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Community-University Partnership Reveals Ongoing Contamination of Alaska Native Villages and the Environment

Despite significant remediation efforts, pollution from former military sites on St. Lawrence Island, Alaska may still be affecting fish and the health of people living nearby, according to research funded by NIEHS. The project is a collaborative research effort between scientists and Yupik tribe members, who expressed concerns that polychlorinated biphenyls (PCBs) and other contaminants left behind at the sites continue to contaminate the environment and adversely affect their health.

"Given that the village residents did not elect to use chemicals at the formerly used defense sites or benefit from them, and yet likely suffer the [health] consequences of exposure, these sites present cases of environmental injustice," say the study authors in a [new article published in the journal Environmental Pollution](#).

The U.S. government closed hundreds of military sites in Alaska after the Cold War, leaving behind a legacy of PCBs and other pollutants that persist in the environment and accumulate in wildlife. Research shows that Yupik people living on St. Lawrence Island have blood [PCB levels about 6 times higher](#) than people living elsewhere in the United States. Exposure to PCBs has been linked to a range of [negative health outcomes](#), including cancer.

Many formerly used defense sites are located close to Native villages and traditional hunting and fishing grounds. One formerly used defense site located on St. Lawrence Island's Northeast Cape is used by Yupik residents for subsistence activities. Concerned by the high exposure and poor health observed in their communities, Yupik people living on St. Lawrence Island collaborated with researchers to study PCB contamination. **"We have worked closely with the St. Lawrence Island**

communities in our community-based research for nearly twenty years. Their leadership and participation have been vital to every aspect of the research, from designing the research plan, to collecting the data, to reporting results back to the communities, and in implementing interventions to reduce exposures," said study co-author Pamela Miller, executive director of [Alaska Community Action on Toxics](#).

The military responded to earlier community-engaged work demonstrating the levels of pollution, but there remain concerns about ongoing contamination. "Over the course of three decades, the U.S. government spent \$120 million remediating the Northeast Cape formerly used defense site, and in 2014 the government determined that sufficient cleanup occurred to cease active remediation activities," said lead study author Frank von Hippel, Ph.D., a professor of biological sciences at Northern Arizona University. "However, results from our research show that fish living downstream from the site still have high levels of PCBs in their tissues and that this exposure negatively impacts their health."

The research team analyzed fish from rivers at Northeast Cape and found that they are still heavily contaminated with PCBs. By comparing the molecular weight of different types of PCBs in the fish, they determined that the formerly used defense site was the source of most of the contamination.

The researchers also found that PCBs were disrupting the endocrine function of fish and altering their gene expression. For example, fish collected from sites with higher PCB contamination had decreased expression of genes important in repairing DNA mutations, which could lead to cancer, compared to less exposed fish.

While the fish analyzed in the study are not typically consumed by people on the island, these results demonstrate the potential for health effects in humans, particularly St. Lawrence Island residents who conduct subsistence activities at Northeast Cape. According to von Hippel, when taken together with the finding that the formerly used defense site is the source of most of the PCB exposure, this study demonstrates that additional remediation of the site is needed to protect the health of Yupik residents and the environment.

"This research affirms the knowledge of my people that the health disparities that we are experiencing, particularly among the families with close traditional ties to Northeast Cape, are closely linked with the contamination left by the military. The contamination that harms the fish causes harm to us," stated Vi Waghiiyi, Tribal Member of the Native Village of Savoonga and Environmental Health and Justice Program Director with Alaska Community Action on Toxics. "We hope that these new data motivate responsible cleanup so that our lands, waters, and health may be restored."