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INSTITUT  
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ET DE SÛRETÉ NUCLÉAIRE

*Enhancing nuclear safety*



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International Atomic Energy Agency

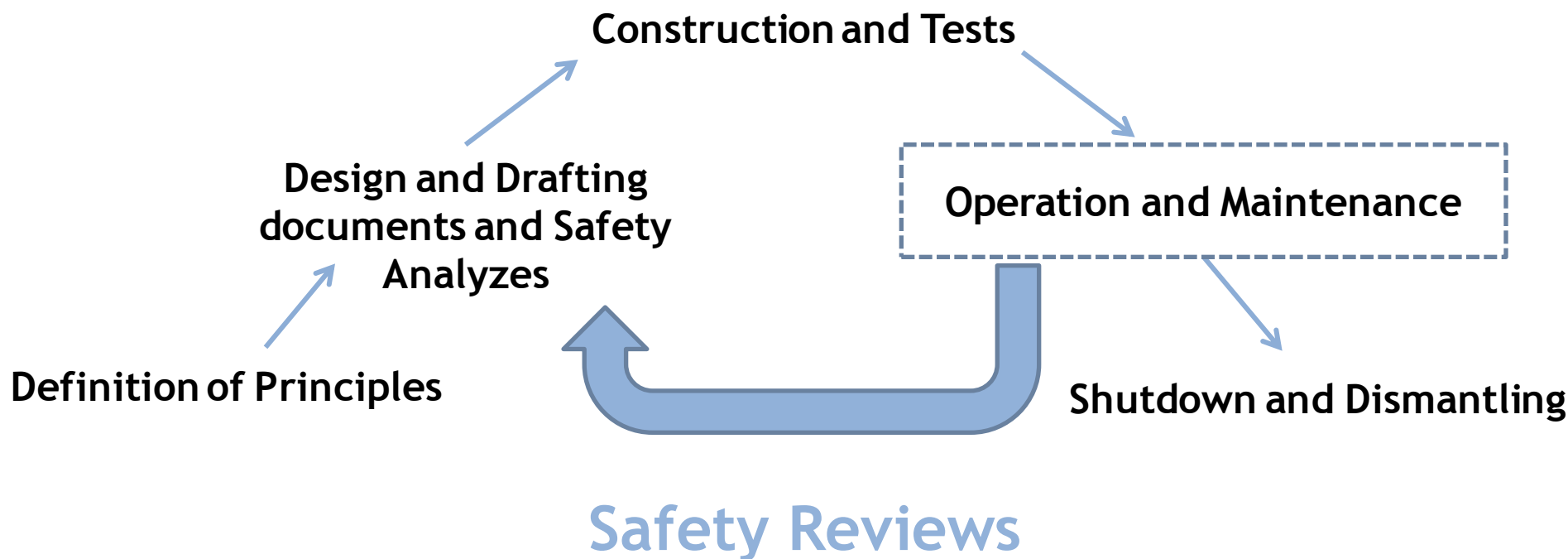
# International Conference on Management of Spent Fuel from Nuclear Power Reactors - An Integrated Approach to the Back-End of the Fuel Cycle

## Lessons Learned From A Periodic Safety Review, Applied To The Design Of New Nuclear Fuel Cycle Facilities

Dr. David RACIMOR, Dr Nicolas CHARRIN, Marie-Thérèse LIZOT

Vienna, 17 June 2015, presented by Dr. David RACIMOR

# How the Safety Review is set up for the Life Time of an Installation enabling to Improve the Design of new Facilities



## Objectives of the Review (every 10 years in France according to the current regulations)

- to check the Conformity of the Facility with the Requirements in Connection with Safety in an independent Way from the normal operating Procedures
- to query the Control Provisions of Aging
- to assess its Safety Level in the light of the Evolution of Regulations, of its Environment, of the Latest State of the Art, and of the Best Practices in the field of Nuclear Safety and Radiation Protection available at the Time of the Review, taking into account Experience Feedback of the Facility, and similar Facilities.

