



United Arab Emirates

UNITED ARAB EMIRATES

FIRST NATIONAL REPORT ON COMPLIANCE WITH THE OBLIGATIONS OF THE JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

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Section A. Introduction

A.1 This is the United Arab Emirates (UAE) first national report on compliance with the obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention). The UAE deposited its instrument of accession to the Joint Convention on 31 July 2009 and under Article (40) the Joint Convention entered into force for the UAE 90 days later on 29 October 2009.

A.2 The report describes the basic policy and legal framework being established by the UAE for spent fuel management and radioactive waste management. The initial framework is contained in the *Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy* (hereafter referred to as the *UAE Policy Paper* and attached as Annex 1) and the *Federal Law by Decree No 6 of 2009 Concerning the Peaceful Uses of Nuclear Energy* (hereafter referred to as the *Nuclear Law* and attached as Annex 2 in unofficial translation).

A.3 The report describes the UAE's existing and planned arrangements for radioactive waste management for radioactive waste arising in medical, industrial and research applications. It also describes the broad plans and arrangements under development by the Emirates Nuclear Energy Corporation (ENEC) for management of spent fuel and radioactive waste generated by the UAE nuclear energy program.

A.4 The progress in establishing regulatory arrangements by the Federal Authority for Nuclear Regulation (FANR) is also described in some detail as this is the UAE's first report.

A.5 The report describes the UAE's compliance as at October 2011. The UAE will expect to be able to report at the Fourth Review Meeting in May 2012 on further progress in spent fuel management and radioactive waste management, including:

- The results of a survey of radioactive waste inventories held by licensed users of radioactive material
- Adoption of a national radioactive waste classification scheme based upon the IAEA safety guide No GSG-1
- Further steps towards developments of an overall strategy for disposal of spent fuel/ radioactive waste, including outcomes from a current project undertaken by international consultants steered by ENEC, FANR and the Ministry of foreign Affairs.
- Progress with radioactive waste management at ENEC, including:
 - Guidelines for minimization of waste volume
 - The proposed plant design including storage of low and intermediate waste at plant site for a minimum of 10 years
- The following measures being taken by ENEC for the management of spent fuel
 - The design of the Braka Nuclear Power Plant having sufficient capacity in the spent fuel storage pool for 20 years of operation for each NPP
 - ENEC's intended establishment of an independent spent fuel storage installation (ISFSI) to support on-going operations. The ISFSI will be established before the spent fuel pools reach their capacity

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- ENEC's progress in looking at long term spent fuel disposal options that include fuel take-back, reprocessing outside of UAE and repositories inside or outside of UAE.

A.6 The UAE nuclear programme is in its early stages. But the UAE accepts that it is not too early to plan for spent fuel and radioactive waste management. In doing so, it will apply the same commitment to highest international standards of safety, security and non-proliferation as it has committed to throughout its peaceful nuclear energy program.

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Section B. Policies and Practices

Article 32.1: Reporting

In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

- (i) spent fuel management policy
- (ii) spent fuel management practices
- (iii) radioactive waste management policy
- (iv) radioactive waste management practices
- (v) criteria used to define and categorize radioactive waste

Spent Fuel Management Policy

B.1 The UAE Policy Paper set out several important commitments that bear on the development of the UAE's spent fuel policy. The following paragraphs are excerpts from the UAE Policy Paper (Section 2, pages 9 and 10).

Renouncing an intention to develop a domestic enrichment and reprocessing capability and undertaking to source fuel from reliable and responsible foreign suppliers

Unlike many countries having civilian nuclear energy programs, the UAE will not be involved in nuclear fuel-cycle activities beyond those that would be required for the management and disposal of radioactive waste in the event that the UAE deployed nuclear power plants within its territory. A number of factors underlie this view, including the economic infeasibility of operating enrichment and reprocessing facilities for comparatively small nuclear fleets, concerns from the international community regarding spent fuel reprocessing and enrichment plants in developing countries, and the dual-use nature of components employed in fuel fabrication and processing. In consideration of these factors, the UAE will not seek to develop domestic capabilities in those areas, either as part of its evaluation of nuclear energy or as a component of future UAE nuclear program.

In lieu of domestic enrichment and reprocessing, the UAE would seek to conclude long-term arrangements with reliable and responsible governments and contractors for the secure supply of nuclear fuel, as well as the safe and secure transportation and, if available, the disposal of spent fuel via fuel leasing or other emerging fuel supply arrangements.

Development as required, of a comprehensive waste management system that reflects the highest standard of international practice and which does not include domestic reprocessing

In terms of short-term fuel storage, the UAE would be committed to the highest standards of security and safety. However, as noted above, in light of the proliferation concerns associated with spent fuel, the UAE would prefer to source nuclear fuel via fuel leasing or similar arrangements that relieve it of the long-term

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requirement of safeguarding spent fuel. In any event, should long-term storage in the UAE be required, long-term spent fuel facilities would be built and managed under strict regulations to ensure the compatibility of the international safety standards of waste disposal. The generation of radioactive waste would be kept to a minimum possible by appropriate design measures and operating practices. Waste treatment and interim storage would be strictly controlled in a manner consistent with the requirements for safe final disposal. The UAE would also prefer using foreign suppliers' services, if offered, to reduce the volume of spent fuel to reduce permanent storage requirements. These services would be obtained under the condition that all reprocessing takes place outside the UAE.

Reprocessing will not be considered by the UAE in any nuclear energy program. In keeping with this approach, the UAE would also support international efforts to develop a network of multi-lateral fuel assurances, possibly including a "last resort" fuel bank, which would provide insurance against nuclear fuel supply interruption for states with no indigenous enrichment facilities.

Setting aside the question of high-level waste associated with spent fuel, the UAE would develop appropriate mechanisms and facilities for the domestic disposal of all low and intermediate level waste generated by any future nuclear facilities.

B.2 The *Nuclear Law* also enshrines the commitment to no domestic enrichment and reprocessing and contains provisions related to spent fuel and radioactive waste management policy (Chapter Eight: Radioactive Waste and Decommissioning).

Spent Fuel Management Practices

B.3 ENEC has taken the following measures for the management of spent fuel

- The design of the Braka Nuclear Power Plant has sufficient capacity in the spent fuel storage pool for 20 years of operation for each NPP.
- ENEC intends to establish an independent spent fuel storage installation (ISFSI) to support on-going operations. The ISFSI will be established before the spent fuel storage pool reaches capacity.
- In addition, ENEC is also looking at long-term spent fuel disposal options that include fuel take-back, reprocessing outside of UAE and repositories inside or outside of UAE.
- ENEC is working with FANR, MOFA and an international consultant on the development of UAE's radioactive waste management policy.

