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Subject: Transport of Ruthenium Oxides

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I looked at NUREG/CR-6218 and the available literature and these are my conclusions.

During the reaction between damaged fuel and air several Ruthenium oxides are formed: RuO, RuO2, RuO3 and RuO4. The yield of these oxides depends on the tempertature of reaction. However, their transport after they leave the reaction zone and are exposed to an ambient temperature depends to a great extent on their volatility. Although I could not find exact vapor pressure vs temperature data for these oxides, it appears that out of the two most common oxides RuO2 is not volatile at all and RuO4 is the most volatile. It can be presumed, therefore, that it will be the oxide mostly released to the environment.

RuO4 is a very toxic substance. It has melting point of 25.4 deg C and boiling point of 40 deg C. It is stable at the temperatores up to 106 deg C. At higher temperatures it is decomposed to RuO2 and oxygen (the reaction is explosive).
Since ambient temperatures never reach 106 deg C, it seems that the release of RuO4 could pose toxic danger to the environment.

Appx B

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