



**INTEGRATED
REGULATORY
REVIEW SERVICE (IRRS)
MISSION
TO
THE UNITED ARAB EMIRATES**

Abu Dhabi, United Arab Emirates

5 to 14 December 2011

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY





**INTEGRATED REGULATORY REVIEW SERVICE (IRRS)
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THE GOVERNMENT OF THE UNITED ARAB EMIRATES**



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THE GOVERNMENT OF THE UNITED ARAB EMIRATES

Mission date: *5 to 14 December 2011*
Regulatory body: *Federal Authority for Nuclear Regulation (FANR)*
Location: *FANR Headquarters, Abu Dhabi, United Arab Emirates*
Regulated facilities and activities: *Braka site, Emirates Nuclear Energy Corporation (ENEC), medical and industrial facilities*
Organized by: *International Atomic Energy Agency (IAEA)*

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The number of recommendations, suggestions and good practices is in no way a measure of the status of the regulatory body. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

EXECUTIVE SUMMARY

At the request of the Government of the United Arab Emirates (UAE), an international team of thirteen senior safety experts met representatives of the *Federal Authority for Nuclear Regulation* (FANR) and other organizations contributing to nuclear safety from 5 to 14 December 2011, in order to conduct an Integrated Regulatory Review Service (IRRS) Mission. The mission took place at the headquarters of FANR in Abu Dhabi, and included some site visits.

The purpose of this IRRS mission was to review the effectiveness of the UAE framework for safety as implemented by FANR. The mission also addressed the establishment of the safety infrastructure to support the rapidly developing nuclear power programme.

The UAE is among several Member States that have decided to introduce nuclear power. This UAE decision was made recently and UAE has since aggressively pursued the development of the infrastructure necessary to achieve this purpose.

Some of the key milestones in the development of the UAE nuclear programme are as follows:

- In April 2008, the UAE published the “Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy”.
- On 23 September 2009, the UAE issued Federal Law by Decree No. 6 of 2009 on the Peaceful Uses of Nuclear Energy that set in place the framework for nuclear regulation and formally established the nuclear regulatory body, the Federal Authority for Nuclear Regulation (FANR).
- On 23 December 2009, the President of the UAE in his capacity as the Ruler of Abu Dhabi established by decree the Emirates Nuclear Energy Corporation (ENEC), the organization charged with implementing the UAE nuclear energy programme.
- On 27 December 2009, ENEC announced that it had selected a team led by the Korea Electric Power Corporation (KEPCO) to design, build and assist in operation and maintenance of four, 1,400 MWe civil nuclear power units. The first of the four units is scheduled to begin providing electricity to the grid in 2017, with the other three units being completed by 2020.
- FANR has so far issued three licences to ENEC: Licence for Selection of a Site for the Construction of a Nuclear Facility on 28 February 2010, Licence for Preparation of a Site for the Construction of a Nuclear Facility, and Limited Licence for the Construction of a Nuclear Facility, both on 8 July 2010.
- On 27 December 2010, ENEC submitted to FANR the construction licence application (CLA). FANR is actively reviewing this application.

The progress of the UAE nuclear power programme was reviewed in January 2011 by the IAEA Integrated Nuclear Infrastructure Review.

With respect to control of radiation sources (defined as regulated materials in the UAE), a Radiation Safety and Security Infrastructure Appraisal (RaSSIA) Mission was conducted in June 2006 at the request of the now defunct Radiation Protection & Control Department of the Ministry of Energy (RPCD). At that time, the IAEA found that Federal Law no. 1 of 2002

established a comprehensive legal basis for regulation but did not define clearly the roles of the five regulatory bodies named in the law; did not extend to government uses; and the role of the Radiation Protection Committee needed clarification.

Since that time, the issuance of the Nuclear Law in September 2009, assigned responsibility for oversight of regulated material to FANR. In this context, FANR is also a ‘new’ organization for the control of regulated material.

The review compared the UAE regulatory framework for safety against IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between IRRS Review team members and their UAE counterparts in the areas covered by the IRRS.

The IRRS Review team consisted of 13 senior regulatory experts from 12 IAEA Member States, three technical staff members from the IAEA and an IAEA administrative assistant. The IRRS Review team carried out the review in the following areas for nuclear power and regulated materials: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; regulations and guides; emergency preparedness and response. In addition, the team used SSG-16¹, “*Establishing the Safety Infrastructure for a Nuclear Power Programme*,” to complement the review of the existing regulatory framework.

The IRRS mission also included the following regulatory policy issues for discussion: response to the Fukushima Daiichi accidents, capacity building and sustainability and involvement of the regulatory body of the country of origin in the assessment process for the NPP programme. The optional thematic areas also covered were: control of medical exposure, occupational radiation protection and the safety and security of radioactive sources. The IRRS review addressed all facilities and activities regulated by FANR and included site visits to a medical facility and an industrial facility where the IRRS reviewers observed the working practices during inspections carried out by FANR, including discussions with licensee personnel and management. There was also a visit to Braka, the proposed site of the future nuclear power plants. The mission included observations of regulatory activities and a series of interviews and discussions with FANR staff and other organizations to help assess the effectiveness of the regulatory system. These activities included visits to the Emirates Nuclear Energy Corporation (ENEC). The reviewers also attended a meeting of National Emergency Planning and Coordination Committee (NEPCC) at which the significant stakeholders were present including the National Emergency and Crisis Management Authority (NCEMA). In addition, a representative of Khalifa University participated in policy discussions on capacity building. Throughout the review of the various areas and policy issues, special consideration was given to the implications of the Fukushima Daiichi accident for the UAE Regulatory System. His Excellency Ambassador Hamad Alkaabi, Resident Representative at the Permanent Mission of the UAE to IAEA in Vienna, met with the IRRS team to discuss in particular, matters relating to the Board of Management of FANR.

FANR provided the IRRS Review team with well-prepared advanced reference material (ARM) including the results of the self-assessment in all areas within the scope of the mission. The IRRS Review team considered this ARM document to be a model for other Member States preparing for their IRRS missions. Throughout the mission, the IRRS Review

¹ At the time of the mission, a Specific Safety Guide, IAEA Safety Standards Series No. SSG-16 had been approved by the IAEA Committee of Safety Standards (CSS) but was still in the publication process. Thus, discussions were based on the April 7 version of DS424 (the draft SSG-16) as approved by the CSS.

team was extended full cooperation in regulatory, technical, and policy issues by all parties; in particular the staff of FANR provided the fullest practicable assistance.

The IRRS Review team identified a number of good practices and made recommendations and suggestions indicating where improvements are necessary or desirable to continue enhancing the effectiveness of regulatory functions in line with the IAEA Safety Standards.

The main observations of the IRRS Review team were the following:

- The UAE developed a Nuclear Policy and subsequent activities related to the introduction of nuclear power within a relatively short timeframe. For the nuclear power programme, the IRRS Review team is satisfied that the UAE/FANR has in place suitable infrastructure to support the currently regulated activities and plans for future activities. The IRRS Review team also considered the UAE/FANR assessment of conformance to SSG-16 and was satisfied that UAE/FANR is in general alignment with this guidance.
- The IRRS Review team acknowledges the efforts by UAE/FANR in developing the overall regulatory framework for regulated material and addressing recommendations in the 2006 RaSSIA report. In developing the nuclear law, UAE used the opportunity to incorporate five pre-existing radiation regulators into one organization. In continuing its development of the regulatory infrastructure, it will be necessary for FANR to appropriately balance the efforts related to nuclear safety and regulated material and activities safety.
- Sustainability and long-term domestic capacity-building for assuring safety is an important issue. The Team recognizes this is an issue facing all nuclear countries and satisfied that the UAE has made a long-term commitment to sustainability in all aspects of radiation and nuclear safety. In this respect, FANR and the relevant stakeholder organizations should consider targets for developing, on an appropriate timescale, Emirati staff having the necessary competences and experiences to assure safety of facilities and activities in all potential circumstances.
- The Government of the UAE should ensure that the development of a National Policy and Strategy for Radioactive Waste Management is brought to conclusion in the shortest timeframe, so that the necessary regulatory and guidance documents can be developed on the basis of this policy and strategy.
- The Government of the UAE should expand its infrastructure to provide control of orphan sources.
- The Government should ensure that the roles, responsibilities and organizational relationships and interfaces between all the emergency response organizations are clarified, agreed and formalized as soon as possible.

Among the good practices identified by the IRRS Review team are the following:

- The UAE Nuclear Policy is based on a firm analysis of future demand for electricity, The UAE consulted widely in the process of formulating policy statements that will guide future activities in the nuclear field, made the nuclear policy publicly available and promulgated it through the Nuclear Law. Whilst this is a requirement, the way it was developed and negotiated is considered good practice
- For the establishment of its own regulatory requirements and guidance, FANR has made extensive use of IAEA Safety Standards. The obligation of FANR to take account of internationally recognized standards and recommendations, such as the

IAEA Safety Standards, when developing the national regulations and guidelines, is explicitly stated as a mandatory requirement in the UAE Nuclear Law.

- UAE and FANR have made extensive use of international peer review missions and demonstrated that the findings from these missions are incorporated into actions plans with the resulting actions being actively implemented. The effectiveness and efficiency by which this has taken place is considered good practice.
- FANR recognised the need for an integrated management system and made very good progress in its implementation at an early stage. Whilst it still needs development as part of the continuous improvement process, it provides an important support function for the activities of the Authority.

The team acknowledges a significant achievement has been made by the UAE in establishing FANR and the national regulatory infrastructure, but recognizes there remains considerable work ahead as FANR continues to develop the regulatory framework as planned.

A press release was issued after completion of the mission.

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I. INTRODUCTION

At the request of the Government of the United Arab Emirates (UAE), an international team of thirteen senior safety experts met representatives of the *Federal Authority for Nuclear Regulation* (FANR) and other organizations contributing to nuclear safety from 5 to 14 December 2011, in order to conduct an Integrated Regulatory Review Service (IRRS) Mission. The mission took place at the headquarters of FANR in Abu Dhabi and included site visits.

The IAEA provided training on the IAEA self-assessment methodology and tools, including the SAT software in April 2011. This was followed by an IRRS preparatory mission in June 2011 carried out at FANR Headquarters to discuss the objective, purpose and consequently the preparations of the review as well as its scope in connection with the areas regulated by FANR and selected safety aspects.

The IRRS Review team consisted of 13 senior regulatory experts from 12 IAEA Member States, three technical staff members from the IAEA and one IAEA administrative assistant. The IRRS Review team carried out the review of FANR in the following areas for nuclear power and regulated materials: responsibilities and functions of the Government; global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body for nuclear power plants and regulated material including the authorization, review and assessment, inspection and enforcement processes; regulations and guides; emergency preparedness and response. In addition, the IRRS Review team reviewed the following thematic areas: control of medical exposure, occupational radiation protection, and safety and security of radioactive sources.

This IRRS mission is the first to review a Member State at an advanced stage of establishing the safety infrastructure for its first nuclear power plant. The UAE is among several Member States that have decided to introduce nuclear power. The UAE decision was made recently and UAE has aggressively pursued the development of the infrastructure necessary to achieve this purpose. The progress of the UAE nuclear power programme was reviewed in January 2011 by the IAEA Integrated Nuclear Infrastructure Review (INIR). The review concluded that progress made to date is, for the most part, consistent with the overall development of the nuclear power programme according to the IAEA NE Series Milestones Guide (NG-G-3.1). It should be noted that the purpose of this INIR Mission was to evaluate the progress made by the UAE in the development of the milestones recommended by the IAEA, but did not assess in depth the quality of the infrastructure building activities.

Some of the key milestones in the development of the UAE nuclear programme are as follows: In April 2008, the UAE published the Policy of the United Arab Emirates on the “*Evaluation and Potential Development of Peaceful Nuclear Energy*”. With the issuance of this Policy, the UAE established a Nuclear Energy Programme Implementation Organization as recommended by the IAEA, which was identified as the Executive Affairs Authority (EAA) of Abu Dhabi. The EAA developed an internal strategy document called the “*Roadmap to Success*” which, building on the guidance from IAEA, set the early path for the programme.

On 23 September 2009, the UAE issued Federal Law by Decree No. 6 of 2009 on the Peaceful Uses of Nuclear Energy that set in place the framework for nuclear regulation and

formally established the nuclear regulatory body, the Federal Authority for Nuclear Regulation (FANR).

On 23 December 2009, the President of the UAE in his capacity as the Ruler of Abu Dhabi established by decree the Emirates Nuclear Energy Corporation (ENEC), the organization charged with implementing the UAE nuclear energy programme.

On 27 December 2009, ENEC announced it had selected a team led by the Korea Electric Power Corporation (KEPCO) to design, build and assist in operation and maintenance of four, 1,400 MWe civil nuclear power units. The first of the four units is scheduled to begin supplying electricity to the grid in 2017, with the other three units being completed by 2020. KEPCO will provide the full scope of works and services for the UAE Civil Nuclear Power Project including engineering, procurement, construction, nuclear fuel and operations and maintenance support.

FANR has developed a set of regulations and guides to support the regulatory review of the ENEC licence applications. That set of regulations and guides draws heavily upon IAEA and other international guidance, particularly from the United States Nuclear Regulatory Commission (USNRC). The choice of the KEPCO design, the similarity of the Korean and US regulations, guides, and codes, has greatly facilitated FANR's effort to establish a comprehensive regulatory framework in a relatively short time.

A site selection process was undertaken using IAEA and other international guidance materials. FANR has so far issued three licences to ENEC: Licence for Selection of a Site for the Construction of a Nuclear Facility on 28 February 2010, Licence for Preparation of a Site for the Construction of a Nuclear Facility, and Limited Licence for the Construction of a Nuclear Facility, both on 8 July 2010.

Most recently, on 27 December 2010, ENEC submitted to FANR the construction licence application (CLA). FANR is actively reviewing this application.

In addition, in 2006 IAEA conducted a RaSSIA Mission. The IAEA found that Federal Law No.1 of 2002 established a comprehensive legal basis for regulation but did not define clearly the roles of the five regulatory bodies named in the law; did not extend to government uses; and the role of the Radiation Protection Committee (RPC) needed clarification. The Nuclear Law and FANR developments since the formulation of the regulatory body have made significant progress in addressing the recommendations contained in the RaSSIA report.

The following policy issues were addressed: response to the Fukushima Daiichi accidents, capacity building and sustainability, and involvement of the regulatory body of the country of origin in the assessment process for the NPP programme.

FANR prepared substantial documentation as advance reference material (ARM) including a well prepared self-assessment. During the mission the IRRS Review team performed a systematic review of all topics using the advance reference material, conducted interviews with management and staff from FANR and performed direct observation of the working practices during inspections. The IRRS review addressed all facilities and activities regulated by FANR and included site visits to a medical facility and an industrial facility where the IRRS reviewers observed the working practices during inspections carried out by FANR, including discussions with licensee personnel and management. There was also a visit to Braka, the proposed site of the future nuclear power plants. The mission included observations of regulatory activities and a series of interviews and discussions with FANR staff and other organizations to help assess the effectiveness of the regulatory system. These activities included visits to the Emirates Nuclear Energy Corporation (ENEC). The reviewers also attended a meeting of National Emergency Planning and Coordination Committee (NEPCC) at which the significant stakeholders were present including the National

Emergency and Crisis Management Authority (NCEMA). In addition, a representative of Khalifa University participated in policy discussions on capacity building. Throughout the review of the various areas and policy issues, special consideration was given to the implications of Fukushima Daiichi for the UAE Regulatory System. His Excellency Ambassador Hamad Alkaabi, Resident Representative at the Permanent Mission of the UAE to IAEA in Vienna met with the IRRS team to discuss, in particular, matters relating to the Board of Management of FANR.

All through the mission the IRRS team received excellent and open co-operation from FANR, questions from the IRRS team members were fully answered, documents requested were presented and explained.

II. OBJECTIVE AND SCOPE

The purpose of this IRRS mission was to conduct a review of the UAE nuclear regulatory framework and regulatory activities for its regulatory effectiveness and to exchange information and experience in the areas covered by IRRS. All facilities and activities regulated by FANR were included in the scope of the review. The review was carried out by comparison against IAEA safety standards as the international benchmark for safety.

It is expected that the IRRS mission will facilitate regulatory improvements in the UAE and throughout the world from the knowledge gained and experiences shared by FANR and the IRRS reviewers and through the evaluation of the effectiveness of the UAE nuclear regulatory framework and its good practices.

The key objectives of this mission were to enhance nuclear and radiation safety and emergency preparedness:

- Providing FANR, through utilisation of the IAEA Self-Assessment Tool (SAT) software, with the opportunity to complete a self-assessment of its activities against international safety standards and guidance;
- Providing the UAE (FANR) with a review of its regulatory programme and policy issues relating to nuclear safety and emergency preparedness;
- Providing the UAE (FANR) with an objective evaluation of its nuclear safety and emergency preparedness regulatory activities with respect to international safety standards;
- Contributing to the harmonization of regulatory approaches among IAEA Member States;
- Promoting the sharing of experience and exchange of lessons learned;
- Providing reviewers from IAEA Member States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field;
- Providing key staff with an opportunity to discuss their practices with reviewers who have experience of other activities in the same field;
- Providing the UAE (FANR) with recommendations and suggestions for improvement;
- Providing other States with information regarding good practices identified in the course of the review.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IAEA REVIEW TEAM

At the request of UAE Government authorities, a preparatory meeting for the Integrated Regulatory Review Service (IRRS) was conducted in June 2011. The preparatory meeting was carried out by the appointed Team Leader Carl-Magnus Larsson and Deputy Team Leader Andrej Stritar together with the IRRS IAEA Team Coordinator Mr Ahmad Al Khatibeh, Deputy Team Coordinator, Mr Stephen Koenick and for emergency preparedness, Rodrigo Salinas from the IAEA's Incident and Emergency Centre (IEC).

The IRRS mission preparatory team held extensive discussions regarding regulatory programmes and policy issues with the senior management of FANR represented by Mr William Travers, Director General of FANR, and other members of FANR senior management and staff. The discussions resulted in the following areas to be covered by the IRRS mission:

- Regulated material;
- Establishing safety infrastructure for the nuclear power programme. ;
- Emergency preparedness and response;
- Selected policy issues.

Mr Travers and FANR staff made comprehensive presentations on the current status of FANR and the self-assessment results to date. IAEA staff presented the IRRS principles and methodology, including the self-assessment phase. This was followed by a discussion on the work plan for the implementation of the IRRS in UAE in December 2011.

The proposed composition of the IRRS Review team (the senior regulators from Member States to be involved in the review) was discussed and the size of the IRRS Review team was confirmed. Logistics discussed including meetings and work space, counterpart identification, lodging and transportation to accommodate site visits and observations were also addressed. On 30th September 2011, FANR provided IAEA with the advance reference material for the review, incorporating the SAT self-assessment report.

The Liaison Officer for the preparatory meeting and the IRRS mission was Mr Stephen Evans.

In addition to Section 8, "*Tailored Module for Countries Embarking on Nuclear Power*" of the IRRS Guidelines, the IAEA Review team and counterparts were given draft Supplemental Guidance for IRRS to Embarking Countries. For Phase 3 countries, it is expected that a Member State would have developed its regulatory infrastructure sufficiently such that the organization of the mission and documentation can follow the format of an IRRS for countries with developed nuclear power programmes.

The guidance suggested the Member State should be cognizant of the actions in SSG-16, identify safety infrastructure to support the regulated activities, and planned infrastructure to support the NPP programme.

B) REFERENCE FOR THE REVIEW

The most relevant IAEA safety standards used as review criteria at the time of the UAE mission were: GSR Part 1, Safety Requirements on Governmental, Legal and Regulatory

Framework for Safety, GS-R-2, Preparedness and Response for a Nuclear or Radiological emergency and GS-R-3, Safety Requirements on The Management System for Facilities and Activities. The complete list of IAEA publications used as the reference for this mission is given in Appendix VII.

In addition, in reference to establishing safety infrastructure, FANR, in Appendix 3 to the Advanced Reference Material; “*UAE/FANR Conformance to SSG-16*” summarized the current status of progress in accordance with the guidance provided in IAEA Safety Guide SSG-16. Furthermore, FANR provided applicable cross-references to the IRRS modules for further discussion. It is important to note that SSG-16 contains a series of actions to assist the MS in developing a safety infrastructure consistent with the IAEA safety requirements. The actions represent guidance only and are not to be reviewed in terms of compliance with IAEA safety requirements.

C) CONDUCT OF THE REVIEW

An IRRS initial team meeting was conducted in Abu Dhabi on Sunday, 4th December 2011 prior to commencement of the formal mission the following day. The initial team meeting was directed by the IRRS team Leader and the IRRS IAEA team Coordinator and focussed on discussions of the general overview, the focus areas and specific issues of the mission, to clarify the basis for the review and the background, context and objectives of the IRRS and to agree among all reviewers, the methodology for the review and evaluation. The meeting was attended by representatives of FANR senior management and the FANR Liaison Officer.

In addition, the IAEA Deputy Team Coordinator presented the draft supplemental guidance for IRRS for embarking countries which would be applied during the mission.

The Liaison Officer was present at the opening IRRS Review team meeting, in accordance with the IRRS guidelines, and presented the agenda for the mission. The reviewers also reported their first impressions of the advance reference material.

The IRRS entrance meeting was held on Monday, 5th December 2011, with the participation of FANR senior management and staff, particularly the FANR counterparts to the IRRS reviewers, together with Ambassador Alkaabi and the IAEA’s DDG Kwaku Aning of the Department of Technical Cooperation (TC). Ambassador Alkaabi provided opening remarks and DDG Aning made a general presentation followed by the IAEA Team Coordinator Ahmad Al Khatibeh, who described the IRRS process and programme. Mr Carl-Magnus Larsson, the IRRS Team Leader described the expectations of the mission and introduced the members of the IRRS Team. Mr William Travers, Director General of FANR provided a welcoming address after which FANR senior staff presented an overview of the status of the regulatory framework in UAE (as identified by the FANR pre-IRRS self-assessment) and also introduced the FANR counterparts to the mission.

During the mission, a systematic review was conducted for all the review areas with the objective of providing FANR with recommendations and suggestions as well as identifying good practices. The review was conducted through meetings, interviews and discussions, visits to facilities and direct observations regarding the national practices and activities.

The IRRS Review team performed its activities based on the mission programme given in Appendix II. Regarding the review of safety infrastructure, consistent with the draft supplemental guidance, the reviewers approached the mission as a typical IRRS. In addition, for areas that were still in the state of development, the reviewers considered the plan for implementation given the compressed schedule for the NPP. The results of this review are largely addressed within the appropriate modules of the IRRS. It is not the intent of this mission to have an itemized review of compliance against each action.

In addition, the reviewers noted that while the principal counterpart of the IRRS is the regulatory body, there are requirements in GSR Part 1 and complementary actions in SSG-16 that are geared toward the government. These requirements and actions have been reviewed from FANR's perspective while the resulting findings are presented as being for the government. Likewise, SSG-16 has actions that extend to the operating organization. Where possible, the reviewer considered whether there was an appropriate regulatory framework to require the specific action to be implemented. In several areas, actions were considered outside the scope of the IRRS.

The IRRS exit meeting was held on Wednesday 14 December 2011. Opening remarks were made by Mr Denis Flory, Deputy Director General of the IAEA Department of Nuclear Safety and Security (NS) after which, the results of the IRRS mission were presented by Mr Carl-Magnus Larsson. Closing remarks were made by Mr William Travers, Director General of FANR.

A press conference followed the exit meeting.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1. NATIONAL POLICY AND STRATEGY FOR SAFETY

The UAE government established a national policy and strategy for safety in its Nuclear Policy published in April 2008; 'Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy' (the Nuclear Policy). The policy and strategy for safety was codified in the 'Federal Law by Decree No 6 of 2009 on the Peaceful Uses of Nuclear Energy' (the Nuclear Law).

The nuclear policy provides a concise summary of the analysis (including consideration of other energy sources such as gas, oil and solar) behind opting for a nuclear power programme. The analysis provided estimates of future demand for electricity, categorized in "low", "likely" and "high" projections for the future. The peak demand for electricity is likely to rise to about 40 GW by the year 2020, following a succession of years with close to 10% annual increase.

Work on the Nuclear Policy commenced in 2006 and involved consultation that lasted for 11 months with a variety of internal stakeholders and also with a number of international counterparts, including supplier countries and the IAEA. The Nuclear Policy is posted on the FANR website. It has been favourably received nationally and by countries in the region.

The Nuclear Policy establishes sourcing of fuel from foreign suppliers as the preferred option and renounces enrichment and reprocessing.

The Nuclear Policy commits the UAE to the highest standards of safety and security. It also commits the UAE to the objectives of the Convention on Nuclear Safety and indicates that the UAE will conform to IAEA standards. The commitments are expressed in the Nuclear Policy as

"... the Government of the UAE desires to make clear its peaceful and unambiguous objectives in respect both of its current evaluation of a peaceful nuclear energy program as well as the potential future deployment of actual nuclear power generation facilities. Further, the Government of the UAE also wishes to emphasize that nuclear energy represents only one of several options currently being evaluated; as the UAE seeks to meet future energy needs and develop a diversified and secure portfolio of power-generation assets."

The implementation of the Nuclear Policy will be guided by the following policy statements:

- The UAE is committed to complete operational transparency.
- The UAE is committed to pursuing the highest standards of non-proliferation.
- The UAE is committed to the highest standards of safety and security.
- The UAE will work directly with the IAEA and conform to its standards in evaluating and potentially establishing a peaceful nuclear energy programme.
- The UAE hopes to develop any peaceful domestic nuclear power capability in partnership with the Governments and firms of responsible nations, as well with the assistance of appropriate expert organizations.
- The UAE will approach any peaceful domestic nuclear power programme in a manner that best ensures long-term sustainability.

While the Nuclear Policy specifically addressed nuclear energy, the Nuclear Law addresses the ‘Nuclear Sector’ which also incorporates the application of radioactive material and radiation sources in various activities and states that “the development and regulation of the Nuclear Sector in the State will afford priority to Safety, Nuclear Safety, Nuclear Security, Radiation Protection and safeguards”.

The Government emphasizes the importance of capacity building in the Nuclear Policy and the Government has established a programme for such capacity-building involving FANR, the Emirates Nuclear Energy Corporation (ENEC) and Khalifa University working with a number of international partners.

To help ensure that the Nuclear Law was consistent with the Fundamental Safety Principles², a draft of the law was provided to the IAEA, France, Korea, the Russian Federation and the USA for comment, and the comments were taken into account in finalizing the law.

The Team considers the Nuclear Policy, as promulgated and expanded in the Nuclear Law, to be an adequate platform for addressing the Fundamental Safety Principles. Whilst a national policy actually is a requirement of GSR Part 1, the Team concludes that such policies are rarely concisely formulated and transparently communicated, even in countries with mature nuclear power programmes. The Team considers it particularly important to issue such policy statements in a country that has just started to explore the nuclear option for addressing its energy demand. The Team also notes that in implementing the Nuclear Policy through the Nuclear Law, UAE consulted widely. The Team therefore considers the Nuclear Policy to be Good Practice.

GSR Part 1 further states that policy and strategy should be implemented using a graded approach. The basic requirement is satisfied in the Nuclear Law, Article (28) (1) which requires that the extent of control applied by the Authority shall be commensurate with the potential magnitude and nature of the hazard of an activity being sought to be licenced. The team was advised that a graded approach was used in the planning processes, but the approach is not formally implemented through for example, a risk-based prioritization system. The Team considers that formalization of the approach would help the Authority (as specified in the Nuclear Law) to carry out its activities based on a graded approach.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS: GSR Part 1, Req. 1, 2.3: <i>“National policy and strategy for safety shall express a long term commitment to safety. The national policy shall be promulgated as a statement of the government’s intent. The strategy shall set out the mechanisms for implementing the national policy. In the national policy and strategy, account shall be taken of the following:</i></p> <p><i>(c) The specification of the scope of the governmental, legal and regulatory framework for safety”.</i></p>
GPI	<p>Good Practice: The UAE developed a Nuclear Policy within a relatively short time frame but based on a firm analysis of future demand for electricity, consulted widely, formulated policy statements that will guide future activities in the nuclear field, made it publicly available and promulgated it through the Nuclear Law. Whilst this is a requirement, the</p>

² IAEA Safety Standard Series No. SF-1

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

way it was developed and negotiated is considered good practice.

1.2. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

The Nuclear Law is the legal framework for safety. Article (5) of the Nuclear Law states that “the Authority shall determine all matters relating to the control and supervision of the Nuclear Sector in the State, particularly those related to Safety, Nuclear Safety, Nuclear Security, Radiation Protection and Safeguards and implements any obligations under the relevant international treaties, conventions or agreements entered into by the State”. Article (6) states, inter alia, that the Authority shall be exclusively responsible for issuing all licences to practice any of the Regulated Activities in the State.

Article (25) of the Nuclear Law describes the scope of the facilities and activities to which the regulatory framework applies. These are defined as ‘Regulated Activities’ and include the range of activities with Nuclear Facilities and Regulated Material (the latter defined to include radioactive material and radiation generators).

Article (9) of the Nuclear Law requires that the Authority maintains the highest standards of transparency whilst performing its functions. Article (38) (3) specifically requires that the Authority take into consideration comments from stakeholders in developing regulations and guidelines.

The Nuclear Law includes provision for the following:

- Authorization (i.e. licensing) requirements for the operation of facilities and the conduct of activities
- Rationale for authorization of new facilities or activities and the applicable decision-making process.
- Involvement of interested parties and for their input into decision making.
- Assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities.
- Continuity of responsibility where activities are carried out by several persons or organizations successively.
- Establishment of a regulatory body (see responses to Requirements 3 and 4 of GSR Part 1).
- Review and assessment of facilities and activities in accordance with a graded approach.
- Authority and responsibility of the regulatory body to promulgate regulations and to develop guidance for their implementation.
- Inspection and enforcement, in accordance with a graded approach.
- Appeal against regulatory decisions.

- Arrangements for preparedness for and response to a nuclear or radiological emergency.
- Nuclear security.
- System of accounting for and control of nuclear material.
- Acquiring and maintaining the necessary competence nationally for ensuring safety.
- Responsibilities and obligations in respect of financial provisions for the management of radioactive waste and of spent fuel, for decommissioning of facilities and termination of activities.
- Offences and the corresponding penalties.
- Controls on import and export of nuclear and/or radioactive material and for its tracking within and outside national boundaries.

GSR Part 1 also identifies the need for criteria for release from regulatory control. In UAE, the decision is made on an individual basis by the FANR Board of Management. The criteria for exempting or release from control are considered to be in line with international guidelines and criteria (FANR REG 24). However, see Section 9.4.2 **Clearance** for further discussion on this matter.

A decision to issue a licence, decline a licence application, or suspend or revoke a licence, is taken by the Board of Management. The applicant has the right to appeal to the Board against a negative decision. The Team could not verify any opportunity to appeal to a court or other third party, nor provisions for other concerned parties to appeal against a decision.

The framework includes the establishment of the regulatory body, which is dealt with in Section 1.3. Under the Nuclear Policy, the UAE has also established the *Emirates Nuclear Energy Corporation* (ENEC) as a public entity, and in accordance with the ENEC Law³. The organisation shall be situated in Abu Dhabi, is established for a duration of 99 years, and is provided a share capital of 370 million Dirhams paid by the State. The purpose of its establishment is stated in Article (4) (1) of the Law: “the Corporation shall object to develop, construct, finance, own, operate, manage and maintain nuclear reactors in the State solely for the purposes of generating power to be used in peaceful means, water desalination and to carry out all other necessary related and ancillary activities including establishing subsidiaries to carry out such activities, commercial and industrial activities inside or outside the State within the objects determined under the Corporation law without prejudice to the provisions of Federal Law No (6) of (2009).

Other elements of the Framework include other agencies. These will be described in later sections of this report, in relation to their relevance to specific functions.

FANR has issued two regulations prescribing requirements related to radiation protection, both based on IAEA BSS: FANR-REG-24 covers the non-nuclear power sector, while FANR-REG-11 is applicable to nuclear power plants. Although at the time of the mission the Team did not recognize any principal differences in requirements between these two regulations, it was noticed that in some areas such as occupational exposure, waste safety, emergency and existing exposure situations there is not full coherence and consistency with the IAEA Safety Standards (GSR Part 3). In addition this may give a wrong impression that radiation

³ Law Number (21) of 2009 Establishing the Emirates Nuclear Energy Corporation

protection requirements are different for various activities or facilities. Thus, a review of these two regulations may be considered, with a view to merging them and thereby avoiding potential discrepancies in radiation protection requirements in the various sectors.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	BASIS: GSR1 Part 1, Req. 2, 2.5: <i>“The government shall promulgate laws and statutes to make provisions for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:...(11) Provisions for appeals against decisions of the regulatory body.”</i>
S1	Suggestion: The Government of the UAE and FANR should consider developing or clarifying, as appropriate, mechanisms by which appeals by a licensee or a stakeholder against a decision by the FANR Board of Management can be reviewed by a body independent of FANR.
(3)	BASIS: GSR Part 3, Req. 2, para. 2.13.: <i>“The government shall establish and maintain an appropriate and effective legal and regulatory framework for protection and safety in all exposure situations. This framework shall encompass both the assignment and the discharge of governmental responsibilities, and the regulatory control of facilities and activities that give rise to radiation risks. The framework shall allow for the fulfilment of international obligations.”</i>
S2	Suggestion: FANR should consider merging the two existing regulations that cover radiation protection requirements in nuclear power and non-nuclear power sectors respectively.

1.3. ESTABLISHMENT OF A REGULATORY BODY

Chapter 2 of the Nuclear Law establishes the regulatory body and its objects. These provisions formally establish the *Federal Authority for Nuclear Regulation* (FANR) as an independent organization with full legal competence and financial and administrative independence; state its broad objective for regulation of the nuclear sector for nuclear safety, nuclear security, radiation protection and for non-proliferation; provide it with a range of regulatory and related powers; establish that it is exclusively responsible for licensing; require it to cooperate with and advise relevant Government agencies; give it investigative powers; and require a commitment to highest standards of transparency in performing its functions.

