

Technical Consultation on Fission Product Model in CINEMA Code Peer Review

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KEPCO ENGINEERING & CONSTRUCTION COMPANY, INC

[SCOPE OF SERVICES AND METHOD OF PERFORMANCE]

1.0 PURPOSE

KEPCO E&C has been developing the Korean integrated severe accident code, CINEMA (Code for INtegrated severe accident Evaluation and MAnagement) with KOREA HYDRO & NUCLEAR POWER CO., LTD (KHNP), KOREA ATOMIC ENERGY RESEARCH INSTITUTE (KAERI) and FNC Technology Co., Ltd. (FNC). CINEMA code can simulate the in-vessel and ex-vessel phenomena of severe accidents, and it will be used for evaluation of severe accident mitigation strategies, operator training etc.

The peer review is essential to improve the adequacy and reliability of CINEMA code, in particular, fission product (FP) behavior model. Therefore, KEPCO E&C aims to get technical support from the Contractor to enhance the level of completeness of FP model in CINEMA code by evaluating the code's ability to model key phenomena and simulate the severe accident progression. This review will be shared internally with code developers such as KHNP, KAERI and FNC. This review shall be done based on the engineering documents provided from KEPCO E&C.

2.0 TECHNICAL SCOPE OF WORK

Contractor shall provide the following consulting services to KEPCO E&C as described in the following tasks (Detailed Table of Contents of CINEMA Peer Review Documents for Task 1 through Task 3 are provided in Attachment):

Task 1: Review the appropriateness of FP behavior models implemented in CINEMA

- In-Vessel Phenomena
 - FP release and transport
- Ex-Vessel Phenomena
 - Generation from Molten Core Concrete Interaction
 - In containment response such as sedimentation, deposition, etc.

Task 2: Review verification and validation results of FP model in CINEMA

- Validation for individual models: conceptual problems and separate effect tests (ABCOVE, etc.)

Task 3: Review the FP behavior in OPR1000 plant by CINEMA

- Accident Scenarios: Large break LOCA(LLOCA) and Loss of 125V DC Bus A(LODCA)
- Review the following for selected scenarios (LLOCA and LODCA)
 - FP behavior in the containment

Task 4: Documentation of the results

- Provide the technical report for Task 1, Task 2 and Task 3.

3.0 METHOD OF PERFORMANCE

Consulting Schedule

The consulting schedule for the basic tasks (Task 1 to 4) shall be until October 31, 2022 from the Execution Date of the Contract, as follow:

Tasks	Schedule		
	Execution Date ~ 2022.08	2022.09	~ 2022.Oct. 31 (End of the Contractor's Services period)
Task 1: Review the appropriateness of FP behavior models implemented in CINEMA			
Task 2: Review verification and validation results of FP model in CINEMA			
Task 3: Review the FP behavior in OPR1000 plant by CINEMA			
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. All expenses for Kickoff meeting are included in the Contract Price. The topics to be discussed during the meeting include:

- A presentation of the background of FP model in CINEMA code
- Specific goals, scope, tasks, methodologies and conditions.

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

- Final Meeting: Approximately two weeks prior to the end of the Contractor's Services period, KEPCO E&C will organize a final meeting at KEPCO E&C's office in Korea, or via video-conference. Note that all expenses for the Final Meeting, including but not limited to, travel expenses are 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 KEPCO 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	Draft report including the Task 1, 2 and 3.	until September 30, 2022
3	Meeting minutes for final meeting	final meeting + 1 week
4	Final report including the Task 1, 2 and 3.	until October 31, 2022

[Attachment – TABLE OF CONTENTS OF CINEMA PEER REVIEW DOCUMENTS]

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