3.16 AIR QUALITY AND CLIMATE CHANGE

3.16.1 Introduction

This section provides the context necessary to understand air quality and climate change effects in the Project area resulting from the Proposed Action and alternatives. Operation of dredges, tugboats, and materials-handling equipment powered by internal combustion engines emits pollutants as exhaust, which affects local and regional air quality. These emissions can cause deterioration of ambient air quality and expose sensitive populations to increased health risks, including cancer and respiratory diseases, while GHG emissions can contribute to global warming and climate change.

This section focuses on existing air quality conditions in the Project area, including emissions associated with the existing operation of dredges, tugboats, and materials-handling equipment powered by internal combustion engines, that may be affected by the Proposed Action and alternatives. It begins with a summary of the federal, state, and local regulatory settings, followed by discussion of the common air pollutants and local monitoring data. These data are important because they highlight pre-existing air quality concerns in the St. Charles segment of the Missouri River. While the Proposed Action and alternatives encompass other counties, this section focuses on the St. Charles segment (which includes St. Louis, Franklin, St. Charles, and Madison[1] Counties), as it is the only river segment in an area that is in nonattainment with regard to the national ambient air quality standards (NAAQS). Changes in dredging operations that may increase pollutant emissions therefore would result in the most profound effect on air quality in this segment.

The section summarizes climatic and atmospheric conditions along the LOMR; these conditions determine the movement and dispersion of air pollutants. The section also provides an overview of sensitive land uses that may be exposed to pollutant emissions as a result of the Proposed Action and Project alternatives.

Information used in the preparation of this section came from a variety of sources, including the USACE and the USEPA.

3.16.2 Regulatory Setting

[1] Madison County, Illinois is the location of one onshore facility owned by Limited Leasing. Because material dredged from the Missouri River in the St. Charles segment will be processed at this location, Madison County is considered part of the St. Charles segment.

This section describes the regulatory framework for the Project area and the standards that will be used to determine whether implementation of the Proposed Action or alternatives would result in potential adverse effects to air quality or climate change.

Federal

National Ambient Air Quality Standards

The federal Clean Air Act (CAA), enacted in 1963 and amended several times thereafter (including the 1990 Clean Air Act Amendments), establishes the framework for modern air pollution control. The CAA directs the USEPA to establish NAAQS for the six criteria pollutants listed in Table 3.16-1.

Regional attainment with the NAAQS is based on local monitoring data. If monitored pollutant concentrations meet federal standards over a designated period, the area is classified as being in attainment for that pollutant. If monitored pollutant concentrations violate the standards, the area is considered a nonattainment area for that pollutant. Regions previously designated as nonattainment areas that have since obtained attainment are designated as maintenance areas. For the ozone standards, nonattainment and maintenance areas are further categorized into groups according to the increasing severity of the exceedance (for example, marginal, moderate, serious, severe, and extreme). Likewise, for the CO standard, areas are grouped into moderate or serious nonattainment or maintenance areas, depending on the severity of the exceedance. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated as unclassified.

Table 3.16-1 National Ambient Air Quality Standards

	Primary Standards[a]		Secondary Standards[b]	
Pollutant	Level	Average Time	Level	Average Time
Carbon monoxide	9 ppm (10 mg/m^3)	8-hour [c]	None	
	35 ppm (40 mg/m^3)	1-hour [c]		
Lead	(0.15 µg/m^3) [d]	Rolling 3-month average	Same as primary	
	1.5 µg/m^3	Quarterly average	Same as primary	
Nitrogen dioxide	0.053 ppm (100 µg/m^3)	Annual (arithmetic mean)	Same as primary	
Particulate matter (PM_{10})	150 µg/m^3	24-hour [e]	Same as primary	
Particulate matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [f] (arithmetic mean)	Same as primary	

Table 3.16-1 National Ambient Air Quality Standards

Pollutant	Primary Standards[a] Level	Primary Standards[a] Average Time	Secondary Standards[b] Level	Secondary Standards[b] Average Time
	35 µg/m³	24-hour [g]	Same as primary	
Ozone	0.075 ppm (2008 std)	8-hour [h]	Same as primary	
	0.08 ppm (1997 std)	8-hour [i]	Same as primary	
	0.12 ppm	1-hour [j]	Same as primary	
Sulfur dioxide	0.03 ppm	Annual (arithmetic mean)	0.5 ppm (1300 µg/m³)	3-hour [c]
	0.14 ppm	24-hour [c]		

Notes:

µg/m³ = Microgram(s) per cubic meter; mg/m³ = Milligrams per cubic meter; ppm = Parts per million; Std = Standard.

[a] Primary standards refer to limits set to protect public health, including the health of "sensitive" populations.

[b] Secondary standards refer to limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

[c] Not to be exceeded more than once per year.

[d] Final Rule signed on October 15, 2008.

[e] Not to be exceeded more than once per year on average over 3 years.

[f] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.

[g] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).

[h] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

[i] (1) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(2) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as the U.S. Environmental Protection Agency (USEPA) undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

[j] (1) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is <1.

