OFFERR

EUROPEAN USER FACILITY NETWORK

CATALOGUE OF FACILITIES
www.snetp.eu/eufn

V1-02 2024

Funded by
the European Union

It is a pleasure for me to present you the first release of the European User Facility Network catalogue.

In the current geopolitical context, it is now clear for everyone that energy is a major issue for Europe. Nuclear energy has the double potential of helping us meet the climate challenge and reducing our dependence towards imported fossil fuels. To realize this potential, we need to do our best to mutualize our efforts in the experimental field, and this is exactly the goal of the European User Facility Network (EUFN), developed within the Open platForm For accessing European nucleaR R&d facilities, the OFFERR project. We also need to build new European R&I nuclear facilities to prepare for the future of nuclear research.

This catalogue is one of the first major result of the OFFERR project. Such an achievement is not only the fruit of OFFERR's work but of the whole European nuclear community brought together by SNETP. More than 180 facilities are listed in this catalogue showing the richness and the diversity of our European research laboratories. Such experimental resources are one of the strengths of the EU. Thus, and in compliance with the SNETP-Strategic Research and Innovation Agenda, there is a strong need of:

- State of the art EU-research infrastructure in terms of availability, functionality, and adequacy with the R&D&I priorities and industrial needs;
- Financially sound basis for the operation and maintenance of this infrastructure;
- Effective transnational access to these facilities by implementing cost effective access to the experimental facilities.

On behalf of SNETP, I would like to congratulate the OFFERR consortium for this achievement, thank the whole European nuclear community brought together by SNETP for its support, and encourage those who have not yet contributed, to make so that we can make our sector even better.

I look forward to seeing the great results generated by this action on the EUFN website **here**.

Bernard Salha

SNETP President | Chief Technical Officer and R&D Director at EDF in France

Document information

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For more information, download Deliverable 1.2 SNETP Database of Users Facilities

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sckcen

BR1

Belgian Nuclear Research Center
Boeretang 200,
B-2400 Mol

guido.vittiglio@sckcen.be

www.sckcen.be/en/about-sck-cen/corporate-information/infrastructure

MOL, BELGIUM

BR1 is a 1 MW research reactor that is fueled with natural uranium, graphite-moderated and air-cooled. It is primarily used for the irradiation of components, the calibration of measuring instruments, and training of nuclear experts. The most important irradiation facilities of BR1 are:

- About 50 channels with cylindrical sections of 80 mm in diameter or square sections of 100 * 100 mm² and 240 * 240 mm², length up to 4 meter and throughput for on-line instrumentation. These channels can be used for ex-core irradiations (neutron beam) or for in-core irradiations. The latter are charactarized by low neutron flux gradients and a thermal flux up to 5 1011cm-².s-1 @ 1 MW reactor power.
- A thermal column containing a spherical cavity with a thermalized neutron spectrum (thermal flux 109 cm-².s-1 @ 1 MW) mainly used as reference neutron fields. Convertors can be introduced in the cavity to create different neutron and gamma spectra (e.g., 235U prompt fission neutron spectrum).
- Pneumatic rabbit systems allowing irradiation of small samples in the core centre for periods ranging from 1 s to several hours.
- A neutronography equipment providing images based on neutron interactions.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

sck cen

VENUS-F

SCK CEN
Boeretang 200,
B-2040 Mol

guido.vittiglio@sckcen.be

www.sckcen.be/en/about-sck-cen/corporate-information/infrastructure

MOL, BELGIUM

The VENUS reactor is a versatile zero power reactor with an open-top stainless steel cylindrical vessel. Until 2007 VENUS was a thermal, water moderated reactor that mostly served as a mock-up for PWR and BWR reactors. Currently VENUS is a mock-up of a fast reactor (VENUS-F) that can be operated in critical mode or as an accelerator driven system. For the latter, a sub-critical core is coupled to the GENEPI-3C deuterium accelerator with a tritium target in the core centre.

VENUS-F consists of a 12×12 square lattice of assemblies that is surrounded by a bottom, top and radial reflector. Each assembly can be filled with fuel, reflector material, B4C (safety/control rod, rod drop) or any other material (e.g., PE acting to obtain a thermal spectrum). An assembly can contain a guiding tube and serve as an experimental assembly with a channel for insertion of detectors.
VENUS-F is equipped with standard instrumentation for reactor control, which remains constantly loaded, and specific instrumentation for physics experiments, which are activation foils and fission chambers inserted in different experimental channels. The experiments include the measurements of reactivity, reactivity coefficients (reactivity of specific elements, void, fuel agglomeration,...), beta fraction, spectrum indices, reaction rate profiles.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES	YES

VERSION · 23 MARCH 2023

European Commission

EUFRAT-GELINA

JRC Neutron Time-of-Flight Facility Owned by the European Commission, Joint Research Centre, Retieseweg 111, B-2440 Geel

Cristiano.fontana@ec.europa.eu
Carlos.PARADELA-DOBARRO@ec.europa.eu

https://joint-research-centre.ec.europa.eu/knowledge-research/open-access-jrc-research-infrastructures_en

GEEL, BELGIUM

GELINA is a 150 MeV electron accelerator serving as strong white neutron source for high resolution neutron time-of-flight measurements. It is tailored to the measurement of neutron-induced reactions and has a range of equipment to study fission, capture, elastic scattering, inelastic scattering and total cross sections as well as measurement stations where users can install their equipment. The neutron energy range is from 10 meV to 15 MeV.
The time-of-flight resolution is less than 2 ns (FWHM). Flight paths are 10 to 400 m. As many as 10 experiments can run simultaneously. The high-intensity neutron and gamma ray fields close to the neutron-producing target can also be used for spectrum averaged and integral experiments. In addition, a dedicated beamline allows direct irradiations with a mono-energetic electron beam tunable from 20 to 130 MeV.

GELINA can be used for studying a variety of nuclear technology and scientific applications, covering areas such as applied physics, in particular nuclear energy applications, fundamental physics, astrophysics, material analysis, cultural heritage and archaeology, radiation-hard electronics development and radionuclide production for medical applications.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 18 JANUARY 2023

European Commission

EUFRAT-MONNET

Tandem accelerator based fast neutron source Owned by the European Commission, Joint Research Centre, Retieseweg 111, B-2440

Cristiano.fontana@ec.europa.eu
Carlos.PARADELA-DOBARRO@ec.europa.eu

https://joint-research-centre.ec.europa.eu/knowledge-research/open-access-jrc-research-infrastructures_en

GEEL, BELGIUM

MONNET is a high-intensity quasi mono-energetic fast neutron source, driven by a vertical 3.5 MV Tandem accelerator producing either continuous or pulsed beams of protons, or deuterons. MONNET generates quasi mono-energetic neutrons in the energy region 0 - 24 MeV by using lithium, deuterium or tritium targets.

MONNET may also be used as a photon source or for studies requiring protons and deuterons without the emphasis on neutron production, if doing so at JRC provides added benefit. The MONNET laboratory offers a range of instruments to monitor neutron flux during experiments. The MONNET laboratory also offers experiments with spontaneous fission sources. More information can be found at https://joint-research-centre.ec.europa.eu/laboratories-and-facilities/tandem-accelerator-based-fast-neutron-source_en. MONNET is covered by the the present and past open access program EUFRAT.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 18 JANUARY 2023

LVR-15

Research Centre Rez
Hlavni 130, Husinec-Rez

jan-milcak@cvrez.cz

http://reaktory.cvrez.cz/en/

REZ, CZECH REPUBLIC

Source of ionizing radiation equipped with

- a system of vertical and horizontal channels for irradiation
- a system of pneumatic rabbit system, systems for homogeneous irradiation (rotating channels)
- the possibility of irradiation in sample rigs, including specially designed ones
- hot cell for basic PIE
- analytical laboratories - radiation spectrometry, chemical analyses

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

LR-0

Research Centre Rez
Hlavni 130, Husinec-Rez

jan-milcak@cvrez.cz

www.reaktory.cvrez.cz/en/

REZ, CZECH REPUBLIC

The LR-0 research reactor is a light-water, zero-power, pool-type reactor. It serves as an experimental reactor for measuring neutron-physical characteristics of VVER (Water-Water Energetic Reactor) type reactors, variable layout of the zone with NPP type fuel - VVER440/1000 including built-ins such as baffle and barrel and other parts of the reactor or other material built-ins.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

PTB

Physikalisch-Technische Bundesanstalt
Braunschweig,
Bundesallee 100,
D-38116 Braunschweig

elisa.pirovano@ptb.de

www.ptb.de/cms/en/ptb/fachabteilungen/abt6/fb-64

BRAUNSCHWEIG, GERMANY

The PTB Ion Accelerator Facility (PIAF) consists of two low-energy ion accelerators: a HVEE 2-MV tandetron accelerator and a TCC CV-28 variable-energy isochronous cyclotron. The tandem provides proton and deuteron beams with energy from 200 keV to 4 MeV, alpha particle beams with energy from 800 keV to 6 MeV, and a current on target in DC mode up to 50 µA. The cyclotron can also produce beams of protons (4 MeV < E < 19 MeV, I < 80 µA), deuterons (4 MeV < E < 13.5 MeV, I < 80 µA) and alpha particles (8 MeV < E < 28 MeV, I < 20 µA). All ion beams are available in DC or ns-pulsed mode for experiments with adjustable repetition rate for time-of-flight measurements.

At PIAF, monoenergetic, quasi-monoenergetic, and broad-energy distribution neutron fields are produced via selected reactions between light-ion beams (protons, deuterons, and alpha particles) and light or medium-weight target nuclei (lithium, tritium, deuterium). The available neutron energies range from 24 keV to 19 MeV. The measurements are performed in open geometry in a large low-scattering hall. It is possible to measure both in continuous and in pulsed mode for time-of-flight measurements. The performance of the procedures for the production and measurement of neutron radiation is regularly checked by participating in the international key comparisons (CCRI, EURAMET) for neutron measurements.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

IT-4 Laboratory of Neutron Metrology

Politecnico di Milano

andrea.pola@polimi.it
davide.bortot@polimi.it

https://www.metrorad.polimi.it/en/

MILANO, ITALY

The laboratory of Neutron Metrology is dedicated to the study, application and development of measurement methods and techniques of neutron fields. The laboratory hosts a neutron irradiation facility based on an Am-Be isotopic source with a nominal emission rate of 2.2E+6 s−1.There are two available configurations: a fast field with an average energy of 4 MeV and an extended thermal field (measurement chamber 30 cm in diameter and height, thermal fluence fraction equal to 87%). The service offered to external clients includes test, characterization and calibration of neutron monitors and personal dosimeters, carried out following the ISO Standards (Calibration based on the shadow-cone method reported in ISO 8529-2).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 01 MARCH 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

MARIA 1

National Centre for Nuclear Research, Maria Research reactor, 7 Andrzeja Soltana str., 05-400 Otwock

Marek.Migdal@ncbj.gov.pl

www.ncbj.gov.pl

ŚWIERK-OTWOCK, POLAND

Maria research reactor - a high-flux research reactor equipped with both in core thermal and fast neutron facilities. It is used for isotope production and materials irradiation in even 1000 deg C. for medical, industrial and research purposes. It enables to perform neutron activation analysis and licensing of new types of fuel. The reactor also includes a neutron laboratory using the reactor's horizontal beams, which can be used for research on the structure of materials, neutronography or radiomedical research. The facility is equipped in hot cell enabling to handle irradiation materials. The reactor is very flexibile and the reactor core can be adapted to specific experiments.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

MARIA 2

National Centre for Nuclear Research (NCBJ) - Maria Research reactor, 7 Andrzeja Soltana str., 05-400 Otwock

jacek.gajewski@ncbj.gov.pl
malgorzata.kot@ncbj.gov.pl
krzysztof.kurek@ncbj.gov.pl

www.ncbj.gov.pl

ŚWIERK-OTWOCK, POLAND

30 MW Research Reactor MARIA, Otwock near Warsaw, used for: production of radioisotopes, testing of fuel and structural materials, neutron transmutation and modification of materials, research in neutron and condensed matter physics, neutron radiography and activation analysis, medicine and training.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

MARIA 3

National Centre for Nuclear Research, Maria Research reactor, 7 Andrzeja Soltana str., 05-400 Otwock

marek.migdal@ncbj.gov.pl

www.ncbj.gov.pl

ŚWIERK-OTWOCK, POLAND

MARIA research reactor is equipped with an epithermal neutron beam. The neutrons are extracted from the core, and in the dedicated irradiation position in the shielded room, a neutron flux of 1E9 n/cm2/s is available. The irradiation position outside the core enables the testing of large components that generally cannot be tested in the limited space of the core. MARIA research reactor is equipped with unique fuel elements dedicated to the irradiation of the sample. The irradiation occurs in the middle of the fuel element, resulting in the fast neutron flux 1E14 n/cm2/s. It can provide services, among others, to the material research dedicated to advanced fission and fusion reactors. MARIA research reactor is equipped with a 14 MeV neutron source. A special converter within the reactor core is providing 14 MeV neutron flux 5E10 n/cm2/s. The adjustable position within the core enables obtaining an energy spectrum similar to those in the fission reactors (i.e. ITER and DEMO).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

TRIGA 14MWth

RATEN Institute for Nuclear Research,
Street Campului Nr. 1,
115400 - City Mioveni

silviu.stanciu@nuclear.ro

www.nuclear.ro/reactor

PITESTI -MIOVENI, ROMANIA

The TRIGA research reactor is a pool reactor with two different cores located in the same pool. Reactor pool type 14MWTRIGA Research Reactor contained in IAEA RRDB as TRIGA II PITESTI-SS Core, IAEA code RO0002. The reactor was commissioned in 1980 and has been in continuous operation since then. In 2006 the reactor was fully converted from HEU to LEU and refurbished in 2009. The planned operational life is estimated until 2035.

TRIGA 14 MW is used for irradiation of nuclear fuel, structural materials intended for nuclear power plants, radioisotopes production for industry and medicine, neutron diffractometry, nuclear methods developments applicable to archeology, geology, medicine and environmental protection. In core irradiation devices (such as irradiation loop, capsules for parametric studies) imported or designed, built and commissioned by the Institute, used for irradiation of nuclear fuel and materials are available for steady-state, transient and accident conditions.
Web page: www.nuclear.ro

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

SLOVK-3 Laboratory of Reactor Physics,

Slovak University of Technology in Bratislava
Ilkovičova 3,
812 19 Bratislava

stefan.cerba@stuba.sk
branislav.vrban@stuba.sk

www.ujfi.fei.stuba.sk/index.php

BRATISLAVA, SLOVAKIA

The laboratory of Reactor Physics, is designed for neutron activation, neutron source emission rate and neutron diffusion and Fermi age measurement. The laboratory consists of experimental workspaces for neutron emission rate, neutron diffusion length and Fermi age measurements with Pu-Be and Am-Be neutron sources and apparatus for remote control and monitoring of experiments. The experimental tank was developed to investigate neutronic parameters of liquid moderators, but possibly can be used in combination with bulk materials to support development of the MSR applications. The tank is equiped with heater, steam generator and dry-channels with variable diameters. Currently a new “Mini Labyrinth” experiment is being prepared to investigate the performance of shielding materials and for the needs of computer codes validation. The neutron sources can be used unshielded and shielded by the graphite prizm, which allows to modify the neutron spectrum, based on the user needs. The Mini Labyrinth coridor is freely accessible for any type of detector. A semi-automatic robotic system can be used for the positioning and the movement of the detector during measurements. Moreover, computational efforts are focused on reactor physics simulations with MCNP, SERPENT, SCALE, DIF3D and PARTISN.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

SMU 1

Department of ionizing radiation, Slovak Institute of Metrology,
Karloveská 63,
842 55 Bratislava

jarmila.sluciak@smu.gov.sk
javornik@smu.gov.sk

www.smu.sk/ionizujuce-ziarenie

BRATISLAVA, SLOVAKIA

The National Standard of neutron dosimetric quantities: For measuring neutron radiation, SMU uses the Bonner sphere spectrometer and an irradiation assembly with radionuclide neutron sources. The Bonner spectrometer works on the principle of moderating the fast neutrons into the thermal ones by means of polyethylene spheres and their subsequent detection by a thermal neutron detector whose sensitive volume is located in the centre of the sphere. The national neutron standard currently reproduces these quantities:
• ambient dose equivalent H*(10) and ambient dose equivalent rate H*(10) ranging from 1×10-7 to 1×10-1 Sv, and from 1×10-7 to 2×10-2 Sv.h-1 (uncertainty 1,5 % for k = 1)
• personal dose equivalent Hp(10) personal dose equivalent rate Hp(10) ranging from 1×10-7 to 1×10-1 Sv, and from 1×10-7 to 2×10-2 Sv.h-1 (uncertainty 1,5 % for k = 1). Number of CMCs: 9.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

TRIGA MARKII

Reactor Infrastructure Center, Jozef Stefan Institute, Brinje 40, SI-1262 Dol pri Ljubljani

luka.snoj@ijs.si
anze.jazbec@ijs.si

https://ric.ijs.si/en/

LJUBLJANA, SLOVENIA

Jožef Stefan Institute (JSI) operates the TRIGA Mark II research reactor since 1966. It is located about 10 km northeast of the centre of Ljubljana at the JSI reactor centre. The reactor can be operated in steady-state mode up to 250 kW and in pulse mode up to 1 GW. In the field of research, the reactor is being used for neutron hardness studies, especially of the electronic components, neutron activation analysis, testing of various neutron and gamma sensitive detectors and validation of computer codes. The maximum neutron flux in the central channel is 1e13 n/cm2s. Larger samples can be irradiated in one of the beam tubes or inside the dry chamber. A detailed description of all experimental channels can be found on our web page.

In the field of training and education, we provide lectures to several universities in the region, organize various international courses and help train future NPP staff. In the past years, we developed over 15 experiments which are performed by the students or trainees through which they learn reactor physics, nuclear engineering and radiation protection. Almost all experiments can also be performed remotely so there is no need to visit our facility to gain new experience and knowledge. Further information can be found on our web page.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 13 JANUARY 2023

SLOVN-2 Hot cell facility

Jozef Stefan Institute, Brinje 40, SI-1262 Dol pri Ljubljani

luka.snoj@ijs.si
anze.jazbec@ijs.si

https://ric.ijs.si/en/

LJUBLJANA, SLOVENIA

The hot cell facility is located next to the TRIGA reactor building at Jožef Stefan Institute reactor centre. It is usually used to support the activities performed at the research reactor, but it can also be used for stand-alone capabilities.

There is one hot cell equipped with master-slave manipulators where radioactive material of activity up to 1000 Ci can be handled. In addition, there are four glow boxes with different amounts of shielding installed that can be used to manipulate radioactive materials.

The following equipment is installed or accessible: bridge crane, heavy table, forklift, 30 t press for radioactive waste, mobile tent with an independent ventilation system, radiation level monitoring equipment, shielding material, etc.

The facility is also used to prepare the radioactive waste for long-term storage but it can also be used for various experiments with radioactive materials where appropriate shielding is required.

More information can be found on our webpage: https://ric.ijs.si/en/ovc/

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 14 JANUARY 2023

CNA-HISPANOS

National Center of Accelerators (CNA), Thomas Alva Edison 7, 41092-Seville (Spain)

cguerrero@us.es
bfernand@us.es

https://cna.us.es/index.php/en/

SEVILLE, SPAIN

The HiSPANoS neutron source is the first accelerator-driven neutron source in Spain, and is capable to deliver both continuous and pulsed neutron beams. It is installed in the 3 MV Tandem accelerator system at Centro Nacional de Aceleradores (CNA, Seville, Spain), a user facility included in the Spanish Singular Science and Technology Infrastructures (ICTS) catalog. At HiSPANoS, it is possible to deliver epithermal neutrons by means of the 7Li(p,n) reaction near the threshold, quasi-monoenergetic fast neutrons (from 2 MeV to 6 MeV) produced by D(d,n) fusion reaction, and fast neutrons up to 10 MeV and 15 MeV with broad energy distribution by means of Be(d,n) and Li(d,n) reactions respectively. Thermal neutrons are also available via moderation. The HiSPANoS laboratory offers different neutron detectors as inorganic or organic scintillators, in addition to gamma detectors as HPGe or La3Br. Also, DAQ based on fast digitizer to perform time-of-flight experiments is also offered. HiSPANoS is eligible as transnational access through H2020-ARIEL project. More information can be found at http://centro.us.es/cna/index.php/en/facilities/financed-feder-funds/equipments/78-neutron-line .

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

CROCUS

Ecole Polytechnique Fédérale de Lausanne (EPFL)

vincent.lamirand@epfl.ch

https://www.epfl.ch/labs/lrs/facilities/

LAUSANNE, SWITZERLAND

CROCUS is a zero-power, uranium-fuelled, and light water-moderated experimental reactor, dedicated to teaching and research. In addition to teaching, it is used for research in reactor physics and nuclear data, as well as for detector development. Recent experiments include the PETALE program for stainless steel nuclear data, and the SAFFRON (interpin) and NECTAR (intrapin) experiments for high resolution neutronics.

It is licensed to operate at a maximum of 100 W, i.e. a total neutron flux of ~2.5•10^9 cm-2.s-1 at the core centre. Criticality is controlled to sub-pcm accuracy, either by water level using a spillway, or by two optional B4C absorber control rods. It operates at room temperature using a controlled water loop with secondary and tertiary circuits, two heat exchangers and electrical heaters. A complete description of the reference core can be found in the International Reactor Physics Experiments Handbook (IRPhE).

The open-pool design of CROCUS allows easy and flexible positioning of instrumentation and equipment in and around the core.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 01 SEPTEMBER 2023

NPL VDG
National Physical Laboratory

michael.bunce@npl.co.uk
ben.russell@npl.co.uk
dean.whittaker@npl.co.uk

https://www.npl.co.uk/nuclear-metrology/neutron-standards

TEDDINGTON, UNITED-KINGDOM

The NPL Van de Graaf accelerator produces monoenergetic neutron fields at energies from the keV region to just below 20 MeV. This includes ISO standard monoenergetic neutron fields from 144 keV to 5 MeV. The Van de Graaff is also capable of other characterised fields, including multi-energy and high intensity fields. The main bay housing the Van de Graaf is also equipped with a graphite pile to thermalise fast neutrons, providing an accelerator based thermal neutron field.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

sckcen

LNK

Laboratory for Nuclear Calibrations, Belgian Nuclear Research Center, Boeretang 200, B-2400 Mol

cristian.mihailescu@sckcen.be
nuclearcalibrations@sckcen.be

www.sckcen.be/en/calibrations

MOL, BELGIUM

The Laboratory for Nuclear Calibrations (LNK) of the Belgian Nuclear Research Centre (SCK CEN) operates a calibration building constructed in 2021 and equipped with modern irradiators, reference instruments and automated data acquisition software.

LNK performs dosimetry calibrations with y-rays, X-rays and neutrons for almost any type of dosemeter used in research institutions, nuclear power plants, industry and hospitals. Irradiations of dosemeters or any kind of sample in general are also performed at LNK as a simplified case of calibrations. Our dosimetry calibration service was one of the first services of SCK CEN that obtained the BELAC accreditation. In the meantime, we have accumulated more than 30 years of experience.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

PIANOFORTE support facilities

SCK CEN - Belgian Nuclear Research Center, Boeretang 200, B-2400

rafi.benotmane@sckcen.be
Liz.Ainsbury@ukhsa.gov.uk

https://eurados.sckcen.be/

MOL, BELGIUM

PIANOFORTE - Radiation exposure platforms defined as facilities where biological specimens (in vivo exposure of animals and plants or in vitro exposures of tissues, organs or cells)may be irradiated under controlled conditions in which dosimetric characteristics are well defined and measured under a traceable, quality control system (ISO certified). There are a total of 45 infrastructures in this category, including facilities for: Low doses and low dose rates (facilities with ionizing radiation dose of < 100 mGy and dose rates of < 0.1 mGy min-1 averaged over 1 hour); Microbeams (small collimated beams of micrometre or sub-micrometre dimensions); Facilities for specific/particular radiation qualities: ions, neutrons, alpha, etc; Internal contamination facilities (where animals or plants are exposed to radiation via ingestion, inhalation or by wounds); Observatory sites (natural sites contaminated by radionuclides (NORM or anthropogenic) via industrial activities or accidental releases).

More information is available on the CONCERT website: https://www.concert-h2020.eu/deliverables/integrating-activities

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 10 FEBRUARY 2023

European Commission

EUFRAT-HADES

Underground laboratory for ultra-low level gamma-ray spectrometry

European Commission Joint Research Centre
Retieseweg 11, B-2440 Geel

Cristiano.fontana@ec.europa.eu
mikael.hult@ec.europa.eu

https://joint-research-centre.ec.europa.eu/knowledge-research/open-access-jrc-research-infrastructures_en

GEEL, BELGIUM

HADES, Underground laboratory for ultra-low level gamma-ray spectrometry (EUFRAT-HADES).
JRC operates a laboratory for ultra-low-level radioactivity measurements inside the 225 m deep underground research facility HADES on the premises of the Belgian Nuclear Research Centre. In HADES, the muon flux is a factor of 10000 lower compared to above ground and the flux of protons, neutrons and electrons is reduced to an insignificant level. This reduction of the cosmic ray flux makes the background in gamma-ray spectrometry measurements significantly lower compared to above ground. Therefore, it is possible to detect very low amounts of radioactivity (sub mBq range). Eleven specially designed high purity germanium detectors are used for the measurements. There is also a scanning station by which the homogeneity of dead layers in HPGe-detectors can be studied.
For comprehensive overview, see:
https://publications.jrc.ec.europa.eu/repository/handle/JRC120311

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

EUFRAT-RADMET

Radionuclide Metrology laboratories

European Commission - Joint Research Centre
Retieseweg 111
B-2440 Geel

Cristiano.fontana@ec.europa.eu
Mikael.HULT@ec.europa.eu

https://joint-research-centre.ec.europa.eu/knowledge-research/open-access-jrc-research-infrastructures_en

GEEL, BELGIUM

RADMET, Radionuclide Metrology laboratories (EUFRAT-RADMET)
The Radionuclide Metrology laboratories (RADMET) are equipped with a broad set of instruments used for nuclear decay measurements, determination of related nuclear data and radiological characterisation of samples and materials. The setups, many of them unique in their kind, are used to perform high accuracy measurements of a large number of radionuclides in diverse samples ranging from reference materials for environmental monitoring to solutions for primary standardisation of activity.