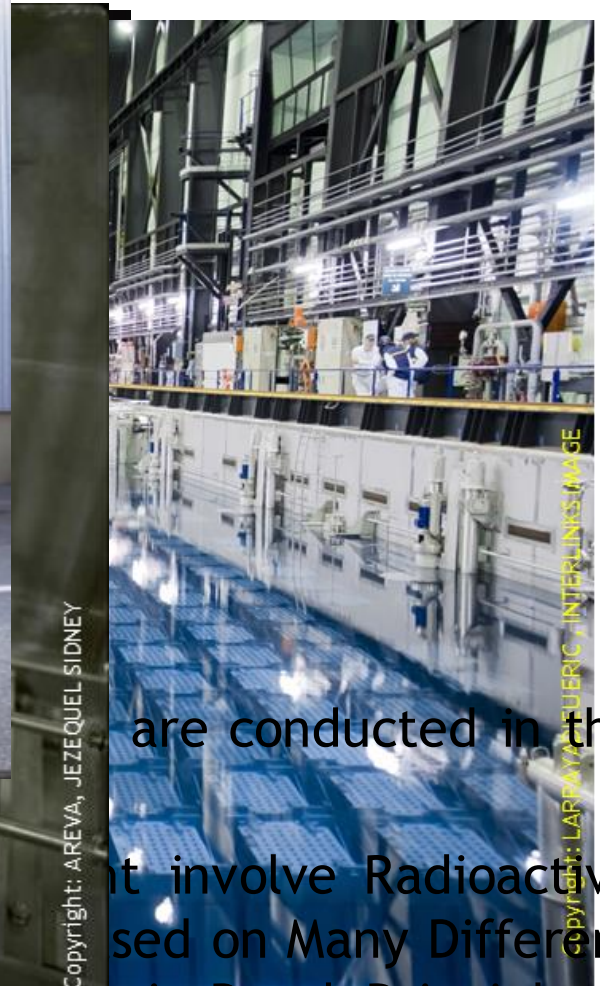
# Safety Review of the UP3-A Plant part of the Facility at La Hague (France) operated by AREVA NC

Plant, built mainly between 1986 and 2002, dedicated to the Treatment of Nuclear Spent Fuel



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# Safety Review of the UP3-A Plant part of the Facility at La Hague (France) operated by AREVA NC



plant ( $\approx 400$ )

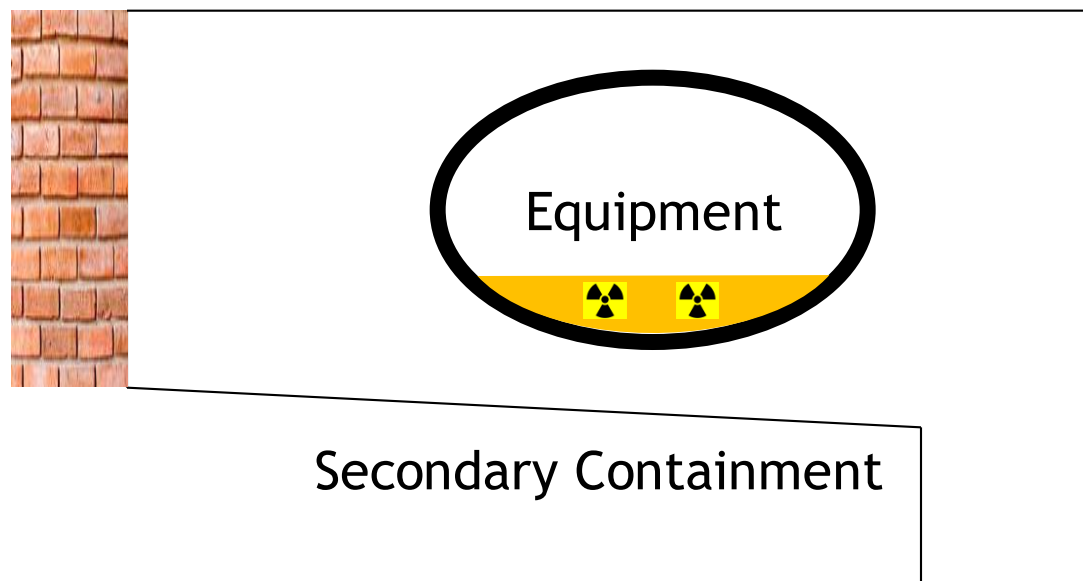
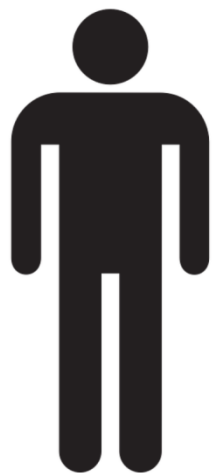
The Risk Co  
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Principles, how

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sed on Many Different  
-in-Depth Principle.

