March 26, 2004

# Arizona Boundary Recommendations for the 8-Hour Ozone National Ambient Air Quality Standard:

# Additional Information to Support the Exclusion of Mohave County Arizona from the EPA Proposed Las Vegas, Nevada 8-Hour Ozone Nonattainment Area

## BACKGROUND

In 1997, the U.S. Environmental Protection Agency (EPA) adopted a new more stringent National Ambient Air Quality Standard for ozone. The averaging time for the new standard (peak ozone levels are calculated over eight hours rather than over one hour) better protects the public from longer periods of exposure to ozone and helps ensure the protection of those most vulnerable, such as children and the elderly. As part of the process of implementing the new 8-hour standard, States and Tribes were requested to recommend boundaries for areas that do or do not meet the standard by July 15, 2003. Arizona submitted boundary recommendations on July 15, 2003, and technical support documentation for the recommendations on July 22, 2003.

The State's recommendations were based on ambient monitoring and emissions data, population information, and other criteria outlined in EPA's March 28, 2000, guidance "Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards." Only one area of the State was recommended nonattainment and Arizona has subsequently been working with EPA to refine the boundaries of the Phoenix 8-hour ozone nonattainment area.

EPA recently informed Arizona of their intent to designate the Las Vegas, Nevada area as nonattainment for the 8-hour standard. Because the default nonattainment area as defined in the March 28, 2000, guidance is the Las Vegas metropolitan statistical area (MSA), EPA is requesting additional information on neighboring Mohave County Arizona (See Attachment 1).

Arizona has concluded that the inclusion of Mohave County is not appropriate. The following information is provided to support the State's original recommendation that all of Mohave County be designated Attainment/Unclassifiable for the 8-hour standard. Additionally, as tribal lands are not within the State's jurisdiction for air quality purposes, no recommendation is being made for any tribal lands located in the described geographical area.

## AREA DESIGNATION CRITERIA ANALYSIS

Section 107(d) (1)(A)(i) of the Clean Air Act (CAA) defines a nonattainment area as *"... any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant..."*

In addition, EPA issued guidance on March 28, 2000, for states to use as they developed their recommendations – "Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards."

The guidance states metropolitan statistical areas would be the presumptive default nonattainment areas as defined by the U.S. Bureau of the Census.[1] In order to avoid the default, a state must address eleven criteria listed in the guidance.

The following sections present data and information on the eleven guidance criteria for the Mohave County area. The analysis is based on the assumption of the pre-2003 Las Vegas Metropolitan Statistical Area boundaries. These data show that Mohave County is expected to remain as neither a source nor a receptor of ozone pollution.

**Criterion #1 – Emissions and Air Quality in Adjacent Areas (including adjacent C/MSAs)**

Section 107 of the Clean Air Act requires that areas not contribute to violations of ambient air quality. As indicated in the following table, Mohave County Volatile Organic Compound (VOC) and Nitrogen Oxide (NOx) emissions, the primary precursors to ozone formation, are substantially less than those that emanate within Clark County, the site of the only violating monitor. Emissions data for 1999, as displayed in Table 1, show that while the land area of Mohave County is 1.7 times larger than that of Clark County, Mohave County sources emit approximately 25% of the VOC and 16% of the NOx emissions when compared to the Clark County total emissions.

Overall, Mohave County emissions are less than 20 percent of Clark County emissions and all of the Mohave County source categories are dwarfed by their Clark County counterparts. These data show that Mohave County is not a source of ozone pollution for Clark County.

[1] Based on earlier U.S. Code of Regulations the Las Vegas MSA included Clark and Nye Counties in Nevada and Mohave County in Arizona. Subsequently, the U.S. Census Bureau revised the criteria for determining MSAs and in 2003 published new MSAs for the U.S. The Las Vegas MSA now includes only Clark County Nevada. For purposes of determining 8-hour ozone boundaries, however, EPA has used the pre-2003 MSA boundaries as the default boundary for nonattainment areas.

| Table 1: 1999 Volatile Organic Compounds (VOC) and Nitrogen Oxides (Nox) Emissions (tons) | | |
|---|---|---|
| Geographic Area/Emissions Source Type | Clark County | Mohave County |
| Area (square miles) | 8,060 | 13,479 |
| **VOC Emissions** | | |
| Fuel Combustion Electric Utility | 202 | 0 |
| Fuel Combustion Industrial | 36 | 16 |
| Fuel Combustion Other | 602 | 98 |
| Petroleum and Related Industries | 37 | 2 |
| Other Industrial Processes | 8 | 9 |
| Solvent Utilization | 12,520 | 1,457 |
| Storage and Transport | 3,107 | 1,081 |
| Waste Disposal and Recycling | 1,486 | 198 |
| Highway Vehicles | 23,136 | 3,997 |
| Off-Highway | 10,391 | 5,211 |
| Miscellaneous | 3,663 | 1,763 |
| VOC – Total | 55,189 | 13,833 |
| **NOx Emissions** | | |
| Fuel Combustion Electric Utility | 30,927 | <1 |
| Fuel Combustion Industrial | 1,611 | 1,322 |
| Fuel Combustion Other | 1,075 | 69 |
| Metals Processing | 153 | 0 |
| Petroleum and Related Industries | 0 | 229 |
| Other Industrial Processes | 200 | 5 |
| Storage and Transport | 281 | 0 |
| Waste Disposal and Recycling | 613 | 86 |
| Highway Vehicles | 27,386 | 6,761 |
| Off-Highway | 15,507 | 3,588 |
| Miscellaneous | 777 | 550 |
| NOx – Total | 78,531 | 12,610 |
| Total VOC and NOx Emissions | 133,720 | 26,443 |

Source: U.S. Environmental Protection Agency 1999 National Emission Trends (NET) Tier Report

**Criterion #2 – Population Density and Degree of Urbanization Including Commercial Development (significant difference from surrounding areas)**

Mohave County is geographically the second largest county in Arizona. Most of the area is classified as desert. Land ownership is distributed as follows: the U.S. Forest Service and Bureau of Land Management own 55.2 percent; Indian reservations, 6.7 percent; the State of Arizona, 6.6 percent; individual or corporate, 17.2 percent; and other public lands, 14.3 percent.

Consistent with emissions levels, total population and the level of population density is low throughout Mohave County. Table 2 presents a comparison between Clark County

and Mohave County and summarizes information on county population and density, and identifies the largest cities and towns for each county.

Population densities are substantially higher in Clark County where the population distribution shows that more than 96% of the total county population resides in the Las Vegas area. In Mohave County approximately 65% of the population resides in and around four main centers.

**Table 2: 2002 Population Data**

| County/Largest Cities and Towns/Unincorporated Areas | Area (square miles) | Population | Population Density (persons per square mile) |
|---|---|---|---|
| **Mohave County** | 13,479 | 166,465 | 12.35 |
| Bullhead City | | 35,410 | |
| Colorado City | | 3,905 | |
| Kingman | | 22,045 | |
| Lake Havasu City | | 46,400 | |
| Unincorporated Areas | | 58,705 | |
| **Clark County** | 8,060 | 1,578,332 | 195.82 |
| Las Vegas Valley Urban Area* | | 1,522,117 | |
| Boulder City | | 14,993 | |
| City of Mesquite | | 13,278 | |
| Unincorporated Outlying Areas | | 27,944 | |

* The Las Vegas Valley Urban Area includes the adjacent incorporated cities of Henderson, Las Vegas, and North Las Vegas, and unincorporated areas that include: Enterprise, Lone Mtn., Paradise, Sloan, Spring Valley, Summerlin South, Sunrise Manor, Whitney, Winchester, and other areas.

