Occupational Radiation Protection (GSG7)

Group Exercise

Selection of personal protective equipment
In your groups, consider the following scenarios and list the appropriate personal protective equipment:

- Preparation of P-32 aliquots in a university research laboratory
- Working with NORM on a contaminated site
- Decommissioning of a disused glove box line in a facility used for studies involving alpha emitting aerosols
- Decommissioning of a nuclear reactor pressure vessel
Group exercise – selection of PPE

- Consider both:
  - Protective clothing required
  - Whether RPE is required, and if so, what type?
University research laboratory

General purpose laboratory used for work with P-32
Working with NORM

- Remediation of a contaminated site
- Soil contaminated with NORM at low activity concentrations
- Potential for airborne contamination
Decommissioning of glove boxes

- Used for studies involving aerosols
- Due to be completely decommissioned
- Will require removal of contamination
- Primary contaminants
  - Pu-239
  - Am-241
- Contamination levels inside are unknown
Decommissioning of a nuclear reactor

- Access to highly contaminated areas required
Objective of protective clothing is to:

- prevent transfer of radioactive contamination onto the worker
- consider protection against other hazards including chemicals and fire, if appropriate
- needs to be comfortable (especially if worn continuously)
- needs to be easy enough to be put on, use and take off (or worker may try to avoid using it)

- A graded approach is needed to match the level of risk and take into account the particular needs of the working environment and tasks undertaken
Remember...

- RPE may be needed for emergencies, repair and maintenance and in special circumstances
- Comfort and convenience of use should be considered as well as protection factor
- For long term wear, powered air respirators or helmets with face shields are preferable for comfort
Occupational Radiation Protection (GSG7)

Group Exercise
Suggested answers

Selection of personal protective equipment
Simple basic clothing for the contamination hazard

- Laboratory coat
- Disposable gloves
- Protective eyewear
- Overshoes

Provides only partial protection
Face and head/hair at risk
Wrist may be exposed
But suitable for many low risk scenarios
Working with NORM

- Overalls
- Gloves
- Overshoes/boots
- Head protection
- Close fitting at wrists and ankles
- No chemical protection needed
Working with NORM

Basic RPE would be suitable – eg negative pressure respirators (dust masks)

- Designed to filter contaminated air before it is inhaled
- Various grades and protection factors (typically PF20)
- Performance dependent upon face seal being maintained
- Only suitable for relatively short wear periods
- Not to be re-used
Working with NORM

Or could use half face masks
- Fixed or detachable filters
- Can allow a better seal to the face so more reliable
- PF depends on filter type – different grades e.g. P1, P2, P3, etc (P3 = typical PF 20).
- Still only suitable for lower risks and shorter wear periods
Decommissioning of glove boxes

- Worn with RPE
- Disposable oversuit
- Close fitting hood with gaps around the respirator sealed with tape
- Gloves taped at wrists
- Overshoes/boots – can also be taped
- Eye protection
Decommissioning of glove boxes

Higher quality RPE would be suitable – eg full face negative pressure respirators

- Better fit to the head is possible: maximum PF 40 (with P3 filter)
- Integral face and eye protection
RPE for longer wear periods

- Positive pressure respirators
- Similar to negative pressure types but with filter/fan unit to supply air to the mask via a hose - more comfortable - longer wear periods
- Maximum PF 40

[Diagram showing components of positive pressure respirator]
Decommissioning of a nuclear reactor

- Complete protection required
- Clothing invariably integral to the respiratory protective equipment
Decommissioning of a nuclear reactor

- Constant flow airline fed full suit
- Fed by a constant flow of breathing air via an airline:
- For highly contaminated environments
- Designed to be decontaminated
- Recommended PF 200
Positive pressure – constant flow airline

- Air supplied by an airline from a remote clean filtered air supply
- May use half masks, full masks or hoods/helmets
- Maximum PF 40
QUESTIONS AND DISCUSSION