From:	Carolyn Lauron
To:	Justin Hawkins
Cc:	Greg Cranston; Andrew Brenner; Michael Dudek
Subject:	NRC Staff Response to Clarification Question re: Reactor Coolant System Flow Instrumentation
Date:	Monday, December 19, 2022 4:17:00 PM

Hi Justin –

Below is the NRC staff's response to the subject question.
If you have questions or need more information, please let us know.

Thanks,
Carolyn

Question:
Do instruments taking measurements that input into safety limits (SLs) have to be classified as safety-related or can they be classified as non-safety related as long as these instruments are not used to generate an ESF actuation or reactor trip (RT) signal?

For example, in the SMR-160 design, does RCS flow instrumentation have to be classified as safety-related if its input is solely used to calculate power distribution limits such as DNBR which is a SL (assuming RCS flow instrumentation does not generate any type of ESF or RT signals)?

NRC Staff Response:
The NRC staff cannot provide definitive insights on whether the SMR-160 measurement instrumentation can be categorized as safety-related or non-safety-related. The NRC staff would need a better understanding of the specific design aspects and use of the measurement instrumentation for protecting safety limits within the proposed design basis of the reactor design. The NRC staff is open to engaging with SMR (Holtec) on these aspects and the specific design proposals further. The NRC staff offers the following general information for SMR's consideration.

10 CFR 50.2, "Definitions" states the following:
Safety-related structures, systems and components means those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

1. The integrity of the reactor coolant pressure boundary
2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
3. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in § 50.34(a)(1) or § 100.11 of this chapter, as applicable.

This definition as applied to plant instrumentation is applicable to those instruments performing measurements that provide signal inputs to support the establishment of safety limits on a continuing basis. If the determination of a safety limit is dependent on the periodic or continuous input signal provided by an instrument, then the instrument is a component that is relied upon to remain functional during and following design basis events

and therefore, such an instrument must be classified as safety-related per 10 CFR 50.2. There are many examples of instruments in operating plants that are classified as safety-related because of the role these components play in the establishment of plant safety limits. As an example, many boiling water reactors use a flow biased simulated thermal power safety limit which is calculated on a continuous basis using input from recirculation flow signals. Because of the dependency of this safety limit calculation on these inputs, the instruments that measure recirculation flow are classified as safety-related.

If, however an instrument measurement is used to calculate a safety limit without a means of automatically or continuously re-calculating or updating that safety limit, then that component may be classified as non-safety-related if an independent means of validating, verifying and controlling the safety limit is used. There are examples of non-safety-related instruments that are used in this way. One example is the use of in-core neutron detector signals by a non-safety related plant computer system to calculate the neutron flux distribution characteristics of an operating reactor. The results of these calculations can be used to establish safety limits of a reactor protection system or to calibrate ex-core neutron detector instruments but the in-core detection instrumentation can be classified as non-safety related because it does not have a means of automatically changing the safety limits without independent validation or verification by a qualified operator or technician.