RADMET is among the few laboratories worldwide to provide reference data to the international reference system (SIR) on the 100 most relevant radionuclides. In connection to the measurements, the lab is well equipped for preparing sources dedicated for the specific measurements.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

Ruđer Bošković Institute

CO60

Radiation Chemistry & Dosimetry Laboratory, Rudjer Bošković Institute, Bijenicka 54, 10 000 Zagreb

zknez@irb.hr
Zeljka.Knezevic@irb.hr

www.irb.hr/Zavodi/Zavod-za-kemiju-materijala/Laboratorij-za-radijacijsku-kemiju-i-dozimetriju/Usluge/Co-60-usluge-ozracivanja-na-panoramskom-izvoru-gama-zracenja

ZAGREB, CROATIA

The panoramic 60Co gamma irradiation facility is a pilot-plant dry storage type irradiator located at the RBI in the Radiation Chemistry and Dosimetry Laboratory (RCDL) in Zagreb. The facility is the only of its kind in Croatia as well as in the neighboring countries. Ionising radiation is applied id different areas of scientific research, especially in radiobiology, solid state physics and polymer chemistry. The facility is used for research and development purposes as well as for radiation sterilization of pharmaceutical raw materials and packaging, medical equipment and supplies or microbiological decontamination of food additives and dry foods, as well as desinsection and microbial decontamination of cultural and artistic heritage object. Presently available dose rate is within the range of mGy/s to Gy/s (centar).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

GoMK,Co-60 irradiation facility

Gama ozařovna Malý kobalt, Centrum Výzkumu Řež, Hlavní 130, Husinec - Rez

lukas.prochazka@cvrez.cz

www.cvrez.cz/

REZ, CZECH REPUBLIC

The device used to irradiate the components, materials and samples at normal and higher temperatures for heat radiation and aging so as to simulate the operation conditions of the nuclear power plants. Irradiation possibilities at cryogenic temperatures, high temperatures and irradiation of small samples in a vacuum apparatus with a vacuum or in an inert atmosphere at temperatures of -196 ° C to 400 ° C, are advantages of the device. The activity of cobalt source is 158 TBq. Main objectives in using of the facility are: Hardness testing of electronic-components and materials properties testing; Characterize materials and components used in space applications, e.g. solar cells, HCMOS device's, transistors (SiGe HBTs, Si-JFETs etc.) at cryogenic temperatures; Enhance structure & properties of polymers and composites at different temperatures; Qualify and quantify lifespan of materials subjected to ionizing radiation used in Nuclear Power Plants, e.g. rubber seals, electrical cables, LEDs, optical fibers, concrete structures at elevated temperatures

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 24 AUGUST 2022

JYFL-ACCLAB

Accelerator Laboratory of
the University of Jyväskylä,
Department of Physics,
P.O. Box 35 (YFL),
FI-40014 Jyväskylä

paul.greenlees@jyu.fi

www.jyu.fi/accelerator

JYVÄSKYLÄ, FINLAND

International-class user facility hosting four accelerators providing a wide range of irradiation and analysis services. One of 29 large scale research infrastructures on Finland's Roadmap (FIRI). Participant in six EU transnational access programs. Irradiations with light and heavy ions, electrons and photons. Broad range of analysis and imaging services available including RBS, high-resolution PIXE, ToF-ERDA, Helium Ion Microscope Imaging.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES | CASE BY CASE

VERSION · 21 DECEMBER 2022

MADERE

CEA (French Alternative Energies and Atomic Energy Commission)

nicolas.thiollay@cea.fr

https://www.youtube.com/watch?v=-ajtgl4eejk

CADARACHE, FRANCE

LDCI laboratory (IRESNE/DER/SPESI) operates a gamma/X spectrometry platform equipped with eight detectors devoted to reactor dosimetry applications.
The technique consists in activating one or more metallic materials sensitive to incident neutrons, each material interacting with neutrons in a specific energy range, and generating a radioactive isotope emitter of gamma/X photons.
When several materials are irradiated together in a specific location, the neutron flux can be unfolded using a dedicated code such as CALMAR, developed in the laboratory.
The main applications of these measurements are the prediction of embrittlement of materials under irradiation (reactor pressure vessel lifetime), neutron flux characterization and nuclear data validation.
Measurements performed with these equipments are accreditated by the French accreditation Committee (Cofrac) relying on the 17025 ISO standard.
The platform allows for detecting activities between 0,1 Bq and 1E+07 Bq.
Amongst all equipments, one can find 3 standard detectors (one having an automatic device) and 2 high efficiency detectors for gamma measurements, 2 standard detectors adapted for low energy levels for X ray measurements. All detectors are HPGe (High-Purity Germanium).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 24 JANUARY 2023

FC WORKSHOP

CEA (French Alternative Energies and Atomic Energy Commission)

nicolas.thiollay@cea.fr

https://www.youtube.com/watch?v=o2aOQSHCTSc

CADARACHE, FRANCE

The CEA has been developing and manufacturing different types of fission chambers to measure neutron fluxes on line in various nuclear reactor technologies, from low-flux critical mock-ups to nuclear power reactors. The purpose of the fission chamber fabrication workshop is to design and manufacture miniature detectors that meet the requirements of experimental programmes, collaborations and calls for tenders in the field of neutron and gamma flux measurements. The fission chamber fabrication workshop is located in the CHICADE facility; it comprises a laboratory with five glove boxes and a room equipped with a X-ray generator for non-destructive testing. Deposits are created by means of electrodeposition using one or several fissile isotopes.
The fission chambers come in kits provided by the industry and are then assembled by laser or tungsten inert gas (TIG) welding. A helium detector is used to check their leak tightness. The components undergo different degassing phases during fabrication to remove any impurity in the fission chamber. The detectors are pressurised with a gas to a specific pressure depending on the type of detector. The workshop offers twelve different fission chamber geometries and fifteen different isotopes. New geometries can be developed as well asa new isotopes to meet specific needs once their design has been approved.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

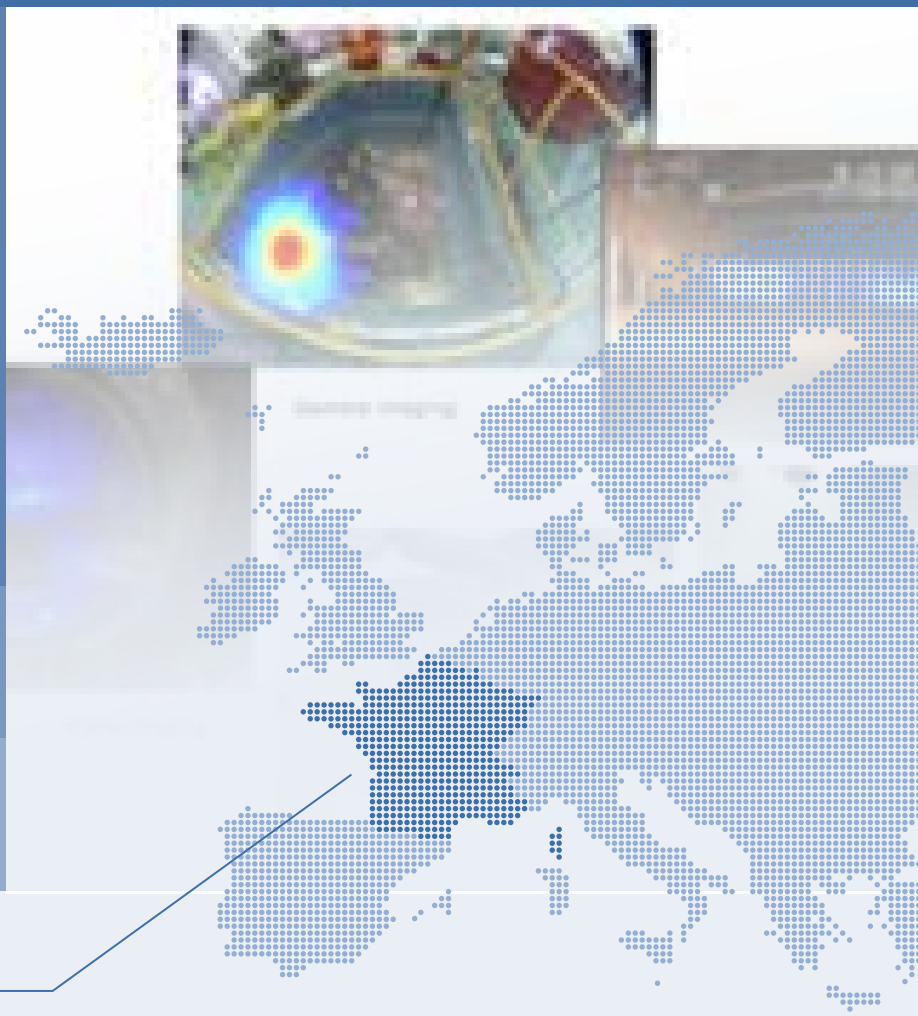
VERSION · 24 JANUARY 2023

Nuclear Measurement Laboratory

CEA (French Alternative Energies and Atomic Energy Commission)

caroline.chabal@cea.fr
eric.cantrel@cea.fr

www.cea.fr



MARCOULE, FRANCE

The CEA Marcoule (Bagnols/Cèze, France) owns a laboratory specialized in nuclear measurements where many pieces of equipment are implemented to support CEA projects. It offers several Gamma Cameras to meet most needs in terms of 3D mapping of irradiating hot spots. Gamma cameras allow to observe and locate most gamma emitters. The Laboratory has also developed an alpha camera that is used for the remote characterization of surfaces contaminated with alpha emitters (241Am, 239Pu, 238Pu, etc.).
Furthermore, the Laboratory has about forty detectors associated with different collimator geometries to perform in situ gamma spectrometry measurements. The technologies used are : CdZnTe, HpGe, NaI, LaBr3.
The teams are experts in complex 3D radiological modeling.
The implementation of radiological calculations is inseparable from in situ measurements to establish the radiological diagnosis. The radiological modeling tools used are multiple. MCNP, TRIPOLI, Panthere, Narmer, RayXPert are the main codes used.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 17 JANUARY 2023

CISLAB

CEA-List CISLAB (Technological Platform for Design, Test and Qualification of advanced sensors & instrumentation)

francois.cartier@cea.fr

https://list.cea.fr/en/

GIF SUR YVETTE, FRANCE

Unique pool in France of experimental and numerical facilities allowing to design, test and qualify sensors and instrumentation systems, organized around 6 technical areas (2 600 m²):

- Chemistry and radiochemistry laboratories, fully equipped for organic material synthesis and material/surface characterization (SEM, AFM, FTIR, DLS),
- Physics modeling and simulation for computer-aided design of ionizing radiation-based sensors,
- Conception of advanced electronic architectures (hardened electronics, FPGA, ASIC) ,
- Development of AI-based embedded algorithms for signal processing,
- Facilities for fast prototyping and system integration (3D printer, water jet cutting, mechanical workshop),

Refs :

- https://list.cea.fr/en/plateformes/cislab/
- http://www.lnhb.fr/presentation-en/

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 9 FEBRUARY 2023

gELBE

HZDR,
Bautzner Landstraße 400,
01328 Dresden

roland.beyer@hzdr.de
A.Junghans@hzdr.de

https://www.hzdr.de/db/Cms?pNid=472

DRESDEN, GERMANY

yELBE is the world's only facility producing bremsstrahlung γ-rays with energies greater than 10 MeV. This beam line offers a continuous spectrum of γ-rays with a maximum energy selectable between 6 and 18 MeV .

The bremsstrahlung is produced by shooting the ELBE electron beam through a thin niobium foil. A photon flux of about 109 s-1 is reached using a foil thickness of 12.5 µm at a typical electron current in the order of 500 µA.

An array of four high purity germanium detectors is installed and in routinely use to perform nuclear resonance fluoresence measurements to study electromagnetic strength functions .
https://www.hzdr.de/db/Cms?pNid=472

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 24 FEBRUARY 2023

GAMMA

ISOTOPTECH ZRT
H-4026 Debrecen
Bem tér 18/C

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

www.isotoptech.eu/en/

DEBRECEN, HUNGARY

Our company has a well-equipped low background gamma spectrometry laboratory for measurement of environmental samples and radioactive wastes. 6 pcs of gamma spectrometers including Standard Segmented Gamma Scanner for scanning of drum geometry, carbon epoxy window gamma spectrometers for low-energy X-ray measurements and a Be window gamma spectrometer measurements.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

DOSIMETRY

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

www.isotoptech.eu/en/

DEBRECEN, HUNGARY

We have experience in modelling the propagation of radioisotopes in the environment and modelling the exposure of biotas using several modelling programs (ERICA Tools, PC-CREAM Radiological Impact Assessment Software, COSIMA, HYSPLIT...).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 19 JANUARY 2023

FIGARO

Norwegian University of Life Sciences Ecotoxicological Lab

olelin@nmbu.no;
dag.brede@nmbu.no

DOI: 10.1080/09553002.2018.1516906

AAS, NORWAY

FIGARO is a facility for low-dose exposure ecotoxicological experiments located at Campus NMBU, Aas (30 km S of Oslo) and is used for a variety of chronic and sub-chronic exposure studies (e.g., fish, mussels, earthworms, plants). The facility is equipped with a climate control system (temperature, light, humidity), and is fully approved as an animal research facility, including the use of GMO rodent and other plant and animal models. FIGARO is primarily designed as an external gamma irradiation facility, although it is also authorised for radionuclide internal exposure (including alpha emitters), as well as other chemical stressors (e.g., metals, organics, nanoparticles) and UV exposure. The irradiation source can be loaded with up to 12 Ci Co-60, which provides a continuous dose rate field from 3 Gy/hr (at source) down to 400 µGy/hr (when maximally loaded) and allows simultaneous, chronic exposure of samples over the whole dose rate field. Temperature and pH controlled flow-through systems are available for aquatic organism exposures. The climate control specifications for the experimental hall are: Temperature: 4 - 37oC (+/- 1oC) Light: ca. 50 - 300 lux with automatic dimmer (10 min) Humidity: 45 - 65% (ScanClime) Ventilation: 300 m3/h.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

CERAD 1

National Centre for Nuclear Research

jacek.gajewski@ncbj.gov.pl
malgorzata.kot@ncbj.gov.pl
krzysztof.kurek@ncbj.gov.pl

https://ncbj.gov.pl

ŚWIERK-OTWOCK, POLAND

CERAD - a 30 MeV proton, deuteron and alpha cyclotron, Otwock near Warsaw - in construction, will operate from 2023

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

POLFEL
National Centre for Nuclear Research

jacek.gajewski@ncbj.gov.pl
malgorzata.kot@ncbj.gov.pl
krzysztof.kurek@ncbj.gov.pl

https://ncbj.gov.pl

ŚWIERK-OTWOCK, POLAND

POLFEL - a THz range Free Electron Laser, Otwock near Warsaw - will operate in 2024

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

RAPID

Institute of Nuclear Chemistry and Technology

u.gryczka@ichtj.waw.pl

http://www.ichtj.waw.pl/drupal_eng/

WARSAW, POLAND

The RAPID Center for Research and Radiation Technology of IChTJ is an important research platform for conducting R&D for domestic and foreign scientific institutions as well as small and medium enterprises in the field of work involving chemistry and radiation technology, carried out using electron beams, accelerated in accelerators with various parameters, covering the energy range from 0.2 to 10 MeV and beam power up to 20 kW. The area of activity of the RAPID Center is the initiation and conduct of scientific research using unique research equipment such as pulse nanosecond radiolysis, used in interdisciplinary research in various fields of radiation chemistry. Application and implementation activities include the possibility of running processes in a continuous mass scale using technological lines including, among others radiation sterilisation and radiation modification of polymers (electric wires, foams, heat-shrinkable products), as well as the possibility of using a pilot installation, particularly useful for assessing the possibility of industrial implementation of individual technological processes.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

STU 1

Slovak University of Technology in Bratislava (STUBA)

jarmila.degmova@stuba.sk
vladimir.krsjak@stuba.sk

https://www.stuba.sk/

BRATISLAVA, SLOVAKIA

Facility 1 - Implantation and Ion Beam Analysis Facility

It is based on an HVEE 6 MV Tandetron accelerator with a maximum achievable energy of 12MeV for protons and 18MeV for He2+ ion beams. Besides the possibility of high-temperature implantation, the system is equipped with an end station for Rutherford Backscattering Spectrometry(RBS), Particle Induced X-ray Emission (PIXE) and Elastic Recoil Detection Analysis (ERDA). The system is further extended by Nuclear reaction analysis (NRA) and a thin sample holder for PIXE aerosol filter measurements.

Location: Faculty of Materials Science and Technology in Trnava, Advanced Technologies Research Institute,
Slovak University of Technology in Bratislava, Jána Bottu 25, Trnava, 91724, Slovakia.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 MARCH 2023

SMU 3

Slovak Institute of
Metrology,
Karloveska 63,
842 55 Bratislava

jarmila.sluciak@smu.gov.sk
javornik@smu.gov.sk

www.smu.sk/ionizujuce-ziarenie/

BRATISLAVA, SLOVAKIA

The National Standard of dosimetric quantities of gamma radiation and national standard of dosimetric quantities of x-ray: SMU uses primary ionization chamber ND 1005/A with other chambers traceable to primary chamber for measuring the air kerma; secondary chamber TW 30013 traceable to BIPM for measuring absorbed dose to water and secondary chamber ND 1000 traceable to IAEA for measurement of N (narrow) qualities of X - ray.

These standards includs irradiation assembly with radionuclide gamma sources S-Cs and S-Co and X - ray generator Philips.
Number of CMCs for gamma radiation: 14.
Number of CMCs for X - ray: 16

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 15 JANUARY 2023

SMU 2

Department of Ionizing Radiation, Slovak Institute of Metrology,
Karloveská 63,
842 55 Bratislava

jarmila.sluciak@smu.gov.sk
javornik@smu.gov.sk

https://www.smu.sk/ionizujuce-ziarenie/

BRATISLAVA, SLOVAKIA

The National Standard of Radionuclide Activity:
The activity scale is realized using two methods: by means of standards of relatively long-lived radionuclides and in the form of calibration constants of the individual measuring devices.

The radionuclide activity scale is realized on several devices with different, partially overlapping ranges (gammaspectrometry, ionizing chambers, alphaspectrometry, windowless gas proportional counter, primary standard of beta radionuclide activity based on liquid scintillation analysis using primary methods TDCR, CIEMAT/NIST and 4Πβ-γ coincidence counting). The total range of the scale of gamma emitters measurable in SMU is 1 Bq (gamma spectrometric measurements) to 10E11 Bq (calibrated well-type ionization chamber). The range of scale for alpha emitters is 1Bq to 100 kBq, for beta emitters 10 Bq to 100 kBq. Number of CMCs: 37.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 6 FEBRUARY 2023

CNA-CYCLOTRON

National Center of Accelerators (CNA): Tandem 3MV Accelerator, Thomas Alva Edison 7, 41092-Seville

lguti@us.es

https://cna.us.es/index.php/en/facilities/18-9-mev-cyclotron-accelerator

SEVILLE, SPAIN

Cyclotron external beam line for protons and deuterons up to 9 and 18 MeV respectively.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 JULY 2023

CNA-RADLAB

National Center of Accelerators (CNA): Tandem 3MV Accelerator, Thomas Alva Edison 7, 41092-Seville

ymorilla@us.es

https://cna.us.es/index.php/en/

SEVILLE, SPAIN

Cyclotron external beam line for protons and deuterons up to 9 and 18 MeV respectively.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 JULY 2023

CNA-SARA

National Center of Accelerators (CNA): Tandem 3MV Accelerator, Thomas Alva Edison 7, 41092-Seville

lguti@us.es

https://cna.us.es/index.php/en/

SEVILLE, SPAIN

SARA is a facility dedicated to Accelerator Mass Spectrometry. It is based on a 1 MV tandetron and able to detect isotopes as 10Be, 14C, 26Al, 129I and actinides.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

CNA-TANDEM

National Center of Accelerators (CNA): Tandem 3MV Accelerator, Thomas Alva Edison 7, 41092-Seville

fjgl@us.es

https://cna.us.es/index.php/en/

SEVILLE, SPAIN

The 3 MV tandem accelerator at the CNA is a powerful tool dedicated to interdisciplinary research using energetic ion beams. It is based on a tandem electrostatic particle accelerator with a maximum terminal voltage of 3 MV, and it accelerates protons, alpha particles, and a wide variety of stable ions, including lithium, carbon, oxygen, and more. The accelerator is primarily focused on material characterization and modification through Ion beam analysis techniques (IBA) and ion implantation. More details can be found at http://cna.us.es/ v

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

MICADAS-CNA

AMS Unit Centro nacional de aceleradores

lguti@us.es

https://cna.us.es/index.php/en/

SEVILLE, SPAIN

MICADAS is a 200 kV terminal Accelerator Mass Spectrometry system for 14C dating.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 JULY 2023

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

PD

Laboratories of Dosimetry Standards (PD) , owned by CIEMAT Avenida Complutense 40, Madrid

miguel.embid@ciemat.es

http://rdgroups.ciemat.es/

MADRID, SPAIN

Laboratories of Dosimetric Standards (PD), where appropriate measurement techniques are used to characterize the processes of interaction of radiation emitted with matter in terms of the energy deposited, allowing the definition of the National Standards of Exposure, Kerma and Absorbed dose, for γ (60Co, 137Cs), X (ISO 4037 10 to 300 kV) or β (147Pm, 85Kr, 90Sr / 90Y) photons.

At present PD studies are being developed to extend X-ray qualities to levels of diagnosis and therapy, new standards for flat chambers (use in therapy), automation of calibrations in air and water and development of primary standards.

More information at http://rdgroups.ciemat.es/web/lmri .

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

RN

Radionuclide Metrology (RN) Laboratories, owned by CIEMAT Avenida Complutense 40, Madrid

miguel.embid@ciemat.es

http://rdgroups.ciemat.es/web/lmri

MADRID, SPAIN

In the Radionuclide Metrology (RN) Laboratories, appropriate measurement techniques are used to metrologically set, maintain and disseminate the National Standard of the SI unit (Becquerel) of the magnitude activity (of a radionuclide) for α, β and γ emitters. The techniques include 2pi alpha counting, alpha spectrometry with defined solid angle chambers, liquid scintillation countig, coincide beta-gamma and alpha-gamma counting and gamma and XR spectrometry.

Other activities are calibration of surface contamination monitors, calibration of activimeters and supply of solid and liquid sources for calibration of equipments and as radiochemical tracers.

More information at http://rdgroups.ciemat.es/web/lmri .

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

NSL

Neutron Standard Laboratory (LPN), owned by CIEMAT Avenida Complutense 40, Madrid

roberto.mendez@ciemat.es

www.rdgroups.ciemat.es/web/lmri

MADRID, SPAIN

Neutron Standard Laboratory (LPN). The NSL is the repository of neutron fluence standards. One of its tasks is to provide metrological traceability to neutron measurement equipment through periodic calibration of area monitors and personal dosimeters.

For this, it counts with three neutron sources of 252Cf, 241Am-Be and heavy-water moderated 252Cf, in accordance with the ISO 8529-1 standard. 1 or 2 Images, references and web pages with information.

More information at http://rdgroups.ciemat.es/web/lmri .

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

LOTUS & CARROUSEL

Ecole Polytechnique Fédérale de Lausanne (EPFL)

vincent.lamirand@epfl.ch

https://www.epfl.ch/labs/lrs/facilities/

LAUSANNE, SWITZERLAND

LOTUS and CARROUSEL are nuclear facilities for gamma and mixed neutron/gamma irradiations, respectively.

LOTUS is an irradiation cavity (3.6 x 2.4 x 3m) used with highly radioactive sources. It hosts the SILC beam irradiator (15 degrees aperture) and its 160 GBq Co-60 source. A table allows easy positining close to and at a distance from the source.

The CARROUSEL facility consists of a cylindrical water tank (diameter: 1.50 m) hosting a strong PuBe neutron source at its center (~10^7 n.cm-2.s-1). Air channels are positionned at adjustable distances from the source.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 01 SEPTEMBER 2023

VTT

Radiochemistry Lab

VTT Centre for Nuclear Safety-Radiochemistry laboratory, VTT Technical Research Centre of Finland, Kivimiehentie 3

wade.karlsen@vtt.fi

https://www.vttresearch.com/en/

ESPOO, FINLAND

Radiochemistry labs for elemental and isotopic analysis. Dosimetry, alpha, beta and gamma measurements. Clay lab for preparing and testing clay samples thermomechanically. Aerosol laboratory for severe accident species simulation and characterization.

https://www.vttresearch.com/en/ourservices/vtt-centre-nuclear-safety

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 FEBRUARY 2023

CHROMIA-EPICUR

IRSN, Cadarache

laurent.cantrel@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

CHROMIA-EPICUR g irradiator facilty + LEAR hot cell. Experimental facilities to study radiochemistry of fission products in severe accident conditions. The second topic deals with irradiation of materials (polymers and others) in controlled atmosphere (H2O, air, H2, NO, Ar ...), The g irradiator is equipped with 60-Co sources. IRSN - Unit PSN-RES/SEREX/L2EC, CEA Cadarache BP n°3, F-13115 Saint Paul Lez Durance.The maximum temperature is set at 130°C. The volume of the irradiation is about 5 liters for quite small sampling, 131-I isotope can be used to label iodine solution to make online measurements, with selective filters, concerning airborne iodine species formed by different phenomena. Dose rates are about few kGy/h but can be lower with screens to attenuate radiation. In LEAR hot lab and/or CHROMIA platform if non radioactive species are used, possible chemical analysis can be performed to make some chemical analysis post-irradiation (g-counters + different standard means of chemical speciation)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

RadioBioLabs

Laboratory at the Institute of Resource Ecology (KB RCL and KB6), Helmholtz-Zentrum Dresden-Rossendorf, Institute of Resource Ecology, Bautzner Landstrasse 400, 01328 Dresden

j.raff@hzdr.de

www.hzdr.de

DRESDEN, GERMANY

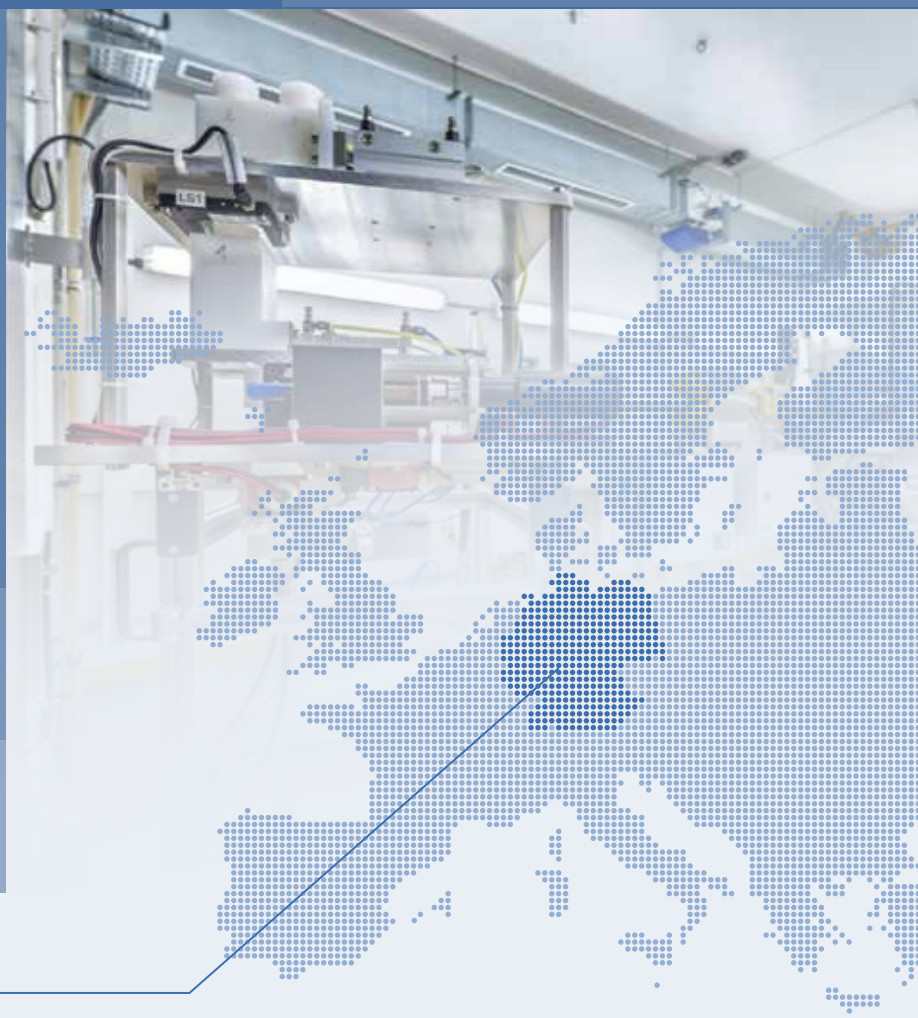
The biological S1 radiochemistry laboratories in controlled areas at HZDR (https://www.hzdr.de/db/Cms?pNid=542) provide a wide range of possible experiments with state of the art microbiological and analytical methods.

Specialized rooms and gloveboxes allow sample preparation of eukaryotes and prokaryotes starting from cell culture (aerobic/anaerobic), microbial diversity analysis, DNA extraction and downstream processing (PCR, RISA, RFLP, sequencing and evaluation). These experiments can include radionuclides (alpha, beta, and gamma emitters, including TRU but NOT fissile material, particularly U-235 and Pu-239).

Available spectroscopic, microscopic and calorimetric characterization techniques include UV/vis, laser-induced luminescence spectroscopy, light/fluorescence/Raman microscopy, atomic force microscopy, microcalorimetry and autoradiography.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 1 FEBRUARY 2024



RCL Leipzig

Institute of Resource Ecology, Research Site Leipzig, Permoserstr. 15, 04318 Leipzig, Germany

c.fischer@hzdr.de

www.hzdr.de

LEIPZIG, GERMANY

The radiochemistry laboratories in controlled areas at HZDR in Leipzig (https://www.hzdr.de/db/Cms?pOid=29974&pNid=2057&pLang=de) provide a wide opportunity for reactive transport experiments using beta and gamma radiotracers. These experiments include tracer production at a cyclotron CYCLONE 18/9.

Available tomography techniques include PET and µCT. Surface analysis is available by confocal and interferometry microscopy. A wide range of (radio-)analytical capabilities is provided.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 1 FEBRUARY 2024

RCL Rossendorf

Radiochemical Laboratory at the Institute of Resource Ecology, Helmholtz-Zentrum Dresden-Rossendorf, Institute of Resource Ecology, Structural materials, Bautzner Landstrasse 400, 01328 Dresden

moritz.schmidt@hzdr.de

www.hzdr.de

DRESDEN, GERMANY

The radiochemistry laboratories in controlled areas at HZDR (https://www.hzdr.de/db/Cms?pNid=542) provide a wide range of possible experiments with radionuclides (alpha, beta, and gamma emitters, including TRU but NOT fissile material, particularly U-235 and Pu-239). These experiments include synthesis and characterization of actinide materials in the solid and liquid state in aqueous and non-aqueous media.

