

MemorandumFOIA
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Client

Project

Subject

To

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Reviewed by

Approved by

Questions/Comments on the NRC "Draft final technical study of spent fuel accidents risk at decommissioning nuclear power plants", 7590-01-P.

Dear Mr Dudley,

During our study of the report, we have found a couple more questions/comments and would appreciate if you can comment on them.

1. 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 per mol Zr = 1.1 MJ per mol Zr (1 mol Zr = 91.2 kg Zr) =
 $1.1\text{E}+06/91.2 = 1.2\text{E}+04$ J/kg Zr. We can conclude that the air oxidation
 energi according to the report is = $1.2\text{E}+04$ J per kg Zr

The corresponding values for Zr-steam reaktion in the Melcor manual =
 $6.43\text{E}+06$ J/kg Zr

(Ref. Bottom Head Package, Reference Manual, Table 3.6. Heats of reaction
 at 1,700 K)

The Maap code uses $6.18\text{E}+08$ J per mol Zr = $6.78\text{E}+06$ J/kg Zr, for Zr-
 steam reaktion i.e. near the same as Melcor.

There is a factor 500 difference in the oxidation energi and to the wrong
 direction.

2. Release Fractions, Page A4-5, Table A4-3.

100 % release is assumed for noble gases, iodine and cesium.

We feel that this is too conservative. The latest estimates by the Swedish
 Radiation Protection Institute for the Tjernobyl case says that 100 % of the
 noble gases, 50-60 % of the iodine and 20-40% of the cesium were released

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... at the accident.