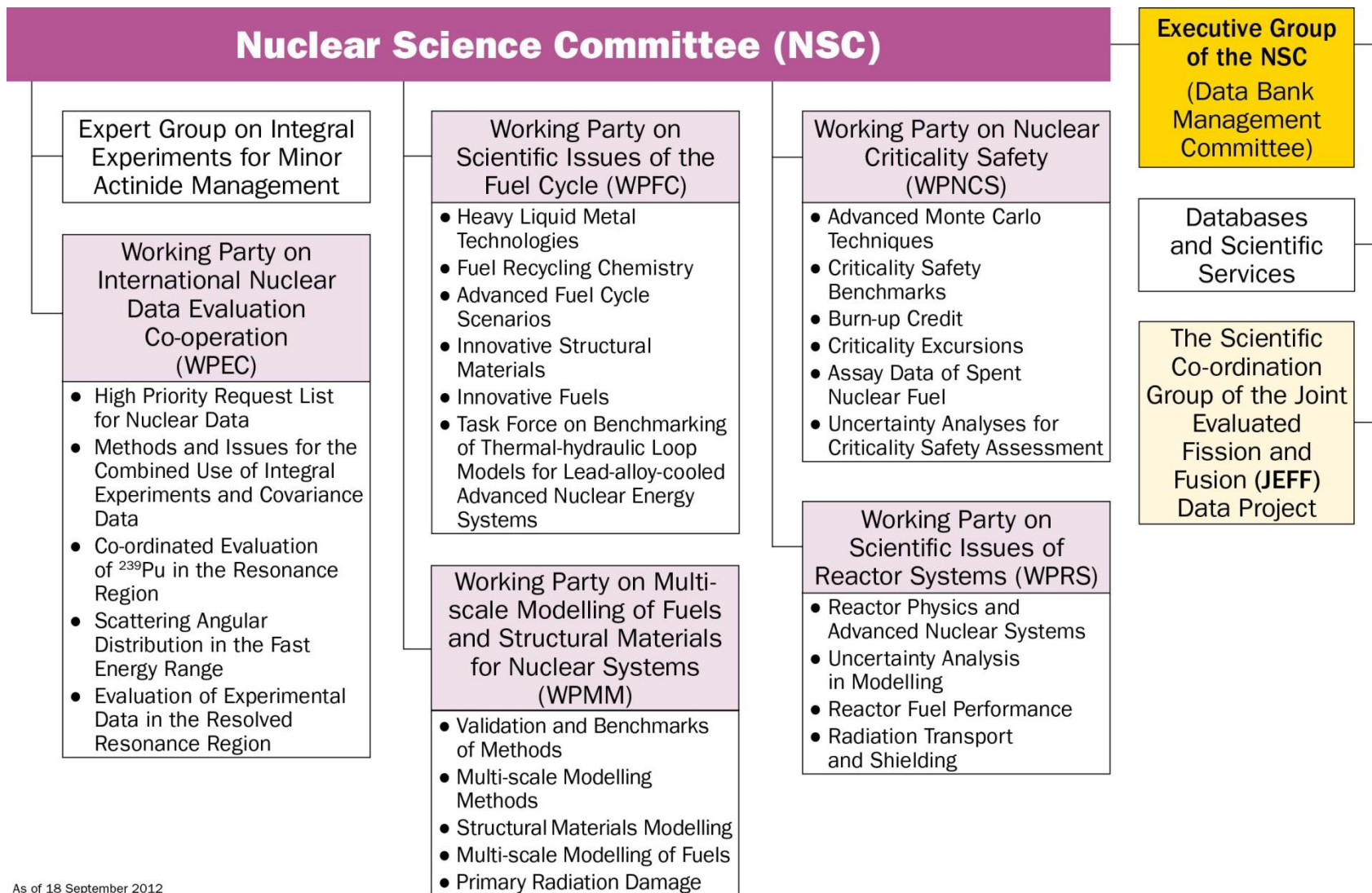


Preliminary Mandate of the Expert Group on Increased Accident Tolerance of Fuels for LWRs elaborated after the 2nd OECD-NEA Meeting on ATF (28-29 Oct. 2013)

EGATFL Start-up Meeting
28-29 April 2014, NEA HQ



As of 18 September 2012

Nuclear Science Committee (NSC)

Expert Group on Integral Experiments for Minor Actinide Management

Working Party on International Nuclear Data Evaluation Co-operation (WPEC)

- High Priority Request List for Nuclear Data
- Methods and Issues for the Combined Use of Integral Experiments and Covariance Data
- Co-ordinated Evaluation of ^{239}Pu in the Resonance Region
- Scattering Angular Distribution in the Fast Energy Range
- Evaluation of Experimental Data in the Resolved Resonance Region

Working Party on Scientific Issues of the Fuel Cycle (WPFC)

- Heavy Liquid Metal Technologies
- Fuel Recycling Chemistry
- Advanced Fuel Cycle Scenarios
- Innovative Structural Materials
- Innovative Fuels
- Task Force on Benchmarking of Thermal-hydraulic Loop Models for Lead-alloy-cooled Advanced Nuclear Energy Systems

