APPENDIX D

Particulate Matter Emission Inventory for Doña Ana County

ATLAS PILOT PROJECT

Particulate Matter Emission Inventory
for
Doña Ana County, New Mexico

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Eastern Research Group
And
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Air Quality Bureau

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Background

The Atlas Pilot Project

Through funding provided by the US Environmental Protection Agency (EPA), the New Mexico Air Quality Bureau (AQB) developed a pilot study for air quality issues in Doña Ana County, NM to be incorporated into a larger body of work called the Atlas Project. The purpose of the Atlas Project is the development of an "Atlas" of environmental issues along the border region of the United States and Mexico. The "Atlas" would be a resource guide that would include inventories, maps, and reference material on all sources of environmental pollution ranging from water to solid waste to air quality. This pilot study is the first attempt at developing a piece of that resource guide.

The Doña Ana County pilot study investigated sources of particulate matter 10 microns in size and less (PM10) and 2.5 microns in size and less (PM2.5) through out the entire County. The study included the development of an improved emissions inventory for PM10 and PM2.5 for sources associated with agricultural and non-agricultural operations. Along with the emission inventory, the pilot study also includes a data analysis of air quality data recorded at the NMED/AQB monitoring stations located in Doña Ana County for the last ten years. The study includes monitored concentrations of carbon monoxide (CO), sulfur dioxide (SO2), oxides of nitrogen (NOx), PM10, PM2.5, and ozone (O3) in Doña Ana County.

The Atlas pilot study was conducted in two phases. The first phase of the study investigated agricultural sources of PM10 and PM2.5 within Doña Ana County (Appendix A). The second phase of the study investigated nonagricultural sources of PM10 and PM2.5 (Appendix B). The second phase of the study also included the air quality data analysis for monitored concentrations in Doña Ana County. Eastern Research Group out of Sacramento, California conducted both of the inventories and the data analysis.

Doña Ana County

Doña Ana County comprises 3804 square miles in south-central New Mexico, bordering on El Paso County, Texas, and the state of Chihuahua, Mexico to the south. Of Doña Ana County's 3804 square miles, approximately 75 % is federal land and 12 % is state land, with the remainder privately held. The area within the county's boundaries is topographically diverse and includes mountain ranges, hills, valleys and deserts (see figure 1). The elevation range for the county is 3730 ft. to 9012 ft. The Rio Grande runs the length of the county from the northwest corner to the south-central border where New Mexico, Texas and Mexico come together. The Rio Grande meanders down through the fertile soils of the Rincon (northern) and Mesilla (southern) Valleys. The primary population areas are found within the Mesilla Valley, with the Las Cruces City limits extending to the east plateau below the Organ Mountains. The Organ Mountains toward the eastern side of the county separate the Mesilla Valley from White Sands Missile Range and Wind Sands National Monument. The western edge of the county tops out of the valley on a wide-open desert plateau.

The climate is generally mild and semiarid, averaging 350 days of clear weather annually. Annual precipitation averages 8.5 inches of rainfall and 3 inches of snowfall. Prevailing winds are generally southwesterly. Windstorms are common during the late winter and through the spring months.

Doña Ana County is the second most populated county in the state of New Mexico. The county seat, Las Cruces, has been ranked as one of the fastest growing communities in the United States for the past decade. The population has risen dramatically since 1900 and is expected to continue to grow at a rapid pace (4-6%) during the next 20 years, and is anticipated to have more than 300,000 people by 2015. The U.S. Census Bureau estimates the county population 2000 to be 174,682. The primary areas of growth have been and continue to be in the Las Cruces metropolitan area and the southern portion of the county. While rapid population growth has occurred around the city of Las Cruces (central) and in the southern section of the county, the northern portion of the county remains primarily rural in nature.

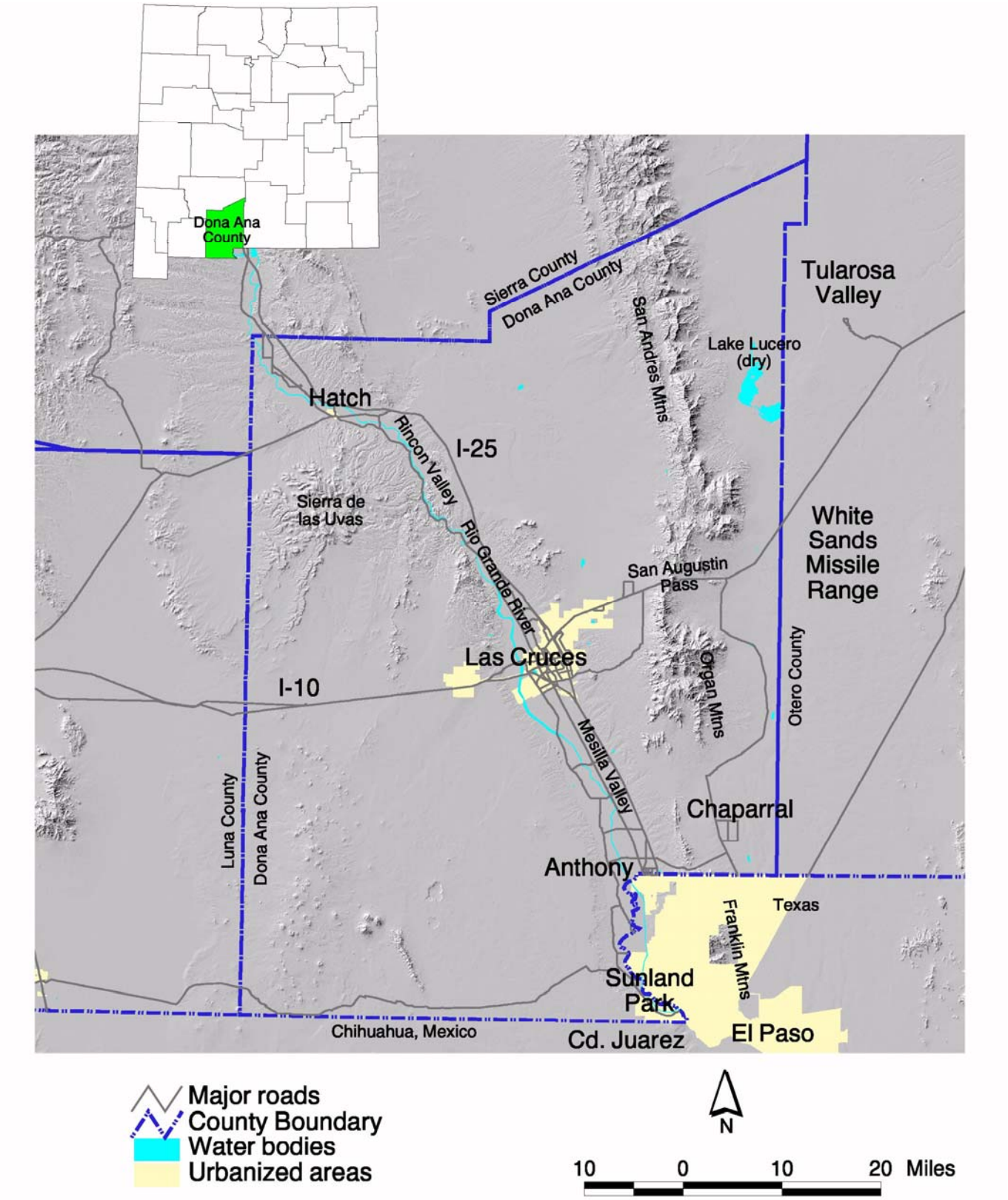
Air Quality in Doña Ana County

Air quality issues in Doña Ana County include ozone and PM10. There is a small marginal ozone nonattainment area located in the southeastern most part of the state that borders El Paso, Texas to the east and Ciudad Juarez, Mexico to the South. The nonattainment area includes the Cities of Sunland Park and Santa Teresa and the Village of Las Union. The area was designated nonattainment by the EPA in 1995.

Another small nonattainment area is located in the southeastern part of Doña Ana County in the City of Anthony. The area was designated nonattainment for PM10 in 1991. Although this is the only PM10 nonattainment area in Doña Ana County, the entire County has experienced high concentrations of PM10 and has exceeded the National Ambient Air Quality Standard (NAAQS) for PM10 on numerous occasions. Most of the exceedances monitored in Doña Ana County have been due to high wind events. In response to these high wind PM10 exceedances, the AQB submitted a Natural Events Action Plan for Doña Ana County in December of 2000.

Along with the high wind PM10 exceedance that have been monitored in Dona Ana County, there have also been numerous low wind exceedances recorded. These exceedances generally occur during the winter months between the hours of 6:00 PM and midnight. The AQB is in the process of researching these exceedances.

Figure 1. Doña Ana County with Major Landmarks, Mountains and Towns



Emission Inventory for Agricultural Area Sources

Scope of Emission Inventory

The scope of the agriculture emissions inventory is as follows:

- Year – 2002 (i.e., coincides with the Atlas Project).
- Geographic domain – Doña Ana County, New Mexico.
- Sources – Agriculture and related activities including crop land preparation and harvesting, burning of agricultural residues and fields, beef and dairy cattle operations, cotton gins, agricultural unpaved road dust, paved road dust (county-wide for all roads), and unpaved road dust (county-wide for all roads).
- Pollutants – Particulate matter (PM) 10 micrometers (μm) in aerodynamic diameter and smaller (PM_{10}) and 2.5 μm in aerodynamic diameter and smaller ($PM_{2.5}$).

Results of Emission Inventory

Table 1 summarizes the annual emissions of agriculture sources in Doña Ana County, New Mexico, for 2002. These results show that the largest two source categories are county-wide unpaved and paved road dust. These two source categories combined comprise nearly 94 percent of the total PM_{10} inventory and over 88 percent of the total $PM_{2.5}$ inventory. Because engineering judgment was used to make several key assumptions (e.g., silt loadings, silt contents, moisture contents, etc.), it may be appropriate to re-examine the unpaved and paved road dust emission estimates when the remaining non-agricultural source categories are inventoried.

If county-wide unpaved and paved road dust are not considered, then the largest agricultural PM_{10} source categories are crop land preparation and crop harvesting (i.e., 43 percent and 21 percent of the inventory, respectively [excluding unpaved and paved road dust]) and the largest agricultural $PM_{2.5}$ source categories are crop land preparation and agricultural burning of prunings (i.e., 31 percent and 30 percent of the inventory, respectively).

Using the facility-level operation schedules obtained during the survey, average hourly emissions for the cotton gins, dairies, and feedlots were estimated. These average hourly emissions represent emissions occurring during periods of operation and were calculated by dividing annual emissions by the annual hours of operation. Dairy and feedlot activity was assumed to be evenly distributed throughout the year. Cotton gin activity at the commercial gins occurred from the beginning of October to the end of January with individual gins having different start and stop dates, as well as variable hours of operation. The USDA-ARS Southwest Ginning Lab conducted variable ginning runs throughout the year and activity was assumed to be evenly distributed throughout the year. The hourly PM_{10} and $PM_{2.5}$ emissions for the cotton gins, dairies, and feedlots are shown in Table 4. Because the operation schedules of the five cotton gins are variable, the hourly PM_{10} and $PM_{2.5}$ cotton gin emissions presented in Table 4 are only valid when all five gins are operating simultaneously.

Using the GPS data collected for these facilities during the survey, maps were developed using ArcView software. Figure 1 shows the location of the individual dairies, feedlots, and cotton gins within Doña Ana County. Figures 2 through 8 show the location of individual facilities at a smaller

scale (i.e., individual township and range). As these figures show, most of these operations are located along the I-10 corridor. Also, a cluster of seven dairies is located in the northwest portion of the county near the town of Hatch.

Table 1. 2002 Annual Emissions for Agriculture Sources in Doña Ana County

Source	Emissions (tons/year)	
	PM_{10}	$PM_{2.5}$
Crop land preparation (tillage)	201.7	44.7
Crop harvesting	96.9	21.5
Agricultural burning (prunings)	45.4	42.8
Cotton gins	16.9	2.2
Dairies	33.3	3.8
Feedlots	4.3	0.5
Unpaved road dust (agriculture only)	55.7	11.8
Unpaved road dust (county-wide)	6,166.9	922.5
Paved road dust (county-wide)	1,119.9	153.3
Agriculture equipment (exhaust)	16.6	15.3
Total	**7,757.5**	**1,218.4**

Table 2. 2002 Average Hourly Emissions for Cotton Gins, Dairies, and Feedlots in Doña Ana County

Source	Emissions (pounds/hour)	
	PM_{10}	$PM_{2.5}$
Cotton gins	18.4	2.4
Dairies	7.6	0.9
Feedlots	1.0	0.1

Figure 2. Cotton Gins, Feedlots, and Dairies in Doña Ana County, New Mexico

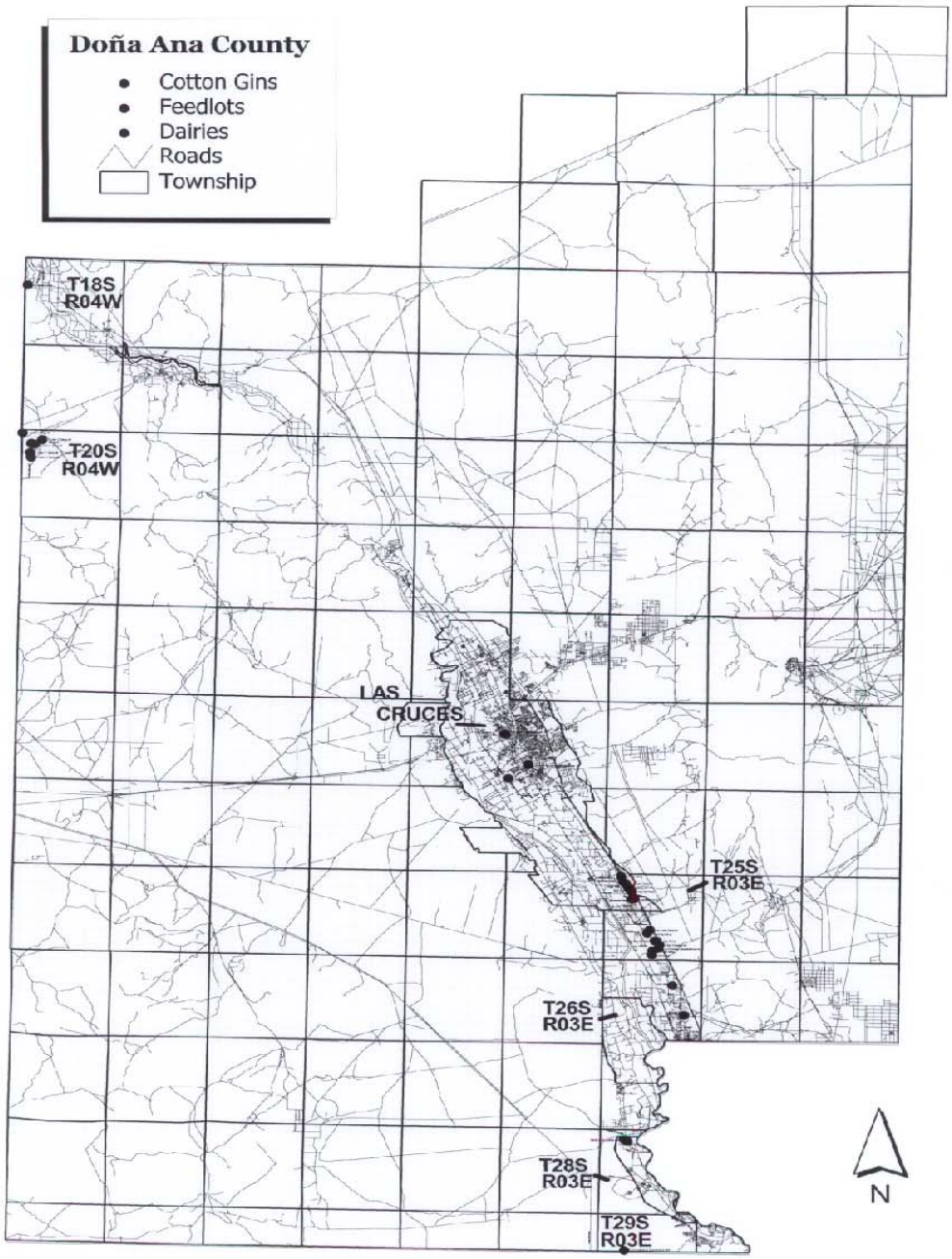


Figure 3. Cotton Gins, Feedlots, and Dairies in Las Cruces, Doña Ana County, New Mexico

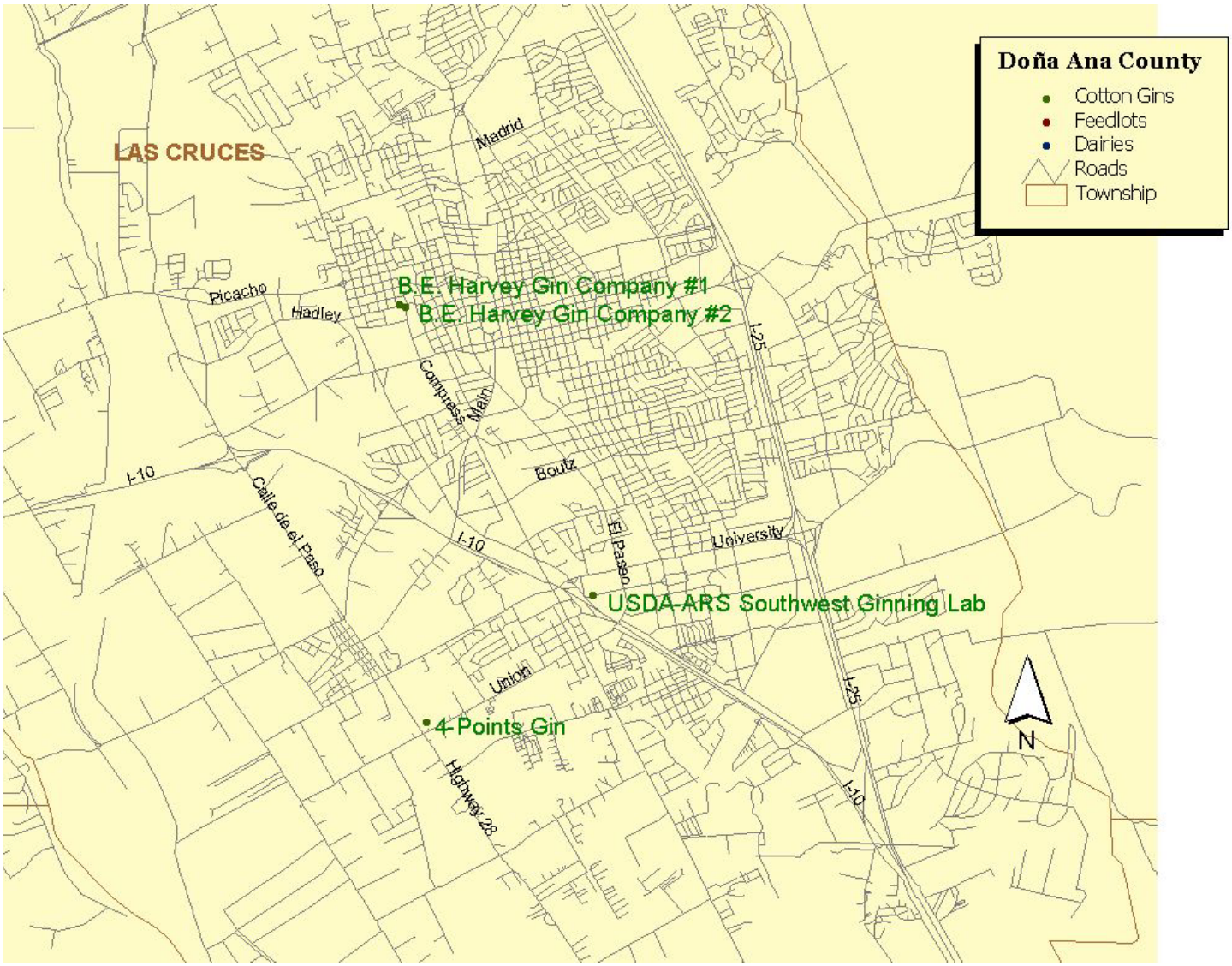


Figure 4. Cotton Gins, Feedlots, and Dairies in Township 18S Range 04W, Doña Ana County, New Mexico

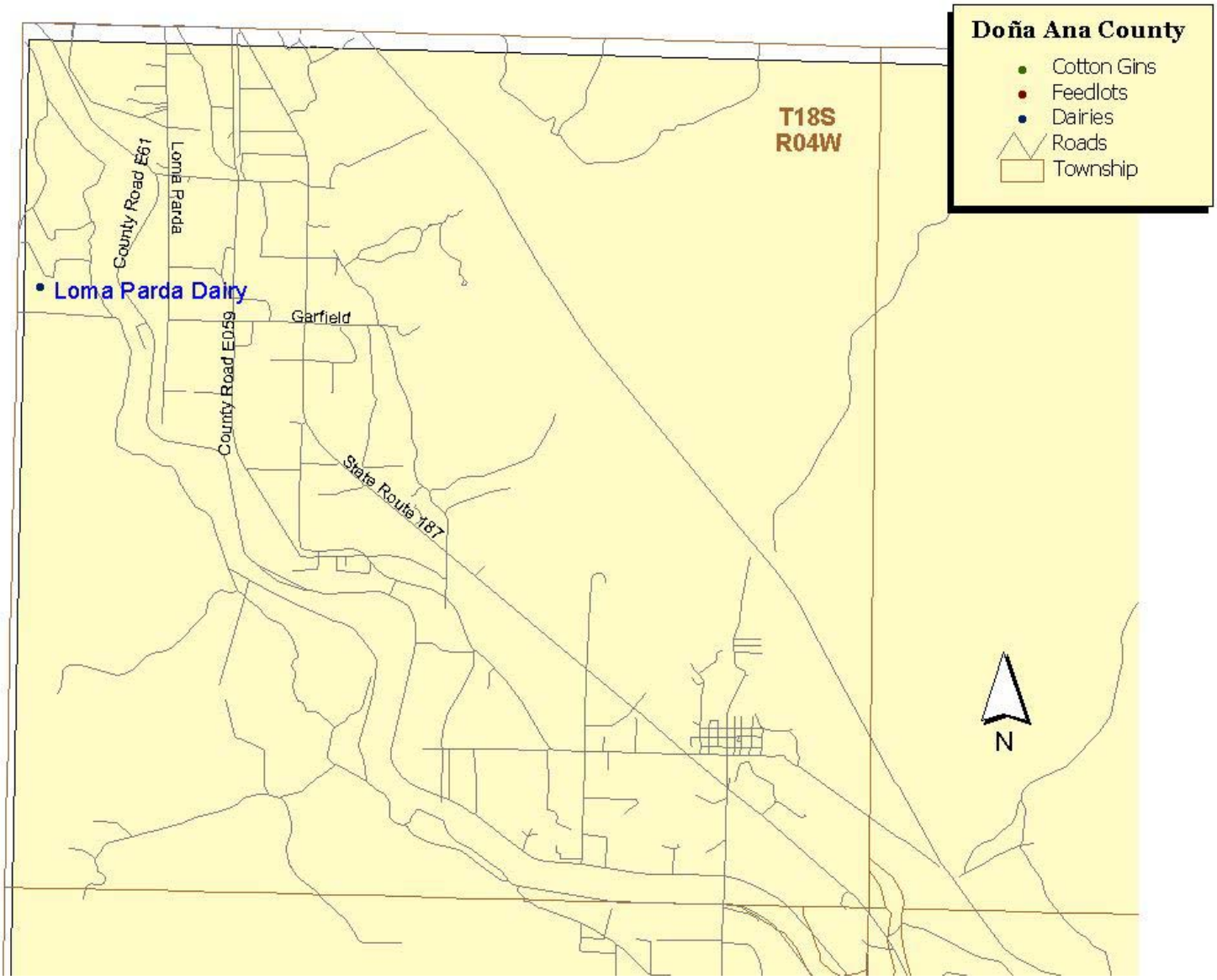


Figure 5. Cotton Gins, Feedlots, and Dairies in Township 20S Range 04W, Doña Ana County, New Mexico

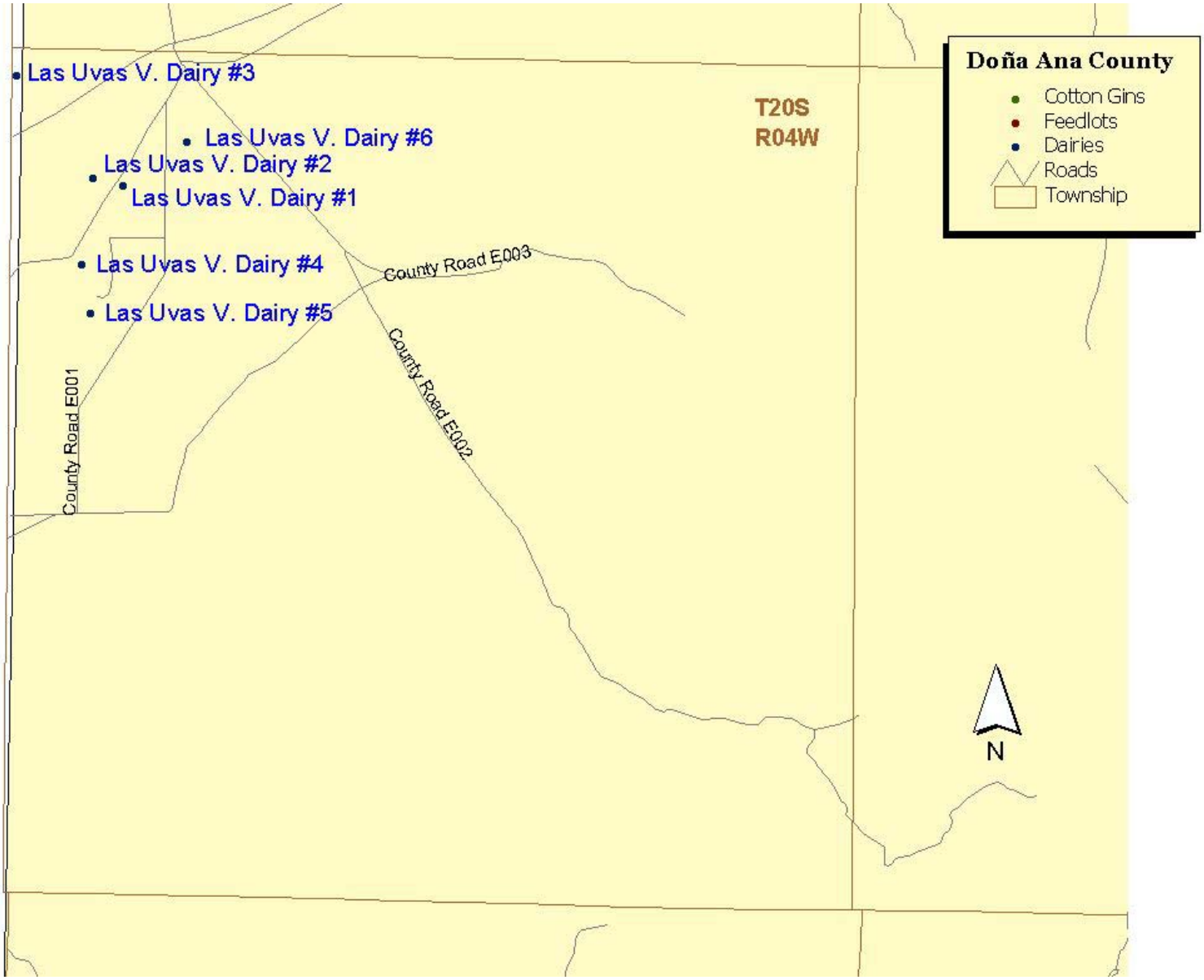


Figure 6. Cotton Gins, Feedlots, and Dairies in Township 25S Range 03E, Doña Ana County, New Mexico

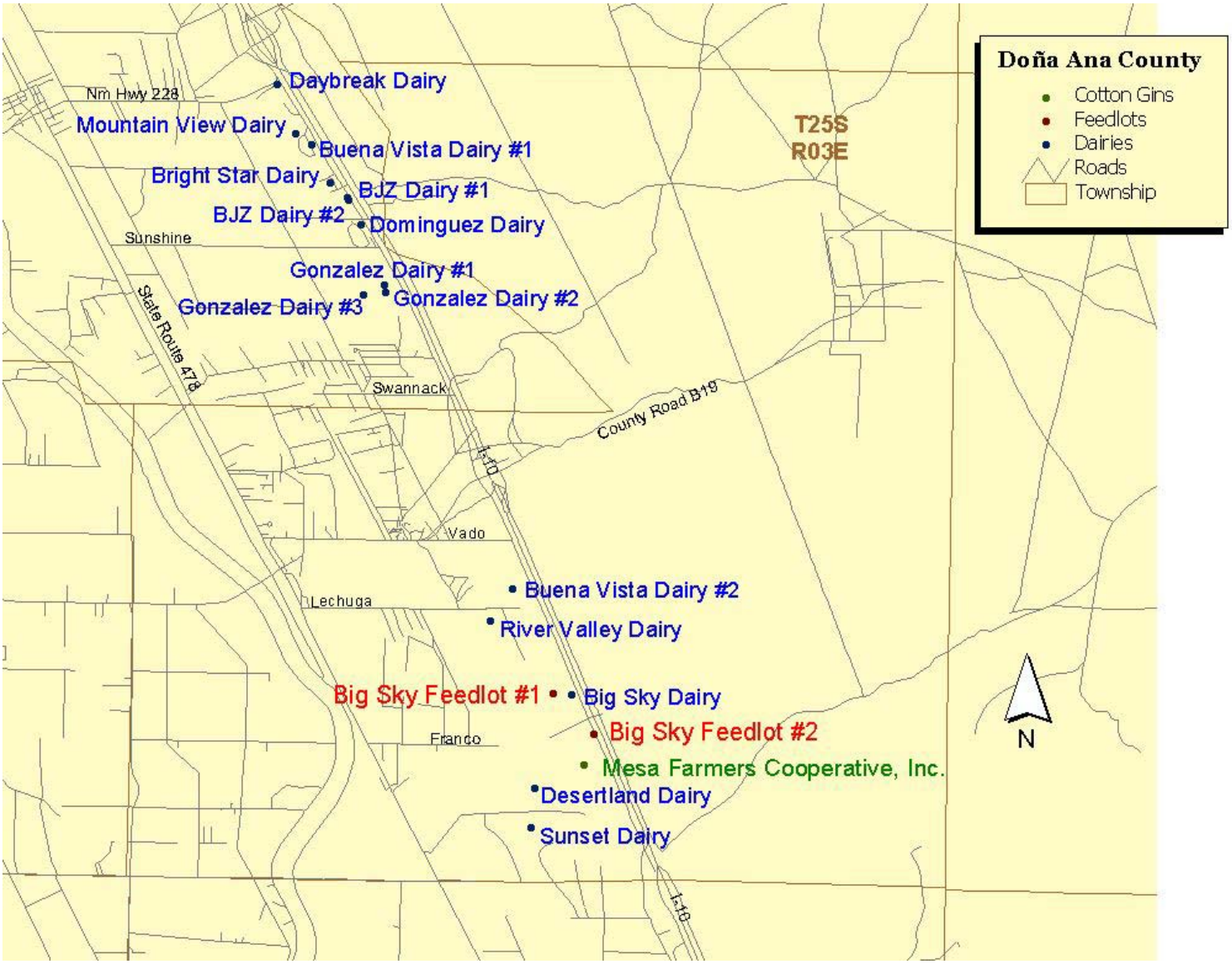


Figure 7. Cotton Gins, Feedlots, and Dairies in Township 26S Range 03E, Doña Ana County, New Mexico