Radioactive Waste Management Policy

B.4 In addition to the references to radioactive waste management in the *Policy Paper* as stated above, Chapter 8 of the *UAE Nuclear Law* (Articles (40-42)) addresses issues of radioactive waste and decommissioning, where;

- Article (40.1) affirms the responsibility of licensees to safely manage and store radioactive waste from its generation until delivery to an entity designated by the UAE Cabinet to manage disposal of such material

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- Article (40.2) obliges the licensee to comply with duties and responsibilities for the safe management of radioactive waste determined by the Authority
- Article (40.3) requires that the Board of FANR to adopt rules for the requirements, responsibilities and duties for the safe management of radioactive waste
- Article (41.1) states that the UAE Cabinet shall issue a policy regarding long-term management and disposal of spent fuel and nuclear waste and identify the entity in charge of implementing the policy. It also states that the spent fuel and radioactive waste will become property of the state from the time of its delivery to the state or to the entity designated by the Cabinet
- Article (41.2) states that regulations shall specify terms and procedure for waste delivery to the entity designated by the Cabinet, including waste which is not subject to delivery, and the regulation shall also specify time limits for the delivery and fees to be paid by the radioactive waste producers
- Article (41.3) prohibits import of spent nuclear fuel and nuclear waste derived from nuclear energy applications outside the UAE, for the purpose of long term storage or disposal in the UAE's lands and sites
- Article (42) establishes a legal regime for decommissioning of nuclear installations, including establishment by the UAE Cabinet of a Decommissioning Trust Fund to be financed through fees collected from licensees. The fees are to cover the costs of construction, operation and closure of a radioactive waste management facility, decommissioning costs, costs of regulatory oversight and for management of the Trust Fund.

B.5 FANR has promulgated FANR-REG-11 'Regulation for Radiation Protection and Pre-disposal Radioactive Waste Management in Nuclear Facilities' which establishes requirements for radioactive waste management in Nuclear Facilities. FANR-REG-11 covers:

- General requirements for pre-disposal management
- Steps in the pre-disposal management of radioactive waste
- Pre-disposal radioactive waste management facilities and activities
- Clearance levels and discharges of radioactive material
- Environmental monitoring programme.

B.6 FANR-REG-24 'Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than Nuclear Facilities' also establishes requirements for radioactive waste management.

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Radioactive Waste Management Practices

B.7 The UAE has 11 medical facilities dealing with nuclear medicine and radiotherapy generating small amounts of radioactive waste which has been stored on their own premises or appropriately discharged. FANR is developing a Regulation that will permit clearance of radioactive material in these practices from regulatory control and systematize the process of disposal of radioactive waste by the user. In general, users of radioactive sources return sources to the manufacturer but some of the licensees have some legacy sources stored at their premises.

B.8 ENEC's activities in the radioactive waste management area are provided below:

- A report outlining the strategy for the radioactive waste storage and disposal has been prepared.
- Radioactive waste management at ENEC involves:
 - Guidelines for minimization of waste volume
 - The plant design including storage of low and intermediate waste at plant site for a minimum of 10 years
 - Longer term storage may be accommodated by construction of a separate Low/Intermediate Radwaste Storage Building near the power plants.

Criteria used to define and categorize radioactive waste

B.9 FANR has commenced the process for developing a Regulatory Guide for classification of radioactive waste based upon the IAEA safety standard GSG-1 Classification of Radioactive Waste Safety Guide. The UAE will report on the progress with this Regulatory Guide at the Fourth Review Meeting.

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Section C. Scope of Application

Article 3: Scope of application

1. This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.
2. This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.
3. This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.
4. This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.

Spent Fuel at Reprocessing Facilities

C.1 Any declaration of reprocessing as part of spent fuel management will be considered should the UAE determine that overseas reprocessing of spent fuel is part of its strategy.

Naturally occurring radioactive material

C.2 The UAE does not declare waste that contains only naturally occurring radioactive material and that does not originate from the nuclear fuel cycle as radioactive waste for the purpose of the Joint Convention, pursuant to Article 3(2).

Military or defence programmes

C.3 No spent fuel or radioactive waste from military or defence programs is declared as spent fuel or radioactive waste for the purpose of the Convention pursuant to Article 3(3).

Discharges

C.4 The UAE notes that the Joint Convention applies to discharges as specified.

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Section D. Inventories and Lists

Article 32.2: Reporting

2. This report shall also include:

- (i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features
- (ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity
- (iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features
- (iv) an inventory of radioactive waste that is subject to this Convention that:
 - (a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities
 - (b) has been disposed of
 - (c) has resulted from past practices

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

- (v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities

Spent Fuel Management Facilities and Inventory of Spent Fuel

D.1 At this stage of the UAE civil nuclear energy program, the UAE has no spent fuel or spent fuel facilities.

Radioactive Waste Management Facilities

D.2 Currently there are no radioactive waste management facilities (as defined in the Joint Convention) in the UAE.

Inventory of Radioactive Waste

D.3 The UAE uses radioactive sources in a range of industrial and medical applications.

D.4 FANR is in the process of licensing all users of Regulated Material (which includes radioactive material and radiation generators) and at the same time implement a national source register. This register will also cover disused radioactive material stored at the licensee's premises.

D.5 The UAE has 11 medical facilities dealing with nuclear medicine and radio therapy generating small amounts of radioactive waste which has been stored on their own premises or appropriately discharged. FANR is developing a regulation that will allow clearance of radioactive material in these practices to systematize the process of disposal of radioactive waste by the user. In general, users of radioactive sources return sources to the manufacturer, but some of the licensees have some legacy sources stored at their premises.

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D.6 FANR is planning to undertake a survey of licensees to verify their inventory of radioactive waste. It is expected that this will be completed to allow the presentation of a draft first national inventory using the IAEA reporting criteria at the time of the Fourth Review Meeting.

Decommissioning of Nuclear Facilities.

D.7 There are no nuclear facilities in the UAE.

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Section E. Legislative and Regulatory System

Article 18: Implementing Measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

Steps to Implement Obligations

E.1 The UAE has established the legislative framework needed to implement its obligations under the Joint Convention, principally through the *UAE Nuclear Law*. The regulatory and administrative framework is under development.

E.2 The UAE's legal and regulatory framework is to be the subject of an Integrated Regulatory Review Service Mission (IRRS) in December 2011. The UAE anticipates reporting on the relevant outcomes of this IRRS mission at the Fourth Review Meeting.

Article 19: Legislative and Regulatory Framework

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.
2. This legislative and regulatory framework shall provide for:
 - (i) the establishment of applicable national safety requirements and regulations for radiation safety
 - (ii) a system of licensing of spent fuel and radioactive waste management activities
 - (iii) a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence
 - (iv) a system of appropriate institutional control, regulatory inspection and documentation and reporting
 - (v) the enforcement of applicable regulations and of the terms of the licences;
 - (vi) a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management
3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

The establishment of applicable national safety requirements and regulations for radiation safety

E.3 Article (11)(4) of the *UAE Nuclear Law* gives Board of Management of FANR the power to establish, develop or adopt regulations and guidelines upon which its regulatory actions are based, including the objective of protecting 'individuals, society and the environment from radiation hazards both for the present and in the future.'

