

**Response to**

**Request for Additional Information No.597, Supplement 1**

**08/14/2013**

**U.S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 06.02.05 - Combustible Gas Control in Containment**

**Application Section: 6.2.5**

**SRSB Branch**

**Question 06.02.05-35:**

In the US EPR FSAR, Chapter 19.2.4.4.5.2, the applicant lists the equipment and instrumentation in containment which must withstand the conditions expected to occur during a severe accident, including a hydrogen burn, as required by 10 CFR 50.44(c)(3). This equipment is also identified in Table 19.2-2, "SAHRS Design and Operating Parameters" and in Table 19.2-3, "Severe Accident Instrumentation and Equipment", (in containment equipment and instrumentation only).

In the response to RAI 473, Question 06.02.05-24 (Supplement 6), AREVA has indicated that the evaluation of the equipment in containment required for severe accident mitigation must be done at a later time. AREVA has stated that an item by item evaluation, showing the equipment identified above, is not possible at this time because this information is vendor-specific and is not available until after the procurement phase is completed.

Originally AREVA was crediting EPRI report NP-4354 and NUREG/CR-5334 for test method and results to qualify equipment for severe accident environment. Since AREVA is now deferring this evaluation to a later time, AREVA should propose in the FSAR, the licensing mechanism for accomplishing this evaluation such as a COL Information Item or ITAAC.

This question is a followup to RAI 473, Question 6.2.5-24.

**Response to Question 06.02.05-35:**

U.S. EPR FSAR Tier 2, Table 1.8-2 will be revised to include a COL item in Section 19.2.4.4.5.2 to require the evaluation of the equipment in containment required for severe accident mitigation.

**FSAR Impact:**

U.S. EPR FSAR, Tier 2, Table 1.8-2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR, Tier 2, Section 19.2.4.4.5.2 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups



**Table 1.8-2—U.S. EPR Combined License Information Items  
Sheet 39 of 39**

Item No.	Description	Section
19.2-3	<p><u>A COL applicant that references the U.S. EPR design certification will describe the key elements of a program to develop procurement specifications for those equipment and instrumentations listed in Table 19.2-2 and Table 19.2-3. The program will ensure procurement specifications will require "survivability requirements" for those equipment and instrumentations due to hydrogen burning during a severe accident condition.</u></p>	19.2.4.4.5.2

\*NRC Staff approval is required prior to implementing a change in this information marked in this table; see FSAR Introduction.

sufficient time exists between loss of power and loading from the emergency diesel generators that would allow the dampers to open. In summary, during a transient, the safety function for these dampers occurs on a loss of power.

### **Pressure, Temperature, and Humidity within Containment**

The pressure, temperature, and humidity time developments during a severe accident were evaluated from the MAAP4-based uncertainty analysis. The maximum “global” containment pressure and temperature that equipment and instrumentation may be exposed to during the progression of a severe accident are 59.4 psia and approximately 381°F, respectively. The maximum humidity inside the containment experienced by the equipment can conservatively be assumed to be 100 percent after the commencement of spraying. However, due to the existence of other gases inside containment, the steam concentration approaches a conservative value of 70 percent. Finally, the IRWST reaches a maximum temperature of 230°F. The SAHRS is conservatively designed for a maximum IRWST water temperature of 320°F.

For the relevant scenarios, which form the basis of the uncertainty analysis cases, local and global hydrogen detonations can be reliably excluded. The highest AICC pressure and temperature resulting from the uncertainty analysis cases is 100.8 psia and 1366°F, respectively. The AICC pressure is a theoretical value that cannot be reached because actual combustion is not adiabatic, isochoric, or complete. The best estimate, limiting pressure, and temperature resulting from forced hydrogen combustion for equipment survivability are 76 psia and 796°F (Section 6.2.5.3.2). It is important to assess the equipment and instrumentation capabilities within these extended operational ranges.

A COL applicant that references the U.S. EPR design certification will describe the key elements of a program to develop procurement specifications for those equipment and instrumentations listed in Table 19.2-2 and Table 19.2-3. The program will ensure procurement specifications will require "survivability requirements" for those equipment and instrumentations due to hydrogen burning during a severe accident condition.

While the equipment and instrumentation inside containment may be exposed to such pressure and temperature spikes, only equipment relied upon to establish and maintain safe shutdown and containment structural integrity must be capable of performing their functions during and after the exposure to the environmental conditions created by the burning of hydrogen per 10 CFR 50.44(c)(3).

For the mitigation of severe accidents, the Severe Accident Management Guidelines rely on safety-related and non-safety-related systems, structures, and components (SSC). Although electrical and mechanical safety-related equipment must perform their safety-related function during design bases events, the equipment necessary for mitigating the severe accident consequences is required to provide a reasonable level