(2) As of June 15, 2005, USEPAthe USUSEPA has revoked the 1-hour ozone standard in all areas except the 14 8-hour ozone nonattainment Early Action Compact (EAC) areas.

For one of the 14 EAC areas (Denver, CO), the 1-hour standard was revoked on November 20, 2008. For the other 13 EAC areas, the 1-hour standard was revoked on April 15, 2009.

Source: USEPA 2009d.

Of all the counties where dredging would occur under the Proposed Action or alternatives, the USEPA has classified St. Louis, St. Charles, Franklin, and Madison Counties as moderate nonattainment areas for the 8-hour ozone standard. All of the remaining counties where dredging would occur under the Proposed Action or alternatives are classified as in attainment or unclassified for all other criteria pollutants (USEPA 2009e).

Federal Conformity Requirements

The CAA requires that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to the appropriate State Implementation Plan (SIP). The rule applies to federal projects in areas designated as nonattainment areas and ensures that they will not interfere with strategies implemented to attain the NAAQS for any of the six criteria pollutants and in some areas designated as maintenance areas. Project-level conformance with the SIP is demonstrated through a general conformity analysis.

As previously indicated, the following counties within the Project area are classified as federal nonattainment areas for the 8-hour ozone standard: St. Louis, Franklin, St. Charles, and Madison (USEPA 2009e). These areas constitute the St. Charles segment of the Missouri River. Although the Proposed Action and alternatives encompass other counties, this analysis focuses on the St. Charles segment (which includes St. Louis, Franklin, St. Charles, and Madison Counties) of the Missouri River, as it is the only Project area segment located in a federal nonattainment area. Consequently, a general conformity determination must be performed to demonstrate that total direct and indirect emissions of ozone would conform to the applicable SIP. More specifically, the general conformity analysis must identify whether Project emissions of ozone precursors (ROG/VOC and NO_X) in these counties meet the following conditions:

- Are below the appropriate *de minimis* threshold (based on the nonattainment level of the Project area, the threshold is 100 tons per year) (40 CFR 51.853); and
- Are regionally insignificant (total emissions are less than 10 percent of the area's total emissions inventory for that pollutant). Regional emissions for ROG and NO_X are presented in Table 3.16-2. Note that the emissions in Table 3.16-2 are from 2002 as this was the most recent information available on the USEPA website.

If the two conditions above are not met, a general conformity determination must be performed to demonstrate that the total direct and indirect emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards would conform to the applicable SIP.

State

Dredging operations associated with the Proposed Action and alternatives would occur in Missouri, Kansas, Nebraska, and Illinois. The following four agencies are responsible for maintaining federal air quality standards within each of these states: MDNR, KDHE Bureau of Air, NDEQ, and Illinois

Environmental Protection Agency (IEPA). The primary tools used by each of these state agencies to implement air quality regulations are construction and stationary source permits:

Table 3.16-2 Regional Emissions for the *de Minimis* Conformity Analysis of Ozone (tons/year)

County	VOC	NO_X
St. Louis	60,120	64,860
St. Charles	13,645	28,037
Franklin	6,091	14,647
Madison	16,471	21,961
10% of Regional Emissions		
County	VOC	NO_X
St. Louis	6,012	6,486
St. Charles	1,365	2,804
Franklin	609	1,465
Madison	1,647	2,196

Notes:

NO_X = Oxides of nitrogen.
VOC = Volatile organic compounds.

Source: USEPA 2009f.

- The MDNR currently requires state permits for construction activities and stationary source facilities that exceed *de minimis* thresholds based on their potential to emit. These permits are in accordance with standards established in Title 10 of the Missouri Code of State Regulations, Rules 10 CSR 10-6.050 Construction Permits and 10 CSR 10-6.065 Operating Permits (Basham pers. comm.).
- The KDHE construction permits ensure that emissions from new or modified equipment comply with the New Source Performance Standards (40 CFR Parts 60, 61, and 62), and the National Standards for Hazardous Air Pollutants. Operating permits are based on a facility's potential to emit. These permits satisfy the requirements of the federal CAA Title V program and closely parallel the requirements of 40 CFR Part 70 (KDHE n.d.).
- The NDEQ has established specific pollutant thresholds for determination of the air quality permits. Construction activities or facilities exceeding these thresholds are subject to NDEQ permitting in accordance with Title 129 of the State Code (NDEQ n.d.).

- The IEPA requires operating permits in accordance with State Regulation 201. The type of permit required is based on a facility's potential to emit. Smaller sources (sources with potential emissions less than 100 tons per year of particulate matter) have fewer restrictions and requirements than larger facilities. Certain activities and classes of equipment, which are summarized in 35 IAC 201.146, are not subject to state permit requirements. It is anticipated that the onshore facility located in Madison County would qualify for several of these exemptions (Schnepp pers. comm.).

According to the agencies listed above, commercial dredges and tugboats are exempt from state permitting requirements. However, onshore materials-handling equipment and facilities exceeding applicable thresholds may be subject to state permits (Basham pers. comm., Schnepp pers. comm.). To the extent that the Proposed Action or alternatives increase pollutant emissions, state permitting requirements may be triggered. In addition, depending on their potential to emit, onshore equipment and facilities may be subject to state rules and regulations. Table 3.16-3 summarizes rules and regulations that may apply to the Proposed Action or alternatives as a result of changing emissions levels.

