

The Role of Industry in NORM Policy and Decision Making

A Practical Perspective

IAEA Webinars in Occupational Radiation Protection

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Content

- **Part 1 – Industry's Understanding of Risk**
- **Part 2 – Graded Approach to Regulation in Practice**
- **Part 3 – The Role of Industry**
- **Part 4 – Summary**



Resource Development



What is NORM?

- NORM (Naturally occurring radioactive material) definitions:
 - **NORM:** Radioactive material containing no significant amounts of radionuclides other than naturally occurring radionuclides (regulatory decision & activity concentration of process material is the key)
 - **NORM Residues:** Material that remains from a process and comprises or is contaminated by naturally occurring radioactive material (NORM).
 - **NORM waste:** Naturally occurring radioactive material for which no further use is foreseen.
- Above a certain criteria, NORM is regulated

General Safety in the Resources Industry

- Safety is a priority for all resource development operations
- Acute and chronic exposure hazards and risks
- Risk management approach:
 - Identify
 - Quantify
 - Control
- Standardised approach (avoid risk prioritisation)
- Control commensurate with the level of risk for all risks
- Limited resources to address issues (money, time, effort)

Safety and Occupational Health

- Safety
 - Short term acute exposure hazards
 - Identify through audits and incident analysis
 - Risk management
 - Eg; vehicle accidents, acute noise levels, slips trips and falls
- Occupational health
 - Long term exposure hazards
 - Need to identify exposure situations and monitor exposure
 - Impacts related to long term exposure
 - Compliance limits established (safe levels)
 - Eg; noise, asbestos, NIR

Mining Hazards



COLLISIONS



CHEMICALS



TYRES



MANUAL
TASKS



ISOLATION



STRATA
CONTROL



FIRES



EXPLOSIONS



SLIPS TRIPS
& FALLS



OCCUPATIONAL
HEALTH



INTERFACE



OUTBURST



GROUND
CONTROL



INRUSH



EXPLOSIVES
OPENCUT



EXPLOSIVES
UNDERGROUND

Mining Hazards



Occupational Health

- Dust (inorganic, silica)
- Diesel exhaust emissions
- Hazardous substances:
 - Gases and vapours
 - Solids and liquids
- Noise, Vibration
- Thermal / heat stress
- Asbestos and synthetic mineral fibres
- Non-ionising radiation (e.g. welding flash)
- Ionising Radiation

Challenge is
maintaining all
risks in perspective









Think About Radiation

- Radiation hazard is one of many hazards in many operations
- National responsibility in accordance with IAEA Safety Standards
- Highly regulated and high management focus
- Management approach is based on:
 - Comply with standards and regulations
 - Risk management in design and operations
 - Quality management systems and regular performance reporting
- Reasons for keeping risks in perspective:
 - Optimise overall health and safety
 - Proper decision making
- Need to manage stakeholder perceptions

Importance of Risk Perspectives

(apologies for generalisations)

Radiation Advisor	System of Dose Limitation
Management	Tell me what I need to do
Engineer	I need to build to a standard
Financial	Cost versus benefit – is this necessary ?
Regulator	Is the company complying and fulfilling its obligations ? Does it know what it is doing ?
Workforce	Am I safe ?
Public	Precaution – all radiation is bad
Media	What sells newspapers
Shareholders	Profits and new projects (mainly)
Industry	“Our industry is free from fatalities, injuries and diseases”

Key Points

- Industry can understand risk
- Industry is generally able to manage risk
- Industry has many risks to manage
- Need to ensure that risk stays in perspective
- This means that the requirements for control are appropriate

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IAEA Safety Standards

for protecting people and the environment

Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards

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General Safety Requirements Part 3
No. GSR Part 3



Safety Reports Series
No. 49

Assessing the Need for
Radiation Protection
Measures in Work
Involving Minerals and
Raw Materials



IAEA Safety Standards

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General Safety Guide
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Radiation Protection
and NORM Residue
Management in the
Production of Rare
Earths from Thorium
Containing Minerals



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Clearance

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and NORM Residue
Management in the
Zircon and Zirconia
Industries



Graded Approach to Regulation

- Requirement 6 of GSR Part 3
 - application of the requirements “*shall be commensurate with characteristics of the practice or source and with the magnitude and likelihood of exposures.*”
 - Applies to regulation, control, monitoring and recording
- Particularly relevant for industries involving NORM
 - Economic importance of industries
 - Doses are generally (but not always) low - moderate
 - Potentially high cost of regulations in relation to reduction in exposure (exposure levels are already low)
 - The graded approach optimizes the use of regulatory and operator resources
 - Regulations (and strategy) required above certain thresholds