E.4 Article (38) of the *UAE Nuclear Law* specifies that the Board shall issue the regulations specifying the requirements which all operators must comply with and follow.

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E.5 The *UAE Nuclear Law* also defines the Regulated Activities for which a Licence is needed. It defines Radioactive Waste as “waste that contains, or is contaminated with, radionuclides at concentrations or activities greater than the levels as established by the Authority”.

E.6 The following regulations have been approved and issued:

- FANR REG-01, “Management Systems for Nuclear Facilities;”
- FANR REG-02, “Siting of Nuclear Facilities;”
- FANR REG-03, “Design of Nuclear Facilities;”
- FANRREG-04, “Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities;”
- FANR REG-05, “Application of Probabilistic Risk Assessment at Nuclear Facilities;”
- FANR REG-06, “Application for a Licence to Construct a Nuclear Facility;”
- FANR REG-08, “Physical Protection for Nuclear Material and Nuclear Facilities;”
- FANR REG-11, “Radiation Protection and Predisposal Radioactive Waste Management for Nuclear Facilities;”
- FANR REG-12, “Emergency Preparedness at a Nuclear Facility;”
- FANR REG-13, “Transportation of Radioactive Materials;” and
- FANR REG-24, “Basic Safety Standards for the Conduct of Regulated Activities with Regulated Material.”

E.7 The following regulations are in draft form:

- FANR REG-07, “Nuclear Facility Construction;”
- FANR REG-09, “Import / Export Controls;”
- FANR REG-10, “Safeguards and Nuclear Material Accounting and Control;”
- FANR REG-14, “Application for a Licence to Operate a Nuclear Facility;” and
- FANR REG-23, “Security of Radioactive Sources.”

E.8 Regulatory guidance that describes methods acceptable to FANR for the implementation of these regulatory requirements is also under preparation in the form of Regulatory Guides. The following regulatory guides have been approved and issued:

- FANR RG 001 “Content of Nuclear Facility Construction and Operating License Application“
- FANR RG 002 Application of Management Systems for Nuclear Facilities
- FANR RG 003 Probabilistic Assessment: Scope, Quality and Application
- FANR RG 004 Evaluation Criteria for Probabilistic Safety Targets and Design Requirements.

E.9 FANR has also established within its management system a process for establishing and revising regulatory requirements and guidelines that includes provisions for internal and external stakeholder review and incorporation of comments, as appropriate.

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A system of licensing of spent fuel and radioactive waste management activities

E.10 The *UAE Nuclear Law* Articles (23 to 31) provides requirements for granting, revocation, and suspension of licences. A licence is required to carry out any Regulated Activity which is defined in Article (25) and would include spent fuel and radioactive waste management activities. Regulated Activities include conducts related to Nuclear Facilities (according to the definition in the Law, a Nuclear Facility includes a Radioactive Waste Repository) and dealings with Regulated Material, which includes radioactive waste.

E.11 Article (28) requires the applicant for a licence to submit detailed evidence of safety that shall be reviewed and assessed by FANR in accordance with defined procedure.

E.12 Article (6) gives exclusive authority to FANR for issuing licences to practice any of the Regulated Activities in the UAE and permits FANR to impose conditions on licences.

E.13 Following review and assessment of a licence application, FANR determines whether to issue a licence, a licence with conditions, or to refuse a licence and record the basis for the decision. The licensing process is described in more detail in Article (14) of this National Report.

A system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence

E.14 Article (23) of the *UAE Nuclear Law* prohibits any person from conducting any 'Regulated Activity' in the UAE unless licensed to do so by FANR. Regulated Activity includes the siting, construction, operation and decommissioning of Nuclear Facilities, including radioactive waste repositories, and activities with 'Regulated Material', which includes radioactive waste. Articles (60) to (62) of the *UAE Nuclear Law* establish criminal penalties for carrying out Regulated Activity without a licence.

A system of appropriate institutional control, regulatory inspection and documentation and reporting

E.15 The *UAE Nuclear Law* Articles (32-37) provides requirements on inspection and control of licensee activities. Article (35) requires FANR to establish a planned and systematic inspection programme. Article (36) requires FANR to conduct inspections covering all areas of regulatory responsibility to ensure that the operator is in compliance with the law, regulations and licence conditions. In undertaking inspections, FANR is required to take account of the activities of suppliers of services and products to the operator. Article (5.8) provides FANR with the power to enter sites and facilities to carry out inspections. Regulatory inspection is discussed in more detail in Chapter 14 of this National Report.

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The enforcement of applicable regulations and of the terms of the licences

E.16 Article (5.17) of the *UAE Nuclear Law* gives FANR the power to undertake enforcement actions, which are defined to include corrective actions, written warnings, revocation of a licence, and administrative penalties and fines. Article (36.2) empowers FANR to take enforcement action compelling the operator to take actions necessary to remediate any breach. Article (36.3) empowers FANR itself to remedy a breach if the operator does not do so. In such cases, the operator would bear the necessary costs of such an intervention. Article (37) obliges the operator to comply with FANR decisions and to remedy any breach, undertake an investigation related to the breach, and take any measures necessary to prevent a recurrence.

A clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management

E.17 As noted in section B.3 of this National Report, Chapter 8 of the *UAE Nuclear Law* (Article (40-42)) addresses issues of radioactive waste and decommissioning, where:

- Article (40.1) affirms the responsibility of licensees to safely manage and store radioactive waste from its generation until delivery to an entity designated by the UAE Cabinet to manage disposal of such material.
- Article (40.2) obliges the licensee to comply with duties and responsibilities determined by the Authority.
- Article (40.3) requires FANR to adopt rules for safe management of radioactive waste.
- Article (41) provides that the UAE Cabinet will issue a policy regarding long-term management of spent fuel and nuclear waste. It also states that the spent fuel and radioactive waste will become property of the state from the time of its delivery to the state or to the entity designated by the Cabinet.
- Article (41.2) states that regulations shall specify terms and procedure for waste delivery to the entity designated by the Cabinet, including waste which is not subject to delivery, and the regulation shall also specify time limits for the delivery and fees to be paid by the radioactive waste producers.

Other authorities concerned with environmental impact assessment, local planning, waste management and other governmental activities will be involved as appropriate as the UAE's overall strategy is developed.

Whether to regulate radioactive materials as radioactive waste

E.18 The UAE will follow IAEA safety standards and guidance in making these decisions.

Article 20: Regulatory Body

- | |
|---|
| 1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and |
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provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.

2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.

Establishment of the Regulatory Body

E.19 The Federal Authority for Nuclear Regulation (FANR) is the federal governmental agency designated as the Regulatory Body which gets its powers from the *UAE Nuclear Law*. Chapter 2, Articles (4–9) of the *UAE Nuclear Law* establishes FANR as the regulatory body to implement the legislative and regulatory framework.

