

Radiation protection & Covid-19 in French Nuclear Power Plants

Sylvain ANDRESZ
EAN meeting
7 June 2023

Context and the initial motive

- According to UK SRP, the key principles of radiation protection also apply to protection from Covid-19
- **But do the key principles of radiation protection also apply to protection from the combined ionizing radiation and Covid?**
- In March 2020 the French Nuclear Power Plants remained in operation
- In controlled area, EDF was confronted with a new risk (Sars-Cov-2) and a new objective (limit the spread of contamination from Sars-Cov-2) in the overall objective to protect the H&S of all workers
- EDF write several documents* which have been analysed to see how the management of 'IR+Covid' has been applied and for different circumstances

Key Principles of Radiation Protection apply to Protection from COVID-19

News Story from 23rd Sep 2020



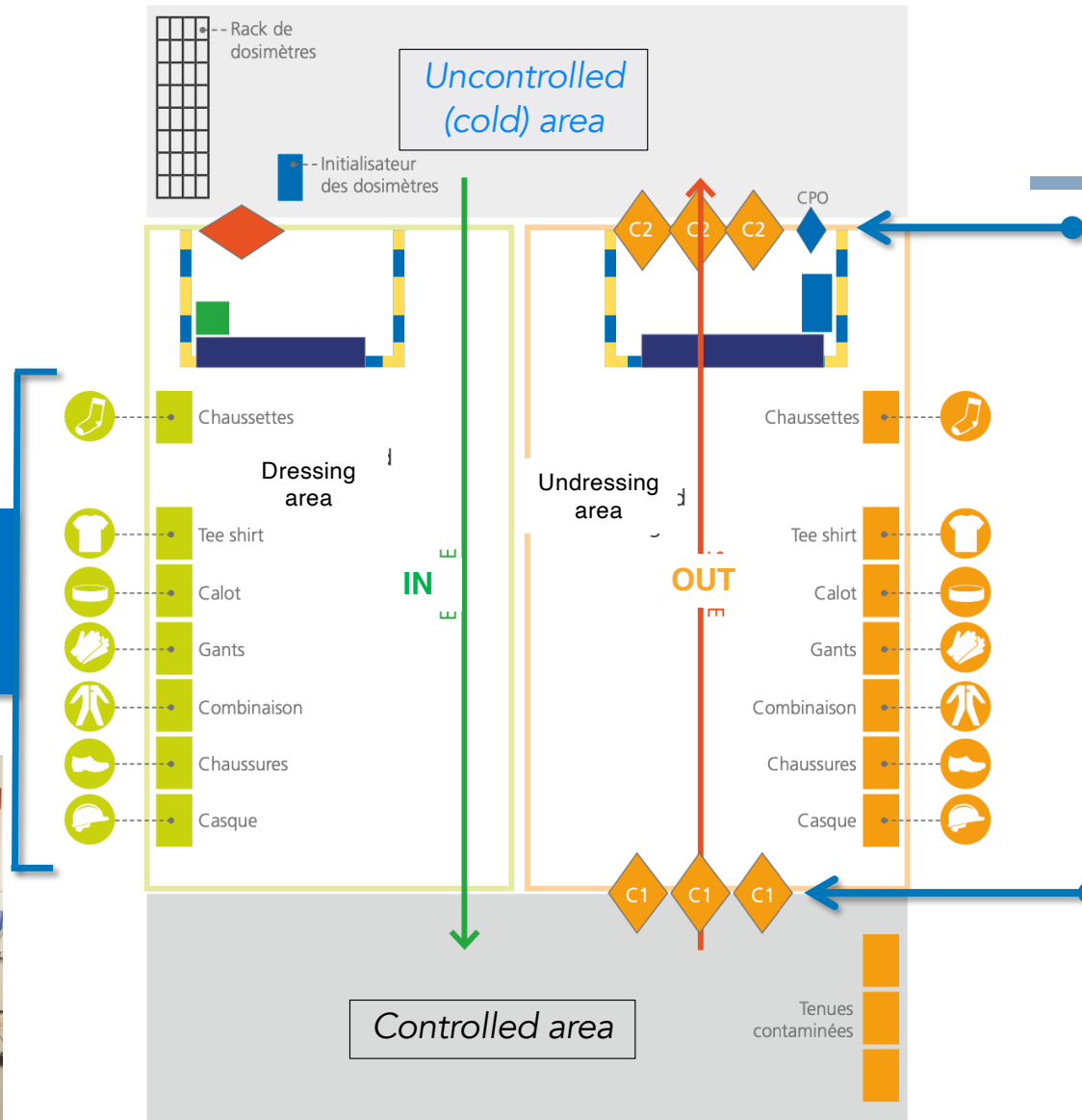
One of the key principles of radiological protection is to keep doses As Low As Reasonably Practicable (ALARP). This is achieved by various combinations and variations of three basic Parameters: Time of exposure, Distance from the source of radiation, Shielding to reduce the radiation.