Working Party on Multi-scale Modelling of Fuels and Structural Materials for Nuclear Systems (WPMM)

- Validation and Benchmarks of Methods
- Multi-scale Modelling Methods
- Structural Materials Modelling
- Multi-scale Modelling of Fuels
- Primary Radiation Damage

Working Party on Nuclear Criticality Safety (WPNCs)

- Advanced Monte Carlo Techniques
- Criticality Safety Benchmarks
- Burn-up Credit
- Criticality Excursions
- Assay Data of Spent Nuclear Fuel
- Uncertainty Analyses for Criticality Safety Assessment

Working Party on Scientific Issues of Reactor Systems (WPRS)

- Reactor Physics and Advanced Nuclear Systems
- Uncertainty Analysis in Modelling
- Reactor Fuel Performance
- Radiation Transport and Shielding

Executive Group of the NSC (Data Bank Management Committee)

Databases and Scientific Services

The Scientific Co-ordination Group of the Joint Evaluated Fission and Fusion (JEFF) Data Project

Expert Group on Increased Accident Tolerance of Fuels for LWRs

Proposal of constitution of an EG on Increased Accident Tolerance of Fuels for LWRs (EGATFL)

Scope

Under the guidance of the Nuclear Science Committee, the Expert Group will primarily act as **a forum for scientific and technical information exchange on advanced Light Water Reactor (LWR) fuels with enhanced accident tolerance**. The Expert Group will focus on the **fundamental properties and behaviour under normal operations and accident conditions for advanced core materials and components (fuels, cladding, control rods, etc.)**. The materials considered will be applicable to **Gen II and Gen III Light Water Reactors**, as well as **Gen III+** reactors under construction.

Objectives (1 / 3)

In particular, the Expert Group will:

- foster information exchange on material properties and relevant phenomenological experiments
- carry out state-of-the-art reviews
- organise benchmark studies
- and foster international collaborations

regarding the development of core materials and designs which provide an improved tolerance to accidents.

- Conditions such as those experienced during the Fukushima incident will be considered but the considerations will not be limited to only Fukushima-like events.

Objectives (2 / 3)

The following items may be included in the programme of work:

- **Data and characteristics of candidate materials**, including:
 - Advanced claddings: coated Zr-based alloys, SiC/SiC ceramic composites, advanced steels, refractory metals (e.g. molybdenum), etc.;
 - Advanced Fuels: doped UO_2 for enhanced thermo-mechanical properties, high density fuels such as U-silicide and U-nitride, dispersion fuels with coated particles, etc.;
 - Non-fuel core components such as fuel channels, control rods and blades, and fuel assembly hardware;
- Issues related to the **modelling of the advanced materials** (fuel/cladding behaviour in normal and transient conditions, including DBA and BDBA, etc.);
- A review of **the needs related to an experimental validation** of the most promising materials: available facilities, opportunities of joint experiments (including out-of-pile and in-pile experiments), identification of gaps, etc.
- The **establishment of appropriate metrics** to help prioritise between the ATF candidates;
- The definition and **evaluation of reference scenarios** to evaluate the effectiveness of ATF candidates.

Objectives (3 / 3)

It is anticipated that the Expert Group may organise the programme of work through activities carried out by individual Task Forces dedicated to specific technical issues such as:

- Identification and evaluation of candidate materials;
- Development of fundamental properties for the candidate materials;
- Evaluation of metrics for ATF;
- Development of modelling and simulation methods, identification of accident scenarios;
- Experimental needs and facilities.

Deliverables

A detailed technical programme of work will be identified by the established Expert Group.

- Key deliverables during the first phase of work may include **multiple reports** such **as state-of-the-art report on candidate materials/designs**, the **available data on fundamental properties**, **technical readiness level definition and evaluations**, **modelling methods**, **definitions of standard scenarios for evaluation of candidates' performance**, **availability of experimental data & experimental facilities**, **desired characteristics/performance metrics**.
- The development of these reports, along with the outcomes of periodic discussions at information exchange meetings will form the basis of the overall programme of work.

Link with other activities

Synergistic links may be established (participation to common meetings, expert advice and/or reports reviewing, joint membership in multiple groups, etc.) with other bodies and stakeholders¹ within and outside the OECD-NEA:

- OECD-NEA Nuclear Science Committee:
 - Working Party on Multiscale Modelling of Fuels and Structural Materials for Nuclear Systems (WPMM), on the issue of advanced modelling techniques;
 - Working Party on reactor Systems (WPRS), for nominal and accidental behaviour, fuel modelling;
 - Working Party on Scientific Issues of the Fuel Cycle (WPFC), Expert Group on Innovative Fuels (EGIF), for innovative fuels and cladding;
- OECD-NEA Committee on the Safety of Nuclear Installations:
 - Working Group on Fuel Safety (WGFS);
 - Working Group on Analysis and Management of Accidents (WGAMA), for accidental scenarios modelling;
 - Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station (BSAF) Project, for the accidental sequences on Fukushima Units 1-3;
- IAEA, which foresees establishing a Coordinated Research Project on ATF from 2015.

¹ Key external non-governmental stakeholders include vendors, utilities, independent research organizations (like EPRI,...), and academic institutions.