

Eu-NORM 2 Symposium, Prague, 16-20 June 2014

**Radiation protection issues in industries involving
Naturally Occurring Radioactive Material –
Main findings of the NORM VII Symposium**

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IAEA

International Atomic Energy Agency

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History of NORM Symposia

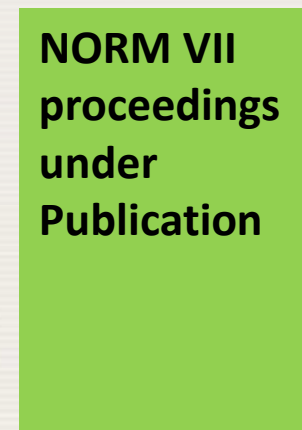
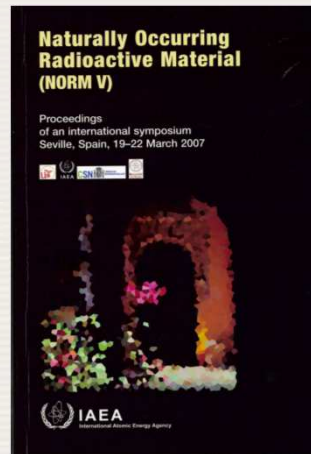
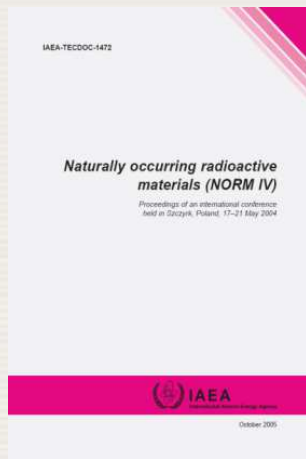
- Amsterdam, Netherlands 1997 (NORM I)
- Krefeld, Germany 1998 (NORM II)
- Brussels, Belgium 2001 (NORM III)
- Szczyrk, Poland 2004 (NORM IV)
- Seville, Spain 2007 (NORM V)
- Marrakesh, Morocco 2010 (NORM VI) →
- **Beijing, China 2013 (NORM VII)** →
- 2016 (NORM VIII) – Brazil (planned)

EuNORM1

EuNORM2

History of NORM Symposia

- Publication of proceedings by the Agency



Seventh International Symposium on NORM (NORM VII)- Beijing, April 22-26, 2013



- Organised by the China Institute of Atomic Energy - CIAE
- Co-organised by : CAEA, NNSA, CSRP, Tsinghua University, China University of Geosciences, University of South China.
- **In official co-operation with the IAEA.**
- **China – a major source, processor, user, supplier of industrial minerals – fitting venue**

Details

- Held at the Beijing International Convention Centre
- More than 150 participants
- 30 Member States
- 8 Technical sessions – 87 papers
- Keynote address IAEA, followed by China & Australia.

Main findings

- Regulatory aspects
 - Much progress in addressing exposure to natural sources in the national laws and regulations

But

- A consistent regulatory approach had still not been fully achieved.
- The new BSS requirements captured the focus

Regulatory aspects

- Regarding the new BSS – much effort needed to improve the level of understanding among national authorities
- Inconsistencies in applying the requirements - in particular the graded approach
- Acceptance in principle that regulatory control was unwarranted for materials with radionuclide concentrations below 1 Bq/g and for practices giving rise to doses less than 1 mSv/a.



Regulatory aspects

- Assignment of correct type of exposure situation – source of confusion
- Over regulation or unnecessary regulation
- The true purpose of 1 Bq/g – not properly understood.
- Highlighted the need for overall approach to health and safety in industries (other hazards, heavy metals)

Radon at workplaces

- Radon – ICRP presentation
- Establishment of the national radon strategy
- Concerns on the increased risk coefficient
- Concerns about the implications in certain underground mines where radon levels are significantly elevated and difficult/impossible to reduce further.
- More emphasis to minimize radon levels in new buildings

Transport

- General acceptance of the criteria - 10 times the activity concentration for exempt material
- Portal monitor alarms in ports – Rep of Korea
- Dose assessment for minerals transport from Australia to China and Japan – road/rail/sea
 - Exposure period of 1400h/a resulted highest dose of 0.74 mSv/a.

Industrial activities involving NORM

- The list of 12 industrial types are valid – Chinese experience indicated Vanadium production to be included in item 10.
- Industry specific approach to the regulation of NORM is the correct approach.
- Large amount of new information on measurements, worker exposure and public exposure
- Potential for high radon in underground mines

World wide information

- Mining and processing of U-ore
 - Many new comer countries
 - ISL technology
 - Co-production with other minerals/metals
 - Many countries – as part of NFC
- Rare Earths
 - Worker dose reported in the symposium from China were less than 1 mSv/a.
 - NORM residues – disposal solutions need to be established in China.



Mining in China

- Nearly 10 million workers in the mining industry
- 6.5 million in coal mines
- 1 million in metal mines
- 44 mines survey – 15% of the mines Rn above 1000 Bq/m³.
- Coal mines in general – average worker dose below 1 mSv/a (certain coal mines U upto 5Bq/g and Th up to 29 Bq/g)
- Certain metal mines – dose > 5 mSv/a

More information...