Article (23) prohibits any person from conducting any Regulated Activity (defined in Article (25) without a licence from FANR and Articles (60) to (63) establish offences for conducting Regulated Activities without a licence. Article (5), (8) gives the Authority the power to enter into relevant sites and facilities at any time to carry out an inspection and to enable it to perform its functions efficiently. Article (37) empowers the authority to take enforcement actions.

Article (18) of the Nuclear Law establishes the funding arrangements for FANR. Under Article (15) (2), the Director General proposes the annual budget for the authority, which is adopted by the Board under Article (11), (2). A proposal to raise the greater part of the budget through fees charged to licence holders has been approved by the Board.

Responsibility for Radiation Safety was previously held by a number of authorities in the Emirates, and FANR has taken over those responsibilities. The Team is convinced this is an improvement. The Team, however, reminds FANR of the need to always maintain a holistic perspective on safety, whether this is nuclear, transport, radiation or waste safety. The current push for establishing a nuclear power programme should not cause fragmentation in the way good safety culture is established and communicated. FANR should, therefore, monitor its own activities and make sure there is no gap, or will be no gap in the general approach to safety in nuclear applications and in radiation activities.

The Team is satisfied with the adequacy and appropriateness of the legal provisions that establish FANR as the Regulatory Body.

1.4. INDEPENDENCE OF THE REGULATORY BODY

The Federal Authority for Nuclear Regulation is established by the Nuclear Law in Article (4) as a public organisation with an independent balance sheet, independent legal personality, full legal competence and financial and administrative independence. The Authority is not a part of any other organization and has no legal or other relationship with any promotional body.

The Nuclear Law provides that regulatory decision-making is in the hands of the Authority. Article (6) of the Nuclear Law provides that the Authority is exclusively responsible for issuing licences to carry out Regulated Activity or amending, suspending, revoking or refusing to grant such licences and to impose licence conditions. Where other bodies have related safety responsibilities, FANR is discussing and negotiating Memoranda of Understanding.

The Chairman of the Board is required to submit an annual report on the Authority's activities to the Minister of Presidential Affairs. While that Ministry has broad coordinating functions in the UAE, it is not responsible directly for energy policy or other policy areas that could conflict with the role of the Authority.

The Nuclear Law gives FANR the authority to access safety information and facilities. For example, Article 29 (3) of the Nuclear Law requires the Operator to provide the Authority with any information it deems necessary to perform its duties, including information related to the Operator's suppliers, even if such information is proprietary. Article 5 (8) gives the Authority broad powers to; "enter into the relevant sites and facilities at any time to carry out an inspection and to enable the Authority to perform its functions efficiently".

Article (10) of the Nuclear Law requires that members of the Board of FANR "shall not engage, whether directly or indirectly, in the conduct of any regulated activity and must not have any personal interest that conflicts the Authority interest". FANR human resources policy requires that FANR employees should avoid any situation which involves or may involve a conflict between their personal interest and the interest of FANR.

The Team has discussed the 'effective independence' of FANR in relation to the recognized fact that:

"An independent regulatory body will not be entirely separate from other governmental bodies. The Government will have the ultimate responsibility for involving those with legitimate and recognized interests in decision making. However, the government shall ensure that the regulatory body is able to make decisions under its statutory obligation for the regulatory control of facilities and activities, and that it is able to perform its functions without undue pressure or constraint." (GSR Part 1, Reqs. 4, 2.7).

The Team also discussed aspects of independence during interviews with staff at FANR and ENEC, and benchmarked the issue against the experiences from other organisations internationally. The discussion with FANR senior management concerned safety first in decision-making, even if this would be to the detriment, in terms of delay, to plans for implementation of the NPP programme in UAE. FANR senior management provided evidence that it is acting independent of the plan and discussions with a representative of the Board of Management confirmed this view. The Team concludes that the level of ‘effective independence’ is high and satisfactory.

1.5. PRIME RESPONSIBILITY FOR SAFETY

Articles (43) and (44) of the Nuclear Law assign responsibility for the management of safety to the Licensee. Article (34) (2) of the Nuclear Law establishes that the operator remains responsible even if certain activities are carried out by contractors. Article (11), (4d) of the Nuclear Law gives the Board the power to specify responsibility when an activity is carried out by several operators successively and to record the transfer of responsibilities.

FANR’s ability to require responsible persons or organizations to comply with safety requirements is inherent in Articles throughout the Nuclear Law. In particular, Article (23) prohibits any person from carrying out regulated activity without being licenced by FANR. Article (24) requires that FANR licences specify the requirements and obligations imposed on the operator, including the requirements established in the regulations. Article (28) requires that, prior to the granting of a licence, an applicant must submit detailed evidence of safety which is subject to review and assessment as specified in Article (32). The Board is empowered under Article (31) to suspend or revoke a licence in the event of serious violations or continued non-compliance. Articles (35) to (37) deal with FANR’s inspection programme and non-conformance arrangements. Article (36), (1) establishes that the purpose of regulatory inspection is to ensure that the operator is in compliance with the Law, applicable regulations and licence conditions. Article 38 establishes that the Board shall issue regulations specifying the requirements that operators must comply with and follow.

The Team is satisfied the legal provisions place the responsibility for safety on the licensee.

1.6. COMPLIANCE AND RESPONSIBILITY FOR SAFETY

Article (36) (5) of the Nuclear Law states that “*Regulatory inspections do not diminish the operator’s prime responsibility for safety or substitute for the control, supervision and verification activities that the operator must carry out*”.

GSR Part 1 further specifies that the responsibilities remain over the entire life cycle, including the management of waste arising during operations and following decommissioning or closure of a facility. This also includes management of spent fuel. Article (40) of the Nuclear Law places the responsibility of waste management on the licensee; Article (41) specifies, that the Government shall issue policy regarding the long term management and disposal of the radioactive waste and spent fuel and to identify an entity (effectively a State entity) in charge of implementing such policy. The radioactive waste and spent fuel will become the property of the State after having been received by this Entity. Article (41) provides for a trust fund being established to cover costs associated with the final management of radioactive waste.

The law does not make provisions for the ownership of orphan sources, nor for mechanisms for their safe recovery, storage and disposal. The Team considers that the Entity identified in the Article 41 could specifically be made responsible for the final safe management of orphan sources, and that in the interim, other provisions are made to place responsibility on an organization (that could comprise one or several bodies) for the safe recovery and storage of orphan sources. With this exception, which the Team feels it is necessary to rectify, the Team considers that arrangements in place and planned through provisions in the Nuclear Law satisfy Requirement 6 of GSR Part 1. The provisions for safe management of orphan sources are considered further in Section 1.9 and Chapter 13.

1.7. COORDINATION OF AUTHORITIES HAVING RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

FANR is exclusively responsible for licensing of Regulated Activity within its competences of nuclear safety, nuclear security, radiation protection, and safeguards.

Article (7) of the Nuclear Law requires that FANR co-operates with relevant government entities, advises them and provides information on relevant topics in relation to environmental protection; public and occupational health; emergency planning and preparedness; radioactive waste; public liability; physical protection and safeguards; water use and consumption of food; land use and planning; and safety in the transport of dangerous goods.

The completion of arrangements for fully effective coordination with other agencies having relevant responsibilities is a work in progress at this stage of the development of the UAE's nuclear sector.

One important counterpart is the newly established 'National Emergency, Crises and Disasters Management Authority' (NCEMA), which is further considered under Section 1.9 and in Chapter 10. The interaction with other bodies may be challenging as this may require interaction with Federal bodies when such have been established, and/or one to several Emirate bodies. This seems to be particularly complex in the field of medical applications of radiation and associated radiation protection issues, as further analysed in Section 11a.

FANR approaches the issue by setting Memoranda of Understanding (MoU) between FANR and other bodies, NCEMA being one example. FANR has entered into, or is currently negotiating a total of 16 such MoUs, covering a range extending through national agencies, Khalifa University, and organisations in other countries. The Team commends this approach and attaches importance to this process being brought to completion. Of note, the guidance contained in IAEA Specific Safety Guide SSG-16, suggests the Government should ensure that all the necessary organizations and other elements of the safety infrastructure are developed efficiently and that their development is adequately coordinated.

Another mechanism to promote collaboration between various bodies having a role in radiation safety is through the Radiation Protection Committee, established by a decision of the FANR Board of Management on the basis of Article (67) of the Nuclear Law. The Radiation Protection Committee (RPC) is headed by the FANR Director General and its membership⁴ includes representatives (each serving a term of three years) as follows: FANR Department of Radiation Safety as Vice President; The Armed Forces; Ministry of Interior; Ministry of Health; Ministry of Environment and Water; ENEC; Federal Customs Authority; Khalifa University; Health

⁴ Resolution No. (04) of 2011 of the Board of Management of the Federal Authority for Nuclear Regulation

Authority – Abu Dhabi; Health Authority – Dubai; Environment Agency – Abu Dhabi; Dubai Municipality and NCEMA.

The Committee is charged with providing advice to FANR on Radiation Protection. It is constituted to work with competent Authorities, develop training programmes as appropriate, and promote awareness in the radiation protection area. The Committee is newly established and has had its inaugural meeting in October 2011. The work programme is being developed and includes derivation of diagnostic reference levels (DRL) for various diagnostic procedures, and definition of intervention levels, or reference levels, for emergency response measures.

The Team considers the Radiation Protection Committee to have a very important function of great benefit for radiation protection and coordination between various national bodies and the UAE should be commended for its establishment. The Team considers it important that adequate priority and resources are provided to carry out activities under the Radiation Protection Committee umbrella and that it formulates an action plan with clearly defined targets and timeframes.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(4)	BASIS: GSR 1 Part 1, Req.7: <i>“Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provisions for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.”</i>
GP2	Good Practice: The Nuclear Law provides the basis for establishing the Radiation Protection Committee that provides a framework for effective interaction between various agencies and other organisations of relevance for the framework for safety.
S3	Suggestion: The Government of the UAE should encourage and facilitate the establishment of Memoranda of Understanding (MoU) between FANR and other governmental bodies, to avoid duplication of efforts and conflicting advice. FANR should conclude the current negotiations for MoUs as soon as practicable.
S4	Suggestion: The Radiation Protection Committee should develop and implement an action plan to address outstanding issues such as reference levels (or intervention levels) for existing exposure situations and emergencies, administration of orphan sources and derivation of diagnostic reference levels for different diagnostic procedures.

1.8. EMERGENCY PREPAREDNESS AND RESPONSE

The government has made provision for emergency response through establishing an emergency response framework as a part of the Nuclear Law. The government has also recently enacted a law that establishes in legislation the ‘*National Emergency, Crises and Disasters Management Authority*’ (NCEMA) which is a high-level coordinating agency for emergencies in the UAE, including nuclear and radiological emergencies.

The framework established in the Nuclear Law is as follows:

- Article (7) requires that FANR cooperate with and advise relevant Government entities concerned with emergency preparedness and response.
- Article (49), 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), 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), 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), requires that a licensee provide its emergency plan to FANR and other competent authorities of the State for approval 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), 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
 - 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), 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 the public be established by regulation.

This area is further discussed in Section 10.

1.9. SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISKS

Unregulated sources of natural or artificial origin as well as contamination from past activities and events may cover a wide range of scenarios, referred to as existing exposure situations in the radiation protection framework as laid out in ICRP Publication 103. This also covers orphan sources and inadvertent exposure, for example to metal components having been contaminated by radioactive sources present during the process of smelting.

The government has not established a system for protective actions or to address radiation risks of unregulated sources and contamination from past events. The government and

regulatory body have focused attention during the early phase of development of the nuclear programme on the Regulated Activities specified in the Nuclear Law.

The team considers it a priority that FANR take actions in this area.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(5)	<p>BASIS: GSR1 Part 1, Req. 9: <i>“The government shall establish an effective system for protective actions to reduce undue radiation risks associated with unregulated sources (of natural or artificial origin) and contamination from past activities or events, consistent with the principles of justification and optimization”</i></p> <p>BASIS: CoC. Section 9: <i>Every State should ensure that appropriate facilities and services for radiation protection, safety and security are available to, and used by, the persons who are authorized to manage radioactive sources. Such facilities and services should include, but are not limited to, those needed for:</i></p> <p style="padding-left: 40px;"><i>(a) searching for missing sources and securing found sources;</i></p> <p style="padding-left: 40px;"><i>(b) intervention in the event of an accident or malicious act involving a radioactive source;</i></p>
R1	<p>Recommendation: The Government of the UAE should encourage collaboration amongst relevant bodies to make an inventory of sites with elevated levels of radiation, whether this be from natural exposure or legacies from past practices, and to determine reference levels for remedial or other actions.</p>
R2	<p>Recommendation: The Government of the UAE should establish an interim organization for the safe recovery and storage of orphan sources until ultimate transfer of responsibility can be achieved to the new “Waste Entity” to be established pursuant to the Nuclear Law.</p>

1.10. PROVISION FOR THE DECOMMISSIONING OF FACILITIES AND THE MANAGEMENT OF RADIOACTIVE WASTE AND SPENT FUEL

There is currently no single document covering all internationally recommended issues to be addressed by the National Policy and Strategy on Radioactive Waste Management. Nevertheless the main aspects are considered in the Nuclear Policy as well as in the legislative and regulatory framework. According to Article (41) of the Nuclear Law, the Cabinet is responsible for issuing a policy for long-term management and disposal of spent nuclear fuel and radioactive waste and shall identify the entity in charge of implementing that policy.

Elements of the policy have already been considered. The UAE’s Nuclear Policy, Section 6, recognizes long-term decommissioning funding as one element in a programme to ensure long-term sustainability. The Nuclear Policy also includes a commitment to the IAEA Joint Convention on the Safety of Spent Fuel and Waste Management. The Nuclear Law in its Article (42), (1) creates the “Decommissioning Trust Fund” established by a decision of the Cabinet according to the Board’s recommendations. This fund will cover costs for construction, operation and closure of a radioactive waste management facility, costs for decommissioning of the nuclear facilities, costs for regulatory oversight and the cost for the management of the trust fund. The Nuclear Policy also considers the development and

funding of human resource capabilities for the whole nuclear programme including the radioactive waste and spent nuclear fuel management.

With regard to safety of radioactive waste, as required by the Joint Convention, the Nuclear Policy states that in the event the UAE deploys nuclear power plants within its territory, it will maintain a high level of safety in the management of spent fuel and radioactive waste. In such a scenario, appropriate measures would be established to ensure protection against radiological hazards at all stages of spent fuel and radioactive waste management and emergency plans would be implemented at waste management and spent fuel facilities.

The responsibilities with the safe management of the radioactive waste management and spent nuclear fuel are well defined in the Nuclear Law. Article (25) includes Decommissioning of a Nuclear Facility as one of the Regulated Activities requiring a licence from the Authority. Article (40) provides that the Licensee is responsible for the safe management of radioactive waste, consistent with regulatory requirements by the Authority, until it is delivered to a national entity for the purposes of disposal.

The Nuclear Policy also establishes that 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. This statement was also reflected in the regulations FANR-REG-11 (Article 15) and FANR-REG-24 (Article 30 2a).

The Nuclear Law in its Article 41 established the prohibition to import radioactive waste and spent nuclear fuel derived from nuclear energy applications outside the State for the purpose of a long term storage or disposal in the State's lands and sites.

The Nuclear Policy states that the UAE would prefer to source nuclear fuel via a fuel leasing or similar arrangement but, in any event, long-term spent fuel facilities would be built and managed under regulations to ensure the compliance with international standards of waste disposal.

The Team was informed that the government has a project underway with the participation of international experts to develop the national policy and strategy on radioactive waste management and spent nuclear fuel referred to in Article (41) and the policy is expected to be put to the Cabinet during 2012.

An important element of a national policy for radioactive waste is public information and participation. Such a national policy addresses this issue in respect of health, safety and the environment and, desirous that decisions leading to the potential development of nuclear power be supported by its citizens, the UAE should take the steps necessary to ensure effective public information and engagement. Transparent communication vis-à-vis the general public will also be bolstered by effective communication with Governmental and appropriate expert organizations, neighbouring countries and the larger international community.

The Team firmly believes the current work on the strategy should be brought to completion so that necessary regulatory documentation can be developed on that basis. This will also be addressed in more detail in subsequent sections of this mission report.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(6)	BASIS: GSR Part 1, Req. 10, para. 2.28: <i>“Decommissioning of facilities and the safe management and disposal of radioactive waste shall constitute essential elements of the governmental policy and the corresponding strategy over the</i>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	<i>lifetime of facilities and the duration of activities. The strategy shall include appropriate interim targets and end states. Radioactive waste generated in facilities and activities necessitates special consideration because of the various organizations concerned and the long timescales that may be involved. The government shall enforce continuity of responsibility between successive authorized parties.”</i>
(7)	BASIS: GSR Part 5, Req. 2: <i>“To ensure the effective management and control of radioactive waste, the government shall ensure that a national policy and a strategy for radioactive waste management are established. The policy and strategy shall be appropriate for the nature and the amount of the radioactive waste in the State shall indicate the regulatory control required, and shall consider relevant societal factors. The policy and strategy shall be compatible with the fundamental safety principles and with international instruments, conventions and codes that have been ratified by the State. The national policy and strategy shall form the basis for decision making with respect to the management of radioactive waste.”</i>
R3	Recommendation: The Government of the UAE should ensure the development of a National Policy and Strategy for Radioactive Waste Management is brought to conclusion in the shortest timeframe. This would facilitate inter alia, the development of the necessary regulations and regulatory guidance documents.

1.11 COMPETENCE FOR SAFETY

The Government of UAE has clearly recognised the importance of human resources in its strategic document ‘Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy’. The document sets the basis for establishing a strategy to strengthen the human resources to regulate, manage, operate and maintain the safety of nuclear facilities.

A national regulatory capacity building effort is being implemented by FANR, ENEC and Khalifa University. These three entities are working together across education, training, and recruitment to ensure 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.

In its regulations, FANR has stipulated a necessary level of competence for persons who have responsibilities relating to the safety of facilities and activities.

The Team finds the MoU between FANR and Khalifa University, as well as the arrangements already in place to maintain an educational programme for 166 students, nationally and abroad, well-structured and ambitious and designed to gradually provide means by which Emirati nationals can fill significant positions at both FANR and ENEC. Students must commit to five years professional engagement with FANR or ENEC following completion of their studies. There is no ‘competition’ between FANR and ENEC, the choice of organization is based on personal preference and availability of positions.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(8)	BASIS: GSR1 Part 1, Req. 11: <i>“The government shall make provision for building and maintaining the competence of all parties having responsibilities in relation to the safety of facilities and activities.”</i>
GP3	Good Practice: Students participating in capacity-building programmes have an opportunity to choose at the commencement of their career, to work either with the regulator FANR or with the operator ENEC on comparable terms. This is a good contribution towards the balanced development of the human capacity throughout the whole nuclear sector.

1.12 PROVISION OF TECHNICAL SERVICES

The UAE Government provides a personal dosimetry service through the Ministry of Health, Dubai Health Authority and a Government hospital and international providers of such services also operate in the UAE. Planning is underway for environmental radiation monitoring near the nuclear facilities, noting that such monitoring by FANR is empowered by Article 5 (28) of the Nuclear Law. This project is also supported through technical cooperation with the IAEA. Similarly there is an IAEA Technical Cooperation project to support the UAE in the process of establishing a Secondary Standards Dosimetry Laboratory (SSDL) in the country.

Work has started to develop an environmental monitoring programme to assist in monitoring radiation exposure to the population and to provide early warnings in case of an accident or malicious act leading to the release of radioactive substances.

Article (24) of FANR-REG-24 requires use of ‘approved/licenced dosimetry services that operate under an adequate quality management system’. FANR does not provide approval or authorization of service providers for individual monitoring. In its regulatory guide RG-007, FANR has indicated that it relies on formal approval by recognized radiological health authorities, such as approval by the Health and Safety Executive in Great Britain and accreditation by the National Voluntary Laboratory Accreditation Program (NVLAP) in the United States. The present arrangements cannot be considered as complying fully with the requirements associated with radiation protection and safety of radiation sources contained in GSR Part 3 (Interim Edition), 3.73, (c). Moreover, operation of NPPs requires the permanent availability of efficient services providers for monitoring of workers and the environment. For example, monitoring in case of internal contamination requires the availability of laboratories which can swiftly and reliably provide results for the dose of contaminated workers. It should be recommended that FANR considers its responsibilities for ensuring in both routine and abnormal situations, whatever the facility, availability of accredited/approved services providers allowing FANR to fulfil its obligations as stated in the Nuclear Law, Art. 5 (10, 12). Achievement of these objectives requires that FANR makes clear provision in regulations on the conditions for services providers to be accredited/approved/accepted by FANR. Licensees should also be encouraged to use such accredited services providers.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(9)	BASIS: GSR1 Part 1, Req. 13: <i>“The government shall make provision, where necessary, for technical services in relation to safety, such as services for personal dosimetry, environmental monitoring and the calibration of</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>equipment”.</i></p> <p><i>2.41. Technical services do not necessarily have to be provided by the government. However, if no suitable commercial or non-governmental provider of the necessary technical services is available, the government may have to make provision for the availability of such services. The regulatory body shall authorize technical services that may have significance for safety, as appropriate.</i></p>
S5	<p>Suggestion: The Government should continue to develop and implement provisions to establish the nationwide radiological monitoring system for early warning purposes as well as for the long-term assessment of radiological contamination of the territory of the country.</p>
(10)	<p>BASIS: GSR Part 3, Req. 20: <i>“The regulatory body shall establish and enforce requirements for the monitoring and recording of occupational exposures in planned exposure situations”.</i></p>
R4	<p>Recommendation: FANR should develop authorization criteria to be fulfilled by dosimetry services providers for the individual monitoring of workers subject to occupational exposure.</p>

2. GLOBAL NUCLEAR SAFETY REGIME

The UAE and FANR intend to maintain significant involvement in a wide range of international activities that contribute to the global safety regime for achieving and maintaining a worldwide high level of safety at nuclear facilities and activities. The international character of the UAE programme and its commitment to international safety standards was emphasized in the Nuclear Policy.

2.1. INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR COOPERATION

The features of the global safety regime include (a) International Conventions, (b) Codes of Conduct, (c) Internationally agreed IAEA Safety Standards, (d) International peer reviews, and (e) Multilateral and bilateral cooperation. The IRRS review team reviewed each of these features as described below.

International Conventions

The UAE is Party to a number of international conventions. These are listed, along with an indication of the activities that have been taken or are underway to implement.

- *Convention on Nuclear Safety (CNS)*: The UAE government ratified the CNS in 2009. As a contracting party, the UAE participated in the 5th CNS Review Meeting held on 4-14 April 2011 to present its 1st National Report. As a contracting party, UAE is obliged to submit a report addressing its actions in relation to the Fukushima Daiichi accidents and to participate in the CNS Extraordinary Meeting related to this topic scheduled for August 2012.
- *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)*: The UAE became a party in 2009. The regulatory authority is coordinating with other UAE Government agencies to provide the first National report to be presented at the 4th Review Meeting to take place in May 2012.
- *Convention on the Physical Protection of Nuclear Material (CPPNM)*: The UAE signed the convention in 2003 and ratified the amendments to the CPPNM in 2009.
- *Convention on Early Notification of a Nuclear Accident*: The UAE signed the Convention in 1987.
- *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*: The UAE signed the Convention in 1987.

In addition, the UAE is party to non-proliferation conventions:

- *Treaty on the Non-Proliferation of Nuclear Weapons*: The UAE became a party in 1995.
- *Comprehensive Safeguards Agreement with the IAEA*: The UAE signed the Agreement in 2003 and ratified the Additional Protocol to the Agreement in 2010.

As stated in the Nuclear Policy, the UAE plans to conclude the following international legal instruments dealing with liability for nuclear damage:

- IAEA Vienna Convention on Civil Liability for Nuclear Damage;
- IAEA Protocol to Amend the Vienna Convention on Civil Liability;
- IAEA Joint Protocol on the Application of the Vienna and Paris Conventions;
- IAEA Convention on Supplementary Compensation for Nuclear Damage.

Article 58 of the UAE Nuclear Law states that “the civil liability for nuclear damage shall be determined according to the provisions of the international treaties and agreements entered into by the State and the relevant legislation issued in this regard”.

The Team is of the view that to ensure all relevant international obligations are fulfilled and to provide the basis for the application of the legal requirements on civil liability for nuclear damage, the UAE should take the necessary steps to ratify international legal instruments in this area.

Codes of conduct that promote the adoption of good practices in the relevant facilities and activities

While the UAE government has not yet made a political commitment to the *Code of Conduct on the Safety and Security of Radioactive Sources (the Code)* or the *Guidance on the Import and Export of Radioactive Sources (the Guidance)*, it does endeavour to follow the provisions of the Code and its accompanying *Guidance*. In this regard FANR requested that the thematic module on the Code be included within the scope of the IRRS. To this effect, FANR addressed the safety and security of radioactive sources in their self-assessment (Module 13). The Team was informed that the UAE will make a political commitment to the Code in the near future.

Whilst there is commitment to follow the provision of the Code of Conduct, the Team considers it important that political commitment is made at the highest level to comply with the Code.

Internationally agreed safety standards that promote the development and application of internationally harmonized safety requirements, guides and practices

The Nuclear Policy established that the policy of the UAE is to seek conformance with IAEA safety standards. The Nuclear Law (Article (38)) requires the Authority to take account of IAEA safety standards in developing regulations and guidelines. FANR is taking part in the activities of some of the Safety Standards Committees. The FANR management process for establishing regulations requires the IAEA safety standards as an input to the development of any FANR Regulation or Regulatory Guidance.

International peer reviews of the regulatory control and safety of facilities and activities, and mutual learning by participating states

The UAE is actively utilizing the international expert peer review services provided by the IAEA for improving nuclear safety and also encouraging the nuclear experts in the UAE to participate in the international expert review missions for nuclear facilities and activities abroad.

The Government has requested or received the following peer reviews of its nuclear programme, (in addition to the IRRS mission covered by this report):

- *Radiation Safety and Security of Radioactive Sources Infrastructure Appraisal (RaSSIA)* in June 2006.

- *Integrated Nuclear Infrastructure Review Mission (INIR)*, in January 2011.
- *IAEA Siting mission*, in November 2011 and
- *The IRRS mission that is the subject of this report*. The IRRS was requested at this stage of programme development to peer review the UAE national framework for safety and FANR's assumed functions in the area of regulated activities as well as the development of the infrastructure for the introduction of nuclear power.

In addition to requesting peer reviews of its programme, the UAE has participated in IRRS missions to the Republic of Korea and Spain.

The UAE has established a high-level group of international experts; the '*International Advisory Board*' (IAB). On at least a semi-annual basis the Board reviews UAE's progress in setting, achieving and maintaining the highest standards of safety, security, non-proliferation, transparency and sustainability. Board members provide their insights into how the programme can be optimized against these targets.

Multilateral and bilateral cooperation that enhances safety by means of harmonized approaches as well as increased quality and effectiveness of safety reviews and inspections

FANR signed an Arrangement with the Ministry of Education, Science and Technology of the Republic of Korea for the exchange of technical information and cooperation in the regulation of nuclear safety, radiation protection, nuclear safeguards, physical protection, export control and related matters in May 2010. Based on this arrangement, FANR signed an Implementing Arrangement with the Korea Institute of Nuclear Safety (KINS) in May 2010. The arrangement will allow the exchange of information, notifications of operating experience, training for personnel, joint cooperation in nuclear safety research and advice and assistance on nuclear regulatory activities. FANR is utilising this arrangement in the rapid development of the organization and with regard to its regulatory review.

Furthermore, FANR signed an implementing arrangement with the Korea Institute of Nuclear Non-Proliferation and Control (KINAC) in March 2011. The arrangement will allow the exchange of information, experience and technology related to ensuring peaceful uses of nuclear technology.

FANR signed a Cooperation Arrangement with the US Nuclear Regulatory Commission (NRC) in August 2010. The FANR-NRC Cooperation Arrangement will allow the exchange of technical information relating to the regulation of safety, security, safeguards, and environmental impact of nuclear energy facilities. The scope of the arrangement also covers a joint safety research exchange, as well as nuclear safety training for personnel.

An agreement with STUK of Finland was signed in November 2011.

There are agreements in preparation with the Regulatory Authorities of UK and France, and with regulators of other advanced countries.

FANR officers are members of NUSSC and RASSC and in addition, FANR staff has taken part in:

- The IAEA General Conference and the Senior Regulators Meeting;
- The Ministerial Conference on Nuclear Safety following the accident at the Fukushima Daiichi nuclear power plant;
- International Nuclear Safety Advisory Group (INSAG) activities;
- IAEA technical meetings;
- The Regulatory Cooperation Forum.

FANR also participates as an observer in some activities of the OECD NEA and closely observes and follows meetings of the Multilateral Design Evaluation Programme, MDEP.

UAE received a RaSSIA mission in 2006 that indicated substantial areas for improvement in the governmental, legal and regulatory framework for safety. This mission’s recommendations have largely been implemented through the creation of FANR and numerous other actions. The Team considers this as evidence that UAE and FANR attach great significance to peer review missions and take objective action on the findings of such missions. The very significant development since 2006 is considered good practice.

The Team is satisfied that UAE through FANR, has taken a very active role in international collaboration and in doing so contributes actively to, and takes stock of, the development of the global safety regime. The team notes that international engagement is driven by the ambition to achieve the highest standards of performance in the nuclear sector, including safeguards and non-proliferation, as clearly laid out in the Nuclear Policy.

The Team believes that the focus on nuclear activities needs to be balanced with the priority given to engagement in international activities relating to radiation protection, radiation science, human factors, safety culture and waste management, and the Team considers it important that these aspects be given visibility in the international programme. This might be assisted by an international strategy and action plan. Although partly covered by the Nuclear Policy, this plan could help FANR focus on what it seeks to achieve with its international interactions across the board. The International Advisory Board may have a significant role in this regard.

FANR has developed a set of regulations and guides to support the regulatory review of the ENEC licence applications. That set of regulations and guides draws heavily upon IAEA and other international guidance, particularly from the USNRC. The choice of the KEPCO design, together with the similarity of the Korean and US regulations, guides and codes, has greatly facilitated FANR’s effort to establish a comprehensive regulatory framework in a relatively short time.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS: GSR1 Part 1, Req. 14: <i>“The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally.</i></p> <p style="margin-left: 40px;"><i>(a) International conventions that establish common obligations and mechanisms for ensuring protection and safety;</i></p> <p style="margin-left: 40px;"><i>(b) Codes of conduct that promote the adoption of good practices in the relevant facilities and activities;</i></p> <p style="margin-left: 40px;"><i>(d) International peer reviews of the regulatory control and safety of facilities and activities, and mutual learning by participating States.”</i></p>
GP4	<p>Good practice: UAE and FANR have given evidence of ambitious use of international peer review missions as well as demonstrated that the findings from these missions are incorporated into actions plans and that resulting actions are being implemented. The effectiveness and efficiency by which this has taken place is considered good practice.</p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S6	Suggestion: The Government of the UAE should officially notify the IAEA as soon as practicable that it endeavours to follow the provisions of the Code of Conduct on the Safety and Security of Radioactive Sources.
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2.2. SHARING OF OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

FANR is developing a comprehensive Operating Experience Feedback Programme. A process and procedures within the Integrated Management System (IMS) are well advanced. In the meantime, FANR has taken the following actions to ensure that operating experience is reflected in its reviews, assessments and decisions:

- The FANR regulation for an *Application for a Licence to Construct a Nuclear Facility* requires that the application includes a section on recent lessons learned and experience from other facilities. This information is being assessed as part of the application that is under review for the first construction licence.
- Participated in international conferences and meetings of direct applicability to operating and construction experience;
- Utilized experienced FANR employees and TSOs who have construction and operating experience;
- Worked closely with the Korea Institute of Nuclear Safety (KINS) to gain insights from their established operating experience feedback programme.

The IRRS Review team concludes that steps are appropriate for FANR at this stage of development of the nuclear power programme. These steps are consistent with those laid down in SSG-16 on the development of nuclear safety infrastructure in that FANR “*has implemented a cooperation programme with the Vendor State and with other regulatory bodies that have experience of oversight of nuclear power plants of the same type as that selected*”.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1. ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

The Nuclear Law establishes that the Federal Authority for Nuclear Regulation is managed by a Board of Management. The Board must comprise not less than five members and a chairman and deputy chairman, and be constituted entirely by qualified nationals of the UAE. The Board appoints a Director General who is empowered to manage the Authority's business and oversee its financial, administrative and technical affairs under the Board's control.

The Director General proposes the general policy of the Authority and its strategic and operational plans for the Board's approval. The Director General also prepares and submits to the Board the Authority's annual budget and proposes the organizational structure to be adopted by the Board.

