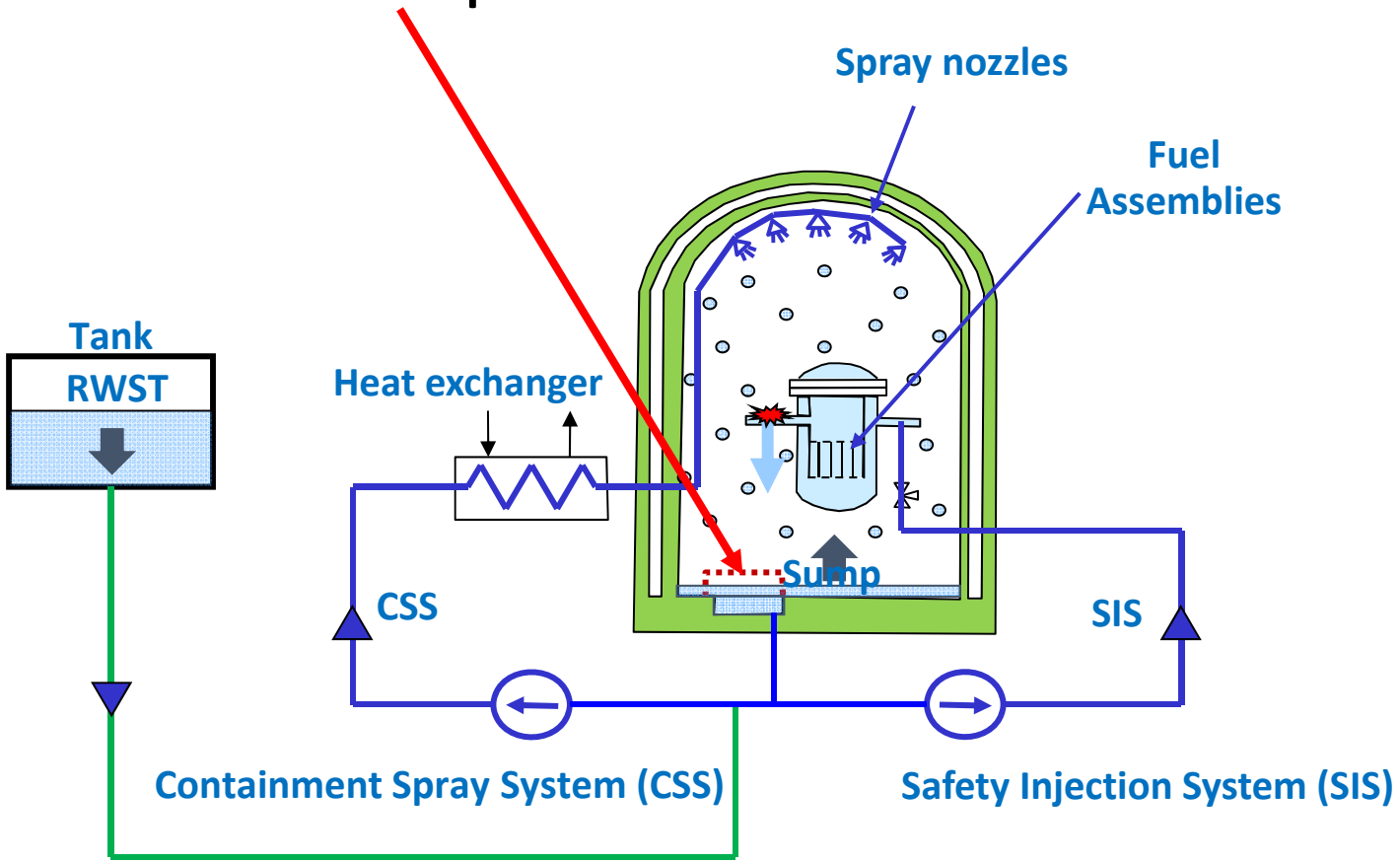
Closure of GSI-191 and Remaining Actions

Webinar - July 11, 2019

Key messages – GSI-191 closure

- The underlying technical issues related to GSI-191 have been thoroughly examined for over a decade.
- GSI-191 no longer meets the criteria to remain in the GI program and is being closed.
- All plants reduced the potential for sump strainer blockage by installing improved strainers.
- In-vessel downstream effects are determined to be low safety significance compliance issues.
- All plants are still required to complete their response to GL 2004-02 if they have not already done so.

