from the Russian Federation until the El- Dabaa NPP is completed.

Interest on the credit will be paid during the construction period, thus avoiding interest accumulation and reducing the overall amount of the credit to be paid during plant operation.

The Egyptian MoF will provide the rest of the financing of the El-Dabaa NPP (15%) in addition to financing the obligations of the NPPA and regulatory work of ENRRA from the GoE budget.

A comprehensive study has been prepared which includes an evaluation of the economic and financial feasibility parameters of the project and its economic benefits for the society. The study was completed in 2016 and concluded:

— Based on the expected outcome of contract negotiations, the Levelised Cost of Electricity (LCOE) is comparable with the reported LCOE for nuclear power plants worldwide. Estimated internal rate of return and cost recovery periods are also considered in line with the international records in nuclear projects;
— The nuclear power plant could be competitive with a gas power plant if gas prices rise above the current very low level. The comparison was made with combined cycle gas power plants, providing the same capacity and covering the same lifetime as the nuclear project. The price characteristics were based on a Siemens contract signed in 2015;
— The long lifetime of the NPP (twice that of a gas power plant) as well as relatively low fuel and operational costs provides stable electricity generation costs. (The volatility of gas prices and their significant share in the cost of electricity makes the generation costs from the gas power plant less stable and less predictable);
— The project will provide significant macro-economic benefits and potential future development opportunities to Egypt.

The INIR team was informed that the financing and cost model of this feasibility study was updated during the negotiations of the contracts with suppliers to ensure that the agreed contracts continued to meet the expectations of Egypt. Furthermore, the financing and cost model continues to be updated as the project is implemented.

The INIR team was informed that Egypt supplies electricity through a regulated market. The Egyptian Electricity Utility and Consumer Protection Agency defines the price for different consumers and pays the different generators their cost of generation. A number of steps have been and are being taken to improve the matching of the price of electricity and the cost of generation. The MOERE expects the electricity price to cover the full cost of generation in two years' time. For the El-Dabaa NPP, NPPA and the Agency will agree a method for cost estimation, and this will be the basis of the income for NPPA.

Several contractual provisions are in place, to allow NPPA to properly manage the risks of the El- Dabaa Project. With respect to financial risks these include: contract performance guarantees; payments of the NPPA's portion; clear mechanism for approval of works performed, milestones achieved and for approval of payments.

NPPA has a finance department with 4 units to oversee the financial aspects of the project.

NPPA and EPC contractor have also established a risk management procedure, agreed with the Russian party to continue to review the project risks and the measures put in place to address these risks.

The INIR team was also informed that in addition to an annual review of the financial performance of the El-Dabaa project, there will be an extensive review of the contract implementation after 4 years.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None
SUGGESTIONS
None
GOOD PRACTICES
None

5. Legal Framework **Condition 5.1: Adherence to all international legal instruments governing nuclear activities**	**Phase 2**
Summary of the condition to be demonstrated	The Member State has adhered to the following international legal instruments and is following an action plan for their implementation: (a) Convention on Early Notification of a Nuclear Accident (INFCIRC/335); (b) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (INFCIRC/336); (c) Convention on Nuclear Safety (INFCIRC/449); (d) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the 'Joint Convention') (INFCIRC/546); (e) Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev. 1) and Amendment thereto (INFCIRC/274/Rev.1/Mod.1); (f) Vienna Convention on Civil Liability for Nuclear Damage (INFCIRC/500); (g) Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (INFCIRC/566); (h) Convention on Supplementary Compensation for Nuclear Damage (INFCIRC/567); (i) Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (INFCIRC/402); (j) Comprehensive safeguards agreement — based on The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/153 (Corrected)); (k) Additional protocol — following the provisions of Model Protocol Additional to the Agreement(s) Between States(s) and the International Atomic Energy Agency for the Application of Safeguards (INFCIRC/540 (Corrected)); (l) Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA.
Examples of how the condition may be demonstrated	Evidence that the State has adhered to the relevant international legal instruments and is implementing the obligations arising from them.
Observations Egypt is party to the following international legal instruments adopted under the IAEA auspices: — Convention on Early Notification of a Nuclear Accident; — Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; — Vienna Convention on Civil Liability for Nuclear Damage; — Joint Protocol relating to the application of the Vienna Convention and the Paris Convention.	

Egypt has concluded an Agreement with the IAEA for the application of Safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons (Safeguards Agreement).

Egypt is signatory (but not yet a party) to the Convention on Nuclear Safety (CNS). Egypt is not a party to the following international legal instruments:

— Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention);
— Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment;
— Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage (Vienna Protocol);
— Convention on Supplementary Compensation for Nuclear Damage (CSC).

Egypt has not concluded an Additional Protocol (AP) to the Safeguards Agreement with the IAEA.

According to the Constitution of Egypt, if a treaty is approved by the Parliament and ratified by the President, it is considered as a law and becomes a self-executing instrument without the need for any new law or amendment of an existing law.

The Minister of Electricity and Renewable Energy issued a decree in March 2018 to establish a national committee to study the feasibility of joining relevant international legal instruments. This Committee:

— Evaluates the importance of ratifying some agreements or not, especially agreements related to nuclear security, nuclear safety and civil liability for nuclear damage;
— Proposes a suitable timescale to ratify the agreements;
— Outlines procedures and responsibilities which are necessary to join these agreements;
— Identifies reservations regarding joining these agreements, if necessary.

The Committee is currently working on the CNS and CSC. The INIR team was informed that these conventions have priority.

The Committee has discussed the CNS, that Egypt signed in 1994, and has submitted its proposal to ratify the CNS to the Cabinet. The approval of all relevant authorities to ratify the CNS has been obtained. A decision of the Cabinet to proceed with its ratification is pending. However, the INIR team was informed that Egypt has the intention to join the CNS and that, since the CNS has already been signed, once the decision is taken, the ratification process will require less time, than conventions that still need to go through the entire consideration and approval process.

The INIR team was informed that a comprehensive analysis of the compatibility of Egypt's existing legal and regulatory framework with the provisions of the CNS, CSC and CPPNM (and its Amendment) has been undertaken by NPPA's legal advisors and technical advisors. This analysis concluded that the Nuclear Law and its Executive Regulations are compatible with all the provisions of the CNS and the CPPNM (and its Amendment) and provide a framework for implementing the obligations contained in these conventions. This analysis also concluded that Egypt might need to make minor amendments to its Nuclear Law to be in line with the CSC. This analysis has been conveyed to the Committee.

The INIR team was also informed that recommendations have been made as to the timing of becoming a party to these conventions and that a plan has been developed for these purposes.

Areas for further action	**Significant**	No

	Minor	International legal instruments

RECOMMENDATIONS

R-5.1.1 Egypt should complete the ratification process of the CNS and become a party to the international legal instruments adopted under the IAEA auspices to which it is not yet a party.

SUGGESTIONS

None

GOOD PRACTICES

None

5. Legal Framework **Condition 5.2: A comprehensive nuclear law enacted**	**Phase 2**
Summary of the condition to be demonstrated	The Member State has enacted the national nuclear legislation that: (a) Establishes an independent nuclear regulatory body with adequate human and financial resources, and a clear and comprehensive set of functions; (b) Identifies responsibilities for safety, security and safeguards; (c) Formulates safety principles and rules (radiation protection, nuclear installations, radioactive waste and spent fuel management, decommissioning, mining and milling, EPR and the transport of radioactive material); (d) Formulates nuclear security principles; (e) Gives appropriate legal authority for, and definition of, the responsibilities of the regulatory body and all competent authorities establishing a regulatory control system (authorization, inspection and enforcement, review and assessment, and development of regulations and guides); (f) Implements IAEA safeguards, including an SSAC; (g) Implements import and export control measures for nuclear and radioactive material and items; (h) Establishes compensation mechanisms for nuclear damage.
Examples of how the condition may be demonstrated	Evidence that a comprehensive nuclear law is enacted and promulgated.

Observations

The main legal framework for the nuclear power programme in Egypt consists of the following legislative enactments:

— Law No 7 of 2010 Regulating Nuclear and Radiation Activities and its Executive Regulations;
— Law No 211 of 2017 on Amendment of some provisions of the Law No 7 of 2010 Regulating Nuclear and Radiation Activities;

— Law No 209 of 2017 Establishing Executive Authority for supervising the construction of nuclear Power Plants projects for generating electricity;
— Law No 13 of 1976 for the establishment of the Nuclear Power Plant Authority;
— Law No 210 of 2017 Amending Law No 13 for Year 1976 for the establishment of the Nuclear Power Plant Authority;
— The Decree of the President of the Arab Republic of Egypt No 196 of 1977 for Establishment of Nuclear Material Authority.

Law No 7 of 2010 regulating Nuclear and Radiation Activities is the main comprehensive piece of legislation providing for nuclear safety, nuclear security, safeguards and civil liability for nuclear damage. Article 11 establishes the Nuclear and Radioactive Control Authority (the Egyptian Nuclear and Radiological Regulatory Authority, in short ENRRA) as an independent regulatory body reporting to the Prime Minister. Article 12 provides for its functions and responsibilities including setting forth regulations; issuing, modifying, suspending and withdrawing all types of licences; inspecting facilities and activities; and enforcing administrative measures including closure of facilities.

ENRRA has a separate budget and a board of directors established by a Presidential Decree. The Chairman of ENRRA is appointed by a Presidential Decree upon proposal of the Prime Minister for a four-year term.

Law No 7 of 2010 provides principles, rules and requirements related to radiation protection, safety of nuclear facilities, emergency preparedness and response, radioactive waste and spent fuel management, transport of radioactive material, nuclear security, safeguards, import and export control as well as civil liability for nuclear damage.

Article 6 of the Law No 7 provides for the prohibition of entry and import of any radioactive waste or spent fuel into Egypt's territorial water, exclusive economic zone and continental shelf. The INIR team was informed that this provision does not affect the principle of innocent passage of ships as stated in the international law of the sea because in the official Arabic text 'entry' in the Article 6 means 'entry as the final destination'. Therefore, the term "entry" does not apply to the transit of radioactive material.

The English version of the Article 33 of Law No 7 states that an inspector has the capacity of a tax officer, however the INIR team was informed that the official Arabic text of the Article 33 of Law No 7 states that an inspector has the power of a law enforcement officer in the context of enforcement; and has the judicial power to take any enforcement measure including initiating a prosecution process with the Attorney General through the ENRRA management. The INIR team was informed that ENRRA works together with the relevant judicial bodies to examine how a qualification process for inspectors will be implemented. In addition, Article 33 states that ENRRA shall set the conditions to be met by the inspectors in terms of qualification, basis of their appointment, and tests in addition to the training programs aiming at enhancing their competencies, in accordance with the international standards set in this regard.