Regulatory Guidance in GSG-7

- To determine the optimum regulatory approach
 - Consider, types of operation, process and material in more detail
 - A prior radiological evaluation of possible exposure
 - Consideration of the costs of regulation in relation to the benefits achievable
 - Arrangements to control, monitor and record of occupational exposure
- Other considerations;
 - Other Regulations
 - Non-radiological risks
 - Levels of analysis, documentation and action suitable to the situation
 - Characterization of the current situation
 - The approach should suit the complexity of the industrial operation
 - Ensure worker protection in a cost effective manner

IAEA Guidance

- Radioactive material is material (irrespective of whether processed or not)
 - that contains no significant amounts of radionuclides other than naturally occurring radionuclides
 - is designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity
- Material containing natural uranium or thorium (U_{nat} , Th_{nat}) $>1\text{Bq/g}$
- Clarification by IAEA (RS-G-1.7) (for purposes of regulatory control)
 - Exclusion – “....unamenable to control”
 - Exemption – “Risks so low as to not warrant regulatory control or provide any net benefit”
 - Clearance – “..removal of material from further control...”

What if Material is > 1Bq/g ?

(Advice from RS-G-1.7 for Regulatory System)

Apply a “graded approach” to regulation

Consider exemption as first option

1. Exemption (decision not to regulate)
 - Dose < 1mSv/y
2. Notification (similar to exemption but regulator stays informed)
 - Dose < 1mSv/y
3. Notification and registration
4. Notification and licencing

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This is all about risk assessment and risk management

Where control is proportional to risk

However, in practice.....

Exemption mechanisms are not obvious
in national regulations

Why ?

- Difficulty in conducting dose/risk assessments
- Difficulty in assessing the dose/risk assessments
- 1Bq/g is a clear unambiguous trigger (can be measured or inferred from gamma)
- Reluctance to grant exemption (precautionary approach, regulatory conservatism or public concern)
- Once a material is defined as radioactive, the label is difficult to then remove
- Mostly – it provided some “certainty”

Consequences

- Raw materials, wastes, products are “radioactive”
- Unclear whether materials are dangerous
- Materials are treated differently
- Added requirements on producer and customers
- Confusion between NORM, radioactive and nuclear
- Everyone is cautious and conservative
- Leading to potential “over” regulation

Direct Industry Cost Impacts

- \$100's million to reduce product from 2Bq/g to 1Bq/g
- \$10's million for tailings lining and underdrainage systems
- Penalties / increased treatment charges
- Project approval delays
- Operational constraints (monitoring, external scrutiny, regulations)
- Material considered to be inferior (loses value)
- Specialist waste disposal



Key Points

- The graded approach is an excellent concept
- However, it is not generally applied in practice
- Regulation tends to not take into account actual risk
- This leads to additional unnecessary costs or cancellation of project
- Money is spent on controlling an already low risk

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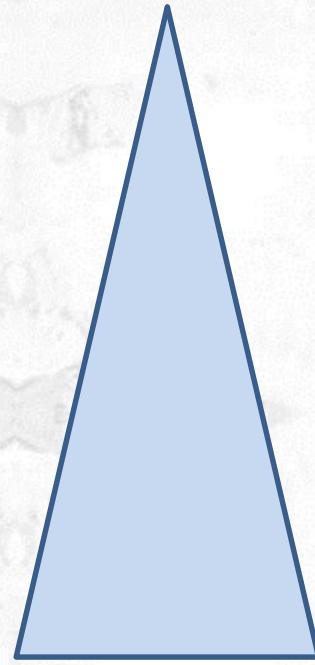
Industry Characteristics

- Culture of managing risks
- Systems approach to managing
- Focus on practicality rather than complexity
- Wide range of approaches;
 - Compliance
 - Leading practice
- Will generally seek guidance from regulators
- Ongoing capacity development through training
- Interaction with local communities
- Need to balance costs (therefore controls focus on risks)

