



Working group 1a

How to apply ALARA for workers in the decommissioning and remediation



How to apply ALARA for workers in the decommissioning and remediation ?

- Radiation protection challenges
 - Wat are the challenges in applying the steps of ALARA ?
 - How are they different from operation ?
 - To which extend can the strategy and the end state have an influence on ALARA ?
 - Are there non-technical factors to take into account ?
 - What solutions/approaches to recommend ?
- Are there remaining issues and need ?
 - Technology ? Characterisation ?
 - Specific training ?



Different thematics were discussed

- ▶ Different type of dismantling operations
 - ▶ Immediate
 - ▶ Differed
 - ▶ Driving force ? Technics, radiological, money,... ?
- ▶ If immediate
 - ▶ Use of workers knowledge from the operational time
 - ▶ Not always possible. In big project, use of many subcontractors with new people
 - ▶ Organization for this knowledge transfer
 - ▶ Temporary storage of the waste. Impact on workers. Temporary can be long !
- ▶ If differed
 - ▶ Lack of knowledge about installation (outside existing documents)
 - ▶ Need of maintenance. Costs
 - ▶ Good for general radiological protection (less doses)
 - ▶ Problems with disappearing of easily to measure keys nuclides as ^{60}Co



Different thematics were discussed

- Application of ALARA at different levels
 - From design (SAR) to the realization of the dismantling
 - Many factors to take into account
 - Importance of the choice of the strategy.
 - Variation of strategy in function of the years.
 - Impact of the choice of dismantling tools:
 - i.e. plasma torch: production and dispersion of many radioactive aerosols
 - Use of robotic arm (work at distance)
 - Procedure to buy the devices: very long, governmental project, money availability, limited budget
 - Need to be flexible
 - Works by steps
 - If not, choice may not be the best optimized option
 - Long term view



Different thematics were discussed

- ▶ Importance of knowledge management
 - ▶ Tool to register experiences
 - ▶ Radiological data
 - ▶ Received doses for each operation
 - ▶ Everything that happens during dismantling (Return of experience-REX)
 - ▶ Registration of weak signals
 - ▶ Transfer of knowledge between workers
 - ▶ i.e. some tools and equipments that are used in operation might be used during decommissioning, although without adequate knowledge it can be difficult: loss of information how to use it.
 - ▶ i.e. contamination risks at the exit of contaminated area (masks)



Different thematics were discussed

- Risk of internal contamination
 - Has to be avoided. No optimization.
 - Use of collective (i.e. ventilation) and individual protection equipment
 - Control of the workers (Whole body counter, urine samples,...)
 - Nuclide composition can change in function of intervention: i.e. system decontamination
 - Optimization of the use of protective equipment in function of type of work



Different thematics were discussed

▶ Training

▶ Norm-industry

- ▶ Workers not used to work with radioactivity.
- ▶ Experience NI: training of the workers about all the risks (including radiological)

▶ Nuclear industry

- ▶ Different types of training in function of the type and how big is the dismantling project.
- ▶ Specific toolbox
- ▶ Holistic approach
- ▶ Importance of return of experience (Doses and events)



Recommendation 1

Protective equipment's

- Use of protective equipment in function of the different situations, taking into account the different risks (starting with good characterization) and comfort of the worker
- Creation of a catalogue

- **Destination:** Health Physics



Recommendation 2

Knowledge management

- ▶ If immediate dismantling
- ▶ Importance to conserve all the knowledge and the know how about the present equipment's of the plant that can be used during the dismantling stage to prevent avoidable exposures.
- ▶ **Destination:** Regulators, Operators



Recommendation 3

Knowledge management tool

- ▶ Use of centralized tool to register and to access all the REX (Returns of experiences) in the preparation stage and during dismantling operations (dose rate, dose, contamination, incidents, weak signals, precursors...).

- ▶ **Destination:** Operators



Recommendation 4

Dismantling strategies

- The choice of the dismantling strategies (i.e. cutting devices,...) has to be done in collaboration with , but not limited to, Radiation Protection Expert (impact on the doses and other risks)
- **Destination:** Utilities, authorities



Recommendation 5

Training

- The training of the workers has to address all safety aspects and particularly the difference in type of risks between operational and dismantling phase. This training has to be kept up to date during all the phases of the dismantling.

- **Destination:** *Utilities*