

CEIDEN: La Plataforma Tecnológica de I+D de Energía Nuclear de Fisión

CEIDEN>NNL UK

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Topic T2: “Thermal Reactor Operations”

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Topic T2: “Thermal Reactor Operations”



- **Points from NNL presentation:**
 - ❖ Plant life extension - support continued operation of UK reactors through a coherent range of activities supporting life extension; long term fuel storage and licensing of alternate storage options (evolution of failed fuel in pond storage,...).
 - ❖ Spent fuel storage - research to underpin long-term fuel storage and licensing of alternate storage options.

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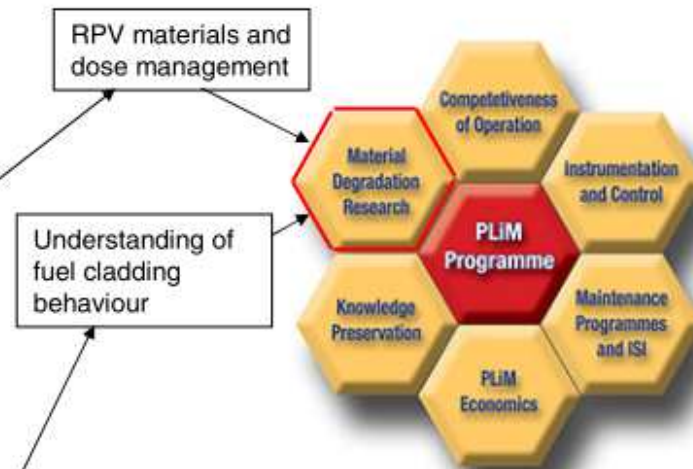
- Points from NNL presentation:

Plant Life Extension (Materials)
(Simon Dumbill)

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LABORATORY

Vision: To support continued operation of UK reactors through a coherent range of activities supporting life extension.

- Improved understanding of RPV hardening and embrittlement EU-Horizon 2020 SOTERIA. CASE award linked to Rolls Royce at Manchester University looking at ion irradiations of RPV steels. Also NNL work on microstructure and mechanical property relationships (e.g. IASCC in austenitics, interactions of temperature and flux by Atom Probe)
- Use of NNUF facilities and CASE studentships in the MUZIC-2 collaboration on zirconium alloy hydriding/corrosion with Westinghouse, EDF, Studsvik, Rolls-Royce, Amec, PSI.



- Training & opportunities for new staff
- Interaction with universities (Oxford, Manchester, Imperial, Liverpool, Tsinghua) and industry
- Uses our leading edge active facilities

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- Points from NNL presentation:

Spent Fuel Storage (David Hambley)



Vision: Leading edge research to underpin long term fuel storage and licensing of alternate storage options

- Cladding

- Thermodynamic and kinetic modelling of precipitation in thermally aged, irradiated austenitic steels (Sheffield collaboration)
- Modelling of radiation induced sensitisation of AGR cladding at high burn-up and in end of life cores

- Fuel

- Evolution of failed AGR fuel in pond storage (Lancaster: Electrochemistry of SIMfuel/real fuel)
- Measurement of water carryover in failed AGR fuel (modify existing kit for gas analysis in storage cans)
- Validation of lattice swelling (He generation) risk for long stored fuel using PIE data



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- **Points from CEIDEN**

- ❖ Thermal Reactors developments in Europe:
 - Supply Chain and costing.
 - Core and primary circuit design activities.
 - Licensing documentation.
 - Instrumentation.
- ❖ Licensing process in UK. Systems design, supply chain and costing.
- ❖ Spent fuel management: stakeholders, main processes, design criteria, fuel characterization, fuel classification, fuel transportation, supporting R&D Programs...
- ❖ Plant life extension and management of specific topics: research on aging and degradation mechanisms for main plant components: large mechanical components, structures, electrical and I&C components; extending plant design life (from 40 to 60 years - from 60 to...???)

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- **Points for discussion**

- ❖ Education and Training opportunities:
 - Use of NNL leading edge active facilities.
 - Knowledge sharing to support the training of new staff.
- ❖ Spent fuel: damage prediction, management, transportation.
- ❖ EURATOM.
- ❖ RBA for LTO: seismic, fire engineering, structural integrity (fatigue).
- ❖ Concrete.
- ❖ ISFSI's. ATC.
- ❖ Tritium.
- ❖ Neutronic calculations: MCNP/Fluent – SF? Casks?
- ❖ Knowledge/contacts in BWRs and PWRs.
- ❖ .../...