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Eidgenössisches Nuklearsicherheitsinspektorat ENSI

Swiss Federal Nuclear Safety Inspectorate

Radiation Protection Assessments and Planning:

terms,
purpose, objectives and reasons,
procedures, tools, competences,

ISOE-Symposium, Webinar June 1-3, 2021

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IAEA GSR 4 Para. 1.8: stages in the lifetime of a facility for which a RP assessment is carried out, …

(a) Site evaluation for the facility or activity;

(b) Development of the design;

(c) Construction of the facility;

(d) Commissioning of the facility;

(e) Commencement of operation of the facility;

(f) Normal operation of the facility *(incl. mainten*

(g) Modification of the design or operation;

(h) Periodic safety reviews (*incl. Quality Assurance Audits, etc.)*;

(i) Life extension of the facility beyond its original design life;

(j) Changes in ownership or management of the facility;

(k) Decommissioning and dismantling of the facility;

(l) Closure of a disposal facility for radioactive waste,

(m) Remediation of a site and release from regulatory

(*n*) *Regular determination of doses due to measureme*

(*o*) *Event analysis (rad. consequences, causes, lesso*

RP design features and concepts

RP planning procedure for future jobs or modifications

RP assessments of past stages of normal operation and events

purpose of RP planning

IAEA GSR 4 Requirement 4

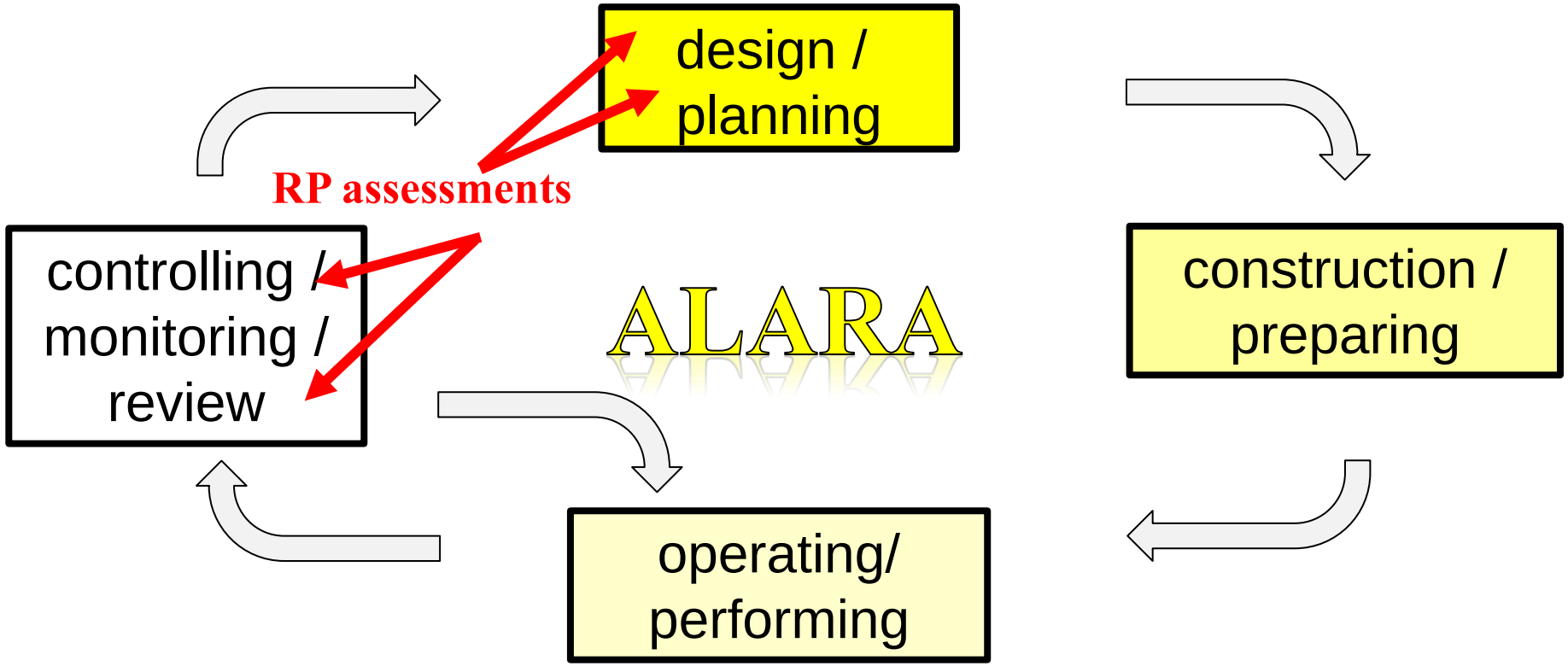
- **controlling of justification of exposure**
- **limitation of exposure**
- **optimisation of RP**
- **avoiding unexpected events**
- **mitigating consequences of events**