Mohave County 2002 Data Source: Arizona Department of Commerce (ADOC), County profiles (Area Data); Arizona Department of Economic Security (ADES), Research Administration, Population Statistics Unit, mid-year 2002 population estimates, approved 12-06-02. Population density was calculated from ADOC and ADES data.

Clark County 2002 Data Source: Southern Nevada Consensus Population Estimate, July, 2002.

Commercial development and employment are two of the surrogate factors that may serve as an indicator of the levels of activities generating ozone precursor emissions. Major industries in Mohave County are retail trade and service industries dominated by small businesses and public administration. Other activities include transportation and public utilities, finance, and insurance and real estate. Table 3 summarizes county wide employment information from 2001 through 2003.

| Table 3: Mohave County Labor Force and Non-farm Employment: Annual Averages 2001-2003* | | | |
|---|---|---|---|
| **Employment Category** | 2001 | 2002 | 2003 |
| Civilian Labor Force | 71,275 | 73,250 | 75,800 |
| Employed Persons | 68,050 | 69,175 | 72,125 |
| Unemployment Rate | 4.5% | 5.6% | 4.9% |
| Total Nonfarm Employment | 42,975 | 44,725 | 46,925 |
| Natural Resources and Mining | 100 | 100 | 100 |
| Construction | 5,175 | 5,750 | 5,925 |
| Manufacturing | 3,025 | 3,125 | 3,350 |
| Trade, Transportation, and Utilities | 9,825 | 10,000 | 10,675 |
| Information | 825 | 900 | 875 |
| Financial Activities | 1,450 | 1,600 | 1,900 |
| Professional Business Services | 2,900 | 3,125 | 3,425 |
| Educational and Health Services | 5,100 | 5,475 | 5,600 |
| Leisure and Hospitality | 5,150 | 5,075 | 5,625 |
| Other Services | 1,975 | 2,050 | 2,075 |
| Federal Government | 525 | 500 | 525 |
| State and Local Government | 6,900 | 7,075 | 6,850 |

* 2001 Agricultural employment was estimated at 461 for Mohave County.

Source: Arizona Department of Economic Security, Research Administration, prepared in cooperation with the U.S. Department of Labor, Bureau of Labor Statistics. Data are adjusted to Current Population Survey 2004 to reflect place of residence, and benchmarked to 1st quarter 2002. Since data are rounded, annual averages may not sum to total nonfarm employment.

The degree of commercial development is relatively low throughout Mohave County with the greatest level of development generally centered near the towns of Bullhead City, Kingman, and Lake Havasu City and the Interstate 40 regional transportation corridor centered on Kingman.

The primary economic activity in Bullhead City is tourism associated with Colorado River recreational activities and the casino/resort center in Laughlin, Nevada located across the Colorado River from Bullhead City. Similarly, the primary economic activity in Lake Havasu City is tourism associated with Colorado River recreational activities and resort facilities. Kingman is a regional trade, service, and distribution center for northwest Arizona and is the County seat. The combined 2002 civilian labor force for Bullhead City, Kingman, and Lake Havasu City was estimated at 47,904 which is more than 65 percent of the County total civilian labor force.

Mohave County has also recently experienced a changing demographic that can affect the level of economic and subsequently emissions activity. The median age in Mohave County is currently 42.9 years compared to an Arizona statewide average age of 34.2 years. The population over age 65 has grown by 65 percent in the last decade. In addition, the fastest growing component of personal income was from non-labor sources. These sources are primarily past investment income and government transfer payments

including retirement, disability and retirement benefits, medical payments, unemployment insurance benefits, and veteran's benefits.

The low population levels as well as an economy dominated by retail trade and service industries demonstrate that Mohave County is not expected to be a source of ozone pollution outside of the three most populated communities.

**Criterion #3 – Monitoring Data Representing Ozone Concentrations in Local Areas and Larger Areas (urban or regional scale)**

ADEQ and local agencies have worked to develop an extensive monitoring network for determining compliance with the ozone standards in Arizona. Selection of monitoring sites has been based on the development of a monitoring network representative of areas of Arizona with the highest expected ambient ozone concentrations. ADEQ, local agencies and private industries currently operate monitoring sites in nine counties across Arizona. Because of the low emissions densities, no monitoring sites are currently operated in Mohave County.

The Clark County Department of Air Quality Management operates an extensive monitoring network of 14 sites in and near the Las Vegas area. Individual monitor locations are shown on the map in Attachment 2. An examination of the monitored air quality data for the Las Vegas area shows that all monitoring locations meet the 8-hour ozone standard with the exception of one location (Joe Neal site) in the City of Las Vegas. This site, situated near the urban core, recorded a violation of the 8-hour standard for the period 2001 through 2003 of 0.086 parts per million. Other data show that none of the other monitored areas within or outside Las Vegas have recorded violations of the 8-hour standard for the compliance periods 2000 through 2002 or 2001 through 2003. In addition, data from the Boulder City monitoring site, which records air quality near the Nevada/Arizona border, show no exceedances of the 8-hour standard. Attachment 3 contains a summary of monitored air quality data and 8-hour design values for the Clark County network from 2001 through 2003.

**Criterion #4 – Location of Emissions Sources (emissions sources and nearby receptors should generally be included in the same nonattainment area)**

Area and mobile sources are the largest source group for both Clark and Mohave Counties. These sources are associated with urban areas and interstate transportation corridors. In Clark County area and mobile sources comprise 76% of the total VOC and NOx emissions for 1999. For Mohave County, area and mobile sources are more than 97% of total 1999 emissions.[2] The largest urban centers are the Las Vegas metropolitan area in Clark County and the Kingman, Lake Havasu City, Bullhead City areas in Mohave County.

[2] See EPA National Emission Trends (NET) Tier Report for 1999.

Highway vehicles make up 41% of total emissions in Mohave County and 38% of Clark county emissions. As described under Criterion 5, the highest activity level for this source type is consistent with the location of population centers for the area of interest. The map in Attachment 4 notes the location of various point sources for the Las Vegas MSA and surrounding areas.

Overall, Clark County emissions are significantly greater than Mohave County emissions for all source category types. In addition, the most populated areas in Mohave County are located at least 100 miles from Las Vegas, the largest source of Clark County emissions.

**Criterion #5 – Traffic and Commuting Patterns**

As shown in Table 4, vehicle miles traveled in Mohave County are dwarfed by those in Clark County. This is consistent with the earlier discussion under Criterion 4.

**Table 4: Vehicle Miles Traveled (VMT) by County (millions of miles traveled)**

| County | 1996 VMT | 1999 VMT |
|---|---|---|
| Mohave | 537 | 1,896 |
| Clark | 7,383 | 9,776 |

Source: Federal Highway Administration, U.S. Bureau of the Census, U.S. EPA.