- Cu mines in Zambia, South Africa
- Gold, tantalum, rutile, iron mines in Sierra Leone
- Ammonium Phosphate plants – Spain
- Zircon – Nigeria & Madagascar
 - 6 Bq/g U-238, 29Bq/g Th-232
- Combustion of coal – release of Pb-210 China
- Water Treatment – Czech Republic
 - Spikes of radon during backwashing of filters
 - Morocco – investigation on waste water treatment

Residues

- Large volume of rare earth processing residues in China
- Evidence of environmental contamination
- Sweden : studies on scrap recycling, Ra226 – 55Bq/g; low doses; volume reduction; license scrap recycling facilities
- UF waste : nuclear or NORM ?
- Comprehensive extraction – emerging concept
- Phosphogypsum – applications (Brazil)

Residues

- Lack of harmonization
- Need to minimize NORM wastes
- Recycling and reuse
- Use in building materials – sensitive issue
- General acceptance of 1 mSv criteria, however;
- Differences in practical approaches

Building materials

- Support for the use of NORM residues such as flyash, steel slag, phosphogypsum, bauxite processing residue (red mud) in construction materials
- EU – Activity concentration index - many countries started using the approach
- However, for regulatory decisions, a situation specific dose assessment needed.
- Continue to be highly sensitive issue.

Remediation of legacy sites

- Scales of operation, sharing of experience
- Society driven
- Reference level

Wismut

Th-legacy site in UK

Rare earths site in China

**Ferro-niobium production
site in Belgium**

old radium facility in Austria

Coal site – Croatia

Pyritic mining in Spain

Phosphate facility in Tunisia

Measurement and dose assessment

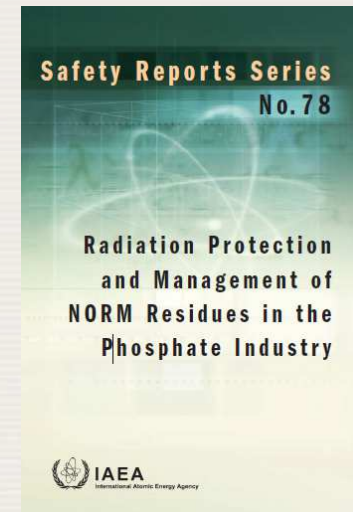
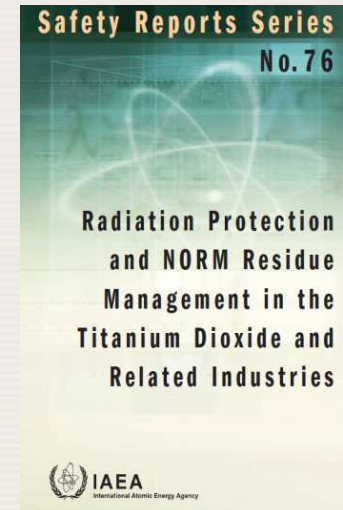
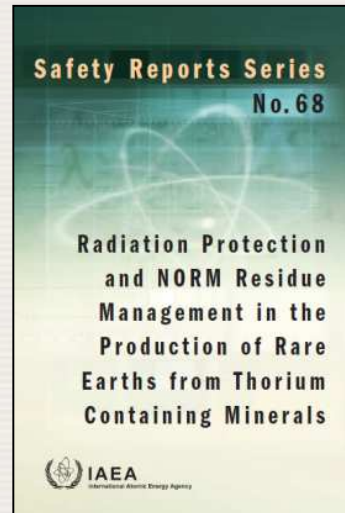
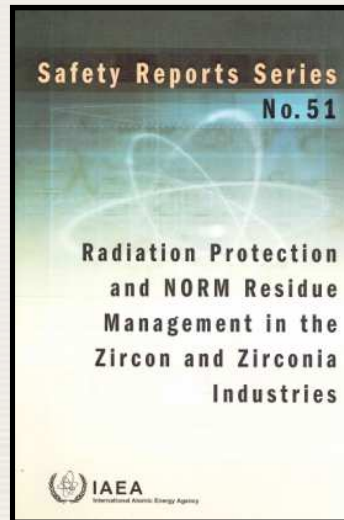
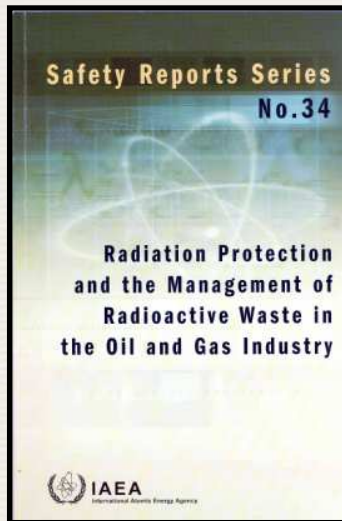
- Standardization of methods and protocols
- Field methods
- Mobile instruments
- Portal monitors
- Geo mapping, remote sensing, airborne gamma surveys : China

Involvement of interested parties

- Stake holders
- Communication
- Understanding associated risks
- Health effects
- Awareness

For Information

IAEA Safety Reports Series



International Conference on Occupational Radiation Protection:

Enhancing the Protection of Workers —
Gaps, Challenges and Developments

1–5 December 2014
Vienna, Austria



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In cooperation with:

European Commission (EC)

International Commission on Radiological
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International Committee for Non-Destructive
Testing (ICNDT)

International Mining & Minerals Association (IMMa)

International Organisation of Employers (IOE)

International Radiation Protection Association
(IRPA)

International Organization for Standardization (ISO)

International Society of Radiology (ISR)

International Society of Radiographers and
Radiological Technologists (ISRRT)

International Trade Union Confederation (ITUC)

OECD - Nuclear Energy Agency (OECD/NEA)

Pan American Health Organization (PAHO)

United Nations Scientific Committee on the Effects
of Atomic Radiation (UNSCEAR)

World Health Organization (WHO)

2nd International Conference of Occupational Radiation Protection

- **Submission of paper : June30, 2014**
- **For more details : IAEA Meetings web page**
 - <http://www-pub.iaea.org/iaeameetings/46139/2ndInternational-Conference-on-Occupational-Radiation-Protection>

Many thanks ...



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