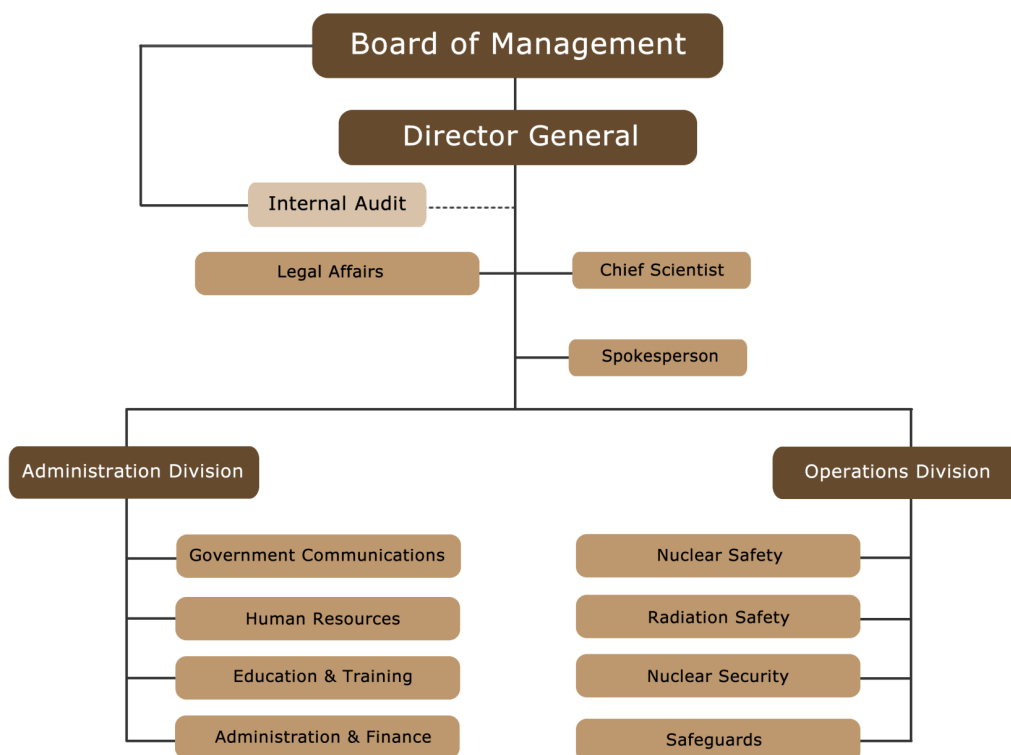


Figure 1: FANR organizational structure

The organizational structure is simple and adequately fits the activities FANR is currently undertaking (see Figure 1). Some areas will need to be added with time, e.g. if and when the UAE policy on waste management go ahead; dosimetry laboratories and other laboratories, etc. Any change to the organizational structure of the Authority would be managed in the context of FANR's Integrated Management System.

The budget is determined with respect to a three-year plan. The general objectives for the three-year period are determined by the Government. FANR develops strategies to achieve the objectives, allocates resources to the various branches and defines an operational plan, key performance indicators, activities and targets. Accountability and responsibilities are clearly defined. All activities are costed and FANR seeks the approval of the budget from the Department of Finance. The Department of Finance scrutinizes the budget in some detail. There are mechanisms in place to make reasonable adjustments to the budget within the three-year period.

The organizational structure reflects the fact that the UAE has begun to undertake a nuclear power programme; that there is the complete range of applications of radioactive sources and radiation generators for medical, industrial and educational purposes in the UAE; that FANR has responsibilities for emergency preparedness and environmental monitoring around the power plants; and that the Nuclear Law established FANR as responsible for safeguards and non-proliferation and nuclear security as well as safety. In addition, there is a policy commitment to the development of national capacity in these areas.

The Team finds the overall organizational structure of FANR being appropriate and serving the objectives of the organization. The Team does, however, feel that FANR needs to monitor the ‘depth’ in key areas, so that FANR doesn’t become too dependent on key individuals. This is also an issue for the succession planning.

The Team noticed that in the field of radioactive waste and decommissioning there seems to be a divide in the way the framework for safety is developed for nuclear installations and for non-nuclear installations. It should be noted that the IAEA Safety Requirements for radiation protection (GSR Part 3 and GSR-R-3), predisposal management of radioactive waste (GSR Part 5), for decommissioning (WS-R-5) as well as for safety assessment (GSR Part 4) should be applied to all practices and activities as it is established in the scope of these documents.

In applying all these requirements FANR should consider that the review and assessment of a facility or an activity shall be commensurate with the radiation risks associated with the facility or activity, in accordance with a graded approach (GSR Part 1). FANR should review and assess the particular facility or activity in accordance with the stage in the regulatory process (initial review, subsequent reviews, reviews of changes to safety related aspects of the facility or activity, reviews of operating experience, or reviews of long term operation, life extension, decommissioning or release from regulatory control).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	BASIS: GSR Part 1, Req. 16: <i>“The regulatory body shall structure its organization and manage its resources so as to discharge its responsibilities and perform its functions effectively; this shall be accomplished in a manner commensurate with the radiation risks associated with facilities and activities.”</i>
(2)	BASIS: GSR Part 5, Req. 16 para. 3.9: <i>“The regulatory body has to carry out activities that are necessary to verify that requirements for safety and environmental protection are being met by the operator.”</i>
S7	Suggestion: FANR should consider organizing the regulatory body so that activities related to radioactive waste and decommissioning are integrated.

3.2. EFFECTIVE INDEPENDENCE DURING CONDUCT OF REGULATORY ACTIVITIES

FANR has published (including on its website) a statement of its Vision, Mission, and Core Values. In particular, Core Value 2 on independence states:

“We make decisions that are objective and unbiased ensuring that the highest forms of ethics are strictly applied.

We believe in having the in-house national and international expertise to independently assess technical views”.

A particular challenge for FANR is the rate by which the implementer, ENEC, is developing its plans, with target dates of 1 July 2012 for the first concrete and commercial operations starting 1 May 2017. FANR also operates in a climate where the Government of UAE has clearly established in the Nuclear Policy its intention of exploring the nuclear option as a means for sustaining its energy demand. Two issues are associated with this situation:

- a) Will FANR be able to build up its capacity quickly enough to regulate, assess and inspect ENEC’s activities in a manner that provide reassurance of the safety of the Braka NPP; and
- b) if this is not possible or if FANR is not convinced that safety is adequate how will delays be perceived?

The issues were discussed with FANR senior management. Although the questions are currently hypothetical, FANR senior management was certain that safety would not be compromised in the interest of the implementer’s efforts to keep to the timeline. However, both the Team and senior management of FANR are aware of the challenges ahead, also when benchmarked against the milestones of SSG-16.

‘Effective independence’ was also discussed in Section 1.4 of this report. To the extent the Team can assess the situation, depending on the dynamic stage of development, the effective independence of FANR is considered by the Team to be satisfactory.

3.3. STAFFING AND COMPETENCE OF THE REGULATORY BODY

Securing a sufficient number of qualified staff commensurate with its responsibilities is an on-going challenge for FANR as is the case for most regulatory bodies worldwide. In its early days, FANR was able to recruit a cadre of senior and highly experienced expatriate staff. It also received a number of experienced radiation protection professionals from a predecessor organisation and recruited a number of people already working in radiation protection in UAE. That group of staff largely remains intact. Comparisons with other regulators indicate that the total number of FANR staff, when supplemented by TSO resources to cover nuclear safety, is appropriate for the tasks currently in hand. Further recruitment is planned for several years ahead.

The Director of the Security Department, and the Manager for Regulated Materials indicated that a major task in hand is the campaign to licence users who were formerly regulated under a previous UAE law (See Section 5.1).

FANR has the added challenge of looking to sustainability of its operations on the basis of building a staffing complement predominantly of Emirati nationals in the medium-longer term. FANR has been successful in recruiting young UAE professionals and has a programme

of postgraduate, on-the-job training and mentoring. The Team believes this process may need to continue for some time to come.

FANR undertakes workforce planning at both a strategic level and in the context of annual budgeting. The workforce planning takes into account not only the nature and number of facilities and activities under regulatory jurisdiction, but the requirement for national capacity building.

Current staffing plans respond to medium-term needs, which are currently driven by:

- establishing and implementing a comprehensive legal and regulatory framework;
- implementing the licensing process for nuclear facilities and radiation sources through review and assessment of applications;
- conducting inspections and undertaking enforcement actions.

In implementing the workforce plan, job vacancies are filled by a mixture of senior staff (both specialists and generalists), and young Emiratis recruited specifically to be developed and mentored to gain the knowledge, skills and attitudes necessary to be a regulator. In general, senior staff members are drawn from countries with mature nuclear regulatory bodies. Senior staff members help ensure current regulatory needs are met and that training and mentoring programmes are implemented to ensure FANR’s long-term sustainability.

The total staff of FANR as at 30th September 2011 numbered 128. The Team noticed there were a significant number of vacancies in the organization.

Current and planned staffing in the two ‘safety’ Departments of the Operations Division is:

Department	Current	End 2012	End 2013
<i>Nuclear Safety</i>	27	40	48
<i>Radiation Safety</i>	29	41	57

The Team believes that generally speaking, staffing (in terms of numbers) is adequate considering the remit of the organization. A high level of competence is being maintained through recruitment of highly experienced expatriates and also highly capable Emiratis. Whilst the expatriates are a solution to the problem for the time being, the high proportion is also a vulnerability.

It should be noted that the total number of appropriately skilled personnel in the country for conducting the nuclear power programme has been estimated at 2,300, a large fraction of which will be expatriates (for instance, ENEC states that 50 – 75 % of the operators at Braka will be of Korean nationality for a period of at least 10 years).

Whilst the Team understands that there are plans for recruitment governed by internal planning processes, the Team considers it necessary that FANR and the relevant stakeholder organisations establish action plans for long-term ‘Emiratisation’, recognizing that full Emiratisation is not a realistic or even desirable target, considering that the access to expertise from abroad is a valuable contribution to the national system. The team believes that with time and at a rate that does not jeopardize safety, more high level technical positions inside the FANR should be held by Emiratis in order to sustainably keep facilities, including the Braka NPP, in a safe state. For this purpose it would be wise to set a long term target for achieving and maintain a reasonable percentage of Emiratis at all levels, for the purpose of maintaining safety.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(3)	BASIS: GSR Part 1, Req. 8: The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities.
S8	Suggestion: FANR and the relevant stakeholder organisations should consider targets for developing Emirati staff having the necessary competences and experience to assure regulation and safety of facilities and activities in all potential circumstances on an appropriate timescale.

3.4. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

FANR has entered into contracts with technical consultancy bodies for the provision of expert opinion and advice in areas defined by the contract. FANR has a medium-term contract with one such body for provision of advice and the drafting of products across the range of FANR’s activities.

Several contracts have been entered into for the provision of technical support in the assessment of the current NPP construction licence application. The contracts with three consortia provide for a total effort of approximately 18 person-years, distributed over a number of ‘work packages’, representing 50% of the total review effort. In managing these ‘TSO’ contracts for the construction licence application, senior FANR staff assesses the work of the contractors. The final safety evaluation reports are the responsibility of FANR staff.

To address conflicts of interest, FANR required bidders to identify potential conflicts and uses the following standard provision in contracts for regulatory advice and assistance:

“The Consultant shall immediately disclose to FANR any conflict of interest which arises in relation to the provision of the Services as a result of any present or future appointment, employment or other interest of the Consultant”.

FANR is also establishing an International Advisory Group for Nuclear Safety Regulation (IAG/NSR). The issues for review by the IAG/NSR will be established by the FANR Board. The FANR Director General will act as a liaison between the Board of Management and IAG/NSR. The objectives of establishing the IAG/NSR are:

- Advising the FANR Board of Management (BoM) on complex technical and policy matters related to nuclear safety, security and safeguards (non-proliferation) regulations;
- Recommending and proposing strategies, policies, procedures, and guidelines;
- Ensuring that FANR actions, technical evaluations, and decisions are realistic, timely, anchored to the best scientific information and conducted against FANR criteria and best international practices.

The Team considers the use and long-term interaction with TSOs to be in accordance with common practice worldwide, provided it is managed well and kept under tight control by FANR. This requires that FANR has the capability to act as an ‘intelligent customer’. The

current apportionment of workload between TSOs and that carried out in-house seems well balanced and gives no rise to concern. Interviews with ENEC largely confirmed this view. TSO contracts seem to be largely focused on the nuclear power programme. However, during interviews responsible staff in other areas stated that such arrangements could also be made, and were indeed established, to support FANR activities unrelated to the nuclear power programme.

FANR's capability to independently assess issues primarily related to nuclear safety, and to provide qualified advice to the Board of Management, is supported by the establishment of the position of FANR Chief Scientist. The Chief Scientist (CS) shall support the Director General in scientific and technical matters relating to nuclear regulation. The job description states, inter alia:

“The Chief Scientist would be expected to take the lead in resolving difficult issues where there is a lack of adequate information or where there is conflicting information, where there are strongly differing opinions among the experts involved, or where the normal FANR management processes are having difficulty reaching a resolution. The CS would be expected to develop and carry out plans for collecting all the facts and opinions, considering all stakeholder views, and proposing a resolution for consideration by the DG. The scope of the CS's authority shall not include direct staff management responsibilities”.

The Team is satisfied with existing arrangements to enter into contracts with TSOs and the capability, through all technical staff and also through the independent advisory role of the Chief Scientist, to act as an intelligent customer and avoid being unduly dependent on the assessments of TSOs. The Team draws attention to the challenges of bringing the right number of competent staff, either internal to FANR or through TSOs, but is reassured by the awareness and commitment by management to address this issue. The Team also reminds FANR of the need to continuously monitor the interactions with, and the actions of TSOs.

3.5. LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

FANR is required by the Nuclear Law to ensure that the relationship with the operator is based on transparency.

FANR's formal mechanisms for communication with authorized parties include:

- Letters requesting additional information from licence applicants. These are captured in FANR's document management system;
- Inspection reports and covering letters requiring action and response to inspection findings;
- Requests for comments on draft regulations and guides;
- Minutes of meetings between FANR staff and licence holders and applicants.

FANR regulatory decisions are formally communicated in writing to the authorized party in accordance with the FANR IMS Core Processes and procedures.

Informal communication is conducted through meetings, telephone calls, seminars, etc. FANR has conducted a number of 'workshops' open to applicants and licence holders for regulated material to discuss its regulatory processes and expectations.

To the extent the Team has been able to assess this issue, the Team is satisfied that FANR complies with GSR Part 1 in this regard.

3.6. COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

FANR has a programme for communication and consultation with interested parties. This programme is sustained by the Spokesperson and the Government Communications Department. As an example of the level of activity, FANR has issued 43 press releases since March 2010.

FANR has a spokesperson / media officer on duty 24 hours a day. FANR uses various mechanisms to inform the public and other stakeholders of its activities, including the following:

- Publishing Board of Management decisions and regulations in the UAE Official Gazette;
- Regular postings on the FANR website;
- Press conferences and media interviews;
- Press releases (43 since March 2010);
- Workshops and seminars;
- FANR Annual Report.

The process by which FANR explains the basis for its decisions is generally described in the formal process MP.2, 'Regulatory Decision Making'. This process involves the preparation of a draft decision; internal and/or external review, as appropriate; resolution of related comments; and publication of a final decision.

The Team is satisfied with the way communication and consultation with interested parties are established and implemented in FANR.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

4.1. THE MANAGEMENT SYSTEM OF THE REGULATORY BODY

FANR has developed an integrated management system (IMS) according to the IAEA Safety Standard GS-R-3. The content and objectives of the IMS are described in the IMS Manual including the FANR vision and mission statements aiming at safety, health, environmental, security, quality and economic elements.

The Team acknowledge that FANR recognised the need for an IMS and has made good progress in its implementation at an early stage. Whilst the IMS still needs development (which itself is part of the continuous improvement process) it provides an important support function for the activities of the Authority.

4.2. GENERAL REQUIREMENTS OF GS-R-3

The IMS is designed to take into account all the activities of the Authority to allow it to achieve its objectives. The IMS integrates the elements of organizational decision-making into one coherent system.

The top requirements are listed in the IMS Manual. Additional process-specific requirements are defined in each of the processes, procedures or instructions. The team believes it is unclear how the IMS provides adequate confidence that all the requirements are fulfilled.

A risk assessment for key functions of the Authority was conducted by the KPMG (appointed as internal auditor by the Board of Management). The assessment resulted in a proposal for a two year plan for internal audits according to the evaluated business risks identified.

In the support process; ‘SP1 Human Resource Management’ the requirements regarding the working environment and related issues have been derived from the HR Policy, as decided by the Board.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)

BASIS: GS-R-3, Req. 2.1 states that “A management system shall be established, implemented, assessed and continually improved. It shall be aligned with the goals of the organization and shall contribute to their achievement. The main aim of the management system shall be to achieve and enhance safety by:

—Bringing together in a coherent manner all the requirements for managing the organization;

—Describing the planned and systematic actions necessary to provide

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>adequate confidence that all these requirements are satisfied;</i></p> <p><i>—Ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, to help preclude their possible negative impact on safety.”</i></p>
GP5	<p>Good Practice: FANR has, at an early stage, developed an integrated management system providing an important support function for the activities of the Authority.</p>

4.3. SAFETY CULTURE

The IMS Manual addresses the importance of a safety and security culture and promotes a questioning attitude amongst the Authority’s staff.

FANR is developing procedures and training for endorsing the training programme for safety culture. FANR is using a three-phase approach with the introduction of safety culture training being a requirement for staff.

4.4. GRADING THE APPLICATION OF MANAGEMENT SYSTEM REQUIREMENTS

A graded approach is addressed in the IMS Manual; Activities with higher inherent regulatory or corporate risk require enhanced controls and verification compared with lower risk activities.

According to the IMS Manual there should also be provisions within each process and procedure for a specific graded application commensurate with their relative importance, complexity and variability and their potential on safety and business risks. An example of such provisions could be seen in the ‘Generic Inspection Guidance’ which requires that inspection planning for selecting an inspection sample should be based on criteria including the safety, risk and hazard significance. FANR’s planned inspection programme reflects a graded approach, commencing with users of category 1-3 radioactive sources and with larger hospitals.

Team members have discovered, however, that not all the process procedures have explicit provisions about how to use the graded approach, so there is some room for improvement.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	<p>BASIS: GS-R-3 Req. 2.6: <i>“The application of the management system requirements shall be graded as to deploy appropriate resources, on the basis of the consideration of:</i></p> <ul style="list-style-type: none"> <i>- The significance and complexity of each product or activity;</i> <i>- The hazards and the magnitude of the potential impact (risks) associated with the safety, health, environmental, security, quality and economic elements of</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>each product or activity;</i></p> <p><i>- The possible consequences if a product fails or an activity is carried out incorrectly.”</i></p>
S9	<p>Suggestion: FANR should consider further improving descriptions of the graded approach to be used in different areas of its activities such as:</p> <ul style="list-style-type: none"> • Licensing of radiation practices; • Safety assessment and inspection for nuclear facilities and activities consistent with the magnitude of the possible radiation risks; • Reviewing or developing the radiation protection regulations for non-nuclear facilities and activities; • Further developing documentation of the Integrated Management System.

4.5. DOCUMENTATION OF THE MANAGEMENT SYSTEM

The IMS Manual is the top-document in the document hierarchy that in an overall way describes the main components of the Authority’s management system as required by GS-R-3, i.e. the organizational structure and main responsibilities and overall policy statements. This includes the vision and mission statements and core values of FANR:

- Safety Awareness and Responsibility
- Independence
- Transparency
- Competency

FANR applies a three level structure of the IMS documentation; 1) the top level document IMS Manual; 2) Process descriptions; 3) Support procedures and controlled work instructions. All the documentation should be available via the Local Area Network (LAN) and thus accessible to all FANR staff.

4.6. MANAGEMENT COMMITMENT

Management commitment is expressed in the IMS Manual where responsibilities are outlined and described as well as vision and mission statements and core values. The IMS Manual is signed by Director General (DG), Deputy Directors General (DDG) and Department Directors. The management process MP.1 ‘Organizational Management and Development, Plan, Direct and Manage’ provides a structured approach to leadership and direction by senior management. The DDG and Department Directors are also involved in developing the processes as members of the IMS Committee. This committee meets on average three times a month. In these meetings, amongst other matters, the progress of development of processes, procedures and handling of non-conformances are managed.

4.7. SATISFACTION OF INTERESTED PARTIES

The Authority's stakeholders are defined in the IMS Manual and there is also a process for 'Stakeholder Engagement and International Cooperation' (MP8) and a process of how to 'Manage Corporate Communications' (MP.3). In the management process MP.2 'Regulatory Decision Making' the possibility for stakeholders' opinions is addressed.

4.8. ORGANIZATIONAL POLICIES

In addition to policies established in the Nuclear Policy and the Nuclear Law, the FANR Board of Management decides on policies as necessary to ensure the effective and efficient implementation of FANR's mission. To date the Board has approved Human Resources and Procurement policies. The vision, mission and corporate values stated in the IMS Manual (approved by the DG) were separately approved by the Board (Minutes from the IMS Committee Meeting 10th March 2010). In the Advance Reference Material it is said that the IMS requires that Board policies be interpreted and then incorporated into processes and procedures. This is however not clearly stated in the IMS Manual and the policies are not available in the IMS within the Local Area Network. The processes refer to several documents that are not yet approved. This could be clarified.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	<p>BASIS: GS-R-3 Req. 3.7: <i>“Senior management shall develop the policies of the organisation. The policies shall be appropriate to the activities and facilities of the organization.”</i></p> <p>BASIS: GS-R-3 Req. 5.26: <i>“Information relevant to safety, environmental, security, quality and economic goals shall be communicated to individuals in the organization and, where necessary, to other interested parties.”</i></p>
S10	<p>Suggestion: FANR should consider having all policies of FANR (approved by the Board of Management) integrated in the IMS and available to all staff via the Local Area Network and that clarifying text is inserted in the IMS Manual.</p>

4.9. PLANNING

The requirement for a process establishing goals, strategies, plans and objectives are met by implementation of the management process 'Plan, Direct and Manage' (MP.1) supported by the 'Strategic Plan Development and the Operating Plan' procedures. The provisions of these processes and documents are gradually being implemented.

4.10. RESPONSIBILITY AND AUTHORITY FOR THE MANAGEMENT SYSTEM

The IMS Management Committee comprising the deputy directors and the department directors meets regularly to review the IMS. Decisions are made by the DG or DDGs according to the process 'Manage Processes' (MP.5).

FANR has appointed a full-time coordinator who chairs the Management Committee meetings and is responsible for:

- Coordinating the development and implementation of the IMS and its assessment and continual improvement
- Reporting on the performance of the IMS

The team noticed that the IMS Coordinator appears to be working alone without supporting staff or mentoring from a senior manager. The team feels the Coordinator would benefit from the advice and support of senior management additionally to interactions with the IMS Management Committee. The position of the IMS Coordinator could be strengthened and the current job description could be adjusted to the current situation.

The job position of the IMS Coordinator is not reflected in the organizational structure of the FANR (i.e. reporting directly to the top management). In addition, the IMS Manual does not clearly address who has authority to resolve potential conflicts between requirements and within the processes of the management system.

The IMS Coordinator chairs the IMS Committee meetings and it is considered that, through this mechanism, the Coordinator is reporting directly to senior management. According to the job description the IMS Coordinator works under the direction of the Manager of QM. This position could not be found in the organization chart and no longer appears to exist.

Designated senior staff is appointed as process-owners by the IMS Committee after nominations of the Directors. See also Process management.

4.11. PROVISION OF RESOURCES

FANR is provided with sufficient financial and other material resources for fulfilling its duties. The Team recognizes that the Government is aware that, for the fulfilment of its ambitious nuclear energy development plans, appropriate resourcing of FANR is necessary.

4.12. HUMAN RESOURCES

FANR recognizes the significance of knowledge management, especially in the context of the capacity-building required to ensure sustainability of its regulatory activities. According to FANR plans, staff numbers will increase from the current 128 (as at September 2011) especially in the two departments dealing with safety issues (Nuclear Safety and Radiation Safety).

Several IMS processes address human resources and knowledge management. General provisions for staff recruitment, rotation and succession plans to deal with the Authority's work are described in the support process 'Human Resources' (SP.1). Measures for providing task-based human resource requirements and building upon national competencies are

established and described in CP.4 ‘Capacity Building’, MP.4 ‘Knowledge Management’ and SP.8 ‘Training’.

A project to develop a FANR-adopted competency framework across the organization is in progress covering training at different levels and types of competencies.

On a national level a National Regulatory Capacity Building effort is being implemented by FANR, ENEC and Khalifa University to meet the needs for building competence for the UAE nuclear energy programme in the period to 2020.

In its regulations, FANR has stipulated a necessary level of competence for persons who have responsibilities relating to safety of facilities.

4.13. INFRASTRUCTURE AND WORKING ENVIRONMENT

The Team notes the good infrastructure and working environment for FANR staff and has not identified any potential areas in need for immediate improvement.

GS-R-3 requires that senior management shall determine, provide, maintain and re-evaluate the infrastructure and the working environment necessary for work to be carried out in a safe manner and for the requirement to be met. However there could be a clarification of what requirements are applicable in this area and also how these issues shall be addressed within the organization.

4.14. DEVELOPING PROCESSES

A process model approach is adopted based on managing how work flows and integrates across the organization. The processes are grouped into three categories; Management Processes, Core Processes and Support Processes. Descriptive process overviews are outlined addressing responsibilities and different steps. Also the interfaces to other processes are pointed out as well as relevant policy documents and detailed guidance documents. However, some process descriptions are still not in place or details are missing, e.g. Core Process CP7 ‘Operating Experience Feedback’. The team recognizes the importance of continuing the work to develop the processes including the underlying documentation and procedures.

The core process CP8 ‘Nuclear Non-Proliferation & Export Control’ has recently been completed.

FANR recognizes that the FANR IMS is not yet fully implemented and not all agreed supporting procedures and work instructions have yet been completed and approved.

4.15. PROCESS MANAGEMENT

Each of the documented processes has a process-owner responsible for developing, improving, documenting and monitoring of the process and also to cooperate with the other process-owners of interfacing processes. Management process MP5 ‘Manage Process’ descriptively points out the various steps in the process. The process owners take an active role in the IMS Committee meetings development and implementation. The Team was impressed with the commitment of the management towards the continuous improvement of

the IMS and by the fact that senior management is taking part in coordination meetings with such a high frequency.

4.16. CONTROL OF DOCUMENTS, PRODUCTS AND RECORDS

Stability and consistency of regulatory control

FANR has established a legal and regulatory infrastructure to provide assurance that regulatory controls are stable and consistent. This regulatory infrastructure includes:

- A Nuclear Law establishing the legal underpinnings for FANR actions;
- Regulations and regulatory guides subject to considerable internal review and external comment to implement the requirements from the Nuclear Law; and
- Internal IMS procedures and processes guiding FANR actions.

In order to assist the consistency of regulatory decision-making FANR has prepared a management process MP.2, 'Regulatory Decision Making'. This process involves the preparation of a draft decision; internal and/or external review, as appropriate; resolution of related comments; and publication of a final decision. Of course, at this stage, the application of the process is untested. However, CP.1, 'Manage Regulatory Framework for Ensuring Safeguards, Safety and Security – Revision 2', has many of the same steps and procedures as MP.2, and that procedure has been and continues to be used successfully for the development of regulations.

The products of FANR are defined as regulations and guides; licences; review and assessment reports; inspection reports and enforcement actions and internal products. According the IMS Manual the control of products is done according to the requirements in the IMS Manual and within specific procedures, e.g. the licensing process (CP.2).

As stated in the IMS Manual: 'The products of the Authority are controlled in accordance with the requirements of the IMS. In some instances, the products are controlled by the processes; in others, the requirements for control of a product are embedded within specific procedures or instructions'.

The processes and procedures for assessment and regulatory decision-making include the application of review instructions and check-lists that individual staff must follow. Inspection reports are reviewed by senior management before being issued.

The detailed guidance provided in the IMS processes and procedures will contribute to preventing subjectivity in decision-making. This includes review and approval by various level of FANR management of staff members' analyses and recommendations.

Safety related records

- The Nuclear Law, Article (5), provides FANR with the authority to keep a number of records and registers. Article 5 states that the Authority shall, for the purpose of carrying out its functions under this law by decree, have power to;
- establish and manage a special register of radioactive sources;
- establish and operate a register of occupational doses and of radioactive releases to the environment arising from regulated materials; and

- ensure that appropriate records relating to the safety of facilities and activities are retained and easily retrievable.

In its regulations, primarily FANR-REG-01 and FANR-REG-24, FANR requires applicants and licensees to create and maintain documents and records related to safety.

FANR has an approved process SP.6 – ‘Document Management’ and approved procedure for managing its documents. Implementation of this process and procedure is underway, including training. FANR has developed an Electronic Document Management System (EDMS) designed so that documents are readable, identifiable and retrievable through metadata. The EDMS has recently been launched (Step1). Documents are managed using a versioning system, so any changes made to a document lead to a new revision. To ensure FANR staff has access to the documents needed to perform their functions, access rights are provided to users for each document consistent with security considerations (SP 3 ‘Internal Security’). There are four levels of security; Public, Official Use Only, Secret and Top Secret.

However, for the moment it is not possible to file all related documents into one dossier, having a unique reference number ensuring that appropriate records relating to the safety of facilities and activities are retained and easily retrievable. The team was informed the next step of the development should resolve this.

For the control of documents related to the NPP construction licence review there is a password protected SharePoint site (EPM) available for staff involved in this process. In the EPM all related documentation and communication between FANR, ENEC and contracted TSOs are stored and accessed. The team was impressed by the effectiveness of the system.

However, the procedures for how documentation should be managed in the EDMS and EPM respectively are not clearly stated in the procedures of the IMS.

The retention time of records and associated materials has not yet been specified by FANR. At this point in time, FANR staff is working to a retention period of at least five years and are expecting to retain records and associated materials for the nuclear power plant for a longer but unspecified period. The team considers that FANR should define in written form, the retention time for safety related documentation.

The team has seen no evidence that the documentation control system is part of the planned self-assessments. Due to the importance of the system it would be wise to plan self-assessments at regular intervals.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(4)	<p>BASIS: GS-R-3 Req. 5.12: “<i>Documents should be controlled...</i>”</p> <p>GS-R-3 Req. 5.21: “<i>Records shall be specified in the process documentation and shall be controlled. All records shall be readable, complete, identifiable and easily retrieved.</i>”</p>
GP6	<p>Good practice: FANR has a good electronic project management (EPM) system for planning, maintaining, retrieving and record-keeping all documents produced in the process of review and assessment.</p>
R5	<p>Recommendation: FANR should prioritise development of the EDMS to ensure those products i.e. documents (reports, licences etc.) addressing the same subject matter can be compiled in one dossier having a unique identification number and that record-keeping follows the same structure. FANR should furthermore, consider resolving the implementation issues with</p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	EDMS and EPM, particularly clarifying the relationships between the two systems, to ensure equal application of the advantages of each system for all areas of FANR's activities.
(5)	BASIS: GS-R-3 Req. 5.22: <i>“Retention times of records and associated test materials and specimens shall be established to be consistent with the statutory requirements and knowledge management obligations of the organization. The media used for records shall be such as to ensure that the records are readable for the duration of the retention times specified for each record.”</i>
R6	Recommendation: FANR should take steps to specify retention times for various records and associated materials.

4.17. PURCHASING

FANR has developed a process for Procurement and Contracting (SP.5). In addition to this there are a Procurement Policy with a manual and a description of the procurement procedures.

The process is supported by nine approved procedures which form part of the Procurement Policy approved by the Board.

Criteria for evaluating performance are explained in the contract and LPO acceptance letter. Periodic progress reports from the contractor provide the basis for evaluating performance.

4.18. COMMUNICATION

The framework for communication within FANR and with external parties is the process ‘Managing Corporate Communications’ (MP.3). Other procedures for communication with external stakeholders and staff are under development or are in the stage of approval. The Director General meets periodically with all staff and department Directors also hold staff meetings. Information is also communicated to staff and visitors via plasma displays throughout the building.

However, the Team has noticed that not all communication procedures are in place yet. The absence of a formal communication policy was acknowledged as a “high risk” in the risk assessment performed by KPMG emphasizing the need for a response plan in the event of incident or emergencies. See also Chapter 10.

4.19. MANAGING ORGANIZATIONAL CHANGES

Management process MP.1 “Direct and Manage the Organization” is the over-arching process involved in organizational change. However, so far FANR has not developed a specific process or procedure for how to clearly justify, evaluate and classify organizational changes according to their importance to safety. In this stage of organizational development FANR has

not found a need for significant organizational changes (some small changes are presently implemented) and the MP.1 process could therefore be sufficient at the moment.

4.20. MONITORING AND MEASUREMENT

FANR has started work to conduct self-assessments, independent reviews and management reviews in a systematic way using process MP.6 'Evaluate and Improve Performance'. Arrangements for management of non-conformances and corrective action are also made through this process by a specific approved procedure. Training of staff started in 2011 and is now being evaluated and improved in order to continue during 2012. Focus in the MP 6 process is on the performance of processes; the follow-up of the results of the Authority's work are followed up and evaluated as part of MP 1.

The outcome of the process 'Manage Processes' (MP.5) is an input to the 'Evaluate and Improve Performance' process (MP.6).

Examples of assessments performed are:

- One IMS self-assessment conducted on July 2010
- KPMG risk assessment as a base for the planning of FANR internal audits.
- A management retreat was held in 2011 focusing on safety culture.
- The Education and Training department has conducted a self-assessment.
- Self-assessment action plan reports were evaluated by the senior management.
- Management system reviews are conducted through the IMS Committee meetings.

4.21. SELF-ASSESSMENT

To support implementation of MP.6 'Evaluate and Improve', FANR has developed a self-assessment procedure. To date FANR has conducted one self-assessment of the Integrated Management System (led by the IMS Coordinator). This self-assessment was conducted in July 2010 by an assigned self-assessment team (10 members) who collected information and interviewed involved staff. The assessment results were grouped into three main areas; IMS, IMS Manual, Processes and Procedures. The result was documented in a self-assessment report (finalized in January 2011) which included a proposal for actions to be taken. The action plan was evaluated, approved by the IMS Committee and implemented. The progress of the actions was followed up using a tracking sheet for the self-assessment. Such a tracking sheet is used for all self-assessments as well as non-conformances.

Other examples of self-assessments are those conducted by the Education and Training Department about training and the Radiation Safety Department about their Regulated Materials licensing programme.

