Air

Number of Days Exceeding Air Quality Standards in Border Monitoring Areas Figure 7	**Type of Indicator** State **Goal and Objective:** 2.1
Description of the INDICATOR	
Definition	Number of days any one monitor in a geographical monitoring area exceeded the 8-hour binational standard for ozone (0.08 ppm) or the 24-hour U.S. standard (150 µg/m^3) for PM_{10}, 2001-2005.
Importance of the indicator/purpose	This indicator indicates the number of days, in a geographic area, that air pollution reached levels considered unhealthy for sensitive individuals, and possibly others, depending on the actual levels of air pollution reached. At levels slightly above the standards, members of sensitive groups may experience health effects but the general public would likely not be affected. At higher levels, everyone may experience health effects, and sensitive individuals might experience more serious health effects.
Units of measure	Number of days any one monitor exceeds the standards.
Concepts and definitions	Ozone (O3) – Ozone is a photochemical oxidant and the major component of smog formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOC) and oxides of nitrogen (NOx) in the presence of sunlight. These pollutants are emitted by transportation and industrial sources. O3 is reactive and damages lung tissue, reduces lung function, and increases sensitivity to other irritants. Particulate Matter 10 (PM10) -- Particulate matter (PM) with an aerodynamic diameter of 10 microns or less (PM10) consists of ground geologic material entrained into the air by agricultural processes, unpaved roadways, and quarry and cement manufacturing. Exposure to PM is a major human health concern including effects on breathing, aggravation of respiratory and cardiovascular disease and premature death. Air Quality System (AQS) Air Quality Index (AQI)
Coverage	Yearly 2001 - 2005. Five geographic monitoring areas: Tijuana/San Diego, Mexicali/Imperial Valley, Nogales/Nogales, Ciudad Juarez/El Paso, Lower Rio Grande Valley. Monitors are located on both sides of the border except in the Lower Rio Grande Valley area. Air data is also available, but not included in this indicator, for outlying sites in between the geographic areas. (Figure 9-1).
Calculation	To determine the monitors within each area, run the CICA Border Air Quality Data "Monitor Values Report" for the areas of interest. (The location of air monitoring sites within these areas is depicted in Figure 9-2 for Tijuana/San Diego, Figure 9-3 for the Mexicali/Imperial Valley, Figure 9-4 for Nogales/Nogales, Figure 9-5 for Ciudad Juarez/El Paso, and Figure 9-6 for Lower Rio Grande Valley.) Since three years of data are necessary, run three reports - Review and select the U.S. and Mexican monitors common in all three reports. Derive the number of exceedance days from the Air Quality System (AQS) using the AMP410S Air Quality Summary Report. Run a report for each Geographic Area/Pollutant/Year using the List of Monitors and use the by "state" option. The output is one page for each state showing the AQI value for each day of the year. Manually make a list of all the dates with an AQI greater than the standard (100), including all U.S. and Mexico border states. Delete duplicate dates from the list. Count the dates on the list and this is equal to the exceedance days for the geographic monitoring area. The data are listed in Table 9-1 for Ozone and 9-2 for PM10.
Sources of information	Data were provided by EPA based on a search of the U.S. EPA Air Quality System (AQS) Database http://www.epa.gov/air/data/aqsdb.html This database is accessible by the public upon request. Border Air Quality Database. http://www.epa.gov/ttn/catc/cica/airq_e.html
References (additional information)	Air Policy Forum http://www.epa.gov/border2012/org.htm#forums
Limitations of the indicator	The indicator does not indicate actual air pollutant concentrations nor the degree to which the standard was exceeded.

Ozone Concentrations in the Border Region Figure 8	**Type of Indicator** State **Goal and Objective:** 2.1
Description of the INDICATOR	
Definition	Ozone ambient air concentrations in the border region by geographic monitoring areas, 2001-2005.
Importance of the indicator/purpose	This indicator documents ozone air pollution trends based on direct measurements of pollutant concentrations in the ambient air from monitoring stations in the geographic areas presented. This information is useful for purposes of assessing whether air pollution is increasing or decreasing over time.
Units of measure	ppm. Average of the 4th highest value of ozone over three years within a geographic monitoring area.