Table 3.16-3 State Rules and Regulations Restricting Emissions

State	Rule	Description
Missouri	10 CSR 10-6.170	Restricts the dispersion of PM from the premises of origin through various control measures.
	10 CSR 10-6.045	Limits open burning of combustible materials. Specifically, open burning outside of major metropolitan areas may not occur within 200 yards of the nearest occupied structure.
	10 CSR 10-6.220	Specifies the maximum allowable opacity of visible air contaminants and requires use of continuous opacity monitor systems on certain air contaminant sources.
	10 CSR 10-6.24/ 10 CSR 10-6.250	Apply to projects with the potential to emit asbestos and requires project proponents to register with the Missouri Department of Natural Resources and allow period asbestos inspections.
	10 CSR 10-6.345	Protects air quality in the St. Louis area by addressing NO_X sources proposed for construction outside and upwind of the St. Louis nonattainment area. Applies to major sources in Perry, St. Genevieve, St. Francois, Washington, and Warren Counties that trigger Prevention of Significant Deterioration review for NO_X or emit more than 900 tons of NO_X during the ozone season.
Kansas	28-19-20	Limits the amount of PM from any processing machine, equipment, or other device.
	28-19-21	Regulates unique chemical or physical compounds that require emissions rates lower than those in Rule 28-19-20.
	28-19-31	Restricts PM emissions from sources used for indirect heating.
	28-19-57	Establishes emissions restrictions for times designated as an air pollution alert period and an air pollution warning period.
	28-19-650	Establishes emissions opacity limits for sources not covered by other regulations.

Table 3.16-3 State Rules and Regulations Restricting Emissions

State	Rule	Description
Nebraska	Title 29 Chapter 20	Reduces the amount of PM emitted from sources used for purposes other than indirect heating.
	Title 29 Chapter 24	Limits the amount of sulfur oxides emitted by any existing fossil fuel–burning equipment in excess of 2.5 pounds per million British thermal unit input, maximum 2-hour average.
	Title 29 Chapter 32	Prohibits handling, transporting, or storage of any material in a manner that may allow PM to become airborne in such quantities that it remains visible in the ambient air beyond the premises where it originates.
	Title 29 Chapter 38	Establishes emissions restrictions for times designated as an air pollution alert period and an air pollution warning period.
	Title 29 Chapter 39	Prohibits operation of a diesel-powered motor vehicle on any public street or highway in such a manner that smoke discharged inhibits visibility.
Illinois	Rule 212	Limits the amount of visible PM emissions. Rule requirements most applicable to the Proposed Action or alternatives include 212.304 through 212.314.
	Rules 214 through 217	Limit emissions of sulfur, organic material, CO, and NO_X in the state through various control measures.
	Rule 228	Prohibits discharge of visible amount of asbestos fiber or asbestos-containing materials unless the actions summarized in Section 228.121 are met.

Notes:

CO = Carbon monoxide.
NO_X = Oxides of nitrogen.
PM = Particulate matter.

Sources: Basham pers. comm., Schnepp pers. comm., MDNR 2009, KDHE 2007, NDEQ 2009, Illinois Pollution Control Board 2002.

Local

Two local agencies in Missouri and one local agency in Kansas have jurisdiction over potential emission sources at the county level in the Project area. The St. Louis County Air Pollution Control Program (St. Louis) is the official regulatory agency in St. Louis County, and the Kansas City Air Quality (Kansas City) is the official regulatory agency in the Kansas City Metropolitan Area. Likewise, the Wyandotte County Department of Air Quality (Wyandotte County) has local jurisdiction over potential emission sources in Wyandotte County. All three of these local agencies enforce state rules and require construction and operating permits for facilities exceeding applicable thresholds. Permits issued at the local level function as state permits. In the State of Missouri, these permits are in effect for the life of the equipment until change of ownership (St. Louis n.d., Manning pers. comm.).

In addition to enforcing state regulations, St. Louis and Kansas City have established air quality codes to address the unique air pollution problems in their respective regions (Froeschner pers. comm.,

Manning pers. comm.). Chapter 2 and Chapter 5 of Title 10 of the Missouri Code of State Regulations outline air quality standards specific to the Kansas City Metropolitan Area and the St. Louis Metropolitan Area, respectively. Table 3.16-4 summarizes rules that may apply to the Proposed Action or alternatives as a result of changing emissions levels.

Table 3.16-4 Local Agency Rules and Regulations Restricting Emissions

Authority	Rule	Description
St. Louis County Air Pollution Control Program	10 CSR 10-5.510	Reduces emissions of NO_X in ozone nonattainment areas. Requires major sources of NO_X to install or comply with reasonably available control technology as required under the Clean Air Act. Applies to all installations located in Franklin, Jefferson, St. Charles, and St. Louis Counties and in the city of St. Louis with the potential to emit 100 tons or greater per year of NO_X.
	10 CSR 10-5.520	Reduces VOC emissions from major sources that have not been affected by other rulemakings (one or more rules under Title 10, Division 10, Chapter 5). Applies to any installation in St. Charles, St. Louis, Franklin, and Jefferson Counties and in the city of St. Louis with the potential to emit more than 100 tons per year of VOCs.
Kansas City Air Quality	10 CSR 10-2.385	Restricts the idling time of heavy-duty vehicles in the Kansas City area so that no owner/operator of a heavy-duty diesel vehicle covered may idle the vehicle for more than 5 minutes in any 60-minute period, except for those operators exempted from the rule as noted in Section C. Applies throughout Clay, Platte, and Jackson Counties.

