

Summary Report: Oil Spill Response Gap Assessment for the Canadian Beaufort Sea and Davis Strait

Background

This gap analysis was initiated as part of NEB's Arctic Review that is engaging industry and the public to review Arctic safety and environmental offshore drilling requirements. The primary objective is to 'Provide estimates about when and how long primary recovery and clean-up techniques of mechanical recovery, dispersants, and in-situ burning would be unavailable due to environmental factors such as adverse ice conditions, visibility, darkness, higher sea states, etc.'. The analysis was completed for the near- and far-offshore waters northwest of Tuktoyaktuk and the central- and west-central Davis Strait west of Disko Bay, Greenland. Large-scale offshore spill response operations were the focus of this assessment. In-situ burning would include the use of fire-proof booms to contain and collect oil in open water conditions and chemical herding agents to enhance burning operations in ice. Large offshore booms and skimmers would be deployed in containment and recovery operations. Large fixed-wing aircraft would be used in chemical dispersant application.

Methodology

Twenty years of wave height, wave period, and wind speed data were acquired from the Meteorological Service of Canada's (MSC) hindcast data sets for the Beaufort Sea (MSC Beaufort, Swail 2007) and the North Atlantic (MSC Atlantic, Swail 2006). Environment Canada's National Climate Data and Information Archives were used as the source for air temperature, visibility and ceiling data in this study. Twenty years of historical data for the towns of Tuktoyaktuk, Northwest Territories and Clyde River, Nunavut were used in the assessment.

Response operating limits that defined categories of Favourable, Marginal and Not Possible, for each environmental factor, were established for each of the primary response options of in-situ burning, containment and recovery, and aircraft-based dispersant application. The environmental factors considered were: daylight, minimum visual flight requirements (VFR) in uncontrolled airspace, superstructure icing, wind speed, wave height, and wave period. A final assessment of the applicability of a countermeasure was made by combining all of these environmental factors to determine if under the combined conditions the countermeasures option was Favourable, Marginal, or Not Possible during periods of open water. The results of this analysis on a monthly basis for the two locations in the two geographic areas are provided in Tables 1, 3, 5, and 7. Tables 2, 4, 6 and 8 identify, on a monthly basis, the percentage of time that at least one countermeasure option is Favourable, at least one option is Favourable or Marginal, and when none of the options is possible during open water periods. When rounding values to the nearest whole number the percentages for Favourable, Marginal and Not Possible do not always sum to 100%.

Response Gap Assessment Results

Based on the historical frequency of these conditions, response with at least one of the countermeasures options of in-situ burning, containment and recovery and dispersant application would be possible for the period when open water is usually present, July through October for the Beaufort Sea and August through November for Davis Strait:

- From 32 to 77% of the time in this period for the Near Offshore location in the Beaufort Sea;
- From 31 to 78% of the time in this period for the Far Offshore location in the Beaufort Sea;
- From 16 to 65% of the time in this period for the West-Central Davis Strait location; and
- From 15 to 63% of the time in this period for the Central Davis Strait location.

For portions of the year outside the above periods, an active response could be deferred until the following melt season.

Table 1: Percentage of Time that Countermeasure Options are Favourable, Marginal or Not Possible for Near Offshore Beaufort Sea

Month	In-Situ Burning			Containment & Recovery			Aerial Dispersant Application		
	Fav.	Marg.	Not	Fav.	Marg.	Not	Fav.	Marg.	Not
June	70	8	22	70	10	20	60	0	40
July	67	7	26	66	10	24	46	0	53
August	45	9	46	46	13	41	48	0	52
September	20	11	69	21	17	62	41	2	58
October	5	7	88	5	9	85	32	3	65

Table 2: Percentage of Time When At Least One Countermeasure Option is Favourable for Near Offshore Beaufort Sea

Month	At Least One Countermeasure Option Favourable	At Least One Countermeasure Option Favourable or Marginal	No Countermeasure Option Possible
June	80	80	20
July	77	77	23
August	60	60	40
September	42	44	56
October	32	35	65

For periods of freeze-up and winter (mid-October through June), response deferred to spring-time melt season.

Table 3: Percentage of Time that Countermeasures Options are Favourable, Marginal or Not Possible for Far Offshore Beaufort Sea

Month	In-Situ Burning			Containment & Recovery			Aerial Dispersant Application		
	Fav.	Marg.	Not	Fav.	Marg.	Not	Fav.	Marg.	Not
June	67	10	23	67	13	20	57	0	43
July	64	11	26	63	13	23	56	0	44
August	43	10	47	43	14	43	48	0	51
September	19	11	70	21	16	63	41	2	57
October	4	7	89	4	9	87	31	3	65

Table 4: Percentage of Time When At Least One Countermeasure Option is Favourable for Far Offshore Beaufort Sea

Month	At Least One Countermeasure Option Favourable	At Least One Countermeasure Option Favourable or Marginal	No Countermeasure Option Possible
June	80	80	20
July	78	78	22
August	59	59	41
September	42	44	56
October	31	35	65
For periods of freeze-up and winter (mid-October through June), response deferred to spring-time melt season.			

Table 1: Percentage of Time that Countermeasure Options are Favourable, Marginal or Not Possible for Central Davis Strait

Month	In-Situ Burning			Containment & Recovery			Aerial Dispersant Application		
	Fav.	Marg.	Not	Fav.	Marg.	Not	Fav.	Marg.	Not
July	59	9	31	36	35	29	53	0	46
August	41	15	45	31	30	39	59	0	41
September	23	17	60	22	27	52	54	2	45
October	9	13	78	9	20	71	39	2	59
November	0	3	97	0	3	97	15	1	83
December	0	0	100	0	0	100	0	0	100

Table 6: Percentage of Time When At Least One Countermeasure Option is Favourable for Central Davis Strait

Month	At Least One Countermeasure Option Favourable	At Least One Countermeasure Option Favourable or Marginal	No Countermeasure Option Possible
July	73	73	27
August	63	63	37
September	54	56	44
October	39	41	59
November	15	17	83
December	0	0	100
For periods of freeze-up and winter (December through July), response deferred to spring-time melt season.			

Table 7: Percentage of Time that Countermeasure Options are Favourable, Marginal or Not Possible for West-Central Davis Strait

Month	In-Situ Burning			Containment & Recovery			Aerial Dispersant Application		
	Fav.	Marg.	Not	Fav.	Marg.	Not	Fav.	Marg.	Not
August	52	9	38	38	26	36	48	0	52
September	33	15	52	31	21	48	52	0	48
October	14	14	72	14	18	67	40	1	59
November	1	4	95	1	4	95	16	0	84

Table 2: Percentage of Time When At Least One Countermeasure Option is Favourable for West-Central Davis Strait During

Month	At Least One Countermeasure Option Favourable	At Least One Countermeasure Option Favourable or Marginal	No Countermeasure Option Possible
August	65	65	35
September	55	56	44
October	40	42	58
November	16	16	84
For periods of freeze-up and winter (December through July), response deferred to spring-time melt season.			