## Need to anticipate the Phenomena of Aging and the Consequences

Margins are taken into account at the Design Stage concerning the Degradation Phenomena (corrosion, erosion...)

- Especially in closed hot Cells where no Access is Possible

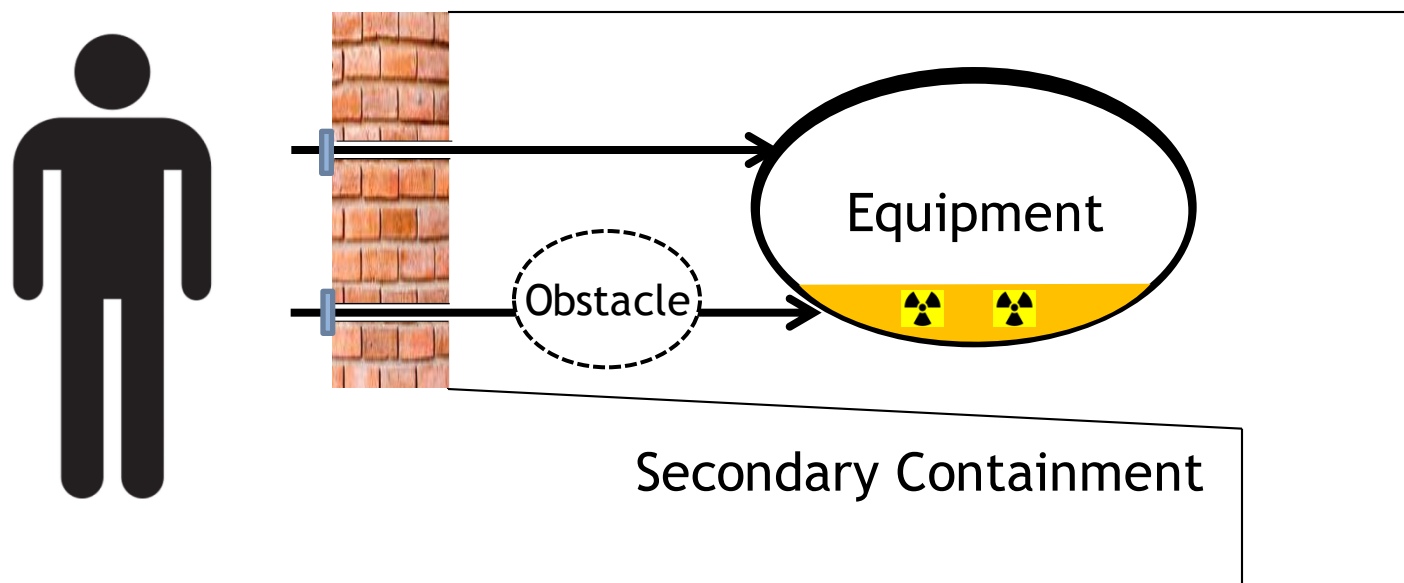


Certain Degradation Phenomena potentially underestimated in the Design

## Need to anticipate the Phenomena of Aging and the consequences

### Need to monitor the Corrosion Kinetics (Thickness Measurements)

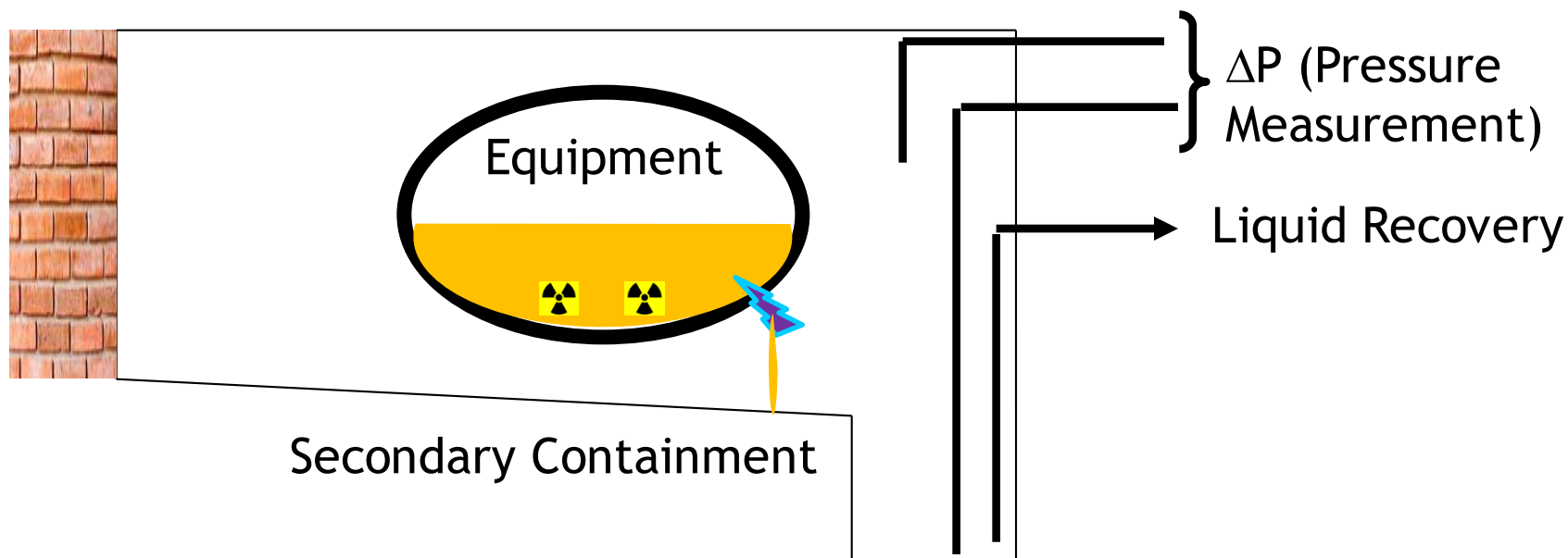