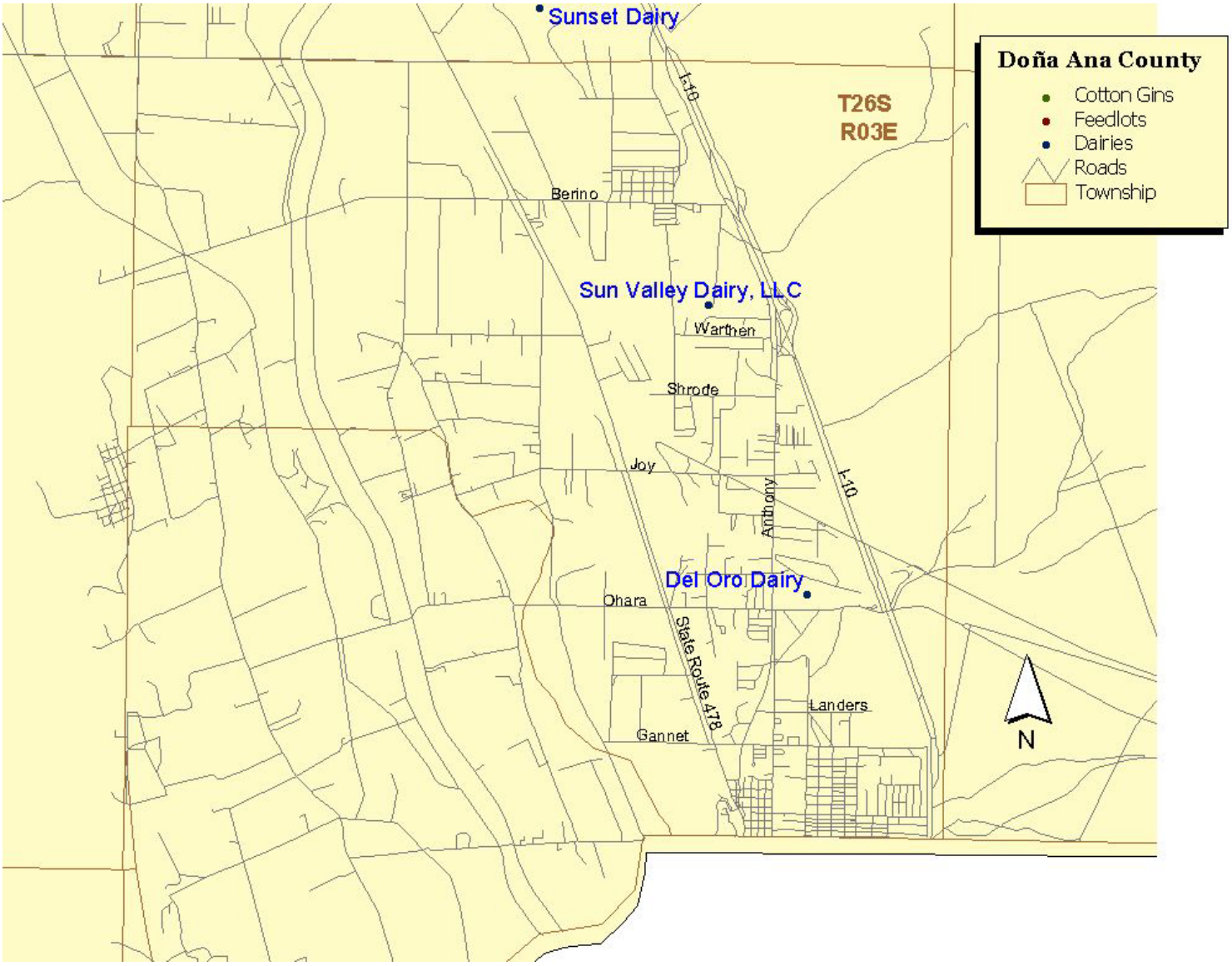


Figure 8. Cotton Gins, Feedlots, and Dairies in Township 28S Range 03E, Doña Ana County, New Mexico

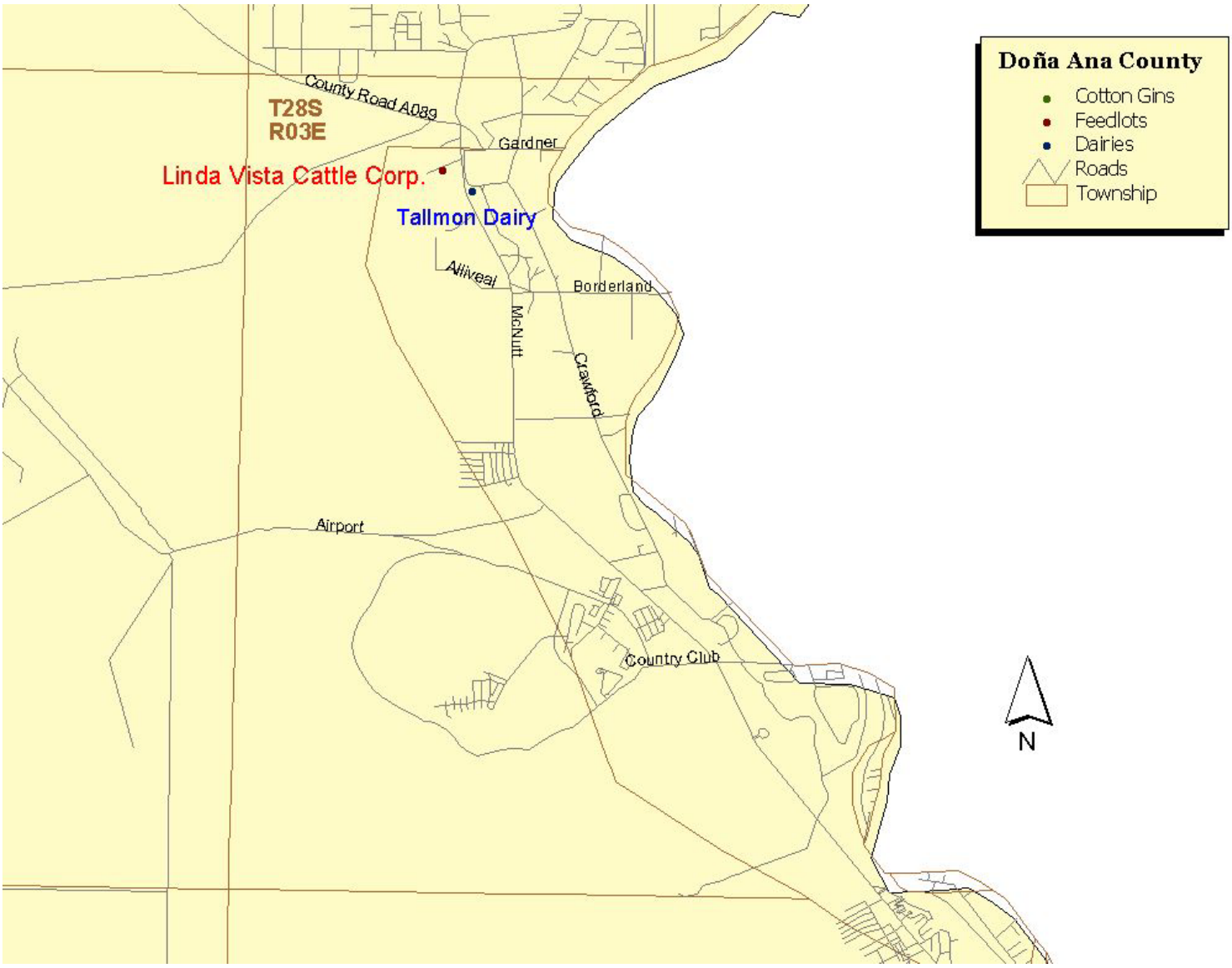
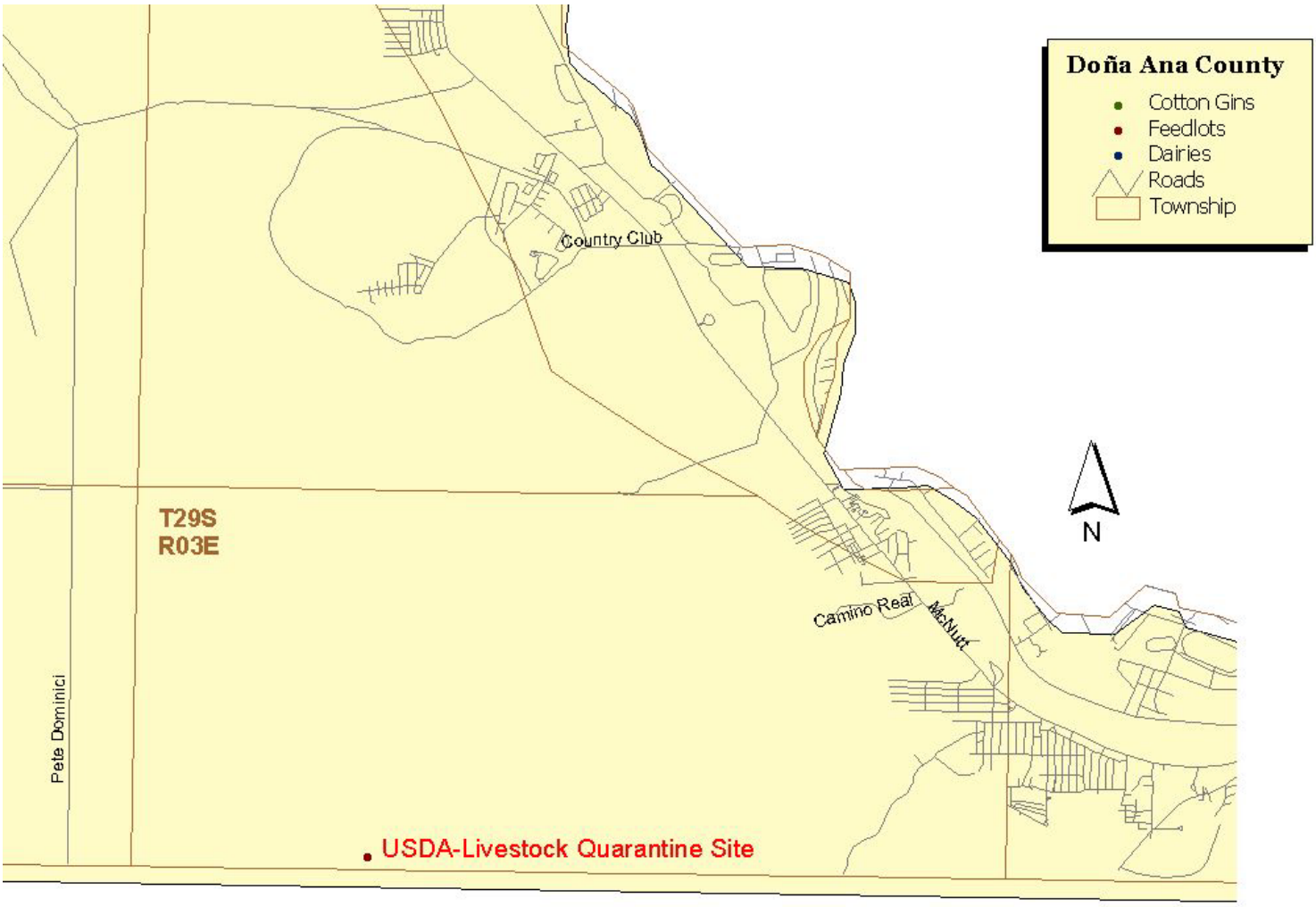


Figure 9. Cotton Gins, Feedlots, and Dairies in Township 29S Range 03E, Doña Ana County, New Mexico



Emission Inventory for Non-Agricultural Area Sources

Scope of Emission Inventory

The scope of the nonagricultural emissions inventory is as follows:

- Year – 2002 (i.e., coincides with the Atlas Project).
- Geographic domain – Doña Ana County, New Mexico.
- Sources – All nonagricultural sources of PM including quarrying/mining, construction activities, on-road motor vehicles, nonroad mobile source equipment, aircraft, railroads, residential wood combustion, charbroiling, paved road dust, residential burning of household and yard waste, other fuel combustion, wildfires, prescribed wildland burning, structural fires, vehicle fires, and wind erosion.
- Pollutants – PM 10 micrometers (µm) in aerodynamic diameter or less (PM_{10}) and 2.5 µm in aerodynamic diameter or less ($PM_{2.5}$).
- Spatial resolution – Facility location (i.e., Universe Transverse Mercator [UTM] or latitude-longitude [lat-long] coordinates, physical address, or township/range/section for mines and quarries; county-level resolution for all other sources).
- Temporal resolution – Annual (tons/year).

Results of Emission Inventory

Table 3 summarizes the annual emissions of nonagricultural sources in Doña Ana County for 2002. The largest source category shown in Table 3 is windblown dust (representing 1996 emissions) which contributes over 85 percent of the total PM_{10} and total $PM_{2.5}$ inventories. However, if the windblown dust is not considered, then the largest nonagricultural PM_{10} source categories are road dust (unpaved and paved), construction activities, and quarrying/mining (i.e., 86.5 percent, 3.5 percent, and 1.9 percent of the inventory, respectively) and the largest nonagricultural $PM_{2.5}$ source categories are road dust, residential wood combustion, and charbroiling (i.e., 60.3 percent, 7.8 percent, and 7.4 percent of the inventory, respectively). Because total PM from combustion sources consists of a larger fraction of $PM_{2.5}$ than total PM from geogenic dust sources does, the relative contribution of combustion sources increases in the overall $PM_{2.5}$ inventory compared to the overall PM_{10} inventory.

Using location information collected from the telephone survey, along with existing location information (Leavitt, 2004; Pfeil et al., 2001), maps of mine and quarry locations were developed using ArcView software. The overall response rate to the telephone survey was fairly low (i.e., 32 percent or 8 out of 25 facilities). The surveyed facilities are presented in Table 4. Figure 10 shows the location of the individual facilities within Doña Ana County. Figures 11 through 16 show the location of individual facilities at a smaller scale (i.e., individual township and range). As these figures show, most of these operations are located along the I-10 and I-25 corridors with a few facilities in outlying areas.

Table 3. 2002 Annual Emissions for Nonagricultural Sources in Doña Ana County

Source Category	PM_{10} Emissions (tons/year)	$PM_{2.5}$ Emissions (tons/year)
Quarrying and Mining	159.2	31.8
Construction Activities	294.2	61.2
On-Road Motor Vehicles	147.0	110.9
Nonroad Mobile Sources	60.1	55.3
Aircraft	6.1	4.2
Locomotives	29.1	26.2
Residential Wood Combustion	138.5	138.5
Charbroiling	143.2	132.6
Paved Road Dust[a]	1,119.9	153.3
Unpaved Road Dust[a]	6,166.9	922.5
Waste Burning – Household Waste	82.5	75.6
Waste Burning – Yard Waste	6.1	6.1
Other Fuel Combustion	70.4	60.1
Wildfires	1.1	0.9
Prescribed Wildland Burning	0.0	0.0
Structural Fires	1.5	1.5
Vehicle Fires	2.8	2.8
Wind Erosion[b]	49,242.5	10,833.3
Total	**57,671.0**	**12,616.8**
Total (minus Wind Erosion)	**8,428.5**	**1,783.4**

[a]Unadjusted emissions taken from agricultural emissions inventory (ERG, 2004a).

[b]Wind erosion emissions obtained from 1996 WRAP wind erosion inventory (ENVIRON et al., 2004).

Table 4. Summary of Surveyed Facilities

Mine Name	Operator Name	Responded to Survey
Anthony Sand & Gravel	Anthony Sand & Gravel	✓
Berino Sand Pit	Del Norte Masonry Products, Inc.	✓
Black Bear Pit	Del Norte Masonry Products, Inc.	✓
Certified Sand Co. (Bill Inman #1)	Certified Sand Co., Inc.	✓
Crusher (DA Co.) - 22/23S/2e	Smith And Aguirre Construction Co.	✓
Donna Mountain	Santa Fe Mining Company	
Eagle Mine/Mill	American Eagle Brick Co.	✓
Faulkner Canyon Quarry	Highland Enterprises, Inc.	✓
Hatch West Pit	Dona Ana County Trans. Dept.	
Hill Pit - DACTD	Dona Ana County Trans. Dept.	
Jobe Vado Facility	Jobe Concrete Products, Inc.	
Jornada Pit	Dona Ana County Trans. Dept.	
Keystone #1 Mine/Mill	Schneider Welding	
Las Uvas HA-0002 Gravel Lease	Las Uvas Valley Dairy	
Las Uvas HA-0003 Clay Lease	Las Uvas Valley Dairy	
Little Black Mountain	Santa Fe Mining Company	
Martinez Sand & Gravel Pit	Martinez Sand & Gravel	
Mesquite Pit	Dona Ana County Trans. Dept.	
Muncrief Placer #1	Rio Grande Rock Inc.	
Osman Pit	Mc Nutt Construction	
Picacho Peak Pit	Burn Construction Company, Inc.	✓
Rainbow Mine - Preece	Preece Enterprises	
SWPP Fort Seldon Quarry	Southwest Paving Products, Inc.	
Vado Pit	Lafarge Southwest, Inc.	
Vado Quarry	Daniel S. Guillen, Inc.	

Figure 10. Mines and Quarries in Doña Ana County, New Mexico

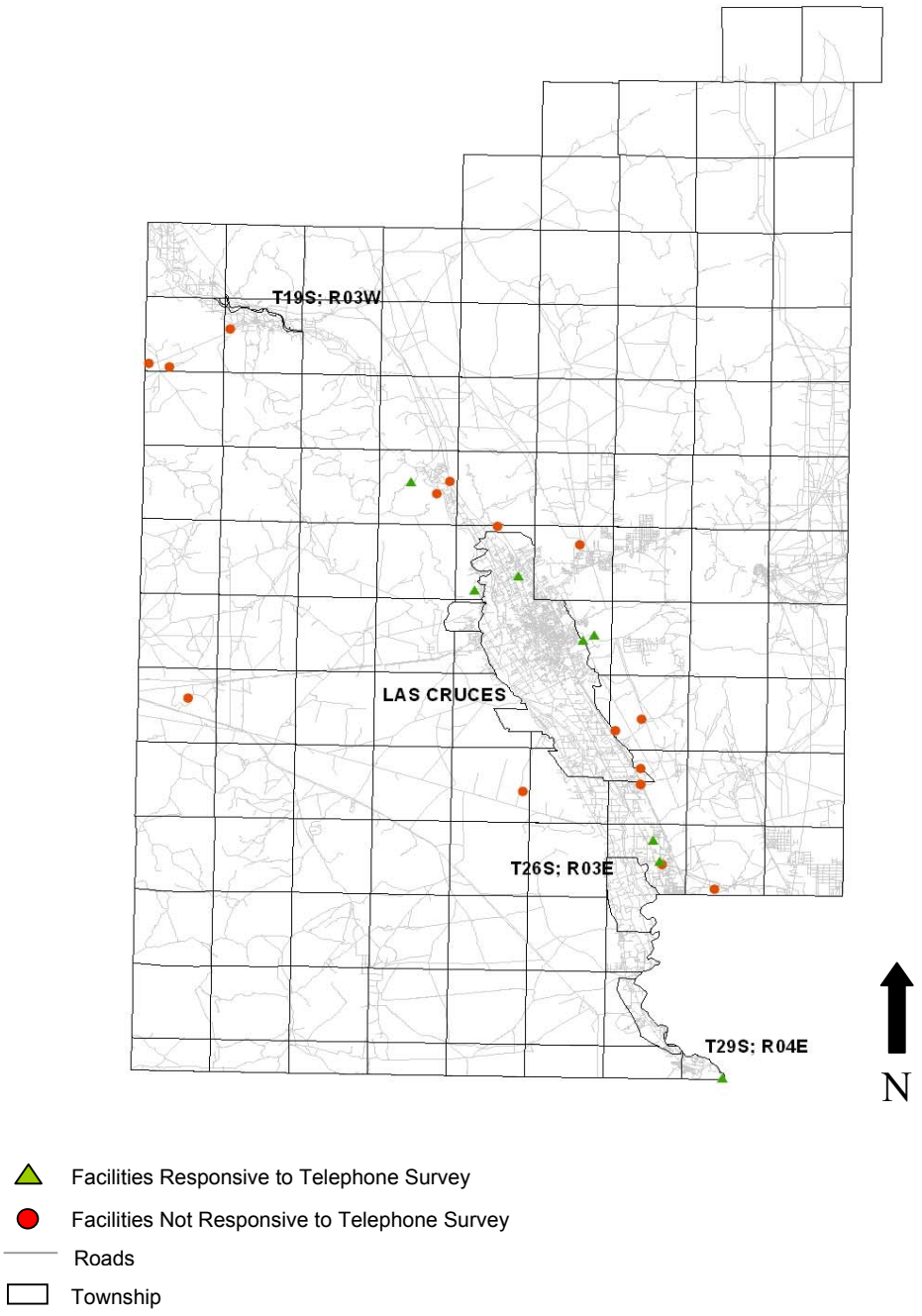


Figure 11. Mines and Quarries in and near Las Cruces, Doña Ana County, New Mexico

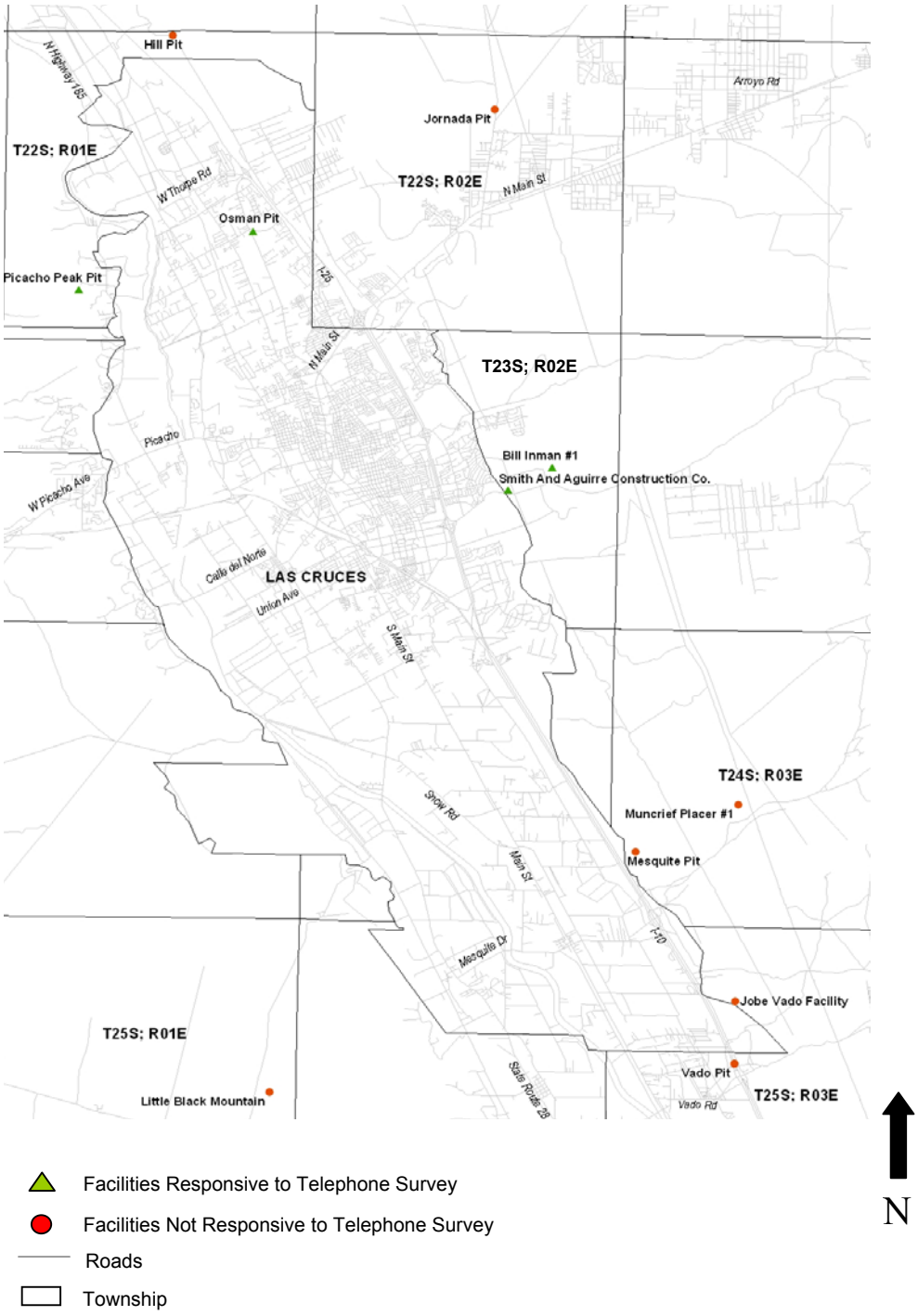


Figure 12. Mines and Quarries in Township 19S Range 04W and Township 19S Range 03W, Doña Ana County, New Mexico

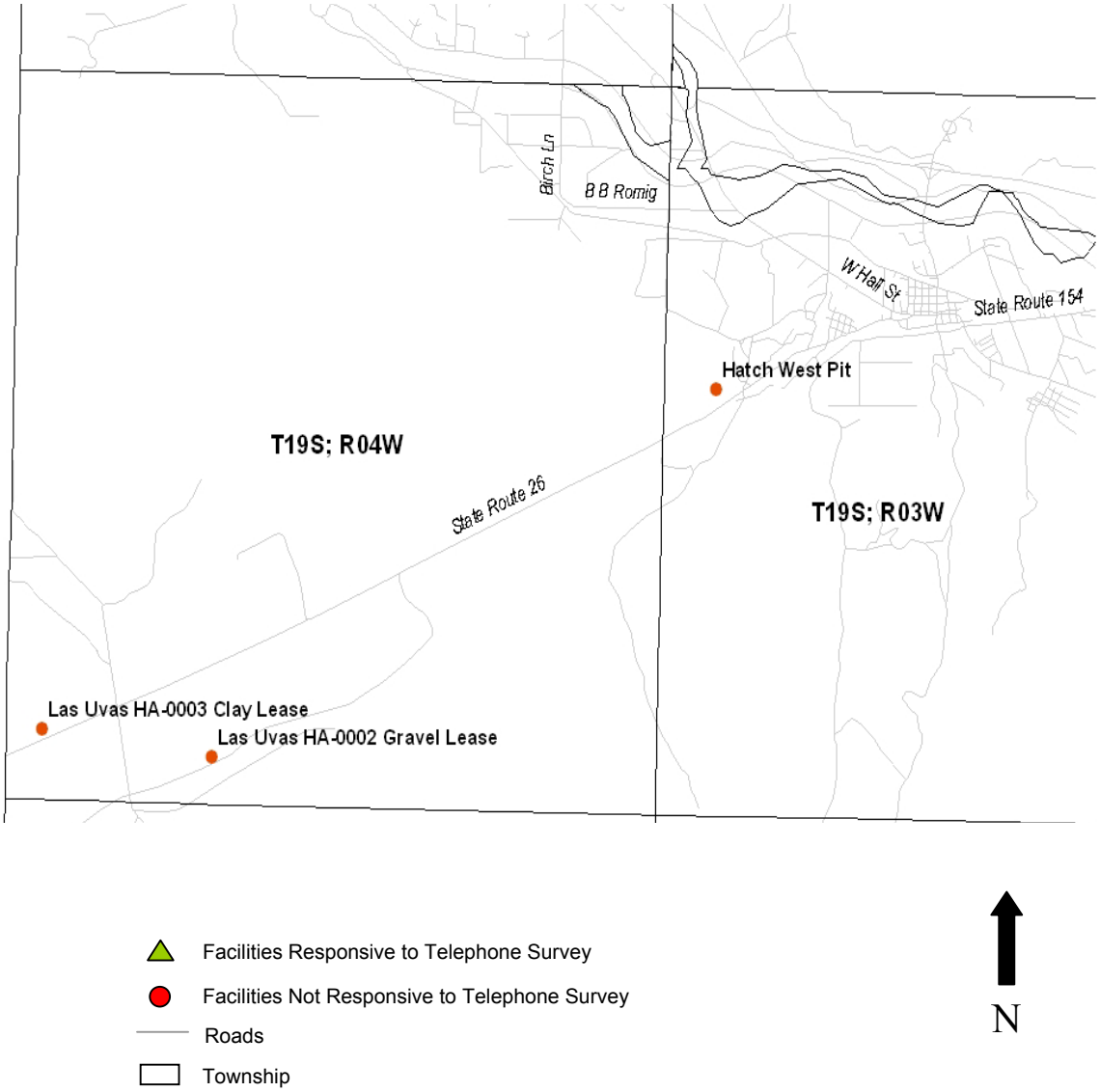


Figure 13. Mines and Quarries in Township 21S Range 01W, Doña Ana County, New Mexico

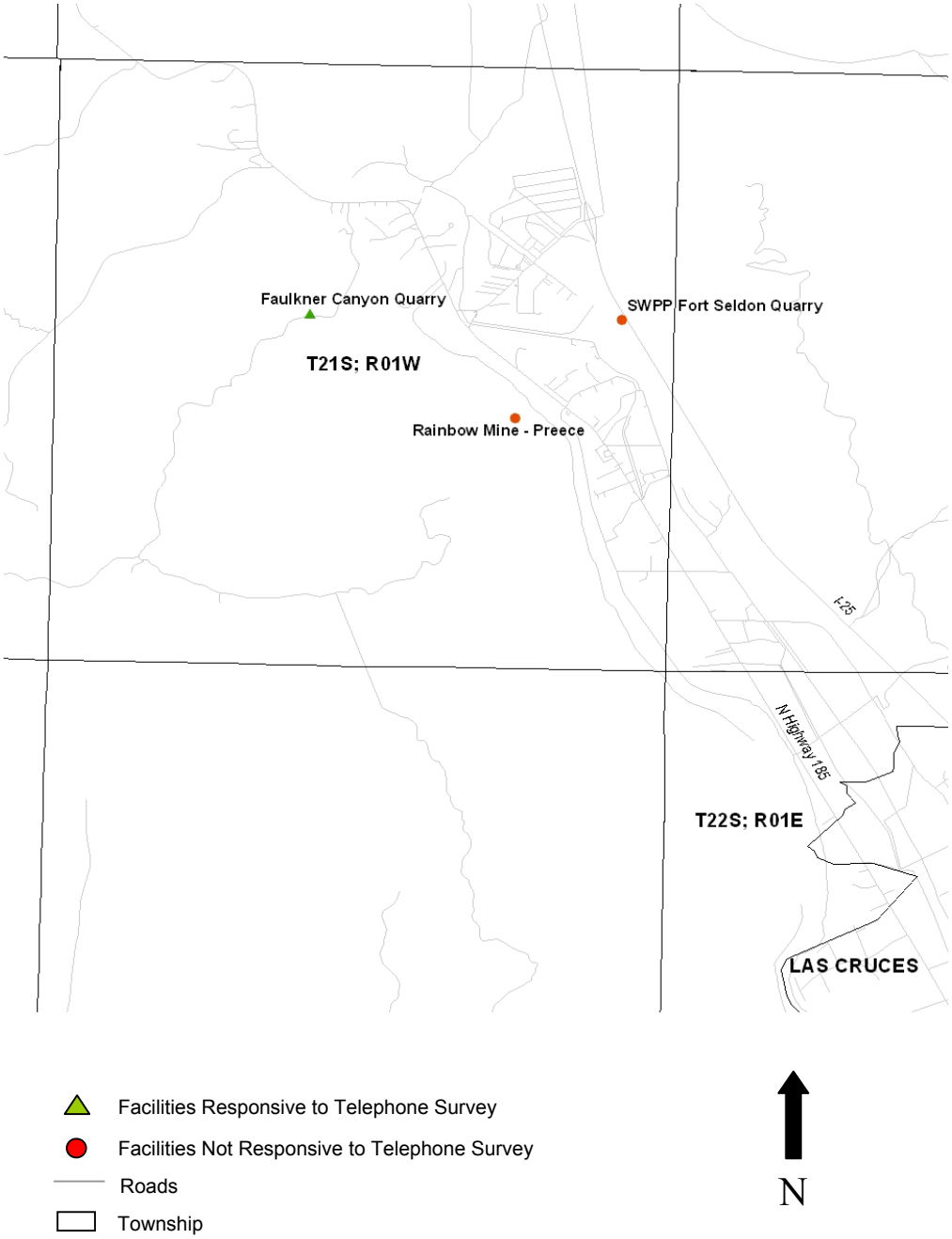


Figure 14. Mines and Quarries in Township 24S Range 04W, Doña Ana County, New Mexico

