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Practical advice on the evaluation and control of radiation protection of workers in the NORM industry – EAN NORM leaflets

Organisation and aims of the network - brief review

- ***EAN$_{NORM}$*** started in 2007
- 44 ‘contact points’ from 23 countries within Europe actively support the network and more then 200 persons are registered
- Aims: implementation of the optimization principles in the non-nuclear industry, Code of practice for the NORM industry
- Approach: exchange of information on regulations, administrative procedures and RP measures, experience between experts of different branches/countries
- Tool for contacts, discussions etc.: online-portal
- Workshops

Workshops

- **1th Workshop European ALARA Network for NORM**
  Nov. 20th - 22nd 2007, Dresden (Germany)
- **2ndWorkshop European ALARA Network for NORM**
  Nov. 24th - 26th 2009, Dresden (Germany)
- **3rdWorkshop "On Scenarios for dose assessment in the NORM industry" (Round Table Workshop)**
  Nov. 23th-25th, 2010, Dresden (Germany)
- **4th EAN$_{NORM}$ Workshop "Transportation of NORM, NORM Measurements and Strategies, Building Materials"**
  Nov. 29th – Dec. 1st, 2011, Hasselt (Belgium)

Conclusions of the first workshops ALARA Newsletters (issues 28 and 30)

- Harmonisation of methods/measures in the NORM industry is still a distant prospect
- Guidelines are desirable for several issues of practical RP (e.g measurements, dose assessment, RP measures)
- The specific activity of NORM is the major parameter in the protection practice. How should it measured efficiently and reliably taking into account the variety of materials?
- The ambient gamma dose rate is the principal component of the monitoring programmes for workers. Traceability?
- A method should be developed in order to assess the contribution of radon released from the materials of concern to the indoor concentration.
- The EC should come to a commonly accepted solution for the cross border material handling and transport of NORM, proposals are given in the last workshop

Control of radiation exposure of workers in the zircon industry (leaflet zircon industry)

- Legal requirements (Dir. 96/29 EURATOM, draft EU BSS)
- Specific activities in raw materials
- Determination of radiation exposure (scenarios, pathways, calculations, measurements),
- RP measures
- RP during transport
- Residues

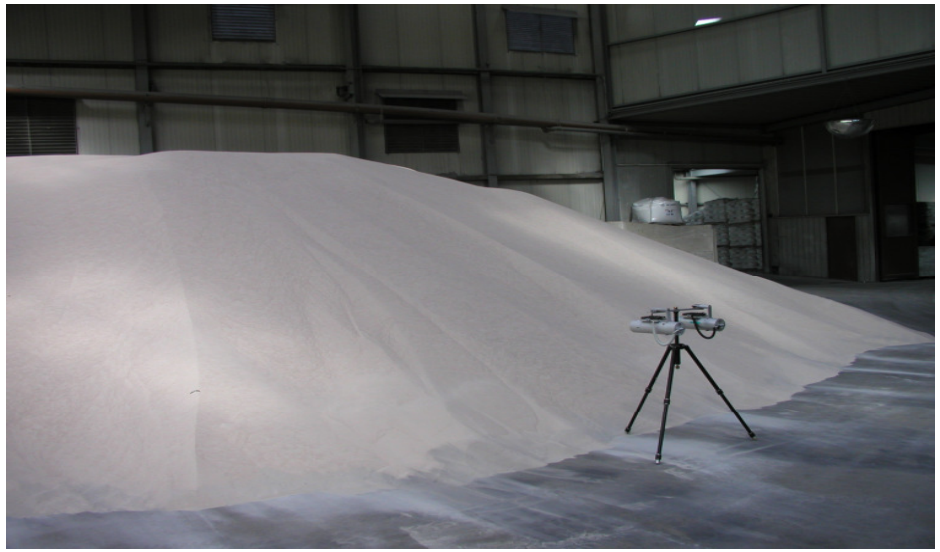
Exposure scenarios in zircon industry

External exposure due to the material

Inhalation of dust

Inhalation of short lived radon decay products

Dose rate measurement at zircon sand storage



Calculation of the effective dose (formulas, parameters, standards)

External exposure:

- from the specific activity of the material
- from the ambient gamma dose rate

Internal exposure due to inhalation:

- from the activity concentrations in the air
- from dust loading (available from industrial dust monitoring) and the specific activity of the material

