BATON ROUGE, LOUISIANA
Final Area Designations for the
2008 Ozone National Ambient Air Quality Standards

Table 1 below identifies parishes in Louisiana that EPA is designating as nonattainment for the 2008 ozone national ambient air quality standards (2008 ozone NAAQS) [1] as part of the Baton Rouge, Louisiana nonattainment area. In accordance with section 107(d) of the Clean Air Act, EPA must designate an area "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. EPA is designating one nonattainment area within the state of Louisiana. The technical analysis supporting the designation and boundaries for this nonattainment area is provided below. This technical analysis includes evaluation of information submitted by the State of Louisiana and comments received from the public. The formal responses to comments received are provided in the 2008 ozone designation response to comments document which can be found in electronic docket EPA-HQ-OAR-2008-0476 (www.regulations.gov).

Table 1. Areas in Louisiana Included in the Baton Rouge, LA Ozone Nonattainment Area

Area Name	Louisiana's Recommended Nonattainment Parishes	EPA's Designated Nonattainment Parishes
Baton Rouge, LA	East Baton Rouge	Ascension East Baton Rouge Iberville Livingston West Baton Rouge

EPA is designating as "unclassifiable/attainment" for the 2008 ozone NAAQS the remaining parishes in Louisiana that are not listed in the table above.

The analysis below provides the basis for the Baton Rouge, Louisiana nonattainment area boundaries. It relies on our analysis of monitoring data that show violations of the 2008 ozone NAAQS, which is based on certified air quality monitoring data from 2008-2010, and on an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis that considers the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA should consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.[2]

1. Air quality data (including the design value calculated for each FRM or FEM[3] monitor in the area);

[1] The primary 8-hour ozone standard, set to protect human health, was revised on March 27, 2008 (73 FR 16436) from 0.08 parts per million (ppm) to 0.075 ppm. The secondary ozone standard, set to protect human welfare and the environment, was revised to be consistent with the primary ozone standard.

[2] The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to nine factors. In this technical support document we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in five categories of factors.

[3] FRM refers to Federal Reference Method, and FEM refers to Federal Equivalent Method. FRM monitors utilize a chemi-luminescent technique to measure ozone, while many FEM monitors use a technique involving ultraviolet photometry. FEM methods began to be developed in the late 1970s and early1980s and are now the most widely utilized methods for

2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., parishes, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. [4] NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards. Accordingly, EPA chose to examine the five factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).[5] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

In EPA's designations guidance for the 2008 ozone NAAQS, EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard, and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's September 4, 2008, guidance recommended using the boundary of the county or parish containing the violating monitor as the starting point for considering the nonattainment area's boundary.