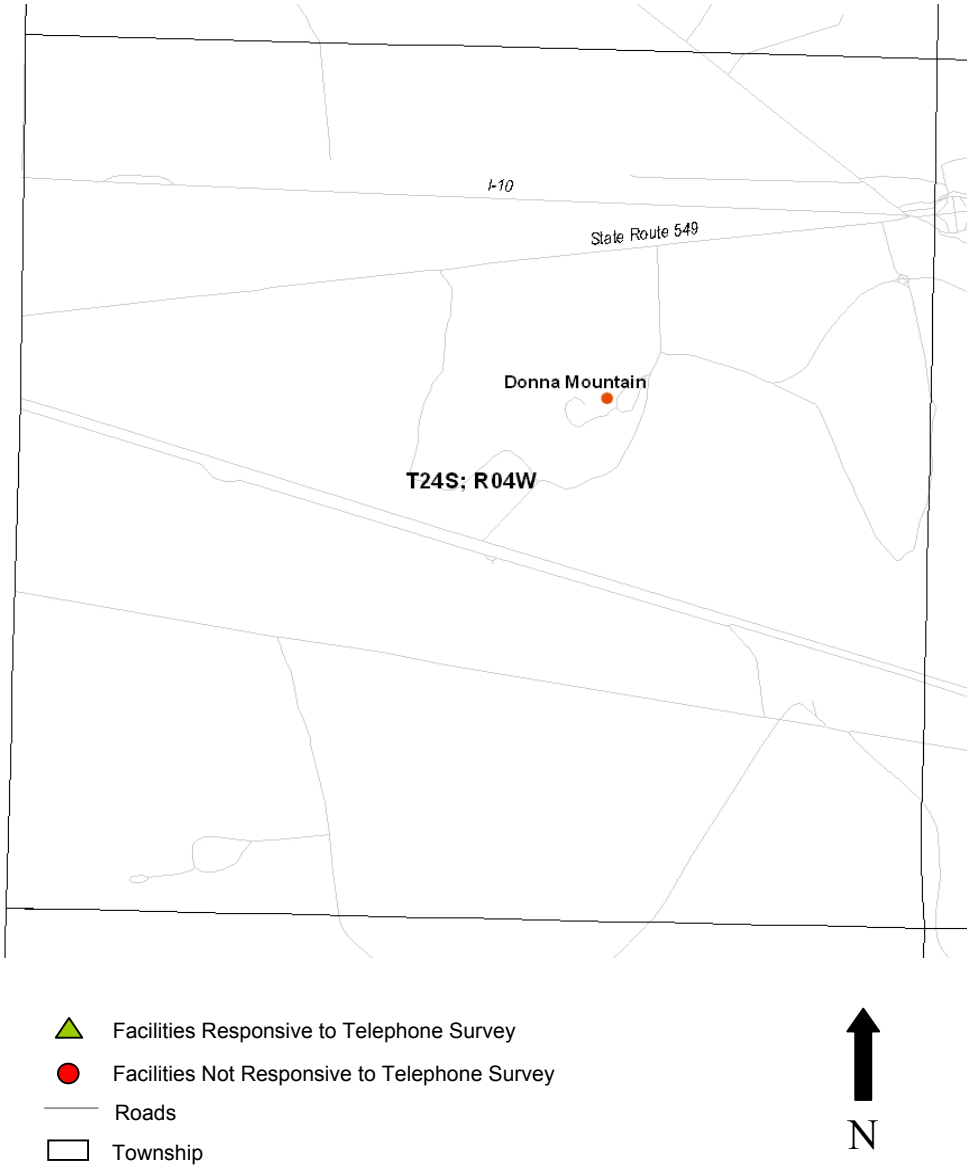


Figure 15. Mines and Quarries in Township 26S Range 03E and Township 26S Range 04E, Doña Ana County, New Mexico

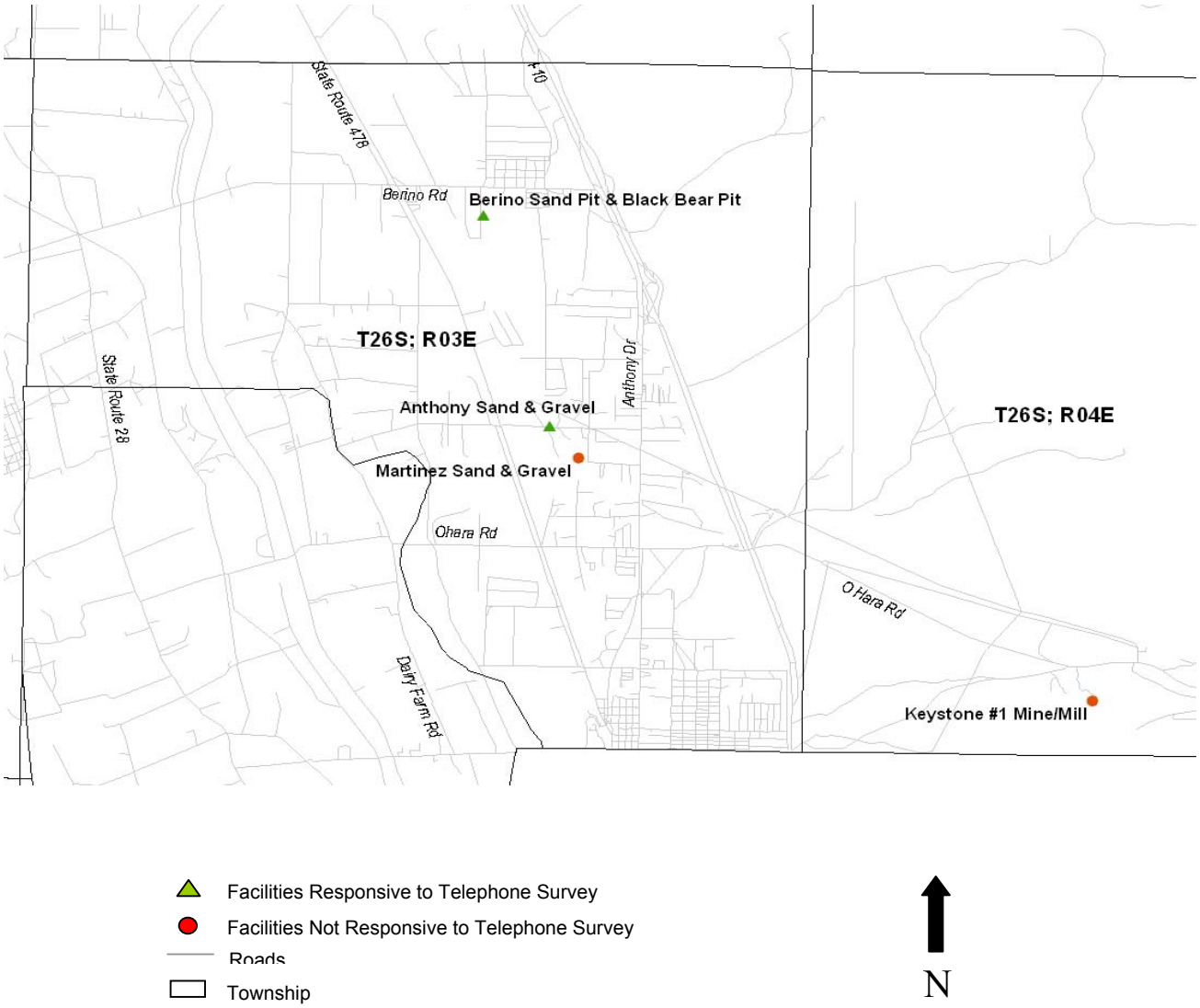
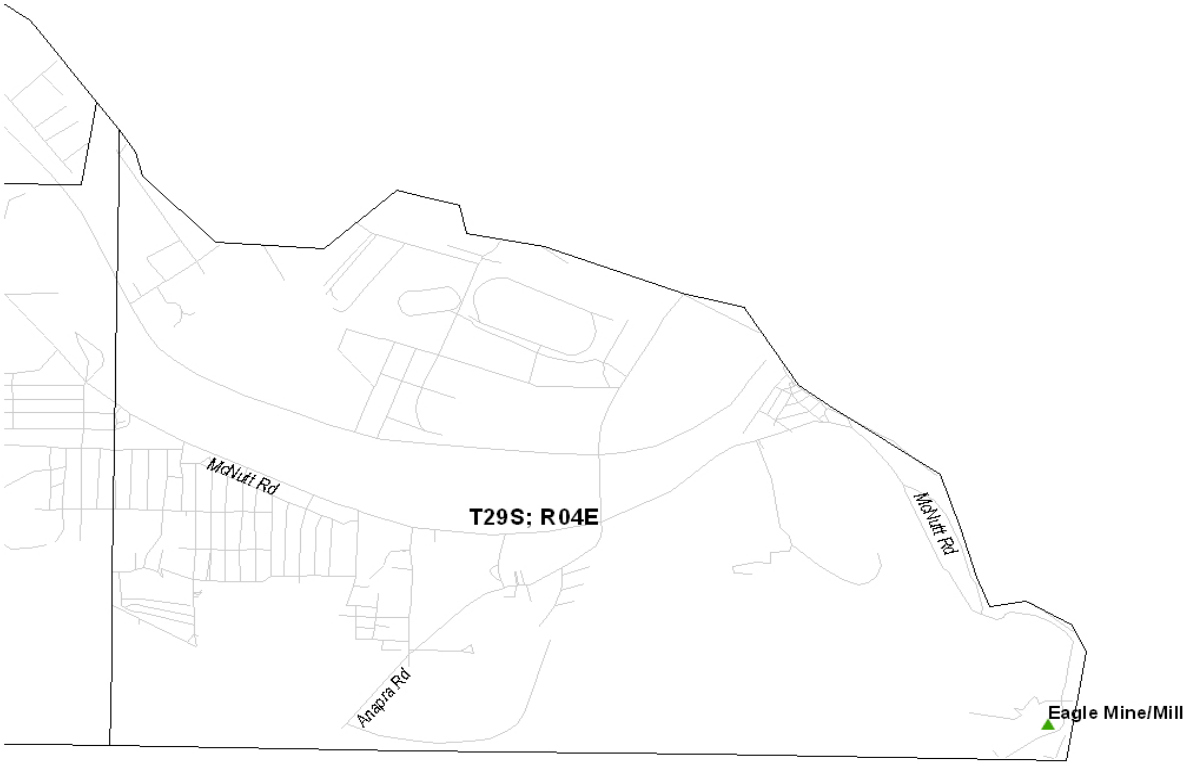


Figure 16. Mines and Quarries in Township 29S Range 04E, Doña Ana County, New Mexico



STATISTICAL ANALYSIS OF DOÑA ANA COUNTY CRITERIA POLLUTANT AIR QUALITY MONITORING DATA: 1994-2003

Introduction

In conjunction with the development of the nonagricultural source emissions inventory for Doña Ana County, ambient monitoring data for criteria pollutants were also compiled for the last 10 years (1994-2003) for monitoring sites located in the county. The data were retrieved from U.S. EPA's Air Quality Subsystem (AQS), which was formally a subsystem under the Aerometric Information System (AIRS). The AQS is EPA's official repository of raw ambient monitoring data for criteria, toxic, and photochemical pollutant data.

Monitoring Sites

Between 1994 and 2003, 15 monitoring sites in Doña Ana County measured for criteria pollutants, and they are summarized in Table 5. Site description information is also included in Table 5. Only two of the sites were located in an urban setting, while eight were in a rural setting. The remaining five sites were located in a suburban setting. All the monitors are situated at high elevations (ranging from 1149 to 1293 meters above sea-level). Specific locations are plotted in Figure 17.

Traffic data were only available for eight sites. Overall, daily traffic volumes passing by the monitors were not heavy, ranging from 500 in the desert to nearly 16,000 in Las Cruces. Seven of the monitors are located in Las Cruces, while one monitor was located just outside of Las Cruces. Of the remaining seven monitors, six are close to the New Mexico-Texas border, and four monitors are close to the New Mexico-Mexico border. Two large cities are near the Texas-New Mexico-Mexico border: El Paso, Texas and Ciudad Juárez, Chihuahua, Mexico.

Pollutants of Interest

The pollutants of interest for this study were limited to criteria pollutants only. Criteria pollutants, as defined by EPA, are:

- Carbon monoxide (CO);
- Sulfur dioxide (SO_2);
- Nitrogen dioxide (NO_2);
- Ozone (O_3);
- Lead (Pb); and
- Particulate matter having an aerodynamic diameter of 10 microns or less (PM_{10}).

The corresponding parameter codes for these pollutants are summarized in Table 6. Although lead is a criteria pollutant, it is also considered a hazardous air pollutant (HAP). In AQS, PM_{10} is available as two forms: as a total concentration sampled at local conditions and/or as a total concentration corrected to 25 °C. Additionally, $PM_{2.5}$ (i.e., particulate matter having an aerodynamic diameter of 2.5 microns or less) data were retrieved with the PM_{10} data.

Ozone, a primary component to smog, is not directly emitted into the atmosphere. Rather, ozone is formed as a secondary pollutant from ozone precursors such as volatile organic compounds (VOC) and NO_2.

As of May 2004, Doña Ana County is in violation of the national ambient air quality standards (NAAQS) for ozone (1-hour standard) and PM_{10} (EPA, 2004b).

Data Parameters

Table 7 summarizes the data parameters retrieved from AQS. For every sample measurement, the corresponding sampling method, units (i.e., parts per million [ppm] or micrograms per cubic meter [$\mu g/m^3$]), data quality flags, and sample duration (i.e., hourly or daily) were also retrieved. Sampling methods (e.g., high-volume atomic absorption, instrumental ultraviolet, etc.) are specific to the pollutant and frequency of measurement.

A total of 1,657,709 hourly and daily raw data records from Doña Ana County were compiled into an Access database, representing 1994-2003. After reviewing the data quality flags (e.g., invalids, null data, etc.), the number of records used for data analysis was reduced to 1,452,215.

Raw data submitted to AQS are coded to optimize data submittal. The following AQS data dictionaries were used to decode the raw information: site code dictionary, parameter code dictionary, sampling method dictionary, sample duration dictionary, and sample units dictionary. These dictionaries will be included in the finalized database.

Data Summary

Tables 8 through 15 summarize the criteria data daily averages by parameter of occurrence (POC) and year. Included in the daily average is the confidence interval at a level of 95%. Additional information in these tables are the number of sampling days, the geometric mean, the minimum and maximum values recorded, and the standard deviation. It is important to note that for parameters measured hourly, such as ozone, the maximum and minimum values refer to hourly values, instead of daily values.

<u>Carbon Monoxide</u>

Four sites measured for carbon monoxide (Table 8). The highest daily average was in 1994 at AQS site 35-013-1012 at 0.8119 ± 0.0199 ppm. The highest recorded sample was 14.3 ppm at the same site, but occurred in 1997. This site also sampled for all 10 years of the study. AQS sites 35-013-0011, 35-013-0023, and 35-013-1012 surround Las Cruces, near major highways. The fourth site, 35-013-0022 is in the desert on the New Mexico-Mexico border. The Las Cruces site averages are significantly higher than the desert site.

<u>Lead</u>

Two sites measured for lead (Table 9). The highest daily average was in 1995 at AQS site 35-013-0004 at 0.0576 ± 0.0133 μg/m^3. The highest recorded sample was 0.3348 μg/m^3 at the same site and year. Both sites (35-013-0004 and 35-013-0017) were located at the Texas-New Mexico-Mexico border. The lead averages are not significantly different from each other. Lead was not sampled for after 1998 at either site.

Nitrogen Dioxide

Four sites measured for nitrogen dioxide (Table 10). The highest daily average was in 1999 at AQS site 35-013-0021 at 0.0121 ± 0.0002 ppm. The highest recorded sample was 0.129 ppm at the same site, but occurred in 1997. AQS site 35-013-0020 is close to the Texas-New Mexico border; 35-013-0021 is close to the Texas-New Mexico-Mexico border; and 35-013-0022 is close to the New Mexico-Mexico border. The fourth site, 35-013-0019 is north of Las Cruces. The Las Cruces site average is significantly lower than the border sites.

Ozone

Seven sites measured for ozone (Table 11). The highest daily average was in 2002 at AQS site 35-013-0019 at 0.0401 ± 0.0003 ppm. The highest recorded one-hour sample was 0.141 ppm at AQS site 35-013-0022 in 2000, which was an exceedance of the 1-hour ozone standard of 0.125. Other sites and years which had exceedances were at AQS site 35-013-0017 in 1994, 1995, and 1998 (0.137, 0.137, and 0.126 ppm, respectively) and at AQS site 35-013-0021 in 1998 (0.128 ppm). All of the ozone exceedances were at border sites. Ozone concentrations were generally higher at the border sites compared to the Las Cruces sites.

Total PM_{10}

Twelve monitors at ten sites measured for total PM_{10} (Table 12). Two monitors sampled for all 10 years of the study (35-013-0016, monitor 1 and 35-013-0017, monitor 1). The highest daily average was in 2003 at AQS site 35-013-0017, monitor 2 at 66.1210 ± 5.9405 μg/m^3, which was an exceedance of the annual standard of 50 μg/m^3. Other exceedances of the annual standard occurred at AQS sites: 35-013-0016, monitor 2 in 1995, 1996, and 2003 (53.0589, 56.7705, and 51.8464 μg/m^3, respectively) and 35-013-0017, monitor 1 in 2003 (53.7707 μg/m^3).

The highest recorded sample was also at AQS site 35-013-0017, monitor 2 in 2003 at 212 μg/m^3, which was an exceedance of the 24-hour average standard of 150 μg/m^3. Other exceedances of the 24-hour standard occurred at AQS sites: 35-013-0016, monitor 2 in 1998 (153.5217 μg/m^3); 35-013-0017, monitor 1 in 2002 (152.3 μg/m^3); 35-013-0017, monitor 2 in 1994 and 2003 (208.5 and 212 μg/m^3, respectively); 35-013-0020 in 1998 (156.913 μg/m^3); 35-013-0021 in 1996 (160.875 μg/m^3); and 35-013-0022 in 1996 (154.4286 μg/m^3). All of the total PM_{10} exceedances were at border sites. Total PM_{10} concentrations were generally higher at the border sites compared to the Las Cruces sites.

PM_{10}-local

Ten monitors at eight sites measured for PM_{10}-local (Table 13). The highest daily average was in 2003 at AQS site 35-013-0017, monitor 2 at 62.1823 ± 12.1485 μg/m^3. The highest recorded sample was 2,071 μg/m^3 at the same site and year. PM_{10}-local concentrations were generally higher at the border sites compared to the Las Cruces sites.

$PM_{2.5}$-local

Seven monitors at six sites measured for $PM_{2.5}$-local (Table 14). The highest daily average was in 2003 at AQS site 35-013-0017, monitor 2 at 14.3887 ± 1.9908 μg/m^3. The highest recorded sample was 146.5333 μg/m^3 at AQS site 35-013-0022 in 2003. $PM_{2.5}$-local concentrations were generally higher at the border sites compared to the Las Cruces sites.

Sulfur Dioxide

Two sites measured for sulfur dioxide (Table 15), which both sampled during the entire 10-year period. The highest daily average was in 1995 at AQS site 35-013-0017 at 0.0112 ± 0.0005 ppm. The highest recorded one-hour sample was 0.500 ppm at the same site, but occurring in 1996. Sulfur dioxide concentrations were generally higher at the border site (35-013-0017) compared to the Las Cruces site (35-013-0008).

Figure 17. Doña Ana County, New Mexico Criteria Pollutant Monitoring Sites

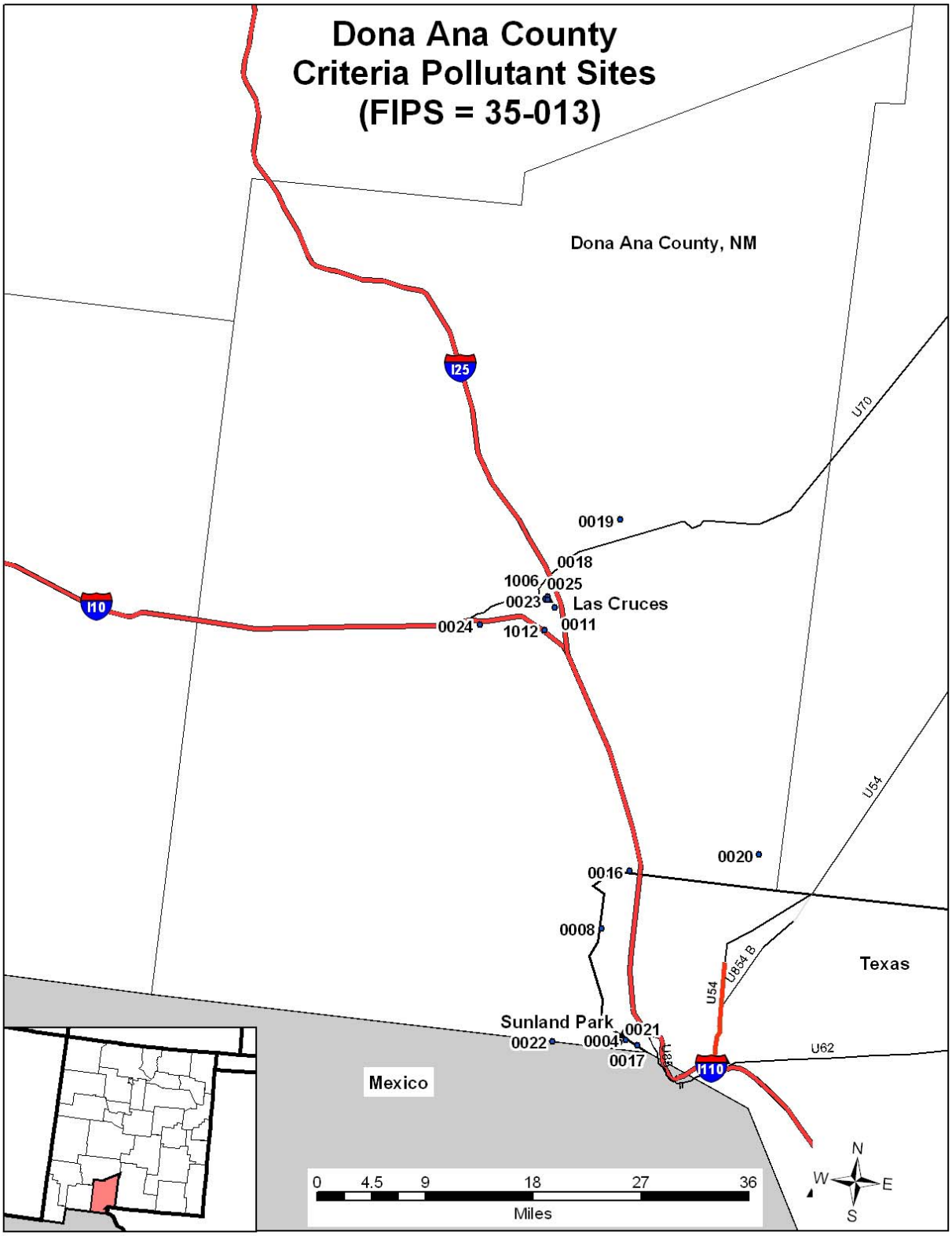


Table 5. Doña Ana County Criteria Pollutant Monitoring Sites

AQS ID	Street Address/Description	City Name	Land Use	Location Setting	Elevation Above MSL (meters)	Latitude	Longitude	Daily Traffic[1]
35-013-0004	Sunland Park Racetrack	Not in city	Agricultural	Rural	1149	31.804	-106.560	NA
35-013-0008	St. Luke's Episcopal Church, Rt 1	Not in city	Agricultural	Rural	1204	31.931	-106.631	NA
35-013-0011	Young Park	Las Cruces	Residential	Suburban	1201	32.309	-106.756	NA
35-013-0016	SE Corner of Anthony Elementary School	Anthony	Agricultural	Rural	1159	32.004	-106.599	NA
35-013-0017	Sunland Park City Yard	Not in city	Commercial	Suburban	1162[2]	31.795	-106.558	NA
35-013-0018	Dirt Road East of Telshor Drive	Las Cruces	Desert	Rural	1189	32.342	-106.760	500
35-013-0019	Las Cruces Well Station #41, Holman Road	Not in city	Desert	Rural	1189	32.425	-106.674	500
35-013-0020	680 McCombs, Chaparral	Not in city	Residential	Rural	1250	32.041	-106.409	1,000
35-013-0021	5935A Valle Vista, Sunland Park	Not in city	Residential	Suburban	1219	31.796	-106.584	500
35-013-0022	104-2 Santa Teresa International Blvd	Not in city	Desert	Rural	1280	31.788	-106.683	500
35-013-0023	750 N. Solano Dr.	Las Cruces	Commercial	Urban	1219	32.318	-106.768	12,000
35-013-0024	South of I-10 at Las Cruces Well #46	Las Cruces	Desert	Rural	1293	32.278	-106.864	15,950
35-013-0025	1170 N. Solano Dr.	Las Cruces	Commercial	Urban	1219	32.322	-106.768	12,000
35-013-1006	1001 N. Solano Dr.	Las Cruces	Residential	Suburban	1187	32.319	-106.771	NA
35-013-1012	Holiday Inn	Las Cruces	Commercial	Suburban	1188	32.281	-106.767	NA

[1] = NA: Not available in AQS
[2] = Not populated in AQS; estimated using topographic map

Table 6. AQS Parameter Codes

AQS Parameter Code	AQS Parameter
12128	Lead
42101	Carbon Monoxide
42401	Sulfur Dioxide
42602	Nitrogen Dioxide
44201	Ozone
81102	Total PM_{10}
85101	PM_{10}-local conditions
88101	$PM_{2.5}$-local conditions

Table 7. Data Fields Retrieved

Data Field	Data Description
Transaction Type	RD = raw data
Action Code	I = Input
State ID	State FIPS
County ID	County FIPS
Parameter	Pollutant Code
POC	Parameter of Occurrence or Monitor #
Sample Duration	Daily or Hourly
Unit	Parameter units (ppm or $\mu g/m^3$)
Method	Sampling Method
Date	Follows YYYYMMDD format
Start Time	Daily = 00:00; hourly = HH:00 format
Sample Value	Value of the parameter (not used for analysis)
Sample Value - Use	Value of the parameter (used for analysis)
Null Data Code	Populated for invalid samples
Collection Frequency Code	Describes the sampling frequency (every day, every six days)
Alternate MDL ID	Not used
Qualifier-1	Data Quality Flag 1
Qualifier-2	Data Quality Flag 2
Qualifier-3	Data Quality Flag 3
Qualifier-4	Data Quality Flag 4
Qualifier-5	Data Quality Flag 5
Qualifier-6	Data Quality Flag 6
Qualifier-7	Data Quality Flag 7
Qualifier-8	Data Quality Flag 8
Qualifier-9	Data Quality Flag 9
Qualifier-10	Data Quality Flag 10
MDL	Minimum detection limit (not used)
Uncertainty	Not used

Table 8. Carbon Monoxide Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-0011	1	1994	355	0.7399 ± 0.0123	0.7019	0.2478	6.6000	0.5725
		1995	347	0.7581 ± 0.0123	0.7130	0.1800	6.2000	0.5674
		1996	140	0.7705 ± 0.0195	0.7386	0.3750	5.0000	0.5756
35-013-0022	1	1996	347	0.3578 ± 0.0049	0.3223	0.1000	2.9000	0.2241
		1997	365	0.3338 ± 0.0044	0.3053	0.1000	4.6000	0.2057
		1998	268	0.3393 ± 0.0045	0.3167	0.1000	3.2000	0.1834
35-013-0023	1	1997	30	0.4667 ± 0.0381	0.3783	0.1143	3.8000	0.4936
		1998	365	0.5568 ± 0.0085	0.5105	0.1294	4.5000	0.4006
		1999	358	0.4630 ± 0.0087	0.4184	0.1000	4.5000	0.4039
		2000	357	0.3863 ± 0.0072	0.3413	0.1083	3.7000	0.3369
35-013-1012	1	1994	365	0.8119 ± 0.0199	0.6627	0.1091	8.3000	0.9061
		1995	365	0.7328 ± 0.0181	0.5874	0.1000	6.9000	0.8223
		1996	362	0.7101 ± 0.0175	0.5691	0.1000	7.9000	0.7963
		1997	364	0.5579 ± 0.0140	0.4526	0.1125	14.3000	0.6397
		1998	364	0.6042 ± 0.0147	0.4994	0.1333	7.0000	0.6742
		1999	363	0.6628 ± 0.0169	0.5000	0.1000	7.2000	0.7611
		2000	357	0.6872 ± 0.0133	0.6240	0.1278	5.9000	0.6142
		2001	365	0.6604 ± 0.0119	0.5781	0.1095	5.1000	0.5614
		2002	360	0.6069 ± 0.0107	0.5019	0.1056	5.2000	0.4967
		2003	365	0.5390 ± 0.0099	0.4472	0.1000	3.8000	0.4654