GSI-191 original issue: "Assessment of Debris Accumulation on PWR Sump Performance"



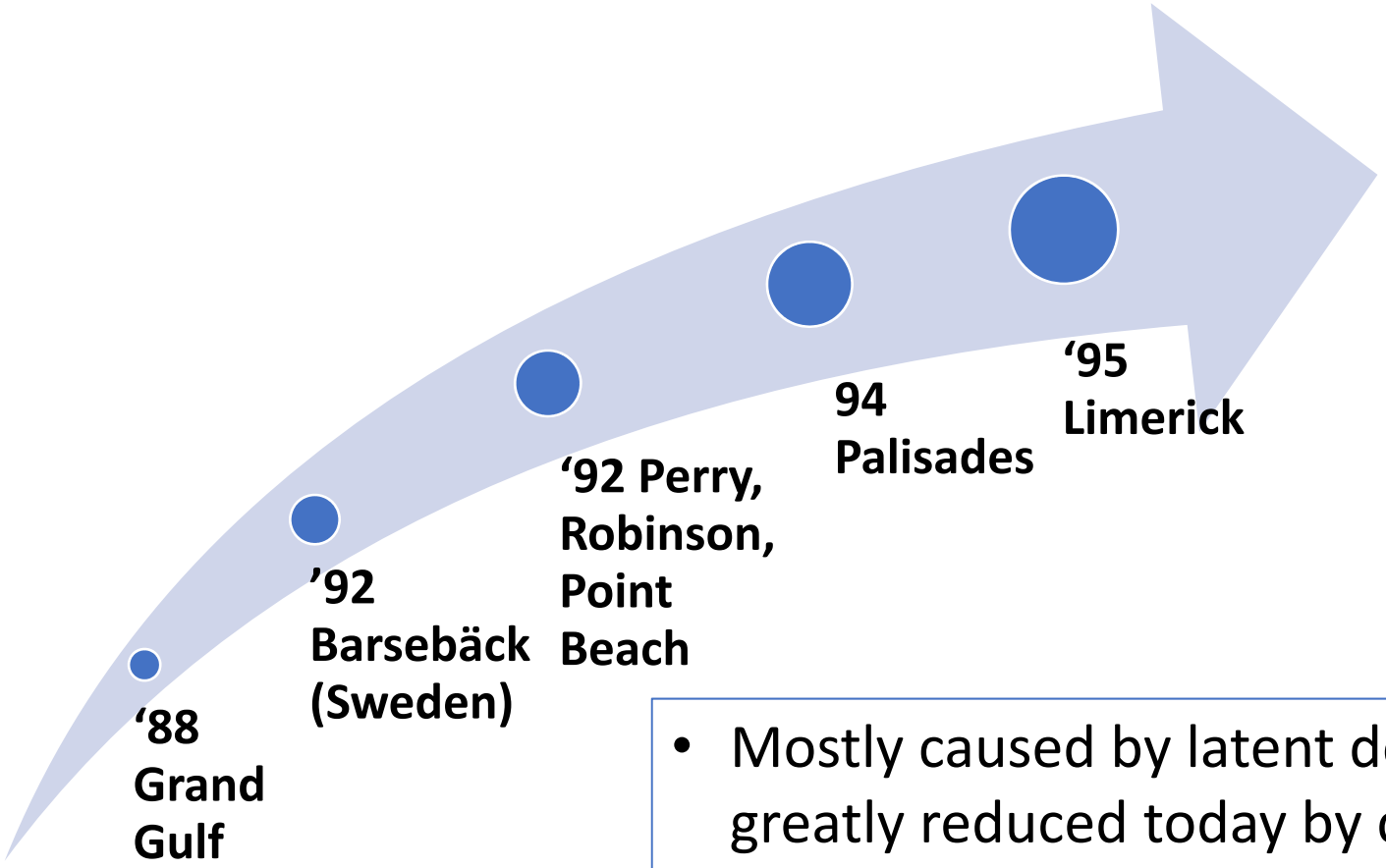
Closure of GSI-191

No longer meets criteria for a Generic Issue

- Criteria 1: Low risk/safety significance
- Criteria 3: Addressed by another NRC regulatory process (e.g., GL 2004-02)

Plant specific resolution of remaining plants will **continue** to be tracked and evaluated under Generic Letter 2004-02