Law No 7 of 2010 assigns responsibilities to ENNRA in the areas of safety, nuclear security and safeguards. However, Article 5, paragraph 7 of the Presidential Decree No 196 of 1977 for Establishment of Nuclear Material Authority (NMA) states that the Authority develops draft legislation in respect of the protection and insurance of the Authority workers. This provision may lead to a conflict of responsibilities between ENRRA and NMA. The INIR team was informed that, in the event of a conflict, the provision of the Decree No 196 is superseded by Law No 7, pursuant to Article 1 of the Presidential Decree issuing Law No 7.

Law No 211 of 2017 amending some provisions of law No 7 of 2010 updated the list of institutions having responsibilities for the physical protection of nuclear material only during international transport. The INIR team was informed that the overall legal and regulatory framework provides for a coordinated system of responsibilities regarding physical protection of radioactive material during both domestic and international transport.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

5. Legal Framework **Condition 5.3: All other legislation affecting the nuclear power programme reviewed**	**Phase 2**
Summary of the condition to be demonstrated	Legislation has been reviewed and amended as necessary to cover: (a) Environmental protection ; (b) EPR; (c) Occupational health and safety of workers; (d) Protection of intellectual property; (e) Local land use controls; (f) Foreign investment; (g) Taxation, fees, electricity tariffs and incentives; (h) Funding of long term liabilities related to spent fuel, radioactive waste and decommissioning; (i) Roles of national and local governments; (j) Stakeholders and public involvement; (k) International trade and customs; (l) Financial guarantees and any other required financial legislation; (m) R&D.
Examples of how the condition may be demonstrated	Presentation of a review identifying relevant laws and evidence that the necessary laws have been enacted, or there is a clear plan to enact them at the appropriate time.
Observations	

Law No 210 of 2017 amended some of the provisions of Law No 13 of 1976 regarding the establishment of El-Dabaa NPP to remove possible obstacles for the nuclear power programme. Law No 7 of 2010 regulating nuclear and radiological activities was amended by Law no 211 of 2017

The INIR team was informed that during the negotiation phase NPPA, the Russian project contractors and NPPA's legal advisors undertook a comprehensive review of Egypt's legal infrastructure to identify any laws that may impact the El-Dabaa NPP project. A number of issues were identified that required changes in the legal requirements. Examples included tax and customs exemption of all material, equipment and supply, as well as exemption from the labour law requirements as regards the percentage of foreign workers. The INIR team was informed that these exemptions have been implemented through the special Law No 211 of 2017. In addition, any law or amendment proposed by another ministry is reviewed by NPPA and ENRRA to ensure that it will not jeopardize the nuclear power programme.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

6. Safeguards Condition 6.1: Strengthening of the SSAC underway	Phase 2
Summary of the condition to be demonstrated	The State authority responsible for safeguards implementation is established and has defined roles and responsibilities within the SSAC. Measures are implemented to enhance the SSAC's capability to regulate and control all nuclear activities in the State to ensure that the nuclear material is used only for peaceful purposes, including: (a) To collect, process and report, on time, correct and complete safeguards relevant information to the IAEA; (b) To facilitate IAEA activities and to provide access for IAEA in-field verification; (c) To confirm or verify the information provided; (d) To resolve questions and inconsistencies through institutional arrangements.
Examples of how the condition may be demonstrated	(1) Description of the SSAC roles and responsibilities; (2) Evidence that all organizations involved in the establishment or adjustment of the SSAC are prepared for the increase of activity, the increase of resources and the enhancement of capabilities needed to embark successfully on a nuclear power programme; (3) A plan to develop operation relevant safeguards procedures; (4) A programme in place to build up the required technical and administrative competence on timescales consistent with the development of the nuclear power programme; (5) Evidence through information exchange with the IAEA that the SSAC has a good understanding of the principles of safeguarding an NPP, including the type of equipment the IAEA may install in the facility.

Observations

Egypt has a Comprehensive Safeguards Agreement, INFCIRC/302, in force since 1982. Egypt has a State Authority Responsible for the Implementation of Safeguards (SRA) established as a part of its State System of Accounting for and Control of Nuclear Material (SSAC). The Egyptian System of Accounting for and Control of Nuclear Material (ESAC) was established by the Presidential Decree No. 152, 2006 within EAEA.

ESAC initiated a gap analysis in 2008 for five years to assess the needs including for the nuclear power programme. Financial resources were received from the government to perform the gap analysis and implement the planned expansion, including legislation and regulations, authorization and license, information system, technical capacities, communication methodologies, and financial support.

The results of this analysis led to the following enhancements in the capabilities of ESAC in order to fulfill the State's safeguards obligations:

— Establishment of non-destructive assay (NDA) and destructive assay (DA) laboratories;
— Development of databases of nuclear material;
— Training and capacity building, including fellowship on NPP burnup calculations, and other regional and international training courses (e.g. IAEA, US DOE training).

Upon the formation of ENRRA in 2012 as an independent regulatory body, ESAC became a part of ENRRA's organizational structure. ESAC currently has 11 analysts and inspectors, requisite laboratories to support safeguards implementation (e.g. NDA and DA laboratories), a Planning and Information Treatment Unit within Nuclear Safeguards Department, a domestic inspection program to facilitate reporting to the IAEA and conduct of in-field verification activities. Additionally, there is an enforcement programme and a system to resolve questions and inconsistencies through institutional arrangements.

The Regulation on Rules and Procedures Related to Nuclear Safeguards ('Safeguards Regulation') was issued in 2014. A software system for nuclear material accounting is in place in ENRRA since 2013. As entities with roles in the SSAC, NPPA and ESAC follow a communication protocol, communicating as necessary according to the Regulation and needs. One person from each side is designated.

In addition to ESAC, NPPA participated in safeguards trainings and there are plans for additional trainings on Safeguards.

ENRRA has one department on Nuclear Security and another on Nuclear Safeguards that share information and resources among them. The INIR team was informed that ENRRA inspectors are competent in both safeguards and security and carry out inspections for the purpose of safeguards as well as security. All ESAC staff have advanced degrees in which they specialized or focused on safeguards areas of expertise.

Both ENRRA and NPPA are aware of the types of equipment that may be needed for safeguards implementation at the NPP, as evidenced by communications with the IAEA and training.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

6. Safeguards **Condition 6.2: SSAC requirements for the NPP recognized and addressed**	**Phase 2**

Summary of the condition to be demonstrated	The owner/operator is aware of the requirements of nuclear materials accounting and control, including the necessary staffing, training and technical resources.

Examples of how the condition may be demonstrated	(1) Human technical and financial resource requirements are included in the owner/operator organization plans; (2) Plans to develop the required system and related procedures for collecting, processing and reporting safeguards relevant information.

Observations

There is a requirement that the construction permit application includes preliminary information regarding a system for accounting for and control of nuclear materials. The system includes procedures for physical inventory taking, designation of material balance areas and key measurement points, nuclear material flow. NPPA has established a safeguards department in its organisational structure, with the responsibilities to fulfil its safeguards obligations under the Egyptian law and regulations.

ENRRA is developing a software to facilitate NPPA submission of safeguards related information. The software is based on Code 10 of the Subsidiary Arrangement in force with the IAEA as a part of Egypt's Comprehensive Safeguards Agreement (INFCIRC/302).

NPPA plans to implement training to be provided by the consultant. There will be a general training for all staff and additional specialized training for safeguards. The training will include the IAEA safeguards systems, state requirements under safeguards, and safeguards at El- Dabaa.

The INIR team was informed that there are human and financial resources to grow as needed. Presently, there are five staff in NPPA with safeguards responsibilities. However, there are plans to increase the number of staff as the El-Dabaa project develops.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

6. Safeguards **Condition 6.3: Design information requirements for safeguards recognized**	**Phase 2**
Summary of the condition to be demonstrated	The State has notified the IAEA of its plans for NPP construction, understands the need for early planning of safeguards relevant features in the design and construction phases (including such requirements in the BIS), and plans to submit early design information to the IAEA as soon as the technology has been decided.

	Any plans for fuel cycle facilities have been communicated to the IAEA.
Examples of how the condition may be demonstrated	(1) Additional protocol [23] declaration (under Article 2.a.x) on 10- year plans for the NPP submitted and regularly updated; (2) Evidence through information exchange with the IAEA that the owner/operator has a good understanding of the principles of safeguarding an NPP, including the type of equipment the IAEA may install in the facility; (3) Information on technology and list of designs being included in the BIS, provided to the IAEA; if a design has already been chosen, design information has been submitted to the IAEA with any specific national variations; (4) Future safeguards requirements for the NPP identified and included in the BIS; (5) Any proposals for fuel cycle facilities discussed with the IAEA.

Observations

NPPA has provided the necessary design information to ENRRA for submission to the IAEA; ENRRA sent preliminary design information to the IAEA in May 2018 and subsequently, the completed Design Information Questionnaire was submitted in May 2019. NPPA is aware of the safeguards related equipment that may be installed in the facility and this will be discussed with the EPC Contractor, ENRRA and IAEA together with NPPA to facilitate installation.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

7. Regulatory Framework **Condition 7.1: Competent, effectively independent nuclear regulatory body established**	**Phase 2**
Summary of the condition to be demonstrated	The regulatory body has the legal authority, technical competence, resources and procedures to fulfil the statutory obligations, and is ready to assess an application for a licence, issue a licence with licence conditions and inspect the construction of the NPP against a clearly defined set of regulatory requirements. Its regulatory decisions are free from undue political and economic influence.
Examples of how the condition may be demonstrated	(1) Demonstration of effective independence, including separation from the promotional aspects of nuclear power; (2) Evidence of adequate human and financial resources, including technical and leadership competence; (3) Processes for communications with the public and liaison with the international community; (4) A documented, formal management system, including roles, responsibilities, organizational structure and processes and record keeping (see infrastructure issue No. 3, management); (5) Technical support organizations and advisory experts available to support the regulatory function; (6) Arrangements for interfaces with operating organizations, other regulatory bodies, transport organizations and international forums; (7) Defined process for the assessment of applications for licence, licence issuance, inspections and enforcement actions. *Note: A report evaluating the regulatory framework against the actions described in SSG-16 [2] would address these conditions with respect to safety. If an IAEA Integrated Regulatory Review Service mission (tailored for embarking countries) has been conducted, the results of this mission could be used as evidence. However, subsequent work on any identified recommendations would be noted but not reviewed in detail, as that would occur during an Integrated Regulatory Review Service follow-up mission.*

Observations

The Nuclear Law establishes ENRRA as an independent nuclear regulatory authority reporting to the Prime Minister with a separate budget. ENRRA has the independent authority to carry out all regulatory control work related to nuclear and radiological activities and facilities in Egypt with the exception of X-ray devices used in the medical sector.

ENRRA was established in March 2012 when the ENRRA's Board and the ENRRA's Chairman and Vice Chairman were appointed by Prime Minister Decrees Nos. 243 and 242 for year 2012.