[1] = POC: parameter of occurrence or monitor number
[2] = Hourly maximum value

Table 9. Lead Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average ($\mu g/m^3$)	Geometric Mean ($\mu g/m^3$)	Minimum Value ($\mu g/m^3$)	Maximum Value[2] ($\mu g/m^3$)	Standard Deviation
35-013-0004	1	1994	61	0.0418 ± 0.0058	0.0373	0.0269	0.1275	0.0231
		1995	61	0.0576 ± 0.0133	0.0450	0.0278	0.3348	0.0528
		1996	59	0.0499 ± 0.0099	0.0415	0.0279	0.2432	0.0387
		1997	61	0.0558 ± 0.0120	0.0431	0.0270	0.2274	0.0477
		1998	15	0.0343 ± 0.0122	0.0307	0.0273	0.1248	0.0242
35-013-0017	1	1994	61	0.0417 ± 0.0054	0.0380	0.0274	0.1189	0.0215
		1995	64	0.0499 ± 0.0092	0.0418	0.0262	0.2044	0.0377
		1996	62	0.0539 ± 0.0101	0.0450	0.0276	0.2614	0.0404
		1997	62	0.0540 ± 0.0095	0.0449	0.0281	0.1762	0.0380
		1998	15	0.0430 ± 0.0159	0.0383	0.0329	0.1606	0.0314

[1] = POC: parameter of occurrence or monitor number
[2] = Daily maximum value

Table 10. Nitrogen Dioxide Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-0019	1	1995	55	0.0053 ± 0.0003	0.0048	0.0014	0.0310	0.0047
		1996	366	0.0040 ± 0.0001	0.0034	0.0010	0.0300	0.0039
		1997	335	0.0039 ± 0.0001	0.0036	0.0012	0.0320	0.0036
		1998	355	0.0041 ± 0.0001	0.0035	0.0011	0.0350	0.0041
		1999	354	0.0042 ± 0.0001	0.0037	0.0010	0.0360	0.0042
		2000	366	0.0041 ± 0.0001	0.0035	0.0010	0.0370	0.0040
		2001	365	0.0038 ± 0.0001	0.0032	0.0010	0.0310	0.0039
		2002	244	0.0037 ± 0.0001	0.0034	0.0013	0.0290	0.0034
35-013-0020	1	1996	321	0.0052 ± 0.0002	0.0041	0.0011	0.0490	0.0061
		1997	365	0.0047 ± 0.0001	0.0040	0.0013	0.0850	0.0055
		1998	363	0.0051 ± 0.0001	0.0040	0.0010	0.0490	0.0057
		1999	362	0.0056 ± 0.0001	0.0046	0.0012	0.0500	0.0065
		2000	366	0.0056 ± 0.0001	0.0046	0.0013	0.0730	0.0068
		2001	365	0.0056 ± 0.0001	0.0044	0.0010	0.0510	0.0065
		2002	363	0.0056 ± 0.0002	0.0044	0.0014	0.0520	0.0066
		2003	180	0.0061 ± 0.0003	0.0045	0.0010	0.0530	0.0075
35-013-0021	1	1996	322	0.0095 ± 0.0002	0.0079	0.0015	0.0830	0.0096
		1997	361	0.0100 ± 0.0002	0.0083	0.0018	0.1290	0.0097
		1998	357	0.0104 ± 0.0002	0.0086	0.0024	0.1170	0.0103
		1999	365	0.0121 ± 0.0002	0.0100	0.0023	0.0840	0.0115
		2000	363	0.0118 ± 0.0002	0.0099	0.0021	0.0900	0.0112
		2001	358	0.0108 ± 0.0002	0.0089	0.0016	0.0930	0.0103
		2002	364	0.0109 ± 0.0002	0.0092	0.0024	0.0920	0.0099
		2003	365	0.0108 ± 0.0002	0.0091	0.0019	0.0790	0.0100
35-013-0022	1	1998	91	0.0080 ± 0.0004	0.0057	0.0010	0.0580	0.0081
		1999	350	0.0066 ± 0.0022	0.0043	0.0010	0.0660	0.0075
		2000	362	0.0064 ± 0.0002	0.0045	0.0010	0.0650	0.0074
		2001	335	0.0064 ± 0.0002	0.0045	0.0010	0.0530	0.0071
		2002	362	0.0066 ± 0.0002	0.0046	0.0010	0.0580	0.0069

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
		2003	352	0.0063 ± 0.0002	0.0044	0.0010	0.0580	0.0068

[1] = POC: parameter of occurrence or monitor number
[2] = Hourly maximum value

Table 11. Ozone Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-0008	2	1994	365	0.0330 ± 0.0004	0.0307	0.0028	0.1000	0.0183
		1995	364	0.0320 ± 0.0004	0.0299	0.0099	0.1110	0.0180
		1996	365	0.0318 ± 0.0004	0.0301	0.0130	0.1020	0.0171
		1997	360	0.0320 ± 0.0004	0.0306	0.0111	0.0910	0.0170
		1998	365	0.0319 ± 0.0004	0.0301	0.0067	0.1230	0.0177
		1999	365	0.0318 ± 0.0004	0.0299	0.0109	0.1010	0.0184
		2000	360	0.0314 ± 0.0004	0.0292	0.0060	0.1100	0.0186
		2001	365	0.0314 ± 0.0004	0.0294	0.0080	0.0930	0.0176
		2002	346	0.0304 ± 0.0004	0.0284	0.0036	0.1000	0.0178
		2003	365	0.0314 ± 0.0004	0.0294	0.0096	0.1070	0.0182
35-013-0017	1	1994	358	0.0333 ± 0.0004	0.0306	0.0055	0.1370	0.0188
		1995	353	0.0322 ± 0.0004	0.0299	0.0086	0.1370	0.0188
		1996	366	0.0321 ± 0.0004	0.0301	0.0108	0.1310	0.0178
		1997	365	0.0321 ± 0.0004	0.0304	0.0076	0.1050	0.0170
		1998	365	0.0337 ± 0.0004	0.0313	0.0061	0.1260	0.0186
		1999	363	0.0330 ± 0.0004	0.0309	0.0070	0.1030	0.0191
		2000	362	0.0331 ± 0.0004	0.0308	0.0109	0.1240	0.0194
		2001	365	0.0319 ± 0.0004	0.0298	0.0092	0.1040	0.0182
		2002	364	0.0325 ± 0.0004	0.0301	0.0103	0.1070	0.0185
		2003	355	0.0322 ± 0.0004	0.0296	0.0049	0.1160	0.0185
35-013-0019	1	1995	55	0.0287 ± 0.0007	0.0279	0.0165	0.0720	0.0127
		1996	366	0.0373 ± 0.0003	0.0363	0.0154	0.0840	0.0132
		1997	355	0.0371 ± 0.0003	0.0362	0.0046	0.0790	0.0124
		1998	365	0.0389 ± 0.0003	0.0378	0.0156	0.0860	0.0135
		1999	365	0.0397 ± 0.0003	0.0390	0.0180	0.0840	0.0129
		2000	366	0.0391 ± 0.0003	0.0381	0.0195	0.0830	0.0134
		2001	365	0.0376 ± 0.0003	0.0367	0.0187	0.0820	0.0130
		2002	270	0.0401 ± 0.0003	0.0394	0.0186	0.0860	0.0125

Table 11. Cont.

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-0020	1	1996	320	0.0367 ± 0.0003	0.0358	0.0151	0.1130	0.0136
		1997	365	0.0362 ± 0.0003	0.0350	0.0128	0.0920	0.0138
		1998	361	0.0392 ± 0.0003	0.0382	0.0181	0.1040	0.0144
		1999	362	0.0387 ± 0.0003	0.0377	0.0205	0.1000	0.0144
		2000	365	0.0381 ± 0.0003	0.0369	0.0133	0.1010	0.0148
		2001	365	0.0360 ± 0.0003	0.0348	0.0075	0.0890	0.0140
		2002	358	0.0363 ± 0.0003	0.0353	0.0148	0.1080	0.0139
		2003	365	0.0372 ± 0.0003	0.0360	0.0134	0.0880	0.0141
35-013-0021	1	1996	322	0.0364 ± 0.0004	0.0351	0.0124	0.1220	0.0166
		1997	361	0.0351 ± 0.0003	0.0338	0.0090	0.1100	0.0162
		1998	365	0.0367 ± 0.0004	0.0348	0.0092	0.1280	0.0174
		1999	353	0.0366 ± 0.0004	0.0353	0.0142	0.1050	0.0172
		2000	361	0.0354 ± 0.0004	0.0334	0.0115	0.1180	0.0179
		2001	360	0.0341 ± 0.0004	0.0323	0.0121	0.1090	0.0169
		2002	365	0.0334 ± 0.0004	0.0315	0.0086	0.1030	0.0164
		2003	365	0.0336 ± 0.0004	0.0310	0.0030	0.1150	0.0172
35-013-0022	1	1996	343	0.0375 ± 0.0003	0.0364	0.0165	0.1050	0.0143
		1997	363	0.0371 ± 0.0003	0.0361	0.0157	0.1010	0.0141
		1998	358	0.0388 ± 0.0003	0.0373	0.0137	0.1020	0.0154
		1999	360	0.0397 ± 0.0003	0.0386	0.0166	0.1130	0.0151
		2000	366	0.0384 ± 0.0003	0.0370	0.0157	0.1410	0.0160
		2001	365	0.0369 ± 0.0003	0.0357	0.0153	0.1020	0.0149
		2002	365	0.0364 ± 0.0003	0.0352	0.0137	0.1000	0.0148
		2003	365	0.0340 ± 0.0005	0.0331	0.0148	0.0970	0.0126

Table 11. Cont.

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-1012	1	1994	365	0.0266 ± 0.0004	0.0244	0.0063	0.0790	0.0183
		1995	364	0.0271 ± 0.0004	0.0248	0.0057	0.0800	0.0179
		1996	365	0.0273 ± 0.0004	0.0251	0.0083	0.0870	0.0171
		1997	365	0.0261 ± 0.0004	0.0243	0.0027	0.0800	0.0151
		1998	364	0.0272 ± 0.0004	0.0249	0.0063	0.0800	0.0182
		1999	351	0.0275 ± 0.0010	0.0253	0.0018	0.0920	0.0184
		2000	361	0.0256 ± 0.0004	0.0234	0.0050	0.0790	0.0183
		2001	356	0.0250 ± 0.0004	0.0232	0.0050	0.0750	0.0169
		2002	345	0.0254 ± 0.0004	0.0237	0.0071	0.0740	0.0173
		2003	365	0.0263 ± 0.0004	0.0241	0.0086	0.0760	0.0182

[1] = POC: parameter of occurrence or monitor number
[2] = Hourly maximum value

Table 12. PM_{10}-total Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (µg/m^3)	Geometric Mean (µg/m^3)	Minimum Value (µg/m^3)	Maximum Value[2] (µg/m^3)	Standard Deviation
35-013-0016	1	1994	181	40.3138 ± 3.3112	34.4882	6.7000	125.9000	22.7285
		1995	59	39.5864 ± 5.4056	35.3529	14.7000	141.6000	21.1847
		1996	61	37.6705 ± 3.9133	34.0772	8.9000	80.9000	15.5941
		1997	61	29.0639 ± 4.5108	25.3288	7.3000	135.3000	17.9751
		1998	61	27.4525 ± 3.2142	23.9786	2.3000	64.5000	12.8083
		1999	59	35.1305 ± 4.6373	30.6361	8.0000	104.7000	18.1737
		2000	61	31.1656 ± 3.8925	27.4046	5.5000	83.9000	15.5114
		2001	61	31.2623 ± 4.2581	26.5540	3.6000	101.8000	16.9682
		2002	56	32.4500 ± 4.7586	28.0354	8.8000	95.0000	18.1687
		2003	55	34.0236 ± 5.0499	29.0612	5.9000	112.8000	19.1081
35-013-0016	2	1994	18	36.1481 ± 9.1892	29.9194	7.9130	65.4167	19.8915
		1995	347	53.0589 ± 2.8571	45.5474	4.0000	148.7083	27.1545
		1996	350	56.7705 ± 2.8667	49.5211	7.6364	140.8571	27.3635
		1997	357	41.5080 ± 2.0757	36.4795	5.5000	111.4167	20.0101
		1998	262	45.8770 ± 2.7810	40.3197	6.2174	153.5217	22.9668
		2003	169	51.8464 ± 3.5267	46.4428	11.0417	116.5455	23.3918
35-013-0017	1	1994	239	35.2845 ± 2.4699	30.6702	5.7000	106.2000	19.4819
		1995	72	39.5278 ± 4.7829	34.6852	11.3000	119.4000	20.7069
		1996	59	36.7254 ± 6.1772	31.0458	10.8000	133.3000	24.2087
		1997	61	32.1361 ± 4.8183	27.8119	9.0000	106.8000	19.2006
		1998	60	32.6450 ± 4.7719	27.9471	3.6000	106.7000	18.8592
		1999	59	44.4898 ± 5.9705	38.2616	11.1000	104.7000	23.3986
		2000	62	41.4016 ± 6.1962	34.1798	4.6000	125.3000	24.8929
		2001	60	37.5417 ± 5.8205	30.7564	5.3000	103.4000	23.0032
		2002	59	40.3169 ± 7.3637	33.6180	14.4000	152.3000	28.8585
		2003	58	53.7707 ± 8.9939	41.9105	4.3000	146.8000	34.9473

Table 12. Cont.

AQS ID	POC[1]	Year	Days	Daily Average (µg/m^3)	Geometric Mean (µg/m^3)	Minimum Value (µg/m^3)	Maximum Value[2] (µg/m^3)	Standard Deviation
35-013-0017	2	1994	143	47.1089 ± 5.0200	38.6074	6.3333	208.5000	30.6286
		1995	352	46.4289 ± 2.9907	38.3742	3.9583	145.0000	28.6282
		1996	348	48.8108 ± 2.9815	40.8021	5.9167	149.4167	28.3776
		1997	361	38.2155 ± 2.3749	31.5187	3.7727	127.6522	23.0223
		1998	268	40.8481 ± 2.7103	34.7622	4.2000	131.3750	22.6377
		2003	171	66.1210 ± 5.9405	55.9548	7.9167	212.0000	39.6347
35-013-0018	1	1995	41	21.2375 ± 4.1421	18.5400	6.9444	82.2174	13.5320
		1996	355	29.2001 ± 2.1552	24.2834	5.2632	131.3333	20.7183
		1997	365	20.9754 ± 1.2136	18.4459	4.4167	86.4167	11.8297
		1998	264	26.1935 ± 2.2040	22.1075	5.7727	129.6190	18.2710
		2003	183	27.1161 ± 2.2507	23.7489	6.3333	101.3636	15.5346
35-013-0019	1	1995	33	23.8904 ± 7.6767	18.2532	5.6957	133.8750	22.5002
		1996	358	31.9000 ± 2.1198	26.0068	2.5455	114.6364	20.4641
		1997	348	24.0253 ± 1.6849	19.3738	2.4286	126.7500	16.0372
		1998	269	29.2826 ± 2.5145	23.4437	3.7500	141.2727	21.0421
35-013-0020	1	1996	310	40.2952 ± 2.6794	33.7901	7.5238	125.8333	24.0695
		1997	361	26.4075 ± 1.6667	22.3330	3.7500	130.0000	16.1568
		1998	257	37.2445 ± 3.1128	30.5063	5.7391	156.9130	25.4611
		2003	174	33.7650 ± 2.8155	29.7696	5.1667	140.8636	18.9487
35-013-0021	1	1996	309	47.2310 ± 3.0989	40.1170	6.0000	160.8750	27.7935
		1997	353	37.1705 ± 2.4467	30.5633	5.2174	144.3750	23.4545
		1998	143	36.3551 ± 4.3953	28.2708	6.1667	135.1667	26.8170
35-013-0022	1	1996	327	34.9264 ± 2.6888	28.4313	5.4545	154.4286	24.8075
		1997	348	32.5952 ± 2.5064	25.7186	3.6667	144.9583	23.8553
		1998	141	23.3389 ± 3.4178	17.0664	4.4500	136.1250	20.7064
35-013-0024	1	2003	174	27.2353 ± 5.3973	21.2328	6.5000	117.8696	36.5329

Table 12. Cont.

AQS ID	POC[1]	Year	Days	Daily Average ($\mu g/m^3$)	Geometric Mean ($\mu g/m^3$)	Minimum Value ($\mu g/m^3$)	Maximum Value[2] ($\mu g/m^3$)	Standard Deviation
35-013-0025	1	2001	61	19.5410 ± 1.9304	17.7894	4.2000	43.7000	7.6923
		2002	57	23.2228 ± 3.8280	20.0805	5.1000	100.1000	14.7455
		2003	25	27.2680 ± 7.2246	22.0870	4.8000	70.3000	18.4305
35-013-1006	1	1994	61	21.6311 ± 2.3267	19.8779	9.2000	53.3000	9.2715
		1995	61	23.9197 ± 2.7897	21.9499	9.2000	71.0000	11.1167
		1996	61	24.3164 ± 2.8388	22.5938	11.4000	92.7000	11.3122
		1997	59	19.6034 ± 1.7733	18.1374	2.6000	36.0000	6.9498
		1998	61	20.6852 ± 1.7887	19.4375	8.3000	44.6000	7.1276
		1999	60	24.4983 ± 4.0710	21.3912	1.9000	122.5000	16.0889
		2000	60	21.5350 ± 2.1656	19.9453	7.2000	50.9000	8.5585

[1] = POC: parameter of occurrence or monitor number
[2] = Daily maximum value

Table 13. PM_{10}-local Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (µg/m^3)	Geometric Mean (µg/m^3)	Minimum Value (µg/m^3)	Maximum Value[2] (µg/m^3)	Standard Deviation
35-013-0016	1	1998	61	25.0508 ± 2.9618	21.9098	2.2000	61.3000	11.8025
		1999	59	32.1593 ± 4.3311	27.9497	7.6000	99.5000	16.9737
		2000	61	28.5557± 3.6223	25.0243	5.2000	76.7000	14.4347
		2001	61	28.5148 ± 3.9254	24.2344	3.3000	96.8000	15.6424
		2002	56	29.6054 ± 4.3209	25.5912	8.2000	84.2000	16.4975
		2003	56	32.8232 ± 6.0442	27.1544	0.0000	148.0000	23.0772
35-013-0016	2	1998	90	38.2668 ± 4.5253	31.4545	4.8750	98.3750	21.9039
		1999	351	48.4181 ± 2.6940	41.5151	5.0833	152.3333	25.7511
		2000	355	44.1700 ± 2.5123	37.7688	5.6364	145.4583	24.1513
		2001	342	46.3316 ± 2.7028	39.9397	4.5455	161.6087	25.5020
		2002	348	46.7366 ± 2.9492	39.1961	4.2174	240.8696	28.0702
		2003	170	49.2867 ± 3.5873	43.2757	5.5238	134.7391	23.8640
35-013-0017	1	1998	60	30.0000 ± 4.4471	25.6765	3.4000	99.9000	17.5753
		1999	59	41.1017 ± 5.6341	35.1154	9.8000	100.1000	22.0800
		2000	62	38.1774 ± 5.8032	31.3988	4.3000	118.1000	23.3140
		2001	60	34.4783 ± 5.3900	28.2513	5.1000	98.2000	21.3018
		2002	59	37.0695 ± 6.8252	30.8496	13.2000	137.7000	26.7480
		2003	58	49.0724 ± 8.2321	38.2532	4.0000	130.0000	33.8834
35-013-0017	2	1998	91	42.2541 ± 5.9763	33.8199	6.5833	146.6250	29.0876
		1999	345	50.6406 ± 3.2999	41.9559	4.4667	177.7917	31.2729
		2000	352	51.1773 ± 3.1279	42.5147	3.4348	153.2500	29.9419
		2001	349	54.4004 ± 3.4907	45.1364	4.6087	182.4211	33.2714
		2002	341	62.1823 ± 12.1485	46.9573	6.3333	2071.0000	114.4601
		2003	165	58.5823 ± 4.8140	49.2422	6.7778	145.5417	31.5500

Table 13. Cont.

AQS ID	POC[1]	Year	Days	Daily Average (µg/m^3)	Geometric Mean (µg/m^3)	Minimum Value (µg/m^3)	Maximum Value[2] (µg/m^3)	Standard Deviation
35-013-0018	1	1998	90	17.4976 ± 2.3317	15.8782	7.1667	108.9583	11.2863
		1999	351	25.7656 ± 2.0255	21.8421	5.5652	133.6087	19.3612
		2000	362	21.8219 ± 1.3686	18.7853	3.9565	87.6250	13.2860
		2001	355	22.4589 ± 1.4031	19.6897	4.7391	115.8333	13.4886
		2002	342	26.3747 ± 1.9765	21.9537	4.5217	141.5833	18.6492
		2003	177	25.6421 ± 3.0242	21.2190	6.5238	155.9000	20.5284
35-013-0019	1	1998	89	17.8321 ± 3.2707	13.0200	1.6250	108.7917	15.7432
		1999	355	25.9697 ± 1.9325	21.4215	3.7500	127.0000	18.5776
		2000	359	23.4655 ± 1.8658	18.3951	1.4000	154.6522	18.0369
		2001	320	27.0764 ± 2.4100	21.2585	1.3333	203.7059	21.9960
		2002	65	21.1179 ± 4.6516	15.1110	1.4737	104.3333	19.1344
35-013-0020	1	1998	91	19.7714 ± 2.6397	16.3067	2.7000	91.5417	12.8479
		1999	351	31.2997 ± 2.2281	26.0377	4.4118	149.7083	21.2985
		2000	352	31.0303 ± 2.1674	25.8112	4.1739	149.9524	20.7471
		2001	350	32.8487 ± 2.3454	26.9864	4.4545	138.9583	22.3878
		2002	342	38.7079 ± 11.0937	26.9186	2.8636	1927.7778	104.6746
		2003	170	35.0831 ± 3.3113	29.4809	4.7500	133.2083	22.0281
35-013-0024	1	2001	355	20.9425 ± 1.5524	17.6334	3.8696	129.4091	14.9235
		2002	358	23.3329 ± 2.1593	17.7846	3.4000	128.4348	20.8448
		2003	176	22.7490 ± 2.7860	18.1624	4.3158	121.2083	18.8578
35-013-0025	1	2001	61	17.7934 ± 1.7509	16.2152	3.9000	39.6000	6.9771
		2002	57	21.1368 ± 3.4542	18.2907	4.8000	88.6000	13.3057
		2003	25	24.6160 ± 6.3517	20.1534	4.0000	62.0000	16.2036
35-013-1006	1	1998	61	18.8295 ± 1.6249	17.7183	7.6000	42.4000	6.4751
		1999	60	22.4450 ± 3.8018	19.5043	1.7000	113.4000	15.0252
		2000	60	19.6717 ± 2.0018	18.2082	6.7000	48.0000	7.9112

[1] = POC: parameter of occurrence or monitor number
[2] = Daily maximum value

Table 14. $PM_{2.5}$-local Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (µg/m³)	Geometric Mean (µg/m³)	Minimum Value (µg/m³)	Maximum Value[2] (µg/m³)	Standard Deviation
35-013-0016	1	1999	247	13.5159 ± 0.8406	12.3468	2.8913	76.0792	6.7402
		2000	365	8.5202 ± 0.5766	7.2220	1.1333	58.9625	5.6203
		2001	350	8.7003 ± 0.7973	7.2373	0.9684	94.1250	7.6106
		2002	349	9.5213 ± 0.7269	7.8380	0.8176	69.1542	6.9286
		2003	362	9.4652 ± 0.7849	7.9601	1.1261	105.8625	7.6195
35-013-0017	1	1999	119	11.1437 ± 1.1083	9.7419	3.3000	32.2000	6.1686
		2000	133	10.5609 ± 1.0379	9.0304	2.5000	31.3000	6.1073
		2001	114	10.8649 ± 1.3407	8.8915	1.8000	44.8000	7.3033
		2002	112	12.1727 ± 1.6097	10.0647	2.4100	56.0000	8.6915
		2003	115	11.2539 ± 1.4677	9.1668	1.6000	51.1000	8.0303
35-013-0017	2	2001	83	14.3887 ± 1.9908	11.4670	1.8471	38.4875	9.2538
		2002	361	13.0495 ± 1.0355	10.3253	1.4214	97.9348	10.0380
		2003	361	12.9863 ± 1.0574	10.2995	0.8300	95.2417	10.2501
35-013-0021	1	1998	92	10.4058 ± 0.9283	9.5083	3.6250	22.6667	4.5429
		1999	365	12.0412 ± 0.7012	10.7133	3.9095	56.3125	6.8353
		2000	365	9.1072 ± 0.5888	7.7470	0.9778	41.4833	5.7389
		2001	358	10.3747 ± 1.3050	7.8769	0.8600	164.6292	12.5985
		2002	362	10.9628 ± 1.0786	8.4207	1.1667	112.9000	10.4709
		2003	365	10.1449 ± 1.0864	7.9731	1.3579	132.6150	10.5897
35-013-0022	1	1998	92	6.7253 ± 0.5543	6.2598	3.2632	16.0000	2.7126
		1999	348	10.3129 ± 0.6044	9.1993	2.8625	54.5958	5.7526
		2000	320	10.7239 ± 1.3195	7.9695	1.7217	124.8750	12.0432
		2001	365	8.9483 ± 1.1045	6.5869	0.9900	129.2818	10.7667
		2002	365	9.5449 ± 1.0685	6.6901	1.1467	93.5739	10.4153
		2003	365	9.4284 ± 1.1646	6.9804	1.2429	146.5333	11.3466
35-013-0025	1	2001	107	6.2701 ± 0.5763	5.7110	1.3000	26.2000	3.0414
		2002	111	6.6378 ± 0.6507	5.9715	2.0800	25.7000	3.4977
		2003	108	6.9324 ± 0.5262	6.4145	2.6000	16.5000	2.7902

Table 14. Cont.

AQS ID	POC[1]	Year	Days	Daily Average ($\mu g/m^3$)	Geometric Mean ($\mu g/m^3$)	Minimum Value ($\mu g/m^3$)	Maximum Value[2] ($\mu g/m^3$)	Standard Deviation
35-013-1006	1	1999	118	6.6686 ± 0.4305	6.2893	2.9000	16.2000	2.3861
		2000	130	6.2215 ± 0.5589	5.7456	2.4000	34.4000	3.2511

[1] = POC: parameter of occurrence or monitor number
[2] = Daily maximum value

Table 15. Sulfur Dioxide Annual Summary

AQS ID	POC[1]	Year	Days	Daily Average (ppm)	Geometric Mean (ppm)	Minimum Value (ppm)	Maximum Value[2] (ppm)	Standard Deviation
35-013-0008	1	1994	320	0.0023 ± 0.0001	0.0019	0.0010	0.0880	0.0029
		1995	311	0.0028 ± 0.0001	0.0021	0.0010	0.0630	0.0036
		1996	312	0.0023 ± 0.0001	0.0019	0.0010	0.0250	0.0025
		1997	279	0.0024 ± 0.0001	0.0019	0.0010	0.0350	0.0026
		1998	255	0.0023 ± 0.0001	0.0018	0.0010	0.0280	0.0021
		1999	254	0.0015 ± 0.0001	0.0013	0.0010	0.0150	0.0010
		2000	269	0.0015 ± 0.0001	0.0013	0.0010	0.0130	0.0008
		2001	166	0.0015 ± 0.0001	0.0013	0.0010	0.0160	0.0010
		2002	206	0.0013 ± 0.0001	0.0013	0.0010	0.0090	0.0008
		2003	104	0.0014 ± 0.0001	0.0013	0.0010	0.0100	0.0009
35-013-0017	1	1994	349	0.0092 ± 0.0004	0.0054	0.0010	0.2380	0.0161
		1995	321	0.0112 ± 0.0005	0.0051	0.0010	0.2620	0.0185
		1996	345	0.0098 ± 0.0006	0.0046	0.0010	0.5000	0.0204
		1997	347	0.0078 ± 0.0003	0.0045	0.0010	0.2370	0.0117
		1998	321	0.0067 ± 0.0003	0.0038	0.0010	0.1570	0.0107
		1999	303	0.0021 ± 0.0001	0.0016	0.0010	0.1020	0.0031
		2000	277	0.0018 ± 0.0001	0.0016	0.0010	0.0160	0.0012
		2001	326	0.0018 ± 0.0001	0.0016	0.0010	0.0240	0.0011
		2002	360	0.0016 ± 0.0001	0.0014	0.0010	0.0180	0.0010
		2003	331	0.0017 ± 0.0001	0.0014	0.0010	0.0180	0.0011

[1] = POC: parameter of occurrence or monitor number
[2] = Hourly maximum value

Appendix A

Agricultural Sources of PM10 and PM2.5

Technical Memorandum – *Final*

To: Gail Cooke, Air Quality Bureau, New Mexico Environment Department

From: Paula Fields, Marty Wolf

Subject: Agriculture Emissions Inventory for Doña Ana County, New Mexico

Date: January 28, 2004

The focus of the U. S. Environmental Protection Agency (U.S. EPA) *Atlas Project* is to develop illustrations, maps, and explanations of environmental data for the entire country (U.S. EPA, 2003). The Air Quality Bureau (AQB) of the New Mexico Environment Department (NMED) issued Contract Number 04-667-3000-0001 to Eastern Research Group, Inc. (ERG) and its subcontractor Paso del Norte Group (PNEG) to develop a spatially accurate emissions inventory of agricultural sources of air pollution located in Doña Ana County in order to support the development of the environmental atlas focusing along the U.S./Mexico border.

Details concerning the roles and responsibilities of the contractors, inventory characteristics, initial methods proposed, and project budget and schedule are contained in the final inventory preparation plan (IPP) developed for this project (ERG, 2003a). This technical memorandum provides information on the inventory characteristics, a description of work conducted to develop the inventory (i.e., data collected and actual emission methods used), inventory results, and some conclusions and recommendations related to future inventory development of agricultural sources in Doña Ana County. All tables and graphs referred to in this memo are located at the back of the memo.

Inventory Scope

The scope of the agriculture emissions inventory is as follows:

- Year – 2002 (i.e., coincides with the Atlas Project).
- Geographic domain – Doña Ana County, New Mexico.
- Sources – Agriculture and related activities including crop land preparation and harvesting, burning of agricultural residues and fields, beef and dairy cattle operations, cotton gins, agricultural unpaved road dust, paved road dust (county-wide for all roads), and unpaved road dust (county-wide for all roads).
- Pollutants – Particulate matter (PM) 10 micrometers (µm) in aerodynamic diameter and smaller (PM_{10}) and 2.5 µm in aerodynamic diameter and smaller ($PM_{2.5}$).
- Spatial resolution – Universe Transverse Mercator (UTM) coordinates (for cotton gins, dairies, and feedlots); and county-level resolution for all other sources.

- Temporal resolution – Hourly (for cotton gins, dairies, and feedlots); 2002 annual for all other sources.

Data Collection Activities

Data needed to estimate emissions for agriculture sources in Doña Ana County included information on the level of activity of the emitting sources (e.g., bales of cotton ginned, acres of residues burned by crop type, vehicle miles traveled on paved and unpaved roads, etc.). Also, for this project the location of each dairy, feedlot, and cotton gin was identified to facilitate future air quality modeling work. These data were collected by three means: telephone interviews of experts, published literature, and a field survey.

Telephone interviews were conducted and the following information was obtained from local agricultural experts:

- Extent of agricultural and prescribed burning in the county, types of residues, and details concerning burning of pecan prunings (Salopek, 2003);
- Prescribed burning activity and significant crops produced in Doña Ana County (Darden, 2003);
- Agriculture and prescribed burning activity (i.e., irrigation district ditch banks) (Esslinger, 2003);
- Listing of cotton gins in Doña Ana County (Burkholder, 2003);
- Listing of New Mexico dairies with fluid milk permits (Reeb, 2003); and
- County-level daily vehicle miles traveled (VMT) statistics (Fredine, 2003).