4.22. INDEPENDENT ASSESSMENT

The Board of Management has appointed KPMG as FANR's Internal Auditor. Subsequently, KPMG conducted one risk assessment for key functions of the Authority. The assessment, presented in July 2011, resulted in a proposal for a two year plan for internal audits according to the evaluated business risks identified. The discussion between KPMG and FANR has resulted in a plan to perform internal audits on four occasions during 2012. The approved plan for independent assessment is under development in collaboration with the external auditor. According to GS-R-3 independent assessments shall be conducted regularly on behalf of senior management and the results should be evaluated by the senior management. These results should also be recorded and communicated internally. An evaluation of the risk assessment was done by the senior management and the result of the evaluation was documented and communicated to the staff by the regularly DG General meeting with staff and by Directors with their staff respectively.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(7)	<p>BASIS: GS-R-3 Req. 6.3: <i>“Independent assessments shall be conducted regularly on behalf of senior management:</i></p> <ul style="list-style-type: none">- <i>To evaluate the effectiveness of processes in meeting and fulfilling goals, strategies, plans and objectives;</i>- <i>To determine the adequacy of work performance and leadership;</i>- <i>To evaluate the organization safety culture;</i>- <i>To monitor product quality;</i>- <i>To identify opportunities for improvement.”</i>
S11	<p>Suggestion: FANR should consider preparing and implementing a plan (programme) for internal audits as a management tool for independent assessment.</p>

4.23. MANAGEMENT SYSTEM REVIEW

Management system reviews are conducted through IMS Committee meetings on average three times a month. The meeting is chaired by the IMS coordinator who is responsible for the agenda. Process-owners attend the meeting to present the status of development and improvement of their processes and procedures. At these meetings decisions are made for revisions of the IMS Manual, processes and procedures. The meetings are documented in minutes which are distributed to the Committee and process-owners.

4.24. NON-CONFORMANCIES AND CORRECTIVE AND PREVENTIVE ACTIONS

Through the 'Non-Conformance and Corrective Action Procedure', the existence, occurrence, or observation of a situation that appears to require further review, evaluation, or action for resolution are identified. Non-Conformance Reports may be submitted for any issue. It is intended that all Non-Conformance Reports will be documented, tracked to closure and archived. They are classified into one of four levels as follows:

- Level 1 Non-Conformance: Significant non-conformance adverse to quality or safety; requires Root Cause Analysis (RCA), corrective actions and actions to preclude recurrence.
- Level 2 Non-Conformance: Non-conformance adverse to quality or safety; requires corrective actions and apparent cause evaluation. Depending on severity may warrant, at discretion of Responsible Manager, RCA and corrective actions to preclude recurrence; for example, an adverse trend of Level C issues, e.g., a series of procedure violations or discrepancies.
- Level 3 Non-Conformance: A non-conformance consisting of relatively minor problems which could be resolved using standard work procedures. Level 3 Conditions are not adverse to quality.
- Level 4 Non-Conformance: A typical routine problem that is adequately addressed by immediate action or a low-level problem identified for trending only.

The reporting of a non-conformance is done using a specific e-mail address and subsequently handled by the IMS Committee. The Team has noticed that the whole non-conformance process is highly encouraged by the senior managers. The Team considers that to be a very valuable practice.

4.25. IMPROVEMENT

FANR is implementing its MP.6, ‘Evaluate and Improve Performance’ process. The MP.6 Process aims to monitor and measure the effectiveness of the IMS to achieve the intended results, and to identify opportunities for improvement. FANR is also implementing the Self-Assessment Procedure, and Non-Conformance and Corrective Action Procedure, both of which help identify changes to improve the management system. Additional improvements are identified during the regular meetings of the IMS Committee. The team concludes that the completion of improvements, including the actions taken regarding non-conformances, should be monitored in a systematic way and that they periodically be checked for their effectiveness.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(8)	BASIS: GS-R-3 Req. 6.18: <i>“Improvement plans shall include plans for the provisions of adequate resources. Actions for improvement shall be monitored through their completion and the effectiveness of the improvement shall be checked.”</i>
S12	Suggestion: FANR should consider taking a systematic approach to monitoring the completion of improvements, including actions taken regarding non-conformances, and how to check for the effectiveness of the improvements.

5. AUTHORIZATION

5.1. OVERVIEW

The Nuclear Law requires the issuing of licences by FANR as the means of authorization of facilities and activities by the regulatory body. The Law explicitly prohibits any person from undertaking 'Regulated Activity' unless licenced by FANR and prescribes penalties for doing so without a licence.

FANR's licences must specify the facilities and activities covered by the licence and the obligations, restrictions and notification requirements imposed upon the operator. FANR is empowered to amend, renew, suspend or revoke licences. Applicants who are refused a licence or granted a conditional licence may seek a review of that decision.

5.2. AUTHORIZATION OF NPPs.

Applicants for licences are required under the Nuclear Law to submit detailed evidence of safety and FANR must issue guidance on the form and content of such applications.

In the UAE, licensing is the only process of authorization as defined in the Nuclear Law. The licence is based on Safety Evaluation Reports (SERs) prepared by the staff, presented to the Board, which may issue a resolution authorizing the Director General to issue the licence document.

The review of the three licences issued so far is summarized below:

1) Site selection licence

This licence is not a common international practice, but is required by the UAE Nuclear Law and includes activities related to selection of a site but not the evaluation of its suitability.

Since there was no specific regulation related to this licence, FANR has issued guidance for the application for this licence in the form of a letter to ENEC. ENEC applied for the licence through letter ENEC/FANR/10/0001L/LNP on 2nd February 2010. FANR reviewed the request and issued a Safety Evaluation Report (SER) on 24th February 2010 and the Site Selection Licence was issued on 28th February 2010, specifying conditions such as periodical reporting (each year) and record keeping (for the life of the plant).

2) Site preparation licence

This licence was limited to activities on the site that do not affect nuclear safety.

Since there was no specific regulation related to this licence, FANR has issued guidance for the application for this licence in the form of a letter to ENEC. ENEC applied for the licence through the letter ENEC/FANR/10/0008L/LNP on 21st April 2010, presenting the scope of activities and an associated management system. FANR reviewed the request and issued a Safety Evaluation Report (SER) on 8th July 2010 and the Site Preparation Licence was issued on the same day, i.e. 8th July 2010. This licence had eight specifying conditions such as: submission of a schedule of the activities; access to inspectors; periodical reporting (each year); the obligation of ENEC to obtain all other required licences from other authorities;

record keeping (for the life of the plant); and the requirement that the activities do not impair safety of the plant in the future.

Regarding other required licences, FANR will not check that this is fulfilled, but rather will let ENEC be responsible for that. Especially regarding the licence from the Environmental Authority (EAD) an Environmental Impact Assessment is required for the environmental licence. FANR did however cooperate with EAD in the radiological impact evaluation. It should be noted that there are no public hearings in the process.

3) Limited Construction Licence

This licence was actually a manufacturing licence, which is considered part of construction in the Nuclear Law. It was required due to the long leading time for some critical equipment such as the reactor pressure vessel.

After some consultation, FANR has issued guidance for the application for this licence in the form of a letter to ENEC on 7th January 2010. ENEC applied for the licence through letter ENEC/FANR/10/0014L/LNP on 21st April 2010, defining the requested scope of the licensing (13 items to be manufactured) and the management system to control such activities.

FANR reviewed the request and sent two Requests for Additional Information (RAIs) related to the use Industrial Codes and the Quality Assurance Programme. After the response by ENEC and the acceptance by FANR, a Safety Evaluation Report (SER) was issued on 22nd June 2010 and the Limited Construction Licence was issued on 8th July 2010. Later the limited licence was amended to include two additional items and the possibility of further inclusions upon specific request.

The licence includes now the following items:

1) Reactor vessel; 2) Steam generator; 3) Pressurizer; 4) Coolant pumps; 5) Primary Piping; 6) Core support structures; 7) Control elements drives; 8) Volume control tank; 9) Containment liner plates; 10) Containment post-tensioning system; 11) Stainless steel liner; 12) Diesel generator oil transfer pumps; 13) Man-machine interface; 14) Intake and discharge structures; and 15) Other systems, structures and components (requiring a ENEC request for approval).

The licence contains also eight conditions: 1) Regulations to be followed; 2) Notification of modifications; 3) Notification of activities and documentation; 4) Notification of changes in design; 5) Access to manufacturing facilities; 6) Periodical reporting; 7) Obligation to obtain all other licences; and 8) Record keeping (for life of the plant).

The manufacturing of some of the items has already started and FANR has performed some inspection at the manufacturing facilities in Korea (Doosan), with the support of KINS inspectors.

Construction Licence

In accordance with Article 28 of the Nuclear Law, FANR has issued regulation FANR-REG-06 '*Regulation for an Application for a Licence to Construct a Nuclear Facility*' to specify the required content of an application for a licence to construct a nuclear facility.

ENEC has applied for a full construction licence in accordance with this regulation through the letter ENA/FANR/10/0044L/LND of 27th December 2010, which was accompanied by the Preliminary Safety Analysis Report (PSAR) for two 1400 MWe PWRs. This application is currently under review and assessment.

5.3. AUTHORIZATION FOR REGULATED MATERIAL

For Regulated Material, the legal and regulatory framework do not consider the possibility for authorizing the various steps in the development of a facility e.g. design, construction, operation, shut down and decommissioning. Moreover, there is no consideration in the Nuclear Law for the review and assessment of the development of such facilities with the evolution of the facilities through different stages.

Turning to radioactive sources and radiation generators (Regulated Material), FANR has been conducting a campaign to licences those users, who were formally regulated under a previous UAE law that divided the regulatory tasks between several competent authorities.

FANR has received 580 licence applications; issued 413 licences; and carried out approximately 150 inspections at a rate of about 22 per month. Each licence is valid for three years followed by a proposed re-appraisal procedure that is yet to be written. FANR's guidance on the format and content of licence applications included a standard application form and guide to making an application that expands on the requirements to submit plans and arrangements for managing safety. Certain groups of radiation users have not responded fully to the invitation advising them to submit licence applications and FANR has plans to address this. For example, it has been suggested that a less detailed application form may be devised for dental practices.

The revised licences stipulate requirements for radiation users to meet the provisions of FANR-REG-24. There are approximately 50 radiation users of Category 1, 2 and 3 sources that will in addition be required to satisfy the additional provisions of FANR-REG-23 on the security of radioactive sources that it is being implemented.

FANR is required to issue licences as the primary control of the regulation of radiation practices within the UAE.

In the case of non-nuclear applications, staged review and assessment do not appear to be actively considered within the non-nuclear power regulations. As such, radiotherapy, brachytherapy, nuclear medicine, industrial irradiators, predisposal radioactive waste management facilities are not required to undergo the degree of regulatory scrutiny that might be expected at the respective stages of development commensurate with the radiation risks of the activity. This is particularly important at the planning and design stage for complex high-risk practices involving significant shielding or other needs for radiation source isolation.

FANR counterparts advised they would apply a step-wise approval process when they are aware of such practices being proposed, however, the differences between the nuclear power and non-nuclear power regulations extend to the area of notification. There appears to be no formal requirement in the regulations to inform the regulator of any intention to conduct a non-nuclear power activity prior to FANR receiving the actual application. FANR counterparts advised that at that point the approval process can be paused to resolve matters concerning detailed shielding designs and other pre-construction aspects for new practices, but it would be useful to augment the non-nuclear power regulation to formalize such a requirement for more complex high-risk practices. This permits full consideration of all aspects of the activity to inform the discussions with the applicant and may assist the resolution of matters such as waste disposal to sewers for nuclear medicine practices (for example) early in the regulatory assessment process to provide greater clarity for both FANR and the applicant. This is particularly important within the medical radiation activity sector, as it is expected that approximately 95% of man-made radiation exposure to the public within the UAE will come from this sector.

The suite of documents covering application processes is well prepared and explains clearly the requirements for making an application. It is at this point that the aspects of addressing the safety requirements of the activity (advice from the proponent of the activity that they can conduct the activity safely) seem to be captured. The documentation guiding FANR personnel is excellent and demonstrates a good part of the overall information management system.

FANR, as the regulatory body for non-nuclear power radiation practices within the UAE, is required to be satisfied that persons conducting the activity are appropriately trained with respect to radiation safety. Discussion indicated that by and large this is dealt with in the context of the approval process for licences. For higher risk practices, training is required to have been delivered prior to the awarding of the licence. For lower risk practices, licences are issued with conditions that staff be trained. Such is evidence of a risk based approach, however no documentation was observed that underpinned this approach.

The work FANR is doing with the combined medical sectors and respective Health Authorities with respect to shifting the regulation of the radiation aspects of medical practices to FANR is to be applauded. It is considered that over time all pre-FANR historical licences issued by Health Authorities will be brought under the FANR regulatory umbrella, and the “one stop shop” for all radiation regulation within the UAE is evidence of international best practice.

FANR-Reg-24 Article (34) (2) reflects the design considerations in GSR Part 3, paragraph 3.161. Currently it is not clear how such an approach translates to non-nuclear power radiation practices. For example, verification of shielding by ensuring that the proposed shielding performance is met is not actively undertaken by FANR, and it is considered that the current practice where Health Authorities are issuing licences might cloud this matter as to who is perceived to be responsible for such approvals at the design stage. The recent approval of a linear accelerator installation for oncology purposes by FANR prior to any physical inspection of the facility was not good practice.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	BASIS: GSR Part 1 Req.23 para. 4.29: <i>“Authorization by the regulatory body, including specification of the conditions necessary for safety, shall be a prerequisite for all those facilities and activities that are not either explicitly exempted or approved by means of a notification process. Different types of authorization shall be obtained for the different stages in the lifetime of a facility or the duration of an activity. The regulatory body shall be able to modify authorizations for safety related purposes. For a facility, the stages in the lifetime usually include: site evaluation, design, construction, commissioning, operation, shutdown and decommissioning (or closure). This includes, as appropriate, the management of radioactive waste and the management of spent fuel, and the remediation of contaminated areas. For radioactive sources and radiation generators, the regulatory process shall continue over their entire lifetime”.</i>
GP7	Good Practice: The suite of documents detailing how to make an application, what information to provide and the internal procedural guidance documents for the FANR personnel on how to perform the licensing indicate sound management of the application process.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S13	Suggestion: FANR should consider authorizing the various steps in the development of a non-nuclear power facility e.g. notification, design, construction, operation, shut down and decommissioning, with a view to confirming that the design intent has been delivered e.g. for shielding high end medical radiation activities such as oncology.
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6. REVIEW AND ASSESSMENT

6.1. OVERVIEW

FANR has so far reviewed and issued three licences related the construction of Braka NPPs 1&2. The Construction Licence Application (CLA), submitted in the end of 2010, is being reviewed by the FANR reviewers with the support of TSOs' reviewers. In the case of non-nuclear applications, staged review and assessment do not appear to be actively considered within the non-nuclear power (Regulated Material) regulations. FANR apply a step-wise approval process for regulated materials where they are aware of such practices being proposed.

6.2. NUCLEAR POWER PLANTS

LEGAL BASIS

The responsibility for review and assessment of nuclear facilities and their related activities is assigned to the Federal Authority for Nuclear Regulation (FANR), as mandated by Nuclear Law No. 6 of 2009, and supplementing FANR regulations.

Article 28 of the Law requires the applicant to submit a detailed safety analysis of the plant, which shall be reviewed and assessed by the Authority in accordance with defined procedures. Article 29 of the Law requires the operator to perform a systematic safety assessment or periodic safety reviews over the lifetime of a nuclear facility. Article 25 (1 through 8) defines the regulated activities of a nuclear facility from the selection of the site to the decommissioning of the facility. Article 32 of the Law contains detailed requirement for review and assessment to be conducted at various stages of the regulatory process and the life of a regulated facility.

FANR has essential regulations and a review process for effectively conducting the review of the applications received to date. FANR should undertake planning and development to ensure that the regulatory framework, standards and review processes adapt as additional applications are received for NPPs.

ORGANIZATIONAL ASPECTS OF THE REVIEW AND ASSESSMENT PROCESSES

The IRRS Team evaluated the effectiveness of the relatively newly established regulatory body in conducting the review and assessment for the licensing of ENEC's Braka nuclear power plants 1&2. FANR's Nuclear Safety Division, consisting of about 30 technical reviewers, are working on the review and assessment of ENEC's construction licence application.

FANR has secured the services of specialised technical support organizations (TSOs) such as the BNES-ISL Consortium (made up of Baynuna Nuclear Energy Services and Information Systems Laboratories), NT (made up of NUMARK Associates Inc. AMEC NSS Ltd, TUV NORD and VTT Technical Research Centre of Finland), and RISKAUDIT-IRSN/GRS. The

TSOs provide regulatory, engineering and technical service to support FANR technical staff and the Authority’s review of the country’s first construction licence application for Braka NPPs 1&2.

FANR has also made arrangements with the Korea Institute of Nuclear Safety (KINS), the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Energy (DoE), and the French Nuclear Safety Authority (ASN) in order to utilize the lessons-learnt from their licensing experiences.

FANR has reviewed and issued three licences to date: a site selection, site preparation and a limited construction licence. The FANR review of the Construction Licence application of the Braka NPPs 1&2 is divided into seven technical ‘Work Packages’ (and a further Work Package for the task of integrating the whole body of work). To effectively perform the review and assessment of the construction licence application, seven review teams were organized under the control of a licensing project manager as shown in Fig. 6-1. FANR has assigned a FANR review and assessment individual as a work package lead for each of the seven of work packages. Each work package lead is responsible for planning, organizing and leading the work necessary to undertake and complete in accordance with the project plan. The FANR work package lead has a TSO counterpart work package lead responsible for completing the scope of work assigned to him by FANR. In the initial stage of the review, the FANR work package lead selects FANR technical experts to review sections or chapters of the work package. FANR and TSO reviewers formulate and proposed requests for additional information, which are approved, modified, or rejected by the FANR work package lead.

The safety evaluation report (SER) for the PSAR of Braka NPPs 1&2 has been segmented into approximately 200 sections covering PSAR chapters 1 through 19 and supplements 1 and 2. Each TSO work package lead is responsible for developing draft SERs within his/her assigned scope of review. The draft SER is reviewed by the FANR work package lead or reviewers, and the final SER should be approved by the Board of Management of FANR.

It can be concluded that review and assessment in FANR with the support of TSOs is organizationally a well arranged and managed process.

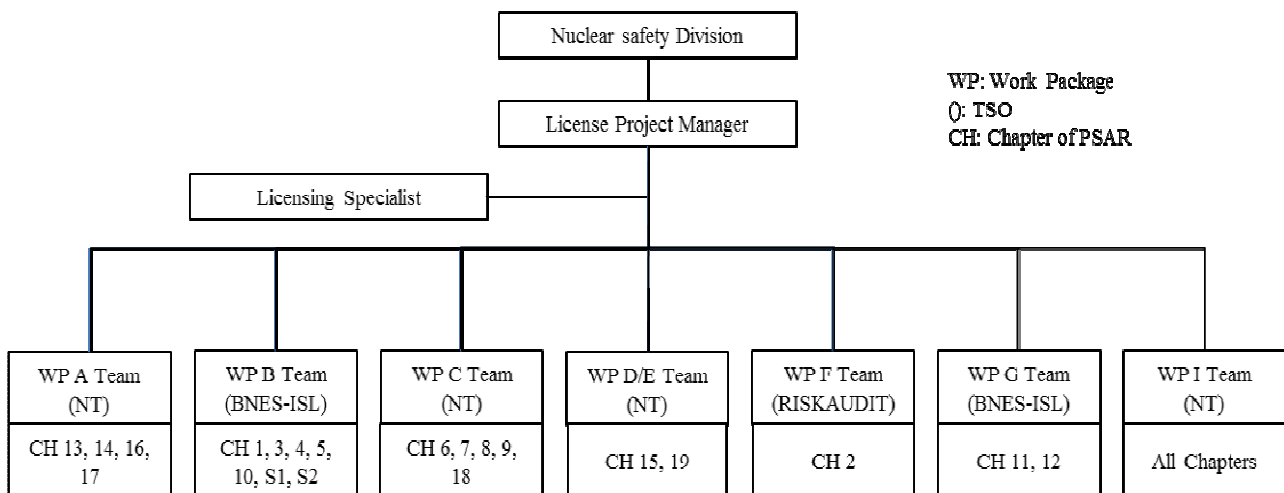


Figure 2. Construction Licence Application Review Organization Chart of FANR

TECHNICAL ASPECTS OF REVIEW AND ASSESSMENT AND UTILIZATION OF LESSONS LEARNED

FANR's Licensing Management Procedure (LMP) sets out the details of the responsibilities and action steps required to execute the licensing process (CP-2). The major steps in the process include; project initiation (register application, completeness check and acknowledgement), review schedule and responsibilities, initial evaluation and request for additional information, final evaluation with licence recommendations, and licensing decision.

According to the LMP, FANR has prepared 21 review instructions covering 19 chapters and two supplemental of Braka NPPs 1&2 PSAR. The FANR Review Instructions reference the Standard Review Plan (SRP) of the U.S. NRC. Each Review Instruction tabulates the FANR regulations and guides applicable to each section of the PSAR and directs the reviewers to give precedence to FANR requirements in case there are differences in the requirements or guidance.

In order to manage the project of the review and assessment of the construction licence application for Braka NPPs 1&2, FANR's Nuclear Safety Department (NSD) developed a Project Management Plan (PMP). The PMP is instrumental in monitoring and controlling the project and promoting communications among the various teams and task leaders, including the TSO personnel.

Article 36, Paragraph 4 of the Nuclear Law states that *'the authority shall seek to ensure that any lessons learned in the area of nuclear safety are applied as appropriate'*. In addition, FANR-REG-06, Article 6.8, requires that the applicant must provide; *'a description of how recent lessons learned and experience from other similar facilities, scientific and technical developments, as well as the results of any relevant research on protection and safety have been applied to resolve potential safety issues'*. In undertaking the review and assessment of the construction licence application, FANR is taking appropriate advantage of the safety evaluations performed by the regulatory body of country of origin (KINS) for the reference plants in Korea (Shin Kori 3 and 4). FANR's objective in doing so is two-fold: to enhance safety through collaboration with Korean experts, and to maximise the efficiency of its review by focusing on those topics specific to the UAE.

In the case of the Fukushima accident, for instance, FANR has issued a letter to ENEC requesting specific evaluation of the lessons learned from the event, and requiring a response by 31st December 2011. This letter has requirements similar to the "stress tests" being carried out in other countries. In addition, ENEC and FANR are closely following the related developments at the Shin Kori plant, with the commitment to implement similar modification at the Braka plant, if applicable.

As a means to systematically utilize the lessons learned, FANR has developed a Construction & Operating Experience Feedback programme action item and related procedure (CP.7). For effective application of the lessons learned, FANR should consider establishing an internal procedure to provide guidance for collecting, analysing, communicating and applying lessons learned information throughout the review effort.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	BASIS: GSR Part 1, 4.45: <i>"In the process of its review and assessment of the facility or activity, the regulatory body shall take into account such considerations and factors as: ...(16) Feedback of operating experience</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<i>nationally and internationally, and especially of relevant operating experience from similar facilities and activities; (17) Information compiled in regulatory inspections; (18) Information from research findings”.</i>
R7	Recommendation: FANR should develop an internal procedure on the transfer of lessons-learned taking into account the benefit of utilizing experience, notably from the vendor country of origin and international community.

COMMUNICATION WITH THE APPLICANT AND TSO

FANR holds weekly licensing management meetings with the applicant to discuss in a general manner, progress made in the review as well as the main issues arising. On an “as needed” basis, FANR work package leads interact with their applicant counterparts to discuss the main technical issues that arise from the review of their corresponding PSAR chapters

FANR holds bi-monthly workshops with the TSO work package leads and their staff. ENEC and KEPCO representatives are invited to attend the last days of these bi-monthly meetings to communicate the status of the review of the open items.

As needed, work package leads organize topical workshops to discuss technical issues. TSOs as well as ENEC and KEPCO representatives may be invited. These meetings assist in clarifying requests for additional information or responses to them. They are not intended to “close” technical issues, but to gain understanding of the information needed. The “closure” of the technical issues will be done through the formal Request for Additional Information process.

The process of submitting and responding to requests for additional information is formal and is conducted through the use of correspondence.

For issues of high importance (e.g. strategic direction of the review), formal meetings are held between FANR Management and ENEC Management. The minutes of such meetings are prepared and signed by both parties.

TRAINING AND QUALIFICATION OF REVIEWERS

The qualification and training of reviewers is part of the overall FANR training programme. The Team noted differences in the training requirements for senior expatriates and TSOs experts and for junior Emirati trainees. Expert qualifications are reviewed by managers and their training is usually focusing on FANR regulations and APR 1400 Technology. Junior trainees receive complete training including regulations, regulatory practices, technology and personal skills (interviewing, inspection). Additional on-the-job training is conducted through a formalized tutoring process with the more experienced expatriated experts.

Training on the use of individual Review Instructions are conducted on an individual basis within the tutoring process and include the use and interpretation of the related US NRC Regulatory Guides and Technical Branch Positions, and the applicable FANR regulatory guides.

To secure competent reviewers from TSOs, FANR has implemented a rigorous TSO selection process which includes benchmarking their principles and criteria against other countries principles and criteria. The criteria included technical competence and capability, adequate staffing, proven performance, and ability to meet defined review schedules.

GRADED APPROACH TO REVIEW AND ASSESSMENT

Article 28 (1) of the Law requires that “the extent of the control applied by the Authority shall be commensurate with the potential magnitude and nature of the hazard as determined by it”. FANR currently uses a graded approach to focus resources on the most risk-significant areas of the application. FANR divided the sections of the PSAR into two categories. Category 1 review is assigned to any item of PSAR that meets any one of the following criteria or does not meet all the criteria for a Category 2 review:

- 1) New technology with significant impact on nuclear safety;
- 2) New findings (for example, from operating experience or research) since acceptance of the plant design by the Regulatory Body in the Country of Origin (RBCoO) with implications on nuclear safety;
- 3) SSCs or operational activities contribute significantly to the facility’s overall risk;
- 4) Conditions (e.g. environmental, external hazards) specific to the UAE;
- 5) Any other matters where the UAE design differs from the reference design.

A Category 2 review is assigned to any item of the SAR that meets all of the following criteria:

1. The documentation submitted by the applicant is adequate to the extent that the reviewer has sufficient information to assess topics 2 to 5 below.
2. The submission demonstrates that the RBCoO’s regulatory requirements associated with this item are consistent with and meet those of FANR.
3. The technical basis used by the RBCoO to perform their review and assessment is clearly described and explained.
4. With respect to the reference plant there is no design change with significant impact on nuclear safety.
5. With respect to the reference plant there is no change in operational activities with significant impact on nuclear safety.

A map of all PSAR was elaborated identifying Category Review for each section (or subsection). About 60% CAT 2 and 40% CAT 1 were identified and the categorization was approved by a Licensing Application Review Panel in a Licensing Application Categorization Report (7th December 2010).

At this stage of construction licence application review and assessment, FANR has graded the application of human resources through the use of categorizing review as either Category 1 or Category 2. In the future, review and assessment staff may be called upon to manage the review of multiple applications, modifications to licences and support of FANR construction instructions. FANR should determine what forms of graded approach can be used for the proper allocation of human resources.

DOCUMENTING RESULTS OF REVIEW AND ASSESSMENT

FANR has developed and utilized an electronic project management (EPM) platform to effectively conduct the review and assessment of the PSAR, in cooperation with TSO reviewers abroad. EPM is used to management, maintain and retrieve all documents produced in the process of review and assessment such as RAIs and SERs. A demonstration of the system was performed during the mission.

6.3. REGULATED MATERIAL

FANR is required to issue licences as the primary control of the regulation of radiation practices within the UAE. Controls for nuclear power and non-nuclear power (Regulated Material) are divided between different sets of regulations. As such, it is considered that this creates the perception of two distinctly different regulatory cultures and this is observed in differences in how complex practices are authorized via the nuclear power and non-nuclear power regulations.

In the case of non-nuclear applications, staged review and assessment do not appear to be actively considered within the non-nuclear power (Regulated Material) regulations. As such, radiotherapy, brachytherapy, nuclear medicine, industrial irradiators, predisposal radioactive waste management facilities are not required to undergo the degree of regulatory scrutiny that would be expected at the respective stages of development commensurate with the radiation risks of the activity. This is particularly important at the planning and design stage for complex high-risk practices involving significant shielding or other needs for radiation source isolation.

FANR counterparts advised they would apply a step-wise approval process when they are aware of such practices being proposed, however, the differences between the nuclear power and non-nuclear power regulations extend to the area of notification. There does not appear to be any formal requirement in regulations to inform the regulator of an intention to conduct a non-nuclear power activity prior to FANR receiving the actual application. FANR counterparts advised that at that point the approval process can be paused to resolve matters concerning detailed shielding designs and other pre-construction aspects for new practices, but it would be useful to augment the related regulation to formalize such a requirement for more complex high-risk practices. This permits full consideration of all aspects of the activity to inform the discussions with the applicant and can greatly assist to resolve matters such as waste disposal to sewers for nuclear medicine practices (for example) early in the regulatory assessment process to provide greater clarity for both FANR and the applicant.

As stated in section 5.3, the suite of documents covering the application processes is well considered and explains clearly the requirements for making an application. Furthermore, FANR, as the regulatory body for non-nuclear power radiation practices within the UAE, needs to be satisfied that persons conducting the activity are appropriately trained with respect to radiation safety.

Review and assessment of regulated activities is conducted based on the information submitted with the licence application as required by FANR Guide; *'Applying for a Regulated Material Licence'*.

Review and assessment of regulated activities is conducted based on the information submitted with the licence application as required by FANR Guide; *'Applying for a Regulated Material Licence'*.

FANR Regulations require the applicant to provide the following information to be reviewed and assessed:

- Section A: Applicant Information
- Section B: Information about Regulated Activities and Regulated Materials
- Section C: Inventory of Regulated Material
- Section D: Radiation Protection Arrangements

Further assessment of regulated activities is conducted by inspection based on the nature of the activity.

Checklists for the inspection of regulated activities include:

- Diagnostic Radiology
- Fixed Gauges
- Industrial Radiography
- Nuclear Medicine
- Portable Gauges
- Radiotherapy
- Well Logging
- X-Ray Scanners

Assessors examine the application using the checklists and called for additional information where necessary. These checklists were derived from IAEA TECDOC 1526.

The Director, Radiation Safety reviews the completed assessment before a recommendation is made to the Board delegate to approve the issuing of a licence..

The great part of applications received has been from applicants already undertaking activities with regulated material under pre-existing regulatory arrangements. Having completed much of this backlog, FANR has recently undertaken a self-assessment of its regulated material licensing process.

7. INSPECTION

7.1. INSPECTION OF FACILITIES AND ACTIVITIES

The basic regulatory framework for regulatory inspections in UAE is contained in Articles 5(8), 35, 36 of Federal Law by Decree No.6 of 2009. This law clearly identifies that the licensee is fully responsible for radiation protection and safety of a regulated facility and activities, and supplier and product to the operator. Further, the law stipulates that regulatory inspections shall not diminish the operator's prime responsibility for safety or substitute for the control, supervision and verification activities that the operator must carry out. However, Article (36)3 of the Law states that 'if the operator fails to remedy the breach related to safety, nuclear safety and nuclear security within the period specified by the Authority, The Authority shall remove any breach and the consequences thereon by its own resources or through whomever it deems appropriate in order to limit the consequences of such breach. The Operator shall bear the costs of such procedure and the Authority's estimate for such cost shall be final'. This provision could be read as giving the sense of FANR sharing in the responsibility for safety.

Generic Inspection Guideline (FANR-NSD-GDL-00001/2011 REV 1) and FANR Inspection of Regulated Activities Procedure (XXX-01) are documents prepared in line with the requirements of the regulation. As per the current stage of licensing, FANR has conducted inspections for site characterization, early site preparation work and manufacturing of items using its own staff and TSOs. One such inspection is Manufacturing, Site Preparation for Braka 1 & 2 NPP Project (FANR-NSD-ENEC-RPT-00004-2011). Whereas FANR is preparing its construction inspection plan to be implemented following a decision on construction licence and is looking to obtain resources for construction inspection activity. As per the self-assessment action plan, the plan for the NPP construction inspection programme will be completed and implemented by mid-2012. During inspections FANR inspectors could be supported by independent consultants from TSOs. Discussions with the counterparts revealed that process and procedures for supervising and evaluating the consultants work independently is not explicitly defined.

Further, responsibility for overseeing industrial safety aspects during civil construction need to be specified either within FANR (not currently authorised by the Nuclear Law) or preferably through liaison with the responsible organization entrusted with overseeing such aspects.

FANR is implementing an inspection programme for users of regulated material. The initial inspection programme focuses on users of Category 1, 2 and 3 sources, together with a focus on the hospitals. Over 180 inspections have been completed but inspection of all facilities involving medical exposures is yet to be completed. Inspections to date mainly include planned, reactive and pre-licensing. The feedback of implementation of this programme will be used in prioritizing future inspections. Inspections are performed in accordance with checklists (based on IAEA TECDOC 1526) and inspection reports are sent to the facilities. Where necessary licensees are asked take corrective actions within a certain time. This response time varies from one to two months depending on whether the recommendation is 'important' or 'very important'.

Inspections are performed on a yearly basis or when non-conformities/incidents require

special inspection. The programme of inspections is provided to facilities to be inspected. Inspections are prepared the day before within the FANR. Inspectors use checklists developed for the various types of facilities to be visited.

An inspection comprises a preliminary meeting with the representative legal person and with the radiation protection officer. Inspections are undertaken and a preliminary report is established and discussed with the representative of the facility. The final version is sent with an indication of the actions which should be taken. The timetable for completing these actions depends upon the priority attributed to the observations made. This varies from one month (“Very Important” observation) to two months (“Important” observation).