- New Tools developed, introduced through existing Holes in the Walls
- Difficulties to position these Devices on the most useful Locations to check the Equipment



- How to carry out such verification Measures should be better considered in the Future Design of nuclear Facilities.

## Need to anticipate the Means of Direct Detection

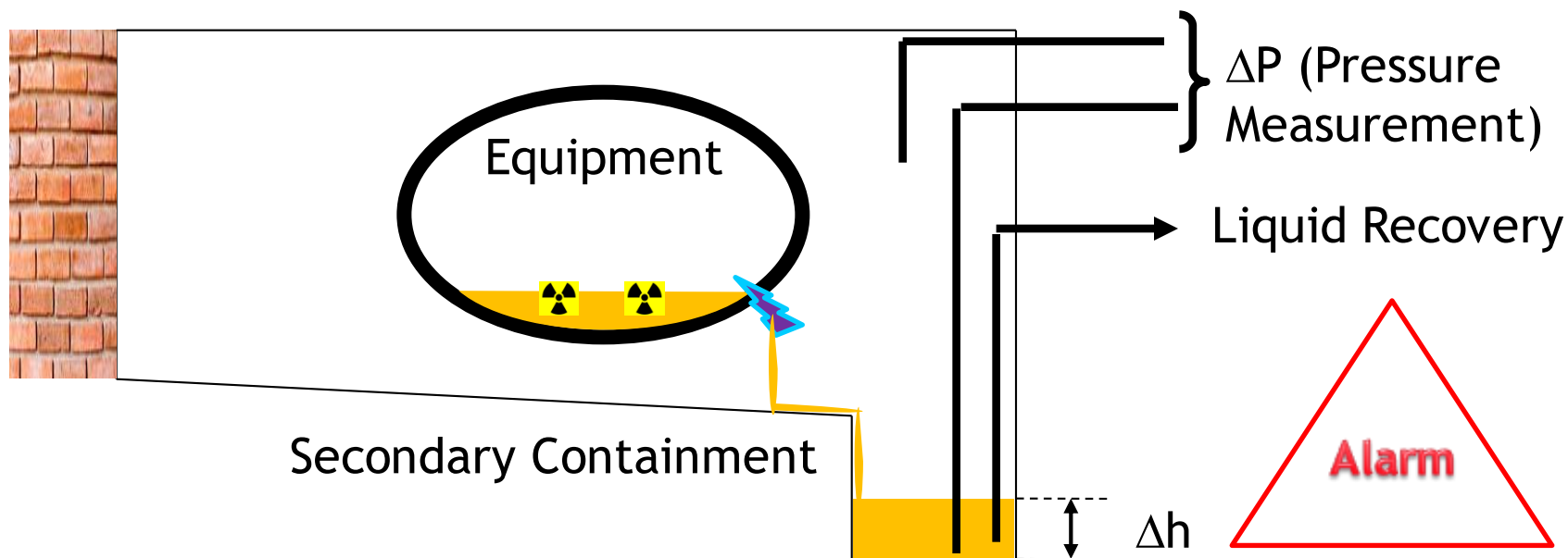
- Leak Detection Devices designed to detect the arrival of a Large Amount of Liquid in the secondary Containment located under the Equipment