Radiation protection practice in the zircon industry

General RP measures are realized by H&S-procedures

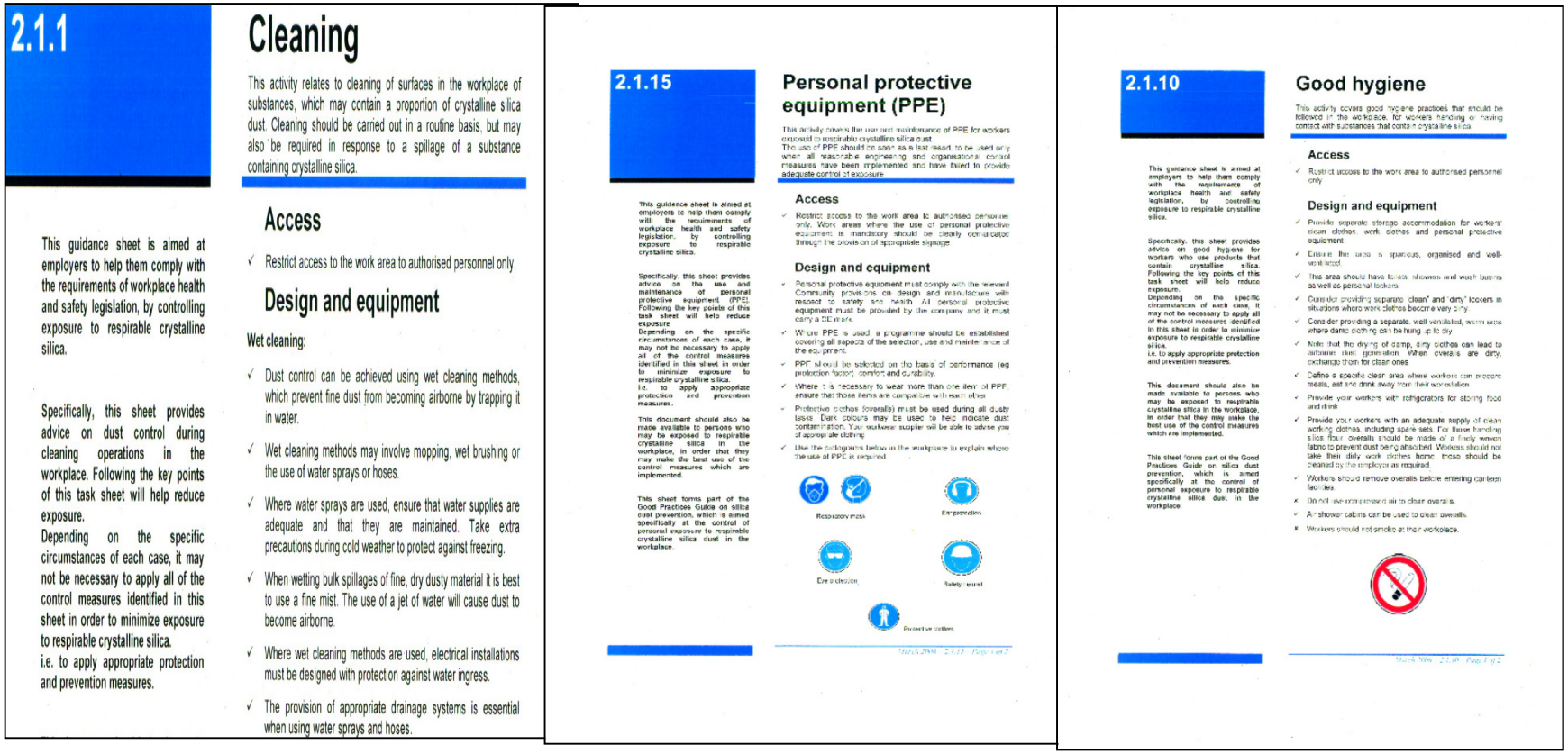
Specific measures (depending on workplace situation)

(German: AAAA – Aktivität, Abschirmung, Abstand, Aufenthaltszeit)

- Use materials with lower activity → justification
- Identify main sources of dust, keep them under control (use containment/ventilation, respiratory protective equipment)
- Optimise location of bulk materials, working time etc. Priority of measures: Technological – Organisational – Personal (TOP)

Materials by industrial associations

The European Network on Silica – Good practice guide: www.nepsi.eu– downloads in many languages



2.1.1

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides advice on dust control during cleaning operations in the workplace. Following the key points of this task sheet will help reduce exposure.
Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimize exposure to respirable crystalline silica.
i.e. to apply appropriate protection and prevention measures.

Cleaning

This activity relates to cleaning of surfaces in the workplace of substances, which may contain a proportion of crystalline silica dust. Cleaning should be carried out in a routine basis, but may also be required in response to a spillage of a substance containing crystalline silica.