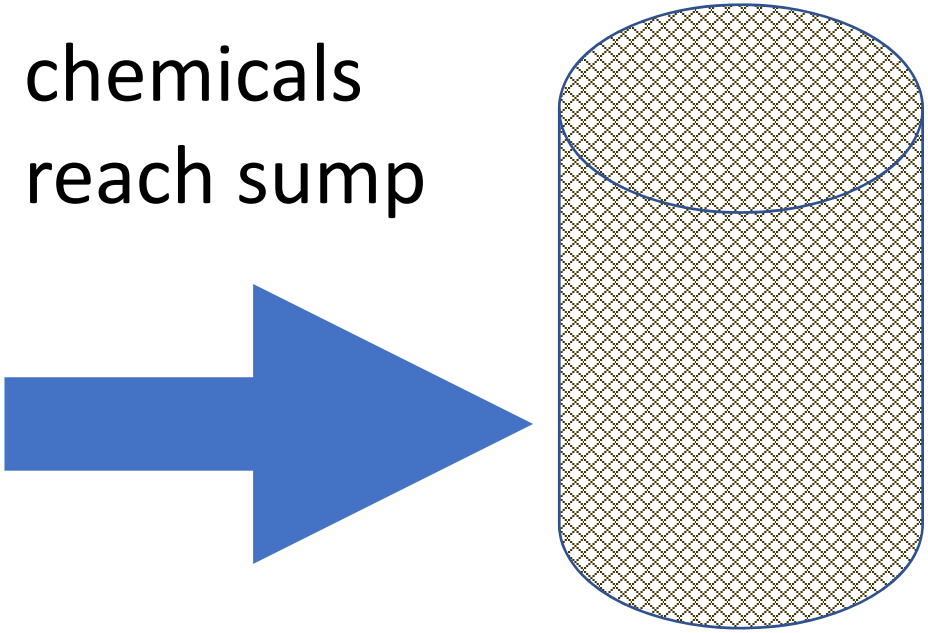
Examples of operating experience



- Mostly caused by latent debris - greatly reduced today by containment cleanliness programs
- However - demonstrated a susceptibility to debris effects

Scope expanded to include downstream and chemical effects

Debris and chemicals reach sump



Some debris and chemicals pass downstream through the strainer to the reactor core

Actions completed at plants

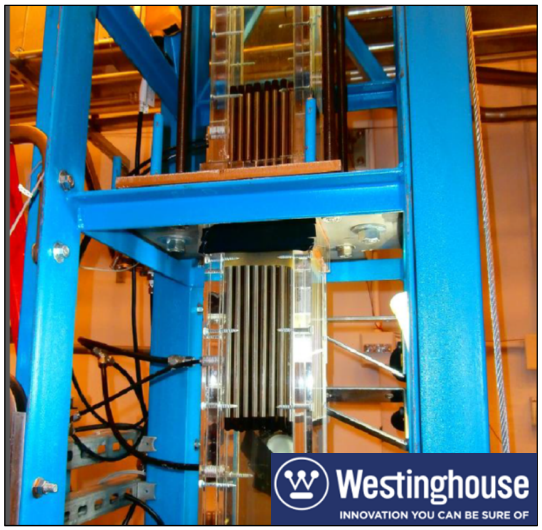
- Improved strainers
- Modified or replaced insulation
- Other physical modifications
- New procedures

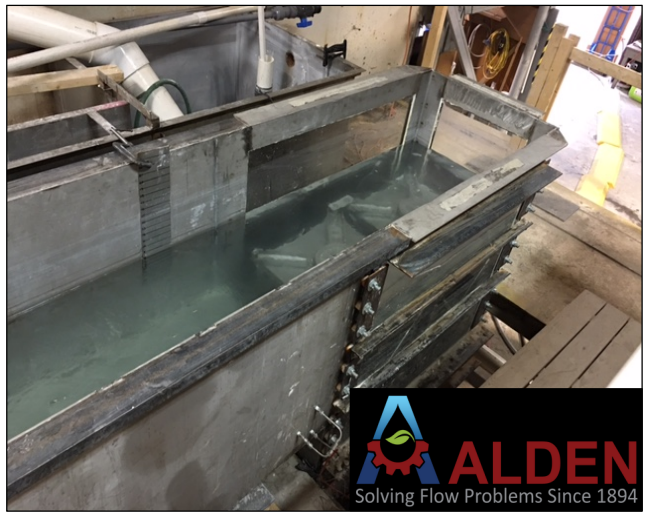
Commission SRM SECY 10-0113

"Given the vastly enlarged strainers installed, compensatory measures already taken, and the low probability of challenging pipe breaks, adequate defense in depth is currently being maintained."