Inspections are performed by an experienced/skilled inspector and one or two inspector(s) “in a learning/training” phase. The inspection report indicates the background and scope of the inspection and the reviewed items. Observations are presented giving rise to “Safety Recommendations”. Inspection procedures do not make provision for checking, through interviews, the awareness of workers on issues such as duties, prior information and/or training.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS: GSR-Part-1 Req. 29: <i>Graded approach to inspections of facilities and activities Inspections of facilities and activities shall be commensurate with the radiation risks associated with the facility or activity, in accordance with a graded approach.</i></p> <p>BASIS: GSR-Part-1 para. 4.49: <i>requirements state that “Regulatory inspection cannot diminish the prime responsibility for safety of the authorized party, and cannot substitute for the control, supervision and verification activities conducted under the responsibility of the authorized party”.</i></p>
S14	<p>Suggestion: FANR should examine Article 36(3) of the Law No.6 with a view to ensuring that prosecutions are possible for situations where FANR has to intervene to restore radiological safety.</p>
(2)	<p>Basis: GS-G-1.3 para. 3.17: <i>The regulatory body, including a dedicated support organization if appropriate, should have staff capable of performing the activities needed for its inspection programme or, if outside consultants are used, staff capable of adequately supervising the consultants’ work and independently evaluating its quality and the results</i></p>
S15	<p>Suggestion: FANR should consider improving the process to assess the competence and qualifications of consultants from technical support organisations assisting FANR during inspections.</p>
(3)	<p>Basis: GSR Part 1 para. 4.47: <i>Risks that are not related to radiation may arise in the operation of facilities or the conduct of activities, and these risks shall also be taken into account in the decision making process of the regulatory body.</i></p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R8	Recommendation: The Government of the UAE should clearly assign responsibilities for overseeing industrial safety aspects during construction of facilities.
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7.2. TYPES OF INSPECTION OF FACILITIES AND ACTIVITIES

FANR has established a process, procedures and instructions within its management system to govern its inspection programme and has a formal inspector training and qualification procedure.

With regard to the nuclear programme, FANR is undertaking inspection activities relevant to the current licensing stage and is planning a comprehensive construction inspection programme. There is also an inspection programme for regulated material users that has employed the range of programmatic and reactive inspections, both announced and unannounced. All inspections are reported upon, sent to the licensee and further managed within the FANR document management system. Arrangements are being completed to ensure FANR access to all sites in the UAE where work using regulated material is carried out.

The Nuclear Law and FANR's inspection procedures allow for the following types of inspections: 'routine', 'special', 'team' and 'reactive', both announced and unannounced. At the present time, only announced routine inspections are performed. Reactive inspections may also occur when appropriate. However, FANR has not yet developed criteria for reporting of events and mechanism on which the reactive actions will be based.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(4)	<p>Basis: <i>GS-G-1.3 para. 3.11: The regulatory body should use the operator's reports of safety related activities or events for assistance in preparing for both planned and reactive inspections. Matters to be included in reports from the operator should be clearly defined so that difficulties in interpretation can be avoided. This information should include, for example, notification of:</i></p> <ul style="list-style-type: none"> - <i>deficiencies in construction and non-compliances in design;</i> - <i>abnormal test results;</i> - <i>radioactive releases...</i>
S16	Suggestion: FANR should consider developing generic criteria for event reporting by all licensees in order to effectively perform reactive inspections.

7.3. GRADED APPROACH TO INSPECTION OF FACILITIES AND ACTIVITIES

FANR has applied a risk-informed strategy to develop its construction inspection programme for NPP. The strategy employs risk insights to prioritize the selection of licensee activities for FANR inspection. The strategy is focused on identifying the inspection frequency and areas to be inspected that will provide independent verification that the licensee has constructed the

facility in accordance with the design and regulatory requirements. However, a formal procedure for coordinating review and assessment with the inspection does not exist.

With regard to regulated material, FANR's planned inspection programme reflects a graded approach, commencing with users of category 1-3 radioactive sources and with larger hospitals. The inspection checklists used for different practices also reflect a graded approach.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(5)	<p>BASIS GS-G-1.2 para. 6.1: <i>The regulatory body should have a system to audit, review and monitor all aspects of its inspection and enforcement activities to ensure that they are being carried out in a suitable and effective manner. It should be ensured by means of this system that any changes necessary in inspection and enforcement activities owing to improvements in methods are implemented. The following points should be considered in this system:</i></p> <ul style="list-style-type: none"> — <i>procedures for co-coordinating inspection activities with the regulatory review and assessment process;</i> — <i>procedures for involving consultants in inspection activities;</i>
S17	<p>Suggestion: FANR should develop a procedure for coordinating inspection activities with review and assessment activities.</p>

8. ENFORCEMENT

8.1. ESTABLISHMENT OF AN ENFORCEMENT POLICY

The fundamental legal framework for FANR's enforcement policy is established in the Nuclear Law. FANR is given explicit power to take enforcement action and to ensure that corrective actions are undertaken. The Board of Management of FANR is also able to impose administrative fines and penalties for breaching the terms or conditions of a licence. The operation of these administrative fines and penalties however, will be the subject of a regulation currently being drafted.

The Board is empowered to suspend or revoke a licence in the event of serious violations. The Nuclear Law also establishes criminal penalties for the most severe cases of wilful wrongdoing.

FANR implements this legal framework through an enforcement procedure established as a part of its integrated management system. FANR has the power and this is reflected in the enforcement procedure to require corrective actions.

FANR has applied the enforcement procedure arising from inspections of the NPP licensee finding a small number of 'non-cited violations'. To date, in the enforcement of regulated material licences FANR has confined itself to making 'safety recommendations', rather than formal findings of violation.

FANR assesses that it has yet to achieve full compliance with Requirements 30 and 31 of GSR Part 1 (being Module 8 of the IRRS self-assessment) and has established an enforcement procedure (CP-3 Enforcement) that deals with most of the issues covered in Requirements 30 and 31. Again, there remain issues to be addressed; including defining precisely what on-the-spot enforcement powers may be delegated to inspectors. Discussions with FANR concluded that FANR understands the importance of the availability of such powers in the non-nuclear sector.

The outcome of inspections of licensees using regulated material has been in the form of 'soft' enforcement through the making of safety recommendations. This was seen as a way of introducing the enforcement regime and the inspectors will be further trained to implement a 'violation' approach in accordance with the FANR enforcement procedure by the end of 2011.

While the Law No. 6 contains significant penalties for contravention, there is no clear delineation of powers for inspectors to enable them to collect evidence, issue penalties, etc. FANR has not provided authority to the inspectors to take on-the-spot enforcement actions. In accordance with FANR General Inspection Guidelines Section 5.1.2, significant unresolved safety issues shall be immediately reported to the attention of the licensee or facility management and FANR management at the earliest opportunity, however this is considered inappropriate for the non-nuclear power sector, where the real potential exists for life threatening situations requiring immediate cessation and/or intervention.

The powers of inspectors for the non-nuclear power sector need to be clarified to ensure that inspectors have an appropriate level of powers clearly delegated to them by FANR with accompanying guidance material to provide increased clarity as to when and how such powers should be used by inspectors. Article 65 of the Law does imply some powers, however it would be sensible for FANR to be very clear as to what powers it wishes its inspectors to

have, and how in the non-nuclear power sector FANR might consider empowering them with respect to initiating enforcement actions.

It is noted that the dose limits in FANR-REG-24 (Articles 10 and 11) apply to the licensee. It is not seen how in circumstances where the dose limits are exceeded that a prosecution for causing harm would be possible. Ensuring that instances of exceeding dose limits caused by unlicensed practices can be prosecuted would be beneficial. This is also addressed in the chapter 7 on inspections.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS GSR Part 1 Requirement 30: <i>“The regulatory body shall establish and implement an enforcement policy within the legal framework for responding to non-compliance by authorized parties with regulatory requirements or with any conditions specified in the authorization.</i></p> <p>BASIS GSR Part 1 Requirement 31: <i>“In the event that risks are identified, including risks unforeseen in the authorization process, the regulatory body shall require corrective actions to be taken by authorized parties.</i></p>
S18	<p>Suggestion: FANR should consider establishing and implementing a policy for the use of enforcement measures by inspectors including seizure of evidence and statement gathering procedures, particularly in cases where immediate intervention for protection of persons is needed in the field.</p>

8.2. REQUIRING OF CORRECTIVE ACTION BY AUTHORIZED PARTIES

Based on the authority provided by the Nuclear Law, FANR requires corrective actions based on the severity of any non-conformance / risk discovered, using the guidance from the FANR Enforcement Procedure. These actions range from a non-cited violation to a notice of violation, which could result in corrective action, a civil penalty or even an order to suspend an activity.

FANR identifies non-compliances via inspections, licensee reports, an event at a regulated activity or through information received (from someone outside the Authority, but with FANR’s verification). The non-compliance is then documented and assessed for safety significance per Appendix 1 of the same procedure.

The time period for an initial response is stated in the formal cover letter associated with the inspection report. In most cases this is 30 days. Direction regarding the timing related to an order to stop an activity is found in Section 7.7.3 Measures to preclude recurrence are determined by the licensee and assessed in accordance with Section 7.9 of the FANR Enforcement Procedure; ‘Assessing Effectiveness of Corrective Actions’.

In accordance with the ‘Enforcement Procedure’ the licensee is required to develop corrective actions to remedy any non-compliance. FANR assesses the effectiveness of the corrective actions on a sampling basis and the effectiveness may be evaluated as part of a regulatory inspection.

The Enforcement Procedure, also discusses the ability of the Authority to exercise discretion and either escalate or mitigate the enforcement actions or otherwise refrain from taking action,

due to a violation. However, stopping an activity must be approved by the Authority's Board of Management, or the Director General (if delegated by the Board).

Having regard to FANR's formal arrangements with relevant government agencies where enforcement action requires the involvement of the police, justice ministry or other authorities, besides being entitled to issue its own regulation on administrative procedures (currently under development), FANR is discussing with the UAE Ministry of Justice the procedural arrangements whereby offences such as those specified in Chapter Ten of the Nuclear Law, will be referred to State prosecution bodies. To this end, FANR inspectors are to receive special training by the Ministry of Justice with a view to enable them to be granted powers of judicial police.

For situations deemed to be serious and considered to pose an imminent radiological hazard to workers, patients, the public or the environment, FANR may require the operator to curtail activities and to take prompt actions necessary to restore an adequate level of safety.

In the event of continual, persistent or extremely serious non-compliance, or a significant release of radioactive material to the environment due to serious malfunctioning at or damage to a facility, the Enforcement Procedure allows FANR to issue a written order to stop a practice or work, which can take effect immediately. The same procedure also requires that an Order suspending or revoking an authorization/licence or to curtail activities and to direct the operator to eliminate unsafe conditions, must be approved by the Board or the Director General of FANR if so delegated.

FANR has not provided authority to inspectors to take on-the-spot enforcement actions. In accordance with FANR General Inspection Guidelines, significant unresolved safety issues shall be immediately reported to the attention of the licensee or facility management and FANR management at the earliest opportunity.

FANR has not yet applied its Enforcement Procedure in the regulatory control of regulated material. It was decided that, given that FANR's regulation was new to existing users of regulated materials and that FANR's inspectors needed to gain experience in enforcement, that the initial approach would be a soft form of enforcement. FANR regulated material inspection reports to date make 'safety recommendations' that are ranked as 'Important' or 'Very Important'. A response to these safety recommendations is sought within a month for Very Important rankings and two months for Important.

FANR began to fully implement the enforcement procedure with regard to users of regulated material with effect from 1st December 2011 after some public communication activities with licence holders and additional training for inspectors.

In one case, FANR effectively undertook enforcement action by refusing an applicant a licence other than to store or export sources until it had remedied certain deficiencies in its application. The sources were put under FANR seal in storage.

The observation of inspection activities in the non-nuclear sector provided clear evidence of FANR ensuring that previously advised findings of reports to licensees were corrected. These were addressed at the time of the entrance interview and confirmed during the inspection.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(3)	BASIS: IAEA BSS 2011 GSR Part 3 interim Requirements 3: <i>“The regulatory body shall establish or adopt regulations and guides for protection and safety and shall establish a system to ensure their implementation.”</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S19	<p>Suggestion: FANR should implement its internal action plan (FANR Action Plan) which proposes to:</p> <ul style="list-style-type: none">• complete regulation on administrative penalties and fines by the end of 2012;• complete protocol on referrals to prosecution authorizes by end 2012;• fully implement enforcement procedures for regulated material users by early 2012; and• complete protocol on referrals to prosecution authorizes by end 2012.

9. REGULATIONS AND GUIDES

9.1. OVERVIEW

The Board of the FANR has the authority to issue regulations and is responsible for developing regulatory guides. FANR is taking into account, in accordance with the provisions of the Nuclear Law (Article 38) international standards such as those issued by the IAEA, as well as the stakeholders' input.

Based on the provisions of the Law and after performing a review of the international standards and of the regulatory frameworks in other jurisdictions, FANR has identified a list of regulations needed to fully establish the regulatory framework for all relevant facilities and activities. The development of the regulatory requirements and guidelines has seemingly been prioritized taking account of the progress in the development of the nuclear power programme.

This is a core process of FANR's Integrated Management System (CP.1 - Manage Regulatory Framework for Ensuring Safeguards, Safety and Security).

The CP.1 process described by a flowchart and a succinct procedure, covers 13 steps starting with identifying the need for a regulation or guide, through the drafting and internal/external reviews, resolution of comments and final approval by the FANR Board. The steps of the process are only briefly described. For example, the criteria for making a decision on whether to issue a new regulation or to modify an existing regulation are not detailed and there is no periodicity specified for the review of the regulations and guides to check whether they remain fit for purpose. The FANR has a more detailed internal procedure for the development of regulatory guides which addresses, among other aspects, the use of regulatory documents issued in other countries.

Once the need for a new regulation or guide is identified by FANR staff, the drafting process starts with the identification and use of relevant IAEA requirements and guidance. For drafting regulations and guides in the nuclear power area, FANR has made extensive use of external technical support organizations (TSOs). Drafts are subject to thorough internal review by those FANR departments having competences and responsibilities in the areas covered by the respective regulations and guides.

Although the CP.1 process flowchart does not include a step for formal review by legal staff, in practice, legal review takes place before the proposed regulations are made available for external review.

There are two stages of external consultation prior to formal issuance of the regulations, one involving other governmental agencies and one involving the general public. At each stage, comments received are assessed and taken into account by FANR. The resolution of comments is documented.

Once formally issued, the regulations and guides are posted on the FANR website, with the exception of those dealing with security issues. The website provides also information on the status of the development of the regulations and guides (i.e. approved, under drafting or planned).

As of December 2011, FANR had established 13 regulations and five guides with an additional seven regulations and 11 regulatory guides under various stages of development, ranging from drafting to resolution of comments from external stakeholders. The effort deployed by FANR for the establishment of the regulatory framework in such a short period (2009 – 2011) is commendable.

FANR has tasked a TSO to carry out a comparison of its regulations for nuclear power activities with the IAEA safety standards. This work is not yet finalised, but the Team was informed the preliminary conclusion is that there is a high degree of consistency between the FANR regulations and guides and the IAEA Safety Standards. Considerations pertaining to nuclear power activities, made in section 9.4, should be expanded in the context of also being applicable to non-nuclear power activities.

FANR has conducted training on the use of regulations and guides as part of the qualification schemes for staff involved in inspection and assessment, as well as for the general staff (as part of the training on the Integrated Management System).

The UAE nuclear regulatory framework is in compliance with Requirements 32 - 34 of GSR Part 1 and is generally in line with the guidance provided in GS-G-1.4.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS: GS-G-1.4, para. 3.26: <i>“The regulatory body should follow a consistent procedure for establishing, revising and revoking regulations and guides. A general procedure should be prepared that details the general format and style of language to be used in developing the regulations and guides. This procedure should be distributed to members of drafting working groups and should be adhered to by all parties involved. Procedures should be efficient and flexible enough to permit revisions to be made so as to adapt to changing conditions or as justified by technological advances.[...]”</i></p>
(2)	<p>BASIS: GS-G-1.4, para. 3.28: <i>“The regulatory body should ensure that regulations and guides are kept up to date, and procedures should be established for their periodic review. Experience in implementing the regulations should be examined, and any problems or difficulties which may have arisen should be duly considered. The status of applicable requirements should also be examined in the light of new developments in relation to nuclear safety. The effect of too frequent changes on the stability of the regulatory system should be taken into account. However, events may occur which necessitate more frequent revisions. The reasons for revising regulations may include:</i></p> <ul style="list-style-type: none"> - <i>changes in legislation;</i> - <i>changes in the organization, responsibilities, policies or procedures of the regulatory body;</i> - <i>experience gained by the regulatory body in the authorization process;</i> - <i>feedback from events, incidents and accidents;</i> - <i>major modification or refurbishment of a facility;</i> - <i>results from research and development in fields relevant to safety;</i> - <i>technological advances;</i> - <i>the need to improve or revoke impracticable, misleading, unenforceable or otherwise inadequate regulations.”</i>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(3)	<p>BASIS: GS-G-1.4, in para. 3.25.: <i>“The purpose of the review by legal staff is to ensure that regulations do not contain provisions that are beyond the jurisdiction and authority of the regulatory body, prohibited by or inconsistent with laws or other regulations, unclear or ambiguous, or otherwise unenforceable”.</i></p>
S20	<p>Suggestion: FANR should consider detailing its internal procedures for elaboration of the establishment, revision and revoking of regulations. Amendments should include criteria for identifying the need for new or revised regulations, should specify the periodicity of the review of the current regulations and guides and should also address the formal review by legal staff in the process for issuing regulations.</p>
(4)	<p>BASIS: GSR Part 1, Req. 32, Regulations and guides: <i>“The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgements, decisions and actions are based.”</i></p>
(5)	<p>BASIS: GS-G-1.4, para. 3.5: <i>“Although the development effort may be lengthy, basic regulations should be established at an early stage. A range of engineering factors and also judgement or probabilistic safety assessments may contribute to setting priorities for topics to be covered by additional and more detailed regulations and guides. These should be sufficiently comprehensive and should be kept up to date to ensure that all essential safety requirements can be considered in a systematic and orderly manner in the authorization process.”</i></p>
(6)	<p>BASIS: GS-G-1.4, para. 3.19: <i>“States embarking on a nuclear programme should consider adapting the IAEA’s safety standards or regulations developed by other States, or a combination of these [...]”</i></p>
GP8	<p>Good practice: The UAE has developed, in a relatively short period of time, a comprehensive national regulatory framework for nuclear safety. For the establishment of its own regulatory requirements and guidance, the FANR has made extensive use of IAEA Safety Standards. The obligation of the FANR to take account of internationally recognized standards and recommendations, such as the IAEA Safety Standards, when developing the national regulations and guidelines, is explicitly stated as a mandatory requirement in the UAE Nuclear Law.</p>

9.2. NUCLEAR POWER PLANT

Existing regulations and guides are adequate for the current phase of the UAE nuclear power programme (in pre-construction stage), supporting the safety reviews and assessments needed in view of issuing a NPP construction licence.

The nuclear safety regulations and guides include siting requirements, design principles and criteria, detailed provisions for the performance and use of probabilistic risk assessments,

requirements on radiological protection, waste management, physical protection and management systems, as well as requirements for the application for a licence to construct a nuclear facility. In particular, the regulatory guide FANR-RG-004 - Evaluation Criteria for Probabilistic Safety Targets and Design Requirements provides the basic criteria for the regulatory review of design (including quantitative criteria), supplemented with specified provisions from several US NRC regulations and guides referenced in FANR's guide.

FANR has plans to issue additional regulations for construction, commissioning, operation and decommissioning. A regulation on Nuclear Facility Construction (Reg- 07) was under internal staff review as of December 2011, prior to undergoing external review. It is estimated that it will come into force in the first half of 2012. The draft regulation includes mandatory provisions for the use of lessons learned from construction and operating experience at other plants worldwide.

Given the ENEC's choice of the Korean design of the nuclear power plant, the similarity of the Korean and US regulations, guides and codes has greatly facilitated FANR's effort to establish the comprehensive regulatory framework in a relatively short time.

It is considered that all relevant actions in IAEA Safety Guide SSG-16 – 'Establishing the Safety Infrastructure for a Nuclear Power Programme' have been implemented for the current phase of the nuclear power programme (early Phase 3, preparing for construction).

The regulatory framework needed to support regulatory review, inspection and decision-making for all the future licensing stages of the nuclear power plant project, is still to be completed.

While FANR regulations do not include any references, the regulatory guides make reference to IAEA Safety Standards, which are consensus documents, as well as to regulatory documents issued in other countries (e.g. regulatory guides issued by the US NRC). The actual conditions for the use of the IAEA and US NRC documents is not formalized in the internal guidelines, i.e. there are no provisions stating how should the changes in IAEA and NRC documents (or in their references) be taken into account and assessed for their impact on FANR regulatory processes. Specific training should be provided to FANR staff in the interpretation and use of international safety standards and regulatory documents issued by regulators in other countries, in order to ensure the consistency and objectivity of the regulatory processes for review and inspection, making these less reliant on the reviewers and inspectors' expert judgment.

As part of its response to the lessons learned from the Fukushima Daiichi accident, FANR plans to review its safety regulations and guides for NPPs by April 2012, to determine whether changes are needed. Under consideration for this review are the requirements for natural hazards such as earthquake and flood and man-made hazards as well as the requirements for plant response to accident conditions including station black-out and mitigation of severe accident sequences. It should be noted that the regulatory requirements and guides already in place include provisions on design features for the prevention and mitigation of severe accidents. The planned regulations for commissioning and operation will also take account of any applicable lessons learned from the Fukushima accident.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(7)	<p>BASIS: GS-G-1.4, para. 3.20.: <i>“If regulations of other States, usually those of the State supplying a nuclear facility, are to be adapted, particular attention should be paid to the legal framework of that State. Owing to differences between States in legal and governmental infrastructures, and in the structure of industry and available resources, it is unlikely that the regulatory body will be able to adopt without revision regulations issued in another State. In adapting regulations and guides issued in other States, the regulatory body should ensure that it understands the regulations in terms of their technical background and significance, and the legal and regulatory framework in the State that issued them.”</i></p>
(8)	<p>BASIS: GS-G-1.4, para. 3.21.: <i>“In adapting IAEA safety standards or regulations of other States, the regulatory body should:</i></p> <p style="margin-left: 20px;"><i>[...]</i></p> <p style="margin-left: 20px;"><i>— promptly evaluate amendments made to the reference regulations or standards and issue amendments to its own regulations as appropriate.”</i></p>
S21	<p>Suggestion: FANR should make provisions to ensure staff is trained in the technical background and significance of those regulatory documents issued in other jurisdictions and referenced / used in FANR’s guidelines. FANR should also take measures to regularly monitor changes in those referenced documents and evaluate potential implications for their own guidelines.</p>
(11)	<p>BASIS: GS-G-1.4, para. 2.13.: <i>The system of regulations should provide advance information to the operator on the requirements for each major stage of authorization. This will assist the operator to make sound plans and decisions with respect to safety in the siting, design, construction, commissioning, operation and decommissioning or closure of a nuclear facility.</i></p>
S22	<p>Suggestion: FANR should continue the process for completing the regulatory framework, in such a manner that all regulations and guides needed to support regulatory review, inspection and decision-making are in place before the related licensing stages of the nuclear power plant project.</p>

9.3. NON-NUCLEAR POWER ACTIVITIES

FANR has completed its ‘Basic Safety Standards’ regulation (FANR-REG-24: “Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than Nuclear Facilities”) based largely on the new IAEA BSS and covering radiological protection. However, the Team has observed that not all the areas are fully covered.

FANR has also adopted TS-R-1 as the UAE transport regulation. A regulation for radioactive waste management, including provisions for discharges and clearance is planned. The Team was informed that supporting guides for radiation protection and transport are well advanced.

9.4. FURTHER CONSIDERATIONS ON REGULATED ACTIVITIES

9.4.1. Discharges

The main safety requirements relating to regulated discharges and control are established in FANR-REG-24 “Basic Safety Standards for Facilities and Activities using Ionizing Radiation other than Nuclear Facilities” (2010) and in FANR-REG-11 “Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities” (2010). These regulations are complemented with FANR REG-04, “Radiation Dose Limits and Optimization of Radiation Protection for Nuclear Facilities”.

The Team noticed that guidance on the implementation of these safety requirements needs to be expanded for the users to understand how to comply with them. FANR plans to develop a regulation on control of discharges from facilities other than nuclear facilities. It was noted that requirements are already in place in FANR-REG-24. A safety guide to help users in the implementation of these requirements may be beneficial. This safety guide could be based on the IAEA Safety Guide “Regulatory Control of Radioactive Discharges to the Environment” WS-G-2.3, and its supporting IAEA Safety Report Series No 19 “Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment”.

The Team was informed that the regulation on control of discharges for Braka NPP (being licenced based on the construction licensing application) adopts those regulations used by the Regulatory Body in the vendor country of origin (RBCoO)⁵. The annual average liquid and gaseous release source terms are based on the results from PWR-Gale programme using NUREG-0017 and ANSI/ANS 18.1 methodology.

9.4.2. Classification of Radioactive Waste

The Team was informed that radioactive waste from the NPP is classified and processed for operational purposes in accordance with 10CFR61⁶.

For regulated materials no classification or categorization of radioactive waste has yet been established.

It was noted that classification for long-term management of radioactive waste needs to be developed. The Team was informed this regulation is planned in the short term. The classification scheme should be in accordance with IAEA Safety Standards and should take into consideration statements given in the National Policy and Strategy for the Management of Radioactive Waste currently under development.

Regulation for the Safe Management of Radioactive Waste

Safety requirements for the safe management of radioactive waste are discussed below:

⁵ [Reference: Licensing Application Categorization Report]. BNPP Preliminary Safety Analysis Report (PSAR) Chapter 11 states that the effluents during normal operation and anticipated operation occurrences comply with ROK Mest Notice 2008-31, “Standards for Radiation Protection” (comparable with 10 CFR 20 Appendix B except it is based on ICRP-60 and -72 dose methodology rather than ICRP-30 that 10 CFR 20 is based on).

⁶ “Licensing Requirements for Land Disposal of Radioactive Waste” requirements, ROK MEST Notice 2008-69 “Regulation on Packaging and Transportation of Radioactive Material”, and USNRC Branch Technical Position ETSB 11-3, “Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Cooled Nuclear Power Reactor Plants”

Nuclear power practices

The Regulation for Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities (FANR-REG-11) establishes specific requirements for radiation protection and predisposal radioactive waste management subsequent to the receipt of nuclear fuel and during the operation of nuclear facilities. It complements FANR Regulation for Dose Limits and Optimization of Radiation Protection, (FANR-REG-04), and FANR Regulation for Emergency Preparedness at a Nuclear Facility, (FANR-REG-12). FANR-REG-11 covers only the overarching safety requirements for predisposal management of radioactive waste established in IAEA GSR Part 5. It is generic and a performance-type document and thus, may create problems when the qualification of the operators and regulators are not at the same level.

Special attention deserves requirements related to the responsibilities of the operator missing in the FANR-REG-11 such as:

- To create and maintain an updated inventory of the radioactive waste generated and managed in the facility, and
- to develop and implement a strategy or programme for the management of radioactive waste.

Non-nuclear power practices

The scope of the document ‘Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than in Nuclear Facilities (FANR-REG-24)’ are the activities, sources and facilities other than those considered nuclear facilities or nuclear materials. FANR REG-24 covers the main requirements on waste safety contented in the recently approved IAEA GSR Part 3 FANR has not incorporated the specific requirements of Para 3.131 that registrants and licensees, in cooperation with suppliers, as appropriate; “... shall ensure that activities for the predisposal and management of and for the disposal of radioactive waste are conducted in accordance with the requirements of applicable IAEA standards³⁷, and in accordance with the authorization”. Footnote 37 clarified that requirements on the predisposal management of radioactive waste are established in GSR Part 5 and for the disposal of radioactive waste are established in SSR Part 5. This means that the GSR Part 5 requirements 6, 9, 10-22 and 22 on predisposal management of radioactive waste are not included in the GSR Part 3 These requirements are important for facilities like research reactors, nuclear medicines departments, radioactive predisposal management facilities.

Attention should be also paid to the safety requirements and recommendations for safe storage of radioactive waste as the disposal policy is still not established in UAE.

The definition of the nuclear facility in the Law is restricted to facilities that contain only nuclear material, i.e. fissionable material. That might lead to improper licensing procedures for the predisposal and disposal of radioactive waste, related activities and facilities, where primarily radioactive material will be handled. In order to be compliant with the relevant IAEA Standards on waste treatment facilities this situation should be clarified.

Clearance

The UAE legal and regulatory framework does not define clearance and for this reason the definition of radioactive waste is also unclear. The Nuclear Law No 6 of 2009 defines radioactive waste as “Waste that contains, or is contaminated with, radionuclides or activities greater than levels as established by the Authority”. A definition for clearance was attempted in FANR-REG-11 for nuclear installations, but the given definition complicates the existing situation. Article 22 (1) is in contradiction with the definitions for “radioactive waste” and

“clearance” accepted internationally, and a result will create complications for clearance and disposal of radioactive material.

Moreover Article 22 (2b) establishes that for material to be cleared; “The activity concentration of an individual radionuclide does not exceed the relevant level in Tables 1 and 2 of IAEA Safety Standard RS-G-1.7 ‘Application of the Concepts of Exclusion, Exemption and Clearance’”. It must be noted that the values presented in IAEA Safety Guide RS-G-1.7 were reviewed and updated to be included in the new revised BSS (GSR Part 3). These revised and updated values for clearance and exemption levels are already included in Tables I-1 and I-2 found in the recently approved FANR-REG-24 and which were included without defining “clearance”.

Finally, Article 22 (3) repeats the same wording establishing that “The licensee shall record the details of any radioactive waste that is cleared from regulatory control and disposed of at any waste facility”.

In conclusion, the clearance and clearance levels are currently defined only for nuclear installations and the definition of radioactive waste is not consistent with the internationally accepted definition.

9.5. DECOMMISSIONING

There are currently no FANR safety regulations for decommissioning of regulated facilities. Only FANR-REG-11 establishes that “The licensee is responsible for the safety of predisposal radioactive waste management facilities and activities. The Licensee shall carry out safety assessment and shall develop a safety case for each identified waste stream, and shall ensure that the siting, design, construction, commission, operating, shut down and decommissioning of the predisposal radioactive waste management facilities is carried out in compliance with this regulation”.

FANR-REG-11 in Article 20 (2) establishes that “The licensee shall include in the safety case a description of how all the safety aspects of the site, the design, operation, shutdown and decommissioning of the facility and the managerial controls satisfy the requirements of this regulation”.

FANR-REG-06 “Regulation for the Application for a Licence to construct a Nuclear Facility” requires preliminary information on decommissioning and the end life including how the design supports safe decommissioning. Finally FANR-RG-001 in Article 8 (11) gives recommendations for the development of the predisposal radioactive waste management of decommissioning from the design stage.

No other safety requirements exist for the decommissioning of nuclear installations and other facilities in general. The Team was informed that the development of a regulation on decommissioning is in the plan.

9.6. EXISTING EXPOSURE SITUATIONS

The Team observed that safety requirements established in the GSR Part 3 on existing exposure situations as well as for emergency exposure situations were not considered in the development of the regulation FANR-REG-24.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(12)	BASIS: GSR Part 3, Req. 31: “ <i>Relevant parties shall ensure that radioactive waste and discharges of radioactive material to the environment are managed in accordance with the authorization.</i> ”
S23	Suggestion: FANR should consider developing a safety guide to assist users in complying with safety requirements on control of discharges for facilities with regulated materials.
(16)	BASIS: GSR Part 3, Req. 8: “ <i>The government or the regulatory body shall determine which practices or sources within practices are to be exempted from some or all of the requirements of these Standards. The regulatory body shall approve which sources, including materials and objects, within notified practices or authorized practices may be cleared from regulatory control.</i> ”
(17)	<p>BASIS: GSR Part 1, Req. 2: “<i>The government shall establish and maintain an appropriate governmental, legal and regulatory framework for safety within which responsibilities are clearly allocated.</i></p> <p>... 2.5 -<i>The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:</i></p> <p>... (2) <i>The types of facilities and activities that are included within the scope of the framework for safety;...</i></p> <p>... (17) <i>The criteria for release from regulatory control;....”</i></p>
R9	Recommendation: FANR should review the existing regulatory framework for safety and define according to the IAEA Safety Standards, the concepts of exemption, clearance and radioactive waste for all practices and activities.
(18)	BASIS: GSR Part 1, Req. 10: “ <i>The government shall make provision for the safe decommissioning of facilities, the safe management and disposal of radioactive waste arising from facilities and activities, and the safe management of spent fuel.</i> ”
(19)	BASIS: WS-R-5, para 3.5: “ <i>The regulatory body is responsible for the regulation of all phases of decommissioning, from initial planning to termination of the practice or final release of the facility from regulatory control. The regulatory body shall establish the safety standards and requirements for decommissioning, including management of the resulting radioactive waste, and shall carry out activities to ensure that the regulatory requirements are met.</i> ”
S24	Suggestion: FANR should develop a regulation establishing the main safety requirements for all phases of decommissioning of all types of regulated facilities. This should include requirements for the period after permanent shutdown of a facility at the end of its operational lifetime.
(20)	BASIS: GSR1 Part 3, Req. 47, para. 5.3: “ <i>5.3. The government shall include in the legal and regulatory framework for protection and safety (see</i>

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	<p><i>Chapter 2) provision for the management of existing exposure situations. The government, in the legal and regulatory framework, as appropriate:</i></p> <p><i>(a) Shall specify the exposure situations that are included in the scope of existing exposure situations;</i></p> <p><i>(b) Shall specify the general principles underlying the protection strategies developed to reduce exposure when remedial actions and protective actions have been determined to be justified;⁴⁹</i></p> <p><i>(c) Shall assign responsibilities for the establishment and implementation of protection strategies to the regulatory body and to other relevant authorities⁵⁰ and, as appropriate, to registrants, licensees and other parties involved in the implementation of remedial and protective actions;</i></p> <p><i>(d) Shall provide for the involvement of interested parties in decisions regarding the development and implementation of protection strategies, as appropriate.”</i></p>
<p>R10</p>	<p>Recommendation: FANR should develop regulations covering the main requirements for the regulation and control of existing exposure situations established in the IAEA Safety Standards GSR Part 3.</p>

Safety Assessment

There are currently no requirements in FANR Regulations on the safety assessments to be performed for the following facilities and activities:

- Facilities for radioactive waste management where radioactive waste is treated, conditioned, stored or disposed of.
- Any other places where radioactive materials are produced, processed, used, handled or stored.
- Irradiation facilities for medical, industrial, research and other purposes, and any places where radiation generators are installed.
- The production, use, import and export of radiation sources for industrial, research, medical and other purposes.
- The transport of radioactive material.
- The decommissioning and dismantling of facilities and the closure of repositories for radioactive waste.
- Activities for radioactive waste management such as the discharge of effluents.
- The remediation of sites affected by residues from past activities.

