# BATON ROUGE AREA
# CLEAN AIR ACTION REPORT

**Prepared for**

ADVANCE
A U.S. Environmental Protection Agency Program

## EPA'S OZONE AND PM ADVANCE PROGRAM

**Prepared by**

Baton Rouge CLEAN AIR COALITION

Capital Region Planning Commission

Louisiana Clean Fuels

**December, 2013**

# FOREWORD

This Clean Air Action Report for the Baton Rouge area has been prepared as a joint effort by the Baton Rouge Clean Air Coalition (BRCAC), the Capital Region Planning Commission (CRPC), and Louisiana Clean Fuels (LCF). These three organizations have been formally recognized by EPA as representatives for the Baton Rouge area in the EPA's Advance Program, which is a collaborative effort between EPA, states, tribes, and local governments. The program encourages expeditious emission reductions in ozone and fine particle ($PM_{2.5}$) attainment areas to help these areas continue to meet the National Ambient Air Quality Standards (NAAQS).

The objectives of this report are:

1. To characterize the Baton Rouge area with respect to its air quality
2. To document the progress the Baton Rouge area has made in air quality improvements and the many efforts that have been made to realize those improvements, and
3. To present a plan for future efforts to further improve Baton Rouge area air quality in order to meet EPA's requirement for a "Path Forward" plan within its Advance Program.

The focus of air quality efforts over the past twenty five years has been on the five-parish Baton Rouge Ozone Nonattainment Area (BRNA) comprised of East Baton Rouge, West Baton Rouge, Ascension, Iberville, and Livingston Parishes. However, for this report we elected to consider the entire 9-parish Baton Rouge Metropolitan Statistical Area (MSA), which includes the original five-parish BRNAA plus Pointe Coupee, West Feliciana, East Feliciana, and St. Helena Parishes.

The information contained in this report was provided by a number of sources, but we are particularly grateful for data and recollections provided by stakeholders of our three organizations and for special assistance provided by the Louisiana Department of Environmental Quality (LDEQ) and the Louisiana Department of Natural Resources (LDNR).

The main take-away for this report should be that the Baton Rouge area has made remarkable progress in air quality improvements against some very tough challenges. This progress can be attributed to federal and state efforts and, most importantly, to local community commitment and efforts. And, as demonstrated in this report, efforts are planned to continue providing air quality improvements for the Baton Rouge area.

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# 1.0 INTRODUCTION

## 1.1 About This Document

This Baton Rouge Air Quality Action Plan has been prepared as a cooperative effort of three organizations participating in EPA's Advance Program for the Baton Rouge area: Baton Rouge Clean Air Coalition, Capital Region Planning Commission, and Louisiana Clean Fuels (formerly Greater Baton Rouge Clean Cities Coalition). This annual report is required of the Advance Program participants to document volunteer actions being taken or contemplated to improve air quality in the Baton Rouge area.

## 1.2 EPA's Advance Program

**The Advance Program** is a collaborative effort between EPA, states, tribes, and local governments. The program encourages expeditious emission reductions in ozone and fine particle ($PM_{2.5}$) attainment areas to help these areas continue to meet the National Ambient Air Quality Standards (NAAQS). The steps taken by program participants could:

1. Help attainment areas reduce emissions in order to ensure continued health protection,
2. Better position areas to remain in attainment, and
3. Efficiently direct available resources toward actions to address ozone and fine particle problems quickly.

**Ozone Advance** promotes local actions to reduce ozone precursors (nitrogen oxides and volatile organic compounds) in attainment areas to help these areas continue to maintain the ozone NAAQS. The program encourages states, tribes, and local governments to take proactive steps to keep their air clean.

Improvements in air quality could:

- help ensure continued health protection over the long term,
- provide state, tribal, and local governments with a cushion against potential future violations of the ozone NAAQS,
- better position an area to achieve air quality concentrations that enable it to avoid a nonattainment designation with respect to any future revised NAAQS or, if eventually designated nonattainment, could result in a lower classification,
- allow for greater ability to choose from control measures and programs that make the most sense for the area and that are cost-effective,
- result in multi-pollutant benefits; for example, reductions of nitrogen oxides can lead to lower ambient fine particulate matter levels as well as lower ambient ozone levels.

Local areas can take steps to reduce ozone on their own, and EPA encourages these proactive efforts. However, some states, tribes, and local governments may prefer to pursue reductions within the Ozone Advance program framework with closer involvement and support from EPA.

**PM Advance** promotes local actions to reduce fine particle pollution ($PM_{2.5}$), and its precursors, in attainment areas to help these areas continue to maintain the $PM_{2.5}$ NAAQS. The program encourages states, tribes, and local governments to take proactive steps to keep their air clean.

Local areas can take steps to reduce PM on their own, and EPA encourages these proactive efforts. However, some states, tribes, and local governments may prefer to pursue reductions within the PM Advance program framework with closer involvement and support from EPA.

## 1.3 Overview of the Baton Rouge Area

**General.** The area of interest for this report is the nine-parish Baton Rouge Metropolitan Statistical Area (MSA) located in southeast Louisiana and anchored by the state's capitol city, Baton Rouge (Figure 1.3-1). Over the past years, the focus for voluntary ozone mitigation strategies has been the five-parish Baton Rouge Ozone Nonattainment Area (Ascension, East Baton Rouge, Livingston, Iberville, and West Baton Rouge Parishes), but with the joining of the three Baton Rouge area Advance organizations, it was decided that the coverage area for the program would be extended to the nine parishes constituting the Baton Rouge MSA.

**Physiography.** The Baton Rouge MSA covers an area of 4,196 square miles. It is relatively flat, with little topographical relief. Elevation within the area ranges from sea level to 150 feet, except for the northern part of the parishes bordering Mississippi where elevations rise to a range of 150 to 300 feet.

**Land Use.** Land uses within the region are primarily forest/wildland, agriculture (primarily soy, cane, and corn), pasture, and urban areas (Figure 1.3-2).

**Climate.** The area has a humid subtropical climate with mild winters, hot and humid summers, and frequent moderate to heavy rainfall. The yearly average temperature for Baton Rouge is 67.5 $^oF$, while the average temperature for January is 51.7 $^oF$ and August is 81.9 $^oF$. The area's average precipitation is 57.9 inches of rain and 0.1 inches of snow annually. A climate data summary for Baton Rouge is provided in Figure 1.3-3. A more detailed summary is provided in Appendix A.

**Baton Rouge Metropolitan Statistical Area**

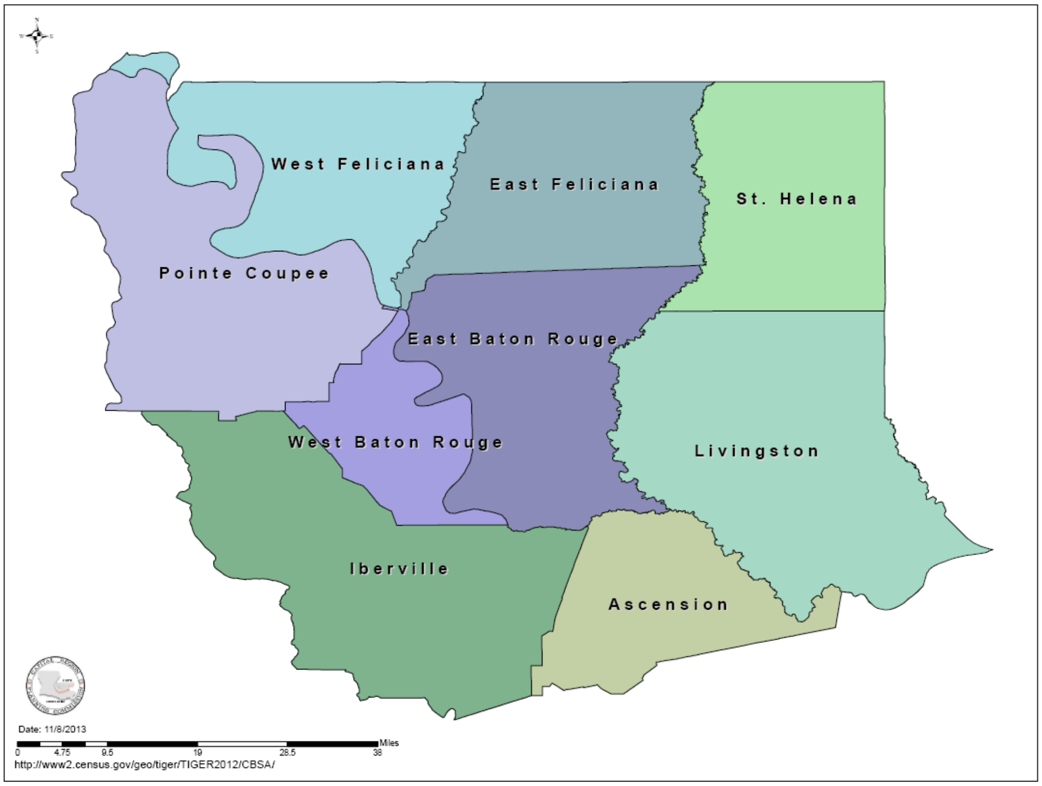
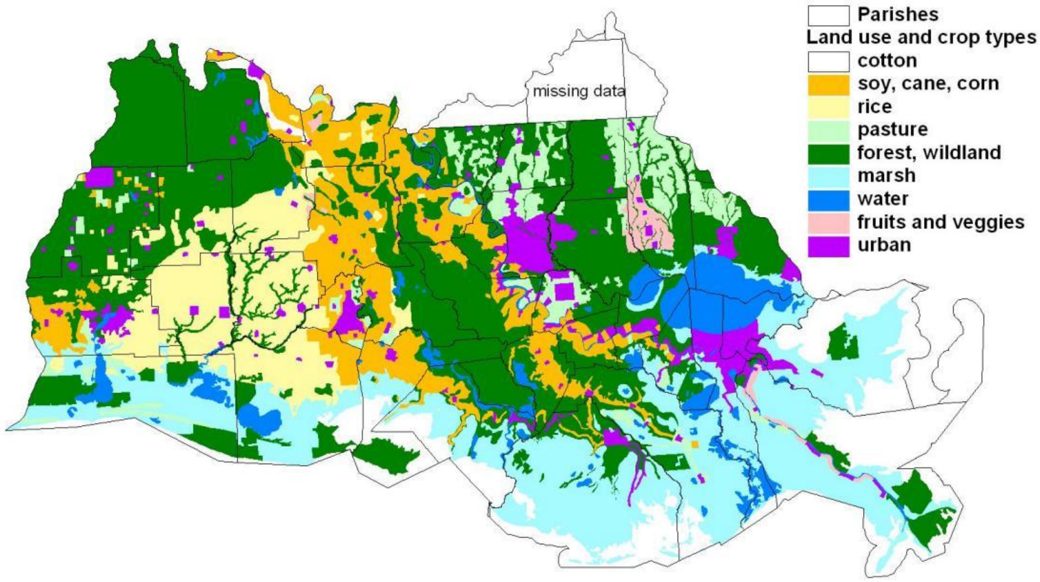




Figure 1.3-1. Baton Rouge Metropolitan Statistical Area.




Source: http://la.water.usgs.gov/nawqa/resource.htm

Figure 1.3-2. Baton Rouge area land use.

**Climate data for Baton Rouge, Louisiana (Metropolitan Airport), 1981–2010 normals**

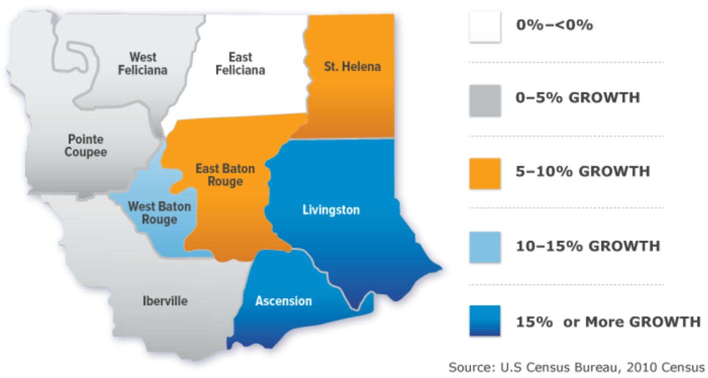
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Record high °F (°C) | 85 (29) | 88 (31) | 93 (34) | 96 (36) | 101 (38) | 103 (39) | 103 (39) | 110 (43) | 104 (40) | 98 (37) | 89 (32) | 88 (31) | 110 (43) |
| Average high °F (°C) | 62.3 (16.8) | 65.7 (18.7) | 72.7 (22.6) | 79.3 (26.3) | 86.2 (30.1) | 90.9 (32.7) | 92.2 (33.4) | 92.5 (33.6) | 88.7 (31.5) | 80.8 (27.1) | 71.9 (22.2) | 64.1 (17.8) | 78.9 (26.1) |
| Average low °F (°C) | 41.2 (5.1) | 44.5 (6.9) | 50.3 (10.2) | 56.8 (13.8) | 65.2 (18.4) | 71.4 (21.9) | 73.7 (23.2) | 73.4 (23) | 68.5 (20.3) | 57.9 (14.4) | 48.9 (9.4) | 42.7 (5.9) | 57.9 (14.4) |
| Record low °F (°C) | 9 (−13) | 2 (−17) | 20 (−7) | 31 (−1) | 40 (4) | 53 (12) | 58 (14) | 58 (14) | 43 (6) | 30 (−1) | 21 (−6) | 8 (−13) | 2 (−17) |
| Precipitation inches (mm) | 5.72 (145.3) | 5.04 (128) | 4.41 (112) | 4.46 (113.3) | 4.89 (124.2) | 6.41 (162.8) | 4.96 (126) | 5.82 (147.8) | 4.54 (115.3) | 4.70 (119.4) | 4.10 (104.1) | 5.60 (142.2) | 60.65 (1,540.4) |
| Avg. precipitation days (≥ 0.01 in) | 9.9 | 8.8 | 8.3 | 7.5 | 7.9 | 12.1 | 12.9 | 11.8 | 8.5 | 7.5 | 8.5 | 9.1 | 112.8 |

*Source: NOAA [14] The Weather Channel (record temperatures) [15]*

Figure 1.3-3. Baton Rouge area climate summary.

**Demographics.** According to the 2010 Census, the Baton Rouge MSA had a population 802,484 with 220,553 individuals residing in the City of Baton Rouge. Population density for the area in 2010 was about 185 individuals per square mile. The population of the area experienced 14% growth over the period 2000 to 2010 (Figure 1.3-4), with most of the growth occurring to the east and south of Baton Rouge.

Nine-parish Baton Rouge MSA or "Capital Region" grew at a rate of **14% from 2000-2010, bringing** the region's population to 802,484




Source: U.S Census Bureau, 2010 Census

| Parish | Total Population | % Growth | Statewide Rank (% Growth) |
|---|---|---|---|
| Ascension | 107,215 | 39.92% | 1 |
| Livingston | 128,026 | 39.44% | 2 |
| West Baton Rouge | 23,788 | 10.12% | 8 |
| East Baton Rouge | 440,171 | 6.62% | 18 |
| St. Helena | 11,203 | 6.44% | 19 |
| West Feliciana | 15,625 | 3.40% | 28 |
| Iberville | 33,387 | 0.20% | 38 |
| Pointe Coupee | 22,802 | 0.17% | 39 |
| East Feliciana | 20,627 | (5.12%) | 52 |
| **TOTAL** | **802,484** | **14.0%** | |

Source: U.S Census Bureau, 2010 Census

Figure 1.3.4. Population growth in the Baton Rouge MSA.

**Economics.** The Baton Rouge area is a major industrial, petrochemical, and medical and research center of the southern U.S. Its largest industry is petrochemical production and manufacturing. The ExxonMobil refinery facility in Baton Rouge is the third-largest oil refinery in the country. Baton Rouge is the farthest inland port on the Mississippi River that can accommodate ocean-going tankers and cargo carriers. The area straddles a main east-west transportation corridor (Interstates 10 and 12) and is home to a major airport (Baton Rouge Metro Airport). In addition to being the seat of state government, the area is also home to two major universities (LSU and Southern University), a state college (Southeastern Louisiana University), a large Baton Rouge Community College, and a number of large hospitals and medical research facilities.  The film industry has recently been a strong growth industry in Baton Rouge.  As indicated in the following Baton Rouge Area Chamber graphic (Figure 1.3-5), the Baton Rouge area has a well-diversified economy.

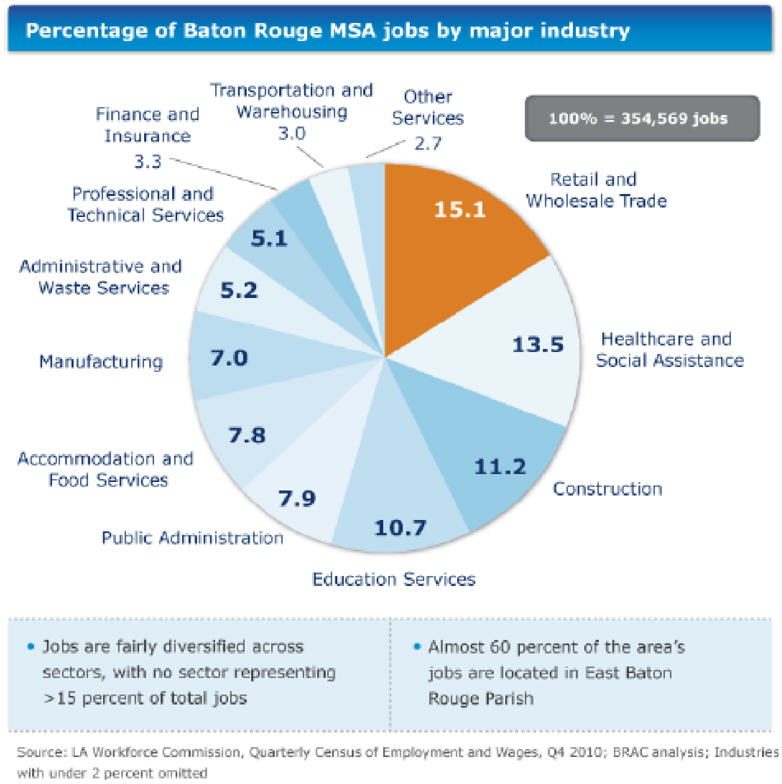



Figure 1.3-5.  Percentage of Baton Rouge MSA jobs by major category.

According to a recent study conducted by a local economics expert, the nine-parish Baton Rouge metro area is projected to add 21,700 new jobs over the next two years as result of a heavy industrial and petrochemical boom (Sanoski, 2013).  The Greater Baton Rouge Industry Alliance has recently tabulated a total of $23.7 billion in announced or underway projects. Most of these projects can be attributed to the abundance of cheap natural gas for energy and feedstock for chemical production.

**Transportation.**   Transportation infrastructure in the Baton Rouge area accommodates most all modes of transportation: roadway, rail, air, waterway, and pipeline.  Major east-west interstate highways (Interstates 10 and 12) cross through the area.  There are approximately 540,000 vehicles registered within the nine-parish area, with about half registered in East Baton Rouge Parish.  Daily vehicle miles traveled (VMT) in the five parish Baton Rouge nonattainment area is about 20,000,000.  During commute peaks in Baton Rouge, the area can be plagued by severe congestion.  According to the 2008 INRIX National Traffic Scorecard, which ranks the top 100 congested metropolitan areas in the U.S., Baton Rouge is the 33rd-most-congested area in the country.  However, when considering population, it has the second-highest ratio of population rank to congestion rank, surpassing even the Los Angeles-Long Beach-Santa Anna metropolitan area. The two major interstates that feed into the city are highly traveled and connected by highways and four–lane roads that connect the downtown Baton Rouge business are to surrounding parishes (Figure 1.3-6). Ninety-nine percent of the Baton Rouge workforce drives a personal vehicle to work.

