



IAEA

International Atomic Energy Agency

Exposures from Legacy NORM Sites

- Legacy sites contaminated by NORM
- Environmental contamination by NORM
- Potential exposure pathways
- Mitigation and remediation options
- Regulatory issues



FIG. 3. Tailings pond no longer in operation.

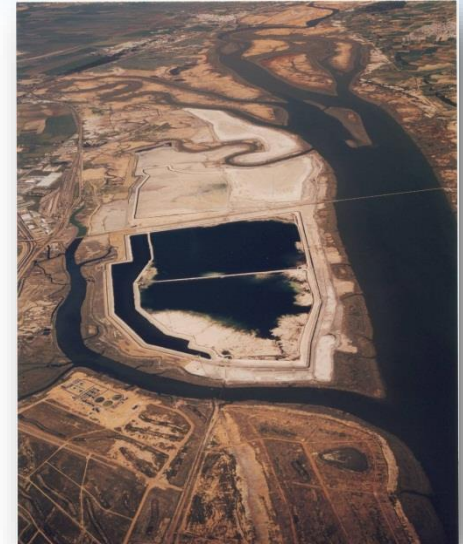
Legacy Sites

- Areas affected by past activities involving NORM.
- They are often abandoned or ownership is uncertain.
- The areas may include facilities, residues, land and water bodies contaminated by NORM residues.
- Legacy sites can be found in remote or urban areas.
- The sites and contamination can be very old e.g. centuries



Legacy Sites

- Contaminated urban legacy sites may have been built over for residential purposes or used for other purposes.
- A wide variety of NORM industries are involved.



Legacy Sites

- Some of these industries are no longer operated e.g. radium refineries, luminising operations, radium health cures.
- There is a wide variation in the extent of contamination, the quantities of materials involved and the radionuclide characteristics and activity levels.
- A wide variety of regulatory approaches are taken worldwide



Regulatory Issues

- Legacy sites contaminated with NORM arise from historical activities that were not regulated as “practices”.
- In most cases the Regulatory approach should therefore be consideration as existing exposure situation and apply the use of Reference Level for optimisation of doses.
- The clean up criteria require to be site specific and based on the principle of optimisation.
- A national strategy may be required to be developed in those countries with significant legacy issues.

Factors Affecting the Strategy Selection

- Availability of funding and experienced staff.
- The level of radiological hazard.
- Availability of waste management systems.
- Social and economic impacts.

Possible Exposure Scenarios

- Building dwellings on contaminated land or residue dumps
- Use of residues in building materials
- Use of contaminated ground and surface waters
- Contaminated foodstuffs
- Soil ingestion (children)

Mitigation Options

- A wide variety of approaches are available to mitigate the radiation exposures of the public from historical NORM residues.
- Removal of the contaminated material for re-use, recycling or disposal to a waste repository.
- Removal of the population from a contaminated area.
- Containment-stabilising, covering, shielding residue dumps.
- Soil and water treatment.
- Restrictions on access or land use.
- Complete isolation of the area.

Post Remediation Phase

Monitoring and surveillance may be required for some time after remediation to confirm that the site complies with the remediation criteria.



FIG. 6. Water sampling.

Key Messages

- Sites contaminated by historical NORM residues are a common phenomena worldwide.
- A wide variety of industries and residues are involved.
- Contaminated sites and materials may be used by the worker or public resulting in radiation exposures.
- Remediation of sites and the mitigation of exposures may be treated as an existing exposure situation.
- Radiation exposures can be reduced through a variety of mitigation options and technologies.
- Monitoring and surveillance may be required for some time following rehabilitation.