



Crittenden County NO<sub>x</sub>, VOC & CO  
Emission Inventory

2008 Ozone NAAQS Nonattainment

2014

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## INTRODUCTION

### A. BACKGROUND

This document represents the 2008 8-Hour Ozone State Implementation Plan (SIP) emissions inventory for Crittenden County, Arkansas and includes emission data for NO<sub>x</sub>, VOCs and CO as required by the Clean Air Act Amendments (CAAA) of 1990. The Clean Air Act of 1970 and the Clean Air Act Amendments of 1990 both contain provisions for the attainment and maintenance of National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The CAAA requires revision of existing plans in states containing areas designated as nonattainment prior to 1990 and also requires development of new plans in newly designated nonattainment areas.

On March 12, 2008, the United States Environmental Protection Agency (EPA) lowered the eight-hour ozone NAAQS from 0.08 parts per million (ppm) to 0.075 ppm. Under the 0.075 ppm (75 parts per billion) standard, the EPA designated the Memphis TN-MS-AR area, as nonattainment with a marginal classification. Crittenden County, Arkansas is located within this nonattainment area. The CAAA requirements are very specific and vary in accordance with the severity of the particular area's air pollution problem. Section 182(a)(1) of the CAAA requires states with nonattainment areas to submit a comprehensive and accurate inventory of ozone precursor emissions from all sources within two years of the effective date of designation, which was July 20, 2012. EPA's proposed 40 Code of Federal Regulations §51.1115, specified that states use 2011 as a base year in the proposed implementation rule for the 2008 eight-hour ozone NAAQS.

Enclosed is the base year 2011 emission inventory for Crittenden County, Arkansas which was classified as "marginal" by the EPA. For marginal ozone nonattainment areas, three pollutants must be inventoried: oxides of nitrogen (NO<sub>x</sub>); volatile organic compounds (VOCs); and carbon monoxide (CO). Air Emissions Reporting Requirements (AERR) Rule submittals every three years thereafter will be used to satisfy the periodic EI requirements.

### B. EMISSIONS SUMMARY

The agency directly responsible for the preparing and submitting the 2008 Ozone SIP Emissions Inventory was the Arkansas Department of Environmental Quality (ADEQ). The 2011 EI of NO<sub>x</sub>, VOCs and CO for Crittenden County was created from four general categories of emissions sources: point, area, on-road mobile, and non-road mobile.

The annual emissions for NO<sub>x</sub>, VOCs and CO are estimated in tons per year (tons/year) and ozone season daily emissions are estimated in tons per day (tons/day). Daily emissions are estimated for the typical peak ozone season day. The peak ozone season is defined as that contiguous three-month period of the year during which the highest number of ozone exceedances have occurred over the past three years. The months of June, July, and August were selected for Crittenden County. Peak ozone daily emissions represent average emissions that occurred on a typical weekday during the peak ozone season. All references to daily or seasonal emissions in this document represent peak ozone season daily emissions. In this inventory, NO<sub>x</sub>, VOCs and CO emissions sources are categorized into point, area, non-road, on-road and biogenic sources. Peak ozone season daily emissions are estimated for all of these emission source categories. Sources for the area, non-road, on-road, and biogenic categories were developed using the AERR and are based on EPA-generated information for Crittenden County.

Table 1: Summary

<b>Category</b>	<b>Ozone Season Daily NO<sub>x</sub></b>	<b>Annual NO<sub>x</sub></b>	<b>Ozone Season Daily VOC</b>	<b>Annual VOC</b>	<b>Ozone Season Daily CO</b>	<b>Annual CO</b>
<b>Units</b>	<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>
Point	0.0017	0.63	0.51	186.84	0.004	1.58
Area	8.70	3,165.17	24.90	8,868.94	20.32	7,375.56
Non-road Mobile	2.11	582.63	3.66	881.35	13.78	3,476.63
On-road Mobile	<u>6.80</u>	<u>2,542</u>	<u>2.42</u>	<u>845</u>	<u>23.13</u>	<u>9,051</u>
Total	<u>17.61</u>	<u>6,290.43</u>	<u>31.49</u>	<u>10,782.13</u>	<u>57.234</u>	<u>19,904.77</u>

## SECTION I

### AREA SOURCE INVENTORY

Stationary sources that do not meet the reporting requirements for point sources are classified as area sources. Area sources are small-scale industrial, commercial, and residential sources that use materials or perform processes that generate emissions. Area sources can be characterized by the mechanism in which emissions are released into the atmosphere: evaporative or combustion. Evaporative emission sources include the following: oil and gas production facilities, printing processes, industrial coating and degreasing operations, gasoline service station underground tank filling, and vehicle refueling operations. Combustion sources include the following small facilities with less than 100 tons per year of emissions: oil and gas production facilities, stationary source fossil fuel combustion at residences and businesses, outdoor burning, structural fires, and wildfires.

Arkansas accepts EPA emission estimates for the Area Sources category.