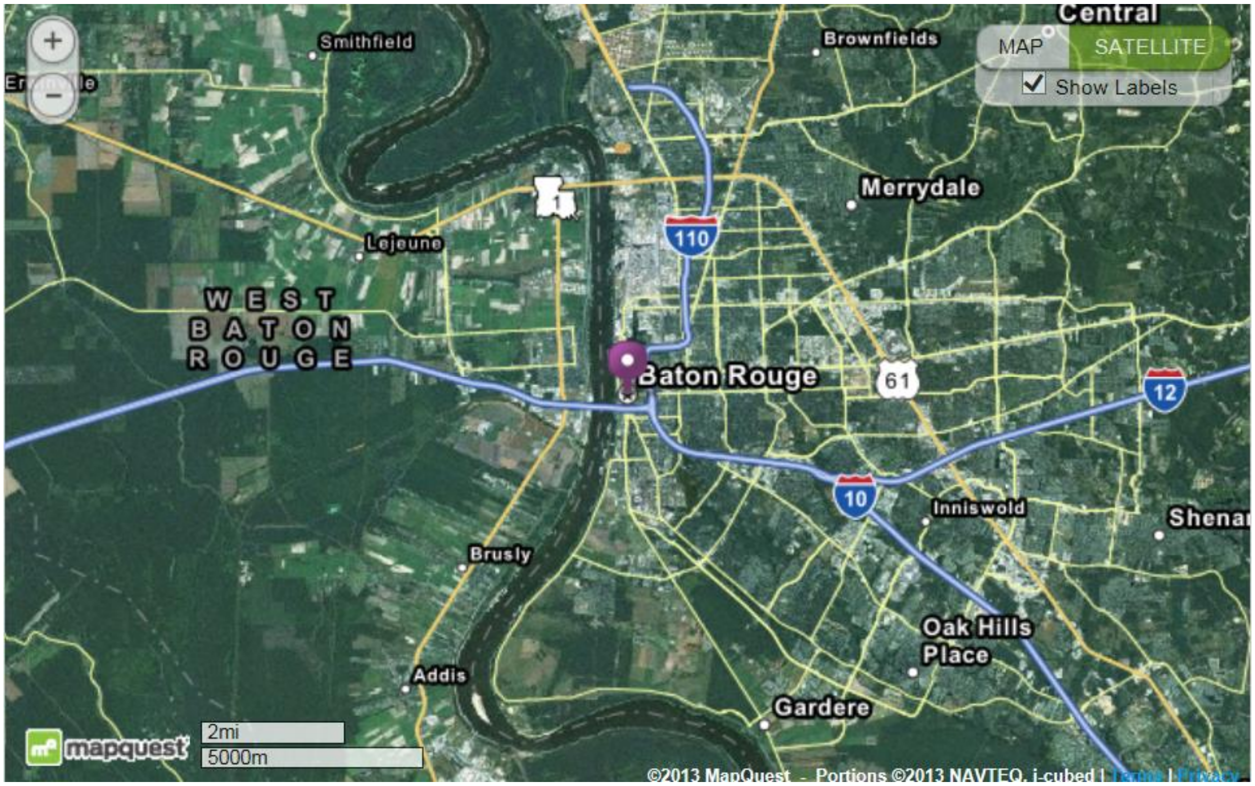



Figure 1.3-6. Baton Rouge Metro Area major transportation corridors.

Located 10 minutes north of downtown, the Baton Rouge Metropolitan Airport connects the area with four major airline hubs serving the southern U.S. Nonstop service is available to Atlanta, Dallas-Ft. Worth, Houston, Memphis, and Charlotte.

Four major rail lines provide railroad freight service within the Baton Rouge area and are particularly important to transportation of materials to and from the local industries.

Capital Area Transit System (CATS) provides urban transportation throughout the City of Baton Rouge, including services to Southern University, Baton Rouge Community College, LSU, and local medical facilities.

There is considerable commercial marine transport activity on the Mississippi River including numerous tug tows, freighters, and ocean-going vessels supplying and carrying materials from the numerous chemical facilities and the Port of Baton Rouge.

A myriad of pipelines crisscross the Baton Rouge MSA forming a dense network transporting various gaseous and liquid products to and from local industries.

## 1.4 Baton Rouge Area Advance Program Participants

A synergistic group of three organizations are working cooperatively on the Baton Rouge area Advance Program. These are the Baton Rouge Clean Air Coalition, the Capital Region Planning Commission, and Louisiana Clean Fuels (formerly Greater Baton Rouge Clean Cities Coalition). These three organizations are described in the following text.

**The Baton Rouge Clean Air Coalition.** The Baton Rouge Clean Air Coalition (BRCAC) is a coalition of local governments, state environmental agencies, businesses, industries, academic institutions, and civic organizations committed to improving air quality in the greater Baton Rouge area through voluntary actions and reasonable, effective regulatory actions. The organization's goals are: (1) to improve air quality through voluntary actions; (2) create public awareness and promote individual responsibility through education; and (3) provide credible measures of air quality improvement efforts.

The Coalition was formed over two decades ago to provide a vehicle for local stakeholder participation in efforts to improve air quality in the Baton Rouge region, and it has been active ever since. Members of the Coalition volunteer their time for outreach events and to help accomplish the organization's goals for clean air for the Baton Rouge area.

BRCAC members include:

- Capital Region Planning Commission
- Baton Rouge Area Chamber of Commerce
- East Baton Rouge, West Baton Rouge, Iberville, Ascension, and Livingston Parishes
- Louisiana Department of Environmental Quality
- Louisiana Department of Natural Resources
- Louisiana State University
- LSU Center for Energy Studies
- Louisiana Association of Business and Industry
- Louisiana Mid-Continent Oil and Gas Association
- Louisiana Chemical Association
- Louisiana Clean Fuels
- ExxonMobil
- Dow Chemical Company
- Trinity Consultants
- Harris, DeVille & Associates
- Providence Engineering and Environmental Group

Regular meetings are held usually on the first Wednesday of each month at the Baton Rouge Chamber Briefing Center, 564 Laurel Street from 1:30 p.m. to 3:30 p.m. Special purpose meetings are held as needed. Meeting announcements are posted on the BRCAC web site, www.brcleanair.com , and Facebook page.

BRCAC works as a partner with the Louisiana Department of Environmental Quality to improve air quality in the Baton Rouge area. Along with the LDEQ, BRCAC is a proud sponsor of the local ***Ozone Action Program***, which is a voluntary, community-based program designed to reduce ozone-forming emissions caused by vehicles and other sources during the summer months. Additionally, BRCAC has recently partnered with the Capital Region Planning Commission and Louisiana Clean Fuels to represent the Baton Rouge area in EPA's new voluntary ***Advance Program*** designed to develop and implement innovative ozone and particulate matter mitigation measures for the area.

**Capital Region Planning Commission.** The Capital Region Planning Commission (CRPC) is a Council of Governments serving the eleven-parish Capital Region, which includes the following Parishes: Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, Tangipahoa, Washington, West Baton Rouge, and West Feliciana. A Council of Governments is a voluntary association of independent local governments who, through planning and communication, foster cooperation and coordination in resolving area-wide problems beyond any individual constituency's authority or competence. Individual governments are represented by locally elected officials who must constitute a majority of representation on the Council. CRPC gets its authority, as do the other Regional Commissions in the state, under Louisiana Revised Statutes 33:131 et seq, as amended. All parish and municipal governments in the Capital Region may join CRPC. At present there are 11 parish members and 38 municipal members.
The reason for CRPC's formation was to respond to four basic needs:

- To provide an effective means of coordination for joint action in resolving common problems resulting from shared air, water, transportation systems, drainage, communication systems, economy, etc.;
- To review numerous federally funded programs to certify conformity to local and regional plans and to prevent redundancy in federal funding;
- To provide comprehensive regional planning; and
- To provide technical assistance to constituent governments, especially for the smaller parishes and municipalities with limited resources.

Programs and services provided by CRPC are funded by local member dues, set by the Commission, and by contracts, approved by the Commission, with any local, state, federal, or private agency needing the expertise of the CRPC staff.

CRPC is the Baton Rouge area's designated Metropolitan Planning Organization (MPO), which each metropolitan area must have in order to carry out regional transportation planning efforts and receive federal highway funds. As the regional MPO, the Capital Region Planning Commission focuses a great deal of its resources on transportation planning issues and activities, which includes highway planning, the regional ridesharing program, and air quality issues.

In addition, CRPC is one of eight sub-state planning and development districts which cover all 64 parishes in the state of Louisiana. Toward that end, CRPC provides technical assistance for economic development, comprehensive planning, and zoning to its members. More information for CRPC can be found at its website: http://www.crpc-la.org/.

**Louisiana Clean Fuels.** Louisiana Clean Fuels is the new name for the Greater Baton Rouge Clean Cities Coalition. The organization recently announced the name change and the finalization of a territory expansion. The new territory will extend the organization's coverage from the original five-parish Baton Rouge ozone nonattainment area to seven of the eight state planning districts (MPOs). The expansion of the LCF territory will fill the need for enhanced regional collaboration on fueling corridor development and will provide these regions with access to help and information for development. The broader territory is also in response to the non-profit organization's recent involvement in improving the air quality around the state through cleaner fuels and transportation opportunities.

The mission of Louisiana Clean Fuels, Inc. is to advance the nation's environmental, economic, and energy security by supporting local actions to provide transportation fuel options. The national Clean Cities program is an initiative of the U.S. Department of Energy's Vehicle Technologies Program. LCF is a designated affiliate of the national Clean Cities program and receives additional support from the Louisiana Department of Natural Resources.

LCF is a stakeholder organization with voluntary participation. Volunteer board members represent some of our most dedicated stakeholders, such as the Louisiana Department of Environmental Quality, the Capitol Region Planning Commission, The Greater Baton Rouge Clean Air Coalition, Entergy, and PEC. With board member guidance, LCF has proven itself a successful facilitator of public-private partnerships. For example, completed projects have included the purchase of Compressed Natural Gas Trolleys for downtown Baton Rouge, opening an E-85 fueling facility, and installation of electric-vehicle charging equipment on the LSU campus and, recently, a truck stop electrification project in West Baton Rouge Parish. LCF emission reduction impacts are shown for 2012 in Appendix B.

More information concerning Louisiana Clean Fuels can be found on its new website, www.louisianacleanfuels.org.

## 2.0 BACKGROUND AND DATA

## 2.1 Ambient Air Quality Monitoring

On a per-capita basis, the LDEQ has established in the Baton Rouge region one of the densest ambient air monitoring networks in the country (Figure 2.1-1). The number of ozone monitors in the area is more than double that required by federal regulations. Although there have been some changes over the years, many of the ozone monitoring sites have been collecting data continuously for over 20 years. The station type and parameters monitored at each site are listed in Table 2.1-1.


Figure 2.1-1. LDEQ air monitoring network sites in the Baton Rouge MSA.

In addition to the LDEQ ambient air quality monitoring, a considerable amount of ambient air quality data has been collected over the years in association with industry monitoring programs and special research projects.

Concomitant meteorological monitoring at a number of the LDEQ sites provides information on meteorological conditions associated with the ambient air quality data, providing valuable information for assessing sources, plume tracks, and spatial and temporal trends in ambient air quality.

The robust and high quality ambient air quality and meteorological monitoring within the area has facilitated sophisticated air quality modeling for purposes such as permitting, air quality planning, emergency response, and research projects.

The public can access the current and historical monitoring data by pollutant, region, or site through the LDEQ website at http://airquality.deq.louisiana.gov/.

Table 2.1-1. Louisiana Department of Environmental Quality – Ambient Air Quality Monitoring Network.

| SITE | STATION TYPE | PARAMETERS MONITORED |
|---|---|---|
| Pride | SLAMS; PAMS | NOx; O3; VOCs; MET |
| New Roads | SLAMS; SPMS | O3; MET; VOCs |
| Baker LSP | SLAMS | Lead |
| Southern | SPMS | VOCs; MET |
| Port Allen | SLAMS; SPMS | NOx; O3; SO2; PM2.5; VOCs; MET |
| Capitol | SLAMS; PAMS; NCORE; STN (Speciation Trends Network) | CO; NOx; O3; SO2; PM10; PM2.5;VOCs; PM Coarse; PM2.5 (Speciation); NOy; MET; Lead; Ceilometer |
| LSU | SLAMS; SPMS | NOx; O3; VOCs; MET |
| Bayou Plaquemine | SLAMS; SPMS; PAMS | NOx; O3; PM2.5; VOCs; NOy; MET |
| Dutchtown | SLAMS; PAMS | NOx; O3; VOCs; MET |
| Carville | SLAMS; SPMS | NOx; O3; VOCs; MET |
| Geismar | SLAMS | PM2.5 |
| Convent | SLAMS | O3 |
| French Settlement | SLAMS; SPMS | NOx; O3; PM2.5 (TEOM); VOCs; MET |
| Hammond | SLAMS | PM2.5 |

Note: NAMS = National Air Monitoring Site; SLAMS = State & Local Air Monitoring Site; PAMS = Photochemical Air Monitoring Site; SPMS = Special Monitoring Site; Met = Meteorological Monitoring.

## 2.2 Ozone Air Quality

In 1991 the five-parish ozone Baton Rouge Ozone Nonattainment Area (BRNA) was designated as nonattainment for ozone by EPA and assigned a classification of "serious" following the 1990 Clean Air Act Amendments. Major milestones in the BRNA efforts to achieve attainment of increasingly stringent ozone standards can be seen in Table 2.2-1.

Over the past two decades, the area has seen significant reductions in ozone levels, attributable to federal and state regulations and community involvement. The magnitude of air quality improvement can be seen by comparing 1-hour ozone NAAQS statistics of 1990 with those of 2013 (Table 2.2-2). Similarly, a trend line of ozone design values calculated for the years 1990 to 2013 (Figure 2.2-1) shows the ozone levels improvement relative to the 2008 8-hour ozone NAAQS.

Table 2.2-1. BRNA Ozone Nonattainment History.

| | |
|---|---|
| 1978 | EPA first designated BRNA as ozone nonattainment area |
| 1991 | BRNA again designated nonattainment (under CAAA) with a "serious" classification with an attainment date of 1999 |
| 1999 | BRNA fails to achieve attainment (by 1 ppb); EPA notices failure to attain and proposes "bump-up to "severe" classification |
| 2001 | Louisiana Governor requests an extension of the attainment date under the 1998 Extension Policy |
| 2002 | EPA finds that BRNA met all "serious" requirements, that there was transport from Texas affecting the area's ability to reach attainment, and extended the area's attainment date to November 15, 2005. |
| 2003 | Following a court ruling vacating EPA's extension policy, BRNA reclassified by operation of law to "severe" classification |
| 2004 | BRNA classified as "marginal" under the 1997 8-hour ozone standard with an attainment date of June 15, 2007 |
| 2008 | EPA finalizes finding that BRNA failed to attain the standard and reclassified the area to "moderate" under the 1997 8-hour standard. |
| 2008 | EPA revises 8-hour ozone standard from 80 to 75 ppb |
| 2010 | Final determination by EPA that BRNA had met the 1-hour ozone standard |
| 2012 | Final determination by EPA that BRNA had met the 1997 8-hour ozone standard |
| 2012 | EPA designates BRNA nonattainment under the 2008 8-hour ozone standard with a classification of "marginal" |
| 2015 | Attainment date for BRNA under the 2008 8-hour ozone standard |

Table 2.2-2. Baton Rouge Ozone Progress Relative to the 1-Hour Ozone Standard of 120 ppb.

| | 1990 | 2013 |
|---|---|---|
| Number of Exceedances | 31 | 0 |
| Number of Exceedance Days | 14 | 0 |
| Maximum Hourly Concentration | 202 | 103 |
| Number of Nonattainment Monitors | 5 | 0 |

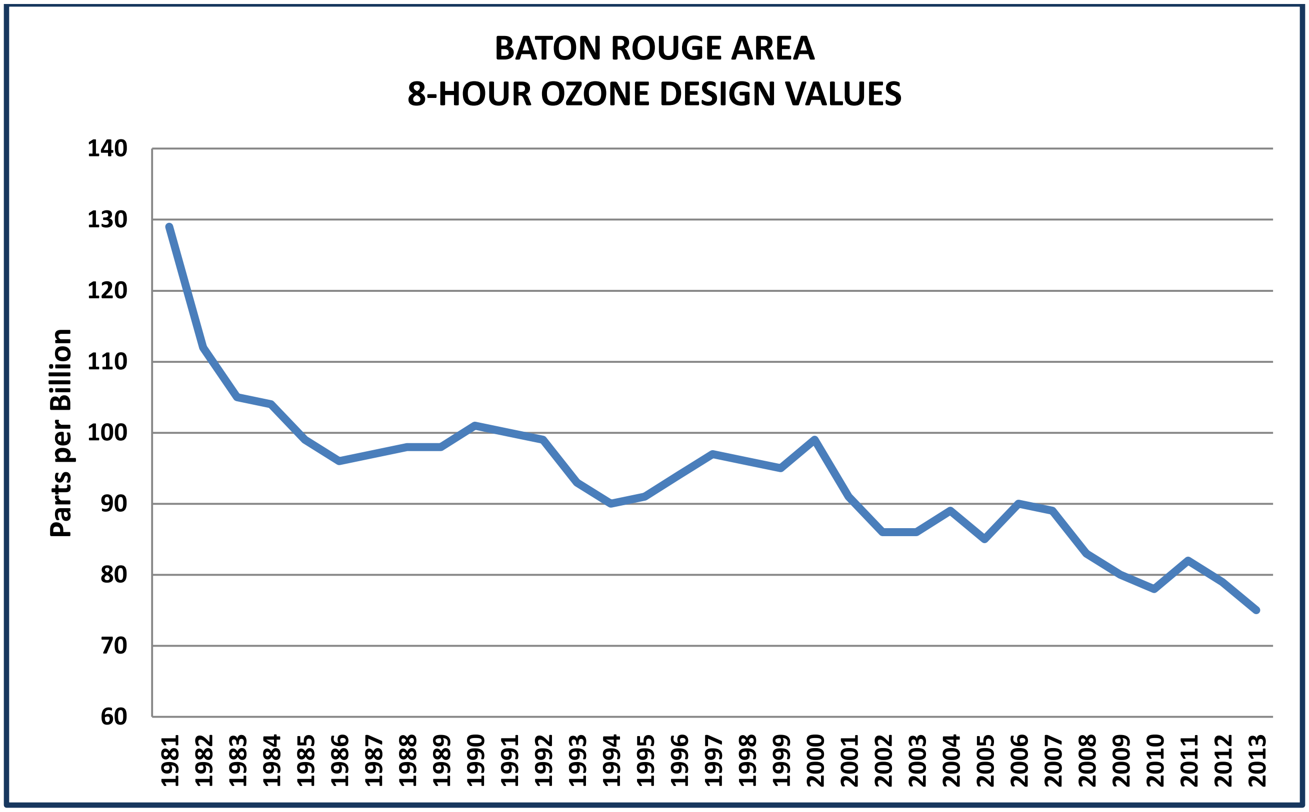



Figure 2.2-1. BRNA progress in 8-hour ozone design values.

Although typically a summertime problem, back in the late 1980's, the BRNA could have an ozone exceedance in any month of the year. In fact, the area was described by EPA at that time as having a 12-month ozone season. Over the two decades since, the ozone season for the BRNA has narrowed to just the warmer months of April through September. The distribution of ozone exceedances over the months during recent years is presented in Figure 2.2-2.

Preliminary ozone design values (through October 31, 2013) computed for the BRNA suggest the area may achieve attainment with the 2008 8-hour ozone standard this year (Figure 2.2-3).