While no data are available on persons commuting between Mohave County and Las Vegas, a number of factors make this unlikely.

As discussed under Criterion 2, Mohave County has also recently experienced a changing demographic that can affect the level of economic and subsequently emissions activity. The median age in Mohave County is currently 42.9 years compared to an Arizona statewide average age of 34.2 years. The population over age 65 has grown by 65 percent in the last decade. In addition, the fastest growing component of personal income was from non-labor sources. These sources are primarily past investment income and government transfer payments including retirement, disability and retirement benefits, medical payments, unemployment insurance benefits, and veteran's benefits. Those with personal income from non-labor sources are, by definition, not commuting.

The three most populated communities in Mohave County are located at least 100 miles from Las Vegas. Access to Las Vegas from the populated areas in Mohave County is principally by U.S. Highway 93, with a functional classification of 2R Principal Arterial. In Nevada, it is a four-lane divided highway from Las Vegas to Boulder City, where it varies from four lanes to two lanes. Congestion occurs at the switchbacks leading to Hoover Dam and due to Dam crossing restrictions.

With most of the economic activity in Bullhead City and Lake Havasu City associated with tourism and service sectors, and considering that Kingman is the local economic hub for Mohave County, as well as the County seat, it is unlikely that there is considerable commuting from the populated centers in Mohave County to Las Vegas. This is

particularly true for residents of the Bullhead City area, which lies across the Colorado River from Laughlin, Nevada. Laughlin currently has nine hotels/casinos and one motel, providing 10,000 beds, 125,000 square feet of meeting space and 60 restaurants, all of which represent a significant source of jobs in the area.

**Criterion #6 - Expected Growth (including extent, pattern and rate of growth)**

Some of the fastest population growth rates in the nation are occurring in the Southwest. Tables 5 and 6 show population and vehicle miles traveled projections for Mohave and Clark Counties. While growth rates are similar, the projected population and traffic increases in Clark County dwarf those of Mohave County.

**Table 5: Population Projection Data 1999-2020**

| County/City/ Area | 1999 | 2002 | 2005 | 2010 | 2015 | 2020 | 1999-2020 Growth Factor |
|---|---|---|---|---|---|---|---|
| Mohave | 142,925 | 166,465 | 171,504 | 194,403 | 215,988 | 236,396 | 0.65% |
| Bullhead City | | 35,410 | 35,926 | 41,899 | 48,206 | 53,848 | |
| Colorado City | | 3,905 | 4,863 | 5,500 | 6,072 | 6,626 | |
| Kingman | | 22,045 | 22,845 | 25,225 | 27,256 | 29,277 | |
| Lake Havasu City | | 46,400 | 52,639 | 58,777 | 63,783 | 68,886 | |
| Unincorporated Areas | | 58,705 | 55,231 | 63,002 | 70671 | 77,759 | |
| Clark | 1,327,145 | 1,578,332 | 1,761,614 | 1,969,348 | 2,082,455 | 2,123,277 | 0.60% |

Mohave County Data Source: Arizona Department of Economic Security.

Clark County Data Source: Nevada State Demographer's Office.

**Table 6: Vehicle Miles Traveled (VMT) Projections by County (millions of miles traveled)**

| County | 1996 VMT | 1999 VMT | 1999-2010 Growth Factor | 2010 VMT | 2010-2020 Growth Factor | 2020 VMT |
|---|---|---|---|---|---|---|
| Mohave | 537 | 1,896 | 51.5% | 2,872 | 25.7% | 3,611 |
| Clark | 7,383 | 9,776 | 49.3% | 14,596 | 24.9% | 18,230 |

Source: Federal Highway Administration, U.S. Bureau of the Census, U.S. EPA.

In Table 7, area and mobile source emissions (and the small fraction of non-electric utility point sources) are projected to grow proportionately with population in Mohave County. The projections are based on the assumptions of no additional control measures implemented for these sources. Emissions projection estimates for electric utilities are based on the anticipated industry growth rate contained in the Western Regional Air Partnership, *Annex to the Report of the Grand Canyon Visibility Transport Commission, October 16, 2000.* The projected 2020 Mohave County emissions are 32% of recent 1999 Clark County levels.

| Table 7: Emissions Projections 1999-2020 (tons) | | | | | |
|---|---|---|---|---|---|
| Emissions Source Type | 1999 | 2005 | 2010 | 2015 | 2020 |
| Mohave County | | | | | |
| Electric Utilities | <1 | 1 | 1 | 1 | 2 |
| Area, Mobile, Other Point | 26,443 | 31,592 | 35,699 | 39,625 | 43,192 |
| Total | 26,443 | 31,593 | 35,700 | 39,626 | 43,194 |

As discussed under Criterion 2, land ownership is distributed as follows: the U.S. Forest Service and Bureau of Land Management own 55.2 percent; Indian reservations, 6.7 percent; the State of Arizona, 6.6 percent; individual or corporate, 17.2 percent; and other public lands, 14.3 percent. Those land ownership patterns are shown on the map in Attachment 5. Because relatively little individually or corporately-owned land is available, future growth is likely to be confined to the existing population centers. Little infrastructure exists in the smaller population centers, making growth in those areas more expensive and therefore less likely.

The area of Clark County between Mohave County and Las Vegas shows a similar land ownership distribution, as depicted in Attachment 6. As a result, it is unlikely that the metropolitan Las Vegas area will grow toward Mohave County.

**Criterion #7 – Meteorology (weather/transport patterns)**

As shown in Attachment 7, the predominant wind pattern during the summer months is from the southwest, which neither transports ozone precursors from Mohave County into Clark County, nor would make Mohave County a receptor of Clark County ozone.

**Criterion #8 - Geography/Topography (mountain ranges or other air basin boundaries)**

The Black and Cerbat Mountains in Mohave County act as a barrier to prevent flow of ozone precursors from Mohave County to Las Vegas. As discussed under Criterion 7, the predominant summer wind pattern neither transports ozone precursors from Mohave County into Clark County, nor would make Mohave County a receptor of Clark County ozone.

**Criterion #9 - Jurisdictional Boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.)**

Emission sources located in Mohave County are under the jurisdiction of the State of Arizona and Clark and Nye Counties are under separate jurisdictions. Including Mohave County within a Las Vegas 8-hour ozone nonattainment area is not necessary to bring the Las Vegas area into attainment of the 8-hour ozone standard. Clark County's jurisdiction extends well beyond that necessary to bring the area into attainment. As discussed under Criterion 3, an examination of the monitored air quality data for the Las Vegas area

shows that all monitoring locations meet the 8-hour ozone standard with the exception of one location (Joe Neal site) in the City of Las Vegas. This site, situated near the urban core, recorded a violation of the 8-hour standard for the period 2001 through 2003 of 0.086 parts per million. Other data show that none of the other monitored areas within or outside Las Vegas have recorded violations of the 8-hour standard for the compliance periods 2000 through 2002 or 2001 through 2003. In addition, data from the Boulder City monitoring site, which records air quality near the Nevada/Arizona border, show no exceedances of the 8-hour standard.

