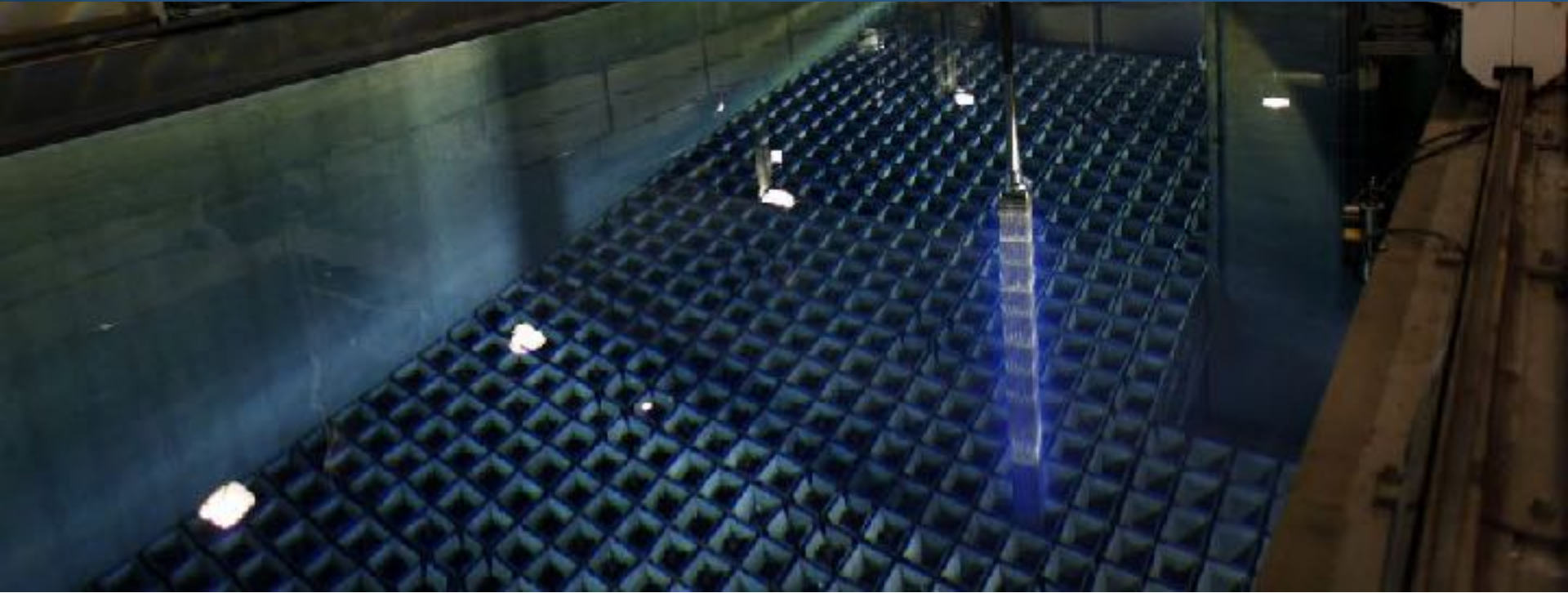


Spent Fuel Pool Under Rack Cleaning



© 2019 Rolls-Royce The information in this document is the property of Rolls-Royce and may not be copied or communicated to a third party, or used for any purpose other than that for which it is supplied without the express written consent of Rolls-Royce. This information is given in good faith based upon the latest information available to Rolls-Royce, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Rolls-Royce or any of its subsidiary or associated companies.