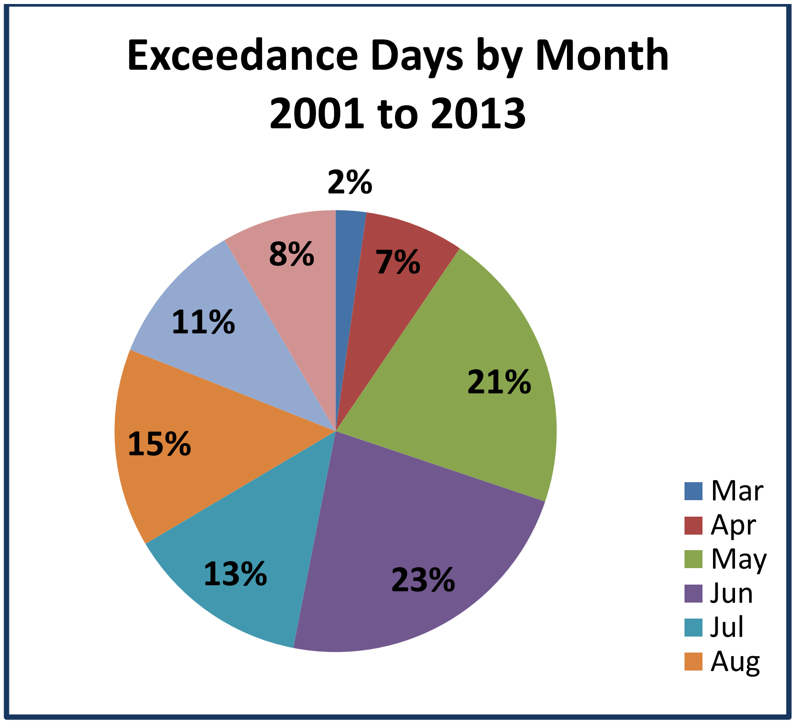



Figure 2.2-2. Distribution of ozone exceedance days over the months from 2001 to 2013.

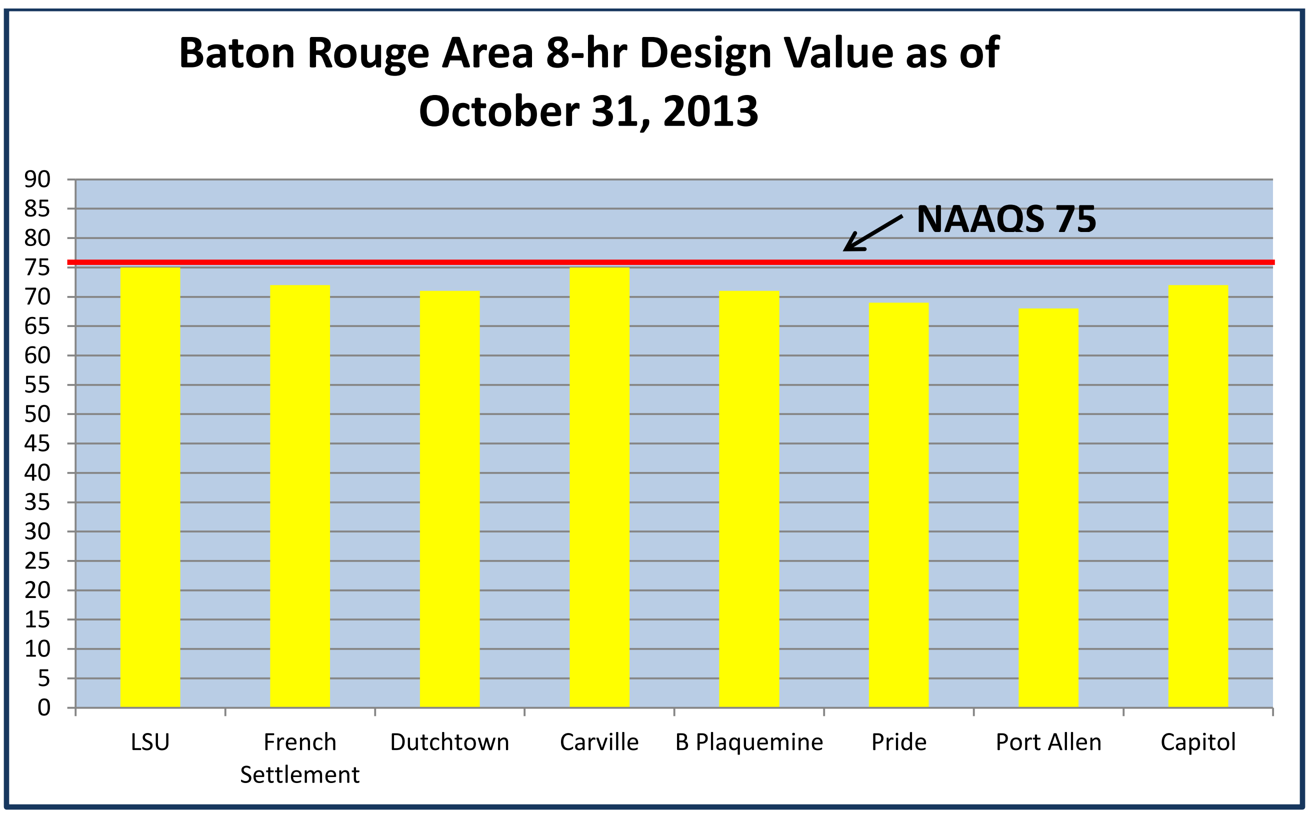



Figure 2.2-3. BRNA 8-hour ozone design values as of October 31, 2013.

## 2.3 Particulate Matter Air Quality

Although close, the Baton Rouge area monitors continue to remain in attainment for the fine particulate matter ($PM_{2.5}$) NAAQS (Figure 2.3-1). The Port Allen monitor has recorded values just below the new standard.

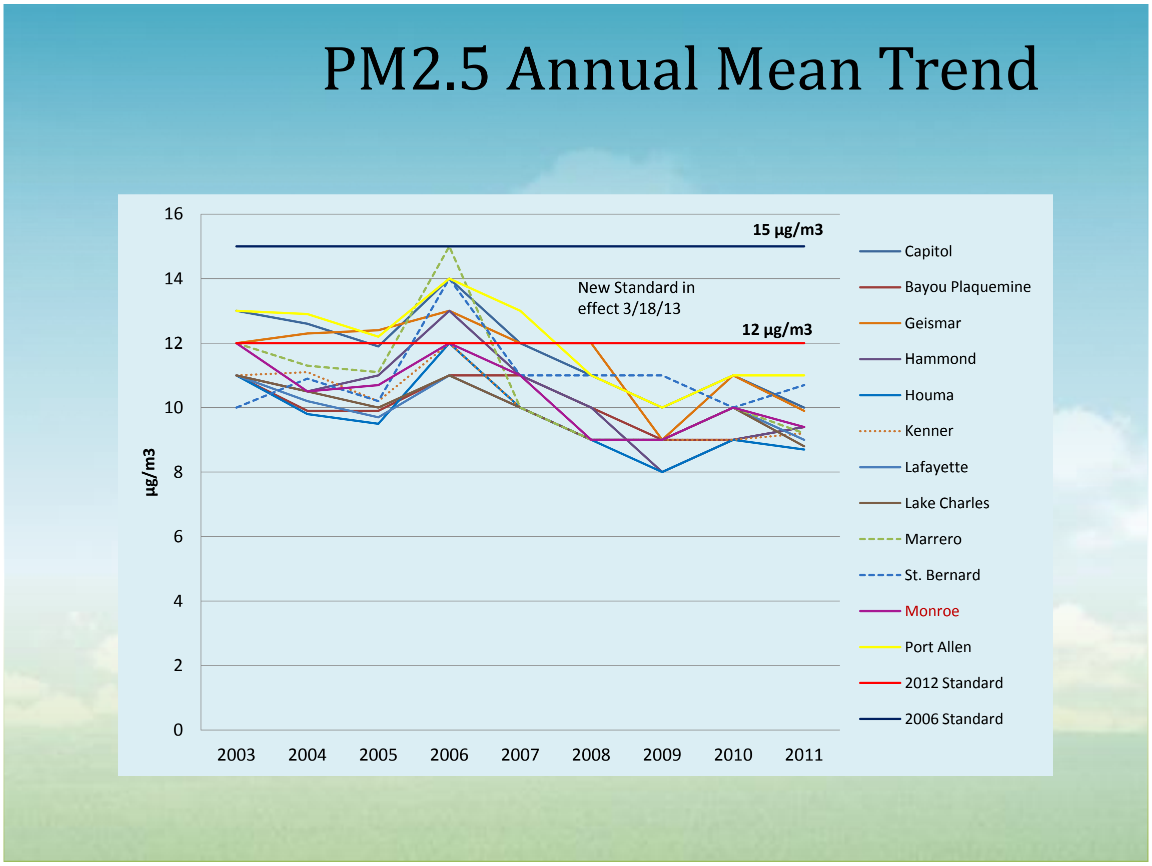



Figure 2.3-1. PM2.5 trend lines for Louisiana monitors.

## 2.4 Emission Sources

***NOx and VOC.*** NOx and VOC emission summaries are presented by source category for the Baton Rouge MSA in Tables 2.4-1 and 2.4-2. The data source for these summaries is the 2011 National Emission Inventory (NEI) Version 1 released September 30, 2013 and posted on the EPA CHIEF web site. The specific files used were the SCC Data Files of which there are four sets of files for each of four categories: Point, Nonpoint, Onroad, and Nonroad. EPA Rail and Airport emissions are included in the Point, but the vast majority of NOx and VOC emissions are from the LDEQ ERIC system as uploaded to EPA. All data for Onroad and Nonroad are from the EPA2011MOBILE data set, and the mobile are from the MOVES model, 2011 being the first year MOVES was used for the NEI, and not the older MOBILE model.

Table 2.4-1. NEI 2011 NOx Emissions for the Baton Rouge MSA.

| Parish | Point Source | Area Source | Onroad | Nonroad | Biogenics |
|---|---|---|---|---|---|
| Ascension | 7635 | 2564 | 2271 | 371 | 156 |
| East Baton Rouge | 9049 | 4249 | 7276 | 1406 | 193 |
| East Feliciana | 356 | 99 | 428 | 74 | 115 |
| Iberville | 9343 | 2033 | 1193 | 242 | 243 |
| Livingston | 61 | 572 | 3240 | 318 | 95 |
| Pointe Coupee | 13638 | 1005 | 464 | 260 | 352 |
| St. Helena | 223 | 75 | 216 | 33 | 83 |
| West Baton Rouge | 983 | 1333 | 1437 | 137 | 151 |
| West Feliciana | 423 | 210 | 423 | 92 | 120 |
| **MSA Total** | **41712** | **12140** | **16949** | **2933** | **1509** |

Table 2.4-2. NEI 2011 VOC Emissions for the Baton Rouge MSA.

| Parish | Point Source | Area Source | Onroad | Nonroad | Biogenics |
|---|---|---|---|---|---|
| Ascension | 3103 | 7672 | 955 | 246 | 9831 |
| East Baton Rouge | 5492 | 11363 | 3367 | 1139 | 11399 |
| East Feliciana | 471 | 410 | 205 | 278 | 17561 |
| Iberville | 2632 | 6808 | 437 | 243 | 16401 |
| Livingston | 316 | 3238 | 1333 | 655 | 26275 |
| Pointe Coupee | 841 | 2061 | 206 | 242 | 12463 |
| St. Helena | 117 | 468 | 105 | 28 | 18972 |
| West Baton Rouge | 717 | 1524 | 514 | 404 | 5193 |
| West Feliciana | 255 | 581 | 203 | 132 | 14066 |
| **MSA Total** | **13945** | **34125** | **7323** | **3366** | **132161** |

The relative contributions of the various source categories to total NOx and VOC emissions for the Baton Rouge MSA are shown in Figures 2.4-1 and 2.4-2, respectively.

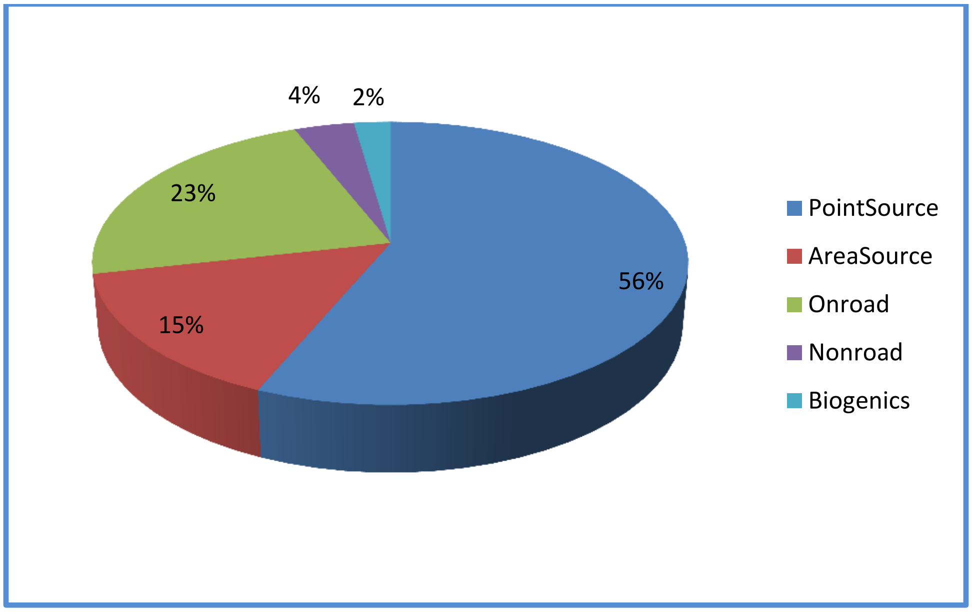



Figure 2.4-1. Contributions of various source categories to total NOx emissions in the Baton Rouge MSA.

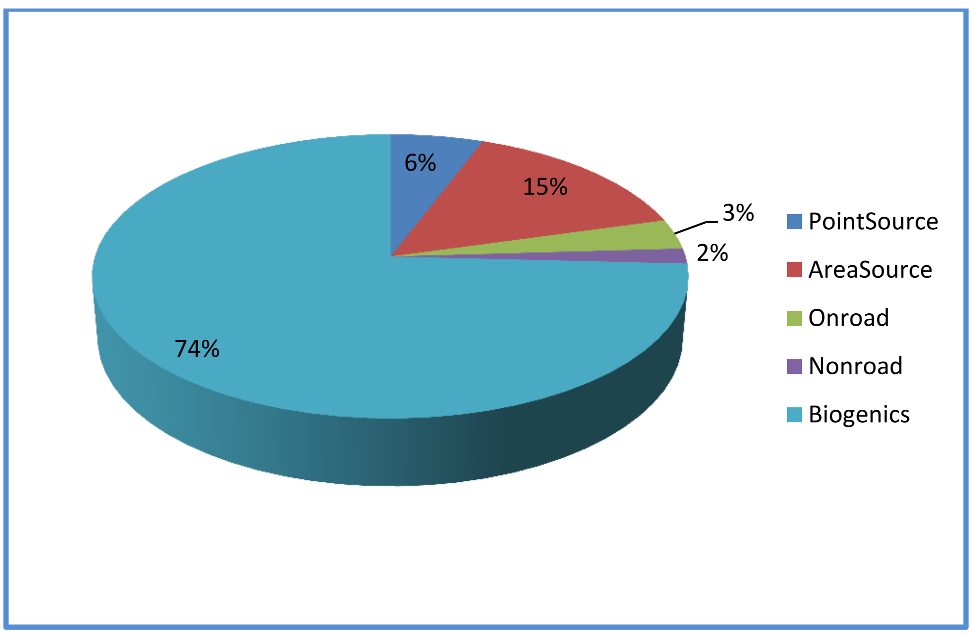



Figure 2.4-2. Contributions of various source categories to the total VOC emissions in the Baton Rouge MSA.

By referring back to the LDEQ 2002 Louisiana Environmental Inventory Report (LDEQ, 2002) it is possible to compare point source (industrial) NOx and VOC emissions for the five-parish ozone nonattainment area from earlier years (Figure 2.4-3) to our most recent 2011 NEI estimates.

| Emissions of VOC and NOx | | | | |
|---|---|---|---|---|
| Reporting | VOC (tons) | | NOx (tons) | |
| Year | 5-Parish Area | LA Total | 5-Parish Area | LA Total |
| 1990* | 38,948 | 129,455 | 66,703 | 410,928 |
| 1993* | 24,965 | 136,924 | 58,930 | 398,428 |
| 1994 | 26,048 | 137,086 | 59,714 | 403,383 |
| 1995 | 22,238 | 134,131 | 57,755 | 374,515 |
| 1996 | 21,192 | 137,318 | 57,096 | 374,400 |
| 1997 | 20,434 | 119,593 | 52,723 | 367,125 |
| 1998 | 19,658 | 106,913 | 52,938 | 357,091 |
| 1999 | 17,007 | 91,892 | 49,817 | 341,478 |
| 2000 | 16,711 | 85,294 | 50,025 | 339,259 |
| 2001 | 14,091 | 79,633 | 47,936 | 306,690 |
| 2002 | 13,022 | 77,810 | 42,415 | 309,987 |

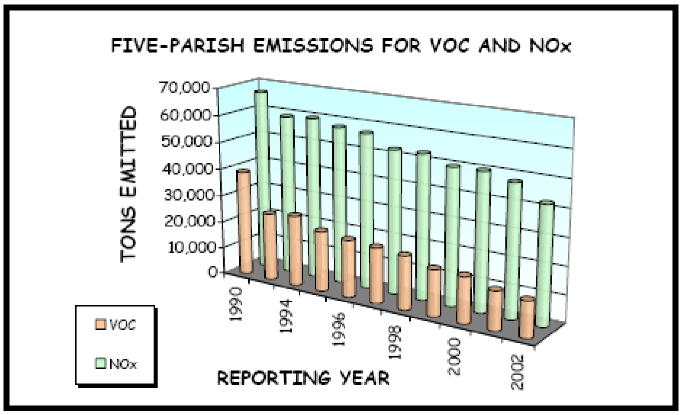



Figure 2.4-3. Emission inventory charts for the BRNA taken from LDEQ's 2002 Louisiana Environmental Inventory Report.

Comparing 1990 point source emission of NOx for the BRNA with those of the 2011 NEI, we arrive at a reduction from 66,703 to 27,071 TPY or a reduction of about 60 percent. The same comparison for VOCs shows a reduction from 38,948 to 12,261 TPY or a reduction of about 70 percent. These reductions are made even more impressive when considering they occurred during a period of significant industrial expansion in the area.

***Particulate Matter.*** Recently received data from EPA's 2011 National Emissions Inventory (NEI) database shows the preponderance of $PM_{2.5}$ emissions in the Baton Rouge MSA comes from point and area sources and a surprisingly small proportion come from mobile sources (Figure 2.4-4). This knowledge will help guide any future fine particulate mitigation measures planning.

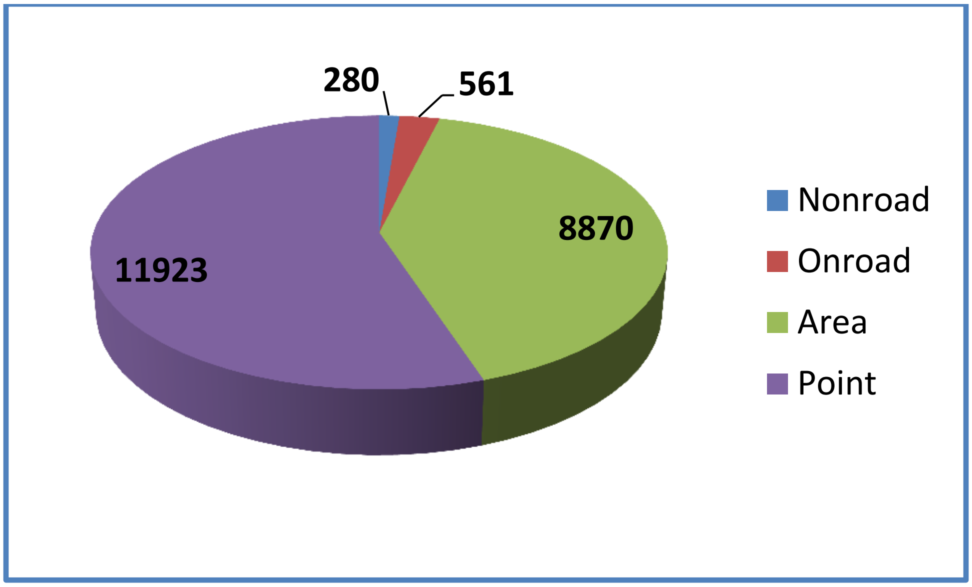



Figure 2.4-4. $PM_{2.5}$ emissions (TPY) by source category for the Baton Rouge SMA (source: EPA 2011 NEI).