Technical Analysis for Baton Rouge, Louisiana

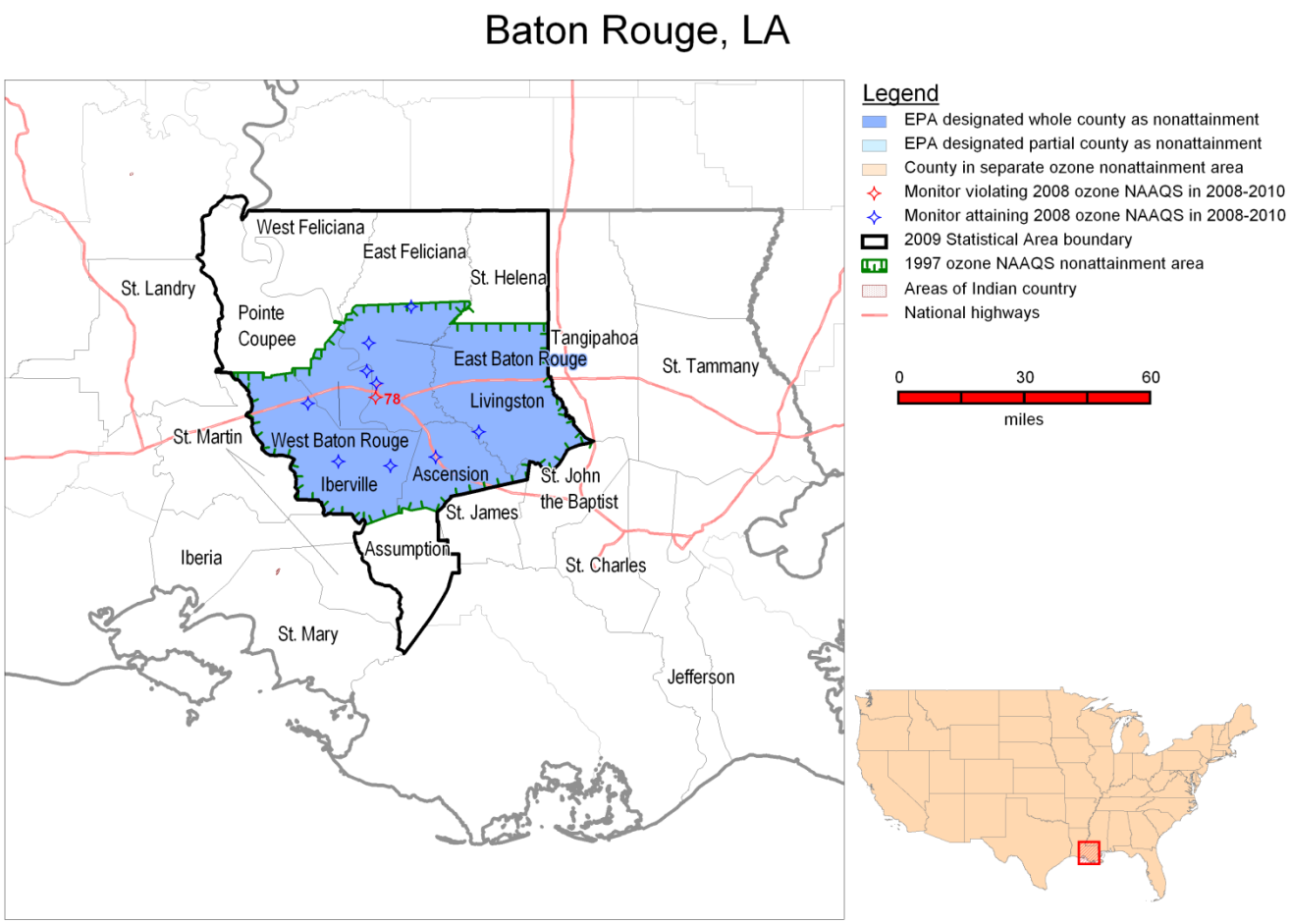
Figure 1 is a map of the designated Baton Rouge nonattainment area. The map provides other relevant information, including the locations and design values of air quality monitors, parish and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for the 1997 ozone NAAQS, and major transportation arteries.

monitoring ozone levels. Refer to 40 CFR Part 53 for a more detailed description of FEM and FRM methods. http://www.epa.gov/ttnamti1/files/ambient/criteria/reference-equivalent-methods-list.pdf

[4] Peak ozone concentrations generally occur downwind of source areas on relatively sunny days with high temperatures and relatively low wind speeds.

[5] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Figure 1: Designated Baton Rouge nonattainment area.



For purposes of the 1997 8-hour ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS was a five parish area that included the entire parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge.

In March 2009,[6] Louisiana recommended that eleven parishes throughout the state, including East Baton Rouge Parish, be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008. In January 2011,[7] Louisiana provided a revised recommendation that only East Baton Rouge Parish be designated nonattainment. This revised recommendation was based on air quality data from 2008-2010, which was obtained from FEM/FRM monitors sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating five parishes in Louisiana (identified in Table 1 above) as “nonattainment” for the 2008 ozone NAAQS as part of the Baton Rouge nonattainment area.

[6] Initial 2008 ozone NAAQS designation recommendation letter from Secretary Leggett to then Acting Regional Administrator Larry Starfield, dated March 12, 2009.
[7] Updated ozone designation letter from Secretary Hatch to Regional Administrator Armendariz, dated January 25, 2011.

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in parishes in the Baton Rouge-Pierre Part CSA based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which comprises the most recent years with fully-certified air quality data for the state of Louisiana. A monitor's design value is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years, is 0.075 ppm or less. A design value is only valid if minimum data completeness criteria are met (See 40 CFR part 50 Appendix P). Where several monitors are located in a parish (or a designated nonattainment area or maintenance area), the design value for the parish or area is determined by the monitor with the highest individual design value.