**Criterion #10 - Level of Control of Emissions Sources**

Several federally enforceable control measures, specifically gasoline and diesel vehicle engine and fuel standards as well as Statewide application (for sources under ADEQ's jurisdiction) of New Source Review Rules, Arizona Administrative Code (AAC) R18-2-401 through 407 and Existing Stationary Source Performance Standards AAC R18-2-701 through 732, provide control for emissions sources in Mohave County.

**Criterion #11 - Regional Emission Reductions (e.g., NOx SIP call or other enforceable regional strategies)**

Because there are no enforceable regional strategies in place at this time, this criterion is not applicable. The State of Arizona, however, is developing its regional haze SIP in coordination with other states, federal agencies and Indian Tribes in the West through the Western Regional Air Partnership. Some regional strategies were submitted in the Regional Haze SIP submitted to EPA on December 23, 2003.

## CONCLUSION

The Las Vegas MSA includes a total of 39,833 square miles, with Mohave County accounting for 13,479 square miles. The majority of Mohave County includes large expanses of undeveloped desert and isolated rural communities. The vast tracts of undeveloped desert and agricultural areas are not a significant source of ozone precursors. A major portion of the County includes two surface water basins that are relatively isolated from the greater Las Vegas area. Finally, prevailing winds during the ozone season greatly limit the impact of emissions from the urbanized Las Vegas area on these non-urbanized portions of Mohave County.

The air quality record for the MSA demonstrates that areas where exceedances of the eight-hour ozone standard are measured are concentrated in the urban core.

Sources of ozone precursors are located in the most heavily urbanized part of the MSA, which is also in its north central area. The highest emission densities are collocated with the densest residential and commercial development. While biogenic emissions of ozone precursors are distributed throughout the MSA and other anthropogenic sources may be found in association

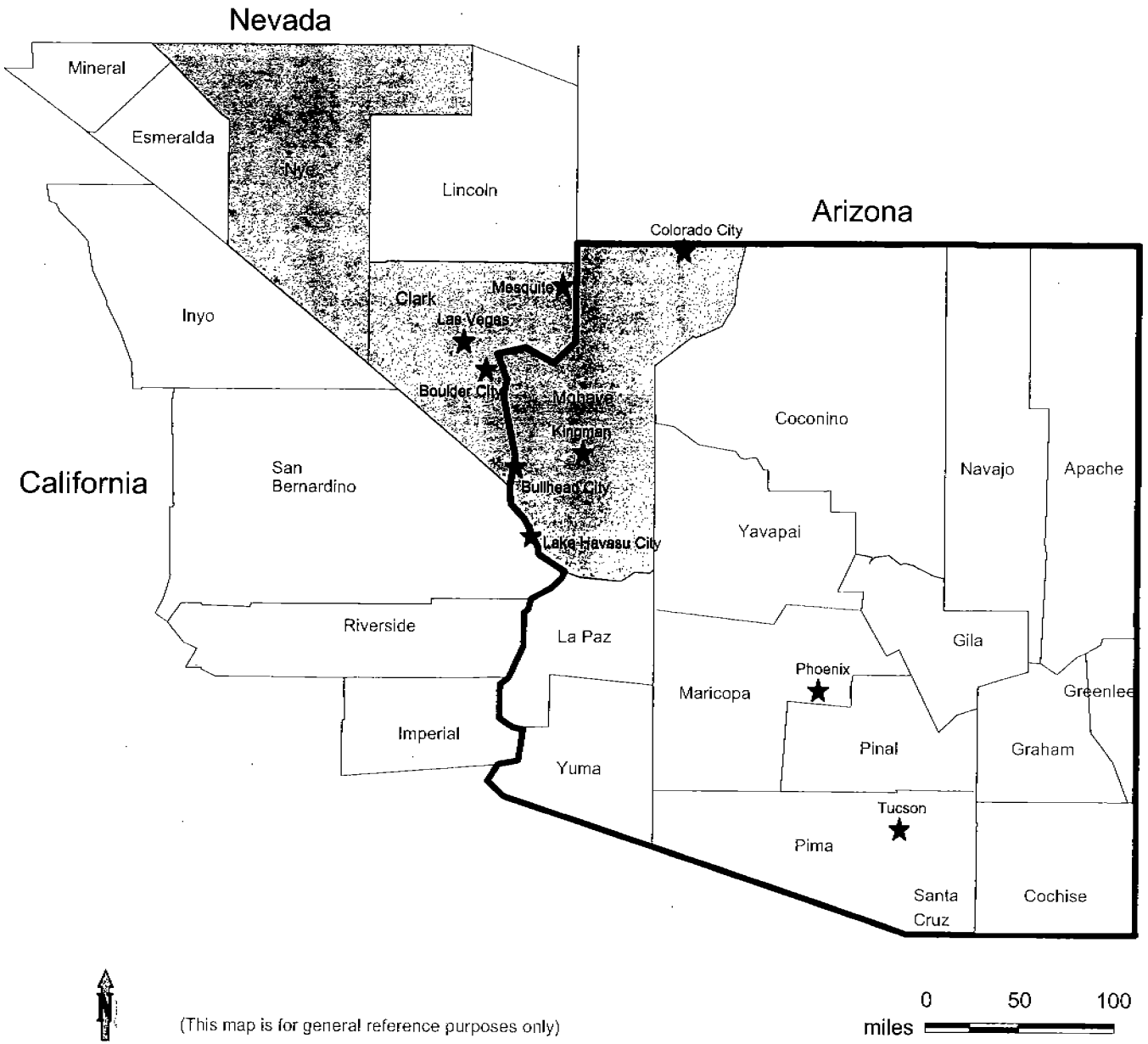
with rural communities and industrial sources, these sources are considerably less important than anthropogenic emissions in contributing to exceedances of the eight-hour ozone standard measured in the MSA.

In addition, the major Mohave County population centers are located at least 100 miles distant from Las Vegas and are both meteorologically and geographically isolated from the Las Vegas area.