## 2.5 Regional Airshed Modeling

Over the past two decades, there have been several iterations of regional airshed modeling that have helped guide emission reduction strategies to help achieve attainment with the ozone NAAQS.

Since the BRNA has been classified as a "marginal" ozone nonattainment area under the 2008 8-hour ozone standard, regional airshed modeling is not required for its SIP due in 2015. However, LDEQ with the concurrence of major stakeholders elected to conduct state-wide ozone modeling for three principal purposes:

- To provide better quality guidance for developing ozone mitigation strategies for the 2015 Baton Rouge nonattainment area SIP
- To provide better quality guidance for attainment areas around the state engaged in the EPA Advance Program for developing effective ozone mitigation measures
- To provide a technically sound basis for developing ozone attainment strategies for newly designated ozone nonattainment areas under a new revised ozone standard expected in the near future.

The modeling program was directed by the Louisiana Department of Environmental Quality (LDEQ), Office of Environmental Services, Air Permits Division. The technical work was conducted by the contractor team of ENVIRON International Corporation (ENVIRON) and Eastern Research Group, Inc. (ERG).

Several EPA-accepted modeling platforms and datasets were applied to address episodic-to-seasonal meteorology, emissions, and air quality during the selected modeling period of September-October 2010. Significant effort was directed towards the inclusion of the latest Louisiana state-wide emission inventories, and the leveraging of nationwide emission databases developed by the EPA, the National Center for Atmospheric Research (NCAR), and the Bureau of Ocean Energy and Management (BOEM). A modeling protocol document was developed previously following the latest modeling guidance published by the EPA related to 8-hour ozone attainment demonstrations.

This study built from previous attainment demonstration modeling conducted for the same area that addressed the requirements of the 1997 ozone NAAQS, but included appropriate deviations to account for new episodes, updated datasets, new modeling tools, and other recently identified issues. For continuity, the modeling system employed many of the same emissions and photochemical model components as the previous modeling effort. However, some newer state-of-the-science components were used. The modeling system included:

- The Weather Research and Forecasting (WRF) meteorological model;
- The Emissions Processing System, version 3 (EPS3);
- The Consolidated Community Emissions Processing Tool (CONCEPT) combined with the EPA Motor Vehicle Emissions Simulator (MOVES) emission factor model for on-road sources;
- EPA's National Mobile Inventory Model (NMIM) for non-road sources;
- The Model of Emissions of Gases and Aerosols from Nature (MEGAN) for biogenic emissions;
- EPA's Biogenic Emissions Inventory System (BEIS);
- The Fire Inventory from NCAR (FINN) for wildfires, and agricultural/prescribed burning;
- The Comprehensive Air quality Model with extensions (CAMx).

This modeling system was employed for an extended period during September and October 2010 when elevated ozone was monitored throughout Louisiana. The modeling domain consists of a two-way interactive nested grid system employing three grids with 36, 12, and 4 km grid resolution, similarly to the previous modeling. However, the projection parameters were changed to align with the standard projection defined by the regional planning organizations (RPOs), and the 36 km grid was expanded to match the RPO continental US (CONUS) domain. This maximized portability of previously or concurrently developed emission inventories and other datasets into this project. The CAMx vertical grid structure was defined on a subset of the WRF meteorological grid structure, extending from the surface to about 11 km altitude.

Other agencies and groups contributed to the datasets employed in this study. The Louisiana Department of Transportation and Development (LDOTD) and the Capitol Region Planning Commission (CRPC) provided datasets necessary for the development of Baton Rouge and State-wide on-road emission estimates. All meteorological modeling, biogenic modeling with BEIS, and processing of EPA county-level anthropogenic emission datasets outside of Louisiana were externally performed by Alpine Geophysics, LLC (Alpine), who operated under contract to the local industry coalition.

Initial modeling and performance testing have been completed and a draft Technical Support Document (TSD) has been provided to LDEQ for review. It is expected that the exercise will be completed and a final report delivered in the early spring of next year.

## 3.0 ACTION PLAN CONTROL PROGRAMS

## 3.1 Voluntary Emission Reduction Measures Already in Place

In the following subsections, voluntary emission reduction measures that have been previously undertaken in the Baton Rouge MSA are organized and presented by major strategies.

### Alternative Energy

- ❖ LCF, LDNR, and LSU (Center for Energy Studies and AgCenter) all help promote alternative fuels through a variety of public education means such as websites, conferences, and exhibits.

- ❖ As part of its contract with DOE, LCF sponsors several alternative fuel conferences/workshops/exhibits each year, maintains an active website with links to resources for its stakeholders, and regularly publishes newsletters with good distribution. With its recent expansion of state coverage, the organization will have the ability to look at promotion of AFVs by working on corridor fueling location strategies.

- ❖ State Incentives/Laws/Regulations. The State of Louisiana has a number of incentives, laws, and regulations related to the use of alternative fuels. Details on the following listing can be found at the DOE Alternative Fuels Data Center website at: http://www.afdc.energy.gov/laws/state_summary/LA.

**State Incentives**

- Alternative Fuel Vehicle (AFV) and Fueling Infrastructure Tax Credit
- Green Jobs Tax Credit
- Compressed Natural Gas (CNG) Project Loans
- Advanced Ethanol Fuel Blend Research Grants
- Biodiesel Equipment and Fuel Tax Exemption

**Laws and Regulations**

- Propane Self-Service Fueling Station Regulations
- Support for U.S. Postal Service Use of Natural Gas
- Support for Growth of Alternative Fuel Sources
- Alternative Fuel Vehicle (AFV) Tax
- Alternative Fuel and Advanced Vehicle Acquisition Requirements
- Renewable Fuel Standard
- Biofuels Feedstock Requirements
- Fuel-Efficient Vehicle Acquisition Requirement
- Low-Speed Vehicle Access to Roadways
- Compressed Natural Gas (CNG) and Propane Regulatory Authority
- Deregulation of Compressed Natural Gas (CNG) as a Motor Fuel

## Energy Efficiency

- In 1999, LDNR introduced ***the HERO Program***, in which Louisiana residents received a rebate for making their homes more energy-efficient. With ARRA funding, the program was expanded to include new home construction, existing home retrofits, and commercial property retrofits. The expanded HERO Program was designed to support homeowners and businesses seeking to save money on energy and/or reduce their environmental impact through cash incentives for energy efficiency improvements.
- LDNR created the ***Renewable Energy Grant Program*** to encourage the development, implementation, and deployment of cost-effective renewable energy technologies in Louisiana; support the creation of additional employment opportunities; and stimulate market demand for other emerging renewable energy systems that meet certain eligibility requirements.
- LDNR created the ***Transportation Efficiency & Alternative Fuels Program*** to improve public infrastructure throughout the State of Louisiana by funding projects that will allow applicants to purchase or convert to alternative fuel vehicles, install efficient traffic signals and streetlights, and install alternative fueling infrastructure.

- The LDNR established the ***Flex-Fund Revolving Loan Fund*** to encourage implementation of cost-effective energy efficiency projects in Louisiana. The program provides low interest loans to qualifying Louisiana entities for qualified energy efficiency projects. Funding is available for commercial and industrial energy efficiency projects through a competitive revolving loan program.
- The LDNR established the ***Renew Louisiana EECBG Program*** to distribute available EECBG funding on a per capita basis as equitably as possible to units of local governments not eligible to receive a direct allocation from the DOE. The funding is distributed through local parish governments.
- As part of the ***American Recovery and Reinvestment Act (ARRA) of 2009***, the Louisiana Department of Natural Resources (LDNR) was awarded $71.7 million through the State Energy Program (SEP) Grant. The SEP grant dollars were allocated toward six programs, including the ENERGY STAR® Appliance Rebate, Home Energy Rebate Option (HERO), Renewable Energy, State Buildings–Lead By Example, Transportation Efficiency & Alternative Fuels Programs, and the Revolving Loan Fund. An additional $4.2 million was awarded through the ARRA ENERGY STAR® Appliance Rebate Grant and $13.8 million was awarded through the Energy Efficiency Conservation Block Grant Program (EECBG). LDNR developed a diverse portfolio of programs to maximize energy efficiency, renewable energy, and alternative transportation opportunities. These programs target the residential, commercial, and public sectors in an effort to distribute the funds throughout Louisiana.
- LDNR helps host ***IETC conferences*** (industry energy issues)
- ***Combined heat and power (CHP)*** - In Louisiana, generation from industrial CHP facilities has increased 71 percent since 2006 (Dismukes, 2013). Almost 27 percent of Louisiana's electricity is generated at industrial CHP facilities: a level considerably more significant than just about any other state including Texas. Nationally, Louisiana ranks third in combined industrial usage and CHP. Louisiana's 35 CHP facilities are located throughout the state with a large concentration along the industrialized river corridor. Thirteen are located in the Baton Rouge MSA.
- East Baton Rouge Parish recently announced a $619,440 grant from DOE for ***weatherization projects***. From 2009 to 2012 the annual awards have been between $200,000 to $300,000 and have reached between 90 and 276 homes per year.

## Episodic Controls

- ***Ozone Action Days.*** About ten years ago, LDEQ and BRCAC launched an Ozone Action Program initiative, of which ***Ozone Action Days*** were a principle element. The Ozone Action Program is a voluntary driving curtailment and public education program coordinated by LDEQ and BRCAC. It is a community-based program designed to reduce ozone-forming emissions caused by vehicles and other sources during the summer months in the Baton Rouge ozone non-attainment area. Based on a prescribed decision-making process, the LDEQ issues an ozone alert in the morning on the day before an elevated level of ozone is expected to occur. Announcements for an ***Ozone Action Day*** are then broadcast through television and other news media. At the same time, a system of employer notification will advise participating employers to notify their employees before the end of the working day. Ozone Action Day coordinators at each employer would be notified by e-mail, phone or fax. They would then notify employees through announcements, e-mail, or printed notices posted at workplace exits. On the Ozone Action Day, organizations and individuals can voluntarily take planned measures to reduce emissions of ozone precursor pollutants.

- ***EnviroFlash.*** To better educate the citizens of Louisiana about air quality issues, the department worked with its partners at EPA to utilize and promote the EnviroFlash system. This system, operated in conjunction with EPA Air Now, sends an automatic message about area air quality, either by e-mail or text, to subscribers. Some users subscribe just to be notified at the orange AQI level, which is the level at which Air Quality Action Days are issued while others may want to know what the air quality is on a daily basis. Citizens can subscribe to receive these free notifications by going to the LDEQ web site, www.deq.louisiana.gov/enviroflash. The EnviroFlash system also allows LDEQ to send notices to subscribers about special air quality events, such as agricultural burning, forest or marsh fires, or industrial accidents.

- ***Industry Ozone Action Days***. This is a joint program implemented voluntarily by LDEQ and Baton Rouge area industries. Based on a prescribed decision-making process, LDEQ issues an ***ozone alert*** on the day before an Air Quality Index (AQI) of 90 for ozone is expected to occur. Participating industries then take pre-determined special emission reduction measures for their facilities to help mitigate ozone formation.

## Urban Heat Island

- ***U.S. EPA Urban Heat Island Pilot Project: Profile of Baton Rouge.*** In May 1998, the National Aeronautics and Space Administration (NASA) took aerial photos of Baton Rouge using Advanced Thermal and Land Applications Sensor aircraft data. The Department of Energy's Lawrence Berkeley National Laboratory (LBNL) then modeled Baton Rouge's near surface heat island, which represents near ground air temperatures as opposed to surface temperatures measured by thermal images. LBNL subsequently analyzed the energy savings potential (direct and indirect effects) of heat island reduction measures on cooling energy use in Baton Rouge (EPA, 2002). Although some potential projects were discussed at the time, none were implemented. The information developed by the project, though, is still available to guide any future urban heat island initiatives. A copy of the report can be obtained at www.brcleanair.com/archivesreports/.

- ***1994 Landscape Ordinance.*** In 1998, the Baton Rouge Department of Public Works strengthened the 1994 Landscape Ordinance that required tree planting on all new developments, excluding single family residential developments. The improved 1998 provision requires two shade trees for every 10,000 square feet of site versus the previous requirement of one shade tree. The provision also requires one shade tree per 60 feet of street frontage and contains new requirements for parking lots. These requirements include one shade tree per 25 parking spaces for a lot with one to 50 spaces; one shade tree per 18 parking spaces for a lot with 51 to 100 spaces; and one shade tree per 12 parking spaces for a lot over 100 spaces.

- **NeighborWoods.** NeighborWoods is a program initiated by Baton Rouge Green, a non-profit urban forestry program in Baton Rouge that provides shade trees for roadway medians, parks, and schools. Each year Baton Rouge Green selects four environmentally underserved neighborhoods throughout the city in which to initiate urban tree planting. The organization provides information and technical assistance to local citizens to help them implement tree planting and maintenance programs in their neighborhoods.

## Research/Application of New Technologies

- ***HRVOC Workgroup.*** The Baton Rouge HRVOC Workgroup (the Workgroup) was formed in 2003 to address the Baton Rouge Non-attainment Area's (BRNA) continued non-compliance with the one-hour National Ambient Air Quality Standard for ozone. Prior to forming the Workgroup, ozone concentrations in the Baton Rouge non-attainment area (Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes) had steadily declined over the last two decades as a result of deliberate actions to reduce ozone precursor emissions, as well as research and regulatory work done to understand the causes of ozone formation in the area. While the average number of ozone exceedances had declined, as had the number of monitors exceeding the standard, the area remained out of compliance with the one-hour ozone standard. Moreover, on June 23, 2003, the area had been bumped-up to a severe ozone non-attainment classification by the EPA. For 2002 and 2003, exceedances of the one-hour ozone standard occurred during circumstances considered atypical of ozone formation. The results were rapid, excessive ozone formation leading to ozone peaks that the area had not experienced in a decade. The ozone readings for two separate episodes in September 2002 and July 2003 were 164 parts per billion (ppb) and 174 ppb respectively, over 30 percent above the standard. Monitoring results from many of these exceedances indicated a high rate and efficiency of ozone production, which was limited spatially to the immediate Baton Rouge area. These ozone episodes corresponded very well to the kind of episodes that had occurred in the Houston/Galveston area. The Texas Air Quality Study 2000, conducted in the Houston/Galveston area, concluded that the reactivity of the hydrocarbons was most often dominated by low molecular weight alkenes and aromatics resulting in explosive ozone formation. Air quality sampling in the Baton Rouge area also showed substantial quantities of the mentioned ozone precursors. The ozone formation experienced in the Baton Rouge area was similarly thought to be the result of emissions of highly reactive ozone precursors. As a result of the summer 2002 and 2003 exceedances and the information gathered, a Highly Reactive Volatile Organic Compound (HRVOC) Work Group was formed to further evaluate the specific causes of the Baton Rouge area's ozone problem. The goal of the HRVOC Work Group was to design and oversee studies and recommend solutions to help the area meet its attainment date of November 2005 and avoid additional repercussions of continued non-attainment.

In order to address the ozone problem more effectively, the Workgroup was divided into three subgroups as follows:

Subgroup 1: Ozone Exceedances/VOC Data Analysis
Subgroup 2: Emission/Meteorology/Monitoring
Subgroup 3: Emissions Inventory

Following surveys and analyses the Subgroups offered the following recommendations:

- Upgrade the monitoring network to include NOx and VOC at all stations
- Record monitoring data in 5-minute and 1-hour increments
- Develop a database to store all data in one place
- Perform a statistical analysis of the database

For more information on this initiative go to http://www.deq.louisiana.gov/portal/tabid/2210/Default.aspx.

❖ ***HRVOC Administrative Orders on Consent/Fence-Line Monitoring.*** In early 2005 the Louisiana Department of Environmental Quality (LDEQ) issued Administrative Orders on Consent (AOC) to 15 facilities in the Baton Rouge Non-Attainment Area that emit highly reactive volatile organic compounds (HRVOC). The purpose of the AOC was to help identify emission sources of HRVOC that were contributing to ozone formation in the five parish area. The companies that received the AOC were: BASF, Chemtura, Dow, DSM, Enterprise, ExxonMobil Chemical, ExxonMobil Plastics, ExxonMobil Polyolefins, ExxonMobil Refinery, Placid, Plantation Pipeline, Occidental, Shell, Syngenta, and Williams Olefins. The companies were ordered to install HRVOC (and other compounds) monitoring on or near their site boundaries. The monitors were to be put into operation by May 1, 2005, and continue for two years. In addition, six of the companies that are located in the North Baton Rouge area were ordered to perform audits of their HRVOC systems. The due date for the completion of the audits was May 1, 2005.

A total of 22 monitors were installed at the plants. All of the stations included a total hydrocarbon analyzer that sampled the air every three minutes and instrumentation to continuously monitor wind speed and direction. The total hydrocarbon analyzer was configured to provide a trigger whenever the sampled air contained hydrocarbons in excess of a pre-determined set point. When the trigger was initiated, a 20 minute sample was collected. Some of the plants installed gas chromatographs that immediately analyzed the collected sample and sent the information to plant personnel. Other plants sent the collected sample to a lab for analysis - a process that took a couple of weeks before the analysis was known. With each trigger event, plant personnel were required to respond by searching the plant for possible sources causing the trigger. All of the data and response findings were reported to LDEQ monthly.

The plants completed the audits by the due date. With a few minor exceptions, the auditors found that the plants were doing a proper job of identifying and monitoring sources where HRVOC could be emitted to the atmosphere.

The monitoring program resulted in a total of approximately 2,500 samples being analyzed by the plants. A portion of the samples contained significant amounts of HRVOC, especially ethylene and propylene. The majority of the samples contained mostly evaporative gas compounds, namely, butane, isopentane, propane, isobutane, pentane, and other hydrocarbons that are in gasoline. The source of most of the gasoline products was storage tanks that do not have vent collection. The next largest cause of strikes was emissions of various compounds that the plants are permitted to emit. Some strike samples showed compounds that were attributed by the plants to flares, and some strikes were caused by leaks, and maintenance and operating activities.

During the monitoring period, the number of strikes at the ten LDEQ-operated monitoring sites showed a significant decline of 25 percent. Strikes at the four urban Baton Rouge monitoring sites declined by 40 percent. Also, reports to LDEQ of unauthorized releases of HRVOC greater than 100 pounds in 24 hours showed a decrease of 60 percent, and the release quantities were much lower. This improved performance helped the Baton Rouge area to attain the old 1-hour ozone standard in

2006. Since this effort, the area has not experienced the ozone spikes that existed previously. The information gained during the course of the program also provided the basis for development of new reportable quantities (RQs) for the HRVOCs.

A copy of the Final Report for this effort (Oubre, 2007) can be found at www.brcleanair.com/archivesreports/.

- ***Ozone Task Forces.*** Over the past 20 years of ozone attainment efforts for the Baton Rouge area, there have been a number of ozone technical task forces pulled together to bring the best technical resources to bear on the problem. The first was the Joint Ozone Technical Task Force co-chaired by a representative each from LDEQ and industry. This task force helped pull together the best technical resources available to assure that monitoring and modeling efforts got off to a good start and provided the best technical data for decision-making. Following promulgation of the 2008 ozone standard, LDEQ formed the Statewide Ozone Task Force to assist with introducing ozone regulation issues to other areas of the state that might fall into nonattainment. Currently, an Industry Technical Task Force has been providing LDEQ support through contracted technical expertise and funding for specific modeling tasks.

- ***Port Fourchon Emissions Study.*** In 2010, The LSU Center for Energy Studies (CES), with Starcrest Consulting Group, LLC, completed an emissions inventory of Port Fourchon, Louisiana. The ***"Port Fourchon Ozone Day Port-Related Emissions Inventory Study,"*** was prepared for ExxonMobil. The study report (LSU CES and Starcrest Consulting Group, LLC, 2010) presents initial estimates of the mobile source emissions associated with operations in and around the port. The inventory was provided to LDEQ and the Baton Rouge Ozone Task Force to be used in regional ozone modeling to support the LDEQ's Non-attainment State Implementation Plan (SIP) for ozone.

