



# What should a radiation regulator do about NORM?

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NORM issues in the Real World

**John Loy**  
Deputy Director General – Operations  
Federal Authority for Nuclear Regulation



## ADNOC's Two Questions of FANR

- ADNOC: Abu Dhabi National Oil Company
- Q1: Does FANR regulate NORM?
  - Answer: No (or perhaps: not yet)
- Q2: Does our proposal for a NORM treatment and disposal facility require a licence from FANR under the Nuclear Law?
  - Answer: Yes
- Why two different answers?





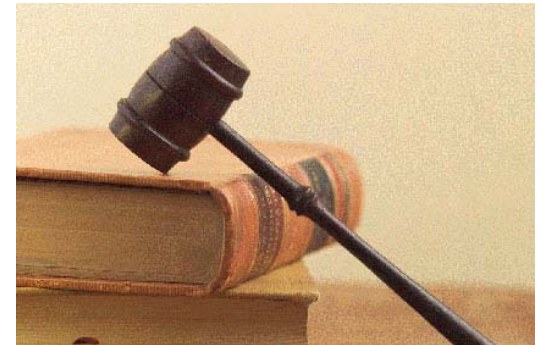
# NORM, Oil and Gas, and the System of Radiological Protection

- Oil and gas production generally creates an exposure situation:
  - Radioactive material is brought into a situation where exposures arise
  - Albeit as an adventitious consequence of an activity of considerable economic value: well JUSTIFIED
- Are we dealing with an
  - existing exposure situation or
  - planned exposure situation?



## Why does the answer matter?

- A **planned exposure situation** can be (and usually should be) regulated:
  - It requires **authorization** (licensing)
  - After **review and assessment** of submission/application
  - Against applicable **regulation(s)**
  - Subject to **inspection** and **enforcement**
- All to assure the optimisation of protection and safety and the application of individual dose limits
- An **existing exposure situation**: apply a graded approach in the context of reference levels of dose
  - Better subject to guidance rather than regulation.





# FANR's Radiation Regulatory System

- By UAE Nuclear Law (supported by FANR Regulations), FANR is required to issue a licence before anyone can undertake:
  - **Regulated Activity**
- For Radioactive Materials, includes:
  - Possession, use, manufacture, handling
  - Import/export
  - Transportation
  - Storage and Disposal
- **Regulated Material**

Includes radioactive materials in bulk quantities where the activity concentration of any radionuclide in the U-Th series exceeds 1 Bq/g





## But – there is the Exemption Processes

- FANR may exempt conduct of certain regulated activity with certain regulated material on the basis of:
  - Dose criteria (the 10  $\mu$ Sv rule)

OR

- Protection is optimized and regulatory control would provide no net benefit





## So what does it all mean?

- The activity of gathering material containing NORM residues (above 1 Bq/g), processing it and disposing of the conditioned NORM residues is:
  - a planned exposure situation
  - involving several Regulated Activities (possession, handling, transport, storage, disposal)
  - with Regulated Material
- Requires justification (why not do nothing?), optimisation, limitation demonstrated through review and assessment, licensing, inspection, etc...
- Therefore FANR needs to regulate the proposed NORM Facility
  - Answer to Q2





## So what does it all mean? - Harder

- Oil and gas production per se is likely to be an existing exposure situation
  - More subject to guidance than regulation
  - Anything gained by licensing?
- Does oil and gas production involve a Regulated Activity (possession, use, handling ) of regulated material ( $> 1\text{Bq/g}$ )?
  - **Arguably NO** – because the exposure is incidental to the purpose of oil and gas production
- Are post-production dealing with equipment containing NORM residues a Regulated Activity with Regulated Material?
  - **MAYBE**
  - **certainly** for conditioning, treatment and disposal of NORM residues.





## The example of aircrew

- Apart from radon, exposure of aircrew to cosmic radiation is the most studied occupational existing exposure situation.
- ICRP 107: existing exposure situation
- IAEA BSS (GSR Part 3): existing exposure situation
  - 5.31: the RB or other relevant authority shall determine whether assessment of exposure of aircrew is warranted
  - 5.32: where assessment is deemed warranted, the RB or other relevant authority shall establish a framework which shall include a reference level of dose and a dose assessment and recording methodology
  - 5.33 employers, where doses are likely to exceed the reference level shall assess doses and keep records and make available records to aircrew AND apply requirements re pregnant aircrew
- New European BSS: planned exposure situation; except de facto reference level of 6 mSv per annum applied





## Are oil and gas production workers like aircrew?

- Yes – their work for entirely a non-radiation-using purpose brings them into a situation of exposure to higher levels of naturally occurring radiation
- Both industries with a strong safety culture
- Differ in that the O&G exposures are more highly variable:
  - the exposure from an Abu Dhabi to Sydney flight can be assessed by algorithm
  - Oil and gas fields differ widely and the activities of workers are more varied
- But measurements of activity concentrations and generic behaviour modeling can allow exposures on average to be assessed in oil and gas production



## A possible radiation regulatory approach for oil and gas production? An answer to Q1?

- Regulatory body, after consulting industry, establishes:
  - a reference level
  - a methodology for dose assessment
- Exemption from regulatory control is granted on the conditions that:
  - The operator makes a dose assessment using determined methodology and derived from measurements of activity concentrations in local conditions
  - If the assessed dose is below reference level, no further action
  - If the assessed dose is above reference level, a scheme for individual worker dose assessment must be implemented and assessed doses recorded
  - Pregnancy information and management as for aircrew
  - Otherwise, prudent OH&S management is taken to assure optimisation.





## How can ICRP Help?

- More analysis and exploration of ‘existing exposure situations’
  - Currently a few brief paragraphs followed by many pages about radon (!)
  - Why worry about space crew?
- Application of principles of radiation protection to activities involving NORM, especially those that are existing exposure situations
  - What is optimisation in the context of reference levels?
- How should reference levels be established for different industries involving exposure to NORM?
  - On a generic basis
  - At a level that represents a higher level of exposure in the particular industry
  - Some other way?
- Flexibility supported by principles

## How Can I Help?





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Thank You