

Research Infrastructure in the Arctic and New Initiatives for High Arctic Research Centers, Poster C25B-0828

Session: C25B. A Blue Arctic Ocean: Future U.S. Arctic Research and Marine Infrastructure Needs

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ABSTRACT

Sandia National Laboratories has managed atmospheric research facilities for the U.S. Department of Energy in northern Alaska for more than 20 years. The Atmospheric Radiation Measurement (ARM) facility at Utqiagvik (formerly Barrow) Alaska began delivering data in 1998. It has operated continuously since then. The AMF3 Mobile facility located at Oliktok Point Alaska operated for 8 years starting in 2013. In July 2021, this mobile facility was disassembled and transported to the lower 48. The AMF3 completed its measurement missions in Alaska. It will be reconfigured and sent to the southeastern U.S. to fulfill a new set of scientific mission requirements.

Sandia will maintain a limited presence at Oliktok Point Alaska for several more years. A Distributed Acoustic Sensor was recently installed (Abbott et al.) It collects acoustic and seismic data from the Beaufort seafloor just north of Oliktok. It will be operated for about two more years. Related instrumentation to help with validations, including a Terrestrial Seismic Sensor, and meteorological measurements will be installed at Oliktok.

With growing interest in the Arctic, continued operations and the unique capabilities at Oliktok Point would benefit international research efforts. For example, the Special Use Airspaces at Oliktok, Restricted Area R2204 and Warning Area W220, enable safe aerial research operations in international airspace extending more than 700 miles north of Oliktok.

We identified two types of scientific and technical research facilities in northern Alaska that would benefit the broader research and technical-development community. One, an open facility would serve international research needs by providing supporting infrastructure, logistics, and capabilities like airspace access. It would mirror existing facilities like the Barrow Arctic Research Center (BARC) but would provide complementary capabilities. A virtual or distributed research facility that includes several physical facilities, such as the BARC and a High Arctic Research Center at Oliktok, could provide a wide range of resources or infrastructure tailored to particular science missions. The other type of facility, a secure facility, would provide research infrastructure that serves the specialized needs of agencies addressing arctic national security concerns.

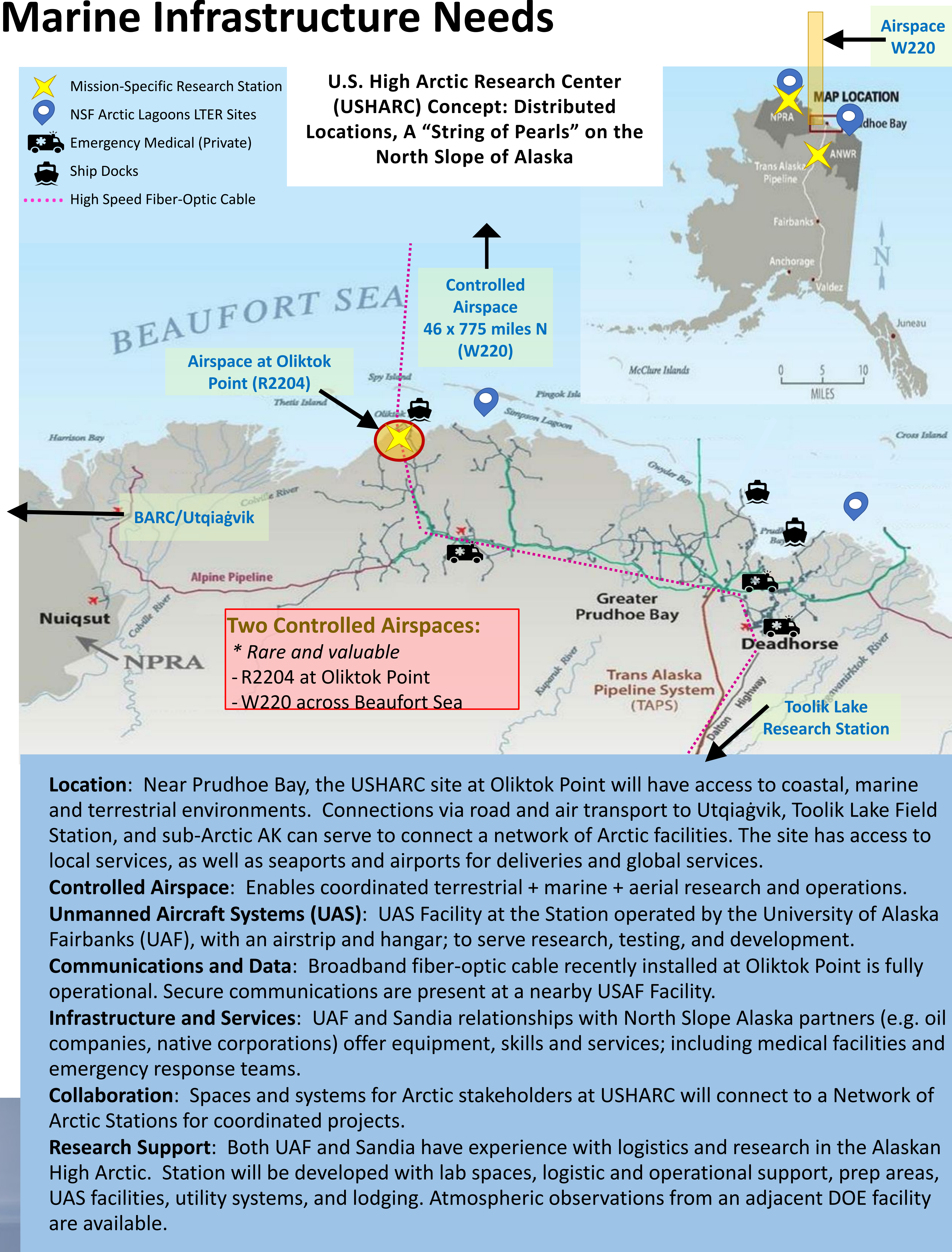
Controlled Airspaces:

