From: Charles Tinkler / RES
To: Fxe
Date: Wed, Jul 7, 1999 9:19 AM
Subject: Weekly Highlight

Farouk - Attached is a recommended weekly highlight on our spent fuel pool work

CC: jhs1

B11

Assessment of Radiological Consequences for a Severe Spent Fuel Pool Accident

RES has assisted NRR in assessing offsite radiological consequences for a severe spent fuel pool accident. This RES assistance is in support of the NRR generic evaluation of spent fuel pool accidents that is being performed to support related risk-informed requirements. The Safety Margins and Systems Analysis Branch has performed, in-house, offsite radiological consequence analysis to evaluate the impact of an accident assuming cooling is lost to the spent fuel and the fuel rods eventually heat to the point that a zircalloy "fire" (oxidation escalation) occurs which would result in severe fuel damage and radionuclide release. Calculations were performed by RES staff using the MACCS2 code to estimate prompt fatalities, person dose, and latent cancer fatalities. Numerous sensitivity studies have been performed addressing radioactive decay (due to extended storage), population density, inventories of short-lived and long-lived radionuclides, and evacuation assumptions. A summary of our evaluation was recently forwarded to NRR.

An overall conclusion from our evaluation is that the offsite radiological consequences of a severe spent fuel pool accident are comparable in magnitude to those of a severe reactor accident. Also, we found that the consequences of a severe spent fuel pool accident are most sensitive to population density. With regard to the effect of decay time on offsite consequences, our calculations showed a factor of two reduction in prompt fatalities if the accident occurs after 1 year of decay instead of after 30 days. Long-term consequences (societal dose and cancer fatalities) are not affected by the decay time, because they are controlled by emergency response actions and inventories of fission products with long half-lives. Our evaluation also showed that starting evacuation before the fission product release begins can reduce the prompt fatalities by an order of magnitude. Further analysis of severe spent fuel pool accidents could yield a better understanding of the magnitude and uncertainty in offsite consequences by addressing conservatisms related to assumptions regarding uniform heat up of the spent fuel pool and aerosol deposition prior to offsite release.

From: Jason Schaperow
To: Charles Tinkler
Date: Wed, Jul 7, 1999 8:48 AM
Subject: Weekly Highlight on Spent Fuel Pool Consequences

Proposed weekly highlight is attached.

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An overall conclusion from our evaluation is that the offsite radiological consequences of a severe spent fuel pool accident are comparable in magnitude to those of a severe reactor accident. Also, we found that the consequences of a severe spent fuel pool accident are most sensitive to population density. With regard to the effect of decay time on offsite consequences, our calculations showed a factor of two reduction in prompt fatalities if the accident occurs after 1 year of decay instead of after 30 days. Long-term consequences (societal dose and cancer fatalities) are not affected by the decay time, because they are controlled by emergency response actions and inventories of fission products with long half-lives. Finally, given the long period of time that it takes to reach the point of releasing fission products in a severe spent fuel pool accident, an early evacuation may be possible. Our evaluation showed that starting evacuation before the fission product release begins can reduce the prompt fatalities by an order of magnitude. However, an early evacuation, not unexpectedly, has very little impact on long-term consequences. Further analysis of severe spent fuel pool accidents could yield a better understanding of the magnitude and uncertainty in offsite consequences by addressing conservatisms related to assumptions regarding uniform heat up of the spent fuel pool and aerosol deposition prior to offsite release.

From: Jason Schaperow
To: cgt
Date: Mon, Jun 21, 1999 9:51 AM
Subject: Weekly Highlight on Spent Fuel Pool Consequences

Proposed weekly highlight is attached.

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From: Jason Schaperow
To: cgt
Date: Fri, May 28, 1999 1:35 PM
Subject: Weekly Highlight for Spent Fuel Pool

Attached is an electronic copy of my proposed weekly highlight for spent fuel pool consequence assessment. Also, I put a hard copy in your in-basket.

Assessment of Radiological Consequences for a Severe Spent Fuel Pool Accident

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An overall conclusion from our evaluation is that the offsite radiological consequences of a severe spent fuel pool accident are comparable in magnitude to those of a severe reactor accident. Also, we found that the consequences of a severe spent fuel pool accident are most sensitive to population density. With regard to the effect of decay time on offsite consequences, our calculations showed a factor of two reduction in prompt fatalities if the accident occurs after 1 year of decay instead of after 30 days. Long-term consequences (societal dose and cancer fatalities) are not affected by the decay time, because they are controlled by emergency response actions and inventories of fission products with long half-lives. Finally, given the long period of time that it takes to reach the point of releasing fission products in a severe spent fuel pool accident, an early evacuation may be possible. Our evaluation showed that starting evacuation before the fission product release begins can reduce the prompt fatalities by an order of magnitude. However, an early evacuation, not unexpectedly, has very little impact on long-term consequences. Further analysis of severe spent fuel pool accidents could yield a better understanding of the magnitude and uncertainty in offsite consequences by addressing conservatisms related to assumptions regarding uniform heat up of the spent fuel pool and aerosol deposition prior to offsite release.

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