Working Document of the NPC Study:
Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources
Made Available March 27, 2015

Paper #7-4

AVIATION AND SUPPORT LIMITATIONS IN THE ARCTIC

Prepared for the

Technology & Operations Subgroup

On March 27, 2015, the National Petroleum Council (NPC) in approving its report, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources*, also approved the making available of certain materials used in the study process, including detailed, specific subject matter papers prepared or used by the study's Technology & Operations Subgroup. These Topic Papers were working documents that were part of the analyses that led to development of the summary results presented in the report's Executive Summary and Chapters.

These Topic Papers represent the views and conclusions of the authors. The National Petroleum Council has not endorsed or approved the statements and conclusions contained in these documents, but approved the publication of these materials as part of the study process.

The NPC believes that these papers will be of interest to the readers of the report and will help them better understand the results. These materials are being made available in the interest of transparency.

The attached paper is one of 46 such working documents used in the study analyses. Appendix D of the final NPC report provides a complete list of the 46 Topic Papers. The full papers can be viewed and downloaded from the report section of the NPC website (www.npc.org).

This page is intentionally left blank.

Topic Paper

(Prepared for the National Petroleum Council Study on Research to Facilitate Prudent Arctic Development)

7-4	Aviation and Support Limitations in the Arctic
Author(s)	**Stuart Greene (Shell)**
Reviewers	**Dale Farmer (ExxonMobil)** **Mitch Winkler (Shell)** **Dennis Warth (Cenergy)**
Date: July 30, 2014	**Revision:** Final

SUMMARY

A description of impacts to aviation logistics and infrastructure in the Alaskan Arctic, current capability enhancements and recommendations for the future.

PURPOSE

This topic paper seeks to define and catalogue the logistical challenges, limitations and current/future operational improvement initiatives affecting aviation operations in the Arctic.

BACKGROUND

There are many challenges to conducting aviation operations in the Arctic beyond the obvious issues of extreme cold, persistent icing and unpredictable weather. Offshore aviation in the arctic is heavily constrained by a general lack of logistics and infrastructure to support all phases of operations. Compounding this issue are the short building season, long lead times necessary to develop infrastructure, and the general level of uncertainty in offshore drilling resulting in a reluctance to invest in long term projects.

While the challenges are great, there are controls in place governed by Industry Aviation Assurance Offices, the Federal Aviation Administration (FAA) rules and regulations, and contract aviation companies' internal controls have effectively managed risks without a major aviation incident/mishap during the most recent operational seasons.

The following is a comprehensive, though not all inclusive list of challenges faced by aviation operations in the Alaskan Arctic:

- A shortage of suitable airfields, which are close to the planned offshore helicopter routes, for use as IFR alternates increases required fuel loads and reduces available payloads resulting in more flights and higher operating costs.
    - To compensate, offshore helicopter landing platforms (heli-decks) are planned, contracted and positioned to support operations in case of emergency divert

    - The suitability can also be mitigated through improvements but with associated costs.
- A general lack of airfields with suitable infrastructure (hangars, Jet-A fuel, suitable Aircraft Rescue and Fire Fighting (ARFF) response, IFR ground-based approaches, runway lighting, ground de-ice capability, and passenger handling facilities
    - Current landscape of suitable facilities and services exist only in Barrow and Deadhorse. Future operational support sites will require significant investment to upgrade existing or develop new facilities and services to adequately support prudent development operations in the Chukchi
    - Many airfields do not have hard surface runways which limits the type and size of aircraft that can be supported. This challenge can be met through long term expansion projects.
    - Any expansion efforts will have to be analyzed to insure minimal impact on the local populations. With this said there are airfields that have great potential for expansion with corresponding minimal impact on the local population. The Wainwright DEW line site with adjacent runway is a good example due to its distance from the village and access to the ocean.
- Long lead time requirements and a shortage of fit for purpose offshore airframes (Heavy Helicopters with de-ice, sea state 6 floats, internal auxiliary fuel tanks)
    - Solutions currently exist with the S-92 and EW-139 airframes, but come at an increased cost to the venture when ordered with short lead times. Therefore, proper planning and funding strategies will decrease the potential of increased cost.
    - As exploration and appraisal operations prove successful, investments will need to be made to grow and maintain a fleet of Arctic-capable rotary wing assets
- Limited Operators able to provide OGP compliant support
    - As exploration and appraisal operations prove expected prospect potential, anticipate that the footprint of viable operator companies will grow to match need
- Societal Risk Normalization. "Bush" pilot mentality.
    - Pros and cons associated. Must develop the pros while mitigating the cons.
    - The Alaska Aviation Industry has invested heavily in mitigating the "bush pilot" mentality through seminars and other educational means. The Alaska Medallion Foundation was setup years ago to improve the industry's accident record; and, in part, management and pilot's analysis of risk.
- Limited air traffic control offshore of North Slope
    - Lack of FAA certified automated weather reporting (AWOS) capability
        - An FAA approved test plan is in place to gain AWOS type certification for floating drilling vessels. These AWOSs will be deployed on the drilling vessels for 2015 season and are planned to be commissioned by FAA in theater to provide certified weather.
    - Lack of radar coverage for IFR separation
        - The use of ADS-B utilizing satellite communication has great potential to provide tracking information direct to FAA controllers. This should be possible in the next decade.
    - Lack of radio communications with ATC