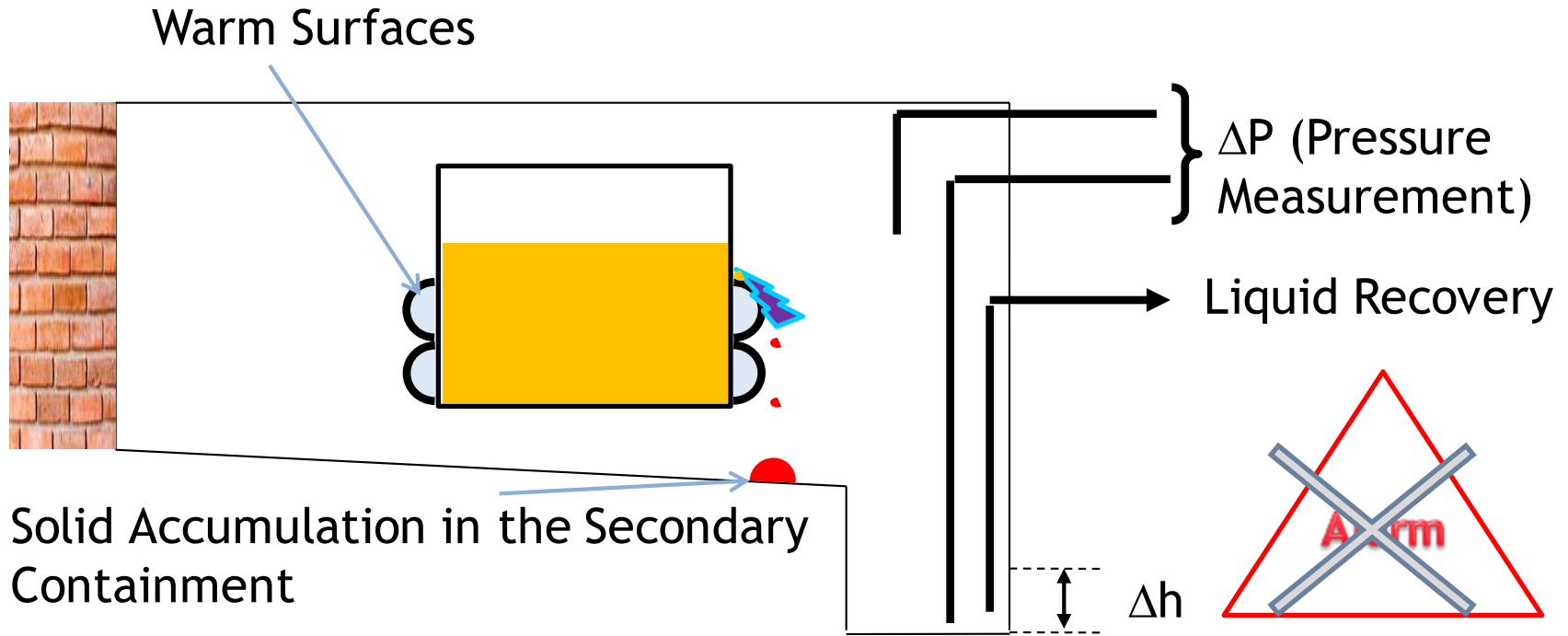
## Need to anticipate the Means of Direct Detection

- Leak Detection Devices designed to detect the arrival of a Large Amount of Liquid in the secondary Containment located under the Equipment



