

STUDY TITLE: Year 2005 Gulfwide Emission Inventory Study

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CONTRACT NUMBERS: CT-04-33205/M04PC00010

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREAS: Central and Western Gulf of Mexico

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COSTS: FY 2004: \$28,352; FY 2005: \$99,334; FY 2006: \$103,657; FY 2007: \$166,934; **CUMULATIVE PROJECT COST:** \$398,277

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BACKGROUND: The Minerals Management Service (MMS) is responsible for determining if air pollutant emissions from Outer Continental Shelf (OCS) oil and natural gas platforms and other sources in the Gulf of Mexico on the OCS influence the ozone attainment and nonattainment status of onshore areas. Consequently, MMS initiated a research study to develop a base year 2005 inventory of criteria air pollutant emissions and greenhouse gas emissions from offshore oil and gas exploration, development, and production in the Gulf of Mexico on the OCS. The inventory also includes non-OCS oil and gas production sources such as the Louisiana Offshore Oil Port (LOOP), military vessels, and commercial marine vessels.

OBJECTIVES: 1- Describe and quantify emission sources in the OCS that release criteria air pollutants (i.e., carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOC)) and greenhouse gases (i.e., carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)) over the course of one calendar year; 2- prepare a report that summarizes the emissions data, describes the methodology used to generate the emissions inventory; and 3- prepare data files for platform and non-platform emissions sources that can be used in air quality modeling studies.

DESCRIPTION: The Year 2005 Gulfwide Emission Inventory Study includes all oil and gas production platforms and non-platform sources in the Central and Western Gulf of Mexico on the OCS. Pollutants covered in the inventory are the criteria pollutants as well as greenhouse gases. MMS attempted to collect activity data from every major active offshore oil production platform in the Gulf of Mexico on the OCS. Operators were provided with the Gulfwide Offshore Activities Data System (GOADS) Visual Basic activity data collection software for compiling monthly data for calendar year 2005. A total of 1,585 oil and gas production platforms submitted monthly equipment activity data files. Rigorous quality assurance/quality control (QA/QC) activities were performed on the activity data collected from platform operators. The monthly activity data collected from the platform operators were then combined with emission factors and algorithms to develop the platform production equipment emission estimates. Non-platform sources were also included in the inventory, such as pipelaying vessels, drilling vessels, and support helicopters and vessels. Base year 2005 activity data for non-platform sources were collected and combined with emission factors to develop emission estimates for non-platform sources in the Gulf of Mexico on the OCS. Inventory data files were compiled with the oil and gas production platform data suitable for use in air quality modeling applications. In addition to monthly emission estimates by pollutant and individual piece of equipment, the files include the company, structure, and complex ID, lease number, block and area number, and latitude/longitude. For each piece of equipment, stack parameter information such as outlet height, exit velocity, and exit temperature is also presented. Non-platform emission estimates were allocated using Geographic Information System (GIS) software to lease blocks and areas, and inventory data files were compiled with the non-platform data, suitable for use in air quality modeling applications.

SIGNIFICANT CONCLUSIONS: MMS has undertaken the Year 2005 Gulf of Mexico Gulfwide Emission Inventory Study to continue past assessments of the potential impacts of emissions from oil and gas exploration, development, and production in the OCS region of the Gulf of Mexico. The overall goal of the studies is to assess the effects that OCS development has on ozone concentrations in the onshore areas of Texas and Louisiana that are designated by the U.S. Environmental Protection Agency (EPA) as nonattainment for eight-hour average ozone. Onshore areas in Mississippi, Alabama, and Florida could also become designated as non-attainment for ozone in the future. Improvements continue to be made in the inventory development methods, such as the use of an improved data collection tool for monthly platform activity data. Significant improvements also continue to be made for non-platform sources, particularly for emission estimates for marine diesel engines. Updated emission factors were used in this inventory that take into account vessel engine speed, fuel type, and mode of operation. Another important change between the 2000 and 2005 non-platform inventories is the use of updated, and, in some cases, activity data from new sources that more accurately represent activities in 2005.

STUDY RESULTS: When reviewing the results of the *Year 2005 Gulfwide Emission Inventory Study*, it is important to keep in mind the widespread damage in the Gulf of Mexico caused by Hurricanes Katrina and Rita, which impacted the inventory results for September through December. The inventory results indicate that OCS oil and gas

production platform and non-platform sources emit the majority of criteria pollutants and greenhouse gases in the Gulf of Mexico on the OCS. OCS platform and non-platform sources account for 93% of total CO emissions, 72% of NO_x emissions, 76% of PM emissions, 73% of SO₂ emissions, and 70% of VOC emissions. Oil and gas production platforms account for the majority of the CO and VOC emissions. Non-platform OCS oil and gas production sources such as support vessels and drilling vessels emit the majority of the estimated NO_x, PM, and SO₂ emissions. For greenhouse gases, platform sources account for almost all of the CH₄ emissions. Commercial marine vessels and support vessels are the top-emitting non-OCS oil and gas production sources in the inventory for both criteria pollutants and greenhouse gases.

Recommendations for future inventory efforts for platform sources in the Gulf of Mexico on the OCS focus on the data gathering tool used. Numerous improvements have been made to the Gulfwide Offshore Activities Data System (GOADS) resulting in more efficient data collection and development of more accurate emission estimates. There is uncertainty, however, associated with some of the activity data provided for the 2005 inventory, the losses from flashing activity data in particular. Much of the uncertainty is thought to be due to the interpretation of the data requested by the operators. For non-platform sources, future inventory development efforts will build upon the foundation developed in previous MMS inventories. With each inventory, significant improvements have been made to the estimation methods and activity data gathering methods for non-platform source categories. For example, for the 2005 inventory, data were obtained from the Offshore Marine Service Association, the Texas Commission on Environmental Quality, the Coast Guard, a local marine exchange, and EPA to more accurately estimate the number and horsepower rating of support vessels operating in the Gulf of Mexico. These same data sources should be used for future inventories. For commercial marine vessels, accounting for domestic marine vessel traffic in Federal waters will provide more accurate emission estimates. Lastly, one major improvement that can be made for the non-platform emission inventory is the development of monthly emission estimates rather than annual estimates. The U.S. Coast Guard's Vessel Traffic System data includes a compilation of global positioning system (GPS) information on all vessels entering the central area of the Gulf of Mexico. These monthly data can be disaggregated by vessel type and used to develop monthly estimates from the annual emission values.

STUDY PRODUCTS: Wilson, D., R. Billings, R. Oommen, and R. Chang. 2007. Year 2005 Gulfwide emission inventory study. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2007-067. 149 pp.

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