The area source inventory includes emitters of ozone precursors (i.e., VOCs and NO<sub>x</sub>) such as devices that combust fuel (e.g., wood stoves, commercial and industrial boilers), disperse industrial and commercial VOC sources (e.g., dry cleaners, degreasing and industrial surfaces coating), gasoline distribution, off-road mobile sources (planes, trains, and watercraft), fires and open burning (e.g., agricultural burning, structural fires wildfires, prescribed burning). Biogenic sources are also included in this category.

Seasonal Adjustment for Area Source Emissions

Daily emissions (tons per day) for area sources are calculated using the EPA-prescribed method in, “Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone Volume 1: Guidance for Stationary Sources” found at:

[http://www.epa.gov/ttn/naaqs/aqmguide/collection/cp2/bakup/19910501\\_oaqps\\_epa-450\\_4-91-016\\_ei\\_preparation\\_stationary\\_sources.pdf](http://www.epa.gov/ttn/naaqs/aqmguide/collection/cp2/bakup/19910501_oaqps_epa-450_4-91-016_ei_preparation_stationary_sources.pdf).

Table 2: Area NO<sub>x</sub> by Sector

<b>Area NO<sub>x</sub> by Sector</b>	<b>Tons/year</b>	<b>Days/Week</b>	<b>Ozone Season Daily tons/day</b>
Biogenics - Vegetation and Soil	545.17	7	1.498
Bulk Gasoline Terminals	0.63	6	0.002
Fires - Agricultural Field Burning	136.02	7	0.374
Fires - Prescribed Fires	55.10	7	0.151
Fuel Comb - Comm/Institutional - Other	0.01	6	0.00005
Fuel Comb - Residential - Natural Gas	30.80	7	0.085
Fuel Comb - Residential - Oil	0.04	7	0.0001
Fuel Comb - Residential - Other	6.55	7	0.018
Fuel Comb - Residential - Wood	1.77	7	0.005
Miscellaneous Non-Industrial NEC	0.21	6	0.001
Mobile - Aircraft	2.80	7	0.008
Mobile - Commercial Marine Vessels	261.42	7	0.718
Mobile - Locomotives	791.46	7	2.174
Mobile - Locomotives	1327.79	7	3.648
Waste Disposal	<u>5.40</u>	6	<u>0.017</u>
<b>Total</b>	<b><u>3165.17</u></b>		<b><u>8.70</u></b>

Table 3: Area VOCs by Sector

<b>Area VOCs by Sector</b>	<b>Tons/year</b>	<b>Seasonal Factor</b>	<b>Days/Week</b>	<b>Ozone Season Daily tons/day</b>
Biogenics - Vegetation and Soil	6193.09	1	7	17.014
Bulk Gasoline Terminals	45.11	1	6	0.145
Bulk Gasoline Terminals	102.99	1	6	0.330
Commercial Cooking	0.33	1	7	0.0009
Fires - Agricultural Field Burning	240.50	1	7	0.661
Fires - Prescribed Fires	569.34	1	7	1.564
Fuel Comb - Comm/Institutional - Other	0.0005	0.6	6	0.000001
Fuel Comb - Residential - Natural Gas	1.80	0.3	7	0.001
Fuel Comb - Residential - Oil	0.0015	0.3	7	0.000001
Fuel Comb - Residential - Other	0.24	0.3	7	0.0002
Fuel Comb - Residential - Wood	16.76	0.3	7	0.014
Gas Stations	455.64	1	7	1.252
Industrial Processes - Storage and Transfer	110.24	1	6	0.353
Industrial Processes - Storage and Transfer	141.73	1	6	0.454
Miscellaneous Non-Industrial NEC	68.29	1	6	0.219
Mobile - Aircraft	6.16	1	7	0.017
Mobile - Commercial Marine Vessels	5.98	1	7	0.016
Mobile - Locomotives	39.09	1	7	0.107
Mobile - Locomotives	92.02	1	7	0.253
Solvent - Consumer & Commercial Solvent Use	650.71	1	6	2.086
Solvent - Dry Cleaning	1.93	1	6	0.006
Solvent - Industrial Surface Coating & Solvent Use	56.50	1	6	0.181
Solvent - Non-Industrial Surface Coating	59.56	1	6	0.191
Waste Disposal	<u>10.95</u>	1	6	<u>0.035</u>
<b>Total</b>	<b><u>8,868.94</u></b>			<b><u>24.90</u></b>