The 2010 design values for the ozone NAAQS for parishes in Baton Rouge and the nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data.

Parish	State Recommended Nonattainment?	2008-2010 Design Value (ppm)
Ascension, LA	No	0.075
Assumption, LA	No	--
East Baton Rouge, LA	**Yes**	**0.078**
East Feliciano, LA	No	--
Iberville, LA	No	0.073
Livingston, LA	No	0.075
Pointe Coupee, LA	No	0.075
St. Helena, LA	No	--
West Baton Rouge, LA	No	0.071
West Feliciano, LA	No	--

Ambient monitoring in East Baton Rouge Parish indicates a violation of the 2008 ozone NAAQS; therefore this parish is included in the nonattainment area. A parish (or partial parish) must also be designated nonattainment if it contributes to a violation in a nearby area. Each parish without a violating monitor that is located near a parish with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation. EPA also notes that, in addition to the violating monitor in East Baton Rouge Parish, ambient monitors in three parishes in the Baton Rouge area, Ascension Parish, Livingston Parish, and Pointe Coupee Parish, indicate design values just under the nonattainment threshold. Assumption, East Feliciano, St. Helena, and West Feliciano parishes do not have ozone monitoring sites.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NOx and VOC) and other emissions-related data that provide information on areas contributing to measured violations of the 2008 ozone NAAQS in East Baton Rouge Parish.

Emissions Data

EPA evaluated parish-level emission data for anthropogenic NOx and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available emissions data in the NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html). Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations.

Table 3 shows emissions of NOx and VOC (given in tons per year or tpy) for violating and nearby parishes that we considered for inclusion in the Baton Rouge nonattainment area.

Table 3. Total 2008 NOx and VOC Emissions.

Parish	State Recommended Nonattainment?	NOx (tpy)	VOC (tpy)
Ascension, LA	No	14,128	13,524
Assumption, LA	No	1,654	2,008
East Baton Rouge, LA	Yes	21,863	24,473
East Feliciana, LA	No	1,142	1,631
Iberville, LA	No	14,818	10,152
Livingston, LA	No	3,087	4,780
Pointe Coupee, LA	No	15,733	2,560
St. Helena, LA	No	1,154	1,001
West Baton Rouge, LA	No	9,268	3,467
West Feliciana, LA	No	1,107	793
	Area-wide:	**83,954**	**64,389**

Five parishes in the CSA are characterized by comparatively high emissions of anthropogenic NOx, which exceed 9,000 tpy, and three parishes have comparatively high anthropogenic VOC emissions in excess of 10,000 tpy. Collectively, the parishes of Ascension, East Baton Rouge, Iberville, Pointe Coupee, and West Baton Rouge contribute 90 percent of the anthropogenic NOx emissions for the ten-parish area. Similarly, Ascension, East Baton Rouge, and Iberville Parishes collectively contribute 75 percent of the ten-parish area's VOC emissions. The relatively high emissions of ozone precursors in these parishes are a factor that EPA considered in evaluating their possible inclusion in the Baton Rouge nonattainment area.

In our analysis of the emissions data for the area, we took note that the NOx emissions from Pointe Coupee originate primarily from a single point source facility (Big Cajun Power Plant) in the northeast part of the parish. If the NOx emissions from the emission units at this facility are removed (12,119 tpy in 2008), the rest of anthropogenic NOx emissions sources in the parish total to 3,614 tpy in 2008.

The remaining parishes are characterized by comparatively low anthropogenic NOx and VOC emissions, in the range of 1,000 to 5,000 tpy.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-generating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to ozone formation that in turn contributes to nonattainment of the NAAQS in the area. Rapid population or VMT growth (see below) in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each of the evaluated parishes in the area.

Table 4. Population and Growth.

Parish	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Ascension, LA	No	107,215	0.35	29,937	39
Assumption, LA	No	23,421	0.06	42	0
East Baton Rouge, LA	Yes	440,171	0.93	27,281	7
East Feliciana, LA	No	20,267	0.04	(1,098)	(5)
Iberville, LA	No	33,387	0.05	72	0
Livingston, LA	No	128,026	0.18	35,496	38
Pointe Coupee, LA	No	22,802	0.04	46	0
St. Helena, LA	No	11,203	0.03	695	7
West Baton Rouge, LA	No	23,788	0.12	2,224	10
West Feliciana, LA	No	15,625	0.04	488	3
	Area-wide:	825,905	0.18	95,183	13

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

The 2010 Census data indicates that the majority of the population of the Baton Rouge-Pierre Part CSA resides in the parishes of Ascension, East Baton Rouge, and Livingston; each of these parishes is characterized by population counts in excess of 100,000 people and population densities greater than 150 people per square mile. Although West Baton Rouge has a lower population than Ascension, East Baton Rouge, and Livingston, it does have a population density of 120 people per square mile, which is similar to that of the larger parishes.

Three of the parishes, Ascension, Livingston, and West Baton Rouge, have undergone increases in population of 10 percent or more since the 2000 Census was taken. The growth in population in these three parishes accounts for almost all the total population growth for the area.

The presence of large populations and high population density is an indicator of high area and mobile source emissions of ozone precursors that may contribute to observed violations of the 2008 ozone NAAQS in this area, which supports inclusion of these parishes in the nonattainment area. The remaining parishes are mostly rural with little urbanization.

The attachment to this document contains Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, and Figure 3, Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the Baton Rouge area.

Traffic data

EPA evaluated the total Vehicle Miles Traveled (VMT) for each parish in the Baton Rouge area. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point (mobile) source emissions. A parish with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that in turn contributes to nonattainment with the NAAQS in the area. Rapid population or VMT growth in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to consider as contributors to the nonattainment area. Table 5 shows traffic data for each parish, including the total VMT in 2008 and VMT growth for the period from 2002 to 2008.

Table 5. Traffic Data (As Indicated by VMT).

Parish	State Recommended Nonattainment?	2008 VMT* (million miles)	% Change in VMT (2002 – 2008)
Ascension, LA	No	1,141	+28
Assumption, LA	No	261	+54
East Baton Rouge, LA	Yes	3,572	+19
East Feliciana, LA	No	225	-19
Iberville, LA	No	516	+28
Livingston, LA	No	1,287	+12
Pointe Coupee, LA	No	289	+25
St. Helena, LA	No	136	+8
West Baton Rouge, LA	No	596	+102
West Feliciana, LA	No	160	-33
	Area-wide:	8,183	---

* MOBILE model VMTs are those inputs into the NEI version 1.5.

Five of the parishes in the Baton Rouge area are characterized by comparatively high VMT. These parishes are: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge. Collectively these five parishes account for 87 percent of the total VMT for the area. Because motor vehicle emissions usually contribute significantly to an urban area's NOx emissions inventory, indicators such as high VMT and growth in VMT support inclusion of these parishes in the nonattainment area designation. The remaining parishes, including East Feliciana and Pointe Coupee, are characterized by low total VMT relative to the core parishes discussed above.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation. Normally when we are developing a conceptual model understanding of the meteorology that yields ozone exceedances in an area, we will evaluate five to ten years worth of meteorological data. Reductions were done regionally and locally prior to 2006. To better reflect current emission and meteorological conditions that yield ozone exceedances we evaluated the 2006-2010 period (the time period after the reductions) for all days that had ozone exceedances at the design value monitor to give a representative meteorological data set analysis.

We conducted an analysis of back trajectories to assess where air masses originated for the 24 hours leading up to observed ozone exceedances (greater than 0.075 ppm) that occurred at the LSU monitor. This monitor has consistently set the design value for the last five years in the Baton Rouge area. We used the National Oceanic and Atmospheric Administration Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT) model to assess all exceedances at the design value monitor for the area, the LSU monitor, for the years 2006 to 2010. HYSPLIT trajectories alone do not determine inclusion or exclusion of an area with regard to ozone designations. Rather, HYSPLIT trajectories are supporting information that complements other meteorological information, as well as information concerning the other factors. For this reason, one cannot set any interpretative thresholds, such as the percentage of trajectories that must traverse an area for that area to be considered contributing. In considering whether a parish may contribute to monitored ozone exceedances, we consider both the frequency of trajectories and the emissions of ozone precursors from a parish. HYSPLIT analysis was conducted using the available EDAS meteorological databases and run for the 24 hours preceding the afternoon of the monitored violation. We used a standard 100 meter start height at the monitor location.