# Attachment 1

## 2002 Las Vegas Metropolitan Statistical Area Map

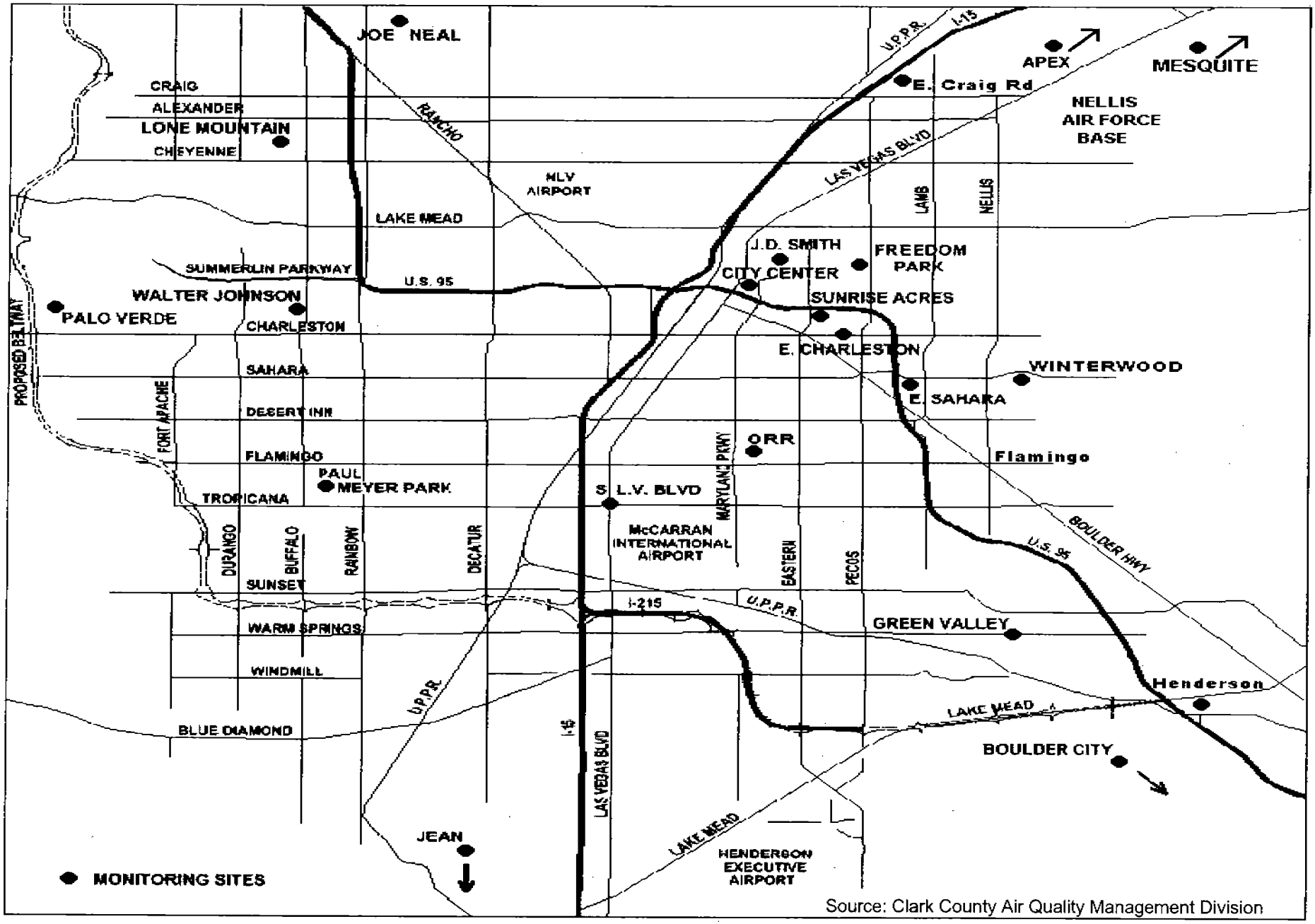
# 2002 Las Vegas Metropolitan Statistical Area



# Attachment 2

## Las Vegas Area Monitoring Site Map

# LAS VEGAS AREA MONITORING SITES




Source: Clark County Air Quality Management Division

## Attachment 3

## Clark County 8-Hour Ozone Summary Statistics – 2001 through 2003

# Clark County
# Air Quality Management Division
# OZONE {PPM}
# Running High 8-hour Average

| | OZONE SUMMARY STATISTICS FOR 2001 THROUGH 2003 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | E. Craig Road | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.078 | 10-Aug | 0.071 | 22-Jun | 0.071 | 6-Jun | **0.070** | 11-Aug |
| 2002 | 0.089 | 16-Jun | 0.082 | 27-Jun | 0.079 | 28-Jun | **0.078** | 15-Jun |
| 2003 | 0.089 | 21-Jul | 0.084 | 29-Jun | 0.081 | 1-Jun | **0.080** | 26-May |
| Average | | | | | | | **0.076** | |
| | | | | | | | | |
| | City Center | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.083 | 10-Aug | 0.070 | 11-Aug | 0.067 | 22-Jul | **0.063** | 23-Aug |
| 2002 | 0.077 | 27-Jun | 0.076 | 2-Sep | 0.076 | 16-Jun | **0.073** | 11-Aug |
| 2003 | 0.082 | 28-Jun | 0.081 | 26-May | 0.081 | 29-Jun | **0.078** | 1-Jun |
| Average | | | | | | | **0.071** | |
| | | | | | | | | |
| | Winterwood | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.085 | 10-Aug | 0.074 | 16-Jun | 0.072 | 11-May | **0.071** | 17-Sep |
| 2002 | 0.086 | 16-Jun | 0.081 | 12-Jul | 0.080 | 27-Jun | **0.077** | 17-Jun |
| 2003 | 0.088 | 29-Jun | 0.079 | 26-May | 0.078 | 13-Jun | **0.078** | 21-Jul |
| Average | | | | | | | **0.075** | |

# Clark County
# Air Quality Management Division
# OZONE {PPM}
# Running High 8-hour Average

| | S.E. Valley | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.076 | 10-Aug | 0.076 | 29-Jul | 0.075 | 7-Jun | **0.072** | 16-Jun |
| 2002 | 0.087 | 27-Jun | 0.082 | 16-Jun | 0.079 | 11-Aug | **0.078** | 8-Jun |
| 2003 | 0.076 | 13-Jun | 0.074 | 4-Jun | 0.073 | 25-May | **0.073** | 21-Jun |
| Average | | | | | | | **0.074** | |
| | | | | | | | | |
| | Apex | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.076 | 29-May | 0.075 | 25-May | 0.074 | 16-May | **0.074** | 6-Jun |
| 2002 | 0.090 | 16-Jun | 0.083 | 15-Jun | 0.083 | 16-May | **0.082** | 15-Apr |
| 2003 | 0.092 | 29-Jun | 0.080 | 25-May | 0.078 | 21-Jul | **0.078** | 1-Jun |
| Average | | | | | | | **0.078** | |
| | | | | | | | | |
| | Lone Mountain | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.090 | 10-Aug | 0.088 | 11-Aug | 0.082 | 9-Aug | **0.080** | 25-May |
| 2002 | 0.092 | 27-Jun | 0.088 | 18-Aug | 0.087 | 11-Aug | **0.086** | 28-Jun |
| 2003 | 0.089 | 21-Jul | 0.088 | 29-Jun | 0.085 | 9-Jul | **0.085** | 26-May |
| Average | | | | | | | **0.083** | |

# Clark County
# Air Quality Management Division
# OZONE {PPM}
# Running High 8-hour Average

| | Palo Verde | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.091 | 10-Aug | 0.090 | 11-Aug | 0.078 | 29-Jul | **0.078** | 2-Jul |
| 2002 | 0.090 | 27-Jun | 0.087 | 18-Aug | 0.084 | 28-Jun | **0.082** | 11-Aug |
| 2003 | 0.088 | 21-Jul | 0.087 | 29-Jun | 0.083 | 26-May | **0.082** | 3-Jun |
| | | | | | | | **0.080** | |
| | | | | | | | | |
| | Jean | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.082 | 16-Jun | 0.080 | 18-May | 0.080 | 1-Jun | **0.079** | 17-Jun |
| 2002 | 0.093 | 27-Jun | 0.092 | 28-Jun | 0.085 | 18-Aug | **0.083** | 11-Aug |
| 2003 | 0.089 | 29-Jun | 0.086 | 3-Jun | 0.085 | 4-Jun | **0.083** | 27-Jun |
| | | | | | | | **0.081** | |
| | | | | | | | | |
| | Paul Meyer | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.085 | 10-Aug | 0.081 | 11-Aug | 0.080 | 2-Jul | **0.076** | 25-May |
| 2002 | 0.090 | 27-Jun | 0.084 | 18-Aug | 0.083 | 28-Jun | **0.079** | 16-Jun |
| 2003 | 0.086 | 21-Jul | 0.084 | 29-Jun | 0.083 | 28-Jun | **0.081** | 3-Jun |
| | | | | | | | **0.078** | |