Table 4: Area CO by Sector

Area CO by Sector	Tons/year	Days/Week	Ozone Season Daily tons/day
Biogenics - Vegetation and Soil	1425.79	7	3.92
Bulk Gasoline Terminals	1.58	6	0.01
Fires - Agricultural Field Burning	2760.70	7	7.58
Fires - Prescribed Fires	2386.49	7	6.56
Fuel Comb - Comm/Institutional - Other	0.008	6	0.00003
Fuel Comb - Residential - Natural Gas	13.11	7	0.04
Fuel Comb - Residential - Oil	0.01	7	0.00003
Fuel Comb - Residential - Other	3.67	7	0.01
Fuel Comb - Residential - Wood	97.13	7	0.27
Miscellaneous Non-Industrial NEC	0.001	6	0.000003
Mobile - Aircraft	227.07	7	0.62
Mobile - Commercial Marine Vessels	53.14	7	0.15
Mobile - Locomotives	171.40	7	0.47
Mobile - Locomotives	116.71	7	0.32
Waste Disposal	<u>118.76</u>	6	<u>0.38</u>
<b>Total</b>	<b><u>7375.56</u></b>		<b><u>20.32</u></b>

## SECTION II

### A. ON-ROAD SOURCE INVENTORY

On-road mobile sources consist of passenger cars, passenger trucks, motorcycles, buses, heavy-duty trucks, and other motor vehicles traveling on public roadways. Combustion-related emissions are estimated for vehicle engine exhaust, and evaporative hydrocarbon emissions are estimated for the fuel tank and other non-tailpipe sources from the vehicle. To calculate pollution from on-road mobile sources, emission rates are estimated as a function of county, vehicle type, roadway type, hour, and operating speed. These rates are then matched with appropriate activity from transportation data parameters such as vehicle miles traveled (VMT), number of vehicles parked, hours spent in extended idle mode, etc.

Arkansas utilized a county scale run of the MOVES 2010b model for this data.

Table 5: On-Road Mobile

Category	Ozone Season Daily NOx	Annual NOx	Ozone Season Daily VOC	Annual VOC	Ozone Season Daily CO	Annual CO
Units	tons/day	tons/year	tons/day	tons/year	tons/day	tons/year
On-road Mobile	6.80	2,542	2.42	845	23.13	9,051

### SECTION III

#### A. NON-ROAD EMISSION INVENTORY

Non-road mobile sources encompass a wide variety of equipment types that either move under their own power or are capable of being moved from site-to-site. More specifically, these sources, which are not licensed or certified as highway vehicles, are defined as those that move or are moved within a 12-month period and are covered under the EPA's emissions regulations as non-road mobile sources. The non-road EI includes emissions from non-road equipment such as:

- Agricultural equipment (i.e. tractors, combines and balers)
- Construction equipment (i.e. graders and back hoes)
- Industrial and commercial equipment (i.e. fork lifts and sweepers)
- Residential and commercial lawn and garden equipment (i.e. lawn mowers and weed trimmers)
- Recreational equipment, (i.e. four wheelers and off-road motorbikes)

This category does not include commercial marine, locomotives, and aircraft.

Arkansas utilized the National Mobile Inventory Model for this data.

Table 6: Non-Road Mobile

<b>Category</b>	<b>Ozone Season Daily NOx</b>	<b>Annual NOx</b>	<b>Ozone Season Daily VOC</b>	<b>Annual VOC</b>	<b>Ozone Season Daily CO</b>	<b>Annual CO</b>
<b>Units</b>	<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>
Non-road Mobile	2.11	582.63	3.66	881.35	13.78	3,476.63



## SECTION IV

### A. POINT SOURCE INVENTORY

Point Sources are large, stationary, emissions sources that release pollutants into the atmosphere. Stationary point source emissions data is collected annually from those sources that meet reporting requirements outlined in the Air Emissions Reporting Requirements (40 C.F.R. Part 51). These sources include, but are not limited to, refineries, chemical plants, bulk terminals, and utilities. Facilities are required to report emissions data via a web-based database system. Reporting of information characterizing the process equipment, the abatement units, and the emission points is also required.

The Arkansas Department of Environmental Quality is responsible for compiling the point source inventory. The Air Division Emission Inventories and Data Management Section is accountable for identifying point sources that meet the reporting threshold criteria as outlined in the AERR and the collection of facility emissions data from designated reporting facilities. ADEQ also processes, compiles, and manages the collected emissions data. Emissions data provided by reporting facilities includes estimates of actual emissions generated by the facility during the previous year. Estimation methodologies are required to follow state and federal guidelines.

ADEQ uses a web-based emissions inventory reporting and database management system to gather point source data from the regulated community. The system is named SLEIS (State & Local Emissions Inventory System). For the 2011 EI, facilities could use SLEIS to electronically submit their EI reports to ADEQ for review; however, they also were required to submit a paper copy of the certifying statement, signed by the responsible official. All submitted data is reviewed for quality assurance purposes and then stored in the SLEIS database. At the end of the annual reporting cycle, point source emission data is reported each year to the EPA for inclusion in the National Emissions Inventory (NEI).

Table 7: Point Source

<b>Ozone Season Daily NOx</b>	<b>Annual NOx</b>	<b>Ozone Season Daily VOC</b>	<b>Annual VOC</b>	<b>Ozone Season Daily CO</b>	<b>Annual CO</b>
<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>	<b>tons/day</b>	<b>tons/year</b>
0.0017	0.63	0.51	186.84	0.004	1.58