

HLWYM HEmails

From: Leah Spradley [REDACTED]
Sent: Wednesday, January 17, 2007 2:32 PM
To: Oleg Povetko
Cc: Christopher Grossman; Tina Ghosh; Keith Compton
Subject: Re: RE: TSPA Question

Oleg,

Thank you very much for taking the time to answer my questions sent by Chris Grossman. If you are able, I would appreciate clarification on the following.

Does "scale down to the 1.45kW/m" mean that you assume the isotopic composition at the time of emplacement to be what results in a 1.45kW/m heat output? Could you clarify what "scale down" means.

Is the heat output averaged over the entire length of the drift, or in 40meter (the length of approximately 7 WPs) segments? If it is averaged over 40meters, why is this so? Why is 40meters or 7WP the ideal length over which to average?

Thank you,

Leah Spradley

On 1/17/07, Christopher Grossman <CJG2@nrc.gov> wrote:

> Leah-
>
> Here is some feedback to your questions, compliment of Oleg from the
> Center.
>
> Chris
>
> >>> Oleg Povetko <opovetko@cnwra.swri.edu> 01/17/2007 2:01:15 PM >>>
> Chris,
>
> Please see my answers below in text next to the questions. The
> numbers are relevant to pre-TAD design only.
>
> >-----Original Message-----
> >From: Christopher Grossman [mailto:CJG2@nrc.gov]
> >Sent: January 16, 2007 1:14 PM
> >To: Oleg Povetko
> >Subject: Fwd: TSPA Question
> >
> >
> >Oleg-
> >
> >Could you help me answer the following questions from Leah Spradley?
> >They are below.
> >
> >Thanks
> >Chris
> >
> >>>> Tina Ghosh 01/16/2007 12:18 PM >>>>

>>Dear Keith and Chris,
>>
>>Could you answer Leah's questions forwarded below on how TSPA treats
>>fuel variability (e.g., aging, burnup and effect on thermal output)
>>among WPs? Please cc me if you have a quick answer, or let me know
>>where I can look up details.
>>
>>Thank you very much for your help,
>>Tina
>>
>>>> "Leah Spradley" <[REDACTED]> 01/15/2007 1:47 AM >>>>
>>
>>Tina,
>>
>>I think I recall that NRC's TPA Model uses Origen libraries for
>>thermal heat decay estimation but I am not sure.
> TPA Version 5 uses inventory data extracted from DOE AMRs and
> available accompanying CDs. The thermal output curve was determined in
> independent depletion analyses using ORIGEN-ARP for CSNF (blend of 65%
> PWR and 35%
> BWR) for
> 1 million years. This curve was scaled down to 1.45 kW/m for time of
> emplacement according to repository performance specifications and used
> to describe heat output temporal decline for 1 million years. It's not
> WP or waste form specific.
>
> Does the
>>TSPA also use Origen?
> TSPA does not use Origen directly. The inventory was determined by DOE
> using SAS2H/ORIGEN-S sequence of SCALE 4.3 and documented in AMRs. The
> latest public versions are:
> PWR Source Term Generation and Evaluation,
> 000-00C-MGR0-00100-000-00B,
> 2004
> BWR Source Term Generation and Evaluation,
> 000-00C-MGR0-00200-000-00A,
> 2003
>
> How does the TSPA determine the thermal
>>output of blended fuel in each WP at emplacement (accounting for
>>aging)?
> I didn't review TSPA thermal analyses, I can ask right people at the
> Center who were involved in this. DOE has established the maximum
> thermal output limits of
> 11.8 kW per WP and the linear thermal power of 1.45 kW/m of drift at
> time of emplacement with 0.1 m WP skirt-to-skirt spacing. For
> comparison, the average thermal output for 21-PWR AP WP is 11.33 kW,
> this WP design is limiting for thermal output. Our depletion
> calculations confirmed that. In order to meet its thermal output goals
> a carefully managed blending is needed. If you, for instance, load
> only "average" PWR assemblies in 21-PWR AP WP it would push you right
> to the WP thermal output limit.
>
> For TPA we conducted depletion analyses for PWR and BWR CSNF using
> fuel
> characteristics, burnup and cooling times described below, obtained

> two thermal output curves for 1 million years, blended them together
> and scaled the resulting curve down to have 1.45 kW/m for time of
> emplacement.
>
> >
> >Do they assume an average burnup and initial enrichment for
> >assemblies, is burnup and/or enrichment set as a random variable?
>
> Burnup and enrichment are not sampled in TSPA.
>
> For performance assessment DOE has done its depletion analyses for the
> following averaged initial fuel characteristics, reactor burnups and
> cooling
> times:
>
> AVERAGE FUEL
>
> PWR assembly: 4.0% initial enrichment, 434 kg U loading 80 GWD/MTU
> burnup, 5 years of cooling time.
>
> BWR assembly: 3.5% initial enrichment, 177 kg U loading 40 GWD/MTU
> burnup, 25 years of cooling time.
>
> MAXIMUM FUEL
>
> PWR assembly: 5.0% initial enrichment, 477 kg U loading
> 48 GWD/MTU burnup, 25 years of cooling time.
>
> BWR assembly: 5.0% initial enrichment, 197 kg U loading
> 75 GWD/MTU burnup, 5 years of cooling time.
>
>
> >
> >Thanks,
> >
> >Leah
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>
> I hope it answered your questions.
> Let me know if you need more information.
>
> Oleg.
>

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From: Leah Spradley

Created By: [REDACTED]

Recipients:

"Christopher Grossman" <Christopher.Grossman@nrc.gov>
Tracking Status: None
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Tracking Status: None
"Keith Compton" <Keith.Compton@nrc.gov>
Tracking Status: None
"Oleg Povetko" <opovetko@cnwra.swri.edu>
Tracking Status: None

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