

Environmental Studies Program: Ongoing Studies

Study Area(s): Beaufort Sea, Chukchi Sea

Administered By: Alaska OCS Region

Title: Arctic Air Quality Assessment Modeling
(AK-13-01)

BOEM Information Need(s) to be Addressed: BOEM requires information to assess the cumulative air quality impact of OCS Arctic oil and gas activity, including oil-spill response equipment and associated support equipment not already accounted for through State and Federal air permit requirements. This information will support BOEM and various Federal and State agencies in assuring compliance with the Clean Air Act and environmental justice initiatives. In addition, the information will provide public agencies, permit applicants, and the public with a holistic view of the air pollution impact on the people and environment in Northern Alaska. To support regulation of oil and gas emission sources on the Arctic OCS, BOEM also requires information for defining emission exemption thresholds to ensure OCS facilities will not produce significant air quality impacts to a State.

Total BOEM Cost: \$1,766,025

Period of Performance: FY 2013-2018

Conducting Organization: Eastern Research Group, Inc.

Principal Investigator(s): Paula Fields Simms (Project Manager)

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

Description:

Background: Any Arctic oil and gas exploration and extraction activities that may be proposed for the OCS will require environmental evaluations pursuant to the NEPA and the Clean Air Act, and air quality operating approval will be required under BOEM's Air Quality Regulatory Program. An air quality model capable of conducting an air impact analysis requires various input datasets, including emission sources and meteorology, and a cumulative evaluation requires existing background pollutant concentrations. This project proposes development of these major input datasets, which would be applied to air quality models such as AERMOD, CALPUFF, and the Community Multipurpose Air Quality model (CMAQ) or the Comprehensive Air Quality Model, with extensions (CAMx), to assess the cumulative air quality impact of proposed offshore OCS projects and North Slope support activities.

Various estimates are available for pollutant sources from proposed and existing North Slope and OCS activities, but there is no overall analysis to show the increased pollutant concentration from all aspects of the proposed activities, including increased emissions in towns along the coast, emissions from support vehicles far from the drilling operation, and aircraft and helicopter emissions. This project pulls together existing emissions information available from the Alaska Department of Environmental

Conservation and combines it with estimates of additional emissions from proposed OCS activities. From this comprehensive database, an emission inventory can be calculated and translated to three-dimensional emissions for a time period of interest (i.e., output from the Sparse Matrix Operator Kernel Emissions [SMOKE] processor).

This project includes development of a five-year meteorological modeling dataset (years 2009-2013) that is optimized for performance with air quality dispersion models. The meteorological and emissions datasets will be applied to local area air quality models such as AERMOD and CALPUFF, and a regional air quality model such as CMAQ or CAMx. The results will assist in defining the cumulative impacts of all pollution sources induced by OCS activity, including the formation of secondary fine particulate matter (PM_{2.5}) and ozone chemistry that may be occurring in this environment. This study will be coordinated with work in the Gulf of Mexico OCS Region to avoid duplication of efforts and ensure consistency with similar approaches.

Objectives:

- Test the hypothesis that the cumulative impacts from OCS-related activities, exclusive of permitted sources, would not cause a statistically significant impact on Alaska.
- Test the hypothesis that secondary PM_{2.5} and ozone are not significant for cumulative impact analyses.
- Evaluate modeling results to assess the cumulative impact of emissions on the OCS and on the North Slope.
- Apply the results to demonstrate compliance under the NEPA and the Clean Air Act for EISs and EAs prepared by BOEM and use the information to evaluate the existing emission exemption equations and, if needed, develop revised exemption equations.

Methods:

1. Build an input database of emission sources typically associated with oil and gas activities on the OCS. Build in a scenario of potential OCS development.
2. Prepare an emission inventory using EPA-approved calculation methods and prepare emissions data sufficient as input to local and regional air quality models.
3. Compile and format a dataset for use in dispersion models approved for the Arctic OCS. To the extent practicable, this should build upon meteorological datasets developed by the BOEM “Beaufort/Chukchi Seas Mesoscale Meteorology Modeling Study” and by industry that reflect climatological conditions of the North Slope, Beaufort Sea, and Chukchi Sea.
4. Conduct air quality modeling by applying the input datasets to EPA-approved models such as AERMOD, CALPUFF, CMAQ, or CAMx.

