

## ArevaEPRDCPEm Resource

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**Sent:** Friday, September 23, 2011 11:30 AM  
**To:** 'usepr@areva.com'  
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**Subject:** Draft - U.S. EPR Design Certification Application RAI No. 515 (6041,6061), FSAR Ch. 6  
**Attachments:** Draft RAI\_515\_SPCV\_6041\_6061.doc

Attached please find draft RAI No. 515 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,  
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**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 3426

**Mail Envelope Properties** (0A64B42AAA8FD4418CE1EB5240A6FED1493AB9EDD4)

**Subject:** Draft - U.S. EPR Design Certification Application RAI No. 515 (6041,6061),  
FSAR Ch. 6  
**Sent Date:** 9/23/2011 11:29:35 AM  
**Received Date:** 9/23/2011 11:29:36 AM  
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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	908	9/23/2011 11:29:36 AM
Draft RAI_515_SPCV_6041_6061.doc		41978

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

Draft

Request for Additional Information No. 515(6041, 6061), Revision 0

9/23/2011

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 06.02.05 - Combustible Gas Control in Containment

SRP Section: 06.02.01 - Containment Functional Design

Application Section: chapter 6

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

06.02.05-26

OPEN ITEM

Follow-up to RAI 471, Question 06.02.05-22

AREVA's response to RAI 471, Question 06.02.05-22 provided the PAR nominal and efficiency curves for the small and large PARs. These will be included in the Severe Accident Topical Report, ANP-10299P, Rev. 2, Supplement 1. The nominal PAR recombination rates are provided in US EPR FSAR, Tier 2, Table 6.2.5-1. The PAR locations are provided in FSAR Figure 6.2.5-1, and Tier 1 Table 2.3.1-1. However, the PAR recombination rates need to be included in the FSAR, Tier 1, Section 2.3.1 and to be verified by ITAAC.

10 CFR 50.44(c)(2) requires all containments to limit hydrogen concentrations in containment during and following an accident that releases an equivalent amount of hydrogen as would be generated from a 100 percent fuel clad-coolant reaction, uniformly distributed, to less than 10 percent (by volume) and maintain containment structural integrity and appropriate accident mitigating features.

In the US EPR, the CGCS limits the hydrogen concentration in containment to 10 percent by volume during and following a beyond design basis accident. The CGCS is composed of PARs, rupture and convection foils, and mixing dampers. The PARs' function is essential in meeting the requirements of 10 CFR 50.44(c)(2). They are the only equipment that will reduce the hydrogen concentration in containment. The CGCS system ITAAC should verify the PARs' key design characteristics and performance requirements.

For the PARs, add, in FSAR, Tier 1, Section 2.3.1:

- a. section 3.0, Mechanical Features, the following sentence "The CGCS contains the passive autocatalytic recombiners (PAR), mixing dampers and rupture and convection foils."
- b. section 7.0, Equipment and System Performance, that the PARs listed in Table 2.3.1-1 recombine at their design rates.
- c. Table 2.3.1-3, column 1, Commitment Wording, that the PARs listed in Table 2.3.1-1 limit the hydrogen concentration in containment to 10 percent by volume during and following a beyond design basis accident.

- d. Table 2.3.1-3, column 2, Inspections, Tests, and Analyses, that an inspection will be performed to verify that the PARs identified in Table 2.3.1-1 are installed as specified in their design or performance test report.
- e. Table 2.3.1-3, column 3, Acceptance Criteria, that the PARs listed in Table 2.3.1-1 with the superscript "1" have the nominal hydrogen recombination rate of 2.6 lbm/hr, per PAR, at 7.25 psig and 4 volume percent hydrogen, and the remaining PARs listed in Table 2.3.1-1 have the nominal recombination rate of 11.8 lbm/hr, per PAR, at 7.25 psig and 4 volume percent hydrogen.

10 CFR 50.44(c)(1) requires that all containments have a capability for ensuring a mixed atmosphere during design-basis and significant beyond design-basis accidents. The mixing dampers are essential in meeting this requirement.

The ITAAC for the CGCS currently includes inspection of the minimum total area for the dampers, their operation on Open and Close signals, and their fail open status on loss of power.

For the mixing dampers, add in FSAR, Tier 1, chapter 2.3.1:

- f. Table 2.3.1-3, column 1, Commitment Wording, that the mixing dampers listed in Table 2.3.1-1 open at absolute and differential pressure.
- g. Table 2.3.1-3, column 2, Inspections, Tests, and Analyses, that type tests will be performed to demonstrate the mixing dampers' ability to open on pressure increase and pressure difference.
- h. Table 2.3.1-3, column 3, Acceptance Criteria, that the mixing dampers open at 0.5 psid and 17.4 psia.

06.02.01-103

OPEN ITEM

Follow-up to RAI 437 Question 06.02.01-97

In RAI 437 Question 06.02.01-97, the staff requested AREVA to provide evaluations for the first 1200 seconds for DEG-CLPS break and for the first 3600 seconds for a DEG-CLPD break. The Supplement 6 response only provided the evaluation up to 100 seconds for both breaks while the non-condensable gas mass fraction continuously increases at 100 seconds. The response needs to be expanded up to the first 1200 seconds for DEG-CLPS break and for the first 3600 seconds for a DEG-CLPD break. Provide evaluations of the impact on containment pressure and temperature when the non-condensable gases were ingested into the reactor system during these time periods.