

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Alaska

Planning Area(s): Beaufort Sea, Chukchi Sea

Title: Oil Spill Occurrence Estimators for Onshore Alaska North Slope Crude and Refined Oil Spills (AK-11-02)

BOEM Information Need(s) to be Addressed: The Oil-Spill-Risk Analysis (OSRA) is a cornerstone to regional EISs, environmental assessments, and oil-spill-contingency planning. Oil-spill issues constitute a significant portion of public comments submitted on sale or development EISs in the Alaska OCS Region. Information from this study will be used by Alaska OCS Region staff to estimate small oil spill occurrence (<1,000 bbl) in preparing future, approximately biannual, Arctic exploration and development EISs or EAs, future developmental EISs, and in reviewing oil-spill-contingency plans for OCS and coastal facilities. This study addresses aspects of USGS Recommendations 5.03 and 5.22.

Total Cost: \$199,260

Period of Performance: FY 2011-2014

Conducting Organization: Nuka Research and Planning Group

BOEM Contact: [Dr. Heather Crowley](#)

Description:

Background: Because of lack of developed hydrocarbon and road transportation systems onshore of areas of Arctic OCS oil and gas interest, BOEM is required to analyze the effects of onshore infrastructure development in NEPA analyses. Local stakeholders are particularly concerned with possible effects of oil spills. In Alaska environmental assessments and environmental impact statements, the BOEM uses various datasets and models to estimate the likelihood of large spills ($\geq 1,000$ bbl) and small spills (<1,000 bbl) occurring at sea and on land. For the Liberty EA, British Petroleum Exploration, Alaska (BPXA) collated industry data through 2006 for crude and refined oil spills and developed statistical estimators based on spills per billion barrels of production for spills greater than or equal to 200 bbl. The industry data for spills greater than or equal to 50 bbl were made available to BOEM, but the data for smaller spills were not.

The MMS last collated and analyzed Alaska North Slope small spill data in 2000. More than a decade has passed since a comprehensive analysis of Alaska North Slope crude and refined small spills has been completed by MMS/BOEM. As oil production continues to decline on the North Slope, concern has been raised that spill rates may increase, as hypothesized in the bathtub curve model of industry spillage. In this model, spillage rates are initially higher in early years of development as part of a learning curve, decrease during maturity, and increase again as the infrastructure ages. Since the analysis in 2000, concern has been raised over increasing spillage from corroded pipelines on the North Slope, and industry has been sued by both State and Federal governments for not properly maintaining pipeline integrity in recent years. Recent stakeholder criticisms have stated that MMS/BOEM must do a better analysis and reporting of sources of variance and magnitude of confidence intervals for spillage estimates. A full study of

sources of variance and confidence intervals in small oil spill occurrence estimators for the Alaska North Slope has not been attempted by MMS/BOEM in the past because of limited data availability.

The MMS/BOEM has worked hard to improve spill data sets along with associated infrastructure data sets. Statistical findings and assumptions merit reanalysis with a more extensive and improved data string. This study will test the assumptions of Poisson distribution for small spills, reconsider the suitability of pipeline length or blended spill estimators, and develop confidence intervals for spill occurrence estimators used by BOEM.

Objectives:

- Update and collate crude and refined oil spills on the Alaska North Slope from industry, U.S. Coast Guard (USCG), Environmental Protection Agency (EPA), USDOJ, BLM, BOEM and Alaska Department of Environmental Conservation (ADEC) data sets through 2010.
- Develop relative spill occurrence estimator(s) suitable for use for onshore small oil spills on the Alaskan North Slope using an appropriate exposure variable.

Methods: Investigators will conduct a preliminary meeting to discuss acceptable statistical methods. This will require an understanding of historical statistical approaches, BOEM rationales for estimating oil spill occurrence rates, and possible sources of variance. The discussion will include: methods for deriving historical spill frequencies from Alaska North Slope spill records; exposure variables for spill frequency such as North Slope pipeline miles, volume of throughput, age, and well years; implications for using different exposure variables; and recommended standard data format for exposure variables and accident data.

The investigators will collect, examine and reconcile spill records and cleanup reports for the North Slope and Canadian Beaufort Sea coastal areas for spills >1 bbl into an electronic database in a standard format. Exposure data for Alaska North Slope and Canada will be collected and the number of wells, flow, and pipeline miles by year provided when available. The investigators will also calculate accident frequencies for small spills and perform appropriate statistical analyses, including trend analysis.

Deliverables will include user-friendly models and/or algorithms to allow BOEM staff to recalculate the contractor's measures of variability as additional information or data become available.

Current Status: Ongoing

Final Report Due: March 2013

Publications Completed: None

Affiliated WWW Sites: <http://www.boem.gov/akstudies/>
<http://www.nukaresearch.com/>

Revised Date: July 2012

ESPIS: Environmental Studies Program Information System

All *completed* ESP studies can be found

here: http://www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp