

Paper #7-3

MANAGING THE ICE PICTURE

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).

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Topic Paper

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

7-3

Managing the Ice Picture

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SUMMARY

This topic paper is analogous to a similar paper “Ice Management” in the EP Chapter. The papers are aligned with their recommendations and it is appropriate that this paper is retained to support the criticality of “Managing the Ice Picture” as it relates to Logistics and Infrastructure. Key recommendations are 1) to always improve our technical surveillance capabilities and 2) improve Arctic mariner training capabilities to ensure that current expertise is not only retained, but enhanced as we conduct future energy exploration and development operations in the Arctic OCS environment.

PURPOSE

Paper purpose is to provide background and information on historic, current and future capabilities to successfully manage ice in the Beaufort and Chukchi Seas.

BACKGROUND

Ice management operations have been used since 1973 to enable moored floating drill ships to operate in ice and extend operations into the ice season. This experience, by Canmar Drilling and Beaudril, includes the Canadian and US Beaufort Sea as well as the central Chukchi Sea. Valuable experience was gained in understanding ice threats, vessel capabilities and in actual ice management techniques. Ice management experience gained during this era was used successfully in offshore Sakhalin Island for seasonal SALM buoy (raising and lowering to the seabed) and protecting tanker loading operations. The same ice management techniques and personnel also participated in a successful coring operation south of the North Pole at ~ 85N. The following information details the historic and current approach to manage ice in the Arctic environment.

1. Historic approach, Canada

- a. Drill ships and support vessels wintered in the arctic in a number of harbors protected from moving ice and with adequate water for deep draft vessels.
 - b. Drilling supplies were trucked north and or shipped down the Mackenzie to Inuvik and Tuktoyaktuk. As the need dictated supply barges with heavier loads were towed north into Canada from the Pacific side around Point Barrow.
 - c. Large tank vessels were stationed in Beaufort Sea harbors for fuel resupply.
 - d. Shallow draft supply vessels able to enter Tuktoyaktuk (limiting water is the approach channel in Kugmalit Bay before entering Tuktoyaktuk)
 - e. McKinley Bay and Herschel Basin were used as floating marine bases for deep draft vessels. Crane and supply barges and various support capabilities including floating dry docks were stationed in these areas, arctic experienced shipyard crews were available for repairs and maintenance
 - f. The ability to over winter the fleet allowed operating companies to avoid lengthy mobilization times and inherent uncertainty of break up timing.
 - g. Crews were mobilized well ahead of the land fast ice break up to warm up the vessels and conduct maintenance.
 - h. Having the fleet close to drill sites and ready to mobilize when ice conditions allowed operations to commence as soon as sufficient open water developed at drill sites often before an open water route around Pt. Barrow had developed.
2. Historic approach, US Beaufort and Chukchi
 - a. Drilling and support assets were Canadian assets mobilized from the Canadian Beaufort and so shared the benefit of Canadian geography.
 3. Current approach limitations
 - a. No operations in Canada to leverage
 - b. All assets mobilized from the US side
 - c. No Arctic ports available for resupply
 - d. Very long supply chain
 - e. Long transits in mobilization time cause complexity in planning

DISCUSSION

Successful ice management and the operation of an Ice Management Plan (IMP) should result in the identification, monitoring, assessment and management of ice regimes in the vicinity of a drilling operation. The successful operation of an IMP should be seen as the capability to properly identify and assess hazardous ice and make the correct decision whether a drilling unit should stay on location while ice management vessels manage the ice or initiate well securement and an orderly departure from the well site before arrival of hazardous ice.

1. Factors for effective Ice Management Planning
 - a. Sufficient appropriately classed ice management vessels
 - b. Ice Management Vessel (IMV) crews with experience in ice operations and ice management

- c. Consideration given to not class vessels for minimum expected conditions. There is always the possibility of late season requirements or production scenarios.
- d. Appropriately ice classed drilling units
- e. All support vessels operating where contact with ice is possible must have an appropriate ice class as per the Polar Code
- f. Consideration given to ice management processes, vessel access to ice regimes for monitoring, plotting and assessing versus USFW / NIMFS concerns.
- g. Real time monitoring of hazardous ice features
- h. Regular satellite imagery delivery
- i. Training for upcoming IMV crews, drilling units and support vessels commensurate with the vessel work assignments
- j. Dedicated radar imagery satellite capability providing frequent area coverage
- k. Contingency contracts with third party icebreaker operators in the event of worst case scenario
- l. Ice alert systems for safe departure from well site
- m. Undoubtedly US flag vessels are required in the long term however in the short term the Jones Act causes complexity when chartering foreign flag ice class vessels to cover lack of US flagged assets

RECOMMENDATIONS

Enhancements and improvements in the following areas are recommended to reduce operating conservatism and ensure sustainable capability:

1. Ice and meteorological input – accurate and timely ice and weather forecasting, imagery, analysis and advice.
2. Maintaining current capabilities while growing the future cadre of Masters and IA's with adequate operational experience to properly assess the ice against vessel capabilities, ground truth satellite and other imagery and feed back to scientific group.
3. A step by step process to monitor ice threat and weigh against operational status to provide a clear cut decision making process for safety of the drilling unit, well and personnel.

The near twenty year time span from the last arctic offshore drilling operations in the nineties to the present interest in arctic offshore has produced a future gap in personnel experienced in offshore arctic drilling and a shortage of ice capable drilling units and support vessels. Consequently a pool of experienced personnel will have to be developed again as well as US flag vessels with the appropriate ice capabilities. An increased Government and environmental focus has produced a more cautious approach to Arctic operations. However this may limit the accrual of actual icebreaking expertise as applied to ice management and slow the development of experienced crews. Increased availability of specific training for vessel operations in ice

including simulator training will help to train new personnel and ensure that this expertise is maintained at levels needed for future Arctic operations.

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