# Clark County
# Air Quality Management Division
# OZONE {PPM}
# Running High 8-hour Average

| | Boulder City | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.074 | 17-Jun | 0.073 | 17-Sep | 0.072 | 16-Jun | **0.071** | 10-May |
| 2002 | 0.084 | 27-Jun | 0.082 | 16-Jun | 0.081 | 15-Jun | **0.081** | 17-Jun |
| 2003 | 0.079 | 29-Jun | 0.077 | 28-Jun | 0.074 | 11-Apr | **0.074** | 21-Jul |
| | | | | | | | **0.075** | |
| | | | | | | | | |
| | J.D. Smith | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.080 | 10-Aug | 0.072 | 11-Aug | 0.072 | 16-Aug | **0.071** | 6-Jun |
| 2002 | 0.085 | 16-Jun | 0.083 | 27-Jun | 0.080 | 28-Jun | **0.078** | 12-Jul |
| 2003 | 0.092 | 21-Jul | 0.085 | 29-Jun | 0.081 | 9-Jul | **0.081** | 1-Jun |
| | | | | | | | **0.076** | |
| | | | | | | | | |
| | Walter Johnson | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.092 | 10-Aug | 0.088 | 11-Aug | 0.082 | 2-Jul | **0.082** | 25-May |
| 2002 | 0.088 | 18-Aug | 0.086 | 11-Aug | 0.085 | 27-Jun | **0.081** | 29-Jul |
| 2003 | 0.093 | 21-Jul | 0.086 | 29-Jun | 0.085 | 17-Aug | **0.082** | 26-May |
| | | | | | | | **0.081** | |

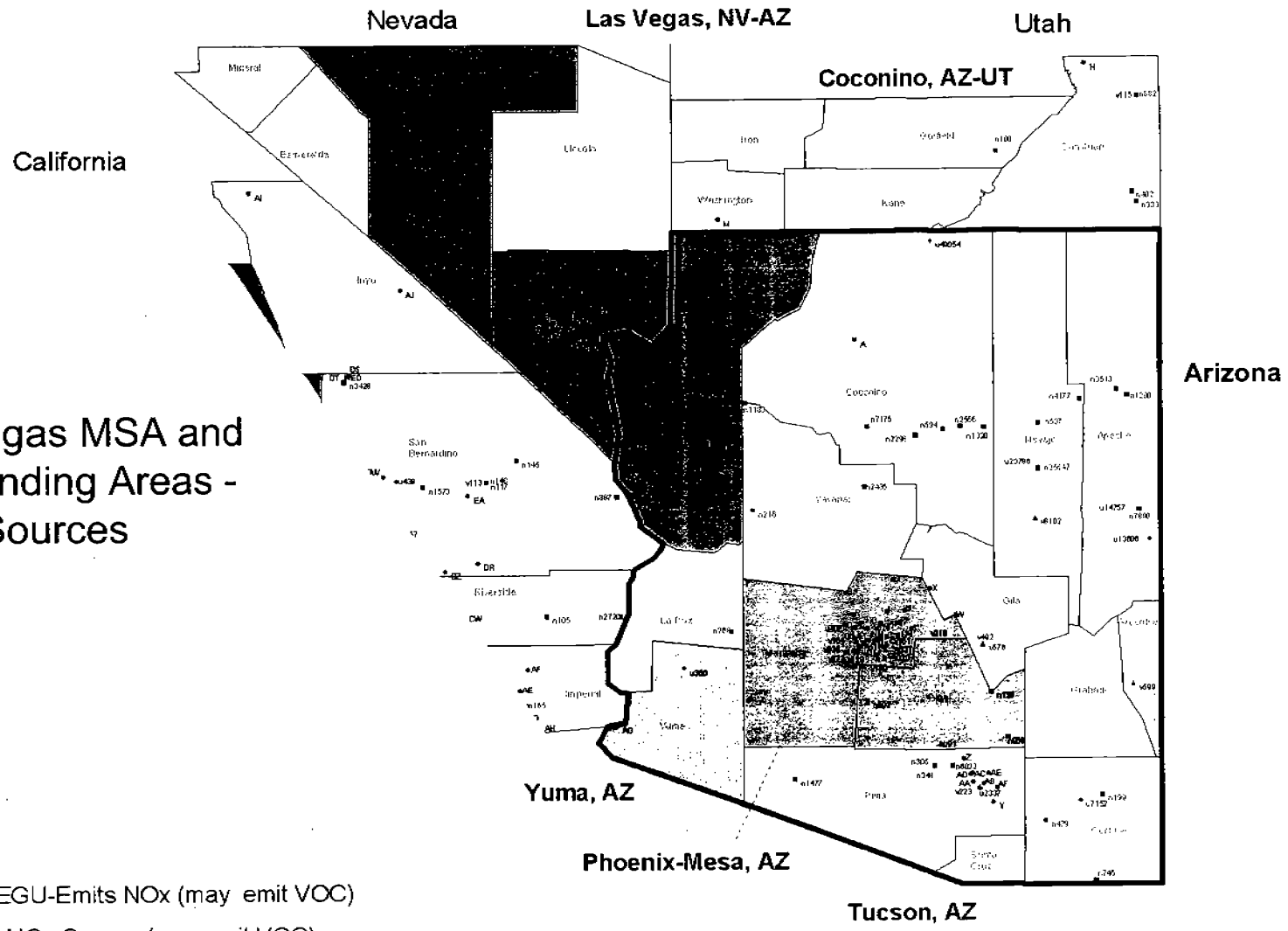
# Clark County
# Air Quality Management Division
# OZONE {PPM}
# Running High 8-hour Average

| | Joe Neal | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.094 | 10-Aug | 0.085 | 9-Aug | 0.084 | 11-Aug | **0.083** | 14-Aug |
| 2002 | 0.093 | 27-Jun | 0.088 | 16-Jun | 0.087 | 28-Jun | **0.086** | 11-Aug |
| 2003 | 0.094 | 29-Jun | 0.092 | 21-Jul | 0.09 | 9-Jul | **0.089** | 26-May |
| | | | | | | | **0.086** | |
| | | | | | | | | |
| | Searchlight | | | | | | | |
| Year | 1st High | Date | 2nd High | Date | 3rd High | Date | **4th High** | Date |
| 2001 | 0.084 | 17-Jun | 0.079 | 16-Jun | 0.074 | 10-May | **0.073** | 1-Jun |
| 2002 | 0.081 | 27-Jun | 0.076 | 8-Jun | 0.075 | 16-Jun | **0.074** | 6-May |
| 2003 | 0.082 | 29-Jun | 0.074 | 17-May | 0.073 | 25-May | **0.072** | 27-Jun |
| | | | | | | | **0.073** | |

# Attachment 4

## Las Vegas Metropolitan Statistical Area and Surrounding Area Point Source Map

# Las Vegas MSA and Surrounding Areas - Point Sources




- ◆ u836 EGU-Emits NOx (may emit VOC)
- ■ n2836 NOx Source (may emit VOC)
- ▲ v681 VOC Source (may emit NOx)
- ● D Ozone monitoring site

Counties included in Metro Statistical Areas are shaded.
Emissions are in tons per year (NET 96 Inventory).