Concepts and definitions	Ozone (O_3) – Ozone is a photochemical oxidant and the major component of smog formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOC) and oxides of nitrogen (NOx) in the presence of sunlight. These pollutants are emitted by transportation and industrial sources. O3 is reactive and damages lung tissue, reduces lung function, and increases sensitivity to other irritants. Parts per million (ppm) Design Value (DV) Monitoring area may also be referred to as a geographic area. Monitor or monitoring site may also be referred to as a site or a location.
Coverage	Yearly 2001 - 2005. Five geographic monitoring areas: Tijuana/San Diego, Mexicali/Imperial Valley, Nogales/Nogales, Ciudad Juarez/El Paso, Lower Rio Grande Valley. Monitors are located on both sides of the border except in the Lower Rio Grande Valley area. Air data is also available, but not included in this indicator, for outlying sites in between the geographic areas. (Figure 9-1).
Calculation	8-hour ozone design values (DV) were calculated for each monitoring area. To determine the monitors within each area, run the CICA Border Air Quality Data "Monitor Values Report" for the areas of interest. (The location of air monitoring sites within these areas is depicted in Figure 9-2 for Tijuana/San Diego, Figure 9-3 for the Mexicali/Imperial Valley, Figure 9-4 for Nogales/Nogales, Figure 9-5 for Ciudad Juarez/El Paso, and Figure 9-6 for Lower Rio Grande Valley.) Since three years of data are necessary for each data value, run three reports. For example, for 2001 run reports for 1999, 2000 and 2001 and select all monitors with three consecutive years of data. Repeat the process for each year of interest to determine monitors considered. (Note: monitors are not common across the entire five year trend.) Using Air Quality System (AQS) AMP 450 QuickLook Report for Ozone, obtain three years of data for each monitor in the geographic area. For example, if interested in 2001 values, obtain data for 1999, 2000, and 2001. Identify the column "4th Max 8-hour Value" concentration in ppm and divide the sum by three. This is the DV for the monitoring site. Repeat this process for each monitor. Compare the values across all monitors within a geographic monitoring area and plot the highest value of the area for the year of interest. The process is repeated for each year of interest (2001, 2002, 2003, 2004, and 2005) and for the geographic are of interest. These values are listed in Table 11-1. (Note: data flagged by the State and concurred by the regional office were excluded)
Sources of information	Data were provided by EPA based on a search of the U.S. EPA Air Quality System (AQS) Database. http://www.epa.gov/ttn/airs/airsaqs/sysoverview.htm. This database is accessible by the public upon request. Border Air Quality Database. http://www.epa.gov/ttn/catc/cica/airq_e.html.
References (additional information)	Air Policy Forum http://www.epa.gov/border2012/org.htm#forums
Limitations of the indicator	None identified.

Particulate Matter (PM_{10}) Concentrations in the Border Region Figure 9	**Type of Indicator** State **Goal and Objective:** 2.1
Description of the INDICATOR	
Definition	PM_{10} ambient air concentrations in the border region by geographic monitoring areas, 2001-2005.
Importance of the indicator/purpose	This indicator documents PM_{10} air pollution trends based on direct measurements of pollutant concentrations in the ambient air from monitoring stations in the geographic areas presented. This information is useful for purposes of assessing whether air pollution is increasing or decreasing over time.
Units of measure	$\mu g/m^3$ The three year average of annual mean concentrations of PM_{10} at highest monitoring site in a geographic monitoring area.
Concepts and definitions	Particulate Matter (PM) -- Particulate matter (PM) with an aerodynamic diameter of 10 microns or less (PM_{10}) consists of ground geologic material entrained into the air by agricultural processes, unpaved roadways, and quarry and cement manufacturing. Fine PM (diameter of 2.5 microns or less) or $PM_{2.5}$ consists of sulfates, nitrates, other gases, soot and finer ground geologic materials. Exposure to PM is a major human health concern including effects on breathing, aggravation of respiratory and cardiovascular disease and premature death. Design Value (DV) Air Quality System (AQS)
Coverage	Yearly from 2001 to 2005. Five geographic monitoring areas: Tijuana/San Diego, Mexicali/Imperial Valley, Nogales/Nogales, Ciudad Juarez/El Paso, Lower Rio Grande Valley. Monitors are located on both sides of the border except in the Lower Rio Grande Valley area. (Figure 9-1).