- Article (4) establishes FANR as a public organisation with an independent balance sheet, an independent legal personality, full legal competence and financial and administrative independence. It states the aims of FANR as the assurance of safety, security and radiation protection within the UAE nuclear programme with the development of the nuclear sector towards only peaceful purposes
- Article (5) gives power to FANR to determine all matters relating to the regulation of the nuclear sector in regard to safety, nuclear safety, nuclear security, radiation protection and safeguards. FANR must also implement obligations under relevant international instruments entered into by the UAE. This Article lists the powers of FANR in 33 sub-Articles
- Article (6) gives FANR exclusive jurisdiction over the licensing of ‘Regulated Activities’ in the UAE
- Article (7) requires FANR to co-operate with relevant government including in relation to radioactive waste
- Article (8) authorizes FANR to investigate potential breaches of the *Nuclear Law*
- Article (9) requires FANR to maintain the highest standards of transparency in its regulatory activities while allowing it to protect confidential information.

E.20 Chapter 3, Article (10-17) of the *UAE Nuclear Law* sets out provisions on the management of FANR.

- Article (10) establishes the FANR Board to manage the organisation
- Article (11) establishes the general authorities and functions of the Board including that it establishes the general policy of FANR, adopts its budget and organisational structure, and issues the range of regulations and requirements needed for FANR’s operations and functions
- Article (12) sets forth conditions of Board membership
- Article (13) identifies the grounds on which Board members may be replaced
- Article (14) provides for the appointment of a Director General to manage FANR and oversee its financial, administrative and technical affairs
- Article (15) establishes that the Director General manages FANR’s business and oversees its financial, administrative and technical affairs under the Board of

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Management control. It sets out the duties of the Director General in nine sub articles, including that the Director General reviews all licence applications and makes appropriate recommendations to the Board

- Article (16) limits the grounds on which the Director General may be replaced
- Article (17) authorizes FANR to appoint employees.

E.21 Chapter 4, Articles (18-22) of the *UAE Nuclear Law* deals with FANR's financial affairs.

- Article (18) gives FANR the powers to manage its finances and identifies the means of funding for FANR as: funding allocated by Government; income generated from its functions (fees); and other income that is accepted and that does not conflict with FANR's objectives
- Article (19) establishes the dates of the fiscal year for FANR financing
- Article (20) makes FANR subject to UAE tender and procurement laws and applicable financial and auditing regulations
- Article (21) grants FANR exemption from UAE taxes
- Article (22) provides that the FANR Board will appoint an independent auditor to report on the Authority's financial affairs.

Status of the Regulatory Body

E.22 The *UAE Nuclear Law* clearly establishes FANR as the independent government body charged with the regulation and licensing of all nuclear activities within the UAE, which includes the siting, construction, and operation, and decommissioning of Nuclear Facilities as well as the regulation of radioactive materials and radioactive sources used in medical, research, oil exploration, and other industries.

E.23 Pursuant to the commitments set forth in *UAE Policy Paper* and consistent with the Joint Convention and other relevant international instruments to which the UAE is a party, FANR has committed itself to the following core values:

1. **Safety Awareness and Responsibility** (commitment to highest standards of safety, security and safeguards; support for international agreements and policies established by UAE Government; collaboration with IAEA and with national nuclear regulatory authorities; engagement with stakeholders)
2. **Independence**(making decisions that are objective and unbiased; applying highest ethics; in-house expertise to assess technical reviews)
3. **Transparency**(engage with stakeholders and independently communicate FANR decisions; clear channels of communication with public and international nuclear community)
4. **Competency**(employ world-class expertise and pursue continuous improvement; collaboration with national and international experts to develop competencies with UAE citizens; benchmark against international standards)

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E.24 The FANR Board Members are appointed for a renewable fixed term and can only be removed by a resolution of the Cabinet for defined reasons (Article (13)). Article 23 prohibits any person from conducting a Regulated Activity (which includes all relevant activities relating to a nuclear installation) without a licence from FANR. Article 6 establishes FANR as the sole decision-maker in licensing, and its decisions are not subject to any external review. FANR is entirely independent of ENEC and any other entity charged with promotional responsibilities. Board members are forbidden by law from engaging directly or indirectly in the conduct of any Regulated Activity and must not have any personal interest that conflicts the interests of FANR.

E.25 The Chairman of the Board is required by the Law to submit a report, at the end of each financial year, to the Minister of Presidential Affairs. As reflected in Chapter 4 of the *Nuclear Law* discussed earlier, FANR has also been assured of having sufficient, predictable and autonomous financial resources to fulfill its responsibilities independently.

Organisation and Staffing; Financial Resources

E.26 FANR has created two main divisions in the organisation to fulfill its responsibilities: Administration and Operations. The Administration division includes the Departments of Administration and Finance, Government and International Affairs, Education and Training, and Human Resources; the Operations Division includes the Departments of Nuclear Safety, Radiation Safety, Nuclear Security, and Safeguards. FANR currently employs about 120 persons.

E.27 FANR has its budget set by its Board of Management and receives funds made available by government allocation. It is expected that licensees will pay fees based on the regulatory scale of services provided by FANR. FANR is free to deal with its funds, including all banking activities according to auditing and financial regulations applicable to FANR. Sources of FANR funds include government allocations and income generated by conduct of FANR regulatory functions. FANR manages its financial resources according to the applicable financial and auditing regulations within the UAE. The FANR Board of Management appoints an independent internal auditor and the appropriate UAE authorities audit annual accounts and prepare reports regarding the results of the audit.

Integrated Management System

E.28 As recommended through IAEA publications on safety requirements and guidance, FANR has developed and is implementing an Integrated Management System (IMS) that is tailored specifically to the regulator. The IMS includes a set of interacting processes that address the objectives and requirements of the organisation. Elements included in the IMS are the structure, resources, and processes of the core business areas of nuclear regulation, licensing and inspection, as well corporate support functions.

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Human Resources and Knowledge Management

E.29 FANR has recruited a core team of experienced international technical personnel to perform all of the functions for which FANR is responsible. FANR plans to maintain the core team and develop a group of skilled UAE nationals in key areas through the National Capacity Building Programme, which includes development of programmes for education and training, college graduates and new engineers being trained overseas (38 currently enrolled in BS and MS programmes), and specialized, individual training plans. Individual Development Programmes (IDPs) will be prepared for specific positions in the developing workforce. Over the long-term, FANR will establish its own in-house nuclear expertise as provided by UAE nationals with support from international experts.

E.30 Efforts are being made to retain in-house expertise and expand the workforce to include a growing complement of Emirati nationals. In areas where technical knowledge is still being developed, FANR has contracted with Technical Support Organisations (TSOs). The role of TSOs includes the preparation of regulatory documents (regulations, regulatory guides and review procedures), the conduct of expert reviews in selected areas, and participation in inspection activities until such time as educated and qualified Emiratis can fulfill that role. FANR is responsible to take ownership of technical reviews.