  A previous analysis of regional ozone modeling in the Baton Rouge area in 2007-2008 indicated an unaccounted-for source of oxides of nitrogen (NOx) emissions thought to be originating along the Gulf Coast of Louisiana. NOx emissions are considered a precursor to ozone. Port Fourchon, which serves approximately 90% of all deepwater and 45% of shallow water rigs and platforms in the Gulf of Mexico and is the only port to serve the Louisiana Offshore Oil Port (LOOP), was considered a likely source of the emissions.

  CES and Starcrest developed an initial inventory of NOx emissions using data representing three days in June and August 2009. Other pollutants measured include volatile organic compounds (VOCs), carbon monoxide, sulfur dioxide, particulate matter, and carbon dioxide.

  CES researchers performed data collection for the inventory. Emissions sources included marine vessels that docked at Port Fourchon berths or passed through the port; cranes and cargo handling equipment; heavy-duty trucks; helicopters; and offshore emissions measured by the Minerals Management Service (now the Bureau of Ocean Energy Management, Regulation and Enforcement).

By incorporating these estimates of regional NOx emissions into recent regional airshed modeling, it is believed that the accuracy of the modeling has been considerably improved. A copy of the Port Fourchon study can be found at www.brcleanair.com/archivesreports/.

- ***FLIR/HAWK Infrared Camera Systems.*** The Baton Rouge and Houston industrial areas were among the first in the nation to research the potential for forward looking infrared (FLIR) cameras to find leaks of organic vapors (VOCs) from vessels and piping at petrochemical facilities. This research showed the infrared camera systems to be an outstanding tool for rapid surveys for VOC leaks at industrial facilities, which was of particular importance to our trying to identify leaks/releases of VOCs believed to be responsible for our rapidly peaking ozone episodes. The utility of the IR camera systems was greatly increased when mounted on a helicopter (HAWK system), since large areas (e.g. tank farms, Mississippi River barges) could be surveyed for leaks very quickly. Figure 3.1-1 provides some examples of VOC leaks detected by the HAWK (helicopter-mounted) infrared camera in field surveys.

Figure 3.1-1. VOC leak detection with the HAWK IR camera system.

- ***Barge emissions research/best practices.*** Although known for some time to be a potentially large source of VOCs, results of the HAWK IR field surveys conducted on the

Mississippi River confirmed that barges carrying fuels and organic chemicals were releasing large quantities of organic vapors. To get a better handle on actual quantities of these releases, LDEQ conducted bagging tests on barges in the Baton Rouge, Louisiana area from September 24 to 28, 2008 (Harris, 2008). The bagging tests were intended to determine the mass of hydrocarbon emissions that would add to the VOC emission inventory around Baton Rouge and could be contributing to excess ozone formation. With this new data in hand, the American Waterways Operators signed a memorandum of understanding with LDEQ in April, 2009 to further research and characterize barge emissions and, subsequently, developed a manual of best practices to help minimize emissions from the barge industry (see Appendix C). This initial research also prompted a larger, more detailed study. A collaborative group with members from the United States Environmental Protection Agency Region 6 (EPA R6), the EPA Office of Research and Development (ORD), National Risk Management Research Laboratory (NRMRL), and National Exposure Research Laboratory (NERL), the Louisiana Department of Environmental Quality (LDEQ) and the Texas Commission on Environmental Quality (TCEQ) was formed to further investigate barge emissions.

## Public Outreach and Education

- ***Public outreach and education efforts*** of LDEQ, LDNR, BRCAC, CRPC, and LCF include websites, conferences, workshops, webinars, newsletters, and exhibits. Public outreach/education efforts of local media outlets include AQI and tips for individual action on local weather broadcasts and AQI forecasts in the local newspaper.

## Other

- ***Major source threshold retained.*** When the Baton Rouge area was classified as “marginal” under the 2008 ozone standard, the area could have relaxed its major source threshold for new source review (NSR) from 50 tons per year (TPY) to 100 TPY. Instead, the area elected to maintain the 50 TPY threshold that had been imposed under its old “serious” classification.

- ***LDEQ requires more robust emission data reporting*** than is required by EPA.

- ***A number of state agencies provide TDM opportunites,*** including flex scheduling and telecommute.

- ***Traffic Management Programs.*** Baton Rouge's Traffic Management Center, Motorist Assistance Patrol, and Green Light (upgrades to traffic signalization and synchronization) Programs all help to maintain good traffic flow and thus lower mobile emissions.

## 3.2 Voluntary Emission Reduction Strategies Currently Being Implemented or Being Considered for Implementation

### Alternative Energy

- ***Louisiana State Agencies Required to Purchase Alt-Fuel Vehicles.*** Louisiana Governor Bobby Jindal recently signed into law ACT 833, an Ortego House Bill (HB 1213), which requires state agencies to purchase alternative-fuel vehicles. As outlined in the final version signed by the Governor, the state shall not purchase any vehicle unless it is "capable of and equipped for using bi-fuels, natural gas, or liquefied petroleum gas." Bi-fuel vehicles are defined as gasoline or diesel plus LPG or CNG. State agencies may waive the requirements only under the following circumstances:
  - The vehicles will be operating in an area that is not within a 25-mile radius of the appropriate type of refueling facility.
  - A state agency is not able to recoup the difference in the cost between the alternative-fuel vehicle and a traditionally fueled vehicle within 60 months of the purchase or lease.
  - The vehicle does not meet the agency's required specifications.

  Since Baton Rouge is home to most state agency headquarters, we expect to see increasing numbers of alt-fuel vehicles in our area.

- ***CATS CNG Vans.*** CRPC and LDOTD were successful in obtaining a federal Congestion Mitigation Air Quality (CMAQ) grant for Capital Area Transit System to purchase a number of CNG vans for their fleet. The vans are in the process of being purchased.

- ***City-Parish Alt Fuel RFP.*** The City Parish has completed the mandatory Energy Efficiency Performance Contract pre-bid meetings. Eight firms attended and are approved to continue in the RFP process. The RFP has been opened up to any energy efficient fuel that can provide a guaranteed savings over its life to pay for the expenses of the program and have a potential net savings to the City Parish. There are roughly over 500 DPW vehicles and 980 city police vehicles that will be evaluated for conversion to either CNG, propane, or electric vehicles. Each proposer will prepare their own program that they feel will benefit the City Parish. This is the first national Energy efficient performance contract for vehicle fleets that is open to all alternative fuels. The final submittal date for the responses is Dec 3, 2013 with award on the contract in early 2014.

- ***Louisiana Department of Transportation and Development*** (LDOTD) is currently funding a project to study the fleet conversion of approximately 2500 LADOTD vehicles to CNG/Natural gas.

- ***Truck Stop Electrification.*** Louisiana has recently cut ribbons to open its first Truck Stop Electrification facility thanks to a grant from LDEQ awarded to LCF. LCF's project partner, IdleAir, will install the electric charging equipment at the Cash's Truck Plaza located in Port Allen, Louisiana. IdleAir Advanced Truck Stop Electrification (TSE) provides class 8 long-haul truck drivers with a suite of services that eliminate the need for engine idling. Electrified Parking Spaces (EPS) allow truck drivers to power their air conditioner, small appliances, or Internet router. The system delivers power for heating, ventilation, and air conditioning by connecting a hose into the truck window. Truck drivers using the equipment will be charged by the hour for access to the EPS.

  As part of the LDEQ Clean Diesel grant, LCF and IdleAir are providing complimentary window adapters and charge time to the first 500 customers. Funding for this project is provided from LDEQ through the Clean Diesel Grant Program as part of the U.S. Diesel Emissions Reduction Act (DERA). The impact of this project includes savings of 105,120 gallons of diesel, resulting in reduction of toxic emissions by over 1,100 pounds per year in greater Baton Rouge.

- ***LCF*** facilitated the Entergy's donation of 2 EVSE units on the campus of Louisiana State University. LSU Charging stations saved 2.1 tons of emissions last year from 12 registered vehicles charging. Currently, LCF manages the PlugInLSU website, providing information on electric vehicles (EV's) including where drivers can find charging stations for their vehicles.

- **LCF in partnership with Whole Foods and Solar Alternatives** held a ribbon cutting ceremony on September 6, 2013 for 2 new EVSE units. The Whole Foods Market Baton Rouge store is the first Baton Rouge retailer to offer public level 2 Electric Vehicle Charging Stations (EVCS). The level 2 EVCS are identified with green painted parking spaces and located on the side of the store. Recharging a vehicle will be complimentary for the Baton Rouge store shoppers.

## Energy Efficiency

- ***Combined heat and power (CHP).*** Although Louisiana ranks among the top states in the country in CHP, efforts are currently underway to exploit additional opportunities associated with new industrial development following the recent increases in shale gas and oil production. LDNR has contracted LSU Center for Energy Studies to conduct a study of status, potential and policies for combined heat and power in Louisiana (Dismukes, 2013).

- ***LDNR's Louisiana Revolving Loan Fund.*** LDNR has just issued public notice that it is requesting energy efficiency loan applications from interested government entities, non-profits, privately held commercial, industrial, or publicly held entities for the Louisiana Revolving Loan Fund Program. Qualified proposals will be eligible for a loan with a fixed interest rate of 2% not to exceed a term of ten years.

- ***Weatherization projects*** have been included in recent LDEQ settlements.

## Episodic Controls

- ***The episodic controls*** currently in place in the Baton Rouge area (i.e. Ozone Action Day, EnviroFlash, and Industry Ozone Action Day) are expected to be continued into the future.

## Urban Heat Island

- ***The NeighborWoods*** urban forestry initiative described earlier is expected to continue into the future

## Research/Application of New Technologies

- ***Sophisticated Regional Airshed Modeling.*** With its current "marginal" ozone classification, the Baton Rouge nonattainment area is not required by federal regulations to conduct regional ozone modeling for its forthcoming state implementation plan (SIP). However, LDEQ with the support of major stakeholders has committed to a new round of very sophisticated statewide ozone modeling. It is expected that this modeling will facilitate intelligent choices in ozone mitigation measures among the state's major urban areas to help prevent these areas into falling from attainment into nonattainment with the current ozone standard. It is also expected to provide a look into possible future circumstances should the ozone standard be lowered. The modeling will also provide capability to test various emission reduction strategies for efficacy at lowering ozone levels. A copy of the technical support document (TSD) for the modeling can be obtained at www.brcleanair.com/archivesreports/.

## Public Outreach and Education

- ***Public outreach and education efforts*** of LDEQ, BRCAC, CRPC, and LCF (e.g. websites, conferences, workshops, exhibits) are expected to continue into the future. With the prospect of the Baton Rouge area coming into attainment or just barely missing it, there will be a good opportunity to further promote ozone and particulate mitigation measures. Public outreach/education efforts of local media outlets (e.g. AQI and tips for individual action on local weather broadcasts, AQI forecasts in the local newspaper) are also expected to continue. LDEQ will soon unveil smartphone and iPhone apps that display the current AQI reading.

- ***EPA School Flag Program*.** CPRC plans to work with schools especially with the ones in the non-attainment parishes to create public awareness of outdoor air quality conditions so that children can continue to exercise while protecting their health when air quality is in unhealthy ranges.

## Other

- ***CRPC TDM Project.*** Using CMAQ funding, CRPC has initiated a travel demand management (TDM) project that will entail employer/employee surveys to fashion resources to promote commute options that will result in reduced daily vehicle miles traveled and concomitant reduction in mobile emissions.

- ***Ongoing Baton Rouge Incident Management Program.*** The Advance Transportation Management Center (ATMC) facilities were constructed during the period of 2000 through 2001. The center was completed and operating since October 2002. Subsequently, over the period of time various Intelligent Transportation System (ITS) devices were also deployed. Freeway Management System (FMS) represents a critical component of the ATMC. The FMS includes incident management, surveillance, and Motor Assistance Patrol (MAP) as major components. FMS in Baton Rouge is very robust and effective. It is a combination of surveillance, incident detection, Dynamic Message Sign (DMS) activations, Advance Traffic Information System (ATIS) alerts, and timely dispatches of MAP and EMS personnel. This decrease in clearance times translates to significant reduction in emissions that is caused by non-recurring congestion on freeways. This analysis provides the basis for calculation of reduction of VOCs and NOx due to these ATMC operations.

- ***Beneficial Environmental Projects (BEPs***). Where practicable, LDEQ and a regulated industry with an environmental violation can enter into settlement agreements that can include BEPs. These BEPs can include projects related to air quality improvements. For example, in a recent settlement agreement, ExxonMobil agreed to funding for an LDEQ air quality modeling project targeted at improving vehicle emissions inventories.

## 3.3 Means of Identifying and Evaluating New Emission Reduction Strategies

- ***Internal Resources.*** BRCAC stakeholders represent a wide variety of entities and private sector networks that can be a resource for new emissions reduction ideas.

- ***External Resources.*** EPA, national organization, and state environmental agencies all can serve as excellent resources for identifying and learning about emissions reduction measures and strategies.

- ***Public Input Portal.*** Earlier this year, BRCAC and LDEQ established and promoted a public input portal providing the public the ability to make recommendations for reducing ozone and particulate emissions.

# 4.0 HEADWINDS AND TAILWINDS FOR AIR QUALITY IMPROVEMENTS

## 4.1 Headwinds

- ***Louisiana Industrial Renaissance.*** Louisiana Economic Development officials and local economic and energy industry experts are projecting an industrial renaissance for the state of Louisiana. It has recently been reported that there are about $80 billion in facility expansion and new facility construction projects expected for the state in the next five years. The vast majority of these projects will be related to chemical manufacturing developments brought by the vast quantities of cheap natural gas that will be used as an energy source or as feedstock for production of various products such as liquid fuels, ammonia, hydrogen, and other various chemicals. The Mississippi River corridor will be a prime beneficiary of this industrial boom (Thompson, 2013). The Greater Baton Rouge Industry Alliance has tabulated a remarkable $23.7 billion in announced or underway industrial projects in the Baton Rouge MSA (Sanoski, 2013). A recent survey conducted by the Baton Rouge Area Chamber across the Baton Rouge region projects that 16,400 jobs will be created locally through 2015 (Boone, 2013). While this is great news for the state and the Baton Rouge area for economic development and jobs opportunities, it does present some challenges for achieving and maintaining attainment for national ozone and fine particulate air quality standards. There will be an increase in emissions directly from the new industrial activity as well as ancillary emission increases associated with increased materials transportation (roadways, rail, air, and pipelines). There will also be a concomitant increase in mobile and area emissions associated with expected population growth.

- ***A Declining Sense of Urgency.*** The Baton Rouge community has achieved remarkable success in improving local air quality. We have progressed from numerous unhealthy episodes of elevated ozone and onerous federal sanctions to just a few days a year of ozone levels unhealthful for sensitive individuals. According to how we fare in the next couple of weeks, the area will remain nonattainment for ozone with a "marginal" classification or will have achieved attainment with the 2008 NAAQS for ozone. Although uncomfortably close to the standard, the area has remained in attainment for the particulate standards. It is going to be challenging to foster a sense of urgency and importance to undertake new initiatives to mitigate ozone and particulates when the public perception is that the problem has been solved or greatly diminished.

## 4.2 Tailwinds

***A Quality State-Wide Regional Ozone Model***. With a "marginal" classification for ozone, the Baton Rouge area is not required by federal regulation to conduct regional airshed modeling for its forthcoming SIP. However, with the concurrence and support of many stakeholders, LDEQ decided to contract a nationally recognized ozone modeling firm to conduct a state-wide ozone modeling exercise. The principal rationale for the effort was that the modeling would help the Baton Rouge area (currently in nonattainment status) and many other urban areas within the state with ozone design values near the standard to select more effective ozone mitigation strategies for their respective areas. This was seen as particularly important with the prospect of a new, lower ozone standard on the horizon. This effort is seen as particularly valuable for the Baton Rouge area for both achieving and maintaining attainment of the ozone standard. With updated emission inventories and improved meteorological inputs, the performance of the model, as described by the modeling experts, is one of the best performing they have ever worked with. This will allow us to test efficacy of various ozone mitigation strategies with confidence. A copy of the draft Technical Support Document (TSD) for the modeling effort can be obtained at: www.brcleanair.com/archivesreports/.

- ***Federal Mobile Emissions Regulations.*** Federal rules regulating fuels, tailpipe emissions, and mileage for motor vehicles are expected to result in declining mobile emissions nationwide. This coupled with fleet turnover and a growing proportion of alt-fueled vehicles and new vehicle technologies entering the fleet should measurably improve the mobile emissions situation in the Baton Rouge area with its traffic congestion.

- ***Federal Non-Road Mobile Emissions Regulations.*** In 2014, EPA's existing rules for low-sulfur fuel in 40 CFR Part 80, Subpart I, for Non-road, Locomotive, and Marine (NRLM) engines will apply to small refiners and other entities previously exempt or allowed to meet less stringent standards. Lower-sulfur fuel will result in lower formation of secondary PM emissions as well as allowing better performance of control equipment for NOx and PM emissions on such engines. EPA's new fuel rules and engine emissions standards for ships, other marine vessels, and locomotives are also still in the process of being phased in and will result in additional reductions of ozone precursors and PM.

- ***Consent Decrees.*** Louisiana Generating (LaGen)(Big Cajun) in Pointe Coupee Parish entered into a Consent Decree with the EPA and LDEQ in November 2012 that calls for substantial reductions in nitrogen oxides ($NO_{x)}$ and sulfur dioxides ($SO_{2),}$ as well as significant reductions in particulate matter (PM.) The reductions required by the proposed consent decree will be achieved through the installation, upgrade, and operation of pollution control devices. One of the three coal-fired power plants will be converted to natural gas. As compared to LaGen's 2011 emissions, EPA expects the following emission reductions to result from this settlement:

    - $SO_2$ at least 24,000 tons per year (20,000 by 2015, at least 4,000 additional by 2025)
    - $NO_x$ about 3,300 tons per year

  These reductions in NOx and SO2 will also result in reductions in formation of secondary particulate matter.

  The consent decree requires LaGen to spend not less than $5 million to install solar photovoltaic panels at local schools, government-owned facilities, or buildings owned by nonprofit groups. In addition, LaGen will spend up to $4 million to fund creation of one or more charging stations for electric vehicles in the South Louisiana area that are supplied with zero emission renewable energy sources, and up to $500,000 on energy efficiency projects, which couldinclude voltage optimization, residential energy efficiency, or assistance with commercial or industrial energy efficiency improvements.

  Another recent consent decree between LDEQ, EPA and Cabot Corp. will result in substantial emission reductions in St. Mary and Parishes. Although these are outside the Baton Rouge MSA, the magnitude of the reductions will result in some air quality improvement within the Baton Rouge MSA. The consent decree applies to three facilities, the largest two of which are in Louisiana. Compliance with the settlement will reduce sulfur dioxide ($SO_2$) by about 12,380 tpy, nitrogen oxides ($NO_x$) by about 1975 tpy, and particulate matter (PM) emissions by approximately 14,355 tons per year from 2011 levels.

- ***Coordinated Efforts.*** The new coordination of BRCAC, CRPC, and LCF activities within the Advance Program will provide a new synergy for ozone and particulate mitigation measures across each organization's strength (i.e. LCF – alternative fuels, CRPC – transportation/air quality, and BRCAC – stakeholders/policy/technology).