Published literature was reviewed and the following information was obtained:

- Type of crops and acres harvested in 2002 in Doña Ana County (NASS, 1999; NMASS, 2003);
- Cotton Board listing of cotton gins (Cotton Board, 2003);
- Annual cotton ginning report for 2002 (NASS, 2003);
- New Mexico Environment Department database listing of discharge permits for dairy facilities (Kirby, 2003);
- Pecan biomass and burning information (Mexal et al., 2003); and
- Precipitation data (NMCC, 2004).

The primary purpose of the field survey was to "shoot points" using a Geographic Positioning System (GPS) device to geospatially identify site information for cotton gins, dairies, and beef cattle feedlots operating in Doña Ana County. Using the data collected during telephone interviews and from published literature, listings of all cotton gins, dairies, and feedlots known to be operating in Doña Ana County (34 total) were developed, including their primary point of contact (POC) and physical and mailing addresses. Approximately two weeks prior to the survey, letters from the AQB were mailed to each POC explaining the purpose of the survey, and asking for their cooperation in collecting GPS and other activity data from their facility. These letters greatly contributed to the high percentage of successfully completed surveys (i.e., only one dairy POC was not available at the time of the survey).

The types of data collected during the field survey included the following:

- Description of facility observed (e.g., name of business at facility entrance, name of business on mail box, address on mail box, etc.);
- Activity data (e.g., estimate of the number of head of cattle per year through feedlot, number of bales processed through cotton gin, etc.); and
- GPS coordinates of the facility.

Upon arrival at each facility, survey staff met with the identified POC. A brief questionnaire was completed during the survey. Copies of the blank questionnaires are included in Attachment 1.

A Trimble "GeoExplorer 3" GPS receiver was used to shoot points of the facilities. The device provides location information to within 1 meter accuracy. Every effort was undertaken to shoot points at the north end of each facility. The GeoExplorer3 has a built-in electronic compass to facilitate the identification of the north end. At the dairy where the POC was not available, points were shot from the front entrance. At least 60 points are recommended in order to differentially correct data and identify the location with a high degree of accuracy. Therefore, at every site where points were short, at least 60 data points were obtained.

Data collected during the survey were converted for export to a geographic information system (GIS) platform and reported in decimal degrees. Subsequently, these coordinates were converted to latitude and longitude, and then to Universe Transverse Mercator (UTM) coordinates. A summary of the GPS information collected during the field survey is shown in Table 1.

Inventory Methodology

Following the data collection activities, emissions were estimated using the methodologies summarized in Table 2. In general, emissions for most source categories were estimated by combining emission factors with activity data collected from telephone interviews, published data sources, or the data collection survey. For agricultural equipment exhaust, emissions were estimated using U.S. EPA's NONROAD model (U.S. EPA, 2002) with selected internal defaults.

The emission calculations for all source categories are presented in Attachment 2. The emission calculations were done in Excel and include all relevant emission factors, equations, data, and assumptions.

Inventory Results

Table 3 summarizes the annual emissions of agriculture sources in Doña Ana County, New Mexico, for 2002. These results show that the largest two source categories are county-wide unpaved and paved road dust. These two source categories combined comprise nearly 94 percent of the total PM_{10} inventory and over 88 percent of the total $PM_{2.5}$ inventory. Because engineering judgment was used to make several key assumptions (e.g., silt loadings, silt contents, moisture contents, etc.), it

may be appropriate to re-examine the unpaved and paved road dust emission estimates when the remaining non-agricultural source categories are inventoried.

If county-wide unpaved and paved road dust are not considered, then the largest agricultural PM_{10} source categories are crop land preparation and crop harvesting (i.e., 43 percent and 21 percent of the inventory, respectively [excluding unpaved and paved road dust]) and the largest agricultural $PM_{2.5}$ source categories are crop land preparation and agricultural burning of prunings (i.e., 31 percent and 30 percent of the inventory, respectively).

Using the facility-level operation schedules obtained during the survey, average hourly emissions for the cotton gins, dairies, and feedlots were estimated. These average hourly emissions represent emissions occurring during periods of operation and were calculated by dividing annual emissions by the annual hours of operation. Dairy and feedlot activity was assumed to be evenly distributed throughout the year. Cotton gin activity at the commercial gins occurred from the beginning of October to the end of January with individual gins having different start and stop dates, as well as variable hours of operation. The USDA-ARS Southwest Ginning Lab conducted variable ginning runs throughout the year and activity was assumed to be evenly distributed throughout the year. The hourly PM_{10} and $PM_{2.5}$ emissions for the cotton gins, dairies, and feedlots are shown in Table 4. Because the operation schedules of the five cotton gins are variable, the hourly PM_{10} and $PM_{2.5}$ cotton gin emissions presented in Table 4 are only valid when all five gins are operating simultaneously.

Using the GPS data collected for these facilities during the survey, maps were developed using ArcView software. Figure 1 shows the location of the individual dairies, feedlots, and cotton gins within Doña Ana County. Figures 2 through 8 show the location of individual facilities at a smaller scale (i.e., individual township and range). As these figures show, most of these operations are located along the I-10 corridor. Also, a cluster of seven dairies is located in the northwest portion of the county near the town of Hatch.

Recommendations

The 2002 agriculture emissions inventory presented in this memo is the first emissions inventory ever developed for agricultural source categories located in Doña Ana County. This inventory includes the best possible current emission estimation methodologies and activity data that could be identified.

However, emissions inventory development is an iterative process in which future inventories build upon earlier inventories. Future agriculture emissions inventories in Doña Ana County will need to update all activity data contained in this inventory from 2002 to the appropriate future year. In addition, the following recommendations should be considered during the development of the next agriculture emissions inventories in Doña Ana County:

- **Crop Land Preparation (Agricultural Tillage) –** Crop- and process-specific acre-pass information was obtained from a study conducted in San Joaquin Valley, California (except for pecans). It is not clear how accurately this information represents agricultural practices in Doña

Ana County. Therefore, acre-pass information specific to Doña Ana County should be developed, if possible. This information would likely be obtained from local farmers.

- **Crop Harvesting** – Crop-specific emission factors were obtained from a study conducted in San Joaquin Valley, California. As with the acre-pass information, it is not clear if these emission factors are the most appropriate for Doña Ana County. It is recommended that additional research be conducted to confirm if these emission factors are the most appropriate.

- **Agricultural Burning (Pruning Burning) –** The burning of tumbleweeds in irrigation ditches does occur, but emissions were not quantified in the 2002 agriculture emissions inventory. It is recommended that further investigation be conducted regarding the extent of tumbleweed burning. This information would likely be obtained with cooperation from the Elephant Butte Irrigation District.

- **Unpaved Road Dust (Agricultural Operations Only) –** Crop-specific VMT rates were obtained from a study conducted in San Joaquin Valley, California. It is not clear if these VMT rates are appropriate for Doña Ana County. It is recommended that VMT rates specific to Doña Ana County be developed. These VMT rates would likely be developed based on information provided by local farmers.

- **Paved and Unpaved Road Dust (County-wide)** – Several key assumptions were made regarding county-wide paved and unpaved road dust. The first major assumption made was regarding the split of overall VMT into paved and unpaved fractions. The New Mexico State Highway and Transportation Department should be encouraged to develop accurate paved/unpaved VMT split information. In addition, it is recommended that assumed average vehicle weights and average vehicle speeds be replaced with data developed in cooperation with the State Highway and Transportation Department. Finally, this inventory uses assumed silt loadings developed from AP-42 default values, while silt content and moisture content values were obtained from a recent study in Ciudad Juárez. These assumed values should be replaced with local silt loading, silt content, and moisture content data collected in Doña Ana County.

Implementation of these recommendations during the development of subsequent emissions inventories will increase overall inventory accuracy by incorporating data that better represent the local conditions that exist in Doña Ana County.

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Table 1. Summary of Surveyed Facilities

Facility Type	Facility Name	UTM Coordinates		Number of Points[a]
		Northing	Easting	
Cotton Gin	4-Points Gin	3571344.686	331843.366	61
Cotton Gin	B.E. Harvey Gin Company #1	3576279.568	331521.290	61
Cotton Gin	B.E. Harvey Gin Company #2	3576255.448	331587.948	61
Cotton Gin	Mesa Farmers Cooperative, Inc.	3552142.877	346498.556	62
Cotton Gin	USDA-ARS Southwest Ginning Lab	3572850.646	333806.468	68
Dairy	Big Sky Dairy	3552964.925	346346.313	61
Dairy	BJZ Dairy #1	3558845.581	343699.639	61
Dairy	BJZ Dairy #2	3558845.581	343699.639	61
Dairy	Bright Star Dairy	3559029.164	343505.532	62
Dairy	Buena Vista Dairy #1	3559480.079	343279.947	61
Dairy	Buena Vista Dairy #2	3554217.616	345645.686	61
Dairy	Daybreak Dairy	3560191.119	342879.064	62
Dairy	Del Oro Dairy	3544480.308	349023.310	63
Dairy	Desertland Dairy	3551870.968	345911.147	61
Dairy	Dominguez Dairy	3558524.926	343868.643	61
Dairy	Gonzalez Dairy Inc. #1	3557820.866	344139.304	66
Dairy	Gonzalez Dairy Inc. #2	3557728.186	344157.016	61
Dairy	Gonzalez Dairy Inc. #3	3557697.762	343897.849	62
Dairy	Las Uvas Valley Dairy #1	3608284.261	285465.663	63
Dairy	Las Uvas Valley Dairy #2	3608377.728	285127.002	62
Dairy	Las Uvas Valley Dairy #3	3609548.219	284258.947	62
Dairy	Las Uvas Valley Dairy #4	3607382.227	284997.673	62
Dairy	Las Uvas Valley Dairy #5	3606832.864	285097.256	61
Dairy	Las Uvas Valley Dairy #6	3608783.035	286194.856	62
Dairy	Loma Parda Dairy	3626289.550	284831.084	62
Dairy	River Valley Dairy, LLC	3553837.237	345390.409	62
Dairy	Sun Valley Dairy, LLC	3547901.980	347860.244	61
Dairy	Sunset Dairy	3551395.259	345875.738	69
Dairy	Tallmon Dairy	3530134.401	343463.561	63
Feedlot	Big Sky Feedlot #1	3552990.522	346133.781	61
Feedlot	Big Sky Feedlot #2	3552510.299	346613.963	61
Feedlot	Linda Vista Cattle Corp.	3530371.654	343107.285	60
Feedlot	USDA-Livestock Quarantine Site	3517806.892	343122.977	94

[a] Number of points indicates the total number of GPS readings made at the facility. At least 60 readings were needed in order to identify the location within a high degree of accuracy.

Table 2. Summary of Methods and Data Used to Estimate Agriculture Emissions in Doña Ana County

Source Category	Methodology		Activity Data		Comments
	Type	Source	Type	Source(s)	
Crop Land Preparation (i.e., agricultural tillage)	Crop/process-specific emission factors	ARB, 2003a; ARB, 2003b; ARB, 1999	Agricultural acreage	NMASS, 2003; NASS, 1999; Salopek, 2003	Estimates made for 10 primary crops.
			Acre-passes	ARB, 2003a; ARB, 2003b; Salopek, 2003	Crop- and process-specific acre-passes from San Joaquin Valley, California were used, except for pecans.
Crop Harvesting	Crop-specific emission factors	ARB, 2003a; ARB, 2003b; ARB, 1999	Agricultural acreage	NMASS, 2003; NASS, 1999; Salopek, 2003	Estimates made for 10 primary crops. Crop-specific emission factors from San Joaquin Valley, California were used.
Agricultural Burning (e.g., pruning burning)	Crop-specific emission factors	U.S. EPA, 1995 (Section 2.5)	Agricultural acreage	NMASS, 2003; NASS, 1999; Salopek, 2003	Agricultural burning of prunings limited to pecans. Burning of tumbleweeds in irrigation districts does occur, but cannot be quantified (Esslinger, 2003).
			Burn fraction/ quantities	Salopek, 2003	
			Fuel loading	Mexal et al., 2003.	
Prescribed Burning (i.e., field burning)	Not applicable	Not applicable	Not applicable	Not applicable	Prescribed or field burning does not occur in Doña Ana County (Darden, 2003; Esslinger, 2003; Salopek, 2003).
Beef Cattle Feedlots	Emission factors	ARB, 2003a; ARB, 2003b; ARB, 1999	Feedlot cattle population	Survey	GPS data collected during survey of 4 feedlots.
			Duration in feedlot	Survey	
Dairy Operations	Emission factors	ARB, 2003a; ARB, 2003b; ARB, 1999	Lactating dairy cow population	Survey	GPS data collected during survey of 25 dairies.
Cotton Gin Operations	Emission factors	U.S. EPA, 1995 (Section 9.7)	Quantity of cotton ginned	Survey	GPS data collected during survey of 5 cotton gins.
			Schedule	Survey	

Table 2. Cont.

Source Category	Methodology		Activity Data		Comments
	Type	Source	Type	Source(s)	
Unpaved Road Dust (agricultural operations only)	Emission factors	ARB, 2003a; ARB, 2003b	Agricultural acreage	NMASS, 2003; NASS, 1999; Salopek, 2003	Estimates made for 10 primary crops.
			VMT rates	ARB, 2003a; ARB, 2003b	Crop-specific VMT rates from San Joaquin Valley, California were used.
Paved Road Dust (county-wide)	Emission factors	U.S. EPA, 1995 (Section 13.2.1)	Paved VMT	Fredine, 2003	Assumptions made to split VMT into paved and unpaved fractions.
			Silt loading	U.S. EPA, 1995; Las Cruces, 1997	AP-42 silt loadings assigned based upon Las Cruces traffic volumes.
			Vehicle weight	Assumed	
			Precipitation data	NMCC, 2004	Data for Las Cruces Plant Science Center.
Unpaved Road Dust (county-wide)	Emission factors	U.S. EPA, 1995 (Section 13.2.2)	Unpaved VMT	Fredine, 2003	Assumptions made to split VMT into paved and unpaved fractions.
			Silt content	ERG, 2003b	Silt content value used from Ciudad Juárez.
			Moisture content	ERG, 2003b	Moisture content value used from Ciudad Juárez.
			Vehicle speed	Assumed	
			Precipitation data	NMCC, 2004	Data for Las Cruces Plant Science Center.
Non-Road Dust and Emissions from Agricultural Operations (i.e., equipment exhaust)	NONROAD model	U.S. EPA, 2002	Not applicable.	Not applicable.	Estimates made using internal defaults. Emissions estimated to be 16.6 tons PM_{10}/year and 15.3 tons $PM_{2.5}$/year.

Table 3. 2002 Annual Emissions for Agriculture Sources in Doña Ana County

Source	Emissions (tons/year)	
	PM_{10}	$PM_{2.5}$
Crop land preparation (tillage)	201.7	44.7
Crop harvesting	96.9	21.5
Agricultural burning (prunings)	45.4	42.8
Cotton gins	16.9	2.2
Dairies	33.3	3.8
Feedlots	4.3	0.5
Unpaved road dust (agriculture only)	55.7	11.8
Unpaved road dust (county-wide)	6,166.9	922.5
Paved road dust (county-wide)	1,119.9	153.3
Agriculture equipment (exhaust)	16.6	15.3
Total	**7,757.5**	**1,218.4**

Table 4. 2002 Average Hourly Emissions for Cotton Gins, Dairies, and Feedlots in Doña Ana County

Source	Emissions (pounds/hour)	
	PM_{10}	$PM_{2.5}$
Cotton gins	18.4	2.4
Dairies	7.6	0.9
Feedlots	1.0	0.1

Figure 1. Cotton Gins, Feedlots, and Dairies in Doña Ana County, New Mexico

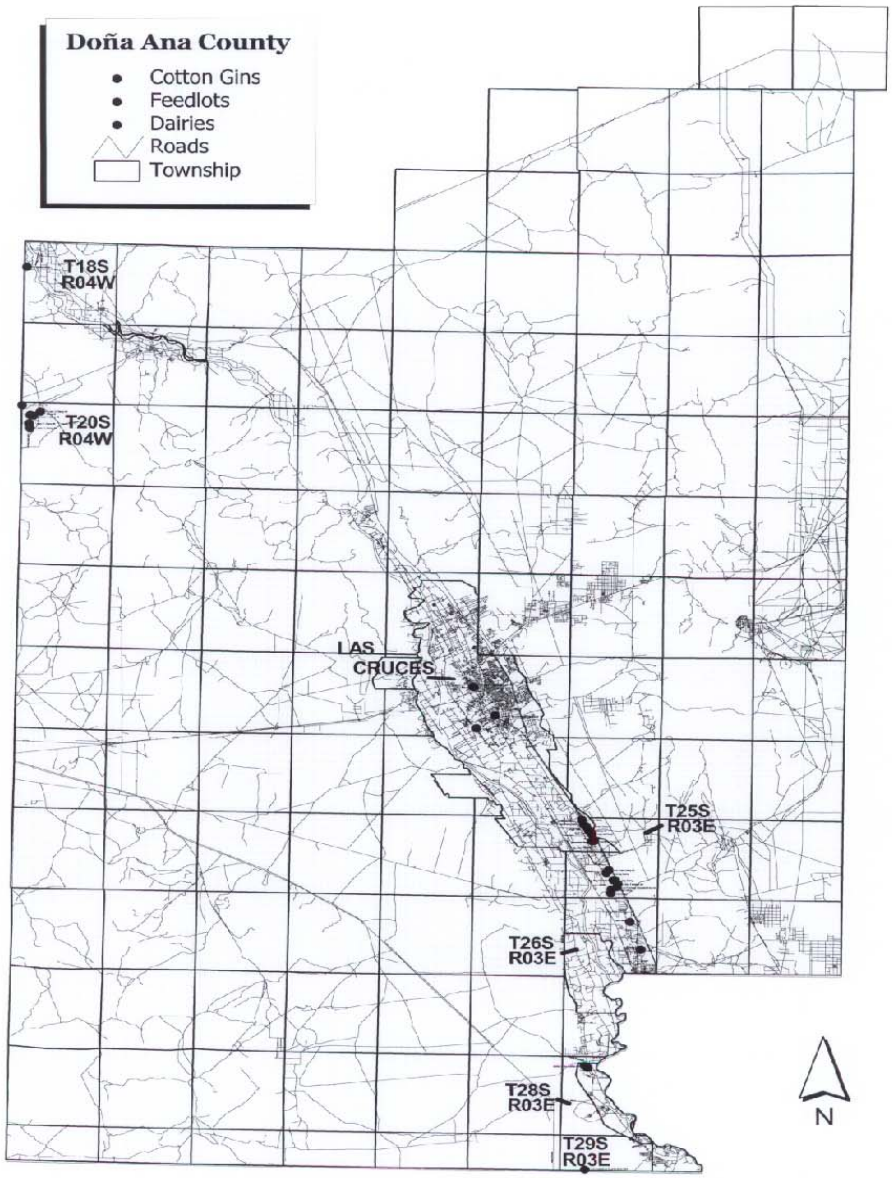


Figure 2. Cotton Gins, Feedlots, and Dairies in Las Cruces, Doña Ana County, New Mexico

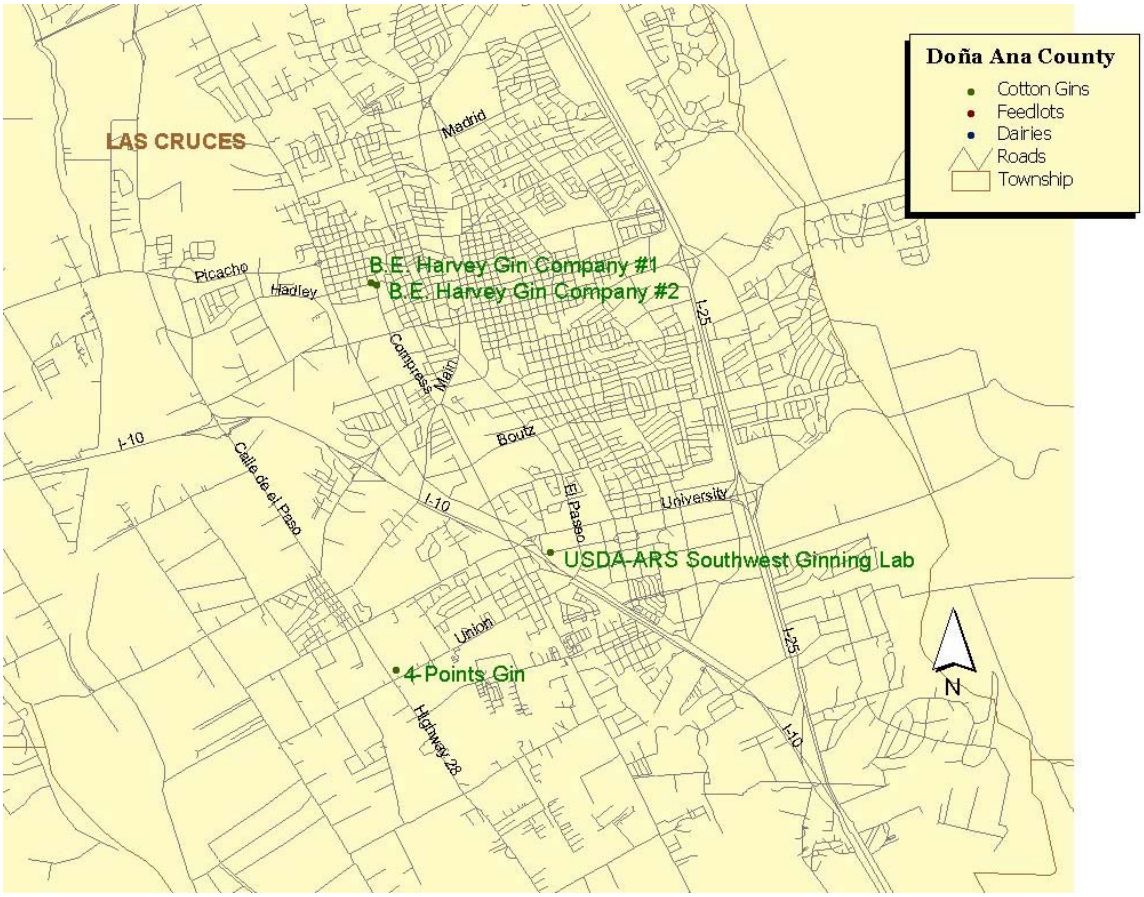


Figure 3. Cotton Gins, Feedlots, and Dairies in Township 18S Range 04W, Doña Ana County, New Mexico

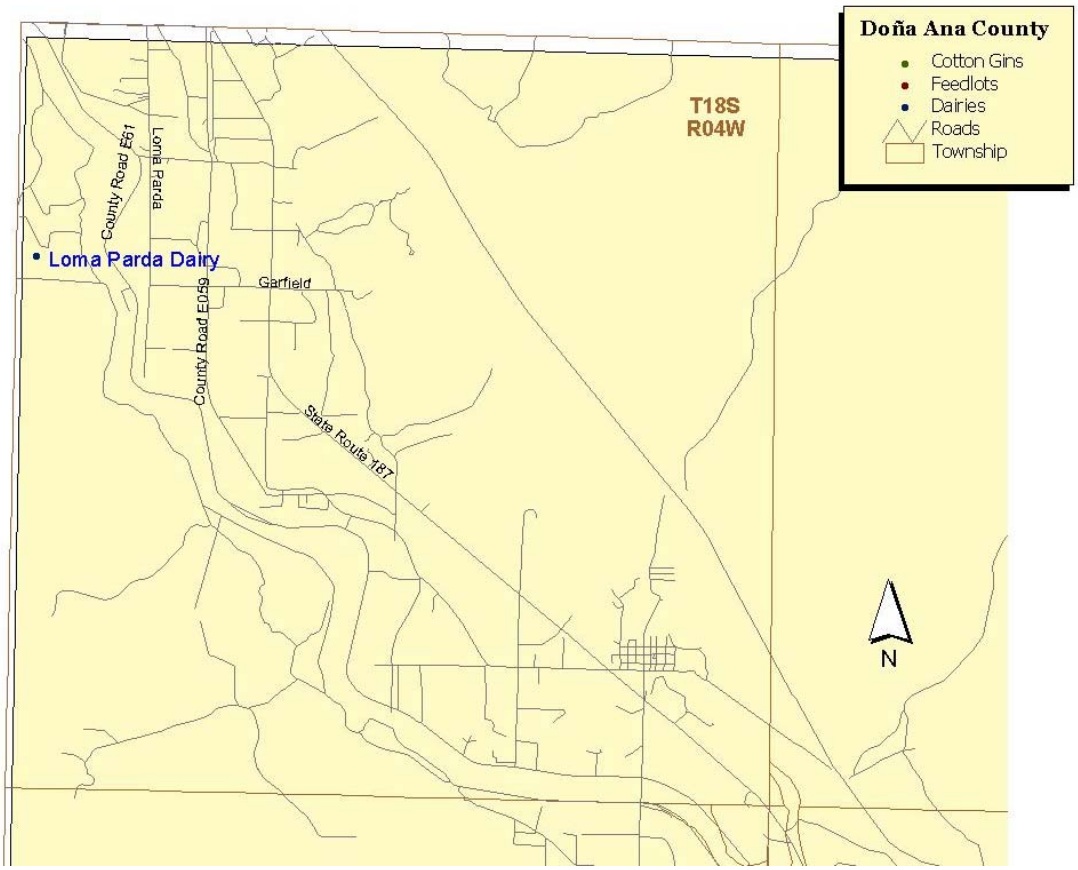


Figure 4. Cotton Gins, Feedlots, and Dairies in Township 20S Range 04W, Doña Ana County, New Mexico

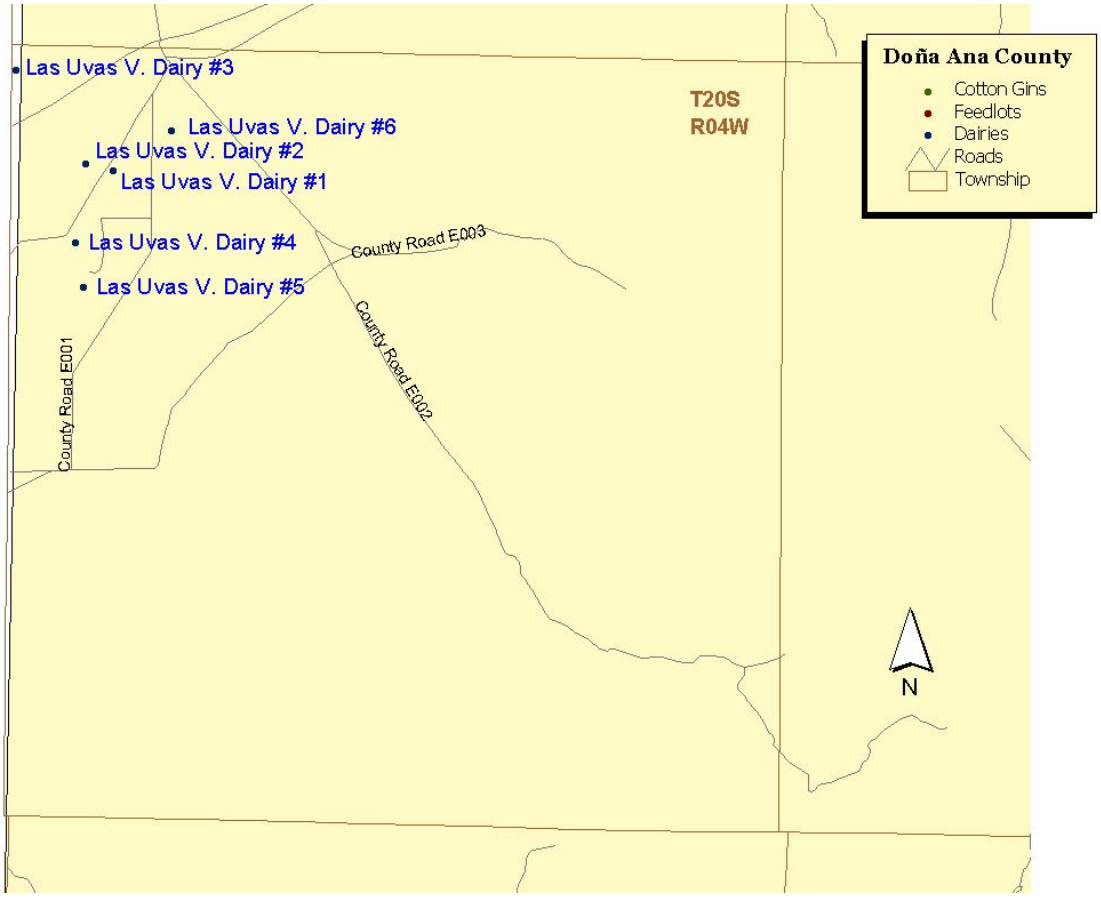


Figure 5. Cotton Gins, Feedlots, and Dairies in Township 25S Range 03E, Doña Ana County, New Mexico

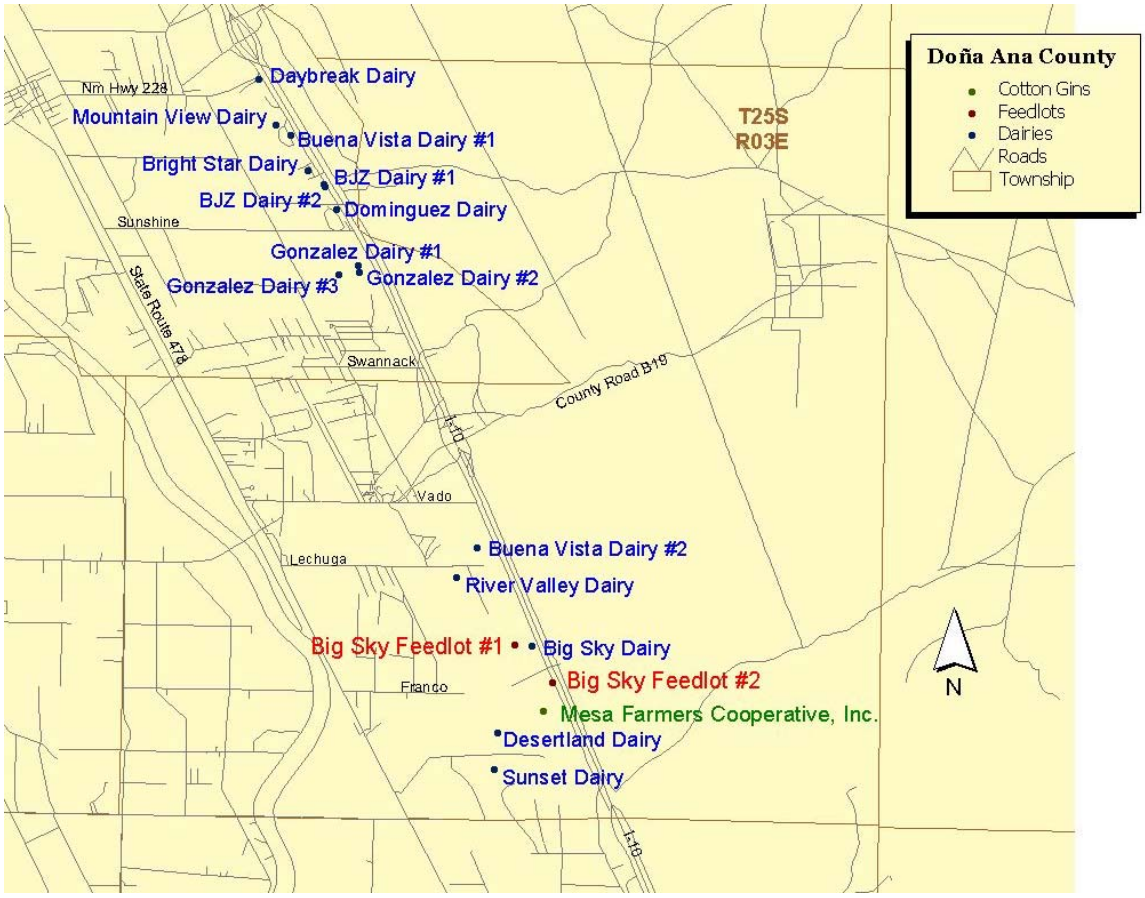


Figure 6. Cotton Gins, Feedlots, and Dairies in Township 26S Range 03E, Doña Ana County, New Mexico