Trusted to deliver excellence

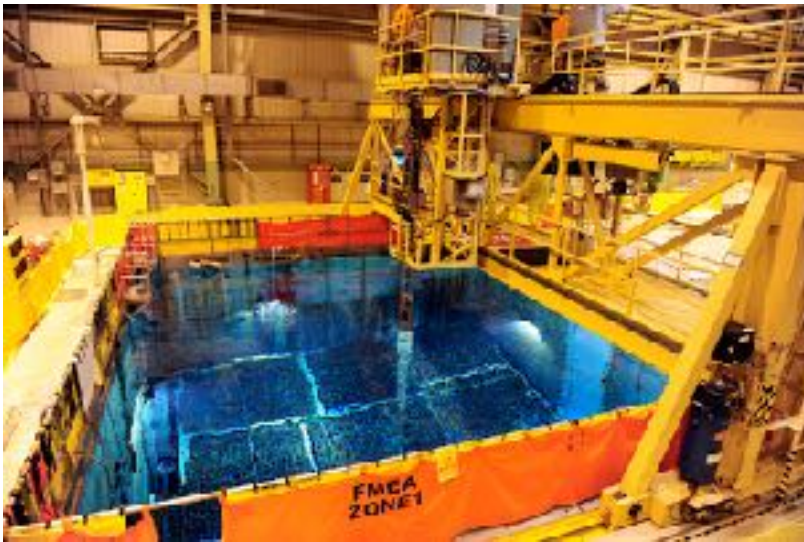


Rolls-Royce

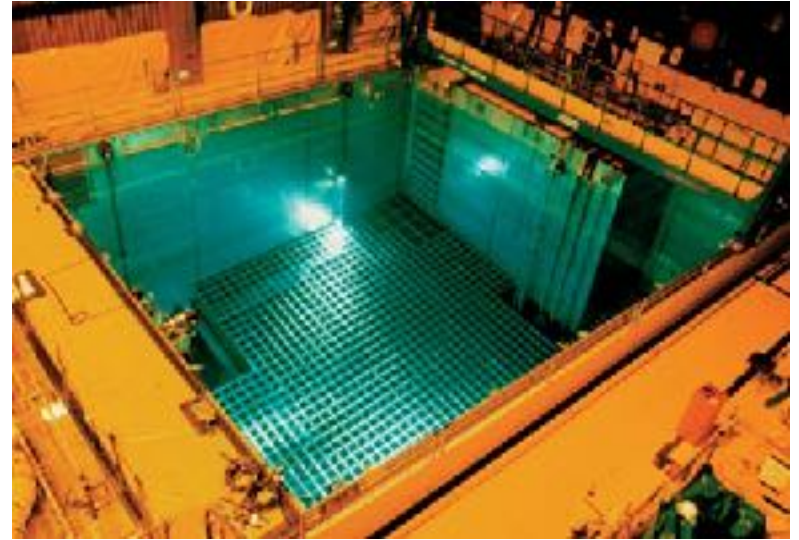
Agenda

2

- **Challenge Statement**
- **Operating Experience**
- **Summary**



BWR Spent Fuel Pool

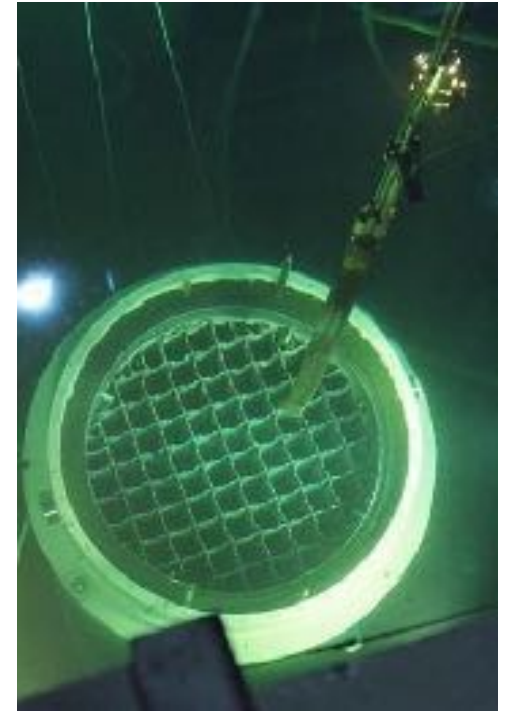


PWR Spent Fuel Pool

Spent Fuel Pool Under Rack Foreign Material Challenge

3

- Foreign material under the SFP rack is disturbed when moving fuel
 - Refueling
 - Dry Cask Loading
- Moving fuel creates an “updraft” in the cell, drawing foreign material up, in and through the rack
- Material has the potential to deposit in fuel assemblies destined for the core



Dry Cask Loading

Foreign Material Examples

4



Rolls-Royce

Operating Experience

5

- Prepare to handle large volumes of highly radioactive foreign material
 - Site A: 1,000 REM / hour of debris and 50 discrete objects
 - Site B: 200 REM / hour of debris and 150 discrete objects
- Stock up on filters



Pen Spring

Operating Experience

6

- Ensure vacuum filtration system is in good repair
 - Capability effects the effectiveness and duration of the service
- Monitor filter radiation levels to meet disposal requirements
 - Dose limit 20 REM / hour



Allen Wrench



Cut-off Wheel

Cleaning Results

7



Pre-Cleaning



Post-Cleaning



Case Study

- General source term removal
- Mitigate potential sources of failed fuel
 - Support full core offload
- Twelve 10 micron filters were collected
- Two crawlers
 - Primary for vacuum activities
 - Gripper for collecting large foreign material
- Ancillary components readily removed under water to reduce radiological concerns (treads, brush)
- Operated remotely from low dose area
- No significant handling/maintenance issues
- Ultimate success will be measured by fuel failure free cycle following RF20



Danger Tag



LPRM

Summary

Spent Fuel Pool Under Rack Cleaning

- Prevention of foreign material-induced fuel failures
- Risk mitigation for fuel failure-induced source term and contamination level increases
- Risk mitigation for response to foreign material found in a fuel assembly
- Risk mitigation for the costs associated with these issues