- R-2204 at Oliktok Point, AK: Domestic Restricted Airspace, to 7000 ft (2134 m)
- W-220 40x700 N Miles (70x1296 km) toward North Pole: International Warning Area to 10000ft (3048 m)



Key science drivers and benefits identified:

- ❖ **Beaufort Sea** has significant gaps in observations and monitoring
 - ❖ Impacts of (and on) **human activities** are poorly understood
 - ❖ **Inter-agency/public-private collaborative opportunities**
 - ❖ Higher resolution measurements across all domains are needed to **support higher resolution modeling and coupling for process-level dynamics**
 - ❖ Opportunity to **test new technologies** (e.g. *unmanned aerial systems and state-of-the-art sensors*) to support Arctic research
 - ❖ **Seasonal transitions** are both **challenging and scientifically interesting**
- Each of the **four key science areas** identified specific **science gaps, operational needs, and technology uses.**



Location: Near Prudhoe Bay, the USHARC site at Oliktok Point will have access to coastal, marine and terrestrial environments. Connections via road and air transport to Utqiagvik, Toolik Lake Field Station, and sub-Arctic AK can serve to connect a network of Arctic facilities. The site has access to local services, as well as seaports and airports for deliveries and global services.

Controlled Airspace: Enables coordinated terrestrial + marine + aerial research and operations.

Unmanned Aircraft Systems (UAS): UAS Facility at the Station operated by the University of Alaska Fairbanks (UAF), with an airstrip and hangar; to serve research, testing, and development.

Communications and Data: Broadband fiber-optic cable recently installed at Oliktok Point is fully operational. Secure communications are present at a nearby USAF Facility.

Infrastructure and Services: UAF and Sandia relationships with North Slope Alaska partners (e.g. oil companies, native corporations) offer equipment, skills and services; including medical facilities and emergency response teams.

Collaboration: Spaces and systems for Arctic stakeholders at USHARC will connect to a Network of Arctic Stations for coordinated projects.

Research Support: Both UAF and Sandia have experience with logistics and research in the Alaskan High Arctic. Station will be developed with lab spaces, logistic and operational support, prep areas, UAS facilities, utility systems, and lodging. Atmospheric observations from an adjacent DOE facility are available.