Notes:

NO_X = Oxides of nitrogen.
VOC = Volatile organic compounds.

Source: MDNR 2009.

3.16.3 Common Pollutants Emitted during Sand and Gravel Operations

Air pollutants of concern associated with sand and gravel operations include carbon monoxide (CO), nitrogen oxides (NO_X), ozone, and particulate matter (PM). The federal government has set standards for six commonly found criteria air pollutants: CO, nitrogen dioxide (nitrogen dioxide is a species of NO_X), ozone, sulfur dioxide (SO_2), PM, and lead (Pb). In addition, dredging operations generate toxic air contaminates (TACs) and GHGs. Ozone and NO_X typically affect air quality on a regional scale, while CO, TACs, and PM tend to accumulate locally. GHGs are the only pollutants considered to affect air quality on a global scale. This is because GHGs can reside in the atmosphere for hundreds of years and thus be dispersed throughout the globe. Table 3.16-5 briefly describes the characteristics of each of these pollutants, as well as any concerns they pose to human health or the environment.

Table 3.16-5 Pollutants Commonly Emitted during Sand and Gravel Operations

Pollutant	Comments
Ozone	• Respiratory irritant not emitted into the air, but formed by a photochemical reaction in the atmosphere between ozone precursors (reactive organic gases [ROG]/volatile organic compounds [VOC] and NO_X) and sunlight. • Pollutant of greatest concern within the Project area.
Carbon monoxide (CO)	• Local pollutant combines readily with hemoglobin. • Reduces amount of oxygen transported in bloodstream. • High CO levels develop primarily during winter, when atmospheric dispersion is reduced due to cold temperatures and light winds.
Nitrogen oxides (NO_X)	• Major component of acid rain and ground-level ozone. • Considerable human health risks, including chronic bronchitis and lung irritation.
Particulate matter (PM)	• High concentrations can reduce visibility and corrode materials. • Inhaled particulate matter less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter can damage human and animal lung tissue.
Toxic air contaminates (TACs)	• Pollutants that may result increased mortality or serious illness or may pose potential hazard to human health. • Diesel particulate matter (DPM) from heavy use of diesel-powered combustion engines during dredging operations is the TAC of greatest concern.
Greenhouse gases (GHGs)	• Most common GHGs generated by dredging activities are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). • CO_2 accounts for more than 75% of all anthropogenic GHG emissions. • GHGs emissions typically reported in terms of carbon dioxide equivalents (CO_2e). • Scientific consensus concludes that emissions of GHGs directly contribute to climate change and global warming.

Note:
For more information on these and other pollutants, please see USEPA 2009a, 2009b, and 2010.

3.16.4 Local Air Quality Conditions

Existing local air quality conditions can be characterized by local air monitoring data and emissions associated with existing sand and gravel operations. A discussion of local existing air quality conditions helps to identify the overall air quality conditions within the Project area and how emissions associated with the Proposed Action and alternatives may degrade air quality.

3.16.5 Local Air Monitoring Data

The existing air quality conditions along the LOMR can be characterized by monitoring data collected in the region. The USEPA maintains an extensive network of monitoring stations throughout the United States that monitor criteria air pollutants. Tables 3.16-6 through 3.16-9 summarize air quality monitoring data from the nearest monitoring stations along the LOMR for the last 3 years. Data are presented for each pollutant of concern (ozone, PM_{10}, $PM_{2.5}$, and CO) monitored at the respective station. Note that not all stations monitor for the same pollutants. As indicated in Table 3.16-6, monitoring stations in the Project area have indicated frequent violations of federal ozone standards, while Tables 3.16-7 through 3.16-9 indicate no violations of the PM_{10}, $PM_{2.5}$, and CO standards, respectively.

Table 3.16-6 Background Ambient Air Quality Data for 8-Hour Ozone

Air Resources Board Air Monitoring Station	Maximum 8-Hour Concentration (ppm)			Second Highest 8-Hour Concentration (ppm)			Number of Days Exceeding 8-Hour NAAQS (0.075 ppm)		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
Maryland Heights—St. Louis County	0.09	0.10	0.07	0.08	0.10	0.07	15	20	1
General Electric Store—St. Charles County	0.09	0.09	0.08	0.09	0.09	0.07	19	24	4
Orchard Farm—St. Charles County	0.09	0.09	0.08	0.09	0.08	0.07	12	14	2
Highway 33 and County Home Road—Clay County	0.10	0.09	0.07	0.09	0.08	0.07	23	10	0
2010 Metropolitan—Leavenworth County	0.08	0.09	0.06	0.08	0.08	0.06	3	6	0
1210 N 10th Street, JFK Recreation Center—Wyandotte County	0.09	0.07	0.06	0.08	0.07	0.06	10	3	0

Notes:

NAAQS = National Ambient Air Quality Standards.
ppm = Parts per million.