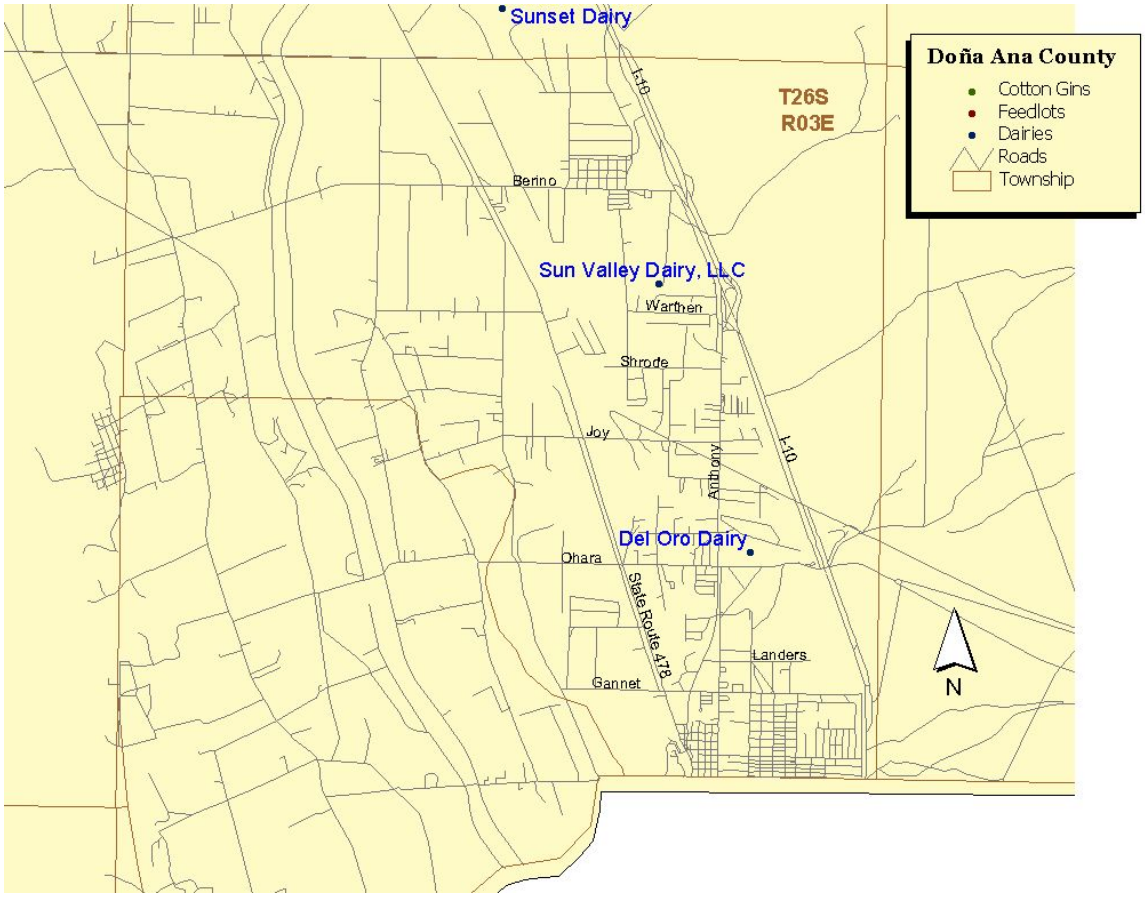


Figure 7. Cotton Gins, Feedlots, and Dairies in Township 28S Range 03E, Doña Ana County, New Mexico

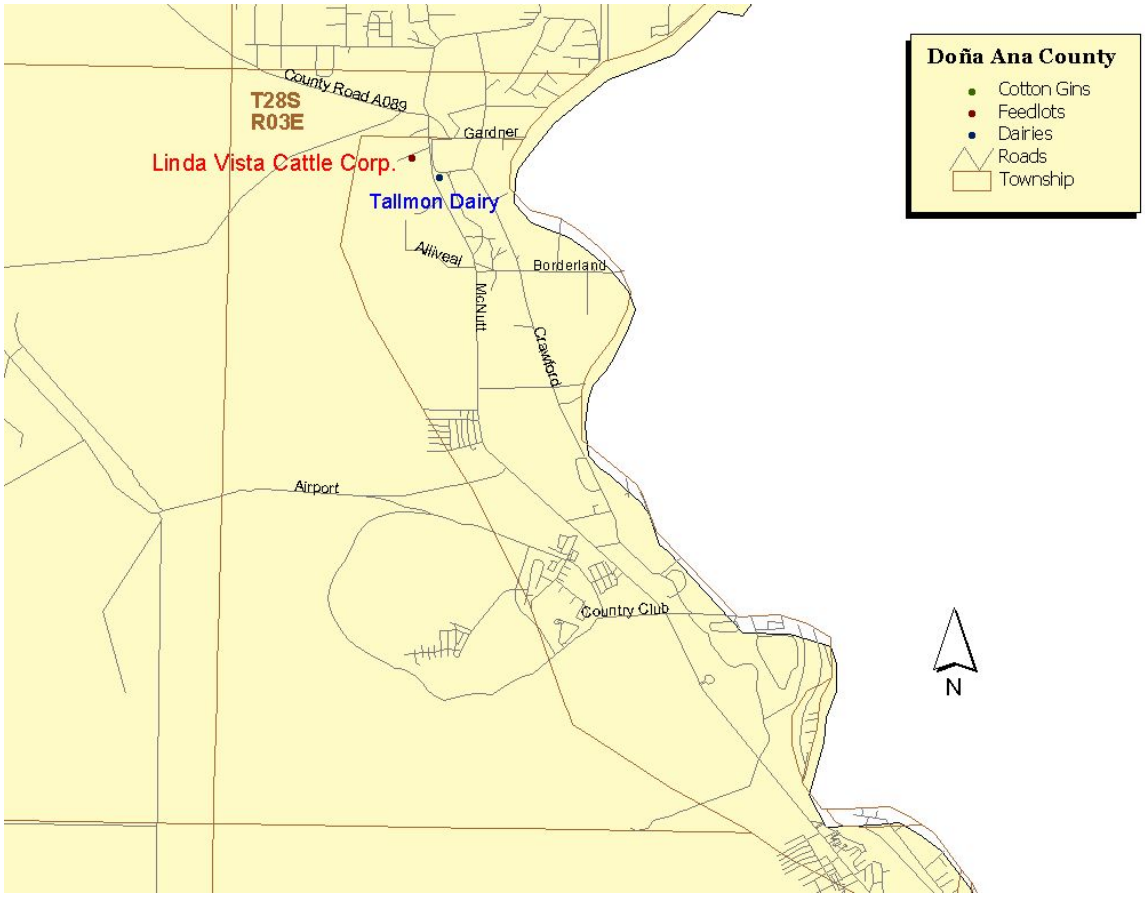
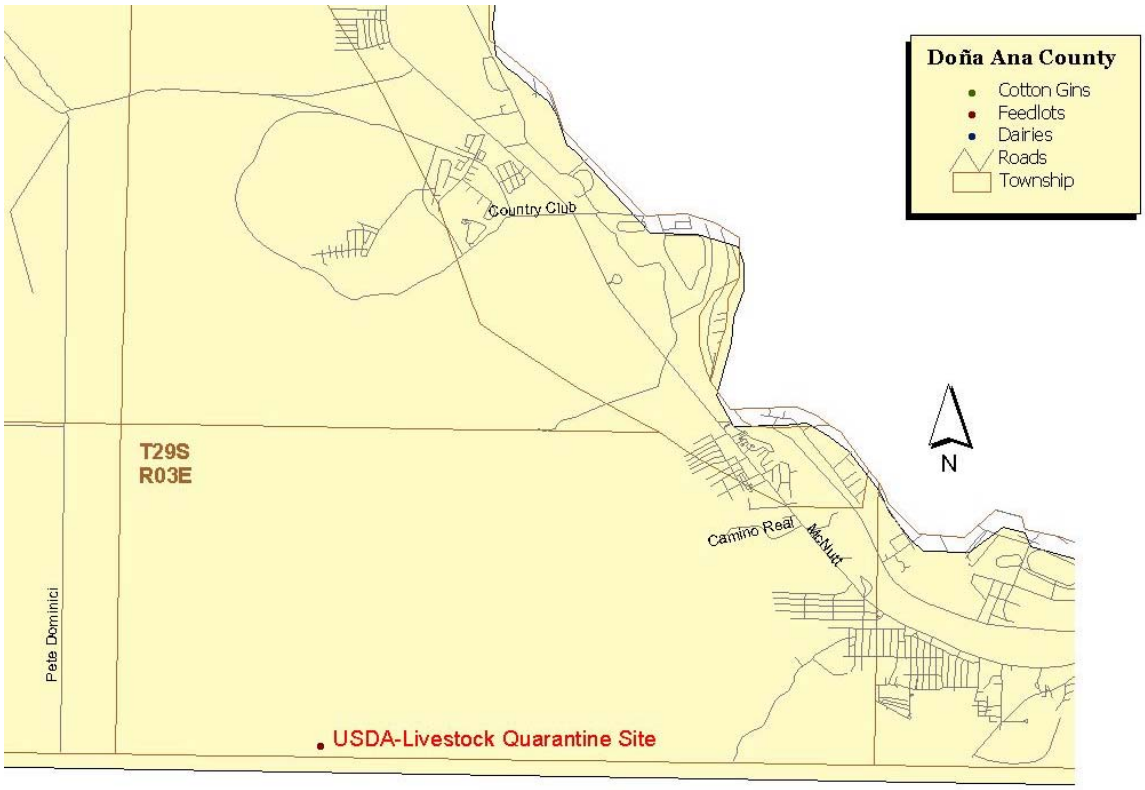


Figure 8. Cotton Gins, Feedlots, and Dairies in Township 29S Range 03E, Doña Ana County, New Mexico



Attachment 1:

Blank Survey Questionnaires:

- Cotton Gins
- Dairies
- Beef Cattle Feedlots

Cotton Gin
Data Collection Form

Facility Name:_____Facility ID: __C-_____

Facility Contact (Persons Name):_____

Phone Number:_____

Quantity of Cotton Ginned in 2002:_____
(Typically measured in bales – 480 lbs or 217 kg)

Ginning Schedule in 2002:

2002 Ginning Season Start Date:_____
2002 Ginning Season End Date:_____
Number of Days per Week:_____
Number of Hours per Day:_____

Particulate Matter Control Devices:
Cyclones (Y/N)?:_____ Control Efficiency:_____
Other (Y/N)?:_____ Control Efficiency:_____
Describe:_____

Data Collected By:_____

Data Collection Date:_____

Dairy
Data Collection Form

Facility Name:_____Facility ID: __D-_____

Facility Contact (Persons Name):_____

Phone Number:_____

_____

Number of Cows Actually Milked in 2002:_____

Data Collected By:_____

Data Collection Date:_____

Beef Cattle Feedlot
Data Collection Form

Facility Name:_____Facility ID: _F -_____

Facility Contact (Persons Name):_____

Phone Number:_____

Number of Cattle Processed in 2002:_____

Feedlot Schedule in 2002:

Average Duration of Cattle in Feedlot (# of days in 2002):_____

Which Months?:_____

Particulate Matter Control Devices:

Sprinklers (Y/N)?:_____ Control Efficiency:_____

Other (Y/N)?:_____ Control Efficiency:_____

Describe:_____

Data Collected By:_____

Data Collection Date:_____

Attachment 2:

Calculation Spreadsheets:

- Burning Emissions
- Cotton Ginning Facilities
- Cotton Ginning Emissions
- Dairy Facilities
- Dairy Emissions
- Feedlot Facilities
- Feedlot Emissions
- Crops
- Tillage Emissions
- Harvest Emissions
- Unpaved Agricultural Road Dust Emissions
- Paved Road Dust Emissions
- Unpaved Road Dust Emissions
- Annual Emissions
- Hourly Emissions

Agricultural Burning (Field and Pruning)

Agricultural burning is limited in Doña Ana County.				
Agricultural burning of field crops (i.e., corn, wheat, etc.) does not occur in Doña Ana County (Darden, 2003; Esslinger, 2003; Salopek, 2003).				
Burning of agricultural wastes may be conducted by "hobby farmers", but the amount of burning is not quantifiable (Darden, 2003; Esslinger, 2003; Salopek, 2003).				
The Elephant Butte Irrigation District does burn tumbleweeds that have blown into their irrigation canals and ditches during the two weeks				
prior to the release of irrigation water (late February or early March). Burning is conducted using propane burners. The exact quantity of tumbleweeds				
burned cannot be determined (Esslinger, 2003). Therefore, emissions were not estimated.				
The burning of pecan prunings does occur during March. The entire pecan acreage is not pruned every year. It is estimated				
that approximately 15% of the pecan acreage is pruned every year. For those pecan trees that are pruned in a given year, approximately 15% of the tree				
branch biomass is removed by pruning and then burned (Salopek, 2003).				
Total pecan acreage		22,989	acres	(see crops spreadsheet; NMASS, 2003)
Fraction of pecan acreage that is pruned		0.15		(Salopek, 2003 indicates 10-15%; Mexal et al., 2003 indicates orchards pruned every 2-3 years).
Pruned pecan acreage		3,448	acres	
Trees per acre		50	trees/acre	(Salopek, 2003; Mexal et al., 2003)
Biomass per tree (branches only)		1193	lbs/tree	(Mexal et al., 2003)
Fraction of biomass removed by pruning		0.15		(Salopek, 2003 indicates 10-15%; Mexal et al., 2003 indicates <25 to 50%).
Pruned biomass		15,427	tons	
PM emission factor		6	lbs/ton	(U.S. EPA, 1995 - Section 2.5) No factor for pecans; used factor for almonds, walnuts, and orchards.
PM10 size fraction relative to PM		0.9814		(ARB, 1999)
PM2.5 size fraction relative to PM		0.9252		(ARB, 1999)
PM10 emissions		**45.4**	**tons/year**	
PM2.5 emissions		**42.8**	**tons/year**	

Cotton Ginning Facilities

ID	GPS_ID	Facility Name	Image	Facility Physical Address	Facility Physical City	Facility Physical State
14	V121222A	Mesa Farmers Cooperative, Inc.	100_1833, 100_1834, 100_1835, 100_1836, 100_1837	18320 Stern Drive	Mesquite	NM
3	V121216B	B.E. Harvey Gin Company #2	100_1813, 100_1814	430 North Compress Road	Las Cruces	NM
2	V121216A	B.E. Harvey Gin Company #1	100_1811, 100_1812	430 North Compress Road	Las Cruces	NM
1	V121215A	4-Points Gin	100_1808, 100_1809, 100_1810	300 South Motel Boulevard	Las Cruces	NM
4	V121216C	USDA-ARS Southwest Ginning Lab	100_1815, 100_1816	300 East College Drive	Mesilla Park	NM

Cotton Ginning Facilities

ID	Facility Physical ZIP	Facility Mailing Address	Facility Mailing City	Facility Mailing State	Facility Mailing ZIP	Facility Phone 1	Facility Phone 2	Facility Contact 1
14	88048	P.O. Box 646	Mesquite	NM	88048-0646	505-233-3112	505-233-2092	Alberto Pando
3	88004	P.O. Box 1057	Las Cruces	NM	88004-1057	505-546-5312	505-524-3862	Emmy Harvey
2	88004	P.O. Box 1057	Las Cruces	NM	88004-1057	505-546-5312	505-524-3862	Emmy Harvey
1	88005	300 South Motel Boulevard	Las Cruces	NM	88005-4005	505-526-8641	505-526-4971	Xavier Juardo
4	88047	P.O. Box 578	Mesilla Park	NM	88047-0578	505-526-6381	505-525-1076	Ed Hughs

Cotton Ginning Facilities

ID	Facility Contact 2	Facility Type	Township	Range	Section	Cotton02	Start02	End02	Days	Hours	Cyclones	EF_1	Other	EF_2	Desc
14	Maricela	Cotton Gin				30873 bales	10/3/02	1/31/03	7	24	yes	don't know	no		
3		Cotton Gin				2632 bales	10/16/02	12/31/02	7	12.5	yes	95%	yes	95%	
2		Cotton Gin				2706 bales	11/6/02	1/6/03	6	10.5	yes	95%	yes	95%	
1		Cotton Gin				5000 bales	10/16/02	1/6/03	6	17	yes	90%	yes		Double cyclone system
4	Virginia Emmes	Cotton Gin				50 bales	year round		variable	variable	yes	99%	yes	99%	

Cotton Ginning Emissions

NASS-based Estimate	Running Bales Produced	Running Bales Ginned	Equivalent 480-Pound Bales Ginned
Chaves	3,250	3,450	3,459
Curry	9,350	0	0
Dona Ana	**36,200**	**38,426**	**38,524**
Eddy	11,300	11,995	12,025
Lea	22,150	0	0
Luna	4,550	4,830	4,842
Quay	0	0	0
Roosevelt	11,400	0	0
Sierra	0	0	0
New Mexico Total	98,200	58,700	58,850
Ginning County Total	55,300	58,700	58,850

USDA NASS Statistics provide running bale production statistics for 9 New Mexico counties (NASS, 2003).
Only about 60% of the cotton produced in New Mexico is ginned in-state.

Five cotton-producing counties (Curry, Lea, Quay, Roosevelt, and Sierra) have zero ginning activity (NASS, 2003).
Most of these are located in eastern New Mexico and likely have cotton ginned in Texas.

Ginning activity is limited to Chaves, Dona Ana, Eddy, and Luna County (Burkholder, 2003; Cotton Board, 2003).
Gin numbers are: Chaves - 1, Dona Ana - 4, Eddy - 2, and Luna - 1.
In Dona Ana County, 2 in Las Cruces, 1 in Mesquite, and 1 in Mesilla Park.

County-level ginning statistics were not provided by NASS in order to maintain individual gin confidentiality (NASS, 2003).

State-level ginning data were allocated to the county-level based upon the fraction of production in the ginning counties

Dona Ana Bales	38,524	480-pound bales	
PM10 Emission Factor	0.82	lbs/bale	(U.S. EPA, 1995 - Section 9.7)
PM10 Emissions	**15.8**	**tons/year**	
PM2.5/PM10 Size Fraction	0.129	relative to PM10	(ARB, 1999)
PM2.5 Emissions	**2.0**	**tons/year**	

PM10 emission factor assumes that all exhaust streams are controlled by cyclones (U.S. EPA, 1995).
The PM2.5/PM10 size fraction is based upon a PM10/PM size fraction of 0.6200 and a PM2.5/PM size fraction of 0.0800 (ARB, 1999).

Survey-based Estimate		**Emissions (tons/year)**	
Facility Name	Bales Produced	PM_{10}	$PM_{2.5}$
Mesa Farmers Cooperative, Inc.	30,873	12.7	1.6
B.E. Harvey Gin Company #1	2,706	1.1	0.1
B.E. Harvey Gin Company #2	2,632	1.1	0.1
4-Points Gin	5,000	2.1	0.3
USDA-ARS Southwest Ginning Lab	50	0.0	0.0
County Total	**41,261**	**16.9**	**2.2**

Dairy Facilities

ID	GPS_ID	Name	Image	Address	City	State	ZIP	Facility Mailing Address	Facility Mailing City
13	V121221C	Big Sky Dairy	100_1832	17800 Stern	Mesquite	NM	88047	P.O. Box 10	Mesquite
29	V121321B	BJZ Dairy #1	No Images	13620 Stern	Mesquite	NM	88047	P.O. Box 30	Mesquite
41	V121321D	BJZ Dairy #2	No Images	13620 Stern	Mesquite	NM	88047	P.O. Box 30	Mesquite
9	V121220A	Bright Star Dairy	100_1827	13520 Stern	Mesquite	NM	88048	P.O. Box 167	Mesquite
7	V121218B	Buena Vista Dairy #2	100_1824, 100_1825	13290 Stern	Mesquite	NM	88048	P.O. Box 346	Mesquite
8	V121218C	Buena Vista Dairy #1	100_1826	13290 Stern	Mesquite	NM	88048	P.O. Box 346	Mesquite
5	V121217A	Daybreak Dairy	100_1817, 100_1818, 100_1819					P.O. Box 170	Mesquite
16	V121222C	Del Oro Dairy	100_1840, 100_1841	1025 E. Ohara	Anthony	NM		P.O. Box 1846	Anthony
33	V121322C	Desertland Dairy	100_1854		Vado -La Mesa	NM	88048	P.O. Box 10	Mesquite
10	V121220B	Dominguez Dairy	100_1828	13950 Stern	Mesquite	NM	88048	P.O. Box 21	Mesquite
30	V121321C	Gonzalez Dairy Inc. #1	No Image	14310 Stern	Mesquite	NM	88048	P.O. Box 199	Mesquite
31	V121322A	Gonzalez Dairy Inc. #2	100_1852	14310 Stern	Mesquite	NM	88048	P.O. Box 199	Mesquite
32	V121322B	Gonzalez Dairy Inc. #3	100_1853	14310 Stern	Mesquite	NM	88048	P.O. Box 199	Mesquite
17	V121317A	Las Uvas Valley Dairy #5	100_1842, 100_1843	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
18	V121317B	Las Uvas Valley Dairy #4	100_1844	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
19	V121318A	Las Uvas Valley Dairy #3	100_1845	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
20	V121318B	Las Uvas Valley Dairy #2	100_1846	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
22	V121318C	Las Uvas Valley Dairy #1	100_1848	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
23	V121318D	Las Uvas Valley Dairy #6	100_1849	County Rd. E01	Hatch	NM	87937-9501	HCR Box 400	Hatch
24	V121319A	Loma Parda Dairy	100_1850					P.O. Box 306	Derry
6	V121218A	Mountain View Dairy	100_1822, 100_1823					P.O. Box 345	Mesquite
12	V121221B	River Valley Dairy, LLC	100_1830, 100_1831	1400 Lechuga Rd.	Mesquite	NM	88048	P.O. Box 1929	Anthony
15	V121222B	Sun Valley Dairy, LLC	100_1838, 100-1839					P.O. Box 1929	Anthony
34	V121322D	Sunset Dairy	100_1855					P.O. Box 10	Mesquite
37	V121323A	Tallmon Dairy	100_1859, 100_1860	6510 McNutt	Santa Teresa	NM	88008	P.O. Box 400	Canutillo

Dairy Facilities

ID	Facility Mailing State	Facility Mailing ZIP	Phone	Facility Phone 2	Contact	Facility Contact 2	Facility Type	Township	Range	Section	Milked02
13	NM	88048-0010	505-233-3620		Ed Deruyter		Dairy	25S	3E	27	5000
29	NM	88048-0030	505-233-2671		Jay Hilliard		Dairy	25S	3E	5	1000
41	NM	88048-0030	505-233-2671		Jay Hilliard		Dairy	25S	3E	5	1000
9	NM	88048-0167	505-233-2029		Ed Deruyter		Dairy	25S	3E	5	1300
7	NM	88048-0346	505-233-4646		Mike Weatherly		Dairy	25S	3E	5 and 21	1100
8	NM	88048-0346	505-233-4646		Mike Weatherly		Dairy	25S	3E	5 and 21	1400
5	NM	88048-0170	505-233-2294	505-233-4548	Jon Gorzeman		Dairy	25S	3E	6	1600
16	NM	88021-1846	505-882-4331		Jerry Settles		Dairy	26S	3E	23	1500
33	NM	88048-0010	505-233-3464		Ed Deruyter		Dairy	25S	3E	33	1400
10	NM	88048-0021	505-233-3409		Isaac Dominguez		Dairy	25S	3E	8	1700
30	NM	88048-0199	505-233-4801	cell: 505-644-7587	J.L. Gonzalez		Dairy	25S	3E	8	1100
31	NM	88048-0199	505-233-4801	cell: 505-644-7587	J.L. Gonzalez		Dairy	25S	3E	8	400
32	NM	88048-0199	505-233-4801	cell: 505-644-7587	J.L. Gonzalez		Dairy	25S	3E	8	1100
17	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	1800
18	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	3000
19	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	1500
20	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	800
22	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	1000
23	NM	87937-9501	505-267-3037		Dean Horton		Dairy	20S	4W	5 and 6	4000
24	NM	87933-0306	505-267-5701		Herman Ortiz		Dairy	18S	4W	7	800
6	NM	88048-0345	505-233-3899		Ed Deruyter		Dairy	25S	3E	5	2000
12	NM	88021-1929	505-233-2061		Bruce Bonestroo		Dairy				2000
15	NM	88021-1929	505-882-5070		Bruce Bonestroo		Dairy	26S	3E	11	2200
34	NM	88048-0010			Ed Deruyter		Dairy	25S	3E	33	2213
37	TX	79835-0400			Glenell T. Loper		Dairy	28S	3E	5	500

Dairy Emissions

NMASS-based estimate			
Population of Dona Ana milk cows was 44,000 in 2002 (NMASS, 2003).			
Listing of dairies with discharge permits provided by NMED (Kirby, 2003).			
Listing of fluid milk permits provided by NMDA (Reeb, 2003).			
Dona Ana milk cows	44,000	milk cows	
PM10 Emission Factor	4.4	lbs/1000 head/day	(ARB, 2003a;ARB, 2003b)
PM10 Emissions	**35.3**	**tons/year**	
PM2.5 Size Fraction	0.1142	relative to PM10	(ARB, 1999)
PM2.5 Emissions	**4.0**	**tons/year**	
The PM2.5/PM10 size fraction is based upon a PM10/PM size fraction of 0.4818 and a PM2.5/PM size fraction of 0.0550			
Facility-level populations were not provided by NMASS to maintain individual dairy confidentiality (NMASS, 2003).			
Survey-based Estimate		**Emissions (tons/year)**	
Facility Name	**Milk Cows**	**PM_{10}**	**$PM_{2.5}$**
Big Sky Dairy	5,000	4.0	0.5
BJZ Dairy #1	1,000	0.8	0.1
BJZ Dairy #2	1,000	0.8	0.1
Bright Star Dairy	1,300	1.0	0.1
Buena Vista Dairy #1	1,400	1.1	0.1
Buena Vista Dairy #2	1,100	0.9	0.1
Daybreak Dairy	1,600	1.3	0.1
Del Oro Dairy	1,500	1.2	0.1
Desertland Dairy	1,400	1.1	0.1
Dominguez Dairy	1,700	1.4	0.2
Gonzalez Dairy Inc. #1	1,100	0.9	0.1
Gonzalez Dairy Inc. #2	400	0.3	0.0
Gonzalez Dairy Inc. #3	1,100	0.9	0.1
Las Uvas Valley Dairy #1	1,000	0.8	0.1
Las Uvas Valley Dairy #2	800	0.6	0.1
Las Uvas Valley Dairy #3	1,500	1.2	0.1
Las Uvas Valley Dairy #4	3,000	2.4	0.3
Las Uvas Valley Dairy #5	1,800	1.4	0.2
Las Uvas Valley Dairy #6	4,000	3.2	0.4
Loma Parda Dairy	800	0.6	0.1
Mountain View Dairy	2,000	1.6	0.2
River Valley Dairy, LLC	2,000	1.6	0.2
Sun Valley Dairy, LLC	2,200	1.8	0.2
Sunset Dairy	2,213	1.8	0.2
Tallmon Dairy	500	0.4	0.0
Dona Ana County Total	**41,413**	**33.3**	**3.8**

Feedlot Facilities

ID	GPS_ID	Facility Name	Image	Facility Physical Address	Facility Physical City	Facility Physical State	Facility Physical ZIP	Facility Mailing Address	Facility Mailing City
35	V121322E	Big Sky Feedlot #1	100_1857	17800 Stern	Mesquite	NM	88047	P.O. Box 10	Mesquite
36	V121322F	Big Sky Feedlot #2	100_1858	17800 Stern	Mesquite	NM	88047	P.O. Box 10	Mesquite
38	V121323B	Linda Vista Cattle Corp.	100_1861	6525 McNutt	Santa Teresa	NM	88008	6525 McNutt	Santa Teresa
40	V010621A	USDA-Livestock Quarantine Site		100 Frontera blvd.	Santa Teresa	NM	88008	P.O. Box 1345	Santa Teresa

Feedlot Facilities

ID	Facility Mailing State	Facility Mailing ZIP	Facility Phone 1	Facility Phone 2	Facility Contact 1	Facility Contact 2	Facility Type	Township	Range	Section	Cattle	Duration	Sprinklers
35	NM	88048-0010	505-233-3620		Ed Deruyter		Feedlot	25S	3E	27	700	120 days	No
36	NM	88048-0010	505-233-3620		Ed Deruyter		Feedlot	25S	3E	27	700	120 days	No
38	NM	88008	505-571-8688		Manuel R. Melendez		Feedlot				1000	90 days	No
40	NM	88008	505-589-1620		Irma Paredes		Feedlot				190000	1 day	No

Feedlot Emissions

Survey-based Estimate			**Emissions (tons/year)**			
Facility Name	**Feedlot Cattle**	**Duration (days)**	**PM_{10}**	**$PM_{2.5}$**		
Big Sky Feedlot #1	700	120	**0.8**	**0.1**		
Big Sky Feedlot #2	700	120	**0.8**	**0.1**		
Linda Vista Cattle Corp.	1,000	90	**0.9**	**0.1**		
USDA-Livestock Quarantine Site	190,000	1	**1.8**	**0.2**		
Total			**4.3**	**0.5**		
PM10 Emission Factor	19.0	lbs/1000 head/day	(ARB, 2003a;	ARB, 2003b)		
PM2.5 Size Fraction	0.1142	relative to PM10	(ARB, 1999)			
The PM2.5/PM10 size fraction is based upon a PM10/PM size fraction of 0.4818 and a PM2.5/PM size fraction of 0.0550 (ARB, 1999).						

