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General Comment

The linear no threshold (LNT) model of radiation effects has remained the dominant method for evaluating risk of radiation because it is simple and accurate enough to fit the available data at the time of it's creation. But "simple" and "accurate enough" are not the descriptors that should be used to describe methodology governing billions of dollars spent in cleanup, waste disposal, or accident planning. There is clearly a level of chronic exposure to ionizing radiation that presents no measurable effect on health. After all, we are constantly exposed to some 300-600 mrem every year from natural and medical sources. To say that 50 or 100 mrem, especially in a non-acute dose, present a measurable increase in risk over that background signal is an extraordinary claim that has been difficult, if not impossible, to attempt to validate. Radiation workers are routinely exposed to multiple rems year after year, and decades long cohort studies are required to indicate possible minuscule increases in risk. Patient surveys have shown doses from low doses of radiation, but suffer from measurement biases that are difficult to tease out; after all many radiation sources are used to detect cancer. If you suspect cancer and get a CT scan, then find cancer, likely the scan did not produce it. A widely touted study by Mathews et al (2013) indicate low doses of radiation produce a measurable but small increase in the cancer rate. Yet careful analysis has shown a strong correlation between increased risk of cancers in body parts associated with localized scans of other body parts. In other words, people with CT scans of their hands ended up with reported increased brain cancers. Or people with unknown issues with extremities were experiencing the early symptons of brain cancer. The time lag between scans and cancer detection was arbitrarily set at 5

years, yet most prior research indicates a 20 year latency for cancer increases. And even then, the largest measured increase in cancer rates was a vanishingly small number compared to the cohort size. With the unavoidable difficulties of these large studies, there has never been conclusive proof of radiation risk from low levels of acute or chronic radiation. And that's the point, if there are effects, they are too low to measure. If they are too low to measure, then they are too low to be the basis of regulatory action.

The LNT model incites misplaced public panic while placing an onerous restrictions on a technology with so much to offer the world. It is a shame for such promising advances to be hamstrung by fears rooted in inaccurate understanding of DNA replication and damage effects. Perhaps implementing the hormesis model is overly optimistic, but surely ALARA is misguided as well. No choice exists in a vacuum. In an ideal world, perhaps we get all our electricity from magic incantations, but we don't live in that world. We much make choices between real risks and alternatives. We should amend 10CFR20 to reflect the actual risk to the public based on understanding borne of five decades of research. A threshold model incorporates existing data, maintains a high standard of public safety, and allows the risk of radiation to be accurately determined.