All the above facilities and activities may be present in the inventory of licensees, practices and sources under the regulatory control of FANR. This means that the safety of these activities and facilities should be assessed before granting an authorization and it is the responsibility of the applicant to develop the safety assessment that will be reviewed later by the regulatory body.

The regulation “Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than in Nuclear Facilities” (FAN-REG-24) mentions safety assessment only

once without defining its scope and content as it is done in the IAEA Safety Requirements GSR Part 3, GSR Part 4 and GSR Part 5.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(21)	BASIS: GSR 1 Part 3, Req. 13: <i>“The regulatory body shall establish and enforce requirements for safety assessment, and the person or organization responsible for a facility or activity that gives rise to radiation risks shall conduct an appropriate safety assessment of this facility or Activity.”</i>
R11	Recommendation: FANR should develop a set of regulations for safety assessment for all regulated facilities and activities taking into account a graded approach.

10. EMERGENCY PREPAREDNESS AND RESPONSE

10.1. BASIC RESPONSIBILITIES

The United Arab Emirates has established a legislative framework for emergency preparedness and response in conformity with Requirement 8 of GSR Part 1. The operational and implementing aspects of this framework are being / or still need to be developed and implemented. Thus, conformance with many requirements of GS-R-2 has yet to be reached.

The Nuclear Law sets the main provisions related to the role and responsibilities of the Authority (FANR) for emergency planning, preparedness and response, as well as requirements for licensees. The UAE recently issued Federal Law by Decree No. 2 of 2011 establishing the '*National Emergency, Crises and Disasters Management Authority*' (NCEMA) furthering legislative responsibilities in this area. NCEMA reports to the Supreme National Security Council.

NCEMA has leading role in the following tasks and responsibilities:

- developing and coordinating the strategic plan;
- development of national response capabilities;
- preparing a register of risks and threats at the national and local levels;
- managing emergencies, crises and disasters;
- coordinating the roles of state concerned agencies during emergencies;
- participating in preparing and coordinating the necessary emergency plans;
- proposing and developing policies, safety measures, professional and institutional safety and security standards;
- establishment of necessary criteria to evaluate procedures for managing emergencies;
- preparing, coordinating, and implementing exercises;
- proposing legislation and regulations.

With regard to the nuclear power programme, FANR has completed and promulgated a regulation for emergency preparedness for nuclear facilities (FANR-REG-12) that imposes requirements on the operator essentially for onsite planning. Initial assessment of the onsite emergency planning will take place within the context of review and assessment of the construction licence application. Approval by FANR of the onsite emergency plan is a pre-requisite to commissioning under the Nuclear Law and FANR will expect that the offsite planning, co-ordinated with the onsite plan, would be completed and exercised before commissioning is licenced.

FANR's radiation protection regulation for users of regulated material (FANR-REG-24) requires that licensees prepare and maintain an emergency plan commensurate with the nature and magnitude of the risk involved. However, this regulation is not sufficient to effectively regulate all important aspects of emergencies related to radiation sources. FANR recognized and addressed this issue by preparing draft guidance to clarify the obligations of the licensee.

FANR is identified as the UAE national warning point and national competent authority (domestic and abroad) for the Early Notification and Assistance Conventions.

Nuclear Emergency Preparedness Coordination Committee (NEPCC):

With regard to offsite planning for nuclear facilities, in accordance with the Nuclear Law, ENEC is working with NCEMA, CNIA and the Western Region Municipality through a Nuclear Emergency Preparedness Coordination Committee (NEPCC). FANR is also a member of this Committee, particularly in its statutory role as cooperating and advising Government agencies on, inter alia, emergency preparedness and response.

The Team has found the establishment of NEPCC as a coordinating body to address the interfaces between the on-site and off-site plans and to coordinate to be very good move at this stage of development.

Radiation Protection Committee (RPC):

The FANR Board of Management has this year established a national Radiation Protection Committee, gathering representatives of FANR, NCEMA, Health and environment ministries. This Committee has to establish national radiation protection guidance for emergency response.

Chemical, Biological, Radiological, Nuclear (CBRN) Committee:

is a committee of all relevant government agencies (including FANR) that is addressing emergency response planning for 'CBRN' emergencies.

The Team has observed that responsibilities, roles and organizational relationships and interfaces between all the response organizations are yet to be clarified.

The CBRN Committee is collecting and discussing the roles and attributions of the different organizations. It will be part of the national specific plan addressing radiation emergencies.

A national plan dealing with radiation emergencies is still to be established (see below item 10.13).

A MoU between FANR and NCEMA is in preparation and will address the two agencies' responsibilities for emergency planning. Also, FANR intends that the newly established Radiation Protection Committee will be the mechanism to include many of the requirements of GS-R-2 into national planning and response arrangements.

Approval by FANR of the on-site emergency plan is a pre-requisite to commissioning under the Nuclear Law (see above).

FANR has established an emergency response process and supporting procedures within its integrated management system and proposes to establish a FANR emergency response centre. More detailed internal planning for FANR's emergency preparedness and response is underway

FANR envisages substantial progress in all of these areas by 2013 and the UAE will consider seeking an Emergency Preparedness Review (EPREV) mission to review and assess the arrangements in place at that time.

FANR has drafted guidance for licensees (FANR RG-007) to help licensees complying with FANR-REG-24 requirements. This guidance includes provisions related to Emergency Preparedness and Response (EPR).

FANR closely follows the implementation of the IAEA Action Plan on Nuclear Safety and intends to reasonably apply all relevant lessons learned from the TEPCO Fukushima Daiichi nuclear emergency, both on a facility (Braka NPP) and a national level.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	BASIS: GS-R-2 para. 3.1.: “ <i>The national co-ordinating authority and the response organizations shall ensure that the arrangements for response to a nuclear or radiological emergency are co-ordinated with the arrangements for response to conventional emergencies. The regulatory body shall ensure that the co-ordinated arrangements are implemented adequately by the operators.</i> ”
S25	Suggestion: FANR and NCEMA should as soon as possible finalize and implement the Memorandum of Understanding (MoU). The MoU should consider the issues of public communication and of cooperation between the Emergency Operation Centres of NCEMA and FANR.
(2)	BASIS: GS-R-2 para. 3.3.: “ <i>It is presumed that the State will have determined in advance the allocation of responsibilities for the management of interventions in emergency exposure situations between the [regulatory body], national and local [response organizations] and [operators]</i> ”
(3)	BASIS: GS-R-2 para. 5.6.: “ <i>The organizational relationships and interfaces between all the major response organizations shall be established.</i> ”
R12	Recommendation: The Government should make sure that the roles, responsibilities and organizational relationships and interfaces between all the response organizations should be clarified, agreed and formalized as soon as possible.
S26	Suggestion: The Government of the UAE should consider inviting an Emergency Preparedness Review (EPREV) mission upon the completion of the national and local off-site radiation emergency plans.

10.2. ASSESSMENT OF THREATS

Article 8 of FANR-REG-12 requires that ‘*the Licensee shall conduct an assessment of the potential emergencies associated with the nuclear facility and shall include this assessment in its emergency plan...*’

At the national level there is a document dealing with the assessments of hazards that could cause mass casualties. In addition FANR has sent to the CBRN Committee the information on hazard assessment related to regulated activities. The CBRN Committee will compile the information for inclusion in the future national radiation emergency plan.

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(4)	BASIS: GS-R-2 para. 3.15: “ <i>The nature and extent of emergency arrangements [for preparedness and response] shall be commensurate with the potential magnitude and nature of the [threat]... associated with the facility or activity.</i> ” <i>The full range of postulated events shall be considered in the threat assessment. In the threat assessment, emergencies involving a combination of a nuclear or radiological emergency and a conventional emergency such as an</i>

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	<p><i>earthquake shall be considered. Any threat associated with nuclear facilities in other States shall also be considered. In the threat assessment any populations at risk shall be identified and, to the extent practicable, the likelihood, nature and magnitude of the various radiation related threats shall be considered. The threat assessment shall be so conducted as to provide a basis for establishing detailed requirements for arrangements for preparedness and response by categorizing facilities and practices consistent with the five threat categories shown in Table I [of GS-R-2] .”</i></p>
R13	<p>Recommendation: Organisations, involved in emergency planning, should finalize the assessment of hazards at the national level properly taking into account radiological hazards in accordance with GS-R-2.</p>

10.3. EMERGENCY MANAGEMENT AND OPERATIONS

The coordination arrangements between off-site and on-site responses for the proposed Braka NPP are being addressed in the first instance by NEPCC that has been established under the chairmanship of ENEC (see above).

Coordination between the various response organizations is being addressed by the CBRN Committee and will be approved by NCEMA and the National Supreme Security Council. The national emergency response is expected to be coordinated by NCEMA.

FANR has internal procedures related to emergency preparedness and response. These procedures address FANR's role in coordinating its own response with the on-site and off-site responses.

10.4. IDENTIFYING, NOTIFYING AND ACTIVATING

The coordination arrangements between off-site and on-site responses for the proposed Braka NPP are being addressed in the first instance by NEPCC that has been established under the chairmanship of ENEC (see above).

The coordination between all response organizations is being addressed by the CBRN Committee and approved by NCEMA and the National Supreme Security Council. The national emergency response is supposed to be coordinated by NCEMA.

FANR has internal procedures related to emergency preparedness and response. These procedures address FANR's role in coordinating its own response with the on-site and off-site responses.

10.5. TAKING MITIGATORY ACTION

These requirements (4.35, 4.36) are being addressed as part of on-going UAE national nuclear and radiological emergency response planning.

This is assumed to be the prime responsibility of the operator. The on-site emergency plan should conclude the necessary provisions; FANR has the obligation to review and approve these provisions.

10.6. TAKING URGENT PROTECTIVE ACTION

The issue of establishing optimised national intervention levels is not yet solved. FANR intends to address it through the UAE Radiation Protection Committee.

Regarding the arrangements to be made for effectively making and implementing decisions on urgent protective actions to be taken off the site, the Nuclear Law (Article 49) requires the establishment of emergency zones (defined consistent with GS-R-2) for the purpose of determining the actions to be taken by the competent authorities to protect population, property and the environment. The necessary on-site requirements are included in FANR-REG-12. This issue will be addressed through the process involving the NEPCC.

The team had the opportunity to visit the site of the Braka NPP under construction and noted that the surroundings of the site appear not to be populated at all. The closest permanent settlement is more than 20 km away. This fact simplifies the emergency preparedness planning considerably. In implementing Article 23.3 of the Nuclear Law, the UAE Government should keep an exclusion zone around the site as big as possible, preventing developments that would unnecessarily increase the population.

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(5)	BASIS: GS-R-2 para. 4.45: “ <i>Optimized [national] intervention levels [for taking urgent protective actions] shall be [established that are in accordance with international standards...]”</i>
S27	Suggestion: FANR, with other relevant stakeholders and through the coordination of the Radiation Protection Committee, should continue to work towards the establishment of national intervention levels for application in emergency situation, in compliance with the international standards.
S28	Suggestion: The Government of the UAE should consider establishing an exclusion zone around the NPP site to prevent the developments which would unnecessary increase the population density and complicate emergency planning.

10.7. PROTECTING EMERGENCY WORKERS

To address the arrangements to protect emergency workers in accordance with international standards, FANR-REG-12 (Article 7) requires that the licensee shall ensure that no emergency worker is exposed in excess of the standard dose limits for exposure of workers except for exceptional circumstances where the workers give informed consent and are, to the extent possible, trained in the actions to be undertaken.

Worker dose limits for regulated materials licences are provided in FANR-REG-24 which does not deal with exposures resulting from an emergency. Draft RG-007 documents that in the case of an emergency FANR would apply FANR-REG-12 Article 7 as above.

This issue is not yet fully resolved; the referred document should be issued as soon as possible.

For other arrangements regarding the adoption of national guidance for managing, controlling and recording the doses received by emergency workers, FANR still needs to establish tools and means to meet this requirement (see also recommendations in Section 12.2).

10.8. ASSESSING THE INITIAL PHASE

Article 9 of FANR-REG-12 requires that ‘the Emergency Plan shall include predefined Emergency Action Levels (EALs). These EALs will be based on the abnormal conditions for the Nuclear Facility, security related concerns, releases of Radioactive Material, environmental measurements and other observable indications and will make use of Operational Intervention Levels (OILs) as appropriate’.

Working with the Radiation Protection Committee (RPC) and the NEPCC, FANR intends to assist in the process of adopting operational intervention levels which are to be used in the initial phase of a radiation emergency. The OILs when established will be included in the national radiation emergency plans.

One of the actions in the FANR Emergency Response Procedure is to provide technical advice and support first responders as needed until the coordinating authority (NCEMA) takes command. This requirement will be taken into account in further detailed planning.

10.9. MANAGING THE MEDICAL RESPONSE

The health department is represented in the NEPCC. The capabilities to deal with medical emergencies both on site and at the hospital level are not yet established. During the NEPCC meeting, a request has been addressed to the IAEA representative for training medical staff on this issue.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(6)	BASIS: GS-R-2 para. 4.77: <i>“Arrangements shall be made for medical personnel, both general practitioners and emergency staff, to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures and other immediate actions warranted if a nuclear or radiological emergency is suspected.”</i>
(7)	BASIS: GS-R-2 para. 4.80: <i>“Arrangements shall be made at the national level to treat people who have been exposed or contaminated. These shall include: guidelines for treatment; the designation of medical practitioners trained in the early diagnosis and treatment of radiation injuries; and the selection of approved institutions to be used for the extended medical treatment or follow-up of persons subjected to radiation exposure or contamination. This</i>

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	<i>shall also include arrangements for consultation on treatment following any exposure that could result in severe tissue damage or other severe deterministic health effects with medical practitioners experienced in dealing with such injuries.”</i>
R14	Recommendation: The Government of the UAE should establish a minimum medical capability at the national level to face medical emergencies, at the hospital level and by medical first responders. Consideration should be given to educating and training medical professionals to recognize the symptoms of radiation injuries.

10.10. KEEPING THE PUBLIC INFORMED

The Nuclear Law requires that the licensee in case of an accident must immediately warn the population and municipalities within the emergency zones and other competent authorities.

FANR has established an emergency communications procedure, which addresses public communication, but recognises that this should be a prime responsibility of the coordinating authority (NCEMA).

According to the Nuclear Law Article 5.12 “FANR shall ... have the power to ... provide governmental bodies, national organizations, international organizations and the **public** with information on incidents and abnormal occurrences, and other information, as appropriate”. This functionality is to be established, the corresponding plan and procedures are to be completed and coordinated with NCEMA.

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(8)	BASIS: GS-R-2 para. 4.83: “ <i>Arrangements shall be made for: providing useful, timely, truthful, consistent and appropriate information to the public in the event of a nuclear or radiological emergency; responding to incorrect information and rumours; and responding to requests for information from the public and from the news and information media.</i> ”
(9)	BASIS: GS-R-2 para. 4.96 : “ <i>Arrangements shall be made for responding to public concern in an actual or potential nuclear or radiological emergency. Preparations shall include arrangements for promptly explaining any health risks and what are appropriate and inappropriate personal actions for reducing risks. These arrangements shall include monitoring for and responding to any related health effects and preventing inappropriate actions on the part of workers and the public. This shall include the designation of the organization(s) with the responsibility for identifying the reasons for such actions (such as misinformation from the media or rumours) and for making recommendations on countering them. How these recommendations are to be included in the national emergency response shall be specified.</i> ”
S29	Suggestion: FANR should consider developing a communication plan taking into account the psychological consequences of radiation emergencies.

10.11. TAKING LONG-TERM PROTECTIVE ACTION

Arrangements for agricultural countermeasures and the setting of Operational Intervention Levels will be addressed through the Radiation Protection Committee.

10.12. ORGANIZATION

The organizations involved in the national emergency preparedness and response scheme, as well as their roles and responsibilities, interfaces and concepts of operation are described in sub-chapter 10.1 above.

Article 14 of FANR-REG-12 requires that ‘the licensee shall establish organisational arrangements consistent with its Management System for coping with the emergencies described in Article 9 of this regulation. The arrangements shall be described in the emergency plan, including definition of authorities, responsibilities, and duties of individuals assigned to it and the means for notification of such individuals in the event of an emergency’.

FANR is addressing its own detailed organisational and staffing arrangements for emergency response. The operational arrangements are yet to be established and tested through exercises.

10.13. PLANS AND PROCEDURES

Requirements regarding the onsite plan and off site plan are addressed in FANR-REG-12 for the NPP licensee. FANR has an emergency response process within its integrated management system and some procedures and is working towards the detailed elaboration of these plans.

A national emergency plan addressing all types of emergencies exists and has been operational since 2003. A new draft of this plan is now being circulated to relevant national organizations by NCEMA for review and comments. FANR in its review should make sure that the radiation emergencies are well identified under the scope of this plan.

The CBRN Committee is contributing to the national radiation emergency plan (roles and responsibilities, comprehensive hazard assessment, capabilities and resources). It is foreseen that this plan will be approved and issued in 2014 and the off site plan of the NPP in 2015.

These various plans have to be integrated and coordinated.

For the establishment of national radiation emergency plan it has been suggested to use, as guidance, the IAEA documents (EPR METHOD 2003).

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(10)	BASIS: GS-R-2 para. 5.13.: <i>“Plans or other arrangements⁷⁵ shall be made for co-ordinating the national response to the range of potential nuclear and radiological emergencies...”</i>
(11)	BASIS: GS-R-2 para. 5.14.: <i>“Each response organization “shall prepare a general plan or plans for coordinating and [performing their assigned functions...”</i>

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R15	Recommendation: The Government of the UAE should ensure that the plans and procedures for coordinating national response, based on a comprehensive assessment of hazards and coordinated with other relevant and existing plans, are established and completed by the indicated deadlines. Each response organization should prepare its own plan for coordinating and performing their assigned functions.
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10.14. LOGISTICAL SUPPORT AND FACILITIES

FANR is developing capabilities for environmental surveillance and emergency response.

Although the national early warning network is under the Ministry of Defence, FANR will focus on the Braika NPP environmental monitoring through a ring network. FANR has its own network with eight stations installed, five in storage and 22 under acquisition through IAEA. There are on-going discussions with the Ministry of Defence to make the data obtained from FANR network available for this Ministry. FANR is upgrading some of the stations under acquisition into five mobile stations and five stations with gamma spectrometry.

With the Institut de Radioprotection et de Sureté Nucléaire (IRSN), France, FANR is establishing a laboratory with the full range of radioanalytical capabilities (gamma spectrometry, alpha, beta-counting system, liquid scintillation, alpha spectrometry) and mobile laboratory. It is planned that these laboratories will be installed and operational by 2014. However, two gamma spectrometry systems are already installed and operational, one at Khalifa University and another at the Environmental Agency of Abu Dhabi.

An Emergency Operation Centre (EOC) is being established in FANR Headquarters. It is foreseen that it would be operational by 2014. The MoU between FANR and NCEMA should address the issue of cooperation between the EOC of NCEMA and the EOC of FANR.

Finally, FANR will receive training on several code calculations on environmental impact studies and dose calculations with the support of its TSO (US/ BNES/ISL).

The available resources of FANR should be considered into the response capabilities when establishing the national plan and off site plan.

10.15. TRAINING, DRILLS AND EXERCISES

The Nuclear Law requires training of employees designated to perform functions in the facility's emergency plan. Similarly FANR-REG-12 addresses these requirements for the licensee of the nuclear facility. The assessment of this training against the requirements in GS-R-2 should be made (and planned) by FANR in reviewing the Emergency Plan prior to commissioning.

Similarly, the Nuclear Law requires that the emergency plan be 'practically tested' prior to commissioning and during the course of operation of the facility. Article 17 of FANR-REG-12 also requires that:

'The licensee shall conduct periodic drills of its emergency plan to ensure that its employees are familiar with their specific emergency response duties.'

The licensee will conduct appropriate drills involving the employees who have defined roles in the emergency organisational arrangements quarterly to assure the effectiveness of the

emergency plan.

The licensee shall review the results of these drills and any necessary retraining or corrections to the emergency plan will be made by the licensee who will also communicate any relevant findings to the competent authorities’.

However, the response organizations still need to establish and conduct a training programme and an exercise programme in cooperation and coordination with NCEMA.

11. THEMATIC AREAS: CONTROL OF MEDICAL EXPOSURE

11.1. RESPONSIBILITIES OF THE GOVERNMENT SPECIFIC TO MEDICAL EXPOSURE

The requirement to ensure optimized radiation protection outcomes for all radiation practices conducted in the UAE also places the responsibility on FANR to regulate the medical radiation sector. The legislation in place makes this clear and it is expected that changing from historical arrangements whereby medical radiation practices were regulated via respective Health Agencies to being regulated by FANR will necessarily involve not only changes in the understanding by the medical radiation sector as to FANR's role as the "new" radiation regulator for medical radiation practices but also FANR's development of new information, advisory material and regulatory guidance for the medical sector (where such material does not already exist or requires updating). FANR-REG-24 broadly reflects the requirement of GSR Part 3, paragraph 3.146-3.148.

FANR and Health Authorities may need to clarify how FANR will give effect to its legal responsibilities for ensuring radiation safety in the medical radiation practice sector. To this end a MoU is a good starting point in order to aid clarity. It is expected that over time such a MoU will evolve to the point where FANR can exercise full and exclusive regulatory control of medical radiation practices.

While prime responsibility for radiation safety rests with those organisations and persons conducting the radiation practice as an integral part of the respective medical practices, FANR should be ensuring competence of those persons performing radiation practices as FANR has exclusive regulatory control authorising radiation activities. This is supported by the fact that the GSR Part 3 definition of "activities" specifically includes medical and research purposes (as denoted by footnote 5 on page 2). FANR, as the sole regulatory body for radiation protection within the UAE by virtue of the Law No. 6, is therefore the regulator for radiation practices conducted within the medical sector. As such FANR should, over time, ensure that within the requirements of both the Law No. 6 and FANR-REG-24 that appropriate authorisations, as required, are in place for organisations and people involved in the conduct of radiation activities so as to ensure that FANR's responsibilities to ensure radiation health protection are effected.

11.2. RESPONSIBILITIES OF THE REGULATORY BODY SPECIFIC TO MEDICAL EXPOSURE

The question of authorization of medical radiation practices is clear from the existing legislation, however, there exists a perceived lack of clarity among medical radiation practices regarding who the regulator for radiation safety in medical practices is and which authority is responsible for ensuring radiation safety regulatory requirements are met. It is understood that some form of licences are issued by the Health Authority of Abu Dhabi (HAAD), Dubai Health Authority (DHA) and the Ministry of Health (MOH) and that some licences have specific requirements, for example, for radiation shielding. Given FANR's role, it is considered that FANR should be increasing efforts to engage the medical sector including

other health regulatory authorities with a view to clarifying the role of FANR as the regulator for the radiation component of medical practices. (By way of comparison: FANR does not regulate the oil production sector, but FANR does regulate radiation activities within the oil production sector). The currently perceived fragmentation of radiation controls is not envisaged to aid policy consistency with respect to the practical application of a common platform of radiation controls throughout the UAE medical sector. Comments concerning reference levels, dose constraints and patient release criteria are addressed specifically in following items below. FANR-REG-32 broadly reflects the requirement of GSR Part 3, paragraph 3.149.

It is acknowledged that as a developing regulatory body, FANR is preparing for the regulation of many different sectors using radiation as an integral part of their respective practices. Medical radiation practices are no different in this regard, and there are some elements of the requirements that require development and/or finalising with respect to providing further guidance to the regulated activities conducted within the Medical Sector.

BSS 2011 GSR Part 3 interim Requirements 37 states that: *“Justification of medical exposures. Relevant parties shall ensure that medical exposures are justified.”* FANR should develop mechanisms to ensure that it is satisfied that justification is effectively performed for radiation practices within the medical sector. Given the prime care of the patient rests with the responsible physician, and as such the responsible physician will be determining any requirements for diagnostic and therapeutic radiation procedures for the patient, justification decisions properly rest with the responsible physician. As such, FANR’s responsibilities to ensure justification of medical radiation practices conducted within the medical sector could be effected by, for example, an audit of a sample of patient records at the time of inspection of the medical practice.

BSS 2011 GSR Part 3 interim Requirements 34 and 35 states : *“The government shall ensure that relevant parties are authorized to assume their roles and responsibilities and that diagnostic reference levels, dose constraints, and criteria and guidelines for the release of patients are established.”* and *“The regulatory body shall require that health professionals with responsibilities for medical exposure are specialized in the appropriate area and that they meet the requirements for education, training and competence in the relevant specialty.”*

The question of ensuring that persons who use radiation are competent to do so have to date been left with the respective Health Authorities. Currently, radiological medical practitioners are licenced to practise radiology and/or nuclear medicine by the Health Authority of Abu Dhabi, the Dubai Health Authority or the Ministry of Health. General medical licensing by those authorities applies to referring medical practitioners and to medical radiation technologists and medical physicists. Permitting somebody to use a radiation source on other persons within the context of providing medical care involves consideration of the radiation user’s competence to do so safely and in an optimized fashion. FANR’s interests lie merely with the radiation aspects of medical practices, not the entire scope of medical practices. For example, FANR should concern itself only with both patient and operator radiation safety aspects of vascular surgery using image intensifiers and any other radiation procedures that may develop in this field, not the entire practice of vascular surgery.

Dose constraints, and diagnostic reference levels and advice for carers and comforters should be developed in consultation with stakeholder consultation.

Questions pertaining to the regulation of medical research will necessarily require clarification with both the Health Agencies and the medical research sector. It is essential given the potentially significant doses involved for participants of medical research programmes and the involvement of medical ethics committees and given FANR’s exclusive

role in the regulation of radiation practices throughout the UAE that FANR clarify how research approvals should work with all affected parties so as to provide clarity for the medical research sector and to ensure that FANR’s legal responsibilities are addressed appropriately in this area.

BSS 2011 GSR Part 3 interim Requirements 38 states that *“Optimization of protection and safety. Registrants and licensees and radiological medical practitioners shall ensure that protection and safety is optimized for each medical exposure.”* It is considered that FANR needs to ensure that regulated medical practices have measures in place to optimise exposures. An integral part of ensuring such is having medical imaging equipment performing in accordance with its technical specifications and with specific reference to Computer Tomography procedures actively pursue measures to work towards established diagnostic reference levels. The medical sector requires guidance as to what equipment performance is adequate from a radiation safety perspective, and FANR should consider developing a set of compliance requirements for the typical suite of medical imaging equipment and other radiation sources as part of efforts to assist medical practices to ensure patient dose optimisation.

BSS 2011 GSR Part 3 interim Requirements 41 states that *“Unintended and accidental medical exposures. Registrants and licensees shall ensure that all practicable measures are taken to minimize the likelihood of unintended or accidental medical exposures. Registrants and licensees shall promptly investigate any such exposure and, if appropriate, shall implement corrective actions. Investigation of unintended and accidental medical exposures...”*

It is considered that in order for FANR to be assured that unintended and accidental exposures are being properly investigated and lessons learned employed that FANR should develop a standardized reporting format for medical radiation incidents/accidents. (Such a reporting format should ideally be practical for wider application to the full suite of non-nuclear radiation activities so that FANR receives all incident/accident reports as the radiation regulator for the UAE so as to ensure FANR that accidents and incidents are being investigated by licensees).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>BASIS: IAEA BSS 2011 GSR Part 3 interim Reqs. 34 and 35: <i>“The government shall ensure that relevant parties are authorized to assume their roles and responsibilities and that diagnostic reference levels, dose constraints, and criteria and guidelines for the release of patients are established.”</i> and <i>“The regulatory body shall require that health professionals with responsibilities for medical exposure are specialized in the appropriate area and that they meet the requirements for education, training and competence in the relevant specialty.”</i></p> <p>BASIS: IAEA BSS 2011 GSR Part 3 interim Req. 38.: <i>“Optimization of protection and safety. Registrants and licensees and radiological medical practitioners shall ensure that protection and safety is optimized for each medical exposure.”</i></p> <p>BASIS: IAEA BSS 2011 GSR Part 3 interim Reqs. 40.: <i>“Release of patients after radionuclide therapy. Registrants and licensees shall ensure that there are arrangements in place to ensure appropriate radiation protection for members of the public and for family members before a patient is released following</i></p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>radionuclide therapy.”</i></p> <p>BASIS: IAEA BSS 2011 GSR Part 3 interim Reqs. 41.:<i>“Unintended and accidental medical exposures. Registrants and licensees shall ensure that all practicable measures are taken to minimize the likelihood of unintended or accidental medical exposures. Registrants and licensees shall promptly investigate any such exposure and, if appropriate, shall implement corrective actions. Investigation of unintended and accidental medical exposures.”</i></p>
R16	<p>Recommendation: The Government of the UAE should ensure, with respect to the specific requirements of IAEA BSS 2011 GSR Part 3 interim:</p> <ul style="list-style-type: none"> • establish a set of diagnostic reference levels; • ensure that, as a result of consultation between the health authority, relevant professional bodies and the regulatory body, the following are established: <ol style="list-style-type: none"> a) Dose constraints to be fulfilled for exposures of carers and comforters, and volunteers participating in a programme of biomedical research; b) Criteria and guidelines for the release of patients who have undergone therapeutic procedures using unsealed sources or patients who still retain implanted sealed sources.
S30	<p>Suggestion: FANR should consider developing a standardized reporting format for radiation incidents/accidents.</p>
S31	<p>Suggestion: FANR should consider developing a set of compliance requirements for the typical suite of medical imaging equipment and other radiation sources as part of efforts to assist medical practices to ensure patient dose optimisation.</p>

11.3. RESPONSIBILITIES OF REGISTRANTS AND LICENSEES SPECIFIC TO MEDICAL EXPOSURE

The need to ensure that no person incurs a medical exposure unless there has been an appropriate medical referral rests with the medical practitioner who assumes responsibility for the medical care of the patient, including radiation safety of the patient. The requirement for FANR to ensure that medical exposures have been properly referred and that the responsible treating physician is aware of their responsibilities in this regard was observed during the inspection to occur as an integral part of the discussions between FANR and the respective medical institution. Given the scope of FANR’s quickly expanding responsibilities, it is felt that this aspect of medical radiation safety is being addressed adequately at this point in time. FANR-REG-32 reflects the requirement of GSR Part 3, para. 3.150-3.153.

11.4. JUSTIFICATION OF MEDICAL EXPOSURE

FANR-REG 32 reflects the requirement of GSR Part 3, paragraph 3.154-3.160. The justification of medical radiation activities is determined by the responsible physician providing the clinical care to the patient. To this end, FANR should satisfy itself that there exists a trail of documented evidence of such a decision so as to demonstrate the medical justification. Such would be adequate for the normal clinical environment.

Research on humans using ionising radiation presents challenges for FANR, as it is generally held that medical exposures outside of the normal requirements of treatment or diagnosis for clinical purposes lies in the area of medical research. Research would be expected to be assessed by an Ethics Committee with direct oversight of the ethical aspects of the research. It would be expected that in the future FANR would approve such research via a FANR licence and the development of processes for this to occur is suggested.

11.5. OPTIMIZATION OF PROTECTION AND SAFETY

Design considerations

FANR-Reg-24 Article (34),(2) reflects the design considerations in GSR Part 3, paragraph 3.161. It is not clear how such an approach translates to non-nuclear radiation activities. For example, verification of shielding by ensuring the proposed shielding performance is met is not actively undertaken by FANR, and it is considered that the current practice where Health Authorities are issuing licences might cloud this matter as to who is perceived to be responsible for such approvals at the design stage. The recent approval of a linear accelerator installation for oncology purposes by FANR prior to any physical inspection of the facility should not be repeated.

Operational considerations

FANR-Reg-24 Articles (34)(3) to (6) reflect the operational Considerations in GSR Part 3, paragraphs 3.162-3.165. Observations made during inspections indicate that regulated entities are cognisant of the requirements to monitor occupational radiation exposure and ensure doses are both optimised and kept below relevant regulatory dose limits. The role of FANR is to ensure this continues.

Calibration

FANR-Reg-24 Article (35) reflects the calibration requirement of GSR Part 3, paragraph 3.166. There are some private sector service providers that assist medical radiation activities with broad quality assurance matters and equipment maintenance. Equipment has been, to date, accredited via the standards of the country of origin. There are no specific equipment compliance requirements currently in place that are consistently applied throughout the Emirates. The UAE accepts the ISO and IEC standards, however it is not specified by FANR which standards are applicable or appropriate (Articles 18(b) and 34 of FANR-Reg-24 refer). A first step of clearly stating which ISO and/or IEC standards are appropriate would provide significant clarity to the medical sector. The chronic shortage of suitably trained and qualified medical physicists is noted. There is a need for an increased workforce in this area, and by providing clear requirements mandates via the legislation and/or as conditions of licence FANR can drive the medical sector to ensure adequate expertise is available to them to ensure radiation safety of equipment and activities at the operational level.

Dosimetry of patients

FANR-Reg-24 Article (36) reflects the dosimetry of patients requirement of GSR part 3, paragraph 3.167. It was observed that compliance with this requirement is established during the FANR inspection procedures.

Diagnostic reference levels

FANR-Reg-24 Article (37) reflects the diagnostic reference levels requirement of GSR part 3, paragraph 3.168, and FANR advise that this matter shall be considered by the Radiation Protection Committee. It is felt that the composition of the Radiation Protection Committee is such that all interested parties are represented and that FANR is well placed to develop DRLs in the future.