Crops

		2002 Overall Dona Ana	Source of Data	Notes
Wheat	**I**	**2,184**	NMASS, 2003	Ratioed from 2001 statistics.
Hay (Alfalfa)	**I**	**20,000**	NMASS, 2003	
Hay (Other)	**I**	**800**	NMASS, 2003	
Sorghum	**I**	**1,076**	NMASS, 2003; NASS, 1999	Ratioed from 1997 Ag Census.
Corn	**I**	**13,000**	NMASS, 2003	
Cotton (Upland)	**I**	**8,200**	NMASS, 2003	Includes Sierra County.
Cotton (American-Pima)	**I**	**6,600**	NMASS, 2003	
Chili Peppers	**I**	**5,392**	NMASS, 2003; NASS, 1999	Ratioed from 1997 Ag Census.
Onions	**I**	**4,500**	NMASS, 2003	
Pecans	**I**	**22,989**	NMASS, 2003; Salopek, 2003	NMASS acreage from 1997 Ag Census; new acreage from Salopek, 2003.
Cabbage	II	550	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Cantaloupe	II	8	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Lettuce	II	1,561	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Oats	II	238	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Pistachios	II	47	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Spinach	II	295	NMASS, 2003; NASS, 1999	NMASS identified as miscellaneous crop; acreage from 1997 Ag Census.
Barley	III	238	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Garlic	III	37	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Okra	III	3	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Pumpkins	III	16	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Squash	III	20	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Sweet Corn	III	10	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Watermelons	III	14	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Apples	III	25	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Apricots	III	1	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Cherries	III	1	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Grapes	III	37	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Peaches	III	8	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Pears	III	1	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Plums/Prunes	III	1	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Blackberries	III	7	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.
Raspberries	III	5	NASS, 1999	Not identified by NMASS; acreage from 1997 Ag Census.

Only Crop Group I crops (i.e., county-level statistics provided in NMASS, 2003) will be used in the calculation of agricultural emissions.

Crop Group II crops are listed in NMASS, 2003 as miscellaneous crops and only provide aggregated state-level totals from the 1997 Census of Agriculture; not used for calculations.

Crop Group III crops are not listed in NMASS, 2003 and are only included in the 1997 Census; not use for calculations.

Tillage Emissions

		PM_{10} Emission Factors	ARB (Typical for San Joaquin Valley)			
Crop	**Acreage**	**Land Preparation (lbs/acre-pass)**	**Acres**	**Acre-Passes**	**Acre-Passes/Acre**	**Notes**
Wheat	2,184	3.08	323,461	388,153	1.20	
Hay (Alfalfa)	20,000	2.76	515,095	746,888	1.45	
Hay (Other)	800	2.76	38,357	55,618	1.45	
Sorghum	1,076	3.08	211	253	1.20	
Corn	13,000	1.64	92,950	390,390	4.20	Corn grain EF used.
Cotton (Upland)	8,200	1.44	211,037	1,308,432	6.20	
Cotton (American-Pima)	6,600	1.44	512,804	3,179,382	6.20	
Chili Peppers	5,392	1.4	898	225	0.25	Bell pepper EF used.
Onions	4,500	1.55	22,980	96,514	4.20	
Pecans	22,989	1.2			2.00	
Emission factors and acre-passes for all crops (except for pecans) from ARB, 2003a; ARB, 2003b.						
Pecan operations and acre-passes from Salopek, 2003. Pecans typically no-till; 1 or 2 acre-passes (disc/chisel/harrow) (1.2 lbs PM10/acre-pass)						
The PM2.5/PM10 size fraction of 0.2217 is based upon a PM10/PM size fraction of 0.4543 and a PM2.5/PM size fraction of 0.1007 (ARB, 1999).						
Land Preparation Emissions:						
	PM_{10} (tons/year)	**$PM_{2.5}$ (tons/year)**				
Wheat	4.0	0.9				
Hay (Alfalfa)	40.0	8.9				
Hay (Other)	1.6	0.4				
Sorghum	2.0	0.4				
Corn	44.8	9.9				
Cotton (Upland)	36.6	8.1				
Cotton (American-Pima)	29.5	6.5				
Chili peppers	0.9	0.2				
Onions	14.6	3.2				
Pecans	27.6	6.1				
County Total:	**201.7**	**44.7**				

Harvest Emissions

		PM_{10} Emission Factors	
Crop	**Acreage**	**Harvesting (lbs/acre)**	**Notes**
Wheat	2,184	5.8	
Hay (Alfalfa)	20,000	0	
Hay (Other)	800	1.69	
Sorghum	1,076	5.78	
Corn	13,000	1.68	Corn grain EF used.
Cotton (Upland)	8,200	3.37	
Cotton (American-Pima)	6,600	3.37	
Chili Peppers	5,392	0.08	Bell pepper EF used.
Onions	4,500	1.68	
Pecans	22,989	4.08	

Emission factors from ARB, 2003a; ARB, 2003b.

The PM2.5/PM10 size fraction of 0.2217 is based upon a PM10/PM size fraction of 0.4543 and a PM2.5/PM size fraction of 0.1007 (ARB, 1999).

Harvesting Emissions:		
	PM_{10} (tons/year)	**$PM_{2.5}$ (tons/year)**
Wheat	6.3	1.4
Hay (Alfalfa)	0.0	0.0
Hay (Other)	0.7	0.1
Sorghum	3.1	0.7
Corn	10.9	2.4
Cotton (Upland)	13.8	3.1
Cotton (American-Pima)	11.1	2.5
Chili peppers	0.2	0.0
Onions	3.8	0.8
Pecans	46.9	10.4
County Total:	**96.9**	**21.5**

Unpaved Agricultural Road Dust Emissions

Emission Factor	2.0	lbs PM10/VMT						
PM2.5/PM10 Size Fraction	0.2120							
Crop	**Acreage**	**VMT/acre/year**	**Total VMT/year**	**PM_{10} (tons/year)**	**$PM_{2.5}$ (tons/year)**			
Wheat	2,184	0.40	874	0.9	0.2			
Hay (Alfalfa)	20,000	0.40	8,000	8.0	1.7			
Hay (Other)	800	0.40	320	0.3	0.1			
Sorghum	1,076	0.40	431	0.4	0.1			
Corn	13,000	0.40	5,200	5.2	1.1			
Cotton (Upland)	8,200	0.40	3,280	3.3	0.7			
Cotton (American-Pima)	6,600	0.40	2,640	2.6	0.6			
Chili Peppers	5,392	2.40	12,940	12.9	2.7			
Onions	4,500	2.40	10,800	10.8	2.3			
Pecans	22,989	0.49	11,265	11.3	2.4			
Total			**55,749**	**55.7**	**11.8**			
Emission factor of 2.0 lbs PM10/VMT obtained from ARB, 2003a; ARB, 2003b.								
The PM2.5/PM10 size fraction of 0.2120 is based upon a PM10/PM size fraction of 0.5943 and a PM2.5/PM size fraction of 0.1260 (ARB, 1999).								

Paved Road Dust Emissions

Daily Vehicle Miles Traveled										
			Paved Fraction	**Unpaved Fraction**	**Paved VMT**	**Unpaved VMT**				
Urban	Interstate	307,000	1.00	0.00	307,000	0				
Urban	Other Freeway/Expressway	0	1.00	0.00	0	0				
Urban	Other Principal Arterial	740,000	1.00	0.00	740,000	0				
Urban	Minor Arterial	51,000	1.00	0.00	51,000	0				
Urban	Collector	131,000	1.00	0.00	131,000	0				
Urban	Local	1,184,000	1.00	0.00	1,184,000	0				
Rural	Interstate	1,362,000	1.00	0.00	1,362,000	0				
Rural	Other Principal Arterial	283,000	1.00	0.00	283,000	0				
Rural	Minor Arterial	21,000	1.00	0.00	21,000	0				
Rural	Major Collector	429,000	0.95	0.05	407,550	21,450				
Rural	Minor Collector	205,000	0.95	0.05	194,750	10,250				
Rural	Local	98,000	0.75	0.25	73,500	24,500				
Total		4,811,000			4,754,800	56,200				
Paved Roads										
E = [K *(sL/2)$^{0.65}$*(W/3)$^{1.5}$ -C]*(1 - P/(4N))			AP-42, Chapter 13.2.1 (Revised December 2003) (U.S. EPA, 1995)							
						K (PM10)	0.016	(U.S. EPA, 1995)		
E = particulate emission factor, lb/VMT						K (PM2.5)	0.004	(U.S. EPA, 1995)		
K = particle size multiplier, lb/VMT (PM_{10} = 0.016; $PM_{2.5}$ = 0.004)						C (PM10)	0.00047	(U.S. EPA, 1995)		
sL = road surface silt loading, g/m^2						C (PM2.5)	0.00036	(U.S. EPA, 1995)		
W = average vehicle weight, tons						P	55	(NMCC, 2004)		
C = emission factor for 1980's vehicle fleet exhaust, brake wear, and tire wear (PM_{10} = 0.00047; $PM_{2.5}$ = 0.00036						N	365			
P = Number of wet days with at least 0.01 inches of precipitation during the averaging period (55).						W	3	assumed		
N = Number of days in the averaging period (365).										
				PM10 EF	PM2.5 EF	PM10 Emissions	PM2.5 Emissions			
		Annual VMT	sL (g/m2)	(lbs/VMT)	(lbs/VMT)	(tons/year)	(tons/year)			
Urban	Interstate	112,055,000	0.015	0.0001878	-0.0001864	10.5	0.0			
Urban	Other Freeway/Expressway	0	0.015	0.0001878	-0.0001864	0.0	0.0			
Urban	Other Principal Arterial	270,100,000	0.030	0.0005521	-0.0000953	74.6	0.0			
Urban	Minor Arterial	18,615,000	0.030	0.0005521	-0.0000953	5.1	0.0			
Urban	Collector	47,815,000	0.060	0.0011238	0.0000476	26.9	1.1			
Urban	Local	432,160,000	0.200	0.0029947	0.0005153	647.1	111.3			
Rural	Interstate	497,130,000	0.015	0.0001878	-0.0001864	46.7	0.0			
Rural	Other Principal Arterial	103,295,000	0.030	0.0005521	-0.0000953	28.5	0.0			
Rural	Minor Arterial	7,665,000	0.030	0.0005521	-0.0000953	2.1	0.0			
Rural	Major Collector	148,755,750	0.060	0.0011238	0.0000476	83.6	3.5			
Rural	Minor Collector	71,083,750	0.200	0.0029947	0.0005153	106.4	18.3			
Rural	Local	26,827,500	0.600	0.0065877	0.0014136	88.4	19.0			
Total		**1,735,502,000**				**1,119.9**	**153.3**			
NOTE:										
PM2.5 emission factors for functional classifications with silt loadings of 0.015 and 0.030 g/m2 were estimated to be negative.										
AP-42 (U.S. EPA, 1995) indicates that negative values are possible where low silt loadings (sL) and/or low average vehicle weight (W) are used.										
AP-42 guidance is to set emissions to zero when an emission factor is calculated to be negative.										
Default silt loadings obtained from AP-42 (U.S. EPA, 1995).										
Assignment of silt loadings to functional classifications conducted using average daily traffic values in AP-42 and Las Cruces functional classification characteristics (Las Cruces, 1997).										
Precipitation data for Las Cruces Plant Science Center obtained from New Mexico Climate Center (NMCC, 2004).										

Unpaved Road Dust Emissions

Daily Vehicle Miles Traveled									
			Paved Fraction	Unpaved Fraction	Paved VMT	Unpaved VMT			
Urban	Interstate	307,000	1.00	0.00	307,000	0			
Urban	Other Freeway/Expressway	0	1.00	0.00	0	0			
Urban	Other Principal Arterial	740,000	1.00	0.00	740,000	0			
Urban	Minor Arterial	51,000	1.00	0.00	51,000	0			
Urban	Collector	131,000	1.00	0.00	131,000	0			
Urban	Local	1,184,000	1.00	0.00	1,184,000	0			
Rural	Interstate	1,362,000	1.00	0.00	1,362,000	0			
Rural	Other Principal Arterial	283,000	1.00	0.00	283,000	0			
Rural	Minor Arterial	21,000	1.00	0.00	21,000	0			
Rural	Major Collector	429,000	0.95	0.05	407,550	21,450			
Rural	Minor Collector	205,000	0.95	0.05	194,750	10,250			
Rural	Local	98,000	0.75	0.25	73,500	24,500			
Total		4,811,000			4,754,800	56,200			
Unpaved Roads									
E = {[k * (s/12)^a * (S/30)^d] / [(M/0.5)^c] - C}*[(365 - P)/365]					AP-42, Chapter 13.2.2 (Revised December 2003) (U.S. EPA, 1995)				
						k (PM10)	1.8	(U.S. EPA, 1995)	
E = particulate emission factor, lb/VMT						k (PM2.5)	0.27	(U.S. EPA, 1995)	
k = empirical constant						a (PM10)	1	(U.S. EPA, 1995)	
a = empirical constant						a (PM2.5)	1	(U.S. EPA, 1995)	
c = empirical constant						c (PM10)	0.2	(U.S. EPA, 1995)	
d = empirical constant						c (PM2.5)	0.2	(U.S. EPA, 1995)	
s = surface material silt content (%)						d (PM10)	0.5	(U.S. EPA, 1995)	
S = mean vehicle speed (mph)						d (PM2.5)	0.5	(U.S. EPA, 1995)	
M = moisture content (%)						C (PM10)	0.00047		
C = emission factor for 1980's vehicle fleet exhaust, brake wear, and tire wear						C (PM2.5)	0.00036		
P = Number of wet days during the year with at least 0.01 inches of precipitation						P	55	(NMCC, 2004)	
						s (%)	6.07	(ERG, 2003)	
						S (mph)	15	assumed	
						M	0.31	(ERG, 2003)	
			PM10 EF	PM2.5 EF	PM10 Emissions	PM2.5 Emissions			
		Annual VMT	(lbs/VMT)	(lbs/VMT)	(tons/year)	(tons/year)			
Urban	Interstate	0	0.6012668	0.0899441	0.0	0.0			
Urban	Other Freeway/Expressway	0	0.6012668	0.0899441	0.0	0.0			
Urban	Other Principal Arterial	0	0.6012668	0.0899441	0.0	0.0			
Urban	Minor Arterial	0	0.6012668	0.0899441	0.0	0.0			
Urban	Collector	0	0.6012668	0.0899441	0.0	0.0			
Urban	Local	0	0.6012668	0.0899441	0.0	0.0			
Rural	Interstate	0	0.6012668	0.0899441	0.0	0.0			
Rural	Other Principal Arterial	0	0.6012668	0.0899441	0.0	0.0			
Rural	Minor Arterial	0	0.6012668	0.0899441	0.0	0.0			
Rural	Major Collector	7,829,250	0.6012668	0.0899441	2,353.7	352.1			
Rural	Minor Collector	3,741,250	0.6012668	0.0899441	1,124.7	168.3			
Rural	Local	8,942,500	0.6012668	0.0899441	2,688.4	402.2			
Total		**20,513,000**			**6,166.9**	**922.5**			
NOTE:									
Silt content and moisture content were obtained from a recent study in Ciudad Juarez (ERG, 2003).									
A vehicle speed of 15 mph was assumed for unpaved roads.									
Precipitation data for Las Cruces Plant Science Center obtained from New Mexico Climate Center (NMCC, 2004).									

Annual Emissions

				Total	Total	Ag Only*	Ag Only*
	PM10	**PM2.5**		PM10%	PM2.5%	PM10%	PM2.5%
Crop Land Preparation (agricultural tillage)	201.7	44.7		2.60%	3.67%	42.84%	31.35%
Crop Harvesting	96.9	21.5		1.25%	1.76%	20.58%	15.06%
Agricultural Burning (prunings)	45.4	42.8		0.59%	3.51%	9.65%	30.03%
Prescribed Burning (fields)	0.0	0.0		0.00%	0.00%	0.00%	0.00%
Beef Cattle Feedlots	4.3	0.5		0.05%	0.04%	0.90%	0.34%
Dairy Operations	33.3	3.8		0.43%	0.31%	7.06%	2.66%
Cotton Gin Operations	16.9	2.2		0.22%	0.18%	3.59%	1.53%
Unpaved Road Dust (agricultural operations)	55.7	11.8		0.72%	0.97%	11.84%	8.29%
Paved Road Dust (county-wide)	1,119.9	153.3		14.44%	12.58%		
Unpaved Road Dust (county-wide)	6,166.9	922.5		79.50%	75.71%		
Agricultural Equipment (exhaust)	16.6	15.3		0.21%	1.26%	3.53%	10.73%
Total	**7,757.5**	**1,218.4**					
Total (minus county-wide paved and unpaved dust)	470.7	142.6					
*All categories minus county-wide paved and unpaved road dust.							

Hourly Emissions

Facility Type	Facility Name	PM10 (tpy)	PM2.5 (tpy)	Days of Operation	Hours/Day	Annual Hours of Operation	PM10 (lb/hr)	PM2.5 (lb/hr)	Notes
Cotton Gin	Mesa Farmers Cooperative, Inc.	12.66	1.63	121	24.0	2,904	8.72	1.12	Ginning 10/3 through 1/31, 7 days/week, 24 hours/day.
Cotton Gin	B.E. Harvey Gin Company #1	1.11	0.14	53	10.5	557	3.99	0.51	Ginning 11/6 through 1/6, 6 days/week, 10.5 hours/day.
Cotton Gin	B.E. Harvey Gin Company #2	1.08	0.14	77	12.5	963	2.24	0.29	Ginning 10/16 through 12/31, 7 days/week, 12.5 hours/day.
Cotton Gin	4-Points Gin	2.05	0.26	71	17.0	1,207	3.40	0.44	Ginning 10/16 through 1/6, 6 days/week, 17 hours/day
Cotton Gin	USDA-ARS Southwest Ginning Lab	0.02	0.00	n/a	n/a	8,760	0.00	0.00	Ginning year round, variable schedule, assumed evenly distributed.
Dairy	Big Sky Dairy	4.02	0.46	n/a	n/a	8,760	0.92	0.10	
Dairy	BJZ Dairy #1	0.80	0.09	n/a	n/a	8,760	0.18	0.02	
Dairy	BJZ Dairy #2	0.80	0.09	n/a	n/a	8,760	0.18	0.02	
Dairy	Bright Star Dairy	1.04	0.12	n/a	n/a	8,760	0.24	0.03	
Dairy	Buena Vista Dairy #1	1.12	0.13	n/a	n/a	8,760	0.26	0.03	
Dairy	Buena Vista Dairy #2	0.88	0.10	n/a	n/a	8,760	0.20	0.02	
Dairy	Daybreak Dairy	1.28	0.15	n/a	n/a	8,760	0.29	0.03	
Dairy	Del Oro Dairy	1.20	0.14	n/a	n/a	8,760	0.28	0.03	
Dairy	Desertland Dairy	1.12	0.13	n/a	n/a	8,760	0.26	0.03	
Dairy	Dominguez Dairy	1.37	0.16	n/a	n/a	8,760	0.31	0.04	
Dairy	Gonzalez Dairy Inc. #1	0.88	0.10	n/a	n/a	8,760	0.20	0.02	
Dairy	Gonzalez Dairy Inc. #2	0.32	0.04	n/a	n/a	8,760	0.07	0.01	
Dairy	Gonzalez Dairy Inc. #3	0.88	0.10	n/a	n/a	8,760	0.20	0.02	
Dairy	Las Uvas Valley Dairy #1	0.80	0.09	n/a	n/a	8,760	0.18	0.02	
Dairy	Las Uvas Valley Dairy #2	0.64	0.07	n/a	n/a	8,760	0.15	0.02	
Dairy	Las Uvas Valley Dairy #3	1.20	0.14	n/a	n/a	8,760	0.28	0.03	
Dairy	Las Uvas Valley Dairy #4	2.41	0.28	n/a	n/a	8,760	0.55	0.06	
Dairy	Las Uvas Valley Dairy #5	1.45	0.17	n/a	n/a	8,760	0.33	0.04	
Dairy	Las Uvas Valley Dairy #6	3.21	0.37	n/a	n/a	8,760	0.73	0.08	
Dairy	Loma Parda Dairy	0.64	0.07	n/a	n/a	8,760	0.15	0.02	
Dairy	Mountain View Dairy	1.61	0.18	n/a	n/a	8,760	0.37	0.04	
Dairy	River Valley Dairy, LLC	1.61	0.18	n/a	n/a	8,760	0.37	0.04	
Dairy	Sun Valley Dairy, LLC	1.77	0.20	n/a	n/a	8,760	0.40	0.05	
Dairy	Sunset Dairy	1.78	0.20	n/a	n/a	8,760	0.41	0.05	
Dairy	Tallmon Dairy	0.40	0.05	n/a	n/a	8,760	0.09	0.01	
Feedlot	Big Sky Feedlot #1	0.80	0.09	n/a	n/a	8,760	0.18	0.02	
Feedlot	Big Sky Feedlot #2	0.80	0.09	n/a	n/a	8,760	0.18	0.02	
Feedlot	Linda Vista Cattle Corp.	0.86	0.10	n/a	n/a	8,760	0.20	0.02	
Feedlot	USDA-Livestock Quarantine Site	1.81	0.21	n/a	n/a	8,760	0.41	0.05	
Total Cotton Gins		16.92	2.18				18.35	2.37	
Total Dairies		33.25	3.80				7.59	0.87	
Total Feedlots		4.26	0.49				0.97	0.11	
Total GPS Facilities		54.43	6.47				26.91	3.35	

Assumptions

All dairy activity is assumed to be constant throughout the year.

Although the feedlot duration varies from 1 day to 120 days, feedlot activity is assumed to be evenly distributed throughout the year.

Cotton gin activity based upon ginning schedules collected during survey.

Hourly emissions = annual emissions divided by annual hours of operation (8760 for dairies and feedlots; based on operating schedule for gins)

Appendix B

Non-Agricultural Sources of PM10 and PM2.5

Technical Memorandum – *Final*

To: Gail Cooke, Air Quality Bureau, New Mexico Environment Department

From: Marty Wolf, Paula Fields

Subject: Nonagricultural Emission Inventory for Doña Ana County, New Mexico

Date: June 23, 2004

The focus of the U. S. Environmental Protection Agency (U.S. EPA) *Atlas Project* is to develop illustrations, maps, and explanations of environmental data for the entire country (U.S. EPA, 2003a). The Air Quality Bureau (AQB) of the New Mexico Environment Department (NMED) issued Contract Number 04-667-3000-0005 to Eastern Research Group, Inc. (ERG) to develop a spatially accurate emissions inventory of nonagricultural sources of air pollution located in Doña Ana County in order to support the development of the environmental atlas focusing along the U.S./Mexico border. A similar agricultural source emissions inventory was developed previously by ERG (ERG, 2004a). The agricultural and nonagricultural inventories taken together represent a comprehensive particulate matter (PM) emissions inventory for Doña Ana County.

Details concerning the roles and responsibilities of the contractor, inventory characteristics, initial methods proposed, and project budget and schedule are contained in the inventory preparation plan (IPP) developed for this project (ERG, 2004b). This technical memorandum provides information on the inventory characteristics, a description of work conducted to develop the inventory (i.e., data collected and actual emission methods used), inventory results, and some conclusions and recommendations related to future inventory development of nonagricultural sources in Doña Ana County. All inventory tables and graphs referred to in this memo are located at the back of the document. Supporting calculational spreadsheets are also included in Attachment A. In addition to the development of the nonagricultural source inventory, this contract also included a task for statistical analysis of air quality monitoring data for Doña Ana County for the past 10 years. This statistical analysis is included in Attachment B.

Inventory Scope

The scope of the nonagricultural emissions inventory is as follows:

- Year – 2002 (i.e., coincides with the Atlas Project).
- Geographic domain – Doña Ana County, New Mexico.

- Sources – All nonagricultural sources of PM including quarrying/mining, construction activities, on-road motor vehicles, nonroad mobile source equipment, aircraft, railroads, residential wood combustion, charbroiling, paved road dust, residential burning of household and yard waste, other fuel combustion, wildfires, prescribed wildland burning, structural fires, vehicle fires, and wind erosion.
- Pollutants – PM 10 micrometers (µm) in aerodynamic diameter or less (PM_{10}) and 2.5 µm in aerodynamic diameter or less ($PM_{2.5}$).
- Spatial resolution – Facility location (i.e., Universe Transverse Mercator [UTM] or latitude-longitude [lat-long] coordinates, physical address, or township/range/section for mines and quarries; county-level resolution for all other sources).
- Temporal resolution – Annual (tons/year).

Data Collection Activities

Data needed to estimate emissions for nonagricultural sources in Doña Ana County included information on the level of activity of the emitting sources (e.g., quantity of ore processed, number of housing permits, number of landing and take-offs [LTOs], etc.). Also, the location of each mine and quarry was identified to facilitate future air quality modeling work. These data were collected by three means: telephone contacts with relevant experts, published literature, and a telephone survey.

Telephone contacts were made and the following information was obtained from relevant experts:

- Quantity of county-level ore production and initial mine locations (Leavitt, 2004; Pfeil, 2004; and Pfeil et al., 2001);
- County-level daily vehicle miles traveled (VMT) statistics (Fredine, 2003);
- Fuel, fleet, and area characteristics for MOBILE6 input files (Cooke, 2004; Dennis, 2004);
- Airport operations (Simcoe, 2004);
- Food facility listing (Hennessee, 2004);
- Local waste disposal practices (Morales, 2004; Kemmer, 2004; Medina, 2004; Mata, 2004; and Goff, 2004);
- Wildfire acreage (Boykin, 2004; Peterson, 2004; Bash, 2004; Christiansen, 2004; Ellington, 2004); and
- Prescribed wildland fire acreage (Heath, 2004).

Published literature was reviewed and the following information was obtained:

- Housing permits in Doña Ana County (U.S. Census, 2002);
- 1999 NEI emissions for railroads (U.S. EPA, 2003b);
- Railroad fuel use (U.S. EPA, 2003b);
- 2002 preliminary NEI emissions for residential wood combustion (U.S. EPA, 2004a);
- County- and place-level population (U.S. Census, 2000);
- Per capita waste generation rates (U.S. EPA, 2003c);
- Community urban and rural fractions (U.S. Census, 2000);

- State-level industrial, commercial/institutional, and residential fuel combustion quantities (EIA, 2004);
- Industrial and commercial/institutional employment statistics (U.S. Census, 2001);
- Heating degree day (HDD) information (NCDC, 2001);
- Residential household heating information for particular fuels (U.S. Census, 2000);
- National structural and vehicle fire statistics (USFA, 2001); and
- 1996 wind erosion estimates (ENVIRON et al., 2004).

The primary purpose of the telephone survey was to determine facility-specific information for the mines and quarries located in Doña Ana County. Based upon a list of facilities provided by staff from the New Mexico Mining and Minerals Division (NMMMD), 25 facilities were contacted by telephone. Three basic questions were asked for each facility:

- What was the operational status of the facility in 2002?
- What is the precise facility location? (In most cases, NMMMD provided some basic location information. However, efforts were made to improve upon this information.)
- What was the 2002 ore production rate?

The overall response rate to the telephone survey was fairly low (i.e., 32 percent or 8 out of 25 facilities). The surveyed facilities are presented in Table 1.

Inventory Methodology

Following the data collection activities, emissions were estimated using the methodologies summarized in Table 2. In general, emissions for most source categories were estimated by combining emission factors with activity data collected from telephone contacts or published data sources. On-road motor vehicle emissions were estimated using U.S. EPA's MOBILE6 model with input parameters developed for El Paso and southern Doña Ana County (U.S. EPA, 2002a); nonroad mobile source emissions (excluding agricultural equipment) were estimated using U.S. EPA's NONROAD model (U.S. EPA, 2002b) with selected internal defaults.

The emission calculations for all source categories are presented in Attachment 1. The emission calculations were made using Excel and include all relevant emission factors, equations, data, and assumptions.

Inventory Results

Table 3 summarizes the annual emissions of nonagricultural sources in Doña Ana County for 2002. The largest source category shown in Table 3 is windblown dust (representing 1996 emissions) which contributes over 85 percent of the total PM_{10} and total $PM_{2.5}$ inventories. However, if the windblown dust is not considered, then the largest nonagricultural PM_{10} source categories are road dust (unpaved and paved), construction activities, and quarrying/mining (i.e., 86.5 percent, 3.5 percent, and 1.9 percent of the inventory, respectively) and the largest nonagricultural $PM_{2.5}$ source categories are road dust, residential wood combustion, and charbroiling (i.e., 60.3 percent, 7.8 percent, and 7.4 percent of the inventory, respectively). Because total PM from combustion sources consists of a larger fraction of $PM_{2.5}$ than total PM from geogenic dust sources does, the relative

contribution of combustion sources increases in the overall $PM_{2.5}$ inventory compared to the overall PM_{10} inventory.

Using location information collected from the telephone survey, along with existing location information (Leavitt, 2004; Pfeil et al., 2001), maps of mine and quarry locations were developed using ArcView software. Figure 1 shows the location of the individual facilities within Doña Ana County. Figures 2 through 7 show the location of individual facilities at a smaller scale (i.e., individual township and range). As these figures show, most of these operations are located along the I-10 and I-25 corridors with a few facilities in outlying areas.

Recommendations

The 2002 nonagricultural emissions inventory presented in this memo is the first PM_{10} and $PM_{2.5}$ emissions inventory ever developed for nonagricultural source categories located in Doña Ana County. This inventory uses the best possible current emission estimation methodologies and activity data that could be identified.

However, emissions inventory development should be an iterative process in which future inventories build upon earlier inventories. The following recommendations are proposed for consideration during the development of future nonagricultural emissions inventories in Doña Ana County:

- **Quarrying and Mining –** Ore production data were collected during the telephone survey; however, the survey response rate was low (i.e., 32 percent). The NMMMD has facility-level ore production data; however, due to confidentiality concerns, they were only able to provide county-level ore production statistics. If detailed facility-level emissions are desired, then either the facility-level data needs to be obtained from NMMMD or a higher response rate is need from surveyed facilities.

- **Construction Activity** – Construction activity data were obtained from a national database maintained by the U.S. Census. Building permit data were requested, but not obtained, for Doña Ana County and the City of Las Cruces. Obtaining these detailed local data will likely improve the emission estimates for this category.

- **On-Road Motor Vehicles –** Emissions from on-road motor vehicles were estimated using MOBILE6 input files for El Paso, Texas that were adjusted by "turning off" the El Paso inspection and maintenance (I/M) program, anti-tampering program (ATP), and oxygenated fuel use. The assumption that on-road motor vehicle emissions in Doña Ana County are similar to those in El Paso should be investigated. This assumption is probably reasonable in the southern part of the county, which borders El Paso; however, it may not be as reasonable for Las Cruces or other areas in the northern part of the county.

- **Paved and Unpaved Road Dust** – As mentioned in the earlier agricultural emissions inventory (ERG, 2004a), there are several key assumptions that were used to estimate emissions for paved and unpaved road dust in Doña Ana County. Attempts were made to identify information specific to the county (i.e., paved/unpaved VMT split information, average vehicle

weights, average vehicle speeds, silt loadings, silt contents, and moisture contents); however, this information could not be located. Efforts should continue in the future to identify this sort of information.

- **Open Waste Burning (Household Waste) –** There were several key assumptions used to estimate emissions from the open burning of household waste. The assumption having the largest potential uncertainty is associated with the behavior of people living in areas without curbside pickup (either from the incorporated community or obtained individually). The extent that these people are willing to transport their waste several miles to a transfer station, rather than to burn their waste, is largely unknown. Additional investigation into this issue will improve the quality of the emission estimate for this source category.
- **Windblown Dust (Wind Erosion)** – As seen in Table 3, windblown dust is by far the largest nonagricultural source category. However, the values presented in Table 3 represent the year 1996 and its associated meteorological conditions. It is likely that the meteorological conditions in 2002 differ from those in 1996. As a result, the 1996 emission estimates are not representative of conditions in 2002. For instance, the 1996 wind events that generated windblown dust emissions in Doña Ana County were limited to six months of the year (i.e., January-April and October-November). Differences in wind event frequencies and wind speeds will result in different emission estimates. A windblown dust inventory is currently being developed for WRAP for the year 2002; results will likely be available in late summer 2004. This inventory will more appropriately represent emissions for 2002.