These parameters also apply to protection from COVID-19.

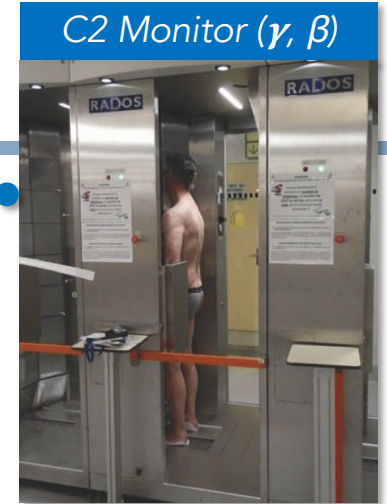
In *EAN Newsletter* **44**, November 2022

* Position papers, technical note, guidance ... Accessible to external companies on the E-learning platform of EDF Euréka/nucléaire. The information are the property of EDF.

Clothes and Personal Protection Equipment

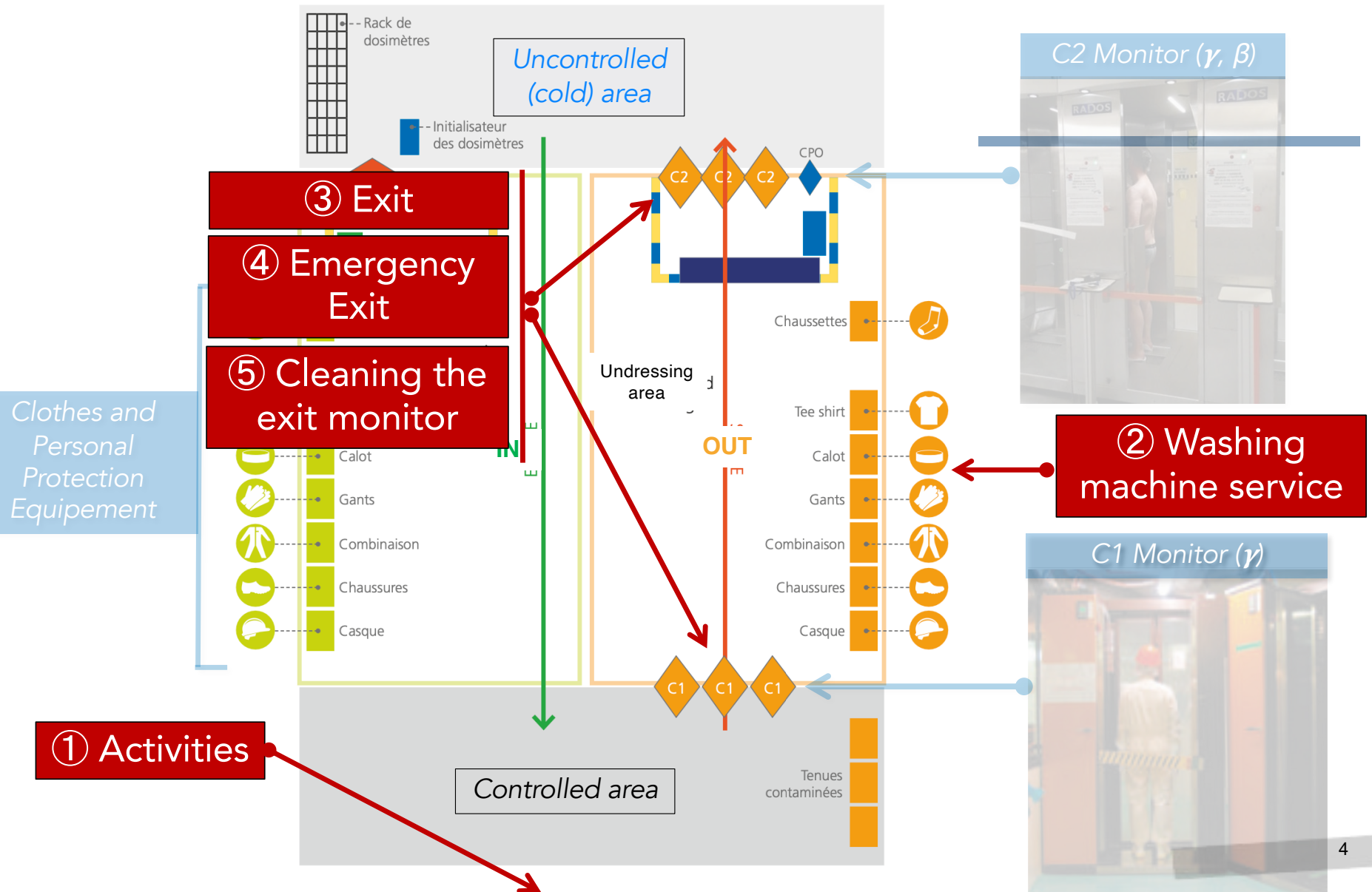


C2 Monitor (γ , β)



C1 Monitor (γ)





Management of IR+Covid in several circumstances

① ACTIVITIES IN CONTROLLED AREA

- Analysis of the organization, the usual practices, the environment, the nearby activities to identify the situation where the minimal 'sanitary distance' of 1 m cannot be maintained and limit their occurrence/frequency (the 1 m value was a recommendation from Government to employers)
- Consider
 - Work schedule (staff limitation, 1 staff), report of activities, limit co-activities, ...
 - Behaviour : cleaning hands, limit contact,
 - Install screen (*makrolon*, plexiglass) (need disinfection)
 - PPE like ventilated mask, protection against asbestos, for welding, chemical, gas filtration and gloves (cotton, *nitrile*) – provide an efficient protection
 - The choice of the PPE depends on the other "*specific and prime*" risks - not Covid. If present, there is no need for surgical mask
 - If surgical mask are to be wear, the risk analysis should examine if it bring a "*significant burden*" to the activity
- The surgical masks are to be changed regularly. The used masks are labelled nuclear waste and dispose of according to the specific stream

Management of IR+Covid in several circumstances

② WASHING SERVICE

- Integration of the recommendation from Health and Labour Ministries ... all aligned with IR : (close bag well, limit handling, wear gloves, washing-machine recommendation ...)
- *"As a matter of fact, all requirements are already applied to limit the transfer of radiological contamination as per se the Managerial Reference"*

③ EXIT

- It rapidly appeared that surgical mask increase the risk of face contamination with radionuclides because the workers regularly adjust/handle it and this also increase the risk of internal contamination. Furthermore the mask can conceal a radioactive contamination (ex. 400-800 Bq β)
