

## Protecting Arctic Communities

### NIEHS-funded community-based research in Arctic Alaska Native lands paves the way for better health.

Supported by the National Institute of Environmental Health Sciences (NIEHS), the community-based organization Alaska Community Action on Toxics (ACAT) works to address health risks from contaminant chemicals. ACAT facilitates collaboration between academic environmental health researchers and the indigenous Yupik people of Sivuqaq, Alaska — also known as St. Lawrence Island.

ACAT researchers work with tribal members, health care professionals, students, teachers, and scientists to conduct community-based participatory research<sup>19</sup> that has revealed the extent of contamination in the island and associated health effects.

In addition to improving the health of Sivuqaq residents, ACAT's research and outreach have had broader impacts. The ACAT team has used their research findings to inform local, state, federal, and international policies about toxic chemicals and protect populations who are most likely to be affected.



#### Impacts



##### Mapping

**Mapping Contamination:** ACAT mapped more than 2,000 contaminated water sites in Alaska using geospatial tools.<sup>2</sup>



##### Pinpointing

#### Pinpointing the Problem:

- Legacy contaminants from Formerly Used Defense Sites were a primary source of exposure for Sivuqaq residents.<sup>3,4,18</sup>
- Levels of PCBs in the blood of Sivuqaq Yupik people were 4.5-9 times higher than the average levels in the U.S.<sup>3</sup>



##### Contaminants

**Addressing Emerging Contaminants:** Found polybrominated biphenyl ethers (PBDEs) and poly- and perfluoroalkyl substances (PFAS) in drinking water and traditional foods; linked exposure to hormone disruption.<sup>10, 11, 12, 13, 14, 15</sup>



##### Clean Up

**Cleaning Up Military Sites:** Prompted the establishment of a Restoration Advisory Board by the U.S. Army Corps of Engineers, which provides a forum for community members to review and advise the cleanup process.



##### Toxic Substances

#### Banning Toxic Substances:

- Achieved global bans on chemicals that are ubiquitous and harming Arctic ecosystems and Alaska Natives through the Stockholm Convention on Persistent Pollutants.
- Helped ban four classes of flame-retardant chemicals from children's products, furniture, and mattresses in Anchorage, Alaska.<sup>16</sup>
- Informed ordinances to prevent the use of pesticides in schools, parks, and public lands in Alaska.<sup>7</sup>



##### Informing Policy

**Informing Policy:** Helped reform the federal Toxic Substances Control Act to protect vulnerable populations.<sup>6</sup>



##### Exposure

**Improving Exposure Assessments:** Helped inform new clinical guidelines by the National Academies of Sciences, Engineering, and Medicine for monitoring PFAS in Alaskan communities.<sup>17</sup>

#### Then and Now

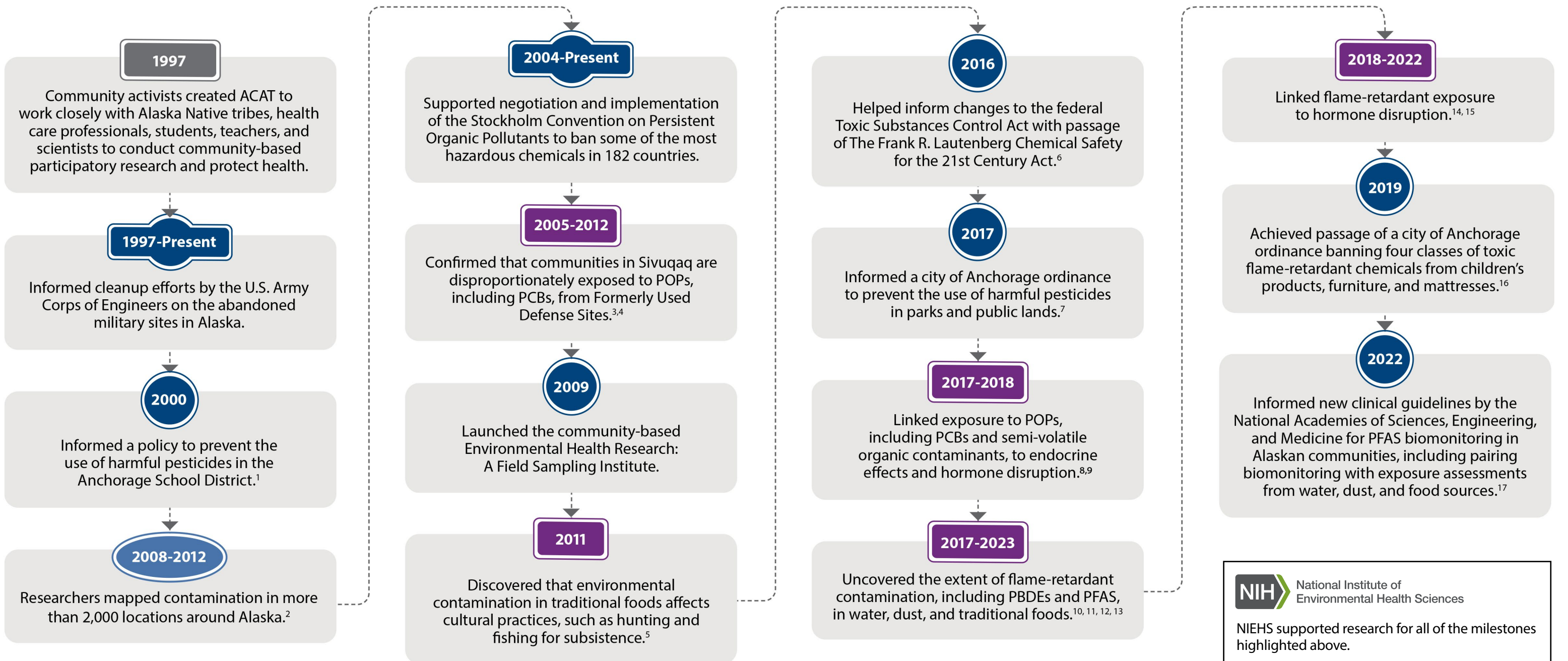
**Then:** Tribal members were worried about exposure to environmental contaminants, including flame retardants and pesticides, through consumption of traditional foods, such as fish, birds, reindeer, and marine mammals.