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# APPENDICES

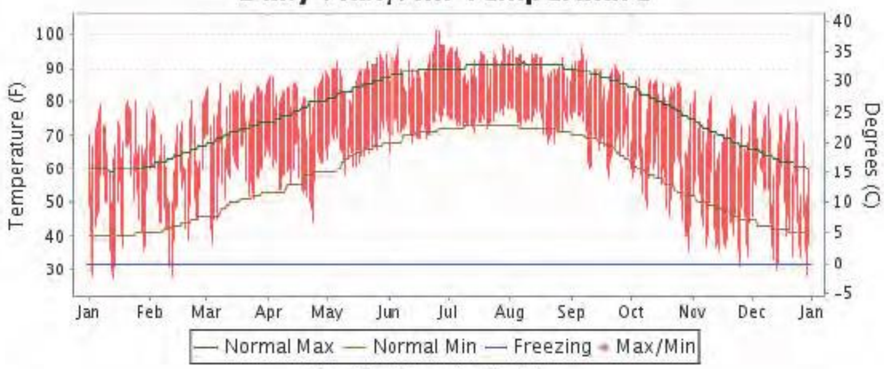
## APPENDIX A

# 2012
## LOCAL CLIMATOLOGICAL DATA
## ANNUAL SUMMARY WITH COMPARATIVE DATA

ISSN 0198-2273

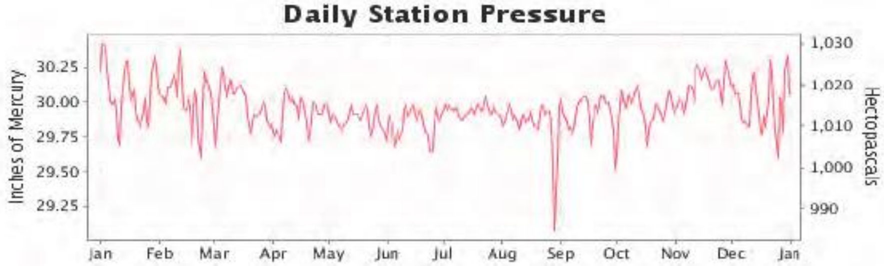
## BATON ROUGE, LOUISANA (KBTR)

### Daily Max/Min Temperature




### Daily Precipitation


### Daily Station Pressure




I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE | NATIONAL CLIMATIC DATA CENTER ASHEVILLE, NORTH CAROLINA | DIRECTOR NATIONAL CLIMATIC DATA CENTER

Appendix A Cont.

# METEOROLOGICAL DATA FOR 2012
## BATON ROUGE (KBTR)

LATITUDE: 30° 32'N  LONGITUDE: 91° 8'W  ELEVATION (FT): GRND: 64 BARO: 70  TIME ZONE: CENTRAL (UTC -6)  WBAN: 13970

| | ELEMENT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEMPERATURE °F | MEAN DAILY MAXIMUM | 69.1 | 67.4 | 79.4 | 81.9 | 88.3 | 91.3 | 92.0 | 90.4 | 88.1 | 79.3 | 71.6 | 67.4 | 80.5 |
| | HIGHEST DAILY MAXIMUM | 80 | 81 | 85 | 89 | 94 | 101 | 97 | 96 | 96 | 87 | 83 | 80 | 101 |
| | DATE OF OCCURRENCE | 25+ | 29 | 31+ | 30 | 30+ | 26+ | 29 | 03 | 06 | 05 | 03+ | 03+ | JUN 26+ |
| | MEAN DAILY MINIMUM | 46.5 | 50.3 | 58.1 | 58.5 | 66.5 | 71.8 | 74.6 | 73.9 | 68.4 | 54.7 | 43.7 | 45.1 | 59.3 |
| | LOWEST DAILY MINIMUM | 27 | 28 | 38 | 44 | 58 | 59 | 71 | 68 | 57 | 36 | 31 | 28 | 27 |
| | DATE OF OCCURRENCE | 14 | 12 | 04 | 24 | 10 | 02 | 14 | 23+ | 20 | 30 | 25 | 30 | JAN 14 |
| | AVERAGE DRY BULB | 57.8 | 58.9 | 68.8 | 70.2 | 77.4 | 81.6 | 83.3 | 82.2 | 78.3 | 67.0 | 57.7 | 56.3 | 70.0 |
| | MEAN WET BULB | 52.7 | 53.8 | 62.3 | 63.6 | 69.7 | | 76.0 | 75.7 | 71.8 | | 51.3 | 51.4 | |
| | MEAN DEW POINT | 47.4 | 49.1 | 58.3 | 59.5 | 65.8 | | 73.5 | 73.5 | 69.1 | | 46.2 | 46.9 | |
| | NUMBER OF DAYS WITH: | | | | | | | | | | | | | |
| | MAXIMUM >= 90° | 0 | 0 | 0 | 0 | 18 | 18 | 24 | 19 | 14 | 0 | 0 | 0 | 93 |
| | MAXIMUM <= 32° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | MINIMUM <= 32° | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 12 |
| | MINIMUM <= 0° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H/C | HEATING DEGREE DAYS | 253 | 215 | 37 | 14 | 0 | 0 | 0 | 0 | 0 | 67 | 230 | 280 | 1096 |
| | COOLING DEGREE DAYS | 39 | 40 | 163 | 178 | 393 | 504 | 576 | 538 | 403 | 138 | 16 | 16 | 3004 |
| RH | MEAN (PERCENT) | 72 | 75 | 75 | 72 | 72 | 71 | 79 | 81 | 79 | 73 | 72 | 76 | 75 |
| | HOUR 00 LST | 81 | 83 | 88 | 86 | 88 | 85 | 88 | 91 | 92 | 89 | 88 | 85 | 87 |
| | HOUR 06 LST | 89 | 85 | 91 | 93 | 92 | 88 | 92 | 94 | 95 | 93 | 91 | 89 | 91 |
| | HOUR 12 LST | 56 | 67 | 59 | 54 | 52 | 56 | 63 | 66 | 61 | 51 | 50 | 62 | 58 |
| | HOUR 18 LST | 62 | 66 | 61 | 60 | 59 | 60 | 72 | 73 | 71 | 67 | 67 | 70 | 66 |
| W/O | NUMBER OF DAYS WITH: | | | | | | | | | | | | | |
| | HEAVY FOG(VISBY <= 1/4 MI) | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | THUNDERSTORMS | 0 | 1 | 3 | 3 | 6 | 7 | 11 | 10 | 0 | 1 | 2 | 5 | 49 |
| PR | MEAN STATION PRESS. (IN.) | 30.06 | 30.03 | 29.98 | 29.92 | 29.87 | 29.84 | 29.93 | 29.84 | 29.91 | 29.94 | 30.11 | 29.99 | 29.95 |
| | MEAN SEA-LEVEL PRESS. (IN.) | 30.13 | 30.11 | 30.07 | 30.00 | 29.95 | 29.88 | 30.02 | 29.92 | 30.00 | 30.03 | 30.19 | 30.08 | 30.03 |
| WINDS | RESULTANT SPEED (MPH) | 2.7 | 1.3 | 3.6 | 2.1 | 0.8 | | 2.2 | 1.0 | 0.8 | 0.7 | 1.2 | 1.4 | |
| | RES. DIR. (TENS OF DEGS.) | 19 | 09 | 16 | 16 | 16 | | 22 | 18 | 10 | 05 | 09 | 16 | |
| | MEAN SPEED (MPH) | 7.1 | 7.0 | 6.8 | 6.0 | 4.4 | 5.5 | 4.5 | 5.9 | 4.2 | 4.3 | 4.0 | 6.2 | 5.5 |
| | PREVAIL.DIR.(TENS OF DEGS.) | 17 | 11 | 12 | 18 | 07 | 11 | 24 | 03 | 07 | 11 | 11 | 17 | 17 |
| | MAXIMUM 2-MINUTE WIND | | | | | | | | | | | | | |
| | SPEED (MPH) | 26 | 31 | 33 | 29 | 23 | 24 | 29 | 45 | 30 | 21 | 25 | 35 | 45 |
| | DIR. (TENS OF DEGS.) | 20 | 22 | 21 | 28 | 13 | 17 | 25 | 03 | 18 | 19 | 15 | 28 | 03 |
| | DATE OF OCCURRENCE | 20 | 23 | 21 | 02 | 07 | 06 | 11 | 29 | 30 | 17 | 11 | 25 | AUG 29 |
| | MAXIMUM 3-SECOND WIND: | | | | | | | | | | | | | |
| | SPEED (MPH) | 33 | 38 | 43 | 38 | 46 | 32 | 47 | 52 | 37 | 28 | 33 | 49 | 52 |
| | DIR. (TENS OF DEGS.) | 15 | 21 | 21 | 28 | 24 | 17 | 18 | 03 | 18 | 23 | 05 | 27 | 03 |
| | DATE OF OCCURRENCE | 25 | 23 | 21 | 02 | 31 | 14 | 12 | 29 | 30 | 31 | 26 | 20 | AUG 29 |
| PRECIPITATION | WATER EQUIVALENT: | | | | | | | | | | | | | |
| | TOTAL (IN.) | 5.75 | 7.56 | 6.42 | 3.27 | 2.77 | 5.50 | 6.60 | 10.82 | 5.41 | 0.40 | 1.21 | 8.10 | 63.81 |
| | GREATEST 24-HOUR (IN.) | 3.31 | 2.93 | 3.51 | 1.61 | 1.30 | 2.00 | 1.08 | 4.52 | 2.90 | 0.26 | 0.75 | 2.28 | 4.52 |
| | DATE OF OCCURRENCE | 25-26 | 17-18 | 21-22 | 03-04 | 07 | 07 | 08 | 29 | 29-30 | 15 | 11-12 | 16-17 | AUG 29 |
| | NUMBER OF DAYS WITH: | | | | | | | | | | | | | |
| | PRECIPITATION 0.01 | 10 | 13 | 10 | 6 | 5 | 8 | 16 | 15 | 7 | 3 | 4 | 11 | 108 |
| | PRECIPITATION 0.10 | 7 | 6 | 7 | 4 | 5 | 6 | 10 | 9 | 4 | 2 | 3 | 8 | 71 |
| | PRECIPITATION 1.00 | 2 | 3 | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 0 | 0 | 4 | 26 |
| SNOWFALL | SNOW,ICE PELLETS,HAIL | | | | | | | | | | | | | |
| | TOTAL (IN.) | | | | | | | | | | | | | |
| | GREATEST 24-HOUR (IN.) | | | | | | | | | | | | | |
| | DATE OF OCCURRENCE | | | | | | | | | | | | | |
| | MAXIMUM SNOW DEPTH (IN.) | | | | | | | | | | | | | |
| | DATE OF OCCURRENCE | | | | | | | | | | | | | |
| | NUMBER OF DAYS WITH: | | | | | | | | | | | | | |
| | SNOWFALL >= 1.0 | | | | | | | | | | | | | |

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## Appendix A Cont.

# NORMALS, MEANS, AND EXTREMES
## BATON ROUGE (KBTR)

LATITUDE: 30° 32'N | LONGITUDE: 91° 8'W | ELEVATION (FT): GRND: 64 BARO: 70 | TIME ZONE: CENTRAL (UTC -6) | WBAN: 13970

| | ELEMENT | POR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEMPERATURE °F | NORMAL DAILY MAXIMUM | 30 | 62.3 | 65.7 | 72.7 | 79.3 | 86.2 | 90.9 | 92.2 | 92.5 | 88.7 | 80.8 | 71.9 | 64.1 | 78.9 |
| | MEAN DAILY MAXIMUM | 83 | 61.8 | 63.9 | 71.5 | 78.2 | 84.7 | 89.8 | 91.2 | 91.4 | 87.1 | 80.2 | 70.3 | 63.9 | 77.8 |
| | HIGHEST DAILY MAXIMUM | 61 | 84 | 87 | 91 | 93 | 98 | 103 | 102 | 105 | 104 | 97 | 87 | 85 | 105 |
| | YEAR OF OCCURRENCE | | 2002 | 2011 | 1963 | 2006 | 1953 | 2011 | 2009 | 2000 | 2000 | 2006 | 1986 | 1982 | AUG 2000 |
| | MEAN OF EXTREME MAXS. | 83 | 77.3 | 79.3 | 83.8 | 87.6 | 92.2 | 95.7 | 96.2 | 96.7 | 94.2 | 89.5 | 83.5 | 79.2 | 87.9 |
| | NORMAL DAILY MINIMUM | 30 | 41.2 | 44.5 | 50.3 | 56.8 | 65.2 | 71.4 | 73.7 | 73.4 | 68.5 | 57.9 | 48.9 | 42.7 | 57.9 |
| | MEAN DAILY MINIMUM | 83 | 41.5 | 43.4 | 50.0 | 56.7 | 64.5 | 69.7 | 73.0 | 72.4 | 67.6 | 57.1 | 47.5 | 42.9 | 57.2 |
| | LOWEST DAILY MINIMUM | 61 | 9 | 15 | 20 | 32 | 43 | 53 | 58 | 58 | 43 | 30 | 21 | 8 | 8 |
| | YEAR OF OCCURRENCE | | 1985 | 1996 | 1980 | 1987 | 2011 | 1984 | 1967 | 2004 | 1967 | 1993 | 1976 | 1989 | DEC 1989 |
| | MEAN OF EXTREME MINS. | 83 | 23.4 | 26.9 | 32.8 | 41.3 | 52.2 | 62.2 | 68.7 | 66.6 | 55.5 | 40.8 | 31.1 | 25.0 | 43.9 |
| | NORMAL DRY BULB | 30 | 51.7 | 55.1 | 61.5 | 68.1 | 75.7 | 81.1 | 83.0 | 82.9 | 78.6 | 69.3 | 60.4 | 53.4 | 68.4 |
| | MEAN DRY BULB | 83 | 51.7 | 53.6 | 60.8 | 67.4 | 74.6 | 79.8 | 82.1 | 81.9 | 77.4 | 68.7 | 58.9 | 53.4 | 67.5 |
| | MEAN WET BULB | 29 | 45.6 | 48.6 | 54.4 | 60.3 | 67.7 | 72.9 | 74.9 | 74.7 | 70.5 | 61.6 | 53.8 | 47.9 | 61.1 |
| | MEAN DEW POINT | 29 | 43.4 | 46.0 | 51.9 | 58.1 | 66.0 | 71.6 | 73.8 | 73.4 | 68.9 | 59.6 | 51.7 | 45.4 | 59.2 |
| | NORMAL NO. DAYS WITH: | | | | | | | | | | | | | | |
| | MAXIMUM >= 90 | 30 | 0.0 | 0.0 | 0.1 | 0.2 | 7.2 | 19.6 | 24.1 | 24.3 | 14.6 | 1.8 | 0.0 | 0.0 | 91.9 |
| | MAXIMUM <= 32 | 30 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| | MINIMUM <= 32 | 30 | 6.3 | 2.9 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 4.9 | 16.1 |
| | MINIMUM <= 0 | 30 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| H/C | NORMAL HEATING DEG. DAYS | 30 | 424 | 295 | 167 | 51 | 2 | 0 | 0 | 0 | 2 | 44 | 189 | 381 | 1555 |
| | NORMAL COOLING DEG. DAYS | 30 | 13 | 18 | 58 | 142 | 334 | 484 | 556 | 556 | 410 | 179 | 51 | 22 | 2823 |
| RH | NORMAL (PERCENT) | 30 | 75 | 72 | 72 | 72 | 74 | 76 | 77 | 78 | 77 | 75 | 76 | 76 | 75 |
| | HOUR 00 LST | 30 | 82 | 80 | 81 | 83 | 86 | 88 | 88 | 89 | 88 | 87 | 87 | 84 | 85 |
| | HOUR 06 LST | 30 | 86 | 85 | 88 | 89 | 91 | 92 | 92 | 93 | 92 | 90 | 89 | 87 | 90 |
| | HOUR 12 LST | 30 | 64 | 60 | 58 | 55 | 58 | 60 | 62 | 61 | 60 | 55 | 60 | 63 | 60 |
| | HOUR 18 LST | 30 | 67 | 61 | 60 | 58 | 62 | 66 | 69 | 70 | 70 | 68 | 71 | 69 | 66 |
| S | PERCENT POSSIBLE SUNSHINE | | | | | | | | | | | | | | |
| W/O | MEAN NO. DAYS WITH: | | | | | | | | | | | | | | |
| | HEAVY FOG(VISBY <= 1/4 MI) | 49 | 3.9 | 2.5 | 2.9 | 2.4 | 2.1 | 1.1 | 1.1 | 1.3 | 1.8 | 3.7 | 3.5 | 3.5 | 29.8 |
| | THUNDERSTORMS | 65 | 2.2 | 3.3 | 4.4 | 5.1 | 6.6 | 10.4 | 15.1 | 12.5 | 6.3 | 2.6 | 2.6 | 2.5 | 73.6 |
| CLOUDINESS | MEAN: | | | | | | | | | | | | | | |
| | SUNRISE-SUNSET (OKTAS) | 1 | 6.4 | 6.4 | | 5.6 | 5.6 | 4.4 | 4.8 | 2.8 | 3.2 | 4.0 | 4.8 | 6.4 | |
| | MIDNIGHT-MIDNIGHT (OKTAS) | 1 | 6.4 | 6.4 | | 5.6 | 4.8 | 4.8 | 4.8 | 2.8 | 3.2 | 4.0 | 5.6 | 6.4 | |
| | MEAN NO. DAYS WITH: | | | | | | | | | | | | | | |
| | CLEAR | 1 | 10.0 | 9.5 | 8.0 | 7.0 | 13.0 | 7.0 | 9.0 | 10.0 | 3.0 | 5.0 | 6.0 | 2.0 | 89.5 |
| | PARTLY CLOUDY | 2 | 3.5 | 5.5 | 3.0 | 6.0 | 6.5 | 17.5 | 7.0 | 8.0 | 2.0 | 3.0 | 3.0 | 2.0 | 67.0 |
| | CLOUDY | 2 | 14.5 | 15.0 | 7.5 | 9.0 | 16.5 | 10.0 | 9.0 | 4.0 | | 8.0 | 7.0 | 5.0 | |
| PR | MEAN STATION PRESSURE(IN) | 29 | 30.08 | 30.03 | 29.97 | 29.92 | 29.90 | 29.89 | 29.94 | 29.91 | 29.90 | 29.98 | 30.03 | 30.04 | 29.97 |
| | MEAN SEA-LEVEL PRES. (IN) | 29 | 30.15 | 30.11 | 30.05 | 30.00 | 29.97 | 29.97 | 30.02 | 29.98 | 29.98 | 30.05 | 30.11 | 30.15 | 30.05 |
| WINDS | MEAN SPEED (MPH) | 29 | 7.3 | 7.7 | 7.7 | 7.6 | 6.6 | 5.7 | 5.1 | 4.8 | 5.5 | 5.6 | 6.3 | 6.8 | 6.4 |
| | PREVAIL.DIR(TENS OF DEGS) | 41 | 13 | 36 | 19 | 19 | 19 | 19 | 26 | 06 | 05 | 07 | 11 | 12 | 05 |
| | MAXIMUM 2-MINUTE: | | | | | | | | | | | | | | |
| | SPEED (MPH) | 19 | 39 | 39 | 44 | 51 | 39 | 39 | 37 | 45 | 61 | 37 | 35 | 60 | 61 |
| | DIR. (TENS OF DEGS) | | 24 | 17 | 25 | 27 | 22 | 19 | 25 | 03 | 08 | 15 | 17 | 29 | 08 |
| | YEAR OF OCCURRENCE | | 1999 | 1998 | 2009 | 2009 | 1999 | 2003 | 2009 | 2012 | 2008 | 2002 | 2004 | 2002 | SEP 2008 |
| | MAXIMUM 3-SECOND | | | | | | | | | | | | | | |
| | SPEED (MPH) | 19 | 47 | 51 | 67 | 64 | 52 | 52 | 55 | 52 | 91 | 49 | 44 | 78 | 91 |
| | DIR. (TENS OF DEGS) | | 23 | 17 | 27 | 22 | 25 | 32 | 21 | 03 | 06 | 24 | 22 | 28 | 06 |
| | YEAR OF OCCURRENCE | | 1999 | 1998 | 2009 | 2011 | 1999 | 2004 | 2010 | 2012 | 2008 | 2006 | 1997 | 2002 | SEP 2008 |
| PRECIPITATION | NORMAL (IN) | 30 | 5.72 | 5.04 | 4.41 | 4.46 | 4.89 | 6.41 | 4.96 | 5.82 | 4.54 | 4.70 | 4.10 | 5.60 | 60.65 |
| | MAXIMUM MONTHLY (IN) | 61 | 14.94 | 14.51 | 12.73 | 14.84 | 14.67 | 23.18 | 10.98 | 14.48 | 13.95 | 14.48 | 13.55 | 15.94 | 23.18 |
| | YEAR OF OCCURRENCE | | 1998 | 1966 | 1973 | 1980 | 1989 | 1989 | 1963 | 1987 | 1977 | 1984 | 1989 | 1982 | JUN 1989 |
| | MINIMUM MONTHLY (IN) | 61 | 0.52 | 0.64 | 0.30 | 0.38 | 0.35 | 0.12 | 1.94 | 0.38 | 0.09 | T | 0.25 | 1.83 | 0.09 |
| | YEAR OF OCCURRENCE | | 2003 | 2000 | 2006 | 1976 | 1998 | 1979 | 2005 | 1999 | 1953 | 1978 | 1967 | 1996 | SEP 1953 |
| | MAXIMUM IN 24 HOURS (IN) | 61 | 9.02 | 4.72 | 6.07 | 12.08 | 6.51 | 9.97 | 4.26 | 8.31 | 9.17 | 8.38 | 7.29 | 8.28 | 12.08 |
| | YEAR OF OCCURRENCE | | 1993 | 1979 | 1973 | 1967 | 2008 | 2001 | 1969 | 1987 | 2005 | 1964 | 1989 | 1982 | APR 1967 |
| | NORMAL NO. DAYS WITH: | | | | | | | | | | | | | | |
| | PRECIPITATION >= 0.01 | 30 | 9.9 | 8.8 | 8.3 | 7.5 | 7.9 | 12.1 | 12.9 | 11.8 | 8.5 | 7.5 | 8.5 | 9.1 | 112.8 |
| | PRECIPITATION >= 1.00 | 30 | 1.9 | 1.6 | 1.6 | 1.5 | 1.6 | 1.8 | 1.1 | 1.6 | 1.5 | 1.7 | 1.2 | 1.8 | 18.9 |
| SNOWFALL | NORMAL (IN) | 30 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| | MAXIMUM MONTHLY (IN) | 46 | 0.6 | 3.2 | T | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | T | 3.2 |
| | YEAR OF OCCURRENCE | | 1973 | 1988 | 1993 | | 1989 | | | | | | 1976 | 1989 | FEB 1988 |
| | MAXIMUM IN 24 HOURS (IN) | 45 | 0.5 | 3.2 | T | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | T | 3.2 |
| | YEAR OF OCCURRENCE' | | 1973 | 1988 | 1993 | | 1989 | | | | | | 1976 | 1989 | FEB 1988 |
| | MAXIMUM SNOW DEPTH (IN) | 46 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | T | 0 | 2 |
| | YEAR OF OCCURRENCE | | 1949 | 1988 | | | | | | | | | 1976 | | FEB 1988 |
| | NORMAL NO. DAYS WITH: | | | | | | | | | | | | | | |
| | SNOWFALL >= 1.0 | 30 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

published by: NCDC Asheville, NC 3 30 year Normals (1981-2010)

