Working Party on the Scientific Issues of Reactor Systems (WPRS)

Current Status

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History

- **Working Party on the Physics of Plutonium Recycle (WPPR) created in 1993 by Nuclear Science Committee**
  - Originally intended to address very specific questions related to physics of MOX utilisation in thermal reactors and fast reactor
  - Scope subsequently evolved and expanded to include innovative systems

Subsequent developments

- **Task Force on Reactor-based Plutonium Disposition TFRPD subsequently initiated with very specific mandate**
  - Close collaboration with WPPR to avoid duplication
- **Working Party on Partitioning and Transmutation formed**
- **In 2003 Nuclear Science Committee decided all three groups needed to be rationalised**
- **In 2004 Nuclear Science Committee approved of new name and mandate - Working Party on Reactor Systems (WPRS)**
  - More general mandate : physics, fuel cycle, fuel behaviour, thermal hydraulics and dynamics/safety of present and future nuclear power systems

WPRS mandate

- **The new mandate of the WPRS was approved by the Nuclear Science Committee on 11 June 2004**
- **1st meeting held at Oak Ridge 17 September 2004**
- **The mandate largely follows on from the previous mandate for the WPPR, but with some significant changes :**
  - WPRS mandate is now complementary to that of the Working Party on the Scientific Issues of the Fuel Cycle (WPFC)
  - The mandate now incorporates for the first time vessel dosimetry and makes explicit reference to fuel behaviour, thermal hydraulics, dynamics/safety and ADS
  - ADS was previously under WPPT, but will now be progressed by WPRS

Vessel dosimetry

- This has not previously been considered in the WPPR, though some of the core physics benchmarks analysed in the past were originally designed to validate vessel dosimetry methods
- However, the NSC identified that there was no other natural home for vessel dosimetry, as SATIF is specific to accelerators
- NSC considered that the WPRS mandate should therefore include specific reference to vessel dosimetry

Fuel behaviour

- **Previously, the WPPR mandate did not specifically include fuel behaviour**
- **The new mandate includes fuel behaviour in recognition that fuel behaviour can affect the reactor physics**
  - However fuel behaviour is not intended to be the main emphasis of WPRS
- **The inclusion of fuel behaviour will facilitate the eventual merger of the Task Force on Reactor Based Plutonium Disposition (TFRPD) if and when the time is considered right**

Thermal-hydraulics / Dynamics & safety

- In the original WPPR mandate thermal-hydraulics and reactor dynamics/safety were not explicitly mentioned
- The WPRS mandate explicitly recognises the potential for thermal-hydraulics to affect reactor performance and allows the WPRS members to engage in thermal-hydraulics and dynamics/safety studies
- Again, the main emphasis will not be on safety (this falls under the remit of the CSNI), but it recognises the potential importance of safety considerations on reactor performance

Accelerator driven systems

- **The WPRS now takes over responsibility for the physics of ADS from the former WPPT**
  - This was previously an area that WPPR considered, but which was passed on to WPPT
  - This fits well as ADS is a sub-critical *reactor system*

Current activities

- HTR physics benchmark
- PWR control rod ejection benchmark
- Discharge inventories benchmark