E.31 FANR is in the process of assuring that significant activities involving the generation and use of knowledge unique to the nuclear sector are being systematically identified and developed to ensure the sustainability of such knowledge from in-house sources. A Knowledge Management programme will comprehensively address the knowledge, experience and expertise generated in the regulatory, technical, scientific, administrative, legal and managerial areas. Implementation of these activities by FANR has already begun.

Section F. Other General Safety Provisions

Article 21: Responsibility of the License holder

1. Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.
2. If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.

Responsibility of the Licence Holder

F.1 *The UAE Nuclear Law Article (40)* states that persons holding licenses to possess Regulated Material are responsible for the safe management and storage of radioactive waste from its generation until its delivery to the entity designated by a decision of the Cabinet for the purpose of disposal. That entity would also need to be licensed by FANR to deal with the radioactive waste and to establish a radioactive waste repository (defined as a Nuclear Facility).

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F.2 The *UAE Nuclear Law* Article (43) also makes clear that the licensee is responsible for all steps necessary to reduce the risk of an accident to a level that is as low as reasonably achievable, and the licensee must ensure that there is a management system in place and adequate financial and human resources to ensure nuclear safety. This applies to the licensee who is also responsible for the safety of spent fuel and radioactive waste management.

Article 22: Human and financial resources

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility
- (ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning
- (iii) financial provision is made which will enable the appropriate institutional controls and monitoring

Resources

F.3 The regulations, FANR REG-06, “Application for a Licence to Construct a Nuclear Facility,” and the draft regulation FANR REG-14, “Application for a Licence to Operate a Nuclear Facility,” mandate that the applicant demonstrate its projected financial and human resource requirements for the proposed nuclear project and provide details regarding its financial and technical qualifications to complete the proposed activities. Additionally, draft FANR REG-14 requires applicants to address the adequacy of decommissioning funding and the adequacy of plans for radioactive waste management.

F.4 The Nuclear Law, Article (42) requires that the operator of a nuclear facility must pay fees into a ‘Decommissioning Trust Fund’. The fees are to cover the costs for: construction, operation and closure of a radioactive waste management facility; decommissioning the nuclear facility; regulatory oversight; management of the trust fund. It is planned that the regulations establishing the decommissioning Trust Fund will be completed by the time of commissioning of the first NPP.

F.5 The UAE has adopted the following two strategic goals associated with National Regulatory Capacity Building (NRCB):

1. Support the national capacity building approach through effective coordination with and support for national efforts to develop human resources in the nuclear sector.
2. Establish and maintain a National Regulatory Capacity Building (NRCB) Programme aimed at developing and sustaining an international-standard UAE national regulatory workforce.

F.6 The UAE human resources policy will be guided by the IAEA Milestone Document recommendation that the relevant expertise required for each phase of the nuclear project be established ahead of time. Initiation of the NRCB Programme at FANR will, therefore, be a priority and FANR will seek to achieve substantial progress in developing national

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regulatory human resources in advance of facility construction and operation. Specific implementation strategies have been developed to realize these goals, including ensuring the continuous development of the overall human resource, including a special mechanism to fund the ongoing human resource development programmes.

F.7 The NRCB effort is being implemented by FANR, ENEC and Khalifa University. These three entities are working together across education, training, and recruitment lines to ensure that the nuclear programme's human resource needs are met at every stage of its development. The UAE estimates that it will need 2,300 qualified personnel to staff its nuclear energy programme by 2020.

F.8 FANR has developed the Emiratization approach for Capacity Building in concert with the other UAE entities but at the same time has created a programme to develop UAE Nationals internally. By using the IAEA standards and specifically TecDoc 1254 to determine the systematic approach to tasks needed for development an initial programme for education and training is implemented. Already results have been shown with UAE Nationals returning to the UAE with degrees and training.

F.9 Finances have been provided as needed with no restraints to develop staff and create the necessary opportunities for international studies. Due to several international agreements with other countries and their regulatory bodies many opportunities exist and have been utilized for UAE Nationals to perform job shadowing and visits. In 2011 the FANR will develop a specific competency framework for the regulatory body that will more precisely define the needed competencies within FANR and provide direction for identifying education and training needs. This will also provide a mechanism for emphasizing Emiratization and succession planning at the regulator.

F.10 ENEC has developed a Human Resources Development (HRD) Strategy to identify needed capabilities, assess the ability of the current market to provide those capabilities and then develop skills and abilities in the UAE so that they are available when needed, as early as 2012 and certainly for the start of operations in the spring of 2017. Aligned with the Emiratization goals of the UAE, the HRD Strategy intends to build the human capacity of people in the UAE to support the nuclear industry, contributing the work of ENEC itself, the prime contractor, and the many businesses in the UAE that will provide services to the overall program.

F.11 The strategy includes building a talent pool throughout the Emirates, starting the educational process in grade school, and working to encompass academic, technical and vocational programs throughout the UAE and abroad. ENEC's current strategies are:

1. Leverage UAE Educational System and Build New Infrastructure
2. Develop Partnership Opportunities
3. Leverage Business and Industry
4. Broad Outreach: Grade School to Graduate Studies

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Article 23: Quality Assurance

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

Quality Assurance

F.12 The *UAE Nuclear Law* Article (44) describes the requirements on the licensee to set up a Management System and a Quality Assurance Program which shall be the subject of approval and inspection by the Authority. FANR Regulation 01 'Management Systems for Nuclear Facilities' requires the licensee to establish, implement, assess and continually improve a Management System that is aligned with the goals of the organisation and contributes to its achievement (Article (3)).

F.13 ENEC has developed a Quality Management System (QMS) which is in compliance with the UAE Law and the Regulations for the current phase of the Civil Nuclear Power Plant (CNPP) development. The Quality Management System includes a Quality Assurance Program which is in compliance with ASME NQA-1-1994, Quality Assurance for Nuclear Facility Applications. ENEC QMS has also been certified to ISO 9001:2008 by the British Standards Institute (BSI). The certification is valid till April 2014 and its scope covers Siting, Design, Procurement, Engineering, Construction, Commissioning, Operations, Waste Management and Decommissioning.

F.14 ENEC shall ensure that the predisposal radioactive waste management facilities are in compliance with FANR Regulations. ENEC, as the Licensee, will ensure that its prime contractor, Korea Electric Power Company (KEPCO), which is responsible for the design, construction, commission, and initial operation of the nuclear plants, performs a Safety Assessment and develops a Safety Case for each identified waste stream.

Article 24: Operational radiation protection

1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:
 - (i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account
 - (ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection and
 - (iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment
2. Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:
 - (i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account and
 - (ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection
3. Each Contracting Party shall take appropriate steps to ensure that during the operating

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lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

F.16 At this stage, there are no spent fuel or radioactive waste management facilities in the UAE. Any such facilities would be subject to FANR licensing under the provisions of the *UAE Nuclear Law*. This gives FANR the authority to regulate radiation protection in the overall 'Nuclear Sector' of the UAE, which includes nuclear facilities and industrial and medical application of radioactive materials.