Available spectroscopic characterization techniques include UV/vis, Raman and IR spectroscopy , NMR and EPR spectroscopy, SQUID magnetometer, XRD , as well as laser-induced luminescence spectroscopy. A wide range of (radio-)analytical capabilities is provided.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

RadchemL

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

A well-equipped Level B radiochemistry laboratory for radiochemical sample preparation is available at our company. We also have a set of modern radioanalytical instruments, Alpha (Alpha Analyst 7200-12 Alpha Spectrometer), beta (Perkin Elmer Quantulus 1220, Perkin Elmer Quantulus GCT 6220, HIDEX 300SL) and gamma spectrometers (6 gamma spectrometers including SGS, carbon epoxy window gamma spectrometer for low-energy X-ray measurements, Be window gamma spectrometer) measurements. We routinely measure several DTM isotopes from LILW and also environmental samples (Co-60, Ag-108m, Cs-134, Cs-137, U-234, U-235, Np-237, U-238, Pu-238, Pu-239, Pu-240, Am-241, Cm-242, Cm-244, Fe-55, Ni-59, Nb-93m, H-3, C-14, Cl-36, Ni-63, Se-79, Sr-90, Zr-93, Nb-94, Tc-99, Sb-125, I-129).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

LILW

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

A complex laboratory background is available for LILW characterisation at our company. We have a well-equipped Level B radiochemistry laboratory and several alpha, beta, gamma spectrometers and Standard Segmented Gamma Scanner for scanning of drum geometry. Furthermore, a large instrumentation park for elemental analysis, inorganic analysis, and analysis of micropollutants also available to support the characterisation process. We routinely measure several DTM isotopes from LILW and also environmental samples (Co-60, Ag-108m, Cs-134, Cs-137, U-234, U-235, Np-237, U-238, Pu-238, Pu-239, Pu-240, Am-241, Cm-242, Cm-244, Fe-55, Ni-59, Nb-93m, H-3, C-14, Cl-36, Ni-63, Se-79, Sr-90, Zr-93, Nb-94, Tc-99, Sb-125, I-129). We are participant of the PREDIS project.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

DT

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

We have environmental analytical laboratory with large instrumentation park for elemental analysis, inorganic analysis, and analysis of micropollutants. Instruments: ion chromatography system, TOC/TN analyser, UV-VIS spectrophotometer, Microwave plasma atomic emission spectrometer (MP-AES), Inductively coupled plasma mass spectrometry (ICP-MS), Atomic absorption spectrometry (AAS), flame emission spectrometry (FES), Attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FT-IR) 10+ Mass spectrometers (Delta plus XP, Delta plus V type IRMS, EnvironMICADAS AMS, VG5400 noble gas mass spectrometer, Neptune Plus multicollector ICPMS, Thermo Fisher Scientific 253 Plus mass spectrometer and its associated Kiel IV automated carbonate digestion system, etc.) NMR technique for structural analysis.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

Isotoptech Zrt.

HU-15
Laboratory of Environmental Studies

veresmihaly@isotoptech.hu
janovicsrobert@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

Environmental analytical laboratory: large instrumentation park for elemental analysis, inorganic analysis and analysis of micropollutants.
Instruments:

- Metrohm ion chromatography system with UV-VIS spectrophotometric detector
- TOC/TN measuring instrument
- UV-VIS spectrophotometer
- Microwave plasma atomic emission spectrometer (MP-AES)
- Inductively coupled plasma mass spectrometry (ICP-MS)
- Atomic absorption spectrometry (AAS), flame photometry (FES)
- Attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FT-IR)

10+ Mass spectrometers (Delta plus XP, Delta plus V type IRMS, EnvironMICADAS AMS, VG5400 noble gas mass spectrometer, Neptune Plus multicollector ICPMS, Thermo Fisher Scientific 253 Plus mass spectrometer and its associated Kiel IV automated carbonate digestion system, etc.)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
ŚWIERK
JRC collaboration partner

CERAD 2

Centre for Design and Synthesis of Molecularly Targeted Radiopharmaceuticals, National Centre for Nuclear Research, Radioisotope Centre POLATOM, 7 Andrzeja Soltana str., 05-400 Otwock

renata.mikolajczak@polatom.pl

https://www.ncbj.gov.pl/en

ŚWIERK-OTWOCK, POLAND

Modern infrastructure dedicated to research on new diagnostic/therapeutic radiopharmaceuticals based on ligands biologically active at the cellular/molecular level. The heart of this infrastructure is the 30 MeV cyclotron accelerating protons, deutrons and alpha particles, surrounded by the processing laboratories for the production of radionuclides and radiopharmaceuticals, quality control and research laboratories. CERAD facility is still under construction, with the planned cyclotron installation in February/March 2023, will be fully operational by the end of 2023.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 15 JANUARY 2023

RO-3 RADIOANALYTICAL LABORATORIES

Institute for Nuclear Research, Street Campului Nr. 1, POB 78, 115400 - City Mioveni

cristian.dulama@nuclear.ro
crina.bucur@nuclear.ro

https://nuclear.ro/reactor/

PITESTI -MIOVENI, ROMANIA

Radioanalytical laboratories are equipped with up-to-date experimental infrastructure (alpha, beta, gamma spectometers, ICP-OES, DTA-GA, ion Chromatography, matrices trsting equipment, etc.) for radiochemical characterization of a large range of environmental samples, radioactive waste (LILW) and for investigating the radionuclide transport processes and parameters (sorption coefficient, diffusion coefficient, etc.) in different natural and engineering environments. Also, the radio-analytical labs offer capabilities for the development and testing new waste conditioning matrices, i.e. geopolymers for direct incorporation of liquid organic waste, magnesium phosphate cements for reactive waste (www.nuclear.ro/en/statia-de-tratare-a-deseurilor-radioactive/).
There are also capabilities to perform radio-ecological studies for characterization and restoration of contaminated radioactive sites (https://nuclear.ro/en/radioprotectie-protectia-mediului-si-protectie-civila/)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

Institut "Jožef Stefan"
Reaktorski Infrastrukturni Center

Radiochemistry Lab

The Radiochemistry Laboratory, Jozef Stefan Institute, Brinje 40, SI-1262 Dol pri Ljubljani

marko.strok@ijs.si

http://www.environment.si/en/

LJUBLJANA, SLOVENIA

Fully equipped radiochemistry laboratories, including radiometric measurement capabilities (gamma spectrometers, alpha spectrometer and proportional counter), licensed to work with open radioactive sources with access to the TRIGA research reactor and hot cell facilities for irradiation of samples.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 18 JANUARY 2023

IR-15C

IR-15C Radio-chemical Characterization Lab, owned by CIEMAT, Avenida Complutense, 40, Madrid

marina.rodriguez@ciemat.es
hitos.galan@ciemat.es

http://rdgroups.ciemat.es/web/hlwu/

MADRID, SPAIN

The work carried out in the radioactive facility (IR-15C), belonging to the Low and Medium Activity Radioactive Waste Unit (LMRWU), called “Laboratory of Characterization”, is related to chemical and radiological characterization and treatment of very low, low and medium radioactive wastes from Nuclear and Radioactive Facilities. In the facility, acid digestion of different types of samples, radiochemical separations, measurement methods of different alpha (238Pu, 239/40Pu, 241Am, 242Cm, 244Cm, 234U, 238U), beta (3H, 14C, 36Cl, 41/45Ca, 55Fe, 90Sr, 63Ni, 99Tc, 241Pu) and beta-gamma emitting radionuclides (93m/94Nb, 129I), and thermal treatment of some matrix such as graphite are performed.
Facility
IR-15C is a second category facility and is made up of four laboratories that in total are equipped with 12 fume hoods; 1 fume hood for acid treatment and 2 armored warehouses. The activities that can be stored in the armored warehouses are: A(beta-gamma) < 6 GBq; A(alpha) < 6 MBq; Unat. < 40 MBq; U enr. < 15 MBq. The limit of activity with which it is possible to work in the laboratory is 10% of the stored values.
In addition, in a non-radioactive laboratory next to the facility, there are 4 liquid scintillation counters.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

Isotoptech Zrt.

Environmental analytical laboratory

Laboratory of Environmental Studies

veresmihaly@isotoptech.hu
janovicsrobert@isotoptech.hu

https://www.isotoptech.eu/

DEBRECEN, HUNGARY

Environmental analytical laboratory: large instrumentation park for elemental analysis, inorganic analysis and analysis of micropollutants.
Instruments:

- Metrohm ion chromatography system with UV-VIS spectrophotometric detector
- TOC/TN measuring instrument
- UV-VIS spectrophotometer
- Microwave plasma atomic emission spectrometer (MP-AES)
- Inductively coupled plasma mass spectrometry (ICP-MS)
- Atomic absorption spectrometry (AAS), flame photometry (FES)
- Attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FT-IR)

10+ Mass spectrometers (Delta plus XP, Delta plus V type IRMS, EnvironMICADAS AMS, VG5400 noble gas mass spectrometer, Neptune Plus multicollector ICPMS, Thermo Fisher Scientific 253 Plus mass spectrometer and its associated Kiel IV automated carbonate digestion system, etc.)

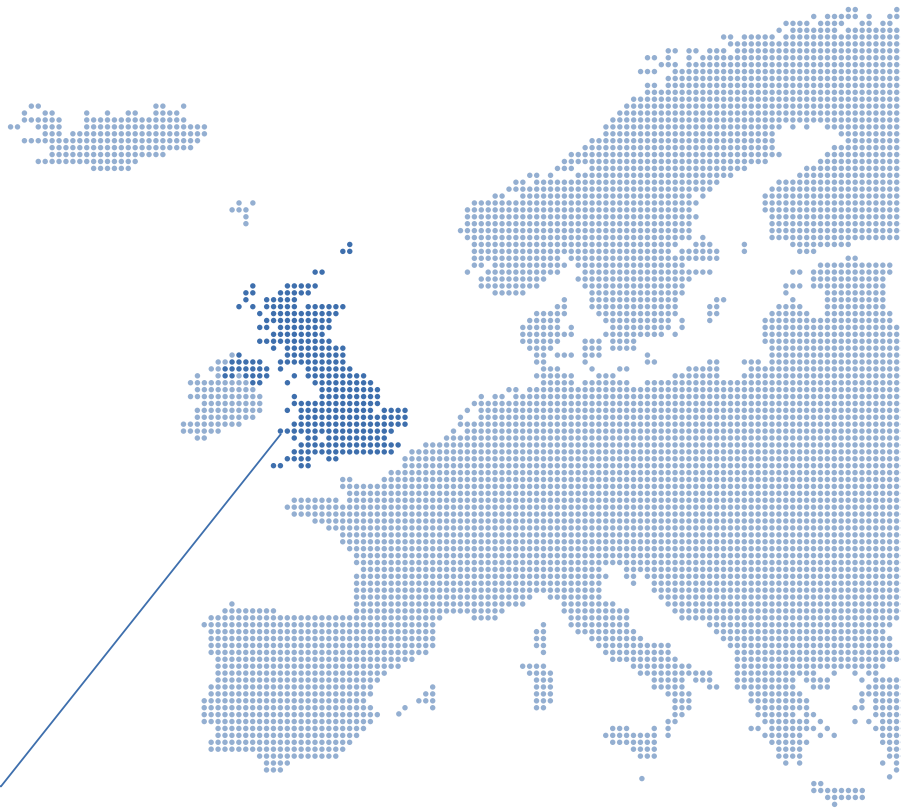
FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

NPL
National Physical Laboratory

michael.bunce@npl.co.uk
ben.russell@npl.co.uk
dean.whittaker@npl.co.uk

https://www.npl.co.uk/nuclear-metrology/neutron-standards



TEDDINGTON, UNITED-KINGDOM

The radiochemistry suite at NPL is used for separation of radionuclides from stable and radioactive interferences prior to measurement using decay counting or mass spectrometric techniques. The labs at NPL have the ability to dissolve solid materials into solution using acid leaching, microwave or borate fusion dissolution. Bulk and chromatographic based separation techniques can be used, with measurement using alpha spectrometry, liquid scintillation counting, gamma spectrometry or inductively coupled plasma mass spectrometry. The radiochemistry group is also moving towards automated radiochemcial separation and labelling of medical radionuclides using high performance liquid chromatography (HPLC).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 1 SEPTEMBER 2023

KRNEC

KRNEC facility
UJV Rez, a. s.
Integrity and Technical Engineering Division
Hlavni 130, Rez

david.batek@ujv.cz

https://www.ujv.cz/en

REZ, CZECH REPUBLIC

Quenching tests experimental facility for simulation of the flooding of the reactor pressurre vessel wall form the outside. Temperature field measurement systém along RPV wall thickness and inside RPV cavity. Simulations lead to a refinement of computational work dealing with RPV flooding from the outside. Refinement of calculations in the analysis of pressure-temperature shock (PTS) scenarios with rapid cooling of the RPV external surface by reactor shaft flooding, which can be caused, for example, by LOCA accidents.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

sCO2

CVŘ, Hlavní 130,
Husinec - Řež,
250 68

petr.hajek1@cvrez.cz

https://www.cvrez.cz/en

REZ, CZECH REPUBLIC

An experimental loop with supercritical carbon dioxide. The main aim of this facility is to verify the conversion cycle and identify correlations for heat transfer and supercritical CO2.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 21 DECEMBER 2022

THS-15

THS-15 (Thermal Hydraulic Stand, est. 2015) UJV Rez, a. s. Integrity and Technical Engineering Division Hlavni 130, Rez

david.batek@ujv.cz

https://www.ujv.cz/en

REZ, CZECH REPUBLIC

Large scale experimental facility to demonstrate the coolability of reactor pressure vessel using IVMR (In Vessel Melt Retention) strategy within severe accident. The originally designed facility respected the design parameters of the VVER1000 reactor, but the phenomena and experimental work are transferable to other reactor types including SMRs (Small Modular Reactors). National and international cooperation in the frame of research projects (e.g. IVMR project, grant ID 662157).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

PWR PACTEL

LUT University,
Yliopistonkatu 34,
53850 Lappeenranta

vesa.riikonen@lut.fi

www.lut.fi/en/research

LAPPEENRANTA, FINLAND

A test facility for safety studies related to thermal hydraulic of the PWRs with the EPR type vertical steam generators - https://ydin.lut.fi/eds.

The facility consists of a U-shaped reactor pressure vessel model, two loops with vertical steam generators, a pressurizer, and emergency core cooling systems including nitrogen-driven accumulators. The maximum core power is 1 MW corresponding roughly to the scaled residual heating power of the EPR reactor. The height scale is 1:1 and the volume ratio between the pressure vessels in PWR PACTEL and EPR is about 1/405. The maximum primary and secondary side pressures are 8.0 MPa and 4.65 MPa, respectively.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES | CASE BY CASE

VERSION · 21 DECEMBER 2022

PASI

LUT University,
Yliopistonkatu 34,
53850 Lappeenranta

joonas.telkka@lut.fi

www.lut.fi/en/research

LAPPEENRANTA, FINLAND

A model of an open passive heat removal system based on natural circulation - https://ydin.lut.fi/eds.

The facility consists of a pressure vessel simulating containment conditions, a heat exchanger, a water pool and interconnecting riser and downcomer pipelines. The pressure vessel around the heat exchanger provides containment environment and the water pool acts as a water reservoir for the system. The height scale is 1:2 and the maximum operating pressure is 5 MPa. The water pool operates in atmospheric pressure.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES | CASE BY CASE

VERSION · 21 DECEMBER 2022

MOTEL

LUT University,
Yliopistonkatu 34,
53850 Lappeenranta

joonas.telkka@lut.fi

https://ydin.lut.fi/eds

LAPPEENRANTA, FINLAND

A test facility modelling an SMR to the design of an Integrated PWR such as NuScale - https://ydin.lut.fi/eds.

MOTEL is designed applying the principle of modularity. The major components are exchangeable. MOTEL includes primary side parts and a helical coil steam generator with 16 tubes for primary to secondary side heat transfer inside a pressure vessel. The primary side operates by natural circulation. The core is generic and does not directly represent the fuel design of any existing reactor type. The core includes 132 heater rods, which are arranged in a rectangular grid. The pressurizer is located at the top part of the pressure vessel.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES | CASE BY CASE

VERSION · 21 DECEMBER 2022

DEFIT

CERG, 7 Rue Lavoisier
38800 Le Pont-de-Claix,
France

yann.bohan@cerg-fluides.com

http://www.cerg-fluides.com/index.php/fr/

PONT DE CLAIX, FRANCE

DEFIT is a characterization test loop which allows the achievement of LOCA (Lost of Cooling Accident) tests. It determines the level of head loss in the Filters which are located on the lower part of the nuclear reactor building where the water is used for safety injection (RIS) and aspersion systems (EAS or other).

Basin dimensions allow conducting scale tests, not only at a reduced scale but also on a full scale filter (even if all filters are not represented).

- Filtration system performance studies
- Innovative filters development
- Safety study based on CFD approaches coupled with validation tests
- Pressure loss and clogged filters measurements
- Study of debris transport and sedimentation
- Influence of the phenomena of erosion, corrosion and chemical effects on pressure drops

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

EPEC3

CERG, 7 Rue Lavoisier
38800 Le Pont-de-Claix,
France

yann.bohan@cerg-fluides.com

http://www.cerg-fluides.com/index.php/fr/

PONT DE CLAIX, FRANCE

The EPEC3 tests loop was developed to test nuclear power plants' backup facilities in accidental situations. Settled in 2012 in our company, it permits to test overal/security organs : pumps, valves... it permits also to reproduce nominal pressure conditions, temperature and flow,thermal shocks, charged water and low NPSH or cavitation.

- Endurance tests realization in charged water;
- Thermal shock tests realization (hot shocks 284°F to 356°For coldshocks 356°Fto 158°F);
- Débit entre 4 et 1500 m^3/h
- Pression entre 12 et 200 Bars
- Température 140°C en continue et 180°C en maximal
- Ageing and endurance tests realization with shutdown and power up;
- Expertise after test and analyze of samples taken;
- Training and design assistance.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

THEMA-ASPIC

IRSN, Cadarache

guillaume.brillant@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The ASPIC test rig was initially designed to study the effects of the failure of spent fuel pool cooling systems. Indeed, in these conditions, and due the decay heat, fuel assemblies can be dewatered and the efficiency of water spay system to cool down these assemblies must be verified.
The test rig is composed of a test section and a water feeding column. The test section is composed of a full-scale assembly (about 4m) that contains heating rods (up to 80 kW). Due to technological issues, assembly temperature is limited to 600°C. The water spraying device alloys flow rates from 5 to 300 g/s with a water temperature between 20 and 90°C.
Instrumentation is composed of thermocouples at various heights inside the assembly, pressure sensors to measure the water level and water and steam flowrate measurement sensors.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

THEMA-MIDI

IRSN, Cadarache

benoit.migot@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The MIDI test rig was initially designed to study the effects of the failure of spent fuel pool cooling systems. Indeed, in these conditions, the decay heat can only be removed from the fuel assemblies by natural convection and by boiling of the water with the fuel rod cladding.

The different heat exchange processes involved in this type of configuration are studied to assess their contribution and to validate the relevant modelling codes. Test rig cross section dimensions are 2.1 x 1.4 m with a water height from 1 to 4 m. At the bottom, 21 heat areas (3x7 cells) have an adjustable power from 0 to 70 kW each with a total power between 25 kW to 300 kW. Water temperature varies between 20 and 110°C.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

THEMA-PEARL

IRSN, Cadarache

walter-john.chitty@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The PEARL test rig was designed to study the coolability of large debris beds. These debris are simulated by stainless steel balls (500 kg).
At the beginning of the experiment, the bed is uniformly heated by induction. Water can be injected from the top or the bottom of the facility. Experiments can be pressurized up to 10 bar.

The bed is equipped with thermocouples that alloys to measure cooling rate at different diameters and heights. Steam flowrate is also measured.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

THEMA-TREFLE

IRSN, Cadarache

guillaume.brillant@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The TREFLE test rig is dedicated to the study of fluid-structure interactions. The industrial problem related to this study is the flow induced induced vibrations of steam generator (SG) tubes.

Water and air are injected at the bottom of the test rig through a 3D printed honeycomb structure to homogenize flowrates. The test section on itself is composed of 25 SG tubes. Their vibration amplitude and frequency are measured optically with a high-speed camera. This camera also gives information on gas bubble diameters. Void fraction is measured locally with an optical probe and at different heights with a wired mesh sensor.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

PLATEAU

CEA (French Alternative Energies and Atomic Energy Commission)

david.guenadou@cea.fr

https://www.cea.fr/energies/iresne/Pages/Nos%20plateformes%20de%20recherche/Thermohydraulique%20et%20hydrom%C3%A9canique%20eau-vapeur.aspx

CADARACHE, FRANCE

The PLATEAU (PLATeforme en EAU/water platform in French) was designed as versatile as possible to accommodate various mock-ups. The hydraulic loop allows three injection points in the mock-up at different temperature (10-60°C) and flow-rate (50-400 m3/h). Without the utility networks, the PLATEAU facility presents four main circuits: the main circuit, the hot secondary circuit, the cold secondary circuit, the transitory injection circuit.
This network allows three operating methods: in the hydraulic mode, only the main circuit is used. The temperature is identical in the three injection points, but the flow rate is controlled independently for each ones. The temperature is regulated by the mean of a heater and or exchanger linked to a cooling system. In the thermohydraulic mode, the main, cold and hot secondary circuits are used. As in hydraulic mode, three different flow rates can be imposed on the injection points. But, this time two temperatures can be imposed: one inlet at high flow rate with hot water and the two others with cold water. The transitory mode is initiated from the thermohydraulic mode and stabilized conditions. All the circuits are used. It aims at realizing a temperature step (cold or hot). The temperature change rate is controlled by regulated valves.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 21 DECEMBER 2022

OLYMPE

CEA (French Alternative Energies and Atomic Energy Commission)

david.guenadou@cea.fr

https://www.cea.fr/energies/iresne/Pages/Nos%20plateformes%20de%20recherche/Thermohydraulique%20et%20hydrom%C3%A9canique%20eau-vapeur.aspx

CADARACHE, FRANCE

The OLYMPE facility was erected to study small analytical mock-ups. This loop is made up with two tanks, one at hot temperature (2 m3, maximum temperature 60°C) and the other one at room temperature (1 m3). Two pumps inject the water into the mock-up and valves regulate the flow rate with a maximum value of about 8 m3/h. At the outlet of the mock-up, water flows by gravity to a 3 m3 tank. When the hot or the cold tanks are empty, the experiment finishes. Water from the 3 m3 tank is pump back to the hot and cold tanks to reset the conditions for a new experiment.

This facility was used to study a device to measure the temperature by the LIF (Light induced Fluorescence) technic or scale effects. Our lab is well equipped for temperature (PT100, thermocouples) and velocity (PIV, LDV) measurements.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 21 DECEMBER 2022

SUPER FENNEC

CEA (French Alternative Energies and Atomic Energy Commission)

nicolas.auriac@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

The SUPERFENNEC facility is designed to introduce trainees to the operation of a sodium loop. This circuit is also used to test small components and instrumentation. This loop is composed of 2 tests sections. The first one is a sodium pot of about 60 liters operating at a maximum temperature of 500°C.
The second tests section is a dynamic test section. Between two flanges separated by a distance of about 1 m, a specific test section can be adapted to a dedicated need.

This facility handles sodium with a high chemical quality obtained through an active purification system. The classical subsystems of such sodium facility are present: storage vessel, cold trap, plugging indicator... The atmosphere above sodium surface is composed of Argon which its pressure is regulated at a slight overpressure, to prevent air ingress.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

BIKINI

CEA (French Alternative Energies and Atomic Energy Commission) Cadarache

guillaume.ricciardi@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

Thermal hydraulic test at PWR conditions (300°C, 150 bars) up to 15m3/h with mastered chemistry.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 21 DECEMBER 2022

FLOREAL METERO-V MISTRA

CEA (French Alternative Energies and Atomic Energy Commission)

gilles.bernard-michel@cea.fr

https://www.cea.fr/english

SACLAY, FRANCE

The FLOREAL facility belongs to CEA's Section of thermo-hydraulic Studies (STMF) and is located in the Paris-Saclay CEA research centre in France. The facility is dedicated to experimental studies in thermalhydraulics and hydrogen risk in accidental situation. The METERO-V facility is a thermalhydraulics loop which enables a separate feeding of two half assemblies with single phase water flows or air-water flows in order to create differences of velocity, temperature, or tracer concentration between the left and right half-assemblies. The test section intends to be modular in order to adapt to various measurement techniques and to various geometries.

The MISTRA facility is dedicated to the study of hydrogen risk in PWR containment (stratification, built-up and dissolution by different means such as spray, venting, cooler). The SSEXHY facility is dedicated to study flame-structure interaction.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

VERSION · 17 JANUARY 2023

SIRO

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development

federico.rocchi@enea.it
mariano.tarantino@enea.it

https://nucleus.iaea.org/sites/

PIACENZA, ITALY

SIRIO Facility, in Piacenza can simulate a passive DHRS with 110 kW power constituted by a bayonet-tubes Steam Generator and an In-pool Condenser.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

NACIE-UP

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development

federico.rocchi@enea.it
mariano.tarantino@enea.it

https://www.enea.it/it/Ricerca_sviluppo/

BRASIMONE, ITALY

NACIE-UP Facility, in Brasimone, is a natural/gas-lift circulation LBE loop with 19-pin instrumented pin bundle.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

KALLA-THESYS

KIT, Institute for Thermal Energy Technology and Safety (ITES)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

karsten.litfin@kit.edu
thomas.wetzel@kit.edu

www.ites.kit.edu/english/140.php

KARLSRUHE, GERMANY

KALLA-THESYS is a LBE loop constructed for the investigation of turbulent heat transfer in an annular gap, for oxygen control experiments and for the investigation and qualification of different flow meters. It contains a test section for a heated rod, an oxygen box for the regulation of oxygen content, an air cooler, an electromagnetic induction pump and four different flow meter techniques: permanent magnet, annubar, electromagnetic and vortex. All piping is fabricated of stainless steel with an inner diameter of 60mm.The cooler has a maximum cooling capacity of approx. 100 kW, the electromagnetic pump provides a flow rate of 14 m^3/h and a pressure head of 5 bar.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

VERSION · 1 FEBRUARY 2024

KALLA-THEADES

KIT, Institute for Thermal Energy Technology and Safety (ITES)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

karsten.litfin@kit.edu
thomas.wetzel@kit.edu

www.ites.kit.edu/english/140.php

KARLSRUHE, GERMANY

KALLA-THEADES is a forced-convection loop for thermal-hydraulic experiments in LBE at temperatures between 180°C - 450°C. The loop is made of austenitic stainless steel with an inner diameter of 105 mm. The complete inventory is 4 m^3.