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

Wet cleaning:

- ✓ Dust control can be achieved using wet cleaning methods, which prevent fine dust from becoming airborne by trapping it in water.
- ✓ Wet cleaning methods may involve mopping, wet brushing or the use of water sprays or hoses.
- ✓ Where water sprays are used, ensure that water supplies are adequate and that they are maintained. Take extra precautions during cold weather to protect against freezing.
- ✓ When wetting bulk spillages of fine, dry dusty material it is best to use a fine mist. The use of a jet of water will cause dust to become airborne.
- ✓ Where wet cleaning methods are used, electrical installations must be designed with protection against water ingress.
- ✓ The provision of appropriate drainage systems is essential when using water sprays and hoses.

2.1.15

Personal protective equipment (PPE)

Access

- ✓ Restrict access to the work area to authorised personnel only. Work areas where the use of personal protective equipment is mandatory should be clearly demarcated through the provision of appropriate signage.

Design and equipment

- ✓ Personal protective equipment must comply with the relevant Community provisions on design and manufacture with respect to safety and health. All personal protective equipment must be provided by the company and it must carry a CE mark.
- ✓ Where PPE is used, a programme should be established covering all aspects of the selection, use and maintenance of the equipment.
- ✓ PPE should be selected on the basis of performance (eg protection factor), comfort and durability.
- ✓ Where it is necessary to wear more than one item of PPE, ensure that those items are compatible with each other.
- ✓ Protective clothes (coveralls) must be used during all dusty tasks. Dark colours may be used to help indicate dust contamination. Your workers' supplier will be able to advise you of appropriate clothing.
- ✓ Use the pictograms below in the workplace to explain where the use of PPE is required.

Respiratory mask · Ear protection · Eye protection · Safety helmet · Protective clothes

2.1.10

Good hygiene

Access

- ✓ Restrict access to the work area to authorised personnel only.

Design and equipment

- ✓ Provide separate storage accommodation for workers' clean clothes, work clothes and personal protective equipment.
- ✓ Ensure the area is spacious, organised and well-ventilated.
- ✓ This area should have toilets, showers and wash basins as well as personal lockers.
- ✓ Consider providing separate "clean" and "dirty" lockers in situations where work clothes become very dirty.
- ✓ Consider providing a separate, well ventilated, warm area where damp clothing can be hung up to dry.
- ✓ Note that the drying of damp, dirty clothes can lead to airborne dust contamination. When overalls are dirty, exchange them for clean ones.
- ✓ Define a specific clear area where workers can prepare meals, eat and drink away from their workstation.
- ✓ Provide your workers with refrigerators for storing food and drink.
- ✓ Provide your workers with an adequate supply of clean working clothes, including spare sets. For those handling silica flour, overalls should be made of a finely woven fabric to prevent dust being absorbed. Workers should not take their dirty work clothes home; these should be cleaned by the employer as required.
- ✓ Workers should remove overalls before entering canteen facilities.
- ✗ Do not use compressed air to clean overalls.
- ✗ Air shower cabins can be used to clean overalls.
- ✗ Workers should not smoke at their workplace.

Control of radiation protection of workers in the oil & gas industry leaflet oil & gas industry

- Legal requirements (Dir. 96/29 EURATOM, draft EU BSS)
- Origin of radioactively contaminated materials, specific activity
- chemical/physical processes relevant for radiation protection control

Determination of radiation exposure and RP measures

- Relevant radiation exposure exposure scenarios, pathways, calculation, measurements
- Dose calculation (formulas, parameters, standards)
- Proper measurements (γ-radiation, dust …)
- RP measures and experience

Radiation protection practice in the oil & gas industry, general aspects

- Good H&S practice is good RP (e.g. avoiding dust generation, keep material wet, venting vessels/container before maintenance……)
- Good housekeeping practice
- Use protective equipment and clothing
- Don't eat and smoke
- Washing of protective clothing
- ……..

