DS427 Radiological Environmental Impact Assessment for Facilities and Activities

For discussion

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Outline

• Background
• Highlights Safety Guide Radiological Environmental Impact Assessment for Facilities and Activities (DS 427).
• Technical challenges:
  • Frameworks of application
  • Humans + Flora and fauna consideration
  • Potential exposures
• Results from NUSCC discussions
• Next steps
Background (1/4)

- DDP approved in 2009 by CSS.
- Aim to provide a general structured approach to facilitate development of REIA in line with SF, BSS and other IAEA requirements, promoting a common understanding of the process, definitions and methodologies.
- Useful for (Nuclear/Radioactive) Authorization processes and for other processes that include considerations on impact to the environment (for example, EIA processes).
Background (2/4)

• In parallel:
  • the ‘system of environmental protection’ was being developed by the ICRP.
  • BSS were being updated, incorporating new considerations on radiological protection of the environment.
  • Authoritative documents were being published: ICRP 108 (2009), BSS (2011), ICRP 124 (approved 2013, being published).
  • Related Safety Guides were in preparation: DS432, DS442.
• Consultants / consultancy meetings / Technical Meeting (TM) were conducted for discussion of issues and drafting.
• Comments from TM incorporated.
• Draft submitted to NUSCC, RASCC, WASCC (September 2013).
The development of adequate and practical guidance on the topics included in this safety guide was noted from the beginning as a necessity and, at the same time, a challenging task (Secretariat + Experts in Consultancy and Technical meetings).

- New topics (protection of flora and fauna),
- Approaches not applied uniformly in all Member States (consideration of potential exposures),
- Different frameworks and the different target audiences (nuclear regulatory versus broader environmental regulators; experts, regulators, governmental agencies, stakeholders, public).
Highlights Radiological Environmental Impact Assessment for Facilities and Activities (DS 427)

• Interprets IAEA Safety Fundamentals, BSS and other IAEA requirements.
• Prospective assessment for planned exposure situations (new and existing installations).
• Provides a general structured approach.
• Promotes a common understanding of the process, definitions and methodologies.
• Useful for (nuclear/radioactive) Authorization processes and for other processes that include considerations on impact to the environment (e.g. EIA processes).
Highlights Radiological Environmental Impact Assessment for Facilities and Activities (DS 427)

• **Scope:**
  • Planned exposure situations: prospective assessments to any new and existing installations “discharging” during operation (not for post-closure releases).
  • Installations needing simple to complex assessments (Labs, hospitals, radioisotopes production, research reactors, NPPs, reprocessing, etc.)
  • Public and environment protection (not workers)
  • Prior to siting, during siting and construction, prior to operation, during operation (changes or periodical safety reviews), during decommissioning.
  • Not retrospective.
  • Could be for initial hazard assessment but not for emergency planning and managing.
  • Monitoring is discussed only as a need to validate the assumptions (monitoring is covered in RS-G-1.8)
Where DS427 fits in the Standards?

Safety Fundamentals (principles, safety objectives; public and environment, safety assessment)

GRS Part 3 (public and environment; safety assessment; graded approach; criteria; responsibilities; authorization process)

GRS Part 4 (safety assessment nuclear installations; responsibilities, graded approach)

SG-DS432 (clarify principles of protection in 3 exposure situations; humans; environment)

SG-DS427 (general framework for assessment radiological impact, planned exposure: normal + potential; humans; biota)

SG-DS442 (Regulatory control of discharges)

To be all submitted by next Spring

- TECDOCS (specific applications)
- SRS 19 models (being updated) (generic models & Input data, humans, biota)
- TRS transfer parameters (humans, biota)
• Discuss at a general level:
  • Input data.
  • Methods and models.

• Indicates and discuss the use of:
  • Numerical criteria (dose limits, dose constraints, risk constraints, reference levels).

• Guides on the necessary level of details for different installations and different stages in the life of an installation (graded approach).
Highlights Radiological Environmental Impact Assessment for Facilities and Activities (DS 427)

- Impact due to normal operations.
- Impact due to potential accidents.
- Impact to members of the public.
- Impact to flora and fauna (as an option).

DS 427 considers only radiological impacts (human health; exposure to flora and fauna which can affect population of species, if deemed necessary)
Challenges:
How to consider different frameworks of application? (1)

- Objective of DS427
  - to provide guidance on the implementation of requirements in the BSS for performing Radiological Environmental Impact Assessments (REIAs) for planned exposure situation as part of (i) information provision, (ii) governmental decision-making and the (iii) regulatory authorization processes for facilities and activities.
Challenges: How to consider different frameworks of application? (2)

- Information provision:
  - Environmental Impact Assessment/Safety Assessment
- Governmental level decision-making
  - Environmental Impact Assessment
- Nuclear/Radioactive Regulatory level authorization processes
  - Safety Assessment

