

Requirements and Provisions for the Release of Sites from Regulatory Control

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Background

- **Increasing number of facilities under or to be decommissioned**
 - Authorised practice
 - Aiming release from regulatory control
- **Site cleanup** may be required
 - Any measures that may be carried out to reduce the *radiation exposure* from existing *contamination* through actions applied to the *contamination* itself (the *source*) or to the *exposure pathways* to humans
 - Function of the size, complexity, the hazard potential and on possible future uses envisioned for the site

Background (cont)

- **Site**
 - Land
 - Buildings
 - Structures
- **Release from regulatory control**
 - Unrestricted
 - Restricted
 - Radiological basis
- **Non-radiological hazards** require consideration

Related Safety Standards



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Criteria for Site Release

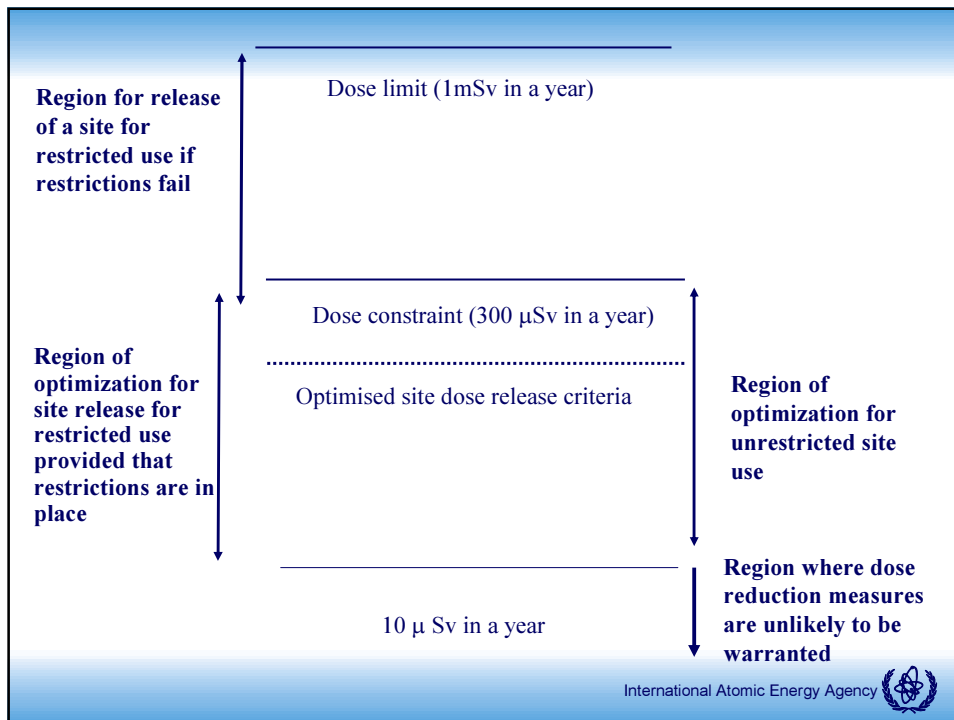
- **Release of site**
 - End of decommissioning
 - Part of practice
 - Basic Safety Standards apply
 - Dose limit – 1mSv in a year
 - Dose constraint – less than 0.3 mSv in a year
 - Optimization below the order of 10 μ Sv in a year may not be warranted
 - Unrestricted use
 - Below 0.3 mSv in a year
 - Restricted use
 - Below 0.3 mSv in a year with restrictions
 - Less than 1 mSv in a year if restrictions fail

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Criteria for Site Release

- **Baseline survey**
 - Prior to operation
 - Old facilities – reference background area
- **Uncertainties**
 - Related to the level of contamination
 - Hidden buried structures and
 - Waste
 - Potential use of the site



Criteria for Site Release

- **Clearance of material**
 - Effective dose to a member of a critical group below the order of 10 μSv in a year
 - Multiple scenarios
 - Enter trade
- **Site release**
 - Effective dose to a member of a critical group below 300 μSv in a year
 - Less scenarios
 - Constant location
- **New practices on a released site**
 - Dose constraint below 300 μSv in a year
 - Below 1 mSv in a year effective dose to public

Cleanup Activities

- **Cleanup involves**
 - Preparation of a cleanup activities
 - Site characterisation
 - Release criteria
 - Definition of endpoints
 - Development of a cleanup plan
 - Approval of the cleanup activities
 - Implementation of the cleanup activities
 - Management of radioactive waste and material resulting from the cleanup activities
 - Surveillance and monitoring, and release of the site from regulatory control

Preparation of a Cleanup Activities

- **Site characterization (land)**
 - General site conditions (e.g. chemical/physical/soil conditions)
 - Current use and history of the site
 - Identification of radiological contaminants and concentrations, and spatial variability of radionuclide distribution in soils (e.g. homogeneity)
 - Potential presence and contamination of underground structures (e.g. pipes, tanks)
 - Groundwater and surface contamination (if any)
 - Other non-radiological contamination that might require cleanup under other legislation

Preparation of a Cleanup Activities

- **Site characterization (cont)**
 - **On-site structures and buildings**
 - Physical state (including, structural stability of buildings, access and security, remaining conventional hazards)
 - Decontamination and radioactive waste management activities at the site
 - Airborne contaminants/air quality (including, suspended particulates, ease of resuspension, radon)

