

Technical Consultation on Development and Review of the MAAP5 API for APR1000 Core Catcher Analysis

November 2022



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KEPCO ENGINEERING & CONSTRUCTION COMPANY, INC

[SCOPE OF SERVICES AND METHOD OF PERFORMANCE]

1.0 PURPOSE

KEPCO E&C is carrying out the core catcher cooling channel performance evaluation project. To conduct an experiment, it is necessary to set appropriate experimental boundary conditions. Analysis using CFD(Computational Fluid Dynamics) and MAAP(Modular Accident Analysis Program) will be performed to set the boundary conditions and compare the results with experiment. However, in the process of the calculation, it is revealed that the heat flux profile could be different from the correlation used in MAAP. In this work, the Contractor will conduct modification of the MAAP subroutines by using API(Application Programming Interface) DLL(Dynamic Linking Library) to apply user's heat flux profile of the APR1000(Advanced Power Reactor 1000) Core Catcher and conduct comparison of MAAP results with CFD's.

2.0 TECHNICAL SCOPE OF WORK

The Contractor shall perform four tasks in this project: 1) Create API to apply user-input heat flux profile, 2) Compare MAAP results against CFD results, 3) Meetings at Contractor's office and 4) Documentation.

Task 1: Create API to apply user-provide input heat flux

- In order to set appropriate experimental boundary conditions, the subroutine of MAAP shall be modified by using API DLL to apply user-provide input heat flux to the core catcher cooling channel.

Task 2: Comparison of MAAP results against CFD results

- Using the core catcher analysis MAAP module developed in the task 1, the heat flux and cooling water behavior in the cooling channel shall be analyzed and compared with the CFD results.

Task 3: Meetings at Contractor's office

- In this task, the Contractor shall host two technical meetings at the Contractor's office.

Task 4: Documentation

- The Contractor shall provide calculation note describing the results.
- Preliminary report shall include a draft of task 1.
- Final report shall include all results of task 1 and 2.

3.0 METHOD OF PERFORMANCE

Consulting Schedule

The consulting schedule for the basic tasks (Task 1 to 4) shall be until April 30, 2023 from the Execution

Date of the Contract, as follow:

Tasks	Schedule				
	Execution Date ~ 2022.12	2023.01	2023.02	2023.03	2023.04
Task 1: Create API to apply user-provide input heat flux					
Task 2: Comparison of MAAP results against CFD results					
Task 3: Meetings at Contractor's office					
Task 4: Documentation of the results					

Method of Performance

The Contractor shall keep confidential all the data and information from this Contract, and shall not divulge them to any third parties.

- Kickoff Meeting: Within approximately two weeks after the Execution Date, kickoff meeting shall be held at Contractor's office, or via video-conference. The expenses for kickoff meeting is included in the contract price. The topics to be discussed during the meeting include:

- A presentation of the background of core catcher model in MAAP code
- Specific goals, scope, tasks, methodologies and conditions.

The Contractor shall prepare the meeting minutes that include technical discussion with KEPSCO E&C during the meeting with action items if any.

- Final Meeting: Approximately one month prior to the end date of project, a final meeting shall be held at Contractor's office, or via video-conference. Note that the expenses for the final meeting is included in the contract price. For this meeting Contractor shall prepare:

- A presentation and review of the Services results and conclusions
- A discussion of future work, if necessary

The Contractor shall prepare the meeting minutes that include technical discussion with KEPSCO E&C during the meeting with action items if any.

Deliverables

The deliverables for the scope of work shall be:

No	Deliverables	Submittal Due Date
1	Meeting minutes for kickoff meeting	Kickoff meeting date + 1 week
2	Preliminary report including computing files	December 15, 2022
3	Meeting minutes for final meeting	Final meeting + 1 week

4	Final report including computing files	April 30, 2023
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