Quality assurance for medical exposures

FANR-Reg-24 Article (38) reflects the quality assurance for medical exposure requirement of GSR Part 3, paragraphs 3.169-3.171. It was observed that compliance with this requirement is established during the FANR inspection procedures.

Dose constraints

FANR has advised that they have not to date included the requirement on dose constraints in GSR, Part 3, paragraphs 3.172 and 3.173. FANR advises that this will be considered and reviewed by the Radiation Protection Committee in the future.

11.6. PREGNANT WOMEN AND BREAST-FEEDING WOMEN

FANR-Reg-24 Article (39)(1) of FANR-REG-24 places a general requirement on the licensee to ensure that procedures are in place to afford radiation protection in cases where a woman may be pregnant or is breast-feeding. Articles (39)(2) to (39) (4) reflect the detail in GSR Part 3, Paragraphs 3.174 to 3.176. It was observed during inspection with FANR that appropriate measures are in place to advise both patients and staff of pregnancy issues and that such patient protection requirements were confirmed with medical practitioners at the inspected institution.

11.7. RELEASE OF PATIENTS AFTER RADIONUCLIDE THERAPY

FANR-Reg-24 Article (40)(1) of FANR REG-24 imposes a requirement on licensees in the terms of Requirement 40. Article (40)(2) of FANR REG-24 reflects paragraph 3.177 of GSR, Part 3 with the exception of a reference to established release criteria. It was observed during medial radiation practice inspections that there are site-specific patient release criteria that, based upon subsequent discussion, reflect international best practice, however such practice varies dependent upon the background of professional medical physics and or oncology staff within the practice.

11.8. UNINTENDED AND ACCIDENTAL MEDICAL EXPOSURES

FANR-REG-24 Article (41) ((1) and (2) of FANR-REG-24 place requirements on the licensee in the terms of Requirement 41 and paragraph 3.178 of GSR Part 3. Articles (41),(3) and (4)

reflect paragraphs 3.179 and 3.180 of GSR Part 3. FANR-REG-24 also requires notification and reporting to the Ministry of Health as well as FANR. To date, FANR advises that it has not received any reports of unintended or accidental medical exposures. It is inconceivable that there have been no such accidental exposures. It is considered that such reports would be provided to Health Authorities.

11.9. REVIEWS AND RECORDS

Fanr-Reg-24 Article (42) of FANR-REG-24 places a general requirement for reviews and records on the licensee. Article (42), (2) refers to paragraph 3.181 of GSR Part 3 and Articles (42),(3),(5) refer to paragraphs 3.182 to 3.184 of GSR Part 3. FANR specifies in FANR-REG-24 a period of 5 years for the keeping of these records. Compliance with this requirement was observed to be verified through practical application at the time of inspection of the FANR inspection instructions (checklist) for protection for medical exposure.

12. THEMATIC AREAS: OCCUPATIONAL RADIATION PROTECTION

The United Arab Emirates has established a legislative framework for occupational exposure, in accordance with Requirement 2 of GSR Part 1. The implementation of this framework has been developed through the publication of the Nuclear Law and the establishment of the Federal Agency for Nuclear Regulation (FANR). FANR has produced the following regulations and guidance material in the areas of occupational radiation protection:

- Regulation for Management Systems for Nuclear Facilities (FANR-REG-01)
- Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities (FANR-REG-04)
- Regulation for Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities (FANR-REG-11)
- Regulation for Emergency Preparedness for Nuclear Facilities (FANR-REG-12)
- Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than in Nuclear Facilities (FANR-REG-24)
- Regulatory Guide Radiation Safety (FANR-REG-007)

FANR-REG-24 ‘Basic Safety Standards for Facilities and Activities using Ionizing Radiation other than Nuclear Facilities’ includes a number of Articles specifically directed towards occupational exposures.

Although it is acknowledged that the material produced reflect mainly the requirements as established in the GSR Part 3 and that many actions for improving the regulations are on-going, there is still a need to complete the work done in order to increase the level of compliance with the Standards developed by the IAEA for the occupational exposure, as part of the planned exposure situations.

12.1. RESPONSIBILITIES OF THE REGULATORY BODY SPECIFIC TO OCCUPATIONAL EXPOSURE

Provisions made in FANR-REG 24 comply with Requirement 19 of GSR Part 3. The responsibilities of licensees are established with regard to the enforcement of the regulations and, in particular, concerning the optimization of radiation protection, dose limits for the workers, the need for FANR to receive and assess the documents provided by the applicants. Use of constraint in the optimization of radiation protection is required. The value of the constraint for occupational exposure is established by licensees and does not have to be approved by the regulatory authority. Provisions for the implementation of a monitoring programme are made.

FANR is conducting ‘workshops’ with licensees to emphasize the requirements of FANR-REG-24 and to draw attention to general lessons arising from FANR inspections. Explanatory material is available in the FANR-REG 007.

Concerning the licensing process, the applicants should include a description of a radiation protection programme covering the activity which is the subject of application. For the new

applications, this is mandatory information, whereas previous licences were granted without necessarily requiring evidence of a radiation protection programme.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	BASIS: GSR Part 1 Req. 14.: <i>“The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and international peer reviews, and promote international cooperation to enhance safety globally”.</i>
S32	Suggestion: FANR should consider within two years an IAEA Occupational Radiation Protection Appraisal Service (ORPAS) mission in order, among other goals, to define an action plan for further development of the infrastructure for the monitoring of occupationally exposed workers.
(2)	BASIS: GSR Part 3. Req. 24.: <i>“ Employers, registrants and licensees shall establish and maintain organizational, procedural and technical arrangements for the designation of controlled areas and supervised areas, for local rules and for monitoring of the workplace, in a radiation protection programme for occupation exposure”.</i>
GP9	Good practice: The provision of guidance material on the protection and the safety of workers and for the completion of the application for a licence is acknowledged as a positive indicator of a high level of commitment from the FANR in order to foster the implementation of the regulations concerning the occupational exposure.

12.2. REQUIREMENTS FOR MONITORING AND RECORDING OF OCCUPATIONAL EXPOSURE

Provisions for the individual and workplace monitoring are made in the FANR-REG-24. Responsibilities of the licensees regarding dose records keeping and for their transmission on a regular basis to FANR are also indicated.

The monitoring frequency is typically one or two months but for some activities, it can be set to three months for low occupational dose. It is well advised that higher monitoring frequencies as mentioned in the FANR-REG 007 (Art.29.2.b) are based on clear evidence using the results from dose measurements. Reporting of dose records to the regulatory authority need to be done after each time period of six months. A study of the set-up of a central dose register has been undertaken but no action has yet been initiated for its implementation.

Article (24) of FANR-REG-24 requires use of ‘approved/licensed dosimetry services that operate under an adequate quality management system. FANR does not provide approval or authorisation of service providers for individual monitoring. In its regulatory guide RG-007, FANR has indicated that it relies on formal approval by recognized radiological health authorities, such as approval by the Health and Safety Executive in the UK, or accreditation by the National Voluntary Laboratory Accreditation Program (NVLAP) in the United States. The present arrangements cannot be considered as complying fully with the requirements of the GSR-Part 3, 3.73, (c). Moreover, operation of NPP’s requires the permanent availability of

efficient services providers for monitoring of the workers and the environment. In particular, monitoring in case of internal contamination requires the availability of laboratories which have to provide, on a short term, reliable results for the dose to e.g. contaminated workers. It should be strongly recommended that FANR considers its responsibilities for ensuring, for whatever the facility and for routine and abnormal situations, the availability of accredited/approved services providers allowing FANR to fulfil its obligations as stated in the Nuclear Law, Art. (5) (10,12) and as required in the GSR-Part 3,3.73. Achievements of these objectives require that FANR makes clear provisions in the regulations on the conditions for services providers to be accredited/approved/accepted by FANR. Licensees should also be encouraged to use such accredited services providers.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	BASIS: GSR Part 3, Req.20,” <i>The regulatory body shall establish and enforce requirements for the monitoring and recording of occupational exposures in planned exposure situations</i> ”;
S33	Suggestion: FANR should consider strengthening its efforts to develop a national dose register for occupationally exposed workers.

12.3. RESPONSIBILITIES OF EMPLOYERS AND LICENSEES FOR THE PROTECTION OF WORKERS

FANR’s requirements apply directly only to licensees and FANR does not distinguish between ‘employers’, ‘registrants’, or ‘licensees’.

Article (20) of FANR-REG-24 establishes a basic requirement on the responsibility of the licensee for the protection of workers against occupational exposure and that he shall ensure that protection and safety is optimised and occupational dose limits are not exceeded. Article (20)(3) requires that non-occupationally exposed workers receive the same level of protection as members of the public.

FANR-REG-007 offers guidance on optimisation of protection and safety, the setting of dose constraints and investigation levels. These responsibilities are clearly indicated and particular attention is paid to the optimization of the dose as well as to workers exposed to radiation from radiation sources within activities not directly related to their work. FANR-REG-007 provides additional guidance for ensuring compliance with the requirement. Special provisions are also made concerning the transmission of dose records when workers are appointed by a new employer.

12.4. COMPLIANCE BY WORKERS

As already mentioned, FANR requirements may only be imposed on licensees by means of the Nuclear Law, regulations and licence conditions. FANR-REG-24, Article (20) indicates that “arrangements are made to facilitate consultation and cooperation with workers with respect to Protection and Safety...”, but there is no clear indication concerning the duties of the workers. It is recommended that FANR regulations are completed by additional

requirements complying with the requirement 22 in GSR-Part 3 which requires that “Workers shall fulfil their obligations and carry out their duties for protection and safety”.

Inspection procedures don’t make any provision for checking, through interviews, the awareness of workers on issues such as duties, prior information and/or training,

It is also advised to make provisions for the Protection and Safety for the contractors.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(3)	BASIS: GSR-Part 3, Req.22:” <i>Workers shall fulfil their obligations and carry out their duties for protection and safety”.</i>
R17	Recommendation: FANR should make provision for requirements stating clearly the responsibilities and duties of the workers for the implementation of the protection and the safety measures for themselves as well as for the other workers.

12.5. COOPERATION BETWEEN EMPLOYERS AND REGISTRANTS AND LICENSEES

Bearing in mind the fact that the FANR does not distinguish between ‘employers’, ‘registrants’, or ‘licensees’, there are no regulations ensuring conformity with Requirement 23 of GSR-Part 3.

Whatever the decision within UAE for introducing such a distinction, cooperation between different employers has to be emphasized. For example, operation of power plants will require the involvement of contractors for maintenance and repair activities which will necessitate transfer of information on dose monitoring and dose records. When occupationally workers are performing their activities in different workplaces, for different employers, arrangements will also have to be made in order to ensure that all requirements regarding their protection and safety are complied with.

The existing regulations don’t provide clear requirements concerning the arrangements to be made concerning the protection and safety of workers who have to work in different facilities, or that are exposed to ionising radiation not under the control of their employer.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(4)	BASIS: GSR-Part 3, Req.23, ” Employers and registrants and licensees shall cooperate to the extent necessary for compliance by all responsible parties with the requirements for protection and safety”.
S34	Suggestion: FANR should consider the establishment of administrative rules concerning the implementation of a radiation protection and safety programme, in particular for those workers who performed their activities in different facilities where radioactive sources are present or where activities involving regulated materials have to be done.

12.6. ARRANGEMENT UNDER THE RADIATION PROTECTION PROGRAMME

FANR has initially adopted a pragmatic approach concerning the mandatory provision by the applicant of information on the radiation protection programme to be implemented for the activity to be licenced. Licence was delivered under conditions. The reason was that the first priority was given to ensuring the identification and a preliminary control on activities to be regulated.

FANR regulations provide for arrangements regarding the radiation protection programme to be implemented for activities involving the use of radiations sources or for activities performed in supervised/controlled areas. Additional guidance is also provided in FANR-REG-007.

Applicants are requested to provide information on the radiation protection programme to be implemented and the inspections procedures contains provisions for checking the implementation of such programme.

As it appears from inspections reports, there continues to be a lack of licensee compliance with this requirement. Although efforts have been undertaken by the FANR to oblige all new applicants to develop and implement a protection programme, it is strongly recommended that FANR requires that all licensees comply with the requirement within a defined period of time.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(5)	BASIS: GSR-Part 3, Req.24, Employers, registrants and licensees shall establish and maintain organizational, procedural and technical arrangements for the designation of controlled areas and supervised areas, for local rules and for monitoring of the workplace, in a radiation protection programme for occupational exposure”
S35	Suggestion: FANR should mandate all licensees that currently do not have a radiation protection programme to provide such a programme within a defined period of time.

12.7. ASSESSMENT OF OCCUPATIONAL EXPOSURE AND WORKERS’ HEALTH SURVEILLANCE

The licensing process addresses the need for assessment which is also checked through inspections. Useful explanatory material and guidance can be found in FANR-REG-007.

Reports on occupational exposure are provided on a regular basis (three months) by licensees and are analysed by FANR. As discussed in section 12.6, at the formulation of FANR, licences were issued without stressing on the need to provide these reports. At the present time, this assessment is performed for all new licence applications.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(6)	BASIS: GSR Part 3. Req.25: “Employers, registrants and licensees shall be responsible for making arrangements for assessment and recording of the occupational exposure and for workers’ health surveillance”.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S36	Suggestion: FANR should consider providing guidance for the assessment of occupational exposure to ionizing radiations to be performed for all exposure pathways and guidance on how to assess the total effective dose.
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12.8 RESPONSIBILITIES OF THE REGULATORY BODY SPECIFIC TO OCCUPATIONAL EXPOSURE

Information and training are considered in the FANR regulations as the responsibility of the licensee. FANR-REG-007 indicates that the Authority endorses the training recommendations found in the IAEA document “Training in Radiation Protection and the Safe use of Radiation Sources”, Reports Series No. 20. This document provides training recommendations by job category and by practice. The job categories include Qualified Experts, Radiation Protection Officers, Occupationally Exposed Workers and qualified operators. The activities include diagnostic radiology, gauges, industrial radiography, irradiators and accelerators, nuclear medicine, radiotherapy and well logging. The main topic to be covered is described in the FANR-RG-007 as well as the obligation for retraining.

Whether FANR provides detailed guidance concerning the training and expertise required for the Radiation Protection Officer, there is no information for operators and workers on the field. Inspections confirm that licensees are not always informed about the existing training courses or services providing radiation protection course. In order to foster an homogeneous level of protection of the workers within the country, FANR should address this issue in its guidance material.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(7)	BASIS: GSR Part 3, Req.26,” <i>Employers, registrants and licensees shall provide workers with adequate information instruction and training for protection and safety”.</i>
S37	Suggestion: FANR should consider providing information to licensees on existing training material or on training service providers for workers subject to occupational exposure.

12.9. CONDITIONS OF SERVICE

Article (28)(1) of FANR-REG-24 states that licensees shall not offer benefits as a substitute for the protection and safety measures required by the regulation. Requirement 27 in GSR-Part 3 considers for example the need for suitable alternative for workers who may no longer be employed as subject to occupational exposure. This is not considered in the FANR regulations

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(8)	BASIS: GSR-Part 3, Req.27.:”Employers, registrants and licensees shall not offer benefits as substitutes for measures for protection and safety
R18	Recommendation: FANR should review and complete the existing requirement addressing the conditions of service as described in the GSR Part 3, 3.111 and 3.112.

12.10. SPECIAL ARRANGEMENTS

FANR regulations contain provisions following closely para. 3.113 to 3.116 of GSR Part 3. Concerning the responsibilities of the licensee on the special arrangements needed for female workers necessary for the protection of the embryo and foetus and/of breast feeding infants, and the protection of people under 18 years of age, from exposure to radiations.

The need for appropriate information to the female workers, importance of notifying the employer, no exclusion from work and implementation of adequate protective measures when pregnancy is notified are covered.

No person under the age of 16 years is allowed to be exposed to occupational exposure.

Compliance with these requirements is checked, as appropriate, during the inspections.

13. THEMATIC AREAS: SAFETY AND SECURITY OF RADIOACTIVE SOURCES

Assessment against the provisions of the Code of Conduct on the Safety and Security of Radioactive Sources

Basic principles: general

The UAE has established through the Nuclear Law, and in particular FANR-REG-24 and FANR-REG-23, the measures necessary to ensure that radioactive sources are safely managed and securely protected during their useful lives and at the end of their useful lives. In association with the UAE Customs and with international cooperation, FANR works to ensure that sources enter the country to be used only by users that have submitted an application for a licence and been granted such a licence with conditions attached that are appropriate to the source(s) and its (their) intended application. Through the licence conditions and inspections carried out by FANR, and not least by the users own documentation, a safety culture and security culture is fostered.

The UAE's national legislative and regulatory system of control over sources is described in detail in FANR responses to a number of modules in the self-assessment included in the ARM. The legislation and regulatory system of control imposes firm requirements over the management and protection of radioactive sources as specified in the provisions of paragraphs 7 and 8 of the Code of Conduct (CoC). FANR's intention is to inspect each radiation user within one month of their receiving a licence under FANR-REG-24. 'Pre-inspections' are being made to those radiation users of Categories 1, 2 and 3 to which FANR-REG-23 will apply.

Training and technical aspects of FANR

FANR has provided their staff with some training and radiation measuring instruments suitable for the purpose of managing radioactive sources; searching for and securing missing sources; and assisting in the event of an accident or malicious act involving a radioactive source. Personal dosimeters are also used by FANR staff. Other services, including environmental monitoring and a secondary standard laboratory (enabling the calibration of radiation monitoring equipment), are planned to be introduced by FANR in accordance with the CoC paragraph 9. In the meantime, if the latter services are required urgently, FANR confirmed that the resources needed would be obtained from an appropriate agent such as a commercial organisation. Such arrangements will enable FANR to search for and secure orphan sources in the context of the development of their national strategy.

Training has been a priority with FANR staff and other agencies attending a workshop (February 2011) on the 'Search and Secure Activities for Orphan Radioactive Sources' organized by FANR and hosted by the United States Department of Energy. Later in 2011 FANR also hosted a workshop explaining the provisions of FANR-REG-23 to an open audience of licensees. An "advanced course" is planned for early 2012 that will essentially be a realistic exercise testing the capabilities. The advanced course should endorse the view that arrangements for the training of law enforcement and emergency services organizations are being addressed in the UAE in accordance with the CoC paragraph 10.

Systems of control

The Nuclear Law gives FANR the power to establish a national register of radioactive sources. FANR is establishing such a register based on the Regulatory Authority Information System (RAIS) database format which is being populated with data as licences are drawn up. Using the RAIS database aids consistency with the goal of international harmonization as

mentioned in CoC paragraph 11. FANR has been in discussion with IAEA on customising RAIS to expand the range of information stored and the detail in analyses available. The UAE has recognized the need to protect particular sources against loss of control and malicious acts and has prepared FANR-REG-23 to address the security requirements to be implemented to protect the most dangerous and vulnerable radioactive sources during their life cycle, in particular during their transportation. These provisions apply security arrangements to the aspects to which CoC paragraph 17 refers.

As stated in the Advance Reference Material, the UAE is party to the Convention on the Early Notification of a Nuclear Accident; and the IAEA Illicit Trafficking Database (ITDB) for which FANR has been designated as the UAE point of contact. For example, FANR provided a report to IAEA when a source was declared missing, satisfying the provisions of CoC Paragraph 12.

As described above, by organizing workshops and placing information on their website, etc. FANR has strived to promote awareness among industry, health professionals, the public and government bodies about the safety and security hazards associated with orphan sources. Some major metal dealers in the UAE are said to have installed portal monitors to detect radioactivity on scrap materials entering their site(s). FANR have been called to investigate several alerts from these operators and found the source to have been naturally occurring radioactive material (NORM) associated with the oil industry. FANR have decided not to exercise regulatory control over NORM at this time and the contaminated items were turned away by the scrap metal dealers. FANR is conscious of the fact that there are many small businesses dealing in scrap metal that do not monitor it for radioactivity. Essentially, FANR's regulations address suppliers, users and those managing disused sources and enforce responsibilities for safety. A project has started to install in the UAE a network of remotely placed detectors that will continuously monitor the environment and provide reports to FANR (see Chapter 10).

There are no source manufacturers in the UAE but it is national policy and practice that sealed sources at the end of their lives should be returned to the manufacturer for reuse or recycling as referred to in CoC paragraphs 13, 14 and 15.

Emergency planning, preparedness and response capabilities

FANR has assessed the domestic threat to and vulnerability of the UAE with respect to the variety of orphan sources within its territory. Consequently, there are emergency response arrangements that are not identical in each of the Emirates but are underpinned by the provisions of FANR. The arrangements combine locally available resources and the federal provisions of FANR, NCEMA and others. For example, the existence of the Critical National Infrastructure Agency aids emergency preparedness within Abu Dhabi. Equipment is being standardized and emergency preparedness at the Federal level is being made consistent by FANR's development of a range of written procedures covering Emergency Contact, Emergency Response and Emergency Communications. A final draft of an *Orphan Source Procedure* is scheduled for completion at the end of April 2012.

As the UAE works rapidly towards establishing uniformity of emergency preparedness and response capability, the IRRS Team understands that mutual aid between UAE local authorities will be provided as needed to enable them regain control and respond to malicious acts involving radioactive sources as specified by CoC paragraph 16. Indeed, FANR has practical experience of dealing with orphan sources. FANR has taken custody of about 10 such sources that are being held safely on FANR's behalf at a number of commercial premises as enquiries are made into the sources' details, histories and owners. The recent response and recovery of a "lost source" was coordinated by FANR and involved several agencies.

In accordance with their emergency procedures FANR has established an emergency contact facility. A mobile telephone arrangement is coordinated by an Emergency Specialist and monitored continuously throughout the year by duty officers. The number is available to the public on the FANR website and is distributed to all government agencies including first responders. Accommodation has been designated in FANR's offices that is to be equipped as an emergency operations centre to coordinate significant events.

The UAE is conforming to a high degree in following the provisions of the Code of Conduct and, to the extent it currently applies, the associated Guidance on the Import and Export of Radioactive Sources.

FANR technical capabilities and operations create the impression that their operations are already of a standard to declare compliance with the Code of Conduct and Guidance on the Import and Export of Radiation Sources. However, the objective is to make such a declaration by the end of 2012.

Legislation and Regulations

The legislation and regulations applied under the provisions of the Nuclear Law, FANR-REG-24 and FANR-REG-23 are assessed in detail elsewhere in this IRRS report. In particular the legislative and regulatory system addressing matters covered by the CoC Paragraphs 18 and 19 are discussed and described extensively in Modules 1 and 3 of this IRRS report. The application of the regulatory infrastructure is also covered with regard to work with sealed sources in the Control of Medical Exposure (Chapter 11) and Occupational Radiation Protection (Chapter 12) modules. Regarding the security of radioactive sources in the UAE, FAN-REG-23 addresses the relevant requirements and these matters are covered in this chapter in terms of the requirements of the Code of Conduct.

Regulatory Body

FANR has regulatory responsibility for both safety and security of radioactive sources. The safety requirements are dealt with by FANR-REG-24 and security requirements are dealt with in FANR-REG-23. The latter regulation requires a security plan to be approved by FANR for licensees with Category 1-3 radioactive sources; with the plan to achieve defined security objectives for each category to reflect a graded approach. A transport security plan is also required and there are administrative requirements, including background checking. FANR's overall response to the detailed matters covered in the CoC paragraphs 21-23 are discussed in detail in the relevant parts of Modules 3-10 of the ARM and Chapters 3-10 of this IRRS report.

The Import and Export of Radioactive Sources

Provisions exist for FANR to establish memoranda of understanding (MoU) with other government agencies. MoU Numbers 12, 15 and 16 define working relationships between FANR and the Federal Customs Authority (FCA), Dubai Customs and the Export and Import Committee respectively.

Radioactive sources may be neither imported nor exported unless the radiation user proposing to import/export is in possession of an appropriate licence. Working closely with the relevant Customs agencies, FANR exercises strong control over the import and export of radioactive sources. The import and export of regulated material are Regulated Activities under the Nuclear Law and FANR (with Customs) requires that it issues a permit before import or export may take place.

In determining whether to allow an import of any source, FANR checks the requested permit to establish that the end user of the imported source is licenced to use such sources and that the import is consistent with the allowed inventory of the licensee. The majority of exports

from the UAE are of decayed industrial radiography sources being returned to the manufacturer, most often in the United States or South Africa. The activities of decayed sources will have reduced below the definition of Category 2 sources by the time of their export. Well-logging companies in the UAE seek to transfer their sources into and out of the UAE to and from their associated companies in neighbouring countries. These are at most Category 3 sources.

FANR-REG-23 enhances the requirements to be satisfied before FANR will grant radiation users a licence to conduct regulated activities using any Category 1, 2 or 3 sources. In particular each licensee must formulate, submit to FANR for approval and implement a Security Plan and a Transport Security Plan. These Plans must be integrated with the licensee’s overall management system.

Each licensee will implement a security system including measures to impede any attempted Security Breach and detection measures for the discovery and assessment of any attempted or actual Security Breach. In addition, response measures are required to be implemented following any Security Breach, including the licensee cooperating with and assisting law enforcement personnel to locate and recover any Category 1, 2 or 3 source that has been stolen or removed from the licensee’s facilities without the written approval of the FANR. These requirements implement the requirements of the CoC paragraphs 23 and 24.

Each licensee must obtain written approval from FANR before transferring or disposing of any Category 1, 2 or 3 source, satisfying CoC paragraph 25. It is reiterated that there are no source manufacturers in the UAE but it is national policy and practice that sealed sources at the end of their lives be returned to the manufacturer thus CoC paragraph 26 is both relevant to the UAE and complied with.

The IRRS Team concurs with the FANR statement in the ARM that CoC paragraph 27 is not applicable to the UAE as it does not manufacture sources.

The UAE has adopted and FANR enforces IAEA TS-R-1 as the applicable transport regulations. FANR works with customs and border authorities to ensure continuity of control during transit and transshipment. The requirement of FANR-REG-23 (3) for the licensee to implement a Transport Security Plan meeting criteria given in Appendix B(2) for Category 1, 2 and 3 sources, adds further reassurance that the transport requirements will be met and CoC paragraphs 28 and 29 will be satisfied.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	<p>CoC Paragraph 9: <i>Every State should ensure that appropriate facilities and services for radiation protection, safety and security are available to, and used by, the persons who are authorized to manage radioactive sources. Such facilities and services should include, but are not limited to, those needed for:</i></p> <p style="margin-left: 20px;">(a) <i>searching for missing sources and securing found sources;</i></p> <p>CoC Paragraph 11: <i>Every State should establish a national register of radioactive sources.....For the purpose of introducing efficiency in the exchange of radioactive source information between States, States should endeavour to harmonize the formats of their registers.</i></p>
S38	<p>Suggestion: FANR should inform IAEA about the proposed developments of RAIS so that other Member States may similarly benefit from useful improvement.</p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S39	Suggestion: The Government of the UAE should ensure that orphan sources are deemed to be evidence unless or until FANR makes the decision not to prosecute the legal owner of the regulated material.
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14. POLICY ISSUES

14.1. RESPONSE TO THE FUKUSHIMA ACCIDENT

In considering FANR's response to the Fukushima accident it is important to keep in mind that there are no operating Nuclear Power Plants in the UAE and none under construction. Thus, FANR's immediate response to the accident was to monitor the situation and advise other government agencies on the event and its potential implications to the UAE, and to inform the public via its web site. Since there is considerable distance between the United Arab Emirates and Japan, there was no likelihood that releases from Fukushima would threaten the public in the UAE.

FANR established an internal task force to coordinate actions to be taken to further address the implications of the Fukushima accident. The activities of that task force include a request to ENEC for a special report supplementing the PSAR on the Fukushima lessons learned, collecting pertinent information on applicable lessons learned for the UAE and the Braka NPP, reviewing the existing FANR regulatory framework, and supporting outreach efforts by FANR both nationally and internationally.

FANR has activities underway or planned that touch to varying degrees each of the IRRS review modules. Some key activities include:

Continued development of national preparedness and response plans for radiological emergencies through collaboration between FANR and the competent authorities, notable the National Crisis and Emergency Management Agency.

Active engagement with the international community through various IAEA activities, and through a formal technical cooperation and information exchange arrangement with the regulatory authority in Korea, and through interactions with the regulatory bodies in the United States of America and the United Kingdom. Additionally, staff from one of the TSO's supporting FANR are heavily involved with IAEA activities related to Fukushima and this provides yet another source of information FANR can draw upon in assessing lessons learned. FANR's special task force established to assess the actions that it should take to follow up on the lessons learned from the Fukushima accident, including a review of the regulatory framework and system, is one aspect of its overall self-assessment process.

As noted, FANR has issued a letter to ENEC requesting that by 31 December 2011 ENEC submit a special report providing a thorough assessment of the NPP design in the context of identifying any vulnerabilities of the design to external events. FANR's guidance is largely based on the approach set out in the joint declaration of the European Nuclear Safety Regulators Group (ENSREG) and the European Commission issued on 13 May 2011, which was initially developed by the Western European Nuclear Regulators Association (WENRA). FANR's review of the ENEC report will examine safety matters for the proposed plant including defence in depth, consideration of low probability, beyond design-basis accidents (in particular extreme external hazards), consideration of combination of events and common

cause failures such as extended loss of ultimate heat sink and loss of essential power supply, and severe accident management issues for the multi-unit site, along with consideration of the safety of spent fuel storages.

FANR plans to complete by April 2012 a review of its current safety regulations and guides for NPPs, to determine whether changes are needed in view of the Fukushima accident.

FANR is continuing the development of the emergency preparedness programme in collaboration with the licensee and the competent authorities in the State. Improvements are planned to enhance the country's capabilities to response to emergencies like the one in Fukushima Daiichi. Examples of measures being proposed include:

- Securing additional protective equipment in preparation for prolonged emergencies;
- Securing countermeasures for protecting maintenance workers;
- Reinforcing education and training for severe accidents;
- Reinforcing radiological emergency exercises;
- Amending the emergency plan to include combined emergency of both a large-scale natural disaster and a nuclear accident;
- Amending the information disclosure procedure in the event of a radiation emergency;
- Reinforcing the environment monitoring for devising a means for securing necessary information in the event that there is a prolonged loss of electrical power;
- Segregation of duties between relevant central and local organizations, etc.;
- Reinforcing the performance of emergency alarm facilities;
- Adequate identification and forecast of the effect of released radioactive materials; and
- Evaluating protective measures for residents who live beyond the emergency planning zone.

The team and FANR benefitted from the discussions regarding the response to the Fukushima accident. These discussions reinforced the broad range of activities FANR have underway, looking at both the short and long-term actions. While the team offered a number of suggestions that might further support FANR's actions there were no major concerns or weaknesses identified in their response.

14.2. CAPACITY BUILDING AND SUSTAINABILITY

FANR's manpower is currently 128 and will grow to 220+ by the end of 2012. An aggressive recruitment campaign, supported by agreements with international recruitment agencies, is underway to recruit 80% of the total manpower by the 3rd quarter of 2012.

FANR's organizational structure is constantly reviewed and updated, especially during annual budgeting, so that the organization remains dynamic, accommodates arising needs, and implement short/long term strategies. For example, for 2012 budget, the position of Director of Management Systems and Corrective Action was added.

The current level of Emiratis is 53% with the majority of the Emiratis occupying entry-level positions, meeting the minimum requirements of holding a degree in a science field and with no relevant experience. FANR's capacity building programme aims to raise the skills and experience of all staff, especially Emiratis in order to guarantee sustainability of the UAE's Nuclear Programme and FANR regulatory activities. FANR Staff are undertaking a combination of short/ long term learning activities and degrees in various international organizations, customized to give/ raise their competency levels so that they can perform their duties as well as share/ transfer knowledge to new comers as appropriate.

Specialists from 22 nationalities work within FANR with Emirati cadre to develop and sustain FANR's regulatory efforts. This mixture allows an influx of nuclear/ regulatory expertise from around the world to enhance processes, procedures, and overall culture and mind-set.

Whilst the Team understands that there are plans for recruitment governed by internal planning processes, the Team considers it necessary that FANR and the relevant stakeholder organisations establish action plans for long-term 'Emiratisation', recognizing that full Emiratisation is not a realistic or even desirable target, considering that the access to expertise from abroad is a valuable contribution to the national system. The team believes that with time and at a rate that does not jeopardize safety, more high level technical positions inside the FANR should be held by Emiratis in order to sustainably keep facilities, including the Braika NPP, in a safe state. For this purpose it would be wise to set a long term target for achieving and maintaining a reasonable percentage of Emiratis at all levels to ensure safety.

During the visit to the Emirates Nuclear Energy Corporation (ENEC) the team has learned that for at least the first decade of operation it is foreseen to have at more than a half of the future plant operating team filled with expatriates. To assure the long term sustainability of safe operation it would be wise to set a long term target for having the Emiratis at the sufficient number of key plant positions which would assure safe operation in any kind of circumstances.

Since the beginning of 2009 FANR & the Education & Training Department has been evaluating the Capacity Building needs of FANR staff, with a focus on creating and continuously developing the training programmes and options that will ensure the growth of skills and abilities of FANR's staff and especially the UAE nationals. In this regard, the following programmes have been developed:

In 2009 ENEC, FANR, and Khalifa University have launched a scholarship programme for UAE nationals was initiated to get degrees in Mechanical, Electrical and Nuclear Engineering both for the graduate and undergraduate level. The Students joined universities in the US, France and the UK. All UAE entities play a major role in this scholarship program as representatives from these entities are part of the interview and selection panel.

As part of organizational preparedness, FANR developed an in-house inspection qualification programme to prepare inspectors in all FANR authority areas as stated in the Nuclear Law, Article 25. The inspection programme is divided into three phases;

- 1) a programme of two weeks training to equip participants with the skills and knowledge required to be an inspector.
- 2) a programme of three days training conducted by the Ministry of Justice on judicial officer skills.
- 3) an inspection qualification committee reviews the qualification and the practical experience of the inspectors, interviews the inspectors and present the inspection code of conduct to the inspectors to be qualified before granting them the inspector ID cards

In order to ensure a knowledge transfer between experienced employees and young UAE national Engineers, The Education and Training Department has developed a mentoring programme. Within this programme, each UAE national is assigned to a mentor and a work plan is developed to cover the tasks the employee will be doing, the training programmes that need to be attended and the duration of each phase in the programme.