ENRRA's initial organizational structure was established and approved by the GoE in March 2013 and entered into force in 2014. ENRRA undertook an analysis of its organization that led the Prime Minister to issue the Decree No. 1114/2017. The Decree contains the following five areas of change to enable

ENRRA to acquire the financial, technical and managerial competences necessary to fulfil its responsibilities:

— Finalizing the contract with the Russian TSO,
— Finalizing the International TSO Contract,
— Finalizing and updating the financial administrative and organization structure,
— Establishing a new headquarters for ENRRA, and
— Developing of a mechanism to facilitate the hiring and retention of competent employees.

ENRRA's organizational structure was subsequently modified and approved in February 2019. ENRRA's board has been expanded by the appointment of five members with expertise in the field of nuclear and radiological activities.

A special regulation for ENRRA employee's affairs was issued by the Prime Minister Decree No 348 for year 2019 which enables ENRRA to hire the most qualified personnel (at the national level as staff members and international experts) to carry out its responsibilities effectively and efficiently.

To meet its statutory obligations as a competent nuclear regulatory body, ENRRA has contracted with two TSOs. An 11-year contract has been negotiated and signed with the Russian TSO in February 2019 including support for development of regulatory framework, development of Integrated Management Systems, capacity building, licensing and inspection. A 6-year (as first phase) contract with an international TSO has been agreed and is being reviewed by the State Council so as to be finalized this year. This contract includes the provision of support to ENRRA in review and further development of the regulatory framework, development of ENRRA IMS, capacity building of ENRRA, authorization process for nuclear and radiation activities, planning and implementation of ENRRA inspections, conformity assessment of the SSCs, on-the-job training and support to ENRRA in management activities.

ENRRA is developing a Management System containing 6 core processes:

1. Regulation Development,
2. Inspection & Enforcement,
3. Licensing,
4. Review and Assessment,
5. Emergency Preparedness,
6. Capacity Building.

The INIR team was informed that the review and assessment process will be performed with the support of the Russian TSO. The process also considers the transfer of knowledge to ENRRA. An independent review of the assessment will be performed by an international TSO.

The INIR team was also informed that ENRRA, with the support of the Russian TSO, will develop an inspection program for the construction of the NPP. ENRRA plans to supplement its own inspection teams with the Russian TSO specialists.

ENRRA and the Russian regulatory body signed an MoU that includes exchange of information in relevant areas of regulatory control (2015). For example, two workshops have been held in December 2018 and April 2019 at ENRRA's premises in different areas: e.g. regulatory framework, review and assessment activities and inspections.

ENRRA has also participated in several international cooperation programs to build its capacity and familiarize staff with different international practices (IAEA, EU and Korean International Cooperation Agency). These activities were related to the review and assessment and inspection for NPPs including the Russian VVER-Type Reactor (VVER) technology e.g. two weeks 'back-to-back' training on the *VVER Design and Operation Safety Review* and the *Regulatory Review of VVER Accident Analysis Results*.

ENRRA is working on enhancing its human and financial resources. ENRRA's Sector of Safety of Nuclear Installations is responsible for the licensing and oversight of nuclear facilities, with the support of other technical sectors. The INIR team was informed that currently the Sector of Safety of Nuclear Installations has 25 staff and expects to have a total of 35 staff in the near future This number is dynamic and will be increased depending on the actual needs. Within this Sector, the Review and Assessment Department has 12 staff and the Inspection Department has 10 staff. The INIR team was informed that in addition, this Sector can obtain support from other Sectors of ENRRA, which currently have 86 total staff.

ENRRA will also continue to obtain support from the former R&D unit of ENRRA (which will function as an Egyptian TSO to ENRRA) which has 128 highly qualified academic and technical personnel in different areas of regulatory activities. This R&D unit has nine departments and the following three scientific divisions (number of personnel in brackets):

1. Radiation Control Division (57);
2. Nuclear Emergency and Regulation Division (30);
3. Safety of Nuclear Installation Division (41).

ENRRA is finalizing job descriptions that will be the basis for further recruitment and training with the goal of reaching 160 staff dedicated to the nuclear power programme.

The INIR team noted that ENRRA's approach to develop future technical competence to fulfil its responsibilities should prove effective. The team also noted that ENRRA needs to act as a knowledgeable customer to understand and take decisions based on the recommendations provided by the TSOs in the areas of review and assessment and inspections.

The INIR team considers that the current number of staff in the Sector of Safety of Nuclear Installations is insufficient even considering the support of TSOs. ENRRA needs to have a sufficient number of competent staff to carry out the review and assessment process and develop an inspection programme.

Areas for further action	**Significant**	No
	Minor	Sufficient number of competent staff

RECOMMENDATIONS

R-7.1.1 ENRRA should ensure it has a sufficient number of competent staff to manage the licensing and construction oversight and to make decisions taking into account the recommendations provided by TSOs in all relevant technical areas.

SUGGESTIONS

None

GOOD PRACTICES	
GP-7.1.1 ENRRA's new financial and administrative mechanisms, approved by the Government, will allow ENRRA to recruit and retain qualified staff to build a sustainable regulatory body.	
7. Regulatory Framework **Condition 7.2: Regulatory framework developed**	**Phase 2**
Summary of the condition to be demonstrated	The regulatory framework addresses all the relevant aspects for safety, security and safeguards related to siting, design and construction of the proposed NPP (including arrangements for spent fuel, waste management and the transport of radioactive material). The framework will ultimately need to cover all the phases of the programme, but at this stage some aspects (e.g. commissioning, operation, decommissioning) may be covered by future work plans.
Examples of how the condition may be demonstrated	(1) A comprehensive list of regulations identifying those issued, those in draft and those yet to be developed; (2) Evidence showing how the regulations have been developed and how they are consistent with IAEA safety standards, security guidance and safeguards requirements.

Observations

The legal and regulatory framework in Egypt is based on:

— Laws;
— Executive Regulations;
— Governmental Decrees;
— Regulatory Regulations and Regulatory Decrees:
  - Regulatory Requirements (acceptance criteria);
  - Regulatory Rules (relations with licensees).
— Guides and Standards.

Article 17.4 of the Nuclear Law No 7 of 2010 states that ENRRA will license NPP using standards and regulations issued in conformity with the international standards, including those in the country of origin of the technology.

ENRRA has already issued or will issue in the near future the following regulatory documents:

— Rules and Procedures for Licensing of Nuclear Power Plants;
— Site Evaluation Requirements for Nuclear Installations;
— Management Systems Requirements for Regulated Facilities and Activities;
— Rules and Procedures for Regulating the Activities Related to Nuclear Safeguards;
— Physical Protection of Nuclear Materials and Nuclear Facilities;
— Security of Nuclear Materials and Radioactive Sources During Transport.

<table>
<tr><td colspan="3">One of the appendices of the EPC Contract includes a list of documents that constitutes the regulatory basis for the El-Dabaa project. The INIR team was informed that this list was developed and agreed between ENRRA, NPPA and the EPC Contractor and it will constitute the basis for licensing.

The Russian TSO will support ENRRA in the short and long-term development of a comprehensive regulatory framework. The Russian TSO has performed a gap analysis and prepared a plan for the development of regulations and guides.

The INIR team noted the importance of having a set of Egyptian regulations and guides in place for the sustainability of the nuclear power programme.</td></tr>
<tr><td rowspan="2">Areas for further action</td><td>Significant</td><td>No</td></tr>
<tr><td>Minor</td><td>National regulations and guides</td></tr>
<tr><td colspan="3">RECOMMENDATIONS</td></tr>
<tr><td colspan="3">None</td></tr>
<tr><td colspan="3">SUGGESTIONS</td></tr>
<tr><td colspan="3">S-7.2.1 ENRRA is encouraged to continue the development of national regulations and guides.</td></tr>
<tr><td colspan="3">GOOD PRACTICES</td></tr>
<tr><td colspan="3">None</td></tr>
</table>

8. Radiation Protection Condition 8.1: Development of radiation protection programmes and expansion of appropriate infrastructures planned	Phase 2
Summary of the condition to be demonstrated	Plans have been developed for programmes to control and monitor the exposure of individuals on-site before any radioactive material arrives on the site, including staff training, procurement of equipment and services, and design requirements. The plans take into account increased requirements during construction and commissioning.
Examples of how the condition may be demonstrated	(1) Plans in place to implement radiation monitoring and protection programmes for exposure of workers and the public on-site before any radioactive material arrives on the site; (2) The appropriate equipment and systems for radiation monitoring are included in the BIS; (3) A review of the national infrastructure for monitoring and recording radiation doses with plans for the required expansion; (4) Evidence of visits to other NPPs to understand the issues of dose and contamination control; (5) Availability of competent staff to review vendor proposals for dose and contamination control.

Observations

The Executive Regulations to the Nuclear Law include the requirements for radiation protection and radiation monitoring for NPPs.

Egypt adopted the IAEA Safety Series No. 115 in 1999 and the new General Safety Requirements GSR Part 3 “Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards” in 2014.

Dosimetry services in Egypt are provided by the National Institute of Standards (NIS). To expand the national capacity, EAEA is in the process of certification to provide this service. NPPA expects to have its own dosimetry service and will ask for its certification.

EAEA has a training program on radiation protection, approved by ENRRA, that covers the main elements of radiation protection which is a pre-requisite to grant a personal license for the workers in the field of nuclear and radiological activities. EAEA organizes this course around the country.

ENRRA has specialists in radiation protection. The INIR team was informed that it plans to increase the number of professionals assigned to radiation protection.

The INIR team was informed that ENRRA keeps hard-copy records of the dosimetry history of all occupationally exposed workers in Egypt. With the support of the Russian TSO, ENRRA will develop a digital database to manage dosimetry data of all workers including those from the NPP. They will also perform a gap analysis of the future infrastructure needed.

NPPA developed a Radiological Protection Program (RPP) to keep exposures ‘As Low As Reasonably Achievable’ (ALARA) and ensuring compliance with the applicable standards. The RPP includes

organization of the Radiation Protection Department of NPPA for the operational stage and radiation monitoring and protection of workers and the other individuals on-site. Some infrastructure is already in place, such as the On-site Monitoring Laboratory for Radiation and Environmental Protection.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

9. Electrical Grid Condition 9.1: Detailed studies undertaken to determine grid enhancements	Phase 2
Summary of the condition to be demonstrated	An analysis of the grid system has been completed to identify any enhancements needed to: (a) Cope with the enhanced generating capacity; (b) Achieve grid stability and reliability requirements to allow safe and efficient operation of the NPP (ability to reliably take the power generated and provide supplies to safety equipment). The requirements of the planned NPP have been agreed with the transmission system operator and they are compatible with the capability of NPP designs being considered.
Examples of how the condition may be demonstrated	Plans to address the grid requirements associated with the inclusion of the NPP. The plans need to include: (1) Enhancement and/or expansion compatible with the increased generating capacity; (2) Achieving the overall grid stability and reliability requirements for safe operation of the NPP; (3) Justification of the reliability and capacity of the off-site power for the NPP; multiple grid connections to the NPP site, including provisions for their robustness, diversity, physical security and cybersecurity; (4) Grid related plant characteristics and reliability requirements included in the BIS.

