Seminar 3: Radiation Protection in the nuclear industry (Focusing on few key issues)

Eduardo Dìaz

• Case studies
• Discussions
• Conclusions/Recommendations
Case studies and recommendations. Operational experience. Feedback into design and procedures.

Try to present “case study” events with radiological significance in the nuclear industry, such as:

- Skin/tissue injuries with simultaneous radioactive contamination. How to deal with hemorrhage and decontamination.

Try to provide recommendations and procedures to eliminate or minimize radiological impact.
EVENTS WITH RADIOLOGICAL SIGNIFICANCE IN THE NUCLEAR INDUSTRY

• Avoid skin/tissue injuries with simultaneous radioactive contamination.
• If it happens, define beforehand how to stop hemorrhage or when to stop decontamination.
• Do not forget injured individual follow up after the event.
Radioactive contamination of drinking water at the plant (intentionally or non-intentionally). How to cope with the problem. How to avoid it or to be acquainted immediately.

- Intentionally: Contamination of drinking water dispensers
- Non-intentionally: Contaminated condenser hold up water drainage.
DRINKING WATER CONTAMINATION

Typical water dispenser

Drinking water plastic bottle

Hot Cold

Cups
DRINKING WATER CONTAMINATION

- From reactor
- Blow down
- River, Lake
- Make up plant
- Drinking water supply system
- Drinking water plant
- Condenser
- Pump
- Drainage
AVOIDING CROSS CONTAMINATION AT THE PLANT

• It is important to define clear routes inside radiological controlled areas, specially, access and exit procedures, including well defined monitoring and applicable clothing.
• Locker rooms, shower rooms and decontamination facilities of personnel, must be also defined.
• Procedures and supporting material should be identified and make it available to establish barriers and “hotter” areas, when necessary.
• Establish permanent and temporary signals to be posted in different areas alerting radiation risk.
CLEAR DEFINED RADIOLOGICAL CONTROLLED AREA VS. GRADED RADIOLOGICAL CONTROLLED AREAS

• Both systems are used in the nuclear industry.
• A “clear defined radiological controlled area” is probably more expensive, but defines clearly conventional and radiological areas with their applicable procedures and precautions.
• Many maintenance and repair works do not need deep decontamination when they are performed inside the “clear defined radiological controlled area”. Some examples will be presented.
• Obviously, “hot workshops and laboratories” will be additionally required. “Hot tooling and devices” must be properly identified.
CLEAR DEFINED RADIOLOGICAL CONTROLLED AREA VS. GRADED RADIOLOGICAL CONTROLLED AREAS

• For “graded radiological controlled areas”, there are three areas defined as: low, intermediate and high risk of contamination/radiation. Access to each area may require adequate clothing and monitoring procedures. Clothing change depends on the radiological situation of the next area. A “high maturity” level of personnel is necessary.

• An exhaustive control of common workshops and laboratories is necessary.

• A very good radiological control of intermediate and high risk areas is necessary. Low and conventional areas must be permanently controlled, avoiding degradation.
CLEAR DEFINED RADIOLOGICAL CONTROLLED AREA - BASICS

- Conventional Chemical Laboratory
- Radiochemical Laboratory
- Conventional Workshops
- Hot Workshops
- Monitoring, lockers, decon.facilities

CONVENTIONAL AREA

RADIOLOGICAL CONTROLLED AREA
GRADED RADIOLOGICAL CONTROLLED AREAS- BASICS

- Low level
  - Monitor
  - Labs & shops
- Intermediate level
- High level
  - Lockers & decont. facilities
  - Large Monitors
  - Formal barrier

Conventional area

Just single lines on the floor
TYPICAL ACCESS TO A RADIOLOGICAL CONTROLLED AREA

- White robes
- Showers
- Laundry
- White robes
- Yellow overalls
- Yellow overalls
- Overshoes changing
- Lockers for street clothes
- Dosimeters

M: Monitor
Y: Yes - accepted
N: No - rejected

Exit & Access
AVOID CROSS CONTAMINATION

• Some examples

- Glass Sliding doors (Yes)
- Sliding doors Proximity detectors (Yes)
- Operated by photocells, pedals, etc (Yes)
TYPICAL POSTERS AT THE ACCESS TO CONTROLLED AREA

STOP  RADIATION  NO SMOKING  No eating!  Do not shake hands!
Many other subjects may be considered during the Seminar, such as:

• National recording system of Radiation Workers
• Indoctrination of outsourcing man-power (Safety and Radiation Protection)
• Radioprotection Supervisors round the clock or “Everyone is a Qualified Radioprotection Supervisor”
• How to avoid legal problems using adequate procedures and monitoring equipment in key access and exit points of the plant.