THEADES basically consists of a centrifugal pump, an expansion tank, an oxygen control system, four test ports for mounting experimental test sections and an air cooler with a maximum cooling capacity of 500 kW. Depending on experimental conditions in the test section, a flow rate up to 42 m^3/h and a pressure head of 6bar can be achieved. Electrochemical oxygen sensors are mounted to measure and adjust the oxygen content in the LBE.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

VERSION · 1 FEBRUARY 2024

KASOLA

KIT, Institute of Neutron Physics and Reactor Technology (INR)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

sebastian.ruck@kit.edu
sara.martin@kit.edu

www.inr.kit.edu/258.php

KARLSRUHE, GERMANY

KASOLA ((KArlsruhe SOdium LAboratory) is a versatile experimental facility to investigate flow phenomena in liquid sodium for nuclear and non-nuclear applications. It hosts a sodium inventory of 7 m³ and can operate in the range of ~ 150–550 °C. A magneto-hydrodynamic pump can deliver a flow rate up to 150 m³/h at a pressure head of 0.4 MPa. The KASOLA facility enables a wide spectrum of thermal-hydraulic experiments:

- Qualification, validation and improvement of turbulent liquid metal heat transfer models in CFD (Computational fluid dynamics) as well as reduced order models
- Development of free surface liquid metal targets for accelerator applications
- Thermal-hydraulic investigations of flow patterns in fuel bundles or pool configurations at prototypical or scaled heights
- Qualification of components and instrumentatin or measurement devices for sodium running applications

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

VERSION · 23 MARCH 2023

COSMOS-H

KIT, Institute for Thermal Energy Technology and Safety (ITES)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

stephan.gabriel@kit.edu
wilson.heiler@kit.edu

www.ites.kit.edu/english/625.php

KARLSRUHE, GERMANY

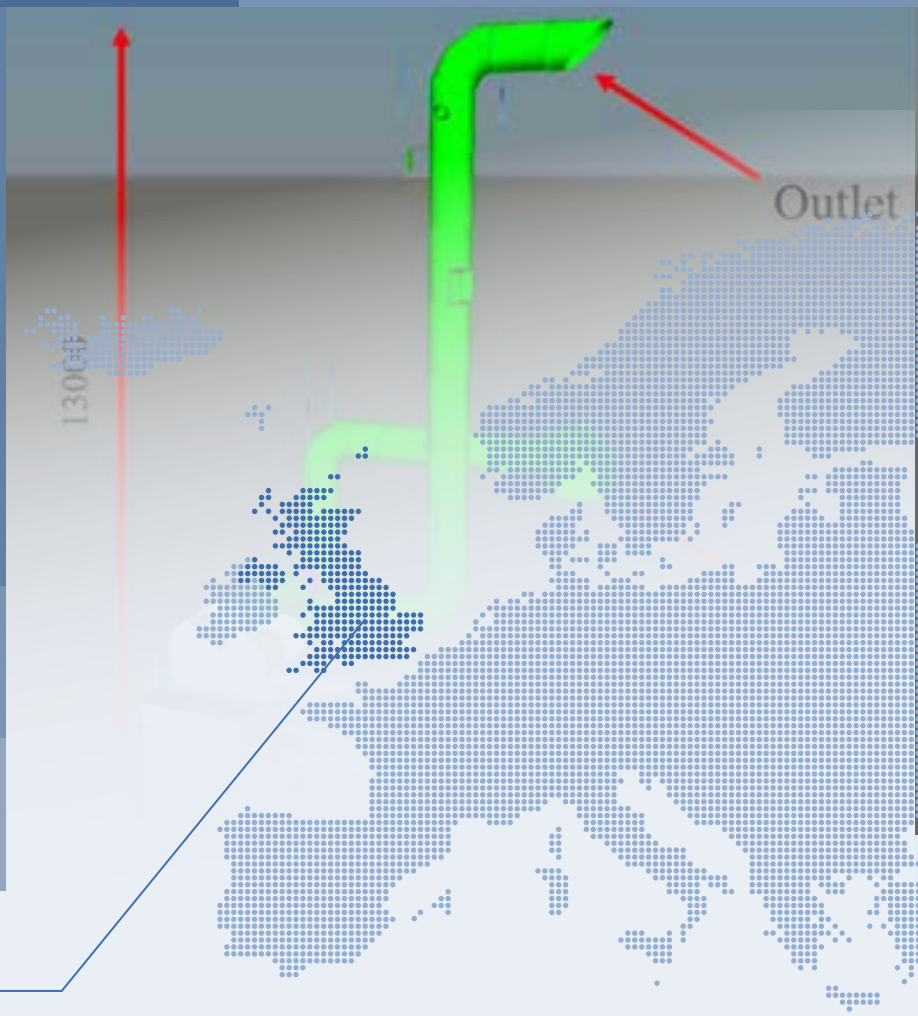
COSMOS-H is a thermohydraulic loop for liquid water and steam under SMR, BWR and PWR typical pressure conditions. The system currently achieves a maximum mass flow up to 1.4 kg/s, pressure up to 170 bar, temperature up to 360°C with a thermal system power of approx. 1.9 MW (600 kW are available for the test section).

The test loop also has a modular, adaptable test section and two bypasses. This permits the change of the flow direction in the test section. The extensive safety system allows the use of sight glasses under high Pressure/ Temperature conditions. Future research topics of COSMOS-H are 1. Critical heat flux at reactor typical conditions 2. Cooling of fuel elements under BWR, PWR, and SMR conditions 3. Accident tolerant fuels from normal operation up to critical heat flux 4. Set-up of thermal-hydraulic data base for physical model and code validation.

Visit COSMOS in the Internet: **https://www.ites.kit.edu/625.php**

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 23 MARCH 2023



PH-RF

Ansaldo Nuclear Ltd
Spring Rd,
Wolverhampton WV4
6JX, UK

marco.caramello@ann.ansaldoenergia.com
simone.pondrelli@ansaldonuclear.com

https://www.ansaldoenergia.com/about-us/media-center/power-generation-news-insights/detail-news/ansaldo-nucleare-westinghouse-take-another-step-forward-in-testing-generation-iv-lead-fast-reactor

WOLVERHAMPTON, UK

The Passive Heat Removal Facility (PHRF) has been built as part of the Advanced Modular Reactor (AMR) Feasibility and Development Project to test passive heat removal systems for innovative liquid metal reactors, notably lead fast reactors (LFR). The main body is connected by ducting with the environment, with an outlet chimney at a height of almost 30 meters from the ground floor. The facility allows to test radiative heat transfer, water boiling on large surfaces, transition from water to air and natural circulation/convection of air within the reactor cavity.
Basin dimensions allow conducting scale tests, not only at a reduced scale but also on a full scale filter (even if all filters are not represented).

- Filtration system performance studies
- Innovative filters development
- Safety study based on CFD approaches coupled with validation tests
- Pressure loss and clogged filters measurements
- Study of debris transport and sedimentation
- Influence of the phenomena of erosion, corrosion and chemical effects on pressure drops

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

VLF

Ansaldo Nuclear Ltd
Spring Rd,
Wolverhampton WV4
6JX, UK

marco.caramello@ann.ansaldoenergia.com
simone.pondrelli@ansaldonuclear.com

https://www.ansaldoenergia.com/about-us/media-center/power-generation-news-insights/detail-news/ansaldo-nucleare-westinghouse-take-another-step-forward-in-testing-generation-iv-lead-fast-reactor

WOLVERHAMPTON, UK

The Versatile Loop Facility (VLF) has been built as part of the Advanced Modular Reactor (AMR) Feasibility and Development Project as a facility for testing key components for lead fast reactors (LFR) technology. It consists of a non-isothermal lead circuit with interchangeable test sections suitable to investigate electrically heated fuel bundles, innovative heat exchangers, liquid metal pumps or other components/systems. the facility is completed by a system for the control and conditioning of lead chemistry. The VLF is cooled by a supercritical water circuit. The facility is primarily focused on evaluating the thermo-hydraulic performance of systems and components, with the production of experimental data for the qualification of components, the validation of calculation codes for design and safety analysis or support for licensing.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

Fiber Bragg Grating Inscription Setups

University of Mons, Belgium, Boulevard Dolez 31, 7000 Mons

patrice.megret@umons.ac.be

https://web.umons.ac.be/tele/en/home/

MONS, BELGIUM

Fiber Bragg grating inscription setups

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 JULY 2023

LABORELEC S.A

Laborelec S.A, member of Engie S.A, rue de Rhode 125 / Rodestraat 125 - 1630

anthony.hedin@engie.com

www.laborelec.com/nuclear-power-generation-2/

LINKEBEEK, BELGIUM

More information on : https://www.laborelec.com

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 JANUARY 2023

Surface treatment facility

Research and Testing Institute Plzen
Tylova 1581/46, Plzen, 301 00

polach@vzuplzen.cz
vokurkova@vzuplzen.cz

www.ujv.cz/en/products-and-services-1

PLZEN, CZECH REPUBLIC

The surface solutions research centre is focused on thermal spray coatings and their analysis with more than 20 years of experiences in this field. Focused mainly on hardmetals deposition by HVOF. Currently operating also with high-enthalpy plasma torch and modern Coldspray technology. Team has many experiences with collaboration with industrial partners, including both commercial spraying and common R&D projects. The facility is equipped with following thermal spray technologies:

- Smart-ARC twin wire arc spray apparatus by Oerlikon Metco and Model 9000 by TAFA Incorporated
- HP/HVOF WokaJet high pressure, high velocity oxy fuel apparatus from Oerlikon Metco and JP 5220 from TAFA Incorporated
- 6P-II flame spray apparatus by GTV and Oerlikon Metco
- Sinplex Pro and F4 plasma spray apparatus by Oerlikon Metco
- tCold Spray Impact Gun 6/11 EvoCSII by Impact Innovations

Furthermore, the laboratory is fully equipped for analysis of thermally sprayed coating.

https://www.vzuplzen.cz/en/our-services/thermal-spraying/

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 FEBRUARY 2023

Hot Cells Facilities

Research Center Rez, Hlavni 130, Husinec - Rez, 250 68

petr.svrcula@cvrez.cz

www.cvrez.cz/cs/o-nas

REZ, CZECH REPUBLIC

The complex of the hot cells consists of ten hot cells and one semi-hot cell. Hot cells are designed for safe work with highly radioactive materials. The design and equipment of the hot cells allow the testing of irradiated materials. Hot cells are equipped with experimental equipment for the analysis of radioactive materials, technologies for complex sample processing (cutting, welding, machining), equipment for performing mechanical tests (deformation tests, fatigue, creep, etc.), and equipment for studying the microstructure of the material (measurement of microhardness and nano hardness of the samples, evaluation of the microstructure using a scanning electron microscope). The equipment of the hot cells is suitable for work with radioactive materials with an activity of up to 300 TBq 60Co and with samples with maximum dimensions of up to 120x124x50 mm.
The facility provides a wide range of services in the field of evaluation and testing of mechanical and corrosion properties of materials, determination of fracture mechanisms of both irradiated and non-irradiated materials.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

Mechanical Testing Facility

Research Center Rez, Hlavni 130, Husinec - Rez, 250 68

petra.gavelova@cvrez.cz

www.cvrez.cz/cs/o-nas

REZ, CZECH REPUBLIC

Performing a wide range of static and dynamic mechanical tests for material characteristic evaluation of metallic and non-metallic materials according to standard and non- standard methodologies with subsequent evaluation of the microstructure by LOM, SEM, SIMS and TEM. Tensile tests according to EN ISO 6892 at room temperature and at elevated temperatures (up to 1,200 °C). Transition (Vidal) curves of the notch impact toughness dependence on temperature including instrumented assessment of the proportion of brittle and ductile fracture in accordance with ISO 14556 and ASTM E2298, dynamic fracture toughness within the range of -180 °C to 300 °C, static fracture toughness within the range of 25 °C to 850 °C (CSN ISO 12737, ASTM E399), evaluation of J-R curves for static and dynamic processes (ASTM E1820), evaluation of high-cycle and low-cycle fatigue (CSN ISO 1099, ASTM E466, ASTM E606) in stress/tension/compression/torsion in the air, at temperatures up to 1,100 °C also in corrosive environments. Short term creep tests and creep to rupture (ASTM E139), relaxation test (ASTM E328), evaluation of material in creep in combination with fatigue (ASTM E2714), measuring of creep-fatigue crack growth rate (ASTM E2760). Evaluation of tensile and fatigue material properties on miniaturised specimens at room and elevated temperature in vakuum, 3D deformation analysis of specimens during static tests and dynamic tensile tests. Testing of real components under fatigue stress, measurement of real strain in tensile tests. Stress corrosion cracking tests at slow strain rate, testing in heavy liquid metal environments (environments as Pb and Lead-Bismuth Eutectic with monitored and regulated amount of oxygen (10-11 to 10-5 wt.%), testing in molten fluoride salts (FLiBe, FLiNaK, Sodium tetrafluoroborate, Temperature up to 800 °C, 10 kN, tensile, compression, Ar protective atmosphere).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

ETL

Experimantal technology line, Research Centre Rez, Hlavní 130, Husinec-Řež 25068, building 211/3

jan.hadrava@cvrez.cz

www.cvrez.cz/en

REZ, CZECH REPUBLIC

The system for the treatment of saturated ion resins and salts from MSO (CO32-, Cl-, SO42, NO32-, WO42-, W2O62-). For R&D of processing and treatment of liquid and semi - liquid radioactive waste (borate solution) and immobilisation of dry crystalline mixture in geopolymers and polysiloxane:

- Preparation of the model solution
- Concentration of the solution using evaporation
- Crystallisation
- Separation of crystals from liquid phase
- Drying solid phase in dryer
- Preparation of matrix (geopolymer or polysiloxane)
- Immobilisation of crystalline mixture
- Measurment of the temperature profile solidification matrix
- Testing of the final product
- Designed as modular system – each device is operated independently

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

MSO

Molten Salt xidation, Research Centre Rez, Hlavní 130, Husinec-Řež 25068, building 211/3

jan.hadrava@cvrez.cz

www.cvrez.cz/en

REZ, CZECH REPUBLIC

MSO (Molten Salt Oxidation) is a technology of flame-less oxidation in molten salts. This technology is mainly used to reduce the volume of hazardous solid and liquid wastes. and allows processing of loose materials, semi-liquid suspensions or liquids over a wide range of viscosity. Combustible wastes are fed through the dosing system into the reactor together with air or oxygen. During the flame-less oxidation, which is deliberately under the salt melt level, heavy metals and radionuclides are captured within.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 21 DECEMBER 2022

Accredited Laboratory for Equipment Qualification

UJV Rez, a. s. Integrity and Technical Engineering Division
Hlavni 130, Rez,
250 68 Husinec

vit.placek@ujv.cz

www.ujv.cz/en/

REZ, CZECH REPUBLIC

Accredited testing laboratory No. 1093.3 of UJV Rez. Determination of physicochemical, mechanical, thermodynamic and electrical properties of materials and industrial products to verify their function in the environment of nuclear and non- nuclear installations, determination of parameters of gamma radiation fields and fields of accelerated electron in the scope indicated in an annex to the Certificate of accreditation Available facilities for NPP equipment operation and accident condition simulation (e.g. thermal ageing, radiation ageing, LOCA and SA simulation). Quantity of instrumentation for properties testing (mechanical, electrical, optical, thermal and other). Gamma ray irradiation facilities with the dose rate ranging from almost 0 to 8 kGy/h at the customer´s temperature and environment requirements with the possibility of on-line functional measurement of irradiated equipment. Vessel for simulation of thermodynamic condition of LOCA and/or severe accidents. During the test, the functionality of the inside installed equipment is demonstrated. Remote access for on-line monitoring of the equipment under test.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 14 FEBRUARY 2023

Accredited laboratory for un-irradiated and irradiated material properties quantification

UJV Rez, a. s. Integrity and Technical Engineering Division
Hlavni 130, Rez

radim.kopriva@ujv.cz

www.ujv.cz/en/

REZ, CZECH REPUBLIC

Accredited laboratory for un-irradiated and irradiated material properties quantification (wide range of destructive testing techniques and analyses - fracture toughness, impact, high temperature tensile, hardness, fatigue, SPT, SEM, autoclave IASCC testing) in the frame of NPP surveillance programs and international research projects (e.g. HORIZON2020). Extensive international cooperation in the area of new test methods and standards development (e.g. sub-sized specimens test techniques - Small Punch Test, miniature-CT for static fracture toughness)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 14 FEBRUARY 2023

VTT

PIE Hot cells

VTT Technical Research Centre of Finland, Kivimiehentie 3

wade.karlsen@vtt.fi

https://www.vttresearch.com/en/

ESPOO, FINLAND

Neutron irradiated structural materials handling, preparation and testing for research, surveillance and failure analyses. Transport reception in vertically and horizontally loaded casks, with 10 TBq Co-60 activity. Accredited mechanical testing according to many standards, including tensile, impact and fracture toughness testing. Specimen preparation and reconstitution utilizing electric-discharge machining and electron-beam welding, including labeling of specimens by laser engraving. Fracture characterization by macroscopy and optical dimensioning.

https://www.vttresearch.com/en/ourservices/vtt-centre-nuclear-safety

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 FEBRUARY 2023

VTT

Advanced Microscopy

VTT Technical Research Centre of Finland, Kivimiehentie 3, Espoo

wade.karlsen@vtt.fi

https://www.vttresearch.com/en/ourservices/vtt-centre-nuclear-safety

ESPOO, FINLAND

Neutron irradiated and contaminated structural materials analytical microscopy from mm down to nm resolutions. Fractography, component failure analysis, metallographic sectioning. Optical dimensioning, microhardness testing, metallography. Bulk chemical analysis, including depth profiles by GD-OES. Bulk light gas analyses. Analytical FEG-SEM with EDS, WDS and EBSD. FIB-sections and liftouts. Analytical FEG-STEM with EDS and EELS.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 FEBRUARY 2023

Corrosion and water chemistry laboratory

VTT Technical Research Centre of Finland Ltd, Espoo

aki.toivonen@vtt.fi

www.vttresearch.com

ESPOO, FINLAND

The facilities (non-radioactive samples) include the following equipment: 1) 4 water loop systems to simulate the chemical environment of the primary and secondary water loops of NPPs. The system includes a low-pressure side where the water chemistry is monitored and controlled in situ with sensors (e.g. DO, H2, pH, EC) and the high-pressure side connected to an autoclave or flow cell. 2) Autoclaves/pressure vessels: Titanium 1 pcs (320 C, 120 bars), SS316 5 pcs (370 C, 200 bars), 1 pcs Ni-coated (320 C, 120 bars), 3) Electromechanical loading systems up to 10 kN, 4) Potentiostats (2 Autolabs, 2 PalmSens 4 with multiplexers) and potential logging devices for in-situ corrosion measurements.
+One special loop has been built high flow rate studies.

The facilities for the radioactive samples include 1) 2 water loops similar to those described above, 2) 2 pcs of SS316 (360 oc, 200 bars) 3) Electromechanical loading systems up to 10 RN.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

Helsinki Accelerator Laboratory

Department of Physics,
University of Helsinki.
Pietari Kalmin katu 2,
00560 Helsinki

filip.tuomisto@helsinki.fi
kerttuli.helariutta@helsinki.fi

www.helsinki.fi/en/researchgroups/helsinki-accelerator-laboratory

HELSINKI, FINLAND

The main facilities in the laboratory are the 5 MV tandem van de Graaff accelerator and 500 kV electrostatic accelerator. The 5 MV tandem is equipped with two 40-cathode MC-SNICS ion sources using solid target materials and CO_2 gas. The beam can be run down to 5 different beam lines, equipped with ^{14}C carbon analysis, ERDA, RBS, PIXE, PIGE, NRA and sample irradiations. The 500 kV accelerator houses ion sources for gas and solid materials, and has beam lines for sample implantation/irradiation and experiments in a large scattering chamber (equipped in the future also with MEIS setup). The implantation beam line has also a beam deceleration system allowing low implantation energies down to few tens of eV. More details can be found from the laboratory web page https://www.helsinki.fi/en/researchgroups/helsinki-accelerator-laboratory.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 21 DECEMBER 2022

Cold Spray

EDF R&D / MMC
EDF Lab Les Renardières,
Moret-Loing-et-Orvanne

thibaut.de-terris@edf.fr
emmanuelle.schoener@edf.fr

www.edf.fr/en

EDF LAB LES RENARDIÈRES, MORET-LOING-ET-ORVANNE, FRANCE

Field of applications: Any nuclear reactors

Description
A cold spray system on the cutting edge of technology;
A large panel of sprayable powders thanks to the ATEX spray booth (mainly 316L steel, titanium, super alloys, aluminum ...);
A unique package combining expertise in the metallurgy and mechanic fields and in the cold spray process;
High end characterization facilities allowing microstructural analysis form nanoscale through meso scale.

Services
R&D service: Development of research programs for innovative applications;
Projection tests with or without characterization of the parts produced;
Development of repair methods from the elimination of the defect, its reconstruction and the mechanical characterization of the regenerated part;
Development of coatings for the functionalization of surfaces (corrosion resistance, wear resistance, etc.).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

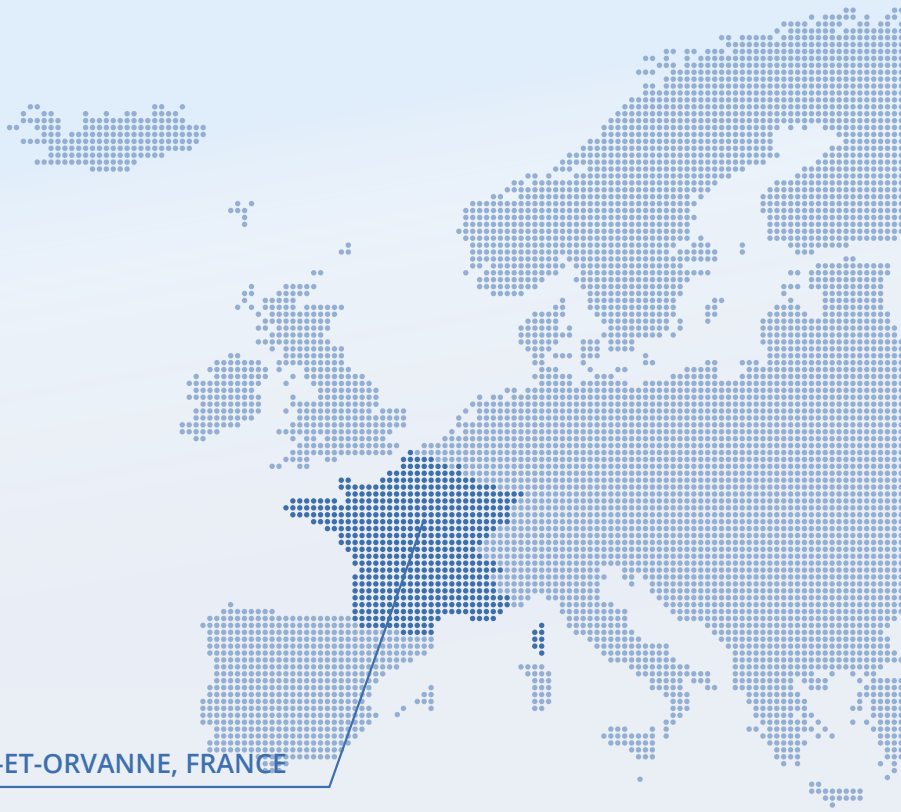
VERSION · 16 JANUARY 2023

Ultrasound testing laboratory

EDF R&D / MMC
EDF Lab Les Renardières, Moret-Loing-et-Orvanne

yann.gelebart@edf.fr

www.edf.fr/en/the-edf-group/inventing-the-future-of-energy/r-d-global-expertise



EDF LAB LES RENARDIÈRES, MORET-LOING-ET-ORVANNE, FRANCE

Field of applications: Any nuclear reactors.

The EDF R&D ultrasonic NDT laboratory aims at understanding of the physical phenomena of ultrasonic testing, supporting the qualification of ultrasonic testing processes for nuclear industry and implementing leading ultrasonic non-destructive testing simulation software. Its main domain of expertise is the impact of the metallurgical structure on ultrasonic performances. The laboratory can realise customised test campaign on representative models, simulation studies with advanced sofware or support development of experimental and numerical study programmes, implementing the methodology developped at EDF R&D.

Equipments:
- Robotic test benches for automated tests: contact and immersion
- 128 channels multi-element systems

Simulation computer codes:
- Finite element code: ATHENA 2D & A3D_CND (EDF)
- Semi-analytical code: CIVA (CEA)
- Hybrid code: CIVA / ATHENA 2D

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 16 JANUARY 2023

Gleeble thermomechanical simulator

EDF R&D / MMC
EDF Lab Les Renardières,
Moret-Loing-et-Orvanne

alexis.graux@edf.fr
emmanuelle.schoener@edf.fr

www.edf.fr/en

EDF LAB LES RENARDIÈRES, MORET-LOING-ET-ORVANNE, FRANCE

Description
A thermomechanical simulator with direct resistance heating system, allowing to perform complex heat treatments combined with strain/stress on metallic samples. The simulator can be used to:

- perform material testing at elevated temperature, such as tensile, compression, stress relaxation tests, studying phase transformation in metallic materials by dilatometry.
- perform process simulation. We can reproduce some steps of manufacturing processes of metallic materials, such as hot rolling, forging, welding.

Services
A complete R&D offer: carrying out tests on Gleeble simulator, analysis of the results, study of the generated microstructures.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 16 JANUARY 2023

Transmission Electron Microcroscopy (TEM)

EDF R&D / MMC
EDF Lab Les Renardières,
Moret-Loing-et-Orvanne

romain.badyka@edf.fr

www.edf.fr/en

EDF LAB LES RENARDIÈRES, MORET-LOING-ET-ORVANNE, FRANCE

Transmission electron microscopy (TEM) is a microscopy technique in which a beam of electrons is transmitted through a specimen to form an image. The specimen is most often an ultrathin section less than 100 nm thick. The image is then magnified and focused onto an imaging device, such as a fluorescent screen or a sensor. This technique makes it possible to study the microstructure of materials by chemical and diffraction (crystallography) analyses.

The voltage of the FEG gun of the microscope varies from 200 to 80 kV depending on the resolution requirements and to avoid damage to the sample to the sample.

Services: cristallography study, chimical analysis by EDX (for element with atomic number less than 16), imaging at different magnifications -(Resolution of 0.16 nm)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 16 JANUARY 2023

ATHENA

CEA (French Alternative Energies and Atomic Energy Commission)

Laurent.brissonneau@cea.fr
Jean-Pierre.FERAUD@cea.fr

www.cea.fr/

CADARACHE, FRANCE

The laboratory has the ability of handling liquid metals (Na, Li, NaK) in purified glove box and to perform compatibility test with different kind of materials. Heat of reaction, released gases or post-test materials can be analyzed (DSC, gas chromatography, metallography, described later).

Our facilities for metallography includes a FEG SEM (Zeiss Sigma 300) equiped with SDD EDS (Oxford XMAX50), XRD (Thermofisher Equinox 1000), optical microscopes (Olympus BX51 M) and microhardness (PRESI Microtech MX7).We can perform DSC from -80 to 850 °C with a Mettler DSC-1. Other DSC can be performed at higher temperature with our SETARAM DSC-111 or avoir DSC-TGA Netzsch STA 449 (up to 1600 °C).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

VERSION · 5 JANUARY 2023

Sensors Fablab

CEA (French Alternative Energies and Atomic Energy Commission)
DES-IRESNE-DTN

Paul-Vincent.BONZOM@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

FabLab dedicated to fabrication, assembly and test of sensors dedicated to surveillance and monitoring of nuclear installations. This includes electronic devices et readout circuits dedicated to these sensors.

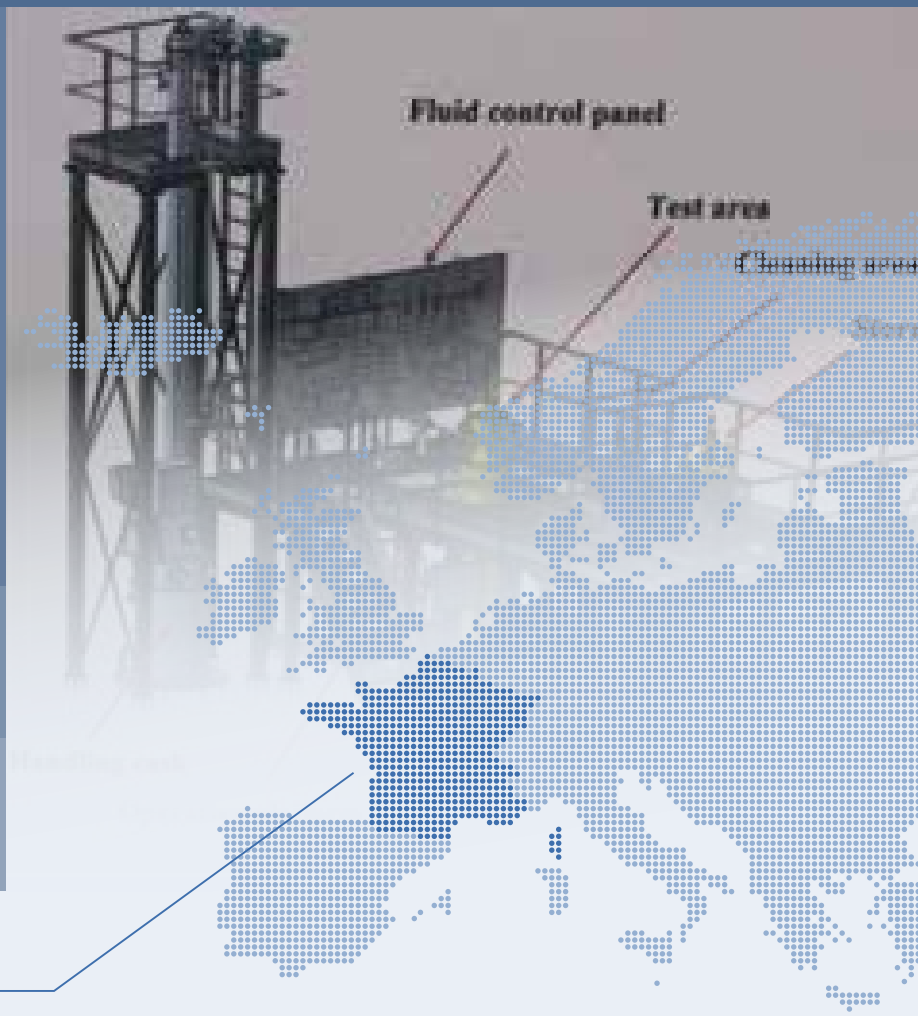
The Fablab is divided into several rooms:
Each with a particular theme: Developments and electronic tests, characterization, design and mechanical manufacturing. The space will benefit from the material necessary for the manufacture of sensors and tools such as 3D printers

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

SOPRANO-CALIPSO

DES-IRESNE-DTN / STCP-LESC
Cadarache Building 202, Hall of sodium installation named PAPIRUS



nicolas.auriac@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

SOPRANO facility consists of metal liquid loop specifically dedicated to NaK alloy. This loop is dedicated for :

- Qualification of tools and methods concerning NaK operations to validate process
- Provide feedback on mock-up design
- Develop qualification program on component

SOPRANO facility is a NaK test loop composed of: Test area to study component, material, and temeprature test of sample. cleaning area to remove and treat NaK. The transfer between the two area is done by docking a transfer chamber filled with Argon.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 JANUARY 2023

MECHANICAL TEST BENCH

CEA (French Alternative Energies and Atomic Energy Commission)
DES-IRESNE-DTN-STCP-LESC

nicolas.auriac@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

Mechanical fatigue testing bench is located in site of CADARACHE CEA (France, south of France close to Aix en Provence):

- Qualification pipe
- Test of experimental device in operation (under maximal pressure 300Bars)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 JANUARY 2023

Fresh Fuel Characterisation lab

CEA (French Alternative Energies and Atomic Energy Commission)
DES-IRESNE-DEC

philippe.garcia@cea.fr
Gerald.JOMARD@cea.fr

https://www.cea.fr/english

CADARACHE, FRANCE

Laboratoire de Caractérisation et d'étude des Propriétés des Combustibles. We could provide access to a compression test machine which comprises an 100 kN INSTRON frame equipped with a tungsten furnace capable of uniformly heating the region in which the fuel pellet is placed to a maximum temperature of approximately 1700°C. The oxygen partial pressure is controlled by setting up a buffering reaction in the gas phase and equilibrating the material with it. A mixture of argon, hydrogen and water vapour is used.