Observations

In 2018, the capacity of the grid in Egypt was 55.2 GW(e) with a peak load of 30.8 GW(e). In 2026, when the El-Dabaa Unit 1 is expected to be connected to the grid, it is estimated that the grid capacity and peak load will be 63 GW(e) and 44.3 GW(e), respectively.

The transmission system operator is the Egyptian Electricity Transmission Company (EETC), a subsidiary of the Egyptian Electricity Holding Company (EEHC). The INIR team was informed that the grid is considered stable and reliable.

The El-Dabaa NPP will be interconnected to the grid by four double circuit 500 kV overhead transmission lines (OHTL). The construction of the 500 kV substation at the plant is included in the EPC contract. The transmission lines will connect it to substations at Marsa Matroh, El-Alamein, Borg El-Arab and Wadi El-Natroon.

EETC contracted Siemens A.G. for a detailed study including:

— A Load Flow Study (including tap changer design parameters for the unit transformer);
— A Short Circuit Study (at 500 kV and 220 kV connection points);
— A Motor Start (FW Pump and RC Pump); and
— Load Shedding and Grid Stability (probabilistic reliability analysis).

This study also examined the NPP impact on the national grid. During the study, the consultant had meetings with the vendor to consider the plant operational parameters. The results of the study were delivered to EEHC in September 2019. EEHC is analyzing the results of the study, and a meeting between the consultant, the vendor and EHHC is planned to take place in the near future.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

9. Electrical Grid **Condition 9.2: Plans, funding and schedule for grid enhancement available**	**Phase 2**
Summary of the condition to be demonstrated	The plans for, and funding of, the identified enhancements are available, and the enhancement programme is consistent with the NPP construction programme.
Examples of how the condition may be demonstrated	(1) Evidence that funding and schedules for grid enhancements, compatible with the foreseen construction, testing and commissioning have been approved and that delivery times of towers, lines and components, substations and switch yards are consistent with the construction schedule; (2) If the grid system will be interconnected to other countries, plans for appropriate legal and commercial agreements and operating procedures are in place for proper control of system frequency after an NPP trip and for grid emergency situations; (3) If the required performance of the future grid is a significant improvement over the current performance, firm and realistic plans exist to ensure this performance will be achieved in time for the commissioning of the NPP.

Observations

EETC is responsible for the necessary grid enhancements. These include:

— Construction of three 500kV substations at Marsa Matroh, El-Alamein and Borg El-Arab;
— Enhancements at El-Dabaa 220kV substation;
— Construction of four double circuit transmission lines.

The 500 kV substation at Wadi-El-Natroon is already built and the 500 kV substation at the NPP is included in the EPC contract.

All these works, including the respective financing sources, are included in the EEHC's planning. Furthermore, a formal exchange of letters between EEHC and NPPA took place to ensure that the required funding is available and secured.

The first phase (single circuit) of the expansion is expected to be concluded by 2023.

A Working Group including NPPA, EEHC, EETC and MOERE was established to ensure that the timing for the upgrades and construction is consistent with the project schedule. This Working Group reports to the senior management of each entity with the Minister of MOERE having the ultimate responsibility to resolve any outstanding issues.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

GP-9.2.1 The early establishment of a working group composed of the NPP owner, national electricity company, national transmission company and the Ministry of Electricity and Renewable Energy ensures alignment between the project needs and the grid enhancements.

10. Human Resources Development **Condition 10.1: Knowledge and skills needed in organizations for Phase 3 and operational phase identified**		**Phase 2**
Summary of the condition to be demonstrated	All relevant organizations have identified an appropriate organizational structure and the staff requirements for Phase 3, and the operational phase and key staff are already in place. The plans need to take into account the staffing requirements for any future units and the strategy for transferring staff between units.	
Examples of how the condition may be demonstrated	For each organization (including support organizations), an analysis of what resources and competences are needed at what time during Phase 3 and the initial operational phase and which positions need to be formally licensed. The competence areas need to include: (1) Technical (including those that are nuclear specific); (2) Business (e.g. legal, finance); (3) Licensing; (4) Stakeholder involvement; (5) Fuel cycle management and procurement; (6) Construction management and commissioning; (7) Operation and maintenance; (8) Spent fuel, and radioactive waste management and decommissioning; (9) Training and development (including a systematic approach to training).	

Observations

Egypt has a long experience in the application of nuclear technologies and this expertise provides a good basis for the development of the workforce needed for the nuclear power programme.

NPPA conducted an integrated HRD study in 2011 to determine the skills and knowledge required for the implementation of the El-Dabaa NPP. NPPA revised its HRD plan in 2017 to address the specific staffing needs following the selection of the NPP technology. NPPA has a detailed organizational structure and staffing plan for the El-Daaba NPP that includes the qualifications and experience required for each position.

ENRRA has performed a self-assessment (SARCON) of the competencies needed to support the nuclear power programme. It has also developed initial job profiles that were reviewed by its TSOs. Once finalized, these profiles will form the basis for the initial staffing plan for the organization for Phase 3 and beyond.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None	
GOOD PRACTICES	
None	
10. Human Resources Development **Condition 10.2: A plan available to develop and maintain human resources**	**Phase 2**
Summary of the condition to be demonstrated	A gap analysis has been completed (based on the requirements of 10.1, above) and recruitment and training plans developed (for each organization). The plans cover education, training and experience requirements and also include consideration of bilateral and international training activities.
Examples of how the condition may be demonstrated	(1) Training plans for senior executives; (2) Recruitment, training and development programmes to provide the competences defined in 10.1, including: (a) The nature of, and time required for, development of each competence; (b) Proposed courses and location of training; (c) The need for training abroad at a similar operating plant to those being considered, with any necessary language training planned; (d) Programmes in place for the involvement of future operation and maintenance personnel with the construction and commissioning groups; (e) The licensing of identified management and operating staff. (3) Proposals for training infrastructure requirements and development of training expertise; (4) The BIS addresses what is required from suppliers, including competence development of national personnel (training and on the job experience), the provision of a simulator and other training infrastructure requirements, and the development of national trainers.
Observations As noted under Condition 10.1, NPPA conducted an integrated study for HRD, including a gap analysis, in order to define the skills and knowledge required for the El-Dabaa NPP which resulted in a staffing plan for the organization. The INIR team was informed that the EPC contract provides on-the-job training in the areas of design, construction, commissioning, operations and maintenance. NPPA analysed the training to be provided under the EPC contract, together with the training provided by its consultant, and included additional training requirements in other contracts. NPPA started the recruitment process for the El-Daaba NPP project and has hired 65 individuals with relevant expertise including some from existing electrical utilities in 2018. All of these individuals receive an initial induction training, which is delivered by NPPA together with its consultant. NPPA and its consultant have also developed a training programme that consists of several elements, such as,	

soft skills, Russian and English language, and project management. Specialized courses are also provided in the areas of mechanical, electrical, instrumentation and control (I&C), human resources (HR), and contract management and negotiations.

The INIR team was informed that as part of the EPC contract, comprehensive training systems — including a training centre — will be provided by the vendor. Construction of this centre will commence in January 2020 and it is expected to be operational with a full scope simulator by January 2023. The instructors for this centre are anticipated to be nationals. The INIR team noted this may be challenging due to the time required for the development of national instructors and that NPPA may consider complementing the instructor team with instructors provided by the vendor.

As noted under Condition 10.1, ENRRA has prepared job profiles for the primary leadership positions in its new organisational structure and initiated a recruitment process for the heads of several departments within the organization (Finance, HR, Legal, Security, Public Relation and International Cooperation) in May 2019 through its website. Some hires have already been made and others are imminent. ENRRA is currently in the process of finalizing the remaining job profiles that will form the basis for the organization's staffing plan for the nuclear power programme. Once finalized, this plan will be reviewed by its TSOs. After the completion of the remaining job profiles, ENRRA will fill these positions. The INIR team noted that the finalization of this plan is important to ensure that ENRRA is prepared to discharge its responsibilities for Phase 3.

ENRRA is also developing its training programme. ENRRA's current training administration will become a separate unit, the Centre of Excellence (COE), which will be responsible for overseeing and delivering training for the entire organization. The COE will report directly to the Vice Chairman of ENRRA and will also be responsible for conducting competency reviews of the staff and evaluating the effectiveness of the training programmes.

ENRRA has developed a Basic Professional Training Programme that it delivers to all staff of the organization, and additional training programmes in the areas of review, assessment and inspection have been carried out through international cooperation.

Areas for further action	**Significant**	No
	Minor	Staffing plan and training programme

RECOMMENDATIONS

R-10.2.1 ENRRA should finalize its staffing plan and training programme to meet the future requirements of the organization.

SUGGESTIONS

None

GOOD PRACTICES

None

10. Human Resources Development **Condition 10.3: An integrated national strategy developed**	**Phase 2**

Summary of the condition to be demonstrated	The plans of the different organizations (including educational institutions, research organizations and technical support organizations) have been considered in an integrated manner so as to optimize the development programme.
Examples of how the condition may be demonstrated	(1) Integration of the plans of the individual organizations (including support organizations) to enable development of a national strategy including: (a) An appropriate balance of resources and competence between the operating organization, regulator and specialist organizations with adequate training provision in each; (b) A long term strategy to ensure sustainable, competent resources for each organization; (c) A remuneration structure that will ensure that all organizations are adequately staffed and that staff are retained; (d) Integrating and optimizing opportunities for training abroad; (e) Confirming the adequacy of national education infrastructure (at the secondary and tertiary levels) or identifying any necessary improvements. (2) Evidence that key stakeholder organizations have participated in the development and review of the above plan.

Observations

An Education and Training Committee was established to integrate the HRD plans of the key organizations. The Committee is responsible for: 1) developing strategies for training, education and specialized national needs; 2) providing opinions on agreements and other forms of cooperation with foreign bodies; and 3) maximizing the benefits from the infrastructure available at national nuclear authorities and universities.

In 2010, NPPA, together with its consultant, prepared a generic and comprehensive National Human Resources Strategy. This strategy was recently updated by NPPA and is currently under final review by the Education and Training Committee.

