



United Arab Emirates



Future Nuclear Power Plants in Embarking Countries: The Challenges of Preparing for Occupational Radiation Protection

The International Conference on Occupational Radiation Protection
Enhancing the Protection of Workers - Gaps, Challenges and Developments
IAEA, Vienna, Austria 1 - 5 December 2014

Hussain Al Katheeri
Federal Authority of Nuclear Regulation
United Arab Emirates



Formation of FANR and Nuclear Law

- Nuclear Law: Federal Law by Decree No 6 of 2009 Concerning Peaceful Uses of Nuclear Energy
 - Legal framework for Safety, Security, Safeguards in the Nuclear Sector, which includes conduct of activities with :
 - nuclear facilities; and
 - regulated material (radioactive material / radiation generators / nuclear material / trigger list items and nuclear related dual-use items)
 - Article (2) invokes the Nuclear Policy and gives priority to Safety, Nuclear Safety, Nuclear Security, Radiation Protection (IAEA definitions) and Safeguards
- All regulated by the Federal Authority for Nuclear Regulation (FANR), formed in 2009 (recently turned 5 years old!)





Key Provisions of UAE Nuclear Law

- **Establishment of FANR and its objectives:**
 - Establishes FANR as an independent legal personality with “full legal competence and financial and administrative independence”
 - States that FANR shall determine all matters regarding control & supervision of Nuclear Sector to ensure Nuclear Safety and Security, Radiation Protection, Safeguards and international obligations
- **Management of FANR:**
 - Board of Management
 - Director General
- **FANR funding**
 - Now largely through licence fees





Background on the UAE Nuclear Program

- The Emirates Nuclear Energy Corporation (ENEC), established in December 2009 is constructing four Korean design APR-1400 units
- Barakah Unit #1 is planned to start operating in 2017 and Units 2, 3, and 4 are scheduled to start operating in 2018, 2019 and 2020





Current Status of Facility Licensing

- FANR licenses issued to Emirates Nuclear Energy Corporation:
 - Site Selection Licence
 - Site Preparation Licence
 - Limited Construction Licence
 - Construction Licence for Barakah Units 1 & 2 (July 2012)
 - Construction Licence for Barakah Units 3 & 4 (September 2014)
 - *Application for licence to Operate Units 1 and 2 expected in January 2015*





Google Earth Image of the Site (~early 2014)





Legislative Framework For Occupational Exposure

- In accordance with requirement 2 of GSR part 1
- Publication of the Nuclear Law and the establishment of FANR
- FANR-REG-04 “Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities”:
 - Requires implementation of ALARA, sets dose limits for workers, and public, requires setting of dose constraints, etc.
- FANR-REG-06 “Application for a Licence to Construct a Nuclear Facility”:
 - Requires applicant to provide preliminary information on the RPP, reviewed prior to issuance of construction license
- FANR-REG-11 “Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities”
- FANR-REG-12 “Emergency Preparedness for Nuclear Facilities”



Regulation

Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities (FANR-REG-04)

Version 0



REGULATION

Regulation for Emergency Preparedness for Nuclear Facilities

(FANR-REG-12)

Version 0



UAE Nuclear Policy – Six Key Goals

- Complete operational transparency
- Highest standards of non-proliferation
- Highest standards of safety and security
- Close cooperation with the IAEA
- Partnership with governments and firms of responsible nations
- Long-term sustainability





FANR Radiation Protection Infrastructures

- Secondary Standards Dosimetry Laboratory (SSDL)
- Radiological Response Vehicle
- Environmental Laboratory
- Gamma Monitoring Network
- FANR emergency center (for radiological and nuclear emergencies)
- Other programmes supporting Radiation Safety (e.g. national dose register)





Implementation Of Radiation Protection Programmes by The Licence Holder

- Barakah NPP incorporates radiation protection measures to ensure that occupational radiation exposures in future operation will be as low as is reasonably achievable(ALARA), e.g.:
 - Separation of radioactive and non-radioactive components
 - Use of shielding
 - Use of remotely operated equipment
 - Ventilation systems – cascading airflow from least to potentially highest contamination areas
 - Installation of permanent radiation and contamination monitoring systems
 - Training of personnel in radiation protection
 - Development and implementation of administrative policies and procedures to maintain exposures ALARA
 - Dosimetry, alarming dosimeters, etc.
 - Radiological Environmental Monitoring Programme (REMP)
 - Radiation protection training and development
 - Emergency response infrastructure, offsite emergency center, etc.



Challenges Encountered in a New Emerging Nuclear Country From a Regulatory Perspective (1)

• Training

- Maintaining adequate levels of expertise:
 - Scholarship programs
 - Assignments to Korean Institute for Nuclear Safety (KINS) and US-NRC
 - RISKTEC programme in UK
 - Gulf Nuclear Energy Infrastructure Institute (GNEII) at Khalifa University
 - Institute of Radiation Protection and Nuclear Safety (IRSN)
 - International Nuclear Safeguards and Engagement Programme (INSEP)
 - Various IAEA missions





Challenges Encountered in a New Emerging Nuclear Country From a Regulatory Perspective (2)

- **Diversity:**
 - FANR staff from many different countries, with differing regulatory approaches
 - Important to develop a common approach to radiation protection
 - Important to develop effective communication and cultural awareness
- **Dosimetry service:**
 - Developing an approved dosimetry service provider under an adequate quality management system
 - IAEA mission on Occupational Radiation Protection Appraisal Service (ORPAS) to develop an action plan for the infrastructure and monitoring of exposed workers





Conclusions

- The challenges to develop an ORP programme as a regulator in an emerging nuclear country are vast and complicated
- The regulator is responsible for ensuring the health and safety of the workers, public and environment
- FANR has made significant progress in developing ORP infrastructure
- FANR is continuing to improve its preparation for the ORP through:
 - Issuing more related regulations and regulatory guides
 - Assure the implementation of ORP programmes by the licensees
 - Maintaining an adequate level of expertise in the nuclear field



شكراً
Thank you