Source: USEPA 2009c.

Table 3.16-7 Background Ambient Air Quality Data for PM10

Air Resources Board Air Monitoring Station	Annual Average (µg/m³)			Maximum National 24-Hour Concentration NAAQS (150 µg/m³)			Days Exceeding NAAQS (>150 µg/m³)		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
3400 Pershall Road—St. Louis County	15	17	18	33	55	60	0	0	0
South 759 Highway, Pump Station—Buchanan County	30	29	32	76	68	88	0	0	0
Fire Station #3—Wyandotte County	40	35	32	92	92	80	0	0	0
1210 N 10th Street, JFK Recreation Center—Wyandotte County	31	29	26	80	63	53	0	0	0
724 Troost (Rear)—Jackson County	23	27	24	58	51	56	0	0	0
27th and Van Brunt—Jackson County	19	20	21	40	38	51	0	0	0

Notes:

µg/m³ = Microgram(s) per cubic meter.
NAAQS = National Ambient Air Quality Standards.

Source: USEPA 2009c.

Table 3.16-8 Background Ambient Air Quality Data for $PM_{2.5}$

Air Resources Board Air Monitoring Station	Annual Average(ppm)			Maximum 24-Hour Concentration			Days Exceeding NAAQS (>35 µg/m³)		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
General Electric Store—St. Charles County	11.56	13.20	12.24	32.0	49.7	28.0	0	0	0
Highway 33 and County Home Road—Clay County	10.49	11.07	10.41	27.3	31.3	28.2	0	0	0
South 759 Highway, Pump Station—Buchanan County	12.03	12.05	12.41	27.4	34.6	29.6	0	0	0
1210 N 10th Street, JFK Recreation Center—Wyandotte County	11.64	11.86	10.43	26.9	25.8	25.8	0	0	0

Notes:

µg/m³ = Microgram(s) per cubic meter.
NAAQS = National Ambient Air Quality Standards
ppm = Parts per million.

Source: USEPA 2009c.

Table 3.16-9 Background Ambient Air Quality Data for CO

Air Resources Board Air Monitoring Station	Maximum 1-Hour Concentration			Days Exceeding NAAQS 1-hour (35 ppm)			Days Exceeding NAAQS 8-hour (>9.0 ppm)		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
1210 N 10th Street, JFK Recreation Center—Wyandotte County	3.5	3.0	2.2	0	0	0	0	0	0

Notes:

NAAQS = National Ambient Air Quality Standards.
ppm = Parts per million.

Source: USEPA 2009c.

The location of the monitoring stations relative to the LOMR is depicted in Figure 3.16-1. As shown in the figure, the majority of the stations are concentrated near the major metropolitan areas of St. Louis and Kansas City. Consequently, data are limited for the much of the Project area. Given the rural character of the region, however, it can be assumed that pollutant concentrations along much of the LOMR are relatively low.

3.16.5.1 Existing Emissions from Current Dredging Operations

Dredging is a current and ongoing activity along the LOMR. Consequently, existing air quality is affected by current dredging operations and their associated effects. While the precise contribution to the deterioration of ambient air quality is difficult to quantify, it is reasonable to assume that the monitored levels presented above are influenced by existing dredging operations.

Emissions from existing sand and gravel operations were estimated by dividing operations into three activities:

- Dredging (removal of sand and gravel from the river bed and transport of that material onshore);
- Onshore materials handing (use of earth-moving equipment to transport the dredged material); and
- Hauling sand and gravel.
- Emissions from each of these activities were estimated using information supplied by the Dredgers and source material from prior studies (ICF International 2009; Starcrest Consulting 2007, 2009). When companies did not supply complete information, assumptions were made using the most conservative scenarios so that potential emissions would not be underrepresented.