Extensive physical testing witnessed and evaluated by NRC

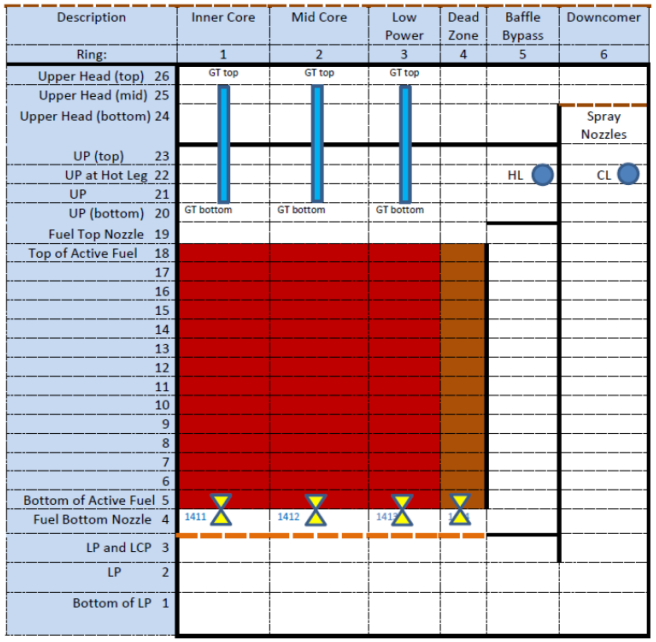
- Debris generation and transport
- Chemical effects
- Strainer
- Fuel and reactor core
- Boric acid precipitation

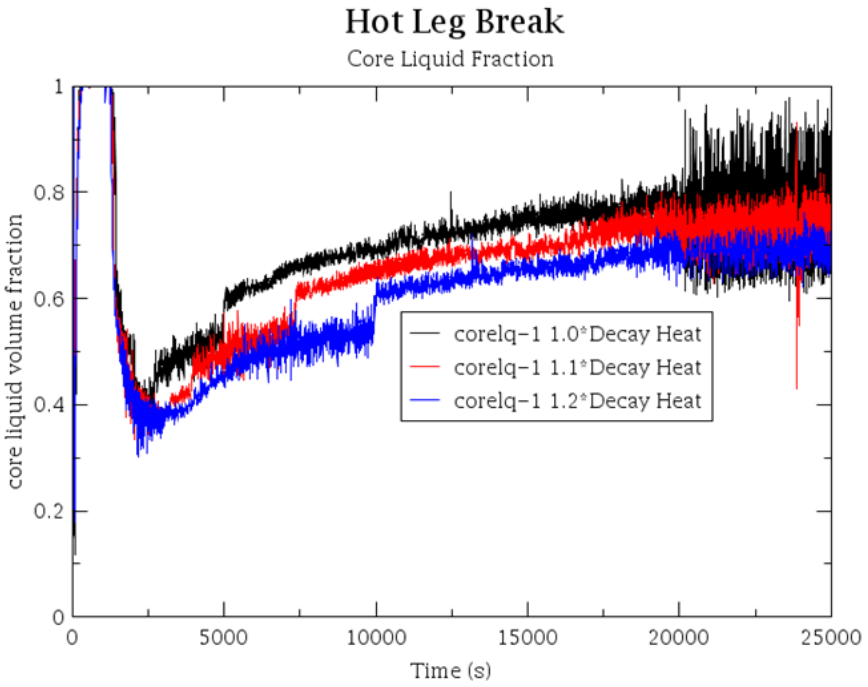




Extensive computer modeling

- Thousands of computer model runs performed by utilities and their contractors (vendors, engineering firms, and academia)
- Supplemental and confirmatory analysis performed by NRC





Generic Letter 2004-02 questions

- Plants must demonstrate:
  - compliance with existing regulations
  - ECCS strainer will allow adequate long-term core cooling under the postulated conditions
  - inadequate core or containment cooling would not result due to debris blockage… downstream of the sump screen…

Reference: Generic Letter 2004-02 - September, 2004
"Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors"
ADAMS ML042360586

Strainer responses

- Staff guidance currently exists for review of these responses
- Nearly all licensees have already responded successfully
- Remaining few being addressed individually using either deterministic or risk-informed means

In many cases, "No Further Questions" letters have already been sent to those licensees that provided acceptable responses.

Downstream effects and compliance responses

- **21 units already resolved** using methods in topical report WCAP 16793 and risk informed license amendments
- Staff guidance in development for reviewing responses relating to in-vessel downstream effects and compliance with 10 CFR 50.46 (long term core cooling)
- Remaining units will resume responding when that guidance is available later this year.

References

- **NUREG/CR-7172 "Knowledge Base Report on Emergency Core Cooling Sump Performance in Operating Light Water Reactors"** (ADAMS Accession No. ML14031A075)
- **Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident**," issued March 2012 (ADAMS Accession No. ML111330278)
- **Staff Technical Evaluation of In-Vessel Downstream Effects**, non-proprietary version issued July 2019 (ADAMS Accession No. ML19178A252)