

Development of a Criteria Pollutant Emissions Inventory for Sources in the Gulf of Mexico

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Introduction

- Project is sponsored by the Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA
- Study area is the entire Gulf of Mexico
- Inventory base year is 2000
- Pollutants covered: all criteria pollutants and greenhouse gases
- All platform and non-platform emission sources

Collection of Platform Activity Data

- Gulfwide Offshore Activities Data System (GOADS)
- Users entered:
 - Company, Structure, and Complex ID
 - Lease, block, and area number
 - Latitude/longitude
 - Equipment-specific activity data for each month

Equipment Covered in Data Request

Amine units

Boilers/heaters/burners

Diesel engines

Drilling equipment

Flares

Fugitives

Glycol dehydrators

Loading operations

Losses from flashing

Mud degassing

Natural gas engines & turbines

Pneumatic pumps

Pressure/level controllers

Storage tanks

Vents

Summary of Data Submitted

- 93 companies submitted data for 3,150 platforms
- 1,150 survey records and 35,200 structure records
- 31,475 structure records were labeled “active”
- ERG verified file integrity, and appended all records into one database for QA/QC

Company, Complex, and Structure Identification Codes

- Compared IDs with MMS master list
- Corrected inconsistent or incorrect IDs
- Other checks performed included:
 - Area
 - Block
 - Lease
 - Latitude and Longitude

QA/QC Activities & Data Analyses

- Reviewed QA Summary Form printouts
- Reviewed QC results and comments
- Pre-processing of the data
- Equipment survey consistency
- Data range checks
- Stream analysis
- Application of surrogate values
- Post-processing

Oracle Database to Calculate Emissions

- Oracle DBMS modified for Gulfwide Study:
 - Calculations added for new equipment
 - Emission factors added for additional pollutants
 - Equations standardized to AP-42 emission factors
 - Calculation methods updated based on EIIP guidance
 - Database can be queried by pollutant, platform, month, or equipment type

Calculation Methods

- Amine units: Subcontractor COMM Engineering ran AMINECalc to develop estimates
- Fuel combustion, including drilling rigs: AP-42 emission factors
- Flares: AP-42 emission factors
- Losses from flashing: Vasquez-Beggs correlation equations

Calculation Methods

- Fugitive emissions: API emission factors, EPA Gas Star Program for compressor seals
- Glycol dehydrators: COMM Engineering developed regression equations based on throughput, wet gas pressure, and wet gas temperature
- Loading, storage tanks: AP-42 equations

Calculation Methods

- Mud degassing: 1977 EPA report
- Pneumatic pumps and pressure/level controllers: Fuel usage rate by equipment type and chemical composition of the gas
- Vents: Volume of gas vented and chemical composition of the gas

Non-Platform Emission Sources

- Commercial fishing
- Drilling rigs
- LOOP
- Military and commercial marine vessels
- Natural sources
- Pipe laying operations
- Support vessels & helicopters
- Survey vessels
- Vessel lightering

Non-Platform Sources

- Commercial fishing
 - Activity data obtained from the National Oceanic & Atmospheric Administration's National Marine Fisheries Service
- Drilling rigs
 - Activity data provided by MMS' Operation and Analysis Branch by block
- LOOP
 - Emission sources include 1000 kW generator, 7,500 hp pumps, support vessels, and oil tankers
 - Hours of operation for generator, pumps, and support vessels obtained from LOOP website
 - Ballasting evaporative losses based on product transfer data

Non-Platform Sources

- Commercial marine vessels
 - Transport agricultural, manufacturing, and chemical products
 - Cruise ships
 - Shipping lane activity data obtained from Department of Transportation
- Military vessels
 - Navy and Coast Guard patrol and maneuvers
 - Vessel fleet engines include older residual fueled steam turbines, marine diesel engines, and high speed diesel turbines
 - Navy data from 1995 MMS study
 - Coast Guard provided 2000 data

Non-Platform Sources

- Natural sources
 - Crude oil subsurface seeps
 - Subsurface bacteria and plankton
- Pipelaying vessels
 - GIS activity data provided by MMS' Pipeline Section

Non-Platform Sources

- Support vessels
 - Activity data for 2000 extrapolated from 1995 MMS study based on increase in platforms
- Helicopters
 - Activity data obtained from the “Helicopter Safety Advisory Conference’s Gulf of Mexico Offshore Helicopter Operations Safety Review”
 - Activity data disaggregated into single, twin, and heavy twin engines
 - Emission factors developed from a variety of published test reports

Non-Platform Sources

- Survey vessels
 - Aggregated activity data provided by MMS' Operation and Analysis Branch
- Vessel lightering
 - Operations occur offshore at 3 locations
 - Activity data obtained from the Coast Guard