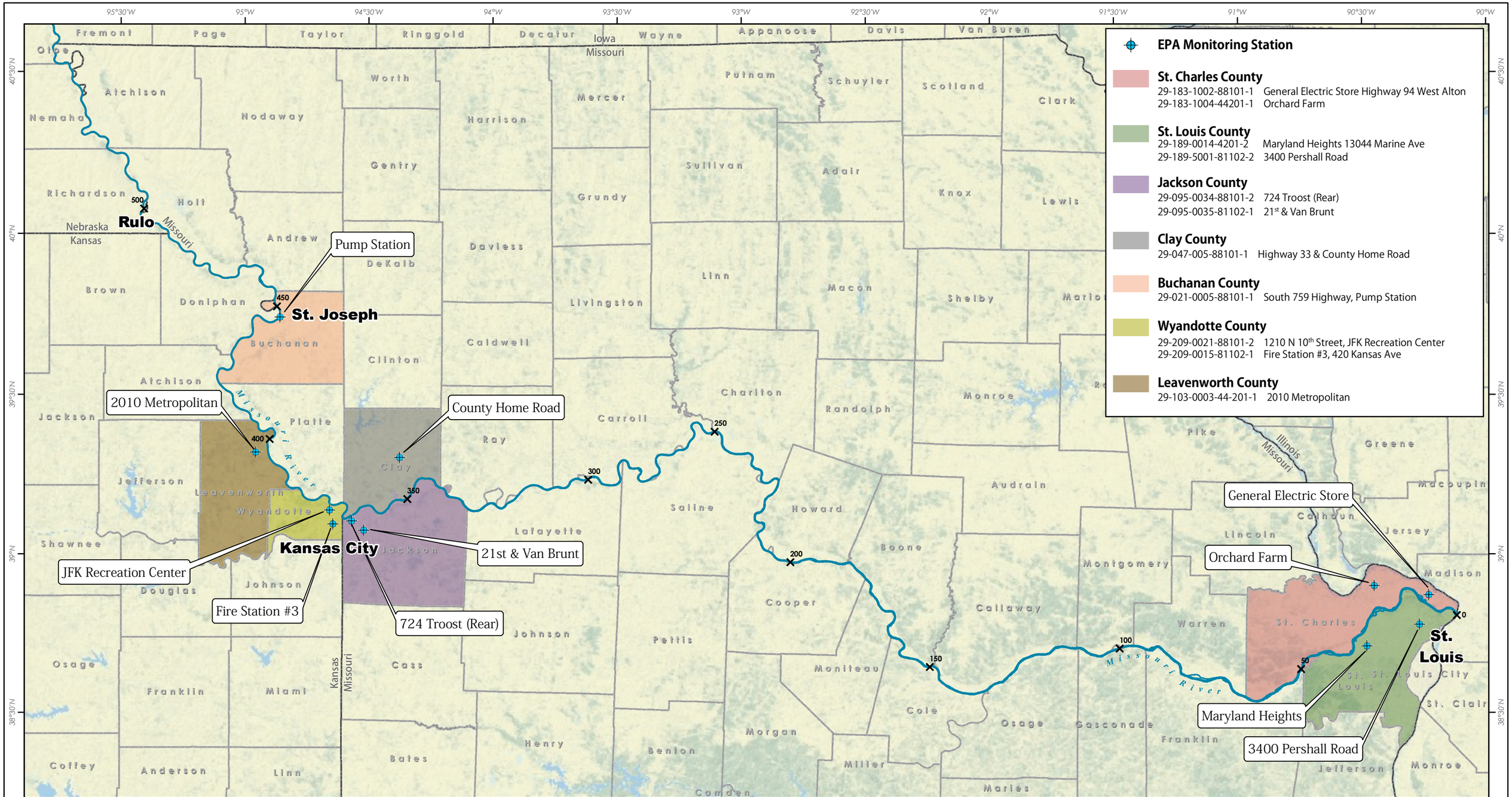

Figure 3.16-1
USEPA Air Quality Monitoring Stations
Missouri River Commercial Dredging EIS

July 2010

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Note that emissions from onshore facilities, such as fugitive dust from processed materials and air pollutants from the maintenance and upkeep of offices and employee vehicle trips, would be generated from facility operations. Dust emissions can occur during materials processing. However, these materials are typically wet or moist when handled, which serves to minimize and suppress dust emissions. Information on facility upkeep was not provided by the existing companies; consequently, these types of emissions were not included in this emissions analysis. However, any criteria pollutant or GHG emissions generated by these facilities are expected to be minimal compared to soil hauling activities and operation of dredging equipment.

Table 3.16-10 presents existing emissions from dredging, onshore materials handling, and sand and gravel hauling by river segment. Please refer to Section 4.14 and Appendix D for a detailed description of the methodologies and assumptions used in the emissions modeling for existing sources, which is consistent with the methodology used to estimate emissions associated with the Proposed Action and alternatives.

Table 3.16-10 Estimated Existing Emissions Inventory by River Segment (tons/year)

Segment	Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e[a]
RM 489							
St. Joseph[b]	Dredging	0.48	11.40	5.62	0.64	0.59	823
	Handling	0.57	5.95	2.44	0.47	0.39	801
	Hauling	0.29	3.76	1.09	0.20	0.18	0.31
	Subtotal	*1.34*	*21.11*	*9.15*	*1.31*	*1.16*	*1,624*
RM 383							
Kansas City[c]	Dredging	3.87	92.72	45.69	5.22	4.80	6,692
	Handling	1.15	11.89	4.88	0.95	0.78	1,603
	Hauling	2.66	34.11	9.93	1.79	1.61	2.80
	Subtotal	*7.67*	*138.73*	*60.50*	*7.96*	*7.19*	*8,297*
RM 350							
Waverly[d]	Dredging	0.60	16.40	6.72	0.74	0.68	1,216
	Handling	0.95	9.26	4.17	0.79	0.65	1,234
	Hauling	0.33	4.24	1.24	0.22	0.20	0.35
	Subtotal	*1.88*	*29.91*	*12.13*	*1.75*	*1.53*	*2,450*

Table 3.16-10 Estimated Existing Emissions Inventory by River Segment (tons/year)

