CIEMAT MELCOR RELATED ACTIVITIES: YEAR 2009

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OUTLINE

1. *Introductory Remarks*
2. *CIEMAT activities with MELCOR code: 2009 - 2010*

1. Introductory Remarks

Objectives:

- To give a snapshot of CIEMAT MELCOR related activities
- To give some insights into the experience gained and the difficulties found

CIEMAT background with the MELCOR code:

- PHEBUS – Tests FPT1 and FPT2 
- Severe accident sequence of a W-PWR 

2. CIEMAT activities during 2009 with MELCOR code

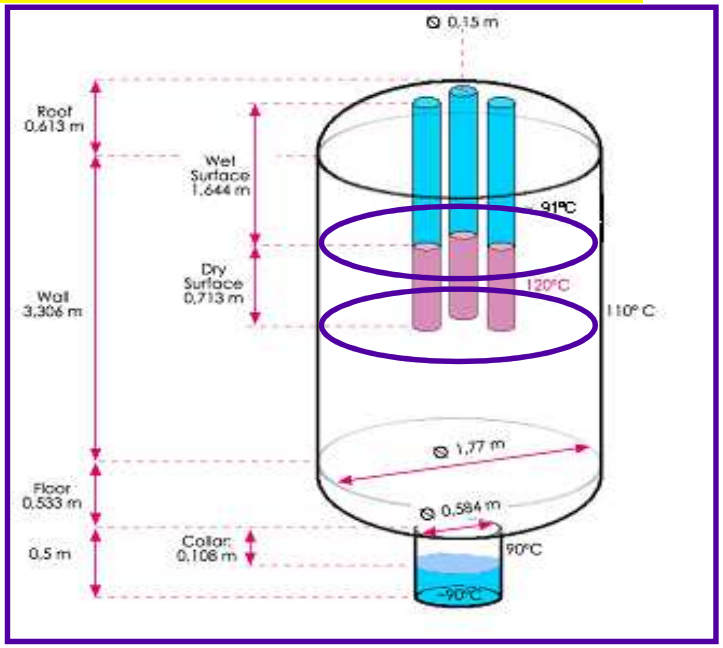
- Scoping calculations with MELCOR 186 to assess how relevant iodine chemistry could be when estimating source term in postulated severe accident scenarios of a W-NPP.

- PHEBUS-FPT3 experiment simulation with MELCOR 186: Simulations aimed at validation of the code against experimental data.

- MELCOR (1.8.2, ITER pedigreed) use in the area of accident analysis in FUSION devices.

THANK YOU FOR YOUR TIME

PHEBUS – Tests FPT1 and FPT2



Objective

- To assess the MELCOR predictability in the areas of containment THs, aerosol behaviour and Iodine chemistry.

