During and subsequent to the Condenser Wide Range Gas Monitor Regulatory Conference held on Friday, July 29, 2022, the NRC Staff requested a response to follow-up questions. This document is the continuation of that dialogue and the response to the remaining requests for information.

**Question 1:**

*Entergy provided simulator data for a Steam Generator Tube Rupture scenario with an assumed Dose Equivalent Iodine (DEI) of 60 μCi/g. The NRC asked Entergy to clarify how much fuel failure equates to 60 μCi/g?*

According to the Waterford Emergency Planning basis for Loss of the Fuel Clad Barrier with respect to Reactor Coolant Activity, a Dose Equivalent Iodine (DEI) of 300 μCi/g equates to approximately 1% fuel clad damage. From this, we can conclude that 60 μCi/g equates to approximately 0.2% fuel clad damage.

The Entergy corporate procedure for Fuel Reliability provides guidance on preventing fuel failures. To ensure prompt and conservative actions are taken in response to early indications of fuel degradation, the procedure also specifies operational limits based on Iodine concentration in the Reactor Coolant System. At a value of 0.1 μCi/g the station must evaluate a power reduction. At a value of 0.4 μCi/g a plant shutdown is required. This is well before the Waterford 3 Technical Specification 3.4.7 normal operating limit of 1.0 μCi/g. Technical Specification 3.4.7 action statement allows an increase of sixty times for a 48-hour period, the specification further prohibits any operation with concentration above 60 μCi/g. This represents a significant indication of fuel degradation and is far beyond procedural limitations that would have already directed a plant shutdown. As stated above, DEI of 60 μCi/g equates to approximately 0.2% fuel failure – sixty times the LCO limit required by the Waterford 3 Technical Specification.

**Question 2:**

*Please confirm the time periods when the Containment High Range Monitor instruments were inaccurate outside their allowable ranges.*

As provided during the Regulatory Conference, Waterford Engineering is continuing its consultation with General Atomics to determine exactly how the incorrect parts issue would have impacted the behavior of Containment High Range Monitor Train A (ARMIRE5400A). Entergy also explained, as detailed in the simulator scenario, that all applicable Alert, Site Area Emergency or General Emergency declarations would be made timely and accurately by other Fission Product Barrier EAL Criteria well before any Containment High Range Monitor dependent EAL thresholds are approached.

The Containment High Range Monitor Train A (ARMIRE5400A) incorrect parts issue was introduced on July 10, 2012 when the incorrect model Log Pico-ammeter and incorrect ADC circuit board were installed. Containment High Range Monitor Train A was repaired on September 1, 2013. The EPLAN impacts will be evaluated with support from General Atomics.

Containment High Range Monitor Train B (ARMIRE5400B) became inaccurate in December of 1984 due to incorrect Engineering Conversion Factors used during calibration. Containment High Range Monitor Train B was calibrated correctly, and its required accuracy restored on May 11, 2022. During this period of unavailability, as described in the simulated Large Break Loss of Coolant scenario below, any applicable Alert, Site Area Emergency or General Emergency declarations would still be made timely and accurately by other Fission Product Barrier EAL Criteria well before any Containment High Range Monitor dependent EAL thresholds are approached.

**Question 3:**

*During the time periods in which the Containment High Range Monitors were inaccurate, can you confirm the effects of the inaccuracies (instrument reading higher/lower than accurate indication, and by what percentage off).*

As provided at the Regulatory Conference, Waterford Engineering is continuing its consultation with General Atomics to determine exactly how the incorrect parts issue would have impacted the behavior of Containment High Range Monitor Train A (ARMIRE5400A). Entergy also explained that all applicable Alert, Site Area Emergency or General Emergency declarations would be made timely and accurately by other Fission Product Barrier EAL Criteria well before any Containment High Range Monitor dependent EAL thresholds are approached.

Based on the calibration error, Containment High Range Monitor Train B (ARMIRE5400B) would have indicated approximately 31% lower than an accurate indication.

The consultation with General Atomics is expected to definitively determine how having the incorrect model Log Pico-ammeter and incorrect ADC circuit board would have impacted the behavior of Containment High Range Monitor Train A (ARMIRE5400A). To conservatively assess the monitors potential unavailability for Emergency Planning, the Containment High Range Monitor A was assumed to be completely non-functional. With the assumed unavailability of Containment High Range Monitor A and Containment High Range Monitor B reading 31% low, all applicable Alert, Site Area Emergency or General Emergency declarations would be made timely and accurately by other Fission Product Barrier EAL Criteria well before any Containment High Range Monitor dependent EAL thresholds are approached.

Under the Corrective Action Program, as stated at the Regulatory Conference, Entergy will determine whether a supplement to the appropriate LER is necessary.

**Question 4:**

*Provide supporting information describing how other EALs were credited to provide timely and accurate classifications despite the Containment High Range Monitors effect on the Fission Product Barrier EALs.*

A Large Break Loss of Coolant Accident was simulated to evaluate alternate Mitigating Factors for event classification with regard to the Containment High Range Monitors issue. The scenario revealed that Alert, Site Area Emergency and General Emergency thresholds were met by other Fission Product Barrier EAL Criteria before any Containment High Range Monitor dependent EAL thresholds were exceeded. As a result, both timely and accurate classifications would have been made.