In 2016, Egypt established a nuclear specific vocational school for post-secondary school students near the El-Dabaa NPP site to develop technicians in the nuclear field.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

11. Stakeholder Involvement Condition 11.1: Stakeholder involvement plans being implemented	Phase 2
Summary of the condition to be demonstrated	Each of the key organizations (government, regulator and owner/operator) has a proactive stakeholder involvement plan that is in use and regularly updated.
Examples of how the condition may be demonstrated	(1) Documented stakeholder involvement strategy and plan for each of the key organizations (government, regulator and owner/operator) addressing the full range of issues, including technology choice, safety, security, waste management, severe accidents, health and environmental impact; (2) Evidence of a competent communications team in each organization, with experience and evidence of engagement with senior staff; (3) Examples of communications in a range of formats with the public, local government, industry, media, non-governmental organizations, opposition groups, educational institutions and neighbouring countries; (4) Evidence of training and experience of spokespersons; (5) Evidence of ongoing government communications with regard to energy policy and energy needs, the role of nuclear power in the energy mix, the benefits and risks of nuclear power, the non-zero potential for severe accidents and response to issues raised; (6) Regular reviews of public understanding and acceptance through means such as opinion polls or meetings; (7) Effective public information centres in place or planned, including required budgets and facility design; (8) Evidence that the owner/operator engages, on a regular basis, with local stakeholders on, for example, construction plans, opportunities for local jobs and benefits to the community; (9) Regulator strategy regarding the availability of information to the public, regulatory communication and consultation with stakeholders; (10) Evidence that the role of the regulator is understood by stakeholders and that it is perceived as competent and independent.

Observations

NPPA has developed a Stakeholder Management Plan that it is currently implementing and updating on a quarterly basis. The plan includes the identification and analysis of the stakeholders related to the El-Dabaa project and provides guidance on the management of these groups.

The INIR team was informed that through the implementation of this plan, NPPA has conducted a number of stakeholder involvement and public communication activities.

NPPA maintains a website that provides the vision and mission of the organization, updates regarding the El-Dabaa NPP, and educational information about nuclear power. The website is also used to issue press releases and other official statements.

NPPA has also developed printed outreach materials, including information to educate students, about how nuclear energy can be used to produce electricity. This information is also provided to the general public.

On behalf of the Supreme Council, NPPA has the lead in disseminating information related to nuclear energy and the El-Dabaa NPP. The Chairman of NPPA currently serves as the spokesperson for nuclear power in Egypt. NPPA currently has 5 individuals working in the area of public communication but plans to increase this staff to a total of 10.

The locations for public information centres in Cairo and El-Dabaa have been selected, and NPPA is working with a consultant to finalize the scope and design for both centres by next year.

NPPA, together with the Ministry of Education, inaugurated the El-Dabaa Nuclear Energy Vocational School in 2017. The school is located near the site of the El-Dabaa NPP and is a five-year technical school for post-secondary school students. The INIR team was informed that a large percentage of the students come from the Matrouh region. After completing the school, students can work for the El-Dabaa NPP or related projects or enter a university. The INIR team considers that this approach will increase the public awareness of the project in the local community.

ENRRA has a strategic goal to continuously improve the engagement of interested parties and public awareness. It has organized workshops to raise awareness about nuclear power and the role of ENRRA for the public and media.

As part of its management system manual, ENRRA has defined four groups of its stakeholders and defined its obligation towards each group. These groups include: (1) the public and members of Parliament; (2) relevant ministries; (3) licensees; and (4) media.

ENRRA's website is currently under revision, however, the INIR team was informed that it will provide information regarding the organization's vision and mission, and general information regarding licenses. ENRRA provides quarterly and annual reports on its activities to the office of the Prime Minister and relevant ministries. A version of the annual report is also provided to the general public.

ENRRA currently has a draft a stakeholder involvement plan developed with EU experts that is under revision and finalization with the support of ENRRA's TSOs. The INIR team noted that the completion and implementation of this plan is important to support ENRRA in performing its public communication and consultation functions during the licensing process.

Areas for further action	**Significant**	No
	Minor	Stakeholder involvement plan

RECOMMENDATIONS

R-11.1.1 ENRRA should finalize and implement its stakeholder involvement plan.

SUGGESTIONS

None

GOOD PRACTICES

GP-11.1.1 The establishment of a vocational school near the El-Dabaa site will increase public awareness about the nuclear power programme and will support the development of future technicians for the project.		
11. Stakeholder Involvement **Condition 11.2: Stakeholder involvement plans coordinated**		**Phase 2**
Summary of the condition to be demonstrated	The NEPIO provides a continuing forum for communication and cooperation among the key organizations, ensuring that the roles and responsibilities of each organization in stakeholder involvement are clear and that all stakeholders are being involved (including the public, local government, industry, media, non-government organizations, opposition groups and neighbouring States).	
Examples of how the condition may be demonstrated	(1) Integrated national strategy agreed among the key organizations, with a commitment to share plans and to ensure consistency of messages; (2) Evidence of regular review by the key organizations of the effectiveness of the strategy.	

Observations

The Coordination Committee serves as the forum for communication among the various national stakeholders. Additional national coordination occurs through the Education and Training Committee, Localisation Committee and International Instruments Committee. These committees provide continuing opportunities for stakeholders from national organizations to discuss their on-going activities, share plans and clarify any questions regarding roles and responsibilities. The INIR team was informed that the Coordination Committee developed a national strategy for communication that is currently with the Supreme Council for approval.

In February 2017, a public hearing session was held and attended by more than 1200 individuals. The hearing was part of the EIA process and provided stakeholders with an opportunity to express their concerns and interests related to the project.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS
None
SUGGESTIONS
None
GOOD PRACTICES
None

12. Site and supporting facilities Condition 12.1: Detailed site characterization completed	Phase 2
Summary of the condition to be demonstrated	The basis for the site selection has been justified against clearly defined siting criteria. These cover safety, engineering, security, environmental, emergency response, social and economic aspects. Site characterization and an evaluation by the regulatory body have been completed (the detailed approach will depend on the specific authorization stages defined in the State). Site related design basis information is available and included in the NPP requirements. A plan for addressing the siting of fuel cycle and waste facilities is available.
Examples of how the condition may be demonstrated	(1) A report demonstrating the ranking of possible sites and basis of the chosen site or sites; (2) Evidence that the site meets all siting requirements and the necessary characterization studies have been completed (see publications listed below for list of topics to be addressed); (3) Evidence that local legal, political and public acceptance issues have been identified and resolved or their resolution is planned; (4) Analysis of sites required for fuel interim storage, and for waste conditioning, storage and, where appropriate, disposal; plans for selecting sites available; (5) Evidence that, where appropriate, transport between the NPP and any waste storage/disposal sites has been considered.

Observations

Siting considerations have been ongoing since the 1960s and 44 potential sites were identified. In 1977, the NPPA issued a contract for the necessary studies and research to screen the initial sites based on local requirements and international practices. Eleven candidate sites were selected.

The study then concluded with the selection of the El-Dabaa site based on local requirements and international practices. The study was reviewed and approved using inputs from a consultant, the IAEA, Egyptian institutes and authorities and the NPPA.

The INIR team was informed that the site selection process involved the ranking of 11 candidate sites using a range of criteria. The process was documented in a report entitled Site Selection and Evaluation and Integration of a Nuclear Power Unit to the Grid, Synthesis Report of Step 1, Recommendations on Preselection of Site Areas dated 14 April 1978.

NPPA established meteorological, groundwater and marine measurement systems at the El-Dabaa site in order to provide data for the site evaluation. These systems have been in operation since 2014.

In 2009, Site Evaluation Requirements for Nuclear Installation were issued by ENRRA.

In February 2010, a Site Evaluation Report (SER) was presented by NPPA to ENRRA and in September 2010, ENNRA issued a report stating that there were no exclusionary elements preventing the construction of the NPP at El-Dabaa.

In 2016, ENRRA updated the Site Evaluation Requirements for Nuclear Installation and in 2017, the updated SER and EIAR were presented by NPPA to ENRRA.

The INIR team was informed that the SER update included revisions following the review of the Fukushima accident, revisions to the population distribution and activities around the site, consideration of flooding and consideration of aircraft crash. Data from seismic activity monitoring and oceanographic systems were also included.

The EPC Contract includes an appendix defining all initial site related design basis information required to be provided to the EPC Contractor. NPPA also provided the EPC contractor with copies of all the previously conducted site evaluation studies.

During the negotiations of the EPC contract, NPPA had concluded in October 2015, a contract with a Russian supplier, to conduct engineering surveys for the site. The scope of services included seismic, geotechnical, meteorological, hydrological and oceanographic surveys. Extensive results of these surveys have now been provided to NPPA. The INIR team was informed that these results did not require any changes to the EPC contract.

ENRRA assessed the SER using its own resources and its comments were discussed with NPPA and were taken into consideration. ENRRA then asked for an IAEA SEED review mission. The INIR team was informed that ENRRA and NPPA have agreed on the issues to be reported on at the time of the construction licence application. NPPA believe that the site parameters being used in the design are sufficiently conservative to accommodate any changes arising from this additional work.

In March 2019, a Site Approval Permit for the El-Dabaa site was issued by ENRRA.

NPPA has signed a contract to construct a nuclear spent fuel storage facility. The INIR team was informed that the facility will be within the NPP site, but the addition of this new facility requires a separate site permit. NPPA is preparing the site evaluation report and the environmental impact assessment report for this facility.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

12. Site and supporting facilities **Condition 12.2: Plans in place to prepare site for construction**	**Phase 2**

Summary of the condition to be demonstrated	Infrastructure either exists, or is planned, to support construction, for example access, workforce housing, water and construction materials. Any outstanding work is planned in accordance with the construction requirements or is included in the BIS.
Examples of how the condition may be demonstrated	(1) A review of the current infrastructure and plans to implement any enhancements required; (2) Existing and planned site facilities are clearly described in the BIS.

Observations

The NPPA is preparing all the supporting infrastructure required for the construction of the El-Dabaa NPP including:

— Contract for the water that will be used for the construction of the NPP;
— Contract for the electricity supply that will be used for the construction of the NPP;
— Housing city for people from NPPA, ENRRA and the main contractor to live in close proximity to the El-Dabaa NPP site, and
— Making communication services available for the site.

The specifications of the work to be undertaken are included in the 'Owners Scope' section of the EPC contract. Design and construction of the site infrastructure is in progress and scheduled to be completed in accordance with the EPC Contractor's construction schedule. Examples of work already underway include a 22 kV electrical supply (with plans to provide a 220 kV supply in the near future) and the provision of 2 large water tanks with supply from a nearby desalination plant. The design and master plan for 2050 housing units has also been prepared.

The INIR team was informed that NPPA is also responsible for constructing a docking facility close to the site for the delivery of materials and large equipment to the site. NPPA will also construct the road to connect the docking facility to the site.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

13. Environmental Protection Condition 13.1: Environmental impact assessment performed		Phase 2
Summary of the condition to be demonstrated	A complete assessment of the environmental impact of the proposed NPP has been carried out in accordance with national requirements and an environmental impact assessment report has been submitted to the appropriate authority. Plans for monitoring to provide a baseline for the site and its surroundings have been developed.	
Examples of how the condition may be demonstrated	(1) Availability of the environmental impact assessment report and the status of approval by all relevant regulators and agencies; (2) Mitigation measures evaluated; (3) Plans to develop systems and facilities for necessary environmental monitoring (including radiation monitoring), with clearly assigned roles for the operating organization and the environmental regulator.	