The humidity level, hence oxygen pressure, is controlled by injecting into the carrier gas small and controlled quantities of oxygen upstream from the sample. This is done with a solid electrolyte (zirconia) oxygen pump and the oxygen partial pressures, dew points and total gas pressures are monitored both upstream and downstream from the furnace.

The equipment may typically be used for developping high temperature mechanical fuel behaviour laws in strain rate regimes corresponding to either normal, incidental or accidental (RIA) operating conditions. Materials are oxide pellets whose volumes are of the order of 1cm3. Mixed uranium rare-earth oxides may also be tested.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 19 JANUARY 2023

RESEDA

CEA (French Alternative Energies and Atomic Energy Commission)
DES-ISAS-DM2S-SEMT

claire.gauthier@cea.fr
cedric.gourdin@cea.fr

https://www.cea.fr/english

SACLAY, FRANCE

The RESEDA facility belongs to CEA's Section of Mechanical & Thermal Studies (SEMT) and is located in the Paris-Saclay CEA research centre in France. The facility is dedicated to static and dynamic mechanical testing. For static analysis, about 20 testing machines are available, enabling tension, compression, fatigue, creep, bending studies covering a mechanical loading range from 0.5 to 5000 kN, and a temperature range from -196°C to 800°C. For dynamic analysis, the platform has different test facilities: mock-ups for flow-induced vibrations (FIV) study, supplied by single phase (water) or two-phase (water/air) loops (ambient conditions), machines dedicated to wear study, supplied with pressurised water loops at PWR conditions (150 bar, 320°C), a drop test tower (max 8 m height and 500 kg drop mass), and a fast depressurization test rig (70 bar in 20 ms) for Loss-Of-Coolant Accident study. The platform is involved in R&D studies about FIV in tube bundles (SG, cross flow) or on long and slim devices (reactor core, axial flow), wear induced by vibrations (sliding only and impact sliding), fast transient mechanics (for structures and fluids), and provides validation data for the codes developed in the labs (EUROPLEXUS and Cast3M).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

MAESTRO-COCAGNE

IRSN, Cadarache

christina.dominguez@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The COCAGNE test rig is dedicated to the study of creep behavior (ballooning) of fuel rods in LOCA conditions. The specificity of this test rig is that neighboring rods can be simulated and have a temperature gradient compared to the considered rod.
In order to obtain these conditions, rod is pressurized at a few ten bars and a temperature ramp between 5 to 20 °C/s up to 1000°C can be applied.
A mobile instrumentation (UV pyrometers) at 1 m/s measures specimen temperature.
This test is performed under a neutral gas to prevent oxidation.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 29 NOVEMBER 2022

MAESTRO-ECSIT

IRSN, Cadarache

christian.duriez@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools

CADARACHE, FRANCE

MAESTRO-ECSIT The ECSIT test rig is a semi-integral test rig that allowys to study fuel rod behavior in LOCA conditions (oxidation + creep).

Specimen is heated is increased by electromagnetic induction and its temperature is controlled by a IR cameras. It's inner pressure is monitored and the steam gaseous environment is are controlled. Specimen local strain is measured by stereo digital images correlation (3D-DIC) techniques.

Max heat-up temperature rate is 150°C/s up to 1500°C.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 10 FEBRUARY 2023

MAESTRO-EPMA

IRSN, Cadarache

severine.guilbert@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

EPMA (Electron Probe Miçgg3g@lygs) is an analyzing technique for local quantitative measurement of a Specimen's elemental chemical composition with µm resolution and ~ 100 ppm accuracy.
Its principle closed to the one of a scanning electron microscope (SEM) but with a higher probe current and the use of wavelength dispersive spectroscopy (WDS) instead of energy dispersive spectroscopy (EDS)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 29 NOVEMBER 2022

MAESTRO-FIGARO

IRSN, Cadarache

christina.dominguez@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The FIGARO furnace is a dead weight creep test machine. Its specificity is to work at a primary vacuum in order to prevent oxidation of specimens during experiments. Strain is measured optically by a laser sheet. The limitation of the technology is it needs markings to be painted regularly on the surface of the specimen. A maximal temperature rate of about 20°C/s can be applied up to 2400°C.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

MAESTRO-FURNACES

IRSN

walter-john.chitty@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

The MAESTRO experimental plateform in IRSN facilities is dedicated to the study of the behaviour of materials in aggressive environments (temperature, oxidation, corrosion) under normal and accident conditions.

For these activities, the lab is equipped with furnaces that enable to either:

- Form on the specimen surface an oxide layer simulating the one that grow on nominal operative condition of the nuclear power plant (see picture a – resistive furnace, inner diameter of 80 mm, length 500 mm, 600°C max temperature)
- Simulate a fast temperature rate in steam environment simulating a LOCA (see picture b – resistive furnace, inner diameter 30 mm, length 150 mm, max temperature 1500°C).

Two thermobalances are also available to measure oxidation rates in steam environment.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 29 NOVEMBER 2022

MAUPERTUIS

INSTITUT MAUPERTUIS
Campus de Ker Lann, 4 Contour Antoine de Saint-Exupery - 35170 Bruz

yannick.villeneuve@institutmaupertuis.fr

https://www.institutmaupertuis.fr/

BRUZ, FRANCE

The MAUPERTUIS Institute is an R&D resource center located in Brittany on innovative technologies (CIR approved):
- Laser welding and cutting
- Metal additive manufacturing: Wire / Electric Arc Fusion = WAAM or Wire / Laser Fusion = WLAM
- Conventional Friction Stir Welding = FSW (or fixed shoulder SSFSW)

Equipped with testing resources, we advise and support our industrial clients to evaluate, test and integrate these innovative technologies to increase their competitiveness.
We work with renowned companies in the automotive, aeronautical, aerospace, railway or energy industries but also with local industrial companies.

Our skills, highly qualified doctors and engineers, support you to develop innovative robotic assembly systems with a high-performance and flexible R&D welding platform (8 robotic cells (3 high-power lasers (up to 20 kW) and 2 equipment robotic FSW).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

ACTUSLAB-FMR

Fuels and Materials Research (FMR)

European Commission - Joint Research Centre
Hermann-von-Helmholtz-Platz 1 D-76344 Eggenstein-Leopoldshafen

konstantinos.boboridis@ec.europa.eu
eric.colineau@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

EGGENSTEIN-LEOPOLDSHAFEN, GERMANY

FMR (Fuels and Materials Research):
This facility located in Karlsruhe provides the scientific basis for the objective assessment and modelling of the safety-related behaviour of nuclear materials, with emphasis on nuclear fuels under normal and abnormal operating conditions, serving European and international authorities as well as academic and research organisations. The main activities of the FMR laboratories involve the synthesis and characterisation of actinide-bearing materials (including plutonium and minor actinides). Standard and advanced methods are employed, such as sol-gel precipitation, powder blending and pressing, conventional and spark plasma sintering, encapsulation techniques, x-ray diffraction, vibrational spectroscopy (Raman and infrared), electron microscopy (scanning, transmission, and focused ion beam), drop and differential scanning calorimetry, Knudsen effusion mass spectrometry, dilatometry, indentation, laser heating/laser flash for the measurement of thermophysical properties including melting.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 MARCH 2023

ACTUSLAB-PAMEC

PAMEC (Properties of Actinide Materials in Extreme Conditions) European Commission - Joint Research Centre
Hermann-von-Helmholtz-Platz 1
D-76344 Eggenstein-Leopoldshafen

eric.colineau@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

EGGENSTEIN-LEOPOLDSHAFEN, GERMANY

PAMEC (Properties of actinide materials under extreme conditions) :
This facility located in Karlsruhe consists of an ensemble of state-of-the-art installations designed for basic research on preparation of materials for energy and non-energy applications, on behaviour and properties of actinide materials under extreme conditions of temperature, pressure, external magnetic field and chemical environment. The facility includes devices for measurements of crystallographic, magnetic, electrical transport, and thermodynamic properties as well as facilities for Np-237 Mössbauer spectroscopy, and a modular surface science spectroscopy station allowing photoemission, atomic force microscopy, and electron scattering measurements. Several physical properties can be measured under extreme conditions of temperature, pressure, external magnetic field and chemical environment to ensure safety of current and future nuclear civil applications. This allows exploring actinide materials in multiple dimensions with the ambitious aim of building theoretical models that not only account for measured properties but would also predict properties of the material and related materials in any external conditions.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 MARCH 2023

nELBE

Helmholtz-Zentrum,
Bautzner Landstraße 400
01328 Dresden-Rossendorf

A.Junghans@hzdr.de

https://www.hzdr.de/db/

DRESDEN, GERMANY

Superconducting linear electron accelerator ELBE (40 MeV, 1mA, variable repetition rates)

Fast neutron time-of-flight facility nELBE (En = 0.1- 10 MeV, ca. 1.E4 n/s cm2) Neutron transmission, elastic, inelastic scattering cross sections, fission cross section measurements fast neutron radiography, imaging.

The nELBE neutron source is the world's only photo neutron source built at a superconducting electron accelerator. This combination enables a very precise time structure, high repetition rate and favourable background conditions.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 24 FEBRUARY 2023

pELBE

Helmholtz-Zentrum,
Bautzner Landstraße 400
01328 Dresden-Rossendorf

m.liedke@hzdr.de
A.Junghans@hzdr.de

https://www.hzdr.de/db

DRESDEN, GERMANY

Positron annihilation spectroscopy is a sensitive tool allowing to precisely describe different material defects, e.g., dislocations, grain boundaries, single or clustered vacancies, micro- and mesopores. These defects alter the energy spectrum of the emitted from the annihilation events photons as well as the lifetime of positrons in characteristic ways as a consequence of varying momentum distributions of the annihilating electrons and their density. Particularly, (i) positron annihilation lifetime spectroscopy (PALS) measures the elapsed time between the implantation of the positron into the material and the emission of annihilation radiation. Positrons are trapped preferentially in atomic defects which in turn have a locally smaller electron density leading to an extended positron lifetime. The PALS technique therefore is a sensitive method to derive sizes and concentration of vacancy-type defects and nano-cavities. (ii) Doppler broadening positron annihilation spectroscopy (DBPAS) at apparatus for in-situ defect analysis (AIDA) employs on the other hand the energy-momentum conservation during positron annihilation. The momentum of the electron-positron pair prior to annihilation is being transferred to the annihilation quanta. In the case of two-photon annihilation the 511 keV photons are shifted in energy in the laboratory frame resembling a Doppler-effect.

More: https://www.hzdr.de/db/Cms?pOid=35245&pNid=3225

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

VERSION · 24 FEBRUARY 2023

framatome

TEST RIGS

Framatome GmbH

manuela.zecho@framatome.com

https://www.framatome.com/de/

KARLSTEIN, GERMANY

Test rigs for environmental assisted fatigue (up to 300 °C)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

framatome

GE-8

Framatome GmbH

michael.grimm@framatome.com

https://www.framatome.com/de/

KARLSTEIN, GERMANY

Refreshing loops with mechanical testing rigs (up to 360 °C, SSRT, CL) mainly for PWR testing.

Static autoclaves with lead shielding for tests under irradiation

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH2023

framatome

GE-9

Framatome GmbH

matthias.herbst@framatome.com

https://www.framatome.com/de/

KARLSTEIN, GERMANY

High temperature loop 650 °C for testing of supercritical conditions

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 23 MARCH 2023

Hot cells Facilities

Helmholtz-Zentrum Dresden-Rossendorf, Institute of Resource Ecology, Structural materials, Bautzner Landstrasse 400, 01328 Dresden

c.kaden@hzdr.de

www.hzdr.de

DRESDEN, GERMANY

The HZDR hot cell platform is devoted to the mechanical characterisation of structural material for nuclear application such as reactor pressure vessel steels, martensitic/ferritic Cr-steels or Fe-Cr ODS alloys. The facility allows both the manufacturing and the testing of neutron-irradiated samples. The characterisa-tion of the irradiated materials is based on the following methods: Quasi-static fracture toughness properties from SE(B) and C(T) specimens, including 0,16T-C(T) (mini-CT) speci-mens; Dynamic toughness properties from instrumented impact testing; Characterisation of mixed-mode fracture behaviour in the brittle-ductile transition region by Master Curve (MC) concept according to ASTM E1921; Characterisation of ductile fracture according to ASTM E1820; Small punch tests according to DIN EN-10371 in combination with FEM simulations; Preparation and light microscopy for metallographic inspections; Replica technique for SEM analyses. An electrical discharging machine (EDM) is used for the manufacturing of samples for mechanical testing and for out-of-cell microstructural investigations (SANS, PAS, APT).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

REKO

Forschungszentrum Jülich GmbH

e.reinecke@fz-juelich.de
m.klauck@fz-juelich.de

https://www.fz-juelich.de/de

JÜLICH, GERMANY

The test rods could be prefilled up to 10 MPa with tracer gases, e.g. Kr or He, to detect onset of rod failure.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

SAAB
Forschungszentrum Jülich GmbH

e.reinecke@fz-juelich.de
m.klauck@fz-juelich.de

https://www.fz-juelich.de/de

JÜLICH, GERMANY

The facility consists of a high-pressure water and steam loop with pump, steam generator, steam superheater and condenser/cooler. The test loop also has a modular, adaptable test section and two bypasses so that the flow direction in the test section can be changed.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

SETCOM

Forschungszentrum Jülich GmbH

e.reinecke@fz-juelich.de
m.klauck@fz-juelich.de

https://www.fz-juelich.de/de

JÜLICH, GERMANY

The facility has a powerful cooling system and a water management system. The extensive safety system allows the use of sight glasses, which have also been developed and successfully tested at pressures up to 100 bar / 310°C.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

CORRIDA

KIT, Institute for Applied Materials – Applied Materials Physics (IAM-AWP)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

carsten.schroer@kit.edu

https://www.iam.kit.edu/awp/english/299.php

KARLSRUHE, GERMANY

CORRIDA is a forced-convection loop for investigating corrosion of steels in order of 1000 kg flowing lead–bismuth eutectic (LBE) at temperatures between 400 °C and 550 °C. The corresponding difference between maximum and minimum temperature along the loop is about 110 and 165 °C, respectively. Oxygen dissolved in the circulating LBE is controlled with the aid of gas/ liquid oxygen transfer and monitored with electrochemical oxygen sensors in four positions along the loop. Oxygen concentration may range from 10–7 to 10–6 % by mass. The LBE mass flow typically is 5.3 kg/ s.

The geometry of tested samples is cylindrical with 6 mm diameter and 35 mm length, including the screw threads for connecting samples with each other. Up to 36 samples of that size may be installed at the same time, in two vertical test sections. The resulting flow velocity along the material surface is 2 m/ s for the standard sample geometry and LBE mass flow. A glove box filled with argon (Ar) houses the locks of the test sections so that samples are introduced or removed from the loop in oxygen-depleted atmosphere.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

QUENCH

KIT, Institute for Applied Materials – Applied Materials Physics (IAM-AWP)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

martin.steinbrueck@kit.edu
juri.stuckert@kit.edu

https://www.iam.kit.edu/awp/english/163.php

KARLSRUHE, GERMANY

The common purpose of the out-of-pile QUENCH facility is performance of bundle tests on investigation of fuel cladding related phenomena during the Design Basis Accidents (DBA, T<1200 °C) and early stage of the Beyond Design Basis Accidents (BDBA or severe accident, T>1200 °C). The test bundle may contain from 21 to 31 electrically heated fuel rod simulators, each about 2.5 m long. Regarding DBA research, seven bundle tests with different zirconium alloy-based cladding materials were performed to investigate the influence of the secondary hydriding phenomena on the applicability of the cladding embrittlement criteria (https://doi.org/10.1016/j.jnucmat.2020.152143). In the BDBA field, twenty high temperature bundle tests (https://quench.forschung.kit.edu/24.php) were performed to investigate such possible effects of reflood as

1. Temperature escalation due to cladding oxidation,
2. Enhanced hydrogen production,
3. Formation of eutectics and aerosol release due to influence of neutron absorber rods,
4. Debris and melt formation with melt relocation and oxidation,
5. Coolability of blocked bundle.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MAR 2023CH 2023

PIAF

Physikalisch-Technische Bundesanstalt PTB,
Neutron radiation,
Bundesallee 100,
D-38116 Braunschweig

elisa.pirovano@ptb.de

https://www.ptb.de/cms/en/

BRAUNSCHWEIG, GERMANY

Critical heat flux at reactor typical conditions DNB and Dryout

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

R004

Physikalisch-Technische Bundesanstalt PTB,
Neutron radiation,
Bundesallee 100,
D-38116 Braunschweig

elisa.pirovano@ptb.de

https://www.ptb.de/cms/en/

BRAUNSCHWEIG, GERMANY

Cooling of fuel elements

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

HU-3 Non-destructive Testing Laboratory

Operational Safety Centre
Bay Zoltán Nonprofit Ltd for Applied Research

szabolcs.szavai@bayzoltan.hu

https://www.bayzoltan.hu/en/

BUDAPEST, HUNGARY

Non-destructive Testing Laboratory: phase array and traditional ultrasonic test; eddy current testing; magnetic particle testing; wall thickness measurement; penetration test; simulation of UT test with CIVA software.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

EK-CER

Centre for Energy Research - EK-CER

szenthe.ildiko@ek-cer.hu,
gasparics.antal@ek-cer.hu,
antal.gasparics@ek-cer.hu

https://www.ek-cer.hu/en/fuel-and-reactor-materials-department/

BUDAPEST, HUNGARY

Handling of irradiated specimens in hot-cell, design and usage of special clamps, wise and jaw for manufacturing and testing of irradiated material, samples. Laws and regulations, requirements that must be followed. Radiation protection rules, regulations, work protection at the qualifiad area. Manipulation in the hot-cell. Optical investigation of the active materials, cameras and remote-controlling. The studies will be performed inside the qualified area of the Fuel and Reactor Material Laboratory, connected to the Budapest Research Reactor in Building 10 of EK-CER. Mechanical testing facility with hot-cell infrastructure, small specimen manufacturing technics: milling, EDM Test techniques for radioactive specimens in qualified area. Laws and regulations, requirements that must be followed. Radiation protection rules, regulations, work protection at the qualifiad area. Microstructural investigation of the active materials, cameras and remote-controlling, optical microscopy, scanning of radioactive materials. The studies will be performed inside the qualified area of the Fuel and Reactor Material Laboratory, connected to the Budapest Research Reactor in Building 10 of EK-CER.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

BAGIRA

Centre for Energy Research - EK-CER

szenthe.ildiko@ek-cer.hu,
gasparics.antal@ek-cer.hu,
antal.gasparics@ek-cer.hu

https://www.ek-cer.hu/en/fuel-and-reactor-materials-department/

BUDAPEST, HUNGARY

Irradiation of metallic materials and ceramics in BAGIRA irradiation rig. Planning of the irradiation, channel-usage, terms and conditions. Lessons and examples of problems arising during the irradiation process from past practice of Fuel and Reactor Material Laboratory. Laws and regulations, requirements that must be followed. Radiation protection rules, regulations, work protection at the qualifiad area. The studies will be performed inside the qualified area of the Fuel and Reactor Material Laboratory, connected to the Budapest Research Reactor in Building 10 of EK-CER.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

NDT methods

Centre for Energy Research - EK-CER

szenthe.ildiko@ek-cer.hu,
gasparics.antal@ek-cer.hu,
antal.gasparics@ek-cer.hu

https://www.ek-cer.hu/en/fuel-and-reactor-materials-department/

BUDAPEST, HUNGARY

Development and adaptation of various magnetic field sensing based NDT methods are available here: MAT, ECT, MFL, as well as, high sensitivity and high spatial resolution magnetic imaging/mapping technique.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

Competence Centre for Paks NPP

Competence Centre for Paks NPP

porg@uniduna.hu

https://www.uniduna.hu/en/news_archive/1527-paks_ii_competence_center_uod

DUNAÚJVÁROS, HUNGARY

To meet the requirement from Hungarian NPPs newly built and refreshed laboratories have been built in 2021/22, which are equipped with contemporary equipment. The main accent was put on Non-destructive testing and Material testing equipment for materials and joints of NPP. To assess the methodology, metrology, and assessment of testing one need mechanical workshop and contemporary welding apparatus as well, which were a part of investment. Non-destructive testing laboratory has all typical testing methods and equipment used in NPP: VT, MT, PT, UT, RT, and AT. The most practice testing method is the Ultrasonic testing (UT), where we have for example five phased array equipment. We have CIVA and Beamtool for UT simulation. We have had experience in NPP Non-destructive testing advisory boards. For traditional material testing we have several equipment for tensile test, tear test, Charpy test, Hardness measurements, microscope examination of prepared samples, Scanning electron microscopic studies.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

COR

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

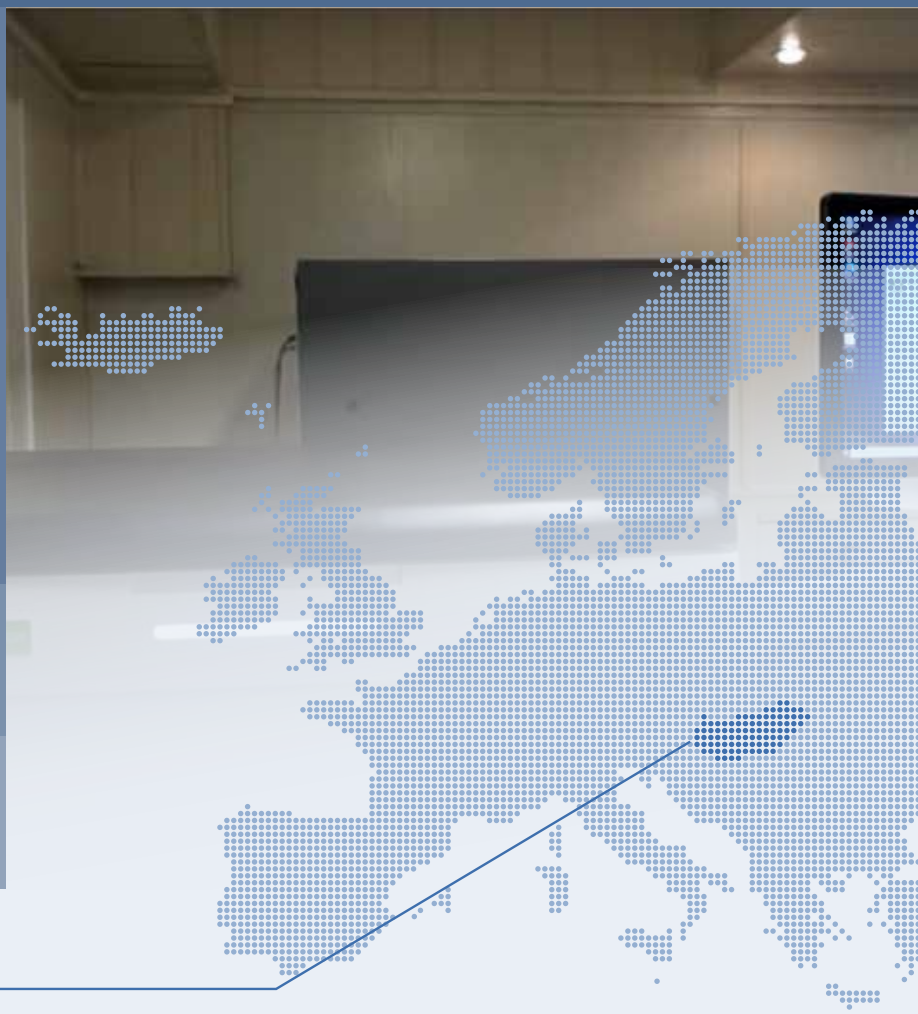
https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

A well-equipped Level B radiochemistry laboratory is available at our company. We have several specific radiochemical separation and measurement methods for quick and precise determination of corrosion products. Using of the results we do calculations of corrosion.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 19 JANUARY 2023



DECOM

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

A complex laboratory background is available for characterisation of radioactive wastes from decommissioning activities at our company. We have a well-equipped Level B radiochemistry laboratory and several alpha, beta, gamma spectrometers and Standard Segmented Gamma Scanner for scanning of drum geometry. Furthermore, a large instrumentation park for elemental analysis, inorganic analysis, and analysis of micropollutants also available to support the characterisation process. We routinely measure several DTM isotopes from LILW and also environmental samples (Co-60, Ag-108m, Cs-134, Cs-137, U-234, U-235, Np-237, U-238, Pu-238, Pu-239, Pu-240, Am-241, Cm-242, Cm-244, Fe-55, Ni-59, Nb-93m, H-3, C-14, Cl-36, Ni-63, Se-79, Sr-90, Zr-93, Nb-94, Tc-99, Sb-125, I-129). We are participant of the PREDIS project.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

NON-D

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

We have several radiation detectors for on-site measurements. On-line portable gamma spectrometers, In-situ gamma spectrometer, Portable Standard Segmented Gamma Scanner, some hand operated contamination monitor. NMR technique for onsite structural analysis.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 19 JANUARY 2023

Isotoptech Zrt.

HU-16 Electronics & Mechanical Development Centre

Laboratory of Environmental Studies

veresmihaly@isotoptech.hu
janovicsrobert@isotoptech.hu

https://hekal.eu/en/

DEBRECEN, HUNGARY

Electronics and Mechanical Development Centre: In addition to mechanical machining, our development centre carries out complex tasks requiring electronic design and manufacturing, as well as software development.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

IT-1 NINE

Nuclear and Industrial Engineering

m.cherubini@nineeng.com
a.petruzzi@nineeng.com

https://www.nineeng.com/

LUCCA, ITALY

We can offer a fresh and active research environment, providing PC and access to workstations with software and computer codes for different disciplines in nuclear technology.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

SENSOR LAB

Institutt for energiteknikk Os Allé5,1777 Halden

per-morten-harlem@ife.no
mikolaj.kunc@ife.no

https://ife.no/en/nuclear-technology/

HALDEN, NORWAY

The SensorLab runs highly advanced workshop facilities, such as Computer Numerical Control (CNC) lathes, 5-axis milling machines, Wire Electrical Discharge Machine, Cavity Electrical Discharge Machine, laser welding and electron beam welding equipment etc. To operate all this SensorLab has multi-disciplinary, highly skilled and experienced staff.
We are the continuation of a strong legacy from the time it was known as the Instrument Workshop in connection with the Halden Boiling Water Reactor (HBWR); this reactor was permanently shut down until June 2018. All of this gives SensorLab a great advantage working with design, development and production of custom solutions for nuclear applications.
SensorLab manufactures nuclear grade instruments and among other things it has a portfolio of very robust Linear Variable Differential Transformers (LVDTs) capable of coping under the most demanding conditions. The current LVDT line-up is designed for applications from cryogenic (-200°C) to high temperature (700°C) and have a pressure rating of 250 bar (at 20°C). ((Homepage: https://ife.no/en/front-page/ Sensorlab Homepage: https://ife.no/en/service/sensorlab/))

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

Wroclaw University of Science and Technology

PO-7

Wroclaw University of Science and Technology

mariusz.frankiewicz@pwr.edu.pl

https://www.camt.pl/index.php/en/technologies/

WROCLAW, POLAND

Facility of functional coating deposition & surface treatment. We are carrying out researches on coating deposition by thermal spraying (plasma APS and cold spray) and laser surface modification. Equipment: industry scale APS system by BayState/Praxair and fibre/diode/disk laser integrated robotized cells for welding, cutting, cladding, heat treatment and surface machining (texturing). Experience in special metal alloys and MMC/CMC composites (eg. rhenium based) coating development for high temperature applications.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 23 MARCH 2023

Wroclaw University of Science and Technology

PO-11

Wroclaw University of Science and Technology

mariusz.frankiewicz@pwr.edu.pl

https://www.camt.pl/index.php/en/technologies/

WROCLAW, POLAND

Facility of additive manufacturing processes equipped by all main technologies: laser and electron beam based systems ((SLM/LPBF, EBM/EPBF). Experience in manufacturing process development and processing special metal alloys and MMC composites (incl. rhenium) including vacuum heat treatment.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 23 MARCH 2023

Wroclaw University of Science and Technology

PO-12

Wroclaw University of Science and Technology

mariusz.frankiewicz@pwr.edu.pl

https://www.camt.pl/index.php/en/technologies/

WROCLAW, POLAND

Facility for material testing: SEM, ED/XRF, XRD, static and fatigue strength testers, technical computed tomography with focused nano/micro beam for non-destructive evaluations. Experience in material research for aerospace and power engineering.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 23 MARCH 2023

Wrocław University of Science and Technology

CAMT 1

Centre for Advanced Manufacturing Technologies CAMT, Wroclaw University of Science and Technology

tomasz.kurzynowski@pwr.edu.pl

https://pwr.edu.pl/en/

WROCŁAW, POLAND

Intustrial computed thomography for inspection of the internal structure of components.