# Need to anticipate the Means of Direct Detection

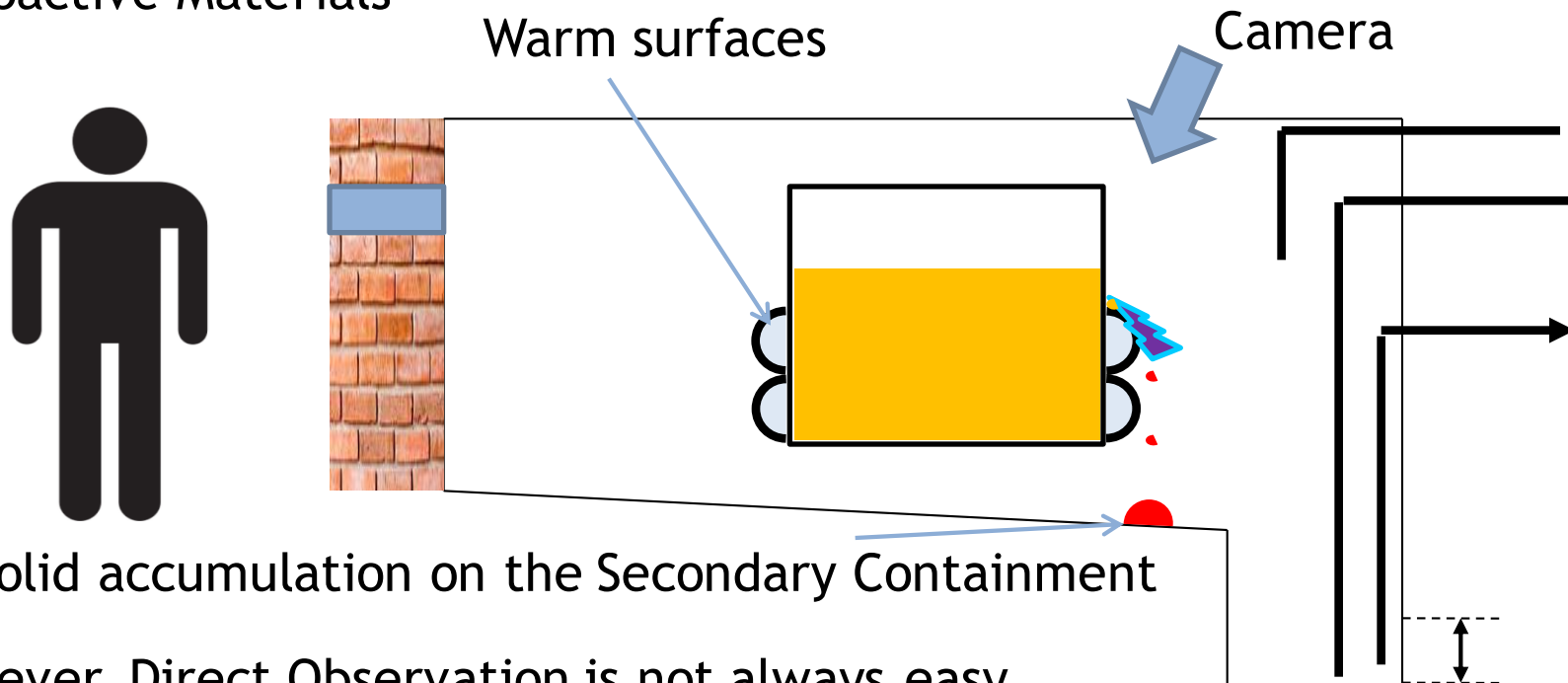
## Inadequacy of Detection Devices in some Cases



## Liquid already evaporated before reaching the Secondary Containment

## Need to anticipate the Means of Direct Detection

- Periodic checks to detect as soon as possible any Accumulation of Radioactive Materials



- However, Direct Observation is not always easy
- The Definition during the Design Phase of Areas to be monitored facilitates the Implementation of these Periodic Observations.
- Justification of the Periodicity is necessary in case of Criticality Risks

## Conclusion

### ■ Need to anticipate the Phenomena of Aging and the Consequences

- Anticipating the Phenomena involved in order to have good Margins in the Design,
- Anticipating the Means for monitoring the Phenomena
- Anticipating the Means of direct Deviation Detection
- Anticipating Ways to Repair or Relocate

### ■ Today some of the Topics require New Operating Provisions, Additional Investigation or Expansions

- Considering a different Design for future Plants

■ The Periodic Reviews concerning the Safety of Fuel Cycle Facilities, every 10 years in France, constitute an essential Process for the Maintenance and Continuous Improvement of the Safety Level in Nuclear Facilities