Observations

In June 2017, NPPA sent the draft Environmental Impact Assessment (EIA) report to ENRRA for review. Based on a MOU between ENRRA and EEAA, a joint committee was established to provide an assessment of the report. ENRRA had the responsibility to assess the radiological chapters and EEAA was responsible for the non-radiological chapters.

Following this assessment, EEAA and ENRRA hosted an IAEA SEED mission in January 2019 to provide a review of the radiological elements of the draft EIA report. The INIR team was informed that the outcome of this review supported ENRRA's assessment. In February 2019, the EIA report was approved by the board of EEAA. This approval was one of the conditions for ENRRA to grant the site approval permit, which was issued in March 2019.

During the EIA process, as mandated by the law, a public information session was conducted in February 2017 near the El-Dabaa NPP site. The event was announced in the newspaper in advance and provided an opportunity for local residents and the general public to express their views and raise any concerns regarding the project. This event also provided an opportunity for EEAA, ENRRA and NPPA to address these concerns. The event was attended by 1200 individuals.

A plan to upgrade the environmental monitoring system commenced in 2017. This plan included updating and expanding the national network of radiation monitoring stations and installing a new site monitoring system. The site monitoring system includes several elements:

— System for monitoring groundwater;
— System for monitoring micro-earthquakes;
— System for monitoring non-radiological gases in air;
— System for monitoring distribution of radionuclides in surface and groundwater;
— System for measure noise levels;
— System for monitoring suspended particulates;
— System for radiological gases in air.

NPPA is responsible for the installation of the site monitoring system as well as the collection and analysis of the results, and ENRRA is responsible for inspecting the system. ENRRA maintains the national environmental radiation monitoring system that consists of 75 stations, one of which is near

the El-Dabaa NPP site.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

13. Environmental Protection **Condition 13.2: Environmental characteristics provided**	**Phase 2**
Summary of the condition to be demonstrated	Comprehensive specification of environmental site conditions, factors, characteristics and data have been included in the BIS in as much detail as possible.
Examples of how the condition may be demonstrated	(1) BIS identifying local environmental factors. Areas to consider include: (a) Pathways for effluent transport and concentration in the surrounding environment; (b) Local population demographics and trends; (c) Predominant plant and animal life and relevant radioecological sensitivities; (d) Predominant land use; (e) Data relevant to justifying heat removal capability; (f) Sites and means for disposal of hazardous waste; (g) Local environment issues affecting construction. (2) Bidders have free access to all detailed site studies including environmental impact assessment documents and collected site data, with the environmental limitations, commitments and conditions; (3) Established procedure for resolution of vendor questions with regard to the interpretation of the site data.

Observations

The INIR team was informed that a copy of the EIA report was provided to the vendor, and that a comprehensive specification of the environmental conditions of the site was included in the EPC contract.

A working group consisting of NPPA, ENRRA and EEAA responds to any requests for additional information or clarifications from the EPC contractor. This includes additional data for the design needs

or missing data that will be obtained during the site survey. This information is provided through a formal exchange of letters.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

13. Environmental Protection **Condition 13.3: Clear and effective regulation of environmental issues established**	**Phase 2**
Summary of the condition to be demonstrated	The environmental regulator for the nuclear power programme has the skills and resources required to fulfil the roles and responsibilities assigned. The interface between this organization and the nuclear regulator has been defined.
Examples of how the condition may be demonstrated	(1) Roles and responsibilities of the environmental regulator for the NPP defined; (2) Memoranda of understanding between the environmental and nuclear regulatory bodies; (3) Evidence of adequate skills and resources to evaluate the environmental impact assessment, plans to develop adequate skills to assess the acceptability of design information, inspect/audit activities during construction and evaluate monitoring results.

Observations

Laws 4/1994 and 7/2010 form the basis of the environmental requirements for the El-Dabaa NPP, which include the protection measures for the environment and the public acceptance process. ENRRA also provided requirements within the Site Evaluation Requirements for Nuclear Installations, which was issued in 2009 and updated in 2016. These requirements are based on the IAEA's Safety Standards Series publication: General Safety Requirements Part 3, No. GSP Part 3.

As noted under Condition 13.1, EEAA and ENRRA established a MOU regarding the sharing of responsibilities for the development of the draft EIA report. Both parties agreed to follow the US Nuclear Regulatory Commission's (USNRC's) guide entitled NUREG 0099 Regulatory Guide 4.2 to develop the report.

The INIR team was informed that the group that reviewed the draft EIA report consisted of 11 individuals with expertise in relevant areas, such as geology, water, land use, etc. Additionally, ENRRA

and EEAA undertook several capacity building activities with the EU and IAEA to develop competencies related to the EIA process.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

14. Emergency Planning **Condition 14.1: Responsibilities of each organization clearly defined and approach for emergency planning being developed**	**Phase 2**
Summary of the condition to be demonstrated	An overall action plan is being implemented to provide the required EPR arrangements and capabilities to be demonstrated before fuel is brought to the site. The organizations involved have identified the resources that will be required to execute the action plan and have made a commitment to provide those resources.
Examples of how the condition may be demonstrated	(1) Action plan that addresses the gaps and leads to a demonstration of adequate EPR arrangements and capabilities prior to fuel being brought to site, including: (a) Actions to be completed, schedule and milestones; (b) Organizations responsible for each action; (c) Resources required for the implementation of the action plan; (d) Action plan implementation progress report. (2) Regulations related to EPR developed; (3) EPR roles and responsibilities at all levels are documented; (4) The types of accident have been identified and potential consequences have been assessed including the likely size of emergency planning zones and distances for an NPP; (5) A generic protection strategy has been defined based on assessed hazards and consequences.

Observations

The INIR team was informed that National Committee for Crisis Management and Disaster Risk Reduction (NCCMDRR) is the organization in charge of the national emergency situations and ENRRA is part of this Committee.

Egypt has developed a national strategy for nuclear and radiological emergency preparedness and response that includes planning for category 1 hazards. The implementation of this strategy will fulfil the requirements for emergency preparedness and response of the country.

The Prime Minister's Decree No. 962 establishes the Supreme Committee for Nuclear and Radiological Emergency (SCNRE) including representatives from all relevant organizations. The SCNRE is headed by the Chairman of ENRRA and is responsible for developing nuclear and radiological emergency plans. The INIR team was informed that the national nuclear and radiological emergency plan is expected to be approved in 2020. The INIR team noted that in the finalization of the plan, Egypt may benefit from reviewing it against international good practices.

ENRRA's duties related to emergency preparedness and response include:

— Regulating, reviewing and assessing emergency plans;
— Communication to the public during emergencies;
— Operating the Central Chamber for Nuclear and Radiological Emergencies (CCNRE) which provides 24/7 coverage for nuclear and radiological emergencies;
— Acting as IAEA focal point in the area of EPR.

NPPA is currently developing its emergency infrastructure and organization as well as the on-site emergency plan for the El-Dabaa NPP.

The INIR team was informed that in case of a nuclear emergency, response is organized as follows:

— NPPA, as operator, identifies the emergency situation and notifies it to the local Governors and ENRRA via the CCNRE;
— Local Governors activate the local emergency plans and the Chairman of SNCRE declares the emergency and notifies the Prime Minister. Participating organizations, including EAEA, are activated to respond to the emergency using approved emergency plans.

The INIR team was informed that the following activities were initiated or completed in order to strengthen the infrastructure related to emergency preparedness and response:

— ENRRA drafted regulatory requirements for the 'On-site Emergency Plan of Nuclear Facilities';
— SCNRE provided guidance for the content of local emergency and evacuation plans to the Matrouh, Sharkia, and Kalubia governorates that surround the El-Dabaa site;
— SNCRE issued the following relevant plans: (1) Plan of Preparedness and Response to Nuclear and Radiological Emergencies Associated with Transport Accidents; (2) "Public Communication Plan in Case of Nuclear and Radiological Emergencies; and (3) "Medical Preparedness and Iodine Tablets Distribution Plan in Nuclear and Radiological Emergencies;
— Ministry of Health is working to increase the response capacity of hospitals in the event of a nuclear or radiological emergency. This includes the training of medical personal and provision of the necessary equipment;
— Ministry of Interior is training first responders with the support of ENRRA.

Egypt is party to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and the Convention on Early Notification of a Nuclear Accident and participates in the Response and Assistance Network (RANET).

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

15. Nuclear Security Condition 15.1: Required physical protection measures developed	Phase 2
Summary of the condition to be demonstrated	The national threat assessment and design basis threat for the NPP have been completed. Requirements for the design of physical protection for the NPP have been defined in the BIS or in other appropriate documents. Specific physical protection requirements during the construction and transport of nuclear material have also been developed. Roles and responsibilities for preparing for, detecting and responding to nuclear security events have been defined.
Examples of how the condition may be demonstrated	(1) A documented national threat assessment that covers the full range of threats affecting nuclear material and nuclear facilities; (2) A competent authority defined with assigned responsibility for developing the design basis threat in coordination with other relevant authorities; (3) Clear definition of roles and responsibilities for each organization involved in the response to nuclear security events; (4) A design basis threat has been developed, the BIS includes physical protection requirements for the NPP; (5) Nuclear security requirements during the construction and transport of nuclear material have been defined.

Observations

The Prime Minister's Decree No. 1501 (2017) established the El-Dabaa National Security Committee consisting of Ministries of: Electricity and Renewable Energy, Defense, Interior, Foreign Affairs, Communication and Information Technology, General Intelligence Agency, Nuclear and Radiological Regulatory Authority and the Nuclear Power Plants Authority.

Executive Regulation of Law No 7-2010 assigns responsibility for developing the design basis threat to the licensee and to provide the document to ENRRA for review and approval. The Design Basis Threat (DBT) has been developed based on the threat assessment report that was developed by the National Security Committee. The DBT was approved by ENRRA in February 2018 and took into consideration the recommendation of the National Security Committee. The assignment of the licensee to develop the DBT is not in line with Nuclear Security Series recommendations. However, the INIR team noted that all relevant stakeholders were involved in the development of the DBT. The DBT is reviewed and if needed revised every three years or sooner as needed to address world events.

The response plan is to be drafted by the National Security Committee. The INIR Team was informed that NPPA is responsible for response for all areas within the NPP site (limited access area) and the Military and Law Enforcement Organizations will have responsibility for response in the limited access area (outer zone) and off-site. The INIR Team was informed that NPPA has formalized this agreement with both organizations.