F.17 *UAE Nuclear Law* Article (43) covers radiation safety and radiation protection. This Article provides the basis for safety requirements in matters affecting radiation protection and states:

The Licensee shall ensure that Occupational Exposures and Public Exposures to Ionizing Radiation and any releases of Radioactive Material to the environment caused by the conduct of Regulated Activities are kept below the prescribed limits during all operational states and Activities, and shall undertake to achieve Doses as low as reasonable achievable. The licensee shall keep records of measured and estimated Doses and release data and report them to the Authority as specified in the applicable regulations.

F.18 FANR has developed the following regulations and key provisions dealing directly with radiation protection:

- **FANR REG-04, "Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities"** covers:
 - i. Dose Limits for Occupational Exposure ,
 - ii. Dose Limits for Members of the Public,
 - iii. Optimisation of Protection for Workers , and
 - iv. Optimisation of Protection for the Public.

This regulation adopts the internationally accepted dose limits for occupationally exposed workers during the normal operation of a nuclear facility.

- **FANR REG-11, "Regulation for Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities,"** covers:
 - i. Radiation Protection Programme,
 - ii. Predisposal Management of Radioactive Waste,
 - iii. Clearance Levels and Discharges of Radioactive Material,
 - iv. Environmental Monitoring Programme, and
 - v. Training.
- **FANR REG-13, "Transportation of Radioactive Material,"** has adopted IAEA document TS-R-1 (2009 Edition), "Regulations for the Safe Transport of Radioactive Material," in its entirety.

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- **FANR REG-24, “Basic Safety Standards for Facilities and Activities Involving Ionizing Radiation other than in Nuclear Facilities”** covers among other things;
 - i. Radiation protection program
 - ii. Dose limits and monitoring requirements
 - iii. Waste management and
 - iv. Source handling

Article 25: Emergency Preparedness

1. Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.
2. Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

F.19 Chapter 9 of the *UAE Nuclear Law* sets out a structure for emergency preparedness. The relevant Articles include:

- Article (49), which requires measures for Emergency Preparedness and Emergency Response for protection of the population, property and environment (off-site Emergency plan) and for each Nuclear Facility and any facility that contains sources of ionizing radiation (on-site Emergency Plan)
- Article (50), which requires preparation, maintenance and coordination of the off-site Emergency Plan by the competent authorities and Licensees in order to provide protection of the public
- Article (51), which stipulates that the material, technical, and human resources for the preparation, maintenance, and implementation of the off-site Emergency Plan shall be financed by the State’s national budget
- Article (52), which requires that a licensee provide its Emergency Plan to FANR for approval and other competent authorities of the State before the Commissioning of a Nuclear Facility and that the Emergency Plan be tested before Nuclear Facility Commissioning and during the course of Operation
- Article (53), which requires that the Licensee familiarize its employees with the Emergency Plans and conduct related training
- Article (54), which requires, in case of an accident, Licensees to:
 - notify FANR immediately;
 - warn the population and municipalities within the Emergency Zones and other competent authorities immediately;
 - take Emergency Action to mitigate and remedy the consequences of the Accident;
 - control and regulate the exposure of the individuals engaged in Accident mitigation and elimination;
 - ensure continuous monitoring of radioactive releases into environment; and

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- perform any other obligations as may be established in the Emergency Plans, the Federal Law by Decree No 6 of 2009, or the applicable regulations
- Article (55), which requires that the terms and procedures for preparation of Emergency Plans, the responsibilities and duties for implementation, the measures for mitigation and remediation of the consequences, and the arrangements for warning of the public be established by regulation
- In addition, Article (7) requires that FANR cooperate with and advise relevant Government entities concerned with emergency preparedness and response.

F.20 FANR REG-12, “Regulation for Emergency Preparedness for Nuclear Facilities,” covers FANR requirements for applicant or licensee preparation and planning for and response to emergencies at nuclear facilities. The purpose of the regulation is to ensure that the applicant has an organisation that is capable of coping with emergencies and mitigating their consequences, and that the applicant or licensee can perform assessment actions and implement notification procedures. It also requires the applicant or licensee to demonstrate that it has adequate emergency facilities and equipment, provides appropriate training, maintains emergency preparedness, and is capable of recovery after an emergency. The requirements for training arrangements and procedures for exercising emergency plans are also included. FANR REG-12 does not apply to the plans and activities of the off-site coordinating agencies or response organisations.

Article 26: Decommissioning

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

- (i) qualified staff and adequate financial resources are available
- (ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied
- (iii) the provisions of Article 25 with respect to emergency preparedness are applied and
- (iv) records of information important to decommissioning are kept

F.21 UAE Nuclear Law Article 42 states that “A juridical Person that is licensed to operate a Nuclear Facility that generates or will generate Radioactive Waste shall pay fee into a trust fund called “Decommissioning Trust Fund” established by a decision of the Cabinet according to the Board’s recommendation.” The Article also describes what the fee shall cover.

F.22 FANR is planning to prepare regulations addressing decommissioning activities; namely FANR REG-21, “Decommissioning;” and FANR REG-22, “Decommissioning Trust Fund.” The planned Regulation 21 and 22 will cover the requirements in Article 26 in the Joint Convention.

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Section G. Safety of Spent Fuel Management

Article 4: General Safety Requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management; individuals, society and the environment are adequately protected against radiological hazards. In so doing, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed
- (ii) ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted
- (iii) take into account interdependencies among the different steps in spent fuel management
- (iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards
- (v) take into account the biological, chemical and other hazards that may be associated with spent fuel management
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation
- (vii) aim to avoid imposing undue burdens on future generations

G.1 FANR-REG-03 at Article (87) provides requirements for spent fuel handling and for spent fuel storage in water pools as follows:

1. *The SSCs for the handling of irradiated fuel shall be designed to:*
 - a. *prevent criticality at all times*
 - b. *prevent unacceptable handling stresses on the fuel elements or fuel assemblies;*
 - c. *prevent the inadvertent dropping of heavy objects such as spent fuel casks, cranes or other potentially damaging objects on the fuel assemblies and dropping of spent fuel in transit;*
 - d. *provide proper means for Radiation Protection;*
 - e. *adequately identify fuel assemblies; and*
 - f. *Facilitate decontamination of fuel handling equipment when necessary.*
2. *The SSCs for the Storage of irradiated fuel in water pools shall be designed to:*
 - a. *. to prevent criticality by physical means or processes, preferably by the use of geometrically safe configurations, even under plant states of optimum moderation;*
 - b. *to permit adequate heat removal in operational states and in design basis accidents;*
 - c. *to permit inspection of irradiated fuel;*
 - d. *to permit appropriate periodic inspection and testing of components important to safety;*
 - e. *to prevent the dropping of spent fuel in transit;*
 - f. *to prevent unacceptable handling stresses on the fuel elements or fuel assemblies;*