Calculation	PM_{10} annual Design Values (DVs) were calculated for each monitoring area. To determine the monitors within each area, run the CICA Border Air Quality Data "Monitor Values Report" for the areas of interest. (The location of air monitoring sites within these areas is depicted in Figure 9-2 for Tijuana/San Diego, Figure 9-3 for the Mexicali/Imperial Valley, Figure 9-4 for Nogales/Nogales, Figure 9-5 for Ciudad Juarez/El Paso, and Figure 9-6 for Lower Rio Grande Valley.) Since three years of data are necessary for each data value, run three reports. For example, for 2001 run reports for 1999, 2000 and 2001 and select all monitors with three consecutive years of data. Repeat the process for each year of interest to determine monitors considered. (Note: monitors are not common across the entire five year trend.) Using Air Quality System (AQS) AMP 450 QuickLook Report for PM_{10}, for a given monitor, sum the column "WTD ARITH MEAN" (weighted arithmetic mean) concentration for the year of interest and the two prior years. (For example, if the year of interest is 2001, sum the "WTD ARITH MEAN" concentrations for 1999, 2000, and 2001). Divide the sum by three. This is the DV for the monitor and year of interest. Repeat this process for all monitors in the geographic monitoring area and for each year of interest. Compare the DVs across all monitors within a geographic monitoring area and plot the highest value of the area for the year of interest. Repeat this process for each year of interest (2001, 2002, 2003, 2004, and 2005) and plot these values. These values are listed in Table 11-1. (Note: data flagged by the State and concurred by the regional office were excluded.)
Sources of information	Data were provided by EPA based on a search of the U.S. EPA Air Quality System (AQS) Database. http://www.epa.gov/ttn/airs/airsaqs/sysoverview.htm This database is accessible by the public upon request. Border Air Quality Database. http://www.epa.gov/ttn/catc/cica/airq_e.html.
References (additional information)	Air Policy Forum http://www.epa.gov/border2012/org.htm#forums
Limitations of the indicator	None identified.

Prevalence of Physician Diagnosed Asthma in Calexico/Mexicali Figure 10	**Type of indicator** Effect **Goal and Objective:** 4.1
Description of the INDICATOR	
Definition	Prevalence of physician diagnosed asthma (2001) in children (6-7 and 13-14 years) in a limited study for one sister city pair: Calexico, CA and Mexicali, B.C., 2001
Importance of the indicator/purpose	While air quality standards provide a platform to understand current air quality conditions, it is important to understand the possible impact of air pollution on human health. Long-term exposure to elevated air pollution is associated with diminished lung function and cardiovascular disease. Vulnerable groups (children, the sick and elderly) are more likely to suffer ill effects. A number of epidemiologic studies have linked changes in air pollutant concentrations with increased risk of pneumonia, respiratory infections, and exacerbation of asthma. For example, evidence indicates that exposure to vehicle emissions aggravates or triggers asthmatic symptoms and airway reactivity.
Units of measure	Percentage
Concepts and definitions	Prevalence - the proportion of persons in a given population that has a particular disease at a point or interval of time. (Prevalence = number of cases (or affected individuals) / number of people in the population).
Coverage	2001. Calexico, CA and Mexicali, B.C. Small sample study of school aged children 6-7 and 13-14 year olds with a total sample size of 37 children.
Calculation	Plot data as presented from study results.
Sources of information	Department of Health and Human Services. 2001. *U.S.-Mexico Border Environmental Health Surveillance Demonstrations Phase Two*. September 2001. http://www.epa.gov/ehwg/projects_publications/usmexico_asthma_surveillance_demonstration.html
References (additional information)	For more information on U.S.-Mexico air quality see http://www.epa.gov/usmexicoborder/org.htm#air For Environmental Health information see http://www.epa.gov/ehwg/projects_publications.html.
Limitations of the indicator	Asthma is a complex disease and multiple factors are implicated in the development and exasperation of this disease, thus at this time it is not possible to directly relate air pollution to the onset of asthma. Despite a surplus of information regarding asthma prevalence, data are not reported in a standardized format. Reporting mechanisms and disease definitions vary considerably between border states and countries, limiting the ability to make comparisons. The data presented in this study includes a very small sample size, and may not be representative of the larger population.