The Nuclear Law, as amended, and its Executive Regulations assigned responsibilities to the authorities involved in the nuclear security regime. The regulation on the *Physical Protection of Nuclear Materials and Nuclear Facilities* has been drafted and is in the approval stage. This regulation covers the lifetime stages of nuclear facilities. The regulation on the *Security of Nuclear Materials and Radioactive*

Sources During Transport has been drafted and is now in the approval stage. NPPA is responsible for and is developing the design of physical protection system and will send it to ENRRA for approval.

The INIR team was informed that NPPA is also preparing a Nuclear Security Plan for the construction phase considering plant design information received from the vendor. NPPA will submit the plan to ENRRA for assessment and approval. ENRRA and NPPA are coordinating which modelling and simulation tools are to be used to evaluate the PPS effectiveness. Results of ENRRA's effectiveness evaluation will be used as input to the PPS design.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

15. Nuclear Security **Condition 15.2: Programmes in place for the management of sensitive information**	**Phase 2**
Summary of the condition to be demonstrated	For each of the key organizations, a process for categorization and management of sensitive information has been developed. This includes control of any sensitive information made available to contractors.
Examples of how the condition may be demonstrated	Processes for the protection of sensitive nuclear security information and protection of computer systems, networks and other digital systems that store sensitive information.

Observations

The Prime Minister's Decree No. 1741 includes the obligation to protect sensitive information. NPPA established an Integrated Information System (IIS) in early 2019. IIS is operated by the EPC Contractor to manage all design-related information. NPPA has the classification levels for different types of sensitive information and established the conditions and limitations of access. The State has established criminal offenses for unauthorized disclosure of sensitive information.

ENRRA and NPPA staff received formal training and certification for classification, protection, and handling of sensitive information by the Institute from the Ministry of Communication and Information Technology. Contractors are not required to attend this training, but NPPA provides guidance to its contractors to ensure they meet the State sensitive information requirements. Additionally, NPPA has a policy to sign a non-disclosure agreement with its contractors who work with sensitive information.

NPPA is developing a plan for cybersecurity relating to project information. ENRRA is in the process of developing a regulation for information and computer security which is expected to be issued in 2020. Although the regulations are not yet issued, ENRRA evaluated the EPC IIS readiness to handle sensitive information prior to commencement of project activities.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

15. Nuclear Security **Condition 15.3: Programmes in place for the trustworthiness of personnel**	**Phase 2**
Summary of the condition to be demonstrated	For each of the key organizations, a screening/vetting process for recruitment and selection of personnel with access to facilities, nuclear material and sensitive information has been developed.
Examples of how the condition may be demonstrated	Processes for the screening/vetting of personnel, including a graded approach depending on the level of access required.

Observations

ENRRA and NPPA applicants are investigated through a trustworthiness program as a condition for recruitment before joining the workforce. The trustworthiness programme is administered by two authorities: General Intelligence and National Security. Elements of trustworthiness checks include a review of employment risk, psychological tests, criminal records, drug test, and medical fitness examination for the assigned position.

This trustworthiness program also applies to all contractors working in the nuclear field. Additionally, contractors receive additional checks for previous employment and criminal background checks such as areas of money laundering and counterfeiting.

All workers in the nuclear field are re-checked/re-screened on an annual basis and when promoted to higher positions of responsibility. The INIR team was informed that the initial trustworthiness check process takes approximately 30 working days.

The draft regulation on the *Physical Protection of Nuclear Materials and Nuclear Facilities* contains a trustworthiness verification requirement for personnel with access to facilities, nuclear materials and

sensitive information. The draft regulation on the *Security of Nuclear Materials and Radioactive Sources During Transport* also contains requirements for trustworthiness verification.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		
15. Nuclear Security **Condition 15.4: Programmes in place for promotion of nuclear security culture**		**Phase 2**
Summary of the condition to be demonstrated	All relevant organizations understand the importance of a nuclear security culture and have plans to develop a nuclear security culture at all levels of the organization.	
Examples of how the condition may be demonstrated	Evidence of the promotion of a security culture by leaders and managers within all key organizations involved in the nuclear power programme, including recognition of the importance of integrated management systems and leadership for security, security of information and trustworthiness.	

Observations

NPPA has conducted several nuclear security training and workshop events for their staff including on the topic of nuclear security culture.

Since 2012, the Egyptian Nuclear Security Support Centre (ENSSC) has been conducting training and workshop events in the area of nuclear security culture for ENRRA staff and other key stakeholders involved in the nuclear power programme.

ENSSC provides the following services: to promote nuclear security culture at the national level; to train and develop human resources related to nuclear activities; and to orient workers in national security authorities to increase the nuclear security culture awareness. Other ENSSC training topics are offered in the areas of civil aviation, border control, and customs.

A five-year training plan was developed by the ENSSC which started in 2016 and includes the promotion of nuclear security culture.

ENSSC continues to work with the IAEA in the area of security culture programme development.

ENRRA stated that nuclear security culture is addressed in the general employee training programs for new and current staff members.

NPPA Nuclear Security department coordinates nuclear security culture activities. One NPPA example is that at the commencement of technical and administrative meetings a NPPA staff provides a 5-10 minutes awareness talk on a relevant nuclear security or nuclear safety topic. This practice reinforces the building of a nuclear security and safety culture.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES:

GP-15.4.1. At the commencement of technical and administrative meetings a NPPA staff provides a 5-10 minutes awareness talk on a relevant nuclear security or nuclear safety topic. This practice reinforces the building of a nuclear security and safety culture.

16. Nuclear Fuel Cycle **Condition 16.1: Front end fuel cycle strategy defined**			**Phase 2**
Summary of the condition to be demonstrated	Based on the national policy, a clear front end fuel cycle strategy has been defined identifying how new fuel will be available in the short and long term or which options are being pursued.		
Examples of how the condition may be demonstrated	(1) A document defining a realistic front end nuclear fuel cycle strategy at a level of detail appropriate for Milestone 2; (2) Evidence that basic decisions needed for Milestone 2 have been made. This includes a decision on the number of reloads to be requested with the first core, and a short and long term purchasing strategy for the fuel services (natural uranium, conversion, enrichment and fuel manufacturing); (3) An integrated plan for bidding and construction of any intended front end fuel cycle facilities consistent with the national long term fuel cycle strategy, the power plant construction programme and the national non-proliferation commitment.		
Observations In October 2017, the Supreme Council approved the Strategy for Securing Long-term Supply Plans for Nuclear Fuel. Egypt signed a Nuclear Fuel Supply (NFS) contract with a Russian supplier for the lifetime operation of all El-Dabaa NPP units. The INIR team was informed that the contract ensures the security of fuel supply and includes conditions under which NPPA can purchase fuel from other suppliers in the event of a serious supply disruption. Currently, Egypt has no plans to develop facilities for uranium enrichment nor NPP fuel fabrication.			
Areas for further action	**Significant**	No	
	Minor	No	
RECOMMENDATIONS			
None			
SUGGESTIONS			
None			
GOOD PRACTICES			
None			
16. Nuclear Fuel Cycle **Condition 16.2: Back end fuel cycle strategy defined**			**Phase 2**

Summary of the condition to be demonstrated	Based on the national policy, a back end fuel cycle strategy has been defined, including plans/options for storage (on-site and off-site), possible reprocessing or arrangements for fuel take back. Actions and timescales are consistent with the planned NPP construction programme.
Examples of how the condition may be demonstrated	(1) A document on spent fuel management strategy, including identification of facilities needed, actions, resources and timescales; (2) Evidence that basic decisions needed for Milestone 2 have been made. This includes a decision on fuel take back if considered, a decision on spent fuel storage capacity on-site and off-site and a strategy for purchasing and building these capacities. (3) Initial requirements clearly defined in the BIS.

Observations

In October 2017, the Supreme Council approved the Strategy for the Management of Radioactive Waste, Spent Nuclear Fuel and Decommissioning NPPs.

Spent nuclear fuel will first be kept in spent fuel pools at the reactor site for a maximum of 10 years. After wet storage, the spent fuel will be transferred to a dry storage facility. This facility will be within the NPP site.

NPPA signed a Spent Nuclear Fuel Treatment (SNFT) contract with a Russian company to design and construct a modular dry storage facility. The INIR team was informed that the contract covers the construction of one module including storage casks, with a capacity for 15 years of NPP operation. The SNFT contract also includes training NPPA personnel who will be responsible for operating the dry storage facility.

The dry storage facility requires a separate site permit. NPPA is preparing the site evaluation report and the environmental impact assessment report for this facility. It plans to apply for the site permit in 2020.

After the interim storage period, the current plan is direct disposal of spent fuel. EAEA is responsible for disposal of spent fuel (see Condition 17.1).

Article 12 of the Nuclear Law assigns the responsibility for regulating and inspecting spent fuel facilities to ENRRA. The INIR team was informed that ENRRA is currently using national regulations, the IAEA's safety standards and the vendor country codes and standards related to spent fuel management.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None
GOOD PRACTICES
None

17. Radioactive Waste Management Condition 17.1: Handling the burdens of radioactive waste considered	Phase 2
Summary of the condition to be demonstrated	Based on the national policy, a clear strategy for the processing, storage and disposal of radioactive waste (including spent fuel if considered as waste) has been developed. If the reprocessing of spent fuel is considered, the waste management strategy includes consideration of the transport, storage and disposal of high level waste. Requirements for processing and storage facilities to be provided by the vendor have been included in the BIS. Plans for any national facilities for radioactive waste management and waste management organizations have been defined and are consistent with the construction programme.
Examples of how the condition may be demonstrated	(1) Policy and strategy documents for the management of radioactive waste (this may include the creation of a specific national waste management organization): (a) Disposal of all waste types; (b) Consideration of regulatory and implementation infrastructures; (c) Allocation of responsibilities; (d) Technical approaches; (e) Funding schemes. (2) Consideration of the suitability of geological conditions in the country for disposal of all types of radioactive waste and/or the potential for contracting for waste disposal with other States; (3) Requirements for facilities to be provided as part of the NPP and provisions for minimizing waste volumes and toxicity included in the BIS; (4) A plan for bidding and construction of any separate waste facilities available and consistent with the power plant construction programme; (5) A plan to initiate or enhance national waste disposal programmes.

Observations

In 2017, the Supreme Council approved the Strategy for Spent Nuclear Fuel, Radioactive Waste and NPP Decommissioning.

Article 12 of the Nuclear Law assigns responsibility for regulating and inspecting radioactive waste management facilities to ENRRA. The INIR team was informed that ENRRA has adopted the IAEA's Safety Standards as described in the GSR Part 3 that includes waste exemption and clearance criteria. ENRRA will develop national regulations with support from a Russian and international TSO. The INIR team was informed that ENRRA is currently preparing requirements for predisposal management. In the future the requirements for disposal will be developed.

EAEA is the national organization responsible for radioactive waste management. Radioactive waste management activities on the El-Dabaa site are the responsibility of NPPA. The INIR team was informed that EAEA is part of the Coordination Committee and the NPPA Chairman is a member of the EAEA Board. This supports the coordination between both organisations.

