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Good morning/afternoon Chairman Waxman and members of the committee. My name is Doug Brugge, I have a PhD in cellular and developmental biology from Harvard University and an MS in industrial hygiene from the Harvard School of Public Health. I am currently associate professor in the department of public health and family medicine at Tufts University School of Medicine. I also direct the Tufts Community Research Center. I have over 20 academic publications about uranium and the Navajo people, including a 2006 book that I co-authored, entitled The Navajo People and Uranium Mining. I have studied the Navajo people in part because they are facing a crisis in uranium contamination.

Appearing before this congressional hearing today reminds me of the long history of such hearings, beginning in the 1960s and continuing through the 1970s, 80s and 90s, that sought and eventually achieved a semblance of compensation for Navajo and other uranium miners. I am deeply saddened by the fact that so little has been accomplished over those decades to eliminate the health hazards faced by the enormous quantities of uranium waste on the Navajo reservation There has been too little research on the health impacts of uranium mining in Navajo communities. The one study underway, for example, will mostly address kidney disease and not birth defects or cancer. Today as we begin the public process of addressing community exposures, I can only hope that the path is far shorter than the one traveled by the uranium miners and their families.

I will now spend a few moments describing the hazards faced by the Navajos today. Clearly, uranium ore is a toxic brew of numerous nasty hazardous materials. Uranium, itself highly toxic, gives rise to a series of other radioactive decay elements that are found in raw, natural ore. Most significant among these are radium and thorium, both of which are highly radioactive. When radium decays it produces radon gas, a potent toxicant. Because it is a gas that becomes airborne, when radon decays it transforms into a series of highly radioactive "radon daughters" that can lodge in the lungs.

The primary heavy metal toxicants in uranium ore include uranium itself and arsenic, as well as vanadium and manganese. During the first phase of processing uranium, most of the uranium is removed, leaving behind mill tailings which retain most of the other toxic contaminants from the ore. The milling of uranium is an industrial process that involves crushing and grinding of the rock and the addition of acids and organic solvents to facilitate concentration and removal of the uranium. Hence, uranium mill tailings and mill tailings effluent are not only highly radioactive, but they are acutely hazardous.

The health effects of uranium and its associated radioactive decay products and heavy metals that rise to the level of proven or near-proven causal links include:

1) Radon, which causes lung cancer and in fact, it is the primary source of lung cancer among Navajo uranium miners;
2) Uranium, which as a heavy metal causes damage to the kidneys and birth defects ;
3) Radium, which causes bone cancer, cancer of the nasal sinuses and mastoid air cells and leukemia; and
4) Arsenic, which causes lung and skin cancer, as well as neurotoxicity, hyperpigmentation and hyperkeratosis of the skin.

There are may also be many other negative health effects from exposure to uranium and its byproducts. In short, there is a clear causal link between uranium exposure and human health. The Navajos continually exposed to uranium and its byproducts even today face grave threats to their health.

I would like to conclude with some observations about the Navajo community of Church Rock, both historical and present day. Church Rock is located outside of Gallup, New Mexico, in the Navajo Nation. The Church Rock tailings spill remains the largest industrial release of radioactive wastes in the history of the United States. In 1979, only months after the Three Mile Island release, a dam holding back a tailings lagoon maintained by United Nuclear Corporation failed, sending 94 million gallons of radioactive and acidic wastewater and 1,100 tons of toxic and radioactive mill waste into the Puerco River. This release, which was substantially larger than the release at TMI, flowed into a low-income, largely Native American community. This incident has been virtually ignored in the press and scientific literature.

For the people in Church Rock and other Navajo communities contaminated for decades with uranium ore tailings there are no "good" options, too much harm has already been done. But there are ways that we can gradually make things better so that maybe the children and the grandchildren of the Navajo uranium miners are not still grappling with this toxic legacy. A good start would be to provide sufficient resources to secure or remove contamination at these hazardous waste sites and to do so in a manner that prevents additional exposure to nearby residents. And Congress must fund the Navajo Nation and federal health agencies to provide resources for health studies among the tens of thousands of Navajo community members who still live next to abandoned mines and-or who were exposed to uranium from the contaminated dusts brought home by their working relatives.

I leave you to ponder a simple observation about this egregious situation: As terrible as the health effects that we know arise from toxins in uranium tailings, there are almost certainly additional ways that the health of Navajo people living near uranium mill and mine waste has been affected. If we are to understand the full extent of this injustice, we will also need additional health studies.