        - A letter has been delivered to FAA requesting two Remote Communication Air to Ground facilities (RCAG) be placed on the two drilling vessels. FAA appears to be supportive of the request. The RCAGs will provide direct communication with the FAA air traffic controllers, who control the theater's airspace.
- General lack of FAA approval of commercial Unmanned Aerial Vehicles (UAV) operations.
    - The use of UAVs will reduce exposure to aircrews operating at low levels, long distances offshore providing required Protected Species and Ice Monitoring observation flights.
    - FAA has approved an over land commercial UAV operation in Prudhoe Bay for road, pipeline, and equipment surveys. Over-ocean studies are also in place utilizing UAVs. Industry is very active with FAA in looking for UAV opportunities and FAA has been cooperating.
- Vast distances can result in extended medical response times.
    - Only Tier 3 Medical Facility in AK is in Anchorage.
    - Potential solutions include enhancing Barrow's Hospital, or developing organic medical facilities offshore.
    - All employees are currently, and in the future must be, medically certified "fit to work" in the remote Alaskan Arctic environment to mitigate medivac needs
- Temperatures can go below the operating certification of aircraft
    - Minimum operating temperatures vary by aircraft type, normally -32^{o}F to -40^{o}F
    - Aircraft cannot be operated in conditions below their certification limits
- Rotor anti-icing systems are necessary for IFR operations in the arctic.
    - No aircraft can operate in severe icing even with de-ice systems
    - De-icing systems such as the Rotary Wing Ice Prevention System are expensive modifications that must be contracted through air service providers.
    - All helicopters planned for IFR operations supporting offshore crew change and Search and Rescue (SAR) will have rotor de-ice systems due to the increased safety margin provided.
- No aircraft can legally takeoff with ice, frost, or snow on the airframe
    - Requirement to contract these services at bed-down and emergency divert airfields
- Runways must be kept clear of excessive ice and snow which can delay operations. However, this is no different than other areas with similar climates. The proper equipment and operating staff need to be available, which will require increased funding support at those airports that do not have the necessary capabilities.
- Visibility & ceilings on the coast regularly prohibit operations due to fog and low clouds
    - Aircraft generally cannot takeoff or land with less than 200' ceiling / ½ SM visibility
    - Visual Flight Rule (VFR) operations require higher weather minimums.
    - Federal and State permits and Subsistence Avoidance agreements can drive up enroute flight minimums reducing window for VFR operations even greater
    - FAA certified AWOS coupled with effective airspace classification and improved communication can greatly enhance operations when IFR rule sets must be followed

    - Operation of IFR and anti-icing equipped aircraft will improve the probability for flight.
- Longer logistical supply chain to the Arctic for aircraft parts resupply can result in longer delays to operations.
- Depending on asset availability and deployment status, USCG response times may be greater if they are not based close to the operating theater.

All of these issues must be addressed and mitigated as they were during the 2012 and 2013 seasons in order to conduct safe and effective aviation operations in the Arctic. Solutions should not be short-sighted and should allow for expansion of all future operations.

DISCUSSION

As discussed, there are many challenges to operating in the Arctic which are compounded by a general lack of supporting infrastructure and support services. These challenges have been and are safely managed, but additional opportunities could be manifested through a coordinated public/private effort to greatly improve our operational agility, success and safety in the future. Some of the opportunities are already being realized by the FAA AWOS, RCAG, and UAV projects and other actions identified above.

As the region expands and operations increase, shared services/shared costs across the industry as well as Federal, State and local governments can develop robust facilities and support services. Long term solutions must be developed for airspace and traffic de-confliction which incorporates helicopter, fixed wing, and UAV operations. As oil lease prospects are explored that are even further off shore, the ability to refuel helicopters offshore must be developed. Moreover, response times of onshore SAR and Medical Response assets must constantly be re-evaluated and addressed. The potential for offshore based assets should be considered.

The most significant hurdles to present and future operations are:

- Airspace development (IFR separation, Communications, Weather reporting)
- Onshore Airfields and Infrastructure (suitable IFR alternates, ARFF, ground services, terminals)

To meet the first hurdle, the development of improvements to the offshore airspace service volume is actively being addressed (AWOS and RCAG) as stated earlier. However, the onshore airfields and infrastructure hurdle will involve high levels of funding and longer time frames to make the necessary improvements. In the meantime, this hurdle is being addressed from a safety standpoint by the control framework currently in place.

Conducting safe and effective aviation operations in the Arctic is a challenging undertaking. It requires a high level of professionalism and understanding of the hazards involved. Ensuring passengers and aircrew are provided the necessary tools and support to conduct these operations is paramount.

RECOMMENDATION(S)

Many of the challenges faced by aviation in the Arctic will require continued cooperation of government and commercial entities. A coordinated strategic plan for Arctic Air Services should be developed to address the requirements, current and future, articulated above down to objectives, the tasks and sub-tasks level of detail. Once complete, this will help focus funding decisions to meet the developed objectives. This effort should be led by industry, with close coordination with Federal, State and local representation as all entities stand to benefit.

Prepared by: Stuart Greene
Organization: Shell Exploration and Production Company, Anchorage Alaska
E-mail address: stu.greene@shell.com
Office phone: 907-887-3586