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 #7-7

MARINE AND AVIATION BASING 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)

7-7	**Marine and Aviation Basing Limitations in the Arctic**
Author(s)	**Adam Shaw (Shell Marine)** **Rocky Lee (Shell Aviation)**
Reviewers	**Dale Farmer (ExxonMobil)** **Mitch Winkler (Shell)**
Date: August 14, 2014	**Revision:** Final

SUMMARY

New port and airfield infrastructure in the Alaskan Arctic needs to broadly consider the cost-benefit across the full user space including the oil gas industry, commercial enterprises outside the oil and gas industry, federal and state users, and local communities.

PURPOSE

This paper is provided as a means to help understand the limitations of Marine and Aviation Basing in the Arctic, specifically the Alaskan Arctic, and to propose recommendations to the Federal Government that not only mitigate these limitations, but encourage thoughtful planning and execution in the future to the benefit of all parties involved.

BACKGROUND

Arctic Alaska hosts relatively few maritime facilities and aviation bases that are properly resourced and dedicated to serving the petroleum industry. The lack of dedicated infrastructure requires industry to seek alternative facilities or bypass Alaska entirely. Without deep-draft ports or marine terminals with suitable dry-dock capabilities and access to intermodal support networks, marine vessels transit to ports outside of the Alaskan Arctic for resupply, maintenance and repair. Aircraft are limited to established public airports that function exclusively as transportation hubs for the people and supplies necessary to sustain rural North Slope villages.

Alaska's only deep-draft ports and associated maritime facilities are located in Anchorage, Seward, Kodiak, Unalaska and Homer. Vessels currently receive limited aviation support for crew change and resupply through regional hubs or engage in offshore vessel to vessel transfer of personnel and supplies. Both delivery options require transshipment via air or land transport through aviation and maritime hubs such as Barrow, Deadhorse, Kotzebue and Nome. With the existing infrastructure on the Arctic Slope, marine vessels require significant supply chains for resupply and limited option for repair.

The added impact of industry aircraft often aggravated the traditional calm of villages so companies also used the existing airline flights to these rural communities in an effort to minimize the increase of their aviation activities at community airports. However, this practice reduced the number of airline seats available for traditional residents thereby escalating ticket costs for rural travelers as prices quickly adjusted upwards in response to the higher demand for airline seats to/from the villages.

In the recent past, development of new industry aviation support bases has been steering toward co-location with existing village airports but this will likely cause more issues and stress between the industry and village populations.

DISCUSSION/POTENTIAL AREAS OF FURTHER RESEARCH

In 2013, the State of Alaska and the U.S. Army Corps of Engineers published the Alaska Deep-Draft Arctic Port System Study. This study reviewed Alaskan ports to identify which were suited for future development to meet the needs of increased maritime traffic, improve opportunity for resource development, and improve incident response and environmental protection capabilities in the Arctic.

The study evaluated Alaskan ports against multiple criteria;

1) Proximity to Natural Resource Extraction
2) Intermodal Connection
3) Upland Support
4) Natural Water Depth
5) Navigation Accessibility

Utilizing Multi-Criteria Decision Analysis and 50-year scenario planning, the initial candidate list was narrowed from 14 ports to the final list of 4 ports suitable for further evaluation. These ports include Nome, Port Clarence, Cape Darby and Barrow.

In addition to the Alaska Deep-Draft Arctic Port System Study, other studies have been conducted to understand or evaluate maritime transportation and infrastructure requirements for the Arctic. Two significant examples include:

1) The Northern Waters Task Force Report (January 2012) recommended continued analysis and development of ports and safe harbors in the Arctic.
2) The 2009 Arctic Marine Shipping Assessment Report recommended critical improvements to infrastructure.

There are four types of Aviation Bases currently being used in the Arctic but, for the purposes of this paper, we will only discuss the first two types listed below:

1) Year-round inland airports serving fixed-wing airplanes (FW), rotary-wing helicopters (RW), and unmanned aerial systems (UAS).
2) Year-round inland helibases or heliports serving RW and vertical or capture-capable UAS (much smaller real estate footprint than conventional runways).

3) Seasonal vessel-based helidecks or heliports serving RW and vertical or capture-capable UAS (can be mobile or seasonally stationary).
4) Seasonal offshore ice runways or helibases/heliports serving FW, RW, and UAS (as ice thickness permits).

Several new strategically placed Aviation Bases would reduce the industry's overall impacts to Arctic Alaska by:

1) Moving industry's aviation footprints and activities away from villages. This would reduce noise signatures and cultural contamination caused by influences from outside workers.
2) Designing flight routes away from communities and subsistence areas, including high overhead IFR routes.
3) Utilizing larger FW aircraft with larger load capacities. Doing so ultimately reduces the number of flights as long as the new Aviation Bases possess long, high-strength, precision IFR runways and full-service passenger / cargo terminals.
4) Facilitating the use of smaller FW and RW 'field' aircraft. This is a natural result of locating the bases closer together so that smaller aircraft, with smaller environmental and cultural impacts, can operate in all weather conditions in more fit-for-purpose roles within new oil development areas.

North Slope villages would also realize some benefits if new inland and offshore Aviation Bases were built. Some of these benefits could include:

1) Improved Search and Rescue (SAR) services. SAR aircraft would have more basing options and divert locations with full support services such as IFR capabilities, fuel, deicing, and climate-controlled passenger / survivor holding areas. This would ultimately result in longer 'on-scene' times for the SAR aircraft and consequently increase the success of SAR situations.
2) Positive radar handling of non-industry aircraft operating in the vicinity of village airports. These services would enhance pilots' awareness of issues such as rapidly changing weather conditions, other aircraft in their proximity; as well as providing Air Traffic Control (ATC) services for inflight emergencies.

As the industry prepares to expand oil development in the Arctic regions, it can leverage the full potential of modern aircraft by building smart, capable, and fit-for-function aviation bases in locations that would facilitate the lowest practical impact to the unique cultures and environs of the North Slope.

RECOMMENDATION(S)

Based on the results of the Alaska Deep-Draft Arctic Port System Study, the State of Alaska and the U.S. Army Corps of Engineers recommended:

1) Strategic investment to enhance development of an Arctic Ports System.

2) Encourage private entities and authorize public agencies to utilize Public-Private Partnerships to collaborate on constructing marine infrastructure.
3) Increase funding to complete hydrographic and bathymetric mapping to support marine infrastructure development.

The State of Alaska and the U.S. Army Corps of Engineers have obtained funding to continue a feasibility study to evaluate the establishment of a port management authority and public-private partnerships. In addition, an initial feasibility study will be conducted to enhance the port facilities at Nome and Port Clarence.

Additional concerns noted by the study that are related to maritime infrastructure include:

1) Potential for maritime incidents due to increased marine vessel traffic.
2) Limited aids to navigation and charting along Alaska's Western and Northern coast.
3) Lengthy response time for State and Federal responders.

New aviation basing models can achieve the optimum balance of benefits for industry, residents, wildlife, and environment alike if federal and state regulators are willing to shepherd those developmental strategies to fruition.

Prepared by:
Aviation:
Rocky Lee
Organization: Shell Alaska
E-mail address: rocky.lee@shell.com
Office phone: 907-433-8848

Marine:
Adam Shaw
Organization: Shell Alaska
E-mail address: adam.shaw@shell.com
Office Phone: 907-433-3459