- At C1 monitor: control (no change)
- At C2 monitor : control gloves (for IR); remove surgical mask; disinfect hands; hands dry; then control.
 - If contaminated below the shoulder: put on a surgical mask. If contaminated above the shoulder, the other staff put on a FFP2 mask

Management of IR+Covid in several circumstances

④ EMERGENCY EXIT

- Airborne activity increase inside the reactor building require emergency exit of all workers in one batch (one batch = 1 airlock)
- Consider
 - Delay the activities that give rise to the possibility of airborne activity increase
 - Limit the number of workers in the reactor building
 - (this makes a link with ① **Activities in controlled area**)

⑤ HOW TO CLEAN AN EXIT MONITOR?

- The material is fragile and design to detect radioactivity: cannot project any drops or moisture (use wipe) and a special gesture
- Consider UV lamp: ~1.5 min needed for disinfection (even 4 min if sneeze/cough)
- Introduce a new risk! 'artificial optical rays': limit the power of the lamp and wear special helmet, gloves and opaque clothes



- The goal remains to protect the health of the workers and *"find compromise and practices to take into account in the most efficient manner the risks of an activity"*
- Based on information from Government, Health and Labour ministries, health agencies, WHO, literature, ... (and subject to evolution)
- Risk of Covid contamination is introduced in the risk analysis and the result could be that ...
- **Results.**
 - **The normal procedure is compatible, so not modified:**
 - Washing service, PPE in place for other risks (respiratory and gloves)
 - **The normal procedure is not compatible with the extra risk, so modified in line with the general principles of prevention:**
 - Avoid risk, adaptation of the work plan, change in behaviour,
 - **The normal procedure is not sufficient, and modified but this bring a new risk:**
 - Mask, internal/conceal contamination, exit monitor, waste ++
- Consultation of the *"the health physicists, the engineering units, Directions, NPPs and external companies"*
- Decision technique : *"efficient", "optimized", "significant", "prime risk", advantages/disadvantages, ...*
- Is it aligned with ALARA? Yes!