U.S. High Arctic Research Center

Sandia National Laboratories' and the University of Alaska's proposed research center will create new and integrate existing permanent facilities to provide researchers and stakeholders with support for High Arctic operations.

A RAPIDLY CHANGING ARCTIC

Rapidly changing conditions in the Arctic have increased access to natural resources and maritime routes, enabling more commercial shipping, resource extraction, and an increased security presence. Permafrost thaw and coastal erosion impact infrastructure, communities, and ecosystems. These security and environmental issues are exacerbated by the enormity of the region, a lack of infrastructure (including communications and rescue operation capabilities), limited interconnectivity between regions, and scarce monitoring. Evolving Arctic conditions also present significant challenges for scientists and policy makers looking to gain a better understanding of the long-term consequences of climate change. To ensure proper stewardship and security of this critical region, many issues must be addressed in the near future. Sandia also manages Special Use Airspace at Oliktok Point, Alaska for the DOE Arctic Energy Office. This resource, along with a Sandia facility at Oliktok Point, offers unique opportunities to collect data at various altitudes across terrestrial, marine, and cryosphere conditions using tethered balloons, unmanned aerial systems, and manned aircraft.

USHARC: MISSION IN THE HIGH ARCTIC

To meet these challenges, Sandia National Laboratories and the University of Alaska-Fairbanks (UAF) have proposed USHARC, the U.S. High Arctic Research Center. USHARC will provide a multi-disciplinary, year-round center for conducting cooperative scientific research, identifying appropriate Arctic technologies, and supporting field tests and exercises. This capability will enable advances in the development, resilience, preservation, and stewardship of Arctic resources, communities, and environment.

USHARC would encompass several facilities in the Alaska North Slope region, including existing ones like the Barrow Arctic Research Center in Utqiaġvik, Oliktok Point, and Toolik Field Station. Specific amenities would include an uncrewed aircraft systems (UAS) facility and integrated ground station for environmental measurements, along with other supporting infrastructure. Research vessels would also be available for lease in Prudhoe Bay for offshore activities. These facilities could offer year-round use, logistical support, and access to varied ecological settings and could support testing for technologies, such as autonomous platforms, renewable energies, microgrids, and sensors.

Having multiple facilities operating in a consortium will enhance the capabilities available to the international science community and the matching of scientific field campaigns to appropriate locations. Collaborations supported by USHARC will also advance U.S. knowledge and monitoring of the Arctic to improve environmental stewardship, security, and sustained economic opportunity.

AN ENDURING PARTNERSHIP

For over 20 years, Sandia and UAF have worked together, connecting researchers to advance Arctic science and infrastructure. UAF is a leader in research on Arctic issues like permafrost, coastal erosion, sea ice, search and rescue operations, glaciers, and remote energy systems. In addition to partnering on USHARC, Sandia and UAF aim to increase resilience across infrastructure and natural systems through modeling and analysis supported by the Arctic Infrastructure Simulation Analysis Center. They also have collaborated to study the use of bifacial (double-

sided) solar photovoltaics and microgrid systems to make energy production economical and reliable in Arctic environments.

SANDIA'S EXPERIENCE IN THE ARCTIC

The Arctic is a critical, but challenging, environment for advancing climate security. In addition to operating facilities in the High Arctic for the Department of Energy, Sandia has decades of experience providing science, applied research, and technology for local and global Arctic challenges, including:

- Measurements and model development for Arctic coastal erosion,
- Energy assessments for Alaska native villages,
- Nuclear materials management for the US Air Force,
- Search and rescue drills with the US Coast Guard,
- Remote sensing of permafrost,
- Computer modeling of the melting Greenland ice sheet,
- Airborne Synthetic Aperture Radar (SAR) to detect crevasses in land ice sheets of Greenland and Antarctica, as well as characterization of sea ice,
- Arctic-capable measurement platforms including tethered balloon systems and uncrewed aerial systems (UAS),
- Testing and development of Arctic resilient technologies.

