From:	Carolyn Lauron
To:	Justin Hawkins
Cc:	Demetrius Murray; Greg Cranston; Andrew Brenner; Michael Dudek
Subject:	NRC Staff response to questions re: Aircraft Impact Analysis
Date:	Wednesday, October 26, 2022 3:12:00 PM
Attachments:	image001.png

Hi Justin –

Please see the NRC staff response below to the subject question.
Please let us know if you need additional information.

Thank you,
Carolyn Lauron
USNRC

Questions:
We are currently working through the NEI 07-13 guidance (SGI-calculations) regarding aircraft impact and the associated calculations.

Below are a few clarifications questions/requests that we have regarding this topic:

1. We would like some clarification on the assumptions for the calculations, specifically how steel reinforcement is taken into account for missile impacts on the concrete containment structure. By our read, it seems like steel reinforcement is not taken into account in the penetration/perforation calculations for the concrete containment structure.

2. We would like to understand if there are any resources available that discuss missile impact studies regarding concrete containment structures and their ability to withstand aircraft impacts. Our group was under the impression that there might be a study involving an international consortium on this topic. Our interest is to obtain physical test data that we could potentially use to benchmark our numerical simulation model.

NRC Staff Response:

1. The NRC staff assumes that by "calculations," Holtec means the formulas given in Section 2.1.2, "Local Loading Formulas," in NEI 07-13. This is a document developed by the Nuclear Energy Institute (NEI). NRC endorsed its application to perform aircraft impact assessment for new nuclear power plants. As such, NEI would be the best source for any questions on the assumptions taken for developing each formula. A quick read of Section 2.1, Local Loading, states that the primary local response of interest of an aircraft engine is the potential perforation through *reinforced* concrete walls. NEI 07-13 gives the source for each formula. Holtec may review those references for further information.
2. New nuclear power reactors must perform a design specific assessment of the effects of the impact of a large commercial aircraft on the facility, as per 10 CFR 50.150, "Aircraft Impact Assessment." The objective of this rule is to require nuclear

power plant designers to perform a rigorous assessment of the design of the facility so as to identify design features and functional capabilities that could provide additional inherent protection to withstand the effects of an aircraft impact.

A Google search will show that several studies have been conducted on the performance of a reinforced concrete structure from an aircraft impact. The aircraft engine is generally taken as a compact, high-density, but crushable missile when impacting the reinforced concrete structure. The Riera method is commonly used to develop the time-dependent impact load on the structure for a specific aircraft.

As stated in NEI 07-13, the NRC will provide each NSSS vendor, or their appointed representatives, with the aircraft engine parameters necessary to apply the formulas provided in Section 2.1.2 of NEI 07-13. The information provided by the NRC is considered Safeguards Information.