From: Joseph Staudenmeier *NRR*
To: Diane Jackson   *NRR*
Date: 2/27/01 1:53PM
Subject: Re: swedish gov't q's on TWG

Diane,

I answered the question. The Swedish calculation contains an error. The answer is that there are 91.2 grams of Zirconium in a mole and not 91.2 kg as wrongly stated by the Swedes in their calculation. It is addressed in comment #70 in the report on page A6-23.

Joe

>>> Diane Jackson 02/27 1:43 PM >>>
Joe - Do you rememeber answering this question? I could not find any response in any file. Could you provide an answer please.

Thanks -Diane

Mats Sjöberg/ Ferenc Müller on report: [Ref. 9] Page A1-7 in the report says:

"When zirconium reaches temperatures where air oxidation is significant, the heat source is dominated by oxidation. The energy of the reaction is 262 kcal per mole of zirconium. In air, the oxidation rate and the energy of the reaction is higher than zirconium-steam oxidation."

We can transfer 262 kcal to other units:
262 kcal pel mol Zr = 1.1 MJ per mol Zr (1 mol Zr = 91.2 kg Zr) = $1.1E+06/91.2$ = 1.2E+04 J/kg Zr. We can conclude that the air oxidaton energi according to the report is = 1.2E+04 J per kg Zr

The corresponding values for Zr-steam reaktion in the Melcor manual = 6.43E+06 J/kg Zr (Ref. Bottom Head Package, Reference Manual, Table 3.6. Heats of reaction at 1,700 K) The Maap code uses 6.18E+08 J per mol Zr = 6.78E+06 J/kg Zr, for
Zr-steam reaktion i.e. near the same as Melcor.

There is a factor 500 difference in the oxidaton energy and to the wrong direction.