Source: EPA Data for Ozone planning - Designation at http://www.epa.gov/ttn/naaqs/ozone/areas/viewmap.htm

October 25, 2000

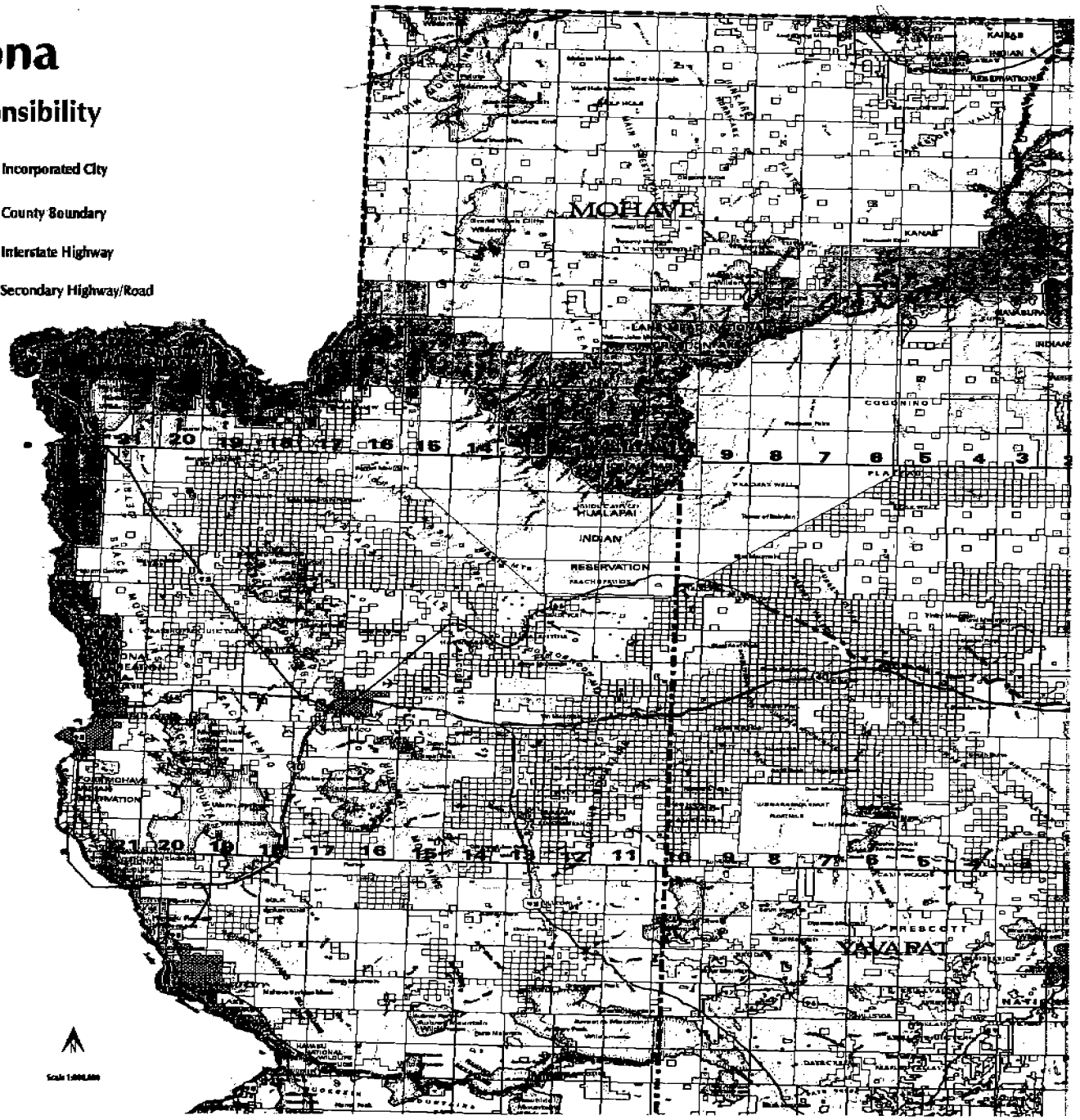
## Attachment 5

## Mohave County Arizona Surface Management Map

# State of Arizona

## Surface Management Responsibility

- Private
- State Trust
- Bureau of Land Management
- Parks and Recreation
- National Parks, Monuments, Historical and Rec. Sites
- National Forest and Wilderness
- Wildlife Refuge
- Indian Reservation
- Military
- Other
- Incorporated City
- County Boundary
- Interstate Highway
- Secondary Highway/Road