Preparation of a Cleanup Activities (cont)

- **Site release criteria**
 - Activity concentration (Bq/g)
 - Surface contamination (Bq/cm²), etc.
- **Approaches for derivation**
 - Generic – Regulatory Body
 - Site specific – Licensee
- **Methodology for derivation of site release criteria**
 - Determination of dose constraints to be applied
 - Definition of scenarios and pathways
 - Collect scenario and pathways specific data
 - Perform dose assessment
 - Determination of release levels

Preparation of a Cleanup Activities

- **Endpoints**
 - Comparison with criteria
 - Cleanup required
- **Development of a cleanup plan**
 - In compliance with hazard potential



Proposed Content of a Cleanup Plan

- Introduction
- Site description
- Cleanup strategy
- Cleanup activities
- Project management
- Dose assessment
- Radiation protection and safety measures
- Radioactive waste and material management
- Management system
- Environmental impact assessment
- Physical protection
- Emergency plan
- Monitoring and surveillance
- Final radiological survey

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Cleanup Plan Approval

- **Regulatory Body**
- **Other competent authorities**
 - Non-radiological hazards
 - Restrictions implementation
 - Bankruptcy
 - Long-term record keeping
- **Involvement of stakeholders**
 - Public, potential users of the site after release

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Implementation of Cleanup

- Protection measures
- Responsibilities
- Funding
- Equipment
- Waste management
- Clearance of material
- Monitoring
- Quality management
- Ensuring compliance with criteria

Final Survey

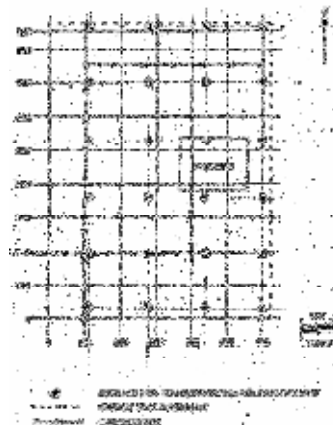
- The final survey is used to demonstrate compliance with the regulatory body guidelines for site license termination
- **Primary objectives:**
 - Describe radiological conditions of the facility on site
 - Demonstrate potential dose or risk from any residual contamination or elevated activity is below applicable regulatory threshold
 - Provide the data to demonstrate compliance with all radiological parameters

Monitoring for Compliance

- **General Considerations**
 - **Planning for the final survey can and should start early in the decommissioning project**
 - **Release criteria for the site should be established early in the planning for the project. Understand the impacts of various levels for release criteria**
 - **Areas can be released as work progresses; there is no need to wait until decommissioning completed**
 - **Use previously generated data to support the final survey plan**
 - **Selected release criteria may be to a national standard or site specific**
 - **Regulatory body may want to review the final survey plan**

Monitoring for Compliance

- **Survey preparation**
 - **Radionuclides of concern after remediation**
 - **Limits and criteria**
 - **Categorization of areas according to contamination potential**
 - **Determination of boundaries and survey units**
 - **Selection of background areas**
 - **Survey reference coordinate system**



Monitoring for Compliance (cont)

- **Survey Design (Plan)**
 - Scanning, direct measurements, sampling
 - Monitoring equipment and techniques
 - Multiple contaminants
 - Determine survey data needs
 - Determining locations
 - Measurement
 - Sampling
 - Sample size efficient to evaluate elevated activity
 - Evaluation of statistical methods

Monitoring for Compliance (cont)

- **Conducting Monitoring**
 - Determination of background levels
 - Determine scan coverage
 - Minimum detectable activities vs limits
 - Calibration, counting efficiency
 - Sampling – preparation, collection and quality control
 - Use of multiple monitoring techniques

Monitoring for Compliance (cont)

- **Evaluation of Results**
 - **Basic Assessment**
 - **Background correction**
 - **Conversion to activities**
 - **Treatment of uncertainties**
 - **Graphical display of results**
 - **Final assessment**
 - **Comparison between measured and expected values**
 - **Decision of compliance**

Release of Sites from Regulatory Control

- **Removal of regulatory control:**
 - **Regulatory body responsible for the decision**
 - **Based on confidence that the release levels have been met**
 - **Recommended use of independent review (verification)**
 - **Notification of licensee, competent authorities, and interested stakeholders**
 - **If compliance is not demonstrated – revision of controls and limits on the site or further remediation**

Final Survey- Independent Verification

- Regulator may require an independent verification survey
 - Performed by regulator or by an independent surveyor for regulator
 - Based on licensee final survey report
 - Random independent survey
 - Basis for licensee release from license
- **Note: It is important that the independent verification is performed with compatible instruments. The independent verifier should have an equivalent QA/ QC Program.**

Summary

- Development of a Safety report on monitoring for compliance with remediation criteria
 - Development of a Safety Guide (DS332) – in print
 - Technical Meeting – 11-15 Sept 2006, IAEA, Vienna

Summary

- **Release of sites**
 - Safety during an after cleanup
 - Decommissioning process
- Planning for the final survey should begin early in the decommissioning planning process
- Understanding the expectations of the regulatory body for how this phase of the work will be performed is a critical element in your on-going dialogue with the regulator
- The commission of a Final Survey Team will streamline the process
- It is critical to know the release criteria for the site before beginning to plan the final survey or the facility decommissioning phases