Implementation of these recommendations during the development of subsequent emissions inventories will increase overall inventory accuracy by incorporating data that better represent the local conditions that exist in Doña Ana County.

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Table 1. Summary of Surveyed Facilities

Mine Name	Operator Name	Responded to Survey
Anthony Sand & Gravel	Anthony Sand & Gravel	✓
Berino Sand Pit	Del Norte Masonry Products, Inc.	✓
Black Bear Pit	Del Norte Masonry Products, Inc.	✓
Certified Sand Co. (Bill Inman #1)	Certified Sand Co., Inc.	✓
Crusher (DA Co.) - 22/23S/2e	Smith And Aguirre Construction Co.	✓
Donna Mountain	Santa Fe Mining Company	
Eagle Mine/Mill	American Eagle Brick Co.	✓
Faulkner Canyon Quarry	Highland Enterprises, Inc.	✓
Hatch West Pit	Dona Ana County Trans. Dept.	
Hill Pit - DACTD	Dona Ana County Trans. Dept.	
Jobe Vado Facility	Jobe Concrete Products, Inc.	
Jornada Pit	Dona Ana County Trans. Dept.	
Keystone #1 Mine/Mill	Schneider Welding	
Las Uvas HA-0002 Gravel Lease	Las Uvas Valley Dairy	
Las Uvas HA-0003 Clay Lease	Las Uvas Valley Dairy	
Little Black Mountain	Santa Fe Mining Company	
Martinez Sand & Gravel Pit	Martinez Sand & Gravel	
Mesquite Pit	Dona Ana County Trans. Dept.	
Muncrief Placer #1	Rio Grande Rock Inc.	
Osman Pit	Mc Nutt Construction	
Picacho Peak Pit	Burn Construction Company, Inc.	✓
Rainbow Mine - Preece	Preece Enterprises	
SWPP Fort Seldon Quarry	Southwest Paving Products, Inc.	
Vado Pit	Lafarge Southwest, Inc.	
Vado Quarry	Daniel S. Guillen, Inc.	

Table 2. Summary of Methods and Data Used to Estimate Nonagricultural Emissions in Doña Ana County

Source Category	Methodology		Activity Data		Comments
	Type	Source	Type	Source(s)	
Quarrying/Mining	Emission factors	U.S. EPA, 2004	Ore production quantities	Leavitt, 2004; telephone surveys	NMMMD provided county-level ore production quantities (Leavitt, 2004). NMMMD also maintains facility-level quantities, but these are proprietary and were not made available for inventory development (Pfeil, 2004). Facility-level ore quantities were obtained via telephone surveys from 8 facilities and were subtracted from the overall county-level ore quantities. Adjusted county-level ore quantities were evenly distributed to the remaining 17 non-responsive facilities.
			Quarry/mine locations	Telephone surveys; Leavitt, 2004; Pfeil et al., 2001	Mine locations were confirmed for 8 locations using telephone surveys. For the remaining 17 non-responsive facilities, existing quarry/mine locations were used (Leavitt, 2004; Pfeil et al., 2001). The following types of location information were used: Universal Transverse Mercator (UTM) or latitude-longitude (lat-long) coordinates; township, range, and section (i.e., for a few facilities, quarter sections and quarter-quarter sections); and street addresses.
Soil Disturbance Due to Construction (i.e., Construction Activity Fugitive Dust)	Emission factors	MRI, 1996	Housing permit information	U.S. Census, 2002	It was assumed that the average acreage for 1 to 4 family unit permits was 8,500 ft^2 (0.195 acres) and for 5 or more family unit permits was 2 acres based upon information from other similar inventory projects (ENVIRON and ERG, 2002; ENVIRON and ERG, 2004). Average duration for heavy earthmoving activities was assumed to be 1 month based upon information from other similar inventory projects (ENVIRON and ERG, 2002; ENVIRON and ERG, 2004). Complete building permit information could not be obtained from the Doña Ana County and Las Cruces city planning departments.

Table 2. Cont.

Source Category	Methodology	Activity Data	Comments

Mobile Emissions – On-Road Motor Vehicles	Emission factors from MOBILE6	U.S. EPA, 2002a	VMT	Fredine, 2003	VMT data from the previous agricultural sources inventory were used (ERG, 2004a).
			Fuel, fleet, and area characteristics	Cooke, 2004; Perkinson, 2004	Fuel, fleet, and area characteristics were assumed to be identical to El Paso, except that inspection/maintenance (I/M), anti-tampering program (ATP), and oxygenated fuel parameters were shut off (Cooke, 2004; Perkinson, 2004). The effects of El Paso vehicles on southern Doña Ana County on-road motor vehicle emissions are thought to be negligible (Perkinson, 2004).
Mobile Emissions – Nonroad Mobile Source Equipment	Modeled output results from NONROAD model	U.S. EPA, 2002b	Not applicable	Not applicable	Default parameter values contained in the NONROAD model were used. Agricultural equipment estimates were included in the agriculture emissions inventory (ERG, 2004a) and were not be included in this inventory.
Mobile Emissions – Aircraft	Emission factors	U.S. EPA, 2003b	Aircraft operation statistics	Simcoe, 2004	There are three airports located in Doña Ana County: Las Cruces International Airport, Doña Ana County Airport at Santa Teresa, and Hatch Airport. Hatch Airport was opened in February 2003 and was not included in the inventory. Exact LTO statistics were not available for any of the airports. LTO estimates were obtained from FAA Form 5010s (Airport Master Records) from 2001 (Simcoe, 2004)
Mobile Emissions – Railroads	Extrapolation	U.S. EPA, 2003b	Railroad fuel use	U.S. EPA, 2003b	1999 NEI railroad emissions were extrapolated to 2002 using railroad fuel use.
Woodburning (Residential Wood Combustion)	Preliminary 2002 NEI	U.S. EPA, 2004a	Not applicable	Not applicable	
Charbroiling	Emission factors	Pechan, 2003	Number of restaurants	Hennessee, 2004	Listing of Doña Ana County restaurants was obtained from New Mexico Environmental Department's District III Food Program. Restaurants disaggregated into five categories (i.e., ethnic, fast-food, family, seafood, and steak & barbeque) based upon restaurant name. Recently developed emission factors, as well as other related statistics (i.e., number of specific devices per restaurant, quantity of meat per device) were used to estimate emissions (Pechan, 2003).

Table 2. Cont.

Source Category	Methodology		Activity Data		Comments
Paved Road Dust	Not applicable	Not applicable	Not applicable	Not applicable	Paved road dust emissions were estimated as part of the agricultural sources emissions inventory using silt loading data from Ciudad Juárez, Mexico (ERG, 2004a). Attempts were made to identify data specific

					to Doña Ana County, but none were found.
Unpaved Road Dust	Not applicable	Not applicable	Not applicable	Not applicable	Unpaved road dust emissions were estimated as part of the agricultural sources emissions inventory using silt content and moisture content data from Ciudad Juárez, Mexico (ERG, 2004a). Attempts were made to identify data specific to Doña Ana County, but none were found.
Demolition	Not applicable	Not applicable	Not applicable	Not applicable	Appropriate information could not be identified for the demolition source category; however, demolition emissions are not expected to be significant.
Waste Burning and Disposal (Residential Household Waste and Yard Waste)	Emission factors	U.S. EPA, 1997; U.S. EPA, 1995	Local population	U.S. Census, 2000a	Las Cruces, Sunland Park, Mesilla, and Hatch have curbside pickup in their communities (Kemmer, 2004; Medina, 2004; Mata, 2004; Goff, 2004). It was assumed that no burning occurs in these communities. It was also assumed that other communities that entirely urban (i.e., Dona Ana and University Park) have no burning. Approximately 50 percent of the addresses without community curbside pickup have private curbside pickup (Morales, 2004). It was assumed that no burning occurs at these addresses. The remaining 50 percent of the addresses without any type of curbside pickup typically take their waste to one of 8 county-run transfer stations. For areas not in close proximity to a transfer station, it is assumed that the national rural average of 28 percent of waste is burned (U.S. EPA, 2004). For area in close proximity to a transfer station, it is assumed that 14 percent of waste is burned.
			Per capita waste generation rates	U.S. EPA, 2003b	
			Urban/rural split	U.S. Census, 2000a	
			Waste disposal practices	Morales, 2004; Kemmer, 2004; Medina, 2004; Mata, 2004; Goff, 2004	

Table 2. Cont.

Source Category	Methodology		Activity Data		Comments
Other Fuel Combustion	Emission factors	U.S. EPA, 1995; EIIP, 1999a; EIIP, 1999b; EIIP, 1999c	Annual fuel usage	EIA, 2003	Includes the residential, commercial/ institutional, and industrial fuel use sectors. Fuel types include coal, natural gas, distillate fuel oil, kerosene, LPG, residual fuel oil, and wood. Commercial/institutional and residential residual fuel
			County-level industrial and commercial employment	U.S. Census, 2001	
			County-level household heating information	U.S. Census, 2000a	

			County-level heating degree days (HDD)	NCDC, 2001	oil combustion and industrial wood combustion do not occur in Doña Ana County. The industrial fuel combustion area source categories were not reconciled with permitted industrial point sources. Reconciliation with point sources will likely result in some reduction of emissions.
Wildfires	Emission factors	U.S. EPA, 1995	Number of wildfires, wildfire acreage, fuel loading and characteristics	Boykin, 2004; Peterson, 2004; Bash, 2004; Christiansen, 2004; Ellington, 2004	A total of approximately 100 acres of grassland wildfires occurred on New Mexico Forestry lands within Doña Ana County (Boykin, 2004). A total of approximately 30 acres of grassland wildfires occurred on Bureau of Land Management lands within Doña Ana County (Peterson, 2004) A total of approximately 125 acres of grassland wildfires occurred on the portions of Fort Bliss and the White Sands Missile Ranges within Doña Ana County (Bash, 2004; Christiansen, 2004). There were no wildfires in 2002 within National Park Service or Fish & Wildlife Service lands (i.e., White Sands National Monument and San Andres National Wildlife Refuge) (Ellington, 2004). There are no Forest Service or Bureau of Indian Affairs lands within Doña Ana County.
Prescribed Wildland Burning	Emission factors	U.S. EPA, 1995	Number of prescribed burns, prescribed burn acreage, fuel loading and characteristics	Heath, 2004	The year 2002 was a severe wildfire season in New Mexico. As a result, very few prescribed fires were conducted in 2002. A check of NMED's prescribed fire database revealed that there were no prescribed fires conducted in Doña Ana County in 2002 (Heath, 2004).

Table 2. Cont.

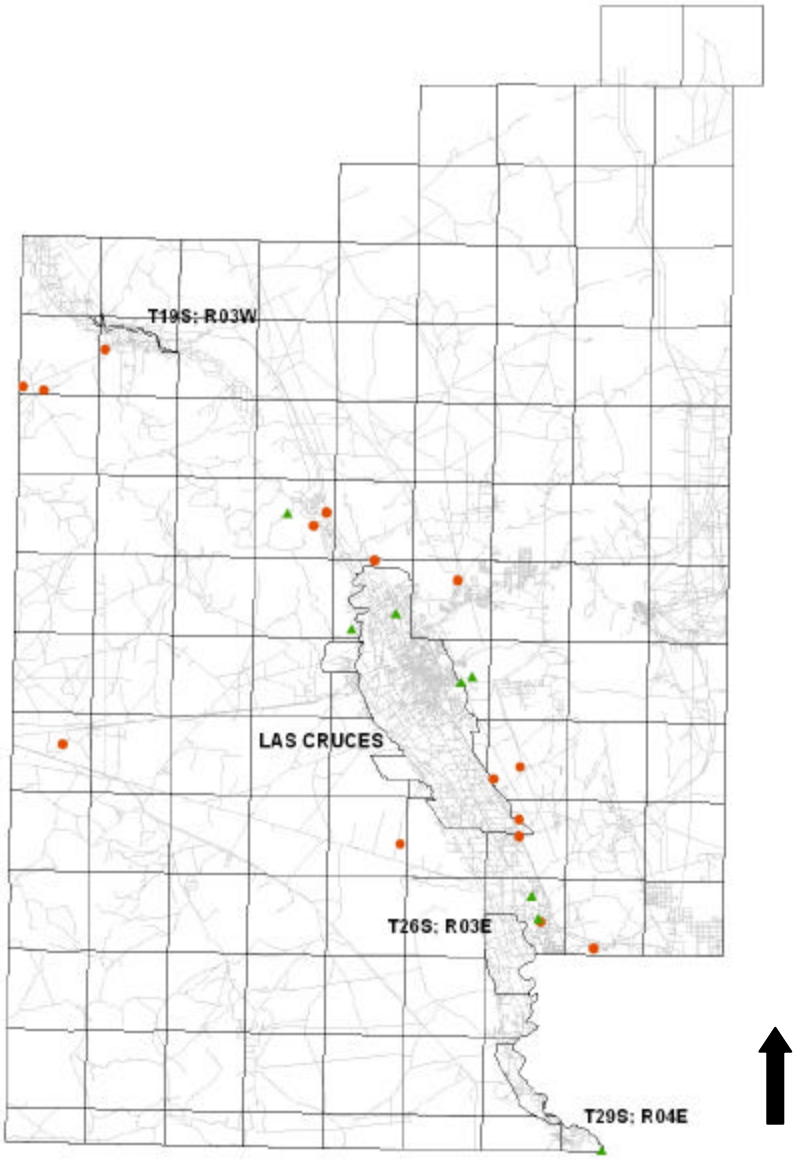
Source Category	Methodology		Activity Data		Comments
Structural Fires	Emission factors	EIIP, 2001	Number of structural fires, population	USFA, 2001 document	fires and do not represent total fires. Structural fires State and county structural fire statistics were limited to investigated were extrapolated from national statistics.
Vehicle Fires	Emission factors	EIIP, 2000	Number of vehicle fires, population	USFA, 2001 document	State and county vehicle fire statistics were limited to investigated fires and do not represent total fires. Vehicle fires were extrapolated from national statistics.
Wind Erosion	Fugitive dust model	ENVIRON et al., 2004	Not Applicable	Not Applicable	Emissions for 2002 are currently not available. Emissions for 1996 were obtained from the WRAP

					windblown dust study (ENVIRON et al., 2004). It should be noted that windblown dust emissions are dependent upon wind events that exceed threshold wind velocities. Because of these variable wind events, it is not appropriate to assume that 1996 emissions would be representative of 2002 emissions.

Table 3. 2002 Annual Emissions for Nonagricultural Sources in Doña Ana County

Source Category	PM_{10} Emissions (tons/year)	$PM_{2.5}$ Emissions (tons/year)
Quarrying and Mining	159.2	31.8
Construction Activities	294.2	61.2
On-Road Motor Vehicles	147.0	110.9
Nonroad Mobile Sources	60.1	55.3
Aircraft	6.1	4.2
Locomotives	29.1	26.2
Residential Wood Combustion	138.5	138.5
Charbroiling	143.2	132.6
Paved Road Dust[a]	1,119.9	153.3
Unpaved Road Dust[a]	6,166.9	922.5
Waste Burning – Household Waste	82.5	75.6
Waste Burning – Yard Waste	6.1	6.1
Other Fuel Combustion	70.4	60.1
Wildfires	1.1	0.9
Prescribed Wildland Burning	0.0	0.0
Structural Fires	1.5	1.5
Vehicle Fires	2.8	2.8
Wind Erosion[b]	49,242.5	10,833.3
Total	**57,671.0**	**12,616.8**
Total (minus Wind Erosion)	**8,428.5**	**1,783.4**

[a]Unadjusted emissions taken from agricultural emissions inventory (ERG, 2004a).
[b]Wind erosion emissions obtained from 1996 WRAP wind erosion inventory (ENVIRON et al., 2004).

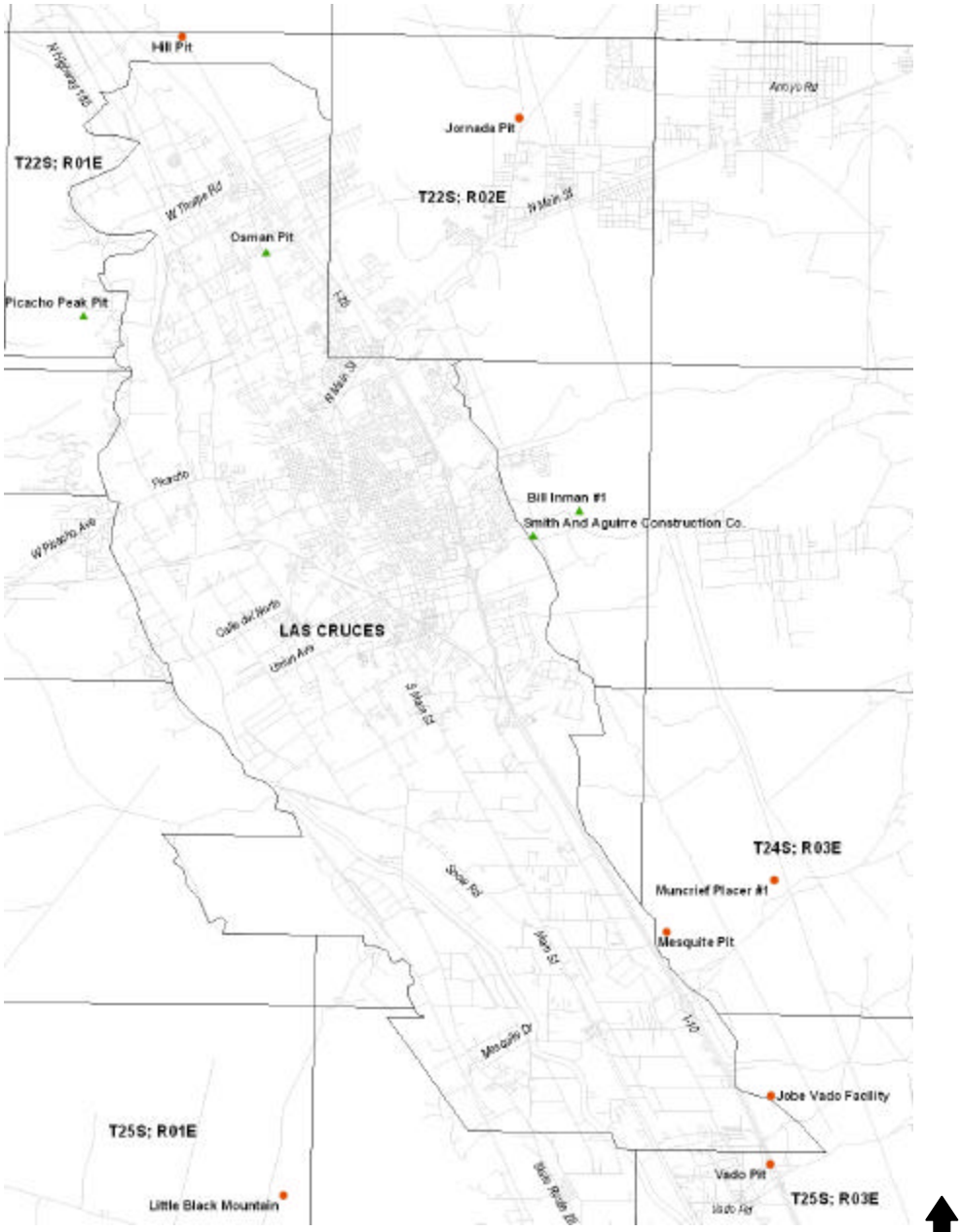


Facilities Responsive to Telephone Survey

Facilities Not Responsive to Telephone Survey

Roads

Township



Facilities Responsive to Telephone Survey

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Roads

Township

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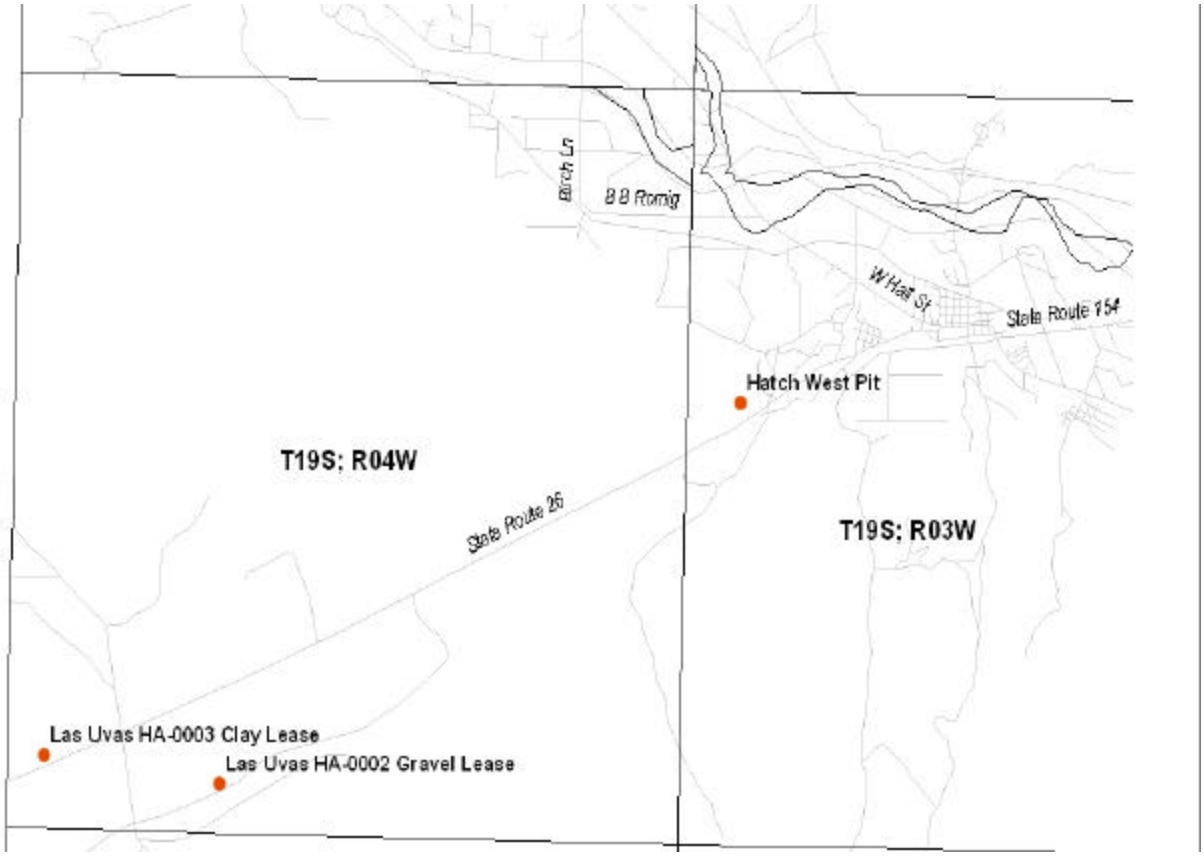

Facilities Responsive to Telephone Survey

Facilities Not Responsive to Telephone Survey

Roads

Township

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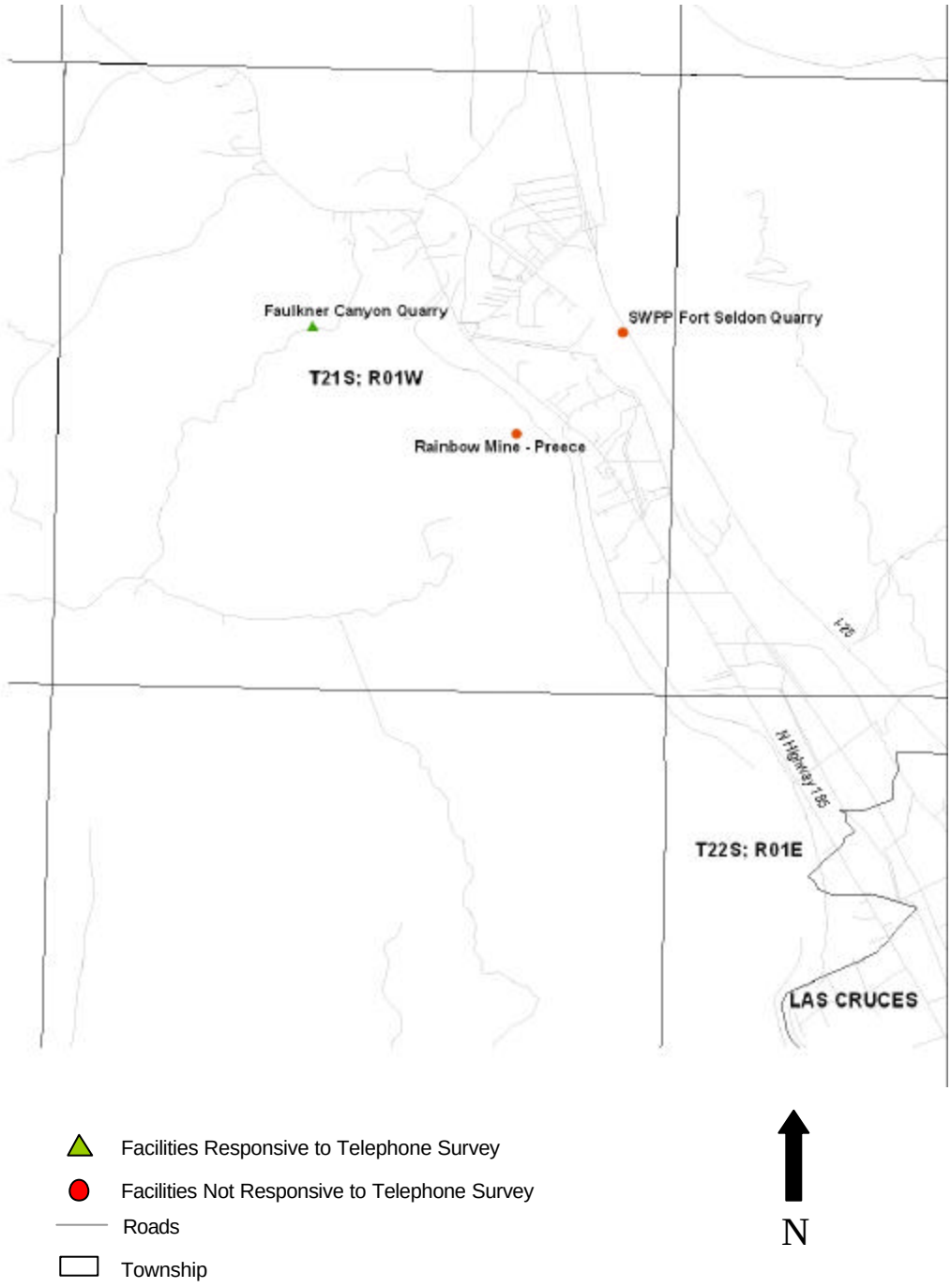
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SWPP Fort Seldon Quarry
T21S; R01W
Rainbow Mine - Preece
I-25
N Highway 185
T22S; R01E
LAS CRUCES
Facilities Responsive to Telephone Survey
Facilities Not Responsive to Telephone Survey
Roads
Township
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Facilities Responsive to Telephone Survey

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Township

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Township

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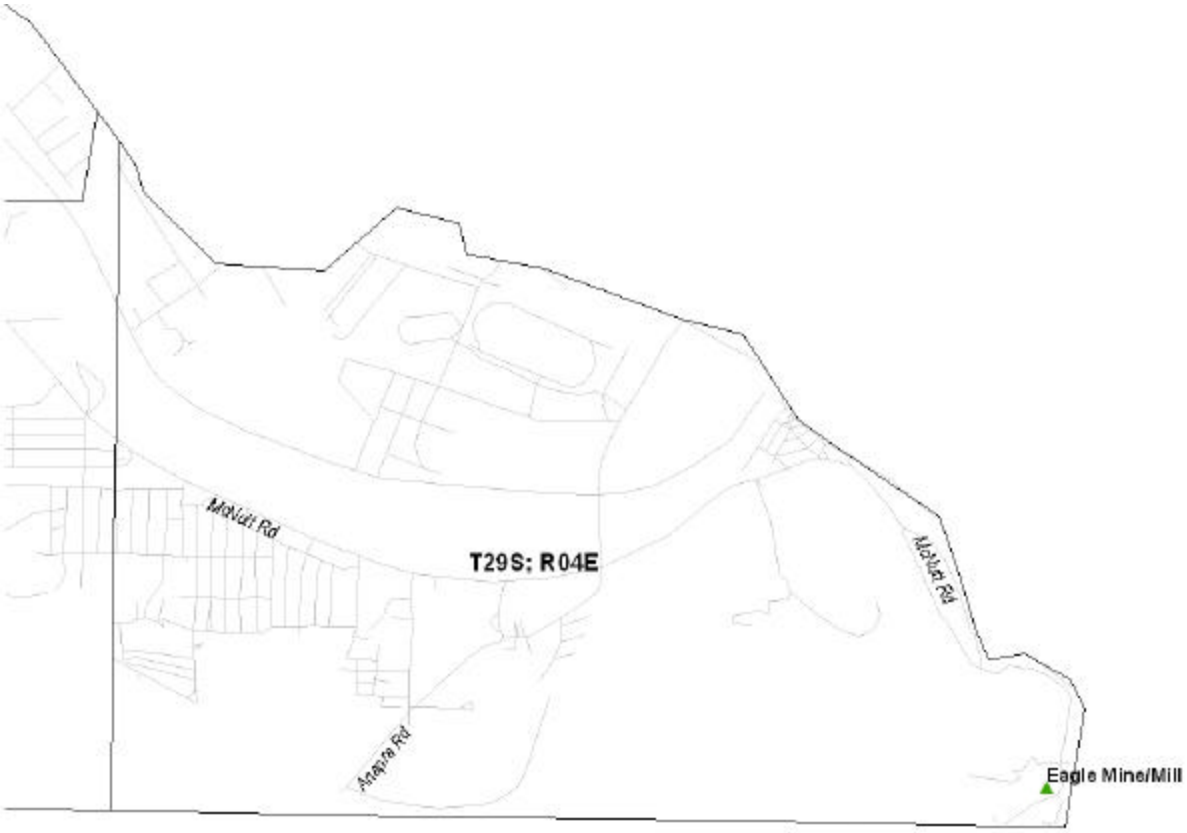

Facilities Responsive to Telephone Survey

Facilities Not Responsive to Telephone Survey

Roads

Township

N

ATTACHMENT A

CALCULATION SPREADSHEETS:

- **Quarrying and Mining Facilities**
- **Quarrying and Mining Emissions**
- **Construction Activity Emissions**
- **On-Road Motor Vehicle Emissions**
- **Nonroad Mobile Source Emissions**
- **Aircraft Emissions**
- **Locomotive Emissions**
- **Charbroiling Emissions**
- **Residential Wood Combustion Emissions**
- **Open Burning Emissions (Household Waste)**
- **Open Burning Emissions (Yard Waste)**
- **Other Fuel Combustion Emissions**
- **Wildfire Emissions**
- **Structural Fire Emissions**
- **Vehicle Fire Emissions**
- **Wind Erosion Emissions**
- **Annual Emission Summary**