The attachments to this document contain Figures 2 and 3, which provide graphical information concerning the ambient monitoring network in the Baton Rouge area and meteorological data. Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, presents locations of major stationary sources, and locations of ambient monitors with their design values. Figure 3, Baton Rouge Ozone and Ozone Precursor Monitoring Network with Wind Trajectories, includes an overlay of the back trajectories characterizing where the centerline of the air mass originated for the 24 hours preceding the afternoon of the violation. An examination of the 24-hour back trajectories for the recent five years of violations of the 0.075 ppm standard at the LSU monitor indicates that emissions from Pointe Coupee Parish do not appear to contribute to observed violations of the 2008 ozone NAAQS in East Baton Rouge Parish. For the three-year period 2008-2010, no wind back trajectories traverse through Pointe Coupee Parish for days with ozone concentrations above 0.075 ppm at the LSU site. Looking back a little further to the 2006-2007 period, there were two days out of 25 with back trajectories that traversed Pointe Coupee Parish. One of these centerline trajectories barely went through the southwest corner of Pointe Coupee parish, and the main point source (Big Cajun) is located in the northeast part of the parish. So it is unlikely emissions the largest source in the parish contributed to the violating monitor on this day. For the five-year 2006-2010 time period the two trajectories through Pointe Coupee parish are less than five percent of all days with ozone concentrations greater than 0.075 ppm at the LSU site.

Conversely, examination of the back trajectory data depicted in Figure 3 indicates that emissions from Ascension, Iberville, Livingston, and West Baton Rouge Parishes could contribute at times to nonattainment in East Baton Rouge Parish.

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. The Baton Rouge area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipated we would recommend should be included in the nonattainment area, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing or prior nonattainment area boundaries for ozone or other urban-scale pollutants, parish lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Baton Rouge area has previously established nonattainment boundaries associated with the 1-hour and 1997 8-hour ozone NAAQS, the latter of which encompassed all of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. Louisiana has recommended a different boundary for the 2008 ozone NAAQS, limiting their recommended nonattainment area to East Baton Rouge Parish, which has the only ambient monitor indicating a violation of the 2008 ozone standard. For evaluation of the boundary for the 2008 ozone nonattainment area, EPA gave strong consideration to the nonattainment area boundary for the 1997 ozone standard.

Conclusion

Based on the assessment of the factors described above, EPA has concluded that the following parishes should be included as part of the Baton Rouge nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. These are the same parishes that were included in the Baton Rouge nonattainment area for the 1997 ozone NAAQS. The air quality monitors in East Baton Rouge Parish indicate a violation of the 2008 ozone NAAQS based on the 2010 design value; therefore this parish is included in the nonattainment area.

Ascension, Iberville, Livingston, and West Baton Rouge are nearby parishes that do not have monitors indicating a violation of the NAAQS based on 2008-2010 data. Based on the five factors discussed previously and the interrelation of these factors, EPA has concluded that these parishes contribute, through emissions from point sources and non-point sources (e.g., vehicles and other small area sources), to the ozone concentrations in violation of the 2008 ozone NAAQS in East Baton Rouge Parish.

Ascension, East Baton Rouge, Iberville, Livingston, Pointe Coupee, and West Baton Rouge Parishes have among the highest NOx and VOC emissions in the area. Pointe Coupee Parish is not being included in the 2008 ozone nonattainment area because analysis of back trajectory meteorological data and locations of emission sources indicates that the emissions from Pointe Coupee did not likely

contribute to more than one observed violation of 2008 ozone NAAQS in East Baton Rouge Parish in a five year period. We also note that most of the emissions of NOx from Pointe Coupee are emitted by a single point source in the northeast corner of the parish. Additionally, this rural parish did not have a significant growth in population or VMT over the 2000 to 2010 period.

Finally, the parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge are the most densely populated in the Baton Rouge area, and some of these parishes are having large increases in population. Collectively, these five parishes account for almost all of the VMT and population growth (2000-2010) within Baton Rouge-Pierre Part CSA.

