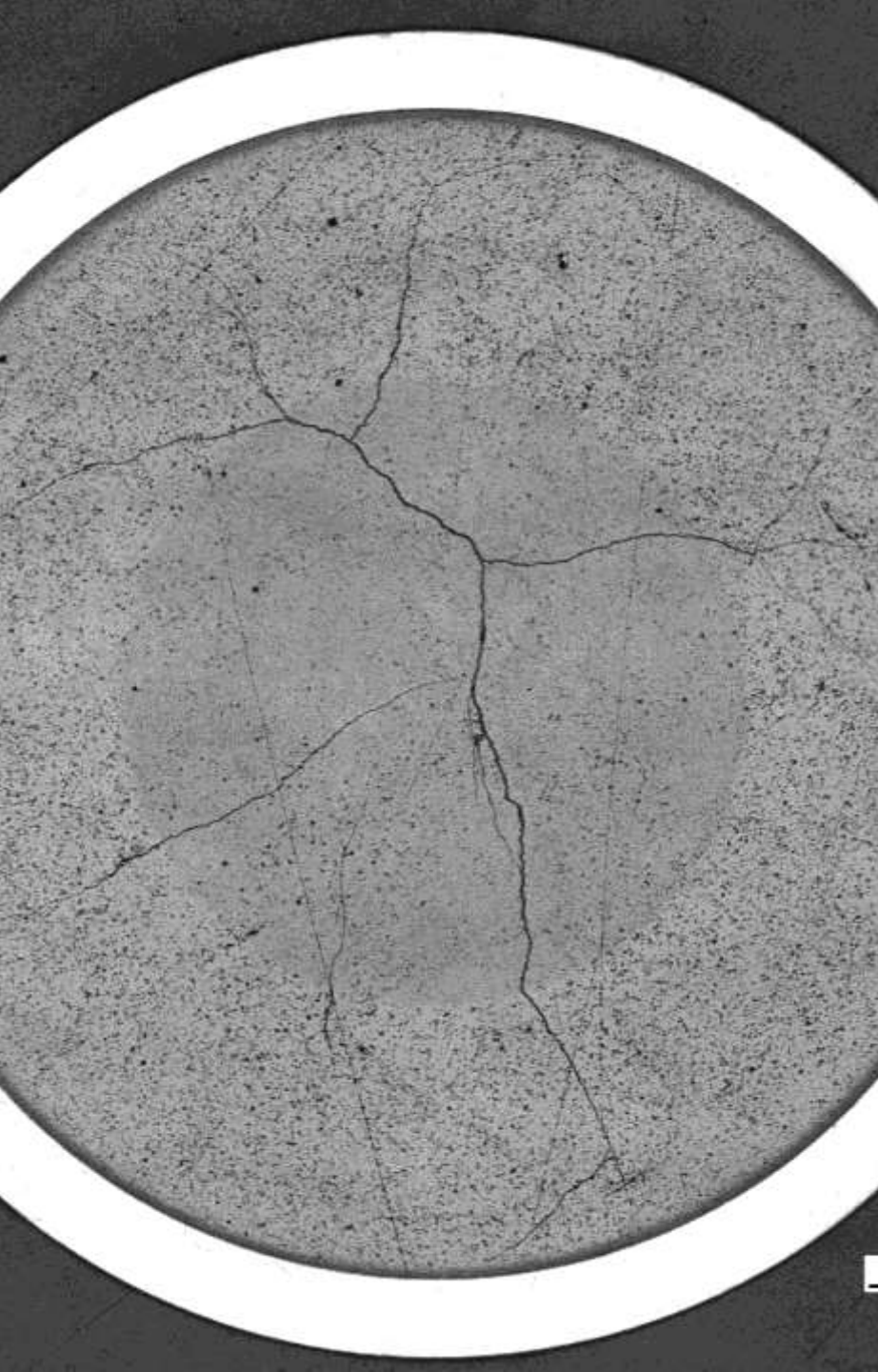




# Studsvik

## *PROJECT LAGER INTRO*

October 2021



## ***GLOBAL DATA PROVIDER***

Studsvik is an independent provider of data for e.g. fuel design development, modelling validation and safety assessments