REMARKS on Aerosols

- The MELCOR 1.8.6 code is capable of catching the experimental scenario

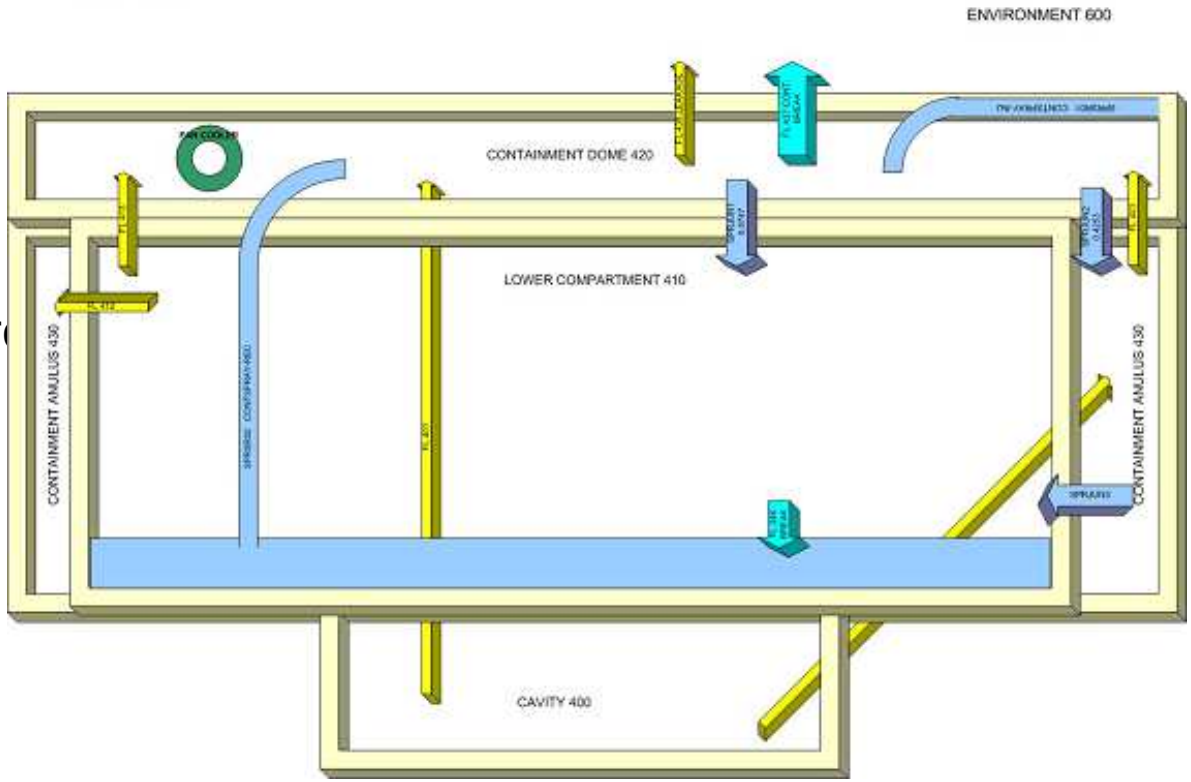
REMARKS on Iodine Behaviour

- MELCOR modelling not as mature and reliable as other code areas (i.e. aerosols)
- Extensive experience mandatory both in iodine chemistry and in MELCOR modelling and running to get the “best of it”.

Sequence of a W-NPP

Objective

- To simulate a full sequence from cor degradation to releases to environment with the MELCOR 186 code



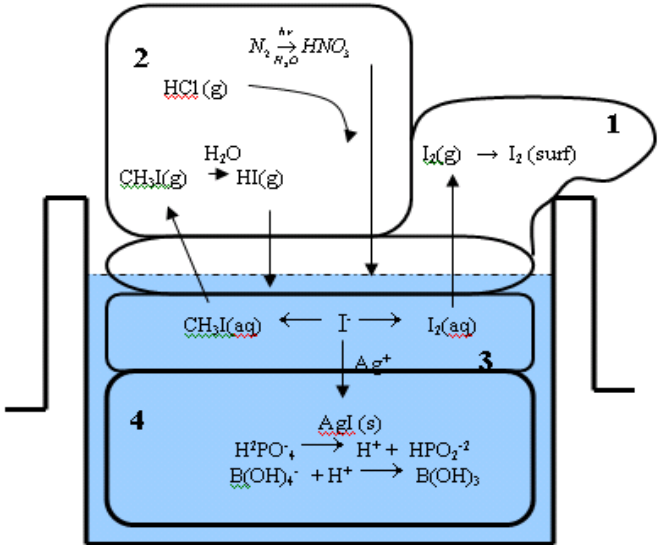
Pitfalls

- Difficulties in update the input deck from MELCOR 184 to 186 version code

Scoping calculations of a full sequence of a W-NPP

Objectives

- To illustrate current iodine chemistry impact on source term estimates through sequence analyses



Final Remarks

- Iodine chemistry impact on source term may be substantial (amount & nature)
- Confirmation of the need of considering iodine chemistry in PSA-2 studies

BUT…

- MELCOR iodine chemistry model needs to be updated and extended
- Validation of MELCOR against PHEBUS-FP tests suggested cautious application of results (sensitivity studies highly recommended)

PHEBUS-FPT3 experiment simulation with MELCOR 186

Scope

- So far, the analysis has covered the thermal-hydraulic evolution and aerosol behaviour in the containment vessel (sensitivity studies on-going).

Difficulties found

- Description of more than one aerosol population reaching the containment is constrained by a single value of aerosol density.
- PARs modelling extension needed to consider a variable recombination efficiency, which accounts for potential catalizer poisoning. An output variable describing such a poisoning is missing.

Further Work

- This work is presently being extended to include iodine studies.

MELCOR for fusion devices - Scope

- Prospective comparison of capabilities of different MELCOR versions developed by INL: 182 (ITER pedigreed) vs 185
- Running of accident sequences considered in the Preliminary Safety Report of ITER (e.g. Ex-vessel LOCA in the shielding modules loop).
- Initiation of a MELCOR model for a specific Tritium Breeder Blanket design based on the dual coolant approach (He/Li-Pb). (National TECNO_FUS project)

Difficulties found

- System complexity: Trade off between exhaustive description and accuracy.
- Pb-Li modelling in MELCOR 182: Approximations underway (previous works: HS)