Segment	Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e[a]
RM 254							
Jefferson City[e]	Dredging	1.55	42.72	18.31	1.89	1.74	3,222
	Handling	2.48	24.47	10.78	2.05	1.69	3,269
	Hauling	1.41	18.15	5.28	0.95	0.85	1.49
	Subtotal	*5.45*	*85.33*	*34.38*	*4.90*	*4.29*	*6,493*
RM 127							
St. Charles[f]	Dredging	3.48	102.96	21.40	4.32	3.98	7,263
	Handling	4.44	45.67	18.93	3.66	3.01	6,775
	Hauling	1.48	18.96	5.52	1.00	0.89	1.56
	Subtotal	*9.40*	*167.58*	*45.85*	*8.98*	*7.88*	*14,039*
Total		26	443	162	25	22	32,904

Notes:

CO = Carbon monoxide.
CO_2e = Carbon dioxide equivalent.
NO_X = Nitrogen dioxide.
PM_{10} = Particulate matter less than 10 microns.
$PM_{2.5}$ = Particulate matter less than 2.5 microns.
RM = River mile.

VOC = Volatile organic compounds.[a] Presented in metric tons per year.

[b] Companies with dredging activity: Holliday Sand & Gravel Company.

[c] Companies with dredging activity: Holliday Sand & Gravel Company.

[d] Companies with dredging activity: Capital Sand Company.

[e] Companies with dredging activity: Capital Sand Company and Hermann Sand & Gravel.

[f] Companies with dredging activity: Capital Sand Company, Hermann Sand & Gravel, Limited Leasing, and J.T.R.

Please see Section 4.14 and Appendix D for further detail on company operations and quantification methods.

3.16.6 Climate and Meteorology in the Missouri River Basin

Although the primary factors that determine air quality are the locations of air pollutant sources and the amount of pollutants emitted from those sources, meteorological conditions (such as precipitation, wind, and temperature) and topography also are important factors. For example, atmospheric conditions (such as wind speed, wind direction, and air temperature gradients) interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. This section discusses the meteorological conditions and topography in the Missouri River Basin, which includes the Project area.

The discussion focuses on the southeastern portions of the basin, where monitoring data indicate pre-existing air quality concerns (see Tables 3.16-6 through 3.16-9).

3.16.6.1 Topography

The Missouri River Basin has exceptionally rugged topography along its westernmost borders, as well as rolling plains in the interior. The southern and eastern portions of the basin are classified as the central lowlands. The central lowlands include approximately 90,000 square miles and extend from Jamestown, North Dakota eastward to the divide between the Missouri and Mississippi Rivers. The area is relatively level with general rolling till-plains (USACE 2006).

Topographical features, such as surrounding hills, create areas of high pollutant concentrations by hindering their dispersal. Nearby hills can affect airflow by causing shallow vertical mixing, directing surface air flows, and creating areas of high pollutant concentrations. Because the topography along the LOMR is relatively flat, it serves to promote pollutant dispersion and prevent stagnant air masses that trap pollutants near the ground.

3.16.6.2 Precipitation

Given its extensive area, the basin experiences a large range of average annual precipitation. Along the LOMR, average annual precipitation is highest near the confluence of the Mississippi River. In particular, areas south of Jefferson City receive approximately 40–50 inches of precipitation, and the region between Jefferson City and Lincoln receives approximately 30–40 inches of precipitation. June is generally the wettest month, when much of the southeastern portion of the basin receives more than 5 inches of precipitation.

Summer precipitation is generally dominated by short-duration thunderstorms with small centers of high intensity. Widespread rains occur occasionally through October, especially in the lower basin. Precipitation depths during winter months are considerably less than during summer months. In the southeastern portion of the basin, January is typically the driest month. Winter precipitation occurs as either rain or snow, or a mixture, and is a result of well-developed low-pressure systems and active fronts (USACE 2006).

Heavy rains during summer help to reduce certain pollutant concentrations along the LOMR. Ozone needs sunlight for its formation, and clouds block the required radiation. Because CO is slightly water

soluble, precipitation and fog tend to "reduce" CO concentrations in the atmosphere. Finally, PM_{10} is somewhat "washed" from the atmosphere with precipitation.

3.16.6.3 Wind

Because the Project area is located mid-continent, the most extreme winds are caused by thunderstorms and frontal passages (movement of a front across an area), as well as air flows from a variety of bordering regions. For example, the area is subject to warm air with high humidity from the Gulf of Mexico and dry air from the arid southwest. Systems originating over the Rocky Mountains also bring warm dry air to the region and create northwesterly surface winds. Occasionally, abnormally cold air will enter the region from a northeasterly direction. In general, the wind flow from one region will last for a few days before being replaced by a different air flow from another region. Wind speed and direction influence the dispersion and transport of PM and CO: the more wind flow, the less accumulation of these pollutants.

3.16.6.4 Temperature

Similar to precipitation patterns, large temperature fluctuations and extremes are common in the basin. Along the LOMR, average annual maximum temperatures are experienced during summer and range from 95 to 105 °F. Average winter lows range from minus 29 to minus 10 °F, with the coldest temperatures along the northern reaches of the Project area (USACE 2006).