**EIA**: a national procedure for evaluating the likely impact of a proposed activity on the environment, including human health and safety, flora, fauna, soil, air, water, climate, landscape and historical monuments or other physical structures or the interaction among these factors; it also includes effects on cultural heritage or socio-economic conditions resulting from alterations to those factors.
Challenges: How to consider different frameworks of application? (3)

IAEA Safety Standards + National (Nuc/Rad) Regulations + Conventions

National Regulations (others) + International Agreements (EC, ESPOO Convention)

DS427
Challenges:
How to incorporate flora and fauna? (1)

Objects of protection

Assessment reference

Estimation of Radiation dose

Source
+ Environmental dispersion
+ Exposure pathways
+ Dosimetric models

ICRP approaches for humans and environmental protection

- Deer
- Rat
- Bee
- Earthworm

- Duck
- Frog
- Trout

- Marine Flatfish
- Crab

- Pine Tree
- Grass
- Seaweed
Challenges: How to incorporate flora and fauna? (2)
Challenges:
How to incorporate flora and fauna? (3)

Integration of human and environmental protection (IAEA GRS part 3)

- Planned, existing, and emergency situations
- Environmental concentrations
- Exposure scenarios for Reference Animals and Plants
- Reference Organisms
- Reference Levels
  - Exposure scenarios for Reference Persons
  - Humans
  - Biota
- Decision making
  - Public health
  - Biota
  - Environmental resources

Best use of resources for assessment and demonstration of compliance (same experts, similar models and same monitoring)
DS 427 Components of an Assessment (normal exposures)

- Source Term
  - Dispersion and Environmental Transfer
    - Exposure pathways to members of the public
      - Identification of Representative Person
        - Assessment of dose to Representative Person
          - Comparison of doses with Constraints and Limits
    - Exposure pathways to flora and fauna
      - Identification of Representative Flora and Fauna
        - Assessment of dose rates to Representative Flora and Fauna
          - Comparison of dose rates with Reference Levels

Optional
Challenges:
How can we consider potential exposures? (1)

- Assessment and control of potential exposure is part of the safety considerations related to planned exposure situations.
- It is clearly identified as a requirement in the BSS and many other safety standards.
- A general framework for prospective assessment of radiological impact (DS427) would be incomplete if potential exposures are excluded.
Challenges: How can we consider potential exposures? (2)

- DS427 covers mainly the radiological assessment part and avoid detailed discussions of accidental source terms (source terms should be provided coming from safety analysis).
- DS427 tries to be general and compatible with different approaches being used in different member states.
Challenges: How can we consider potential exposures? (3)

- Possible selection of BDBA accidents and criteria
  - Conservative bounding accidents for small installations (e.g. Hospitals)
  - “Characteristic” accident/s (representative of the safety characteristics of the installations, based on safety assessment considerations, not the worst case).
- Systematic determination of accident frequencies and source terms (PSA Level 1 and 2)
- Dose criteria (e.g. 10-50 mSv); Risk criteria (ICRP / INSAG); No need of certain countermeasures (e.g. no large evacuations; no long term food restriction, etc.).
Challenges:
How can we consider potential exposures? (4)

• Guidance is very general and compatible with different approaches being used in different member states but remarks the need to consider potential exposures.

• Risk criteria (for those using risk estimations) by ICRP and INSAG.

• National examples in annex.

• Discussions on how to communicate in different frameworks (Safety Assessment vs. EIA)
DS427 Components of an Assessment (potential exposures humans)

1. Potential accident
2. Source Term
3. Dispersion and environmental transfer
4. Exposure pathways to members of the public
5. Identification of Representative Person
6. Assessment of dose to Representative Person
7. Comparison of dose/risk with criteria

flexible

harmonized
Results from NUSCC meeting(1)

- **NUSCC:**
  - *Notes that the IAEA’s view is that DS427 (Radiological Environmental Impact Assessment for Facilities and Activities) is not ready to be submitted to the Member States.*
  - *Considers that a revision of the DPP, which would not prevent continued development of the draft, could help in clarifying expectations and the scope of the document, thus addressing some of the comments/questions raised during SSC review. A decision on this would have to be taken by WASSC, the lead Committee.*
Results from NUSCC meeting (2)

• Issues:
  • frameworks (SA vs. EIA): communication
    View Technical Officer: will be improved in next version
  • potential exposures: think on excluding, moving
    View Technical Officer: should remain
  • post-disposal assessment: exclude
    View Technical Officer: will be clarified (its already excluded)
Next steps

• DS427 will be discussed in RASCC/WASCC joint meeting this week.
• To receive the advice from the committees and produce a new reviewed version in time for the next set of meetings in 2014.
• To discuss under request during that review period any of the resolutions elaborated by the Secretariat (already uploaded in the SC web page).
• DS432 (principles) and DS442 (control of discharges) will be submitted together with the updated version of DS427.