ES-konsult
ENERGI OCH SÄKERHET AB

Memorandum

FOIA REQUEST

Date
2000-04-25

Page
1(1)

Client

Issued by
Mats Sjöberg/ Ferenc Müller

Reviewed by

Project

Approved by

Subject

To

Copy

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 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 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

A17

at the accident.