The extreme temperatures along the LOMR tend to exacerbate formation of ozone and accumulation of CO. High temperatures during summer months, combined with stagnant air, provide conditions suitable for formation of ozone. During winter, extremely cold temperatures and light winds form ground-level temperature inversions (typically from the evening through early morning) that result in reduced dispersion of CO emissions from vehicles. Motor vehicles also produce increased CO emission rates at low air temperatures.

3.16.7 Sensitive Receptors

Sensitive receptors are generally defined as locations where people reside or where the presence of air emissions could adversely affect the use of the land. Sensitive receptors are locations and land uses that are more susceptible to health problems associated with air pollutants. Typical sensitive receptors include residences, schools, hospitals, clinics, and housing for elderly.

Sensitive receptors that may be exposed to increased levels of pollutants during dredging activities include residences, schools, and parks located along the river edge. In general, these sensitive receptors are concentrated in major cities. However, scattered rural residences are located throughout the undeveloped agricultural land along the river.

Table 3.14-3 in Section 3.14 summarizes the cities and towns located along the river where sensitive receptors may be concentrated. In addition, Table 3.14-3 identifies the distance between existing sand and gravel facilities and the nearest residences. Residences and other sensitive land uses within 0.5 mile of dredging-related operations may be exposed to increases in pollutant concentrations.

3.16.7.1 Climate Change

Only recently has climate change been widely recognized as an imminent threat to the global climate, economy, and population. Thus, the climate change regulatory setting—nationally and statewide—is complex and evolving, and the Proposed Action and alternatives are currently not subject to any GHG regulation. The following section identifies key legislation, executive orders, and seminal court cases relevant to the environmental assessment of Project-related GHG emissions.

Federal Regulatory Setting for Greenhouse Gas Emissions

Federal Action

In 2002, President George W. Bush set a national policy goal of reducing the GHG emission intensity (tons of GHG emissions per million dollars of gross domestic product) of the U.S. economy by 18 percent by 2012. No binding reductions were associated with the goal. Rather, the USEPA administers a variety of voluntary programs and partnerships with emitters of GHG in which the USEPA collaborates with industries producing and using synthetic gases to reduce emissions of these particularly potent GHGs.

On September 30, 2009, the USEPA proposed a new rule that would establish significance thresholds for six GHGs. The rule would define when CAA permits under the New Source Review (NSR) and Title V operation permit programs would be required for new and existing facilities. The proposed threshold is 25,000 tons of carbon dioxide equivalent (CO_2e) per year. Facilities exceeding this threshold would be required to obtain a permit that would demonstrate they are using Best Management Practices (BMPs). The USEPA estimates that 14,000 large sources would need to obtain permits, the majority of

which would be municipal solid waste landfills. The USEPA is evaluating the proposal and will issue final guidance once a ruling has been made (USEPA 2009g).

USEPA Proposed Rule – Mandatory Greenhouse Gas Reporting

On October 30, 2009, the USEPA signed a rule that requires mandatory reporting of emissions of GHGs from large sources in the United States. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to report annual emissions to the USEPA. The rule went into effect on January 1, 2010. The first annual reports for the largest emitting facilities, covering calendar year 2010, will be submitted to USEPA in 2011.

USEPA Finding of Endangerment

On December 7, 2009, the USEPA Administrator found that current and projected concentrations of GHGs threaten the public health and welfare of current and future generations. Additionally, the Administrator found that combined emissions of CO_2, CH_4, N_2O, and fluorinated compounds from motor vehicles contribute to the atmospheric concentrations and thus to the threat of climate change. Although the endangerment finding in itself does not place requirements on industry, it is an important step in the USEPA process to develop regulation of GHGs.

The USEPA has prepared various documents in support of the endangerment finding, including a *Summary of the Science Supporting EPA's Finding that Greenhouse Gases Threaten Public Health and Welfare* (USEPA 2009h). The summary notes that "Climate change is expected to worsen regional ozone pollution, with associated risks in respiratory infection, aggravation of asthma, and premature death. The impact on particulate matter remains less certain."

Draft NEPA Guidance

On February 18, 2010, Nancy Sutley, Chair of the White House Council on Environmental Quality (CEQ), issued a memorandum (Draft Guidance) providing guidance on consideration of the effects of climate change and GHG emissions under NEPA. The Draft Guidance suggests that the effects of projects directly emitting GHGs in excess of 25,000 tons annually be considered in a qualitative and quantitative manner. The CEQ does not propose this reference as a threshold for determining significance but as "a minimum standard for reporting emissions under the CAA." The Draft Guidance also recommends that the cumulative effects of climate change on the proposed project be evaluated.

The Draft Guidance is still undergoing public comments and is not effective until issued in final form (Sutley 2010).

State Regulatory Setting for Greenhouse Gas Emissions

According to the MDNR, KDHE, NDEQ, and IEPA, no agency has adopted state GHG regulations applicable to the Proposed Action or alternatives (Basham pers. comm., Schnepp pers. comm.). Further consultation with agency staff indicates that Missouri, Kansas, Nebraska, and Illinois will develop GHG emission rules and regulations following more definitive federal guidance. In the interim, all agencies recommend and support voluntary GHG emission reductions efforts.

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