Equipement:

- Phoenix v|tome|x m 300 (GE Sensing & Inspection Technologies GmbH, Wunstorf, Germany) – technical computed tomograph with focused nano/micro beam – metrology version
- METROTOM 1500 ZEISS (CARL ZEISS, Oberkochen, Germany) – technical tomograph with focused micro-beam
- Datos 2.7.2, METROTOM OS – dedicated software for the reconstruction of tomographic data
- VG Studio MAX 3.3 (Volume Graphics GmbH, Heidelberg, Germany) – dedicated software for visualization and analysis of tomographic data (analysis of porosity, inclusions, foams, fibers, reverse engineering, coordinate measurements, numerical simulations)
- Mimics Materialise, Geomagic, GOM Inspect, ImageJ – software for volumetric data analysis and processing

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

Wrocław University of Science and Technology

CAMT 2

Centre for Advanced Manufacturing Technologies CAMT, Wroclaw University of Science and Technology

jacek.reiner@pwr.edu.pl

https://pwr.edu.pl/en/

WROCŁAW, POLAND

Laser processing laboratory: welding, machnining, coating and suface micromachining

Remote laser processing system dedicated for welding and hardening applications. The robotic process head guidance system allows processing in a wide range of directions and areas increasing the flexibility of the already large range of achievable technological applications. The additional equipment of the optical head with coaxial temperature measurement ensures high quality and control of hardening processes.

System for laser cladding with powder - The system for laser cladding allows coatings to be applied from a huge range of powder materials, with simultaneous mixing of 2 different powders during the process. The modular design of the system further increases its applicability when depositing materials that require additional preheating. The cladding system is complemented by a process monitoring system for melt pool dimensions and temperature.
Laser source: Laserline LDF 4000-30

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 15 JANUARY 2023

Wrocław University of Science and Technology

CAMT 3

Centre for Advanced Manufacturing Technologies CAMT, Wroclaw University of Science and Technology

tomasz.kurzynowski@pwr.edu.pl

https://pwr.edu.pl/en/

WROCŁAW, POLAND

Material testing laboratory.

Optical and Vision Measurement Equipment
Blackfly S BFS-PGE-51S5P-C (FLIR, Wilsonville, USA) – polarizing camera
HR4000 (Ocean Insight, Orlando, USA) – UV-VIS-NIR spectrometer – 200-1100 nm
NIRQuest (Ocean Insight, Orlando, USA) – NIR spectrometer – 900-2200 nm
LJ-V7020 (Keyence, Osaka, Japan) – laser triangulation head
LJ-V7060 (Keyence, Osaka, Japan) – laser triangulation head

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 15 JANUARY 2023

LEPI

RATEN - State Owned Company "Technologies for Nuclear Energy"/ Institute for Nuclear Research, Street Campului Nr. 1, POB 78, 115400 - City Mioveni, County Arges, Romania

ion.man@nuclear.ro

https://nuclear.ro/reactor/

PITESTI -MIOVENI, ROMANIA

Post-Irradiation Examination Laboratory, directly linked with the TRIGA reactor pool by a water channel, allows examinations of irradiated fuel and structural materials irrdiated in TRIGA reactor. The laboratory consists of:

Destructive and non-destructive techniques applied in the hot cells facilities are:

- Non-destructive PIE techniques:
- Visual examination and photography;
- Dimensional measurements;
- Axial gamma scanning and tomography;
- Eddy current defect testing;
- Oxide layer thickness measurement by eddy current;
- Destructive PIE techniques:
- Fission gasses analysis, internal pressure and free volume of fuel element determination;
- Optical microscopy;
- Hydrogen combined in the clad and other samples;
- Scanning electron microscopy (SEM);
- Burn-up by mass spectrometry;
- Mechanical testing.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

Mössbauer Spectrometry Lab

Mössbauer Spectrometry Laboratory, Slovak University of Technology in Bratislava, Ilkovičova 3 81219

marcel.miglierini@stuba.sk

http://www.ujfi.fei.stuba.sk/index.php

BRATISLAVA, SLOVAKIA

Mössbauer Spectrometry Laboratory is used for non-destructive material testing using the Mösbauer effect with a wide diagnostic potential, applicable to all iron-containing materials. It enables accurate phase analysis of materials as well as identification of iron atoms in different crystallographic positions. INPE is experienced in analyzing samples from the fields of archeology, biology, chemistry, thin films, metallurgy, magnetism and mineralogy including meteorites. The current configuration of the Mössbauer spectrometer can be used in transmission or backscattering geometry. In addition, the techniques of Conversion Electron Mössbauer Spectrometry (CEMS) and Conversion X-ray Mössbauer Spectrometry (CXMS) are also available. They scan surfaces of the investigated samples to the depth of ~200 nm and 5 000 nm, respectively. All experiments are routinely performed at room temperature. Experiments at low temperatures (down to 4.2 K) and/or in external magnetic field (up to 6 T) can be arranged on demand. The recorded spectra are analysed by suitable evaluation software. Their interpretation, however, requires experienced personnel. An inevitable condition for Mössbauer spectrometry experiments is a presence of the individual Mössbauer nuclide, 57Fe in our case), in the investigated samples.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 18 JANUARY 2023

SLOVK-2

Positron Annihilation Spectroscopy Laboratory, Slovak University of Technology in Bratislava (Institute of Nuclear and Physical Engineering - INPE), Ilkovičova 3 81219

branislav.vrban@stuba.sk
vladimir.necas@stuba.sk

www.stuba.sk

BRATISLAVA, SLOVAKIA

The laboratory for Positron Annihilation Spectroscopy (PAS) at INPE has two techniques based on electron-positron annihilation, namely, positron annihilation lifetime spectroscopy (PALS) and the coincidence Doppler broadening spectroscopy (CDBS).

Positron annihilation spectroscopy (PAS) is known to be very sensitive to vacancy-type defects as small as mono-vacancies at concentrations as low as 0.1 appm. Positron annihilation lifetime spectroscopy (PALS) is a PAS technique based on the implantation of positrons from the positron source to the sample and monitoring the lifetime of these positrons in the examined material, which is directly proportional to the size of vacancy-type of defects. Using this technique, it is possible to quantify and qualify the smallest volume defects, which are not seen by other techniques, including TEM. This method was successfully used in verification programs for the assessment of the neutron embrittlement of the nuclear reactor materials.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 15 JANUARY 2023

STU 2

NDT laboratory, Slovak University of Technology in Bratislava (Institute of Nuclear and Physical Engineering), Ilkovičova 3, 812 1

jarmila.degmova@stuba.sk
vladimir.krsjak@stuba.sk

www.stuba.sk

BRATISLAVA, SLOVAKIA

Non-destructive laboratory based on small-sized sample testing comprising:

Micromagnetic testing based on magnetic Barkhausen noise phenomenon. The technique is useful for the determination of residual stress in the material, which relates to the presence of defects such as precipitates, grain boundaries and lattice defects.

Nanohardness is a conventional quasi-non-destructive testing method for the evaluation of mechanical properties. It is an effective method for assessing the mechanical properties of materials' surface layers and is, therefore, a particularly suitable method for testing the implanted materials.

Atomic and Magnetic Force Microscopy is the method that allows exploring the surface properties of samples with high spatial resolution. It allows the monitoring of the topography or other surface properties (such as magnetic force gradients above the surface) of the sample.

Röntgen diffraction analysis of microstructural changes introduced into material due to irradiation/implantation

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 15 JANUARY 2023

PAS Lab

NDT laboratory, Slovak University of Technology in Bratislava (Institute of Nuclear and Physical Engineering), Ilkovičova 3, 812 19

jarmila.degmova@stuba.sk
vladimir.krsjak@stuba.sk

http://www.ujfi.fei.stuba.sk/index.php

BRATISLAVA, SLOVAKIA

The laboratory for Positron Annihilation Spectroscopy (PAS) at INPE has two techniques based on electron-positron annihilation, namely, positron annihilation lifetime spectroscopy (PALS) and the coincidence Doppler broadening spectroscopy (CDBS).

Positron annihilation spectroscopy (PAS) is known to be very sensitive to vacancy-type defects as small as mono-vacancies at concentrations as low as 0.1 appm. Positron annihilation lifetime spectroscopy (PALS) is a PAS technique based on the implantation of positrons from the positron source to the sample and monitoring the lifetime of these positrons in the examined material, which is directly proportional to the size of vacancy-type of defects. Using this technique, it is possible to quantify and qualify the smallest volume defects, which are not seen by other techniques, including TEM. This method was successfully used in verification programs for the assessment of the neutron embrittlement of the nuclear reactor materials.

(Coincidence) Doppler Broadening Spectroscopy (C)DBS. This method provides unique information about the momentum of an electron-positron pair prior to their annihilation process. The line shape parameters S and W describes the annihilation with low-momentum valence electrons and high-momentum core electrons.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

STU-MTF

Department of Ion Beam Technologies, Advanced Technologies Research Institute, Faculty of Materials Science and Technology in Trnava, Slovak universtiy of Technology in Bratislava

pavol.noga@stuba.sk
zoltan.szaraz@stuba.sk

www.stuba.sk

BRATISLAVA, SLOVAKIA

The SlovakION Ion Beam Centre run by the Advanced Technologies Resarch Institute, MTF STU provides ion irradiation/implantation as well as ion beam analysis experiments using two ion accelerators - the 6 MV Tandetron tandem ion accelerator and a 500 kV ion implanter. https://atri.mtf.stuba.sk

Ion beams of a wide range of ions (H to U excluding artificial radionuclides and enriched ion source material) available in the energy range from 40 keV to 100 MeV (depending on species - for protons the maximum energy is 11 MeV, helium 17 MeV)

Ion Beam Analysis (IBA) provides a highly sensitive (down to ppm level depending on particular combination of elements) and reference-material-free elemental analysis of materials, especially thin films and surfaces, however bulk material analysis is possible as well. Specific advantage is the ability to detect and quantify the presence of light elements including hydrogen. Avaiable ion beam analysis methods are Rutherford Backscattering Spectrometry (RBS), Particle Induced X-ray Emmission (PIXE), Nuclear Reaction Analysis (NRA), Elastic Recoil Detection Analysis (ERDA).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 18 JANUARY 2023

IP-SAV

Tandetron laboratory, Institute of Physics, Slovak Academy of Sciences, Vrbovská cesta 110, 921 01

mvenhart@cern.ch
andrej.herzan@savba.sk

https://www.sav.sk/

PIEŠŤANY, SLOVAKIA

The accelerator laboratory equipped with the 2 MeV Tadetron, manufactured by the High Voltage Engineering Europe B.V. The duoplasmatron ion source can deliver light-ion beams (proton, alpha). The 2 MV Tandetron has one main experimental beamline with a possibility to add another beamline(s) at different angles, if needed. The focal plane of the accelerator contains an array of 4 HPGe coaxial detectors and two scintillators. Additionally, two BEGe detectors and one planar Si(Li) detectors are available for measurements. Only recently, a new goniometer/polarimeter has been installled at the focal plane to measure linear polarization and angular distribution of the electromagnetic transitions. Both solid and gas target systems are available, depending on the needs of a particular experiment. Furthemore, a quasi-monoenergetic neutron source is available together with a set of neutron detectors and cameras. The focal-plane setup can be re-arranged as needed and further equipped with e.g. silicon detectors for charged particles. At the end of the beamline, a set of three collimators, acting also as Faraday cups, is installed for optimizing the ion optics and accurate determination of ion-beam electric current. The small-scale laboratory which can deliver light-ion beams with tuneable energy and intensity is an appropriate facility for long-term measurements focused on nuclear structure studies and material research:
https://www.fu.sav.sk/index.php?id=72&L=1

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 18 JANUARY 2023

CMAM

Centre for Micro Analysis of Materials (CMAM), Autonomous University of Madrid, Faraday 3, 28049

gastón.garcia@uam.es
cesara.lopez@uam.es

https://www.cmam.uam.es

MADRID, SPAIN

The main experimental tool of the Centre for Micro Analysis of Materials (CMAM), is a tandem electrostatic ion accelerator with a maximum terminal voltage of 5 MV, devoted to the analysis and modification of materials. The accelerator is exploited through a set of 6 beamlines, equipped with several analytical techniques such as RBS, Channeling, PIXE, PIGE, ERDA, STIM and NRA. More details can be found at https://www.cmam.uam.es.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

Microscopy & surface analysis lab

Microscopy and surface analysis (RADIOACTIVE FACILITY) owned by CIEMAT, Avenida Complutense 4, Madrid

marta.serrano@ciemat.es

https://www.ciemat.es/

MADRID, SPAIN

Microscopy and surface analysis (RADIOACTIVE FACILITY)

- Scanning Electron Microscopy (SEM) HITACHI 30 kV Backscattered Electron Detector (BSE) and Dispersive X-ray (EDS) analysis system
- Scanning Electron Microscopy (Field emission gun) (STEM). Hitachi. EDX, BSE, EBSD, TEM detectors
- Auger Spectroscopy PHI 660 Scanning Auger Microprobe
- X-ray Photoelectron Spectroscopy (XPS), also known as Electron Spectroscopy for Chemical Analysis (ESCA), ESCA spectrometer PHI 5400
- Transmission Electron Microscopy (TEM) 200 kV Jeol 2010.

http://rdgroups.ciemat.es/es/web/materiales/LaboratorioRadiactivo.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

Mechanical caract lab

Mechanical characterization (RADIOACTIVE FACILITY) owned by CIEMAT, Avenida Complutense 4, Madrid

marta.serrano@ciemat.es

https://www.ciemat.es/

MADRID, SPAIN

Mechanical characterization (RADIOACTIVE FACILITY)

- Two MTS 810 Servo-Hydraulic Machine. Capacity 100 kN. Cooling-Heating from -150°C up to 1000°C
- Wolpert Impact test 300 J and 25 J
- Small Punch tester: Temperature from -150ºC to 500ºC.
- Small Punch Creep tester: Temperature upto 800ºC.

http://rdgroups.ciemat.es/es/web/materiales/LaboratorioRadiactivo

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 19 JANUARY 2023

NAYADE

Nayade, owned by CIEMAT, Avenida Complutense,40, Madrid

marta.serrano@ciemat.es

https://www.ciemat.es/

MADRID, SPAIN

NAYADE Co-60 irradiation facility: The Nayade facility of CIEMAT is pool-type with water as biological shield. It consists of a pool of 1.2 m on side and 4.5 m deep of water, providing enough biological shielding for about 100,000 Ci of Co-60. http://rdgroups.ciemat.es/es/web/materiales/LaboratorioRadiactivo

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

LADICIM

University of Cantabria, LADICIM Research Group

ciceros@unican.es

https://ladicim.es/en/

CANTABRIA, SPAIN

- Mechanical testing (10 kN to 1000 kN), bench for multiaxial dynamic mechanical testing, hydraulic presses for compressive testing (up to 1500 kN), load actuators (up to 500 kN), static servo-hydraulic machine (up to 1500 kN), hydraulic and electromechanical machine with load cells of 10 N, 100 N and 500 N capacity, resonance machine, Charpy impact testing machine for polymers and composites, hardness, microhardness and ultra-micro-hardness durometers, etc.
- Microstructural characterisation: optical microscopy, Scanning Electron Microscopy (SEM), microanalysis by X-ray scatter energy (EDAX), image analysis and treatment system, general X-ray diffractometer (XRD), computed axial Tomography (CAT).
- Auxiliary equipment: conventional, high temperature and low temperature extensometers, stroboscopic system for crack monitoring, environmental chamber for high/low temperature tests, low-temperature thermostatic unit, profile projector, 3D measurement bench, etc.
- Finite element licences.
- The University of Cantabria also has scientific equipment that supports LADICIM activity, particularly regarding TEM analyses and backup equipment.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

STUDSVIK HOT CELL FACILITY

Studsvik Nuclear AB
Atomvägen 1
611 82 Nyköping
Sweden

carolina.losin@studsvik.com
joakim.karlsson@studsvik.com

https://www.studsvik.com/about-us/our-business-areas/fuel--materials-technology/virtual-tour/

STUDSVIK, SWEDEN

Studsvik operates the following laboratories and services.

1. Hot cell laboratory for studies of spent nuclear fuel and irradiated materials. Capabilites inlude a large range of non destructive and destructive examination methods. Examples are visual inspection, dimension measurements, eddy current measurements, fission gas and inner pressure measurements, microstrucutral studies, refabrication of test rods for in or out of pile testing, intermediate and final storage simulations, transient simulations.
2. Mechanical testing laboratory of irradiated materials including e.g. tensile testing, RIA simulations, creep and HRX testing, PCI simulation and crack initiation and propagation testing.
3. Pool facility. Three pools for irradiated materials handling, equipement benchmarking and sample storage.
4. Transportation management, fissile and irradiated materials. We can accomodate horizonthally unloaded casks up to 50 and vertically (wet) unloaded casks up to 60 tons.

www.studsvik.com

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

SVTI ASIT

SW-1

Laboratory is part of the Nuclear Inspectorate department at SVTI and is based in Wallisellen

aurelia.muller@svti.ch
daniel.algernon@svti.ch
claudia.thurnherr@svti.ch

https://www.svti.ch/en/nuclear-inspectorate/non-destructive-testing-laboratory

WALLISELLEN, SWITZERLAND

The NDT (Non-Destructive Testing) Laboratory is part of the Nuclear Inspectorate department at SVTI and is based in Wallisellen in Switzerland. The Laboratory is composed of a team of experienced PhD researchers with advanced expertise in NDT systems and the inspection of Nuclear Power Plant as well as civil engineering infrastructures. The Laboratory focus on advancing knowledge and bringing innovation in the fields of NDT technology, materials science as well as civil and mechanical engineering. The Laboratory members' expertise extends to software development, advanced data processing and visualisation, implementation of Artificial Intelligence and Machine Learning tools as well as Numerical simulation and FEM. Our team is experienced with Python, Matlab, Labview, CIVA and ANSYS.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

EMMA-AMALIA

European Commission - Joint Research Centre
Westerduinweg 3
NL-1755LE Petten

radek.novotny@ec.europa.eu
oliver.martin@ec.europa.eu
Karl-Fredrik.NILSSON@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

PETTEN, THE NETHERLANDS

The AMALIA laboratory at the Joint Research Centre (JRC) in Petten, the Netherlands was built and is operated in order to study the effect of water environments on the mechanical and corrosion performance including life assessment and qualification of structural materials for present and next generation nuclear systems. It includes test machines and auxiliary equipment for corrosion and environmentally assisted cracking testing for various types of test specimen. In support microstructural analysis (e.g. 3D-profilometry, x-ray tomography, SEM) and data management tools can be offered.

AMALIA consists of 5 water loops for providing and analysing water for AMALIA autoclave test facilities. The water loops include:

- State-of-the-art water chemistry sensors such as Conductivity, pH, dissolved oxygen and hydrogen sensors.
- Low and high pressure pump including the back pressure regulators and pulsation dampeners to provide water circulation and needed water pressure for test facilities.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

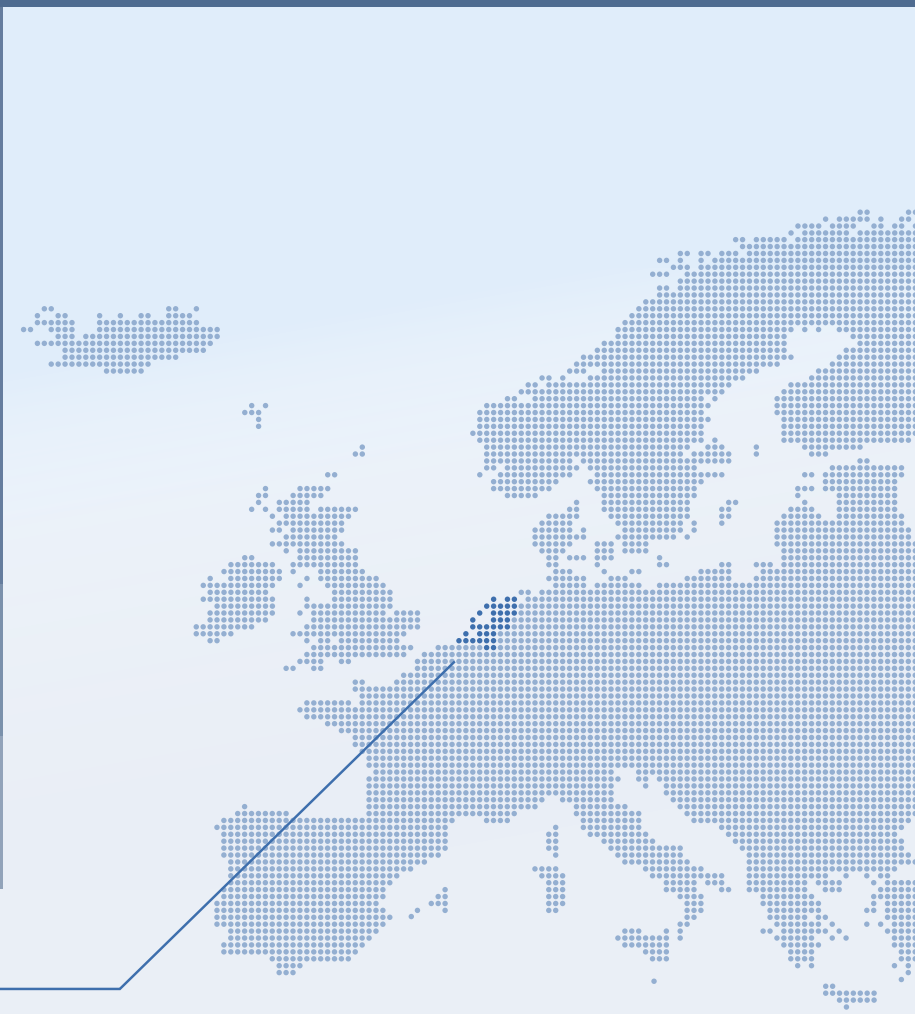
VERSION · 23 MARCH 2023

EMMA-LILLA Lab

European Commission - Joint Research Centre
Westerduinweg 3
NL-1755LE Petten

peter.haehner@ec.europa.eu
radek.novotny@ec.europa.eu
Karl-Fredrik.NILSSON@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en



PETTEN, THE NETHERLANDS

The Liquid Lead Laboratory (LILLA) at the Joint Research Centre (JRC) in Petten, the Netherlands offers testing of mechanical and corrosion properties of materials in liquid lead with controlled dissolved oxygen concentrations and for temperatures up to 650°C. It gives the possibility to study liquid metal embrittlement phenomena and the effect of stress, temperature and oxygen content in lead on corrosion mechanisms, as well as testing of lead chemistry instrumentation.
LILLA features four test sections with pneumatic bellows-based loading devices that allow mechanical tests (load or displacement controlled, tensile tests, small punch tests, fracture toughness tests) with the following characteristics:

- Maximum load: 20 kN, push/pull;
- Maximum displacement: 5 mm;
- Displacement rates: 10–8 to 10–2 mm/s;
- Fatigue: R > 0, maximum 0.1 Hz;
- Test / hold times: up to 1,000 h;
- Test sections are equipped with Pt-air reference electrode oxygen sensors and thermocouples.

LILLA also provides supporting services for cleaning of specimens, 3D-profilometry, microstructural analysis (light optical microscopy, SEM with energy dispersive X-ray spectrometry (SEM–EDX)) and Vickers micro hardness testing.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES **YES**

VERSION · 21 MARCH 2023

EMMA-MCL

Micro-Characterisation Laboratory (MCL) European Commission - Joint Research Centre Westerduinweg 3 NL-1755LE Petten

peter.haehner@ec.europa.eu
Karl-Fredrik.NILSSON@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

PETTEN, THE NETHERLANDS

The Micro-Characterization Laboratory (MCL) is dedicated to the experimental investigation of materials performance in terms of microstructure and micromechanics. The lab provides insight into the complex coupling between microstructure, its defects and the mechanical behaviour of small volumes of metals, ceramic materials, polymers and composites of interest for the safe operation of nuclear installations and for non-power nuclear applications. Priority research topics of MCL include

1. Micro-characterization of materials of nuclear interest.
2. Development of micro-mechanical testing methodologies.
3. Support to predictive mechanism-based multiscale material models
4. Material degradation sources in nuclear environments (irradiation, high temperature, corrosion).
5. Understanding of small-scale plasticity.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 21 MARCH 2023

EMMA-SMPA

Structural Materials and Performance Assessment (SMPA) Lab

European Commission - Joint Research Centre
Westerduinweg 3
NL-1755LE Petten

igor.simonovski@ec.europa.eu
karl-fredrik.nilsson@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

PETTEN, THE NETHERLANDS

The Structural Materials Performance Assessment (SMPA) laboratories at the Joint Research Centre (JRC) in Petten, the Netherlands are used for the mechanical performance characterisation, life assessment and qualification of structural materials for present and next generation nuclear systems. They include test machines and auxiliary equipment for performing creep, tensile and fracture tests for different test specimens including uniaxial tensile/creep, small punch and compact test specimens. Supporting 3D profilometry, microstructural analysis and data management tools may be offered.

The SMPA laboratories include the following test machines:

Universal Tensile test Machines for tensile, fatigue, fracture, and creep fatigue, slow-strain-rate test (SSRT), Creep-fatigue Crack Growth:

- Large force servo-hydraulic test machine up to 250kN with furnace heating up to 1200°C.
- Medium force servo-electric test machine up to 100kN with induction heating.
- Low force electro-pulse test machine up to 3kN, adapted for small punch tensile testing, with an environmental chamber from -150 to +600°C.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

CL5 **MATERIAL RESEARCH AREA**

CL1 **NEUTRONIC RESEARCH AREA**

HFR

Nuclear Research & consultancy Group (NRG). Westerduinweg 3, NL-1755LE, Petten

huntelaar@nrg.eu

https://www.nrg.eu/en

PETTEN, THE NETHERLANDS

45-MW Material Test Reactor, used for medical isotope production and materials & fuels testing. In-core irradiation facilities are inert gas filled capsules allowing for monitoring and control of sample temperatures.

https://www.ensuringnuclearperformance.com/en/products/irradiation-services

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

ORIENT-NM support facilities

Westerduinweg 3, 1755 LE
PETTEN P.O. Box 25, 1755 ZG

g.dehaas@nrg.eu

http://www.eera-jpnm.eu/orient-nm/

PETTEN, THE NETHERLANDS

ORIENT-NM aims to explore the consensus on a European partnership (former EJP) on nuclear ma terials with the objective to accelerate the design, manufacturing and qualification of innovative nuclear materials with improved performance and reduce their time to market to meet the challenges posed by the clean energy transition timely. An integrated European partnership on nuclear materials research will facilitate coordinated use of assets spread across member states and associated countries, as well as to give continuity to the pursued research lines.