Experts in tailored experiments and methods for our customers and international joint projects such as SCIP, SMILE, SPARE, LAGER



# *HOT CELLS FOR FUEL EXAMINATIONS*



7 concrete hot-cells for PIE and fuel testing

Microstructure and chemistry laboratory

Separate advanced cladding and materials testing facility

All transport casks with horizontal loading accepted

Rod library, >600 m available for data acquisition

Key data produced for the entire nuclear life cycle





# **INTERNATIONAL PROJECT LAGER**

## **LASER ABLATION OF GADOLINIUM EVOLUTION RADIALLY**

### **The Nuclear community needs:**

- Experimental data for validation of models and calculations used to predict the burnup of Gd in PWRs and BWRs
- Calculations made for taking credit for Gd in criticality analyses, mainly BWR

### **The Studsvik solution:**

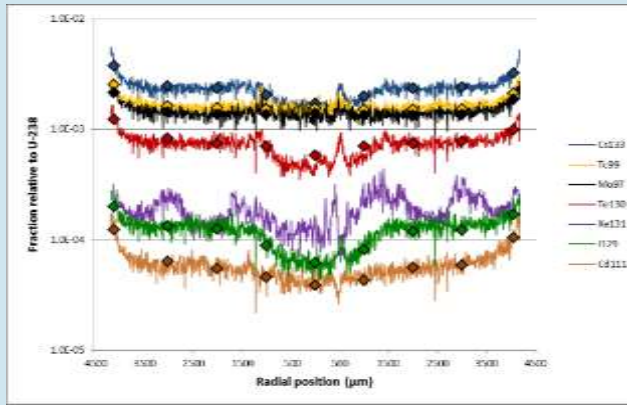
- Use an already available 1-cycle, intact BWR fuel rod with burnable absorber (Gd) and launch an international research project

### **The outcome**

- Input data and data files designed for modelling
- Comprehensive presentation of data with deeper analysis and conclusions in a project report



# LASER ABLATION SYSTEM



- Analysis of any material including irradiated fuel
- Simplified sample preparation
- Enables local and radial isotopic profiling
- Examples of applications
  - Detailed burn up profiling
  - Modelling benchmark
  - Lithium-boron uptake in irradiated cladding





# **FUEL AND SCOPE SUMMARY**

## **Fuel rod**

- Intact 10x10 BWR rod
- 8.87 MWd/kgU average burnup
- 6-11 MWd/kgU from gamma scanning
- 3.66 %  $^{235}\text{U}$  enrichment
- 4% initial Gd content

Basic fuel characterization performed in Studsvik Hot cells during 2020

## **Experimental**

### Gd-content at three BU levels

- Laser ablation – unique radial isotopic profiling
- Chemical ICP-MS – pellet bulk isotope content
- FEG-SEM/EPMA – radial pellet imaging and elemental profiling
- LOM – pellet grain and pore size

## **Analysis**

- Literature review and comparisons other studies
- Modelling
- Conclusions and reporting

## **Administration**

- Multilateral project
- Target budget **\$2.0M**
- 25 % Vattenfall contribution offered



# LAGER SCHEDULE



## Scope definition

- Project idea information meeting (May 2021)
- Feedback on proposed scope (ongoing)
- Scope refinement and definition (2021)



## Agreement

- Scoping interest (ongoing)
- Budget suggestion (ongoing)
- Cooperations (2021)
- Drafting LAGER agreement (2021)
- Contract process (Q1-Q2 2022)



## Experimental

- Start (March 2022)
- Experimental work (2022-2023)
- Coordination other programs (eg. REGAL)
- Final reporting (Q4 2023)





**For more information about LAGER or  
Studsvik in general please contact:**

**[Carolina.losin@studsvik.com](mailto:Carolina.losin@studsvik.com)**