

**International Radiation Protection Association  
12<sup>th</sup> International Congress  
Buenos Aires, Argentina – October 19-24, 2008**



**IRPA 12**

**Concluding Plenary Session III**

**NORM in Industry  
P A Burns**



# NORM in Industry

TS III 4 NORM in Industry was divided into four topic areas

- TS III 4.1 NORM Uranium Mining and Processing
- TS III 4.2 NORM Other Minerals Mining and Processing
- TS III 4.3 NORM in Oil and Gas Industries
- TS III 4.4 NORM and Radon Issues in Building

# TOPICAL SESSION III.4.1: NORM - URANIUM MINING AND PROCESSING

- 7 oral presentations
- 3 posters presentation
  - 9 countries
- COMMON ISSUES DEALT IN ALL PAPERS:
  - regulatory policy;
  - environmental impact of uranium mining and milling and
  - radiological impact on workers and on the public.

# TOPICAL SESSION III.4.1: NORM - URANIUM MINING AND PROCESSING

## •IMPORTANT CONCLUSIONS:

- Uranium industry is undergoing a renaissance.
- Radiation protection procedures and regulations needed.
- Shortage of trained and experienced radiation protection professionals - cannot be produced overnight.
- Public education required.
- Interaction between regulators and operators must be stressed.



# TOPICAL SESSION III.4.1: NORM - URANIUM MINING AND PROCESSING

## •IMPORTANT CONCLUSIONS:

- All parties need to work to achieve high levels of excellence in the management of radiation health, safety, waste and the environment
- Strong safety culture should be based on internationally shared principles.
- Needed for emerging uranium producing countries.
- “Best practices standards” need to be introduced.
- Social acceptance will depend on proper management
- International organizations ( i.e, IAEA, WNA, ICRP, IRPA) have a role.



# Technical Session III 4.2

## NORM Other Minerals Mining and Processing

- Thorium in rare earths
- Phosphates
- Coal
- Country reviews
- Models for evaluation
- Elevated background
- Scale on water pipes

## Technical Session III 4.2

### NORM Other Minerals Mining and Processing

- A wide variety of industries produce NORM
- Several countries have undertaken comprehensive reviews
- Usually large volumes of low activity material
- Measurement of NORM and dose estimation

## Technical Session III 4.2

### NORM Other Minerals Mining and Processing

- System of radiation protection includes NORM
- Regulatory instruments and management tools need to be flexible to handle wide variety of situations
- Legacy sites and decommissioning were discussed



# Topical session III.4.3

## Norm in Oil and Gas Industries

- Countrywide surveys
- Pipes scales and sludges
- Measurement techniques
- Decommissioning
- Radon

## Topical Session III.4.3 Norm in Oil and Gas Industries

- ✓ **Surveys in oil fields:**
- ✓ Large amount of scales and sludges
- ✓ Dose rates - background to  $150\mu\text{Sv/h}$
- ✓  $400\mu\text{Sv/h}$  in a pump
- ✓  $400\text{kBq/m}^3$  radon gas in propane stream
- ✓ Maintenance of pipes and equipment
- ✓ Disposal of Norm wastes
- ✓ Decommissioning of installations

## Topical session III.4.3 Norm in Oil and Gas Industries

- ✓ NORM in Brazilian facilities
- ✓ Equatorial oil fields – safety manual
- ✓ Management strategy in Arabia Saudi
- ✓ Belgian regulatory framework
  
- ✓ Measurements
- ✓ Liquid scintillation:  $^{222}\text{Rn}$ ,  $^{228}$ ,  $^{226}\text{Ra}$ ,  $^{210}\text{Pb}$   
and  $^{210}\text{Po}$
- ✓ Radium isotopes
  - ✓ assess Th/U in geological formations
  - ✓ dating scales and contaminated soils



# Technical Session III 4.4

## NORM and Radon Issues in Building

Large number of papers on a wide variety of issues

- Measurements and modelling
- Regulation
- Surveys and dose measurements
- Management of risks and waste

# Technical Session III 4.4

## NORM and Radon Issues in Building

- Large number of surveys on different issues
- Radon build up in workplaces
- Radioactivity in building materials
- Radioactivity on tobacco

# Technical Session III 4.4

## NORM and Radon Issues in Building

- Measurement and modelling in a variety of situation
- Regulation and management of materials

# TS III 4 NORM in Industry – Conclusions

## *What's out there?*

- Wide variety of NORM industries
  - Uranium, Rear Earths
  - Coal, Oil, Gas
  - Phosphates, Mineral Processing and others
- NORM can concentrate in:  
Products, By-products and Residues
- Exposures to Large Populations – Small Doses
- Exposures to Small Populations – Larger Doses
  - Occupational exposures

# TS III 4 NORM in Industry – Conclusions

## *How to measure it?*

### Difficult measurement situations

- Measurement of Activity or Activity Concentration
  - Long decay chains – Disequilibrium
  - Hard to measure – radium, radon, thoron, Pb 210, Po210
- Modelling exposure pathways
  - Lot of assumptions
  - Averages adopted for widely varying situations
- Assessing doses to individuals
  - Large uncertainties – internal exposure



# TS III 4 NORM in Industry – Conclusions

## *What to do about it?*

- No one solution to the management of NORM
- Wide variety of regulatory instruments required
- Graded approach
  - Exclusion, Exemption, Clearance, Notification
  - Registration, Licensing
- Managed as Planned or Existing Exposure Situations
  - Dose Constraints or Reference Levels
- Numbers of people exposed and magnitude of exposures should be Optimised within dose bands
- Flexibility required