The EPC contract includes provision of on-site facilities for processing and storing low- and intermediate-level waste (LILW). The technical specifications include requirements for minimization of wastes and discharges and the use of the latest techniques for waste treatment. The on-site dry storage of spent fuel is included in the SNFT contract (described under Condition 16.2).

Obtaining the construction permit will include the approval of a preliminary radioactive waste management plan. The final plan will be provided as part of the operating license application.

After an on-site storage period of 10 years, the LILW will be transferred to EAEA. EAEA currently operates the "Central Radioactive Waste Processing Facility" for the processing and storage of radioactive waste in Egypt. The bulk of this waste comes from two research reactors, a radioisotope production facility, a nuclear fuel fabrication plant and nuclear applications using sealed radioactive sources.

To prepare itself for the management of NPP waste in the future, EAEA will expand its competence in this field. EAEA is collaborating with the US National Laboratory and the IAEA. Both organizations are providing EAEA with opportunities to follow international efforts and progress on waste management and disposal.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

17. Radioactive Waste Management **Condition 17.2: Preliminary decommissioning plan requested**	**Phase 2**

Summary of the condition to be demonstrated	A request for a preliminary decommissioning plan from the vendor has been included in the BIS. Specific national requirements have been included.
Examples of how the condition may be demonstrated	(1) A document discussing national requirements for decommissioning; (2) Requirements for a decommissioning plan included in the BIS.

Observations

The EPC contract includes preparing a preliminary decommissioning plan. Obtaining the construction permit will include the approval of a preliminary decommissioning plan. The plan will include a preliminary cost estimate for decommissioning.

The INIR team was informed that the decommissioning plan will be updated every 5 years. The INIR team was also informed that NPPA has allocated staff of its engineering department to work on decommissioning. ENRRA will develop regulations for the decommissioning phase with the support of a Russian and international TSO.		
Areas for further action	**Significant**	No
	Minor	No
RECOMMENDATIONS		
None		
SUGGESTIONS		
None		
GOOD PRACTICES		
None		

18. Industrial Involvement Condition 18.1: National capabilities assessed and plans to enhance capability defined	Phase 2
Summary of the condition to be demonstrated	A review of national capability has been completed, identifying areas where national supply is available or can be developed. Based on this, volume targets, or specific areas, for national involvement have been developed. Plans for upgrading national capability have been defined and funded. The transfer of technology including intellectual property has been considered.
Examples of how the condition may be demonstrated	(1) A realistic assessment of the national and local supplier capabilities based on the national policy recommended by the NEPIO; (2) An assessment of the training and funding requirements to upgrade quality; (3) Extent of national industrial participation agreed, desired targets for local and national industrial involvement specified, and requirements for the transfer of technology, including intellectual property, included in the BIS; (4) Clear plans and programmes identifying: (a) Specific industrial involvement in future construction, maintenance or operational support services; (b) Audits of the progress of industrial preparation and ability to meet the requirements for addition to the approved supplier list; (c) Short term and long term programmes (including future projects) to develop the ability to produce items initially being supplied by foreign suppliers; (d) Requirements for industries to be added to the potential vendor/service supplier lists; (e) Requirements for export and import consistent with the State's commitment and obligations with regard to non-proliferation of nuclear weapons and safeguards implementation.

Observations

There is a national policy for local participation and technology transfer. The INIR team was informed that the EPC contract foresees 20% local content for the first unit, increasing to 35% as further units are built. The main target areas are design, construction, equipment and components, and materials.

A Ministerial Decree was issued in 2016 establishing the National Committee for Localization for the Nuclear Power Programme, at the ministerial level, referred to as the Egyptian National Localization Joint Committee (ENLC). The ENLC maintains a website that allows Egyptian companies to register and propose their support for the construction and supply of equipment and materials for the El-Dabaa NPP project.

An initial evaluation of national capabilities was performed in 2010. The INIR team was informed that the potential national suppliers list has over 150 companies. NPPA maintains and shares with the EPC

contractor a database of those potential national suppliers that contains initial information about the companies and their qualifications.

A decree of 2016 established the Joint Committee on Localization (JCL), between NPPA and the EPC contractor. JCL is responsible to facilitate the exchange between prospective Egyptian companies and the EPC contractor. JCL has organized several activities with national companies, such as seminars, technical review visits, meetings, nuclear supply forums, etc.

NPPA and the EPC contractor are carrying out joint technical audits of national suppliers, but it is recognized that the qualification and choice of sub-contractors is the responsibility of the EPC contractor. Law 210/2017 provides tax incentives for the participation of the local companies but any required investments to achieve the necessary qualification will be the responsibility of the interested companies. The understanding of industrial codes and standards is addressed through training courses and seminars for all relevant parties.

JCL issues annual and quarterly plans, aligned with the procurement plan, to facilitate and monitor localization efforts.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

GP-18.1.1 NPPA is involved in a joint committee with the EPC contractor that works actively in promoting, facilitating, planning and auditing the preparation of the national industry for the supply chain of the NPP project. This committee facilitates the achievement of the localization targets.

19. Procurement **Condition 19.1: Procurement capability available**		**Phase 2**
Summary of the condition to be demonstrated	A procurement capability has been established for specific services, such as siting work and consultancy services.	
Examples of how the condition may be demonstrated	(1) Procedures or audits to ensure suppliers have appropriate expertise and experience; (2) Evidence of preparation of formal specifications for the services required; (3) Quality standards included in the service specifications; (4) Awareness of the non-proliferation regime with regard to nuclear or nuclear related trade.	

Observations

General government procurement is regulated by the Law 89/1998. Some more flexibility is foreseen in a new law No. 182/2018, but the executive regulations under that law have not yet been issued.

Basic requirements are specified in both laws for all suppliers, including that they must be competent, licensed in Egypt, financially sound and have experience.

Law 210/2017 allows NPPA to develop special procurement procedures that provide added speed and flexibility over the general governmental procurement law. Three main procurement options are available, namely open tender, limited tender with pre-selected suppliers and direct order. After specifications are prepared, budget costs are estimated and offers are evaluated in specific committees.

Law 211/2017 allows ENRRA to develop special procurement regulations to have a more flexible procurement process. However, the decree to implement these procurement regulations is still in draft.

ENRRA's procurement process is described in the Management System Manual as support process number 8, under the responsibility of the Procurement and Warehouse Unit. A technical committee elaborates the specifications as well as a budget estimate, and a financial committee evaluates the offers.

Both NPPA and ENRRA have experience in carrying out relevant procurement activities, such as consultancy services from different TSOs.

Areas for further action	**Significant**	No
	Minor	No

RECOMMENDATIONS

None

SUGGESTIONS

None

GOOD PRACTICES

None

APPENDIX 2: LISTS OF THE INIR TEAM MEMBERS AND COUNTERPARTS

INIR MISSION REVIEW TEAM	
Jose Bastos	Team Leader, IAEA
Mehmet Ceyhan	Mission Coordinator, IAEA
Susan Pickett	IAEA
Douglas Shull	IAEA
Eric Mathet	IAEA
Matthew Van Sickle	IAEA
Philippe Van Marcke	IAEA
Abdelmadjid Cherf	International Expert
Stephen Mortin	International Expert
Julio Barcelo	International Expert
Marcelo Gomes da Silva	International Expert

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1	**National Position**	**Prof. Amged Saeed EL-WAKEEL (Leading)**	**NPPA**
		Dr. Abdel Hamid Abbas EL-DESOKY	NPPA
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		Dr. Khalil Abdel Fattah YASSO	NPPA
		Prof. Mahmoud Ali MOHAMED	EAEA
		Eng. Mohamed Ahmed EL-MAHLAWY	MOERE
		Prof. Usama Seddik MOSTAFA	ENRRA
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2	**Nuclear Safety**	**Prof. Usama Seddik MOSTAFA (Leading)**	**ENRRA**
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4	**Funding and Financing**	**Mr. Mahmoud ABO-SAIF (Leading)**	**NPPA**
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5	**Legal Framework (Cont.)**	Dr. Manal Abdel Hakim ELTANTAWY	EEAA
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		Mr. Kossay Mahmoud KOREISH	EEAA
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		Prof. Usama Seddik MOSTAFA	ENRRA
		Mr. Zakaria Abdallah EL-SAYED	NPPA

APPENDIX 3: REFERENCES

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APPENDIX 4: ABBREVIATIONS

ARE	Arab Republic of Egypt
BIS	Bid Invitation Specifications
CCNRE	Central Chamber for Nuclear & Radiological Emergencies
CIGA	Credit Intergovernmental Agreement
CRWPF	Central Radioactive Waste Processing Facility
CSA	Comprehensive safeguards agreement
DA	Destructive Assays
DBT	Design Basis Threat
DIQ	Design Information Questionnaire
EAEA	Egyptian Atomic Energy Authority
EEAA	Egyptian Environment Affairs Agency
EEHC	Egyptian Electricity Holding Company
EETC	Egyptian Electricity Transmission Company
EIA	Environmental impact assessment
EIAR	Environmental Impact Assessment Report
ENRRA	Egyptian Nuclear and Radiation Regulatory Authority
EPC	Engineering, procurement and construction
ESAC	Egyptian System of Accounting for Control of Nuclear Material
FCNRS	Joint Stock Company Federal Center for Nuclear and Radiation Safety
GoE	Government of Egypt
GSR	IAEA Safety Standard
HLW	High-level radioactive waste
HRD	Human Resource Development
IAEA	International Atomic Energy Agency
IGA	Intergovernmental Agreement

IMS	Information Management System
INIR	Integrated Nuclear Infrastructure Review
LILW	Low and Intermediate Level Waste
MOD	Ministry of Defense
MOE	Ministry of Environmental
MOERE	Ministry of Electricity and Renewable Energy
MOFA	Ministry of Foreign Affairs
MOH	Ministry of Health
MOI	Ministry of interior
MOT	Ministry of Transportation
MOU	Memorandum of Understanding
MW(e)	Megawatt electric
NDA	Non Destructive Assays
NEPIO	Nuclear Energy Programme Implementing Organization
NFS	Nuclear Fuel Supply
NMA	Nuclear Materials Authority
NPP	Nuclear power plant
NPPA	Nuclear Power Plants Authority
NPT	Non- Proliferation Treaty
OSM	Operation Supporting Services and Maintenance
PDA	Project Development Agreement
PSAR	Preliminary Safety Analysis Report
QA	Quality Assurance
QC	Quality Control
RANET	IAEA, Response and Assistance Network
SCNRE	Supreme Committee for Nuclear and Radiological Emergency
SER	Self-evaluation report

SNFT	Spent Nuclear Fuel Treatment
SSAC	State system of accounting for and control of nuclear material
TSO	Technical support organization
USA	United States of America
VVER	Russian VVER-Type Reactor
WANO	World Association of Nuclear Operators