## Appendix A Cont.

PRECIPITATION (inches) 2012 BATON ROUGE (KBTR)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | 6.25 | 4.63 | 5.39 | 12.75 | 6.17 | 12.25 | 3.39 | 8.39 | 4.47 | 1.55 | 4.33 | 8.06 | 77.63 |
| 1984 | 2.77 | 6.63 | 1.20 | 1.79 | 3.82 | 3.00 | 4.95 | 3.92 | 2.37 | 14.48 | 2.74 | 3.76 | 51.43 |
| 1985 | 4.56 | 5.95 | 4.15 | 1.61 | 2.72 | 4.13 | 8.85 | 6.92 | 6.31 | 10.08 | 0.42 | 4.68 | 60.38 |
| 1986 | 1.53 | 3.50 | 2.71 | 2.94 | 8.21 | 6.10 | 3.31 | 6.38 | 1.91 | 4.40 | 8.52 | 6.19 | 55.70 |
| 1987 | 7.04 | 7.97 | 6.02 | 1.40 | 4.23 | 4.48 | 6.42 | 14.48 | 0.78 | 1.54 | 3.78 | 3.89 | 62.03 |
| 1988 | 3.98 | 12.49 | 9.00 | 4.66 | 0.95 | 4.16 | 6.45 | 11.02 | 9.48 | 2.80 | 2.88 | 8.17 | 76.04 |
| 1989 | 4.02 | 1.51 | 4.64 | 2.34 | 14.67 | 23.18 | 6.25 | 5.16 | 4.51 | 2.18 | 13.55 | 6.31 | 88.32 |
| 1990 | 11.41 | 7.91 | 5.84 | 2.71 | 3.61 | 7.15 | 7.37 | 4.35 | 5.06 | 3.15 | 2.12 | 4.77 | 65.45 |
| 1991 | 9.69 | 7.85 | 3.21 | 9.18 | 10.63 | 5.21 | 5.29 | 10.67 | 6.31 | 4.64 | 2.70 | 2.36 | 77.74 |
| 1992 | 9.70 | 7.53 | 4.46 | 2.29 | 2.16 | 14.45 | 6.52 | 7.64 | 1.50 | 1.21 | 8.09 | 4.70 | 70.25 |
| 1993 | 13.35 | 2.82 | 5.36 | 11.58 | 2.18 | 3.14 | 4.48 | 4.29 | 1.46 | 5.49 | 3.76 | 3.29 | 61.20 |
| 1994 | 6.66 | 2.98 | 3.75 | 8.75 | 5.81 | 6.99 | 10.32 | 3.05 | 4.13 | 5.13 | 1.24 | 3.07 | 61.88 |
| 1995 | 7.27 | 3.56 | 10.70 | 9.55 | 10.82 | 2.34 | 2.36 | 5.34 | 2.70 | 3.10 | 8.16 | 8.99 | 74.89 |
| 1996 | 6.41 | 3.27 | 6.21 | 5.92 | 3.14 | 5.04 | 2.52 | 5.94 | 6.57 | 10.17 | 2.30 | 1.83 | 59.32 |
| 1997 | 6.04 | 7.98 | 3.43 | 9.51 | 7.46 | 7.83 | 4.71 | 4.26 | 1.18 | 3.49 | 6.06 | 6.32 | 68.27 |
| 1998 | 14.94 | 5.60 | 4.03 | 5.05 | 0.35 | 2.51 | 3.56 | 3.05 | 8.54 | 2.23 | 3.05 | 3.58 | 56.49 |
| 1999 | 5.48 | 1.78 | 5.39 | 0.64 | 5.49 | 6.67 | 5.97 | 0.38 | 4.08 | 7.04 | 0.87 | 5.27 | 49.06 |
| 2000 | 2.78 | 0.64 | 3.36 | 1.55 | 1.15 | 4.78 | 3.61 | 2.68 | 3.04 | 1.07 | 10.71 | 2.73 | 38.10 |
| 2001 | 4.00 | 1.83 | 7.35 | 0.55 | 0.83 | 21.36 | 3.20 | 5.77 | 7.11 | 5.49 | 0.58 | 4.25 | 62.32 |
| 2002 | 4.28 | 1.44 | 9.43 | 4.64 | 1.83 | 3.94 | 3.38 | 4.63 | 6.20 | 9.30 | 3.76 | 7.15 | 59.98 |
| 2003 | 0.52 | 7.26 | 2.14 | 3.18 | 0.45 | 7.38 | 4.85 | 3.23 | 4.47 | 1.63 | 5.49 | 2.62 | 43.22 |
| 2004 | 3.76 | 11.44 | 2.42 | 6.70 | 10.64 | 10.41 | 2.03 | 3.06 | 1.47 | 9.02 | 6.60 | 3.14 | 70.69 |
| 2005 | 5.89 | 3.96 | 2.06 | 2.06 | 3.38 | 1.98 | 1.94 | 6.32 | 11.69 | 1.17 | 2.88 | 4.20 | 47.53 |
| 2006 | 1.77 | 4.34 | 0.30 | 3.01 | 1.26 | 1.27 | 7.16 | 5.96 | 4.51 | 9.05 | 2.86 | 8.13 | 49.62 |
| 2007 | 7.78 | 1.83 | 2.31 | 3.87 | 8.23 | 4.46 | 8.88 | 2.07 | 3.63 | 2.93 | 3.29 | 3.49 | 52.77 |
| 2008 | 9.39 | 2.28 | 3.74 | 2.67 | 8.81 | 3.52 | 3.37 | 7.86 | 8.77 | 0.26 | 1.09 | 6.36 | 58.12 |
| 2009 | 3.33 | 2.07 | 6.16 | 4.04 | 2.19 | 0.59 | 4.65 | 6.54 | 5.55 | 12.82 | 1.53 | 14.86 | 64.33 |
| 2010 | 2.38 | 6.51 | 2.54 | 0.96 | 6.92 | 6.41 | 3.44 | 12.99 | 1.90 | 1.67 | 4.96 | 4.59 | 55.27 |
| 2011 | 5.28 | 1.90 | 6.93 | 0.99 | 0.59 | 4.59 | 6.22 | 2.17 | 9.90 | 0.49 | 7.44 | 2.82 | 49.32 |
| 2012 | 5.75 | 7.56 | 6.42 | 3.27 | 2.77 | 5.50 | 6.60 | 10.82 | 5.41 | 0.40 | 1.21 | 8.10 | 63.81 |
| POR= 83 YRS | 5.23 | 4.79 | 4.81 | 4.91 | 4.72 | 4.68 | 6.02 | 5.54 | 4.46 | 3.36 | 4.18 | 5.20 | 57.90 |

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AVERAGE TEMPERATURE (°F) 2012 BATON ROUGE (KBTR)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | 48.7 | 51.4 | 57.3 | 62.6 | 72.6 | 77.0 | 82.0 | 82.2 | 75.2 | 68.0 | 58.9 | 46.5 | 65.2 |
| 1984 | 45.4 | 53.4 | 59.9 | 68.0 | 73.8 | 78.9 | 80.3 | 79.8 | 75.9 | 73.5 | 57.3 | 61.3 | 67.3 |
| 1985 | 43.8 | 50.4 | 64.9 | 68.7 | 74.0 | 80.2 | 80.7 | 82.0 | 76.5 | 72.1 | 66.3 | 48.6 | 67.4 |
| 1986 | 50.7 | 57.8 | 60.5 | 68.5 | 76.4 | 81.6 | 83.8 | 82.1 | 82.0 | 69.1 | 63.8 | 51.0 | 68.9 |
| 1987 | 49.0 | 55.0 | 58.7 | 65.7 | 76.9 | 79.7 | 82.4 | 83.1 | 77.5 | 64.3 | 60.5 | 57.4 | 67.5 |
| 1988 | 47.0 | 51.9 | 60.2 | 68.0 | 73.7 | 80.3 | 82.7 | 83.0 | 79.0 | 66.9 | 63.9 | 55.0 | 67.6 |
| 1989 | 58.7 | 53.7 | 63.2 | 67.4 | 76.5 | 79.9 | 82.0 | 82.5 | 77.2 | 67.9 | 60.9 | 44.6 | 67.9 |
| 1990 | 56.9 | 60.6 | 63.2 | 68.1 | 76.6 | 83.9 | 82.2 | 82.9 | 79.6 | 66.5 | 61.5 | 56.3 | 69.9 |
| 1991 | 50.9 | 56.7 | 63.1 | 70.9 | 77.2 | 81.6 | 83.5 | 82.1 | 77.6 | 70.7 | 55.7 | 57.1 | 68.9 |
| 1992 | 50.8 | 58.2 | 61.8 | 67.0 | 73.3 | 80.3 | 84.0 | 79.8 | 78.5 | 68.9 | 55.3 | 56.3 | 67.9 |
| 1993 | 54.3 | 54.4 | 58.9 | 63.8 | 71.0 | 79.9 | 82.3 | 82.8 | 78.0 | 67.0 | 55.6 | 50.3 | 66.5 |
| 1994 | 47.9 | 53.7 | 59.9 | 68.6 | 73.3 | 80.5 | 80.3 | 80.6 | 76.5 | 69.0 | 62.8 | 54.8 | 67.3 |
| 1995 | 51.3 | 55.0 | 61.8 | 68.2 | 76.9 | 78.7 | 83.1 | 83.5 | 78.9 | 68.7 | 57.8 | 53.1 | 68.1 |
| 1996 | 51.4 | 54.1 | 56.6 | 64.9 | 76.6 | 79.0 | 81.9 | 80.0 | 76.2 | 67.7 | 60.0 | 55.2 | 67.0 |
| 1997 | 51.2 | 54.9 | 64.2 | 62.4 | 72.9 | 79.0 | 82.5 | 81.2 | 78.5 | 68.0 | 55.7 | 49.8 | 66.7 |
| 1998 | 53.9 | 53.5 | 58.4 | 65.3 | 77.6 | 83.2 | 84.5 | 83.4 | 80.8 | 71.0 | 62.7 | 55.9 | 69.2 |
| 1999 | 55.9 | 58.6 | 59.3 | 71.8 | 74.5 | 80.3 | 81.6 | 85.1 | 76.1 | 67.6 | 59.0 | 52.3 | 68.5 |
| 2000 | 54.1 | 59.9 | 64.1 | 65.5 | 78.3 | 80.6 | 82.9 | 84.3 | 77.6 | 67.4 | 56.0 | 45.6 | 68.0 |
| 2001 | 47.7 | 59.2 | 56.8 | 70.6 | 74.3 | 78.0 | 81.7 | 81.0 | 75.9 | 64.8 | 63.1 | 55.0 | 67.3 |
| 2002 | 52.6 | 50.3 | 60.6 | 70.6 | 74.6 | 79.4 | 81.7 | 81.7 | 79.6 | 71.9 | 57.0 | 52.0 | 67.7 |
| 2003 | 47.2 | 52.9 | 60.9 | 67.2 | 78.0 | 80.2 | 81.4 | 82.8 | 76.8 | 68.4 | 62.3 | 50.6 | 67.4 |
| 2004 | 52.0 | 51.0 | 64.6 | 65.3 | 75.0 | 80.4 | 82.6 | 80.9 | 79.4 | 74.6 | 62.6 | 51.1 | 68.3 |
| 2005 | 56.4 | 58.0 | 59.3 | 66.2 | 74.1 | 81.0 | 83.8 | 83.9 | 82.0 | 68.5 | 61.4 | 51.0 | 68.8 |
| 2006 | 58.0 | 54.0 | 64.2 | 72.5 | 75.4 | 81.8 | 82.8 | 83.9 | 77.9 | 70.3 | 58.3 | 54.1 | 69.4 |
| 2007 | 52.0 | 53.3 | 64.9 | 65.9 | 74.9 | 81.8 | 81.7 | 85.7 | 80.5 | 71.0 | 61.4 | 59.0 | 69.3 |
| 2008 | 51.8 | 58.8 | 61.9 | 68.8 | 76.2 | 82.5 | 84.1 | 82.6 | 77.8 | 67.8 | 59.2 | 56.5 | 69.0 |
| 2009 | 54.5 | 58.2 | 64.6 | 68.1 | 76.3 | 83.2 | 83.8 | 82.0 | 79.2 | 69.3 | 58.7 | 50.5 | 69.0 |
| 2010 | 46.7 | 45.8 | 56.7 | 69.4 | 78.8 | 83.4 | 83.8 | 84.3 | 79.7 | 68.7 | 60.2 | 49.5 | 67.3 |
| 2011 | 48.5 | 54.0 | 63.9 | 71.4 | 75.1 | 83.9 | 83.8 | 86.3 | 75.9 | 65.7 | 60.4 | 54.3 | 68.6 |
| 2012 | 57.8 | 58.9 | 68.8 | 70.2 | 77.4 | 81.6 | 83.3 | 82.2 | 78.3 | 67.0 | 57.7 | 56.3 | 70.0 |
| POR= 83 YRS | 51.7 | 53.6 | 60.8 | 67.4 | 74.6 | 79.8 | 82.1 | 81.9 | 77.4 | 68.7 | 58.9 | 53.4 | 67.5 |

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## Appendix A Cont.

HEATING DEGREE DAYS (base 65°F) 2012 BATON ROUGE (KBTR)

| YEAR | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983-84 | 0 | 0 | 8 | 51 | 216 | 571 | 598 | 338 | 188 | 46 | 5 | 0 | 2021 |
| 1984-85 | 0 | 0 | 8 | 16 | 248 | 179 | 648 | 413 | 72 | 33 | 2 | 0 | 1619 |
| 1985-86 | 0 | 0 | 0 | 23 | 76 | 509 | 433 | 230 | 169 | 25 | 0 | 0 | 1465 |
| 1986-87 | 0 | 0 | 0 | 31 | 118 | 431 | 490 | 280 | 201 | 90 | 0 | 0 | 1641 |
| 1987-88 | 0 | 0 | 0 | 66 | 181 | 264 | 559 | 378 | 186 | 25 | 1 | 0 | 1660 |
| 1988-89 | 0 | 0 | 0 | 20 | 129 | 325 | 230 | 357 | 170 | 68 | 0 | 0 | 1299 |
| 1989-90 | 0 | 0 | 0 | 62 | 177 | 626 | 258 | 153 | 126 | 57 | 0 | 0 | 1459 |
| 1990-91 | 0 | 0 | 1 | 94 | 147 | 311 | 432 | 238 | 146 | 15 | 0 | 0 | 1384 |
| 1991-92 | 0 | 0 | 1 | 25 | 332 | 273 | 433 | 207 | 130 | 56 | 12 | 0 | 1469 |
| 1992-93 | 0 | 0 | 0 | 6 | 297 | 271 | 329 | 299 | 214 | 104 | 0 | 0 | 1520 |
| 1993-94 | 0 | 0 | 1 | 83 | 314 | 455 | 527 | 328 | 203 | 64 | 0 | 0 | 1975 |
| 1994-95 | 0 | 0 | 0 | 40 | 117 | 315 | 423 | 280 | 158 | 31 | 0 | 0 | 1364 |
| 1995-96 | 0 | 0 | 1 | 31 | 232 | 410 | 423 | 365 | 293 | 95 | 3 | 0 | 1853 |
| 1996-97 | 0 | 0 | 5 | 49 | 182 | 312 | 450 | 300 | 91 | 105 | 3 | 0 | 1497 |
| 1997-98 | 0 | 0 | 0 | 79 | 277 | 464 | 338 | 316 | 253 | 70 | 0 | 0 | 1797 |
| 1998-99 | 0 | 0 | 0 | 15 | 94 | 335 | 312 | 213 | 182 | 30 | 2 | 0 | 1183 |
| 1999-00 | 0 | 0 | 0 | 67 | 189 | 402 | 355 | 198 | 99 | 62 | 0 | 0 | 1372 |
| 2000-01 | 0 | 0 | 7 | 57 | 315 | 597 | 529 | 210 | 252 | 38 | 0 | 0 | 2005 |
| 2001-02 | 0 | 0 | 3 | 99 | 106 | 325 | 416 | 408 | 225 | 29 | 8 | 0 | 1619 |
| 2002-03 | 0 | 0 | 0 | 13 | 258 | 396 | 546 | 333 | 134 | 53 | 0 | 0 | 1733 |
| 2003-04 | 0 | 0 | 0 | 28 | 154 | 441 | 412 | 401 | 77 | 83 | 10 | 0 | 1606 |
| 2004-05 | 0 | 0 | 0 | 9 | 122 | 445 | 298 | 217 | 200 | 38 | 6 | 0 | 1335 |
| 2005-06 | 0 | 0 | 0 | 74 | 176 | 435 | 232 | 314 | 110 | 6 | 0 | 0 | 1347 |
| 2006-07 | 0 | 0 | 0 | 34 | 220 | 339 | 416 | 327 | 97 | 74 | 0 | 0 | 1507 |
| 2007-08 | 0 | 0 | 0 | 44 | 157 | 244 | 420 | 205 | 166 | 48 | 0 | 0 | 1284 |
| 2008-09 | 0 | 0 | 0 | 63 | 190 | 312 | 341 | 217 | 97 | 44 | 0 | 0 | 1264 |
| 2009-10 | 0 | 0 | 0 | 68 | 192 | 448 | 562 | 528 | 265 | 12 | 0 | 0 | 2075 |
| 2010-11 | 0 | 0 | 0 | 26 | 188 | 485 | 505 | 344 | 104 | 22 | 16 | 0 | 1690 |
| 2011-12 | 0 | 0 | 0 | 75 | 196 | 340 | 253 | 215 | 37 | 14 | 0 | 0 | 1130 |
| 2012- | 0 | 0 | 0 | 67 | 230 | 280 | | | | | | | |