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- g. to prevent the inadvertent dropping of heavy objects such as spent fuel casks, cranes or other potentially damaging objects on the fuel assemblies;*
- h. to permit safe storage of suspect or damaged fuel elements or fuel assemblies;*
- i. to provide proper means for radiation protection;*
- j. to adequately identify individual fuel modules;*
- k. to control soluble absorber levels if used for criticality safety;*
- l. to facilitate maintenance and decommissioning of the fuel storage and handling facilities;*
- m. to facilitate decontamination of fuel handling and storage areas and equipment when necessary; and*
- n. to ensure that adequate operating and accounting procedures can be implemented to prevent any loss of fuel.*

G.2 ENEC has taken the following measures for the management of spent fuel

- The design of the Braka Nuclear Power Plant has sufficient capacity in the spent fuel storage pool for 20 years of operation for each NPP
- ENEC intends to establish an independent spent fuel storage installation (ISFSI) to support on-going operations. The ISFSI will be established before the spent fuel pools reach capacity.

In addition, ENEC is also looking at long term spent fuel disposal options that include fuel take-back, reprocessing outside of UAE and repositories inside or outside of UAE. ENEC is working with FANR, MOFA and international consultants on the development of UAE's spent fuel and radioactive waste management policy.

Article 5: Existing facilities

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

G.3 Currently, there are no spent fuel management facilities existing in the UAE, and the UAE does not have an inventory of spent fuel to report. The UAE has no spent fuel management past practices to report.

Article 6: Siting of proposed facilities

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:
 - (i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime
 - (ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment

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- (iii) to make information on the safety of such a facility available to members of the public
 - (iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory
2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.

G.4 In accordance with Article (28)(1) of the *UAE Nuclear Law*, an applicant for a licence to construct or operate a spent fuel management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Consistent with the approach described in FANR-REG-11, any proposal for a spent fuel management facility would need to establish a Safety Case (see definition at paragraph G.8.) The characteristics of the siting of the facility would be a part of the Safety Case. It would be expected that the relevant requirements of FANR-REG-02 'Siting of Nuclear Facilities' would apply.

G.5 ENEC will comply with FANR Regulations. Spent fuel pool storage is currently considered in the design of BNPP and FANR requirements have been addressed in the Preliminary Safety Analysis Report (PSAR) that is currently under review by FANR. ENEC also envisions that capability may be required for the dry storage of spent fuel. ENEC will comply with FANR requirements in the siting and design of the dry fuel storage facility.

Article 7: Design and construction of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;
- (ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;
- (iii) the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

G.6 In accordance with Article (28)(1) of the *UAE Nuclear Law*, an applicant for a licence to construct or operate a spent fuel management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Consistent with the approach described in FANR-REG-11, any proposal for a spent fuel management facility would need to establish a Safety Case. The approach to the design and construction of the facility would be a part of the safety case. It would be expected that the relevant requirements of FANR-REG-03 'Design of Nuclear Power Plants' and FANR-REG-14 'Construction of a Nuclear Facility' would apply.

G.7 ENEC will comply with FANR Regulations.

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Article 8: Assessment of safety of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out
- (ii) before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i)

G.8 In accordance with Article (28)(1) of the *UAE Nuclear Law*, an applicant for a licence to construct or operate a spent fuel management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Environmental assessment would be carried out by the relevant competent authority (eg the Environment Agency of Abu Dhabi). Consistent with the approach described in FANR-REG-11, any proposal for a spent fuel management facility would need to establish a Safety Case. This is defined as:

A collection of arguments and evidence in support of the Safety of a Facility or Activity including the findings of a Safety assessment and a statement of confidence in these findings.

Consistent with the approach taken in its regulation of Nuclear Facilities to date, FANR would expect a preliminary Safety Case at the stage of seeking a construction licence followed by a final safety case at the stage of the operating licence.

G.9 ENEC will comply with UAE Law and FANR Regulations.

Article 9: Operation of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements
- (ii) operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary
- (iii) operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures
- (iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility
- (v) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body
- (vi) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate
- (vii) decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body

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G.10 All the above requirements are included in the FANR regulations dealing with Nuclear Facilities (including spent fuel management facilities) and would be appropriately applied to any proposed spent fuel management facility.

G.11 ENEC will comply with FANR Regulations.

Article 10: Disposal of spent fuel

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

G.12 Should the UAE designate spent fuel for disposal as part of its spent fuel and radioactive waste management strategy, these provisions would apply.

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Section H. Safety of Radioactive Waste Management

Article 11: General Safety Requirements

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.

In so doing, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed,
- (ii) ensure that the generation of radioactive waste is kept to the minimum practicable
- (iii) take into account interdependencies among the different steps in radioactive waste management
- (iv) provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards
- (v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation
- (vii) aim to avoid imposing undue burdens on future generations

H.1 FANR Regulation 11 “Regulation for Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities” contains a chapter about Predisposal Management of Radioactive Waste.

General Obligations of license holder

H.2 Article (14) of FANR-REG-11 requires the licensee to be responsible for the waste until its delivery to the entity designated by the Cabinet for the purpose of disposal. It also require the licensee to carry out Safety Assessment and develop Safety Case for each identified waste stream including a phases of a radioactive waste management facility’s life span. The Licensee shall implement measures to ensure integrated approach to safety and security

Waste minimization

H.3 Article (15) of FANR-REG-11 requires the Licensee to identify all radioactive waste and keep radioactive waste to a minimum. It also state that the Licensee shall consider the authorized discharge of effluent and the clearance of material from Regulatory control after processing and/or storage, together with reuse and recycling of material in order to reduce the amount of waste that needs further processing or storage.

Interdependences among different steps

H.4 Article (14.4)of FANR-REG-11 states that the licensee shall take into account interdependencies among all steps in the predisposal waste management of radioactive

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waste, as well as the impact of the anticipated disposal option as this becomes known to be able to consider the radioactive waste management in an integrated manner.

Protection of individuals, society and the environment

H.5 Article (24) of FANR-REG-11 describes the Licensee's obligations with regard to environmental monitoring program to ensure that public exposure is adequately assessed and sufficient to demonstrate compliance with the regulations, and what the program at least shall include.

Non radiological hazards in waste management

H.6 Article (16) of FANR-REG-11 requires the Licensee to characterize the waste in terms of its physical, mechanical, chemical radiological and biological properties at various steps and classify it appropriately, including from the perspective of its future disposal.

Strive to avoid actions that impose impacts on future generations

H.7 While not explicitly covered in the Regulation, this principle would be applied by FANR.

Aim to avoid to impose undue burden on future generations

H.8 While not explicitly covered in the Regulation, this principle would be applied by FANR.

