

Minutes of the Meeting
on
2nd Consultancy of INPRO COOL Collaborative Project (CP)
11-12 June 2009, IAEA Headquarters (VIC C0255), Vienna, Austria

1. Introduction and Opening

The meeting was opened by Mr. A. Omoto, Director, Division of Nuclear Power, IAEA. All expected member countries, excluding the Czech Republic, attended the meeting. The list of participants is attached (attachment 1).

Mr. Beatty, INPRO Group Leader, explained INPRO activities in general, and in particular the main objectives of the second consultancy meeting of the CP COOL.

The participants introduced their national R&D activities, and agreed that no duplication exists between COOL project and GIF activities.

Mr. N.K. Maheshwari, the project leader, was appointed as Chairman of the meeting.

2. Overview of THERPRO and possibilities of including COOL Data as a module within THERPRO

The Literature Review prepared by intern Mr. David Samuel was presented during the meeting and well received by the participants. Ms Sama Bilbao y Leon presented the Strategic plan for Thermo-physical properties united in a single data base together with Literature summary on High Temperature Molten Salt Coolants: Key Research & Development Challenges. She mentioned about the necessity of providing to THERPRO the data generated while implementing the COOL project. Mr. Beatty mentioned that a contact point connecting COOL and THEPRO will be designated.

3. Terms of Reference of the project

Explanation on the new draft Terms of Reference (ToR) was provided by Mr. Kim. Intensive discussions were undertaken under the leadership of Mr. Beatty who gave extensive explanation and guidance towards the goal of the consultancy. All participants showed great interest to contribute to the project and at the end of the meeting the draft ToR was finalized, adopted, and signed by all participants except the Czech Republic (attachment 2).

4. Presentations by participants

Each participant presented their experience and interest in the project. The presentations were focussed on 1) Current status of R&D activities related to COOL, 2) National activities that could contribute to COOL, and 3) Future plan for COOL.

Germany, India and Italy presented lots of activities about liquid metal, while Brazil focused on neutronics, and Hungary on CFD.

China presented activities about sodium cooled reactor, while Korea presented basic research as there is no R&D project at national level.

The activity of the Czech Republic will stay the same as basically indicated in the existing ToR of the COOL project. Mr. Kim will transmit the Czech Republic the final ToR results as well as the minutes of the consultancy meeting and will request them for their views and final decision on their participation in the project.

5. Project implementation plan with milestones

Considering that INPRO COOL Phase-2 will be finished by September 2010, the schedule for preparing the report of Phase-2 is agreed as below:

- Each participant country will prepare and send a progress report (by end of 2009);
- Progress report will include description and results of work;
- Each participant country will prepare and send the consolidated report (by end of May 2010)

The reports should be sent electronically to both the project leader, Mr. N.K. Maheshwari and the IAEA Scientific Secretary, Mr. Sung Bong KIM.

Information on the report formatting and style will be provided to all participants by the IAEA Scientific Secretary.

6. Closing/Conclusion

The participants in the COOL CP were in support of considering the extension of the THERPRO database to include molten salts and liquid metals and of using the THERPRO DB as a repository for Thermophysical properties obtained within the framework of the COOL CP.

The next meeting of CP COOL is planned to be held in June 2010 and the main objective of the meeting will be to review the draft chapters and finalize them, with the understanding that each participating country will be in charge of preparing one of the chapters.

Detailed list of activities

S. No.	Activity	Participation and contribution	Priority	Schedule
1	Study on Properties of coolants (LM and MS)			
1.1	Survey of available data on transport and thermodynamic properties	Czech Rep., India, IAEA		Phase 1
1.2	Experimental works to measure transport and thermodynamic properties of coolants up to 1000°C	Czech Rep., Korea		Phase 2&3
2	Studies on thermal hydraulic correlations for LM and MS coolants			
2.1	Experimental and computational studies on correlations for LM for tubular, pebble bed and other geometries	India, Italy		Phase 2&3
2.2	Experimental and computational studies on correlations for MS for tubular, pebble bed and other geometries	Czech Rep., Korea		Phase 2&3
2.3	Experimental study on the effect of dissolved oxygen on fluid flow and heat transfer	China, Czech Rep.		Phase 2&3
2.4	Assessment of existing pressure drop and heat transfer correlations for natural circulation flow	China, Czech Rep., India, Italy		Phase 2&3
2.5	Assessment of existing pressure drop and heat transfer correlations for enhanced gas injected circulation	Italy		Phase 2&3
3	CFD and neutronics studies on LM and MS			
3.1	Verification of calculation models for lower temperatures for LM and MS. Assessment of correlations for LM and MS commonly used in chemical industry	Brazil(neutronics), Czech Rep., Hungary, India, Italy,		Phase 2
3.2	Verification of calculation models at high temperatures in currently available codes for use in LM and MS systems	Brazil(neutronics), China, Czech Rep., Hungary, India		Phase 2&3
3.3	Preparation of verification report	Brazil(neutronics), China, Czech Rep., Hungary, India, Italy,		Phase 3
4	Studies on phase change of LM and MS			
4.1	Numerical simulation of freezing and de-freezing and small experimental results	Czech Rep., India, Italy		Phase 2&3
4.2	Studies on melting/freezing in	Czech Rep.		Phase 2&3

S. No.	Activity	Participation and contribution	Priority	Schedule
	large vessels, long pipes, pebble bed geometry, etc.			
4.3	Preparation of report	Czech Rep., India		Phase 2&3
5	Development of tool for on- line monitoring and control of coolant chemistry			
5.1	Research in various loops up to 550°C for LM.	India,		Phase 2&3
5.2	Research in various loops up to 700°C for MS	Czech Rep.		Phase 2&3
5.3	Development of technologies and tools (sensors, detectors, instruments and software) for measurement and control of impurities (e.g. oxygen) (for LM)	Germany, India(description of loop), Italy		Phase 2&3
5.4	Development of technologies and tools (sensors, detectors, instruments and software) for measurement and control of impurities and REDOX control system (for MS)	Czech Rep.		Phase 2&3
5.5	Preparation of documentation for the final report on COOL CP	Czech Rep., Germany, India, Italy		Phase 3
6	Components for service in intimate contact with high temperature coolants (LM and MS)			
6.1	Experimental study on components and various materials that are in contact during operation with LM and MS	Czech Rep., Germany, India, Italy		Phase 2&3
6.2	Preparation of progress report	Czech Rep. Germany, India, Italy		Phase 3