Date: Aug. 26, 2020

To: Radiation Safety Committee (RSC), C. Cutler, S. Harling and D. Medvedev

From: K. Yip

Subject: Review of C. Schaefer’s Hotspot analysis of an MCI in MIRP


The meeting started soon after 4 pm. Before the meeting, Chuck Schaefer provided us his report of the Hotspot analysis for an MCI (Maximum Credible Incident) scenario in MIRP (Medical Isotope Research and Production) facilities ¹. The meeting started by Chuck giving a 7-page presentation ².

i. Chuck’s presentation was mainly about explaining why his new Hotspot analysis has different results compared to the last Hotspot analysis report that he made ³ on Mar. 5, 2020. Reviewers in the Accelerator Readiness Review for MIRP have provided a lot of inputs and feedbacks and Chuck has adopted of their suggestions which result in this updated Hotspot analysis report.

ii. The changes include more “lofting” of material from the fire (which would give rise to higher doses) and using a more conservative atmospheric Stability Class. There is also clarification of physical forms allowed for targets in MIRP; particularly, there is no gaseous target.

iii. The most dramatic and significant change is the changes of ARF (Airborne Release Fraction) × RF (Respirable Fraction) by adopting those in the DOE handbook DOE-HDBK-3010. The ARF×RF values change from $2.5 \times 10^{-4}$ (metals) and $2 \times 10^{-3}$ (liquids/powders) in the last analysis to 0.1 and 0.5 respectively, which are equivalent to scaling factors of 400 and 250. A few members were interested in this change and Chuck has made a few different attempts to explain it. At the end, it was realized and understood that one major incentive to be so conservative in the values of ARF×RF is to allow possible future growth in the MIRP program such that if the masses of some MIRP targets increase in the future, they have been essentially accounted for by these scaling factors and we may avoid having to have the same review again.

² https://www.c-ad.bnl.gov/esfd/RSC/Presentations/2020/2020-8-26%20CAD%20RSC%20Presentation.pptx
³ https://www.c-ad.bnl.gov/esfd/RSC/Minutes/03_05_20_Minutes.pdf
iv. I pointed out that from Table 2 (on page 10) and the arithmetic calculation on page 16 of the new report, without the above-mentioned scaling factors of 400 and 250, the dose due to BLIP (Brookhaven Linac Isotope Producer) targets is actually 0.91 mrem (in this new analysis report) compared to about 8 mrem in the old report. It is only after including the scaling factors of 400 and 250, the dose due to BLIP targets is increased to about 0.32 rem.

v. S. Harling reminded us that the Isotope Production Facility of Los Alamos National Laboratory (LANL) has used a scaling factor of 200 (as mentioned on page 5 of Chuck’s presentation), which is comparable to what Chuck has used.

vi. L. Hammons let us know that this Hotspot analysis report is also being independently validated by Jon Tapia at LANL as we have been required to do by DOE.

vii. Towards the end of the meeting, the RSC members have accepted and approved Chuck Schafer’s report.

viii. The meeting was adjourned at around 5 pm.

Copy to:

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