H.9 ENEC will comply with FANR Regulations. Even though not explicitly covered in Regulations, ENEC understands its obligation to future generations and will strive to avoid undue impacts and burdens to future generations.

Article 12: Existing facilities and past practices

Each Contracting Party shall in due course take the appropriate steps to review:

- (i) the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility
- (ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention

H.10 Currently, there are no radioactive waste management facilities existing in the UAE.

Article 13: Siting of proposed facilities.

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

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- (i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure
 - (ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure
 - (iii) to make information on the safety of such a facility available to members of the public
 - (iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory
2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects

H.11 In accordance with Article (28)(1) of the UAE Nuclear Law, an applicant for a licence to construct or operate a radioactive waste management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Consistent with the approach described in FANR-REG-11, any proposal for a radioactive waste management facility would need to establish a Safety Case. The characteristics of the siting of the facility would be a part of the Safety Case. It would be expected that the relevant requirements of FANR-REG-02 'Siting of Nuclear Facilities' would apply.

H.12 ENEC will comply with UAE Law and FANR Regulations.

Article 14: Design and construction of facilities.

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases
- (ii) at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account
- (iii) at the design stage, technical provisions for the closure of a disposal facility are prepared
- (iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis

H.13 In accordance with Article (28)(1) of the *UAE Nuclear Law*, an applicant for a licence to construct or operate a radioactive waste management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Consistent with the approach described in FANR-REG-11, any proposal for a radioactive waste management facility would need to establish a Safety Case. The approach to the design and construction of the facility would be a part of the Safety Case. It would be expected that the relevant requirements of FANR-REG-03 'Design of Nuclear Power Plants' and FANR-REG-14 'Construction of a Nuclear Facility' would apply.

H.14 ENEC will comply with UAE Law and FANR Regulations.

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Article 15: Assessment of safety of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out
- (ii) in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body
- (iii) before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i)

H.16 In accordance with Article (28)(1) of the *UAE Nuclear Law*, an applicant for a licence to construct or operate a spent fuel management facility would be required to submit a detailed evidence of safety that would be reviewed and assessed by FANR. Environmental assessment would be carried out by the relevant competent authority (eg the Environment Agency of Abu Dhabi). Consistent with the approach described in FANR-REG-11, any proposal for a spent fuel management facility would need to establish a Safety Case. This is defined as:

A collection of arguments and evidence in support of the Safety of a Facility or Activity including the findings of a Safety assessment and a statement of confidence in these findings. Consistent with the approach taken in its regulation of Nuclear Facilities to date, FANR would expect a preliminary safety Case at the stage of seeking a construction licence followed by a final safety case at the stage of the operating licence.

H.17 ENEC will comply with UAE Law and FANR Regulations.

Article 16: Operation of facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements
- (ii) operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary
- (iii) operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure
- (iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility
- (v) procedures for characterization and segregation of radioactive waste are applied
- (vi) incidents significant to safety are reported in a timely manner by the holder of the

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- licence to the regulatory body;
- (vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate
 - (viii) decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body
 - (ix) plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body

H.18 All the above requirements are included in the FANR regulations dealing with Nuclear Facilities (including radioactive waste management facilities) and would be appropriately applied to any proposed radioactive waste management facility.

H.19 ENEC will comply with UAE Law and FANR Regulations.

Article 17: Institutional measures after closure

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

- (i) records of the location, design and inventory of that facility required by the regulatory body are preserved
- (ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required and
- (iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary

H.20 These obligations of the Joint Convention will be included in a future FANR regulation concerning radioactive waste disposal facilities.

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Section I Transboundary Movement

Article 27: Transboundary Movement

1. Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments. In so doing:
 - (i) a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination
 - (ii) transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized
 - (iii) a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention
 - (iv) a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement
 - (v) a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article , unless an alternative safe arrangement can be made
2. A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.
3. Nothing in this Convention prejudices or affects:
 - (i) the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law
 - (ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin
 - (iii) the right of a Contracting Party to export its spent fuel for reprocessing
 - (iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin

I.1 As a Contracting Party to the Joint Convention, the UAE adopts and supports the objectives of Article (27) without exception. Import of spent fuel and nuclear waste into the UAE for the purpose of long term storage or disposal is prohibited under the *UAE Nuclear Law*, Article (41.3).

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Section J. Disused Sealed Sources

Article 28: Disused sealed sources

1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.
2. A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

J.1 The 'possession, use, manufacture or handling' and the 'storage' and 'disposal' of Regulated Material are Regulated Activities under Article 25 of the *UAE Nuclear Law*. The definition of Regulated material clearly includes sealed radioactive sources (with activity above the IAEA exemption levels). Therefore, the 'possession, remanufacturing or disposal' of disused sources is subject to licensing by FANR with the associated need for safety to be demonstrated.

J.2 In general, UAE users of sealed sources have contractual arrangements to return disused sealed sources to the manufacturer. The verification of these arrangements is an important part of FANR's review and assessment and regulatory oversight of these licensees. Article (18)(8) of FANR-REG-24 requires that licensees ensure that arrangements are made for the safe management and disposition of radioactive sources, including financial provisions where appropriate, once they have become disused.

J.3 FANR also has power under Article (5)(32) of the *UAE Nuclear Law* to develop a strategy to ensure radiation protection from orphan sources. Such a strategy is under development and will be reported on at the Fourth Review Meeting.

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Section K. Planned Activities to Improve Safety

K.1 The discussion contained in this first UAE Joint Convention *National Report* of actions taken by the UAE, as a Contracting Party, regarding the obligations under relevant Article s of the Joint Convention confirms a conscientious and systematic effort by relevant bodies in the UAE to fully implement these provisions in developing the UAE programme for the peaceful uses of nuclear energy. Even at this early stage in the programme, the UAE government has recognized the need to put into place the necessary legislative, regulatory, and organisational framework to ensure the safety, security and environmental acceptability of its spent fuel management and radioactive waste management. This *National Report* is the first Joint Convention report submitted by the United Arab Emirates and, thus, reflects the fact that additional measures will be needed over the coming months and years as the programme evolves and progresses. Relevant UAE organisations are fully committed to meeting the obligations of this Joint Convention and actively participating in the peer review process established under the Joint Convention. The UAE has adopted a policy of transparency regarding its nuclear programme, including spent fuel and radioactive waste, and will continue to make available a full range of information on how it is meeting its responsibilities to ensure safety, security and safeguards in the future. The UAE looks forward to receiving the questions and comments of other Joint Convention Contracting Parties on this *National Report* and is committed to clarifying any issues raised both in its responses to questions or comments and during the May 2012 Joint Convention review meeting.

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Section L. Annexes

Annex 1: Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy

Annex 2: Unofficial Translation of Federal Law by Decree No 6 of 2009 Concerning the Peaceful Uses of Nuclear Energy.