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General Comment

Comments on U.S. NRC Level 3 Probabilistic Risk Assessment (PRA) Project Volume 3d: Reactor, At-Power, Level 3 PRA for Internal Events and Floods, draft for comment June 2022; Docket ID NRC-2022-0085.

The PRA 3 is incomplete and misleading since it does consider the most important health effects of severe reactor accidents, the deaths and other physical and mental health effects resulting from the protective actions taken to reduced radiation induced health effects.

Like the severe accidents studied in this PRA, the radioactive releases from the Fukushima Daiichi nuclear power plant (FDNPP) accident were too small to result in any discernable radiation induced health effects even it no protective action were taken. However, there were clearly observable increases in non-radiation induced physical health effects attributed to protective actions (e.g., evacuation, relocations and sheltering) taken to reduce radiation induced health effects. These included hundreds of deaths, increases in morbidity (e.g., diabetes, hypertension, atrial fibrillation), and mental health problems. The protective actions taken during the FDNPP accident were similar to those in NRC recommendations. A recent study (Callen-Kovtunova2022) estimates that the protective actions taken to reduce radiation health effects would result in about 3 deaths per thousand being clearly seen among the general population following dislocations resulting from protective actions (e.g., evacuations, sheltering) and 17 deaths per thousand for residents of nursing homes and facilities for the institutionalised elderly. These estimates were based on the experience from the FDNPP accident and the response to hurricanes in the USA.

Mental health effects have been identified as the most important health effects of the FDNPP, Three Mile Island and Chernobyl NPP accidents. Following the FDNPP accident there were hundreds of excess cases of severe mental health effects (e.g., PTSD, depression) (Callen-Kovtunova2022). The major risk factor associated with mental health problems following NPP accidents is the public's perceived risk of

radiation-induced health effects. This demonstrates the importance of putting the radiological risks in perspective in a way that the public and decision makers can understand.

I recommend that the Level 3 PRA be expanded to:

• Reflect the physical health attributed to protective actions (e.g., evacuation, relocations and sheltering)

• Address the mental health effects that have been seen following severe NPP emergencies by putting the radiological and protective action health risks in perspective in a way that the public and decision makers can understand.

(Callen-Kovtunova2022) Jessica Callen-Kovtunova et al 2022 J. Radiol. Prot. in press https://doi.org/10.1088/1361-6498/ac5bde