The Potential Use of Unmanned Aircraft in the Alaska Oil and Gas Industry

Cathy Cahill
Director
Alaska Center for UAS Integration
What is the Alaska Center for UAS Integration (ACUASI)?

• ACUASI is the University of Alaska’s Unmanned Aircraft System (UAS) research program

• Our missions include:
  – Assisting the FAA in the safe integration of UAS into the National Airspace System
  – Supporting Alaskan UAS users and industry
  – Conducting scientific research
ACUASI Is a Leader in UAS

• ACUASI leads the Federal Aviation Administration’s (FAA) Alaska Test Site
• The University of Alaska Fairbanks (UAF) is a core member of the FAA’s Center of Excellence for UAS Research (ASSURE)
• ACUASI leads one of the 10 FAA UAS Integration Pilot Program efforts
Unmanned Aircraft System (UAS)
ACUASI’s UAS Fleet
(evolution in action)
Payload Development and Integration:

- MESA-DAA airborne radar [24.55 GHz]
- IRIS vision Hedgehog [visual distance]
- SWIR, MWIR, LWIR
- EO/IR sensors
- In situ methane sensors
- In situ CO₂ sensors
- Optical particle counters
- Flares
- Lidar

Velodyne VLP16 LiDAR
Trillium Orion HD50
Potential Uses of UAS for the Alaska Oil and Gas Industry

• Pipeline surveillance
  – Leak detection
  – Threat identification
  – Encroachment
  – Pipeline shifting
• Cargo delivery
  – Medical supplies
  – Repair supplies
• Oil spill response
• Mammal surveys
• And the list goes on...
Oil and Gas Infrastructure

**Eni Infrastructure**

Part change out on gas flare stacks has traditionally been performed by ordering parts and shutting the stacks down without knowing whether they required replacement.

**Oliktok Point Production Facility**

Through the power of UAS, it is possible to fly close enough and capture video showing whether a part has outlived its useful life.

The result - $1 to $3 million in savings per stack by not shutting down unless replacement is necessary.
Beyond Visual Line of Sight (BVLOS) - Trans-Alaska Pipeline

- Monitoring of critical infrastructure, the Trans-Alaska Pipeline, BVLOS of the Pilot in Command in Class G airspace.
- Complex COA process included coordinating airspace with military, using ADS-B transponders, and requiring daisy-chained observers.
In Situ Methane Sensor for Hilcorp Energy Co.

- ABB Microportable Gas Analyzer (CH$_4$, H$_2$O)
- 35 watts
- 6.5 kg (without case)
- Detection: 3 ppb
- 1s sampling rate
- Real-time data delivery (KML update every 3 seconds)
- Aircraft: S1000
- Logs GPS / flight data (MAVLink or GPRMS)

Proof of Principle done with BP Alaska
Herder Burner - Oil Spill Research
Poker Flat (April 2015)
Advantages of UAS

• Safer
• Repeatable
• Environmentally friendly
• Can be less expensive to operate
• High-resolution data
• Have the potential to fly when manned aircraft cannot fly by Visual Flight Rules
Challenges of UAS

• Federal Government/FAA regulations
  – Beyond Visual Line of Sight (BVLOS)
  – Type certification
• General aviation
• Harsh environments (icing, winds, etc.)
• Appropriate UASs, crews, and logistical capabilities
• Unlicensed users
• Quantity of data produced
The Path Forward

• ACUASI is working with the FAA, NASA, and commercial entities to develop, test, and evaluate “Detect and Avoid” (DAA) technologies for use on small UAS

• ACUASI, as the lead for one of the FAA Test Sites and a UAS Integration Pilot Program site, is working with the FAA to obtain BVLOS permission in Alaska
UAS Integration Pilot Program

• U.S. Department of Transportation program created in response to an Executive Order from the President

• Purpose - To accelerate the commercial use of UAS in the U.S.

• 149 state, local, and tribal government teams submitted proposals

• 10 IPPs were granted

• The ACUASI-led Alaska team got one!
Alaska IPP Team
ACUASI - lead

Alaska Aerial Media
Alaska Department of Fish and Game
Alaska Department of Transportation & Public Facilities
Alyeska Pipeline Service Company
Aquilo
Cherokee Nation
Crown Consulting Inc.
Fairbanks North Star Borough
Hilcorp Energy Company
Insitu
Iris Automation
K-2 Dronotics
Latitude Engineering
North Slope Borough
Simulyze
Trumbull Unmanned
Unifly
University of Hawaii
Unmanned Systems Alaska
Vigilant Aerospace Systems
UAS Integration Pilot Program

- Prioritized projects:
  - Trans-Alaska Pipeline System
  - Hilcorp Energy Pipelines
  - Medical Supply Delivery

- Early wins:
  - True BVLOS permissions for ~11 miles of the Trans-Alaska Pipeline near Pump Station #1 and just north of Fairbanks
  - One of the first civil BVLOS operation permissions given in the U.S.
  - Unmanned Systems Alaska LLC - Part 135
Commercial

• Part 135 - This means an FAA Certified Air Carrier
• Type certified aircraft - These aircraft have been proven to be safe
• Challenges
  – No pure unmanned aircraft Part 135 exists
  – Only two type certified unmanned aircraft
  – Until these issues are overcome, no BVLOS
The Path Forward

• Proof of principle exercises
  – Medical supply delivery

• Working in similar climates, out of similar airports, and with larger aircraft
  – Transport Canada is teamed with ACUASI to develop the concept of operations for flying UAS out of northern airports in Canada
  – Larger aircraft usually can carry larger payloads/cargo and fly longer distances
Larger Aircraft - SeaHunter
Larger Aircraft - Sentry
Summary

- This is an exciting time for developing the use of UAS in the oil and gas industry in Alaska.
- The technologies and regulations are getting closer to being able to support cost-effective Alaskan BVLOS missions.
- The use of UAS will enhance safety and decrease costs for a multitude of oil and gas industry related efforts.
Thank you for your attention!

Questions?

SeaHunter flying over the North Slope of Alaska in October. Photo courtesy of Jordan W. Murdock and Robert J. Edison.