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Environmental contamination of the Yupik people of St. Lawrence Island, Alaska

St. Lawrence Island, Alaska, is a 100 by 40 mile island off the coast of Nome in the Bering Sea, not far from the Arctic Circle and so close to Russia that the mountains there can be seen on a clear day. The approximately 1,600 Yupik people who live there practice a traditional way of life, and their diet consists primarily of greens, berries, fish, and marine mammals (including bowhead whale, several species of ice seals and walrus). During the Cold War, because of the proximity to Russia, the U.S. established two major military bases on the Island. When these bases were closed, the military simply left in place or buried the building infrastructures, equipment, massive fuel spills, and chemicals including pesticides, solvents, heavy metals and PCBs.

When one of the village elders, Annie Alowa, developed liver cancer, she reached out to an environmental NGO in Anchorage, the Alaska Community Action on Toxics (ACAT), because she felt that diseases such as cancer, diabetes, reproductive problems, and heart disease, which had previously been uncommon in the St. Lawrence Island community, were occurring more frequently than before. She wondered if the chemicals from the former military bases were responsible.

This inquiry has resulted in a community-based research collaboration among the residents of the two villages on St. Lawrence Island, Savoonga and Gambell;ACAT; and the University at Albany which began ten years ago and is continuing. Our initial study was to ask the question whether residents of St. Lawrence Island do indeed have elevated concentrations of chemicals in their blood. We chose to study polychlorinated biphenyls (PCBs) and chlorinated pesticides, such at DDT and its breakdown product, DDE. In a study of blood samples from 130 adults we found that St. Lawrence Island residents had a mean PCB concentration of 4.6 ppb (Carpenter et al., 2005), significantly higher than the levels reported to be background concentration in the US by ATSDR (2000) of 0.9-1.5 ppb. Levels of pesticides were also elevated.

The researcher team then attempted to answer the question concerning the sources of the high levels of PCBs and pesticides. One possibility was clearly the military sites. The other possibility was that atmospheric transport of these persistent organic pollutants from more temperate regions into the Arctic was to blame, with consequent bioaccumulation in the traditional food sources. Marine mammal blubber is a major part of the diet here, and these are all fat-soluble contaminants.

To try to answer this question we compared levels in the blood of different segments of the population. The most contaminated site is at the Northeast Cape (NEC), a former military site. The military displaced the village site at NEC although it remains an important seasonal fishing and hunting camp. NEC is also used for drinking water when people are travelling to other hunting camps in the region. We compared the blood serum levels of PCBs and pesticides in Savoonga residents who did not have camps at the Northeast Camp to those who did, and also obtained blood samples from residents of Gambell, the site of another former military base. We found that the average blood level

of PCBs and pesticides were elevated in all St. Lawrence Island residents, not just those whose families maintained camps at the Northeast Cape, although those with camps there did have a slightly higher level [mean wet weight PCB level 4.8 ppb (n=46) as compared to 3.7 ppb in Savoonga residents who did not have camps at the Northeast Cape (n=44)]. This suggested to us that while the abandoned military sites contribute to the contaminant levels, the major cause of the high concentrations of persistent chemicals was atmospheric transport and accumulation of PCBs and pesticides in the traditional foods. This does not mean that the PCB exposures from the military site are unimportant.

We have recently completed an EPA-funded study in which we have analyzed a wide range of traditional foods for PCBs and pesticides. We found elevated levels of PCBs in two types of foods that are critical to the traditional diet of the Yupik people on St. Lawrence Island, the rendered oils (194 ppb in walrus oil, 421 ppb in ringed seal oil and 354 ppt in bowhead whale oil) and blubber (34 ppb in walrus blubber, 116 ppb in bearded seal blubber, and 317 ppb in bowhead blubber) of marine mammals. In fact, we found the levels to be so high in these foods that they would elicit stringent consumption advisories when applying EPA guidelines for fish consumption. Levels in marine mammal meat were much lower, as were the levels in reindeer and fish. The research team have presented and discussed the results with the community, but how these observations impact cultural traditions and practices remain to be determined. These findings pose serious and fundamental questions, whereby the importance of cultural traditions must be balanced against the human health hazards associated with the contaminants.

The communities have requested comprehensive health studies that would provide answers about the adverse health outcomes observed by elders and community health workers. We have a grant application pending that would provide critical information about the relationship of contaminant levels with such health outcomes as cardiovascular disease and diabetes. While the health hazards of PCBs and chlorinated pesticides are well known, and include an increased risk of cancer, diabetes, heart disease and hypertension as well as immune system suppression and cognitive impairment (Carpenter, 2006), marine mammal blubber also contains high concentrations of omega-3 fatty acids, the “good” fats that are believed to prevent heart disease and perhaps some of these other diseases as well. Thus at present, it is difficult for the community to make decisions about the relative safety of their traditional foods. They have opted to continue their close reliance on traditional foods because of the spiritual and cultural benefits, although rightfully want to obtain more information as well as reduce their exposures. . It is critical for the people to have information necessary to make informed decisions that affect their health and the health of future generations.

One thing is clear, however. The Arctic is contaminated with persistent, bioaccumulative, and toxic chemicals that originate primarily from industrial areas in temperate climates. The people of St. Lawrence Island, Alaska, have never directly benefited from the industries that made and profited from use of these chemicals. Even if the presence of omega-3 fatty acids reduces the hazard from these contaminants, this is a striking example of environmental injustice. Nothing is more defining of a culture than

traditional foods, and it is a tragedy that the traditional foods of the Yupik people have been contaminated by industrial and military uses of dangerous chemicals. The Yupik people are determined to maintain their close connection with the land and ocean, including their spiritual and cultural reliance on traditional foods. The people of SLI have taken an active role in chemicals policy reform efforts on a national and international level in order to ensure effective cleanup of the military sites and to reduce the burden of persistent organic pollutants in the Arctic.

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