Such a partnership will «need and feed» available schemes and roadmaps for access to and use of infrastructures, such as those designed in the parallel JHOP2040 CSA and the OFFERR CSA, or in the framework of international organisations (e.g., OECD/'NEA's FIDES initiative). Such a crosscutting programme is expec ted to leverage substantial national and industrial support.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 14 FEBRUARY 2023

UKR-1

IPP-Centre LLC

zarazovskii-mm@ipp-centre.com.ua
dubyk-yr@ipp-centre.com.ua

http://www.ipp.kiev.ua/en

BOLSUNOVSKA, UKRAINE

"IPP-Centre" G.S. Pisarenko Institute for Problems of Strength of the National Academy of Sciences of Ukraine

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

AMRC
Nuclear AMRC

f.nafiah@sheffield.ac.uk

https://namrc.co.uk/capabilities/innovation/welding/

ROTHERHAM, UNITED KINGDOM

Welding and Joining R&D
The Nuclear AMRC hosts a number of welding facility of varied techniques at our Rotherham office, including, but not limited to, electron beam welding, diode and disk laser welding, submerged arc welding, and TIG welding. These are specifically tailored to the needs of the nuclear industry and has a history of continuous research and development. As an example, the EBW cell is the largest EBW vacuum chamber is the UK, and has a max part weight of 100 tonnes and able to produce fully penetrated single-sided welds up to 150 mm thickness. Through multiple series of R&D projects, we have also developed several robotic welding cells of wide range of welding techniques, some are readily-equipped with automated inspection capability and closed-loop feedback using camera-based tracking mechanism for improved welding accuracy. These in-house facilities have been, and still are, being utilised extensively on multiple works, including the manufacture of Group 4 Pressuriser Nozzle to Shell Weld Test Pieces, TP127 & TP128.
The NDT team at the Nuclear AMRC, in particular, has a wide range of expertise in delivering works, not only in industrial NDT, but also R&D on robotic inspections, novel NDT techniques, and NDT data analysis.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 FEBRUARY 2023

IRRADIATION

CERG, 7 Rue Lavoisier
38800 Le Pont-de-Claix,
France

yann.bohan@cerg-fluides.com

http://www.cerg-fluides.com/index.php/fr/

PONT DE CLAIX, FRANCE

The irradiator is a "pool-type" irradiator. It consists of a pool filled with water, where radioactive sources of cobalt 60 (60Co) emitting intense gamma radiation are stored, and an irradiation cell, a kind of concrete casemate, connected to the pool via a channel passing under the wall separating them. The function of the water in the pool is to block the gamma radiation. The protection of the people in the installation is thus ensured either by the thickness of water separating them from the sources, or by the thickness of the concrete walls when the sources are in cells.
Irradiations can be carried out in a cell, with sources moved from the pool by a mobile cart system, or in the pool, in containers immersed and deposited near sources placed at the bottom of the pool.

- Total authorized activity: 3700 TBq of 60Co (100,000 Ci), classic activity in recent years: 1000 to 2500 TBq depending on the decay of 60Co and the renewal of sources
- Depth of the pool: 4.25 m
- Thickness of the cell walls: 1.50 m
- Interior dimensions of the cell: 4.00 m x 4.00 m with a ceiling height of 2.60 m (2.00 m useful under the bridge crane)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

IGNIS

EDF R&D / MFEE
EDF Lab Chatou

sebastien.thion@edf.fr

https://www.edf.fr/en

CHATOU, FRANCE

Life-size fire safety installation (IGNIS)
Equipment four test facilities, two of which have been designed as empty shells with concrete walls 30 cm thick. Applications Any nuclear industrial application. Designed for water reactors

IGNIS is an experimental installation that allows real fires to be carried out in premises representative of nuclear power plants. We thus find the same ventilation system and a similar dimensioning.
The idea is therefore to design a long-lasting tool that would also make it possible to recreate different configurations of premises. For example, we have a test facility ten meters high. We are able to position three levels of premises or even a stairwell there. Another test facility is twelve meters long and can also be separated into several modules. We are able to have here long lines of electric cables as one finds some in a nuclear power station.

- Services Qualification of a fire simulator
- Study of pressure effects
- Study of equipment fire
- Multiple configurations are possible

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

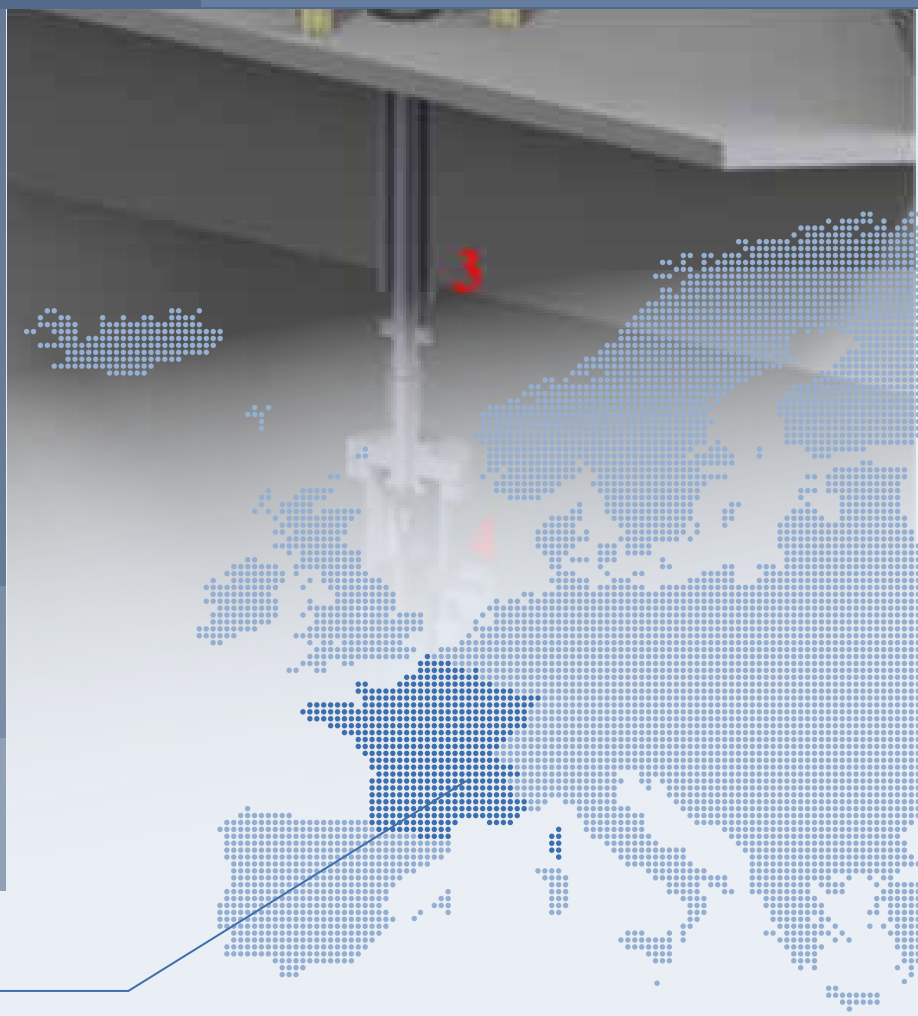
VERSION · 16 JANUARY 2023

KROTOS

CEA (French Alternative Energies and Atomic Energy Commission)
DES-IRESNE-DTN (SMTA-LEAG)

andrea.bachratakubic@cea.fr
arthur.denoix@cea.fr

www.cea.fr



CADARACHE, FRANCE

KROTOS is a facility located in CEA cadarache in the south of the France. It is dedicated to the study of Fuel Coolant Interactions, (steam explosions, fragmentation, debris bed formation, coolability) in connection with the validation of codes devoted to Fuel Coolant Interaction (FCI).

The KROTOS facility, dedicated to severe accident studies of Corium Water Interaction, consists of 5 parts: a resistive furnace (1), an isolation valve (2), a transfer tube (3), and a test section (5) with the corium jet formation area (4) (see figure 1). The furnace can melt 500cm3 (3-8kg depending on the composition) of prototypical corium (depleted UO2, no nuclear FP and no Pu), and reach a temperature of 2900°C. The test section consists of a pressure vessel and a test tube (Figure 2). The pressure vessel is designed to sustain 2.5 MPa at 493 K. It is a cylindrical vessel made of three parts. The upper part, made of stainless steel, houses the lower end of the release channel. It is provided with a number of feed-through for auxiliary gas connections and mounting of instrumentation (vessel pressure transducers, level swell, dynamic pressure transducers and temperature of the melt).

https://linktr.ee/leag_plinius (including presentation and link to dedicated webpages)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: NO

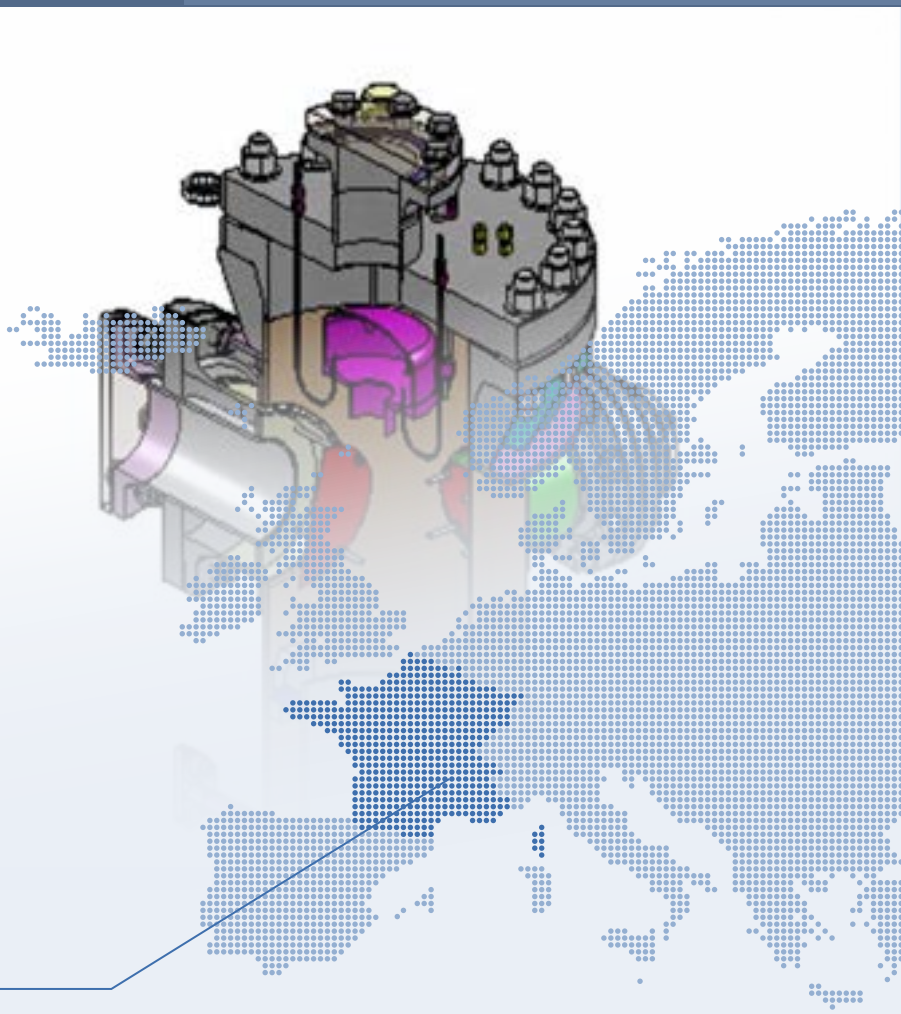
VERSION · 17 FEBRUARY 2023

MERELAVA

CEA (French Alternative Energies and Atomic Energy Commission) DES-IRESNE-DTN (SMTA-LEAG)

andrea.bachratakubic@cea.fr
arthur.denoix@cea.fr

www.cea.fr



CADARACHE, FRANCE

MERELAVA is a facility located in CEA cadarache in the south of France. It has been designed to carry out experimental R&D on Molten Core Concrete Interaction with water top flooding in order to extend the study of water ingression from SSWICS tests to prototypical mixture of oxide corium and steel.
- Corium synthesis at high temperature
The prototypical corium in MERELAVA facility could be composed of depleted UO2, constituent of concrete, stainless steel and non-radioactive fission products. Thermitic reaction is used to reach rapidly high temperature, higher than the corium mixture liquidus temperature. The temperature depends on the thermite composition. Then induction heating (400 kW and 70-300kHz) is used to simulated the decay heat. It permits to complement current transient experiments with steady state tests, including the actual gas-generating ablation (1D) of a concrete layer at the crucible bottom.

https://linktr.ee/leag_plinius (including presentation and link to dedicated webpages)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: NO

VERSION · 17 FEBRUARY 2023

VULCANO MCCI

CEA (French Alternative Energies and Atomic Energy Commission) DES-IRESNE-DTN (SMTA-LEAG)

andrea.bachratakubic@cea.fr
arthur.denoix@cea.fr

www.cea.fr

CADARACHE, FRANCE

VULCANO MCCI is a facility, located in the south of France, dedicated to the behavior studies of high mass of corium, representative of reactor case, mainly for ex-vessel conditions. The granular load (up to 50kg) is place in a circular concrete test section. It could be instrumented to follow the concrete ablation or to monitor pool temperature with for example: - around 140 type K thermocouple (up to 1370°C). - Specially sheathed type C thermocouple (up to 2320°C). – Sensing cables. - Bichromatic pyrometer. - Infrared camera. Two way of heating are possible inside VULCANO MCCI: - The thermitic reaction is used to reach rapidly high temperature, higher than the corium mixture liquidus temperature. The temperature depends on the thermite composition. Then induction-heating (400 kW and 70-300 kHz) with a coil installed around the cylindrical concrete test section could be used to simulate the decay heat. It heats mostly the oxide phase in case of oxide + steel mixture. – The induction-heating can slowly heated the load up to melt temperature. It is only possible for corium with a significant amount of metal. In both case a ceramic tube is installed over the test section since the density of the granular load is much lower than that of the product melt.

https://linktr.ee/leag_plinius (including presentation, and links for dedicated webpages)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: NO

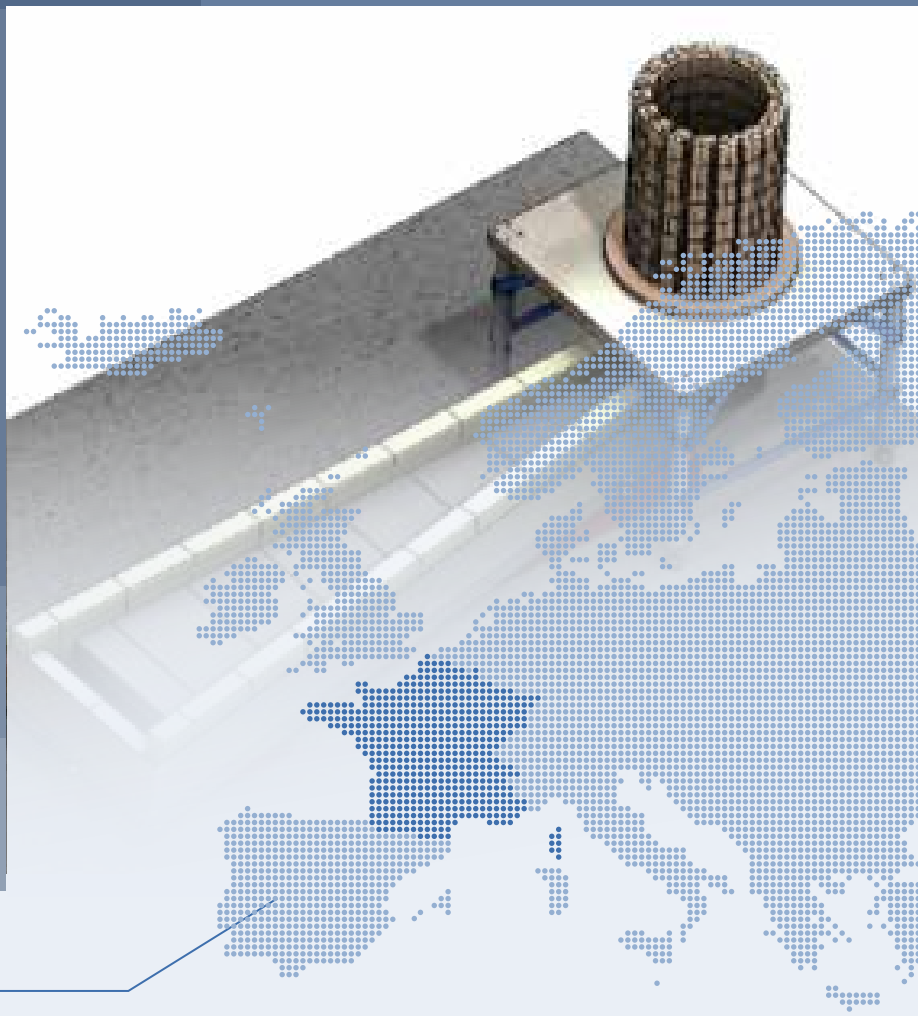
VERSION · 17 FEBRUARY 2023

VULCANO Spreading

CEA (French Alternative Energies and Atomic Energy Commission)
DES-IRESNE-DTN (SMTA-LEAG)

andrea.bachratakubic@cea.fr
arthur.denoix@cea.fr

www.cea.fr



CADARACHE, FRANCE

VULCANO spreading is a facility, located in the south of France, dedicated to the behaviour studies of high mass of corium, representative of reactor case, mainly for ex-vessel conditions. The granular load (up to 50kg) is place in a circular a 305 mm diameter crucible with a 60 mm hole at the base, mounted on a table with a 120 mm hole at its center. The crucible is constructed of zirconia bricks and is housed within a steel casing with a sand-filled cavity between the zirconia and steel. Melt discharge is controlled by the melting of a 3 mm thick tin plug covering the hole at the base of the crucible. The crucible is mounted above a stabilization zone, which regulates the melt flow into the spreading channel. The spreading channel and stabilization zone are walled with zirconia bricks or concrete. The entry to the spreading channel is 95mmwide, with walls diverging at an angle of 9.5 ° along its 2 m length.
Specially sheathed type C thermocouples measure the temperature of the corium inside the crucible. Type K and type C thermocouple are inside or on the spreading surface the follow the corium melt progression and temperature. The spreading channel is mounted on three 300kg scales to detect the rate of mass flow onto the test section.

https://linktr.ee/leag_plinius (including presentation, and links for dedicated webpages)

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

VERSION · 17 FEBRUARY 2023

TAMARIS / AZALEE

CEA (French Alternative Energies and Atomic Energy Commission)

darius.seyedi@cea.fr

www-tamaris.cea.fr

SACLAY, FRANCE

The TAMARIS infrastructure belongs to CEA's Seismic Mechanics Study Laboratory (EMSI), who is leading the French SEISM Paris-Saclay Institute, in France. Several international RTD collaborations with other facilities (EU, Japan, China, USA) have been set up. The AZALEE shaking table, with 1000 kN allowable model mass, is one of the largest shaking tables in Europe. To date, tests with masses up to 920 kN have been successfully performed. The shaking table is 6mx6m and 6 Degrees-of-Freedom, allowing testing specimens under independent excitations of various types: sinusoidal, random, shock and time-history with 0 to 30 Hz frequency ranges. Maximum accelerations of 1g in the horizontal and vertical directions can be applied to specimens with the maximum payload of the table. The TAMARIS facility now proposes geotechnical earthquake engineering testing possibilities, such as liquefaction analyses, soil-foundation and soil-structure interactions, thanks to a rigid soil square container which can be put on the AZALEE shaking table.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: NO

VERSION · 17 JANUARY 2023

MAESTRO

CEA (French Alternative Energies and Atomic Energy Commission)

caroline.chabal@cea.fr
eric.cantrel@cea.fr

https://www.cea.fr/

MARCOULE, FRANCE

To provide technical support in R&D to projects wishing to implement remote intervention technologies, the CEA Marcoule (Bagnols/Cèze, France) has two experimental test halls, in which robotic equipment is tested and qualified through full-scale mock-ups.

The expertise in remote handling, robotics, programming, cutting process, CAD and mock-up allows us to take projects to a technology demonstration phase in a representative environment (TRL 6). Examples include the laser installation used to test the cutting of materials encountered on dismantling sites and the MAESTRO process developed by the CEA in collaboration with Cybernetix. The laboratory also makes its expertise and qualification platforms available to projects to evaluate the mobility of robotic means and analyze their nuclearization.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 17 JANUARY 2023

MISTRAL

IRSN
Saclay Nuclear Center
91400 Saclay, France

jerome.richard@irsn.fr

https://en.irsn.fr/EN/Research/Research-organisation/Research-units/special-studies-safety-assessments/SERAC/Pages/Laboratory-for-the-Study-and-Modelling-of-Airborne-Dispersion-and-Containment-LEMAC-1945.aspx

SACLAY, FRANCE

The MISTRAL platform gathers facilities of différent scales which the issue is the experimental study of the transfer of pollutants (gas or particles) inside rooms and ventilation networks.

The main facilities are:
CARDAMOMETTE, a 4 m3 ventilated enclosure for studies with a reduced scale about the dispersion of gases in a ventilated industrial room; it is equipped with a laser imaging velocimetry system (2D and 3D);
MASSALE, airtight and rigid ventilated enclosure of approximately 120 m3; MASSALE is currently equipped and instrumented to quantify leaks of gaseous or particulate pollutants escaping from a dismantling airlock, during the study of incident scenarios;
DIESE, modular bench allowing full-scale studies (0.4 m x 0.6 m section, flow range possible up to approximately 10 000 m3.h -1) on the deposition of particles in ventilation networks (several singularities available); it is equipped with a laser imaging velocimetry system (2D) to characterize flows in the bench;
BEMOL is also a modular bench (same sizes and same flowrates range of DIESE) allowing full-scale studies about the conditions required for the good mixing of gas and particles in ducts (important issue for the sampling in ducts);

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 MARCH 2023

CHROMIA
IRSN

laurent.cantrel@irsn.fr

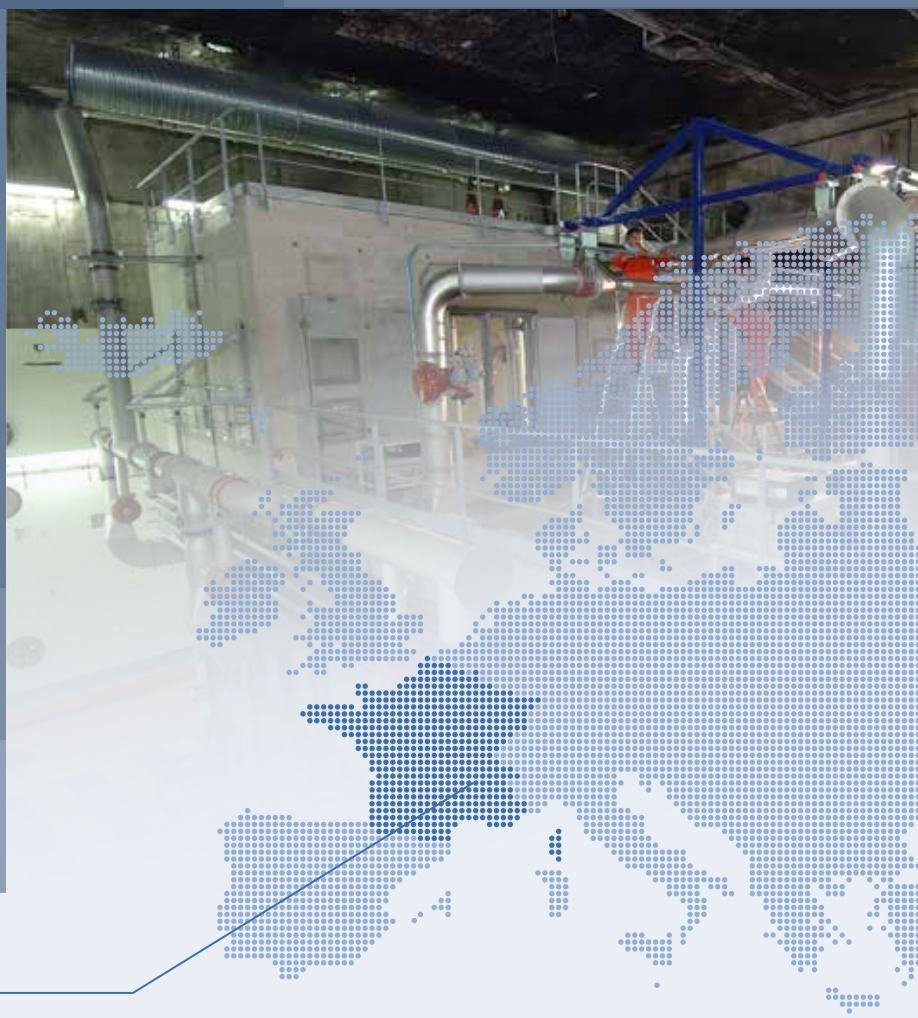
https://www.irsn.fr/

CADARACHE, FRANCE

CHROMIA IRSN experimental platform devoted to source term studies (fission products chemistry in accidental transient conditions), filter qualification and polymer ageing. Plaform at IRSN Cadarache (France), https://www.irsn.fr/fr/irsn/presentation/documents/irsn_plaquette%20cadarache.pdf Technical plateau including different techniques of analytical means for anlysis in liquid and gas phases as well as surface analysis techniques. This is completed with different experimental loops devoted to specific studies. Skills relative to fission products behaviour - See attached docx

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 29 JANUARY 2023



GALAXIE

IRSN, Cadarache Nuclear Center Bât. 346 - 13115 Saint-Paul-Lez-Durance Cedex

sylvain.suard@irsn.fr

www.oecd-nea.org/jcms/pl_24955/

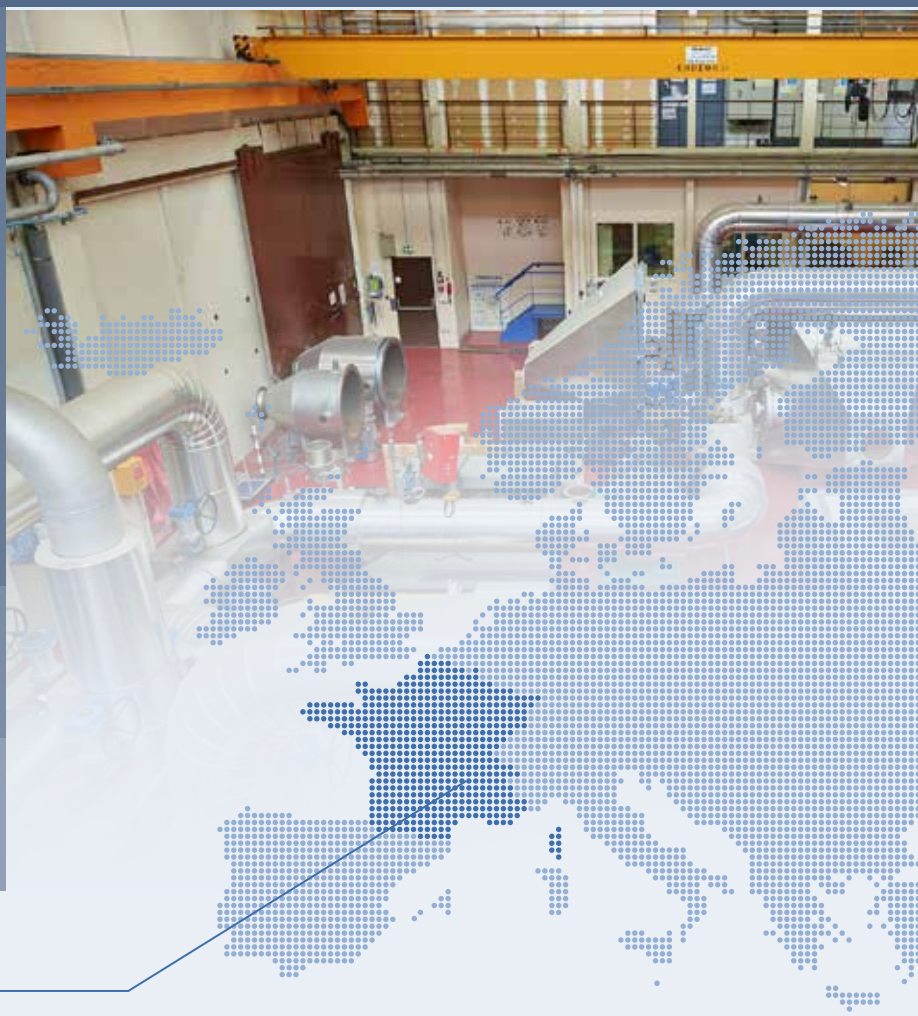
CADARACHE, FRANCE

The GALAXIE platform includes experimental facilities of various capacities, located on the Cadarache site, which allow experimental research necessary for the control of fire hazards in nuclear facilities. In particular, it is equipped with several large-scale facilities for experimental simulation of fire scenarios in open environments or in confined and mechanically ventilated compartments. Research facilities also allow to study, flame propagation phenomena on surfaces, the effect of under-oxygenation on the fire heat release rate, and the flows within a confined environment on a medium scale using optical metrology.

https://www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Galaxie/Pages/galaxie-experimental-plateform.aspx

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 6 FEBRUARY 2023



BOREE

IRSN
Saclay Nuclear Center
91400 Saclay, France

celine.monsanglant-louvet@irsn.fr

https://en.irsn.fr/EN/Research/Research-organisation/Research-units/special-studies-safety-assessments/SERAC/Pages/Laboratory-for-the-Experimental-Study-of-Containment-Air-cleaning-and-Ventilation-LECEV-704.aspx

SACLAY, FRANCE

The BOREE platform brings together a set of experimental facilities

STARMANIA: test bench dedicated to the investigation on the behavior of filters or compartmentalization systems such as full-scale fire doors and dampers, in typical fire development conditions (temperature up to 200°C, flowrate up to 20 000 m3/h, up to 100% RH, DP up to 900 mbar)
SIMOUN and RAFALES: test benches use to investigate the behavior of filters or compartmentalization systems, in different severe conditions (flowrate up to 3700 m3/h, temperature up to 400°C, different types of aerosols and associated measurements)
BANCO: filter clogging test bench devoted to the study of the behavior (filtration efficiency, pressure drop, mechanical strength) of HEPA filters in case of fire (flowrate up to 450 m3/h, O2 concentration 13-21 %).
CATFISH: test bench dedicated to the investigation of the behavior of the mechanism filtration of different types of filters in humid conditions at different scale (RH up to 100 %, temperature up to 150 °C, flowrate up to 200 m3/h)
CAPIMIF: test bench dedicated to the investigation of the behavior of filters or spark arresters analytically (filtration efficiency measurements – flowrates 450 and 1500 m3/h) More here:
https://en.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/persee-facility/Pages/PERSEE-Facility.aspx

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 MARCH 2023

ODE

IRSN
Cadarache Nuclear Center
B.P. 3 - Cadarache
France

laurent.cantrel@irsn.fr

www.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/Pages/experimental-facilities-means.aspx

CADARACHE, FRANCE

Evaluation and monitoring of concrete nuclear structures with two main objectives:

- Extension of operation of nuclear power plants (LTO)
- Ageing issue for nuclear storage facilities

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 16 JANUARY 2023

TOSQAN

IRSN
Saclay Nuclear Center
91400 Saclay, France

Emmanuel.porcheron@irsn.fr

https://en.irsn.fr/EN/Research/Scientific-tools/experimental-facilities-means/TOSQAN-facility/Pages/default.aspx

SACLAY, FRANCE

The TOSQAN facility allows to generate and to characterize locally various types of multiphase flow (gas-aerosol-droplets) representative of interest conditions for nuclear safety.