Radiation protection practice in the oil & gas industry, specific measures

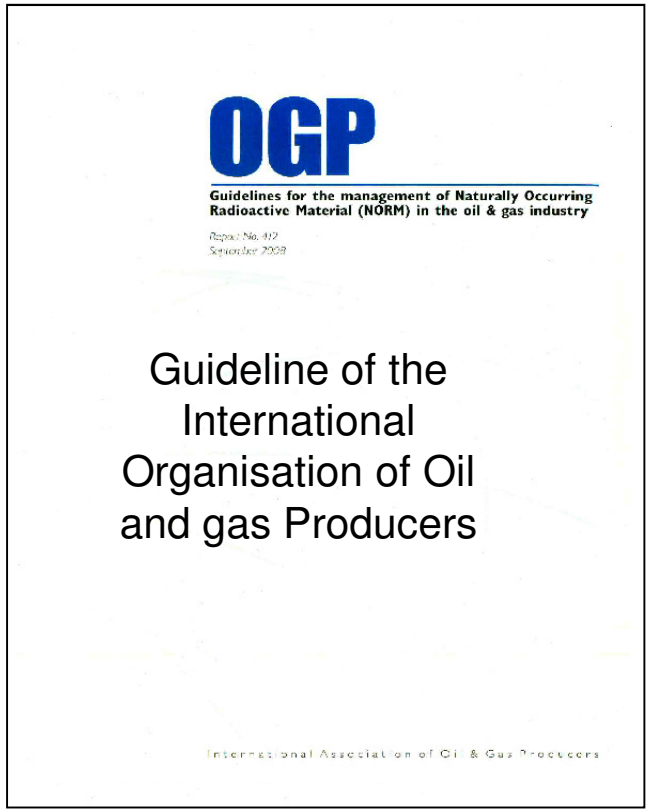
- Systematic surveys to detect relevant workplaces and keep them under control
- Detection and analyse of radioactive contamination
- Preventing spreading of radioactive contamination
- Venting vessels/container before maintenance……
- Optimize operations, working time etc., review in reasonable intervals
- Priority of measures: Technological – Organisational – Personal (TOP)

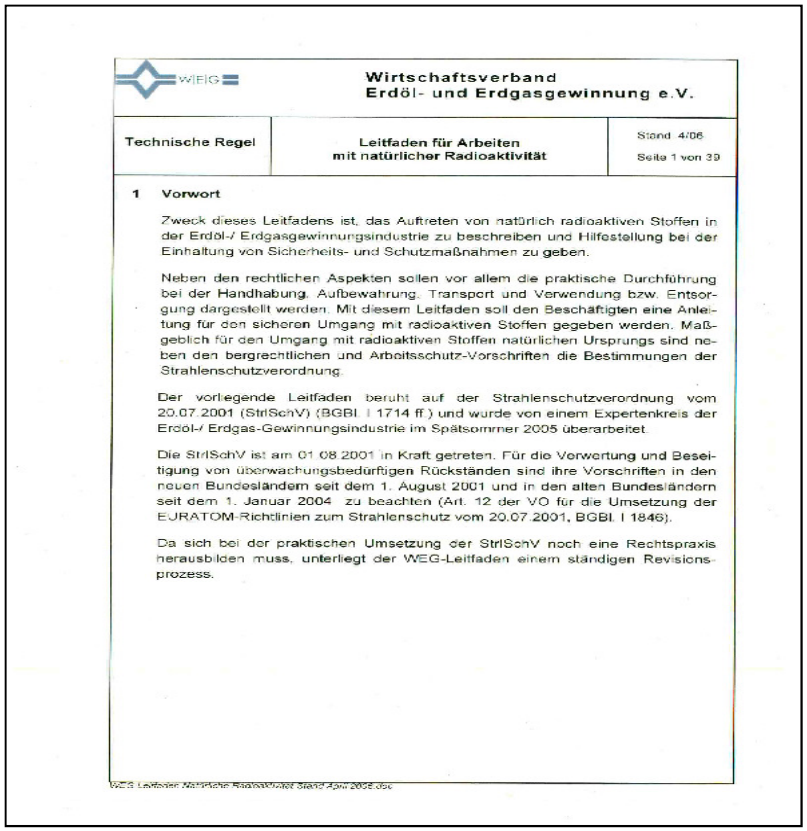
Residues of oil & gas industry-management and transportation

- Specific activity < CL= Normal waste, release and normal waste disposal
- Specific activity > CL = NORM waste, disposal in compliance with the radiation protection standards
- Requirements for transportation set out in TS-R-1 (IAEA) and ADR (European Countries)

Materials by industrial associations

Documents of the OPG and national organizations





General conclusions

1. RP should always be included into H&S procedures
2. Analyse the processes and identify relevant workplaces
3. Do realistic dose assessments
4. Proper operational management (priority of measures in TOP order)
5. Care for safe disposal of residues
6. Keep environmental impact and the exposure of the public as low as reasonable achievable
7. Keep workers informed

Network cooperation and perspective

- About 30 networkers engaged in the discussion of the leaflets, 10 sent comprehensive comments and made contributions to the text. **Thanks to all!**
- Publishing leaflets is an arduous job, however it is worthwhile
- Exposure due to NORM – according to future EBSS it is planned situation, more stringent requirements
  List of relevant Activities - Annex V
- Further information (leaflets) are necessary on the requirements of the revised EBSS, e.g. What should be done to justify the practice and to notify the authority?
- For what NORM industries leaflets are desirable (see Annex V of the EBSS draft)?
- What measurements are suitable for the determination of the exemption criteria?
- The workshop should draw conclusions and give proposals