WBAN : 13970

COOLING DEGREE DAYS (base 65°F) 2012 BATON ROUGE (KBTR)

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | 0 | 0 | 14 | 48 | 243 | 368 | 533 | 538 | 325 | 152 | 39 | 4 | 2264 |
| 1984 | 0 | 7 | 38 | 141 | 286 | 423 | 480 | 468 | 343 | 286 | 22 | 69 | 2563 |
| 1985 | 0 | 10 | 76 | 148 | 291 | 459 | 492 | 533 | 352 | 248 | 121 | 11 | 2741 |
| 1986 | 0 | 35 | 36 | 136 | 359 | 503 | 592 | 536 | 517 | 164 | 89 | 5 | 2972 |
| 1987 | 3 | 4 | 14 | 116 | 376 | 447 | 548 | 568 | 384 | 53 | 51 | 33 | 2597 |
| 1988 | 7 | 4 | 44 | 121 | 275 | 467 | 555 | 564 | 428 | 88 | 102 | 21 | 2676 |
| 1989 | 42 | 47 | 119 | 148 | 365 | 453 | 534 | 550 | 373 | 157 | 62 | 0 | 2850 |
| 1990 | 17 | 36 | 81 | 155 | 366 | 572 | 543 | 563 | 445 | 150 | 52 | 46 | 3026 |
| 1991 | 2 | 12 | 92 | 201 | 386 | 504 | 577 | 537 | 385 | 209 | 59 | 36 | 3000 |
| 1992 | 0 | 17 | 38 | 126 | 274 | 463 | 593 | 469 | 412 | 135 | 11 | 9 | 2547 |
| 1993 | 6 | 5 | 33 | 75 | 192 | 452 | 543 | 560 | 398 | 152 | 41 | 5 | 2462 |
| 1994 | 4 | 19 | 52 | 180 | 263 | 472 | 482 | 488 | 352 | 170 | 62 | 5 | 2549 |
| 1995 | 8 | 9 | 68 | 137 | 377 | 418 | 572 | 583 | 425 | 159 | 29 | 52 | 2837 |
| 1996 | 8 | 54 | 40 | 101 | 370 | 428 | 529 | 472 | 344 | 135 | 41 | 14 | 2536 |
| 1997 | 29 | 23 | 72 | 32 | 255 | 426 | 548 | 510 | 414 | 180 | 5 | 2 | 2496 |
| 1998 | 2 | 0 | 56 | 86 | 398 | 552 | 612 | 580 | 484 | 211 | 31 | 61 | 3073 |
| 1999 | 35 | 42 | 11 | 241 | 304 | 465 | 523 | 629 | 339 | 152 | 17 | 16 | 2774 |
| 2000 | 23 | 55 | 79 | 82 | 418 | 476 | 560 | 606 | 392 | 136 | 54 | 0 | 2881 |
| 2001 | 0 | 54 | 4 | 210 | 294 | 398 | 524 | 504 | 339 | 99 | 54 | 22 | 2502 |
| 2002 | 39 | 2 | 94 | 204 | 312 | 439 | 524 | 526 | 445 | 233 | 25 | 2 | 2845 |
| 2003 | 4 | 2 | 17 | 127 | 411 | 465 | 517 | 558 | 363 | 142 | 77 | 0 | 2683 |
| 2004 | 15 | 0 | 75 | 99 | 326 | 467 | 552 | 501 | 436 | 313 | 55 | 16 | 2855 |
| 2005 | 38 | 26 | 29 | 82 | 295 | 489 | 585 | 590 | 516 | 190 | 73 | 7 | 2920 |
| 2006 | 20 | 10 | 94 | 238 | 328 | 512 | 559 | 592 | 394 | 208 | 29 | 8 | 2992 |
| 2007 | 19 | 7 | 103 | 110 | 310 | 511 | 523 | 648 | 469 | 239 | 55 | 64 | 3058 |
| 2008 | 17 | 33 | 76 | 169 | 352 | 532 | 602 | 552 | 389 | 156 | 24 | 53 | 2955 |
| 2009 | 24 | 37 | 96 | 145 | 357 | 549 | 588 | 532 | 432 | 211 | 10 | 5 | 2986 |
| 2010 | 3 | 0 | 12 | 152 | 433 | 559 | 590 | 605 | 450 | 149 | 51 | 10 | 3014 |
| 2011 | 0 | 43 | 76 | 222 | 338 | 575 | 588 | 669 | 338 | 104 | 66 | 15 | 3034 |
| 2012 | 39 | 40 | 163 | 178 | 393 | 504 | 576 | 538 | 403 | 138 | 16 | 16 | 3004 |

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## Appendix A Cont.

SNOWFALL (inches) 2012 BATON ROUGE (KBTR)

| YEAR | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980-81 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | T | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1981-82 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1982-83 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1983-84 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1984-85 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | T | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1985-86 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1986-87 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1987-88 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 |
| 1988-89 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | T | 0.0 | T | 0.0 | T |
| 1989-90 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1990-91 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1991-92 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | T | 0.0 | 0.0 | 0.0 | T |
| 1992-93 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | | | |
| 1993-94 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1994-95 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T |
| 1995-96 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | | | | | |
| 1996-97 | | | | | | | | | | | | | |
| 1997-98 | | | | | | | | | | | | | |
| 1998-99 | | | | | | | | | | | | | |
| 1999-00 | | | | | | | | | | | | | |
| 2000-01 | | | | | | | | | | | | | |
| 2001-02 | | | | | | | | | | | | | |
| 2002-03 | | | | | | | | | | | | | |
| 2003-04 | | | | | | | | | | | | | |
| 2004-05 | | | | | | | | | | | | | |
| 2005-06 | | | | | | | | | | | | | |
| 2006-07 | | | | | | | | | | | | | |
| 2007-08 | | | | | | | | | | | | | |
| 2008-09 | | | | | | | | | | | | | |
| 2009-10 | | | | | | | | | | | | | |
| POR= 66 YRS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | T | 0.1 | 0.1 | T | 0.0 | T | 0.0 | 0.2 |

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### REFERENCE NOTES :

PAGE 1:
THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).
PAGE 2 AND 3:
H/C INDICATES HEATING AND COOLING DEGREE DAYS.
RH INDICATES RELATIVE HUMIDITY
W/O INDICATES WEATHER AND OBSTRUCTIONS
S INDICATES SUNSHINE.
PR INDICATES PRESSURE.
CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).
GENERAL:
T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE.
+ INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM.
PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH.
POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING.
WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED.
0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.
CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET
CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS.
GENERAL CONTINUED:
WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH.
RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION.
AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.
SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.
A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65 F.
DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.
DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY.
WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.
ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.
STATION HISTORY STOPPED WITH THE 2009 ANNUAL. IF YOU NEED SATION HISTORY INFORMATION GO TO "Historical Observing Metadata Repository", URL IS:
http://www.ncdc.noaa.gov/homr/
SNOWFALL STOPPED MONTH & YEAR INDICATED ABOVE. NO FURTHER YEARS INCLUDED UNLESS RESTARTED.

**NOTE:**

The "Period of Record:(POR)" for all "averages" is based on "Summary of the Day First Order Station" and "Cooperative Summary of the Day" archives.

The 2012 Annual Publications were reproduced on 6/05/13 to correct two problems that occurred when the Publications were first produced on 02/28/13.

1) A small number of stations did not correctly show number of days with thunderstorms and heavy fog.
2) Climate Normals in the Annual Publications were based on a first edition of the 1981-2010 Normals release. With the release of Service Pack 1 (SP1) new normals for 83 stations are available and now included. Additional information on SP1 is available at: http://www1.ncdc.noaa.gov/pub/data/normals/1981-2010/status.txt.

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## Appendix A Cont.

### 2012
### BATON ROUGE
### LOUISANA (KBTR)

Baton Rouge, the capital city, is located on the east side of the Mississippi River in the southeast section of the state, some 65 miles inland from the coast. The area is near the first evident relief north of the deltaic coastal plains. The NOAA National Weather Service Office is located at Ryan Airport, some 8 miles north of the downtown area. Elevations in East Baton Rouge Parish range from near 25 feet to more than 100 feet above sea level.

The general climate of Baton Rouge is humid subtropical, but the city is subject to significant polar influences during winter. Prevailing wind flow is from the southerly direction during much of the year. This maritime air from the Gulf of Mexico helps to temper summer heat, shorten winter cold spells, and provides abundant moisture and rainfall. Winds are usually rather light.

Rainfall is heavy and amounts are substantial in all seasons, with an early autumn low in September and October. Almost all rainfall is from brief convective showers. Occasionally during winter, slow moving cold fronts may produce rains lasting for a few days. Extremes of precipitation may occur in all seasons.

The winter months are normally mild with short cold spells. The typical pattern is, turning cold with rain on the first day, colder with clear skies on the second day, and warming on the third day. Freezing or sub-freezing temperatures occur several times annually, but temperatures nearly always rise above freezing during the day. The average date of the first freeze in the autumn is late November, and the average date of the last freeze in spring is late February, producing a mean freeze-free period of 273 days. Annual total snowfall averages only a fraction of an inch and many years pass with no measurable snow.

The summer months are consistently quite warm, but high temperatures rarely exceed 100 degrees. This is because of the high humidity of the maritime tropical air mass, the effects of cloudiness, and the scattered showers and thunderstorms which are a primary feature of the weather during these months. Scattered showers normally fall in the area on about one-half of the days in June, July, and August.

Except for three or four days per month, point rainfall totals are usually less than 0.5 inch. Summer relative humidity exceeds 80 percent for about 12 hours per day. High humidity may be experienced at any hour, but occurs mainly at night. Readings of 50 percent or less occur about two hours per day, usually in the afternoons. Temperatures in the spring are usually mild and pleasant and in the autumn they are generally delightful for outdoor activities.

Thunderstorms occur each month, most frequently in July and August. Severe local storms, including hailstorms, tornadoes, and local wind storms, are most frequent during the spring months. Large damaging hail very rarely occurs and tornadoes are unusual. Hurricane centers have occasionally passed very near Baton Rouge.

## Station History BATON ROUGE, LA

| NAME | Begin Date | End Date | Latitude | Longitude | Elevation Feet | Relocation | Platform |
|---|---|---|---|---|---|---|---|
| BATON ROUGE RYAN AP | 2011-09-13 | Present | 30° 32' | -91° 8' | 64 | | ASOS,COOP,USHCN |
| BATON ROUGE RYAN AP | 1954-03-10 | 1969-01-01 | 30° 31' | -91° 9' | 66 | | AIRWAYS,COOP,USHCN |
| BATON ROUGE HARDING FIELD | 1948-01-01 | 1954-03-10 | 30° 31' | -91° 9' | 66 | | AIRWAYS,COOP,USHCN |
| BATON ROUGE RYAN AP | 1994-04-01 | 1995-04-01 | 30° 32' | -91° 8' | 64 | .5 MI NW | ASOS,COOP,USHCN |
| BATON ROUGE RYAN AP | 1995-04-01 | 2011-09-13 | 30° 32' | -91° 8' | 64 | | ASOS,COOP,USHCN |
| BATON ROUGE HARDING FIELD | 1941-01-01 | 1942-05-31 | 30° 27' | -91° 7' | | | AIRWAYS |
| BATON ROUGE HARDING FIELD | 1945-02-01 | 1945-10-01 | 30° 31' | -91° 9' | | | AIRWAYS |
| BATON ROUGE RYAN AP | 1969-01-01 | 1978-10-20 | 30° 31' | -91° 9' | 66 | | COOP,USHCN,WXSVC |
| BATON ROUGE RYAN AP | 1993-05-01 | 1994-04-01 | 30° 32' | -91° 8' | 64 | | ASOS,COOP,USHCN |
| BATON ROUGE HARDING FIELD | 1945-10-01 | 1948-01-01 | 30° 31' | -91° 9' | 69 | | AIRWAYS,COOP,USHCN |
| BATON ROUGE RYAN AP | 1978-10-20 | 1988-07-01 | 30° 31' | -91° 7' | 64 | | COOP,USHCN,WXSVC |
| BATON ROUGE RYAN AP | 1988-07-01 | 1993-05-01 | 30° 31' | -91° 7' | 64 | | COOP,USHCN,WXSVC |

## Element History

| Element | Begin Date | End Date | Frequency | Time Of Observation | Equipment * | Equipment * Modifications | Equipment Exposure |
|---|---|---|---|---|---|---|---|
| PRECIP | 1988-07-01 | 1993-08-01 | DAILY | 2400 | UNIV | RCRD | |
| PRECIP | 1978-10-20 | 1988-07-01 | DAILY | 2400 | UNIV | RCRD | |
| PRECIP | 1978-10-20 | 1988-07-01 | HOURLY | 2400 | | | |
| PRECIP | 1988-07-01 | 1993-08-01 | HOURLY | 2400 | | | |
| TEMP | 1988-07-01 | 1993-08-01 | DAILY | 2400 | HYGR | | |
| PRECIP | 1993-08-01 | 2011-09-13 | HOURLY | 2400 | AHTB | RCRD;HTD | |
| PRECIP | 1993-08-01 | 2011-09-13 | DAILY | 2400 | AHTB | RCRD;HTD | |
| TEMP | 2011-09-13 | Present | DAILY | 2400 | ATEMP | | |
| TEMP | 1978-10-20 | 1988-07-01 | DAILY | 2400 | MXMN | | |
| TEMP | 1993-08-01 | 2011-09-13 | DAILY | 2400 | HYGR | | |
| PRECIP | 2011-09-13 | Present | DAILY | 2400 | PCPNX | | |
| PRECIP | 2011-09-13 | Present | HOURLY | 2400 | AHTB | RCRD;HTD | |

* For explanation of codes and abbrevitions see Station Metadata link below.

Other Station Information can be found at:
ASOS Implementation by NWS: http://www.nws.noaa.gov/ops2/Surface/asosimplementation.htm
Station Metadata website: http://www.ncdc.noaa.gov/homr

INQUIRES/COMMENTS CALL: (828) 271-4800, option 2
Fax Number : (828) 271-4876
TDD : (828) 271-4010
Email : ncdc.orders@noaa.gov

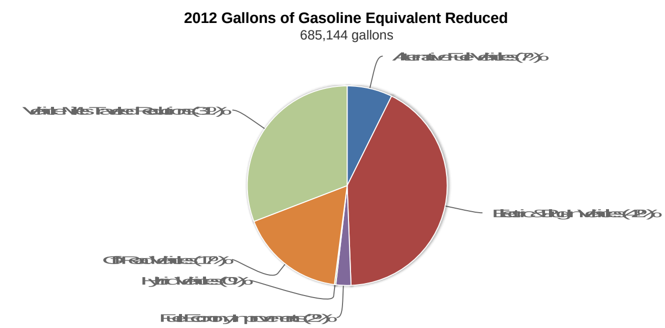
NOAA/National Climatic Data Center
Attn: User Engagement & Services Branch
151 Patton Avenue
Asheville, NC 28801-5001

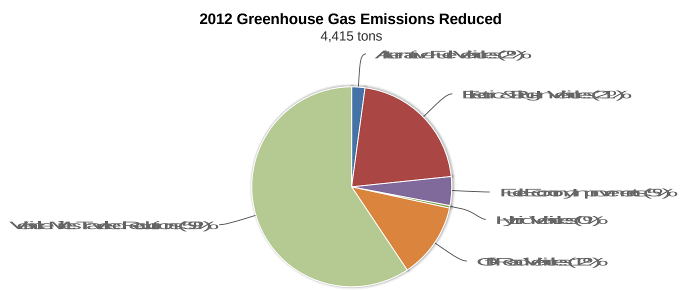
Visit our Web Site for other weather data: www.ncdc.noaa.gov

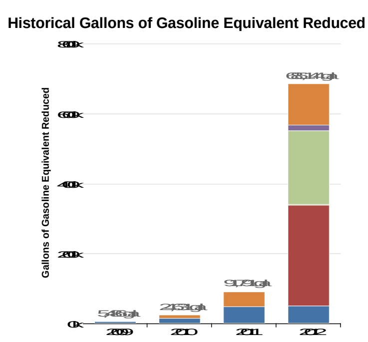
# APPENDIX B

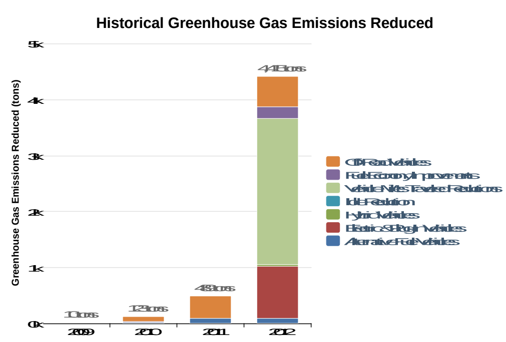
## Louisiana Clean Fuels
## 2012 Annual Report

Every year, each Clean Cities coalition submits to DOE an annual report of its activities and accomplishments for the previous calendar year. Coalition coordinators, who lead the local coalitions, provide information and data via an online database managed by the National Renewable Energy Laboratory (NREL). The data characterize membership, funding, projects, and activities of the coalitions. The coordinators also submit data on the sales of alternative fuels, deployment of alternative fuel vehicles and hybrid electric vehicles, idle-reduction initiatives, fuel economy activities, and programs to reduce vehicle miles traveled. NREL and DOE analyze the data and translate them into petroleum-use and greenhouse gas reduction impacts for individual coalitions and the program as a whole. This report summarizes those impacts for Louisiana Clean Fuels.



**APPENDIX C**

# Barge study latest air quality effort

In an effort to continue to improve air quality throughout Louisiana, a new alliance was formed between the American Waterways Operators and DEQ. This alliance established a workgroup that will allow the state and barge companies to gain more information on emissions from marine vessels –specifically barges- that traverse the Mississippi River. This impact on air quality is largely unknown and unquantified.

DEQ performed air monitoring with the HAWK, which is an infrared camera used to see emissions that are not visible to the naked eye. With this new data in hand, the American Waterways Operators signed a memorandum of understanding with DEQ in April 2009. This agreement outlines an in-depth plan to determine if barges are impacting ozone concentrations by using the monitor DEQ's Carville monitoring site as a test site. Additional monitors may be added to the study.

"For over 60 years, AWO has sought collaboration with government agencies in efforts that protect our environment and quality of life while providing the most economical way to move America's commerce."

**- Dan Jaworski**
*Chairman, AWO Inland Liquid Sector*

"For over 60 years, AWO has sought collaboration with government agencies in efforts that protect our environment and quality of life while providing the most economical way to move America's commerce," said Dan Jaworski, Chairman, AWO Inland Liquid Sector. "LDEQ's Memorandum of Understanding with AWO is a great example of these efforts."

New technologies employed by the barge industry allow tracking of barge movements on the river. The operators can take a snapshot and produce a graphic image of barges and their locations on the river at any given time. The DEQ monitor at Carville is equipped with an automatic gas chromatograph that can pull an air sample, immediately analyze it and send the information back to DEQ air quality staff. The information is collected, reviewed and analyzed to determine if emissions from barge traffic are affecting the monitor.

The air monitoring system is designed such that a sample is automatically taken when the total hydrocarbons at the monitor reach a certain level. The system then sends an email to the barge industry and DEQ staff signaling that a sample has been taken. The sample is then analyzed and the results are sent to DEQ staff. Simultaneously, the barge industry staff produces a screen shot of barges located on the river in the area near the monitor. The barges are identified and the owners are contacted to identify the barge's cargo.

Once this information is gathered, it is sent to DEQ with the vessel owner's name, barge identity, type of product on the barge and whether the barge is loaded or empty. DEQ reviews the data to determine whether the barge's emissions affected the monitor.

This partnership between the American Waterways Operators and DEQ will meld technology and data to give a more complete picture of what is affecting the air quality.

"By taking the tools and the technology that the barge operators have and combining it with the data from our own monitors, we can get a complete picture," said Paul Miller, Assistant Secretary for the Office of Environmental Assessment. "We can see what is impacting our monitors. This is a good example of cooperation between the state and other interested parties to improve the environment."

*Barge traffic is shown on this photo of the Mississippi River*

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