

Feedback on comments for discussion paper DIS-16-03

"2.1.1 Categories of waste

4) Uranium mine and mill tailings

Uranium mine and mill tailings (UMMT) are a specific type of radioactive waste generated during the mining and milling of uranium ore and the production of uranium concentrate. In addition to tailings, mining activities typically result in the production of large quantities of waste rock, as workings are excavated to access the ore body. The wastes contain long-lived activity that does not decrease significantly over extended time periods. UMMT are typically disposed of on site, which are often located in remote areas. For the long term, engineered placement in surface or near-surface facilities is considered a safe and practical option for wastes such as mine tailings and waste rock. In Canada, uranium mining generally takes place in remote areas."

All I can do is try to emphasize, to the utmost possible, that remote areas have people living and working in them, harvesting food, clothing, housing, transport and other materials from them, and are situated where wind and water can (and do) carry dust, fumes or vapour and sometimes other matter away from storage sites, tailings piles, ponds, even underground facilities.

Remote areas also are home to flora and fauna which not only feed, clothe and house humans, but also have their own lives and habitats, usually not considered as relevant in these studies. Both non-radioactive and radioactive materials brought to the surface affect plants (microscopic to tree size, as well as underground spore-based growths) and animals (including fish and birds). From relatively low-impact phenomena (such as blocking migration routes or removing habitat such as trees or rock cliffs), to high-impact (radioactive hot zones, or areas or water bodies with chemicals now in them), these resources and natural features should be considered, further studied; impacts should be closely regulated; and public reports issued upon them in close consultation with the people who live in their vicinity, at least.

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Each category of waste includes "thermal power" as a product, ranging from none to $< 2 \text{ kW/m}^3$ to No Limit. As a non-specialist, I take this to mean "heat". Perhaps in the late 1960s or early 1970s I read, I believe in an article on nuclear energy in Scientific American, that stored nuclear wastes produce heat to one extent or another, and that after some decades of presence, this heat had the effect of drawing ground water to it, or toward it. One implication I, at least, understood, was that this water then was partially turned to vapour and partially also migrated away from the stored wastes as it cooled. The water reported then found its way into sub-surface water, aquifers, perhaps eventually surface water such as streams, rivers, lakes. I regret I do not have an accurate citation for that article. Others with more resources may be able to dig it up. I tried online archives to no avail. I do not think the physics of that process have changed in the years since.

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Later sections in the report (such as 2.6 Regulating remediation activities, ending of licensing and so on) deal with disposal, management and storage, all activities that I believe to be endless in time. These materials should not be abandoned or ignored. There is no "decommissioning" that can deal with endlessly-lasting radioactive materials. The text says "when they reach the end of their lifecycle, but still require long term care and maintenance." They have to be tended to forever, with a plan and funding to actually carry on forever. Ending a license does not mean the materials and the hazards disappear or that they become safe somehow. There are endless costs of the nuclear industry and nuclear energy, no matter how used. They are just facts that will be with humanity until our sun burns out, or at least until the earth becomes uninhabitable. I may be uncharitable to say that nuclear power and its by-products are already contributing to that state of uninhabitability, but it's a fact.

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