Assumptions for Large Break Loss of Coolant Scenario

Double Ended Guillotine Shear of one (1) Reactor Coolant System Cold Leg Pipe
No Loss of Offsite Power
All Safety Injection Tanks Isolated
All High-Pressure Safety Injection Pumps disabled
All Low-Pressure Safety Injection Pumps disabled
All Containment Spray Pumps disabled
$T_0$ = 11:15 (Simulator Time)

Containment High Range Monitor A and B are calibrated properly(1)

| Time | Event Progression | Rev 6 EAL Threshold Met | Rev 5 EAL Threshold Met | Highest indicated Containment High Range Monitor(1) |
|---|---|---|---|---|
| 11:15 | Large Break LOCA Initiated Loss of the RCS Barrier | Alert Declared FA1.1 EAL RCB1 | Alert Declared FA1 EAL RCB2 | 0.6 rem/hr |
| 11:37 | Potential Loss of the Fuel Clad Barrier (RVLMS Plenum 0%) | Site Area Emergency Declared FS1.1 EAL FCB1 | Site Area Emergency Declared FS1 EAL FCB4 | 3.1 rem/hr |
| 11:52 | Loss of the Fuel Clad Barrier (1200° F Rep CET) | EAL FCB2 | EAL FCB3 | 3.5 rem/hr |
| 12:02 | (1900° F Rep CET) | | | 3.6 rem/hr |
| 12:07 | Potential Loss of the Containment Barrier (1200° F Rep CET and Restoration not effective in 15 minutes) | General Emergency Declared FG1.1 EAL CNB2 | General Emergency Declared FG1 EAL CNB3 | 3.9 rem/hr |
| 12:12 | (2200° F Rep CET) | | | 4.9 rem/hr |

As indicated in the table above, Alert, Site Area Emergency and General Emergency thresholds were met by other Fission Product Barrier EAL Criteria before any Containment High Range Monitor dependent EAL thresholds were exceeded. To provide some context, for the NEI 99-01, Rev. 5 EALs, the Containment High Range Monitors would have to reach a value of 100 rem/hr to meet the threshold for a Loss of the RCS barrier; 1000 rem/hr to meet the EAL threshold for a Loss of the Fuel Clad Barrier; and 4000 rem/hr to meet the threshold for a Potential Loss of the Containment barrier. Referring back to the Large Break Loss of Coolant scenario above, when a General Emergency is declared based on other Fission Product Barrier thresholds the Containment High Range Monitors were indicating only 3.9 rem/hr.

Considering the NEI 99-01, Rev. 6 EAL scheme, the Containment High Range Monitors would have to reach 60 rem/hr to meet the threshold for a Loss of the RCS barrier; 900 rem/hr to meet the threshold for a Loss of the Fuel Clad Barrier; and 15,000 rem/hr to meet the threshold for a Potential Loss of the Containment barrier. Again, during the Large Break Loss of Coolant scenario above, when a General Emergency is declared based on other Fission Product Barrier thresholds, the Containment High Range Monitors were indicating only 3.9 rem/hr.

This error associated with the Containment High Radiation Monitor would not have impacted the ability to adequately perform dose assessments that would impact the health and safety of the public. Detailed dose assessment analysis using design basis leakage from containment and with this monitor reading 15,000 rem/hr would have yielded a dose assessment for an Unusual Event only and would not have reached the Alert level, with no impact on state or local ORO actions for public safety. Additionally, while this monitor is an input into URI Rascal, it is not a primary input typically used for dose assessment.

**Question 5:**

*Does WF3 use the RASCAL program?*

The Unified RASCAL Interface (URI) is not the RASCAL program, it is a separate program from RASCAL. It does use some of the RASCAL modeling code but is a separate program.

**Question 6:**

*Is the containment radiation monitor utilized in the URI dose assessment processes?*

The Containment High Range Monitors are used as a backup process when primary effluents are unavailable or there is a direct release to the environment. In URI, the input method for containment leakage is always available if the selected pathway is from containment to the environment through the Auxiliary Building or from the Spent Fuel Pool to the environment through containment. We would not select the Containment Leakage method if this was a Monitored Release with effluent monitors available. Reactor Coolant System Leakage, Release Point Sample, or Field Team methods may also be available as backups depending on the pathway design.

**Question 7:**

*When would we select the Containment Leakage method in URI?*

The Containment Leakage method is only used if there is a breach of containment, a failed containment isolation valve or when manually venting containment to the environment and the effluent monitors are unavailable. The containment pathway does not account for release flow as other true effluent monitors would. Because the Containment High Range monitors are area radiation monitors, the containment pathway calculation can scale the release but not primarily used as an effluent monitor. The Containment High Range monitors can be used to determine the concentration of the effluent together with containment vent flow or leakage rate to determine the flow rate of the activity but because the instruments are area monitors, the results are limited.