OLIKTOK POINT FACILITY AND SITE ASSETS

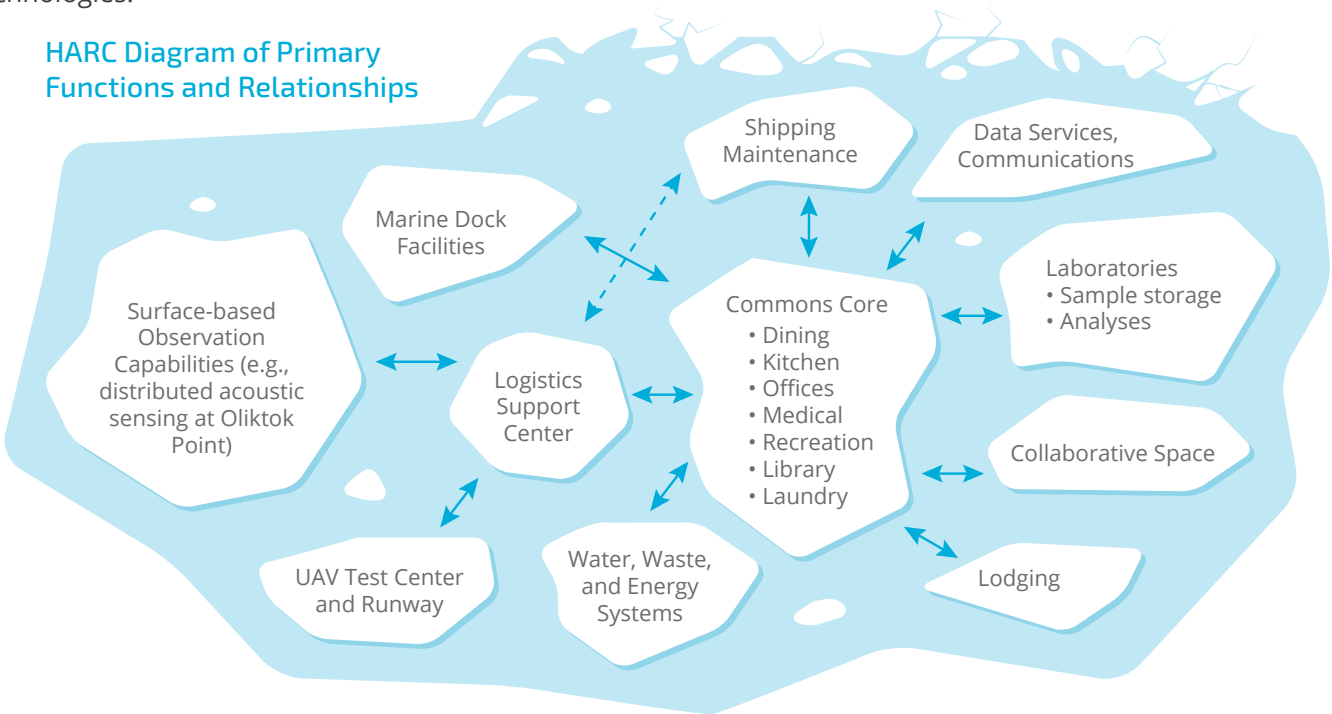
Existing assets include:

- **Access:** 1 km from the Arctic Ocean; with access to the lower 48 states via the northern-most road in the U.S.
- **Controlled airspace:** Domestic and international airspaces to provide researchers with access to areas at Oliktok Point and 700 miles north across the Arctic Ocean
- **Research support:** Lab space, logistical and operational support, UAS facilities, lodging, and test equipment

Planned features of USHARC include:

- **Collaboration:** Collaborative space for Arctic stakeholders, e.g., federal agencies, local governments, industry, and universities
- **Ocean access:** A year-round road from the station to the shoreline to provide direct ocean access for marine engagements Shared use: On-site support equipment, a UAS hangar, real-time observations, meteorological data, and lodging
- **Secure Communications:** Depending on the mix of USHARC users, the facility could include classified and secure communications and workspace

HARC Diagram of Primary Functions and Relationships



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