From: Akhavannik, Huda
Sent: Tuesday, March 31, 2015 4:43 PM
To: 'Michael.Conroy@dot.gov'
Subject: RE: Questions on Aspect 12K Package

Thanks, Mike. The reviewer finds their responses to be sufficient. I will put this email in ADAMS.

I am just waiting on her input and will be able to start the concurrence process soon.

From: Michael.Conroy@dot.gov [mailto:Michael.Conroy@dot.gov]
Sent: Monday, March 30, 2015 12:52 PM
To: Akhavannik, Huda
Subject: FW: Questions on Aspect 12K Package

Huda-
Please see the responses from Spec below.
Let me know if you would still like to schedule a teleconference.

From: Kelley Richardt [mailto:kelley@spec150.com]
Sent: Monday, March 30, 2015 12:33 PM
To: Conroy, Michael (PHMSA)
Cc: Boyle, Rick (PHMSA)
Subject: RE: Questions on Aspect 12K Package

Michael,

Here is the information that I've obtained regarding the preliminary questions. We are available for a teleconference either in the late morning or afternoon of Thursday April 2nd, please let me know whether the discussion is needed in light of this information.

"The temperatures reported in Appendix 3.6.4 Table 3.5 were the temperatures from" a previous design "which used polyurethane foam as the outer insulation. Consequently, since the design changed, these temperatures are incorrect. The correct values are those presented in Section 2.7.4.1 on page 2-11.

The pressure analysis is correct. The remark by the reviewer: "Based on the ideal gas law, when temperature increases, pressure will also increase, not decrease as suggested", is only true for a confined volume of gas. The more generalized representation of the ideal gas law is:

$PV = nRT$

Where P is the pressure
V is the Volume
n is the number of moles of gas
R is a constant, and
T is the temperature

In the pre-welding condition, the gas (air) inside the container would be at atmospheric pressure and room temperature and would contain n moles of gas.

During the welding process, up to the point of completion of the seal weld, the container is not sealed and therefore the gas is not contained. The heating of the container during the welding process causes the gas to expand and escape the container.

Mathematically expressed:

P remains constant as the container is open to the atmosphere,
V remains constant as the volume of the container doesn't change
T increases due to the heat generated during the welding process, so therefore
n (number of moles of gas) decreases commensurate with the increase in temperature

This is the condition at the time of sealing (completing the weld).

Then after completing the welding, the container returns to ambient room temperature.
Mathematically:

T returns to the pre-welding temperature
V remains constant
n (number of moles of gas) remains at the decreased amount (as there is no means for the escaped gas to re-enter the container now that it is sealed), so therefore
P reduces below the pre-welded condition (commensurate with the reduced number of moles of gas).

And therefore, the assumptions in App 3.6.4-3 are conservative.

In the unlikely case that the fit of the container components were so tight that no gas could escape during the heating which occurs during the welding process, then the post-weld temperature and pressure would be the same as the preweld conditions and those assumptions used in the analysis in App 3.6.4 would remain valid."

Thanks, Kelley

Kelley Richardt
Regulatory and Quality Manager

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From: Michael.Conroy@dot.gov [mailto:Michael.Conroy@dot.gov]
Sent: Tuesday, March 24, 2015 12:26 PM
To: kelley@spec150.com
Cc: rick.boyle@dot.gov
Subject: Questions on Aspect 12K Package

Kelley –

I am working on your application for revalidation of the Canadian certificate for the Aspect 12K package. I have sent it to the NRC for their technical review.
They have identified a couple of questions and have suggested that I schedule a teleconference with you to discuss them.
They have proposed a teleconference on Thursday, April 2nd any time after 10 am (EDT).
Please let me know if you (and whoever else you might need to answer these) can schedule a call on that date and your preferred time.

Here are the NRC questions, in **draft** form:

1. Clarify the maximum package temperatures.

Table 3.5 on page App 3.6.4-1 provides a Summary of Maximum Package Temperatures. The temperatures listed do not correspond with the maximum package temperatures described elsewhere in the analysis including those specified in SAR sections 2.7.4.1 and 3.1.3.

The staff needs to verify the maximum package temperatures; therefore, the applicant should clarify which are the correct maximum package temperatures.

This information is needed to determine compliance with IAEA TS-R-1 Requirement 728.

2. Clarify the assumption and its basis used in the analysis of oxidation of the uranium shield.

On SAR page App 3.6.4-3 the applicant states “For analysis, we assume this volume is filled with air at atmospheric pressure. This is a conservative assumption, as during the seal welding process, the temperature of the stainless steel, and therefore the contained air, would be elevated, thereby reducing the initial pressure.”

a) Based on the ideal gas law, when temperature increases, pressure will also increase, not decrease as suggested. The applicant should clarify this relation between temperature and pressure.
b) The staff needs to verify the appropriateness of this assumption; therefore, the applicant should describe how temperature and pressure correlate to oxidation and explain why this assumption is conservative.

This information is needed to determine compliance with IAEA TS-R-1 Requirement 651.

Let me know if you have any questions on this.

Michael Conroy
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