5. Analyze importance of atmospheric chemistry with tools such as a literature survey, box chemistry models, plume models with chemistry, and regional air quality models.
6. Assess the results to identify the background impact and the cumulative impact of proposed OCS activities to meet the project objectives.

Current Status: Completed

Final Report Due: June 2018

Publications Completed:

- Brashers, B., J. Knapik, J.D. McAlpine, T. Sturtz, R. Morris. 2015. Arctic Air Quality Impact Assessment Modeling Study-Meteorological Dataset Evaluation Report. Prepared by Ramboll Environ US Corporation, Lynnwood, WA for U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region, Anchorage, AK. Unpublished report. 48 pp. plus appendices.
- Brashers, B., J. Knapik, J.D. McAlpine, T. Sturtz, R. Morris. 2016. Arctic Air Quality Modeling Study: 2009-2013 BOEM Arctic WRF Dataset. Prepared by Ramboll Environ US Corporation, Lynnwood, WA for U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region, Anchorage, AK. OCS Study BOEM 2015-049. 50 pp.
- Do, B., L. Dayton, N. Hilliard, and P. Fields Simms. 2017. Arctic Air Quality Modeling Study – Final Near-Field Modeling Report. Prepared by Eastern Research Group, Incorporated for U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-029, 59 pp.
- Do, B., N. Hilliard, L. Dayton, J. Sellers, and P. Fields Simms. 2017. Arctic Air Quality Impact Assessment Modeling Study – Evaluation of the Emissions Exemption Thresholds Report. Prepared by Eastern Research Group, Incorporated for U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-040, 59 pp.
- Fields Simms, P., R. Billings, M. Pring, R. Oommen, D. Wilson, M. Wolf. 2014. Arctic Air Quality Modeling Study: Emissions Inventory – Final Task Report. Prepared by Eastern Research Group, Inc., Sacramento, CA for U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region, Anchorage, AK. OCS Study BOEM 2014-1001. 169 pp.
- Fields Simms, P., B. Do, B. Brashers, Ph.D., T. Stoeckenius, and R. Morris. 2018. Arctic Air Quality Impact Assessment Modeling Study: Final Project Report. Prepared by Eastern Research Group, Inc., Sacramento, CA for U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region, Anchorage, AK. OCS Study BOEM 2018-020. 58 pp.
- Fields Simms, P., M. Wolf, M. Pring, R. Billings, R. Oommen, D. Wilson, H. Crowley, V. Raps. 2015. Baseline Emissions Inventory and Future Year Projections for the Arctic Air Quality Modeling Study. Proceedings of the EPA 2015 International Emission Inventory Conference, San Diego, California, April 12-16, 2015.
- Fields Simms, P.G., B. Do, T. Stoeckenius, R. Morris, and H. Crowley. 2017. Arctic Air Quality Modeling Assessment Study. Presentation at U.S.-Canada Northern Oil and Gas Research Forum, Anchorage, AK, October 11-13, 2017.
- Morris, R., T. Stoeckenius, P. Fields Simms, B. Do, H. Crowley. 2017. BOEM Photochemical Modeling of Oil and Gas Development in the Arctic. Presentation at U.S.-Canada Northern Oil and Gas Research Forum, Anchorage, AK, October 11-13, 2017.
- Stoeckenius, T., J. Jung, B. Koo, T. Shah, R. Morris. 2017. Arctic Air Quality Modeling Study Photochemical Modeling Report. Prepared by Ramboll Environ, Novato, CA for U.S.

Dept. of the Interior, Bureau of Ocean Energy Management, Alaska OCS Region,
Anchorage, AK. OCS Study BOEM 2016-076. 124 pp.

Affiliated WWW Sites: <http://www.boem.gov/akstudies/>
<https://marinecadastre.gov/epis/#/search/study/26887>
<https://marinecadastre.gov/epis/#/search/study/27100>

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