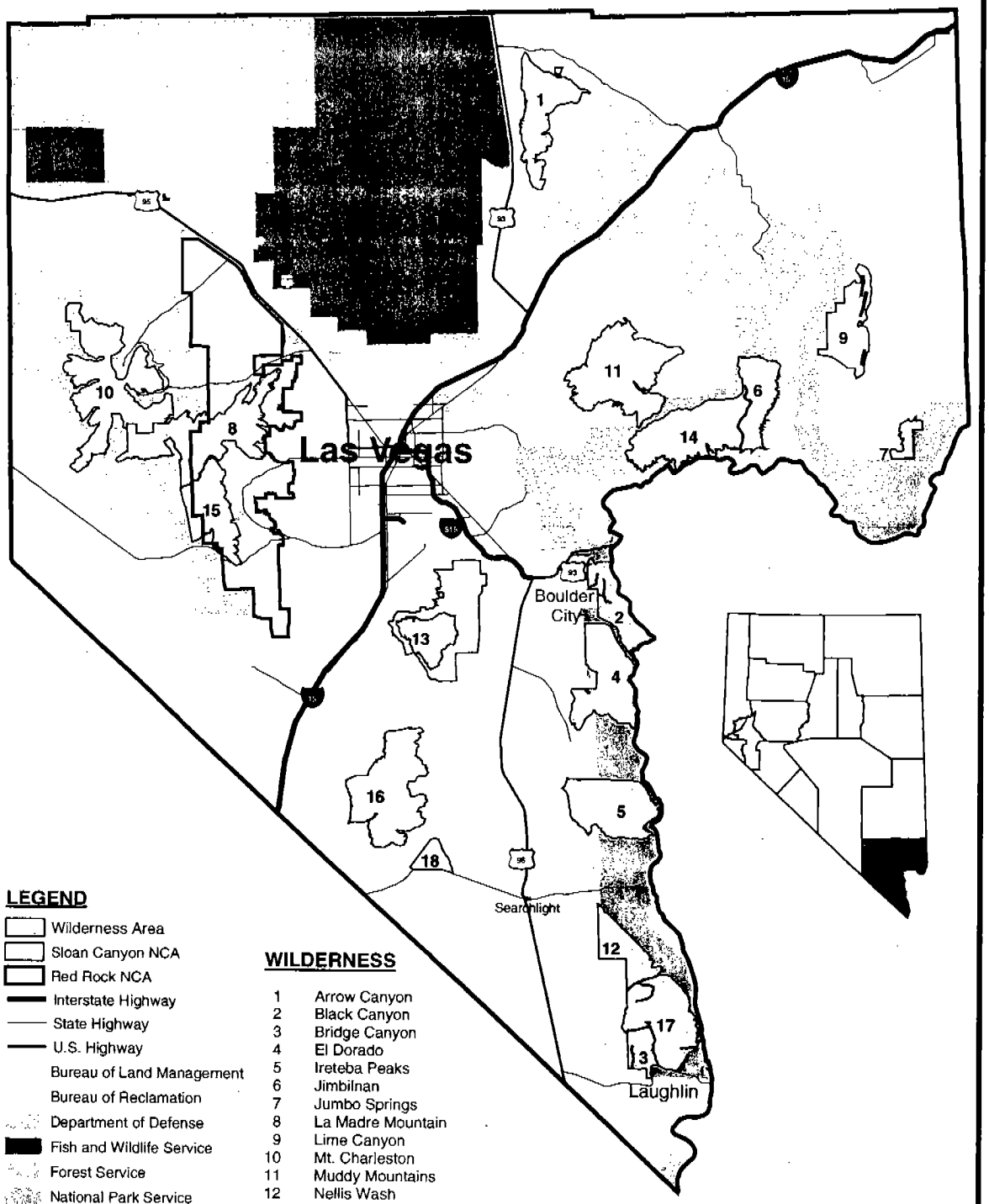

January 2002

This image depicts a portion of of the original Arizona State Land Department map. The entire map can be viewed online at http://www.land.state.az.us/maps/paper_maps_surface.htm.

## Attachment 6

## Clark County Nevada Wilderness Area and Land Ownership Map

# Clark County Wilderness Areas




**LEGEND**

- Wilderness Area
- Sloan Canyon NCA
- Red Rock NCA
- Interstate Highway
- State Highway
- U.S. Highway
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Fish and Wildlife Service
- Forest Service
- National Park Service
- Native American Reservation
- Private
- State of Nevada
- Water

**WILDERNESS**

| | |
|---|---|
| 1 | Arrow Canyon |
| 2 | Black Canyon |
| 3 | Bridge Canyon |
| 4 | El Dorado |
| 5 | Ireteba Peaks |
| 6 | Jimbilnan |
| 7 | Jumbo Springs |
| 8 | La Madre Mountain |
| 9 | Lime Canyon |
| 10 | Mt. Charleston |
| 11 | Muddy Mountains |
| 12 | Nellis Wash |
| 13 | North McCullough |
| 14 | Pinto Valley |
| 15 | Rainbow Mountain |
| 16 | South McCullough |
| 17 | Spirit Mountain |
| 18 | Wee Thump Joshua Tree |

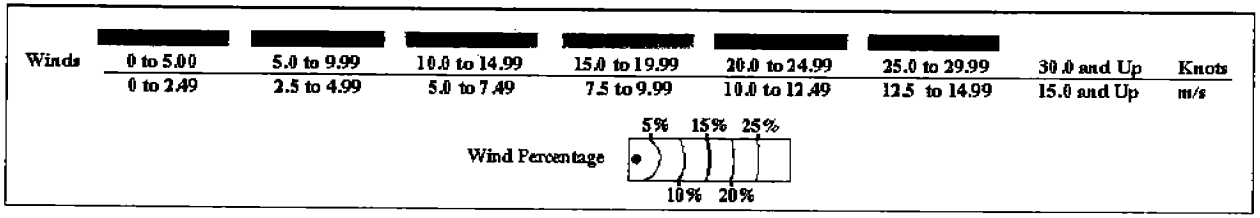
5 2.5 0 5 10 15 20 Miles

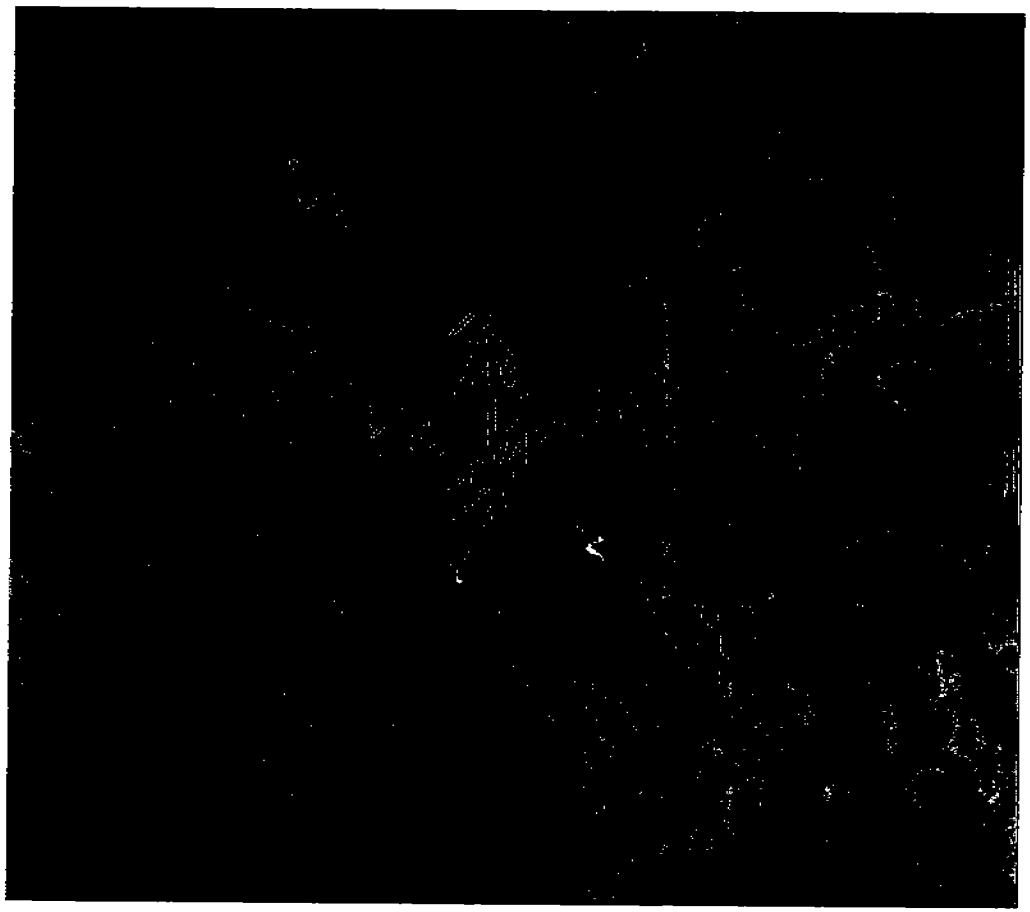
December 13, 2002

# Attachment 7

## Windrose Wind Analysis for Southern Nevada

# Wind Systems of the Mountain West: Graphic Analyses
## Windrose Wind Analysis for Southern Nevada at 00 UTC, overall Summer



Source: "A Climatological Study of Thermally Driven Wind Systems of the U.S. Intermountain West," Stewart et. al., University of Utah, August 1, 2001.