**Now:** Working with community members, ACAT collected tissues from harvested animals and measured PFAS and PBDEs to discover which animals and parts of the animal had higher contaminant levels and which ones were safe to eat.<sup>12</sup>

**Then:** Residents expressed concern about the potential health effects of chemical exposures on children, and the extent and mechanisms were not known.

**Now:** Researchers discovered that exposure to polychlorinated biphenyls (PCBs) and persistent organic pollutants (POPs) can disrupt the normal function of hormones, which can lead to birth defects, reproductive health problems, and developmental and learning disabilities, among others.<sup>8,9</sup>

# ACAT Protecting Arctic Communities



**NIH** National Institute of Environmental Health Sciences  
 NIEHS supported research for all of the milestones highlighted above.



## Training Community Researchers

ACAT established the Environmental Health Research Institute to provide the community with the tools necessary to conduct their own community-based environmental sampling program. The Institute brings together tribal leaders and community members from around Alaska for a weeklong intensive program to gain knowledge and hands-on experience on a variety of topics, including water quality testing, fish sampling, sediment coring, and GIS computer mapping. The college-credited course also gives participants the opportunity to learn from environmental health experts about how environmental contaminants may affect human health, and how to implement independent community-based environmental sampling programs in their villages.



*Environmental Health Research Institute participants receive laboratory trainings. (Photo courtesy of ACAT)*

## Training Community Health Workers

ACAT runs programs to educate and train health care providers, including community health aides, who are the frontline health care system in most rural Alaskan communities. The training includes monthly webinars for more than 200 people, covering topics such as flame retardant chemicals and their health effects, presentations at hospitals and health care centers, and training at statewide health conferences. Participants can obtain continuing medical education through these trainings.



*ACAT staff member and a tribal member dissect fish for analysis in Sivuqaq. (Photo courtesy of ACAT)*

The team has also developed a variety of toolkits on topics such as environmental health and breast cancer prevention, which also provide important information about how parents and teachers can prevent harmful exposures to children that result in breast cancer and other adverse health outcomes.

## International Involvement

ACAT plays a large role in international efforts to ban toxic chemicals globally. As part of the United Nations' Stockholm Convention on Persistent Organic Pollutants, the team brings Alaska Native leadership, as well as traditional and scientific knowledge, to testify and participate in the decision-making process. Since joining Stockholm Convention negotiations, ACAT has been instrumental in achieving global bans for 34 chemicals that cause harm to the Arctic.

They also participate in the Global Indigenous Peoples Caucus, which convenes during the Stockholm Convention, and the International Pollutants Elimination Network.

## Research Challenges and Solutions

**Challenge:** Slow progress to completely clean up abandoned military sites.

**Solution:** ACAT learned that patient, sustained work with the military in reviewing and advising on project complexities is essential.

**Challenge:** The Northern Hemisphere is a sink for industrial chemicals mobilized from around the world.<sup>20</sup>

**Solution:** Tackling the global scale of contaminants in the Arctic requires international efforts, such as ACAT's work with the Stockholm Convention.

**Challenge:** Extreme weather conditions make it hard to reach and work with remote tribal communities in Alaska.

**Solution:** ACAT researchers learned to adapt, and to be flexible and persistent. The team hired local Yupik-speaking community health researchers and trains tribal members to continue field sampling when the ACAT team is not on-site.



*"Our research is founded on the guidance of community leadership," said project lead Pamela Miller. "We have worked with leadership to establish research questions, as well as how to implement the research. We emphasize community right to know, promote educational empowerment, and support communities against polluters."*

*For references, supplementary information, and more on the impact of NIEHS research, please visit <https://niehs.nih.gov/research/programs/translational/examples>.*