

STUDY TITLE: The Data Quality Control and Emissions Inventories of OCS Oil and Gas Production Activities in the Breton Area of the Gulf of Mexico

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CONTRACT NUMBER(S): 1435-01-01-CT-31163

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA(S): Gulf of Mexico within 100 kilometers of the Breton National Wildlife Refuge/Wilderness Area

FISCAL YEAR(S) OF PROJECT FUNDING: 2001; 2002; 2003; 2004

COMPLETION DATE OF REPORT: October 2004

COST(S): FY 2001: \$14,600; FY 2002: \$113,550; FY 2003: \$82,430; FY 2004: \$21,611; **CUMULATIVE PROJECT COST:** \$232,191

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KEY WORDS: Air pollutant emissions inventory, Gulf of Mexico, BOADS, Breton National Wildlife Refuge/Wilderness Area, sulfur dioxide, nitrogen oxides

BACKGROUND: The Breton National Wilderness Area (BNWA), part of the Breton National Wildlife Refuge, is classified as a Class I area under the U.S. Environmental Protection Agency's (EPA's) Prevention of Significant Deterioration (PSD) regulations. Under the Clean Air Act, air quality degradation is limited in Class I areas by establishing stringent "increment" limits for nitrogen oxides (NO_x) and sulfur dioxide (SO₂). These increments are the maximum increases in ambient pollutant concentrations allowed over baseline concentrations. The Minerals Management Service (MMS) is responsible for determining if air pollutant concentrations of NO_x and SO₂ have changed over time in the Gulf of Mexico in the vicinity of the BNWA due to emissions from oil and natural gas production sources. In response to this mandate, MMS has developed an overall strategy to deal with Outer Continental Shelf (OCS) oil and gas production activities that could affect the BNWA. This includes developing inventories of platform emissions, conducting air quality monitoring activities, and establishing a review process for new plans that includes close coordination with the Fish and Wildlife Service.

OBJECTIVES: 1- Describe and quantify emission sources in the OCS that release SO₂ and NO_x within 100 km of the BNWA over the course of 12 consecutive months from September 1, 2000 to August 31, 2001; 2- prepare a report that summarizes the emissions data and describes the methodology used to generate the emissions inventory; 3- prepare data files for platform and non-platform emissions sources that can be used in air quality modeling studies; and 4- update and improve the Oracle computer software program used to used to develop the emission estimates.

DESCRIPTION: The study includes all oil and gas production platforms and non-platform sources within 100 km of the BNWA. Pollutants covered in the inventory are SO₂ and NO_x. MMS attempted to collect activity data from every active offshore oil production platform in the vicinity of the BNWA. Operators were provided with the Breton Offshore Activities Data System (BOADS) Visual Basic activity data collection software for compiling monthly data from August 2000 through September 2001. Nearly 600 oil and gas production platforms submitted monthly equipment activity data files. The monthly activity data collected from the platform operators were then combined with emission factors and algorithms in the final Breton Oracle Database Management System (DBMS) to develop the platform emission estimates. Activity data for non-platform sources within the vicinity of the BNWA were also collected and compiled in order to develop emission estimates for the same time period. For the most part, the emission factors used to calculate the emissions from all of the engines for these non-platform sources were obtained from the EPA's Office of Transportation and Air Quality. EPA published the emission equations along with the diesel marine vessel rule in 2002. The resulting emission estimates have been disaggregated to MMS lease blocks using Geographic Information Technology (GIS) software.

SIGNIFICANT CONCLUSIONS: At the completion of any emissions inventory effort, one final, useful QA/QC check is to compare the inventory results with those from similar inventories. The most applicable inventory to use in a comparison is a base year 2000 (January-December) inventory of emission sources within 100 km of the BNWA. For oil and gas production platforms, the primary source of NO_x in both studies is natural gas engines. The number of natural gas engines in the two studies is similar (513 units in this study, 499 in the base year 2000 study). Daily NO_x emissions in the base year 2000 inventory average 90 tons per day from natural gas engines, compared to an average of 40 tons per day in this inventory. Aside from the reported activity data for each equipment type, a review of the emission factors used in each study provides a good indication of why the NO_x emission estimates are lower in the current study. The estimates in both studies were developed using EPA emission factors, but the emission factors have been changed for natural gas engines. On average, the NO_x emission factors for natural gas engines are 50% lower than the factors applied in the base year 2000 inventory. The contribution of natural gas engines to total NO_x emissions accounts for a large portion (84%) of the emissions reported in the base year 2000 study. The discrepancy in the SO₂ emission estimates is due to the flare estimates in the two studies. In the base year 2000 study, 67% of the SO₂ emissions are from flares, with an average daily value of 2 tons per day. Again, the number of units in the

two studies is similar (data reported for 45 flares in the current study, vs. 51 flares in the base year 2000 study). In the current study, flares account for less than 1% of total SO₂ emissions, with an average daily value of 2 pounds per day. It is believed that the difference is due to a calculation correction in the final Breton DBMS.

STUDY RESULTS: The inventory results indicate that OCS oil and gas production platform and non-platform sources emit the majority of NO_x and SO₂ in the vicinity of the BNWA. OCS platform and non-platform sources account for 80% of total NO_x emissions, and 54% of SO₂ emissions. Oil and gas production platforms account for the majority of NO_x emissions (53%). Other top-emitting NO_x sources are commercial marine vessels (a non-OCS oil and gas production source), drilling operations, support vessels, and pipelaying vessels. Oil and gas production platforms account for only 15% of total SO₂ emissions. Non-OCS oil and gas production sources emit 46% of total SO₂ emissions. Commercial marine vessels, drilling operations, support vessels, and pipelaying vessels are the top-emitting sources in the inventory.

Recommendations for future inventory efforts for oil and gas production platforms in the vicinity of the BNWA focus on the data gathering tools used. There is high uncertainty associated with flare emission estimates, for example. Much of the uncertainty is thought to be due to the interpretation of the data requested by the operators as well as the pre-processing steps applied prior to development of the emission estimates. Work is underway to improve the BOADS software for these equipment types. In addition, an overall improvement will be made to the software to simplify the data requested each month to only the equipment variables that change monthly. This will reduce data entry volume, processing time, and the likelihood of data entry errors.

For non-platform sources, the estimates developed for some source categories such as support vessels and naval operations were based on adjustments to activity data gathered by MMS in 1992. The estimates would be improved by directly collecting activity data for the inventory base year rather than adjusting a prior year's data set. An up-to-date support vessel survey could collect detailed information about vessel size, horsepower rating, and typical operating loads, as well as annual and seasonal activity. The new survey vessel inventory could be used to develop emission estimates in terms that can be readily applied to state-of-the-art GIS tools to spatially allocate emissions with greater accuracy. Although it may prove difficult, MMS may be able to solicit up-to-date information on naval operations in the vicinity of the BNWA.

STUDY PRODUCT(S): Billings, R.S. and D.L. Wilson. 2004. Data Quality Control and Emissions Inventories of OCS Oil and Gas Production Activities in the Breton Area of the Gulf of Mexico: Final Report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2004-071. 94 pp.