- Applies generally – recognising that there are outliers

Observations - Operations

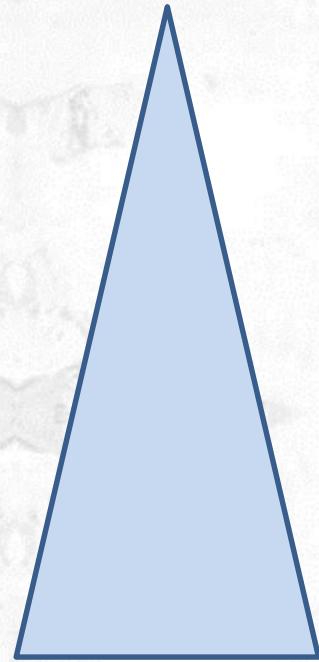
- Uranium projects
- Mineral sands
- Oil and Gas
- Rare Earths
- Other mining/processing



Number of Operations

Observations - Expertise

- Uranium projects
- Mineral sands
- Oil and Gas
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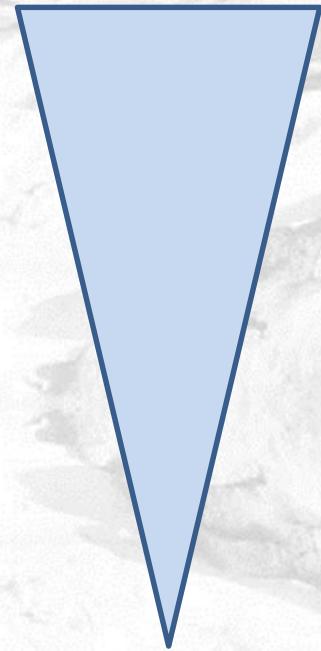
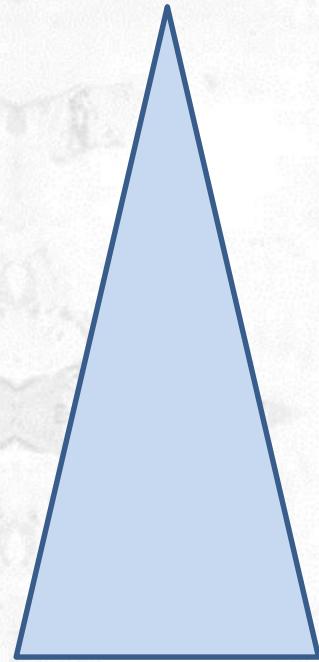


Number of Operations

Radiation Protection
Expertise

Observations - Expertise

- Uranium projects
- Mineral sands
- Oil and Gas
- Rare Earths
- Other mining/processing



Variable levels of expertise, so...

Number of Operations

Radiation Protection
Expertise

Need to communicate and work together



Guidance for Industry

- Be competent or seek assistance
- Be aware of the theory and science
- Move beyond compliance (graded approach to management of risk)
- Working relationship with regulator (mutual respect)
- Adopt new requirements
- Utilise expertise in wider industry groups
- Provide clarity to workforce
- Seek radiation mentoring - experienced professionals assisting and coaching
- Develop internal capacity (as part of OHS)
- Build competence and confidence



Industry Input to Policy

- Develop clear and simple messages – eg; “Radiation is safe at low levels”
- Cost effective screening monitoring
- Simple assessment and monitoring tools
- Avoid mixed messages
 - “doses are low but you still need to calculate them”
- Ensuring precise language and use of terms
- Manage as “one of a number of workplace hazards”
- Incorporate into safety management plan (for NORM)
- Hand in hand with developing capacity

IRPA NORM in Industry TG (ToR)

- To develop and promote a library of good practice documents for radiation protection in various NORM industries.
- To identify gaps at a global scale related to ethical foundations of radiation protection in working with NORM and stimulate open discussion of such issues
- To organise workshops and similar events including webinars for the dissemination of experience and good radiation protection practice in NORM industries world-wide.
- Webinars are particularly promoted as they allow to reach out to distant participants with limited resources to travel, e.g., in Africa, Central Asia
- Collaborate and co-ordinate with other groups of similar direction (e.g., within IAEA)
- Other means of dissemination will include position papers and website information



IRPA NORM TG Action Plan

- Collect examples of NORM related activities within their country
- Development of support documentation
- Maintain a watching brief on the ethical approach to radiation protection
- Develop a position on the graded approach to regulation
- Develop a document with advice for workers on NORM
- Propose to conduct a dedicated session at NORM IX
- Liaise with the IAEA to identify opportunities to work together
- Write to the ICRP to notify of its existence
- Write to other NORM organisations to seek collaboration

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Summary

- Risks in perspective
- Consistent with the “graded approach to regulation”
- Industry generally good at managing risk
- For NORM;
 - must understand the risk
 - then control appropriately
- Seek assistance
- Expertise does exist in industry
- Communications with stakeholders
- Industry provides very practical expertise



Thanks for listening !



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