For hydrogen risk in nuclear facilities in relation with non-condensable gases distribution issue in case of steam wall condensation, spray systems effect, sump influence. For aerosols scavenging by spray systems in nuclear reactor containment in case of severe accident or mitigation strategies for aerosol dispersion during dismantling operation of nuclear facilities or in industrial facilities, and environment.
For aerosols mobilization and resuspension induced by aeraulic stress during loss of vacuum due to air or water ingress, for dust issues in fusion reactors.
For spray and pool scrubbing issues in relation for gas epuration from particles.
Main specifications:
Absolute pressure: 1 mbar to 6 bar
Temperature: up to 160°C
Gas injection: air, steam, helium
Aerosol injection: 10 nm to 100 µm
Instrumentation: Optical diagnostic (PIV, LDV, ILIDS, high speed visualization, Spontaneous Raman), particle counter (WELAS, Pegaor) and impactor (DLPI, ELPI).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

MARIN

IRSN
Saclay Nuclear Center
91400 Saclay, France

françois.gensdarmes@irsn.fr

https://en.irsn.fr/EN/Research/Research-organisation/Research-units/special-studies-safety-assessments/SERAC/Pages/Aerosol-Physics-and-Metrology-Laboratory-984.aspx

SACLAY, FRANCE

The MARIN platform gathers facilities at different scales which main issues are the aerosol source characterization, particle resuspension, aerosol metrology calibration.

This platform brings together a set of experimental facilities and measurement means:
EPICEA: laboratory for testing radioactive aerosols which makes it possible to evaluate atmospheric contamination monitors by producing calibrated radioactive aerosols, containing different radioelements (cesium, plutonium, etc.);
BISE (Banc de mIse en Suspension par Ecoulement): aeraulic vein dedicated to the study of the suspension of non-radioactive particulate contaminants by turbulent air flows up to 40 m/s;
CEPIA: In-situ Study and Sampling Chamber for Aerosols with a volume of 36 m3 makes it possible to evaluate the performance of aerosol samplers, the deposition and resuspension of particles;
DISCO: Contaminant DISpersion chamber allows the experimental study of the suspension of particles for fall or accidental contaminant emission scenarios (powders, objects, liquids, etc.). Its volume of up to 40 m3 allows experiments to be carried out on a scale representative of industrial situations. DISCO is equipped with instruments for real-time measurements of the aerosols emitted in order to determine their concentration, mass and particle size.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

framatome

KATHY, GAP

Thermal Hydraulic Platform Karlstein (including KATHY, GAP and other) at Seligenstaedter Str. 100, 63791 Karlstein am Main

Achim.Beisiegel@framatome.com
Thomas.Mull@framatome.com

https://www.framatome.com/EN/businessnews-1594/framatome-in-germany-karlstein-site.html

KARLSTEIN, GERMANY

The TH Platform Karlstein comprises:

1. The GAP - (German abbreviation for Grossarmaturen-Prüfstand) which is the World's Largest Valve Test Facility and operable for water as well as steam flows. Tests can be performed in accordance with international standards, such as ASME QME-1. Static loads can also be applied under full flow. Features: Water volume: 25 m³ // Design pressures up to 165 bar // Design temperatures up to 350 °C // Total fl ow rate up to 2,000 kg/s (steam), 4,000 kg/s (two-phase) and 1,300 kg/s (water), respectively // Accumulator volume: 125 m³ // Test section lines up to DN 700 (28")
2. KATHY - Karlstein Thermal Hydraulic Loop for Critical Heat Flux (CHF) Tests of real fuel geometries for LWRs under original conditions. The thermal-hydraulic conditions, such as pressure, temperature and mass flow, are kept constant during the CHF test run while the power is slowly increased until CHF is reached. The extensive instrumentation with thermocouples inside the heater rods allows local determination of the axial and radial onset of CHF in the test bundle.
3. Other test facilities, e.g. smaller valve test devices and pump test facilities

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

CODEX
Centre for Energy Research

hozer.zoltan@ek-cer.hu
farkas.robert@ek-cer.hu

https://www.ek-cer.hu/en/fuel-and-reactor-materials-department/

BUDAPEST, HUNGARY

The CODEX (COre Degradation EXperiment) facility was built for simulation of severe accident conditions with electrically heated bundles. The test matrix until today covered DBA and DEC-A scenarios up to 2000 °C. It is planned to carry out the next tests with accident tolerant fuel bundles.

The test facility includes a bundle design, which is representative for VVER or PWR reactors. The basic part of the facility is the test section comprising the bundle. The bottom of the test section is linked to the steam generator unit. The condenser cooled down the hot steam and gas flowing out from the top of the test section. Mass spectrometry is applied to measure the outlet gas composition. Post-test examination of the bundle includes metallography, mechanical tests, H content measurements, scanning electron microscopy.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES

VERSION · 2 MARCH 2023

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

LASS

LASS: Laboratory for Analysis of Safety Systems, owned by CIEMAT @ Avenida Complutense,40

luisen.herranz@ciemat.es

http://rdgroups.ciemat.es/web/sormicol/

MADRID, SPAIN

LASS Laboratory for Analysis of Safety Systems (Madrid, Spain)

A multi-purpose facility with an 8 m3 steel facility with thermal-hydraulic and particle measurement instrumentation. So far, most of experimental projects have been devoted to aerosol experiments under severe accident conditions (pool scrubbing; SGTR; acoustic agglomeration; ...), but also hydraulics (jet behviour through a tube bundle).

The facility consists of different systems: the aerosol generation system can be arranged to produce different types and sizes of particles; several types of generators can be used: evaporation/ condensation, powder dispersion, and fluidized bed, among others; the gas supply system, which consists of two sections, one for feeding the aerosol generator and the other for supplying air to the injection line (the former includes a battery of eight gas bottles and the corresponding instrumentation for pressure and flow rate regulation; the latter is basically an air station with a compressor, a drier, a filtration system and the associated instrumentation for measuring and control); and more.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023

FLiBe

Research Centre Rez,
Hlavní 130, Husinec-Řež
25068, building 212

martin.marecek@cvrez.cz

www.wikipedia.org/wiki/FLiBe

PRAGUE, CZECH REPUBLIC

An experimental loop will serve mainly for material testing of variable nickel alloys in the environment of fluoride melt. This device is non-active laboratory universal technical set of loop conception, which models the primary circuit of the future salt reactor (MSR). Its purpose is to study the behavior of molten fluoride salts, technology of preparation and manipulation with molten salts in different operating models, long-term corrosion tests and long-term tests of various types of gaskets in flanged connections.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 21 DECEMBER 2022

GERIM2

CEA-List NDT Plateform GERIM2

francois.cartier@cea.fr

https://www.cea.fr/

GIF SUR YVETTE, FRANCE

Robotized X-Ray tomography plateforms for large industrial samples:
GERIM2 cell: Protected room 6m x 4m x 2,5m
Micro-foCUS X-ray tube Viscom 10kV - 225 kV <5 µm
Flat panel Perkin Elmer 1024 x 1024 pixels 200 µm
Robots Kuka KR60HA 60 kg load < 0,05mm
ELIXIR Cell : Microfocus RX Tube Viscom 225 kV
40 x 40 cm Perkin Elmer flat panel (pixel 200 µm)
2 ABB robots, wh 2 translations for the robots, 1 rotation for the part.
Protected room 9m x 6m x 4m
Laser ultrasound cell for non contact ultrasonic inspection.
TECNAR system and protected cell

UTPA instruments, probes, scanners and robotic arms for medium and high frequency tests of complex parts: Eddyfi Panther 256, TPAC Pionner 256, Verasonics Vantage 256, phased-array probes, calibration blocs...

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 3 FEBRUARY 2023

PRESAGE

CEA (French Alternative Energies and Atomic Energy Commission) DES-ISEC

caroline.chabal@cea.fr
eric.cantrel@cea.fr

https://www.cea.fr/

MARCOULE, FRANCE

The CEA is equipped with an immersive room, located in Marcoule (Bagnols sur Ceze, France), which groups all the technologies enabling user immersion and interaction in a virtual environment. First, the immersive room is equipped with 3D visualization system, very high resolution (4K), with 2 screens (face and ground). The result is a definition of less than 1mm pixel. The size of the screen enables working on life-size simulations. To bring interactivity, the room is equipped with a motion capture system, based on the ART high-end tracking solution. To produce tactile immersion, haptic systems are used, enabling the sensations of touch and of effort. Sound simulation has been also added. Via this immersive equipment, the user, through gestures, or control devices, interacts with the simulation via vision, touch and sound feedback. PRESAGE² has been mainly designed to prepare complex operations, by helping to design equipment to be used during operations, by optimizing scenarios, by training workers and by monitoring interventions.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 17 JANUARY 2023

Robl

Ressonedorf Beamline at the European Synchrotron (71 Avenue des Martyrs, 38000, Grenoble, France), funded by Helmholtz-Zentrum Dresden-Rossendorf (400 Bautzner Landstrasse, Dresden

kristina.kvashnina@esrf.fr

https://www.hzdr.de/

DRESDEN, GERMANY

The Rossendorf Beamline is one of 12 Collaborating Research Group (CRG) beamlines, located at SBM port 20 of the EBS ring of ESRF. It is owned and operated by the Helmholtz-Zentrum Dresden Rossendorf (HZDR, Germany), and is dedicated to actinide sciences and radioactive waste disposal research. The beamline provides of four experimental stations in an alpha-lab environment: XAFS, XES, XRD-1, XRD-2.

https://www.esrf.fr/UsersAndScience/Experiments/CRG/BM20 https://www.hzdr.de/db/Cms?pOid=12071&pNid=247&pLang=de

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 1 FEBRUARY 2024

COSMEA

COSMEA (as part of TOPFLOW);
Helmholtz-Zentrum Dresden-Rossendorf
Bautzner Landstraße
Dresden

p.schuetz@hzdr.de
u.hampel@hzdr.de

https://www.hzdr.de/db/Cms?pNid=627

DRESDEN, GERMANY

A X-ray source with an acceleration voltage of 150 kV up to a beam current of 500 mA can be used for the investigation of a two-phase flow (water and steam).

https://www.hzdr.de/db/Cms?pNid=627

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

VERSION · 20 JANUARY 2023

Universität Rostock

MRI-Flow lab

Rostock university

martin.bruschewski@uni-rostock.de

https://www.mriflowlab.uni-rostock.de/

ROSTOCK, GERMANY

The MRI Flow Lab is equipped with a medical 3 Tesla magnetic resonance imaging system used exclusively for fluid mechanics research. The experiments in this laboratory aim to measure the 3D velocity field in replicas of nuclear fuel assemblies under isothermal conditions. Most of the experiments in this laboratory are performed under steady-state flow conditions and single-phase light water. Multiphase systems with a dispersed phase such as particles or air bubbles can be realized.

The applied measurement technique magnetic resonance velocimetry (MRV) is able to deliver high-accuracy 3D mean velocity data. In addition, 3D Reynolds stress data, as well as time-averaged void fraction and particle density can be acquired. Because MRV is a non-optical technique, there are no optical requirements, but there are restrictions on the materials used due to the high magnetic field.
The main advantage of MRV is that it provides a complete three-dimensional representation of the flow field in a short time. The full-field experimental data obtained with MRV enable extensive validation of numerical solutions obtained with Computational Fluid Dynamics (CFD). For case studies, see https://doi.org/10.1016/j.nucengdes.2021.111080. You can find more information at https://www.mriflowlab.uni-rostock.de/en/

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

TOPFLOW

Helmholtz-Zentrum
Dresden-Rossendorf
Bautzner Landstraße
Dresden

p.schuetz@hzdr.de
u.hampel@hzdr.de

https://www.hzdr.de/db/Cms?pNid=1003

DRESDEN, GERMANY

TOPFLOW allows two-phase flow investigation as in vertical test sections as in horizontal geometries. The facility combines 3 test rigs, a steam generator module and the necessary auxiliary systems.

https://www.hzdr.de/db/Cms?pNid=1003

FACILITY OFFERED FOR FAST TRACK ACTIVITIES NO

VERSION · 20 JANUARY 2023

HU-1

Nonprofit Ltd. For Applied Research;
Kondorfa street 1,
Budapest, 1116

szabolcs.szavai@bayzoltan.hu
peter.rozsahegyi@bayzoltan.hu

https://www.bayzoltan.hu/en/

BUDAPEST, HUNGARY

The Operational Safety Centre intends to integrate testing and engineering modelling opportunities related to the operational safety of engineering structures, components and systems. It includes a wide range of mechanical, non-destructive, and structural testing, as well as engineering simulation and virtualisation methods.
Mechanical Testing Laboratory: tensile, compression, bending, biaxial testing, multiaxial component – static and fatigue (specimen and multiaxial component testing); fracture mechanics tests; tribological tests; impact tests; hardness tests; welding technology tests; structural, metallographic and composition tests; residual stress measurement; 3D optical strain measurement ; strain measurement with strain gauges; temperature distribution measurement, optical and scanning microscopes with EBSD etc.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES · YES

VERSION · 8 FEBRUARY 2023

NSRA

Nonprofit Ltd. For Applied Research; Kondorfa street 1, Budapest, 1116

szabolcs.szavai@bayzoltan.hu
peter.rozsahegyi@bayzoltan.hu

https://www.bayzoltan.hu/en/

BUDAPEST, HUGARY

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Mechanical Testing Laboratory: tensile, compression, bending, biaxial testing, multiaxial component – static and fatigue (specimen and multiaxial component testing); fracture mechanics tests; tribological tests; impact tests; hardness tests; welding technology tests; structural, metallographic and composition tests; residual stress measurement; 3D optical strain measurement ; strain measurement with strain gauges; temperature distribution measurement, optical and scanning microscopes with EBSD etc.
Digital Reality and Engineering Simulation Laboratory: simulation of metallic technologies (volumetric and sheet metal forming, welding, heat treatment – considering structural changes); etc.

www.bayzoltan.hu

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 8 FEBRUARY 2023

RandD

ISOTOPTECH ZRT.
H-4026 Debrecen
Bem tér 18/C.
info@isotoptech.eu

janovicsrobert@isotoptech.hu
orsovszkigergely@isotoptech.hu

https://www.isotoptech.eu/en/

DEBRECEN, HUNGARY

We are experienced in the field of Research and Development. We have developed several unique sampling/monitoring and measurement methods for determination of radioactive isotopes from environment, air, water, soil, biota and from radioactive wastes. Our recent R&D projects: monitoring system for examining of gas generation of LILW, Noble gas spectrometry method for I-129 determination, determination of total and inorganic C-14 from water samples... And we also have an Electronics and Mechanical Development Centre: In addition to mechanical machining, our development centre carries out complex tasks requiring electronic design and manufacturing, as well as software development

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 19 JANUARY 2023

LI-1
Lithuanian Energy Institut

algirdas.kaliatka@lei.lt

https://www.lei.lt/en/

KAUNAS, LITHUANIA

Reactor Physics & Criticality modelling using MCNP 6.1 / MCNP5 1.60 / MCNPX 2.7.0 Monte Carlo code for neutron, photon, electron, or coupled neutron/photon/electron transport, including the capability to calculate eigen values for critical systems.

Reactor Physics & Criticality modelling using Fispact 2010 / Fispact II codes. Neutron and charged particle simulation and include self-shielding factors from probability tables, dpa, kerma, robust pathway analysis with pathways-based uncertainty propagation, Monte-Carlo sensitivity and uncertainty quantification and propagation using full reaction covariance data (including neutron and non-neutron irradiations), full energy-dependent fission yield treatment.

Reactor Physics & Criticality modelling using SCALE 6.1 code. Criticality safety analysis of complex 3D systems, applying Monte Carlo method.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

LI-2
Lithuanian Energy Institut

algirdas.kaliatka@lei.lt

https://www.lei.lt/en/

KAUNAS, LITHUANIA

Modelling of thermal-hydraulics in Reactor Cooling System (RCS) using ATHLET, RELAP5 and Severe accident analysis in reactor core and RCS using RELAP/SCDAP-SIM and ATHLET-CD codes. RELAP5 -thermal-hydraulics code used to analyse large/small break LOCAs (Loss of Coolant Acidents) and system transients in both pressurized- and boiling-water reactors (PWRs and BWRs). ATHLET - system TH code used to analyse large/small break LOCAs (Loss of Coolant Acidents) and system transients in both PWR and BWR.

Modelling of processes in Containment in case of DBA and severe accidents using COCOSYS code

Modelling of Severe accidents using Integral code ASTEC for severe accidents in Light Water Reactor

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

LI-3
Lithuanian Energy Institut

algirdas.kaliatka@lei.lt

https://www.lei.lt/en/

KAUNAS, LITHUANIA

Mechanical structural analysis using ABAQUS code. ABAQUS is a highly sophisticated, general purpose finite element program, designed primarily to model the behaviour of solids and structures under externally applied loading. Abaqus/Standard is ideal for static and low-speed dynamic events and will give highly accurate stress solutions appropriate to this environment. Abaqus/Explicit is particularly well-suited to simulate brief transient dynamic events such as consumer electronics drop testing, automotive crashworthiness, and ballistic impact.

Modelling of processes in nuclear fuel using FEMAXI-6 and TRANSURANUS codes

Modelling of Fires & Explosions in the reactor compartments using Computer code COCOSYS for containment response includes pyrolysis model.

Safety / PSA analysis for nuclear equipment using different computational tools.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

n-TOF

CERN
Espl. des Particules 1,
1211 Meyrin

alberto.mengoni@cern.ch

www.cern.ch/n_TOF

MEYRIN, SWITZERLAND

www.cern.ch/n_TOF

Spallation neutron spectrum (moderated)
Energy range: 1 meV - 1 GeV
Driver: CERN PS accelerator, proton beam, 20 GeV/c

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 JULY 2023

UKR-2

Energy Safety Group LLC (ES Group LLC)

mazurok@e-s-group.com.ua
shpiller@e-s-group.com.ua

https://e-s-group.eu/o-nas/

KIEV, UKRAINE

ES Group LLC has the material and technical base, technologies, computing, copying and printing equipment and transport necessary to perform work/provide services.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 23 MARCH 2023

EURAD support facilities

SCK CEN - Belgian Nuclear Research Center, Boeretang 200, B-2400

niels.belmans@sckcen.be

https://euradschool.eu/infrastructures/

MOL, BELGIUM

EURAD Project

FACILITY OFFERED FOR FAST TRACK ACTIVITIES YES

VERSION · 17 FEBRUARY 2023

Complex of the Radiochemical Laboratories

Complex of the radiochemical laboratories, CVUT

john@fjfi.cvut.cz

https://nssf.fjfi.cvut.cz/en/

PRAGUE, CZECH REPUBLIC

The Complex of the Radiochemical Laboratories at the Department of Nuclear Chemistry (DNC) of the Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague comprises the 1st and 2nd class radiochemical laboratories certified for work with open radiation sources. Laboratories are supported with full spectrum of (radio)analytical and detection equipment namely high-resolution gamma- and alpha-ray spectrometers, liquid scintillation counters (Triathler and Hidex 300SL), low resolution gamma spectrometers and counters with NaI(Tl) and LaBr detectors. For chemical and structural analysis, DNC operates FT-IR (infra-red spectroscopy with Fourier transformation), XRF (X-ray Fluorescence spectroscopy), XRPD (X-ray powder diffraction), TRLFS (Time-Resolved Laser Fluorescence Spectroscopy), and broad spectrum of mass spectrometric analytical methods – LC-HRMS (Liquid Chromatography coupled with High Resolution Mass Spectrometry), ICP-MS (Inductively Coupled Plasma Mass Spectrometry), GC-MS+ LC-MS QQQ (ESI).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

Decontamination lab

Decontamination lab, CVUT

katerina.cubova@fjfi.cvut.cz

https://nssf.fjfi.cvut.cz/en/

PRAGUE, CZECH REPUBLIC

The Decontamination Lab at the Department of Nuclear Chemistry (DNC) of the Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague is a highly specialized decontamination lab intended for training and research of the students in the field of decontamination and decommissioning. In addition to standard laboratory devices and equipment, the unique device - decontamination loop intended for studies and development of various decontamination methods and procedures is available. For this purpose, the system consists of a number of individual modules such as stirred reactor, modular electrolytic cell for the electrochemical decontamination, sorption and filtration columns, flow-through heaters, solution circulation pumps, flow-through cell for radioactivity measurement, dual extraction unit etc. The system is connected to the flow-through cell for gamma-ray measurement with solid-state scintillation detector. The laboratory also includes analytic and measuring facilities namely high-resolution gamma-ray spectrometer with the automatic sample changer or ion liquid chromatograph. The laboratory is operated as B-class radiochemical lab licensed for the work with a broad scale of radionuclides as low-activity open radiation sources. All standard preparative/analytical chemical laboratory equipment is available.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

Radiopharmaceutical laboratories

Radiopharmaceutical laboratories, CVUT

martin.vlk@fjfi.cvut.cz

https://nssf.fjfi.cvut.cz/en/

PRAGUE, CZECH REPUBLIC

The Radiopharmaceutical Laboratories at the Department of Nuclear Chemistry (DNC) of the Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague are operated by the Radiopharmaceutical Group at the DNC. The laboratories are equipped with chemical fume hoods and isolators for work under negative pressure or variable atmosphere, vacuum evaporators, scales and centrifuges for organic and inorganic synthesis. Chemical and analytical laboratories are equipped with non-flammable cabinets for organic solvents and chemicals. The laboratories are also equipped with sources of air, natural gas and inert gases and a treatment plant for ultrapure water (Millipore).

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 JULY 2023

INE Nuclear Chemistry Laboratory

KIT, Institute for Nuclear Waste Disposal (INE)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

horst.geckeis@kit.edu

https://www.ine.kit.edu/

KARLSRUHE, GERMANY

Nuclear Chemistry Laboratory: includes hot cells, alpha glove boxes, inert gas alpha glove boxes and radionuclide laboratories. License to perform research with highly radioactive waste forms related to nuclear waste disposal. State-of-the-art analytical instruments and methods are applied for the analysis and speciation of radionuclides and radioactive materials (trace element and isotope analysis, nuclear spectroscopy, mass spectrometry, surface sensitive analysis and characterization, e.g. FIB-SEM, SEM, XPS, μ-CT). Advanced spectroscopic tools exist for the sensitive detection and analysis of radionuclides. Laser spectroscopic techniques are developed and applied for sensitive actinide and fission product speciation such as time-resolved laser fluorescence spectroscopy (TRLFS), laser-induced breakdown detection (LIBD) and Raman spectroscopy.

Details see www.ine.kit.edu

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

INE Beamline Stations

KIT, Institute for Nuclear Waste Disposal (INE)
H.-v.-Helmhotz-Platz 1
D-76344 Eggenst.-Leopoldsh.

christian.marquardt@kit.edu
rothe@kit.edu

https://www.ine.kit.edu/

KARLSRUHE, GERMANY

Insight into the structural and electronic properties of radionuclide species is obtained by X-ray absorption spectroscopy (XAS) and related techniques (XANES, EXAFS) available at the INE-Beamline and the ACT experimental station (HR-XANES, RIXS) at the KIT Light Source at KARA. Partly, those facilities are unique for Germany and beyond, e.g. due to the close vicinity of state-of-the-art synchrotron based spectroscopy stations to radiochemical laboratories with a license acc. to § 9 of the German Atomic Energy Act for handling radioactive materials.

Details see www.ine.kit.edu

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 20 JANUARY 2023

ACTUSLAB-HC-Ka

Hot Cell Laboratory
European Commission - Joint Research Centre
Hermann-von-Helmholtz-Platz 1
D-76344

laura.aldave-de-las-heras@ec.eur opa.eu
Eric.colineau@ec.europa.eu

https://joint-research-centre.ec.europa.eu/tools-and-laboratories/open-access-jrc-research-infrastructures_en

EGGENSTEIN-LEOPOLDSHAFEN, GERMANY

HC-KA (Hot cell laboratory):
The Hot cell laboratory in Karlsruhe is a unique facility in Europe and an ensemble of state-of-the-art installations designed for research on analyses and behaviour of nuclear spent fuel and radioactive waste. It consists of 24 shielded hot cells where highly radioactive materials can be received, handled, examined and encapsulated for return to their owners. The facilities are equipped for Post Irradiation Examination (PIE) of nuclear fuels, including non-destructive and destructive techniques. Irradiated fuel pins and capsules properties are determined using profilometry, visual inspection, eddy current measurements, gamma scanning. Internal fission gas pressure and composition are measured by puncture test. Microscopy examination of fuel and cladding, and heat treatments (limited to specific configurations) can be performed. Mechanical testing set-ups (bending, impact) and a Raman spectrometer for the determination of surface composition are also available in hot cell.The team that manages the Hot cell laboratory conducts R&I activities jointly with the Member States in the field of nuclear safety of the back end of the nuclear life cycle.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 23 MARCH 2023

IR30+IR08

IR30+IR08 Testing & analysis lab of radioactive samples, owned by CIEMAT @ Avenida Complutense,40

hitos.galan@ciemat.es,
marina.rodriguez@ciemat.es;
nieves.rodriguez@ciemat.es

http://rdgroups.ciemat.es/

MADRID, SPAIN

These infrastructures are designed for carrying out several types of experiments to evaluate and explore solutions for the management of high level wastes: solubility, oxidation and leaching tests in final geological conditions; fabrication of new model systems based in different solid matrix; radionuclide complexation; liquid–liquid extraction; and molecules stability to hydrolysis and radiolysis; fabrication of UO2 based fuels and spent nuclear fuel surrogates, leaching of fuel in groundwater at a long-term scale, UO2 oxidation tests in dry conditions and reprocessing processes studies of medium-long life radionuclides, such as radionuclide complexation, liquid–liquid extraction, mass transference and stability to hydrolysis and radiolysis; retention/transport experiments with many different radioisotopes (actinides and fission products) at a medium scale, mimicking in-situ conditions both for clay and granitic rocks, analysis of the behaviour of radioactive colloids and their role on the overall RN transport in fractured rocks; and application of thermodynamic models, including solubility and speciation studies.

FACILITY OFFERED FOR FAST TRACK ACTIVITIES: YES

VERSION · 17 JANUARY 2023