

Profile SFR-82

LECI

FRANCE

GENERAL INFORMATION

NAME OF THE FACILITY LECI
ACRONYM LECI
MAIN PURPOSE Characterization of irradiated non fissile materials
MEMBER STATE (country): FRANCE
OPERATOR / OWNER CEA
LOCATION (address): CEA Paris-Saclay, B. 605
F-91191 Gif-sur-Yvette, France
OPEN TO COOPERATION ? YES
CONTACT PERSON(S) Christophe BLANDIN
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STATUS OF THE FACILITY In Operation
Start of operation (period): 1960's
Exact dates facility operated: 1959

MAIN RESEARCH FIELD(S)

- Zero power facility for V&V and licensing purposes
- Design Basis Accidents (DBA) and Design Extended Conditions (DEC)
- Thermal-hydraulics
- Coolant chemistry
- Materials
- Systems and components
- Instrumentation & ISI&R

TECHNICAL DESCRIPTION

Description of the facility

The LECI, located on the Paris-Saclay centre, is the CEA reference hot laboratory in charge of the characterization of irradiated non fissile materials for:

- Water cooled reactors (PWR): pressure vessel life extension (embrittlement, mechanical properties), Internals (swelling, creep, stress corrosion cracking of 304 or 316 stainless

steels), Zirconium alloys for fuel pin cladding and assembly (evolution of metallurgical and mechanical properties in incidental, accidental or in service reactor conditions, in storage or retrieving after interim storage conditions ;

- Generation IV reactors: characterization of materials for fuel pin cladding and assembly for sodium or gas-cooled reactors (steels, ODS, ceramics, refractory materials, graphite) ;
- Research or material testing reactors: characterization of Aluminum alloys for reactor structure and fuel cladding.

More detailed information on the LECI capabilities is available on the following CEA web site:

http://portail.intra.cea.fr/den/SiteAssets/ressources-utiles/presentations/LECI_uk.pdf

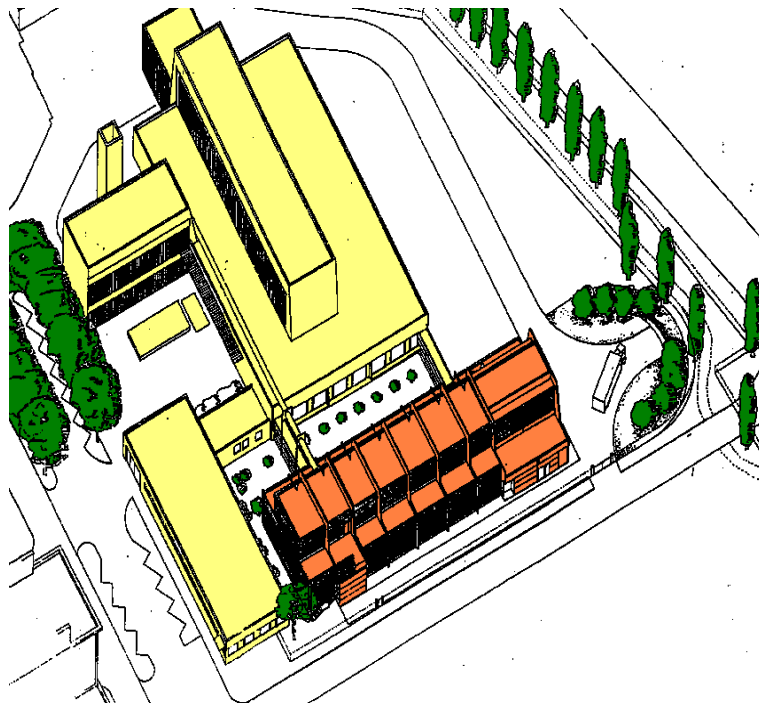
Acceptance of radioactive material

Yes

The LECI is authorized to receive the following irradiated materials:

- Irradiated structural materials (steel, zirconium alloys, aluminum alloys...),
- Absorbing materials from testing reactors and nuclear power plants (B_4C , HfB_2 ...),
- Glass matrices for waste storage, Ceramics and composites, Graphite and polymers.

Scheme/diagram



3D drawing/photo



Parameters table

Main characteristics:

The LECI includes 40 hot cells, with up-to-date scientific equipment, such as:

- Dimensional measurements : Optical (UV) contour and laser thickness measurements
- Radiography bench
- Hydrogen content and density measurement
- Optical microscopy, micro hardness and hardness
- Thermo-electric power measurement
- Creep tests and relaxation tests – [50 – 800°C]
- Pressurized tests on cladding tubes
- Toughness tests : 2 machines – [150 – 1000°C] - load cells 25, 100, 250 kN
- Static tensile tests: 3 machines - [130 – 1800°C] - load cells 5, 25, 50 kN
- Dynamic tensile tests
- Impact tests - 2 pendulum systems 300 & 50 Joules – [150 – 600°C]
- Corrosion loop under light water reactors (LWR) conditions - 2 autoclaves of 3 liter capacity, one of them equipped with slow strain rate tensile test/creep top
- Iodine induced stress corrosion cracking tests
- Sample preparation - Plunge spark erosion machining, Wire electro-discharge machining, TIG and laser welding...
- EPMA observations
- TEM observations

- Nuclearized Zeiss SUPRA 55 FEG-SEM with SE, BSE, EDS, WDS and EBSD detectors
- Nuclearized Tomographic Atom Probe CAMECA LEAP 4000X HR
- Nuclearized Focus Ion Beam Zeiss Auriga 40 (in progress)

COMPLETED EXPERIMENTAL CAMPAIGNS: MAIN RESULTS AND ACHIEVEMENTS

All the experimental equipment, described earlier in this document, allow to perform in the LECI facility a very large range of mechanical, metallurgical and physico-chemical characterizations for mainly GEN II-III and GEN IV power plants.

PLANNED EXPERIMENTS (including time schedule)

Near future research activities in the LECI facility will still be mainly in support to GEN II-III and GEN IV reactor needs.

TRAINING ACTIVITIES

None

INFORMATION PROVIDED

Name	C. Blandin
Date of update	2019/01/22

REFERENCES (*specification of availability and language*)

Provide list of references (preferably in IAEA publication format):

- C. Poussard, Ph. Bossis, G.-M. Decroix and P. Yvon, The CEA LECI hotlab facility: present and short term future capabilities, HOTLAB 2013, Idaho Falls, ID, USA, September 23-26, 2013
- Ph. Bossis, C. Poussard, A. Petitrenaud and P. Yvon, Experiments in Support to the Understanding of Fuel Cladding Behavior in Normal, Accidental and Storage Conditions at the CEA LECI Hotlab Facility, Proceedings of WRFPM 2014, Sendai, Japan, Sep. 14-17, 2014

Indicate if information has been included in or published as part of IAEA activities