Therefore, in conclusion of our review/analyses of the five factors for the parishes in the Baton Rouge Pierre Part CSA, we are designating the Baton Rouge 2008 8-hour Ozone nonattainment area be comprised of the following five parishes: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge.

ATTACHMENTS

Figure 2. Baton Rouge Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2006-2010 period.

Figure 4. Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network.

Figure 2 - Baton Rouge Ozone and Ozone Precursor Monitoring Network, with Population Density

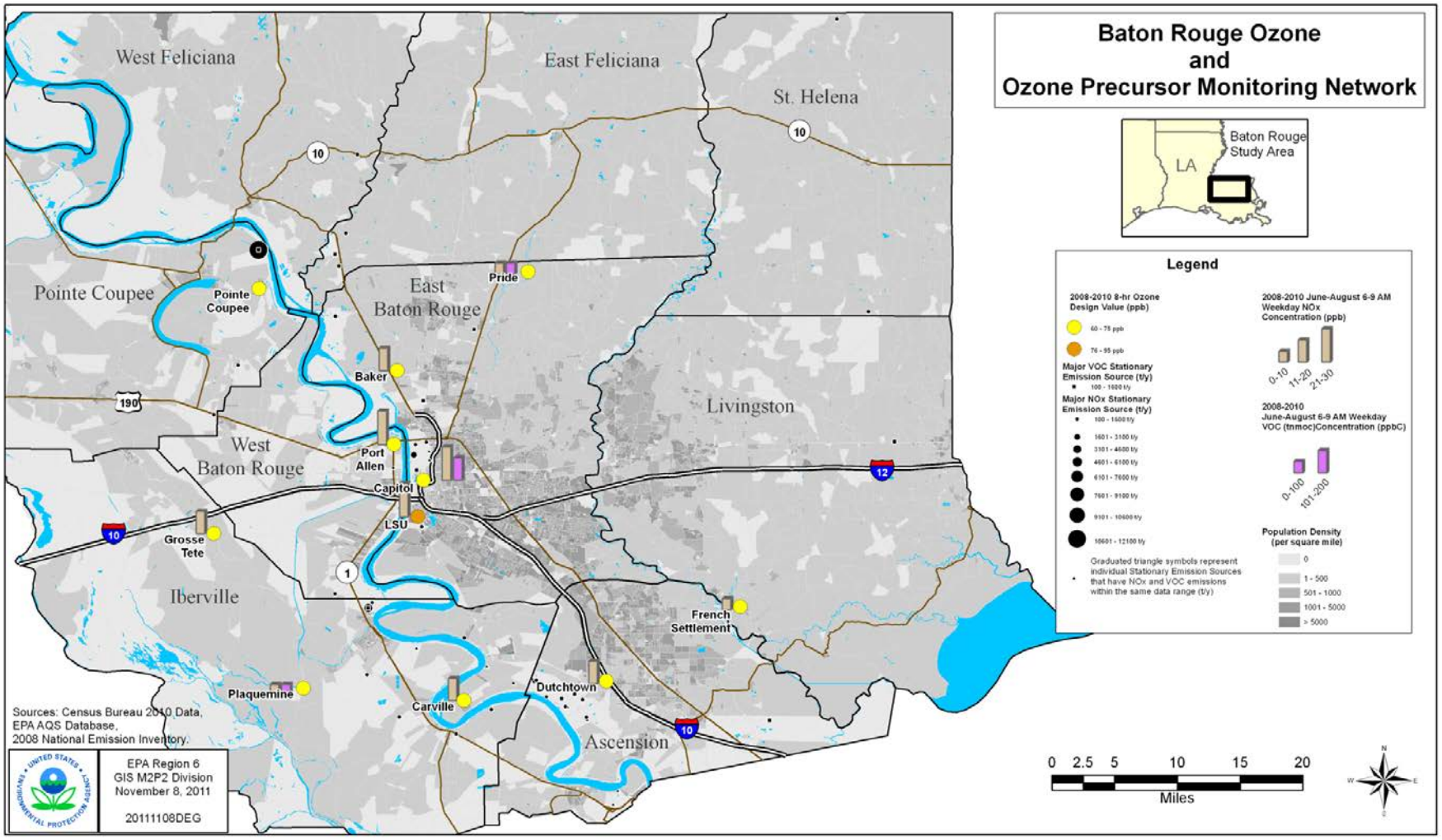
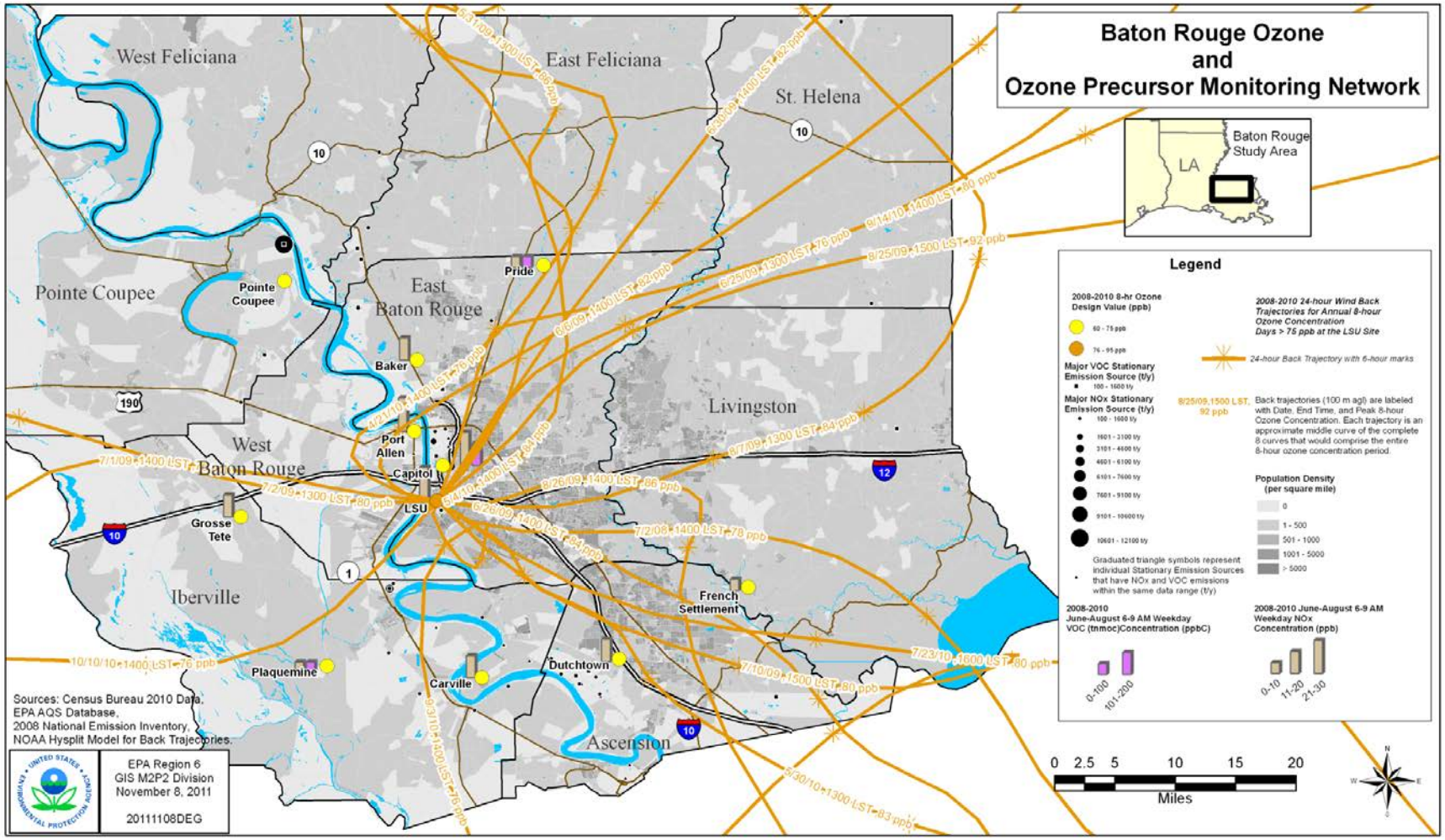


Figure 3 – Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2008-2010 period.



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