14.3. INVOLVEMENT OF THE REGULATORY BODY OF THE COUNTRY OF ORIGIN IN THE ASSESSMENT PROCESS FOR THE NNP PROGRAMME

FANR regulations have adopted the concept of REFERENCE PLANT in its licensing process. Since UAE will be using imported technology in its first nuclear power project, it would be beneficial to the regulatory body to establish good cooperation and receive some support from the vendor country.

To facilitate the use of safety information from the reference plant in Korea, FANR has established a technical cooperation agreement with the Korean Institute of Nuclear Safety. The agreement provides for exchanges of technical information as well as training and staff exchanges. The agreement was executed by the FANR Director General and the President of KINS and is administered by twice-yearly meetings of the management of each organisation.

This support should include the areas of:

- Review and Assessment
- Inspection
- Experience Feedback
- Training

In the execution of the agreement in the long term, FANR should ensure that current changes in the regulatory regime in Korea may affect the interface among the two parties and FANR should benefit from the regulatory effectiveness in Korea in the licensing regime regarding review and assessment and licensing of modifications.

The team has observed an instance where KINS appeared to be providing a service to ENEC. In this regard the team feels that FANR must be aware of any issues that might give rise to conflict of interests.

Use of regulatory body of country of origin safety evaluations

In undertaking the review and assessment of the construction licence application, FANR is taking appropriate advantage of the safety evaluations performed by the Korean regulator (KINS) for the reference plants in Korea (Shin Kori 3 and 4). FANR's objective in doing so is two-fold: to enhance safety through collaboration with Korean experts, and to maximise the efficiency of its review by focusing on those topics specific to the UAE.

Sections of the Preliminary Safety Analysis Report have been nominated either for a Category 1 review, namely an independent review by FANR, or a Category 2 review where the review is principally a matter of FANR taking ownership of the KINS review. The review categorisation is performed by the Licence Application Review Panel (LARP) chaired by the Director of the Nuclear Safety Department in accordance with the *Licensing Management Procedure*.

A Category 1 Review is assigned to any item of the SAR that meets any one of the following criteria or does not meet all the criteria for a Category 2 Review (below)

- 1. New technology with significant impact on nuclear safety;*
- 2. New findings (for example, from operating experience or research) since acceptance of the plant design by the Regulatory Body in the Country of Origin (RBCoO) with implications on nuclear safety;*
- 3. SSCs or operational activities contribute significantly to the facility's overall risk;*
- 4. Conditions (e.g. environmental, external hazards) specific to the UAE;*
- 5. Any other matters where the UAE design differs from the reference design.*

A Category 2 Review is assigned to any item of the SAR that meets all of the following criteria:

- 1. The documentation submitted by the applicant is adequate to the extent that the reviewer has sufficient information to assess topics 2 to 5 below.*
- 2. The submission demonstrates that the RBCoO's regulatory requirements associated with this item are consistent with and meet those of FANR.*
- 3. The technical basis used by the RBCoO to perform their review and assessment is clearly described and explained.*
- 4. With respect to the reference plant there is no design change with significant impact on nuclear safety.*
- 5. With respect to the reference plant there is no change in operational activities with significant impact on nuclear safety.*

A Map of all PSAR was elaborated identifying Category Review for each section (or subsection). About 60% CAT 2 and 40% CAT1 were identified and approved by a Licensing Application Review Panel in a Licensing Application Categorization Report (Dec 7,2010). Additional "conditions specific to UAE", besides environmental, external hazards (sand storm, seismic, etc.), were the electric grid frequency (50Hz in UAE) and the temperature of the cooling water.

To facilitate the use of safety information from the reference plant in Korea, FANR has established a technical cooperation agreement with the Korean Institute of Nuclear Safety. The agreement provides for exchanges of technical information as well as training and staff exchanges. The agreement was executed by the FANR Director General and the President of KINS and is administered by twice-yearly meetings of the management of each organisation.

Pursuant to the technical cooperation agreement, FANR has received copies of the KINS safety evaluation reports for the construction licence of the Shin Kori reference plant and for the APR 1400 standard design approval and copies of the relevant Korean regulations and guides. Several technical meetings and expert workshops have taken place. FANR and KINS have also set up a “Request for Information” (RFI) process whereby FANR reviewers seek clarification of the basis of KINS acceptance of specific PSAR sections.

Use of regulatory body of country of origin in inspection:

KINS has provided support to FANR inspectors during inspection in manufacturing facilities. This should continue during construction inspections. The commissioning of Shin Kori will provide a unique opportunity for training and experience feedback to FANR staff.

Use of regulatory body of country of origin in OPEX feedback:

The proposed Construction and Operation Experience (COPEX) system should have inputs from Korean plant experiences in addition to the international experience.

Use of regulatory body of country of origin in training: Support from KINS to train FANR personnel is essential, both on technical courses as well as in on the job training. Especial consideration should be given to the training of commissioning and operations inspectors, which has a long leading time.

THE IRRS TEAM



APPENDIX I – LIST OF PARTICIPANTS

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APPENDIX II – MISSION PROGRAMME

IRRS MISSION PROGRAMME	
Sunday, 4 December 2011	
IRRS Initial IRRS Review Team Meeting	
15:00 - 19:00	Opening remarks by the IRRS Team Leader (C.M. Larsson) Introduction by A. Al Khatibeh, A.Stritar, S. Koenick Self-introduction of all attendees First impression from experts arising from the Advanced Reference Material (ARM) Administrative arrangements FANR Liaison officer and Directors of Nuclear Safety and Radiation Safety Departments in attendance
Monday, 5 December 2011	
IRRS Entrance Meeting	
09:30 – 13.00	09:00 Arrival, registration, welcome 09:30 Ambassador Alkaabi UAE – Welcoming Address 09:50 DDG Aning’s presentation – TC and the IRRS 10:10 IRRS Coordinator – The IRRS programme 10:20 IRRS Team Leader – Expectations for the Mission and introduction of the IRRS Team 10:45 Coffee 11:15 FANR DG – FANR Welcoming Address 11:30 FANR presentation – Regulatory Overview (and introduction of FANR Counterparts) 12:45 Questions
14:00 – 17:00	Interviews and Discussions with Counterparts (parallel discussions)
17:00 - 18:00	Daily IRRS Review Team meeting
Tuesday, 6 December 2011	
Daily Discussions / Interviews	
09:00 – 17:00	Interviews and discussions with counterparts (parallel discussions)
09:00 – 12:30	Visit to ENEQ HQ for some team members (discussions on Braka)
14:00 – 16:00	Ambassador Alkaabi meeting with IRRS senior team
17:00 – 18:00	Daily IRRS Review Team meeting
Wednesday, 7 December 2011	
Daily Discussions / Interviews	
09:00 – 17:00	Follow-up interviews and discussions with counterparts for all modules
06:30 – 17:30	Visit to Braka NPP Project site (A. Stritar, S.Koenick, Z.Shah)
09:30 – 13:30	Visit to ENEQ HQ (I.Soufi, P.Zombori) (attending NEPCC and discussions on EPR)
07:00 – 17:00	Visit to medical facility site (the American Hospital in Dubai) (B.Cassels, R.Wheelton)
17:30 – 18:30	Daily IRRS Review Team meeting
Thursday, 8 December 2011	
Daily Discussions / Interviews	
09:00 – 14:30	Visit to industrial facility site (Weatherford Precision Drilling, Abu Dhabi) (P.Deboodt)
09:00 – 17:00	Interviews and discussions with counterparts (parallel discussions)
12:00 – 14:00	Policy issue discussion: <i>capacity building/ sustainability</i>
16:00 – 18:00	Daily IRRS Review Team Meeting: recommendation, suggestions and good practices
Friday, 9 December 2011	
Daily Discussions / Interviews and Site Visits	
09:00 – 14:00	Report preparation

IRRS MISSION PROGRAMME

Saturday, 10 December 2011

Daily Discussions

09:00 – 19:00	Report preparation
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Sunday, 11 December 2011

Daily Discussions

09:00 – 12:00	Interviews and discussions with counterparts (parallel discussions)
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09:00 – 12:00	Policy Issue discussion: <i>Fukushima; RB of country of origin involvement in assessment</i>
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13:00 – 23:00	IRRS Report preparation
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Monday, 12 December 2011

Daily Discussions

08:00 – 15:00	Finalizing Mission Report
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18:00 – 19:00	Handover of Draft IRRS Mission report to FANR for review and comments
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Tuesday, 13 December 2011

Daily Discussions

11:00 – 17:00	Discussion FANR comments (all IRRS Review Team)
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20.00 – 22.00	Official Dinner
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Wednesday, 14 December 2011

09:00 – 13:30	IRRS Exit meeting, opening remarks DDG-NS Flory
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	Main findings of the IRRS mission (C.M.Larsson)
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	Closing Remarks FANR DG Travers
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	Press Conference
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APPENDIX III – SITE VISITS

SITE VISITS	
1.	Site visit to Nuclear Power Plant - Braka A.Stritar, Z.Shah, S.Koenick
2.	Site visit to Industrial facility – Weatherford Precision Drilling P.Deboodt
3.	Site visit to Medical Facility - American hospital B.Cassels, R.Wheelton

APPENDIX IV – LIST OF MISSION COUNTERPARTS

	AREAS	IRRS EXPERTS	FANR Counterpart
1.	RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT		
		C.M. Larsson A.Stritar	John Loy Ian Grant
2.	GLOBAL NUCLEAR SAFETY RÉGIME		
		C.M. Larsson A.Stritar	John Loy Ian Grant Barry Kaufer Monira Al Kuttab
3.	RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY		
		C.M. Larsson A.Stritar	John Loy Ian Grant
4.	MANAGEMENT SYSTEM OF THE REGULATORY BODY		
		E.Oehlen	Fatema Al Junaibi
5.	AUTHORIZATION		
		C. Almeida K.Do P.Deboodt B.Cassels L.Jova Sed	Pablo Abbate Aayda Al Shehhi
6.	REVIEW AND ASSESSMENT		
		C. Almeida K.Do P.Deboodt B.Cassels	Mike Cash Guenaël Le Cann Aayda Al Shehhi

	AREAS	IRRS EXPERTS	FANR Counterpart
		L.Jova Sed	
7.	INSPECTION		
		C. Almeida K.Do P.Deboodt B.Cassels L.Jova Sed	Mustafa Majali Premek Skopal ↘
8.	ENFORCEMENT		
		Z.Shah P.Deboodt B.Cassels L.Jova Sed	Premek Skopal John Loy ↘ Eyad Mahadeen
9.	REGULATIONS AND GUIDES		
		M.Mayfield M.Tronea R.Wheelton L.Jova Sed	↘ Barry Kaufer
10.	EMERGENCY PREPAREDNESS AND RESPONSE		
		P.Zombori I.Soufi	Jean-Loup Frichet Walid El Mowafi
11.	THEMATIC AREAS: CONTROL OF MEDICAL EXPOSURE		
		B.Cassels	Mustafa Majali Zeineb Al Husari
12.	THEMATIC AREAS: OCCUPATIONAL RADIATION PROTECTION		
		P.Deboodt	↘ Krzysztof Szornel Ra'ed Al Adaileh

	AREAS	IRRS EXPERTS	FANR Counterpart
13.	<ul style="list-style-type: none"> ➤ THEMATIC AREAS: SAFETY AND SECURITY OF RADIOACTIVE SOURCES 		
		R.Wheelton	<ul style="list-style-type: none"> ➤ Salem Al Qubasi ➤ Denis Winter Aayda Al Shehhi

APPENDIX V – RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT	GP1	The UAE developed a Nuclear Policy within a relatively short time frame but based on a firm analysis of future demand for electricity, consulted widely, formulated policy statements that will guide future activities in the nuclear field, made it publicly available and promulgated it through the Nuclear Law. Whilst this is a requirement, the way it was developed and negotiated is considered good practice
	S1	The Government of the UAE and FANR should consider developing or clarifying, as appropriate, mechanisms by which appeals by a licensee or a stakeholder against a decision by the FANR Board of Management can be reviewed by a body independent of FANR.
	S2	FANR should consider merging the two existing regulations that cover radiation protection requirements in nuclear power and non-nuclear power sectors respectively.
	GP2	The Nuclear Law provides the basis for establishing the Radiation Protection Committee that provides a framework for effective interaction between various agencies and other organisations of relevance for the framework for safety.
	S3	The Government of the UAE should encourage and facilitate the establishment of Memoranda of Understanding (MoU) between FANR and other governmental bodies, to avoid duplication of efforts and conflicting advice. FANR should conclude the current negotiations for MoUs as soon as practicable.

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
		S4
	R1	The Government of the UAE should encourage collaboration amongst relevant bodies to make an inventory of sites with elevated levels of radiation, whether this be from natural exposure or legacies from past practices, and to determine reference levels for remedial or other actions.
	R2	The Government of the UAE should establish an interim organization for the safe recovery and storage of orphan sources until ultimate transfer of responsibility can be achieved to the new “Waste Entity” to be established pursuant to the Nuclear Law.
	R3	The Government of the UAE should ensure the development of a National Policy and Strategy for Radioactive Waste Management is brought to conclusion in the shortest time frame. This would facilitate inter alia, the development of the necessary regulations and regulatory guidance documents.
	GP3	Students participating in capacity building programmes have an opportunity to choose at the commencement of their career, to work either with the regulator FANR or with the operator ENEC on comparable terms. This is a good contribution towards the balanced development of the human capacity throughout the whole nuclear sector.
	S5	The Government should continue to develop and implement provisions to establish the nationwide radiological monitoring system for early warning purposes as well as long term assessment of radiological contamination of the territory of the country.

AREAS	R: Recommendations	Recommendations, Suggestions and Good Practices
	S: Suggestions G: Good Practices	
	R4	FANR should develop authorization criteria to be fulfilled by dosimetry services providers for the individual monitoring of workers subject to occupational exposure..
2. GLOBAL NUCLEAR SAFETY REGIME	GP4	UAE and FANR have given evidence of ambitious use of international peer review missions as well as demonstrated that the findings from these missions are incorporated into actions plans and that resulting actions are being implemented. The effectiveness and efficiency by which this has taken place is considered good practice.
	S6	The Government of the UAE should officially notify the IAEA as soon as practicable that it endeavours to follow the provisions of the Code of Conduct on the Safety and Security of Radioactive Sources.
	S7	FANR should consider organizing the regulatory body so that activities related to radioactive waste and decommissioning are integrated..
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	S8	FANR and the relevant stakeholder organisations should consider targets for developing Emirati staff having the necessary competences and experience to assure regulation and safety of facilities and activities in all potential circumstances on an appropriate timescale.
	GP5	FANR has at an early stage developed an integrated management system providing an important support function for the activities of the Authority.
4. MANAGEMENT SYSTEM OF THE REGULATORY BODY	S9	FANR should consider further improving descriptions of the graded approach to be used in different areas of its activities such as: <ul style="list-style-type: none"> • Licensing of radiation practices; • Safety assessment and inspection for nuclear facilities and activities consistent with the

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
	S10	FANR should consider having all policies of FANR (approved by the Board of Management) integrated in the IMS and available to all staff via the Local Area Network and that clarifying text is inserted in the IMS Manual.
	GP6	FANR has good electronic project management (EPM) system for planning, maintaining, retrieving, and record-keeping all documents produced in the process of review and assessment.
	R5	FANR should prioritise development of the EDMS to ensure those products i.e. documents (reports, licences etc.) addressing the same subject matter can be compiled in one dossier having a unique identification number and that record-keeping follows the same structure. FANR should furthermore consider resolving the implementation issues with EDMS and EPM, particularly clarifying the relationships between the two systems, to ensure equal application of the advantages of each system for all areas of FANR's activities.
	R6	FANR should take steps to specify retention times for various records and associated materials.
	S11	FANR should consider preparing and implementing a plan (programme) for internal audits as a management tool for independent assessment.
	S12	FANR should consider taking a systematic approach to monitoring the completion of improvements, including actions taken regarding non-conformances, and how to check for

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
5. AUTHORIZATION	GP7	The suite of documents detailing how to make an application, what information to provide and the internal procedural guidance documents for the FANR personnel on how to perform the licensing indicate sound management of the application process.
	S13	FANR should consider authorizing the various steps in the development of a non-nuclear power facility e.g. notification, design, construction, operation, shut down and decommissioning, with a view to confirming that the design intent has been delivered e.g. for shielding high end medical radiation activities such as oncology.
6. REVIEW AND ASSESSMENT	R7	FANR should develop an internal procedure on the transfer of lessons-learned taking into account the benefit of utilizing experience, notably from the vendor country of origin and international community.
7. INSPECTION	S14	FANR should examine Article 36(3) of the Law No.6 with a view to ensuring that prosecutions are possible for situations where FANR has to intervene to restore radiological safety.
	S15	FANR should consider improving the process to assess the competence and qualifications of consultants from technical support organisations assisting FANR during inspections.
	R8	The Government of the UAE should clearly assign responsibilities for overseeing industrial safety aspects during construction of facilities.
	S16	FANR should consider developing generic criteria for event reporting by all licensees in order to effectively perform reactive inspections

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
		S17
8. ENFORCEMENT	S18	FANR should consider establishing and implementing a policy for the use of enforcement measures by inspectors including seizure of evidence and statement gathering procedures, particularly in cases where immediate intervention for protection of persons is needed in the field.
	S19	FANR should implement its internal action plan (FANR Action Plan) which proposes to: <ul style="list-style-type: none"> • Complete regulation on administrative penalties and fines by the end of 2012; • Complete protocol on referrals to prosecution authorizes by end 2012; • Fully implement enforcement procedures for regulated material users by early 2012 ; and • Complete protocol on referrals to prosecution authorizes by end 2012.
9. REGULATIONS AND GUIDES	S20	FANR should consider detailing its internal procedures for elaboration of the establishment, revision and revoking of regulations. Amendments should include criteria for identifying the need for new or revised regulations, should specify the periodicity of the review of the current regulations and guides and should also address the formal review by legal staff in the process for issuing regulations.
	GP8	The UAE has developed, in a relatively short period of time, a comprehensive national regulatory framework for nuclear safety. For the establishment of its own regulatory requirements and guidance, the FANR has made extensive use of IAEA Safety Standards. The obligation of the FANR to take account of internationally recognized standards and recommendations, such as the IAEA Safety Standards, when developing the national

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
	S21	FANR should make provisions to ensure staff is trained in the technical background and significance of those regulatory documents issued in other jurisdictions and referenced/used in FANR's guidelines. FANR should also take measures to regularly monitor changes in those referenced documents and evaluate potential implications for their own guidelines.
	S22	FANR should continue the process for completing the regulatory framework, in such a manner that all regulations and guides needed to support regulatory review, inspection and decision-making are in place before the related licensing stages of the nuclear power plant project.
	S23	FANR should consider developing a safety guide to assist users in complying with safety requirements on control of discharges for facilities with regulated materials.
	R9	FANR should review the existing regulatory framework for safety, and define according to the IAEA Safety Standards, the concepts of exemption, clearance and radioactive waste for all the practices and activities.
	S24	FANR should develop a regulation establishing the main safety requirements for all phases of decommissioning of all types of regulated facilities. This should include requirements for the period after the permanent shutdown of a facility at the end of its operational lifetime.
	R10	FANR should develop regulations covering the main requirements for the regulation and control of existing exposure situations established in the IAEA Safety Standards GSR Part 3.

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
		R11
10. EMERGENCY PREPAREDNESS AND RESPONSE	S25	FANR and NCEMA should as soon as possible finalize and implement the Memorandum of Understanding (MoU). The MoU should consider the issues of public communication and of cooperation between the Emergency Operation Centres of NCEMA and FANR.
	R12	The Government should make sure that the roles, responsibilities and organizational relationships and interfaces between all the response organizations should be clarified, agreed and formalized as soon as possible.
	S26	The Government of the UAE should consider inviting an Emergency Preparedness Review (EPREV) mission upon the completion of the national and local off-site radiation emergency plans.
	R13	Organisations, involved in emergency planning, should finalize the assessment of hazards at the national level properly taking into account radiological hazards in accordance with GS-R-2.
	S27	FANR, with other relevant stakeholders and through the coordination of the Radiation Protection Committee, should continue to work towards the establishment of national intervention levels for application in emergency situation, in compliance with the international standards.
	S28	The Government of the UAE should consider establishing an exclusion zone around the NPP site to prevent the developments which would unnecessary increase the population density and complicate emergency planning.

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
		R14
S29		FANR should consider developing a communication plan taking into account the psychological consequences of radiation emergencies
R15		The Government of the UAE should ensure that the plans and procedures for coordinating national response, based on a comprehensive assessment of hazards and coordinated with other relevant and existing plans, are established and completed by the indicated deadlines. Each response organization should prepare its own plan for coordinating and performing their assigned functions.
11. CONTROL OF MEDICAL EXPOSURE	R16	The Government of the UAE should ensure, with respect to the specific requirements of IAEA BSS 2011 GSR Part 3 interim: <ul style="list-style-type: none"> • establish a set of diagnostic reference levels; • ensure that, as a result of consultation between the health authority, relevant professional bodies and the regulatory body, the following are established: <ol style="list-style-type: none"> c) Dose constraints to be fulfilled for exposures of carers and comforters, and volunteers participating in a programme of biomedical research; d) Criteria and guidelines for the release of patients who have undergone therapeutic procedures using unsealed sources or patients who still retain implanted sealed sources.
	S30	FANR should consider developing a standardized reporting format for radiation incidents/accidents.

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
		S31
12.OCCUPATIONAL RADIATION PROTECTION	S32	FANR should consider within two years an IAEA mission on Occupational Radiation Protection Appraisal Service (ORPAS) mission, in order, among other goals, to define an action plan for further development of the infrastructure for the monitoring of occupationally exposed workers.
	GP9	The provision of guidance material on the protection and the safety of workers and for the completion of the application for a licence is acknowledged as a positive indicator of a high level of commitment from the FANR in order to foster the implementation of the regulations concerning the occupational exposure.
	S33	FANR should consider strengthening its efforts to develop a national dose register for occupationally exposed workers.
	R17	FANR should make provision for requirements stating clearly the responsibilities and duties of the workers for the implementation of the protection and the safety measures for themselves as well as for the other workers.
	S34	FANR should consider the establishment of administrative rules concerning the implementation of a radiation protection and safety programme, in particular for those workers who performed their activities in different facilities where radioactive sources are present or where activities involving regulated materials have to be done.
	S35	FANR should mandate all licensees that currently do not have radiation protection

AREAS	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions and Good Practices
	S36	FANR should consider providing guidance for the assessment of occupational exposure to ionizing radiations to be performed for all exposure pathways and guidance on how to assess the total effective dose.
	S37	FANR should consider providing information licensees on existing training material or on training service providers for workers subject to occupational exposure.
	R18	FANR should review and complete the existing requirement addressing the conditions of service as described in the GSR Part 3, 3.111 and 3.112.
13. SAFETY AND SECURITY OF RADIOACTIVE SOURCES	S38	FANR should inform IAEA about the proposed developments of RAIS so that other Member States may similarly benefit from useful improvement.
	S39	The Government of the UAE should ensure that orphan sources are deemed to be evidence unless or until FANR makes the decision not to prosecute the legal owner of the regulated material.

APPENDIX VI – FANR REFERENCE MATERIAL USED FOR THE REVIEW

DOCUMENT	DESCRIPTION
UAE Legislation	
Law No. 6 of 2009	Federal Law by Decree No 6 of 2009, Regarding the Peaceful Uses of Nuclear Energy
Law No. 2 of 2011 (NCEMA)	Concerning The Establishment of the National Emergency Crisis and Disaster Management Authority (NECDMA)
Policy	
UAE Nuclear Policy	Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy
FANR Regulations	
FANR-REG-01	Management Systems for Nuclear Facilities (This regulation defines generic management system requirements applicable throughout all phases (i.e. siting, design, construction, commissioning, operation and decommissioning) of the lifetime of a nuclear facility including any subsequent period of institutional control.)
FANR-REG-02	Regulation for the Siting of Nuclear Facilities (This regulation is to establish the requirements for the site evaluation for one or more nuclear facilities. The evaluation will characterize fully the site specific conditions so that the nuclear facility is protected against external hazards and any environmental impacts that might arise from its operation are minimized)
FANR-REG-03	Regulation for the Design of Nuclear Power Plants (The regulation establishes Design requirements for Systems, structures and components important to Safety that must be met for safe operation of a Nuclear Power Plant, and for preventing or mitigating the consequences of potential events that could jeopardize Safety. It also establishes requirements for a comprehensive Safety Assessment, which is carried out in order to identify the potential hazards that may arise from the Operation of the Nuclear Facility, under the various Plant States (Operational States and incident/Accident Conditions).
FANR-REG-04	Radiation Dose Limits & Optimisation of Radiation Protection for Nuclear Facilities (This regulation establishes the radiation dose limits and the requirements for optimisation of radiation protection that are relevant to a nuclear facility during its design, construction, normal operation and decommissioning.)
FANR-REG-05	Probabilistic Risk Assessment Application (PRA) at Nuclear Facilities (This regulation is to require the applicant or licensee

DOCUMENT	DESCRIPTION
	constructing or operating a nuclear facility to conduct a PRA to support the application for a Construction and Operating Licence)
FANR-REG-13	Transportation of Radioactive Materials (This regulation establishes the requirements for the safe transport of radioactive material, as defined in the IAEA Safety Standards Regulations for the Safe Transport of Radioactive Material, 2009 Edition (No. TS-R-1) within the State by road, rail, and waterways under the jurisdiction of the State).
FANR-REG-17 (Draft)	Certification of Operations Personnel
FANR-REG-23	Security of Radioactive Sources
FANR-REG-24	Basic Safety Standards for Facilities and Activities involving Ionizing Radiation other than in Nuclear Facilities
REGULATORY GUIDES	
FANR-RG-001	Content of Nuclear Facility Construction and Operating Licence Applications (Corresponding Regulations: FANR REG 06 Application for a Licence to Construct a Nuclear Facility & REG 14 Application for a Licence to Operate a Nuclear Facility)
FANR RG-002	Application of Management Systems for Nuclear Facilities (Corresponding Regulations: FANR REG 01 Management Systems for Nuclear Facilities)
FANR RG-003	Probabilistic Risk Assessment Scope, Quality and Applications (Correspondng Regulations: FANR REG 05 Regulation for Probabilistic Risk Assessment Application at Nuclear facilities)
FANR RG-004	Evaluation Criteria for Probabilistic Safety Targets and Design Requirements (Corresponding Regulations: FANR REG 03 Design of Nuclear Power Plants)
FANR RG-005 (Draft)	Guidelines for the Design, Construction and Operation of Nuclear Power Plants
FANR RG-007	Radiation Safety Guide
FANR RG-008	Guidance for Reporting Nuclear Facility Incidents
Inspection	
Generic Inspection Guide (GIG)	Inspection of Regulated Activities
Inspection Procedures	Enforcement of regulatory requirements
Enforcement Procedure	Training Instruction: Inspector Qualification for NSD Staff
Inspector Qualification for NSD	Training Instruction: Inspector Qualification for RSD Staff
Inspector Qualification for RSD	Training Instruction: Inspector Qualification for RSD Staff

DOCUMENT	DESCRIPTION
Inspection Instructions: Diagnostic and Interventional Radiology	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Fixed Gauges	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Industrial Radiography	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Nuclear Medicine	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Portable Gauges	Inspection Objective - General Inspection Instruction- Site Report Form Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Radiotherapy	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: Well Logging	Inspection Objective - General Inspection Instruction- Site Report Form - Inspection Recommendations - Inspection Notes - Checklist
Inspection Instructions: X-ray Security Scanners	For Regulated Materials
Pre-inspection Checklist	
Feb 2011 Inspection Report	
KEPCO April 2011 Inspection Report	
June 2011 ENEC Audit report	
NSD Inspection Report	Letter to licensees for announced inspection
RSD e-mail pre-inspection	Example
FANR inspection report cover letter	Letter to the licensee “Assessment of response to the inspection Report”
Letter: Assessment of response to the inspection Report	
Training Qualification Card (NSD)	
Regulated Material Licensing	
RAI Log	Log of Requests for Additional Information (RAI)
ARESPC Form	

DOCUMENT	DESCRIPTION
Application form (Regulated Materials)	Application form for a licence to conduct 'Regulated Activity Using Regulated Materials'
FANR Guide: Applying for a Regulated Materials Licence	FANR Guide: Applying for a Regulated Materials Licence
Example of RM Licence	Example of a Licence to conduct Regulated Activity using Regulated Materials
Import/ Export Permit	Example of Import/ Export Permit for Regulated Materials.
Transport Notification	Example
Inventory Form	Regulated Materials Inventory Form
Review and Assessment Sheet	Example
IMS	
IMS Manual	Integrated Management System Manual
CP.1	Manage Regulatory Framework for Ensuring Safeguards, Safety and Security
CP.2	Licensing
CP.3	Assurance of Compliance for Safety, Security, Safeguards & Rad. Prot.
CP.4	Capacity building, training and knowledge management (Rev.2)
CP.5	National Radiation Protection Infrastructure
CP.6	FANR Response to Emergencies
CP.6	FANR Emergency Communication procedure
CP.6	FANR emergency procedures
MP.1	Direct and Manage the Organization
MP.2	MP.2 – Regulatory Decision Making – Revision 1
MP.3	Manage Corporate Communications
MP.4	Organizational Planning
MP.5	Manage Processes
MP.6	Evaluate and Improve Performance
MP.7	Project Management
MP.8	Manage National & International Stakeholder Engagement, Cooperation and Interactions

DOCUMENT	DESCRIPTION
CP.1 (ARESPC Form)	Assessment and Resolution of External Stakeholder and Public Comments (ARESPC) and Examples
SP.1	IMS Process SP 1: Human Resources Management
SP.2	Finance
SP.6	ELECTRONIC DOCUMENT MANAGEMENT SYSTEM (EDMS)
Education and training self-assessment	
Systematic Approach to Training (SAT) procedure	
FANR/LJMU Training Programme	Self-assessment report
Others	
Convention on Nuclear Safety Report	Report
Convention on Nuclear Safety Presentation	Presentation
FANR Organization Chart	
FANR Procurement Procedures	
FANR Website	http://fanr.gov.ae/en
Paper	'Developing National Regulations in the United Arab Emirates' delivered to OECD Committee on Nuclear Regulatory Activities International Workshop on 'New Reactor Siting, Licensing and Construction Experience' Czech Republic, September 2010
Chief Scientist Job Description	
Annual Report 2010	
Public information sessions	Example: http://gulfnews.com/news/gulf/uae/government/licences-will-ensure-safe-use-of-radioactive-materials-1.634711
'Inside Business' video report on FANR	http://www.youtube.com/watch?v=o5xxoeEPpyg
Internal Audit procedure	

APPENDIX VII – IAEA REFERENCE MATERIAL USED FOR THE REVIEW

- 1. IAEA SAFETY STANDARDS SERIES No. SF-1 - Fundamental Safety Principles**
- 2. IAEA SAFETY STANDARDS SERIES No. GSR PART 1 - Governmental, Legal and Regulatory Framework for Safety**
- 3. IAEA SAFETY STANDARDS SERIES No. GS-R-2 - Preparedness and Response for a Nuclear or Radiological Emergency**
- 4. IAEA SAFETY STANDARDS SERIES No. GS-R-3 - The Management System for Facilities and Activities**
- 5. IAEA SAFETY STANDARDS SERIES No. NS-R-1 – Safety of Nuclear Power Plants: Design**
- 6. IAEA SAFETY STANDARDS SERIES No. NS-R-2 – Safety of Nuclear Power Plants: Operation**
- 7. IAEA SAFETY STANDARDS SERIES No. NS-R-4 - Safety of Research Reactors**
- 8. IAEA SAFETY STANDARDS SERIES No. GS-G-1.1 - Organization and Staffing of the Regulatory Body for Nuclear Facilities**
- 9. IAEA SAFETY STANDARDS SERIES No. GS-G-1.2 - Review and Assessment of Nuclear Facilities by the Regulatory Body**
- 10. IAEA SAFETY STANDARDS SERIES No. GS-G-1.3 - Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body**
- 11. IAEA SAFETY STANDARDS SERIES No. GS-G-1.4 - Documentation for Use in Regulatory Nuclear Facilities**
- 12. IAEA SAFETY STANDARDS SERIES No. GS-G-2.1 - Arrangements for Preparedness for a Nuclear or Radiological Emergency**
- 13. IAEA SAFETY STANDARDS SERIES No. GS-G-3.1 - Application of the Management System for Facilities and Activities**
- 14. IAEA SAFETY STANDARDS SERIES No. GS-G-3.2 - The Management System for Technical Services in Radiation Safety**
- 15. IAEA SAFETY STANDARDS SERIES No. RS-G-1.3 - Assessment of Occupational Exposure Due to External Sources of Radiation**
- 16. IAEA SAFETY STANDARDS SERIES No. RS-G-1.4 - Building Competence in Radiation Protection and the Safe Use of Radiation Sources**
- 17. IAEA SAFETY STANDARDS SERIES No. NS-G-2.10 - Periodic Safety Review of Nuclear Power Plants Safety Guide**
- 18. IAEA SAFETY STANDARDS SERIES No. NS-G-2.11 - A System for the Feedback of Experience from Events in Nuclear Installations Safety Guide**
- 19. INTERNATIONAL ATOMIC ENERGY AGENCY - Convention on Early Notification of a Nuclear Accident (1986) and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1987), Legal Series No. 14, Vienna (1987).**
- 20. INTERNATIONAL ATOMIC ENERGY AGENCY - Generic Assessment Procedures for Determining Protective Actions during a Reactor Accident, IAEA-TECDOC-955, IAEA, Vienna (1997).**

APPENDIX VIII – ORGANIZATIONAL CHART FANR