as well as

- *saving time, resources, and money*

optimization in practice

best moment for optimization (searching best solution by variation of design, work flow, tools and additional radiation protection measure to reduce radiological consequence as low as reasonable achievable …) is during the **design stage for a new facility or for the modification** as well as during the **planning stage for a new job/activity**



failing to plan is planning to fail

causes of events (from assessment of 25 events in nuclear facilities in Switzerland 1980 - 2000)	***amount of events***
missing or inadequate plan, design mistakes	*10*
poor maintenance (aging checks, missing function test)	*8*
Non compliance with local rules, disregarding RP measures	*5*
poor or missing monitoring	*5*
technical failure (not specified)	*3*
external causes (lightning, earthquake, blackout)	*3*
poor preparation, imperfect installation	*3*
poor rules, procedures, or operating instructions	*2*
missing marks, labelling, warnings	*2*
poor instruction, training or education, job experience	*1*

RP planning procedure

example of some regulatory requirements from swiss guideline (ENSI-G15)

- *the licensee shall establish a **RP planning procedure** wherein depending on **criteria as risk and complexity (graded approach)** of an activity*
  *the **level of detail** (content) and*
  *the **kind of documentation** of the RP plan has to be determined*

- *If the estimated collective dose for an activity exceeds 50 man-mSv the licensee has **to present the RP plan** to the regulatory body in advance*

- *the licensee has **to present** a summary of RP plans about a planned outage or decommission phase*

RP planning procedure:
preselection, level of detail, type of documentation

Examples, how it is implemented in swiss NPP regarding the graded approach

Each activity or modification with radiological consequences (e.g. activities inside the RCA)
has to be ***checked in advance by RP-personal deciding, whether and which type of RP-plan has to be developed***

- if individual doses < 10 microSv per day or job
  no job specific RP is needed, generic RP is sufficient
- if a routine activity results in
  - individual doses < 0.1 mSv per day or
  - collective doses < 0.5 man-mSv per day

  the RP controllers/RP technicians in charge may decide by themselves which RP measures and monitoring have to be provided when giving RP permission for a workplace ("mental planning"),
  documentation in RP logbook is optional.

RP planning procedure: level of detail, type of documentation

- …
- If a project (modification of NPP structure, systems or components, non routine maintenance or decommission step, job packages or single job) results in
  - individual dose > 5 mSv,
  - collective dose > 20 man-mSv,
  - generated rad waste > 10 m^3 or 1 Mg (tonne) or
  - release to environment > 10% allowed short term release limit

  an **detailed RP plan** has to be drawn up

  with the following content …

  (whereby some aspects may be skipped, when information exist somewhere else or is routine/trivial)

content and structure of RP plan

example from training course for RP technicians

- describe: purpose, layout, work flow, … of facility, operation, activity, … as well scope, time, duration, localisation, …
- estimate or measure: state and development of radioactive inventory, dose rates, contaminations, (special radiotoxic nuclides, neutrons, …)
- consider: exposure pathways in normal operation and after deviations
- set up: RP measures (design, technical, organisational, personal, …) using systematic approach (RP objective, concept)
- estimate: dose of workers (and public if release or radiation outside RCA exceed normal levels)
- compare: with dose limits, dose constraints, deduced limits
- vary workflow and add further RP measures to reduce radiological consequences if ALARA, perform mockup exercise
- set up: workplace monitoring and dose assessment, intervention levels
- organize: logistics, incl. transport, temporary storage, radwaste disposal
- determine: responsibilities, qualification of involved persons, pre-job-briefing, criteria for permits, thresholds for intervention, quality assurance, end of work procedure, feedback documentation

iterative steps until complying with limitation and optimization

necessary tools for easy RP planning

- Planning Procedure
  - criteria for choosing the adequate (few) levels of RP planning
  - check lists including the relevant information, settings, orders, intervention levels …
- Radiological Information Systems comprising:
  - ground, building, room and systems layout including RCA classification
  - relevant source terms
  - contamination and dose rate mapping
  - 360°-images from all rooms in RCA containing detailed radiological data as much as possible
  - reports about former activities or events
  - classification, qualification and dose data of staff members and outside workers
  - compact description of RP management, searching tools on internal manuals, rules, and regulatory requirements

necessary competence in respect to RP planning

- ***NPP management**:*
  should know why there is necessity for the involvement of RP in the design and planning modifications/activities, and how RP (incl. ALARA) has to be realized

- ***design engineers, project managers, persons in charge of facilities or systems**:*
  should know the main objectives, concepts, provisions of RP,
  and how these have to be considered during planning

- ***RP-experts, -specialists, -technicians and –controllers:***
  should have education, training and continuing training (i.e. visiting ISOE symposia) as well as should have gathered experience (i.e. benchmark visits) to understand plans and to implement all RP aspects

- ***project collaborators, staff, contractors/outside worker:***
  should be qualified, beside for self protection,
  to understand why RP provisions set up in the RP plan have to be implemented and how to act in compliance with RP rules set up in the RP plan

Thank you for attention!

Questions?

Acknowledgement:

- my colleagues at ENSI: Magnus Brunell and David Wittwer