STUDY TITLE: Loss of Well Control Occurrence and Size Estimators for the Alaska OCS

REPORT TITLE: Final Report Loss of Well Control Occurrence and Size Estimators for the Alaska OCS

CONTRACT NUMBER: M12PC00004

SPONSORING OCS REGION: Alaska

APPLICABLE PLANNING AREA: Beaufort Sea, Chukchi Sea

FISCAL YEARS OF PROJECT FUNDING: FY 2012-2016

COMPLETION DATE OF REPORT: September 24 2014

COSTS BY FY: FY 2012: $298,540
FY 2014: $ 7,500

CUMULATIVE PROJECT COST: $306,040.00

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KEY WORDS:

Loss of Well Control, Blowout, Blowout Preventer, Oil Spill, Pollution, Offshore Drilling, Offshore Production

BACKGROUND:

Probabilistic estimates of oil spill occurrences are used by the United States Department of the Interior, Bureau of Ocean Energy Management (BOEM), to support the development of environmental impact assessments for hypothetical and proposed developments in the U.S. Chukchi and Beaufort seas. Due to the limited offshore oil development in this region, it was not feasible to base these oil spill probability estimates on empirical data from that region alone. Rather, statistically significant non-Arctic empirical data from the U.S. Outer Continental Shelf (OCS) – including the Gulf of Mexico (GOM) and Pacific OCS – and world-wide sources, together with their variance, are used as a starting point, to be adjusted using fault and event tree methodologies to emulate Arctic conditions. One of the sources of oil spills, and likely the largest spill volume potential, is the Loss of Well Control (LOWC) leading to a blowout during drilling, production, workover or abandonment. The general purpose of the current project is to conduct a study of world-wide data on LOWC incidents, and generate statistics and information characterizing regional, incident type, causal, and other characteristic variations of LOWC frequencies and associated consequences including hydrocarbon spill volumes. LOWC events include both blowouts and well releases.

* P.I.'s affiliation may be different than that listed for Project Manager(s).

OBJECTIVES:

Specifically, this study included the following principal objectives:

- Update of offshore LOWC frequency information through 2011 for the U.S., Canadian and Australian offshore regions, the North Sea, and other areas with a comparable regulatory regime, and collation of associated exposure variable information that was readily available.
- Application of statistical procedures to develop LOWC occurrence rates for different operational phases and products spilled.
- Evaluation of confidence intervals for LOWC occurrence rates.
- Provision of statistical measures such as mean and median spill sizes, spill size distributions, and as well as provision of methods for possible statistical outliers such as the Macondo blowout.

DESCRIPTION:

An extensive study of world wide loss of well control (LOWC) incidents has been carried out to support BOEM's use of the results from the fault tree model generating oil spill occurrence rates for oil and gas lease sales and any development projects in the Chukchi and Beaufort Sea OCS Planning Areas proposed under BOEM and industry planning.

The principal data sources used were the BOEM/BSEE (Bureau of Safety and Environmental Enforcement) data and the SINTEF offshore blowout database. As access to the full the SINTEF database is on a proprietary membership basis, the contractor acquired such membership as part of the work for years 2013 to 2015. The methods utilized including data analysis, statistical, probabilistic, and risk analysis techniques used produce results compatible with and applicable to the fault tree evaluations of oil spill occurrence estimators used by BOEM. Such an application is currently underway and the results generated herein have been found to be compatible with the application.

NOTABLE CONCLUSIONS:

Notable conclusions of the work can be summarized as follows:

- Generally adequate data on LOWC occurrences and their characteristics in western waters such as the North Sea and the U.S. GOM, are available from the SINTEF database for a sufficiently large exposure for the period from 1980 to 2011.
- More detailed data, on LOWC occurrences and their characteristics, including spill volumes, for the U.S. OCS are available from the BOEM/BSEE database for a sufficiently large exposure for the period from 1980 to 2011.
- The above data were of sufficient quantity and quality to permit the generation of statistics, including occurrence rates for different operational phases and products spilled, associated confidence intervals, and other statistical measures.
- Certain data, however, were not available, including spill volumes for locations other than the U.S. OCS, well exposure populations by water depth intervals for all locations, or detailed characterization of the products spilled from LOWC incidents.
- Recommendations to address any shortcomings of the work were made.

STUDY RESULTS:

Table 1 summarizes the key high level LOWC parameters for the principal regions studied. These are only the high level results; far more detailed results are provided in the report.

Table 1: Summary of Principal LOWC Parameters for Key Regions

REGION	EXPOSURE		LOWC FREQUENCY			LOWC DURATION	
	Drilling	Production	Drilling	Production	Interventions	50 % stopped	90 % stopped
	wells drilled	well-years	per 1000 wells drilled	per 1000 well-years	per 1000 well-years	minutes	days
U.S. GOM	31,574	197,721	3.45	0.106	0.314	200	8
North Sea	13,727	59,141	2.99	0.051	0.355	3	20
Holland	1,143	2,948	0	0.339	0.339	n/d*	n/d
Australia	2,559	9,589	1.56	0.104	0	n/d	n/d
Canada East Coast	679	3,955	2.95	0	0	n/d	n/d

* n/d = no data

STUDY PRODUCTS:

Products of the study were a series of reports including the following:

- Post Award Meeting Report
- Scientific Review Panel Resumes
- Progress Report #1
- Progress Report #2
- Draft Final Report and Technical Summary
- Final Report and Technical Summary

Bercha, F., C. Smith, H. Crowley, “Current Offshore Oil Spill Statistics”. Proceedings of the 11th International Conference and Exhibition on Performance of Ships and Structures in Ice (ICETECH 2014); Banff, Alberta, Canada July 28-31, 2014.

Bercha International Inc., “Loss of Well Control Occurrence and Size Estimators for Alaska OCS”. OCS Study BOEM 2014-772, Final Report to BOEM, US Department of the Interior, Alaska Outer Continental Shelf Region, October 2014.